icerae three-jointed and chelate. The organs of respiration are tracheae, and there are no spinning-glands. These creatures live in the grass for the most part, and feed upon plant-lice and other minute insects. Many common American forms may be found de¬ scribed and illustrated by Wood, in the Pro¬ ceedings of the Essex Institute (Salem, Mass.), Vol. VI. Consult also Comstock, J. N., (The Spider Book) (Garden City, N. Y., 1912).

PHALANSTERY. See Fourierism.

PHALANX, fa'lanks or fal'anks, a word used by the Greeks to designate the mode of formation of the heavy infantry of the Greek armies. Three Greek states acquired renown for their superior organization and use of the phalanx — Sparta, Thebes and Macedon. In all of them it consisted of several ranks of infantry in close array, armed with long spears as their principal weapon. The organization of the troops composing the phalanx varied in dif¬ ferent states, but generally they were arranged in regular divisions under officers of various ranks, as in a modern army. The Spartan pha¬ lanx varied in depth, according to circumstances, but was commonly eight ranks deep. _ The Theban phalanx, particularly under Epaminondas, was much deeper, reaching 12 ranks, the longest spears being 18 feet long. At the battle of Leuctra he kept one of the two divisions into which the phalanx was usually divided retired, using it to strengthen the other wing in depth. The phalanx was perfected by Philip of Mace¬ don. He increased the length of the spears to 24 feet and the number of ranks to 16; and the lines were arranged at such intervals that the spears of the fifth rank projected three feet in front of the first, so that the front was pro¬

tected by a solid array of five lines of spears. The men were also armed with large shields which nearly covered the body. The rush of the phalanx was well-nigh irresistible, but it was unwieldy, and was abandoned because it could not be manceuvered quickly and failed al¬ together when the fighting became hand to hand.

PHALARIS, fal'a-ris, ruler of Agrigentum in Sicily remembered as the ˆTyrant® : b. near Cnidus, Asia Minor, 6th century b.c. He as¬ cended the throne about 570 b.c. and though ap¬ parently elected by his fellow citizens appears

to have usurped despotic authority. His his¬ tory is largely enveloped in fable, and his name has become symbolical of savage cruelty, his most infamous act being the roasting alive of prisoners in the brazen bull, in which he is said to have first executed its inventor, Perillus. In an insurrection 16 years after his accession to the throne Phalaris himself was overthrown and tortured in the same horrible manner. Later traditions attempted to paint him as a humane and high-minded ruler on the strength of the (Epistles of Phalaris, } 148 letters (first printed in Venice, 1498) attributed to him. But these were proved by Richard Bentley (q.v.) in 1697-99 to be spurious. Consult Freeman, E. H., (History of Sicily > (New York 1892).

PHALARIS, a genus of grasses, of which the fruit of one of the species (P. canariensis) or canary-grass, is canary-seed extensively em¬ ployed as food for birds. See Canary-seed; Grasses of the United States.

PHALAROPE, a snipe-like shore bird of the Nortnern Hemisphere belonging to the family Phalaropodidce. They are from seven to nine inches in length and have a straight slender beak and lobate toes, enabling them to swim well. The females are larger than the males, more brightly (and very handsomely) colored and more aggressive than their mates. These birds spend their summers in the Arctic regions and nest in a shallow cavity in the ground dug and lined with grass by the male. The female lays three or four very dark-colored eggs of olive-gray blotched with chocolate. These are incubated by the male alone. Their flesh is oily and of poor taste. In winter they migrate southward, spreading over both the Old World and the New. Two of the three appear com¬ monly in the United States, — the northern phalarope (Phalaropus lobatus) which in winter passes numerously all along the Atlantic Coast ; and the distinctively American variety, Wilson's phalarope (Steganopus tricolor), the largest of all rare on the coast but common all over the Rocky

Mountain region and breeding in north¬ western Canada as far south as the borders of Dakota. It is an esteemed game bird in the mountain lakes of the high Western Plains. The red phalarope, or gray phalarope (Cry mo - philus fulicanus) , is rare here, but familiar in Europe and Asia. It is thus variously called because of its rich, brownish-red plumage in summer changes to gray (and white) in winter. Consult Coues, E., (Birds of the Northwest (Washington 1874) ; Forbush, E. H., (Game Birds, Wild-Fowl and Shore Birds) (Boston

1912).

PHALLACEˆE. See Fungi.

PHALLICISM. A form of nature wor¬ ship which particularizes upon reproduction as symbolized by the sex-organs. The fact deter¬ minant for phallicism was the discovery by primitive man of natural objects resembling the male (Greek, phallos) or the female (Greek, lcteis) organ of generation. A roughly cylin¬ drical stone or rock was considered an erect penis; a stone or rock, amorphous in general but showing any sort of cleft, was considered an opened vulva. Wherever a further corre¬ spondence of size or color (red for male, black for female) appeared, the object was all the

more esteemed. The term ithyphallie <(erect phallos® is superfluous, since all phallic symbols are erect.

Among all the varied objects of man's wor¬ ship, alike in the mineral, vegetal and animal worlds, this phallos and kteis enjoyed the dis¬ tinction of correspondence of form to the neces¬ sarily and therefore invariably, human-like deities that man sought to discover and to in¬ fluence as the controllers of his changing for¬ tunes. Such resemblance would afford the most powerful aid possible to that nature-worship which, co-ordinate with ancestor-worship, medi¬ ated all forms of religion. Man is the measure, here as in every other cultural. In consonance with these facts and this principle, phallicism was both a primitive and a universal practice. It combined admirably with the likewise obvi¬ ous, primitive and universal myth that the out¬ stretched Father Heaven discharges the fertiliz¬ ing rain into the

lap of recumbent Mother Earth, who then teems with all living things. Phallicism still so combines in the cosmologies of the Japanese; but by other people has been associated with various other nature-gods dis¬ tinguished for productive energy, as will appear in the following ethnical sketch.

An original phallos and kteis are sometimes found in the same region, occasionally in prox¬ imity ; otherwise a phallos is made for the kteis or a kteis for the phallos. The same sex-dual¬ ism prevails for the later deities in all religions, with few exceptions. An adequate term for the system would therefore be phalloktenism.

That phallicism was not solely a species of magic, but a form of religion is evident from the use of phallos or kteis as an idol whether under a shrine or in the open, the offering to them of food and drink, or the presentation of small duplicates as votives, accompanied by peti¬ tion or thanksgiving. . This use of the artifi¬ cial phallos as a votive led to its facture by thousands in stone, wood, iron and clay. No artificial kteis is known to be used as a votive to either the phallos or the phallos with kteis. Other uses of the phallos dispense with all cult and must therefore be regarded as magic of the sympathetic type. The purpose of phallicism was naturally to secure fertility equally of cere¬ als, animals and humans. _ Phallie festivals sometimes permitted sexual liberties beyond the laws commonly observed.

Phallicism was freely practised throughout Japan until in 1872 foreign influence began to suppress it, but in-yo-seki, <(female-male-stone® may still be met in the remoter regions. Natu¬ ral pfialjoi and ktenes occur in all sizes from rocks, one of which formed a whole islet, named Onogoro, down to pebbles. . No artificial ktenes are made but the awabi (haliotis) shell is offered as votive to a phallos by infertile 9r sick women. Artificial phalloi are wrought in great numbers for use as votives to a natural phallos or a phallos-kteis. Also a large artifi¬ cial phallos may be placed near a natural kteis to complete the pair. The peach and the bean are used also as symbols of the kteis and the mush¬ room and the hog's snout similarly for the phal¬ los. Phallos and kteis are credited with pro¬ moting pregnancy, parturition and the cure of all diseases of the generative system. The phal¬ los serves also as symbol of the road-god and as patron-god of harlots, a small specimen

often appearing, among other symbols on the kami-dana ((god-shelf® of the house. The offer¬ ings made to phallos and kteis are the usual ones of food, drink and light. This cult aptly interprets the cosmology given in the Kojiki that Izanagi (Male that invites) and Izanami (Female that invites) stirred the ocean with <(a jeweled spear,® which dripped from its end the sea water that made the islet Onogoro. The naked pair then ran around a ((heavenly pillar,® and begat the remaining islands of Japan. Since the phallos was life-giving, it could also avert diseases and other ills, which traveled, as men do, on roads and therefore became road-god, appearing on road-sides and crossroads. Such deities were the Sahe no Kami ((Preventive Deities,® comprising an Eight-road-fork Prince with a consort, Eight-road-fork Princess and a third, Kunado. They had no temples and their festivals were held at crossroads. An¬ other phallic road-god was Dosojin <(Road-ancestor deity,® a popular name for Saruta-hiko of the Kojiki, represented by a natural boulder, often with a pile of stones before it. These deities were supplicated by travelers before starting on a journey and were also invoked in tsuji-ura, a form of divination conducted at crossroads. At a few famous phallic shrines, the annual festival has permitted promiscuous coition.

Several popular sex-myths are reported in Mayer's <(Chinese Readers Manual,® several sex-ceremonies are described in De Groot's ftFetes Annuelle a Amoui® and M'Clatchie construes the trigrams as conventionalized sex-symbols, yet no phallicism has been discovered in China. Chinese scriptures, both the king and the shu are devoid of sex-myths, as unimaginative as are the Chinese tablets, ideographs, literature and entire culture.

Phallicism, prehistoric in India as elsewhere, but unknown to the Veda, was only later united with Rudra, a storm-god as chief trait in Siva, god of destruction and reproduction, symbol¬ ized along with his wife, Kali, in millions of linga-yoni, a mere stone cylinder or cone erect upon a stone disc. Natural — large stones or rocks — linga are considered of their own na¬ ture pervaded by the essence of Siva, so that shrines are built over them and a yoni is then usually added. Not less sacred are certain peb¬ bles found in rivers. Two such are oval shaped, one being the bana-linga of white quartz, for Siva and another the sala-grama, a black peb¬ ble containing amnonites — fossil shells — the spiral of which suggested the serpent, for Vishnu. These two, with a bit of metallic stone for Ganesha and a crystal for Surya, are

used in the panchayatana, the daily household rite in India. The cult of the linga-yoni consists in decorating it with flowers, pouring milk over it, and wrapping it with bilva leaves, in order to allay its irritation. Vigil and fasting accompany this cult on the great Sivaite festival, 27 February. Artificial linga-yoni need ((endowment with breath,® namely consecration by a Braham. The Sankhya philosophy regards the linga-yoni as symbols of the eternal princi¬ ples : Prakriti, the one creative force or matter, female; and Purusha, innumerable spirits, male. But among the masses phallicism promotes sex¬ ual excesses in the cult of Siva's consort, one of the forms of Sakti (the female energy in nature) and by obscene carvings and pictures

in the Sivaite temples, though no more of either practice than the unrelated Vaishnavism pre¬ sents. Both systems are products of the Indian heredity and environment.

Tibetan Buddhism probably derived its prayer-wheel formula, ((Ow mani padme Hum? from Saivism, with the meaning <(Om Jewel (the linga) lotus (th e yoni) Hum? In the East India Islands phalloi figure as members on the statues of ancestral deities and are accompanied by crocodiles as symbols of bravery, the other chief male attribute.

The primitive phallicism of Greece was later adopted by several cults. Dionysos was cele¬ brated in a rite (resembling that of the consort of his Indian analog, Siva) where phallos and kteis were borne in procession, sacrificial vic¬ tims were torn apart and devoured raw, wine drunk, and dancing with wild cries practised, all ending in coition under cover of darkness. Out of the coarse humor inseparable from such scenes, Greek genius developed comedy. In the Thesmophoria, celebrated by women alone in honor of Demeter and Kore, phalloi and snakes made of dough were carried about with fir¬ cones and dedicated to these goddesses of agri¬ culture. Concurrently the participants indulged in flitting indecent chaff, doubtless with the pur¬ pose of stimulating reproduction in both earth and humans. The Haloa, a festival in honor equally of Demeter, Kore and Dionysos, re¬ sembled the Thesmophoria, but here the symbols represented both

sexes and the priestess whis¬ pered into the ears of the women present words that might not be uttered aloud. Both phallos and kteis were used also at the Eleusinian mys¬ teries; some authorities think with the usual symbolism of fertility, while others believe that they connoted rebirth after death. The minor deity, Priapos, showed by the conspicuous phal¬ los of his statues that he represented the merely sensuous factor in reproduction. At Greek marriages a phallos, with other symbols of plenty, were carried in the liknon, doubtless as a charm to produce the thing signified.

The phallic deities native to ancient Rome are unfamiliar to the modern reader, because they were early identified with correspondent Greek deities and thenceforward passed under Greek names. Such were Mutunus identified with Priapos and Liber with his consort Libera, identified with Bacchos and Aphrodite. Liber and Libera were represented in their shrine simply by a phallos and kteis. The extreme grossness of this cult is evidenced by the bronze figures now preserved in the Naples Museum. As late as 1781 Sir William Hamilton could collect votive phalloi in Naples and forward them to the British Museum. Phalloi were widely used by the children of ancient Rome as amulets and are still so used in Italy.

The three great gods of northern Europe were represented (according to Adam of Bre¬ men) at Upsala in Sweden by three images: Odin (or Wodan) as a warrior in mail, Thor with his sceptre holding, as greatest god, the middle place, and Freyr with his customary phallic symbols of fecundity and peace. Evi¬ dence of a similar cult in France and Belgium remained during the Middle Ages and later in the practice of supplicating phallic saints, such as Saint Foutin, for offspring or the cure of venereal disease. As late as modern times fe¬

male figures with conspicuous vulva appeared in carving over church doors in Ireland and England, but most of them have now been removed. Those in Ireland were called sheila-na-gig. Definite evidence in some cases and survivals in others show that throughout me¬ diaeval Europe spring festivals usually culmi¬ nated in sexual orgies. A survival from phal¬ lic symbolism in the druidical use of the signifi¬ cantly shaped mistletoe appears in its exclusion from church decorations at Christmas, but its welcome-to hang in every house, where it licenses kissing beneath its bough. Also English farm¬ ers used to decorate with mistletoe the first cow to calve in the New Year.

Turning to the Semitic peoples, we find Baal and Astarte (Istar, Baalat)

worshiped together, commonly under the form of a stone pillar called masseba and a tree or stake called ashera. Monuments and records indicate that these were just a phallos and kteis. This cult, as practised by the Canaanites, proved a licentious snare to the Israelites who were urged by their prophets ((to dash in pieces® the masseba and ((to cut down® the ashera. (Exodus xxxiv, 13, Revised Version). A (<cleft in a rock® served as natural kteis and the ˆsmooth stones of the valley® as phalloi, doubtless in Palestine as everywhere else. (Isaiah lvii, 5-6, Revised Version). The unconvincing arguments of Robertson Smith and the Encyclopaedia Biblica against this view have been disproved by recent excavations of phalloi from the ruins of Nippur and of Tell Lob in Babylonia and at Lachish, Gezer and other sites in Palestine.

In Egypt the phallos was attached to the images of Min (Khem), old father Nature, ac¬ companied by his consort, the cow-horned Ha-thor, a pair upon whom all the force and pleas¬ ure of life depend. Furthermore, the phallos of the great creative god, Osiris, is prominent equally in his myth, his representation and his ritual. Phallicism is current among the Tusa-yans, Pueblos and other Redskins of North America; and its symbols have been found in Mexico, Central America, Peru and other parts of South America. As examples of phallicism in West Africa there may be cited the Ewe-Speakers, the Yoruba and the Dahomeyans.

Bibliography.— Knight, R. P., discourse on the Worship of Priapus' (1865; this work con¬ tains 138 illustrations from the originals pre¬ sented by Mr. Knight to the British Museum) ; Forlong, J. H. R., (Rivers of Life) (1883) ; much of this material was gathered in India ; Inman, Thomas, (Ancient Pagan and Modern Christian Symbolism' (1884, contains 200 illus¬ trations) ; Jennings, H., (Phallicism) (1884); Westropp and Wake, (Ancient Symbol Wor¬ ship' ; Dulaure, J. A., (Les Divinites Genera¬ trices' (1885) ; Capree, A., (Monumens du Culte Secret des Dames Romaines' (1784).

Edmund Buckley.

PHALLUS (Greek, Phallos), a symbol of the productive principle of nature as exempli¬ fied by the male sex in contradistinction to the female. See Phallicism.

PHANARIOTS, fa-nar'i-ots, or FANAR-IOTS, Greek inhabitants of Fanar, Constanti¬ nople. They were of Byzantine descent and when Mohammed II conquered Constantinople he granted them the quarter of Fanar in recognition of their services. The district takes

its name from the “beacon® which stood on the promontory extending into the Golden Horn. The Phanariots were descended from some of the oldest and noblest Byzantine families, and their superior intelligence soon gained for them a dominant influence over the ignorant Turks. Among them were poets and dramatists of con¬ siderable renown. They were ambitious, avaricious and double-dealing, and their subtle intrigue soon gained for them high political places, in which they displayed much selfishness and greed. The offices of dragomans, secre¬ taries, etc., were filled by them as well as many civil offices and the hospodars of Moldavia and Wallachia were appointed from their ranks from 1716 to 1821. Their position became one of great power and importance, but they never showed any appreciable degree of patriotism and when the war of Liberation broke out their services fell far short of the importance which their wealth and position should have made them. Since the revolution (1822) their power has been broken and as a class they have no longer any political influence in the affairs of Turkey. Consult Tennent, (History of Modern Greece > (1845).

PHANEROGAMS, the class of the flow¬ ering plants ; those in which the sex processes are plainly observable, as distinguished from the Cryptogams, in which these processes are concealed. Neither of these terms is strictly accurate, but they are in common popular use. See Cryptogamous Plants.

PHANTASIASTS, fan-ta’zi-asts, Monophysites of the 6th century, who believed that the Divine nature had so transformed the body of Jesus from the very moment of His con¬ ception that His apparent body had become ethereal, imperishable and immortal. It felt neither hunger, thirst, fatigue nor pain, but only semblances or phantasms of these affec¬ tions, and His whole human “life® was only a vision, and that He did not and could not from his spiritual nature suffer and die upon the cross. Prominent among the adherents of this sect were Julian, the bishop of Halicarnassus, and, in his latter days, Justinian (q.v.). They were known also as Aphthartodocetae Docetse, and were grouped

with others under the title of Manichaeans.

PHANTASMAGORIA. See Magic Lan¬ tern.

PHARAOH, fa'ro, the Hebraic name given in the Bible to the kings of Egypt, correspond¬ ing to the PER-'O (Great House), P-RA or PH-RA of the Egyptian hieroglyphics, which

signifies the sun. . , ..

The Pharaohs mentioned (Gen. xn; 10) in the time of Abraham (believed to be Osirte-sen I) and Joseph (the latter, according to tradition, minister of Apophis II Aa-Kenen- Ra), were probably the shepherd kings or Hyksos. The Pharaoh in the time of Moses, 200 years later, was Rameses II, the Sesostris of the Greeks. He was succeded by his son Meneptah II, and the Exodus took place either under the latter, or in the reign of his succes¬ sors Seti II and Ei-Ptah. The two Pharaohs mentioned in the reign of Solomon, the one who gave his sister-in-law to Hadad the Edomite, and the one whose daughter Solomon himself married, were the last kings of the 21st dynasty. The Pharaoh mentioned as the op¬

ponent of Sennacherib was probably the Sethos of Herodotus. Pharaoh-Necho is the first Pha¬ raoh mentioned in the Bible whose proper name is recorded. He is mentioned by Herodotus under the name Nekos. He was the king of Egypt during the reign of Josiah, Jehoahaz and Jehoiakim, kings of Judah. Pharaoh-Hophra succeeded Necho. He is identified with Apries, who reigned from about 590-571 b.c., but the dates of both the beginning and end of his reign are variously stated. He is the last Pharaoh mentioned in the Bible narra¬ tive. Several kings of Egypt are mentioned in the Bible who are not called Pharaoh. See Egypt.

PHARAOH'S ANT, the tiny red ant (Monomorium pharaonis), which is a house¬ hold pest in almost all parts of the world. It makes its nests in the walls or under the floors of houses, and forms long trails to any bit of acceptable food that may be discovered, pref¬ erably sweets or some kinds of cooked meats. Within a few hours such dainties may be taken possession of by swarms of ants numbering tens of thousands. Why it is so called is not clear. Several other familiar and troublesome animals are called by the royal name as "Pha¬ raoh's hen,® the Egyptian vulture (q.v.), and "Pharaoh's rat,® an ichneumon (q.v.). Con¬ sult Lubbock, Sir J., (Ants, Bees and Wasps) (London

1882); Wheeler, W. M., (Ants: their Structure, Development and Behavior* (New York 1910).

PHARISEES, a religious sect of the an¬ cient Hebrews who based their division from other sects upon their unbending adherence to the Mosaic laws governing the division between the clean and the unclean. This party probably became a distinct sect as a result of the reaction against the attempt of Antiochus Epiphanes to eliminate the distinctions between the Jews and the Greeks, and as a party were in opposition to John Hyrcanus, the high priest (135-105 b.c.), who reigned over the state founded when the Maccabean revolt was brought to a successful termination. They were also in opposition to the Sadducees, being essentially a religious sect, opposed to anything non-Jewish, and rarely en¬ gaged in political strife unless some of their rights or privileges had been outraged. The principles of the Pharisees were many and varied. As their name signifies (separatists), they held aloof from all intercourse with the lower classes; even their orthodox countrymen, unless they lived up to the Pharisaic interpreta¬ tion of the laws, were shunned by them; and they carried their religious fanaticism to such an extent that laws were even imposed upon members of their body prohibiting trade with disbelivers. They, however, worshipped with their countrymen in the same synagogue under the command of their great rabbi : “Separate not thyself from the congregation.® They in¬ sisted upon a strict observance of the laws as being necessary to righteousness, though they placed more weight on the belief in traditional laws than on the written laws, and extended the observance of these laws to the tithes, fasts, Sabbath worship, the ablution of hands, vessels, *etc.* Especially in the matter of tithes they pre¬ served rigid watchfulness, holding that only food which had been tithed could be partaken of without sin. This was the preliminary re-708

quirement imposed upon candidates for admis¬ sion to the sect. Among the Pharisees them¬ selves there were four ranks of purity, accord¬ ing to the degree of cleansing practised by the individual. They also believed in the existence of an oral law to complete and explain the written law (the Torah), in which was set forth the continuance of life after death, the immortality of the soul, the resurrection of the dead, human freedom, providence, *etc.* We find in

the Mishna that ((Moses received the law from Sinai, and delivered it to Joshua and Joshua to the elders, and the elders to the prophets, and the prophets to the men of the great synagogues.® In the course of time these laws received many additions which were not supposed to be of divine origin, but were made by both the writers of the sacred books and the commentators.

The Pharisees came into prominence more particularly in the time of Christ because of their opposition to the principles of religion as taught by him. But their main objection to Jesus and the disciples lay in the fact that they associated so freely with the publicans and sin¬ ners, this being in direct contradiction to all the traditions and beliefs of the Pharisees. Jesus also taught that the religious relationship should be one of personal fellowship, while with the Pharisees this was held to be one only of legal compact. This doctrine the Pharisees perceived, if allowed to gain influence with the people, would lose to them their power, hence their de¬ sire to be rid of him, even if by death.

The Pharisees have, however, been misun¬ derstood and maligned, especially as to being hypocritical. This party was the popular party of the day, having as members some of the most learned, pious and patriotic men of the country, and, as in all sects where strict ad¬ herence to principle is an intensely religious duty, some defects of virtue crept in, but to stigmatize all as insincere and hypocritical is beyond reason. It is to be remembered that Simeon, Zacharias, Gamaliel and Paul of the Bible narrative were all Pharisees.

Josephus is authority for the assertion that under the Herods the number of the Pharisees exceeded 6,000. The sect survived until long after the fall of Jerusalem in 70 a.d., still be¬ lieving in the restoration of the kingdom of Israel through divine mediation. Consult Delitzsch, F., (Jesus und Hill el > (Erlangen 1866; Monkhouse trans., London 1877) ; Mil-man, H. H., (History of the Jews) (London

1863).

PHARMACEUTICAL SCHOOLS. See

Education, Professional, in America.

PHARMACOPEIA, far”ma-ko-pe’i-a, a book of directions or formulae for the identifi¬ cation and preparation of medicines which has received the official sanction of the govern¬ ment, or at least that of a

responsible body of practitioners. Such a book is issued in every leading country, and contains a list and descrip¬ tion of the substances used in the treatment of disease and included in the materia medica (q.v.), with the chemical processes for obtain¬ ing them, their purity-tests, the prescriptions most approved, *etc.* The object of the phar¬ macopeia is to so standardize drugs as to se¬ cure a uniform compounding of prescriptions by pharmacists. After 1542 when the first

pharmacopeia, that of Nuremberg, appeared, these books gradually superseded the treatises of apothecaries and increasingly acquired a more authoritative character. In 1618 the London College of Physicians issued its phar¬ macopeia, of which 11 editions afterward ap¬ peared, the last in 1851. Until the passage of the Medical Act in 1858, separate pharmaco¬ peias were published by the colleges of physi¬ cians of London, Edinburgh and Dublin. Since that act went into effect a British pharmocopeia issued by the medical council of the United Kingdom has been recognized by the general medical profession of Great Britain.

The pharmacopoeia of Prussia, which is used throughout Germany and the <(Codex medica mentarius® of France, in use also in most of the countries of South America and in Turkey, are the most important published in the conti¬ nental countries of Europe.

In the United States the first pharmacopeia was published in Philadelphia in 1778; in 1805 appeared another in New England; others were afterward issued by hospitals and other medi¬ cal institutions; and in 1818 medical societies in New York planned a convention of delegates from medical colleges and societies in the vari¬ ous States, which was held in Washington, Jan¬ uary 1820. Out of the transactions of that convention came, in the same year, the first pharmacopoeia published in the United States. This was called (The Pharmacopoeia of the United States of America, > and was printed in Latin and English at Boston. A second edi¬ tion of this pharmacopoeia appeared in 1828. In 1830 two others appeared, one published in New York and the other in Philadelphia. These were eventually combined and a second edition issued in 1842. The third edition was published in 1851, and a revision in 1855. The fourth revision was issued in 1863, and the fifth in 1873. In 1882 the sixth edition appeared, and steps were taken to secure government sanction. The medical officers of the army and navy were enlisted in a new revision which was published in 1893 and was made the official pharmacopeia of the

United States. It is not required by Federal law that this pharmacopeia shall be followed in the medical practice of the country, but it has been adopted as the legal standard in many States.

At the International Conference for Unifi¬ cation of the Formulas of Heroic Medicines, at Brussels, each country being represented by a physician and a chemist, new standards of strength for all very potent drugs were agreed upon and pledges were made by each govern¬ ment that the national pharmacopoeia should conform. The new (United States Pharma¬ copoeia* has adopted the results of the Brus¬ sels conference, and it will be the first national pharmacopeia of international §cope.

Revision of the Pharmacopeia. — National regulation of the purity and strength of drugs was still in the future when the eighth revision of the Pharmacopeia (held in 1900) became official, 1 Sept. 1905. The Federal law which bears the short title ((The Pure Food and Drugs Act, June 30, 1906,® was passed the following year, and became operative on 1 Jan. 1907. This law specifically designated the Pharmacopeia as the legal standard, and thereby gave it a stand¬ ing which it had not previously attained. The vigorous manner in which the authorities pro-

ceeded to execute the law, at once caused thou¬ sands who had known the book simply as a name, or not at all, to buy or use it. The Pharmacopeia has thus become a part of the Federal law, as well as of the laws of many of the States which enacted statutes based on the Federal Pure Food and Drugs Act; and since the organization which owns and controls it is an incorporated body, the meeting of the United States Pharmacopeial Convention, for the last revision of the work, which took place in Washington 10-12 May 1910, exceeded in importance any of the conventions which had previously been held to make or revise the book. The far-reaching effect of the work of manufacturers and importers, retail pharma¬ cists, food and drug officials, and practitioners of medicine made it important that each of these interests should be well represented in the convention.

Wholesale and retail druggists' organizations and medical societies had been discussing the Pharmacopeia with a view, par¬ ticularly, to protect the public against the evils of low-grade drugs, and at the same time safe¬ guard their own interests by impressing upon those most interested the importance of con¬ sidering the interests of all concerned.

The United States Pharmacopeial Conven¬ tion is itself an incorporated body, chartered under the laws of the District of Columbia 7 July 1900, and is continuous, with power to conduct future revisions under the constitution and by-laws framed by the convention.

The convention for the 9th decennial revi¬ sion was held in the New Willard Hotel, Washington, and was attended by about 325 delegates, representing about 157 medical, phar¬ maceutical and chemical societies and associa¬ tions, government departments, *etc.* The re¬ port in detail of the action of the convention is published officially in The Druggists Circular for June 1910.

The revision became official 1 Sept. 1916. Among the recommendations adopted by . the convention was the following proposed limit to the scope of the Pharmacopeia:.

«We recommend that this committee of revi¬ sion be authorized to admit into the Pharmaco¬ peia any medical substance of known origin; but no substance or combination of substances shall be introduced if the composition or mode of manufacture thereof be kept secret, or if it be controlled by unlimited proprietary or patent rights, and the list of substances should be care¬ fully selected, with standards for identity and purity, as far as possible. Substances used only for technical purposes should not be admitted to the next Pharmacopeia, and a statement should be placed in the preface to the effect that standards of purity and strength prescribed in the text of the Pharmacopeia, are intended solely to apply to substances which are used for medical purposes or in determining the identity and purity of the same."

Another of the ((general principles" of revi¬ sion adopted was:

«That the committee be instructed to revise as carefully as possible the limits of purity and strength of the pharmacopeial chemicals and preparations for which limiting tests are or may be given. While no concession should be made toward a diminution of medicinal value, allowance should be made for unavoidable, innocuous impurities or

variations due to the

particular source or mode of preparation, or to the keeping qualities of the several articles. The (purity rubric, > which limits the percentage of innocuous impurities, as introduced into the eighth revision, should be continued, and tests and requirements should be appended to each article carrying a (purity rubric. > In the case of crude drugs and natural products, the limits of admissible impurities should be placed at such a figure as to exclude any that would not be accepted by other countries.” Consult Flint, J. M., (Report on the Pharmacopoeias of All Nations) (Washington 1883).

PHARMACY. Definitions. — (1) Phar¬ macy is the art of preparing and dispensing remedial agents. (2) The term Pharmacy is also applied to the place (shop or store) where medicines are prepared or sold, for example, a drug store or apothecary’s shop. The phar¬ macist is the operator or dispenser, known also as druggist, or pharmaceutist (in England, chemist or pharmaceutical chemist). The product of the pharmacist’s skill is called a pharmaceutical preparation or compound. At present, owing to the evolution that has largely transferred to manufacturing establishments, or factories, the making of specialties, and many compounds employed by physicians, such trade compounders are known as manufacturing pharmacists. Thus the differentiating terms retail pharmacist and manufacturing pharmacist now prevail.

The word pharmacy, derived from the Greek word fapfianov signified in early times either (<the use of medicine” or ((the practice of witchcraft.” The past record of the art, in all countries, seems to be fairly outlined by these definitions. In all cases, the early record of pharmacy is intricately connected with the practice of medicine, nor is it possible to write the history of one, without entering, somewhat circumstantially, into the story of the other..

Beginning of Pharmacy. — The beginning of the practice of pharmacy may be located in the efforts of primitive people of all ages to counteract disease or to relieve injuries. The very earliest literature of all nations gives proof of the study, as well as does the practice of the aborigines of every land. Scriptural reference to the ((dead flies in the ointment of the apothecary,” the fig poultice applied by Isaiah, and the many references in Jeremiah and elsewhere in the Scriptures to the medici¬ nal virtues of leaves and plants are familiar to all readers of the Bible, and give proof of the practice of the art of pharmacy

among the Hebrews.

In Assyria, cuneiform inscriptions teach that the healing art was practised by the priest¬ hood at a verv early date* Ancient Egyptian inscriptions1 2 illustrate the process of distilla¬ tion, while a papyrus 3300 years b.c.1 gives prescription formulae. Recent explorations have brought to light the interesting code of Ham¬ murabi, king of Babylonia, 2250 b.c.,3 in which we read of the doctor healing the sick, and the surgeon operating with the knife, but in which we find no reference to the compounding of medicines. By inference, then, we know that the physician and the pharmacist of ancient Susa must have been identical, since it is to be presumed that, had this not been the case, a

* For references see end of article.

document embodying such minutiae of details in law would have considered penalties for phar¬ macists' blunders, as well as for medical and surgical malpractice. In China and Japan, pharmacy, coexistent with their earliest records, is a curious art, while India, as shown in its <(Charaka-Samhita®4 (8th century, or earlier), is to be credited with a wonderful detail study of drugs and simple pharmaceutical prepara¬ tions.

Glancing rapidly over the history of the world, we find in all countries and in all ages a like development of the pharmacist's art. Swayed originally by religious principles, the people looked naturally to the priest as council¬ or and helper, for physical as well as for moral ailments. In mediaeval times, ((Christ as an Apothecary,® surrounded by the well-known im¬ plements of the art, was the subject of more than one painting. Of the semi-barbarous tribes of mediaeval history, the Druids, who were held in such veneration by the people that their authority was almost absolute, were espe¬ cially proficient in mystic rites and medicine.5 It is recorded that <(the nine rural arts known and practised by the ancient Cymry, before they became possessed of cities and a sovereignty,® which was before the time of Prydain ab

Aldd Mawr, about 1000 b.c., was medicine.5 The aborigines of America attained a considerable skill in pharmacy, as is evidenced by a collec¬ tion in our own possession, of stone mortars from prehistoric Kentucky tombs, and lava mortars employed in the processes of making remedies and face paints, from the habitations of the lost Arizona Mound Builders. In fact, the records of early man, everywhere, give evi¬ dence of some form of the practice of medi¬ cine, and the rudiments of pharmacy. Said the erudite Dr. Alexander Wilder, ((Every country having a literature of ancient periods of its his¬ tory, possesses some account of a healing art.®6

The early healing arts, among primitive peo¬ ples, were dominated by, or connected with reli¬ gious rites, and consequently, with such, «the functions of the physician are usually united with those of the priest and civil ruler,®' to whom was relegated both the compounding and the administering of drugs. Ignorance and su¬ perstition led naturally to belief in sorcery, charms and witchcraft, as well as to confidence in the priest-physician, and faith in the wisdom of philosophers, astrologers, believers in divina¬ tions and the charm of soothsayers.5 Hence we find the secondary meaning of the word <pdf'/uaKov to be sorcery, with which the prim¬ itive practice of medicine (and pharmacy) was often most intricately complicated, a practice exemplified to-day by belated people, for exam¬ ple, by the ˆpow-wow® methods of the Amer¬ ican Indian ((Medicine Man,® and the ((Ordeal Tests® of the African. The separation of the duties of the physician as we know him, from the offices of the priest or charm healer, came as a natural sequence to civilization's progress, and marks the first step in the development of the pharmacist.

Evolution of Pharmacy. — For a long pe¬ riod this process necessarily consisted of a pick¬ ing out, or establishing, of remedial agents, and an excision of religious ceremony. By slow degrees, the sacred groves and pagan temples lost the confidence of the people as hospitals for the sick, and priests and mystics were

no longer regarded as special physicians for disorders of the body. The magic touch of a love draught, or philter, the legendary C(cry of the mandrake root,® the casting of the horo¬ scope, the influence of metals, plants, constel¬ lations, the foreboding bad sign, and the acts of witches and wizards, these and such as these became severally less conspicuous, and were gradually eliminated from the domain of medi¬ cine. A majority of such remedial agents as were used even to the very door of the 19th century, were likewise destined to be

displaced, including a multitude of loathsome mixtures and concoctions, such as preparations of vipers and toads, excrement, hog lice, dead creatures, se¬ lected parts of animal viscera, dead human be¬ ings, etc., *etc.* In the march of events, the alchemistic complexities of the Middle Ages, such as Van Helmont's <(Amulet,® Albertus Magnus' <(Elixir of Life,® the ((Elixir Album,® <(Elixir Rubrum,® and a multitude of elixirs of the Disciples of Hermetic Philosophy disappeared, as did also the numberless complex distillates and illogical compounds of mediaeval Europe, a few of which, however, have left fragments of their skeletons, reclassified, to cumber our pharmacopoeias. As examples of such linger¬ ing compounds that came thus to our doors may be cited ((Elixir of Vitriol,® which gave us aromatic sulphuric acid; <(Elixir Salutis,® which gave us compound tincture of senna ; (<Elixir Proprietatis,® which gave us compound tincture of aloes ; (<Elixir Stomachicum,® which gave us compound tincture of gentian; <(Elixir Sacrum,® which gave us tincture of rhubarb and aloes. Taken as a whole, we perceive in the history of pharmaco-medicine a mighty struggle or tur¬ moil through the passing ages, amidst which reason gradually took the place of both fancy and faith, and in which the action of definite drugs replaced charm, superstition, and the at¬ tractive mystery of occultism. As a factor, as well as a shadowy actor in it all, is to be seen the growth of :

The Pharmacist. — Not until the 18th cen¬ tury had well passed into history, did the phar¬ macist appear as a distinct factor in his un¬ happy struggle for individuality. Into the field where religion, legend, superstition and medi¬ cine were commingled, the alchemists, those searchers for the ((Alkahest,® the ((Philosopher's Stone,® the ((Quinta Essentia,® or <(Soul of the Four Elements,® wedged themselves. Not only were these men destined to serve their parts in the birth of modern chemistry, but in the evolu¬ tion of the pharmacist as well. Such as Para¬ celsus, _ Cagliostro, the healers by vegetables (Galenical pharmacy), the advocates of miner¬ als (remedies originated by fire), each in turn combated for supremacy, while the votaries of sulphur (the ((Home of the Spirit®), Mercury (the ((connecting link between spirit and body®), the users of animal and vegetable nos¬ trums, the believers in the doctrines of signa¬ tures, of charms, of mysticism and astrology, by turns deceived the people, and themselves as well, and racked and tortured humanity. Char¬ latanism was ever rampant; mystery, deception, fallacy and legend reigned supreme. Fact con¬ cerning both remedies and diseases dovetailed so closely into fancy, both of form and ex¬ pression, as to mystify both the actors and be¬ holders, and to distract the historian. But at last, as a result of this ordeal and struggle, the

physician, freed largely from the realm of mys¬ ticism, became a self-existing entity. Yet, for a long period, he served a dual part, for he was both the giver and the. maker of medicine, while the surgeon and the barber were still one. Now came a cry for the separation of the art of compounding from the art of prescribing medi¬ cine, but it is impossible, in a limited article, to locate with exactness the dates of the vary¬ ing differentiations, inasmuch as the process has not been a uniform proceeding, so far as either periods or countries are concerned. Different countries moved separately, as indeed did dif¬ ferent sections of the same country. Nor do they to-day parallel each other. There have been ebbs and flows in the march of civiliza¬ tion, and to these medicine has ever responded, and yet responds. For example, as early as the time of Aristotle,7 the (<physician® practised medicine, and the business of the <(apothecary® consisted in <(preparing and dispensing medi¬ cines® ; and yet, not until 1754 did the code of the College of Physicians of Edinburg prohibit their Fellows and Licentiates from <(keeping an Anothecary Shop.® In England, a still greater license prevailed in the selling of medi¬ cines, which were not infrequently carried by grocers as a part of their stock, until 1617, when it was by law enacted that ((no grocer should keep an apothecary's shop, and no surgeon should sell medicines.® Even when the shop of the apothecary finally took a recognized place as a supply for medicine, the apothecary did more or less prescribing. This, proportionately, led to a degree of rivalry and even antagonism between physicians and apothecaries, an antago¬ nism which had come down through the Middle Ages and the 15th, 16th and 17th centuries, lasting even into the 19th century.9 Finally, under the inroads of modern science and the higher ethics of the leading professional men of healing, the physician turned his attention more directly to therapy, while the coexisting barber and surgeon separated. Chemistry became a modern science, and phar¬ macy a recognized art, but one whose limits are even yet undefined, for never has the ((apothecary® been regarded merely as a ((collector or compounder of drugs.®

The latter part of the pharmacist's evolution may be graphically shown by a study of the suc¬ cessive issues of the European pharmacopeias, to which we may briefly allude. The first Eng¬ lish pharmacopeia, issued (1618) by the Col¬ lege of Physicians, carried many curious mix¬ tures and many cumbersome, ridiculous com¬ pounds. ((Theriaca Andromachi,® containing 60 ingredients (one of them a preparation of vipers), and other prescriptions of similar com¬ plexity held place, even in the revision of 1650. But animal drugs and similar products were gradually relegated to obscurity, and finally, when chemistry became the master of alchemy, and the art of compounding became separate from the art of prescribing, mysticism practi¬ cally vanished from the field of European phar¬ macy, leaving a number of pharmacopeias, each bearing modified relics of formulae that had sifted to them from the past.10

American Pharmacy. — In the early prac¬ tice of American medicine, remedies similar to those employed in England naturally prevailed. In our infancy, such works as the Dispensatory of Quincy, and the Dublin and Edinburgh dis¬

pensatories were conspicuous authorities.. Eng¬ lish textbooks and English educational institu¬ tions, directly or indirectly, schooled the ma¬ jority of American physicians. From them the professors in the American medical colleges drew their inspiration.* Familiar English com¬ pounds, such as Dover's Powder, James' Pow¬ der, Fowler's Solution, Elixir of Vitriol, Sweet Spirit of Niter, Hiera Picra, Black Drop, Laud¬ anum, Paregoric, etc., were everywhere in evidence.

Early American pharmaceutical prepara¬ tions, like the practice of American medicine, were thus but the outcome of the transplanted English art, which, as has been shown, was a conglomerate from out the siftings of mediaeval Europe, which in turn had heired the remains of ancient sects and systems. As an example, although sassafrasf and sarsaparilla were in¬ troduced into the Cordic Dispensatory, in 1592, American remedial agents were not taken seri¬ ously, even in America, until long after this date. American medicine, as well as therapy, were, until the opening of the 19th century, in the hands of the physician, who prescribed from his own stock of drugs. There is no evidence that a pharmacist, as now known, existed in America preceding the Revolution. The first American attempt at separating the two factors then vested in the physician, was made by Dr. John Morgan, of Philadelphia, in an address (30 May 1765), for which he was severely criticised for "trying to transplant into a new country,

ideas that were suited only to con¬ tinental practice.® 12 Not until 1774 did another physician write a prescription, when Dr. Abra¬ ham Chovert of Philadelphia presumed to make the innovation.

No author, no committee, even, ventured to issue an American pharmacopeia before 1778, at which date William Brown published at Lancaster, Pa.,13 a little work of 32 pages for the use of the military hospital of Washing¬ ton's army.$ This was followed, 1808, by the Pharmacopoeia of the Massachusetts Medical Society, and in 1820 by the first edition of the Pharmacopoeia of the United States, which has since been revised each decade, although in 1830, owing to a split in the convention, two revisions appeared, one from New York, the other from Philadelphia. See Pharmacopeia.

The American Pharmaceutical Association, which met first in 1852, and continuously each year thereafter, excepting 1862, has been of in¬ valuable service in advancing American phar¬ macy. To its endeavors may be added the in¬ fluence of the State Pharmaceutical societies and their publications, as well as the many journals on pharmacy. The attention of ob¬ serving physicians and botanists practising in rural American districts, and others, was finally drawn to the possibilities of the American flora, which was destined, eventually, to contribute its quota of remedial agents. Among the keen ob¬ servers of that time may be mentioned B. S. Barton, Benjamin Rush, Manasseh Cutler, Wm. Tully, C. S. Rafinesque, Jacob Bigelow, Robley

* The fi?st in America to teach medicine, including materia medica, pharmacy and pharmaceutical chemistry, was Dr-John Morgan, 1765, Philadelphia.

| The first American remedy introduced into Europe, about. 1562. First described in detail by the Spanish physician, Monardes, of Sevilla, in 1754.11

J The Botanical treatises of Manasseh Cutler, 1785, and Schoepf, 1787, could scarcely be called medical ,

Dunglison, Samuel Thomson, Stephen Elliott, Daniel Drake, Wooster Beach, R. E. Griffith, Wm. Zollicoffer, John King and numerous others.

In the first half of the 19th century the Thomsonian and Eclectic schools of medicine arose, whose efforts were conspicuously devoted to the study of American vegetable products and the suppression of cruelty in medication, such as blistering, bleeding, salivation and the use of depleting energetics. In 1821, the Phila¬ delphia College of Pharmacy was instituted, while the New York College of Pharmacy opened in 1829. The Journal of the Philadel¬ phia College of Pharmacy (the first journal on pharmacy in the English language), ap¬ peared in 1825, and the American Druggists' Circular in 1857, to be followed by a number of journals on pharmacy, now current. A power in themselves, great has been their in¬ fluence.

These separated and often antagonistic fac¬ tors led to a remarkable interest in American medicines, which was furthered by the rivalries both of the American schools in medicine, and by the sects and factions practising medicine in America, from which must not be excluded those using <(Domestic Medicine,® as well as the <(hydropaths® and the so-called ((Indian Doctors.® About this period (middle of the 19th century), pharmacists began to give their attention more liberally to remedies that were increasingly American, while simple preparations, equally as effective but more pleasant, were devised to re¬ place the more complex Pharmaeopoeial mix¬ tures. The ˆCompound Tinctures® (the elixirs of old), <(Compound Powders,® etc., were largely displaced by fluid extracts, and simple tinctures, while the great class of foreign con¬ fections or conserves, the numerous treacle mixtures, the many electuaries, the distilled waters of herbs and mixtures of herbs, familiar in European Pharmacopoeias, also mostly dis¬ appeared.

Let us now briefly consider this evolution of medicinal products in its connection with the practice of American medicine, for medicine and pharmacy are inseparable. Until the mid¬ dle of the 19th century, remedies nasty and violent were not only prevalent, but were pre¬ scribed in heroic doses. The public, as well as the medical profession, had been taught to con¬ sider desirable drug action as necessarily con¬ nected with systemic shock. Pharmaceutical preparations, as well as dosage, were such as usually violated the patient's conception of pleasure, rest and peace. Distasteful decoctions and concoctions, salivating mercurials, violent emetics, blisters and escharotics, bleeding and torturing mechanical processes, were conspicu¬ ous. This condition confronted pharmacy when Coxe's American Dispensatory appeared (1806), and the first edition of the Pharmaco¬

peia, already mentioned (1820). No less was it a factor when appeared in 1833 the first edi¬ tion of the (Dispensatory of the United States,* fashioned like that of Coxe, after the European dispensatories, but yet evidencing a spirit of unrest and independence. Already had arisen in America a growing questioning of such methods of medication, a questioning that was fostered, if not instigated, by the attacks of the irregulars, the faddists, the various curers by secret mixtures, and independent agita¬

tors outside the medical profession, who, with¬ out much hope of success, and with no system¬ atic plan, demanded reform, both in method and medicine. Their incipient attempt was first a questioning cry, next an energetic plea, then a demand for kindness to the sick. But these alike met the resistance of a body of physicians trained by the authority of centuries in the belief that disease was due to devils, as an invading entity, and that the devil must be fought by fire. The crusade that followed made Wooster Beach (see Eclecticism) and Samuel Thomson conspicuous. European drug conglomerates were finally bitterly and publicly assailed, as well as were the generally accepted methods of those who treated disease by such authority as reigned supreme, especially bleed¬ ing, blistering and mercurials. Thoughtful physicians likewise became imbued with a de¬ sire for new and more kindly agents to take the place of harsh and disagreeable remedies. All this gave both an incentive and an encour¬ agement to pharmacists, and now it was that American substitutes for European remedies, both drugs and pharmaceutical preparations, be¬ gan to creep into conspicuity. The resultant more elegant pharmaceutical preparations and more direct remedies led also to simplicity of medication, that was fortified by the discovery of a few proximate principles of plants. New processes and new classes of pharmaceutical preparations now began to prevail, on pharmacopoeial authority.

As in medicine, so in pharmacy. The re¬ form began in the early part of the 19th cen¬ tury with the application of the process of per¬ colation to powdered drugs, suggested by Count Real in 1815, and adopted by Roullay Brothers, Paris, France, 1837. This process took deep root in America, and owing chiefly to the impetus given the subject by the French phar¬ macist, Duhamel, in his paper republished in the (American Journal of Pharmacy* (1838), and to the efforts of Proctor, Graham, Parish, Squibb, and others, it was adopted in the 1840 Pharmacopoeia, in making ((Fluid Extracts.®

This new class of pharmaceutical prepara¬ tions, the (<Fluid Extracts,® was a great im¬ provement on the decoctions, infusions and common tinctures then so commonly employed. American manufacturing pharmacists and phar¬ maceutical factories now for the first time be¬ came a factor in pharmacy, and turned their attention to the cultivation of this promising field. By means of special studies, improved appliances, and expert manipulative talent, they accomplished more than could have been ex¬ pected of the circumscribed apothecary, of end¬ less cares, limited opportunities, and innumer¬ able shop diversions. Factory-made, sugar-coated pills were introduced (followers of French coated drages), and attained a wonder¬ ful popularity (1860 to 1880). These were closely followed by gelatine coated pills (known long previously, but nearly forgotten), and under the force of these machine-made prod¬ ucts and their numberless combinations, the art of extemporaneous pill-making by prescription, practically disappeared from the realm of the American pharmacist. Then came factory-made, empty, gelatine capsules for encasing powders and masses, and finally, at the close of the 19th century, with a rush, came mechani¬ cal tablets of various fancy colors and designs

carrying divided amounts of drugs, and stamped into a variety of pleasing forms. These being advertised to physicians, largely brushed aside the prescription-made powders of the apothecary. Trade emulsions and trademarked specialties also took a place in medica¬ tion, while elixirs (1860 to 1875) in the way of sweetened and aromatized liquids, arose in numberless combinations to help the manufacturer in his aggressive inroads. The Eclectic School of Medicine felt the touch of the times, and turned its at¬ tention to the evolving of remedies more ef¬ fective and more pleasant than were the very disagreeable early Eclectic products. The first edition of King's (American Dispensatory* (1852), had been a great factor in correlating and somewhat simplifying Eclectic preparations, after which Scudder's aggressive attacks on the complex (shot-gun processes') in Eclectic medi¬ cine, and his plea in behalf of kindlier,

more effective and more pleasant remedies, estab¬ lished the reformation. The heroic methods of Samuel Thomson were likewise abandoned by his followers (now known as the Physio-Medi¬ cal school), until the past harshness of Thomsonian practice contrasts with their present methods, about as favorably as does the evolu¬ tion in the Eclectic school. Notwithstanding ridicule and sarcasm of the "Regular" medical profession, the pleasant granules and dilutions of Homoeopathy found favor with the public, and although of European origin, found a fer¬ tile and responsive field in America, serving American pharmacy and medication even more than its disciples appreciate, or its antagonists concede. The inroad of these discordant fac¬ tors came between 1820 and the century's close. With increasing rapidity they followed each other, and together led to a brushing out of the disagreeable old, and its replacement with a more pleasant new.

Looking back over this period, one perceives, mainly, the bitterness of rivals and antagonists, the calumnies and attacks of individuals, the contentions of sects in medicine, and of fac¬ tions in pharmacy. But this discord of the fac¬ tors was accompanied by a harmonious move¬ ment of the whole, in which pharmacy and medicine were slowly uplifted, and by which the people have surely benefited.

The Present in Pharmacy. — Contrasted with half a century ago, the art of pharmacy in America is scarcely to be recognized by either the constituents of physicians' prescriptions, or by classes of pharmaceutical preparations. True, the Pharmacopeia still gives place to tinctures, syrups, pills, decoctions, infusions, etc., while old style bottles still cumber the phar¬ macists' shelves, but in practice the remedial preparations of the last century are no longer supreme, and many drugs then deemed vital are obsolete. Bitter has been the crusade that resulted in their displacement, a revolution has it been, largely to be credited to the factors that America has evolved and fostered, since she arose to take an active, critical part in the evo¬ lution of modern pharmacy.

At present, the evolution of pharmaceutical plant preparations is increasingly teaching that, in their natural settings, they constitute classes of substances that cannot be wholly paralleled by isolated constituents. In their interstructural forms and relationships, plant constituents are,

as a class, colloidal or amorphous. It is now becoming apparent that the science of phar¬ maceutical chemistry applied to the vegetable

kingdom demands the closest investigation of colloidal attributes, and of connected, catalytic affinities. A pronounced feature in alkaloidal problems is the discovery (by John Uri Lloyd), that colloidal hydrous aluminum sili¬ cate has a special affinity for all alkaloids. This affinity is considered as an adhesion attrac¬ tion, the compounds of even the bitter alkaloids, such as strychnine, being tasteless or nearly so. These compounds have the remarkable quality of retaining their integrity in the presence of dilute (aqueous) acids, while dilute alkalies liberate the alkaloids from combination. This fact enables physicians to administer freely alkaloids that, uncombined, would disturb the stomach, because in the acid gastric juice, the alkaloid is inert. As an example may be men¬ tioned the emetic alkaloids of ipecac, chief of which is emetine, that in this combination have no nauseating qualities.

An American “pharmacy® (drug store) now embraces not only medicines, but many foreign substances which permit of profit. The country drug store carries a miscellaneous assortment of nearly every description, even, at times, in¬ cluding groceries, wall paper, paints, glass and oils. In our cities the past 50 years have, as a rule, excluded oils, paints and glass from the pharmacist’s province, but have introduced candies, fancy soda beverages, and many similar substances fully as foreign to medicine. Pre¬ scriptions are to a less degree than formerly compounded from preparations prepared by the pharmacist, factory-made products being favored by physicians to a great extent, and increasingly. Ready made specialties for the self-cure of dis¬ ease are becoming familiar to the public, who purchase tablets and pills of active drugs so freely, as increasingly to breed harmful drug habits, a wrong that now receives the urgent attention of lawmakers and philanthropists. The past decade has brought from Germany a number of patented, copyrighted and trademarked synthetics, introduced first to the med¬ ical profession, who prescribed them by name. Thus they became known to the laity, who soon became self-prescribers of energetic rem¬ edies, such as the hazardous heart depressants, whose employment is not without risk, even under the watchful eye of a physician. This pernicious effect of over-drugging by these sub¬ stances, as, well as by the narcotics of old, has perhaps led an increasing class of citizens to discard all remedies, and to discredit all physi¬ cians, their beliefs reminding one of the healers of the far distant past, when the Church cared for both spiritual and temporal ailments. And lastly, may be briefly noted the introduction of animal extracts, antitoxins and serums, which came at the very close of the 19th century. Within recent years, these animal products have claimed the attention of many physicians, the long

established animal digestive agents, pepsin and pancreatin being well-known examples. Prolific sources of supply of such as these are the slaughter-houses of America, from which come an extensive line of crude products, once considered as “offal,® but now offered in good faith to manufacturers of pharmaceutical prod¬ ucts, for utilization in the direction of serums and vaccines. The following is a list of “ant-714

mal glands® recently offered by a reputable packing company: Parathyroid glands, pectoral glands, sheep thyroids, inguinal glands, pre-crural lymph glands, prescapular glands, mam¬ mary glands, pancreas glands or liver sweet¬ breads, posterior sublingual, pineal glands,, hog ovaries, calf thyroids, stomach linings for pep¬ sin, calf thyroid glands, beef thyroids, suprarenal glands, sheep thymus glands, reto-pharyngeal glands, calf thymus or throat sweetbreads, pitui¬ tary glarids, beef thymus gland or throat sweet¬ breads, anterior sublingual, beef ovary glands, hog thyroids, sheep ovaries, ((or any other pharmaceutical preparations in our line.®

All these conspiring influences together with annoying State pharmacy laws, and the inroads of cut-rate druggists and aggressive department stores, have no doubt harassed the dispensing pharmacist. And yet, the literature of phar¬ macy to-day is the most extensive in all its record, the latest edition of the Pharmacopeia of the United States is superior to anything that has preceded, and pharmaceutical education is the most comprehensive and exacting in all American history.

The author is indebted to the Lloyd Library for the data on which this paper is based. The titles of Pharmacopoeias and Materia Medicas, numbering several hundred, in this collection, need not be given, but it is desirable that a few volumes concerning the historical record be referred to by consecutive text numbers. These are as follows :

1. Peters, H. (Netter’s translation), ‘ Pictorial History of

Ancient Pharmacy,’ Chicago 1889.

2. Ebers, * Papyrus Ebers,’ Leipzig 1889.

3. * Laws of Hammurabi,’ found in ruins of ancient Susa.

The most ancient code of public laws yet discovered. 2250 b.c. (700 years before the time of Moses.) Translated and described in * Records of the Past,' Washington, D. C., March 1903.

4. * Charaka-Samhita ' (' Works of Charaka ') 775 b.c.

Translated into English and published by Avinash Chandra Kaviratna, Calcutta. Still in process of publication.)

5. Wellcome, ' Ancient Cymric Medicine,' London 1903.

6. Wilder, ' History of Medicine,' New Salem, Me., 1901.

7. Watson, ' The Medical Profession of Ancient Times,'

New York 1856.

8. Heydon, ' Theomagia or The Temple of Wisdom,'

London 1664.

9. Bell and Redwood, * Progress of Pharmacy,' London 1880.

10. Lloyd Library Collection of Pharmacopoeias.

11. Lloyd, * Historical Story of Sassafras,' Chicago 1898.

12. Wilbert, ' Life of John Morgan,' ' Amer. Jour, of Pharm.'

1904.

13. ‘ Am. Jour. Pharmacy,’ Vol. 56, 483-491, 1884; Vol. 63,

156-157, 1891.

14. Lloyd Library Bulletins, Reproduction Series, Nos. 3 and

4.

Other valuable volumes consulted in the preparation of this paper should also receive special mention.

Haeser, H., ‘ Geschichte der Medicine,’ Vol. I, Jena 1875. Hoffman, * History of American Pharmacy.’ Transactions Am. Pharm. Ass’n, 1902.

Park, ‘ An Epitome of the History of Medicine,’ Phila¬ delphia i897.

Renouard, ‘ History of Medicine.’ Trans, by Comegys, Philadelphia 1867.

Schelenz, H., ‘ Geschichte der Pharmazie,’ Berlin 1904. Wise, ‘ Review of the History of Medicine,’ London 1867.

John Uri Lloyd,

President Lloyd Library, Cincinnati, Ohio.

PHARNACES, far’na-sez, king of Pontus, son of Mithridates the Great. He usurped the throne of his father, who was compelled to commit suicide, 63 b.c., and by friendly em¬ bassies to Pompey enjoyed for a time the friend¬

ship of Rome. The civil war between Caesar and Pompey tempted him to make an effort to extend his territory, thereby bringing on a war with Rome. For a time he was successful, capturing Colchis and Armenia, but Caesar him¬ self met him near Zela (47 b.c.), utterly routed his armies, and sent to Rome the famous mes¬ sage, ((Veni, vidi, vici.® Reports conflict con¬ cerning the fate of Pharnaces, some accounts having him slain by his son-in-law, A sander, while others make him die in captivity.

PHAROS, an island off the coast of Egypt opposite Rakotis. The island was connected with the mainland by Alexander the Great, who constructed the famous mole known as the Heptastadium. At the entrance of the greater harbor Ptolemy I engaged Sostratus of Cnidus to erect a great lighthouse, which was brought to completion under Ptolemy Philadelphus. This huge tower had a square base 100 feet to the side and a beacon fire was maintained at the summit. It ranked as one of the wonders of the ancient world but there are evident

exaggerations as to its height and other dimen¬ sions. On 7 Aug. 1303 this lighthouse, long known as the Pharos of Alexandria, was partially destroyed by an earthquake, and its ruin was comoleted about 1346. Subsequently the stone was used in the construction of the fort Kait Bai. Consult Tubker, (Reallexikon des klassischen Altertums) (Vol. II, 8th ed., Leipzig 1914).

PHARSALIA, far-sa'H-a, the name given to the northermost section of the great plains of southern Thessaly, whose principal city is Pharsalus (q.v.). The name of the district is sometimes applied to the battle, better known as that of Pharsalus; and served Lucan (q.v.) as the title for his republican epic glorifying Cato and the other opponents of Caesar, many of whom were killed in that battle.

PHARSALUS, far-sa'lus (now Fersala in Greek; Chatalja in Turkish), city of southern Thessaly on the Enipeus, south of Larissa. A town of considerable antiquity with fortifica¬ tions commanding the important defiles of the Othrys, one of the gateways of northern Greece, it played no part in Greek history, but was the scene of a Roman victory over Philip V of Macedon in 196, and in 48 b.c. (9 August, or possibly 6 June), of the complete defeat of Pompey (q.v.) by Julius Caesar (q.v.), the be¬ ginning of the end of republican Rome. In 1881 Pharsalus became a part of Greece through cession, with Thessaly, by the Turks. In the war between Greece and Turkey the Greeks were defeated near this town 5 May 1897, and the Turks occupied it the next day. Since 1900 the city has been the seat of two Roman Catholic sees : Phanarus and Thessaliotides.

PHARYNGITIS, inflammation of the mucous membrane which lines the pharynx (q.v.). See Nose and Throat, Diseases of.

PHARYNX, the region included in the back part of the mouth and upper portion of the throat. The pharynx is a funnel-shaped elastic pouch-like passage, about four inches in length, connecting the cavities of the mouth and nose with the oesophagus and the larynx. In repose the pharynx is continuously open for the passage of air to and from the lungs. During the act of swallowing, the pharynx is

closed by its muscular fibres to impel the food toward the stomach. As a whole, it is attached superiorly to the basilar process of the occipital bone. Its broadest part lies opposite the hyoid bone. Its lowest boundary is at the cricoid cartilage of the larynx, that is, about the level of the fifth cervical vertebra, where it passes into and becomes continuous with the narrower oesophagus or <(gullet.® It is loosely attached behind to the bodies of the cervical vertebrae by areolar tissue destitute of fatty elements.

The pharynx is composed of three coats — the inner being the mucous layer, the middle a fibrous coat, and the outer a muscular layer. The muscular coat is composed of various distinct muscles, chief among which are the three constrictor muscles of each side. The in¬ ferior constrictor arises from the sides of the cricoid and thyroid cartilages; the middle con¬ strictor takes origin from the great cornu or horn of the hyoid bone, from the lesser cornu, and from part of the stylo-hyoid ligament; while the superior constrictor, situated at the upper part of the pharynx, arises from the hamular process of the sphenoid bone. All of these muscles are inserted into the middle line of the pharynx. The stylo-pharyngeal muscle of each side arises from the inner aspect of the base of the styloid process. The constrictor muscles of the pharynx contract upon food and cause it to pass downward to the oesophagus, the action of the stylo-pharyngei muscles being to draw the sides of the pharynx outward and upward and so to widen the cavity for the reception of food from the base of the tongue. The pharynx forms only part of the mechanism connected with swallowing the tongue and the palate (q.v.) and its arches and muscles being also intimately concerned in the process. The pharynx is also concerned in the modulation of the voice.

The pharynx is commonly considered as of two general parts : The nasal, or nasopharynx — that part above the plane of the soft palate; and the oral, or oropharynx — that part below the soft palate. Some anatomists divide the oropharynx into a middle section to which they limit that name, and the laryngopharynx, the section lying next to the larynx.

Seven apertures open into the pharynx : The two Eustachian tubes of the ear; the two pos¬ terior nares or hinder openings of the nostrils; the single aperture opening backward from the mouth, termed the isthmus facium; the cordiform or heart-shaped opening of the larynx, guarded by the epiglotis; and the opening of the oesophagus, into which the pharynx itself is continued. See Adenoids ; Alimentary

System ; Brain; Digestion; Nose and Throat.

PHASCOLOGALE, fas-ko-lo ga-le, or ((pouched mouse,® a genus of small marsupials, differing from the dasyures in their dentition, which is on the insectivorous order; found throughout Australia, New Guinea and the Aru Islands. They bear some resemblance to rats, but are usually much smaller. The muzzle is long and pointed, and the ears are somewhat rounded and nearly naked. The pouch is rudi¬ mentary, rarely more than a fold in the skin below the teats which range from 4 to 10 in number. The latter fact would indicate that they produce more young at a birth than any other marsupial. The hind feet have five toes

and generally are broad with smooth soles. They feed on insects, and climb trees (except P. virginice of North Queensland) in order to get them. P. penicillata, or Tapoa Tafa, is one of the commonest species, and is a pretty little animal with a bushy tail. The four Papuai varieties are marked with a stripe. See Dasyure.

PHASE. See Electrical Terms.

PHASE, or PHASIS, in astronomy, one of the appearances noted as to the illumination of the moon in its passing from an unillumined state (dark moon) through that of a continu¬ ally broadening crescent and gibbous stages to a complete orb (full moon), and back to a dark moon again. (See Moon). Similar phases are undergone by the planets whose orbits lie between that of the earth and the sun. Mars, though his orbit lies outside the earth's orbit, exhibits slight phases ; when in opposition his disk is circular, at all other times it is gibbous. Saturn's rings, also, show limited phases.

PHASIS, fa/ sis, in ancient geography, a navigable river of Colchis, 305 miles in length, rising in the mountains of Armenia, and form¬ ing a part of the boundary line between Colchis and Asia Minor. It is now called Rioni.or Rion (q.v.), after one of its tributaries, the Rhion of antiquity. Near it pheasants were plentiful and their name, Phasianus colchicus , is derived from that of the river, Phasiani in Latin mean¬ ing ˆbelonging to the Phasis.®

PHASMIDˆE, or ((spectre insects,® <(leaf insects,® and ' "walking sticks,® a family of orthopterous insects allied to the Mantidcu, and remarkable for their very close resemblance to the leaves, twigs, grass and lichen-covered bark in the midst of which they live. The family

includes about 600 species, nearly all being natives of tropical and semi-tropical Asia, Africa and Australia. Only six genera are represented in the United States and only one species, Diapheroma femorata, in the eastern section. The others are to be found only in the south and southwest. They are all vege¬ table feeders in which they differ from the Mantida. Some of them are destitute of wings, and have the appearance of dead twigs, while the motionless attitudes they assume add to the deception. In others, as the genus Phyllium, the wings have the appearance of withered leaves, while the brighter hue of the wing-covers of a few of larger size give to the animal the appearance of a fresher leaf. An interest¬ ing peculiarity of these insects is their ability to reproduce a lost limb in the succeeding molt, provided the joint next the body was not severed. See Leaf-Insect; Mimicry in Animals ; Walking-Stick Insect.

PHEASANT, the common appellation of a group of magnificent gallinaceous birds gen¬ erally considered to constitute a family (Phasi - anidee) . There are 20 genera included, with over 100 species. The name is an Anglicized form of the Latin Phasianus. The upper man¬ dible is arched, overhangs the lower at the tip, and is naked at its base ; the nostrils are placed at the base of the mandible, and are covered by a scale. The cheeks, region about the eyes, and often other parts of the head are naked and often provided with fleshy outgrowths.

The wings are short; the tail long, wedge-shaped, and consisting of 18 to 32 feathers, but with its coverts often presenting a remarkable development. The three front toes are united by a membrane up to the first joint, and the hinder toe is articulated to the tarsus. The males possess horny tarsal spurs. The food consists of grains, soft herbage, roots and in¬ sects. Pheasants are chiefly terrestrial in habits, taking short, rapid flights when alarmed. They are polygamous, the males and females consorting promiscuously together during the breeding-time, which occurs in spring. The simple nest is commonly formed amid long grass or bushes, and the female performs the entire duties of incubation. No true pheasants are indigenous to America, but all of

the genera and species belong to Asia and are particularly represented in India and Indo-China. The English ring-necked pheasant, which is a familiar bird in this country, having been introduced into pheasantries and preserves, is a hybrid between the ring-necked pheasant (Phasianus torquatus), imported from China about a century ago, and P. colchicus, which is supposed to have been brought to Great Britain by the Romans, but may have been native. This pheasant is found throughout southern Europe, and was known to the ancient Greeks and Romans; Jason is reported to have brought it from Colchis in the famous ship Argo. The English pheasant often has also blood of P. versicolor and the plumage varies accordingly.

These birds breed freely in a domesticated state. The pheasant will interbreed with the common fowl, the Guinea fowl, and even with the black grouse; and there are white and pied varieties of the common species. The hybrid produced by the union of a cock-pheasant with the common hen is termed a pero. The female pheasants when old may, like peafowl, assume the feathers and general plumage of the males.

The pheasant is a famous game-bird in Eng¬ land and parts of the Continent. Great numbers are reared and fed artificially, and liberated in selected coverts on English estates. Consider¬ able numbers have been placed on preserves in certain parts of the United States; but, while these handsome birds undoubtedly add interest to the landscape, pheasant shooting cannot be commended as a sport ; the birds are too tame. As practised in England it differs little from a slaughter of barnyard fowls.

The green pheasant of Japan (P. versicolor) and the copper pheasant of China (P. soemmer-ringi) have also been introduced into the United States. Many of the Asiatic species of pheas¬ ants, the males of which exhibit strikingly handsome colors or peculiar modifications of the plumage, are well-known objects in aviaries and fancy-poultry yards in this country. The golden pheasant (Chrysolophus pictus) of eastern Tibet and southern China is a beautiful species, colored scarlet, blue, black and yellow, and having a brilliant golden erectile crest borne on the head. The Lady Amherst pheasant (C. Amherstice) is one of the most brilliant and among the largest, reaching 50 inches in length and exhibiting golden yellow, orange, blue, russet and crimson shades. It succeeds well in confinement. The silver pheasant of Indo-China and the lower Himalayas (Gennceus nycthemerus) belongs to the Kalij (kaleege) group. It possesses a generally silver-white

plumage, the feathers being marked by fine con¬ centric black lines; the under parts are colored black. The tragopan or “horned^ pheasant (Tragopan satyra), found in the Himalayas, approaches more nearly the domestic barnyard fowls. The males of this species possess pe¬ culiar bluish, fleshy, horn-like processes on the head, and wattles of a similar color. The male plumage is colored red with white spots, that of the females being brown. The habitat of the tragopan is the high Himalayan forests, from 7,000 to 12,000 feet elevation. The argus pheas¬ ant (Argusianus argus), included by some naturalists with the peacocks (Pavonince) , is a large species found in Sumatra and the Indo-Malayan region. The males of this bird measure from five to six feet from the tip of the beak to the extremity of the tail. The plumage is exceedingly beautiful, the second¬ ary quills of the wings being each adorned with a series of ocellated or eye-like spots of bril¬ liant metallic hues. The general body plumage is colored brown. The flight is feeble, owing to the length of the secondary feathers, which latter, however, assist these birds in running. A bird of somewhat similar eye-spots found over the same region is the peacock pheasant (Poly pie ctr on).

Reinhardt’s argus pheasant (Reinhardius ocellatus) also belongs in this group, and is the largest of the pheasants, being 84 inches in length ; of which the tail measures 60 inches. The Blood pheasant (Ithaginis) is a native of Tibet inhabiting even higher elevations than the Tragopan — from 10,000 to 14,000 feet al¬ titudes. The male has bright grass-green plum¬ age; the female, brown. The Eared pheasant (Crossoptilon) is another species of the high Himalayas. It readily becomes extremely tame, and promises to be one of the best for domesti¬ cation. The Cheer pheasant is another Hima¬ layan species frequenting the lower levels. Its colors are less striking but elegant — buff, barred with black and pale blue. Reeves’ pheasant, a native of central Asia, is a very large bird, 75 inches in length, with a long white tail barred with black. It has been naturalized in English coverts, and also tested in the United States. It is regarded as the ^gamest® of all the pheasants, flying readily and with great swiftness. Other pheasants often found in aviaries are the Firebacks (Lophura) of Cochin China and Malaysia, and the Koklass pheasant (Pucrasia) from the mountain region of Afghanistan. The gorgeous Impeyan pheasant or Moonal (Lophophorus impeyanus) is found in South Kashmir. This, and related species of the same genus inhabiting the - Himalayas, are of surpassing beauty, with their crested heads and brilliant metallic greens, purples, golden and coppery colors, set off by patches of silvery white and velvety black. The Jungle Fowl (Gallus), from which our domestic fowls are doubtless descended, is a member

of the pheasant group. So also is the Peafowl (q. v.). In parts of the United States the ruffed grouse is erroneously known under the name of ˆpheasant.® The turkeys belong to a family closely related to the pheasants, which they represent in the native avifauna of America.

The first successful introduction of pheas¬ ants into the United States was in 1880-81 by Hon. O. N. Denny, then consul-general at

Shanghai, China. He selected the native ring¬ necked pheasants and in two importations suc¬ ceeded in landing alive 22 cocks and 20 hens. These birds were liberated in the Willamette Valley, in Oregon, and prospered exceedingly In 1892 an open season of 10 weeks was de¬ clared, and it was reported that the first day's shooting netted 50,000 birds. This experience aroused a demand from all parts of the country for breeding stock, and pheasantries multiplied throughout Oregon. In 1899 alone shipments of breeding birds were made to 509 different localities, from Alaska to Mexico. The greater part of these experiments failed utterly, but the birds have flourished in Oregon, Washing¬ ton and British Columbia. Consult Barton, F. T., (Pheasants in Covert and Aviary* (Lon¬ don 1912); Elliott, D. G., (Monograph of the. Phasianidae* (2 vols., New York 1872) ; Tegetmeier, W. B., (Pheasants: their Natural History and Management (London 1897); United States Department of Agriculture, farmers' Bulletin 390* (Washington 1910).

J. Percy Moore, University of Pennsylvania.

PHEASANT'S EYE, a popular name for the garden Adonis flower (Adonis cestivalis). It is also used as a distinctive name for a par¬ ticular group of hardy pinks. See Pinks.

PHˆDRE, fa/dr' (Phaedra 1677) was the last tragedy written for public

performance by Jean Racine and shows his dramatic method in its highest development. He gave it the first place among his tragedies. Boileau agreed with him. Votaire thought Phaedra's role (<the finest ever put on the stage in any language.® Yet its immediate success was bitterly contested, as that of some of his other plays had already been, by a court cabal directed by the Duchess de Bouillon. Pradon's insignificant (Phedre et Hyppolyte) was set up against it. There was a lively war of sonnets, too, in which Racine s friend Boileau had the better part. Old scan¬ dals were revamped, and matters grew so em; bittered that only the intervention of Conde saved Racine from prosecution on a trumped-up charge of corruption of public morals. With the subsidence of personal piques and passions <Phedre) was recognized as a masterpiece and has engaged the talent of a long series of great actresses to this day. The thenie is that of the exquisite <Hippolytus) of Euripides and the declamatory (Phaedra, } or hippolytus,* of Seneca Comparison well illustrates the Greek and the Roman practice in tragedy and the French classical tradition. But in (Phedre * as in no other French drama, the analysis of passion is so wrought as to produce not merely Aristotle's purgation by. moral fear but also by psychic terror at the victims' powerlessness to contend against what she knows to be sin against ((Venus clinging utterly to her prey® (line 306). Racine thus wholly changes the ethical bearings of the situation. He brings into it a Christian conviction and something of the peculiarly Jansenist theory of the powerless¬ ness of the human will without prevenient di¬ vine grace, which was then deeply engaging his interest and that of Church and court in France. This gives to his treatment of the characters in the play a distinct modernity. Greek feelings and ideas are so deftly mingled with the modern fffat this heroine of ancient legend seems, in

Chateaubriand's phrase, <(the sinner fallen alive into the hands of God,® to be pitied, though inexcusable.

Phaedra, young bride of the aging Theseus, who has left her at Troezen, finds herself truly sick of love for his son Hippolytus, votary of the chaste huntress Diana and cold to her advances. Her ((shameful grief® is thus further inflamed. She knows it to be criminal, but finds no power in herself to resist <(all the furies of love® which drag her, the woman scorned, through desire of death and fear for her good name, to frantic resolve of jealous vengeance. Calumniating the son to the father, she leads Theseus to will and effect the death of Hippolytus, whose strange fate is re¬ counted in the famous recit de Theramene, a stock declamation piece in France (lines 1498-1570).

Phaedra in terrified remorse confesses her fault. Her guilty confidante Oenone <(has found in the sea too mild an expiation.® She ˆexposing her penitence to all, will go down to the dead by a slower way,® and ends her life by a poison of Medea's brewing.

Phedre is edited with English Comments by Bue (London 1903), and Babbitt (Boston 1910) ; with French comments by Mesnard in (Oeuvres de J. Racine) (Vol. Ill, 1865) and by Clouard in (Theatre complet de Racine) (Vol. Ill, 1912). Translated as (Phaedra* by Boswell in (Dramatic Works of Racine) (Lon¬ don 1890), by Tickell and others. Consult Deltour, (Les Ennemis de Racine) (pp. 331— 368, Paris 1859).

Benjamin W. Wells.

PHELAN, James Duval, American legis¬ lator: b. San Francisco, 20 April 1861. In 1881 he was graduated at Saint Ignatius College and studied law at the University of California. He was a commissioner and a vice-president of the World's Columbian Commission and after the San Francisco disaster of 1906 was president of the Relief and Red Cross funds; was designated by President Roosevelt to receive funds and was member of the committee of 50 and 40 for relief and reconstruction. He erected the largest office building in San Fran¬ cisco after the fire. In 1896-1902 Mr. Phelan was mayor of San Francisco and in 1900 re¬ ceived a complimentary vote for United States senator in the California legislature. In 1913 President Wilson appointed him special com¬ missioner to Europe to support his invitation to foreign countries to participate in the Panama-Pacific Exposition of 1915, and was also special commissioner to investigate the diplomatic complications arising in Santo Domingo in 1915. In 1914 he was elected to the United States Senate for the term 1915-21.

PHELAN, Richard, American Roman Catholic bishop: b. near Ballyragget, County Kilkenny, Ireland, 1 Jan. 1828; d. Idlewood, Pa., 20 Dec. 1904. He was educated in the College of Saint Kieran, Kilkenny; came to this country in 1850 attending first the old seminary of Saint Michaels, and subsequently spending three years in Saint Mary's Theological Seminary at Baltimore. Ordained to the priesthood in 1855 He was for four years a curate at Saint Paul's Cathedral at Pittsburgh, after which he served as pastor at Freeport, Pa., until 1868, when he was appointed pastor of Saint Peter's Church, Allegheny City. A new church which

he built there at a cost of $150,000, regarded as perhaps the finest in Western Pennsylvania, was destroyed by fire just as Father Phelan was leaving for a new and higher appointment. He relinquished his elevation and remained with the charge until a new church had replaced the ruins of the former building. He served the diocese several times as administrator and in 1883 was made vicar-general. In 1885 he was consecrated coadjutor bishop of the two sees of Allegheny and Pittsburgh, succeeding to the full bishopric of Pittsburgh in December 1889.

PHELPS, Anson Greene, American mer¬ chant and philanthropist : b. Simsbury, Conn., 12 March 1781 ; d. New York, 30 Nov. 1853. He was by trade a saddler and at 18 established himself in business at Hartford, Conn., after¬ ward owning a branch business at Charleston, S. C. In 1815 he removed to New York where he formed a partnership with Elisha Peck under the title of Phelps and Peck, dealing in tin plate and heavy metals. This house became the largest house in the metal trade in the United States. By the later addition of Mr. William E. Dodge, a recruit from the dry goods trade, the world famous house of Phelps, Dodge and Company was established. In 1845, Mr. Phelps bought a dam and surrounding lands on the Naugatuck River, Connecticut, and built a factory and some dwelling-houses; thus founding the town of Ansonia which was named for him. Out of this concern grew the great Ansonia Brass and Copper Company. Mr. Phelps amassed a large fortune, which was augmented by fortunate investments in real es¬ tate. His later years were spent in benevolent enterprises ; he was president of the American Board of Commissioners for Foreign Missions; of the New York Asylum for the Blind: the Seaman's Friend Society; the Seamen's Bank for Savings; the American Tract Society,' and the New York branch of the Colonization So¬ ciety. His will bequeathed large sums to re¬ ligious and charitable institutions.

PHELPS, Austin, American Congrega¬ tional clergyman and author: b. West Brook¬ field, Mass., 7 Jan. 1820; d. Bar Harbor, Me., 13 Oct. 1890. He entered Hobart College, and after two years there went to Amherst and thence to the University of Pennsylvania where he was

graduated at the head of his class in 1837. He studied theology first at the Union Theological Seminary in New York and later at the Yale Theological School; but having begun to preach, he was persistently urged before his course was completed to accept a pastorate. He continued his study, however, until 1842 when he accepted a call to the Pine Street Con¬ gregational Church, Boston. He remained pas¬ tor of this church until 1848 when he resigned to accept the chair of Homiletics and Sacred Rhetoric in Andover Theological Seminary. His health failing he resigned his professorship in 1879. He had also been president of the in¬ stitution from 1869. The rest of his life was spent in retirement. His published works in¬ clude (The Still Hour) (1859), a book which was reprinted in many thousands abroad; (The New Birth) (1867) ; (Studies of the Old Testa¬ ment (1879) ; (Theory and Practice of Preach¬ ing, } a much valued work (1881); (Men and Books) (1882) ; (English Style in Public Discourse) (1883) ; (My Studies and Other Es¬

says) (1886); (My Note Book: Fragmentary Studies in Theology and Subjects Adjacent Thereto) (1889). He was, besides, a constant contributor to (The Congregationalism* and other religious periodicals. (See also Phelps, Elizabeth Stuart). Consult (Austin Phelps: A Memoir, > by Elizabeth Stuart Phelps-Ward (New York 1891).

PHELPS, Charles Edward, American sol¬ dier and jurist: b. Guilford, Vt., 1 May 1833; d. Baltimore, Md., 26 Dec. 1908. He was gradu¬ ated from Princeton in 1852, from Harvard Law School in 1853, and established a law prac¬ tice in Baltimore, Md. He was one of the founders of the Maryland Guard, serving first as captain and later as major. In 1862 he en¬ tered the Federal service as lieutenant-colonel in the 7th Maryland Volunteers, and was soon made colonel. He commanded a division of the Fifth Army Corps at Laurel Hill, where he was severely wounded. He was nromoted to the rank of brevet brigadier-general of volun¬ teers and was awarded a medal of honor for gallantry at the battles of the Wilderness and Spottsylvania. He was elected to Congress in 1864 and 1866, and in 1882 elected to the Supreme bench, Baltimore, for a 15-year term. Reelected in 1897 for a like term, a special act of the legislature in 1902 permitting him to continue in office, though past the constitutional age limit. He was professor of law at the University of Maryland and wrote (Phelps's Juridical Equity* (1894) and (Fa:lstaff and Equity * (1901).

PHELPS, Edward John, American diplo¬ matist: b. Middlebury, Vt., 11

July 1822; d. New Haven, Conn., 9 March 1900. He was graduated at Middlebury College in 1840, and took up the study of law in the office of Horatio Seymour at Utica, finishing with a year at the Yale Law School; was admitted to the Vermont bar in 1843, and began practice at Middlebury, but in 1845 settled in Burlington, Vt. In 1851 he was appointed second comptroller of the treasury by President Fillmore and remained in the office through his administration. He was strongly opposed to the Civil War, was a mem¬ ber of the Vermont constitutional convention in 1870, and in 1881 was president of the Ameri¬ can Bar Association, and in that year ran for governor of Vermont on the Democratic ticket but was defeated. _ In 1881 he was made Kent professor of law in the Yale Law School and also lecturer on constitutional law in Boston University. President Cleveland appointed him Minister to England 1885-89. In 1890 he was the Democratic candidate for United States senator in the Vermont legislature but failed of election. During the Bering Sea dispute in 1893 he was appointed by President Harrison senior counsel for the United States, after which he resumed his chair at Yale and con¬ tinued there until his death. He wrote 'The Life and Character of Charles Linsley) ; Ora¬ tions and Essays* (published posthumously 1901), and a series of articles on the Constitu¬ tion of the United States published in the Nineteenth Century in 1888.

PHELPS, Elizabeth Stuart (<(H. Trusta**): American author: b. Andover, Mass., 13 Aug. 1815; d. Boston, Mass., 30 Nov. 1852. She was married to Austin Phelps (q.v.) in 1842 and subsequently devoted much attention to writing.

Her (Sunny Side) (1851) reached a sale of over 100,000 in one year. Among her other works are the (<Kitty Brown** series (1850) ; (The Angel over the Right Shoulder* (1851) ; (A Peep at Number Five* (1851) ; (The Tell-Tale* (1852); <Little Mary* (1853). and <The Last Sheaf from Sunny Side* (published with a memorial by her husband 1853).

PHELPS, Elizabeth Stuart. See Ward, Elizabeth Stuart Phelps.

PHELPS, John Wolcott, American soldier and abolitionist: b. Guilford Centre, Vt., 13 Nov. 1813; d. Brattleboro, Vt., 2 Feb. 1885. His progenitors for several generations were eminent lawyers He was graduated at West Point in 1836; entered the artillery and served against the Creeks and Seminoles, 1836-38. After this war he was in charge of the removal of the Cherokee Indians to the West. In the Mexican War he fought at Monterey, Vera Cruz, Cerro Gordo, Contreras, Molino del Rey, and City of Mexico, and was brevetted captain for gallant conduct, but declined a nominal pro¬ motion, and in 1850 received the regular pro¬ motion to that rank. He served along the Mexican border until 1852 when he went to Europe on a year's furlough. On his return he served under General Johnson in the Utah expedition. He resigned from the army in 1859, and devoted himself to writing vigorous and scholarly articles attacking the principle and practice of slavery. He enlisted in 1861 as colonel of the 1st Vermont Volunteers, was soon made brigadier-general, and was with Farragut in the lower Mississippi in April 1862. He occupied New Orleans 1 May 1862, and is¬ sued soon after a proclamation against slavery, which resulted in a reproof from General But¬ ler. During his command of Camp Parapet, near New Orleans, the camp was thronged with escaped slaves and General Phelps began or¬ ganizing them as troops. The government was not yet ready to accept this policy, and General Phelps was sharply rebuked, and ordered to use the negroes only for menial labor, the argument presented being that they were still slaves, and that slaves could not be soldiers. In August 1862 he was declared an outlaw by the Con¬ federate government for having ((organized and armed negro slaves.** Failing to make headway against continual opposition, he resigned and returned to Vermont. A few months later the government adopted his view, and began to organize negro regiments, and President Lincoln tendered him a commission as major-general in command of such troops. This, however, he declined. In Vermont he took a prominent part in educational work and in historical research, and was an eminent anti-Mason. He was nominated for the Presidency by the American (or Anti-Masonic) party in 1880. He opposed all secret societies, and in 1864 translated de la Hodde's (Societes secretes de France* under the title (The Cradle of Rebellions.* He also wrote (Sibylline Leaves* (1858); (Secret So¬ cieties, Ancient and Modern* (18731 : (History of Madagascar* (1884), and contributed exten¬ sively to literary and scientific oeriodicals of the day. Consult biographical sketch by Howard, C. H. C. (Brattleboro, Vt., 1887).

PHELPS, Oliver, American merchant and land speculator: b. Windsor, Conn., 1749; d. Canandaigua, N. Y„ 21 Feb. 1809. He was a

merchant in Suffield, Conn., and from 1771 in Granville, Mass., and amassed a large fortune. In 1788 he formed a partnership with Nathaniel Gorham and purchased from the Common¬ wealth of Massachusetts its pre-emptive rights to a tract of 6,000,000 acres of land in New York for £300,000, to be paid for in “consolidated securities,** The land was within the charter limits of both New York and Massachusetts, but a compromise was effected whereby the sovereignty remained with New York and the ownership of the territory was ceded to Massa¬ chusetts by the Hartford convention of 1786. Phelps secured the Indian title to 2,600,000 acres of the land and opened at Canandaigua the first land office in the country. The rise in value of the “consolidated securities** made full payment impossible and Phelps relinquished to the State the portion of the land still unpaid for. In 1790 he sold to Robert Morris his remaining share, 2,100,000 acres, and in 1795, in partnership with several others, purchased from Connecticut 3,- 300,000 acres in Ohio, known as the Western Reserve. Later he sold his interest and re¬ turned to Canandaigua. He was the first judge of the county of Ontario, and was a member of Congress in 1803-05. He took an active inter¬ est in the Erie Canal and the Welland Canal, and for a time engaged in building steamboats on Cayuga Lake.

PHELPS, Samuel, English actor: b. Devon-port, Devonshire, 13 Feb. 1804; d. near Epping, Essex, England, 6 Noy. 1878. He was em¬ ployed as junior reader in the office of the Plymouth Herald, and later on the London Globe and Sun. For some time he belonged to a private amateur theatrical society of which Douglas Jerrold and William Edward Love were also members. In 1825 he made his pub¬ lic debut as an amateur at the Olympic Theatre, later joining a circuit in which he achieved pop¬ ular success. In 1837 he made his first appear¬ ance in London, in the character of Shylock, at the Haymarket Theatre and scored a success, appearing later in the same season with Ma-cready in Covent Garden Theatre, alternating with him the roles of Othello and Iago. He came rapidly to the front as an actor, rivaling Charles Kean in many Shakespearian roles. In partnership with Thomas Greenwood and Mrs. Warner he took the management of Sadler’s Wells Theatre, Islington, in 1844, and there achieved a great success, extending over 20 years, and producing more than 30 of the plays of Shakespeare and other famous dramatists. He published an edition of Shakespeare in 1853. Consult Coleman, J., (Memoirs of Phelps*

(London 1886) ; Forbes-Robertson, J., <Lifeand Life-Work of Phelps* (London 1886).

PHELPS, Thomas Stowell, American naval officer: b. Buckfield, Me., 2 Nov. 1822; d. New York, 10 Jan. 1901. He was graduated from the United States Naval Academy in 1846, served in the Mexican War, was engaged in the coast survey, and participated in the Indian War in Washington Territory in 1855-56. In 1858-59 he served on the Paraguay expedition as master, and later as lieutenant, and at the outbreak of the Civil War was in command of the coast survey steamer Vixen, engaged in making surveys of southern harbors. # He joined the naval expedition for the relief of Fort Sumter and was actively employed in making the needed war charts of southern

rivers and inlets, taking part in many skir¬ mishes while carrying on his work. In 1862 he joined the North Atlantic squadron and partici¬ pated in the Peninsula Campaign (q.v.). He was commissioned lieutenant-commander and took a creditable part in many engagements. In 1863 he was made commander of the Corwin and resumed the work of making charts for campaign purposes. In 1864 he distinguished himself at Fort Fisher, where he commanded the Juanita. He afterward served on the southern coast until 1867, when he was trans¬ ferred to the California navy yard. In 1871 he was promoted to the rank of captain, and in 1879 to commodore. In 1881-82 he was com¬ mandant of the Mare Island navy yard and in 1883-84 commanded the South Atlantic, squad¬ ron. In 1884 he was made rear-admiral and was retired in that year, atter 45 years of active service. He published (Sailing Directions for the Straits of Magellan> (1855) ; and Remi¬ niscences of Washington Territory) (1882).

PHELPS, William Lyon, American educa¬ tor: b. New Haven, Conn., 2 Jan. 1865. He was graduated from Yale in 1887 and is now professor of English literature there. He is the author of (The Beginnings of the English Romantic Movement (1893) ; (The Permanent Contribution of the 19th Century to English Literature* (1901) ; (A Dash at the Pole) (1909) ; (Essays on Modern Novelists) (1910) ;

(Essays on Russian Novelists) (1911) ; Teach¬ ing in School and

College) (1812) ; (Essays on Books) (1914); (Browning, How to Know HinP (1915) ; (The Advance of the English Novel* (1916) ; (Archibald Marshall* (1918). He has also edited many editions of English classical authors. He is vice-president of the National Institute of Arts and Letters, member of the Authors Club, London, and president of the New Haven Symphony Orchestra. Mr. Phelps is also a well-known lecturer on literary subj ects.

PHELPS, William Walter, American statesman and diplomat: b. New York, 24 Aug. 1839; d. Teaneck, N. J., 16 June 1894. He was graduated from Yale in 1860 and from the Co¬ lumbia Law School in 1863, engaged in an ex¬ tensive law practice as counsel for a number of banks and trust companies, and nine railroad companies. Upon the death of his father he withdrew from his general law practice and devoted his energies to the management of some large estates and the trusts connected with them. In 1872 he was elected member of Con¬ gress from New Jersey on the Republican ticket, and took an active part in the proceed¬ ings of that body, particularly on monetary questions. He was appointed Minister to Aus¬ tria in 1881, resigned in the following year, and in 1882-88 was again in Congress for three con¬ secutive terms. In 1889 he was one of three United States commissioners to the Interna¬ tional Conference on the Samoan question, held in Berlin, and in 1889-93 was United States Minister to Berlin. In the latter year he was appointed judge of the New Jersey Court of Errors and Appeals, which office he resigned on account of failing health a few weeks before his death.

PHENACETIN, fe-nas'e-tm, in pharmacy, CcHb.O.C«H4.NH.COCH3, para-acet-phenetidin (acetphenetidin in the United States Pharma¬

copoeia) is formed by the action of the strong¬ est acetic acid on para-phenetidin, a body re¬ lated to both aniline and phenetol. When crys¬ tallized from a water solution phenacetin forms colorless crystalline scales, odorless, tasteless, sparingly soluble in cold water, more so in hot water or alcohol. It has found extensive use as an antipyretic and an analgesic, being one of the least dangerous and most efficient drugs of its kind. It is a heart depressant, diminishing the action of the cardiac muscle. Frequently combined with caffeine when used for relief of headache, neuralgia, the pains of rheumatism, and the like. See Analgesics; Antipyretics.

PHENACITE, a transparent mineral, not unlike quartz, for which it may be easily mis¬ taken, usually colorless, but sometimes tinted

yellowish or wine-red. It possesses extraordi¬ nary hardness, 7.5 to 7.8, and yields gems of much brilliancy. It occurs in prismatic crystals often very large, up to one pound or more in weight, and also in lenticular form in Russia and Switzerland, also in the United States, with topaz at Topaz Butte (near Florissant), and on Mount Antero, Colorado. In lenticular form it is found with topaz on Bald Face Mountain near Chatham in New Hampshire, and in the mica mines of Amelia County, Virginia. It is a beryllium orthosilicate, with the symbol Be2 Si04 or 2 BeO.Si02 and the average composi¬ tion : silica 54.45 per cent and glucina 45.55 per cent.

PHENACODUS, or PHENACODON,

a typical perissodactylic representative of the early extinct, ungulate group Condylarthra (q.v.), whose well-preserved remains are recov¬ ered from the lowest strata of the Lower Eocene (Wasatch) formations of the central Rocky Mountain region. Two species are known — P. primcevus , about as large as a tapir and P. wortmanni , smaller — that is, from five to six feet in length. The head was com¬ paratively small and the brain-cavity relatively so and the brain itself small and smooth, the cerebellum uncovered and as large as the cerebrum. The halves of the lower jaw are not fused at the chin ; the dentition is general¬ ized; clavicles are absent; the hind limbs are much larger than the fore limbs and the feet are nearly plantigrade and five-toed. The ter¬ minal phalanges of the toes show that they did not bear claws but hoofs, with the axis pass¬ ing through the third digit, foreshadowing the condition of the single-hoofed animals (horses). Consult Woodward J., (Vertebrate Palaeon¬ tology } (London 1898) : Beddard, F. E., (Mammalia) (London 1902).

PHENOL, or CARBOLIC ACID,

C0H5OH, is the first member of a series of hydroxy compounds in which the hydroxyl group is directly attached to the nucleus. It was dis¬ covered by Runge in coal-tar, in 1834. The commercial' product is obtained from this source by fractional distillation. The fraction containing carbolic acid is shaken with suffi¬ cient sodium hydroxide solution to form so¬ dium phenate, which yields phenol when treated with carbon dioxide in the presence of a small quantity of sulphuric acid. For the manufacture of certain compounds, i.e., picric acid and for medicinal purposes, phenol is pre¬ pared synthetically by fusing dry sodium benzene sulphonate with caustic potash. The

product is cooled, dissolved in water and acidi¬ fied with HC1,H2S04 or carbonic acid. An¬ other synthetic process consists in the treat¬ ment of acidified aniline sulphate solution with the required quantity of sodium nitrite. The diazonium salt obtained in this reaction yields phenol when heated with water. The products in all these processes may be purified by dis¬ tillation. Phenol has also been obtained by the distillation of crystallized salicylic acid, and by heating molecular proportions of chlor¬ benzene, sodium hydroxide and water to about 300° C. under pressure.

Phenol crystallizes in needles or prisms, melts at 42° C. and boils at 183° C. It is very soluble in glycerine, alcohol, ether, chloroform, benzene and to a limited extent in water, one part of phenol dissolving in 15 parts of water at 16° C. ; the solubility increases with rise of temperature. The crystals of phenol are hygroscopic and liquefy in the presence of moisture. Under the influence of light or air the compound assumes a red color. According to recent investigations this is caused by minute traces of quinone or its derivatives. Chemi¬ cally pure phenol has practically no action upon blue litmus paper, the red color imparted to blue litmus by phenol from coal-tar is evi¬ dently due to benzoic acid. The hydroxides of strong alkalies, halogens, nitric acid, sulphuric acid and other reagents readily react with phe¬ nol forming a number of derivatives.

Phenol finds wide application as a power¬ ful antiseptic. Disinfecting powders or liquids contain a mixture of the compound with neu¬ tral substances like infusorial earth, tar-oil, *etc.* In the concentrated form phenol is a powerful irritant, coagulating albumin, destroy¬ ing the mucous membrane and gradually para¬ lyzing the higher tissues. Taken internally it acts as a fatal poison. Phenol is used on an extensive scale for the manufacture of picric acid, salicylic acid, phenacetin, phenolphthalein and other derivatives. It is an important in¬ termediate in the dye industry; with benzo-trichloride it forms benzaurine, with oxalic and sulphuric acids it condenses into coralline, with diazo-sulphanilic acid it is converted into Tropaeolin Y and with meta-and para-dia¬ mines it forms derivatives from which black dyes of the aniline-black series are obtained. The important commercial article, known as Bakelite, is manufactured by the condensation of Phenol with formaldehyde in the presence of a base. When this product is molded into the desired form and heated under pressure in the presence of a filling material like asbestos, rubber, casein, nitrocellulose, etc., it becomes insoluble, hard and sometimes infusible. But¬ tons, umbrella handles, insulators, tobacco pipes and

many useful articles of commerce are manufactured from Bakelite. See also Car¬ bolic Acid.

V. S. Babasinian,

Professor of Chemistry , Lihigh University.

PHENOL, Poisoning by. See Toxicology.

PHENYL, a monovalent radical with the symbol CoH5, entering into the composition of many organic substances, as benzene (phenylhy-dride) ; phenol (phenylhydroxyl) ; aniline (phenylamine) , *etc.* It exists in the free state in diphenyl, in the combination C«HB — HeCe—

PHERiE, fe’re, one of the most ancient cities of southeastern Thessaly, in the Pelasgi-otis. It was situated in a fertile region and was surrounded by gardens and plantations and was 10 miles westerly from its harbor city of Pagasae; both towns were intimately con¬ nected with the myth of Alcestis (q.v.) and Admetus, the son of Pheres, the founder of Pherae and father of Emmelus who sailed with 11 ships from Pherae and neighboring towns to take part in the Trojan War. In the early years of the 4th century b.c., toward the close of the Peloponnesian War, in which Pherae had aided the Athenians, a tyranny was es¬ tablished here by Lycophron, whose son Jason succeeded him, became the practical master of all northern Greece and thus the forerunner of Philip and Alexander of Macedon and was assassinated in b.c. 374, by his brothers. They quarreled quickly; Polyphron killed Polydorus and was himself assassinated by his nephew Alexander in 369, who is remembered for his fiendish cruelties. But his reign was short; about 359 his wife Thebe and her brothers killed him. The government was continued by two of the brothers, Tisiphonus and Lycophron, successively. The latter was deposed by Philip of Macedon, who, after an unsuccessful experi¬ ment with democratic government at Pherae, made it a part of the province of Thessaly. The ruins of Pherae may still be traced near the modern town of Velestino.

PHERECYDES, fer-e-si’dez, early Greek philosopher, probably belonging to the middle of the 6th century b.c. He was a native of the island of Syros (and is not to be confused with Pherecydes of Leros,

485-400 b.c., an Athenian historian, of whose works only frag¬ ments remain). His philosophy shows the in¬ fluence of the Phoenicians and probably had an admixture also of the Egyptian_and possibly included the doctrine of metempsychosis, or transmigration of souls. His great work, en¬ titled <Heptamychus) or 'Tentemychus,* a cos¬ mogony based on the three elemental energies of Time, Earth and Hither; a curious blending of science and mythology. Cicero says that Pherecydes was the first Greek to teach the immortality of the soul. Pythagoras was his pupil, but it has not been established that the theory of the transmigration of souls, pro¬ pounded by the latter, was a part of the phi¬ losophy of Pherecydes. Philo Judaeus is reck¬ oned among his followers. The few remains of his writing, in the Old Ionic dialect, are edited in Muller, K. O., (Fragmenta Historicorum Graeco rum > (Gottingen 1850) ; and the recently discovered (Marriage of Zeus and Chthonia) in Grenfell, B. P., (New Classical Fragments) (Oxford 1897).

PHI BETA KAPPA SOCIETY. See

Greek-letter Societies and College Frater¬ nities.

PHIDIAS, fid'i-as, Greek sculptor: b. Athens, b.c. 498; d. there, b.c. 432; the age of Pericles. He was the son of Charmides, and a pupil of Hegias the Athenian and probably of Ageladas, the sculptor of Argos. He was first employed on public works by Cimon (q.v.) under whom he executed several statues at Delphi. The works of himself and his pupils were exceedingly numerous, and he is said to have executed three important statues of Mi-

nerva or Athene alone, all o £ which were standing in the time of Pausanias (17a a.d.). One colossal statue, « Athene Promachos, » that is, the champion, was of bronze, the metal for which was taken from - the spoils of Marathon.

It stood between the Parthenon and the Propy-lseum. Upon her shield, in rilievo, was wrought the battle of the Centaurs, from designs by Parrhasius. Near the statue stood an owl, the bird of Athene, goddess of wisdom. This statue towered so high on the Acropolis that mariners, doubling the promontory of Sumum, saw her helmet and her spear. The second of his most famous statues was made of ivory

and gold. It was the Athene of the Parthenon or the temple of Parthenos, the virgin god¬ dess, and was about 41 14 English feet in height. This was the renowned chrysele-phantine statue, formed of wood overlaid with ivory. The arms were of gold, as was the peplos or gar¬ ment, and the metal' was either beaten or cast with such exquisite skill that this robe might be put off or on, and could be weighed by the treasurer of the temple. Thus the sculptor was enabled to refute the charge of pecula¬ tion afterward made against him, and fore¬ seen by Pericles who warned him to devise the removable garments. The gold weighed 44 talents. The eyes were of marble, painted ac¬ cording to the Homeric description of the blue-eyed goddess. The figure stood upright, segis on breast and spear in hand. A serpent or dragon stood near it, supposed to be that of Ericthonius, one of the gods of the hill. In the right hand of the goddess was the figure of Victory, of ivory, with a vestment of gold, four cubits high. By her side stood the shield ; on the convex side of which was carved the battle of the Titans. Phidias is said to have introduced portraits of himself and of Pericles in the Battle of the Amazons, one of the sub¬ jects carved upon this shield. The Olympian Zeus of Phidias was ranked for its majestic beauty among the wonders, of the world. It was nearly 60 feet in height, including the throne and was regarded as the greatest , of Greek sculptures. Zeus was here seen sitting upon a throne, with an olive wreath of gold about his temples; the upper part of his body was naked; a wide mantle covering the rest of it, hung down in folds to his feet, which rested on a footstool. The naked parts of the statue were of ivory, the dress was of beaten gold. In the right hand stood Victory facing the statue, and carved, like it, out of ivory and gold; she was holding out, as if offering to the deity a fillet of triumph. In his left hand Zeus held a sceptre, made of various metals skilfully joined, and on the sceptre an eagle had alighted. Power, wisdom and goodness were admirably expressed in his features. Cicero relates that the artist was led by a passage in the Iliad to conceive such a figure. The statue was surrounded and con¬ cealed by hanging tapestry, which was drawn aside only on particular occasions. This statue was removed to Constantinople by Theodosius I, and destroyed by fire in 475.

Phidias was, moreover, employed by Pericles as an architect, and by his genius Athens was made the most magnificent city in Greece. Dur¬ ing the government of Pericles, which lasted 20 years, it was adorned with more temples, colonnades and works of art than Rome could

boast the construction of in seven centuries. Materials and artists were

abundant. Phidias superintended these improvements; and the sculptures with which the Acropolis was adorned were partly from his own hand and partly worked out by pupils in the spirit and after the ideas of this great master. While a number of existing statues are attributed to him none can be identified as positively of his own handiwork. The frieze of the Parthenon, of which only fragments remain, is gen¬ erally regarded as his personal work. Phidias received great honors from the Athenians, but was subsequently accused first of peculation, which he successfully disproved; and then of impiety for putting his own likeness and that of Pericles on the shield of Athena. He died in. prison, a martyr to his friendship with Pericles, on whom his persecutors aimed by this action to inflict suffering. .

Consult Collignon, M, < Phidias' (Pans 1886) ; Gardner, E. A., '■Six Greek Sculptors (London 1910); Lechat, H, (Phidias et la Sculpture Grecque au Ve Siecle> (Pans 1906.) ; Mueller, K. O., (Commentatio de Phidiae Vita et Operibus) (Gottingen 1827) ; Murray, A. S.,

(History of Greek Sculpture* (London 1890) ; Waldstein, C., (Art of Phidias > (Cambridge

1885) :

PHIGALIAN (fi-gaTi-an) MARBLES, a

frieze from the temple of Apollo Epicuiius at Bassse, four miles from Phigalia in Arcadia, rediscovered by Bochor and by Chandler in 1765, when the temple was practically intact, having been nearly hidden by the vegetation of the mountain slopes, below which it lies. The temple was unique in that its orientation was north and south, instead of east and west, and in that its frieze was on the inner walls of the cella, a circumstance which preserved it from weathering. The frieze comprised 23 marble blocks cut in high bas-relief, each two feet two and one-half inches high and forming complete a length of over 100 feet. It was purchased by the British government in 1814 for £15,000 and is now in the British Museum. Although the original design was evidently ex¬ cellent, the workmanship shows many evidences of hasty execution at the hands of several dif¬ ferent workmen. The subjects of the carvings were the battles of the Lapithse and the Cen¬ taurs, and between the Amazons and the Greeks. The restoration of the temple, a Doric build¬ ing, 125 by 46 feet, of yellowish limestone, has been undertaken by the Greek Archaeological Society. Consult Cockerell, C. R., (The Temples of Jupiter Panhellenius at ZEgina and

Apollo Epicurius at Bassae* (London 1860), and Smith, A. H., Catalogue of the Sculptures in the Department of Greek and Roman An¬ tiquities, British MuseunP (London 1892).

PHILADELPHIA. See Ala-Shehr.

PHILADELPHIA, Pa., the largest city in the State and the third largest in the United States, at the junction of the Delaware and Schuylkill rivers (Independence Hall, lat. 39° 56′ 57.5″ N„ and long. 75° 8′ 54.75″ W.). The site was determined by the ((Falls line,® which marks the limit to inland navigation on the Schuylkill and to navigation by deep-sea craft on the Delaware. Both sociological and natural causes combined to establish a centre of popu¬ lation between the Hudson and Chesapeake Bay

———————

3 4

PHILADELPHIA

(MAIN PORTION)

Rand McNally & Co.'e New 11x14 Mop of Philadelphia (Main Portion)',' Copyright by Rand MoNally & Co.

Ik, - 1 L*13l

i rA.»pen- - — —

1—8*— I i - 1 r

L-ru Sr; r — 1 1 i-j LstU

agaNLlDD

-O rˆi *I5 = ia* 135 _ la — ia -

: — Ht. — I i - 1 r

—Vernon— - j . — » .~0 > ’ — i

WBwr

I _ gTZD

Mt-Ver

Je§§bok

Qd

- 1 1

\£1»J1 1

r- — Green—) r— \ i p— -]

| [Brandywinej - rd. Jji *—

JUˆ

——1 | — -Si - 1 rCallowlvi-llig*

r PHILADELPHIA] |

[Noble

rstn c

£□□ □£. rW-lldey

eSsBfeiJ

r. VI _ — . ,** f-1 a—

IQCZ1J1

T FRANK .ir.H

□T.J D-IULl — -

r~in nn

rˆll =1 rSˆlll I

OCTSBEg

DBBJias

I l-Lf f

jbD DB B1 DO HE! [lira [

BOS® S|

iaoc

to

to Coopera Point

-erry’ io Cramer Hill

Cpopers

Point

_ Olay Line • Philadelphia I Transatlantic . Line I Allen Line

Italian l In ˆ ”*Shaokamaxtn.* - / and Vine Sts. I

IPs/tnt *Philadelphia , 13-14 N.* Penna.R.R. i JP.R.R. / > j

Jim ■8.&/0.R.R. I

/ !

TT~)10 N. fits* iW 8 N. Lehlgˆ Valleg R. R.

is N.‘Un.fed Fruit Co. •hemt-tGrCram er Hill

Cuthhei }=siqj=

rCburch

]QQ[

n m*=i

I LjUnatead——— J | — | lgt J [1 1 *n*l Ranatead

l|PoiFy5fflce r

ffli

!o\i rse “«? *

. -loni -Scl INDEl’tND e no J LlndcpVndeUce p®*

□SOB?

] B< >urse ˆca | rCastomiHjjj.1 _

n Uesp®ˆ

b®‘0LJ

ajtna n

=12n;’

jrvijlg.

pPenWsylA gnia~| ty-pn-asl Lsi _ Ijp3£~

oBˆBttdSSCfe

□ rstr3

L—J I _

pircIli -

QOQflflS

annwlt

finil’pfen.n

Taylof (— PE > ina. J

[Addiaoy | |m~

|Stamper6|ˆ

]?□§□ QˆT]

i — i r~s,n i m

,5

ssaaSBDPDaoDfl

r — i izni

rRenil-wprth~_

••Lj

_BO FBH

m

no

_ ’

—ˆFerryHo Kaighne Aue, .CT Camdenˆ ˆ ˆ

jˆGJoucebtei S.*On- ˆ

-Bens

132S..U1 \ ,

■TLsA Cc N. Cermcrn vˆA\

1135 s.'ii iloHd \ \

\ a. \ x \

*•’. America ˆ l\di ao \

*■ J i ot. 1 oi— vionnsil’rt I I \ Line ˆ ˆ \

PI’S HO cdBs— \ ‘ ‘■ ‘

\ \ Q\

~\46 S. Hamburg Amer.\

‘ Z./ne\ \ \

-Berkley -

m

I 4f? sA Hollandˆ meift can Che

tˆp.r.r. \ \ \ \

‘ 53ˆS ‘.\Amorlcan\Llni \

~55S \ Red Star pn$

\ Kalghrif s v\ Po/nt

10

506

PHILADELPHIA

on the peninsula, partly alluvial and partly glacial drift, whereon Philadelphia arose, 96 miles from the Atlantic and about the same distance from New York and Baltimore.

Topography. — The city's area (84,933.12 acres, whereof 1,593 acres is water surface or 132.7 square miles in all) is an irregular figure. Its curving eastern boundary is formed by the Delaware. The southern limit is a line east and west following narrow watercourses which separate League Island and Hog Island from the municipality. Its western and northern limits are Delaware, Montgomery and Bucks counties and are defined by the early colonial administrative lines fixed by proprietory grants. Cobbs and Darby creeks divide off Delaware County on the southwest and Poquessing Creek marks the extreme northeastern limit. Within this area there are three fairly defined regions. The first is the low, flat neninsula between the rivers, from 8.7 to 40 feet above mean low tide. The second region is bounded to the south by a 40-foot contour line, whose south¬ ern angle reaches to Broad and Callowhill streets, and rises over on a strike of azoic schists and gneisses (Bush Hill), which ex¬ tends from the Schuylkill to the Delaware. This region runs to the north, with lower ground near the Delaware, culminating in the northwest in Chestnut Hill, 431 feet high, and other elevations of like height. The third region is west of the Schuylkill (West Phil¬ adelphia), a rolling country 200 feet high in Fairmount Park and 100 feet in the built-over sections. The old city was laid out on the peninsula from river to river; the factory sec¬ tion grew up in the second region, with Ger¬ mantown on the heights, while West Philadel¬ phia began as an open suburb and still is mainly a residential district. Three lesser streams crossing the municipal area originate outside the city limits. The Wissahickon, draining an upland plain in Montgomery County, has cut a canyon-like valley through primitive rocks and enters the Schuylkill at Manayunk, furnish¬ ing a remarkable park feature. Across north¬ eastern Philadelphia, which remains in great part open country, the Pennypack and Tacony flow, both draining the plateau to the north of the city. Within the built-over sections the drainage is by parallel streams entering the Delaware and rising in the elevated region in the northwest of the city, the most important being Wingohocking Creek and Gunners' Run, These parallel streams have been made the basis of a sewage system, which has nearly everywhere a fall of from 20 to 40 feet. The easy grades and the absence of restraining physical features have . led to the spread of population and habitations in all directions.

Settlements started at favorable points, as Ger¬ mantown on the fertile and sunny southern slopes toward Chestnut Hill; or they grew up around mill, shipyard and furnace and were gradually enveloped by the greater community. Philadelphia's amoeba-like growth resembles that of London rather than the organic ex¬ tension of Paris or New York.

City Plan.— Philadelphia was the first of modern municipalities whose plan, was pre¬ pared for a particular site. Captain 1 nomas Holme, surveyor-general . for Pennsylvania, whose name has survived in that of the village of Holmesburg on Pennsylvania Creek, made

the lay-out in the form of a parallelogram, 10,922 feet 5 inches east and west and 5,370 feet 8 inches north and south, extending from river to river and from Vine street to Cedar (now South) street, comprising two square miles. In this area two streets, Broad and High (now Market) were laid out at right angles, 6 perches wide. The other main streets were laid out 3 perches (50 feet) and the alleys 1 14 perch (25 feet) wide. The main streets defined squares of about 400 feet to a side, containing 4 acres each and bisected by alleys. The plan gave 30 per cent of the area to street surface, twice the usual proportion in European cities of the day, and the two main arteries were twice the width of the broadest street pro¬ vided for in London. Broad street is now 113 and Market street 110 feet wide. This rectangular plan has been extended over the entire area and has guided city planning in America ever since. It was followed by Randell in the lay-out of New York and, by re¬ ducing realty to lots of uniform size, it has rendered the transfer of property easy and certain. On the original plan the streets run¬ ning north and south were numbered, as they still are; those running east and west were named after trees, the botanical vocabulary having since been supplemented by a wider nomenclature. At irregular intervals avenues 100 feet wide have been added, some of these running diagonally. A system of numbering, under which the century changes for every block, makes the house number a co-ordinate and fixes the place of any lot in the city system. Modern ideas of city planning took root late in Philadelphia. Some 20 years ago it was pro¬ posed to give more direct access to the north¬ east from the centre of the city by cutting 100-foot-wide extensions of Kensington and Frankford avenues through to Broad street; the proposals, however, received little official, or public support. The Parkway project, conceived about the same time, was not taken in hand energetically until 1909, but has now been car¬ ried almost to completion. Beginning with a width of 150 feet, which

increases to 250 feet, this magnificent avenue runs from the city hall to Fairmount Park, where it leads through a plaza of 2,000 feet lateral extension to the Municipal Art Museum and where it connects with Fairmont Park drives east and west of the Schuylkill. The building sites on the line of the Parkway have been reserved for the mu¬ nicipal auditorium, the free public library and other structures of a public or semi-public char¬ acter. The Northeastern boulevard, 300 feet wide and running a distance of seven miles from Hunting Park to Pennypack Creek, is also practically complete. It. will form a part of the national Lincoln highway. Besides these 20 other avenues, most of them 148 feet wide, with double or triple roadways separated by planting spaces for trees, shrubs and grass, have been confirmed on the city map. The total length of the park boulevards and avenues thus plotted is 150,240 feet and considerably more than one-half of them are open. The Schuylkill embankments (approved, but stayed by war exigencies) are second to the Parkway alone as city embellishments. The Delaware waterfront improvements are utilitarian in character, though ornamental also in their own way. The foundation of the plan is the widen-724

ing of Delaware avenue from 150 to 250 feet its entire length (17 miles). The work has been completed on the whole of the old com¬ mercial front, with concrete inner bulkheads and nine municipal and about 30ˆ other piers that may be rated as modern. The plan in¬ cludes the elevation of all railroad freight lines passing through populated territory to the waterfront, with belt-line connections for all piers ; the establishment in the extreme south of the city of a freight terminal covering 600 acres and conecting with 10 railroad and nine municipal piers, each about 1,000 feet in length. The city has $13,000,000 immediately available to carry out its part of the work. One double¬ deck pier has been completed by the city and the Federal government is constructing three others for an oversea shipping depot, which will cost $15,000,000. The revised map of South Philadelphia, showing these improvements with League Island Park, etc., is a good example of modern city planning. Scarcely of less utilitarian value than the Delaware street widen¬ ing is the Central Traffic Circuit — a parallelo¬ gram of 50-foot streets, in the heart of the city to be broadened to 140 feet and connected by radial avenues with the northeast, north¬ west, southwest and the river front. The pro¬ jected

bridge across the Delaware River is nearing realization.

Housing and Public Works. — About one-half the city area is built over, the unimproved property being mainly in the northeast, where a large proportion is still rated and assessed as farm land. The buildings increase on the average about 6,000 yearly, though the number has risen in some years to 11,000. Of this yearly increase all but a few hundreds are small dwellings, costing normally about $3,000 each. The number of buildings in Philadelphia at the last count was 443,566. of which 373,608 were dwellings, two-thirds of the latter being two-story brick houses, and 125,000 owned by the people who live in them. In the newly-developed regions the monotony of rows upon rows of such dwellings, unrelieved by a single distinguishing feature, is being broken by ar¬ rangement between the building operators and the city. The new houses are grouped around “garden streets® or “neighborhood centres,® the builders dedicating the ground and the city providing for the planting or other beautifica¬ tion of the same. There are in all the city 1,70354 miles of highways, whereof 1,16454 miles are paved city streets, nearly half of them covered with sheet asphalt, 358ˆ4 pules with granite block, 182*4 miles with vitrified brick, 43 miles with wood, asphalt, slag or cement and granolithic blocks and less than 10 miles with cobbles or rubble. Of the country roads, 25054 miles are paved with water-bound mac¬ adam, 10554 with bituminous or cement concrete and 18254 miles are unsurfaced (earth) roads. In the pavement of newly-opened, primary and secondary thoroughfares (118 and 88 feet wide, respectively) an elastic system has been adopted. Beyond the permanent curb . lines temporary curbs are laid down, narrowing the roadway to be paved. In the wider streets the middle of the road is also left unsurfaced, to be planted, like the spaces along the temporary curbs, with trees, shrubs and grass until such a time as increasing traffic requires the use of the roadway to its full width. This effects a

great saving in the initial cost of the pave¬ ment as well as in the upkeep. Meanwhile these temporary and, possibly, permanent garden streets are much increased in value and de¬ sirability for residential purposes. The 23 sewerage districts with over 1,000 miles of main and branch sewers (there were only 238 miles in 1883) follow in general the drainage basins of the ancient watercourses and are calculated to dispose of a rainfall whose maxima and minima run from 23 to 67 inches annually. Surface drainage for household waste water still prevails in many of the back alleys of the older parts of the city, and the number of houses not directly connected with the sewers was,

until recently, quite large. This nuisance, however, is being abated. In four recent years nearly 40,000 privy vaults were abandoned. The Fairmount waterworks were put in operation as a steam-pumping plant in 1815. After 1822 the pumping was mainly by water power, which had meanwhile been installed. The distribut¬ ing reservoir was completed in 1837 and the Fairmount works, where the water “pumped itself,® became one of the engineering wonders in America. The growth of population necessi¬ tated an increased supply and other pumping stations were established successively at Rox-borough, Belmont and Queen Lane, all of which drew from the Schuylkill. The Frankford sta¬ tion was the only one on the Delaware and supplied only a small percentage of the total consumed. The contamination of the rivers by sewage led to unsanitary conditions which made the name of Philadelphia a byword. Typhoid fever became endemic. The deaths averaged 611 annually for the five years 1898-1902 and were 948 in 1899, with some 12,000 cases. It was decided in 1902 to purify the water supply by slow sand filtration, and on 1 March 1909 the entire city received filtered water. The filters have a nominal daily capacity of 382,000,000 gallons, and two-thirds of the city water is now drawn from the Delaware, the filter beds of the new pumping station at Torresdale hav¬ ing a daily capacity of 240,000,000 gallons. The installation cost of the system was over $26,- 000,000. High pressure services for fire pro¬ tection have also been established in the con¬ gested business centre and in the mill district. The necessity of changing the method of sew¬ age disposal was enforced by the health laws of the State as well as by local self-interest, which does not comport with the pollution of the water supply. The plan adopted involves the diversion of the sewage from the streams by three systems of collecting mains to treat¬ ment works located, one in the northeast, one in the southeast and the third and largest in the southwest of the city, where the solids will be screened out and digested, and the effluent oxidized by spring filters and made innocuous. *The estimated cost of the entire system is $22,400,000; annual cost of operation $500,000 and $2,000,000 a year will be required for new sewers to keep up with the city’s growth. The construction of the northeastern system of collectors and Imhoff tanks is well under way.

Government. — Penn granted the first city charter in 1701, on the model of Bristol, which followed English precedents by establishing a body corporate of mayor, council and freemen of the liberties. This charter was superseded

by the act of assembly 11 March 1789, which created a city government with an elective mayor (two-year term), a select council (one member elected from each ward for three years) and a common council (one member for every 2,000 taxpayers in a ward). The mayor's chief function was the charge of the police. Other administrative bodies were cre¬ ated by subsequent legislation : health board, park commission, park wardens, selected by common pleas judges; guardians of the poor, chosen by the councils, whose committees con¬ ducted most of the executive administration of the city. The Act of 1854, whereby the city was made coterminous with the county, 13 townships being absorbed, made little change in the form of government. In 1885 the ((Bullitt Bill" was passed, embodying the present city charter. This extended the mayor's term to four years and greatly enlarged his powers, giving him the appointment of nearly all city officials. It consolidated the numeous municipal bureaus in departments under single heads, called directors. These are :

The director of public safety, whose depart¬ ment comprises the electrical bureau, the bureaus of police, fire, building inspection, etc., the director of supplies; the< director of public works, whose department includes the bureau of city property (city markets, public buildings, parks and squares) ; the bureau of highways (paving, street cleaning, city bridges) ; the bureau of surveys (street openings, sewers, city planning) ; the director of public health and charities, whose department administers the almshouses, hospitals and city farms and in¬ cludes a housing division; the director of wharves, docks and ferries, in charge of the water front improvement, and whose depart¬ ment in conjunction with the commissioners of navigation (a State board) has charge of the local administration of the port of Philadelphia; the director of city transit, whose department (organized 1 July 1913) is in charge of the planning and construction of a city-owned sys¬ tem of high-speed transit lines.

Other bodies appointed by the mayor haying important administrative or advisory functions are the civil service commission; the recrea¬ tion commission, in charge of public play¬ grounds; the permanent committee on compre¬ hensive plans, which includes in its member¬

ship the mayor and the heads of the engineer¬ ing departments and bureaus, advises and co¬ operates in the projection and advancement of public improvements; the art jury, passes on the design and location of all buildings, bridges, arches or other structures and of sculptures or other works of art to be presented to or paid for by the city or other public authority, or for which the city or other public authority is to provide a site, and the zoning commission, em¬ powered to draft a building code, restrict the height, character, use and location of buildings to be constructed or altered, and to prescribe and define residential, manufacturing and other areas.

The departments of education, parks, taxa¬ tion and city trusts (Girard estate) remain under boards and commissions appointed by the judges of the Courts of Common Pleas. The controller, city treasurer, receiver of taxes and city solicitor are elected by popular vote. 1 he city government is organized on what is called

by municipal researchers the federal plan; the authority of the executive officers to raise and expend money for municipal purposes being granted by the legislative branch, which, in Philadelphia, consists of a select and common council. These bodies sit and vote separately; but in practice the financial program is ar¬ ranged by a joint finance committee, from the recommendations of department chiefs and in co-operation with the controller, the two cham¬ bers of councils ordinarily confining themselves to confirmation of the budget and the tax rate thus agreed upon. Loans may be authorized by ordinances of the council when their total does not exceed 2 per cent of the assessed value of taxable property; when this is exceeded ratifi¬ cation of the ordinance by popular vote is re¬ quired. Franchises for the operation of public utilities must be obtained from the councils. The municipal gasworks are operated by the United Gas Improvement Company under a lease, the city receiving in lieu of rent 20 per cent of all collections from consumers. There is very little other original legislation by the legislative branch of the city government. The department of health prescribes the sanitary ordinances; the board of surveyors in the de¬ partment of public works makes and revises the street, sewer and water supply systems ; the zoning commission is authorized to frame the building code; the art jury and other adminis¬ trative bodies exercise powers which are legis¬ lative in effect. Of course where money is re¬ quired the departmental and other rulings and plans cannot be carried out unless the funds are provided — and the purpose of expenditures must be stated in the ordinances of councils and have received their approval. The substi¬ tution of a

small single-chambered city council for the present unwieldy bicameral legislative body of 200 members is a desideratum. The police force of the city consists of 2,500 patrol¬ men, 300 mounted men and a cycle corps of 50. The traffic regulations are very good. An ambulance service has been organized in con¬ junction with the hospitals, one of the latter covering each of the 37 ambulance districts. The fire department has 1,037 men and is equipped with 50 steamers, eight chemical en¬ gines, 20 hook and ladder trucks, two water towers and one fire boat.

Municipal Finances. — The assessment of real estate for taxes in 1918 was $1,766,553,000. The rate was $1.75 per hundred for the general tax (an increase of 25 cents above previous years) and 60 cents per hundred (an increase of 10 cents) for the school tax. The revenue receipts of the city (exclusive of the school tax) for 1917, the last year of which there are complete returns, amounted to $40,050,418, of which more than one-half, or $20,148,273, was yielded by the real estate general tax. The departmental expenditures for 1917 were $40,- 223,130. The financial statements of the City Manual are not well arranged. A better view may be obtained in the financial Statistics of Cities) published by the United States Census Bureau. These relate to the year ended 30 June 1916, but no essential or fundamental changes in the fiscal administration of Philadelphia have occurred since then. The total revenue receipts of the municipality in that year were $36,195,- 193, of which $18,607,117 came from general property tax; $2,146,137 from business (chiefly

liquor) licenses; $1,142,173 from special assess¬ ments; 256,380 from State subventions; $1,972,- 781 from departmental earnings (of which $405,- 658 and $243,028 received in fees by the courts and the register of deeds, respectively, were the largest items) ; $628,549 for highway privileges from public service corporations; $4,301,709 for rents (including $2,784,213, 20 per cent, receipts from consumers of the United Gas Improve¬ ment Company) ; $1,657,258 for interest, on cur¬ rent deposits, sinking fund and public trust funds) ; $5,142,128

in earnings of public utilities — almost entirely from the bureau of water supply. The governmental cost payments amounted in total to $41,317,229, distributed as follows : Departmental expenditures $23,988,- 582 (which included $1,668,046 for the adminis¬ tration of justice, $4,532,835 for police, and $1,453,967 for fire protection, $1,194,066 for the financial departments, including the assessment and collection of taxes, and $668,181 for elec¬ tions) ; expenditures in public service enter¬ prises $2,202,134 (nearly all in the water supply service) ; $4,616,534 interest on the funded debt, and $10,509,979 for departmental outlays. The principal outlays were: for the first pavement and repair of streets and roads, $3,646,932, a part of which is recouped in the form of special assessments; for sewers and sewage disposal $1,828,903; for public charities $527,308; for recreation (playgrounds, public baths, etc.), $1,095,398; for material and supplies in the water bureau $1,028,567. The receipts and ex¬ penditures of any year rarely balance, the dis¬ crepancy being covered by the surplus carried over from the preceding year, and it is often necessary to resort to temporary loans to con¬ vert a bookkeeping credit into actual cash. Under the headings (<non-revenue receipts® and ((non-governmental cost payments® the Census Bureau includes moneys received from the sale of bonds and investments, moneys paid in the purchase of investments and the redemption of obligations and debits and credits representing transfers between the municipality and its inde¬ pendent departments. The following financial statement covers the receipts and payments for 1916 of the city as well as the school district and poor district of Philadelphia:

Cash balance at beginning of year . $16,679,332

Revenue receipts. . 45,858,425

Non-revenue receipts . 24,756,097

Total . $87,293,854

Governmental cost payments . $52,734,967

Non-governmental cost payments… 23,441,617

Total . $76,176,584

Cash balance at end of year . $11,117,270

History. — The original site of Philadelphia was occupied by Delaware Indians peaceful and industrious, tributary to the Iroquois. Though the 17th century Swedes and Dutch made a number of settlements on the Delaware River and Bay, most of them abortive, of which the only permanent monument is Gloria Dei (the Old Swedes Church) erected in 1700 on the site of a former Swedish fort. Some 368 Swedes and Dutch and over 800 newly arrived English immigrants (mostly Quakers) were in and about future Philadelphia, when in 1681 Penn ob¬ tained his charter as proprietor. The ((Letitia® house (now removed to Fairmount Park), which

was built by Penn for his town residence, was occupied by the Provincial Council as its official home during the proprietor's absence. The municipal council remained homeless until in 1709 the Towne Hall, a combined market and courthouse, was built opposite the original Friends' Meeting House, in the centre of High street between Second and Third streets, giv¬ ing that thoroughfare its new name. Until the State House (Independence Hall) was erected in 1735, the Towne Hall was also the frequent meeting place of the general assembly. From its balcony war was proclaimed against Spain 14 April 1740 and later on George Whitfield, the evangelist, addressed his 6,000 or more hearers. The city grew with great rapidity and became the grain and lumber mart of the Atlantic Coast. In 1725 it was overbuilt and passed through its first reaction. The recovery was rapid, however. In 1725 the vessels arrived and cleared from the port numbered 140; in 1735 there were 427. In 1728 the naturalist Bartram built his house and established his world-famed botanical garden on the west bank of the lower Schuylkill. The house has been preserved and the garden is now a city park. The building of Christ Church was completed in 1744. For 40 years in the middle of the 18th century Franklin was the dominant figure, founding the American Philosophic Society, Philadelphia Library, University of Pennsyl¬ vania and Pennsylvania Hospital. The first two of these institutions were direct outgrowths of the ((Junto,® a literary club organized before 1730, which, through various mutations, led to the committee of safety, whereby the city was governed through the Revolution. <(Nothing I ever gained-by cunning gave me so much pleasure,® wrote Franklin, alluding to the charter of the Pennsylvania Hospital granted in 1751. The original building fronting on Pine street and extending the whole length of the square between Eighth and Ninth streets is still in service. In the way of amusements early

Philadelohians had little choice. Bull-bating remained popular until 1820, when Mayor Wharton confiscated the last bull to ap¬ pear in a Philadelphia ring. The ordinance against play-acting notwithstanding, the old Southwark Theatre from 1760 enjoyed a pre¬ carious existence. It was finally opened, under a license, with the performance of Beau¬ marchais' (Eugenie, } given in honor of General Washington on his return, a victor, from Yorktown. Peace brought a rapid expansion of population and commence, checked somewhat by yellow fever, which had frequently visited the city during the preceding 50 years but came with exceptional severity during the last decade of the 18th century, when it twice ravaged a most filthy city. During the epidemic of 1793 an army of people (17,000) camped in open fields or took'refuge in neighboring towns. The scourge claimed 5,000 victims, one-sixth of the entire population. The first organized bank in the United States was established at Philadel¬ phia in 1780 by an unchartered association. This became the Bank of North America, planned by Robert Morris with the approval of Congress and incorporated by the Pennsylvania legisla¬ ture in 1782. The city suffered another com¬ mercial setback early in the 19th century in con¬ sequence of the Embargo, which was accentuated by the loss of trade and bank failures attend-PHILADELPHIA

ing the War of 1812. The second Bank .of the United States, incorporated by act of Congress 10 April 1816, was located in Philadelphia, and on the expiration of its 20-year charter was reorganized as a State bank under the same name. By the year 1820 the city had once more begun to grow. Many charitable institutions, asylums for the blind, the deaf and dumb, the city almshouses, etc., were founded. Girard Col¬ lege was founded and its building commenced in 1833. The decade 1837-47 was a period of disaster, culminating in the failure of the Bank of the United States. Canal and railroad con¬ nections with the anthracite coal fields aided in the development of manufactures, and from 1850 Philadelphia led all other American cities in the aggregate value of its products. This industrial growth reached its apex in 1876 and was visualized in the Centennial Exhibition, which was attended by 9,910,966 visitors. A de¬ pression ensued and when the city emerged from this in 1879-80 it was to begin a new period of development. The quality of its tex¬ tile products greatly improved. Cramp, ships; Baldwin, locomotives ;

Dobson, carpets ; Stetson, hats, and eight other industrial establishments were at the close of the 19th century the largest in their lines known anywhere.

Population. — Early estimates of the popu¬ lation of Philadelphia partake of the dubious¬ ness attaching to all colonial statistics. Tn 1683 the city proper was estimated to have 80 houses and 500 inhabitants. It quadrupled in a year, and in 1699 a rude census showed 4,500 inhabitants. In 1740 the population was estimated at 20,000. A count of houses (4,474) made in 1772 indi¬ cates a population of 26,844, and another house census in 1777, showing 5,743 dwellings, indicates a population of 35,000. Exact statistics began in 1790 with the first Federal census. In the fol¬ lowing table the population of the city proper and of the city and county combined are shown side by side up to the date of the census of 1850. After that the figures rubricated under the heading «City» show the entire population of the city and county, which had been con¬

solidated :

City and City county

1790 … .

. 28,522

1800 .

. 41,220

1810 .

53,722

1820 .

63 , 802

1830 .

80,462

1840

_ 93,665

1850 .

121,376

I860 .

565,529

1870 .

674,022

1880

847,170

1890 .

1900 .

_ 1,046,964

. 1,293,697

1910 .

1920 .

. 1,549,008

1,823,779

54,391 81 ,009 111,210 137,087 188,797 258,037 408 , 462

Down to 1820 the city and county of Phila¬ delphia was greater in population than New York though the population of the city proper was smaller. In 1830 and 1840 the city was exceeded by New York and Baltimore, and in 1850 by New York, Baltimore and Boston. After

the consolidation Philadelphia became and remained the second city until the census of 1890, when it became, as it still is, the third city in the Union. The early population of Phila¬ delphia had a larger proportion of non-English (Germans, French Huguenots and Swedes) than any colonial city, New York soon losing its preponderance of Dutch. Ihe racial conglom¬

eration has continued, though an unusually large proportion of Philadelphia's population is native-born. No other large Northern city has so large a proportion (63 per cent) born in its own State and the ratio of foreign-born is smaller only in Baltimore and Saint Louis. But the persons of foreign parentage constitute more than one-half, 55 per cent. Less than one-fourth (24 per cent) are of native birth and native parentage. The foreign-born constitute 22 per cent of the total and about one-third are of Irish, one-fourth of German and one-eighth of English birth. In number the colored population is larger than in any other Northern city; but it is only 5 per cent of the total, whereas it was 10 per cent a century ago. Statistics on a basis of municipal boundaries often give an inadequate idea of the population grouped about an urban centre. In the im¬ mediate vicinity of Philadelphia there live 583,- 455 people who form as truly a part of the metropolitan community as those who live in the city proper. The census, of 1920 shows a population of 2,407,234 in the metropolitan dis¬ trict of Philadelphia, which includes Chester, Darby, Nonristown and Bristol, Pa., and Camden, Gloucester and Burlington, N. J. According to the last Federal census, the popu¬ lation of Philadelphia increased 19.7 per cent between 1900 and 1910 and 17.7 per cent between 1910 and 1920. The increase in some of the nearby cities was much greater. Chester, for example, increased 50.6 per cent in 1910-20.

Industry. — Industry has grown commensurately with the population. A consolidation of manufactures began when the number of es¬ tablishments, which had risen from 8,461 in 1880 to 18,166 in 1890, diminished to 8,381 in 1910. Capital, which had not increased between 1870 and 1890, had quadrupled by 1910, reach¬ ing the total of $688,782,000. In 1914 capital invested in 8,454 industrial establishments amounted to $772,696,000. Since then the in¬ dustrial development has been tremendous. The present capital investment is estimated at $1,000,- 000,000 and the annual industrial output at more than that in value. The greatest single increase has been in the shipbuilding industry. The yard of the American International Shipbuilding Cor¬ poration at Hog Island is the largest in the world. It

has 50 ways ; its equipment includes 70 locomotive cranes, 650 electric motors and 80 miles of standard railroad track; approxi¬ mately 35,000 workingmen are employed and the weekly payroll exceeds $1,000,000. Nearly 100,- 000 people are engaged in the shipbuilding in¬ dustry within the Philadelphia zone. In rolling mill, foundry and machine shop output Phila¬ delphia maintains its pre-eminence in quantity, though the product of some American cities may exceed it in value. The Baldwin works are still the largest producers in the country of locomo¬ tives; the Pencoyd Iron Works, now employed mainly in government service, built the bridge across the Nile below Khartoum and the Que¬ bec bridge across the Saint Lawrence, the greatest cantilever span ever conceived and carried to completion. The product of the roll¬ ing mills, foundries and machine shop indus¬ tries at date of the last census was valued at $50,474,000 a year. Other metal industries were brass and bronze, worth $4,057,000 of output; copper, tin and sheet iron wares, $7,493,000; cutlery, $1,686,000; files, $1,540,000; electrical

machinery, $7,065,000. The Disston saw works at Tacony are the largest of their kind in the world. The textile products of Philadelphia were: woolens and worsteds, $54,922,000 (first in the United States) ; hosiery and knit goods, $23,971,000; cotton goods, $22,538,000; carpets and rugs, $22,629,000. Tanned leather was pro¬ duced of the value of $23,526,000; boots and shoes, $6,517,000; belting, saddlery and other leather goods, $3,994,000. Other industries in which the city stands in the first rank are: cordage and twine; dyeing and finishing; felt hats (of which 25,000 are produced per day) ; chemicals ($9,643,000 per annum) ; medical compounds ($9,423,000 per annum) ; soap ($7,319,000) ; paint and varnish ($8,045,000) ; lumber and plaining mill products ($7,703,000) ; tobacco and cigars ($13,429,000) ; confectionery ($7,315,000) ; fertilizer ($4,268,000) ; women's clothing ($30,133,000), and millinery and lace ($5,052,000). There has been a great diversion of the industries from their ordinary employ¬ ment to war work, but the quantity and value of their product as a whole has increased by more than 50 per cent above the

figures given. Phila¬ delphia refines 500,000 tons of raw sugar an¬ nually, one-sixth of the United States total.

Commerce and Banking. — The Federal Reserve banking district of Philadelphia in¬ cludes eastern Pennsylvania, the whole of Delaware and all of New Jersey excepting that which lies in the metropolitan area of New York, and is the location of one of the 12 Federal Reserve banks of the United States. The Philadelphia clearing-house transactions for nine months ended 30 Sept. 1918 amounted to $14,276,449,469, an increase of 13 per cent over the corresponding period in 1917. The follow¬ ing is a summarized bank statement of the in¬ corporated banking institutions located in the city, compiled from the latest available State and Federal reports:

are subports. The business of the port of Philadelphia has grown more than proportion¬ ately to the growth of the population and indus¬ tries of the metropolitan district. The exports for four years ended 30 June 1914 were about $280,000,000 in value ; in the four years ended 30 June 1918 they amounted to $1,195,000,000, a fourfold increase. The imports in recent years have averaged $110,000,000 per annum, about 50 per cent increase. The Federal gov¬ ernment is maintaining a 35-foot channel in the Delaware to the sea. More than 4,000,000 tons of coal are shipped annually by water from the storage yard at Port Richmond. The new grain elevator at Girard Point has a capacity of 2,200,000 bushels and is capable of delivering 60,000 bushels per hour, and there is docking room for three vessels at its pier. The ore piers at Richmond and Girard Point have un¬ loaders which can handle from ship to car 1,000 tons per hour. Almost 45 per cent of the gross tonnage of exports from Philadelphia consisted until quite recently of oil from the refineries of the lower Schuylkill. There has been a great industrial expansion northward from Chester to Philadelphia which gives indi¬ cations of permanence and emphasizes the sug¬ gestion to direct and plan the develonment of this region as a unit, with a coherent street systems, docks, basins, warehouses, terminals, a factory district and residential areas with parks and playgrounds. A consolidation of a score of small municipalities would be a prereq¬ uisite. The area is traversed by three railroads and has a frontage on deep water affording sites for wharves 2,500 to 3,000 feet long. A tunnel under the Delaware affording direct freight routes to New York and the East and railroad connections with the trunk lines to the West -and South are other essentials. The project would bring the new port of Philadel¬ phia 10 miles nearer to the sea and establish it

Loans and Investments, Capital Savings and

institution All resources discounts cash and credits and surplus Deposits trust funds

28 national banks _ $587,570,426 $323,937,328 $263,633,098 $70,391,065 $320,040,514 $5,979,814

58 trust companies… 1,459,453,043 175,996,749 1,283,456,294 114,777,949 256,096,516 1,070,497,763

18 State banks . 11,597,756 6,960,890 4,636,866 2,198,280 6,013,243 2,874,958

$2,058,621,225 $506,894,967 $1,551,726,258 $187,367,294 $582,150,273 $1,079,352,535

Total

The miscellaneous liabilities of the national banks were $191,159,033, including bank notes in circulation ; of the trust companies, $18,090,-855; State banks, $511,275. About two-thirds of the investments of the national banks were United States and other bonds deposited in the Treasury as security for circulating notes. Very nearly $1,000,000,000 of trust company in¬ vestments included in the foregoing statement are held by these institutions as trustees only and represent a corresponding amount of indi¬ vidual trust funds. In addition the trust com¬ panies of Philadelphia are mortgage trustees for corporate bond issues to the amount of ap¬ proximately $2,200,000,000 (face value), and hold securities pledged as collateral for trust bond issues to the value of nearly $700,000,000.

The United States customs district and port of Philadelphia (Act of 24 Aug. 1912) in¬ cludes all of the State of Pennsylvania east of 79° W. longitude, all of Delaware and all of New Jersey not included in the New York district. Chester, Pa., Wilmington and Lewes, Del., and Tuckerton and Thompsons Point, N. J.,

below the Horseshoe, whose always dangerous shoals and occasional ice blockades could thus be avoided by shipping.

Buildings. — The architecture of Philadelphia was determined by the building material nearest to hand — azoic marble, red sandstone and glacial clay, giving brick. Penn's town resi¬ dence (the Letitia House) in Fairmount Park and his grandson's m'anor in the Zoological Garden, with the Chew mansion and various early homes in Germantown, begin the list of historic edifices, wherein are included some of the best examples of colonial architecture known. These tare Independence Hall and Christ Church both following Gibbs' models and designed by John Kearseley, and the Penn¬ sylvania Hospital, erected a few years later, constructed of brick imported from England. Ridgeway Branch of the Philadelphia Library (Doric) and Girard rollege (Corinthian) by MacArthur illustrate Neo-Grecque at its best. Le Bruni's Roman Catholic cathedral and Academy of Music reflect the first appearance in the , city of Renaissance, while Notman's

PHILADELPHIA, PA

Birdseye view of the city

PHILADELPHIA, PA

..«R—

nim&k ' mBt*

■ "-Sip «■

■ "iiiV w p 1

-UK

Pennsylvania Railroad Station

Independence Hall and Square

PHILADELPHIA, PA.

This view also shows

1 A view of the Holme Avenue Bridge, on the Northeast Boulevard, looking toward Welsh road a portion of Holme Avenue beyond the limits of the bridge

2 Piers 38 and 40, South Delaware Wharves. View from River looking north

3 Aramingo Avenue and Lehigh Avenue, showing the elevation of the railroad tracks formerly in Lehieh Avenue Thic in°many 1 2 3 year s recen* ^ completed, and brought to a close one of the most important improvements effected in Philadelphia

Saint Mark's is one of the earlier examples of Gothic. The vast, clumsy, marble pile of the city hall covers four and one-half acres; its fronts are 90 feet hieh, the central pavilion 303 feet and the tower 547 feet, 11*4 inches — 2^4 feet shorter than Washington Monument, which it was intended to excel. It is 470 feet square, has 15 acres of floor space, has cost $25,000,000, and its design by MacArthur is derived from the style of the Second Empire. On the same square front the Masonic Temple (Norman) by J. T. Windrim, and the Pennsylvania Terminal (English Civic Gothic) by Frank Furness, with florid

sculptures by Carl Bitter. Other note¬ worthy buildings are the Art Club and Horti¬ cultural Hall, both designed by Frank Miles Day, and the new United States Mint. The designs for the Municioal Art Museum by Borie, Dantzinger and Trumbau, and the Free Public Library (Renaissance) by Horace Trumbauer, have been approved by the art jury, whose powers have also been exercised to make the numerous new railroad bridges ornaments to, father than disfigurements of, the streets and streams they cross. The sky¬ scrapers came late to Philadelphia ; but there are now quite a number, the best in design be¬ ing the Wanamaker Store (marble) and the Bell Telephone Central (limestone and brick), J. T. Windrim, architect. The principal mon¬ uments are the Soldiers and Sailors' Memorial in Fairmount and the Washington Monument at the Spring Garden entrance to the park. There are a number of equestrian and other bronze statues scattered over the city, which it, is proposed to remove to more appropriate sur¬ roundings and in more fitting settings along the Parkway.

Street Railways, *etc.* — The narrowness of the streets in the older parts of the city per¬ mits the running of surface car lines in only one direction on all but the few 100-foot thor¬ oughfares, some 30 miles in length. Over 400 miles of the paved streets are tracked. All of the trolley lines have been combined in opera¬ tion under one corporation, the Philadelphia Rapid Transit Company, with a capital of $30,- 000,000. This corporation has constructed a high-speed line (subway and elevated) from the Delaware River to 69th fland Market streets, where there is connection with suburban elec¬ tric railways to West Chester, Ardmore and Norristown. The. agreement of 1907 with the city requires payment by the Rapid Transit Company for the repair and repavement of streets occupied by its lines, in accordance with the franchises of the underlying corporation. The payments on this account have averaged about $500,000 fla year, and will continue during the life of the contract, which runs for 50 years. The city was also to receive one-half the net income from operation after deducting interest, guaranteed dividends and other fixed charges and current obligations of the operating company. Up to date nothing has come to the city from this source. The city is represented on the company's board by three directors, of whom the mayor, ex officio, is one. The Penn¬ sylvania and the Philadelphia i.and Reading own 360 miles of track within the municipal area, reaching the centre of the city on viaducts i.and furnishing belt freight lines as well as suburban passenger service. Grade crossings, of which there are several hundred, are being

eliminated, the city sharing the expense. Those on the Philadelphia and Reading lines have been abolished to a very large extent; most of those on the Pennsylvania lines will be abated by the elevation of that company's existing and projected freight tracks to the water front. The city-owned high-speed lines, for which $63,000,000 have been appropriated and made available through ˆauthorized loans, provide a comprehensive system of intramural transit facilities. The system includes a, subway on Broad street, construction of which has been begun ; an elevated line to Holmesburg, which is nearing completion, with a surface line ex¬ tension to Bustleton ; a subway on Chestnut street from the Delaware to the Schuylkill, ex¬ tended by elevated road to Darby ; a delivery loop (subway) in the heart of the city; a Park¬ way subway with an elevated extension to Rox-borough. The total mileage of the system as approved is 50, of which 1 5.4 is subway, 24.5 elevated and 10.1 surface road. These with existing high-speed lines, steam and electric, will give service radially from the city's centre in every direction.

Parks and Playgrounds. — Fairmount Park

began with five acres, purchased in 1812 for the waterworks and opened in 1825. It was enlarged to 41 acres in 1855 and to nearly its present dimensions in 1867-68, when a number of country estates on the Schuylkill were ex¬ propriated. Fairmount Park includes 373 acres of water surface (Schuylkill River), and its total area is now about 3,546 acres, but this is being added to constantly. By a legislative act of 1917 the condemnation of between 1,100 and 1,200 acres in the Wissahickon Valley was ordered. This will include Fort Washington, second in its historic associations only to Valley Forge. Up to the end of the 19th century the most considerable additions to the city's park area outside of Fairmount were Hunting Park (86ˆ2 acres) in North Philadelphia >and Bartram's Garden (27 acres) on the lower Schuyl¬ kill. A large number of small squares have since then been confirmed on the city map. The more important accessions, however, have been quite recent. Among these are League Island Park (300 acres) ; Pennypack Park (726 acres) ; Tacony Creek Park (250 acres) ; Cobb's Creek Park (288 acres). The last three follow the valleys of the creeks for which they are named from four to six miles. The bank of the Delaware from Torresdale to Tacony, owned by the city and the site of pumping sta¬ tions, filtration plants and other municipal works and institutions, given landscape garden treatment as intended, will provide nearly four miles of river front park connecting with Pen¬ nypack, the largest of the ˆcreek® narks. Bur-holme Park (69 acres) ; Whitehall Commons (35 acres) ; Fernhill Park (10ˆ2 acres) ; Wis-ter's Wood (37 acres) and the Cope Arboretum (22 acres, donated to and

administered by the City Park Association) are all in the north¬ eastern or northern sections of the city. The total park area of Philadelphia, including squares and parkways, is 6,000 acres — only a little more than one-third the park area of metropolitan Boston. The Fairmount Park com¬ mission governs most of these parks, but some are under the control of the department of public works. Permanent playgrounds, 22 in number (several of them donations of public-

spirited citizens — Happy Hollow is the most famous), have been opened by the board of recreation since it came into existence. Of these, eight, averaging four acres in area, are provided with recreation centre buildings. The other 14, which average ˆabout two acres in ex¬ tent, have equipment and are enclosed, and four of them have swimming pools. The attendance is in excess of 2,500,000. Of the 248 school yards in the city, 106, averaging one acre in dimension, are operated as playgrounds in the summer under direction of the board of edu¬ cation. The attendance at the public bath¬ houses maintained by the municipality exceeds 3,000,000 in a > season.

Libraries, Museums, *Etc.* — There are 65 libraries and reading-rooms in the city. The Philadelphia Library Association — an out¬ growth of Franklin's <(Junto® founded in 1731 — has 250,000 volumes, equally divided between the main library at Locust and Juniper streets and the Ridgeway Branch at Broad and Chris¬ tian. It is sustained to the extent of one-half of its disbursements by endowments, the largest being that made by Dr. James Rush — $1,300,- 000, including the value of the very handsome building for the Ridgeway Branch. The Mer¬ cantile has about 200,000 volumes. The library of the University of Pennsylvania, housed in the most ornate structure of the grounds, has had a remarkable growth, increasing in 10 years from 60,000 to over 400,000 volumes. The other large libraries in the city are technical or other¬ wise specialized in character ; the Academy of Natural Sciences, 50,000 volumes and 15,000 pamphlets; Drexel Institute, 27,000 volumes; Franklin Institute, 51,000 volumes, and Ameri¬ can Philosophical .Society (principally transac¬ tions), 35,000. The Pennsylvania Historical So¬ ciety has a large collection of Americana, chiefly of the Middle States. All of these are open to non-members for consultation, a concession ex¬ acted from subscription and (association libraries in return for exemption from taxation. The

Free Library of Philadelphia was established under a charter granted February 1891 ; it is governed by a board of trustees pursuant to ordinances of the city councils and an act of assembly. The principal trust funds tare be¬ quests of George S. Pepper, R. G. White, George B. Roberts, William Brooke Rawle and Jonathan Livezey. The plant consists of the main library, at 13th rand Locust streets, and 27 branches, of which 21 occupy buildings erected from Andrew Carnegie's gift of $1,500,000 to the city. Of the sites for these 15 were donated by citizens of Philadelphia, and two branch buildings, including the ground on which they stanch rare gifts of the late P. A. B. Widener and Robert Ryerss. The library building now contains 534,152 volumes and 274,821 pamphlets. During 1917 3,148,509 volumes were lent for home use, including 1,280,943 books taken out and read by children. In addition 1,831,580 persons used the library buildings for reacting and study. On 12 May 1917 ground was broken for the new main building, which is being built by the city on the Parkway. This great build¬ ing, which will have i>a shelving capacity for more than 1,500,000 volumes, will be an orna¬ ment to the Parkway and in every way worthy of the city.

The Philadelphia Commercial Museum is the only institution of its kind in the United States.

Its object is the promotion of international trade by diffusion of knowledge of the re¬ sources and needs of foreign countries. It oc¬ cupies a group of buildings at 34th and Spruce streets, where it maintains a very complete ex¬ hibition of fibres, minerals *and other raw mate¬ rial of industry, illustrative of the commercial geography of the world.

The Academy of Natural Sciences has pos¬ sibly the largest of all collections of butterflies jand marine shells. The Museum of Science and Art of the University of Pennsylvania is notable for its Oriental ceramics, its archaeological col¬ lections, illustrative of the most ancient civil¬ izations of the Mediterranean Basin, Egyptian, Assyrian, Minoan, etc., and of the ethnography of America. The Franklin Institute shows models of epoch-making inventions. The nucleus of a superior museum of fine aarts ex¬ ists in the Wilstach collection, now housed in Memorial Hall at Fairmount Park. The collec¬ tion bequeathed to the city by the late J. G. Johnson is on exhibition at the donor's former residence, in i-accordance with the conditions of the bequest ; but it will have to be removed to the projected Art Museum building to protect it from fire and other risks. There are others,

notably the superb Widener aiid Elkins collec¬ tions, which will inevitably gravitate to the mu¬ nicipal museum. The Academy of Fine Arts has an almost complete collection of portraits by Stuart and a permanent free exhibition of earlier and modern American art, which is out¬ growing its space. The display in Independ¬ ence Hall constitutes a historic art museum in itself and the Fairmount Park Art Association has an endowment fund of $800,000 for the purchase of works of sculpture.

Philadelphia has two opera-houses, the Academy of Music and the Metropolitan, and there are five theatres of modern construction. Mrs. Drew's Arch Street Theatre is still in service ; in recent years it has given a home to German and Yiddish drama and vaudeville.

Education. — The Provincial Council, 26 Oct. 1683, provided for the hire of a school¬ master, and established the fees to be charged for his tuition in the ordinary English branches. In 1689 the William Penn Charter School was opened, chartered 1697, and has been continu¬ ously in operation down to the present time, its building standing now, as it has for many years, at 12th and Market. In 1743 the Academy and Charitable School of the Province of Pennsyl¬ vania was outlined by Benjamin Franklin, urged in a pamphlet in 1749, and the common council of the city began in 1750 the policy, fol¬ lowed by the city since, of establishing scholar¬ ships by giving £ 200 in cash, £50 per annum for five years and an additional sum for each scholar sent to the Charity Department. Out of this academy grew the University of Pennsyl¬ vania. *

Public schools for <(indigent® children were opened in 1818. There were 6 schools with 10 teachers and 2,845 pupils, nabout one-fourth the population of school age. Since 1830 the public schools have been free to all, and in 1838, 20 years after their first opening, the number of pupils was 18,794, seven times the original at¬ tendance — and there were 167 schools with 257 teachers. The law of 1912 established Phila¬ delphia as a school district in the State's de¬ partment of public instruction and empowered

the board of education to levy the school tax and borrow money independently of the city council. In 1917 the board expended a total of $11,371,018. A remarkable development of the public school system has been the growth of the high school attendance. The high school enrolment now exceeds 18,000, more than three times the number 10 years ago. There are more than 1,600 applicants annually for admis¬ sion, and to obviate the construction of a new building each year the freshmen classes are segregated in a junior high school. Besides this junior high school there are 11 academic high schools, one industrial arts high school, two schools for trades and higher vocational training, the Normal School with two adjuncts, and the School of Pedagogy, giving two years' postgraduate courses for female and male scholars, respectively, who are qualifying for the profession of teaching. There are also five evening high schools and one evening trade school for those unable to attend in the daytime. The elementary schools are 197 in number and there are 20 elementary evening schools. Voca¬ tional training (elementary) is now given to all pupils of the 7th tend 8th grammar school grades — in 48 metal and woodworking shops ; 48 domestic science classes (cooking, etc.) ; 40 classes for elementary instruction in the industrial arts (three times that number are required), and there are 122 sewing classes. In 1917 the enrolment in elementary schools (including 8,281 in continuation classes and nearly 3,000 in special classes for the backward and other subnormals) was 212,599, and the grand total for all the public schools was 232,051. The school buildings owned by the district number 328, and there are 17 portable and 12 rented buildings in use. The equipment has been greatly improved since 1912 and the new buildings are models of their < kind. In addition the city pays for the tuition of 200 graduates from the public high schools at col¬ leges and professional 'schools and provides also more than 400 scholarships at the various art schools in the city. The parochial schools in the city — chiefly Roman Catholic — contain about 35,000 pupils and private schools nearly 3,000 more. Girard College, founded by Stephen Girard, has an endowment of nearly $15,000,000 and receives white male orphans from 9 to 19 years of age. It has about 1,600 pupils.

The University of Pennsylvania has about 330 instructors and over 3,000 students. It maintains in its collegiate department, in addi¬ tion to the usual curriculum, technical courses in architecture, mechanical engineering, music, *etc.* Its law school has about 400 students. The university, originally upon the site now occupied by the post office at 9th and Chest¬ nut streets, is now at Woodland avenue and 33d street,, where since the removal in 1876 there have been constructed 29 buildings, in¬ cluding a library, a museum, a hospital and a

botanical garden. The city receives 50 free scholarships in return for its grant of the land on which the university stands. Philadelphia is, and has long been, famous for its medical schools. The universitv medical department, established 1765, was the first in the United States. Besides this, the best-known medical schools are Jefferson. Medico-Chi rurgical, Woman's and Hahnemann. All of these give

four-year courses and have university privi¬ leges. The College of Pharmacy is one of the best in the country. Divinity schools are main¬ tained in the city bv the Presbyterian, Lutheran, Reformed, Protestant Episcopal and Roman Gatholic churches. These seminaries have had for a number of years an average of 1,500 students. Approximately 1,200 students attend the four dental schools in the city, including that of the university. Industrial training for the indigent is provided at Girard College and at the Williamson Trades School, just outside of Philadelphia, which has an endowment of $2,000,000. The Drexel Institute gives courses in mechanical drawing, engineering, archi¬ tecture, chemistry, dressmaking and domestic economy. The Pennsylvania Academy of Fine Arts is the oldest institution of its kind in America and gives instruction in applied as well as in high art. The Academy, the Pennsyl¬ vania Museum and School of Industrial Art and the Woman's School' of Design (Spring Garden Institute) are attended by an aggregate of nearly 3,000 pupils.

Hospitals, *Etc.* — There are about 2,500 asso¬ ciations of religious and humanitarian character and aims. The realty owned by these bodies and exempt from taxation is of the value of more than $50,000,000, which is divided in nearly equal parts between churches and char¬ itable and educational foundations. About 1,500 agencies are directly engaged in the relief of physical suffering. Of these 40 are special and 22 general hospitals, with 16 dispensaries. The city maintains four homes for the indigent; the latest published official census shows 204 male and 473 female inmates at the old alms¬ houses in West Philadelphia, 947 old men at the Holmesburg Home and 160 women at the Brown farm. The Municipal Hospital (for contagious diseases) maintains an ambulance service, which makes an average of 10 calls per day, averaging nine and one-half miles per run. The Philadelphia (public) Hospital for the Insane has a worldwide reputation and cares for upwards of 2,000 patients; more than 500 other insane persons are treated and kept oc¬ cupied on the city farms at Ryberry. The Phil¬ adelphia General Hospital (Blockley's) has usually more than 2,100 inmates under treat¬ ment. Of _ private charitable institutions the Pennsylvania (free) Hospital, founded by Franklin in 1751, and its

filiate for the treat¬ ment of mental and nervous diseases (Kirk-bride's) are still foremost. Other large hospi¬ tals are the Episcopal, Saint Joseph's, Mount Sinai, German, Jefferson, Polyclinic, Medico-Chirurgical and Pennsylvania University. Among other semi-public charitable foundations the Pennsylvania Institution for the Deaf and Dumb, established 1820; the Home for Train¬ ing in Speech of Deaf and Dumb Children ; the Pennsylvania Institution for the Blind, estab¬ lished 1820; the Pennsylvania Training School for Feebleminded Children, established 1853 ; the Widener Home for Crippled Children; the Children's Aid and the Society for the Preven¬ tion of Cruelty to Children are conspicuous.

Bibliography. — Belisle, D. W., 'History of Independence HalP (Philadelphia 1859) ; Eber-lein, H. D., (Colonial Houses of Philadelphia and its Neighborhood) (Philadelphia 1912) ; Fisher, S. G., (The Making of Pennsylvania) (ib. 1896) ; id., Pennsylvania: Colony and Com-

monwealth J (ib. 1897) ; Hazard, Samuel, (Wat¬ son's Annals > (ib. 1884) ; Hotchkin, S. F., (Penn's Greene County Towne) (Philadelphia 1904) ; King, Moses, ˆPhiladelphia and Notable Philadelphians) (New York 1902) ; Lawrence, (History of Philadelphia Almshouses and Hos¬ pital (Philadelphia 1905) ; Macfarlane, J. J., Manufacturing in Philadelphia 1683— 1912) (ib. 1912) ; Oberholtzer, E. P., (Literary History of Philadelphia* (ib., 1906); Pennell, Elizabeth, (Our Philadelphia* (ib. 1914) ; Repplier, Agnes, Philadelphia: the Place and the People* (new ed., New York 1907) ; Rhoades, L. I., (The Story of Philadelphia) (New York 1900) ; Scharf and Wescott, (History of Philadelphia, 1609-1884) (3 vols., Philadelphia 1884) ; Shack-leton, Robert, (The Book of Philadelphia) (Phil¬ adelphia 1919); Talcott, William, Philadelphiaˆ (in Powell's (Historic Towns of the Middle States,* New York 1899) ; Vickers, G. E., Philadelphia: The Story of an American City) (Philadelphia 1893) ; Young, 'Memorial His¬ tory } (ib. 1895).

Stephen Pfeil,

Formerly of the Philadelphia ‘ Press.’*

PHILADELPHIA, Academy of Natural Sciences of, an institution for the advancement of learning in the natural sciences, founded in 1812. It has a large and handsome building in the city of Philadelphia and conducts its highly organized work through four principal depart¬ ments : the library, the museum, the publication office and the department of instruction and lec¬ tures. The library has grown chiefly by gifts and numbers upward of 80,000 volumes and many more thousands of pamphlets. It is essentially a reference library. The museum is one of the most important in the world. The collections are in two grand divisions : one for public exhibition, and the other for study by specialists, some of whom come from great dis¬ tances to avail themselves of its unequaled advantages. Of vertebrate animals there are over 130,000 specimens, comprising 12,000 mam¬ mals, 60,000 birds, 20,000 reptiles and 40,000 fishes. Insect specimens number over 400,000 and of shells there are more than 1,500,000 — the largest collection in the world. There are upwards of 50,000 fossils ; 30,000 minerals ; 20,000 archaeological objects and more than 900,-000 dried plant specimens in the herbarium. The several series of publications have filled nearly 150 volumes, the annual output being nearly 2,000 pages, with a large number of plates both in half-tone and color. Lectures have been given since 1814. Besides the regular evening winter courses, special educational series are given to schools. For 25 years past all lec¬ tures have been free to the public. A number of scientific clubs make the Academy their headquarters, meeting there at regular intervals. Among these may be mentioned the Delaware Valley Ornithological Club and the Philadelphia Botanical Club. The Academy provides oppor¬ tunities for scientific education free to worthy students. Its regular periodical publications are its Proceedings and Journal.

History. — Within a few months after its founding a considerable number of valuable scientific works had been presented to the new association, forming the nucleus of its now famous library; and the museum now renowned the world over began its existence writh a few contributions by the members, and a collection

of 2,000 specimens of minerals purchased upon pledges. By 1814 the Academy had 14 members and 33 correspondents and courses of lectures in botany and entomology were arranged. The Journal first appeared in 1817. The neces¬ sity for larger quarters led to the purchase of a small meeting-house in 1826, and there the museum

was first opened to the public in 1828. The Academy's second building was erected es¬ pecially for its purpose in 1839. This was en¬ larged in 1846, and again in 1855. In 1860 the Thos. B. Wilson collection of birds, then the largest in the world, which had long been on exhibition in the museum, was given to the Academy. It comprised 20,000 mounted speci¬ mens and 2,000 skins. In the same year a pub¬ lication fund and several endowment scholar¬ ships were established through gifts to the Academy. At this time the Proceedings and the Journal were the most important publica¬ tions on natural history in the United States. A large and handsome building was completed in 1876 on Logan square and the collections and library were installed the same year. From this time the growth of the institution was rapid and through appropriations from the State legisla¬ ture additions have been made to the building from time to time — in 1890, 1892, 1908 and 1911 until the original building has been trebled in size, a fine library stack and reading-room having been added to house the scientific library which is unrivalled in America. In 1912 the Academy celebrated its first centennial and del¬ egates or messages were received from upwards of 500 societies throughout the world. During its long history the Academy has taken part in very many important scientific explorations and some of its members took part in Long's Expe¬ dition to the Rocky Mountains (1819-20) ; the United States Exploring Expedition (Wilkes' Expedition, 1838) ; Dr. Kane's and Dr. Hays' Arctic expeditions ; Audubon's Missouri River Expedition ; the first Peary Arctic Expedition (1891-92). The Academy financed one of Du Chaillu's African expeditions and sent mem¬ bers of its staff on exploration to Mexico and Yucatan (1890), and to various parts of the western United States. The institution has also furnished from its membership time and again eminent scientists for posts in various govern¬ ment departments and elsewhere, while the Jessup Scholarship Fund left in trust to the in¬ stitution has been instrumental in developing many young men who have made their mark in science, by making it possible for them to pursue their studies in science at the Academy.

PHILADELPHIA, The College of Phy¬ sicians of, an association of physicians founded at . Philadelphia on 2 Jan. 1787, having for object, according to its first constitution, (<to advance the science of medicine, and thereby to lessen human misery, by investigating the diseases arffi remedies which are peculiar to our country, by observing the effects of different seasons, climates and situations upon the human body, by recording the changes that are produced in diseases by the progress of agri¬ culture, arts, population and manners, by search¬ ing for medicines in our woods, waters and the bowels of the

earth, by enlarging our avenues to knowledge from the discoveries and publica¬ tions of foreign countries; by appointing stated times for literary intercourse and communica¬ tions, and by cultivating order and uniformity

in the practice of physick.® At first the col¬ lege consisted of 12 senior fellows and an in¬ definite number of junior and associate fellows; the senior and junior fellows being chosen from physicians who resided <(in the City or District of Southwark or Liberties of Phila¬ delphia, and the associates from <{such per¬ sons of merit in the profession of medicine® who did not live within these described limits. The first three presidents were John Redman, William Shippen and Adam Kuhn. The college was incorporated on 26 March 1789. The col¬ lege was never a teaching institution in the ordinary sense of that term, nor has it the power to confer degrees. It has the right only to bestow fellowship and associate fellowship upon those who are eligible for these honors and to elect a limited number of corresponding members. It is, therefore, a scientific body, and once a month, except during July, August and September meetings are held at which papers on medical, surgical and allied subjects are read and discussed. These are published in the transactions, > the first volume of which ap¬ peared in July 1793. At an early period in its history the college assumed a guardianship over the health, safety and even the morals of the community. The first standing committee, that on meteorology and epidemics, had a continued existence from 1787 to 1882. The members of the college did much to combat the epidemics of yellow fever in Philadelphia which were frequent prior to 1820. The college took a prominent part in all movements for the better¬ ment of public health, such as the establish¬ ment of a quarantine and hospital for con¬ tagious diseases, of hot and cold baths, of the regulation of the practice of physic within the State, and its important actions in relation to the preparation of the Pharmacopoeia of the United States. Within recent years, however, the college has confined itself in largest meas¬ ure to the discussion of scientific matters. The new building of the college was completed and occupied on 10 and 11

Nov. 1909. Here is maintained a large library of over 100,000 vol¬ umes, an equal number of unbound pamphlets and 165 medical incunabula. The library is free and is open to any one who is interested. Only Fellows have the privilege of taking books from the building. About 1,200 current periodicals are received. The Mutter Museum is one of the features oil the building, with its hundreds of pathological specimens. The museum is open to all research students, medi¬ cal students and physicians under proper regu¬ lations. In 1882 a Directory for Nurses was organized. Since the foundation, 935 Fellows, 91 American Associate Fellows, 51 Foreign As¬ sociates and eight Corresponding Fellows have been elected. At present there are 404 Resi¬ dent Fellows, 27 Non-resident Fellows, 20 Foreign Associate Fellows and four Corre¬ sponding Fellows. Several series of lectures are given, under the provision of various en¬ dowments, to some of which all physicians and even the general public are admitted. Consult Henry, F. P., historical Sketch of the College of Physicians of Philadelphia) (New York 1909), and Schweinitz, G. E. de, (Account of the College of Physicians of Philadelphia> (Philadelphia 1912).

PHILADELPHIA, Destruction of the,

one of the boldest and most daring exploits in

naval history. This American frigate had pur¬ sued a piratical Moorish vessel into the harbor of Tripoli, 31 Oct. 1803. In endeavoring to beat off from the harbor the Philadelphia struck on a sunken ledge which was not laid down in the charts. The Tripolitans at once sent out nine gunboats to attack the helpless vessel, and Captain Bainbridge, in command of the Phila¬ delphia, had no resort except to surrender. He, however, first threw all his guns overboard and scuttled the ship, so that if she were pulled off the ledge she would go to the bottom. He and his men were treated humanely. Captain Bainbridge succeeded in sending information of his misfortune to Commodore Preble, in com¬ mand of the American squadron at Malta. Meantime the Tripolitans had worked the frig¬ ate off the rock, plugged the holes in her bot¬ tom and removed her into the harbor, where they were fitting her out to be used against the Americans. Captain Bainbridge devised a plan for the destruction of the Philadelphia and managed to send it by letter to Commodore Preble who assigned Lieut. Stephen Decatur to the dangerous task. Lieutenant Decatur with 74 volunteers started on his errand 9 Feb. 1804 in a small vessel called a <(ketch,® which had been captured by the Americans and christened the Intrepid. The Siren, Lieut. Charles Stew¬ art, accompanied the Intrepid to cover the

re¬ treat. A gale sprang up and for six days the men who crammed the <(ketch® to its capacity were practically imprisoned and compelled to subsist on half-rations. On 15 February the gale passed and the expedition was resumed. It was a moonlight evening, and as the officers and men were concealed below, the Intrepid looked to the Tripolitans like an innocent mer¬ chant vessel. A hail from the Philadelphia was answered in Maltese, and as the Intrepid was warped alongside the frigate, the Ameri¬ cans sprang from concealment, rushed on board and, after a fierce hand-to-hand attack, the Tripolitans threw themselves into the sea. The fire squads went promptly to their stations with the combustibles and the Philadelphia was fired in four places. Then under the glare of the flames, with no wind, the <(ketch® was slowly moved out of the harbor by sweeps, a target for 115 heavy cannon in the land fortifications and for 24 gunboats and other heavily armed craft which took up the pursuit. The retirement, however, was made without mishap. Parts of the water-logged timbers of the Philadelphia were recovered by Captain Breese of the Cum¬ berland in 1844 and converted into souvenirs.

PHILADELPHIA (Tenn.), Military Op¬ erations at. Philadelphia, a station on the rail¬ road from Chattanooga to Knoxville, south of Holston River, was held in September 1863 as an outpost to Burnside's army, which was north of the Holston and spread out widely through¬ out the valley of eastern Tennessee, in the endeavor to keep the entire country clear of the numerous bodies of Confederate troops which threatened it at several points. On 27 September the Union troops were driven from the place and other points south of the river by the Confederates, who had advanced to threaten Burnside at Loudon and to cover a cavalry raid upon Rosecrans' communications with Nashville. In this advance the Confed¬ erates captured at various points 6 guns, 50 wagons and some 600 to 700 prisoners. About

8 October Philadelphia was reoccupied by Colo¬ nel Wolford, with his Union cavalry brigade of 2,200 men and six guns. Wolford's force was made up of the 1st, 11th and 12th Ken¬ tucky Cavalry and the 45th Ohio Mounted Infantry. On the 19th Gen. C. L. Stevenson ordered the Confederate cavalry brigades of Colonels Dibrell and Morrison, numbering about 7,000 men to move upon Philadelphia and capture

Wolford or drive him across the Holston. Dibrell was to move from Cleveland and attack from the south, while Morrison, march¬ ing from Wolf River Bridge, was to gain the Loudon road and attack from the north. Mor¬ rison, with 1,800 men, in approaching the Lou¬ don road from the west, on the morning of the 20th captured a foraging train with its guard of 40 men, and in quick succession the 11th and 1st Kentucky Cavalry were sent by Wolford to recapture it. A fight ensued, with varying success, but Morrison finally interposed be¬ tween the two regiments and Philadelphia, driv¬ ing them in the direction of Loudon, and gain¬ ing the road two miles in rear of Philadelphia. Meanwhile Dibrell, moving through Sweetwater, came in sight of Wolford's 12th Kentucky and 45th Ohio, with the six-gun battery, and at 1 p.m. opened with his artillery and charged with his cavalry, but met with such a determined resistance that he was held at bay, and the ac¬ tion on that front lapsed into an artillery duel. Morrison now came up in Wolford's rear, dis¬ mounted his men and began his attack. Leav¬ ing a small party to oppose Dibrell, Wolford, with his two regiments of 700 men and his (battery, turned upon Morrison, repulsing sev¬ eral attacks. After three hours' fighting the artillery ammunition was entirely exhausted, and the carbine ammunition nearly so ; Dibrell was closing in on one side and Morrison on the other ; and Wolford ordered a sabre-charge to cut his way out to Loudon. He dashed against Morrison, and broke through, just as Dibrell was cutting into his rear, detaching scores of prisoners. He left his guns, am¬ bulances, 30 wagons, many horses and mules and 324 prisoners in the hands of the Con¬ federates, and made his way in some confusion to Loudon, taking with him some 50 Con¬ federate prisoners. He was joined on the road by the 1st and 11th Kentucky. Morrison fol¬ lowed until he came in sight of Burnside's in¬ fantry near Loudon. The Union loss was 32 killed and wounded and 447 captured. The Confederate loss was 15 killed and 82 wounded, and 111 prisoners.

PHILADELPHIA AND READING RAILWAY COMPANY, a public utility cor¬ poration, incorporated in Pennsylvania, 17 Nov. 1896, to acquire the railroad lines of the old Philadelphia and Reading Railroad, which were sold under foreclosure on 23 September of that year. The company operates the railroad for¬ merly leased to the old company, either through transfer of the old leases or through creation of new leases. Its entire rolling and floating equipment is leased from the Reading Company, which equipment it undertakes to maintain un¬ impaired as to capacity and efficiency. The company is largely engaged in the transporta¬ tion of coal from the first and second anthra¬ cite coal fields in Pennsylvania to tidewater at Port Reading,

N. J., and Port Richmond, Phila¬

delphia. The terminals at the latter port cover 140 acres of land and include an extensive sys¬ tem of piers and wharves from whence the company operates a service of sea-going barges and tugs distributing coal to many points along the coast. The yard comprises over 80 miles of track and has accommodations for over 6,000 freight cars. There is a grain elevator with a storage capacity of 1,500,000 bushels and discharging capacity of over 30,000 bushels an hour. There is also an ore-unloading plant and pier with a discharging capacity of 600 tons per hour. On 31 Dec. 1918 the Philadelphia and Reading Company owned 386.79 miles of first track, 186.77 of second track, 75.48 of third and fourth tracks and 620.33 miles of sidings and laterals, making a total of 1,269.37 miles of track. On the same date the company held under leases, 705.92 miles of first track, 379.57 of second track, 50.71 miles of third and fourth tracks and 546.52 of sidings and laterals, a total of 1,652.72 miles under lease. In addition it held trackage rights over 34.46 miles, making a grand total of 2,956.55 miles over which it operates. The main line has 105.63 miles of first track and a total of 595.11 miles of all tracks and sidings ; main line branches have total trackage of 56.05 miles; Lebanon Valley branch, 55.48 miles of first track and 243.93 miles of all tracks, *etc.* On the above date the rolling stock and floating equipment were as follows: 1,028 locomotive engines and tenders, worth $13,334,265 ; 42,487 revenue freight cars, worth $42,591,681 ; and capacity of 3,581,408,000 pounds ; 954 passenger cars, worth $5,193,047 ; and 620 work cars, worth $460,103 ; 21 sea tugs, worth $1,518,906; and 114 sea barges of 83,478 regu¬ lar gross tons, worth $2,651,017, making a total valuation of rolling and sea-going equip¬ ment over $65,500,000. In 1918 the income from all sources aggregated $16,570,754.88 ; the vari¬ ous deductions from income $8,060,292.90, leav¬ ing a net income of $8,510,461.98. Of the latter $6,858,568.24 was appropriated for investment in physical property, leaving a balance transferred to profit and loss of $1,651,893.74. The capital stock amounted to $42,481,700; the funded debt, $49,495,585.61 ; current liabilities, $5,852,618.77 ; unadjusted credits, $26,946,257.89; deferred lia¬ bilities, $1,373.70; additions to property through income from 1907 and charged as an asset, $28,-861,046.35 ; profit and loss, $10,780,898.74, a total liability of $164,946,404.48. The main line is from Philadelphia to Reading; branches: Read¬ ing to Harrisburg, Lebanon to Pine Grove and Auburn, Pine Grove to Rockville, Reading to Shenandoah, Mahanoy Plane to Port Trevor-ton, with numerous shorter branches in the coal

regions.

PHILADELPHIANS, a sect or society of mystics founded in London toward the close of the 17th century by Jana Leade and Dr. John Roidage; the latter a follower of the German mystical philosopher, Jacob Boehme, whose complete works had been translated into English and published at intervals ‘between 1644 and 1662. There had already existed a society or sect of Boehmenists in England with a mem¬ bership made up of cultured people and simple, but it became merged into Quakerism. The philosophy of Boehme had a special attraction for cultured mystics, and such were Dr. Francis Lee, Dr. Lot Fisher, Dr. Thomas Bromley

PHILAE

1 Colonnades of the Temple of Isis

2 Colonnade of Ptolemy IX

-

,

‘

*

and others who became founders of the Society of the Philadelphians or of Brotherly Love. The belief peculiar to the Philadelphians was that of possible intimate communion with the spiritual realm, which, years afterward, marked the teachings of Swedenborg. The Society

gathered a large following among the members of orthodox churches who retained such mem¬ bership while subscribing to the doctrines of the Philadelphians. Many of these were in Hol¬ land and Germany, to which countries the So¬ ciety sent literature and missionaries. Consult Illgen, (Zeitschrift fiir Historische Theologie> (1865, Vol. II, pp. 171-290).

PHILADELPHUS, or MOCK ORANGE, commonly known in America as Syringa, which is, however, the botanical name of the lilac. The name <(Mock Orange" arises from the similarity of perfume of the flowers of the syringa and the orange. It is a genus of deciduous or sub-evergreen shrubs of the order Saxifragacece, and thus related to the Deutzias. The species, of which about 30 have been described, are natives of the Northern hemisphere, and very widely distributed, being found in China and Japan, the Himalayas, Mexico and the Pacific Coast of the United States. They have three-nerved leaves, flow¬ ers in racemes or solitary on little twigs and many-seeded dehiscent fruits (capsules). Twenty of the species recognized by Koehne are indigenous to North America. The popular name, ((syringa," by which several of the species are widely known in America, is misapplied. Syringa is the generic name for lilac. The species are mostly hardy in the Northern States, tropical and subtropical species generally ex¬ cepted. They are readily propagated by means of division of the roots, layers, suckers, cuttings and seeds. But since the species readily inter¬ cross, seeds are rarely used except for pro¬ ducing new varieties. They will thrive in any ordinary, well-drained soil and in any degree of sunlight ; some will even stand shade, but they thrive best in a deep, moderately rich loam. The flowers appear in early summer upon twigs of the previous year. Pruning *is rarely needed, especially in the case of the tall-grow¬ ing sorts, but, when necessary, should be given in summer just after the plants have blossomed. The popular garden forms are much alike in appearance, but there is a great difference in fragrance. Probably P. coronarius Chinensis is the most common. It is a native of western Asia and southern Europe, and is one of the most fragrant. Some very remarkable and valuable varieties have ‘been developed by florists through hybridization. They produce flowers of twice the size of the parent stocks, reaching over two and one-half inches in diameter, and some semi-double and double sorts have been created. Among the more desirable varieties may be named the Lemoine hybrids . Avalanche ; Fantaisie (tinged with rose) ; Mont Blanc; Pnrpureo-maculatus (purple-spotted) ; and Virginal (double). The Lemoine varie¬ ties require quite vigorous pruning and make fine single specimens when kept dwarf upon a single stem.

PHIL2E, fi’le, a small island bf the Nile in Upper Egypt, on the old boundary of Ethio¬ pia, about seven miles south of Assouan and on the upper side of the hirst Cataract. 1 he

name Philae seems to be an attempt to repro¬ duce in Greek Pilak or Pilakeh, a Coptic word meaning ((corner” or (<end,” given because of the border site of the island; it is now called Jeziret el-Birba, <(Temple Island,” or Jeziret Anas el-Wogud, <(Island of Anas el-Wogud,” as the scene of a tale in the (Arabian Nights,’ whose hero is so called. The present site of the island is within the Assouan reservoir ; see plate accompanying article Assouan. The reservoir waters overflow the island and par¬ tially submerge the temples, except from August to December of each year, when the gates of the dam are open and the river falls to its accustomed flood level, but elaborate precau¬ tions were taken to strengthen the foundations of the various temples ; these are described in the article Assouan. A minute inspection made in 1907 showed that there had been no settling, and except for the blurring of some inscrip¬ tions at the base of sandstone structures, which had become infiltrated with salts from the mudhouses built against them, the ruins were unchanged. To some extent, however, there has been discoloration of the sandstone from iron and manganese in its composition. ((Temple Island® is the most expressive appellation for this place, which was sacred to Isis and is cov¬ ered with remains of the best preserved temples of all Egypt. The island is scarcely less re¬ markable for its position high above the sur¬ rounding waters, so that it was never over¬ flowed until the building of the Assouan dam, and for its beautiful vegetation, luxuriant palms and mimosas, than for the adaptation of Egyp¬ tian architecture, usually massive and majestic, to the exigencies of an island 1,500 feet long and 480 feet wide. The monuments of Nectanebo II (4th century b.c.) are the oldest now existing on the island or anywhere men¬ tioned in inscriptions as having been built here. The temple of Isis, which was-doubtless antedated by an important cultus, was begun in the time of Ptolemy II Philadelphus, carried out by his successor, Ptolemy Euergetes, and added to by Neos Dionysos in the 1st century b.c., when the decorations on the walls were made by Augustus and Tiberius, whose votive offerings in the form of reliefs decorate the exterior, and by Hadrian, who reared a shrine at the west of the main temple. Other build¬ ings are the pavilion of Trajan, a portico of 14 columns; a temple to Hathor, built by Euer¬ getes II and finished by Augustus; the Kiosk; the temple of Harendotes and a shrine of Imhotep. For a full description of the Island consult Benedite, G. A., (LTle de Phile’ (Paris 1893) ; Edwards,

A. B., (A Thousand Miles up the Nile' (London 1877), and Baedeker's (Egypt.'

PHILANDER, fi-lan'der, the Dutch knight in Ariosto's <Orlando Furioso' (1516). He is represented as making love to Gabrina, the wife of his host, and his name has come to ibe synonymous with masculine coquetry. It was used for the character of the lover in many old plays, and from it came the verb ((to philander."

PHILANDER SMITH COLLEGE, at

Little Rock, Ark. It was founded in 1877 under the auspices of the Methodist Episcopal Church. The college offers, in addition to the regular collegiate work, a business course, a

normal course and a special music course; there is also a preparatory department. The col¬ legiate work is arranged in two courses, the classical and philosophical, and the degrees of A.B. and B.Ph. are conferred. Women are admitted to all courses. Webb Hall, a new dormitory for girls, was opened in 1915. The grounds and buildings in 1918 were valued at over $175,000, and the library contained 2,000 volumes. The annual income for 1918 amounted to $18,000. The students in that year numbered 429 and the faculty 24.

PHILANTHROPY, the impersonal love of humankind based upon the idea of the brotherhood of all men. It is most commonly exhibited by the founding or endowment of public institutions for the organized and sys¬ tematic relief of the indigent or suffering. In German and Swiss pedagogics the term is ap¬ plied to the theory of those who advocate Rousseau's plan of education ; chief among whom was Basedow (q.v) who founded the first of many Philanthropina at Dessau in 1774. The New York School of Philanthropy, con¬ ducted by the Charity Organization of the City of New York, publishes an (AnnuaP and a series of <Bulletins) keeping fully abreast of philanthropic movements. Consult Bolton, S. K., (Famous Givers and Their Gifts* (New York 1896) ; Goodale, F. A., (The Literature of

Philanthropy* (New York 1893) ; Hodges, G., (Efficient Philanthropy) (New York 1911).

PHILARET, fe-la-ret' (Vasili Drosdov), Russian prelate: 'b. near Moscow, 26 Dec. 1782; d. Moscow, 1 Dec. 1867. He was ordained priest and in 1812 became rector of the Alexander Nevski Academy at Saint Petersburg. In 1817 he was made bishop of Reval; in 1819 arch¬ bishop of Tyer; in 1820 archbishop of Yaroslav; in 1821 archbishop of Moscow, and metropoli¬ tan of Moscow in 1826. He was an eloquent crator and long one of the most influential of the Greek clergy. His cathechism has been used by all the orthodox clergy and in all the schools in Russia since its publication in 1837.

PHILASTER, or LOVE LIES A-BLEEDING. Beaumont and Fletcher, the courtly pair, who, though writing together only some six or seven plays, gave their joint names to a vastly greater output, had most of Shakes¬ peare's secondary virtues. In the handling of plot and situation and character they had. all of his theatrical skill; in poesy they had much of his grace and vigor. But they lacked his genius for truth. They carried playwriting out of the domains of life into the regions of con¬ vention. (Philast?r) is one of the best ex¬ amples of that class of tragi-comedy invented for the purpose of appealing to the sensibili¬ ties without wringing them with true tragedy. The situation is built up by painstaking artifices to reach a moment of artificial tensity. At any moment <(all these jealousies had flown to nothing® had a word been spoken, but the word is not spoken until the authors are ready for it. The authors are no less adept at pro¬ viding a solution than they are in creating the situation. In this case a tragic denouement is avoided by the introduction of a crowd as god outside the mechanism and by an oppor¬ tune confession.

The play itself must be read in the light of the romantic love-comedies of Shakespeare,

the materials of which it uses and develops for theatrical effect. The figure of the girl dressed as page and serving as love-tribune of the man she loves comes direct from Shake¬ speare, as also do the woodland scenes. (Philaster) is ((a weakened adaptation of Ham¬ let.® And yet between the two there is the difference between stylish embroidery in the ((vogue® and the first spirited imagining of the pattern. English dramatic poesy has never gone beyond the flexibility and piteous music of the lines of (Philaster* ; the combined verse and prose are handled with perfect grace. The atmosphere of playful

unreality is skilfully maintained ('Tis but a bit of childhood thrown away.® <Philaster) was first acted about 1608 at. the Globe Theatre and later at the Black-friars. It was first printed in 1620, after Beaumont's death, which occurred in 1616, un¬ der the names of both authors. The plot is original with the writers. The play was very popular, being played after the Restoration, when according to Dryden its authors were more popular than Shakespeare. In adapted form it held the stage until the early 19th century.

Editions: (Variorum,* ed. Bullen, A. H., 1904 — ; Glover, A., and Waller, A. R., 10 vols., 1905— 12; Schelling, F. E., (Masterpieces of the Eng¬ lish Drama * (1912) ; (Everyman's Library)

(Vol. 506) ; (Mermaid Series,* ed., Strachey; (Philaster,* ed., Boas, F. S., (Temple Dramatists) (1898) ; Thorndike, A. H., (Belles Lettres Series) (1906).. Consult Ward, A. W., (A His¬ tory of English Dramatic Literature, etc.* (1899); Gayley, C. M., (Beaumont the Dramatist (1914); Hatcher, O. L., <John Fletcher, a Study in Dramatic Method) (1905) ; Thorndike, A. H., (The Influence of Beaumont and Fletcher on Shakespeare) (1901).

Thomas H. Dickinson.

PHILATELIC ASSOCIATIONS, Amer¬ ican, various associations in the United States devoted to the study of philately or the science of postage stamps. There are local societies in the larger cities and a national association or¬ ganized in 1885. The New York City associa¬ tion has a club house and a large and valuable library, and publishes monthly The American Philatelist. See Philately.

PHILATELIC SOCIETY, The London,

an association founded in London in 1869, for the study of postage stamps. The Society pub¬ lishes the Monthly Journal of Philately.

PHILATELY, fi-lat'e-li, a term embrac¬ ing the collecting and study of the postage stamps of all nations and the trade which has resulted therefrom. The beginning of this di¬ version or pastime, as it was in the early days, dates about 1850. It has since developed into a recognized pursuit comparable with the collect¬ ing of curios generally. The word philatelist comes frorti the Greek pliilos, a friend or ad¬ mirer, and ateleia, exemption from taxation. Taxation at the time it derived its name in Greek was represented by a small printed piece of paper or check used as a postage stamp is now used. Primarily philately is an intellectual pursuit. It connotes geography,

history, art and science, and stimulates research inf many di¬ rections. Postage-stamp collecting has been visited with more or less ridicule, but has stead¬ ily held its devotees by its unquestionable fasci-

nation, and once aroused the collector's inter¬ est never wanes.

Postage stamps generally bear upon their face the effigy of the reigning king or prince, or the national arms, or various other attrib¬ utes of sovereignty, or the likenesses of men who have made history for their country. The various alterations to which stamps of a coun¬ try have been subjected during the passing years have furnished in many instances records of political or dynastical movements of certain states or countries. History is accurately de¬ picted in the stamps bearing portraits of rulers. There have been issued for Great Britain and her colonies over 1,325 stamps of different de¬ signs and value, bearing the portrait of Queen Victoria. The stamps of some other countries are embellished by numerals, heraldic devices and arabesques, the latter emanating from Mo¬ hammedan lands. Others bear the figures of gods and goddesses and various devices, thus enabling the collector to tell whence they come. The collector can trace the changes of govern¬ ments, kingdoms and empires that have be¬ come republics, and republics that have pro¬ visional government regencies, insurrections, re¬ bellions and confederacies. Upon the simple postage stamp can be studied the rise, decline and fall of empires. The displacement of the stamps of the Roman states, of the Church and the kingdom of Naples, tells of the establish¬ ment of the kingdom of Italy. The disappear¬ ance of the Confederate stamps from circula¬ tion told of the close of the Civil War. The absence from circulation of the beautiful stamps of New Brunswick and Nova Scotia heralded the fact of the confederation of these prov¬ inces under the Dominion of Canada. The rise of the German Empire made obsolete various continental stamps as well as those of Alsace and Lorraine. In other instances old stamps have been superseded by stamps of newer de¬ sign, but the majority of obsolete stamps have been set aside by external forces and thus illus¬ trate history and political geography. The more recent rise and rapid progress of Japan is no¬ ticed by a series of stamps engraved by native artists and printed upon paper of native manu¬ facture.

The 5-cent stamp of the United States first issued bears the face of one of the heroes of the Mexican War. Inadvertently, the col¬ lector is led to inquire into the history of the war, and in a short time learns the relation ex¬ isting between Mexico and other countries. He learns that Spain was known to the Romans as Hispania, that France was known as Gallia and what now comprises the Ottoman Empire was formerly a group of provinces of Greece and Rome. He must know where each stamp-issu¬ ing country is located and by what government it is ruled, in order to understand and classify his stamps properly, and in the chronological order of their issue. The relation philately bears to the study of languages is important. Native letters and Arabic numerals are found upon the stamps of many countries, including Montenegro, Bulgaria, Serbia and Russia. There are countries employing both native and Roman letters and numerals, such as China and Japan, Egypt and Turkey, and some of the na¬ tive Indian and Oriental states. The first seri¬ ous collecting of postage stamps, began about 1854-55, and was chiefly geographical, taking the you 21 — 47

form of arranging on a large sheet a single specimen from each of as many different for¬ eign countries as were obtainable. About 1860 exchanges began to be conducted between boy-collectors, who met in the London streets — at first in Birchin lane — with their duplicates. A year or two later these ˆexchanges® were dig¬ nified by the attendance of adult collectors of both sexes, some of them of notable position, who entered into the trading with such earnest¬ ness that the police not infrequently dispersed the crowd. There was similar trading in other cities of Europe, and out of these exchanges grew the dealers' shops and a lively and profit¬ able business sprang up. Ardent collectors be¬ gan to issue pamphlets on the subject, more or less valuable according to their research and means of information. From this beginning the pursuit has expanded to very considerable proportions ; and as the number of specimens extant of the older issues is, of course, limited, and the demand by new collectors is continually increasing, the acquisition of rare stamps has become a matter of keen rivalry, in which the prices of such specimens has gone to astonish¬ ing figures. Perhaps the record price paid for specimen stamps was reached in England a few years ago when, a fine pair of Mauritius <(Post Office® stamps brought $17,150. There are now about 750,000 collectors scattered throughout the world in about the following proportions: United States, above 150,000; Canada, above 30,000; South America, 4,000 to 5,000; Great Britain, above 120,000; France and Belgium, above 90,000; Germany, above 50,000; Austria, above 30,000; Italy, above 6,000: Spain and Por¬ tugal, above 4,000;

Switzerland, above 6,000; all other European countries, above 30,000; Asia, above 1,500; Africa, 1,000 to 1,500; Aus¬ tralia, 2,000 to 3,000; West Indies, above 600; countries and colonies not included in the above list, about 1,000.

Among prominent philatelists are kings, queens, presidents, financiers and men of af¬ fairs. There are many private collections val¬ ued at from $10,000 to $100,000, and the Roths¬ child collection is said to be worth $175,000. One of the most valuable is the former collec¬ tion of Mr. Tapling now belonging through his bequest to the British Museum. It has more than 100,000 specimens of stamps and postal stationery and is valued at $500,000. It is the best in England and the third in value in the world. There are other than philatelists proper who collect stamps. A great many artists gather the more beautiful specimens to study designs. These are also very valuable guides in the mat¬ ter of engraving on tinted paper. The stamps of the French Republic are masterpieces in this respect. Until they appeared, it was never thought possible to give such effects in engrav¬ ing on tints. The engraving companies now have in many instances beautiful collections of stamps, but they are, of course, of the uncan¬ celed specimens.

The American Philatelic Association has nearly 2,000 members scattered throughout all the States of the Union. The members in New York City are among the representative men of the country. Among them may be found cler¬ gymen, physicians, lawyers, merchants and stockbrokers, there being some 20 members of the New York Stock Exchange in the associa¬ tion. In addition to the parent association

there are branch societies in nearly all the large cities of the United States.

The first sale of postage stamps by public auction took place in London 18 March 1872.

Confederate States Provisional Stamps.

The catalogue comprises some 275 specimens, and the time consumed by the sale was about four and one-half hours.

Among the rare American stamps highly prized by collectors are the early United States provisionals, issued in 1845. The government, being unwilling to undertake the expense of a general issue of postage stamps, permitted the postmasters of certain towns and cities to issue stamps at their own expense and for their own convenience. The postmasters of Alexandria, Va., Brattleboro, Vt., Baltimore, Md., New Haven, Conn., New York, N. Y., Providence, R. I., and Saint Louis, Mo., adopted the plan with such success that the government under¬ took in 1847 a general issue. Other rare stamps are the Confederate provisionals issued during the Civil War by the postmasters in several Southern cities. These stamps were super¬ seded by the regular issue of the Confederate government.

The philatelist collects not only postage stamps, but revenue, telegraph and express stamps, now long since obsolete. The internal revenue stamps formerly used on proprietary articles were of varied design. There was a common stamp for them just as there is now for tobacco. But under the law any manu¬ facturer who was willing to bear the additional expense of preparing a special die and the fur¬ ther cost, if any, of printing stamps after his own design, could have special stamps printed for him at the government bureau. Many of the proprietors of well-known articles, par¬ ticularly patent medicines, availed themselves of the privilege because of the prestige and adver¬ tising which it carried. A unique branch of philately is that of State revenue stamps. These stamps, which are exceedingly rare, represent the tax imposed upon the citizens by the State government in addition to a regular tax im¬ posed by the United States government. Only a few States have ever issued revenue stamps. They are Alabama, California, Louisiana, Ore¬ gon and Nevada. Those of Alabama have arms

in the centre and are printed in vermilion, red and dark blue. Their values are $1 and $2. Telegraph and express stamps are much prized by collectors on account of their extreme rarity. They are not issued by governments, but by private corporations, and are both stamps and franks.

Second only in importance to stamps them¬ selves is the literature relating to them, and the collector who desires to keep abreast with the latest developments in matters pertaining to stamp collecting must devote considerable time, space and money to his philatelic library. The most rapid growth in this line has oc¬ curred within recent years. About 1863 'the first journal devoted to the "literature" of postage stamps appeared in Belgium. It was a monthly publication, Le Timbre Poste. The first stamp paper started in the United States was the Philatelic Journal of America. Philatelic papers are published most numerously in this country, though the highest class of them come from foreign lands. Among the countries that con¬ tribute liberally to philatelic literature, outside of the United" States, are England, Germany, France, Belgium, Italy, Austria, Spain, Switzer¬ land, Denmark, Mexico, Brazil, Argentine Re¬ public, Chile and Peru, one or more papers be¬ ing issued from each of these. But more im¬ portant and desirable to the collector than all the regular philatelic publications are the cata¬ logues, giving a list of all the stamps ever is¬ sued and the current prices of most of them. The cash values of the rarer stamps are estab¬ lished by the prices they bring at auction sales. The great values of some of these have led to the production of clever counterfeits and some notable frauds have been perpetrated. Up to a recent date there was but one American catalogue that was generally accepted by col¬ lectors and dealers alike, but now there are several catalogues issued in the United States by different houses, all of which are much fuller and more comprehensive than any heretofore published. The catalogues issued by English, German and French dealers are also utilized to some extent in this country as the basis of valuation, as they are usually more correct as to the actual market value of foreign stamps. Handbooks play no small part in a philatelic library. They are usually the production of a student of the stamps of some particular coun¬ try and the exhaustiveness with which the sub¬ ject is entered into indicates a marvelous amount of patience and research on the part of the author. These monographs are in demand chiefly by advanced collectors and specialists.

Stringent laws have been passed by the United States and other countries prohibiting under penalty of fine and imprisonment the making in any manner of facsimiles of the regular issues of postage or1 revenue stamps. These lawˆs prevent also the printing or pub¬ lishing of facsimiles of government stamps in books, newspapers, periodicals or other publi¬ cations, as a protection against counterfeiting. Governments, however, the world around have not hesitated to cater to the stamp collectors by special issues of stamps to commemorate expositions or historic celebrations and the profits

made on the sales of stamps which never carry any mail are very large. In some of the smaller countries new issues of stamps are much more frequent because of the army of collec-

tors who may be depended upon to absorb a considerable value far beyond the postal needs of the country itself. (See Post and Postal Service). Consult Burroughs, W. D., The Won-land of Stamps) (New York 1910) ; Creeke, A. B., (Stamp-Collecting : A Guide for Beginners) (London 1914).; Linn's (Philatelic Handbooks5 — on United States stamps (Columbus, Ohio, 1913-14) ; Melville, F. J., (All about Postage Stamps5 (London 1913) ; Nankivell, E. J., (Stamp Collecting as a Pastime5 (London 1902) ; Power, E. B. L., (The General Issues of United States Stamps5 (New York 1909).

PHILBRICK, John Dudley, American ed¬ ucator : b. Deerfield, N. H., 1818; d. 1886. In 1842 he was graduated at Dartmouth College and from 1843 to 1853 was engaged as a teacher in Boston. He was nominated principal of the Connecticut Normal School in 1853 and two years later was made superintendent of schools of Connecticut. In 1857-74 and in 1876-78 Mr. Philbrick was superintendent of the public schools of Boston. He attended the Vienna exposition of 1873 as educational representative of Massachusetts. Subsequently he was presi¬ dent of the National Teachers' Association. He wrote (City School Systems in the United States5 (published by the United States Bureau of Education, Washington 1885) and edited the Massachusetts Teacher and the Connecticut Common School Journal.

PHILEMON, fi-le'mon, Greek comic poet, the son of Damon: b. Soli, Cilicia, about 360 b.c. ; d. 262. He became a citizenˆ of Athens before 330 b.c., and is credited with 53 comedies, some of which may have been written by his son. Of these only fragmentary quotations, mostly from Stobseus, remain (ed. in Kock, <Comicorum Atticorum Fragmenta,5 1884). Philemon flourished in the reign of Alexander and was a contemporary of Menander, though preceding him by eight years and outliving him by many. He is called the first poet of the New Comedy, the first example of this school being Philemon's play

(Hypobolimseus.5 An idea of his wit, which was ranked above that of Menander in his own day, although Menan¬ der was called the greater poet, may be ob¬ tained from Plautus' imitations of the Mer¬ cator,5 (Trinummus5 and (Mostellaria5 of Philemon's (Emporus,5 (Thesaurus5 and (Phasma.5 Consult Meineke, A., (Menandri et Philemonis Reliquiae5 (Berlin 1840).

PHILEMON, Epistle to. The little letter of Paul to Philemon is the only private letter of the Apostle which has been preserved, al¬ though doubtless he wrote many which have perished. We gather from it, compared with Colossians, that Philemon was a prominent member of the church at Colossae, presumably wealthy, and certainly favorably known for his kindness and hospitality. A slave of his, Onesimus by name, had stolen from him and run away to Rome. Brought in some way in relations with Paul, he had become converted, a thoroughly changed man. Although Paul had not only found him useful but had learned to love him as well, yet it was his duty to re¬ turn to his master whom he had wronged, and accordingly when the departure of Tychicus for Colossae gave an opportunity, Paul sent Onesimus with him and wrote this letter tx> en¬ sure for him kind treatment, since, as should

be remembered, the law set no limits to the punishment which an angered master might in¬ flict. The letter has long been regarded as a masterpiece of tact. After the usual greetings Paul praises the Christian character of Phile¬ mon about which Paul had heard, and then turns to make a most winning appeal for Onesimus, in the past unworthy but now use¬ ful, as he assures Philemon in an untranslatable play on the name, urging his master to receive him as a brother in the Lord. Paul even offers to make good to Philemon any loss which he might have suffered through Onesimus, at the same time reminding Philemon of his obligations to himself, and holds out hope that he may soon visit him. This inimitable letter is now accepted with practical unanimity by critics of all schools as a genuine Pauline Epistle, written from Rome at the same time with the Epistle to the Colossians. (See Colossians, Epistle to.) Too much can scarcely be said of the temper, the skill, the beauty with which Paul handled the situation so difficult at that time. Sabatier said: ((We have here only a few familiar lines, but so full of grace, of salt, of serious and trustful affection, that this short epistle gleams like pearl of the most exquisite purity in the treasure of the New Testament,55 and Renan said ((Only Paul could have written this little masterpiece of the art of letter-writing.55

Bibliography. — Oesterley, W. E., (Epistle to Philemon5 (Expositor's Greek Testament, 1910) ; Vincent, M. R., (Epistle to Philemon5 (International Critical Commentary, 1897).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

PHILEMON AND BAUCIS, ba'sis, in Greek mythology, a couple celebrated for their faithful affection even in advanced age. Jupi¬ ter and Mercury in human form traveling through Phrygia found no one willing to enter¬ tain them except this aged couple, who received them hospitably, washed their feet, set before them a rustic meal and prepared a couch for their repose. The deities then took their hosts to a neighboring mountain, and when they looked behind them they saw their village sunk beneath the waves of ?n inundation; but the cottage in which they had welcomed the pil¬ grims had become a magnificent temple. Jupiter promised also to fulfil all their wishes; but they only asked that they might die together as servants in that temple. At length, at a very advanced age, as they sat at the temple door they were transformed, Philemon into an oak and Baucis into a linden. They were con¬ scious of their change, which came gradually upon them, and while they were able to see and speak they took the most affectionate leave of each other. The trees were regarded as sacred.

PHILETAS (fi-le'tas) OF COS, Greek poet and grammarian : b. island of Cos, about 350 b.c. ; d. about 290 b.c. He was preceptor to Ptolemy II Philadelphus and is quoted by Theoc¬ ritus as his model. He was regarded as the earliest of the <(grammarians,55 and was the au¬ thor of elegies, epigrams and grammatical works which were imitated and much admired by Propertius, and as a poet was ranked by the Alexandrian critics second only to Callimachus.

Fragments of his poems still in existence were collected and published in 1829. Consult Couat, A. H., (La Poesie Alexandrine) (Paris 1882) ; Weber, (Elegische Dichter der Hellenen)

(1826).

PHILHARMONIC SOCIETIES, are or¬ ganizations for the cultivation of orchestral music, and are generally found in all large cities. The London society, founded in 1813, has not only produced many works by British composers, but has also brought to England several great foreign composers to conduct at its concerts. Among these are Cherubini (1815), Spohr (1820 and 1843), Weber (1826), Men¬ delssohn (1829, 1842, 1844, 1847), Wagner (1855) and Gounod (1871), some of whom wrote works expressly for the society. Beet¬ hoven's great ninth symphony was written for the London society and its timely aid helped to soothe the sadness of the great composer's last hours. Among its regular conductors have been most of the best known of English 19th cen¬ tury musicians. The Society has an extensive library dating back to the year of its organiza¬ tion. It contains orchestral parts of the princi¬ pal works of the classic composers sufficient to fit out a full orchestra ; and many priceless manuscripts and original scores autographed by eminent composers. The Philharmonic Society of New York is the oldest organized orchestra in the United States. It was founded in 1842, and its first concert was given on 7 December of that year. Among its conductors have been Bergman, Damrosch, Thomas, Seidl, Paur and Walter Damrosch 0902). The orchestra num¬ bers about 110 performers. There are similar organizations in Vienna, Berlin, Boston, Phila¬ delphia, Pittsburgh, Chicago, Brooklyn (N. Y.) and other cities. Consult Hogarth, G., (The Philharmonic Societv of London) (London 1862) ; Huneker, J. G., (Philharmonic Society of New York; A Retrospect (New' York

1917).

PHILHELLENES, fil-hel'enz (Greek, philellen), a term employed to designate those wbo were friendly to the Greeks in their strug¬ gle for independence in the first third of the 19th century. Their sympathies were aroused by the realization that the cause of the Greeks was in fact that of civilization as opposed to barbarism. They were of all nationalities, Lord Byron being one of the most noted, and associa¬ tions of Philhellenes occupied themselves in collecting resources in aid of the struggling Greeks. As these associations multiplied they came gradually to serve as an excuse for polit¬ ical movements of far-reaching importance.

PHILIDOR, fil'i-dor, the assumed name of the Danican family, of which the most illus¬ trious member was Franqois Andre Danican, French musician and chess expert: b. Dreux, 7 Sept. 1726; d. London, 30 Aug. 1795. He became a page and then choir-boy in the royal chapel, in which capacity he received instruction in music from the eminent Andre Campra. For some time he devoted himself to the teaching of music, but dissatisfied with the rewards 'he turned to chess¬ playing in which he was alreadv locally famous as an amateur. By the time he was 18 years old he was supporting himself by his playing. In 1745 he started on a tour, traveling in Hol¬ land, England and Germany as a chess player.

While in England, where he played three blind¬ fold games simultaneously, he wrote a book on the game, w'hich was published there in 1749, and in an enlarged form in Paris in 1777. His musical friends in France, mourning his loss to their art, finally persuaded him to abandon his chess performances, and in 1754 he returned to Paris, where he wrote several successful comic operas. The first of these, (Blaise le Savetier,* was performed in 1759 and brought him im¬ mediate popularity. Among the many scores which followed from his pen may be mentioned as of unusual interest (Le MarechaP (1761) ; (Le SorcieD (1764), and (Tom Jones* (1765). He wrote also several original and able tragic operas, (Ernelinde) (1767) being the best known, and various' religious compositions. His (-Analyse du Jeu des Eches* (1777) was long an authoritative work on chess. Consult Allen, G., (The Life of Philidor* (Philadelphia 1864).

PHILINTE, fi-lant, a character in Moliere's (Misanthrope) (1666). His easy-going tolerance of the faults of others due to his recognition of the impossibility of reforming them makes him a strong foil to the impatient hero Alceste, his intimate friend.

PHILIP (Marcus Julius Philippus), styled ((the Arabian,® Roman emperor: b. Arabia, about 204; d. 249. He entered the Roman military service and became Praetorian prefect 243. The Emperor Gordian was forced to receive him as a colleague on the throne by the soldiers who had conquered Sapor, king of Persia, and who had found Gordian immature. In 244 Philip put his rival to death and became sole emperor. In 248 he celebrated the thou¬ sandth anniversary of the founding of Rome by a remarkable exhibition of the secular games. He was killed in battle by the soldiers of Decius. He has been called by certain writers the <(first Christian emperor,® but this is not borne out by facts ; as, witness, the accounts of the anniver¬ sary

celebration. He is, however, credited with exercising a powerful check on the licentious vices of Rome, and the title may have been applied upon this ground.

PHILIP I (Fr. fe-lep), <(the Fair,® king of France, son of Henry I and Anne of Russia: b. 1052; d. 29 July 1108. He was crowned at Rheims in 1059, ruling for a year jointly with his father, upon whose death in 1060 he suc¬ ceeded to the throne. For seven years he ruled under the regency of his mother and later of his *uncle, Baldwin V of Flanders. When the latter died, in 1067, Philip, though but 15 years of age, assumed the government. His reign was troubled by frequent contests between his great feudatories. He was defeated by Robert the Frisian in 1071, but in 1075 he defeated William I of England, Duke of Normandy. In spite of all difficulties, however, he suc¬ ceeded in greatly extending his domain. He married Bertha of Holland in 1071, and though a son was born to them in 1081, who later be¬ came Louis VI, he repudiated his wife and lived openly with Bertrada, Countess of Anjou. Both were excommunicated. In 1095, a year after Bertha's death, he was excommunicated for the second time, and in 1100 was forced by the legates of Paschal II to acknowledge his son Louis VI coregent. The ban of excommu¬ nication was removed in 1104 by Paschal upon

his promise of reform; a promise which he failed to keep, however.

PHILIP II, or PHILIP AUGUSTUS,

king of France, son of Louis VII ; b. Gonesee, near Paris, 21 Aug. 1165; d. Mantes, 14 July 1223. He was crowned in 1179, becoming co¬ regent with his father ; and a year later suc¬ ceeded him. He persecuted the Jews, driving them in 1182 from the country, and profited by Henry II's quarrels with his children to force the English king to do him homage for his continental fiefs, by declaring war against him. He undertook the third Crusade with Richard I of England in 1190, but the two kings quarreled after the capture of Acre in 1191, and Philip returned to France, intrigued with the German emperor to imprison Richard on his way home, made an alliance with John, whom he had assisted to the English throne, and, in spite of

this, invaded Normandy. From 1194 to 1199 he made war on Richard, and upon his death in the latter year renewed his quar¬ rel with John. A nephew of both Richard and John, Arthur of Brittany, claimed the crown from John, at Philip's instigation, but was seized and killed by the English king, who as Philip's vassal was condemned for this crime to lose his continental fiefs of Nor¬ mandy, Maine, Touraine and Anjou. Only a part of Guyenne remained in the possession of the English. Philip then prepared to invade England, but was frustrated by the Pope, to whom John had become subservient. John formed an alliance first with Ferrand of Portu¬ gal. Count of Flanders, and then with Otto IV of Germany, only to be defeated by Philip's splendid military organization at Bouvines in 1214, the foundation of the continental great¬ ness of the French kingdom. During John's struggle with the rebellious nobles Philip as¬ sisted them and put his son Louis forward as a claimant to the English throne. His internal policy was no less active; the Crown was made more powerful by a reformed system of ad¬ ministration; papal influence in France was ob¬ stinately combatted; the feudal system made subservient to the king; and in Paris he aided in the building of the first Louvre and Notre Dame, and in the foundation of the university. Philip married Isabella of Hainault, who died in 1190; then Ingeburga, daughter of Walde-mar of Denmark, whom he repudiated in less than three months (1193) ; and in June 1196 Agnes of Meranie (in the Tyrol). This mar¬ riage was declared null by the Pope and Philip was forced tp receive Ingeburga again. Agnes died in 1201 ; her children were legitimatized by the Pope. Philip was the ablest of the Capetingian kings of France. Consult Cape-figue, J. B. H. R., (Histoire de Philippe-Au¬ guste* (4 vols., Paris 1829); Delisle, L. V., (Catalogue des Actes de Philippe-Auguste* (Paris 1856), and Carteflieri, A., (Philipp II, August* (Leipzig 1913) ; Hutton, W. H., (Philip Augustus) (London 1896).

PHILIP III, king of France, called Le Harm, <(The Bold® : b. Poissy, 3 April 1245 ; d. Perpignan, 5 Oct. 1285. Upon the death of his father, ' Louis IX, in 1270 at the camp before Tunis, Philip was proclaimed king. In 1271 he inherited from his uncle Alphonse, Count of Poitou and Toulouse, much of Languedoc; was under the influence of Pierre de la Brosse, his

PHILIP IV

barber, whom he afterward made the court chamberlain, until 1274

when he married Marie of Brabant, who ruled the king thereafter. In 1279 Edward I of England ceded to him the whole of Normandy. In 1285 he undertook to punish Peter III of Aragon for the massacre known as the Sicilian Vespers (q.v.). He died on his way home after an unsuccessful campaign. Consult Langlois, C. V., (Le Regne de Philippe le Hardi* (Paris 1887).

PHILIP IV, king of France, called Le Bel, <(The Fair,® son of the preceding; b. Fon¬ tainebleau, 1268; d. 29 Nov. 1314. He came to the throne in 1285, was crowned at Rheims 6 Jan. 1286, and began his reign with Cham¬ pagne and Brie as appanages, thanks to his mar¬ riage (1284) with Johanna of Navarre. Guy¬ enne he won from Edward I of England in 1294 only to restore it in 1299, when he gained the most of Aquitaine. Almost immediately afterward he occupied Flanders, but ruled there so cruelly as to arouse a great revolt under the leadership of the weaver Peter de Koninck. The French nobles were terribly beaten by these Flemings at Courtrai (Kortrijk) 11 July 1302, the (<Day of Spurs,® ((after which 4,000 gilt spurs were hung as trophies in Courtrai cathe¬ dral.® Two years later Philip made peace with Flanders, giving up his title to the country. The subjection of Lyons to the Crown (1312) was his last and most important addition to the royal territory. But neither temporal strife nor territorial change is the most important event of Philip's reign. His relations with the papacy and his internal and financial policy are the two things that mark out Philip's rule — if not Philip's self, for it is impossible to decide how far his personality was a factor in diplomacy or administration ; contemporary mention of him gives no hint of any vigor, force or ability, whereas modern historians are loath to describe the far-reaching events of his reign without intimating that they were primarily the result of his own definite policy. His break with Boniface VIII, whether due to the king or to his civil jurisconsults, began in the early years of Philip's reign, when the Pope attempted to bring Philip and Edward of England to a peace¬ able understanding. In 1296 the Pope issued a bull excommunicating Philip, and bidding the clergy pay no taxes to the Crown or any other temporality without papal consent, under pains of the ban. An apparent reconciliation took place in 1297, but three years afterward the Pope's legate to France was arrested by the king on the charge (speciously trumped up) of treason, specifically of rousing the people to re¬ volt. In the following year Philip and the French kingdom were interdicted by papal ban. This bull Philip openly burned. The counter¬ move was sharp and decisive; Nogaret, Philip's greatest lawyer-diplomat, in 1303, with the help of the Colonne, seized the person of the Pope, who died soon after (1304); Moreover, Philip succeeded in electing the bishop of

Bordeaux, Bertrand de Goth, as Pope Clement V, and in keeping the curia out of Rome and in Avignon, the beginning of the <(Great Captivity,® during which the papacy was under French control for 70 years. The internal administration of Philip was significant in that fresh and cruel taxes were levied, the Jews (1306) and Lombards (1311) persecuted for their wealth, and the

coinage of the realm debased. In 1307 he had attacked the Templars, seizing and executing their grand master and the principal knights, and confiscating their property. Consult Boutaric, (La France sous Philippe le BeP (1869) ; Renan, (Etudes sur la Politique religieuse du Regne de Philippe le BeP (1899).

PHILIP V (Le Long, le long), «the Tall,» king of France, son of Philip IV : b. about 1294; d. 3 Jan. 1322. Upon the death of his brother, Louis X, he became regent; and after a few months succeeded to the throne in 1316 by vir¬ tue of the Salic law which excluded the daugh¬ ter of his brother. In 1317 Philip settled the dispute with Flanders, acquiring additional ter¬ ritory, and throughout his reign endeavored to make various reforms, but was usually thwarted by the States-General. In 1320 a cruel persecution against the Jews was begun. Philip's death occurred in the midst of it. Con¬ sult Lehugeur, P., (Histoire Philippe V le Long* (Paris 1897).

PHILIP VI, «the Fortunate,® king of' France, brother of Philip (<the Fair,® and son of Charles, Count of Valois, hence founder of the house of Valois and therefore styled Philip of Valois: b. 1293; d. Nogent-le-Roi, 22 Aug. 1350. He was grandson of Philip III le Hardi (q.v.), and had shown himself an able soldier before he became count, 16 Dec. 1325, and as count a fiery feudal lord. On the death of his cousin, Charles IV, he was named regent, and his claim to the throne was preferred by the second application of the Salic law (the first in 1317, when Philip V came to the throne) to that of the posthumous infant daughter of Charles, and he was made king, April 1328. The claim of Philip was admitted in 1330 by Edward III of England who had himself laid claim to the throne of France through his mother,

daughter of Philip IV. Putting him¬ self at the head of the nobles, who were eager to take vengeance on the Flemish for the de¬ feat of Courtrai, the king won the battle of Cassel, 23 Aug. 1328, and made Flanders a French county. Philip's interference in Scot¬ land, his attempt to close Flanders to English merchants, and a story that he had become Count of Valois by trickery, and so king of France, prompted Edward III of England to re¬ consider his acquiescence in Philip's accession to the throne, and he claimed the French crown for himself as son of Isabelle, sister of Charles IV (in spite of the Salic law). In 1337 the Hundred Years' War broke out. Its main events occurring in this reign are the defeat of Philip's fleet at Sluys (1340), which laid the foundation of British supremacy in the Channel, and the loss of the great battle of Crecy (1346) and of 30,000 of the flower of the French no¬ bility at Calais (1347). Edward challenged him to a duel, but he declined. The terrible Black Death devastated France during the last years of Philip's life. His reign, though the source of so much mediate loss to France, was not without territorial gain; Valois, of course, came to the Crown ; Champagne and Brie were ceded by Philippe d'Ebreux; and Montpellier and Dauphiny were bought. Philip VI was suc¬ ceeded by his son John II, called ((The Good.® Consult Gaillard, G. H., (Histoire de la Querelle de Philippe de Valois et d'Edouard IIP (Paris 1819), and Longman, W., (Life and Times of Edward the Third) (London 1869).

PHILIP II, king of Macedon: b. Pella, 382 b.c. ; d. 336 b.c. He was the youngest son of Amyntas II, and obtained at Thebes a careful education, gaining knowledge of military insti¬ tutions and statecraft from Epaminondas (q.v.), the victor of Leuctra, and familiarizing himself also with the intellectual culture of the Greeks. He was later regarded as an orator of consider¬ able ability. On the death of his brother Perdiccas II (359 b.c.), he became the supreme ruler of Macedonia as guardian of his nephew Amyntas, whom he soon set aside in order to assume for himself the regal title. At that time Macedonia was in very real danger. Pausanias, a pretender who had been expelled from the kingdom, and Argaeus, who had once held the throne for two years while Amyntas II was a fugitive in Thessaly, now asserted claims to the royal power. The Paeonians were making attacks at the north, the Illyrians on the west. Philip reorganized the army, increasing its efficiency by the invention of the well-known Macedonian phalanx, a compact mass protected by round shields and bristling with long spears. In a year he had completely freed himself from his enemies, and having thus made his small do¬ mains secure proceeded to enter upon that career of aggrandizement which

extended Mace¬ donian sway over Greece, and was aimed to include Persia also. There were then three powers upon the position of which his success depended. These were Amphipolis, a city at the mouth of the Strymon, once a colony of Athens, but later successful in revolt; Olynthus, the strongest town of the Thracian Peninsula; and Athens. Philip agreed in secret negotiations with Athens to restore Amphipolis on condition of being given control of Pydna, the latter hav¬ ing a harbor on the Thermaic gulf, then com¬ manded by Athens. He captured Amphipolis (358 b.c.) , and then marched on Pydna, the easy conquest of which by his own forces and not through Athenian aid afforded a pretext for re¬ fusing to keep his agreement. He prevented any co-operation between Athens and Olynthus by taking Potidsea from the former and giving it to the latter in 356 b.c. Not long after he took the Thracian settlement of Crenides, which he renamed Philippi, and which was the valuable centre of a gold-mining district. His capture of Methone in 352, after a long siege, gave him the key to Thessaly, where he quickly established his ascendency. He marched as far south as Thermopylae, which he found so strongly guarded that he retired. Already, in 352, Demosthenes (q.v.), in his first philippic, had endeavored to arouse Athens to a sense of its danger. Philip conquered Thrace, by 347 was in possession of all the Chalcidian cities, and in that year took Olynthus, which had received tardy and in¬ effectual assistance from Athens, with whom Philip concluded peace in 346. He then en¬ tered PhocE; destroyed the Phocian cities and had their place in the Amphictyonic Council given to himself. His Hellenic influence was fur¬ ther conceded by his joint appointment with the Thessalians and Thebans to the presidency of the Pythian games. In 340 he began the siege of Byzantium and Perinthus, but Athens, finally alarmed, sent aid under Phocion, who in 339 compelled Philip to raise the siege of both towns. Philip now seemed to turn his attention to the peoples of the north ; but his agents were busy compassing his designs. The Amphictyonic

Council declared war in 339 against the Locrians of Amphissa for having seized part of the sacred territory, but the commander of the army sent accomplished nothing. In 337, therefore, Philip was appointed general. He marched through Thermopylae, and took

Elatea. Again Demos¬ thenes thundered ; the Athenians were aroused and formed an alliance with Thebes. But the combined army was defeated by Philip at Chaeronea (August 338). Thus ended the in¬ dependence of Greece. Athens was treated with leniency, but Thebes resisted and fared hardly. The invasion of Persia was now within reach. A congress was held at Corinth, to which all the states of Greece but Sparta were invited. At this congress the war with Persia was deter¬ mined on, and Philip appointed commander of the confederate forces. In 336 b.c. he cele¬ brated with great pomp the marriage of his daughter Cleopatra with his brother-in-law Alexander of Epirus, by which he hoped to heal this division, but he was assassinated during the feast by a Macedonian youth, Pausanias, who had a private grudge against him. Alexander (q.v) and his mother Olympias were suspected of complicity in the plot. Philip was a bold and warlike ruler, with the craft which he found necessary if he were to carry out an ambitious foreign policy by means of a small state. He was a patron of art and literature. Consult Leland, J., (History of the Life and Reign of Philip, King of Macedon) (2 vols., London 1775) ; and standard histories of Greece. See Greece, History.

PHILIP V, king of Macedon: b. 237; d. Amphipolis, 179 b.c. He was eight years old at the death of his father, and came to the throne in 220 after nine years of capable regency of his uncle, Antigonus Doson. Philip was a general but no statesman. In 217, having joined the Achaean League, he defeated the .Etolians. In order to subdue all Greece he made an alliance with Hannibal against the Romans, who occu¬ pied Illyria. In the first Macedonian war (214-205) he accomplished nothing and was forced to a humiliating peace. He still aided Hannibal with supplies, however, and in 200, after the con¬ clusion of the second Punic War, Rome, roused by this fact and by the complants of Attalus, the Rhodians and the Egyptians made war upon him again. He was successful until Fla-minius took command, and then the allied army of Romans' and Etolians completely defeated him at Cynoscephalae in 197, the end of the second Macedonian War. Macedonia became an ally of Rome; all Philip's alliances and con¬ quests were renounced, and he had to pay a heavy tribute. Perseus, his natural son, suc¬ ceeded to the throne. Consult Droysen, (Geschichte des Hellenismus) (1877-78); and Mahaffy, Alexander's Empire) (1888).

PHILIP I, king of Spain, surnamed (<the Handsome®: b. Bruges, 22 July 1478; d. Spain, 25 Sept. 1506. He was the son of Maximilian I, emperor of Germany, and a grandson of Charles the Bold. He became ruler of the Netherlands in 1482, and by his marriage in 1496 with Joanna, daughter of Ferdinand V, king of Aragon, and Isabella, queen

of Cas¬ tile, he obtained the Crown of Castile in 1504. He was the father of the emperors Charles V and Ferdinand I.

PHILIP II

PHILIP II, king of Spain, son of the em¬ peror Charles V and Isabella of Portugal : b. Valladolid, 21 May 1527; d. palace of the Esco-rial, 13 Sept. 1598. He was married in 1543 to Mary of Portugal, who died in 1545 after the birth of Don Carlos; and early showed himself haughty, cold and restrained, so that the pur¬ pose of his father to procure for him the im¬ perial election was made impossible by his un¬ popularity, and in 1551 he returned to Spain after a three years' stay in Germany and as¬ sumed the royal duties there, to which he had been accustomed since his 16th year, when upon his father's departure for Germany the boy had become regent with a council headed by the Duke of Alva. Philip married Mary of Eng¬ land in 1554, and the queen, who was 11 years his senior, seems to have been deeply in love with him and was certainly greatly influenced by his advice. But the English climate did not agree with him, and in 1555 he left the country for Brussels, having been appointed governor of the Netherlands and of the Spanish posses¬ sions in Italy; on 16 Jan. 1556 his father abdi¬ cated the Spanish throne in his favor. His royal policy was (<worldwide power for Spain and the Roman Catholic Church,® but this did not prevent war with the Neapolitan Pope Paul IV, and the papal ally, the French king, both of whom were defeated. Yet in general Philip's project was in behalf of the defense of the Church, which he regarded as a means to his own ends. With English help he had defeated the French at Saint Quentin, 10 Aug. 1557, and at Gravelines, 13 July 1558, and had made the peace of Chateau Cambresis in April 1559. Upon Mary's death (1558) Philip became one of the many suitors of Elizabeth, her succes¬ sor, but, learning that her policy was entirely opposed to his, 24 June 1559 married Isa¬ bella, daughter of Henry II of France. In the meantime Alva's stern attempts to carry out the policy of maintaining Catholicism in the Neth¬ erlands had roused the province to determined rebellion and had annihilated the king's income from Dutch commerce, so that Alva was re¬ called, and his place taken first by Requesens, then by Philip's brother, Don John, the hero of the wars with the Moors and with the Turks. Don John's want of success was apparently due to the king's refusal of funds as a part of the royal plan to repress this brilliant and popular leader, and he was succeeded by Alexander Farnese. In 1,570, after the death of Isabella, Philip married his niece, Anne of Austria, who lived only 10 years and left him one son, the

future Philip III. Roused by the widespread assistance offered his rebellious Netherlands, Philip undertook a great scheme of European conquest, claimed and won the throne of Portu¬ gal, struck a great blow at the Netherlands by the assassination of William of Orange, and, having made France entirely subject to his policy, in 1588 fitted out the great Armada which was to punish Elizabeth for the execution of Mary of Scotland and to make England a Catholic appanage of Spain. The destruction of this fleet was a terrible calamity to Spain. Troubles with France, where it was only with the greatest difficulty that Philip placed on the throne his daughter Isabella and where Henry of Navarre kept the League in disorder, were followed by the death of Alexander Farnese (1592) and by increased boldness on the part

of English privateers against Spanish shipping, so that the Spanish kingdom was practically ruined at the death of Philip, and largely by his ambitious schemes, whose only success was in the firm foundation of the counter-Reformation. Consult the biographies of Philip by Prescott, Dumesnil, San Miguel and Hume and the re¬ habilitation by Montana, (Nueva luz y juicio verdadero sobre Felipe IP (1882).

PHILIP III, king of Spain: b. Madrid, 14 April 1578; d. there, 31 March 1621. He was the son of Philip II and his fourth wife, Anne of Austria, and succeeded his father in 1598. In the next year he married Princess Margaret of Austria. During his reign the war in the Netherlands continued, his general, Spinola, tak¬ ing Ostend in 1604 after a three years' siege. Nevertheless Philip was at last obliged to ad¬ mit the independence of the United Provinces and made a truce with them in 1609. In the same year he expelled the Moors from Spain, a step which accelerated the downfall of Spain's importance. The expelled persons were for the most part valuable citizens, — thrifty traders and farmers — and their departure left entire provinces half depopulated.

PHILIP IV, king of Spain : b. Valladolid, 8 April 1605: d. 17 Sept. 1665. He was the son of Philip III, whom he succeeded in 1621. His first Prime Minister was Olivarez, whose mal¬ administration had

proved so calamitous in the previous reign. The war with the Netherlands was renewed, lasting until the Peace of West¬ phalia, when the independence of the Nether¬ lands was conceded by Spain. Other events of this melancholy reign were the war with France 1635-59; a formidable revolt in Catalonia, sup¬ pressed in 1652 ; the revolt of Portugal in 1640 with a long war ensuing which terminated in the Portuguese victory of Villaviciosa in June 1665. An equestrian portrait of this monarch by Velasquez hangs in the Royal Museum at Mad¬ rid and is considered the finest portrait by that artist. A second portrait of Philip IV by Velasquez is in the Louvre at Paris.

PHILIP V, king of Spain, grandson of Louis XIV of France: b. Versailles, 19 Dec. 1683; d. Madrid, 9 July 1746. He was the sec¬ ond son of the Dauphin Louis, who died when the boy was 10; received from Louis XIV the title of Duke of Anjou ; and as a direct descend¬ ant of Philip II of Spain was named successor to Charles II of Spain in the will of that child¬ less monarch in 1700. To withstand this ad¬ vance of the Bourbon family and of the per¬ sonal power of Louis XIV, and to promote the claim of the Archduke Charles of Austria, who was as near the Spanish throne as Philip by ties of blood, England, Holland and Austria formed the Grand Alliance and precipitated the war of the Spanish Succession. (See Spanish Succession, War of). His realms suffered by the detachment of his domains in Italy and in the Netherlands, and of Minorca and Gibral¬ tar, but he remained king of Spain. The loss of his wife, Maria Louisa of Savoy, in 1714 deprived him of a wise counselor and put an end to the influence of the Countess of Orsini. He married Elizabeth Farnese of Parma, came under the influence of Alberoni, minister from Parma to Spain, and was hurried into war with France by the scheme to arrange for his chil¬ dren by this second marriage. In 1717 Great

Britain and Holland, and in 1718, Austria, joined France. The Duke of Berwick invaded Spain, and Sardinia was lost as soon as won. Alberoni was dismissed and his place taken by Jesuit advisers. Philip in January 1724 for obscure reasons abdicated in favor of his son Luis, who died in August, so that Philip had to return to power. His mind failed during his last years. Consult Baudrillart, (Philippe V) (1890); and Coxe, (Memoirs of the Kings of Spain> (1815).

PHILIP, often called KING PHILIP,

chief of the Wampanog or Pokanoket tribe of Indians: b. near the beginning of the 17th cen¬ tury; d. 12 Aug. 1676. He was the

youngest son of Massasoit (q.v.). In 1662 he became chief and renewed the former treaties with the whites But suspicion seems from the first to have pre¬ vailed on both sides. In 1674 John Sausamon, a Spraying Indian, w or disciple of John Eliot, reported that Philip was stirring up the tribes against the English. An investigation was made which proved practically nothing, but the colo¬ nists were aroused, and the Indians in turn put themselves on the defensive. On 30 June 1675 the first attack was made on the colonists during their return from church. The war was of the most desolating character, the Indians never meeting the enemy in the open field, but rapidly passing from one exposed point to another, burning villages, cutting off by ambuscades de¬ tached parties of troops, and shooting down all who strayed outside of the places of protection. Philip also formed an alliance with the powerful tribe of Narragansetts, and in December 1675, 1,000 men under the command of Governor Winslow invaded their territory, stormed a fort in which there were said to have been 4,000 Indians, and utterly destroyed their village with all its stores. The war raged during the first half of 1676 with unabated fury, but the con¬ quest of the Narragansetts and the complete destruction of his own tribe soon left Philip without resources. Deserted by all, he was hunted from spot to spot, and at last, taking refuge at Mount Hope, was there attacked and in attempting to flee was killed by a renegade Indian. Large numbers of the Indians were sold as slaves in the West Indies and South America. During the war, which had lasted a little more than a year, Brookfield, Northfield, and Springfield in the Connecticut Valley, Lan¬ caster, Weymouth, Marlboro, Groton and Med-field in Massachusetts, and Providence and Warwick in Rhode Island, had been destroyed ; and many attacks and massacres had taken place. The character of Philip has been vari¬ ously represented ; but it seems plain that the encroachments of the whites were responsible for his desperate outburst, and that, judged by Indian standards, he was a valiant warrior.

PHILIP, John Woodward, American naval officer: b. New York, 26 Aug. 1840; d. Brook¬ lyn, N. Y., 30 June 1900. He entered the United States Naval Academy in 1856, was appointed a midshipman in 1861, served on the Constitution and the Santee and was promoted in that year to be acting commander of the sloop-of-war Marion. In 1862 he received the rank of lieu¬ tenant, served on the Chippewa, Pawnee and the monitor Montauk and took an active part in the siege of Charleston, S. C. In 1868 he was promoted lieutenant-commander and served in the Asiatic and European squadrons until

1874 when he was commissioned commander. He was appointed to command the Woodruff scientific expedition round the world in 1877, was lighthouse inspector in 1884-87, received the rank of captain in 1889 and in 1894-97 was in command of the Boston navy yard. In 1897 he was assigned to the command of the battle¬ ship Texas and played a distinguished part in the battle of Santiago in 1898. In that year he was placed in command of the North At¬ lantic squadron and in 1899 was promoted rear-admiral in charge of the Brooklyn navy yard, in which command fie remained until his death. Consult Mackay, (Life and Adventures of Jack Philip, Rear-Admiral United States Navy*

(1903).

PHILIP, The Adventures of, a novel by W. M. Thackeray, published in 1862. It was a sequel to (The Shabby Genteel Story) and first appeared serially in the Cornhill Magazine

(1861-62).

PHILIP THE APOSTLE, the fourth of the 12 Apostles chosen by Jesus Christ. In the synoptical gospels he is merely named on occasion as one of the 12; in the Fourth Gos¬ pel he is individualized ; there the manner of his call is told. Jesus ((found Philip,® who ((was from Bethsaida® and said to him, <(Follow me.® He appears to have been a disciple of John the Baptist, and to have been influenced to approach Jesus by Andrew. Immediately after he was himself called he brought to Jesus his com¬ panion Nathaniel (called also Bartholomew). Philip is the only one of the apostles who had a Greek name ; probably he spoke Greek, as it was to him that <(certain Greeks came® to re¬ quest to be admitted to the presence of Jesus (John xii, 20-22). He is one of the two apostles who alone are named in the narrative of the miracle of the feeding of the 5,000. (John vi, 5-9). Of his life after the apostles went forth on their mission very

little is known. According to Theodoret and Eusebius his special field was the two Phrygias. His festival is observed in the Eastern Church on 14 No¬ vember, in the Latin Church on 1 May.

PHILIP THE BOLD, duke of Burgundy: b. 15 Jan. 1342; d. 27 April 1404. He was the fourth son of John, king of France. He fought at Poitiers (1356), where, according to Frois¬ sart, he acquired the surname of the Bold, shared his father's captivity in England, and on his return his father restored for him the Duchy of Burgundy, which he had united irrevocably to the crown, and made him premier peer of France. Philip married in 1369 Margaret, daughter of Louis, Count of Flanders, which gave him on the death of his father-in-law (1384) the counties of Flanders, Artois, Rethel and Nevers, tand made him one of the most powerful sovereigns of Europe. Philip served against the English in campaigns in Beauce and Burgundy (1364), before Calais (1369), in Poitou (1372) and Flanders (1377). On the death of Charles V (1380) he became regent with his brothers. His administration in Flan¬ ders appears to have been wise and conciliatory. In 1388 the king, Charles VI, took upon him¬ self the administration of the kingdom but in 1392 showed signs of insanity, and Philip re¬ sumed the regency, which he retained till his death in 1404.

PHILIP THE EVANGELIST, or PHILIP THE DEACON, was with Stephen and five others, all Greeks, chosen by the apostles to administer the economic affairs of the faithful in Jerusalem. After the death of Stephen, Philip went as an evangelist into Samaria, where his ministry was exceedingly fruitful (Acts viii), and where Simon Magus, or Simon the Sorcerer, professed the faith, convinced by Philip's preaching. Other inci¬ dents of Philip's life recorded in the same chapter of Acts are, the conversion of the Ethiopian eunuch, and the preaching of the gospel in all the cities of Philistia till he came to Caesarea. He appears to have fixed his resi¬ dence there, for several years after, when Paul visited Caesarea (a.d. 55) he was entertained in the house of Philip, who at that time (<had four daughters, virgins, which did prophesy® (Acts xxi). The history of this Philip has been by many ancient writers confounded with that of Philip the Apostle. The Latin Church commemorates Philip the Deacon on 6 June.

PHILIP THE GOOD, duke of Burgundy: b. Dijon, 13 June 1396; d. Bruges, 15 June 1467. He succeeded his father, John the Fearless, on the assassination of the latter in 1419, wand at once entered into the Treaty of Arras, by which he recognized Henry V of England as succes¬ sor to tfie crown of France. Charles VI con¬ cluded with him

the Treaty of Troyes (1420), which was -accepted by the States-General and the parliament, excluding the Dauphin from the succession and recognizing Henry as adminis¬ trator of the kingdom and heir to the crown. Both Henry V and Charles VI died in 1422, and Henry VI wfas then proclaimed king of France. Bedford, who now became regent of France, married Philip's sister. Disputes with the Eng¬ lish presently followed and Philip, making his peace with Charles VII, concluded a defensive alliance with, him, and declared wrar on England. He received the Dauphin Louis (see Louis XII) at his court, when he quarreled with his father (1456) and accompanied him to his coronation in 1461. Philip was much beloved by his sub¬ jects, and under his rule Burgundy was both prosperous and tranquil. He was succeeded by his son Charles the Bold.

PHILIP THE MAGNANIMOUS, land¬ grave of Hesse: b. Marburg, 13 Nov. 1504; d. Cassel, 31 March 1567. He was the son of William II, whom he succeeded under the regency of his mother in 1509. He vanquished Franz von Sickingen in 1523, and joined the princes who went out in 1525 to quell the in¬ surrection of the peasants. The same year he issued an edict on the preaching of the gospel and the morality of the clergy, and to aid the success of the new doctrine, formed the League of Torgau with the Elector of Saxony in 1526. At the Diet of Spires he spoke in behalf of the rights of the Lutheran Church. He then ex¬ pelled the monks from the monasteries and confiscated their revenues to secular purposes. In 1527 he founded the University of Marburg; subscribed the protestation to the Diet of Spires in 1529, and submitted the Confession of Faith at Augsburg in 1530. He was, with the Elector of Saxony in 1531, head of the Schmalkaldic League but was obliged to submit to the Em¬ peror Charles V after the battle of Miihlberg (1547). In 1552 he obtained his freedom, and

after his return to his dominions he sent a body of auxiliaries to assist the French Hu¬ guenots. With the consent of his wife, Chris¬ tina, who lived till 1549, and after obtaining the assent of Luther and

Mclanchthon, he in 1540 married Margaret of Saale, usually called the Heft landgravine,® and had by her six sons and a daughter, an alliance which caused much scandal. Consult Rommel, (Philip der Gross-miithige Landgraf von Hessen, nebst einem Urkundenbuche) (1830) ; Ranke, (History of the Reformation in Germany) (English transla¬ tion 1845-47).

PHILIP THE MAGNANIMOUS, Order

of, an order founded by the Grand-duke Lud¬ wig I of Hesse, 25 Aug. 1807. There are five classes ; the decoration is a cross of white enamel, and the motto, ((Si Deus nobiscum, quis contra nos?® (If God be with us, who can be against us?).

PHILIP NERI, Saint. See Neri, Saint Fellippo de.

PHILIP OF SWABIA, emperor of the Holy Roman Empire: b. about 1177; d. 21 June 1208. He was the youngest son of Fred¬ erick Barbarossa and was educated for the Church, becoming bishop of Wurzburg in 1191. He resigned his see the next year and in 1196 succeeded to the dukedom of Swabia. He at¬ tempted to obtain the German crown for his in¬ fant nephew, Frederick II, but was unsuccessful in this, though himself chosen emperor of the Holy Roman Empire in 1198. He was opposed by the Guelf candidate, who was crowned two months before him. Otho was supported by Pope Innocent III, but Philip at last secured the assistance of the archbishop of Cologne and other great rulers and was crowned by the arch-ibshop in 1205. Consult Winkelmann, (Philipp von Schwaben und Otto IV, von Braunschweig)

(1873-78).

PHILIP AND HIS WIFE, a novel by Margaret Deland, published in 1895. The book might well be called a study in selfishness, al¬ though its emphasis seems to bear upon mar¬ riage and the marriage laws ; concerning which the author propounds certain theories and prob¬ lems, without offering any direct solution. There are some scenes of great dramatic power and the background of village life in southern Pennsylvania is pictured with much charm.

PHILIPP, fe-lep, Isidor, French pianist: b. Pesth Austria, 1863. He removed to France when very young, was educated in the Con¬ servatory and became one of the most popular Parisian pianists of the day. His appearances in London and Brussels were also very suc¬

cessful. He has made a specialty of classical chamber music and has published editions of classic studies as well as compositions of his own. He was one of the founders of the Societe d'Art, of which he afterward became pres¬ ident. Since 1903 he has been a professor in the Conservatoire at Paris.

PHILIPPA (fi-lTp'a) OF HAINAULT,

• ha-no', English queen, daughter of William the Good of Holland and Hainault : b. Holland 1314; d. Windsor Castle England 15 Aug. 1369. She was married to Edward III of England by a special papal dispensation in 1328 and was crowned at Westminster in 1330. Her mar¬ riage was of political importance, inasmuch as

it strengthened the friendship between England and Flanders, greatly benefiting the commerce of England. She was very popular among her subjects and some authorities credit her with having summoned and harangued the forces which defeated the Scots at Neville's Cross. She was the mother of seven sons and five daughters, her eldest child being Edward the Black Prince.

PHILIPPE DE CHAMPAIGNE, French painter : b. Brussels, 26 May 1602 ; d. Paris, 12 Aug. 1674. He first appears in history as en¬ gaged with Duchesne on the decoration of the Luxembourg Palace at Paris, where he was persecuted by the envy and jealousy of his collaborators and driven back to Brussels (1627), but was recalled by Queen Maria de' Medicis and appointed court painter. He was elected successively member, professor and rector of the Academy. His fame at Paris was, however, soon eclipsed by that of Le Brun, and he retired to Port Royal, where the recov¬ ery of his daughter, a nun in that monastery, from severe sickness, gave occasion for the lovely picture now in the Louvre, (Sister Su-sanne and Mother Agnes in Prayer.5 If the conception of this work lacks clearness and intensity and the composition is not perfect in harmony, there is everything to be found there which study and deftness of handling could supply. The influence of Poussin is plainly discernible in all his works, but he has also all the excellencies of the Dutch school, and is perhaps most successful as a portrait painter. His own portrait, engraved by Edelinck, is in the Louvre, where also may be seen his (Philip the Apostle) ; (The Last Supper5 ; incidents from the Life of Saint Gervasius and Pro-tasius) ; (Portrait of Richelieu.5 His (Adam and Eve Weeping Over the Death of AbeP (1656) is in the Imperial Gallery at Vienna. Consult Gazier. (Philippe et Jean-Baptiste Champaigne)

(1893).

PHILIPPEVILLE, fe-lep-vel, Algeria, a seaport and the capital of an arrondissement in the department of Constantine; on the Gulf of Stora. It has a fine harbor, protected by two moles, one 1,310 feet long and the other 4,590 feet. The town is modern, a large part of it was built since 1838 on the site of the ancient Rusicada. It has manufactories of cork, leather and also a large distillery. Iron mines and marble quarries are in the vicinity. There is an extensive trade in grain, fruits, tobacco, cot¬ ton, cork and leather. Pop. 16,000.

PHILIPPI, fe'lep-pe, Felix, German dramatist: b. Berlin 1851. He entered journal¬ ism and in 1875 removed to Munich, where he wrote for different French and German period¬ icals, and after 1884 devoted himself to the writing of dramas. His plays are of the real¬ istic type and he is one of Germany's most suc¬ cessful dramatists, his plays having also been successfully presented before German audiences in New York. Among them are (Der Advokat5 (1884) ; (Dagmar) (1886) ; (Das alte Lied5 (1889) ; (Wohlthater der Menschheit5 (1895) ; <Wer Wars?5 (1896), *etc.*

PHILIPPI, fi-lip'i, an ancient city of Mace¬ donia, northeast of Amphipolis, now Filibedjik. Originally a Thracian city named Crenides, ((the place of springs,® it was conquered by Philip II of Macedon, named after him, and exploited

by him because of valuable gold mines in the neighborhood. Here in 42 b.c. the triumvirs, Antony and Octavian (later Augustus), de¬ feated the republican army led by Brutus and Cassius, after a battle in which Brutus de¬ feated the wing commanded by Octavian. Au¬ gustus made the city the Roman colony of Julia Augusta Philippi. Saint Paul seems to have vis¬ ited Philippi twice and to have founded there the church to which he wrote the Epistle to the Philippians (q.v.). The city is now in ruins.

PHILIPPI, Engagement at. Upon the se¬ cession of Virginia Governor

Letcher ordered Col. George A. Porterfield to proceed to Graf¬ ton and organize a command to hold the Bal¬ timore and Ohio Railroad and guard the west¬ ern frontier of the State against invasion from Ohio. The Union sentiment was strong and Porterfield with difficulty succeeded by 25 May 1861 in raising about 500 infantry and 175 mounted men. Governor Letcher had ordered him to make a descent on Wheeling and burn the bridges of the railroad should the Union troops endeavor to pass over it. The descent on Wheeling was impossible, but on the 25th he burned the railroad bridges between Farm¬ ington and Mannington. Gen. George B. Mc¬ Clellan, in command of the Union department of Ohio, including West Virginia, when in¬ formed of this ordered his troops to move to the Ohio and four regiments were crossed on the 27th and advanced from Wheeling and Parkersburg by the branch railroads uniting at Grafton. The bridges were repaired and the two columns joined at Grafton on the 30th. Porterfield abandoned Grafton on the 28th, retreating 15 miles south to Philippi, in Ty-gart's River Valley. Gen. T. A. Morris, with a brigade of Indiana troops, arrived at Grafton on 1 June and was given command of the Union troops in West Virginia. Upon his arrival he found that Col. B. F. Kelley, 1st Virginia (Union) regiment, under instructions from McClellan, had planned an expedition to sur¬ prise and capture Porterfield. Morris enlarged it by sending another column, under Col. Du¬ mont, of the 7th Indiana, to co-operate with Kelley. Kelley had about 1,500 men of the 1st Virginia, 9th Indiana and 16th Ohio and Du¬ mont, the 7th Indiana, part of the 6th, 14th Ohio and two guns of Barnett's Ohio artil¬ lery. Both columns made a night march, Kelley starting . from Thornton and Dumont from Webster, on the railroad and converg¬ ing on Philippi, which was to be attacked about 4 a.m. of 3 June. Dumont reached the hills overlooking Philippi soon after the ap¬ pointed time and without waiting for Kelley opened fire with his artillery upon Porterfield's camp, taking it by surprise; in the midst of which Kelley came in from the other direction, but not soon enough to intercept the Confed¬ erate retreat. Porterfield, though surprised, by his coolness, courage and energy got his men off with but few casualties and the loss of some public stores and private baggage and retreated in good order to Beverly, some 30 miles south¬ east, and the Union troops occupied Philippi. Col. Kelley was the only person wounded on the Union side. Three Confederates were wounded, one, J. E. Hagner, by a cannon-ball, necessitat¬ ing the amputation of a leg, the first amputation of the war. This was the first passage of arms in West Virginia ; it greatly elated the Union

men and gave an impetus to the dismemberment of Virginia and the formation of a new State ; the secessionists were much depressed.

E. A. Carman.

PHILIPPIANS, Epistle to. Authorship.

— That Paul wrote the Epistle to the Philip¬ pians is now asserted or conceded with practical unanimity by critics of all schools. The mani¬ fest sincerity of the letter, the Pauline charac¬ teristics displayed in a plainly unconscious and utterly inimitable way, the total lack of any plausible reason why such a letter should be forged, added to a chain of external evidence running back to Polycarp, these arguments seem to have decisively and finally answered the objections raised by some in the last century to its genuineness.

Church Addressed. — The church at Phi¬ lippi was the first founded by Paul after he crossed from Asia to Europe on his second great missionary journey. He could not have worked in that city more than a few months, perhaps only weeks, ‘before a riot was raised, and the magistrates commanded that Paul and his companion Silas should be beaten and im¬ prisoned, in spite of the fact that they were Roman citizens. The next day, to be sure, they were released with a formal apology but they left at once to work in other places. However, in spite of the shortness of his stay, a church was founded which seems to have been more loyally and affectionately devoted to the Apostle and to have shared more largely in his own tender remembrance than any other of his churches. This is demonstratively shown by the fact that they repeatedly sent contributions to the Apostle’s support, and by the character of this letter which is in large part a cordial acknowledgment of their Joving generosity. Other than these personal relations there seems to have been little to discuss. The .section of warning appears to have been written rather to guard against possible future evils. The only suggestion of any unfortunate condition in the church is the brief reference to a difficulty ex¬ isting between two women, presumably im¬ portant members of the church, and possibly ladies of rank and influence in the city. In no other Epistle does Paul find so little to correct, in no other so much to commend.

Occasion and Purpose. — As has been said, the primary purpose of this letter was to ac¬ knowledge a gift which the Philippian church had made to the Apostle in his imprisonment. It seems safe to infer that Paul was also an¬ swering a letter which the church had ad¬ dressed to him in which there had apparently been some suggestion that Paul did not fully ap¬ preciate their affection and liberality, and

also an expression of their fears as to the result of his imprisonment on his work as an Apostle. The Epistle assures them that their affection is fully reciprocated'and their gifts appreciated, and further corfveys the information that his bonds had helped rather than hindered Chris¬ tian work in Rome. With these assurances go also some warnings and encouragements.

Contents. — After a salutation in which, though not in the bodv of the letter, Timothy is associated (i, 1, 2), Paul expresses his grati¬ tude for their gift and his prayerfulness in their behalf (i, 3-11); assures them that the work of Christ is going on well in spite of his imprisonment (i, 12-26) ; urges them to unity,

humility, a blameless life, and Christian joy (i, 27— ii, 18) ; promises to send Timothy as his representative, even though he hopes soon to visit them himself, and bespeaks a welcome for Epaphroditus the Philippian messenger, who had been very ill (ii, 19-30). With an abrupt turn, which has led some to think that it was occasioned by news of his enemies' activity which reached him as he was writing, he warns against the ˆJudaizers,® and offers himself as their example (iii, 1-16), adding a warning against the gross immorality of some (iii, 17-20). After various injunctions, special and gen¬ eral (iv, 1-9), he renews his expression of thanks for their gift (iv, 10-19), and ends with brief salutations (iv, 20-23).

Date and Place. — It is generally agreed that this letter was written during Paul's im¬ prisonment at Rome rather than at Caesarea, as some have thought. The majority of critics also probably rightly infer from some state¬ ments in the letter that it was near the end of the imprisonment, as Paul does not appear to have the liberty which he enjoyed for two years, and seems to expect his case to be finally settled very soon. There is no certain ground on which to assign the years to the events of Paul's life and chronologies vary more than five years, but it may safely be said that this was the last of the letters from his Roman prison, and was written about 60, pos¬ sibly later, possibly somewhat earlier.

Bibliography — Kennedy, Ii. A. A., <The Epistle to the Philippians> (Expositor's Greek Testament, 1908) ; Lightfoot, J. B., (Saint Paul's Epistle to the Philippians> (1869) ; Moule, H. C. G., (The Epistle of Paul the Apostle to the Philippians) (Cambridge Greek Testament, 1906) ; Vincent, M. R., < Com¬ mentary on the Epistle to the Philippians5 (In¬ ternational Critical Commentary, 1897).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

PHILIPPIC, the title applied to the re¬ markable speeches made by Demosthenes, the greatest of Attic orators, against Philip of Macedon. The invective of these famous ora¬ tions is so powerful as to render them unique, and the term philippic has since been applied to any damnatory and vituperative public ad¬ dress. Thus, Cicero termed philippics those orations of his which drove Mark Antony from Rome and compelled the Senate to pros¬ ecute the war against him after the murder of Julius Caesar.

PHILIPPINE (fil'ip-m) COMMISSION.

See Philippine Islands.

PHILIPPINE (fil'T-ptn, pen, or pin) IS¬ LANDS. Geographical Position and Area.

— The Philippine Islands lie approximately be¬ tween 21° and 4° north latitude and 116° and 128° east longitude. The accompanying dia¬ gram gives their position relative to the neigh¬ boring countries. This shows that while they are not in direct line with the best devel¬ oped transportation lines along the Asiatic Coast, yet they are not far distant from Hong¬ kong, the shipping centre of the region. Pre¬ viously most of the trade with Europe and America was carried on by transshipment through Hongkong, but recently several lines plying between the west coast of north

America and Manila make this city a calling port either before or after Hongkong. The islands have a direct monthly service to Europe by the Spanish mail. Also a line of steamers plying between Asiatic ports and Australia call at one or more ports of the Philippines.

The area of the Philippines, while not ac¬ curately determined, is estimated to be about 120,000 square miles. They are about the size

of the State of New Mexico or almost exactly twice as large as the four States of Maine, New Hampshire, Vermont and Massachusetts.

Physical Features. — The Philippine Archi¬ pelago is made up of some 1,200 islands sepa¬ rated from each other by narrow channels. The largest of these with their approximate areas in square miles from the north to the south are as follows: Luzon, 43,000; Mindoro, 4,000; Samar, 5,200; Leyte, 3,800; Panay, 4,700; Negros, 4,800; Cebu, 1,600 ; Palawan, 4,300; Mindanao, 45,500. The islands are mountainous in nature; the larger ones have more or less continuous mountain ranges which extend in the direction of the longest axis. In some casg3 these ranges are nearer one side of the islands than the other ; in others, large river valleys separate two parallel mountain ranges. The peaks are volcanic in origin. Only one of these reach an altitude of about 10,000 feet. There are recorded 50 volcanoes, a number of which are more or less active. Limestone de¬ posits, often crystallized by volcanic action, occur scattered throughout the islands, espe¬ cially along the coast. In some portions, large areas of stratified volcanic tufts exist.

While there are many small streams which in the rainy season are mountain torrents, there are only a few large rivers. Some of these are navigable for small draft steamers, lighters and canoes, and thus play an important role in the development of the valleys in which they lie. The Cagayan River in the northern part of Luzon is about 168 miles in length and drains an intermontane area of some 16,000 square miles. The Agno River drains the mountainous region in north central Luzon. The Pampanga River drains a large area of central and north central Luzon and enters tidewater at the north end of Manila Bay. The Pasig River, at the mouth of which Manila is situated, is the outlet of Laguna de Bay (a fresh water lake) and facilitates trade by small steamers between Manila and the rich region on the shores of the lake. The Mindanao River, the chief river of the island of that name, is the largest river in the archipelago. The lowest third is navi¬ gable for small draft steamers, and this bids fair to play an important part in the develop¬ ment of its basin, which is as yet little utilized.

Climate. — The insular nature of the Philip¬ pines exerts an important influence on the tem¬ perature and ameliorates what might other¬ wise be an ‘extremely unhealthy climate. The climate of Manila is divided into seasons, viz., the rainy season (June to November) ; the cool dry season (December to Febru¬ ary) ; and the hot dry season (March to May). For nine months of the year the nights are comparatively cool, for the remaining three months there are only a few excessively hot nights. At Manila the annual mean is 80°, the

January mean, 77°, and the June mean 82°. The highest recorded temperature is a little over 100°, and the lowest a little under 60°. The

Sanchez Mira •* ‘Kˆvlova R Palai £>ˆAbu>ug

Ct’s\ Aparril

== - Nag part tan,

Dirique V Pasuquin] Baca o’ Laoasfi San Nicolas Jiatflfco CurrtmaoF BadocJiF’L SinaitˆVˆ Cabugao Day**

| La)>’«j BayTf & Sto. Domingo0

Sti. CatnljnafaoJL’-;

Roscrio

❖\Lecberia

Bashi Channel t

BIitan Is.

\Malapo $>\N’ icolaa O c

■SOfc’iStn MarisfTˆ, ˆ‘fsTSlSin 3k _ ..-IS. •* V-Jl’ * T.U

:=3=qˆi Apalh Juan i»

. ˆ ys. _ n Dainfmt

PuTJlatt==ˆ 1

Gulf of

Hainan Strait

Lubac

/°Soledao.

Tung king

iungchovc

’intang.Channel

+ . PL

pˆ-ˆjˆEwsrpada O

lAparri

“V li\ Tuguegarao

i San’Fe’rnando f A!oj* > c g IdUfODSO 5 XyLDingatan Bay\

ˆCaingin Bayabaj?- Btli,e

ˆˆRSTˆV /*’

,5®, °Niugan j l£-g\ *«0m*

in CatacteAngaK?**0ˆ— ˆ

_ˆˆMabua

c Cacaron u, r . t ;

inn o Puting-lupa /

AV N ;V

Bigot Alaung ‘ I \

L. W

/Balasin ° y

_ ftUrriˆ Sto. Cristo

yPiˆTˆTˆfisaionary Sta.

// Camalanmgan . V | ’ JN mL/’G agua

Lingshui

L&ougi Vignn p

luzonIv

Bolinaojul Tar lie Ibaˆ

Thuan-an

lagor llo O

»’*“ „ s‘5 Pandi

0Ugas. Baleu ,>iaiu>0 napa j oc,’ . ., .

ˆReVola«o,\:n ˆ‘P 7’yu‘no ,

*SatflorV? /clbm..o c(

? o ®g*0.MSag,lˆL _

(fr \ T ar» • v-*l U &ˆ!l?anWlˆlot,‘L’ 1 0 Pastor N\ˆ \

oBunducan Mtmlaoˆˆ J***

i/ˆˆOUrilao ˆBazbaguin , A

Lift uni ‘Nn | y°i>tuij

M—NoTalichos (v.»ˆ

i\ˆv O0/Cainglr| i

>|a!anday Burges

V S. Bartolomc frfy

* Bagbaz \ ˆ

,° Talipapa $ a Baebse— - - S’Ql

£aoM«®

CATANDUANES I.

SubicfVf

Manila Bag (

C. Calavite^, Mi.vdow Mindoro Strait CALAMIaNES ts.$fa

Cape San-ho , Phuycn i \ *

Uonkoe Bay “

X O C O fi .

•arvacan

Sta. Mari: Saotiacoj

Candt»fiv

Sta. Lucia v Sta. Cruz’

iay°S

)Samar

Bagne^

-^^a ban zap

■j Banalo1i]_| (Man’cayan H

TacudinS

baugarA Pt. T > arigayos/o ‘ I Bacnotanl IS. JuanLcl Sail rtf’,1 Feruaiiclo > !z v 1 BauanikJ^ CabajT 5

Aringay -

arruyanQ^5 Xnyai/eitwp

/SvGamu ? MMunu

lu.rXifj’ , _

Si ABC. AO I.

CLEOPATRA WtEOLcj

Bunutan

Binaungani

Palawan

Puerto PrincesO^^ C. Buliluyan^’

BALABAC l.p#

Baliibae StrV _

Sampanrnangio.r^Bl?8,c

P,1 o

NCmTH^ % B0RNEO 2s\ Brunel!ef> tBR’t’SH)

Cartagena*

IIIULt

Baoazi

S U L U Tolo dUc *■ LV| SKA ˆ

P. Santa Mariaˆ V MLvDAN AO;

vi I * /

A ZiimboRDgaCj VˆJpCf » Srroiiˆ ’V’

K \ ˆulu I ‘ %

&‘V T»Ll T„’»i ARCHIPELAGO

sv .a? i yy celbues&e.

lohagiici

Damjiarjˆ. \

Malabotmˆq-

.Navotae’Aˆ

NJLMateo

//7 V._

Bmbal 0 “Cupang

Bolinao.

Pt.

Pltdr nr Zaracozai

, i j

Unojero9

V Calooca

‘• Wavau . *ˆSayaganˆ* *Sar»ngBni Is.

Manaoac’-

Mariqu

Bulaoc

-Tiigrayˆn

DaaSl S. CarlosX

r?.

St.. CrS.ˆ-Cau«llIl5Mo3 r.odel.rii? 1 WjCn‘ijJi -feiXT h. Ant.‘C . M , . sintoev

M»si,, ocJ> *WA R ft /Va””, 3 T.r®’

P.I.UIBVJ-! ‘Va_ ..MurdUj

iˆˆL’aiiangarfS P.inalqiM

ˆ S. Feliperpˆ— *•£ iciLS. N arcisp

S. MarceUno0

ˆ I . *k7 -Aflrn pTˆftlA 1 olo6dˆ?il*?l

Purt SUaW”H?c ?Balanga\

Po<* v\ot°oVˆ«ATAAN\ Caloocaiv R/l . I ˆ Bagacj wmanilasMˆ Ml. Manvels. c.vita, APajii

MarivelaAsCiVite VkiffiˆUI r,

■ ‘■’jfcl/BSilkd

— CAVlTEˆta.

1. Juan del Monte ian Felii/ Neri/’

LupadˆoˆPtˆbangan/ˆˆ

U > »(Ba,,l

Yn;r\ Ene“M0

C rfKJ *\ ˆ tvitr/s.lla del Sab

/ˆfCabanatuˆr-Diigalln

jyst a\Ross f-faJ pu Agria 1

Enaitav/?.

Malatc

Botel

Yl’asay’vˆˆ’ -f,

Eiy

t’lr’c Muliliajlctl?

ˆon I ✓

I I Ilagonoy ‘5W f Sta. Monica f~ f 1 Bicutan0

jLas Pinas Baguinbayan ‘Ba ; Jb cat c

c#1* Bula nansao 0

iQBAGi

1 South Cape

MANILA

AND

VICINITY

JJaehi Channel

Pt.,San»ley

/0ˆ1’avitc

Bacoor

Caridai

Dnflialan Ban , Ft. I > eseada W?

LACUNA j DE BAY

fCupang

** Angelto ‘ A M,pS\ N G A. k-Rilft. J-j&an

‘S.Ildefoi

iULACAl

Scale of Statute Miles

linucayi

Pt. Banla

\ poL\£ifO-°:*.- 1

tT,‘Df’tot»Pt. G.brUuj-.VSrˆ

fMt . JBatay r.mit)V:-I.\u“T; ‘SL lifaWN

’tfc’felVa .• Lamon , % %,

I’ala Is. .PaT.nanongan I. #*A3 * La NT AO x.

plˆOMAUG L

’*aA-9 AUUR t.

f’ SW ° i

IBA VAT I.

BATAN ‘ ISLANDS

BATAN

AND

BABUYAN IS.

Scale of Statute Miles 0 10 ?0 30 40 50 00 70

TINAGA i.

ˆ % Icagbalisav I.

Camarln/de Cordllerfa TON DO/W’b“®J>

1Mˆ4n°£c\8lUof Ja

IS. vi.Syˆ>iS(j< LlnaJ j *X

‘■. CfflfiMST

ˆC.Santiagt>l>a« AOqVCGo-ˆ g ˆf Bocboc i’ˆBat.aga >* t a njcas Tayctba

AJIT* maricabanˆˆi Pt. Locoloco

Verde/ Island Passage «verde Pt. Malabrigo tcˆ-r1 - - GaienLj r.

pftgb&b»p y } I i.“ 1/ / .- Pole

Pt. Talabasil -MINDORQ

- rSta.-CruzVˆry/ˆ’ i’jpamˆlayanˆ

balintanc.

A «■

5 »

lin /o i* ©J cK‘ ‘ ,.cO’y„ >

»l1-.Tibotol.,5«A. Ti<l»s5ˆ.S’ -Aatm <7 i i

p i

iˆy(isarogˆ 1

(l ˆjNuk

Kˆ*i..WbuIk.

b /LN, VF S , ■

f-TONDOˆ

s. m l > > t.

ro tˆvXpnAnJ

iaDGumoca > >

n isan Lo pez

itoiM&f R*g»y(’ . .

r, YMa’calclonl Bangui’ -tf

f pc’ V -■ivrirr LiBnmiuMI

Tuquian’ˆJ_CiaUiy»uan aˆaammavaK- • Ji’ ˆS-N arci80 — nTj r,r»«»V ‘ y Pasacaot

i’PyViA i r \ Jaˆuraoi iW1- \ Bon doc I

rorrijOs ‘4o Raf/a > \

Aren*

I tm ˆtan pt.Bondoo ˆ ˆ

-Pt,-Gu induganan = 4 BURIAS L

V ISLAND

ˆ0f./Pt. Binurun At Port Baras ‘T’-Bnto ˆ‘•bygao Bay ‘* ‘ trac

:*”■ < ’

,RaPURAPU I.

PL Ungay

tfontufar ˆc

ˆ-43 Sorsopon

ˆlˆˆ&ubat

Jpbanˆ Julusa

BuWanV.sj.‘1 b,,, t V”0.

rv’i’S (vAtiˆˆ)4i?i’c - - ■

Pitogo’V Qq be n do

WVLLtE ROCKS A

Calavan Lˆs. B.rt, B ABU VAN Dalcpiri 1.ˆ ISLANDS

Caceres ˆ

ˆPt. Tiwi V* ‘SpVMalinac /

|Maehibat

BojeadorU” Diriq’ue uor*

LuotfeˆL

■bulVc V. Don Sc fVNonoc

Dos Herm.

Pan can Is.. Xs is, C.\

4 % Sallayan\ J -* I* .‘s

‘b’VC.V,OSfI. U*J»Wi)‘oM < > Vj

aPo v Pt. n t v ‘i ;

- - vcDpogonV I > ir,Vn <

wB ANTON I.

ˆSimara I. Pt. Origon

Maestre i > e Campo I.

,Bongabon \ ˆDdi

■P «, Jn-Dujag.n

SCLS/Maos»l»jl’.tp.|oja

• r TABLAS 1.

■7 ˆ BAlalacao Odiongaifq i / _

/ ’vf PLBu vr.ltao pTibgarac Espaˆi Caguraypt. Pandanˆ(,rrS:bL6oc
“ˆPt. Durunc.ii r ROMBLON

— Catolog* j/L

,Lu;f.°?s …

t. Tali M»y .borooav i. < x h- ˆ\t.ay»°9

Sorsyl

Mabiton

‘9 > ’-‘mˆT?eˆiry:

w < *w. < Aon

n,,de. D i qeA

iffiOBfl®/

ZcJnl ~v /• p.».ui

BATAC I.

Lapang

ˆPalapag

}ujaD’XSaca mnliy Bay “p tV Pt. Silo

LON I. Pt. Bugui A, Magallanes *1.

trˆ\ al

SIBUYAN I.

xˆ/ˆxaara Mandacm i PL Cauit | PL

Mariveiear Pt. Talieayrˆ

Batuˆoj.

<S£ Magaranv> ;u“ˆM.ng.V

O, TARA I. 1L|N T L

Coconongon * A mro lon I Mi

BUSUANGA I. P ’ .Marc 1 1 la Sc.

Mapbat

CalayifK

Min nit]

PL Bang*

samar.,v

..I r.ayosrr: r\,

.MANILA x

Scale of Feet

Q…- 1 01 10 2000 30<X> 4000

® Tarangnan Calaj

CO RON I.

r C I? ˆ Bulalacao I.

tJ’ CAM 1*0 I.

r”v°l * GROUP

jc. ‘VNANCALAOl. CABO LA u A N I.

i. 4*-?c*r) • Cadilala.n

fCALCYA I.

Buruanga* ISLANDS Pt. Pucioˆj

SEMIRARA (PANAUATAN I.

Cl* LION I. Halsey Harboi /“Vv.

LIMBANCAOA van

t<p ,. JINTOTOLO I. NARO 1.

A’*=\

1 ov Pt. Caduruan’

ˆ V-V/lY’- 1 “• CIGANTE

“‘■C”i‘,rr‘ oicaktI ˆ Balasan ? A 0 sicogon i.

;iaa Baga6ay> cuintacan 1. ..<re

frDaoy / Of* , Madrideioe (J I

rr. rfc&ˆLcˆ _

-J»rAiToiio Jk’- >®-*“M?*“Ur,?ˆ?Clt .0‘0?.,i“:v>.v!w.nacoiodV)“ln‘v*/ T;Hbii,

Port Libas fLibae.ˆPt. Maria r “»k ~‘*r* Port tfuronyan ■wˆsABorongan I

“o» - U

Kabay

\ N-TjˆPnbay Bay ‘ X ySMatanuao Bay ibujohZJSFJUjljao

|

. Capince _ˆifiuiuap

iRipipi i. Tuadai

Panclan]

Sebaate

JU A MOVIN’ I •

ilalinioˆv y Batan\p .jVIambusaoN Jam in da n ‘

Quiniluban V.b Guiup

, Pa U a LI CON I.

＜5 MANAMOC I.

. C,T ‘-0 I .

I. vv aGULAVa I.

BATBATANI.O i

CulasijNZ. Mt. Madjaci Tibiaofc ˆ BarbaiarAˆj

NBS SgdfcHi

-ˆSUEPRita,,

1 BajJntxiT’.‘ruilˆ.

^^^Taciu6an> .bgio T Ojaro if, f \,Vi, . Palo a

Tanauaii

*Ta« l. iˆTJa.Y ,\ MALA BIT ETON I.

yr. **.’ ‘ ˆ

A_. %jJi—

Pt. Tabonan’Lˆ;

Palompoh’

4%H Pulanican VP&QCOl,

LVRIC i.n

MANIC AM

,BISVCAT I. CAPNOVAN l.

I BingT Imuiptan Bay i

Boa van I._ J

JXi>l’MARAN I. Dnutaran Bohol

A Cacnipa j.

7y Cacbolo l.al

‘ Jilboom Bay Kj

Pt. Piedraa „F? Cleopatra Nˆfˆle, ‘ Caj>e Noruestenv

ˆ>San

Carloe

liai bMap

Piedra Blanca I.

ei y x /v Toledb” V). W (*Pli«mu£- fjjj

:) < =■ m 1 1. J; nirfeˆZj IVaSa

1 j X J-mu ml < 7 “‘far

Dadian X rsao >T.,TU OuoBx.tjy b O „04’ e j Diiliisuete L’ i

l.usinl -r J ManliujOˆTasy,1

Tu mar bon Island Bay

H\mapi*5y§7’

.iloan Eib, \i*axaonK~ JKlcn.r.

Pt. Tahle

; 7xl > ai0£ˆ-l > = Tanabog -

/ ‘ Tapul , Babuywn

* f y- , royiiEADo i.

fiTagborea

■ *j-s ˆ-0 Puerto Princesa I Pt. Langw*uVhigTj ApurauaDJo’-ˆgnepˆan peaks

PEAK CD 1../ ‘ _r f l Hondo “f V yˆMALAKAOI. lmaJi.vP ˆ Victoria Peak pK.ˆ > Pl. Native C W - RO,A OR MANTaoI IN I.

AND CHICKENS

Pt. Bluff X Anepabao

Ibeltfioo-

_ - w ˆ „ … S1ARGAO

‘A0y °S AiNvhnancia i.

Noooo ˆf.vATVAN < ‘acabungtug

ˆliTv * i. Vjjnpa

b.ˆ_ˆBA|wARBl’CA8 L

YPlaccriBacuaSYJGRANDE I.

° ‘■ Vrt4eˆ*ˆSˆ i zn ° i’ tˆ °

rrnA CoFrosoal w It. Ledaspi t . ˆfutNERAL

} K I Vt k Lanuza ˆ

Mt . \Urdanet4 “V ‘NfwˆI Pt.Cauit \ 7Corl.i/

DANJVCAN I. /. 8 ˆt. Blnig8ian’<M wa . Matatindoc .Vabulao
Bayˆ~~ HinubaunLJ Cal i pa pa ˆ S. Sebae.ian

iNl’Ll.NG I.*

0 . MAXUCAN I.

‘ ˆJ*D°Nf>ONAY t.

• ‘ Cagayancillo

ISLANDS

StALAPACKVN t. Pt. Isabel ˆ

tutuam

.* Hilonghtlˆngf >*■

R… ^^9 flridˆ

y?>1p!*MVi\Bulua!

Maiypapay]

iNCANl

Tt. PaBipoudugang

Culasian/i l.l/araol Bay ˆ .

Martngl

Mt. Sarap,. ˆ . Canipan/o M~l

Mt. | Gantung

‘ .• “ Pt. N&rlZjTACALiNoo or

“J WtˆMantalingajan Ea«i Island Jq -fur Ipolote Bay San Antonio Bay

TlbraTah.

Islands

/ y Da ‘VapajˆPitogo

.Nie\eY5 k -Cˆ\, Pt.

C’IS.g-s&p™*

Sr* ˆˆOtelta

l’;) 1, inneaˆ- “T 11 9 n, ˆ

M4»o\ngonˆ» Juan

jrjrX- .NcSWetqJ’

Wciyljo ‘ jo 7 ˆ

DapitanjiT? * >

Lubungon -

‘ s.| “i iDxsog ˆ.-j iAoruyˆ

;Mt: Bisod ‘gudeia\

, f rif/ ˆ iX’uladUO

Mt. MallndangY

Pt. Sulauai

,P». Polo 1 VManella

AOroauietd Ij

Disacatr Ponot J’

Buliluyani P AND AN AN

MˆSabr’ag

Siari Stndangant Pt. Slndangan Tiiiu —

Pt. QuiplˆXˆSalum

i‘jl _ˆ/lligan 1 ˆ ‘Camp Overton Q1

manlagvle i.

Balabac

l BSE

llulcihn f^VTTcauanO

>n’0 ° S

X cJTupilac Ularasint ” -^iguian < *jg!^ n jySibatfueit)* • *‘^~v;*

v/L ^«.v

ATuDganau &.

.. Olutang.v.IJ^ yvitali vy-

‘Biualug Pt. Lutangan Coroan

N5./J BALABAC I.

\< • LCMUVCAN I.

Cape MelvllV

BALABAC STRAIT

<&*“% Maxosi Islands l^y’ rvest Channel

f. M tv. .

Sugarloal

\Tucuran-c

^dunayi

A

Mandaran -r’

.Cateel

Carotnatan ˆ%ˆIao\

‘t’lPagaria&ˆL ’A ANL, A(Vlt.

rilJ.. Pt. “ aVla’-‘arDagurnba.

Brnˆs SigayanBarnfV •»”’

To re an i. MalcbangV Mt’.

\ Ilian a | MacaitJring Xi Pt.*MaUmua%>; pˆa -

Vr Pt. Flechas boncuˆ ..3ˆ -

■<v D(“j :

+ I.B3cdatv«ˆ2N?>”Libu

Tt-T.|:i.n/’>V4yˆ

ˆValencia Levant o’

P..ˆMt.

Pahoml

V Bagalobong

Comfiostela L_-ˆ_

jfBANGUEY I.

Cftnnnel PjMaLHU AI.LE I

Pt. Sibuco, jSibuco Bo uL

Bicungui

Pahauaun .V

S. Ramon V’ K/

Matiao’ tfovtllaˆ

Uanicaano

Qnesim

Juratn0

ˆMatUXucatau ˆuyu Bui/

,5;v iufin»’-/f/5frT ˆRegente {

: ˆ Ligjfasan 4

■: Talayan

tCarmet

TEINC.v I.

Sanodov Is.-* KALIDLGH J…

T.J.I,

Pt. Tabanalobong rt4 7ˆ“.,. „ Pt. Quidapil utbassak]

BalllaL <Tˆ Lebaic?

TT “, ‘I7 - ˆaH

“771 <“J h:r

IV storgaT T ivlirjˆ

A LA MPA I. LA.MIIL I.

PaetY fD’S “‘GII.F 5

Malalag Bay fˆt’,

OF v iCalapim9 [\D.4 » ’AO

* Strait”

Jalactasat?

ˆˆCandus

itf’Ciiwsi ;Dalot

Ypuluan rada VN-j-LT-ft ftoltt

ˆ BJ HarnMuitan

/Alfonso [Mt. ˆingan caret

Pt.Matanal

• r* . .‘V.Pangasahan Malusofc ‘ ˆTAXIVK I.9 Xjji ‘■♦apavAN L

- ULXTO-UA I. J- 11 VLAN 1.

f «* < Sk?v >

OiC,dluncjan

BRITISH

PANGUTAR a no KULASSIE.N I. a

GROUP fl : Te PaNCVTaRaXC lj\ A

■Staj 4sabel’

PabuH

(MalUa | V’S

| l’undaguitaxi\/

1C. S

VTalagutun I \Pt. Cal ian

kaOLUax/ J Sulu

j Sett *5}

‘K uaJli.iv.og. ‘

‘ I’t. | Wun. j . _ Malatunacˆ Malatunaˆl Pal mi ban ptXv p/da “

iyoRx.

Lrtbuk

Mt. Maiutum

Usaoa

iA.ir\LES

.SnndakffQ

LA PA HAN I.

‘Luajon

Pt. Bacud’

Macar’

CROUI > ‘Sang SULU

dakan Harbor

Parang’ TAPUL ly

r ,?v

V-v/4.4vi

SI.MOM.iR HBVTOI. ˆ i Lokdatun

Longitude East from Greenwich

ARCHIPELAGO.

BALII\ > NGPONG

TVMtNDAO]

MANILA

ˆPt. Escarpada

.Nassipinz L;

＞A,leala

ftmuIuˆwMCelaoeo

o/rf .TI’eCftTMunca

k i

■Ygl ugt ‘ˆr“0

Dos Cuernos

itlacan B＜

Port Bimnlansan

‘.‘k Di vi/a can Buy fffL Cresta \n pjTt Dimnlur. TumauinK r\ .

.. rDauilicarN %

Mt.lMotseS’ fPalatum*-l±

ˆIlnfean. 7 fy?* BaV

Palananˆ’ . f Pt Diaumaogi

Digollorin Bay

Pt. Dlnapiqul i Dilasac Bay ? Tu Tangtig

AND THE

CHINA SEA

Scale of Statute’Mlles

0 50 150 250

no®

PHILIPPINE

ISLANDS

SCALE

Statute Miles, 75 = 1 Inch.

I 25 50 75 lOt

Rand-McN&lly's 11 x 14 Map of Philippine Islands. Copyright by Rond-MoNally k Co.

Cl

sBaTaX I. Baaoo •tˆ-ibana

Mat

Balintang Channel y

ry _ˆtCabacuan (

\J Badly an li

120 ' * T, AJy,S' GROUP

sigbuye 5 TV atASM.

TAMBAGAAN !>-»< =» J. B VUUAN !. J 21

.t 125 ‘■128°

BAurrfeJ Sahascani Is.

At high altitudes the climate is much lower. Thus at Baguio (altitude of station 4.777), for¬ merly the official summer capital, now a sum¬ mer resort, the mean annual temperature is near 65°, the mean maximum, 77°, and the mean

above figures give a fair idea of the temperature condition through the islands at or near sea-level, though interior points and points farther north show greater oscillations in temperature, and those nearer the equator less oscillations.

minimum, 53°. The mean annual rainfall varies from less than 40 inches to over 120. With¬ out going into the causes that produce the variations in rainfall in different parts of the islands, it is sufficient to state that they have been divided into different zones as fol¬ lows : (1) Zone of very definite rainy and dry

seasons : mainly the western coast of northern and central Luzon, western coasts of Mindoro and Panay and the Calamianes group. (2) Zones of long rainy season and short dry sea¬ son. The northern and western coasts of Luzon, the central Visayans and northern Mindanao. (3) Zones with more or less uni¬ form distribution of rainfall over the

whole year : the southeastern end of Luzon ; the east¬ ern Visayans. eastern and southern Negros and Panay, the eastern and southern coast of Mindanao and the Jolo group.

In the summer and autumn months the rain¬ fall is abundant throughout the archipelago. The winter or northeast rainfall is, generally speaking, abundant in zones 1 and 2. The spring rainfall in the months of March, April and May, due to local disturbances, occurs in all zones but is most abundant in zone 3. The different classes of rainfall are important because they determine to a great extent the classes of crops that can be raised most successfully in the dif¬ ferent parts of the islands.

called, are cyclonic winds that cause annually .great destruction to growing crops, shipping, and buildings of all kinds. Sometimes when most severe they are accompanied by heavy rains, and these flood the streams and lowlands, thus add¬ ing to the loss of property and lives. The study of the history of these storms has been carried on for years by the Weather Bureau in the Philippines, which, aided by a large number of stations throughout the islands, can predict with great certainty the approach of a typhoon. The warnings of this bureau have for years saved large sums of money to the shipping in¬ dustry, not only by the Philippines, but of the neighboring Asiatic coast as far north as Japan. The reader is referred to the publications of the bureau for an extended description of these storms. It is sufficient to state here that south¬ ern Mindanao and the Jolo group are practically free from them, that they generally originate to the east and southeast of the archipelago, have a general northwest trend and occur most fre¬ quently in the months of July, August and September.

Population and Inhabitants. — The census of 1903 gave the population as 6,975,073. A re¬ cent estimate on the basis of the electoral vote as furnished by the Bureau of Insular Affairs gives the total population at 9,503,271. See fol¬ lowing table :

The typhoons, or baguios as they are locally

Estimated Population by Provinces.

Class A.— Provinces in which the governor, other members of the provincial board, and ■esentatives in the legislature are elected by popular vote:

1.

2.

3.

4.

5.

6.

7.

8. 9.

10.

11.

12.

13.

14.

15.

16.

17.

18.

19.

20.

21.

22.

23.

LUZON GROUP

Batanes .

Cagayan …

Isabela .

Ilokos Norte .

Ilokos Sur .

Abra…

La Unibn .

Pangasinan .

Nueva Ecija .

Tarlak .

Zambales .

Bataan .

Pampanga …

Bulakan .

Manila City .

Rizal .

LaLaguna .

Cavite .

Batangas . .

Tayabas… . . _ .

(a) Subprovince of Marinduque .

Ambos Camarines .

Albay . .

(a) Subprovince of Catanduanes.

Sorsogbn .

(a) Subprovince of Masbate ….

Total.

1.

2.

3.

4.

5.

6.

7.

8. 9.

1.

2.

BISAYAN GROUP

Capiz … . .

(a) Subprovince of Romblon. .

Iloilo .

Antique . .

Negros Occidental .

Negros Oriental …….

(a) Subprovince of Siquijor …

Cebu .

Samar …

Leyte .

Bohol .

Total.

Misamis. Surigao .

MINDANAO GROUP

Total.

Christian Mohammedan

Pagan

Total

8,685

8,685

187,672

4,750

192,422

94,763

3,985

98,748

184,748

698

185,446

167,435

3,442

170,877

48,488

16,682

65,170

148,347

112

148,459

533,871

‘ 1,154

535,025

167,250

776

168,026

165,891

1,847

167,738

106,862

3,772

110,634

49,526

1,741

51,267

268 , 602

1,476

270,078

250,626

623

251,249

266,108

117

21

266,246

177,687

2,840

180,527

175,354

47

175,401

157,465

5

7

157,477

286,641

2

286,643

186,860

5,380

192,240

61,812

61,812

286,788

6,224

293,012

241,873

1,109

242,982

49,172

3

49,175

146,419

23

146,442

54,608

54,608

4,473,553

124

56,712

4,530,389

280,614

6,313

286,927

66,048

65

66,113

448,123

i

6,787

454,911

156,549

3,321

159,870

409 , 893

4,220

414,113

192,743 *

15,038

207,781

57,421

57,421

727,943

12

727,955

323,745

67

1,420

325,232

478,480

478,480

307,911

3

307,914

3,449,470

83

37,164

3,486,717

172,348

3,797

983

177,128

112,973

17

4,650

117,640

285,321

3,814

5,633

294,768

PHILIPPINE ISLANDS

751

SPECIAL GROUP

Christian

Mohammedan

1.

Mindoro .

51,592

2.

Palawan .

2,940

Total .

2,940

Class B. — Provinces in which the governor, other members of the representatives in the legislature are appointed by the governor-general.

mountain province Christian Mohammedan

1. Apayao . : … 350 .

2. Kalinga . 250 .

3. Bontok . 986 .

4. Ifugao . 120 .

5. Lepanto-Amburayan . 15,750 .

6. Benguet . 2,916 .

Total. Nueva Vizcaya .

20,372

24,365

DEPARTMENT OF MINDANAO AND SULU

1. Agusan . .

2. Bukidnon …

3. Lanao .

4. Zamboanga … . ; .

5. Sulu .

6. Cotabato .

7. Davao .

22 , 890

9,808

542

9,747

69 , 850

49,732

43 , 687

6,728

103,820

7,841

82,670

33,238

8,450

Total

139,984 309,019

CLASS A (ELECTIVE)

Luzon provinces .

Bisayan provinces .

Mindanao provinces .

Mindoro and Palawan .

SUMMARY.

4,473,553

3,449,470

285,321

93,648

124

83

3,814

2,940

Total

8,301,992 6,961

CLASS B (APPOINTIVE)

Mountain province .

Nueva Vizcaya .

Department of Mindanao and Sulu…

20,372 .

24,365 .

139,984 309,019

Total

184,721 309,019

Class A .

Class B .

Total population

8,301,992 6,961

184,721 309,019

8,486,713 315,980

Pagan

12,185

20,135

Total

63,777

65,131

32,320

128,908

provincial

board and

Pagan

28,500

78,200

60,514

129,380

43 , 684 26,738

Total

28,850

78,450

61,500

129,500

59,434

29,654

367,016

387,388

10,300

34,665

36.800

47.800

31,450

7,150

68,233

59,690

58,150

79,597

124,869

110,548

97,661

109,921

191,433

640,436

56,712

37,164

5,633

32,320

4,530,389

3,486,717

294,768

128,908

131,829

8,440,782

367,016

10,300

191,433

387,388

34,665

640,436

568,749 .

1,062,489

131,829

568,749

8,440,782 1 ,062,489

700,578

9,503,271

The foregoing table shows that of the popu¬ lation of the islands, 8,486,713 are classified as Christians, 315,980 as pagans and 700,578 as Mohammedans. The city of Manila has a population of 266,108…

It is generally conceded that the original inhabitants of the islands were Negritoes (./Etas) who belong to the eastern section of the Ethiopic division of the human race. To-day there are not more than 30,000 of these people scattered through the mountains of some of the larger provinces. The most civilized of them are more or less mixed with the Malays. They arc pure or nearly savages, a nomadic people living on roots and products of the chase, though many of them, where in contact with the Chris¬ tians, piece out their existence by trade in for¬ est products, principally rattan, gums and resins.

After the Negrito invasion came the Malays, who gradually spread throughout # the islands. The most progressive of the primitive races are the Igorrotes and allied tribes of the mountains of northern Luzon. Other mountain tribes of importance are the Tagbanuas of Palawan, the Manguianes of Mindoro and several of Mindanao. Besides the wild

tribes or Pagans, as they are officially designated, arˆ the Chris¬ tians (Filipinos) and the Moros (Mohamme¬ dans). In point of numbers the three most im¬ portant groups of Christian Filipinos are t e Visayans of the Central Islands, the Tagalogs of central Luzon and the Ilocanas of the north¬

west coast of Luzon. Besides numerically im¬ portant are the Ybanags of the Cagayan Valley, the Pampangans and Pangasinanes of the flat country north of Manila and the Bicols of southeastern Luzon. The languages of these several tribes are as a rule very different, but where they come in contact with each other they sometimes merge. This is especially the case with the Bicol, which has elements of both the Visayan and Tagalog languages. The Filipinos also occupy various points on the coast of Mindanao. Sometime previous to . the discovery of the Philippines, Malay mission¬ aries imbued with the Mohammedan faith car¬ ried their religion to the southern islands. This religion, tinctured with paganism, overran the Sulu Islands and parts of Mindanao and re¬ sisted successfully the attempts of the Spaniards to change it to the Christian religion. .

Previous to the time of discovery of the Philippines there was more or less trade with the Chinese, but few, if any, had settled in the islands. Only after the Spanish conquest did any considerable number migrate to the islands. At present there are perhaps 100,000 Chinese in the islands, and a very much larger number of Chinese mestizos. Previous to the discovery Japanese colonies were made in certain parts of Luzon and left their imprint in racial features on the Tagalogs. Of late years considerable numbers of Japanese have immigrated to the islands. The most important colony is in the

Davao district of Mindanao, where they are en¬ gaged in the cultivation of hemp. The Spanish left their racial imprint on the population and Spanish mestizos form a considerable propor¬ tion of the population. The American influence in racial features has so far

been almost negli¬ gible.

Spanish Rule in the Philippines.

Magellan discovered the Philippine Islands in 1521. From this date until 1565' unsuccess¬ ful attempts were made by the Spaniards to establish themselves in the islands. In 1565 Legaspi landed at Cebu and the conquest of the islands began. Notable events during this period were as follows: (1) in 1570 the native city of Manila (Maynila) was captured by Legaspi, but it was not until the following year that the modern Spanish city was founded. (2) In 1574 Limahong, a Chinese pirate, at¬ tempted to capture Manila and later to estab¬ lish himself in Pangasinan, but both attempts failed. (3) In 1581 the first bishop of Manila arrived and almost immediately there began conflicts between the civil and religious authori¬ ties. (4) In 1596 the first attempt to colonize the southern Philippines was made and a set¬ tlement established near Zamboanga, Mindanao. (5) In 1599 this settlement was destroyed and then commenced (1600) a series of Moro raids which menaced the northern islands until about 1800. During the period from 1565 to 1600 the conquest of all the large islands except Palawan and the Moro country was practically com¬ pleted and the people for the most part were ready to be converted to Christianity. Manila had become the first city of the East. Trade was established with China, Japan, India and Malacca. The period from 1660-63 was marked by a series of conflicts with the Dutch and Moros. In the meantime, 1580, under Philip II, Portugal had been conquered by Spain and with this seizure all the rich Portuguese colonies of the East Indies came under the rule of the Spaniards with the centre at Manila. With the loss of the Spanish armada in the English Channel, the rule of the East passed to the English and Dutch.

The conflict between the Dutch and Spanish for possession of the East ended in the loss to Spain of most of the possessions to the south in the hands of the Dutch, although efforts of the latter to gain possession of the Philippines were without success. In 1640 Portugal freed herself from Spain and Spain lost the remainder of her possessions to the south. During this period the raids of the Moros continued. These pirates did much damage. This led to efforts on the part of Spain tq conquer these warlike people, which resulted in the conquest of Jolo and the estab¬ lishment of a stronghold at Zamboanga. In 1662 Koxinga, a Chinese pirate, demanded the surrender of Manila. This danger was so great that the Spaniards concentrated all their efforts to resist the threatened invasions and abandoned some of their strongholds in the south. The Chinese in Manila were suspected of being in the plot. They assaulted Manila but

many were slain and the remainder left the city. The threatened invasion never was carried out for Koxinga died. The effects of the events cited above left Spanish prestige at

a low ebb. Manila was no longer the prin¬ cipal commercial centre of the East and never again recovered that position. The century that followed from 1663-1762 has been de¬ scribed as one of obscurity for the Philippines. It was filled with conflicts between the civil and Church authorities. Corruption and vmlence went unreb'uked. Efforts made by Spain to correct the abuses were for the most part without success. One of the courageous gov¬ ernors was killed by Church authorities. Com¬ merce between South America and the Philip¬ pines was forbidden and that with Mexico greatly restricted for the benefit of the mer¬ chants of Spain. This economic policy nearly paralyzed trade. Moro piracy again became active. In 1762 the English captured Manila, but made no attempt to extend their conquest. By the Treaty of Paris in 1763, the Philippines were restored to Spain. From then to 1897 Spain was in undisputed control of the Philip¬ pines. The loss of her South American colonies between 1810-25 did not greatly influence her in the treatment of her remaining colonies — Cuba, Porto Rico and the Philippines. During this period undoubted progress was made in the industrial development of the Philippines. Some of the more progressive governors en¬ couraged agriculture, favorable commercial legislation was passed and the opening of the port of Manila in 1837 was followed by in¬ creasing prosperity. The different religious or¬ ganizations of the Church, which at first were devoted principally to religious and educational work, increased in power and wealth and often overshadowed the local rulers in different parts of the islands. The Spanish friars thus be¬ came powerful. Their paternal authority was often used to suppress radical views. The vast estates which they owned materialized their religious zeal. Contact with the outside world, through the opening of foreign commerce, brought to the Philippines, Spaniards who had been influenced by the revolutionary changes in Europe and agitation against the power of the friars began. The first newspaper made its appearance in 1822; a number of others fol¬ lowed in the forties. The first publications were Spanish and were followed later by periodicals printed in the local tongues. Though severely censored, these papers spread liberal ideas. In 1863 public schools were authorized. The friars were the local inspectors of the schools. However, the boys and girls who at¬ tended the schools grew ambitious for further progress. Parties for reform were started. One leader of these reform parties was Jose Rizal. He was educated by one of the Jesuit colleges, studied in Spain and

traveled in other European countries. While there he wrote his first novel entitled (Noli Me Tangere,* which dealt with his life in his Filipino home, and in this and a .later novel he set forth his ideas of reform. This work made him enemies and on his return to the islands he was arrested and deported to Mindanao in 1892. While incipient revolts against the government and especially the friars previous to this time had been easily repressed, a more serious one in 1896 led to the arrest of many prominent and rich Filipinos and to an organized revolt under the leader¬ ship of Aguinaldo. This revolt was suppressed but not without great difficulty. Rizal returned to Manila in 1896 and though it was disproved

that he had any part in the revolt he was sentenced to death and shot on 30 Dec. 1896. This execution only added flame to the feeling. It broke out afresh in 1897 and ended only on promises of reform. Aguinaldo and some of his followers agreed to leave the islands on the payment of 600,000 pesos. This they did on 27 Dec. 1897.

The Spanish-American War. — Because of misrule in Cuba, the people of the United States had long been in sympathy with the Cubans in their struggle for independence. On 20 April 1898, shortly after the battleship Maine had been destroyed in the harbor of Havana, the American Congress demanded that Spain should recognize the independence of Cuba. Spain refused and this was followed by war. On 1 May 1898 Admiral Dewey destroyed the Spanish fleet at Cavite. On 13 August Manila surrendered to American land forces. On 10 December the treaty of peace was signed at Paris. By the terms of this treaty Spain ceded to the United States for $20,000,000, the Philip¬ pine Islands. Before the capture of Manila, the insurrection of the Filipinos broke out afresh. Aguinaldo returned to the islands and became the leader. A provisional government was organized by the Filipinos and the inde¬ pendence of the archipelago was proclaimed. The expectation was that as soon as the Spaniards were defeated the Americans would withdraw. Disappointed in the terms of the treaty, Manila was attacked by the Filipinos on 4 Feb. 1899 and war was

declared against the United States. This continued until March 1901 when the insurrection was broken by the capture of Aguinaldo, though it was some time after this before all the leaders surrendered.

The Philippines Under American Rule.

The policy of the United States has been from the beginning one of increasing autonomy for the Filipinos. The question of how rapidly this should be granted and how far it should go has been in constant dispute among experts on colonial history. The political parties of the United States represented two opposing views ; the Republicans advocating caution and slowness in developing self-rule and the Demo¬ crats urging independence either at once or the fixing of the date in the near future. The time from the suppression of the insurrection to the present date can be divided into three periods, each of which marks an advance to¬ ward increasing autonomy.

1. The Rule of the Islands by a Com¬ mission. — In June 1900, President McKinley appointed a commission of five members, headed by William H. Taft, to legislate for the islands and to prepare a way for establishment of civil government. A little later three Filipino members were added to the commis¬ sion. On 4 July 1901 civil government was es¬ tablished with changes from time to time in the personnel and lasted by commission until 15 Oct. 1907. The government was very liberal. It provided for practically self-government of the municipalities and part self-government for the 38 provinces of the islands. The central government for the purpose of administration was divided into four departments, viz.: in¬ terior, finance and justice, commerce and po¬ lice and public instruction. Under these, de¬ partments the various bureaus were organized.

Education. — The keystone to the arch of American rule has been education, not only by the establishment of a public school system and its extension as rapidly as the funds would permit, but education consciously or uncon¬ sciously among the Filipino employees in the various bureaus. As only a few of the edu¬ cated Filipinos had a knowledge of Spanish, in the absence of a common native lan¬ guage the English language was decided upon as the basis of education. Some idea of the progress made in extending education is given by the following figures : Up to 1914 there had been established 3,913 primary schools, 278 intermediate schools and 44 secondary schools ;

in 1917 the number of schools had been in¬ creased to 4,274, 422 and 48, respectively. In 1914 there were 9,462 Filipino and 612 Ameri¬ can teachers; in 1917 the Filipino teachers had increased to 13,377 and the American had de¬ creased to 417. In 1917, out of an estimated total of 1,200,000 children of .school age, 600,- 000 were receiving free elementary education. For the five years from 1912 to 1916 the school expenditures from all sources amounted to nearly $20,000,000, of which about $13,000,000 was furnished by the central government. This amounts to about 17 per cent of the total reve¬ nue of that government during the same period. Industrial, agricultural and physical training take a very prominent place in the educational system of the islands, much more so than in the public school system of the United States. No act of American rule in the Philip¬ pines has done more to convince the Filipino people of the unselfish purpose of the United States in remaining in the islands than the attitude toward education.

Reconstruction. — The early years of the rule of the commission were devoted mainly to various reconstruction problems. In many provinces a number of subordinate leaders of the insurrection refused to follow the leaders in submission. They kept up a period of raid and pillage that continued until late in 1906. The evil was overcome but not without some serious mistakes on the part of the govern¬ ment in handling it.

Shortly after the establishment an epidemic of. cholera visited the islands and before it had run its course some 200,000 deaths were re¬ corded. Smallpox, until checked by a resump¬ tion of general vaccination, claimed a large number of victims. Bubonic plague in the early days was a source of much worry to the officials. Diseases assailed animals as well. Surra and rinderpest nearly depopulated the islands of work animals. At first, with little trained help to combat these diseases and against strong opposition by many interests, by the establishment of rigid quarantine, these epidemics were brought more or less under control, so that to-day, with the exception of rinderpest, the islands are comparatively free of these diseases.

The purchase :by the government of the lands held by the friars, the misuse of which was one of the main causes of discontent in Spanish days, did much to settle the intense feeling that the Filipinos had against the clerical own¬ ership of these properties. Among other meas¬ ures undertaken by the commission was the perfecting the civil service by strengthening the merit system upon which it was based ;

guaranteeing interest at 4 per cent for a period of 30 years on the bonds of railway companies to attract capital to construct them; the im¬ provement and beautifying the city of Manila; sanitary measures of all kinds throughout the islands; a reform in the currency, which gave a stable medium of exchange; the adoption of the metric system as the best means of stand¬ ardizing the unstable system of weights and measurements, and establishing a postal sav¬ ings bank connected with the Bureau of Posts, to encourage savings among the Filipinos.

In the meantime the American Congress recognizing the political ambitions of the Filipinos as legitimate and promising passed an act creating a Philippine assembly. This act provided that the appointed commission should remain as the executive head of the government and should share with an elected assembly the legislative powers. The act provided that the Philippines should be represented in the House of Representatives at Washington by two resi¬ dent commissioners, but without votes. It fur¬ ther provided that bills introduced by either body of the legislative powers should have the consent of both bodies before it became a law, but that in case the two houses could not agree upon appropriation, the budget of the preceding fiscal period should remain in force. It also provided that the non-Christian people (the pagans and Mohammedans), being not ready for self-government, should not be subject to the government by the Christian people, hence the former were left to the exclusive jurisdic¬ tion of the commission. This leads to the sec¬ ond period of government under American spvereignty.

2. The Rule of the Islands by an Ap¬ pointive Commission Composed of a Major¬ ity of Americans and an Elective Philippine Assembly. — The first assembly of the Philip¬ pine Islands was inaugurated on 16 Oct. 1907. The result of this dual legislative arrangement, one controlled by the Americans and the other by Filipinos, while it led to some friction be¬ tween the two houses, especially in regard to appropriation bills, to the rejection of some measures advocated by one or the other bodies, was on the whole fairly successful. Changes in the personnel of the commission had con¬ tinued from time to time.

Mr. Taft left Manila in December 1903 and Luke E. Wright was inaugurated as governor-general February 1904. He was succeeded by Henry Clay Ide on 12 April 1906. The next man to hold the office was James F. Smith, from 20 Sept. 1‘906 to May 1909, when he was followed by Cameron F. Forbes, who remained in power until October 1913.

The Presidential election of 1912 placed the Democrats in power by the election of Presi¬ dent Wilson. As the Democrats were com¬ mitted to an early independence, this changed radically the policy of the rule. President Wil¬ son appointed Burton Harrison as governor-general. This inaugurates the third period of American rule in the Philippines.

3. Rule by an Appointive Commission Composed of a Majority of Filipinos and an Elective Assembly. — Governor-General Harri¬ son in his inaugural address stated that it was the policy of President Wilson to appoint to the commission a majority of Filipinos. This gave the people of the islands control of both

branches of the legislature. In his message to the assembly which convened in October 1913 he announced that no more American em¬ ployees would at present be engaged. There began at once an exodus of many American employees and substitution of Filipinos for a number of important and many subordinate positions in the different bureaus. In the mean¬ time the Democratic Congress pressed their measure to provide for an early independence of the islands by the passage of the so-called Jones bill. This bill at first fixed the date for the establishment of a republic at 1921. This act as finally approved, August 1916, did not include the date. The preamble reads as fol¬ lows :

“ Whereas, It was never the intention of the people of the United States in the incipiency of the war with Spain to make it a war of conquest or for territorial aggrandizement; and

” Whereas, It is, as it has always been, the purpose of the people of the United States to withdraw their sovereignty over the Philippine Islands and to recognize their inde¬ pendence as soon as a stable government can be established therein; and

“ Whereas, For the speedy accomplishment of such pur¬ pose it is desirable to place in the hands of the people of the Philippines as large

a control of their domestic affairs as can be given them without in the meantime impairing the exer¬ cise of the rights of sovereignty by the people of the United States, in order that, by the use and exercise of popular franchise and governmental powers, they may be the better prepared to fully assume the responsibilities and enjoy all the privileges of complete independence."

It provided for an elective legislative as¬ sembly composed of a senate and house of representatives and a governor-general ap¬ pointed by the President of the United States. By the act certain classes of laws passed by the legislature are subject to the approval of the President. The President also has the power to appoint a vice-governor, an auditor and the chief and associate justices of the Su¬ preme Court. A bureau of non-Christian tribes is created which is more or less under the con¬ trol of the governor-general. Another restric¬ tion limits the power of the newly-constituted assembly to limit the indebtedness to $15,000,- 000 at any one time, exclusive of the friar land bonds. With the exception of these and other re¬ strictions, mainly to 'ensure constitutional rights to the people and the sovereignty of the United States, the assembly has large powers. With the creation of the machinery to carry out the provisions of this act, the people of the Philip¬ pine Islands under American sovereignty passed the fourth and probably last milestone on their march toward independence, for in April 1918, President Wilson publicly announced to a dele¬ gation of Filipinos appearing in Washington to ask for independence that the time was ripe for granting their desire.

Whatever may be the outcome, the Ameri¬ can people can look with pride on the two decades of their rule in the Philippines. Sweep¬ ing aside all precedents there was inaugurated a new precedent in colonial rule. They found the islands in a deplorable backward and un¬ sanitary condition ; they have made them pros¬ perous and fairly clean. They found a people with many languages and for the most part uneducated. They have succeeded in giving an opportunity of obtaining an education in a common language to more than half the people of school age throughout the islands.

In this place it is opportune to recount the progress made along various lines and to sum

up the richness of the islands in natural re¬ sources.

The Vegetation. — The flora of the Philip¬ pines, like all tropical regions, is rich and varied. In the early days of American occupa¬ tion provision was made for its classification, until to-day our knowledge concerning the flora of the islands has developed more rapidly pro¬ portionally to the time occupied in it than any other tropical region of the same area. Much remains to be accomplished. The great wealth of the natural vegetation consists in the for¬ ests. Soon after the occupation of the Amer¬ icans a bureau of forestry was established, grafted onto the old Spanish organization. Whatever can be said against Spanish rule, it had kept the forest lands of the islands under government control, so that when the Ameri¬ cans took possession they found that practically 99 per cent of forested area was owned by the government outright. No other country in the world has such a large proportion of its forest land under government ownership. Steps were immediately taken to conserve and properly use this asset. To this end a comprehensive forest act was passed, which, with some changes, remains in effect to-day. It soon be¬ came apparent that forest asset was not suffi¬ ciently utilized. The islands were importing considerable quantities of timber that was be¬ lieved could be obtained at home. In order to attract capital for the instalment of more mod¬ ern methods of logging and milling an inven¬ tory of the forest resources was undertaken.

This inventory showed that vegetative classification of the islands to be as follows :

Square miles

Virgin forests . 40,000

Second growth forests . 20 , 000

Grassland with scattered tree growth . 48 , 000

Cultivated lands . 12, 000

Total . 120,000

The amount of standing timber in the islands is estimated at about 200 billion board feet, or more than half the amount of stand¬ ing timber in the famous yellow pine forest of the southern part of the United States. More¬ over, the forests are comparatively simple in composition, and in heavy enough stands, to warrant the introduction of logging machinery. A large proportion of the stand consists of classes of timber that can be used as substitute for pines and oaks in all classes of general con¬ struction work. While it is true that the Philippines are as rich in fancy hardwoods as other tropical forests, yet the great richness of the forests consists in their heavy stands of comparatively light hardwoods that are easily worked and thus meet the demands of the gen¬ eral rather than the special markets.

The publications of the Bureau of Forestry that called attention to these facts soon suc¬ ceeded in attracting capital, and in this way the lumbering industry of the islands has been rapidly develpped, so that when the World War curtailed transportation the islands were found not only to be self-supporting in their requirements for the raw product of lumber, but for the first time in their history had a considerable surplus for the export trade. In 1910 the lumber production of the islands amounted to 176,758 cubic meters; in 1917 it

had reached 366,891 cubic meters, or more than double.

The following trade figures showing the value of timber and lumber exported and im¬ ported gives some idea of the growth of the local industry in six years :

	Exports	Imports
1910 .	$30,000	$300,000
1916 .	565,000	170,000

All the timber is cut under the control of the Bureau of Forestry. The revenues obtained amount to about twice the cost of maintaining the bureau. Besides timber there are other forest products, such as dyewoods (sappan or Brazil wood mostly), tanbarks, rattan, bamboo, resins, gutta percha, but very little wild rubber.

Mineral Resources. — Comparatively speak¬ ing, the archipelago cannot be said to be very rich in mineral resources. While gold, silver, iron, copper and manganese ore are known to exist, only the gold mines are producing. Of recent years the developing of these has been greatly stimulated. In 1911 the production of gold amounted in value to about $150,000. This has steadily increased until in 1917 the produc¬ tion reached a little more than $1,500,000 in value. Coal, slightly inferior to that of the imported Australian and Japanese for steaming purposes, exists, but up to the present time the deposits have been little worked. Signs of petroleum are found in certain sections, but up to 1918 the evidence is not conclusive that the Philippines contain paying quantities of this valuable article.

Fauna, Wild and Domestic. — The islands are not rich in large mammals : wild hogs, deer, monkeys and a small buffalo called the timarau are the principal ones. Small mammals are more abundant. A manual of birds published in 1909 showed 739 known species recorded. There are probably many more. Of the many varieties of snakes, the python is the largest. Crocodiles are fairly abundant in some of the fresh waters and are sometimes seen along the coast, in the sea. There are many varieties of fish which constitutes an important item of food, and in the southern waters fishing for pearls is a profitable industry. The most im¬ portant domestic animal is the water buffalo, called carabao. This has escaped domestication and in some islands, like Mindoro, there are wild herds of this animal. Rinderpest is the greatest enemy of the water buffalo, and while great attempts have been made to rid the islands of this disease, it is still present and is one of the principal reasons why the islands have never been able to raise enough rice to be self-supporting in this valuable cereal. The cattle industry which formerly was a profitable one is now at a low ebb because of the ravages of this disease. Other domestic animals have been imported.

Commerce and Agricultural Products.—

Since the main exports of the islands consist* of agricultural products, commerce and agricul¬ tural products are discussed together. In 1899 the total trade of the islands amounted to about $32,000,000. From that date there has been a steady increase in the foreign commerce.

The following table will show this trade and its re¬ lation to the United States:

Total Foreign Trade.

TWELVE MONTHS ENDING 31 DEC.	1908 .
Consignments from United States	$5,101,836
Consignments from other countries	6,445,331
Total	20,068,542
Shipments to United States	19,156,987
Shipments to other countries	$24,084,284
Total	$29,186,120
	$10,450,755

$22,150,317

$32,601,072

1909 .

24,639,088

31,084,419

14,726,513

20,197,824

34,924,337

1910 .

29,650,819

49,719,361

17,241,725

23,386,738

40,628,463

1911 .

28,867,420

48,024,407

19,827,030

24,760,261

44,587,291

1912 .

24,309,010

37,358,941

61,667,951

22,814,238

31,970,500

54,784,738

1913 .

26,676,261

26,636,525

53,312,786

16,434,018

31,338,938

47,772,956

1914 .

24,020,395

24,568,258

48,588,653

24,427,710

24,261,924

48,689,634

1915 .

26,381,069

22,931,115

49,312,184

23,653,211

30,159,793

53,813,004

1916 .

22,862,67 3

22,633,665

45,496,338

35,648,133

34,289,050

69,937,183

1917 .

37,620,648

28,176,383

65,797,031

63,234,359

32,369,948

95 , 604 , 307

From 1899 to 1916 the balance on trade was mostly against the islands, but the year 1916 left a net balance in favor amounting to more than $5,630,000. This increased in 1917 to

$35,438,000.

Export Trade. — As shown by the above table the total value of exports increased from more than $29,000,000 in 1908 to nearly $66,-000,000 in 1917. Manila hemp has from the beginning been the chief article of export, amounting to $46,807,780 in 1917. The banner year of hemp production in amount was in

1912., but the increased value of hemp put its value at more than double that of 1912. Manila hemp has long been considered the most valu¬ able cordage fibre in the world. It is produced by a species of

Musa, the same genus to which the banana belongs and looks very much like this plant. While efforts have been made to cultivate it in commercial quantities in other tropical countries than the Philippines, these attempts so far have been unsuccessful. The products of the cocoanut palm stand next to hemp in value of the exports. Previously the dried ((flesh® of the nut under the name of <(copra® was shipped mostly to Europe. Of late years, however, mills for extracting the oil have been erected and now the value of the shipments of cocoanut oil exceeds that of copra. The following table gives some idea of the growth of this industry and the share of the United States in this industry:

Cocoanut Products.

	Copra shipments	Cocoanut oil shipments	Shipments to United States
1910 .	$10,639,049	$16	$638,783
1917..	8,327,151	11,409,147	17,495,610

Thus, whereas the United States imported a very small proportion of the cocoanut products in 1910, in 1917 it absorbed nearly all of ap¬ proximately $20,000,000 worth of these prod¬ ucts. While the price of cocoanut products has remained nearly stable, the amount produced has nearly doubled. The scarcity of animal fats during the war has no doubt stimulated the use of cocoanut oil. Its principal use is in making the so-called coco butter. This valuable sub¬ stitute for butter has been so favorably re- * ceived that there will be a steady demand for it in the years to come. Sugar is the next in importance of the exports. The shipments of this product amounted to $7,224,385 in 1910, of which nearly all was made to the United States. This had increased to $18,587,593 in 1916 ; less than half was exported to the United States. Owing principally to the lack of tonnage the

exports in 1917 decreased to $12,277,679. To¬ bacco is the last of the four principal export¬ ing articles of the Philippines. The products shipped are in the form of leaf tobacco and cigars. In 1910 the exports amounted in value to $4,315,531, of which about one and a half million dollars worth went to the United States. In 1917 the total shipments amounted to $6,- 279,548, of which nearly four and a half

mil¬ lion dollars worth were destined for the United States.

The value of the other principal products exported in 1917, besides lumber and gold, which have already been mentioned, are as follows :

Embroideries and hats . $ 1 , 964 , 659

Maguey . 2,348,246

Pearl buttons and shells . 260,536

Imports. — As shown by an above table the total value of the imports of the Philippines in¬ creased from $29,650,819 in 1910 to $65,797,031 in 1917. Of the above amount cotton goods imported stand first, having a value in 1917 of $18,787,002. Of this amount the United States furnished 70 per cent of the total. Iron and steel stand next in value with a total of $5,927,- 562 in 1917; approximately 85 per cent of the total importations of this commodity were fur¬ nished by the United States. Rice, the staple food product of the islands, stands third in the value of imports. In 1917 $5,390,731 worth of rice was imported. Efforts made to render the islands independent of importation of rice, while not entirely successful, have resulted in a steady increase in the production of this valuable product. Among the other products shipped into the islands that had a value in 1917 of more than a million dollars each are automobiles and accessories ($1,540,400) ; chemicals, *etc.* ($1,431,124) ; coal ($1,538,235) ; food products other than cattle and rice ($8,804,432) ; leather goods ($1,623,908) ; illumi¬ nating oil ($1,336,667) ; other oils ($1,457,441) ; silks ($1,980,593), and vegetable fibres, *etc.*

($1,535,905).

Agricultural Crops. — The following table gives the estimated values of the principal agricultural crops produced in 1917 :

Corn . $38,820,000

Rice . 36,250,000

Hemp . 30,361,000

Cocoanuts … 16, 430 , 000

Sugar . 16,425,000

Tobacco . 5,818,500

Maguey . $2,481,000

Coffee . 198,500

Cacao . 196,000

Total… $146,980,000

Of these products rice, corn, cacao and coffee are practically all consumed at home.

PHILIPPINE ISLANDS

1 A Country Road in the Philippines

2 Mouth of the Pasig River, Manila

PHILIPPINE ISLANDS

1 Well-cultivated fields, Basco (Batan Island)

2 A country scene in the Philippines

The others, as shown above, are mainly ex¬ ported.

Transportation and Public Works. — No

doubt much of the recent economic prosperity of the Philippines has been due to increased transportation facilities. In 1900 there were about 100 miles of railroad in the islands. To-day nearly 1,000 miles have been completed. The bonded indebtedness of the railroads amounts to $22,263,000 and the interest on this amount up to 4 per cent is guaranteed by the Philippine government. At the time of Amer¬ ican occupation the highways built by the Span¬ iards had become impassable. Up to 1918 there had been built 2,318 miles of first class, 1,275 miles of second class and 2,105 miles of third-class roads. Re-enforced concrete structures consisting of schoolhouses, provincial build¬ ings, markets, etc., to the number of 4,138 had been built up to 1918. There are in existence 7,370 durable bridges and culverts and 728 artesian wells have been driven. By furnishing pure potable water these latter have been very instrumental in reducing greatly the mortality of the regions in which they exist.

Revenues and Expenditures. — With the ex¬ ception of the cost of maintaining an army in the Philippines by the United States, the islands have been self-supporting under American rule. During the year 1917 the total revenues of the Philippine government amounted to over $14,- 000,000, and the expenditures to nearly $12,- 000,000. The surplus on hand on 1 Jan. 1918 was over $6,000,000. The bonded indebtedness of the Philippine government, 30 June 1918, was $20,125,000. This includes the indebtedness of the cities of Manila and Cebu.

Bibliography. — Barrows, David P., (A His¬ tory of the Philippines > (New York 1911) ; id., (A Decade of American Government in the Philippines:* (New York 1914) ; Worcester, D. C., (The Philippines: Past and Present (2 vols., New York 1914) : Foreman, (The Philippine Islands) (3d ed., New York 1906) ; (The Census of the Philippines) (4 vols., Washington 1905) : Blair, E., and Robertson, T. A., (The

Philippine Islands > (55 vols., Cleve¬ land 1903-09) ; The Philippine Journal of Sci¬ ence, founded in 1906. Manila, P. I., contains articles showing progress in scientific investi¬ gations ; publications and annual reports of the Philippine Commission and various bureaus of the Philippine government (Manila 1900-18).

H. N. Whitford,

Yale School of Forestry , New Haven, Conn .

PHILIPPINE LANGUAGES AND DIALECTS. Established languages, having an extensive printed literature, are the follow¬ ing: 1. Tagalog, with 1,500 printed books and pamphlets, 80 periodicals and 1,789,049 people making use of this tongue. 2. Bisaya or Vi-saya, (a) Panayan dialect, with 500 printed books and pamphlets, 21 periodicals and 1,289,- 142 people; and (b) Cebuan dialect, with 120 printed books and pamphlets, 17 periodicals and i,848,613 people. 3. Iloko, with 500 printed books and pamphlets, 40 periodicals and 988,841 people. 4. Bikol, with 300 printed books and pamphlets, 6 periodicals and 685,309 people.

5. Pampangan, with 270 printed books and pe¬ riodicals, 7 periodicals and 337,184 people.

6. Pangasinan, with 100 printed books and pamphlets, 4 periodicals and 381,49a people.

Thus we find the total number of printed books and pamphlets in these six leading tongues to be 3,290; the total number of periodicals, 175; the total number of people speaking one or more • of these six established languages to be 7,319,-

Semi-established languages having less printed literature than the foregoing are : 1. Bi¬ saya (a) Samar-Leyte dialect, with 40 printed books and pamphlets, 6 periodicals and 601,683 people; and (b) Aklan dialect, with 15 printed books and pamphlets, 1 periodical and 137,772 people. 2. Ibanag, with 50 printed books and pamphlets, 3 periodicals and 136,134 people. The totals for this class are: Printed books and pamphlets, 105; periodicals, 10; number of people, 875,589.

Dialects having still less printed literature (1 to 10 books or pamphlets) are the follow¬ ing: Sulu, population 87,400; Bontok, popula¬ tion 29,258; Bagobo, population 5,600; Isinai, population 2,647; Ivatan, population 6,392; Gaddang, population 16,240; Magindanao, popula¬ tion 79,850; Tirurai, population 7,150; Ifugao (pure), population 86,000; Ilongot, subdivision Egongut, population 2,150; Kalamian, popula¬ tion 11,350; Tagbanua, population 10,000; Ting-gian, population 27,648; Igorot (a) Baukok, population 12,000 and (b) Inibaloi, population 12,621 ; Lanao, population 58,350; Mangyan, sub¬ division Hampangan, population 5,250 ; Sambal, subdivision Iba Sambali, population 39,715; Subanun, subdivision Sindangan, population 10,000. The total population in this class, there¬ fore, 509,621.

Dialects having no printed literature but of which brief vocabularies have been published are Ata (Dugbatang dialect), population 1,000; Bila-an, 8,000; Gaddang (Yogad dialect), 5,000; Ifugao (subdivision Ifugao dialect), 45,000; Igorot (Kankanai dialect), 27,887 ; Ilongot (Ibilao or Abaka dialect), 2,000; Isamal, 983; Kalinga (Gina-an dialect), 6,000; Mandaya (Mansaka dialect), 5,000; Mangyan (a) Abra de llog dialect and (b) Bako dialect, each 2,000; Manobo, 30,600; Sambal, subdivision Bolinao Sambali, 16,431; Subanun (a) Dapitan dialect, 8,450; (b) Buluan-Kipit dialect, 6,000; (c) Tukuran dialect, 7,000; Tagakaolo, 7,100. Total population in this class, 180,451.

Dialects known only through manuscript vocabularies or verbal information are Apayao, used by 23,000 people ; Ata, Tugauanum dialect, 500; Bagobo (a) Gianga dialect, 1,200; (b) Obo dialect, 350 and (c) Eto dialect, 200; Bila-an, Tagabili dialect, 2,400; Bisaya or Visaya, Min¬ danao dialects, 100,000; Bontok (a) Kadaklan-Barlig dialect, 8,000; (b) Tinglayan dialect,

20,000; (c) Dananao-Bangaad dialect, 6,000; Bukidnon (a) Bukidnon dialect, 38,500 and (b) Banuauon dialect, 10,000; Dumagat, 352; Gad¬ dang (a) Maddukayang dialect, 8,480 ; (b)

Katalangan dialect, 2,000; (c) Iraya dialect, 2,000; Ibanag, Itavi dialect, 20,000; Ifugao, Lagaui dialect, 1,500; Igorot (a) Malaya dia¬ lect, 8,000 and (b) I-waak dialect, 800; Ilongot

(a) Italon dialect, 2,000; Kalinga (a) Dadayang dialect, 12,000; (b) Kalagua dialect, 12,000; (c) Nabayugan dialect, 2,000; (d) Mangali-Lubo dialect, 13,000; (e) Lubuagan dialect, 16,450; (f) Sumadel dialect, 6,000; Kulaman, 3,600; Mandaya (a) Mandaya dialect, 15,000;

(b) Pagsupan dialect, 5,000; Mangguangan dialect 2,500; Mangyan (a) Bangon dialect,

2,000; (b) Bukil dialect, 1,000; Manobo (a) Debabaon dialect, 3,000; (b) Libaganon dialect, 6,000; Palawan dialect, 1,940; Samal dialect, 78,700; Sanggil dialect, 2,450; Tagbanua, Paluan dialect, 9,460; Yakan dialect, 7,290. Total num¬ ber of persons using dialects of this class, 454,-

Negrito and Negroid groups number about 35,926; non-Negroid or semi-Negroid Hill Peoples, 46,015. It must be said in regard to many of these Negrito groups and hill tribes that their dialects remain practically unknown; and, if we add 8,000 for certain Ata and Bogobo groups, we reach a total of 89,941 for this class.

Foreign-born residents, a relatively small element, numbering 73,366 (according to statis¬ tics published at Manila in 1917), employ by preference Spanish, English and other lan¬ guages of Europe and the mainland of Asia — languages which lie beyond the scope of the present article.

The foregoing list of native languages and dialects, fairly complete for the Christian peo¬ ples and for the majority of the sedentary and semi-sedentary non-Christian groups, is never¬ theless unavoidably incomplete in its relation to the more primitive pagan peoples, and espe¬ cially those living in migratory bands. The idioms of those peoples credited in the forego¬ ing list with a considerable written literature are referred to as ˆlanguages,® while those of tribes having little or no written literature, and whose speech is therefore changeable and far from permanent, are regarded as (<dialects.® Naturally, however, the term dialect is also used to indicate local variations from established forms of written languages. Professor Beyer, of the University of the Philippines, writes that <(of dialects, in the latter sense, we have a multitude in the Philippines which are not re¬ corded. For example, the spoken Tagalog of Batangas province differs considerably from that of Bulakan, while in Laguna, Cavite, Marinduque and other places there are still other Tagalog dialects. It is nevertheless quite per¬ missible to speak of the Tagalog language, for the reason that the native newspapers and the more than 1,500 books and pamphlets printed in Tagalog have fixed the general character of the written speech.® Many of the Bisayan or Visayan dialects having developed extensive literatures of their own, are quite properly treated as separate languages.

Dr. Frank R. Blake and Mr. F. C. Cole have written conservatively: <(The influence of Chi¬ nese trade, which has been carried on for sev¬ eral centuries, is found in the vocabularies of nearly all the tribes and the effect of the Ameri¬ can and of the earlier Spanish occupation of the islands has been by no means inconsiderable.® These are comparatively unimportant influences. Let us consider now the chief

formative in¬ fluences that trace their origin to early waves of colonization through conquest. Dr. Blake thinks that the Philippine languages, so far as they are known, form a closely related group of tongues belonging to the Malayo-Polynesian family (compare writings of Churchill, W.) ; and it seems most likely that the cradle of the Malayo-Polynesians, whose ancient history is practically a sealed book, was on some of the numerous islands which it now inhabits, pos¬ sibly some of the large islands in the vicinity

of the Malay Peninsula (or upon the Malay Peninsula itself, more probably). ‘These an¬ cient progenitors of a race so typically seafar¬ ing in its preferences must have spread out in a series of waves or swarms. Crossing at first by means of their canoes over the compara¬ tively short stretches of sea between the Ma¬ lay Peninsula and the neighboring islands, they gradually pushed out adventurously un¬ til they had occupied almost all the land space of the Pacific Ocean. <(Some of the islands,® Dr. Blake thinks, <(they probably found unoc¬ cupied (but) in others they must have come in contact with an inferior black race similar to that inhabiting Papua and Australia, as is shown by the remnants of this race which are found pushed back into the interior mountain ranges of some of the larger islands, notably the Philippines.®

Evidently the oldest colonies — or, more strictly, independent settlements — were those of the Philippines, because these islands lay nearest to the birthplace of the Malay fortune-hunters. The Malay tongue, then, embracing the languages of the Malay Peninsula, of the Philippines, of the East India islands, of Mada¬ gascar, etc., is a branch of the Malayo-Poly¬ nesian linguistic family; and the Philippine idioms, dialects, or, as we have said above, “languages,® are as a matter of fact the local manifestations of the expression-impulse which must be studied sometime, for purpose of comparison, in southern islands of the widest oceanic areas.

Dr. Blake (see Bibliography) writes that, beginning at the extreme north of the Archi¬ pelago, the languages about which anything defi¬ nite is known are as follows : Batan is the lan¬ guage of the Batan and Babuyan islands to the north of Luzon. On the island of Luzon, Taga¬ log, the most important and best known of the Philippine languages, is spoken from coast to coast, in the middle region of the island, in the latitude of Manila Bay. On the west coast its territory does not extend north of the bay, but on the east it reaches as far north as the province of Isabela. On the south and south¬ east it extends down into the

land's end of Luzon, trenching on the domain of Bikol. In the region north and west of the Tagalog dis¬ trict a number of languages are spoken. Ibanag prevails in the northeast, in the valley of the Cagayan River; Ilokan occupies the north and west coasts, extending as far south as the Gulf of Lingayen, between which and Manila Bay are heard the Pangasinan, Tino or Zambal, and the Pampangan tongues. Various Igorot dia¬ lects are spoken in the highlands of the interior.

On the Visayan Islands and on the north and east coasts of Mindanao, Visayan (Bisa¬ yan) is spoken in a number of different dia¬ lects. Sulu is the Moro tongue in the islands which extendˆ from Mindanao westward. Moro tribes of Mindanao, in the west and southwest of that large island, speak two dialects known as Magiridanao and Malano. Of the other idioms spoken on Mindanao, only Bagobo and Tiruray are mentioned by Blake. The island of Mindoro forms the domain of the Mangyan tongue. The principal language of the Calamianes and the long narrow island of Palawan, which together form a chain stretching from Mindoro toward Borneo, t is Tagbanwa. The tribes that speak these languages fall into three

general groups, according to their religion. Those that speak Batan, Ibanag, Ilokan, Pangasinan, Zambal, Pampangan, Tagalog, Bikol, Visayan, Agutayan and Koyuvan are Christians, the Sulus, Magindanaos and Malanaos are Mo¬ hammedans ; while the remaining tribes men¬ tioned are still pagans. The three alphabets used by natives of the Philippines are: (1) That of the pagan Tagbanwas and Mangyans. (2) That of the Mohammedan tribes, namely, the Arabic alphabet with additional signs to denote peculiar native sounds. (3) The Roman alpha¬ bet introduced by Spaniards, in which are writ¬ ten all languages of the Christian tribes and all those dialects of pagan tribes which have been reduced to writing by Spanish mission¬ aries. At the time of the Spanish conquest the chief tribes possessed alphabets that were practically identical with those of the Tagban¬ was and Mangyans ; but those ancient alpha¬ bets have been superseded so completely that, in the Mohammedan tribes, no

trace of them has been preserved, and their use in the Chris¬ tian tribes seems to have died out more than 150 years ago. <(The archetype of these native alphabets seems to have been,® Blake observes, <(of Indian origin. As in the Indian alphabets, every consonantal character without addition represents the consonant followed by the vowel a, the other vowels being indicated by second¬ ary marks. There was no way of expressing a consonant without a following vowel.® The Roman alphabet, used in writing the native lan¬ guages, was conformed to the peculiarities of Spanish orthography, but lately a number of improvements in spelling have been introduced, the most important being the use of k for c and qu, and w for consonantal u. To some extent the Philippine languages have been in¬ fluenced by the languages with which they have come in contact. The vocabularies of Tagalog and Bisayan (Visayan), for example, contain a number of Sanskrit words. Again, the lan¬

guages spoken by the Mohammedan tribes con¬ tain a number of Arabic words. The Chris¬ tian tribes have adopted Spanish terms; a few Chinese words are heard in Tagalog; and, of course, <(at present the various languages are being subjected to the influence of English, and English words will probably be more or less extensively borrowed.® The most important characteristics which the Philippine languages possess in common are given in the Journal of the American Oriental Society, Vol. XXVII, second half, pages 323-396.

Bibliography. — Beyer, H. O., Population of the Philippine Islands in 1916) (Manila 1917) ; Blake, F. R., ‘Contributions to compara¬ tive Philippine Grammar,) Journal of the American Oriental Society (New Haven 1907) ; (The SubamP (Washington 1913).

Marrion Wilcox.

PHILIPPINES, University of the, an in¬ stitution for higher education founded by the legislature in 1908 at Manila. It comprises the College of Liberal Arts, College of Medicine, College of Law, Pharmacy School, College of Veterinary Science School of Education, and School of’ Fine Arts, and a College of Agricul¬ ture at Los Barros, Laguna. The institution is governed by a board of 11 regents, of whom five are appointed by the governor-general, and the remainder hold office ex officio. The annual enrolment is about 750.

PHILIPPITE, a mineral belonging to the group of Zeolites, formerly regarded as ortho¬ rhombic, but now ascertained to be monoclinic in crystallization. Crystals always twinned. Hardness, 4-4.5 ; specific gravity, 2.2 ; lustre, vitreous ; color, white ; translucent to opaque. Composition : (CaK2) AhSisCWHzO. Occurs in vesicular cavities in old igneous rocks.

PHILIPPIUM, in chemistry, an element closely allied to cerium. Though described by Delafontain in 1888 as a newly discovered ele¬ ment, it was not until 1897 that it was acknowl¬ edged to be such by English chemists. Philip-pium has been found in gadolinite, samarskite and fergusonite. It appears in two sets of com¬ pounds, the philippous and the philippic, cor¬ responding to a white acid and an orange oxide. The salts of the first series are colorless, quite stable, crystallize well, and correspond to the lanthenum and yttrium salts. Philippic oxide has a deep orange-red color. The constitution of philippiuin compounds remains to be estab¬ lished.

PHILIPPOPOLIS, Bulgaria, the second largest city of the country and once the capital of eastern Rumelia situated on the Maritza River, 80 miles southeast of Sofia, on the rail¬ road connecting the latter city with Constanti¬ nople. It is well laid out ; has fine parks and suburbs, and is the seat of an archbishop of the Eastern Church. There are several Christian churches and mosques, a college and a national library. The city is the chief commercial point of central Bulgaria, with a huge trade in silk, cotton goods, attar of roses, grain, rice, hides and tobacco. It is an ancient city of Thrace and has suffered much in the course of the cen¬ turies from the tide of war in which it was sev¬ eral times engulfed. In 1818 an earthquake well-nigh destroyed it and a disastrous fire occurred in 1846. Pop. 47,000.

PHILIPPOTEAUX, fe-le-po-to, Henri Emmanuel Felix, French painter: b. Paris, 3 April 1815; d. there, 9 Nov. 1884. After study¬ ing his art under Cogniet he applied himself to the painting of battle scenes, and his canvases give a vivid and almost complete panorama of 19th century wars. His mastery of details and lively delineation of the clash and movement of combat are remarkable. Among his principal pictures are (The Evacuation of Moscow* (1835); (The Capture of Ypres* ; (The Siege of Antwerp in 1 792 > (1838) ; (Louis XV Visit¬ ing the Battlefield of Fontenoy) (1840), in the Luxembourg; (The Battle of RivolP (1845) ; (Charge of the Chasseurs d'Afrique at Bala-clava) (1859); (The Siege of Puebla) (1865); <The Meeting of Henry IV and Sully after the Battle of Ivry, 1590) (1875), now in the mu¬

seum at Versailles; (Bayard on the Bridge of Garigliano, 1503* ; (The Battle of Alma* (1875) ; (A Panorama of the Siege of Paris, 1870-7P; and several other war panoramas.

PHILIPPSBURG, Germany, a town in Baden on the right bank of the Rhine, 16 miles north of Carlsruhe, formerly a celebrated im¬ perial fortress. In 1734 it was captured by the French under the Duke of Berwick (who lost his life here), and its fortifications were razed in 1800. Pop. about 2,500.

PHILIPPSON, fe'lep-zon, Martin, Ger¬ man historian: b. Magdeburg, Germany, 27 June 1846. He was eduacted at Bonn and at Berlin,

became docent at Bonn in 1871, and in 1878 was appointed to the chair of history in the Uni¬ versity of Brussels. A bitter controversy arose with the anti-German student body in 1890, and Philippson resigned his professorship. He wrote ˆeschichte Heinrichs des Lowen) (1868) ; (Geschichte des preussischen Staats-wesens vom Tode Friedrichs des Grossen bis zu den Freiheitskriegen) (1880-82) ; (DasLeben Kaiser Friedrichs IIP (1900) ; (Kurfurst Friedrich Wilhelm von Brandenburg) (1879— 1901), *etc.*

PHILIPS, f il'ips, Ambrose, English poet: b. Shropshire, 1675; d. London, 18 June 1749. He was graduated from Cambridge in 1696, and removed to London, where he became intimate with Addison and Steele. His (Winter-pieced published in the Tatler, first gained him rec¬ ognition; his six (Pastorals,5 which appeared in Tonson's (Miscellany 5 (1709), gained the praise of Tickell, but roused a bitter satirical attack from Pope. Some of his odes written to chil¬ dren contain really his best work, but their sim¬ plicity of diction earned for him the nickname ˆNamby-Pamby,® since become an adjective in general use. He established the FreeThinker in 1718, and supported

the government in its columns, later sat in the Irish Parliament for Armagh, was secretary to the lord-chancellor of Ireland in 1726, and judge of the Prerogative Court in 1733. His play, (The Distrest Mother5 (1712), adapted from Racine's (Andromaque,5 received high praise from the Spectator , but (The Briton 5 (1722), and (Humphrey, Duke of Gloucester (1723), attracted little attention. Consult Johnson, (Lives of the Poetsd

PHILIPS, Edward, English author: b. London, August 1630; d. there, about 1696. He was educated under the care of his uncle, John Milton, and studied for a time at Oxford. Later, with his brother, John (1631-1706), who had been Milton's assistant as Latin secretary to Cromwell's government, he joined the Cavalier party, which proceeding resulted in an estrange¬ ment from his uncle. He engaged in literary work, edited a volume of poems by William Drummond, and supported himself by literary hack work and tutoring in noble families. Sub¬ sequently he became reconciled to his uncle and was a warm admirer of his work. He wrote (New World of English Words) (1658) ; Mys¬ teries of Love and Eloquence) (1658) ; (Theatrum Poetarum5 (1675) ; (Life of Milton) (1694), *etc.*

PHILIPS, Francis Charles, English nov¬ elist and dramatist : b. Brighton, Sussex, 3 Feb. 1849. He was educated at Brighton College, entered the army, where he served three years, became a barrister in 1884, and began writing novels and plays. His novel, (As in a Look¬ ing Glass 5 (1885), was dramatized and played by both Sarah Bernhardt and Mrs. Beere. He collaborated in writing the plays (A Woman's Reason) ; (The Fortune of War5 ; (Papa's Wife) ; etc., and among his numerous novels are (The Dean and His Daughter, 5 dramatized Mrs. Bouverie) ; (The Luckiest of Three) ; Men, Women and Things) ; (A Devil in Nun's Veiling5 ; (A Full Confession ; My Varied Life> is a volume of reminiscences.

PHILIPS, George Morris, American edu¬ cator: b. Atglen, Pa., 28 Oct. 1851. He was graduated from Bucknel! University, Lewis-

burg, Pa., in 1871, and has been principal of the Pennsylvania State Normal School, West¬ chester, Pa., from 1881. He has published (Astronomy) (1882) ; (Natural Philosophy5 (1884) ; (Civil Government of Pennsylvania5 (1893); (Geography of Pennsylvania5 (1895) ; (Nation and State5 (1907) ; (The Silver-Burdett Arith¬ metics5 (with Anderson).

PHILIPS, or PHILLIPS, John, English poet: b. Bampton, Oxforshire, 30 Dec. 1676; d. Hereford, England, 15 Feb, 1709. He was edu¬ cated at Winchester and Oxford, and won his first literary success on the publication of His (Splendid Shilling,5 written in blank verse lit imitation of Milton. His ˆyder5 was also an imitation, after Virgil's Georgies, and (Blen¬ heim,5 which was a Tory celebration of Marl-bo'rough's victory, was written in reply to Addi¬ son's (Campaign.5 He is the only notable writer in blank verse between Milton and Thomson.

PHILIPS, Katherine Fowler, English poet: b. London, 1 Jan. 1631; d. there, 22 June 1664. She was married to Hector Philips in 1647 and afterward accompanied the Viscountess Dungannon to Ireland. On her return to Lon¬ don she became a member of the famous liter¬ ary circle which included Jeremy Taylor and Sir Charles Cotterel and was known among them as (<the matchless Orinda.55 Her transla¬ tion of Corneille's (Pompee5 was very success¬ ful and was acted in 1663-64. An unauthorized edition of her poems was printed in 1663 and her letters to (Poliarchus5 (Sir Charles Cot¬ terel) were published in 1705. Consult Gosse, ˆSeventeenth Century Studies5 (1883).

PHILIPSBURG, Pa., borough in Center County, on the Mushannon Creek, and on the New York Central and Hudson River, the Penn¬ sylvania, and the Pittsburgh and Susquehanna railroads, 40 miles northeast of Altoona. Great quantities of bituminous coal are mined nearby and there are also great deposits of clay in the neighborhood. Its industrial establishments in¬ clude flour mills, foundries, planing mills, man¬ ufactories of hardware and tools, and machine shops. There are two sanatoria and it is also the seat of Cottage State Hospital. Pop. 3,900.

PHILIPSON, fil'ip-son, David, American rabbi : b. Wabash, Ind., 9 Aug. 1862. He was graduated from the University of Cincinnati and from the Hebrew Union College there in 1883. In 1884-88 he was rabbi of the Har Sinai Congregation in Baltimore, and has since been in charge of the B'ne Israel Congregation, Cin¬ cinnati, and professor of homiletics in the He¬ brew Union College there. He was president of the Central Conference of American Rabbis 1907-09 and has been a member of the execu¬ tive committee since then. He was a consult¬ ing editor of the Jewish encyclopedia and is a member of the board of editors of the new Jewish Bible -translation. He is prominently connected with various charitable and other associations and has published (The Jew in English Fiction5 (1889, 1902, 1911) ; (Five Lectures on Cuneiform Inscriptions5 (1890) ; (01d European Jewries5 (1894) ; (The Oldest Jewish Congregation in the West5 (1894) ; (A

Holiday Sheaf5 (1898) ; (Reminiscences by

Isaac M. Wise5 (1901) ; (The Reform Move¬ ment in Judaism5 (1907); Max Lilienthal, American Rabbi5 (1915), besides many pamph¬ lets.

4 PHILISTINES, fi-lis'tinz (Hebrew, Phil-lSthiim), a people who appear to have settled in the coast plain of Canaan shortly before the arrival of the Israelites; whence they migrated is a question which historical and archaeologi¬ cal research has as yet failed to resolve. Some historians trace their origin to the island of Crete, others hold that they came from the borders of Egypt, the land of Gerar. Their territory, called Philistia or land of the Philisthiim, gave, in after times, to the whole country at any period occupied by Israel the name it still bears, Palestine. They occupied four prin¬ cipal cities from the neighborhood of Joppa on the north, southward to the Egyptian border, namely, Azotus (Ashdod), Gaza, Ascalon (Ash-kelon)— these on the Mediterranean Coast; and Gath and Ekron inland. These five cities, under as many lords, were always confederated for war, offensive or defensive, against foreign enemies. Throughout the period of the Judges in Israel this confederacy was at almost con¬ tinual war with the Israelites, and despite the consolidation of the military resources of the Hebrew people under the kingship, the ascend¬ ency of Philistia seemed assured before the close of Saul's reign. But David carried the war into the Philistine country and with notable success ; his son Solomon completely subdued Philisthiim and made the country tributary to Israel. Even after the division of Israel into two kingdoms the Philistines, though they were a serious menace to the northern kingdom, for some time did not dare to attack the kingdom of Judah; but in the reign of Ahez, the 11th of the Judaite kings, they reconquered some of their ancient possessions. In the time of the Maccabees the Jews once more asserted mastery over their ancient rivals; afterward Philistia was annexed by Pompey to the Roman prov¬ ince of Syria. The origin of the Philistines is a much vexed question. That they were of Semitic race or that they were at least a

semi-tized people, has been with strong probability inferred from such remains of their language as are extant. First, the names of their cities, which are unquestionably Semitic; but are the names we have the very names given to the cities themselves, or are they names given them by their Semitic neighbors? If the question had to be resolved by means solely of the names given in the Hebrew sacred books, the solution would be open to doubt ; but the mod¬ ern study of the Assyrian monuments has dis¬ covered a great many other proper names of persons and places — to say nothing, of analo¬ gies in religious beliefs ; and these give abund¬ ant proof that the Philistines were, at least in language, Semitic.

PHILISTINISM, a term of contempt to designate the manners, habits of thought, and views of life held by persons of inferior cul¬ ture. The word Philistine (Philister) was first employed in some such sense as this by German university students; for them all classes outside of university circles are Philister. Matthew Arnold attributes Philistinism to the whole mid¬ dle class of the English people, who are, he says, ignorant, strenuously obstructive and nar-row-minded. But Sir Leslie Stephen recognized in the use of the word the very note of Phili¬ stinism ; ˆPhilistine,® he says, «is a term of con¬ tempt applied by pngs to the rest ot then

species.®

PHILISTUS, a Greek historian who re¬ sided at the court of Dionysius the Elder, ty¬ rant of Syracuse (430-367 b.c.), and wrote a history of his life. The work has not come down to our time; it is quoted by Pausanias.

PHILLEO, fil-e'o, Prudence Crandall,

American philanthropist: b. Hopkinton, R. I.,

3 Sept. 1803; d. Elk Falls, Kan., 28 Jan. 1889. In 1831, with the aid of several residents, she opened at Canterbury, Windham County, Conn., a school for young ladies. She received a col¬ ored pupil, and thereby aroused the disapproval of her Canterbury neighbors, who declined to help sustain the school if the objectionable member were retained. Upon her refusal to dismiss the colored pupil, the white scholars left, and she then determined to teach blacks only. In April 1833 her new enterprise was begun. Upon petition of the townspeople, an act was passed by the legislature making un¬ lawful the establishment of

young ladies' schools for colored pupils not resident in the State, and in the succeeding autumn she was twice tried and convicted. In 1834 the judg¬ ment was reversed by the Supreme Court of Errors. During the two years struggle with the town of Canterbury, she was subjected to ostracism and spiteful persecution, and her house was even set on fire. Soon afterward she was married to Rev. Calvin Philleo, and with him removed from Connecticut. Consult May, ˆRecollections of the Anti-Slavery Con¬ flict (1869).

PHILLIMORE, fil'i-mor, John George,

English jurist: b. Oxfordshire, 5 Jan. 1808; d. Shiplake House, Oxfordshire, 27 April 1865. He was educated at Westminster and Oxford, was called to the bar of Lincoln's Inn in 1832, became eminent in his profession and member of Parliament in 1852-57. He published (Intro¬ duction to the Study and History' of Roman Law1 (1848) ; (Private Law Among the Romans: Principles and Maxims of Jurisprudence) ; *etc.*

PHILLIMORE, Sir Robert Joseph, Eng-glish jurist, brother of J. G. Phillimore (q.v.) : b. London, 5 Nov. 1810; d. Henley-on-Thames,

4 Feb. 1885. He was educated at Oxford, was called to the bar in 1841 and rapidly came to the front in his profession. He sat in Parlia¬ ment for Tavistock 1852-57; in 1867 was ap¬ pointed judge of the High Court of Admiralty, and in 1871-72 was judge-advocate-general. He was knighted in 1862 and created a baronet in 1881 and two years later resigned his judge-ship. His works include Commentaries . on International Law) (1854-61) ; (The Ecclesias¬ tical Law of the Church of England1 (1873) ; and a translation, with notes, etc., of Lessing's CaoGoon1 (1874).

PHILLIMORE, Sir Walter George Frank, English jurist: b. London, 21 Nov. 1845. He was educated at Oxford, became a barrister of the Middle Temple in 1868 and received the patent of precedence in 1883. He was a judge of the Queen's Bench Division of the High Court of Justice 1897-1913 and was one of the Lords of Appeal 1913-16. He is vice-president of the English Church Union. He edited Robert Phillimore's Ecclesiastical Law of the Church of England1 and (International Law,1 and wrote 'Book of Church Law.1

PHILIP, fil'Ip, John, Scottish painter: b. Aberdeen, Scotland, 19 April 1817; d. Lon¬ don, 27 Feb. 1867. While a boy in distressing poverty, he cultivated his natural taste for paint¬ ing and at the age of 13 received instruction from a local portraitist. Before his 15th year he produced portraits which won for him the patronage of Lord Panmure and the means of pursuing his art studies in London as a student at the Royal Academy. His subjects were at first all Scotch, — (A Scotch Fair,5 (A Scotch Washing,5 etc., or in individual portraits. A visit to Spain for his health's sake in 1851 re¬ sulted in a distinct change both of style and subject and thenceforth his standing among the foremost British artists was assured; he sub¬ sequently made two further visits to Spain and also spent three months at Rome. Among his works are {The Letter-writer of Seville> ; (The Spanish Contrabandista) ; (The Early Career of Murillo5 ; (La Bomba) ; (La Gloria5 ; (I1 Ciga¬ rillo5 ; (The Marriage of the Princess Royal.5

PHILLIPIUM, in chemistry, a rare ele¬ ment belonging to the yttrium group. Dis¬ covered by Delafontain (1878) in a sample of the mineral samarskite obtained from North Carolina, it appears to form two series of com¬ pounds, the phillipous and the phillipic, but the chemistry of these substances and even the ele-itientary nature of the so-called phillipium it¬ self needs further confirmation.

PHILLIPPS, Chips, Sir Thomas, English book-collector: b. Manchester, England, 2 July 1792; d. Cheltenham, England, 6 Feb. 1872. He studied at Rugby and Oxford, early evinced a taste for collecting valuable books and manu¬ scripts and devoted his entire life to his col¬ lections, which exceeded 60,000 books and man¬ uscripts and a large number of old coins and pictures. In 1821 he was created a baronet, and in 1822 established a printing-press on his estate, from which he issued publications im¬ portant to collectors. His eldest daughter was married to James Orchard Halliwell, the Shake¬ spearian scholar, who upon succeeding to Sir Thomas' estates changed his name to Halliwell-Phillipps (q.v.). The vast collection was be¬ queathed to the youngest daughter, but much of it is now scattered.

PHILLIPS, if Pips, Adelaide, American singer: b. Stratford-on-Avon, Enghand, 26 Oct. 1833; d. Carlsbad, 3 Oct. 1882. At seven she removed with 'her family to Boston, and at the Boston Museum, 25 Sept. 1843, made her debut as Little Pickle in (The Spoiled Child.5 She afterward appeared as a juvenile d'anseuse at Barnum's Museum

in New York, under the name of ((the Child of Avon.55 At the Boston Museum she subsequently played soubrette parts, and in 1846 appeared at the W*alnut Street Theatre, Philadelphia, as Rosa in (John of Paris.5 In 1852, having developed a con¬ tralto voice of rare dualities, on the advice and with the practical assistance of Jenny Lind, she went to Italy for study. After two years she returned to the United States, having mean¬ while (1853) made a successful debut in (Semiramide5 in Brescia. She 'appeared in concert in Boston (1854), and made her first American appearance in opera 17 March 1856, at the Academy of Music, New York, as Azucena in (I1 Trovatore.5 She sang in the Italian Opera House, Paris, in 1861, and after¬

ward in all the chief cities of the world. For many years she was the foremost of American contralto singers. Consult biography by Water-ston (1883).

PHILLIPS, David Graham, American novelist: b. Madison, Ind., 1867; d. New York, 24 Jan. 1911. In 1887 he was graduated at Princeton University and at once entered the field of journalism. In New York he was first on the staff of the Sun; next he became Lon¬ don correspondent of the World, after which he w*as for a time private secretary to Joseph Pulitzer, owner of the World. In 1901 he pub¬ lished his first novel (The Great God Success,5 which at once brought him into general notice as a story-teller of marked ability. He dealt largely in his books with the burning problems of the day and was always interesting, inform¬ ing and entertaining. His best works are (The Second Generation5 (1907) ; (01d Wives for New5 (1908); (Hungry Heart5 (1909); (Her Serene Highness5 (1902) ; (Golden Fleece5

(1903); (The Social Secretary5 (1905) ; (The Fortune Hunter5 (1906) ; (Light-Fingered Gen¬ try5 (1907); (Worth of a Woman5 (1908); (The Husband's Story5 (1910) ; (The Grain of Dust5 (1911). Consult Cooper, F. T., (Some American Story-Tellers5 (New York 1911) and Underwood, J. C., (Literature and Insurgency5 (ib., 1914).

PHILLIPS, George Searle (((January Searle55), American author: b. Peterborough, England, January 1815; d. Morristown, N. J., 14 Jan. 1889. He was educated at Cambridge, came to New York, and engaged in journalism, but returned to England in 1845. He was editor of the Leeds Times, principal of the Peo¬ ple's College, Huddersfield, England, in 1846, and later came back to the United States, where he settled permanently. He edited the Chicago

Republican, in conjunction with Charles A. Dana (q.v.), and afterward was literary editor of the New York Sun. In 1873 he became in¬ sane, and the remainder of his life was spent in an asylum. He wrote (Life of Ebenezer Elliott5 (1850); (Memoirs of Wordsworth5;

(Emerson : His Life and Writings5; (The Gypsies of the Dane's Dyke5, *etc.*

PHILLIPS, Henry, American archaeolo¬ gist: b. Philadelphia, 6 Sept. 1838; d. there, 6 June 1895. He studied law and was ˆadmitted to the bar in 1859, but practised little, devoting his attention chiefly to numismatics, archaeology, *etc.* He published (History of American Colonial Paper Currency5 (1865); (History of American Paper Money5 (1866) ; (Plef!asures of Numismatic Science5 (1867) ; (Poems from the Spanish and German5 (1878); a translation of Chamisso's (Faust5 (1881); and four volumes of translations from the Spanish, Hungarian

and German (1884-87).

•

PHILLIPS, Henry Myer, American law¬ yer and politician: b. Philadelphia, 30 June 1811; d. 3 Aug. 1884. _ He was admitted to the bar in his native city in 1832, turning his atten¬ tion with much success to criminal fiand civil practice. In 1856 he was elected as a Democrat from the fourth district of his State, to the 35th Congress. After the expiration of his term, he accepted many positions in educational, charitable and financial institutions, became a commissioner of the Board of Citv Trusts, hav-

ing control of the Stephen Girard estate, and was made president of that board and president as well of the board of directors of the Acad¬ emy of Music, Fairmount park commission, and director of numerous corporations. He served also as Grand Master of Freemasons of the State.

PHILLIPS, John, American educational benefactor: b. Andover, Mnass., 6 Dec. 1719; d. Exeter, N. H., 21 April 1795. He was a son of Samuel Phillips (1690-1771), was graduated from Harvard in 1735, and after studving the¬ ology preached for a time. He w*as afterward a merchant at Exeter, and for several years one of the New Hampshire council. In 1778 he assisted in founding Phillips Academy at An¬ dover, and in 1781 he founded Phillips Academy at Exeter. He was also a benefactor to Dart¬ mouth College.

PHILLIPS, John, English geologist: b. Marden, Wiltshire, 25 Dec. 1800; d. Oxford, Eng¬ land, 24 April 1874. He was educated under the supervision of his uncle, William Smith, the geologist, with whom he engaged in geolog¬ ical investigations in England. In 1834 he ac¬ cepted the chair of geology at King's College, London, receiving an appointment to the same position at the University of Dublin in 1844 and at Oxford in 1856. He was keeper of the Ashmolean Museum 1854-70, in 1859-60 presi¬ dent of the Geological Society and of the British Association in 1865. He wrote (Guide to Geology) (1834) ; (Memoirs of Williflam

Smith) (1844) ; (Vesuvius> (1869) ; (The Geology of Oxford and the Valley of the Thames) (1871), *etc.*

PHILLIPS, John Arthur, English geolo¬ gist : b. Polgooth, Cornwall, 18 Feb. 1822 ; d. London, 4 Jan. 1887. He was graduated from the Lcole des Mines, Paris, in 1846. In 1848-68 he was a mining engineer and metallurgist in London, .acted as chemist to the Admiralty Commission, and in 1848-50 was professor of metallurgy at the college for civil engineers at Putney. He inspected the California gold mines in 1853 and later years, and wrote /The Mining and Metallurgy of Gold and Silver) (1867); (Elements of Metallurgy* (1874); (A Treatise on Ore Deposits) (1884), *etc.*

PHILLIPS, Philip, American jurist: b. Charleston, S. C., 17 Dec. 1807 ; d. Washington, 14 Jan. 1884. He studied law in Charleston; was admitted to the bar at 21 ; and was a mem¬ ber of the State constitutional convention of 1832, known as the Nullification convention. Elected to the State legislature in 1834. he re¬ signed in 1835 and removed to . Mobile, Ala., where he practised his profession. He w'as president of the Alabama State convention in 1837; in 1844 was elected to the State legis¬ lature, and reelected in 1852; was inember of Congress from, Alabama from 1853-55, and de¬ clining re-election he removed to Washington, D. C., and practised law until the Civil War, when he went to New Orleans, La. After the war he returned to Washington, where he re¬ sided until his death. In 1840

he prepared a (Digest of Decisions of the Supreme Court, of Alabama/ and was the author of c Phillips Practice of the Supreme Court of the United States/ As one of the eminent lawyers of his time, he was connected with some of the most noted law cases of the country.

PHILLIPS, Philip, American Methodist evangelist and singer : b. Chautauqua County, N. Y., 13 Aug. 1834; d. Delaware, Ohio, 25 June 1895. In 1861 he opened a music store in Cin¬ cinnati, and during the Civil War held song services in many northern cities to aid the Christian Commission, and in 1866 was musical editor of the Methodist Book Concern. In 1868 he visited England, where he sang 200 nights for the Sunday School Union, and prepared for them (The American Sacred Songster/ of which 1,100,000 copies were sold. He traveled with D. L. Moody (q.v.), and in 1872 made a singing tour of the world. He published (Spring Blossoms) (1865) ; fallowed Songs) (1871) ; (Our New Hymnal* (1894), *etc.*

PHILLIPS, Samuel, American colonial clergyman: b. Salem, Mass., 17 Feb. 1690; d. Andover, Mass., 5 June 1771. He was gradu¬ ated at Harvard in 1708, studied theology and was ordained pastor of the Second or South Parish Church of Andover, in 1711, a pastorate which he held till his death. He was a notably strict Calvinist in his theology. His ‘brother, John, was the great-grandfather of Wendell Phillips (q.v.), and his grandson, Samuel Phil¬ lips, was the founder of Phillips Academy at Andover.

PHILLIPS, Samuel, American lawyer and legislator: b. North Andover, Mass., 7 Feb. 1752; d. Andover, Mass., 10 Feb. 1802. He was a grandson of Samuel Phillips (1690-1771) (q.v.), and was the fifth of the name. He was graduated at Harvard in 1771. He succeeded his father as town clerk of Andover in 1773, was a member of the provincial congress 1 775— 80, and of the Massachusetts constitutional con¬ vention, 1779-80. He sat in the State senate 1780-1801 (excepting in 1787-88), was lieuten¬ ant-governor 1801-02, and justice of the court of Common Pleas for Essex County, 1781-98. He is best known as the founder of Phillips Academy, a project conceived by him soon after leaving college and to the furtherance of which he induced his uncle, John Phillips (q.v.), the founder of Phillips Academv at Exeter, to con¬ tribute. (See Phillips (Andover) Academy). His daughter, Mary, was the mother of Bishop Phillips Brooks (q.v.). After his death his wife assisted in the founding of Andover Theo¬ logical Seminary.

PHILLIPS, Stephen, English poet: b. Somertown, near Oxford, 28 July 1868; d. 9 Dec. 1915. He abandoned an Oxford career to go on the stage in Frank Benson's company, in which he played in his time many parts and gained the experience which later was so greatly to aid him in the dramaturgic construc¬ tion of his works. 'His first serious effort, (Eremus* (1894), though praised by Stopford Brooke and Addington Symonds, attracted little general notice. It was later withdrawn by t»he author. (Christ in Hades and Other Poems) (1896) found generous eulogists, but it was not until his (Poems* (1897), a small collection, was crowned by the (Academy* as the best work of the year with the first prize of 100 guineas, that Phillips achieved a reputation. In his later works he successfully revived the Eng¬ lish poetic drama. Some discerning critics have regarded certain of the <Poems) as his finest work, but the dearth of poetry in the English drama gave to (Paolo and Francesca>

(1899); <Herod> (1900), and <Ulysses5 (1902), and (The Last Heir5 (1908), a greater interest. Ulysses was presented in the United States in 1903. His other works include (New Poems5 (1903) ; (The Sin of David5 (1904) ; (Nero5 (1906) ; (Pietro of Siena5 (1910) ; (The New Inferno5 (1910); (The King5 (1912); (Lyrics and Dramas5 (1913); (Iole5 (1913); Arma¬ geddon5 (1915) ; (Panama5 (1915). See Herod; Paolo and Francesca.

PHILLIPS, Thomas, English painter: b. Dudley, Worcestershire, 18 Oct. 1770; d. Lon¬ don, 20 April 1845. He was an early pupil of Edington, the glass-painter at Birmingham, and worked as his assistant until 1790, when he went to London and was employed by West in executing a design for the windows in Saint George's Chapel, Windsor. Soon afterward he began to devote his time to portraits and be¬ came one of the most fashionable portrait paint¬ ers of his day, in spite of the competition of Sir Thomas Lawrence, as well as of Hoffner, Shee, Owen and Beechey. His (Venus and Adonis5 (1808) secured his election as a Royal Academician, and in 1825 he was appointed Fuseli's successor as professor of painting at the Royal Academy. His

lectures were pub¬ lished in 1833. He was very successful in catching a likeness, and his portrait of Napo¬ leon, painted by stealth with the connivance of the Empress Josephine, is now at Petworth, and has been frequently engraved; that of David Wilkie by him is in the National Gallery. He also painted well-known likenesses of Lord Byron and Sir Walter Scott, as well as of Crabbe, Chantrey, Southey, Coleridge, Camp¬ bell, Rogers and Sir Humphrey Davy.

PHILLIPS, Thomas W., American capi¬ talist and legislator: b. Mount Jackson, Pa., 1835 ; d. 1912. He acquired vast interests in oil wells and was one of the largest individual oil producers of the country. He was also inter¬ ested in politics and during the Garfield cam¬ paign of 1880 originated the campaign text¬ book. From 1893 to 1897 he was a member of Congress, where he introduced the -bill creating the Industrial Commission. He served on the newly-formed Commission and in 1902 submit¬ ted a supplementary report which resulted in the creation of the Bureau of Corporations.

PHILLIPS, Ulrich Bonnell, educator and economist: b. La Grange, Ga., 4 Nov. 1877. He graduated at the University of Georgia, A.B., 1897; A.M., 1899; and there was Fellow and tutor in history 1897-1900. In 1901 he was awarded the Justin Winsor prize of the American Historical Association. From 1900-02 he was Fellow of Columbia University, where he received his Ph.D. degree in 1902. He was instructor in history 1902-07 and as¬ sistant professor 1907-08 at the University of Wisconsin; professor of history and political science, Tulane University 1908H1 ; and from 1911 professor of American history at the University of Michigan. He also acted as research assistant at the Carnegie Institution of Washington, 1904-06; was collaborator of the American Bureau of Industrial Research 1905— 09; was army camp educational director, Y.M.C.A., Camp Gordon, 1917; and is associate of many learned societies. He came into in¬ ternational prominence as the author of nu¬ merous articles on the economics of slavery,

on the plantation system and ante-bellum politics. He edited Plantation and Frontier Documents5 (1909) ; (The Correspondence of Robert Toombs, Alexander H. Stephens and Howell Cobb5 (1913); and is author of (Georgia and State Rights5 (1902) ; c History of Transportation in the Eastern Cotton Belt5 (1908); Life of Robert Toombs5 (1913); (History of American Negro Slavery5 (1918).

PHILLIPS, Wendell, American orator and reformer: b. Boston, 29 Nov.

1811; d. there, 2 Feb. 1884. He was graduated from Harvard in 1831, a classmate of J. L. Motley (q.v.). After three years' study at the Harvard Law School he was admitted to the bar in 1834; but he took slight interest in the legal profession. On 21 Oct. 1835 he saw Garrison (q.v.) dragged through the streets of Boston by those (<gentlemen of property and standing,55 as the press styled them, who had been disappointed in their original purpose of bringing George Thompson (q.v.) to the tar-kettle. From that time he was an Abolitionist, with which interest he identified himself in, 1836. He came at once into promi¬ nence by his great Faneuil Hall speech of 8 Dec. 1837. Through the efforts of W. E. Channing a meeting had there been assembled suit¬ ably to protest against the murder of E. P. Lovejoy (q.v.) at Alton, Ill., while defending the freedom of the press against a pro-slavery mob. But the entire purpose of the gathering seemed likely to be defeated by James T. Austin, a parishioner of Channing and attorney-general of Massachusetts, who, in a singularly absurd outburst likened the Alton rabble to the patriots of the Revolution and declared that Lovejoy had perished ((as the fool dieth.55 It appeared not improbable that these most ill-considered remarks might divide the audience, when Phillips, by invitation, took the platform and made answer. <(When,55 he said, as he be¬ gan that stinging rebuke, ((I heard the gentle¬ man lay down principles which placed the riot¬ ers, incendiaries and murderers of Alton side by side with Otis and Hancock, with Quincy and Adams, I thought those pictured lips (here indicating the portraits in the hall) would have broken into voice to rebuke the recreant Amer¬ ican, the slanderer of the dead.55 Phillips be¬ came forthwith the chief of American orators and the apostle of the Garrisonian school of abolition. He accepted the creed of Garrison almost without condition, though he became but gradually a disunionist and was never a non-resistant. In 1839 he withdrew from profes¬ sional practice, being unwilling to bind himself by the advocate's oath of fealty to the Constitu¬ tion. Later, for a similar reason, he declined Congressional candidacy. With Garrison he op¬ posed in 1839-40 the attempt to debar any from the anti-slayery platform on the-ground of dif¬ ferences in religious faith, and thg organization of the Abolftionists into a political party. He disagreed, however, with Garrison in 1864 in regard to Lincoln's re-election, which he did not favor; and in 1865, respecting the discon¬ tinuance of the Anti-Slavery Society, which Garrison held then to have concluded its mis¬ sion. Phillips believed that the education and enfranchisement of the negro ought to be ac¬ complished, and was elected in Garrison's place to the presidency of the societv, a post which he held until the disbandment, 9 April 1870, con-PHILLIPS — PHILLIPS (ANDOVER) ACADEMY

sequent upon the passage of the 15th amend¬ ment. But his activities did not now pause here. He thought the task of reform was never done, and on this idea placed a most valuable emphasis. So he spoke for the Indian, for the Irish, for improvements in the criminal law and prison administration, for women suffrage, for legislative control of the sale of liquor and against accumulations of corporate wealth dangerous to the State. In all these causes Phillips was never even remotely the dema¬ gogue, though at times his associates may have been such. He received in 1870 about 20,000 votes as labor-reform and temperance candi¬ date for the governorship of Massachusetts. He was known also for years as one of the kings of the American lyceutn, among his most famous addresses being (The Lost Arts,* (Toussaint l'Ouverture) and (Daniel O'Con¬ nell.) Among his occasional orations may be mentioned that in memory of Theodore Parker (q.v.) and that on (The Scholar in a Republic,* given in 1881 at the centennial of the Harvard Phi Beta Kappa. A scholar himself, in the nar¬ rower acceptance, Phillips was not. The course of his activities did not allow this ; but he was a considerable reader, appropriated to his own uses all that he studied and found ample supply of needful illustration in the history of the English Revolution of 1630, on which subject he had once read every work obtainable. Con¬ temporary evidence as to his oratory is unani¬ mous and places him with Webster and Everett. His method was far different from theirs; he replaced their rounded sonority by the easy, limpid and colloquial style which since his time has remained the type of the best American public speech. He spoke with much repose, did not lack for appropriate wit and was superb sarcasm, epigram or invective. He surm

rendered worldly preferment to identify him¬ self with a despised propaganda; he gained his fame and saw his victory against heavy odds, opposed to the inertia of a general prejudice. Many of his speeches were, as reports show, sword-play with a hostile audi-Of course, under existing conditions,

ence.

he made mistakes, but his fine attainments were always finely used. He contributed to Anti-Slavery Standard and The Liberator, and wrote several pamphlets. A collection of his (Speeches, Lectures and Letters,* edited by J. Ridpath, was published in 1864; a second series, by T. C. Pease in 1892. Consult Austin, G. L., (Life and Times of Wendell Phillips> (new ed., Boston 1893) ; Martin, W. C., “Wendell Phillips The Agitator** in (American Reformers) (New York 1890) ; Russell, C. E., (The Story of Wendell Phillips, Soldier of the Com¬ mon Good) (Chicago 1914) ; Sears, Lorenzo, < Wendell Phillips, Orator and Agitator’ (New York 1909) ; also works treating of the anti-slavery period and its leaders.

PHILLIPS, William, American merchant, son of Samuel Phillips (1690-1771) : b. 1722, d. 1804. He was a wealthy merchant of Boston, and becoming interested in the project of an academy at Andover as outlined by his nephew, Samuel Phillips (1751-1802) gave to it an amount equal to that contributed by his brother Samuel. He was a member of the Massachu¬ setts legislature and held various political offices of importance.

PHILLIPS, William, American educational benefactor, son of William Phillips (1722-1804) : b. Boston, Mass., 10 April 1750; d. there, 26 May 1827. He engaged in business with his father, became wealthy and was 12 times chosen lieutenant-governor of Massachusetts (1812-23). At his death he bequeathed large sums to Phillips (Andover) Academy and to Andover Theological Seminary.

PHILLIPS, William Addison, American soldier: b. Paisley, Renfrewshire, Scotland, 14 Jan. 1824; d. Fort Gibson, Okla., 30 Nov. 1893. He received an academic education prior to the migration of his father’s family to America in 1838. He-grew to manhood on a farm in Illinois. At the age of 22 he engaged in news¬ paper work and later began the study of law. In 1855 he went to Kansas as a special cor¬ respondent of the New York Tribune. Al¬ though he was offered a large salary to go to the front as a correspondent at the outbreak of the Civil War, he chose rather to enter the volunteer military service. He was com¬ missioned major of the 1st Indian Home Guard regiment in 1862 and was soon pro¬ moted to the colonelcy of the 3d Indian Home Guard regiment. He commanded the Indian brigade, with

headquarters at Fort Gibson, and for a time commanded a division, though never promoted above the rank of colonel. His posi¬ tion as the ranking Federal military com¬ mander in the Indian Territory during most of the time for two years was one which called for the exercise of energy, tact, diplomacy and administrative ability of a high order as well as a large degree of military skill. From 1873 to 1879 he represented the first Kansas district in Congress. Almost radically progressive in his views, he was a careful student of eco¬ nomics and sociology, as evidenced by his work, 'Labor, Land and Law,* which was pub¬ lished in 1886. After his retirement'from Con¬ gress he served for some years as an attorney for the Cherokee Nation. He was buried at Salina, Kan., of which town he was one of the founders.

PHILLIPS (ANDOVER) ACADEMY,

a celebrated college preparatory school for boys at Andover, Mass., founded 25 April 1778, opened 30 April 1778 and incorporated 4 Oct. 1780. It owes its existence to the initiative of Samuel Phillips (1751-1802). The property, originally conveyed to the academy trustees by Samuel Phillips (the elder) and his brother John, consisted of 141 acres with several build¬ ings upon it, in Andover, 200 acres in Jaffrey, N. H., and some $8,000 in cash. In 1785 a new academy building was erected, the gift of the three brothers, Samuel, John and William Phil¬ lips. The trustees of the academy were vested in 1807 with authority to receive and hold funds for a theological school and what is now known as the Andover Theological Seminary (q.v.) was founded the next year. The acad¬ emy has grown to be one of the foremost insti¬ tutions of its kind in this country, and in recent years' its equipment has been very ma¬ terially increased, the archaeological department with ample endowment and costly building being one of the most notable of recent gifts. The larger number of the students go to Har¬ vard and Yale on leaving the academy, and the institution is, therefore, based on the require-

ments of those universities. It accommodates about 400 pupils. Its endowment now amounts to about $500,000, and outside of invested funds the academy property amounts in value to $500,000. There are 60,000 volumes in the sev¬ eral libraries of the institution. Consult Adams, (Some Famous American Schools)

(1903).

PHILLIPS (EXETER) ACADEMY, a

noted American college preparatory school at Exeter, N. H., incorporated 3 April 1781, en¬ dowed by John Phillips, 9 Jan. 1782, opened 7 May 1783. The institution was the earliest of an educational character incorporated by the New Hampshire legislature, and-was named in honor of its founder, John Phillips (q.v.), whose gifts to it totaled $65,000. It accommo¬ dates 300 and odd students. Like the sister institution at Andover, it has prospered greatly in recent years, and many new and commodi¬ ous buildings have been erected within the past decade, the most notable of these being the great dining hall, built in 1903. It has an endowment of $400,000 and an annual income of $100,000. Its alumni number about 10,000. A marked characteristic of the school is its thorough carrying out of the principle of self-government. Consult Adams, 'Some Famous American Schools) (1903).

PHILLIPSBURG, fil'ips-berg, N. J., town in Warren County, on the Delaware River, and on the Central of New Jersey, the Pennsyl¬ vania, the Delaware, Lackawanna and Western, Lehigh and Hudson and the Lehigh Valley railroads, about 60 miles in direct line west of Newark. It was settled in 1749, and in 1861 was incorporated. It has good water power and excellent facilities for transportation. The chief manufacturing establishments are foun¬ dries and furnaces, railroad shops for the five railroads, horseshoe works, boiler and drill works, machine shops, stove works, sheet iron works, silk mills and large coal yards. Its prominent public buildings are its municipal buildings, several business edifices, the churches and schools. It has several private business schools, public and parish schools and a public library. The government is administered under a revised charter of 1875 and is vested in a commission of five, which holds office for a term of four years. Pop. (1920) 16,923.

PHILLPOTTS, fil'pots, Eden, English novelist: b. Mount Aboo, India, 4 Nov. 1862. After serving as clerk in a fire insurance office at Plymouth in 1880-90, he studied in London for the stage, but found ((his ability did not justify perseverance.® His earlier works are of inferior value. Among his representative books are 'Down Dartmoor Way5 (1895) ; 'Lying Prophets) (1897) ; 'Children of the Mist) (1898) ; 'Sons of the Morning) (1900) ; 'The Good Red Earth) (1901) ; 'The Striking Hours> (1901); 'The River5 (1902); 'My Devon Year) (1903) ; 'The

Secret Woman5 (dramatized in 1912) ; ‘Knock at a Venture> (1905) ; ‘The Portreeve5 (1906)’; ‘The Vir¬ gin in Judgment5 (1908) ; ‘The Three Broth¬ ers5 (1909); ‘Dance of the Months5 (1911); ‘The Forest on the Hill5 (1912) ; ‘The Iscariot5 (poem 1912) ; ‘Widcombe Fair5 (1913) ; ‘Curtain Raisers5 (1.914) ; ‘Old Dela-bole5 (1915) ; ‘The Human Boy and the War5

(1916) ; ‘The Chronicles of Saint Tyd5 (1917) ; and ‘Storm in a Teacup5 (1919). Phillpotts is the recognized interpreter of Dartmoor folk and scenery, and received high praise from R. D. Blackmore (q.v.).

” PHILO BYBLIUS, fi’lo bib’K-us, Heren-nius, Phoenician grammarian : b. Byblos, Phoe¬ nicia; flourished between 64 and 141 a.d. He is the author of a famous historical work, ‘Concerning Cities and Their Renowned Citi¬ zens.5 It is in 30 books and has proved the thesaurus of later grammarians. He also ex¬ ecuted a translation of the alleged work of Sanchuniathon (q.v.), of which some frag¬ ments have survived and have been published in the third volume of Muller’s ‘Fragmenta Historicorum Graecorum,5 Vol. III. The al¬ leged complete text of Sanchoniathon, which was discovered in a Portuguese monastery and published by Wagenfeld (1837), proved to be a forgery.

PHILO JUD2EUS, joo-de us, Jewish phi¬ losopher : b. aibout 20 b.c. ; d. not later than 54 a.d. He went to Rome in 42 a.d. Has one of a deputation from Alexandria to the Emperor Caligula, to persuade him to release the Jews from the obligation of adoring the imperial statue. He was the oldest of five deputies. This and the fact that he visited Jerusalem and belonged to a wealthy family is nearly all that is known of his life.

Before the time of Philo the Hellenized Jews (see Hellenists), particularly those of Alex¬ andria, had begun to blend the ideas of the Greek philosophers with the teaching of their own sacred books; but as they generally held that the Pentateuch itself was the source of in¬ spiration from which the Greeks derived what was true in their philosophy, they endeavored by allegorical interpretations of their own books to find “indications of the profoundest doctrines of philosophy in the simplest stories of the Pentateuch.55 It was in this school that Philo was brought up. His philosophy was thus strictly a theosophy. It rested, as its direct foundation, on the Jewish Scriptures as an in¬ spired revelation, and with these it incorporated the

speculations of the writer, founded on the systems of Greek philosophy, which best har¬ monized with the teaching of the Hebrew Scriptures, and especially on the philosophy of Plato.

Philo's idea of God was partly religious, partly philosophical. From his faith as a Jew he derived the principle that God is to be wor¬ shipped as a personal being, but in developing his conception of God he is indebted chiefly to philosophical speculations. He held that God is incorporeal and only cognizable by reason. He is the most universal of beings, and higher than knowledge, goodness or beauty, per se. He has, strictly speaking, no attributes, being pure, unqualified being; he is therefore incom¬ prehensible. The attributes ascribed to God in Scripture are to be understood only figuratively. God is present everywhere in the material uni¬ verse by his operations ; nowhere in his essence. God is the only free being. All others are sub¬ ject to necessity. Philo's notions of matter are not remarkably consistent. He held God to be too perfect to have any association with it, yet he holds Him to be the Creator of the uni-PHILOBIBLON

verse. Between God and the world there is an intermediate being, the Logos. He wavers in his account of the Logos also. The Logos is the most universal of all beings except God. The Logos contains in itself the sum of ideas — powers or spiritual forms which pervade the universe, and which are creative, governing, foreseeing, law-giving, *etc.* These forms are also regarded as either qualities of the deity or distinct persons. Sophia, wisdom, is sometimes considered as the first of the potencies of the Logos, sometimes as the mother of the Logos. God created the world as already indicated, by the agencies of these potencies, or of the Logos in whom they reside, out of unqualified matter. He gives the Logos the titles of Son of God, Paraclete, and Mediator between God and Man.

Man is a dual being, having a soul that came from God, tied to a body that naturally tends to the things of sense; 'by the aid of God the soul may be lifted above the body and ulti¬ mately regain its original source.

In interpreting Scripture Philo recognizes a double sense, the allegorical, which is the more important, and the literal, which is not to be neglected. The ˆanthropomorphic representa¬ tions of God in Scripture he regarded as an accommodation to the sensual nature of man. It is a fundamental principle with him that the law, which emanates from the being who is both the creator and the father of the universe, is in harmony with nature, and that he who vio¬ lates it is punished by natural events. Consult Drummond, (Philo Judaeus> (1888) ; Conybeare, (Philo about the Contemplative Life* (1895) ; Freudenthal, (Die Erkenntnislehre Philons von Alexandria> (1891), and the 'Jew¬ ish Encyclopedia.*

PHILOBIBLON, fl-lo-bib'lon, a prose eulogy of books and learning written in Latin by Richard Aungerville, called Richard de Bury from his birthplace (1287). He was bishop of Durham and lord high chancellor and treasurer under Edward III. The work was finished in 1300, and first printed at Cologne in 14721 (Philobiblon* was intended to serve as a hand¬ book to the libntary which he founded in con¬ nection with Durham College at Oxford (after¬ ward suppressed). It gives an interesting ac¬ count of how he collected his library, describes the state of learning in England and France and closes with an explanation of the rules for the management of his library, which were founded on those adopted for the library of the Sorbonne. An American edition was printed at Albany, N. Y. 0861), by Samuel Hand, and the Latin text, with translation by Andrew F. West, was issued by the Grolier Club of New York (1889). See Aungerville, Richard.

PHILOCHORUS, fil-ok'o-rus, Greek his¬ torian : flourished in Athens between 306 b.c. and 260 b.c. Suidas states him to have been a contemporary of Eratosthenes, an adherent of Ptolemy Philadelphus, and a bitter opponent of Demetrius Poliorcetes and his son, the latter of whom had him put to death when he took pos¬ session of Athens. His best-known work, (Atthis, } a history of Athens dating from the remotest period of their history down to the death of the author, is the most valuable and authentic of the special histories of Attica.

Fragments of it are preserved in Muller's (Fragmenta Historicorum Graecorum* (1841).

PHILOCTETES, fil-ok-te'tez, Greek archer. He was a friend and armor bearer of Heracles, who bequeathed to him his bow and arrows. As one of the suitors of Helen he started with seven ships for the Trojan

War, but becoming ill from the bite of a serpent was left by the Greeks on the island of Lemnos. An oracle declared that Troy could not be taken without the arrows of Heracles, and Ulysses and Diomedes journeyed to Lemnos, whence Philoctetes accompanied them to Troy and fought bravely until the city was taken, slaying Paris with one of his poisoned arrows. The legend was dramatized by Sophocles, 2Eschylus and Euripides, the plav by Sophocles still sur¬ viving.

PHILODEMUS, fil-6-de'mus, Greek Epi¬ curean philosopher and epigrammatic poet, a contemporary of Cicero. He was a resident of Gad&ra in Palestine, and a leading Epicurean of his time. The (Greek Anthology* contains 34 of his epigrams.

PHILOLAU.S, fil-6-la'us, Pythagorean phi¬ losopher; according to Plato he was a contem¬ porary of Socrates, and was born in Magna Graecba. He left Metapontum on account of political disturbances and entered Lucania. Later on he visited Thebes. The teachings of Pythagoras were for the first time committed to writing by him. The only fragments of this work which are extant Bockh declares to be genuine (1819). Their genuineness hnas, how¬ ever, been denied by Schaarschmidt, (Die angebliche Schriftstellerei des Philolaus) (1864). Some of them are undoubtedly authentic, others spurious.

PHILOLOGICAL ASSOCIATION,

American. See American Philological Asso¬ ciation.

PHILOLOGICAL SOCIETY, British, a

society founded in London, 1842, for the study of language according to its scientific analysis. It publishes annually its transactions,* a volume of papers read at its meetings, which are held monthly from November to June. The most important work of the British Philo¬ logical Society has been the publication of the (New English Dictionary,* which was begun under the editorship of James (later Sir James) A. H. Murray in 1857, and has not yet been completed.

PHILOLOGY. See Language, Science of.

PHILOMEL, a poetic name for the night¬ ingale (q.v.), especially the large Asiatic species (Daulias philomela) or the Persian form (D . ha fid).

PHILOMELA, fil-6-me'la, in Greek my¬ thology, daughter of Pandion, king of Athens ; was by fraud won by Tereus, a Thracian king, to be his bride, Tereus pretending that his wife, Procne, her sister, was

dead. Lest Philomela should reveal her wrongs, Tereus cut out her tongue. But she contrived to oacquaint Procne with her story. The sisters in revenge slew Itys, son of Tereus, and served him to his father at table. The gods transformed Philo¬ mela into a nightingale and Tereus and Procne, Itys and Pandion into other birds.

PHILOMELA, The Lady Fitzwater's Nightingale, title of a romance by Robert

Greene, published 1592, probably founded on the story of Tito Hand Gisippo in the Decameron, or the (novela del curioso impertinente* related in Don Quixote, Book 1, chap. 34 et seq.

PHILOPCEMEN, fil-6-pe'men, Greek gen¬ eral and statesman : b. Megalopolis, Greece, 252 b.c. ; d. Messene, Greece, 183 b.c. He came of a noble Arcadian family, was orphaned at an early age and brought up by Cleander, an in¬ fluential citizen of Mantinea, received his edu¬ cation under the philosophers Ecdemus tend Demophanes, and gained his first military ex¬ perience in the border raids between the Arcadians and Laconians. In 222 he aided in the defense of Megalopolis ˆagainst Cleomenes, king of Sparta, and in 221, at the head of a company of horsemen, fought under the Mace¬ donian king, Antigonus, who came to the aid of the Achaeans against the Spartans. In 210 he was appointed general of the Achaean horse, and in 209 accompanied Philip in his expedition against Elis, conducted himself with his usual bravery and slew in 'battle the Elean com¬ mander Demophantus. In 208 he was elected strategus or commander-in-chief of the Achaean League, an office to which he was seven times reelected. He introduced reforms in military arms 'land discipline, and brought the army to the highest state of efficiency it had attained since the decline of Greece. In 208 he utterly routed the Spartans under Machanidas at Mantinea Hand was proclaimed the liberator of Greece® at the Nemean festival. In 194 he was reappointed strategus, defeated Nabis in 192, forced Sparta to enter the Achaean League and upon her revolt in 188 defeated her forces and compelled her to adopt Achaean laws. In 183, when Philopcemen lay ill at Argos, the

Messenians revolted and he arose from his sick-bed to le'iad the army against them, though now a man of 70. He was captured and given a cup of poison by Deinocrates, the Messenian leader. He is the last of the great Greek commanders. Consult Plutarch, (Life of Philopcemen) ; Mahaffy, (Alexander's Empire!* (1888).

PHILOSOPHER OF FERNEY, The, a

title by which Voltaire was known on account of his residence from 1758 to 1788 at Ferney, five miles northwest of Geneva.

PHILOSOPHER OF MALMESBURY,

The, a title given to Thomas Hobbes (q.v.), who was born at Malmesbury in Wiltshire.

PHILOSOPHER OF SANS SOUCI,

The, a name which Frederick the Great applied to himself on account of his residence at the pnalace of Sans Souci which he built at Potsdam.

PHILOSOPHER OF WIMBLEDON,

The, a name bestowed upon John Horne Tooke (q.v.), the political writer and grammarian, whose later years were passed at Wimbledon, Surrev.

PHILOSOPHER'S STONE. See Al¬

chemy.

PHILOSOPHICAL SOCIETY, Ameri¬ can. See American Philosophical Society.

PHILOSOPHY. Definition of Philoso¬ phy. — No satisfactory answer to the question, What is philosophy? can be derived either from the meaning of the word, or from the consensus of opinion expressed by writers on

philosophy, unless these opinions are themselves subjected to comparison and criticism from the philosophic point of view. For the conception which defines the task, and describes the method of philosophy is itself subject to change and growth ; and accurate and harmonious defi¬ nitions are themselves among the latest prod¬ ucts

of any pursuit conducted by a truly scien¬ tific method. But this, like every other devel¬ opment, has certain permanent features ; it fol¬ lows, more or less closely, certain clearly dis¬ cernible lines of movement. To describe these features and follow these lines must, therefore, determine the method of our attempt to answer the question: What is philosophy?

In its most general meaning, though in rather vague and aimless fashion, philosophiz¬ ing dates back to the very beginnings of human mental development. The savage or primitive man (the Naturmensch) , instead of being, as is sometimes supposed, untroubled bv metaphys¬ ics, is much more, if this were possible, naively and necessarily metaphysical than is his civil¬ ized descendant. But the results of his reflec¬ tive thinking over the problems of existence, of the origins of things and of human life and destiny, take th : forms of myth and legend rather than of scientific system.

The particular line of development which chiefly concerns us in the attempt to define philosophy is traced back to the Greeks. This statement is true for two reasons: (1) The Greeks first separated philosophical speculation from its dependent connection with religious myth and theological conceptions; and (2) they are, in fact, the ancestors of that branch of the universal family of philosophers to which we belong.

History of Opinion. — Originally, a loose and wide meaning was given to the term <(philosopher® (tyLtidootyog). At first, it stood for any man who, whether by travel or reading or in¬ terest in art, had the spirit and acquisitions of intellectual culture. Solon was said to have ˆtraveled through many lands philosophizing® (Herodotus i, 30) ; and Thucydides, in his fu¬ neral oration over Pericles, claims for all the Greeks that they love the beautiful with true simplicity, and <(philosophize without effemi¬ nacy.® The earliest more systematic attempts at philosophy among the Greeks displaced the theogonies of the poets, or their explanations of the universe as due to the actions of the gods, with cosmogonies, or speculations as to the ori¬ gin of things and the causes of experience, by means of known physical elements or mental principles. As yet, however, there was no dis¬ tinction between philosophy and the positive sci¬ ences ; and, indeed, science did not exist in the modern acceptance of the term.

It is customary to say that Socrates was the first (<to lead mankind from the study of the universe to the study of man® ; but this is only relatively true. With Plato and Aristotle the more definite conception of the sphere of phi¬ losophy, and the use of the more scientific

method for its pursuit, began — not only among the Greeks but among all mankind. In spite of those many and important differences, which the latter seems to have taken pains to exag¬ gerate, these two great thinkers are in substan¬ tial agreement as to the essential nature of philosophy. With them both, the word does

not stand for any one particular science or even for the aggregate of all the sciences ; on the contrary, philosophy is held by Plato and Aris¬ totle to ‘be the supreme and only true science, or knowledge of the universal and unchanging.

Plato taught that philosophy imparts to the mind something more than merely ((correct opinion® ; that it deals with being, and not with seeming; with the truly real; it, therefore, im¬ plies the acquisition of what is knowable, in the highest meaning of the word. But the es¬ sential and immutable being of everything is its idea; and of all the ideas, the supreme one is the idea of the good. Philosophy is, therefore, the knowledge of the ideal and absolute ele¬ ments of things. Aristotle, on the other hand, regarded philosophy as science, or knowledge, in general ; in his scheme it comprised the speculative, the practical and the artistic sci¬ ences. But there was also a <(first philosophy,® or supreme science; and in his conception of this, Aristotle agrees in the main with Plato. For ((first philosophy® investigates being as being; it inquires into the first principles and ultimate causes of things; and thus it renders possible the knowledge of that absolute princi¬ ple which presupposes nothing more ultimate than itself. The peculiar characteristics of philosophy are thus held to be its certainty, uni¬ versality, independence, supremacy and a kind of divine character. This last characteristic makes it worthy of honor even by Deity itself.

Although the later Greek philosophy, under the conduct of the Stoics and the Epicureans, took a more practical turn, and although phi¬ losophy during the Middle Ages, being em¬ ployed by Christian theologians in the defense of dogma, lost much of its characteristics of independence and supremacy, the conceptions of the greater Greek

thinkers remained sub¬ stantially unchanged down to modern times. When the Renaissance gave back to philosophy its independence, both Bacon and Descartes re¬ garded philosophy as a universal science. The former held that all human cognitive endeavors are summed up in history, poetry and philoso¬ phy, which correspond to the three faculties of memory, imagination and reason. Thus every¬ thing which is an object of knowledge by human reason falls within the sphere of philos¬ ophy. Bacon, too, like Aristotle gave a special place to first philosophy. Descartes regarded philosophy as a universal science; but first philosophy is the science of principles, — that is, of the highest generalizations of all the posi¬ tive sciences. Descartes did in a way for mod¬ ern philosophy what Socrates is said to have done for Greek philosophy; he made its point of starting a critical examination of the mind of man.

With Locke and hi*s ‘successors, but espe¬ cially with the critical philosophy of _ the (<astounding Kant® (first edition of his (Critique of Pure Reason, > 1781), philosophy became

chiefly an analysis and criticism of the cognitive powers of the human mind. Thus one branch of the subject — namely, the philosophy of knowledge, or epistemology — occupies the chief place in, if it does not usurp the whole of, the field properly covered bv the term. Such is in a peculiar way the position of Kant, who holds that the primary and chief task of philosophy is to ascertain the a priori elements and prin-

ciples of the human mind, and to arrange these together into a system. As to a science of real¬ ity — meaning by this, the knowledge of the world of beings that exist independently of hu¬ man mental representations — this great thinker comes to a sceptical conclusion. But with the successors of Kant philosophy began again to be considered more as of old — an absolute, universal and independent science, whose au¬ thority within its own proper domain must be considered as supreme. In one way or another, this was the position of Fichte, Schelling and Hegel.

While the Scottish school, consisting of Reid and his followers, reduced philosophy to a kind of theoretical psychology, and Positivism denied the possibility of philosophy with anything like its traditional meaning and claims ; still the conception of its aim and its scope, which is honored by time and is essentially the same as the ancient notion, continues to maintain itself. Yet there are to be noted

significant changes in the points of view, in the use of method, in the factors chiefly emphasized ; and, especially, in the notion of the relation which philosophy properly sustains to the particular sciences. These changes must, then, be briefly noticed, if one would arrive at a satisfactory answer to the question: What is philosophy?

Analysis of the Factors. — The modern con¬ ception of philosophy can now, in its more complete and scientific form, be best understood by stating what are the principal problems, or groups of problems, which it attempts to solve. These may be conveniently arranged under the following four heads: (1) Especially since the time of Kant, the question of the nature, limits and validity of human reason itself has occu¬ pied a prominent place in the discussions of philosophy. With Kant himself — as we have already seen — this self-criticism of reason was the principal part of philosophical discipline. To quote the words of Fichte: <(This science can be nothing but the universal knowledge, which has come to know of itself, and has en¬ tered a state of light, consciousness and inde¬ pendence, in regard to itself.® Or, according to the more extreme statement of another advo¬ cate of a similar view : ((Philosophy calls itself knowledge of the Universe (Weltweisheit)® ; but ((we call it self-knowledge.®

From this point of view, the outcome of philosophical discipline may be either one of two conclusions. The criticism of reason may end is what is known as positivism, or some form of phenomenalism. In this case reason, by self-criticism, would have discovered and proved that reason itself is limited to appear¬ ances of phenomena; that human knowledge cannot reach the world of reality. In a word, philosophy as a reasoned and systematic on¬ tology, or a valid _ doctrine of real being, is found to be impossible.

But the opposite conclusion — namely, that all human knowledge somehow envisages, or implicates, reality — necessarily leads the thinker who holds it to lay emphasis on another main branch of philosophical discipline.

(2) The second form of the modern con¬ ception of philosophy continues to emphasize the factors rendered prominent by Plato and Aristotle, and which, indeed, have been prom¬ inent in the entire history of reflective thinking. As Matthew Arnold tersely puts the question;

(<We want to know what Being is.® And in its revolt from the self-criticism which ends in scepticism, the mind of man continues to in¬ quire after the nature of ultimate reality; it con¬ tinues to believe that the forms of man's own mental life of cognition do somehow faithfully and truly represent the beings and events of a world which lies outside of that mental life, and which has, so to say, an existence and a value of its own. Philosophy is then conceived of mainly as a growth of assured knowledge of reality, and as a speculative activity of the human reason toward the transcendent ground of all existence. This view of the task of phi¬ losophy is that of Hegel and of all his follow¬ ers, however dissenting from the details of the Hegelian system. It is also the view of those who, like Schopenhauer and Hartmann, culti¬ vate systematic philosophy as a so-called meta-nhysics of the unconscious. It is even substan¬ tially the view of Herbert Spencer who, in spite of his doctrine of the Unknowable, has built up upon the basis of facts supposed to accord with his peculiar view of evolution, one of the most complete and stupendous theories of real¬ ity which the history of speculative thinking has ever produced. In a word, according to this view, "philosophy is the rational science of reality.® Or, as another modern writer de¬ clares: It is "the science of the most supreme and important realities.®

(3) It has always been felt that the more speculative conception of philosophy leaves the problems of human life too much out of its ac¬ count. In order to merit appreciation for its real value, reflective and speculative thinking ought to result in practical truths or conclu¬ sions which may serve to enrich and guide the moral and social interests of mankind. This conception of the philosopher's task has always been prominent in the Orient. And in Oriental countries to-day .the true philosopher is he who has wisdom ; and so can counsel men as to what they ought to do, and as to what, in the world of reality itself, ought to be. In modern times Kant himself wrote (preface to Jachmann's Examination of the Kantian Philosophy, of Religion 0 that, while philosophy, as a scien¬ tific theory, has only a. relative value, "philosophy, in the literal meaning of the word, as a doctrine of wisdom, has an absolute value ; for it is the doctrine of the final purpose of human reason.® From this point of view philosophy is chiefly a reasoned theory of values; and the principal task of the philosopher is to deal with the value-judgments of mankind, with the

ideas and ideals of humanity as to what ought to be, - in conduct, in art, in society and in religion. In his effort to do this, the thinker must, of course, justify reason in respect of her ideals, and not simply discover and describe what those ideals happen to be at any particular point of time, or at any particular place, in man's his¬ torical development. It appears, therefore, that philosophic wisdom in this meaning of the term implies knowledge of the reasonable and of the universal.

(4) The great advances of the particular sciences in modern times have forced into a conspicuous position another and somewhat dif¬ ferent conception of philosophy. This concep¬ tion is by no means wholly new. For it has never been supposed that speculative thinking,

whether in the form of a self-criticism of reason, or of a reasoned theory of reality, or of a rational system of practical principles, could dispense with all knowledge of facts, their uniform sequences and the laws of the forces operative in their realization. But the modern scientific development has certainly made im¬ perative a new adjustment of the relations be¬ tween philosophy and the particular sciences. Each one of these sciences is fast discovering its relations of reciprocal dependence and mu¬ tual goodwill toward all of the other sciences. Each one when pressed to give an account of itself is discovered to have its own body of uncriticised presuppositions, its own naive theory of knowledge and theory of reality, so to say. And, indeed, it is not difficult to show that even the most purely physical and positive of the sciences have to include certain value-judgments and conceptions of what ought to be in their methods of research and in their discovered principles. And thus the conception of philosophy as a "science of sciences® is, as it were, born anew, but with increased duties and increased liabilities to make mistakes, al¬ though also, with increased promises of success and reward. It is from this point of view that Professor Wundt has described philosophy as (<the universal science which has to unite the cognitions, obtained by the particular sciences, into a consistent system.®

Synthesis of the Factors. — Both a study of the history of philosophy and a reflective con¬ sideration of these four groups of problems lead to the same conclusion. No one of the four can be left out of the proper conception of the field of philosophy. In particular, the theory of knowledge and the theory of reality, the self-criticism of reason and the unceasing and undaunted endeavors of reason to reach a worthy knowledge of the world of reality, are like the two sides of the one

shield ; or rather, they are twin ways of the functioning of man's rational powers, neither of which can exist without the other and both of which are des¬ tined to live because belonging to the very life and growth of reason itself. Moreover, what man knows, or thinks he knows, about his own rational life and about the ultimate reality, can never fail to be regarded by him as a basis for conduct, for art and for religion. Man cannot manage his life wisely, without regard to his views upon so-called epistemological and ontological problems. His doing cannot be wholly divorced from his thinking. For as one of the great modern philosophers (Fichte) has said : "A philosophical system is not a dead bit of furniture which one can take to one's self or dispose of, at pleasure; but it is endowed with a soul by the soul of the man who has it.® And they who have no metaphysical system are none the less, whether savage or civilized, naively metaphysical. Especially is it true that religion is always and essentially; not merely a matter of feeling and cult, but also a certain theory of reality.

Hence the effort arises to summarize these groups of factors and unite them in some one conception. This attempt leads us to the fol¬ lowing preliminary definition of what modern philosophy is attempting to accomplish. Thus defined : —

Philosophy aims to establish, by the valid use of human reason, a harmonizing and unitary

view of the world and of human life, based upon the principles presupposed and ascertained by the particular sciences. More briefly said: philosophy is the attempt at a critical and ra¬ tional system of man's judgments and beliefs that have reference to reality and to the ideals of ethics, art and religion.

Relations of Philosophy to the Particular Sciences. — The definition of philosophy sug¬ gests that its relations to the particular sciences may be considered from two somewhat diverse points of view; and when considered from these points of view, the relations themselves divide into two classes. For in the first place, philosophy is critical with

respect to the pre¬ suppositions, or assumptions of each of the particular sciences; and it aims, by its criticism, to harmonize and unite the conclusions of all the sciences. Philosophy is, therefore, when regarded from this point of view, superior to the particular sciences; it is their critic, judge and arbiter, or referee, so to say. But, on the other hand, philosophy is dependent upon the particular sciences. It cannot, without com¬ mitting itself to an absurd and irrational attempt and to a course of reasoning doomed to failure, refuse to take its points of starting, its ma¬ terial of facts, laws and subordinate principles, from these same sciences. For philosophy does not purpose to construct a world that shall accord with the fancy and sentiment, however animated and exalted, of the individual, specu¬ lative reason. It aims, the rather, to discover upon what universal or most general principles the world is, in fact, constructed.

With reference to the critical attitude of philosophy toward the particular sciences it is to be noted that all these sciences have their com¬ mon presuppositions, or opinions and judgments taken for granted. It is not their business, as such, to discuss the nature, limits and validity of man's cognitive faculties, or the grounds upon which reposes his belief in his power to transcend the particular in his own experience and to know the extramentally real ; or to settle other problems of a theory of knowledge. Moreover, each one of these sciences has its own convenient and appropriate assumptions. For example, the mathematical and physical sciences assume some sort of reality for space and time; they also assume that these forms of man's apprehension are valid for the actually existing physical bodies, molecules and atoms, for the luminiferous ether and for the emana¬ tions from radioactive substances, *etc.* Physics and chemistry also take it for granted that all these physical beings actually move, combine, separate and enter into an indefinite variety of actual relations to one another. They also as¬ sume that forces have some kind of real ex¬ istence ; that these forces are actually conserved and correlated ; and that this takes place in some uniform and regular way; that is, they assume the existence and reign of so-called laws. The biological sciences make all these and still other asumptions ; for, under any of the numerous current theories of evolution, they claim to be able mentally to represent the order and causal connection of organic forms with one another, the reactions upon the changes in their environment and the laws of their rela¬ tions, as the actual history of real beings must have taken place, or probably did take place,

extending over wide areas of space, during enormous stretches of

time.

And in a word : The claim to know what is real and true is an assumption of all the particular sciences. And since the claim is an assumption of all the particular sciences, philos¬ ophy, as a so-called epistemology or theory of knowledge, becomes in this way the critic of them all. Moreover, as metaphysics or theory of reality, it examines critically the real mean¬ ing and validity of these assumptions. Thus it inquires: What is the real nature of space; and what is it really to be in space? What is the real nature of time; and what is it really to exist, or to continue, in time, etc.? Again, all real beings — both things and minds — are re¬ garded as occupying time; and things, at least, are said to occupy space. What, then, is it to occupy space and time; as the beings of the world of our experience must do, in order to be known as real? And still further: What sort of reality attaches itself to the conception of force (or its modern substitute in physics — namely, energy) ? and — more puzzling question still : What takes place in actuality when force is said to be stored, or set free; or when the energy is called that' of position or that of mo¬ tion? Motion itself, when considered as really taking place and as anything more than a sub¬ jective change in relations of apparent position, offers many puzzling problems to our philo¬ sophical inquiries. But, perhaps, most compli¬ cated of all is the question : What is it to be a cause, to cause and to be caused, etc.?

Moreover, the particular sciences, in depend¬ ence on their assumptions, are constantly in¬ creasing and modifying the stock of their con¬ clusions regarding the real nature of the beings of the world and regarding the actual char¬ acter of the relations between these beings, and of their transactions in the time of the world's history. All these principal conclusions are of interest to philosophy. It. accepts them gratefully, so far as they may be regarded as proved or highly probable, from the hands of the workers in the particular sciences.

This need of the critical and harmonizing work of philosophy becomes the more clear when we consider another side of human experi¬ ence with which another group of the particu¬ lar sciences attempts to deal. This group of sciences is especially connected with that branch of philosophy which deals with the problems of human life. But the solution of these prob¬ lems requires the consideration of certain facts of a quite different order from those with which the physico-chemical, or even the biologi¬ cal sciences, as such, are competent to deal. What are called value-judgments — or judg¬ ments which express not merely the mental apprehension of the truth of fact and law, but the

mental appreciation of the worth of certain facts, ideas, emotions and ideals — offer many interesting problems for the student of human life. Most of these problems concern the genesis, development, grounds and ultimate na¬ ture, of what men believe and think ((ought to be,® rather than what they conjecture or know, ((actually is.® But several of the particular sci¬ ences attempt to deal with this same class of problems. These particular sciences, too, al¬ though they are generally, in themselves, more philosophical than are the physico-chemical sci¬ ences, have their own assumptions and arrive

at a more or less defensible system of conclu¬ sions respecting matters of fact. For the feel¬ ings and judgments and ideals of what ought to be are themselves facts of human experience.

Philosophy and science come into peculiarly intimate and important relations, when the phe¬ nomena of the religious consciousness and reli¬ gious development of the race are subjected to study by the historical and psychological meihods. Anthropology and comparative history are mak¬ ing it more and more evident that man is es¬ sentially a religious being; while psychology is just beginning to show how deeply seated in all his various conscious functions, as well as in what is figuratively called his subliminal self, is the religious experience of man. The three allied sciences of psychology, anthropology and comparative history are, therefore, all exceed¬ ingly busy just now in the collection and dis¬ cussion of the data necessary to frame a so-called science of religion.

Numerous instances, to illustrate and enforce this function of philosophy in its relations to all the particular sciences, might be brought forward. But one or two are sufficient for the present purpose. The chemico-physical sciences, and the sciences of biology, psychology and anthropology, as influenced by the chemico-physical sciences, have been forming a more and more complete conception of man as, himself a piece of intricate mechanism, set in the totality of a vast natural system, a natural uni¬ verse, mechanically conceived. Thus placed, the individual and the whole race are regarded as strictly

determined in all their actions and de¬ velopment, after the analogy of a chemico-physical system or organism. But such a me¬ chanical conception of human nature, of its functioning and its development, has never seemed satisfactory to morals, to art or to religion. Hence there has been and still is a contention between the two — ((a long-standing and unsettled strife® — as to the right conception of man and of his place in the universe. Phi¬ losophy must mediate in this strife. It asks : What is it to be a cause; and are things and minds causally related in the same way? It aims to harmonize the demands of the physico¬ chemical sciences with the feelings, value-judg¬ ments and ideals, of the moral, sesthetical and religious consciousness of man.

Or again : the physico-chemical sciences think it right to insist upon such a conception of the Being of the World as shall represent it in terms of impersonal forces, and of a universal but unconscious and purposeless ordering of its own affairs. It (or Nature) behaves thus and so ; and it develops as it does, in accordance with its own inherent forces and immutable laws. These sciences are naturally and properly shy of what they call anthropomorphism. They think that the Being of the World is not scien¬ tifically conceived of, when the conception is anthropomorphic. But morals, and art, and re¬ ligion, are naturally and properly careful to conserve the interests of the feelings, judgments of worth and ideals, in which, so to say, their most valuable assets chiefly consist. They are, therefore, more indulgent to the imagination and intellect in their combined effort to con¬ struct a picture of the Being of the World, which shall not violate, but shall on the con¬ trary satisfy, these ethical, aesthetical and re¬ ligious interests. Such an effort is necessarily

anthropomorphic in a different way from that in which the chemico-physical sciences think it altogether safe to indulge themselves. Thus morals, art and religion make the Being of the World, good, and beautiful, and worshipful, — in brief, an ideal personal Being. That which the former sciences conceive of as an impersonal system of forces and laws the ideals of the mind prefer to conceive of as perfect ethical spirit, to be admired, worshipped and obeyed, as God. But philosophy must exercise, in a supremely important way, its harmonizing offices in the attempt at a solution of this great problem.

The number of subordinate problems, in the consideration of which the reconciling office of philosophy is helpful and indeed indispensable, is not small. But the end which philosophy diligently

and unswervingly pursues has already been described; it is the forming of a harmon¬ izing and unitary view of the world and of human life.

Philosophy and Psychology — Among the particular sciences there is one which stands in a peculiarly intimate relation to every branch of philosophical discipline. This science is psychology. Indeed, so intimately related are psychology and philosophy that some writers have insisted upon the impossibility of dis¬ tinguishing between the two. But this is an exaggeration of the real state of the case. The modern science of psychology aims to treat by scientific methods the phenomena of human con¬ sciousness in such manner as to form a valid conception of the nature, genesis and laws of the development of man's mental life. It, there¬ fore, admits of many subordinate and yet cog¬ nate divisions. It concerns itself downward, so to say, with the psychical life of the lower animals, with the facts and laws of. human physiology, and especially with the science of nervous phenomena ; and outward and back¬ ward in history, with anthropological and anti¬ quarian researches. In its method it does not neglect the study, from the psychological point of view, of the products of the human mind, in the other sciences, in literature, in art and in philosophy. It even regards history itself as man's will and intellect, written in the large. But psychology also leads onward and upward into philosophy, in a very imperative way.

The relations between psychology and phi¬ losophy are so ilitimate that, in many cases, the two have been — as has already been said — largely, or almost wholly, identified. This has especially been true of English philosophy. For example, Locke's (Essay Concerning Human Understanding* has been called — although im¬ properly — <(the most important offspring of modern philosophy.® But its author describes his purpose to be an inquiry (<into the original, certainty, and extent of human knowledge, to¬ gether with the grounds of belief, opinion, and assent.® This inquiry necessarily raises prob¬ lems which' we should now say belong to psy¬ chology, and also to that branch of philosophy which is called epistemology; but it does not completely cover the field of either psychology or philosophy. A modern English writer (Ward) has maintained that we cannot define psychology at all, because we cannot distinguish, at the outset, ((what takes place in the mind® from (<what takes place without® ; and a dis¬ tinguished German psychologist (Wundt) affirms that the partition of sovereignty be-PHILOSOPHY

tween psychology and philosophy is an abstract scheme which, in the presence of the real facts, always appears unsatisfactory.

The modern view, however, is distinctly favorable to separating, as far as possible, be¬ tween the spheres of psychology and philosophy, and to treating psychology as one of the par¬ ticular sciences. Thus understood, this science will collect, compare, analyze and discuss the phenomena of man's mental life, with a view to a tenable theory of the nature and development of the so-called human soul, or mind. Without doubt many of the particular problems of psy¬ chology may be and should be treated by the scientific method, and after making only such naive assumptions as are necessary to all the positive sciences. On the other hand, it is ap¬ parent that the deeper probing of even those problems almost irresistibly leads to such dis¬ cussions of the nature and authority of con¬ sciousness, and the nature and relation to the ˆoutside" world, of the human mind, as de¬ mand the methods of reflective thinking, in a word, need philosophizing. For example, the problem of sense-perception, or our knowledge of things by the senses, is primarily a problem for psychology. But the study of sense-percep¬ tion soon compels the recognition of a certain belief in the reality, both of the objects per¬ ceived and of the perceiving self, and in the actuality of relations of interaction between the two. From the beginning the different schools of philosophy have divided sharply over the nature, grounds and validity of this belief ; and over the nature, grounds and validity of the distinctions implied, between the perceiv¬ ing self and the object which is perceived.

In this connection it should also be said that psychology, like all the other particular sciences, has its own assumptions, or points of view and conception, which have not yet been

which its pursuit inevitably leads, it is itself dependent upon philosophy ; and, finally, that philosophy is something much more than a higher stage of psychology; for philosophy aims at a rational system of the conceptions and principles, presupposed or ascertained by all the particular sciences.

Divisions of Philosophy. — Like every other vast field of human research, philosophy needs to have made some specific allotment of its

different aspects, if not of its wholly separable portions. The problem of making this allot¬ ment is the problem of division. Its inquiry is: How many, and what, are the different main branches of the general subject? But like every other similar problem in scientific division, the realities to be considered do not follow any strictly logical order; nor do they observe definitely fixed bounds to their relations, in a way to favor only one method of division. For these reasons different writers on the subject have advocated different ways of dividing the general field of philosophy. Nor do we at¬ tach any super-eminent claims to excellence for the scheme of division we are about to propose.

In every attempt at systemizing the problems of philosophy, two considerations should be borne in mind: (1) These problems are all interdependently related to one another ; and they all sustain the relations which have al¬ ready been described, to certain of the par¬ ticular sciences. But, at the same time, (2) these various problems require treatment in a manner to contribute toward the attainment of the final purpose of philosophy. This we have seen to be a reconciling and uniting view of nature and of human life.

The following table expresses, according to our views, the truth of philosophy in the divi¬ sion of its different chief problems : —

I. Philosophy of the Real [Metaphysics, in the wider meaning of the word]

1. Theory of Knowledge

[Or Epistemology, Noetics]

2. Theory of Reality

[Ontology, or Metaphysics in the narrower meaning of the word]: with its two branches

I A. Philosophy of Mind B. Philosophy of Nature

(or of physics, etc.)

II. Philosophy of the Ideal

[Or of that which ought to be: Teleology]

1.

Idealology, or Rational •

Ethics, or the Ideal of Conduct [Metaphysics of Ethics, Moral Philosophy]

./Esthetics, or the Ideal of Art [Philosophy of the Beautiful]

Philosophy or Practical

III. Philosophy of the Absolute [or the Supreme Ideal-Real]

critically examined. For example, the study of the science of psychology assumes that the mind is real, and that the things it perceives by the senses are real; that knowledge of the mind and of things is possible; and, also, that the common-sense cenceptions of space, time, force, relation and all the other so-called cate¬ gories are sufficiently accurate for beginning its scientific pursuits. But philosophy challenges and criticises all these assumptions.

It would appear reasonable, then, to respect this intimate and necessary relation between psychology and philosophy, in the following way. The former, when pursued as a science, should be allowed the same rights in making its preliminary assumptions, and in arriving at its conclusions, as those which belong to all the particular sciences. But psychology should, as far as possible, recognize the fact that in the more speculative solution of the problems to

‘ This endeavors so to conceive of the Being of the World, or the Ultimate Reality, as to unite the conclusions of the other branches of philosophy.

Different Main Branches of Philosophy.—

It now remains only to describe, in the briefest manner possible, the different groups of prob¬ lems which correspond to the divisions of

phi¬ losophy indicated in the table given above. Among these we have to notice : —

The Theory of Knowledge or Epistemol¬ ogy. — In the second edition of his (Critique of Pure Reason* Kant affirms that (<philosophy re¬ quires a science to determine a priori the pos¬ sibility, the principles, and the extent of all cognitions.” Modifying this statement some¬ what, we may say that epistemology investigates the universal and permanent factors of our ex¬ perience in a way to answer these three ques¬ tions: (1) What really is knowledge? (2) What are the limits of human knowledge? and (3) What is the nature and guaranty of the cer¬ tainty of knowledge? The position of philos¬ ophy toward all these questions is that of criti-

cal inquiry. In taking this position the mind makes the effort to strip itself of all prejudices and even of all presuppositions ; and, by a process of patient and thorough reflective think¬ ing, to probe to the bottom its own cognitive powers. Thus we have before us the somewhat strange and intensely interesting spectacle of the knowing mind striving to know itself as knower : — to understand its own doubts and beliefs, the principles upon which its life of knowledge bases its existence and growth, and the nature and direction of the barriers to its knowing powers which are set by its own constitution, or by the fixed relations in which its activities stand to its own objects.

The limits of this article do not permit that we should discuss at length the problems them¬ selves and the answers arrived at by the dif¬ ferent schools of philosophy, in this branch of its manifold investigations. It must suffice to sav that the one most important point of dif¬ ference concerns the relation in which those mental states which we call cognitive — or states of knowledge — stand to extramental realities. Upon this point we find the extreme so-called idealistic school, or school of phenomenalism, holding that, for every individual mind, only its own states can be known ; or, in a word, all knowledge is of phenomena ; and all known phenomena must be subjective, or modifications of consciousness that can be relied on

only to tell the truth about themselves. On the other hand we find those who claim that knowledge is, always and essentially, some sort of an envisagement, or immediate apprehension, of reality; and that this claim is as true for things as for our own selves. Between these two views on the epistemological problem lie many others of a mediating sort.

Theory of Reality, or Ontology. — This same branch of philosophy is also properly called metaphysics, in the narrower meaning of the word. In its most general form its attention is directed upon the problem, What is reality? More elaborately expressed we may say that metaphysics is the critical and sys¬ tematic exposition of those necessary concep¬ tions and presuppositions which enter into man's cognition of what he considers to be real. Popularly said, this branch of philosophy strives to answer the question: What is it to be real?

Now even a superficial and preliminary ex¬ amination is enough to show that there are certain conceptions which the mind, always and of the strictest necessity, applies to every kind of a real object. Such conceptions have been called ˆcategories.® For this reason, a doctrine of ontology has sometimes, not inaptly, been spoken of as a criticism of the categories,— meaning, by this word, the conceptions which are always and necessarily applied to all beings considered to be real, and to all events con¬ sidered to be actual (as distinguished from non¬ existent or imaginary).

But there are two different classes of real beings — namely, minds or selves, and things or non-self-like existences. And these two do not really exist under precisely the same con¬ ditions, or display precisely the same essential qualities, or enter into preciselv the same rela¬ tions, whether among themselves or between each other. Things and Minds are, then, es¬ sentially unlike in respect of some qualities which they must have, respectively, in order to

exist at all. Moreover, the kind of energy which things and minds display, and the actual dynamical relations into which they can enter with other beings, are markedly different. General metaphysical philosophy is divided, then, into the Philosophy of Mind and the Philosophy of Nature.

The Philosophy of Mind. — The primary

object of this branch of philosophy is to deter¬ mine what claim to

reality, and to a place in the system of real things, can be established for the Ego, or subject of mental states. The skeptical and phenomenalistic view regards the mind as merely a succession of states. The now old-fashioned theory of mental substance regarded man's soul as some sort of an entity that might be conceived of as existing in reality, without, however, doing anything or showing its peculiar forms of active life in any way. The modern theory of the nature of mind is more dynamical, as it were. It finds the essential core of the being of mind in activity; and it tries to deter¬ mine the nature of this being by studying the mental life as a development of more and more complex combinations of permanent forms of activity. This form of examination it applies to the critical inquiry after an answer to such problems as follows : What is it really to be as all minds are? What is the character of that unity which belongs to the mind? — at least, in its normal and developed condition, however such unitary being may be disturbed by double (or triple) consciousness, and other similar phenomena. Thus the inquiries of this branch of philosophy have a very important bearing on the questions whidh religion raises with re¬ gard to the nature, origin and probable destin}' of the human soul, and of the race.

The Philosophy of Nature. — It is not suf¬ ficiently recognized that a very large proportion of the entire body of the modern natural and physical sciences is really metaphysical, in the strictest meaning of the latter term. Moreover, the metaphysics of the chemico-physical and bio¬ logical sciences is of the most subtle, elaborate and difficult character. No one can doubt this who has attempted even partiallv to understand the modern conceptions of atoms, electricity, ether, physical energy, the constitution of mat¬ ter and the nature of the relations sustained to one another by different material existences. And, indeed, the new discoveries as to the ex¬ istence and behavior of radioactive substances, and their emanations, of germ-cells and their developments, are complicating enormously the metaphysics of these sciences. The truth is that the metaphysics of things (or the philosophy of nature) is much more obscure, complex and at present purely tentative, than is the meta¬ physics of mind. On the other hand, the amount of patient research and the order of talent given to this branch of philosophy at present are such as to encourage the most hopeful atti¬ tude toward its future developments. What are the essential qualities, what the universal and permanent relations, what the laws and final purposes, of material things, are philosophical questions which physics, chemistry and biology are now investigating in a most productive manner.

Ethics, as the Philosophy of Conduct. —

The opinions of men as to the right and wroner of conduct may profitably be studied from the historical point of view. A study, by the meth-

ods of psychology, of the nature of man as fitted for conduct and for the development of moral character, furnishes further material for an attempt at a science of ethics. But all such empirical methods of examining the problems of morality only raise, but do not solve, the more ultimate and profoundly interesting problems. Among these are such as the fol¬ lowing: What is the essential nature of the morally right? What is the authority and guar¬ anty of the feeling of obligation to do the right? (As Kant would propose the question: How can there be a categorical imperative?) But, finally, what ground, that is universal and unchanging, can be found for the morally right, in the real being of the world? Such questions as these define the sphere of the metaphysics of ethics.

Closely akin to these are the questions pro¬ pounded to aesthetics.

ˆEsthetics, as the Philosophy of the Beauti¬ ful. — Here again the historical study of art and of the development of opinion and feeling re¬ specting ‘beautiful objects, as well as the analysis of so-called aesthetical consciousness, only raises, but does not answer, the questions of chief in¬ terest to philosophy. Such study shows that man has always regarded the characteristics of beauty as not merely subjective, but as really belonging to the object. dhe beautiful is dis¬ tinguished from the sensuously agreeable by the possession of two characteristics in a special way: these are objective validity and ideal worth. Hence the inquiry arises for a ground of that which seems to human consciousness to be possessed of these characteristics ; and that ground philosophy aims to place in the Being of the World. But this is equivalent to regard¬ ing this being as an ideal life, conceived of after the analogy of the human spirit It is this feeling of kinship for the beautiful m nature, of which even the rudest and most savage of mankind show manifest signs, that led the poet (Byron) to exclaim:

“ Are not the mountains, waves, and. skies a part

Of me and. of my soul, as 1 of them .

It is obvious, however, that such pei sonify¬ ing of that system of things which science calls nature, must provoke much skeptical criticism , whether the personifying take the form of con¬ structing this system in terms of the ideal ol ethics or of the ideal of aesthetics. In this way the mind is challenged and directed in its ie-newed effort to perform the supreme task of

systematic philosophy. «

The Philosophy of the Absolute (or Su¬ preme Ideal-Real.)- All the other branches, therefore, lead up toward and are auxiliary to the philosophy of the absolute. In this way the reflective thinking of humanity makes its con¬ stantly renewed and developing, but never completely satisfying and final, effort at a supreme synthesis. It attempts to reach such a conception of the Being of the World, or the universe considered as the manifestation of an essential unity, as shall accor.d with the facts and laws of the particular sciences, -both physi¬ cal and psychological, and at the same time har¬ monize their differences and seeming contradic¬ tions. In this attempt metaphysics comes into closest relations with the so-called philosophy

Beskles the phenomena of man’s ethical and

artistic life and development, we have to notice those of his religious life and development. The conception of the Being of the World to which the highest religious development _ of humanity has attained is that of a perfect ethical spirit, into moral and spiritual relations with whom man may come by voluntary acts of com¬ munion and service. Philosophy, therefore, has before it the final problem of striving to satisfy all the various demands of man’s many-sided nature and development in the conception which it presents of the Ultimate Reality, or the World-Ground. The appropriate name which philosophy bestows upon its conception of this unitary being is the Absolute. [It should be borne in mind, however, that such terms as “absolute,® “infinite,® “unconditioned,® etc., can never be employed in a quite unlimited way. Thus “absolute® means freed from conditions of dependence, not from all conditions what¬ ever; “infinite® means, without certain kinds of limitation, not wholly

indeterminate, a merely negative conception, etc.].

The most profound and important questions debated by the different schools of philosophy, from the beginning of its existence in any sys¬ tematic form up to the present time have, there¬ fore, concerned the nature of, and relation of mankind to, this so-called Absolute. But the differences of opinion existing between these different schools mav be best summarized by saying that they concern the character and the amount of personality which may oroperly be attributed to “the Absolute.® On this point we find one extreme claiming that the two concep¬ tions — namely, of absoluteness and personality — are not only incompatible, but antagonistic. On the other hand, the conclusions of psy¬ chology, philosophy of mind, epistemology , and even a theory of reality based upon the con¬ ceptions of science, are being summoned to show that all human thinking and living is con¬ ditioned upon the essential personality of the Absolute, or likeness of the environing world to the human self. And perhaps it is no exaggera¬ tion to say that some such form of an ideal-real¬ ism is just now the kind of philosophy which divides the field of reflective thinking with those who still cling to the skeptical position of phenomenalism.

The Benefits of Philosophy — It is custom¬ ary to bring the ceaseless discussion of the ulti¬ mate problems of philosophy, and the alleged fruitlessness of this discussion, as a serious and even conclusive charge against the usefulness of philosophy. To answer this charge fully it would be necessary to pass in review the entire history of man’s development in reflective think¬ ing. This history would show conclusively that every great movement in science, art, morals, religion, and even in politics and social affairs, has been profoundly influenced by the pre-exist¬ ing and current philosophical opinions. And if this influence has ever been injurious to, or re¬ strictive of, human welfare, its only counter¬ acting influence has arisen out of the same source, — namely, -the renewed and better use of human reason in the discovery of the complete and final truth touching the nature of reality.

But it is not true that the discussion of philosophical problems has been fruitless or, on the whole, harmful to the best interests of man¬ kind. On the contrary, it may be successfully maintained that no other form of man’s higher

life ha-s made more essential progress, or has contributed more to other forms of progress, than has philosophy ; — when the term is under¬ stood in the broad and generous way in which we have tried to interpret it. For in philosophy, man's reason reaches its supreme expression of the striving after what is ideally best; and this is to know one's self and one's fellows, the world and God, in a more profound manner, and so as to satisfy the entire intellectual, ethi¬ cal. aesthetical and religious needs of the soul.

It will appear that our effort has been, not to advocate any special system of philosophy, but, the rather, to describe what philosophy in its modern form essentially is; what method it employs for the solution of its problem; and what are the orincipal problems which give oc¬ casion for division into the main types of philos¬ ophy. Even this limited discussion of the sub¬ jects, however, suggests certain considerations which concern every man's choice of position toward philosophy in general and toward its contending systems. We mention some of the more important of these considerations :

1. The method of all philosophy is essentially rationalistic. To philosophize is to use the rea¬ son, or the reflective powers of the human mind, in the search for an answer to the profounder problems of existence and of human life. Criticism, and even scepticism of the most unlimited kind, have no other method that is tolerable to the most shallow conception of what philosophy is, than the rationalistic. In this meaning of the word, all philosophical opinion is some form of Rationalism.

2. Philosophical criticism, like everv other use of the critical faculties, implies an indestruc¬ tible faith in the authority and validity of rea¬ son. The very last and most impossible thing for a mind endowed only with powers of sensa¬ tion and animal intellection to accomplish, or even to undertake, would be the task of self-criticism. From this it follows that a complete and unlimited scepticism is suicidal. Especially in the form called solipsism, or skeptical ideal¬ ism, is this statement manifestly true. You cannot argue that only knowledge of the self by the self is possible, without implying the exist¬ ence of other selves, known by the self that argues to be really existent and actually in the exercise of essentially the same rational facul¬ ties.

3. It follows further that all philosophy is necessarily to some extent realistic, is indeed some form of Realism. To begin the process of reflective thinking with the denial of all cogni¬ tion of actual facts and real existences is to at¬ tempt the impossible. All thinking, and espe¬ cially all philosophizing, assumes some ground of standing in actual happenings and real exist¬ ences. Something is real. But what is real ; and what is it to be real?

4. But especially true is it that every system of philosophy is, essentially considered, some of Idealism. The existence and potent influence of human ideals are as obvious and determining of opinion, in the most rigidly mechanical doc¬ trines of the human soul and of the universe of things, as they are in the wildest flights of Plato's imagination in the (Timaeus,5 or in the most mystical of the writings of Brahmanism or Buddhism. The question remains for philos¬ ophy ever anew to strive the better and the more fully to answer: What are the ideals

actually followed in the constitution and on¬ goings of the world of things, and in the con¬ stitution and development of the human soul?

5. Philosophy, like all the other endeavors of the human mind, and like the particular sciences and special forms of social union un¬ dertaken by the race, is under the laws that control all human development. These laws are involved in immenselv complicated phenomena, and as yet are far from being brought within the grasp of the human understanding. But the facts suffice to warrant the affirmation that philosophy, like all other forms of human de¬ velopment, is essentiallv teleological. It is aimed toward some far-distant goal, in the supreme excellence of which the ethical, aesthetical and religious ideals of reason en¬ courage and support an undying confidence.

Bibliography. — For the detailed opinions of the writers on the problems of philosophy, besides the introduction to Philosophy, > the following treaties may be consulted: Philoso-phv of Mind} ; (A Theory of Reality) ; (Philosophy of Knowledge) ; Philosophy of Conduct*; Philosophy of Religion) (2 vols.). The following list is chosen from books most accessible and most likely to be profitable for the average reader:

General Philosophy. — Kulpe, introduc¬ tion to Philosophy) ; Robertson, (Elements of General Philosophy) ; Watson, (An Outline of

Philosophy* ; Russell, B., (The Problems of Philosophy > ; Russell, J. E., (First Course in Philosophy* ; Sidgwick, H., Philosophy, its Scope and Relations) ; Hoffding, H., (The Problems of Philosophy) ; Bergson (Creative Evolution. >

Theory of Knowledge. — Hobhouse, (The Theory of Knowledge* ; Ormond, (Foundations of Knowledge) ; Enriques, Problems of Sci¬ ence^; James, W., Pragmatism* and (The Meaning of Truth) ; Pearson, K., (Grammar of Science) ; Bergson introduction to Metaphy¬ sics. }

Metaphysics. — Bradley, (Appearance and Reality* ; Mackenzie, (Outlines of Meta¬ physics^; Bosanquet, (Nature and Value of Individuality) ; Royce. (The World and the In-dividuaP ; Taylor, A. E., Plements of Meta¬ physics. }

Philosophy of Mind and Matter. — Hol¬ man, (Matter, Energy, Force and Work) ; Mach, E., (Analysis of Sensations) ; Stallo, (The Concepts and Theories of Modern Physics* ; Ward, (Naturalism and Agnosti¬ cism. }

Ethics.— Seth, <A Study of Ethical Principles) ; Paulsen, (A System of Ethics) ; Sidg¬ wick, (Methods of Ethics*; Wundt, <Ethics) ; Moore, G. E., <Ethics) ; Dewey and Tufts Pthics* ; Palmer, G. H,, (The Nature of Goodness) ; Royce, (The Philosophy of Loyalty) ; Mezes, Pthics, Descriptive and Explanatory> ; Aristotle, (Nicomachean Ethics) (trans. by Peters).

^Esthetics.— Marshall, Pain, Pleasure and ./Esthetics* ; Santayana, (Sense of Beauty) ; Puffer, (The Psychology of Beautv) ; Begg, (The Development of Taste) ; Broze, B., (2Esthetics* ; Davies, (Art in Education and Life.*

Philosophy of Religion.— James, W., (Varieties of Religious Experience) ; Bowne, Philosophy of Theism* ; Pfleiderer, Philoso-

phy and Development of Religion* ; Tiele, Ele¬ ments of the Science

of Religion *; Balfour, (The Foundations of Belief* and (Theism and Humanism*; Ward, Pluralism and Theism*; Caird, Ed., (The Evolution of Religion) ; Fair-bairn, (Philosophy of Christian Religion*; Hocking, W. E., cThe Meaning of God in Hu¬ man Experience) ; Hoffding, H., (The Philos¬ ophy of Religion* ; Pringle-Patterson, <The Idea of God in the Light of Recent Philosophy.*

George Trumbull Ladd, Emeritus Professor of Moral Philosophy and Metaphysics , Yale University.

PHILOSOPHY, History of. The history of philosophy has a peculiarly close and vital relation to philosophy itself. It may even be said to form an essential and integral part of philosophical discipline. While a knowledge of the history of every science is of great service in aiding one to comprehend its standpoint and fundamental hypotheses, insight into the genesis and historical development of philosophical problems and conceptions is in philosophy a primary and essential requirement. For, in the first place, these conceptions are not the work of any single mind, or the possession of any particular school. They are the outcome of a long line of development to which many ages have contributed, and in which many individ¬ uals have borne a part. Even where different systems seem to be directly opposed as they successively make their appearance in history, the new is never a mere denial or displacement of the old, but is connected with it by positive lines of relation. And ultimately nothing which is of value is ever lost, but is taken up and preserved in the later systems. In short, the history of philosophy presents an account of the evolution of human thinking in one of its most universal aspects. It deals with the develop¬ ment of the process in which the race has at¬ tempted to express in scientific form its views regarding the nature of the world and its in¬ terpretation of life. These are problems to which the human mind must in every age seek to find an answer. The form of these inquiries, however, can never remain unchanged. For the object that every philosophical thinker seeks to understand is the world as it is known to him and to his generation. As new material .is brought to light by the advances of the special sciences, or as the changing interests of practi¬ cal life bring now this and now that aspect of reality into prominence, and thus leading to a modification of the standards of value, the problems of philosophy get new formulations, and the old systems show their inadequacy and need of revision. We mav, therefore, say that the history of philosophy gives an account of the process in which the human spirit becomes constantly more clearly gnd definitely conscious of itself and its relation to the world. The task of philosophy, which accordingly consists in de¬ fining more clearly at once the nature of the self and of the world, must be

undertaken anew by the thinkers of each generation. No age can rest in the definitions of the past. But, on the other hand, it is only in the light of the past that the thinkers of any particular age can understand their own problems. It is only by building upon the foundations already laid, by continuing the work of their prede¬ cessors, that they are able to accomplish any~ thing of value. A philosopher s best originality

consists in developing, and thus rendering more exact and definite, the thoughts of those who have gone before him. It is true that he must work in the light of the science and practical insight of his day; but, in order to produce valuable results, it is necessary that his reason should be illumined by the philosophical con¬ ceptions and principles which have proved their fruitfulness in the great systems of the past.

There is, of course, a fundamental difference between this conception of the history of phi¬ losophy and that formerly prevailing which looked on it as a record of the opinions of in¬ dividual thinkers whose theories had no positive or essential relation to one another. From this standpoint, the history of philosophy possesses merely an antiquarian interest. It leads us through a road strewn with the wreckage of dis¬ carded theories and broken-down systems. Oftentimes the diversity of opinion which it presents is taken as a proof that the goal which philosophy seeks to reach is unattainable, and its problems insoluble. In spite of the preva¬ lence of the notion of development, this view of the history of philosophy still persists in some quarters. The conception of the history of phi¬ losophy as a process of development was, how¬ ever, clearly formulated by Hegel (q.v.) a cen¬ tury ago. This conception gave a new signifi¬ cance to the historical facts and aided in arous¬ ing a new interest in their investigation. By Hegel himself, however, the development was conceived in a wholly logical sense. That is, he conceived the progress from age to age as de¬ termined wholly by the inner necessity with which inconsistent and inadequate thoughts lead on in a regular and absolutely necessary order to their own refutation and correction. As a result of this logical interpretation, Hegel was led to force the facts of the history of philosophy into an artificial scheme of thesis, antithesis and synthesis, corresponding to the universal thought movement as laid down in his (Logic.* Moreover, in the light of this logical interpretation, the history of philosophy appears as an impersonal process of develop¬ ment characterized by inner necessity, where the individual thinkers seem to determine noth¬ ing through their free personality, but merely to represent a certain inevitable stage in the evolution of the

thought of the race. In spite, therefore, of the great service which it has rendered, Hegel's conception has serious de¬ fects. For while fully admitting the import¬ ance of the logical factor, it is impossible to forget that the development of philosophy is the work of individual thinkers, whose con¬ ceptions spring from their own personal life, and that its progress is also modified by the general culture and prevalent interests of the times in which it makes its appearance. In in¬ vestigating the history of philosophy, then, these various factors must be given due place. The task which investigation in this field has to per¬ form has been stated under the following three headings by Windelband ((History of Philos¬ ophy, > § 2, 6) : (1) ((To establish with preci¬ sion what may be derived from the available sources as to the circumstances in life, the mental development, and the doctrines of in¬ dividual philosophers; (2) from these facts to reconstruct the genetic process in such a way that in the case of every philosopher we may understand how his doctrines depend in part

upon those of his predecessors, in part upon the general ideas of his time, and in part upon his own nature and the course of his education ; (3) from the consideration of the whole to estimate what value for the total result of the history of philosophy belongs to the theories thus estab¬ lished and explained with respect to their origin.®

Philosophy, so far at least as it forms a part of the culture of the Western nations, took its rise in Greece in the 6th century b.c., and was developed by the independent thinking of the people of the Western world. Whether there existed anything that may properly be called philosophy among any of the Oriental peoples, particularly among those of India and China, or whether the so-called Oriental philosophy does not rather belong to the history of religion, are questions that may here be left undecided. Philosophy, as it is known to the Western world, may conveniently be divided into an ancient, a mediaeval and a modern period. Ancient philosophy is almost entirely the product of Greek thought, and was first de¬ veloped in the Greek colonies of Asia Minor in the East, and in Sicily and Italy in the West.

It reached its culmination in Athens, and was finally cultivated at Alexandria, and at various points throughout the Greco-Roman world. Greek philosophy falls naturally into the pre-Socratic period, the Socratic School, including Socrates, Plato and Aristotle ,(qq-v.) and the post-Aristotelian Systems. In this classification the Sophists may perhaps be regarded as a transition link between the first and second periods. Pre-Socratic philosophy was occupied mainly with attempts to explain the nature of the external world and the character of those physical phenomena that most readily attracted attention. According to the generally received account, philosophy had its origin in the 6th century with Thales of Miletus, in Asia Minor, who was followed in the same city by Anax¬ imander and Anaximenes. We say that philos¬ ophy, which in its beginnings included all the sciences, had its origin with these men, because, so far as we know, they were the first to ad¬ vance beyond mythologies, and definitely to raise and seek to answer the problem regarding the natural causes and principles of the world. A little later Pythagoras (q.v.) and his school, who flourished in lower Italy, did good service in developing the mathematical sciences, and also proposed a universal explanation of things couched in terms of numbers. Lower Italy was also the home of the Eleatics, whose greatest representative, Parmenides, taught the unchang¬ ing and unitary character of that which truly is. About the same time Heraclitus was main¬ taining at Ephesus, in Asia Minor, that every¬ thing is in process of change and becoming, and that nowhere is there to be found any permanent' static being. To reconcile the op¬ position between the views of Parmenides and Heraclitus, both of which seemed to be justi¬ fied by experience, later thinkers, Empedodes, Anaxagoras and the Atomists, while differ¬ ing in important respects from each other, agreed in adopting a plurality of fixed, un¬ changing elements which are constantly .form¬ ing new combinations by their union and being dissolved in turn. Thus while elements remain unchanged, what we call things are in constant process of transition.

The work of the Sophists was almost en¬ tirely critical and destructive. They are signifi¬ cant, however, as first calling attention to the subjective side of experience. This took the form of an assertion that knowledge exists only as sensations and feelings in individual minds, and that, therefore, there is no standard beyond the individual of truth or of moral values. The Sophistic skepticism was met and refuted by Socrates and his pupil Plato (q.v.), who showed, by a more thoroughgoing analysis of the nature of conscious experience, that in reason, as opposed to sense-perception, man pos¬ sesses a standard both of theoretical and of practical truth. Aristotle organized the

special sciences on the basis provided by his predeces¬ sors, and defined their field of inquiry, while at the same time applying and making more con¬ crete in the field of philosophy the idealistic principles of Plato. During the post-Aristote¬ lian period, the philosophical interest was mainly ethical and practical. The reasons for this are to be found in the political conditions of the time. The Greek states had lost their independence, and when the social and political institutions, which embodied the laws of life and conduct for the Greek in objective form, had thus collapsed, it became necessary for the individual to seek to find in his own nature the principles of practical guidance that life de¬ mands. At the same time, theoretical problems were not entirely abandoned, though in general they were subordinated to practice. Both the Stoics and Epicureans made philosophy include logic and physics as well as ethics, but both alike regard the two former disciplines merely as means, and the last alone as the true end. These two schools were founded at Athens at very nearly the same time (about 300 b.c.), the former by Zeno (q.v.), and the latter by Epi¬ curus (q.v.). The Stoics taught a system of materialistic pantheism, which they drew largely from Heraclitus. In ethics, where their teach¬ ings are of the greatest importance, they em¬ phasize the necessity of self-restraint and of independence of external goods and outward circumstances. They maintained that the high¬ est good consisted in the attainment of virtue, and that this was entirely different in character from personal happiness or satisfaction. The school of Epicurus, on the other hand, based their account of the physical world upon Atom¬ ism, and in ethics they regard the rational pur¬ suit of pleasure as the end of life. Skepticism made its appearance in Greek philosophy with Pyrrho (q.v.) (360-270 b.c.), in the school of the Academy with Arcesilaus about the time of Alexander the Great, and among a group of later thinkers in the 3d century of the Christian era. We find the skeptical arguments and diffi¬ culties which are familiar in modern times elaborated in great detail and urged with re¬ markable acuteness by these writers, particu¬ larly by Sextus Empiricus. Eclecticism (q.v.) flourished especially at Alexandria, where Philo (q.v.) sought to unite Hebrew theology and Greek philosophy, and among the Romans, where writers like Cicero (q.v.) selected freely whatever doctrines commanded themselves in the various systems of Greek thought. Greek philosophy ends in Neo-Platonism (q.v.), which is a species of mystical theosophy. It abandons the attempt to discover ultimate truth by means of logical thought, and seeks to comprehend all

things in their immediate relation to God by inducing, from time to time, a state of ecstasy in which the limitations of ordinary conscious¬ ness are transcended, and the highest truths are apprehended in direct intuitive vision.

The ideas and conceptions introduced by Christianity gave a new impulse and direction to philosophical inquiry during the Middle Ages. During this period there was developed the con¬ sciousness of a fundamental opposition between God and the world, and in general between the spiritual and the natural. This shows itself in sharp division between Church and State, this life and the future life, priests and laity, *etc.* Along with this, there went also a sense of man's natural helplessness and lack of freedom, and the futility of all his attempts to save him¬ self without divine grace. Mediaeval philoso¬ phy may be divided into two main periods, a Patristic and a Scholastic period. These may be described in the words of Ueberweg: ((In the patristic period, philosophic thought stands in the closest relation with theological speculation, and oo-operates in the development of Christian dogma. In the scholastic period, it passes into the service of theology, being employed merely to reduce to scientific form a body of dogmatic teaching for the most part already at hand, by introducing a logical arrangement, and bringing to its support philosophical doctrines from ante- ■Christian antiquity.® The work of the Fathers of the Church reached its culmination in Saint Augustine (q.v.) (354-430 a.d.), w'ho, after his conversion to Christianity, employed his pro¬ found philosophical genius in explaining and justifying the theological dogmas of the trinity, of predestination and of the origin and nature of the human soul, *etc.* Scholasticism (q.v.), as Hegel has remarked, is modern science in embryo. It is the form under which the thought of the Western nations was molded and schooled for long centuries. Ostensibly, at least, philosophy during this period was entirely subordinated to the accepted theological doc¬ trines. Credo ut intelligam was its professed motto. This subordination, however, was never absolute, and in every generation there were thinkers who modified, and to a greater or less extent rationalized, the teachings of the Church. In spite of the subjection of thought to author¬ ity, the history of the whole period shows a gradual though slow awakening on the part of European peoples to the rights of reason, a growing consciousness that thinking, to exist at all, must be free and

independent. Early scho¬ lastic philosophy was mainly under the influence of Plato and the Neo-Platonic writers. Of Aristotle only the logical writings in the Latin translation of Boethius (q.v.) were known. The most noted names of this period are John Scotus Erigena, Anselm of Canterbury and Abelard (qq.v.). About the beginning of the 13th century, the Catholic scholars became ac¬ quainted, through the Arabians, with the other writings of Aristotle; and the great Dominican teacher, Albert Magnus (q.v.), was quick to see how the system of the ˆheathen® philoso¬ pher might be made the support and bulwark of the Church. This led to a revival and transfor¬ mation of scholasticism. The doctrines of the Church found a new and broader philosophical basis in the profound system of Albert's pupil, Thomas Aquinas (q.v.) (1225-74), which was, however, sharply opposed on some points by

the subtle dialectician, John Duns Scotus (q.v.). During the 11th century, and during the first part of the 12th, and again in the last period of scholasticism, philosophical discussion centred round the question of the universal and its rela¬ tion to the particular object. Realism (q.v.) maintained that the universal is the primary and fundamental reality in which and through which alone particular objects can exist (uni-versalia ante rent). Nominalism, on the other hand, contended that the universal was nothing more than a name given to a number of par¬ ticular objects, and that, therefore, only these have any real existence. It is at once evident that this controversy is only a particular form of the most fundamental problem of all phi¬ losophy, the relation of the one and the many. It is also interesting to note that the reappear¬ ance of nominalism in the later scholastic period was coincident with, and indeed an expression of the same spirit as, the new interest in nat¬ ural science and in the observation and study of particular objects by empirical methods.

At the time of the Renaissance (q.v.), phi¬ losophy felt the same quickening influence which manifested itself in other fields. This renewed interest was first directed toward a study of other ancient systems besides that of Aristotle, who, as the official philosopher of scholasticism, was in many quarters condemned and decried. Plato and the Neo-Platonists were especially prized, and a Platonic Academy was founded at Florence by Cosmo de' Medici. This revival of the ancient learning was quickly followed by independent investigations in the field of physical phenomena, and to some extent also in that of the phenomena of mind. Here belong the names of Nicolaus Cusanus, Coper¬ nicus, Kepler, and, though later, that of Galileo (qq.v.). The

results gained by the new science were combined into a monistic and pantheistic view of the world in the philosophical system of Giordano Bruno (q.v.). One -of the most important steps taken by these early investigat¬ ors of nature was the development of the con¬ cept of mechanical explanation, and the formu¬ lation of its principles in the laws of motion. Descartes (q.v.) applied the conception of mechanism to all the phenomena of the physical universe, reducing them to terms of motion and extension. Descartes was no materialist, how¬ ever, but maintained the existence of spiritual substances, operating according to their own laws, alongside, and largely independent of. the world of physical bodies. Thomas Hobbes (q.v.), whose theories in ethical and political philosophy are of great historical importance, was the first thinker to be led by the principles of modern science to reduce, all classes of phe¬ nomena, phvsical and mental alike, to mechani¬ cal terms.

One of the most striking characteristics of early modern thought is found in its conscious¬ ness of new problems, and in the resulting sense of a complete break with the past. It was felt that up to this time little or nothing had been discovered, with the exception of mathematics, which could pass as real knowl¬ edge. The first demand was for a right method of discovering truth. It was confidently as¬ sumed that when this fundamental need was supplied, diligence and co-operation on the part of scientific workers would in a short time re¬ veal all of the important laws of nature. The

search for a method of scientific procedure gave rise to Rationalism and Empiricism (qq.v.), the two distinctive philosophical schools in the 1/th and 18th centuries. Rationalism endeavors to imitate the procedure of mathematics, which it regarded as furnishing the one species of cer¬ tain knowledge. It seeks to start, as mathe¬ matics does, with a number of axiomatic prin¬ ciples; and by analyzing these, and showing the necessary results to which they lead, it will ex¬ hibit its conclusions as a system of demonstra¬ ble truth. In this theory of knowledge, obser¬ vation of particular facts is not emphasized: the

organ of knowledge is reason, which pro¬ ceeds by the road of analysis and deduction. This method, first formulated and employed by Descartes, was most consistently applied by Spinoza (q.v.), and continued with some modi¬ fications and additions in the systems of Leib¬ nitz and Wolff (oq.v.). The empirical method, with its inductive procedure, was emphasized and stated in eloquent terms by Francis Bacon (q.v.) in his (Novum OrganumU Locke's (Essay Concerning Human Understanding, > however, must be regarded as the starting point of philosophical empiricism. For it refutes in detail the doctrine of innate ideas, and main¬ tains, as its fundamental thesis, that all knowl¬ edge is derived from experience, and that ex¬ perience is given as definite and particular con¬ tents which are known to the mind through external sense-perception or through internal observation. Thus the starting point and the essential character of knowledge are found in particular facts passively perceived by the mind, while the activities of mind and the processes and principles of reasoning are pro¬ portionately minimized and given, a subordinate place. In the development of this doctrine, Bishop Berkeley (q.v.) transformed Locke's «plain historical account® of mind into a sys¬ tem of empirical idealism. A little later, David Hume (q.v.), developing the empirical princi¬ ples with the consistency and thoroughness of genius, arrived at utter theoretical skepticism regarding any rational basis of experience. Empiricism was also adopted and developed in France, notably by Condillac and Helvetius (qq.v.), but soon passed into naturalism and materialism, which finds its most pronounced expression in von Holbach's (System of Na¬ tureˆ Although usually taking an agnostic position on ultimate philosophical questions, empiricism has continued to have its representa¬ tives, among whom we may mention the names of David Hartley, Joseph Priestly, James Mill and his son, John Stuart Mill, and Alexander Bain (qq.v.). These writers have dealt mainly, though not exclusively, with psychology, where they have emphasized various forms of the principle of association as a connecting law of mental phenomena.

The skeptical conclusions of Hume were opposed in the name of Common Sense by Thomas Reid (q.v.), the founder of the Scot¬ tish school, and by his followers, of whom the most noted are Dugald Stewart (q.v.) and Sir William Hamilton (q.v.) in Scotland, and in America, President James McCosh of Princeton, and President Noah Porter (q.v.) of Yale University. Reid's method, which was somewhat refined and developed by his later followers, consisted in an appeal to the com¬ mon sense of the plain man in order to estab¬

lish the existence of certain fundamental prin¬ ciples that were perceived intuitively and imme¬ diately both in the realm of theoretical and of practical experience. This method serves to emphasize the fact that there is much in expe¬ rience which is overlooked by the empirical ac¬ count; but it was necessary that philosophy should define and exhibit this by a more sys¬ tematic and scientific method of analysis. This Kant accomplished mainly in his epoch-making work, the (Kritik of Pure Reason. } Kant showed that experience was not constituted simply by a given content, but that, in order that it should exist, there was also necessary a system of interpretative forms or functions on the part of the mind, and that these find their unity and complete expression in the nature of self-consciousness. He thus at once reconciled and completed the partial views of Empiricism and Rationalism, and, at the same time, fur¬ nished philosophy with a new principle and a new method. Nevertheless, Kant himself failed to perceive the full scope of his own principles, and maintained that knowledge can only deal with phenomena or appearances, while the world of things in themselves remains beyond the reach of man's knowing faculties. In the (Kritik of Practical Reason, } however, he showed that it is admissible and necessary in the light of our moral experience to make certain postulates regarding the nature of the ultimate realities, though these postulates never attain the rank of knowledge, but must always remain matters of faith. In the (Kritik of Judgment, 5 Kant attempted to unite the standpoints of the other two critiques, but the result, though very suggestive and historically important, was left in a somewhat indefinite and unsatisfactory state. Kant's philosophy was at once taken up and made the starting point of a notable line of development by three great thinkers, Fichte, Schelling and Hegel (qq.v.). These men all abandoned the absolute distinction be¬ tween phenomena and thiners in themselves, and proceeded boldly in somewhat different ways to construct systems of Idealism (q.v.). To de¬ scribe these briefly, we may say that Fichte's system is Ethical Idealism, finding in the moral life the ultimate explanation and raison d'etre of the world; that Schelling's main interest is in external nature, which he interprets in terms of Evolutionary Idealism ; while Hegel's system is more universal in its scope, and attempts to embrace in a vast logical scheme the complete process of the Absolute Thought, including all the facts of man's life in their historical evolu¬ tion, as well as the laws and forms of the phys¬ ical universe. Hegel's philosophy of nature cannot be regarded as successful ; and his sys¬ tem contains formal paradoxes and artificialities that have prevented its real value from being generally appreciated. But, with all its defects, it can scarcely be doubted that it furnishes the most complete

and satisfactory sjmthesis of ex¬ perience that has yet been formulated, and that the progress of modern thought is constantly developing and rendering more concrete its principles. It was Hegel's great achievement to grasp clearly for the first time the conception of history as a rational organic process, and thus to rise to the notion of a dynamic and concrete universal. His ideas have, therefore, proved exceedingly fruitful in the development of social and political philosophy, as well as

in the more usual fields of metaphysical speculation.

In Hegel's postulate that the real is the rational and must disclose its nature to thought, we have the culmination of Rationalism. Scho¬ penhauer, on the other hand, maintains in his <The World as Will and Idea) the doctrine of Irrationalism, — that the world in all its various parts is not the expression of reason at all, but is the manifestation of a blind, purposeless principle, which he calls Will (q.v.). This in¬ sistence on Will as opposed to Reason (q.v.) does not, however, result in emphasizing more strongly the ethical life, as with Fichte. For Schopenhauer, Will is a blind impulse which manifests itself in the processes of nature which are usually regarded as purely physical, as well as in the phenomena of life and mind, while its coming to consciousness in man must be regarded as an unessential moment in its na¬ ture, and a misfortune. Its very nature is blind, purposeless striving that must forever remain unsatisfied. This is the basis of the Pessimism which Schopenhauer (q.v.) so con¬ vincingly enforces. Edward von Hartmann (q.v.), who makes the unconscious the ultimate principle of the universe, and whose system also results in Pessimism (q.v.), may be regarded as a follower of Schopenhauer, though he in¬ troduced certain modifications into the latter's system that seem to be derived from Hegel.

In opposition to Idealism, Johann Friedrich Herbart (q.v.) (1776-1841) developed the real¬ istic elements in Kant's philosophy, and ad¬ vanced a system which he called Realism (q.v.). He maintains the existence of independent be¬ ings beyond experience, existing in

the form of simple quality-less “reals? By discarding the reference of mental phenomena to separate fac¬ ulties and substituting for this formal explana¬ tion a statement of their concrete laws and relations, Herbart also contributed largely to the development of psychology as a science. R. H. Lotze (1817-81) shows in some points the influence of Herbart, but criticises keenly the latter’s conception of simple independent “reals? and arrives himself at the notion of reality as a system of souls that are united organically with one another and with the life of the Absolute, while each still retains, in some way, and to some extent, its own independence and’ freedom. Lotze may thus be described as an ideal realist; or, since he finds the ultimate purpose and explanation of things in the idea of the Good, his system may be described as Ethical or Teleological Idealism.

An important philosophical movement called Positivism (q.v.), which still exerts an import¬ ant influence in France, was inaugurated by Auguste Comte (1798-1857). By Positivism Comte means a mode of explaining phenomna which rejects all reference to the will of the gods or other superior beings (Theology), or to abstract essences or powers (Metaphysics), and deals solely with the invariable laws of the phenomena themselves. The order of the de¬ velopment of the human mind, and hence of all the sciences, is from the theological, through the metaphysical to the positive point of view, io render sociology, which has been the last in order of development, a positive science was the main object of Comte’s writings. Positive philosophy is not a separate discipline, but the

synthesis and systematic co-ordination of all the sciences. Since the publication of Darwin’s (Origin of Species) (1859), philosophy, like all other branches of inquiry, has been especially influenced by the concept of evolution, and this notion has affected, to a greater or less extent, both the method and the conclusions of all recent writers. The only comprehensive “sys¬ tem,® however, that has yet appeared, based professedly on this conception, is that of Her¬ bert Spencer (q.v.). In the (Synthetic Philosophy) Spencer has furnished an account in evolutionary terms of the origin of the physical universe from a primitive nebula, and has also, traced the genesis of animal life, and the human mind, as well as the evolution of con¬ duct, and of social life and institutions. He thus aims to give in his philosophy a complete synthesis of the sciences. The question may, however, be raised whether Spencer’s adoption of the standpoint and conception of the par¬ ticular sciences, and especially of the physical sciences, as final, without criticism or modifica¬ tion, does not render his conclusions

unsatis¬ factory as the last word of philosophy.

Bibliography. — General: Erdman, (Grundriss der Geschichte der Philosophy (2 vols., Berlin ; English trans., 3 vols., London 1890) ; Rogers, (A Student's History of Philosophy) (New York 1901) ; Thilly, F., (History of Phi-lcsophy) (New York 1914) ; Turner, <History of Philosophy* (Boston 1903) ; Ueberweg, (Grundriss der Geschichte der Philosophic* (3 vols., later editions edited and enlarged by Heinze, Berlin; English trans., 2 vols., New York 1872-74) ; Windelband, (Geschichte der Philosophy (Leipzig 1892; English trans., New York 1893).

Ancient Philosophy: Burnet, (Early Greek Philosophy* (London and Edinburgh 1892) ; Fairbanks, (The First Philosophers of Greece) (New York 1898) ; Gomperz, (Griechische Denker) (3 vols., Leipzig 1896-1902; English trans., 3 vols., 1901-05) ; Windel¬ band, W., (Geschichte der alten Philosophy (2d ed., Munich 1894; English trans. by H. E. Cushman, 3d ed., New York 1910) ; Zel¬ ler, (Die Philosophic der Griechen in ihren Geschichtlichen Entwickelung) (5th ed., 5 vols., Leipzig 1892; English trans., London and New York) ; id., (Grundriss der Geschichte der griechischen Philosophic* (4th ed., Leipzig 1893; English trans., New York 1890).

Mediaeval Philosophy: Harnack, A., (Lehrbuch der Dogmengeschichte* (3 vols., Freiburg 1888-90; English trans., New York 1903) ; Haureau, (Histoire de la philoso¬ phic scolastique* (Paris 1872-80) ; Lecky, (A History of European Morals from Augustus to Charlemagne) (3d ed., 2 vols., London 1877) ; Stockl (Geschichte der Philosophic des Mittelalters) (3 vols., Mainz 1864-66) ; Wulf, M. M. de (History of Mediaeval Philosophy* (English trans. by Peter Coffey, 3d ed., New York 1909).

Modern Philosophy: Blackwood's 'Phil¬ osophical Classics* ; Falckenberg, (Die Ge¬ schichte der neueren Philosophy (1 vol., 2d ed., 1892; English trails., New York 1893); Fischer, (Geschichte der neueren Philosophy (3d ed., 9 vols., Heidelberg 1900; English trans of Vol. I, (Descartes and His School? New York 1887) ; Griggs, < Philosophical Clas¬ sics* (Chicago); Hoffding, H., (Die Nyere Filosofie History (Copenhagen 1894-95; Eng-

lish trans., 2 vols., (The History of Mod¬ ern Philosophy,) London 1900) ; id., (Modern Philosophers > (English trans. by A. C. Mason, New York 1915) ; Merz, J. T., (History of European Thought in the Nineteenth Century) (4 vols., New York 1915) ; Royce, J., (The Spirit of Modern Philosophy® (Boston

1892).

Special Movements: Albee, (A History of English Utilitarianism* (London and New York 1902) ; Lange, (Geschichte der Materialis-mus) (1876-77; English trans., 3 vols., London 1878-81); Stephen, (A History of English •Thought in the Eighteenth Century* (London

1876).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell JJ niversity.

PHILOSOPHY, Moral. See Ethics.

PHILOSTRATUS, fi-los'tra-tus, Flavius, ((<The Elder®), Greek Sophist and rhetorician: b. Lemnos about the middle of the 2d century a.d. Few facts regarding his life have come down to us. We know that he taught rhetoric at Athens and subsequently at Rome, where he obtained the favor of the Emperor Septimus Severus, and was received into the circle of literati that the Empress Julia Domina had gath¬ ered around her. His principal work is his (Life of Apollonius of Tyana,* which is re¬ garded as rather fiction than history. His other works include the (Heroicus,* dealing with the Trojan War; the <Eikones,> a description of certain paintings the author says he had seen at Naples; (Vitae Sophistarum,* or the lives of several of the Sophists; and (Letters. }

PHILOXENIAN (fil-ok-se'ni-an) VER¬ SION OF THE BIBLE, a translation of the Greek version of the Hebrew Scriptures and of the New Testament books into Syriac, made by Philoxenus (or Asenaya), bishop of Mab-bogh, early in the 6th century for the use of his

coreligionists of the Monophysite or Jacob¬ ite sect or branch of the Syrian Church, the Peshitto version, already in existence, being deemed unfaithful. Philoxenus' version was highly esteemed by his contemporaries : he was one of the most eminent writers of Syriac; but his version of the Bible was superseded by two others, and only fragments of it are extant.

PHILOXENUS, fi-lok'se-nus, Greek di-thyrambic poet : b. 435 b.c. ; d. 380 b.c. He was originally from Cythera, and upon the capture of the island was taken as a prisoner of war to Athens, where he became the slave of Melan-ippides, the musician, who educated and freed him. For a considerable time he lived at the court of Dionysius I of Syracuse. He severely wounded the vanity of the tyrant by refusing to praise the latter's verses, declaring, on being given one to revise, that the best revision would be to draw a black line through the entire pro¬ duction. As a result he was put in prison ; he either escaped thence or soon after his release left the court. He wrote 24 dithyrambs, in¬ cluding the (Cyclops,* his most celebrated work, and the (Deipnon* (<Banquet)), of each of which fragments remain. He was long highly esteemed ; and so late as the time of Polybius his dithyrambs were annually pre¬ sented by the Arcadians.

PHILTRE, fil'ter, in popular superstition, a love powder or love potion. From the ear¬ liest times it has been supposed that there were means by which love could not only be excited but be directed to a particular object. Various substances from the animal and vegetable king¬ doms have been used for this purpose, some disgusting, some injurious, some without any distinguishing character. The truth is, that physical desire may be produced by physical stimuli, which are called aphrodisiacs, but it is absurd to suppose that such means can produce a passion for a particular object.

PHINEAS FINN, The Irish Member, a

novel by Anthony Trollope, published in 1869. Taking its title from the name of its hero it is the earliest of Trollope's political novels and was followed by (Phineas Redux) (1873) ; 'The Prime Minister) (1875) and (The Duke's Children *(1886). In accordance with Trol¬ lope's custom of linking one fiction to another by presenting some of the same characters in each, Phineas and many of the dramatis per-sonce of (Phineas Finn* appear in the later novels of the series.

PHINEUS, fin'e-us or fi'nus, king of Sal-mydessus, Thrace, son of Age

nor. He was a blind soothsayer and had received his prophetic powers from Apollo. Different traditions pre¬ vail concerning the cause of his blindness, but the one generally accepted is that it was a pun¬ ishment inflicted upon him for his cruelty to the children of his first wife whom his second wife hated. He was tormented by harpies, who seized his food or rendered it unfit for use and was freed from them by Zetes and Calais, in gratitude for which service Phineus fitted out the Argonaut expedition.

PHINTIAS, fin'ti-as. See Damon and Phintias.

PHIPPS, Henry, American manufacturer: b. Philadelphia, Pa., 27 Sept. 1839. He was engaged in various business houses of Pitts¬ burgh, Pa., until 1861, when he became a mem¬ ber of the firm of Bidwell and Phipps, dealing in powder. Later he engaged in the steel in¬ dustry in which he amassed an immense for¬ tune. He is actively interested in various educational and philanthropic enterprises, has presented to the public several fine conserva¬ tories, established a completely equipped botani¬ cal garden in Schenley Park, Pittsburgh, in 1900, and in 1903 founded and endowed the Henry Phipps Institute (q.v.) at Philadelphia for the treatment of tuberculosis. He also built a psychiatric clinic in connection with Johns Hopkins Hospital, Baltimore.

PHIPPS INSTITUTE, The Henry, an

institution in Philadelphia, Pa., founded by the generosity of Henry Phipps (q.v.) of Pitts¬ burgh, Pa., for (<the study, treatment and pre¬ vention of tuberculosis.® The institution was opened 1 Feb. 1903 and incorporated under the laws of the State of Pennsylvania, 1 Sept. 1903. The first medical director was Lawrence F. Flick. The first year there were in the house 52 beds, which were occupied all the time, and 2,000 patients were treated in the dispensary. Inspectors visited the homes of the outside patients to see that instructions were carried out. In 1903 the institute gave a series of international lectures which were

largely attended. Great opportunities are fur¬ nished by the institute for research into the nature and best treatment of tuberculosis.

PHIPS, or PHIPPS, Sir William, Amer¬ ican colonial governor: b. Pemaquid (now Bristol), Me., 2 Feb. 1651; d. London, Eng¬ land, 18 Feb. 1695. His youth was spent as a shepherd and as an apprentice to a ship-car¬ penter, after which he went to Boston, learned to read and write and then engaged as a trader. He married a rich Boston widow, built for himself a ship and engaged in commerce. Fired with the hope of regaining the treasure from a Spanish ship wrecked off the Bahamas, he went to England and prevailed upon the British Admiralty to furnish him a ship and means to seek the treasure. The expedition was unsuccessful but a second venture in 1667, backed by the Duke of Albemarle, resulted in the recovery of treasure to the value of £300,000, of which Phips' share was £16,000; he was also knighted and made sheriff of New England. In 1690 he commanded a fleet of eight vessels in an expedition against Port Royal which he captured, and later in the same year commanded an expedition against Quebec with a fleet of 34 vessels, but was unsuccessful and on the return voyage nine of his vessels were wrecked. He visited England endeavor¬ ing to induce the government to send another expedition against Quebec and while there, through the influence* of Increase Mather (q.v.), was appointed first royal governor of Massachusetts. His first official act was the organization of a special court which speedily terminated the prosecutions for witchcraft. While governor he was accused of arbitrary measures and conduct, and in 1694 was sum¬ moned to London to answer complaints made against him. He received promises of restora¬ tion, but died in London before they could be carried out. Consult Cotton Mathers (Mag-nalia) (1702) ; Francis Bowen's (Life of Sir William Phips, > Vol. VII; Sparks' (American Biography > (1834-37); Myrand, (Sir William Phips devant Quebec) (1893).

PHIZ. See Browne, Halbot Knight.

PHLEBITIS, inflammation of the veins. It may begin outside of the vein, from some wound, abscess, etc., from which irritant mate¬ rial . travels upward in the loose connective tissue of the vein-bed. The inflammatory proc¬ ess invades the coats of the vessel, disturbing their nutrition and reaching the inner coat, where it causes cloudy swelling and roughness of the surface, on which the blood tends to coagulate in layers, and thus may form a clot large enough to block the vessel. Or the in¬ flammation may begin from within the vessel, owing to a clot forming on its inner wall, and which, acting as an irritant, excites inflam¬ mation in the coats of the vessel from within

outward. In the first case the formation of matter is likely to occur around the vessel, and parts of the clot, which is soft and loose, are apt to become detached and to be carried by the circulation to other parts, setting up similar changes there. In the second case the vessel is likely to be obliterated and converted into a fibrous cord. Death may result where a large vein is obstructed. The disease is indi¬ cated by great tenderness, tension, acute pain and a knotted, cord-like swelling in the course

of a vein or veins, sometimes attended with discoloration of the surface. Dropsical swell¬ ing of the affected part or of a whole limb may occur.

Phlebitis may be prevented by proper care in the dressing of wounds, so as to keep the wound clean and healthy. The treatment is various. The patient must be kept perfectly quiet ; the part be elevated ; nourishing food should be given; tonics are of great advantage; stimulants are often required ; and antiphlogis-tics locally applied will allay the inflammation. Abscesses within reach should be opened. Ligation of the part and washing out are also resorted to with success: See Phlegmasia.

PHLEBOLITE, a calcareous concretion formed within a vein. Such formations are due to the degeneration of coagulations in veins, or occasionally may have their origin in the coats of the vessels. Phlebolites which have formed nodules vary in size from that of a pinhead to that of a pea. They are also called vein-stones.

PHLEBOTOMY. See Venesection.

PHLEGETHON, flej e-thon, in Greek my¬ thology, a name given to a river of fire in the infernal regions. See Cocytus.

PHLEGMASIA, a painful inflammation at¬ tended with considerable swelling, especially af¬ fecting the cellular tissue, such as phlegmasia glandulosa and phlegmasia myoica. Phlegmasia dolens (Phlegmasia alba dolens, white-leg milk-leg), the principal form, may affect both sexes. It has appeared in convalescence from typhoid fever and dysentery ; in diseases of the rectum ; as the result of the removal of fibroids and of the ovaries ; but for the most part it is a disease of the puerperal state. It usually occurs in the left leg but both legs may be affected. As a disease of the puerperal state it is seldom seen nowadays, but when it so occurs it usually appears the second or third

week after parturi¬ tion. Premonitory symptoms are frequently ab¬ sent, but there may be feverishness for a day or two. Pain, swelling and tenderness appear in the upper part of the thigh and extend down¬ ward and in 24 hours the whole leg may be swollen and hard and more or less tender, but not reddened. The leg is pale or sallow, has a glossy or polished appearance and is sometimes called marble-leg. Usually in a few days the pain and swelling diminish, but it is often sev¬ eral weeks before the disease disappears and sometimes the condition lasts indefinitely. After its disappearance persistent aching of the limb, oedema of the foot, muscular weakness, etc., may remain for a long time. 4 he causes of phleg¬ masia dolens are periphlebitis, phlebitis and thrombosis. It commonly results from an ex¬ tension through lympathic vessels of inflamma¬ tion from and about the uterus to the tissues surrounding the great vessels of the thigh. The origin of the primary inflammation is not always ascertained, but it most frequently results from uterine infection (puerperal or contact infec¬ tion) by pathogenic germs introduced by in¬ fected hands, instruments, etc., into the uterus. The treatment is both constitutional and local — sleep and rest in recumbent posture with the limb in a comfortable position and elevated; tonics and laxatives if necessary; easily digested food ; hot anodyne fomentations ; and when the disease disappears, careful bandaging, fric-784

tion and favidization. A common complication is pulmonary embolism, in which case death supervenes in almost all cases.

PHLEGRiEAN (fleg-re’an) PLAIN, a volcanic plain on the Campanian coast west of Naples, Italy. Legendary lore locates this plain as the scene of the combat between the gods and the giants. Ruins of numerous Roman buildings are found here.

PHLEGYAS, flej’i-as, in Greek mythology, king of the Lapithae; he was son of Ares (Mars) and father of Ixion and Coronis; he is commemorated in the Hymni Homer ici.

PHLEUM, a genus of grasses including timothy grass. See Grasses in the United States.

PHLOGISTON, flo-jis’ton, in chemistry, a hypothetical substance supposed at one time to be a part of all bodies that were capable of

being burned. The conceptions of the terms ele¬ ment and combustion have been many and varied, but the first of real importance to the phlogiston theory was that of Becker (1635-82). He held that all inorganic substances were com¬ posed of three “earths,® the mercurial, the vitreous and the combustible called “terra pinguis,® and that when substances were burned or metals calcined (oxidized) this latter “earth® escaped. Stahl (1660-1734) expanded this idea into what was known as the Phlogiston Theory. This holds that all substances capable of burn¬ ing — and calcination was recognized as slow combustion — contained a substance called phlo¬ giston and that this was given off when the substance burned. A substance that burned readily contained a large amount of phlogiston; and as coal did so with the evolution of a large amount of heat and left little residue, it was supposed to be nearly pure phlogiston. A sub¬ stance that had been burned could be rephlo-gisticated and thereby made capable of being burned again by being heated with a substance rich in phlogiston. Thus the result of the burning or calcination of a metal, known as a metallic calc, could be changed back to the metal by being heated with coal. This theory was generally accepted by chemists until toward the end of the 18th century. Phlogiston itself was never isolated, though the hydrogen dis¬ covered by Cavendish was thought by some to be this all-important substance. Facts began to accumulate, however, that seemed opposed to this theory. It was shown that metals gained instead of lost weight when calcined. Phlo-gisticians at first denied this, but later tried to explain it by claiming that phlogiston possessed negative weight, and that, therefore, a substance would, of course, be heavier when it had been driven off. Substances would not burn except in the presence of air. This was said to be because the air must be present to take up the phlogiston. The final overthrow of the theory was accomplished by Lavoisier. He showed and proved by careful weighings that a metal when calcined gained in weight and exactly as much as was taken from the air. Later, after the discovery of oxygen and its presence in the air by Scheele and Priestley, he showed that it was this oxygen that combined with a burning substance. Combustion was thus shown to be combination with oxygen rather than loss of phlogiston, and the phlogiston theory was

abandoned. See Combustion; Lavoisier; Priestley ; Stahl.

PHLOX, a genus of herbs of the family Polemoniacece. The species, of which about 30 have been described, are mostly tall, spreading perennials, and with two exceptions, a Siberian and a Chilean species,

are all natives of North America, where they are extensively distributed. Their showy flowers, borne either in terminal clusters or solitary, and their ready adaptability to a wide range of soils and situations, have made phloxes general favorites in gardens. They are hardy and very floriferous and have developed a large number of hybrids and cross¬ varieties of great diversity of form, colors and markings. They are of two classes : the an¬ nuals, all the garden varieties of which have been derived from P. drummondii, a Texan species; and the perennials, derived from sev¬ eral species, some of which are still cultivated in the pure natural form in old gardens. Of these last one of the best known is the moss or ground pink (P. subulata), which is a favorite plant in rockeries and cemeteries, since it does well in dry soils and forms a dense mat of foliage and bloom. The cultivated perennial phloxes are, however, mostly derived from P. maciilata and P. paniculata. The annual varieties are readily grown from seeds planted under glass or in the open air in spring, the seedlings being transplanted to good garden soil as soon as the weather becomes favorable. The perennial varieties may be propagated by seeds, but since these do not produce progeny like the parent, cuttings of stems or roots and division of the clumps are generally pre¬ ferred. Division may be made in early spring or in autumn; stem-cuttings during the summer and root-cuttings in spring or fall. After they commence to grow, cutting plants are managed like seedlings. In the garden, the perennial sorts are planted three or four feet apart and divided every two or three years ; the annuals are set a foot apart.

PHOBOS (Greek, “fear,® an attendant upon the god Mars), in astronomy, the inner satellite of the planet Mars. It was discovered at Washington, in 1877, by Asaph Hall. It is remarkable for its small size and for the rapidity with which it revolves about its pri¬ mary. Its diameter is only about six miles, and its period of revolution is 7 hours, 39 minutes and 14 seconds. See Deimos.

PHOCA PHOCID2E, the genus and fam¬ ily of the typical seals. See Seals.

PHOC.7EA, fo-se’a, ancient Ionian city in Asia Minor, situated on a peninsula between the gulfs of Elaea and Smyrna and on a neigh¬ boring island. Legend makes it a colony of Athens. It early attained great commercial im¬ portance, indeed the earliest Greek coins seem to be those of this city. Clay wares were its main export. Among its western colonies was Massilia, now Marseilles, and as early as the 6th century b.c. tribute was paid the city by native chiefs of southern Spain. But in 540 b.c., after a heroic defense the city was captured by

Cyrus' lieutenant Harpagus; many of the inhabitants migrated to Corsica, where they successfully met the attacks of Carthaginians and Etruscans, and then to southern Italy, where they founded the city of Velia. A few of the Phocaeans had rebuilt the city in the meantime ; and in the Ro-

man period it again grew to prominence and wealth. It was sacked by the Romans during the war with Antiochus ; was attacked without success by Aristonicus of Pergamus; and then sank again into obscurity. The Genoese founded the city of New Phocaea near the site of the old in 1421.

PHOCAS, fo'kas, Byzantine emperor: b. Asia Minor; d. Constantinople, October 610. He was of low birth and served in the army of Mauritius as an obscure centurion, where he gained a name for brutal courage among his fellows. In 602 he headed a revolt against Mauritius, seized the throne and after his coro¬ nation executed Mauritius and his five sons. Later accusing the Empress Constantina of con¬ spiracy against him, she with her three daugh¬ ters was cruelly put to death by his orders. He secured peace with Europe, but Chosroes II of Persia waged a determined war against him; and in 610 Heraclius, son of the exarch of Africa, led an expedition against him, invested Constantinople and put the tyrant to death with cruelty equal to that exercised by Phocas in his sanguinary reign.

PHOCAS, Column of, a monument in the Forum at Rome erected in 608 in honor of Phocas, emperor of the East. The column, 54 feet high, is of such artistic excellence that it is presumed that its workmanship must have been long before the 7th century. It was redis¬ covered in 1813.

PHOCION, fo'shi-on, Athenian general: b. about 402 b.c. ; d. Athens, 317 b.c. Of humble descent, he was educated under Plato and Xenocrates, receiving instruction which influenced his entire life. His first military service was per¬ formed under Chabrias, where he rendered good service in the victory at Naxos in 376 b.c. In 349 he was sent

with troops to Eubcea, where he defeated the forces of Philip of Macedon, banished Plutarchus from Eretria and secured the island against the invasion of Philip. Later he defeated Philip's forces at Megara, re-estab¬ lished the walls of Nicsea, and on a subsequent expedition to Eubcea freed Orcus and Eretria from the Macedonian rule. In 340 he was sent to the Propontis, where he forced Philip to abandon the siege of B}rzantium and Prienthus. As leader of the peace party at Athens he ad¬ vised the surrender of Demosthenes and other orators demanded by Alexander after the de¬ struction of Thebes in 335, but upon the refusal of the demand headed the second embassy and succeeded in appeasing Alexander. After the death of Alexander in 323 Phocion reluctantly assumed command of the forces which were to free Athens from the Macedonian sway. They were at first successful, but ultimately were compelled to make peace. Upon Antipater's death Phocion became involved in an intrigue with Cassander, rival of Polysperchon, and was compelled to flee to Phocis, whence he was delivered up to Polysperchon by the Athenians and by him forced to drink poison. The Athenians later repented of their injustice and buried Phocion with high honors. Consult Plutarch, (Life of PhocionP

PHOCIS, fo'sis, an ancient division of cen¬ tral Greece and since 1899 a nome in the present kingdom. It lay to the north of the Gulf of Corinth ; was largely taken up by the range of Parnassus, so that there were only a few fertile VOL. 21 — 50

spots along the river valleys, especially the Cephissus, where excellent wines were grown ; and gained most of its importance from the sacred city of Delphi (q.v.). The antiquity of settlements in Phocia is attested by the mention of the district and its most important cities in the Homeric catalogue of the ships in the second book of the Iliad. Myth makes the Leleges, Hyanthians and Thracians the first settlers, but the people in historic times were clearly of Dorian stock. The history of Phocis is little more than a series of quarrels over the oracle and treasure house at Delphi, of which the con¬ federation of the 22 Phocian cities claimed to be guardian — a claim supported by Athens, al¬ ways opposed by the Thebans and with less animus by the Thessalians (who were severely defeated at Hyampolis at the beginning of the 5th century b.c.), as well as the Spartans, against whom the Dorian Phocians joined Athens in the Peloponnesian War. The first Sacred War, 595-585 bc., resulted in the de¬ struction of Cirrha, a city which had lived by plundering pilgrims to Delphi. In the second Sacred War Phocis gained control of Delphi in spite of Sparta's

intervention, but lost it again 30 years after by the terms of the Truce of Nicias (421). The third Sacred War began with a decree of the Amphictyonic Council of 357 b.c., no doubt dominated by Theban in¬ fluence, condeming the Phocians to pay a heavy fine for having used part of the sacred lands of Delphi ; and this decree was finally carried out in spite of the resistance of the Phocians, who were long secretly backed by both Athens and Sparta and who appropriated much of the Delphic treasure to carry on the war.

PHOCYLIDES, fo-sil'i-dez, Greek poet, who flourished about 537 b.c. His poetry was made up chiefly of gnomic precepts, and only 18 fragments have been preserved. A didactic poem in 230 hexameters long passed current as the work of Phocylides, but was shown by Jakob Bernays to be a later forgery. This seems to furnish evidence of the esteem in which Phocylides was held, the only object of the anonymous author having apparently been to procure prestige for his composition by at¬ taching to it a recognized name.

PHCEBE, fe'be, in Greek mythology, the daughter of Oranos and Gaea (heaven and earth), mother by Zeus of Asteria and Leto. As the successor of Themis and the predecessor of Apollo she presided over the oracle at Delphi. Later poets speak of Phoebe (the radiant one) as a title of Artemis, the moon goddess.

PHCEBE, The. See Essex, Phcebe and Cherub.

PHCEBE-BIRD. See Pewee.

PHCEBUS, fe'bus, William, American Methodist clergyman : b. Somerset County, Md., August 1754; d. New York, 9 Nov. 1831. He entered the ministry in 1783, and was engaged upon various circuits until 1798 when he estab¬ lished himself as a physician in New York. In 1806 he re-entered the ministry and continued in the service until 1824, when he was placed on the retired list. He edited the Experienced Christian's Magazine in 1796, and wrote (An Essay on the Doctrine and Order of the Evan¬ gelical Church of America as Constituted at Baltimore, 1784) (1817).

PHCEBUS. See Apollo.

PHOENICIA, fe-nish'i-a, in ancient geog¬ raphy, a maritime region and a Semitic kingdom with widely varying boundaries at different periods, but generally defined as the fertile coast region of Syria lying between the Lebanon range and the Mediterranean, and bounded on the south by Carmel and on the north by Latakia (Laodicea) and the country around Cyprus. The name is Greek and has been variously explained; either from phoenix, <(a palm tree,® or from phoenix, <(red.® The former etymology would allude to the palms of the country ; the latter to the red brown complexion of the inhabitants, or to the scarlet dye of the murex which was a staple article of trade with this people, or to the region about the Red Sea, whence their own legends say that they emigated. Very probably none of these explana¬ tions is correct. The native name was Khna, familiar to us in the form Canaan and signify¬ ing ((the lowlands® ; it was extended at an early date to cover Palestine. <(Tyre and Sidon,® the names of the two great Phoenician cities, were often used to include all the cities of the plain. The coast line, 200 or more miles long and broken by several sharp promontories, is fol¬ lowed by a narrow strip of very fine sand; inland are the fertile plains of Acre, Tyre, Sidon, Marathus, etc., varied by round hills and backed by the range of Lebanon, 130 miles in length and overgrown with the proverbial cedars and other ship timber. Besides the great cities of Tyre and Sidon there were in early times even the minor cities of Arvad, Accho, Orthosia, Arka, Botrys, Berytus, Sarepta, Dora, etc., so that the entire country might have been defined as a series of ports practically forming one unbroken city along the sea. The geology of Phoenicia is simple with its silicious coast strip ; its alluvial plains, cut by the rivers Badas (Nahr-el-Melk), Eleutherus, Orthosia (Nahr-el-Berid), Tripolis, (Kad-isha), Adonis (Ibrahim), Lycus (Nahr-el- Kelb), Magoras (Beirut), Bostrenus (Nahr-el- Auly), Sidon, Litny, Sarepta (Zaherany) and Belus (Acre or Akko) ; and the mountain ranges of Bargylus and Lebanon, formed of an early limestone, very soft and broken now and again with igneous rocks. The sandstone is rich in iron in many localities ; coal and ochre have been found and there is evidence that the Phoenicians themselves dug extensively for amber.

Commerce. — Almost as soon as they de¬ voted themselves to

farming and cattle raising in the plains and mining in the hills, the ancient Phoenicians must have begun to fish, to navi¬ gate the Mediterranean and to trade with its varied peoples. Whether they had been sailors before coming to the Mediterranean coast is uncertain ; the question depends on the solution of the difficult problem of the precise origin of the people. Their own legend that they came from the region around the Red Sea would make it probable that they had known some¬ thing of shipping and trade before they settled in their new home. At any rate in Phoenicia they were famous sailors and seem to have been the earliest people to dare to sail by night as well as by day, under the guidance of the north star, which they may be said to have discovered. The purple, or more exactly, scarlet dye made

of the shell of the murex; the skilful embroid¬ ery, jewelry and weaving of the Tyrian crafts¬ men; and glass, which if not discovered by the Phoenicians was evidently improved and largely sold by them — together with the natural prod¬ ucts of the country — were the main articles of Phoenician export. Imports were limited only by the variety of the products of the Mediter¬ ranean Basin, the Far West, for the Phoenicians brought tin from Britain and the Far East, for Syria and Babylonia made Phoenicia a market place for exchange with Egypt, and the caravan wares of India and eastern Africa both made their way to Phoenician marts, where there was a great slave trade.

Colonization. — Phoenician colonists were no less famed than their traders and navi¬ gators. The impulse seems to have been due to the, wars in Canaan, which drove the Hitites and Amorites into the northern and maritime country whence they were sent to settle in Cyprus. It seems probable that by 1500 b.c the Phoenicians had colonies throughout the .Egean Sea. Soon afterward, at the latest, they settled in Malta, Sardinia and Sicily, where the cities of Motye, Soloeis and Machanath (later Panor-mus) grew up; then Hippo, Ityke (Utica) and Carthage were planted on the African coast, Carthage becoming one of the greatest mari¬ time powers of the Old World, and about 1100 they reached the Pillars of Melkarth (or Her¬ cules), now Gibraltar, and founded Gades (Cadiz), a western outpost and a trading station with the countries of the nearer At¬ lantic.

History. — The ethnology and early history of the people are alike uncertain. The Biblical account (Gen. x, 6-15) in making Sidon a de¬ scendant of Ham seems to argue for the Hamitic origin of the race. The argument against this from the Semitic character of the language is not conclusive ; as in Parthia, a Turanian peo¬ ple adopted an

Iranian language and became merged to a great degree with the Persians as concerns customs and religion, so here it is ossible at least that the Phoenicians may have een originally Hamitic and that they learned a Semitic tongue only after their settling in the eastern end of the Mediterranean. But, taking into consideration the racial type and the mental characteristics of the people, most ethnologists are agreed on their Semitic origin. Relationship with Egypt then becomes merely a matter of commerce and trade. The earliest historical mention of the country is in Egyptian monu¬ ments and evidences Egyptian control of the Phoenician cities from 1600 to 1300 b.c. Sidon then arose as a great power, withstood the Israelites and made Dan subject to her, hut was unsuccessful in her attack on the Philistine city of Ascalon, which, attacking her in turn, practi¬ cally broke the supremacy of Sidqn. Tyre was the new leader, its supremacy beginning about the middle of the 13th century b.c., colonization being extended and the cordial feeling with the Israelites rising to its highest in the days of Hiram and Solomon. But Tyrian hegemony after 400 years nearly (1250-875) was broken by the Assyrian Empire, whose control of Phoenicia lasted, with important intervals of successful rebellion on the part of Tyre, to the last of the 7th century (about 625). Egypt first, then Baby¬ lon, now held all Syria; and after Cyrus' cap-PHOENICIA

ture of Babylon (538 b.c) Phoenicia was a part of the Persian Empire up to 333. In this period much of the old maritime power of Phoenicia returned; she became in short the Persian riaval outpost on the Mediterranean. This power prompted a revolt against Persia, which founded a brief period of independence before the cap¬ ture of Tyre, after one of the greatest sieges in history, by Alexander the Great in 332 b.c., which closes the history of the region. Syria fell under Turkish rule in 1516.

Religion — The precise nature of the Phoe¬ nician religion is as obscure as all Phoenician origins. Philo of Byblus (about 64-141 a.d.), himself a Phoenician, wrote in Greek on this topic in a manner that some critics consider mere euphemistic theorizing, but which others accept as actual proof that the gods were merely notable heroes of the primitive period.

It seems more probable that, like most other Semitic religions, the

Phoenician was a nature worship, possibly monotheistic in origin, but certainly polytheistic and extremely corrupt, vicious and depraved in historic times. Indeed almost all that is unnatural and vile in Greek cults seems traceable, at the expense of less or more ingenuity, to Phoenician influence. Ihe wickedness of Sodom and Gomorrah and the cities of the plain was proverbial in both the Old and New Testaments; it seems to have been ceremonial and closely connected with the worship of Ashtoreth (Astarte, the Venus Syriaca), and not to have been due to the ill-repute that the Phoenicians had for veracity, fidelity and honesty. The word ˆsodomy,55 from Sodom or Sido.n,. is in itself a sufficient commentary on Phoenician worship. Ashtoreth, on the naturalistic theory, seems to be the per¬ sonification of the moon, as Baal was the sun. Melkarth, the tutelary deity of Tyre, in many respects like the Hellenic Heracles, whose very name indeed has been derived from Mel¬ karth (read backward, as the Phoenicians wrote from right to left) ; Adonis, or Adonai, the god of Byblus. the complaint for whose loss seems to have fashioned a ceremonial elegy, which possibly affected the Ionian elegiac form, and whose name was substituted by the Hebrews for the sacred triliteral name of Yahweh (IOA) in their texts; and Dagon, the fish-god, are a few of the divinities which sprang up after the early monotheistic stage in which Baal alone .was worshipped. Human sacrifice was practised, notably to Moloch, as we know from the Scrip¬ ture narrative ; and it has been suggested that prostitution as a cult rite may have had its origin in the same notion of averting the divine anger by offering up the most precious and best — an idea carried even further by the emas¬ culated Galli. In the Phoenician temples no statues of the gods were reared, but simple cone-shaped columns.

Art and Architecture — See article PHce-nician Art.

Language and Literature. — The I hcenician alphabet was the original, thanks to Sidonian and Tyrian colonies which car¬ ried it through the Mediterranean, of that oi the Greeks, who reckoned Cadmus, a Phoeni¬ cian, the inventor of letters. It is certain that there were earlier alphabets, for example, Egyptian and Hittite ; and it seems probable that the Phoenician was derived from the

Egyptian. If so it has the virtue of simplifi cation as it contains only 24 letters, practically those of the earlier Greek alphabet with the sign F, for a v, w, or / sound. Ihe importance of this simplified alphabet, the direct ancestor of the Greek, and thus indirectly the parent of all the alphabets of modern Europe, can scarcely be overestimated. The

language of the Phoenicians differed so little from Hebrew that a Hebrew scholar has little difficulty in reading it. Like the alphabet it was spread widely over the Mediterranean Basin by colonization, but as the Phoenician colonies were overwhelmed by Greece and Rome the language died out , Carthage, destroyed by Rome in 146 b.c., was probably the last place where the language was used. The result is that the greater part of our knowledge of the language is from very in¬ direct sources such as proper names of gods, men and places, or chance citations in gram¬ matical writings. The direct sources include only the inscriptions on coins or temple walls, votive offerings, *etc.* These are included in the French Academy's (Corpus Inscriptionum Semit-icarum> (1881 seq.), and their grammar is dealt with in Schroder, (Die phomzische Sprache) (1869) and Lidzbarski, <Handbuch der nordsemitischen Epigraphik) ; they date from the 9th century b.C: to the 3d century a.d., most being between the 5th and the 2d centuries b.c. The nature of the inscriptions, their brief ceremonial form, make the Phoenician vocabu¬ lary which has come down to us consist very (largely of names of divinities, the names of men and women being almost without exception compounded of god-names ; and the indirect sources, as has been remarked, furnish nothing but proper names. These indirect sources are the Biblical texts, citations by Greek and Roman grammarians, and such names, preserving their Phoenician form somewhat, as occur in Greek and Latin translations of Phoenician authors. How large a literature there was in Phoenicia proper and its colonies is problematic. The work of Sanchuniathon of Berytus on cosmog¬ ony and theogony, supposed to date from 1200 b.c., is preserved in part in a Greek version by Philo of Byblus, who is reckoned by some mod¬ ern scholars to have tampered with the original if original there ever was. Other names are those of the historians Theodotus and Hypsi-eratus (whose clearly Greek names cast sus¬ picion on their being actually Phoenicians), Mochus, who is said to have enunciated the atomic theory; and among African authors, Hanno, whose 'Periplus5 in Greek version has come down to us, and Hiempsal, king of Numidia, Hamilcar and Mago, who all wrote on history and agriculture. Mago's work was translated into Latin by Silanus upon the order of the Roman Senate, and seems to have been used in Varro's <De Re Rustica) and in Virgil's (Georgies.) Virgil's description of the song of Iopas at the close of the first 2Eneid may prove that he knew something of Punic philosophy; Servius states that this was the case, but it is quite as likely that the outline of the theogony of Iopas is reminiscent of Sanchuniathon, or from some other Hellenic source.

Bibliography. — Bloch, (Phonizisches Glossar> (1891); Bovet, (Egypt,

Palestine and Phoenicia5 (1882); Euting, <Punische Steine5 (1871); Kenrick, (History and Antiquities of

Phcenicia) (1855) ; Landau, (Die Phonizier) (1901); Levy, (Phonizisches WorterbucfP (1864) ; Meyer, (Geschichte des Altertums) (1884) ; Moore, (Carthage and the Phoenicians > (1905); Movers, (Die Phonizier (1841-56); Perrot and Chipiez, (History of Art in Phoe¬ nicia* (1885); Pietschmann, (Geschichte der Phonizier) (1890) ; Rawlinson, history of Phoenicia) (1889) ; and the shorter history in (Story of the Nations) series; Renan, (Mission de Phenicie* (1865-74) ; Rollin's (Ancient History) ; and the works of Pinches and Sayce.

PHOENICIAN ART. The Phoenicians in¬ vented little in the domain of art; what remains of their production shows them to have been possessed of the power of assimilation and recombination so as to be able to improve upon models which they derived mainly from Babylonia, Egypt and Assyria. What they pro¬ duced bore the impress of the most skilful workmen of ancient times and in their de¬ veloped forms often returned to the countries whence they had sprung. Figures, identified as Phoenicians, on the walls of Rekhmara's Tomb at Thebes, erected in the time of Thotmes III, wear richly embroidered tunics and carry vases in their hands, from which may be inferred the skill already developed in embroidery and pot¬ tery-making.

It will be more logical, however, to speak first of Phoenician architecture. Few remains exist of which anything like an adequate ac¬ count may be derived. The reason is twofold ;

• first, the temples, built of stone, were of mono¬ lithic or megalolithic structure, and disappeared, for the most part, during the succeeding su¬ premacy of the Cananites, who used the ma¬ terial for their own more refined building. The domestic architecture was of wood and metal and has long since crumbled away. Enough remains, however, to enable us to form a basis for reconstructing the system upon which they worked. Contrary to the system of the Greeks, as pointed out by M. Renan, the foundation of Phoenician architecture was the carved

rock and not the column. When the wall replaced the carved rock the character of the latter was not wholly lost. The keyed vault was probably un¬ known to them. Neither did the Phoenicians construct each architectural member out of separate stones, as was demanded by Greek taste; but instead they frequently carved as many as three or four members out of a single block of stone. The refinement of design, which results from the lines of the stone following the lines of the building, was wholly absent. Whatever the size of the block in leaving the quarry, it did not diminish in being incorpo¬ rated into the building.

The existing monuments are chiefly to be found in the neighborhood of the five coast-towns, — Ruad (Aradus) . AˆrUIi (Marathus) ; Jebeil (Byblus) ; S?ida (Sidon) ; and Sur (Tyre). At Amrith is a temple or shrine in good preservation. It stands in the centre of a rectangular area, 192 feet long by 160 broad, its foundation is block 20 feet square and 10 feet high, of living rock, showing the depth to which the surrounding area was sunk. The superstructure consists of three wall blocks cov¬ ered by a roof of a single block, enclosing the interior on three sides only. No ornament is attempted save a. fillet, and cornice around the exterior of the roof-block, and a shallow carved

vaulted roof on the interior. No steps lead up to the fane. A similar fane, discovered in the neighborhood by Renan during the Syrian expedition projected by Napoleon III, though not so well preserved, bears evidences of an en¬ tirely monolithic structure.

The walls of Phoenician towns were of mas¬ sive stones like the foundations of temples. These were placed in superimposed courses without the use of mortar. Of all Phoeni¬ cian monuments, the tombs, or structures sup¬ posedly tombs, of which there are several re¬ maining in good preservation possess the high¬ est architectural character. The best known are the ˆMaghazils® near Amrith, one of which Renan has called ((a real masterpiece in respect of proportion, elegance, and majesty.® This monument consists of three parts ; the basement story being circular upon a square platform or plinth. Above each corner of the plinth stands an engaged lion. The second story is cylindri¬ cal, of less diameter than the base, and has a molding of delicate curve at its base and carved dentals and battlements around the upper part. The surmounting story is cylindrical, of still less diameter, crowned by similar carving and finished by a dome. The basement story con¬ sists of four blocks, while all above it is mono¬

lithic. The type of monument, though rare, may be original with the Phoenicians, as it differs from the pyramidal and the step-terraced terminations of Egyptian and Assyrian monu¬ ments.

The four lions upon the tomb are among the most important of the remains of Phoenician sculpture. They are rudely carved and bear some indications of a Mesopotamian conception of animal life, with a peculiarity of technique that allies them with the bas-reliefs or empaestic metal work by which Phoenician sculpture was almost exclusively represented. Reliefs cut in solid rock at Gineh and Mashnaka of animals and men are comparable to Assyrian sculpture, but represent humbler phases of life than that depicted upon the works of Nineveh. Movable sculpture showing Egyptian characteristics, and sarcophagi with bas-reliefs of confused Egyp¬ tian and Greek elements have been found at Saisa. Their date is assigned to a time not earlier than the Seleucidse.

The lack of sculptured remains is due to the fact that the Phoenicians probably made their movable figures out of metal. Upon a wooden core carved either in relief or in the round, the metal was placed and hammered to fit the carv¬ ings beneath, forming a so-called sphyrelaton. Bronze was the metal usually employed for ornamented vessels. Reliefs were made of cop¬ per, gold, silver and even tin ; these metals being sometimes employed in connection with mosaics of precious stone, ivory and amber. The elabo¬ rately ornamented pillars, called Jachin and Boaz in Solomon's temple, the altar of gold, and the table for the show-bread, the great laver supported by lions, together with vessels, lamps, candlesticks and all implements described in 1st Kings in the Old Testament as appurte¬ nances to the temple, were of Phoenician work¬ manship. The bronze dishes embossed and en¬ graved, found by Sir Austin Layard at Nimrud and described in his (Monuments of Nineveh,* are ascribed to Phoenician workmen of the 8th or 9th centuries b.c. The designs upon these vessels show more liveliness of fancy than artis-PHGENISSˆE — PHOLUS

tic merit. Figures of men as well as various animals natural and mythological, including the sphinx derived from Egypt, are wrought upon them. The human figures are often purposely grotesque.

In gem-cutting the Phoenicians attained a degree of excellence, while in many of the other minor arts such as ornamental jewelry, embroidery, etc., evidences of their variety and skill are not wanting. Consult Clermont-Ganneau, C., (L'Imagerie phenicienne) (Paris 1880) ; Frohner, C. E. L. W., (La verrene antique) (Le Pecq 1879); Halbherr, O., (Lan-trodi zeus in Creta) (Rome 1883) ; Menant, J., (La glytique orientale) (Paris 1883) ; Perrot and Chipiez, (History of Art in Phoenicia and its Dependencies-* (2 vols., trans. by W. Arm¬ strong, New York 1885) ; Rawlinson, H. C..

(History of Phoenicia) (London 1889) ; Renan, E., (Mission de Phenicie) (Paris 1865-74).

PHCENISSiE, fe-nis'se, a play of Eurip¬ ides (q.v.). It receives its name from its chorus of Phoenician captives. The story of the play is the same as that of the (Seven Against Thebes. * The maidens who form the chorus are supposed to be on their way from Tyre to Delphi where they were to serve in the temple, but on the outbreak of the war were detained at Thebes.

PHOENIX, feniks, Ala., a city of-Lee County, opposite Columbus, Ga., 76 miles north¬ east of Montgomery and situated on the Central of Georgia Railroad. It was founded just be¬ fore the war, was incorporated in 1883, re¬ ceived a new charter in 1894, under which it is now governed by a mayor elected biennially and a city council. It is a city of homes with grow¬ ing commercial interests. Pop. 4,555.

PHCENIX, Ariz., city, capital of the State and county-seat of Maricopa County, on the Santa Fe, Prescott and Phoenix Railroad, in the south central part of the State. A short railroad line connects Tempe, on the Santa be, eight miles east of Phoenix, with Maricopa, on the Southern Pacific Railroad. It was settled in 1870 and in 1881 was incorporated. It is in a mining region, where there is good farm land in the valleys. The chief industrial establish¬ ments are stock-yards, machine shops and large jobbing houses. It is a famous winter resort. Its trade is chiefly in fruits, especially oranges, honey, grain, cotton, mining products and live¬ stock The prominent public buildings are the caoitol the agricultural experiment station, in¬ sane asylum, courthouse, city-hall new Young

Men's Christian Association building, Water

Users' building, Federal building, churches and schools. The public school system has been developed with great intelligence, both in re p-ard to school buildings and courses of instruc¬ tion The city has

several large modern grammar schools and the High School group presents a most attractive appearance Other educational institutions are Academy of the Sacred Heart Saint John's Indian School (R-C), a number oi parish schools and a public library. The. gov¬ ernment is administered, under the commission

managerial form, put into effect May. 1914. The officers are a mayor and four commission¬ ers. The city's business is managed by a city manager.® Pop. (1920) 29,053.

PHCENIX, fabulous bird, about the size of an eagle. According to Herodotus it came from

Arabia once every 500 years to the sanctuary dedicated to it at Heliopolis, bringing with it the dead body of its parent, which it buried m the shrine. When it felt its life drawing to a close it built itself a nest, from which after its death a new phoenix rose ; while other versions speak of a worm which, proceeding from the body of the dead bird, was developed into a new phoenix. According to a more modern modifi¬ cation of the story the bird, at the age of 500 years, built a funeral pile of wood and aromatic gums, which it lighted with the fanning of its wings, and rose from the flames with renewed life. Similar stories of birds occur in the Oriental mythologies, as, for instance, the myth of the Persian bird simorg and that of the In¬ dian semendar. Ancient writers mention four epochs of its appearance in Egypt under Sesostris, under Amasis (569-525 b.c.), under Ptolemy III (247-221 b.c.) , and under Tiberius (34 a.d.).

In Saint Clement's epistle to the Corinthians it is used as an illustration of the doctrine of the resurrection ; it had been regarded by the Egyp¬ tians as the symbol of immortality thousands of years previously; it appears on the coins of several Roman emperors as a symbol of their own apotheosis or of the dawn of a more glorious era under their reign.

PHCENIX, in botany, a genus of palms, containing such valuable species as the date-palm, sago-palm and others of northern Africa and southern Asia. See Date-Palm; Palms.

PHCENIX OF THE HOUSE OF HOHENLOHE, Order of. See Orders, Royal.

PHCENIX PARK, in Dublin, Ireland. On 6 May 1882 Lord Frederick Cavendish, Chief Secretary of Ireland, and Thomas Burke, the under

secretary, were assassinated in this park. See Dublin.

PHCENIX VILLE, feniks-vil, Pa., bor¬ ough, Chester County, at the junction of the Schuylkill River and French Creek, on the Pennsylvania and the Philadelphia and Read¬ ing railroads, 23 miles northwest of Philadel¬ phia. It was first settled in 1792, and the bor¬ ough incorporated in 1849. It is an important centre of the iron industry, and contains rolling mills, blast furnaces, bridge works and steel mills. It also manufactures cotton goods, hosiery, silk and matches. The borough has a public park, a hospital, a public library and good schools. The government is by a council and a burgess who holds office for three years ; the public school directors are chosen directly by the people. The waterworks are owned and controlled by the borough. Pop. 10,743.

PHOLAS. See Date-shell.

PHOLUS, fo'lus, in the Greek myth, a cen¬ taur of the Pholce, a spur of the Erymanthus range, which separated Elis from Arcadia. When Hercules visited him he opened in his honor a cask of wine, the gift of Dionysus, and the other centaurs who had joined in the revel becoming excited with the fumes of the wine fell upon Hercules with sticks and stones. Her¬ cules fought his way out of the cave and slew many of them with his poisoned arrows, putting the rest to flight. Pholus was accident¬ ally wounded by one of the poisoned arrows from which he died.

PHONAUTAUGRAPH. See Phono¬ graph.

PHONENDOSCOPE, an instrument used in auscultation in much the same manner as the stethoscope, than which it is much more deli¬ cate. It consists oi a shallow cup from which project rubber tubes covered with a disc of ebonite. In the centre of the disc is a small rod carrying a button on its end. The button is placed on the area under examination and the tubes are fitted to the ears of the examin¬ ing physician.

PHONETIC SPELLING, a system of spelling in which the words are spelled exactly as they are pronounced, the sounds being repre¬ sented by characters, each of which represents a single sound; as (<stix® for sticks.

PHONETIC WRITING, is writing ac¬ cording to sound, the ordinary method of the stenographer. There is a more primary mean¬ ing to the phrase, referring to the rendering of languages or dialects not yet reduced to written form. For instance, a traveler reporting on native words in a little-known savage tongue, has to reproduce them phonetically, as they sound to him. This custom has resulted in a great duplication of spellings, as Hindoo and Hindu, and geographers and editors of ga-zeteers have had infinite trouble in trying to reduce them to reasonable system. L' Associa¬ tion International Phonetique has been formed as an authority to remedy many of the diffi¬ culties encountered by editors and stenographers in dealing with phonetic renderings. The re¬ spelling of title words in dictionaries and ency¬ clopedias is done phonetically, and there is an unfortunate lack of harmony in the method of using diacritical marks to indicate the exact pronunciation. See Orthography; Stenog¬ raphy; Spelling Reform.

PHONETICS, or science of speech-sounds, is the art of producing speech-sounds and recognizing them by the ear. The organic side of phonetics describes the actions and po¬ sitions of the vocal organs — throat, tongue, lips, *etc.* — by which speech-sounds are pro¬ duced, and classifies those sounds according to their organic formation. The acoustic study of speech-sounds classifies them according to their similarity to the ear and explains how the acoustic effect of each sound is the neces¬ sary result of its organic formation. In com¬ mon practice phonetics apply to the articulate sounds of human speech and their representa¬ tion 'by alphabetic characters. How unsatis¬ factory and misleading the alphabetic system is — in the English language especially — may be shown by the similarity of spelling (ough) and the total dissimilarity of pronunciation in such words as cough, rough, bough, though and through, while rite, write, right and wright are all pronounced the same. The foundation of speech is the current of air issuing from the lungs through the bronchial tubes into the trachea and thence into the larynx, across the interior of which are stretched the vocal cords — two elastic ligaments. The breath causes these cords to vibrate and produce a musical sound — the voice, from which is obtained an endless variety of sounds, vowel and con¬ sonantal. The lungs are the bellows of the speaking machine; the larynx is the vocalizing part where the modifications affecting the pitch

of the voice are produced; the contraction and expansion of the vocal ligaments or glottis — the orifice of the larynx — produce the sound or voice and regulate its volume between the loud and the whisper. The pharynx, or passage between the larynx and the mouth, is a cavity susceptible of various degrees of contraction and expansion, from which the percussive ef¬ fects of consonants mainly arise. In passing through the mouth the sounds receive their final shade and texture by the operation of the tongue against the palatal arch ; the val¬ vular action of the soft palate and the forma¬ tion of the lips. The physiology of speech is a complex study, absolutely indispensable to an understanding of phonetics. The researches of American, British, French and German philologists have led to the construction of an alphabet by which every sound that the human voice is capable of uttering can be expressed by one invariable symbol. After many years of experiment, a ˆUniversal Alphabet® was pub¬ lished by Prof. Alexander M. Bell of London in 1867 under the name of ((Visible Speech,® applicable to every language. It contained no (<letters® in the alphabetic sense ; each symbol represented an operation of the organs of speech ; by following each sign the reader must inevitably produce the correct sound, whether labial, dental, sibilant, guttural or any nuance of a vowel sound. Applied to any other lan¬ guage, it removed the impossibility of repro¬ ducing foreign sounds by the somewhat clumsy system of ˆtransliteration.® In effect it was the same theory as obtains in music, where 10 musicians of different nationalities and unable to converse with each other may nevertheless perform harmoniously together in the same orchestra.

The English alphabet is the alphabet of Latin, and for that reason it is inadequate for representation of the very many vocalizations of English which are alien to Latin, for ex¬ ample, the several different values of the vowels. The five vowels have in Latin each two values and no more ; they each represent one vowel sound long (or full) and short (or thin, tenuis). But the vowel signs in English stand each for several different sounds. For example, a stands for the several vowel sounds heard in fate, fat, father, fall, fare, what and in the initial syllable of among; e has at least six values, as in we, wet, here, her, there and the final syllable of gotten ; i represents seven dif¬ ferent sounds ; o represents eight and u four. Or the sound of a in lane may be represented in other words by ei (rein) or by ea (great).

The several consonants, too, are not re¬ stricted to one sound-value: examples, get, gem; cat, cent. Consonant sounds unknown to the Latins are represented by combinations of consonants: ch, as in chin and as in chivalry; th as in thin and in than. Then-, both vowels and consonants are in a large proportion of the words of the language

silent. A phonetic alphabet would, as far as is possible, provide a sign for each vocalization in the language and would eliminate ((silent® letters. Many al¬ phabetic schemes to that end have been pro¬ posed, perhaps the most notable among them being the phonetic alphabet devised by A. J. Ellis of Cambridge University and Isaac Pit¬ man, which was first published in 1847, and which since that time has been variously modi-

fied by them or by others. Though strenuous efforts have been made for the adoption of the Ellis-Pitman or other similar phonetic systems; though primers and textbooks for schools and works of general literature, including the Bible and numerous magazines and newspapers, have been printed in phonotype, and alphabetic re¬ form has been zealously and ably advocated in England and the United States, there is as little prospect now of its adoption as there was 70 years ago or even less.

In the phonetic alphabet of Ellis and Pit¬ man, as at first constructed, 23 of the letters of the Latin alphabet were retained, the remain¬ ing three, c, q and x being rejected as super¬ fluous. Seventeen new characters were de¬ vised to represent sounds that are not repre¬ sented unambiguously in the existing alphabet. Afterward the 17 new characters were reduced to 11, namely, 7 new signs for vowel sounds and 4 for consonants. In a phonetic alpha¬ bet the signs must always, in whatever position, each represent one definite sound-value and no more. The sounds represented in such an alphabet by the vowel signs a, e, i, o and u are the sounds which those vowels have in the words, an, ell, in, on, run.

In 1877 the American Philological Associa¬ tion agreed upon an alphabet, the distinguish¬ ing features of which were the use of the five vowel signs in their Latin values, and the addi¬ tion of three new forms, making eight vowel symbols. By placing a macron over these the long vowel ‘was represented; unaccented, the vowels were short. With the further develop¬ ment of the science of phonetics and a conse¬ quent change in the methods and aims of lan¬ guage study, a

growing need was recognized for a rational scientific alphabet. In 1903 a com¬ mittee was formed of five members representing the National Education Association, the American Philological Association,, and the Modern Language Association of America, to ((agree upon and promote the general adoption of the best set of alphabetic symbols to be used in dictionaries and textbooks for the accuiate denotation of the sounds heard in English speech.® The alphabet of 1877 was adopted as the basis for the proposal. The result of the committee's labors was issued in 1904 and is generally known as the (<N. E.ˆ A. Alphabet. Briefly stated, it consists of 45 symbols — 18 vowel sounds, 24 consonants and three diph¬ thongs, as being sufficiently precise for popular scientific purposes. By dropping the signs that can be most easily dispensed with in rapid writ¬ ing, a <(shorter alphabet® of 38 letters was ar¬ rived at. . i ,

The consonant signs in the phonetic alpha bet stand for the same vocalizations which they represent in the regular alphabet, with t is exception, that in the phonetic system they have only one sound: g is always hard, as in get, never soft as in gem, the soft sound of g being there represented always by j; m hi-ce manner ˆ is always sharp, as in so, never solt as in has: the sound of j in has is represented phonetically by the character z. The sounds of sh zh, th and ng as heard in she and nation, in leisure and occasion, in thin, in thou and in sing have in the phonetic alphabet then proper signs, as can be seen in numerous examples ot

Ph°The Modification of the vowel signs make

them representative of vowel sounds not ade¬ quately discriminated in the existing alphabet. There the vowel sound of o in more, of u in puzzle, of u in delusion, of u in confuse and various other vowel sounds not discriminated in the regular alphabet; also the sound of ng, of sion in delusion, of th in truth and a num¬ ber of other vocalizations of English speech, are represented unambiguously in the phonetic characters. Lord Lytton wrote : (<A more lying, puzzle-headed, delusion than that by which we confuse the clear instincts of truth in our ac¬ cursed system of spelling was never concocted by the father of falsehood. How can a sys¬ tem of education, flourish that begins by so monstrous a falsehood, which the sense of hearing suffices to contradict?®

Although the alphabetic system and orthog¬ raphy of the English language are notoriously chaotic, the very magnitude of the evil

consti¬ tutes an insuperable obstacle to reformation. To adopt any radical phonetic system would at once antiquate all the existing literature in our language. The inconsistent orthography to which we adhere would surprise a genera¬ tion that had been accustomed to a rational system; and the ((ancient classics® of the year 1918 would be as irksome reading as the writ¬ ings of Chaucer and Wyclif are now. The new generation would have to learn the old A, B, C and the old orthography, else those ((classics® would be unintelligible to them. On the other hand the opponents of reform main¬ tain that an educated person finds no difficulty in spelling correctly, whereas a less educated individual would probably have quite as much trouble even if the orthography were simpli¬ fied. Reading is the best teacher. See Lan¬ guage, Science of.

Bibliography.— Bell, A. M., (Sounds and their Relations) (Salem, Mass., 1881); ‘Eng¬ lish Visible Speech) (Washington 1895), also in Italian and German, and -‘The Science of Speech) (Washington 1897) ; Ellis, A T.,

< Early English Pronunciation) (London 1869) ; Grandgent, C. H., (German and English

Sounds) (Boston, Mass., 1892); Merkel, C. L., (Physiologie der menschlichen Sprache) (Leipzig 1866); Sayce, A. H ‘The Principles of Comparative Philology* (‘London 1885) and (Introduction to the Science of Language (London 1900); Scripture, E. W., ‘The Ele¬ ments of Experimental Phonetics (New Yoik 1902); Sievers, E., ‘Phonetic (Leipzig 1901); Soames ‘Introduction to English, French and German Phonetics) (London 1899) ; Storm, J.,

‘ Englische Philologie) (1892) ; Sweet, H, ‘Practical Study of Languages) (London 1899) and ‘A Primer of Phonetics) (Oxford 1906) .; Vietor ‘Elements of Phonetics) (London 1910) ;’ Report of a Joint Committee on the Subiect of a Phonetic English Alphabet (New York 1904) ; Weeks, R., ‘The N. E. A. Phonetic Alphabet) (Lancaster, Pa. 1912).

PHONOGRAPH, an instrument invented in 1877 by Thomas A. Edison (q.v.) of Menlo Park, N. J., by means of which within a moderate radius sounds can be registered pci manently and afterward reproduced from such mechanical register. The instrument as orig¬ inally made consists of a mouthpiece, having a diaphragm or membrane. Connected with the centre of this diaphragm is a steel

point, which

when the sounds are projected on the diaphragm through the mouthpiece vibrates and cuts a vibrating spiral groove in the surface of a rotating cylinder having also a slow endwise motion. This cylinder surface is then hardened and becomes a ((record® for reproduction of the sounds. In the original phonograph a piece of tin-foil is laid round the cylinder, being kept close to it by means of gum or water, and .the stand holding the mouthpiece is brought close to one end of the cylinder; the steel point of the diaphragm is then adjusted so as to be just touching or close to the tin-foil, and above the line of spiral groove. It will be seen, then, that any movement of the steel point due to the motion of the diaphragm will cause a slight indentation of the tin-foil, which will by such movement be slightly depressed into the groove beneath it; and if the cylinder be rotated, that the steel point will, from the pitch of the groove and screw being alike, al¬ ways be over the line of groove. If the instru¬ ment be then set as above described, and some words be spoken into the mouthpiece, while at the same time the cylinder is kept in rotation, a series of minute marks are made upon the tin-foil by the movements of the steel point, and these markings have all an individuality of their own, due to the varying sounds addressed to the mouthpiece. So far a register only of the sounds emitted has been obtained, and we have now to show how these sounds in this manner, fixed as it were on the tin-foil, can be reproduced. To effect this the mouthpiece must be drawn back and the cylinder rotated in the reverse direction to what it was at first, so as to bring the same part of the tin-foil with which the operation commenced back to the point at which it started, namely, opposite the steel point. The diaphragm with its steel point is then approached toward the tin-foil as at first and is now resting upon the same point of the tin-foil as it had previously first in¬ dented. The cylinder is now rotated as at first, with the result that the small indentations or sound markings made previously now act upon the steel point by causing it to rise or fall or otherwise move as the markings pass beneath it ; the result of this is that the diaphragm in

connection with the steel point is thrown into a state of vibration exactly corresponding to the movements induced by the forms of the markings and thus affects the air around so as to produce sounds, and these vibrations being exactly similar to those originally made by the voice necessarily reproduces these sounds to the ear as the words at first spoken. The diaphragm in this way acts as the medium of transmission of sounds to be registered on the tin-foil, and as the medium of reproduction of these sounds from the metallic register on which they have been impressed.

In Edison's improved phonograph (1895) lubes of wax are used instead of the tin-foil, the cylinder fitting into ihe inside of the tube, and the markings being made on the surface of the wax by a fine steel point. This familiar type of phonograph has a horizontal mandrel or shaft, on which the cylinder turns by the pressure of a spring, which is usually wound by a hand crank. The hollow cylinder record is slipped on the cylinder which is uncovered at one end for that purpose. The diaphragm or reproducer, which holds the horn, travels along

the cylinder, following the spiral indentations of the record. The wax cylinders can be used several hundred times, the machine being fitted with a small paring tool which will shave off the record previously made leaving a smooth new surface. The machine has also been sup¬ plemented by the inventor with an ingenious little electric motor with delicate governing mechanism, so that the phonograph can be operated at any chosen rate of speed, uniformly. This motor derives its energizing current either from a storage battery or an electric-light cir¬ cuit.

The cumbersomeness of phonograph cylin¬ der records, which required great room for storage, led to the marketing in 1897 of ma¬ chines in which a disc carried the record, those being frequently called gramophones or graphophones (q.v.). The discs had the advantage of permitting longer records. A prominent ma¬ chine of this type is the Victrola. In the disc machines, a turntable replaces the cylinder, and this turntable supports and rotates the disc record, which is clamped fast. A needle of steel, wood, etc., is used to travel in the in¬ dentation and impart the vibrations to the dia¬ phragm in the sound-box. The Dictaphone is another development, also the Detectograph, all of which employ the fundamental principles de¬ scribed. The greatest demand has proved to be for records of popular songs and instru¬ mental music. Automatic phonographs are to be found in many places of public resort, equipped with musical or elocutionary cylinders,

which can be heard upon the insertion of a small coin ; and miniature phonographs have been applied to dolls and toys. The value of the phonograph in the preservation of dying languages has been perceived, too, and records have already been secured of the speech, songs, war-cries and folklore of American tribes now becoming extinct. It is also worthy of note that several voice records remain of distin¬ guished men who (<being dead yet speak.® Their tones can now be renewed at will and their very uterances, faithful in accent and individuality, can be heard again and again through all time.

The manufacture of phonographs and graphophones has become an industry of some importance in the United States. The produc¬ tion in 1899 was valued at $1,240,000; rose to $5,438,000 in 1909 and to $11,525,000 in 1914. The production of records and blanks is about $5,000,000 annually. There has been much in¬ crease in the quality and the value of the in¬ dividual machines, also in the size and quality of the musical records, especially the discs. In 1914 there were 18 establishments engaged in the industry, employing about 10,000 persons and capitalized at almost $34,000,000.

PHONOGRAPHY. See Shorthand.

PHONOLITE (Clinkstone), in geology , a compact gray or green volcanic rock of feld-spathic or porpnyritic. texture consisting largely of orthoclase, nepheline. pyroxene and some¬ times leucite. Found in the United States prin¬ cipally as dikes in the Black Hill region and in the Cripple Creek mining district. More widely distributed in Europe, being found in many parts of Germany and in the volcanic region of central France. Also found in the Cape Verde Islands. Many phonolites crack up internally into a number of parallel plates so that the

stone gives a peculiar sound when struck with a hammer, hence the name.

PHONOMETER, an instrument, usually self-registering, for ascertaining the number of vibrations of a given sound in a given

space of time.

PHONOSCOPE, an apparatus for testing the quality of musical strings, invented by Koenig. Also a combination of an induction coil and battery with a rotating vacuum tube, for translating vibrations of sound into visible figures.

PHORBAS, for'bas, in the Greek myth, a son of Lapithes, father of Augea and Aktor. He was asked by the Rhodians for his assist¬ ance in freeing their island from serpents, and for his services was honored as a hero. Many identify him with the constellation Ophiuchus.

PHORCYS, for'sis, PHORCYN, or PHORCUS, an aged sea god, according to Homer; according to Hesiod a son of Pontus and Gaea (sea and land). He was brother of Nereus and Ceto, of whom he begot the Graiae and the Gorgons, and the dragon Ladon that watched over the golden fruit of the Hesperides. He is also called the father of the nymph Thoosa, who was the mother of Cyclops Polyphemus, the maidens Hesperides, the Sirens and Scylla.

PHORMINX, an ancient Grecian lute or

lyre.

PHORMIO, for'mi-o, a comedy by Ter¬ ence, produced in 161 b.c. It was copied from a comedy of Apollodorus and in turn copied by Moliere in (Fourberies de ScapinP

PHORMIUM. A silky fibre obtained from a plant (Phormium tenax) found in New Zealand, the Chatham Islands and Norfolk Island. It was introduced in 1789 in Great Britain and continental Europe. It grows abun¬ dantly in the southern part of Ireland and also on the west coast of Scotland. The plant re¬ ceives its name of "Phormium® from the Greek < pop/j-og , a basket, because of the use made of its leaves by the people of New Zealand. The leaves are «thick, stiff and leathery, » and the flowers bright red or yellow and from one to two inches long. It grows best along streams. Among the Maoris the fibre is used for cloaks, mats, fishing-lines, *etc.* Phormium is prepared very carefully by the natives, but the process is very wasteful. After its import¬ ance had been recognized machinery was in¬ vented to free the fibre from the leaves. As this means, however, produced an inferior fibre a reward was offered by the government of New Zealand

in 1893 for the invention of a machine which would produce a satisfactory fibre. The fibre is becoming popular as a ma¬ terial for binder-twine on reaping machines.

PHORONIS, a marine animal of the class Phoronidea. It is worm-shape, with long slender body enclosed in a leathery tube. At the mouth is a circlet of tentacles. It abounds on the New England coasts and m Europe. Thev are also found on the shores of Australia. Consult Harmer, S. F in ‘Cambridge Natural History } (Vol. II, London 1899).

PHORORHACHO.S, fo-ro-rakos, a huge fossil bird of the Miocene Age, several species of which are found in the rocks of eastern

Patagonia. It was as large or larger than an ostrich, and is <(remarkable for the immense size and heavy build of the skull, to which the legs, huge though they sometimes are, bear no proportion ; the maxilla is exceedingly com¬ pressed, yet very deep, and ends in a strong hook, while the long massive mandible curves upward to meet it.® The bird must have re¬ sembled in appearance a great, thick-legged ostrich, with the head of a still greater hawk. Its relationships are in dispute, and it is not even certain that it is ratite, the sternum-not having yet been disclosed. Evans, (Birds) (1900), places it in the same group as the epiornis ; while Dr. Gadow and others regard it as representing the ratite Stereonithes.

PHOSGENE, fos’jen or -jen, in chemistry, COCh, carbonyl chloride, phosgene gas, car¬ bon oxychloride, was first obtained by Davy (1812) by direct union of carbon monoxide (CO) and chlorine in sunlight and is still made by same process. A colorless gas with suffo¬ cating odor and very disagreeable effect on respiratory organs; on cooling or under pres¬ sure it condenses to a low boiling liquid. A very active chemical agent, used in the manu¬ facture of various chemical substances, particu¬ larly dye stuffs, it comes on the market as liquid under pressure in steel cylinders or in solution in toluene.

PHOSPHATE FERTILIZERS. See Fer¬ tilizers.

PHOSPHATE ROCK. See Mineral

Production of the United States.

PHOSPHATES. See Phosphoric Acid.

PHOSPHINE. See Phosphorus.

PHOSPHOR-BRONZE, an alloy made by fusing phosphor-tin with copper. It usually contains 0.053 to 0.76 phosphorus and 8 to 12 per cent of tin. The effect of the phosphorus is probably to reduce action on the oxides of the other metals during the process of manu¬ facture. Phosphor-bronze is of finer grain and color than ordinary bronze. It is as tough as wrought iron, more ductile than copper, is com¬ pletely homogeneous and shows great resistance to wear. Because of these qualities it is largely employed for bearings, wire and cannon. It was invented about 1870 by two Belgian metal¬ lurgists.

PHOSPHORESCENCE, a term formerly used to indicate a variety of phenomena con¬ sisting in the production of light without the concomitance of such a degree of heat as is associated with normal combustion. Besides the luminescence of living organisms (see Phos¬ phorescence in Living Organisms) these phe¬ nomena comprise thermoluminescence, or the luminescence of substances such as fluorspar below ordinary red heat (only after exposure to light however) ; triboluminescence or lu¬ minescence, such as that of sugar, due to > cleavage, friction or similar mechanical means;; crystalloluminescence, exhibited by arsenious acid, taking place during crystallization from fusion or solution; chemiluminescence, or the formation of light in a chemical reaction with¬ out corresponding heat, as in the case of phos¬ phorus ; electroluminescence, or luminescence excited by electrical means, which takes place in many gases upon the passage of an electrical discharge; and photoluminescence, or lumines-

cence upon exposure to light. When photo¬ luminescence lasts only so long as the light that causes it, it is known as fluorescence (q.v.), but if it remains after the inducing light has ceased, it is called phosphorescence in the strict sense current at the present time. This is shown by a large number of substances — perhaps the ma¬ jority — in some slight degree, and is especially characteristic of the sulphides of the alkaline earths, if these are prepared artificially. It appears that this phosphorescence is partly due to the presence of minute, but definite, propor¬ tions of foreign substances. Solid flurorescent substances invariably manifest some degree of phosphorescence, but this is not exhibited by fluorescent liquids, unless these are rendered solid by freezing or gelatinization or some sim¬ ilar process. The color of the phosphorescence of a substance depends on a large number of

imperfectly understood factors, •but is almost invariably, if not quite, of longer wave-length than the stimulating rays. Phosphorescence may be caused by invisible light-rays, such as ultra-violet rays or X-rays. Cathode rays and the radiations from radium and allied sub¬ stances will produce effects much like ordinary phosphorescence.

The duration of brief periods of phos¬ phorescence is measured by instruments known as phosphoroscopes. These consist of a dark chamber in which is the substance to be exam¬ ined. This has two openings, obstructed by shutters so arranged that the shutter at one end is open when that at the other end is closed and vice-versa. Light is admitted to the phos¬ phorescent substance through one opening, and it is examined through the other. It is clear that by causing the alternating action of the shutters to take place with sufficient speed the briefest phosphorescence will appear to the ob¬ server like a continued glow, and that by com¬ paring the intensity of this glow with the form and speed of the shutters the duration of phos¬ phorescence can be measured. Consult Becquerel, (La lumiere) (Paris 1867) ; Winkelmann, (Handbuch der PhysflC (Vol. VI, Leip¬ zig 1906).

PHOSPHORESCENCE IN LIVING ORGANISMS. Many living organisms, both in the animal and in the vegetable kingdom, exhibit an ability to give off light. This light is characterized by the almost perfect efficiency with which it is generated. As much as 97 per cent of the radiation from the phosphorescent organism lies within the bounds of the visible spectrum. This contrasts strongly with the efficiency of all other forms of illumination. The best artificial illumination has an efficiency of about 10 per cent, while the efficiency of the sun is not far from one-third. Phosphorescence is observed in the animal kingdom among Radiolarians ; the pelagic Cystoflagellate Noc-tiluca; certain medusae, polyps and Ctenophores; Rotifers; Chaetopod worms such as Chceiop-terus ; some Polyzoa; Pholas and other Mol¬ luscs ; Copepoda and deep-sea Crustacea ; Myriapods; certain May-flies; Elaterid beetles of the genus Pyrophorus ; the Lampyridce or common fire-flies ; Ascidians, and many deep-sea fishes. The phosphorescence of pelagic forms often causes the sea to appear a mass of light. In the vegetable kingdom certain bacteria and saprophytic fungi show a most marked

phosphorescence and cause the fox-fire often seen on rotten stumps. Phosphorescence in most cases, if not in all, is due to the slow oxidization of some fat-like substance in the presence of water. In

multicellular animals this oxidation usually takes place in the prod¬ ucts secreted by certain glands on the integu¬ ment. These glands are well innervated and sometimes the entire luminescent organ con¬ sists simply of a gland or glands, together with the nerves pertaining thereto. On the other hand, the luminescent organ, instead of being of this simple diffuse sort, may possess a high degree of organization. It may have a re¬ flector, a lens and an iris diaphragm, as in the case of the organs of many deep-sea fishes. These are located in a variety of different posi¬ tions, but there is a general tendency to group them on the head. They enable the fish to find its prey and to avoid its enemies in the dark abyss of the sea. Sometimes they may serve as bait, in cases where they are found on barbels dangling near the mouth. In other cases their chief purpose may be that of making recogni¬ tion possible.

PHOSPHORIC ACID, in chemistry, an acid substance formed by the union of phosphorus pentoxide (see Phosphorus) with the elements of water. The combination may occur in three proportions. When one mole¬ cule of the pentoxide combines with three mole¬ cules of water, the resulting acid is called <(orthophosphoric acid® ; when one molecule of the pentoxide combines with two molecules of water, the acid is called <(pyrophosphoric acid® ; and when one molecule of the pentoxide com¬ bines with one molecule of water, the acid is called <(metaphosphoric acid.®

Orthophosphoric Acid. — This is the com¬ pound which is always understood, when <(phosphoric acid® is mentioned without further qualification. It has the chemical formula H3PO4, and may be prepared, as indicated by the equation P205 + 3LLO — 2H3PO4, by dissolv¬ ing phosphorus pentoxide in water, and boiling the solution. This acid is also formed when phosphorus is heated with nitric acid, red fumes composed of the lower oxides of nitrogen being evolved, while the phosphorus is simultaneously oxidized, passing into solution in the form of phosphoric acid, H3PO4. Pure phosphoric acid (that is, orthophosphoric acid), when free from water, forms a thick, semi-solid mass, with a specific gravity of about 1.88, and it may be obtained in the form of tabular crystals, by evaporating the nearly anhydrous acid in a vacuum, over concentrated sulphuric acid. The crystals melt at 107° F., and the liquid formed from them solidifies again, when cooled to 100° F., the temperature at the same time spon¬ taneously rising to 105° F. The crystalline and the syrupy forms both dissolve freely in water, and both deliquesce when exposed to the air. The phosphoric acids form salts, which are known as ((phosphates.® Common, or ortho¬ phosphoric acid, is tribasic, each of its hydrogen atoms being replaceable by a monovalent base. With sodium, for example, it forms

three defi¬ nite, crystallizable compounds. Common neutral sodium phosphate, or ((hydrogen di-sodium phosphate,® may be obtained in the form of large, transparent, rhombic prisms, by neutraliz¬ ing phosphoric acid by sodium carbonate, and

evaporating the solution. The crystals have the composition HNa2P04 + 12H20. If sodium hy¬ drate is added to a solution of this salt, needle¬ like crystals of sodium subphosphate, or (<tri-so- dium phosphate,® are obtained upon evaporation, these having the formula NaaPCh + 12H20.

If on the other hand excess of phosphoric acid be added to a solution of the common phos¬ phate, evaporation yields crystals of sodium superphosphate, or ((dihydrogen sodium phos¬ phate,® N2NaP04+H20. An orthophosphate is known as <(primary,® ˆsecondary,® or ((tertiary ,® according, as one, two or three of the hydrogen atoms of the acid are replaced by a monovalent base. With calcium, orthophosphoric acid forms three well-defined compounds. The normal phosphate, Ca3(P04)2, occurs native as the min¬ eral ((phosphorite,® and also, combined with the fluoride or chloride of calcium, as (<apatite.® It is likewise an essential constituent of bones, forming about 85 ner cent of the weight of their ash. It may also be prepared, artificially, by adding phosphoric acid to a solution of calcium chloride, when it is obtained in the form of a white, amorphous powder. Calcium phosphate, in some form, is an essential constituent of fertile soil, as it is needed for the growth of plants. The normal phosphate, just described, is capable of furnishing both the phosphorus and the calcium ; but since it is nearly insoluble, it is not readily absorbed by the plant. By the action of strong sulphuric acid, the normal phosphate, Cas(P04)2, is converted into a soluble compound which has the formula CaH4(P04)2, as indicated by the equation Ca3(P04)2 + 2H2S04 — CaH4 (PO4) 2 + 2CaS04. The com¬ pound CaH4(P04)2 is known as <(monocalcium phosphate,® or (commercially) as ((superphosphate of lime,® and is prepared artificially on the large scale, from, bones and the mineral phosphates

of calcium, for use as a fertilizer, for which it is especially adapted by reason of its solubility. Commercial phosphoric acid is prepared chiefly from superphosphate of lime, but the process is a somewhat involved one, and for it the treatises on technological chemis¬ try must be consulted. Pure phosphoric acid, for use in medicine and in the laboratory, is usually prepared by the oxidation of phosphorus, as described above. Dicalcium phosphate, CaHPCh, may be prepared by precipitating a solution of calcium chloride with ordinary sodium phos¬ phate, Na2HPCh. It is of far less importance than either of the other phosphates of calcium Many other compounds of orthophosphoric acid with metallic bases are known, and many of these are used both in the laboratory, and in the arts. Numerous double salts are . also known, in which the hydrogen of the acid is re¬ placed partly by one base, and partly by another.

Of these, the hydrogen-ammonium-sodium phos¬ phate, or <(microcosmic salt,® . HNaNFUI 04 7-4H20, deserves special mention, since it is greatly used in the laboratory. It may be piepared by crystallization from a solution contain¬ ing five parts by weight of crystals of common sodium phosphate, Na2HP04 + 12H20, and two parts of secondary ammonium phosphate, (NH4)2HP04.

Pvrophosphoric Acid. — When concen-tratea orthophosphoric acid is heated to 415 h., until it yields, with silver nitrate, a white precipi¬ tate (instead of a yellow one), it becomes con¬ verted into a different compound, which is known

as ˆpyrophosphoric acid,® has the formula PI4P 2C)7, and is tetrabasic. The change consists in the loss of a molecule of water, as may be seen by writing formulae for orthophosphoric and pyrophosphoric acids in the respective forms : 2H2P04 — P2053H20, and H4P20t = P2052H20. The salts of pyrophosphoric acid are much more important than the acid itself, and are known as <(pyrophosphates.® They may be prepared most readily by the action of heat upon the secondary orthophosphates. Thus if common (that is, secondary) sodium phosphate, Na2HP04, be heated to redness, it loses the elements of water, and becomes converted into, normal sodium pyrophosphate, Na4P207, as indicated by the equation 2Na2HP04 — Na4P207 H~ H20. This salt can be dissolved in water and crystallized, for it does not readily take up water again, so as to be reconverted into the ordinary ortho¬ phosphate. The pyrophosphates are transformed into orthophosphates, however, upon being strongly heated with an alkali or an alkaline carbonate, and also

when boiled in aqueous solution with the stronger acids. Several of the pyrophosphates, especially those of iron, are used in medicine.

Metaphosphoric Acid. — When phosphorous pentoxide, P2Os, is dissolved in cold water, it combines with one molecule of the water to form an acid which has the formula HP03; the equation being P2Os H~ H20 — 2HP03. The same compound may be obtained in the form of a glassy, ice-like mass, by heating anhydrous orthophosphoric acid to 750° F. The vitreous mass so obtained is known as ((glacial phos¬ phoric acid.® It dissolves in water to form a solution of metaphosphoric acid, and if the solution is allowed to stand for a time and is then boiled, it becomes converted into ordinary orthophosphoric acid. Metaphosphoric acid forms salts, which are known as ((metaphos-phates® ; but these are of much less importance than the orthophosphates and pyrophosphates.

Phosphatic Fertilizers. — Apatite (q.v.) has been used to some extent as a fertilizer, but rock phosphate, in which the phosphoric acid has probably resulted from organic matter, con¬ stitutes the greatest source. It usually occurs as concretions or thin beds in sedimentary rock. Florida is the largest producer, the supply com¬ ing from rocks of Tertiary age. Phosphate of similar age occurs in . South Carolina. The Tennessee beds occur in rocks of Ordovician and Devonian age. Large reserves, as yet prac¬ tically untouched, exist in Carboniferous rocks in Utah, Idaho and Wyoming.

PHOSPHOROSCOPE, an apparatus con¬ sisting of glass tubes arranged in a box and containing phosphorescent substances, as the sulphides of lime, strontium, barium, *etc.* When this is exposed to the sun's rays or to the light emitted by a gas-burner or burning magnesium, and then removed to a dark place, each tube appears to glow with light of a different color, as red, blue, green, *etc.* Also an instrument devised by Becquerel for measuring the dura¬ tion of phosphorescence in different substances.

PHOSPHOROUS ACID, a compound of phosphorus, oxygen and hydrogen, possessing acid properties, and having the chemical formula H3P03. It may be prepared by acting upon phosphorus trichloride (see Phosphorus) witfi water, as indicated by the equation PCla +

3H20 = H3PO3 +3HC1. Hydrochloric acid, it will be seen, is formed at the same time ; but this may be expelled by boiling. The solution, when concentrated by evaporation in a vacuum and allowed to cool, deposits crystals of phos¬ phorous acid. These melt at about 160° F., and, when heated somewhat more strongly, decom¬ pose with the formation of phosphoric acid, H3PO4, and phosphine, PH3. Phosphorous acid is dibasic, only two of its hydrogen atoms being replaceable by bases. It forms a series of salts known as ˆphosphites,® those of the alkali metals being soluble, while the others are mostly insoluble.

PHOSPHORUS (Greek, ˆlight-bearer®), a non-metallic element, first prepared in the ele¬ mentary form, about 1669, probably by . Brand; although its discovery is also attributed to Boyle and to Kunkel. Phosphorus never occurs free in nature, but it forms an essential part of numerous minerals, prominent among which are apatite and phosphorite. It occurs in bones in considerable quantity, combined with lime, oxygen and organic matter;. and the extensive beds of fossil bones that occur in the Carolinas and elsewhere are regularly worked for the sake of the calcium phosphate they contain. Phosphorus also exists in various organic sub¬ stances, notably in brain tissue, in blood and in the yolks of eggs. Chemically phosphorus has the symbol P, and an atomic weight of 31.04, when that of oxygen is taken as 16.

Phosphorus was formerly prepared by re¬ ducing monocalcium phosphate by heating it with charcoal — the monocalcium phosphate being first obtained by the action of sulphuric acid upon tricalcium phosphate (or bone-ash). This process, which was cumbersome and ex¬ pensive, has now been almost entirely replaced by the continuous electric-furnace process of Readman, Parker and Robinson. Bone-ash or phosphate rock can be used equally well as the source, and the furnace (which is of the verti¬ cal-electrode arc type) is charged with a mix¬ ture of one of these substances with charcoal and silica. The silica is added partly to in¬ crease the yield (because only two-thirds of the phosphorus is reduced by carbon alone) and partly to cause the slag to take a fluid form, so that it can be drawn off easily from the furnace, thus keeping the furnace clean. The products (in addition to the fusible slag) are phosphorus vapor and carbon monoxide, as indicated by the equation Ca3(P04)2 + 3Si02 + 5C — 3CaSi03 + 2P

+ 5CO. The yield of phosphorus, by this method, is said to be about two pounds per electrical horse power, per 24-hour day.

Phosphorus may be easily freed from sand, carbon and other solid particles by melting it under warm water and filtering it through can¬ vas or chamois. It may also be purified by distillation from iron retorts.

Pure phosphorus, when prepared as described above, is a colorless, whitish or yellowish, semi¬ transparent, waxy solid, with a specific gravity of about 1.82, and a specific heat of about 0.19. It becomes brittle at low temperatures, melts at 110° F. under water and at 86° F. when dry, and distils, under ordinary atmospheric pressure, at 516° F. Melted phosphorus may often be cooled to a point considerably below its point of fusion before it again solidifies. It may be

obtained in the form of crystals by fusing and cooling it in considerable quantities, or by sub¬ liming it in a vacuum, or by evaporating its solution in carbon disulphide. Phosphorus, in the form here described (which is called its (<ordinary® form), is exceedingly inflammable. It should never be touched with the fingers, as it is liable to take fire from their warmth; and it should always be stored and manipulated under water.

When ((ordinary® phosphorus is heated for some hours to about 500° F. in an atmosphere composed of some gas that will not combine with it, it becomes converted into an amorphous, red, allotropic modification, whose properties are quite different from those described above. Thus the red variety has a specific gravity of 2.25, is entirely insoluble in carbon disulphide, do£S not melt even when heated to redness in a sealed glass tube, and takes fire in the air only when heated to 500° F. Ordinary phosphorus glows in the dark when exposed to the air, the element taking its name from this circumstance. The red allotropic form, however, does not ex¬ hibit any such luminosity. Ordinary phos¬ phorus is poisonous, and when handled in con¬ siderable quantities by persons with defective teeth, it often induces necrosis of the jaw-bone. Red phosphorus is pronounced, by nearly all authorities, to be non-poisonous ; and if it has poisonous properties, they are certainly far less mlarked than those of the ordinary variety. Ordinary phosphorus is superficially converted into the red allotropic form by the action of light, its surface first becoming yellow, and then passing into a red. In the presence of a small quantity of iodine, the transformation of the

ordinary form into the allotropic one is effected by heat with great facility.

Other allotropic varieties of phosphorus have been described, but their existence is not yet generally admitted. Hittorf, for example, dis¬ solved phosphorus in melted lead, allowed the mass to cool, and then dissolved the lead in nitric acid. Violet-black crystals remained be¬ hind, which were composed chiefly of phos¬ phorus ; but they have never been obtained en¬ tirely free from lead and it is possible that their character is determined by the lead and other impurities present.

When phosphorus is heated in contact with air, it burns with a brilliant flame, and with the formation of clouds of ((phosphorus pentoxide,® P_2O_5. These may be collected in the form of a white, amorphous powder, which absorbs moist¬ ure with avidity, and hence is used in the labor¬ atory for drying gases. The pentoxide dissolves in water with a hissing noise, its solution consti¬ tuting the compound known as phosphoric acid (q.v.). With hydrogen, phosphorus forms a gaseous compound known as phosphoreted hy¬ drogen, or ((phosphine.® This has the formula PH_3 and is best prepared by the action of caus¬ tic potash and*water upon ordinary phosphorus; potassium hypophosphite, KPH_2O_2 being formed at the same time, in accordance with the equa¬ tion $3KOH + 4P + 3H_2O = 3KPH_2O_2 + PH_3$. Phosphine is a colorless gas with an offensive odor suggestive of decomposing fish and it takes fire spontaneously upon contact with the air. The spontaneous inflammability appears to de¬ pend, however, upon the presence of traces of another hydride having the composition P_2H_4.

Chlorine combines directly with phosphorus, forming phosphorus trichloride, PCh, which is an oily liquid boiling at 169° F., and having a specific gravity of 1.61. The trichloride absorbs chlorine readily, forming a yellowish, solid pen-tachloride, PCh.

Phosphorus, on account of the facility with which it ignites under the influence of frictional heat, has long been used in the manufacture of

matches and until recently the familiar <(strike-anywhere® matches of our everyday ex¬ perience had tips composed of ordinary phos¬ phorus, combined with manganese dioxide, chalk, coloring matter and glue, or with other analogous substances. Necrosis of the jaw¬ bone (already mentioned above) was pitifully common, however, among the workers in match factories using the ordinary (or white) variety of phosphorus. Finland, in 1872, forbade the manufacture or sale of matches containing it, and similar action was subsequently taken in certain other countries. As a sequel to an international convention held in 1906, at which the match problem was considered, most of the leading nations agreed to discontinue the manufacture of the white-phosphorus match. England and the United States declined to enter the pact, but England reversed her de¬ cision shortly afterward, thereby leaving the United States the only important nation that still permitted the manufacture and use of matches of this kind and thrusting upon us the unenviable distinction of having phosphorus necrosis (or (<phossy jaw®), known as a dis¬ tinctively American occupational disease. This state of affairs was remedied by an act passed by Congress in April 1912, which taxed the white-phosphorus match out of existence and forbade the subsequent importation, exportation or sale of such matches : and with the enforce¬ ment of this act necrosis of the jaw, as an oc¬ cupational disease, practically disappeared.

The ((strike-anywhere® match that we now use depends for ignition upon the use of the sesquisulphide of phosphorus, which is practi¬ cally non-poisonous. The sesquisulphide match was invented in France, and in 1912 the patent rights to it, in the United States, were owned by the Diamond Match Company. That cor¬ poration voluntarily surrendered them, however, and gave the sesquisulphide patents to the pub¬ lic without compensation and subject only to the condition that Congress would make the white phosphorus match illegal.

For the tips of “safety® matches, a mixture of potassium chlorate, potassium bichromate, antimony trisulphide and minium is often used. This will not ignite readily by ordinary friction, but takes fire easily when drawn across a surface coated with antimony pentasulphide and red phosphorus.

Phosphorus is used in considerable quan¬ tities as an essential constituent of various poi¬ sons for rats and other animal and insect pests. (<Bologna phosphorus® does not contain any true phosphorus, but consists of calcined sul¬ phide of barium (see Barium), taking its name from the marked phosphorescence that it ex¬ hibits after

exposure to a bright light.

A. D. Risteen.

PHOSPHORUS, in astronomy , a name given the planet Venus as the morning star;

also called Lucifer (q.v.). When it is an even¬ ing star it is known as Hesperus and Vesper.

PHOSPHORUS, Poisoning by. See

Toxicology.

PHOTIUS, fo'shi-us, Byzantine scholar: b„ Constantinople, 820; d. Armenia, 891. When he held the office of Secretary of State under the Emperor Michael III, the patriarch Ignatius incurred the displeasure of the weak and profli¬ gate Michael, was deposed, imprisoned and sent into exile and Photius was raised from the standing of a layman to the patriarchal dignity in his place. The installation was recognized by the metropolitans of the patriarchate, but opposed by Pope Nicholas I, whom Photius soon after excommunicated. But the Emperor Michael having been murdered in 867 by Basil, who was raised to the throne, that prince im¬ mediately replaced Ignatius in his office and banished Photius, who, however, resumed his dignity on the death of Ignatius in 878. On the accession of Leo, son of Basil, in 886, Photius was again deposed and banished to a monastery in Armenia, where he died. His death might have put an end to the division he had occasioned between the Greek and Latin churches, had not the popes refused to acknowl¬ edge the priests and bishops ordained by him and insisted upon their degradation. It is now difficult to arrive at a correct estimate of the character of Photius; for, while his biographers of the Roman Catholic Church ascribe to him craft, violence and perfidy, the Greek Church has canonized him. He was an able man of the world, but not influenced by the principles which befitted his sacred office ; yet he was probably not below the average of the states¬ men prelates of his age. His chief writings are (1) ˆyriobiblionP an extensive review of ancient Greek literature by a scholar of erudi¬ tion and judgment. The best edition is that of Bekker (1825). (2) ˆomocanonˆ (q.v.). (3) A Greek Lexicon, of which editions have ap¬ peared at London (1822) and Leyden (1864-65). A collection of letters (Greek and Latin, London 1651). (5) A treatise on the Holy

Spirit, maintaining the ((Single Procession.® Consult Migne,

<Patrologia Grseca,* Vol. 101— 104 (1860) ; Hergenrother, (Photius, Patriarch von KonstantinopeP (1867-73).

PHOTOCHEMISTRY, that branch of chemistry which deals with the chemical changes that are produced by the agency of light. The earliest observed photo-chemical phenomena were the fading of dyes and other colors in a strong light and the bleaching of linen and similar fabrics, under the influence of sunlight. The oldest known example of the power of light to induce chemical change in an inorganic substance is undoubtedly the blackening of silver chloride — a phenomenon which has been fa¬ miliar to chemists since the 16th century. The number of known photo-chemical phenomena is so great as to be almost past enumeration. The most important of them all is the decompo¬ sition of carbon dioxide gas by the green color¬ ing matter (chlorophyll) that occurs in the leaves of plants; for it is by means of this de¬ composition that plants obtain the greater part of the carbon they subsequently utilize in the formation of wood and of starches and sugars and other analogous foodstuffs. The

carbon dioxide gas that exists in the air is absorbed by the chlorophyll corpuscles in the leaves, and is split up, under the influence of sunlight, into carbon and oxygen. The oxygen is liberated in the free state (in large measure) and is permitted to escape again into the air. The carbon does not appear to be set free in the elementary state at any stage in the process, but is retained in the leaves in the form of some chemical combination with hydrogen and (probably) oxygen. The precise chemistry of the change is not definitely known; but as Sachs says, the (<first obvious product® which is formed in the leaves is starch.

In the blackening of silver chloride there appears to be an elimination of chlorine, and, under ordinary circumstances, a simultaneous absorption of oxygen; the silver chloride (AgCl) being partially converted into an oxy¬ chloride, whose formula has been given as AgiOCh by Hodgkinson, and as Ag2C10 by Baker. Light acts in an analogous manner upon the other haloid salts of silver; but it appears

that the decomposition can never pro¬ ceed far, in any case, unless some substance is present which is capable of absorbing the liberated halogen. Moisture suffices as the ab¬ sorbent in the case of the chloride and bromide of silver; but its sufficiency in the case of the iodide depends upon the way in which that salt is prepared. In photography, all three of these salts of silver are used, the chloride being em¬ ployed in the preparation of positive prints, while the bromide and iodide are used in the manufacture of the negative plates. It is prob¬ able that an organic compound of silver is formed in the course of the manufacture of the emulsions employed in modern dry-plate photography, this organic compound being (as experience indicates) exceedingly sensitive to the action of light, becoming transformed with extraordinary facility into unstable com¬ pounds which are readily reducible by the sub¬ sequent action of the reducing agents that are technically known as ˆdevelopers.®

It was formerly customary to consider sun¬ light as divisible into three essentially different kinds of rays, which were known, respectively, as <(heat rays,® (<light rays® and (<actinic (or chemical) rays® ; heat rays including those parts of the radiation which are distinguished by a relatively long, wave-length, and which are mostly confined to the red and the infra-red parts of. the solar spectrum; light rays includ¬ ing those parts which strongly affect the human eye ; and actinic rays including those parts of the total radiation which are capable of effect¬ ing chemical changes and which were formerly considered to be mostly confined to the violet and ultra-violet parts of the spectrum. In mod¬ ern physics this distinction has largely disap¬ peared, especially with respect to the actinic rays; for while it is still admitted that chiefly the violet and ultra-violet rays are concerned in the reduction of silver salts, it is also recog¬ nized that many other chemical changes depend for their production upon rays of much greater wave-length. Many changes are known, for ex¬ ample, which are undoubtedly induced by the action of the red and infra-red rays, which have been ordinarily classified as <(heat rays.® (Consult Tyndall, Contributions to Molecular Physics in the Domain of Radiant Heap)-

The action of light upon a gaseous mixture composed of equal volumes of hydrogen and chlorine has been studied extensively, chiefly by Draper and by Bunsen and Roscoe. When a mixture of this kind is exposed to strong sun¬ light, its constituents combine explosively, with the formation of hydrochloric acid gas ; but when exposed to a subdued light, they com¬ bine slowly and with

considerable regularity. Draper invented an instrument (the ((actinometer®) for the measurement ot the actinic power of a given source of light, basing its op¬ eration upon the rapidity with which combina¬ tion takes place in a mixture of hydrogen and chlorine, when exposed to the light whose chemical power is to be determined. The in¬ strument consisted of a bulb that was filled partially with water and partially with the mixed bases and which was also provided with a graduated capillary stem, in which a column of mercury or of water served as an index for the determination of any change of volume in the gaseous mixture in the bulb. When the bulb was exposed to a subdued light for a definite time, the hydrogen and chlorine com¬ bined partially and the hydrochloric acid gas that was formed was almost immediately ab¬ sorbed by the water, in which it is exceedingly soluble. The volume of the gases in the bulb, therefore, suffered a reduction, which was pro¬ portional to the total amount of chemical change induced by the light ; and the extent of this reduction in volume was indicated by the move¬ ment of the index-liquid in the graduated stem of the instrument. Draper's actinometer was open to two general objections. In the first place (as Draper himself discovered in 1843), the combination of hydrogen and chlorine, in a diffuse light, does not proceed at a rate that is strictly proportional to the time. The further researches of Bunsen and Roscoe showed that the action of the light, in Draper's actinometer, is at first very slow indeed and that the rate of combination increases, after the lapse of a cer¬ tain time, up to a maximum value which is thereafter constantly maintained. In some of the experiments it was found ttiat the chemical action during the seventh minute of exposure of the instrument was nearly as great as the total action during the first six minutes and that the action during the eighth minute was 50 per cent greater than that during the seventh minute. In these particular experiments the instrument could not be relied upon until after the lapse of eight minutes; and the initial period of irregularity would of course be different un¬ der other intensities of illumination. Great dif¬ ferences in the indication of the Draper in¬ strument were also found to result from ap¬ parently trivial variations in the relative quantities of hydrogen and chlorine present. The second objection to the Draper actinometer is that it can indicate nothing but the power of the light under examination to induce the com¬ bination of hydrogen and chlorine, or to per¬ form some other change that depends upon light of the same wave-length as that concerned in this particular effect. A similar objection may be urged, it is true, against every form of actinometer; for no instrument can be con¬ structed, which will indicate anything about light of other wave-lengths than those that are concerned in its own operation. The point of

the criticism is, however, that in estimating the power of a given light to perform a given kind of chemical change, it is essential that the actinometer adopted shall depend for its action upon the same wave-lengths as those concerned in the phenomenon for whose study the actinometer is employed. It is not logical, for ex¬ ample, to use the Draper actinometer for deter¬ mining the power of a given light to effect the reduction of the halogen salts of silver, unless it is first proved that the combination of hydrogen and chlorine, and the blackening of silver salts, are effected by the action of light-rays of substantially equal wave-lengths. The commonest problem in actinometry at the present time is the determination of the time of exposure in the taking of photographic pictures ; and when an actinometer is employed for this purpose, it usually consists of a strip of sensi¬ tive paper which is exposed until it darkens to a definite shade; the time required for this blackening being taken as an index of the intensity of the light, so far as its power of reducing silver salts is concerned. It is possible the initial slowness with which diffuse day¬ light induces the combination of hydrogen and chlorine is a characteristic common, to a greater or lesser extent, to all photographic processes ; but familiar experience in the taking of so-called instantaneous® photographs indi¬ cates that if this initial slowness exists in the case of the modern dry-plate, its period is ex¬ ceedingly short. Consult Draper, (Scientific Memoirs) (1878) ; Derr, (Photography for Stu¬ dents > (1906); Plotnikov, <Photochemie>

(1910); Nernst, (Theoretische Chemie) (1913). Compare Actinometer; Phosphorescence; Photography.

PHOTOENGRAVING, a general term covering various processes ‘by which the action of light upon suitably sensitive surfaces is made to yield plates from which facsimiles of photo¬ graphs or drawings may be printed. The proc¬ esses commonly and very successfully employed at present are dependent upon the properties of various substances such as gelatine or similar bodies to undergo certain changes under the action of light.

If a thin layer of asphaltum is spread upon a metal plate and exposed to the light under a negative or positive, the parts under the clear portions of the screen either positive or nega¬ tive become insoluble, while those under the dense parts remain soluble. When the plate is then washed with a suitable solvent, the soluble parts will be removed, the hardened parts re¬ maining. The plate can then be etched, the asphaltum serving as an etching ground. The result is a relief plate, if the black parts of the design were hardened under a negative ; an intaglio plate, if the whites were hardened un¬ der a positive. ■ .

Albumen, or white of egg, is soluble in cold water even if allowed to dry. If mixed with a solution of potassium bichromate and spread upon a surface and dried, it still remains solu¬ ble as long as it is not exposed to light Al¬ bumen when combined with potassium bichio- mate acts like asphaltum, subject to certain

modifications in handling.

If gelatine is mixed with potassium bichro¬ mate it retains its qualities if left in the dark, but exposed to light it acquires the power ot

resistance to mordants according to the degree of exposure. These peculiarities of the various substances mentioned have been used to further the work of the photo-mechanical processes. The aim of them all is to reproduce any photo- • graph or drawing into a printing plate without the intervention of other than mechanical means.

The familiar half-tone, so generally em¬ ployed in modern periodicals and books, is a very beautiful and successful result of the spe¬ cial application of the action of light upon a properly prepared copper plate. It is depend¬ ent for its printing qualities upon the inter¬ position of the so-called half-tone screen be¬ tween the object photographed and the nega¬ tive. This screen is made up of pieces of glass that have been very finely ruled and put to¬ gether in such a way as to make of the intersect¬ ing lines a great number of minute dots. The effect of this upon the negative is to break up the flat surfaces into a corresponding texture of dots, their size depending upon the relative darks and lights of the original. It is in fact a gen¬ eral stippling of the surface, affording a gram to which the ink may cling. The fineness or delicacy of the resulting plate is dependent upon the character of the screen used. In some of the most beautiful reproductions of to-day, there are as many as 200 dots to the inch. In

such cases, however, successful printing is only possible with the very finest paper and the most experienced and careful press work. For ordi¬ nary magazine work the screen is usually 125 to 150 dots to the inch, while 100, 80 and 70-line screens are common for newspaper printing.

In making the half-tone a negative in re¬ verse made with the screen is put into contact with a highly polished metal plate, usually cop¬ per, which has been properly sensitized or coated with a preparation of fish glue, bichro¬ mate of ammonia, albumen and water. It is then exposed to the light and afterward washed in water. Those parts which haye been pro¬ tected from the light by the denser portion of the negative are washed out and the other por¬ tions in varying degrees. The plate is then dried and burned in over a suitable heater, when it is ready for etching. Few half-tones are satisfactory without considerable artistic hand-work to' perfect them. Much depends upon the skill of the photographer and upon the degree of etching.

The half-tone, more than any other of the photo-mechanical processes, has helped to ad¬ vance and develop American illustrative art. Be¬ fore its employment, drawings in wash or color had to be redrawn on the wood block in black and white and in reverse. This limited both the mediums employed and greatlv hampered the comparatively few artists who had eitner the time or inclination to learn to draw in the special way required. With the advent of the half-tone, artists could draw as they chose; size was unimportant, for the photographic repro¬ duction allowed for any reduction necessary. Again, there were artists whose work suffered materially at the hands of the engraver; the resulting print was only a fair interpretation, not a facsimile in black and white. The rela¬ tive small cost of the half-tone has permitted of the freer use of illustrations, and has brought out the work of many men who have attained high places in American art. There have been

many claimants for the invention of the half¬ tone, but it is generally conceded that Ives of Philadelphia was one of the first to make it

practicable.

Frederick E. Ives invented the first success¬ ful half-tone process and half-tone three-color printing in 1878, when he had charge of the photographic laboratory at Cornell University. The half-tone process was simplified in opera¬ tion in 1880, introduced commercially in Phila¬ delphia in February 1881, and patents issued in the same year. This was a photo-mechanical process, the translation of the body shades of the photograph into definite line and dot, as required for typographic printing, depending upon the relation of ruled V-shaped lines to the uneven surface of a photogelatine relief.

The half-tone process now universally em¬ ployed was the result of Mr. Ives' effort in

1885. to obtain the results more directly and eco¬ nomically, by substituting the application of an optical V line to a camera image for the appli¬ cation of the ruled V line to the photogelatine relief. The crossline sealed screen and the regulation of the gradation of line and dot by screen distance and special lens diaphragms was a part of the invention as operated by Ives in

1886, and afterward taught to others, but not patented.

The Meisenbach process, patented in 1882, was the first screen process to be used in a large way. The half-tone is most valued for the reproduction of photographs or drawings in which there are tints and masses involving delicate gradations.

For the reproduction of drawings in line or solids, the zinc etching process is employed, be¬ ing less costly and more rapid. In this work the metal employed is usually a zinc plate coated with albumen mixed with bichromate and exposed under a reversed black and white negative made from the drawing to be repro¬ duced. After exposure it is washed with a solvent that removes the unchanged part of the coating, leaving the lines of the design in hardened albumen upon the plate. It is then etched into relief and the rough places gone over with a graver and the blank spaces or pure whites routed out. It is then mounted on a block type-high and is ready to print.

Another familiar process employed in the reproduction of line work is known as the swell gelatine process. A bichromatized gela¬ tine film is laid on a glass plate and exposed under a black and white negative. The film is then soaked in water, which causes the lines protected by the dark parts of the negative to swell up while the others do not

swell. The film is then a mold or matrix from which a wax or plaster impression may be taken, and from this an electrotype can be made. This is a more difficult and uncertain process, how¬ ever, and is not very generally employed.

Another most beautiful process involving just the reverse of the methods employed in the half-tone is known as photogravure. It may be employed either in the reproduction of draw¬ ings, in tint or pure line, and because of the absence of sharp lines and dots there results a fascinating richness of texture, a velvety qual-itv that is especially adapted for the reproduc¬ tion of paintings or old etchings. Some of the most sumptuous and valuable art works of our

time are illustrated by the use of the photo¬ gravure, and it is constantly employed in the re¬ production of drawings and prints of the old masters. One of the simpler methods of pro¬ ducing a photogravure plate is as follows : A copper-plate covered with asphaltum or albumen mixed with a bichromate is exposed under a black and white positive. The parts under the clear spaces of the positive are hardened; those under the opaque places corresponding to the lines of the original remain soluble. Washing with a solvent bares the metal in the soluble places, and the plate is then etched, the hard¬ ened coating forming a resist. A grain is ob¬ tained in this process by first sprinkling the plate with powdered resin which is made to adhere by heating. Photo-aquatint is another familiar method for the reproduction of intaglio half-tone plates. There are a number of proc¬ esses known under various names, that are somewhat similar in general character and in¬ volve adaptations in the use of sensitized gela¬ tine. Among these the best known are the Woodburytype, the stannotype, the heliotype, the collotype and the autotype.

With the advent of color in the pages of our leading magazines, a new impetus has been given toward the development of methods by which direct reproductions can be made of colored originals. The so-called three-color process is based upon the theory that all the colors in the chromatic scale may be derived from the three primaries, red, blue and yellow. In making the half-tone negatives from a colored original, fay filters are used, which are transparent color mediums that permit only cer¬ tain rays to be effective in the photographic plate. The resulting plates printed the one upon the other in just the proper shades of red, blue and yellow, ought to result, theoretically, in an exact copy of the original. As a matter of fact these color reproductions are but approximate. However, with the aid of a

keyplate, printed in black or photo-brown, and by ingenious me¬ chanical aids, the three-color or four-color work has been brought to a marvelous degree of perfection, and is generally employed for magazine covers and colored inserts.

In all of the various processes employed in photo-engraving, much has to be left to the skill of the operator. Certainly we owe much to the men who have done their part toward furthering the advancement of the mechanical processes. While the general principles and processes employed in these reproductive arts are well known and common property, there are yet many special adaptations and more or less secret methods that have grown out of special experimentation and experience.

Modern art has been brought into the house¬ hold by our illustrative magazines and papers, and the art of all time can be studied in the cheap reproductions made possible bv these modern photographic processes. For the photo¬ lithographic process see Photo Lithography.

The photo-engraving industry in the United States in 1914 included 376 establishments, em¬ ploying 6,211 people, besides 1,771 employed in this work in connection with printing offices. The total production of both was $17,559,000.

J. B. Carrington,

Assistant Editor (Scribners Magazine?

Vol. 22, PHOTOGRAPHY TO PUMPKIN

Americana

V

.

d

| I

I

4

I

|

1

1

$

I

|

I

I

i

THE

ENCYCLOPEDIA

AMERICANA

JT

Ubˆary

UNIVERSAL

.Knowledge,

In Thirty Volumes

.1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

b

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

m IB .922

©<*.A654317

‘Wd \

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXII

ALDEN, RAYMOND M., Ph.D., LL.D.

Professor of English, Leland Stanford Junior University

POETRY

ALEXANDER, W. J. ˆ

Professor of English, University of Toronto

PROMETHEUS UNBOUND

ALEXIS, JOSEPH, A.B., A.M.

Assistant Professor of Germanic Languages and Literatures, University of Nebraska

PILOT AND HIS WIFE, THE

AUSTIN, O. P., M.A.

Statistician, National City Bank of New York

POPULATION

BABASINIAN, V. S.

Lehigh University

PICRIC ACID PIPERAZINE

BALDWIN, CHARLES SEARS, Ph.D.

Professor of Rhetoric and English Composition, Columbia University
>

PILGRIM'S PROGRESS, THE

BANCROFT, JESSIE H.

Assistant Director Physical Training, Public Schools, New York City

PHYSICAL TRAINING

BAXTER, JAMES PHINNEY, Litt.D.

Editor of " The Documentary History of Maine "

PORTLAND, MAINE

BELL, LOUIS, A.B., Ph.D.

Consulting Electrical Engineer, Boston, Mass.

POWER-HOUSES

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

PROPHECY

PROVERBS

PSALMS

BESSEY, CHARLES E.

Late Professor of Botany, University of Nebraska, and

BESSEY, ERNEST A., Ph.D.

Professor of Botany, Michigan Agricultural College

PLANTS, CLASSIFICATION OF

BESSEY, ERNEST A., Ph.D.

Professor of Botany, Michigan Agricultural College

PLANTS, MORPHOLOGICAL EVOLU¬ TION OF

BIEN, MORRIS, LL.B., LL.M.

United States Reclamation Service, Washington. D. C.

PUBLIC LANDS

BIGGS, HERMANN M., M.D.

New York State Public Health Commissioner

PREVENTIVE MEDICINE

BOGART, ERNEST L., Ph.D.

Professor of Economics, University of Illinois

PUBLIC FINANCE

BRIDGMAN, HERBERT L.

Secretary Peary Arctic Club

POLAR RESEARCH –

BROWN, THOMAS BENJAMIN

George Washington University, Washington, D. C.

PHYSICS

BURBANK, LUTHER, Sc.D.

Santa Rosa, Cal.

PLANTS, BREEDING OF

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

PHYSIOLOGY OF TASTE POLYEUCTE PRINCESSE DE CLEVES

CARRINGTON, EDWARD C.

New York City

PROGRESSIVE PARTY, THE

CARUS, PAUL

Editor of ‘ ‘ The Monist ”

POSITIVISM

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Political Economy, Harvard University

PRICES

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

PHOTOMICROGRAPH PLANTS, MALFORMATIONS IN- PLANTS, RECAPITULATION IN PLANTS, REGENERATION IN PLANTS, SEX IN, ORIGIN, EVOLUTION AND DETERMINATION OF * PLANTS, VASCULAR ANATOMY OF PLASTID POLLINATION PROTOPLASM

CHURCHILL, WILLIAM

Author of ” Polynesian Wanderings,” etc.

POLYNESIANS

Contributors to Volume XXII — Continued

CIGRAND, B. J.

Author of “ Our Presidents ” and “ Heraldic Americana ”

PRESIDENTS OF THE UNITED STATES, FAMILY COATS OF ARMS OF PRESIDENTS OF THE UNITED STATES, GRAVES OF THE

CLEMENTS, FREDERIC E., B.Sc., Ph.D.

Carnegie Institution of Washington

PLANT GEOGRAPHY

COCHRANE, CHARLES H.

Author of “ Modern Industrial Progress ”

PRINTING PRINTING PRESSES PRINTING TRADE, AMERICAN

CONGDON, RANDOLPH T.

Principal of State Normal School, Potsdam, N. Y.

PUBLIC SCHOOL ORGANIZATION

COOPER, LANE, Ph.D.

Professor of the English Language and Literature, Cornell University

POETICS OF ARISTOTLE

CORNYN, J. H., B.A., LL.B.

Birmingham Southern College

PRESS ASSOCIATIONS.

PROVENQAL LANGUAGE PROVENCAL LITERATURE

COTTON, CLARENCE A.

Secretary Providence Chamber of Commerce

PROVIDENCE, RHODE ISLAND

COUMBE, CLEMENT W.

Technical Art Expert

PLATE ARMOR PORCELAIN PRAYER RUGS

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell University

PLURALISM

PRAGMATISM

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

PICKWICK PAPERS PRIDE AND PREJUDICE

CUSHMAN, ROBERT EUGENE, A.B.

Associate in Political Science, University of Illinois

PROPORTIONAL REPRESENTATION PUBLIC UTILITIES

CUTLER, FRANCES W., M.A.

Instructor in English, Vassar College

PRINCESS, THE

K •

DAKE, CHARLES LAURENCE, A.M.

Associate Professor of Geology and Mineralogy, School of Mines and Metallurgy, University of Missouri

PHYSIOGRAPHY

DARTON, NELSON H.

United States Geological Survey

POT-HOLES

POTASH

DEARBORN, GEORGE VAN NESS, M.D., Ph.D.

Medical Corps, United States Army

PHYSIOLOGY

DE GARMO, CHARLES, Ph.D.

Emeritus Professor of Science and Art of Education, Cornell University

PUBLIC SCHOOLS

DOBSON, AUSTIN

Author of “ Life of Goldsmith,” ” Life of Richard¬ son,” etc.

POPE, ALEXANDER

DOCKERY, ALEXANDER M.

Third Assistant Postmaster-General

POSTAL MONEY-ORDER SERVICE

DODD, WILLIAM E., Ph.D.

Professor of History, Chicago University

POLK, JAMES KNOX

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

PRECIPICE, THE

ECKERSON, S. H., Ph.D.

Instructor in Physiology, University of Chicago

PLANTS, PHYSIOLOGY OF

EGGERT, CARL E., B.Ph., Ph.D.

Assistant Professor of German, University of Michigan

PRIEST OF KIRCHFELD, THE

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

POETRY AND TRUTH

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

POISON GAS PROJECTILES

t

FLATHER, J. J., Ph.B., M.M.E.

Professor of Mechanical Engineering, University of Minnesota

POWER, UTILIZATION OF

Contributors to Volume XXII — Continued

GARNER, JAMES WILFORD, Ph.D.

Professor of Political Science, University of Illinois

POLITICAL SCIENCE PRISONERS OF WAR PRIZE COURTS AND PRIZE JURIS¬ DICTION PUBLIC LAW

GEHRING, ALBERT, A.M.

Author of “ The Appreciation of Music,” etc.

PIANOFORTE INSTRUCTION

GUITERMAN, ARTHUR, B.A.

Author and Critic

PLAIN TALES FROM THE HILLS

HAMMOND, WILLIAM A., Ph.D., LL.D.

Sage Professor of Ancient Philosophy, Cornell University

PLATO

PLATONISM

HANFORD, JAMES H., A.M., Ph.D.

University of North Carolina

PRELUDE, THE

HARRY, JOSEPH E., Ph.D.

Author of “ The Greek Tragic Poets,” etc.

PROMETHEUS BOUND

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor, Department of German Language and Literature, College of the City of New York

PLEKHANOFF, GEORGE

HODGE, F. W.

Washington, D. C.

PUEBLO INDIANS

HOLLAND, W, J., Ph.D., Sc.D., LL.D.

Director Carnegie Museum, Pittsburgh

PITTSBURGH, PA.

INGERSOLL, HELEN

Naturalist

PLANTS, ORNAMENTAL

ISAACS, EDITH J. R.

Critic and Essayist

PROBLEMATISCHE NATUREN

JELLIFFE, SMITH ELY, M.D., Ph.D.

Professor of Psychiatry, Fordham University, New York

POLIOMYELITIS

PSYCHOANALYSIS

JERNEGAN, MARCUS W., Ph.D.

Associate Professor of History, University of Chicago

PIERCE, FRANKLIN

JERVIS, WILLIAM P.

Author of “ The Pottery Marks of the World,” etc,

POTTERY

POTTERY, MANUFACTURE OF KAINS, M. G., B.S., B.S.A., M.S.A.

Horticultural Consultant

PLANTS, FOOD OF

KLEIN, HENRI F.

Editorial Staff of the Americana

POLYNESIA

KUNZ, GEORGE F., Ph.D., Sc.D.

Gem Expert, Tiffany & Co., New York City

PLATINUM PRECIOUS STONES

LEWIS, BURDETTE G., A.B.

Commissioner of Department of Institutions and Agencies, State of New Jersey

PRISONS

LING, GEORGE H., Ph.D.

Dean of the Faculty of Arts and Science, University of Saskatchewan

PROBABILITY

McVEA, EMILIE WATTS, A.M., Litt.D.

President Sweet Briar College, Virginia

POE, EDGAR ALLAN

MATHEWS, JOHN M., A.B., Ph.D.

Associate Professor of Political Science, University of Illinois

POLITICAL PARTIES AND THE WORLD WAR

MOORE, J. PERCY

University of Pennsylvania

PIGEON

MORE, PAUL E., LL.D., Litt.D.

Author of “ Life of Benjamin Franklin,” etc.

PLATO’S REPUBLIC

MORRIS, EDWARD PARMALEE, L.H.D., Litt.D.

Professor of Latin Language and Literature, Yale University

PLAUTUS

MOSES, ALFRED J., E.M., Ph.D.

Professor of Mineralogy, Columbia University

PHYSICAL CRYSTALLOGRAPHY

MOSES, MONTROSE J., B.S.

Author and Translator

PIPER, THE

Contributors to Volume XXII — Concluded

NICHOLS, EDWARD L., B.S., Ph.D.

Professor of Physics, Cornell University

PHOTOMETRY POLARIZATION OF LIGHT

PLATNER, JOHN WINTHROP, D.D.

Professor of Ecclesiastical History, Andover Theo¬ logical Seminary

PROTESTANTISM

RICE, JAMES E., B.S.

Professor of Poultry Husbandry, Cornell University

POULTRY

RISTEEN, ALLAN D., Ph.D.

irector of Technical Research, The Travelers Insurance Company, Hartford, Conn.

PHOTOSYNTHESIS

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ America, Asia and the Pacific’,’ etc.

POLAND

PRAKRIT LANGUAGES AND LITERA¬ TURE PRUSSIA

SEDGWICK, WILLIAM T., Ph.D., Sc.D.*

Professor of Biology and Public Health, Massachu¬ setts Institute of Technology

PUBLIC HEALTH

SINGLETON, ESTHER

Author of “ The Art of tne Belgian Galleries ”

PROOF IN ART

SMITH, CHARLES FORSTER, Ph.D., LL.D.

Professor of Greek and Classical Philology, Univer¬ sity of Wisconsin

PINDAR, ODES OF

THOMPSON, CHARLES L., D.D.

Ex-Moderator, Presbyterian Assembly

PRESBYTERIAN CHURCH IN THE UNITED STATES OF AMERICA PRESBYTERIANISM

THOMPSON, ROBERT ELLIS, Ph.D., S.T.D., LL.D.

Author of “ Elements of Political Economy ”

PROTECTION

TITCHENER, EDWARD BRADFORD, D.Litt., D.Sc.

Sage Professor of Psychology, Cornell University

PSYCHOLOGY

PSYCHOLOGICAL APPARATUS

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

PIPPA PASSES

VINCENT, SYDNEY B.

Portland Chamber of Commerce

PORTLAND, OREGON

WALSH, JAMES J., M.D.

Author of “ Makers of Modern Medicine,” “ Old Time Makers of Medicine,” “ History of Medicine in New York,” etc.

PODIATRY

WALTER, FRANK K., M.A., B.L.S., M.L.S.

Vice- Director, New York State Library School

PUBLIC LIBRARY AND POPULAR EDUCATION

WALTON, WILLIAM

Painter; Author of “ Chefs-d’CEuvre, Exposition Universelle,” Paris

POST-RENAISSANCE PAINTING

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

PROTOZOA

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern French Literature,” etc.

POEM OF THE CID

WHITE, WILLIAM A., M.D.

Superintendent of Saint Elizabeth’s Hospital, Washington, D. C.

PSYCHIATRY PSYCHIATRY AND WAR PSYCHOLOGY OF THE ABNORMAL

WIELAND, G. R., Ph.D.

Paleontologist, Yale University

PROTOSTEGI DZE

WIENER, LEO

Professor of Slavic Languages and Literatures, Harvard University

POLISH LITERATURE POWER OF DARKNESS, THE

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

POSTULATES

WILLISTON, SAMUEL W., Ph.D., Sc.D.

Late Professor of Paleontology, University of Chicago

PTERODACTYLS

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Columbia University

PRINCE, THE

WOODS, ALBERT F., B.Sc., A.M.

President, Maryland State College

PLANTS, DISEASES OF

- Deceased

KEY TO PRONUNCIATION

a

far, father

n

Span, n, as in canon (can’yon), pin on (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

A

a

all, fall

o or 5

not, on

ch

choose, church

6

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. c , as in de; eu, as in neuf ; and oen, as in

oi

oil, soil ; also Ger. eu, as in beutel

boeuf, coeur; Ger. d (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. sur,

Ger. Muller

Ih

O

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

A

1

y

(consonantal) yes, young

A

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

.

,(*. = : > :*■ ” Ri > - jt’ i .

‘ ‘

•>

. , f, hiou

> F-.l A 1 : !

.

u

.

, , . HI

Photography. The fact that light

visibly affected matter — darkening some that was light and lightening some that was dark, and changing and dis¬ charging colors, must have been noticed before history began to be recorded, although it was not till perhaps the fourth quarter of the 18th century that it began to receive anything like systematic attention ; not until Scheele, a Swed¬ ish chemist, noticing that silver chloride dark¬ ened under

the rays of the sun, sought for ex¬ perimental evidence of the cause and conse¬ quence. He found that the action was practically confined to the lower end of the spectrum, the blue-violet and the ultra-violet ; and that the re¬ sult was a liberation of chlorine. Scheele was followed by many others, some of whom added more or less to the desired information ; but not till 1791 does any one seem to have thought of it as a means of picture-making; at which date there is ample evidence in a book, ‘Torn Wedge- wood, the First Photographer,5 published in 1803 by Duckworth and Company of London that Wedgewood made photographic copies of pictures, probably using the salts of silver and by <(contact printing.® A more or less full ac¬ count of his methods, written by Davy, appears in the journal of the Royal Institute5 for 1802, but although it is known that he worked with Davy in the laboratory of the institution it does not appear that the latter had any share in the photographic experiments.

To Nicephore Niepce, however, belongs the honor of getting the first camera image, which he did in 1827, although he had been experi¬ menting since 1814; but as, according to Da¬ guerre, it required an exposure of from seven to eight hours, it left much to be desired; and it is safe to say that practical photography was not reached till 1839. Early in January of that year, Daguerre first reported the results of his process and published a description of the same on 19 Aug. 1839. On 31 Tan. 1839, Talbot, who had obtained permanent prints and camera im¬ ages as early as 1835, reported his process to the Royal Society, and on 21 February follow¬ ing, published the details of the same. In the early part of 1839, Mungo Ponton, in a paper read at a meeting of the Royal Scottish Society of Arts, made known to the world his discovery that soluble organic matter, in the presence of an alkaline bichromate, was rendered insoluble by exposure to light — a discovery the value of which was not recognized for some years, but which is the basis of all that is included in

“process work,® or half-tone engraving. See P H OTOENGRAVING.

Daguerre and Talbot had been working in¬ dependently and without knowledge of each other for several years, the latter alone and on scientific methods, having been a student of science, especially chemistry, from his school days ; the former empirically and, for some time before he reached the goal, in conjunction with Niepce. The latter had been working at the problem since 1814. He obtained camera im¬ ages in 1827, and two years later, at the solici¬ tation of Daguerre, entered into partnership with him. From the documentary evidence available, it is at least certain that the sugges¬ tion of the action of iodine on a silver plate — which led to ultimate success —

came from Niepce. Be that as it may, it is worthy of notice that, working on different lines and with different material, Daguerre and Talbot found success in the same metallic haloid, the same silver iodide, although made in a very different way and giving very different results. Each was able to secure photographic impressions, one on sensitized paper, the other on a sensi¬ tized plate, but were unable to prevent the im¬ age from fading out until Sir John Herschel, in 1839, discovered that hypo-sulphite of soda dissolved out the silver unaffected by light, thereby fixing the image. Daguerre's process, to which he had given the name "daguerreo- type,® consisted in exposing the highly polished surface of a silver plate, or a copper plate coated with silver, to the vaoor of iodine. The silver iodine thus formed passed through various colors, depending on the length of the exposure, and experience soon showed the color which had the highest degree of sensi¬ tiveness. This, on exposure in the camera, produced no visible image, but, on exposing the plate to the vapor of mercury (such small quantity as arose from a temperature of about 140°), an image was developed, the mercury vapor having adhered to such parts as had been acted on by light, and in proportion to the quan¬ tity or intensity of that light.

The image thus formed was of exquisite del¬ icacy, the minuteness of its detail being lim¬ ited only by the degree of perfection of the optical appliances ; but the process was slow, re¬ quiring an exposure of minutes. Prof. John William Draper of the University of the City of New York, with improved lenses early in 1840 made the earliest sunlight picture of a human face by this process. The subject was

his sister, Miss Dorothy Catherine Draper. The picture is the property of Sir William Herschell of England. Nearly a year later, Goddard in England and another of the same name in America added bromine, which reduced the ex¬ posure to seconds. About the same time an improvement hardly less important was made by Fizeau, known as ˆgilding,® the deposition of an extremely thin film of gold on the surface of the plate, which materially added to the beauty and permanence of the image. The diffi¬ cult point about the daguerreotype was that it could not be duplicated nor multiplied except by making duplicate original pictures with a plurality of lenses, as is now done with the ferrotype or tin type. Each exposure yielded a picture complete in itself, but only one, a positive; whereas the altogether easier although apparently more complicated method of

Talbot gave a negative that could be duplicated from or multiplied to any extent.

Talbot's process (calotype, he termed it, but better known by his own name) had for its support paper, and according to his first de¬ scription was made as follows : A sheet of paper was brushed over with a solution of sil¬ ver nitrate, dried and dipped into a solution of potassium iodide and again dried. This he called iodized paper; it was hardly if at all sensitive to light, and would keep indefinitely. To make it sensitive, it was brushed over with what he called gallo-nitrate of silver, a mixture of solutions of silver nitrate and gallic acid; and after exposure on the camera the image was developed by brushing over with the same solu¬ tion and the application of a gentle heat. The image so produced was a <(negative® ; that is, the lights and shades were reversed, darks in the subject being represented by lights or white paper and vice versa. The advantage of this lay in the fact that a sheet of the same paper placed under this negative and exposed to light re¬ sulted in a positive, an image in which the lights and darks were in their right position; and that an unlimited number of such positives could be made from such negative. But as positives on calotype paper would require de¬ velopment, the same as the negative, Talbot recommended • the employment of the silver chloride paper first brought before the Royal Society, which simply required exposure to light, or what is now known as <(printing-out paper.® To facilitate this printing, and to avoid as far as possible the grain of the paper in the paper negative, he subsequently saturated it with wax; and later on, paper iodized and waxed, or ((waxed paper,® became an article of commerce.

About 1840 ((amateur® photographers came on the stage. Le Gray's wax-paper process, a modification of the talbotvpe, which consisted in waxing the paper before iodizing it, came into use; it was slow yet yielded fine results, so fine, indeed, that some of the negatives made then are quite equal to anvthing turned out at the present time, notwithstanding all the im¬ provements. The albumen process, first pro¬ posed by Niepce de Saint Victor, a nephew of the original Niepce, was perfected by Le Gray about 1850. Iodized albumen was spread on a glass, plate and sensitized by immersion in a solution of silver nitrate; and it gave results that for delicacy of detail have not been equaled

except by the daguerreotype ; results so perfect that for certain purposes — such as transpar¬ encies for the stereoscope and for enlarging — it has no equal, and consequently is still in use.

In 1850 the introduction of a practical method of employing collodion as the sensitive film and glass as its support gave photography a new impetus. Collodion, a solution of a va¬ riety of gun-cotton, in a mixture of alcohol and ether, was suggested by Le Gray, in 1850; but it remained for Scott Archer of London in 1851 to give it a practical form. Compared with the daguerreotype, it was simplicity itself, while in delicacy of detail and beauty it was not far behind; and more important still, the im¬ age might be either positive, so as to be avail¬ able at once, or negative, with all the advan¬ tages of unlimited multiplication. The image on a collodion plate is positive when examined by reflected, and negative by transmitted, light. With a comparatively short exposure and development, the plate needs only backing with some black substance to supply the shadows to convert it into a very beautiful picture. With longer exposure, and develop¬ ment continued until the highest lights are opaque, followed by intensification, it need be, the image is negative, and capable of giving prints of the very highest quality. The devel¬ oper used is a solution of sulphate of iron and acetic acid, while the fixing agent to fix or dissolve out the film unacted upon by light, is a solution of cyanide of potassium. From this duality of the collodion film there arose two classes of professional photographers, the few, with higher ideals and catering to the better class of the people, adhered to negatives of con¬ siderable size, generally (

But collodion, or wet collodion, as in the light of after developments it was called, how¬ ever convenient for the professional, heavily taxed the amateur who went afield. The plates had to be prepared and finished on the spot which entailed, even when only the smaller sizes were used, the transportation of an amount of apparatus and material that would greatly in¬ commode a modern amateur. This led to a demand for a process that could be employed in the field as easily as wax paper, and, after many attempts, the result was what was then known as <(dry collodion,® 1856-57. A dry col¬ lodion plate differed from a wet in having the free silver nitrate washed away; but if then dried and exposed, only a weak, useless image could be obtained, as it required something to take the place of the silver as an absorber of the liberated iodine and bromine. This ab¬ sorber, or sensitizer, as it was called, consisted first of certain preparations of gelatine, then tannin, and ultimately almost any kind of sol¬ uble organic matter, tea, coffee, malt, beer, al¬ bumen, etc. Such plates were slow, 5, 10 and 15 minutes being quite usual, even on well-lighted landscapes, and although it was a great relief to have nothing to take to the field but a dozen plates in half as many double slides or plate-holders, the amateur was not satisfied.

The next step in advance was the introduc-

Monument in the National Museum, Washington, D. C., to Daguerre, the discoverer of the art of photography

Copyright, 1900, by A. R. Dugmore

A BROOD OF WILD CHIPPING SPARROWS

Photographed on the author's hand by himself, using an air bulb and long tube. The mother bird is feeding her young, and the other

parent flew just as the exposure was made

ROCK BASS

Photographed in water

tion by Sayce and Bolton of the "collodio- bromide emulsion in 1864-65.® This did away with the troublesome preparation of the plate in the silver bath, it being only necessary to pour the sensitized emulsion directly on the plate and set it up to dry. Exposures were now much shorter, but still far behind wet collodion, and so the search for greater rapidity continued. Henry J. Newton, in 1870, prepared a collodio- bromide emulsion of considerable sensitiveness, which was successfully used prior to the intro¬ duction of the faster process. The emulsion idea was really the turning-point. In 1871 Dr. R. L. Maddox of England, while using photog¬ raphy as an aid in his microscopical work, dis¬ covered the possibilities of an emulsion com¬ posed of isinglass, gelatine and bromide of silver, and published a description of his process that year in the British Journal of Photog¬ raphy, submitting specimen negatives to the publishers. His process may be said to be the beginning of the now universally used gela- tino-bromide process, commonly known as the <(dry plate® process. In the preparation of the emulsion, only certain kinds of gelatine are suitable, and much time was spent in discover¬ ing which was the best. King, in 1873, improved the emulsion by washing out the free silver, thereby increasing its rapidity. In the same year Burgess began the manufacture and intro¬ duction of prepared plates. Bennett in 1874 sold dry sensitized emulsion or pellicle which could be prepared

for coating plates by simply dissolving in hot water. In 1878 Bennett made a great step in advance by <(cooking® or heat¬ ing the emulsion at a given temperature. This wonderfully increased the sensitiveness of the emulsion to light to such an extent that glass plates coated with a film of it became from 30 to 50 times more sensitive to light than wet collodion, which was then considered standard. At a meeting of one of the London societies, Bennett showed full-timed negatives made with such brief exposures as to fairly astonish those present. Mockhoven in 1879 discovered that by the introduction of ammonia into the emul¬ sion remarkable rapidity was obtained nearly equal to the <(boiling or heating® method of Bennett. Very soon several dry plate manu¬ facturers began to supply the prepared plates for the use of photographers. About 1880-81 plates began to be made in the United States by Cramer and Norden, photographers in Saint Louis, Mo., and John Carbutt in Philadelphia. It was a new industry, for theretofore photog¬ raphers were required to prepare their own plates.

In 1884 A. L. Henderson, an English photog¬ rapher, demonstrated before the Society of Ama¬ teur Photographers of New York, the process of making a gelatino-bromide emulsion. The general process is shown in the following for¬ mula as used by Henry London :

First make the following two solutions:

No. 1.

Bromide of potassium . 20 grams

Gelatine, Nelson's No. 1 . 3 grams

Iodide of potassium . 4 grams

Distilled water . 170 c. c.

Alcohol, 95 per cent . 25 c. c.

No. 2.

Nitrate of silver . 25 grams

Distilled water . 170 c. c.

Then make

No. 3.

Heinrichs' special gelatine . 34 grams

Nelson's No. 1 gelatine . 4 grams

Distilled water . 180 c. c.

Each of the above solutions may be prepared sepa¬ rately, in ordinary light. Solution No. 1 is placed in a water bath of warm water, and constantly stirred with a glass rod; when all the ingredients are completely dissolved, it is tested with blue litmus paper for acidity; if not acid, it is made so by the addition of enough of the following to turn the litmus

slightly red:

Distilled water . 5 drams

Acetic acid . 1 dram

No. 1 solution is thoroughly mixed by being placed in a hot water bath and agitating, then in a darkened room illuminated only by a faint non-actinic light. No. 2 solu¬ tion is mixed with No. 1 solution in the form of a fine stream so that the silver may come in contact with the bromide and be converted into bromide of silver. After cooling to 90° F. a solution of alcohol 5 cubic centemeters (nearly 2 drams) and ammonia (Sp. Gr. 910) — 110 minims is added a little at a time. The emulsion is then kept under heat over night at a temperature of 100° F. and solution No. 3 heated up to 125° F and then cooled down to 100° F. is added to the sensitized solution. The whole is allowed to cool until it solidifies into the form of a jelly, this is compressed and sifted through a screen until it is broken up into small particles and is then washed for several hours. The water is drained off and the emulsion dried. It is then melted at a tempera¬ ture of 135° F. and 20 cubic centemeters of alcohol is added. Is filtered while liquid in a warm condition, and then coated upon leveled glass plates usually placed upon a marble slab. On cooling the film solidifies, the plate is then removed and placed in a drying closet. After this operation it is ready for use in the camera.

The foregoing is the basis of the process now used by all the large manufacturers of dry plates, who consume many tons of silver gelatine and glass to supply the demand. Spe¬ cially constructed machinery is used for pre¬ paring and coating plates and paper with the sensitive emulsion on a large scale. To explain the magnitude of this work, there was made in 1903 a single positive print on gelatino-bromide paper in Germany 40 feet long by 5 feet wide. A special building was

constructed to hold the immense reel, over 13 feet in diameter, on which the exposed paper was wound and developed.

The convenience to the novice or skilful photographer of having a sensitized plate ready prepared and capable of being used at any time, gave a great impetus to photography, and extended its field of usefulness in a remarkable degree. The great sensitiveness of the plates facilitated the practice of instantaneous photog¬ raphy which led to the manufacture of the hand camera, an instrument carried in the hand by a handle, having a finder for locating the image to be photographed, a shutter adjustable for rapid, or slow exposures, and a focusing device so arranged that the instrument can be used at a moment's notice without the aid of a tripod. The first practical machine of this kind was in- invented by a German, M. Schmid, and was in¬ troduced by E. and H. T. Anthony and Co. of New York in 1884-85. It was found that the sensitized solution could be applied to celluloid transparent film as well as to plates. This lightened the work of the photographer and avoided the danger of breakage which the use of glass entailed. John Carbutt of Philadelphia was the first to introduce coated cut celluloid films in 1883. In 1888 there was introduced by George Eastman of Rochester, N. Y., a new miniature hand camera named the ((kodak,® which carried spools or rolls of paper sensitized with a film of gelatino-bromide emulsion of sufficient length to take at least 100 small pictures about three inches in diameter. After

each exposure the paper was reeled off, bring¬ ing a fresh surface behind the lens. The spool of exposed paper was removed in a dark room and developed there. From the paper negatives thus obtained, prints were made on the same plan as from the paper negatives made by Fox Talbot. Or by a tedious process the developed gelatine film was removed from the paper sup¬ port and mounted upon a transparent gelatine sheet, which avoided the grain of the paper. A year later improvements were made in the manufacture of celluloid films, whereby they could be produced in long strips, and these sup¬ planted the paper at first employed. The film of the present day is simply a refinement of the first celluloid Tollable film, with the additional improvement that it is wrapped in an extra length of non-actinic opaque paper, allowing the roll to be inserted in and removed from the camera in open daylight, thereby dispensing with the usual dark room. The Tollable film is of great utility to tourists and others.

The manipulation of the gelatine film requires the use of cool solutions not exceeding a tempera¬ ture of 80° F., on account of its tendency to soften and dissolve away if too warm. This tendency is checked by the use of alum or formaldehyde.

On the Continent, in the United States and some other countries, the ferrous oxalate de¬ veloper (first proposed by Carey Lea in 1878) was at first preferred for developing the bromide film either on plates or paper; it is pre¬ pared by mixing two chemicals separately. First a saturated solution of neutral oxalate of potas¬ sium is made acidified slightly with oxalic acid, then a solution of sulphate of iron 500 grams to 1,000 c.c. of water slightly acidified with sul¬ phuric or acetic acid. Prior to development one part of the iron solution is mingled with six parts of the potash solution, which makes a sherry-colored solution. In this several plates or sheets of bromide paper may be successively developed. In England the pyro ammonia de¬ veloper was preferred and is prepared by dis¬ solving about four grains of pyrogallic acid in one ounce of water and adding a drop or two of strong ammonia. The negative obtained had a brown and yellow color rendering it a slow printer. In 1882 Herbert Berkley discovered that a small quantity of neutral sodium sulphite added to the pyro ammonia developer retarded the oxidation of the developer and prevented the yellow pryo stain yielding negatives of a bluish black color.

Soon after this, in the United States, prior to 1884, H. J. Newton suggested the use of sodium carbonate (ordinary sal soda) as a sub-situte for the alkali ammonia in the pyro de¬ veloper, which with sodium sulphite made a so¬ lution that was particularly adapted to the pro¬ duction of negatives having quick printing qualities. The sodium sulphite prevented the yellow stain, and the carbonate of sodium was more stable than the evaporating ammonia.

The proportions of the developer were:

Sodium sulphite . 185 grams

Pyrogallic acid . 30 grams

Water . 500 c. c.

ALKALINE SOLUTION

Sodium carbonate (crystals) . 125 grams

Water . 500 c. c.

For a developer, 30 c.c. of pyro solution and 30 c.c. of alkaline solution are put into 185 to

305 c. c. of water. It was found about this time to obtain the best results on plates having had instantaneous exposures, that potassium carbon¬ ate as an alkali superseded soda, and this is largely used at the present time, in combination with soda, particularly for the development of shortly-timed plates. In 1889 and since then the new coal tar developing agents were introduced under the name of eikonogen, metol, glycin, ortol, etc. They largely take the place of pyro¬ gallic acid. The fixing agent for dissolving out the creamy unacted-upon film after develop¬ ment is hyposulphite of soda.

Printing methods in photography have been as varied and their improvements as great as in the case of the negative. At first prints were made on plain silver chloride paper, and when the ammonia-nitrate was substituted for the plain nitrate, some were made that are not ex¬ celled by anything at the present day. The desire for greater detail, however, brought into use albuminized paper, which not only came into universal use, but held its sway until com¬ paratively recent times. About a decade ago it was displaced by paper coated with a chloride emulsion, a highly glossy family, generally known as the aaristo.® This still continues in use and is largely used in prints intended for process reproduction, on account of the clear rendering of fine details. For truly pictorial work methods which give “mat® or plain paper prints are preferred. The principal, or the most generally employed, are the ((carbon® and the ˆplatinum® methods, both introduced in the ’60s’ though both lay dormant for many years.

The carbon, probably the best of all printing methods, although platinum is a close second, is more of a mechanical than a chemical proc¬ ess. It uses a paper coated with bichromated gelatine, colored with finely divided carbon or other pigment. This is exposed under a nega¬ tive, and wherever light has reached the ((tissue,® as it is called, and just in proportion to the quantity or intensity of that light, the gelatine becomes insoluble. Immersed in warm water, the soluble parts of the tissue (those protected by the opaque or semi-opaque parts of the negative, and consequently the lights of the picture) soften and are washed away. Who first proposed carbon is uncertain. Fargier, in France, was early in the field, but to Swan of England is due the credit of first making it a practical process; although Blair of Perth, Scotland, was the first to recognize the crucial part of it — the necessity for exposing through the hack of the tissue, or in other words, de¬ veloping from the side opposite to that which was exposed. Platinum was introduced by Willis of England in 1874, and is

based on the fact that a platinum salt is reduced to its metal in the presence of potassium oxalate and a ferrous salt of iron. At first the paper was coated with the ferric salt of iron and exposed to light under the negative, the light changing the ferric to the ferrous salt. Development was effected by a hot solution, a mixture of the oxalate and the platinum salts ; but more recently the platinum has been mixed with the iron, and development carried on in a cold solution of potassium oxalate.

During recent years two modifications of the carbon printing process have come into pretty general use, especially among picto- rialists; (

They are simpler than the original method, do not reverse the image, need no transfer and are supposed to give greater control.

In the gum-bichromate process, paper is evenly coated with a suitable mixture of gum- arabic, coloring matter and potassium bichro¬ mate, and dried. It is printed under a negative in the ordinary way and developed by floating on water of suitable temperature, assisted by brush action, letting the water fall in streams and sometimes mixed with sawdust to assist the removal of color from the lights.

In the ozotype process perfected by Manly, paper is coated with a patented sensitive solu¬ tion consisting of potassium bichromate and certain other salts, dried and printed as in gum-bichromate ; and may then be kept indefi¬ nitely. To develop the print the printed paper, with a slightly visible image, is soaked in a solution of hydroquinone acetic acid, copper or iron sulphate, etc., according to the effect de¬ sired, and, under the solution, brought into contact with a piece of carbon tissue, or the “plaster® prepared by the patentee. Develop¬ ment takes place in warm water, the coloring matter of the plaster or tissue adhering to the parts of the print acted on by light. The ferro prussiate process (blue print process) was dis¬ covered in 1842 by Sir John Herschel.

Not the least important of what may be called the side issues, or secondary applications of photography, are the various productions used in printing. See Photo-Engraving.

Photography in natural colors, or, as Sir W. de W. Abney has it, in the colors of nature, has been the dream of many experimenters ; but, notwithstanding all that has been done, we are no nearer it than when

they began. Color photography, however, that is, photographs hav¬ ing the semblance of the natural colors, has made considerable progress. Becquerel was the first to secure on silver chloride something ap¬ proaching the colors of the spectrum, but got no further ; and to Ducos du Haroun is due rhe credit for, in 1869, clearly foreshadowing the three methods which include all that has as .yet been done in it — the superimposing of three-color images, Joly-McDonough colored lines, and Lippmann's interference process. Taking them in the order of their least im¬ portance, Lippmann's method is to expose a very thin sensitive film backed by mercury as a reflector, to the colored object. Incident light reflected from the metallic mirror in con¬ tact with the film results in interference, and, as the constituents of white light are of varied wave-length, produces in the film a series of planes parallel with its surface, emitting colored light exactly as does the soap-bubble ; but the process is difficult, and not likely ever to be more than a scientific curiosity. In the Joly-McDonough method a negative is made in the ordinary way, but with a glass plate with closely ruled colored lines in front of and in contact with the sensitive plate. From the negative so made a positive is printed, and a second or viewing screen with similar colored lines is placed in contact with it, and in exact register with the impressed lines, the result being a picture in the semblance of the natural colors.

An improvement over the screen color lined plate was made in 1906 by August and Louis Lumiere of Lyons, France, manufacturers of plates and films, by the introduction of single

glass plate coated with a special transparent film, upon which is sprinkled a composite mixture of colored microscopic dust-like starch (potato starch) grains, colored respectively orange, green and violet, there being about 5,000,000 colored grains to the square inch. After the plate is thus coated it is brought under pressure by special mechanical means which flattens out the minute colored starch grains, causing them to merge into each other, giving the appear¬ ance, under the microscope, of a mosaic forma¬ tion. Viewed by transmitted light, the screen appears to have no color.

Upon the screen film thus formed the ortho- chromatic silver sensitized gelatine emulsion is flowed, and when dry the plate is packed ready for use in the camera, like an ordinary dry late, except that it is inserted in the plate older film side down, against a sheet of black surfaced paper, which comes with a box of plates. Thus the glass side of the plate is next to the lens.

A special yellow colored filter intended to absorb a portion of the blue

rays of light is interposed in the camera between the lens and the plate. The light from the object to be photographed, after passing through the lens and color filter, first impinges upon the glass side of the color sensitive plate, then pene¬ trates the screen film and lastly acts upon the back of the sensitized film, affecting the film automatically in proportion as the color par¬ ticles of the screen film transmit the colors of the object photographed to the sensitized film.

The exposure of the plate in the camera for any given stop or diaphragm is usually about 50 times longer than for an ordinary fast plate. The developer used is of the metol-quinone type, having liquid ammonia as an accelerator.

After exposure, the developer (at a tempera¬ ture of between 60° to 65° F.) is applied to the plate (placed in a tray) preferably in a room that is perfectly dark, for two and a half minutes. It is then poured off, the plate rinsed with water, then a reversing solution (perman¬ ganate of potassium) is applied (under a bright light) for three minutes which dissolves away the black reduced silver negative image, con¬ verting the same into a positive image. The plate is next rinsed under the tap and the same developer is again used in the tray a second time in bright daylight, which converts the un¬ reduced bromide of silver (or what would represent the shadows in the original negative image) into dark metallic silver, and thus com¬ pletes the manipulation required to make the transparency. The plate, after removal from the developer, is washed under the tap for a brief period, and, on viewing the same by transmitted daylight, a beautifully colored transparency, possessing all the gradations of the color of the original, is observed.

The operation is nearly as rapid as that of making an ordinary tintype. The finished pic¬ ture is termed an “autochrome,® since its color¬ ing is automatically obtained.

The “three-color® method is the most impor¬ tant, as it has the greatest commercial possi¬ bilities, and gives the most varied and most sat¬ isfactory results. Although Collen, in 1865, was probably the first to suggest the method, and du Haroun, in 1869, outlined it clearly, they and those that followed them were on the wrong • track, working on the theory of Brewster, which

never could lead to success, instead of that of Young, Helmholtz and Maxwell, now univer¬ sally accepted. The first to recognize this was Fred E. Ives of Philadelphia, and to him more than to any other, or indeed to all the others together, are we indebted for the great progress that has already been made. The first experi¬ mental half-tone three-color plates and prints were made in 1881.

In 1910 Mr. Ives introduced an improved system of color photography by which dupli¬ cate color photographs on a transparent film were obtained. In a specially constructed camera three sensitized dry plates, two of which were sensitive to red and green rays of light and one to blue rays, were exposed simultaneously, after passing through the single camera lens, between which and the plates was interposed a yellow-orange trans¬ parent light filter or screen for the purpose of reducing the strength of the blue rays.

The three sensitive plates were enclosed in a single plate holder, specially designed, so arranged that two of the plates were placed film sides in contact and a third, a trifle smaller in size, with the film side against the glass side of one of the two plates in film contact. The three plates were secured together at one edge bv a flexible paper hinge and the whole was named a ˆtripack.®

To make an exposure in the camera (after focusing) the holder (containing the three plates) is inserted like an ordinary plate holder in the usual way. On withdrawing the plate holder slide, the smaller plate in the holder falls out by gravity and rests on the bottom of the camera in a horizontal position, but the other two plates are held in the holder in a vertical position. After this operation a second yellow tinted transparent plate on the interior of the camera was dropped by a lever on the exterior, downward from the roof of the camera in front of the tripack plate holder at an angle of 45 degrees, the top of the plate being nearer the lens than the bottom, and formed a transparent reflec¬ tion since its location was over the smaller sensitive plate lying on the bottom interior of the camera. Part of the light from the colored object, after passing through the camera lens and the yellow absorption filter, is reflected downward by the transparent reflector upon the two horizontal blue sensitive plates, while the rest of the light continues on in a horizontal direction, striking the underside first of the red sensitive plate film, passing through the same and acting upon the face of the vellow-green sensitive plate film in contact therewith. Thus three plates are in focus and exposed at one time. After exposure the angular filter screen plate is carried back to the camera roof, a lever on the outside raises the horizontal smaller plate into the plate holder till the plate holder slide is pushed in. The three

exposed plates are each marked to indicate their respective color sensitiveness and are then developed as a unit in a tank developer for a specified time. Each image is distinct and sharp and exactlv the same size. The duplicate positives are made from the three negatives upon a transparent film sensitized with a gelatine bichromated solu¬ tion, printed in a printing frame in sunlight all • three at one time, fixed in warm water. Where the light has acted, renders film absorbent to

color. Each respective film picture is next dipped in its blue, red and yellow dye solution, washed, and when dry are clamped together so that images perfectly match between two pieces of glass, with the result that a beautifully brilliant colored very transparent picture, true to nature, is obtained. See Color Photography.

A serious objection to silver-bromide, the sensitive salt in the ordinary photographic plate, is the fact that it is so much more sensitive to the blue-violet than to the green and red of the spectrum as to give a very false rendering of color values or luminosities, the darker colors showing as the lighter and vice-versa. Dr. W. H. Vogel was, perhaps, the first to find that the addition of certain dyes to the emulsion tended, to a large extent at least, to equalize the sensi¬ tiveness ; and to plates prepared with such an emulsion or soaked in the dyes after prepara¬ tion, he gave the name of orthochromatic or isochromatic. But even the most evenly sensi¬ tive of such plates are still more sensitive to the blue-violet than to the red and green and for the best results — the true rendering of color luminosity, it is desirable to employ color filters or screens that will absorb the excess of blue-violet.

The beginning of the moving picture idea was early in 1878, prior to the introduction of the present rapid dry plate, by E. T. Muybridge, a photographer in San Francisco, Cal., who photographed the movements of a racing horse owned by Leland Stanford by having a series of individual cameras placed in a row about one foot apart, the shutters of which were electri¬ cally operated automatically, as the horse moved forward. This first experiment proved that a trotter's feet are entirely off the ground to¬ gether twice during the making of a stride. In 1896 Edison and others perfected the moving film system in combination with a shutter. See Moving Pictures.

In scientific investigation, photography has been remarkably helpful. It has taken the place of manual labor in record-keeping, measured the velocity of flying bullets, shown the true positions of animals in motion and created the (

As an educational adjunct, photography has played an important part. The projection lan¬ tern finds a place in every well-equipned lecture-

room, and the photographic lantern-slide lends itself equally to the teaching of science and the illustration of travel. The beauty and ac¬ curacy of the photographic lantern-slide and the ease with which it is made make it equally available to the college professor and the itin¬ erant lecturer, enabling the one to show to a whole class what otherwise would require to be handled by the members one by one ; and giving to the other an opportunity of making a comfortable living and in some cases amass¬ ing a fortune, by amusing and instructing the popular audience. Hardly less important, al¬ though much less popular, is the enlarging of small objects, “photomicrography.® In bacteri¬ ology, histology, etc., its importance can hardly be overrated, affording, as it does, illustrations in works dealing with such subjects that are without a suspicion of the imperfections of draftsmanship and showing, as they do, when orthochromatic plates are employed, the differ¬ ent luminosities of the various stains.

Nor is photography less important from a social point of view. While it displaced minia¬ ture painting, a style that only the rich could enjoy, it gave a better likeness of loved ones equally available to rich and poor. It has given us correct instead of fancy or distorted views of the manners, customs and scenery of distant lands ; enabled the cottager to decorate his walls with better pictures than were available to his richer neighbor previous to its advent and given a new interest to periodical literature by the low cost and excellent quality of its illustra¬ tions. Not less wonderful has been its influence commercially. It has created new branches of trade and manufacture and largely increased many that were in existence before, furnishing well-paid work to hundreds of thousands of both men and women. The glassmaker and the optician have wrought together till they have given us lenses as nearly perfect as we can hope to see ; the chemist has given us new material and improved the old, building factories for the manufacture of some by the ton that, pre¬ vious to the advent of photography, were only known as curiosities of the laboratory ; while the camera-maker has so exercised his inge¬ nuity as to give us cameras of perfect workman¬ ship and almost automatic in their action. In 1914 there were 87 establishments in the United States manufacturing photographic apparatus, of which 21 made almost exclusively cameras and 21 motion-picture machines. In the same year

there were reported 59 factories making photographic materials of the gross value of $4,273,000. This latter industry employed 6,658 people and made gross products of $34,768,000.

Bibliography. — Harrison, (History of Pho- tography) (1887); Wall, dictionary of Pho- tography > (1897) ; Payne, (Wet Collodion Pro¬ cess* (1907) ; Derr, (Photography for Students) (1906); Holme, (Colour Photography* (1908); Cassell, “Cyclopedia of Photography* (1911); Jones, (Photography of To-Day) (1912); Hance, “Commercial Photography* (1914); Roebuck, (The Science and Practice of Photog¬ raphy* (1918) ; files of The Camera , Photo¬ graphic Journal, etc. See Photo-Engraving.

John Nicol, Ph.D.,

Frederick C. Beach, Ph.B.

PHOTOGRAPHY IN COLOR. See

Color Photography.

PHOTOGRAVURE, fo” to-gra-vur’, a process of engraving in which, by the aid of photography, subjects are reproduced as plates suited for printing in a copper-plate press. The process known as heliogravure is essentially the same. See Photo-Engraving.

PHOTO-GLYPTOGRAPHY, that depart¬ ment of photo-engraving in which the plates are in intaglio. See Photo-Engraving.

PHOTO-HELIOGRAPH, an instrument for observing transits of Venus and other solar phenomena, consisting of a telescope mounted for photography on an equatorial stand and moved by suitable clockwork.

PHOTO-LITHOGRAPHY, a method of producing by photographic means designs upon stones or zinc or aluminum plates, from which impressions may be obtained by lithographic process. The first requisite for the production of a good result by this process is a suitable original. The drawing should be made with perfectly black lines throughout, no matter how thin the lines are ; the scale of reduction should not be too great; the best proportion is ob¬ tained when the drawings are made about one- third larger than the required block ; the paper used should be white and smooth in texture.

The negative for a line-block is made prefer¬ ably by the wet-plate or collodion process, be¬ cause of the facility with which these plates can be intensified and the clearness of the lines. Asser of Amsterdam was

the first to put photo¬ lithography to practical use, but probably it is to Osborne of Melbourne that we are indebted for the modifications which made it the process now employed by every map-maker in the world. A sheet of suitable paper is coated by floating on a solution of bichromated gelatine or albumen ; printed under a negative and inked either by a roller or, better still, by spreading the ink evenly and passing the paper through the press once or twice as if drawing a proof. The inked sheet is then laid face down on warm water if gelatine has been employed and cold if albumen. The gelatine, where light has not affected it, swells and dissolves, leaving ink only where light has acted, the parts repre¬ senting the dark lines of the original. A spray with water or even a slight wash with a sponge makes it ready, after drying, for transferring to the stone or plate and the quality of the work will depend on the care given to the preparation of the transfer.

Photo-lithography is the principle used in offset printing. See Offset-Press under Printing Presses ; also Photo-Engraving.

PHOTOMETER, an instrument intended to indicate relative quantities of light, as in a cloudy or bright day, or to enable two light¬ giving bodies to be compared. A photometer in common use was invented by Bunsen ; it consists of a screen of thin paper moistened with a solution of spermaceti in turpentine, except a spot in the centre. This screen being placed on a stand at a fixed distance from a source of light of constant intensity, the un¬ greased spot appears darker than the greased part. One of the lights to be compared is then placed in front of the screen and adjusted at a distance such that the ungreased spot is illumi¬ nated as much as the rest of the screen. A similar experiment being made with the other light to be compared, the intensities of the two

are to one another in the proportion of the squares of the distances from the screen at which the lights must be placed in order to cause the disappearance of the ungreased spot. Other photometers depend upon sensitizing a paper which is darkened by exposure ; and in variations in the resistance of a selenium cell. The art of measuring the intensity of a source of light is termed photometry.

PHOTOMETRY is the art of comparing the intensity of a source of light with that of another source which is taken as a standard. The

possibility of making such comparisons de¬ pends upon the power of determining by means of the eye when two neighboring fields of view, illuminated respectively by the two sources in question, are equally bright. The sensitiveness of the eye to inequalities of brightness does not greatly exceed 1 per cent, even under the best conditions; and since it frequently falls below that value from fatigue and from various other causes, numerous attempts have been made to find photometric methods which are independ¬ ent of this organ, but thus far without much success.

Photometers. — Any instrument for the measurement of the intensity of a source of light is termed photometer. Since all attempts to substitute for the eye such instruments as the thermobile, the bolometer and the selenium cell have, for the ordinary purposes of photome¬ try, led to unsatisfactory results, all existing photometers which have come into general use are based upon the above-mentioned power of the eye. The earliest form, which was orig¬ inally described by Bouguer, was invented early in the 18th century. It consisted of a screen AB (Fig. 1), illuminated by the sources of light S and s, the intensities of which were to be compared. The partition PC prevented the light of 5 from falling upon BC and that of s from reaching AC. The distance of the two sources from the screen was adjusted until the illumination of AC appeared to the eye to be equal to that of BC.

Since the illumination produced by a source of light is inversely as the square of its dis¬ tance :

_ Ii

bi — Const. —

d\

U

b2 — Const. —

d%

where di and d2 are the distances of S’ and s, respectively, from the screen, b ± and b2 the il¬ lumination of the screen due to S and s re¬ spectively and h and h the intensities of the screens. Since bi = b2 we have

Ji d\

U d\

An ingenious modification of this instru¬ ment, devised by Lambert (1760) and subse¬ quently used by Rumford (1794) is known as the

Shadow Photometer or Rumford Photom¬ eter. — In this apparatus an opaque body, usu¬ ally an upright rod (R, Fig. 2) is placed in front of the screen. The surface of the screen is illuminated by both sources but the two shadows AB, CD, are each illuminated by light

from one of the sources exclusively. When these shadows are equally bright the distances of S and s from the shadows which they il¬ luminate determine the relative intensity of the two sources.

Ritchie (1826) introduced a new principle into photometry. He placed the two lights to be compared at the ends of a track or bar along which a box containing two mirrors M,M' (Fig. 3) could be moved, until the rays from S, re¬ flected at M to the left half of the screen AB gave an illumination equal to that from the rays from ˆ reflected by M' to the other half of the screen. This screen was of some translu¬ cent material, usually paper.

Bunsen (1841) substituted for the Ritchie screen a sheet of unsized paper the central, usu¬ ally circular, portion of which had been ren¬ dered translucent by the application of oil or of melted paraffin. The paper when placed be¬ tween two sources of light, the plane of the paper perpendicular to the incident rays on either side, affords a very simple and convenient means of determining when the illumination from the two sides is equal. When subjected to unequal illumination from the two sides the translucent portion of the face toward the brighter source appears dark, the unoiled por¬ tion bright. On the other face the reverse is true (see Fig. 4). As the paper is moved away from the brighter source and toward the weaker an interchange in the appearance of the two sur¬ faces occurs and there is a neutral position in which both appear alike and in which it is scarcely possible to distinguish the translucent portions. When this position has been found the relative intensities of the two sources may be calculated from the law of inverse squares. To facilitate the observations the bar or track upon which the paper screen is mounted is di¬ vided into a convenient number of equal parts.

The sheet of paraffined paper, technically known as the Bunsen disc, is usually -mounted in a wooden box with blackened walls (the pho¬ tometer carriage), which slides or rolls along the track between the sources of light. Two small mirrors (M and M' , Fig. 5), mounted

obliquely within the box, enable the operator to observe simultaneously the two faces of the paper (O.O.).

In practice the paper is frequently used with an unoiled central disc, the remainder of the surface being rendered translucent bv treatment with oil or paraffin. To avoid the use of oil or paraffin which gives a surface which soon becomes soiled from dust in the air, two similar paper screens are sometimes employed. Identi¬ cal portions, in form either a disc or a star, are cut out from the centre of each. A sheet of tissue paper placed between the two then affords a translucent region which takes the place of the oiled paper of Bunsen's original de¬ vice.

The various forms of photometer already described and all others which depend upon the power of the eye to detect slight inequalities of illumination are essentially of equal sensitive¬ ness. They are all limited by the sensitiveness of the eye and approach the maximum degree of delicacy as we fulfil more and more nearly the conditions under which the eye can be used to the best advantage. All forms of the Ritchie and Bunsen photometers, of each of which many modifications have been devised, are, however,

subject to a peculiar source of error. It is found that when two sources of light, the rela¬ tive intensities of which are known, are com¬ pared by means of such photometers, observers will persistently set the instrument to a false position. The majority of observers find ap¬ parent equality at a position toward the left- hand source. The errors which are constant for a given observer, however great his experience, range from 1 per cent to 10 per cent. They appear to be analogous to the errors which oc¬ cur when one endeavors to bisect a straight line by the eye without the use of instruments. The existence of this personal error has led to the substitution, whenever extreme precision is de¬ sired, of a form of photometer in which only one eye is used and in wrhich the conditions of maximum delicacy are more completely met than in any of the earlier types of instrument.

The photometer in question was invented by Lummer and Brodhun. In this photometer as in the instruments of the Ritchie and Bun¬ sen types, the two sources of light to be com¬ pared are mounted at the end of a graduated bar or track. Upon this runs the photometer carriage, the essential features of which are as follows :

1. An opaque screen (0. O, Fig. 6) upon the whitened faces of which the light from the two sources shines; each face of the screen being illuminated exclusively from one of the sources of light.

2. The device by which both faces of the screen can be observed simultaneously without the use of both eyes. This consists of two precisely similar mirrors M, M' , mounted facing each other within a dark box not shown in the diagram. The diffusely reflected rays from the screen reach these mirrors at an angle of 45° and are reflected as shown in the figure. Where the reflected rays cross each other at an angle of 90 degrees, is placed an ingenious arrangement technically known as the Lummer-Brodhun body, (BDEF) which consists of two right- angled reflection prisms placed with oblique faces together so as to form a cube. The face of one of them is, however, cut away so that contact occurs only over a small circular space in the middle of the face. Light from the source S (Fig. 6) diffusely reflected from the left-hand face of the screen and received upon the mirror M, enters the body through the face AB. Those portions of the beam which reach the central face of contact pass through uninterrupted, while all other portions are intercepted by total reflection within the prism. Light from s, dif¬ fusely reflected from the right-hand face of the screen, is reflected by the mirror M' to the face DE of the body. Those portions which fall up¬ on the central area of contact pass through, but the surrounding portions are totally reflected and leave the body in paths parallel to and sur¬ rounding the path of the transmitted beam which has come through the face of contact from the mirror M. Observations are made by means of a small telescope T, the field of view of which consists of a disc of light coming from S, surrounded by a ring of light from s. If the illumination of the side of the screen facing s be brighter than that upon the opposite face of the screen, which receives its light from S, one sees a bright disc of light surrounded by a dark ring. When the position of the photometer car¬ riage upon which the screen, mirrors, body and

telescope are mounted is moved to a position such that the two sides of the screen are equally illuminated, disc and ring are equally bright. The distances from the two sources are then read upon the scale of the photometer bar and the relative intensities of the sources are com¬ puted. The accuracy of this form of photom¬ eter depends upon the following conditions : (1) The opaque screen must stand in the line joining the two sources of light. (2) Its two faces must be identical in character both as re¬ gards color and power or diffuse reflection. (3) The mirrors M and M' must be identical as regards reflecting power and must be sym¬ metrically placed. (4) The Lummer-Brodhun body must be optically perfect so that transmis¬ sion through the faces of

contact will be com¬ plete.

The construction of the instrument is such as to permit reversal by revolving the whole appa¬ ratus upon a horizontal axis through 180 de¬ grees. The face of the screen which previously was lighted from the source 5 by means of the mirror M and the prism ABG now receives its light from s and vice versa. Any lack of uniformity in the two sides of the apparatus is thus readily detected and can be eliminated.

Standards of Light. — When, owing to the development of the gas industry, the art of photometry began to take on commercial im¬ portance, it became necessary to have recognized standards of comparison. The standard adopted in France was a vegetable oil lamp with me¬ chanical draft burning colza-oil and known from its inventor as the Carcel lamp. The di¬ mensions of the lamp were carefully specified together with the form and size of the chim¬ ney and the amount of oil (42 grams an hour) to be consumed.

In England the light unit adopted by gas manufacturers and subsequently legalized by the board of trade was the light given by at candle. The British standard candle was made of spermaceti. It was slightly conical in shapd for convenience in molding and of such size (tV inch in diameter at the bottom, 10 inches long and i80 inch in diameter at the top) as to consume 120 grains of wax per hour. The wicks were made of three strands of cotton, each strand consisting of 18 strands.

In Germany the manufacturers of illuminat¬ ing gas adopted as their standard a candle of paraffin. This candle, which is known as V ereinskerze had a diameter of 22 millimeters. The wick consisted of 25 strands of cotton. The height of the flame when burning normally was 50 millimeters. In Munich the legalized standard agreed upon between the city and the gas company was the light from a stearine candle slightly conical in form, of a mean diameter of 20.5 millimeters, the height of the flame being 56 millimeters.

The practical advantage o£ the candle as a light unit, which consists in the fact that it is a form of light with which the public is familiar, led to the introduction in France of a standard candle known as la bougie de I’etoile. This was a stearine candle consuming 10 grams an hour. Its light was approximately equal to ˆ of a carcel. The height of the flame was 52.5 milli¬ meters.

Extended studies of the performance of standard candles and countless

attempts to de¬ termine the relative intensities of the various

forms legalized in the different countries have only served to demonstrate the inadequacy of this source of light even when prepared with the utmost care, to serve as a standard in pho¬ tometry. Almost the only advantage such a unit possesses is found in the fact that the term candle-power has a familiar sound to the public.

The range and character of the fluctuations of the British standard candle may be seen from the curve in Fig. 7 which is taken from measure¬ ments made by Sharp and Turnbull (ˆTrans¬ actions of the American Institute of Electrical Engineers, } Vol. 13, pages 145, 1896). The curve covers a period of 60 minutes during which the brightness of the candle was observed at intervals of 30 seconds. It will be seen that the intensity of the flame is subject to frequent fluctuations often amounting to more than 10 per cent.

The altogether unsatisfactory performance of the various forms of standard candle has led to numerous attempts on the part of pho-tometrists to find a more reliable standard of light. A form of standard lamp introduced by Methven (1878) and consisting of an Argand

A

S

•

P

o

Fig. 1. — Bouguer's Photometer.

burner for ordinary illuminating gas with a metal screen which cuts off all but the central portion of the flame has been extensively used in gas photometry. The tests of this standard have shown, however, that it is subject to vari¬ ations but little less than those of the candle, owing to the variable character of the gas em¬ ployed. In 1877 Harcourt introduced a standard lamp in which the petroleum product known as pentane is the . fuel employed. This substance which is obtained by fractional distillation can¬ not be readily obtained in

complete purity, but the distillate which boils off at 50° C. consists largely of pentane with a small proportion of other closely allied hydrocarbons. The liquid is highly volatile and in the Harcourt lamp the vapor is ignited at the end of a metal tube extending about two inches above the wick. A modified form of the pentane stand¬ ard lamp is extensively used in gas photom¬ etry in the United States and is said to give excellent results.

If a luminous flame is to be the standard it is essential to find a fuel of known and definite composition and to devise a lamp which will insure its combustion under uniform conditions.

Extensive experiments with lamps burning vegetable and animal oils and with a variety of petroleum lamps have only demonstrated the necessity of a proper fuel.

One of the few available fuels of known chemical composition is amyl acetate. A stand¬ ard lamp in which this liquid is used as the combustible was described by Hefner- Alteneck

s

Fig. 2. — The Shadow Photometer.

in 1884 ((Elektrotechnische Zeitschrift,) 1884, page 20). The performance of this lamp was so promising that it was, after thorough and systematic study at the Imperial Physico-Tech- nical Institute in Charlottenburg, reduced to standard form. The modified type of amyl-acetate lamp thus produced has become recog¬ nized as the most reliable and desirable form of primary standard thus far proposed.

The Hefner lamp in the final form given it, as the result of the experiments made in Char¬ lottenburg, consists of a cylindrical body of brass upon which is mounted the wick tube. This is a vertical tube of German silver, the height, diameter and thickness of wall of which are accurately specified and the dimensions and details of construction of which must be fol¬ lowed with precision if the intensity of the flame is to agree closely with the standard. Upon the accuracy wfith which it is possible to follow these specifications, in metal working, the performance of the lamp depends. Lamps which are faithful copies of those upon which the original investigations were carried out give results far more consistent as to intensity of light than have been attained with any other form of standard in which a flame is used, and it is this complete and accurate reproducibility which has caused the Hefner lamp to be adopted as the best available primary standard. The

light-giving power of the flame of this lamp, like that of all flames, varies not only with the composition of the combustible but likewise with the height of the flame and with the amount of moisture in the surrounding air. The relation between flame-height and inten¬ sity as determined by Liebenthal to whom our knowledge of the performance of the Hefner

lamp is chiefly due, is shown in the following table :

Intensities

0.38 0.55 0.70 0.85 1.00 1.12 1.25 1.50

To determine the height of the flame a gauge, which consists of a lens throwing a magnified image of the tip of the flame upon a disc of ground glass, is mounted with its axis 40 millimeters above the top of the wick-tube as shown in Fig. 8. The character of the wick does not affect appreciably the intensity of the flame.

Flame heights 20 mm.

25 mm.

30 mm.

35 mm.

40 mm.

45 mm.

50 mm.

60 mm.

A precise relation between the intensity of the Hefner unit and the various standard can¬ dles cannot, owing to the inconstancy of the latter, be said to exist. Since, however, candle- power is still the term according to which nearly all artificial sources of light are rated it has been found necessary to adopt some definite ratio. The photometrists of the Physico-Tech- nical Institute, using numerous data obtained by various observers, found as a mean value, 1 Vereinskerze — 1.2 Hefners; also 1 British' Standard Candle = -1.14 Hefners, or 1 Hefner

— .877 British Standard Candles. Schiele from extensive measurements found 1 Hefner — .881 British Standard Candle. It is probable that the factor .88 gives as fair a ratio rep¬ resenting the average performance of the candle as can be obtained.

Another substance of definite composition the flame from which would be a very desirable standard of light is acetylene. The advantage of such a flame over that of the amyl-acetate lamp, the ruddy color of which makes compari¬ sons with the brilliant sources of light used in modern illumination uncertain, lies in the fact of its far greater intensity and whiteness. Un¬ fortunately acetylene on account of its richness in carbon will burn without smoking only when mixed, before escaping from the burner, with a considerable amount of air. In all practicable forms of acetylene burners thus far devised the openings for the egress of the gas are very small. It is on this account difficult to produce

Fig. 4. — The Bunsen Disc.

burners all of which will give precisely the same candle-power. Owing likewise to the minuteness of these apertures the burner is subject to partial choking by small particles of lime, etc., deposited from the gas. Thus the amount of gas flowing under a given pressure is reduced and what is quite as serious, the pro¬ portions of the mixture of acetylene and air upon which both the brightness and the color of the flame depend is changed. Because of the difficulty of burning acetylene under completely

controllable conditions, there is at the present day no standard burner for use in photometry, but as a secondary standard, subject to repeated comparison with some reliable primary source, the acetylene flame has been found to be of great value.

Incandescent solids maintained at a constant temperature by the action of the electric cur¬ rent would seem to offer possibilities for the construction of a light standard free from the objections to which all standard flames are nec-

Fig. 5. — Mirrors and screen of Bunsen Photometer.

essarily open. Numerous attempts to produce light standards based upon this principle have been made ; the most noticeable being that of Violle. Violle's device consisted of a mass of platinum brought to its melting point by the action of the current. He proposed to define as the standard the light from a square centi¬ meter of the surface of the

metal at the tem¬ perature of solidification. The advantages of a standard capable of such rigorous definition was so obvious that the electrical congress as¬ sembled at Paris in 1881 appointed a committee to determine the question of its practicability. Extended experiments at their hands and on the part of the members of the Imperial-Tech¬ nical Institute in Charlottenburg have unfortu¬ nately led to the conclusion that the platinum standard cannot, with the means ordinarily at command, be made to give constant results.

In the meantime studies of the performance of the ordinary incandescent lamp have shown that we have in it, when properly prepared and handled, a source of light better adapted as a working standard than any other at present available. The carbon filament heated in vacuo by means of a constant current is subject to changes of illumination only as the result of the slow disintegration of the carbon or of gradual loss of vacuum in the bulb surrounding the fila¬ ment. By the use of storage batteries supple¬ mented by the regulation of a resistance in the circuit it is possible to maintain the filament of an incandescent lamp in a state of incandes¬ cence, the constancy of which leaves little to be desired. Given one such lamp, the intensity of which is known or is arbitrarily taken as the unit, it is possible to determine the voltage at which other lamps have the same intensity, so that it is possible to make copies of the original which, whenever subjected to current at the proper voltage, will return to the intensity at which they were when the comparison was made. Thus while it is not possible to con¬ struct incandescent lamps which shall at a pre¬ scribed voltage give a definite illumination, it is on the other hand possible by comparison of such lamps with a given standard to find the

various voltages at which they will have equal intensities.

The use of the incandescent lamp does not fully solve the problem of the standardizing of light sources ; for the determination of the lamp from which the copies are to be made must be by reference to some primary standard such as the Hefner lamp. Having once adjusted one incandescent lamp to agreement with the stand¬ ard, however, one may make copies of these which will agree with one another much more closely than any two Hefner lamps or than a single Hefner lamp upon successive trials will agree with itself. If one were to start anew, with the Hefner lamp as a standard, and make another set of

standardized incandescent lamps, these, though highly uniform, might show no better agreement with the former set than that which one can obtain in subsequent trials with the lamp itself. Such variations of the Hefner lamp amount to about 2 per cent.

The province of the art of photometry does not end with the determination of the intensity

«

Fig. 6. — Diagram of the Lummer-Brodhun Photometer.

of the light sent out in a given direction from any source. One of its chief purposes is to enable us to deal definitely and intelligently with the problems of illumination and these are complicated by the fact that, in general, sources of light do not radiate with equal intensity in all directions. The accepted unit of illumina¬ tion among photometricians on the continent of Europe is the lux, which is the illumination re¬ ceived from a source of unit intensity at a dis¬ tance of one metre. The unit source in this definition is the Hefner lamp already described, so placed that the light is received from it in the horizontal plane. The term bougie-metre is also used in speaking of this unit of illumina¬ tion. The term bougie (or candle) in this defi¬ nition is not any of the standard candles al¬ ready described but a hypothetical candle equal to the Hefner. In countries where British measures are still in vogue a unit of illumina¬ tion frequentlv employed is the candle-foot which is the illumination afforded by a British standard candle placed at a distance of one foot from the illuminated surface.

The distribution of light from the various sources used in artificial lighting is far from uniform and it is necessary, therefore, in order to give a complete description of the lighting power of any source, to determine the intensity of the source as viewed from all possible di¬ rections. In the case of certain sources of light such as the incandescent electric lamp this is easily accomplished by mounting the lamp at

the end of the photometer bar in a holder so constructed as to permit of rotation about both a vertical and a horizontal axis without displacing the centre of the lamp from its po¬ sition. In the case of other sources, such as the arc lamp and most flames, which cannot be

Fig. 7. — Fluctuation? of a British Candle.

tipped from the vertical without modifying the distribution of light or interfering with the performance of the lamp, it is necessary to have recourse to a mirror, placed in the axis of the photometer bar, by means of which light can be reflected along the bar. By varying the angle of the mirror the light can thus be viewed from any desired direction. Corrections must of course be made for loss of light at the surface of the mirror.

The results of the exploration of the field of light around a given source are usually ex¬ pressed by means of curves. The curve showing the distribution in a horizontal plane is called the curve of horizontal intensities. The cor¬ responding curve for any vertical plane is a curve of vertical intensities. In Fig. 9 are given two typical curves of vertical intensities from measurements of an open-arc lamp without shade. Fig. 10 is a diagram showing the'illumination of

Fig. 8. — Wick tube, lame and gauge of the Hefner Lamp.

the ground at different angles when such a lamp is used in street lighting. When the curve of horizontal intensities is a circle, a single curve of vertical intensities suffices to completely de¬ scribe the performance of the source of light; when, however, as is usually the case, the curve

of horizontal intensities is not a circle, the curve of vertical intensities will vary in form as the vertical plane to which the curve applies is revolved about a vertical axis through the cen¬ tre of the source of light. The average inten¬ sity of a source of light viewed in the horizontal plane is called the mean horizontal intensity. L he average intensity, taking into consideration every possible point of view, is called the mean spherical intensity of the source.

The rigorous determination of either of these quantities in the case of unsymmetrical sources would take an infinite number of readings. In the case of the incandescent lamp, which will permit of such treatment, it is, however, pos¬ sible to obtain the mean horizontal intensity by rotating the lamp upon its vertical axis at the end of the photometer bar. Measurements made upon the lamp revolving thus at a speed of several revolutions per second are found to agree well with the mean horizontal intensity as determined by plotting a series of readings taken from different positions at a horizontal plane with the

lamp at rest, and integrating the curve thus obtained. The approximate deter¬ mination of mean spherical intensities of non-symmetrical sources such as the arc lamp, when made with the ordinary photometer and mirror, involves the taking of many individual read¬ ings. In the Franklin Institute tests, made at the Electrical Exhibition in Philadelphia in 1885, 65 measurements were made in each determina¬ tion and these were combined in computing the main spherical intensity. These readings were made from 38 directions distributed as evenly as possible around a sphere of which the light was the centre. To avoid this labori¬ ous process numerous special forms of photom¬ eter have been devised of which the most successful is that invented by Matthews and used in the extensive studies of the arc light recently carried on under the auspices of the National Electric Light Association. In this instrument which is known as Matthews' inte¬ grating photometer 24 large mirrors are ar¬ ranged around the source, the mean spherical

Fig. 9. — Curves of vertical intensities (open-arc lamp).

intensity of which is to be determined, in such a way as to produce upon the photometer screen an illumination proportional to the mean spherical intensity. The adjustment of these mirrors is such as to direct simultaneously to¬ ward the photometer the beams of light which the eye of an observer would receive if he were to view the source successively at angular intervals of 15 degrees in a vertical plane. The intensity of the light received in these various directions must further be reduced in the ratio of the sine of the angle between the direction of view and the vertical, and this is done by the interposition of glasses which are smoked until they transmit the desired proportion of

the light falling upon them. With this instru¬ ment the photometer gives by a single reading a value proportional to the mean spherical in¬ tensity of the source.

For the application of photometry to astron¬ omy, see Stars. For the application of the Selenium cell of photometry, see Selenium.

Bibliography. — Palaz, (La Photometrie In- dustrielle) (translation by Patterson) ; Stine, (Photometrical Measurements) ; Bell, (The Art of Illumination.* Consult also the reports of the committee on photometry in the (Proceedings> of the National Electric Light Association; various papers in the

Edward L. Nichols,

Professor of Physics, Cornell University.

PHOTOMICROGRAPH. A photomicro¬ graph is a photograph of a microscopically small object. The term microphotograph is sometimes used, but is very inaccurate, and should be used only to designate a very small photograph ; e.g., a photograph an eighth of an inch square of the Niagara Falls is a micro¬ photograph. Simple photomicrographs may be made without any expensive special apparatus. A microscope and any camera with a ground glass for focusing will suffice. The lens, or lenses, but not the shutter, are removed from the camera; the eyepiece is removed from the microscope, which is placed in a horizontal posi¬ tion. The eyepiece end of the microscope tube is now inserted a little into the lens barrel of the camera and a black cloth is wound around the place where they come together in order to exclude the light. The tube of the microscope should be exactly perpendicular to the ground glass of the camera. Any strong light may be used, as direct sunlight, a gas mantle lamp, an acetylene lamp, a kerosene lamp, or an elec¬ tric arc ; but ordinary incandescent bulbs are not satisfactory. Remove the mirror of the microscope, since it will not be needed in any photomicrographic work, and let the light come directly into the optical axis of the microscope. If the illumination of the ground glass is un¬ even and shows a (

sidewise until the best illumination is secured. About six inches from the stage is likely to be a good position.

Suppose we are to photograph a transverse section of a vascular bundle, using a two- third-inch (16-millimeter) objective. With such a low power lens and with all lenses of longer focus, the condenser in the microscope is not only unnecessary but it interferes with good work. Remove it. However, the con¬ denser should be used with objective of one- third inch (eight millimeters) focus and with all objectives of shorter focus. Carefully focus the object upon the ground glass. The ground side of the glass should be next to the micro¬ scope. After a sharp focus has been obtained, close the shutter of the camera and insert a plate, just as in ordinary photography. The time of exposure will depend upon the intensity of the light, the speed of the plate and the magnification. Small negatives may be made from lantern slide plates, especially when a contrasty negative is desired. With a gas mantle lamp, a lantern slide plate and a 16- millimeter objective used without an ocular or condenser, try an exposure of 30

seconds. Un¬ til one becomes proficient in estimating expos¬ ures, it is a good plan to expose 10 seconds ; then close the shutter and push in the slide of the plate holder just an inch; then expose 10 seconds, close the shutter and push in the slide another inch; then repeat twice more and you will have exposures of 10, 20, 30 and 40 seconds on one plate. It is easy to determine which is the best exposure and only one plate is sacri¬ ficed. A print on printing-out paper from such a negative is very instructive, since it shows the comparative merits of negatives of vari¬ ous densities. A filter, such as is used in out- of-door photography, is likely to improve the negative. Experts use filters of various colors, according to objects and the features which are to be emphasized. The developing is the same as in case of lantern slides (q.v.), or as in case of ordinary photography, if a fast or medium plate is used. With higher powers, use the con¬ denser and, if necessary, the ocular. If much work is to be done, the need for a solid sup¬ port for both camera and microscope will be realized. A simple contrivance which any one can make for himself is illustrated in Fig. 1.

Fig. l.

Use a clear board an inch thick, a foot wide and five feet long. On top of the board, at the sides, screw two strips, an inch thick, one and one-half inches wide and five feet long, so as to form a guideway for the camera. A long slit, one-quarter inch wide, should be made to accommodate the screw which is ordinarily used to fasten the camera to a tripod. If the same camera is to be used for all work, the space between the two long strips should be

just wide enough to admit the camera. A strip of wood one-half inch thick, an inch wide and five inches long, placed over the horse-shoe base of the microscope and held in place by a bolt put through the long slit, will hold the microscope in position.

For the finest class of work, especially where very high magnifications are desired, elaborate and expensive apparatus is very convenient. In these elaborate forms, experts do not always use the same arrangement. The relative posi¬ tions of the various parts, as shown in Fig. 2, is very effective.

C/5

if)

CT3

O

r-» <— <

G

O

u

o

C/5

£

o

13

05

■—

£

05

u

CJ

U

1/5

G

a

G

o

O

u

+-I

u

c/5

o

U

o W

4->

J3

u

iTi

• (H

s

*5i “

u

v

c/5

Vh §

O G O O

(JO

■&

Fig. 2. — Relative positions of the various points.

Consult Chamberlain, C. J., (Methods in Plant Histology) ; Walmsley, W. H., (The A. B. C. of Photomicrography } ; Wratten, (Photo¬ micrography > (Eastman Kodak Co.).

Charles J. Chamberlain.

PHOTOPHONE, the name given an ap¬ paratus for transmitting articulate speech to a distance along a beam of light. It was first de¬ scribed in 1880 by Alexander Graham Bell, known in connection with the telephone, at the Boston meeting of the American Association ; but already in 1878 its inventor had announced the possibility of <(hearing a shadow® by means of a similar agency. It has never been com¬ mercially introduced. The success of the photo¬ phone depends on the peculiarities of the metal selenium. Crystalline selenium offers a high degree of resistance to the passage of an elec¬ tric current; it is eminently sensitive to light; and the resistance is less when exposed to lighr than in the dark, being in some cases only a 15th in the light of what it is in the dark. Pro¬ fessor Bell, his friends and assistants devised some 50 forms of apparatus, for so varying the transmission of light to prepared selenium as to produce audible sound. In the photophone found most serviceable the transmitter is a plane mirror of silvered microscope glass or thin mica ; the receiver, fixed at a distance with¬ out any connection, is a parabolic reflecting mirror, in the focus of which is placed a sensi¬ tive selenium ˆcell,® connected in local circuit with a battery and telephone. When the appa¬ ratus is used, a strong beam of light is con¬ centrated by a lens in the plane mirror; the speaker directs his voice against the back of this mirror, which is thrown into vibrations corresponding with those of the voice. The reflected beam of light, to which corresponding vibrations are also communicated, is directed through a lens to the receiving mirror, and creates in the selenium cell a rapidly variable current, which at the end of the telephone at¬ tached becomes audible again as vocal sound. When first described, the photophone had been used effectively with a distance of 230 yards between transmitter and receiver. The rays of the oxyhydrogen light, or of an ordinary kero¬ sene lamp, suffice for transmitting articulate speech. The loudest sounds obtained from the

photophone were produced by means of a per¬ forated disc, noiselessly revolving so as rapidly to interrupt the light in transmission. It was also found that a very audible sound could be nrocured from the selenium without the aid of telephone and battery. A beam of intermit¬ tent light will produce a strong musical note from the selenium. Further experiment showed that selenium is not the only substance thus sen¬ sitive to light. Still louder sounds than these obtained from the selenium directly, though not articulate, were got from diaphragms of hard india-rubber and of antimony; and sounds of

varying intensity were given out by many other substances, including gold, silver, platinum, cop¬ per, zinc, lead, paper, parchment and wood. Consult Bell, (The Photophone* (1878). See Selenium.

PHOTOPLAY, the technical name given to a moving-picture which presents a complete drama. The conditions under which a moving-picture is made and exhibited place the photo¬ play in a distinct class by itself. It cannot, like the novel, short story, or the regular theatrical play depend upon language to explain situations or to express thoughts and emotions. Its sole medium of expression is self-explanatory ac¬ tion. The photoplay differs from other mov¬ ing-pictures in that it has a definite plot, which is worked out by a series of dramatic scenes. There is no limit to the number of these sepa¬ rate scenes; they may run up to 40 or 50, if necessary to round out the story. Nor are there any bounds within which the plot action shall move forward. The ability to join into one picture films made at the opposite ends of the earth, if desired, give the widest latitude to the inventive faculties of the author. In these pe¬ culiarities the photoplay leans more toward the plan of the novel than to the theatre play pre¬ sented in three or four acts, and within the con¬ fines of the stage. The scenes in which the photoplay is presented are not required to progress consecutively as to time of happening: it is entirely permissible for the action to ((cut back® as in the novel, to take up a parallel sequence of events needed to bring the action to a climax.

The elimination of the spoken language normal to the stage play and such a large auxil¬ iary in the development of the story in the novel, necessarily shortens the time required to present a photoplay covering the same re¬ cital. Thus a play which would consume per¬ haps three hours on the stage, stripped to its physical action only may be shown as a photo¬ play in the course of 20 minutes. One of the results of this condensation is to give the photoplay a peculiar hurried effect. There is entire absence of repose, so indispensable in a stage play or novel as a foil to even the minor action. The consequence of these limitations is to place the photoplay on so high a plane of intensity that all action is exaggerated far bevond the normal. This apparent haste in the action is enhanced by the characteristic focal expression of the photographic lens, with its distorted perspective — distorted as compared with the elastic vision of the human eye. The difficulties for both author and audience are mutually recognized, and certain auxiliary de¬ vices for helping the presentation along are ac¬ cepted as conventional, ffhe use of some lan¬

guage is permissible in the line of subtitles, leaders or captions, as they are variously called. When skilfully composed they not only

intro¬ duce the scene about to come on the screen, but link it with the action of the scene just halted. ˆInserts® are bits of language of a different sort, arranged as a part of the plot action — as, for instance, the display on the screen of a letter, telegram, or scrap of news¬ paper, that the spectators may read, each for himself. These adjuncts however, are to be avoided, and wherever possible substituted by action which will suggest, if not actually depict, the progress of the plot.

The conventional measure of length of a photoplay is the (

The production of a photoplay requires the perfect collaboration of several highly skilled specialists. The author devises his plot and to a large degree the scenes which shall express it. His manuscript is submitted to the photoplay editor, who passes on the availability of the story for photoplay presentation. He may re¬ ject it altogether, return it to the writer with suggestions for amendment, or, if the subject appeals to him'as worthy, may make the emen¬ dations himself. In the larger establishments the editor has a corps of readers to assist him in winnowing the great mass of manuscripts submitted by would-be photoplaywrights. For every manuscript accepted more than 700 are rejected as unsuitable. The accepted photo¬ play goes to the director of the establishment. His is perhaps the most vital part of all, as it is his task to make real what the author and editor have imagined. He decides upon the make-up of the scenes, what scenery is to be used, or perhaps made especially, what setting, the actors who are to take part, the clothes they are to wear, their appearances and posi¬ tions on the stage, the conduct of rehearsals, and the ultimate direction of the actual production of the play before the camera. The camera man's work is largely mechanical, but calls for extreme accuracy. The exposure being made, the film goes to the developing room where the negative made in the camera is developed, and a positive such as is used for projection upon the screen is printed from it. Then comes the <(try-out,® when the complete film is exhibited on a screen for the judgment of an exceedingly critical jury, made up of the editor, the direc¬ tor, the actors, the camera men, and every one else who has had a responsible part in the pro¬ duction. Some of the scenes may prove to be inadequate, and may have to be done over again — or possibly omitted altogether. Perhaps the whole play will be rejected as not up to the

standard of the firm which must stand sponsor for it in the film market. The editor and di¬ rector then decide as to the inserts actually needed to give the utmost finish to the play, and these are made by the photographic staff, put into their proper places in the negative, and the whole cemented into one continuous strip. When this is finally satisfactory, many copies are made and distributed by the business de¬ partment of the producing company to the ex¬ hibiting houses all over the country, and in foreign lands as well. So that no one locality may have an advantage over another in point of time on any given picture-play, it is custom¬ ary for the manufacturer to place a <(release date® on the film, before which time it may not be shown.

The studios of the larger photoplay com¬ panies are marvels of scientific adaptations of means to end. Some of them are enclosed with glass and the scenes photographed in daylight. Others are fitted with electric lights of great power, which can be grouped for any desired effect of lighting. For small scenes the actual space within which the play is enacted may not be more than 8 or 10 feet wide and about 6 feet in depth. In a large studio, 50 to 60 feet long, it is not uncommon to have three or four scenes in action at one time, each attended by its own director and camera man.

In these establishments a permanent com¬ pany of actors is in constant attendance, and each studio has its list of special actors who can be called on at any time for special service. A staff of artists and mechanics — carpenters, masons, smiths and scene painters, is also a permanent part of the personnel ; the prepara¬ tion of the scenery for a single 20-minute play occupying the time of several men perhaps for three or four weeks. In the property room of such a studio is gathered a collection of the oddest description, ranging from the primitive bow and arrow of the aboriginal Indian to a modern quick-firer; from the New England wheelbarrow to an oldtime <(prairie schooner® ; the dobe hut of the Mexican, and the rose-cov¬ ered porch of an old Virginia mansion — any¬ thing and everything which may add impressive reality to the detail of any possible story. In the costume room are literally thousands of garments of «every age and nationality. Some studios, in addition to all these, support exten¬ sive stables to provide horses of certain re¬ quired training, beside cattle and other lesser livestock called for by the play approved by the editor.

Mention has been made of the very large proportion of photoplay manuscripts rejected by readers and editors as compared with the very few accepted. Scores of books have been pub¬ lished to aid those who have the ambition to write photoplays, but beside the mastery of the

technique of expression peculiar to the photo¬ play, a genuine gift for story-telling is a sine qua non of the successful writer's equipment. The great difficulty of getting really good plays which are new as well as effective on the screen has led the large film companies to employ a regular staff of skilled writers to produce the bulk of the plays eventually exhibited, the small sup¬ ply received from the outside public being unde¬ pendable when compared with the constant and importunate demand of the trade — amounting

to an aggregate of 5,000 to 6,000 new plays annually. The literature of all countries is searched by staffs of translators for plots which, though not new, may be at least made to ap¬ pear so by presenting them in varied settings. This matter of changing the setting of an origi¬ nal story has developed business enterprises of great complexity. Some of the larger photo¬ play makers have traveling companies of actors who wander about the earth enacting the scenes of plays to which they are assigned — in the Western Plains, in the jungles of the tropics, among the palms of the West Indies, beside the pyramids of Egypt, in the white snowfields of the Arctic, or within the hallowed precincts of the Holy Land. The same plot worked out in such widely varying environments, with ap¬ propriate costumes and with characteristic per¬ sonnel, will give a whole series of plays hardly to be recognized by the ordinary photoplay audiences as being of even remote relationship.

A more intimate knowledge of the subject will require the concentrated study of the very extensive literature of the photoplay, of which only a few titles may be mentioned in this article. See also Moving Pictures, for descrip¬ tion of the instruments and processes used in making and exhibiting the films.

Bibliography. — Consult Bernique, J., Mo¬ tion Picture Acting for Professionals and Ama- teurs> (Chicago 1916) ; Croy, H., (How Motion Pictures are Made) (New York 1918) ; Dimick, H. J., (Photoplay Making) (Ridgewood, N. J.,

1915) ; Esenwein, J. B. and Leeds, A., (Writing the Photoplay) (Springfield, Mass., 1913) ; Freeburg, V. O., (The Art of Photoplay Mak- ing) (New York 1918) ; Harrison, L. R., (Screencraft> (New York 1916) ; Lomas, H. M., (Picture-Play Photography) (London 1914); Muensterberg, H., (The Photoplay: A Psychological Study) (New York 1916) ; Nel¬ son, J. A., (The Photoplay) (Los Angeles 1913) ; Phillips, H. A., (The Photodrama) (Larchmont, N. Y., 1914) ; Sargent, E. W., technique of the Photoplay) (New York

1916) .

PHOTO-SCULPTURE, a novel process used by sculptors for producing statuettes by the aid of photography. It was invented by M. Villeme, a French sculptor. The model stands in a studio of special construction, in the centre of a circle of 24 cameras, by all of which he is photographed at the same moment. The 24 negatives are then projected in succession on a screen by means of an optical lantern and the artist goes over the outline of each with the tracer of a pantograph, a cutting tool acting upon a lump of modeling clay, mounted upon a turn-table, being substituted for the usual pencil. After each photograph is gone over, the clay is turned through 15°, and after a complete revolution it is removed and finished by hand.

PHOTOSPHERE, in astronomy, the lu¬ minous envelope, supposed to consist of in¬ candescent matter, surrounding the sun. See Sun.

PHOTOSYNTHESIS, the synthesis of chemical compounds by the action of light. The broader subject of photochemistry includes all chemical reactions that are induced or main¬ tained by the action of light, whether they result in true synthesis or not; but photosynthesis, in the strict sense, is a constructive process, re-

suiting in the production of substances that are higher in type than the materials from which they are formed, by reason of possessing a more complicated structure or of containing a greater quantity of energy per unit of weight. Photochemical processes occur in inorganic nature and also in the animal world (notably in the retina of the eye) ; but the most important case of photosynthesis consists in the formation of starch and other related compounds, from carbon dioxide and water, in the green leaves of plants.

Light cannot produce chemical changes un¬ less it is absorbed. This rather evident fact was first distinctly recognized by Grotthus in 1819, and is usually known as <(Grotthus' law,® but it was also independently stated by Draper in 1841, and from this circumstance it is some¬ times called (

the consequent formation of new compounds of a simpler nature ; and when this occurs the disruption may be attended by the liberation of

energy, so that the final products contain less energy, on the whole, than the parent sub¬ stance from which they were produced. Other compounds, more stably constituted or more efficiently absorptive, may be able to store up the vibratory energy of the light until they become capable of entering into combinations of a higher type, and in a case of this kind we should have a true photosynthesis.

Inasmuch as light must be absorbed in order to give rise to photochemical action, we find that such action is characterized by high absorption power on the part of the substance that under¬ goes the chemical transformation. If all the incident light were absorbed the substance would reflect nothing and would, therefore, appear black. If the absorption were only par¬ tial and if it took place in such a way that the absorbed energy constituted the same fraction of the incident white light at every wave-length, then the reflected light would contain all the colors that exist in sunlight and in the same proportion in which these colors must be present to produce the sensation of whiteness; and hence in this case the substance would appear white or gray. In the actual case as we find it in nature, the incident light is only partially absorbed, but the absorption is quite marked (and may even be almost complete) between certain wave-lengths, while in other parts of the spectrum there is little or no absorption. The absorbing substance, therefore, appears colored, since it absorbs certain wave-lengths with marked efficiency and gives off the others by re¬ flection. In studying the absorption of light scientifically the spectroscope is employed, and the particular wave-lengths that are absorbed are determined by allowing the spectrum to fall upon a uniformly thick layer of the substance under investigation and examining the trans¬ mitted light to see what particular colors have been absorbed — absorption being indicated by the presence of dark bands (or <(absorption bands®) in the spectrum of the light that has passed through the test layer, in the case of the green coloring matter of plant leaves, the absorption band that corresponds to the photo¬ synthetic activity is in the red part of the spectrum.

It is not possible to determine with precision the efficiency with which the absorbed vibratory energy of the light is converted into potential chemical energy in the leaf of a growing plant, but it is known that this efficiency is quite high. According to the best available estimates it may range from 40 per cent upward, and some authorities have even estimated it at 98 per cent in special cases.

The synthesis of highly organized com¬ pounds from carbon dioxide and water is per¬ formed by living organisms in various ways. Certain of the bacteria, for example, perform syntheses of this kind by

utilizing the energy obtained by the simultaneous oxidation of hy¬ drogen or other substances that may be present. Most of the plant life of the world, however, depends upon photosynthesis, effected through the agency of the green <(chlorophyll® that the leaves contain. The coloring matter extracted from green leaves contains four recognizably distinct constituents — two of which are green

and two yellow. The green substances appear to be the ones that effect the photosynthesis. One of them (((a-chlorophyll®) is bluish green in color and the other ((

There is a close and suggestive structural similarity between chlorophyll and the haemo¬ globin of the human blood, and this fact may lead to a further understanding of the way in which chlorophyll acts. We do not yet know how it affects the synthesis of starch and sugar from carbon dioxide and water. In the living leaf the chlorophyll occurs in the form of con¬ centrated layers upon (or near) the surfaces of certain tiny structural granules called <(chloroplasts ,® which appear to perform an important function of some kind or other. It has been shown, for example, that when a seedling is grown in the dark and subsequently placed in the light it does not necessarily pos¬ sess photosynthetic power as soon as chloro¬ phyll appears in it ; and this shows that other elements, structural or chemical, are needed be¬ fore photosynthesis can occur. It is also inter¬ esting to note that a mere trace of chloroform vapor in the air stops photosynthetic activity, even in a healthy and vigorous leaf.

The fascinating suggestion has been made that formaldehyde is first formed in the leaf in accordance with the simple equation $CO2 + H20 = CH20 + 02$. If it could be demonstrated that this action really occurs, we should prob¬ ably be justified in the expectation that the mysteries of the green leaf will soon be cleared up. Formaldehyde easily polymerizes with the formation of higher compounds, and there would not be any great difficulty, apparently, in accounting for the formation of starch, sugar and other related substances after formaldehyde had once been obtained. The fact that for¬ maldehyde has a strong toxic effect on living matter would not necessarily constitute an ob¬ jection to the theory, because the formaldehyde might become polymerized, in the growing leaf, almost as rapidly as it was formed, so that it would never be present in sufficient quantity to exert a harmful influence. Considerable doubt has been thrown upon

the formaldehyde hy¬ pothesis by the work of Schryver, Wager and Warner, who find that although an aldehyde of some kind appears to be formed in the leaf, it probably is not formaldehyde. Moreover, the presence of carbon dioxide is not essential to its production.

The carbon dioxide absorbed by the leaf may combine, first, with the chlorophyll and then split off in a different form, but we have no proof as yet that an action of this kind occurs.

For a good general discussion of the known facts concerning photosynthesis consult Bay-

liss, Principles of General Physiology.* For detailed data regarding the composition and constitution of chlorophyll consult Stewart, A. W., (Recent Advances in Organic Chemistry. *

Allan D. Risteen.

PFIOTOTHERAPY, the treatment of dis¬ ease by light — sunlight and electric light (For treatment by the Roentgen ray or X-ray, see Radiotherapy).

From the very earliest times sunlight has been considered an important aid in the pres¬ ervation of health. The ancient Greeks and Romans exposed their naked bodies to the sun in the open air to recruit mental and physical energies, and built balconies or terraces (so¬ laria) on the roofs or southern walls of their dwellings, so that the occupants could sun themselves. Exposure to the sun's rays was also adopted by the physicians of those times as a remedy for many affections, ˆespecially dropsy, inflammation of the kidneys, and paral¬ ysis.® Celsus, the Latin writer, recommended for those with weak digestion a house <(well lighted, having the winter sun® ; but while he and Galen advocated sunlight as a remedial agent they pointed out the evils resulting from excessive insolation. Much has been written within the last century on the remedial value of sunlight. In 1815 Cauvin presented a thesis ((on the benefits of insolation® ; prior to 1820 Ebernier, Girard and others discussed the ef¬ fects of sunlight on animal life; and in 1847 Richter, at Gottingen, wrote on <(insolation, or the power of the sun on the human body.® In 1848 Perreira spoke of solar light as a (

The importance of light for healthy growth and development has been recognized by san¬ itarians for many years. Solaria or sun-rooms are a part of some modern hospitals. Houses and rooms receiving little or no sunlight are unhealthful. In a military barrack at Saint Petersburg

the mortality was three times greater on the dark than on the light side of the building. Animals and plants living in the dark become bleached, as is celery. Clinical observations show that a want of sunlight pro¬ duces depression of spirit, lack of energy, loss of appetite, disturbance of digestion, turbid urine and a kind of homesickness. The face becomes pale (etiolation), the blood is thin, the red corpuscles are diminished, pulse is frequent and weak, palpitations of the heart occur on the slightest exertion, there is muscular debility, little recuperative power, and an increased sus¬ ceptibility to contagious diseases.

Interesting experiments and observations have been made as to light, by Becklard, Becquerel, Draper, Edwards, Gardner, Hunt, Landgrebe, Hammond and others; but, as one of the writers observes, ((we do not know what is the exact effect produced by light. Does it,® he inquires, <(act directly, or is its only effect to modify the intensity of certain functions, such as respiration?® Later Edward Smith proved that light is a powerful stimulus to respiration, that ((under the influence of day¬ light one-third more atmospheric air enters the

lungs than under darkness or even under ex¬ posure to artificial lignt.® Hence the vigor of the ((ruddy, healthy peasant who retires to rest with his cattle and is up with the lark® is be¬ lieved to be mainly due to the thorough oxy¬ genation and subsequent reddening of the blood by much contact with oxygen in the light and air of the day. Where direct sunlight cannot be obtained in rooms, reflected sunlight by means of mirrors has been found serviceable, in the maintenance of health. A room with a southern exposure is desirable. Sternberg and* others have shown that bright sunlight, inde¬ pendently of the heat of the sun, is germicidal, destroying various pathogenic organisms, some¬ times within a single hour. Sunlight is thus an important disinfectant. The sterilizing in¬ fluence of light in the purification of water and sewage has been repeatedly proved (see Ster¬ ilization). But the fact that the germicidal property of light chiefly depends on its blue and violet rays was proved by Finsen near the close of the 19th century. It has been recently stated that the strongest sunlight has too feeble bac¬ tericidal properties for therapeutic purposes ; for example, it does not kill bacterial skin-dis¬ ease in the summer; but a concentrated focused light, transmitting as many blue, violet and ultra-violet rays as possible, such as the con¬ centrated electric light of Finsen, is necessary. This light kills bacteria in a few seconds when

spread on a thin film of agar. But Angell in 1878 had reported cases of acne speedily cured <(by exposure to direct and entire sunlight.®

Light has long been considered a complex agent. It has been known that the sunbeam is resolvable into rays of various colors (violet, indigo, blue, yellow, green, orange, red), which embody luminosity, heat and actinism, the chemical property of light. It was known that the red rays of the spectroscope were heat- rays ; that the rays toward the violet side were actinic or chemical ; that luminosity was strong¬ est in the orange and yellow rays. Later it was discovered that there are invisible heat- rays beyond the red, and actinic rays beyond the violet, and these were called ultra-violet. About 1845 Gardner and R. Hunt experimented with the rays separated by a prism, and ascer¬ tained some interesting facts as to the effects of blue, yellow and violet rays upon vegetation. Ponza, an Italian physician, found blue and vio¬ let light to be soothing to the insane. Gen. Alfred Pleasanton, in his advocacy of blue light as an invigorator, claimed too much for it, and the ˆblue-grass® craze died out. Most physicians believed that treatment by isolated rays of light did not possess ((very essential therapeutic value.® A few clung to the idea that if the excess of heat and light could be eliminated the actinic rays might be of value.

It was reserved for Niles R. Finsen, a physi¬ cian of Copenhagen, in 1895, to utilize scientifi¬ cally the constituent or spectroscopic elements of light as therapeutic agents. In 1832 Pictou of New Orleans published a pamphlet proving that the absence of light would prevent sup¬ puration and pitting (scarring) in smallpox, and recommended that the eruption should be protected from air and light. Finsen, by nu¬ merous experiments on worms and insects, con¬ vinced himself that under red light they were comfortable, and under blue light were irri¬ tated. Then reading Pictou's pamphlet, he

inferred and advised that keeping smallpox patients in a red light would be as efficacious as darkness in preventing pock-marks by exclud¬ ing the irritating actinic ravs. If the skin is protected against the chemical rays inflamma¬ tion will diminish and suppuration be prevented. In August 1893 Svendson in Norway and in November 1893 Benckert in Sweden used the red-light treatment with smallpox patients, and found that suppuration was abolished, scars were rare and insignificant and the disease was shortened. Even a very little daylight admitted to the room did harm, so sensitive was the inflamed skin to the actinic rays. In mild cases a clear red light was found sufficient; in severe cases a deep red light was necessary. Having proved that red light was inimical to the germs of smallpox and other eruptive dis¬ eases, Finsen turned his attention to the effect of

decomposed light on other germ-diseases, especially lupus. He proved (1) that the bac¬ tericidal action of light is practically limited to the blue, violet and ultra-violet rays, and is greatly intensified by concentrating the rays by means of a suitable apparatus; (2) that the actinic rays so concentrated will penetrate the skin to a small degree and will go deeper if the red blood be pressed out of it — hence they would be of value in superficial cancer, baldness of microbic origin, acne, etc. ; (3) that they have power to produce inflammation of the skin (erythema solare). Finsen's first case of lupus was successfully treated in 1895, with an ordinary arc electric light and a hand-lens, the red and ultra-red rays being filtered out through blue water. He then devised and used a sun- apparatus consisting of two lenses of glass, one plain, the other convex, framed in a brass ring, mounted on a stand, and which admitted of adjustment and focusing. Between the lenses was a bright blue weak ammoniacal solution of copper sulphate. Discovering that the ultra¬ violet rays were more efficacious than the violet in killing bacteria, he abolished the blue-water filter which prevented the ultra-violet rays from passing, and used clear distilled water, which sufficiently absorbs the red and ultra-red burn¬ ing rays. Lenses of clear quartz-crystal were substituted for those of glass, it being found that they are better heat-filters and allow the chemical rays to pass almost unimpaired. As sunlight could not be depended upon for regu¬ lar and systematic treatment, Finsen turned to the electric light.

The Finsen apparatus as now constructed consists of an arc-lamp, of from 40 to 80 am¬ peres and one or more telescopic tubes of brass for concentration and focusing. Each tube closed is three feet four inches long and can be extended 10 inches. The head-piece of the tube has two plano-convex lenses of quartz-crystal, one with the convexity toward the light, the other with the plane surface in contact with the plane surface of the first lens. Toward the lower end of the tube there is a chamber for distilled water, designed to diminish the heat- rays not eliminated by the crystal lenses. The light-rays, emerging from this bath, are con¬ centrated by another quartz-crystal plano-con¬ vex lens at the distal end of the tube upon the surface to be treated, the convex surface of the lens being toward the patient. To enable the rays to penetrate the surface more deeply by squeezing out the blood a compressor may be

used, consisting of two quartz-crystal lenses, one plane, the other

convex, with a chamber between having an inlet and outlet, through which water can be kept continuously flowing still further to cool the rays. This compressor is either held in place by an attendant or tied on. An improvement by Hopkins of Brooklyn admits of the adjustment of the tube on a stand to suit the case to be treated, as in uterine carcinoma.

The objection to the Finsen apparatus are the cost, the usually frequent and tedious treat¬ ment necessary — one hour a day for months — and the effects sometimes produced on the eyes. It has mainly been used in cases of lupus vul¬ garis, and lupus erythematosa, birth-marks, acne, and rodent ulcer. Dr. Rollier of Switzer¬ land has had great success in employing the sun's rays for the open air treatment of tuber¬ culous joint affections in children.

Though Finsen's discovery may not do all that has been claimed for it, it marks a great advance, especially in the cure of lupus. Out of 456 cases treated by Finsen, 130 were cured; the disorder had not recurred in from one to five years. Cases of abdominal malignant can¬ cer have been successfully treated in this coun¬ try. It is claimed by originators of improved apparatus that as much can be done therewith for lupus in 20 minutes as Finsen effected in an hour or more, that only 30 amperes, instead of 80 are necessary and that one application in several days is sufficient.

The Minim light, suggested by Minim of Saint Petersburg, which is an ordinary incan¬ descent light, covered by a bulb of natural blue glass, with a reflector, has proved valua¬ ble in the treatment of various forms of ulcers, in alopecia areata, in contusions and in other acute injuries. Minim also offers this light as a substitute for the Finsen light in lupus.

Doctor Hopkins of Brooklyn claims the treatment by the light of the Hopkins lamp is a cure for pulmonary tuberculosis in the first stage, as well as for many cases in the second stage and that it has been of great comfort and has prolonged life in a number of instances in the third stage of the disease. The lamp con¬ sists of a 50-ampere searchlight in a brass cylin¬ der, with a French condensing-lens, 18 inches in diameter. It focuses at a distance of about 12 feet. The light passes through a sectional screen of blue glass, two feet square, to cut out the heat-rays and impinges upon the chest of the patient. Half-hour exposures to this light are found to be sufficient.

The German Light-Bath is used for treating the naked body by concentrated light. It con¬ sists of a couch in a cabinet or sheet

enclosure, with two or more lamps within it comprising from 40 to 80 amperes. This bath of light has proved efficacious in malnutrition, marasmus, and various forms of debility and in neuras¬ thenia and other neurotic affections.

The mercury vapor lamp of Kronmayer, in which the rays are passed through a window of rock crystal, the crystal not filtering out the ultra-violet rays has made it possible to pro¬ ject intense radiations and so produce very violent reactions from short exposures. By careful management it is possible thus to re¬ move angioma, rosacea, patches of lupus, etc. In carbuncles, radiant light and heat may be employed alone to abort the condition if applied

in the early stages and for long periods. Light has proved effective also in tuberculosis, peri¬ tonitis and other tuberculous conditions.

Bibliography. — Allen, C. W., (Radiotherapy and Phototherapy } (Philadelphia 1904) ; Cleaves, M. A., (Light Energy > (New York 1904) ; Finsen, N. R., (Phototherapy } (t. by Sequeira, London 1901) ; Finzi, N. S., (Radium

Therapeutics > (Oxford 1914) ; Hammer, W. J., (Radium and Other Radio-Active Sub¬

stances* (2d ed., New York 1904) ; Kassabian, M. K., (Rontgen Rays and Electro-Therapeu¬ tics* (2d ed., Philadelphia 1910) ; Newcomet, W. S., (Radium and Radiotherapy * (Phila¬ delphia 1914) ; (Reference Handbook of the Medical Sciences) (Vol. VII, New York 1916) ; Potts, C. S., (Electricity : Its Medical and Surgi¬ cal Applications* (Philadelphia 1911) ; Rogers, C. E., (Textbook on the Therapeutic Action of Light) (Chicago 1910).

PHOTOTOPOGRAPHER. See Sur¬

veying.

PHOTOTROPISM, same as heliotropism (q.v.).

PHRANZA, fran'za, or PHRANZES, fran'zas, George, Byzantine historian: b. 1401; d. about 1477. He was chamberlain of Manuel II (Palaeologus) and was a warrior and diplo¬ mat in the service of Constantine XIII, whose life he saved in the siege of Patras (1429). After the capture of Constantinople by Moham¬ med II (1453) he escaped to Corfu and retiring to a monastery, wrote his interesting and reli¬ able

PHRASE, in music, a short division of a composition, in compound ‘time sometimes con¬ tained within one measure, but usually consist¬ ing of two or more measures, closing with a half-cadence or a cadence. Two united phrases ending in a cadence form a section, and two sections, the first terminating with the dominant, and the second with the tonic harmony, consti¬ tute a perfect musical idea. The musical phrase is analogous to the literary sentence ; theirj proper interpretation and rendition, termed ˆphrasing,® into which the due elements of accent and rhythm enter, is one of the distin¬ guishing characteristics of the art of the vocal¬ ist or instrumentalist, without which any musi¬ cal performance is merely mechanical. The term phrase is applied also to any short pas¬ sage performed without break, and the irregular phrase qualifies a passage with any unusual number of measures.

PHRENOLOGY (Greek, phren, mind; logos, discourse), the science which teaches that there exists a relation between the several faculties of the mind and particular regions of the brain, and that these are the organs of those faculties ; in accordance with this theory phrenologists chart the cranium of man in sec¬ tions, each section being taken to represent the seat in the brain of some definite faculty or mental or moral disposition. That the brain as a whole is the organ of mind we should in¬ cline to regard as an instinctive judgment were it not that some of the most highly gifted races, as the Hebrews, the Egyptians, nay even

the Hellenes, as is proved by their vocabularies and their literature, recognized various organs and viscera as the seats of the intellective and of the emotional faculties; the heart, for ex¬ ample, was for the primitive Romans the seat of understanding, of wisdom, as also for the Egyptians, the Hebrews, the Greeks ; but at the same time it was for them the organ of feeling and emotion. But Pythagoras (6th century b.c.) held the brain to be the seat and organ of understanding; yet Aristotle, 200 years later, taught that the heart is the master organ of life and inelligence, and that the brain is a cold, inert, bloodless organ, the sole function of which is to temper the heart’s excessive heat. But for Plato the heart was the chief organ of intellect, and the great naturalists, anatomists, and physicians who lived later adhered to Pythagoras’ view despite the very high authority of the Stagirite. Even in the Middle Ages when Aristotle’s authority was supreme, the scholastic philosophers rejected his doctrine on this point, and

Albertus Magnus, in the 13th century, and very many other philosophers and naturalists after him, divined a localization of faculties in the brain. Albertus < saw in the anterior region the seat of judgment or ratiocination, in the medial, that of imagination, and in the posterior region the seal of the mem¬ ory; and his successors in a similar way dis¬ tributed the seats of the several faculties of the soul in the different regions of the brain. Hence, Francis Joseph Gall, though justly ac¬ counted the founder of modern phrenology, did but revive the ancient knowledge and de¬ velop it further. He expounded his views on the subject in lectures at Vienna in 1796 and later, but in 1802 was compelled to discontinue them by order of the Austrian government prompted by the ecclesiastical authorities. Gall had already attached to himself a gifted pupil and efficient coadjutor in the person of John Gaspar Spurzheim, and the pair pursued their investigations in concert and delivered lectures on phrenology throughout 'France and Great Britain. In both countries they gained enthu¬ siastic disciples not only among the less edu¬ cated class but among the learned also — such men as Sir George Mackenzie, Archbishop Whately, Laycock, Macnish, Andrew Combe : the last named was universally recognized as the ablest expositor of the doctrine in Great Britain, and its indefatigable propagandist. Phrenological societies sprang up everywhere in England and the United States, and the prin¬ ciples of the science were propounded and de¬ fended in a number of periodicals, British and American, the first both in point of time and in authority being the British Phrenological Jour¬ nal, published in Edinburgh and edited by Dr. Combe till his death in the United States, 1847. The popular interest in phrenology which for 30 years or more was at fever heat languished and died away till now phrenological societies are heard of no more and phrenology for years had but one representative in the periodical press of the United States. Fowler and Wells of New York were the last publishers to take an active interest in the science, and Nelson A. Sizer was the last of active phrenologists.

Phrenology, as finally developed, is the work rather of Spurzheim and of Combe than of its first founder, Gall. Gall located 27 special faculties out of the 35 usually recognized; but

to Spurzheim is due the credit of having sys¬ tematized and justified Gall's data and of hav¬ ing enriched the science with important dis¬ coveries. Not the least of Dr. Spurzheim's merits is the improvement made by him in the nomenclature of the science : for example, when what in Gall's scheme is called murder, Spurz¬ heim calls destructiveness, a term which is more comprehensive as well as more exact; or when of Gall's two terms veneration and religion Spurzheim

retains only the first, in which the second is comprised. The 27 faculties identified by Gall are by Gall himself named and num¬ bered as follows: 1, veneration; 2, love of off¬ spring; 3, friendship; 4, courage, self-defense; 5, murder; 6, cunning; 7, the sentiment of property; 8, pride, self-esteem, haughtiness; 9, vanity, ambition; 10, cautiousness; 11, memory of things, educability; 12, local memory; 13, the memory for persons; 14, memory for words; 15, memory for languages; 16, colors;

1 7, music; 18, number; 19, aptitude for draw¬ ing conclusions; 22, wit; 23, poetry; 24, good nature; 25, mimicry; 26, religion; 27, firmness of character. (The numerical figures do not apply to Spurzheim's phrenological chart).

Spurzheim classified these faculties, propen¬ sities and other characters as follows ;

Spurzheim's Classification and Localiza¬ tions.

Spurzheim recognizes two great classes of human faculties, namely:

I. Feelings, divided into :

1. Propensities, or predispositions only to

certain kinds of acts.

2. Sentiments, or impulses which prompt

to emotion as well as to action, and these are either

a. Lower, common to man and lower

animals ; or

b. Higher, peculiar to man.

11. Intellective faculties :

1. Perceptive faculties.

2. Reflective faculties.

PROPENSITIES.

1. Amativeness. 2. Philoprogenitiveness. 3. Concentrativeness. 4. Adhesiveness. 5. Combat¬ iveness. 6. Destructiveness. 6a. Alimentive-

ness. 7. Secretiveness. 8. Acquisitiveness. 9. Constructiveness.

SENTIMENTS I LOWER.

10. Self-esteem. 11. Love of Approbation.

12. Cautiousness.

SENTIMENTS I HIGHER.

13. Benevolence. 14. Veneration. 15. Con¬ scientiousness. 16. Firmness. 17. Hopefulness.

18. Wonder. 19. Ideality. 20. Wit. 21. Imita¬ tion.

PERCEPTIVE FACULTIES.

22. Individuality. 23. Form. 24. Size. 25. Weight. 26. Color. 27. Locality. 28. Number. 29. Order. 30. Eventuality. 31. Time. 32. Tune. 33. Language.

REFLECTIVE FACULTIES.

34. Comparison. 35. Casualty.

Phrenology was popular during the middle of the 19th century, but suffered from the lack of true science displayed by many of its advo-

cates, who assumed altogether too much for it, and made money out of it by charting heads of those interested at from 50 cents to $5 per chart. The most necessary thing for a professor of phrenology was a happy faculty of flattering everybody, and the more they flattered the more people paid to have their heads charted, to get information as to their characteristics. A few men of large perception, like the late Nelson A. Sizer, gave value for the examinations they made, but they appear to have used phys¬ iognomy to assist them, and to have been also very shrewd observers, discovering characteris¬ tics in half a dozen ways, besides examining the skulls of their subjects. Another blow was given phrenology as anatomy advanced. The study of the brain functions on the dissecting table did not carry out all the assumptions of the phrenologists; the colleges refused to teach it as a

science, and it gradually fell into desuetude. Yet there seems to have been a mistaken haste in condemning phrenology. Like chiropractic science, — which was de¬ veloped by non-scientific men, until the scientific had to take it up and acknowledge its many virtues — phrenology contains truths that should not be overlooked. Herbert Spen¬ cer emphasizes these: “No physiologist can long reject the conviction that different carts of the cerebrum subserve different kinds of mental ac¬ tion. Localization of function is the law of all organization; separateness of duty is univer¬ sally accompanied with separateness of struc¬ ture, and it would be marvelous were an ex¬ ception to exist in he cerebral hemispheres.

. . . These more or less distinct kinds of psy¬ chical activity must be carried on in more or less distinct parts of the cerebral hemisphere.® Dr. Bernhard Hollander investigated the sub¬ ject at great length, and endeavored to find proof in hospital records, finally giving his attention mainly to cases of mental disease and injury, and the effects on the areas of the brain. After an examination of hundreds of cases, which he cites in his book, ‘The Mental Func¬ tions of the Brain,5 he concludes: “(1) Melan¬ cholia is especially associated with injury or disease of the parietal lobe of the brain. (2) Mania furiosa is especially associated with in¬ jury or diseases of the central portion of the temporal lobe. (3) Mania with suspicions and delusions of persecution is especially associated with injury and disease of the posterior por¬ tion of the temporal lobe.® Dr. Hollander dep¬ recates the false notion of

means than examining the heads of applicants. Phrenology was disowned by science because too much was claimed for it, and too much ex¬ pected. Like physiognomy (q.v.) it is a valuable aid to estimating character.

Bibliography. — Gall and Spurzheim, ‘Anat- omie et Physiologie du Systeme Nerveux> (1810-19) ; Gall, (Des Dispositions Innees de l’Ame et de l’Esprit> (1812) ; Sewall, ‘An Ex¬ amination of Phrenology5 (1837) ; Fowler, (Phrenology and Physiology) (1844) ; Wundt, W., ‘Grundziige der Physiologischen Psy¬ chology (Leipzig 1888) ; Donaldson. (The Growth of the Brain5 (1898) ; Barker. (The Nervous System5 (1899) ; Hollander, (The Mental Functions of the Brain) (1901) ; ‘Scientific Phrenology5 (1902), and the files of the Phrenological Journal.

PHRIXUS, phrik’sus, in Greek mythology, the son of Athamas and Nephele, and the brother of Helle. When about to be sacrificed to Zeus, he was rescued by his mother and carried with his sister to

Colchis upon a ram with golden fleece. Helle fell into the sea and was drowned on the way and the waters where it took place were called the Hellespont. It was the fleece of this ram, given to King ZEetes, and kept by t,he king in a garden guarded by a fiery dragon, in search of which Jason went in the expedition of the Argonauts.

PHRYGIA, frij'i-a, in ancient geography, a country of Asia Minor, occupying the central plateau west of the Halys and the interior desert, but otherwise very ill-defined, since the country varied much at different times and in general was an ethnological rather than a geographical term, as it was applied to the district occupied by the Phryges or Phrygians. The region was broken by sharp valleys, was extremely fertile, especially on its western slope, and was rich in gold as is evidenced by the myth of its King Midas. He was said to be the second king of the country succeeding his father Gordius, a common laborer who founded the kingdom, about 800 b.c. The names of Gordius and Midas are frequently repeated in the list of Phrygian kings, and this account of the foundation of the kingdom is scarcely credible. Indeed it seems that a much earlier Phrygian civilization spread over Lydia, Cap¬ padocia and Lycaonia as well as Phrygia, leav¬ ing behind it monuments of its peculiar art and a road system later utilized by the Persians. Intercourse with the Greek cities of Asia Minor seems to date from the 9th century b.c., and with the European Greeks, through the colony of Sinope (founded 751) in the 8th century. But 100 years later the Phrygian kingdom was wiped out (680-670 b.c.) by the invasion of the Cimmerians, who seem to have held the country till about 620, when the Lydians con¬ quered Phrygia, to hold it until the conquest of Lydia by Persia. Persia's downfall trans¬ ferred Phrygia to Macedonia, and it became a part of Pergamus, and in 90 b.c. was incor¬ porated into the Roman province of Asia. Phrygian slaves were highly prized among the Greeks, probably as early as the 5th century.

Ethnologically the Phrygians seem to have been closely related to the Armenians. Both were of Indo-Germanic stock, as has been proved by recent studies on the Phrygian lan¬ guage, which is known to us only from the

scanty remains of widely scattered inscriptions and a few glosses; many of the funeral in¬ scriptions are in Greek, save for the curse at the end on him who <(disturbs my bones,® which was written in

Phrygian. The language, like Armenian, seems to be Iranian in its affinities. Inscriptions in its peculiar alphabet, the exact value of some signs which are still unknown, are found in Lemnos and in Egypt. Some few of its words agree almost exactly with the Greek, and many loan *words from the Phrygian seem to be found even in the Homeric dialect. Most of the sepulchral inscriptions alluded to are found on tombs with peculiar conventional pattern of great boldness and skill in design, the figures being mostly of a heraldic type strangely suggestive of Oriental rugs. The most famous of these tombs are those of the early kings, including Midas, in the hills near San- garius — all apparently were memorials and not actual burial places. The Phrygians seem to have been essentially a rustic people, and their religion was a nature worship, in which the great divinity was Ma or Ammas, the Great Mother, also called Cybele, which seems to have meant <(the mountain goddess.® Her seats were Dindymus, Sipylus and Ida, and she was the goddess of vegetation and of all life and gen¬ eration. Her cult passed to Greece in the 5th century, and her black stone image was carried to Rome in 204 b.c. Closely associated with her was Attis, again a divinity of nature's powers of reproduction.

Bibliography. — History: Ramsay, his¬ torical Geography of Asia Minor > (1890), (Cities and Bishoprics of Phrygia) (1895—97) and (Cities of St. PauP (1907) ; on topography and scenery: Ouvre, (Un Mois en Phrygie) (1896) ; on language and inscriptions, Ramsay, in jour¬ nal of Hellenic Studies) (1882, 1884), (Journal of the Royal Asiatic Society> (1883), and (Zeitschrift fur vergleichende Sprachforschung) (1887); and on archology and myth and re¬ ligion: Perrot and Chipiez, (Histoire de l'Art dans l'Antiquite) (Vols. Ill and IV, 1886, 1890), and Roscher, (Lexikon der griechischen und romischen Mythologies s. vv. Attis, Kybele, Men, etc. (1884 seq.).

PHRYGIAN CAP, or LIBERTY CAP, a peaked headdress worn by the ancient Phry¬ gians. Such a cap when placed upon the heads of Greek and Roman slaves became a token of their freedom. Hence it has become a sym¬ bol of liberty. The Roman conspirators, after murdering Caesar, carried it through the streets on a pole and it was stamped on coins. It was also connected with the French Revolution. Louis XVI was compelled to wear it in 1792 in order to show his agreement with the peo¬ ple's desires. In the same year it was made the mark of a ˆpatriot.,? It is also seen on the head of the Goddess of Liberty, on some of the coins of the United States, and has been adopted by some foreign countries, being in¬ scribed on their coats of arms.

PHRYGIAN LANGUAGE. See Phrygia.

PHRYNE, fri'ne, famous Greek courtesan: b. Thespiae, Bceolia, in the 4th century b.c. She was named Mnesarete, but on her coming to Athens, where she became a flute player and later a hetsera, was called Phryne (literally (

grew rich in her profession and became the mistress of the sculptor Praxiteles, who modeled after her his statues of Aphrodite and. made two portrait statues of her. Many stories of her are told, the most famous being that of her promise to rebuild from her own purse the city of Thebes on the condition that the city should be inscribed <(Destroyed by Alexander ; rebuilt by Phryne® — an offer which was declined. Quintilian is the first authority for the story of her trial before the Areopagus, in which her lawyer Hyperides, seeing that he would lose the case, drew her clothes from her breast and shoulder, showing the judges a beauty so per¬ fect as to force them to declare her innocent. During an Eleusinian festival, another story relates that she appeared in the sea bathing in full view of the pilgrims, a theme taken by the painter Apelles for his picture of Aphrodite Anadyomene (that is, ((rising from the sea- foam®). In later art Phryne figures in a fa¬ mous fresco at Pompeii, and in the painting of Gerome (1861), and in the statue by Pradier.

PHRYNICHUS, frin'I-kus, early Greek tragic poet. He was an Athenian, won his first tragic victory in 511 b.c., and was writing in 476 b.c., at which time his (Phoenissas) was presented with much pomp by Themistocles. Besides the (Phoeniss3e,) which was imitated by Eschylus in the Herodotus says, was the cause of his being fined for thus employing a national calamity, and of a law against tragedies of political con¬ tent. Phrynichus is said to have been the orig¬ inator of several improvements in the drama.

PHTHA, tha. See Ptah.

PHTHIOTIS, thi-6'tis, the southernmost of the tetrads of ancient Thessaly and now forming, with Phocis, a nomos, or govern¬ mental division of the Greek kingdom. The ancient district, famed as the home of Achilles, included the region about the Othrys range be¬ tween the valley of the Sperchius and the great plain of Thessaly. The present division, which before 1899 formed a nomos together with Phocis (q.v.), has now been separated; its area is about 1,800 square miles; pop. about 73,000. Capital city Lamia.

PHTHISIS, thi'sis. See Consumption.

PHYCOCYANIN, fi-ko-si'a-nm, PHY- COERYTHRIN, PHYCOPH2EXN,

pig¬ ments coloring the blue-green, red and brown seaweeds respectively. See Alg;e.

PHYCOLOGY, that department of bot¬ any which treats of the algae or seaweeds.

PHYCOMYCETES, PHYCOPHYTES.

See Fungi.

PHYFE, flf', William Henry Pinkney,

American author: b. New York, 13 June 1855; d. 7 March 1915. He received his education at Columbia College and devoted himself to a study of spelling and pronunciation, on which subject he wrote (The School Pronouncer; How Should I Pronounce ?> (Seven Thousand Words Often Mispronounced,* subsequently re¬ vised to include 10,000 words; again in 1908, 12,000 words, and in 1914, 18,000 words. He was also the author of (Napoleon, the Return from Saint Helena) (1908).

PHYLACTERY (Gr. QvlanTr/piov , a re¬ ceptacle for safe-keeping. The Hebrew word means ˆfrontlet®) ; a sort of small box contain¬ ing four passages from the Pentateuch, namely. Exodus xiii, 1-10, 11-16, Deuteronomy iv, 4-9, xi, 13-21. The phylactery or tephillah was a small leather case fastened to a band, and each male Jew of 13 years of age and upward wears two of them at morning and evening prayer. One is bound round the head in such a way that the case comes between the eyebrows. In this case are four compartments, each containing a strip of parchment with one of the four passages above mentioned. The other band with a simple phylactery is fastened round the left arm, the little case being turned toward the heart. The practice of wearing these tephillin was devel¬ oped out of the commands in Exodus xiii, 9 and 16, and Deuteronomy vi, 8, and in its pres¬ ent form dates from about the 1st century before the Christian era. In Matthew xxiii, 5, Jesus condemns the Pharisees for making broad their phylacteries. The name phylactery, from a Greek word meaning <(to guard,® refers to their use as amulets for protection against demons.

PHYLZE, fi'le, in Greek history, the sev¬ eral tribes of a city or nation, each composed of men who traced their descent to a single com¬ mon ancestor. The Ionians were made up of four such tribes which settled

themselves in Attica, namely the Geleones, the Hopletes, the Agikores and the Argades. They were the foundation of the Athenian state and were di¬ vided into three phratries. Solon recognized these four Old Ionic tribes. Cleisthenes organ¬ ized them into 10 tribes which he called after Old Ionian heroes ; and these were again divided into demes. In 307 b.c. two new tribes were added, and these in honor of Demetrius and his father Antigonus were named Demetrias and Antigonis. A 13th Hadrianis was added in honor of the emperor Hadrian (123 a.d.). The Dorians had three tribes, the Hylles, Dymanes and Pamphyles, forming the main body of the state, and in Sparta were divided into 10 Obes.

PHYLARCHUS, fi-lar'kus, Greek histo¬ rian, who flourished about 215 b.c. He was, according to some, an Athenian, according to others an Egyptian. He wrote 28 books of • 'I oTopiai' (), a work apparently con¬ taining accounts of not only Greece and Mace¬ donia, but also Egypt and other contemporary states. It covered the period from the invasion of the Peloponnesus by Pyrrhus to the death of King Cleomenes of Sparta. Polybius and Plutarch attack his credibility, yet Plutarch made extensive use of Phylarchus' work in his own lives of Cleomenes and Aratus. Only a few fragments remain.

PHYLLIS, fil'is, in Greek myth, a daugh¬ ter of Sithon, king of Thrace, who from grief at the absence of her beloved Demophon took her own life, and was changed into a leafless almond tree. When Demophon returned and flung his arms around the tree it burst into full leaf.

PHYLLITE, (1) a mineral related to or a variety of ottrelite, found as micaceous scales in the mica schist of various parts of Massa¬ chusetts and Rhode Island. Hardness six to seven; color greenish-gray to black. In com¬

position a hydrated silicate of iron, aluminum, and manganese. (2) A finely crystalline meta- inorphic rock which is a fine-grained mica schist and may be considered a transition type between an ordinary mica schist and a slate.

PHYLLIUM. See Leaf-insect.

PHYLLOCARIDA, a name given by Pack¬ ard to the group of crustaceans called Lepto- straca by other authors. But a single genus (Nebalia) is known, a small shrimp-like form occurring in seas of moderate depth. The group is characterized by having a bivalve carapace, 21 body-segments, of which eight are in the abdomen, and leaf-like thoracic feet resembling those of the Phyllopoda.

PHYLLOPODA, the most primitive group of existing .Crustacea. The name refers to the feet, which are broad leaflike structures, the thoracic appendages being unjointed, while those of the head are typically arthropodan. The number of segments of the body varies between very wide limits, those of the abdomen being without appendages. In all except the Branchipidce , a carapace is developed, either as a broad oval plate covering the thorax, or as a bivalve shell closed by adductor muscles like a clam. The group is divided into the Branchio- poda (q.v.) with numerous segments, most of the species being inhabitants of fresh water (see Apus) ; and the Cladocera in which the segments number less than a dozen, the species being some inhabitants of fresh water, others of the sea. Most of the fresh-water species are normally parthenogenetic (see Parthenogenesis), the males appearing only at rare intervals; indeed the males of some species are unknown. Many are inhabitants of pools which dry up in hot weather : and it has been found that with some species the eggs need to be dried before they will develop. Many species lay two kinds of eggs, thin-shelled summer- eggs and thicker-shelled winter eggs. In the Cladocera the dorsal part of the cara¬ pace serves as a brood-pouch, the eggs here undergoing their development, sometimes nour¬ ished by fluids secreted by the mother. The species of Artemia are remarkable from the fact that they live in salt springs and lakes, or in tubs and vats filled with brine, but are un¬ known in the sea or in fresh waters. (See Brine Shrimp). Consult Packard, A. S., (North American Phyllopod Crustacea) (Wash¬ ington 1883) ; id., (Text-book of Zoology) (11th ed., New York 1904).

PHYLLOTAXIS, in botany, the arrange¬ ment of leaves on a stem, three common posi¬ tions being opposite, alternate and verticillate. See Leaves.

PHYLLOXERA, or VINE-PEST, an

American aphist (Phylloxera vastatrice), de¬ structive to grapevines. It has four forms: sexual, leaf-gall, root and winged. The sexual female lays an egg upon the vines during the autumn. About the time the buds open, the larva hatched from this egg forms a gall upon the upper surface of a leaf and in about two weeks commences egg-laying, soon producing from 500 to 600 eggs within the gall it has made. The young which appear in about a week dis¬ perse to other parts of the vine and form galls like the first. During the summer six or more generations are produced and the leaves may

be completely covered with galls. The last brood produced before cold weather migrates to the roots where the insects hibernate until spring. During the growing season of the second year several generations of wingless females are produced upon the rootlets which swell more or less at the points of attack. In early autumn these root forms may produce winged females, which fly to the vines and lay eggs to continue the life-cycle. Often, however, no winged forms may be produced for several years, the root forms being capable of continued reproduction under favorable conditions. Flight is not the only means the insect has for dis¬ tribution ; it may be carried by vines trans¬ planted from infested vineyards to new ones, by birds and insects to whose bodies the leaf form may cling; by winds which carry the leaf form either with leaves torn from the vines or otherwise ; and through the crawling of the root form through cracks in the earth.

Though the insect is an American species, it has done little damage upon American varieties, since these are more resistant, probably because of the thicker bark of their roots and their robust habit of growth. But upon the Euro¬ pean varieties of Vitis vinifera the root-form is especially troublesome. It was introduced into France upon American vines about 1859, and not only in France but throughout the grape-growing sections of Europe it quickly spread and did enormous damage. It is now known in nearly all grape-growing countries of the world. It is believed to be responsible for the failures of European varieties in America where, however, it was unknown at first ex¬ cept in the Rocky Mountain region, and then, somewhat later, in California upon European vines. Since the root form, which is seldom seen, is the destructive form, methods for com¬ bating it were rarely satisfactory. The most frequently tried were probably bisulphide of carbon injected into the soil and flooding the ground. The one preventive remedy now prac¬ tised is the grafting of the European varieties upon the roots of American varieties, especially those derived from Vitis labrusca, V . cestivalis, and V. riparia. Since this discovery was made, experiments have been made in the growing of European varieties in America, the vines having American roots, the object being to discover the cause of previous failure of the European varieties. Consult Marlatt, Princi¬ pal Insect Enemies of the Grape) (United States Department of Agriculture, Farmers' Bulletin, No. 70; Washington 1898). See Grape Insect-pests.

PHYLOGENY, the development or evolu¬ tionary history of an animal group considered as a whole. This branch of knowledge is based on the study of embryology of animals and the facts thus brought to light, which are supple¬ mented by the study of paleontology. See Evo¬ lution ; Paleontology.

PHYSA. See Pond-snail.

PHYSALIA. See Portuguese Man-of- War.

PHYSIC-NUT, or CURCAS, the seed of Jatropha purgans , or the plant itself, a tropical shrub belonging to the order Euphorbiacece. These seeds have strong emetic and purgative properties, due to a fixed oil which is expressed

and used in medicine under the name of jatro- pha-qil. The seeds of another species (/. multi fidus) are called French or Spanish physic-nuts, and these yield oil of pinhoen. See Jatropha.

PHYSICAL CONSTANTS. See Units

of Measurement; Weights and Measures.

PHYSICAL CRYSTALLOGRAPHY

treats of the physical properties of crystals and their determination. In general any measurable property will yield results varying with the di¬ rection and alike only in directions which are structurally equivalent. If these results are represented by straight lines of proportionate length in the given directions they determine a closed surface which in symmetry and dimen¬ sions represents that property in that crystal.

The physical characters may be subdivided into those which depend upon cohesion and elasticity, and upon the action of radiant energy (light, heat, magnetism and electricity).

The Properties Dependent upon Cohesion. — The resistance opposed by a crystal to forces tending to separate its particles is shown by various important properties, as cleavage, glid¬ ing, parting, percussion-figures, etch-figures, corrosion and hardness. Of these cleavage has been described, see Cleavage, and hardness is discussed under the article Mineralogy.

Gliding is the tendency of the particles to slip or glide without separation parallel to a so-called gliding plane, which is always a pos¬ sible crystal face, when pressure is exerted in a certain direction. Thus if a slender crystal of stibnite supported at the ends is pressed downward with a dull knife edge, it is bent at this point without affecting the other parts. The gliding may be accompanied by a revolu¬ tion of 180 degrees bringing a part of the crys¬ tal into twinning position. Unlike cleavage planes, which are at right angles to directions in which the particles are furthest apart, gliding planes are at right angles to directions in which the particles are very close together.

Parting. — The planes along which gliding has taken place often become planes of easy sepa¬ ration and are then called parting-planes. Part¬ ing resembles cleavage, but is distinguished by the fact that it takes place only in certain defi¬ nite planes, those of the molecular disturbance, while cleavage may be obtained in any part of the crystal in the given direction.

Etch figures. — When a crystal is attacked by any solvent the action proceeds with differ¬ ent velocities in crystallographically different

directions, and if stopped before the solution has proceeded far, the crystal faces are often pitted with little cavities of definite shape usually bounded by minute faces.

The figures, whatever their shape, conform in symmetry to the class to which the crystal belongs and as the faces rarely belong to limit forms common to several classes, etch figures are very useful in determining the true symme¬ try of the crystal.

Etch figures are alike on faces of the same crystal form and generally unlike on faces of different forms.

Corrosion. — The unequal rapidity of solu¬ tion in different crystallographic directions is sometimes studied by immersing a crystal in a solvent. This may result in the development of new faces conforming in position to the sym-

metry of the crystal. Sometimes a sphere is cut from the crystal and submitted to the ac¬ tion of the solvent. Thus a sphere of quartz subjected to the prolonged action of hydro¬ fluoric acid was attacked rapidly in the direction of the vertical axis but scarcely at all in the direction of the horizontal axes, the resulting form being a subtriangular lens.

Percussion Figures. — Cracks parallel to crystallographic directions are sometimes devel¬ oped by pressing or tapping a conical point against a face of a crystal. Examples are mica and common salt.

The Properties Dependent upon Elasticity.

— If rods of the same length, breadth and thickness are cut from different parts of the same crystal and subjected to equal strains, they are found to undergo different extensions, and if, from the resulting coefficients of extension for all directions, the extension surface is con¬ structed, this, while often a very complex shape, is found always to be symmetrical to the axes and planes of symmetry of the crystal.

Pressure in different directions will modify the optical characters of a crystal. For in¬ stance, isotropic crystals may be made to yield uniaxial or biaxial phenomena according to the direction in which the pressure is applied.

The Optical Properties of Crystals. — Al¬ though the electromagnetic theory of light is now generally accepted, the terminology of the older undulatory theory is still conveniently used in discussing the optical characters of crystals. It is assumed that while the direction of advance in a homogeneous medium is in straight lines, the transmission is due to vibra¬ tion (or waxing and waning of force) at right angles to this direction of advance. This may be called a vibration and designated* in direction and intensity by a straight line. The advance during a complete vibration is called a wave length and determines the color of the light while the amplitude of the vibration deter¬ mines the intensity.

The properties of light are elsewhere de¬ scribed (see Light). Those most used in the study of crystals are refraction, double refrac¬ tion, polarization and absorption. In other words, because crystals on account of their structure retard the transmission of light dif¬ ferently in different directions, both with re¬ spect to the velocity of transmission and the quantity transmitted, these properties of trans¬ mission are utilized to determine crystalline structure.

Refraction. — Rays of light in passing obliquely from one medium to another in which the velocity of transmission is different are bent or refracted. If the velocity is lessened the bending is toward the perpendicular to the sur¬ face of contact, if the velocity is increased the bending is away from the perpendicular.

The ratio of the velocities of light in the two media is called the index of. refraction of the second medium with respect to the first and it has been proved that whatever the angle of incidence, the ratio of the sines of the angles of incidence and the angle of refraction is con¬ stant for the same two media and equal to this

index of refraction. That is, w= -r— =

sin i Vx

sin r Vi

Double Refraction. — In 1679 Erasmus Bar¬ tholin observed that the objects viewed through

ic.eland spar appeared double, one image con¬ forming to ordinary refraction, the other not so conforming. For instance, one of the two rays had a fixed index of refraction (1.658 for yellow light) while the index of the other varied for different directions of transmission from 1.658 to 1.486. As early as 1678 Huyghens showed that the optical

behavior could be repre¬ sented by a double shelled surface like that later described under optically uniaxial crystals.

Double refraction could be proved for only a few crystalline substances by the direct ob¬ servation of double images. Other methods, however, prove that it is a general property of all crystals except those of the isometric system.

Polarised Light. — In ordinary light the vi¬ brations are assumed to take place at right angles to the line of transmission but in any plane. Malus discovered that light reflected from inclined plates of glass, when viewed through the doubly refracting iceland spar, gave images which differed in intensity, and that for certain positions of the iceland spar one or the other image disappeared. Light so modified is said to be polarized and the vibrations are con¬ sidered to take place in one plane only.

The rays transmitted by any doubly refract¬ ing crystal consist of polarized light and for any direction of transmission the planes of vi¬ bration of the two emerging rays are at right angles to each other.

Absorption and Pleochroism. — Light passing through any substance is partially absorbed, the amount increasing with the thickness. If the light is composite the component lights of different wave length may not be absorbed in the same ratio and the substance will appear of the color due to the unabsorbed portions of the components.

In doubly refracting crystals the two rays transmitted in any direction are apt to undergo different absorptions and may emerge of dif¬ ferent color and intensity. Furthermore in different directions in the same crystals the so- called ((twin colors® may notably differ and in such a case the (

The Optical Classification of Crystals. — According to their optical behavior crystals may be classified as 1. Optically isotropic, 2. Op¬ tically anisotropic uniaxial, 3. Optically aniso¬ tropic biaxial.

Optically Isotropic Crystals. — Isometric cry¬ stals show the same optical properties in all directions, yielding in all directions the same index of refraction and the same rate of ab¬ sorption. They are singly refracting or rarely circularly polarizing.

Optically Anisotropic Uniaxial Crystals. — In tetragonal and hexagonal crystals the op¬ tical behavior varies with the direction, the principal crystallographic axis is also an axis of optical symmetry, for in all directions equally inclined to it the same optical tests are ob¬

tained. It is a direction of single refraction or of circular polarization.

The optical properties of a uniaxial crystal are best understood by considering the shape of the Ray Surface, which consists of two shells with a common centre. One is a sphere, the other an ellipsoid of revolution, each passing through points on the. rays determined by the velocities of transmission.

Evidently for every direction except that of the. optic axis two rays are transmitted, an ordinary, with a velocity indicated by the sphere radius, and an extraordinary, with a velocity indicated by the corresponding radius vector of the ellipsoid, and the greatest differ¬

ence of velocity exists for the direction of transmission at right angles to the optic axis.

The spherical shell may surround the ellip¬ soid shell or vice-versa. The former combi¬ nation is called a positive ray surface (Fig. 1), the latter a negative (Fig. 2).

The Optically Anisotropic Biaxial Crystals. — In all orthorhombic, monoclinic and triclinic crystals, the optical behavior varies with the direction, and while there are no true optical axes, there are, for monochromatic light and constant temperature, two directions of single refraction which are called optic axes from analogy with the direction of single refraction in the uniaxial crystals.

The ray surface consists of two intersecting shells ■ symmetrical only to three lines at right

If the vibration directions of the fastest and slowest ray are denoted by X and Z respec¬ tively and a direction at right angles to these by Y, the shape of the ray surface may be judged from the shape of the principal sec¬ tions XY, XZ and YZ.

Y

The section XY (Fig. 3) cuts the two shells of the ray surface as a circle within an ellipse with radius, major and minor axes respectively slowest, fastest and intermediate velocities, while the section YZ (Fig. 4) cuts the two shells of the ray surface as an ellipse within a circle with radius, major and minor axes re-

Z

spectively fastest, intermediate and slowest velocities.

The section XZ, the plane of the optic axes, cuts from the ray surface an ellipse and a circle which intersects the ellipse in four symmetri¬ cally placed points, E (Fig. 5). The radius, major and minor axes are respectively the intermediate, fastest and slowest velocities.

z

angles and to three planes each through two of these lines. Two of the three lines are the vibration directions of the fastest ray and the slowest ray. . It may be noted that when planes or axes of geometric symmetry exist they co¬ incide with planes or axes of optical symmetry.

Near but not at the points E common tan¬ gent planes can be drawn to each shell. The directions, AA, normal to these common tan¬ gent planes are directions of single refraction, the so-called optic axes. The acute angle be¬ tween these is called the optic axial angle.

As in the uniaxial ray surfaces there are two types, the described sections being those of a positive ray surface with Z bisecting the acute angle between the optic axes ; when X bisects this angle the ray surface is said to be negative.

Determining the Optical Properties of Crystals. The Light Used. — In general the light used is polarized, as the effects of the crystalline structure upon this are more readily studied. Some of the tests also require the use of monochromatic light, that is of light of one definite wave length, while other tests are made with white light.

Obtaining the Polarised Light. — Although occasionally produced by reflection of common light at a definite angle, or by double refraction

and absorption, as in the sim¬ ple polariscope, known as the tourmaline pincers, the usual method is by sending common light through one of the vari¬ ous forms of ((nicols® prisms, the original form of which de¬ scribed by Prof. William Nicol was constructed as follows : A cleavage prism of transpar¬ ent calcite (Fig. 6) is cut di¬ agonally along the line H H and then the two parts are ce¬ mented

together with Canada balsam. The end faces are ground off slightly so that an angle of 68 degrees is formed. (See Fig. 6). The ordinary ray o with an index of refrac¬ tion of 1.66 is totally reflected. The extraordi¬ nary ray e with an index of refraction of 1.54 (practically that of the balsam) passes through the prism with little, if any, change. The plane of vibration of the nicol is assumed to be through the shorter diagonal.

The Polarising Microscope. — The various polariscopes of former days have been replaced almost entirely for crystal study by the polariz¬ ing microscope the simplest form of which necessarily includes the essentials of an ordi¬ nary microscope (a stand supporting a tube carrying objective and ocular, a platform or stage and means of focusing and illuminating), and in addition a nicol, <(the polarizer,® -below the object, to polarize the incident light, and another above the objective, ((the analyzer® ar¬ ranged to be thrown in or out and <(crossed® with respect to the polarizer.

To these essentials may be added many de¬ vices and attachments for special purposes.

The tests usually are made in known crystal¬ lographic directions, preferably upon (

(< Crossed Nicols .® — When the vibration di¬ rections of the upper and lower nicol are crossed, the polarized light from the lower nicol cannot penetrate the upper nicol and the field is dark. If when a transparent section of a crystal is placed on the stage and revolved, the field is still dark, the direction of transmis¬ sion is one of single refraction , but if during the rotation the field is in general illuminated, but is dark for four positions, 90 degrees apart, then the direction of transmission is one of double refraction.

These four positions of darkness or <(Extinc¬ tion ® occur when the vibration directions of the two polarized rays emerging from the section are parallel to those of the two nicols for then only the polarized light from the lower nicol is transmitted by the section with unchanged vibration direction and cannot pass through the upper nicol.

With crossed nicols and a doubly refracting crystal section the light effect at any point is due to the combined effect of two components with vibrations in the same plane. In general they have been unequally retarded during trans¬ mission and may supplement or neutralize each other. If for instance monochromatic light is used and

the difference in retardation of the two rays is denoted by A and the wave-length of light by A then :

If A— A, 2 A, 3A, . . , n A the two compo¬ nents following the same path will oppose and exactly neutralize each other, the light will be stopped and darkness will result for all posi¬ tions of the crystal section.

Similarly if A = 3 /%\ 6/2ˆ> etc , the

maximum illumination results.

Since A increases with the thickness these facts may be shown by use of a thin wedge of a double refracting crystal. Under low magnifi¬ cation this will show with monochromatic light equidistant dark bands with brightest illumi¬ nation midway between them. When white light is used instead of monochromatic light ((interference colors ® result because for any section A may be at the same time: (a) ap¬ proximately a multiple of the wave-length of light of one or more colors, which would, there¬ fore, be shut out: (b) closely an odd multiple of the half wave-lengths of other colors leaving these at nearly their full intensity, and (c) in¬ termediate, with still other colors.

For any value of A there is an absolutely fixed interference color and as these to some extent repeat periodically they are conveniently divided into <(orders® the transition color be¬ tween orders being a sensitive violet so-called be¬ cause very minute changes in A result in de¬ cided changes to blue or red. The first, second and third orders end respectively at A = 575, 1,130, 1,652 millionths of a millimeter.

Determining the Fact of Single or Double Refraction. — If with crossed nicols and the crystal section on the stage the field remains dark throughout the rotation of the stage the crystal is singly refracting in the direction of transmission. If the field is dark at intervals of 90 degrees and elsewhere illuminated the crystal is doubly refracting.

Determining Indices of Refraction. — Ac¬ curate determinations require monochromatic light, constant temperature and, except in iso¬ tropic substances, those directions of transmis¬ sion which yield the principal indices. The more used microscopic methods are those of Becke and Van der Kolk both of which involve a com¬ parison with the known indices of liquids.

Becke’s method is based upon total reflection at an approximately vertical boundary between two substances and the consequent

concentra¬ tion of light upon the side of the substance with the higher index of refraction. After focussing sharply upon a fragment or grain with an ap¬ proximately vertical boundary or edge and sur¬ rounded by the liquid, the objective is slightly

Fig.6.

raised, giving the effect of a bright band moving into the denser substance.

Van der Kolk's method is better for irregular fragments and is based upon the behavior of the fragment in obliquely incident light. With proper adjustments approximately lens-shaped fragments become more strongly illuminated on one side or the other according as their in¬ dices of refraction are greater or less than that of the surrounding liquid.

Accurate determinations of the principal in¬ dices of refraction are often preferably made by the ((prism method® involving the measure¬ ment of the (

In a much used type the surface of contact is the diametral plane of a glass hemisphere of very high index of refraction, the crystal sur¬ face is placed on this with a drop of some liquid also of high index. The diffused light from one side is in part totally reflected and the (< limit line® found by a telescope. The index is calculated from the angle at which the telescope obtains the adjustment

Determining Birefringence. — The birefrin¬ gence or strength of double refraction of any doubly refracting crystal is the difference be¬ tween its maximum and minimum indices of refraction. If these indices can be determined to the third decimal their difference may be taken as the birefringence.

In practice the birefringence is usually de¬ termined from the retardation A and conse¬ quent interference color and the thickness of the section, by the relation A—t(ni — n).

The retardation A can be measured with great accuracy by compensators. The thick¬ ness determination is less accurate.

The function of the compensator, which in its simpler form is a wedge

of doubly refract¬ ing crystal, is to lower the value of A by known amounts until A— 0.

Determining Extinction Angles. — The angle between an extinction direction and some rec¬ ognizable crystalline direction, cleavage, crack, edge, twin plane, etc., is called an extinction angle of the section.

The best general method is to carefully de¬ termine the position of the crystalline direction, then rotate the stage clockwise until the field is dark at some reading a. Continue the rotation until the field is light, then turn back counter clockwise to some reading a' where the field is again dark. The reading halfway between is near maximum darkness.

Test plates are also used which between crossed nicols develop some sensitive interfer¬ ence color. This color is not changed when the section being tested is in its extinction position, but is notably changed for any other position.

Determining Pleochroism. — Pleochroism may be determined with the polarizing microscope as follows :

The extinction directions are found and then the upper nicol is pushed out and the colors for the two extinction positions noted and com¬ pared. These positions give the maximum dif¬

ference in color for the direction of transmis¬ sion. The pleochroism may appear as a change in color or a change in the shade of the same color.

It is sometimes more satisfactory to observe the <(twin® colors side by side by use of a di- chroscope which in its essentials is a cylindrical casing with a rectangular hole at one end and a lens at the other and between a rhomb of calcite of such a length that the two images of the hole are just in contact.

The section is held close to the rectangular hole and the instrument rotated until the two images are alike in color. Midway between two such positions the colors differ most.

Determining Uniaxial or Biaxial by Inter¬ ference Figures. — By introducing a convergent lens below the stage of the microscope polar¬ ized rays are sent through the section in a great number of directions and a simultaneous pic¬ ture is obtained of the interference phenomena due to the varying structure in all these direc¬ tions. Usually a high power objective is needed and the so-called

interference figure may be seen by removing the eye-piece and looking down the tube or by retaining the eye-piece and using suitable extra lenses.

No interference figure is obtained from any section of an isotropic (isometric) crystal. The field remains dark.

Uniaxial Crystals give their most character¬ istic interference figure when the section is at right angles to the optic axis. This figure con¬ sists of a dark cross, the arms of which, called

Fig. 7.

the <(isogyres,® intersect in the centre of the field and remain parallel to the vibration directions of the nicols during rotation of the fragments. It is due to those rays which then have their vibration planes parallel to the nicols. As the stage is rotated successive rays come into these positions, maintaining the same effect.

With monochromatic light the field will be of the color used, but if the section is not too thin, the centre of the black cross will be sur¬ rounded by concentric dark circles, correspond¬ ing to rays for which A— 22, 32, etc.

With white light the concentric circles will be color rings, arranged strictly in the order of the interference color.

Biaxial Crystals yield characteristic interfer¬ ence figures both with sections normal to an optic axis and with sections normal to the bi-sectrics X and Z. In the former the isogyre is a single black bar, essentially straight, when the trace of the plane of the optic axes coincides with the vibration direction of either nicol, but for all other angles of rotation it is curved and resembles one arm of an hyperbola. This arm rotates in the opposite direction to the rotation of the stage.

If the section is not too thin there will be black and often nearly circular interference bands with monochromatic light, and colored curves with white light corresponding to A~ /l, 2ˆ, 3ˆ, etc.

Sections normal to a bisectrix yield an inter¬ ference figure in which the ˆisogyres® appear as two dark bars or brushes. For the so-called normal position (Fig. 8) one bar connects the points of emergence of

the optic axes, the other is a thicker, lighter band at right angles to the first and midway between the axes.

Fig. 8.

If the stage is rotated the straight bars seem to dissolve into an hyperbola, the vertices of which are the loci of the optic axes and the branches of which rotate in the opposite direc¬ tion to the rotation of the stage.

With convergent monochromatic light there will be, in a field of the color used, black closed curves around the loci of the optic axes cor¬ responding to A— 2ˆ, 3\ etc. If white light is used isochromatic curves result, but the interference figure may be much more complex than with monochromatic light as neither the axial loci nor the isogyres nor the curves of equal retardation coincide for different wave lengths. The angle between the optic axes may be obtained from the last ‘described interference figure.

Under favorable conditions interference figures obtained with white light will serve to distinguish between the orthorhombic, mono¬ clinic and triclinic systems, for they conform in shape and distribution of color to the sym¬ metry of the system. With orthorhombic crystals the figure will be symmetrical to the line joining the optic axes, to the line through the centre at right angles thereto and to the central point, with monoclinic crystals the figure will be symmetrical to only one of these and with triclinic crystals to none.

Interference figures furnish a ready means for ascertaining whether the ray surface is positive or negative.

Thermal Properties of Crystals. — Heat rays differ from light rays in their relatively greater length, but may be reflected, refracted,

doubly refracted, polarized and absorbed, and it is possible, though difficult, to determine a series of thermal constants for crystals.

Conductivity. — Crystals conduct heat with unequal rapidity in different directions. If a crystal face or cleavage surface is coated with an easily melted wax and touched with the point of a hot wire the wax will melt in a circle with either an isometric crystal or a basal section of a hexagonal or tetragonal crystal. All other sections will yield ellipses varying in eccentricity and in position of axes.

Expansion. — When a crystal is uniformly heated, directions crystallographically alike ex¬ pand in the same proportion, but

directions un¬ like do not. This is shown by the fact that cer¬ tain interfacial angles are changed, others are not, and the expansion may be accurately meas¬ ured for any direction, but the methods in¬ volve apparatus of great precision and cost.

The Magnetic Properties of Crystals. — All crystals and indeed all substances are to some extent either attracted or repelled when placed in the field of a powerful electro¬ magnet. Those that are attracted are para¬ magnetic, those repelled, diamagnetic. The strength of the magnetization varies with the direction in crystals, and so far as studied the magnetic relations are analogous to the optical relations with the curious exception that the isometric crystals of magnetite are not mag¬ netically isotropic, but show different magnetic intensity in different directions.

Electrical Properties of Crystals. — Electric waves are like light wˆves; they travel with the same velocity, exhibit the phenomena of reflection, refraction and polarization and differ only in much greater length. Bose has de¬ scribed an electric polariscope, with which it may be possible to test opaque crvstals as we now test transparent crystals.

• Electric Conductivity. — In the few tested crystals there has been found a dependence of electric conductivity upon crystallographic direc¬ tion, conforming to the thermal conductivity.

Pyroelectricity. — Change of temperature will develop electric charges in certain classes of crystals. Usually the crystal is heated and al¬ lowed to cool. During the cooling of the crystal positive charges collect at the so-called antilogue pole and the negative charges at the analogue pole.

Piezoelectricity. — Similar charges are de¬ veloped by pressure, for instance tourmaline compressed in the direction of the vertical axis develops a positive charge at the antilogue end and a negative charge at the analogue end, or . precisely the charges which would result from cooling a heated crystal.

Bibliography. — Most of larger textbooks of mineralogy and special works such as v. Groth, P., (Physikalische Krystallographie) (Leipzig, also translation of part by Jackson, New York 1910) ; Becker, A., (Krystalloptik F. Erike) (Stuttgart 1903) ; Fletcher, L., (The Optical indicatrix* (London 1892) ; Tamman, G., (Kristallisiren und Schmelzen) (Leipzig 1903) ; Voigt, W., (Elemente der KrystallphysikJ (Leipzig 1898).

Alfred J. Moses,

Professor of Mineralogy, Columbia Univer¬ sity.

PHYSICAL CULTURE. See Physical

Training.

PHYSICAL ECONOMICS. See Indus¬ trial Hygiene; Insurance, Industrial; Labor; Social Insurance; Workmen's Compensation.

PHYSICAL EDUCATION. See Health Education.

PHYSICAL GEOGRAPHY. See Physi¬ ography; Geography.

PHYSICAL OPTICS. See Light.

PHYSICAL SOCIETY, American, a so¬ ciety affiliated with the American Association for the Advancement of Science (q.v.). It was founded in New York, 20 May 1899. From that date to June 1902 it published quarterly a (Bul¬ letin.) After that the proceedings of the society and the papers read at its meetings were pub¬ lished in The Physical Review, a monthly founded in 1893 and published with the assist¬ ance of Cornell University at Lancaster, Pa., and Ithaca, N. Y. In January 1913 this publi¬ cation was taken over by the society and is now managed by an editorial board appointed by the latter. The society has no definitely estab¬ lished headquarters, but holds frequent meet¬ ings in various parts of the United States for the reading and discussion of papers on the subject of physics.

PHYSICAL SOCIETY OF LONDON, The, a learned organization established on 14 Feb. 1874, having for its object the advancement of a knowledge of physics. The society pub¬ lishes

PHYSICAL TRAINING, a term used to indicate the systematic development and main¬ tenance of bodily power and health. In the broad sense it includes gymnastic and athletic exercise, active sports, personal, public and school hygiene. While the term is often used in its broad sense as health training, this article has special reference to physical exercise as related to this.

Systematic training of the body has been fol¬ lowed in some form by

probably every nation and race, savage and civilized. In the past it has taken the varied forms of training for war¬ fare through exercise for developing endurance, strength and skill ; recreative and competitive sports ; gymnastic dances for religious, martial or recreative purposes, and remedial exercises for the cure of disease, often associated with religion and administered by the priesthood. The highest development in many ways that the subject has ever known was in ancient Greece, where athletic games held a place in the politi¬ cal, religious, intellectual and artistic life of the country that made them one of the greatest human institutions in history. (See Athletics; Games). The physical training of women in ancient Greece consisted mostly of dancing and ball-playing, though the women of Sparta were not allowed to marry until they had given a public exhibition of proficiency in gymnastics. After its decline in Greece physical training next arose to the dignity of an institution in the age of chivalry when physical strength and prowess were again apotheosized for noble uses. (See Games). Following this, development of the body fell under the ban of an ascetic age,

where it remained until early in the 19th cen¬ tury despite the protests of such philosophers and reformers as Rabelais, Montaigne, Rous¬ seau, Pestalozzi, Luther, Milton and Locke. At the time mentioned began a renaissance of physical training out of which has grown, side by side with the continuance of athletic sports, the modern gymnasium, a wholly unique insti¬ tution in its construction, equipment, and the kinds of exercise adapted to it. This exercise includes gymnastics proper, with and without apparatus, games, gymnastic and folk dancing and athletics. With the growth of cities, mass¬ ing large numbers of people in limited space and curtailing facilities for outdoor exercise, the gynasium has come to mean, not only a prep¬ aration for competitive sports, but for thou¬ sands of people the only opportunity for vigor¬ ous, all-over bodily exercise. At the same time there has developed a scientific and educational understanding and application of the subject in marked contrast to earlier methods. Exer¬ cise in its early forms, as inspired by considera¬ tions of religion, warfare or competitive sport, was used with a purely empirical knowledge of its effects. With the development of physiology, psychology and related sciences, has come a closer analysis and classification of exercises for their effects upon the physiological func¬ tions, a clearer knowledge of the relation of exercise to psychological and moral develop¬ ment, its adaptation to individual needs, and its use as an instrument of education. Germany and Sweden were pioneers in this modern ad¬ vance of the subject, and the principles and methods there developed have had a profound

influence upon the physical training of other European countries and America.

German gymnastics have been developed in societies organized into the Turnerbund, which is the largest organization for gymnastic pur¬ poses that the world has ever known. It was founded about 1810 by Friedrich Ludwig Jahn (1778-1852), who invented the mode of exer¬ cise known as turning, and who is called the Father of German Gymnastics. The inspiring expressed motive for Jahn's work was patriot¬ ism — the development of strong men for the (

bars, traveling and flying rings. The vaulting horse and buck, balance boards, ladders and climbing poles are also prominent in German gymnastics. Freehand gymnastics (namely, without apparatus) and work with light, mov¬ able apparatus, such as wands, dumb-bells and Indian clubs, were developed and adapted to schools by Adolph Spiess (1810-58). The es¬ tablishment of gymnasiums for secondary schools was decreed by the Prussian govern¬ ment in 1844, and for elementary schools for the people in 1860. The Royal Central Gym¬ nastic Institute for training teachers of gym¬ nastics for the army and the schools, was es¬ tablished by the government in 1877. Techni¬ cally, as introduced in the United States, Ger¬ man gymnastics partake of the empirical char¬ acter of earlier forms of exercise. The work is classified as tactics, calisthenics, fancy steps, apparatus work, popular gymnastics, games and plays. Within these divisions further classification is according to external features, as, exercise on the upper side of the ladder, on the lower side, outer side, etc. The progressive arrangement of exercises is accord¬ ing to neuro-muscular skill, advancing from simple to complex movements. The capacity of pupils is also determined on the general lines indicated by their separation into classes of children, men, women and old .men. Almost all possible movements are permissible, and the ingenuity of teachers has resulted in a large variety of exercises. Indeed, interest and en¬ joyment — work under the guise of youthful happiness and sport — mark the general spirit of the turner gymnastics. Games for both adults and children are a prominent feature, and for women and children, figure marching with dance steps and singing, called roundels or reigen. The method of teaching and con¬ ducting work is almost invariably imitative, the pupils' movements being largely reflex and auto¬ matic. This, with the use of apparatus, gives an objective trend to the mental attitude of pupils which reduces mental tension to

a mini¬ mum. The musical genius of the German peo¬ ple is manifest in its gymnastics, not only in the frequent use of musical accompaniment, or, in the absence of music, of inspiring rhythms beaten out by the instructor, but, in a larger sense, in the artistic arrangement of drills or series of exercises. These are often con¬ structed around a given exercise which serves as a theme on which variations are arranged, working up, as it were, to a climax, and return¬ ing at the close of the series to the initial movements. This artistic bent shows in en¬ semble effects used for their appeal to the eye, as when alternate lines work in opposite direc¬ tions, or a program is closed with a tableau or pyramid of performers.

Gymnastics in Sweden are also <(the length¬ ened shadow of one man® — Peter Henry Ling (1776-1839). While never attracting a popular following like German gymnastics, those of Sweden are also under government auspices and are universally used in the schools and the army, while since 1814 a Roval Gymnastic Cen¬ tral Institute for the training of teachers has been maintained at Stockholm by the govern¬ ment. Ling put gymnastics into pedagogical, military, medical and aesthetic divisions. He brought the subject within the scientific trend of the century by a careful study of the effects

upon the body of various positions and exer¬ cises, and their classification according to these effects. Developments in physiology have modi¬ fied some of Ling's conclusions, but the under¬ lying principles remain. He invented a num¬ ber of pieces of fixed apparatus, notably the stall bars, Swedish horizontal bar (boom) and vaulting box. These pieces of apparatus admit of less freedom and variety of motion than the German apparatus, but lend themselves to more closely graded mechanical progression in the exercises. No light, movable, or so-called calis- tb.enic, apparatus is used in the Swedish work, but much is made of free-hand gymnastics. All exercises are carefully selected for their ef¬ fects upon the physiological functions or bodily posture. The latter is especially emphasized. No exercises are admitted which even tempora¬ rily constrict the chest, embarrass the respira¬ tion or ˆproduce continuous pressure upon the large vascular or nerve trunks.® Static con¬ traction of the muscles is much used, however, in holding one part of the body in a given posi¬ tion (as bending the trunk forward) while an¬ other part (as the head or arms) is exercised. All Swedish gymnastics are taken to command, music being entirely eschewed. These com¬ mands are extremely analytical, practically nothing being left to the initiative of the pupil or to the sub-conscious processes of muscular co-ordination. Many Swedish instructors teach new exercises entirely from command or verbal description as distinguished from imitative methods of presentation.

As introduced in the United States Swedish gymnastics have been characterized by an arbi¬ trary and minute classification of exercises and the arrangement of these in a (

(2) archflexions, (3) heave movements, (4) balance movements, (5) shoulder blade move¬ ments, (6) abdominal exercises, (7) lateral trunk movements, (8) slow leg movements, (9) jumping and vaulting, (10) respiratory ex¬ ercises. The idea of orderly progression in the use of exercises with regard to their physiolog¬ ical and mechanical difficulty is one of the most valuable contributions made to modern gymnas¬ tic practice. For instance, the effect upon cir¬ culation and respiration of exercise of the large muscular groups, as of the thigh and trunk, is much greater than of small groups, as of the arms or legs, and within reasonable limits this effect is intensified by overcoming resistance as in lifting the weight of the body in jumping or other precipitant exercises. Exercises for these muscular groups therefore bear a logical rela¬ tion to one another. Muscular strength is sim¬ ilarly amenable to progressive development through the application of some of the laws of mechanics. For instance, work of the trunk muscles is increased by altering the leverage through positions of the arms, and balance exercises are made more difficult by narrowing the base and shifting the centre of gravity. The Swedish medical gymnastics, especially in orthopedic practice and in the form of massage, are widely used.

Physical training in the United States re¬ ceived its first popular impetus from Dr. Dio Lewis, about 1860. Dr. Lewis was not a scien¬ tific worker, but aiming to put the spirit of sport and play into gymnastics promulgated some good all-over exercise in free-hand move-

ments and with dumb-bells, wands, Indian clubs, bean bags and some apparatus of his own devis¬ ing — the ((shoulder pusher" and ((iron crown." This work had an extended vogue throughout the country with both men and women, and was introduced into many schools. Since the Civil War, and especially in the last 10 years of the 19th century and the early 20th century, physical training has undergone a steady advancement in the United States, both in the extent to which it is used, and in the development of the subject itself.

In 1870 and later Dr. Dudley A. Sargent invented a series of pulley

weight machines, some 40 in number, which have since held a prominent place in gymnastic equipment. The best known of these is the chest weight machine. By means of these appliances exer¬ cise may be localized to given groups of mus¬ cles, thus developing weak or undeveloped parts of the body. Obviously measurement and gen¬ eral physical examination of pupils is an im¬ portant factor in the thorough use of such a method.

In 1887-88 there swept over the country a popular fad for what was called the Delsarte system. Frangois Delsarte (1811-71) was a native of France, whose work to establish laws of expression for the dramatic art probably led to the origination of certain forms of free-hand exercise, aesthetic in character, which have been developed by a number of American workers, though his daughter has expressly denied that he had anything to do with gymnastics. His work was approached entirely from a philosoph¬ ical, as distinguished from a physiological, view point, and the mystic number three and its mul¬ tiples governed the various modes of movement and expression. That every movement and atti¬ tude of the body should express an emotion was a cardinal point. The cause of physical train¬ ing was for a time retarded by the sentimental, languid and unscientific atmosphere which sur¬ rounded much of this work, but with the pass¬ ing of the vogue it is found to have left two distinct types of exercise and certain principles of graceful motion which have permanent value. To make the body flexible, and to free it from habits of muscular tension, relaxing (devitalizing) exercises are used. These con¬ sist in making absolutely limp one part of the body after another, and finally the whole at once, by removing all tension from the articu¬ lations. These exercises are followed by a series of energizing or vitalizing movements, slow and rhythmic. Principles of grace embodied in these include the slow evolution of move¬ ment from one point to the next, and the move¬ ment in opposition (opposite directions) of two parts moving simultaneously. Delsarte's ex- pressional work is highly valued in dramatic training.

Swedish educational gymnastics were intro¬ duced into this country in 1888 by Baron Nils Posse, having been preceded many years by German gymnastics. These two schools or methods of work, differing radically, were each introduced with the handicap of the term ((sys- tem," implying fixed limits and arbitrary modes of procedure, as distinguished from flexible methods, capable of growth and adaptation, though each claimed the latter quality. A bitter rivalry ensued, extending over many years and hindering the development of the subject. This vol. 22 — 3

warring of systems has largely given place to a broader spirit which recognizes the fact that different methods of gymnastic procedure are fitted to produce different results suited to dif¬ ferent conditions and temperaments. Certain principles have emerged which, in a more flex¬ ible guise than when first introduced to us, are more largely entering into all gymnastic work and may be said to serve as criteria of its qual¬ ity. These principles include a careful con¬ sideration of the condition and needs of the individual, a purposeful selection of exercise with regard to its effects, a general, though not of necessity an uninterrupted, progression in its use, all-over body exercise in a given lesson, and its arrangement with reference to curves of effort — that is, the gradual approach to, and receding from, maximal heart effects. Awk¬ ward performance is giving way to the good form or finished execution that denotes definite training of the power of muscular co-ordina¬ tion ; cultivation of erect carriage and generally good posture are recognized as indispensable. Methods of teaching gymnastics are found to be as amenable to the laws of pedagogy as any other branch worthy to rank in the science of education, and recognition is given to the train¬ ing or use of psychological powers — the motor sense, the will, objective and subjective inter¬ est, automatic and voluntary attention, etc. In¬ deed, physiological psychology and child study have contributed as much to physical training as has the physiological laboratory.

The professional training of teachers of gymnastics has done much to advance the cause of the subject which long suffered from the idea that agility of performance was a sufficient qualification for teaching. There are in the United States many normal schools of physical training, offering courses from two to four years in length, including several universities and colleges that give normal instruction in the theory and practice of the subject. In addition many normal schools for class teachers train their students ■ to conduct class exercises in various branches of physical training. There are also each year many summer schools of physical training. The subjects studied in nor¬ mal schools of physical training include physics, chemistry, histology, physiology, anatomy, kinesiology, anthropomotry, biology, symptom-ology, psychology, pedagogy; personal, . public and school hygiene, besides the various kinds of practice work in gymnastics, athletics, swim¬ ming and other sports, fencing, games, dancing, voice training and practice teaching.

The modern _ gymnasium requires expert knowledge for its design and construction. From 30 to 40 square feet of floor space should be allowed for each pupil exercising in a class. Trusses or ceiling beams should clear the floor 20 feet and a gallery for a running track should

be 10 or 11 feet clear from the floor. Lockers, swimming tank, office and examining room for the director should be included.

Anthropometry, as used in connection with physical training, consists mainly of the meas¬ urement of significant girths with a steel tape; depths, as of chest and abdomen, with calipers; standing and sitting heights with the stadiom- eter; strength tests of the various muscular groups with dynamometers, etc. ; the measure¬ ment of lung capacity with the spirometer and the taking of weight. The testing of sight and

hearing, and psychological tests for reaction, time, etc., are often included. To these are added examination of the heart, lungs, spine, etc., and a tabulation of facts of personal his¬ tory bearing upon heredity and other significant influences. Such examination is made by the physical directors of practically all colleges and universities, secondary and normal schools and young men's Christian associations. From this data an individual may be compared with the mean, average or normal type for his age and height, exercise prescribed according to his needs and development noted from time to time. Physical examination of children in the public elementary schools is rapidly becoming an estab¬ lished feature, and many States have laws re¬ quiring such regular examinations and system¬ atic physical training for children of school age. Out of this there is evolving a more scientific correlation between the laws of growth and physical exercise. These laws have been largely formulated on the classic studies first made by a commission in Sweden, and in the United States by Dr. W. T. Porter in Saint Louis and Dr. H. P. Bowditch in Boston. From these measurements have come a recog¬ nition of growth periods and laws of growth that form a valuable index to required exercise.

The representative organization of physical training in the United States is the American Physical Education Association (formerly The American Association for the Advancement of Physical Education), organized in 1885. The Proceedings* of this association and its official organ, (The American Physical Educa¬ tional Review) published since 1896, form the most valuable depository in English of the scientific and philosophical material on the subject.

Other organizations of national scope should be mentioned, each of which is devoted to a special phase of physical development. Ath¬

letics and sports have been mainly fostered by the Amateur Athletic Union, the National Col¬ legiate Athletic Association, The Intercollegiate Association of Amateur Athletes of America, The Young Men's Christian Association Ath¬ letic League and Public Schools Athletic Leagues for Boys and Girls. These athletic organizations govern amateur standards and awards, are more or less concerned with ar¬ rangements for competitive games and meets, furnish officials for these and are usually rep¬ resented on the rules committees for various games. The Playground and Recreation Asso¬ ciation of America, organized in 1904, has secured children's playgrounds for many com¬ munities throughout the country, and has fur¬ thered all kinds of recreation for children and adults, including leadership in war camp com¬ munity service during the World War. This organization has been a large factor in wide recognition of play as a factor in social economics and for its educational values, physi¬ cal, mental and moral. The American Posture League, founded in 1914, has done much prac¬ tical work in gaining recognition of habitual body posture as a fundamental feature of sound physical development and health. . Its educa¬ tional work has included the promulgation of a standardized or <(Triple Test® for posture that has furnished means of measuring educa¬ tional results in this particular. The main work of the society, however, has been to improve

the environment as it affects posture, by fash¬ ioning in correct anatomic form many articles of every-day use that mold the posture of the body — a scientific work engaging in the league's technical committees, orthopoedic sur¬ geons, school hygienists, etc., and resulting in the standardization of school and other fur¬ niture, shoes, corsets, waists, coats, hose sup¬ porters and other articles. The Life Extension Institute, founded in 1915, is also unique as an organization in the field of public health and preventive medicine. It undertakes, by stand¬ ardized periodic examinations, to discover incipient or developed pathological conditions and so forestall illness. These examinations are made by contract with industrial organiza¬ tions for their employees, or for individuals on annual membership or otherwise. In the ex¬ amination of many thousands of industrial and office workers the Life Extension Institute has found that from 50 per cent to 59 per cent have impairments of arteries, kidneys, heart or other organs that indicate breakdown if not taken promptly in hand and remedied. The army draft, with its rejection of 40 per cent on grounds of physical defects, and the Marine Corps rejection of 90 per cent startled the country into realization of the need for better physical development for children, better living and working conditions for adults and better personal hygiene for all.

In 1918 there were in the United States of America 57 societies engaged in public health work. Twenty-eight of these were devoted to such work exclusively and 29 of them supple¬ mented their main work of social or educa¬ tional betterment with some activity in pre¬ ventive medicine. Among the many other indi¬ cations of a vast movement among the more intelligent public to improve health and de¬ velopment and forestall illness may be men¬ tioned the great health engineering work of the Rockefeller Foundation through its medi¬ cal board, of the Russell Sage Foundation, enormous private bequests to medical research, the improvement of health conditions and the wiping out of specific diseases in whole districts, as in New Orleans, Cuba and the Panama Canal Zone. Much of this has been the work of the Federal government through the surgeon-gen¬ eral's office and its other agencies (segregated in 1918 under the United States Public Health Service). The community surveys and co¬ operative work of all health agencies in the great experimental studies in Framingham, Mass., Jackson, Mich., and Cincinnati, Ohio; the anti-tuberculosis crusade; the attention to school and industrial luncheons ; the attention to nutrition, food values and wholesome food for the masses preceding, during and after the war — these are all parts of the great movement for improved health standards.

All of these health agencies recognize physi¬ cal exercise as a fundamental requisite to any health program. Conversely, systematic work in physical exercise, to produce its best results, should be related to other health considerations and preceded by thorough physical examina¬ tion. It has been estimated (New York City Department of Health, 1916) that out of any 1,000 industrial workers 25 are all the time absent for illness. The United States Health Service has estimated the annual economic loss from illness among industrial workers in this

country at $750,000,000. The future of the nation in its economic power and in the strength and character of its population, is thus inherent in this subject of physical development.

Bibliography. — American Association for the Advancement of Physical Education, Pro¬ ceedings (1885 to 1895) ; American Physical Education Review (1896 et *seq.) ; Reports, United States Commissioner of Education and United States Bureau of Education (1891, 1897 and later) ; Bibliography of Physical Training, McCurdy, 1905 ; Bibliography of Physical Training, Bridges (from 1905 to

1911), pub¬ lished by Y. M. C. A., 1912; Bibliography of Physical Training, Affleck, published in Physical Education Review semi-annually since 1913 ; Bibliography on Posture and related subjects in (The Posture of School Children,) Ban¬ croft, 1912; A Bibliography on Educational Hygiene and Physical Education, Wood and Reesor, published by Columbia University, 1911.

Jessie H. Bancroft,

Assistant Director , Physical Training, Public Schools, New York City.

PHYSICIAN, one who practises or is skilled in the art of healing and in methods of preserving and promoting health, especially one who prescribes remedies for diseases; specifi¬ cally, one who is legally authorized to practise medicine. In the United States physicians qualify by compliance with State requirements. State examinations for ascertaining the fitness of candidates for this calling are now generally held, and to those who successfully pass them license to practise is granted. Usually a physician is not bound to attend any person who may call him ; but having undertaken to treat a patient, he is liable to the penalties of malpractice in case of injury resulting from his own incompetence or neglect. As between physician and patient, relations are privileged and confidential, and a patient's secrets in the keeping of a physician are in¬ violable, the State not even requiring them to be made known in legal procedures. The rela¬ tions of physicians to the legal fraternity and to the legal transactions of the State form part of the subject of medical jurisprudence (q.v.). Consult Mitchell, S. Weir, (The Physician, a Poem) (Boston 1900) ; Moll, A., (Aerztliche Ethik) (Stuttgart 1902) ; Mumford, J. G., (A Narrative of Medicine in America) (Phila¬ delphia 1903) ; Schweninger, E., (Der Arzt) (in Die Gesellsschaft, Vol. VII, Frankfort on Main 1906) ; Taylor, A. N., (The Law in its Relation to Physicians) (New York 1900).

PHYSICIANS, Royal College of, Edin¬ burgh, incorporated 26 Nov. 1681 by royal charter; a body empowered to make laws for promoting and regulating the practice of medi¬ cine within the city of Edinburgh, town of Leith, and districts of the Canongate, West Port, Pleasance and Potterrow. No person was to be allowed to practise medicine within these limits without a license or diploma from the college, and all medicines sold within the same limits were made liable to be inspected by the officers of the college, together with a magistrate and chemist, who were authorized to destroy all medicines which were found bad or unwholesome. No apothecary was allowed to open a shop until he had passed an examina¬ tion before the president and censors of the

college. Its Fellows were freed from jury duty. Many of the rights and practices of the college gradually fell into abeyance, due to the changes in customs brought about as time passed. A warrant from the college is no longer necessary to a practitioner ; but the body is now represented in the general medical coun¬ cil established by the Medical Act of 1858. A new charter was granted to the college by Queen Victoria on 16 Aug. 1861, under which the institution operates at the present time. In connection with the college there is a library, founded in 1683, and a museum of materia medica, begun in 1835. The college, since 1846, is located in its own building in Queen street. Consult historical Sketch and Laws of the Royal College of Physicians of Edin¬ burgh, 1681— 1882> (Edinburgh 1882).

PHYSICIANS, Royal College of, Lon¬ don, a body whose organization dates from 1518. In that year Thomas Linacre, the cele¬ brated scholar and humanist, one of the physi¬ cians of Henry VIII, obtained from him, with the aid of Cardinal Wolsey, letters patent dated 23 Sept. 1518 and incorporating all men of the medical faculty in London as one body. Vari¬ ous privileges were accorded to them, chiefly that of prohibiting any one from practising as a physician in London, or within seven miles of it, unless he had first obtained a license from this corporation. A charter granted four years later confirmed the privileges of the body, ex¬ cept that graduates of Oxford and Cambridge were permitted to practise within the jurisdic¬ tion of the college without previously being examined by it. Various charters have been since granted to the college, but from the pass¬ ing of the Medical Act of 1858 its license has not been necessary to those practising in Lon¬ don or within seven miles around. At present the corporation consists of a president, fellows and members. It occupies a building in Pall Mall East, opened in 1825. Consult Garth, Sir S., cThe Dispensary, a Poem) (London n. d.) ; Munk, W., (The Roll of the Royal College of Physicians of London, 1518—1825 } (3 vols.,

London 1878).

PHYSICIANS' LIABILITY INSUR¬ ANCE. See Accident Insurance.

PHYSICK, fiz'ik, Philip Syng, American surgeon: b. Philadelphia, 7 July 1768; d. there, 15 Dec. 1837. His father, Edmund Physick, was an Englishman and, previous to the out¬ break of the revolution, Keeper of the Great Seal of Pennsylvania. Philip Syng Physick was graduated from the College of the Uni¬ versity of Pennsylvania in 1785, studied medi¬ cine under Dr. Adam Kuhn, a well-known Philadelphia practitioner and pupil of Linnaeus and at the University of Pennsylvania. In 1789 he accompanied his father to England where he

continued his medical studies under Drs. Hunter, Clark and Osborne. In January 1790 he was appointed for one year to the position of house surgeon at Saint George's Hospital, London. In January 1791, at the expiration of his term at the hospital, he received his diploma from the Royal College of Surgeons in London. Shortly after that he went to Edinburgh where he continued his medical studies until May 1792 when he received the degree of M.D. from the University of Edinburgh. He returned to Philadelphia in 1792 and began practice. In

1793 he did valuable service during a severe epidemic of yellow fever as the physician of a special hospital established by the board of health. He himself suffered a severe attack, but recovered. His fame as a highly skilled and suc¬ cessful surgeon spread rapidly. As early as 1794 he was elected one of the surgeons of the Pennsylvania Hospital, Philadelphia, where he performed many hitherto more or less unknown operations. During his career he also developed a number of surgical instruments to such a point of perfection that some of them are still used to-day in accordance with his plans. During the repeated yellow fever epidemics of 1797, 1798 and 1799, he was again so active that he suffered a second attack from which he recovered only after a severe illness. In 1805 he was appointed professor of surgery at the University of Pennsylvania and in 1819 be¬ came professor of anatomy there, which post he held till 1831. In 1824 he was elected president of the Philadelphia Medical Society, continuing as such until his death. In 1825 he was made a member of the Royal Academy of Medicine of France and in 1836 an honorary fellow of the Royal Medical and Chirurgical Society of London. He has been styled <(the father of American Surgery.® Consult Bell, John, (Philip Syng Physick* (in (Lives of Eminent American Physicians and Surgeons } ed. by Gross, S. D., Philadelphia 1861) ; Randolph, J., (A Memoir on the Life and Character of Philip Syng Physicˆ (Philadelphia 1839).

PHYSICS may be defined as the science of energy , of the transformations of energy and of its relation to matter. This is an im¬ perfect definition in that, first, a comprehensive understanding of the meaning of energy involves a complete knowledge of physics; and second, the science of energy, in its broadest sense, com¬ prehends all science, while the content of physics is generally limited to the scope of the topics which will be outlined below. In¬ deed, in its earlier history and under its early title of natural philosophy, physics did encom¬ pass a much wider scope ; but by a process of exclusion of

certain branches as they developed into specialized sciences, such as chemistry, astronomy, metallurgy, meteorology and ge¬ ology, it has been limited to its present scope ; and about 1870 its present name of physics took the place of the older title. This process of separation is still going on : as, for example, certain parts of electricity, that have heretofore belonged to physics, are gradually being de¬ veloped into the separate science of electrical engineering, as distinguished from the practice or art of electrical engineering. At the same time, investigation and discovery are adding new fields to the science of physics. In its applications and its inter-relationships, physics lies at the foundation of all of the experimental sciences and still assists their modern develop¬ ment, to a lesser extent only than does mathe¬ matics. Thus the interconnections between physics and the other sciences, particularly chemistry, are so intimate that it is impossible to draw an exact line of separation, so that in these borderlands between the sciences have been built up new sciences which partake of the nature of both and which have consequently been named physical chemistry or chemical physics, meteorological physics, physical as¬ tronomy or astro-physics, etc.

Modern physics is an inductive science. Like the other sciences, it is based upon a belief in the “constancy of nature® ; upon the belief that the same cause, operating under the same conditions, will result in the same effects at any time. In order to ascertain the causal rela¬ tions of physical occurrences, or phenomena, observations are made of what conditions seem to affect the phenomenon under study and ex¬ periments are performed in which the condi¬ tions are under the control of the observer, so that they may be varied separately, in order to determine which conditions are essential and which are accidental. Then exact measure¬ ments are made to determine the quantitative relation between the essential conditions and the effect resulting. This quantitative relation, rigidly established by exhaustive experiments and with its limitations clearly specified, is known as a physical law. For example, it is found that for a constant mass of gas, at a constant temperature, the product of its pres¬ sure by its corresponding volume is a constant for most gases within a moderate range of pres¬ sures; and this relation is known as Boyle’s Law. It may be called an empirical law, in that it represents a relationship between two physical quantities, the explanation of which it does not give. A study of many similar or related phenomena suggests a generalization or hypothesis as the explanation of them all. This hypothesis, tested, modified and perfected by extensive study and experimentation along lines suggested by it and extending to all known phenomena to which it may have any relation and strengthened by its use in suggesting and

predicting new phenomena, becomes a physical theory and may later attain to the dignity of a general physical law. Thus a further study of the relations between the pressure and vol¬ ume of a gas and the other factors (tempera¬ ture, chemical structure, etc.) which might be related to it, led to the kinetic hypothesis of gases and this hypothesis, suitably modified, having been found to be in agreement with the phenomena it was called upon to explain and to be still further supported by other phenomena (such as, for example, the Brownian movements) has become the kinetic or dynamic theory of gases.

Physics, as the science of energy, has its unification in the principle of the conservation of energy. The statement of this, in the words of Maxwell, is : “The total energy of any ma¬ terial system is a quantity which can neither be increased nor diminished by any action between the parts of the system, though it may be trans¬ formed into any of the forms of which energy is susceptible.® The importance of this princi¬ ple and its influence in unifying and in de¬ veloping physics cannot be overestimated. Just as the development of the principle of conserva¬ tion of matter unified chemistry and put into the hands of the chemist a rule for measuring his facts and for checking his theories, so the principle of conservation of energy has become the basic law connecting all physical phenomena, for testing the accuracy of physical experi¬ ments and for checking, modifying and extend¬ ing physical theory. Obviously, a great deal depends upon our definition of energy and the great importance of the conservation principle lies in the fact that there is so simply definable a physical function as mechanical energy which

does remain invariant in a “closed® system; and furthermore, that it is possible to express quantitatively all other physical manifestations of nature in terms of this invariant energy function. In the paragrapns which follow, at¬ tempt is made to outline the content of physics as it exists at the present writing. It should be again emphasized here that this content can¬ not be fixed for all time ; that it is changing, undergoing development, essentially dynamic in its nature. It is at present generally divided into the following topics, or similar ones : me¬ chanics and (mechanical) properties of matter (“pure® and “physical® mechanics), sound, heat, light and magnetism and electricity. This divi¬ sion is to a great extent arbitrary, made for con¬ venience in study and the modern science is careful to recognize it as such and to recognize the unity of relationship among all its parts.

Mechanics (or “pure® mechanics) is essen¬ tially a branch of mathematics, based on cer¬ tain axioms derived from physics, but its basic importance in all branches of physical science makes it one of the first topics included in a study of physics. It is that branch of science which deals with motion, with forces, with mat¬ ter in so far as it is affected by motion and forces i.e., mass and configuration, and with their inter-relations. It is generally divided into kinematics, which deals with motion by itself ; and dynamics, of which statics deals with forces alone, under conditions of balance, or equilibrium, and kinetics deals with mat¬ ter in motion, as the result of the action of forces, and with forces as producing motion. Hydrostatics and hydraulics should be men¬ tioned as important branches or extensions of this part of the science, although often in¬ cluded in the next topic.

Properties of matter (“physical® mechanics) comprises the general mechanical properties of matter in each of its three physical states — solid, liquid and gaseous, and the laws that express the causal relations found to exist among them. It includes also all of the distinctive data and physical constants obtained by experimenta¬ tion with different kinds of material. Density, gravitation, buoyancy, gas laws, elasticity, vis¬ cosity, diffusion, osmosis and surface tension are some of the important sub-topics of this subject. Other divisions of the subject are often made, in order to present some particular phase or view-point : as, for example, division into “mass® mechanics and “molecular® me¬ chanics.

Although wave motion is, in its mathemati¬ cal development, properly a branch of “pure® mechanics, it is generally included with, or placed just before, the subject of sound, since in sound waves and in the vibrations of sound¬ ing bodies (stretched strings, rods, bells, air columns, etc.), there exist the most perfect and tangible examples of such motion. And, aside from a study of the physical characteristics of audible sounds, particularly musical sounds and their physical relations in the musical scale and in musical composition, and quite recently, vowel sounds and other sounds occurring in articulate speech, the study of sound is the study of a typical wave motion, whose characteristics (re¬ flection, refraction, interference, etc.), may be easily demonstrated on a convenient scale. The practical importance of the applications of the physics of sound, in the design of sound-pro¬

ducing and reproducing instruments, and in the design of auditoriums and similar public halls, has attained to considerable recognition and emphasis in recent years. Descriptions of the mode of production of vocal sounds, and of the mechanism of audition, is usually included in

a general treatise on pnysics, although they now more properly belong to the respective domains of physiology and of the new (experimental) psychology.

The sub-topics of heat, given in the usual order, are thermometry, thermal ex¬ pansion, calorimetry, change of state, transfer¬ ence of heat and thermodynamics. Ther¬ mometry covers the usual empiric methods of temperature measurement; the idea of the Kelvin or thermodynamic (absolute) tempera¬ ture scale is left to the proper section of thermodynamics. Thermal expansion includes the experimental determination of the empirical relations existing between physical dimension and temperature for different materials, and the principles and constants thus determined are of considerable importance to the design of all kinds of machinery and construction, and are of vital importance in physical mensuration and chronometry.

Calorimetry and changes of state deal with measurements of quantities of heat. Although arbitrary units of heat quantity (calory, British thermal unit, etc.), are most frequently used, the establishment by Joule and others of the exact equivalence between heat quantity and mechanical energy has made the use of energy units (erg, joule, etc.), increasingly more com¬ mon. The experimental work consists largely in the determination of specific heats (latent), heats of changes of state (fusion, vaporization, etc.), and of solution, combustion, etc.; and in the study of the physical phenomena which ac¬ company change of state, such as change of volume, of specific heat, of color, etc., and of the effects, of all the possible external factors which may affect or change the conditions of change of state. The values of these physical quantities and relationship for the pure ele¬ ments and for their compounds has assumed such importance in chemical theory and prac¬ tice that their determination has become an im¬ portant part of the borderland science, physical chemistry. The study of change of state has made valuable use of thermodynamic reasoning, and among the important developments result¬ ing in recent years should be mentioned the ob- tainment of nearly all of the normally gaseous elements and compounds in liquid form, and in many cases in sold form and the production of extremely low temperatures by their means. Transfer of heat may be accomplished by three different methods — conduction, convection and radiation: the first two methods depend for their operation upon intervening material media and are properly a transfer of heat energy as such ; while the third is a type of electro-magnetic radiation, and is more completely treated under that heading.

Thermodynamics, as the name implies, is involved whenever there is a

transfer into heat energy of any other form of energy, or vice versa; and for the investigation and study of such phenomena there have been developed cer¬ tain general relationships, theorems and methods of treatment, which, taken together in their proper arrangement, form a peculiar and dis-

tinct mathematical branch of science which we may designate as “formal® thermodynamics, to distinguish it from the broader field of gen¬ eral thermodynamics. The applications of this thermodynamic reasoning are found in every branch of physical and chemical theory, includ¬ ing electrical, electro-chemical and radiation theory.

The best-known of the relationships of “formal® thermodynamics are the Carnot theorem and the Kelvin or thermodynamic tem¬ perature scale. The latter furnishes a tem¬ perature standard which is independent of the physical properties of any physical substance, while the two together not only furnish a cri¬ terion for the efficient performance of any heat engine (steam, gas, etc.), the purpose for which they were originally developed, but are also the basis of relationships connecting the factors involved in change of state (e.g., the Clapeyron- Clausius equation), thermo-electricity, solution and innumerable other physical and physico¬ chemical phenomena. Certain special thermo¬ dynamic functions such as entropy, which is the common one, have been formulated to simplify the mathematical treatment of these problems. General thermodynamics includes, in addition to the reasoning of “formal® thermo¬ dynamics and the applications mentioned above, a thorough study of the relations connecting the mechanical and thermal conditions of matter in the different states, and in the transition states : such as, for example, the relation of pressure and specific volume to the temperature, specific heats, heat of transformation, etc., and their interpretation according to thermodynamic reasoning. The idea of a “perfect® gas, and the evolution of the kinetic or dynamic (mole¬ cular) theory of gases, are logical developments of this section of physics. In recent years the methods of “statistical® mechanics which have been developed for the study of certain types of thermodynamic problems have met with con¬ siderable success in the study of the “dynamic® theory and of radiation theory. The many ap¬ plications of thermodynamic theory and rea¬ soning in heat-power engineering, physical chemistry and other fields, might properly be classed as applied or technical thermodynamics.

Light is a form of radiant energy capable of stimulating the nerve termini of the retina of the human eye. Two well-defined methods of study are generally recognized. To a limited extent, its phenomena may be studied, and simple laws for its reflection and refraction by mirrors, prisms and lenses be deduced, without reference to the physical nature of light energy, or of its propagation. This is the method of geometrical optics, as distinguished from phys¬ ical optics ; and it suffices for the design of cameras, telescopes, surveying instruments, range finders, etc., and for most of the work of perfecting the optical surfaces of the lenses used in such instruments (to make them achro¬ matic, anastigmatic, aplanatic, etc.), although intelligent work in this field is now guided by a knowledge of many of the phenomena which come within the scope of physical optics. In physical optics, the phenomena of light are studied for the purpose of determining the nature of light energy and of its propagation, and of its relation to other forms of energy. Lately this has extended to the study of the nature of the bodies that produce light, and as

well, of those that reflect, refract or otherwise modify its character or propagation. Study of the phenomena of interference, of diffraction, of transmission in finite time, and of polariza¬ tion, established the theory (the wave theory) that light energy is propagated through space as a transverse wave motion at a finite, though incredibly high, velocity. Spectral color is identified with wave length. Later investiga¬ tions have identified light radiation as that part of electro-magnetic radiation whose wave lengths are capable of exciting the visual sense. The wave theory of light gives a clear and logical explanation of all of the phenomena of reflection and refraction, and in addition, has disclosed physical limitations to the clearness of the optical images produced thereby, other than the limitations to the perfection of the optical surfaces, the knowledge of which has done much toward the perfection of such optical instruments. Furthermore, the development of apparatus for the demonstration and study of the phenomena peculiar to physical optics has resulted in the invention of many new and valu¬ able physical instruments — interferometers, diffraction gratings, polarimeters, etc. — which open up new fields of knowledge and study, and permit of the measurement of many physi¬ cal quantities, both new and old, to a previously unheard-of degree of accuracy.

The study of the spectrum has proven a most fruitful field of endeavor: to the physicist, in¬ tent on knowing the structure of the molecule and the atom, it has suggested some of his best ideas ; while to the chemist is given the ability to identify the minutest quantities of elements, by examination of emission, transmission (ab¬ sorption), and reflection

spectra; and to the astronomer starlight has revealed, in its spec¬ trum, the composition, and sometimes the motion, of its celestial source. Photometry, the measurement of the brightness of luminous sources and of illuminated surfaces (illuminom- etry), is a branch of the applied science, developed by the physicist and psychologist in close co-operation, which is of great import¬ ance to the physical investigator, as well as to the illuminating engineer.

Electricity and magnetism are nowadays treated as a single subject, although in its earlier stages of development, different types of electric and magnetic phenomena were studied as magnetism, static electricity (electrostatics), and current electricity (electrokinetics), and it was only after considerable, later work that the close relationship between them was recognized, as manifestations of the same form of energy. The division is still made for convenience in many treatises, particularly by those who favor the historical method. Magnetism covers the properties of permanent magnets, and the phe¬ nomena of magnetic fields produced by such magnets. Many of the problems of terrestrial magnetism may be considered on the assump¬ tion that the earth is a huge magnet, without regard to its source of magnetization, and most of the methods of magnetic survey have been developed under this heading. The magnetic properties of para-magnetic and dia-magnetic substances (permeability, hysteresis, etc.) may be considered here, but are more generally included as a part of electrokinetics, under the sub-topic of electro-magnetism. The “mole-

cular® (Ewing’s) theory of magnetism is here used to explain the facts, although its complete development also properly belongs to the later section.

The quantity factor of electrical energy is electric charge ; the intensity factor is electric potential difference. The presence of electric potential difference across a non-conductor (dielectric) produces what is often described as a piling up on the opposite boundaries of the dielectric of equal and opposite quantities of electric charge (Maxwell’s explanation of this, as a momentary displacement of electric charge across the dialectric is believed at present to be a more rational one) ; and this results in a state of strain, described as a field of electrostatic force, throughout the dielectric. The presence of electric potential difference across a con¬ ductor produces a continuous displacement or “flow® of electric charge across the

conductor which constitutes an electric current, and which is accompanied by a state of magnetic strain or a field of magnetic force in the conductor and in the surrounding space. Study of the phe¬ nomena of the electrostatic field constitutes electrostatics, while that of the phenomena ac¬ companying electric flow or current constitutes electrokinetics. The latter topic has proven up to this time far the more important, although the modern physics, both in theory and in prac¬ tice, has been forced more and more to consider the electrostatic phenomena which accompany current flow; as for example, in electro-mag¬ netic radiation theory and its applications in wireless communication, in the theory and the applications of gaseous conduction, and in the design and operation of long distance, high potential transmission lines.

Electrical energy becomes manifest to our senses only indirectly, as it is transformed into other forms of energy, such as heat energy, chemical energy and mechanical energy; the last most often through the intermediary of electro-magnetic force action. And the methods of measurement and of utilization of electrical energy are indirect, measuring and utilizing the transformed energy. On the other hand, elec¬ trical energy is produced by the transformation of the other forms of energy into electrical energy, and the commercial utilization of elec¬ tricity became practicable only after the inven¬ tion of dynamo-electric machinery, which made possible the efficient transformation of mechanical energy into electrical energy; the other methods of production being too limited and costly. Too numerous to mention are the inventions and practical applications of elec¬ tricity to the needs of humanity: in communi¬ cation, from the earliest telephone and the first Atlantic cable to the wireless telegraph and telephone of to-day and to-morrow ; in illumi¬ nation, where electricity has revolutionized the world's lighting methods; in power transmis¬ sion, which has made possible the utilization of the least accessible of the world's power re¬ sources; in power application, from the largest motors to the smallest motors for fans and toys ; in chemical production — the whole de¬ velopment of electro-chemistry; in medicine, as in the applications of X-rays; and in liter¬ ally millions of other ways, in every conceiv¬ able field, electricity is serving humanity. The development of the production, transmission and utilization of electric power constitutes the

business of the electrical engineer. A complete outline of this quite modern, but already very extensive subject, with its relations to electro¬ chemistry and electrical engineering, will be found elsewhere in these volumes. The most recent developments of electrical science in the way of advancement of knowledge of the nature of electricity

itself are so epochal, so extended and so far-reaching in their bearing on all other physical theory, that their consideration is properly left to the paragraphs that follow.

Recent Developments. — Although develop¬ ments of major importance have been made in all fields of the science, yet certain lines of investigation have extended so far, and have established such profound unifying principles, as to justify their recognition as new sections of physical science. The first of these is Elec¬ tro-magnetic Radiation. Maxwell's mathemati¬ cal theories of electricity indicated the possi¬ bility of the propagation of energy -through space as electro-magnetic wave motion ; a pos¬ sibility that was experimentally verified by Hertz. The velocity of these "Hertzian® waves, which have since been applied with such great success to "wireless® communication, was found to be the same as the velocity of light: and from this followed directly the recognition of the identity of light radiation, of heat radia¬ tion, and of those regions of radiation of frequencies above and below those correspond¬ ing to visible light, respectively called ultra¬ violet and infra-red "light® or radiation, as all one and the same type of radiation, differing only in frequency and in methods of detection; while the discovery of X-radiation (and gam¬ ma-radiation of radio-active materials) has extended our knowledge of electro-magnetic radiation to what seems to be the extreme up¬ per end of the frequency scale. The importance of this unifying principle, in connection with the others to be mentioned later, to the compre¬ hension of light phenomena can only be sug¬ gested here; the study of light is now the study of electro-magnetic radiation ; and theories advanced to explain its phenomena may be tested, not only throughout the little more than an octave of frequencies comprised by the vis¬ ible spectrum, or even the much greater range available when the ultra-violet and infra-red regions are included, but throughout the innu¬ merable octaves included between the longest "wireless® rays and the shortest gamma rays. Big unexplored intermediate gaps still exist in the "spectrum® of radiant electrical energy, due to the lack of suitable detectors or of known radiators for those regions, which leave ample opportunity for future investigation. In this field of study belong also the phenomena of fluorescence and phosphorescence, which, to¬ gether with those of the "characteristic® X-radi¬ ation, form a fascinating field of complex radiation phenomena, which seem to hold many of the secrets of the structure of matter. On the theoretical side, mathematical theories to account for the phenomena of thermal radia¬ tion have been developed by Stephen, Wien, Planck and others, and the "quantum theory,® first advanced by Planck, and later modified by himself and others, has aroused widespread in¬

terest both on account of its revolutionary sug¬ gestions, and because of its wide application and remarkable agreement with many experi¬ mental facts.

Another field of investigation is that which began with the study of electric dis¬ charge through rarified gases, and which has reached its present culmination in the modern electron theory (q.v.) of electricity. On the practical side, the toy of the scientist, the ˆvacuum® tube, has proven the progenitor of the X-ray tube, the “vacuum® tube so essential to “wireless® apparatus, the thermionic rectifier, ?nd many other valuable devices. The work of J. J. Thomson, C. T. R. Wilson, Millikan, and others has shown that the “electrons® or car¬ riers of negative electricity in the “vacuum® tube discharge, are invariably associated with a fixed amount of charge; and that this charge, whose value has been determined with great accuracy, is the “elementary® electric charge, of which all other charges are exact multiples. And this conception of electric charge, together with Maxwell’s theory of electric fields, pro¬ vides a -rational basis for the study of all of the electrical phenomena of conduction, thermo¬ electricity and the like, as well as of the phenomena whose existence has been revealed to us through this theory, such as thermionic currents, photo-electricity, ionization in gases, etc.

Still another field of both theoretical and experimental development is that in which at¬ tempts have been made to develop theories of the structure of matter. The dynamic theory of gases, previously quite fully developed, has been further advanced by ideas derived from progress in other fields and extended to explain many more phenomena. The discoveries in radio-activity, disclosing as they have the ex¬ istence of atomic disintegration, reveal a new complexity of atomic structure, and at the same time suggest a simplicity of atomic constituents, which, together with the knowledge already gained by the observation of the behavior of electrons in “vacuum® tube discharge, has stimulated many serious attempts to build up an electric atom, consisting of some form of positively charged nucleus about whose centre electrons circle or vibrate at very high fre¬ quencies. As is to be expected, only very partial success has been obtained in devising such an atom that will be’ in accord with all of the known atomic phenomena, such as the phenomena of radiation and of electricitv. and which will at the same time have all of the necessary chemical properties. But many iso¬ lated phenomena, such

as dia-magnetism and the Zeeman effect, have already been given very satisfactory explanations in this way, while promising attempts have been made toward the explanation of many other phenomena, as for example, para-magnetism and thermal radia¬ tion (“magneton® and “quantum® theories), and many chemical phenomena, such as valency and electrolysis, can now be seen clearly to be electro-atomic in their nature. No one can prophesy the future of this class of investiga¬ tion. In another direction, the discovery that X-ray wave lengths are comparable with the distances ‘between the atoms in a crystal has enabled Bragg and others to study the struc¬ ture of crystals, and not only to verify the regular arrangement of the atoms, which had been guessed at previously, but as well to de¬ termine the exact positions and spacing of the atoms in a great many simple crystals : a work which is gradually extending to the analysis of

more and more complex crystals. Whither will it finally lead? As the science grows the range of its knowledge and of its usefulness ever widens, yet at the same time it centres closer and closer around one great problem. Has the problem of the science of energy become that of answering the question, “What is matter?® Quite probably. But experiment shows that the mass of a moving electron is partly, and may be wholly, electro-magnetic, and thus there is more than a suggestion of the possibility that matter is energy.

Historical. — The history of science, prop¬ erly written, is more interesting than the his¬ tory of wars and empires ; for it tells the story of the development of human ideas. Yet in spite of this, very few histories of science are to be found. Only a brief outline of the his¬ tory of physics may be given here; and, aside from the few references given in the bibliogra¬ phy below, further knowledge of the history of physics must be gleaned from the biogra¬ phies and writings of the men whose names are famous for their scientific achievements. Physics, in common with the other sciences, may trace its origins to remotest antiquity; but its modern development, which began with its recognition as an experimental science, dates from about the 16th century. Although the knowledge of the ancients of civilization — the Greeks, Romans, Egyptians and Arabians — comprised many isolated scientific discoveries and inventions, and while’ the writings of their philosophers often turned toward the explana¬ tion of them, yet it cannot be said that the ancients made any appreciable contributions toward the advancement of science ; certainly none comparable with their contributions to other fields of thought. While it can be said that the authority of their master philosophers, such as Aristotle, stood a formidable barrier to scientific advancement for centuries, the con¬ fused and intimate relations between scientific, metaphysical and

mystical ideas, combined with an inexplicable disregard of experiment as a means of interpretation of nature, opposed any real advancement. The achievements of Archi¬ medes in the fields of statics and hydrostatics stand among the few solitary exceptions that foreshadow the modern scientific viewpoint.

During the Middle Ages much of the scien¬ tific knowledge of the ancients was irretrievably lost, and most of that which survived lay dor¬ mant. The supreme authority of Aristotle among the scholastics, and their syllogistic methods of reasoning, prevented any advance¬ ment of physical science by them. Only the alchemists, whose secret work must have dis¬ covered (and lost) many a scientific truth; and a few, inspired men among the scholastics, such as Roger Bacon, kept alive the spark of prog¬ ress that burst into flame in the later Italian Renaissance with the work of Galileo Galilei. Galileo's experimental studies of the motion of falling bodies are the first of their kind, and may truly be said to date the beginning of mod¬ ern science ; although the studies in magnetism of his contemporary, William Gilbert, are scarcely less epochal. From then on the op¬ position and persecution, which had so hindered progress on the part of Galileo and his prede¬ cessors, weakened and finally broke down, and the development of the new science progressed rapidly. The history of the science can for a

while now be outlined by mentioning great names. Torricelli, Pascal, von Guericke, and later Boyle, Mariotte and others discovered in quick succession the properties of the atmos¬ phere and of gases and extended and unified the knowledge of hydrostatics. Huygens laid the foundations of physical optics, although building on them was deferred until nearly a century later. The list culminates in the name of Newton, who, born in the year that Galileo died, built upon the work of Galileo, and gave us our complete system of mechanics in his Principia,' published in 1686-87. His experi¬ mental investigations in light added greatly to the knowledge of that subject, although here he was unfortunate in his theoretical reasoning.

During a period which includes the 18th cen¬ tury and the early part of the 19th century, the spread of popular interest in experimental sci¬ ence, already noted in the foundation of the Royal Society of London in 1662, of the Academie des Sciences at Paris in 1666, and of the corresponding society at Berlin in 1700, stimulated scientific effort

to an extent which made this period pre-eminently one of scien¬ tific discovery. The names of Franklin, Caven¬ dish, Black, Young, Fresnel, Galvani, Volta, Ohm, Ampere, Gauss, Davy and Faraday repre¬ sent only a part of those whose brilliant dis¬ coveries and clear thinking brought about such rapid advances in all branches of physics. Some of these, such as Franklin, Cavendish, Black and Davy, are to be recognized as men also promi¬ nent in other and now far separated activities. This versatilitv is better understood when it is remembered that it was only after the discov¬ eries of this period had added so much to the knowledge of natural philosophy, as all of physical science was then called, that its differ¬ entiation into specialized sciences — physics, chemistry, etc. — began; and that, even after chemistry obtained individual recognition, physics formed the major portion of what re¬ mained, and was known, as natural philosophy for considerable time thereafter. The Indus¬ trial Revolution in England about 1770, brought about as it was by scientific discoveries such as those which resulted in the invention of Watt's steam engine, had a profound reaction on scien¬ tific discovery in the 19th century.

The discovery of electro-magnetic induction by Faraday in 1831 made possible the invention of the dynamo, whose commercial importance was at once recognized, and developments of commercial applications of electrical energy took place with great rapidity. In another direction a new tendency is to be noted in the establish¬ ment, during the first half of the 19th century, under the leadership of Helmholtz, Mayer, Rumford and Joule of the principle of con¬ servation of energy and of its universal appli¬ cation. William Thomson (Lord Kelvin) was an important participator in this work, which he carried further by applying the principle to the co-ordination and extension of the theory of thermodynamics which had been so ably begun by Carnot and his contemporaries.

These two points of departure along new and divergent lines of development, between which experimental investigation continued to flourish, mark the beginning of the modern pe¬ riod of science. The history of the commercial side is initiated by a remarkable series of bril¬ liant inventions such as the telegraph, telephone,

trans-Atlantic cable, incandescent lamp, electric traction, etc. ; and its later details belong to electrical engineering. On the purely scientific side, development has been no less rapid, though until recently, less spectacular. Maxwell's genius early shaped the course of all later theo¬ retical reasoning in electricity and light, while Kelvin developed much of the apparatus now used in electrical measurements. Joule, Ama- gat, Andrews and others continued the experi¬ mental studies

begun by Charles and Regnault of the properties of gases, where later a spec¬ tacular result was realized in the liquefaction of air and other gases.

The history of the later developments of this period has been touched upon in a previous section. Few discoveries stand out in their en¬ tirety as do the discoveries of X-rays by Roent¬ gen in 1896, of radio-activity by Becquerel the same year, or of radium by the Curies in 1898. The developments have been so varied, and much of the advancement has been by a process of growth through the combined efforts of so many men, that it must be left to the historian of 100 years hence to look back over this period and properly to adjudge its achievements.

Bibliography. — No attempt is here made to even begin to give a complete bibliography of the science. This would be impossible. The following lists contain references to only a representative few of the more recent and more important publications in English, except that a fairly complete list of periodicals is given. Only general treatises are mentioned. For further study recourse should be had to the treatises covering the special topics of physics, and for these the reader is referred to the bibliographies under the corresponding arti¬ cles included elsewhere in these volumes.

Historical. — Cajori, F., (A History of Physics' ; Barus, >C., Progress of Physics in the Nineteenth Century ' ; Schuster, A., Prog¬ ress of Physics, 1875— 1908) ; Williams, H. S., (A History of Science,' and also Nineteenth Century Science1* ; Sedgwick, W. T., and Tyler, H. W., (A Short History of Science.'

General Elementary. — Carhart, H. S., and Chute, H. N., Physics with Applications) ; Mil¬ likan, R. A., and Gale, H. G., Pirst Course in Physics1* ; Lynde, C. J., Physics of the House¬ hold.) Advanced. — Ames, J. S.f> (Text Book of General Physics) ; Carhart, H. S., (College Physics) ; Crew, H., (College Physics) ; Duff, A. W., Next Book of Physics) ; Kimball, A. L., (College Physics' ; Watson, W., Next Book of Physics1* ; Poynting, J. H., and Thomson, J. J., Next Book of Physics' (3 vols., incomplete) ; Franklin and McNutt, (Elements of Physics' (3 vols.) ; Edser, E., (General Physics and Sound, Heat and Light' ; and Hadley, H. E., cMagnetism and Electricity' (a uniform set of four volumes which form a complete text¬ book of physics).

Periodicals. — American Journal of Sci¬ ence; Proceedings of the American Philosoph¬ ical Society; Annalen der Physik; Archives des Sciences; Astrophysical Journal; Bulletin of the Bureau of Standards ;

Comtes Rendus ; Journal of the Franklin Institute; Journal de Physique; Nature; Nuovo Cimento; Proceed¬ ings of the National Academy of Sciences; Philosophical Magazine; Physical Review; Proceedings of the Physical Society of Lon¬ don; Physicalische Zeitschrift ; Philosophical

Transactions of the Royal Society of London; Proceedings of the Royal Society of London; Science Abstracts, Section A; Scientific Amer¬ ican; Science; Journal of the Washington Academy of Sciences; Zeitschrift fur Instru¬ ment enkunde.

Thomas Benjamin Brown,

George Washington University, Washington,

D. C.

PHYSIOCRATIC SCHOOL, in political

economy, a school in France headed by Ques- nay (q.v.) and Gournay (q.v.). who, in opposi¬ tion to the Mercantile System, regarded the production of raw materials, and more espe¬ cially agriculture as the great source of national well-being, and sought to regulate legislation accordingly, laying special stress on the require¬ ment that the revenues of the state ought to be raised by a single tax on land. See Political Economy.

Bibliography. — Cheinisse, ‘Les Idees Poli- tiques des Physiocrates) (Paris 1914) ; Daire, E.,

PHYSIOCRATS. See Economics.

PHYSIOGNOMY (Greek, physiognomo- nia, literally, the judgment by bodily appear¬ ance), the art of judging character from the countenance. We are generally impressed at first sight favorably or unfavorably, in regard to the temper and talents of others, by the ex¬ pression of their countenances. As the face is that part of the body in which the noblest ex¬ ternal organs are united, by which men put themselves in contact with the world, and, for various reasons, show most of their character¬ istic traits, it has been made the particular ob¬ ject of study by the physiognomist. Aristotle was the first known physiognomist. He ob¬ served that each animal has a special instinct ;

the fox cunning, the wolf ferocity, etc., and he concluded that men, whose features resemble those of certain animals, will have the quali¬ ties of those animals. Battista della Porta, in his work (De Humana Physiognomia5 (1586), revived this theory and carried it out further. The French painter Lebrun, in the 17th century, executed a series of pictures founded on the resemblance between the human figure and that of animals ; and his theory was also adopted and illustrated by Tischbein, a German painter of the 18th century. The physiologist Camper

sought new data in a comparison of the heads of different types and decided the degree of intelligence belonging to each from the facial angle. Lavater was the first to develop a com¬ plete system of physiognomy, which included all the relations between the physical and moral nature of man. (See Lavater). As the ex¬ pression of the face depends very much upon the formation of the skull, physiognomy is connected with craniology. Among the chief points in physiognomy, Kant, in his anthropol¬ ogy, reckons — (1) the general formation of the face, particularly in the profile; (2) the individual features of the face; (3) the mo¬ tions of the face, as far as they have become habitual; also the walk, etc. Kent and others think that physiognomy can never be elevated to a science. It is, however, a subject of great interest; but the student must be on his guard against a general application of its formulated rules. Even Lavater's system lasted but a short time, though he has collected valuable materials. In the 19th and 20th centuries the subject has been taken up in a more scientific way by physiologists and psychologists and a very extensive literature has come into exist¬ ence. . A great deal of the latter, however, especially in recent years, is of the popular- scientific type and ought to be used with con¬ siderable care in regard to the correctness of its conclusions.

Bibliography. — Aguirre de Venero, 'New System of Physiognomy) (New York 1865) ; Aristotle, (History of Animals and a Treatise on Physiognomy5 (translated by T. Taylor, London 1809) ; Bell, Sir Chas., (The Anatomy and Philosophy of Expression as Connected with the Fine Arts5 (5th ed., London 1865) ; Boree, A., 'Physiognomische Studien> (Stutt¬ gart 1899) ; Cyril, V., and Berger E., 'Les Tetes Baissees5 (Paris 1914) ; Darwin, Charles, (The Expression of Emotions in Man and Animals) (London 1872) ; Fosbroke, G. E., 'Character Reading through Analysis of the Features> (New York 1914) ; Krukenberg, H., (Der Gesichtsausdruck des Menschen5 (Stutt¬ gart 1913) ; Lavater, J. C., 'Essays on Phys- iognomy) (translated by T. Holcroft, 13th ed., London 1867) ; 'L'Art de Connaitre les Hommes par la Physionomie5 (10 vols., Paris 1820) ; Mategazza, P., 'Physiognomy

and Ex¬ pression (London 1892); Redfield, J. W., ‘Comparative Physiognomy5 (New York 1853) ; Simms, J., ‘Physiognomy Illustrated) (10th ed., New York 1891) ; Stanton, M. O., ‘Physiog¬ nomyˆ (San Francisco 1881) ; ‘A System of Practical and Scientific Physiognomy1* (Philadel¬ phia 1890) ; ‘Encyclopedia of Face and Form Reading) (Philadelphia 1895) ; Warner, F., ‘Physical Expression5 (New York 1886) ; Waynbaum, I., ‘La Physionomie Humaine5 (Paris 1907).

PHYSIOGRAPHY (Greek, physis — na¬ ture + graphia — description) , has been vari¬ ously defined. By many it is considered to be synonymous with geomorphology or geomorph- cgeny. In this sense it may be defined as the science which treats of land forms and their origin. On the other hand it is considered by many as equivalent to physical geography, and a recent authority has defined it as “that sci¬ ence which investigates the physical features of the earth and their influence on life, espe-

dally man.® The geologists in general tend to favor the former idea ; the geographers the lat¬ ter. In the modern development of the subject there is a strong tendency to emphasize the more purely geographic aspects of the science; or, as some one has said, to humanize it.

Physiography has been called the latest chap¬ ter in geology, a very apt phrase when applied to geomorphology proper. It covers largely the same subject matter treated in dynamical geol¬ ogy, namely, the processes and forces now operating to modify the earth. Physiography, however, investigates these facts, as a key to the study of human progress; dynamical geol¬ ogy because it is only in the light of the proc¬ esses now in operation that we can interpret the history of the past, as locked up in the rocks.

Change of seasons, tides, wind circulation and their geographic relations are so directly dependent on astronomic considerations that a preliminary study of the earth in its relations to the universe is essential to physiography. Because of the activity of atmospheric agents in shaping land forms, physiography is often pref¬ aced with a brief study of meteorology and climatology, with special reference to wind, temperature and rainj their cause and distri¬ bution. A brief study of rocks and minerals is also necessary, since it is possible to

under¬ stand the activities shaping the earth's crust only when we know something of the nature of the materials upon which these forces act. The subject is not infrequently divided under the headings of the atmosphere, the hydro¬ sphere and the lithosphere.

The Atmosphere. — For a discussion of the composition and direct geologic activity of the atmosphere as a weathering agent see the sec¬ tion on Work of the Atmosphere in the arti¬ cle on Geology. In addition to these factors more important considerations to the geog¬ rapher are winds, temperature and rainfall. The great wind belts are shown to be the result of excessive heating in the equatorial regions, causing the air drifts from the poles toward the equator, and this is modified by the earth's rotation giving belts of winds and calms. Un¬ equal heating of land and water and the trend of mountain ranges modify the planetary wind belts and give local variations. Temperature depends primarily on latitude, but temperature belts are modified by proximity to oceans or large lakes, and by the effect of mountain ranges on wind direction. Precipitation is largely dependent on wind movements. In the equatorial belts of calms where the air is rising and cooling, rain is abundant. Deserts are the rule in the horse latitudes, where the air is descending and becoming warmer. Winds blowing over high mountains are forced to give up their moisture on the windward side, and are dry winds beyond the mountain ranges. The physiographer is concerned with all these facts in their effect on man and his activities, both directly as the sum total of climate, and indirectly in shaping land forms. See Air; Wind; Climate; Geography and Geology.

The Hydrosphere. — The geologic aspects of the waters of the earth's crust have been discussed in the sections on Work of Oceans and Work of Lakes, in the article on Geology. See also Oceans and Lakes.

The ocean as an equalizer of climate is of

interest to the physiographer, since it is a well- known fact that regions near the ocean do not have the extremes of temperature that exist in the interior of continents. Ocean currents are important in this respect. The warm Gulf stream and the cold Labrador current account¬ ing respectively for the equable climate of England and the bleakness of Labrador. The ocean as a highway for human traffic and as a source of human food are within the scope of physical geography. The smoothness or irregu¬ larity of shore lines, which results from geo¬ logic processes, determine the nature of har¬ borage. Still within the scope of the physiog¬ rapher's research but less directly, so are the processes of sedimentation going on in the ocean, since these control

in part the types of rocks with which man has to deal on the earth's surface.

The Lithosphere or Solid Earth. — As the

home of man and the source of most of the products he utilizes, the lands hold the largest place in the research of the physiographer. Here he is faced with two problems ; a study of the origin of land forms, and the determi¬ nation of the influence of land forms on man and his pursuits. The first of these problems has already received attention in the section on Dynamical Geology, under title of Geology. The second will be briefly considered below. The major relief features of the lands are plains, plateaus and mountains, and each has its own characteristic effect on life of all kinds.

Plains. — Plains are of several varieties. Coastal plains lie between the shore line and the higher, often mountainous, interior. A typical example is the Atlantic coastal plain. Not all coasts have such plains, but when they do, the region is usually one recently emerged from the sea. It is likely, therefore, to have long straight coasts and few harbors. A slight recent Sinking of parts of the Atlantic Coast of the United States has fortunately resulted in good harbors. Because coastal plains are re¬ cently emerged sea bottom, and because when submerged they were being overspread with sand deposits their soil is frequently sandy. The Atlantic Coastal Plain has large stretches of infertile soil, but because it faces America's greatest market — Europe, and has good har¬ bors, it has undergone rapid development. Flood plains and delta plains on the larger rivers are often very extensive. The rivers are slug¬ gish, carrying little coarse sand or gravel, and from year to year in time of flood they have spread out broad layers of fine rich soil until they comprise some of the richest agricultural lands of the world. They are usually densely populated with an intelligent and progressive class of people. Their most serious drawback is from flooding, which takes toll of many lives, and millions of dollars' worth of property each year, on the great flood plains of the world, like those of the Mississippi, Nile, Ganges, Danube and the Hoang Ho. Many other types of plains are known, and each has its character¬ istic relation to human activity.

Plateaus. Plateaus are elevated plains, usually bordering or enclosed by mountain ranges. For this reason they are often cut off from rain¬ bearing winds and are semi-arid, as our western "Great Plains,® (more properly spoken of as plateaus) and the Columbia Plateau; or truly desert, as most of the <(Great Basin,® which is,

properly speaking, a plateau carrying mountain ranges on its extensive surface. Some of the very elevated plateaus, such as the Colorado Plateau, rise so high that, even in the midst of deserts, they receive enough rain to support splendid forests. Because of their great eleva¬ tion and sometimes due to their aridity and isolation by mountain chains, plateaus are less favorable to population than plains. Where these high plains are deeply dissected, as in the Allegheny and Cumberland plateau region, they are often called mountains, and resemble these latter in their effect on civilization.

Mountains. These are the most striking of nature's forms and contain the grandest scenery in the world. They are also of profound in¬ fluence on all life history. For the most part rocky, isolated and inhospitable, they form rather barriers than homes. It is true that mountains have many times in the history of the world offered asylums to weaker peoples, driven out of other lands by religious or polit¬ ical persecution, but their most important role is to act as barriers. They deflect winds or rob them of their rain, so that in the lee of mountains often lie deserts. They prevent the migration of many types of plants and even some members of the animal kingdom. Even to man they present serious obstacles to travel and transportation, more so formerly than now. In the isolated valleys of the more remote mountain regions are crowded the stragglers of the world's migrations, and there, old customs, traditions and manners of speech are preserved among ignorant and illiterate peoples long after they are forgotten elsewhere. Because moun¬ tains are often the seat of extensive volcanic activity, and because volcanic processes are largely responsible for deposits of valuable metals, mountains are often important mining regions. It is the search for metallic wealth more than anything else that has peopled moun¬ tain regions with progressive populations, and except along tourist routes, few important cities exist in mountainous areas other than in mining districts.

Charles Laurence Dake, Associate Professor of Geology and Mineral¬ ogy, School of Mines and Metallurgy, Uni¬ versity of Missouri.

PHYSIOLOGUS, an early Greek bestiary. See Bestiaries. Consult Golastaub, M., (Der Physiologus und seine Weiterbildung) (in VIII, p. 337, Leip¬ zig 1899-1901) ; Hommel, F., (Die Aethiopische Uebersetzung des Physiologus* (Leipzig 1877) ; Lauchert, F.,

(Geschichte des Physiologus) (containing the Greek text, Strassburg 1889) ; Peters, E., (Der Griechische Physiologus und seine Orientalischen Uebersetzungen) (in 15. Festschrift, Gesellschaft fur Deutsche Philol¬ ogies Berlin 1898) ; Thierfelder, J. G., (Eine Handschrift des Physiologus TheobaldP (in ˆSerapeum,* Vol. XXIII, pp. 225 and 241, Leipzig 1862).

PHYSIOLOGY. Physiology is the science that deals with organic processes or function. In such a very general definition, the word “function® applies not to machines (because we do not know that organisms properly are ma¬ chines), but to organism. It does not refer to organic motions merely, blit to functions, and many motions are not functions or even proc¬

esses. As part of the definition of this science, it may be worth noting that it is in logical con¬ trast on the one hand with anatomy, and in probable continuity with psychology.

Varieties of Physiology. — Plant:physiol- ogy will be discussed elsewhere in this work, but it is obviously as much physiology as is any other kind. Animal physiology deals with those organisms which, for example, consume oxygen both day and night, whose catabolism outruns their anabolism; but there is no sharp line of demarkation.

Animal physiology properly includes human physiology. Such differences as there are be¬ tween brutes and humans are due mainly to man’s unhygienic life, to the greater influence of his mind, and the larger development of his moral nature. Leave out the considerable in¬ fluence of these, mostly social, forces, and human physiology is much more like animal physiology than many of us would care to admit, — however much we need to admit it.

Academic physiology is nothing more nor less than unapplied physiology, — pure science for its own sake. As such, it has very great dis¬ ciplinary value, equaling or perhaps exceeding in this respect anything that mathematics has to offer, for to many mathematics is actually repellant, while physiology is sure to interest even though it repels.

Medical physiology in its old form of 20 years ago is rapidly passing. On the other hand, in its new form, it is as yet undeveloped, so that to-day medical physiology is betwixt and between. It is neither a pure academic science nor a properly applied science, but in many medical schools a traditional hodge-podge of outworn and more or less useless material, especially in its laboratory aspects. Medical physiology is

allied on the one hand to prophy¬ laxis (hygiene), and on the other hand to therapeutics. Since, as a matter of fact, physi¬ ology as taught is very largely found in the medical schools and the dental schools, we may there perhaps get the best notion as to its ma¬ terial, if not as to its method.

The matter of physiology, then, relates to at least three distinct modes of viewing organic function :

First, there is that ancient term “vital,® re¬ ferring of course to processes. An encyclo¬ pedia article is no place to enter into polemic discussions. On the other hand, to discuss physiology without a reference to this matter would be to leave such a discussion quite in¬ adequate. More and more scientists and philos¬ ophers to-day are thinking of “Life® as a cate¬ gory, and one scarcely less general to the human mind than space, time and causality. Men are gradually realizing as they look farther afield into the reality of things, that life and consciousness and energy and matter are but aspects of the Real. This conclusion cannot be avoided, I think, by any serious student of Life, especially of human life as it actually is about us and within us. It is easier to be skeptical and even scorn the term “vital® (es¬ pecially as a reaction against a former unwar¬ ranted notion of it), than to replace that which it stands for with something more pre¬ cisely scientific. Recent thought tends above all things to emphasize continuity, and the con¬ tinuity just suggested above obviously tends to give to the term “vitalism® a meaning which

no one can properly deny, that is as an in¬ separable part of the consciousness-subscon- sciousness-energy-matter “continuum” with which physiology must be concerned.

But from a narrower point of view, the term “vital” stands, it must be admitted, for proc¬ esses not yet comprehended and understood. It is a real name, none the less, and stands for a reality. The splendid work of Jacques Loeb, now of the Rockefeller Institute, perhaps on the whole the most searching into these mat¬ ters that has been carried out, has always left a distinct impression on the unbiased reader that the results stop just where they should be¬ gin if vitalism really is to mean anything more than physics and chemistry. The old familiar example germplasm, and its indescribably intri¬ cate content, the transfer of the energy of pro¬ teins and of fats and of carbohydrates

into the chromatin of nerve-cells, and therethrough into the nerve impulse called neurility, and there¬ through again into mental processes, suggests a meaning to vitalism which the skeptic can deny only by refusing to think it out or by adopting some hypothesis of which there is no present proof, such as psycho-physical par¬ allelism. In short, the broad-minded thinker on organic functions at the present time seems to have to admit relationships in organic life for which the word “vitalism” may well be al¬ lowed to stand — until at least its uselessness has been demonstrated.

A second aspect of the matter of material of physiology is classed as physical. This as¬ pect of the science discusses function as motion, in short. Motions are of two kinds in living matter as in other kinds of matter, namely molecular and molar. The term molecule means little to-day with the decadence of the term atom, but nonetheless the word is in universal use, and stands in physiology for those attrac¬ tions and repulsions which, viewed from a somewhat different angle, we term chemical. Metabolism is molecular movement, so are heat and light, electricity, nerve-force, and all those processes which to-day are on the border line between physics and chemistry. The energies of the body, in short, are reducible to modes of molecular movement. Unless we insist on vital processes as something distinct, the mole¬ cular movements of living matter, so far as we can see, are no different from those of non¬ living matter, except in one fundamental par¬ ticular, namely their complexity, and this differ¬ ence does not always obtain.

Molar movements may of course, for the sake of logical completeness, be classed as properly organic and as merely passive. The organic movements proper are again divided into two kinds, the first being muscular or active movements, and the second recoil or passive movements. It is worth noting that muscle is the sole organ for active movement in organism, although its precursors include such processes as cell-turgor, protoplasmic streaming, and even various grades of direct contractility and possibly of expansion, pro¬ duced by various forms of contractile threads. Muscular movements are classed as vegetative and as voluntary or personal, although these, like everything else, merge more or less in¬ sensibly into each other in the living organism.

The recoils are passive and include such essential movements as the probable passive

mechanical constriction of the arterioles, of the lungs, of the urinary bladder, in short of any distended viscus. The torsional recoil of the costal cartilages is obvious in one’s mind, as well as others of still less

importance. Some of these recoils are made more of than fact sanctions, in all probability; even the most im¬ portant of them all, the constricting process of the arterioles, may prove to be, after all, an active movement, and not a mere passive me¬ chanical recoil. Molar movements have as their qualities : first, quantity, referring to the mass of active muscle concerned in them; second, extent, referring obviously to the amount of linear space involved in a short¬ ening of the muscle ; third, speed, which means the amount of space covered in a unit of time ; fourth, location, which has importance in the applied science of kinesiology and in general physical education ; fifth, force, which in this case means the capability of overcoming resist¬ ance and not necessarily through space (here, pure physics has for once shown the inadequacy of some of its old definitions) ; sixth and lastly, duration.

It would be pedantic for any physicist to claim that the processes of an organism which he might care to class as “physical® did not merge over a considerable area with those that are more often called “chemical.” Protoplasm includes so much, that at present to say what of its processes are physical and what chemical would be pure arbitrariness, just as both the botanists and the zoologists still include certain infusoria in their tectonic schemes.

The chemical processes of living matter, in many cases, are indescribably, and so far as we can see, unimaginably, complex. So far as we can realize at present, this may be their chief difference from inorganic chemism. In addi¬ tion to these intricate chemical reactions of attraction and repulsion between the atoms, of course all the simpler ones are going on uni¬ versally. Every organism is a marvelously com¬ plicated chemical laboratory where untold multitudes of complex substances are made and unmade and intermixed ; every organ is such a laboratory; some have even ventured to suggest that every cell carries on essentially this same complexity of chemic work. As an index of this intricacy of chemism, one need only to be re¬ minded that the molecular weight of some of the component compounds of protoplasm is probably at least 150,000. As some biologist long ago suggested, it may well be that in this complexity and perhaps characteristically so, lies the secret of Life; in other words, that the living molecule lives because it is more complex and more intricately unstable than is any other substance.

A few years ago, in many of the medical schools of mark at least, there was plain a tendency to give up to bio-chemistry the more narrowly chemical functions of organism and to think of physiology more and more as a science of physical reactions. Then about this time we began

to have an inkling of the un- parelleled importance and influence of the products of the ductless glands, and, as one might expect would have happened, this stimu¬ lated anew the former absorption in chemical physiology. At the present time, therefore, a considerable proportion of the research-work being done in the laboratories of physiology is

chemical in its relations and aims. One might almost say that various aspects of metabolism was at present the chief research-problem of physiology, however unfortunate for the lounded dignity of physiology such a condition of things may be. Certainly the only reason that bio-chemistry does not claim its own and insist that physiology attend to its more prop¬ erly own affairs, comprehending the functions of protoplasm as a whole, is that modern chemistry plainly already has very much more than it can attend to by itself. There is room for the relatively unexpert chemic research of the physiologist, as the medical school knows him.

The relations of physiology need not detain us long. Those most obvious and close are with biology as the general science of life ; to anat¬ omy as a comparatively narrow phase of mor¬ phology; to chemistry; to hygiene, part of which of course is physiology applied to the maintenance of health as long as possible; to therapeutics; to neurology; to psychology in all its protean forms; to philosophy, and even at times and in certain minds to metaphysics. The self-respecting physiologist is invariably a fairly good student of (biology, and if he knows nothing and cares less about metaphysics, at least it is undeniably true that the metaphysi¬ cian no longer snorts at the suggestion that a little physiology would not hurt his wisdom, — although he seldom or never acts on the notion.

Applications of physiology. Without talk¬ ing much about it or making it very explicit in the public mind, phvsiology has far outdis¬ tanced psychology in applying itself usefully to life, and yet scarcely a beginning has been made, especially since the applications of physi¬ ology scarcely realize that they are applications. In one sense, and to a degree, the applications of physiology were made before the physiology itself.

In the days of Oliver Wendell Holmes, for example, one man, with some assistants prob¬ ably, taught all the anatomy and physiology

that was given in the Harvard Medical School. As things were just before the great World War began, at least 20 men, each of whom probably knows more of medicine than Oliver -Wendell Holmes (great as are his contributions to med¬ ical science and to literature), instructed in anatomy and physiologv in the same school, and the annual budget of these two departments was certainly several times the entire income for the sale of course-tickets in Dr. Holmes' day. Much of this money to be sure is expended in expensive practical work rather than in salaries for mere lectures.

Among the most obvious applications of physiology are those seen in physical education, especially in the physiology of exercise; in med¬ icine ; in general education ; and the most re¬ cent of them is to the orthopedic re-education of the maimed and crippled, and those suffer¬ ing from war neuroses sometimes still called "shell-shock.®

Methods. — Physiology is slightly deductive from the principles of biology and from struc¬ ture. Although it is certain that no one could discover the action of some machines from the unmoving machine itself, it is equally true that other mechanisms 'bear in their very structure, so to say, a moving picture of their action. In

no mechanism or near-mechanism perhaps is this less true than it is of organisms, the reason for this being apparently the minute complexity of many of its mechanisms. The heart, for ex¬ ample, certainly bears in its anatomy its mode of action, for it is in part a matter of direction of blood-stream through unalterable valve's workable only in one direction ; on the other hand, decades of study were required to ex¬ plain under what precise conditions the heart contracted, in relation to the nervous-system.

The failure of deduction as a physiological method has its most striking example in the brain, and it is in a degree literally true that the men who really knew most about the human brain are those least certain of its orocesses — a statement of which elementary students of physiology delight to remind their instructor just before examination!

Physiology is largely inductive from experi¬ mentation. For one good guess made by the physiologist with imagination, at least a hun¬ dred more or less important facts have been discovered by experiment, often elaborate be¬ yond the comprehension of the untechnical. No science is more inductive than phvsiology. Laboratory-physiology is a highly complex art in itself, an art continually changing, and we may say, simplifying, reducing itself to its low¬ est terms.. Many of the greatest discoveries of modern times have been made by mechanisms

of the simplest type, which differ from those employed in previous researches by (being underlaid by an ingenious new idea.

A glance at any of the laboratory-manuals of physiology, such as that for example of Cannon, published by the Harvard University Press, shows how instructive and at the same time how elaborate and expensive of time and money such a course to-day must be. The present writer, if he may be allowed to intrude a bit of his work, has already developed a laboratory course in physiology, suitable for elementary and secondary girls' schools of all grades, and dealing wholly with animalculae. This article summarizes itself as follows:

A Laboratory Course in Physiology Based on Daphnia, Etc.

I. Introduction: Vegetal and Animal Histology.

II. Comparison of Living Vegetal and Animal Cells: Bacteria, desmids, diatoms, Edeogonium, Spiro- gyra, Euglena, ciliated infusoria. The relations of micro-organisms to disease.

III. Protoplasm and its Streaming: Ameba. Surface-

tension. Universal versatility.

IV. Locomotion by Cilia: Paramecium, Stentor.

V. Simple Forms of Muscle: Hydra, Stentor, Vorticella, Brachionus.

A. The reaction-time of Stentor's or of Vorticella 's

myonemes.

B. The relaxation-time of Stentor's or of Vorti¬

cella 's myonemes.

C. The spontaneous contraction-rhythm of Vorti¬

cella.

D. Fatigue in Vorticella 's myonemes.

E. Exhaustion in Vorticello's myonemes.

F. Individual differences in the movements of

Stentor and of Vorticella.

G. Skeletal muscle.

VI. The Molar Movements of Simple Metazoa: Hydra, the rotifers Philodina, Brachionus.

VII. Dessication and Re-humidification: Tardigrada,

Philodina.

VIII. The Anatomy, Gross and Microscopic, of Daphnia.

IX. Nutrition: Daphnia.

A. The water-currents toward the mouth.

B. Deglutition.

C. The digestive glands and their movements.

D. Peristalsis.

E. Speed of the antiperistaltic wave.

PHYSIOLOGY

47

IX. Nutrition: Daphnia — continued

F. Frequency of the antiperistaltic waves.

G. Defecation.

H. Catharsis.

I. Correlation in the alimentary canal.

X. Blood: Daphnia. (Compare Hydra and Man.)

A. Number and size of the amebocyte-corpuscles.

B. Shapes and intrinsic movements of the corpu¬

scles.

C. Change of color on exposure to air.

XI. Circulation: Daphnia.

A. The heart. Systole and diastole.

B. The average heart-rate.

C. The effects of varying temperature on the rate.

D. The heart's extreme persistence.

E. The blood-sinuses. Osmosis.

F. The effects of electricity on the heart.

G. The effects of blood-salines on the heart;

osmosis.

H. The effects of certain other drugs on the heart.

I. Correlation with extrinsic conditions.

J. The embryonic heart-rate: why slower than

the maternal heart-rate? Myogenesis vs. Neurogenesis.

K. The cardio-inhibitory centre.

XII. Respiration: Daphnia.

A. Direct respiration.

B. Structure of the gill-feet.

C. Rhythmic movements of the gill-feet.

D. Apnea?

E. Effects of carbon dioxide in excess.

F. Effects of a lack of oxygen.

G. Effects of carbon monoxide.

H. Hemocyanin in solution.

XIII. Muscle and Muscle- Action: Daphnia.

A . Smooth muscle of the alimentary canal.

B. The eye-muscles. Convulsive action.

C. Voluntary muscle of antennas, etc. Fatigue.

D. Cardiac muscle. Tonus. Actions of the ions

in the various blood-salines. Absence of obvious fatigue.

XIV. The Nervous System: Daphnia.

A. Brain and optic lobe.

B. Moto-sensory circuit: Retzius's work.

C. Augmentory action: heart.

D. Inhibitory action: heart.

XV. Taxes: Daphnia, Cyclops, etc.

A. Chemotaxis: Paramecium, Anurea.

B. Phototaxis: Daphnia, Ameba.

C. Thermotaxis: Paramecium, Oxytricha.

D. Electrotaxis: Cyclops.

XVI. The Senses: Daphnia.

A. Vision: Range and acuity.

B. Touch. " Reflex " removal of irritants.

C. Taste.

D. Smell.

XVII. Embryology: Daphnia.

A. Summer eggs and their development.

B. Winter eggs.

C. Parthenogenesis.

D. The brood-sac and its secretion.

E. Coalescence of embryonic eyes.

F. Comparison of various functional rates in

embryos and in mother.

XVIII. Animal Behavior: Paramecium, Hydra, etc., etc. XIX. The Mental Life of the Animalcules. The inherent individual will.

One finds here basal and important princi¬ ples of universal physiology, and the ingenuity of other experienced physiologists would surely indicate and define many principles more. The essentials of much physiology certainly . are present in experimentation of this relatively simple kind.

The standing of this pioneer endeavor as a pedagogic proposition, as a scientific method, we may attempt to justify at the present writ¬ ing under six heads. The first of these heads we may suggest as the substantiality and the variety of the physiologic principles that can thus be studied.

A second possible feature'of this manner of teaching elementary physiology has been alluded to by implication already: the transparency and the smallness of the animals used make more striking and easy of acceptance the essential unification of parts into the animal whole. In Daphnia this is notable in the interest a first viewing of the animalcule invariably excites whether in man or child. One actually sees, for

example, the blood corpuscles that are kept in circulation by the heart pulsating under the ob¬ server's eye ; and the intestinal peristalsis can be actually seen to advance up the gut in relation with the pulsations of the digestive gland. Here is unification too obvious to be missed even by the careless child. Without a comprehension of the interdependence of his bodily parts he can learn neither to understand himself nor how to keep well !

A third advantage of such a course lies in the simplicity and the inexpensiveness of the apparatus required. Many elementary schools have compound microscopes, and every school or even every student could provide at least a strong pocket-lens, which might be made to suffice. Beyond the microscope the apparatus required is almost nothing not afforded by every laboratory of chemistry, if we except a few always-present implements such as a watch, a millimeter rule and small and simple glassware. To those of us who know the considerable ex¬ pense of most of the apparatus that we use this factor will appeal.

At any rate, it puts this course within range of any school, no mat¬ ter how simple or indigent or isolated, and makes more affluent schools more independent than heretofore of the avaricious apparatus- dealer.

In similar manner, the life-material required is always obtainable with great ease and with little or no expense, summer or winter, and throughout the world. As is well known, these animals have an almost earth-wide distribution and are easily gathered from pools and streams. If this be not convenient, a few cents for postage brings most of these animalcules within easy reach of such few schools as for special reasons might not care to maintain the simple jar-aquaria for breeding them. They come in such countless numbers so readily that whoever made a business of supplying them could not conscientiously, one would hope, charge for them more than the smallest public class could easily paˆ.

Ease of maintenance of the animalcules is an advantage close to that just mentioned. In¬ stead of ill-smelling animal-rooms expensive to maintain, containing unhappy large animals often both hard and expensive to properly feed, the animalcules are kept in more or less at¬ tractive glass aquaria that need contain no more than a few litres of water each for use of large classes. Many of these little animals maintain themselves year after year. Daphnia, for example, not <(running out® as long as one uses just ordinary intelligence in imitating a simple environment somewhere near that which is natural to it. The infusoria, of course, Stentor, Paramecium, etc., can be readily de¬ veloped at any time in two weeks from old leaves and hay and similar commonplace ma¬ terial, everywhere and always at hand.

No one with a quirkless brain can nowadays fail to justify vivisection by competent scien¬ tists, but many, nonetheless, men as well as women and children, savants as well as fools, dislike to do this work, especially for purposes of routine class-instruction. This repugnance to blood-shedding and mutilation is obviously a necessary human feeling worthy to be culti¬ vated rather than blunted. (In the vivisection polemics one sees too seldom perhaps due credit given us animal-experimentalists for the per-

formance of disagreeable death and mutilation on animals whom we of all men best appreciate at their marvelous value and perfection). Strangely enough, the size of the animal is a factor in the

determination of the strength of this feeling of repugnance to mutilation found in all normal human beings, while another of its determinants is complexity. Men of culture who would hesitate to kill a mouse or to drown a puppy have no such feelings ordinarily in re¬ gard to ants, however wonderfully efficient in their complex living, or in regard to the medusoids, however large and conspicuous. Thus the animalcules may be adequately studied by young or old , by boys and girls, without a prohibitive feeling of repugnance to the destruc¬ tion of life. This circumstance is both justifi¬ able biologically and ethically and practically convenient for teaching purposes, and gives the animalcules an advantage for scientific purposes not easy to exaggerate.

It has been already sufficiently implied per¬ haps that this course in practical physiology is for elementary use, although it serves a helpful purpose also as an introduction and advance summary epitome for courses of physiology the most advanced and technical, as routine experi¬ ence indeed has shown. In high schools, in academies and in academic (collegiate) cur¬ ricula, particularly in those for women, one might expect its value especially to be demon¬ strated. From such schools all laboratory- physiology worthy of the name has been hereto¬ fore excluded. It is on this basis and with this intent that the present tentative suggestions have been offered to the science of physiology, for development into an efficient new educa¬ tional method. (Reprinted from the Boston Medical and Surgical Journal (vol. CLXVII, No. 5, pp. 153-156, 1 Aug. 1912) ; and from the Biologische Centralblatt, Bd. XXXII, No. 5).

In the light of the colossal slaughter of men and children, women and maidens in the present European conflict, the vivisection problem, in¬ teresting as it is to every kind heart, fades into relative insignificance ! Phvsiologists have taught physiology to considerable classes for a great many years without doing any vivisecting, but it is undeniable that vivisection (without pain or acute discomfort, invariably) without exception is indispensable to the advancement of physiology and of medicine. The reason for this indispensableness of the vivisection of in¬ vertebrates and even mammals lies not only in the essential similarity of the brute and the human organism, but in the often grievously ignored fact that an organ or tissue isolated from the family of which it is a part, is scarcely more that organ or that tissue as it properly is than a slice of “liver® . on your breakfast-plate is liver in the living animal from which it came.

The most conspicuous example of the lack of consideration of this then undiscovered fact is the grossly misleading study of muscle iso¬

lated from the body of its animal, and already hastening to decay, at first without moisture, without warmth, and even now always without its own intrinsic circulation. To-dav physiolo¬ gists for the most part realize that an isolated organ or tissue has only the faintest hints to offer as to its normal mode of action. Think of one trying to study the life of a muscle entirely deprived of its usual changes in adrenin, dextrose and alkalinity, not to mention other

essential factors of the living blood! These numerous researches on isolated tissue have un¬ doubtedly served important use, but it is likely that they are not being rapidly enough aban¬ doned even yet for the more philosophic methods of recent days, which study, the best that may be, the normal entire animal.

Vivisection is indispensable for this kind of work, but vivisection always without pain or acute discomfort, as indeed has been very gen¬ erally the custom everywhere for a generation at least.

Divisions of Animal Physiology. — These, of course, are wholly arbitrary for any one dis¬ cussing the subject, but, as one may see from the writer's textbook, the following topics may well enough serve as chapter headings :

Protoplasm should be described morpholog¬ ically, physically and chemically in every text¬ book of physiology intended for the use of students. A ibaker might succeed in making good bread and pastry out of various grains without knowing anything about these grains and their mode of preparation for his work, but the probabilitv, none the less, is that the baker who has milled his own meals and flours and studied their physical properties and respec¬ tive chemical compositions will make a more artistic product than another. All recent text¬ books, so far as the writer is aware, have reme¬ died this old-time defect in physiological text¬ books which left protoplasm to some supposed but usually imaginery biologist.

The Nervous System is the next logical be¬ ginner of a systematic treatise on physiology, as it is one on psychology. Although in some re¬ spects the hardest part of physiology, the remainder of the subject cannot be understood unless the chief actions of the autonomic sys¬ tem, spinal cord and the brain are compre¬ hended. Physiology, then, should take the bull by the horns, and, with the aid of anatomy and histology, teach the physiology of the nervous system the first thing after protoplasm has been achieved.

In like manner Muscle should be understood and appreciated before

the other functions of the body are undertaken. The body in its es¬ sence is motion, a mechanism for dislocating material objects or matter in space. Motion, therefore, is its essence, and it should be well understood accordingly.

As the third part of the mechanism of effi¬ ciency the Glands should be studied. Endocri¬ nology, the modern science of the functions of the ductless glands, is the most active and at present the most productive part of physiology, and the more we learn about it, the more impor¬ tant does it appear to be. It pervades modern physiology.

Dietetics and Nutrition are the natural topics to come next, the latter term to include excretion.

The Circulation logically is the next thing in order, because it is the blood and the lymph which distribute all the required materials, and collect all the undesirable materials of the or¬ ganism for prompt removal.

Respiration, although in a sense next to motion the most fundamental of organic func¬ tions, may be considered in one place as well as another, although not, certainly, until part at least of the chemical and the neuro-physical movements of the organism have been learned.

Respiration is at heart a chemical process, a fact which some students are slow to learn, but which is fundamental.

There is no reason known to the writer why Reproduction should always be found at the latter end of a general treatise on physiology, since no apology need be offered for discussion of this base-function. It <(goes® at the end, however, as well as anywhere else. In the majority of textbooks, even to-day, it certainly is discussed inadequately, a bare outline being given, and the entire hygienic aspect — the only aspect in which the majority of young men and women really need information — is wholly ignored. In many schools it is not customary to systematically teach this subject at all, ap¬ parently not altogether out of <(modesty,® but because every medical faculty realizes that this ordinarily is the first chapter of the textbook to become really familiar to the student : it has native and dynamic interest for every normal adolescent.

Laboratory Physiology , as already has been suggested, is an art in itself, a highly technical art, moreover, based on science. Every year it is more practical, applying itself more widely and also in more detail to the needs of practi¬ cal medicine, and of hygiene, making itself in short more and more useful (never was it by any possibility ornamental).

Recent Advance in Physiology. — Looking back a generation, comparing Dalton's text¬ book with the latest edition of Howell or of Bainbridge and Menzies, it is clear that the advance in the science as a whole is dominat- ingly metabolic. This indeed was what was lacking 20 years ago to round out the science beyond the organic mechanics which then largely it was. Still considerable progress has been made in neurology, in nutrition, and in the physiology of the skin.

In choosing a dozen or more augmenting topics for mention as of especial import in the advance of physiology, it is almost impossible to suit the tastes of any observer besides the writer! Still, perhaps these subjects are really those that have developed most importantly for science in general :

The more recondite composition of the blood has been very successfully studied by many. Immunity, sera, anaphylaxis, acidosis, etc., are physiologic topics studied mostly by other branches of medicine, but each chemical and not part of the ingenious fairy-story of ((ceptors® and so on which originated in Germany. The dynamic factors of the blood have been much developed, especially as the new backbone, so to say, of the newest branch of physiology called by some endocrinology, the science and art of the ductless glands. Much has been learned at Harvard about adrenin and pituitrin and their relations to the dynamic <(drives® of the organ¬ ism — during anger for example. Vasocon¬ striction, quicker coagulation, antifatigue effect, and an increase of blood-sugar are somehow topics conspicuous in this new work.

Many plant-pollens give special cases of hay- fever because their protein is reacted too vio¬ lently by the blood-proteins this is a type of a new group of blood-reactions whose study properly is on a physiologic base.

Fatigue in its more rational aspects (involv¬ ing the actual living of the actual animal and VOL. 22 — 4

not the actual dying of some abstracted por¬ tion of an animal) has been studied extensively in part as <(war-work® toward the maximal

pro¬ duction of munitions, etc. Columbia has led in this work here in America.

Integration has been appreciated as never before under the influence of psychology. Less and less attention is paid to the phenomena ex¬ hibited by protoplasm in its dying stages — as dying every isolated organ must be. The prin¬ ciple is capable of very much further applica¬ tion still in both theoretic and practical physi¬ ology. A materialist, for example cannot be pos¬ sibly really wise as a physiologist, however good an anatomist he may develop into.

The movements of the alimentary canal, both gross and minute, have been studied with much success. It is beginning to be recognized at last that where contractile tissue is there is movement ! The Roentgen rays have revealed some of the complex movements of the gut, 18 years ago, and now the finer movements, e.g., of the villi, remain to be described. Nearly five years ago I called attention to their move¬ ment and to one of their possible ulterior absorptive functions : <(The 4,000,000 villi of the intestine, rich in smooth muscle and sympa¬ thetic nerves as well as in epithelium, probably adapt the blood's content of the nutritive lipoids and proteins to the varying immediate needs of the nerve-cells, and may besides send inward sympathetic influences which, fusing, possibly in the brain, become euphoric.®

Dietetics has made strides, especially in the direction of applied economic physiology. The old matter of doubt as to the safe-minimum of protein has not been clarified to everyone's satisfaction.

The integrating nervous system has become better known in certain of its functions. The sensory side of the autonomic (itself relatively a recent ˆdiscovery®) has been developed as Remak's fibres, thus laying more of the physical basis of the subconscious aspects of mind. The cerebral cortex has revealed some of its func¬ tions on a basis of psychomotion, especially in the way of restraint. Work has been done on the physiology (vasomotion and keinesthesi- ology mostly) of sleep. The reflexes have been studied in many directions, practical and theo¬ retic. The senses have been investigated in new ways, on one hand highly technical and on the other practical and popular, a new series of books on the senses helping the latter purpose. Vasomotion has been getting on to a gratifying extent.

The neuro-musculo glandular system, mechanism of efficiency, has received much at¬ tention, especially in England and in some of the physical-education schools of America. The all-or-none principle has been of use in under¬ standing many things in regard to skill. The

relations of physiology to exercise has been developed in many directions; and those of sat¬ isfaction to the dynamic aspects of work — the so-called ((stheneuphoric index® or energy-joy ratio. The rehabilitation of one hellwar crip¬ pled and shocked is sure to give the psycho¬ logical physiology of skill a chance to develop far in theory as well as in practice.

Dental physiology has gone on, largely in the directions of electrical and pathological and prosthetic physiology.

50

PHYSIOLOGY OF PLANTS — PHYSIOLOGY OF TASTE

The skin has been revealing some of its hid¬ den mysteries, and proves to be an organ of pre-eminent general importance to the indi¬ vidual. If I may again repeat part of an article — summary of nearly five years ago :

The integrated epicritic impulses (from the skin and mucosae) appear to have predominance in human physiologic euphoria, two possible means of stimulation being evaporation and oxidation.

A list of the more or less influential elements of the skin would include the complex vaso¬ motor mechanism ; the arrectores pilorum mus¬ cles; afferent sympathetic dendrites, the pecu¬ liarly efficient epidermis, sweat glands, seba¬ ceous glands; Meissner's corpuscles, the ter¬ minal cylinders of Ruffini, tactile menisci, the nerve-rings of Bonnet (?), Vater-Pacinian cor¬ puscles, free nerve-endings, heat-receptors, cold- receptors, pain-receptors, pleasure-receptors, and possibly tickle-receptors.

Air that is dead (i.e., not moving) ; humid and too warm; humid and too cold; or lacking in oxygen, is a chief occasion of organic dys¬ phoria. Physiologically these conditions are lacks, — lack of movement over the skin, lack of the optimum temperature, lack of dryness (evaporation so being lessened), and lack of dermal oxygen, possible reflex determinant in part of pulmonary respiration.

Arterial tension has been actively studied in many places and is about to reach important practical conclusions as

Arterial stuffing and constriction are very active and variable in all persons. Peripheral arterial tension is by far the most sensitive and easiest index of vasomotor rearrangement correlate to activity mental or bodily. The doubleness of blood-pressure measurement (((systolic®

and <(diastolic®) makes possible a partially differential index of activities :

The <(systolic® tension represents especially the ever-changing output of the left heart, which latter is quickly variable in size (Gesell) as well as in the frequency of its contraction. The diastolic tension is more dependent on the autonomic vasomotion, direct and reciprocal. Thus the systolic variations are more directly mental, and the diastolic more somatic and vegetative.

The ordinary systolic pressure-range is about 10 millimeters Hg, increasing to 40 or 50 or more in ((mental® activity of a somewhat greater intensity. The usual diastolic range is about 8 millimeters Hg, save in old persons, and it has a lower maximum. Vasotension is a ready in¬ dex of the intellectual and affective psycho¬ physical dynamism (((power of concentration®) of an individual, and as such has value as a mental test ; it is also a useful index of ˆnervousness® and of mental derangement perhaps.

Aments (except microcephs?) sometimes have a spontaneous systolic range of no more than 2 or 3 millimeters Hg for many minutes at a time, and a mental activity-range of 5 or 10 millimeters. Complete dements exhibit some¬ thing of the same arterio-stasis but with a ten¬ dency to large progressive excitement-rises not observed in aments. One microceph had a large and quick diastolic range and a normal systolic curve. Imbeciles and morons show varying degrees of the systolic plateau more or less according to mental status and dynamism; but there are many exceptions.

No personal, racial, sexual or age-differences in the variability have appeared; each hemo¬ barogram is unique and always an interesting and accurate ((human document.®

Sudden mental activity, apparently of any sort (e.g., multiplication, imagination of any kind of personal activity, transfers of the at¬ tention-line, attention to the arm-sensations, dynamic associations, unpleasant or pleasant ef¬ fects) ; active inhibition ; breath-holding, and gradual subconscious increase of psychophysical tonus, increase both the systolic and the diasto¬ lic tensions, especially the former; so does phys¬ ical exertion proper.

Really passive relaxation of the muscles and of the mind; quiet, prolonged recall of happi¬ ness ; sleep-suggestion ; humor ; deep breathing, and usually sensations of pleasure not allowed to excite, cause a lowering of both pressures. Marked rises in both tensional

phases occur without conscious accompaniment, suggestive if not demonstrative of the subconscious actions of mind. Reciprocal variation of the systolic and the diastolic is very frequent, yet in some cases the two parallel each other for many minutes at a time. True emotion (adrenin and blood-sugar are suggested) lasts much longer than pretended emotion and <(causes® (?) more variation.

Imaginary neuromuscular fatigue exerts a strong vasomotor influence. Lapsus attentionis lowers both tensions suddenly and far.

These are some of the chief personal con¬ siderations. The medical relations are too com¬ plex to be reported; less has been accomplished in this field of application.

Very numerous topics have been developed by physiologists since the preceding revision of this Encyclopedia was made, but these seem to the present writer to be fair examples of the most important directions. The World War will deflect the research-activities of the science into more practical (if not more useful) lines, at least for a time. The average phys¬ iologist will then have a broader mind and will realize, often for the first time, that his great and fundamental science, as the one dealing with organic functions, is more than a study of ((nerve-muscle-preparations,® that it may be made one of the two foundation sciences of personal human life.

George Van Ness Dearborn, Medical Corps, United States Army.

PHYSIOLOGY OF PLANTS. See

Plants, Physiology of.

PHYSIOLOGY OF TASTE, or PHYS- IOLOGIE DU GOtJT. This work may be compared in a distant way to the (Compleat Angler5 of Isaak Walton. It is a similar repertory of information, precept, anecdote and

personal reflection, a similar stream of pleasant talk by a charming companion who discourses most entertainingly of what has been, after his business, the most unfailinginterest of his life. Its author, Brillat-Savarin (q.v.) (1755-1826), was an honored magistrate and jurist, but his fame rests wholly on this volume of ((medita- tions of transcendent gastronomy,® as he calls it with mock grandiloquence and with a humorous reference, perhaps, to Lamartine's (Poetical Meditations, > which had been the great literary success a few years before. He worked at it affectionately for many years, and only gave it to print, and then anonymously, a year before his death. Its contents are most various. First come 30 ˆmeditations® on such matters as the senses, taste, smell, appetite, thirst, the pleasures of the table, digestion, rest, sleep, dreams, diet, corpulence, fasting, the history of cooking, in which physiological fact and theory alternate with stories of re¬ membered feasts, bits of strange lore from far afield with descriptions of culinary chefs- d'oeuvre that makes your mouth water, racy anecdotes with practical recipes. Then, as if the meditations had not afforded him latitude enough, he adds 27 varietes, ˆmiscellanies.® But various as are the contents, they all turn about the business or pleasure of eating. Gastronomy is declared to be the chief of all sciences. ((The destiny of nations depends on how they are fed,® and <(Tell me what you eat and I will tell you who you are,® are among the aphorisms which serve as its basis. And the intentional mock grandiloquence of the style and the apparent levity of the author should not de¬ ceive us as to the seriousness of the work. There is much in the book, in its intention, at least, to justify the title, ((physiology of taste.® It was one of the first attempts to approach the spectacle of human conduct from the phys¬ iological side. It is perhaps not without sig¬ nificance that Balzac admired it much and afterward wrote a (Physiology of Marriage) and a (Physiology of Dress. > However, Balzac recognized that the charm of the book lies, not in the matter, but in the style and in the genial, lively and humorous personality that shines through it. Consult the English transla¬ tion by Anderson, R. E., ˆGastronomy as a Fine Art* (London and New York 1877).

Arthur G. Canfield.

PHYSOSTIGMA. See Calabar Bean.

PHYTOGEOGRAPHY. See Plant Geog¬ raphy.

PHYTOLACCASE.7E. See Pokeweed.

PI-BESETH, pe-ba'seth. See Bubastis.

PIA MATER, pi'a ma'ter the innermost of the three membranes investing the brain and spinal cord. See Brain ; Arachnoid Mem¬ brane.

PIACENZA, Pietro, Italian clergyman : b. Piacenza, Italy, 21 Jan. 1847. He was educated at Alberoni's College, Piacenza, and ordained to the priesthood in 1869. From 1870 to 1878 he was professor of history and liturgy, at Pia¬ cenza Seminary; from 1878 to 1897 he was arch¬ priest and pastor of Fiorenzuola, and after 1897 archpriest of the cathedral of Piacenza. Since 1904 he has been visitor apostolic of Rome and its district, and after 1907 professor of liturgy in the Roman Seminary. Dr. Piacenza has

published (Storia del B. Gregorio X) (1876) ; (Qusestiones Liturgical (1887) ; (I1 Rito della consacrazione di un vescovo) (1899); (Un curioso documento della giovinezza di Pietro GiordanP (1901), etc., and contributions to Ephemerides Liturgicce, Archivo sTorico , etc.

PIACENZA, pe-a-chen'za (ancient Placen¬ tia), Italy, city, capital of the province of Pia¬ cenza; one-third mile south of the Po River; 43 miles southeast of Milan and 35 miles north¬ west of Parma. It is a fortified city and has always been considered of great strategic and commercial importance. The fortifications are kept in repair and improved from time to time as new defense methods are introduced. The city was founded 219 b.c. by the Romans. About 20 years later it was destroyed by the Gauls. When the Via ˆEmilia, a Roman military road, was constructed, the western terminus was at Piacenza. The city entered the Lombard League in the 12th century, later fell under the domination of the Visconti, the Sforza, and the popes. In 1545 Pope Paul III pre¬ sented it together with Parma (q.v.) to his son Pier Luigi Farnese. From then on its political fortunes followed those of Parma.

Among the historic buildings of Piacenza is the ancient church, San Sisto, rebuilt in 1499- 1511, for which Raphael, about 1515, painted the Sistine Madonna. This picture was sold, in 1753, to Frederick Augustus of Saxony and is now in the Dresden Gallery. Other noted buildings are the cathedral (1122), in which there are paintings by Guercino, Carracci and others. The church of Santa Maria di Cam-pagna has fine frescoes by Pordenone; the square has some fine

equestrian statues. The public library has about 120,000 volumes. The Palazzo Municipale is an impressive building dating back to 1281. The huge, uncompleted Palazzo Farnese, begun in 1558, now serves as a military barrack. It has modern theatres, hospitals and educational institutions. It has considerable manufacturing interests, especially in silk, cotton and woolen goods, pottery, wine, cheese and machinery. In the vicinity are valu¬ able marble quarries. Pop. commune about 40,000. Consult (Monumenta Historica ad Provincias Parmensem et Placentinam Per¬ tinentˆ (8 vols., Parma 1855-60) ; Giarelli, (Storia di Piacenza> (2 vols., Piacenza 1889) ; Jordan, L., (Die Renaissance in Piacenza y (in (Archiv fiir Kultur-Geschichteˆ Vol. V, Ber¬ lin 1907) ; Siro Corti, (Provincia di Piacenza) (Turin 1893).

PIACERE is D'Annunzio's first novel, and was first published in 1889, when he was 26 years old. A more fitting title than the one which the author gave it is that of the English translation by Georgina Harding, (The Child of Pleasure) (Boston 1910), which in turn was suggested by the still more illuminating and apt title of the French translation, (L'En- fant de la Volupte.* The story is that of a workless yet wealthy young man of the Italian nobility who has a love for, and succeeds in winning, several women, and who has more momentary affairs with a great many others, all of them, however, of his own class. The two most interesting parts of it are the de¬ scription of a horse race for ((gentlemen® riders, in which the hero races against a friend the love of whose mistress, the wife of a mutual

friend, he has appropriated, and the descrip¬ tion of the duel on the following day between the winner (of the race as well as of the lady) and the loser, which event interrupts the love- making of Jhe former because of a serious wound received. Both incidents are familiar to novel readers. There is no plot. The book is a painstaking exposition of an artificial state of mind and of sensual emotions which it engenders. The attitude toward women therein displayed is not wholesome : they merely present possibilities for material pleasure. The very completeness of its psychological detail renders it at least monotonous, and the normal, healthly mind conceives no sympathy, to put it mildly, with D'Annunzio's hypocritical and obnoxiously aristocratic hero. In workmanship the story does not present a high degree of skill and a number of the links are plainly conventional. However, it must be remembered that it is a work of youth. Consult Sedgwick, H. D., (Essays on Great Writers } (Boston

1903).

Americo U. N. Camera.

PIAGGIA, Carlo, Italian explorer: b. Lucca, Italy, about 1822; d. Sennaar, Sudan, 17 Jan. 1882. He went to Egypt when young, was with Antinori in Bahr-el-Ghazal 1860; went with Gessi to the lakes of the Nile in 1876 and was the first European among the Nyam-Nyam. His ethnographic collection was acquired by the Berlin Museum. He published (Dell' arrivo fra i Niam-Niam) (Lucca 1877).

PIANISSIMO, the superlative of piano (Italian for soft and low) ; piano is used in music in contradistinction to forte. The sym¬ bols for these terms are pp. and p. Some com¬ posers, especially Verdi, Berlioz and Tschaikov- sky use the symbol pppp. and even ppppp. to ex¬ press that they desire the softest pianissimo possible, while many others frequently indicate this by ppp. See Music.

PIANKISHAW (pi-an'ke-sha) INDIANS, a small American tribe of the Algonquian family, originally a part of the Miamis (q.v.). The tribe never numbered over 1,000. They removed to the Indian Territory, now Okla¬ homa, from Kansas in 1867, after selling all their lands in the latter State. They are now known under the name of Peoria, of which in 1906 there were only 192 left, none of whom was of pure blood. Consult Hodge, F. W., ed., (Handbook of American Indians North of Mexico) (Part II, Washington 1910).

PIANOFORTE, a stringed musical instru¬ ment commonly known as a <(piano,® and essen¬ tially consists of a series of stretched, graded and tuned wires which are struck by felt-cov¬ ered hammers by the operation of keys con¬ veniently arranged in a keyboard. The term, ˆpianoforte,® which is the original term desig¬ nating the instrument, is derived from the Ital¬ ian ((piano,® soft + ((forte,® loud; while the term <(piano,® usually designated by p., is a sign used in music to denote softness, that is, the strain where the indication occurs is to be played with less than the average intensity. Similarly, pp., or ppp., abbreviations for ((pianis- simo,® signify very soft.

The pianoforte is probably the most exten¬ sively used of all musical instruments. It was evolved directly from the clavichord and harp¬ sichord, which were undoubtedly elaborations of

the monochord or pitch-carrier with one string, although even the approximate date or the name of the inventor who first put keys to a mono¬ chord and called it a clavicordium is quite un¬ known.

Virdung, in his (Musica Getutscht,* published in 1511, states his inability to ascer¬ tain those facts, although it is well known that Pythagoras, in the 6th century b.c., measured a vibrating string stretched between raised bridges on a resonance box, and by shifting those bridges he accurately determined the in¬ tervals of the Greek diatonic scale. It is sup¬ posed that Pythagoras obtained the mono¬ chord embodying the principle of the stopped string upon a finger-board from Egypt, where it had been known for ages before his time. After Pythagoras, the monochord became, in Greece and Europe, the canon or rule for the measurement of musical sound intervals, and continued to be so employed up to the 11th cen¬ tury, a.d., when it was transformed into a poly¬ chord of four strings, to facilitate the melodic division of the Gregorian tones — the Plain- Song of the Church as used in the Ritual, and were known under a great variety of names such as clavichord, clavicordium, spinet, vir¬ ginal and regal.

The early clavichords had a compass of four octaves. The natural keys were made of citron wood and the sharps of ebony. The damper was a narrow band of felt attached with glue to the hitch-pin blQck, opposite to the wrest-pin block, and the bridge was curved. As they were strung with wires in equal lengths, they were for a long time regarded as sets of mono¬ chords, the scaling being effected by the line of the tangents attached to the keys on the left- hand side of the player, while the three or more sounding-board bridges rested upon the narrow belly on the right. Owing to the length of the scale the longer instruments were not capable of being tuned higher, giving them a weak but delicate tone which responded to the gradations of the player's touch. The tangents were up¬ right blades of brass fastened into the keys and beaten out at the top so as to touch equally the one string or the two or three unison strings forming a note. The tangents thus constituted a series of bridges or sound exciters, and each of the little groups of strings thus formed was acted upon by two or sometimes three or four tangents to obtain as many notes. The damp¬ ing was contrived with a cloth interwoven among the strings behind the line of tangents. This cloth instantly dampened the vibration of the strings when the finger released the key and the tangent quit the string.

Fig. 1. — Queen Elizabeth's Virginal, South Kensington Museum, London.

Clavichords with pedals are mentioned by Virdung and Reynvaan, and are also particu¬ larly described by Adlung, indicating that some of the instruments had two octaves and a note of pedals attached to a separate clavichord pedalier and <(fretted ,® there being three

strings in the lower and four in the upper range for each pedal note. The terms virginal or spinet

generally indicate one and the same instrument without regard to form of construction, but practically limited to a plectrum (jack) clavier with one string only to each note (see Fig. 1). Its earliest recorded name is the clavicvmbo- lum, occurring in the rules of the Minnesingers under the date of 1404. It is the Latin for psaltery, an instrument of the dulcimer kind, to which a keyboard was added and suggests an ecclesiastical or monastic origin. Virginal was the English name of the spinet, and was so called probably on account of its appropriate¬ ness for girls as compared with the contempo¬ rary lute which was a more difficult and manly instrument, rather than the assumption that Queen Elizabeth was a skilful performer on it, especially as the name was current in the reign of her grandfather, Henry VII. According to Scaliger, who wrote in the latter part of the 15th century, the name spinet is derived from the little quill point or plectrum, as an improve¬ ment upon the instruments previously known as monochordum and harpsichordium, a keyboard psaltery of harp shape. On the other hand, the Italian expert, Signor Ponsicchi, attributes it to a Venetian maker, who signed and dated an in¬ strument of this kind (

Fig. 2. — Spinet — 1710.

(see Fig. 2). Italian spinets were made of cy¬ press wood, and as the utmost vibration was sought for by the makers, both case and belly were constructed of that material. They con¬ sisted of two cases — the inner rough, but pos¬ sessing a free and satisfying quality of tone, while the outer received great care in work¬ manship and was often beautifully decorated. The pentagonal or heptagonal spinets had false cases like the clavicumboli or harpsichords, from which they could be removed when re¬ quired for performance, while the oblong Ital¬ ian makes were inseparable from the outer case like the modern pianos. Until the 1 7th century, the keyboard was usually an external addition to the case, when Rosso, a Milanese maker, set it back into the body of the instru¬ ment, a recessing which was generally copied afterward (see Fig. 3).

The harpsichord is a double, treble or quad¬ ruple spinet, the sounds being excited by a jack and quill plectrum, as in the case of the

virginal or spinet. More exactly stated, instead of hav¬ ing one string to a note, as in the virginal or spinet, it has two, three and sometimes four strings to a note, which, with the exception of • the common features of the case, sound-board,

wires and keyboard, it differs entirely in sound, excitement and effect from the clavichord. It has an individuality of tone not possessed by the pianoforte, and a brilliancy of effect be-

Fig. 3. — Clavichord, Taphouse Collection, Oxford.

yond the capacity of the clavichord, but in ex¬ pressiveness depending upon touch its power is much less than either.

The harpsichord was a much favored musi¬ cal instrument during the 1 7th century, occupy¬ ing the place now filled by the grand piano, and while not so much a solo instrument, it was of considerable importance in the orchestra, its player generally assuming the responsibility of conductor. The complex character of its mech¬ anism required a larger and differently shaped case to that of the spinet and prefigured that of the grand piano, the wing-shape giving rise to the German name fluegel, also kielfluegel, from the plectrum (kiel, quill) producing the sound. With the Italians — it was known as the clavicem- bolo, while the French called it clavecin. In the English term harpsichord, the harp disposi¬ tion is recognized in contrast to the trapeze shape of the spinet, which appeared about the same time — the earlier part of the 15th cen¬ tury.

The description of a very fine example of a Roman harpsichord in the South Kensington Museum, London, inscribed and dated ((Heirony- mus Bononiensis Facietat Romae, MDXXIX,® will serve to illustrate the general character of the instruments of that time. It has one key¬ board and two unison strings to each note; boxwood natural keys, with an apparent com¬ pass of nearly four octaves, E to d3, which by a short octave in the bass becomes C to d3. In the Italian instruments no change of power was attainable by stops, while the pedals, as in the

Fig. 4. — Trasuntino Harpsichord — 1531.

Trasuntino harpsichords, controlling a sordino for muting, were a very late addition (see Fig. 4). The highest credit for excellence in the manufacture of harpsichords belongs to the

famous Ruckers family of Antwerp. The earli¬ est instruments made by them bear the date of 1590, and the latest 1659, a short period of splen¬ did work. Of their instruments there are 70 existing specimens, including some of great beauty of decoration, but they have all been sub¬ jected to one or more alterations of scale and keyboard compass. It is claimed that Hans Ruckers, the elder, added the octave register and steel wire instead of brass for the treble notes, designed a second keyboard in imitation of the organ and increased the number of keys from E to C3 to C-c , thus making the short octave in the bass a long or chromatic one down to the lowest notes. The most famous harpsi¬ chord makers of the 18th century were Burkat Shudi (Burkhardt Techudi) and Jacob Kirck- man (Kirchmann) in London, and Taskin in Paris. Burkat Shudi began business in 1732 in the house still occupied by his descendants, the Broadwoods, 33, Great Pulteney street, Golden square, London ; while Kirchmann continues to be represented by his descendants in a first- class London pianoforte manufactory.

About this time, makers, more or less con¬ trolled by the prevailing style of domestic fur¬ niture, substituted the more rigid cases of wal¬ nut and Spanish mahogany for those of reso¬ nant cypress, cedar and pine, and thus obtained a greater power and majesty of tone, while a greater variety of tone was derived by a freer use of the stops. To the three shifting regis¬ ters of jacks of the octave and first and second unisons, Van Blankenburg's lute stop was added, which by plucking the strings in the lower and medium divisions of the scale, close to the bridge and much nearer the treble, pro¬ duced a charmingly delicate, reedy tone quality very much like that of the mandolin. Finally, to obtain ((crescendo)) and <(diminuendo,® a swell was introduced, which consisted in gradu¬ ally raising a hinged portion of the cover with a pedal. This invention of Roger Plenius was probably suggested to him by the nascent piano¬ forte which appears to have been first made by him in England.

Although references to the pianoforte occur in the correspondence of musical instrument makers during the latter part of the 16th cen¬ tury, as, for example, in the letters written by Hippolito Crica or Paliarmo, dated 27 June and 31 Dec. 1598, and addressed to Alfonso II, Duke of Modena, the first true pianoforte, as now understood by that term, was invented by Bartolommeo Cristofori, a Paduan harpsichord maker, in Florence about 1709. At that time kings and princes well disposed toward music were accustomed to keep large collections of musical instruments to be used in connection with their domestic and courtly festivals, and to keep such instruments in

playing order it was necessary to employ men possessing the requi¬ site ability. It is of record that Cristofori was engaged in that capacity by Prince Ferdinand dei Medici, and while thus employed invented and produced the pianoforte. The record of this invention is given by the Marchese Scipione Maffee, under the date of 1711, in a description which appeared in the Giornale dei letterati d'ltalia, a publication conducted by Apostolo Zeno. It gives the information that in 1709 Cristofori had completed four (

harpsichord form. There are two grand pianos still in existence, made by Cristofori, and dated respectively 1720 and 1726. They are of a very perfect construction, and embody all the essen¬ tials of piano movement. The first belonged to the Signora Ernesta Mocenni Martelli of Flor¬ ence, and was acquired by Mrs. J. Crosby Brown of New York in 1895 for presentation to the Metropolitan Museum of Art of that city. It has a compass of four and a half octaves, C-f3. The second belongs to the Commendatore Alessandro Kraus of Florence. Their actions are similar, and show that Cristofori succeeded in satisfactorily solving the problem of escape¬ ment, and had also provided for repetition

Fig. 5. — Cristofori's Action.

without a double escapement. Fig. 5 is a com¬ plete diagram of this action: (k) is the key; (h) the hopper or movable tongue; (n) the notch for the hopper beneath an underhammer or escapement lever (1), which being covered with leather upon the end operates to raise the hammer butt (d) ; (e) is the hammerhead; (s) the spring regulating the play of the hop¬ per or distance between it and the string and regulated by a small hopper check (w) ; (f) hammer check; (g) damper, and (j) damper stop. It appears that in this action, Cristofori retained the shallow measure of an Italian harpsichord, and consequently inverted his wrest-plank (the block in which the tuning-pins are held), which had to be much stronger than in the harpsichord, owing to the increased thickness of the strings which were required to stand the impact of the hammers, and attached the strings beneath. The pins pierced the wrest- plank so that the tuning was accomplished harp fashion. His instruments ranged in compass from four to four and a half octaves. The essential features of Cristofori's action were adopted by Gottfried Silbermann, the great organ builder and clavichord maker of Dresden. He made two pianofortes, which he submitted to J. S. Bach, who disapproved of them on ac¬ count of their weak treble and heavy action. Recognizing that he had not attained the req¬ uisite skill to reproduce the excellent quality of his models, he devoted several years to ex¬ periments, and

finally submitted another to Bach, which met with the great composer's ap¬ proval. It is a fact, however, that the elder Bach never really adopted the pianoforte, and that all of J. S. Bach's compositions for the clavichord and harpsichord, no less than those for the organ, have to be virtually transcribed in the rendering when transferred to the piano¬ forte. This fact is very clearly shown in Czerny's edition of the (Forty-eight Preludes and Fugues.*

The Seven Years' War (1755-62) terminated Saxon pianoforte making, and scattered the workmen, some of whom found their way to England and made a fresh start in the business.*

Up to 1760, all pianos had been built in the shape of the modern grand, horizontal or up¬ right; but, between 1760-65, Johann Zumpe, a former workman in Shudi's establishment, in¬ troduced the English square piano. The action was sufficient, although almost rudimentary, and contained what was called the (

Between 1780 and 1790, John Broadwood recognized the fact that when the string was struck at a certain point, it yielded a fuller tone. He, therefore, adjusted the hammers so as to obtain this result, and also transferred the wrest-plank to the back of the case, and intro¬ duced the two pedals — one to raise all of the dampers, and the other to soften the tones by dropping a piece of cloth over the strings. The change in the place of the wrest-plank enabled him to reduce the inordinate length of the un¬ used wire, and also to straighten the keys,

Fig. 6. — Broadwood's English Action.

which had been hitherto left more or less twisted, as in the clavichord, but in connection with the crank damper, he did not get beyond the ((old man's head® device that lifted the ham¬ mer, and the merit of introducing in the square piano the ((hopper® — a jack with a string work¬ ing in a notch forming the front part of a lever, technically known as the ˆunder-hammer® — belongs to John Geib, who took out a patent for the improvement in 1786, and first ap¬ plied it to the square pianos he made for Long¬ man and Broderip, music publishers in Cheap- side.

Fig. 6 shows the Broadwood grand piano action, commonly known as the ((English direct lever action,® in which the key (k) on being

depressed raises the hopper (h) which strikes in the notch (n) cut in the butt of the ham¬ mer (d), the play of the hopper against the notch determining the velocity of the hammer and the individuality of the player's touch; (w) is the wire hopper check; (s) the screw that regulates the lever to determine the distance of the hopper motion; (a) is the hammer-head, and (c) the check which is raised when the key is depressed and arrests the hammer in its fall. It is the first simple contrivance for repetition, that is, for repeating the blow of the hammer before it returns to its original position or equipose. The key not only raises the hopper and check, but also the damper, so as to allow the string forming the note to continue the

vibration, and the escapement when raised with¬ out impact as depends upon that space between the hammer and the strings, to allow the ham¬ mer to clear them under a blow either soft or loud, and thus prevent the strings stifling the vibration before it has had time to become a musical note. This action was invented about 1772, and was further developed and perfected by Broadwood, with the assistance of Backus and Stodart, until it became the best single escapement action.

Fig. 7. — Streicher-Viennese Action.

About 1777 the German manufacturers pro¬ duced another kind of escapement, which was considered favorably by prominent pianists for many years. It was invented by Stein, a pupil of Silbermann, but was carried to its highest state of perfection under the joint efforts of his daughter Nannette and son-in-law, Andreas Streicher, about 1794. Fig. 7 shows the con¬ struction of this action: (k) is the key, (h) the hopper, (s) the hopper spring, (1) the standard in which the hammer butt (d) is centred, (b) the set-off button, (c) the check and (g) the damper. This action differs from the Cristofori (English) action, in that the hammer is directly attached to the rear end of the key itself, in¬ stead of being fixed to a lever independent of the key. This arrangement caused a change of axis of the hammer when the key was struck, thus giving the extreme lightness of touch which enabled easier execution and brilliant playing, although less capable than the English of producing its tone varieties. Up to 1777 the French imported their pianos chiefly from Eng¬ land, when Erard (Erhardt), a German piano- maker, produced the first piano made in France. Having been driven to London by the Revolu¬ tion, he familiarized himself with the English methods, and incorporated the English prin¬ ciples in his first instrument. Subsequently he

Fig. 8. — Erard's French Action.

adopted the Stein principle, and afterward de¬ veloped his own action, illustrated by Fig. 8, in which, when the key (k) is depressed, the lever (1) is raised by the pilot (p), and the hopper (h) escapes forward when it has de¬ livered its blow to the roller (r) beneath the hammer fork (f). Similar to the notch of the English action, the roller transmits to the ham¬ mer the player's intention and individuality. A prolongation of the hopper forms the escape-

mcnt lever (e) which controls the set-off from the strings by the screw and button (s). The wire hopper spring (b) maintains the hopper in position, and together with the hammer-head (d) and the check (c), completes the single escapement action. The repetition or second escapement is obtained by the roller resting upon the hinged repetition lever (t) which rises when the wire spring (q) is bent by the depression of the key, the rise of the lever be¬ ing controlled by the screw (w), which acts on the point of the lever.

Under this arrangement, no matter how slowly the key is depressed, the action produces sound, and also enables the hopper to repeat a blow with a partially risen key. The damper (a) is beneath the string (g) and is pushed up by the spring (m). This double escapement action was invented by Sebastian Erard and patented by his nephew, Pierre Erard, in 1821, but did not succeed in obtaining public recog¬ nition until after 1835. While not demanding as high a finger movement as the English action, it is uniform in the variety and directness of blow.

The Herz-Erard repetition action shown in Fig. 9 is a simplified form of the Erard action just described. It was first employed in the grand pianos of Henry Herz of Paris, but, owing to its economy and efficiency, has been adopted with slight modifications by many of the most prominent piano-makers. Next to Erard the most prominent piano manufacture in France was Pape, a native of Hanover. In 1827 he invented a down-striking action, of which the mechanism was above the strings. During the latter part of the 18th century the desire to save space originated the idea of mak¬ ing musical instruments of this class in an up¬ right form. The first attempts were merely to turn the horizontal pianos, spinets and harpsi¬ chords into a vertical position on a stand. In the year 1800 John Isaac Hawkins, an English¬ man, living in Philadelphia, Pa., invented the first genuine upright piano and patented it in the United States and England. He called it the Portable Grand Pianoforte, and it is re¬ markable as containing

most of the features characteristic to the modern upright. The idea was further developed and improved by South- well in 1807, who produced the now obsolete but beautiful toned “Cabinet,® and by Wornum, who produced a low upright with diagonal strings, in 1811, and one with vertical strings in 1813.

Fig. 10 shows the Wornum upright piano action, as made by Broadwood : (k) is the key,

(b) the hopper, (d) the hammer-butt, holding the shank of the hammer-head (e) ; (c) is the check, (f) the damper, (i) the set-off button,

(1) the spiral hopper spring invented by Bord, (m) the pilot, employed to raise the hopper and its crank to the height required for their service, and the tape (n), which, being tight¬ ened by the rise of the hammer when the key is struck, pulls the hammer back when the key returns and thus assists the repetition. Because of the small floor space occupied the upright piano became the instrument for the million, but it can never be the choice of the artist, be¬ cause it smothers the vibrations, which can be brought out fully in* a grand piano.

A modern piano, consists of the following parts: (1) The “case,® made of rosewood, mahogany, walnut, cherry, maple or other hard wood, and, according to its form, classified as grand, square or upright. The grand pianos are triangular in body and are built in various sizes, from the full concert grand, 8 feet 10/ inches in length, to the baby grand, six feet long, and adapted to parlor use. The square form is no longer built, having been entirely superseded by the upright for use in private houses. The outer side of a pianp case is usually veneered over the solid wood. Some makers build their piano cases of material made of several thicknesses of wood, under the sup¬ position that it assists the resonant qualities. Some cases are very elaborately carved and others expensively inlaid. Special instruments have been made costing as high as $50,000.

(2) The “frame,® now almost universally made of iron or steel, held within the case and in¬ separable from it. (3) The “string-plate,® at¬

tached to the rear end of the frame and to which the strings are fastened. (4) The “wrest- plank,® attached to the front end of the frame and holding the tuning pins, around which one end of the strings is wound, so that their ten¬ sion is regulated by turning the pins. The wrest-plank has to be made very solid to ensure the rigidity necessary to withstand the enor¬ mous strain of the strings, a tension

amounting to from 10 to 20 tons.

(5) The “belly® or “sounding-board,® a thin

piece of wood placed under the strings to in¬ crease the sound produced by their vibrations. Owing to their small diameter and consequent limited contact with the air, the sound produced by strings vibrating freely is so weak that a resonance factor is necessary. This factor is supplied by the belly upon which hardwood bridges are glued, which transmit the vibrations of the strings to the belly and thus creates sym¬ pathetic vibrations of the woody substance so as to adequately increase the sound. The manu¬ facture of sounding-boards is an important branch of the industry and elaborate planing and glueing machinery is utilized.

(6) The “strings,® made of steel wire, one end of each being fastened to the string-plate and the other coiled around tuning-pins in the wrest-plank. They increase in length and thick¬ ness from the treble to the bass. In the bass, in order to make the rate of vibration slower, they are over-spun or wound around with fine copper or mixed-metal wire. For the lowest tones (A3-F2) only one wire is employed; for each .tone (Gr-C) two strings; and above that, three strings. One of the most remarkable dif¬ ferences between the modern and old pianos is due to the vast increase in the tensile strength of piano wire drawn under modern methods. The breaking strength of English piano wire ranges from 225 pounds for No. 12 music, 0.029 inch diameter, to 650 pounds for No. 22, 0.052 inch diameter; giving an ultimate tensile strength of 340,000 pounds to the square inch, about five times that of the best old hand-drawn wire.

(7) The “actions,® the principal varieties of which have already been carefully described, and which consist of the entire mechanical de¬ vice by which the hammers are propelled against the strings, including the keyboard and its row of keys, which are manipulated by the fingers. The keyboard of a modern piano has a com¬ pass of seven octaves, A-A, or seven octaves and a minor third, A-C, the extreme notes of which are very near the limits of the power of the average human ear to distinguish musical sounds. • Cristofori’s pianos were four-octave instruments. The keys corresponding to the natural tones and called “naturals® are made of ivory, and those corresponding to the chromat¬ ically altered notes and called “sharps® are made of

ebony. They are shorter than the nat¬ urals and are raised above them. When a key is pressed down its rear end rises and lifts the “jack,® which throws the hammer against the strings. The hammers are attached to shanks of light wood, such as pear wood, hickory or white beech, sufficiently tenacious not to fracture under the hardest blow, and yet elastic enough to rebound. The wooden ham¬ mer-head is covered with felt, of ‘ compressed sheep’s wool, cut from one piece, and increasing in thickness from treble to bass. The texture of the felt should be neither too hard nor too soft. A hammer with* a hard surface leaves the strings immediately after contact with it and allows the very dissonant upper partial tones to run their course, while a hammer with a soft surface clings slightly to the string, or at least Ion? enough to damp such discordant partials. Simultaneously with the throw of the hammer the “damper® is raised, thus allowing the string to vibrate freely, but by a “check® which pre¬ vents its rebound, the damper remains raised

as long as the key is pressed down and the string continues to vibrate.

(8) The “pedals,® a set of levers, usually two in number, which are pressed down by the feet. They are called the “piano® and “forte® pedals; some makers add a third called a tone- sustaining pedal. The left foot .presses upon the “piano® or soft pedal, which either throws all of the hammers nearer to the strings so that the striking distance is lessened by one-half, or by shifting the keyboard action bodily, removes the stroke of the hammer from three to two strings, one being left unstruck, but not silent, since it vibrates in sympathy with the sounding strings with which it is in tune. This sympa¬ thetic vibration gives a beautiful aeolian tone quality that has been recognized by modern composers from Chopin to Liszt as of much ad¬ vantage. The “forte® or loud pedal is pressed by the right foot and raises all the dampers so that the strings struck continue to vibrate even after the keys are released. The “tone- sustaining® pedal, although not invented bv the Steinways, is often found in their grand pianos. It is an arrangement that, instead of raising all the dampers, allows the player to prolong any note or group of notes by keeping raised only such dampers as are raised by the kevs when the pedal is down. In many upright pianos a soft pedal (Celeste) is applied by mechanically interposing a strip of thin felt be¬ tween the hammers and the strings, thus ma¬ terially diminishing the sound, and affording a great convenience in practising.

The earliest compositions for the piano¬ forte appear in a volume entitled (Sonate da Cimbalo di Piano e Forte, detto volgarmente di MartellattiF Dedicato a Sua Altezza Reale. IT serenissimo D. Antonio

Infante Di Porto- gallo, e Composto da Lodovico Guistini di Pis- toia. Opera Prima, Firenzi, 1732, the year after Cristofori died. The first compositions which showed* a technique characteristic of the pianoforte are the three sonatas by Muzio Clementi, published in 1773. From that date the composers studied the new instrument and employed the proper technique, with the result, as in the case of Beethoven's magnificent piano¬ forte compositions, that they went beyond the capabilities of the instruments of that time, and stimulated the piano-makers to increase both the compass and the power of the instruments. Increase in the power of tone demanded strings of greater thickness, while the extension of scale called for an increased number of strings, and, consequently, an enormous increase in the tension strain on the frame. These conditions led to the use of metal for frames, beginning with the hollow metal tube framing patented by Allen and Thom in 1820, followed by the cast- iron frame of Babcock of Boston, in 1825, and the improvements of Jonas Chickering, who in¬ troduced the full iron frame in 1837. Then came Steinway and Sons, who in 1859 intro¬ duced the overstrung scale, permitting a much larger number of wires in a small space; thus the modern pianoforte was developed to its present state of perfection and power (see Fig. 11).

Some of the men who have made the piano history of America are Jonas Chickering, the pioneer, whose place in the trade was later filled by Thomas E. and C. Frank Chickering; George and* Francis Bacon; James A. Gray,

William Boardman, A. H. McPhail, E. N. Scherr, Henry Lindeman, H. C. Schomacker, Ernest Knabe, Henry Hazleton, Hugh Hard¬ man, Napoleon- J. Haines, Albery Weber, Henry E. Steinweg (later Steinway), Charles, Henry and C. F. Theodore Steinway, William and Al¬ bert Steinway, T. A. Heintzmann, F. G. Smith, Myron A. Decker, Hugo Sohmer, Frederick Mathushek, William E. Wheelock, Simon Krakauer, W. B. and H. B. Tremaine, Edwin S. Votey, W. W. Kimball, Edwin S. Conway, Rudolph Wurlitzer, etc.

An important modern invention is the aeolian attachment, by which a current of air is directed against the strings to reinforce the vibrations. Considerable increase in the vol¬ ume and duration of the tone is thus obtained. Of course the device was not available until it became customary to use a small motor or a bellows for power. Another

invention for ob¬ taining an aeolian effect was brought out in 1891 by Eisemann of Berlin, who introduced electromagnets placed close to the strings. The pressing of any of the keys closed electric cur- cuits, energizing the appropriate magnets and enhancing and sustaining the vibrations of the notes affected. This device had the novel effect of altering the tone of the piano so that the strings gave sounds resembling harp strings.

Of devices embodying dumb keyboards for practising purposes, the <(digitorium) or dumb piano, consisting of a portable box equipped with five keys supported on springs, and the ((practice clavier® invented by Virgil of New York in 1883, are the modern representatives of a very old idea. The use of the former has been severely condemned by good musicians ; but the 'latter, which possesses a complete key¬ board, is of great use in the practice of a legato touch. The mechanical arrangement affords two audible clicks — one when a key is pressed down and the other when it is released, so that the only observation required of the performer is to note that the two clicks caused by the de¬ pression of one key and the release of the next coincide. The apparatus may be so adjusted that the action can be regulated at will, from the lightest, two ounces, pianoforte touch, up to a touch exerting a pressure of 20 ounces. Its use is of great advantage in acquiring strength of the fingers and for purely technical exer¬ cises.

The mechanical or automatic piano had its origin in an adaptation of the perforated cards of a Jacquard loom, in which the holes are positioned so as to direct the disposition of the threads in a pattern. The earlier patents for the use of this principle for playing the keys of a piano were by Seytre of France, Bain of Scotland and Pape of Paris. The principle is applied by means of a continuous roll of stout paper in which are holes or perforations posi¬ tioned so that as the roll is unwound air is permitted to pass through the holes to the tubes indicated, thus being directed to operate the right piano keys at the correct time. Elec¬ tromagnets have also been employed to make the connections between the perforated roll and the keys, but as a rule the modern automatic pianos and player-pianos depend on a bellows-pump and the resulting air-pressure or suction to strike the keys and operate the instrument.

The first markedly successful machine in¬ volving this principle was made as an attach¬

ment to a piano and named the (

affords a range — from the soft velvety legato to a blow as powerful as that exerted by Liszt or Rubinstein. The tempo-indicator is used in accordance with the system of markings on the perforated roll music, so that the piece is played exactly in the time intended by the composer. The time-shading of the various passages being prescribed by the metronome, perfect time is obtained by simply moving the tempo-lever back and forth upon a dial marked from 0 to 130, to accelerate or retard the movement. It is also equipped with a forte-lever, to still further sustain and Control expression.

The immense sale of the pianola led piano- makers generally to seek to incorporate its prin¬ ciples into their machines, and hence arose the player-piano, which type of instrument has so taken the market, that the demand for an old-style hand-played upright is rapidly reduc¬ ing. Each of the leading manufacturers brought out some form of player-piano that would play music furnished in the roll, and at first each gave a special name to his product. But as there was little difference in the mechanisms, the public came to pay less attention to the trade names, and all these instruments have

come to be classed as player-pianos. After a time it became obvious that it was to the in¬ terest of the trade to have a standard width of music roll, so that music could be run on any player-piano, and a trade agreement was entered into to that effect between leading manufacturers. The typical player-piano has a bellows, operated usually by foot-pedals like those of parlor-organs ; also a compensating or equalizing device to govern the air-pressure, which is very necessary ; a series of air-tubes to which a current is admitted when a perfora¬ tion of the traveling music-roll uncovers the desired valve; a motor (which may be based on the bellows-power) for moving the paper roll, and a tracker-mechanism for utilizing the air-pressure or vacuum, to strike the keys of the piano itself. There are also controlling levers for regulating the time, by allowing the roll to move slower or faster ; also for re¬

winding and for producing the expression. Large player-pianos are made on this prin¬ ciple and fitted with electric motors for use in furnishing automatic music in ˆmovie® theatres, on shipboard, etc., these being com¬ monly called automatic pianos.

In 1914 there were manufactured in the United States 183,368 pianos,

of the total value of $62,775,000, this being a slight reduction as compared with the production in 1909, though a gain of over 30 per cent as compared with 1904. The production of player-pianos in 1914 attained two-fifths of the total value, and in 1918 it is estimated that the majority of the pianos are made either with a player embodied in the design or with such attachment. The annual production of music rolls for such pianos in 1918 was over $1,000,000. During the period between 1909 and 1914 the number of upright pianos made in the United States for or with player attachments increased from 34,495 to 88,078, or by 154.6 per cent, and their value increased from $9,275,001 to $20,892,514, or by 118.5 per cent. The number of grand pianos made for or with player attachments increased from 21 in 1909 to 831 in 1914, and their value increased from $28,900 to $413,665. The output of player-pianos in 1914 included 3,352 automatic pianos, valued at $1,373,206.

There were 255 piano factories in the United

States in 1914, giving employment to 24,000 persons and paying out nearly $16,000,000 in wages. They purchased that year nearly $30,-000,000 of materials, adding $33,000,000 value in process of manufacture. The leading States in the piano manufacturing industry are Illinois, Indiana, New York, Massachusetts, New Jersey and Michigan.

Bibliography. — For further modern in¬ formation consult Spillane, (History of the American Pianoforte } (New York 1890) ; Hip- kins, (History of the Pianoforte) (London 1896) ; Rimbault, (History of the Pianoforte> (London 1860) ; Paul, (Geschichte des Klaviers) (Leipzig 1868) ; Bie, (History of the Piano¬ forte and Pianoforte Players) (London 1899) ; Bluethner and Gretschel, (Lehrbuch des Piano-fortebauen) (Weimar 1886) ; White, (Theory and Practice of Pianoforte Building) (1906) ; Dolge, (Pianos and Their Makers) (1913) ; Van Atta, (Treatise on the Piano and Piano Player* (1914), and for information of the earlier type, consult Schlick, (Spiegel der Orgelmacher* (Mainz 1511, Berlin reprint, 1869) ; Virdung, (Musica Getuscht und ausgezogen) (Basel 1511, Berlin reprint 1882).

PIANOFORTE INSTRUCTION, Meth¬ ods of. The word “method,® as applied to piano¬ forte instruction, may be used in a double sense. In the first place it may refer to the current collections of exercises and pieces which are used for the teaching of beginners ; in the second place it may refer to modes or prin¬ ciples of instruction. We shall use the word only in the broader sense. To be sure, the two meanings overlap to a considerable degree. A plan of instruction is generally

embodied in books intended for the guidance of pupils, and collections of the kind mentioned are likely to contain suggestions of a pedagogic nature in addition to the material they offer for prac¬ tice. Methods have been numerous, and it cannot be our purpose to go into a detailed enumeration and consideration of them. Nor will it be necessary. For most of the systems of former days have been superseded by later ones, so that an examination of the former would have only a remote, historic interest. Among the more important systems of the first half of the 19th century were those of Logier, Kalkbrenner and Czerny. A peculiarity of the Logier method was its employment of the mechanical device known as the chiroplast ; likewise the simultaneous teaching of many pupils. Kalkbrenner used a modified form of the chiroplast, called the hand-guide. Czerny was the pedagogue who especially promoted the technical side of piano playing. Many of his etudes are classical and are still in use among teachers. Plaidy had the same end in view in his well-known (Technical Studies.) It is peculiar that the individuals in whom piano¬ forte virtuosity found its culmination — includ¬ ing Liszt, Tausig, Biilow and Rubinstein — should have given us no methods of instruc¬ tion. Tausig, to be sure, left a collection of valuable studies, a feature of which is the per¬ sistent use of certain fingerings, unobstructed by the presence of black keys. And Biilow has likewise embodied some novel ideas on fingering in the editions flowing from his pen. But nothing approaching a system or method was left by any of these men. The more im-

portant methods of recent times are those of Kohler, Deppe, Leschetizky, Mason and Virgil — the two latter being the product of American thought. The Kohler method is careful and betrays great pedagogic ability; but it is some¬ what dry and lacks important features which are the result of more recent insight. Deppe's method lays great stress on ease and freedom of movement and advocates co-operation of the arm in playing. His maxim is: <(If it looks well, it is right.® Leschetizky has been famous as the teacher of a great number of eminent pianists. In consequence his system has gained wide celebrity. An examination of the same, however, as outlined by some of his assistants (Bree, Prentner), fails to reveal any startling innovations and so we are inclined to attribute his success to personal qualities as a teacher rather than to peculiar secrets of system. Mr. Mason may be regarded as the Nestor of Amer¬ ican teacher-virtuosos. He published a method entitled (Touch and Technic, >

which is very popular on this side of the Atlantic. Opposed to the stiff finger and wrist playing of former days, he aims particularly at beauty of touch. Like Deppe, he lays stress on arm movements, his analysis of the same being especially illumi¬ nating. He likewise developed an ingenious method of practising scales and arpeggios in various rhythms and tempos. The Virgil method is unique inasmuch as it makes use of the dumb piano called the Practice Clavier. Tone is here replaced by clicks, which can be produced both by the up and down action of the keys. Likewise the force necessary to de¬ press the keys is subject to regulation. Special printed instructions of a very detailed nature are supplied for the guidance of teachers and pupils.

In general, the tendency of modern instruc¬ tion has been toward freer and more natural movements and specifically toward a more liberal use of the arm. Playing in the older days was comparatively stiff. It proceeded mainly from the fingers and wrist and the members not directly involved were supposed to be held quiet. This has been changed of late: the old hammer-like touch of the fingers is having its supremacy disputed by touches that depend more on pressure, while the arm and forearm are constantly being brought into play. Even the time-honored motion of the thumb under the palm of the hand, in perform¬ ing scales and arpeggios, is no longer insisted on so rigorously, and deft arm-movements are coming into the foreground.

Among the foremost innovators in this movement is Rudolf M. Breithaupt. He has published a voluminous treatise entitled (Die natiirliche Klaviertechnik,* which is searching in its analysis and replete with excellent sug¬ gestions. Among other things, Breithaupt aban¬ dons the traditional wrist stroke, and his play¬ ing of scales is accomplished by means of hand and ˆ forearm movements, with the minimum passing under of the thumb.

While this is not the place to pronounce judgment on methods, we may refer to the con¬ sensus of modern opinion in favor of freer and more natural movements and liberal co-opera¬ tion of the arm. The results which have been arrived at are based on careful analysis and seem destined to become permanent. Among the future advances to be expected in the field

under consideration is the application thereto of psychological methods. Hitherto very little has been accomplished in this direction. Yet there is hardly a field which is more favorable to the work of the psychologist. The exact determination of the best playing motions, the regulation of practice hours, the testing of pupils for musical talent — these are but a few of the many things with which psychology would

be competent to deal. There is no doubt that this work will soon be taken up. And the results will be shown in heightened efficiency on the part of the teacher and greater progress on the part of the pupil.

Albert Gehring,

Author of cThe Appreciation of Music,) etc.

PIANOLAS. See Pianoforte.

PIARISTS, members of a religious order, known as ((Patres Piarum Scholarum,® and de¬ voted especially to the education of the young. The order was founded in 1597 by a Spanish nobleman, Joseph Calasanza (Saint Joseph Calasanctius) (1556-1648). In 1621 the order was approved of by Gregory XV, and endowed by Innocent XII with all the privileges of a mendicant order (1690). Much of the work of the Piarists was accomplished in Poland and Austria, where there are still flourishing several Piarist schools. The members of the order number some 2,000 and they manage about 200 educational establishments. (See Orders, Re¬ ligious). Consult Heimbucher, M., (Die Orden und Kongregationen der Katholischen Kirche) (Paderborn 1907) ; (Ordinis Clericorum Reg- ularium Pauperum Matris Dei Scholarum Piarum Catalogus Generalis) (Rome 1909) ; Seyffert, E. J. A., (Ordensregeln der Piaristen) (2 vols., Halle 1783).

PIATT, pi'at, Donn, American lawyer and journalist: b. Cincinnati, Ohio, 29 June 1819; d. Cleveland, Ohio, 12 Nov. 1891. He was educated at the Athenaeum, now Saint Xavier's College, Cincinnati, and by private tutors. Though he studied law with his father for a number of years and became a partner in his older brother's law firm, he devoted much of his time during these years to writing for news¬ papers. In 1852 he was appointed judge of the Court of Common Pleas of Hamilton County, Ohio. On account of the failing health of his wife — he had married in 1847 — he went to France in the summer of 1853 and settled in Paris, from which city he did considerable writing for American and English newspapers on current events. In April 1854 he was ap¬ pointed secretary of legation at Paris by President Pierce, acting as charge-d'aff /ires whenever his chief was absent or ill and ac¬ quitting himself in this responsible position with great credit. In 1855 he returned to the United States and again took up his former interests, politics and journalism. He was an active sup¬ porter of Lincoln and Fremont. On the out¬ break of the Civil War he entered the Union army as a private, attained the rank of colonel and was assistant adjutant-general and chief of staff of General Schenck. He resigned in 1864, and in the fall of 1865 was elected as a Republican

member of the Ohio house of rep¬ resentatives. In 1868 he accepted the position of Washington correspondent of the Cincinnati Commercial. In March 1871 he founded and began to edit the Washington Capital. In 1880

he decided to retire to his old home in Ohio, Mac-o-chee, about 100 miles north of Cin¬ cinnati. He did not dispose of his financial interest in the Capital, however, until 1890. During the years of his retirement he devoted himself to literature and farming. He wrote (The Memoirs of the Men Who Saved the Union > (Chicago 1887) ; 'The Lone Grave of the Shenandoah and Other Tales 5 (Chicago 1888); 'Poems and Plays) (Cincinnati 1893); (Sunday Meditations) (Cincinnati n. d.) ; with H. V. Boynton, (General George H. Thomas5 (Cincinnati 1893). Consult Miller, C. G., 'Donn Piatt: His Work and His Ways5 (Cincinnati

1893).

PIATT, John James, American poet : b. James' Mill, Dearborn County, Ind., 1 March 1835; d. Cincinnati, Ohio, 16 Fed. 1917. Pie was educated at Capitol University (Columbus, Ohio) and Kenyon College (Gambier, Ohio), was clerk in the United States Treasury Depart¬ ment in 1861-67, librarian of the United States House of Representatives 1871-75, consul at Cork, Ireland, in 1882-93 and consul at Dub¬ lin April-September 1893. In 1868-69 he was editorially connected with the Cincinnati Chronicle and in 1869-78 with the Cincinnati Commercial. He attained considerable recogni¬ tion among American minor poets. His works include (Poems by Two Friends5 (1860), with W. D. Howells; 'The Nests at Washington5 (New York 1864), and 'The Children Out-of- Doors : A Book of Verses by Two in One House5 (Cincinnati 1885), with S. M. B. Piatt (q.v.) ; 'Poems in Sunshine and Firelight5 (Cincinnati 1866) ; (Western Windows and

Other Poems5 (New York 1869) ; 'The Pio¬ neer's Chimney, etc.5 (Cincinnati 1871) ; land¬ marks, The Lost Farm and Other Poems5 (New York 1872) ; 'Poems of House and Home5 (Boston 1879) ; (Penciled Fly-Leaves5 (Cincinnati 1880) ; 'At the Holy Well5 (Dub¬ lin 1887) ; (Idyls and Lyrics of the Ohio Val¬ ley5 (Boston 1888) ; 'A Book of Gold5 (1889) ; 'The Lost Hunting Ground, etc.5 (London 1893) ; 'Little New-World Idyls5 (New York 1893) ; 'The Ghost's Entry and Other Poems5 (1895) ; (A Return to Paradise.5 He has also edited:

(The Poems of George D. Prentice5 (Cincinnati 1876) ; (The Union of American Poetry and Art5 (Cincinnati 1880) ; ‘The Hes¬ perian Tree, An Annual of the Ohio Valley5 (Cincinnati 1900-03). Consult Howells, W. D., ‘John James Piatt5 (in Harper’s Magazine, Vol. CXXXV, p. 291, New York 1917).

PIATT, Sarah Morgan Bryan, American poet: b. Lexington, Ky., 11 Aug. 1836. She was graduated from Henry Female College, New Castle, Ky., and was married in 1861 to J. J. Piatt (q.v.). Her first poems were published in the Louisville, Ky., Journal. She spent many years in Ireland, where her husband acted as United States consul at Cork and Dublin, with whom she published (The Nests at Washing¬ ton and Other Poems) (New York 1864) ; and ‘The Children Out-of-Doors5 (Cincinnati 1885). Her other works include (A Woman’s Poems5 (Boston 1871) ; ‘That New World and Other Poems5 (Boston 1876) ; (Poems, in Company with Children) (Boston 1877) ; ‘Dramatic Per¬ sons and Moods, with Other Poems) (Boston 1880) ; ‘An Irish Garland5 (Boston 1885) ; (Selected Poems5 (Boston 1885) ; (In Primrose

Time: A New Irish Garland5 (Boston 1886); (A Voyage to the Fortunate Isles and Other Poems5 (Boston 1886) ; ‘Child’s World Bal¬ lads5 (Cincinnati 1887) ; (The Witch in the Glass5 (1889) ; (An Irish Wild Flower, etc.5 (New York 1891) ; (An Enchanted Castle5 (New York 1893) ; ‘Completed Poems5 (2 vols., New York 1894); ‘Child’s World Ballads, Second Series5 (Cincinnati 1895).

PIAUHY, pe-ow-e’, or PIAUHI, a state of southern Brazil, bounded on the north by the Atlantic (for only 43 miles), on the east by Ceara and Pernambuco, on the south by Bahia and on the west by Maranhao, the boundary being the Parnahyba River, into which all the streams of the state flow. The only one of any importance is the Piauhy, which gives its name to the state, rises in a range also called Piauhy, about 350 miles from its junction with the Par¬ nahyba, and is scarcely ever navigable because of the scant rains. The state has mountain ranges on its eastern and southeastern borders, and river-pierced plateaus elsewhere. The area is officially given as 232,712 sq. km., or about 90,000 square miles. The climate is unhealthy; the rainy season often lasts only a few weeks and occasionally, as in 1877 and 1880, does not come at all. Then famine and typhus follow. The capital city is Therezina, about 220 miles inland on the Parnahyba River, with about 30,000 inhabitants, and some trade in cotton and cattle. Therezina is connected with Amarragao, the only port of the state on the Atlantic Ocean, by a steamship line. Another line runs from Therezina to the upper limit of navigation on the Rio Parnahyba, Floriano. Various

railways have been planned bur so far only about 75 miles of the line Therezina — Saint Luis (in Maranhao) have been completed. This line is called the Caxias and Therezina Railway. The population of the state is scanty and includes some independent Indian tribes in the southwestern part; it is estimated at 425,000. The principal crops of the state are cotton, tobacco, manigoba, rubber, sugar and cereals. More important is the raising of cattle and goats. There are also extensive for¬ ests. The mineral wealth is known to be con¬ siderable, but is practically undeveloped. Con¬ sult Buley, E. C., 'North Brazil5 (New York 1914); Domville-Fife, C. W., 'The United States of Brazil5 (New York 1911) ; 'The South American Yearbook5 (London 1915).

PIAZZA, in architecture, a portico, or cov¬ ered walk, supported by arches. It properly signifies a square, or open place of any shape, in a city, and has derived its architectural mean¬ ing from the fact that in warm countries such open places are in very many instances sur¬ rounded by covered walks. Consult Matthews, A., 'Piazza5 (in Nation, Vol. LXVIII, p. 416, New York 1899).

PIAZZI, Giuseppe, joo-sep'pe pe-at'se, Ital¬ ian astronomer: b. Ponte, Valtellina, Italy, 16 July 1746; d. Naples, Italy, 22 July 1826. He was educated in Milan, Turin and Rome, and appointed professor of mathematics at the Uni¬ versity of Malta in 1770, where he remained until its abolition in 1780. In the same year he accepted the chair of mathematics at Palermo, where, through his efforts, an observatory was established in 1789. Previous to its opening he made a journey to England where he established

friendly relations with the English astronomers Maskelyne, Herschel, Vince and Ramsden. At his new observatory he made important investi¬ gations, the results of which were published in 1792, and in 1801 he discovered the first of the planetoids known to science, which he named Ceres. Though it was visible for but a short time his observations were sufficient to com¬ pute its orbit so that it was found in the fol¬ lowing year. In 1803 he completed his first catalogue of the fixed stars, which contained 6,784 stars, and received a prize from the In¬ stitute of France at Paris, to which it was ded¬ icated. His second catalogue containing 7,646 was completed in 1814 and also received recogni¬ tion from the Institute at Paris. This catalogue has been of great and lasting value and Piazzi's observations are now being used in a new com¬ putation by modern methods. He also made

valuable discoveries concerning comets, and in 1817 was appointed chief director of the govern¬ ment observatory at Naples. His most import¬ ant work after his catalogue was (Lezioni ele- mentarii di Astronomia) (2 vols., Palermo 1817). The Kaiser hch-Kdnigliche Sternwarte, Vienna, has published in its IV-XII, Vienna 1841-51) a ejection of his observations under the title (Piazzis Beo- bachtungen, 1 792-1813.) Consult Edinburgh Journal of Science (Vol. VI, p. 193, Edin¬ burgh 1827), containing a list of his works; Grant, R., (History of Physical Astronomy5 (London 1852) ; Maineri, B. E., (L'Astronomo G. Piazzi5 (Milan 1871).

PICA, a genus of the Crow family; the magpie (q.v.).

PICA, the former name of a size of print¬ ing type now known as 12-point. It was used as a base or standard for all type measurement. Six picas square equaled one square inch. It was the double of nonpareil, which is now called 6-point. See also Printing. Consult De Vinne, T. L., (Plain Printing Types) (New York 1900) ; Legros, L. A., and Grant, J. C., typo¬ graphical Printing-Surfaces) (London 1916).

PICA, a perverted or morbid appetite for substances unfit for food, or incapable of diges¬ tion. It is most common in chlorosis and in pregnant and hysterical women. Some insane persons and idiots are subject to it, introducing into the stomach such articles as string, paper and cocoanut fibre. The perverted appetite causes persons having it to eat, with apparent relish, chalk, slate-pencils, coal, plaster, earth, clay pipes, stones, and even filth. Dirt and clay eating (geophagia) exists not only among sav¬ ages, but also in certain sections of the civilized world, mainly among the lower classes, although sometimes educated people indulge in it. In the case of an appetite for articles of a repulsive nature the disease is called coprophagy, or dung¬ eating. Physicians incline to regard the vitiated tendency of the appetite as a neurosis connected with the digestive system. It may in some in¬ stances be the outcome of habit resulting from the silly desire for notoriety; it may depend on a disordered condition of the brain ; may be caused by bad and insufficient diet and chloro- anaemia; by inflammation of the mesentery or <(the presence in the duodenum of numerous nematoid parasites.® It has been supposed that some of the substances eaten supply a deficiency in some of the ingredients of the ordinary food.

Horned cattle and sheep are also subject to pica. Prolonged eating of dirt, clay and other unusual substances usually produces emaciation, a protuberant abdomen and a sallow com¬ plexion. Sometimes there are serous effusions and hypertrophied liver and spleen. The treat¬ ment

consists in removal of the causes and the substitution of proper diet. See Bulimia.

PICARD, George Henry, American nov¬ elist : b. Berea, Ohio, 3 Aug. 1850 ; d. 7 Oct. 1916. Graduated Baldwin University, Berea, in 1869, and from the Cincinnati Medical College in 1877. He published (A Matter of Taste> (1887) ;

PICARD, Jean, zhon pe-kar, French as¬ tronomer: b. La Fleche, 21 July 1620; d. Paris, 12 July 1682. He took orders and became prior of Rifle in Anjou. He aided Gassendi in the observation of the solar eclipse of 25 Aug. 1645, and in 1655 succeeded to Gassendi's chair in the College de France. In 1666 he became one of the original members of the Academy of Sci¬ ences. He was the first to apply- the telescope to the measurement of angles ; improved instru¬ ments and methods; founded the Connaissance des T emps, an astronomical annual ; and by his efforts secured the establishment of the Univer¬ sity of Paris. But his principal achievement was the first exact measurement of a degree of the meridian, made in 1669-71 between Amiens and Malvoisine. In 1671 he made a voyage to the island of Uranienburg in connection with the astronomical observations of Tycho-Brahe. On 11 Jan. 1672 Oldenburg read before the Royal Society of London a letter from Paris describing Picard's method and the length of a degree as determined by him. It is probable that it was Newton's knowledge of this meas¬ urement that led him to regard his original con¬ jecture of gravitation as satisfactorily estab¬ lished. (See Newton, Sir Isaac). The follow¬ ing of his works have been published sepa¬ rately: (Degre du Meridien, entre Paris et Amiens, etc.5 (Paris 1740) ;

PICARD, Louis Benoit, loo-e be-nwa, French dramatist: b. Paris, 29 July 1769; d. there, 31 Dec. 1828. He went on the stage and began writing for it at the age of 18, and had his first play, (Le Bandinage Dangereux,5 a comedy, accepted in 1789. In 1791 his play (Encore des Menechmes5 gained for him repu¬ tation as a playwright. During the Revolution he acted in several of his plays. In 1800 he be¬ came director of the Louvois Theatre. In 1807 he was elected a member of the French Acad¬ emy. In the same year he was appointed di¬ rector of the Opera, but gave up this position in 1816 to become director of the Odeon where he continued until 1821. Though not a drama¬ tist of the first class, his plays, comedies in prose and verse, exhibit many pleasing char¬ acteristics. His style was easy, his power of invention considerable, his humor unforced, his dialogue very natural. He was a prolific writer, producing 94 comedies and seven novels. In some of the former he was assisted by col-

laborators. His novels were of small import¬ ance and added little, if anything, to his literary reputation. Among his best plays are Medio¬ cre et Rampant) (1797) ; (La Petite Ville) (1801); (Les Marionettes) (1807); ^'Intri¬ guant Maladroit) (1820). Part of his works were published in 1812. A full collection of them was published as (CEuvres de Picard) in 10 volumes (Paris 1821). Various selections have been issued: (GEuvres Choisies) (New York 1830) ; (Theatre de Picard5 (2 vols., Paris 1877) ; (Theatre Choisi de L. B. Picard5 (Paris 1881). Many of his plays have been translated into various foreign languages. Only two, how¬ ever, have been translated in English: (The Parasite, or the Art to Make One's Fortune5 (Philadelphia 1872) ; (The Rebound5 (trans. by B. H. Clark, New York 1915). Two of his plays — (Encore des Menechines5 and (Mediocre et Rampant5 — have been translated into German by Schiller, and from his German into English as (The Nephew as Uncle5 (by G. G. Harris, Leipzig 1856; by T. C. Wilkinson, Ipswich 1882) ; and (The Parasite, or, the Art to Make One's Fortune5 (by F. S. Nysson, Leip¬ zig and New York 1856; by J. S. S. Rothwell, Munich 1859). Of his novels only one has been translated into English as (The Gil Bias of the Revolution, or, the Confessions of Law¬ rence Giffard5 (3 vols., London 1825). Con¬ sult Dawson, J. C., (La Petite Ville5 (New York 1913) ; Lenient, Ch., (La Comedie en France au XVIIIe siecle5 (2 vols., Paris 1888) ; (La Comedie en France au XIXe siecle5 (2 vols., Paris 1898).

PICARD, a modification of Beghard; see Beguines; Religious Sects.

PICARDY;, France, an ancient province, now included in the department of the Somme and parts of the Pas-de-Calais, Oise and the Aisne. Amiens was the capital of the prov¬ ince. In 1435 Picardy was joined to Bur¬ gundy and in 1477 became a part of France. In the Great War of 1914-18 it was the scene of much of the fighting on the western front. The struggle initiated with the great offensive of the Germans on 21 March 1918 is known as the battle of Picardy.

PICARI.£E, a group of families of birds, variously limited by ornithological systematists. In its later significance, as established by Nitsch (1820) and substantially adopted by Sclater and the more recent writers, it included the rollers, hoopers, kingfishers, cuckoos, par¬ rots, trogons, woodpeckers, nightjars, owls, swifts, humming-birds and their immediate al¬ lies, which consequently are known as ((pica- rian55 birds. The still more modern group Coraciiformes nearly

conforms with it but omits the parrots and cuckoos. The group embraces more than 1,800 species, mainly trop¬ ical — most of the families being exclusively so. The group is fully discussed by Stejneger, (Standard Natural History5 (Vol. IV, 1885), and by Evans, (Cambridge Natural History5 (Vol. IX, 1900).

PICASSO, pe-kas'sd, Pablo, Spanish painter and sculptor: b. Malaga, 1881. Picasso is of the post-impressionist school and is famed as the founder of cubism. While eminent as a technician he has ever sought the psychical in form rather than the physical and regards color

only as to its light effects. His paintings and sculptures were exhibited at the Grafton Gal¬ leries, London, in 1912, and at the International Exhibition of Modern Art in New York in 1913. Consult Huneker, J. G., (The Pathos of Distance5 (New York 1913).

PICAYUNE, pik-a-yoon', a name derived from the Carib language and used in Louisiana for a small coin worth six and one-quarter cents, current in the United States before 1857 and known in different States by various names (fourpence, fippence, fip, sixpence, etc.). The word picayune has long been used, especially in the Southern States, in a slang sense to indi¬ cate a person or thing of slight value or small importance.

PICCADILLY, pik'a-dil-i, in London, a famous street extending for a mile between the Haymarket and Hyde Park corner. At its northern end is an open space known as Pic¬ cadilly Circus. Its western half is flanked on the south by the Green Park. In one part of Piccadilly are many fashionable residences and clubs, while another portion contains many handsome shops and stores. Many articles of wearing apparel have been named after Pic- adilly, from having been first offered for sale by haberdashers in this thoroughfare. Indeed, it is claimed that the very name of the street has a connection with this trade, though its origin is not absolutely established. About 1623 there was a Pickadilly Hall at the north¬ east corner of Haymarket and it is surmised that the owner of it had acquired his fortune by the sale of pickadillies, by which name the hems or collars worn with the costumes in vogue at the beginning of the 17th century were known. In its long history Piccadilly has seen many changes. In 1902 part of it was consider¬ ably widened. In spite of the fact that some of its historical houses have had to give place to improvement at various times, there are still many buildings left which possess great his¬ torical interest. Amongst these are Saint James's Church, built by Wren in 1682-84; Bur¬ lington House, part of which dates back to 1695, and which now houses the Royal Society and many other

scientific bodies as well as the Royal Academy of Arts; Devonshire House; Apsley House, the residence of the Duke of Wellington. At 139 Piccadilly Lord Byron passed part of his married life and his only daughter was born there. Of more modern houses there are the Museum of Geology; Pic¬ cadilly Hotel ; Royal Institute of Painters in Water Color; Prince's Restaurant; the Albany Chambers, long residence of many famous English writers ; the Burlington Arcade, the home of many fashionable shops. Among the clubs located in Piccadilly are the Naval and Military, formerly the house of Lord Palmer- stone, Junior Naval and Military, Badminton, Saint James's, Savile, Junior Athenaeum, Cav¬ alry and Lyceum. Consult Baker, H. B., Stor¬ ies of the Streets of London5 (London 1899) ; Besant, Sir Walter, (London of the 18th Cen¬ tury5 (London 1902) ; (London of the 19th Century5 (London 1909) ; (North of the

Thames5 (London 1911) ; Clinch, G., (Mayfair and Belgravia5 (London 1892) ; Hatton, E., (A New View of London5 (London 1708) ; Harrison, Walter, (A New and Universal His¬ tory, Description and Survey of the Cities of

London and Westminster, Etc.* (London 1776) ; Hunt, J. H. Leigh, (The Town, Etc.* (London 1848) ; Hutchings, W. W., (London Town,

Past and Present (London 1909) ; Hutton, Laurance, (Literary Landmarks of London * (London 1897) ; Jesse, J. H., (Literary and Historical Memorials of London) (Vol. I, London 1847) ; Lambert, B., (The History and Survey of London * (4 vols., London 1806) ; Lang, Andrew, (Piccadilly * (in Scribner's Magazine, Vol. X, p. 135, New York 1891) ; Lang, E. M., (Literary London * (London

1906) ; Lemon, M., (Up and Down the London Streets> (London 1867) ; Loftie, W. J., Lon¬ don City: Its History, Streets, Traffic) (Lon¬ don 1891) ; (New and Compleat Survey of London) (2 vols., London 1742) ; Skinner, R., (A New and Complete History and Descrip¬ tion of the Cities of London, Westminster, Etc.* (London 1796) ; Smith, J. F., (An Antiquarian Ramble in the Streets of London, Etc.1* (2 vols., London 1846) ; Stopes, C. C., (Early Piccadilly * (in Athenceum, p. 125, London, July 1901) ; Taylor, G. R. S., (An Historical Guide to Lon- don) (London 1911) ; Weir, W., Piccadilly* (in (London,* ed. by Chas. Knight, Vol. I, p. 297, London 1841) ; Welch, C., (Modern History of the City of London* (London 1896) ; Wheat- ley, H. B.,

(London, Past and Present* (Vol. Ill, London 1891) ; (Round About Piccadilly and Pall Mall* (London 1870).

PICCINNI, pet-che'ne, Niccolo, Italian musical composer: b. Bari, Italy, 16 Jan. 1728; d. Passy, near Paris, France, 7 May 1800. He studied at the Conservatory of San Onofrio at Naples and began to compose comic and serious operas, chiefly for the stages of Rome and Naples, with such success that for many years he was without a rival in Italy. In 1776 he ac¬ cepted an invitation from the French court and went to Paris. There he brought out the Poland of Quinault* (1778), which, notwith¬ standing the opposition of Gluck (q.v.) and his friends, was successful. Although Gluck and Piccinni were personally reconciled, yet the war between their respective admirers continued and in order to compare their merits, the two rivals composed the same subject, Hphigenia in Tauris) ; in this contest Gluck had the advan¬ tage. Piccinni was appointed teacher of vocal music in the Royal Singing School in 1784, but the Revolution deprived him of his appoint¬ ments and he returned to Naples. At first he was well received by the king, who granted him a pension. But before long he was, though without cause, suspected to hold revolutionary views. He was deprived of his pension and finally, though not actually sent to jail, re¬ strained under arrest at his own house. In 1798, however, friends succeeded in gaining him permission to return to Paris. Though he was received there with much kindness and was granted a small pension, the irregular pay¬ ment of the latter caused him frequent and serious financial embarrassment. His health, too, failed and he died in his 73d year as the result of a stroke of paralysis at Passy where he had gone in the hope to recover his health. His great success is now difficult to understand. He was very conservative, possessed little orig¬ inality, but withal was an accomplished and scholarly composer of pleasing music, which was always quite correct. He was a very

prolific worker and in the period of 40 years, from 1754-94, he composed 139 operatic works. His native town has honored his memory by erecting a statue in one of its most prominent streets. Consult Cametti, A., (Saggio Cronolog- ico (1754-94) delle Opere Teatrali di Niccolo Piccinni* (in (Rivista Musicale Italiana,* Vol. VIII, pp. 75-100) ; Ginguene, P. L., (Notice sur la Vie et les ouvrages de N. Piccinni* (Paris 1800) ; Le Brisoys Desnoiresterres, G., (La Musique Frangaise au XVIIIe siecle. Gluck et Piccinni. 1774-1800) (Paris 1872) ; Longo, A., (Gluck e Piccinni * (in (Soc. Reale di Napoli. Reale Accad. di Archeologia, Letters e Belle Arti,* N. S., Vol. V, pp. 311-332, Naples 1917) ; Thoinau, E., (Notes Bibliographiques sur la Guerre Musicale des Gluckistes et des Piccin- nistes> (Paris 1878).

PICCIOLA, pet'chd-la (((poor little one®), a story by Saintine (Joseph Xavier Boniface), a French author, born in Paris, 10 July 1798, and who died there, 21 Jan. 1865. It was pub¬ lished in 1836, ran through numerous editions, was translated into many languages and re¬ ceived from the Academy the Montyon prize. The tale is a simple and touching recital of the loving care bestowed by a prisoner of Na¬ poleon's time upon a plant growing between the stones of his cell and from his tender nam¬ ing of which the sketch takes its title. An in¬ fusion of it restores him from dangerous ill¬ ness and when he is released and leaves, the plant droops and dies.

PICCOLO, a small flute having the same compass as the ordinary orchestral flute, but producing sounds one«octave higher than the notes as they are written; it is also called the octave flute. Piccolo is also the name of an organ stop of two feet length giving a piccolo tone.

PICCOLOMINI, pik-ko-lom'e-ne, Italian family of Sienna. The two most celebrated members are: 1. PEneas Sylvius Bartholo- mˆeus, afterward Pope Pius II. (See Pius II). 2. Octavio, grand-nephew of the first : b. Amalfi, 1599; d. Vienna, 10 Aug. 1656. He served in the armies of the German emperor and became one of the distinguished generals in the Thirty Years' War. He was a favorite of Wallenstein, who entrusted him with a knowledge of his projects, when he purposed to attack the emperor. Nevertheless he made him¬ self the chief instrument of Wallenstein's over¬ throw, and after the latter's assassination (1634) was rewarded with a portion of his estates. After the battle of Nordlingen (1634), in which the Swedes were greatly weakened, he advanced with Isolani through Wurtemberg, over the Main. In the following year he was sent to aid the king of Spain against the French and delivered the Netherlands from the hands of the latter. His further successful campaigns in the Thirty Years' War induced Philip IV of Spain to beg the emperor to allow him to lead the Spanish armies. The request was granted and as a Spanish general Piccolomim again distinguished himself in the Netherlands, against both the French and the Dutch. The king of Spain rewarded him for his services with the duchy of Amalfi. During the vic¬ torious advance of the Swedes in 1648 he was recalled by the emperor and appointed, with the title of field-marshal, to the command of

the troops destined to oppose them. His mili¬ tary career was

concluded after a short cam¬ paign in the same year by the Peace of West¬ phalia. He is one of the principal characters in Schiller's trilogy of (Wallenstein,' to the sec¬ ond part of which he gives the title. Consult Weyhe-Eimke, (Ottavio PiccolominP (1871).

PICE, pTs, a small East Indian coin, value one-fourth of an anna or about three-quarters of a cent.

PICHEGRU, Charles, sharl pesh-grii,

French general: b. Arbois, department of Jura, 16 Feb. 1761; d. Paris, April 1804. He was for some time a tutor at the College of Brienne, but soon exchanged this profession for that of a soldier and served with a French artillery regiment. He was chosen the commander of a body of volunteers from Besangon to join the Army of the Rhine. He was rapidly advanced, and in October 1793 was appointed general-in-chief of the same army. In 1794 he was selected as the fittest man to command the Army of the North, then beaten and de¬ moralized. He defeated the enemy at Courtrai, Menin, Hoogelede, reduced to subjection Bruges, Ghent, Antwerp, Hertogenbosch, Ven- loo and Nijmegen, crossed the Maas and the Waal on the ice in the winter of 1794—95, sub¬ jugated Holland and entered Amsterdam in January 1795. Then he returned to Paris to enjoy his triumph. He was now at the height of his fame and was honored by the Convention with the title of savior of his country. Soon after he set out to take the command of the army of the Rhine and Moselle, but in this post displayed none of his former energy, and enter¬ ing into negotiations with the Bourbons was deprived of his command under suspicion of treason (1796). Having secured his election to the Council of Five Hundred, he was chosen its president (March 1797) and became the soul of the party hostile to the Revolution. He was proscribed and transported to Cayenne, but managed to make his escape the year follow¬ ing. In 1803 he was in London, and there he allied himself with George Cadoudal in a con¬ spiracy to assassinate Napoleon. Having gone to Paris for the purpose, he was captured by the police (1804) and committed to the Tem¬ ple prison, where he was found strangled 5 April. Consult the (Life' by Bouziers (1870) ; also Daudet, (La Conjuration de PichegriP

(1901).

PICHICIAGO, or PICHY-CIEGO. See

Armadillo.

PICHINCHA, pe-chen'cha, (1) a volcano in Ecuador in the western Cordillera right on the equator northwest of the city of Quito, which it destroyed in 1660 by an eruption. Since then it has been dormant. The mountain has five peaks, the highest measuring 15,918 feet above the sea ; the crater is nearly a mile across and is 2,500 feet deep — one of the deepest in the world. (2) A province of Ecuador, includ¬ ing the plateau of Quito and the ˆ.ndeati slopes, named from the volcano. Pichincha is said to signify <(boiling mountain.® The prov¬ ince is watered by the Perucho, which empties into the Pacific, and by the head-waters of the Napo. Area, 8,300 square miles; pop. (est) 215,000. Principal products, sugar, maize, indigo, cotton and fruit. Capital, Quito.

VOL. 22 — 5

PICHON, pe-shon, Stephen (Jean Marie),

French statesman : b. Arnay-le-Duc, 10 Aug. 1857. He received his education at the Uni¬ versity of Paris, studied medicine, but soon abandoned it for -journalism. In 1880 he be¬ came a member of the staff of La Justice, a journal owned by Georges Clemenceau. In 1882 Mr. Pichon became a member of the municipal council of Paris, and was several times its secretary. He became a member of the Cham¬ ber of Deputies in 1885 and was secretary of the Chamber in 1889-90. In 1894 he was ap¬ pointed Munster to Haiti, and subsequently served as Minister to Brazil, China and Tunis. In 1905 he was elected senator and in 1906 Clemenceau appointed him Minister of Foreign Affairs. He held the same portfolio in the cabinets of Briand 1910-11 and of Barthou in 1913. On the formation of Clemenceau's War Cabinet, on 16 Nov. 1917, Mr. Pichon again became Minister of Foreign Affairs and also became a member of the War Committee of the Cabinet. He was one of the French delegates to the Peace Conference.

PICHURIC ACID. See Lauric Acid.

PICIDiE, pis'i-de, the family name of the woodpeckers (q.v.) ; the typical sub-family is Picince ; and the typical genus Picus.

PICK, Bernhard, American Lutheran clergyman: b. Kempen, Prussia, 19 Dec. 1842; d. 10 April 1917. He studied in Berlin; gradu¬ ated, Union Theological Seminary, New York, in 1868. He was ordained in the Presbyterian ministry in that year, and held various import¬ ant charges, but in 1884 joined the Lutheran denomination, in which he afterward officiated. He was a learned Hebrew and rabbinical scholar, a contributor to McClintock and Strong's Schaff-Herzog and the

Jewish encyclopaedias; made numerous translations, and published (Luther as a Hymnist' (1875) ; historical Sketch of the Jews) (1887); (The Talmud: what it is and what it says about Jesus and the Christians) (1887) ; (The Extra-Canonical Life of Christ' (1903) ; (Hymns and Poetry of the Eastern Church ' (1908) ; (Remains of Gospels and Sayings of Christ' (1908) ; (Apocryphal Acts of Paul, Peter, John, Andrew and Thomas' (1909) ; translations of the Bible' (1913); (The Cabala' (1913); (Jesus in the Talmud' (1913). He was a member of the German Oriental Society, Leipzig.

PICKARD, Samuel Thomas, American journalist and biographer: b. Rowley, Mass., 1828; d. 1915. Mr. Pickard acquired the Transcript of Portland, Me., in 1852 and con¬ tinued its editor until 1894. He married a niece of John Greenleaf Whittier, by whom he was made his literary executor. Pickard was also appointed trustee of the Whittier home¬ stead and birthplace. His published works in¬ clude (Hawthorne's First Diary' (1897) ; (Whittier as a Politician' (1901); (Whittier Land' (1904) ; (Life and Letters of John Greenleaf Whittier' (1907) and numerous monographs and literary articles in newspapers and reviews.

PICKENS, pik'enz, Andrew, American sol¬ dier: b. Paxton, Pa., 19 Sept. 1739; d. Tomassee, S. C., 17 Aug. 1817. He removed with his par¬ ents to the Waxhaw Settlement, S. C., in 1752, was engaged in the Cherokee War of 1761, and

at the outbreak of the American Revolution was appointed a captain of militia, from which rank he rose to be brigadier-general. He de¬ feated General Boyd at Kettle Creek in 1779, was engaged in the battle of Stone Ferry in the same year, routed the Cherokees at Tomassee, and in 1781 so distinguished himself at the bat¬ tle of Cowpens that Congress voted him a sword. He compelled the surrender of the British forts at Augusta, Ga., fought under General Greene in the campaign of Ninety-six, and by a successful expedition against the Cherokees in 1782 gained from them a large strip of territory which later became a part of Georgia. In 1783-94 he was a member of the South Carolina legislature, and in 1793-95 served in Congress. He was a member of the State Constitutional Convention, a commissioner in many important treaties with the Indians, and was

again member of the legislature in 1801 and 1812.

PICKENS, Francis Wilkinson, American legislator and diplomat : b. Togadoo, S. C., 7 April 1805; d. Edgefield, S. C., 25 Jan. 1869. He was educated at the South Carolina College, admitted to the bar in 1829 and in 1832 elected to the State legislature. He was a member of the Nullification Party and an advocate of ex¬ treme State rights. In 1834-44 he was a mem¬ ber of Congress, from 1858-60 was United States Minister to Russia, and in the latter year was elected governor of South Carolina. He was prominent in the secession movement, de¬ manded the surrender of Fort Sumter and erected the batteries which caused the reduc¬ tion of that fort. He retired from public life in 1862.

PICKENS, Fort. See Fort Pickens.

PICK'EREL, a small pike (q.v.). PICKEREL-FROG. See Frog.

PICKERING, pik'er-mg, Charles, Amer¬ ican naturalist and physician, grandson of Timothy Pickering (q.v.) : b. Starucca Creek, Pa., 10 Nov. 1805; d. Boston, Mass., 17 March 1878. He was graduated from Harvard in 1823, from its medical department in 1826 and estab¬ lished a practice in Philadelphia. . In 1838-42 he was naturalist in the United States Explor¬ ing Expedition under Lieut. Charles Wilkes. In 1843-45 he traveled through Egypt, Arabia, East Africa and India, engaged in scientific research. He was a prominent member in the leading scientific societies of America and wrote (The Races of Man and Their Geographical Distri¬ bution J (1848) ; 'Chronological History of Plants ; Man's Record of His Own Existence Illustrated Through Names, Uses and Com- panionship) (1879) ; etc.

PICKERING, Edward Charles, American astronomer: b. Boston, Mass., 19 July 1846; d. Cambridge, Mass., 3 Feb. 1919. He was gradu¬ ated from Harvard in 1865, was instructor in mathematics at the Lawrence Scientific School there in 1865-67, accepted the chair of physics at the Massachusetts Institute of Technology in 1867, where he remained until 1877, after which he was professor of astronomy at Har¬ vard and director of the Harvard Observatory. He established the first physical laboratory in the United States ; constructed the first tele¬ phone receiver in 1870 and published the 'Elements of Physical Manipulation > (1874-76).

In Cambridge he made over 1,400,000 measure¬ ments of the light of the stars. Under his di¬ rection the endowments of the observatory in¬ creased seven-fold ; 250,000 photographs of the stars were taken;

70 quarto volumes of annals were published and a station was established in Arequipa, Peru, which supplemented the study for stars in all parts of the sky, and where over 240,000 photographs were taken. He was the recipient of numerous academic honors and was a member of various scientific societies all over the world.

PICKERING, John, American linguist and lexicographer, son of Timothy Pickering (q.v.) : b. Salem, Mass., 7 Feb. 1777; d. Boston, Mass., 5 May 1846. He was graduated from Harvard in 1796, studied law, was secretary of the legation at Lisbon in 1797 and in 1799 was private secretary to Rufus King, United States Minister to England. He returned to the United States in 1801 and after admission to the bar practised law in Salem until 1827 and then removed to Boston, where he was city solicitor in 1827-46. He served six terms in the Massachusetts legislature, was president of the American Academy of Science and first presi¬ dent of the American Oriental Society. He possessed a wide knowledge of European, Asian, Egyptian and American Indian languages, and published ‘Adoption of a Uniform Orthography for the Indian Languages* (1820) ; ‘Vocabu¬ lary of Words and Phrases Peculiar to the United States) (1816) ; ‘A Comprehensive Dictionary of the Greek Language * (1826), etc. Consult Pickering, M. O., ‘Life of John Picker- ing> (1887).

PICKERING, Timothy, American states¬ man; b. Salem, Mass., 17 July 1745; d. there, 29 Jan. 1829. He was graduated at Harvard in 1763, was admitted to the bar, became register of deeds for Salem County and displayed so great interest in military matters that he was commissioned lieutenant of militia in 1766 and became colonel in 1775. He was a prominent and active patriot, drew up the pamphlet called ‘State of the Rights of the Colonists) in 1773, and drafted the Salem protest against the Bos¬ ton Port Bill. In 1775 he wrote ‘An Easy Plan of Discipline for the Militia,* an able manual much used in Massachusetts and for the whole Continental army; and in December 1776 joined the Revolutionary army, meeting Washington in February 1777 and becoming adjutant-general. He fought at Brandywine and Germantown, was quartermaster-general, general 1780-85, and was present at Yorktown. At the close of the war he settled in the Wyoming Valley, where he organized Luzerne County. Pickering concluded a treaty with the Six Nations in 1791, was appointed Postmaster- General in that year and Secretary of War in 1795, founded the United States Military Acad¬ emy at West Point, and did much for the up¬ building of the navy. He was Secretary of State from December 1795 to May 1800, and after his retirement lived in some destitution on his property in Pennsylvania, whence he re¬ turned to Massachusetts. In 1803 he was elected United States senator and in

that ca¬ pacity as in his office of Secretary of State roused popular hatred by his extreme Federalist position. From 1812 to 1814 he was again out of public life, but was elected to Congress in

the latter year and to the Massachusetts Execu¬ tive Council in 1817. In the second war with England he was a leader of the New England opposition and favored the Hartford Conven¬ tion (q.v.). Consult the biography by Octavius Pickering, his son, and C. W. Upham (1867-73).

PICKERING, William, English publisher: b. 1796; d. Turnham Green, Middlesex, 27 April 1854. He was apprenticed to a bookseller at 14; was himself bookseller 1820-23; and in 1821 began to publish the famous Diamond Classics in 48mo. Of these there were 24 vol¬ umes,, including Shakespeare's Works, Walton's

PICKERING, William Henry, American astronomer: b. Boston, 15 Feb. 1858. He re¬ ceived his education at the Massachusetts In¬ stitute of Technology, where he became an instructor. Later he was appointed assistant professor at the Harvard Observatory. He led expeditions to observe the total solar eclipses of 1878 in Colorado, of 1886 in Gren¬ ada, British West Indies, of 1889 in Cali¬ fornia, 1893 in Chile and 1900 in Georgia. In 1890 he established the Southern Sta¬ tion of the Harvard Observatory at Are- quipa, Peru, and erected the first telescope and dome for the Lowell Observatory in 1894 at Flagstaff, Ariz. He also established a tem¬ porary observatory at Mandeville, Jamaica, British West Indies (1900), and a per¬ manent one there in 1911. While there he devoted his studies to the moon and Mars, indicating that both snow and vege¬ tation are to be found on the former. Monthly reports are issued regarding the latter. He has also made some notable mountain as¬ cents, and has published (Walking Guide to Mount Washington Range* (1882) ; Hnvestiga- tions in Astronomical Photography) (1895) ; (Visual Observations of the Moon and Planets) (1900) ; (An Atlas of the Moon) (1903); (The Moon* (1903); (Lunar and Hawaiian Physical Features Compared) (1906) ; Researches of the Boyden Department (1908) ; four volumes of (Annals of the Harvard College Observatory, * and over 200 articles in astronomical magazines. He is a member of various distinguished scientific societies.

PICKET, a wooden stake with a sharpened end, or sharpened at both

ends, used variously; in the war of 1861ˆ65 often employed to hinder the advance of cavalry. The United States cav¬ alry use a picket-pin, or short iron rod, which is thrust into the ground to hold a picket line or tether, to which the horses are attached for grazing. Also a guard posted in front of an army to give notice of the approach of an enemy ; an outlying picket. Also one of a com¬

pany of striking workmen chosen to watch the place of their late employment and discourage other workmen from accepting employment there.

PICKETING, the practice of placing pic¬ kets or strikers on watch over the premises of a factory or other place of employment where there is a strike. See Strike.

PICKETT, pik'et, George Edward, Amer¬ ican military officer: b. Richmond, Va., 25 Jan. 1825; d. Norfolk, Va., 30 July 1875. He was graduated from West Point in 1846, served in the Mexican War, especially distinguishing himself at Contreras, Churubusco and Chapulte- pec, and was promoted to the rank of brevet captain in 1847. He served later on the fron¬ tier in Washington Territory, and in 1856 occupied San Juan Island, where he prevented the landing of British troops and received the thanks of Congress for his services. In 1861 he resigned from the Federal army and joined the Confederate forces, becoming major-general in 1862. At Fredericksburg his division held the centre of Lee's line, and at Gettysburg in 1863 he made the gallant assault of Cemetery Ridge, famous as <(Pickett's charge.® (See Gettysburg). He later commanded the depart¬ ment of North Carolina, successfully defended Petersburg in 1864 and performed excellent service at Dinwiddie Court House and Five Forks. He engaged in business in Richmond after the war.

PICKINQ, Henry Forry, American naval officer: b. Somerset County, Pa., January 1840; d. Charlestown, Mass., 8 Sept. 1899. He was graduated from the United States Naval Acad¬ emy in 1861 and was assigned to the North At¬ lantic blockading squadron. He participated in the sinking of the Confederate Petrel, was en¬ gaged in the Monitor-Merrimac engagement, served in the East Gulf and the South Atlantic blockading squadrons, was promoted lieutenant in 1862 and in 1865 placed in command of the Nahant. After the war he continued in the service, became rear-admiral in 1898 and died while commandant of the navy yard at Charles¬ town.

PICKLE WORM, or PICKLE MOTH,

moth of the Pyralidae which is numerous in southwestern United States. It bores into cucumbers when they are about half developed and there lives in the larval state. Squash, melon and cantaloupe are also favorite feeding plants for this pest. The sole remedy for its abatement appears to be a thorough spraying with arsenic compounds before the fruit is grown and while the early generation of the pickle worm is feeding on the plant leaves.

PICKLES. Food that has been pickled, es¬ pecially cucumbers that are preserved in vine¬ gar. They are prepared by first washing in clean water, then soaking for a few days in brine, afterward drying them with a cloth or draining them, and finally putting them into the vessel in which they are intended to be pre¬ served and pouring in boiling vinegar until the vessel is quite full. Before the vinegar is poured in, spices are added. When the vege¬ tables that are to be pickled are naturally soft the vinegar is sometimes poured in cold. To preserve the color of vegetables that are natu¬ rally green the best means is to steep vine, cab-

bage, spinach or parsley in the vinegar. In many cases this is effected with much less trouble by boiling the vinegar in copper vessels, and thus forming an acetate of copper, or by directly adding that salt, which is green ; but this practice is a very injurious one, as the acetate of copper is poisonous. The vegetables most often pickled are cabbage, cauliflower, gherkins (young cucumbers), French beans, onions, walnuts, mushrooms and nasturtiums. Chile peppers and sweet peppers, olives and capers are the most common kinds of imported pickles, and mangoes are occasionally used. Meats are also sometimes pickled in brine. A diluted acid solution for cleaning metal cast¬ ings is termed a pickle or pickling solution.

PICKNELL, pik’nel, William Lamb,

American painter: b. Hinesburg, Vt., 30 Oct. 1854 ; d. Marblehead, Mass., 9 Aug. 1897. He went to Europe in 1874, where he studied with George Innes at Rome, and later at the ficole des Beaux Arts under Gerome. He settled at Pont Aven, Brittany, where he worked for five years under Robert Wylie and painted (Route de ConcarneauP a picture that established his position as an artist, won an honorable mention in the Salon of 1880 and now hangs in the Corcoran Art Gallery. His later life was spent in Annisquam, Mass., and France. He

was a landscape painter of poetic qualities, with a feeling for atmospheric effects. Subjects found along the coast chiefly attracted him. His pic¬ tures are to be found in the galleries of Bos¬ ton, New York, Brooklyn, Pittsburgh and the Luxembourg, Paris.

PICKWICK PAPERS. «The Posthumous Papers of the Pickwick Club,® issued in 20 monthly numbers, began to appear the last of March 1836, and were concluded in November 1837. They were the work of a young man but 25 years old, who had hitherto written noth¬ ing more than a group of sketches dealing mainly with London life. A firm of London publishers, Messrs. Chapman and Hall, was then projecting a series of <(cockney sporting plates® by Robert Seymour, a rather clever ar¬ tist. There was to be a club, the members of which were to be sent on hunting and fishing expeditions into the country. Their guns were to go off by accident ; fishhooks were to get caught in their hats and trousers ; and all these and other misadventures were to be depicted in Seymour's comic plates. At this juncture, Charles Dickens was called in to supply the letterpress — that is, the description necessary to explain the plates and connect them into a sort of picture novel such as was then the fashion. Though protesting that he knew noth¬ ing of sport, Dickens nevertheless accepted the commission ; he consented to the machinery of a club, and in accordance with the original design sketched Mr. Winkle who aims at a sparrow only to miss it. Seymour dying, other artists took his place; but from the very first Dickens was the master. Only in a few in¬ stances did he adjust his narrative to plates that had been prepared for him. He himself led the way with an instalment of his story, and the artist was compelled to illustrate what Dickens had already written. The story thus became the prime source of interest, and the illustrations merely of secondary importance.

By this reversal of interest, Dickens trans¬ formed, at a stroke, a current type of fiction, consisting mostly of pictures, into a novel of contemporary London life. Simple as the proc¬ ess may appear, others who had tried the plan had all failed. Pierce Egan partially succeeded in his (Tom and Jerry, } a novel in which the pictures and the letterpress are held in even balance. Dickens, his genius working silently and perhaps unconsciously, won a complete triumph.

To begin with, Dickens had no other aim than to amuse the public month by month. There was in his mind no thought of a novel with a plot to be worked out to a logical con¬ clusion. The first number, of which onlv 400 copies were bound, awakened only moderate interest. But all was changed with the introduction of Sam Weller in the fifth number; and by the time the fifteenth num¬ ber was reached, the

printer was binding 40,000 copies. People of every class and every age bought or borrowed Pickwick. c< All the boys and girls,® Miss Mitford wrote of Dickens, ((talk his fun — the boys in the streets; and yet those who are of the highest taste like it the most.® Doctors read the book while rid¬ ing from patient to patient, and judges read it while juries were deliberating. The fact is,

Wilbur L. Cross.

PICO, pe'ko, an island of the Azores (q.v.) group; it is 25 miles long with an area of 175 square miles. It is crossed by a volcanic ridge which terminates in the peak, El Pico, 7,613 feet in height, flhe island is well wooded and fertile; but earth had to be brought from Fayal to cover or enrich the lava. Now the slopes are covered with vegetation, especially vines,

and the island exports an excellent wine. The chief town is Villa-di-Laguna. Pop. 15,138.

PICO DELLA MIRANDOLA, Giovanni,

jo-van'ne pe'ko del'la me-ran'do-la, Count of Mirandola, surnamed the ˆPhoenix,® Italian humanist : b. Mirandola, 24 Feb. 1463 ; d. Flor¬ ence, 17 Nov. 1494. He undertook the course in canon law at Bologna, but repugnance to the study and an inclination to philosophical and scientific subjects led him to visit the different parts of Italy and France for the purpose of observation and to attend the lectures of the most distinguished professors. In 1484 he went to Florence, where he became a member of the Platonist group known as the (< Academy. w In 1486 he proposed 900 theses on all subjects, which he declared himself ready to defend, ac¬ cording to the custom of the times, in public. No one ventured to appear against him, and the envious endeavored to implicate him in a charge of heresy. Innocent VIII forbade the reading of the propositions, and Pico withdrew to France. He was absolved, however, from any suspicion of heresy by Alexander VI. Having next applied himself to the study of Biblical literature he published the fruits in (1858) ; Pater, (Studies in the History of the Renaissance* (1873).

PICO DE TEIDE, pe'ko da ta'e-fhe. See Teneriffe, Peak of.

PICOLINE, in chemistry, a base CsHtN, isomeric with aniline and

closely related to pyridine, obtained from bone oil, coal-tar, naphtha, etc., the name being derived from Latin, pix, pitch, and oleum, oil. It is a color¬ less, mobile, very pungently odorous liquid, with an alkaline reaction and a boiling point of 135° C. One variety is very corrosive, with choking vapors ; it quiets the excited nerve cen¬ tres if used as a hypodermic injection.

PICOT, Frangois, fran-swa pe-ko, French painter: b. Paris, 1786; d. there, 15 March 1868. He was a pupil of Vincent and his early reputa¬ tion was won by his large picture (Cupid and Psyche) ; which was followed by (Raphael and La Fornarina) ; and an (Evening Landscaped His (Death of Sapphira,* also an early work, is in the church of Saint Severin at Paris. The French government purchased for the Luxem¬ bourg Gallery his (Orestes Sleeping in the Arms of Electrad He painted a and the (Fall of Pompeii and Hercu- laneumd His colossal figure of < Christˆ in the church of Saint Vincent de Paul at Paris is in the Byzantine style. He, however, met with much greater success as a teacher of painting than as a painter.

PICOT, Georges, zhorzh pe-kd, French historian and jurist: b. Paris, France, 24 Dec. 1838; d. 1909. He studied law, was appointed a judge in the Seine tribunal in 1865, and in 1877 accepted a post in the Ministry of Justice. He was editor of Le Parlement and in 1878 suc¬ ceeded Thiers at the Academy of Moral and Political Sciences, where he became permanent secretary in 1896. Among his publications are ‘Recherches sur la Mise en Liberte sans Cau¬ tion * (1863) ; (Histoire des Etats Generaux* (1872) ; (La Reforme Judiciare > (1881) ; decentralisation et ses Differents Aspects) (1897) ; (L’Institut de France > (1907), etc.

PICPUS, Society or Congregation of, a

religious association founded in Paris, 1805, by Pierre Coudrin, priest. The associates were to devote themselves, as a protest against the pre¬ vailing unbelief, to the perpetual adoration of the Blessed Sacrament ; they were also to pre¬ pare candidates for the priesthood and for serv¬ ice in the foregin missions. The mother house was the conventual building of the original congregation of Picpus, a Franciscan fraternity. They had charge of seminaries in various parts of France. In 1825 they sent six of their priests to the mission in the isles of the Pacific, and those islands have ever since been the field of their missionary labors. They have two houses in the United States, at Olema, Cal., and Fair- haven, Mass.

PICQUART, Georges, zhorzh pe-kar, French soldier, prominent in (

in the Rennes trial of 1899. At the retrial of the case 19 June-12 July 1906, he was acquitted of all charges, subsequently promoted brigadier- general and in October 1906 became Minister of War in the cabinet of M. Clemenceau, where he remained until 1909. See Dreyfus.

PICQUET. See Piquet.

PICRATE. See Piric Acid.

PICRIC ACID, or TRINITROPHENOL,

C6H2OH3(l, 2, 4, 6), was discovered by Woulfe in 1771. It is formed by the action of nitric acid on indigo, wood, silk, leather, aloes, resins, and many derivatives of benzene. On a commercial scale picric acid is manufactured from phenol by first treating it with sulphuric acid. The sulphonic acid produced in this way is diluted with water to 30° Be. and heated with steam. Phenol para-sulphonic acid is pro¬ duced under these conditions which yields picric acid when it is nitrated with about 3.5 times its weight of nitric acid of 40° Be. The crys¬ tals obtained on cooling the reaction mixture are washed, and further purified by recrystalli¬ zation from hot water. A product of high purity may be obtained by converting the com¬ pound into the sodium salt and reprecipitating it with excess of hydrochloric acid. Very pure picric acid has been obtained directly by the nitration and subsequent hydrolysis of chloro¬ benzene, the reagents used being crude sodium nitrate and commercial sulphuric acid. Picric acid may also be prepared by the oxidation of trinitrobenzene, or, the nitration of diazoben¬ zene sulphonic acid.

Picric acid is a yellow, crystalline sub¬ stance with a melting point of 122.5° C. With many metals it forms salts which are highly explosive. It is not very soluble in cold water, but will readily dissolve in alcohol, ether, ben¬ zene and other solvents. Solutions of picric acid, especially those of its alkaline salts, show an intense yellow coloration. Picric acid is a violent explosive but does not readily explode on mere heating. Under ordinary conditions the application of heat may either cause rapid combustion, or sublimation with the liberation of yellow, irritating vapors. The acid will ex¬ plode with violence when dropped upon a red- hot plate. Disastrous explosions in picric acid factories are on record. These have in all probability been caused by metallic picrates present as impurities in the acid, or, by the combustion of picric acid dust produced during the grinding of the dry compound. The acid can be handled with perfect safety, and can even be transported as an ordinary chemical when it contains 20 per cent of water.

Picric acid is extensively employed as a powerful explosive. Melinite, Lyddite, Shimo- site, Emmensite, etc., are mixtures of the acid with small quantities of gun-cotton. On ac¬ count of their great

sensitiveness metallic pic¬ rates are sometimes mixed with chlorates or nitrates and employed as detonating charges for shells. Picric acid has been used as a dye for silk and wool. In an acid bath it imparts an intense yellow color to these fibres. Although the acid is not used as a dye at the present time, it is sometimes mixed with other dyes for the production of shades of scarlet, green or * yellow. In the laboratory picric acid is a valu¬ able reagent since it forms well crystallized and difficultly soluble compounds with a number of

organic bases. Picric acid has also been used by brewers for the purpose of imparting bit¬ terness to beer. In large doses the acid behaves as a poison, causing purging, vomiting and col¬ lapse, although small quantities have been em¬ ployed with success in the treatment of eczema, erysipelas and in diseases of the skin and hair. Solutions of varying strengths have also been highly recommended in the treatment of burns.

V. S. Babasinian, Professor of Leliiqh University.

PICROMERITE, a monoclinic mineral occurring as crystals and crystalline incrusta¬ tions, a compound of hydrous sulphate of magnesium and potassium. It is found in the crater of Vesuvius and also in the salt mines of Stassfurt.

PICROTOXIN, a poison, C30H34O13 (or possibly C12H14O5), extract from the Indian berry, the fruit of the East Indian Anamirta cocculus or paniculata, by treating with hot alcohol the powdered seed. The alcohol is dis¬ tilled, the residue boiled with water to which the acetate of lead has been added and the solu¬ tion then evaporated. The crystals, white or transparent prisms or rays grouped in star-like forms, are very bitter to the taste, are odorless, inalterable in the air, insoluble in the essential oils, but soluble in cold water (150 times its bulk), boiling water (25 volumes), alcohol (3 volumes), or ether (2l/2 volumes), and are one of the most violent convulsive poisons known, closely resembling strychnine in their action. The poison brings death by asphyxia¬ tion after severe convulsion and is bulbo- medullary and not cerebral in its action. Mor¬ phine and chloral hydrate are the antidotes, but neither seems to have antidotic force if the original dose is much above the mortal mini¬ mum. In therepeutics picrotoxin is practically unused, though it is claimed to be valuable in epilepsy, chorea, chronic constipation, etc.

PICTET, pek-ta, or pe-ta, Adolphe, Swiss scholar and linguist: b. Geneva, 11 Sept. 1799; d. there, 20 Dec. 1875. He studied in Paris, Scotland and Germany; in 1838 became profes¬ sor of aesthetics and

philology in the University of Geneva; and wrote (Du Beau dans la Nature, l'Art, et la Poesie) (1856), (Les Origines indo- europeennes> (1859-63), and on the relation of Celtic to Sanskrit. He invented a percussion howitzer shell used by the Austrian army.

PICTET, Raoul, Swiss .physicist : b. Ge¬ neva, June 1842. He was professor in Geneva for a time, but removed to Berlin. In 1877 he liquefied oxygen, nitrogen and hydrogen ; pub¬ lished a memoir on that subject in 1878; and also wrote (Synthese de la ChaleuD (1879), (Nouvelles Machines frigorifiques> (1885), (Le Materialisme et le Spiritualisme par la Physique experimental (1896),

PICTON, pik'ton, Sir Thomas, English military officer: b. Poyston, Pembrokeshire, Wales, August 1758; d. Waterloo, Belgium, 18 June 1815. He entered the army at 13, served at Gibraltar, and in 1794 went to the West In¬ dies, where he distinguished himself at Saint Lucia, Saint Vincent, Martinique and Trinidad, and in 1797 was appointed governor-general of the last-named island. In 1801 he became

its civil governor and was promoted brigadier- general. He served in the Peninsular War under Wellington, received rank as lieutenant-general in 1813, was engaged with Ney at Quatre Bras in 1815 and was killed while lead¬ ing a charge at Waterloo.

PICTON, Canada, town in Prince Edward County, province of Ontario, on an arm of the Bay of Quinte, about 36 miles southwest of Kingston. It has steamboat connection with the larger cities of the Dominion. Pop. 3,564.

PICTONES, pik'ton-ez, or PICTAVI

(Pictones , Pictdvi), the ancient inhabitants of a region in Aquitanian Gaul, the French prov¬ ince of Poitou, which is now for the most part comprised in the Department of Vienne; the chief town of the Pictones was Pictava, modern Poitiers; before the Roman conquest of Aquitania its name was, as rendered by the Latins, Limonum.

PICTOR. See Equuleus.

PICTORIAL COMPOSITION. See Art

Drawing.

PICTORIAL REPRESENTATION. See

Art Drawing.

PICTOU, pik'too', Canada, a port of entry and capital of a county of the same name, Nova Scotia, 85 miles northeast of Halifax, on a branch line of the Intercolonial Railway. The town was settled in 1763 and occupies the site of an Indian village. Pictou Academy, or¬ ganized in 1818, is its chief institution. There is a flourishing motor boat industry. The harbor is safe and commodious and an active export trade is carried on in the coal and build¬ ing stone of neighboring mines and quarries, in agricultural produce and fish. Pictou Island lies about six miles outside the harbor. Pop. (estimated) 3,179.

PICTS. See Scotland.

PICTURED ROCKS, in Michigan, sand¬ stone cliffs about 300 feet in height, extending along the coast of Alger County, on the south shore of Lake Superior, about 43 miles east of Marquette. They are varied in color and form, quaint designs have been carved upon them by the elements and a number of waterfalls still continue the work of change. The cliffs are about five miles long. Longfellow, in his In¬ dian tale of Hiawatha, locates the wigwam of Nokomis at Munising Harbor, among the Pic¬ tured Rocks.

PICTURES OF TRAVEL (Reisebilder), the most famous of the prose works of Hein¬ rich Heine. It was published in four parts, 1826-31, and the appearance of the first book of these sketches marked an epoch in the de¬ velopment of German literature. It was read with avidity by the public and so strong was its influence that it gave the first serious check to a prevailing tendency in the world of let¬ ters — the romantic tendency. The power of the Romantic School was broken by the vivid realism of Heine's (Hartz Journey.5 The keen observation of the great lyrist and satirist, his brilliant searching criticisms of men and insti¬ tutions, his stinging sarcasms poured out on existing conditions, were entirely opposed to the spirit of Romanticism, and its author at¬ tained at once to almost as widespread a rec¬ ognition as he was ever to reach among his

countrymen. The brilliancy and bitterness, the sweetness and the mockery, of his strange na¬ ture, are all brought into play in this, his first prose work of significance.

PICUDA, a fish. See Barracuda.

PICUL, a Chinese weight of about 140 pounds ; the same as tan. It is divided into 100 catties, or 1,600 taels. Also spelled pecul and pecal.

PICUS, pi'kus (Lat., the woodpecker), in the most ancient mythology of the Sabines, Lat¬ ins and Etrurians, the sacred bird of the god of the upper atmosphere, of the land and agricul¬ ture, sender of rain, giver of fertility. This god was Mars, Mavors or Marspiter (Mars pater, father Mars), who afterward was sup¬ planted by the more than half-Grecian god Jupi¬ ter (father Jove), while Mars or Mavors was assimilated to the Grecian god of war, Ares. The Latin god Mavors gave oracles by means of the noises made by the woodpecker tapping on the trees. In the confusion of the diverse mythologies, Sabine, Roman, Latin, Etrurian, the woodpecker, Picus became a form of the god himself, or son of the god and a famous hero, king of Latium, and father of Faunus.

PIDAL, pe-dal, Ramon Menedez, Spanish philologist, critic and educationalist : b. Coruna, 13 March 1869. Educated at the universities of Madrid and Toulouse he became professor of Roman philology at the former university (1899). His markedly critical mind, his mas¬ tery of the French tongue and his extensive writings soon won for him an international reputation and he was invited to lecture in the universities of various foreign countries, prin¬ cipally those of South America. He has also given courses of lectures in Johns Hopkins University (1909), the Turnbull lectures; and in most of the universities of Spain. He also delivered the Hispanic Society lectures at Columbia University in 1909. Thus he came to be recognized as one of the foremost and most progressive educationalists in Spain. Shortly after the formation of the Junta para Ampli- acion de Estudios (a board created in 1907 for the extension and improvement of uni¬ versity studies throughout Spain), he became a member of the organization and director of its summer session ; and in 1913 Counselor of Public Instruction in Spain. His services in these and other educational and literary capac¬ ities gained for him membership in practically all the noted literary organizations of his native country, among them being the Royal Academy of History, Madrid, and the Academia Real de la Lengua; and also of the Hispanic Society of America. The Academia Real de la Lengua crowned his (Gramatica y vocabulareo de poema del Cid,5 and the same honor was extended to his (Leyenda de los infantes de Lara5 by the Royal. Academy of History. In the field of Spanish philology he occupies a distinguished place which may be said to make him a noted specialist in his line of work. Among his published works are (L'Epopec castillane a travers la

litterature espagnole5 (his Turnbull lectures, 1910) ; (E1 Romancero espanoP (His¬ panic Society Lectures at Columbia) ; (Gra- matica Historica Espanola5 ; (Leyenda de abad Don Juan de Montemayor5 ; (Primera cronica general5; (Cantor de mio Cid5 (3 vols., 1908-

11); (Cancionero de romances impreso en Amberes sin Ano) (1914).

PIDAVRO. See Epidaurus.

PIDDIG, pe-deg', Philippines, pueblo, province of Ilocos Norte, Luzon; on the Guisi River, near its junction with the Pagsan ; nine miles east of Laoag, the provincial capital. It is connected with Laoag and other towns by wagon road. Pop. 10,850.

PIDDOCK, the British name for certain edible species of mollusks of the genus Pholas. See Date-shell.

PIDGIN, pij'in, Charles Felton, American statistician and novelist : b. Roxbury, Mass., 1 Nov. 1844. He was in mercantile employment in Boston 1863-73, becoming in the latter year chief clerk of the Massachusetts bureau of statistics of labor. He has invented several machines for the mechanical tabulation of sta¬ tistics, among them the electric adding and multiplying machine, addition register and type¬ writer tabulator. He has published Practi¬ cal Statistics) (1888) ; 'Quincy Adams Sawyer) and (Mason's Corner Folks) (1900) ; 'Blenner- hassett) (1901) ; (Stephen Holton) (1902) ; 'The Climax) (1902); (Little Burr) (1905); 'Theo¬ dosia) (1907) ; 'Labor, or the Money God' (1908) ; 'Further Adventures of Quincy Adams Sawyer) (1909) ; 'Chronicles of Quincy Adams Sawyer, Detective) and 'The House of Shame) (1912) ; 'The Courtin') (a comic opera, 1913). He has also composed several musical works, among them 'CambysesC a grand opera, and 'Peck's Bad Boy,) a musical comedy. He is also the author of some 35 songs.

PIDGIN, or PIGEON, ENGLISH, a

form of "business English)) ; a conglomeration of English and Portuguese words wrapped in a Chinese idiom, used by English and American residents in China in their intercourse with the natives. It accommodates the Chinese inability to sound the r, which is always /, and it adds the long e or ee (double e) after consonants that trouble the Chinese tongue. Thus price becomes "plice,)) and wash is

“washee.)) Some pidgin English has drifted into American use as “chow-chow,)) meaning food, or as a verb, to eat; and “savey,® which is accepted slang for know.

PIED (pid) PIPER OF HAMELIN,

The, according to a legend a magician who promised to rid the town of Hamlin from rats for a stipulated sum of money. He performed his task by playing on his pipe as he walked to the river and the rats, following the music, were consequently drowned. On the citizens then refusing to pay the money the piper took up his pipe once more and led the way out of the town followed by 130 children. On ar¬ riving at a hill known as the Koppenberg they all entered the hill and vanished from, sight. In the Hamelin Rathaus the event is recorded and it was long supposed to be historical. Browning’s poem, ‘The Pied Piper of Hame¬ lin) (1842), is based on this tale.

PIEDMONT, ped’mont (Italian, Piemonte, “Country at the Foot of the Mountains))), Italy, a compartment including the provinces of Cuneo, Alessandria, Novara and Torino. It is sepa¬ rated from France and Switzerland by the Alps. It was a part of France from 1797 to 1814, and

was at one time the chief part of the kingdom of Sardinia (q.v.). In 1911 there were 26,332 industrial establishments in the territory, giving employment to 342,354 people. Silk culture is a flourishing industry. Farming is carried on mainly on shares, the tenant dividing with the proprietor. The area is 11,331 square miles; pop. 3,508,626. See Italy.

PIEDMONT, Battle of. After the battle of New Market (q.v.), 15 May 1864, General Sigel was relieved, and 21 May General Hunter was assigned to the command of the Union forces in the Shenandoah Valley. The com¬ mand in the field consisted of Gen. J. C. Sulli¬ van’s division of infantry, two brigades, under Colonels Moor and Thoburn ; Gen. J. Stahel’s division of cavalry, two brigades, under Colonels Tibbits and Wynkoop, and five batteries of ar¬ tillery. With this force of 8,500 men and 21 guns, Hunter broke camp on Cedar Creek on the 26th to move on Staunton and Lynchburg, marched to Woodstock, and thence to Harrisonburg, where, 2 June, he learned that General Imboden was at Mount Crawford, eight miles distant, barring the direct road to Staunton. He avoided Imboden by passing his right by way of Port Republic. From his camp one mile south of Port Republic he advanced early on the morning of the 5th on the Staunton road, met the Confederate cavalry at 6 a.m., and drove them after a sharp

skirmish,, with a loss of 75 men killed, wounded and missing. At Piedmont, seven miles southwest of Port Re¬ public, Hunter found Gen. W. E. Jones with a Confederate force of 6,000 men and 12 guns, strongly posted, his left resting on Middle River, a tributary of the Shenandoah. Line was formed ; Moor's brigade on the right; Thoburn's on the left; Wynkoop's cavalry massed in rear of Moor. Hunter's artillery opened at 9 a.m., and after a fire of less than two hours Moor at¬ tacked the Confederate left and drove the first line back on the second, which was on a curving ridge of heavily wooded hills, and on reaching which Moor was checked and fell back with some loss, the Confederates following, but soon checked in turn by Moor, aided by the cross¬ fire of three batteries. Meanwhile Thoburn had crossed a ravine to gain the Confederate right flank. Securing an advantageous position, he made a charge on the woods and heights; there was a fierce struggle, in which bayonets and clubbed muskets were used on both sides; Moor and Wynkoop co-operated in the attack; and the Confederates abandoned their position in great disorder, leaving General Jones dead on the field, with more than 1,000 prisoners, in¬ cluding 60 officers. In killed and wounded the Confederate loss was about 600. The next day Hunter captured 400 sick and wounded. Three guns, several battle-flags, and a large number of small arms were captured. Hunter's loss was 420 killed and wounded. General Vaughn, who succeeded Jones in command, fled with not over 3,000 effective men to Waynesboro, and abandoned Staunton. Hunter marched to Staunton on the 6th, where he was joined on the 8th by Generals Crook and Averell, who had marched from West Verginia, with 10,000 men, raising his force to 18,000 men, with 30 guns. He destroyed much public property in Staunton, broke the railroad several miles east and west of it, and on the morning of the 10th

marched for Lynchburg. Consult 'Official Records' (Vol. XXXVIII) ; Pond, 'The Shen¬ andoah Valley in 1864) ; The Century Company's 'Battles and Leaders of the Civil War' (Vol. IV).

PIEDMONT ALLUVIAL PLAINS. See

Alluvial Fans.

PIEDMONT PLAIN, the name given to that part of the Atlantic coastal plain, in the United States, which lies between the Appa¬ lachian highland and the coastal plain proper. This plain is well defined in the

Southern States, but not so distinct in New England. It is near¬ est to the ocean in New York; in North Caro¬ lina it is about 300 miles wide. It is crossed by deep river valleys, and is seamed with rug¬ ged gorges, and water beds. The rock is harder and older than in the coastal plain proper, be¬ longing chiefly to the Pre-Cambrian. The “fall line,® or escarpment over which the Atlantic rivers fall and form cascades and rapids, marks the change from the hard rocks of the Pied¬ mont to the softer rock formations of the Coastal Plain.

PIEDS PUIDREAUX, pe-a pwe-dro. See Piepowder Court.

PIEGAN (pe’gan) INDIANS, an Amer¬ ican tribe of the Algonquin family. Some 2,000 of them reside on the Blackfoot Reservation in northern Montana. They are members of the Siksika confederacy, being associated with the Siksikas, Bloods and other tribes. They are a very peaceable people and crime is almost un¬ known among them.

PIEHL, pel, Karl, Swedish Egyptologist ; b. Stockholm, 30 March 1853; d. 1904. He was educated at Upsala, where he became docent of Egyptian languages in 1888, and in 1893 pro¬ fessor upon a special grant by the Riksdag. He published ‘Inscriptions hieroglyphiques’ (1884- 99), ‘Petites Etudes egyptologiques’ (1881), ‘Dictionnaire du Papyrus Harris Nr. U (1882), and many contributions to archaeological period¬ icals. In 1896 he became editor of Le Sphinx, an Egyptological journal.

PIENG-AN. See Ping-Yang.

PIENO (Ital., meaning full), a term often used in music as equivalent to tutti, grande or grossi, to signify employment of all the instru¬ ments of an orchestra; sometimes it is used with coro, as pieno coro, full chorus.

PIEPER, Franz August Otto, American Lutheran theologian: b. Carwitz, Pomerania, Germany, 27 June 1852. Coming to the United States, he was graduated from Northwestern University, Watertown, Wis., in 1872, and from Concordia Seminary in 1875. He held a Lu¬ theran pastorate at Manitowoc, Wis., 1875-78, was professor of theology at Concordia Sem¬ inary 1878-87, and president of the latter insti¬ tution since the year last named. Among his many ‘published works are ‘Lehre von der Rechtfertigung) (1889); (Wie studiert man Theologie?) (1898) ; ‘Lage der Kirche am Anfang des 20 Jahrhunderts) (1901); ‘Die Grunddifferenz’ (1904) ; Conversion and Elec¬ tion (1913).

PIEPOWDER (pi'pow-der) COURT, or PIERPOUDRE COURT, a court formerly set up at fairs and markets in England for the summary administration of justice in cases aris¬

ing there. It is also called the Court of Dusty Foot, which has the same meaning as pie¬ powder (a corruption of the French pied pau- dreux) , and probably got its name from the fact of its being chiefly resorted to by peddlers and wayfaring persons, to whom the name of pieds puidreaux was given in Old French.

PIER, Arthur Stanwood, American novel¬ ist: b. Pittsburgh, 21 April 1874. He was grad¬ uated from Harvard in 1895, and has been an assistant editor of the Youth's Companion from 1896. He has published 'The Pedagogues' (1899) ; 'The Sentimentalists' (1901) ; 'The Triumph' (1903) ; 'Boys of Saint Timothy's' (1904) ; 'The Ancient Grudge' (1905) ; 'Hard¬ ing of Saint Timothy's' (1906) ; 'The Young Mr. Heart' (1907); 'The New Boy' (1908); 'The Crashaw Brothers' (1910) ; 'The Jester of Saint Timothy's' (1911) ; 'The Story of Harvard' (1913) ; 'The Women We Marry' (1914); 'Grannis of the Fifth' (1914).

PIER, in engineering , a structure extending out from the land into the water, adapted to form a landing place for passengers or mer¬ chandise from ships which float in the deep water alongside the pier or wharf ; a mole or jetty. Many large and commodious piers have been built at watering places to receive incom¬ ing visitors and these are often fitted up with booths, bandrooms, dancing pavilions, etc. They are variously constructed. Some are founded on piles, with cross timbers, braces and sheath¬ ing; floor timbers affording a road for the traffic. The wooden structure is sometimes filled up with stone, like a dike; at other times it is of the nature of trestle work. The name is extended to any plain single mass of masonry supporting a large structure, as a bridge pier, foundation pier. A section of a brick or stone wall between windows is also termed a pier, whence comes the term pier-glass, for a long mirror suited to such a position. See Founda¬ tions; Dock; Mole; Wharf.

PIERCE, pers, Franklin, 14th President of the United States (1853-57) : b. Hillsboro, N. H., 23 Nov. 1804; d. Concord, N. H,, 8 Oct. 1869. His father, Benjamin Pierce (1757-1839), served in the Revolutionary War, was member of the State legislature 1789-1801, and from 1803 to 1809. He was a Democrat in politics, an active public-spirited man, and governor of New Hampshire from 1827 to 1829. His son, therefore, was brought up in an atmosphere of public service. Franklin Pierce was educated at various academies, Hancock, Francestown and Phillips Exeter, entered Bowdoin College, Maine, 1820, and had as

classmates Longfellow and Hawthorne. He graduated third in his class in 1824 and studied law for the next three years, first with Levi Woodbury at Ports¬ mouth, then at the law school of Judge Howe at Northampton, Mass., and finally with Judge Edmund Parker at Amherst, N. H. He was admitted to the bar in 1827 and entered politics almost immediately as a Democrat. In 1829 he was elected as a representative to the State legislature, and in 1832 was made speaker. In 1833 he entered Congress, became a close friend of Jackson and sustained him in important con¬ tests. His career in the House of Representa¬ tives during the next four years was unevent¬ ful, because most of his work was done in the committee-room. He rarely made a speech,

and then not on the most important questions. He spoke 27 Feb. 1834, against the bill on the subject of Revolutionary claims, on the ground of economy and justice; and on 30 June 1836 against the bill making appropriations for the United States Military Academy, on the ground that it was legislation conferring ((exclusive and gratuitous privileges.® He approved of Jack¬ son's veto of the Maysville road bill, and in general was a believer in a strict construction of the Constitution. In December 1835 he spoke and voted against the policy of receiving petitions for the abolition of slavery in the District of Columbia. In 1837 Pierce was elected to the Senate, but was overshadowed by such men as Clay, Calhoun, Webster and Ben¬ ton, Pierce being the youngest of all the senators. He seldom spoke and avoided, as in the House, the big questions of the day. He resigned in 1842 to accept the office of district attorney of New Hampshire.

When the Mexican War broke out in 1846, he enlisted as a private, enrolled in a company of volunteers organized at Concord, and soon received from the President a commission as colonel of the Ninth regiment. On 3 March 1847, he was commissioned as brigadier-general in the volunteer army, though practically with¬ out military experience. He was with General Scott in the march on the City of Mexico, but did not play a conspicuous part in the military operations. After his return home he engaged in the practice of law. The Democratic Na¬ tional Convention met at Baltimore 1 June 1852, with Lewis Cass, James Buchanan and Stephen A. Douglas as the leading candidates. On the 35th ballot the Virginia delegation voted for Pierce, and on the 49th he received 282 votes to 6 for all other candidates. This ((dark horse® Presidential candidate was a real

surprise to most people. The reasons for passing by the three leading candidates mentioned above were varied. Since each had a large following there was bitter personal rivalry, and this made the success of any one a matter of considerable doubt. The chief concern of the leaders was to placate the South and avoid the growth of a purely sectional narty. Accordingly, the con¬ vention adopted a resolution pledging the party to enforce the compromise of 1850. Pierce was favorable to the institution of slavery, believing that it was guaranteed by the Constitution, and was thus considered a <(safe man® by the South. In the election which followed in November, he received 1,601,474 popular votes to 1,386,580 for Gen. Winfield Scott, the Whig candidate, and at the meeting of the elec¬ toral college 254 votes to 42 for Scott. All of the States voted for Pierce excepting Ver¬ mont, Massachusetts, Tennessee and Kentucky. He was inaugurated 4 March 1853, and on March 7 announced his Cabinet, namely, Wil¬ liam L. Marcy of New York, Secretary of State; James Guthrie of Kentucky, Secretary of the Treasury; Jefferson Davis of Missis¬ sippi, Secretary of War; Robert McClelland of Michigan, Secretary of the Interior; James C. Dobbin of North Carolina, Secretary of the Navy; James Campbell of Pennsylvania, Post¬ master-General, and Caleb Cushing of Massa¬ chusetts, Attorney-General.

The election of Pierce may be considered primarily as a verdict in favor of carrying out

the terms of the compromise of 1850 and the policy of expansion. In his first inaugural ad¬ dress Pierce said : C(The policy of my adminis¬ tration will not be controlled by any timid fore¬ bodings of evil from expansion.® He also de¬ clared that ((our position on the globe renders the acquisition of certain possessions not within our jurisdiction eminently important for our protection.® This doubtless referred to Cuba, much desired by the southern expansionists for additional slave territory. Pierce appointed Pierre Soule of Louisiana as Minister to Spain, a man who had previously declared in open senate his desire to annex Cuba to the United States by some other method than by purchase. In August 1854, Secretary of State Marcy sug¬ gested that Soule, James Buchanan, and John Y. Mason, ministers respectively to Spain, Eng¬ land and France, have <(a full and free inter¬ change of views® in regard to the acquisition of Cuba. The result was a meeting at Ostend, where on 9 Oct. 1854 they drew up the famous Ostend Manifesto, in which Spain was urged tc sell Cuba to the United States, and in case of refusal the question should be considered whether the interests of the United States were endangered by Cuba remaining in the posses¬ sion of Spain. If answered in the affirmative, then (

Moreover it was during the administration of Pierce that William Walker carried out his notorious filibustering expeditions in Central America, for the purpose of setting up a gov¬ ernment under American rule favorable to slavery. In June 1855 he entered Nicaragua with a small force, captured Granada on 13 October, procured his election as President in July 1856, and proclaimed Nicaragua a slave State. His dominion was recognized by the American minister resident, and Pierce received Walker's envoy, though he had previously issued proclamations warning the people against armed expeditions to countries with whom the United States was at peace. Ministers from other Central American republics protested against this violation of neutrality, but to no purpose.

Pierce supported several other policies of importance. He wished to expand American commerce as rapidly as possible, first by fed¬ eral .subsidies to shipping and second by open¬ ing up new areas for trade. Commodore Perry was sent to Japan to induce this nation to open her ports to American trade and was successful in his mission. Pierce also supported the plan of linking California .more closely with the rest of the country by means of a transcontinental railroad. The best route lay through territory, a portion of which was in the possession of Mexico. Accordingly James Gadsen was sent to Mexico to purchase a strip of territory on the southern border of New Mexico. He se¬ cured a tract of some 50,000 square miles for $10,000,000, which was known as the Gadsen purchase. The railroad was planned largely to benefit the economic development of the lower

South, and Congress voted the funds for the survey of routes. Pierce advocated the build¬ ing of the railroad in his first annual message, and handed over the work of seeing to the sur¬ vey to Jefferson Davis.

Another policy was the opening up of the Northwest to settlement. The platform of the Democratic party declared that the party (

Pierce did not measure up to the standard of most of the Presidents. He was not a com¬ manding figure in any field. He was honest in his intentions as a conciliator of the two sec¬ tions, in his belief that the Constitution guaran¬ teed slavery as an institution, and that the way

to avoid civil war and disunion was to support the South in this view. His strong leaning to¬ ward the South, however, really had the effect of promoting sectional strife and finally in leading to civil war. He was an amiable, hon¬ est, generous, modest, educated gentleman, but lacked intellectual acumen and that idealism necessary for great leadership. His chief stock

in trade was attention to legislative details, fidelity to party, winning manners, and a neu¬ tral compromising character which was a nega¬ tive rather than a positive and constructive force. His last years were passed at his home at Concord, N. H., beloved by his personal friends but almost forgotten by his countrymen.

Bibliography. — There is no good life of Pierce. The early biographies were published for campaign purposes and do not cover his term of office. Consult life by Bartlett, D. W. (Auburn N. Y., 1852), and by Hawthorne, Nathaniel (Boston 1852), both eulogistic ac¬ counts; Ireland, J. R., (History of Life and Administration and Times of Franklin Pierce' (Chicago 1888), in Vol. XIV of his Republic. See also Richardson, J. D., (Messages and Papers of the Presidents' (Washington 1897) ; Leech, W. L., ˆCalendar of the Papers of Franklin Pierce' (Washington 1917). Some of his correspondence is printed in American His¬ torical Review, Vol. X, 110-127, 350-370. The best accounts of his administration are in Schouler, James, (History of the United States' (New York 1894), Vol. V; Rhodes, James Ford, (History of the United States from the Compromise of 1850' (Vols. I— II, New York 1900) ; von Holst, Hermann, Con¬ stitutional History of the United States' (Vols. IV and V, Chicago 1899).

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

PIERCE, George Foster, American Meth¬ odist bishop, son of Lovick Pierce (q.v.) : b. Greene County, Ga., 3 Feb. 1811 ; d. near Sparta, Ga., 3 Sept. 1884. He was graduated from Franklin College, Athens, Ga., in 1829, and en¬ tered the ministry in 1831. He attained great popularity as a preacher, was president of the Georgia Female Seminary, Macon, Ga., in 1839-42, of Emory College, Oxford, Ga., in 1849-54 and was elected bishop in the latter year. He was a member of the convention which met at Louisville, Ky., in 1846, and or¬ ganized the Methodist Episcopal Church, South, and was prominently connected with it until his death. Consult (Life' by George G. Smith

(1888).

PIERCE, Lovick, American Methodist clergyman: b. Halifax County, N. C., 17 March 1785; d. Sparta, Ga., 9 Nov. 1879. He entered the Georgia Conference in 1805, was chaplain in the army in the War of 1812, and afterward studied medicine, which he practised until 1821, when he re-entered the ministry. He was prominently connected with the organization of the Methodist Episcopal Church, South, in 1846, and was famous for pulpit eloquence.

PIERIANS, pi-e'n-anz, or PIERIDES,

pi-er'i-dez, a name given the Muses, from their birthplace, Pieria in Thessaly.

PIERIDiE, a large family of butterflies, of medium or large size, and chiefly white and yellow in their coloration, and represented in all parts of the world. They are distinguished from their nearest relatives, the Papilionidce (q.v.), by the fact that all six legs are fully developed in both sexes; and from the Hesperidce and Lyccenidce, by the greater specialization of the neuration of the wings.

The widespread ˆcabbagewhite® is a typical representative. A well-known American genus is that of the orange-t-ips.

PIERNE, pe-ar-na, Gabriel, French organ¬ ist and composer : b. Metz, Germany, 1863. He was graduated from the conservatory at Paris and in 1882 won the Prix de Rome; in 1890 he was appointed organist at Saint Clothilde and has since devoted much time to composition. His operas have been very successful, partic¬ ularly (IzeiP (1894) : He brought out the oratories of (Les Enfants de Bethlehem) (1907), and (Saint Francois d' Assisi > (1913).

PIERO DI COSIMO, pe-a-ro de ko-se- mo, Italian painter: b. Florence, about 1462; d. there, 1521. He was a pupil of Casimo Roselli and at times was influenced by Signorelli, Filippino and Leonardo da Vinci. He devoted himself to landscape backgrounds, which were always ably executed, if somewhat fantastic in character. This feature is especially notable in his (Death of Procris) (National Gallery, London). His pictures are somewhat rare, though the galleries of Florence, Rome, Paris and London possess several specimens.

PIERO DELLA FRANCESCA. See

Francesca, Piero Della.

PIEROL/*, pe-a-ro'la, Nicholas de, Pe¬ ruvian politician: b. Camana, Peru, 5 Jan. 1839; d. 1913. He was educated in the college of Santo Toribio in Lima, admitted to the bar in 1860 and was connected with various journal¬ istic enterprises. In 1869-72 he was Minister of Finance under President Balta. Impeached under the administration of Pardo, he came to the United States, though acquitted, and in¬ terested himself in revolutionary schemes. At the outbreak of the war between Chile and Peru his services were accepted by President Pardo and he returned to Peru in 1879. Upon the flight of Pardo he headed a revolt against the government, but was defeated. In 1885 he was banished for attempting to seize the presi¬ dency, but in 1894 headed a revolt which suc¬ ceeded in overthrowing President Caceres. Pierola was thereupon elected President and served until the end of his term in 1899.

PIERPONT, per'pont, Francis Harrison,

American politician : b. Monongalia County, Va. (now West Virginia), 1815; d. Pittsburgh, Pa., 24 March 1899. He was graduated from Alle¬ gheny College, Meadville, Pa., in 1839, was ad¬ mitted to the bar and established a law practice in Fairmount, Va., where he soon became widely known. He was a staunch Whig and Abolition¬ ist and at the outbreak of the Civil War re¬ mained loyal to the Union, organized the con¬ vention which decided that the western part of Virginia should remain in the Union and was elected governor of the (

lived in retirement until appointed internal revenue collector by President Garfield.

PIERPONT, James, American mathema¬ tician : b. about 1863. In 1886 he was grad¬ uated at the Worcester Polytechnic Institute and in 1894 he received the degree of Ph.D. at the University of Vienna. In 1899 he received the honorary degree of M.A. from Yale Uni¬ versity and in 1909 that of LL.D. from Clark University. In 1894-95 Pierpont was lecturer in mathematics, in 1895-96 instructor, in 1896-98 assistant professor at Yale. Since 1898 he has been full professor there. His published works are (Lectures on the Theory of Functions of Real Variables) (1905) ; (The History of Mathematics in the Nineteenth Century) (1905) ; (Functions of a Complex Variable)

(1914).

PIERPONT, John, American Unitarian clergyman and poet : b.

Litchfield, Conn., 6 April 1785; d. Medford, Mass., 27 Aug. 1866. He was graduated from Yale in 1804, studied law at Litchfield and after admission to the bar of Essex County, Mass., practised for a short time at Newburyport. Later he studied theol¬ ogy and in 1819 was ordained pastor of the Hollis Street Church in Boston. His outspoken views on temperance, anti-slavery and other reforms occasioned his dismissal from the parish in 1845, and he was subsequently pastor of Unitarian churches at Troy, N. Y., and Med¬ ford, Mass. His (Airs of Palestine,* first is¬ sued in 1816, was republished in a volume enti¬ tled (Airs of Palestine, and Other Poems) (1840). He also published (Anti-Slavery Poems) (1843). One of his best-known poems is (Warren's Address at the Battle of Bunker Hill, > and the pathetic lines on the death of his son are still remembered.

PIERPOUDRE COURT. See Piepowder Court.

PIERRE, pe-ar', S. Dak., city, capital of the State, county-seat of Hughes County, on the Missouri River, and on the Chicago and Northwestern Railroad, near the central part of the State. It was settled in 1880 and in¬ corporated in 1883. It is in an extensive farm¬ ing and stock-raising, region, and in a natural gas belt. Its industries are chiefly connected with farm products, natural gas and the ship¬ ment of cattle. About 1,000 carloads of live¬ stock are exported each year from this city. It is the seat of a Government Indian Industrial School, it has public and parish schools, a pub¬ lic library, and Saint Marv's Hospital. It has two daily newspapers and good banking facili¬ ties. The city owns and operates the gas plant, electric-light plant and waterworks. Pop. 3,209.

PIERREPONT, per'pont, Edwards, American jurist and diplomat: b. New Haven, Conn., 4 March 1817; d. New York, 6 March 1892. He was graduated from Yale in 1837, admitted to the bar in 1840, established a law practice in Cincinnati, Ohio, where he remained until 1845, when he removed to New York. In 1847 he was elected judge of the Superior Court of New York, resigning in 1860. In 1862 he was appointed by President Lincoln to conduct with fohn A. Dix the trials of the prisoners of State, and in 1864 actively sup¬ ported Lincoln in the Presidential campaign. He was prosecutor for the government of John

H. Surratt, indicted for complicity in the assassination of Lincoln, and

in 1869-70 was United States district attorney for southern New York. In 1870 he was one of the com¬ mittee of 70 which fought the Tweed ring, and in 1875 became Attorney-General of the United States, which office he resigned in 1876 to ac¬ cept the appointment of Minister to England. He resigned this post in 1878, and resumed his law practice.

PIERROT, pe-a-ro', in France one of the characters that appear in pantomime. The pierrot is a cunning and shameless poltroon, whose delight is in mischief or roguery. His dress is white, very wide and loose, with huge buttons.

PIERS PLOWMAN. See Langlande, William.

PIERSON, per'son, Abraham, American educator : b. Lynn, Mass., about 1641 ; d. Kil- lingworth, Conn., 7 March 1707. He was graduated from Harvard in 1668, ordained in the following year, served in charge of various pastorates and in 1700 was one of the founders of Yale College, of which he became the first president in 1701. He remained in that office until his death in 1707.

PIERSON, Arthur Tappan, American Presbyterian clergyman: b. New York, 6 March 1837. He was graduated from Hamilton Col¬ lege, Clinton, N. Y., in 1857, and was a Con¬ gregational minister until 1863, when he en¬ tered the Presbyterian body. He has held many important pastorates in the United States, was pastor of the Metropolitan Tabernacle in Lon¬ don in 1891-93, and of Christ Church, there, in 1901-03. He has lectured on missions in the United States and in Scotland and'is author of: (Keys to the World) (1888) ; (Heart of the Gospel) (1892); (New Acts of the Apostles) (1894) ; (The Gordian Knot) (1902) ; (The Keswick Convention* (1903), etc.

PIERSON, Israel Coriell, American actu¬ ary: b. Westland, N. J., 22 Aug. 1843. He was graduated from the University of the City of New York in 1865. He is actuary of the Wash¬ ington Life Insurance Company and first vice president of the Actuarial Society of America, of which he was secretary 1889-99.

PIETER DE HOOCH (or HOOGH),

pe ter de hoH (hog), Dutch painter: b. about 1630; d. about 1681. Very little is known of the life of this painter, of whom no authenti¬ cated portrait exists and a number of con¬ temporary Pieter de Hoochs have added con¬ fusion to the various printed accounts. His birthplace is unknown, but from documentary evidence he seems to

have been living at The Hague from 1653 to 1655, where he was em¬ ployed as servant to a merchant, Justus de la Grange and painted pictures as he had oppor¬ tunity. He is recorded, 20 Sept. 1655 as a member of the Painters' Guild of Saint Luke at Delft. Two years later he is lost sight of and remains in obscurity until he is found in Am¬ sterdam in 1668. Here he came under the influ¬ ence of Rembrandt, an influence of highest im¬ portance to his art. No picture of de Hooch is dated later than 1677 and it is assumed that he died shortly afterward. He is a painter of genre subjects, choosing for the most part Dutch interiors, though there exist a number of ex¬

terior scenes — scenes of cottage life outdoors, where the landscape features are ably handled. Though several of his pictures exhibit animated groups of people, he for the most part relegates the human element to a subordinate position and paints sunlight as his principal object. His rep¬ utation has increased in recent years; the Eng¬ lish, who possess many of his best works, being earliest in showing their appreciation. His greatest works are (The Country House) and (The Battery) in the Ryks Museum, Amster¬ dam; the (Card Party* in the Louvre and the (Dutch Interior) in the National Gallery. An (Interior) is in the Metropolitan Museum, New York and other examples in the private col¬ lections of C. F. Yerkes of Chicago and H. O. Havemeyer, New York.

PIETERMARITZBURG, pe-ter-mar'its- boorg, or simply MARITZBURG, South Af¬ rica, the capital of Natal, situated on an elevated plain, 2,200 feet above sea-level, 70 miles by rail west-northwest of Durban, on the river Um- sindusi, a tributary of the Umgeni. It is a thriving and pleasant town, well laid out, with broad streets, many planted with trees and lighted by gas and electricity. It contains sev¬ eral handsome public buildings including the Legislative Council building, in front of which is a white marble statue of Queen Victoria. Pietermaritzburg is the seat of an Anglican bishopric and among its churches are two cathedrals. Its educational institutions include a library, a small museum, Maritzburg College and several public schools, an Anglican college for girls and a Roman Catholic convent. The town has several reserves for recreation pur¬ poses, the chief being Alexandra Park. The Botanic Gardens are situated a short distance from the town. The extensive waterworks cost about $300,000. Fort Napier contains the bar¬ racks. The chief industries are the building of carts and wagons, tanning, brickmaking and brewing and there is some trade in hides, etc. Pietermaritzburg was founded by Boers in 1839 and derives its name from two Boer lead¬ ers, Pieter Retief and Gert Maritz. It was incorporated in 1854 and the railway was opened in 1880. The assessed valuation of realty is over

$20,000,000. Pop. (estimated) 30,555, of whom half are white, one-fourth Asiatics and Indians and one-fourth blacks.

PIETISM, a religious movement in the Lutheran churches of Germany, which had its rise toward the end of the 17th century. Like Methodism and Methodist, Pietism and Pietist were originally terms of contempt bestowed on religious innovators by their conservative op¬ ponents. The author of the Pietist movement was Philip James Spener, a Lutheran pastor at Frankfort on the Main who in 1670 began to hold private conferences in his own house with devoutly inclined people, in which the Scrip¬ tures were explained with a view solely to the promotion of inward piety instead of the in¬ culcation of dogmatic beliefs. In a book en¬ title (

were continually expounded and defended, while the Bible was made of no account by preachers and pastors, in the theological schools or in the family. The true pastoral work of the Christian ministry, that of forwarding the moral and spiritual welfare of the people, was in desuetude. To remedy these evils Spener pro¬ posed in his work: (1) Cultivation of devout study of the Scriptures in private meetings ; (2) Recognition of the Christian priesthood of all the faithful by giving to the laity a share in the government of the Church; (3) Insistence, in pulpit discourse, upon the necessity of vital personal piety; (4) Kindly persuasion instead of polemic bitterness in dealing with heretics and unbelievers; (5) Making theological semi¬ naries schools of personal piety no less than of doctrine; (6) Banishing from the pulpit the tricks of rhetoric and substituting heart-to- heart hortation to Christian faith and love. The book made a deep impression throughout Germany among the devout laity and the more earnest clergy. Spener was the same year ap¬ pointed court chaplain at Dresden and in that station was the means of bringing about a ref¬ ormation of the system of catechetical instruc¬ tion throughout Saxony. In the Leipzig Uni¬ versity some of the students and docents of the theological school formed themselves into a society for study of the Scriptures both intel¬ lectual and devotional and those among them who were the more advanced conducted courses of practical exposition and application of the sacred text, to which students and townspeople resorted eagerly, so that the Church authorities were alarmed and the lectures were suppressed by the government. The young theologians thereupon left the university and the city and entered the new university just founded at Halle by friends of the new movement;

there¬ after Halle was the chief centre of Pietism. Like most other reformatory movements whether in church or state, its aims were from first to last condemned as impious or as seditious, but one by one they were adopted by their antago¬ nists ; Pietism as an organized movement sub¬ sisted till the middle of the 18th century; its monument was a state church reformed in nearly every particular in accordance with Spener's program. Consult Schubert, Out¬ lines of Church History > (1907).

PIETISTS. See Pietism ; Religious Sects.

PIETRA DURA, pe-a'tra doo'ra, a mosaic executed in Italy and especially at Florence, in hard stones, such as topazes, garnets, carnelians, rubies, etc. Inferior kinds, in which imitation stones are used, are largely made in England.

PIEZOMETER, any of several instruments for measuring the compression of water and other liquids under pressure. They usually in¬ clude a glass tube containing a compressible liquid, backed by a graduated gauge, like a thermometer. They are used for testing pres¬ sure in water-pipes, the compression of gas in a gun-bore, to discover deep-sea pressures, etc.

PIFFARD, Henry Granger, American physician: b. Piffard, N. Y., 1842; d. 1910. He was educated at the University of the City of New York and in 1864 was graduated at the New York College of Physicians and Sur¬ geons. From 1875 to 1910, Dr. Piffard was professor of dermatology at the University of

the City of New York, later known as New York University. He was renowned in the dif¬ ferent fields of physics, botany, therapeutics and linguistics. He founded ' the Dermatological Society, translated Dartrous's

PIG. See Swine.

PIG-IRON. See Iron and Steel In¬ dustry in America.

PIGAFETTA, pe-ga-fet'ta, (Francesco) Antonio, Italian explorer and historian : b. Vi¬ cenza, Italy, 1491 ; d. there, about 1535. He ac¬ companied Magellan on his voyage around the world in 1519-23, and wrote the journal which constitutes the only history of the voyage which remains, as that written by D'Anghiera was de¬ stroyed during the storming of Rome in 1527. The first complete edition of this valuable work was published under the title, (Primo Viaggio intorno al Globo Terracqueo) (1800).

PIGALLE, pe'gal, Jean Baptiste, French sculptor: b. Paris, 1714; d. 1785. He studied under Robert le Lorrain and Lemoyne, and later at Rome. Pigalle was elected to the Acad¬ emy in 1744; became professor there in 1752 and rector in 1777. His best work is of which there is a replica in the Metropolitan Museum, New York. Other works are (Child with Cage,} (Love and Friendship,* busts of Guerin and Maurice of Saxony, all in the Louvre; (Mercury* (Berlin Museum) ; (Venus* (Potsdam) ; Louis XV monument at Rheims; (Queen of Heaven,* marble group in Saint Sulpice, Paris ; tomb in Notre Dame de Paris; statue of Voltaire in the Institut. • Consult Tarbe, (La vie et les oeuvres de J. B. Pigalle) (Rheims 1859).

PIGEON, a general name applied to any species of bird of the family C olumbidce , or col¬ lectively to the entire group, or in an even wider sense to the whole order Columbce. No sharp distinction can be drawn between the usage of the words dove and pigeon for birds of this group; though in a general way the former is applied to the smaller and more delicate, the latter to larger and more robust forms. In the articles Columbˆ: and Columbidˆe will be found some account of the characteristics, distribu¬ tion and chief groups of the pigeons, and under Dove descriptions of a few representatives of the smaller wild species. This article will be confined to a discussion of the origin, varieties and care of the domestic pigeons, and a brief account of a few of the native wild species to which the name "pigeon® most properly applies. Accepting the conclusions of Darwin, who in¬ vestigated the subject extensively, ornithologists and fanciers trace the origin of all the numer¬ ous varieties of domestic pigeons to the com¬ mon rock-pigeon (Columba livia) of Europe and North Africa. The ease with which many wild species of pigeons hybridize and produce fertile offspring is, however, well known ; and there is much reason to believe that the strain of the domestic pigeons is not entirely pure, but has been mixed from time to time with certain Asiatic species, and especially with such true rock-pigeons as C. leuconota and C. intermedia*. However, all of these forms are very closely related, differing in little besides color; and

«

there is no reason 10 doubt that C. livia is the predominant ancestral species.

Many individuals of the common dovecot pigeon — those of a grayish-blue color with white lower backs and two black wing-bars — very closely resemble the wild rock-pigeon. In the wild state the rock-pigeon inhabits the rocky sea coasts and neighboring islands of Europe and North Africa, but is rare inland; though in many places flocks of domestic pigeons have re¬ verted to the feral state and have reacquired most of the characteristics of their wild an¬ cestors. Indeed several of the so-called species found in various parts of Europe, Asia and Egypt are considered by Darwin to have thus originated. Like their domesticated descend¬ ants,. wild rock-pigeons are gregarious and live in communities among the caves and As¬ sures of inaccessible cliffs, where they associate with cormorants and other sea-birds. In the early morning they fly in flocks to the cultivated districts for the purpose of feeding upon grains and seeds. They also relish snails, insects and fruits. Except when with young, whose needs force them to return to the nesting site more frequently, they remain in the fields throughout the day. These pigeons are little, if at all, migratory, and during the winter congregate in larger flocks which search the farming districts for food. About April a simple nest of grass and twigs is constructed on a rock-ledge and two eggs are laid. After the young are able to leave the nest a second and perhaps a third pair is raised. They are strictly monogamous, and are said to mate for life. In movements, voice and other ordinary habits they resemble the common domestic pigeon.

Rock-pigeons take very kindly to domestica¬ tion, and they, and perhaps closely related spe¬ cies, have been confined and bred for an im- memorable period, not alone because of the very excellent quality of their flesh as food, but also as carriers of messages, and because of the in¬ terest attached to the remarkable and numerous varieties to which they give origin. It is, how¬ ever, probable that pigeons were first domesti¬ cated solely for the purpose of supplying the table; at least the earliest known record, more than 3000 b.c., signifies their use for this pur¬ pose by the Egyptians. Several hundred dis¬ tinctive varieties, of which about 150 are named and recognized by fanciers, have been produced under domestication, some of them differing but little, others to a marvelous degree, from the wild stock; many, indeed, are almost monstrous. Concerning the origin of many of the principal types of domestic pigeons, very little is known historically. Some of them, as the carriers or homing-pigeons, are certainly very ancient, and the Romans, who valued pigeons highly, had many races, the pedigrees of which were care¬ fully recorded. Darwin based his conclusion that all this multitude of divergent forms could be traced back to a common ancestry in the rock-pigeon not only on the well-

known facts of the ease with which the rock-pigeon can be domesticated, the resemblance in appearance, habits and voice between the common domestic pigeon and the wild rock-dove, and the geo¬ graphical distribution of the latter, but also upon a most painstaking anatomical study of many varieties and of the facts of breeding and reversion. He noticed that triple crosses between distinct varieties of no matter what

color were very likely to produce in the third generation a color pattern precisely like that of the wild race. The remarkable persistence of the white wings, which breeders find to be one of the most difficult features to breed out of fancy-colored strains, points to C. livia, of which this feature is a characteristic. Darwin's views have been generally accepted, as has his classification of the numerous varieties. Four principal groups are recognized: (1) The pouters, forming a very distinct race especially characterized by the enormously enlarged in¬ flatable oesophagus and crop ; (2) a group in which the beak is generally long (short in the barbs), the skin about the eyes and the base of the beak is rough, swollen and wattled, and the feet are large; in this group are included the various kinds of carriers, dragons, runts and barbs; (3) a group in which the beak is short and the naked skin about the eyes but little developed ; Darwin considers this an artificial group and includes in it the fantails, owls and turbits, tumblers, frill-backs and jacobins, each 'representing a well-marked sub-group; (4) this group includes a great number of races more or less closely resembling the rock-pigeon, from which they have departed much less widely, and are consequently less highly valued by fan¬ ciers than the more strikingly modified races of the preceding groups. Among those which Darwin considers as belonging here are the trumpeters, laughers, nuns, spots, swallows and common dovecot pigeons, of which the latter stands nearest to the ancestral type. Next to the pouter the fantail is the most extreme modi¬ fication, for its tail contains up to 36 or even 42 quill feathers, in place of the 12 originally present.

Concerning the care of pigeons a few gen¬ eral principles may be stated and the novice will avoid many difficulties by recalling the habits of the wild birds and not running counter to na¬ ture. In domestication a dovecote or loft is substituted for the rocky caverns of their native isles, but pigeons should have as much free¬ dom as possible, with plenty of fresh air, light, clean food and water, and a clean and roomy shelter from the extremes of weather. Dirty, crowded quarters engender parasites ; sour food and lack of air and light cause various dis¬ eases; lack of suitable shelter from the weather proves especially fatal to the young birds and * nestlings. If possible, pigeons

should be given the utmost freedom to fly and return at will; but, if for any reason this is inexpedient, a large flying-cage in the open air should be provided. The gregarious instinct is so strong in pigeons that birds continually desert a small flock in order to join a large one in the same neighbor¬ hood. For housing pigeons the loft is prefer¬ able to the cot or small house, for very many reasons. It should be a large, airy, well-lighted room, with suitable means for the ingress and egress of the pigeons, and capable of being divided in order to permit of the separation of the different races and sexes when desired. Easily cleaned nesting and roosting boxes may be arranged in shelves on the walls and dur¬ ing the breeding period should be provided with nesting saucers or pans, some clean, soft hay, and kept scrupulously clean. Pigeons do not dust, but are very fond of bathing, for which ample facilities should always be provided. The food best adapted to the hardier is not always

suitable to the more delicate varieties, which require a more dainty diet; blit in general crushed Indian corn, wheat, peas and beans are the staples, the legumes especially for breeding birds. If they have no opportunity to fly in search of insects and snails a few of these or of earthworms should be occasionally added. A little salt, an abundance of ground oyster-shells or other calcareous material, gravel and drink¬ ing water are required. For the special require¬ ments of the fancy varieties reference must be made to some of the special works on pigeon breeding.

Besides the fancy varieties raised in the United States, great numbers of the common sorts are bred for use at shooting-matches and for table consumption in the form of squabs. Most of the supply comes from the small lofts owned by numerous farmers and stablemen, but in a few places the business has been entered upon on a more extensive scale.

Besides many species known as doves, four species popularly designated as pigeons occur in the United States. Three of these belong to the typical genus Columba, to which the rock- pigeon belongs. These are the band-tailed pigeon (C. fasciata) of the Rocky Mountain and Pacific region, with a distinct sub-species in Lower California; the red-billed pigeon (C. flavirostus) from Arizona southward, and the white-crowned pigeon (C . leucocephala) of Florida and the West Indies. They all differ greatly from the rock-

pigeon in habits, being wood-pigeons, which build their nests in trees and bushes, among whose branches they largely live, though they feed upon the ground on acorns, nuts, seeds, etc. They lay two eggs, like most pigeons, and are gregarious, the first es¬ pecially often collecting in great flocks. From all of these the famous passenger pigeon (Ectopistcs migratprius) is distinguishable at a glance by its long tail composed of 12 slender, tapering feathers. It is a large bird, having a total length of 16 to 18 inches, and, with its graceful form and beautiful metallic tints, is a bird of impressive appearance. This bird has no fixed abode, but wanders widely in great flocks in search of food. Formerly it ranged throughout North America east of the Rocky Mountains and occasionally pushed even to the shores of the Pacific. It was most abundant, * however, east of the Great Plains and in tem¬ perate regions. At the present time it has practically disappeared from most of this re¬ gion and is now found in any numbers only in the upper Mississippi Valley and the borderland between the United States and Canada. See Passenger Pigeon; Homing Pigeons, and the names of various groups and species.

Consult Darwin, C., (Animals and Plants under Domestication (2 vols., New York 1900) ; id., (Origin of Species by Means of Natural Selection (6th ed., New York 1906) ; Evans, A. H., ˆBirds,® in (Cambridge Natural History) (Vol. IX, New York 1900) ; Fulton, R., edihor, Wright, L., Hllustrated Book of Pigeons) (New York 1876) ; Howard, G. E., (The Homing Pigeon (Washington 1901) ; MacCleod, A., (Pigeon Raising) (New York

1913) ; Mershon, W. B., editor , (The Passenger Pigeon) (New York 1907) ; Rice, E. C., (The National Standard Squab Book) (Boston

1914) ; Stewart-Baker, (Indian Pigeons and Doves > (London 1913) ; Tegetmeier, W. B.,

(Pigeons: Their Structure, Varieties, Habits and Management (London 1868) ; Twombley, E. G., (The Pigeon Standard) (Boston 1900).

J. Percy Moore, University of Pennsylvania.

PIGEON-BERRY, or INK-BERRY. See

POKEWEED.

PIGEON ENGLISH. See Pidgin.

PIGEON HAWK, a small falcon (Falco columbarins) , distributed throughout the north¬ ern hemisphere. There are more than a dozen

species scattered over the world, the two most common being the European representatives Hobby and Merlin; they prefer wooded culti¬ vated districts, and usually follow in the train of the small migratory birds on which they prey; the flight is rapid and long sustained; the nest is made on trees or among rocks, and the eggs are from three to five. The American pigeon hawk is 12 to 14 inches long and about 25 in alar extent ; the male smaller. The gen¬ eral color is bluish slate, every feather with a longitudinal black line ; forehead and throat white; below pale yellowish or reddish white, each feather with a longitudinal line of brown¬ ish black; the tibiae are light ferruginous, with black lines ; quills black, with ashy white tips ; tail light bluish ash, tipped with white, with a wide subterminal black band and several narrower bands of the same ; cere and legs yellow and bill bluish ; the variations in plu¬ mage, according to age and locality, are con¬ siderable. It is found over all temperate North America, Central and the northern part of South America, and breeds in the north. It is the boldest of any hawk of its size, pouncing on thrushes, wild pigeons, woodpeckers, snipe and even teals, but preying chiefly on birds of the size of the red-winged blackbird and sora rail. It rarely attacks poultry, yet has been known to seize cage-birds hung in the porches of houses even in crowded cities. The nest, placed in some thickly foliaged tree, is coarsely constructed of sticks and mosses, resembling that of a crow ; the eggs measure about one and three-fourths by one and one-half inches, and are nearly spherical ; the color is not a very clear white, and there are a few bold irregular dashes of light yellowish brown, chiefly about the smaller end.

The pigeon hawk, says Stejneger, is very closely allied to, if not identical with, the Euro¬ pean merlin (F . lithofalco) ; these two forms, with the East Indian turumti (F. chiqnera), and its South African race (F. ruficollis) , are frequently regarded as a separate genus FEsalon. Consult Fisher, A. K., (Hawks and Owls of the United States) (Washington 1893).

PIGEON-PEA, the fruit of the leguminous shrub Cajanus indicus, a native of India, but now cultivated in tropical Africa and the West Indies. There are two varieties, distinguished as bicolor and flavus. The former reaches a height of from three to six feet, and has yellow flowers with crimson markings ; the latter is larger, sometimes attaining a height of 10 feet, and its flowers are of a uniform yellow color. In India the pigeon-pea forms a pulse of gen¬ eral use. The former variety is called also Angola pea and Kongo pea.

PIGEON SHOOTING. See Trap-shoot¬ ing.

.. Bluerock. 2. Drummer-pigeon of Bachara. 3. German Drummer-pigeon. 4. Curly-pigeon. 5. Ruff or Capuchin. 6. German Tumbler. 7. Nun. 8. Almond. 9. Bearded- tumbler. 10. Jacobin. 11. Egyptian Turbit. 12. Chinese Turbit. 13. German Turbit. 14, 15. Fantails. 16. English Pouter. 17. French Pouter. 18. Brown Pouter.

19. Carrier or Homing-pigeon. 20. German Carrier. 21. Cyprian Pigeon. 22. Italian Pigeon. 23, 24. Belgian Carriers.

PIGEON WOODPECKER, the flicker.

See Woodpecker.

PIGEONS, Clay. See Trap-shooting.

PIGLHEIN, peg'l-hin, Bruno, German painter: b. Hamburg, 19 Feb. 1848; d. Munich, 15 July 1894. He began his study of painting in the studio of Lippelt in Hamburg. Going to Dresden in 1864 he attached himself to Schil¬ ling, with the idea of becoming a sculptor, but in 1870 returned to painting, which he studied under Pauwels in Weimar, and in Munich under W. Diez. The series of decorative works and mythological genres which he soon after¬ ward produced show the influence of Bocklin (q.v.) and Makart. He first became widely known by his (Moritur in Deo) (the dying Christ supported by an angel), now in the Ber¬ lin National Gallery. He then executed a series of drawings in pastel, — busts, heads and half- lengths of ladies of fashion, rakes, dandies and children, — which appeared at Munich (1884) under the title (Douze Pastels.) His genre pictures of child life are well known through the reproductions of his illustrations to the idyll (Kind mit HundP In 1885 he undertook a journey to Palestine with the object of col¬ lecting materials for a panorama of (the Crucifixion,* which he completed with the as¬ sistance of several other artists and exhibited in 1886. It was afterward reproduced in wood cuts 1887, but the original was destroyed by fire at Vienna (1892).

PIGMENT (old French), any substance that is used or can be used by painters. The word comes indirectly from the Latin pigtnen- tum, and is related to paint and painting. The Piets of Scotland were so called because they painted themselves. Technically a pigment is a dry

substance that can be easily pulverized if it be not already in the form of powder. But the term has been extended so as to include mixed paint ready to be applied.

In biology the word pigment is used in the sense of organic coloring matter; that is organized substances in the tissues of animals and plants giving them color. This coloring matter or pigment is very generally distributed throughout the animal and plant kingdoms, the absence of color in any of them or of their parts being very rare. The darker or lighter color of the skin in different races is due to the presence of more or less heavv pigmentation of the choroid. In many plants and animals the pigment color characterizes the genera, or family. This is especially noticeable in the lower forms of animal and plant life.

A highly spiced wine sweetened with honey is also called pigment. See Color.

PIGMENTS, Animal. See Coloration, Protective.

PIGMY. See Pygmies.

PIGNUTS. See Hickory.

PIGOT, Sir Robert, British soldier: b. Patshull, Staffordshire, 1720; d. there, 2 Aug. 1796. Entering the army as a boy, he served at Fontenoy, was colonel in 1772, accompanied the 38th foot to Massachusetts, fought at Lex¬ ington, 19 April 1775, and 17 June commanded the British left at Bunker Hill, becoming colonel of the regiment in December of the same year and major-general in 1777. He was stationed in Rhode Island in the next year, and

in 1782 became lieutenant-general. In 1778 he succeeded his brother as baronet and became part owner of the Pigot diamond, brought by his brother from India; it was raffled for in 1800, the receipts being nearly $120,000 and in 1802 was sold for $150,000 to Ali Pasha, who had it ground to powder in 1822, when he was mortally wounded by Reshid Pasha.

PIGRIS, a Greek poet, brother of Arte¬ misia, queen of Caria (352-350 b.c.). Modern critics assign to him the authorship of the famous mock epic, B arpaxofivofiaxia,

PIGWEED. See Goosefoot.

PIKA, a small animal of the higher moun¬ tains of the northern hemisphere, representing the family Lagomyidce, and closely allied to the hares, of which it seems a degenerate branch. The pikas differ from the hares in their much smaller size, in the nearly equal length of the fore and hind legs, in the short, rounded ears, the very small size or absence of the tail, and in the possession of nearly com¬ plete clavicles or collar-bones. In their most southern distribution they inhabit the mountain¬ ous districts and highlands, well-known species being numerous on the mountain tops of the European Alps, in the Himalayas and in the Rocky Mountains. They are never seen below timber-line, but are found far above it, in Ladak to the altitude of 16,000 feet. They dwell in underground burrows, or among the loose fallen rocks of a slide or cliff-talus, where large communities occupy favorable olaces. To this they owe the name “coney,® commonly given to Lagomus princeps, the best-known American species, which the Indians called “lit- tle chief.® The European name, “calling® or “piping® hare, refers to the shrill, piping bark. They feed upon herbage during the summer, and in the early autumn cut and dry a great quantity of this, which they take into their deep burrows as provender for the winter. Their fur is exceedingly warm and close, and was utilized by the American Indians as material for underclothing, infants’ garments, etc. About 16 species are known. Consult Blanford, (Fauna of British India Mammals) (1888); Stone and Cram, (American Mammals) (1902).

PIKE, Albert, American author and law¬ yer: b. Boston, Mass., 29 Dec. 1809; d. Wash¬ ington, D. C., 2 April 1891. He was educated at Harvard, engaged in teaching, in 1831 ac¬ companied an expedition to Santa Fe, afterward exploring the head-waters of the Red and Brazos rivers, and in December 1832 settled at Fort Smith, Ark. He edited the Arkansas Advocate in 1833-36, was admitted to the bar and engaged in law practice. In the Mexican War he. commanded a squadron, fought at Buena Vista, received the surrender of Mapimi in 1847, and during the Civil War was Indian commissioner of the Confederate government, and later brigadier-general. After the war he practised in Memphis and in Washington, edited the Memphis Appeal in 1867-68, and engaged in literary work. His (Hymns to the Gods,* published in Blackwood’s Magazine in 1839, gained for him a reputation as a poet, and be¬ sides 30 volumes of Masonic works he pub¬ lished (Prose Sketches and Poems) (1834).

PIKE, Robert, English colonist in Amer¬ ica: b. England, 1616; d. Salisbury, Mass., 1706. He came to America in 1625, from 1629 re¬ sided on a farm at Salisbury, Mass., and from 1644 until his death held public office in a colony. He is distinguished for his liberal at¬ titude on various questions of colonial interest. Thus, though a believer in witchcraft, he op¬ posed the admission in court of ((spectre® tes¬ timony; and though a strictly orthodox Puritan, defended the Quakers, and censured the gen¬ eral court for its position in the matter. In these questions he appears as one of the earliest exponents in America of the sentiment toward free speech, criticism, and petition of legislative assemblies, and acquittal in courts of law in default of sufficiently conclusive evidence.

PIKE, Zebulon Montgomery, American soldier and explorer: b. Lamberton, N. J., 5 Feb. 1779; d. York (Toronto), Canada, 27 April 1813. He was the son of an army officer, into whose company he volunteered, serving as a cadet when only 15, and becoming a first lieu¬ tenant six years later. In 1805 after the Louis¬ iana Purchase he was ordered to trace the upper course of the Missouri, and with 20 men spent nearly nine months on the dangerous voyage to Red Cedar Lake. Immediately upon his return he was commissioned by General Wilkinson to lead a party through the centre of the Purchase. This expedition was overtaken by winter and the party, while on the banks of what they thought the Red River, was arrested by the Spanish authorities, who later released all mem¬ bers of the expedition. Before his arrest Pike had discovered <(Pikes Peak® and had explored the country around Leadville. He arrived at Natchitoches 1 July 1807, was warmlv thanked by his superiors, and was rapidly promoted. In 1812 he was stationed on the frontier, and in the next year, having become a brigadier, led the attack on York, Canada. The magazine of the fort exploded during the assault and Pike was killed by a flying stone. The fort sur¬ rendered just before he died. Consult Cones, E., ˆExpedition of Zebulon M. Pike to the Headwaters of the Mississippi (3 vols., New York 1895).

PIKE, a weapon much used in the Middle Ages as an arm for infantry or foot-soldiers. It was from 16 to 18 feet long, and consisted of a pole with an iron point. (See Lance). Men armed with it were called pike-men. After the invention of guns, pikes gradually fell into disuse, the bayonet in the musket or rifle being more suited to hand-to-hand fighting. The Prussian Landsturm was armed with pikes in 1813, to be used in case no better arms were to he had. The Swiss first substituted the halbert for the pike toward the 15th century. For some time every company in the armies of Europe consisted of at least two-thirds pike-men. In the United States during the John Brown (q.v.) insurrection at

Harper's Ferry, Va., Brown's followers were armed with pikes as well as muskets.

PIKE, PICKEREL, fresh-water, ravenous fishes of the family Luciidce or Esocidce. They are teleostomous fishes, forming, with the mud-minnows, cyprinodonts and blind fishes, the order Haplomi. In the pikes the body is lengthened, flattened on the back, and tapers abruptly toward the tail. One dorsal fin exists,

placed far back on the body, and opposite the anal fin. The mouth is very large and lower jaw projects, the biting edge of the upper jaw being formed by the maxillary and premaxil¬ lary bones. Teeth are present in plentiful array, and are borne by almost every bone en¬ tering into the composition of the mouth as well as small ones upon the tongue. They are very sharp and of various sizes, the larger ones having a hinge-like attachment by means of a ligament, to the bones. The body is clothed with small cycloid scales, or those of a simple rounded variety. There is a single genus (Lucius) with five species, four of which are confined to North America, the fifth being found in Europe and Asia also. The common pike (Lucius Indus) occurs in the rivers of Europe, northern Asia and North America. Pikes are the tyrants of their sphere, being the most voracious of fresh-water fishes. They feed upon smaller fishes, up6n frogs, muskrats, and other animals ; and young ducks and other aquatic birds have been known to be dragged below the water and devoured by these fishes. Perches and sunfish are said to escape the pike's attack owing to the presence of their spiny dorsal fins. When fully grown the pike may ordinarily attain a length of four feet, and there are instances on record in which these fishes have exceeded that length.

In America this species ranges from the Ohio River and southern New York to Alaska and Greenland, and is especially abundant in the lakes and rivers of British America. It prefers quiet waters; and remains for long pe¬ riods suspended perfectly stationary in the water, but, -when its prey approaches, darts upon it with the utmost suddenness and the speed of an arrow. Throughout the year, ex¬ cept in the spring when they consort in pairs, the pike leads a solitary life; 100,000 to 500,000 eggs are deposited from April to May, accord¬ ing to the latitude. No nest is made, and the non-adhesive eggs sink to the bottom. The muskellonge or muscalonge is a still larger spe¬ cies, often attaining a length of five to eight feet and a weight of 100 pounds or more. It may be quickly distinguished from the pike, with which it is often confused, by the absence of scales from the lower part of the cheeks and the greater number of rays in the fins. It is found in the Great Lakes and other large bodies of water in that general region and

northward. Being a pike on a large scale, its habits closely resemble those just described for that species. It prefers the deeper waters, resting among plants near the bottom and is a most formidable enemy of all living creatures inhabiting the same waters.

The name <(pickerel® is the diminutive of pike and is employed to designate all of the small species as well as the young of the larger. The species to which this name is especially applied are the banded pickerel (L. ameri- canus), which seldom exceeds 12 inches, and is found in lowland streams of the Atlantic watershed from New England to Florida; the western pickerel (L. vermiculatus) , a similar species of the Mississippi Valley; and the com¬ mon pickerel, pike, or jack (L. reticulatus) of the entire eastern United States. The last named attains a length of two feet and is com¬ mon everywhere, being especially abundant in clear lakes, where it reaches the largest size.

All of these are most excellent table fishes. The dash with which they take the hook, and the vigor and determination with which they fight for liberty makes them great favorites with sportsmen, though their destructiveness to other game fishes has gained them many ene¬ mies. The larger species, and especially the muskellonge, are usually taken by trolling, a copper wire line being used when they seek the depths of the lakes. The smaller ones may be taken with a light tackle, the chief precaution being to provide against the severance of the line by their sharp teeth. Live minnows or small frogs are tempting baits.

The name pike is also used for several other quite unrelated fishes which present some re¬ semblance to the pikes in their elongated forms. Among these may be mentioned the gar pikes (Lepidosteus) and the sea pike or silver gar (Tylosuras) . Consult Henshall, (Bass, Pike, Perch and Others) (New York 1903) ; and Cholmondeley-Pennell, (Book of the Pike) (New York 1890).

PIKE-PERCH, a fish closely allied to the perch, but showing a resemblance to the pike iit the elongated body and head. The Ameri¬ can pike-perches belong to the genus Stizos- tcdion, which differs from the European Lucio- persa in the weaker development of the fin spines. From the true perches the pike-perches are easily distinguished by the elongated head and the presence of canine teeth on the jaws. The most important species is N. vitreum, which bears a large number of local names, but is best known as the wall-eyed pike (q.v.). The

chief European species is L. sandra, which at¬ tains a length of three or four feet, and weighs 25 or 30 pounds. The S. canadense inhabits many of the northern lakes of North America, and is slightly more cylindrical than S. vitreum, besides having more spots on the fins and no black spots back of the dorsal fins.

PIKES PEAK, in Colorado, a peak of the Rocky Mountains, lat. 39° N., long. 105° W. ; the height is 14,108 feet above sea-level. Gen. Z. M. Pike, of the United States army, discov¬ ered this mountain in 1806. Colorado Springs, a famous summer resort, is near by. In as¬ cending the mountain the transition is abrupt from pine forests, which cover the sides up to nearly 12,000 feet in height, to bare granite rocks with here and there tufts of sage grass in the crevices and at the summit, fringing the snow fields, plants with pale yellow and delicate purple blossoms. Two gorges extend from the top almost to the base. The summit is nearly level, with an area of about 60 acres. From the top may be seen a view of unsurpassed magnifi¬ cence and grandeur; for fully 100 miles in all directions is a vast expanse of mountains and valleys, dotted with sparkling lakes and rivers. From 1873 to 1888 the United States Signal Service had here a meteorological station. The weather bureau established a station here in 1892. In 1891 a rack and pinion road was opened to the summit. The name Pikes Peak is often applied to the gold region in the vicin¬ ity of the mountain.

PILASTER, in architecture, a column set in and partially projecting from a wall, as an ornamental support to an arch, etc., and seldom projecting more than one-fourth or one-third of its breadth from the wall. It may be a sim¬

ple square support, or of any of the common orders of architecture, with capital.

PILATE, pi'lat, Pontius (Pontius Pila- tus), the Roman governor (procurator) of Judaea, Samaria and Idumea at the time of Christ's crucifixion : he held that station from the year 26 till he was deprived of office in 36 : the capital of the district ruled by him was Caesarea, in earlier times known as Turris Stra- tonis. Little or nothing is known regarding his history previous to his appointment as procura¬ tor. He was a man specially unfitted by tem¬ perament for the station to which he was as¬ signed, in view of the keen animosities existing for ages between the Jews, the Samaritans and the ancient inhabitants of Philistia, and the abhorrence of the Jews for their Gentile rulers. Pilate flaunted in the face of the people of the Holy City the standards of the Roman armies with the image of Tiberius and the eagles of the legions, both of which were always saluted with religious veneration

as gods; he rifled the sacred treasury (corban) of the temple to pay the cost of an aqueduct; he slaughtered a com¬ pany of Galileans while they were engaged in an act of sacrifice ; he set his troops upon a peaceable assemblage of Samaritans on Mount Gerizim, the holy place of that nation; it was this act, not his surrendering Jesus into the hands of his enemies in violation of Roman justice and simple humanity, that led to his being deprived of office. Eusebius adds that he was banished to Vienna (Vienne) in Gaul and that he died by suicide. But legend does not treat his story so prosaically; one legend makes him die at Rome where his body, having been thrown into the Tiber, caused violent tempests and inundations ; but the patrons of the Vienne tradition make Vienne and the river Rhone the theatre of these prodigies. Strangely, Ter- tullian holds Pilate to have been at heart a Christian (pro sua conscientia christianus) ; the Copts reckon him among the martyrs, and he has a place in the Abyssinian Church calendar. Pilate's wife, traditionally named Procla, or Claudia Procula, is venerated in the Greek Church as a saint ; her day in the Greek Church calendar is 27 October. Consult the apocryphal (Acts of Pilate) ; Rosadi, G., (The Trial of Jesus} (London 1905).

PILATUS, pe-la'toos, Mount, in Switzer¬ land, a peak of the Bernese Alps, near Lake Lucerne. The highest crest, Tomlishorn, is 6,998 feet above sea-level. A rack and pinion railroad extends to the summit. The name seems to have come from the word pila, a pillar, hence, ((pillar mountain.® Some authorities claim the name comes from mons pileatus, ((hatted moun¬ tain,® from its appearance when the mists or clouds are rising. One of the numerous legends connected with the place is that it is named after Pontius Pilate, who from the top of this mountain threw himself into a lake and was drowned. Allusion is made to this legend in Scott's work, (Anne of GeiersteinP

PILAU, pi-la', or PILLAF, a food prep¬ aration common in Turkey, Egypt, Syria and India, consisting generally of rice, thoroughly boiled, drained, and frently stirred with butter, pepper and finely-chopped onions. For the tables of the wealthy, fowls, lamb, mutton, shreds of ham or bacon, variously cooked, but

always well boiled or roasted, are placed on the top of the rice, and served with it.

PILCHARD, a European herring (Clupea pilchardus) , the full-grown

form of the sardine (q.v.), which closely resembles the ordinary herring but is of smaller size and straighter outlines. This species is found in greatest plenty on the southern coasts of England, the Cornwall pilchard fisheries being those best known and most celebrated. The fishery is more or less continuously carried on, but pro¬ ceeds with the greatest vigor in July. Shoals of pilchards then appear, which are taken in seines in vast amounts. More than 10,000 hogs¬ heads, each holding 3,000 fish, have been filled in a single day's fishing at one port. These fishes are salted and cured, and are then piled into great stacks, from which a valued oil exudes. They remain four weeks in these stacks, and are then washed to free them from the oil, packed in barrels, and afterward ex¬ ported. The pilchards are chiefly consumed in Spain, Italy and France during Lent and other fasting seasons.

PILCOMAYO, pel-ko-mi'o, a South Amer¬ ican river, one of the affluents of the Para¬ guay, rising in the Bolivian pleateau east of the Andes from several small streams in the prov¬ inces of Lipez, Chichas and Poopo. Its general course is southeast, and its length perhaps 1,300 miles. It receives the Potosi and the Cachimayo; crosses the department of Potosi, Sucre and Tarija; joins the Pilaya, which drains southern Bolivia, above San Francisco Solano; and near that mission is joined by the Chaco. Its course so far is narrow, winding, and full of rapids and cascades, and its drop has been from a height above the sea of 6,500 feet to only 1,300 feet. But on coming into the flat country it does not become a navigable river, but like many of the Western rivers of the United States almost disappears in the sands and then spreads out in shallow lagoons, so that the embouchure of its main branch into the Paraguay is a forest swimming in a lake delta. Other branches join the Paraguay farther south than Asuncion, where the main branch empties. The main branch was a subject of dis¬ pute between Argentina and Paraguay, as the boundary was defined simply as being the main branch of this river. The Spanish explorers had considered it to be the Araguai Guazu (or Rio del Instituto Argentino) ; but a board of arbitration of which Rutherford B. Hayes was president decided against this claim in 1878. Fishing in the river is excellent. Exploration was begun by Father Patino in 1721. In 1882 Crevaux, a French explorer, was killed with five of his comrades by the Toba Indians.

PILE, or SPILE, in engineering and build¬ ing, a heavy beam or timber, driven into soft ground, sand, mud, etc., to form part of a solid foundation for a building, wharf, wall, etc. The word comes from Anglo-Saxon pil, a sharp stake, which is also represented in modern English by the word pale, as a fence-pale. A pile is usually a portion of

a straight tree trunk, from six to eight inches diameter at the smaller end, which is sharpened to a point, to drive easily into the ground. Sometimes this point is armed or protected with iron or steel, to pre¬ vent the wood from splitting in going down into hard ground. A pile may be of any length

that can be conveniently handled, but from 20 to 60 feet is the usual thing. A series of them driven into a muddy bottom on a shore make a very firm support for a building. As wood becomes scarcer, the concrete pile has come into use, being a light shell of steel, filled with concrete. In some instances, as for steady¬ ing the tubes of the Pennsylvania railway tubes under the Hudson River, screw piles have been preferred, these having a very broad screw-like flange at the foot, which resists motion in any direction. They are put into posi¬ tion by turning like a screw, whereas the com¬ mon pile is driven by a pile-driver. See Foun¬ dation.

PILE, a primitive form of electric battery, made of plates piled up, as a dry pile, voltaic pile or thermopile. See Electricity.

PILE-DRIVER, a machine for driving piles or spiles. A tall framework carries a heavy weight sliding between guides and con¬ fined by a rope. The pile being adjusted in posi¬ tion, the weight is dropped on the head of the pile, thus hammering it down, until the desired level is attained. A hoisting engine may be employed to raise the weight, and it may be given added force for its blow by a steam piston, on the principle of a steam hammer.

PILE-DRIVING. See Foundation.

PILE-DWELLINGS, See Lake-dwell¬ ings.

PILES. See Hemorrhoids.

PILEWORT, a plant regarded as curative of piles. In Great Britain these virtues and the name belong to the celandines (q.v.), especially Chelidonium majus. In the United States sev¬ eral herbs of medicinal repute are called pile- worts, such as the Maryland figwort (Scropliu – larva rnarylandica) ; the fire-weed (Erechtites hieracifolia) , a thistle; and a crowfoot, the so- called lesser celandine (Ficaria ficaria).

PILGRIM, Charles W., American phy¬ sician: b. Monroe, Orange County, N. Y., 1860. He received his medical degree from New York Lhiiversity in 1881 and pursued his studies fur¬ ther at the University of Vienna. In 1882 he was assistant physician in the asylum for in¬ sane criminals at Auburn, and occupied a similar position later at the

Utica State Hos¬ pital and at the Women's Hospital at Munich, Germany. In 1890 he was appointed superin¬ tendent of the Willard State Hospital, and three years later became head of the Hudson River State Hospital. In 1906 he became presi¬ dent of the State commission in lunacy, which office he resigned in the following year to re¬ sume his work at the State hospital. In 1916 he was appointed chairman of the State hos¬ pital commission under Governor Whitman's regime.

PILGRIM COMPACT, The. See May¬ flower, The.

PILGRIM FATHERS. See Mayflower, The.

PILGRIMAGE OF GRACE, in English history, an insurrectionary movement in 1536- 37, consequent upon the proceedings of Henry VIII in regard to the Church, and led in the first instance by Robert Aske, a Lincolnshire gentleman. The insurgents demanded the fall of Cromwell, redress to the Church, and re-

union with Rome. Mustering to the number of 30,000, they marched upon York, and within a few days were masters of England north of the Humber. Henry temporized, promising a free parliament at York; but when the insur¬ gents returned home all concessions were re¬ voked, and a renewal of the revolt was sup¬ pressed with great rigor. Many perished by the block, the gibbet and the stake. See Eng¬ land.

PILGRIMAGES, journeys to distant places for devotional purposes. The custom of pilgrimage is ancient and, until modern times, was universal. In ancient Egypt and Syria were privileged temples to which devotees re¬ sorted from distant parts. Pilgrimage is an im¬ portant element in the religions of India. In the period of highest Grecian culture, whether in Greece itself or in Asia Minor or in Magna Graecia, the chief temples of the Hellenic gods were the resort of pilgrims in thousands; the temple of Athene at her own city, that of Zeus at Olympus, that of yEsculapius at Epidaurus, of Hera at Samos, of Artemis at Ephesus, were for the Greeks what the temple at Jerusalem was for the people of Israel, or what Moham¬ med's tomb is for the Moslems. ((We are only stirred,® says Cicero, <(by the very places that bear the footprints of those we love or admire.® The pilgrimages of the Jews to their holy city at the high festivals were matter of precept; in Christianity, though pilgrimages have never been commanded by the Church, the custom of pilgrimage has had a vast

development, begin¬ ning probably in the first Christian Age, and certainly attaining considerable proportions in the century which saw the triumph of the new religion over Roman paganism. Among the works of Saint Jerome (340-420) occur letters of his correspondents in Syria, the ladies Paula and Eustochium, in one of which the resort of numerous pilgrims to the holy places in Pales¬ tine is recorded in terms which give proof that in that day pilgrimage was a highly esteemed form of devotion, though the historical ac¬ curacy of the statement that pilgrims had flocked to the scenes of Christ's life <(ever since the ascension® is open to question. ((It were irksome,® the lady Paula writes, ((to count the bishops, the martyrs, the masters of ecclesias¬ tical learning, who from the Lord's ascension till this day have come to Jerusalem, thinking that they would have less devotion, less knowl¬ edge ; that their virtues would lack their last perfection, unless they should have worshipped Christ at the very spot where first the gospel light beamed forth from the gibbet.® We learn from Saint Augustine and some of his contem¬ poraries that the tomb of the protomartyr, Saint Stephen, attracted in his time great throngs of pilgrims. But it was in the Middle Ages that pilgrimage had greatest vogue. For some time after the Saracens had become mas¬ ters of Palestine the pilgrims from the West had unhindered access to the holy places ; but when Jerusalem came under the control of the fanatical sect of the Fatimites, Christian dev¬ otees were made the victims of all forms of outrage. After enduring this for about two centuries the Western world poured out its hosts of armed pilgrims, the Crusaders. But Palestine did not comprise all the places of pilgrim resort: near the city of Rome is Loreto, believed to contain the very house in which Jesus

and his mother lived; Spain had the shrine of Saint James (Santiago) de Compostella; France that of Saint Martin of Tours. In the year 1428 there sailed from nine different ports of England for Spain on the way to Compostella 866 pilgrims ; at the same time there were several famous shrines in England itself, chief among them the shrine of Saint Thomas a Becket, archbishop of Canterbury, one of the most celebrated resorts of pilgrims. In the latter half of the 19th century there was a revival of the custom of pilgrimages, especially in France. The most persistent pilgrimages of modern times are those of Islamites to Mecca (q.v.) and Medina (q.v.). These two Arabian cities live almost wholly off the pilgrims who come in vast numbers. Mecca is the sacred city, but the bones of the Prophet lie in a mosque at Medina, so thousands of the faith¬ ful deem it incumbent on them to visit both cities.

PILGRIM'S PROGRESS, The. This is an allegory of the life of man, the

journey of the awakened soul to God. Crying ((What shall I do?® Christian flees from the City of Destruc¬ tion, puts aside his jeering or pitying neigh¬ bors, struggles through the Slough of Despond, trembles under Sinai, is comforted and in¬ structed at Interpreter's house, and losing his burden at the Cross, is ready for the great journey. He fights against Apollyon, is im¬ prisoned with Faithful in Vanity Fair. Escap¬ ing both seducers by the way and the clutches of Giant Despair, he gains those Delectable Mountains whence, though Atheist and Igno¬ rance intervene, the way to the Celestial City is sure, even through the river of Death. Though the conception of human life as a hard journey toward the divine is both old and common, it has nowhere else been imagined so appealingly. This is not critical opinion; it is fact. The (Pilgrim's Progress, > translated into all lan¬ guages, has had a circulation beyond the pos¬ sibility of record. It is one of the few in¬ stances, not merely of international fame, but of international popularity. Its characters have become proverbial ; and the Slough of Despond and Vanity Fair are used almost as common nouns.

Popularity so wide must have its springs very deep. Surface reasons explain merely the occasion. Bunyan was a Dissenter in the time of the Protestant revolt. Born eight years after the Pilgrims landed at Plymouth Rock, he was a lad during the Civil War (1642-46), a young man under the Commonwealth and in his manhood 12 years a prisoner for insisting on liberty of preaching. He spoke to English Pro¬ testants on both sides of the Atlantic in their own religious language. But since his appeal has been limited neither to English nor to Prot¬ estants, we must look deeper. The persons of the (Pilgrim's Progress, > Mr. By-Ends, the brisk lad Ignorance, Faithful and the rest, though they bear abstract names, are not mere personifications. They are more than the types of ordinary allegory, more even than the pictur¬ esque figures of the (Faery QueeneP They are individuals, as truly characters as the persons of plays and novels. They talk as real people. We get from them what we desire of all imagi¬ native literature, vicarious experience o' human life.

The life that Bunyan thus creates by force

of imagination he knew by direct contact. It is common life because he was a man of the people. An unschooled tinker, mending pots and pans from door to door, he knew the com¬ mon hopes and loves and fears by daily hard experience from childhood. That tells why he speaks the common language, a language so common as to be sometimes illiterate; it does not yet tell why he speaks the universal language. Bunyan happened to be a tinker; he was born to be a preacher; he became a great preacher because he developed to an extraordi¬ nary degree imaginative vision. Such of his actual sermonizing as has been imperfectly pre¬ served, or is suffered to interrupt the story of the (Pilgrim's Progress, > shows little beyond the disputatious habit of his sect. It is not characteristic. Bunyan cannot be reduced to sermon heads; for he was not a reasoner. But he was all the more a popular preacher; for his persuasion sprang from imaginative oral realization. He pictured vividly in his own mind both things and thoughts ; he had a seeing imagination. And to an equal degree he had the power of oral utterance in words that would make his hearers see and feel too. Thus his diction is habitually concrete because for him to think was to see. He makes doubt, fear, repentance real by making them visible and al¬ most tangible. He makes us live them in the persons of his story, feel them with him because we see them with him.

The other mainspring of his appeal is a style more utterly oral than that of any other English author. He follows with fearless sim¬ plicity the ways of common speech. The prov¬ erbs that he uses so often — <(a saint abroad and a devil at home,® ((a waterman, looking one way and rowing another® — are no more homely than his own habitual expression. ((There is a company of these crazed-headed coxcombs that when they take a fancy by the end are wiser in their own eyes than seven men that can render a reason.® <(Some cry out against sin even as the mother cries out against the child in her lap, when she calleth it slut and naughty girl and then falls to hug¬ ging and kissing it.® Knowing few books but the English Bible, he has the cadences not of literature, but of talk. His style is as oral as any that was ever put into a book.

But deeper even than his vivid concreteness and his oral homeliness is the spring of his sincerity. His style is the pure expression of his own intense experience. His power still to stir men's souls wells from the

agonies and triumph so vividly described in his (Grace Abounding, > from his going down, as he says, into the deep, his enlarged spiritual capacity. The crowning merit of the (Pilgrim's Progress) is that it cannot be long thought of as a work of art, that it makes us forget its style for its summons from the deceptions of things seen to the eternal unseen. Born an artist, Bunyan with single mind devoted his art to the glory of God and the salvation of men. His expres¬ sion of the spiritual world is most simple and homely because he himself was simpler and homelier than any other Englishman who ever took a pen ; but it is most intense because he himself was a fellow citizen with the saints.

Charles Sears Baldwin, Professor of Rhetoric and English Composition, Columbia University.

PILIDIUM. See Larva.

PILL, a form of prepared medicine con¬ sisting of a small globule convenient in size for swallowing. The ordinary weight of a pill is five grains. Some vegetable substances used as medicines may be made into pills without the addition of any other material, but usually the substances having medicinal properties are not of the proper consistence to be made into pills by themselves and require the addition of some other material, which is called an excipient. The usual excipients are bread-crumbs, hard soap, extract of licorice, syrup, molasses, muci¬ lage, castor-oil, honey and conserve of roses. The last-named of these is especially valuable, as it preserves for a long time the proper con¬ sistency of the pills. The materials of which pills are made are mixed together until they are perfectly homogeneous and are afterward separated into pills with instruments or ma¬ chinery devised for the purpose. To prevent them from adhering to one another, as well as to some extent to conceal the taste, they are covered with some fine powder, such as licor¬ ice-powder, wheat-flour, fine sugar and lycopo¬ dium. Immense numbers of pills are made by machinery and it is very common to coat them with sugar, gelatin and other substances, which are flavored and colored in various ways. Pills also sometimes receive a thin coating of gold or silver. The pill is a highly suitable form for administering medicines which operate in small doses, or which are intended to act slowly, or not to act at all until they reach the lower in¬ testines and especially convenient in the case of substances which are strongly offensive to taste or smell. So common has the pill be- come for the administering of a cathartic, that pill is often synonymous for cathartic or physic.

PILLAF. See Pilau.

PILLAR, an upright, free, supporting mem¬ ber used in building, of any shape in section and thus to be distinguished from the column which follows the classical rules, being usually circular with a capital, while a pillar is plain and of any cross-section. The pier is heavier and broader than the pillar and usually of masonry. The term pillar is applied to the sup¬ ports left for the roof in mining excavations and their rude form perhaps typifies the first step in this architectural usage.

Among the earliest peoples of which we have record the Egyptians used the pillar as an architectural member. In the remains of tombs at Beni-Hasan and elsewhere are found two types of pillars. One called the Proto-Doric is found in front of a tomb having a portico- in-antis of two columns. The resemblance of this pillar to that afterward developed by the Greeks has given it its name. The other type has received the name of lotiform from the fact that it seems to resemble a bundle of four lotus stalks bound together near the top. Above the ligature is carved the conventionalized lotus bud to form a capital. This pillar, no doubt originally constructed of wood, was adopted as the favorite order of later Egyptian builders.

A single column, as a monument, has occa¬ sionally been termed a pillar as Pompey's Pil¬ lar. See Architecture; Column.

PILLAR SAINTS (Greek, stylitai), the name of a class of hermits in Syria and Pales-

line who from the 5th to the 12th century lived on the summit of pillars in the open air. The earliest was Simon Stylites, who in 420 invented this new kind of asceticism, professing a de¬ sire to do public penance and make vicarious atonement for others' sins. Accordingly he built a pillar 18 feet high and 3 feet wide at the summit. This he eventually raised to 60 feet high and 6 feet broad. There he lived for 37 years. His example was widely followed by a succession of hermits who, however, died out before the beginning of the 13th century.

PILLARS OF HERCULES, also called PILLARS OF MELKART, the latter being the Phoenician name : the peaks on either side of Gibraltar (q.v.), near which was planted the colony of Gades, now Cadiz. The

Greeks, identifying the god Melkart with Hercules, their own guardian of travelers, called the place the Pillars of Hercules. See Calpe.

PILLING, James Constantine, American ethnologist: b. Washington, D. C., 1846; d. 1895. He received his education at Gonzaga College, Washington, and in 1872-79 was a member of the Rocky Mountain Geological Survey with Major J. W. Powell. This expedition afforded Pilling an excellent opportunity to study the Indian dialects of the region. He became chief clerk of the Bureau of Ethnology in 1879 and two years later was mad,e chief clerk of the United States Geological Survey. He published bibliographies on several Indian languages and a general work under the title, (The Languages of the North American Indians) (1885).

PILLNITZ, a palace of the former king of Saxony, on the right bank of the Elbe, seven miles from Dresden. The court remained here for some time each year. Pillnitz is famous for a meeting of the Emperor Leopold II, Fred¬ erick William II of Prussia, the Count of Artois, the ex-minister Calonne and several other personages, from 25 to 27 Aug. 1791. A treaty of offensive alliance was not concluded, but preliminaries were agreed on for a defen¬ sive alliance between Austria and Prussia, which was settled at Berlin, 7 Feb. 1792. The French were greatly irritated by this conven¬ tion, which they considered as the basis of the coalition of Europe against France.

PILLORY, an old-time mechanism for punishment, consisting of a frame of wood erected on posts, with movable boards, and holes through which were put the head and hands of the criminal. In this situation crimi¬ nals in Great Britain were formerly often ex¬ posed to the outrages of the mob in a way in¬ consistent with any rational notions of punish¬ ment. Those who were offensive to the crowd were in no small danger from the missiles by which they were assailed. The culprit was al¬ lowed to make speeches, defending himself and attacking his enemies. In England this punish¬ ment was first meted out for mean offenses, as using false weights, perjury and forgery, but it was extended to include libelers, and finally any who printed without a license. In 1816 this punishment was abolished in all cases except that of perjury. It was abolished totally in 1837, and in the United States in 1839. The ex¬ ception was Delaware, which adhered to ancient methods of punishment until. 1905.

PILLOW, Gideon Johnson, American sol¬ dier: b. Williamson County, Tenn., 8 [line 1806; d. Lee County, Ark., 6 Oct. 1878. He was grad¬ uated at the University of Nashville, studied law, became prominent in the Democratic party of the State, and in 1844 as delegate to the

National Convention did much to secure the nomination of Polk, his intimate friend, for the Presidency. In 1846 he was commissioned brigadier-general, immediately went to the front with his Tennessee volunteers, fought bravely at Vera Cruz, was severely wounded at Cerro Gordo, became second in command to General Scott, was again wounded at Churubusco, and after the war was accused by Scott of insub¬ ordination, but acquitted. His difference with Scott as to the Convention of Tacubaya seems to have been the origin of these charges. He opposed secession at first, acquiesced later, was made major-general of Tennessee troops, raised 35,000 men, and advanced to the Confederate government much money, which was never re¬ turned. Jefferson Davis disliked him and re¬ duced his rank to brigadier. He fought under Leonidas Polk at Belmont 7 Nov. 1861, op¬ posed the surrender of Fort Donelson February 1862, and thereafter did not figure in any battle save Murfreesboro, in which he had a courtesy command. He was ruined by the war, and tried heroically but vainly to recover his former financial position.

PILLOW, Fort. See Fort Pillow.

PILLOW-LACE. See Lace.

PILLSBURY, pilz'ber-i, Harry N., Amer¬ ican chess-player: b. Somerville, Mass., 5 Dec. 1872; d. Philadelphia, Pa., 17 June 1906. He won the world's championship at the Hastings International Chess Congress in England, in 1895, the first American to attain that honor since 1858. He tied with Tarrasch in 1898 in the international cable match at Vienna, di¬ vided second honors with Janowsky and Maroczy in 1899 and won first prize at the American tournament in Buffalo in 1901, and was an honored competitor in the leading in¬ ternational games. In 1897 he won the Amer¬ ican championship by defeating J. W. Sho- walter. He made a record for blindfold play, conducting 22 games at one time, without sight of the boards or pieces, and winning most of the games. He was also a checker player of the first order.

PILLSBURY, John Sargent, American legislator: b. Sutton, N. H., 29 Tuly 1828; d. Minneapolis, Minn., 18 Oct. 1901. He was en¬ gaged in various business ventures until 1872 when he became a member of the noted flour milling firm of Charles A. Pillsbury and Com¬ pany. At the outbreak of the Civil War he organized three regiments for the Union army and later he assisted in the organization and equipment of other regiments for the suppres¬ sion of an Indian uprising in Minnesota. In 1863 he was sent to the State senate and served almost continuouslv until elected governor in 1875, to which office he was

twice re-elected. During his administration he prevented the repudiation of the Minnesota State Railway bonds and favored measures to benefit the agri¬ cultural portions of the State. He was a generous benefactor of educational institutions, hospitals,, libraries, etc.

(

PILLSBURY, Parker, American reformer: b. Hamilton, Mass., 22 Sept. 1809; d. Concord, N. H., 7 July 1898. He was graduated in 1838 from Gilmanton Theological Seminary, studied also at Andover and became pastor of the Con¬ gregational Church at New London, N. H. Under the influence of William Lloyd Garri¬ son's pleas, he joined the anti-slavery forces, withdrew from ministerial duties and became an anti-slavery lecturer in New England and the West. In 1854 he went to England and there lectured in the principal cities. He was one of the more violent of the abolition orators, but in his way effective. At different times he was editor of the Herald of Freedom at Con¬ cord, N. H., and of the Anti-Slavery Standard in New York. In his later years he was a preacher for various Western religious societies. He published his recollections of the anti¬ slavery struggle and its leaders as (Acts of the Anti-slavery Apostles* (1883).

PILLSBURY, Walter Bowers, American psychologist: b. Burlington, Iowa, 21 July 1872. In 1888-90 he studied at Penn College, Oska-loosa, Iowa, and in 1892 was graduated at the University of Nebraska and in 1896 received the degree of D.Ph. at Cornell University. In 1895-97 he was assistant in psychology at Cornell, in 1897-1900 instructor, in 1900-05 assistant professor, in 1905-10 junior professor of philosophy and director of the psychological laboratory at the University of Michigan. In 1910-11 Professor Pillsbury was president of the American Psychological Association and in 1907 of the Western Philosophical Association. His publications include (Attention) (1908) ;

Psychology of Reasoning> (1910) ; (Essentials of Psychology0 (1911); fundamentals of Psychology) (1916). With E. B. Titchener, he translated Kiilpe's (Introduction to Philosophy* (1897), and in 1917 was chairman of the edi¬ torial committee of (Studies in Psychology, * in honor of Professor Titchener.

PILMOOR, Joseph, American Episcopal clergyman : b. Tadmouth, Yorkshire. England, 31 Oct. 1739; d. Philadelphia. Pa., 24 July 1825. He was educated in John Wesley's school at Kingswood, entered the Methodist ministry in 1765 and in 1769 came to America where he as¬ sisted in establishing the Methodist faith. He founded the first Methodist church built in Philadelphia and preached in the interests of the Wesleyans until 1774, when he returned to England, angered at what he considered Wes¬ ley's injustice in having omitted him from the Hegal hundred.® In 1785 he again took up his residence in America, was ordained in the Epis¬ copal Church in that year and held charges in Philadelphia and New York. In 1804 he be¬ came rector of Saint Paul's, Philadelphia which post he retained for 20 years.

PILOCARPIN. See Jaborandi.

PILON, Germain, zhar-man pe-lon, French

sculptor: b. Paris, 1535; d. there, 4 Feb. 1590. He was a favorite court sculptor of Catherine de' Medici. Many of the works were destroyed in the Revolution. The earliest extant is a canopy for the tomb of Francis I at Saint Denis. In the chapel of Saint Eustache at Saint Denis is also the famous tomb of Henry II on which Pilon was occupied from 1564 to 1583. His 'Three Graces.* (Saint Catherine du Val des Ecoliers,* erected by Cardinal Birogue

in honor of his wife, the tomb of the cardinal himself, (The Four Cardinal Virtues,' and others are now in the Louvre. A statue ordered by Catherine, (Vierge de Pi tie, ˆ is now in the church of Saint Paul and Saint Louis, Paris. Pilon, in the voluminous folds and tortuous lines in the draperies of his figures, marks the beginning of the decadence from the classic simplicity and strength of his immediate prede¬ cessor, Jean Gonjon.

PILOS. See Hats and Hat-making

PILOT, The; a Tale of the Sea, published in January 1824 (the earliest edition is actually dated 1823). was James Fenimore Cooper's fourth novel and his first sea tale. He had undertaken to surpass Scott's (Pirate* (1821) in seamanship, and. a sailor by profession, not only succeeded in this but produced a book on almost every count better than its model. In¬ deed, Cooper may be said in (The Pilot) to have created a new literary type, the tale of ad¬ venture on the sea, in which, although he was to have followers and rivals in many modern languages, he still keeps a high place for vigor and variety. Smollett

had already discovered the racy humors of seamen, but he had seen lit* tie else in their calling; it remained for Cooper to capture for fiction the mystery and beauty, the shock and thrill, of the sea, which in his pages has much of the proud pomp of Byron's ocean. Experts say that Cooper's technical knowledge was sound; what is more important, he wrote a story about sailing vessels which convinces land-dwellers even in days of steam. Although based, with many realistic details, upon his own experience, (The Pilot) has a large conventional element, chiefly in connec¬ tion with its hero, John Paul Jones, who ap¬ pears as always brooding upon a dark past and a darker fate. Yet he is not so morbid but that he can occasionally rouse himself to terrific activities in his raids along the English coast. Cooper credits him with a love affair, conven¬ tional in tone, and not important. Of the characters, only one possesses much interest or verisimilitude — Long Tom Coffin, of Nan¬ tucket, who takes his place worthily beside Har¬ vey Birch and Natty Bumppo. If he seems hardly so vivid a patriot as the spy it is be¬ cause he is first of all a sailor, and belongs to the open sea as Leather-Stocking belongs to the forest. Long Tom is as real as an oak; he is also as romantic as storms and tides.

Carl Van Doren. PILOT CHART. See Chart.

PILOT-FISH, any of several fishes re¬ puted to act as guides and sentinels to sharks, or resembling species so acting. The fish tradi¬ tionally so called (Naucrates auctor) is a small mackerel-like member of the family Carangidce (q.v.), which abounds in all warm seas, and was well known in the Mediterranean where the ancient fishermen observed its constant associa¬ tion with sharks, and its habit of following ships for many days together. They said it acted as a guide and protector of the sharks, leading them to prey and warning them of dan¬ ger; and that when a mariner lost his way on the high seas it appeared and piloted him to port. The association with sharks and other large fishes and the following of ships are still observable, but the modern explanation is that the little fish gain food and some protection

from the big ones, and, therefore, seek to swim near them. They are excellent eating. An¬ other nearly related fish (Seriola zonata) , one of the amber-fishes, is called "shark's pilot® along the south Atlantic Coast of the United States; in the West Indies several chichlids are

called black, or cow, or cockeye pilots; and in Lake Champlain this name is given to a white- fish (Coregonus quadrilateralis) called Menomi¬ nee or round white-fish in the Northwestern lakes. Consult Goode, (Fishery Industries, Sec. I* (1884); Day, (Fauna of British India: Fishes* (1889).

PILOT AND HIS WIFE, The (

Joseph Alexis.

PILOT KNOB, any one of various hills conspicuous from a coast or harbor, and used by pilots as an aid in setting their course.

PILOT MOUNTAIN, in North Carolina, on the border of Stokes and Surrey counties near Ararat River. See Ararat.

PILOT AND PILOTAGE. A pilot is a seafaring man familiar with a particular coast, who is licensed by the government or State, to navigate vessels within a particular district. In every large harbor where there is much water traffic, pilots go out in small boats or tugs to meet incoming steamships, and take them safely into port. It is the pilot's business to know all about shifting sandbars, or other ob¬ structions to navigation, to keep accurate watch

of tides and to be thoroughly familiar with local currents and conditions. When he comes aboard of a vessel that has called him, he goes at once to the wheelhouse, and takes charge. In Great Britain and the United States every qualified pilot on his appointment receives a license for a particular district from the pilot¬ age authority of that district. Masters or mates of any ship may, upon giving due notice, be examined and passed by the proper authori¬ ties, and receive pilotage certificates. In this case they must be renewed every year. Fur¬ ther, any master or mate of a ship may obtain, after examination, a certificate to the effect that he is authorized to pilot any ship or ships be¬ longing to the same owner of and under a cer¬ tain draft of water. Any qualified pilot who > commits any fraud against the customs or ex¬ cise, or is guilty of corrupt practices as to ships, cargoes, crews or passengers ; who lends his license, acts as pilot while suspended or when drunk, causes unnecessary expense to enhance his own or someone else's gain; declines, with¬ out reasonable cause, to go off when signaled for or required; unnecessarily cuts or slips a cable; refuses to conduct a ship into port, ex¬ cept on reasonable ground of danger to the ship; or leaves the ship of which he is in charge, without the master's consent, before the service for which he was hired has been per¬ formed — renders

himself liable to suspension or dismissal, as well as to a fine in addition to damages to the persons aggrieved. Pilotage fees depend on the draft of water of the ship pi¬ loted, and for vessels with a large draft of water are very much higher than for those with a small one. In Great Britain no owner or master of any ship is answerable to any person for any loss or damage occasioned by the fault or incapacity of any qualified pilot acting in charge of such ship within any district where the employment of such pilot is compulsory; but the pilot must not be interfered with in the discharge of his duties. Other maritime coun¬ tries have also passed laws to regulate the pilotage of vessels. In the United States each individual State makes its own regulations as authorized by act of Congress. The most im¬ portant body of pilots in the United States are those under the pilot commissioners of New York. The master of a vessel with a pilot on board has still the management of the vessel, and sees that she is kept in the course the pilot directs. A master refusing to take a pilot often vitiates the insurance on the vessel.

PILOT-PLANT, the compass-plant (q.v.).

PILOT SNAKE, a rustic name in the United States for several different snakes, as the mountain blacksnake (Zamenis obsoletus) , which is harmless, and the copperhead (q.v.), which is venomous.

PILOT WHALE, a caaing whale (q.v.).

PILOTY, pe-16’te, Ferdinand, German painter: b. Munich, 8 Oct. 1828; d. there, 21 Dec. 1895. After studying in the academy of his native city, he directed his artistic activity altogether under the influence of his brother Karl von Piloty, especially imitating him in technique and color. A number of his histori¬ cal frescoes are to be seen in the National Mu¬ seum at Munich and in the town-hall of Lands- berg-on-Lech. He also painted in oils for the Maximilaneum at Munich the picture (Elizabeth

of England reviewing her Troops in Sight of the Armada. > Of his other works, among the most notable are (Sir Thomas More in Prison) ; (Raffael on a Sick Bed) ; (Count Eberhardt of Wiirtemberg by the Dead Body of his Son> ; (The Judgment of Solomon. > He designed many illustrations for Schiller’s

PILOTY, Karl von, German painter: b. Munich, 1 Oct. 1826; d. there,

21 July 1886. After attending for a short time the Munich Academy, where he especially attached himself to the guidance of Schnorr, he joined the litho¬ graphic business of his father. He later fell under the influence of his brother-in-law, Schorn, whose realistic teaching he enthusias¬ tically accepted and later was molded by the colorists of Belgium and France. Beginning as a genre painter in his remarkable canvas (The Nurse) (1853) he revealed for the first time a most brilliant technique which inaugurated a new style at Munich, and indeed throughout Germany: Two years later he was appointed professor in the Munich Art Academy. In 1854 he produced – his first historical picture (The Institution of the Catholic League, > which, despite its fine color scheme, was marred by a too emphatic and theatrical action, and a lack of depth and spirituality of expression. A long series of paintings of the same class followed this, and among them, (Seni by the Corpse of Wallenstein* (1855), an important work, now in the New Pinakothek at Munich; (Nero amid the Ruins of Rome) (1861); ˆGodfrey de Bouillon with the Pilgrims at the Holy Sepul- chre) ; (Assassination of Julius Caesar* (1865) ; ˆColumbus* (1866) ; (Thusnelda in the Tri¬ umphal Procession of Germanicus* (1873), a replica of which is in the Metropolitan Museum of New York; (The Death of Alexander (1877), unfinished. He painted many portraits and designed illustrations for Shakespeare, and the German classic writers. In 1874 he was director of the Munich Academy. In his style he turned from classicism to realism; and was inclined to choose subjects of a melancholy or tragic caste, and sometimes was given to the melodramatic treatment of a theme, but his drawing, coloring and handling were masterly. As the representative of a distinct school in German art he counts among his pupils and fol¬ lowers Makart, Max, Defregger, Lenbach, J. Brandt, etc. ‘Consult Rosenberg,

PILPAY, pil’pl, or PILPAI. See Bidpai.

PILS, pelz, Isidore Alexandre Auguste,

French painter: b. Paris, 1815; d. Douarnenez, Brittany, 3 Sept. 1875. The son of an artist and soldier, he studied with Lethiere and Picot and in 1838 gained the Grand Prix de Rome. His first success, after trying religious subjects, was in 1848 with (Rouget de l’lsle chantant pour la premiere fois la Marseillaise* (Louvre). His greatest successes were with military scenes such as (Debarquement en Crimee* and ˆa- taille de l’Alma,* and water-color studies of soldiers during the siege of Paris. He was pro¬ fessor at the ficole des Beaux Arts and Mem- bre de l’lnstitut.

PILSBRY, pilz’bri, Henry Augustus,

American conchologist : b. Iowa City, Iowa, 8 Dec. 1862. He was educated at the State Uni¬

versity of Iowa, from which he received the degree of D.Sc. in 1899. He has made a life¬ long study of mollusks and has been special curator of the department of mollusks at the Philadelphia Academy of Natural Science since 1888. He has published (The Manual of Con- chology) (26 vols., 1888-1911) ; (Marine Mol¬ lusks of Japan* (1895) ; (Guide to the Study of Helices) (1907) ; (Barnacles of the United

States* (1907) ; also about 200 articles on con- chology, geology and zoology, published in scientific journals and publications of Ameri¬ can and foreign learned societies.

PILSEN, pil'sen, Czecho-Slovakia, an im¬ portant city of the state of Bohemia, at the con¬ fluence of the Radbusa with the Mies (Beraun), 53 miles southwest of Prague. It consists of the town proper and extensive suburbs; is a well- built, handsome place ; has a splendid Gothic church of the 13th century; a townhouse, Fran¬ ciscan monastery, a German and Czech thea¬ tre, German and Czech gymnasia, barracks ; and important and varied industries, embracing ma¬ chinery and metal wares, porcelain, glass, liquers, refined spirits, etc., and large brewer¬ ies which produce a famous variety of beer. Coal, iron and alum mines are in the vicinity, and there is a considerable trade. Pilsen pos¬ sessed a printing-press as early as 1468. *It was once a fortified town, and was several times be¬ sieged during the Hussite wars. In 1618 it was stormed by Mansfield, and in the Thirty Years' War was for a time the headquarters of Wallen¬ stein. The people are mainly Czechs. It has grown fast in modern times from 38,883 popu¬ lation in 1880 to 84,800 in 1914.

PILUM. See Javelin.

PILZ, pilts, Vincenz, Austrian sculptor: b. Warnsdorf, Bohemia, 1816; d. 1896. He studied both painting and sculpture at the Vi¬ enna Academy, but eventually came under the influence of Fiihrich and Rahl and gave all his attention to sculpture, producing many groups and reliefs under the approval of these masters. Among his works are the two (Winged Horses) in front of Memorial Hall, Philadel¬ phia; the 'Neptune* of the Vienna Exchange and (Science and Commerce) at Windsor Castle, England. He also decorated public buildings at Vienna with statues of Austrian generals, celebrities of antiquity and modern composers.

PIM, Bedford Clapperton Trevelyan, Eng¬ lish naval officer: b.

Biddeford, England, 12 June 1826; d. London, England, 1 Oct. 1886. He was educated at the Royal Naval School and entered the English navy in 1842 ; took part in the Franklin search expedition in 1852; com¬ manded a gunboat on the Baltic during the Crimean War; served in China in 1857, and was promoted commander in 1858. In 1859 he served in Central America and surveyed the Nicaragua Canal route. He was retired from active service in 1861, but received rank as rear-admiral in 1885. He was admitted to the bar in 1873 and was a member of Parliament 1874-80. He wrote (The Gate of the Pacific) (1863) ; (Jottings on the Roadside in Panama, Nicara¬ gua and Mosquito) (1869) ; (The War Chron- icle> (1873), etc.

PIMAN (pe'man) STOCK, an American family or . group residing in Mexico and Ari-

zona. The stock includes among other tribes the Papagos, Pimos, Gatschets, Tarumaris, Yaquis and Huichols. The Piman family is a southern extension of the Shoshone (q.v.) fam¬ ily. They number about 90,000. Consult Rus¬ sell, F., (The Pima) (in 26th Annual Report, Bureau of American Ethnology, Washington

1908).

PIMENTA. See Allspice.

PIMLICO. See Friar-bird.

PIMO, or PIMA INDIANS, an Amer¬ ican tribe of the Piman family, living in New Mexico, in the valley of the Gila. They are neighbors of the Maricopas, whom they re¬ semble so much in person and manners that they are not easily distinguished from them. Their number is about 4,000. The men have slender forms, but the women, who do most of the hard labor, are well made. Agriculture is their principal occupation. They are the most civilized of any of the North American In¬ dians ; they manufacture cotton fabrics, pottery and other useful articles with considerable skill, and enjoy a reputation for simplicity of char¬ acter, peacefulness and honesty. The only weapon used by the tribe is the bow and arrow. They possess horses and cattle, but very few mules. About two-thirds of the Pimos live on government reservations. See Piman Stock.

PIMPERNEL, a flowering plant of the primrose family and genus

Anagallis, with a wheel-shaped corolla. The scarlet or field pimpernel (A. arvensis) is wild in Europe, and both cultivated and run-wild all over the world. The small flowers are usually scarlet with a purple spot in the centre, but in one variety blue. This species is commonly known in Eng¬ land as the ((poor man's weather-glass,® from the fact that its flowers do not open in rainy weather. The bog pimpernel (A. tenella) is an extremely delicate and beautiful plant, which naturally grows in the drier parts of marshes; its flowers are red, and it is distinguished from the field pimpernel by the fact that its corolla considerably exceeds the calyx. The blue and lilac varieties of A. collina, a native of South Africa, have been introduced into gardens gen¬ erally, where they have a fine effect. A closely allied plant (Centunculus minimus) is called false pimpernel or chaff-weed.

Another group of pimpernels is the genus Pimpinella of the apiacece, relatives of the snake-root. A widespread and representative species is P. saxifraga, sometimes called burnet saxifrage.

PIMPLES, eruptions of the skin, of which several varieties are distinguished by special names, but various causes may transform one of these into another. The typical pimple is a slight swelling with an inflamed base. The papule is a solid elevation, apparently contain¬ ing no fluid, and either of the natural skin- color, or bluish, blackish, etc. The vesicle is an elevation of about the same size, containing a clear or milky fluid; by alteration of its con¬ tents to yellow pus it becomes a pustule. A bleb or bulla is a larger vesicle or pustule, and may be as large as a hen's egg. A large papule is called a tubercle, and wheal is the term applied when the raised skin is of greater extent than elevation.

PIN, a small piece of brass or steel wire, sharp at one end and furnished with a head at the other, used chiefly for the toilet for tempo¬ rarily securing portions of the dress, and gen¬ erally by seamstresses and tailors for fastening their work together. Th.e need of little utensils of this sort has been met from ancient times by various devices. The original pin must have been slit from the shaft of a bird's feather, as the root word, Latin pinna, means feather. In the Egyptian tombs they are found much more elaborate and costly than the pins of the present time. They vary in length up to seven or eight inches, and are furnished sometimes with large gold heads, and sometimes with a band of gold around the upper end, those of the latter kind having probably been used for securing the hair. The ancient Mexicans found in the thorns of the agave convenient substitutes for metallic pins ; and even the English, up to the middle of the 16th century, made use of rude skewers of wood, though they also made others of gold, silver

and brass to serve as pins. To that time they had depended upon the manufacturers on the Continent for their sup¬ plies of the better sorts of pins, and this im¬ portation appears to have been established previous to 1483, when it was interrupted by a prohibitory statute. In 1543 an act of Parlia¬ ment provided ((that no person shall put to sale any pins but only such as be double-headed and have the head soldered fast to the shank of the pin, well smoothed, the shank well shaven, the point well and roundly filed, canted and sharp¬ ened.® Within three years from this time the manufacture was so much improved that the statute was of no importance. In Gloucester the business of pin making was introduced in 1626, and soon proved so prosperous that it gave em¬ ployment to 1,500 persons. It was established in London in 1636, and afterward in Birming¬ ham, which became the chief seat in England of this and other manufacturing operations of similar character.

In the United States pins were first made in Rhode Island during the Revolution by Jere¬ miah Wilkinson, the heads being made by twisting fine wires firmly at one end. Samuel Slocum at about the same time commenced in Providence in the same line. In 1824 a machine for making solid-headed pins was invented by Lemuel W. Wright, of New Hampshire, which was soon after introduced into England, patents also being granted there. It was, however, crude compared with those of later construc¬ tion, and did not complete all the operations of pin making. In 1831 the first machine for mak¬ ing perfect solid-headed pins like those now in use was invented by John Ireland Howe, a physician of Bellevue Hospital, New York City, and in the next year a company was started in that city. Six years later the business was re¬ moved to Derby, Conn., where it is still carried on. In 1835 another company was formed by Dr. Howe, which continued its operations under his charge till 1865, many improvements being made. Samuel Slocum, an ingenious Con¬ necticut man, invented a pin-sticking machine, which was used in Howe's factory in 1841, and was improved in 1843, he and Slocum becom¬ ing joint owners of the two patents.

The manufacture of pins has become such an industry in the United States that the mills of

this country practically supply the world with this article. In 1900 the 75,000,000 people in the United States used 60,000,000 gross of

com¬ mon pins, which is equal to 8,600,000,000 pins, or an average of about 113 pins for every man, woman and child in fhe country. This is the highest average reached anywhere in the use of pins. In 1890 we used only about 72 pins each. Assuming that the present consumption is 125 per individual, the 110,000,000 people of the United States in 1918 used about 10,375,000,000 pins. The census lumps together the makers of pins, needles, hooks and eyes, so exact statistics are no longer available. It appears, however, that more than half the pins are made in the State of Connecticut, where there are eight factories, employing 3,000 people.

The common pin is of brass with a tinned surface. Pins now are turned out by automatic machines in such quantities that the cost of manufacture is slightly greater than the value of the brass wire from which they are made. A single machine does the work. Coils of wire, hung upon reels, are passed into machines which cut them into proper lengths, and they drop off into a receptacle and arrange themselves in the line of a slot formed by two bars. When they reach the lower end of the bars they are seized and pressed between two dies, which form the heads, and pass along into the grip of another steel device, which points them by pressure. They are then dropped into a solution of sour beer, whirling as they go, to be cleaned, and then into a hot solution of tin, which is also kept revolving. They here receive their bright coat of metal, and are pushed along, killing time, until they have had an opportunity to harden, when they are dropped into a revolving barrel of bran and sawdust, which cools and polishes them at the same time. Because of the oscilla¬ tion of the bran they work gradually down to the bottom of the barrel, which is a metallic plate cut into slits just big enough for the body of the pins, but not big enough for the head to pass through. Thus they are straightened put into rows again, and, like well drilled soldiers, pass along toward the edge of the bottom, and slide down an inclined plane, still hanging by their heads, until they reach strips of paper, to which they are introduced by a curious jerk of the machine. The first they know they are all placed in rows, wrapped up and on their wav to the big department stores, where they are sold at a small price. A machine is expected to throw out several thousand gross an hour. Hairpins and safety pins and other kinds of pins are all manufactured by somewhat similar special machinery.

The word pin is applied in mechanics to any relatively small straight piece of metal that serves to join parts. The crank-pin of a great steamship's mainshaft may weigh a ton, where¬ as a pin in a watoh-plate may be difficult to discern. A wooden pin is now more commonly called a peg. Both needles and hairpins are manufactured to a greater extent in Europe than plain pins. Safety pins, however, are

decidedly American, and of these we make on an average 1,000,000 gross a year.

PIN-MONEY, the money which a husband hands a wife for minor personal expenses; in law, an annual sum of money, sometimes pro¬ vided for in a marriage settlement, to be paid

by the husband to the wife for her separate use, and to be applied in the purchase of apparel, ornaments for her person or for private ex¬ penditure. See Husband and Wife.

PINA (pe'nya) CLOTH, an extremely soft and delicate fabric, the manufacture of which is peculiar to the Philippines. It is made from the unspun fibres of the leaves of the cultivated pineapple plant, and the finer qualities are always made in small pieces, since only 'single fibres are used for them. For the coarser qualities several fibres are often joined together, so as to make warp threads of con¬ siderable length. Its color is almost white, but has a slight tinge of yellow in it. Its chief use is for making ladies' pocket handkerchiefs, which are frequently adorned with exquisite em¬ broidery.

PINAFORE, H. M. S., a comic opera in two acts, libretto by W. S. Gilbert, music by Sir Arthur Sullivan ; first produced at the Opera Comique in London, 25 Mav 1878. First authorized appearance in America, November 1879, at the Boston Museum. Replete with those nonsensical whimsicalities which have given the word ((Gilbertian® to the English language, this opera with its dainty music be¬ came an immediate success. The captain of H. M. S. Pinafore wants his daughter (Jose¬ phine) to marry Sir Joseph Porter, First Lord of the Admiralty, but she is in love with Ralph, a sailor. They agree to elope, but their plan is betrayed by Dick Deadeye, the villain. A bumboat woman, Little Buttercup (in love with the captain), informs the First Lord that the cap¬ tain and Ralph had accidentally been exchanged as infants. To rectify this error, the First Lord reduces the captain to ordinary sailor and makes Ralph captain. Both Josephine and Lit¬ tle Buttercup wed the lovers of their choice under this grotesque arrangement and with the blessing of the First Lord.

PINAKOTHEK, pin'a-ko-thek (Ger. pe- na-ko-tak') (Greek, ˆcollection of pictures®), anciently, a chamber in which votive pictures of the gods were hung in Greece. Such a chamber was situated in the left wing of the propylseum or gate of the acropolis at Athens. In other states (Samos, Ephesus, etc.) special buildings were raised for the storing of votive tablets. Among the Romans the entrance to the atrium of their houses was adorned with statues, pic¬ tures and other

dbjects of art. In Munich at the present day the term is applied to a public art gallery, and there is in that city an old and a new pinakothek.

PINALOBO, pe-na-lo'bo, a mountain of the Cordillera de Cabusilan, Philippines, in the northwestern part of the province of Pam- panga, near the intersection of the boundary of Tarlac and Pampanga with Zambales. It is 6,040 feet in height, and the highest of a series of peaks which ends in the south with the Mariveles summits and forms a landmark for Subic Bay and for vessels approaching Manila Bay from Hongkong and northern China.

PINAR DEL RIO, pe-nar' del re'o, Cuba, the most western province of the island, bounded on the east by Habana province, area, 5,212 square miles. The Cordillera de los

Organos traverses the centre of the province from east to west, and from this range the land slopes gradually to the coasts, which are gen¬ erally low and marsh)'-. The southern slope is the most fertile, and forms the famous Vuelta Abajo, where the finest quality of tobacco in the world is grown. This tobacco is the staple crop of the province ; but coffee, sugar and fruits are also raised. The mountains are heavily wooded, mainly with pine, and lumber¬ ing is an important industry; some cattle are also raised; and charcoal is manufactured. The mineral resources are comparatively unimport¬ ant and have not been developed; asphalt and copper are found. Pop. 269,166.

PINAR DEL RIO, Cuba, city, capital of the province of Pinar del Rio, 95 miles south¬ west of Havana. It was founded in 1776. It is connected with Havana 'by rail and with La Coloma by highway, and being situated on the southern slope of the mountains is the com- merical centre of the tobacco-growing district, Vuelta Abajo. It has grown very rapidly in recent years. Pop. 52,472.

PINASTER. See Pine.

PINCHBACK, Pinckney Benton Stewart,

American lawyer and politician : ib. Macon, Ga., 10 May 1837. He was of negro stock, studied in the public schools of Cincinnati, became a river boatman, and in 1862 enlisted in the Union army. In 1867 he

was made inspector of cus¬ toms at New Orleans. He took a prominent part in politics as a Republican leader; was a delegate to the Reconstruction Convention of the State in 1867; was State senator, 1868-71, lieutenant-governor, 1871-72, and acting governor during Warmoth's impeachment December- Januarv 1872-73. He was elected to the United States Senate in 1873, but was never seated though he received regular pay and mileage ; in 1882 was named surveyor of customs of New Orleans ; and in 1886 was admitted to the bar, but a few years later retired from practice.

PINCHBECK, an alloy formerly in use, four parts copper and one part zinc, with oc¬ casional traces of tin, used in the manufacture of cheap jewelry. It has something the ap¬ pearance of gold, but became notable as _ a synonym for cheapness. It was named from its discoverer, Christopher Pinchbeck, a London jeweler: b. about 1670; d. 18 Nov. 1732. He made clocks, watches, astronomical instruments and various automata, especially musical, which he exhibited at fairs.

PINCHE, a sort of marmoset (q.v.).

PINCHOT, pin'sho, Amos Richard Eno,

American lawyer and publicist : b. Paris, France, 6 Dec. 1873. In 1897 he was graduated at Yale University and subsequently studied law at Columbia University and the New York Law School. Mr. Pinchot served in Porto Rico dur¬ ing the Spanish-American War and in 1900-01 was deputy assistant district attorney of New York Countv (borough of Manhattan). Mr. Pinchot became an active worker along sociological lines and wrote much on industrial, charity and social organization generally. He supported Theodore Roosevelt in 1912 in organizing the Progressive party, but left the party two years later after a controversy with George W. Perkins, of the Harvester Trust. He

is a trustee of the People's Institute and one of the founders of the Pinchot School of Forestry of Yale University.

PINCHOT, Gifford, American forestry expert: b. Simsbury, Conn.. 11 Aug. 1865. In 1889 he was graduated at Yale University, after which he studied forestry in France, Germany, Switzerland and Austria. In January 1892 he began the first systematic forest work in the United States aft Biltmore, N. C. His work there attracted general notice and in 1893 he establishing himself in New York as consulting forester. He became member of the National Forestry Commission in 1896. From 1898 to 1910 he was forester and chief of division of the Bureau of Forestry, afterward the Forest Service of the United States Deoartment

of Agriculture. Since 1903 he has held the chair of forestry at Yale and since 1910 has served as president of the National Conservation Asso¬ ciation. In 1902 Mr. Pinchot inspected the forests of the Philippines and recommended a forest policy for the islands. He also served on various commissions, dealing with conserva¬ tion, waterways, etc. In 1909 he was engaged in a controversy with Secretary Ballinger over the policy of the latter's department, which Pinchot claimed was inimical to the best inter¬ ests of the people. In 1910 the President dis¬ missed Pinchot for insubordination and in the inquiry subsequently instituted by Congress Ballinger was held blameless (((whitewashed®) . Public opinion, however, sustained Pinchot, who was undoubtedly right in his assumptions and justified in opposing the reactionary schemes of the Taft administration. In 1912 Mr. Pinchot supported the Progressive party and in 1914 was that party's candidate for United States senator from Pennsylvania. He failed of elec¬ tion, however. He is one of the founders of the Pinchot School of Forestry at Yale. In 1915 he started to perform relief work in Belgium but was expelled by the Germans, be¬ cause his family was allied by marriage with a member of the British diplomatic service. Mr. Pinchot has published (The White Pine) (1896) ; (The Adirondack Spruce) (1898) ; (Primer of Forestry) (1899) : (The Fieht for Conserva- tion} (1909); (The Countrv Church, > with C. O. Gill (1913L

PINCKNEY, pink'm, Charles, American statesman: b. Charleston, S. C., 1758; d. there, 29 Oct. 1824. He was educated for the bar, was elected to the provincial legislature, was held prisoner from the capture of Charleston until the end of the Revolution, then resumed prac¬ tice, and in 1785 was chosen to the provincial congress. In 1787 he was a delegate to the United States Constitutional Convention, in 1789 was elected governor of South Carolina and in 1791 and 1796 was re-elected. He was elected to the United States Senate as a Republican in 1798, in 1802-03 was Minister to Spain and in 1806 was made for the fourth time governor of South Carolina. In 1819-21 he was in Con¬ gress, where he opposed the Missouri Com¬ promise. He wrote well on political topics and his addresses to the people under the pseu¬ donym Republican® (1800) were of assistance in Jefferson's election to the Presidencv.

PINCKNEY, pink'm, Charles Cotesworth,

American soldier and statesman : b. Charleston,

S. C, 25 Feb. 1746; d. there, 16 Aug. 1825. He was educated at Oxford; read law in the Mid¬ dle Temple, London; studied military affairs in the Royal Academy at Caen, France, and in 1769 began the practice of law in Charleston. He was a member of the first provincial con¬ gress of South Carolina (1775), and during the Revolution served with distinction in the Con¬ tinental army. During the second attack on Charleston he at first commanded Fort Moul¬ trie, but after the entrance of the enemy's fleet into the harbor withdrew to the city, and was taken prisoner at the capitulation in May 1780. He was held in severe confinement for two years, exchanged in 1782 and made a brigadier in 1783. In 1787 he was a member of the United States Constitutional Convention, and took an active part in the busy debates connected with the framing of the instrument. He favored the slave trade, urged a landed-property qualifica¬ tion for the executive, judiciary and the legis¬ lative department; and demanded that blacks be counted equally with whites in the estimate for representation in the national legislature. It was he who secured the insertion in the Con¬ stitution of the clause that <(no religious test shall ever be required as a qualification to any office or public trust under the authority of the United States.® Under the Constitution he was a zealous Federalist. He was a member of the State Constitutional Convention of South Caro¬ lina in 1790 and in 1796 became United States Minister Plenipotentiary to France. Ordered by the Directory to quit France within 30 days, he retired to Amsterdam, and on his arrival in America was made (1797) major-general of United States troops by President Washington. It was during the French mission that Pinck¬ ney, in response to Tallvrand's insinuation that recognition might be obtained by money, for lack of which war might follow, is said to have replied: ((Millions for defense, but not a cent for tribute ! ® In 1800 he was Federalist can¬ didate for the Vice-Pr.esidency, and in 1804 and 1808 for the Presidency.

PINCKNEY, Thomas, American diplomat and soldier: b. Charleston, S. C., 23 Oct. 1750; d. there, 2 Nov. 1828. He was educated in England with his brother, Charles Cotesworth, was called to the English bar in 1770, returned to Charleston in 1772 and in 1775 entered the Constitutional Congress as a zealous Federalist. He acted as aide to Lincoln, D'Estaing and Gates, distinguished himself in the engagements at Stone Ferry and Savannah in 1779, and at Camden in 1780 was wounded and taken pris¬ oner, not regaining his liberty until the end of the war. In 1787-89 he was governor of South Carolina, Minister to England in 1792-94 and in 1794-96 was engaged in a special mission to Spain, with whom he secured in 1795 a treaty which granted to the United States free naviga¬ tion of the Mississippi

for three years. He was a member of Congress in 1799-1801 and in the War of 1812 was major-general in com¬ mand of the 6th military district where he utterly routed the Creek Indians at Horse Shoe Bend. He spent the remaining years of his life in retirement. Consult his 'Life* by C. C. Pinckney (Boston 1895).

PINCKNEYVILLE, pmk'm-vil, Ill., city and county-seat of Perry County, on the Illinois

Central and the Wabash, Chester and Western railroads, 60 miles southeast of Saint Louis. It has extensive lumber, flouring and coal-mining interests. In 1915 the commission form of gov¬ ernment was put in operation. The municipal¬ ity owns the water-supply system. Pop. 2,649.

PINDAR (Gr. II Ivdapog), Greek lyric poet: b. Cynoscephalae, near Thebes, 522 b.c. ; d. Argos, probably 443 b.c. For the development of his poetical talent he was sent to Athens, where he became the pupil of Lasus of Her- mione, the Athenian school of dithyrambic poetry. On his return to Thebes he was espe¬ cially indebted for the further cultivation of his poetic gifts to Corinna, a distinguished poetess. He was held .in great honor by many princes of Greek states, for Whom he composed choral songs. Alexander, king of Macedonia, was one of his most ardent patrons. He regularly at¬ tended the contests at Olympia. Delphi and else¬ where, and frequently attended. the victors home to direct triumphal ceremonies. In 472 he visited Sicily, the courts of King Thero of Agrigentum and King Hiero I of Syracuse. 2Eschylus made a journey to the island at about the same time ; and rival descriptions of the eruption of 2Etna appear in the

PINDAR, Odes of. Few names were so venerated among the ancient Greeks as the great Theban poet, Pindar. As Homer was their ((epic poet® and Sophocles their ((tragic poet,® so Pindar was their "lyric poet.® His chair was preserved at Delphi, and at the peri¬ odic theogenia or sacred festival it was the custom of the priest of Apollo to call out, ((Let Pindar the poet go into the banquet of the god.® At the destruction of Thebes, Alexander the Great

" bade spare

The house of Pindarus, when temple and tower

"Went to the ground."

Pindar belonged to the school of Dorian choral poets. His fragments represent nearly

every kind of lyric poem. These were com¬ posed as if to be sung on the spot in imme¬ diate celebration of the victory; but in the nature of the case this could seldom be, and the ode was generally composed later, to be sung at a commemoration festival at the home¬ town of the victor. Like all choral lyrics, the epinikion was essentially narrative ; it is, how¬ ever, not the story of the contest that Pindar gives, but some myth of the family or race which at once tells an appropriate tale and points a moral. This digression was the heart of the odej but its connection with the hero's victory is not always easy to see. The ode, once composed — in strophe and antistrophe, or both these with epode — a band of youths was carefully selected to render it with song and rhythmic movement. The ancient Hellene felt, as no mortal can ever feel again, that There is no greater glory for a man while yet he lives than that he achieves with hand and foot® ; and no pains or expense was spared by the victor's fellow-townsmen to bring out Pindar's ode with proper splendor.

It is not possible for moderns to appreci¬ ate the full excellence of the Pindaric ode. It was not merely a spectacle in honor of a man ; the celebration was an act of divine worship and the poet was filled with religious fervor. The odes were meant to be sung, not read, and the music is lost ; besides the scenic accessories are all gone. No great poetry can be really translated, least of all Pindar. Perhaps there is no great poet in all the world's literature of whom a less ade¬ quate conception can be obtained through trans¬ lations. As Jebb eloquently says, <(The glory of his song has passed forever from the world with the sound of the rolling harmonies on which it once was borne, with the splendor of rushing chariots and athletic forms around which it threw its radiance, with the white- pillared cities by the PEgean or Sicilian Sea in which it wrought its spell, with the beliefs or joys which it ennobled; but those who love his poetry and who strive to enter into its high places can still know that they breathe a pure and bracing air and can still feel vibrating through a clear calm sky the strong pulse of the eagle's wings as he soars with steady eyes against the sun.® The price of knowing Pindar is high, but those who pay it have no regrets. For the great majority, Pindar is a lost art, but the few know that it is a very great art; and for the sake of our standards in literature it is devoutly to be hoped that such a saving rem¬ nant, however small, may always be found. Pindar's standard was so high and his achieve¬ ments so sure that the modern world cannot afford to lose the tradition of his high excel¬ lence. While many especially

great qualities might be mentioned, there is space here to em¬ phasize only one — his style. Matthew Arnold coined the word ((Pindarism® to express it, say¬ ing, ((Pindar is a poet on whom, above all other poets, the power of style seems to have exer¬ cised an inspiring and intoxicating effect.® The chief characteristic of that style was splendor. ((To Pindar's soul splendor was as elemental as harmony to Milton's.® This quality is best exhibited in some passages from the Epinikia, but these cannot be translated. There is a ten¬ derer beauty perhaps in this picture from the

second Olympian of the happy dead in the Islands of the Blest:

" Where the soft Ocean breezes float for ever Around the Islands of the Blest.

There golden bloom to bloom succeeds.

Through springs that never tire.

They fill with light the ground below.

Athwart the shining trees they glow;

Their growth the very water feels.

Hid under flowers of fire."

A similar beautiful picture is this fragment of a threnos :

" For them the night all through,

In that broad realm below,

The splendor of the sun spreads endless light;

'Mid rosy meadows bright,

Their city of the tombs with incense-trees.

And golden chalices Of flowers, and fruitage fair.

Scenting the breezy air.

Is laden. There with horses and with play,

With games and lyres, they while the hours away.

On every side around Pure happiness is found.

With all the blooming beauty of the world;

There fragrant smoke, upcurled

From altars where the blazing fire is dense

With perfumed frankincense.

Burned unto gods in heaven,

Through all the land is driven.

Making its pleasant places odorous

With scented gales and sweet airs amorous.”

For a discussion of English Pindaric odes, consult Edmund Gosse’s Introduction to his (English OdesP Gray’s two Pindaric odes, the (Progress of Poesy) and (The BardP are per¬ haps the most famous in our language ; Aken- side’s series of odes are regarded as coming nearer to the Greek model than any other imi¬ tations, but they lack inspiration. Perhaps the best English editions of Pindar are the com¬ plete edition of C. A. M. Fennell (1893-99) ; the (01ympian and Pythian Odes,* by B. L. Gildersleeve (1885) ; the (Nemean and Isth¬ mian Odes,* by J. B. Bury (1890-92). The best translation is the prose rendering by E. Myers (revised 1883). Consult Jebb, (Lectures on Greek Poetry) (1893) ; Fraccaroli, (Le odi di Pindaro) (1894) ; also Morice, F. A., (Pin- darP in Ancient Classics for English Readers.

Chas. Forster Smith.

PINDEMONTE, pen-da-mon’ta, Cava- liere Ippolito, Italian poet: b. Verona, 13 Nov. 1753; d. there, 18 Nov. 1828. He was of a rich and cultured family, and. early showed signs of poetical taste and ability. He traveled in Eng¬ land, Germany and France, and, like the great English poets of the epoch, greeted with joy the French Revolution, publishing (La Francia) in 1789, but was soon disillusioned by its ex¬ cesses and especially by the sufferings of Italy, which followed it. His principal poems were (Poesie Campestre* (1788), filled with charm¬ ing descriptions of British scenery; (Dodici Sermoni Poetici* (1819), in a Horatian man¬ ner; and

PINDEMONTE, Marchese Giovanni, Italian dramatist, brother of Ippolito Pinde- monte (q.v.) : b. Verona, Dec. 1751 ; d. there, 12 Jan.

1812. His early years were full of political ups-and-downs, now in Italy in high office and again living in exile in France. In 1802 he became a member of the Italian Parlia¬ ment. He was a brilliant improvisateur, a

translator of note, like his brother, and the author of 10 tragedies, of which the best are (I BaccanalP and (,Ginevra di ScoziaP

PINDHAREES, pin-darez, PINDAR- EES, or PINDARIS, the name given to the hordes of mounted robbers in central India who for several years (after 1812) infested the possessions of the East India Company. These freebooters had existed since 1761, but made themselves particularly formidable in the be¬ ginning of the following century. They were descended mostly from the caste of Moham¬ medan warriors, which formerly received high pay from the Indian princes. But' the British East India Company disarmed many of the tributary native princes and maintained under the command of the British residents at the Indian courts large bodies of mercenary troops, which the mediatized nabobs were obliged to pay. The number of the Pindarees was thus increased, and they were secretly excited by the Indian tributaries to attack the company. In the last year of their excesses, 1816, they sacked over 300 villages. In 1817 the British governor-general, the Marquis of Hastings, de¬ termined on the destruction of these robbers, whose force was estimated at 40,000 horse and 160,000 infantry. Attacked on all sides, they were conquered and dispersed.

PINDUS, in ancient geography, the main range of northern Greece between Thessaly and Epirus, running from the northwest to the southeast, and the source in its northern part of the principal rivers of Greece, the Achelous, Haliacmon and Peneius. It includes several peaks from 6,000 to 7,500 feet high. Geologically it is calcareous in formation. The range is well watered and profusely wooded. In classic times its inhabitants were the half barbarian Atha- manes and Dolopes, and the range, like Par¬ nassus and Helicon, was sacred to the Muses and to Apollo. The inmost recesses of the mountains were the fortress and hiding place of determined brigands in the days of Ali Pasha. Its present inhabitants are peaceable shepherds and farmers, both Greek and Albanians, for the range now lies partly in Turkish and partly in Greek territory.

PINE, a genus (Pinus) of trees and a few shrubs of the order Coniferce. The species, of which about 70 well-mgrked ones have been de¬ scribed, are natives of the Northern hemi¬ sphere and more than half are indigenous to North America. Their distribution is from the Arctic zone to near the Equator, where, how¬ ever, they are found only near the snow-line on the mountains. They are characterized by resiniferous wood, foliage, etc.; usually tall trunks ; spreading branches which form a pyramidal or round top ; needle-like leaves ar¬ ranged in clusters of two, three or five, some¬ times solitary; yellow or purple staminate flowers, greenish or purplish pistillate ones, the latter developing into usually cylindrical brown cones, which vary in size from less than an inch to 18 inches long and reach maturity gen¬ erally when two years old ; some not until three or more years of age.

Economically the pines are more important than any other timber trees used by man ; the nearest rival being the oaks. The main rea¬ sons for this eminence are the wide extant of their distribution, the enormous area occupied,

their adaptability to human needs and their occurrence largely upon poor land unfit for agricultural purposes. Not only for fuel and for timber are they noted; certain species yield pitch, tar and turpentine, used extensively for naval supplies ; the leaves of several are made into <(pine wooP* and also furnish essential oils ; the seeds of other species are used as food and for flavoring; and many are serviceable as wind¬ breaks and shelter-belts or for ornamental planting. They thrive on a wide variety of soils, from beach-sand to alluvial river bottoms or rocky mountain-sides ; and usually are found in large numbers together, often to the exclusion of other trees.

Pines are readily propagated by seeds, which in some species may require more than one year to germinate, unless planted as soon as gathered. They do best in a moderately moist soil en¬ riched only to a slight depth so as to encourage the formation to surface roots rather than tap roots. While little they generally need partial shade and care in watering, both extremes of wetness and of dryness being avoided. When two years old or younger they are transplanted to increase the stockiness of the roots and ren¬ der the trees better able to stand transplanting to final quarters. In general, the species do best in dry, upland soils, sandy rather than clayey, poor rather than rich, though soils of moderate texture and richness suit them well. When re¬ moved from the nursery rows the roots should be puddled in loamy mud to prevent the drying of the rootlets. Generally, best results are ob¬ tained in transplanting in the spring, before growth starts and selecting youngest specimens or such as have been transplanted in the

nurs¬ ery several times.

A very large number of insects feed upon the pine, nearly 300 being recorded in Europe and 200 in America, although the actual num¬ ber in this country is probably twice as many. Of these probably the most troublesome are the borers, of which a very large number are known, among which the following may be mentioned: Wood-engraver bark-beetle (Xyle – borus ccelatus), which attacks the Georgia and the white pine; coarse-writing bark-beetle (Tomicus calligraphus) also attacks the white pine, but seems to be more partial to the pitch pine; the white pine-weevil (Pissodes strobi) works, as a larva, in the leading shoot, which dies and thus forces the tree to develop a second leader, forming a crook in the trunk or branch attacked; the sawyer (Monohammus confusor) is a scourge of Southern pine forests ; the pine- destroying beetle (Dendroctonus ponderosa) has greatly injured the timber of the Black Hills region by boring in the trunks ; and there are many other boring beetles. The Nantucket pine-moth (Retinia frustrana) burrows, as a larva, in the wood of the twigs and when in sufficient numbers kills the trees. Of other in¬ sects than borers perhaps the caterpillars are most frequently troublesome. Among the best known are the larvae of two hawk-moths (Lipara combycoides and L. pinetum) ; of the imperial moth (Eacles imperialis) ; and of two butterflies (Thecta niphon and Pieris manapia). These all feed upon the foliage. A leaf miner (Gelechia pinifoliella) burrows in the leaves. A gall midge (Diplosis pini-rigidce) forms galls at the bases of the leaf-clusters and its relative (D. resinicola) lives in the pitch of the pitch

pine. There are also many saw-flies, plant-lice and scale-insects which destroy the foliage. The best known species are the following :

White Pine (Pinus strobus). — In every way this is the most useful species of the genus, combining utility in many directions with orna¬ mental qualities superior to other species, adap¬ tability to many soils and climates and rapidity of growth with productivity. It is an Ameri¬ can species, ranging from Newfoundland to Manitoba and southward to Illinois and in the mountains, to Georgia. It attains heights often exceeding 100 feet, sometimes 150 feet, and diameters of four or more. The white or cream-colored wood is soft, straight-grained, somewhat resinous and easily worked. It is very popular for house-building especially for making door and window-frames, shingles,

blinds and interior finish. But since the forests of the northern United States and adjacent Canada have been considerably depleted other woods are replacing it for certain purposes.

Georgia Southern, Yellow, or Long-leaf Pine (P. palustris). — As a timber tree this species ranks next to the white pine and is the most important and most widely distributed timber tree of the Southern States. It is found upon the coastal plain from Virginia to Missis¬ sippi in a belt about 125 miles wide. It often exceeds 100 feet in height, but rarely more than 120 feet, gradually tapering from a base of about 30 inches. Its orange-brown branches form an open head; its leaves are often more than a foot long and its cones larger than those of species in the same range. The yellow, very resinous wood is the heaviest and strongest of the pines. It is extensively used for ship and bridge building, flooring and for interior finish of houses especially when such is to be left unpainted to show the grain. The tree is the most important source of turpentine, resin, etc., the obtaining of which ranks second only to its timber industry. Its leaves are one of the most important sources of a turpentine-like oil and of pine wool, to obtain which they are boiled in alkalis.

Red, or Norway Pine (P . resinosa). — Third in importance among American pines, this spe¬ cies is second in the North to the white pine as a lumber tree. It ranges from Labrador to Manitoba and south to Pennsylvania. Though usually about 75 feet tall and two feet in diame¬ ter, it sometimes doubles this height. It occurs most frequently upon dry, sandy soils, where it often forms dense forests. Its light, elastic, resinous, hard wood is durable only when in dry places and is used like that of the short-leaf pine of the South.

Spruce or Yellow Pine (P. echinata or P. mitis) . — This species ranks second in the South to the Georgia pine and comes fourth in the American list as a lumber tree. Its range is from New York to Illinois and southward to the Gulf States, sometimes excluding other spe¬ cies in large tracts. It attains from 75 to 120 feet in height and a diameter of two feet. The heavy, hard, coarse-grained timber is valued fol¬ ks strength and durability. It is largely used for framework, railway ties, outside finish of buildings, railway cars, etc. It also furnishes resin. As an ornamental specimen it has been found hardy as far north as Rhode Island.

Loblolly, Frankincense, or Old Field Pine (P. t&da) . — This species yields very variable vol. 22 — 7

timber, the quality depending upon the condi¬ tions under which it is

grown. When in forests it is considered valuable ; when in fields usually not. It is a rapidly growing tree which often exceeds 150 feet in height and has about the same range as the Georgia pine. Its chief use is probably for fuel, though it is also cut for timber when grown under favorable conditions.

The Slash, Swamp, or Cuban Pine (P . cubensis). — This species is associated with the preceding and though used similarly is con¬ sidered inferior to the Georgia pine.

Sugar Pine (P. lambertiana) . — One of the most important timber trees of the Pacific Coast. It is indigenous from Oregon to Mexico, attains heights of 200 to 220 feet, diameters exceeding 10 feet and a large portion of its trunk is branchless. It is one of the tall¬ est trees of the region and of its genus. Its timber is heavy, straight-grained, easily worked and is largely used for furniture and interior finish of houses. It bears edible nuts. Its name is derived from the sugar-like odor of its burning resin.

Bull, or Yellow Pine (P . ponderosa) . — Perhaps second in importance to the preceding species in the West, its range being from British Columbia to Nebraska and southward to Texas and Mexico. It has several sub-species or varieties, which are of varied usefulness and application; those growing remote from the coast having coarser grained, harder and more fragile wood than those on the coast. Like the preceding it is one of the largest species of its genus and region, sometimes attaining a height of 230 and even 250 feet and a diameter of 10 feet but usually ranging from 100 to 150 feet with a diameter of about six feet.

Mountain White, or Silver Pine (P. mon- ticola). — Another large species of the West, ex¬ tending from British Columbia and Idaho to California, and attaining heights of 100 to 150 feet. It resembles the Eastern white pine some¬ what in appearance.

Species of Inferior Importance. — The

pinon, or nut pines (P . monophylla, P. edulis and P. parryana) are small trees in comparison with the foregoing, seldom attaining 50 feet. They are natives of the southwestern United States, where their wood is used as fuel and their large edible seeds as food. The Scotch pine (P. sylvestris) is the leading species of Europe, where it often forms extensive forests, frequently mixed with spruce fir, extending into northern and western Asia. Though usually less than 100 feet tall and about 30 inches in diameter, it sometimes attains 120 feet and a

diameter of four feet. In its economic uses it resembles the Georgia pine, being good for ship-, bridge- and house-building, though there is considerable variation in the quality of the timber produced upon various soils and by vari¬ ous varieties. It also furnishes much turpen¬ tine, resin, etc., and its leaves are used for making pine wool and oil. The timber of the best grades is known as red pine or red deal. Corsican or black pine, or black fir (P . laricio) , is a large native of southern Europe and west¬ ern Asia, which is exceedingly rich in turpen¬ tine, etc., and supplies also some Burgundy pitch. Its wood is of little value except for fuel. The Aleppo pine (P. halepensis) is a native of the Mediterranean region and western Asia, and rarely exceeds 60 feet in height. It is

useful for shore-planting, yields Venice turpen¬ tine, a liquid resin and a timber used in its eastern range for ship-building and similar pur¬ poses. The cluster pine or pinaster (P . pinaster) grows on the south European seaboard, and like the Corsican pine is used for shore-planting ex¬ tensively in southern England along the coast. The Japanese red pine (P. densiflora) and Japanese black pine (P. thunbergi) are the two principal Japanese and North China species. They are used for many timber purposes and also for ornamental planting, having developed several horticultural varieties. The Cheer pine (P. longifolia) is a Himalayan species which often exceeds 100 feet in height and is valued for its timber, which is often substituted for European deal. Its resin is also obtained in commercial quantities. It has been introduced into California, where it is prized as one of the most decorative of pines, on account of its light, green, drooping leaves. Another Himalayan species, the Bhotan pine (P. excelsa), furnishes a close-grained durable wood which on account of its abundant resin is often used for torches. It is about the same size as the preceding spe¬ cies, and somewhat resembles the white pine of America.

Numerous other pines are more or less locally important, as the Philippine Island pine (P. insularis), which is one of the leading tim¬ ber trees of the Philippine Islands, upon the high lands of which it forms large forests ; the stone pine (P. pinea), one of the most pic¬ turesque trees of southern Europe and valued for its almond-flavored nuts and beautifully grained wood; Mexican pines (P. montezu- mce, P. ayacahuite and P. arizonica) , the first a white pine, the other two yellow; and the Cembra or Swiss pine (P. cernbra), a species ranging

from the Swiss Alps to northern Rus¬ sia and Siberia, throughout which country it is valued for its nuts and its ((Carpathian balsam.ˆ

Bibliography. — Betts, H. S., (Western Pines) (in United States Department of Agri¬ culture Bulletin No. 16, Washington 1914) ; North, A. T., (The Yellow Pine) (Saint Louis 1913) ; Pinchot, G., (Primer of Forestry* (2 vols., Washington 1903-09) ; Pinchot and Graves, (White Pine) (New York 1896) ; Schwarz, G. F., (Longleaf Pine in Virgin For- est) (New York 1907) ; Shaw, G. R., (Pines of Mexico* (Jamaica Plains, Mass., 1909) ; id., (The Genus Pinus) (Arnold Arboretum 1914) ; Sudworth, G. B., (Forest Trees of the Pacific Coast) (Washington 1908) ; also consult Baker, R. T., (Pines of Auhsalia) (Sydnev 1910) ; and (European Pines* (in Kew Miscellaneous Bul¬ letin No. 6, London 1915).

PINE, Ground. See Lycopodiales, under Ferns and Fern Allies.

PINE, Running. See Lycopodiales, under Ferns and Fern Allies.

PINE BLUFF, Ark., city, county-seat of Jefferson County; on the Arkansas River, and on the Saint Louis, Iron Mountain and Southern and the Saint Louis Southwestern railroads, about 45 miles in direct line south by east of Little Rock. It is in an agricultural region in which cotton is one of the chief products. Its chief manufacturing establishments are cotton gins, cotton compressers, cottonseed-oil mills, foundry, furniture factory, saw-mills, automo¬ bile spokes, feed mills, printing establishments

and boiler-sheet iron works, cotton, hides and poultry are shipped. The railroad shops of the Saint Louis Southwestern are located there. The annual fair under the auspices of the State Fair Association is held there. It is the seat of the State Colored Normal College, the Merrill Institute and a girl's industrial school, and it has public and parish schools and a public library. There is a free library con¬ nected with the Merrill Institute. Pop. 19,280.

PINE BLUFF (Ark.), Engagement at.

Pine Bluff was held 25 Oct. 1863 by Col. Powell Clayton with a Union brigade consisting of the 5th Kansas and 1st Indiana Cavalry regiments, a company of State militia and seven field guns, in all about 575 men. Early in the morning of the 25th General Marmaduke with a division of about 2,500 Confederate cavalry and 12 guns ap¬ proached the place and demanded its surrender. The outpost commander refused to permit the demand to be sent into headquarters

and skir¬ mishing began; the Union pickets being slowly driven in. Meanwhile Clayton, whose troops were quartered in the town, had set 300 negroes at work rolling cotton-bales out of the ware¬ houses and barricading the streets leading into the public square. Artillery was put in position to sweep every avenue of approach; sharpshoot¬ ers were posted in the buildings ; and barrels were filled with water from the river to with¬ stand a siege. The skirmishers were driven in about 8 o'clock and Marmaduke made an attack with his 12 guns and sharpshooters, but making no headway set fire to several buildings near the square to burn Clayton out. Failing in this, Marmaduke at 2 p.m. fell back, leaving some of his dead and wounded, and followed a mile by Clayton. He reported a loss of 40 killed and wounded. Clayton's loss was 11 killed and 27 wounded, and in addition several negroes were killed and wounded. The courthouse and sev¬ eral other buildings were burned and the town wrecked by the Confederate artillery fire. Con¬ sult (Official Records) (Vol. XXII).

PINE FINCH, LINNET, or SISKIN, a

small greenish finch (Spinus pinus) , related to the goldfinch, whose home is in northern Can¬ ada, and which visits the northern United States • in cold winters. These birds frequent conifer¬ ous trees and depend upon their seeds, buds, etc., for most of their food.

PINE GROSBEAK, a large northern finch

(Pinicola enucleator) , whose summer home is in northern Europe, Canada and the Rocky Mountains. It measures 9 to 10 inches in length. The head, fore-parts, neck and rump are bright red ; back blackish brown, the feathers of this region having red edges; lower portion of the body light gray; wings and tail dusky. Like most winter visitors, it is very tame during the time when it is seen within the United States, which is irregularly in midwinter. Its food seems to consist principally of pine seeds, but it is also fond of those of the birch and alder, and occasionally descends to the ground, where it picks up the seeds of various plants, and probably a few insects. During late sum¬ mer and winter it has a very pleasing song — clear, sweet and flowing, like that of the pur¬ ple finch. Four or five eggs of a pale green color spotted with brown are produced ; the nest, roughly built of sticks and lined with

PINE MARTEN

PINEAPPLE

feathers, being placed on a branch of a tree near the ground. Consult Coues, (Birds of the Northwest.-*

PINE MARTEN, the American sable. See Marten ; Sable.

PINE MOUNTAIN, Engagement of.

Gen. J. E. Johnston, commanding the Con¬ federate army opposing General Sherman in the Atlanta campaign, abandoned his lines in front of New Hope Church 4 June 1864 and withdrew to a new position prepared by his engineer, run¬ ning west from Brush Mountain to Pine Moun¬ tain and thence southwest to Lost Mountain. Pine Mountain, an isolated hill rising 300 feet above the surrounding country, formed a salient near the centre of this line. Upon Johnston's with¬ drawal Sherman occupied the railroad at and near Acworth, brought up supplies, was joined by General Blair, with two divisions of the 17th corps, and on the 10th moved his whole line forward and closed up on the Con¬ federate position. By the 14th General Thomas, with a part of his line, had worked his way close to Pine Mountain, and during the day General Johnston, with Generals Hardee and Polk, two of his corps commanders, were on the mountains observing the movement, when some of Thomas' batteries opened upon the group, killing General Polk. During the night Johnston abandoned Pine Mountain, placing Bates' division, which had occupied it, in re¬ serve, and on the morning of the 15th it was occupied by Howard's Fourth corps. _ John¬ ston still held the entrenchments connecting his principal line with Pine Mountain and other de¬ tached works, and at noon both Howard's and Hooker's corps advanced against these, Howard on the left of the mountain and Hooker on its right, driving the Confederates to their main works after a sharp engagement. Hooker then pushed against the principal line, Geary's divi¬ sion, supported by Williams', on the left, and Butterfield's division on the right. The Con¬ federate resistance was very strong, and Hooker was repulsed with a loss of 639 killed and wounded. The Confederates, well covered by log breastworks, suffered but slightly. There was brisk and incessant skirmishing until the 18th, Sherman pressing closely and persistently at all points, and on the 19th Johnston was back on a new line, Hood's corps with its right on the Marietta and Canton road; Loring's (formerly Polk's) on theKenesaw Mountain, and Hardee's on the left, extending across the Lost Mountain and Marietta road. (See Kenesaw Mountain, Battle of; Kolb's Farm, Engagement at). Consult (Official Records) (Vol. XXXVIII) ; Cox, (Atlanta) ; Sherman, (Memoirs) (Vol. II) ; The Century Company's (Battles and Leaders of the Civil War) (Vol. IV).

PINE MOUSE. See Field Mice.

PINE SISKIN. See Pine Finch.

PINE SNAKE, or BULL SNAKE, a

large colubrine serpent (Pityophis melanoleu- cus), prevalent in the pine-covered coast region from New Jersey southward, and locally called thunder and lightning snake and bull snake, the latter in reference to the loud hissing and bel¬ lowing noise it is able to make by reason of its peculiarly constructed glottis. It is pugnacious and malodorous, but harmless, and feeds on insects, mice, ground squirrels, eggs and young

birds, etc., and lays its eggs in a shallow bur¬ row in the sand. This serpent reaches a length of six feet, and is cream white, variously blotched with chocolate brown. Consult the writings of Holbrook, Cope, Abbott and Lock- wood, and Ditmars, R. L., ˆReptile Book) (New York 1914).

PINE-TREE FLAG, an American colonial flag used in New England as early as 1700. It was at first red or blue with a pine-tree on a white field. Later it was all white with a pine- tree in the centre, and also the motto ((An Ap¬ peal to Heaven.® This flag was carried by the first war vessels used in the Revolution. See Flag.

PINE-TREE SHILLING. See Numis¬ matics.

PINE-TREE STATE, a popular name ap¬ plied to Maine, from the extensive pine forests covering a large part of the State.

PINEAL BODY, a small conical reddish body (frequently called pineal gland), ovoid and conical, an organ attached to the posterior cerebral commissure. It projects downward and backward between the anterior pair of the corpora quadrigemina. Its function was long questioned, the most favored theory being that it was a vestigial sense-organ, probably an eye. A hollow found in the parietal bone in many fossil mammals and reptiles was believed to ‘have been the site of such an organ. This theory is now generally discarded, it having been demonstrated that there is a slight secre¬ tion by the body which is, therefore, classed as a gland. It appears to be connected with growth, both physical and mental. Consult Mc¬ Cord, C. P., (The Pineal Gland in Relation to Somatic, Sexual and Mental Development (Chicago 1914).

PINEAPPLE, a perennial herb (Ananas sativus) of the family

Bromeliaccce. It is a native of the American tropics, but has been in¬ troduced into warm climates throughout the world. It grows about three feet high, bears long, stiff, sword-shaped, brittle leaves in an elon¬ gated rosette, from the centre of which arises the fruit, surmounted by a crown of stiff leaves. After fruiting another stem may arise and bear a fruit, the process being repeated sometimes for 10 years or even more. The fruit vary from 4 to 10 inches or even more, and from 4 to 20 pounds, but the average weight is prob¬ ably about eight pounds. Until the introduction of recent methods of rapid transit the pineapple was confined to warm countries, or to hot¬ houses, in which large quantities were for¬ merly grown. Very few are now cultivated under glass, but immense and annually increas¬ ing numbers are shipped from tropical and sub¬ tropical fields to the markets of cooler coun¬ tries, and also are used for canning. The prin¬ cipal fields are the West Indies, Florida, north¬ ern Africa, Queensland, Hawaii and Azores Islands.

The pineapple thrives best in an equable cli¬ mate where the temperature averages between 70° and 80°, and where dry and rainy seasons alternate. Whatever the soil it must be thor¬ oughly drained, even dry. Depth is inconse¬ quential ; the plants produce well in the Florida Keys, where the soil is often only one or two inches deep above the coralline rock. They

will withstand months of dry weather but quickly succumb to an excess of moisture, either in the air or the soil. Florida pineapple land frequently contains only a trace of the fertiliz¬ ing elements considered essential ; hence appli¬ cations of plant-food must be liberal, care being taken to avoid an acid phosphate. Dried blood, nitrate of soda, ground bone, carbonate and sul¬ phate of potash and cotton-seed meal are favor¬ ite fertilizers. The plants are never raised from seed except for the production of new varieties, since 10 years is often required to bring such plants into bearing. Rattoons, crowns, slips and suckers are used instead. Crowns, or the ros¬ ettes of leaves upon the fruits, are little used except when varieties are rare. Suckers de¬ velop from axillary buds near the ground and produce thrifty plants which usually bear before 18 months old; slips, taken from the base of the fruit, require fully a year longer to reach bearing age. Rattoons, which develop from buds beneath the ground and form a root-sys¬ tem of their own, are relied upon to a large extent to replace the plants that have borne. The land having been prepared, the plants

are set in checks 18 to 36 inches apart, with alleys left at intervals of six or eight feet. Cultiva¬ tion consists in keeping the surface loose with a scuffle hoe. With reasonable care a plantation should bear for 10 years without resetting. The fruits are gathered about a week before full maturity, wrapped individually in brown paper, packed firmly in half-barrel or barrel crates and shipped.

Pineapple sheds are built of slats upon a framework of posts and beams high enough to permit a man to stand upright under them. The slats are about three inches apart, to permit the ingress of light. The sheds protect the plants from excessive heat and from frost, and they improve the quality of the fruit. Only choice varieties are so grown, the cost of erec¬ tion, about $500 an acre, being prohibitive of inferior sorts.

The principal enemies of the pineapple are red spider (Stigmceus floridanus) ; scale insects (Diaspis bromeliece) ; and mealy bugs (Dacty- lopius citri, etc.). The first appears upon the tender leaf bases and causes rot. A handful of tobacco-dust placed in the crown of the plant is effective ; rains dissolve and carry the solution to the infected parts. Resin wash, whale-oil soap and kerosene emulsion are used for the scale; these and the tobacco are used for the mealy bugs. The scale usually appears on the under surfaces of the leaves, but produces a yellow spot on the upper ; the mealy bugs attack the bases of the leaves below ground, the buds and the fruit.

Blight or wilt is said to be due to a soil fungus at the roots. Removal and resetting are practised, though plants of valuable varieties are sometimes trimmed and replanted. Sand¬ ing, which follows the filling of crowns of young plants with sand, may be prevented by filling the crown after planting with cottonseed meal, or other loose material which will not prevent growth but will keep out the sand. Spike, non-expansion of the leaves, is due to unfavorable conditions of the soil. Change of fertilizer is recommended. Heart rot or bitter heart, which often accompanies wet seasons, is of unknown origin. The affected part, the

heart, looks watery, and the whole fruit be¬ comes bitter. If not serious in nearly mature fruits the pineapples may be marketed; other¬ wise destroyed. Consult Bailey, (Cyclopedia of Standard Horticulture) ; Rolfs, (Pineapple Growing, > United States Department of Agri¬ culture (Washington 1901) ; Rolfs, (Pineapple Fertilizers,) Florida Experiment Station, Bul¬ letin 50.

PINEAPPLE FIBRE. See Fibre.

PINEAPPLE-MELON. See Melons.

PINEDA, pe-na'da, Philippines, pueblo of Rizal, Luzon. See Pasay.

PINEHURST, pin'herst, N. C., village in Moore County, 62 miles southwest of Raleigh and 125 miles from the seacoast. It is 650 feet above sea-level. The Pinehurst Electric Rail¬ road connects with the Seaboard Air Line at Southern Pines. Railroad connection is made from Pinehurst over the Aberdeen and Ashe- boro Railroad with the Seaboard Air Line at Aberdeen and the Southern Railroad at High Point. Pinehurst is 18 hours' ride from New York City. It is a winter resort, founded in 1895 by James W. Tufts of Boston. It em¬ braces a large tract of country, 150 acres of which has been beautifully laid out with croquet grounds, tennis courts, parks, etc. It includes a shooting preserve of 50,000 acres, a dairy and poultry farm and a large market garden. The location was selected for its scenery and healthfulness. Part of the year there is a pop¬ ulation of about 2,500, at other times only 200 or 300.

PINEL, pe-nel, Philippe, French alienist: b. Saint Andre d'Alayrac, 20 April 1745 ; d. Paris, 26 Oct. 1826. He studied medicine in Toulouse, in Montpellier and in Paris, where he had to teach philosophy and mathematics to keep himself alive; in 1791 became directing physician in the insane asylum at Bicetre and in 1794 at the Salpetriere ; and in both these in¬ stitutions introduced gentle, kind treatment in place of the barbarities he found. In his book, (Sur l'Alienation Mentale) (1791), he first sug¬ gested moral remedies for the insane, so that this work is the foundation of modern psychi¬ atry. His (Nosographie Philosophique) (1798) created an epoch in French medicine. He be¬ came a member of the Institute in 1803 on Cuvier's death. Suspected of liberal political views he was removed from his post in the medical school in 1823.

PINERO, pi-ner'o, Arthur Wing, Eng¬ lish dramatist: b. London, 24 May 1855. His ancestors, the Pinheiros, Portuguese Jews, set¬ tled in England in the 18th century. He was a solicitor's clerk for several years; went on the stage in 1874, appearing first in Edinburgh ; be¬ came a member of Henry Irving's company soon afterward, playing Claudius in (Hamlet) ; and had written a farce, (Two Can Play at that Game' ; a successful comedietta, H200 a Year) ; the one-act plays, (Daisy's Escape) and By¬ gones, > which were curtain-raisers for the Irv¬ ing company at the Lyceum ; and in 1881 (The Squire) and before turning him¬ self in 1882 entirely to dramatic authorship. His earliest plays after that date show a striv¬ ing after real characters — none too successful, for example, in (The Magistrate* (1885). The

beginning of his naturalistic power was to be

seen not only in the well-known farces of the next two years, (The Schoolmistress,* (The Hobbyhorse* (1886) , and (Dandy Dick) (1887), but in the tragedy called (The Weaker Sex,* first played in 1888. (Sweet Lavender,* a

pretty, rather unpleasant, very unreal and quite uncharacteristic play, was written in 1888. (The Profligate,* with its Puritan theme of the impossibility of burying a wicked past, was dramatically powerful but poorly written. It was followed by the weak farces, (The Cabi¬ net Minister* and (The Times,) in 1891 by (Lady Bountiful,* and in 1893 by (The Second Mrs. Tanqueray,* which showed great gain in literary ability and in dramatic machinery. Between them and (The Notorious Mrs. Ebb- smith) (1895), no doubt his best play, came again a farce (The Amazons) ; indeed it seems that after every serious effort he returned to the farce. Pinero's later works are (The Bene¬ fit of the Doubt* (1895), a triumph of theatri¬ cal construction; (The Princess and the Butter¬ fly * (1897), a charming combination of satire and romance; the graceful (Trelawney of the Wells* (1898) ; a study in moral evolution, (The Gay Lord Quex) (1899) ; 'the unpleasant but strong

PINEVILLE, Ky., city and county-seat of Bell County, on the Cumberland River and the Louisville and Nashville Railroad, 155 miles southeast of Lexington. It is an export centre for coal and lumber and has manufactures of coke and staves. Its principal points of in¬ terest are an Indian mound, the Continental Hospital and Sanitarium, the Mayne Johnson Seminary, courthouse, city hall and county infirmary. The city was first settled in 1868. Pop. (1920) 2,908.

PINEVILLE, La., town in the parish of Rapides, on the Red River and on the Chicago, Rock Island and Pacific, the Louisiana and Ar¬ kansas ' railroads, opposite Alexandria. The Louisiana Baptist College and the State Hos¬ pital for the Insane are located here. There is also a national cemetery. Farming and lum¬ bering are the leading industries. The town owns the electric-lighting plant. Pop. 1,212.

PING PONG, or TABLE LAWN- TENNIS, a game that was introduced from England and became very popular in the United States in 1902. The game is played very much as is the regular game of lawn-tennis.

Follow¬ ing are the rules of the game, which should be learned thoroughly before attempting to play:

First. — The game is for two people, one standing at one end of the table, the other opposite. The player who first delivers the ball is called the server, the other the striker out.

Second. — At the end of the first game the striker out becomes the server and the server becomes the striker out, and so on, alternately.

Third. — The service is strictly underhand, and delivered from beyond the end of the table.

Fourth. — The ball served must drop on the table top beyond the net, and is then in play. If it drops into the net or off the table it counts to the striker out.

Fifth. — In serving it is permissible for the ball to touch the net in passing over.

Sixth. — If the ball in play strikes any object above or around the table before it bounces on the table itself (net or post excepted) it counts against the player.

Seventh. — The server wins a stroke if the striker out fails to return the service or ball in play off the table.

Eighth. — The striker out wins a stroke if the server makes a foul or fails to return the ball in play so that it falls off the table.

Ninth. — No volleying is allowed, but so long as the ball touches the table it is in play and can be taken at half volley.

Tenth. — On either player winning his first stroke the score is called 15 for that player; on either player winning his second stroke the score is called 30; on either player winning his third stroke the score is called 40, and the fourth stroke won by either player is scored a game for that player, except as below.

Eleventh. — If both players have won three strokes (4) the score is called deuce, and the next stroke won is scored to the player. If the same player win the next stroke he wins the game; if he lose the next stroke the score is again called deuce, and so on until either player wins the two strokes immediately following the score of deuce, when the game is scored for that player.

Twelfth. — The player who first wins six games wins a set.

Thirteenth. — The game may also be scored by points, 20 up. In this case the players change the service every five points, as in cricket.

The game may be played on an ordinary dining table, about nine feet by five feet being the most convenient dimensions, though either a larger or a smaller table may be used. The net is between six and seven inches high, and the remaining accessories are posts to hold the net when stretched across the table; vellum, string or wood racquets and celluloid balls.

PING- YANG, ping yang, Korea, a city on the Ta-tong River about 40 miles above its mouth and about 120 miles northwest of Seoul. It extends for two and a half miles along the river bank, is surrounded by fortified walls 20 feet high and is considered of great strategic importance, being called the ((Key of Korea.® Ping-Yang is open to foreign settlement, and is the seat of several Christian missions. There are about 10,000 Japanese here, they being most active in business. Ping-Yang is said to date from 1122 b.c., when the historic Ki-Tse or Kija, ancestor of Confucius, landed here from China, and laid the foundations of Korean civil¬ ization. His tomb is one of the city's sacred shrines. Among the important incidents of the city's history are the defeats of the Chinese here by the Japanese in 1593 and again on 16 Sept. 1894. A fine monument has been erected to the Chinese warrior Tso who ruled their forces and perished here. Pop., including suburbs about 173,273.

PINGREE, pm'gre, Hazen Senter, Amer¬ ican politician : b. Denmark, Me., 3 Aug. 1842 ; d. London, England, 18 June 1901. He enlisted in the Union army and served through the war, afterward settling in Detroit, Mich., where he became one of the largest shoe manufacturers in the West. In 1889 he was elected mayor of Detroit and in 1896 gained control of the Re¬ publican political organization and notwith¬ standing the opposition to his radical ideas was elected governor. He continued to hold his office as mayor until 1897 : he was elected gov¬ ernor of the State, and re-elected in 1898, re¬ tiring in 1900.

PINGUIN, the West Indian wild pine¬ apple largely grown in the Antilles as a hedge- plant. See Bromelia.

PINK-EYE, a disease of horses, frequently suffered in the Southern States, but rare in the North. It is allied to influenza and scarlet fever in man. It usually breaks out in wet, cold weather, and its chief

symptoms are, besides the redness of the eye to which it owes its name, loss of appetite, feverishness, quickened pulse and perhaps stiffness of the limbs and

constipation. It is likely to be epidemic in lim¬ ited districts, because spread by the aid of the midges of the genus Hippelates, which hover about the eyes of diseased horses and carry pathogenic germs to the next animal they visit. It usually runs its course in 10 days or less, and is generally not fatal. In treating this dis¬ ease an antiseptic wash for the eyes should be used; cardiac stimulants may be required and strict attention must be given to all sanitary care.

PINKERTON, ping'ker-ton, Allan, Scot- tish-American detective : b. Glasgow, Scotland, 25 Aug. 1819; d. Chicago, Ill., 1 July 1884. In Scotland he had learned the trade of cooper and after his arrival in the United States set up a cooperage at Dundee, near Chicago. In 1842 he came to Chicago, Ill., and was ap¬ pointed its first detective in 1850. In the same year he established a detective bureau, after¬ ward well known from its use by predatory capitalistic interests to crush trades-unionism. He organized the secret service division of the United States army in 1861, was made its first chief and later formed and directed the secret service department of the Gulf until the end of the war. While employed by the Wilmington and Baltimore Railway he discovered a plot to assassinate Lincoln on the way to Washington (1861). He was very successful in his detective work, being particularly skilful in the detection of bank and express thieves and the recovery of the money taken. He also broke up the ((Molly Maguire® band of Pennsylvania. Among his writings were (The Spy of the Re- bellion) (1883) ; (Thirty Years a Detective) (1884) ; (History and Evidence of the Passage of Abraham Lincoln from Harrisburgh, Pa., to Washington, D. C., on the 22d and 23d of Feb¬ ruary 1861 } (1891) ; (Strikers, Communists ajid Tramps > (1878), in which Pinkerton's lack of sympathy with the toilihg masses is evidenced as also his unholy alliance and sympathy with the capitalists of his day. As manager and hirer of ˆstrike-breakers® during the great railroad strikes of 1877 many of his methods were of questionable morality, although always strictly within the law, while many of his operations actually incited others to the crimes which were then ((detected.® His writings are a sad com¬ mentary on the period which tolerated both him and his methods.

PINKERTON, John, Scottish antiquary: b. Edinburgh, 17 Feb. 1758; d. Paris, France, 10 March 1826. In 1781 he settled in London, where in 1783 he published (Select Scottish Ballads, > a part of the supposedly ancient con¬ tents of which was from his own pen. He was for a time editor of the Critical Review; and he turned out a large number of volumes, origi¬ nal and compiled, the former showing more of skill in research than literary merit. Among works editorially prepared by him were An¬ cient Scottish Poems* (1786), sometimes de¬ clared to have been a forgery, though the manu¬ scripts are in the Pepysian library at Cam¬ bridge; and a Collection of Voyages and Travels) (1807-14), a voluminous (17 vols.) and, in its day, valuable publication.

PINKERTON, William Allan, American detective: b. Dundee, Ill., 7 April 1846. He is a son of Allan Pinkerton (q.v.). During the Civil War period he was employed in the

United States Secret Service and afterward entered his father's office. On the death of his father, in 1884, he became head of the agency and extended its operations throughout the world.

PINKNEY, pink'ni, William, American diplomat: b. Annapolis, Md., 17 March 1764; d. Washington, D. C., 25 Dec. 1822. He was edu¬ cated at King William's Seminary, studied law under Samuel Chase and was admitted to the bar in 1786. While a member of the Maryland legislature he assisted in the ratification of the Federal Constitution in 1788 and in the same year was elected to the house of delegates. As United States commissioner to England under the Jay Treaty he secured in 1796 a claim of $800,000 for the State of Maryland against the Bank of England for losses and damages to American merchants caused by the English gov¬ ernment. Afterward he engaged in law prac¬ tice in Baltimore and in 1804 became attorney- general of Maryland. In 1806 he was sent as Minister Extraordinary to England, where in conjunction with James Monroe he treated with England in regard to the latter's violation of the rights of neutrals. He was Resident Min¬ ister to England in 1807-11 and in the latter year was appointed Attorney-General of the United States. He fought in the War of 1812, served in Congress in 1815-16 and in 1816 was appointed Minister to Russia and Special En¬ voy to Naples. In 1818 he resigned and resumed his law practice in Baltimore and in 1820 was elected to the United States Senate. Consult Wheaton, (Life, Writings and Speeches of William Pinkney * (1826).

PINKROOT, the rhizome of a loganaceous medicinal woodland (Spiqelia marilandica) of the United States, which is bitter,

anthelmintic, toxic, dilates the pupil, etc.

PINKS, a genus (Dianthus) of mostly perennial herbs of the order Caryophyllacece. The species, of which about 200 have been de¬ scribed, are natives of the Eastern hemisphere, especially Europe and western Asia. Their jointed stems, which grow in tufts, bear grass¬ like leaves and terminal, often fragrant, flow¬ ers either in clusters or solitary. Their popular name is derived from the prevailing color of the flowers, though white and purple are com¬ mon in garden varieties. For centuries the pinks have been cultivated, their flowers, hardi¬ ness and ease of cultivation rendering them garden favorites. They are easily propagated from seeds or cuttings; thrive in well-drained, rather light loam ; and the perennial kinds mulched during the winter with loose litter, straw or brush to prevent the formation of ice around the stems and to hold the snow and keep the frost in the ground until late in the spring. The seeds are usually sown under glass in early spring and the plants set in the garden when the weather has become settled. Cuttings are used for double and other choice varieties. Seeds sown in late summer will produce plants for early spring blossoming if mulched during the winter.

Among the best-known species are the fol¬ lowing: Common grass, or garden, Scotch or pheasant's eye pink (D . plumarius), a general favorite in old-fashioned gardens; sweet-wil¬ liam (D. barbatus) , one of the oldest and most popular of garden flowers ; clove pink, picotee,

grenadine or carnation (D . caryophyllus) , popu¬ lar in various forms either as a garden or a greenhouse plant (see Carnation) ; maiden pink (D . deltoides), popular as an edging plant; D. prolifer and the Deptford pink(D. armeria), well-known weeds naturalized in the Eastern States; Chinese or Indian pink (D . chinensis) and D. superbus, also popular garden species. In rock gardens D. alpinus, D. neglectus and D. glacialis are favorites. They are too easily covered by earth washed upon them bv rains to be of value in level gardens.

PINNA, or WING-SHELL, a genus of bivalve mollusks of the family Aviculidce with wedge-shaped shells of a horny, delicate struc¬ ture, the hingeless beaks forming a pointed ex¬ tremity. The foot is long and grooved and secretes a large byssus of strong, silky texture. The genus is represented by the Pinna nobilis of the Mediterranean Sea, from whose byssus in past days the Neapolitans, Sicilians and Maltese

used to weave quantities of durable silk. Frequent mention is made of the fabric by Latin authors. Pope Benedict XV in 1754 had a pair of stockings made from this ˆsilk.® Many other species are known in various parts of the world, including the shores of the Gulf of Mexico.

PINNACE. One of the boats of a man- of-war formerly used to carry the officers to and from the shore. It was smaller than the launch, but larger than the cutter, and was rowed by from 10 to 16 oars. Also, anciently, any small sailing craft.

PINNACLE, ■ in architecture, any small, tall, more or less ornate terminating upper point of a building, tower, etc. ; the topmost finishing piece of a high point, as on a gable, buttress or spire. The term pinnacle is not very definite, but it is used to describe miniature towers or tops of towers that are too conspicuous to be termed finials.

PINNATED GROUSE. See Grouse.

PINNIPEDIA, a suborder of Carnivora, the seals, especially adapted in the structure of their limbs to an aquatic existence, as the name indicates. Both pairs of limbs, and especially their proximal segments, ire very short, and the distal part flattened, webbed and paddle-like. The hind limlbs are placed very far back and are very peculiar in that the first and fifth toes are stout and as long or longer, instead of shorter, than the others. The head is usually short and rounded, the neck short, the trunk thick and fusiform and the tail rudimentary. The teeth are simpler in structure than in most carnivora, the molars and premolars being either nearly simple cones or crowned with numerous small-pointed tubercles ; the incisors are re¬ duced in size and often in number, but the canines of the males are usually enlarged, and in the walruses become enormous tusks. The brain is large and much convoluted, and the eyes large and possessed of a very human ex¬ pression. All of the pinnipeds spend the greater part of their lives in the water, swimming with great speed and dexterity; but the peculiar structure of their limbs ill adapts them for ter¬ restrial progression, which is accomplished in an awkward shuffling manner with severe con¬ tortions of the back. They are chiefly marine,

frequenting the coasts of colder climates, though some species are tropical and others enter fresh water. Some of the species spend much time far out at sea, but land on islands for the purpose of mating and bearing young. Most of them are carnivorous, feeding upon fishes, mollusks and crustaceans, but a few subsist in part upon marine algae. The pinni- pedia have been derived from land animals, probably from the bears, and their adaptation to an aquatic habitat is not nearly so

extreme as in the whales. Three families are usuallv recognized: The Otariidce, or eared seals, which have a small, valvular, external ear and include the sea-lions and sea-bears. The Phocidce have no external ear, and are the most completely aquatic members of the suborder. Here belong the common harbor-seal of the north Atlantic coast, the hooded seal, the sea-elephant and numerous other species. In the Trichechidce is included only the walrus, in many respects the most remarkable of the entire group. Consult Allen, J. A., (History of North American Pin¬ nipeds } (1880). See Seals; Elephant-seal; Walrus.

PINOCHLE, pe'no-kl (corruption of Bin- ocle).

PINOCLE, or PENUCHLE, a game of cards very popular among the Germans in America. The object of the game, which may be joined in by either two, three, or four persons, is to secure 1,000 points. The game is played with two full packs of cards, mixed, from which the twos, threes, fours, fives, sixes, sevens and eights have been removed. In 64- card pinocle the sevens and eights are retained. This is the schedule of ˆpoints® :

Eight aces count . 1 , 000

Eight kings count . 800

Eight queens count . 600

Eight jacks count . .' . 400

Two queens of spades and two jacks of diamonds

(double penuchle) count . 300

Ace, ten, king, queen and jack of trumps count . 150

Four aces of different suits count . 100

Four kings of different suits count . 80

Four queens of different suits count . 60

Four jacks of different suits count . 40

Queen of spades and jack of diamonds (penuchle)

count . 40

King and queen of trumps (royal marriage) count …. 40

King and queen of a suit not trumps (marriage)

count . 20

Nine-spot of trumps counts . 10

The relative value of the cards is : Ace

counts for 11 points, 10-spot counts for 10 points, king for four, queen for three, jack for two and the nine counts nothing. The last trick counts 10 points for the player who takes it. The total points, therefore, of the cards and last trick combined amount to 250. Four-handed pinocle is usually played two against two as. partners, sitting opposite one another. The cards are all dealt out, four at a time, each played receiving 12, and the las(card is turned up for trump. If two are playing, the 25th card is trump. If a nine is turned up the dealer is credited at once with 10 points; if any other card is turned up either of the other players who holds a nine of trumps may ex¬ change it for the trump card and claim 10 points, the player sitting on the left-hand side of the dealer having the preference. Each player then melds whatever he has in his hand and the partners score together. The eldest hand then leads a card for the first trick. In

every trick each player must follow suit; if he cannot he must trump ; if neither is possible, he may play any card he pleases ; he must take the trick if he can ; the player who takes the trick, leads for the next. When either side reaches 1,000 points the scorer calls “game,® and the balance of the hands are void. In three-handed pinocle 16 cards go to each player, four at a time; and each player keeps his own score. In auction pinocle no trump is turned, each player in turn from the dealer’s left bid¬ ding a number of points for the privilege of naming the trump. If all the players pass this privilege the dealer is obliged to bid 20 and name the trump. Consult Foster, R. F., (The Laws of Pinocle* (New York 1908).

PINOS, pe’nos, Mexico, town in the state of Zacatecas, 45 miles west of’ San Luis Potosi, and capital of the administrative district of Pinos. It is about 7,700 feet above the sea- level, lying on the eastern slope of

the Cerro de Candelaria; is centre of a rich silver and gold-mining district, and produces an excellent grade of mescal. The population of the dis¬ trict is estimated at 50,000; of the town, 7,500.

PINSUTI, pen-soo'te, Ciro, Italian com¬ poser : b. near Siena, 9 May 1829 ; d. Florence, 10 March 1888. He was trained as a musician by his father and by Rossini ; became a singing teacher in London and Newcastle in 1848 and professor of singing in the English Royal Acad¬ emy of Music in 1856. He wrote the successful Italian operas (I1 mercante di Venezia) (1873) ; (Mattia Corvino) (1877), and

PINT, a measure of capacity, the eighth part of a gallon. See Weights and Measures.

PINTAIL, or SPRIGTAIL' DUCK. See

Duck.

PINTO, pen'to, Alexandre Alberto da Rocha Serpa, Portuguese explorer in Africa: b. Castle Polchras, 10 April 1846; d. Lisbon, 28 Dec. 1900. He was educated in America, where he lived with his father, 1848-58, and then in the Lisbon Military College, whence he entered the Portuguese army in 1864. He served in Mozambique and in 1877-79 explored the country between Mozambique and Pretoria, in 1885 the region west of Lake Nyanza, and in 1889, having been named governor of Mozam¬ bique, the region round the Shire River. His bold attitude toward English expansion in Africa and his efforts to spread Portuguese in¬ fluence made his recall necessary in 1890 be¬ cause of a protest from England. His trip across Africa in 1877-79, the fourth crossing from west to east, was his greatest feat and is described in his book (How I Crossed Africa)

(1881).

PINTO, Fernao Mendez. See Mendez Pinto.

PINTSCH (pinch) SYSTEM, a system of compressed gas chiefly used for lighting rail¬ road cars. Nearly every large railroad system in the United States has adopted this system. The gas is made largely from oil and com¬ pressed, 125 pounds of pressure to the square inch giving one foot of oil gas, equal to the illuminating power of five feet of coal gas.

Petroleum oil is "cracked® at a high tempera¬ ture, yielding an oil gas rich in illuminating power; by washing the forming of tar is obviated. The lamps used are of special design, each having from four

to six burners. The system has been applied to lighting harbor buoys and found advantageous.

PINTURICCHIO, pen-too-rek'ke-6 ("the good little painter®), easel name of Bernardino de Betto Bagio, Italian painter: b. Perugia, 1454; d. Siena, 11 Dec. 1513. It is thought that he was a fellow-student of Pietro Perugino under Niccolo da Foligno, and he was assisting Perugino (his senior by only eight years), at Rome (1484) in executing the frescoes of the Sistine Chapel for Innocent VIII. Among his other Roman patrons were Sciarra Colonna and Alexander VI ; for the latter he painted a series of scenes from the life of Saint Bernard in the church of Ara Cceli, and five frescoes in the Vatican. He returned to Umbria in 1498 and works of his are extant in Perugia, Orvieto and Spoleto. Cardinal Francesco Piccolomini, afterward Pius III, on completing his cathedral at Siena, invited him to decorate the library of that building (1502). The walls he frescoed with scenes from the life of Pius II, the cardi¬ nal's uncle, and the roof with arabesques and mythological compositions. Raphael, then 19, accompanied him to Siena, but whether he took part in the execution of the frescoes is uncer¬ tain. These works are brilliant in conception and execution and are considered the finest of his frescoes. Fresco-painting was indeed his strongest point ; he understood well the decora¬ tive resources of his art, and was master of ornament. He left few easel pictures and these are scattered through the chief public and pri¬ vate galleries of Europe. His (Return of Ulysses) was sold in 1874 for $10,761.50, and his three scenes from the life of Griselda for $3,620. The last of his known works, painted in 1513, is the (Procession to Calvary,* now in the Casa Borromeo, at Milan. Sigismodo Tizio, parish priest at Siena, has left a true but tragic account of his death. When confined by sick¬ ness to his bedroom his wife locked him in, went off with her lover and left her husband *to perish by hunger. In the history of paint¬ ing he is to be looked upon as the link between Perugino and Raphael and some pictures of his have been attributed to each of these masters. He bore a high character among his fellow-citizens and was elected decemvir of Perugia in 1501.

PINWORM, a small parasitic nematode worm (Oxyurus vermicularis) , usually less than half an inch in length, which infects the human rectum and large intestine, especially in children. Pinworms travel down the bowel and cause irritation about the anus, which provokes the victim to scratching. The eating of fruit, etc., handled by one suffering from pinworms is a probable means of infecting another.

PINY RESIN, TALLOW, or VARNISH.

See Dammar.

PINZON, pen-thon', Martin Alonzo, Span¬ ish shipbuilder and navigator: b. about 1440; d. 1493. He was a native of Palos, and at the summons of Prior Juan Perez of La Rabida held a conference with Columbus (q.v.) and decided to aid the latter in his first voyage.

In this expedition he sailed in command of the Pinta, the second caravej, but deserted Colum¬ bus off the coast of Cuba 20 Nov. 1492. The Pinta was the fleetest of the three vessels, and the purpose of Pinzon's treachery was evidently that he might first reach Spain and there make exaggerated claims for himself. He was the first to reach Haiti (Hispaniola), where he traded and found gold, and where when he fell in with Columbus, 6 Jan. 1493, he explained that stress of weather had separated him from the other ships. In a fierce storm during the return (12-18 Feb. 1493), the Nina and Pinta were parted, and the Pinta reached Bayonne, a Galician port. Thence Pinzon dispatched to the sovereigns an account of the discovery, claiming much. But this was quite disregarded, and when he reached Palos it was only to find the admiral already there. A letter from the monarchs forbade him to appear at court, and it was said that chagrin hastened his death.

PINZON, Vincente Yanez, Spanish ship¬ builder and navigator: b. about 1450; d. about 1525. He was a brother of Martin Alonso Pinzon (q'.v.) and a native of Palos, and set sail from there on Columbus' first voy¬ age as commander of the third caravel, the Nina. But he is better known for a voyage he undertook in 1500, during the course of which he discovered the Brazilian coast and the mouth of the Amazon. He made with Juan Diaz de Solis two voyages, one probably in 1497 to the bay of Honduras, the other in 1508-09 along the eastern coast of South Amer¬ ica as far as the Colorado River, lat. 40° S.

PIOLET, pe'6-la, Jean-Baptiste, French clergyman and author : b. Courteix, Correze, France, 24 June 1855. He was educated at the college of Ussel and the seminaries of Ser- vieres and Tulle and various Jesuit scholasti- cates. In 1876 he became a member of the Society of Jesus and was ordained to the priesthood in 1888. In 1890-91 he was laboring as missionary in Madagascar and in 1898 de¬ livered a course of lectures on Madagascar at the Sorbonne. Subsequently Dr. JPiolet was missionary in Wales and at Paray-le-

Monial, and for some years has been stationed in Paris. He was awarded three prizes by the French Academy and the Academy of Moral Sciences and has attended various co¬ lonial congresses and the sessions of the In¬ ternational Colonial Institute. His publications include

PIOMBINO, pe-om-be'no*, Italy, (1) a former principality of Tuscany, lying between Siena and the Mediterranean, opposite the is¬ land of Elba, from which it is separated bv the channel of Piombino. Its extent was about 216 square miles, with a population of 25,000 at the

time of its incorporation with the kingdom of Italy (1860). It was originally a fief in the possession of the Appiani family, which, after a rule extending over 300 years, sold it to the Buoncampagni family in 1634. In 1804 Na¬ poleon granted it to his sister Eliza, Princess Baciocchi ; but she was rejected by the Con¬ gress of Vienna, and the old family restored. Piombino now forms part of the province of Pisa. (2) A seaport town of Pisa, 40 miles south-southeast of Leghorn, at the end of Monte Massoncello peninsula. Elba is visible six miles across the channel. Pop. with com¬ mune about 8,700.

PIOMBO, pe-om'bo, Sebastiano del, Ital¬ ian painter: b. Venice, 1485; d. Rome, 21 June 1547. His family name was Luciani. Having renounced music, to which he had early de¬ voted himself, for painting, he studied under Giovanni Bellini and Giorgione, the latter of whom he especially imitated. Something of the fine coloring of Giorgione appears in the figure of Saint Chrysostom writing, in the altar- piece of the church of that name at Venice, which is Piombo's earliest fresco. In 1510 he went to Rome and became acquainted with Michelangelo, whose mastery of form he tried to make his own and to combine with his own Venetian skill in coloring. He also vied with Raphael, and the so-called ˆornarina* in the Uffizi and the (Saint Dorothea) at Berlin were both for a long time attributed to Raphael. When Raphael had painted his (Ascension,* Sebastiano was induced by Michelangelo to at¬ tempt to surpass it by the (Raising of Lazarus,* considered his greatest work. His Martyrdom of Saint Agatha) also ranks among the master¬ pieces of the Italian school. His chief merit, however, lay in single figures and portraits. His (Pietro Aretino) and his (Clement VIP are admirable likenesses and perfect in color¬ ing. He was high in favor with Clement : who created him one of the keepers of the Papal seals, Frate del Pionibo; hence his surname, the seals attached to the papal bulls being at that time of lead (pionibo). This post made it necessary for him to assume the clerical habit, and from that time he painted but little. He invented a peculiar method of painting in oil on walls, in which manner there is a

(Scourging of ChrisP to be seen in Saint Pietro in Mon- torio.

PIONEERS, in old-time warfare, a de¬ tachment of soldiers equipped with pickax,- spade, etc., in the proportion of 10 to every battalion of infantry, whose duty it was to clear and repair roads, bridges, etc., as far as possible, for troops on the march. They were placed at the head of the battalion of which they form a part and commanded by a pioneer sergeant. They have long been replaced by the engineer corps. However, the engineers are sometimes termed the ((pioneer battalion.®

PIOTRKOW, pey-otr'kov, Poland, (1) the capital of a government of the same name, 90 miles by rail southwest of Warsaw. Cot¬ ton and wool spinning, with the manufacture of agricultural implements, are the chief in¬ dustries. The town dates from before the 12th century and is one of the oldest in Po¬ land. In its ancient castle, still standing, diets were held in the 15th and 16th centuries and the kings elected. After being captured by the

German army in 1915, the fortifications were strengthened. Pop. about 41,181. (2) The

government in the west of Poland, south of the government of Warsaw, has an area of 4,730 square miles. The surface is undulating and diversified by hills from 1,000 to 1,600 feet high, extending southwest to northeast. It is rich in coal deposits and iron, zinc and lignite are also mined. Agriculture and stock-raising are im¬ portant industries and there are manufactures of textiles and ironware on a moderate scale. Pop. 2,097,900.

PIOUS FUND OF CALIFORNIA, an

endowment fund dating from 1697 and created from voluntary donations and subscriptions re¬ ceived or solicited from various benefactors and religious bodies, chiefly in Mexico, to be applied to the propagation of the Catholic faith in California. The first chief contributors who each gave $1,000 were Don Alonzo Davalos, Conde de Miravalles and Don Mateo Fernandez de la Cruz, Marquez de Buena Vista. By their example others were induced to subscribe and in a short time $15,000 more were made up, $5,000 in cash and $10,000 in promises. On 5 Feb. 1697 the necessary authority was con¬ ferred on Fathers Juan Maria Salvatierra and Francisco Eusebio Kino of the

Jesuit order, to undertake the invasion of California on the express conditions: 1. That possession of the country was to be taken in the name of the Spanish crown, and 2. That the royal treasury was not to be called on for any of the expenses of the enterprise. Don Pedro Gilde la Sierpe, treasurer of Acapulco, offered the use of a galliot to transport the missionaries to their destination, and the gift of a small boat or launch. Considering the remoteness and isola¬ tion of the field, it was determined to establish a separate special fund or capital, the income from which should form a permanent endow¬ ment for the missionary church. Toward this latter object the first recorded contribution is from the congregation of Nuesah Signora de los Dolores, of the city of Mexico, which con¬ tributed $10,000 and Don Juan Caballero y Ozio who donated $20,000 more, besides giving Father Salvatierra the satisfactory assurance, that in any unforeseen emergency, he might draw on him for whatever money he needed and he would honor his drafts, large or small. This endowment fund, commenced by the pious liberality of the society and the individual just named, was increased by subsequent donations. The capital was invested as securely as possible, and as an income of $500 yearly was deemed necessary for each mission and 5 per cent was the current rate on safe investments, a capital of $10,000 was made the basis of each new mission founded. From 1698 to 1757 13 mis¬ sions were founded on the peninsula and these sums of money forming a considerable capital, received by common consent the name of <(The Pious Fund of the Missions of California,® or more briefly, the <(Pious Fund of California.® In 1767 the Jesuits were expelled from the Spanish dominions; the Pious Fund was seized by the Crown and transferred to the Fran¬ ciscans under whom from 1769 to 1823 the 21 missions in upper California were founded. On the declaration of Mexican independence, Mexico succeeded the Crown of Spain as trus¬ tee of the Pious Fund and it continued to be

managed and its income applied as before, down to 19 Sept. 1836, when the Mexican Con¬ gress passed a law attaching an endowment of $6,000 per year for the erection of a bishopric and conceded to the incumbent when selected and his successors, the administration and dis¬ posal of the ((Pious Fund.® On 8 Feb. 1842 this law was abrogated by a decree of Santa Ana and the capital of the Pious Fund after about 160 years of separate existence ((was en¬ gulfed in the maelstrom of the Mexican treas¬ ury.® Not, however, before Don Pedro Ramirez, the venerable agent and attorney of the fund, had drawn up in duplicate his detailed (the Church 6 per cent in perpetuity on the principal. The war of 1847 between the United States and Mexico resulted in the trans¬ fer of Upper California, and

Mexico ceased paying interest. In 1868 the Roman Catholic Church in California made a claim, based on Don Pedro's data for 21 years' interest — nearly a million dollars — and after seven years a commission at Washington, D. C, gave a decision that the interest of the fund should be equally divided between the Church in Mexico and in California and that Mexico should set aside half of the annual payment. This was the famous Sir Edward Thornton decision. The Mexican government paid the award decreed by Sir Edward, but did not pay anything after. In 1902 the matter was brought before the Hague International Court for arbitration. The decision was given : that the Mexican govern¬ ment shall pay to the government of the United States in the claim on behalf of the archbishop of San Francisco, $1,420,682.6 7 in money of the legal currency of Mexico, a sum covering the total payment of annuities due from Mexico, namely, the annual payment of $43, 059.99, and that the Mexican government shall pay to the United States on 2 Feb. 1903 and every following year of the same date forever, an annual payment of $43,059.99. Consult Doyle, T. T., (History of the Pious Fund of California) (San Francisco 1887).

PIOZZI, pi-oz'i (Ital. pe-ot'se), Hester Lynch Salisbury, English author : b. Bodvel, Carnarvonshire, Wales, 16 Jan. 1741 ; d. Clifton, Gloucestershire, 2 May 1821. In 1763 she was married to Henry Thrale, a wealthy brewer of Southwark, which borough he afterward repre¬ sented in Parliament. In 1764 the Thrales made the acquaintance of Dr. Johnson, who lived much with them for more than 16 years and of whom she published

Society in the 18th Centtiry) (1892); Bos- v. oil, 'Life of Samuel Johnson > (1791).

PIP. See Poultry.

PIPA. See Surinam Toad.

PIPE, a wine measure, usually containing very nearly 105 imperial or 126 wine gallons. Two pipes or 210 imperial gallons make a tun. In practice, however, the size of the pipe varies according to the kind of wine it contains. Thus, a pipe of port contains 138 wine gallons; of sherry, 130; of Madeira, 100, etc. The pipe of port is seldom accurately 138 gallons and it is customary to charge what the vessel

actually contains.

PIPE, Manufacture of. Pipes are hollow

cylinders made of various materials and used as conduits for liquids, air or gas. The ma¬ terial of construction varies according to the character of.' the substance to be conveyed, its availability in any particular locality and its relative cheapness. They may be divided into five general classes characterized by the ma¬ terials of which they are made — metal, wood, earthenware, cement and rubber. Metal pipes are made of lead, block-tin, zinc, brass, copper, cast iron, wrought iron and steel. Lead pipes have been used from the earliest times. Up to the close of the 15th century, they were made of sheet lead bent around a metal core and welded or soldered along the horizontal joint. About the beginning of the 16th century, a casting method was invented by Robert Brooke, which was extensively employed in England up to the close of the 18th century, when it was superseded by the pressing and drawing methods in use at the present time. They are made in continuous length, by squeezing the molten metal through a die (a steel plate perforated writh a hole containing a central core) by hydraulic pressure. Different sizes of pipes are produced by changing the dies, the cores of the dies determining the diameter of the bores. Sizes of pipes are designated according to the measurement of their internal diameters. Lead water-pipes range from three-eighths to five inches, while the waste pipes range from one and one-half to five inches. Lead pipes as small as one-sixteenth of an inch and as large as eight inches are made for various purposes. The high cost of lead and the great thickness of metal required to withstand high press- pres practically prohibit the production of the larger sizes. Pipes of ductile metal, such as block-tin, brass and copper, are made by draw¬ ing methods. An ingot of metal is cast in cylindrical shape with a conical end and with a hole through its axis corresponding in size • to the bore of the desired pipe. A mandrel (long iron rod) is thrust into the hole so that it projects slightly beyond the conical end. This end is then placed in a funnel-shaped hole drilled through a steel post fixed to the draw¬ ing table and gripped at the outer end by a pair of pincers at the end of a chain attached to the power machinery. The ingot together with the mandrel is then drawn through the hole, the former being thus extended uniformly over the latter in the form of a complete pipe. Unlike the pressure method, the metal is drawn cold and often requires annealing, as it hardens under the repeated drawings. Block-tin pipes are used in soda fountains and as conveyors of

beer and chemicals. Copper pipes are used in distilleries, and when

employed in chemical wrorks Tire tin-plated within to protect them from corrosion. Brass is generally used for pipes exposed to great heat, such as the tubes of steam boilers, etc. Block-tin pipes range from three-eighths to two and one-half inches in diameter.

Cast-iron Pipe. — In making cast-iron pipes, the mold used consists of two parts — the core which shapes the interior and the flask which holds the pattern for the exterior form. The core is made by winding a hay-rope around a spindle and coating it with several layers of clay. It is then shaped in a lathe to the desired size and dried in an oven. Tempered clay and sand are rammed around the pattern in the flask and then dried in an oven to form a mold. The pattern is then removed, the flask is placed in a vertical position and, the core exactly central within it. The molten metal is run into the space between the mold and the core and, when partly cooled, the core is drawn out and the interior of the pipe is coated with asphaltum to prevent corrosion. In size they range from two to 60 inches and are made in standard lengths of 12 feet. The larger pipes are generally cast in shorter lengths in order to keep down the weight of the individual pipes so as to permit convenient handling. They are used for water mains, pneumatic tubes, exterior casings for other tubes and pipes, etc.

Wrought-iron Pipe. — Wrought-iron pipes appear to have been first employed to convey illuminating gas, and this remains one of the most common uses, the carrying of steam and water being others. At first they were made by hand, the plates being bent and the seams welded, a few inches at a time. The develop¬ ment of steam engineering, however, created a demand for larger and stronger pipes, in the production of which new processes of manu¬ facture employing special machinery have been introduced and developed to a high state of perfection. The wrought-iron pipe and tube industry was one of the last to discard puddled iron in favor of Bessemer steel. The advan¬ tages of increased strength and lower cost, to be obtained by the use of steel, had been fully realized for some time, but the difficulty of mak¬ ing lap-welded and butt-welded steel pipes, hav¬ ing the same strength in the weld as in the body of the pipe, prevented its adoption.

Methods of Manufacture. — These difficul¬ ties, however, have been overcome by improved methods of production in materials and ma¬ chinery in pipe making. The general process of manufacture is as follows : A carefully selected grade of cast iron, together with the proper quantities of coke and limestone, are melted down in the cupolas of a blast furnace, drawn off and placed in the Bessemer converters, where it is heated until practically all of the carbon in the cast iron has been Iburned out. The metal is then poured into casting

ladles, into which an amount of ferromanganese is also added, sufficient to give the proper proportion of manganese and carbon. The resulting metal is a mild steel of a very reliable welding quality. The cast ingots are then placed in the soaking pit and raised to a white heat. From the soak¬ ing pit they are picked out by overhead cranes and rolled down into the blooms of the bloom¬ ing mill. This mill is of massive construction

and is driven by horizontal reversing engines. It consists of a set of reversible mill rolls, with a long table of rollers on each side. The action of the rollers draws the ingot quickly into the rolls and as soon as it has passed through, the engines are reversed, the rolls are brought a little closer together by a pair of screws set in the standards and the ingot is again reduced in thickness. This operation is repeated until it has been brought down to the desired section, when it is sheared into short lengths, called slabs and billets. These are re¬ heated and passed through a continuous mill, consisting of a large number of rolls in pairs, placed one beyond the other at increasing in¬ tervals. As the billets or slabs are carried through each successive pair of rolls, they are reduced in thickness and increased in length, until they issue from the last pair of rolls in the form of long narrow plates, known as skelp. They vary in width from a few inches up to eight feet. In the narrower strips, used for smaller pipes, the width is sufficiently uni¬ form to dispense with the necessity of trimming up with shears, but the skelp for large pipes has to be carefully trimmed to the right di¬ mensions. In general, all wrought-iron or steel pipes may be divided into two classes — lap- welded, ranging from \l/2 to 30 inches and butt- welded, from one-third to one and one-fourth inches in diameter. In lap-welding, the plate is first laid upon a traveling table and has its edges scarfed or beveled. It is then heated in a bending furnace and rolled up into the form of a pipe, with the beveled edges overlapping. This partially made pipe (known also as skelp) is brought up to a welding heat in a furnace and then passed through the concave welding rolls between which a ball-shaped mandrel, the diameter of which is equal to that of the pipe, is held in position by a long bar. As the skelp passes through the rolls, the overlapping edges are squeezed together between the rolls and the mandrel into a more or less perfect weld. The rough pipe is then passed through the siz¬ ing rolls and brought to the exact diameter re¬ quired; then through the cross-straightening rolls and made perfectly straight ; then rolled on a cooling table while cooling, to

nrevent warp¬ ing and finally forced through the dies of the straightening machine by hydraulic pressure. The ends are then trimmed and threaded and after being screwed into the couplings, it is tested in a hydraulic testing machine. The smaller sizes under pressures ranging from 600 to 1,500 pounds and the larger sizes from 500 to 750 pounds to the square inch.. Oil-well piping is tested under pressures as high as 2,500 pounds to the square inch. In butt-welding, the edges of the plate are left square. The skelp is heated in a furnace and raised to a welding heat. It is then drawn through a bell-shaped die. the diameter of which is a little less than that of the skelp. The pressure thus induced squeezes the edges together and makes a perfect weld. The smaller pipes are usually fitted with screwed flanges and couplings. In the larger pipes the flange is formed out of a bar of steel, bored out and faced on the inner face, a half-inch fillet being left on the inner edge. The end of the pipe is swaged down slightly, the flange pushed over it and the edge of the pipe beaded over to hold the flange in place while it is in the furnace. When it has reached a welding heat, it is placed

on a concave anvil, stepped to receive both pipe and flange and revolved axially under the blows of the hammer which quickly effect a weld. Flanges have been welded on pipes over 30 inches in diameter, with satisfactory results.

Coupling. — Pipe couplings are made from bars of iron corresponding to the width and thickness of the desired coupling. The smaller sizes are made by a machine which cuts up the bar into the proper lengths and forms up the pieces on a mandrel with great rapidity. These pieces are then heated in a welding furnace and welded under the blows of a quick-acting steam hammer. The larger sizes are made from bar iron of the proper length, which is formed up by a machine consisting of a vertical cylin¬ drical mandrel of a diameter equal to that of the desired coupling. A vertical roller attached to the end of a horizontal arm travels around the mandrel. One end of the heated bar is placed between the mandrel and the roller ; the roller is then revolved around the mandrel and bends the bar into the required circular form. The piece is then reheated, slipped over a cylindrical mandrel and the joint welded under the blows of a quick-acting steam hammer.

Varieties. — Spiral-riveted and spiral-welded pipes are made by winding thin iron plates spirally around a mandrel into tubular forms, and the overlapping edges riveted or welded together. They are made in standard lengths of 20 feet and range from 3 to 24 inches in diameter. The metal plates used range from .035 to .109 inch in

thickness. They are capa¬ ble of withstanding bursting pressures up to 1,330 pounds to the square inch.

The locking-bar pipes are made of two semi¬ circular plates of metal joined together longi¬ tudinally by a channel bar of soft steel, the flanges of which are pressed into the edges of the plates until a tight joint is effected. The earliest forms of wood pipes were simply bored logs. Their first use as a continuous tube v/as the six-foot penstock built at Manchester, N. H., in 1874, by J. T. Fanning. The use of metal bands around wood-stave pipes was first sug¬ gested in 1880 and were first extensively used in Denver, Colo., in 1883. This particular kind of pipe is built in a trench. The staves are of different lengths, which allows continuous con¬ struction. They are bound together by light metal rods or bands provided with screw ends and nuts for tightening. These rods are spaced on the pipe according to the amount of in¬ ternal pressure they are expected to withstand. The staves used are thin enough to secure com¬ plete saturation and to deflect readily to the curvature employed; yet, thick enough to pre¬ vent an undesirable amount of percolation through them. The proportion between the thickness of the staves and the strength of the bands is such that the swelling of the wood does not produce injurious strains upon the bands. . Such pipes or conduits range from 10 to 72 inches in diameter; are capable of with¬ standing pressures as high as 1,100 pounds to the square inch, and have done service, in the United States, for periods ranging from 20 to 50 years, without any material deterioration.

Fibre Pipe. — Fibre pipes are made by wind¬ ing sheets of wood pulp around a core. The desired thickness being obtained, the tubes are saturated with a wood preserving solution and dried. The joints at the ends are turned in a

lathe and they are provided with screw coup¬ lings. They may be made^ in any size or thick¬ ness, but usually range from one to eight inches in diameter, with a uniform length of five feet. Being made of a non-corrosive material, they are especially useful for conveying chemicals.

Clay Pipe. — Earthenware or terra-cotta pipes are represented by the various forms of drain tiles, designedly made porous or vitrified, and with or without joint sockets, according to the purposes for which

they are used. They were first made in England about the close of the 18th century and were mere cylinders of porous baked clay. In recent years their manu¬ facture has attained the proportions of a great industry. They are produced by forcing pre¬ pared plastic clay through a die into the form of a continuous tube, which is subsequently cut up into shorter lengths and the joint sockets molded by a special machine. They are then baked in kilns by a very high temperature. The vitrified variety are glazed by the introduction of salt into the fire holes of the kilns while the pipes are being baked, so that the salt is volatilized and combines with the silica in the clay. They range from 1*4 to 36 inches in diameter and from one to three feet in length. Pipes are also made of cement and concrete. They are usually molded in place by the use of a movable mold and core, which is shifted along the work or by stationary built- up molds, which are torn out after the cement has set. Wire nettings and iron rods are often inserted in the cement to give additional strength.

Bibliography. — Special articles may be found in the files of following named publica¬ tions : Engineering News, New York; Street Railway Review, Chicago; Journal Am. Soc. of Naval Engineers, Washington; Progressive Age, New York; Scientific American Engineer¬ ing Record, New York; Engineer, London; Engineering , London. Consult also Rjorling. P. R., (Pipes and Tubes) (New York 1908) ; Sharp, John, (Some Considerations Regarding Cast-Iron and Steel Pipes) (1914).

PIPE, Tobacco, a bowl and connecting tube, made of baked clay, wood, stone or other material and used in smoking tobacco. The cheap pipes in common use are made of a fine¬ grained white plastic clay. Much finer and more expensive pipes are made of meerschaum, a somewhat plastic magnesian stone of a soft greasy feel. (See Meerschaum). This mate¬ rial is found in several parts of Europe (in Moravia, Piedmont and the Crimea), but more abundantly and of finer quality in Asia Minor. Meerschaum pipe making is carried on to the greatest extent by the Germans, and Vienna may be said to be the centre of the manufac¬ ture. Sometimes the bowl alone (which is fre¬ quently artistically carved) is of meerschaum, the stem being of wood, the best sorts of which are got from the young stems of the Mahaleb cherry, grown near Vienna, the mock orange of Hungary and the jessamine sticks of Turkey. The stem, whether of the same material as the bowl or of wood, is usually provided with a mouth-piece of ivory, silver or amber, the last being preferred. Briar-root pipes, with the bowl and stem of one piece of wood, and pro¬ vided with amber, ivory or bone mouth-pieces, are now very common ; they have little or no

advantage over the clay pipe except in being less liable to break. Many Germans prefer pipes with porcelain bowls, which are sometimes beautifully painted in the style of fine chinaware painting. The Eastern hookah, or Turkish pipe, is a pipe of great length, the bowl of which is set upon an air-tight vessel partially filled with water, and has a small tube which passes down- into the water; the long flexible smoking-tube is inserted in the side of the vessel. By exhaust¬ ing the air in the smoking-tube, the smoke is forced down through the water, and entering into the space above it passes into the stem, cooled and freed from some of the most acrid properties of the tobacco.

In the United States, Indian pipes have been in use from very remote periods. They are found in the ancient mounds of the West, to¬ gether with other relics of an unknown race, elaborately carved in stone into fanciful shapes, often resembling various animals of the coun¬ try. In northern New York they are frequently discovered in plowing the land. Some are of soapstone and others of baked clay. In the account of the discovery of the Hudson River by Robert Juet, mention is made of ((red copper tobacco pipes and other things of cooper, which the savages did wear about their necks.® In the Northwest Territory, upon the summit of the dividing range between the Saint Peter's and the Missouri rivers, and in the latitude of Saint Anthony's Falls, the Indians have long procured a peculiar variety of red steatite or soapstone, of which all the red stone pipes of that region are made. The locality is held in great rever¬ ence by the Indians, and they have strongly op¬ posed any attempts of the whites to visit it. Catlin, however, succeeded in overcoming their scruples, and was shown the spot at the base of a long vertical wall of quartz, which lay in horizontal strata, the pipestone layers spreading under the adjoining prairie land of the ridge, whence it was obtained by digging a few feet in depth. He judged from the great extent of the excavations, and from the graves and ancient fortifications, that the dace must have been fre¬ quented by different tribes of Indians for many centuries. The pipes made of this stone are heavy and usually of rather plain form, deco¬ rated by bands and ornaments of lead, which appear to have been run into depressions made to receive it and then smoothed down. The stems are long and curiously carved sticks of hardwood, sometimes flat, frequentlv orna¬ mented with gaily colored feathers of birds and horse hair dyed of scarlet hue.

The manufacture of1 the more expensive pipes in the United States began about 1860. Previous to that time they were imported; but the ordinary clay pipe has been in use since 1820. The earliest manufacturer whose name is now recorded was Thomas Smith, tobacco-pipe maker, of the city of New York, in 1847. The high tariff

during the Civil War stimulated manufacturing. This was commenced on the smallest possible scale by two or three enter¬ prising German workmen, with neither ma¬ chinery nor experience. The goods could not be compared with the European product, and they were almost as expensive, even with the high tariff paid on the imported articles. Trade itself previous to the Civil War was very small. Edward Hen, who before 1860 was almost the

only importer of note, was known as the pipe man of the United States. His pipe business was less than $50,000 per year. William De-muth, a pupil of Edward Hen, began the mak¬ ing of pipes in 1861. The local manufacture has steadily developed and by 1904 the pipe in¬ dustry in the United States was not only equal to that at the celebrated factories in Vienna, Ruhla and Saint Claude, but surpassed the lat¬ ter in many respects. Many improvements and inventions have been made in America, which were later introduced into Europe. There are now (1918) about 65 factories in the United States making tobacco pipes ; they employ over 3,000 work people; have $4,000,000 invested cap¬ ital and manufacture a gross product of $6,000.- 000 annually, nearly half of which they expend for materials. New York is the leading State in the industry, having 30 factories and turning out more than half the entire product.

PIPE-CLAY. See Clay.

PIPE-FISHES, small teleostomous fishes included in the order Lophobranchii (and with the sea-horses (a.v.) constituting the family Syngnathidce) . The gills are disposed in tufts on the branchial arches, the gill-cover is a simple plate and the gill-aperture of small size. The body is covered by bony plates arranged transversely, and in the pipe-fishes is very long and attenuated. No ventral fins exist, and the jaws are united to form a pipe or tube, bearing the small, toothless mouth at the tip.

A very curious and remarkable circumstance in connection with the pipe-fishes consists in the males of some species possessing a pouch-like fold, situated on the under side of the abdomen or tail, in which the eggs are contained after being extruded from the body of the females. And after the young fry are hatched they con¬ tinue to reside within this pouch for a longer or shorter period, when the pouch opens and permits them to escape. No analogous struc¬ ture is found

in the female.

The family Syngnathidce comprises about 15 genera and 150 species, all small fishes of warm seas, and most of them true pipe-fishes, which differ from the sea-horses in the possession of a caudal fin, while in the latter the fin is absent and the tail prehensile. Several genera of pipe¬ fishes occur in American waters, the principal one being Siphostoma, with at least 25 North American and West Indian species. The com¬ mon pipe-fish (S . fuscum) is the only species found on the coast of the New England and Middle States and is very common in shallow bays and estuaries, where it lives among the vegetation. In this afid related species the egg- pouch is formed of a pair of longitudinal folds which extend along the greater part of the long tail. All of the pipe-fishes are feeble swimmers, the fins being very small and weak ; and their manner of moving through the thick vegetation may be described as crawling rather than swim¬ ming. They make very interesting tenants of salt-water aquaria. In Daryrhamphus the egg- pouch is beneath the abdomen ; while the males of the genus Syngnathus carry the eggs uncov¬ ered on the skin.

The name pipe-fish is also applied to the members of the genus Fistularia , or trumpet- fishes, included in the order Hemibranchii. The bones of the face are prolonged to form a tubular structure, at the extremity of which the

mouth opens. The Fistularia tabaccaria of the Antilles, averaging kbout three feet in length, represents this genus and occurs not infre¬ quently on our Atlantic Coast.

PIPE LINES. A form of transportation that may be used for any liquid or gas, but which is principally employed to transport the petroleum and natural gas products from the wells in the oil fields to the refineries and the markets or points of utilization, with the mini¬ mum of expense. Soon after the discovery of petroleum in the United States the transporta¬ tion of the product formed an important factor in the problems relating to its profitable market¬ ing. Although petroleum was discovered as early as 1829, up to 1870 the use of wooden and iron tank cars prevailed, entailing a great cost in transportation and resulting in a compara¬ tively slow disposal of the product. To lessen the cost of transportation, the practicability of employing a conduit of wrought-iron piping was suggested by Gen. S. D. Karns of Parkersburg, W. Va., as early as 1860, but pipe lines were not successfully operated until 10 years later. Karns' idea involved the principle of gravity; he proposed to lay a line of pipe from the wells at Burning Springs to Parkersburg, a distance of about 36 miles, and

allow the oil to flow down to the shipping points on the Ohio River. Through a lack of enterprise more than any other reason, the line was never laid. His idea was taken up and developed by J. L. Hutchin¬ son of New York, who in 1862 laid a pipe line from the Tarr Farm wells to the refinery at Plumer, Pa. As the wells and the refinery were situated on the opposite sides of the hill, the pipe line formed a siphon, which, under the effect of the high air pressure, leaked freely at the joints, and resulted in its final abandonment. He laid another line in 1863, from the well at Sherman to a refinery three miles distant. In this case the oil was pumped from the well to the refinery, but as in the former case the leak¬ age at the joints was too great to allow the line toˆbe a practical success. Between 1865 and 1870 a great many attempts were made to em¬ ploy this method of transportation in the vari¬ ous oil fields throughout the country, with more or less success, in spite of the opposition of those interested in the employment of wagons and tank-cars, but the unqualified success of the line laid by Samuel Von Syckle of Titusville, Pa., from Pithole City to Miller's Farm, in 1865, induced the creation of numerous pipe¬ line companies, and the extension of the lines to distant shipping points. In 1875 the Penn¬ sylvania Transportation Company, authorized to lav a pipe line from the oil regions to tide water, laid one from the lower oil regions to Pittsburgh, a distance of about 60 miles. Its operation was highly successful. The refineries, heretofore located near the wells, were re¬ moved to various ports on the seaboard, and on the shores of the Great Lakes, and the connect¬ ing pipe lines were rapidly laid. By 1877 10 or 12 pipe lines were being operated through the oil regions, while the laying of long-distance lines was commenced by the United Pipe Lines Company. By 1892 the National Transit Com¬ pany controlled several great trunk lines. The great competition reduced the profits derived from pipe-line transportation and led to the consolidation of the companies, and by 1902 two

companies, of which the National Transit Com¬ pany was the larger, controlled all of the pipe lines in the United States. It is estimated that the National Transit Company, handling -the output of the Standard Oil Company, exclu¬ sively, controlled in 1904 about 40,000 miles of pipe line and in 1918 over 50,000 miles. Of foreign countries, Russia has built the most pipe lines. The first line was laid in 1879. from the Baku wells to a refinery situated at a dis¬ tance of about nine miles. By 1895 over 20 pipe lines were in operation, and long-distance lines were later constructed. The line from Mikhoilov to Batum, laid in

1900-01, was orig¬ inally 145 miles in length, but now connects with Baku, a total of about 550 miles. Several hun¬ dred miles of pipe lines have been laid in Mexico, and doubtless will be extended as political disturbances subside. See Petroleum.

Oil pipe lines connect points by straight lines as near as possible, and are usually laid below frost line, two or three feet under the surface of the ground, the undulations of which they follow throughout their entire course. They are constructed of wrought-iron pipes four to eighth inches in diameter and are provided with bends at regular intervals to take up the ex¬ pansion and contraction due to varying tem¬ peratures. Pumping stations and storage tanks are placed at intervals of 30 miles, or they are located at central points in the valleys along the lines, to pump the oil over the intervening hills and mountains. High pressure compound con¬ densing pumps are used, working under a head depending upon the topography of the country through which the line is laid and upon the friction due to the diameter of the pipe and the length of the line. The plugging up of the pipes by sedimentary deposits is prevented by occasionally running a <(go devil® scraper through the pipes, which is forced along from station to station with the oil by the pressure of the pumps, and scrapes off the paraffin in¬ crustations.

Pipe lines for conducting natural gas vary in construction greatly, being made from wroughGiron piping two or three inches in diameter, large cast-iron pipes, or from riveted steel-plate tubes, ranging from 15 to 25 inches in diameter. In the United States the use of natural gas followed the general development of the petroleum industry. Numerous gas-pipe lines were established in the various gas pro¬ ducing areas, some of which are in operation at the present time, while many have been aban¬ doned upon the exhaustion of the wells. Each of the main lines is about 50 miles in length and originally conducted gas at pressures rang¬ ing from 200 to 1,200 pounds per square inch. In late years, however, these pressures have de¬ creased enormously, being now but a small fraction of what they were, and necessitating the employment of pumps to maintain a de¬ livery pressure ranging from 10 to 50 pounds per square inch. See Gas, Natural; Standard Oil Company.

Bibliography. — For detailed information consult Proceedings of the British Association for the Advancement of Science5 ; (The Min¬ eral Industry5 (New York, annual); Dyer, E. I., Plow of Oil in Pipes5 (in (lournal of American Society of Mechanical Engineers,5 New York 1914). .

PIPER, The. Josephine Preston Pea¬ body's (The Piper5 won a prize offered in com¬ petition by the English actor, F. R. Benson, for the best poetic drama. It had previously been submitted to the New Theatre, New York, but had been rejected. The interest created by its production at the Memorial Theatre, Stratford- upon-Avon, by the Benson Company, on 26 July 1910, warranted a reconsideration of the play by Mr. Winthrop Ames, with the result that it was given a colorful premiere at the New Theatre, on 30 Jan. 1911, Miss Edith Wynne Matthison in the role of The Piper. It was hailed by the American critics as the precursor of a poetic revival on the stage. But thus far (1919) the American theatre has been pledged to the drama of condition, of psychology, rather than of poetry. And Miss Peabody's (The Piper5 stands better known as a reading drama than as a piece of the theatre. Judged as poetry, its story is clothed in a symbolism which makes the old legend of The Pied Piper of Hamelin take on a significant modern application. Judged as drama, its pictorial effectiveness is hampered by the infusion of social and Chris¬ tian ethics, which are not as fully developed as they should have been. To Miss Peabody, The Piper represents the singing, free side of life, whereas Hamelin and its stodgy population are measure of the selfish, money-grubbing side of daily existence. The old Piper of Browning's poem and of the German folktale was simply a rat exterminator of prodigious merit. Miss Peabody's Piper is the enchanter of childhood, and by his playing he would free them of Hamelin, which is inimical to the child spirit. His is not the compassionate love of Christ for little children, but it has the same lyric charm. The Lonely Man of the Cross who fascinates the crippled Jan, and his mother — the only Mother of Hamelin who goes forth in the right spirit to seek her child whom the Piper has lured away — are the spiritual threads on which the philosophy of the play is strung. This philosophy, slim though it be, has poetic beauty and universal applicableness. In a sensual way Ibsen's the Rat Wife in (Little Eyolf5 is re¬ called by the Piper legend. And the ethics of the play seem to be this : that in all the Hamelins of this world, there are parents whose worldly vision separates them from a joyful life lived with their children. To preserve this life, the Piper, at the close of the play, goes onward, piping his lure of childhood until Christ's love for little children enters all our hearts.

Miss Peabody (Mrs. Lionel Marks) studied dramaturgy under Prof. G. P. Baker, at Harvard, and was for a time instructor of Eng¬ lish at Wellesley College. In addition to (The Piper,5 she has written the following dramas: (Marlowe5 (1901) ; (The Wings5 (1905) ; (The Wolf of Gubbio5 (1913).

Montrose J. Moses.

PIPERAZINE, Diethylene diamine

nh\ch22'ch22/nh' is obtained' mixed with

a number of basic substances, by the interaction of ammonia and ethylene bromide or ethylene chloride. The crude product is purified by treatment with nitrous acid, which forms a nitroso derivative; the latter will readily yield piperazine by the action of a reducing agent,

The manufacture of piperazine on a commercial scale involves the following steps: (1) The formation of cliethylene diphenyl diamine by treating ethylene bromide with aniline and anhydrous sodium carbonate; (2) the conver¬ sion of this compound into a nitroso derivative by the action of sodium nitrate in the presence of hydrochloric acid; (3) the liberation of piperazine from the nitroso derivative by first treating it with sodium bisulphite and then with sodium hydroxide.

Piperazine is a crystalline hygroscopic com¬ pound having a melting point of 104°-107° C. and a boiling point of 140°-145° C. It readily dissolves in water, absorbs carbon dioxide from the air with great avidity and shows strongly basic properties forming crystalline salts with inorganic and organic acids. Of special inter¬ est is the salt which it forms with uric acid converting it into a soluble compound. This property of piperazine has made it a popular remedy for diseases caused by the accumulation of uric acid in the body. Piperazine has there¬ fore been recommended as an efficient cure for gout, rheumatism, uric acid gravel and calculi. Piperazine is especially valuable as a remedy for these diseases since it passes through the system without any toxic action. A number of piperazine derivatives have also been recom¬ mended as solvents for uric acid; of these, piperazine quinate or Sidonal, dimethyl pipera¬ zine tartrate or Lysetol, and dihydroxy pipera¬ zine are well-known examples.

V. S. Babasinian.

PIPERINE, PIPERIDINE, PIPERIC ACID and PIPERONAL PIPERINE

(C17H19NO3), an alkaloid found in different va¬ rieties of pepper and related to both pyridine and pyrocatechnic acid. Obtained from black pep¬ per by extraction with hot alcohol. A colorless crystalline substance, insoluble in water, soluble in alcohol, ether and other like

solvents. When digested with a hot alcoholic solution of caustic potash it breaks down into piperidine and piperic acid. Piperidine (CbHuN) or hexa- hydropyridine is an oily liquid boiling at 106° C., soluble in both water and alcohol, hav¬ ing the odor and taste of pepper. Piperic acid (C12H10O4) is a monobasic, pale yellow crystal¬ line acid, slightly soluble in water, somewhat more so in alcohol. Careful oxidation in dilute neutral solution with permanganate of potash gives piperonal (heliotropine (C8H5O2.CHO), a colorless crystalline body, soluble in both water and alcohol and having a very pleasant aromatic odor. Used in perfumery. It is closely related to vanillin, the flavoring principle of vanilla bean. All of the above compounds have (been made in the laboratory by various synthetic processes.

PIPESTONE, Minn., city and county-seat of Pipestone County, on the Chicago, Mil¬ waukee and Saint Paul, the Chicago and North¬ western, the Great Northern and the Rock Island railroads, about 200 miles southwest of Minneapolis. Pipestone is important as a grain¬ shipping centre and the distribution centre of a large and populous district. The noted Indian pipestone is quarried nearby. The city contains an Indian training school, a public library and a creamery and several wholesale depots. The city was settled in 1878 and received its charter as a city in 1901. Pop. (1920) 3,325.

PIPEWORT, an acaulescent, or very short¬ stemmed bog or aquatic plant, with tufted grass¬ like basal leaves and very small flowers in ter¬ minal solitary heads on long, slender, hollow, ribbed scapes. Many species exist in the family Eriocanlacece.

PIPING CROW, a bird (Gymnorhina tibi- cen) of New South Wales, remarkable for its musical powers and for its ability in mimicking the voices of other birds and uttering a few parrot-like words. It is black and white in color and is allied to the shrikes.

PIPIRI, pe-pe’re, a West Indian name for the large tyrant flycatchers known in the United States as kingbirds, especially Tyrannus domini- censis.

PIPISTRELLE, one of the smallest and most familiar of European bats (V espertilo ripistrella) .

PIPIT. See Titlark.

PIPPA PASSES. This brief but delightful poetic drama by Browning was published as the initial number of (Bells and Pomegranates) in 1841, and, according to Mr. Gosse, was the first work of its author to

win the public. Mrs. Orr says that it was conceived when the poet was once walking in a wood near Dulwich. There came to his mind the image of some one, unimportant in himself and unconscious of his influence upon others, walking alone through life and yet influencing permanently the lives of those whom he met. The image took shape in the person of one of Browning's most charming imaginative creations, Felippa, or ((Pippa,):> the little Italian girl of Asolo, near Venice, who on her one holiday of the year passes singing through the streets and by her songs changes the lives of the other persons of the play. The time of (Pippa Passes) is the early 19th century, the ((local color" that of Asolo, but the story has no historic founda¬ tion. The play consists pf prologue and epilogue spoken by Pippa in her room ; of four principal scenes, which take place re¬ spectively in the morning, noon, evening, and night of Pippa's holiday; and by three inter¬ ludes on the streets. The form is free lyric verse in Pippa's monologues and songs, 'blank-verse in the first, second and third scenes, and prose in the fourth scene and the interludes. Pippa, wishing to make the most of her holiday, alone, yet longing to love and be loved, identifies herself with those whom she fancies must be the happiest in Asolo — with Ottima and Sebald, the guilty lovers in the great house on the hill; with Luigi and his loving mother; with Jules 'the sculptor and Phene his bride ; and with Monsignor the Bishop, who loves but God. As Pippa passes in turn by the houses of these persons, her song greets each at a crisis of his life. Ottima and Sebald are spiritually saved; Jules, about to send away the ignorant and baseborn Phene, whom he has been tricked into marrying, lifts her instead up to his own level and into his heart; Luigi, about to yield to his mother's plea that he give up his dangerous patriotic mis¬ sion, chooses death rather than safety; and Monsignor the Bishop, tempted to sin through avarice, turns upon his tempter and saves his soul.

Pippa's songs are not impressive in them¬ selves; their power and Significance lie only in the hearer's state of mind, but they change the course of destiny; for c(all service ranks the same with God,8 with whom ((there is no last nor first.8 Each of the four scenes, complete in itself, is essentially and intensely dramatic; the characters are all individualized, though their speech is rather the speech of Browning; the style is always appropriate and at times, with its intensity of feeling and magnificence of imagery, rises to the heights of very great poetry- _ The scenes are given background and continuity by the interludes in the streets, in which figures artists, village girls, and the

Austrian police. Pippa has no personal concern in the action save in the last scene, in which by her singing she unconsciously saves herself from death or worse. The human truth under¬ lying the conception of the play, the dramatic force of the various scenes, the representative characterization and the always forceful and often superb style, combine to render (Pippa Passes) one of the very few remarkable poetic dramas in recent English literature, almost the only one, in fact, that has gained a large read¬ ing public and yet has qualities that fit! it for the stage. Although hot written for the theatre, it has repeatedly been presented in special per¬ formances with all the fine effect to be expected from its essential dramatic quality. Rolfe's (Select Poems) contains (Pippa Passes) with introduction and notes, and Miss Burt discusses the character of Pippa in her (Browning's Women \

Marion Tucker.

PIPPAL, an Indian tree. See Peepul.

PIPPI, pip pe, Giulio. See Giulio Ro¬ mano.

PIPPIN, the name given to a certain class of desert apples, probably because the trees were raised from the pips or seeds, and bore the apples which gave them celebrity without grafting. They seem to have been introduced into Great Britain from France, and were little known there until about the end of the 16th cen¬ tury. In the time of Shakespeare pippins were delicacies for the dessert : Sir Hugh Evans, in the (Merry Wives of Windsor,) says: ((I will make an end of my dinner — there 's pipoins and cheese to come.8 Justice Shallow, in his invita¬ tion to Falstaff, says: (

PIPSISSEWA, a plant, prince's pine (q.v.).

PIQUA, pik'wa or -wa, Ohio, city in Mi¬ ami County, on the Miami River, the Miami and Erie Canal, and on the Pittsburgh, Cincin¬ nati, Chicago and Saint Louis and the Cin¬ cinnati, Hamilton and Dayton railroads, about 70 miles northwest of Columbus. The extensive water-power has contributed toward making the city an important industrial centre. The chief manufacturing establishments are large oil-mill machinery works, strawboard mills, woolen mills, furniture factory, rolling mills, iron¬ works, stove and range works, and sheet steel-mills. Its educational institutions are a high school, public and parish schools, and the vol. 22—*

Schmidlapp Free Library. The city owns and operates the waterworks. Pop. (1920) 15,044.

PIQUl£ (pe-ka’) WORK, an old form of decoration consisting of a pattern made up of small lozenge-shaped units : made in fabrics with a needle or in hard surfaces by inlaying.

PIQUET, pe-ka’, a game of cards played between two persons with 32 cards, all the plain cards below seven being thrown aside. On the cards being shuffled the players cut for deal ; the party drawing the lowest card has to deal first. The cards are then dealt two by two until each player has 12 cards, the eight remaining undealt (called the stock) are laid on the table between the players. The first hand (the non-dealer) must then discard five or less of his cards (he must discard at least one), exchanging them for an equal number drawn from the stock; the younger hand (the dealer) may exchange from the stock three or less, but may refuse to ex¬ change altogether. In playing, the cards rank in order as follows: the ace (which counts 11), the king, queen and knave (each of which counts 10) and the playing cards each of which counts according to the number of its pips. The player who first reaches 100 has the game. The score is made up by reckoning in the following manner : Carte blanche, the point, the sequence, the quatorze, the cards and the capot. Carte blanche is a hand of 12 plain cards, and counts 10 for the player who holds it. The point is the’ suit of highest value, the value being deter¬ mined by the number it makes up when the cards held are added together ; thus, if a player holds ace, king, ten, nine and eight, his point would be 48. The first player having called a point, the younger hand must then say whether his point is superior, equal or inferior in value to his opponent’s, by calling in the first place ((good,8 in the second <(equal,8 and in the last <(not good.8 If the elder hand’s point is ˆood8 he at once shows it, and counts one for each card in it, except with the points 34, 44, 54 and 64, which count one less than the number of cards. If the points are equal he counts noth¬ ing. The sequence is composed of a regular succession of cards in one suit, and the highest sequence. The quatorze is composed of four aces, four kings, four queens, four knaves or four tens, and counts 14. The winner of the greatest number of tricks counts 10 in addition (the <(cards8), if he holds all the tricks he counts 40 in addition (the ((capot8). For the sake of convenience the scores are generally recorded at the end of the hand ; but they are recordable no matter by which hand they are made, according to the following table of pre¬ cedence: 1, carte blanche ; 2, point; 3, sequences; 4, quatorzes and trios ; 5, points made in play ; and 6, the cards. If one player scores 100 be¬ fore the other obtains 50 he wins a double. Consult Cady, (Piquet > (1896).

PIRACICABA, pe-ra-se-ka’ba, Brazil, a town of the state of Sao Paulo,

on the Pirarcicaba headstream of the Tiete affluent of the Parana River, about 100 miles northwest of Sao Paulo with which and Rio de Janeiro, 270 miles eastward, it is connected by rail. It has an active export trade in the coffee and sugar of the surrounding region. Pop. 25,374.

PIRACY. See Pirate.

PIRACY IN STREAMS. See Stream Piracy.

PIRAEUS, pi-re'us, Greece, the port of the city of Athens, lying five miles southeast of the city and now terminus of railroads to Athens and to the Morea. Three excellent harbors in¬ dent the shore deeply, Piraeus, Zea and Mu- nychia. Munychia is also the name of the moun¬ tainous peninsula separating the harbor from the Saronic Gulf, and on this peninsula is the town, which was built 493 b.c. by Themistocles, whose able policy of Athenian defense soon effected the construction of the famous <(long walls.® These made Athens independent of the rest of Attica, as was plainly seen in the Pelo¬ ponnesian War, when, with the additional walls built by Cimon and Pericles, Athens was undis¬ turbed, although all Attica outside of the walls was in the hands of the Peloponnesians. But the destruction of the remains of the Athenian navy at -Egospotami in 404 b.c. left the port defenseless ; it was taken and the walls were destroyed to the music of the flute. Conon re¬ built them 10 years later, and Athens tem¬ porarily regained some of its importance. But the splendid city, one of the master works of the Periclean age, was finally destroyed by Sulla in 86 b.c., and there was only a wretched village on its site even some years after 1836, when Athens again became the capital of Greece. But in 1835 the old name had been revived, to take the place of Porto Leone, the name given by the Italians. The present city is modern in its con¬ struction ; has street railways, a gymnasium, ex¬ changes and theatres ; is the second port * in Greece, being outranked only by Syra ; manufac¬ tures macaroni, cheese, cognac, liquors and various textiles ; has a large import and a moderate export trade ; and is the main station of the Austrian Lloyds Company, and of vari¬ ous steamship lines, so that it is in direct con¬ nection with Trieste, Corfu, Constantinople, Smyrna, Alexandria and Marseilles. In 1915, 3,827 steamships of 2,430,680 tons entered at this port, two-thirds of this tonnage flying the Greek flag. There are several consulates. The population of the city is estimated as about 75,000. Consult Weller, C.

H., (Athens and Its Monuments) (New York 1913).

PIRAI, pi-ri, or PIRAYA, pi-ra'ya (Ser- rasalmo piraya), voracious fresh-water fish of the caribe family of tropical America. It is three or four feet in length and its jaws are armed with sharp lancet-shaped teeth, by which cattle when fording rivers sometimes suffer terribly. So sharp-edged are the teeth that they are mounted and used as knives by the Indians of Guiana, for pointing their blow-pipe arrows, etc. See Caribe.

PIRANESI, Giovanni Battista, jo-van'ne bat-tes'ta pe-ra-na'ze, Italian architect and en¬ graver: b. Venice, 4 Oct. 1720; d. Rome, 9 Nov. 1778. He passed the greater part of his life at Rome. He published (Antichita Romane) (1756) ; (Antichita d'Albano e di Castel Gan- dolfo) ; (Trofei d'Ottaviano Augusto) ; (Della Magnificenza ed Architettura de' Romani, } and over 100 views of modern Rome. His archi¬ tectural designs display much grandeur and fer¬ tility; but his representations of real objects are not always faithful. His son and pupil, Francesco, continued the publication of works on similar lines.

PIRATE, one who sails the seas for the purpose of robbery, whether in command of

-PIRATE

a ship or as one of the crew ; a highwayman of the sea; a freebooter, or buccaneer. Piracy is the term applied to the crime of robbery com¬ mitted upon the high seas. It is an offense against the universal law of society. As the pirate has renounced all the benefits of society and government and has reduced himself to the savage state of nature, by declaring war against all mankind, all mankind must declare war against him ; so that every community has a right, by the rule of self-defense, to inflict that punishment upon him which every individ¬ ual would, in a state of nature, otherwise have been entitled to do for any invasion of his person or personal property. By various stat¬ utes in England and the United States other offenses are made piracy. Thus, if a subject of either of these nations commits any act of hostility against a fellow-subject on the high seas, under color of a commission from any foreign power, this is an act of piracy. So, if any captain of any vessel, or mariner, run away with the vessel, or the cargo, or yield them up to a pirate voluntarily, or of any seaman lay violent hands on his commander, to hinder him from fighting in defense of the ship or goods committed to his charge or make a revolt in the ship, these offenses are acts of piracy by the laws of England. By statute of George II the ransoming of any neutral vessel, which has been taken as a

prize, by the commander of a private ship of war, is declared to be piracy. By the act of Parliament, passed in 1824, the slave-trade is also declared to be piracy. In the time of Richard I, all infidels were regarded as pirates and their property was liable to seizure wherever found. By the law of nations the taking of goods by piracy does not divest the actual owner of the prop¬ erty. Piracy, with intent to murder, stab or wound, is capital and pirates can gain no rights by conquest. It is of no importance, for the purpose of giving jurisdiction in cases of piracy, on whom or where a piratical offense is com¬ mitted. A pirate, who is one by the law of nations, may be tried and punished in any country where he may be found; for he is re¬ puted to be out of the protection of all laws. But if the statute of any government declares an offense, committed on board one of its own vessels, to be piracy, such an offense will be punished exclusively by the nation which passes the statute. In England the offense was formerly cognizable only by the admiralty courts, which proceeded without a jury, in a method founded upon the civil law. In the United States piracy is tried in the Federal courts.

Piracy, in the common sense of the word, is distinguished from privateering by the circum¬ stance that the pirate sails without any commis¬ sion and under no national flag and attacks the subjects of all nations alike; the privateer acts under a commission from a belligerent power, which authorizes him to attack, plunder and de¬ stroy the vessels which he may encounter be¬ longing to the hostile state. He is not re¬ garded as a pirate by the laws of nations, but in accordance with these is bound to observe certain rules and restrictions. Thus, he is debarred from attacking the vessels of the enemy while lying in any port or haven under the protection of a friendly or neutral state. It was held by many experts in international

law that the U-boats of Germany, though com¬ missioned by their governments, were engaged in piracy whenever they attacked neutral ves¬ sels. See Neutrality.

PIRATE BUG, a predaceous bug of the family Reduviidce. See Cone-nose.

PIRATES OF PENZANCE, The, a

comic opera by William S. Gilbert and Sir Arthur Sullivan, which was

produced 31 Dec. 1879 in New York City and in London on 3 April 1880.

PIRENE, pl-re'ne, a spring of crystal water at Corinth, which in Greek tradition was sacred tu the Muses.

PIRITHOUS, pi-rith'6-us (Gr. Peirithoos) , in Grecian mythology, a son of Zeus and Dia, the wife of Ixion; he was king of the Lapithae. At the marriage of Pirithous with Dejanira, Eurythion, one of the Centaurs, attempted to do violence to the bride and thence resulted the famous battle of the Centaurs and Lapithae. After the death of Dejanira (also named Hippo- damia) Pirithous with his trusty friend Theseus carried off Helen from Sparta. At Athens it was decided by lot which was to have her and Theseus won; but under the conditions of the lot the winner must help his comrade to pro¬ cure a wife and Pirithous' choice of a wife was Proserpine, wife of Pluto. To the infernal kingdom, therefore, the two heroes went down, but suddenly were powerless to stir from the seats they had taken. Afterward Hercules de¬ livered Theseus, but Pirithous remained in Hades for evermore, loaded with 300 chains.

PIROGUE, pi-rog', or PERIAGUA, per- i-a'gwa, the name given a small canoe used on the Western rivers of the United States and in Central and South America. It is commonly cut from a single log and is popularly known as a dug-out. In the West Indies a larger boat deckless, but with two masts, bears the name.

PIRON, pe-ron, Alexis, French wit, poet, and dramatist: b. Dijon, 9 July 1689; d. Paris, 21 Jan.' 1773. He studied law as Besangon and later went to Paris, where he produced in 1738 his chef d' oeuvre, ˆetromanieC a comedy which Laharpe characterizes as excelling in plot, style, humor and vivacity almost every other composition of the kind. In the latter part of his life he made repeated attempts to gain admission into the French Academy, but without success. He revenged himself for his disappointment by calling the Academy Les invalides du he) esprit , and composing the humorous epitaph :

" Ci-git Piron, qui ne fut rien,

Pas raeme acaddmicien."

" Here lies Piron, who was nothing —

Not even an Academician."

There is a collective edition of his works by Juvigny (1776). Troubat

published (CEuvres Choisies de Piron > in 1890.

PISA, pe'za or sa, Italy, a province of Tuscany and its capital city. (1) The province of Pisa, bounded on the north by Lucca, on the east by Florence and Siena, on the south by Grosseto, and on the west by Livorno and the Ligurian Sea, has hills in the south and east, notably the Monti Pisani and the Monti di Vol terra, and at the west a fertile plain, watered

by the Arno and Serchio, and rich in vines and olive orchards. Its mineral wealth is marble, alabaster and mineral waters ; and its industries cotton and silk spinning. Its area is 1,185 square miles and its population in 1915 was 351,841, of which 270,000 are in the district of Pisa, the others living in the second district of the province, Volterra. (2) The capital of the province, situated on both banks of the Arno, about seven miles from its mouth, is on the railroads between Genoa and Rome and between Florence and Livorno, and is the terminus of a line running from Pistoja through Lucca. The streets are old and crooked, but well paved and broad, and lined with substantial dwellings, many built of marble. The modern city is on the south side of the Arno and contains one old build¬ ing of importance, the Gothic church of Santa Maria della Spina, on the Lungarno, that is, the street ((along the Arno,® which is peculiarly picturesque on either side of the river. In the old city to the north are the cathedral, built of dazzling white marble in 1063 to commemorate a naval victory near Palermo, with a fagade formed of four galleries of pillars, bronze doors designed by John of Bologna, and within five naves separated by Greek and Roman columns, the spoil of various Pisan victories, and 12 lateral altars attributed to Michelangelo, but probably the work of Stagi di Pietra Santa; the Baptistery, begun in 1153 and finished in 1278, a great dome-crowned rotunda 190 feet high, in which are a fountain executed by Guido Biga- relli in 1246, and a chair supported by seven columns and decorated in fine bas-relief by Nicolas Pisano (1260) ; the Campanile or Bell Tower, better known as the leaning tower of Pisa, finished in 1350 by Tommaso Pisano, with its six galleries of pillars, a total height of 179 feet and a deviation from the perpendicular of 14 feet; and the Campo Santo, originally a cemetery filled in with earth from the Holy Land at the close of the 12th century, and be¬ tween 1278 and 1283 surrounded by Giovanni Pisano with a rectangular portico more than 400 feet long and 170 feet wide, decorated on the outside with frescoes by Florentine and Siennese artists of the 14th and 15th century, notably the 23 scenes from' the Old Testament by Benozzo Gozzoli and the (Triumph of Death > and (Last Judgment by the two Lorenzetti ; on the in¬ side are funereal monuments of different periods. There are many other

buildings of beauty in the city, mostly churches ; mention should be made of the Palazzo Medici on the Lungarno, built in 1027 and enlarged three centuries later, of the University with an early Renaissance court, and of the Palazzo Lanfreducci, built (1590) of Car¬ rara marble.

The industry and commerce of the city are slight, but it has cotton factories, machine shops, glass and hat factories, and also pro¬ duces alabaster. The city is a favorite winter resort because of its mild and delightful climate. It has rail connections as noted above and steamboat lines to Marina and Pontedera. It is the seat of an archbishop, of a civil and a mili¬ tary governor, and of a court of the first resort. Its educational equipment includes the Univer¬ sity, founded in 1338, closed in 1359, revived in 1364 only to die out again in 1406, and newly established in 1473 by Lorenzo, and in 1542 by Cosimo de Medici, and again in 1838 by Leopold II of Tuscany, and at present made up of facul-

ties of law, philosophy, medicine and surgery and mathematics and natural science, with 1,200 students in 1915; related to the University are normal, engineering, pharmaceutical, veterinarian and agricultural schools, a museum of natural history, founded in 1596, and particularly rich in Tuscan ornithology and geology, and a botanical garden, as well as a library of over 200,000 volumes, excluding pamphlets ; and there are also secondary schools, technical and in¬ dustrial schools, a valuable library in the archiepiscopal seminary, a Museo Civico, and archives with documents dating back to the city's relations with Frederick Barbarossa and Richard I of England.

Pisa was one of the 12 cities of the Etruscan confederation, became a Roman colony 180 B.C., and in the 9th and 10th centuries took a promi¬ nent place in Italy. In the 11th century its power was extended to Sardinia and Corsica (1050), it defeated the Saracens (1063) off Palermo, and took part in the first crusade. About 1100 its population was estimated at 150,000. The city sided with the Ghibellines and suffered severely when the Guelfs were victori¬ ous. The long feud with Genoa, came to an end with the Pisan defeat in 1283 at Leghorn, and in 1300 Sardinia, Corsica and the Belearic Is¬ lands were evacuated. Twenty-five years later Aragon got control of Pisa, which changed owners several times in the next three quarters of a century, and in 1406 was sold to Florence. In 1409 the Council of Pisa (q.v.)

met (25 March). Pisa rebelled against Florence in 1494, fought bravely for 15 years, and were finally reduced by starvation. As an appanage of Florence it became a part of the grand- duchy of Tuscany, and thus entered the Italian kingdom in 1860. Consult Rohault de Fleury, (Les Monuments de Pise au Moyen Age* (1866, with atlas) ; Schubring,

PISA, Council of, an assembly of bishops and theologians generally but not universally accounted by Catholic divines to be oecumenical. It was called by leading cardinals belonging to the two ˆobediences® into which the Church was at the time divided, the <(obedience® of Gregory XII, canonically elected in 1406, and that of Benedict XIII (Peter de Luna), anti¬ pope since 1395; and its purpose was to end the schism. The two rivals promised to withdraw their claims and to abdicate, so that then a pope might be elected with undisputed title. But the promises were not kept. The council met 25 March 1409, and was dissolved 7 August. The number of bishops who attended in person or by deputy was 200, of cardinals 20, of abbots near 300. When the rival popes refused to submit their claims to the council's judgment, the cause of each was weighed, and both of them were declared deposed, and the election of a new pope demanded of the college of car¬ dinals. The cardinals elected Cardinal Philargi, who took the name of Alexander V. But as Benedict and Gregory persisted in their claims the situation was only made worse, and the schism, which already had for 30 years divided the Church, continued eight years longer, till it was ended by the action of the Council of Con¬ stance. Previously, in 1133, there was a council

at Pisa, which condemned Peter dc Bruys. Again in 1511 a council was called then to condemn Pope Julius II, but the cardinals refused.

PISACAS, pe-sha'kas, in Hindu mythology, certain base and cruel demons, who devour hu¬ man flesh ; they are practically ghouls, embody¬ ing the spirit of lying, adultery and lunacy. Agni, the pure spirit of fire, is implored to drive them away, and by certain incantations these malignant spirits can be induced to cure dis¬ eases and perform other beneficent offices. Ac¬ cording to early tradition they were produced by creative power from the drops of water which were scattered, in superfluous profusion at the creation of beneficent beings — .gods, men, etc., or as the children of Prajapati, or of one of the Prajapatis.

PISAGUA, pe-sa'gwa, Chile, a port of the province of Tarapaca, on the Pacific Coast, 40 miles by rail north of Iquique. On 18 April 1879 the city was bombarded and destroyed by the Chileans; and near the

town, 19 Nov. 1879, occurred a battle in which the combined forces of Peru and Bolivia, numbering about 11,000, were defeated by a Chilean force of 6,000. Pisagua ships large quantities of nitre brought from the interior. It has a foreign commerce totaling about $8,000,000 annually. Pop. about

5,000.

PISANITE, a mineral consisting of sul¬ phate of iron and copper (Fe Cu) So4.7H20. Common in old drifts at Butte, Montana, and in Old Jordan mine, Bingham, Utah.

PISANO, pe-za'no, a surname or appella¬ tion of several artists of Pisa, distinguished in the early history of Italian art ; among them are: (1) Giunta Pisano, or G. di Pisa, also styled Giunta di Giustino : the earliest known Pisan painter (about 1190-1250). He is sup¬ posed to have been a pupil of the Byzantine painters who came to Pisa after the capture of Constantinople by the Venetians, and to him belongs the credit of reviving the art of paint¬ ing in Italy. (2) Niccola Pisano (about 1200- 1275), eminent alike in sculpture and archi¬ tecture, the greatest artist of the 13th century, and one of the restorers of the ancient classic sculpture, getting his inspiration from the sculpture of an ancient sarcophagus brought from Greece. Three works typical of his style are extant, namely, the pulpit in the baptistery of Pisa, the shrine of Saint Dominic at Bologna and the pulpit of the Siena Cathedral. (3) Giovanni Pisano (about 1235— 1320), son of Niccola, an artist hardly in¬ ferior to his father as sculptor or architect. His most celebrated works are the Campo Santo of Pisa, the magnificent high altar and reredos in the cathedral of Arezzo, the splendid fagade of the cathedral of Siena, and the church of Saint Dominic at Perguia, the north transept of which contains his beautiful tomb of Bene¬ dict XI. The little chapel of Santa Maria della Spina at Pisa was the most beautiful of his architectural works; but it has been spoiled by ˆrestoration.®

PISANO, Vittore, commonly known as Pisanello, Italian painter and medalist: b. San Virgilio, on Lake Garda, 1380; d. 1456. He ex¬ ercised his art in Verona, Venice, Pavia, Rome, Ferrara, Rimini, Milan, Mantua, and Naples.

Several of his paintings are still to be seen in Verona and among them an (Annunciation J in the church of San Fermo and a (Saint George) in that of Santa Anastasia. These pictures are in fresco. His principal fame, however, comes from the fact that he was one of the first artists to model portraits and cast them in metal medals. His works are prized as among the most excellent historical memorials of his time.

PISANUS, pi-sa'nus, Leonardus (Leo¬ nardo di Pisa), Italian mathematician of the 13th century: b. Pisa, about 1160. His father, called Bonaccio (probably a nickname), was in the employ of the merchants of Pisa, who had establishments for trade on the southern and eastern coasts of the Mediterranean, and Leon¬ ardo, whose nickname in his boyhood was Bigollone (dunce), was destined by his father to be a clerk or accountant in one of the fac¬ tories. To fit him for this station he was sent to the town of Bugia in Algeria, a noted empo¬ rium at that time, resorted to by the European and Arab merchants. Later, in his travels round the Mediterranean, he so improved his oppor¬ tunities as to acquire an extraordinary fund of erudition. Returning to Italy in 1202 he pub¬ lished his (Liber Abaci, } in which are set forth the most perfect methods of arithmetical cal¬ culation. It is a voluminous treatise, occupying 459 pages in the printed edition of the author's works ; and deals arithmetically and algebraic¬ ally with the most difficult and complex prob¬ lems. He had mastered the geometry of Euclid and the algebra of Mohammed ibn Musa. Be¬ sides the (Liber Abaci, > he wrote (Practica Geometriae) ; (Liber QuadratorunP ; and some minor treatises.

PISAY, pe'za. See Pise.

PISCATAQUA, pis-kat'a-kwa, a river on the boundary between Maine and New Hamp¬ shire. It has its rise in East Pond, between the towns of Newfield, Maine and Wakefield, N. H. The upper part of its course is called Salmon Falls River. After passing Dover, N. H., it is connected with a tidal lake, and then flows past Portsmouth to the Atlantic. From Ports¬ mouth to the sea — three miles — there is but little obstruction by ice — the strong tide pre¬ venting. The harbor is one of the best in the United States. The entire river is about 82 miles long.

PISCES, pis'ez, that group of animals called fishes ; the term has been variously limited with varying views of affinity and classi¬ fication. See Fish ; Ichthyology.

PISCES, in astronomy, a sign of the zo¬ diac, which is entered by the sun about 19 February. The constellation which occupies the zodiacal region corresponding to the sign has the same name ; it contains some interesting double stars.

PISCICULTURE. See Fish Culture.

PISCINA, pi-si'na, in Roman antiquities, a large water basin or pool, often one in which fish were kept. In ecclesiastical architecture,, the stone basin used to receive the water after it has been used for washing the chalice, subse¬ quent to the eucharistic celebration. The piscina is supplied with a drain-pipe to carry the water out of the church, and is usually constructed in the southern wall of the sanctuary. It some¬

times takes the form of a canopied niche dec¬ orated with carving.

PISCO, pes'ko, Peru, a city and port of the department of lea, on the bay of Pisco, where the Chunchanga River empties into it. A railroad connects it with the inland cities of the department. It exports cotton, sugar, silver, wine, salt and spirits, and has a large distil¬ lery. Pop. about 4,000.

PISEMSKI, pe'sem-ske, Alexei Feofilak- tovitch, Russian novelist : b. Ramene, Kos¬ troma, Russia, 20 March 1820 ; d. Moscow, January 1881. He was educated in the Univer¬ sity of Moscow and was for some years en¬ gaged in government service, resigning in order to devote himself wholly to literary pursuits. His work, which belongs to the realistic school, is of a most sombre and cynical type, betraying an entire lack of high ideals and a failure to recognize anything noble or good in humanity. His most successful novel, (A Thousand Souls,' was published in 1858, and much of his work has been translated into German and French. Among his books are (Boyarshchina) (1847) ; (A Bitter Lot) (1853) ; (The Stormy Sea) (1863); (In the Whirlpool J (1871). His com¬ plete works were issued in 24 volumes in 1895.

PISGAH, piz'ga, a mountain in Palestine, in the Abarim Range, east of the Dead Sea. The name seems at times to have been applied to the whole range, and again limited to one of the summits. It is supposed to be identical with Mount Nebo (q.v.) 2,643 feet. It is not the highest peak of the range, but the one nearest to the place were the Israelites

were encamped. From the summit may be seen (to the west) Samaria, Lower Galilee, as far as Tabor, and the chain of Gilboa. To the southwest may be seen the north half of the Dead Sea, the preci¬ pices of Engedi, and beyond, the desert of Judea.

PISISTRATUS, pl-sis'tra-tus, a notable Greek "tyrant® of Athens : d. about 527 b.c. He first appears as an educated well-to-do citi¬ zen of Athens, of most engaging manners and strong ambitions. He held a minor office at the time there were three parties in Greece : the party of the Plain, comprising the landed pro¬ prietors, then headed by Lycurgus ; that of the Coast, or wealthy trading class, headed by Megacles ; and that of the Highlands, mainly made up of the laboring population. The latter being the party that, seemed most likely to further his designs, Pisistratus threw in his lot with it, and secured its allegiance by coming forward as patron and benefactor of the poor. In all his public speeches he was the advocate of civil equality and a democratic constitution. On one occasion he appeared in the market¬ place with several slight self-inflicted wounds, and called upon his fellow-citizens to protect him against certain alleged enemies, who had, as he said, attacked his life on account of his adherence to the democracy. A bodyguard of 50 men was voted him ; this force he soon greatly increased, and made himself popular with his guard and bound them to serve him, and in 560 b.c. seized upon the acropolis. He was now master, or, as the Greeks termed it, "tyrant® of the city. The term was equivalent to the modern political "boss.® Solon had long recognized him as a dangerous man and a hypo-

critc, but his charges had been unheeded, and Solon departed from his enslaved country. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He was twice in exile, once for five years, once for 11, but regained his power. He forced many of the idle inhabitants to leave the city and cultivate the country around, which by these means was covered with corn-fields and olive plantations. Those who had no resources of their own he supplied with cattle and seed. He extracted from everyone the tenth part of his income and earnings, and thus increased the revenue of the state, which he expended in splendid public buildings. He established a pub¬ lic library, and collected and arranged the poems of Homer. Twice was he deposed and driven away, and twice he returned and assumed au¬ thority. The last time he came back with an army of Greek mercenaries whom he had at¬ tached to himself by developing

some gold mines at Mount Pangaeus, and spending the sums gained with great liberality. When he returned, about the year 540, thousands of his old supporters rallied about him, and he ruled from that date until his death, with great wis¬ dom, and care to maintain his popularity. He kept the people at work, reduced the taxes of the agriculturists, improved the courts of law, and increased the prosperity of the state. He carried out many of the reforms proposed by Solon, whom he had virtually thrust out of office. As he wTell knew how tyranny was hated he carefully concealed his power under the ex¬ terior of a private citizen. He submitted like others to the jurisdiction of the Areopagus, be¬ fore which he was accused of murder, and con¬ ducted himself with as much prudence as clemency. Consult the works by Flach (1885) and Topffer (1886).

PISO, pi'so, Gaius Calpurnius, Roman poli¬ tician of the 1st century b.c. Cicero speaks very favorably of him as an orator. He be¬ came consul with Manius Acilius Glabrio in 67 B.C., and in 66-65 b.c. was proconsular ad¬ ministrator of Narbonese Gaul. Accused of extortion by Caesar, he was defended by Cicero, whom he urged, to accomplish his own revenge, to bring charges against Caesar as one of the Catilinarian conspirators.

PISO, Gnaeus Calpurnius, Roman politi¬ cian of the late 1st century b.c. and early 1st century a.d. He was consul with Tiberius (q.v.) in 7 b.c. and when the latter became emperor was employed to thwart Germanicus (q.v.) in all ways possible, to which end he received the command of Syria. It was thought at the time that he caused the death of Germanicus by poison. Tiberius was forced to sanction an investigation by the Senate ; but before its termi¬ nation Piso was found dead, whether by suicide or sacrificed by Tiberius to arrest popular in¬ dignation is uncertain.

PISO, Lucius Calpurnius, with agnomen Frugi, Roman statesman and historian of the 2d century b.c. He was tribune of the plebes in 149 b.c. and consul (with Publius Mucius Scaevola) in 133 b.c. He opposed the corn laws, especially the lex frumentaria, of Gaius Gracchus. He wrote several orations and the 'Annales,* a history of Rome from the earliest period to his own time, none of which has sur¬ vived.

PISO, Lucius Calpurnius, Roman politi¬ cian of the 1st century b.c. and father-in-law of Julius Csesar. The most of our information regarding him is obtained through Cicero, who depicts him in the darkest of colors. Inasmuch as the great orator was both a personal and a political enemy, some reasonable modifications of his estimate must be made. As consul in 58 b.c. (with Aldus Gabinius), he obtained

Cicero's banishment (see Cicero) and in 57-55 b.c. as governor of Macedonia he certainly plun¬ dered the province most rapaciously. On re¬ turning from exile Cicero spoke his mind about him in the speeches (De Provinciis Consulari- bus) and (In Pisonem. > See Oesar.

PISO, Marcus Pupius, Roman orator and' politician of the 1st century b.c. He held the praetorship at an uncertain date, was procon¬ sular administrator of Spain and on his return thence in 69 b.c. received a triumph. In 61 b.c. he was consul (with Marcus Valerius Messalla Niger). In his earlier period an excellent forensic speaker and better versed than his predecessors in Greek literature, he was an in¬ structor of Cicero.

PISOLITE, or PEASTONE, aggregated

concretions, usually calcareous, about the size of peas. Upon being split open these globules showr a concentric structure. They are some¬ times mademp of considerable beds of pisolitic limestone, which is particularly characteristic of certain parts of the Jurassic system.

PISSARO, pe-sa-ro, Camille, French ar¬ tist: b. Saint Thomas, West Indies, 10 July 1830; d. Eragny, 12 Nov. 1903. He studied art under Melbye and Corot and his early work showed the influence of the latter. In choice of subject he is allied with Millet, though he does not invest his scenes of rustic life with the same pathos. In the luminous quality of light he surpassed Millet. This predilection for effects of light predisposed him to favor the departure of the so-called ˆimpressionists® and about 1870 he allied himself with the group composed of Manet, Degas, Renoir, Claude Monet and a few others. After much ridicule the new departure won the day as a recognized method of technique. Though popular in France Pissaro's pictures are not so well known out¬ side that country. Seven of his works hang in the Luxembourg. Special exhibitions were held at intervals in Paris after 1890. Views of Rouen, Paris and the country about Eragny besides studies made in London during a visit with Monet form his later subjects.

PISTACIA, a genus of trees of the family Anacardiacece. The 10 or a dozen species are natives of western Asia and the Mediterranean region, with one in Mexico. They have alter¬ nate, evergreen or deciduous leaves ; small, apetalous, dioecious flowers in axillary racemes or panicles; and dry, drupaceous fruits with bony stones which split in two and expose the oily kernels. The pistacia — or pistachio — nut or tree (P . vera) is a native of western Asia but is

cultivated in the Mediterranean region and other warm climates, including California. It grows about 20 feet tall, bears pinnate leaves and fruits about as large as olives. The kernels, known also as green almonds, are widely used for flavoring and coloring confectionery, ices, cakes, etc. The turpentine tree (P . terebinthus) yields Cyprian or Scio turpentine, a greenish-

yellow, fragrant product which has been used by druggists and physicians since the days of Hippocrates. It is a native of the Mediter¬ ranean region, attains heights of about 30 feet and has pleasant oily fruits. It is cultivated to a small extent in the southern and southwestern United States. The batoum tree (P . atalantica) , a native of northern Africa, grows about 40 feet tall, bears an edible fruit popularly used by the Arabs and an aromatic gum resin which is chewed as a dentifrice and breath perfume. The lentisk or mastic tree (P . lentiscus) yields mastic (q.v.), a gum resin, and the kernels of P. oleosa yield a fragrant oil used by the Orien¬ tals for perfuming ointments and other drug¬ gists' compounds. The tree is indigenous to eastern Asia.

PISTIL, in botany, the female organ of a phanerogamous flower, occupying almost in¬ variably the centre of the flower. See Flower.

PLSTOIA, pis-to'ya, or PISTOJA (an¬ cient Pistoria), Italy, city in the province of Florence, about 20 miles northwest of the city of Florence. The city is noted for its fine specimens of early art and architecture. Ver¬ rocchio's first work in marble is said to be the monument to Cardinal Forteguerra, in the ca¬ thedral. The cathedral was built in the 12th century. A pulpit by Pisano is in the church of Saint Andrea. Other remarkable art produc¬ tions are here ; the ancient churches and palaces are well preserved and of great historic and artistic interest. In 62 b.c. Catiline was de¬ feated here, and the name of the place occurs frequently in the history of the contentions between the Guelfs and Ghibellines. It is said to have received its name on account of fire¬ arms having been first made here. It has con¬ siderable manufactures of silk goods, firearms, glass, paper, iron and steel wares, linen and woolen goods. Pop. of commune about 70,000; town, 14,000.

PISTOL. See Small-arms.

PISTOLE, pis-tol', a gold coin formerly in use in Spain, Italy, Switzerland and some parts of Germany. It was originally a Spanish coin and was equivalent to $3.65. One of the Italian pistoles is quoted as worth $5.55.

PISTON, in engines and motors, a device for reciprocating in a cylinder or tube, and receiving pressure from a fluid or gas, or de¬ livering pressure. It is usually cylindrical or drum-shaped, so fitted as to fill the sectional area of a tube, such as a pump barrel, or. the cylinder of a motor, and capable of being driven alternately in opposite directions, by the pres¬ sure of a motive fluid, or of being reciprocated by a crank and connecting rod, and thus com¬ pressing any gas confined in the cylinder. A piston requires to fit snugly in its tube or cylin¬ der, and the usual device for fitting it tightly is called ˆpacking,** but consists of a series of spring spiral rings that by their expansive ten¬ sion fill the cylinder bore very accurately. A piston and cylinder with connecting rod and crank constitutes a mechanical motion funda¬ mental in the building of reciprocating engines and motors. See Cylinder ; Steam and Steam Engines; Motor; Locomotive, The.

The piston of a rotary pump takes a radically different form from the standard piston. It is really a swinging sector, called a piston, be¬

cause it performs the work of a piston. It is usually a rectangular plate, arranged to rock on a centre, and fill the cross section of a sector, in which it moves and forces the containing fluid.

PIT AND GALLOWS, a term now obso¬ lete, formerly, in feudal times, a privilege granted to barons by the Crown, in virtue of which they were empowered to hang on a gal¬ lows men convicted of theft or other crimes, and to drown in a pit or well women guilty of those crimes.

PIT-RIVER INDIANS, the name given several small American tribes of the Palaihnihan family residing along the Pit River in north¬ eastern California. The river received its name from the tribal custom of digging deep pits or windfalls for capturing deer and other animals. These Indians are of a very inferior type, mentally and physically, and were formerly very warlike and hostile. About 1,000 of them roam about the Pit River region refusing to reside on the Indian reservations.

PIT VILLAGES, collections of earth caves, dug in the ground and covered with stones, wood, clay or sods of turf. They were used by

prehistoric races or by races of the lowest stages of barbarism. A good example was unearthed during the latter half of the 19th century near Andover, in Hampshire, Eng¬ land. The pits are reached by entrance shafts, sloping downward. The pits themselves are oval or pear-shaped, varying between 22 and 42 feet in length, and are about 12 or 13 feet wide and five feet high, with the fire-olace in the centre. Flint and bone implements and rude pottery have been found in them.

PIT-VIPER, a venomous viperine snake of the family Crotalidce or subfamily Crotalince, prominently represented by the rattlesnakes, and characterized by a deep pit between the eye and the nostril, the function of which, if it has any, is not known. See Vipers; Rattlesnake.

PITA. See Fibre.

PITAKA, pTt'a-ka, in the sacred literature of the Buddhists, any one of tripit'aka meaning the three great divisions of canonical works, which, and collectively, constitute the whole Buddhistic code. The Sutta-Pittaka embodies the philosophy and traditions of the Buddhists. There are five books and 15 parts. The Vinaya- Pitaka deals with discipline and includes five books; the Abhidhamma-Pitaka, of seven books, discourses of metaphysics, the elements, manifestation, and enumerates personal duties.

PITAVAL, John Baptist, American Ro¬ man Catholic archbishop : b. France, 10 Feb. 1858. His preliminary studies for the priesthood were made in the archdiocese of Lyons, France. In June 1881 he came to the United States and entered Saint Mary's Seminary, Baltimore, being ordained a priest by Rt. Rev. Joseph P. March- ebeuf in Denver, Colo., 24 Dec. 1881. For 21 years he devoted himself to missionary work in Colorado and on 25 July 1902 was conse¬ crated titular bishop of Sora and auxiliary bishop of Santa Fe. When this see became vacant on the death of Archbishop Bourgade in May 1908, Bishop Pitaval was named adminis¬ trator of the archdiocese of Santa Fe, which office he filled with eminent success, being

nominated archbishop of Santa Fe by His Holiness Pius X on 3 Jan. 1909.

PITCAIRN, pit'karn, John, Scotch soldier: b. Fifeshire, about 1740; d. Boston, Mass., 17 June 1775. He seems to have been a soldier from his youth ; was promoted to be captain of marines in 1765 and to be

major in 1771 ; was stationed in Boston about 1772; and was popu¬ lar there because of his just treatment of com¬ plaining colonists. He led the advance guard of the force sent from Boston to Concord 19 April 1775, met the minute men at Lexington, ordered them to disperse, and took part in the resulting battle, which is commonly believed to have been begun by his orders to fire, though his own story was that the minute men fired first. Pitcairn played a prominent part in the battle of Bunker Hill, was the first to mount the breastworks and was mortally wounded by a negro as he was crying <(Now for the glory of the marines.®

PITCAIRN, Pa., borough in Allegheny County on the Pennsylvania Railroad, 15 miles east of Pittsburgh. It is a thriving industrial centre, with extensive railroad shops and yards, foundries, machine shops and electrical-supply works. Coal-mining is also an important in¬ dustry and gives employment to many. The borough owns the electric-lighting plant. Pop.

(1920) 5,738.

PITCAIRN ISLAND, a British posses¬ sion in the Polynesian Islands, belonging to the Low Archipelago, in lat. 25° 5′ S. ; long. 130° 5′ W., about two miles long and one mile wide. Its coast is almost perpendicular and is fringed with rocks and reefs, making it impossi¬ ble to land except at a few points. The interest which attaches to this island is derived from its history; it was discovered by Carteret in 1767 but was uninhabited till 1790, when nine British sailors, mutineers of the British ship Bounty, together with 18 natives of Tahiti, 6 men and 12 women, landed on this island. Their subsequent contentions resulted in murders and various crimes. After 10 years John Adams (q.v.) and a few survivors were left. His reform and his manner of teaching and supervising the little colony led to a complete change. They became peaceable, moral and industrious. He had saved a Bible from the ship and ruled his little kingdom with wisdom and justice. An American sealing ship visited Pitcairn in 1808 and H. M. S. Britain in 1815. The British Crown took formal possession in 1839. In 1856 the community (194 in number) was removed to Norfolk Island, Pitcairn hav¬ ing become too small for their comfortable subsistence. Some of the number, about 40, returned to Pitcairn. In 1911 there were on the island 145 persons (40 adult males, 45 adult females, 43 children aged 6 to 16, and 17 infants under 6). In religion the islanders are Seventh Day Adventists. A recent colonial office report describes the people as having degenerated from their former manner of living. The products of the island are sweet potatoes, beans, sugarcane, yams, taro, melons, oranges, bananas, pineapples and

arrowroot. Excellent coffee also grows. There are on the island about 200 wild goats and a small stock of chickens. The local government is adminis¬ tered by a council of seven members, with a president, who acts also as chief magistrate,

and a vice-president, who is also government secretary, subject to the control of the high commissioner for the western Pacific. See Bligh, William.

PITCH, a thick, sticky, dark, resinous sub¬ stance with brilliant lustre, obtained from the various kinds of tar produced in the destructive distillation of wood, coal, etc. Pitch is exten¬ sively used in shipbuilding, etc., for closing up seams, also for keeping wood from speedy decay, or iron railings from rusting when exposed to the weather. Natural pitch, as that found in the noted pitch lake in Trinidad, is formed of the dried flow of petroleum. The residue of petroleum in refining also yields tar, and in gas making tar is formed as a by¬ product. Pitch and tar are chemically the same, but the term pitch is used mainly for the product from the southern pines and natural deposits in pitch lakes. See Tar.

PITCH, in mechanics, inclination, slope; in architecture, the rise, or versed sine of an arch ; in carpentry, the inclination of a roof.

The point or degree of elevation is also termed pitch. Musical sounds give to the mind a feeling of acuteness or gravity accord¬ ing to the rapidity or slowness of the vibra¬ tions producing them; hence, the former are called acute or high, the latter grave or low. See Music.

PITCH AND HITCH, a game for ten players, five on a side, usually played indoors. Disks of galvanized metal are pitched from a distance of ten yards into a receiver, a round rubber dish, having an opening at the top five inches in diameter. The game is similar to that of quoits (q.v.), the courts being the same.

PITCH LAKE. See Trinidad.

PITCH AND TOSS, a game played by throwing up a coin and calling heads or tails; hence, to play pitch and toss with anything is to be careless or wasteful about it ; to play ducks and drakes.

PITCHBLENDE. See Uraninite.

PITCHER, Moll, American heroine. She was the wife of a soldier in the Continental army and at the battle of Monmouth, 28 June 1778, saw her husband killed in the act ©f firing a cannon. She at once took his

place, fired the already loaded cannon, and fought throughout the day. She was praised by Wash¬ ington who commissioned her a sergeant in the army.

PITCHER, Thomas Gamble, American

soldier: b. Rockport, Ind., 23 Oct. 1824; d. Fort Bayard, N. Mex., 21 Oct. 1895. He was graduated from West Point in 1845, served in the Mexican War and for gallantry at Contreras and Churubusco was in 1847 bre- vetted 1st lieutenant. He served on the frontier until the outbreak of the Civil War, defended Harper's Ferry in 1862 and later served in the Virginia campaign. From 1863-65 he was pro¬ vost-general-marshal, and in the latter year brevetted brigadier-general in the regular army for services throughout the war. He was mustered out of the volunteer service in 1866 and commissioned colonel of the 44th Infantry. In 1866-71 he was superintendent at West Point, governor of the Soldiers' Home near Washington in 1871-77, and in 1880-87 superin-

tended the New York Soldiers and Sailors' Home.

PITCHER, Zina, American physician: b. Washington County, N. Y., 1797; d. 1872. In 1822 he was graduated at Middlebury College and soon afterward was appointed assistant surgeon in the army. In 1835 he was president of the Army Medical Board. After 15 years, connection with the army medical service, he resigned and established a medical practice in Detroit. He was thrice mayor of Detroit ; was president of the Michigan Medical Society in 1855—56 and of the American Medical Associa¬ tion in 1856. He also served as regent of the University of Detroit. He was also for three years editor of the Peninsular Medical Journal.

PITCHER-PLANTS, plants whose leaves resemble pitchers. These pitchers, which are more or less filled with water, are thought to act as plant-food gatherers, especiallv of nitrog¬ enous food, Which they are believed to digest from the bodies of entrapped insects. Gen¬ erally they have lids whose office is to keep out rain ; honey-secreting glands, which attract in¬ sects ; downward pointing hairs or bristles which permit the visitors to crawl down in the pitchers but prevent their return ; digestive and even pepsin or enzvme-containing secretions which act upon the soft parts of the insects' bodies. After

the nectar-hunting insects have finally begun to decompose, the odor of decay fre¬ quently attracts carrion-feeding insects so the plants may be said to have two harvests.

Mosquitoes have been known to breed in the water contained in the pitchers.

The best-known kinds are the species Nepenthes (family N epenthacece, of which about 50 tropical species, mostly Malayan, have been described. These are the pitcher-plants seen in greenhouses, the pitcher pendant upon the ends of rather narrow leaves. Two genera of these plants are American. The pitcher- plants or ((side-saddle flowers® of the swamps east of the Rocky Mountains, especially well- known east of the Mississippi River, belong to the genus Sarracencia. The other genus has only one species (Darlingtonia calif ornica) , which is found only at high elevations of the Pacific Coast. Heliamphora nutans is a unique species found in northern South America. These three genera constitute the family Sarraceniacece. Cephalotus follicularis is an Australian plant with pitchers resembling those of Nepenthes, but it belongs to a different family.

PITCHSTONE, a glassy volcanic rock, assumed to resemble hardened pitch, but of any color. It is translucent on thin edges and breaks with a conchoidal or splintery fracture. It occurs in the form of dikes and as lava-flows and may be considered as a natural glass formed by the rapid cooling of those lavas of which common feldspar (orthoclase) forms a con¬ siderable part. Sometimes it is spherulitic, the spherules, which are occasionally of large size, showing a fibro-radial structure. It is found chiefly in Mexico, South America and southern Europe.

PITH, the cylindrical or angular column of cellular tissue at or near the centre of the stem of a plant, also called the medulla, of which a good example is afforded by studying Chinese rice paper, made from the pith of the Aralia

papyrifera. The pith is at first succulent and of a greenish color, afterward it becomes dry, and in many plants its cells are broken up, leaving large cavities. In its primary state it appears to be a reservoir of nourishment for the embryo plant. See Anatomy of Plants.

PITHECANTHROPUS E R E C T U S ,

(erect ape-man), the name given by Dr. Eugene Dubois to the fossilized remains found by him in Java in 1891-92. These consist of

the upper part of a cranium, a left femur and two molar teeth, and indicate a high order of ape, closer to man than any previously noted of Pleistocene ages. Much doubt and discussion was aroused at first in regard to it but the weight of scientific opinion is now that it was either an ape or a man, or that the bones became mixed, hence that there is no ((missing link®. The animal when erect must have stood Sl/2 feet high, ((and the contents of the cranium,® says Beddard, ((must have been 1,000 cm., that is to say 400 cm. more than the cranial capacity of any anthropoid ape, and quite as great or a trifle greater than the cranial capacity of some female Australians and Veddahs; but as these latter are not five feet in height, the ape-like man had really a less capacious cerebral cavity.® The skull in form and capacity stands roughly midway between that of a young chimpanzee (with no crest), and that of the lowest human example known — the man of Neanderthal. Consult the discoverer's monograph, Pithe¬ canthropus erectus) (Batavia 1894, in Ger¬ man) ; reprinted in English in Smithsonian Report* for 1898; Haeckel and Gadow, (The Last Link* (1898) ; and Beddard, (Mammalia*

(1901).

PITHOM, pi'thom, a town of northern Egypt, in the land of Goshen, built for Rameses II by the children of Israel (Exod. i, 11)„ as a storage citv to supply his Asiatic armies. The town was discovered at Tell el Maschulah, between Ismailia and Tell el Kebir in 1882, and its ruins explored by Dr. Naville (1882-83). A statue of Rameses II was unearthed as well as of other monarchs of up to the 22d dynasty to the time of the Ptolemies. Consult Naville, ˆThe1 Store-city of Egypt and the Route of the Exodus* (1888).

PITKIN, Timothy, American lawyer and historian: b. Farmington, Conn., 21 Jan. 1766; d. New Haven, Conn., 18 Dec. 1847. He was graduated at Yale in 1785; became a lawyer and a leader of the Connecticut Federalists, who elected him to Congress in 1805 ; served there for 14 years; and was one of the earliest politi¬ cal historians of the United States. He wrote Statistical View of Commerce of the United States of America) (1816), and Political and Civil History of the United States of America from the Year 1763 to the Close of Washing¬ ton's Administration* (1828).

PITMAN, Benn, American phonographer : b. Trowbridge, Wiltshire, 24 July 1822; d. Cin¬ cinnati, Ohio, 28 Dec. 1910. He was educated in the academy of his brother, Sir Isaac Pit¬ man (q.v.), and for 10 years engaged in lectur¬ ing on and teaching phonography in England. In 1853 he came to this country and established the Phonographic

Institute at Cincinnati, Ohio, of which he was long president. His latter teaching differed in several particulars from

that of his brother. He was military recorder of State trials during the Civil War, invented the electro-process of relief engraving, and in 1873-92 was lecturer on art and teacher of ar¬ tistic wood-engraving in the Cincinnati Art Academy. He has published (Manual of Pho¬ nographˆ (1854) ; (History of Shorthand) (1858); (A Plea for American Decorative Art* (1895) ; (Phonographic Dictionary* (1899).

PITMAN, Sir Isaac, English phonog- rapher : b. Trowbridge, Wiltshire, 4 Jan. 1813; d. 22 Jan. 1897. He was educated in London at the Normal College of the British and Foreign School Society, and in 1832 was appointed mas¬ ter of the British school at Barton-on-Humber. In 1837 he published Stenographic Sound- Hand* which under the present title of phonog¬ raphy or stenography has become so widely used as to practically extinguish the earlier sys¬ tems. It is claimed that he first suggested the postage stamp as a convenient way of paying postage. The Phonographic Journal, afterward named the Phonetic Journal, was established by Pitman in 1842, and for a period of more than 50 years was personally edited by him. He issued numerous revised manuals and over 200 works in his system of shorthand, consisting of standard and general literature, ranging from the complete Bible to the Vicar of Wakefield, etc. His (Shorthand Instructor, * was exten¬ sively adopted by commercial and high schools and the Pitman system will always be remem¬ bered as fundamental in shorthand. In 1894 Pitman was knighted by Queen Victoria for (

PITNEY, Mahlon, American jurist: b. Morristown, N. J., 5 Feb. 1858. In 1879 he was graduated at Princeton University and in 1882 was admitted to the bar and practised at Morris¬ town. From 1895 to 1899 Mr. Pitney was a member of Congress and in 1899-1901 was a member of the senate of New Jersey. In 1901- OS he was associate justice of the Supreme Court; in 1908-12 he was chancellor. In the latter year Justice Pitney was elevated to the Supreme Court of the United States in succes¬ sion to Justice Harlan. He allied himself with the conservative group of the Supreme Court.

PITRI, in Hindu mythology, one of several orders of divine or spiritual beings. According to one of the Vedic accounts the older manes or

deceased a-ncestors of mankind were pitris, and a great deal is written about the Lunar pitris. The tar prajapatis are also alluded to as pitris; they were creators of the human race, and included ancestors of demons. For a full understanding of the term consult Besant, A., (Ancient Wisdom* (1892) ; Sinnett, (Esoteric Buddhism* (1883).

PITT, William, English Parliamentary ora¬ tor and statesman : b. Hayes, near Bromley, Kent, 28 May 1759; d. Putney, 23 Jan. 1806. He was the son of the Earl of Chatham (q.v.). In 1773 he entered Pembroke Hall, Cambridge, where his knowledge of mathematics and the classics seems to have astonished ripe scholars. His acquaintance with modern literature was

slight. Of living languages besides his own he was almost entirely ignorant; an imperfect knowledge of French was all he possessed. His whole education was directed to the end of making him a great Parliamentary orator. In 1778 he entered Lincoln's Inn, and in 1780 was called to the bar. He attended the western cir¬ cuit once and was introduced into Parliament by Sir James Lowther, as representative for his borough of Appleby. His maiden speech was delivered in support of Burke's financial reform bill. On the failure of Fox's India bill, which produced his dismissal of the North and Fox coalition ministry, Pitt, although at that time only in his 24th year, assumed the station of Prime Minister by accepting the posts of First Lord of the Treasury and Chancellor of the Exchequer. Although strongly supported by the sovereign, he stood opposed to a large majority of the House of Commons, and with the excep¬ tion of Henry Dundas (q.v.), every other prom¬ inent debater in the House was against him. In spite of many defeats in the Commons he refused to dissolve Parliament or resign, until, having at last obtained a majority, he fixed the day (24 March 1784) on which the king dis¬ solved Parliament.

At the general election which followed the voice of the nation appeared decidedly in his favor, and some of the strongest interests in the country were defeated, Pitt himself being re¬ turned by the University of Cambridge. His first measure was the passing of his India bill, establishing the board of control, followed by much of that fiscal and financial regulation that gave so much eclat to the early period of his administration. The establishment of the de¬ lusive scheme of a sinking fund followed in 1786. In 1788 Pitt resisted the doctrine of the opposition that the regency, during the king's indisposition, devolved upon the Prince of Wales by right. The minister maintained that it lay in the two remaining branches of the legislature to fill up the office, but that the prince could not be passed over in nominating to this post. By the adoption of this principle he was enabled to pass a bill

restricting the re¬ gent's power, which the king's recovery ren¬ dered unnecessary. The French Revolution now broke out, and in 1793 war arose between Great Britain and France. Great Britain was successful by sea, but during the life of Pitt the conflict on the Continent was in favor of France. In 1800 the Irish union was accom¬ plished. In 1801 the opposition of the king to all further concessions to the Irish Catholics caused Pitt to resign his post. The Peace of Amiens succeeded; and the Addington admin¬ istration, which concluded it, Pitt supported for a time, and then joined the opposition. The new minister, who had renewed the war, unable to maintain his ground, resigned; and in 1804 Pitt resumed his post at the Treasury. Returning to power as a war minister, he exerted all his energy to render the contest successful, and found means to engage the two great military powers of Russia and Austria as well as Sweden in a new coalition, which was dissolved by the battle of Austerlitz. Pitt, whose state of health was previously declining, was sensiblv affected by this event, as he was also by the Parliamentary attack upon his old associate, Lord Melville (see Dundas), not wholly parried either by minis-

terial influence or the merits of the case. Pitt has been much criticised as a war minister, but with great evident injustice. He wisely saw that the war on England's part must be naval. He formed coalitions with Continental powers that were to act on land. He met the demands of these powers by large subsidies. If the coa¬ litions failed, as they did fail, Pitt was not responsible for the self-seeking of his Conti¬ nental allies. In peace he sought Parliamentary reform, strengthened the national credit, estab¬ lished an improved financial system and fol¬ lowed a successful commercial policy. He was altogether above the meanness of avarice, his personal disinterestedness being extreme. His eloquence, if not more elevated or profound, was, upon the whole, more correct than that of any other orator of his time, and his language was remarkably copious and well arranged. On the whole Pitt was a minister of commanding powers. A public funeral was decreed by Par¬ liament, and a grant of £40,000 to pay his debts. Consult Lord Stanhope's (Life of Pitt > (2d. ed., 1862) ; Sergeant, (William Pitt) (1882) ; Walford, (William Pitt: a Biographv) (1890); Rosebery, (William Pitt) (in (Twelve English Statesmen,) 1891).

PITT, William (1708-1778). See Chat¬ ham, Earl of.

PITT, William (1773-1857). See Am¬ herst, William Pitt.

PITT, Diamond. See Diamonds.

PITT, Fort. See Pittsburgh.

PITTACUS, one of the seven Grecian sages : b. about 650 b.c., d. 569. He assisted in the overthrow of the tyrant Melanchrus, led the Mytilene forces against the Athenians in a contest for Troad coast territory, slaying Phryno in single combat. He was raised to the dictator¬ ship, and ruled successfully for 10 years. He wrote poems and originated the truism, <(It is hard to be good.®

PITTI (pit'te) PALACE, a celebrated Florentine palace, the second in size in the w'orld. See Florence.

PITTMAN, Key, American legislator: b. Vicksburg, Miss., 19 Sept. 1872. He was edu¬ cated by private tutors and at Southwestern Presbyterian University, Clarksville, Tenn. In 1892 he established a law practice at Seattle, Wash.; joined the movement to the Klondike in 1897 ; worked as a common miner for two years and served as counsel for Australians who attacked the corruption of government officials at Dawson. He went to Nome in 1899 and participated in the organization of a ((con- sent® form of government, became first district attorney there, and was one of the leading counsel for miners in their fight against a con¬ spiracy to rob them of their mines in 1901. He removed to Tonopah, Nev., in 1902 and ac¬ quired a large mining and corporation practice. In November 1912 Mr. Pittman was elected United States senator by popular vote, subse-. quently confirmed by the legislature, for the unexpired term (ending 4 March 1917) of G. S. Nixon, deceased. He was re-elected for the term 1917-23.

PITTSBURG, Kan., city in Crawford County, on the Saint Louis and San Francisco, the Kansas City Southern, the Atchison, To¬

peka and Sante Fe and the Missouri Pacific railroads, about 125 miles south of Kansas City. It was settled in 1876 by colonies from the East¬ ern and Southern States ; incorporated as a city of the third class the same year, a city of the second class in 1880, and first class city 9 Nov. 1906. It is in a productive agricultural region, and has considerable manufacturing interests. The chief manufacturing establishments are the Kansas City Southern shops, foundry and ma¬ chine shops, one brick plant, packing-house, planing mill, artificial ice plants, electric-power plant, tile works, three zinc smelters, flouring mill, elevator, hat factory, candy factory, knife factory and boiler works. About 2,000 men are employed in industries in the city, and

about 600 men, who live in the city, are employed in the coal mines in vicinity. There is a large trade in manufactured goods, coal and farm products ; coal is king. The educational insti¬ tutions are the State Manual Training Normal School, a high school, five ward schools, one parish school and a public library. There are 13 churches, and five banks, one denominational hospital, also a Y.M.C.A. The banks have a combined capital of $500,000 and deposits $3,- 500,000. The govenment is commission form with five commissioners elected by the city for a period of two years. Pop. (1920) 18,052.

PITTSBURGH, Pa. (incorrectly spelled ((Pittsburg,® Pittsburgh being the true name of the city, originally given to it, used on its great seal from the date of its incorporation and legalized by joint resolution of Congress), the metropolis of the Ohio Valley and county-seat of Allegheny County, Pa., is located at the junc¬ tion of the Monongahela and Allegheny rivers, which here unite to form the Ohio in lat. 40° 30' N., long. 80° W. (Greenwich). The three rivers flow through deep valleys of erosion, which have been excavated by them and the high lands on their sides are broken into a great number of hills, separated by deep ravines, also caused by erosion in past ages. In its topography the city presents a marked con¬ trast to many other cities, which are built upon comparatively level ground. Rome had her (

which are so characteristic of the older part of the city. The ftNorth Side® of Pittsburgh, formerly the city of Allegheny, occupies a com¬ paratively level tract along the Allegheny and the Ohio rivers, broken nearly opposite <(The Point,® where the rivers unite, by Monument Hill, so called because it is surmounted by the Soldiers' Monument erected at the close of the Civil War. This low-level area, upon which the city of Allegheny had its beginning, is flanked to the west of the Allegheny and to the north of the Ohio by lofty heights, rising from 500 to 750 feet above the level of the rivers, up the sides and over the tops of which the city has crawled. On these breezy hill-tops are some of the most beautiful residential neighbor¬ hoods, and here is Riverview Park near the entrance of which stands the Allegheny As¬ tronomical Observatory. Immediately over¬ looking the old city and rising hundreds of feet above it is Mount Washington, from which on a clear day there is a fine panoramic view of the greater part of the older portions of the city. The wall of the canyon of the Monon-gahela recedes sufficiently from the river to allow of the location upon

level ground of that part of the city which once was <(The Borough of Birmingham,® but which is to-day commonly known as <(The South Side.® Back of this level ground rise a number of high, flat-topped hills, rapidly becoming densely popu¬ lated and in common parlance known as (

Over 30 boroughs and townships have al¬ ready been absorbed into the city, and the names of these still in many cases cling to them. When a Pittsburgher speaks of going ((into the City,® he means that he is going to that part of the great municipality forming the small triangle ((at the Point,® where the city had its beginning. The area outside of this is cut up into a multitude of districts, which still bear old names — Soho, Oakland, Bellefield, Shady- side, East Liberty, Brushton, Lawrenceville, Manchester, Birmingham, Knoxville, etc. The stranger, visiting the place, unless he take pains to inform himself, is apt to be bewildered by these names, which are in common use, and will be as much puzzled as a visitor to London or Boston, cities also formed by a process of gradual absorption.

Area and Population. — At the time of its first incorporation the city was confined to the small triangle at the confluence of the Monongahela and Allegheny rivers, bounded on the east by Grant's Hill, so named after Major Grant of Forbes' army, who was defeated and lost his life in an encounter with the French, a few days before the capture of the spot by Forbes. The area of this site was only 320 acres, or less than half of a square mile. In 1909, at the time of the absorption of Beech- view Borough, the latest addition to the city, its territory had expanded to 26,465 acres, or 41.35 square miles. The greatest territorial ad¬ dition occurred on 30 June 1868, when six adja¬ cent townships were annexed, they having an area of 13,568 acres. The greatest single in¬ crement in the population was made when, on

7 Dec. 1907, the city of Allegheny, having more than 150,000 inhabitants, was merged into the city of Pittsburgh. The population ascertained by the United States census of 1910 was 533." 905. According to the official report of the United States Census Bureau the population in 1920 was 588,343. This is, however, very far from truly representing the urban population found in the locality known as Pittsburgh. The city is growing and expanding on all sides be¬ yond its comparatively narrow municipal limits and in the immediate suburbs there are almost as many people as within its legally defined bound¬ aries. Within a radius of 10 miles of the tower of • the Pittsburgh courthouse there are over a million of people and as a ((Metropoli- tan Centre,® according to the last United States census, Pittsburgh holds the fifth place in the United States, being outranked

by only New York, Chicago, Philadelphia and Boston, in the order given. As in all of the larger in¬ dustrial centres of North America, the popula¬ tion of Pittsburgh contains a very large per¬ centage of the foreign-born, attracted to the spot by the opportunity to find remunerative employment. There are many Hungarians, Poles, Slovaks, and Ruthenians in Pittsburgh, and these are even exceeded in number by the Italians and Germans. There are in the neigh¬ borhood of 10,000 Greeks in the city andˆa con¬ siderable number of Belgians. The foreign element is largely drawn from those regions of the Old World in which mining and glass¬ working prevail. Since 1914 there has been a large influx of negroes from the Southern States.

Transportation Facilities.— The three

rivers which traverse the city are important waterways and provide within the limits of the city proper a water-frontage of more than 40 miles. The Monongahela by the construction of dams and locks has been made navigable for a distance of more than 100 miles to the south and access is thus gained to the im¬ mense coal-fields of the northern part of West Virginia. The Allegheny is being canalized in the same way and thus the oil- and coal¬ fields of the upper counties of western Pennsyl¬ vania are being reached. By the Ohio the door is opened to thousands of miles of navigable water in the west and the south and access is had to the Gulf of Mexico and the oceans of the world. There is a large river traffic be¬ tween Pittsburgh, Cincinnati, Saint Louis and New Orleans. In the early years of the last century, Pittsburgh was an important ship¬ building centre and before the days of such gigantic craft, as now sail the seas, many wooden ships, which in those days were es¬ teemed of large size, were built in Pittsburgh and, passing down to the Gulf, entered into maritime commerce. At so late a period as that of the Civil War, smaller vessels were con¬ structed here and a number of the early <(Mon- itors,® among them the Miantonomah and sister ships, were launched from Pittsburgh ways. Even now the building of stern-wheel river- boats and marine engines is an important in¬ dustry and craft of this description built and engined in Pittsburgh are being constructed for use upon the rivers of both Americas, upon the Volga, the Danube, the Yangtse, and the Kongo. In quite recent years the construe-

■

/P.R.R.

Yardsˆ

High wood Cemetery Tfej

.7 /Herron

// Hill

4L>‘ark

Adelaide st.-

//lSryn-Mattr-R/ – Anaheim-St.-

>K\chaiyf?;

81. | s s

TTniomlale ‘ Cemetery

•Cherokee St.

lllNEKSVILLE

fo Eunice

Kaeeˆ

Course

%Xp’

ˆ ofi1 zftrcT&t>A.

raring

Iiecdgdale

Caraon

WMMm

DIJQCESN

iBinghnnjj

Manor St.

Strˆ- ‘W llUpgton_Av

ˆMichael ,Ilaek8town [_ | ‘Monaat

ˆNejrton St

y obleBtown

3 I — —r

ˆ c53£

-1 f\ rJ»6V%

MAIN PORTION

PITTSBURGH

SCALE

Reams’

Kanil-McNally’s 11 × 14 Map of the Main Portion of Pittsburgh. Copyright by Rand, McNally Si Co.

I Ham berg St.

V,

4

\

PITTSBURGH

125

tion of steel barges for the transportation of coal has become an industry of magnitude. The harbor of Pittsburgh by the erection of the Davis Island Dam on the Ohio River has been made navigable throughout the year and here assemble the great <(coal-tows,® which at times of flood descend the Ohio to the Missis¬ sippi and go south to the Gulf. The word (

The facilities for transportation by water have been during the past 70 years enormously supplemented by the construction of railways. At the present time there are 14 different steam- railways entering the city, connecting with all the railway systems of the country. The loca¬ tion of Pittsburgh as a point for the assem¬ blage and distribution of

merchandise is thus very favorable and the city is within one night's ride of half the population of the United States at the present time. Its central position is shown by the following scale of distances : to Wheeling 67 miles; to Cleveland 150 miles; to Buffalo 270 miles; to Washington 290 miles; to Baltimore 334 miles ; to Philadelphia 340 miles; to New York 431 miles; to Chicago 468 miles. By express trains the most distant of these points is reached in less than 12 hours.

Travel within the city and the adjacent sub¬ urbs is facilitated by lines of electric railways radiating in every direction and extending far through western Pennsylvania, West Virginia and eastern Ohio. There are in the city 772 miles of streets and boulevards and 335 miles of ways and alleys under 20 feet in width, or a total of 1,107 miles of thoroughfares. The boulevards are kept free from rails and are the main arteries of communication by automo¬ bile. Owing to the peculiar topography, Pitts¬ burgh has probably more bridges and viaducts than any other city in the world. There are 114 bridges and viaducts within the city proper, not counting railway bridges, of which there are seven. Almost every style of construction known to the engineering profession is repre¬ sented by them. The Bloomfield bridge, con¬ necting the Herron Hill district with the Bloom¬ field district, spans a deep valley and has a length of 4,962 feet, 6 inches. The Manchester bridge, spanning the Allegheny at its confluence with the Ohio, has a length of 3,257 feet. The Larimer Avenue viaduct at the time it was built was the longest single arch of reinforced concrete in the world, having a span of 312 feet, at its centre 125 feet above the bottom of the ravine which it crosses. Since it was built one or two others of larger span have been con¬ structed, one of these in Australia. One of the interesting means of communication between certain parts of the city which excites the curi¬ osity of visitors are the inclined planes, built to carry passengers and vehicles. There are a number of these, which enable a quick ascent to be made from lower to higher levels, with¬ out long detours. One of the best known of these is the Mount Washington Incline, opposite the Pittsburgh and Lake Erie Railroad station, by which in a minute the passenger is lifted 400 feet above the level of the old city and finds

himself in a city literally <(set upon a hill,® looking down upon the steeples and "sky-scrap¬ ers® far below.

The tonnage of Pittsburgh, owing to the character of the commodities in which it deals, is very large and exceeds that of any other city in the world. Coal, ores, iron, steel and other heavy articles constitute much of what the city receives and sends out. At the present time the tonnage handled by rail and water exceeds 175,000,000 tons

annually, twice that of New York, London, Liverpool and Marseilles com¬ bined, the aggregate of these in 1917 having been 84,376,000 tons. The rail traffic is repre¬ sented by nearly 1,000 passenger and freight trains daily arriving or departing.

Manufactures and Mining. — Pittsburgh is located at the heart of the largest and most productive coal-field on the continent. Until the recent discoveries in the Southwest and Mexico, Pittsburgh was the centre of the most productive oil-fields in North America, which still have a great production. She has at hand one of the most extensive and richest fields of natural gas in the world. Pittsburgh annually uses in her grates and furnaces over 100 billions of cubic feet of natural gas, piped in the city through nearly 6,000 miles of gas-pipes, which reach out in every direction through western Pennsylvania and into West Virginia. The abundance of cheap fuel at her command has made the city the natural centre of all those in¬ dustries which depend upon fire for their suc¬ cessful prosecution. She is the hearth of the nation, at which the spirit of Tubal Cain min¬ isters to the wants of man. She used to be called ((The Iron City,® to-day she is called ((The City of Steel.® The Pittsburgh district annually produces more than one-half of all the coke manufactured in the United States and 10 per cent of all the bituminous coal mined in the world. Three-tenths of all the pig iron produced in the western hemisphere is made in Pittsburgh and four-tenths of all the steel; and the combined production of these commodi¬ ties considerably exceeds in the Pittsburgh dis¬ trict alone the entire output of iron and steel annually produced in Great Britain and her colonies. Pittsburgh makes more steel rails, more plates for the hulls, boilers, and armament of ships, more pressed steel cars and coaches than any other city in the world. During the World War the capacity of her mills and fur¬ naces was taxed to supply the needs of the Allies and later of the government of the United States, and it is said upon excellent authority that 60 per cent of the metal supplies used by the United States came originally in the rough and largely in the finished shape from the Pittsburgh district. Before the output of the great steel-making establishments of Pittsburgh, that of the Krupp works at Essen in its palmi¬ est days sinks into relative insignificance.

Pittsburgh is the seat of the manufacture of aluminum in America and the industry was originally developed here, the process being the result of experimental work by Pittsburgh men, followed by the application of their efforts and capital. Bronze, brassware, copper in various shapes, tin-plate and white lead are extensively manufactured. In short all the industries in which the metals play a part are developed in this great metallurgical centre, more especially

so far as the production of raw materials is concerned, although finished product is pro¬ duced in vast quantities. Recent statistics show that Pittsburgh supplies with their raw material certain great industries in the United States in the following proportions : manufacture of automobiles, 46 per cent ; hardware, 45 per cent ; agricultural implements, 44 per cent; machinery, 37 per cent.

The making of structural steel shapes em¬ ployed in the building of edifices had its be¬ ginning here and it is said that the plans and specifications for a majority of the ((sky-scrap- ers® built in the great cities of America are to be found in the archives of the steel-mills of Pittsburgh.

Pittsburgh leads the world to-day in the production of plate glass, window-glass, pressed table-ware, bottle-ware and lamp chimneys. The finer manufactures in glass are also well represented by establishments which make dif¬ fracting prisms used in lighthouses, lenses for opera-glasses, telescopes, range-finders and mi¬ croscopes. The optical establishment of Dr. J. A. Brashear has a world-wide reputation for the excellence of the lenses turned out. The output of the Pittsburgh Plate Glass Company in 1918 was 31,600,000 square feet and the total production of plate glass in the district in 1918 was nearly 60,000,000 square feet, which if made into one sheet would cover an area of 1,377 acres, or make a pane of plate glass three miles high by one mile wide and the ordinary win¬ dow-glass made here would, if in one piece, be a pane nearly three times as large. The largest manufactory of corks in the world (corks are the corollary of bottles) is located here and not only makes stoppers for phials and bottles, but everything which can be made from cork, including life-preservers and linoleum. En¬ ameled ware is extensively manufactured and the Standard Sanitary Manufacturing Company is famous for its beautifully perfect wares. Its trade with South America has attained very large proportions and it exports its products to every quarter of the globe. In recent years a great development has taken place in the chemical industries, especially those which are connected with the by-products of the coke in¬ dustry. The manufacture of coal-tar, ammonia and various derivatives of coal-tar has assumed large proportions. During the European War, Pittsburgh produced an immense quantity of high explosives, which her position fitted her to supply at low rates of cost, and train-loads of trinitrotoluol were continuously shipped from the district.

The packing of meats and the preserving of other food products is an extensive business and employs a large amount of capital and labor. The products of the Heinz Company, which is known to be the largest establishment of its kind in the world, are widely distributed and may be purchased in Argentina, Australia and at the Cape, as well as in Paris, London and Tokio. The manufacture of salt is exten¬ sively carried on, the salt water being drawn from artesian wells and the salt obtained by evaporation. The refining of oil and the manu¬ facture of gasoline is a great business, and Pitts¬ burgh was the original centre of the oil-refining industry, which has spread extensively else¬ where. One of the very large and profitable

undertakings of Pittsburgh is the manufacture of fire-brick for the lining of furnaces and also of building-brick. Fire-clay and the silicates which are employed in this industry are found near at hand in abundance and the Harbison and Walker Refractories Company is known among smelters all over America for the ex¬ cellence of its product. The manufactures of machinery, especially electrical machinery of all kinds, has attained a great development. The group of industries, which perpetuate the name of George Westinghouse, Jr., the Westinghouse Air-Brake Works and the Westinghouse Elec¬ trical Company are colossal enterprises, the reputation of which is international. Another notable industry is the manufacture of wire in all its forms and its insulation for electrical purposes. The American Wire Works and Pittsburgh Steel Company produce an enor¬ mous output of wire and without them the battles in the trenches of Europe might have been different in their result from what the event proved. Barbed wire made in Pittsburgh was strung all along the front in northern France and Belgium during the World War. The development of oil and of gas early led men in Pittsburgh to undertake the manufac¬ ture of pipes and tubing. These articles may be made by casting or by forging. Both methods are employed in the community. The National Tube Company, one of the integral factors of the United States Steel Corporation,* is the largest single establishment in existence, en¬ gaged in manufacturing welded pipes. A num¬ ber of foundries cast pipes from 8 inches to 10 feet in diameter, to be used as water-pipes and mains. Plumbers' supplies bulk large in the output of Pittsburgh factories. There are over 2,500 manufacturing concerns in the Pittsburgh district with their headquarters and offices in the city, with a capital investment of nearly a billion of dollars, employing a quarter of a million of operatives and executive agents, with a total annual output exceeding twice the capi¬ tal employed. Among the more colossal indus¬ tries located here are those which are associated with the names of Andrew Carnegie and his partners, which constitute

the backbone of the United States Steel Corporation, the Ameri¬ can Iron Works, familiarly known as <(Jones and Laughlins,® the Westinghouse Electric Company, the Pressed Steel Car Works, the Crucible Steel Company of America, the Pitts¬ burgh Steel Company, the McClintic and Mar¬ shall Construction Company (which built the lock-gates on the Panama Canal), the Ameri¬ can Bridge Company, the Pittsburgh and the Standard Plate Glass companies (the main works of the latter concern located at Butler, Pa., an hour's ride from Pittsburgh), the Na¬ tional Glass Company, the American Window Glass Company, the Standard Underground Cable Company, the Harbison and Walker Re¬ fractories Company, the National Tube Com¬ pany, the Atlantic Refining Company. There are scores of other concerns which might be mentioned, each with a capital running into the millions, but these are some of the largest at the present time.

United States Bureau of Mines. — The prin¬ cipal experimental station of the United States Bureau of Mines is located in Pittsburgh in a group of buildings which have been erected

in recent years. Here the work or the Bureau is principally carried on, though the general offices are located in the city of Washington. At the National Safety Meet held in Pittsburgh in 1911, 18,000 coal miners were present. The Bureau has at Bruceton, about 12 miles from Pittsburgh, an experimental mine, where from time to time explosions are artificially produced and rescue apparatus is tested.

Banking Facilities. — For the prosecution of the vast business carried on in Pittsburgh a large capital is required. At the close of busi¬ ness on 31 Dec. 1918, there were 21 national banks, 24 State banks and 31 trust companies, or a total of 76 banking corporations in the Clearing House Association of the city. The accompanying brief table shows in epitome the situation as to these institutions :

CAPITAL STOCK.

. $28,350,000

. 3,472,700

. 22,185,400

- $54,008,100

SURPLUS AND UNDIVIDED PROFITS.

National banks . $26,274,344

State banks . 8,552, 044

Trust companies . 63,170,876

- 97,997,264

DEPOSITS.

National banks . $388 , 832 , 35 7

State banks . 101,784, 903

Trust companies . 248 , 403 , 709

- 739,020,969

Total resources of banks . $891 , 026 , 333

The Bank of Pittsburgh (N.A.) is the oldest banking institution on this continent west of the Allegheny Mountains, and in 1910 commemo¬ rated its centennial. The business transactions of the city represented by the exchanges made in the clearing-house during the year 1918 amounted to the enormous total of $5,761,511,- 498.93. Pittsburgh in the amount of her traffic represented by the exchange of the clearing¬ house stands sixth in rank among the great cities of. the country, being outclassed only by New York, Chicago, Boston, Philadelphia and Saint Louis, in the order given, though it fre¬ quently happens that the exchanges in the Pitts¬ burgh clearing-house in a given week or month exceed those of Saint Louis. The pay-rolls made out in the banking institutions of the city amounted during the year 1918 to the daily average of $2,750,000, which was due to the war activities of the time, but have receded in 1919. A fair average for the past five years would be $1,960,000 per diem; that is to say the working population in the mills and factories receives a total annual wage of approximately $588,000,000. This does not include payments for clerical, administrative and professional services, but represents simply the return to skilled and unskilled laborers employed in manufacturing, and takes no account of purely commercial or other business.

Chamber of Commerce. — Occupying quar¬ ters in a new and commodious building at the corner of Seventh avenue and Smithfield

street, the Chamber of Commerce has a membership of 6,000 representing not only all the business firms of the city, but numbering in its ranks many public-spirited professional men, who are interested in the general welfare of the com¬

munity. The chamber has a very complete or¬ ganization, enabling it to deal with all manner of questions which may come before it, and to aid strangers and foreigners in securing such information as they may seek in reference to trade and manufactures in the city. It has taken a very active part in securing legislation deemed to be advantageous to the interests of the com¬ munity and the nation, and many beneficial laws on the statute-books of city, state and nation, found their first advocates here, among which may be mentioned the (

Housing. — Pittsburgh is well-known for the beauty and elegance of its better residential quarters. The eastern extension of Fifth avenue as well as Penn and Highland avenues are lined by palatial homes and such homes are also to be found on Ridge and Irwin avenues on the North Side. Sewickley Heights is adorned with some of the most beautiful and costly resi¬ dences in America, surrounded by extensive grounds, laid out with great taste. Not only are the homes of the wealthy beautiful, but those also of persons in less affluent circumstances. Pittsburghers, even those of humble means, avoid life in closely compacted quarters, and al¬ most every home, even that of the common laborer, has in front or rear or at the side a small amount of space for shrubbery or garden. There is less squalor and filth per capita in Pittsburgh than in any other great manufac¬ turing city in the world. Intelligent efforts have been consistently made for years by manufac¬ turers and the municipal authorities to combat crowding into close and unsanitary quarters, and any difficulty which has been encountered by them has arisen from the disclination of the un¬ intelligent laborers of foreign origin to adapt themselves to the usages of the country to which they have come. One of the most famous of the millionaires of Pittsburgh undertook a few years ago to build a large number of model homes for workingmen fitted out with all modern conveniences, which were rented at low rates, and then discovered, to his disgust, that the porcelain bathtubs were being used as coal- bins and receptacles for rubbish by the “op¬ pressed® laborers from southern Russia and Hungary who were his tenants, while the coal- bins, which had been provided, were used as sleeping quarters. Pittsburgh has few “slums,® and nothing which may be compared with the “East Side® of New York, the back streets of Buenos Aires or the White Chapel district in London, unless it be the hill district near the centre of the city familiarly known as “Haiti,® which has in recent years become thronged with negroes and poor

Italians.

Parks. — The city possesses an extensive sys¬ tem of 26 parks, having an aggregate area of 1,320 acres. Schenley Park, the gift to Pitts¬ burgh of the late Mrs. Mary E. Schenley, con¬ tains 422 acres ; Highland Park in the extreme northeastern section of the city has 366.6 acres ; Riverside Park includes 240 acres, and the Alle¬ gheny parks in the heart of the North Side, formerly the Allegheny “Commons,® cover 88 acres. All of the parks have been carefully im¬ proved and planted with the advice of the most reputable landscape gardeners in America, and are a joy to the people. Many of them are adorned near their entrance by beautiful build¬ ings and contain groups of statuary. In High¬ land Park which commands a wide view up the

National banks . State banks …. Trust companies

Allegheny Valley to the north are the Zoologi¬ cal Gardens with fine buildings erected by the late C. L. Magee, and here is the statue of Stephen C. Foster, one .of the most noted com¬ posers of ballads in America, who was born, lived and died in Pittsburgh, and whose ((01d Folks at Home® and (<01d Black Joeˆ are known the world over. At the entrance of Schenley Park are the buildings of the Carnegie Insti¬ tute and Library, and monuments commemorat¬ ing Mrs. Mary E. Schenley, the donor of the park, the late E. M. Bigelow, and the late Chris¬ topher Magee, public-spirited citizens. Here too is the Phipps Conservatory, rivaling in size the biggest conservatories at Kew Gardens, London. In the Allegheny parks are many monuments and another conservatory, likewise built by Mr. Henry Phipps. At the entrance of Riverview Park is the Allegheny Observa¬ tory. Recreation grounds and bathing pools under municipal control are provided abun¬ dantly and it is said that Pittsburgh per capita surpasses all other American cities in its use of bathing facilities. This is perhaps due to the grimy work in which a large part of the labor¬ ing classes are daily engaged and which leads to a desire for frequent ablutions.

Water Supply and Sanitation. — Pittsburgh was one of the first cities in America to adopt on a large scale the method of slow filtration through sand for the purification of its water supplies. The water is drawn from the Alle¬ gheny River above the city limits, is filtered and the effluent pumped across the river to the Brilliant Pumping Station

where it is thrown up to higher levels, or is pumped to the great reservoir on the north side which supplies that section of the city. There are three major and two secondary reservoirs, the largest being on the north side, covering 17 acres, at an eleva¬ tion of 27 5 feet, and having a capacity of 151,- 000,000 gallons. The two Highland reservoirs in Highland Park, No. 1 having an elevation of 363 feet, and No. 2 having an elevation of 276 feet, which is cross-connected with the north side reservoir, have a combined area of 38.8 acres and a combined capacity of 242,000,- 000 gallons. The Herron Hill reservoir, having an elevation of 559 feet and an area of two acres, has a capacity of 12,000,000 gallons, and the Bedford Avenue basin of an elevation of 398 feet has an area of 1.1 acres and a capacity of 2,800,000 gallons. Besides these greater reservoirs there are many tanks at high eleva¬ tions on the hills with capacities suited to the localities which they supply. All are filled by pumping engines, the greatest of which are located at Aspinwall and at Brilliant on the Allegheny. There were, in 1918, 945 miles of pipe varying from 4 to 66 inches in diam¬ eter, with 15,386 control valves and 6,996 fire¬ plugs. The city daily consumes 110,000,000 gallons of water, exclusive of the amounts used in the larger manufacturing plants which pump their water directly from the rivers. The sys¬ tem of water-supply has cost the city $33,000,- 000, and could not at present be replaced for twice that sum.

Pittsburgh has 669.5 miles of sewers, rang¬ ing in size from 8 to 144 inches in diameter. The sewering is carried on by a number of dis¬ tinct systems, draining certain limited water¬ sheds defined by the topography. The trunk

sewers recently constructed are plain concrete, vitrified brick being used as an invert lining. Owing to the prevailing steep slopes the rate of run-off is large, as it is quickly concentrated. The sewage enters the river below Pittsburgh. The matter of erecting a plant for the concen¬ tration and treatment of the sewage was care¬ fully investigated some years ago, the report being adverse, the cost of installing a plant for this purpose being found to be prohibitive, and because the existing conditions are such from a sanitary standpoint as not to justify the under¬ taking. It is an interesting fact that the water of the Monongahela River, being contaminated by the drainage from the coal-mines along its banks, and receiving acid discharges from the numerous manufacturing establishments throughout its lower course, is highly acid in its reaction and very germicidal, so that the acid contamination serves to counteract the bacterial contamination. So strongly acid is the water below Pittsburgh that in the upper reaches of the Ohio for miles below the city all aquatic life, both animal and

vegetable, has been practically destroyed. Both the aquatic flora and fauna of the upper Ohio are now ex¬ tinct.

Extensive provision has been made for the disposal of garbage and rubbish. The Ameri¬ can Reduction Company has a contract for peninsular Pittsburgh, and the rest of the city is served by reduction plants situated beyond the city limits and reached by rail. The gar¬ bage is treated for the extraction of the grease; the residue is used as the basis for a fertilizer; the rubbish after all portions of value have been salvaged, and* the paper for rags baled, is incinerated. The garbage collected during the year ending 31 Jan. 1916 amounted to 93,- 901 tons, and the rubbish to 50,956 tons. These totals since that date have been increased, but the latest statistics are not available. Practically no collection of ashes is made in the city, natural gas, which produces no ashes, being the prevalent domestic fuel, and the manufacturing establishments dispose of their ashes and cinders by fillage and haulage. Furnace-slag is now very largely utilized in the manufacture of cement, and instead of forming unsightly banks about the furnaces, is a source of profit and disappears in commerce. The fact that natural gas is the prevalent fuel in Pittsburgh, and that it is used in stoves and furnaces which do not as a rule admit of the use of other fuel, accounts for the high per capita amount of rubbish annually re¬ moved, which is in other cities burned in the home. The sanitary conditions in the city are upon the whole very good and compare favorably with those of other cities of the same size in the United States. Prior to 1905 the community had an unenviable reputation on account of the prevalence of typhoid fever, but to-day, as the result of the installation of its new and splendid filtration plant, it has lost that evil reputation, and instead of having the highest mortalitv from this disease, it has the lowest among American cities. The water sup¬ plied to the inhabitants of the city throughout the year is not only clear and sparkling, but potable and sanitary. As Pittsburgh has suc¬ cessfully combatted typhoid fever, she is also, with a great measure of success, combatting

PITTSBURG, PA

Panoramic view of City from Mount Washington

Civic Center of Pittsburgh

PITTSBURG, PA

PITTSBURG, PA.

Scenes in Residential Section, Schenley District

PITTSBURG, PA.

• ar ’ll. ‘ |rr *lW^‘7p $

mim, 1 ||X | x

1 Exposition Winter Garden

2 Larimer Avenue Bridge over Washington Boulevard

other prevalent diseases, and through an efficient bureau of health and sanitation, has waged war against tuberculosis, and all other infectious diseases. The death rate in Pittsburgh is much less than that in some of the other large cities of the United States, though pneumonia, as in all other cities, seems to be on the increase for reasons which have thus far escaped the scrutiny of the medical profession. Malaria is unknown except through imported cases. This is due to the fact that there are no marshy tracts any where in the region, and the waters for half a century have been treated with coal oil from seepage or waste from the wells. Anopheles, the malarial mosquito, does not appear to exist in western’ Pennsvlvania.

Universities, Colleges, etc. — The Univer¬ sity of Pittsburgh is the oldest institution of learning on the continent west of the Allegheny Mountains, north of the Ohio river. Chartered in 1787 as the Pittsburgh Academy, it was re¬ chartered in 1819 as the Western University of Pennsylvania, the intention of the legislature being that it should fulfill for the western half of the State the functions performed by the University of Pennsylvania in Philadelphia. It still operates under the charter of 1819, but the name was changed in 1908 to the University of Pittsburgh. It is absolutely undenominational, and is recognized as an integral part of the edu¬ cational system of the Commonwealth, the gov¬ ernor being always a member of the board of trustees, and the support of the university be¬ ing to a considerable extent provided from the treasury of the State. In 1917 the university had an enrolment of 4,250 students and a faculty composed of 441 persons, the chief executive officer being the chancellor. The number of students was diminished as the re¬ sult of the late war, but recent reports show a rapid recovery. The service rendered by the university during this war is worthy of men¬ tion.

Over 4,000 of the alumni and under¬ graduates entered the army or were engaged in technical duties connected with its maintenance, or the relief of the wounded. Over 70 of these men laid down their lives. One of the base hospitals in France was served by the medical faculty, with its dean at the head of the or¬ ganization, the original equipment having been provided at large cost by Mrs. Henry E. Col¬ lins, a granddaughter of the late William Thaw, whose generous spirit she has inherited. The organization of the university includes 16 dif¬ ferent schools, of which the College of Arts and Letters is the largest, having over 600 students. The School of Mines, partly sup¬ ported by the State, the School of Education, the School of Law, the School of Medicine, the School of Dental Surgery the latter said to be one of the very best in America, the Mellon Institute, and the Allegheny Observatory, are some of the most famous institutions entering into the complex life of the great institution. The Allegheny Observatory, splendidly equipped with instruments, and with considerable en¬ dowment, bus a world-wide reputation through the researches carried on here bv Prof. Samuel P. Langley in the domain of solar physics, and later in aeronautics. Here were laid the foundations of that science which has given to man in these later days the dominion of the air. The observatory is also famous for the classic researches of the late Prof. James E.

Keeler upon the nebulae, which, continued by him at Lick Observatory, have tended to con¬ firm in a remarkable manner the theories of La- Place. The Mellon Institute is a unique in¬ stitution, owing its origin to the genius of the late Prof. Robert Kennedy Duncan and the splendid generosity of Mr. A. W. Mellon and his brother, Mr. R. B. Mellon, two of the fore¬ most citizens of Pittsburgh. Great and im¬ portant discoveries in chemistry and the indus¬ trial arts are being constantly made here, and there were 39 fellowships in research in opera¬ tion in 1918. The campus of the university comprises 43 acres in the (

The Carnegie Institute of Technology, a de¬ partment of the Carnegie Institute, and the last to be created bv the founder of that complex of institutions in Pittsburgh, which bears his name, has recently grown to great proportions through his lavish gifts. It occupies a tract of about 35 acres adjoining Schenley Park, pur¬ chased by the- city of Pittsburgh for its use. Here have been erected numerous buildings, splendidly equipped for their purposes. Originally intended by Mr. Carnegie to be a ˆtrade-school® of advanced grade for the poorer and less fortunate young people of Pittsburgh, it has in recent years

essayed a more ambitious role, and has established courses in the various branches of engineering, in which it confers degrees. A school of the arts in which courses are given in architecture, sculp¬ ture, modelling, painting and the drama has been created. The small theatre in this school is a very perfect example of what a theatre should be. There are about 3,500 students in attendance from all over the United States, but principally from Pennsylvania, attracted by the advantages furnished at a merely nominal cost. Mr. Carnegie's original gift to this school has been from time to time increased, until it now totals for buildings and endowment the sum of over $15,000,000.

This account of the schools of higher learn¬ ing in the city would be incomplete without reference to the three theological seminaries, all located in the portion of the city known as (

tcrian Church and has sent out over 2,000 graduates, many of whom have held distin¬ guished positions in the Church and as educators in the colleges and universities of America. The buildings and endowment of the seminary represent an aggregate investment of about $1,500,000. The Theological Seminary of the United Presbyterian Church and that of the Reformed Presbyterian Church are both located on North avenue in close proximity to each other and serve in part to meet the requirements of these two denominations for a trained clergy. Both are welbknown ((Schools of the prophets,® the alumni of which have reflected honor upon them.

Public Schools, etc. — The public schools of Pittsburgh, partly supported by the municipality and partly by the State, are thoroughly organ¬ ized and well administered under the general control of a board of education appointed ac¬ cording to law by the judges of Allegheny County and selected because of their known fitness for their duties. The school property owned by the city has cost $21,034,221. It con¬ sists of 129 buildings with grounds averaging nine acres to each building. There are 96,000 pupils in attendance, 10,077 of whom in 1918 were in the high schools. There were 2,616 teachers employed in the same year. The buildings, many of which have been erected in quite recent years, are notably well adapted to their use, one of the best examples being the Schenley High School on Bigelow boule¬ vard. The Roman Catholic parish schools number 65, with an enrolment of over 30,000 pupils and 632 teachers. There are nine well- established private commercial schools, enroll¬ ing 3,600 pupils, and seven preparatory schools with 1,400 scholars. Through the generosity of Mr. Henry C. Frick there has been established a fund of $500,000, the interest of which is an¬ nually to be expended in sending the teachers of the public schools, who may be selected for their special fitness, to summer schools, where they may at once be refreshed and further quali¬ fied for their duties. A board of trustees chosen by Mr. Frick, and having self-perpetu¬ ating powers, administers this fund.

The Carnegie Institute and Library. — This complex of institutions holds an unique posi¬ tion. An English writer has recently denomi¬ nated it as <(the world's greatest and most splendid storehouse of knowledge.® Mr. Car¬ negie's original offer to found a library was made in 1881, but it was not until 1887 that the gift was made possible by enabling legislation. The first offer had been to give $250,000 for this purpose, but in 1887 the amount was in¬ creased to $1,000,000, with the stipulation that the main building should afford accommodations for a museum and a gallery of art, and that branch libraries should be provided, and that the city should obligate itself to provide for the maintenance of the library and its branches. For the maintenance of the museum and the art gallery Mr. Carnegie provided $1,000,000, placing this sum in the care of the trustees of the library and of 18 others, associated with them, 36 trustees in all, who constitute the con¬ trolling body. Of these trustees nine directly represent the government of the municipality. Mr. Carnegie from time to time increased the building and the endowments and later added the technical schools, as a third department,

under the same general control. The original main building of the

library and institute was greatly enlarged at Mr. Carnegie's suggestion, he agreeing to defray the cost, and the building was rededicated in 1907 with appropriate cere¬ monies in the presence of representatives of the governments and leading institutions of learning both of America and Europe. In all the gifts of Mr. Carnegie to this complex of institutions amount to a total of approximately

$30,000,000.

The main building, housing the central li¬ brary, the hall of music, the museum and the art galleries, is three stories in height and covers approximately six acres. Its exterior is of light gray sandstone in a modification of the Italian Renaissance. The entrances are flanked by statues of Shakespeare, Bach, Galileo and Michelangelo. The interior, which is resplen¬ dent with the finest marbles, provides a great hall of music, where throughout the year, ex¬ cept in the heated summer months, free organ recitals are given every Saturday evening and Sunday afternoon. The department of fine arts controls the galleries of architecture, sculpture, paintings, and engravings. These gal¬ leries are large and stately and contain already notable collections of art in all its departments, and especially a representative assemblage of the best works of recent American and Euro¬ pean painters. Here is annually held an inter¬ national exhibit of paintings, to which the artists of the world contribute, the only <(Salon® in America.

The museum is a general museum, laying special stress upon the natural sciences and the industrial arts. The staff consists of about 40 persons, a number of whom are engaged in special scientific researches in connection with their other duties. The collections in the pos¬ session of the museum, either permanently or as loans, at the present moment have an aggre¬ gate value of approximately $2,000,000. The museum possesses one of the largest and most important paleontological collections in the world, including the great collections made in the Western States by the museum itself and the collection of Baron Ernst Bayet of Brussels, purchased for the museum by Mr. Carnegie, representing the extinct faunae of Europe. The collections of birds contain approximately 80,000 specimens ; the mammals are represented by many thousands of specimens, many of them superbly mounted in groups, among which may be mentioned the collection of East African mammals collected by Mr. Childs Frick and parts of the collections made by the late Col. Theodore Roosevelt. One of the largest col¬ lections of South American fresh-water fishes is here, and one of the very largest entomo¬ logical collections in the New World, contain¬ ing the types and cotypes of many thousands of species. The ethnological collections are large and one of the very best

assemblages of Indian basketry and an unrivaled collection of Costa Rican antiquities are specially worthy of mention. The ivories and the timepieces col¬ lected by the late H. J. Heinz ornament a' room specially set apart for their display, and the exhibit of miniatures, waxes, snuff-boxes, fans and other articles of vertu loaned by Mr. Herbert Dupuy is viewed with endless admira¬ tion by visitors.

The library, which occupies the southwestern

portion of the great edifice, is provided with a fireproof stack capable of holding 1,000,000 volumes. It already possesses approximately 400,000 books. The facilities for consultation and reference are unequalled. There are eight branch libraries administered from the main library, situated in different residential sections of the city and beautifully housed, and in addi¬ tion there are a multitude of (

Libraries. — In addition to the great Car¬ negie library which has been briefly described in the foregoing account of the Carnegie Insti¬ tute and Library, there are a number of other libraries of importance in the city. The Al¬ legheny library, which was erected by Mr. Carnegie prior to the establishment of the Car¬ negie library in Pittsburgh, Allegheny at that time not being a portion of Pittsburgh, cost the donor over $300,000 for its erection and equip¬ ment, and is also maintained by the city for the benefit of the residents of the Northside. It possesses a large and useful collection of books. There are important collections of books in the library of the University of Pittsburgh, which has recently been enriched by the great collec¬ tion of Americana made by the late William M. Darlington, Esq., whose daughters have transferred it to the university as a gift in memory of their father. The library of the Allegheny Observatory is very large and rich in works upon astronomy, physics, and mathe¬ matics. The libraries of the various theological seminaries are well supplied with books, that of the Western Seminary containing about 40,000 volumes, including one of the most per¬ fect collections of works relating to ecclesias¬ tical music and hymnology in existence, which has recently been acquired.

Scientific Associations, etc. — There are a number of associations in Pittsburgh, some of which have a large membership, devoted to promoting the sciences and the arts. The En¬ gineers Society of Western Pennsylvania is one of the strongest bodies of its kind in the

country and has its headquarters in the Union Arcade building. The Art Society of Pitts¬ burgh was established nearly 50 years ago and promotes interest in music, painting and other fine arts. The Academy of Science and Art of Pittsburgh has a membership of over 2,500 and annually provides lectures upon scientific topics in the lecture hall of the Carnegie Museum. The number of such lectures in 1918 exceeded 50. The Associated Artists of Pittsburgh has a membership of about 100 persons who prac¬ tise painting, sculpture, and architecture. The Authors' Club- of Pittsburgh has a membership of over 50. The Pittsburgh branch of the Archeological Institute of America is vigorous and by annual appropriations helps to maintain the classical schools at Rome and Athens founded by the Institute. The Historical Society of Western Pennsylvania occupies a building erected in the <(civic centre® in prox¬ imity to the buildings of the university.

Social Clubs and Fraternities. — The Pitts¬

burgh Directory in 1918 shows that there are 115 social clubs and fraternities in the city. Some of the largest and better known clubs are the Pittsburgh, the Duquesne, the Union, the Monongahela and the University Club. The Pittsburgh Golf Club, the Allegheny Country Club and the Oakmont Golf Club are beautifully housed and are frequented by lovers of outdoor sport. The annual meet of the American Association of Golfers to decide the national championship in golf took place in 1919 upon the links of the Oakmont Club. The Pittsburgh Athletic Association has its club¬ house in the civic centre on Fifth avenue. The building cost over $1,000,000.

Hotels. — Pittsburgh has numerous hotels, some of them of large size and modern in all their appointments. The Hotel Schenley in the civic centre is in proximity to the university, the Carnegie Institute and the many buildings grouped near the entrance of Schenley Park, and contains 260 rooms. The Fort Pitt and the William Penn, the latter recently opened and having 904 rooms, are fine examples of the best class of hotels. There are many others, and with an abundance of halls, large and small, for meeting places, Pittsburgh in recent years has come to be widely regarded with favor as a ((convention city,® and gatherings of from 2,000 to 6,000 delegates frequently assem¬ ble here.

Newspapers, etc.— The Pittsburgh Gazette- Times, originally established as the Pittsburgh Gazette in 1786, is one of the oldest newspapers in America and the first established on the continent west of the Allegheny ridges. There are published in Pittsburgh eight daily papers of large size and 60 other weekly, trade, re¬ ligious, scientific,

and social journals and period¬ icals. Books bearing Pittsburgh imprints have been issued from as far back as 1789, and while publishing is not one of the leading industries of the place, its aggregate annual volume is not inconsiderable.

Churches. — There are 489 churches and places of religious assemblage in Pittsburgh. Almost every religious denomination is repre¬ sented in the community, so that the early pre¬ diction of Arthur Lee, who visited the spot in 1786 and found ((Not a priest of any persua¬ sion, nor church nor chapel,® and who, there¬ fore, declared the people to be ((likely to be damned without benefit of clergy,® is certain not to be fulfilled. Pittsburgh is the seat of a Roman Catholic and a Protestant Episcopal bishop, and is the seat of the Board of Missions to the Freedmeti of the Southern States of the Presbyterian Church, and of all the ecclesiastical organizations of the United Presbyterian Church in America. The vast influx of people from the south of Europe in recent years has somewhat changed the religious complexion of the place, but originally settled by the Scotch it is still in certain aspects as much a Presbyterian community as Glasgow or Edinburgh. The churches of the major denominations in the city are in number as follows: Baptist, 56; Christian, 12; Congregational, 4; Episcopal, 24; Evangelical (mostly German), 10; Jewish synagogues, 21; Lutheran (all branches), 53; Methodists (all branches), 73; Presbyterians and Reformed, 93 ; Roman Catholic, 81 ; mis¬ cellaneous, 62. Thirty-three churches are

attended and maintained by the colored popula¬ tion, 20 of these being Baptist and 11 Methodist. Many of the church edifices are large and some very beautiful and costly. Saint Paul's Catholic Cathedral, situated at the corner of Fifth avenue and Craig street, is a. very large and stately structure in a somewhat inornate Gothic style, imposing by its mass rather than by the perfection of its lines. Calvary Episcopalian Church on Shady avenue, designed by Ralph Adams Cram, is pronounced in Baedeker's (Guide to the United States y to be ((the finest example of Norman Gothic in the New World.® Trinity Church, in the heart of the old city, is a fine edifice, and so also are the First and Third, the Shadyside and the Bellefield Presby¬ terian churches, and Christ Methodist Episcopal Church. But these are only a few of the really noble church buildings which have been erected in the city, principally in the past three decades.

Hospitals, etc. — The city is well supplied with hospitals, some of which are very large, and most of which occupy buildings wnich are modern. There are 48 hospitals and infirma¬ ries, the largest being the Western Pennsylvania Hospital, the Mercy Hospital, the Elizabeth Steele Magee Memorial Hospital, founded by the late C. L. Magee in memory of his mother, by the donation of about $4,000,000, the Alle¬ gheny General Hospital, the Columbia, and the Homcepathic Hospital, but there are many others, nearly as large. There are numerous special hospitals, for the treatment of diseases of special organs, such as the eye and the ear, or for the treatment of special forms of disease, such as tuberculosis, etc. The Pennsylvania Hospital for the Insane at Dixmont, a nearby suburb, is a huge establishment, administered by the trustees of the Western Pennsylvania Hospital. Almost all the hospitals are in re¬ ceipt of aid from the treasury of the State of Pennsylvania, but depend in the main upon the charity of the citizens.

Charities Other than Hospitals. — There are 250 or more charitable institutions or founda¬ tions in the city, other than those which care directly for the sick and wounded, and which aie maintained by charitable gifts by the living or with funds which have been bequeathed to them by the dead. One of the unique founda¬ tions created by Mr. Andrew Carnegie is The Hero Fund. His gift consisted of $5,000,000, which he entrusted to a body of 21 trustees with the power of self-perpetuation, who were in¬ structed to use the annual interest in caring for those in civil life, who may have made heroic efforts at the risk of their own lives to save the lives of others, or in event of death in the performance of the act, to care for desti¬ tute dependents. The operation of the fund is restricted to the United States, Canada and Newfoundland. Since the trustees accepted the trust in 1905 they have had before them over 20,000 cases of alleged heroism, and have made awards in over 1,500 cases. The awards con¬ sist in every case of a medal, reinforced by a donation of money for a worthy purpose in all needy cases. The monetary award is made for the purchase of homes, the payment of debts, establishment in business or in the case of the young for education. Pensions are given to widows and orphans. At the present time the

lurid is paying pensions to 250 widows, and is caring for 226 children, left fatherless; is edu¬ cating in school and college 46 young people ; and providing for 16 other poor people. The fund through wise investments has increased to nearly $8,000,000 and its annual benefactions amount to nearly a quarter of a million of dol¬ lars, carefully expended under vigilant super¬ vision in such a way as to benefit and not pauperize the recipients. The Carnegie and United States Steel Pension Fund for the re¬ lief of aged and incapacitated

employees is ad¬ ministered in offices adjoining those of the Hero Fund, and have at their disposal the interest of $12,000,000. The Western Pennsylvania Institution for the Blind, the Western Penn¬ sylvania Institution for the Deaf and Dumb, are great and well-administered establishments. Scores of others might be named, but to describe them all would be to write a volume. Suffice it to say that in proportion to the num¬ ber of its inhabitants there is no other city in the country which has shown a more benevolent and altruistic spirit, recognizing the responsi¬ bility of those who have to minister to those who may be in need. No call for help ever reached the ears of Pittsburgh which has been allowed to pass unheeded.

Cemeteries. — The cemeteries of Pittsburgh of which there are 23 are beautifully laid out and abound in noble monuments of those who have lived and died here. The most beautiful and extensive are the Allegheny, the Home- wood and the Uniondale cemeteries, the latter on the north side on one of the high hills over¬ looking the city.

Government. — The city of Pittsburgh is divided into 27 wards. The administration is entrusted to a mayor, elected quadrennially, and to the officers under his authority, known as chiefs of departments, or heads of bureaus. The legislative power, the power of making ap¬ propriations and fixing the annual tax-levy is entrusted to a council composed of nine mem¬ bers, elected by the people and receiving an¬ nual salaries, judged sufficient to enable them to devote their entire time, if necessary, to the public business. The old system of unpaid representatives, divided into two houses, form¬ ing a <(Select Council,® corresponding to the Senate, and a (

PITTSBURG, PA

Saint Paul's Catholic Cathedral 2 Calvary Protestant Episcopal Church

PITTSBURG, PA

1 Carnegie Institute

2 A Branch Children's Room, Carnegie Library

PITTSBURGH

133

poration, on 31 Dec. 1917, were $43,489,714.98, of which amount $33,199,300 represented the proceeds of the sale of municipal bonds in former times. The net bonded debt of the city at the same date,

deducting the amounts in the sinking funds, was $32,737,851.16. The assessed value of taxable property in 1916 was $782,-

563,920.

The principal departments of administra¬ tion are that of public safety, having charge of the police, the bureau of fire, etc. The police force is large, well drilled and com¬ manded. There are 61 engine-houses in the municipality, and with an abundant water- supply at command, the Underwriters Associa¬ tion of America has expressed itself as hold¬ ing that in this respect the city is as well pro¬ tected as any other in America. The depart¬ ment of public works has charge of the high¬ ways, bridges, sewers, waterworks and also of the public buildings and parks. The depart¬ ment of law, at the head of which is the city attorney, attends to all legal matters, in¬ cluding the prosecution of offenders in the courts. There is a considerable body of magis¬ trates, who are under municipal appointment, whose business it is to take cognizance of cer¬ tain offenses against municipal ordinances. The department of public charities has charge of the various eleemosynary agencies of the munic¬ ipality, including the homes for the destitute and aged, which have been provided. The bureau of public health is well equipped and manned by scientifically trained officials, pro¬ vided with abundant laboratory facilities. The city in June 1919 voted for the sale of $20,- 000,000 of bonds with the proceeds of which to build a new boulevard from the eastern por¬ tions into the centre, to be called, <(The Boule¬ vard of the Allies,® to construct a subway, with which it is hoped to relieve the congested traffic at the centre, and to make various other improvements which will add to the beauty of the place and promote the comfort of its inhabitants. The seat of the government is in the so-called ((City and County Building,® jointly erected by the municipality and the county of Allegheny, and occupied by certain of the officials of both. It is a huge pile, covering the block between Grant and Ross streets, flanked by Fourth avenue and Diamond street, adjoining the Allegheny Courthouse.

Early History. — The valleys of the Ohio and the Mississippi were originally claimed by the French in virtue of the explorations and discoveries of La Salle in 1669. Virginia laid claim to the valley of the Ohio in virtue of her charters; and in 1748 the Ohio Company was formed to exploit and take possession of the region. In 1749 a French expedition under Celeron was dispatched to formally annex the Ohio Valley to the French crown. This ex¬ pedition was followed by the French in the spring of 1753 by a small army of occupation, which did not advance further than the present site of the town of Venango, Pa.,

where it went into winter quarters. In the fall of 1753 Governor Dinwiddie of Virginia sent George Washington to warn the French against further intrusion and in the spring of 1754 a force of Virginians was sent to build a fort on the site of the present city of Pittsburgh. While en¬ gaged in this work the small body of troops, commanded by Capt. William Trent and En¬

sign Edward Ward, was confronted by an over¬ whelming force of French and Indians coming from the north. The Virginians withdrew. The first armed encounter between the French and the Virginians took place on 27 May 1754, when Washington defeated and captured a body of French troops under Jumonville near the mouth of Redstone Creek. This engage¬ ment was followed by the battle of Fort Neces¬ sity, where the Virginians were defeated, but allowed to withdraw with the honors of war. In 1755 an attempt to retake the spot was made under the command of Major-General Brad- dock. It resulted in the terrible defeat at Brad- dock's Field on 9 June. The French, who in the meanwhile had built Fort Duquesne, held the region until 25 Nov. 1758, when they fled before the advance of General Forbes, leading an army of 10,000 British and Colonial troops. In the dusk of the evening of that day Colonel Armstrong planted the flag of Great Britain over the smouldering ruins of Fort Duquesne, which the French had fired as they abandoned it, and, at the suggestion of George Washing¬ ton, Forbes called the place Pittsburgh. <(It is,® says Bancroft, ((the most enduring monu¬ ment to William Pitt. America raised to his name statues that have been wrongfully broken and granite piles of which not one stone re¬ mains upon another ; but long as the Mononga- hela and the Allegheny shall flow to form the Ohio, long as the English tongue shall be the language of freedom in the boundless valley which their waters traverse, his name shall stand inscribed upon the gateway of the west.® The English occupation continued until the out¬ break of the American Revolution and was made memorable by the series of engagements which took place on the spot, or near by, during the period of Pontiac's Conspiracy and the events of the French and Indian War. The only remnant of the extensive fortifications erected by the British is the <(01d Block-house,® which was a redoubt built by General Bouquet in 1763 and which still stands, being the prop¬ erty of the Pittsburgh Chapter of the Daugh¬ ters of the American Revolution, presented to them by the late Mrs. Mary E. Schenley.

A town was laid out about Fort Pitt in 1764 under the authority of Col. John Campbell and this plot, which was incorporated in subsequent surveys, is commonly known as <(the old mili¬ tary plan.® The ((Manor of Pittsburgh,® re¬ served to the Penns by acts of assembly in 1779, had been originally surveyed in 1769, and was

resurveyed in 1783 by George Woods. In the following year a portion of it was plotted as the site of the town of Pittsburgh. On 22 April 1794, the place was incorporated as a borough and in 1816 it was reincorporated as a city. Several acts of reincorporation have been passed by the legislature of Pennsylvania since then and the original limits have been gradually enlarged by the annexation of con¬ tiguous territory.

The Spirit of Pittsburgh. — Pittsburgh en¬ joys a well-deserved reputation for the gen¬ erosity and civic pride of its citizenship. An illustration of its devotion to the Common¬ wealth was furnished by its loyal response to the call of the country for funds with which to prosecute the World War and provide for the various works of relief incident thereto. The

per capita contributions of Pittsburgh to the different Liberty Loans, to the support of the Red Cross and other agencies, exceeded that of every other city in the Union. Its total sub¬ scription to the Liberty Loans amounted to $625,429,600, exceeded only by that of the Wall Street district in New York and representing a total oversubscription of $118,708,850. To those who only know Pittsburgh as they may have caught a glimpse of her fires and seen the smoke, which on still and foggy days fills the valleys about her, as they have been whirled into and out of her portals on trains, she may indeed seem forbidding ; but those who have traversed her avenues at leisure, who have visited her great establishments, who have studied the splendid institutions which reflect her love of science, learning, and art, and above all who have experienced the warmth of the open hospitality which clings to her with the traditions of the earlier days, grow to love and admire her. She has learned the secret of transmitting material prosperity into ((the things of the spirit.® Though still at times <(swart with the smoke of her forges® she is known to¬ day as one of the great scientific, artistic, and educational centres of the New World. She has justified her motto ˆPittsburgh Promotes Progress,® as she has justified her title <(The Workshop of the World.® The citizens of Pittsburgh who have risen to distinction in various walks of life are legion and her glory is not so much that she makes steel as that she makes men. From her distinguished bar she has given to the Supreme Court of the United States a number of judges. To the halls of national legislation she has sent many senators. She has been represented in the Cabinet by many of her illustrious sons and repeatedly has

provided governors for the Com¬ monwealth of Pennsylvania. To the long list of the world's most eminent inventors, finan¬ ciers, philanthopists, artists, and men of science she has added a striking array of names with which the student of her history is familiar. She is proud of her Stephen C. Foster, whose songs are sung the world over; of her Keeler, who wrote his name on the stars ; of her Lang¬ ley, who paved the way for man's dominion of the air; of her Stanton, man of iron, who, when others wavered or were faint, stood like a wall of adamant amidst the conflict, of the Civil War; of her Westinghouse, prince of inven¬ tors ; and of her Carnegie, king of philanthro¬ pists. She rejoices in her sons, a mighty army of them, the story of whose deeds would fill volumes, who in many callings and in many lands have done honor to the great gray city, which sits as ((The Mother of Prosperity® at the fountain-head of the beautiful Ohio.

W. J. Holland,

Director Carnegie Museum, Pittsburgh.

PITTSBURGH, The University of.

Formerly the Western University of Pennsyl¬ vania, coeducational institution of higher educa¬ tion, located at Pittsburgh, Pa. The first charter was granted in 1787 under the name of the Pittsburgh Academy, the second oldest in¬ stitution of learning west of the Appalachian Mountains. The constitution of Pennsylvania adopted in 1790 provided for one or more insti¬ tutions of learning and under this provision the existing institutions in Philadelphia were re¬ chartered in 1791 as the University of Penn¬

sylvania and in order to provide the same edu¬ cational opportunities in the western part of the State the Pittsburgh Academy was in 1819 rechartered as the Western University of Penn¬ sylvania. The University has continued to operate under this second charter until the present time, changing its name in 1908 to the University of Pittsburgh. While the University offered courses in engineering as early as 1845, and while it operated a law school from 1840 to 1849, and again in later years, yet until 1892 the institution confined itself chiefly to the work of the ordinary college. Between 1892 and 1896 the University established permanently the school of law and in affiliated relations schools of medicine, dentistry and pharmacy, all of which have now become integral parts of the University, except the school of pharmacy. The University now includes the following schools and departments : The college, school of eco¬ nomics, school of education, school of engineer¬ ing, school of mines, school of

chemistry, Mel¬ lon Institute, graduate school, the observatory, school of medicine, school of law, school of dentistry, school of pharmacy, department of university extension, department of physical education, department of health, department of military science and tactics. The University offers the usual degrees, both bachelor and graduate. It has been since 1895 open to women in all its schools and departments, ex¬ actly as to men. The Allegheny Observatory was founded in 1859 and became a part of the university in 1867. It was in this department that Professor Langley did his great work and under the benevolent assistance of William Thaw solved the problem of aviation. The requirements for admission in the schools of law and medicine are the usual high school course and two years of college work. The University of Pittsburgh along with the Uni¬ versity of Pennsylvania and State College re¬ ceive biennial appropriations from the Com¬ monwealth. The amount for the biennium 1917-19 is $750,000. At the beginning of the academic year 1917-18 military training was made compulsory in the University of Pitts¬ burgh and was successfully conducted until 1 February, at which time the Reserve Offi¬ cers' Training Corps was established. In the late summer of 1918 the Reserve Officers' Training Corps was suspended during the pe¬ riod of the war in order that the government might establish in the University the Students' Army Training Corps. This training corps is divided into two sections: (a) the collegiate section, in which courses are offered to boys 18 years old and upward who desire training along lines of especial value to the government. There are about 2,000 enrolled in this section ; (b) the vocational section, in which are offered courses along the lines of gas engine, motor mechanics, etc. There are 1,700 enrolled in this section. The total enrolment in the Students' Army Training Corps and in the regular work of the University in 1918-19 was about 4,500. The total number in the faculty, including assistants and demonstrators, in 1919 was 219.

PITTSBURGH LANDING, Battle of.

A battle of the Civil War fought 6 and 7 April 1862 at Pittsburgh Landing in Tennessee, on the west bank of the Tennessee River, about 20 miles north of Corinth, Miss. See Shiloh, Battle of.

PITTSFIELD, pits'feld, Mass., city, county-seat of Berkshire County, on the New York, New Haven and Hartford and the Bos¬ ton and Albany railroads, about 50 miles north¬ west of Springfield. It was settled in

1743, in¬ corporated as a town in 1761 and chartered as a city in 1891. It was called at first Boston Plantation and Poontoosuck, but the name was changed to Pittsfield when it was incorporated. Within the present corporate limits are several small villages. The city is noted as the centre of a residential section among the Berkshire Hills ; but it has considerable manu¬ facturing; the chief industrial establishments are foundry and machine shops, electrical ma¬ chinery and supply works, a silk mill, cotton and woolen mills, paper mills, fine stationery, men and boys' clothing. The principal public buildings are the Berkshire Athenaeum (cost $100,000), the Crane Art Museum, the court¬ house, built of white marble at a cost of $400,- 000, the Berkshire Life Insurance building, the Berkshire County Savings Bank and the County Home for Aged Women, Agricultural National Bank building, City Savings Bank building. The educational institutions are the high school, academic high school, commercial high school, about 25 grammar schools, Miss Hall's private school for girls, one business college, Saint Joseph's Academy, public and parish elementary schools, the Henry W. Bishop Training School for Nurses, the Public Library containing over 72,000 volumes and connected with the Berk¬ shire Athenaeum. There are five public parks, in one of which is a statue, ((The Color Bearer? The government, administered under a revised charter of 1895, provides for a mayor, who holds office one year, and a council. The mayor appoints the license commissioners and the council elects several of the administrative offi¬ cials. The school committee is chosen at the popular election. The city owns and operates the waterworks. Pop. 41,751. Consult Smith, (History of Pittsfield5 ; Mullany, (History of Berkshire Hills?

PITTSFIELD, Me., town in Somerset County, on the Sebasticook River and the Maine Central Railroad, 20 miles northeast of Waterville. The Maine Central Institute is located here ; there are also a public library, creamery, woolen mills, packing-houses, lumber yards, etc. Cheap power is furnished by the Sebasticook. Pop. 2,146.

PITTSTON, pits'ton, Pa., city in Luzerne County, is situated in the historical Wyoming Valley, along the Susquehanna River, nine miles northwest of Wilkes-Barre, the county-seat. Its railroad facilities consist of the Lehigh Val¬ ley main line, Delaware, Lackawanna and West¬ ern, Delaware and Hudson, Central Railroad of New Jersey, Erie and two interurban lines, con¬ necting with Wilkes-Barre and Scranton. Pitts- ton is an industrial centre of considerable im¬ portance. It was settled in 1770, laid out in 1768, incorporated as a borough in 1853 and in 1894 was chartered a city. It was named in honor of William Pitt, when it was first laid out, but for some years it was called Pittston Ferry. It is in the midst of the Wyoming anthracite

region and its industries are connec¬ ted with the mining and shipping of coal. In the vicinity are deposits of fire clay. The

chief manufacturing establishments are flour and lumber mills, knitting mills, foundries, machine shops, brick-works, stove and engine- works, silk mills, ladies' underwear factory, car shops, tape mill and steel range works. Its many and various industries and facilities for handling and marketing products, cheapness of fuel as well as electricity which may be used for power purposes, make it an ideal place for the investor, the manufacturer, the laborer and the home-builder. The principal educational institutions are the public and parochial schools. It has one hospital which was opened in 1893. There are four banks in the city with a com¬ bined capital of $700,000. The population of the city is (1920) 18,497, with a population of about 60,000 residing within two and one-half miles of the city post office.

PITUITARY BODY or GLAND (Hy¬ pophysis cerebri), a small oval, reddish-gray, vascular mass lodged in a depression (pituitary fossa or cella turcica) of the sphenoid bone, and connected with the brain by a pedicle. It consists of two lobes. Its function is complex since each part has a very profound influence in the growth of the body. The growth of the bony skeleton is under the influence of the pituitary. Hyperpituitary states lead to gran- tism, to acromegaly, ana to various anomalies of bony structure. Diminished activity, hypo¬ pituitarism leads to obesity, various bony under¬ growths and anomalies and a number of mental defects. Consult Cushing, Harvey, (The Pitui¬ tary Body and its Disorders5 (Philadelphia

1912).

PITYRIASIS, an affection of the skin (pityriasis simplex), characterized by a scur- finess of the epidermis with numerous branny scales. It is also a symptom of various skin diseases attended by accumulations upon the surface of the body of oily, waxy or bran-like scales. Pityriasis capitis (dandruff), beginning as a mild affection, may become a part of dermatitis seborrhoica, an inflammation of the derma of the scalp; lichen piliaris (pityriasis rosea) is a hypertrophic disease with conical elevations of sebaceous material and epithelial cells about the orifices of hair-follicles; pitv- riasis rubra is an inflammatory disease of the entire skin with abundant thin white scales. The favorite seats of pityriasis are the scalp, face, back, chest, umbilicus and the genital organs, but it may involve the whole body. Though usually a mild affection, it may be severe and last for months. In many cases there is little inflammation, the skin being pale and

either dry or greasy. Pityriasis occurs espe¬ cially in anaemic and chlorotic individuals, and is often increased by care, anxiety or dissipation. Treatment calls for tonics, attention to hygienic measures and the application locally of fatty substances, especially stimulating ointments. In pityriasis of the face exposure to cold winds is often irritating; therefore, before going into the open air apply a soothing lotion. Consult Kaposi, (Pathologv and Treatment of Diseases of the Skin5 (1895) and Pusey, William Allen (in (Reference Handbook of the Medical Sciences,5 Vol. VII, New York 1916).

PITZER, Alexander White, American clergyman : b. Salem, Va., 14 Sept. 1834. He was educated at the Virginia Collegiate Institute

(Roanoke College) and at Hampden-Sidney College. After studying theology at the Union Theological Seminary, and at Danville, Ky., he ibegan preaching at Leavenworth, Kan., in 1857. From 1851-58 he was pastor of the First Church there, when he returned to Virginia and served as missionary to the Con¬ federate armies. Subsequently he held pastor¬ ates at Sparta and Mount Zion, Ga., Cave Spring and Liberty, Va., until 1861, when he undertook evangelistic work at Washington, D. C. Here he organized the Central Church in 1868, of which he was pastor. He is a sup¬ porter of the pre-millenial theorv of the com¬ ing of Christ, and is an ardent advocate of the Revisionist movement. He is the author of (Ecce Deus Homo) ; (Christ the Teacher of Men* ; (The New Life* ; Confidence in Christ* ; (Manifold Ministry of the Holy Spirit J ; (Predestination,* and (Blessed Hope of the Lord's Return.* He has contributed also to numerous journals.

PIURA, pe-oo'ra, a river, department or province, and city of northern Peru. (1) Rio de Piura, or Sechura, rises in the coast cordil¬ lera scarcely 100 miles from where it empties into the Pacific at a point nearly due west from its source, but by its great sweep to the north around the Sechura Desert makes its actual length nearly 200 miles. It is called Huarmaca in its upper course, and near Sechura Bay and below Sechura Desert is named the Sechura. It is navigable from February to June. (2) The department, in the extreme northwestern Corner of Peru, is bounded by Ecuador to the north, the department of Loreto to the east, Cajamarca to the southeast, Lambayeque to the south and the Pacific to the west; and has an area of 16,825 square miles. The mountains on the eastern border and the cordillera of the coast are rich with pasture grasses ; the coast is practically a desert,

but has rich mineral de¬ posits of petroleum, salt and soda. Pop. about 250,000. (3) The capital city of the department, 690 miles northwest of Liuca, and 80 miles southeast of Cape Blanco, on the western bank of the river, is connected by rail with Payta, its harbor, which has a population of 3,500. The surrounding country grows a fine grade of cotton. The other exports of the city are salt, hides and cinchona bark. It is a trade centre for the northern valleys of Peru and southern Ecuador. There is a chamber of commerce and a bank. Pop. (estimated) 15,000.

PIUS, pi'us, the name of 10 popes, as fol¬ lows :

Pius I, Saint: d. 155. Little more is known of him than that he succeeded Hvginus about 140, and died about 154. His day is 11 July.

Pius II (2Eneas Sylvius Piccolomini, e-ne'as sil'vi-us pik-ko-lom'e-ne) : b. Corsig- nano, near Siena, 18 Oct. 1405; d. Ancona, 14 Aug. 1464. He belonged to an illustrious family and in 1431 assisted at the Council at Basel as secretary. He was subsequently secretary to the antipope Felix V, and then to the Emperor Frederick III, by whom he was employed on various embassies. Eugenius IV made him apostolic secretary and by Nicholas V he was made bishop of Trieste in 1447 and sent as nuncio to Bohemia, Moravia and Silesia. He became bishop of Siena in 1449 and Calixtus

III created him cardinal 18 Dec. 1456. Early in his career he was a liberal in ecclesiastical matters, but he now became a staunch upholder of papal authority both in opposition to the secular power and to the authority of councils. He was one of the most learned men of his day and distinguished by moderation and a conciliatory spirit. He succeeded Calixtus III 19 Aug. 1458, and in the next year assembled a congress at Mantua to plan a crusade against the Turks, but nothing of importance was then accomplished. He is best known at the present day by his writings, and as author and scholar furnishes an excellent example of the learning of the Renaissance. His works include his¬ tory of Bohemia) ; (Cosmographia) ; (History of the Council of BaseP ; (History of Frederick III, > etc. Consult Lives by Voigt (1856-63) and Weiss (1897) ; Creighton, historical Es¬ says and Reviews > (1902).

Pius III (Francesco Todeschini, fran- ches'ko td-des-ke'ne) : b. Siena, 29 May 1439; d. 18 Oct. 1503. He was a nephew of Pius II, by whom he was made bishop of Siena and sub¬ sequently cardinal. He was elected Pope in suc¬ cession to Alexander VI on 22 Sept. 1503, but died only 26 days afterward.

Pius IV (Giovanni Angelo de' Medici, jo-van'ne an'ja-lo da ma'de-che) : h Milan, 31 March 1499; d. 9 Dec. 1565. He studied medicine and law, but subsequently entered the Church and was made an archbishop in 1545 and cardinal in 1549. Ten years later (26 Dec. 1559) he succeeded Paul IV in the papal chair. The most important event of his pontificate was the reopening of the Council of Trent. In 1564 he published a bull confirming the decrees of this council. The confession of faith known as the Creed of Pius IV (q.v.) was put forth by him as a statement of the dogmas defined in the council.

Pius V_, Saint (Michele Ghislieri, me-ka- la ges-le-a're) : b. Bosco, near Alessandria, Italy, 17 Jan 1504; d. 1 May 1572. He entered the Dominican Order at 14 and was so distin¬ guished by austerity of his life, and his zeal against heresy, that he was appointed inquisitor in Lombardy, and in 1558 inquisitor-general. He was created cardinal in 1557, and succeeded Pius IV, 7 Jan. 1566. He at once began to enforce reforms with great vigor and aroused much opposition by his seizure, imprisonment and burning of persons convicted or suspected of heresy, among whom were several men of note. He reissued the bull, ((In ccenam Domini,** and expelled the Jews from the states of the Church, excepting only the cities of Rome and Ancona. The victory over the Turks at Lepanto was largely the result of the efforts of Pius V, who organized with Venice and Spain the Holy League against them. He was canonized in 1712. Consult Falloux, (Histoire de Saint Pie V> (3d ed., 1858).

Pius VI (Giovanni Angelico Braschi, jo- van'ne an'jal-e ko bras'ke) : b. Cesena, Italy, 27 Dec. 1717; d. Valence, France, 29 Aug. 1799. He was made a cardinal in 1773 and succeeded Clement XIV 15 Feb. 1775. He immediately instituted reforms in the public treasury, and next completed the museum in the Vatican, but his greatest work was the draining of the Pontine marshes. When the Austrian emperor, Joseph II, decreed that all the religious orders

in his dominions were free from papal juris¬ diction, Pius, apprehensive of the consequences of such a measure, went in person to Vienna in 1782, but his remonstrances were futile. At the time of the French Revolution the Pope having favored the allies, Bonaparte entered the papal dominions and compelled him to pur¬ chase a peace. Basseville, an agent of the re¬ public to Rome, aroused so much hatred that he was presently slain by the populace. The French

forces under Duphot attempted to re¬ store order, but the papal soldiers routed them, and Duphot was slain. Bonaparte accordingly entered Italy, made the Pope prisoner and plundered the city. The aged Pontiff was then carried away by the victors, and hurried over the Alps to Valence, where he died.

Pius VII (Gregorio Barnaba Chiara- monti, gra-go're-o bar'na-ba ke-a-ra-mon'te) : b. Cesna, Italy, 14 Aug. 1740; d. 20 Aug. 1823. He was a Benedictine monk who became hishop of Tivoli and was created cardinal in 1785. He succeeded Pius VI 14 March 1800 and the next year concluded at Paris a concordat with France. In 1804 he went to Paris and crowned Napoleon emperor, but after the seizure of Ancona the quarrel between Napoleon and the Pope began. On the annexation of the states of the Church to the French Empire in 1809 the Pope published a bull of excommunication against the perpetrators of the invasion. He was then arrested and sent to Savona, and after¬ ward to Fontainebleau, and was not permitted to return to Italy until January 1814. The Congress of Vienna restored the states of the Church to the Pope, who applied himself thenceforth to internal reforms. He re-estab¬ lished the Order of the Jesuits in the year of his return to Rome. The character of Pius VII was such as to win him the esteem and sympathy of men of views the most diverse. Consult Artaud, (Histoire du Pape Pie VIP (1836) ; Celani, (I1 Viaggio di Pio VII a ParigP (1893) and by Allies (1901).

Pius VIII (Francesco Xaviero Cas- tiglione, fran-ches'ko za-ve-a'ro kas-tel-yo- na) : b. Cingoli, near Ancona, Italy, 20 Nov. 1761 ; d. Rome, 1 Dec. 1830. After being suc¬ cessively bishop of Montalto, Cesena and Fras¬ cati, he became cardinal in 1816 and Pope in succession to Leo XII, 31 March 1829. During his short pontificate of one year he condemned the slave trade in Brazil, opposed civil marriages in Prussia, denounced Freemasonry and se¬ cured the organization of an Armenian arch¬ bishopric at Constantinople. Consult Artaud, (Histoire du Pape Pie VIIP (1844).

Pius IX (Giovanni Maria Mastai-Fer- retti, jo-van'ne ma-rea mas'ta-e-fer-ret'te) : b. Sinigaglia, 13 May 1792; d. Rome, 7 Feb. 1878. He belonged to a noble Lombard family. He was educated at the College of Volterra, and in 1815 became one of the Guardia Nobile of the Vatican, but soon after entered the Church, and lived for a few years in Rome as the head of a large orphanage. Not long after the death, in 1823, of Pius VII he was appointed by Leo XII a prelate in his house¬ hold; in 1827 was created archbishop of Spoleto, and five years later transferred to the see of Imola. At Imola he showed himself zealous in good works and possessed of liberal convictions. He was raised to the

cardinalate in December

1840, but continued to reside, in his diocese till

1846, when, shortly after the death of Gregory XVI he was elected Pope, 16 June. In honor of his patron, Pius VII, he assumed the name of Pius IX (Pio Nono). He ushered in his reign by liberating 2,000 political offenders imprisoned by his predecessors, and granted a general amnesty, restoring all prisoners and exiles to their civil rights on their signing a declaration of allegiance. He also established four new dioceses in the United States at Al¬ bany, Buffalo, Cleveland and Galveston, all in

1847. In later years he established nearly 50 others in medium-sized American cities. He also (in 1848) drew up a scheme of represen¬ tative government, with two chambers, a free press and a national guard. These and similar measures for a brief period secured him bound¬ less popularity. But the Italians wished to drive out the Austrians. The Milanese overpowered Radetzky, Charles Albert led the Piedmontese to the Minico, and the youth of all Italy rose to the rescue. Matters were now going too fast and too far for Pius, who refused to countenance the revolutionary movement, and as a result Charles Albert was overpowered in Lombardy, while Naples, Tuscany, Parma and Modena had their newly-acquired freedom quenched in blood. The Pope now entirely lost the favor of the Roman populace. Threat¬ ened by the mob in his own palace he fled to Gaeta, and a Roman republic was proclaimed in February 1849, with Mazzini at its head. Louis Napoleon, determined to restore the Pope, sent an expedition to Rome under Oudi- not, by whom the Italian patriots, led by Gari¬ baldi, were overpowered. Rome surrendered on 3 July; but the Pope did not return to his capital till April 1850. After his return his government lost much of its personal character, and became reactionary. He now placed his whole confidence in Antonelli, a prelate who had risen to distinction under Gregory XVI and whom Pius had made a cardinal and a member of his council of state in 1847. Antonelli pre¬ served the ascendency in all matters of state till his death in 1876. The Pope himself now be¬ stowed his whole attention upon the Church. He recalled the Jesuits, canonized saints and defined two dogmas. The doctrine of the im¬ maculate conception of the Virgin Mary was defined in 1854; that of the infallibility of the Pope, when speaking ex cathedra on a question of faith or morals, was proclaimed in the great Ecumenical Council held in the Vatican in 1870. Previous to this time the Pope's temporal do¬ minions had become sadly shrunken in extent, owing to the gradual unification of Italy under Victor Emmanuel. (See Italy). The tem¬

poral power of the Pope, however, was still secured by the presence of a body of French troops at Rome. But after the defeat of Na¬ poleon III at Sedan these were withdrawn. On 20 Sept. 1870 the Italian troops entered Rome, and the temporal power was at an end. The Vatican was left to the Pope; and free diplo¬ matic intercourse, the honors due to a sovereign, and a civil list of £129,000 yearly, secured to him. But these he declined, and confined him¬ self to. the Vatican and its garden, declaring that he was under restraint and a prisoner in his own palace. Consult Pougeois, (Histoire de

Pie IX > (1877-86) and Lives by Maguire

(1878); Shea (1878); O'Reilly.

Pius X (Giuseppe Sarto, joo-sep'pa sar'- to) : b. Riese, 2 June 1835; d. 20 Aug. 1914. He was elected to the papacy by the College of Cardinals, 4 Aug. 1903, after the conclave had been in session five days and assumed the title of Pius X. He was born in a small Vene¬ tian town, of a humble peasant family. His father died 4 March 1842, and his mother, Mar¬ garita Sanson, 2 Feb. 1894, after a life of labor and sacrifices, entailed in rearing her family of nine children, eight of whom were living at the time their brother was made Pope, all in humble circumstances. There were two brothers and seven sisters. When young Sarto became a parish priest his mother was too hum¬ ble to live with him, but his unmarried sisters resided with him at the patriarchal, palace in Venice. He made his elementary studies at Castelfranco, a small town not far from Venice and thanks to the interest shown in him by Cardinal Monico, patriarch of Venice, was en¬ abled to continue his education. He was or¬ dained priest 18 Sept. 1858 by special dispensa¬ tion of Pius IX, and was appointed assistant priest at Tombolo, from which place he was transferred in 1867 to Salsano as parish priest. His zeal, piety and well-directed energy led to subsequent appointment to such important ec¬ clesiastical dignities as spiritual director in the seminary, judge of the ecclesiastical tribunal and vicar-general of Treviso. In 1884 he was consecrated bishop of Mantua, in Lombardy, where he remained for nine years. On 12 June 1893, Pope Leo XIII created him cardinal with San Bernardo alle Terme as his titular church and very shortly after this he was made patri¬ arch of Venice, whence, nine years later, he was summoned to Rome to elect a successor to the papal throne, made vacant by Leo's death, and was chosen as that successor, 4 Aug. 1903.

Pius X is a striking example of the bestowal of the highest dignity in the Roman Catholic Church upon one of the lowliest origin, utterly void of ambition, whose career had been marked only by the sincerest piety and indom¬ itable zeal in the practice of his ecclesiastical profession. His elevation is an apotheosis of the parish priest. There could be no more marked contrast than that presented by this Pope and the Pope whom he succeeded. Leo XIII was of aristocratic birth, a scholar, a dip¬ lomat. Pius X had the lowly peasant spirit which characterizes his whole family. He deprecated his elevation to the bishopric of Mantua and was prostrated by his election to the papacy, accepting it only through sense of duty. Although speaking and knowing his own language with classical finish, he was familiar with no other except for a slight knowledge of French and German. He was known through¬ out Italy by his work for societies and for his schools. His ardor for missionary work drew to him the attention of all who were interested in this field. He exacted observance of dis¬ cipline although he was indifferent to ceremony and the punctilious observance of mere form and conventionalities. He was a staunch advo¬ cate of the Gregorian chant, which is in keeping with his insistence on liturgical observance. In his first encyclical given two months after his accession, the Pope declared that (

that of restoring all things in Christ (Eph. l 10), so that (Christ may be all in alP® (Col. iii, 2).

One vigorous measure of Pius X shortly after his elevation to the papacy was to abolish the <(veto® which three Catholic Powers enj®yed in the election of a Pope. He drew up a docu¬ ment in which excommunication is pronounced ipso-facto against any one who acts as the inter¬ mediary of any power in proposing a veto against any cardinal during a conclave. De¬ spite his unflinching attitude toward all that involves the authority, teaching and dignity of the Church, Pius X was personally friendly toward Queen Margherita, with whom he be¬ came acquainted when bishop of Mantua and toward King Victor Emmanuel and Queen Helena, whom he received at the patriarchate in Venice on their visit to that city.

The Venetians were surprised that the Pope did not assume the title of Benedict, as one of the seven popes who, like himself, were from the province of Venice, was Benedict XI (Boc- cassini, 1303-04). This Pontiff was born at Treviso, with which town Cardinal Sarto had been connected by his labors as priest. Bene¬ dict also, like himself, was of humble origin and of lowly spirit.

Pius X was a handsome man of fine phy¬ sique, with blue eyes and

silver hair, a most sincere and lovable face, and possessed a sonorous voice of great volume, something of special value to one who is distinguished by zeal for preaching. The arms of this Pope are an anchor resting on the waters and a radiant star. This and the fact that he was elected on the day of Saint Dominic have recalled the title applied to this Pope by the prophecy of Saint Malachy: <(Ignis Ardens® (a blazing fire). The arms of the Dominicans have a dog (Domini Canes) bearing a blazing torch. He displayed great restraint when re¬ lations were broken off with the French govern¬ ment. In 1907 he issued the encyclical <(Pas- cendi,® condemning Modernism. He advocated increased study of the Bible and the codification of the canon law. In 1910 he issued a decree barring the clergy from the temporal adminis¬ tration of social organizations, as this had often been the foundation of serious annoy¬ ances. He was most energetic in raising funds for the sufferers of the great earthquake of 1907 and secured $1,400,000 for them. Consult (Life of Pope Pius XP with preface by Cardi¬ nal Gibbons (New York 1904) ; (Giacomello, Pio X> (Padua 1908).

PIUS IV, Creed of, a dogmatic fomula of the Roman Catholic Church, announced by Pope Pius IV in his bull (In Sancrosancta) (1564). It was prepared by a commission of the Tridentine Council. A formal acceptance of it is required by the Church from all con¬ verts, teachers and priests. The contents may best be ascertained by consulting the full text given in Schaff's (Creeds of Christendom >

(1877-78).

PIUS IX, Order of, a papal order of merit of two classes founded by Pius IX, in 1847. It is conferred on the nobility in recognition of virtue and desert. The uniform is of blue with red facings and gold embroidery and the dec¬ oration is a hexagonal blue star with gold flame between the arms, bearing upon the obverse,

HIS HOLINESS POPE PIUS X WITH PAPAL CROWN AND ROBES OF STATE

<(Pius IX, » surrounded by the motto ((Virtuti et Merito.®

PIUTE (pi'ut) INDIANS, a name given various small tribes of American Indians of the Shoshone family residing in southwestern Utah, Nevada, Arizonia and southeastern California. There are about 5,000

of them \yho have been known by the name, most of whom are beyond the jurisdiction of the Indian agencies. The United States official records recognize but 750 of them. The Piutes in different localities are known as Paviotos, Chemehuevis, Pautis and Numas. See Shoshone Indians.

PIZARRO, pi-za'ro (Sp. pe-thar'ro) , Fran¬ cisco, Spanish adventurer, the discoverer and conqueror of Peru : b. Truxillo, Estremadura, about 1471 ; d. Lima, Peru, 26 June 1541. The spirit of adventure which in his time pervaded Spain induced him to seek his fortune in the newly-found continent of America. He was in Darien in 1509 and afterward was connected with Balboa when the latter discovered the Pacific (1513). Subsequently he became asso¬ ciated with Hernando Luque, a priest possessed of some money, and Diego de Almagro, an ad¬ venturer like himself, and having jointly fitted out an expedition the associates set sail from Panama on a voyage of exploration and con¬ quest along the coast to the southward (1524). Their first voyage was unsuccessful, but learn¬ ing the existence of the rich empire of Peru they were not long in making a second voyage, with the intention of conquering this country. Their forces were too few, however, for this object, and Pizarro determined to seek assist¬ ance in Spain. After encountering tedious de¬ lays and obstacles he obtained from the queen a commission bestowing on him the right of discovery and conquest in Peru, with the rank and title of governor and captain-general of the province. Raising a small force in Spain, he re¬ crossed the Atlantic (in 1530), and January 1531 sailed from Panama with three vessels and a force of 185. Taking advantage of a civil war then raging in that country, the Spaniards became the allies and eventually the enslavers of Atahualpa, the successful contestant for power. What has been ascribed to treachery on the part of Pizarro in dealing with Ata-' hualpa has proved, in the light of recent his¬ torical research, to have been a justifiable and necessary policy in the Spaniards' defense against the Indian chief's fully planned con¬ spiracy against their lives. The ransom offered and paid by Atahualpa for his release amounted to some $8,000,000 and not to $17,000,000 as commonly and erroneously stated. The news of their success brought a considerable acces¬ sion of strength from Europe to the invaders. The Inca Manco was allowed to reign as a do- nothing monarch. Pizarro was made a mar¬ quis and in order to consolidate his empire founded, in 1535, the city of Lima, which he in¬ tended as the capital of his possessions. But the discord which had long existed between Almagro and Pizarro at last broke out into open violence, and in the struggle which ensued Almagro was defeated, taken prisoner and killed. This catastrophe, which took place in 1538, was avenged by partisans of

Almagro, who conspired against Pizarro and murdered him in his palace at Lima. The character of Pizarro has been largely rehabilitated by the

new school of the historians of the Spanish conquests. He is now acknowledged to have been not only a man of remarkable military genius, but of great integrity and high moral purpose. Consult Prescott, (Conquest of Peru) (1847); Markham, (Peru) (1893); Liunmis, (Spanish Pioneers) (1893) ; Ober, F. A., (Pi¬ zarro, and the Conquest of PeriP (1906).

PIZARRO, Gonzalo, Spanish adventurer : b. Truxillo, Estremadura, about 1506; d. Cuzco, Peru, April 1548. He was half-brother of Francisco Pizarro (q.v.) whom he accompanied on a second visit to Peru in 1531. In early life he had signally distinguished himself as a soldier and when he reached the New World was acknowledged to be the best lance in Peru. His talents were exclusivelv those of a guerrilla chief, as he lacked the military and civil capacity of Francisco. He subdued Char- cas (Bolivia), obtained a grant of the mineral district about Potosi and grew rich. In 1540 he was appointed by Francisco governor of Quito and directed to undertake an expedition toward the east, where a land supposed to be extremely rich in spices was reported to lie. He set out on the expedition across the Andes, during which he was deserted by Orellana (q.v.), who discovered the headwater of the Amazon and descended that stream to the ocean. The expedition occupied two years and greatly thinned the ranks of the adventurers by its hardships. After the assassination of Fran¬ cisco, Gonzalo raised an army and advanced upon Lima to attack Nunez Vela, the new and unpopular viceroy sent out from Spain. He was warmly supported by the bulk of the colo¬ nists and many of the royal troops. On 18 Jan. 1546 a battle took place at Anaquito near Quito, in which Nunez was defeated and slain. But in the following year Pizarro was attacked by an army sent from Spain under Pedro de la Gasca and was eventually defeated, taken prisoner and executed.

PLACE, Victor, Franch Assyriologist : b. Paris, 1819; d. 1875. In 1839 he began his con¬ nection with the Foreign Office and was succes¬ sively consular agent at Naples, Gibraltar and Haiti. In 1851 he was removed to Mosul as consul and continued the excavation projects inaugurated by his predecessor, Botta, at Khor- sabad. Many valuable Assyrian remains were uncovered. Some of the trophies were lost in the river by accident. In 1855 Place was transferred to Jassy, Moldavia, but his abuse of power and greed for gold soon caused his removal to Adrianople, whence in 1870 he was transferred to New York. Here he was en¬ gaged in purchasing munitions for France in

the war with Prussia, and by purchasing de¬ fective material and charging a high price to his government, he enriched himself to the ex¬ tent of over 600,000 francs, when he was dis¬ covered, indicted, tried, convicted and sentenced to two years in prison. President Thiers after¬ ward commuted the sentence. Place published (Ninevie et l'Assyrie) (2 vols. text; 1 vol. plates, Paris 1867-70).

PLACENTA. See Embryology; Obstet¬ rics.

PLACER DEPOSITS, deposits of the metals or valuable minerals in fragmental form associated with coarse sand or gravel. The

common minerals to be found in this way are gold, platinum, tin and monazite, though other placer deposits are known. Placer deposits originate from the weathering of rocks in which these minerals occur. As the valuable minerals are heavier than the waste rock, they are grad¬ ually segregated by the carrying away of the finer or lighter material. The gold placers of California and Alaska constitute familiar ex¬ amples. The valuable minerals are secured by washing the gravels either by hand (panning) or other means.

PLACER MINING. See Gold Mining.

PLACERS, in mining, deposits of valuable minerals, found in small particles in the beds of streams and on lakes and seashore. The principal metals so found are gold, tin, chro¬ mium, iron and precious stones. According to the legal classification of mines in the United States all mineral deposits other than veins of rock in place are placers. Placer ores, being heavy, when freed by the decomposition of the containing rock, mingle with the materials car¬ ried down by running streams and settle to the bottom where the current slackens. Magne¬ tite is the commonest of the ores found in placers, and the frequency of gold and platinum in it gives it a high commercial value. See Gold; Mining.

PLACET, pla'set, or PLACITUM, plas'i-

tum (placitum rcgium), the assent of the civil power to the promulgation of pontifical ordi¬ nances within its jurisdiction ; called also exe¬ quator. The right to exercise supervision over communications of the Holy See with bishops, clergy and people of sovereign states and to prevent or suspend the promulgation of bulls,

letters apostolic and other papal instruments, unless they have received the approval of the secular state itself, is asserted in the famous (Declaration > of the Gallican clergy (1682) ; and in the various German states it is embodied in the constitutional law : this is no less true of Catholic states than of Protestant. The exer¬ cise of the right was carried to extreme lengths by the Emperor Joseph II (reigned 1765-90) who asserted for himself a supremacy in the administration of Church affairs. And not only ordinances emanating from Rome but even those of the local bishops were made subject to censorship by the secular authority. The see of Rome has never admitted as a matter of right the claim of the state to impede the exe¬ cution of papal ordinances ; but to prevent greater evils it has generally acquiesced in the exercise of this power. All the Catholic states of the continent of Europe claim and exercise the right. In the kingdom of Prussia in the years 1873-75 very stringent laws were enacted (Falk laws, May laws) to control the Catholic bishops and clergy, the Catholic theological seminaries and the Catholic Church discipline. A newly-ordained priest was made liable to fine and imprisonment if he proceeded to the work of his ministry without the placet or exequatur of the Minister of Worship; or confessors in¬ curred the like penalties for refusing absolution under certain circumstances to penitents; in 1884 there were in the one diocese of Breslau 119 priests who had incurred the penalties; but the government intervened ,and the penalties

were remitted; afterward all of the Falk laws were either repealed or mitigated essentially.

PLACETAS, pla-sa'tas, Cuba, town, prov¬ ince of Santa Clara, 20 miles southeast of the city of Santa Clara. It is in a fertile sugar district, is connected with Camajuani, and the seaports of Sagua La Grande and Caibarren by rail. Pop. about 6,500.

PLACOIDEI, pla-koi'de-i, the name of an obsolete grouping of fishes, including those with placoid scales. See Fish.

PLAGAL, in music, the name given by Gregory the Great to the four collateral scales which he added to the four authentic scales of Ambrose. The term plagal is now applied to melodies in which the principal notes lie between the fifth of the key and its octave. The plagal cadence consists of the chord of the sub¬ dominant followed by that of the tonic. See Music.

PLAGIAULACIDiE, pla"ji-a-las'T-de, a family of fossil, multituberculate mammals, whose fragmentary remains occur in forma¬ tions from the

Triassic to the Tertiary periods in both Europe and North Amer¬ ica. These remains are chiefly of jaws and molar teeth, in many respects foreshadowing those of the marsupials. The typical genus is Plagiaulax ; others are Alio don, Bolodon and Ctenacodon. This family, says Woodward, does not seem to have become extinct until early Tertiary times, the genus Ptilodus occur¬ ring in the Puerco (Eocene) beds of New Mexico. Whether the South African genus Microlestes, often associated with these genera, really belongs here is disputed, many palaeontol¬ ogists regarding it as reptilian. Consult Wood¬ ward, (Vertebrate Palaeontology) (1898) ; Bed- dard, (Mamrpalia) (1901).

PLAGIOCLASE, a group of triclinic feld¬ spars (q.v.) in which the two prominent cleavage-directions are oblique to each other. The designation was adopted by Breithaupt. In the group are included anorthite, albite, oligo- clase, labradorite.

PLAGIOSTOMI. See Fish; Ichthyology.

PLAGIUM, in Roman law, the crime of stealing the slave of another, or of kidnapping a free person in order to make him a slave. Ac¬ cording to German law it is the getting forcible possession of a man's person, so as to restrain him of his liberty. By Scotch law the crime of stealing an adult person was punishable with death, and the same punishment has been ap¬ plied to the stealing of children.

PLAGUE, History of the. The plague,

so-called, has been a general name for centuries for any prevailing sickness that carried off great numbers of people. While all the instan¬ ces recorded below are spoken of as ((the plagueˆ it is probable that several diseases have figured in the records. See Black Death ; Bubonic Plague (concerning the modes of communication of the plague), very different opinions have been entertained, according to the state of medical science. In early times, when calamitous events, the causes of which were not understood, were attributed to spirits and de¬ mons, the plague was also ascribed to their in¬ fluence. At a later period it was accounted for by changes in the air, by poisonous vapors

which descended from the atmosphere, or was attributed to clouds of insects which were re¬ ceived into the body by inspiration, or in the food, or by absorption through the skin, thus corrupting the blood. There are certain condi¬ tions which have always attended outbreaks

of the plague. The chief of these are unwhole¬ some and insufficient food, overcrowding, bad ventilation, accumulation in the neighborhood of dwellings of decaying animal and vegetable refuse. In short, these conditions may be summed up in the words, (

There is little doubt that the plague ap¬ peared in the most ancient times, particularly where a numerous population was crowded to¬ gether in the warm climates; but we must not consider every disease as the plague which has been so called by historians, as they often mean by the term nothing more than a malignant dis¬ order prevailing over a considerable extent of country. Among the most famous instances is the plague described in so masterly a manner by Thucydides, which, in the second year of the Peloponnesian War (430 b.c.), ravaged Athens, then besieged by the Spartans. A large number of the inhabitants of Attica had fled into the city. Fear, anxiety, want or poor provision and the corruption of the air caused by the crowded state of the population, produced and propagated the disease in the city. Death gen¬ erally ensued on the seventh or ninth day. This epidemic does not seem to have been the real Oriental plague, however, any more than that which prevailed in Jerusalem (72 a.d.) when it was besieged bv the Romans, as de¬ scribed by Josephus. In Rome the plague ex¬ isted (77 a.d.) in the reign of Vespasian; of Marcus Aurelius (170), when it raged over almost all Europe and Asia (but this was probably not the real plague) ; of Commodus (in 189) ; and particularly of Gallienus (in 262), when 5,000 persons are said to have died daily in Rome. In Constantinople, in the reign of Justinian (in 544), it raged so violently that 1,000 grave-diggers are said to have been in¬ sufficient for the interment of the dead. This terrible plague continued its ravages for 50 years with but short intervals. In 565 it ap¬ peared under the name of pestis inguinaria in Treves; in 588 in Marseilles. From the de¬ scriptions of this visitation given by contem¬ porary writers it was evidently the true Orien¬ tal plague, and it had spread over Egypt before reaching Europe. Great mortality from it re¬ sulted not only in Constantinople but also in Italy, Gaul and other countries, including north¬ ern Africa.

In the 7th century the plague or other seri¬ ous epidemic raged in Saxony; in 823 it pre¬ vailed all over Germany, and from 875 to 877 was particularly malignant in Saxony and Mis- nia, as was also the case in 964. In the 11th century it broke out in Germany at least six

times, mostly after or during a famine, and raged with so much violence that it was be¬ lieved that all mankind was doomed to be swept away by it. This unfortunate belief prevented the taking of effectual means to check it, and apathy in suffering was considered as

an act of piety. In some cases, however, the Jews were suspected of having poisoned the wells, as in a time not very remote the Hungarian peasantry suspected the nobility when the chol¬ era swept away so many of the poorer classes. In the 12th century the plague prevailed in Ger¬ many above 25 years. In the 13th century it was brought into Europe by the Crusaders. At the middle of the 14th century it traversed all Europe, and was then called the Black Death. The black death was carried to Europe from the East, having been transmitted, it is said, from Tartary, and ultimately from China, to the Crimea, whence it was carried to Italy by certain Genoese. It also reached Egypt and thence northern Africa. In England it broke out first in the west in 1348, and then spread over the rest of the country, including Ireland and Scotland, its ravages being severest in the towns. After causing an immense number of deaths it reappeared in 1361 and 1369. The black death was the most serious epidemic ever known to have afflicted Europe. In England the proportion of deaths amounted to a third, or even a half, of the whole population. Some towns lost almost all their inhabitants; in Ox¬ ford two-thirds of those connected with the educational institutions perished ; in London the deaths amounted to 100,000, in Norwich to 60,000. The mortality was naturally greatest among the lower orders; while the clergy and religious orders suffered to an equal or greater extent, no dou!bt from their efforts on behalf of their suffering brethren. Of those attacked some died almost immediately, others within 12 hours, almost all succumbed within three days. It appears to have been at its height in the sum¬ mer of 1349. The consequences left behind were great and far-reaching. One was that la¬ borers were so scarce that wages went up to double their former rate, thus leading to the passing of acts intending to regulate them, which had little result except to stir up ill-feel¬ ing, ultimately culminating in Wat Tyler's in¬ surrection. Another consequence was the breaking up of many estates into farms let on lease, owing to the scarcity of hired labor by which they could be cultivated under their own¬ ers' management. A great accession to the land owned by the Church was another conse¬ quence of the black death, which long remained a landmark in English social history. Since that time the plague has never raged with so much violence.

Boccaccio, in the introduction to his (Decam¬ eronˆ has given a vivid description of its phys¬ ical and moral effects in Florence in 1348. In the 15th century it raged in Europe on several occasions, and was accompanied with dreadful sufferings. The historians of that time give ter¬ rible pictures of distress. London suffered se¬ verely both at the beginning of the century and again in 1428, while a serious outbreak took place in 1472 and subsequent years. In the 16th century the

plague again raged, and in 1563 was introduced into England by the return of an English army from the Continent. Though some means were already taken against the

plague — for instance, lazarettos built — yet it raged in Europe on various occasions and in different countries during the 17th century. Holland suffered from it in 1603; in the same year Egypt lost by it about 1,000,000 of its in¬ habitants. In 1630 Milan was ravaged by it; in 1635-37 Holland again suffered ; in 1656 Italy had a dreadful visitation, during which 300,000 persons are said to have died in Naples, 60,000 in Genoa, but only 14,000 in Rome, owing to superior sanitary measures and precautions. On this occasion it spread also to Spain, Germany and Holland. In 1603, 1625, 1636 and 1665 it made great ravages in England. In 1603 there are said to have been 38,000 deaths in London; in 1625, 35,000; in 1636, over 10,000; while 1665 is known as the year of the ((great plague® in London, so graphically described, with perhaps some coloring, by Defoe. During the year the deaths are given at nearly one-seventh of the population. The disease spread somewhat widely over the country both in this and the following year. The cessation of the plague in London was attributed to the great fire, and though this no doubt had its local effect, still there was a similar disappearance of the epi¬ demic not long after this time in western Europe.

In 1679 Vienna lost 76,000 of its citizens by this scourge; in 1681 Prague lost 83,000; and various German cities suffered severely. Early in the 18th century the plague caused many deaths in eastern and central Europe, the num¬ ber in Prussia and Lithuania being set down at 283,000. On this occasion it extended its rav¬ ages into northern Europe, Copenhagen and Stockholm having both suffered, the latter to the extent of 40,000 deaths. In Constantinople and other places in the Levant it frequently raged during this century, and in 1720-21 Mar¬ seilles and part of southern France were rav¬ aged by the epidemic brought from this quar¬ ter. The deaths in Marseilles alone are said to have numbered from 40,000 to 60,000; thousands of corpses lay unburied in the streets. In 1770 it raged in Moldavia, Wallachia, Poland and other adjacent regions, and in 1771 it carried off over 40,000 persons in Moscow, or one- fourth of the whole population. During the 19th century it made itself felt on several occa¬ sions in Constantinople and other parts of east¬ ern Europe, in Asia Minor, Syria, Mesopotamia, Arabia, Persia, Egypt and northern Africa, but

nowhere did it affect a very wide area. In 1834-35 great mortality was caused in Egypt. It also carried off many thousands in Mesopo¬ tamia between 1873 and 1877. In 1878-79 the plague made its appearance on the lower Volga, where it caused a considerable number of deaths.

India has often been visited by this terrible disease, and hundreds of thousands have at va¬ rious times succumbed to it in that country. In September 1896, several cases were recognized in Bombay, and during the succeeding nine months the disease raged in the city with such severity that the majority of the inhabitants fled to neighboring towns and villages. Poona and Karachi were attacked by the end of 1896, and the disease also spread to more distant parts. A special commission of experts was appointed by the Indian government, and vigor¬ ous measures, such as house-to-house visitation,

thorough disinfection, and enforced isolation, were adopted. The native municipality of Bombay was for plague purposes superseded by a plague committee. In February 1897, an in¬ ternational sanitary conference regarding the plague sat at Vienna, and after discussion came to the conclusion that the disease was caused by a bacillus discovered in 1894 by Kitasato and Yersin. They also gave countenance to the view that rats, mice and certain other animals, which were liable to attack, probably contrib¬ uted largely to spread the disease. Bombay was again visited by a serious epidemic in the au¬ tumn of 1897, which reached a climax in Feb¬ ruary of the following year, when the deaths from plague numbered 250 per day. This out¬ break also spread to other parts of India, espe¬ cially in the Bombay presidency, but it was vir¬ tually over by June. The sanitary measures of the authorities came into collision with native beliefs and prejudices at various points, and on 9 May 1898 serious riots broke out in Bombay and elsewhere. This led the government to abandon all the more stringent and severe of their preventive measures, and the fact that no harm resulted from their action seemed to jus¬ tify the statement that the disease takes its own course whatever may be done. Calcutta was first visited by the plague on 16 April 1898, and soon a considerable number of cases were re¬ corded. Bangalore and some other places in southern India suffered severely, and in August, Bombay was again seriously affected. This re¬ newed outbreak passed off in due course only to be succeeded by another, extending from February to July 1899. In 1899 Calcutta was revisited, and other parts of India still con¬ tinued to lose many lives by this scourge. The plague reached Madagascar in November 1899, and this is the first authentic record of its ap¬ pearance south of the equator. It was soon afterward reported from Reunion, Mauritius, German and Portuguese East Africa, and West Africa. In July of that year some Spanish sailors

arriving at Oporto died of the plague, and it also carried off others in this part of Portugal. The first instance of the plague in the New World was recorded from Brazil in No¬ vember 1899. Early in 1900 the first case of it was recorded in Australia, but by September that country was practically free from the dis¬ ease. It has since visited South Africa, and in 1900 there were a few cases at Glasgow. The spread of the plague in India during recent years is shown by the following official figures : In 1897 there were 56,000 recorded deaths; in 1900, 93,000; in 1901, 274,000; in 1902, 577,000. During the single month of March 1903 no less than 136,000 in that country perished from this disease. No city with modern sanitation has suffered from the plague in the 20th century.

PLAGUES OF EGYPT, a succession of inflictions, usually regarded as having been 10 in number, which, according to the Old Testa¬ ment, were divinely sent upon the Egyptians to compel them to emancipate the Israelites from bondage and allow them to quit the land of Egypt. (Ex. vii. 14, xii. 30. For the use of the word plague, see ix. 14, xi. 1). The first plague consisted in the turning of the waters o“f Egypt into blood; the second, of frogs that covered the land; the third, of lice annoying •both man and beast; the fourth, of grievous

swarms of flies; the fifth, of murrain that at¬ tacked the livestock; the sixth, of hoils wbreak- ing forth with Iblains upon man and upon beast® ; the seventh, a severe thunderstorm ac¬ companied by destructive hail ; the eighth, a plague of locusts that ate what the hail had spared; the ninth, a darkness that could be felt; the tenth, the death of the firstborn of man and beast among the Egyptians. Consult Driver, S. R., Commentary on Exodus* (1911); Selbst, (Handbuch zur Biblisch Geschichte) (Freiburg 1910).

PLAICE, a European flatfish (Plenro – nectes platessa), allied to the turbot, and highly esteemed as food. It attains an average length of 12 or 18 inches. The dark or upper side is colored brown, spotted with red or orange. They are caught chiefly by means of trawl-nets.

PLAIDS. A plaid is a pattern in textile fabrics consisting of bars, or stripes, of color crossing each other at right angles. A plaid is a development of the check, which in textile fabrics is a pattern of squares of alternate colors. Properly speaking, a check should have no divisions between the squares more than a thin boundary line. Ln

other words, the pat¬ tern should resemble the ordinary chess-board. The word check is derived from an old Euro¬ pean custom of settling accounts and comput¬ ing money by means of counters, or tallies, on a table covered with a checkered cloth. The word comes from the French echiquier mean¬ ing chess-board.

The check , a very ancient pattern, was ex¬ traordinarily popular in ancient Egypt as a motive of decoration ; and this motive was un¬ doubtedly derived from the woven fabrics and the baskets of plaited reeds and rushes. In the decorations of temples, tombs and houses the Egyptians frequently used a single checker of two colors, dark and light, alternately arranged. Sometimes the form was rectilinear instead of square. Sometimes each square was ornamented by a cross ; and in this case the blocks were frequently yellow and green, alternately, and the device (cross) upon them red and black. Occasionally, too, the squares were of various colors arranged in such a way as to form geometrical patterns. Sometimes the squares were cut into halves and the little triangular blocks were grouped so as to make a pleasing effect of form and color. Fabrics, both of linen and wool, exhibited a great variety of motives formed of straight lines — lines horizontal, perpendicular and diagonal. The Egyptians may be said to have ((worked the check to death.®

The check is found in nearly every country, ancient and modern, savag*e and civilized, as a motive of decoration and as forming a pattern for textiles. Scotland is, however, of all coun¬ tries the home of the plaid, there called tartan, and affectionately fidaidie® in song, story and legend. The word tartan is derived from the Gaelic tarstin, or tarsuin, meaning across, athwart, over or through, which, of course, ap¬ plies to the crossing of the threads in the weav¬ ing of any sort of cloth. The word tartan seems to have been applied in early times to \he material and not to the pattern.

To-day the word tartan includes both rna-

terial and pattern. The French had the word tiretaine in the 13th century for <(cloth dyed of a scarlet color.® In a wardrobe account of James III of Scotland (1471) there is mention of an ell and a half of blue tartan to line his gown of cloth of gold. James V of Scotland in 1538 on a hunting excursion into the High¬ lands wore a suit made of varicolored tartan.

The variegated pattern has also a Gaelic name — ((Cathdath,® ((war-

color,® or ((the strife of colors.® Another name is plodden. An Englishman visiting Edinburgh in 1598 wrote, ((The citizens, wives and women of the country did wear cloaks made of a coarse cloth of two or three colors in chequer-work, vulgarly called ploddenA In 1616 Taylor in his <(Penniless Pilgrimage® describes the dress of the High¬ landers as ((warm stuff of divers colors which they call tartan.®

The use of the tartan seems to be beyond the reach of history. The Scotch Highlanders are a remnant of the great Celtic race and were the last to oppose the conquering arms of Rome. When Agricola invaded North Britain in 81 a.d. he found 21 aboriginal tribes, or clans. Clanship, like the tartan which dis¬ tinguishes its wearers, eludes the historian and disappears in the mists of tradition. The pic¬ turesque dress of the

“ Bonneted chieftains all plaided and plumed in their

tartan array”

is, therefore, one of the most ancient of all costumes.

The clothing of the early Britons was much the same as that of the Gauls. From the Belgic Gauls who settled in Britain, the Britons learned to dress skins, to spin and to weave. The Gauls made several kinds of cloth which they dyed various colors. For the tunic and trousers they used a cloth of mixed colors, forming a check, the prototype of the Scotch plaid. The mantle was generally one color, preferably blue. The Britons were particularly skilful in dyeing; and they Used the juice of such plants as the foxglove, sorrel and the famous woad, from which the blue dye was obtained. Color was an important element in British dress. The colors the bards wore were blue, green and white. The Irish Druids wore several colors : the higher the rank, the greater the variety. In Ireland outside the priesthood, color was much esteemed ; and the first regula¬ tions resembling sumptuary laws in the British Isles were passed long before the Christian Era, ordering the Irish peasantry and soldiers to have their garments of one color only, officers of two colors, commanders of clans, three; and so on. The Royal Family were allowed seven colors. Irish bards wore plaid, or checkered, cloth for their undergarment — a kind of tunic

— and over this they threw a long cloak striped in various colors. There is a striking kinship between the Scotch tartan and the checks worn by the Irish in ancient times. In common with the Gauls and

ancient Britons the Celts were fond of brilliant colors; and even as far back as 390 b.c. Livy and Virgil assert that these strangers appeared fin flaming tartan garb® be¬ fore the walls of Rome in that year.

The original dress of the Highlander was the Celtic Feile-breacan (belted plaid). This was a piece of tartan about two yards broad and four yards long, which was drawn round

the waist in nicely adjusted folds and tightly buckled with a belt. The lower part came down to the knees in much the same manner as the modern kilt, while the upper part was drawn up and adjusted to the left shoulder so that the right arm might be perfectly free. This upper part was the (

The utility of such a dress in the Highlands is obvious, for the (

In Heron's (History of Scotland* we read that in Argyll and the Hebridse before the middle of the 15th century tartan was manu¬ factured of one or two colors for the poor, and more varied for the rich. The author of { Cer¬ tain Matters Concerning Scotland,* who wrote prior to 1597, said that the (

The Highlanders had neither cochineal, foreign woods, nor the manv brilliant hues pro¬ duced to-day; but their native hills yielded wonderful dyes. Every housewife was able to dye red, blue, green, yellow, black and brown with their various compounds. As many of the ancient dyes are still used in the Highlands it is interesting to note from what native flora the dyes were obtained. Black was from alder tree bark, dock root and water fly root; blue, blue¬ berry with alum, or elder with alum; brown, lichen, dulse, currant with alum, blueberry with gall nuts; crimson, white lichen, dark lichen;

flesh color, willow bark; grey, root of yellow water-flag; green, broom, whin bark, teasel, heather with alum; magenta, dandelion; orange, bramble ; purple, sun dew or cupmoss ; red, rock lichen, white lichen, rue root, or tormentil ; scarlet, limestone lichen; violet, wild cress; and yellow from bog-myrtle, ash tree root, bracken root, Saint John's wort, teasel, lidhen, common heather with alum and sun dew with ammonia.

According to Captain Burt in (Letters from a gentleman in the North of Scotland to his friend in London,* written in 1730, — : <(The

chequered stuff commonly worn by the High¬ landers, by them called breacan (parti-colored) and by the Lowlanders tartan (French, tire-taine), is neither peculiar to Celts nor Goths, and is to be found at this day, although not in such general use, among many of the Slavonic tribes, who have no connection with either.® Captain Burt also says that when the High¬ landers are trained to lie among the hills in cold, dry, windv weather, they sometimes soak the plaid in some river or burn, and then hold¬ ing the corner up above their heads, they turn themselves round and round until they are en¬ veloped in the whole mantle and then lay them¬ selves down on the leeward side of some hill where the wet and wqrmth of their bodies makes a steam like that of a boiling kettle, and keeps them warm by thickening the stuff and keeping the wind from penetrating.®

For a long period the ((belted plaid® was the dress of the Highlanders. Early in the 18th century it was succeeded by the little kilt called the feile beg , or fillibeg, and was much the same in appearance as the modern kilt worn to-day. The little kilt was made of six ells of single tartan, plaited, sewn and fixed round the waist with a strap, half a yard being left plain at each end and these crossed each other in front. Kilt is a Lowland word signifying a shortened, or tucked-up-garment. The plaid figured largely in Lowland politics. Allan Ramsay, who was throughly Jacobite, supporting the claim of James Stuart to the throne in 1715, wrote. a poem <(Tartana, or the Plaid,® which specially refers to the wearing of tartan plaids by the ladies, a custom then universal in the Low¬ lands.

The kilt is worn to-day so that when the wearer is standing erect the edge of it should reach the centre of tfie kneecap. The kilt is the principal part of the Scottish dress and should be made of tartan associated with the name of the wearer. In absence of any claim to wear a particular tartan, the Roval Stuart tart n can be worn. The shoulder plaid is merely orna¬ mental, but should always be worn with even¬ ing dress. The lower end of the plaid is fastened round the waist by a band and the other end is pulled through the epaulette on the left shoulder, where there should be a rosette on the plaid through which a brooch is fixed. This can be of any design provided it is round and may have a Cairngorm, or other stone, in the centre, or it may be made after the pattern of the Lome brooch.

Stockings used to be made out of the web of tartan but they are now knitted. Tartan ribbons, like stockings,, are attached to the garters.

In order to understand the significance of the clans it is well to remember that Scotland

was divided in two parts: the Highlands and the Lowlands. The Highlands comprised the northwest of the country, occupying little over half the area. Formerly the map of Scotland was divided into clans and countries. A clan means a family, or tribe, all loyally under the will of a chief, or chieftain. The Highlands were divided up among 31 clans. Each clan had a dress of distinctive tartan. In some cases a clan had more than one design. The Stuart and Campbell clans and some others had five. In such cases there was a special tartan reserved for the chief. The others wore the dress tartan (in which the plaid appears on a white ground), and the hunting and mourning tartans. Thus while there are but 31 clans in the Highlands there are 96 Highland tartans. Ignorance of this leads to many disputes as to the correctness of a particular tartan, it being generally thought that a clan had but one tartan.

It should be remembered that a <(clan tar¬ tan" is the specific variety of tartan worn by a Highland clan and to be worn by all members of one family — Campbells, Camerons, Grants, etc. There are certain refinements of distinc¬ tion ; for instance, separate stripes are used to distinguish a chief or two divisions of the same house. Tartan as a distinguishing clan mark seems to be a survival of totemism. It was so arranged that a man could tell to what district as well as to what clan the wearer belonged. There are also two tartans which do not belong to any family; one distinguishes an order, the clergy; and the other, a cause, the Jacobite, or Stuart.

Of the total tartans about one-half are of red ground and one-half are black, blue and green. The Rob Roy is the easiest of all to recognize, as it is a simple red and black check. The Black Watch, or Forty-Second, is black, blue and green. It is often mistaken for the Sutherland, similar in design but lighter in color. The MacMillan is easy to recognize for it is pink, yellow and white; and the very striking and handsome- Menzies (pronounced Mingies) is scarlet and white. There are only four tartans with two colors only. The greater number have five colors. Those with black, blue and green ground have stripes, white and red, or yellow and red, or yellow and white. When there are four colors the stripe is white or yellow and red. There are never more than six colors in any tartan, although some of them at first sight appear to have many more. An example is the Ogilvie.

There are three shades of blue and green, but only one shade is used

in the same plaid with the exception of the clergy tartan, which has two blues : one is dark and one is light, representing things below and things above. The hunting MacPherson is alone in having gray. Neither violet, nor brown, is employed in tartans, but when blue and red are intermixed in the weaving, they produce a brown effect which is particularly marked in the Erskine, which has but these two colors in equality. The Elliot is the bluest and the MacArthur the greenest of all the tartans.

In Scotland all the big dry-goods houses keep a stock of tartans of all clans, but outside of Scotland they are hard to find. Some Lon¬ don houses keep a complete “set.” The word “set” refers to the size of the design of the

tartan and signifies the number of spaces be¬ tween the colored lines to the width of the tartan from 4 to 24. Thus, a “4-set plaid” has 4; a “16-set,” 16; and a “24-set,” 24. All tar¬ tans are made in piece goods and traveling rugs as well as the typically Scotch body wrap, or shawl or “maud,” as it is locally called; it is correctly three and one-half yards long and is used throughout Scotland for moun¬ taineering.

All regular tartans are made so that in the folds of the kilt and plaid, which are made into quilted or box-plaiting, a particular stripe shall appear. Thus, in the Gordon set the stripe is yellow; in the MacKenzie, white; and so on. The plaid over the shoulders is also adjusted carefully so as to exhibit the distinguishing stripe of the family.

One of the most famous tartans is that of the “Black Watch.” This has no clan sig¬ nificance. It is entirely military. When Gen¬ eral Wade in 1725 was sent to Scotland to pacify the Highlands, in pursuance of the act for disarming the Highlanders, he gave orders that the six companies in existence should adopt a uniform tartan; and this being of a dark color gave rise to the name of the Black Watch. In 1739 these six companies were formed into a regiment and the history of the Black Watch began. Ever since Fontenoy this regiment has been associated with some of the greatest deeds accomplished by the British army. The great fame of the Black Watch caused other Highland regiments to be formed: the 71st and 72d in 1773; the 74th in 1788; the 78th in 1793; the 79th or Cameron Highlanders in 1795; the 92d or Gordon Highlanders in 1796; and the 93d or Sutherland Highlanders in 1800. The dress of these regiments has become a national feature and has done more than anything else to perpetuate the wearing of the kilt. The Battle of Culloden (1746), where Prince

Charles, Edward Stuart, grand¬ son of James II, was defeated by the Duke of Cumberland, ended the clan system.

In that year (1746), the wearing of the tar¬ tan was prohibited by the British Parliament under penalty of six months' imprisonment. This act was repealed in 1782, through the efforts of the gallant Duke of Montrose.

In the 36 intervening years the weaving of the Highlanders ceased in the Highlands and many of the old "sets" or patterns were for¬ gotten. Owing to the fact that the tartan was worn in the Lowlands, particularly in Edin¬ burgh, where the ladies made it a fashionable craze, it was possible to revive the ancient fabrics. From 1782 onward the wearing of the tartan became general throughout Scotland, and the romances of Sir Walter Scott, who peopled the country with fascinating heroes and hero¬ ines, gave a new and poetic interest to the national dress.

During the World War the Germans called the Highland regiments "Ladies from Hell."

The king of England and all branches of the royal family wear the royal plaid of the high steward of Scotland, whose name is, in consequence of the office, Stewart (or Stuart). The Prince of Wales, as Lord of the Isles, wears the red and green plaid with intersecting black lines of that district. The Duke of Sussex, who is Earl of Inverness, wears the

Inverness. In modern times many tartans have been invented, manufactured and named after the Border tribes of the Lowlands, such as Douglas, Johnston, Lindsay, etc., and many fancy tartans in various sorts of fabrics have been manufactured, particularly for women's dresses. Silk tartan and tartan velvet (with short nap woven in plaids) have been manu¬ factured for women's dresses and men's waist¬ coats, and at certain periods have been ex¬ tremely costly and fashionable. Every sort of article appears in Scotland in the national tar¬ tans : capes, skirts, boys' suits, kilts for little boys and girls, underpetticoats, ties, tarn o'shant- ers, blouses, shawls, rugs, kummerbunds and linings for bags and satchels.

The Lowland <(Shepherd's Plaid,® or tartan, is a woolen cloth made into small checks of black and white. This is also called a <(maud.®

The check and plaid appear in many varie¬ ties in the cotton, woolen and silk goods made in India. Agra, for instance, turns out large quantities of checked and striped cotton cloths. Gingham comes from a Malay word, meaning striped. It is of cotton, or linen, woven of dyed threads in stripes or checks and plaids. Ging¬ hams were much worn in the 18th century. For example, the British Magazine (1763) notes that <(Ladies of taste are prodigiously fond of the ginghams manufactured in Manchester.® Khes is the name by which a stout fabric, woven in colored check patterns, is known in the Punjab. The loom for khes weaving is wider than usual and the cloth is prized for winter wraps. Dark red, dark blue and white are the usual colors. These cloths are some¬ thing like the ginghams and checks of England. They are mostly woven with yarn brought from England, or are Bombay mill-spun. Another kind of check cloth, largely made at Ludhiana, is called Gabrun or Gamrun. It is still better known as Ludhiana cloth and is much used by Europeans for summer clothing.

In Multan and Bhawalpur, where variegated silks are produced, checks are among the favor¬ ite patterns. In Peshawar, Kohat, Shahpur and Bhawalpur silk Langis are made. These are woven of various colors and often with .gold thread interwoven for extra beauty. Lungis are chiefly worn for turbans and are exten¬ sively used on the Punjab frontier, as they are considered handsomer than white turbans. Some of the arrangements of stripes are, like the Scottish tartans, distinctive of certain Khels, or clans.

Khes, described above as made of cotton, are also made of silk, sometimes plain, some¬ times in patterns. (

Blankets of goat's hair are produced in the hill districts of the Punjab. These are often woven into a check pattern. Various kinds of silk and cotton mixed fabrics are made in the Maldah district: Sabzikatar, for example, is of a green ground with fine stripes of checkered crimson and yellow, with figures resembling a dagger between the stripes.

Bulbnlchasm has a gold ground with dia¬ mond patterns, compared to the eye of the nightingale (bulbul). In many provinces silk and cotton weaving with warps and wefts,

which have been separately tied and dyed by the Bandhana knot-tying process, is practised. From this name is derived the bandanna hand¬ kerchief, which the old Southern negress used to wear in the form of a picturesque turban.

Thus the migration of the check in all its various manifestations and

varieties brings mankind together strangely; and the old dis¬ tinction of plaid and checks, which was used originally to label clans and families, lives to-dav as a popular and useful motive of decoration.

Bibliography. — Skene, William Forbes, (The Highlanders of Scotland) (Stirling 1902) ; Browne, Dr. James, (History of the Highlands and the Highland Clans) (4 vols., 1838; re- edited by J. S. Keltie, 2 vols., 1875) ; Grant, James, (The Tartans of the Clans of Scotland) (Edinburgh and London 1886) ; Stewart, David, (Sketches of the Character, Manners and Pres¬ ent State of the Highlanders* (2 vols., Edin¬ burgh 1825) ; Logan, James, (The Scottish GaeP (2 vols., London 1831) ; Mclan, R. R., (The Clans of the Scottish Highlands) (2 vols., London 1845-47) ; Macleay, K., (Highlanders of Scotland) (2 vols., Edinburgh 1870) ; Johns¬ ton, W. and A. K., (Scottish Clans and their Tartans) (Edinburgh and London 1891).

PLAIN (Lat. planum, level ground), a tract of land which is level or undulating. That por¬ tion of the earth's surface not covered by water may be classified into two great divisions, namely, mountains and plains. This broad classi¬ fication includes under plains all broad tracts whose surfaces are not so elevated as to be in¬ cluded among mountains. The plains may be classified as the narrow tracts of land, with high land or mountains bordering the sides, as valleys; the broad expanse of level or rolling land of an altitude of 1,000 feet or over, as a plateau, and all the broad plain-lands below 1,000 feet are classified as plains. This classi¬ fication is not always followed, as many of the plateaus of the world, are called great plains. Another method of classification is by the nature of the formation of the plain. The rivers of the world which enter the ocean de¬ posit each year a large amount of debris brought down from the mountains. The ocean currents and tides distribute this deposit over the ocean bed and, in some places, a constant process of plain-building is in progress. As the amount of soil accumulates, the plain grows higher until it becomes a part of the continen¬ tal land mass. Such tracts of land are called marine plains. The North Atlantic marine plains formed on both the east and west coasts are now so broad that the coast plain on both sides extends far out, below the surface of the water. The fossils found in the strata indicate the origin of the Atlantic Coastal Plain. Tracts of land that were once the beds of great lakes, but which have dried up, are called lacustrine lains. Lacustrine plains exist around Great alt Lake in Utah, and in Nevada, the valley of the Red ˆRiver of the North, the vale of Kashmir in northwestern India, and the great Hungarian Plain. The deposit of silt at the mouths of rivers, and sometimes along the banks make fluviatile plains, or flood-plains. The Mississippi, Po, Ganges, Nile and other large rivers have constructed great fluviatile

plains, and the mighty builders still continue their work. Still another origin for plains is erosion, by means of which the mountains are lowered and the broad tract of rolling or hilly land forms. Such formations are called plains of denudation. Where considerable of the former mountain area rema'ins, the lowland formed by erosion or denudation is called a peneplain. In respect of fertility plains show all gradations from wholly barren salt plains, such as the sali- nas of Argentina, in South America, and almost wholly barren deserts, such as are represented chiefly in Africa and Asia, to the highly pro¬ ductive alluvial plains of such great rivers as the Mississippi and the Ganges. Various spe¬ cial kinds of plains in different parts of the world are distinguished by special local names. Among these are the landes, or sandy plains in the southwest of France; the treeless steppes of southern Russia in Europe and Central Asia; the marshy tundras of northern Siberia ; the arid karroos of Cape Colony; the savannahs and prairies of North America; the grassy llanos of the Orinoco Valley; the forest plains or selvas of the Amazon basin ; and the treeless and partly barren pampas of Argentina. The great desert plain of the world is the Sahara (q.v.) in Africa, extending from the west coast of Africa to the Red Sea, a distance of over 2,500 miles ; and over 1,000 miles wide from north to south. This desert plain is made of bare ledges of rock miles in extent, oceans of sand, white in some places on account of the salt. Beyond the Red Sea the desert lands extend, including the Arabian plain, and plains in the interior of Asia, into China almost to the Pacific Ocean. It must not be understood, however, that all deserts are plains ; many are highly mountainous. The great plains of the interior of Africa, south of Sahara, are covered with dense vegetation. The interior of Australia, so far as known, consists of extensive low plains upon which the waters of the rivers become stagnant amid gigantic reeds and her¬ baceous brushwood. The long dry seasons to which the country is subject make the plains vast deserts. The falling of the rains, however, speedily converts these dusty wastes into verdant pastures. Central Asia is a region of immense mountain chains supporting table¬ lands of great extent. The northern parts of the same continent and of Europe present in a range of more than 6,000 miles a succession of broad plains, covering the greater part of Siberia, a large part of Russia, Germany and Holland. On this range, from the Pacific to the Atlantic, are no elevations exceeding a few hundred feet. These plains in Siberia and Russia are called steppes, and large portions of them are rich pasture lands, without trees, and much resembling the prairies of the Mississippi Valley. The American

continent, north and south, is eminently a land of plains. They form full two-thirds of the whole surface of the country, extending on the Atlantic side from one extremity of the continent to the other, with only occasional interruptions by mountain ranges of little extent. In South America are distinguished three great regions of plains separated from each other by low ranges of mountains, which run from the At¬ lantic Coast toward the Andes. The northern of these regions, having an area of 260,000 square miles, comprises the valley of the Ori¬

noco and its tributaries, and the elevation of this great territory nowhere exceeds 300 feet above the sea-level. So smooth is the surface that over hundreds of square miles the land is almost as unbroken by any unevenness as the water itself, and the rivers are so sluggish that their current is diverted in any direction by light winds. This is the region of the llanos (Lat. loca plana). In the dry season the ground is parched and barren, and clouds of fine dust and sand incessantly rising fill the air. The grasses, which in the rainy season suddenly spring up and grow to the height of four feet, are withered and crumble into dust. But as the vegetation appears with the return of the rains, the plains are soon overrun by vast herds of horses and wild cattle, which then find a rich pasturage; and from the jungles of the river banks, to which they had retired during the drought, the great serpents and alligators make their appearance and overspread the plains. The only interruptions to the dead level of the surface, beside the depressions of the beds of the rivers and creeks, appear to be occasional banks of limestone or sandstone, called bancos, standing four or five feet above the general surface, flat at the top, and several leagues in length. Slight undulations, called mesas, imperceptible to the eye, are indicated by the water-courses which are turned by them in different directions. The plains of the Ama¬ zon extend up the course of that river and its branches to the Andes, and include, with all the waters they enclose and some ranges of hills, an area of 2,340,000 square miles. About one-third of this territory is covered with dense forests, the principal portions of which have not been explored. So luxuriant is the vegeta¬ tion and enervating the climate, that to reclaim any considerable extent of these wilds is a task almost beyond the ability of man. From their wooded character the plains here are called selvas; but open tracts like the llanos are scattered among the forests, and numerous broad rivers occupy large areas and afford the only means of gaining access to the distant interior. The plainsˆ of the southern portion of South America, lying beyond lat. 15° S., are termed pampas, from an Indian word signify¬ ing a flat. They resemble the steppes of Russia, being open grass-covered tracts of vast

extent, interspersed with barren areas composed of rocks and sand. Their total extent from north to south is about 1,800 miles, and from east to west from 300 to 900 miles. On the north they reach the region of tropical productions, and at the extreme south their surface is in many places concealed beneath the never-melting ice and snow of those frozen latitudes. Across their range from the coast to the Andes three belts are recognized in their northern division, distinguished from each other by their peculiar productions. The first is strongly marked by its singular growth of tall thistles succeeded by clover. The former come forth with wonderful rapidity in the early summer, shooting up to the height of 10 or 11 feet, and bearing a profusion of rich blossoms. So close are the stems, that even if unarmed with their prickles they would still present an impenetrable barrier. As the summer passes away this vegetation dies down, and luxuriant crops of clover spring up, and in¬ vite the return of the countless herds of cattle

which were expelled by the thistles. To the west of this is a belt of plains covered with long grass, which from season to season undergoes little change except as the green of summer changes to the brown hue of winter, and this gives place to the verdure of the succeeding spring. Beyond this is a region of more ele¬ vated plains lying along the range of the Andes, and covered with low trees and shrubs, all ever¬ greens. The plains of North America, while no less extensive than those of the southern part of the continent, are ‘distinguished from them by greater diversities of level, which, together with the climate, render the country better adapted to the necessities of man. Excepting the parts cov¬ ered by the Rocky and Alleghany Mountains and their spurs, all the rest are plains uninterrupted by mountain elevations. Near the mountains the surface is hilly and more or less broken, but re¬ ceding from the Alleghanies westward it grad¬ ually assumes the distinctive character of plains, which are developed upon a grand scale in the boundless prairies of the northwest, and in the barren territories commonly known by the name of plains which stretch away from the prairie region in the States of Arkansas, Missouri and Kansas to the foot of the Rocky Mountains. Throughout these immense territories the differ¬ ences of level are sufficient to produce a steady flow in the mighty rivers, not so rapid as to ob¬ struct their navigation, but sufficient to insure salubrity to the country by a healthy drainage ; and thus is secured a system of easy intercom¬ munication between all sections of the

country, unsurpassed in importance by any similar system in the world. In the first volume of the geolog¬ ical report of Iowa Prof. James Hall has pre¬ sented a full account of the northwestern prairies. The region they occupy is the western part of Ohio, nearly the whole of the States of Indiana, Illinois and Iowa, the southern part of Michigan, the northern part of Missouri and portions of Kansas and Nebraska, in which, near the meridians of 9 7° and 100° W., they gradually pass into the arid and desert plains. Throughout this territory a great sameness ex¬ ists in the varieties of the topography, the vegetable productions, the soil, and geological features. The surface is drained by streams which commence in almost imperceptible de¬ pressions of the high prairies, and flow in beds and valleys of gradually increasing depth be¬ tween vertical walls of limestone or sandstone, through the horizontal strata of which the current has in past times made its channel. What are called bottom lands lie between the rocky bluffs and the stream, and upon the Mississippi and the Missouri, these attain in places a width of six to eight miles; they are, however, often wanting entirely, the bluffs on each side coming close to the river banks. On the upper Mississippi the bottom lands are in gen¬ eral well wooded, but along the State of Mis¬ souri they spread out into open prairies. These low or wet prairies are distinguished from the high or rolling prairies, which .form the gen¬ eral upper level of the country upon the sum¬ mit of the bluffs. The elevation of these above the rivers is very variable. Near Prairie du Chien in Wisconsin, it is about 400 feet above the Mississippi, and the bluffs themselves pre¬ sent a vertical face of about 300 feet. At Cairo

in Illinois, the upper surface is from 100 to 250 feet above the river, or 400 to 550 feet above the sea-level. In the central portion of the State, near the Illinois Central Railroad, the average elevation is from 650 to 750 feet above the sea, and near the northern border of the State this increases to 800 or 900 feet, and some of the highest swells of the prairie are 1,000 feet high. In southern Wisconsin, the more elevated portions of the prairie are about 1,100 feet above tide water. In Iowa the plateau du coteau des prairies of Nicollet, dividing the waters of the Mississippi from those of the Missouri, is from 1,400 to 1,500 feet above the sea. On the head waters of the Illinois and Wabash, and south and west of Lake Michigan, the prairies are very level and smooth, and are termed flat. Elsewhere the surface is undulating and broken by the depressions of the streams, and they are known as rolling prairies. The de¬ pressions where there are no streams are often 50 feet below the mean level, and in the bottom the soil is wet and marshy and forms “swales® or “sloughs,® which

render the roads almost im¬ passable. In these places the grass grows very rank and tall, but upon the upper and drier surface the natural growth is finer and the sod dense and closely interwoven. A great variety of flowering plants are interspersed among the grasses, and during the summer the whole surface of the prairies is gaily decked with bright colors. The characteristic herbs, as described by Professor Gray in a paper on the “Flora of the Northern States,® published in the (American Journal of Science) (2), xxiii, p. 397 (1857), would seem to be compositae, especially helianthoid compositae, of many species. Trees are in scattered groups, or along the larger streams, or occasionally on low rocky ridges. West of the Mississippi they become less fre¬ quent, and near long. 98° W. they disappear altogether. The soil of the prairies is remark¬ able for its finely comminuted condition. It is generally free from stones, though in some lo¬ calities boulders or fragments of rock are found upon the surface and scattered through it. In the swales and in some of the bottom lands the rich black vegetable mold is very deep, but on the upper prairies its depth is usually from one to two feet. The subsoil is almost invariably an argillaceous loam, more or less mixed in its lower portions with sand and occasional pebbles. The total thickness of clay, sand and loam amounts in some places near the larger rivers to 200 feet, but the rock is often found in other places very near the surface. Water is generally found in the sandy stratum 15 to 30 feet below the surface. Throughout the prairie region the underlying rocks are soft sedimentary strata, especially shales and impure limestones. Most of these on exposure disintegrate readily and crumble to soil, and the whole soil of the prairies appears to have been produced from such materials not removed far from their first beds. To the finely comminuted condition of these materials Professor Hall ascribes the tree¬ less character of the prairies. Where such soils are found in portions of the western part of North America, covering tracts of limited area, even enclosed in thickly wooded districts, thev are commonly without trees; and as is the case with the vast treeless plains of the Mississippi

Valley, no ancient trunks buried in the soil indi¬ cate that the localities were ever covered with trees.

PLAIN, Fort, or FORT McKEAN, a

former fort of Revolutionary days, located at the junction of the

Mohawk and Osquaga creeks, in New York State.

PLAIN SONG (Plain Chant, Cantus planus, Gregorian Chant), the most ancient and sim¬ ple form of church music, consisting of easy progressions in one of the church modes, suit¬ able for use by priests or a congregation. When counterpoint was introduced, it was cus¬ tomary to compose parts above or below a por¬ tion of ancient plain song; hence the term plain song is often synonymous with canto fermo, or the fixed melody to which counterpoint is added. It differs from modern music, (1) in its recitativo-like character, as opposed to barred music; it has no marked and regular rhythm; the rhythm of a piece of modern music is indicated by the signature as being either in common or in triple time or some vari¬ ety of these, and the stave is divided into bars or passages equivalent in length; but in plain song there is no such division, and the rhythm of the music is derived from the metrical rhythm of the psalm or hymn rather than vice versa. (2) The inodes or scales in which plain song is written are more numerous and varied than the modern major and minor. (3) The notation of plain song is by means of a stave of four lines, on any one of which either of the two received clefs (C and F) may be set and so determine the sound of all other notes, above and below. Originally the notes in plain song were all of one length; they are now of three kinds, longs, breves and semibreves, the long being equal to the breve and semibreve. The modes of plain song are named after the an¬ cient Greek modes — Dorian, Phrygian, Lydian, etc., but beyond the name there is no relation between, the two systems. The principle of the plain song modes is that each of the seven nat¬ ural sounds of the diatonic scale forms the key¬ note or “final* of a mode, which comprises that note and the seven above it. (The melodies rarely exceeded an octave, and no flats or sharps are used except an occasional B flat). This gives seven modes ; but to each of these is attached another, in which the melody, while having the same “final* or key-note, instead of rising to the octave above, ranges from the fourth below it to the fifth above ; these are the authentic and the plagal modes respectively. The difference between an authentic and a pla¬ gal melody may be illustrated from the two psalm tunes Newton or New London and the Old Hundredth ; in the first the melody lies be¬ tween the key-note and its octave, but in the other between the fourth below and the fifth above the key-note. Of these 14 modes two are universally rejected in practice as defective — the 11th and 12th. In the following table the notes of the scale are indicated by the letters of the alphabet according to modern notation ; the “final* or key-note in each mode is distin¬ guished by full-face type.

Authentic Modes

1. Dorian, D E, F, G, A,

B, C, D.

3. Phrygian, E F, G, A, B, C, D, E.

5. Lydian, F G, A, B, C, D, E, F.

7. Myxolydian, G A, B,

C. D, E, F, G.

9. ˆEolian, A B, C, D, E,

F, G. A.

11. Locrian, B C, D, E, F,

G, A, B.

13. Ionian, C D, E, F, G, A, B, C.

Plagal Modes

2. Hypodorian, A, B, C, D, E, F, G, A.

4. Hypophrygian, B, C.

D, E, F, G, A. B.

6. Hypolydian, C, D, E, F, G, A, B, C.

8. Hypomyxolydian, D, E, F, G A, B, C, D.

10. Hypoaeolian, E, F, G, A,

B, C, D, E.

12. Hypo locrian, F, G, A, B,

C, D, E, F.

14. Hypoionian, G, A, B, C,

D, E, F, G.

The Ionian is the modern major mode. In one or other of the 12 approved modes every plain song melody is composed. The psalm tunes are written in the eight modes one, three, five and seven (authentic), and two, four, six and eight (plagal) ; the 114th psalm, In Exitu Israel, has from ancient times been sung to a peculiarly beautiful melody in mode nine, the Tonus peregrinus: ancient tradition traces this tune back to the time of the Maccabees and the purification of the Temple after the first victo¬ ries of Judas Maccabseus (165 b.c.) on which occasion were sung the psalms of the Hallel (Ps. cxiii-cxviii) ; and it is highly probable that all the psalm tones used by the church had their origin in the Jewish Temple-service. From the beginning vocal music was employed in the church service and. formed an important part of it. At first the tones and melodies were handed down orally, afterward some crude sys¬ tem of notation was devised, but it was defect¬ ive, and was reformed by Saint Ambrose, bishop of Milan (4th century), who brought to the West the mode of chanting which he had learned during his residence at Antioch : the (Ambrosian chant) was founded on the first four authentic modes, and was sung antipho- nally. Till the pontificate of Gregory I it was widely in use in the Western churches; but after Gregory's reform the Ambrosian chant was disused, and is now practised only in the cathedral and diocese of Milan. How Gregory noted the music is uncertain ; the early notation and rules of plain song were so complicated that it is said 10 years' study was necessary to acquire mastery of them. Among the plain song melodies used in the Roman church service of the Holy Week, those of the Lamentations of Jeremiah and of the Exultet, a portion of the Holy Saturday service, are by musicians de¬ clared to be "beautiful beyond all description* ; and the Exultet has been regarded as the finest example of plain song in existence.

PLAIN TALES FROM THE HILLS,

Rudyard Kipling's first book, originally pub¬ lished in Calcutta in 1888, quickly drew the at¬ tention of European and American critics to "this cocksure young man from India* who was opening our eyes to a new world. These sto¬ ries, with their breezy, individual style and unusual plots, portraying Anglo-Indians in so¬ cial, official and military life and giving a few glimpses of mysterious native ways, soon estab¬ lished the young Anglo-Indian journalist in the minds of Western readers as the literary dis¬ coverer of modern Hindustan. As Andrew Lang wrote of the author, "For the first time he' has shown English readers what India is like; how full of infinitely various life and ro¬ mance.* Many of the tales, as less favorable critics have remarked, are somewhat marred by

youthful cynicism and a method that is rather too journalistic; and it has been objected that they unfairly emphasize the less pleasing fea¬ tures of Anglo-Indian society; yet their inter¬ est is unfailing, and they are full of the prom¬ ise so amply fulfilled in the author's maturer work. In the later authorized editions, the col¬ lection consists of 38 stories, among them (Lis- peth,5 the story of a Himalayan Hill-girl: (Three and an Extra,5 introducing Kipling's social heroine, Mrs. Hauksbee ; (Miss Youghal's Sais,5 being the romance of the author's favo¬ rite secret service officer, the redoubtable Strickland; (Thrown Away,5 the pathetic story of a young subaltern, and such vignettes of native life as cIn the House of Suddhoo,5 be¬ yond the Pale,5 (The Gate of a Hundred Sor¬ rows5 and that tender little tale of a brown baby, (The Story of Muhammad Din.5

Arthur Guiterman.

PLAINFIELD, Conn., town in Windham County, on Moosup River (a tributary of the Thames), and on the New York, New Haven and Hartford Railroad, about 41 miles east of Hartford. The town includes within its corpo¬ rate limits several villages. It was settled in 1690 and at first was called Quinebeag. It was incorporated as a town in 1699. The chief manufacturing establishments are a foundry, wagon and carriage Shops, cotton and woolen mills, thread and yarn factories, and creameries. The old Plainfield Academy is in the village of Plainfield, and there are public libraries in the villages of Plainfield and Moosup. The government is by annual town meetings. Pop.

(1920) 7,926. _

PLAINFIELD, N. J., city in Union County, on the Central of New Jersey Rail¬ road, about 15 miles west by south of Newark and 24 miles west of New York City. It is at the base of First Mountain, a ridge or uplift in the northeastern part of the State. It was first settled in 1684, incorporated as a township in 1847, and chartered as a city in 1869. It is a residential city, but it has a number of manu¬ facturing establishments, chief of which are machine shops, wagon and carriage factories, aeroplane works, silk and cotton mills, kid glove factories, lumber mills, furniture factories and aluminum works. Chamois, men's clothing and printing-presses are also manufactured here. The notable public institutions are the Muhlen¬ berg Hospital, 25 churches, eight public schools, one parish school, several private schools, a public library which has about 30,000 volumes, and the Young Men's Christian Association building. The three banks and one trust com¬ pany have a combined capital of over $500,000, exclusive of the savings bank. The govern¬ ment is vested in a mayor and a council of 11 members who appoint or elect the administra¬ tive officials. Pop. (1920) 27,700.

PLAINS OF ABRAHAM. An elevated tableland above Quebec, on the west and south¬ west boundaries of the city. It was named after Abraham Martin, one of the pioneers of French Canada. It formed the scene of the famous battle between French and English which determined the mastery of the New World, when the British forces, under James Wolfe (q.v.), defeated the French under Mont¬ calm (q.v.). Both leaders were mortally wounded in the engagement ; the spot where

"Wolfe died is marked by a monument and not far distant is another, erected to the joint mem¬ ory of Montcalm and Wolfe. The ground now commonly known as the Plains of Abraham, which was purchased by the government and given to the city of Quebec in 1908, and called the Park of the Battlefields, formed no part of the scene of the famous conflict, nor was any portion of this ground ever owned by Abraham Martin.

PLAINVIEW, Tex., town and county-seat of Hale County, on the Panhandle and Santa Fe Railroad, 315 miles northeast of Dallas. The Wayland Baptist College and the Seth Ward Methodist College are situated in Plain- view, which contains also a Masonic Hall, an Elks Home, sanitarium, city hall a.nd court¬ house. The town has extensive farming, stock- raising and fruit-growing interests. The to.wn owns the water-supply system. Pop. 3,989.

PLAINVILLE, Conn., town in Hartford County, about five miles northwest of New Britain, on the New York, New Haven and Hartford Railroad. Electrical supply works constitute the bulk of the town's industrial ac¬ tivity. Pop. 2,882.

PLANARIAN WORMS. The term is usu¬ ally employed to designate free living flatworms included under the Turbellaria. They are dis¬ tinguished by the presence of a triclad or poly- clad alimentary canal. The fresh-water forms (triclads) are abundant in ponds or streams, where they occur on stones, sticks and water plants. The soft body is elongate and moves in a gliding manner by the action of the ciliary coating of the epidermis. Marine planarians (polyclads) are broader, leaf-like and much larger. Land planarians are rare beyond the tropics and sub-tropics, where they occur abun¬ dantly in moist regions and are photophobic in habit. In form they are much elongated, cylindrical and of considerable size, while the body is often brilliantly marked by colored bands. The food usually consists of higher worms, mollusks and insects, although a few have become true parasites. Consult Graff,

(Monographic der Turbellarien5 (Leipzig 1882- 99) ; Woodward, (Bulletin Harvard Museum5 (XXXI, 1898).

PLANCHETTE, plan-chet' (Fr. plan-shet), a thin heart-shaped piece of wood supported on two castors at the ends of the base and on an ordinary pencil at the apex that was popular about 1860 to 1880, before the Ouija board supplanted it. If the finger-tips be placed upon this device, the pencil may readily be made to trace characters without conscious movement on the part of the operator. Like the Ouija board it was used by two classes of persons : (1) Believers in Spiritualism, who asked ques¬ tions of a spiritual control and believed that they received answers from intelligences on the spirit plane; and (2) people who regarded the mechanism as a game and amused themselves by pushing it to write messages for the benefit of others present. When used by some per¬ sons the planchette seemed to begin to move of its own accord after a little space of time and if the person wished, for instance, to have an answer to a certain question, writing was formed on the sheet of paper on which the instrument was placed, containing something

PLANETS

■«

•

T* H : -‘ ‘

X :: %

<$.* . "

■V c-*

•■* u

<

-4 –

«e*4 ~

‘

sn

^ . :

ZTj

«5

w

Lv1

fc

«£«

>

- >/•

r

Comparative Sizes of the Planets

•

‘

■

.

■

more or less pertinent to the matter. Consult Huntley, F., (The Great Psychological Crime) (Chicago 1912).

PLANQON, plan-son, Pol, French bass singer: b. in the Ardennes, France, about 1855; d. 1914. He studied music at the Ecole Duprez in Paris and in 1881 made his debut at Lyons in lLes Huguenots. * In 1883 he appeared in the Paris Grand Opera as Mephisto in ‘Faust* and scored a great success, which was followed by an equally praiseworthy presentation of Ramfis in

PLANCUS, Lucius Munatius, Roman politician and soldier: b. Tibur, near Rome, 1st century b.c. He was a pupil of Cicero and an officer under Caesar in the Gallic war and was shown much favor by that general. After Caesar’s assassination he favored Brutus, but soon deserted to Antony and in 42 b.c. was con¬ sul. Later he fell in disfavor with Antony and became a partisan of Octavius. The 7th ode of the first book of Horace is dedicated to him.

PLANE, a popular name for several trees of the genus Platanus, which alone constitutes the family Platanacccc, which includes six or seven species, all natives of the northern hemi¬ sphere. The American plane, sycamore, button- wood, or buttonball (Platanus occidentals), the largest tree of eastern North America, often at¬ tains heights of 130 feet and occasionally more than 150 feet The diameter is frequently more than eight feet. It is a native from Maine to Minnesota and southward to the Gulf States and is a familiar object in low grounds along streams, especially in the Middle States. Its brownish timber is sometimes used for interior finish and frequently for fuel. The California sycamore (P . racemosa) and the Arizona syca¬ more (P . zcrightii) are smaller than the eastern, which they resemble more or less. They are confined to the southwestern States. The name “plane® is. often applied to the sycamore maple or great maple (Acer psendoplatanns) because of the resemblance of the foliage to that of the true plane tree.

The Oriental plane is P. orientals , a native of India, southwestern Asia and southeastern ‘ Europe. It grows about 80 feet tall, has a rather short, thick trunk and a broad round head ; grayish or greenish bark

which annually flakes off; large, palmate, deciduous leaves; and monoecious flowers crowded in globular heads, pendulous on long stalks. The bristly fruit-heads persist during the winter. The tree was popularly planted by the Greeks and Ro¬ mans as an ornament and specimens are still extant which are reputed to be more than 2,000 years old. It thrives best in moist, rich alluvial soil. The timber of young trees is cream- colored; that of old trees brownish. Being fine-grained and easily polished it is _ popular for cabinet making and for interior finishing.

PLANE, a flat, level surface; in geometry, a surface characterized by the property that the straight line joining any two points in it lies wholly in the surface; ’a level surface. Two such surfaces cannot have three points, not in a straight line, in common without coinciding throughout and any two planes intersect in a

straight line. Parallel planes are those whose line of intersection is at an infinite distance, or such as can have a common normal or perpen¬ dicular. The angle between two non-parallel planes is that formed by two intersecting straight lines, one in either plane, perpendicular to the line of intersection. There will always be two such angles, each being the supplement of the other, but in ordinary cases the acute one will be most naturally regarded as the angle formed by the planes. One plane is perpen¬ dicular to another when the angles thus formed are right angles, or, to put the same thing in a simpler way, when it contains a straight line perpendicular to that other. Three planes will always have one point in common, but this point may be infinitely removed; and they form a solid angle, which is measured in a special way. three mutually perpendicular planes, known as the co-ordinate planes, are used in analytical geometry of three dimensions for determining the position of points in space. See Geometry.

PLANE. See Metal-Working Machin¬ ery; Wood-Working Machinery.

PLANE CURVES. See Curves, Higher Plane.

PLANE-TABLE SURVEYING. See

Surveying.

PLANET, any world which, revolving about a far larger, central sun, shines principally by light reflected from this sun. Of the eight planets of the solar system, the four inner are solid and the four outer are probably in a gaseous condition and are probably slightly self-luminous. (See Earth; Jupiter; Mars; Mer¬ cury; Neptune; Saturn;

Uranus and Venus). For such evidence as we have as to the exist¬ ence of other systems of planets, see Cosmog¬ ony.

PLANETARIUM. See Orrery.

PLANETESIMAL HYPOTHESIS. See

Cosmogony; Geology.

PLANETOIDS. See Asteroids.

PLANIMETER is a machine for deter¬ mining the area of any plane figure drawn to scale such as maps, sections, diagrams, indi¬ cator diagrams. There are two kinds, “polar® and “rolling.® The polar planimeter invented by Amsler in 1850 consists of two principal parts, viz., the tracer arm carrying the tracing point and a carriage with the computing wheel and the pole arm, a rod mounted on a pivot on which the instrument revolves. The area of any figure is obtained accurately by tracing its boundary line with the tracing point, reading off the graduations on the measuring wheel and multiplying by a suitable factor to give square feet, square miles or other desired unit. The original instrument has been considerably im¬ proved as to usefulness and accuracy and in being set to any desired scale, but as all polar planimeters revolve around a fixed point, their scope is limited by the length of arms of the instrument. Therefore, a large figure has to be divided into sections. The rolling planimeter moves on two broad rollers from one of which the movement is imparted to the recording mechanism. The measuring wheel revolves by contact with a polished sphere segment. Onlv the rollers and the tracer are in contact with the drawing and the results are., therefore, not

affected by irregularity of the paper. Accord¬ ingly it will measure with one operation the area’ of a figure of any length, the width of which does not exceed the length of the ex¬ tended tracer-arm. Wider areas can be sub¬ divided by lines and each subdivision measured separately. Figure 1 shows the simplest form of polar ‘planimeter. A higher grade machine

Polar Planimeter.

Precision Polar Disc planimeter.

Pantograph Polar Planimeter.

Precision Rolling Planimeter.

is shown in figure 2. The compensating plani¬ meter is a modification of the polar instrument in which the pole arm is held in the wheel car¬ riage of the tracer arm by a pivot which ends in a steel ball fitting nicely in a s

mental errors are compensated. The pantograph polar planimeter has two arms, one about seven and one-half inches long for measuring very small figures and one 11 inches long which covers a circle 38 inches in diameter for measuring large figures. The machine is so compensated that when the smaller arm is used the result is more accurate. The disc plani¬ meter is another form in which the motion of the measuring wheel is independent of the con¬ dition of the paper on which the figure is drawn as the measuring wheel revolves by contact with the plane disc.

For mechanical integrators or integraphs which work on nearly the same principle as the planimeter see Integrators.

PLANING MACHINE. See Metal-

Working Machinery; Wood- Working Ma¬ chinery.

PLANK, Fort, or FORT BLANK, a

former fort, of Revolutionary days, located in Montgomery Countv, N. Y., about two miles northwest from the village of Fort Plain.

PLANKINTON, S. Dak., city, county- seat of Aurora County, on the Chicago, Mil¬ waukee and Saint Paul Railroad, about 80 miles northwest of Yankton. It is in an agri¬ cultural and stock-raising centre, has grain elevators and mills and ships considerable wheat. There are two newspapers and a bank. Pop. (1920) 803.

PLANKTON, a term given by Haeckel to the life, both animal and plant, which occurs floating at the top of lakes and seas, in contrast to the forms of the shores or bottoms. The vegetable element in the plankton is largely diatoms while the animals show a much greater variety. In the fresh waters the plankton is very inconsiderable as compared with that of the sea and to the latter most of these statements apply. The marine plankton consists of both young and adult animals. The adults are largely protozoans, jellyfish, tunisates (especially Sal pa, Doliolum, Pyrosoma, Appendicularia) , together

with a few worms. The young include repre¬ sentatives of almost every group of marine animals for the larvae of many shore or bottom animals are free-swimming for a time. One marked feature of these surface forms is their great transparency and almost total absence of color, except the black pigment in the eyes of the eyed forms.

The plant life of the oceanic plankton in¬ cludes diatoms, bacteria, blue-green algae and similar low organisms. The first are especially conspicuous in very cold waters. In some cases the prevailing organism is so abundant that the water is distinctly tinted by it, as in the Red Sea, where a red alga is especially numerous. Many of the plants Have powers of locomotion well developed, a feature peculiar to low forms of plant life. The fresh-water vegetable plank¬ tons are less noteworthy than the marine be¬ cause of their smaller extent, the much smaller number of species generally represented, etc! These formations are of particular interest from an economic point of view because they constitute the pastures of the deep. The minute animals feed more or less upon the plant life, great numbers of free-swimming, surface- inhabiting marine animals feed upon the plants or the animals or both, and are in turn the

food of other pelagic animals or birds. At certain seasons the leading forms of the plank¬ ton disappear and others take their places. Generally they sink to lower levels to reappear after a more or less definite time. To the student of zoology the plankton is of great in¬ terest both from its importance as a food sup¬ ply for marine forms and as a means of ob¬ taining the larvae of many animals. It is studied by collecting the life in a net of bolt¬ ing cloth drawn along the surface and then ex¬ amining the catch with the microscope. The plankton varies greatly from day to day, and is markedly more abundant at night than in the day. Many of the forms, notably the medusae, worms and young Crustacea, are markedly phos¬ phorescent and to them is due the light in a vessel's wake.

PLANQUETTE, plan-ket, Robert, French composer: b. Paris, 21 July 1850; d. there, 28 Jan. 1903. He studied at the Conservatoire and with- Duprato, gained some popularity by nu¬ merous chansons and chansonettes, in 1873 be¬ gan the writing of operettas and in 1877 achieved a notable success with (Les Cloches de Corneville,5 which ran for 400 performances in Paris, and later as (The Chimes of Nor¬ mandy1 was almost equally popular in London. It has been often

heard in both the French and English versions in the United States. Plan- quette did not attempt any more serious form of music, but wrote 18 other operettas, includ¬ ing two, (The Old Guard5 (1887) and (Paul Jones5 (1889) for the English stage.

PLANT, Morton F., American financier; b. New Haven, Conn., 18 Aug. 1852; d. 4 Nov. 1918. He was educated at Russell's Military School, New Haven, and in 1868 entered the service of the Southern Express Company at Memphis, Tenn. From 1884 he was connected with the Plant system of railroads, of which he was vice-president until 1902, when the system was merged in the Atlantic Coast Line Railroad Company. Mr. Plant was a director of the At¬ lantic Coast Line and vice-president of the Chi¬ cago, Indianapolis and Louisville Railway and chairman of the board of directors of the South¬ ern Express Company. He was a director of the National Bank of Commerce and trustee of the Connecticut Trust and Safe Deposit Com¬ pany.

PLANT, in its most general sense, one of the vegetable order of organized things, pos¬ sessed of life, but not of feeling; in more re¬ stricted and popular usage, any small herb, thus excluding the larger shrubs and trees. _ Orig¬ inally the term denoted a short, cutting or sapling, as shown by its derivation from the Greek ˆ harvg, broad, Latin Planus , flat. In modern times the term has come to denote the building, machinery, fixtures, etc., necessary for the operation of an industry or business, and in a colloquial sense, also denotes a plot _ or swindle. In this work plants in the botanical sense are treated under Alpine Plants ; Beach Plants ; Plants, Breeding of ; Plants, Classification of; Plants, Diseases of; Em¬ bryology of Plants; Fertilization in Plants; Plant Foods ; Plant Geography ; Plants, Malformations in; Plants, Migration of; Plants, Morphological Evolution of ; Plants, Ornamental; Plants, Physiology of; Plants, Poisonous; Plants, Recapitulation in;

Plants, Vascular Anatomy of. See also Agricultural Chemistry.

PLANT-BUG, a bug of any of several families of Hemiptera, which obtain their food by sucking the juices of plants through beak¬ like mouths. The largest group is the family CoreidcB, consisting of at least 1,500 species, some of which are dreaded pests of cultivated crops and trees. Two well-known species are the box-elder plant-bug (Leptocoris trivittatus) , which is especially troublesome in the western States, where the box-elder is largely planted as a windbreak and for timber : and the squash- bug (Anasa tristis), which is an incorrigible enemy of squashes, pumpkins, cucumbers, etc. (See Squash). The Lygceida include fully 1,300 species, nearly 200 of which are known in

America, and of which one of the most widely destructive is the little chinch-bug, a pest upon certain cereal crops. The Pyrrho coridce is a small family, but contains several serious pests, of which the cotton Stainer or red-bug (Dys – durcas suturellus) is a pest in the southeastern United States. It feeds upon orange fruits and cotton. Consult Comstock, (Manual for the Study of Insects5 (1895) ; Smith, (Manual of Economic Entomology5 (1896) ; Howard, (The Insect Book5 (new ed., 1914).

PLANT GEOGRAPHY.— The relation of the plant covering to the surface of the earth is the basis of that division of botany which is called plant geography. This does not confine itself to the geographical dis¬ tribution of plants, as was formerly the case, but comprises all the out-of-door relations of plants to each other, and to their environment. The subject falls somewhat naturally into several divisions with respect to the point of view. Floristic botany deals with the geographi¬ cal distribution of species, and with the charac¬ ter of the plant population of different regions and countries. Ecology concerns itself espe¬ cially with the relation existing between the plant and its environment, and with the group¬ ing of species in particular areas called forma¬ tions, such as prairie, forest, etc. Experimental ecology is merely a phase of the latter, in which changes in the form and .behavior of plants are brought about by changing the physical conditions of the environment. It is of great importance because of its bearing upon the origin of species.

Environment and Plant. — The essential points of inquiry in plant geography are the environment, or home of the plant, usually called habitat by botanists, and the plant, either as an individual, or as a member of the vegetation. The habitat is to be regarded as the cause, the plant as the effect. This is true of the present relation between any habitat and the plants which grow in it only to a certain degree, for probably no plant of the present day owes its entire structure to one habitat. Each habitat, however, does have a modifying in¬ fluence upon the plants in it. This influence will be great where the physical conditions are ex¬ treme, and it will be slight where they are more moderate. In either case this modification will leave its distinctive stamp upon the plant in such a way that one may readily tell whether it grew in pond, meadow, forest or desert. Of the many factors which make up a habitat not all are of the same importance. In some situations

the water of the soil will be most important, in others light will be the controlling factor, while in still other places wind will have the most striking effect. Habitats show great differences also in the amount of water, light, wind and other factors. If one will know the causes of plant structure and distribution, it is necessary to look into the habitat with great care, and to determine the relative importance and the amount of each factor.

The factors of a habitat which are most in¬ timately connected .with the form of the plant are those that have to do with the water-supply, and with the food-making activities of the leaf. These are water and light. They have a direct influence upon the plant form, while all others affect the structure indirectly, as a result of their action upon the water of the soil* or the air, or upon light. Every habitat comprises the following factors : water-content, humidity, light, temperature, soil, wind, precipitation, physiography, dead vegetation and animals. Of these, water-content, soil, soil temperature, and physiography belong to the soil, and are in con¬ sequence called edaphic. Humidity (air moist¬ ure), light, air temperature, wind, and precipita¬ tion pertain to the air, and are termed atmos¬ pheric or climatic. Dead vegetation and ani¬ mals are biological or biotic factors. Living vegetation has a marked effect upon its habitat, but this is to be regarded more as a reaction than as a cause.

Water as a Factor. — The simplest plants grow in water, and are in every way dependent upon it. Terrestrial plants — for example, prac¬ tically all flowering plants and ferns — have adapted themselves to two media, air and water, and their dependence upon water is not so marked. The active root-hairs are still really aquatic, and must always be in contact with an adequate supply of water. The stems and leaves are aerial, but their behavior and form are largely determined by the water in the air, that is, the humidity. The water-supplv is used by the root-hairs, while water-loss is the result of evaporation from the surface of the leaves. The excess of supply over loss will determine the form of the .plant; it is evident that plants can¬ not grow where the loss exceeds the supply. The balance between these is so nice that plants grow well only where it is maintained. The most luxuriant vegetation is the forest, where both supply and loss of water are great. An excess of supply over loss is almost as cer¬ tain to produce stunting and dwarfing, as seen in the plants of ponds and marshes, as is an excessive water-loss, which is the condition typical of deserts and high mountain peaks. The total amount of water present in the soil will vary with the rainfall, and with the behavior of surface and underground streams. Much of the rainfall runs off the surface, while a part of it sinks below the roots and is carried off by underground

drainage. What is left remains in contact with the soil-particles as a thin film, and it is this which is absorbed by the root-hairs. The pull exerted by the absorptive power of the hair upon the water- film is greater than the attraction of the soil- particle, and the latter loses its water. If this continues, however, the ratio lessens, and in soils that are drying out the particles hold the water-films with increasing tenacity. In

consequence, plants will wilt and die in soils that still contain water. Loose soils, such as sand and gravel, will give up all but 0.5 to 1 per cent of the water-content, while compact clays retain as high as 12 Up 30 per cent. An excess of salts in the soil, or a lack of air usu¬ ally produces a similar effect. They decrease the absorptive power of the root-hairs, and lead to the production in marshes and bogs of plants showing the effects of an insufficient water- supply.

Air Humidity. — The humidity of the air exerts a direct control upon the amount of water evaporated from the leaves. It is evident that the water-loss of the plant will be slight where the amount of moisture in the air is great, and that the evaporation will be great where the air is dry. This effect of humidity is so marked that plants which grow in-moist climates often have structures designed to increase water-loss, while those living in desert-like places regularly protect themselves by thickening their epidermis, and decreasing the amount of surface exposed. The relative humidity of lowlands and sea- coasts, especially in the tropics, is above 80 per cent; in deserts and upon high mountains it is rarely more than 30 per cent, and often falls below 15 per cent.

Influence of Light. — The amount of light present in a habitat influences directly the food¬ making activities of the plant. The green col¬ oring matter of plants, the chlorophyll, is formed readily and abundantly only in the light, and the combination of crude materials, water, carbon dioxide, and salts into foods available for the protoplasm can occur only in the pres¬ ence of this pigment. Light thus bears a pe¬ culiar relation to the nutrition and growth of plants, and in a large degree determines their form and size. Sunlight produces vigorous, stocky stems, and thick leaves, as a rule, while plants grown in the shade have tall slender stems, and broad thin leaves. Plants that occur under¬ ground, in caves, or grow within organisms, do not develop chlorophyll, and without excep¬ tion belong to the flowerless forms known as fungi. The intensity of the light varies through¬ out the day and year; it is greater in the tropics than at the poles, and on the tops of high peaks than at their bases. In forests and thickets the light is often very diffuse, varying from .01 to

.003, summer sunlight being 1.

Temperature. — This is directly concerned with the nutrition and growth of plants. Heat is necessary for the germination of seeds, and for the sprouting of bulbs and tubers. It must be present in a considerable degree for the food¬ making activities of plants, and upon it in a large part depends the size of individuals, and the luxuriance of vegetation. The growing period is the season during which temperatures favorable to plant growth prevail ; the length of this period determines in great measure the native vegetation of a country, and the culti¬ vated plants which can be grown there. In¬ directly, temperature exerts a pronounced effect upon the form of plants, by decreasing the moisture of the air, and thus increasing the water-loss. In tropical and subtropical deserts this indirect action of heat is a predominant factor. Soil temperatures are of much less importance, though they have much to do with germination and the activity of underground parts.

Wind Effects.— Wind influences plant life both directly and indirectly. Its mechanical action is marked in regions where forceful and constant winds prevail, notably seacoasts and high mountain peaks. Shrubs and trees become bent or prostrate, and their branches are de¬ veloped almost wholly on the leeward side. Over great open stretches where strong winds prevail, for example prairies and steppes, the plant forms are largely grasses and grass-like plants, which are not easily torn or whipped by the wind. As is well-known, winds play an ex¬ tremely important part in carrying the pollen of trees and grasses, and in scattering seeds and spores. Like heat, wind decreases the humidity of the air, and correspondingly increases the evaporation from leaf-surfaces. It does this by removing the more or less saturated air in contact with the plant, replacing it with air con¬ taining less moisture. This action is character¬ istic of the dry southwest winds in the corn-belt, which rapidly carry away the moisture of the leaves, causing the latter to curl, thus de¬ creasing the surface and affording some measure of protection. The stunted forest vegetation of arctic and alpine timber-lines is largely due to the drying action of almost constant winds. The direction, force, and duration of the wind must all be taken into account in the study of vegetation.

Soil Action. — The soil acts directly upon the behavior and form of plants by reason of its influence upon water-content and temperature.

In plant geography, all inorganic strata upon which plants grow are termed soils. The ex¬ treme types are rock and water, between which are found all manner of gradations from gravel to mud. The weathering of rocks produces two kinds of soils quite different in their behavior with respect to water. The one is loose and composed of large particles — for example, sands and gravels ; the other is composed of fine, compact particles, clays and loams. Sands and gravels absorb nearly all of the rain fall¬ ing upon them but much of the water taken up passes through and is carried away along some impervious stratum. What remains as water-content is readily absorbed by the root- hairs or is lost by evaporation from the soil. On account of the large air-spaces between the grains, the water in the lower layers is raised with difficulty by capillary action. Plants withdraw from loose soils nearly all of their water-content. Compact soils, especially clay do not absorb rain rapidly, and much of the latter is carried away by surface drainage. Water once absorbed is held tenaciously, and the loss by underground drainage is slight. The pores of the soil are fine, and capillarity plays an important part in raising water from the lower levels. The particles attract the water- films strongly, and in consequence clay yields its water to plant or air very slowly. Ordi¬ nary plants will wilt in clay soils which still contain as high as 12 to 30 per cent of water. Rock is all but absolutely impervious to water. Mosses and lichens alone can grow upon it, in consequence of their power to decompose the surface and their ability to withstand drying out. The amount of soluble material in the soil has a direct effect upon the growth of plants. Nearly all ordinary soils contain an adequate supply of soluble minerals; a few, however, are deficient in these, and are unable

to support more than a scanty vegetation. Other soils contain in excess soluble salts and acids which are harmful. The sparse, desert-like vegetation of salt basins and alkali wastes is due to the large quantities of sodium chloride, sodium carbonate, and other salts present. In swamps and bogs the decay of plant and animal remains uses up the available oxygen and thus hinders the absorptive powers of the roots. The kind of material in the soil and the fineness and compactness of the grains deter¬ mine its behavior with reference to the absorp¬ tion and radiation of heat. The color of the soil, the amount of water present, and other conditions have also to do with this matter. Rock is warmed most readily in the sunshine, and at night most readily parts with its heat. Water is at the other extreme; it warms up slowly and, conversely, yields its heat reluctantly.

Utilization of Moisture. — It is a well-estab¬ lished fact that plants in general are unable to absorb water-vapor from the air. The moisture

must be condensed into water, and then must regularly find its way into the soil before it can be used by the plant. A comparatively small number of plants, lichens, mosses, and tree¬ dwelling orchids absorb rain or dew directly through their leaf or thallus surfaces, but with the great majority of plants the water can only be taken in from the soil or substratum. The moisture of the air is condensed or precipitated in various forms — rain, dew, snow, sleet, hail, frost and fog. With the exception of the last, all of these contribute sooner or later to the water-content of the soil, the important differ¬ ence being that the solid forms usually melt grad¬ ually and are in consequence absorbed more completely. The water which falls upon the surface of the soil is partly absorbed, and partly carried away by drainage. The latter is known as ˆrun-ofP ; its amount will depend upon the compactness of the soil and the steepness of the slope. The absorbed water passes into the lower layers in part, where some of it is drained off as gravitation water, and some is retained as capillary water to be raised by pillary action into the upper layers of the soil. That which remains in the soil about the roots forms thin films about the soil-grains, and is known as the water-content. This alone can be used by the root-hairs. Part of it, however, is lost by direct evaporation from the soil. Rain has lit¬ tle or no mechanical action upon plants, except perhaps in the tropics, where it falls in torrents. In the form of ˆrun-off,® however, it acts powerfully upon the surface of hills and mountains, and plays in consequence an ex¬ tremely important part in the development of vegetation. Sleet and hail are very destructive in the breaking of twigs and branches and the cutting and tearing of leaves, but are of little importance because of their relative infrequence. Snow, on the other hand, has had a great deal to do with the forms of trees, particularly the pines, spruces, and firs, in northern and moun¬ tain regions. It is a poor conductor, and for this reason affords much protection to plant parts covered by it. Unlike rain, it is often unequally distributed ‘by the wind, and there¬ fore produces important local differences in the water-content of the soil.

Physiography. — The surface features of a region — its physiography — affect directly sev-

eral of the physical factors of habitats. Alti¬ tude not only influences the rainfall, but it also increases water-loss by reason of the reduced air-pressure and the decreased humidity. The sunlight may be stronger, as the rays pass through fewer air-layers, and are absorbed

in a less degree. The degree of slope is especially important, as it determines very largely the ra¬ tio between < and absorbed water. In mountain regions particularly, it modifies the angle at which the sun's rays strike the sur¬ face, and increases the amount of heat and light received. The exposure of the surface, that is, the direction in which it lies, affects the amount of heat and light, the intensity of the wind, and the snowfall. Furthermore, the character of the surface itself, whether level or uneven, will influence all of these factors in a less degree. Physiographic changes, such as elevation and subsidence, the erosion of river- valleys, and the upbuilding of swamps, deltas, etc., have a profound effect upon the distribu¬ tion of plants, and the development of vegeta¬ tion.

Vegetable, Animal and Human Factors. —

Dead vegetation increases the water-content of a habitat by checking the movement of the <(run-off,® and thus increasing the absorption, and by protecting the surface of the soil from excessive evanoration. It equalizes the soil temperature by hindering the warming action of the sun's rays, and the cooling effect of radia¬ tion. It also diminishes the force of the wind, and, finally, by decay, returns to the soil much of the nutrient material taken from it. Living vegetation has the same effect, but is different in that it constantly draws water and nourish¬ ment from the soil, and often reduces the amount of light present. The activities of animals and man are extremely diverse. Earth¬ worms and burrowing mammals enrich the soil by working it over repeatedly. Grazing animals have more or less effect upon grass¬ lands. Insects are fundamentally important in fertilization, and doubtless often act decisively in the struggle for existence by destroying some plants and not others. Man is a biological factor of the first importance, even if we leave out of consideration all the changes that he has brought about in plants and vegetation in conse¬ quence of cultivation. He changes habitats fundamentally by the removal of forests, by fires, by the construction of railroads and canals, by drainage, by irrigation, etc.

Classification of Habitats. — Habitats are usually grouped with respect to the two direct factors, water and light. They are first classed as wet, moist and dry and the moist habitats are further divided into sun and shade. Wet habitats comprise all bodies of water, oceans, lakes, ponds, springs, streams, swamps, marshes, river-banks, seashores, tanks, etc. Dry habitats are principally deserts, sandhills, prairies, gravel-slides, strands, dunes, bad lands, cliffs, rocks, heaths, humus-marshes, moors, alpine and polar barrens. Sunny moist lands are meadows, pastures, grain-fields and waste places. Shady moist habitats are forests, groves,

woodlands and thickets.

Effects of Habitat. — These, as regards the individual, are either evident or demonstrable, as in the case of the habitat form seen in bog- plants, shade-plants, etc., or they are obscure

and remote and can in consequence no longer be traced. The latter is true of vegetation forms — trees, shrubs, bulb-plants, etc. Three well-defined groups of habitat forms are recognized, based upon the water-content of habitats. These are water-plants (hydrophytes), moist-land or middle plants (mesophytes) , and desert plants (xerophytes). Upon the basis of light differences, mesophytes are further divided into sun-plants (heliophytes)', shade-plants (scio- phytes) and darkness-plants (scotophytes). Water plants owe their peculiar stamp to the fact that the water-supply is always greatly in excess of the water-loss. The roots are super¬ ficial in position, owing to the abundance of water at or on the surface of the soil. Root- surfaces are slightly developed and root-hairs often lacking, because the amount of water ren¬ ders absorption easy. The surplus of water is a disadvantage, however, as it reduces the amount of air in the soil and hence cuts off the supply of oxygen necessary for the activity of the roots. This lack of aeration is compensated by the development of large air-passages leading down from the leaves through the stem and roots. Stems and leaves are almost invariably smooth and without any sort of protective cov¬ ering. Breathing-pores are usually abundant and the necessity that the plant should lose a large amount of water has led to the develop¬ ment of water-pores and papillae. This struc¬ ture is typical of amphibious plants, that is, those that grow in the mud or in shallow water. Floating plants are usually much the same, with the exception that the breathing pores become useless and disappear on the under surface of the leaf, which is in contact with the water. Certain plants, such as the duckweed, have be¬ come greatly reduced in consequence of the floating habitat, and consist merely of a tiny, leaf-like disc, with a few rootlets. Submerged plants grow entirely beneath the water and are not subject to water-loss. As a result their lea

Desert-plants are in most respects the exact opposites of water-plants. Not only is the water-supply scanty, but all the 'factors which increase water-loss are present in a large de¬ gree. Such plants must use all their power of adaptation to absorb and store all the water they can and to lose just as little by evaporation as possible. The roots of desert-plants are for the most part deep-seated and branch for the most part only in the deeper, moist soil. They are covered elsewhere with a corky layer to pre¬ vent the loss of water where the root passes through the dry upper layers. In the moist soil, root-hairs are

produced in large numbers. In many cases the upper portion of the root consists of tissue especially adapted to the stor¬ age of water. The stems of xerophytes are short and stout. The leaves are thick and much reduced in size ; and in extreme forms they are entirely lacking. Both leaves and stems are covered with a thick coating of hairs, or wax, or the epidermis is greatly thickened, all for the purpose of protection against water-loss. The breathing-pores are generally confined to the underside of the leaf and are often sunken far

below the surface for still greater protection. In the cactus the leaves are reduced to mere scales and the stem often contracted into a cylinder or ball, thus decreasing the exposed surface to the minimum. Succulent plants, such as the live-for-ever and ice-plant have, on the other hand, been modified so that the leaves serve for the storage of water.. Lichens and mosses which grow on rocks are capable of withstanding extreme dryness, a faculty seem¬ ingly inherent in their protoplasm, as they are without ordinary protective contrivances.

Moist-land plants, or mesophytes, stand as intermediate between the two preceding groups. The water-supply, though not excessive, is usually sufficient, and the humidity of the air is great enough to preclude the danger of excessive water-loss. In consequence, mesophytes have well-developed, more or less branched, root-systems, which are usually intermediate in posi¬ tion, but many of them are deep-seated. The development of surface is moderate, as well as that of the protective cork. Stems are for the most part tall and vigorous and much-branched. The leaves are large and mostly entire, or at least rarely finely dissected.. Hairs are com¬ mon, but seldom compacted into a dense cover¬ ing. The epidermis is not greatly thickened and while the breathing-pores are often more abundant on the lower side, they are present in large numbers on both surfaces. The leaves of mesophytes are characterized regularly by com¬ pact rows of oblong cells placed at right angles to the surface, which are called palisade-tissue, and by loose irregular cells with large inter¬ cellular spaces, the sponge tissue. The former is usually in the upper, the latter in the lower half of the leaf. The palisade is differentiated in response to the action of strong light, while sponge-tissue results from the need of the rapid diffusion of the carbon dioxide and oxygen ab¬ sorbed from the air.

Sun-plants and shade-plants are especially different in their leaves ;

this is to be expected, as the leaf is the organ most dependent upon light. The root-system will be more superficial in shade-plants, as the moisture is nearer the surface of the soil in shaded than in 'sunny places. The stem will be more' slender, taller and often more branched, since it is necessary to place the leaves in the position to receive the most of the diffuse light. The leaves are broad, thin and entire, increasing the exposed surface, while in sun-plants they are thick and more or less divided. In typical shade-leaves, the pali¬ sade-tissue is reduced to a single row, or is al¬ together absent. The cells are not crowded closely and their longest axis often coincides with the epidermis of the leaf. Sun-leaves have one or more rows of typical palisade on the upper side and are frequently palisaded on the lower side also. The epidermis develops more wax and hairs in the sun; the breathing-pores are more numerous on the lower than upon the upper surface, while there is little difference in the shade.

Origin and Distinction of Forms. — Vege¬ tation-forms doubtless originated in response to physical conditions, but this relation is hardly evident to-day. We can only see in trees, shrubs, herbs, etc., an expression of the success which different plants have obtained in the struggle for existence. It is also evident that the vege¬

tation form of a plant has much to do with its persistence and hence with its importance in vegetation. The main groups of vegetation-forms are woody plants, herbs and thallus (flowerless) plants. The former are the largest, the most dominant, and the most persistent of all forms; the latter are tiny, subordinate and fleeting. The various woody forms are trees, shrubs, bushes and climbers ; the first are the most important, the last the least so. Trees con¬ stitute the most permanent type of vegetation, the forest, to which shrubs, bushes and climbers also contribute. The relation between these forms is easily seen in the development of a forest, in which bushes precede and are fol¬ lowed by shrubs ; these give way to the trees, the climbers coming in after the latter.

Herbs are specially distinguished from woody plants by their lack of woody stems and by the fact that their persistent parts are under¬ ground. They can never be very large, for their stems lack support, though they may per¬ sist for years. They are either perennial, blooming each year, or annual-biennial, bloom¬ ing at the end of the first or second year, and then dying. Various forms of herbs are dis¬ tinguished with reference to the position of the stem and leaves. In some, like the dande¬ lion, the leaves are grouped in rosettes in re¬ sponse to light and heat. In others, such as the everlasting, the plants are set close together for somewhat similar reasons and perhaps for

mutual protection also. Climbers, sweet peas, vetches, etc., develop partly for increased sup¬ port, partly to secure more light. Grasses form sod because of their abundant rootstalks ; it is this faculty which enables grasses to control the vegetation of meadows and prairies. Bunch- grasses are an exception, but they generally grow where the formation of a sod is impos¬ sible on account of unfavorable physical condi¬ tions. The position and abundance of herbs in a formation will depend also upon the char¬ acter of the underground parts. Species with underground runners or rootstalks will be more abundant and more widely distributed than those with nearly stationary bulbs or tubers. The vegetation forms of thallus plants play a very subordinate role in vegetation. Mosses, liverworts and lichens are regularly present in tree and herb formations, but their small size and transient nature make them of little im¬ portance. They are significant of the early stages of vegetation on rocks, new soils, etc., but they soon disappear before the grasses and other herbs. Fungi are entirely dependent upon their host plant or stratum and are relatively insignificant, except where they are necessary to the nutrition of the host, as in the case of cer¬ tain trees.

Plant Formations. — The vegetation of the earth's surface is not at all uniform, but con¬ sists of a large number of different areas, de¬ termined by climate and soil. The most exten¬ sive of these are known as formations, illus¬ trated by the deciduous forest of the Mississippi Basin, the prairie-plains grassland, and the sage¬ brush desert of the Great Basin. Each forma¬ tion is the product of a particular climate and hence represents the highest type of vegetation possible under it. For this reason, each forma¬ tion is often called a climax or climax forma¬ tion. The entire plant covering of the globe is

made up of such climax formations. These are far from continuous or uniform, however, owing to the interruptions due to bodies of water, outcrops of rock, fire, cultivation and other disturbances. In such areas are to be found pioneer communities which develop through a series of stages until the final stage or climax for that particular climate is reached. Thus, each formation consists of two kinds of communities, developmental or successional ones which disappear in turn until the final stage is reached, and climax ones which persist for long periods and over vast areas as long as the climate remains essentially the same. The climax divisions of a formation are known as associations, consociations and societies, and are well illustrated by the grassland

formation which covers the prairies and plains. The tall grasses of the prairie constitute one association made up of consociations of Stipa, Agropynwi and Koeleria, while the short grasses form a plains association consisting of the Bouteloua and Bulbulis consociations primarily. The socie¬ ties are due to the presence of characteristic per¬ ennial herbs such as Amorpha, Psoralea, Aster, Solidago, etc., which dominate more or less dis¬ tinct areas within the association.

Areas or Formations. — The vegetation of the earth's surface is not at all uniform, but consists of a multitude of different areas, each corresponding to a habitat. These areas are called formations and each is composed of an association or groups of plants determined by the physical factors of its habitat. A pond will be occupied by a community composed of water- plants ; a forest formation will consist of me- sophytes, and desert plant formations will be found in dry, sandy regions. Even within each formation it will be found that the plants are not uniformly distributed; some will occur in masses, while others are scattered singly, and one species will be met again and again, while another will be found but once. Furthermore, communities are not fixed groups of plants. One species will find that the conditions of life be¬ come more and more difficult; and will gradu¬ ally disappear. Other species will prosper and increase rapidly in number, this very prosperity often producing the conditions unfavorable to another. The seeds of species from other places will be brought in by the wind, by birds or by animals, and will find a new home, or, after struggling for a while, the plants will disappear. Frequently, new plants come in to such a degree that they finally replace the original species en¬ tirely and the community is replaced by a new one.

The development of a formation may be readily followed where rocks are disintegrating, or where an original vegetation has been re¬ moved by fire. In the first case, the pioneer plants are small crust-like lichens, which de¬ compose the surface of the rock, and by their decay prepare a thin soil for the larger leaf- like forms, which sooner or later appear. With these usually enter the rock mosses and the two by their activity and ultimate decay finally form a soil sufficient for some of the grasses and other herbs which are able to withstand extreme dryness. Meanwhile, the action of rain and frost has produced rifts in the rocks, which are first filled with mosses, and then by a soil deep enough to support larger plants. The ultimate

result of the activity of these various factors is the breaking down of the rock into soil. In the case of the harder rocks, this will be a coarse sand or gravel ; with the softer ones, it is a fine sand or marl. At this

stage, leaf-like lichens and mosses play some part in binding the soil particles together, but they soon dis¬ appear before the grasses, which in their turn yield in a few years to other herbs. These are sooner or later displaced by bushes and shrubs and the latter make way for the trees which mark the close of the process. Such a primary succession takes place very slowly and may of¬ ten extend over a century or more. When a forest is burned, the revegetation is much more rapid, as the soil is already prepared and the succession is termed secondary. Tiny mosses and fungi first appear and in a year or two at the most are replaced by low herbs. These disappear before the invasion of grasses and “fireweed,® and these are replaced by fast¬ growing trees, such as the birch and the aspen. Such trees are usually shortlived and are dis¬ placed after a decade or so by pines, spruces or firs, which in many cases are at last conquered by the hardwoods. It is significant of the plants of each stage of such successions that they bring about conditions in their action upon the habi¬ tat which finally cause their own disappearance. Each stage represents a community, but the change from one stage to the next takes place so slowly that it is not at all uncommon to find associated with the plants typical of one stage some survivors of the preceding community, as well as a few pioneers of the next stage.

Migration of Plants. — The movement of plants in vegetation is known as migration. In the case of the simple water-plants, the algae, the whole plant moves of its own accord, or is carried by some agent. The same holds for a few of the flowering plants of floating habit. All terrestrial plants are fixed, however, and migration must act regularly upon the spore or seed. In tumbleweeds, the whole plant is fre¬ quently carried away by the wind, but it is no longer in a living condition. Spores are readily scattered by the wind on account of their light¬ ness, but seeds and fruits have been especially modified for migration on account of their greater weight. Plants growing in or near the water often have fruits with corky or inflated envelopes, which serve to keep them afloat. The great majority of the modifications for securing migration, however, are concerned with wind and animals. In the former, the con¬ trivances are uniformly for the purpose of light¬ ening the fruit or seed, so that it may readily be carried by the wind. Fruits that are to be distributed by animals are provided with spines, hooks or glands for attachment, or are made attractive by a bright or edible envelope. Wind- carried fruits are especially common; they are provided with wings, as in the maple; with hairs, as in the milkweed, and with parachute-like tufts, as in the dandelion. Man plays the most important part of all distributive agents, if vol¬ untary as well as involuntary carriage be con¬ sidered.

He has carried cultivated plants and weeds all over the globe and to thousands of places where they could never have gone of themselves.

The movement of the seed or fruit of a spe¬ cies into a new formation or country is often

FLAX

MOPS

VANILLA

COTTON

CACAO

HEMP

MAIZE

SUGAR CANE

BEET SUGAR

SORGHUM

COPYRIGHT, lvl l, BY F. E. WRIGHT,

PLANTS OF

GREAT COMMERCIAL VALUE

determined by natural barriers. Winds bear seeds for long distances, but they are powerless to carry them across oceans, or over high mountain ridges.. Similarly, a desert region is a barrier to seeds brought from a moist climate, and a cold climate prevents the naturalization of species coming from a* warm country. The chance that seeds will germinate and grow is greatest when they are carried into a habitat similar to the original one and it is least when they are left in habitats very different from it. It is unquestionable that seeds have often been carried into many places where they were un¬ able to secure a foothold. This fact explains why many species are found only in certain countries, or localities, and why it is that each formation

retains a more or less distinctive impress.

North American Vegetation. — The vege¬ tation of the North American continent owes its general features to the gradual decrease of heat to the northward, and the more or less con¬ stant decrease in the rainfall in passing from the coasts to the interior. The greatest develop¬ ment of forests is found in the warm coast- regions of the southeast, and of the Pacific. The poorest vegetation is found in the north, and on high mountains, where the temperatures are low, and in the interior where the rainfall is slight. The character and distribution of vegetation are chiefly determined by heat and water. As a result, the vegetative covering falls into zones corresponding in a general way to zones of tem¬ perature. If the distribution of moisture were uniform over the continent, the series of zones would be as follows: (1) the zone of ever¬ green tropical and subtropical trees; (2) the zone of deciduous trees; (3) the zone of cone¬ bearing trees ; (4) the zone of grasses and other herbs; (5) the zone of mosses and lichens; (6) the zone of ice and snow. The rainfall de¬ creases regularly from the coast inland, while a high mountain range makes an abrupt change in the amount. The Appalachian, Rocky Moun¬ tain and Sierra Nevada ranges act as barriers to the passage of moisture-laden winds, and turn into- grass land or desert, regions that are sufficiently warm to be forested. The Appa¬ lachian barrier is too low to be very effective, and the forests yield to prairies only slowly and far inland. The Sierra Nevada and the Rocky Mountains are almost complete barriers, and they enclose a parched desert. The height of these ranges causes an abundant condensation on their slopes, and in consequence they are more or less heavily wooded. On account of the altitude, the temperature is low, and the forests are merely southerly extensions of the great boreal zone of pines and spruces. A general survey of the North American conti¬ nent would show it to be wooded on the eastern, western, and southern coasts. In the north, there is a zone of grass and moss-covered bar¬ rens. In the interior there is a region of plain and prairie, stretching unbroken from Atha¬ basca to Texas, and between the two great Cordilleran ranges from Washington to Central America lies a great desert region, broken re¬ peatedly by intersecting lines of mountains. Running southward from the great northern forest mass of the continent are the three mountain systems. In the low Appalachian system, the arctic vegetation of the north is found on a few alpine peaks alone, but in the

higher Rocky Mountains and the Sierra Nevada this long southward extension of dwarf herbaceous vegetation is almost continuous. All carry the northern pines and spruces far south, but in the lower range, these disappear in Virginia, while on the higher ranges they persist

almost to the Mexican boundary. North Amer¬ ica is thus seen to be covered with belts of vegetation running east and west, which are completely interrupted in the interior by high mountain ranges, which, together with the Appa¬ lachians, also serve to carry the northern forests southward in three long tongues.

Frederic E. Clements, Carnegie Institution of Washington.

PLANT INDUSTRY, Bureau of. See

Agriculture, Department of.

PLANT-LOUSE. See Aphid.

PLANT SOCIOLOGY. See Ecology; Plant Geography.

PLANTAGENET, plan- taj ‘e-net, a family whose various branches occupied the throne of England from the reign of Henry II (1154) until the accession (1485) of Henry VII, the representative in the female line of the Lancas¬ trian branch of it, who, by his marriage (1486) with Elizabeth of York, daughter of Edward IV, representative of the York branch, united its various branches in the house of Tudor, of which he was the direct descendant. On the death of Henry I the Crown was claimed by his daughter, Maud or Matilda, first married to Henry V, emperor of Germany, and after¬ ward to Geoffroi V, Count of Anjou, surnamed Plantagenet, on behalf of her son by the latter, Henry Plantagenet. Stephen obtained it during his lifetime and was succeeded on his death by Henry, who became the first of the Plan¬ tagenet kings. The name is said to have been derived from the circumstance of the Count of Anjou wearing a branch of broom (plante de genet) in his cap. The direct line became extinct in Richard II (1399), before whose death the Crown was usurped by Henry IV, son of John of Gaunt, Duke of Lancaster, 4th son of Edward III, in prejudice of Edmund and Anne Mortimer, the descendants of Lionel, Duke of Clarence, 3d son of the same Edward. He was succeeded by his descendants, Henry V and Henry VI, and during the reign of the latter, Edmund Mortimer having died without heirs, Richard, Duke of York, son of Anne Mortimer, who had married the heir of Ed¬ mund, Duke of York, 5th son of Edward III, claimed the Crown. This occasioned the wars of the Roses, which terminated in the accession of Henry VII, as above mentioned. See Eng¬ land, History; and articles on individual monarchs.

PLANTAIN, several species of Plantago, a genus of the family Plantaginacece. Most of the 200 or more widely distributed species are

weedy herbs or subshrubs. The best known species is the common plantain or ribgrass, an abundant weed throughout most of North America. It is a native of Europe, but was spread so rapidly by human agencies in Amer¬ ica that the Indians sometimes called it ((white man's foot.® The leaves are sometimes used as pot herbs. Another well-known species is Eng¬ lish plantain or ribwort (Plantago lanceolata) , in America a pernicious lawn weed, but some¬ times used in Europe upon sterile and dry soils

as a fodder plant, the hot, dry summers favor¬ ing its .growth in the United States and re¬ ducing the resistance of the grass. The only safeguards against it are thorough preparation and enrichment of the ground before planting to lawn, careful selection of pure lawn-grass seed and persistent care both in annual attention to the needs of the grass and the weeding. The seeds are used for bird-feeding. Numer¬ ous species are natives of North America.

PLANTAIN, Adam's Fig, or COOKING BANANA, a tropical herb of the family Mu-

sacece, considered as a distinct species (Musa paradisiaca) by some botanists and as a variety of the common banana by others. From India, where it is native, it has been taken by man to all tropical countries, and it forms a staple food both eaten raw and cooked in a variety of ways. It is, however, less palatable in the fresh state than the banana. The plants are propagated by suckers or cuttings of the root- stock. The former are cut from the parent plant with a spade and set where desired. The latter are transplanted from a propagating bed when they have one or two leaves. They suc¬ ceed best in moist, rich soil. When about 18 months old they should bear a cluster of fruits, after which the stalk dies and new sprouts take its place and so continue for years.

. PLANTAIN-EATERS, a family (Muso- phagidce) of African picarian birds, classified near the parrots, with notched or saw-edged bills and usually of brilliant colors. The genus Musophaga, in which the base of the bill spreads over the forehead like a broad plate, includes the most typical West African forms. These birds feed chiefly upon the fruit of the banana and plantain. The members of the genus Turacus (or Corythaix), called ((1893-96).

PLANTATION, a term anciently used to designate a colony. Plantations, according to Blackstone, are colonies where the lands are claimed by the right of occupancy only, by finding them desert and uncultivated, and peo¬ pling them from the mother country; or where, when already cultivated, they have been either gained by conquest or ceded by treaties. The term came into use in the United States in colonial times and is still preserved in the official title of the State of Rhode Island, namely, <(Rhode Island and Providence Planta¬ tions. w The plantations of the southern United States were the chief centres of aristocracy before the emancipation of the negro slaves. Changing conditions are rapidly wiping out the old-time plantation, which is characteristic of agricultural countries, and disappears in the march of industry. The word plantation be¬ came popular in an extended and different meaning in the South, where it is still used to designate a large section of cultivated land; the estate of a large landed proprietor — equiv¬

alent to the (< ranch® of the western United States or the hacienda of South America.

PLANTIGRADE ANIMALS, those which in stepping place the heel and yvhole sole of the foot upon the ground, for example, bears ; as opposed to digitigrade animals, for example, cats, dogs, which step upon their toes. The term was applied by Cuvier to a section (Plantigrada) of the Carnivora, but has now no significance in classification.

PLANTIN, plan-tan, Christophe, French printer: b. Saint Avertin, France, 1514; d. Antwerp, 1 July 1589. He established at Ant¬ werp in 1555 a printing press which became famous for the character of the work produced and later founded presses at Leyden and Paris. His most celebrated work is the (Biblia Poly- glotta) (8 vols., 1568-73). His office in Ant¬ werp was purchased in 1877 by the city and now constitutes the Muse Plantin-Moretus. Consult (Life) by Rooses (1892).

PLANTS, Alpine. See Alpine Plants. PLANTS, Beach. See Beach Plants.

PLANTS, Breeding of. Fundamental Prin¬ ciples. — Only the most limited view of plant¬ breeding can be given in an ordinary thesis. It would be necessary to extend the subject through many volumes to give even a general view of what has already been demonstrated, and that which the clear light of science has yet to bring forth from the depths is too extensive even for the imagination to grasp, except through a full knowledge of what practical field-work has already accomplished.

The fundamental principles of plant-breed¬ ing are simple, and may be stated in few words ; the practical application of these principles de¬ mands the highest and most refined efforts of which the mind of man is capable, and no line of mental effort promises more for the eleva¬ tion, advancement, prosperity and happiness of the whole human race.

Every plant, animal and planet occupies its place in the order of Nature by the action of two forces — the inherent constitutional life-force with all its acquired habits, the sum of which is heredity; and the numerous compli¬ cated external forces or environment. To guide the interaction of these two forces, both of which are only different expressions of the one eternal force, is, and must be, the sole object of the breeder, whether of plants or animals.

When we look about us on the plants inhab¬ iting the earth with ourselves, and watch any species day by day, we are unable to see any change in some of them. During a lifetime, and in some cases perhaps including the full breadth of human history, no remarkable change seems to have occurred. And yet there is not to-day one plant species which has not undergone great, and to a certain extent con¬ stant change.

The life-forces of the plant in endeavoring to harmonize and adapt the action of its ac¬ quired tendencies to its surroundings may, through many generations, slowly adapt itself to the necessities of existence, yet these same accrued forces may also produce sudden, and to one not acquainted with its past history most surprising and unaccountable, changes of char¬ acter. The very existence of the higher orders

of plants which now inhabit the earth has been secured to them only by their power of adap¬ tation to crossings, for through the variations produced by the combination of numerous ten¬ dencies, individuals are produced which are bet¬ ter endowed to meet the prevailing conditions of life. Thus to Nature's persistence in cross¬ ing do we owe all that earth now produces in man, animals or plants; and this magnificently stupendous fact may also be safely carried into the domain of chemistry as well, for what is common air and water but Nature's earlier ef¬ forts in that line, and our nourishing foods but the result of myriad complex chemical affinities of later date?

Natural and artificial crossing and hybridi¬ zation are among the principal remote causes of nearly all otherwise perplexing or unaccount¬ able sports and strange modification, and also of many of the now well-established species. Variations, without immediate antecedent cross¬ ing occur always and everywhere from a combi¬ nation of past crossings and environments, for potential adaptations often exist through gener¬ ations without becoming actual, and when we fully grasp these facts there is nothing myste¬ rious in the sudden appearance of sports; but still further intelligent crossings produce more immediate results and of great value, not to the plant in its struggle with natural forces, but to man, by conserving and guiding its life-forces to supply him with food, clothing and innumer¬ able other luxuries and necessities. Plant-life is so common that one rarely stops to think how utterly dependent we are upon the quiet, but magnificently powerful work which they are constantly performing for us.

It was once thought that plants varied within the so-called species but very little, and that true species never varied. We have more lately discovered that no two plants are ever exactly alike, each one having its own individuality, and that new varieties having endowments of priceless value, and even distinct new species, can be produced by the plant-breeder with the same precision that machinery for locomotion and other useful purposes are produced by the* mechanic.

The evolution and all the variations of plants are simply the means which they employ in ad¬ justing themselves to external conditions. Each plant strives to adapt itself to environment with as little demand upon its forces as possible and still keep up in the race. The best-endowed species and individuals win the prize, and by variation as well as persistence. The constantly varying external forces to which all life is everywhere subjected demand that the inherent internal force shall always be ready to adapt itself or perish.

The combination and interaction of these in¬ numerable forces embraced in heredity and en¬ vironment have given us all our bewildering species and varieties, none of which ever did or ever will remain constant, for the inherent life- force must be pliable or outside forces will sooner or later extinguish it. Thus adaptabil¬ ity, as well as perseverance, is one of the prime virtues in plant as in human life.

Plant-breeding is the intelligent application of the forces of the human mind in guiding the inherent life-forces into useful directions by crossing to make perturbations or variations and new combinations of these forces, and by VOL. 22 — 11

radically changing environments, both of which produce somewhat similar results, thus giving a broader field for selection, which again is simply the persistent application of mental force to guide and fix the perturbed life-forces in the desired channels.

Plant-breeding is in its earliest infancy. Its possibilities, and even its fundamental princi¬ ples, are understood but by few; in the past it has been mostly dabbling with tremendous forces, which have been only partially appre¬ ciated, and it has yet to approach the precision which we expect in the handling of steam or electricity, and, notwithstanding the occasional sneers of the ignorant, these silent forces em¬ bodied in plant-life have yet a part to play in the regeneration of the race which by compari¬ son will dwarf into insignificance the services which steam and electricity have so far given. Even unconscious or half-conscious plant¬ breeding has been one of the greatest forces in the elevation of the race. The chemist, the me¬ chanic have, so to speak, domesticated some of the forces of Nature, but the plant-breeder is now learning to guide even the creative forces into new and useful channels. This knowledge is a most priceless legacy, making clear the way for some of the greatest benefits which man has ever received from any source by the study of Nature.

A general knowledge, of the relations and affinities of plants will not be a sufficient equip¬ ment for the successful plant-breeder. He must be a skilful botanist and biologist, and having a definite plan, must be able to correctly esti¬ mate the action of the two fundamental forces, inherent and external, which he would guide.

The main object of crossing genera, species, or varieties is to combine various individual tendencies, thus producing a state of perturba¬ tion or partial antagonism by which these tendencies are, in later generations, dissociated and recombined in new proportions, which gives the breeder a wider field for selection ; but this opens a much more difficult one — the selection and fixing of the desired new types from the mass of heterogeneous tendencies produced, for by crossing bad traits as well as good are al¬ ways brought forth. The results now secured by the breeder will be in proportion to the ac¬ curacy and intensity of selection, and the length of time thev are applied. By these means the best of fruits, grains, nuts and flowers are capable of still further improvements in ways which to the thoughtless often seem unneces¬ sary, irrelevant or impossible.

When we capture and domesticate the vari¬ ous plants, the life-forces are relieved from many of the hardshins of an unprotected wild

condition, and have more leisure, so to speak, or, in other words, more surplus force, to be guided by the hand of man under the new en¬ vironments into all the useful and beautiful new forms which are constantly appearing under cultivation, crossing and selection. Some plants are very much more pliable than others, as the breeder soon learns. Plants having numerous representatives in various parts of the earth generally possess this adaptability in a much higher degree than the monotypic species, for having been subjected to great variations of soil, climate and other influences, their contin¬ ued existence has been secured only by the in¬ herent habits which adaptation demanded, while

the monotypic species not being able to fit themselves for their surroundings without a too radically expensive change, have continued to exist only under certain special conditions. Thus two important advantages are secured to the breeder who selects from the genera having numerous species — the advantage of natural pliability, and in the numerous species to work upon by combination for still further variations.

The plant-breeder before making combina¬ tions should with great care select the indi¬ vidual plants which seem best adapted to his purpose, as by this course many years of experi¬ ment and much needless expense will be avoided. The differences in the individuals which the plant-breeder has to work upon are sometimes extremely slight. The ordinary un¬ practised person cannot by any possibility dis¬ cover the exceedingly minute variations in form, size, color, fragrance, precocity and a thousand other characters which the practised breeder perceives by a lightning-like glance. The work is not easy requiring an exceedingly keen perception of minute differences, great practice, and extreme care in treating the or¬ ganisms operated upon, and even with all the naturally acquired variations added to those secured by scientific crossing and numerous other means the careful accumulation of slight individual differences through many ‘generations is imperative, after which several generations are often, but not always, necessary to thor¬ oughly <(fix® the desired type for all practical purposes.

The above applies to annuals or those plants generally reproduced by seed. The breeder of plants which can be reproduced by division has great advantage, for any valuable individual variation can be

multiplied to any extent desired without the extreme care neces¬ sary in fixing by linear breeding the one which must be reproduced by seed. But even in breeding perennials the first deviations from the original form are often almost unappreciable to the perception, but by accumulating the most minute differences through many generations the deviation from the original form is often astounding. Thus by careful and intelligent breeding any peculiarity may be made per¬ manent and valid new species are at times pro¬ duced by the art of the breeder and there is no known limit to the improvement of plants by education, breeding and selection.

The plant-breeder is an explorer into the infinite. He will have <(No. time to make money,® and his castle, the brain, must be clear and alert in throwing aside fossil ideas and rapidly replacing them with living, throbbing thought followed by action. Then, and not till then, shall he create marvels of beauty and value in new expressions of materialized force, for everything of value must be produced by the intelligent application of the forces of nature which are always awaiting our com¬ mands.

The vast possibilities of plant-breeding can hardly be estimated. It would not be difficult for one man to breed, a new rye, wheat, bar¬ ley, oats or rice which would produce one grain more to each head or a corn which would produce an extra kernel to each ear, another potato to each plant or an apple, plum, orange or nut to each tree.

What would be the result ? In five staples

only in the United States alone the inexhaustible forces of Nature would produce annually, without effort and without cost. 5,200,000 extra bushels of corn, 15,000,000 extra bushels of wheat, 20,000,000 extra bushels of oats, 1,500,000 extra bushels of barley, 21,000,000 extra bushels of potatoes.

But these vast possibilities are not alone for one year or for our own time or race, but are beneficent legacies for every man, woman and child who shall ever inhabit the earth. And who can estimate the elevating and refining influence and moral value of flowers with all their graceful forms and bewitching shades and combinations of colors and exquisitely varied perfumes? These silent influences are unconsciously felt even by those who do not appreciate them consciously, and thus with better and still better fruits, nuts, grains and flowers will the earth be transformed, man’s thoughts turned from the base, destructive forces into the nobler productive ones which will lift him to higher planes of action toward that fiappy day when man

shall offer his brother man, not bullets and bayonets, but richer grains, better fruits and fairer flowers.

Cultivation and care may help plants to do better work temporarily, but by breeding, plants may be brought into existence which will do better work always in all places and for all time. Plants are to be produced which will perform their appointed work better, quicker and with the utmost precision.

Science sees better grains, nuts, fruits and vegetables, all in new forms, sizes, colors and flavors, with more nutrients and less waste and with every injurious and poisonous quality eliminated and with power to resist sun, wind, rain, frost and destructive fungus and insect pests; fruits without stones, seeds or spines; better fibre, coffee, tea, spice, rubber, oil, paper and timber trees, and sugar, starch, color and perfume plants. Every one of these and 10,000 more, are within the reach of the most ordinary skill in plant-breeding. On the plant-breeder •now rests one of the next great world move¬ ments, the guidance of the creative forces are in our hands.

Man is slowly learning that he too may guide the same forces which have been through all the ages performing this beneficent work which he sees everywhere above, beneath and around him in the vast teeming animal and plant life of the world.

These lines were penned among the heights of the Sierras, while resting on the original material from which this planet was made. Thousands of ages have passed and it still re¬ mains unchanged. In it no fossils or any trace of past organic life are ever found, nor could any exist, for the world creative heat was too intense. Among these dizzy heights of rock, ice-cleft, glacier-plowed and water-worn, we stand face to face with the first and latest pages of world creation, for now we see also tender and beautiful flowers adding grace of form and color to the grizly walls and far away down the slopes stand the giant trees, oldest of all living things, embracing all of human his¬ tory; but even their lives are but as a watch- tick since the stars first shone on these barren rocks, before the evolutive forces had so

gloriously transfigured the face of our planet home.

Luther Burbank.

PLANTS, Classification of. Vegetable kingdom. All the plants in the world are most easily considered in systematic order, especially with reference to their arrange¬ ment in branches, classes, orders, etc. On account of the vast numbers of known species of plants (nearly 250,000) it is necessary that they should be arranged in an orderly system, for in this way only can we readily refer to or remember them. Of course, there may be many useful systems of plants, that is, systematic arrangements of the thousands of species, and in fact many systems have been proposed from time to time by different botan¬ ists. More than 300 years ago, Cesalpino, in Italy, proposed a system in which the 15 classes which he recognized were separated primarily into “trees® and “herbs,® and these were again distinguished by their fruits and seeds. A half century later Morison, in England, devised a system of 18 classes based upon characters of the plant as a whole (trees, shrubs, herbs, etc.), the inflorescence and the fruit. About 200 years ago Ray, in England, published his system of 23 classes, in which he still adhered to the time- honored primary division into “herbs® and “trees,® the former of which he divided into the “imperfect® (seaweeds, fungi, mosses, ferns, etc.), and the “perfect® herbs. His “perfect® plants were divided into “dicotyledons® and “monocotyledons,® as they are to this day, and several of his classes were practically identical with some of the families of the present time, as Umbelliferae, Leguminosae, grasses, etc. About the same time Bachmann, in Germany, proposed a system in which he rejected the com¬ mon division into trees, shrubs and herbs, and based his 18 classes upon the form of the flower ; first, whether regular, irregular or in¬ complete, and then, whether monopetalous, dipetalous, tripetalous, etc. At the same time Tournefort, in France, proposed still another system and based his 22 classes on characters derived from the corolla. However, he still adhered to the division into herbs and trees. Linne, in Sweden, a little more than 160 years ago gave the world his so-called sexual system, in which the number and relation of the stamens characterized the 24 classes, which were again divided into orders, mainly upon characters derived from the pistils. This system, while quite artificial, was very useful in enabling botanists to arrange their rapidly increasing knowledge of plants, and it was very generally used for a century.

We owe to Linne also the suggestion of a more natural system, which he published in fragmentary form contemporaneously with his sexual system. He recognized the greater groups Acotyledons, Monocotyledons, Dicotyle¬ dons and Polycotyledons, and such smaller ones as the Orchideae Liliaceae, Gramina, Coniferae, Amentaceae, Compositi, Umbellatae, Bicornes, Pomaceae, Drupaceae, Caryophyllei,

Asperifoliae, Stellatae, Papilionaceae, Siliquosae, Personatae, Filices, Musci, Algae, Fungi, etc., which have since been incorporated into most natural sys¬ tems under these or slightly different names. Half a century later this bore fruit in the sys¬ tem of Jussieu (in France) which divided the

vegetable kingdom into Acotyledons, Monoco¬ tyledons, and Dicotyledons, and recognized 15 classes and 100 families. The dicotyledons were divided into Apetalae, Monopetalae and Polypetalae, and the higher families were essen¬ tially identical with many of those now gen¬ erally recognized. Thirty years later (1819) DeCandolle modified Jussieu's system, revers¬ ing the sequence so as to proceed from the higher to the lower, and dividing the petalifer- ous dicotyledons into the Thalamiflorals, Caly- ciflorals and Corolliflorals. He recognized 161 families of plants of all kinds. Over 50 years ago the Candollean system was further modi¬ fied by Bentham and Hooker, and until re¬ cently this has been the commonly accepted system in English and American botanical textbooks.

Chart showing the relationship of the phyla of the Vege¬ table Kingdom, the respective areas being proportional to the present number of species in each phylum.

About 35 years ago Eichler (in Germany) published his system, in which the vegetable kingdom was separated into five "divisions,® — Thallophyta, Bryophyta, Pteridophyta, Gymnos- permae, and Angiospermae, and under these were about eight classes and nearly 40 orders. This by modification has given rise to the sys¬ tem of Engler (in Germany) now in common use in the United States, which in its latest form recognizes 13 primary "divisions® of the vegetable kingdom, 38 classes, about 100 orders and nearly 600 families.

The system outlined below, while conform¬ ing in numerous points with that of Engler,

differs from it in many fundamental as well as minor points. It is an attempt to make the system conform to the author's conception of the course of evolution in the vegetable king¬ dom. The general relations of the classes to one another may be indicated by the chart on the preceding page.

Phylum I. Myxophycete. — The Slime Algae — Single cells or groups or threads of cells ; blue-green to brown-green or in some cases colorless; reproduction typically by fission, rarely by internal cell formation ; sexual repro¬ duction lacking; cell walls usually soft; often secreting a gelatinous substance within which the plants remain imbedded. Fresh water and marine, one order hysterophytic and omnipres¬ ent. Two classes are recognized.

Class 1. Archiplastidece. Nucleus illy de¬ fined ; chloroplasts not differentiated ; cell walls containing chitin. About 2,000 species.

Order 1. Chroococcales. The plants of this order are strictly unicellular or grouped into irregular or regular colonies, but not filament¬ ous; coloring matter present. (Fig. 1). Two families, mostly of fresh water.

2

X

Fig. 1. — A cell of Chroococcus in process of fission; much magnified.

Fig. 2. — Part of a filament of Oscillatoria; much magnified. Fig. 3. — A cell of Protococcus which has divided into three cells, which have not yet separated; much mag¬ nified.

Fig. 4. — A young filament of Uronema; much magnified. Fig. 5. — Parts of two filaments of Spirogyra just before the fusion of the protoplasm of contiguous cells; much magnified.

Fig. 6. — Part of plant of Vaucheria, showing root below and green filament above, with antherid and two oogones; much magnified.

Fig. 7. — A whole plant of Dictyoneuron ; much reduced.

Order 2. .Oscillato Hales. In this order the cells are in threads which mostly do not branch; colored blue-green to brown-green ; some spe¬ cies inhabit hot springs. Six families, includ¬ ing such genera as Oscillatoria (Fig. 2), Nos- toc, Rivularia, etc.

Order 3. Bacteriales. The Bacteria. Usu¬ ally minute, filamentous, or by the early solu¬ tion of the filament few or one celled; lacking chlorophyll, hence saprophytic or parasitic on plants or animals, frequently causing diseases; some genera motile by flagella. A large and important group of omnipresent forms of the utmost importance. The larger filamentous forms are certainly closely related to the fore¬ going order, but there is considerable uncer¬ tainty as to the

relationship of the more minute, one-celled genera. Seven or more families.

Class 2. Holoplastidece. Nucleus with defi¬ nite membrane; typical chloroplasts present. Only one order of about 20 species.

Order 4. Glaucocystales. Minute, one-celled, fresh water algae.

Phylum II. Chlorophyceal — The Simple Algae. Single cells, irregular or regular colo¬ nies, plates or most often filaments of cells; bright green, or rarely colorless ; nucleus with membrane; chloroplasts well developed; cell walls of cellulose or related substance; repro¬ duction by fission or internal development of zoospores or both, and usually also by the union of equal motile gametes or small motile sperm and feebly motile or non-motile egg to form a thick-walled zygote. Chiefly fresh water plants, a few genera, however, almost exclusively marine. Two classes are here rec¬ ognized.

Class 3. Protococcoidece. The Green Slimes. The plants of this class are strictly unicellular or united into irregular or regular colonies; mainly found in fresh water or moist places. Over 400 species, many world-wide in their dis¬ tribution. One of the latter, Protococcus (Fig. 3), forms a green, paint-like coating on damp walls, tree trunks, etc. Two orders are recog¬ nized.

Order 5. Tetrasporales. The plants of this small order are embedded in gelatinous colonies, or provided with gelatinous stalks in some of the genera that do not form colonies. Repro¬ duction is both by division of the cells and by zoospore formation, frequently besides by the union of equal motile gametes. Perhaps four families should be distinguished.

The order Volvocales is clearly closely re¬ lated to the foregoing order, but is distinguished by the fact that the cells retain their flagella and remain motile, even in their vegetative state. On the other hand they present no sharp line of demarcation from the Flagellates among the animals, so that it seems best to exclude this order from the vegetable kingdom, looking upon it as perhaps the bridge between the two kingdoms.

Order 6. Protococcales. In this order the plants lack the gelatinous stalks or matrix. Furthermore, with a very few exceptions of rather uncertain relationship, the asexual repro¬ duction takes olace only by the internal division of the vegetative cells into motile zoospores or non-motile autospores, the ordinary type of fission of the cells being

absent. Those forms with zoospores frequently also possess sexual reproduction by the union of equal or unequal motile gametes. All of the 10 or more families are green except the Synchytriaceae, which con¬ sist of minute parasites in the cells of higher plants.

Class 4. Confervoidea. The Confervas are filamentous (rarely stratose) plants which may be branched or less often simple. The color is usually bright green. Asexual reproduction is mostly by the setting free of motile zoo¬ spores, although in some genera these are re¬ placed by autosphores. Sexual reproduction shows all gradations from the union of gametes which are equal and motile to those in which both gametes are motile but unequal and finally to forms where only the small sperm cells are motile while the eggs are large and non-motile within the mother cell (oogone). While a few forms are marine the great majority occur in fresh water. In moist climates many species are terrestrial and some are found on the

leaves of tropical evergreen trees. A few species enter such leaves and pass a partially parasitic existence. Over 600 species distributed unequally among five orders, of which the fol¬ lowing are the most important :

Order 7. Chcetophorales. Unbranched or mostly branched filaments, usually attached; in one family, sheets or tubes of cells; sometimes flat discs ; cells normally with one chloroplast with but a single pyrenoid, and with a single nucleus; cell wall usually in one piece; asexual reproduction by various types of zoospores; sexual reproduction by the union of equal or unequal motile gametes. The plants of this order vary considerably in size. The delicate unbranched thread-like Uronema (Fig. 4) is barely one of two millimeters long, while some of the beautiful, much branched species of Draparnaldia exceed 10 centimeters in length. The delicate marine plants known as Sea Let¬ tuce from their resemblance to a leaf of lettuce, are sometimes over a metre long.

Order 8, Microsporales and order 9, Prasi- alales, each with but a single family and but few species, are filamentous algae undoubtedly related to the foregoing order and by some au¬ thors included in it.

Order 10, Oedogoniales consist entirely of fresh- water filamentous forms, ˆeither unbranched or branched. The asexual reproduction is by

means of large zoospores produced singly in the vegetative cells of the filament. In their sexual reproduction a higher stage is attained than in any of the groups yet mentioned. In certain specially modified cells are produced one or two small, motile sperms which swim to the large non-motile eggs which are produced singly in special, swollen cells which are provided with an opening to permit the entrance of the sperm. There are approximately 250 species known from all parts of the world, divided into three genera, forming one family.

Order 11. Coleochcstales. The few species of the single genus of this order are exclusively fresh-water forms and small. They live attached to objects in the water, such as stems of plants, sticks, etc., and form more or less circular discs (Fig. 10) or more rarely low cushions, in which the branched filaments are radially ar¬ ranged. Many of the cells bear long, bristle¬ like extensions. Asexual reproduction consists of the formation of motile zoospores, singly in the vegetative cells ; sexual reproduction occurs by the union within the usually long-necked oogone of the single large, non-motile egg and a small motile sperm which has been produced singly in a small terminal antherid. The great advance in this order is that after fertilization of the egg the surrounding vegetative cells send out brancnes that tightly invest the oogone in a protective coat. After a period of rest the fer¬ tilized egg divides into eight to 16 cells, each of which develops a single zoospore which pro¬ duces a new plant.

Phylum III. Zygophyce.®. — The Conju¬ gate Algae — Aquatic chlorophyll-containing plants forming delicate, unbranched filaments which may be many centimeters long or reduced to but few cells. In many cases they consist of single cells which separate as soon as they divide. A comparative study of the various forms of this variable group makes it seem probable that these latter are to be considered as descended from long filamentous forms which have broken

up early so as to be few or one-celled. Asexual reproduction is by fission only, with the doubt¬ ful exception of some little known forms. Sex¬ ual reproduction is by the fusion of the pro¬ toplasmic contents of two contiguous cells, either by means of a tube formed as a result of the contact of the cells, or by the breaking apart of the cell walls so that the two masses of protoplasm lie in contact in the space be¬ tween the cells. The result of the union is the formation of a thick-walled resting spore (zygospore). Throughout the phylum the cells possess but a single nucleus and one to several, definite chloroplasts, colored either green or brown. The filamentous forms of the two classes form the connecting link as the one- celled species are extreme modifications of the group in different directions.

Class 5. Conjugates. These are plants with bright green chloroplasts and with cellulose walls. They are confined to fresh wˆter and usually have a slimy coating which makes them slippery to the touch. They may be long fila¬ ments or in one order more often reduced to short filaments or separate cells.

Order 12. Zygnematales. Pond Scums. These plants are long filaments usually floating in the water, rarely attached, with chloroplasts star, band or disc shaped. The well-known Spirogyra (Fig. 5) with its spirally wound chloroplasts is a favorite subject of microscopic study. About 150 species.

Order 13. Desmidiales. Desmids. The beautiful plants belonging to this order are al¬ most all visible only under the microscope. The more primitive forms possess filaments but most of the 2,100 species are one-celled. The cell wall is frequently constricted at the middle and mostly roughened with spines or tubercles. The cell wall typically is in two pieces which meet at the middle of the cell. A few species are motile, being able to glide along, but they lack flagella. Two or three families are recognized.

Class 6. Bacillarioidecs. Diatoms. The plants of this class are also microscopic. Their mode of reproduction is much like that of the foregoing class. Like the Desmids their walls are in two distinct halves which either meet at their edges or overlap a little like the cover and base of a pill-box. The walls are heavily im¬ pregnated with silica and are in consequence almost indestructible, so that they persist for hundreds of thousands of years as fossils, the well-known and valuable <(diatomaceous earth.® The chlorophlasts are disc shaped or elongated, and brown in color. These plants are found in fresh and salt water from the Arctic and Ant¬ arctic zones to the Equator. The more than 5,000 species are distributed in two orders of six to eight families each.

Order 14. Eupodiscales. Round Diatoms. Mostly marine, cells round or polygonal in end view of the filament.

Order 15. Naviculales. Flat Diatoms. Fresh water and marine ; filament flattened so that in end view it is elliptical or boat-shaped.

Phylum IV. Siphonophyceˆ:. — The Tube Algae. In all of the plants mentioned hitherto the cells, with rare exceptions, were provided with but a single nucleus. In this phylum, how¬ ever, we find the type of cell structure known as a coenocyte, a sort of compound cell that has many nuclei embedded in the cytoplasm instead of the one.

Furthermore, the growth of the

plants of this group, which are almost all fila¬ mentous, or modifications of filaments, is mostly terminal, instead of occurring at all points in the filament as was the case in the preceding phyla. Aside from these points of difference the phylum shows many points of similarity to the Chloro- phycese from which it doubtless arose. The plants are rather coarse, more or less branched filaments, bright green in color (rarely red in a few forms) or colorless in the species that lack chlorophyll. The colored forms are aquatic and for the most part marine; the colorless forms are fresh-water or terrestrial. Asexual repro¬ duction is by means of motile zoospores cyr in some of the colorless species by the formation of wind-borne cells that are not motile. Sexual reproduction is by the union of equal or unequal motile gametes, or of motile sperms and non- motile eggs, or by the direct union of protoplasm of sperm and egg through a connecting tube, the result in any case being a more or less thick- walled resting spore. About 1,200 species, prob¬ ably best disposed in three classes. It is possible that some of the plants included in this phylum are descended from some of the class Pro- tococcoidese and others from the class con- fervoideae, but that is a disputed point.

Class 7. Siphonocladece. Plants consisting of microscopic or moderate sized bladders from which may sprout smaller bladders or short filaments, or, of coarse filaments constricted or segmented at intervals to form numerous coenocytes. The filamentous forms are mostly branched, either irregularly or in definite pat¬ terns, often with the branches whorled; chloroplasts small disks or more often large and net-like; about 425 species, marine in most cases; a few families also contain fresh-water species. Reproduction asexually usually by zoospores, sexually (where known) by the union of equal, motile gametes, or of non-motile egg with motile sperm, to form a zygote which may germinate immediately or function as a resting spore.

Order 16. Siphonocladales is the only order in this class. In fresh water may be frequently found the filamentous Water Flannels (Clado- phora) ; on damp, clayey soil often appear the minute bladder-like, green plants of Botrydium. In the ocean, particularly in the warmer waters, are found large numbers of plants of this order, among them the Mermaid's Wineglasses (Acetabulum) with calcified slender stem bear¬ ing at its apex a whorl of united, spore-bearing segments,

forming a structure resembling some of the more delicate mushrooms. Four or five families are recognized.

Order 17. Charales. Stoneworts. (Fig. 24). The relationship of this group is obscure. It seems likely that it should be placed in the vicinity of those members of Class Siphono¬ cladales which possess whorled branches. The plants of this group are inhabitants of fresh water, chiefly shallow lakes and ponds, and are frequently incrusted with lime. They consist of long septate tubes with whorls of branches at the joints, these in turn often with similar whorls of branches ; the ultimate branches are the so-called leaves, which are cylindrical, pointed coenocytes. Asexual reproduction does not occur except by the formation of buds or of bulb-like structures. Sexual reproduction by the union of a minute motile sperm with the single large, non-motile egg contained within the

oogone which is surrounded by a tight protect¬ ive layer of spirally wound threads. Over 200 species, divided into six genera, in two families. Chara and Nitella are the genera most fre¬ quently found.

Class 8. Siphonece. Tube Algae. These plants consist of elongated tubes, branched ir¬ regularly or so as to produce definite structures ; these tubes are coarse and not septate, except for the production of the zoospores by which asexual reproduction mostly takes place, or of the gametes, which are (where known) always unequal, both sexes being motile in some cases or the female gamete (egg) non-motile and re¬ tained within the oogone. The plants are typi¬ cally green, with numerous disc-shaped chloro¬ plasts. In a few marine forms a violet color conceals the green to some extent. Probably two orders should be recognized.

Order 18. Bryopsidales. Marine forms of moderate size or sometimes large; irregularly branching coarse, non-septate, coenocytic threads or tangled masses of such threads forming definite structures, in one family the large coenocyte differentiated into parts functioning as roots, stems and leaves ; asexual reproduction where known by forma¬ tion of zoospores in lateral zoosporangia or by the breaking up of the plant; sexual reproduc¬ tion where known by the union of unequal mo¬ tile gametes ; confined mostly to warmer waters. The genus Codium contains representatives forming rope-like masses sometimes several feet long; Caulerpa forms a creeping, branched stem, rooted at intervals and sometimes several feet long with upright, sometimes leaf-like branches several centimeters high. Its only mode of reproduction, so far as known, is the death of the older connecting stems so that the plant becomes separated into independent indi¬

viduals. About four families, exclusively marine.

Order 19. Vaucheriales. Green Felts. The plants of this order are coarse, branching, green tubes, mostly forming dense tangled felts. They are confined to fresh water or to wet earth, ex¬ cept the few species of one family which, al¬ though green, are parasitic. Asexual reproduc¬ tion by large zoospores formed in segments at the ends of the filaments, rarely by non-motile spores (aplanospores) formed within the fila¬ ment. Sexual reproduction (wanting in the para¬ sitic forms) by the union of motile sperm and nonmotile egg within the oogone. Two families. Here we find the common Green Felt (Vaucheria — Fig. 6, common in springs, damp ground, slow-moving streams, etc., as well as the pecu¬ liar leaf parasite of Aroids (Phyllosiphon) .

Class 9. Phy corny ceteos. Tube Fungi or Lower Fungi. These plants are undoubtedly de¬ rived from the order Vaucheriales, but differ in several particulars. They lack chlorophyll and hence are either parasitic in their mode of life or feed on dead organic substances. They con¬ sist of long, usually irregularly branched, non- septate tubes (sometimes septate in old age) which may be all alike or which may show dis¬ tinction of vegetative portion contained within the substratum upon which the plant is feeding and a usually coarser external reproductive part. Asexual reproduction varies from the formation of zoospores in terminal zoosporangia, which remain attached, to the production, on the one hand, of separable zoosporangia (conidia)

which produce zoospores only when they fall into water and in some genera fail to produce zoospores at all, and on the other hand, of aerial sporangia within which are produced nonmotile, walled spores which are set free by the rupture of the sporangium. Sexual reproduction in the more primitive forms is close to that in Vaucheria, consisting of the union of motile sperm with non-motile egg within the oogone; a more advanced step is the use of a conjugation tube to transfer the sperm nucleus to the oogone; the most advanced case being the reduction of the differences between the male and female repro¬ ductive organs until they are almost equal and similar (as in some sorts of Mucor). The plants of this class are aquatic, or parasitic within land plants, or saprophytic and terres¬ trial. They are mostly easily visible to the naked eye. About 400 species, distributed in four

orders.

Order 20. Saprolegniales. Water Molds. These are aquatic fungi with zoospores pro¬ duced in permanently attached zoosporangia. Some of them are troublesome parasites on young fish in fish hatcheries, especiallv species of Saprolegnia and Achlya, others are serious pests of seed beds (Pythium). About six families.

Order 21. Peronosporales. Downy Mildews. These are parasites of higher plants within which they live, sending out their reproductive branches to produce their coilidia which in most cases produce zoospores when they fall into wrater. The fungi causing respectively Late Blight of potato (Phytophthora) , Downy Mil¬ dew of grape (Rhysotheca), White Rust of cabbage and radish (Albugo), are among the most common. Two families are recognized.

Order 22. Mucorales. Terrestrial; spores usually produced in aerial sporangia; but little difference between male and female structures in sexual reproduction. Saprophytic ; sometimes parasitic on other fungi. Four families of in¬ teresting fungi including the ubiquitous Black Mold of bread (Mucor).

Order 23. Entomophthorales. Insect Fungi. These are minute fungi mostly parasitic within the bodies of insects which they kill. The asexual spores are produced singly on short branches which emerge from the body of the insect. The male and female reproductive organs are scarcely distinguishable. Here be¬ longs the Fly Fungus which kills flies in large numbers in the early autumn (Entomophthora).

Phylum V. Phˆophyceˆe. — Brown Algae. This group is composed of filamentous or, more commonly, massive plants, the latter of considerable dimensions and often differentiated into roots, stems and leaves. They are of a brownish-green color, due to the presence of a brown pigment which hides the bright green of the chlorophyll. The cells are uninucleate and the ohloroplasts are small and disc-like or larger and net-formed. With a very few ex¬ ceptions the members of this phylum are ex¬ clusively marine. The thousand or so species are divided into three classes.

Class 10. Phceosporece. The Kelps. These range from small filamentous branching plants to enormous plants hundreds of feet in length with stems, roots and leaves. Asexual repro¬ duction occurs throughout the class by the for¬

mation of zoospores which are biflagellate and pear or kidney shaped.

The organs in which they are produced, the zoosporangia, are often collected in patches on the surface of the plant. (Fig. 7). Sexual reproduction is known in many of the forms and consists of the union of equal or unequal motile gametes which are very similar to and sometimes indistinguishable from the zoospores. In a few forms the eggs appear to lack power of motion. The approximately 500 species of this class are largely found in the cooler parts of the ocean. They may be divided into three orders as follows :

Order 24. Ectocarpales. Gametes all motile and equal or nearly so, or the egg non-motile ; from filamentous to massive forms. Per¬ haps 16 families should be recognized. Among the common plants of this order are the Devil's Aprons (Laminaria) which consist of a stout stem with roots below and terminating above in a broad, often longi¬ tudinally split, leathery leaf, the whole some¬ times attaining a length of one to several yards and a. width of a foot. The Giant Kelp (Macrocystis) of the Pacific Ocean is no doubt the longest plant in the world, sometimes reach¬ ing the enormous length of 700 feet. It con¬ sists of a long, tough, round stalk, an inch or more in diameter and many feet in length with large branching roots below and bearing many narrow leaves, two to four feet long, each having a large air vessel (an inch in diameter and four or five inches long) in its petiole. By means of these air vessels the leafy por¬ tion of the plant floats out at the surface of the water. Nor are the Sea Trees (Lessonia) also of the Pacific Ocean, any less interesting. They consist of erect stems, rooted below and branched above, the latter bearing many pend¬ ent narrow leaves. Some of these veritable trees are several yards in height. The pretty Mermaid's Strings (Chorda) are flexible, string-like stems, a yard or so in length, rooted below and smooth and delicately fringed above. They occur in the Atlantic and Pacific oceans. Dictyoneuron (Fig. 7) of the Pacific Coast of North America is a foot or so long.

Order 25. Cutleriales. The plants of this order are small to several inches tall, disc¬ shaped or erect and more or less flattened and sometimes much divided, frequently in a dichotomous manner. Asexual reproduction is by means of zoospores which are produced in different plants from those producing the gametes. The gametes are motile, but differ exceedingly in size for the 'two sexes. Usually the fertilized egg produces a zoospore^bearing plant and vice versa, but this is not always the case.

Order 26. Tilopteridales. Filamentous plants with typical zoospores and with small, motile sperms and large, non-motile eggs which are produced singly in the oogones and set free before fertilization. Only a few species of little importance and infrequent in occurrence.

Class 11. Dictyotinece. The few species (about 130) included in this class in its single order.

Order 27. Dictyotales, are wholly marine, mainly in those portions of the sea where the water is fairly warm. They are of moderate size, growing fast to rocks or other objects, as in the preceding class. They are differentiated into basal holdfast or root and vegetative shoot

which is usually more or less flattened. It con¬ sists of several layers of cells, but there is little tissue differentiation. Sexual reproduc¬ tion is by means of . non-motile eggs, set free singly from superficial, crowded oogones and fertilized by minute, motile sperms oroduced in large numbers in similarly clustered, superficial antherids. These fertilized eggs give rise to similar plants, which*, however, do not bear sexual organs, but reproduce iby the produc¬ tion, in fours, of naked ˆtetraspores® which in their turn produce the sexual plants. Dictyota (Fig. 8) is the principal genus.

8 9 10

Fig. 8. — A plant of Dictyota; somewhat reduced.

Fig. 9. — Portion of a plant of Sargassum; much reduced. Fig. 10. — A plant of Coleochaete; much magnified.

Class 12. Cyclosporece. Rockweeds. These are branching, medium sized plants, growing at or near the surface of the water, often at¬ tached to rocks between low and high water. They are exclusively marine and are found from the cold waters of the north and south Atlantic and north and south Pacific to the warm waters of the tropics. They are firmly rooted below and in some cases the plant body is differentiated into stem and leaves. No means of asexual reproduction are known. The sexual organs are formed in narrow-mouthed, almost spherical depressions (conceptacles) on the surface of the unmodified vegetative branches or of specially modified reproductive branches. The eggs are produced by eights, fours, or even singly in the oogones, escaping through the mouth of the conceptacle and there meeting the small motile sperms which have been produced in large numbers in the numer¬ ous small antherids in other conceptacles, either on the same or on another plant. The fertilized egg germinates almost immediately. There are upward of 400 species, all included in one order,

Order 28, Fucales, and divided among four families. The largest genus is Sargassum (Fig. 9) with about 200 species, of the warmer waters of the sea, one of which (S. bacciferum) is the <(Gulf-weed® which floats in large quantities in the so-called ((Sargasso Sea® in the mid-Atlantic Ocean. Originally, attached by its roots it has broken loose and been carried away by the Gulf Stream and other ocean currents. It floats in the water by means of its many little air bladders which occur on the petioles. Other common plants of this class are the Rockweeds, proper (Fucus), which are attached to rocks and wharves between hieh and low- tide marks and the Knotty Rockweed (Asco- phyllum) with large bladders in its slender stems.

Phylum VI. Rhodophyceˆ:. — The Red Seaweeds. These plants are minute to middle- sized or even large (a foot or more in length),

rooted below and more or less branched above. In the simpler forms they are unbranched or branched filaments, but many form broad sheets or large and massive plant bodies. All but a few species are chlorophyll-bearing, but the green color is concealed by a red or purple pigment. The species are with verv few ex¬ ceptions marine. A very few species are true parasites in other seaweeds. Asexual repro¬ duction is by means of naked, non-flagellate cells set free singly or in fours. Sexual repro¬ duction is by the union of the nucleus from a naked, non-motile sperm with that of an egg enclosed within the oogone, the resulting cell dividing into few or many cells, some or all of which are the carpospores which give rise to the new plants. The phylum is divided into two unequal classes.

Class 13. Bangioidea. Simple or branching filaments or' sheets of cells. Asexual reproduc¬ tion by the formation of single naked cells (monospores). Sexual reproduction by the transformation of ordinary vegetative cells into oogones or antherids. After fertilization, the oogones divide into four or eight cells (rarely not dividing) which slip out of their walls as naked, non-flagellate, amoeboid carpospores. About 50 species, doubtfully divided into two orders.

Order 29. Bangiales. Chloraplasts single in each cell. Bangia with a dozen or more species of filamentous plants and Porphyra, ((Laver,® of almost 20 species are the principal genera. The last-named are flat, leaf-like, purple plants, which are very common throughout the world in salt or brackish water and are used for human food. One family only; marine.

Order 30. Rhodochcetales. Chloroplasts several to many in each cell. Filamentous, sometimes corticated plants. Asexual repro¬ duction by

monospores ; sexual reproduction not known. Two families, one marine and one fresh water. A doubtful group because of ignorance as to the sexual reproduction.

Class 14. Floridece. True Red Seaweeds. This class includes approximately 3,000 species of plants, found in the seas of all parts of the world and in small numbers in fresh water as well. A few species are true parasites upon other seaweeds, and entirely colorless ; others although parasitic in habit still retain some of their color. The great majority, however, are not at all parasitic. Many are edible and some are of great economic value. In this class the cells possess mostly numerous, small, disc¬ shaped chloroplasts and are connected to one another by plasmatic strands through the central openings in the cell wells, both being features lacking in the preceding class. Asexual reproduction is by means of monospores in a few cases, where there is no alternation of sexual and non-sexual plants. In the contrary case, however, which is the rule in nearly all species, the asexual reproductive cells are pro¬ duced in fours (tetras pores) on one generation of plant, these producing the plants that bear the sexual organs. The latter are special cells, not merely slightly modified vegetative cells. The oogone has a long neck (trichogyne) and is the terminal cell of a row of three or four cells. After fertilization by the water-borne, non-motile, naked sperm the oogone sends out branches at the ends of which are produced the

carpospores, or the oogone fuses with adjacent cells and from the common cell thus produced arise the carpospore threads. The carpospores produce the tetraspores plants in the species with alternation of generation.

Order 31. Netnalionales. The fertilized oogone grows out directly to form the carpo- spore-bearing threads. Many of the plants of this group occur in fresh water, e.g., Thorea (Fig. 11) which occurs as a somewhat slimy, branched, brown string, several inches long in fresh-water streams. Nemalion forms a mass of slimy, brownish threads on rocks between high and low water marks in the sea. Many species of this order show no alternation of generations and hence produce monospores in¬ stead of tetraspores.

Pig. 11. — Portion of a plant of Thorea; somewhat reduced. Fig. 12. — A plant of Chondrus; somewhat reduced.

Fig. 13. — A fruit of Microsphaera with its branched append¬ ages; much magnified.

Fig. 14. — A fruit of Tuber; somewhat reduced.

Order 32. Cryptonemiales. The fertilized oogone sends out long threads which unite with large nutritive cells in various parts of the plant and there give rise to the carpospore- bearing threads. Asexual reproduction by tetraspores. Worthy of notice is the genus Corallina, in which the plant body is very thoroughly infiltrated and encrusted with lime. The plants are jointed, being flexible at the joints which are not encrusted. The color is a delicate pink.

Order 33. Ceramiales. The fertilized oogone fuses with an adjacent nutritive cell, from which then the short sporogenous threads arise, the whole being mostly surrounded with a pro¬ tective coat of sterile threads with an opening to permit the escape of the carpospores. Asex¬ ual reproduction is by means of tetraspores. Some of the plants of this order are filamentous, such as the very common and beautiful Cer- amium species, others are more or less leaf¬ like, as Delesseria.

Order 34. Gigartinales. The fertilized oogone fuses with an adjacent nutritive cell as in the foregoing order but the filaments sent out from the latter are long and grow and branch in among the vegetative tissues of the plant. Tetraspores are formed. The plants are not filamentous but many cell's thick. Chondrus crispus, Irish Moss (Fig. 12), forms branching, purple plants a few inches high in the waters of the North Atlantic. It is used for making blanc mange.

Order 35. Rhodymeniales. The nutritive cell with which the fertilized oogone fuses is not formed until after fertilization has taken place. From it grow out short sporogenous threads.

Tetraspores are present in all species. Agar- agar, which is of such great importance in bacteriological work, is obtained from an East Indian species of Gracilaria, belonging to this order.

Phylum VII. Carpomycete/E. — The Higher Fungi. Terrestrial, rarely aquatic, filamentous, branching plants with frequent cross walls, and usually, at first, but one nucleus to -a cell. No chlorophyll is produced so that the plants are dependent upon organic matter produced by other organisms. Large numbers are sapro¬ phytes, i.e., they feed upon the bodies of dead organisms, or on non-living organic matter,

but a vast number are parasites, some of them very destructive, upon animals or plants. Asex¬ ual reproduction is present in almost all groups and consists usually of the rounding off and setting free of terminal cells (conidia) of ordi¬ nary or special branches. These conidia offer a multiplicity of forms and colors and great variety of detail as to the location on the conidiophores and as to the shape and group¬ ing of the latter. Sexual reproduction is known in all of the larger groups and likewise shows great variability as to detail. In common to all the groups and to the Red Seaweeds from which this phylum probably arose is the fact that the union of sexual cells or nuclei leads to the production of a mass of threads of which the terminal (or subterminal) cells produce the spores which develop into the new plants. The approximately 64,000 plants of this phylum are distributed among three classes.

Class 15. Ascomyceteoe. The Sac Fungi are in many respects more primitive than the other classes of the phylum. Their distinguishing feature is the production of the spores in sex¬ ual reproduction within terminal or sub-termi¬ nal, usually enlarged cells, called asci. In each ascus the number of spores produced is most often eight, although in some cases the number is higher or lower. By bursting of the ascus, the cells are ejected with more or less violence and on germination give rise to the new plants. In some of the families of this class that show the most points in common with the Red Sea¬ weeds sexual reproduction results from the union of a non-motile, water-borne sperm with the elongated portion (trichogyne) of the oogone, exactly as in the Class Florideae. As a consequence of this union there arise from the oogone numerous threads, corresponding to those producing the carpospores, the subtermi¬ nal cells of which become the asci. In more plants of this class separate sperms are not produced but the antherid comes into direct union with the oogone or its extension, the asci developing, however, in the same manner. In some cases even the antherids seem to have dis¬ appeared, and the two sexual nuclei which unite both originate within the oogone. In a few very much simplified forms the oogone is also lacking and asci arise from vegetative cells, the two nuclei that develop within the ascus fusing before the spores begin to be formed. ’Through¬ out most of the group the ascus-producing threads are associated with sterile threads so as to form a small or large fruit which may be solid (Fig. 14) or hollow, with or without (Fig. 13) a definite opening, or may open out as a cup or saucer-shaped structure (Fig. 16). In the simplified forms the asci may be naked and

scattered. The class contains about 29,000 species in perhaps 15 orders.

Order 36. Laboulbeniales. Beetle Fungi. These are minute fungi of but few cells each, parasitic in the chitinous wall of the body or appendages of beetles and other insects, par¬ ticularly those of damp places. The oogone is provided with a trichogyne to which the usually naked non-motile sperms become attached. From the cell below the oogone an envelope is produced before fertilization, that completely invests it as a protective coat. The fertilized oogone gives rise to a considerable number of four, rarely eight-spored asci. Over 50 genera and more than 600 species have been recognized from all parts of the world.

Order 37. Lecanorales. Disc. Lichens. Fungi parasitic upon lower green and blue algae, usually forming characteristic, variously colored, flat or erect, leaf-like of leafy stemmed struc¬ tures growing on the ground, on rocks, on trunks of trees, etc. Sexual reproduction by the union of a minute, non-motile sperm with the many celled trichogyne that grows out from the oogone. The resulting threads that grow out from the oogone bear their asci in a saucer or cup-shaped structure (apothecium). Several thousand species distributed among nearly 30 families. Among them are the Reindeer Moss (Cladonia), which is the most important food for the reindeer, Old Man's Beard (Usnea) which hangs in long streamers from the branches of trees, etc.

Order 38. Pezizales. Cup Fungi. In this group the plants are parasites upon other plants than lower algae or saprophytes. The asci are produced as in the preceding order in cup or saucer-shaped apothecia. In most forms, the details of sexual reproduction are unknown. In a few forms the oogone possesses a long or short trichogyne which grows over to an antherid with which its tip fuses. Antherids are sometimes lacking. Plant consisting of slender, branched, septate threads, usually in¬ conspicuous but apothecia often showy (Fig. 16) varying in size from under a millimeter to 15 to 20 centimeters in diameter. About 10 families. The genus Sclerotinia contains several very destructive plant parasites.

Order 39. Helvellales. Related to the fore¬ going, but the apothecia more or less everted and frequently stalked. The Sponge Mushroom (Morchella) is a very delicious mushroom found in the woods in the spring. Three families.

Order 40. Caliciales, and Order 41, Phaci- diales, are related to the first two orders. The former consist mostly of lichens (i.e., fungi parasitis upon lower algae).

Order 42. Tuberales. Truffles. Plants sub¬ terranean, both as to vegetative and repro¬ ductive parts. The latter are up to an inch or two in diameter, more or less spherical, and apparently to be looked upon as an apothecium that is highly contorted, with but a very small opening. 'The common truffle (Tuber, Fig. 14) is found in oak forests in Europe. Some species occur in America.

Order 43. Exoascales. Fungi saprophytic or parasitic upon higher plants, with abundant or scanty, branching plant body upon which is produced a single layer of closely placed asci, forming a sort of simplified apothecium. Sexual

reproduction unknown beyond the union of two nuclei in the very young asci. Two families of about 60 or more species. Species of the genus Exoascus cause several serious diseases, e.g., the destructive Leaf Curl of the peach and witches' broom of cherry, etc.

Order 44. Hysteriales. Slit Fungi. Wood and leaf-inhabiting fungi, as well as "lichens.® The apothecium is very much elongated so that its opening forms a slit. Among the "lichens® is Rocella from which the pigment litmus is obtained. The genus Hysterographium (Fig. 15) is common on twigs of ash and other trees. Perhaps seven families.

Fig. 15. — A dead stick with black fruits of Hysterographium; slightly reduced.

Fig. 16. — Several fruits of Peziza; slightly reduced.

Fig. 17. — Part of a grass leaf with a Rust (Puccinia) upon it; slightly reduced.

Fig. 18. — Head of wheat affected with a Smut (Ustilago); somewhat reduced.

Fig. 19. — A verticle section through the fruit of Phyllos- ticta; much magnified.

Order 45. Pyrenulales. Closed Lichens. Parasitic on lower algae. Asci produced in a more or less spherical hollow body (perithe- cium) with a small apical opening. Twelve or so families of usually small lichens.

Order 46. Sphariales. Black Fungi. Sapro¬ phytes or parasites, but not parasitic on algae (i.e., not “lichens®). Closely related to the fore¬ going order, possibly to be united with it. Asci produced in more or less spherical hollow bodies (perithecia) with small apical openings (ostioles). Perithecia black and rather brittle; separate, or crowded together, or united by a special fungal mass {stroma). Sexual repro¬ duction studied only in a few forms. Oogones provided with trichogyne in some genera, with¬ out it in others ; separate, non-motile sperms apparently produced in some forms, the oogone and antherid uniting directly in others. More than 6,000 species in 18 or more families. The species of this group are largely found on wood or on living or dead herbaceous stems or leaves. Many of the more important plant dis¬ eases are due to their activities ; e. g., Black rot of grape due to Guignardia, Scab of apple and pear caused by different species of Venturia, Bitter Rot of apple and many other plants caused by Glomerella, and Chestnut Blight caused by Endothia.

Order 47. Dothideales. This order is closely related to the foregoing one from which it differs in that the asci are borne within cavities

in a stroma without a special perithecial wall of their own. The nearly 800 species, repre¬ senting 140 genera and four families, are found in most parts of the world but are especially abundant in the Tropics. They are, practically without exception, parasites in herbaceous stems and in leaves. The Elm Leafspot which causes the premature falling of elm leaves in Europe is caused by a species of Systremma. More than 300 species of Phyllachora are known, among them the common Phyllachora graminis on various grasses.

Order 48. Hypocreales. The several hun¬ dred species of this order show great similarity to the two foregoing orders, differing principally in the rather bright color and fleshy or lea’thery consistency of the perithecium or stroma. Many are saprophytes but a number of dangerous parasites occur on plants, e.g., Nectria, causing cankers on limbs of apple; Spermcedia (Clavi- ceps) causing Ergot of rye and other grasses.

Order 49. Peris poriales. Mildews. Super¬ ficial fungi, mostly parasitic. Asci arising from the base in small closed perithecia, following direct union of antherid with oogone which possesses no trichogyne. Two, possibly three, families of which one (Erysiphacece

) contains many important plant parasites, e.g., Micro- sphaera (Fig. 13) the cause of the Powdery Mil¬ dew of lilac; Sphaerotheca, which, when intro¬ duced from America into Europe, proved so destructive to the gooseberry; Uncinula, which had a similar history with regard to the Euro¬ pean grape.

Order 50. Asperc/illales. Molds. The many hundred fungi making up this order are very largely saprophytes although a number are parasites of economic value. None are parasitic on algae. They are mostly well provided with means for asexual reproduction, sometimes the sexual type being produced only rarely. The asci are produced within more or less spherical, closed, solid bodies, being scattered through the mass of the tissue (not basal in a cavity as in the Perisporiales) . In a number of cases the union of antherid with the oogone has been observed. The fruits are mostly minute but in two families are large and subterranean. The common Blue Mold (Penicillium) is found in damp climates as a destructive mold on shoes and other leather goods ; other species are es¬ sential to the production of Roquefort cheese; some are parasitic within the ear of man. Thielavia causes a serious root disease of tobacco and other plants.

Order 51. Saccharomycetales. These plants show the greatest degree of simplification in this phylum. The plant body may consist of elongated branching threads, or, in many cases, the cells may separate soon after cell division so that one-celled forms result. Even the filamentous forms resolve themselves into the other type under special external conditions. The asci are not formed within any special structure but arise on the filamentous forms as scattered lateral outgrowths, either without, or as a result of, the union of almost similar antherid and oogone. The one-celled forms (yeasts) may become converted directly into asci, with or without previous union of two cells. The most important family of this order is that of the Yeasts, of which the genus Saccharomvces is most important. The com¬

mon yeasts have been cultivated from time immemorial for the leavening of bread and also for the production of alcoholic beverages.

Class 16. Teliosporece. Brand Fungi. Long, branching, septate fungi, parasitic within the tissues of higher plants, which are often very seriously injured by them. Asexual reproduc¬ tion by various types of non-septate conidia. Sexual reproduction consisting of the union of adjacent cells to form binucleate cells. The uniting cells may be definitely located or the union may consist in the division of the nucleus of a cell and the failure of the cytoplasm to divide. The

process may occur at various points of development, depending upon the form. The binucleate cells by division give rise to filaments of similar cells. Eventually thick- walled binucleate spores (teliospores) are formed in various ways, the two nuclei fusing when the spore is still young. After a short or long resting period, or immediately, in some cases, this teliospore gives rise to a short fila¬ ment (promycelium) upon which are produced four (sometimes more) uninucleate spores (sporidia) which serve to infect the new host plant. Over 4,000 species divided among two orders.

Order 52. Uredinales. Rusts. The fungi composing this order are among the worst plant parasites of cultivated crops, as well as of in¬ numerable wild plants. Typically, there are five spore forms: (1) teliospores, giving rise to a four-celled promycelium bearing on each cell a

(2) sporidium. This produces a fungal growth within a suitable host plant which produces the

(3) pycniospores, which appear to be func¬ tionless sperms, and the (4) seciospores. There is a sexual union of adjacent threads before this process so that these spores are binucleate. They give rise, in the proper host plant, to a septate branched thread with binucleate cells. From this arise the (5) urediniospores, also binucleate, and later the (1) teliospores. The urediniospores produce a growth exactly like that from the seciospores. They are properly called repeating spores because they do not intro¬ duce a different generation. Complications are ver) numerous, in that many rusts have this latter stage on one kind of host plant and the stage that produces the pycniospores and ieciospores on another host. Again, some rusts have no urediniospores and in still others the teciospores also are not produced. The teliospores vary greatly in appearance. Among the better known rusts are the Black Rust of small grains, which has its pycnial- aecial stage upon the common and purple bar¬ berry, and its other stages on the small grains and various other grasses (Fig. 17) ; White Pine Blister rust with its destructive pycnial-aecial stage on the white pine and the other stage on currants and gooseberries; Apple rust, with its destructive pycnial-aecial stage on apple and the telial (there is no uredinial stage) stage on red cedar. Probably 3,000 or more species in three or four families.

Order 53. Ustilaginales. The Smuts. These are also widespread as destructive parasites of cultivated and wild plants. The teliospores are usually produced as a powdery mass, within the tissues of the host plant, often totally de¬ stroying portions of the plant and thus being

set free as a dark-colored dust. There is not

the complicated life history that the previous order possesses. The promycelium from the teliospores produces sporidia which may infect the host at once or which may give rise to a saprophytic growth on decaying organic mat¬ ter in the soil, producing numerous small conidia which are capable of infecting the host plants. The young teliospores are binucleate, as are the cells from which they arise, but there is no strict alternation of generations with uni¬ nucleate and binucleate cells as in the Rusts. The 1,000 or more species are divided into two families. Among the more destructive parasites are the Loose Smut of wheat (Fig. 18) and the smuts of oats and corn, caused by species of Ustilago, Stinking Smut of wheat caused by Tilletia and several others on rye, barley, sorghum, etc.

Class 17. Basidiomycetecu. In this vast class of about 14,000 species and perhaps nine orders, sexual reproduction has reached almost its lowest ebb. There seems to be no definite union of antherid and oogone at any definite point. By the failure to produce a cross wall, a di¬ viding cell becomes binucleate and thys initiates a series of binucleate cells. Eventually the terminal cells of such threads enlarge, the nuclei fuse and a basidium results. From this bud out four (in some cases more or less) basidio- spores, which start the new plants. The basidia are produced on surfaces either within a closed fruit or exposed to the air; in the former case the fruit opens in some way (sometimes only by decaying) to permit the spores to escape, in the latter they are set free directly into the air. The fruits are mostly of good size, from a few millimeters up to a foot or more in diameter.

Order 54. Hymenogastrales, and Order 55, Sclerodermatales, consist of fungi growing in the soil and producing their moderate-sized fruits below the surface, although they may emerge at maturity. The basidia are produced within the fruits. Unimportant groups.

Order 56. Lycopcrdales. Puff Balls. The large, fleshy fruits of this order are often sub¬ terranean at first. They are fleshy to begin with and edible. After the spores have been produced in the small, sinuate cavities, the tissues all disintegrate, leaving the dry dark- colored spores in a large central cavity, usually with an apical pore. On logs and on the ground are found numerous species of Lycoperdon (Fig. 22), the Giant Puff Ball (Calvatia), found on lawns and meadows,

sometimes reaches a diameter of 18 inches or more. The little Earth Stars (Geaster) also belong here, being puff balls whose outer. coat splits down

Fig. 20. — A vertical section through the fruit of Glceo- sporium; much magniˆed.

Fig. 21. — Several spore-bearing threads of Ramularia; much magnified. ‘

Fig. 22. — A fruit of a Puff Ball (Lycoperdon) ; somewhat reduced.

longitudinally, turning out so as to form a star-like figure.

Order 57. Nidnlariales. Bird’s Nest Fungi, whose dainty little cup or beaker-shaped fruits, containing a number of egg-like bodies, are found on the ground or old sticks, are few in number as to species, but widespread as to distribution.

Order 58. Phallales. Stink Horn Fungi. The fruits of the usually terrestrial fungi of this order are fleshy and produce their spores internally as in the foregoing orders. Their escape is furthered by the rupture of the fruit and the deliquescence of the sporogenous tissue into a foul-smelling slime which attracts the carrion-loving flies which serve to distribute the spores. The common Stinkhorn (Phallus) is found the world over.

Order 59. Agaricales. In this order which contains most of the commoner fungi of this class, the fruit is from medium size to large. The basidiospores are produced on basidia which line surfaces exposed to the outer air so that as the spores fall they are carried off by the wind and do not have to await some process by which an opening is made, as in the foregoing orders. The order has about five families, all of them world-wide in their dis¬ tribution. Best known are the toadstools, in which the basidium layer occupies the surfaces of the radiating gills. These umbrella-shaped fruits (Fig. 23) are familiar to everyone. Of

Fig. 23. — A fruit of a Toadstool (Amanita) ; somewhat re¬ duced.

Fig. 24. — A plant of a Stonewort (Chara); considerably re¬ duced.

Fig. 25. — A Liverwort (Grimaldia) of the thallose type; somewhat reduced.

the 6,000 or more species of toadstools a few are deadly poisonous,

more are mildly so, and the vast majority are harmless. One species (Agaricus campestris) is cultivated the world over in temperate climates. Numerous other species are collected regularly as they appear in the wild state. Most toadstools grow on decaying vegetable matter in the soil, but some are wood destroyers; a few even attacking living trees. The Pore fungi, on the other hand, are mostly wood inhabitants, causing the decay of the heart wood in some cases ; of the sap wood in others or of both. They may attack only dead trees or may grow only on living trees. They contain some of our most dangerous timber destroyers. Mostly their fruits are bracket or hoof-shaped, growing out from the side of the tree or timber, within which the richly branched, septate threads of the fungus are spreading. On the under side of this fruit are minute pores which, like the gills of the toadstools, are lined with the

basidia. Among the more widely distributed fungi of this family are various species of Fomes and Polyporus. In another family of the order, the basidia line teeth or prickles that hang from the under side of the fruit (Hydnum) while in still other families the smooth surface of the fruit bears the layer of basidia (Corticium). Most of the members of these latter families are also wood destroyers, but few. are found on any but already decaying logs, sticks, etc. One species of Corticium, however, is a destructive root parasite of po¬ tato, beet and many other cultivated crops.

Order 60. Exobasidiales. The basidia in this order are like those of the preceding one, club-shaped, with the four basidiospores arising from the rounded top. The fungus itself grows inside the herbaceous portions of living plants, breaking through the epidermis to form a single layer of basidia on the outside. There is no distinct fruit, other than this layer of basidia. The genus Exobasidium contains a harmful parasite of the cranberry.

Order 61. Tremellales. Jelly Fungi. These are mostly wood or ground inhabitants. The fruits are of moderate size and cushion-like or lobed in various ways. When wet, they are soft and jelly-like; when dry, very inconspic¬ uous, dark, hard masses, of greatly reduced size. The basidia are split down lengthwise into four cells, each bearing on a long stalk a single basidiospore.

Order 62. Auriculariales. Ear Fungi. These resemble the foregoing

order greatly in gen¬ eral habit, gelatinous nature of the fruit, etc. The essential difference is that the basidia are elongated and divided transversely into four cells, from each of which a stalk arises, bear¬ ing a single basidiospore. The common Jew's Ear (Auricularia) is very common as a brown, ear-shaped fungus on branches of trees.

The Imperfect Fungi constitute a group of fungi containing neary 17,000 species. They form in reality only an artificial group of heterogeneous species. Their sexual reproduc¬ tion is unknown and they are grouped ac¬ cordingly' only by their modes of conidium formation or where no kinds of reproductive spores are known by their vegetative structures. As they are studied carefully, many of them are being found to be merely conidial or vegetative stages of fungi that belong to the class Ascomyceteae or less often to the Basidio- myceteae. It is possible that some of them are fungi that have utterly lost their sexual re¬ production and reproduce now only asexually. In such a case, their exact kinship cannot be determined and they will have to remain in this group of Imperfect Fungi. For the sake of convenience, the fungi in this group are, so far as they reproduce by spores, distributed among three orders.

Order 63. Sphceropsidales. The conidia are produced within more or less rounded protect¬ ive bodies (pycnidia) usually with an open¬ ing for the spores to escape. These fungi in¬ clude some troublesome parasites of plants, e.g. — Phyllosticta (Fig. 19) which causes leaf spots on various plants, Septoria, the cause of Leaf Spot of Tomato, etc.

Order 64. Melanconiales. The conidia in this group are produced on rather short threads that are closely crowded side by side, usually

underneath the epidermis of the host plant. They accumulate in such numbers as to burst the epidermis and allow them to exude a sticky mass. Here we have numerous species .of Giooeosporium (Fig. 20).

Order 65. Moniliales. Molds. The spores in this group occur neither in rounded bodies (pycnidia) nor in packed threads under the epidermis (acervuli) but on more or less sepa¬ rate threads which emerge from the object on which the mold is growing in various ways. In Ramularia (Fig. 21) and Cercospora we have numerous parasites of leaves, the elon¬ gated conidia arising from short or elongated threads that emerge from the stomata of the host epidermis. Botrytis causes many diseases, as on onion, peony, lily, etc. Many species of Fusarium attack the potato.

Phylum VIII. Bryophyta. — Mossworts. The plants of this phylum are all massive, in contrast to the filamentous structures generally found in the preceding phyla, being composed of many layers of cells, which are aggregated into flat bodies (thalli) or leafy stems. They are typically terrestrial, although in the lowest family some species are still aquatic, while others have come out a little distance from the water upon the wet earth. All of the species are chlorophyll-bearing and none are either parasitic or saprophytic. Their repro¬ duction is mostly sexual. The egg cell is in¬ vested from the first with a long-necked en¬ velope, the archegone, which opens at the apex tc permit fertilization. The antherids are com¬ pound, consisting of many small, cubical cells (each an antherid proper and producing a single sperm) surrounded by an enclosing layer of larger cells. The sperms are spirally curved and provided with two long flagella. After fertilization (which must take place in water, as in a rain drop) the egg divides repeatedly and gives rise to a globular or elongated cellu¬ lar structure, some of whose interior cells ultimately divide internally into four spores each. The spores on escaping germinate and eventually give rise to new plants. The asexual reproduction, which is lacking in some species, is as follows : Upon some part of the plant, single cells (brood cells) or masses of cells (brood masses), grow on the ends of short hairs, and, falling off, grow directly into new plants. There are two classes.

Class 18. Hepaticce. Liverworts. These are mostly supine, flat plants, attached to the ground by root hairs for nearly their whole length. By the deeper and deeper lobing of the margins of the thallus we find all grada¬ tions up to a leafy stem, with the leaf planes parallel to the stem axis. Such leafy stems are as distinctly two-sided (dorsiventral) as the undifferentiated thalli from which they are derived. There are about 4,000 species of liverworts, which may be arranged in three or four orders.

Order 66 . M archantiales. (Fig. 25). In this order are aggregated those liverworts in which the plant is thallose and the fruits indehiscent or dehiscent only by irregular or regular termi¬ nal openings. The antherids and archegones are on the upper side of the plant or the arche¬ gones apparently on the under side of special stalked receptacles. There are three families, the first of which, the Crystalworts (Ric-

ciacece), includes small, radiate, thallose plants, half an inch or so in diameter, floating on the water or growing on the wet earth. The antherids and archegones are sunken in the upper surface of the plant body. The fruits are spherical, stalkless and indehiscent and re¬ main enclosed in the archegonial wall. Ex¬ cept for the outer layer of cells the whole fruit consists of spores. Riccia and Ricciocar- pus are common. The Great Liverworts (Marchantiacece) are larger and dichotomous- spreading upon the ground. The thallus . is ribbed in its longitudinal axis. The fruit, which is short-stalked, breaks open more or less ir¬ regularly at its apex and sets free the spores which are intermingled with elongated, sterile cells, the elaters. The archegones and fre¬ quently also the antherids are often produced on stalked portions of the thallus, the recep¬ tacles, as in Marchantia and Grimaldia (Fig.

25).

Order 67. Anthocerotales. Horned Liver¬ worts. These are thin, flat, thallose plants hav¬ ing their antherids and archegones embedded in the upper surface. After fertilization, the egg develops into an elongated, somewhat club- shaped stalk, containing a large amount of assimilating tissues and a central ((columella,® the spores, intermingled with elaters being formed in the rather limited space between. This fruit may continue to grow at the base after the spores are ripe at the tip where it splits lengthwise into two valves to set the spores free. In this family, particularly in the genus Anthoceros (Fig. 26), the fruit (hence¬ forward called sporophyte in the higher groups) is only partially dependent upon the thallose parent plant, obtaining water and mineral mat¬ ters from it but manufacturing for itself most of the organic foods it requires for the nourish¬ ment of the spores.

Order 68. Jungermanniales. The Scale Mosses (Fig. 27) are leafy stemmed (or their

26 27 28 29

Fig. 26. — Fruiting plant of a Horned Liverwort (Antho¬ ceros); slightly reduced.

Fig. 27. — A Scale-moss (Plagiochila) in fruit; about natural size.

Fig. 28. — Branches of a Black Moss (Andreasa); somewhat magnified.

Fig. 29. — Portion of a Peat Moss (Sphagnum) in fruit; slightly reduced.

simplest forms thallose) plants with their fruits (sporophytes) split vertically into four seg¬ ments, setting free the spores and elaters. These little plants are frequently mistaken for mosses, which they resemble in external appearance. They grow commonly on trees, stones and sometimes on the ground. The more than 135 genera and 3,600 species may be divided into two families. The genera Jungermannia and Plagiochila (Fig. 27) are common in many parts of North America.

Class 19. Musci. Mosses. These are leafy-

slemmed, terrestrial, rarely aquatic plants, usually erect and attached to the ground by root hairs on the lower part of the stem. The leaf planes are approximately at right angles to the stem axis and the leaves are usually in many rows, alternate and crowded, only rarely in two rows. The antherids and archegones are at the summit of the stem, sometimes together, oftener on separate shoots or plants; or at the ends of short lateral shoots. The fruit (sporophyte) resulting from the growth of the fertilized egg may develop a long stalk (as in most mosses) or be short stalked or almost stalkless. In the latter cases, how¬ ever, the parent stem may grow out into a stalk (pseudopodium) which is not part of the sporophyte. The main portion of the sporophyte is enlarged and contains externally and inter¬ nally considerable sterile tissue with an inter¬ mediate layer of sporogenous tissue. Mostly this (

Order 69. Andreceales. The Black Mosses (Fig. 28) are small, leafy, dark plants, usually growing on rocks. Their leaves are thickish and composed of uniform cells. The sporo¬ phyte is raised on a stalk (pseudopodium) of the leafy plant itself. It opens to permit the escape of the spores by four or eight longi¬ tudinal slits. The protonema is thallose. The single genus Andreaea contains over 100 species.

Order 70. Sphagnales. The Peat Mosses (Fig. 29) are large, leafy, pale-green *plants growing in bogs. Their leaves are thick and are composed of dissimilar cells, some contain¬ ing chlorophyll and others with perforated walls so as to admit water freely. The sporophyte is raised on a pseudopodium and is itself short-

Fig. 30. — Plant of a Sac Moss (Archidium) ; somewhat en¬ larged.

Fig. 31. — One of the True Mosses (Bryum) in fruit; some¬ what reduced.

Fig. 32. — An Adder-tongue Fern (Ophioglossum) ; consider¬ ably

reduced.

Fig. 33. — A spore-bearing leaflet of a Ringless Fern (Marat- tia); considerably reduced.

Fig. 34. — Plant of a Quillwort (Isoetes) ; somewhat reduced.

stalked. It opens by a circular lid to permit the escape of the spores. The protonema is thallose. There is but one family, containing the single genus Sphagnum, with over 250 species. These are found over nearly the whole world. They are highly esteemed by gardeners for packing plants, on account of their power of retaining moisture for a long time. Some species possess great value for surgical dressings.

Order 71. Bryales. The True Mosses (Figs. 30 and 31) are small to large plants, exceedingly variable as to habitat ; they are found on trees, on the ground, on rocks and a few species in water. Some form large cushions a foot or more in diameter and several inches thick, while others are scattered and but a few milli¬ meters in height. The leaf cells are all more or less similar and chlorophyll-containing. With a very few exceptions the sporophyte is long- stalked and the capsule is usually dehiscent by a circular lid. In the family Phascacece the capsules of the minute plants are short-stalked and indehiscent ; but in the remaining families of the order the capsule develops a lid which on falling off reveals an opening usually pro¬ vided with a fringe of teeth in one or two rows. These may number 4, 8, 16, 32 or 64 and con¬ stitute the “peristome.® The protonema is typi¬ cally filamentous. The 12,000 or more species are divided among nearly 60 families. Among the commoner mosses are Phascum, Orthotri¬ chum, Funaria, Bryum (Fig. 31), Mnium, Poly¬ trichum, with sporophytes terminal to the main stem, and Fontinalis (an aquatic form), Neck- era, Leskea, Climacium and Hypnum, with sporophytes arising from short lateral shoots.

Phylum IX. Pteridophyta. — Ferns. The plants of this phylum present a distinct alterna¬ tion of two generations, gametophyte and sporophyte, respectively. The gametophyte is a small thallose plant resembling the simpler liverworts and bears antherids and archegones of the same plan as in those plants. The sperms are spiral and multiciliate. The fertilized egg develops into a multicellular structure which is at first enclosed within and dependent upon the

gametophyte, but which soon develops roots, stem and leaves of its own and attains complete independence of the parent gametophyte. This sporophyte has true vascular bundles. It does not develop its spores until it has reached a comparatively large size. The leaves are mostly large and broad, and are clustered near the apex or scattered along the stem, but never in whorls. The stem is solid and upright or horizontal, in most forms subterranean. In contrast to the Bryophyta the sporophyte is the long-lived generation while the gametophyte persists only until the former has established itself independently. In further contrast the sporophytes of Pteridophyta develop only a relatively small part of their cells into spores. These are produced in small “sporangia® which may originate within the tissues of the plant or as external structures, always as parts of leaves. These leaves are mostly not different from the vegetative leaves, although in some species the “sporophylls® are much differen¬ tiated. Asexual reproduction occurs in a few species by the formation of little bulblets on the leaves. About 3,800 species are recognized, distributed very unequally in two classes.

Class 20. Eusporangiatcc. This class con¬

tains only a small number of existing species, but seems in the Paleozoic era to have been very numerously represented. Its chief dis¬ tinction lies in the development of the sporan¬ gia from internal cells of the leaf. Three or¬ ders may be recognized.

Order 72. Ophioglossales. Adder-tongue ferns. The gametophytes of this order are sub¬ terranean and tuberous ; the sporophyte pos¬ sesses short, subterranean stems and usually but one leaf at a time. This is simple or com¬ pound. The spore-bearing leaves are divided into a spore-bearing and vegetative part. The chief genera of the single family are Ophioglos- sum (Fig. 32), the adder-tongue fern, and Botrychium, the grape fern.

Order 73. Marattiales. The Ringless Ferns have flat, green, liverwort-like gametophytes and large-leaved, thick-stemmed sporophytes, the leaves on some species reaching a length of 10 to 15 feet. The sporangia are formed on the dorsal side of the leaf, arising within the leaf but growing so as to project prominently. In most of the few genera the crowded sporangia are united into compound structures called “synangia.® All the species are tropical. Ma- rattia (Fig. 33), Angiopteris and Danaea are grown in the larger conservatories.

Order 74. Isoetales. The Quillworts. The sporophytes of this order are plants from an inch to a foot in height, rooted in the mud in or near

the water of shallow ponds and ditches. The stem is very short and sheathed by the broad bases of the narrow, pointed leaves. The single sporangium is borne near the base on the upper side of the leaf. Two kinds of spores are produced in separate sporangia ; megaspores and microspores, the former large and less numerous, the latter small and very numerous. Both sorts may be produced on the same plant, the megaspores on the outer leaves, the microspores on the inner. The gameto¬ phytes are accordingly of two kinds, each re¬ tained within the spore wall ; megagametophyte, producing archegones, and, after fertilization of the egg, nourishing the embryo sporophyte and microgametophyte, reduced to but one vegetative cell and one antherid producing four multiciliate, spiral sperms. The single genus Isoetes (Fig. 34) contains about 60 species.

Class 21. Leptosporangiata. This class is distinguished by the mode of origin of the sporangia, which arise from the superficial cells of the leaves, usually dorsally, and mostly are stalked. They are grouped into characteristic groups (sori) which usually have a definite pro¬ tective covering (indusium) when young. There are two orders.

Order 75. Polypodiales. Common Ferns. Spores of but one kind are produced so that the gametophytes are also all alike, usually with both antherids and archegones on the same individual. Sporohytes with large, usually com¬ pound leaves, with prostrate, underground stem or with stem vertical and very short, or even tree-like in dimensions. Of the eight families into which the 3,500 or more species are dis¬ tributed the very great majority are found in the Polypodiacece. Among the genera common in North America are Polypodium, Dryopteris, Asplenium, Adiantum, Pteridium, Woodsia (Fig. 35), etc.

Order 76. Marsiliales. The Water Ferns

either root in the mud in or near the water or float free on the surface. The sporophylls are folded together to form a closed <(sporocarp® in one family, while in the other the indusium is indurated and completely encloses the sorus. The spores are of two kinds as are accordingly the gametophytes. Marsilia (Fig. 36) resembles a four-leaved clover. It roots in the mud. Salvinia (Fig. 37) and Azolla are floating plants and have no resemblance to the common ferns, to which they are, however, evidently related.

Phylum X. Calamophyta. — The* plants of this phylum that survive are only about 25 in number, but these are the remnant of a large group of three distinct classes and as many or¬ ders, that flourished in Paleozoic times. The gametophytes are known only from the mod¬ ern representatives of the phylum. They are flat and liverwort-like, producing antherids and archegones and multiciliate sperms, all essen¬ tially like those of the Pteridophyta. The spo- rophyte consists of cylindrical stems, jointed at the nodes where the leaves arise in whorls. If branched, as is frequently the case, the branches arise in whorls also. The ancient plants were both arboreal and herbaceous, but the modern survivors are all herbaceous.

In some forms the stem was solid but in others hollow. The sporangia are borne on modified leaves collected into a terminal cone. In one class there were two kinds of spores ; in the others but one kind.

Class 22. S phenohyllinece. The Wedge¬ leaved Calamites were herbaceous and woody plants of Paleozoic times with solid, jointed stems and whorls of wedge-shaped leaves. The spores were of only one kind (isosporous). Long since extinct. One order.

Order 77. Sphenophyllales. Characters of the class.

Class 23. Equisetinece. Horsetails. These are herbaceous plants extending from the Paleozoic to the present era. The stems are hollow and jointed and the leaves are united at

Fig. 35. — Plant of one of the True Ferns (Woodsia); muen reduced.

Fig. 36. — Plant of a Water Fern (Marsilia); considerably reduced.

Fig. 37. — One of the Floating Ferns (Salvinia); considerably reduced.

their bases to form a sheath at each joint, with a tooth to represent the reduced blade of each leaf. The sporophylls are shield-shaped and produce but one kind of spore.

Order 78. Equisetales. This order with but one family and one surviving genus (Equise- tum, Fig. 38) is found in all parts of the world except the cold regions. Their stems are green and in some species the epidermis is so filled

with silica that they were formerly used for scouring cutlery, whence the name (

the right, pale spore-bearing plant at the left; much reduced.

Fig. 39. — Part of a Ground Pine plant (Lycopodium), with spore-bearing cones; much reduced.

Fig. 40. — Part of a Little Club Moss plant (Selaginella), with many spore-bearing cones; somewhat reduced.

Class 24. Calamarinece. The Calamites were Paleozoic plants, long extinct, forming trees with woody stems which were hollow and ca¬ pable of increasing in thickness. In their ter¬ minal cones, most of them produced two kinds of spores (heterosporous) , hence it must be that the gametophytes were also of two kinds.

Order 79. Calamariales is the only order recognized, with two families.

Phylum XI. Lepidophyta. — The Lycopods are represented now by about 700 species of herbaceous, plants, but in Paleozoic and suc¬ ceeding ages immense trees occurred whose re¬ mains form part of the coal deposits in vari¬ ous parts of the world. The sporophytes of all forms possess solid stems, sometimes un¬ branched, more often branched and clothed by scale or needle-like, spirally arranged, overlap¬ ping leaves. The leaves in the modern forms are green and functional. The spores are borne in sporangia which are produced singly in the axil or on the upper surface of the sporophylls. The latter are more or less sim¬ ilar to the vegetative leaves and grouped into a terminal cone. The gametophytes are known for only a part of the living forms and for very few of the fossil ones. The sperms are spiral and possess two long flagella, resembling those of the Bryophyta instead of the Pteridophyta or Calamophyta. The embryo sporophyte is nour¬ ished for a considerable time within the game- tophyte tissues. Two classes may be distin¬ guished.

Class 25. Lycopodinea. Lower Lycopods. These are only known in their modern forms, the fossil ancestral forms being entirely want¬ ing. The sporophytes are herbaceous, ever¬ green, mostly trailing plants, sending up cone¬ bearing stems here and there. The spores are of but one kind. The gametophytes are more or less tuberous and sometimes underground. They bear antherids and archegones on the same gametophyte.

Order 80. Lycopodiales. One, or doubtfully two, families. The chief genus is Lycopodium (Fig. 39), of economic value as a source of Lycopodium powder and of the t(Ground Pines® so extensively used for Christmas greens.

Class 26. Lepidodcndruiece. The Higher Lycopods consisted so far as fossil records go of trees and of herbaceous plants; their mod¬ ern representatives are entirely herbaceous. They are in general like the foregoing class but differ in that the leaves and sporophylls pos¬ sess a scale-like process on the upper surface, the ligule, and the spores are of two kinds. The gametop'hytes are contained within the spore walls and possess no chlorophyll. In the mi- crogametophyte there is but one vegetative cell and the antherid is single, producing but few sperms. The megagametophyte begins to form long before the sporangium reaches maturity and opens. In some fossil species this devel¬ opment proceeded so far that the archegone was fertilized while the megagametophyte was still retained in the sporangium — the beginning of seed production.

Order 81. Selaginellales. The Club Mosses are the modern representatives of this once very important class. They are small, mostly inconspicuous, moss-like, eve-rgreen plants, re¬ sembling miniature ground pines. The single genus Selaginella (Fig. 40) contains about 500 species, mostly tropical, but a few occurring throughout the United States and in Canada. A few species are grown in greenhouses.

Order 82. Lepidodendi ales. Extinct, Paleo¬ zoic and Mesozoic plants ; mostly trees, with woody stems, capable of increasing in thick¬ ness. Four or five families. Some of these plants formed very tall trees.

Phylum XII. Cycadophyta. — Although

rudimentary seeds were formed, apparently, in one or two long since extinct genera of the Phylum Lepidophyta, the Cycadophyta were the first group in which seeds were regularly de¬ veloped. The gametophytes are of two kinds, conesponding to the two kinds of spores. The microspores are wind carried. Even before they leave their microsporangium they begin to develop into the microgametophyte. This is at first contained within the spore wall and con¬ sists of a vegetative portion of one to several cells and a single antherid. The four mega¬ spores are produced within a very large mega¬ sporangium surrounded by a protective (VOL. 22 — l'i

whole megasporangium falls off as a mature seed. Under favorable circumstances the em¬ bryo sporophyte then resumes its growth and

emerges from the seed, or as we say, the seed germinates. The sporophytes in this phylum are all woody, some with underground stems, others with erect stems, unbranched or branched, forming large trees in many cases. In the lower classes the leaves are fern-like or at least large and pinnate; in their higher forms they are long and narrow or medium-sized and fan-shaped, always with numerous longitudinal veins. The sporangia are borne on the under side or edges of scarcely or much modified leaves which may be scattered among the vege¬ tative leaves or grouped into cones.

There are somewhat over 100 species of this phylum now existent, representing two out of the four classes. Many more species, in all four classes, were present in Paleozoic and Mesozoic times. Indeed, the present species represent but meagre remnants of a once dominant vege¬ tation.

Class 27. Pteridospermece , with the single order 83. Lyginopteridales. Seed Ferns. This group is only known from fossils of the Paleo¬ zoic era. The plants were woody stemmed with secondary thickening, and fern-like as to foli¬ age. The microspores were borne in sporangia similar in structure and location to those of the Order Marattiales in the Phylum Pteridophyta. The megaspores were borne in sporangia ter¬ minal to the lobes of unmodified or consider¬ ably modified leaves.

Class 28. Cycadinecu. Cycads. Only one order (Order 84, Cycadales) is now repre¬ sented, confined to the tropical and sub-tropical

42 43

Fig. 41. — Plant of a Cycad (Cycas); greatly reduced.

Fig. 42. — Leaves and microsporophyll cone of Ginkgo (at left), and naked seed (at right); considerably reduced.

Fig. 43. — Pine-tree (Pinus); very much reduced.

parts of the world. These are plants with erect, woody, little branched stems (occasionally sub¬ terranean), with terminal clusters of large, thick, pinnate leaves. The two kinds of sporo¬ phylls are produced on separate plants, in ter-

minal cones. They are much smaller and en. tirely unlike the vegetative leaves in the male (microsporophyll) cones and in the female cones of all but one genus (Cycas) in which the loose terminal cone resembles a cluster of stunted leaves with seeds borne at the edges of the lower parts of the rachis. The develop¬ ment of the male gametophyte and of the sperms has been fully worked out in this group. The genus Cycas (Fig. 41) is frequently grown in large greenhouses. Zamia occurs in Florida and in the tropics. It is used as a source of starch.

Class 29. Bennettitinecp. The single order of this class (Order 85, Bennettitales) contains many species of Mesozoic plants resembling vegetatively the plants of the foregoing class (Cycadinece) , They differ in that the micro- sporophylls and megasporophylls are present in the same cone. These cones are lateral, axil¬ lary to the leaves, and numerous. They are sur¬ rounded at the base by ‘large leaves comparable in position to the sepals and petals of a Mag¬ nolia flower. Above these are the micro- sporophylls, many in number and much divided, like fern leaves, bearing at the extremities of the divisions the microsporangia. Above these, occupying the centre of the <(flower® are nu¬ merous simple megasporophylls, reduced to a stalk terminated by a megasporangium, and in¬ termingled with sterile bracts. The seed is like that of the preceding order. The chief genus is Bennettites. The plants have great interest 'because of the light they throw on the probable ancestry of the Flowering Plants (Phylum XIV).

Class 30. Cordaitinece. The trees which make up this class were often very large, so far as they are known. The trunk was usually branched, the ultimate branches being clothed with the leaves, giving the plants a tufted ap¬ pearance. The leaves were thickish and parallel- veined, in some cases fan-shaped, mostly, how¬ ever, long and narrow. The microsporophylls occur in small cones ; the megasporophylls in imperfectly understood, complex cones. The seeds are of the same general type as in the two foregoing phyla and were in all probability, as is the case in Ginkgo (Fig. 42), fertilized by motile sperms, either set free directly from the microgametophyte or (as in Ginkgo) from a lonˆ tube produced by it. Two orders may be distinguished with certainty, others will prob¬ ably have to be placed here.

Order 86. Cordaitales. Extinct, Paleozoic trees with elongated, narrow leaves and com¬ plex female cones.

Order 87. Ginkgoales. Maidenhair Trees. In Mesozoic, and probably Paleozoic times, there were many species of this order, but they are represented now by a single species native to China and extensively cultivated there and in Japan and to some extent in this country, Ginkgo biloba (Fig. 42). The trees are freely branched and possess fan-shaped leaves, notched at the middle of the outer edge. The microsporophylls are in small, loose cones ; the seeds are borne singly or in twos at the apex of a long stalk.

Order 88. Gnetales. This order, consisting of three families, each with a single genus, is of very doubtful affinity. It may be related to this class or to the preceding one or its re¬ lationship may be elsewhere. The plants are

more or less woody, with opposite leaves. The stems in two genera are green. The leaves are large or reduced to scales. The micro¬ sporophylls are borne singly or a few together in the axils of scales which are arranged in cones ; i.e., the male cones are compound. Ap¬ parently the same is true for the female cones. The ovules (the term applied to the unde¬ veloped seed) are naked. The sperms are not ciliated. There are three genera. Ephedra (Fig. 44) is found in arid regions, e.g., Arizona and

44 45 46

Fig. 44. — Fragment of a Joint-fir (Ephedra), with clusters of microsporophylls; considerably reduced.

Fig. 45. — Plant of Water Plantain (Alisma), in flower; much reduced.

Fig. 46. — Plants of a Lily (Lilium), in blossom; greatly reduced.

the Mediterranean Basin. The plants of this genus are leafless and jointed. Gnetum with netted-veined, opposite leaves, forms climbing woody vines or even trees, in tropical regions. Tumboa, from southwest Africa, ‘has a radish¬ shaped root surmounted ‘by a short thick stem, reaching a thickness of a yard or more and bearing two, opposite, foot-broad leaves, sev¬ eral yards long.

Phylum XIII. Strobilophyta. — Conifers. The plants of this phylum are all woody, with secondary thickening of the stem. With the exception of a few low shrubs all are trees, some of them of great dimensions. The spores are of two kinds, megaspores and microspores. They are

borne in separate cones on the same or on different plants. The megaspore is re¬ tained within the megasporangium (ovule) while it develops into a megagametophyte of a large number of cells with several archegones. The microspore, even before it leaves its spo¬ rangium, has begun its development into a gamet¬ ophyte, by the cutting off of one or two small vegetative cells, the remainder being the antherid. This is carried by the wind to the megasporangium, and then the antherid begins to elongate, boring its way through the mega- sporangium tissue until the enclosed gametophyte with its archegones is reached. This tube (pollen tube) enters an archegone and one of the two non-ciliated sperms fertilizes the egg. The embryo develops much as in the preceding phylum, resulting in the formation sooner or later of a mature seed. The megasporangium (ovule) and resulting seed are borne on the open surface of well-developed or much re¬ duced sporophylls which may be united into large cones or into small cones with only one or two of the sporophylls functional. The 400 living species form but one class (Class 31. Pinoidecu) with two orders.

Order 89. Abietales. The trees (rarely shrubs) of this order are resinous. The foliage of the majority of species is evergreen, the

leaves being: scale-like and appressed to the twig or needle-like. The megasporangial cones consist, usually, of many scales which are usually woody, but in some genera the cone scales are fleshy at maturity. The seeds are dry and hard, externally. The six families con¬ tain many trees of the utmost economic value. The commoner are Pinus (pines, Fig. 43), Picea (spruces), Larix (larches), Abies (firs), Sequoia (redwood and big-tree), Cupressus (cypress), Juniperus (junipers), Thuya (arbor- vitae), Tsuga (hemlocks).

Order 90. Taxales. The plants of this order resemble closely those of the preceding one, but the megasporophylls are usually single. The seeds are hard-shelled within aad fleshy exter¬ nally. Three families may ibe distinguished. The Yew of Europe and Ground Hemlock of North America belong to the genus Taxus. Podocarpus is an important tree of the South¬ ern hemisphere.

Phylum XIV. Anthophyta. — The Flower¬ ing Plants. This immense phylum includes plants varying from great trees on the one hand to minute herbs on the other. The vast majority are chlorophyll-bearing,

but a few species lack chlorophyll and are saprophytes or even parasites. The leaves are most typically broad with more or less netted venation, but in many groups the venation is parallel, and nar¬ row leaves are found in some plants of nearly every large subdivision of the phylum. The foliage may be evergreen or may fall before the new leaves appear. The plants may live only a few weeks or for hundreds of years. The microspores (pollen) are borne in modi¬ fied sporophylls (stamens), consisting of a stalk (ˆfilament®) bearing usually four micro¬ sporangia (collectively, with the intervening tissues, known as the anther). The megaspores are produced in megasporangia (ovules) borne on megasporophylls (carpels) which are folded together and united at the edges or with the edges of adjacent megasporophylls to form closed cavities in which the ovules lie. These structures are known as pistils and are consid¬ ered as simple if they consist of one mega- sporophyll and compound if two or more megasporophylls are united to form the pistil. Only one megaspore develops to maturity and produces a gametophyte. The latter (called embryo-sac) by division of the nucleus of the megaspore possesses eight nuclei of which six are set off by the organization of cells (but not necessarily with cell walls). One of these naked cells is the egg. The microgametophyte consists simply of one antherid with its tubular extension (pollen tube) which grows down through the tissues of the pistil and through the megasporangium (ovule) tissues to the egg which is fertilized by one of the sperm nuclei. The other sperm nucleus unites with the two nuclei at the centre of the embryo-sac and this stimulus leads to the resumption of the growth of the gametophyte to form the nutritive tissue (endosperm) used for the nourishment of the developing embryo.

The sporophylls are grouped in typical cones (called flowers) or these are much reduced in structure. The apical portion of the cone is occupied by the pistils or pistil ; below these are the stamens and next the petals, showy modified leaves, and the sepals, usually green modified leaves that enclose the whole flower in the bud.

In the primitive groups that s*how the closest relationship to the Bennettitales, the presumptive ancestors of this phylum, the sepals, petals, nu¬ merous stamens and numerous pistils are all spirally arranged’ in a large cone (e.g., flower of Magnolia), but as the evolution progresses we find the size of the flower and the number of each kind of part reduced in connection with modification of the spiral arrangement to whorled arrangement and the union of adjacent parts. Thus the flower of the Pink Family may have five whorls of parts, five to a whorl, viz., five sepals, five petals, two whorls of five stamens each and five megasporophylls united into one compound

pistil. Besides reduction in number we may find actual loss of certain parts; thus many flowers lack petals and some lack sepals also. In some plants the stamens and pistils are found in separate flowers, either on the same plant (monoecious) or on different plants (dioecious). The more than 132,000 species are divided into two unequal classes and 32 orders.

Class 32. Dicotyledonece. The Dicotyledons are trees or shrubs with true wood, increasing in thickness by means of a cylindrical layer of cambium, or herbs whose vascular bundles, with few exceptions, also undergo secondary thick¬ ening. These bundles are mostly arranged equidistanfly from the centre of the stem in one series. The leaves are mostly broad and net- veined. They are scattered along the stem or whorled or very often opposite. The parts of the flowers are most frequently in fives or fours, rarely in threes. The young seedling possesses two seed leaves (cotyledons). The first order of this class shows the greatest affinity to the Order Alismatales of the next class probably having given rise to it in the course of evolution. Likewise in it are shown most clearly the points of resemblance to the Bennettitales (Phylum Cycadophvta) from whose close allies the Anthophyta are believed to have evolved. The first 14 orders, from Ranales to Lamiales, inclusively, represent a line of development in which one structural idea remains predominant, with very few ex¬ ceptions, viz., the pistil, stamens, petals and sepals are attached successively lower down on the elongated or short, but never saucer or cup¬ shaped flower axis. Sometimes the axis is flattened, in which case the points of attach¬ ment are successively further from the centre of the flattened area. The pistil or pistils, therefore, are superior. Beginning this line come orders in which the various parts are nu¬ merous and separate. Reduction in number is the first noticeable feature. Soon, however, the union of pistils to form a compound pistil ap¬ pears. The number of parts in the whorls of sepals, petals, stamens and carpels becomes pre¬ vailingly established at five with two whorls of stamens at first, one soon disappearing. The number of carpels then begins to be reduced, reaching two for the higher orders. Finally we find certain stamens disappearing from the whorl. All along the line petals may disappear and sometimes even the sepals. The sexes may become separated in different flowers. With these changes going on, sometimes within one order it is difficiflt to make a characterization that will cover all the plants in the order with¬ out going to too great length. Indeed, were it not for so many intermediate forms we would

hardly be able to justify the placing of such extremely different forms in one order as will be found here given.

Order 91. Ranales. Trees, shrubs or woody vines or herbaceous plants, mostly with alter¬ nate leaves (but opposite leaves prevail in some families). The flowers have their parts mostly spirally arranged upon the axis and free from each other. Mostly the flowers are radially symmetrical (regular), but in some cases they are zygomorphic and possess only bilateral sym¬ metry. The pistils are attached to the axis above all other parts of the flower, i.e., they are superior. The carpels vary from many (typically) to few or even one; they are free; in a few cases only, being united into a com¬ pound pistil. The stamens are mostly numerous or indefinite in number, reduced to few in some cases. The seeds mostly contain a small em¬ bryo in copious endosperm. The approximately 5,600 species represent 24 families distributed all over the world. In temperate North Amer¬ ica the Buttercup (Ranunculus , Fig. 47), Mag¬

Fig. 47. — A Buttercup (Ranunculus) in blossom; greatly reduced.

nolia, Barberry (Berberis) , Sassafras, Lotus (Nelumbo), etc., represent the commoner fami¬ lies of the order.

Order 92. Malvales. Trees, shrubs and herbs with mostly alternate leaves. The radi¬ ally symmetrical flowers typically are of medium size to large, with five sepals and five petals and numerous stamens united by their filaments into one or several groups. The pistil is superior and compound, with many loosely united car¬ pels. By various steps we find also in this order plants in which the petals are wanting, or the number of stamens has been reduced to five or even to one {Ficus, the Fig), or the number of carpels is likewise small. The seeds may contain endosperm or not. The over 3,800 species represent about a dozen families, of which the following are important examples : Cacao (Theobroma), Cotton (Gossypium), Lin¬ den (Tilia), Elm (Ulmus), Hemp (Cannabis), Nettle (Urtica). Some of the families are ♦ strictly tropical in their distribution, others are world-wide.

Order 93. Sarraceniales. A small order of less than 100 species and consisting of two fam¬ ilies. The plants are all herbaceous and pos¬ sess leaves modified for catching and digesting insects. The radially symmetrical flowers have separate sepals and petals and a few to many stamens. The pistil is superior and compound and consists of three to five carpels with many

seeds with endosperm. Perhaps this order ought to be united with the preceding one.

Order 94. Geraniales. This order, like the Malvales, is to be looked upon as derived from the Ranales. The plants are trees and shrubs, or herbs, with mostly alternate leaves. The flowers are mostly radially symmetrical. The petals and sepals are mostly in fives and sepa¬ rate; the stamens are mostly in one or two whorls of five. The superior compound pistil consists of five, sometimes fewer, mostly weakly united carpels, with many or but few, usually pendent ovules. As in other orders, we find a tendency toward reduction in parts in certain lines of development. Thus some of the over 9,200 species making up the 22 families of this order have lost their petals and in some cases the sepals have disappeared also. Similarly a reduction in the number of stamens shows itself at frequent intervals. As representatives of the commoner families may be mentioned the culti¬ vated Geranium (Pelargonium), Wood Sorrel (Oxalis), Touch-me-not (Impatiens), Flax (Linum), Orange (Citrus), Castor Bean (Rici- nus), etc.

Order 95. Hypericales. Nearly all the 3,100 species of this order are trees or shrubs, com¬ paratively few being herbs, these being mostly extra-tropical, while the vast majority of the families are tropical. In a few families zygo- morphy of the flowers is strongly developed; the majority, however, are radially symmetrical. The kinship to the Ranales from which the order probably arose is shown by the usually large number of stamens (rarely reduced to five) and by the separate sepals and petals and superior pistils. The latter are compound, con¬ sisting of several, rarely as few as two, carpels, often joined by their edges, so that the ovules are parietal, sometimes with axial attachments of ovules. The seeds mostly have no endo¬ sperm. The 20 families of this order are rep¬ resented in temperate North America bv Saint John's Wort (Hypericum), Violet (Viola), Rockrose (Helianthemum), while in warmer regions of the world we find in cultivation Tea (Thea), Papaya (Carica) and Passion Flower (Passifiora).

Order 96. Papaverales. Trees or shrubs in some cases, but mostly herbs, usually with col¬ ored juices or pungent properties. Flowers radially or occasionally bilaterally symmetrical. Sepals and petals separate, usually in whorls of five or four, rarely numerous and spirally ar¬ ranged; stamens many and spirally arranged or in one or two whorls and few in number; pistil superior, compound, of two to six, rarely more, united carpels; ovules mostly parietal; seeds with or without endosperm. Arising from the Ranales this group shows progression from forms with several carpels, many stamens (spirally

arranged) and numerous petals and sepals toward those plants with two carpels, two or one whorl (sometimes incomplete) of stamens and five or four petals and sepals (or even two sepals). The seven families include nearly 3,000 species. The Poppy Family {Pap aver ace ce) includes many plants frequently grown for the beauty of their flowers as well as several of medicinal value, e.g., the Opium Poppy (Papaver). The Mustard Family (Brassicacece) contains very many troublesome weeds and some important food plants such as

Cabbage, Turnip, Cauliflower, Mustard, etc. (Brassica), Radish (Raphanus), various kinds of Cress and other plants of less importance.

Order 97. Chenopodiales. Trees or shrubs, or far more numerously herbs, mostly free from harmful properties. Flowers radially symmetri¬ cal ; sepals and petals usually present and in whorls of five, or in some families the petals lacking. The stamens are in two whorls or the inner whorl may be lacking; occasionally they are more numerous or fewer. The pistil is superior (with rare exceptions), and com¬ posed of several or few, most often five or three, united carpels. The ovules are borne axially or basally in the mostly one-loculed ovary. The seeds usually have a curved embryo embedded in endosperm. Nearly 4,500 species are included in this large order which compre¬ hends 18 families. Its distribution is world¬ wide. As in the preceding orders the more primitive forms show their close kinship to the Ranales by their pistils consisting of several carpels; their many stamens reduced to two whorls as the first step and next, to one whorl, and their separate petals and sepals. This order is marked by the great frequency with which the loss of the petals occurs, their function being taken by the sepals or neighboring bracts which become showy, or the flowers becoming small and inconspicuous. Many of our com¬ monest weeds belong to the latter type, such as Lamb's Quarters (Chenopodium), Pigweed (Amaranthus), Knotweed (Polygonum). Among the plants with more showy flowers are the Pink (Dianthus), Portulaca, etc. The Wil¬ low (Salix) and Poplar (Populus) are the most important trees of the order. They pos¬ sess no petals.

The next seven orders are probably to be derived directly or indirectly from the more primitive forms of the foregoing order, i.e., those forms with parts in whorls of five each and all parts separate except the

united carpels ; with two or more whorls of stamens and with a tendency toward a unilocular ovary with free central placenta.

Order' 98. Diospyrales (Ebenales) . Trees or shrubs, mostly of warm climates. Flowers regular and perfect or sometimes the stamens and pistils in separate flowers. Sepals more or less united, as are the petals. Stamens in two or sometimes one or three whorls, usually at¬ tached to the united petals (corolla). Pistil of several united carpels with one or a few ovules in each carpellary cavity, usually su¬ perior. Seeds usually large, mostly with endo¬ sperm. This order is probably derived from some of the woody forms of the preceding order with the union of sepals and of petals as a forward step. The ovary is still mostly of several carpels and the stamens in more than one whorl. The four families contain over 1,100 species. The family Sapotacece contains some valuable tropical fruits, e.g., sapodilla (Sapota). The genus Diospyros of the Dios- pyraceco (Ebenacea ?) furnishes the persimmon as well as many kinds of ebony.

Order 99. Ericales. Trees, shrubs and herbs of tropical and temperate climates. Flowers regular, perfect, with parts in fives or fours. Sepals and petals usually more or less united. Stamens in two or more often one whorl, mostly free from the petals. The superior

(rarely inferior) pistil is compound, of two to many, mostly five or 10 carpels, each with sev¬ eral minute seeds with endosperm. A few species are parasite or saprophytes. The family Ericacea? is especially associated with (but not confined to) heaths or peat bogs where, for example, the Cranberry (Oxycoccus) abounds. The order contains over 1,700 species in six or seven families.

Order 100. Primulales. This order, consist¬ ing of trees, shrubs and mainly herbs, appears to have arisen, like the two foregoing orders, somewhere in the Order Chenopodiales. The characters are more nearly like those of the Pinks (Diant hacea) than some of the other families. The flowers are regular, with parts mostly in fives. The stamens are mostly in only one whorl (the inner one, alternating with the sepals) sometimes with rudiments of the outer whorl as ˆstaminodia.® The pistils are mostly superior, composed of two to several carpels, usually as many as the petals, with a single locule. Seeds with endosperm. Of the approximately 1,600 species in this order the Primrose family (Primulaceco , Fig. 48) is the

48 49 50 51

Fig. 48. — Flower and leaf of a Primrose (Primula) ; greatly reduced.

Fig. 49. — A Foxglove (Digitalis), in bloom; greatly reduced. Fig. 50. — Flowers and leaf of Strawberry (Fragaria) ; greatly reduced.

Fig. 51. — Leaf and flower-heads of Compass Plant (Sil- phium), one of the Asterales; greatly reduced.

largest in temperate regions. The Plantains (Plantago) probably are related to this family but their position is uncertain.

Order 101. Gentianales. Trees and shrubs, less frequently herbs, largely of the warmer parts of the world, frequently with milky latex. Flowers regular, with sepals and petals united, usually in whorls of five; stamens as many as the petals (rarely only two), being the outer whorl and alternating with the petals. Pistil superior, composed of two, rarely four (some¬ times loosely) united carpels, with mostly many ovules in eadh locule. Endosperm mostly pres¬ ent in the seed. Leaves mostly opposite. The 4,700 species represent six families, of which the following representatives may be mentioned: Lilac (Syringa), Olive (Olea) and Ash (Frax- inus), in the Olive Family (Oleacece) ; Gentian in the family of that name (Gentiana in the Gentianacecu) ; Oleander (Nerium), Periwinkle (Vinca), and several important rubber plants in the Dogbane family (Apocynacece) ; Milk¬ weed in the family of that name (Asclepias in the Asclepiadacecu) .

Order 102. Polemoniales. Trees and shrubs or (in temperate regions especially) more often herbs with mostly alternate leaves. Flowers regular, or somewhat bilateral in the higher families of the order; sepals and petals mostly

in fives and united; stamens one whorl (the outer) alternating with the petals and equaling them in number. Pistil superior, consisting of five or three, in the higher families of two united carpels with two to many ovules to a carpel. Seeds mostly with endosperm. The Phlox family (Polcmoniacece) shows great re¬ semblance to the Primrose family in Order 100, but differs in having the single whorl of stamens the outer instead of the inner one, in having the number of carpels reduced and in having one locule for each carpel instead of one locule for the whole pistil. This order contains about 4,100 species and seven families. The Potato (Solanum), Forget-me-not (Myosotis), ‘Dod¬ der (Cuscuta), Morning Glory (Ipomoea) and Phlox represent respectively

five of these.

Order 103. Scrophulariales. Trees, shrubs and (mostly in temperate regions) herbs, more often with opposite leaves. Flowers irregular, often strongly twro-lipped, the sepals and petals usually in fives and united ; the stamens repre¬ senting the outer whorl, but with one or three missing or represented by stamonodia. Pistil superior and composed of two (rarely four) united carpels, with many ovules in the two or sometimes single locule. Seeds largely with endosperm. About 7,100 species and 10 fami¬ lies. The Foxglove (Digitalis, Fig. 49), Catalpa, Sesame (Sesamum), Broomrape (Orobanche), and Acanthus belong to this order.

Order 104. Lamiales. Trees, shrubs and herbs with mostly opposite leaves. Flowers usually strongly zygomorphic, sepals and petals united, in fives ; stamens representing the outer whorl and, therefore, alternate with the petals, usually one or three missing. Pistil superior, of two united carpels, but often four or more loculed, with one ovule in each locule. The seeds contain little or no endosperm. Over 4,100 species, in four families. In the Verbena family (V erbenacecc) are found such herbs as the Verbena and such trees as the Teak (Tectona). The Mint family (Lamiacece) con¬ tains many plants cultivated for seasoning, e.g., Sage (Salvia), Thyme (Thymus), Mint (Mentha), etc.

Contrasted to the structural idea, hypogyny, running throughout the foregoing 14 orders, that of the remaining 10 orders of the class Dicotyledoneae is perigyny and epigyny. The axis of the flower is expanded below the region of attachment of the pistils or pistil into a disc or cup on th* upper surface or edge of which the stamens, petals and sepals are attached, so that they arise at a level with the body of the pistil or above it. This is called perigyny if this cup-like axis does not grow fast to the pistil that it surrounds and epigyny if the en¬ closed pistil is grown fast to the investing axis- cup. In the most primitive families of this series the pistils are numerous and simple and the axis-cup shallow. Progression is along several lines ; thus the number of pistils may be reduced to one simple pistil, or after the re¬ duction has reached a certain point the re¬ maining pistils may unite into a compound pis¬ til. This may be free from the axis-cup or as evolution progresses this may grow fast to it so that we now find an inferior, compound pistil. Similarly the large, indefinite number of stamens of the more primitive families finally becomes reduced to one whorl of as many stamens as there are petals, or some stamens

may even be missing in this whorl. The primi¬ tive families of the first order of this series are certainly closely related to the .more primitive

families of the order Ranales, which in its turn shows kinship to the ancestral forms among the Bennettitales.

Order 105. Rosales. Trees, shrubs and herbs with mostly alternate leaves. The flowers are mostly regular, but in one side line of evolution zygomorphy has become prev¬ alent. Normally the sepals and petals are in fives or (less frequently) in fours, and separate, but in some families the petals have become lost and the sepals much reduced or also lost. In the earlier families the stamens are very numerous, but in several directions of evolu¬ tion the number has been reduced to double or equal to that of the petals or sepals. In the less advanced forms the simple pistils are numerous ; in one direction of evolution the number is reduced to one, in another direction the reduced number of pistils unites to a com¬ pound pistil. Perigyny is present in the lower members of the order, epigyny in some of the higher members. In one group of families the seeds lack endosperm, in other it is abundant. It is only by the presence of so many forms that are intermediate in their characters that these very diverse plants are united into one order. The species number over 14,000 and rep¬ resent 20 to 25 families. The Strawberry (Fragaria, Fig. 50) represents one of the most primitive groups of the order, being in its flower structure very close to plants of the order Ranales. Other plants are the Rose (Rosa), Apple (Malus), Plum (Prunus), Acacia, Bean (Phaseolus), Clover (Trifolium), Currant (Ribes), Witch Hazel (Hamamelis), etc.

Order 106. Myrtales. Trees, shrubs and herbs with opposite or less often alternate leaves. Flowers regular with sepals and petals separate, stamens mostly many or reduced two to four times as many as the petals, rarely just as many or fewer. Pistil compound, of two to many united carpels, with as many locules, or with one locule. Ovules mostly numerous, sometimes reduced to one ; seeds with or with¬ out endosperm. Pistils surrounded but free from the deep axis-cup in one family, in the remainder enclosed by and grown fast to the axis-cup (ovary inferior). In this order we find a progression from perigyny to epigyny, from many stamens to few stamens, and from possession of petals to apetaly in a few fami¬ lies. Furthermore, several of the 15 families are strict parasites and leafless. Among the latter should be mentioned the East Indian Rafflesia which grows inside the tissues of the woody host as long threads of cells, for all the world like a fungus, forming its flower buds beneath the bark of the host and finally burst¬ ing out to form an immense flower, in one species over a yard in diameter. The order contains nearly 7,500 species. The Myrtle family contains many trees of economic im¬ portance such as the Blue Gum (Eucalyptus), Allspice (Pimenta), Clove (Eugenia). In an¬ other family

we find the Pomegranate (Punica). In this order, too, belong the Even¬ ing Primrose (Oenothera), Mangrove (Rhizo- phora), Brazil-nut (Bertholletia) , etc.

Order 107. Loasales. Mostly herbs, rarely shrubs or trees, with alternate (only rarely op-

posite) leaves; frequently climbing vines. Flowers regular or in one family zygomorphic, with separate sepals and petals, usually in fives or fours. Stamens numerous or equal to or twice as many as the petals, sometimes fewer. Pistil inferior, composed of three or sometimes more, united pistils ; with one or sometimes several locules. Seeds usually many, mostly without endosperm. The plants of this order tend to be more fleshy on the whole than in the preceding one, and the ovules are more pre¬ vailingly parietal. Both orders apparently have about the same origin and develop parallelly. About 1,400 species in five families. The Gourd family, with Muskmelon and Cucumber (Cucumis), Watermelons (Citrullus), Squash and Pumpkin (Cucurbita), etc., and the Begonia family are perhaps the most familiar represen¬ tatives of this order.

Order 108. Cactales. This order appears to have arisen from the preceding one. The plants are herbaceous and very fleshy, in a few cases with leaves, but mostly leafless. The fleshy, green stem is modified in very remark¬ able ways and is usually spiny. The flowers are regular or nearly so, with numerous sepals, petals and stamens. The pistil is inferior, of four to eight united carpels, with the numerous ovules parietal. Endosperm is scanty or lacking. The single family contains nearly 1,200 species. These are mostly found in warm parts of the New World, frequently in exceedingly dry situations. The Giant Cactus of Arizona (Carnegiea) attains a height of over 60 feet, while the little Purple Cactus (Coryphantha) from Colorado to Alberta is only one to five inches in height.

Order 109. Celastrales. Trees and shrubs, rarely herbs, with opposite or alternate leaves. Flowers small, regular, with separate sepals and petals (the latter wanting in some families), which are usually in fives (or fours). Stamens as many as the sepals, rarely twice as many. Axis of the flower expanded into a more or less glandular, turgid disc, or ring, which par¬ tially surrounds the pistil and is grown fast to it in the further developed families. Pistil compound, of two to six (rarely

more) united carpels with as many locules, or the locule, only one in certain families. Ovules few : seeds with or without endosperm. This order apparently arose from some of the Rosales in which the axis-cup was shallow and in which epigyny had not yet been developed. However, the reduction in number of stamens had been established and the pistils were compound. Some of the 24 families are included here very doubtfully. In three families the plants are true parasites and in another many species are at least partially so. Belonging to this order are the Grape (Vitis), Holly (Ilex), Sandal¬ wood (Santalum), Mistletoe (Viscum and Phoradendron) and many other plants of economic interest.

Order 110. Sapindales. Trees and shrubs (very rarely herbs), with alternate or opposite leaves. Flowers small (with few exceptions), regular (occasionally zygomorphic), sepals and petals separate, from 3 to 10 in number, usually four or five, petals often wanting. Stamens as many as the sepals, rarely twice as many. Axis developing a more or less pronounced disc which is grown fast to the compound pistil in the higher families but free from it in the

lower ones. Carpels one or two to five, mostly two or three; pistil with one or several locules; ovules one or two in each locule ; seeds with¬ out endosperm. This order probably arose from somewhere in the preceding order from which it differs in the mostly smaller number of ovules and carpels, and in the very strongly marked tendency to apetaly. The 15 families contain nearly 3,000 species of plants, of which the following may be mentioned: Maple (Acer), Sumac (Rhus), Mango (Mangifera), Walnut (Juglans), Birch (Betula), Oak (Quercus).

Order 111. Ammiales. Trees or shrubs or herbs with alternate or opposite leaves which are very frequently compound. Flowers regular, small, pentamerous or tetramerous ; calyx of small sepals, sometimes reduced to a mere border. Petals (rarely wanting) small, separate. Stamens as many as the petals and alternating with them. Compound pistil inferior, of two (rarely three or more) united carpels with a single ovule in each locule. Seeds with endo¬ sperm. The flowers are usually borne in large numbers in umbels or small heads, often with the marginal flowers larger and showy. This order of three closely related families and over 2,800 species probably arose from some of the higher Celastrales. In the Araliacece we find the English Ivy (Hedera) and Ginseng (Panax) ; in the Cornacecu we find the Dog¬ wood (Cornus) ; and in the Ammiacece Celery (Apium), Carrot (Daucus), Fennel (Fceni- culum), Parsnip (Pastinaca), etc.

Order 112. Rubiales. Trees, shrubs and herbs with opposite leaves

which are entire or more or less dissected. Flowers medium-sized to small, regular or sometimes more or less zygomophic, single or more often in clusters of various types, including umbels and heads. Sepals and petals in fives or fours ; sepals often small. Petals united into a tube or merely at their bases. Stamens separate, as many as the petals and alternating with them. Pistil in¬ ferior, of two to three, sometimes more united carpels, and one to many ovules in each locule, or in one family the locule single with one pendent ovule. Seeds mostly with endosperm. This order of about 5,100 species and five fami¬ lies shows kinship to the preceding order from which it differs chiefly in the united petals. Coffee (Coffea), Elder (Sambucus), Honey¬ suckle (Lonicera), Teasel (Dipsacus), etc., are members of this order.

Order 113. Campanulales. Trees and shrubs, more often herbs, with mostly alternate, undivided leaves. Flowers mostly showy and moderately large, regular or markedly zygomor¬ phic, with sepals and petals mostly in fives. Sepals separate or partly united ; petals united into a wheel-shaped or more often more or less bell-shaped corolla which is sometimes two¬ lipped. Stamens as many as the petals and alternating with them or fewer; united by the anthers or by the filaments or if not united at least in many cases with the anthers closely crowded around the style. Pistils compound, of two to five united carpels, mostly with as many locules as carpels and many ovules in each, in one family with one locule and a single pendent ovule. Pistil inferior, sometimes com¬ pletely, sometimes only partially. Seeds mostly with endosperm. This order differs from the foregoing one in the prevalence of alternate leaves, in the tendency for the stamens to be

more or less united, and in the greater inclina¬ tion toward herbaceousness. The two orders are closely related and probably have a common origin. Five or six families are recognized, containing in all toward 1,600 species. The Bellflowers (Campanula) and Lobelia are among the best-known members of this order.

Order 114. Asterales. Trees and shrubs or most often herbs with alternate or opposite leaves and great variety of stem structure. Flowers united into heads with the marginal flowers sometimes modified into showy struc¬ tures (ˆrays®). Flowers regular or zygomor- phic. Sepals very various, e.g., united to a low ridge, separate, chaffy scales, numerous small teeth, or long simnle or

feathery threads (as in thistle down). Petals five (very rarely four), united into a tube and regularlv or ir¬ regularly lobed above or the tube split down on one side. Stamens five, attached at the base of the corolla tube, with separate filaments, but with united anthers. Pistil inferior, with one locule and one ascending ovule, bicarpellary. Seed without endosperm. An immense order of over 14,000 species, formerly regarded as a single family, later as constituting three fam¬ ilies, but here regarded as representing 14 (the tribes of other authors). This order is re¬ garded as the culmination of the evolutionary development of the Phylum Anthophyta. Among its members may be mentioned i.he Sun¬ flower (Helianthus) , Compass Plant (Sil- phium, Fig. 51), Goldenrod (Solidago), Thistle (Cirsium), Lettuce (Lactuca), etc.

Class 33. Monocotyledonece. The mono¬ cotyledons are mostly herbaceous plants, rarely trees, without true wood and without the power to increase in thickness (secondary thickening). The vascular bundles are scattered in the stem, not equidistant from the centre. The leaves are mostly scattered along the stem, rarely whorled and only exceptionally opposite. They are long and narrow and parallel-veined, or if broad usually have a midrib, with the lateral veins parallel. The parts of the flowers (sepals, petals, stamens and carpels) are mostly in three's. The seed leaf (cotyledon) is single (apparently through the failure of one of the two that start to form to continue iL develop¬ ment). The evidence drawn from structure and from the development of the embryo makes it seem probable that this class arose from some of the herbaceous members of the preceding class (Dicotyledonece) , almost certainly from Order Ranales, close to the Family Ranun- culacese. Indeed, that group and its near relatives sometimes show a suppression of one cotyledon, a scattered arrangement of vascular bundles which even may lack the power of secondary thickening, and a trimerous ar¬ rangement of the parts of the flower. Further¬ more, the members of what seems to be the most primitive order of the Monocotyledoneae, the Alismatales, frequently possess net-veined leaves, and in seedlings of many members of this class traces are found of secondary thick¬ ening in the vascular bundles. The eight orders comprise nearly 24,000 species.

Order 115. Alismatales. Herbaceous, in one family shrubby or tree-like. Usually in wet soil or aquatic. Pistils simple, mostlv more than one, superior to all other parts. of the flower, which are also not united to each other. In some of the nine families both petals and sepals

are present, in others these are lacking or rep¬ resented by scales or

bristles. Of the 400 species that make up the nine families some are marine; almost the only .flowering plants that grow in the ocean. The Water Plantain (Alisma, Fig. 45) is world-wide in its distribu¬ tion as are some of the Pond'weeds (Potamoge- ton) .

Order 116. Liliales. The Lilies. The plants of this order are only exceptionally aquatic or marsh inhabitants. They are herbaceous with a few exceptions. The pistil is compound, con¬ sisting of (usually) three united carpels. The stamens are in two (sometimes, by suppression of one whorl, one) whorls of three each and the petals and sepals are well developed and often alike. The flowers are radially symmetri¬ cal or nearly so. The pistils are attached to the flower axis above all the other parts (pistil superior). The flowers are mostly showy and borne singly or in spikes or various other tvpes of inflorescence, rarely closely crowded. Here are to be found many of the most beautiful flowering plants such as the Lilies proper (Lilium, Fig. 46), Lily of the Valley (Conval- laria), Crown Imperial (Fritillaria) , Tulips (Tulipa), Mariposa Lilies (Calochortus) , Spring Lilies (Ervthronium), Hyacinths (Hy- acinthus), Day Lilies (Hemerocallis) , etc. There are 12 or 13 families and nearly 3,400 species.

Order 117. Arales. The Aroids. These have a flower structure derived from that of the Liliales. The pistil is superior and typically tricarpellary, each carpel usually with two or more ovules. The petals and sepals are re¬ duced to small scales or are entirely wanting. The flowers are perfect (stamens and pistils in the same flower) or the stamens and pistils are in separate flowers, usually then not far distant. The flowers are crowded on

duced.

Fig. 53. — A Date Palm (Phoenix) ; greatly reduced.

Fig. 54. — A Brome Grass (Bromus), in blossom; greatly reduced.

rather thick, fleshy spikes which are fre¬ quently surrounded and overtopped by a large bract (spathe). In a few cases this spike is reduced to a short axis with only one or two flowers. The plants are mostlv large: in some cases being palm-like and somewhat woody, but in most cases herbaceous and upright or climb¬ ing. The leaves are large and often net-veined, and entire or lobed or compound. In one family (Lemnaceoe , the Duckweeds) the leaves are lacking and the small floating stem is flat¬ tened and thallus-like, bearing only one or two flowers at the edge. The 1,100 plants of

this order make up three families which are mostly inhabitants of the warmer recions of the world. In North America the family Ara- cecc is represented by the Jack-in-the-Pulpit (Arisaema), Sweet Flag (Acorus), Skunk Cab¬ bage (Spathyema), etc., while in cultivation we find the Calla Lily (Richardia, Fig. 52) and the Elephant's Ear and Taro (Colocasia), etc. The third family (Cyclanthacece) consists en¬ tirely of tropical forms of which only a few are grown in greenhouses in the temperate regions.

Order 118. Arecales. The Palms (Fig. 53) are nearly all shrubs or trees, often 50 to 100 feet in height, but without true secondary thickening. Their stems bear a crown of pin¬ nate or palmate leaves at their summits, and among them are the axial (rarely terminal), usually much-branched inflorescences along whose branches the flowers are attached. The inflorescence has one or more large bracts that enclose it when young. The flowers are of the Lily plan, consisting of a superior, tricarpel- lary, compound pistil producing from one to three seeds, and two whorls of three stamens each and three rather small petals and sepals respectively. The petals and sepals are lacking in some palms and in many of the tribes the stamens and pistils are in separate flowers. The single family (Arecacece divided by some authors, perhaps with right, into five or more families) includes more than 1,100 species, all natives of warm climates. Among these are the Coconut Palm (Cocos nucifera), <(The most useful plant in the world,® the Date Palm (Phoenix dactylifera, Fig. 53), the Palmetto (Inodes palmetto), etc.

Order 119. Poales. The plants of this order are grass-like plants (with the exception of the bamboos, herbaceous), with slender stems and simple, usually narrow leaves. The superior, compound pistil is tricarpellary or bicarpellary (rarely more than tricarpellary), with one ovule to each carpel, or where the pistil has but one locule only one ovule in the pistil. The peri¬ anth is reduced to small scales or bristles. The inconspicuous small flowers are accompanied with chaffy bracts. The seeds possess abundant endosperm. Of the five families in this order the Sedges (Cyperacece, about 3,000 species) and Grasses (Poacecc , about 3,500 species) are the most important. These two families form the chief food for the vast numbers of cattle and wild herbivorous animals that live on prairies and in open, forests. The former may be dis¬ tinguished by the fact that the leaves are three-ranked with their sheaths closed to form a tube while in the grasses

they are two-ranked with the sheaths split down one side. In the sedges the embryo is embedded in the endo¬ sperm ; it lies at one side of it in the grasses. The chief sedges of the temperate regions of North America are very numerous species of Carex, of Cyperus, of Scirpus (Bulrush), etc., while the vast number of grasses include Tim¬ othy (Phleum) , Red Top (Agrostis), Orchard Grass (Dactylis), Brome Grass (Bromus, Fig. 54), and such cereals as Wheat (Triticum), Rye (Secale), Oats (Avena), Barley (Hor- deum), Maize (Zea). Rice (Oryza), etc. The Bamboos (Bambusa and Phvllostachys) are large perennial woody grasses of the warmer regions of the world where they often attain tree-like dimensions,

Order 120. Hydrocharitales. The plants here included are all aquatic and mostly submerged. They are found in fresh and salt water. Their compound pistils are formed of three or more united carpels and are interior (i.e., the portion of the flower axis on which the petals and sepals are borne has grown up around the pistil, growing fast to it so that the petals and sepals seem to rise from the upper part of the Distil). They have but one cavity with the mostly nu¬ merous ovules parietal. The flowers are of separate sexes, or in some cases perfect. The stamens are in one to several whorls of three. The seeds contain no endosperm. The relation¬ ship of .the order is uncertain, but it seems possible that they are to be considered as de¬ rived from the Alismatales or from the Liliales not far from the ooint where they arose from the Alismatales. The 50 or more species of the order are placed by some authors in one, by others in two families. Eel-grass (Vallisneria, Fig. 55) and Waterweed (Philotria) are com-

55 56 57

Fig. 55. — Plant of Eel-grass (Vallisneria), in blossom; greatly reduced.

Fig. 56. — Iris plants in blossom; greatly reduced.

Fig. 57. — An epiphytic Orchid (Gongora), with pendent flower clusters; greatly reduced.

mon plants of this order. The latter has be¬ come a pest in streams in Europe into which it was introduced from its native home, America, filling them up and even impeding navigation.

Order 121. Iridales. Herbaceous plants, sometimes of large size, often vine::. Flowers radially symmetical or nearly so, with com¬ plete trimerous whorls of sepals, petals, stamens and carpels. Stamens in two whorls or the inner or outer whorl lacking. Pistils inferior. These

plants are very closely related to the Liliales from which they were undoubt¬ edly derived. The chief difference is the in¬ ferior pistil as compared with the superior pistil of that order. About six families include the 1,850 species of this order. Among these may be mentioned the Irises (Iris, Fig. 56), the true Yams (Dioscorea), Amaryllis, Gladiolus, Nar¬ cissus, etc.

Order 122. Zingiberales. The plants of this order are, like those of the foregoing one, herbaceous, in the case of the bananas being of tree-like dimensions. The flowers are some¬ what to exceedingly irregular, either by their dorsiventral symmetry or by total lack of sym¬ metry. The whorls of stamens are usually in¬ complete, certain members being lacking or re¬ placed by petaloid ((staminodia.® The pistil is inferior and consists of three united carpels with one to many seeds in each. This order is closely related to the foregoing one from

which it differs chiefly by its zygomorphous or asymmetrical flowers with incomplete whorls of stamens. The Banana (Musa), Ginger (Zingiber), Canna, etc., are well-known repre¬ sentatives of the group which contains about 550 species in four families.

Order 123. Orchidales. The two families generally placed in this order are not with any certainty to be placed together. Possibly the one (Burmanniacece) should be placed with the Iridales. The two agree, however, in the inferior, tricarpellary pistil with very numerous, minute seeds with no or very little endosperm. In the one family (of about 60 species) the flowers of some species are radially symmetrical, of other species zygomorphic, the latter being the case throughout the other family (Orcliidacece) . In the latter family, three, four or five stamens are suppressed, while in the former both whorls or only one whorl may be present. The plants are all herbaceous. The Orchids (Fig. 57) number up¬ wards of 7,500 species and are found from the cooler temperate zones to the tropics where they reach their greatest development. They are terrestrial or epiphytic, green or in a few cases lacking chlorophyll and then gaining their food from decaying organic matter in the soil. None are parasites. The flowers are strongly zygomorphous, with the one or two (rarely three) stamens grown fast to the pistil. They show the most remarkable adaptation to fer¬ tilization by insects. Although grown largely for the beauty of their usually long-persisting flowers, e.g. — Cattleya, Catasetum, Dendrobium, etc., the only orchid widely cultivated for other purposes

is Vanilla, a climbing vine with thick, green stem and flat leaves, whose long slender pods are the ((Vanilla beans® of trade. Among the commoner native orchids of temperate North America may be mentioned the Lady's Slipper (Cypripedium), Orchis, Pagonia, etc.

Charles E. Bessey,

Late Professor of Botany, The University of Nebraska,

Revised by Ernst A. Bessey, Professor of Botany, Michigan Agricultural College.

PLANTS, Diseases of. Diseases in plants have existed as long as plants themselves — ages before the advent of man. Civilization and agriculture have usually developed together in all parts of the earth and it is not strange that anything that troubled or destroyed an im¬ portant food plant should be observed and the cause sought. In the earliest historic records as well as in early Greek and Roman times some of the more destructive diseases of plants, like rust and mildew or blight of cereals, were widely known and discussed. A special deity was recognized who ruled these phenomena and to whom sacrifices were offered.

Injury due to animals, especially insects, and to extremes of weather and unfavorable soil conditions were early often associated with their appropriate causes. It was not, however, until the latter part of the 18th and the begin¬ ning of the 1,9th century that the solid founda¬ tions of plant pathology were laid by the de¬ velopment of anatomy and physiology. The early works of Unger, (Die Exantheme der Pflanzen,1* etc. (1833) ; Weigmann, (Die Krank- heiten und Krankhaften Misbildungen der

Gewalchse) (1839), and of Meyen,

Health and Disease Compared. — That there is no defined line between health and disease is generally recognized by pathologists and physiologists. A plant continually varies in response to changes in its environment. There is, however, for each individual and for a given species as a whole a certain accustomed range or power of adaptation to each factor of its environment and to the various combinations of these factors. The process of natural selec¬ tion operates to perfect this adaptive attuning of the individual and the species as a whole to the conditions under which they live. If these conditions are subject to great extremes of moisture and dryness or heat and cold, the natural or indigenous vegetation will be found, as a rule, equal to the

emergency, while an introduced species, if developed under an en¬ vironment not subject to such extremes, might be seriously injured or destroyed, and if the change is very unusual even the indigenous species may suffer. A moist, warm, cloudy spring may be followed by dry, hot weather and the tender watery growth be so much dried out and checked that it may be deformed and abnormal in shape, structure and size. This variation may be slight or it may be great. If it is slight it may have no appreciable effect on the vigor and growth of the plant. The leaves becomes a little firmer and smaller and more resistant to the hot; dry conditions, while the maturer leaves that cannot adapt them¬ selves to the change turn yellow and fall, cut off by the parent plant. The plant is better for the change and can live under the modified conditions with greater ease and safety.

If the variation is greater the growth of the plant may be decidedly checked, the leaves being small and many more of them shed. In still more extreme cases the tender leaves may be dried up and killed either wholly or in part. According to Hartig, <(It is only when the sickly

condition leads to the death of some part of the plant that we may speak of actual disease." Where a few leaves, unable to adapt themselves to a changed condition, turn yellow and fall, the leaves themselves may be diseased, but the plant as a whole is benefited by their loss by being relieved of sources of uncontrolled drain of its water supply. As the loss of leaves be¬ comes greater, however, we pass from the ex¬ tremely localized disease to a point where the whole or a considerable part of the plant is weakened, either by the direct loss of food that should be furnished by the leaves to the rest of the plant structure or by the use of reserve food in the reproduction of lost parts. It is evident in such cases that the border line be¬ tween health and disease is hard to define. The case is not much easier if, instead of variations produced by 'moisture and temperature, we consider those caused by insects or fungi. A few leaves eaten from a tree by some insect or destroyed by a fungus might have no injurious effect on the tree as a whole and might even be an advantage, but as the number of in¬ jured leaves increases the tree is weakened and its life threatened. Slight doses of certain poi¬ sons stimulate the cells to more vigorous growth, acting as a tonic, while a little larger dose poisons and destroys the cell. Leaving all questions of consistency of definition, we may practically define as diseased all those condi¬ tions

of a plant which directly or indirectly en¬ danger its life or prevent normal development under given conditions of environment. Or, as Marshall Ward puts it, <(We may define disease as dangerous disturbances in the regularity, or interference with the completeness or range of the molecular activities constituting normal life — that is, health — and it is evident that every degree of transition may be realized between the two extremes."

Classification of Diseases. — The method of classification adopted is more a matter of convenience than importance. Most writers in plant pathology base their classifications on the causes of disease. Frank, for example, adopts the following outline: (1) Effects of insuffi¬ cient room or space; (2) Effects of wounds; (3) Diseases due to atmospheric influences; (4) Diseases due to soil influences; (5) Diseases due to the action of injurious substances; (6) Diseases due to injurious plants; (7) Diseases due to injurious animals; (8) Diseases without any noticeable causes.

Hartig discusses diseases of trees according to the following scheme: (1) Diseases induced by Phanerogams; (2) Diseases induced by Cryptogams; (3) Wounds; (4) Diseases due to unfavorable conditions of soil; (5) Diseases due to unfavorable atmospheric conditions. While a classification based on cause is more scientific and more convenient for the pathol¬ ogist, classifications based on the plant, the part of the plant attacked and the symptoms are the most intelligible and convenient for those who devote themselves to the practical culti¬ vation of plants. According to such an arrange¬ ment we should have diseases of roses, carna¬ tions, violets, lilies, wheat, corn, oats, rye, apple trees, peaches, plums, maple, alder, birch, etc. Under each head we could subdivide into dis¬ eases of roots, stems, leaves, flowers and fruits, and again according to symptoms — decay or loss of parts, swellings, galls, shrinking, cank¬

ers, spots, discolorations, etc., finally coming down to the causes. It cannot be too strongly urged that pathologists writing for practical men adopt this latter type of classification at least as a key for the identification of specific diseases, as Hartig has done in his excellent work on the (Diseases of Trees.) In practice we have in plant pathology, the same as in animal pathology, first carefully to examine, de¬ termine and interpret the symptoms (diagnosis), then to find and study the causes (etiology). We are then in a position to determine curative measures (therapeutics) or preventive measures (prophylaxis).

The general survey of the subject of plant pathology as planned in this

article is based on the following classification :

I. Constitutional conditions — predisposition and immunity.

II. Diseases without apparent cause.

III. Diseases caused by the non-living envi¬ ronment.

(a) Conditions of soil or substratum.

b) Atmospheric conditions.

c) Temperature.

(d) Light.

(e) Electricity.

(/) Shock or jars — mechanical.

IV. Diseases caused by the living environ¬ ment.

(a) Antagonistic association, crowd¬

ing, isolation, etc.

(b) Vegetable parasites.

(c) Animal parasites.

Constitutional Conditions — Predisposi¬ tion and Immunity. — A plant may be likened to a very delicately constructed and complex machine automatically adjustable under certain conditions and capable of running and doing work if properly supplied with energy. The accurate and perfect working of the machine depends first upon the perfection of its con¬ struction and adjustment, down to the minutest detail. It comes from the manufacturer with a wheel or screw missing, or the parts incor¬ rectly adjusted or made, it must do its work, if at all, with more or less imperfection, and we may consider that the mechanism has a consti¬ tutional difficulty or imperfection. Perhaps a new machine is assembled from parts of old ones so differing from each other that it be¬ comes impossible to produce a perfectly co¬ ordinated mechanism. Some of the variations that occur in the constitution and organization of plants during the process of reproduction and development are of the nature of such im¬ perfect construction or adjustment. When these imperfections endanger the life of the plant we have a constitutional disease, or at least a

predisposition to disease.

Predisposition to disease may be normal or abnormal. Normal predisposition is where some perfectly normal condition of growth makes the plant liable to injury. Young cereal plants, for example, are liable to infection by smuts, while older plants are quite resistant. When the formation of young, tender growth coincides with the spore dissemination of some fungus or the prevalence of some insect best able to attack growth in such condition, the plant is at this stage normally predisposed to such attack. In the same way there may be normal predisposition to injury by cold, light,

heat, etc., but in no case of this kind could the predisposition be considered in any sense dis¬ ease. Abnormal predisposition is where some abnormal change takes place in the plant from any cause which lowers its vitality or resistance, and which is in itself a pathological condition. Wounds and mechanical injuries may permit the entrance into the plant of insect or fungous parasites, as is the case with many of the wood rot fungi. Injuries from cold or heat may re¬ duce the normal resistance to parasites. Plants which have been severely chilled during rapid growth, though not to the point of killing or even freezing, are often unable to resume nor¬ mal growth even under the most favorable con¬ ditions. They appear to be partially paralyzed and are in this condition extremely subject to insect and fungous attack. So many predisposi¬ tions develop as the result of starvation, over¬ feeding or unbalanced nutrition even before the initiative pathological changes have become chronic.

Genera, species and individuals vary among themselves in liability to disease or resistance to it as they do in other ways. Races resistant or immune to certain unfavorable conditions or parasitic enemies are common in nature, and may develop as the result of natural selection, or more quickly and certainly as the result of artificial selection of a natural tendency. If a natural tendency to resistance is not present in a given species, race or variety, it may be introduced into new generations through the processes of breeding and selection combined. The production of plants for special purposes resistant or immune to certain diseases is prov¬ ing of immense value to agriculture. On the other hand, both in natural and artificial selec¬ tion and breeding, non-resistant or sensitive in¬ dividuals, varieties and races may develop or be developed unusually subject to disease.

Seedless or non-fertile individuals may re¬ sult from too close fertilization, or where the parents are too distantly related; or if seeds are produced in such cases, the individuals grown from the seeds often lack in vigor or reach an incomplete or imperfect development the same as in animals.

Many species of plants, like the violet, straw¬ berry, lilies and bulbous and tuberous rooted plants in general, are naturally propagated by vegetative offshoots, runners, buds, bulbs, etc., and by seeds. The seed generations under nor¬ mal conditions are usually the most vigorous and variable. Take, for example, plants from the seeds of Lilium harrisii (Bermuda lily), de¬ rived from crossing individuals of the same variety, as compared with plants from bulblets of the same individuals propagated for many years by bulb generations, and note the differ¬ ences. The plants direct from the seed and from the bulbs produced by the seedling genera¬ tion are relatively much more vigorous than the plants from bulbs distantly removed from a seed generation. The latter are much more sensitive than the former to the attacks of aphides and red mites on the leaves and the bulb mites on the bulbs and roots. The latter are also more sensitive than the former to fungous parasites, and to unfavorable condi¬ tions of the non-living environment. The same is true of the cultivated violets, especially the varieties that are propagated from runners and seldom produce seed on account of the

doubling of the flowers. Long continued asex¬ ual propagation appears in these cases to gradu¬ ally reduce the power of individual adjustment or adaptation to changes in environment, re¬ sulting in decreased vigor and resistance to un¬ favorable conditions. On the other hand, there are many varieties of plants thus propagated that do not appear to suffer in this way. That it is the cause of predisposition to disease in some cases, and even constitutional derange¬ ment, must not be overlooked in the study of aetiology of a disease.

Diseases without Apparent Cause. — Under

this head a number of obscure but well-defined diseases are grouped, the aetiology of which is still unknown. Among these are the California vine disease, peach yellows and peach rosette, little peach, some forms of gummosis of the stone fruits, die back of the orange and a score of other diseases, apparently contagious, though the cause has not yet been found.

Variegation. — Formerly variegations were included in this class. These are characterized by the development of white, yellow or

colored spots, blotches, segments, stripes or bands in the otherwise apparently normal green leaves. The transition from the diseased to healthy cells is usually sharp and well defined from the youngest to the oldest stages of the leaves or other tissues involved. Any particular cell is subject to the disease only while in a state of active division. It, therefore, never spreads to a cell that has stopped dividing. The diseased cells are usually smaller than healthy cells, and are of much slower growth. The nucleus and protoplasm are more vacuolate, but the most apparent change is in the development of the chloroplast and the chlorophyll. The chloro- plasts may be reduced in number and size, and the chlorophyll may be reduced or entirely ab¬ sent. The change in the diseased cells them¬ selves is often progressive, starting with a re¬ duction of chlorophyll, gradually fading to yel¬ low, then to white as the cell matures. In many cases the disease is transmitted through the seed and is thus hereditary. In others it is propagated only by division of the original plant by buds, cuttings, etc. When a variegated bud or branch is grafted into young, rapidly-grow¬ ing tissues of a normal or healthy plant of the same variety, branches formed above and below the graft often become variegated, demonstrat¬ ing that the disease is thus transmissible or in¬ fectious. When it once appears in a plant it is very persistent, especially when it has gone to the point of involving the seed generation. Sometimes, however, a plant which has been producing variegated growth suddenly returns to the normal green. While such changes are usually classed as spontaneous variations, they differ in many respects from normal variation. Recent investigations by the writer and others have demonstrated that variegations, including the so-called mosaic diseases, develop as the result of certain disturbances of nutrition of the young dividing bulb cells.

All forms of variegation weaken the tissues involved and make them more subject to insect and fungous attack and more easily injured by cold or high temperature. Besides this the changes are in themselves strictly pathological, and threaten or cause the premature death at least of the parts affected.

Albinism, — When the loss of the green col-

oring matter is complete and apparently spon¬ taneous, not curable by addition of some lacking nutrient, it may be classed with variegations. Other forms of albinism, yellowing or chlorosis are

brought about by lack of iron, excess of lime, carbonic acid, lack of light, etc., and will be further discussed when these factors are considered in relation to disease. The cure and prevention of diseases of this class must be based on securing and maintaining a correctly balanced nutrition for the young cells — protect¬ ing them from shocks, especially those due to temperature variations. Peach yellows and rosette, California vine disease, die back of the orange and diseases of this type can be con¬ trolled only by rooting out the diseased individ¬ uals upon the appearance of the first symptoms. At the present time we know no cure for these particular diseases. In many respects they behave like variegation or mosaic diseases.

Diseases Caused by the Non-Living Environment.

From what has been said in previous para¬ graphs, it is evident that unfavorable physical and chemical conditions of the soil, excessive dryness or moisture of the soil or atmosphere, unfavorable conditions of temperature, light, etc., may cause derangements resulting in temporary or chronic disease. Plants which have become adapted by natural or artificial selection to a certain range and sequence of soil, moisture, temperature and light conditions usually suffer some sort of derangement if exposed to a set of conditions materially different in any par¬ ticular factor, group of factors or in the rela¬ tion of these to each other. It is absolutely necessary, therefore, in studying the aetiology of diseases to know the natural or constitutional requirements of the plants and their powers of adaptation. This knowledge can be obtained only by long and intimate acquaintance with the kind of plants in question under varying con¬ ditions.

Soil. — In natural conditions it is a matter of general observation that certain varieties of plants thrive best on particular kinds of soil, the same as in particular conditions of light, temperature and moisture. The storage and movement of water in soils and its availability to plants, the solution of soil foods, nitrifica¬ tion, temperature and aeration depends largely upon the structure or physical composition of the soils. Water, food, air and temperature are among the fundamental requirements of vegetation. It is the varying amounts and rela¬ tions of these factors maintained by a given soil that largely determine whether or not it is naturally suited in a given region to a par¬ ticular class of plants. Where all these con¬ ditions are under easy control the kind of soil is a matter of less importance. The work of furnishing and maintaining proper conditions is done by the gardener instead of by the soil in the latter case. It is not profitable, however, to employ soils that require close and constant attention, even where conditions are largely under control. It is the aim of economical production to select

a soil for a given crop that, with a minimum of labor expended on the part of the cultivator, produces the desired results. It is evident from these considerations that the conditions of the soil must be considered in connection with all of the other factors of

environment, as no one of them ever acts inde¬ pendently and alone in the production of dis¬ ease. The plant, too, has to be considered. It may be adapted to withstand the variations that take place in a sandy soil in a locality charac¬ terized by particular meteorological conditions, while it could not thrive in a clay soil in the same locality. On the other hand, with changed meteorological conditions the same plant might do best in the clay soil.

Root Suffocation. — This is one of the most usual diseased conditions caused by physical conditions of the soil preventing the ready access of atmospheric oxygen or the ventilation of the soil. A very fine sand closely packed, or a clay soil with a crust excludes the air, unless the sand is stirred or the crust broken. Carbon- dioxide accumulates and the oxygen is reduced. The root hairs and feeding roots die for lack of sufficient oxygen for respiration. Growth is checked by starvation due to reduced root ac¬ tion. The tissues become hard and woody. The plant may then die in dry, hot weather by desiccation, or it may simply starve to death. Plants injured in this way, even slightly, often become the prey of insects and fungi, especially of those that attack the roots. This form of suffocation is also often found where the roots of plants have to grow under close pavements or hard packed ground or heavy sod. Another form of root suffocation results from poor drainage or excess of moisture in a soil, thus excluding the oxygen and preventing soil venti¬ lation. The feeding roots die and ferment, not only cutting off the proper absorption of soil food elements but resulting in poisoning the plant by products of fermentation. The leaves rapidly turn yellow and drop, and unless the sod is dried out and aerated the plant soon dies. This latter form of root suffocation is very common among plants grown in pots or tubs. When the natural drainage is stopped up or the plant is over-watered, the soil becomes sour.

The best thing to do in such a case is to re¬ pot the plant into fresh soil containing a little lime or wood ashes, first washing off the old soil and trimming off the diseased roots. Good drainage must be furnished and over-watering avoided. It must be clearly understood that the roots of most plants require an abundant supply of oxygen, and that they will suffocate and die if they do not get it. .

Poisonous materials in the soil are also often the cause of serious root

injury. Illu¬ minating gas leaking from gas mains or pipes and diffusing through the soil in the minutest quantity kills and poisons the roots of all kinds of vegetation. The only thing to do in such cases is to stop the leak and air the soil.

The decomposition of organic matter, espe¬ cially manures rich in nitrogen, in soils not well supplied with oxygen, results in the formation of products injurious to the roots of plants. In¬ jurious acids are often set free from their com¬ binations in the soil by the action of plant roots, bacteria and fungi and by chemical changes brought about by the use of certain fertilizers, like the acid of superphosphates. In all those cases a liberal addition of lime to the soil acts as a cure to the injured plant and corrects the acid condition.

Alkali Soils. — In some cases, on the other hand, there is too much lime or other alkaline material such as carbonate of spda, etc., in the

soil. The root hairs and feeding roots are killed by a sudden rise of a soluble alkali, or they may die a slow death if there is too much lime. It is a curious fact that a liberal addition of gypsum tends greatly to reduce the injury in both these cases and to raise the limit of endur¬ ance of most crops of alkali. Where alkalis cannot be washed out of soils through proper drainage, much can be done by breeding and selecting varieties of plants better adapted to such conditions. Great progress has already been made in this direction with alfalfa, sugar beets, cereals, date palms, etc.

Soil Nutrients. — Every green plant re¬ quires for its healthy development, besides water, oxygen and the C02 of the air, a certain proportion of nitrogen in the form of nitrates or ammonia, a salt of potassium and of phos¬ phoric acid, available calcium and magnesium in about equal proportion, sulphur and a trace of iron and chlorine. If these are not available to the plant in the right form or ratio, or if any of them is too greatly in excess or lacking, a diseased condition of the plants in such soils quickly develops.

Nitrogen. — Lack of nitrogen in available form causes a proportionately diminished vegetative growth, light green or yellowish leaves, even where there is abundant moisture and other nutrient materials. An excess of nitrogenous fertilizer, on the other hand, causes various pathological derangements. Abnormal vegetative

growth at the expense of flowers and fruit thus inducing temporary sterility is one of the commonest results of a food containing too much nitrogen in comparison with potassium and phosphoric acid. The tissues in such cases are likely to be soft and watery, easily injured by unfavorable temperature or moisture conditions as well as by insect and fungous parasites.

Tissue degeneration is in many cases the result of over¬ feeding with nitrogenous fertilizer. This appears to be one of the commonest causes of " die back " or gummy degenera¬ tion of the orange. Peaches and plums also suffer from a similar malady from the same cause. Large gum pockets develop in the wood as a result of the degeneration of the cells. The movement of water and food materials in the plant is greatly interfered with. The wood does not mature properly and as a result winter kills, or it is destroyed by insect and fungous parasites.

Phosphoric acid is an important constituent of every living cell, entering largely into the composition of the nucleus. Its reduction below the cell requirements is followed by a cessation of cell division and growth and in green cells by disorganization of the chlorophyll which first becomes reddish, then yellow. These latter changes take place first in the maturer leaves, then in the younger parts. An application of phosphates or superphosphates usually promptly corrects these pathological conditions.

Potassium also is required in considerable quantity by all plants. One of the first signs in a plant of a lack of available potassium is a decided cessation of growth without other apparent cause of trouble. During the early stages of potash starvation the plants often retain their normal green color. In later stages very little starch or sugar is made and almost no protein or nitrogenous matter. Unless the missing element is supplied the plants finally become yellow and slowly die. Potassium hastens and perfects the maturing of plants, especially the ripening of the wood of perennial plants, making them less liable to winter injury.

Calcium. — Lack of this element in plant nutrition is first indicated by a more or less marked yellowing of the young leaves due to a reduction in number and size of the chloroplasts though the chlorophyll itself may be normal. The starch made by the chloroplasts is converted with difficulty into sugar. This retardation is probably due to the fact that in calcium starvation the production of the starch transforming enzyme (diastase) is greatly reduced.

Magnesium. — While this element does not appear to be of such

fundamental importance to the vegetable cell it is nevertheless absolutely required, especially during the periods of flowering and fruiting. A very small amount may often suffice to meet the requirements of growth up to the flowering period, but at this time a decided lack of magnesium results in the failure to set fruit or its failure to mature. With a more decided lack normal vegetation soon ceases, proleptic shoots develop with shortened stems, small, distorted, yellowish leaves crowded together in rosettes somewhat resembling potash starvation except in color.

It appears to be necessary that magnesium and calcium always be associated in plant cells except in some of the lower classes of plants. The ratio of one part of magnesium

to three of calcium is the most favorable in many cases though this is quite variable for different species. In a large number of cases an excess of magnesium over calcium results in greatly retarded growth and an early death of the cells.

Both magnesium and calcium oxides (lime) play a secondary part in the soil by combining with the acids set free by root action, fermentations and other biological and chemical processes. If these were not at once combined the root hairs and feeding roots would be injured or killed and the plant would suffer from general starvation if not actual poisoning.

Sulphur. — This element usually absorbed by plants in the form of sulphates is one of the absolute requirements of all organisms. It enters into the structure of protoplasm and the more highly organized nitrogenous foods, proteids, required as the direct food of growing cells. Its abnormal reduction results in the cessation of proteid manufacture and consequently causes proteid starvation. ‘ Growth ceases and death follows unless the element in some available form is supplied.

Other elements and compounds are often important to the plant though not required. Silica for example is found very commonly deposited in the cell walls of plants, especially in the epodermal cells of cereals and grasses. Its presence stiffens the stems and leaves and in a measure protects them from biting and sucking insects and other small animals. Aside from decreased resistance to such attack a plant grows as well without silica as with it.

Chlorine. — This element in very small quantity appears to be necessary to the vigorous growth of plants, especially during the

formation of flowers and fruit. In excess it is usually injurious except to plants adapted to soils rich in chlorides, such as sugar beets, asparagus, celery, etc. It is an interesting fact that sugar beets and celery are rendered much more resistant to spot diseases caused by Cercospora when well supplied with sodium chloride, than without it. Why this is so has not been determined.

Iron. — A small amount of this element is necessary to the formation of chlorophyll. An insufficient amount of iron is indicated very quickly by the formation of chlorotic or white leaves which become green on the addition to the soil of a soluble iron salt, such as iron sulphate. Often the failure of a plant to obtain iron is due to the death of the root hairs and feeding roots from various causes, alkali or acid, excessive moisture or dryness, insect or fungous attack, etc. In such cases, however, there are indications of general starvation as well as of lack of iron, and the diseased con¬ dition can be cured only by removing the cause of the death of the roots.

Atmospheric Conditions. — The close co¬ ordination between the conditions affecting the plant in the soil and atmosphere is at once apparent. In most of our ordinary plants, water, with various materials in solution, is absorbed by the roots from the soil and passes up through the stem to the leaves and other parts above ground. From these there is a continual loss of moisture, regulated in part by the plant, but depending largely upon whether or not conditions of the atmosphere, light, etc., favor evaporation, or transpiration as it is more correctly termed where living plants are under consideration.

Moisture Variation. — Plants growing in soil and air uniformly moist have smaller root systems and a larger total leaf surface than they would have if grown under constantly varying conditions of soil and atmospheric moisture. A plant reared in a moist greenhouse will gradually shed its older leaves if the air is allowed to become too dry or the plant is removed to an ordinary dwelling-room. The new leaves that develop under such circum¬ stances are adapted to the drier air and are better able to retain the water furnished by the roots. If, however, the change from moist to dry is too sudden, the defoliation will be exces¬ sive and the new growth may develop very slowly and be poorly nourished. In the case of house plants there is almost a universal tendency to over-water the plant at such times. This brings on suffocation and death of the root hairs and feeding roots, and ends in death of the plant. Instead of watering under such conditions the soil should be allowed to become

comparatively dry until renewed growth of leaves create a demand for water from the roots.

Plants which have been growing for a con¬ siderable period with a comparatively small water supply develop a large number of root hairs and firmer and smaller leaves adapted to reduce transpiration to its lowest terms. If a cloudy, wet period suddenly follows, or the plants are over-watered, they become gorged with water. The more plastic tissues start into growth, with the result that the leaves often become distorted, wrinkled, curled or twisted. If there is a continued excess of moisture many of the root hairs and finer roots may die, and symptoms of root suffocation develop, the leaves become spotted with yellow and finally drop off.

CEdema is a pathological condition charac¬ terized by the formation of water blisters or warts on the stems or along the vascular bundles of leaves over-gorged with water. This dis¬ eased condition often develops in plants growing in moist situations, especially under conditions where the soil is likely to be warmer, than the air, thus favoring absorption of water by the roots, but not favoring transpiration through the leaves. The disease often develops, also, in extended periods of moist, warm, cloudy weather.

Burning or Scalding.— The growth that plants make under cloudy, moist conditions is often watery and soft, an easy prey for parasitic fungi and likely to dry out, wilt and die easily if suddenly exposed to clear, hot weather. Such (lburning)) or ˆscalding® of the edges and tips of leaves is very common in the spring, when moist, cloudy periods are suddenly followed by clear, hot days.

Wind often causes injury by whipping and tearing the leaves or breaking limbs. In the latter case injuries are produced which predis¬ pose the plant (especially trees and shrubs) to attack by insects or fungi. Wherever possible all such injured parts should be cut out to unin¬ jured tissue and protected by antiseptic washes or grafting wax. Dry, hot winds coming early in the summer often cause the death of tender foliage by desiccation.

Injurious Gases. — Slight traces of illumi¬ nating gas escaping in rooms or greenhouses, or the slightest trace of sulphurous fumes from burning coal from furnaces or stoves, is ex¬ tremely injurious to vegetation. The presence of these gases in the atmosphere causes the gradual yellowing, browning and finally the death of leaves, especially

the tips and edges. Although the soil, temperature and light condi¬ tions may be the most favorable, the plants gradually die where they are more or less con¬ stantly exposed to a trace of these gases. In the neighborhood of factories or large cities vegetation is often injured, as described, by these and other poisonous gases. In some cases the amount of poisonous gas thrown into the air with the smoke from certain factories is so great that vegetation of all kinds is unable to thrive in the neighborhood. The injury ex¬ tends often several miles from the factory in the direction of the prevailing wind.

Temperature. — Many predispositions to disease, as well as specific pathological condi¬ tions, are produced in plants as the result of un¬ favorable temperature conditions. As a rule,

when growth is taking place and the cells con¬ tain much water, vegetation is most sensitive to heat and cold. When growth has ceased and the tisses are mature or in a resting or dormant condition and contain much less water, they are least sensitive to heat and cold. The tempera¬ ture range for any individual during growth, and even in the dormant or resting condition, varies for different individuals, varieties and species. These temperature ranges have be¬ come more or less fixed within certain limits for different individuals and species through the in¬ fluence of the temperature factor in the environ¬ ment under which the species or individuals have developed. Thus, plants adapted to long growing seasons of the South will not thrive in the shorter, colder season of the North. On the other hand, many plants adapted to Northern conditions do not thrive in the South. When an individual or a species becomes adjusted or accustomed to the conditions and changes of a particular environment it may be unable wholly or in part to adjust its life processes to an un¬ usual change in any factor or group of factors or the relation of these to each other. The orange, lemon, lime and numerous other sub¬ tropical fruits, for example, do not have a well- defined resting or dormant period like the apple, pear, peach, etc., in the North. They would, therefore, be quickly killed if exposed to severe frosts.

Certain varieties of peaches and plums which survive Northern winters without injury, when planted in the South often winter-kill. Ex¬ tended warm spells in the latter part of winter, and the warming effects of the sun on the south and southwest sides of the trunk start the ac¬ tivity of the cambium, which is subsequently injured or killed by freezing, the same as are young buds pushing out too early in the spring under the influence of warm days and when caught by the late frosts.

Varieties that start into growth readily under such conditions may be completely winter-killed if the conditions are such as to stimulate a gen¬ eral premature activity. If only the tissues warmed by the direct action of the sun are in¬ volved, patches of various sizes may be killed. These usually start near the surface of the ground on the southwest side of the tree and extend up the trunk to the limbs, varying in width from a few inches to the whole south and southwest side.

Winter Sun Scald. — This term is usually applied to cases like those just described where smaller areas on the south or southwest side of trees are killed during winter by the successive warming and freezing of the tissues. This form of injury is common in the North and West. Considerable protection may be afforded in all such cases by coating the tree with whitewash or protecting it from the direct action of the sun in some way.

Winter Desiccation. — Evergreen trees and shrubs are often killed or greatly injured during periods of bright warm weather in the winter by rapid evaporation of water from the leaves while the ground and roots are frozen and un¬ able to replace what is lost.

Another form of winter desiccation is through the direct action of freezing, where, by intense cold, the water is drawn so completely from the protoplasm into the cell walls or in¬ tercellular spaces in the formation of ice crys-

tals that the cells are unable to reabsorb water on thawing. This effect of freezing is similar in many respects to that of drouth. Water is withdrawn from the protoplasm to a greater or less extent, according to the duration and severity of the cold and the retaining power of the protoplasm. If the withdrawal has not been too great and thawing process is slow so that the cells can gradually reabsorb what was given up in freezing, the plant may suffer no harm. If on the other hand, the tissues are thawed rapidly, the air is driven out of the intercellular spaces and the cells may die for want of oxygen or the water may be lost by evaporation before it can be reabsorbed. Frozen plants should, therefore, be thawed slowly and protected from evaporation by sprinkling with cold water or shading. While most cases of injury from freezing are due to the conditions just de¬ scribed, there is another class of cases where the injury is apparently due to structural and

chemical changes in the protoplasm induced by the cold.

Cold Rigor. — As already pointed out, the sensitiveness of protoplasm of various plants and at various stages of growth differs remark¬ ably, but in all cases during vegetative activity there is a point either a little above or below the freezing point of water where protoplasmic movement and growth cease without the cells being necessarily frozen or killed. This condi¬ tion is known as cold rigor and is often taken advantage of by florists and gardeners in hold¬ ing their flowers or fruits temporarily in some particular stage of development for a particular market period. Uusually when the temperature is raised the growth continues normally, but occasionally, if the temperature is a little too low and long continued, the plant fails to re¬ spond again to a higher temperature and is found to be in a state of permanent rigor or paralysis ; though the plant does not die, it makes little or no growth.

Mechanical Separation of Cells. — In many parenchymatous tissues, leaves, bark, paren¬ chyma, fruits, etc., which can stand considerable freezing without injury to the protoplasm, there is more or less rupture of the cells from each other by the formation of ice in the cell walls or intercellular spaces. In some cases the epi¬ dermal cells are almost completely separated from the rest of the tissue. In other cases, as in apples and bark parenchyma, the individual cells may, in extreme cases, be separated and form a powdery mass. If the separation is complete the cells die after a time. In any case, even a partial separation and breaking of the protoplasmic connections between the cells in¬ terferes with normal development, and may cause the premature death of the whole or parts of the plant by interfering with the movement of food materials, etc.

Frost-cracks. — These usually occur as the result of rapid freezing and shrinking of the outer tissues of trees, especially while the inner tissues are relatively warm. After the cold pe¬ riod is over and warmer weather comes such cracks close up.

Frost Canker. — This name is applied to wounds that are prevented from healing through the action of late frost in killing the callus rings as they develop. The killing of roots and the lifting of plants from the soil by freezing are familiar phenomena to all gardeners, but fur¬

ther consideration of this subject cannot be undertaken here.

Scorching or Burning. — Sometimes in hot, dry weather smooth-barked trees and shrubs may have portions of their tissue exposed to

strong sunlight actually killed by the high tem¬ perature. In light-colored, sandy soils the re¬ flection of heat from the sand often kills the lower leaves of low-growing trees, shrubs and especially of herbaceous plants. The reflection of sun heat from the south or west side of buildings, etc., may also cause similar injury. The direct injury in such cases is often, how¬ ever, confused with the effects of excessive transpiration. The burning effect of hot, dry winds is largely due to the excessive transpira¬ tion they induce. The burning is especially se¬ vere when there is an insufficiency of soil moisture as the result of drouth or lack of proper cultivation.

Sudden Variations of Temperature. — As

already indicated, the injury resulting from changes of temperature above the maximum or below the minimum for a species or individual depends in large measure upon the rapidity of the change. If the change is slow, even the individual plant may adjust its vital processes to temperatures which would have resulted in death had they been sudden. Some of the algae, for example, live in hot springs at a temperature of 93° C., while the original stock from which these forms were derived lives in water rarely exceeding 40° C. A transfer of individuals from 40° to 93° would result in almost instant death, while by slow, gradual change they could be accustomed to this ex¬ treme temperature. For flowering plants (Phanerogams) the possible maximum is much lower, 50° being the extreme limit, while the average limit is from 37° to 46°.

Sudden variations well within the fatal lim¬ its, however, are productive of pathological changes. A rose, tomato, violet or almost any other plant grown at a cool temperature (8° to 15° C.), all other conditions remaining the same and then suddenly exposed to 24° to 27° C, will turn yellowish, become weak and spin¬ dling and very sensitive to insects and parasitic diseases. The same plants, started at 24° to 27° and growing normally at that temperature, if suddenly dropped to 15° or 8° become yellowish and weak and very sensitive to parasite enemies. In either case the change from one temperature to the other could be made without serious injury if made gradually and slowly. For a general discussion of this subject with refer¬ ences to literature, consult Davenport's Ex¬ perimental Morphology.)

Resting or Dormant Period. — A resting or dormant period is more or less well defined in many perennial plants. In northern and tem¬ perate latitudes this period coincides with cold weather and has developed in response to this constantly recurring seasonal change. In other cases in hot climates a partial rest may occur during the dry

season. In many cases this period of rest has come to be a necessity to the normal and healthy development of the plant. Detmer and Miiller-Thurgau have shown in the case of potato tubers and many dormant buds that in the fall and early winter the tissues contain only enough sugar to meet the demands of respiration of the dormant cells, not enough to stimulate growth. Muller-Thurgau has dem-

DISEASES OF PLANTS

1-6. Brand-fungi (Ustilagineae) of Oats and Wheat, with Spores. 7-10. Potato Rot. 11-15. Rusts, showing effects on leaves. 16. Leaf affected by Hyrnenomycetous

Fungi (Oidium). 17. Oidium-Growth. 18-23. Ergot-fungus, showing development and effects.

onstrated that exposure of tubers dug in August to 0° C. for a few weeks causes an accumula¬ tion of sugar sufficient to start normal germina¬ tion when the cooled tubers are placed under favorable conditions. The cold reduces the amount of sugar used in respiration and prob¬ ably also causes an increase of diastase, the enzyme that converts starch into sugar. The same has been shown to be true also in the case of the dormant buds of many trees and shrubs. Exposure of dormant buds, bulbs, tubers, etc., to sulphuric ether for several days has a similar effect to that produced by exposure to cold. In the case of plants that have their dormant or resting period in dry weather there is an accu¬ mulation and modification of reserve foods pre¬ paratory to the next season of growth. Buds, bulbs and tubers may often be forced to grow before they have accumulated sufficient reserve food in the proper form, but the result is usually a weak plant very subject to disease. A good example of this may be seen in the attempt that is often made to force bulbs that are immature and that have not had their normal period of rest or have been forced the previous season. Variegation or mosaic disease is also often pro¬ duced in this way.

Light. — Practically all the chlorophylla- ccous plants are dependent upon sunlight for normal development and activity. Every in¬ dividual and every species is adapted or attuned to a particular range of light intensity and suffers injury if the intensity becomes too great or too small, or if the change from one in¬ tensity to another is too

sudden.

Injury from Strong Light — Many bac¬ teria and fungi, for example, Bacillus anthracis and Botrytis cinerea, grow best in darkness or very weak light, but are killed in a short time by exposure to sunlight or to artificial light strong in the blue-violet rays. It is this por¬ tion of the spectrum that causes the chemical disorganization of the protoplasm or rather its destruction by oxidation as in the absence of oxygen during exposure no change takes place. The same is true of the more highly developed chlorophyllaceous algae and shade plants •— too strong light not only destroys the chlorophyll by oxidation induced by the blue-violet rays, but the protoplasm itself may finally be thus killed or chemically disorganized. This is also well shown in the injurious effect of the ultra¬ violet rays in the naked electric arc light. A glass globe which cuts off these rays prevents the injury. This pathological condition in vary¬ ing degrees of intensity is produced not only in shade plants when exposed to direct sunlight, but also in other plants when grown in the shade and suddenly exposed to strong light. It is also common when an extended period of cloudy or foggy weather in the spring is sud¬ denly followed by bright, clear days. Under such conditions there is not only a partial de¬ struction of the chlorophyll, but an excessive loss of water from the poorly cuticularized leaves. Such leaves are also unable to close their stomata quickly, which is another reason for their suffering from excessive loss of water. The action of light in promoting evaporation or transpiration is mainly by raising the tempera¬ ture of the tissues above that of the surround¬ ing air. When the air temperature is very high the increased temperature of the tissues of VOL. 22 — 13

plants exposed to strong sunlight is often suffi¬ cient in itself to cause injury or death.

Injury from Weak Light. — While too strong light cannot be endured by any plant, lack of light is injurious only to cholorophyl- laceous plants. When the light intensity is re¬ duced below the minimum for any of these plants the synthesis of carbon and nitrogen compounds is reduced accordingly until in very weak light or darkness the plant can make no use whatever of the carbondioxide of the air. That the plant will starve in proportion to the reduction in photosynthetic activity is evident.

Electricity. — That electrical conditions of the earth and atmosphere and of the plant have an important relation to the physiological con¬ dition of the latter has been demonstrated in many cases, but the full significance of this re¬ lation is not yet understood. Plants vary in

sensitiveness to electric currents in much the same way that they do to light or heat. A current above the maximum for a plant causes the disorganization and death of the protoplasm. This is often accomplished by a comparatively weak direct or alternating current, but is per¬ haps most familiar in cases of injury or death from currents of high intensity, as from elec¬ tric-light wires or lightning stroke.

Mechanical Injury. — Finally, among the causes of disease in the non-living environ¬ ment, we have to mention mechanical injuries, such as those produced by hail, wind, falling trees, etc. Hail stones often severely cut and tear the foliage of trees and herbaceous plants and may also produce more or less serious wounds in the more resistant tissues. Wind may injure the foliage, break limbs, etc., as may also falling trees. In all these cases, except in the most severe forms, the greatest danger comes from the entrance into the tissues of the wounded plant of parasitic insects and fungi. Large mechanical wounds, however produced, should have antiseptic treatment where practi¬ cable, especially in large and valuable trees. The injured parts should be trimmed to healthy tissue in such a manner as to favor rapid for¬ mation of callus. After a wash of some disin¬ fectant, such as copper sulphate 1 per cent solu¬ tion in water, the wound should be protected by shellac or grafting wax or white lead paint.

Diseases Caused by the Living Environment.

Struggle for Room. — The results of crowd¬ ing are so familiar and apparent that discus¬ sion of the subject is scarcely required. The strong plants occupy the soil with their roots and the air space with their leaves and branches, crowding out the more backward or weaker individual or species. Some are thus starved to death, others are reduced in size and vigor according as they lack the proper space in which to grow.

Plant Associations. — Plant associations spring up controlled by certain dominant species. Each individual of such a community has its influence on the others. The shade of a tree keeps back some sun-loving species and makes it possible for shade-loving species to grow, and so, with countless inter-relationships, plant communities develop, often of great complexity. If the tree or other dominant factor is re¬ moved the changed conditions are followed by a breaking-up and readjustment according to the new conditions. Many of the former occupants

of the area will be starved or crowded out in the struggle. Others may suffer from excess of light or too high temperature. Disregard of the natural requirements of plants and their inter-relations in communities often leads to disastrous results in clearing or planting in landscape gardening.

Symbiosis. — This term was first used by De Bary to designate plant partnerships such as those represented by the co-operation of fungi and algae in the formation of organisms known as lichens. The fungous hyphae surround the algae cells and furnish them with water and dissolved salts from the substratum, and the algae in return supply to the fungus hyphae the required organic nutrient materials. The community forms in itself a specific vegetable organism, though under favorable conditions of nutrition both the fungus and the algae form¬ ing the lichen may live independently of each other. Another type of symbiotic relationship is found in the so-called Mycorhiza or fungus roots. These are specially common on plants growing in humus. Two types are distinguished, one where the fungus is in close external union with the roots, covering them with its fila¬ ments and preventing the formation of root hairs, actually taking their place by supplying the plant not only with water and mineral food but also with organic nutriment from the humus. These external associations are usually termed ectotrophic mycorhiza.

Monotropa hypopitys is a good example of a non-chlorophyllaceous plant dependent upon ectotrophic mycorhiza for its food. Among forest trees the phenomenon is very common especially in the Cupuliferc c and Abietinea. That the fungus mantle in these cases supplies the host with food materials from the humus has been amply demonstrated. Or¬ dinarily the host plant in these cases furnishes little or nothing to the fungus, which is able to obtain all its nutriment from the humus. In some cases, however, the mycorhiza fungus has been observed to penetrate the root sheath and become parasitic. It is a short step from this condition to the cases where the fungus is normally internal, forming the so-called endotrophic mycorhiza, as in many of the Orchidece, Ericacecc , Epacridecc, Empetraceco and representatives of other groups living in humus soils. In many of these cases, while the plants are not in any way apparently in¬ jured by the fungus, they can thrive as well without as with it, and the relation of the fungus to the host has not as yet been fully investigated. Among the Leguminosce, how¬ ever, the case is different. All legumes in their native soils have their roots covered with ˆtubercles.® These develop as the result of stimulation produced by certain bacteria which enter

the young roots through the root hairs and grow symbiotically within the cells. The bacteria draw their organic nourishment from the stores in the root and in return secure nitrogen directly from the atmosphere which afterward becomes available to the legume. Legumes with these tubercle bacteria can thrive in a soil absolutely devoid of nitrogen, whereas, without the bacteria, they could not live at all in such a soil. The failure of legumes to thrive in certain soils is often due to the absence of these tubercle organisms. On the other hand, trie tubercle organism often degenerates into

a mere parasite. Similar organisms are also found in symbiotic relation in the alder and in several other groups of plants.

Vegetable Parasites. — The true vegetable parasites (obligate parasites) are those which cannot, in any phase of existence or stage of development, live independent of the host plant. There are many true parasites both among the higher and lower orders of plant life. Many organisms, however, are parasitic during certain stages of their development and saprophytic in other stages; where the parasitic nature is pre¬ dominant they are called hemi-parasites ; if the saprophytic phase predominates they are classi¬ fied as hemisaprophytes. All of these classes are responsible for the production of diseases of various types. The true saprophytes, which live entirely on dead organic matter, are seldom the cause of diseases. The disease of plants due to vegetable and animal parasites constitute by far the larger number of diseases and are those of greatest economic importance. In some cases, as previously suggested, it is difficult to deter¬ mine whether we are dealing with a harmless symbiotic relationship or one where the host is more or less injured. In this doubtful cate¬ gory, for example, are to be placed the mistle¬ toes (Loranthacece). These plants possess leaves containing chlorophyll and are related to their host the same as a scion to a stock. The true mistletoe of Europe (Viscum album) and its relatives in America (Phoradendron flavescens) are parasitic on a great variety of deciduous trees and sometimes do considerable damage. Here also must be placed those endotrophic mycorhiza of many plants growing in humus where neither benefit nor injury has been shown as a result of the presence of the fungus in the roots. Among the phanerogams, however, there are many true parasites, for example, the Orobanchacecc, which are devoid of chlorophyll and derive all their nourishment from the roots of the host plants to which they are attached. These parasites often do considerable damage to tobacco, hemp, lucerne, clover and other crops. The Dodders (Cuscuta) are also true phanerogamic parasites, deriving all their nourishment from their host plants, which they overrun and penetrate with their sucker roots (haustoria).' The most dangerous and prolific disease-producers, however, are the pathogenic fungi and bacteria.

Pathogenic Fungi. — The consideration of

diseases caused by pathogenic fungi is usually based upon the fungus and the genetic relation¬ ships of the fungi usually determine the order in which the diseases are discussed.

While this practice is undoubtedly the best one to follow in a systematic treatise, it is prob¬ ably the cause of the erroneous impression sometimes encountered that the fungus is the disease. The disease is the functional or cell derangement of the plant or part of the plant. The same functional or cell derangement and, therefore, strictly the same disease, may in some cases be produced by a great variety of totally unrelated causes. More attention should be given in plant pathology to the study of the disease itself ; though not less attention should be paid to the determination and study of the cause. This latter course is especially neces¬ sary in the case of the pathogenic fungi, bac¬ teria or insects. A complete and accurate knowledge of the life history and nutritive re-

quirements of pathogenic organisms furnishes the best foundation on which to base the pro¬ cedure for preventing or controlling the dis¬ eases caused by them. As already suggested, there is every possible gradation among the pathogenic fungi, between the strict saprophyte (such as sooty molds), causing disease only by chance association, and the strict parasite (such as rusts and smuts), unable to exist in¬ dependently of their living hosts.

Among the diseases caused by strict sapro¬ phytes may be mentioned the starved and chlo¬ rotic condition of many leaves and fruits due to the presence of sooty molds on their surface. These black, mold-like fungi grow in sugary excretions, especially the <(honey dewˆ excreted • by . insects, aphides, scales, leafhoppers, etc. This black growth, where it covers the surface of leaves, occasionally cuts off so much light that the chloroplasts lose their green color, and the formation of starch and sugar is so greatly reduced as to cause partial starvation and gen¬ eral retardation of growth of the whole plant. This is intensified by the injury produced and the food removed by the insects.

Many of the saprophytic yeast fungi, molds and bacteria cause fermentive decomposition in the weakened and dead cells of the wounded tissues, especially those rich in sugar or other reserve materials. Toxic products are thus produced which weaken or kill all the cells ab¬ sorbing them. Such fermentations are espe¬ cially common following mechanical injury to ripening fruits and to the sapwood of trees, in the latter case particularly following the work of borers. Fungi of this class grade imper¬ ceptibly into the

hemisaprophytes or facultative parasites which start their vegetative develop¬ ment in dead or weakened tissues like the heart- wood of a tree or the dead tissue of a wound, and then gradually spread into the living tissues, killing them. The best examples of this class are the wood-destroying Polyporece (bracket •fungi), Agaricinecs (toad stools), and related fungi. When these get into the heart-wood through a wound, or into an area of dead cam¬ bium bark, or sapwood, they first kill the dead area with their mycelium and gradually spread into surrounding living tissue, in some cases by secondary action through decomposition products, or by cutting off the water or food supply from the living tissues, or by primary action, where the mycelium spreads from its saprophytic vantage ground directly into the neighboring living tissue.

In order to prevent wound infection of woody plants it is necessary either to keep the surface of the wound dry, preventing the ex¬ udation of sap and the entrance of water by searing with a hot iron, or by treating the in¬ jured surface with an antiseptic or protective coating, paint or wash, such as coal tar, white lead, copper sulphate, etc.

Besides the hemisaprophytic wood-destroy¬ ing fungi which gain entrance through wounds and are not able otherwise to infect a sound plant there are others of the same class, such as Agaricus melleus, whose mycelial strands or rhizomorphs are able to work their way through the sound bark of numerous conifers, under¬ neath the bark and in the wood of which the fungus produces dense white, felt-like mycelial membranes. These kill the bark and wood and stimulate an excessive flow of resin into the

injured parts, finally resulting in the death of the tree. This same fungus also attacks decid¬ uous broad-leaved trees, but here it is more particularly a wound parasite.

Botrytis, Pythium, Sclerotinia and many other fungi, though able to pass the whole of their existence as saprophytes, are also able under favorable conditions to infect the living tissues of plants and destroy them. It is a short step from these fungi to those of a slightly more decided parasitic nature, the hemiparasites, or¬ ganisms which cannot in nature complete their life history as saprophytes. The U stilaginece (smuts) are among the most familiar examples of this class. These grade imperceptibly into the strict parasites such as the Uredinea (rusts), which cannot live at all as saprophytes.

Among the strict parasites there is often a high degree of

specialization, a given species of fungus being restricted in many cases to a particular genus or even species of plant. In some of the rusts there is a peculiar phenom¬ enon of this nature known as heteroecism. Many species of rusts go through their whole life history producing all their various forms of spores on the same host. In other cases, however, spermatia and secidiospores are pro¬ duced on one host and the uredospores and teleutospores of the same fungus are produced on an entirely unrelated host.

Injury Caused by Parasitic Fungi. — It is extremely difficult to classify the various re¬ actions of plants to parasitic attack. Every case has to be considered in a large measure individually. There are, however, certain gen¬ eral types of reaction and injury that may be noted. There are many parasitic fungi, for ex¬ ample, that attack the leaves of plants; some of these, like the powdery mildews, grow only on the surface of the leaves and younger stems, forming powdery, whitish spots or coatings and drawing nourishment from the surface cells by sending down into them short, root-like growths, haustoria. When these surface parasites attack the young growing leaves, stems or fruits, the areas occupied by the fungus are greatly re¬ tarded in development, often causing more or less distortion of the leaves, and in severe cases often killing them and causing early defoliation. The flowers and fruit may thus also be de¬ stroyed. The proper ripening and maturation of the wood of perennials is often so much re¬ tarded by these direct and indirect effects that it winter-kills. When these fungi, however, attack only a few leaves on a plant, or where they attack the leaves after they are full grown, the injury is comparatively slight. Prompt burn¬ ing of the fallen leaves in autumn is one of the best preventive measures. Sulphuring, so widely practised in the case of vine mildew, helps to rid plants of the fungus, and spraying with Bordeaux mixture is a good preventive as well as curative treatment.

Besides these external parasites there are a large number which penetrate and vegetate di¬ rectly in the cells or in the intercellular spaces of the host. Some of these after a time kill the tissues in which they are growing, producing a dead area. If these dead areas are in the leaves and are numerous or large, the value and working power of the leaf may be seriously impaired or destroyed altogether. The destruc¬ tion of the first crop of leaves often results

from the attack of leaf-spot fungi early in the summer, and the plants

are obliged to put out a second crop of foliage. This must ‘be done at the expense of reserve food stores. In such crops as sugar beet, Irish potato, etc., this use of reserve food becomes evident in the reduction of yield of tubers and sugar. In crops like beets and potatoes, where there is a con¬ tinual succession of new growth, a second attack is not so serious as in the case of trees and shrubs where two successive defoliations either kill the plant outright or so weaken it that it winter-kills or dies of starvation. The weaken¬ ing effects of premature defoliation are often not fully realized. Where one premature de¬ foliation has occurred from any cause, great effort should be made to protect the second crop of leaves and to stimulate the plant with nitrogenous fertilizers. If the plant is a perennial, some protection, if possible, should be furnished during winter, as the wood is likely to be poorly ripened. Practically all the leaf-spot diseases are easily controlled by spray¬ ing the foliage with Bordeaux mixture or other good fungicide. Immediate removal, if possible, and burning of the diseased leaves also serve to hold these diseases in check.

If prompt action of this kind is taken when the trouble first appears it may often be checked without other treatment. It is safest, however, to spray the plants with a fungicide, whenever practicable.

Many fungi which may start by attacking the leaves are not limited to them, but spread to or even directly attack the stems. The Perono-sporece, or downy mildew’s, are good examples of this class. Plants which have developed in moist, cloudy weather are particularly sensitive, and the parasite starting in leaves or stems may in a few days invade all the tissues of the plant, causing a rapid soft rot. The well-known (

The root rot and damp-off fungi — Rhizoc- tonia, Ozonium, Agaricus melleus, Botrytis, Pythium, Fusarium, etc., usually attack the plant through the roots or base of the stem, and cause a more or less rapid decay of the invaded tissues, followed by the starvation and death of the whole plant.

The cultivation of resistant individuals or the use of uninfected or sterilized soil and at¬ tention to general cultural conditions, especially rotation of crops, drainage and aeration of soil, are the best preventive measures for diseases of this type.

In other cases stems and leaves may be in¬ vaded by fungi (rusts or smuts), but rotting or sudden death of the tissues does not occur. The plants may, however, be so reduced in vigor that they fail to mature. The cereal rusts, for example, often greatly reduce the yield of grain.

In case of the smuts the grain is replaced by the spores of the fungus, hut the plant is ap¬ parently not otherwise injured.

Hypertrophy. — In some cases the tissues attacked by fungi are stimulated to excessive

growth. Finger and toe disease of turnip roots caused by Plasmodiophora, plum pocket and ((leaf curl,® Switches' brooms,® etc., caused by Exoascus, the large galls on Vaccinium and Rhododendron caused by Exobasidium, the large swellings produced on conifers by Peri- derminm, etc., are good examples.

Pathogenic Bacteria. — The casual relation of bacteria to numerous animal diseases has been the subject of much careful study, but until recently there were only a very few plant diseases known to be caused by these organisms.

Among the best known examples may be mentioned the (

A bacterial disease of the English walnut on the Pacific Coast is a serious menace to the cul¬ ture of these trees. A bacterial gall or tumor of olive trees is serious in Europe, and has ap¬ peared in some of the olive groves of California. Among the bacterial diseases of vegetables may be mentioned the bacterial rot of the tomato, egg plant and Irish potato, carried by biting insects, the brown rot of cabbages, and a bac¬ terial disease of sweet corn entering the tissues through water pores in the edges of the leaves. Numerous other plant diseases have been shown to be due to bacteria, and the number will prob¬ ably be greatly increased as the field is more carefully worked.

Diseases Caused by Animals. — Next to

diseases of vegetable origin, those caused by animals, especially insects, are the most numer¬ ous and destructive. Many fungus and bac¬ terial diseases are carried from plant to plant by insects ; for example, pear blight by bees, potato rot by potato beetles, ferment and wood- rot fungi by boring beetles, etc. In the case of pear blight the bees, though they are carriers of the disease, are beneficial to the trees in aiding pollination. In other cases the injury caused by the insects may in itself be serious. The biting insects may in some cases cause more or less complete defoliation, or the sucking in¬ sects and mites may so reduce the stores of plant food as to seriously interfere with growth. Among the best known and most injurious of these are the scale insects, mealy bugs, plant lice (Aphidce), leaf hoppers, and the <(plant bugs® (Capsidce) . All of these feed on the sap of the

plant by sucking it out of the tissues, but causing little or no mechanical injury to the cells. In many cases there is simply a general or local retardation of growth due to the removal of sugars and proteids ; in other cases irritations are set up, possibly by some material injected into the tissues by the insect, resulting in gall-like swellings or various hyper¬ trophied developments of the parts attacked, for example, Phylloxera on the leaves and roots

of grape; woolly apple louse (Schizoneura) on roots of apple; Colopba, cockscomb gall on elm, etc. In other cases the growth of the tissue is checked, as where tissues are attacked b}' scale insects such as San Jose scale, and by many of the plant lice and leaf hoppers. In other cases growth is neither checked nor accelerated, but definite spots are produced which continue to enlarge, resembling a fungus or bacterial infec¬ tion (Stigmonose) or puncture diseases, etc.

Borers may more or less completely ring a tree, cutting off the connection between root and leaves and thus resulting, in many cases, in death. Hypertrophy of tissues is also often the result of insect attack. Many insect larvae de¬ veloping from eggs laid in young tissues cause, by the irritations they set up, growths known as galls. Nematode worms attacking the roots of plants also cause gall-like swellings.

As in the case of the fungi, the complete life history and habits of any particular injurious insect must, as a rule, be determined before the greatest success in controlling it can be attained. Many insects have their natural ene¬ mies, which, if favored, may hold a serious pest in check. The development of natural resist¬ ance in plants by selection is also an important means of preventing injury in certain cases. And finally, the use of insecticides must be resorted to, as arsenic, etc., for biting and eating insects, and contact poisons for sucking insects.

Albert F. Woods, President Maryland State College.

PLANTS, Embryology of. See Embry¬ ology of Plants.

PLANTS, Fertilization in. See Fertili¬ zation in Plants.

PLANTS, Food of. Two classes of defini¬ tions have been applied to this term. Those formulated by agriculturists include all such substances as plants can assimilate from soil or air, anything adapted

to form tissues and sustain the growth, functions and reproduction of plants, such as natural materials, manures or fertilizers. Botanists, on the other hand, exclude all these materials and limit their defi¬ nitions to those substances elaborated or manu¬ factured by and within the plant organism it¬ self for building cellular or other tissue or cell contents. What the former considers as plant foods the latter calls plant food materials. Of the two definitions the first given is the most widely accepted because the most rational and satisfactory. From the agricultural standpoint the definition is generally extended to include those substances which supply perhaps . only one element of their composition but which is essential to some function of the plants. Some of the elements secured are built into the cell tissue; others are contained in the protoplasm or other materials with which the cells are filled. When plant foods are readily taken up by plants they are termed available foods ; when not easily assimilated unavailable foods. The latter must pass through changes of vari¬ ous kinds before they can become available. Without exception, however, both available and unavailable foods when secured by the plant from the soil must be in a form soluble in water.

In order to attain normal development every

plant requires 10 or more substances which are called essential elements because the lack of any one will interfere with growth and develop¬ ment and in time prove fatal. These elements are carbon, hydrogen, oxygen, nitrogen, sul¬ phur, phosphorus, potassium, calcium, iron and magnesium. The first four of these and some¬ times the fifth and sixth are called ˆorganogens® because they are considered as charasteristic of organic compounds. Besides the 10 elements mentioned most plants also contain silicon, sodium and chlorine, but these have not been proved essential ; usually plants seem to grow more normally with than without them.

The physiological functions of these various foods have been largely determined by experi¬ ments but in some cases much remains to be discovered. A knowledge of these functions is of profound importance in crop production, especially since manuring, fertilizing, tillage and many other farm practices may be more intelligently carried on when they are under¬ stood. Briefly the principal roles are as fol¬ lows :

Carbon enters through the leaves where by means of photosynthesis (q.v.) it combines with water to form the foundation compounds of which starches, sugars, cell tissue and other carbon-containing organic substances are the final or resultant products. Thus carbon be¬ comes the most important organic element, not only within the plant, but in

nature, because all its naturally occurring organic compounds, whether in plants, or as assimilated by animals, or deposited as coal, oil or gas, trace back to it via nature's chemical laboratories in the leaves and other green parts of plants.

Oxygen ranks next to carbon as a constitu¬ ent of the dry matter since it is in almost all plant compounds. It is also essential to respira¬ tion (q.v.), to oxidation of materials and thus to the development of energy in the growing plant. When combined with hydrogen in the form of water it is both the main solvent and the transporting vehicle for crude and elabo¬ rated plant foods dissolved in the ®sap.): > Water also performs several other functions in plants; for instance, maintaining turgor, reducing tem¬ perature through evaporation, etc.

Hydrogen enters into every organic com¬ pound excepting neutral oxalates in plants, yet because of its extreme lightness plants contain only about 6.5 per cent of it.

Phosphorus is largely used by plants to make proteins, cell nuclei, to stimulate growth of seedlings, increase root growth, divide cells, ripen the seed and to reduce the content of nitrogen in cereal seeds. When plenty of it is in the soil, especially during a dry season, plant roots are able to penetrate deeper than they could otherwise and thus tap surer sources of water. When applied as fertilizer in the drills of corn and other crops it stimulates the crop, as in the practise of the New England Indians who deposited a dead fish in each hill of corn.

Potassium is necessary to the manufacture of the carbo-hydrates in plants, for the hydrol¬ ysis of starch, the production of cell tissue to help give rigidity to stems, to help resist fun¬ gous diseases, strengthen leaf development, in¬ crease yields of potatoes, sugar beets and other crops rich in starches or sugars, to neutralize

acids, produced by plant growth and to heighten the color of fruits.

Nitrogen is essential to the production of proteins, the formation of protoplasm, chloro¬ phyll (qq.v.) and many other compounds. It stimulates plant tissue, especially of leaves which it makes large and dark green, as every market gardener can testify from his experience in using it upon cabbage, spinach, lettuce and other pot herb crops. Over-stimulation with it delays seed maturity, tends to make plants weaker stemmed and tender to frost and to dis¬ ease, thus acting

opposite to phosphorus and potassium.

Sulphur helps to make most proteins and many flavoring oils such as in onion, cabbage and mustard.

Calcium, like potassium, helps dissolve and transport starch, develops strong cell walls and root hairs, precipitates oxalic acid which is formed by plant activity and unless crystallized would poison the plant.

Magnesium aids the formation of chloro- phyl, of proteins, the assimilation of phos¬ phorus and the development of seeds presum¬ ably as a carrier of phosphorus in the plant.

Phosphorus and nitrogen migrate to the seeds during the ripening process so that there are often two or more times as much of these in the seeds at that time as in other parts of the plant. Potassium and calcium remain in the stems then to aid in assimilation — two or three times as much of the former and almost eight of the latter as in the seeds. Sulphur and magnesium are more uniformly distributed. Iron is largely in the green coloring matter.

About 75 per cent of the live weight of plants consists of water. The balance is termed <(dry matter® which is either taken up or manu¬ factured by the plant. It consists mainly of organic material in about the following propor¬ tions : Carbon, 11 per cent; oxygen, 10 per cent; hydrogen, 2 per cent. The balance includes the nitrogen, part in organic form and part in the ftash,® or residue left after burning. All of these ash elements are necessary in the for¬ mation though not part of the fundamental plant substance.

Foods reach the interior of plants in two ways, through the air and through the soil ; practically all the carbon and much of the oxy¬ gen in the former and part of each combined with certain ash elements in the latter by which way also the other elements enter in the form of various compounds such as phosphates, ni¬ trates, sulphates, carbonates, etc., always in solu¬ tion. When taken up by the roots soil water becomes sap which passes from cell to cell till it reaches various kinds of conduits which direct it to the leaves and other parts of the plants, where needed.

The absorbing parts of the roots have a selective action which allows helpful substan¬ ces to enter but to a greater or less degree prevents the entrance of phosphites, nitrites and sulphites, etc., which are not plant foods but plant poisons and so would prove harmful. This

selective action is still more refined, for at times when the plant may be in special need of nitrates it will seize these but take up little or no phosphates, though the case may be reversed or both be equally absorbed at another time. Again the protoplasmic layer of the roots

may appropriate the nitrate from nitrate of soda or some other salt by chemico-physiological processes but leave the undesired sodium in the soil. Consult Duggar, (New York 1911); Stoddart, (Chemistry of Agriculture) (Philadelphia and New York

1915).

M. G. Kains.

PLANTS, Fossil. See Paleobotany.

PLANTS, Geographical Distribution. See

Plant Geography.

PLANTS, Hybrids in. See Hybrids in

Plants.

PLANTS, Lore of. Quite apart from all the fancies connected with flower language and symbolism (see Flowers, Symbolism of), there is an abundant stock of traditionary lore associ¬ ated with all kinds of trees, plants and flowers. The study of this throws much light on many puzzling survivals in folk-lore, and some wrriters have shown its importance for part of the prob¬ lem of primitive religion. Among Australians and red Indians the totem often takes the form of a plant or tree, for wffiich the individual shows his reverence by refusing to gather or destroy them. The worship of trees is widely prevalent among savages everywhere, and there is ample evidence that it was an important ele¬ ment in the religion of all the families of the Aryan stock. Grimm thinks the oldest sanctua¬ ries of the Germans were natural woods, and hints at a historical connection between the an¬ cient sacred inviolate wood and the later royal forest.

The oak-worship of the ancient Druids, the sacred fig-tree of Romulus in the centre of Rome, the Ficus religiosa of India, and the sacred groves of the Semitic and pre-Semitic races still surviving at Carthage a century after Augustine, are ready examples of tree-worship from sufficiently wide centres of civilization. The primitive mind of the savage readily con¬ ceives of a tree as animated by a conscious soul cognate with his own, and he may regard the tree either as its

permanent outward organism or merely as its characteristic dwelling-place. Hence trees have their place in fetishism, idol¬ atry, and the upward development of religion. Buddhists do not include trees among sentient beings possessing mind, but recognize the exist¬ ence of the genius of the tree, and Buddha himself was regarded as such no less than 43 times during his transmigrations. The rever¬ ence paid to the famous bo-tree shows how fundamental a fact is tree-worship, which un¬ doubtedly formed a large part of the old Hindu religion amalgamated by the new philosophical faith.

But the sacred tree and grove are likewise to be found within the range of Semitic and Aryan influences. From all sides appears evi¬ dence at once of the great antiquity and uni¬ formity of the worship of trees, whether for the services they render to man, for their venerable antiquity, their form, for particular qualities ascribed to them as containing the seeds of fire, for their situation, as on sombre and lonely mountain tops, or for their association with certain phenomena, as plagues and pestilences, or certain events in the history of the home¬ stead. In the growth, life, decay and death of the plant the primitive man easily sees an

analogue to his own life-history, and herein we may find the philosophy of the widespread rustic rites associated with marriage and with the birth of children. The custom of scatter¬ ing flowers and the fruits of the field over the footsteps of a newly married pair conveys an obvious reference to the belief in the repro¬ ductive powers of vegetation. Primitive ideas of the fertilizing and fruit-bearing powers of nature led to the belief that each tree or plant possesses spiritual as well as physical life, being tenanted either by semi-divine spirits or by the ghosts of the dead, and a natural generaliza¬ tion of this notion made plants and trees col¬ lectively the abode of particular inhabitants — an example of animism developing into poly¬ theism.

A forest-god has been deduced from a mere tree-soul, both alike regarded as powerful to produce rain or sunshine, to cause fruits to spring and cattle easily to bring forth their young. A still higher generalization gave a belief in a genius of plant-life or forest-life, or, higher still, a genius of growth or fertility in general. This universal genius of growth was symbolized by a bush or tree, brought in triumph from the forest, gaily decked, and solemnly planted near the homestead or in the village. In many cases the tree-spirit was re¬

garded as detached from the tree and clothed in human form as a man or girl decked with flowers — the May-king, Queen of the May, the Old Woman or Corn-mother of German har¬ vest-fields, the Jack-in-the-Green of young Lon¬ don sweeps, and the like. The existence of those corn spirits which especially haunted and protected the waving corn is dimly recognized in characteristic ceremonies of an English har¬ vest-home, and in the French and German ob¬ servance of the Harvest May, in which a branch or tree decked with ears of corn is carried home in the last wagon from the harvest-field and hung on the roof of the farmhouse till the next year.

Sympathetic affinities between plant and ani¬ mal life strongly impress the primitive imagina¬ tion and play an important part in many cos¬ mogonies, as in the Iranian account of how the first human pair grew up as a single tree, the fingers or twigs of each one folded over the other's ears, till the time came when they were separated, and endowed with distinct human souls. Other mythical cosmogonic trees are the heavenly fig-tree of the Vedas, and the ash- tree Yggdrasil of Norse mythology. The belief that a child's rickets can be cured by passing him through a cleft ash-tree till lately lingered in corners of England, and stories of trees giving forth human groans and exuding human blood are common in folk-tales everywhere. Families, as well as individuals, have tutelary or guardian trees.

Even the Christmas-tree, which originally made its way into England and France princi¬ pally through the influence of Prince Albert and the Duchess Helen of Orleans, is really a sur¬ vival of an ancient German custom of heathen origin. Many plants have received a kind of religious consecration from the name of some saint whose festival fell on the day on which they were gathered. Christianity, like Buddhism, early showed a marvelous adaptability in the way in which it adopted popular rites of an

earlier religion and rebaptized them as its own. Many remnants of primitive superstitions sur¬ vive in the local English names of plants and flowers, chiefly in connection with the fairies, the devil, the Virgin and the Cross, and we have a great wealth of association from one cause or other between saints and flowers, as Saint Agnes with the Christmas rose, Saint Joseph of Arimathea with the Glastonbury thorn, Saint Patrick with the shamrock, the Virgin with the white lily, just as Thor had its oak-tree, Venus her myrtle, the Indians the lotus, and the Druids the mistletoe. Again, his¬ torical personages and families are frequently associated with particular flowers — it is enough merely to name the orange lily, the red and white roses, the fleur-de-lis, the planta genista, and the violet. Family and clan crests fre¬ quently take

this form, as the fir, holly, juniper; also national badges, as the rose, thistle, sham¬ rock.

More curious and interesting, though ob¬ scure, are the notions of magical properties connected as persistently with some plants as medicinal properties are with others. Most prominent in European folk-lore are the elder, the thorn, and the rowan or mountain ash ; but strange properties are still ascribed to the rose¬ mary, vervain, Saint-John's-wort, mandrake, asphodel, and to fern-seed; and many flowers lend themselves through some obscure inherent fitness to special methods of divination. The doctrine of signatures, so important in the history of medicine, opens up a special chapter of sympathetic magic, involving the belief that plants bore by nature marks indicating plainly for what diseases they were medicinally useful. The trees of Paradise, of Chaldaean and other cosmogonies, the oracular oaks of Dodona, those trees of healing spiritually allegorized in the Apocalypse, the trees of Liberty and the French Revolution, and the trees round which an Indian bride and bridegroom walk hand in hand point as unmistakably to a real sympathetic affinity between the human and the vegetable world as did the Dryads, Fauns and Satyrs of the an¬ cient Hellenic mythology, with their analogues the elves and fairies of the woods, the transfor¬ mation-myths, the Orpheus whose lyre laid its charm on beasts and trees alike, or the Pan at the report of whose death all nature mourned aloud. Consult Dyer, (Folk-lore of Plants-*; Frazer, (Golden Bough. >

PLANTS, Malformations in. Malforma¬ tions in plants are more or less conspicuous growths or deformities which do not occur in the normal life history of the plant but are caused by various agencies, such as insects and other animals, fungi and other plants, and some¬ times by merely mechanical accidents, and some¬ times by agencies which are entirely unknown.

Most of the conspicuous malformations caused by insects and by other plants are called galls (Fig. 1). The gall-flies (Cynipidse), the gall-nats (Cecidornyiidse), mites, caterpillars and the larvae of the beetles are the most frequent causes of galls ; but many are caused by fungi. In most cases the depositing of an egg by an insect is the stimulus which initiates the forma¬ tion of abnormal tissues and outgrowths ; but in many cases, the principal stimulus comes later, in the development of the larva from the egg. The nature of the stimulus still needs

investigation, but it has some of the character¬ istics of fertilization; at least, there is a stimu¬ lus to growth and development. Whether there is any transmission of hereditary characters or not is a question ; but it is an undeniable fact that certain insects produce certain galls with such distinct characters that analytical keys can be constructed for the identification of galls.

Fig. 1. — Gall on leaf of White Oak: a sectional view is shown

below, at the right. The harder, inner part, suspended

by strands, contains the grub.

Galls occur in every great group of plants, even in the algae and fungi; they are not nu¬ merous in the Bryophytes, the liverworts being particularly free; in the Pteridophytes they are more numerous. In the Gymnosperms, there are many galls, some of them, like the ((Witches Broom® and ((Cedar Apples,® being very con¬ spicuous. In the Angiosperms, especially in the Dicotyls, galls reach their maximum in display, distribution and variety. No less than 901 dif¬ ferent kinds of galls are found in the Fagaceae, the family which includes the beech, chestnut and oak, the latter having more kinds of galls than any other plant. The Compositae (Sun¬ flower Family) come next with 664, followed by the Salicaceae (Willows and Poplars) with 573, the Rosaceae (Rose family) with 500, the Leguminosae (Peas, Beans, etc.) with 481, the Cruciferae (Mustard, Radish, Turnips, etc.) with 256, the Labiatae (Mint family) with 217 and various others ranging down to a single gall. Among the Monocotyls, the Gramineae (Grasses) lead with 193, no other family hav¬ ing even as many as 50. Many families, both in Dicotyls and Monocotyls, are entirely free from galls.

A gall may consist of a single cell or of many cells which have been modified by the infection, producing distortions without adding to the number of cells; or the infection may stimulate cell division and growth, building up extensive new tissues with characteristic forms. In plants which are normally hairy, the hairs may be enlarged and modified in shape, but the infection often results in the formation of hairs on plants which are normally smooth, as in case of the common basswood. The leaves are quite smooth, but when infected, the epidermal cells grow out into long hairs (Fig. 2). In this connection it is of great interest to note that not only may structures, like the hairs, be pro¬

duced in plants which are normally smooth, but it is claimed the structures called forth by the stimulus may resemble those of closely

related species.

Entire leaves are often greatly reduced and distorted, their margins may be folded in and adjoining surfaces may grow together. Flower clusters are often modified and young vegeta¬ tive shoots may be greatly reduced, so that the leaves become crowded and make the shoot look like a cone, as ofter seen in the willows. In some Composites, like the sunflower, the in¬ fection causes a distorted vegetative develop¬ ment to take the place of floral development and the head looks like a modified involucre.

Large swellings are often caused in the stems of herbaceous plants, the galls on stems of golden rod being familiar examples. The more or less spherical galls on rosebushes and on leaves and twigs of oaks are often highly colored. The large spherical gall, often an inch in diameter, found on oak leaves and twigs, is a good example of a very complicated gall (Fig. 1). At maturity, it is dry, papery and hollow, with slender strands suspending a hard portion within which is the insect.

Many malformations caused by plants come within the category of galls. Some of these take the form of conspicuous irregular distor¬ tions; while others are scarcely noticeable blis¬ ters or spots on leaves or stems, or may be merely internal malformations, not visible from the outside. Perhaps the most familiar gall of the irregular distortion type is the corn smut, caused by the fungus, Ustilago Maydis. On the young ear of corn this gall becomes as large as one's fist, and on the tassel the distorted portions may be as large as hickory nuts or walnuts. Similar galls, not so large, but caused by related fungi, are very numerous. The smut on wheat and oats and other cereals are only too well known examples. (Figs. 3 and 4).

Fig. 2. — Filamentous gall on leaf of Basswood.

The <(Club Root® of cabbage, cauliflower, turnip and other members of the Crucifer family is a large gall caused by Plasmodiophora brassicce, one of the Myxomycetes (Fig. 5). The knotty swellings prevent the normal func¬ tioning of the root and thus stop the growth of the head and finally kill the plant. The spores of the fungus will live in the soil for years.

The ((Black Knot® caused by the fungus, Plowrightia morbosa , is

very destructive to cherry and plum trees. The infected twigs be¬ come swollen, often to several times their normal diameter, and the disease becomes so deep seated that the branches are killed. In

Fig. 3. — Rust ot wheat and oats; the aecidium, or cluster cup stage on leaf of Barberry. The rust appears as yellowish spots.

Fig. 4. — A greatly magnified view of a section of one of the cluster cups on Barberry leaf.

1906, ((Black Knot® had become so destructive to cherry trees in North Carolina, that cherry¬ growing was practically abandoned in that State, and at one time this disease almost put an end to the cherry industry in Maine. Infected twigs should be pruned off in the autumn or early winter and destroyed.

The (

Fig. 5. — The “ Club Root ” gall on roots of a turnip.

which promptly germinate putting out a short tube consisting of four cells, each of which produces a spore. These spores germinate on young quinces, june berries, hawthorns and apples, or on the young twigs of these trees, causing destructive malformations. Since the fungus cannot complete its peculiar life history

without the cedar apple stage, the disease can be eradicated by destroying the junipers in the vicinity of the orchards.

The <(White Rust® caused by the fungus, Albugo Candida, is rather common on the “Shepherd’s Purse,® Capsella, and upon various other members of the Mustard family. On the stems, leaves and flowers of Capsella, it forms blister-like white galls, which rupture the epidermis and scatter the asexual spores, it also develops a sexual stage, usually on the upper part of the stem or on the flowers, caus¬ ing considerable distortion but not rupturing the tissues or causing any change in color. On the other hosts, the sexual stage may cause a distinct change in color.

One of the most familiar galls is seen in the <(root tubercles® of the Leguminosae (Pea family) caused by bacteria (Rhizobium radici- cola). These swellings, or tubercles, enable the plant to make use of free nitrogen in the soil. Clover is abundantly supplied with these root tubercles which not only add to the vigor of the clover, but improve

the soil.

A peculiar gall caused by “Bacterioids® as¬ sociated with a blue green alga (Anabaena), is found on the rootlets of the cycads. The in¬ fection causes the rootlets to swell to several times their normal size and changes the direc¬ tion of their growth, so that instead of grow¬ ing down, they grow straight up and emerge above the surface in profusely branching coral- loid masses.

One of the most remarkable and most thoroughly investigated of all galls is the “Crown Gall,® which has been called a plant cancer and is caused by Bacterium tumifaciens. It is very destructive to the apple, peach, plum, cherry, apricot, blackberry, grape, potato, tomato, tobacco, turnip and many other crops. It is particularly disastrous to young plants in the nursery. The bacteria have been isolated in many cases and from pure cultures obtained in this way many species have been inoculated and the characteristic galls have been induced, so that the relation between the bacteria and the galls has been established. The development of the disease closely parallels the progress of cancer in man and animals. In both cases, there is some stimulus to internal cell division. In case of the <(Crown Gall,® that stimulus is a definite organism, but in man no definite organ¬ ism has yet been discovered. The results of investigations upon the crown gall make it seem probable that some organism may yet be found to be the cause of human cancer.

Some malformations caused by large plants have been classed as galls. As the mistletoe grows into the branch of its host, the host is stimulated and grows up around the base of the parasite. When the parasite dies and falls off, the outgrowths of the host, with the character¬ istic markings left by the parasite, are called “Wooden Roses.®

There are many malformations in plants not caused by either insects, fungi or other plants One of the commonest of these malformations is known as fasciation. A familiar example is often found in the dandelion, where the flower scape, instead of presenting its usual tubular shape, becomes broad and ribbon-like. Many plants show deformities of this sort. Various malformations are found in flowers, the most

common being those in which one floral organ takes the form of another or in which a floral organ takes the form of a leaf. In the doubling of roses and many other flowers, the stamens become petals, or rather, the embryonic growths which normally would have developed into stamens, develop into petals. Similarly, we some¬ times find leaves where we should expect to find carpels, which form the ovary. Any of the floral parts, sepals, petals, stamens and carpels may be replaced by leaves, and this fact is cited as proof that they were all leaves originally and that they have been modified to their present form from which they occasionally revert to the ancestral leafy condition.

The leaves of ferns, especially in green¬ houses, often become greatly modified. Plants of the ((Boston Fern® type often have leaflets which branch repeatedly at the tips, so that the plant bears little resemblance to the type. Pteris cretica, which normally has entire leaflets, has given rise to varieties with leaflets profusely branched.

The navel orange is a very valuable mal¬ formation due to an excessive enlargement of the axis just below the portion which consti¬ tutes the fruit in seedy oranges. The <(Navel® of the navel orange represents the whole orange of the normal type.

Most of the literature on malformations is found in works dealing with galls and with various plant diseases.

Bibliography. — Howard, C., (Les Zooceci- dies des Plantes d'Europe) (Paris 1908; three large volumes in French describing and classifying galls and giving extensive references to literature) ; Kuster, Ernst, (Die Gallen der Pflanzen) (Leipzig 1911; 437 pages, a com¬ prehensive treatment with numerous illustra¬ tions and references to literature) ; Hesler and Whetzel, (Manual of Fruit Diseases) (New York 1917) ; Smith, Erwin F., (The Structure and Development of Crown GalP (United States Department of Agriculture, Bureau of Plant Industry, Bull. No. 255, 1912) ; Masters, M. T., (Vegetable Teratologv) (London 1869).

Charles j. Chamberlain, Professor of Morphology and Cytology, The University of Chicago.

PLANTS, Medicinal, plants of which some part is used in medicine or from which some preparation is extracted for similar purpose. To persons unacquainted with the nature of the various wild plants which surround them in farm and outdoor life, it comes as a great sur¬ prise to find that the world's supply of crude, botanical (vegetable) drugs

are for the most part procured from the leaves, bark, seed, flowers, rhizome, etc., of these very plants, many of which are regarded as noxious weeds. The most valuable drug-plants which grow in America, from the point of view of the grower, are ginseng and golden seal (qq.v.), but there are all told more than 1,000 different plants which are indigenous or naturalized in the United States alone. Some of these are very valuable and have, since their medicinal prop¬ erties were discovered, come into use in all parts of the world, others now collected in the United States have been brought here, and much, like the English sparrow, become in their propagation a nuisance and a pest to the farmer. The limitations of the present article preclude

any extended discussion of the methods and habits of growth of the several plants, the methods of planting, cultivating, curing, preparation or extraction of the drugs, prices, etc. This information will be found, in the case of the more important plants, in the arti¬ cles on these plants, v.g., Ginseng. It is in¬ tended here merely to set forth briefly those plants having a medicinal value, indicating the part or parts so used, and the general uses of each. As in the case of many native medicinal plants the early settlers in America learned of the virtues of Golden Seal (Hydrastis canaden¬ sis) through the Indians, who used the root as a medicine and the yellow juice as a stain for their faces and a dye for their clothing. Golden Seal is also known by different names in different localities, most of them bearing some reference to the characteristic yellow color of the root, such as yellow root, yellow puccoon, orange root, yellow paint, yellow Indian paint, golden root, Indian dye, curcuma, wild curcuma, wild tumeric, Indian tumeric, jaundice root and yellow eye, eyebalm, eye root and ground raspberry. The rhizome or root- stock and rootlets are the parts used in medicine. When dry the root measures from one to two inches in length and from one-eighth to one-third of an inch in diameter. The Indians regarded Golden Seal as a specific for sore and inflamed eyes and it was a very popular remedy with pioneers of Ohio and Kentucky for this affec¬ tion, as also for sore mouth, the root being chewed for the relief of the last-named trouble. The juice is also used as a diuretic stimulant and escharotic, the powder for blistering and the infusion for the dropsy. It is useful in digestive disorders and in certain catarrhal affections of the mucous membranes. In 1860 the root was officially listed in the United . States Phar¬ macopoeia. The plant is native from southern New York to Minnesota and south to Georgia and Missouri. It is estimated that the annual consumption of Golden Seal root is from 200,- 000 to 300,000 pounds annually, about one-tenth of which is exported. Consult Bulletin edited by Alice Henkel and published by the Bureau of Plant Industry of the United States

Depart¬ ment of Agriculture.

Black Cohosh (Cimicifuga racemosa) , also known locally as black snakeroot, bugbane, bug- wort, rattlesnake root, rattleroot, rattletop, rich- weed and squawroot. It grows in the shaded woodlands from Maine to Wisconsin and south to Georgia and west to Missouri. The Indians long regarded the root as a valuable medicinal plant, not only for the treatment of snake bites, but it was also a very popular remedy among their women, and it is to-day esteemed as an alterative, emmenagogue and sedative. It is officially listed in the United States Pharma¬ copeia.

Blue Cohosh (Caulophyllum thalictroides) , also known locally as papoose root, blueberry root, blue ginseng, yellow ginseng. The dried root is the part used in medicine as a demulcent, antispasmodic, emmenagogue and diuretic. Snakeroot (Asarum canadensis), also called wild ginger, Indian ginger, Vermont snakeroot, heart-snakeroot, southern snakeroot, colt's foot, broadleaved asarabacca, colic root, etc. The root is used as an aromatic, diaphoretic and carminative. Serpentaria, also known locally as snakeweed, pelican-flower, sangrel, sangree-

root, etc., grows in rich woods from Connecti¬ cut to Michigan and certain varieties occur in the southwestern States. The roots are used for their stimulant, tonic and diaphoretic prop¬ erties. It is officially listed in the United States Pharmacopeia. May-apple (Podophyl¬ lum peltatum), also locally named mandrake, wild lemon, ground-lemon, hog-apple, raccoon- berry, duck's foot, umbrella-plant, vegetable calomel, etc. It grows all over the eastern half of North America. The root is used as an ac¬ tive cathartic and is official in the United States Pharmacopeia. Pokeweed (Phytolacca decan- dr a) , also commonly called poke, pigeon-berry, garget, scoke, pocan, coakum, inkberry, Amer¬ ican nightshade, cancer-jalap, redweed, etc., is found in rich soils along fence rows and on unimproved land from Maine to Minnesota and south to Texas. The root is used for its alter¬ ative properties in treating various diseases of the skin and blood, and in certain cases in re¬ lieving pain and allaying inflammation. It also acts upon the bowels and causes vomiting. The matured berries are also used in medicine. Seneca snakeroot (Polygala senega) or moun¬ tain flax, the root, once used by the Indians as a cure for snakebite, is now employed as an ex¬ pectorant, emetic and diuretic. Lady's Slipper (

Cyripedium hirsutum Mill), or moccasin- flower, nerve-root, male nervine, umbril root, etc., rootstock and roots are used in medicine as a nerve tonic and an antispasmodic, also for the same purposes as valerian. Bethroot (Tril¬ lium erection L.) , birthroot, bathwort red wake- robin, bumblebee-root, dishcloth, Indian sham¬ rock, wood-lily, etc. Root used in medicine as an astringent, tonic, alterative and expectorant. Culver's Root (Leptandra virginica) or black- root, speedwell, tall veronica, wholywort ; root- stock and roots used as an alterative, cathartic and in disorders of the liver. Stone root (Col – linsonia canadensis), or knobroot, horsebalm, richweed, ox-balm, citronella; root used for its tonic, astringent, diuretic and diaphoretic prop¬ erties. Leaves are also used as an application to bruises. Cfawley-Root (Corallorhiza odon- torhiza) or coral root, dragon's claw, chicken toe, fever root; root used to promote perspira¬ tion and also as a sedative and in fever. Male fern (Aspidhon) or sweet brake, basket-fern, etc. ; root used as a remedy for worms. Care must be taken to avoid overdoses which are highly dangerous. Goldthread (Coptis trifolia) or cankerroot, mouthroot, etc. ; root used as a remedy for ulcerated and sore mouth; also as a wash or gargle for similar affections and as a bitter tonic. Twinleaf (Jeffersonia diphylla) or rheumatism root, helmet pod, ground-squirrel pea, etc.; rootstock used as a diuretic, alterative, antispasmodic, and a stimulating diaphoretic. Large doses are emetic. Canada moonseed (Menispermum canadense) , or yellow sarsapa¬ rilla, vine-maple, etc. ; both roots and rootstock are used in medicine as a tonic, alterative, and diuretic. Wild turnip (Arum triphyllum), or wild pepper, devil's ear, starchwort, priest's pintle, etc. ; the partially dried corn is used as a stimulant, diaphoretic, expectorant and irri¬ tant. Black Indian hemp (Apocynum canna- binutn) , bowman's root, wild cotton, etc.; root has emetic cathartic, diaphoretic, expectorant and diuretic properties, and is much used in drop¬ sical affections. Chamaelirium or Helonias (C. luteum), or unicorn root, drooping starwort,

devil's bit, etc. ; of especial use in derangements of women. Wild Yam (Dioscorea villosa), or colic root, devil's bones ; root is said to possess expectorant properties and to promote perspira¬ tion, and in large doses providing emetic. It is sometimes used in bilious colic. Skunk-cabbage (Dracontium foetidum), or polecatweed, col- lard, stinking poke, etc. ; rootstock is used in affections of the respiratory organs, in nervous disorders, rheumatism and dropsical complaints. American Hellebore (V eratrum viride), or bear-corn, bug-bane, earth-gall, itchweed, etc. ; it is an acrid narcotic poison, and has emetic, diaphoretic and sedative properties. Other medicinal plants with their specific uses in medicine are : Water-eryngo (diuretic, expecto¬ rant) ;

yellow jasmine or jessamine (powerful effect on nervous system) ; sweet flag (aromatic stimulant and tonic in feeble digestion ; dried root chewed for dyspepsia) ; blue flag (altera¬ tive, diuretic and purgative) ; cranes-bill (tonic and astringent) ; dandelion (tonic in diseases of the liver and in dyspepsia) ; soapwort (tonic, alterative, diaphoretic) ; burdock (alterative in blood and skin diseases) ; yellow dock (purifier of blood and in the treatment of skin diseases) ; stillingia, or queen's root, nettle-potato, etc. (alterative) ; American Colombo, or yellow gen¬ tian, ground century, etc. (simple tonic, emetic and cathartic) ; couch-grass, quitch-grass, etc. (fluid extract used in affections of the kidney and bladder) ; echinacea, or coneflower, nigger- head (alterative and to promote perspiration) ; aletris, or stargrass, starwort, aloe-root, husk- wort, etc. (of value in digestive affections) ; wild indigo, or yellow broom, shoofly, etc. (emetic and cathartic in large doses; stimulant, astringent and antiseptic; and as a local applica¬ tion to sores, ulcers, etc.) ; pleurisy-root (used in disordered digestion and in affections of the lungs to promote expectoration and induce easier breathing) ; blood root, coon root, yellow puccoon, tetterwort, tumeric, etc. (tonic, alter¬ ative, emetic and stimulant) ; pinkroot, or star- bloom, wormweed (principal use is as an an¬ thelmintic) ; Indian physic or false ipecac (emetic) ; wild sarsaparilla, shotbush, wild licorice (alterative, stimulant and diaphoretic) ; comfrey, or bruisewort, gumplant, slippery-root (used in coughs and diarrheal complaints ; ac¬ tion is slightly astringent and demulcent) ; ele¬ campane, or horseheal, elfwort, velvet-dock, wild sunflower (used in affections of the respi¬ ratory organs, in digestive and liver disorders, catarrhal discharges and skin diseases) ; queen of the meadow, or boneset, motherwort, quill- wort, etc. (astringent and diuretic) ; hydrangea, or seven-barks (as a diuretic and in calculous complaints) ; Oregon grape, or holly-leaf bar¬ berry (tonic and blood purifier, berries in pre¬ serves and cooling drinks). Ginseng (roots ex¬ ported to China, where they are reported to be used as an almost universal remedy. Odd¬ shaped roots are said to be especially prized as talismans. Many other plants are used in lim¬ ited quantities, among which may be noted birch bark, blackberry, catnip, chicory, corn ergot or smut, geranium, hemlock, huckleberry, penny¬ royal, peppermint, sheep laurel, tag alder, water pepper, wintergreen, witchhazel, etc.

Bibliography. — Henkel, Alice, (Weeds Used in Medicine** (Farmers' Bulletin No. 188, United States Department of Agriculture, Washington 1904) ; Harding, A. R., (Ginseng

and Other Medicinal Plants) (Columbus, Ohio,

1913) ; Hobbs, Charles E., (Hobbs' Botanical Handbook } (Boston 1876) ; Kraemer, Henry,

(Applied and Economic Botany* (Philadelphia

1914) ; id., (A Text-Book of Botany and Phar- macognosy) (4th ed., ib. 1910) ; Mansfield, Wil¬ liam, (Histology of Medicinal Plants) (New York 1916) ; Sloan, George W., (Fifty Years in Pharmacy * (in Indiana Historical Society Pub¬ lications, Vol. Ill, No. V, Indianapolis 1903) ; Youngken, Heber W., (Pharmaceutical Botany * (2d ed., rev. and enlarged, Philadelphia 1918).

PLANTS, Migration of. Plants need a constant change of situation because they may exhaust the amount of the special food of each species in the soil; or impart to that soil injuri¬ ous elements ; or for the sake of increased vigor. They accomplish the needed change by many methods. Very low forms, such as the molds, spread by a creeping action ; some higher plants are torn up by the roots and rolled long distances, to survive and renew their fixture and growth when favorable conditions are reached. Those that have "runners,® like the strawberry, reach out, take root at a distance and so advance by long steps, as it were; while the grasses, ferns and others make similar progress by means of underground root-stems. Dissemination is accomplished more generally, however, by means of fruit (seeds). In many cases the seed-pods are so strained by ripening that at last they burst, hurling the seeds to a considerable distance, or the pods open and the seeds are tossed out by some agitation of the plant, usually with elastic force. No sort of this machinery, however, advances the plant- species more than a few feet; and far more effective is dispersal by wind and water. To this end seeds of a large variety of trees and herbs are provided with wings, like those of the maple and tulip-tree, or with long feathery attachments, like cotton and dandelion, which serve as parachutes to sustain them in the air while wafted away to new habitats. These windblown seeds are always minute and oily, the latter feature giving them the necessary lightness of weight. Floating is a means of dispersal important not only to aquatic plants, but to others. Many river and pond-plants move bodily and are carried here and there by currents; and floods often transport living land- plants to new regions. Some send abroad re¬ generative parts, as buds ; or, in

more cases, seeds in capsules or little bladders, or air-tight pods. The wide distribution of the cocoanut palms throughout the tropics is due to the ability of the tight nut to float long distances. Mangrove seeds are especially fitted to do so; and that a great many other land-growing trees and plants can make long voyages, as seeds, is shown by the vegetation clothing remote islands and the way in which island floras are related to prevailing oceanic currents. That animals assist plants to migrate is well known. Many seeds are provided with hooks that catch in hair and wool and are carried onward by pass¬ ing animals. Birds and mammals eat fruit and drop the uninjured seeds perhaps miles away. The planting of nuts by squirrels, jays and so forth, is useful in this direction. Finally, man has been distributing plants by his operations ever since he began to move about, by the use of fruit and seeds for food, by passing them on

for new orchards and grainfields from country to country; and also by the accidental carriage of them in his ships and otherwise. Every country now has many introduced species. See Plant Geography.

PLANTS, Morphological Evolution of.

The distinction of all living things into plants and animals seems on first thought to be an easy one to make. Animals walk or fly or swim, have mouths by which they eat food and stomachs in which to digest it ; they have eyes with which to see, ears to hear, etc. ; while plants are firmly fixed by their roots, have no power of motion, take their food from the air and dissolved in water from the soil and have in the common view no power of perception of light, sound, etc. The foregoing distinctions are true if we confine our attention solely to the higher groups of plants and animals. But when we follow downward from the more com¬ plex to the simpler plants and animals we find that we are converging more and more until we reach some groups of organisms which have been claimed by both botanists and zoologists. It is impossible to deny that some of these have almost equal right in either kingdom, so that any line that may be drawn to separate animals and plants must be arbitrary. On the other hand many forms that were once considered to be plants are certainly animals, e.g., sponges, corals (Bryozoans) , wdiile such a group as the slime molds (Myxomycetecz or Mycetozoa) , still regarded as belonging to the plants by most botanists, in reality seems to show phylogenetic kinship only with the animals and so ought to be placed there. There still remain, how¬ ever, certain groups which cannot be looked upon as other than transitions from animals to plants or plants to animals. It is for these transitional groups that it is especially difficult or absolutely impossible to draw a natural line of separation between the

two kingdoms. The organisms in question include the Flagellata (in the wider sense of the term) and the re¬ lated Volvo cales (often included fin the Flagel- ata) and the Pcridinialcs (or Dino flag data) . These are in part colorless organisms, but many of them are green and contain chlorophyll by means of which they manufacture food in the same manner as undoubted plants. They are, however, motile during their chief vegetative period, non-motile and encysted only during rest periods. In the latter stages they are very similar to the ordinary vegetative stage of many undoubted plants belonging to the order Chlo- rococcales, in which during reproduction motile, naked cells are formed that are scarcely dis¬ tinguishable from the vegetative stages of the organisms under question. Any line drawn will be arbitrary: perhaps the most logical pro¬ cedure, then, is to consider as animals those forms in which the motile, usually naked stage is predominant, with the non-motile, encysted stage serving merely to tide the organisms over until favorable conditions again occur, while those forms are to be called olants in which the ordinary vegetative stage is non-motile and only the reproductive stages motile. The fore¬ going distinctions must, of course, be under¬ stood to apply only to those debatable groups which have most of their other characters in common. The sponges are motile only during their reproductive stages, but in their other

characters they are animal so that this rule would not apply, while the motile diatoms like Navicula are so plantlike in other features that they would also not be affected.

With the forgoing in view we may consider the stages of evolution in plants. In so doing it must be remembered that the first plants came into existence eons ago and that it is impossible to be certain just what they looked like or what was the early course of their evo¬ lution. Judging by the simplest plants now known these first plants must have been naked, without any hard parts to be preserved as fos¬ sils. Hence the earlier rocks carry very few remains that can be with certainty ascribed to the simpler plants, it being only in the most recent rocks that some of the softer aquatic forms are recognizable, although it seems cer¬ tain that for ages the only plants in existence were water plants. Accordingly we must have recourse to the now existing forms of these simpler plants, making the perhaps not unwar¬ ranted assumption that they represent, as it were, stragglers along the line of evolutionary advance whose progress has been slow, so that although

they are descendants of those primi¬ tive plants of ages ago yet they have changed but little in this long period of time. By this method the main lines of evolution may per¬ haps be indicated with a fair probability of cor¬ rectness, but it will perhaps always be impossi¬ ble to clear up the details to such a degree as has been done in the study of the ancestry of the horse and other animals which having hard skeletons have left permanent records in the rocks.

The simplest plants now known are some of the bacteria and the one-celled blue-green algae (Chroo coccus , etc.). There is no serious doubt that the bacteria and the blue-green algae are closely related; which are the oldest, however, is a question that offers many difficulties and that seems beyond our present powers of solu¬ tion. Most bacteria are unable to grow with¬ out the presence of some organic matter while the chlorophyll-containing algae are independent in that they can manufacture their own organic matter from inorganic substances. Thus a priori they would seem to be more primitive. Yet, on the other hand, there are a few bac¬ teria which if supplied with ammonia or nitrites are able to make use of C02 without the need of light or of chlorophyll and thus build up their necessary organic compounds. It is here assumed, however, that the bacteria are not primitive but derived from the blue-green algae.

These most primitive plants that we know, e.g., Chroococcus, consist of minute balls of protoplasm colored bluish green and enclosed in a thin wall made up in part of chitin. The central, uncolored part of the protoplasm prob¬ ably functions as a nucleus or directive centre for the plant, but is not set off distinctly from the rest of the cell as is the case in the higher plants. Neither is the coloring matter located in definite organs of the cell, the chloroplasts, but merely scattered throughout the outer part of the protoplasm. Reproduction, also, is sim¬ ple, consisting of the division of the cell into two cells which soon separate. The next step in evolution seems to have been that of the ad¬ herence of these cells for some time after divi¬ sion, resulting in the formation of irregular

colonies. As the successive directions of divi¬ sion became more and more fixed these colonies came to have more and more definite shape, square plates, cubes, hollow spheres, etc., the furthest advance seemingly having occurred in the formation of filamentous colonies. In these the successive planes of division are all in the same direction. In Oscil'latoria and its near relatives the cells of the filament are all alike, but in the somewhat higher forms such as Nostoc, certain cells are enlarged (heterocysts). A further type of cell differentiation is seen in Rivularia and its relatives in which the basal cell is a heterocyst and

attached to some object, the next cells being large, those further out gradually diminishing in size until the ultimate cells are very long and slender or even pointed.

The bacteria are considered as an offshoot from plants related to Oscillatoria (e.g. Phormi- dtium), the chief difference between such blue- green algae and the higher bacteria such as Beggiatoa lying in the presence of the coloring matter in the former and its absence in the lat¬ ter. The mode of growth and of reproduction are the same. From Beggiatoa the gradation is gradual throughout the filamentous bacteria and down to the one-celled forms that constitute the commonest forms of bacteria. Yet it is not cer¬ tain that this line is continuous, for flagella, which are apparently lacking in the blue-green algie and Beggiatoa are present in many of the one-celled bacteria. Possibly this indicates an origin of the latter independent of that of the filamentous bacteria.

All of the foregoing forms are placed in the Phylum Myxophycece. There remains a small group of plants placed by some botanists in this and by others in other phyla that are pos¬ sibly a transition to the next phylum. These plants (Glaucocystis , for example) are blue-green, like the others, and multiply by division of the cells, but differ in the possession of a definite nucleus cut off from the remainder of the cell by a nuclear membrane, and in the re¬ striction of the coloring matter to definite or¬ gans, the chloroplasts.

In the next phylum, Chlorophyceae, the coloring matter is bright green, instead of blue-green, and is mostly, if not always, con¬ fined to definite chloroplasts, usually large and few in number in the cell. The nucleus, more¬ over, possess a definite membrane and is well organized. The cell wall is composed of cellu¬ lose or carbohydrates of kindred nature. Mul¬ tiplication by simple division of the cell is not the sole method of reproduction except in a few forms, such as Protococcus. On the con¬ trary we find that two great advances have taken place in the reproductive methods in this phylum. The first is the production of zoo¬ spores. The contents of a vegetative cell, or, in a few of the more specialized forms, of a special cell, divide up within the wall into a number of naked cells provided with long fla¬ gella, or swimming organs, by means of which after emerging from an opening in the cell wall the zoospores (as these naked swimming cells are called) swim around. After a while they settle down, form a cell wall and start the new plant. The second great advance is the intro¬ duction of sexual reproduction. This seems to have been at first a modification of the fore¬ going method, for in some of the more primi¬ tive forms of this phylum, e.g., Ulothrix, cer-

tain swimming cells act merely as zoospores under some external conditions while under other conditions the naked cells fuse by pairs, not merely the cytoplasm but also the two nuclei undergoing fusion. In the more highly developed members of this phylum we find the two functions entirely separated so that the cells that function sexually are entirely distinct from those that act as zoospores for the asex¬ ual reproduction of the plant. In this first appearance of sexuality it is noteworthy that sexual reproduction occurs in plants (and the same is true for animals) before there is any distinction of sex.

In this phylum as in the Phylum Myxo- phycece we find two tendencies exhibiting them¬ selves in the vegetative structure, viz., the for¬ mation of plants consisting of single cells or regular or irregular colonies of cells (Class Protococcoidece) and that of plants consisting of simple or branched filaments or rarely sheets or tubes (Class Confervoidece) . In the more highly developed members of the latter class we find that the sexual reproduction has undergone a further evolution. Instead of producing sex¬ ual cells that are all alike these plants produce two kinds of gametes, smaller, very actively motile sperms, usually arising in large numbers, and larger, less numerous, sluggish eggs. This is the beginning of the differentiation of sex. The further development along this line of evolution led to the complete loss of motility by these eggs and their retention, for further protection, within the walls of the mother cell (the oogone) where the sperm seeks them out and fertilizes them, entering through some sort of an opening in the cell wall. The height of evolution in this direction in this phylum is reached in Coleochcete, in which the fertilized egg becomes surrounded by an investing layer of protective filaments which makes its safety doubly sure.

Closely allied to the one-celled green slimes (Class Protococcoidece) are those organisms mentioned before, whose assignment to the ani¬ mal kingdom or vegetable kingdom is a matter of rather arbitrary choice. A form like Chlamy- domonas is to all intents and purposes a per¬ manently motile zoopore which loses its fla¬ gella and becomes invested with a firm cell wall only to enable it to survive unfavorable con¬ ditions. In mode of reproduction and in struc¬ ture it clearly approaches on the one hand such an undoubted plant as Chlorococciim and on the other certain of the Flagellata whose kinship to the rest of the animal kingdom is incontestible.

From the simpler, filamentous Chlorophycece appear to have arisen the conjugate algae phylum (Zygophycece) , whose more primitive forms are filaments made up of uninucleate cells with green chloroplasts. The power of producing motile zoospores has become lost and sexual reproduction takes place by the union of the non-flagellate protoplasmic con¬ tents of adjacent cells, usually of neighboring filaments, rarely within the same filament. By a further differentiation of the cells and organ¬ ization of the cell wall into two distinct pieces we find the desmids (Order Desmidiales) arising. In this order the filamentous condition of the more primitive forms soon becomes lost as the filaments become more and more con¬ stricted at the joints, until in the highest genera

the filaments are very few celled or even more often reduced to single cells. The diatoms (Class Bacillarioidcce) with their silicified walls and their brown-colored chloroplasts appear to be related to the desmids, to the filamentous forms of which they show the nearest resem¬ blance, especially if the filamentous diatoms are selected in making the comparison. In parallel development we find the gradual shortening of the cells of the filament in each order and the eventual breaking up of the filaments into one- celled forms, exactly as happened in the desmids.

Again going back to the simpler filamentous Chlorophycece we find another group (phylum Siphonophycece) arising. The evolutionary tend¬ ency in this case has been along the line of coenocyte development, the rather short, uninu¬ cleate cells of the Chlorophycece giving way to longer, multinucleate coenocytes with septa at occasional intervals (Cladophora) and finally to tubular coenocytes almost completely lacking cross walls. In the simpler forms the asexual reproduction by zoospores and sexual reproduc¬ tion by the union of equal motile gametes re¬ sembles very closely that of the simpler Chloro¬ phycece, but, as in that phylum, the higher groups show, first inequality of gametes, both retaining motility, and finally the complete loss of motility on the part of the female gamete which is retained within its mother cell wall, as in V aucheria. From plants clearly very close to this last have arisen a large number of genera and species of chlorophyll-less forms compris¬ ing the class Phycomycetece. Vegetatively these resemble V aucheria and its nearest rela¬ tives in consisting of branching, non-septate, tubular ccenocytes, the chief point of difference being the lack of chlorophyll. This necessi¬ tates a different mode of life, either saprophy¬ tic, i.e., feeding on dead organic matter, or parasitic upon animals or more often plants. As to asexual reproduction that, in the lower Phycomycetece is by means of zoospores while sexual reproduction is

by means of motile sperms which seek out the non-motile egg within its oogone. In most members of this class, however, evolution has gone a step fur¬ ther and made fertilization less a matter of chance by developing a tube which leads from the antherid into the oogone, so that there is no opportunity for the sperm or at least its nucleus to fail to reach the egg. These color¬ less plants are aquatic, like their green ancestral forms, in the more primitive groups (Sapro – legniales) , but in the downy mildews (Pero – nosporales) we find that they have emerged and become parasitic in higher plants. Hav¬ ing ceased to be aquatic they did not at once cease to produce zoospores in the course of their life cycles. However, the zoosporangia became reduced in size and instead of setting the zoospores free while still attached to the plant, the zoosporangia themselves are set free to be scattered by the wind, producing the zoospores only when they fall into a drop of water. In two genera of the group there is one step further that has been taken in that the zoosporangia fail to produce zoospores at all and germinate directly.

In the black molds (Mucorales) the evolu¬ tion proceeded differently. Evidently this group also arose from the aquatic Saprolegniales, but as the fungi emerged from the water and be-

came terrestrial the zoosporangia became larger instead of smaller and did not set their con¬ tents free as naked zoospores blit permitted these to become encysted before they were set free to be scattered by the wind. In this group a few genera show a rapid reduction of size of these large sporangia until some forms are known in which, as in the preceding group, the sporangium is reduced to a small, wind-dis¬ tributed body or conidium.

The Chlorophycece appear to have been a very prolific group for the production of other phyla. So in still another direction we find arising the brown algae (Phylum Phceophycecu) , whose primitive filamentous forms reproduce asexually by zoospores and sexually by the union of equal motile gametes. In this phylum the vegetative structure has undergone the greatest evolutionary advance among all the lower plants. From simple filaments of cells to the massive kelps or complicated rockweeds or sargassums there is almost an unbroken series. Except for some of the largest trees the biggest plants in the world are the giant kelps (Nereocystis) of the north Pacific Ocean, some of which attain a length of several hun¬ dred feet with stems

several inches in thickness. Along with this external differentiation we find tissue differentiations to a higher degree than in any other plants outside of the so-called ˆvascular® plants, which are very much further developed evolutionally. On the other hand the reproductive processes are but little modified. Asexual reproduction by means of zoospores persists in most of the forms, although lacking in some of the higher members of the phylum. Sexual reproduction consists of the union of equal motile gametes in the lower forms, of unequal motile gametes in those a little fur¬ ther advanced, and in the union of motile sperms of small size with large, non-motile eggs in the highest forms. In all cases the union occurs outside of the parent plant and the product of the union is a simple cell which by its division produces the new plant.

The great phylum of the red seaweeds (Rhodophycece) probably also had its roots in the Chlorophycece, but so many intermediate forms have been lost that it is difficult to imag¬ ine just how to picture the steps along which the evolution progressed. The simplest red seaweeds consist of unbranched or branched filaments of uninucleate cells, with their chloro- plasts stained red or violet. Motile reproduc¬ tive cells are totally lacking in the group, bar¬ ring a possible amoeboid motion observed in a few. cases. Asexual reproduction consists of the production of non-ciliate cells, either singly or in fours (monospores and tetraspores, re¬ spectively), these escaping from their walls as naked protoplasts which are carried about by the water currents. Sexually, an egg, enclosed in an oogone, is fertilized by a naked-non-motile sperm which is carried by the currents and which clings to a projection of the oogone, the trichogyne. The sperm nucleus enters this pro¬ jection and passes downward to the egg nucleus with which it unites. Now, unlike the forms hitherto under discussion, the fertilized egg undergoes rapid nuclear division and ultimately branches out into several or many filaments which terminate in the ultimate reproductive cells, the carpospores. Thus one sexual union results in the production of numerous repro¬

ductive cells instead of one. In the higher red seaweeds the carpospores give rise to plants which produce only the asexual tetraspores, while the plants arising from these tetraspores are, in turn, the sexual plants, thus introducing a new feature, the Alternation of Generations (q.v.). It is worthy of note that this feature appears to have arisen at various points in the vegetable kingdom independently. Aside from this complexity of reproductive processes the red seaweeds show all gradations within the group from simple filaments to very complex, massive bodies. Like the brown seaweeds they are prevailingly marine.

The red seaweeds are of interest, because from them seems to have arisen the great group of the higher fungi phylum (Carpomycetece) just as the lower fungi (Phycomycetece) arose within another phylum (the Siphonophycece) . The fungi in question are filamentous and largely terrestrial, often parasitic upon plants or even animals. They lack chlorophyll, but in many ways show structural characters found also in the Rhodophycece. Asexual reproduc¬ tion is by the production of non-motile conidia. The more primitive forms have a form of sexual reproduction that resembles greatly the process in the red seaweeds, viz., the union of a non-motile, water-borne sperm with an exten¬ sion of the oogone, the result of the union being the development of an extensive mass of threads which terminate in the reproductive cells. These terminal reproductive cells are different in the three great classes of this phylum, being an ascus, containing usually eight spores, in the Ascomycetece, a basidium, producing externally usually four spores, in the Basidiomycetece, and a teliospore, producing a usually four-celled promycelium, which gives rise to four spores, in the Teliosporece. In this phylum we find that the sexual process has undergone several modifications as we pass from the more primitive to the more highly- developed groups. Thus the formation of sep¬ arate sperm cells is omitted and the antherid and oogone (or its extension, the trichogyne) come in immediate contact. Finally antherids seem to be wholly omitted, the sexual process in such plants consisting in the union of what were potentially egg nuclei or their derivatives. In many fungi even the oogones fail to be produced, the nuclei that eventually unite being apparently of vegetative origin. Throughout the phylum the vegetative structure maintains its simplicity, consisting essentially of a more or less loose weft of branching, septate threads. It is the reproductive structures that show the greatest differentiation. Thus, one finds in this group such varied structures as the cup-like apothecia of the cup fungi, the globose, sub¬ terranean fruit of the truffle, the umbrella- formed mushroom, the bracket-like pore fun¬ gus, etc

One of the most significant steps in the evo¬ lution of plants resulted in the development of the liverworts and mosses phylum (Bryopliyta). This is the first group of chlorophyll-bearing plants to become terrestrial, although even in the first phylum (the Myxophycece) a few forms crept out on land to inhabit damp places. The plant body is mostly more compact than in the more or less filamentous Chlorophycece , which were probably the ancestors of this group. They are attached to the soil by

rhizoids which serve not only to hold the plant in place but also to absorb water and pass it on to the plant. Their aquatic ancestry is still shown by the production of motile sperms which are dependent upon the presence of water at the proper time to enable them to swim to the egg. Another forward step is seen in the fact that the eggs are surrounded before fertilization by a protective layer of cells, forming a flask-shaped structure, the archegone. Unlike the lower Chlorophycece, the fertilized egg in this phylum does not be¬ come a thick-walled oospore but divides rapidly, forming a complex structure, rooted in the parent plant from which it draws a large part of its food, that produces internally the ultimate reproductive spores. The plant body likewise shows evolutionary development from a flat thallus in the lower liverworts, becoming lobed in those higher in the scale, and finally reaching the leafy-stemmed mosses.

In the next step, which probably took place rather rapidly, the relative importance of the sexual stage (garnet ophyte) and of the spore¬ bearing stage (sporophyte) has been reversed. As in the Bryophyla, the sporophyte starts as a single fertilized egg cell within an archegone. This egg divides repeatedly to form a many- celled structure which is at first enclosed within and dependent upon the gametophyte. Soon, however, it acquires its own roots and leaves and quickly becomes entirely independent of the gametophyte, which dies, leaving the sporo¬ phyte as the long-lived stage. This is the step of evolution that has been reached by three phyla, Pteridophyta, C alamo phyta and Lepi- dophytci. These differ markedly from one another in the structure of the stem, leaves and spore-bearing organs, but the fundamental life history is the same, at least in the lower repre¬ sentatives of each group. By an apparently parallel development each of the three groups has taken a further but similar step, in that the spores produced are of two kinds, which pro¬ duce respectively male or female gametophytes. These sexual plants are much smaller in size and depend for their food largely upon the food stored up in the spores themselves, instead of manufacturing it in large amounts, as in the mosses and liverworts or the lower mem¬ bers of these same phyla. This line of evolu¬ tion is carried one step further in the phylum Cycadopliyta (sago palms and their relatives), where the spores that produce the female sexual plants are permanently retained within the parent plant, undergoing their development there, including the formation of egg, fertiliza¬ tion of the latter and the beginning of the development of the new sporophyte generation. The resulting structure, consisting of the spore- containing organ (the sporangium), containing the remains of the female gametophyte,

which in its turn contains the new sporophyte gener¬ ation, is what is called a seed. In this phylum the aquatic ancestry is still revealed in the pro¬ duction by the much reduced male gametophyte of motile sperms which accomplish the fertili¬ zation of the eggs.

The last developed phyla in the vegetable kingdom retain the chief characters of the last- mentioned phylum. In them, however, the sperms are no longer provided with cilia or flagella by means of which they swim a short

distance from the ruptured tip of the male gametophyte to the archegones containing the eggs. The male gametophytes themselves grow as long tubes down through the intervening tissues and spaces directly to the egg, only there rupturing to permit the sperm to accom¬ plish its function. In one of these phyla (Strobilo phyta, the conifers) the reproductive structures are chiefly arranged in cones with the seeds produced on their open surfaces. The highest development is found in the other phylum (Antho phyta , the flowering plants), where the seeds are enlosed within special struc¬ tures, the pistils, thus attaining a rhaximum of protection. Vegetatively it is noteworthy that the sporophyte, which from the Pteridophyta (ferns) onward is the long-lived structure, be¬ comes more and more complex in its external and internal structure, thus reaching its cul¬ mination in the Anthophyta, whose tissues as well as general structure are differentiated fur¬ ther than in any other group of plants. Within this group the plants vary from the minute duckweeds, only a few millimeters in dimen¬ sions, to the tall eucalyptus trees, towering 400 feet into the air, from annuals that live but a few short weeks and then lie dormant as seeds until favorable conditions again appear, to trees that may live for many centuries, from sub¬ merged aquatic inhabitants of rapidly-flowing streams to the spiny, leafless cacti of the des¬ erts. And yet throughout this group the one structure, the flower, holds them all together in a common bond of kinship, and through' this structure we can trace backward the steps of evolution until we again find the minute micro¬ scopic sexless plants that seem to represent most nearly the first plants that arose, eons ago, in the water or mud of the primeval sea.

Ernst A. Bessey,

Professor of Botany, Michigan Agricultural College.

PLANTS, Ornamental. The climate and soil of North America vary so tremendously that only by a close study of local florists' cata¬ logues, and the reports of State experiment stations, can the ornamental

plants suitable for any given locality be determined. A hint of the trees, shrubs, climbers, aquatics and lesser herbaceous plants, of the perennial type, most frequently set out, is given below.

Rapidly-growing trees, particularly for tree¬ less regions, are the cottonwoods (Populus) common along mid-western water courses ; the silver maple (Acer) and the white willow (Salix) for moist soils : white and Scotch pines (Pinus) for sandy ones: white and Norway spruces (Picea) ; green ashes (Fraxinus) ; osage orange (Toxylon) ; European larch (Larix) ; black locust (Robinia) ; hardy catalpa (Catalpa) and Russian mulberry (Morus) are recom¬ mended for planting, serving as windbreaks, as shade trees and as material for fence posts and fuel.

For street planting in city and village, cer¬ tain trees have been found more or less resist¬ ant to the deleterious effects of urban existence. The most important of these are the plane-tree of Europe (Platanus) readily identified in winter by its long-hanging balls of fruit; the trim maples (Acer) the leaves of some species turning to gorgeous color in fall ; graceful elms

DECORATIVE PLANTS

Aesculus hippocastanum

Digitalis purpurea

Abrus precatorius

Evonymus curopaea

Eryngium alpinum

Rhodoleia Champion

Callistemon angustifolia

Bougainvillea

spectabilis

Vriesea Wittmackiana

Warszewitzia cocehea

Euphorbia splendens

Alloplectus peltatus

Melampyrum nemorosum

Salvia sclarea

(iJlmus) arching over roadways, wherever they can be protected from noxious insects; the tree-of-Heaven (Ailanthus) , evil-smelling when in bloom, but gay later with huge bunches of pinkish fruits, half-hidden in the compound foliage of this most enduring of all these trees. Rather less common are the Japanese Gingko, a conifer which sheds its fan-shaped foliage in winter; ashes (Fraxinus) untroubled by in¬ sects; shapely lindens (Tilia), fragrant in bloom and humming with nectar-seeking bees, and occasionally other trees like slowly-growing oaks (Quercus) and Liriodendrons. Lombardy poplars (Populus) and bald cypress (Taxo – dium) are planted for formal gardens; tall, slender and conical they also make good de¬ ciduous screens. Coniferous evergreens are planted moreover for screens as well as for windbreaks and ornament, especially the spruces (Picea) ; pines (Pinus) ; firs (Abies), and hemlocks (Tsuga). Sombre, thick-foliaged cedars (Junipcrus) , Chamaecy-paris, and arbor- vitae (Thuya), lend themselves to architectural effects, being symmetrical of growth ; they are frequently set . and trimmed for hedges, taking the place of the old-time slowly-growing yew (Taxas) and box (Buxus). Privet (Ligus- trum) is also used much for quickly-growing hedges; also barberries (Berberis) brilliant in autumn with arching sprays loaded with oval scarlet berries ; the even more interesting holly (Ilex) ; thorns (Cratcegus) , handsome both in flower and fruit; the glossy osage orange (ToxylOn) , and honey-locust (Gleditsia) , the latter being sufficiently armed with spines Japanese quince (Cydonia) , flowering gayly, is used for low hedges. The Southwest has thickets of cactus, impressed for impenetrable spiny hedge-rows.

On lawns and in gardens are planted beeches (Fagus) some varieties having purple leaves; the (

and the silver bell tree (Halesia) are native white flowering trees of much value for small places. Indian bean trees (Catalpa) although of Southern origin are frequently seen in North¬ ern parks, where their great panicles of white, streaked, velvety flowers are set off by the

huge heart-shaped leaves. The catalpa is apt to be irregular, even sprawling in habit, but the fa¬ miliar horse-chestnut (FEsculus) and its Amer¬ ican relatives the buckeyes, are singularly sym¬ metrical in growth, and the former has strik¬ ing flower-spires of white.

In warmer climes we find live oaks (Quer¬ cus) dripping with Spanish moss; palms — Washington, Royal, Phoenix and Monterey, and near the coast palmettoes and cocoanuts; Aus¬ tralian eucalyptus, tall with strangely-set foli¬ age and tasseled flowers ; handsome liquid- ambar with star-shaped leaves that turn to red and purple in the fall; the pleasant-fruited pecan (Hicoria) ; mulberries (Morns) whose soft fruit is so attractive to birds that the tree is sometimes planted to allure them from more valuable fruits, and luscious figs (Ficus). The Pride-of-China tree (Melia) is another favorite food-tree of birds who are said to oc¬ casionally intoxicate themselves with its rather poisonous translucent berries. Pepper trees (Schinus) and the madrona (Arbutus) laden with scarlet berries, are also frequented by birds. The crape myrtle (Lagerstrocmia) with crinkled petals of rose and white, the blaz¬ ing royal poinciana (P oinciana) ; the handsome golden-flowered Cassia fistula; the whole tribe of wattles (Acacia) including the fragrant- flowered cassie (A. farnesiana) ; the fern¬ leaved silk-oak (Grevillea) and the weird she- oak (Casuarina) are well-known exotics fre¬ quently planted. Among the natives are the blue-flowered California lilac (Ceanothus) , the magnificent magnolias and the loblolly bay (Gordonia).

The South, again, can have a wonderful collection of flowering shrubs, both native and foreign, some of which are cultivated in the window gardens and greenhouses of the North. Such are the oleander (Nerium) bearing great sprays of pink or white or cream flowers; Chinese Hibiscus, or shoe-black plant, tossing its gay flowers with long projecting column out of every shrubbery; the pomegranate (Punica), its flowers of pure vermilion followed by heavy fruit that pulls down the slender branches; golden Allamandas, half-climbing in habit, azure phlox-like Plumbago; stiff waxen Ixoras of many hues, the scentless Camellias, and all those shrubs of different families called jessamine, scented and white and waxen of petals. One is the Cape jessamine better known at the North as Gardenia; another is the crape jessa¬ mine (Taberncemontana) the rose-bay of India; still another is the Confederate jasmine (Trachylospernium) with delightful flowers like tiny children’s windmills. Among native shrubs are the Stuartia with large white flowers; the lovely Matilija poppy (Romneya) ; Bauhinias, with orchid-like flowers, gorgeous Lantanas ; the sea-side mahoe (Paritium) , with effective yellow flowers like hollyhocks; Daturas with huge white nodding trumpets and many others.

The calico bush (Manzanita) thickly be¬ decked with fragrant white bells (Arctostaphy- los) also noted for the rich color of bark and

twigs; the extraordinary tree-yuccas (Yucca); Californian holly (Heteromeles) , whose cardi¬ nal-berried sprays are used for Christmas deco¬ ration; that barberry (Berberis) , with holly-like foliage, called most frequently Mahonia ; the golden-flowered Fremontia; the tree-mallow (Lavatera) ; the tasseled Garrya; and the fra¬ grant California laurel (Umbellularia) are often seen in Western and Pacific Coast plantations.

There is, however, no lack of flowering or fruiting shrubs for the more severe climates, and a certain amount of garden-color may be procured for even the dreary winter season, by planting broad-leaved evergreens, such as the stiff formal box (Buxus) ; hollies (Ilex) ; mountain laurel (Kalmia) and Rhododendron, the last two being even more desirous when in bloom. Dwarf conifers also, as the spreading Canadian yews (Taxus), junipers (Juniperus) and low pines (Pinus) form masses of grateful green in the foreground of shrubberies. Cer¬ tain cornels (Cornus), which bear cymes of pretty flowers in summer, followed by white or blue fruit, are remarkable for their brightly colored twigs in winter; likewise willows (Salix), brightening towrard spring, and Ker- ria, are useful for their tinted bark.

All those shrubs which bear winter berries are also important for color; they include sumach (Rhus) ; burning-bush (Euonymus) and its allies; barberries (Berberis); wild roses (Rosa) ; and deciduous hollies, especially that known as black alder; wax-myrtles and bayberries (Myrica), most of which also afford a winter fare for hard-weather birds. Others that are tempting to the avian palate, but which mature earlier are the spice-bush (Benzoin) ; choke-cherries (Prunus) ; red- and black- fruited elderberries (S ambucus) ; oleaster (Eleagnus) ; service-berries (Amelanchier) ; buckthorn (Rhamnus) ; sea-buckthorn (Hippo- phce) ; buffalo berries (Shepherdia) and the white fruited snowberry (Symphoricarpos) .

Among the flowering shrubs one can have blossoms in early spring on fragrant mezereon and Daphne (Daphne) ; on the sweet-scented Asiatic bush honey-suckles (Lonicera) ; on the drooping golden bell (Forsythia) , and the scent¬ less yellow jasmine (Jasminum nudiflorum). These are swiftly followed by pink and flaming azaleas ;

by the chocolate-colored, spicily- fragrant Sweetshrub ; by Golden-flowered Kerria; by lilacs (Syringa) in all shades of purple and white; by flowering almonds (Pru¬ nus) and graceful snowy Deutzias; Kalmias and Rhododendrons come in June and July with a gorgeous company of Spiraeas, some with hemi¬ spherical heads of white, some shooting up into spires of pink tiny blossoms. Huge snowballs (Viburnum) follow, the old-fashioned guelder- roses and the equally well-known Rose-of- Sharon (Hibiscus) , tree-like covered with flowers like hollyhocks, pink or white. Single wild roses (Rosa) as the pink prairie-rose, the eglantine with lemon-scented foliage, and the robust Japanese roses are suitable for hedge¬ rows, in company with heavily scented mock- oranges (Philadelphus) ; pepper-bush (Clethra) and late white Azaleas; and with the scentless but floriferous raspberries (Rubus) ; garlanded pink Weigelas (Diervilla) ; the blue-spired Buddleia, delightful to butterflies; the smoke¬

like puffs of Rhus Cotinus and the heavy heads of Hydrangeas of ever-changing tints.

The seashore claims its own peculiar shrubby flora. Among those shrubs that may be planted along the dry strand are feathery Tamarix, each spray tipped with a wand of delicate rosy bloom ; the native dark-colored aromatic bay- berry (Myrica), dense clusters of high-water shrub, (lva), fleshy-leaved like its neighbor, the Baccharis, which in autumn is smothered in white down of its fruits; and where the climate permits, wattles (Acacia) that are ex¬ cellent sand-binders. Beach-plums wreathed with white bloom in early spring, hung with blue fruit in fall, and the creeping matted bear- berry, thickly studded with scarlet berries, will thrive in sandy wastes.

Vines carefully trained over trellis or wall or tree are valuable for ornamental as well as for the more prosaic purpose of screens. Since their methods of ascension are different, these must be taken into consideration. Virginia creeper and its familiar relative, the Boston ivy (Ampelopsis) raise themselves by sucker¬ like discs at the end of tendrils, and are es¬ pecially suited for creeping up walls, rocks and tree-trunks. European ivy (Hedera) and the American creepers (Tecoma) which ascend by thrusting out aerial rootlets, are equally adapt¬ able for this use. Other common vines climb by tendrils or by weaving, twining or scram¬ bling and are therefore useful for twisting about wires, or weaving into the meshes of a trellis. Wistarias are familiar examples of this sort, often becoming in age self-supporting, drop¬ ping their heavy purple and white racemes from tree-like trunk and branches. Bittersweet (Solatium), covered with purple star-flowers in summer and with yellow and scarlet berries in fall; honeysuckles

(Lonicera) prodigal of scented yellow or pink or white blossoms or un¬ scented red ones; Clematis, bearing either large formal flowers of white or purple, or small clusters of small white ones of the type known as traveler's joy, succeeded by gray fluffy seed- balls of feathery-tailed fruit; fragrant cinna¬ mon vine (Dioscorea) ; matrimony vine (Lycium) throwing out long wands freighted with scarlet berries; Akebia quinata, delicate in foliage and gay in fruit; far-scrambling wild cucumber (E chino cyst is) ; and humble gourds of all shapes, with the hop (Humulus), laden wfith pale fruit, form verdurous screens.

Our wild bittersweet, or wax-work (Celas- trus scandens) gorgeous with scarlet and gold far into winter; the delicate mountain-fringe (Adlumia) with its fern-like foliage and pink, saccate blossoms and the ground-nut (Apios) wreathed with violet-scented balls of old-rose tinted blossoms, are perhaps best left to garland fence and hedgerow. Climbing roses, such as the Baltimore Belle, the ubiquitous ramblers and various hardy hybrids are useful for trellis and garden arches, one of the best being the native prairie-rose (Rosa setigera) and its varieties. The South, however, can grow a number of climbing roses like the deliciously fragrant yellow Marechal Niel, the Gloire de Dijon and the wonderful single white Cherokee rose which takes possession of hedges. They have also the fragrant yellow jessamine (Gel- semium sempervirens) and the exotic star- flowered, perfumed white jasmines (Jasminum)

as well as the tropical Solanums with large blue flowers.

Climbing also in those favored lands are the incomparably blue Clitoris ternatea, purple and brick-red Bougainvillaeas, smothered by their papery triple bracts ; the gayly-colored climbing lily (Gloriosa superba), shell-pink rosa-de-montana (Antigonon) flinging its branched coral-like sprays in wild profusion ; Clerodendrons with scarlet corollas peeping out of white bag-like calyxes ; Thunbergias, some small, white or yellow with purple eye, some huge of leaf, fringed with long racemes of gigantic velvety flowers of white or purple. They have, too, quaintly-flowered Aristolochiae, grotesquely shaped, strikingly reticulated with pale veins on a purplish or brownish velvety ground.

Convolvuluses are rampant in tropical climes, and great moonflowers,

and the satiny chalices of pink and white and blue are common there, as well as the charming cypress-vines (Iponuea) with delicately cut foliage, which are grown at the North as annuals.

If the size of the place prohibits the use of many trees or even of shrubs, there are still a number of perennial plants that are large and conspicuous enough to be truly decorative. Peonies form an important group of ex¬ tremely hardy herbaceous plants, being found in many single and double varieties and as many hues, often rose-scented, moreover. Irises are a close second, having a bewildering number of species, types and colors, a constant succession of varieties being obtainable from early spring to midsummer. Lilies (Lilium), too, include many species of many colors, but always decora¬ tive and graceful, very often fragrant. Daylilies (Hemerocallis ; Funkia) are also very decora¬ tive and form huge clumps, the orange and yel¬ low varieties liking moisture and full sunshine, while the white and blue kinds prefer shade- this preference is shared by fragrant lilies-of- the valley (Convallaria) which carpet wide ground-space, and by evergreen, trailing peri¬ winkles (Vinca) starred with purple blossoms in early spring. Some of the members of that large group, Campanula, both blue and white, also like shady places, and one species, the blue¬ bells of Scotland is never so happy as when perched on rocky slopes or cliffs. It is one of the best plants for a simple rockery, . sharing the damp stony location with dancing col¬ umbines (Aquilegias) . Rosetted Saxifrages and Sedums, trailing Phloxes, sweetscented Daphne, and the scrambling rose (Rosa wichuriana) are all fit subjects for the sunnier aspects of a rockery, or for hot banks.

Aconites with cowl-like flowers of rich pur¬ ple or yellow, Virginia bluebells (Mertensia) ; tall white Phloxes, and fragrant sweet rocket (Hesperia) ; scarlet and violet bee-balms (Monarda) ; and the stately foxgloves (Digi¬ talis) are striking border plants for more or less shady places. In the full sun we may find the annual humble but glowing sunflower (Helianthus) splendid screening plants; azure larkspurs (Delphinium) , ever a lure for hum¬ ming birds; gray-green grass-pinks (Dianthus) profuse of fragrant bloom in June and ever¬ green throughout the winter, and the picturesque hollyhocks (Althcea). Hardy old fashioned pompon Chrysanthemums bloom gorgeously far into fall undisturbed by frosts, the stiff papery

flowers of immortelles, the satin discs of honesty (Lunaria), and the vermilion, inflated calyxes of the Chinese lantern plant (Physalis) , lend their cheer to the late garden, followed by the stiff waxy blossoms of the Christmas rose (Helleborus) .

Southern climates permit of the culture of green-white Eucharis ; Pancratiums and Cri- nums of varied hues ; of viciously-armed Cacti and the stiff Aloes, Agaves and Yuccas, ex¬ tremely decorative with their formal tufted growth and pyramidal bloom. There hothouse plants of the North, Heliotropes, Fuchsias, Begonias and Geraniums, become bushes, and the tea-rose blooms perpetually. Thev have also the gaudy dwarf Poinciana and the even more brilliant Poinsettias and Acalyphas (Arundo) . Shrubby lantanas choke roadsides, and Bamboos and giant reeds form thickets.

Swampy lands and quiet pools, natural or artificial, filled with tepid water and with gold¬ fish for the reduction of mosquitoes, can be turned into most decorative features, as bog- or aquatic-gardens. In the moist soil of the bog-gardens can be planted a variety of native plants such as the purple ironweed (V ernonia) ; the old-rose gigantic Joe-Pye-weed, and its smaller congener, the massive-headed, white boneset (Eupatorium) ; the vivid cardinal flower (Lobelia) and its blue relative; the pale turtle-head (Chelone) topheavy with its long continuing masses of oddly-inflated blossoms ; yellow and magenta Lysimachias ; goldenrods (Solidago) ; Asters and some of the more con¬ spicuous orchids. The flaunting rose-mallow (Hibiscus) , and marshmallow (Althcea) may also be suggested. The most splendid aquatic plants are in the genus Nelumbium, or lotus, our native species being pale yellow and the Orien¬ tal, pink or white, raised high in the air over huge umbrella-like leaves. Various waterlilies (N ymphcea) some hardy, and others tender, in the North, float on the surface of the pond, with the humble spatter-dock and the purple water-hyacinth (Eichornia) which is become such a pest in Southern water-ways, and gay water-poppies (Limnocharis) .

Tall blue spikes of pickerel-weed (Ponte- deria) and the white fugitive flowers of the arrow-head (Sagittaria) and tufts of umbrella plant and ancient papyrus (Cy penis) rise above the water. Consult Bailey, L. H., (Cyclopedia of American Horticulture) (New York 1904) ; (How to Make a Flower Garden) (New York

1903).

Helen Ingersoll.

PLANTS, Physiology of. Since the plant is the ultimate source of all of the world's food, the study of the processes by which these sub¬ stances which serve for food for man and beast are built up from the elements is exceed¬ ingly interesting and highly important. That is Plant Physiology. It is important because of its value in increasing food production. But apart from the utility of the study there is also an aesthetic value. There is keen pleasure in learning by observation and experiment how plants live and grow and reproduce their kind and incidentally supply food for the world.

As will be seen from a brief history of the development of the subject the scope has been extended gradually with increase of knowledge, and the particular aim in the study of the sub-

ject changes with different times and condi¬ tions. The aim of the first plant physiologist, Stephen Hales, is given in the preface to his book (Vegetable Staticks) (1726) : <(Since we are assured that the all wise'Creator has observed the most exact proportion of number, weight and measure in the make of all things ; the most likely way therefore to get any insight into the nature of these parts of the creation which come within our observation must in all reason be to number, weigh and measure.® Most of the early observers in plant physiology were interested in recent discoveries in animal physiology and were curious to see if plants behaved similarly. Hales compares the "quan¬ tities of moisture perspired® by plants and trees with the amount perspired by a man ; the per¬ spiration of a 160-pound man is to the perspira¬ tion (transpiration) of a sunflower plant as 141 to 100. Also after he had determined the force of blood in the arteries of dogs, he measured the pressure of the sap in grape vines. Again, Hales found that there is no circulation of sap in plants similar to the circulation of blood in animals, but that there is free move¬ ment of the sap upward and laterally. These few examples serve to show the general attitude of the first experimenters in plant physiology.

Fig. 1. — Graphs showing daily growth. The unbroken line represents the daily growth in millimeters of Fritillaria stem. The broken line represents the daily growth of the root of Vicia faba. The vertical

extent represents the num¬ ber of millimeters of growth, and the horizontal extent rep¬ resents the number of days during which the growth was taking place.

In 1779 Ingen Housz, a physician, discovered that all plants give out carbon dioxide and ab¬ sorb oxygen as animals do in respiration, and in addition to this that the green leaves absorb carbon dioxide and give off oxygen. This process is peculiar to plants and is the source of the carbon used in the manufacture of sugars, starches and other carbon compounds in the plant.

About 1800 Theodore de Saussure made quantitative analyses of the ash of many plants. By growing plants in watery solutions of the mineral substances found in the ash, he proved that some of these are necessary for growth. He also showed that nitrogen, one of the neces¬ sary elements, is obtained by plants from the soil and not in gaseous form from the air as had been thought. Boussingault in 1840 made an extensive series of experiments based on those of de Saussure and proved that the mineral substances necessary for plant growth are nitrogen, phosphorus, sulphur, potassium, magnesium, calcium and iron besides carbon which is obtained from the carbon dioxide of the air.

Although the foregoing important facts

about the physiology of plants were discovered before 1850 they were not widely known. About that time Sachs, the first great teacher of plant physiology, collected all the isolated data, or¬ ganized them and published them in his lec¬ tures on Plant Physiology. This was the real beginning of plant physiology as a science.

During the next 50 years plant physiol¬ ogists were chiefly interested in quantitative measurements of the different life processes. New apparatus was developed to make these measurements more exact. One of these was the self-recording apparatus for measuring the rate of growth, first used by Sachs. The rate of growth per hour of roots and stems was de¬ termined for many plants. The rate of absorp¬ tion of water by roots, the rate of flow of sap through trees and the amount of water loss per hour per square metre of leaf surface — all were determined for various plants. Sachs demonstrated the formation of starch in green leaves in the light and its disappearance in darkness, simply by putting the leaves in iodine solution. If starch is present they become blue, if not they stain yellow. Measurements were made of the amount of starch formed per hour per square metre of leaf surface.

An important piece of work of this period is that of Pfeffer (1877). In an attempt to find what physical forces are available to do work in the plant, he measured the pressure which sugar solutions exert when separated from water by a membrane. This is the condi¬ tion in root hairs: the cell sap (sugar solution) is separated from the water of the soil by a membrane. Pfeffer found that the pressure is proportional to the concentration of the solu¬ tion. The pressure in plant cells varies from four to 50 atmospheres.

A phase of physiology which received much attention during this period is that of plant movements. From early times people had been interested in these movements. The turning of stems toward the light, the drooping of the leaves of the sensitive plant on contact, the movements of tendrils and twining plants — all these attracted the attention of the observer. There were attempted explanations of the mechanical force involved in the curvatures. Ray in 1693 thought that all curvatures were due to differences in temperature on the two sides, — that the warmer side grows more rapidly, and, therefore, becomes convex. In 1806 Knight by ingenious experiments proved that the upward growth of stems and the down¬ ward growth of roots is due to the influence of gravity. He grew germinating seeds on a centrifuge, which was revolved rapidly, thus substituting centrifugal force for the force of gravity. The roots grew in the direction of the centrifugal force, the stems in the opposite direction. Now followed a period when “vital force® was offered as an explanation of plant movements, or indeed of any plant behavior which was not understood. Sachs scorned the vital force conception and initiated experiments to discover the physical or mechanical basis for plant movements. Unfortunately before any real progress had been made, the “stimulus® conception was offered as sufficient explanation. Light acts as a stimulus, therefore stems turn toward it. Gravity acts as a stimulus, therefore roots grow downward. A vast number of use-

AMERICAN POISONOUS PLANTS

1 Poison Ivy (Toxicodendron radicans) : a, spray

showing aerial rootlets and leaves; b, fruit

2 Poison Hemlock (Conium maculatum), showing

flowers and seed

3 Water Hemlock (Cicuta maculata), showing section

of spindle-shaped root and lower stem, the leaves, flowers, and fruit

4 Pokeweed (Phytolacca americana)

5 Stemless Loco-weed (Oxytropis lamberti), in flower

6 Broid-leaf Laurel (Kalmia latifolia): a, flowering

spray; b, vertical section of flower showing pecu¬ liar attachment of stamens (enlarged) ; c, fruiting capsules

7 Poison Sumac (Toxicodendron vernix), showing

leaves and fruit

8 Jimson-weed (Datura stramonium) : a, flowering

spray; 6, fruiting capsule

9 Woolly Loco-weed (Astragalus mollissimus)

less experiments on movement were made dur¬ ing this period. Since 1900 plant physiologists are seeking to find, not necessarily the cause of movements, but those chemical and physical changes within the organ which precede and accompany the movements. An important dis¬ covery is that of Lepeschkin (1910). He found that the cells in the upper side of the swelling at the base of bean leaves are more sensitive to light and darkness than those in the lower side. In the light the cell membranes in the upper half become more permeable, there¬ fore the cells lose some of their sugar, -and be¬ come flaccid; the upper side becomes concave and the leaf rises. In darkness the opposite process takes place : cell membranes become less permeable, therefore the cells retain their sugar and absorb more water ; this causes the cells to swell ; the upper side becomes convex and the leaf droops.

From 1900 up to the present there has been a rapid increase in knowledge of the chemistry of plant life, — of the chemical constitution of the. sugars, proteins and many other substances which are found in plants ; also, and this is much more important, an increasing knowledge of the chemical and physical processes which are going on in the living plant. In his work the plant physiologist now makes use of all the methods and apparatus available from the sciences of physics, organic and physiological chemistry. The close

relation between the science of plant physiology and the arts of agri¬ culture and horticulture is now being recognized, and the facts discovered by the plant physiol¬ ogist are made use of in agricultural and horti¬ cultural practice.

The progress in the attitude of plant physiol¬ ogists with increasing knowledge may be illus¬ trated by the questions which they have sought to answer concerning a single plant organ — the green leaf. Before 1850 : What is the func¬ tion of the leaf? What the function of the green color?

From 1850 to 1900: What is the amount of work done by the leaf? The amount of starch formed per hour? The amount of water lost per square metre of surface? The amount of carbon dioxide absorbed and oxygen given off in the light? The amount of oxygen absorbed and carbon dioxide given off during respiration?

From 1900 to 1918: What are the physical and chemical processes by which sugar is. made in green leaves? What conditions of soil and what proportion of mineral substances are necessary for the production of the greatest amount of sugar in leaves? What is the ratio between the sugars and mineral substances, es¬ pecially nitrates, in the plant which cause fruit¬ fulness ?

Bibliography. — Books which the layman will find interesting: Ganong, W. F., (The Liv¬ ing Plant> (1913) ; Sachs, (Lectures on the Physiology of Plants) (Oxford 1887) : Timir- jazev, (Life of the Plant) (1912). Technical books: Jost, (Lectures on Plant Physiology* (Oxford 1914) : Pfeffer, ‘Physiology of Plants) (Oxford 1906) ; Palladin-Livingston, ‘Plant Physiology* (1918).

S. H. Ecicerson, University of Chicago.

PLANTS, Poisonous, those inflicting toxic disease upon men or animals. The most widely

dreaded toxic plants in America are probably those poisonous to the touch. Such are the poison ivy or the poison oak and the poison sumac, otherwise known as the poison elder or poison dogwood. All of them affect certain constitutions most disastrously, containing, even when dried, an oil which, soon after touching the skin, raises a severe inflammation, and pro¬ duces an intolerable itching, especially where the skin is callous, or there is friction. Imme¬ diate washing after contact with the plant will sometimes prevent the trouble, and very hot soap suds, or sugar of lead, will alleviate the suffering. The poison

seems most virulent when the plants are blooming.

The above all belong to the genus Toxico¬ dendron, and are continually being confused with innoxious plants, the Virginia creeper, for instance, often being destroyed with the poison ivy, the two vines sometimes growing together. This poison ivy is a climbing or trailing shrub (sometimes erect), with variable three-foliate leaves, aerial rootlets and greenish flowers. The smooth, greenish berries often remain on it until late in the winter, forming a- food for birds, which disseminate the plant. The leaves differ from those of the Virginia creeper in having only three leaflets instead of five, and they are of a peculiar dark green, and glossy as though waxed. The poison ivy grows every¬ where, in open brush, in ravines and on the borders of woods; it climbs tall trees, and luxu¬ riates in fence corners, often rearing its head high above the posts. In autumn it assumes brilliant colors, and is oftentimes picked for ornament, — with unfortunate results.

The poison sumac grows in swamps from Florida to Canada and westward to Louisiana. It is a tree-like shrub, 6 to 30 feet high, with long pinnate leaves having from 7 to 13 smooth and glossy leaflets, on red petioles, and without marginal teeth. The wood has a faint sulphur¬ ous odor, which, together with the leaf scars, which are very prominent, enables one to dis¬ tinguish the plant from other shrubbery in the winter. The loose, grape-like bunches of silver- gray berries are also visible in the winter and are a frequent sour.ee of poisoning, being picked for ornament.

The western poison-oak has the same un¬ pleasant toxic characteristics, and differs from the poison ivy mainly in the character of its leaves, which are thicker and smaller, and less sharply lobed.

Other plants, less common, but quite as viru¬ lent to some people, are the handsome ladies' slippers, the largest, the crimson and white Cypripedium regince, growing in sphagnum swamps, producing almost identically the same symptoms as the sumacs. The juice of several spurges (Euphorbia) excites similar inflamma¬ tions.

Plants having poisonous fruits are perhaps the most dangerous, especially to investigating children. There are several kinds of berries, like those of the pokeweed, bitter sweet and night shade, and the black cherry kernels, which are poisonous, when eaten rashly, but the most destructive fruit is probably that of the thorn- apple, or Jimson weed (Datura) — a fruit most unappetizing in appearance, covered with spines, and holding hard black seeds, containing sev¬ eral

poisonous alkaloids. The plants are rank and ill-smelling smooth and bushy annuals, with

large irregularly flaccid leaves, and large flowers, white or purple according to species, blooming at night, and resembling half-opened, long-tubed morning-glories. They are found on waste lands and rubbish heaps.

The water-hemlock (Cicuta maculata) is also responsible for many deaths. It belongs to the great carrot family, which contains both edible and poisonous roots and seeds. It is a smooth erect perennial, three to eight feet high, with a rigid, hollow stem, marked with purple lines, numerous branches, finely dissected leaves, tiny white flowers, disposed in the familiar flat umbels of the wild carrot or sweet cicely, and a cluster of spindle-shaped roots, which vary in length from one and one-half to three inches, and are very characteristic. This is one of the most poisonous native plants in the United States, being rapidly fatal to both man and ani¬ mals. The roots are especially dangerous, be¬ cause the taste, being aromatic and to some people suggesting that of horseradish, parsnips, artichokes or sweet cicely, is apt to lead chil¬ dren to eat them when they are found forced out of the soil by washing, freezing or other causes in early spring. ‘Cattle sometimes eat the tubers, and in marshes they are poisoned by drinking water contaminated by the juice of roots which have been crushed by being tram¬ pled upon. No estimate can be made of the amount of damage done to livestock, but it is very considerable. The human victims average several per annum.

The historic poison hemlock of Greek fame is another violently poisonous plant, in all its parts. Similar in appearance to the other hem¬ lock, with purple spotted stems, and a mouse¬ like odor when bruised, it is becoming natural¬ ized in waste places, and is dangerous when seeds, foliage or roots are eaten.

The beautiful evergreen mountain laurels (Kalrnia) conceal a strong poison in their leaves, as do other closely related species of the Heath family, such as the Rhododendron. The smaller laurel, K. angustifolia, carries the sug¬ gestive name of lambkill. Livestock are the principal sufferers from these plants, scores being poisoned and killed by, them annually, but children are sometimes poisoned by eating young shoots, which grow with and closely re¬ semble wintergreen, but are

without the spicy flavor of the latter. Honey is said to be ren¬ dered poisonous when bees feed upon the Kalinia pollen.

Livestock are also often killed by eating the poisonous fruits of the buckeye (which with the young shoots were bruised and thrown into ponds, stupefying fish and rendering their cap¬ ture easy) ; they are also poisoned by the leaves of the black cherry, especially when wilted.

In the West the sneezeweed (H elenium) , the larkspurs, rattlebox and the loco- or crazy- weeds are the dread of stock-raisers. The lat¬ ter (Astragalus) , silvery-white, silky-leaved perennials, have a most peculiar effect on horses. It is not an acute disease and has two recognized stages. The first, which may last several months, is a period of hallucination or mania accompanied by defective eyesight, dur¬ ing which the animal may perform all sorts of antics. After acquiring a taste for the plant it refuses every other kind of food, and the second stage is ushered in. This is a lingering period of emaciation, characterized by sunken

eye-balls, lustreless hair and feeble movements. The animal often dies, finally, as if from star¬ vation.

Human beings occasionally poison them¬ selves by cooking various plants in mistake for the harmless ˆgreens** or salad plants. Toad¬ stools, perhaps, cause as many poisoning cases as any other plants. The attractive-looking Amanitas are continually being gathered by careless or ignorant people in mistake for the true edible mushrooms, and very often cause death.

PLANTS, Recapitulation in. The term,

recapitulation, in plants and also in animals, is used to designate features of the embryogeny and early development of the individual. <(Ontogeny recapitulates phylogeny® is the usual classroom term, meaning that the individual, in its own development, repeats the history of the race. The frog is first a pollywog and then tadpole, before it finally reaches the adult stage. This is interpreted to mean — according to the recapitulation theory — that the frog's very re¬ mote ancestors were adult at the pollywog stage; and that its less remote ancestors were adult at the tadpole stage. The frog, in its individual life history, repeats these phases of its ancestry. Zoological literature is full of il¬ lustrations. In plants, illustrations of recapitu¬ lation are just as numerous, but are not so widely known. In many trees and shrubs, the early leaves of the seedling are quite different from the

leaves of the adult plant. The Ginkgo, or Maiden Hair Tree, offers a good example. The leaves of the adult tree have an even, wedge-shaped outline (Fig. 1, D) or have a notch at the apex (Fig. 1,(7), the latter condition suggesting the specific name, hiloha, the scientific name being Ginkgo hiloha. The

simple outline, but are deeply cleft (Fig. 1, B) . This is significant, for the geological ancestors of Ginkgo — like the Baiera — have just such cleft leaves at the adult stage (Fig. I, A). In the common larch (Larix) the seedling has simple, needle leaves, and such leaves are found on the first year's growth from any bud on the

tree; but later, the leaves appear in dense clus¬ ters on short spurs. In the pine, the seedling has short needle leaves, but later the leaves are longer and occur in twos, threes or fives on short spurs. Examples might be multiplied. The early form of leaf is called a ((juvenile® leaf, and many believe the seedling is passing through a stage which characterized its adult ancestors. All Pteridophytes (ferns and fern allies), which have two kinds of spores, furnish excellent illustrations of recapitulation. Sela¬ ginella, a very common greenhouse plant, may be taken as an example. In its early develop¬ ment, the megasporangium is just like the sporangium of a common fern which is to pro¬ duce only one kind of spore. In Selaginella itself, the microsporangium looks very like the sporangium of a common fern. All of its spores reach maturity. In the megasporangium, the spore tissue develops just as in a fern and mother cells round off, as if to produce the usual four spores; but only one mother cell undergoes the expected division, giving rise to four spores, while all the rest of the mother cells disorganize and their substance is ab¬ sorbed by the four spores. Selaginella repeats an ancestry in which the spores were all alike and all functioned. The protonema of a moss

Fig. 2. Fig. 3.

Fig. 2. — Laminaria. A, sporeling, B, adult form.

Fig. 3. — Nereocystis. A, pporeling, B, older but not yet adult form.

repeats an algal ancestry. In the Algae, illus¬ trations are numerous. The common kelp, Laminaria, in its early development, has a small, flat blade, and in the adult plant the blade has simply grown larger. In Nereocystis, one of the Giant Kelps of the Pacific Ocean, the young

plant has the simple blade, but the adult form is much more complex. Compare Fig. 2 A and B with Fig. 3 A and B.

The Fucaceae, the family to which Fucus, the most familiar of all brown seaweeds belongs, offer a fine illustration in the microscopic de¬

tails of recapitulation. In the oogonium of Focus eight nuclei are formed and each nucleus becomes the centre of an egg. In most of the other genera of the family, the eight nuclei are formed, but some of them disorganize, so that the mature oogonium contains only four or two eggs, or even only one. Fucus shows the ancestral condition. The others pass through the Fucus stage on account of this phase of heredity known as recapitulation. In studying the relationships of great groups, orders, fami¬ lies, genera and even species, recapitulation fur¬ nishes valuable suggestions. Consult Wilson, E. B., (The Cell in Development and Inherit¬ ance* ; Spencer, Herbert,

Charles J. Chamberlain, Professor of Morphology and Cytology, The University of Chicago.

PLANTS, Regeneration in. The subject of regeneration has received much more atten¬ tion from zoologists than from botanists. It has long been known that if the leg or tail of a salamander be cut off, a new leg or tail will be formed, or ˆregenerated .® If an earthworm be cut into three pieces, the anterior piece will develop a tail ; the posterior, a head ; and the middle will develop both a head and a tail. These illustrations indicate the general applica¬ tion of the term, regeneration, in animals.

In plants, the term has been applied rather loosely, but in some cases a missing part may be replaced, or regenerated and the term, regen¬ eration, might well be limited to the replacement of an organ or structure which has been re¬ moved, as in the case of the replacement of a leg in the salamander. In some plants, if the apex of a root be cut off, the missing part will be restored (Fig. 1, A and B), but if the cut

A B C

FlG. 1. — Regeneration in roots; a small portion cut off (A) is restored (B); a larger portion, cut off (C) is not re¬ stored, but new roots form above the injury (D).

be too far back from the apex a new root tip is not restored, but new roots develop a short distance behind the cut surface (Fig. 1 C and D). If the shoot of a common dandelion be cut off some distance below

the leaves new shoots develop from the cut surface of the root. Many plants with strong, fleshy roots behave in this way. If a vigorous willow twig be cut off and the cut end be placed in soil or in water, roots will develop from the lower part, just above the cut surface (Fig. 2). If the part in the water has buds, roots may develop at the lower part of the bud.

From stumps of trees it is very common to find new shoots developing and they may even develop into trees. It used to be assumed that such shoots come from dormant buds, but it is now known that in most cases there are no such buds in the region from which the shoots origi¬ nated. They come from the cambium or from embryonic tissue induced by the wound. In (

this way, although some come from buds already present. In the cycads, buds develop from almost any wounded portion of the trunk, the bud arising from the cambium or from em¬ bryonic tissue due to the wound. In this case, dormant or latent buds are entirely out of the question, because the cycad stem has only one bud and that one is terminal. The underground stem of the cycad, Zamia, may be cut into several pieces and shoots will develop from the

Fig. 2. — Behavior of Willow twig when cut off and placed

in water.

cut surfaces. This case is different from that of the potato, for the potato, as it is cut for planting, has several eyes or buds in each piece from which the new plants are formed.

Many plants are propagated from cuttings. In the Begonia or Bryophyllum, the leaf is cut into several pieces and a whole new plant is developed. This behavior differs from that noted in the salamander where a new leg grows and replaces one which has been cut off, for the piece of a leaf does not replace the missing parts and become a whole leaf, but produces a bud and a root which develop into a complete plant.

While a great deal of observation and a con¬ siderable amount of investigation has been done along the lines indicated, the term regenera¬ tion is so elastic that botanists still use it in describing the various cases to which we have referred.

Bibliography. — Child, C. M., (Senescence and Rejuvenescence,* (Chicago 1915) ; McCal- lum, W. B., Regeneration in Plants) (Botani¬ cal Gazette, Vol. XL, 1905, pp. 97-120) ; Mor¬ gan, T. H., (Regeneration > (New York 1901; this work deals with animals, but has a chapter on regeneration in plants).

Charles J. Chamberlain, Professor of Morphology and Cytology, The University of Chicago.

PLANTS, Sex in, Origin, Evolution and Determination of. For the origin of sex and the early stages in its evolution, one must turn to the algae and fungi, since all plants from the liverworts to the sunflowers and orchids have already reached that degree of development which is characterized by eggs and sperms. In lower members of the algae, reproduction by swimming spores is common. Repeated divi¬ sions within a cell give rise to several nuclei, each surrounded by a mass of protoplasm. (See Cell; Chromosome and Protoplasm). Each mass of protoplasm, with its nucleus, becomes transformed into a swimming spore, which

owes its motility to thread-like cilia. The spore comes to rest, elongates and then divides trans¬ versely. By repeated divisions, a filament like the parent plant is built up (Fig. 1, A). In Ulothrix, which is commonly used for illustrat¬ ing the origin of sex, the zoospores are formed, 1, 2, 4, 8 or 16 in a cell. If one, two or three more divisions take place — the cells divide simultaneously — so that 32, 64 or 128 cells are produced, the cells develop into the motile con¬ dition but seem too small and deficient in energy to divide. However, they unite in pairs — for which reason they are called gametes — their protoplasm fuses into one mass and the two nuclei blend into one. The result of the union is a vigorous cell which may at once de¬ velop into a filament like that produced by the zoospore, or may produce a few zoospores, which then behave like those formed in the cells of a filament (Fig. 1, B). Thus the gamete habit originated from the zoospore habit, and sexuality, characterized by the fusion of two gametes, represents an advance beyond the zoospore condition. The zoospore is the an¬ cestor of the gamete. The gamete habit arose from the zoospore habit independently in vari¬ ous algae and fungi. In the illustration just given, the two gametes are of the same size and shape; but, after the gamete habit became established, the gametes began to differ, one remaining small and active, and the other grow¬ ing larger and less active and finally losing the swimming habit. When the two gametes have begun to differ in size, the terms, male and female, may be used, the smaller being the male and the larger the female ; also, the male gamete may properly be called a sperm and the female an

egg. Stages in the evolution from similar gametes to highly differentiated eggs

Fig. 1. — Ulothrix, one of the green algae. A, portion of a filament, at the left, showing cells producing zoospores: o, the zoospore has lost its cilia; b, zoospore has elongated and divided: c, further divisions have resulted in the forma¬ tion of a filament. B, cells producing gametes: a, two gametes uniting; b, the cell formed by the union; c, cilia have been resorbed; d, a filament has been developed. Greatly magnified.

and sperms may be illustrated by Cutleria, one of the brown algae, in which the egg, although motile, is much larger than the sperm. In Oedogonium, a very common green alga, the egg is immensely larger than the sperm and has not only lost all motility, but remains in the cell (Fig. 2, A and B). From this stage in the evolution of sex, the egg is always retained in the organ which produced it, further de¬ velopment being more conspicuous in the organs

which produce and nourish the eggs and sperms than in the eggs and sperms themselves. In liverworts, mosses, ferns and their allies, and in most Gymnosperms, the organ which pro¬ duces the egg is called an archegonium and that which produces sperms is called an antheridium, although in the Gymnosperms the antheridium character is not so obvious to the layman.

Fig. 2. — A, Cutleria: e, egg; s, sperm. B, Oedogonium: e, egg; s, sperm.

In the Gymnosperms the eggs arise in structures concealed in large cones and the sperms are finally developed from spores which were pro¬ duced in smaller cones. We have no hesitation in calling these larger cones female cones and the smaller ones male. In the same way we should call the ovaries of the Angiosperms female organs and the anthers, male. When ovaries and anthers are formed on separate plants, as in the willows and many others, we believe it is perfectly correct to speak of male and female trees. Some botanists object to using the terms male and female, except as ap¬ plied to the gametophyte generation. (See Alternation of Generations). The determina¬ tion of sex is a problem which is receiving •ncreasing attention from zoologists, especially it has been determined that, in at least some cases, the sexes are characterized by differences in the

number or sizes of chromosomes, e.g., in one of the worms, two of the four sperms produced from a mother cell has five chromo-

Fig. 3. — Archegonium, A, and antheridium, B, of a liver¬ wort; e, egg; v, ventral canal cell.

somes while the other two have six. All of the eggs have six chromosomes. An egg fertilized by a sperm with five chromosomes produces a male individual, while fertilization by a sperm with six chromosomes results in a female in¬ dividual. In plants, investigations have not ad¬ vanced to any such extent but it is known that, in some cases, the two sexes are differentiated

during the reduction of chromosomes (see Chromosome), while in others the differentia¬ tion takes place at various stages in the life history. In both animals and plants,, efforts have been made to control, artificially, the sex of offspring, chiefly by nutrition. If the num¬ ber or size of the chromosomes should be the determining factor, no experiments in nutrition could affect the result, unless such experiments could affect the chromosomes. Consult Coulter, J. M., (The Evolution of Sex in Plants* ; Morgan, T. H., (Heredity and Sex) ; Walter, H. E., (Genetics.*

Charles J. Chamberlain, Professor of Morphology and Cytology, Uni¬ versity of Chicago.

PLANTS, Structure of. The cell, the elementary organ of plants and animals, was first observed by the English micrographer, Robert Hooke (1667), who suggested the name <(cell** because of its resemblance to the cell of a honeycomb. A few years later another Eng¬ lish author, Nehemiah Grew, extended this ob¬ servation and published the first work on plant anatomy (1672), in which he described the minor structure of leaves, stems and roots, and introduced several anatomical terms still in use. Grew was soon followed by an Italian, Marcello Malpighi, the author of the illustrious work, (Anatome Plantarum) (1675), and these three men are thus the founders of the science of plant morphology, as the study of plant struc¬ tures is now called, th$ term anatomy being restricted to the study of plant tissues. Many years later Robert Brown (1833) detected the nucleus in the cell, and the German botanist Schleiden (1838) pointed out the general oc¬ currence of this new body within the cells of plants and its importance to the cell-division. These discoveries soon led to the apprehension of the cell as being the elementary organ of plants, and when the occurrence of nucleus had been proved also in the cells of animals the German naturalist Schwann (1839) advanced

the important doctrine that bodies of animals and plants consist of cells and the products of these.

While the nucleus had thus been detected and described to some extent, there still re¬ mained a closer examination to be made of the other parts of the cell-contact, which some of the earlier investigators had already observed and described as a soft, gritty matter, capable of motion in the cell. This cell-content was studied by Mohl (1846), who gave it the name protoplasm. The constituents of the cell were thus properly defined as the cell-wall, the protoplasm and the nucleus. Of these the protoplasm and the nucleus are the most essen¬ tial parts, since the wall is not always developed, but is totally absent in numerous animal-cells and also in those of several plants among the lower Algce and Fungi, at certain stages, for ex¬ ample. A completely developed plant-cell may for the most part be defined as a microscopical, closed vesicle consisting of a wall, and the con¬ tents, nucleus, protoplasm and cell-sap. The shape of the cell presents a vast number of forms, generally referred to only two types : the parenchymatic and the prosenchymatic. Of these the parenchymatic is either isodiametric or elongated, but with blunt ends and usually thin-walled, while the prosenchymatic is mostly

elongated with pointed or sharp endings, and is more or less thick-walled. A third type of cell may be mentioned, the ˆhypha® of certain Algce and Fungi , which is very thin, thread¬ like and composed of a single cell or many. There are plants consisting of one cell only, but most plants are composed of an enormous number, which together constitute the so-called ((cellular tissues,® parenchyma and prosenchyma, in respect to the shape of the cells of which they are composed. The function performed by these tissues is very different, and the classi¬ fication as parenchyma and prosenchyma is thus not sufficient, since this only applies to the external shape of the cells. In accordance with both structure and function the following tis¬ sues are observable in the higher plants : Epi¬ dermis, the mechanical tissue, the conductive tissue and the fundamental tissue; the first and the last of these tissues being parenchymatic, the others prosenchymatic.

The minor structure of these various tis¬ sues may be described as follows :

Epidermis. — This is the outermost cell¬ covering of a plant-organ, such as the leaf, stem and root, and consists of at least one layer of cells. The outer cell-wall is often con¬ siderably thickened and invariably covered by a thin membrane, the so-called cuticle (cm Fig. 1) which is highly impermeable to water, and

Fig. 1. — Epidermal cells of the leaf of aloe: c, the cuticle; c. s., cuticular layers; b, cellulose.

especially well developed in land-plants ; in sub¬ merged water-plants the cuticle is, on the other hand, much reduced. The epidermal system of plants has a threefold significance: it protects the more delicate parts of the organs against mechanical injuries, pressure, etc.; it forms a protection against evaporation by being im¬ permeable to water and water-vapor, and forms also a water-supplying system. These three functions are expressed by various development of the cells, which may be illustrated by a sec¬ tion of a leaf of aloe (Fig. 1) in which all three epidermal peculiarities are quite well de¬ veloped. The thick cuticle and cuticular layers form an excellent protection against loss of moisture, while the thickening of the outer cell- wall and portion of the radial walls furnishes the mechanical support. Characteristic of epi¬ dermis, furthermore, is its covering of hairs, which present a number of forms and of which the majority are developed from the epidermis itself. Some of them consist only of a single cell, but usually they are composed of several. The hairs may be simple or branched and attain various forms from sharply pointed to globose, scale-like or star-shaped. The ordinary hairs contain only air, and when occurring as a dense covering of the plant-organ aid materially in the protection against loss of moisture, thus entering directly into the function of epidermis. Other hairs contain and secrete ethereal oils, the so-called glandular hairs, which may serve for attracting insects to carry the pollen, or if

the secretion is of a sticky consistence, the function may be to keep off injurious, crawling insects, less adapted for aiding in cross-fecun¬ dation. Several hairs contain poisonous mat¬ ters and cause great pain when touched, as, for instance, the hairs of the common nettle, but the physiological significance of such and other hair structures is not satisfactorily explained.

A very simple structure is possessed by the root-hairs, which consist of only a single epider¬ mis-cell, and of which the function is to absorb and conduct food substances in solution. A purely mechanical function is exhibited by the climbing-hairs — that is, hairs in the shape of hooks by which the weak stems of certain plants — for instance, hop,

cleavers, etc. — are able to climb by attaching themselves to other plants.

Finally to be mentioned are the stomata. If the epidermis be able to regulate the evapora¬ tion, it is readily understood that this tissue must be compact and without intercellular spaces unless these be capable of closing and opening themselves under certain conditions. Such intercellular spaces occur in the epidermis and were by De Candolle named (

Fig. 2. — Cross-section of a stoma from the leaf of Commelina ; ac, the air-chamber; g, guard-cells; 5, subsidiary cells.

ing the guard-cells are usually two or more epidermis-cells of a shape somewhat different from the others, and these have been called the subsidiary cells ; their number and manner of arrangement is often very variable in several orders of the phanerogams. The guard-cells are, as a rule, the only cells of epidermis which contain chlorophyll and starch ; they have the power of closing or opening the orifice of the intercellular space, a phenomenon that has been studied and explained by Schwendener. When moist these cells become swollen, and, as they lengthen, curve outward in the middle so as to leave a free opening. An opposite movement takes place when they become dry: they are then shortened and straightened with their inner faces applied to each other, closing the orifice. Stomata occur as a rule on all green plant-organs, stems and leaves, but lack in those that are constantly under water, and they are totally absent in the thallophytes. The location of the stomata varies somewhat, but they are more numerous on the lower face of the leaves than on the upper. Their position offers a number of variations and is sometimes de¬ pendent upon the nature of the surroundings, especially of the climate, the dryness of the air,

etc. The guard-cells may be free, reaching above the surrounding epidermis, or they may be sunk below this.. A very peculiar arrange¬ ment is noticeable in Nerxum, where the sto¬ mata are located, several together, in depres¬ sions of the leaf-surface. A modification of stomata are the so-called water-pores, exhibit¬ ing a like structure, but somewhat larger than these and unable to open or close themselves. They are mostly located on the margins of leaves near the ends of the nerves.

The Cork. — While the epidermis is seldom of any long duration in plant-organs which persist for more than one season, another cov¬ ering becomes necessary and is represented by the so-called cork. This tissue may be de¬ veloped >by the epidermis itself, but in most instances it originates in the parenchymatic lay¬ ers underneath the epidermis, or sometimes much deeper, in the innermost portion of the cortex, for instance. The cork is able to con¬ tinue its growth, following the increase in thickness of the stem, and consists of several strata of quadratic or rectangular cells, ar¬ ranged in compact rows, vertical on the surface of the plant-organ.

The Mechanical Tissue. — The best-known elements of this tissue are the so-called <(stere- ome-cells,® which are thick-walled, very long prosenchymatic cells, of which the walls have narrow pores and consist of cellulose. The stereome-cells are mostly arranged in strands and located in such portions of leaves or stems as are the most exposed to injury. The cells are very flexible, and the arrangement of the layers is remarkably well fitted for rendering the plant-organ the greatest possible support by means of the smallest quantity of material, as demonstrated by Schwendener. Besides this function the mechanical tissue is also observed to form protective layers around the mestome- bundles, especially near the leptome-elements.

Another thick-walled but parenchymatic cell- form is the so-called sclerotic, occurring in the cocoanut, walnut, etc.

The Conductive Tissue. — This tissue is represented by the so-called ((mestome-bundles® or ((vascular bundles® of earlier authors, which traverse the plant-organs mostly in a longitudi¬ nal direction ; they constitute a part of the nerves in leaves and of the wood in trees. Their composition is often very complicated, especially in stems and roots, where they are often associated with some of the other tissues, from which they are not always readily dis¬ tinguished. At present <(mestome,® as proposed by Schwendener, comprises only two elements, (

Mestome-bundles, containing leptome and hadrome, are observable in all the higher plants: vascular cryptogams and phanerogams, but are not developed in any of the thallophytes (Fungi and Alg

The Fundamental Tissue. — This tissue comprises all the other tissues of the plant not referable to the epidermis, the mechanical or the conductive tissue, and is as a rule com¬ posed of thin-walled, parenchymatic cells with distinct intercellular spaces. Its function is principally to prepare and store nutritive mat¬ ters, hence the

chlorophyll, the starch and simi¬ lar matters are contained in this tissue. Sev¬ eral types of fundamental tissue have been distinguished in the various plant-organs, such as the cortex in stems and roots; the pith in stems, but only occasionally in roots ; the mesophyll with the palisade- and pneumatic- tissue in leaves ; and finally the parenchymatic sheaths, which often surround the mestome- bundles as the endodermis, the mestome- sheath, etc.

The Root Structure. — The fact that the root is only slightly susceptible of modification in respect to its external structure is especially expressed by the great uniformity that prevails in its internal structure. Roots, however, are not always quite as uniformly developed as generally described, but very few botanists have paid much attention to their structural peculiarities. Some types of roots have been suggested — for instance, “nutritive,® “attach- ment,® (

The Structure of the Stem. — The minor structure of the stem of the above- and under¬ ground differs materially from that described as characteristic of normal roots, even if the tissues themselves are much the same. There is an epidermis, a cortex, a mechanical- and conductive-tissue besides a pith, but no pericam¬ bium. The stem, however, exhibits a much larger plasticity than the root, and the numer¬ ous modifications that occur in respect to the mere external structure are usually accompanied by a corresponding variation in its interior. Marked distinctions are noticeable in stems when we compare the herbaceous with the woody, the annual with the perennial, the ter¬ restrial with the aquatic, and the aerial with the subterranean, — distinctions that have been very extensively studied and have rendered it possible to identify fragments of such stems merely by the aid of the microscope.

When compared with the root, the presence of a pith is characteristic of the stem, while on the other hand a pericambium is observable only in roots. The minor structure of the stem is thus very variable.

The Structure of the Leaf. — The manifold variation exhibited by leaves corresponds also with certain modifications of the internal struc¬ ture, but to a much less extent than observable in stems. The various functions performed by the leaves do not require such great internal modification as is necessary to the stem, even if the leaves exhibit a metamorphosis of no small importance. The stem-leaves and the floral leaves naturally show conspicuous anatomical distinctions, and the fleshy leaves of bulbs are of course very different in structure from the thin, scale-like leaves of tubers and stolons. However, the principal structure, such as is ex-

hibited by the relative development and arrange¬ ment of the main tissues, for instance the meso- phyll (the chlorohyll-bearing parenchyma in¬ cluding the palisade- and the penumatic-tis- sue), the stereome and the conductive tissue, is not very variable in leaves when we consider the enormous variation in the shape and size of their outline. In the leaves the epidermis is perhaps the tissue that is subject to the most conspicuous modification, which is especially noticeable in the development of the cells when examined on both surfaces of the leaf, above and between the nerves. The various arrange¬ ments of the stomata often cause a modifica¬ tion of the surrounding strata, which is less pronounced in the stems. Thus the epidermis, when examined superficially, exhibits several distinct forms of cells, rectangular, polyhedric, or with the outline very prominently modulate. The covering with hairs is especially character¬ istic of leaves, and several types of these may be found to occur on the same leaf. The cuti¬ cle is usually very distinct, and renders by its various consistence the most essential protec¬ tion to the leaf while performing its functions. Besides the epidermis, corky layers may be developed, at least locally, in leaves which per¬

sist for several seasons ; for instance, the ever¬ green, in which the outer cell-wall of epidermis often becomes very considerably thickened.

The mesophyll is generally differentiated as a palisade- and a pneumatic-tissue, the former located on the upper face of the leaf, just beneath the epidermis, while the latter occupies the lower portion. In some leaves the meso¬ phyll is not differentiated into these two tissues, but only as a homogeneous (Fig. 3) tissue; such leaves are called ((isolateral)) in contradistinc¬ tion to the others, the “bifacial.® Otherwise the mesophyll possesses the same forms of res¬ ervoirs, ducts and lacumes as are characteristic of the cortex.

The leaf-structure thus possesses less varia¬ tion than that of the stem, if we compare the relative development and the arrangement of the tissues, especially of the mesophyll, the stereome and the mestome. The main varia¬ tion seems to lie in the epidermis, and becomes especially noticeable in the comparison of leaves of plants that grow under diverse condi¬ tions — of terrestrial and aquatic plants, for instance. Among the former the desert-plants

are known to possess highly complicated struc¬ tures, which naturally are expressed by the epidermis and the mesophyll rather than by the other elements. But considered as a whole, the leaves show less modification of the inner tis¬ sues than the stem, and when some prominent variations are found to occur in leaves these are generally observable also in the stems of the same plants. See Plants, Vascular Anatomy of; Botany.

Bibliogaphy. — Atkinson, G. F., (Elementary Botany* (3d ed., New York 1905) ; Barnes, C. R., (Plant Life) (New York 1898) ; Bessey,

C. E.,

Caldwell, O. W., (Handbook of Plant

Morphology* (New York 1904) ; Campbell,

D. H., ˆStructural and Systematic Botany) (Boston 1890) ; Coulter, J. M., (Plant Struc¬ tures* (2d ed., New York 1904) ; id., (A Text- Book in Botany) (New York 1906) ; id., Ele¬ mentary Studies in Botany) (New York 1913) ; Coulter and Chamberlain, (Morphology of An-giosperms) (New York 1903) ; id., (Morphology of Gymnosperms5 (Chicago 1910) ; Coulter, Barnes and Cowles, (A Text-Book of Botany* (New York 1910) ; Goebel, K. E., “Outlines of Classification and Special Morphology, * trans¬ lated by Garnsey (Oxford 1887) ; Stevens, W. C., (Plant Anatomy * (1910) ; Strasburger, Ed¬ ward, Schenck, Heinrich, Jost, Ludwig, and Karsten, George, (Text-Book of Botany) (4th English ed., revised with 10th German ed., by W. H. Lang, New York and London 1908) ; Vines, S. H., (Students’ Text-Book of Botany) (New York 1895) ; Warming, Eugen, hand¬ book of Systematic Botany, 5 translated by M. C. Potter (New York 1895).

PLANTS, Vascular Anatomy of. Even in

the earliest days of the microscope, the vascu¬ lar structures of plants were objects of interest and a large proportion of the figures in Nehe-miah Grew’s

elaborated material comes down in the phloem or is stored there. Practically all who have studied the ascent of sap agree that the upward movement is in the xylem. While the structure of the xylem and phloem became well known before the middle of the 19th

century, investi¬ gations were limited to descriptions of vascular bundles in various plants, there being no at¬ tempt to use the results in any evolutionary scheme. Of course, it must be remembered that at this time most biologists still believed in the fixity of species. Darwin's

Fig. 1 . — Diagrams of types of vascular cylinders (steles) as seen in transverse section. A, protostele; B, amphi- phloic siphonostele; C, polystele; D, ectophloic siphonˆ ostele. In all the diagrams the xylem is hatched and the phloem dotted ; the narrow outer zone is the epidermis and the zone inside it, the cortex. These features are lettered in A. d being epidermis; c, cortex; p, phloem; x, xylem.

The name indicates that it is the first type of cylinder. It is characterized by a solid cen¬ tral mass of xylem surrounded by phloem. This type is found in all roots and in the stems of most lycopods and some ferns. It is very rare in the flowering plants. The arnphiphloic siphonostele (B) is so named because the stele has a pith in the centre and has phloem on both sides of the xylem. The English botanists call this form the solenostele. This type is quite frequent in ferns, but is occasionally met in higher plants. The polystele (C), as the name indicates, consists of several steles, each stele having the structure of a protostele. _ Many do not regard this as a separate type, since it re¬ sults from the splitting of an arnphiphloic si¬

phonostele into several steles. Most ferns show this type, but there are examples among the flowering plants. The ectophloic siphonostele (D) has a pith and has phloem only on the outside, of the xylem. Some ferns show this type, but it is almost universal in the flowering plants. There is little difference of opinion as to the evolutionary sequence of these steles. The protostele is most abundantly represented in Paleozoic fossils and the ectophloic siphono¬ stele is more abundant in the living flowering plants. In sporelings and seedlings of most vascular plants, the vascular cylinder is first outlined as a protostele, remaining in that con¬ dition in the forms mentioned above, but in others becoming differentiated into the higher types in the subsequent history of the individual. Many botanists see in this behavior an excellent example of recapitulation. See Plants, Reca¬ pitulation in.

After the cells which are to constitute a bundle of xylem and phloem have been formed, there is first a differentiation into xylem and phloem regions. These two regions are called the primary xylem and primary phloem. In the primary xylem, the walls of some of the cells begin to thicken earlier than in others. As the cell walls thicken and harden, the growth in diameter of such cells is checked ; and since

these cells are not scattered, but form a group, they can be recognized, in trans¬ verse section, by their smaller diameter, the surrounding cells having continued their growth for a while before any thickening occurred. The thickening of the first cells takes place during a period of rapid elongation which causes the thickening to take the form of spirals and rings. This first xylem is called protoxylem and the rest of the primary xylem is called metaxylem. The protoxylem is characterized, generally, by the smaller diameter of its cells, but almost always by the spiral and annular thickenings. The metaxylem may have pits or reticular markings, but no spirals or rings. The position of the protoxylem in the primary xylem is of great importance. There are three posi¬ tions (Fig. 2). The protoxylem may be at the

Fig. 2. — Diagrams showing three types of primary bundles. The primary phloem is dotted, the primary wood is hatched, and the position of the protoxylem is indi¬ cated by the solid black dot. All the primary xylem, except the protoxylem. A, exarch arrangement; B, mesarch; C, endarch.

outside of the primary xylem, next to the phloem (Fig. 2 A). In this case the vascular bundle is said to be exarch. This type is found in all roots, in the stems of lycopods and in a few of the higher plants. When the protoxylem group is surrounded by the rest of the primary wood — which is called metaxylem — the bundle is said to be mesarch (Fig. 2, B). This condi-

tion is characteristic of ferns, but is found in the adult stems of some of the Paleozoic Gymnosperms and in seedling stems of some living Gymnosperms. It is also found, as a vestige, in the cone stems and leaf veins of some living Gymnosperms. However, it is so characteristic of ferns, that it is regarded as a lingering effect of a fern ancestry when it is found in Gymnosperms. The third type is the endarch bundle. It is found only in si- phonosteles and the protoxylem is next the pith (Fig. 2, C). This is the most advanced type and is characteristic of the flowering plants, although a few ferns have reached this level. The exarch condition is regarded as the most primitive because it has its most abundant rep¬ resentation in Paleozoic fossils and also because it is found in plants which, for other reasons, are regarded as primitive. The endarch condi¬ tion is regarded as the most advanced, be¬ cause it is rare in ferns and ancient seed plants, but is almost

universal in living seed plants. The mesarch character is plainly intermediate.

Secondary xylem and secondary phloem are formed by a layer of embryonic cells which arise on the inner border of the primary phloem. These cells are called the cambium and by their division they add to the xylem and phloem, so that the primary xylem and primary phloem become separated by zones of secondary wood and secondary phloem (Fig. 3). The secondary structures are easily recognized from the fact that they are arranged in definite rows, while the cells of the primary xylem and phloem are more or less irregular in their arrangement. The structure of an ordinary dicotyl stem, like that of a geranium, or monocotyl stem, like

Fig. 3. — Diagrammatic sketch of a vascular bundle: i>, phloem; c cambium; x, xylem, p't primary phloem; p- secondary phloem, x' primary xylem consisting of metaxylem, m, and protoxylem, px.

that of corn, is very complicated (Fig. 4). The dicotyl stem shown in the diagram has an en¬ darch siphonostele. At first, it had five pri¬ mary bundles, each with its primary xylem and primary phloem ; but, later each bundle de¬ veloped secondary xylem and secondary phloem, so that each of the five bundles assumed the structure shown in Fig. 3. Then the cambium of the five bundles became extended, so as to

bridge the gaps between the bundles, forming a complete zone of cambium. This new cam¬ bium forming secondary xylem and secondary phloem, nearly filling in the gaps between the five original bundles, makes the woody cylinder almost complete. However, there are still left some thin plates of tissue between the solid woody portions. These plates are called rays. Some of the wider rays are breaks in the cylin-

Fig. 4.— Diagrams of cross-sections of stems. A, typical dicotyl stem, showing p, pith, surrounded by a ring of vascular bundles; p\ primary phloem; p2, secondary phloem; m, metaxylem; px' , protoxylem; x2, secondary xylem; c, cambium. B, monocotyl stem showing scattered bundles; x, primary xylem; p', primary phloem.

der just above the points where the vascular systems of leaves unite with the cylinder. Such rays are called leaf gaps. Some botanists at¬ tach such extreme importance to the leaf gap that they divide all vascular plants into two groups, one (Pteropsida), characterized by the presence of the leaf gap, and the other (Lycop- sida), lacking the gap.

These botanists insist that the Gymnosperms, all of which have leaf gaps, could not have been derived from the lycopods, which have no leaf gaps, but must have come from the ferns, which are a leaf gap assemblage. All agree that the zone of wood surrounding, a pith, as shown in Fig. 4, A, is a more primitive arrangement than tfce scattered bundles shown in B, of the same figure. The zone of wood surrounding a pith is character¬ istic of the Gymnosperms and Dicotyls, but some Dicotyls show the scattered arrangement; the scattered bundles are characteristic of the Monocotyls, but some Monocotyls have a dis¬ tinct zone of wood surrounding a pith. This is just what should be expected, if the Mono¬ cotyl line has been derived from the Dicotyl, as practically all botanists now believe. A study of the bundle arrangement in the Monocotyl seedling and even the arrangement in the adult stem confirm this view. The structure of the individual bundles of Dicotyls and Monocotyls is different. In Dicotyls the xylem and phloem lie side by side, with the cambium forming a straight line between them, so that the bundle is collateral. In many of the Monocotyls the xylem has grown up around the phloem, so as to enclose it, forming an amphivasal bundle. The amphivasal condition is so obviously de¬ rived from the collateral, that it is a strong argument in favor of the claim that the Mono¬ cotyls constitute a branch from the Dicotyls. Another difference is that the Dicotyls have a cambium between the xylem and phloem and so have a continuous growth ; while the latter have no cambium and, therefore, no secondary growth. Bundles with a cambium are said to be

open; those without are said to be closed. Monocotyls have lost the cambium between the xylem and phloem. However, some tree-like Monocotyls, like the Yucca, Aloe and Dracena (Dragon Tree), have an embryonic region at the outer part of the woody region, which produces a succession of new bundles of the closed type, and thus the trunk may reach a diameter of several feet. Such cases are rare and practically confined to the tropics and sub¬ tropics. Practically all shrubs and trees owe their increase in diameter to the zone of the cambium between the xylem and phloem. In temperate regions, the cambium is very active in the spring, becomes less active as summer advances, becomes sluggish in autumn and in winter its cells are dormant, not dividing at all. With the return of spring, the cambium renews its activity. The first cells formed in the spring are the largest of the year and the size gradu- • ally decreases as the season advances, the last cells formed in the autumn being comparatively small. This

alternation of large and small cells is the cause of the annual rings, which are easily seen by the naked eye and which mark, with reasonable accuracy, the age of the plant, since a new ring is formed each year (Fig. 5).

If a dry summer is followed by a warm, rainy autumn, a second ring may be formed. Condi¬ tions which will cause an appletree or peach tree to blossom in the autumn will also produce a second ring of wood. In the tropics, the al¬ ternation of rainy seasons and dry seasons acts in the same way as the warm and cold seasons of the temperate zone and results in the forma¬ tion of growth rings. In a few tropical places where the temperature and rainfall are nearly constant throughout the entire year, woody

stems of considerable size are formed without any appearance of growth rings. Investigations upon the vascular system are being prosecuted with great vigor and have already shed much light upon the evolution and relationships of plants and it is possible that the results may, eventually, be of considerable economic import¬ ance. Consult Coulter, J. M., and Chamberlain, C. J., (Morphology of Gymnosperms* ; Jeffrey, E. C., two chapters in (Seed Plants,* by Coulter, J. M., and Chamberlain, C. J. ; Jeffrey, (Anat¬ omy of Woody Plants.*

Charles J. Chamberlain, Professor of Morphology and Cytology, Uni¬ versity of Chicago.

PLAQUEMINE, plak-men', La., town, parish-seat of Iberville Parish, on the Missis¬ sippi River, and on the Texas and Pacific Rail¬ road, about 15 miles south of Baton Rouge. It is in a productive agricultural region, and is the trade centre for a large part of Iberville and adjoining parishes. The chief industries are saw and shingle mills, stave and heading, and oar factories, sugar, cotton and rice prod¬ ucts. It has considerable itrade in manufactured articles and in the raw products of the farms. The town owns and operates the waterworks. Pop. (1920) 3,977.

PLARR, Victor Gustave, English libra¬ rian:. b. 21 June 1863. He was of German and English parentage, removed from Strassburg to Scotland with his parents in 1870 and was edu¬ cated at Oxford. He was librarian of King's College, London, 1890-97, and has been librarian of the Royal College of Surgeons from the last- named year. He has edited (Men and Women of the Time,* 14th and 15th editions, and has written (In the Dorian Mood* verse (1896), etc.

PLASMA, (1) in mineralogy, a leek-green silicious mineral, found in angular pieces asso¬ ciated with chalcedony. It is feebly trans¬ lucent, and has a somewhat oily lustre. It is somewhat rare and was wrought into engraved ornaments by the Romans to a considerable ex¬ tent. (2) In biology, the liquid part of nutri¬ tive animal fluids, such as blood, lymph or milk as distinguished from the organized solids con¬ tained in them, as for instance the corpuscles of the blood.

PLASMODIUM, a genus of sporozoan protozoa that contains the malarial organisms. The genus belongs to the order Hcemosporidia which contains highly specialized parasites adapted for life in the blood stream. There are included three parasites of human malaria and also a species which produces avian malaria. The young Plasmodium (see Fig. A) which is active and amoeboid occurs in the red blood corpuscles and after a period of growth, dur¬ ing which it attains rapidly the size of the corpuscle, the organism divides into numerous spores (merozoites) which scatter and attack new blood cells. The process of schizogony just described is repeated until the infection has be¬ come general. When a corpuscle breaks up and the merozoites are scattered a central residual mass of protoplasm loaded with black pigment (melanin) is dispersed in the blood plasma.

At times the merozoites in the corpuscles de¬ velop into two new types, the gametes, one of which is finely granular and opaque whereas the other is hyaline. These do not undergo further

change until the blood is withdrawn into the stomach of a mosquito, though the same changes follow its experimental removal to a culture tube. In the mosquito's stomach (see Fig. B) the motile microgametes are formed and one such fuses with a non-motile macrogamete after the latter has extruded a portion of its

Life cycle of Plasmodium falciparum. A, Asexual cycle in human blood; 1, sporozoites injected by mosquito bite, 2-9 schizogony and reinfection of corpuscles, 10-11 origin of gametes. B-E, Sexual cycle in mosquito; B , in stomach, 12-17 growth and fusion of gametes; C, sporogony in wall of intestine, 18-25 formation of sporoblasts and of sporozoites in cysts; D, sporozoites in body cavity; E, sporozoites penetrating salivary gland and proboscis.

The dotted line across the figure separates stages in man (above) from

those in mosquito (below).

nuclear substance. There is formed by the union a motile oolcinet which penetrates the stomach wall of the mosquito (see Fig. C), encysts and undergoes multiple division to form sporoblasts within which arise also by division sporozoites. The latter are verv minute. Set free by rupture of the cystwall they wander to the proboscis and enter the salivary glands (see Fig. E) whence they are injected into a new human host when the mosquito bites. They attack the red cells at once and the life cycle begins anew.

Laveran in 1880 was the first to attach significance to the structures found in red blood cells in cases of malaria though the malarial organism had actually been seen and figured in 1843. Manson set forth distinctly in 1896 the part of the mosquito in transmitting the disease and a year later Ross followed in detail for the first time the fate of the parasites in the body of the mosquito. Malarial parasites have been cultivated in vitro by Bass and Johns.

The three species parasitic in man give rise to different and generally recognized types of malaria. Plasmodium malaria, which extends farthest north and is not found in the tropics, is the cause of quartan fever. Plasmodium vivax gives rise to the tertian fever; it is widely distributed and not very dangerous. Plasmodium falciparum, the smallest of all three, produces the dangerous fevers known as ‘the pernicious, tropical, quotidian or estivo- autumnal type; this type is epidemic only in the tropics and subtropics. Other varieties have been described though their independent char¬ acter is not fully recognized.

PLASSEY, plas’se, India, a village on the Bhagirathi River, 96 miles north of Calcutta, celebrated in the history of India for the great victory gained by Clive over Suraj ud Dowlah, subahdar of Bengal, 23 June 1757, a victory which laid the foundation of British supremacy in India. The site of the battle is now covered by the river. See India.

PLASTER OF PARIS, powdered gypsum as prepared for taking casts, molds, etc. If one part of powdered gypsum be mixed with two and a half parts of water, a thin pulp is formed, which after a time sets to a hard, com¬ pact mass. By adding a small quantity of lime to the moistened gypsum a very hard marble¬ like substance is obtained on setting. Sub¬ stances other than lime are also employed for the purpose of rendering the mass hard and very compact; thus Parian cement consists of plaster of Paris mixed with borax; marble- cement is the same plaster mixed with alum and soda. See Gypsum.

PLASTERING is the art of covering the surface of a wall or ceiling with lime or plaster in order to give it a smooth and uniform sur¬ face, and generally in interiors to fit it for painting or decoration. Technically the term plastering is used only when the plaster is spread over a screen of laths fixed to the wall. In modern usage this lath may be of perforated sheet metal, or a heavy paper board, called plaster board, may be substituted for the wooden laths. The chief preparations used bv plaster¬ ers are known as coarse stuff, fine stuff, plasterer's putty, and gauged stuff. The first of these is composed of sand and lime, mixed with long ox hair ; the second is slaked lime, usually without hair; the third is not unlike the second; and gauged stuff is a mixture of plasterers' putty and plaster of Paris. Three kinds of plastering are distinguished, namely, one-coat (lath and lay), two-coat (lath, lay and set), and three-coat (lath, lay, float and set). In one-coat work a layer of coarse stuff is spread over the laths and pressed well into the spaces so as to form a key to hold the coat in place. When a second coat is to be applied, the first is not smoothed, but roughened with a

birch-broom so as to retain the second one in place. The second coat consists of fine stuff, putty or gauged stuff. In plastering the in¬ terior of houses a first coat is laid on of coarse stuff, the process being known as prick¬ ing-up. The face of the first coat, which should be of considerable thickness, is troweled or indented diagonally with the point of a lath to form a key for the finishing coats. The second coat is applied to this when it is thor¬ oughly dried. It consists of fine stuff, and is rubbed in with a flat board so as thoroughly to fill the indentations and cover the unequal sur¬ face of the first coat with a smooth and even one. In plastering walls great care must be taken to have the surface perfectly vertical. This second coat is called the floated coat, be¬ cause wooden boards, known as floats, are used in rendering the surface plane. Before drying this coat is scraped with a birch-broom to form a key for the next. The setting coat is ap¬ plied to the second after it has become per¬ fectly dry. If the wall is to be papered this coat is of fine stuff. (See Building; Gypsum; Laths).

Consult Eckel, E. C., (Cements,

Limes and Plasters1* (New York 1905) ; Hodg¬ son, F. T., (Mortars, Plasters, Stuccos, Arti¬ ficial Marbles, Concretes, Portland Cements and Compositions* (Chicago 1914) ; Millar, Mas¬ tering* (London 1892) : Richey, H. G., (Build¬ ing Mechanics' Ready Reference : Cement Workers' and Plasterers' Edition* (New York

1908).

PLASTERS, preparations for local applica¬ tion to the surface of the body, kept in place by any convenient wrapping of cotton, linen, silk, etc., or merely of paper and frequently with the aid of some adhesive substance. Plasters may be intended simply to give pro¬ tection, support or warmth, as in the case of wounds, bruises or local weakness, or they may be actively medicinal. In most of the recog¬ nized medicinal plasters the adhesive property is due to the combination of oxide of lead with fatty acids, though india-rubber is also used. Olive-oil and litharge are used in the com¬ pound which most frequently forms their base. The 13 plasters of the United States Pharma¬ copoeia are ammonia and mercury, arnica, belladonna, cantharides, capsicum, iron, isin¬ glass, lead, mercury, opium, pitch, resin and soap. The numerous unofficial plasters are various in composition and in specific purpose and efficacy. The porous plaster made to stick very firmly to the skin has been popular. Plasters in the form of blisters are also largely used. See Blister.

PLASTID. A plastid may be defined as a differentiated portion of the plant protoplasm which is not formed de novo, but arises from the division of a pre-existing plastid. Plastids are denser than the surrounding protoplasm and the interior is denser than the surface. There is no surrounding membrane. The shape is generally spherical or oval (Fig. 1), but many plants have very striking plastids, as in case of the alga, Spirogyra (Fig. 2). When plastids are colorless, they are called Icucoplasts, or leucoplastids; when colored, they are called chromatophores. When chromatophores are green, they are called chloroplasts; when they have any color other than green, they are cliro- moplasts. However, most botanists do not use vol. 22 •— 15

so many names, but call all the colorless plas¬ tids leucoplasts and all the colored ones chroma* tophores. In all cases, the ground substance of the plastid is colorless, but it contains drop¬ lets of an oily substance which is green, yellow, orange, red or brown, as the case may be. Plastids near the surface are likely to develop chlorophyll, a green oily substance of the utmost importance in plant life; while plastids more deeply placed are likely to remain as colorless leucoplasts whose principal function is to pro¬ duce starch. However, a leucoplast may be¬ come a chloroplast, as when potatoes are ex¬ posed to the light and become green ; and they

Fig. 1. — Sectional view of four cells of a fern prothallium, showing numerous small plastids.

Fig. 2. — A cell of the pond scum, Spirogyra, showing two spiral plastids, or chromatophores.

Fig. 3. — Sectional view of a cell of an onion root tip showing thread-like mitochondira. All highly magnified.

again become leucoplasts when the potatoes are kept in the dark. Chlorophyll-bearing plastids usually contain also some very small grains of starch. Such starch grains are the first visible products of assimilation. Reserve starch, like the large starch grains of the potato, are formed inside the leucoplast and become so large that the leucoplast is stretched until it is only a very thin membrane surrounding the conspicuous starch grain. Botanists are not entirely agreed as to whether the plastid may originate de novo or not. The weight of authority is on the side of those who claim that the plastid is a perma¬ nent organ which arises only by the division of a previous plastid, as already indicated in our definition. That plastids divide and that an unbroken series can be traced throughout the greater part of the life history no one disputes ; but in some phases of the life history, the most critical methods give no convincing demonstra¬ tion of the presence of a plastid. In recent years, peculiar structures, called mitochondria, many of which resemble various forms of bac¬ teria, have been claimed to develop into plastids (Fig. 3). This subject is still under vigorous investigation. Consult Mayer, A., (Untersuch- ungen fiber die Starkekorner* ; Schimper, A. F. W., (Uber die Entwickelung der Chlorophyll- kbrner und Farbkorper* (Botanische Zeitung, Vol. XLI, 1883, p. 105) ; Cavers, F„ «Chondrio-

somes and Their Significance® (in (New Phy- tologist,> Vol. XXXI, p. 170, 1914).

Charles J. Chamberlain.

PLATA, Rio de la, re'o da la pla'ta (silver river), a great estuary of South America, lying between Uruguay and Argentina and formed by the junction of the Parana and the Uruguay rivers (qq.v.). With these rivers it may be considered the second great river system of South America which drains the so-called La Plata states, namely, Argentina, Uruguay, Para¬ guay, southeastern Bolivia and southern Brazil. But the Plata itself is merely the estuary of this system and it is impossible

to mark the point where it empties into the ocean, as the ((river® is 170 miles wide between Cape San Antonio and Cape Santa Maria. The volume of the river is great, in spite of its shallow¬ ness, and its current is perceptible 150 miles out to sea. The broadest river-mouth of the world, the Plata measures 25 miles across at Buenos Aires and more than 60 at Montevideo, where the only harbor of the whole basin is situated. At both Buenos Aires and the port of La Plata immense piers or breakwaters are built out far into the water. The entry from the ocean is dangerous and is guarded by lighthouses and lightships. The course of the La Plata system was explored by Day in 1853 and by Page

1853-56.

PLATiEA, pla-te'a, ancient city of Boeotia in Greece, on the frontier of Attica, beneath Mount Cithteron and south of the Asopus River, at the head of the Gulf of Corinth. The famous temples of Hera and of Athena Areia with one of Phidias' colossal statues and paintings by Polygnotus were situated here. Its inhabitants were probably of Ionian stock. In 519 they made a treaty of alliance with Athens and at Marathon 1,000 Plataeans shared in the victory. Their city was burned by the Persians in 479 and in September of the same year the Persian army was defeated here by the Plataeans, Athenians and Spartans in a bloody battle, in which Mardonius, leader of the forces, left for the conquest of Greece after Salamis, took the offensive after the armies had been face to face for a fortnight and was killed with almost his entire army. The Plataeans were highly honored by their allies for their part in this great battle and their independence was guaranteed by all the Greek states. But in the Peloponnesian War Plataea sided with Athens and was nearly betrayed (431) by a body of Thebans who attempted to destroy the city. In 429 the Spartan army of Archidamus at¬ tacked the city, from which all the non-com¬ batants save 110 women had been sent to Athens. The 480 who remained (80 Athenians) withstood all assaults, so that the Spartans had to be satisfied with a thorough blockade, in the second year of which the city was taken and its defenders killed, except a gallant party of 212 which had cut its way through the Spartan lines. The city was rebuilt and reoccupied by its people in 387, only to be destroyed again in 372 by the Thebans. It was again restored after the battle of Chaeronea. A portion of the ancient city wall is still extant. Consult files of the American Journal of Archceology.

PLATE ARMOR. In general it may be said that at first all plate armor used was for reinforcing mail or other armor. The full

panoply (cap-a-pied) was in use by the middle of the i 5th century. The early period produced the finest pieces ; the 16th century showed com¬ mencement of decline as to protective purposes. Then fire-arms caused the disuse of one piece after the other as affording too little protection. By the 18th century armor had become a cere¬ monial gear and was valued according to its metalworkers' and goldsmiths' decorative fea¬ tures. For historic purposes perhaps Ash¬ down's period division is as well suited as any, and is used in this description.

Studded and Splinted Period (1335-60). — This is a transition era in which ((reinforced® chain-mail (see Chain-Armor) came into vogue. The bascinet (headpiece) was of plate with visor attached (see Helmets), and in some cases with a neck-plate riveted to the head-piece. Demi-brassarts were used to protect the upper arm. A plate vambrace or demi-vam- brace was sometimes worn over the hauberk (see Hauberk) to add to the protection of the arm. Grevieres or jambarts for the legs occur, but they were more often of splints than plate. Sollerets (see Foot Armor) were in use but rarely and covered only part of the upper half of the foot. The shield was, when carried, of (

The Camail and Jupon Period (1360-1410).

— The sleeveless cloth jupon (surcoat) was worn over a swelling breastplate, under which was the hauberk. The bascinet was tall and conical with visor (snout-faced visors belong to this period) and attached to the camail ; the Italian barbute was used now. (See Helmets). Other plate defenses are the laminated shoul¬ der-pieces (epaulieres) ; brassarts for the upper arm and coudieres protecting the bend of the arm. Vambraces of cylindrical form protect from forearm to wrist, which latter is covered by the gauntlet cuff. Steel cuissarts, laminated skirts, surrounded the thighs. Plate genouil- lieres guard the knees, first in a single plate, then reinforced above and below by steel lames. Grevieres of steel surround shins and calves. Small pieces of mail termed goussets or gussets were at the back of the joints of the knee, shoulder, elbow and ankle. An elaborately or¬ namented hip-belt of large proportions, to which was attached the sword scabbard, was a characteristic of this period. The shield is rarely shown in contemporary illustrations. The great heaume (see Helmets) was used for tilting and the bascinet for warfare.

.Surcoatless Period (1410-30). — In this period arrives the full panoply of plate free from textile; even the camail disappeared. It was replaced by a plate gorget upon which the bascinet rested. The breastplate is now worn outside and is ((globose® and has a back-

plate {dossier e) . Overlapping steel lames were at¬ tached below the breastplate and were termed taces. The hip-belt was worn around these. The shoulders had laminated epaulieres as be¬ fore but pallettes of different forms were at¬ tached to them. Brassarts, protecting the arms, were of riveted lames, but front and back plates were still in use. Coudieres have often faiv <

shaped (“shells®) outer plates at the elbow joints. Vambraces remain unchanged. Gaunt¬ lets have larger cuffs. (See Gauntlets). Also the cuissarts, genouillieres, grevieres and sol- leres stay mostly as before. The sword at right and dagger at left hip remain. Shields are small and of various shapes. (See Shields). The salade headpiece (see Helmets) starts in use in this period.

Tabard Period (1430-1500).— These were years of war and armor improved in defensive power. The pieces became not only more com¬ pletely protective but the metal was better tem¬ pered till offensive arms, even guns, fo”Und trouble in penetrating it. It was a period of evolving frequent changes; the tabard alone was constant, whence the use of the term for the time. The tabard was a sleeved surcoat usually decorated with the wearer’s armorial bearings. Till 1450 the bascinet continued in a very short time to give place to the armet. The body was protected with the “globose® breastplate till about 1450 when it was reinforced with the “demi-placcate® (or pansiere), a plate rising from the waist and curving upward to a point in the centre of the chest. Armhole gussets were now rigid or turned back. Backplates (dossieres) about 1450 were formed of several pieces. Epaulieres and brassarts for the right arm were laminated for rapid sword action after shivering the lance. The bridle (left) arm wore extra thick plates and reinforcements of many kinds. About 1430 the “pauldron® (shoulder piece) was introduced into England becoming larger and larger from a developed palette till it enclosed the entire shoulder and then grew up along the neck, evolving (latter part 15th century) the ((passe-garde,)) “garde- col® or “pike guard,® to protect the neck. The coudieres by the middle of the century (as the shield had been discarded) became immense and uncouth. About this time appeared the “garde- de-bras® to protect the inside bend of the arm. The taces of this period decreased in number, exposing part of the thigh; the “tuilles® were now .strapped below the taces ‘to protect the front of the thigh, and they grew both longer and wider. Leg defenses remained as before till about 144D, when the genouillieres became pointed below instead of

being cut off square, and laminations appeared in the lower part and reinforcing plates to project the thigh are added above. ‘Pointed sollerets remained in use till about 1490, when “sabbatons® with square toes displaced them entirely. Tilting armor was composed of a harness built so heavy the knight could not mount his horse without as¬ sistance, but this was not used in. warfare. The heaume had projections from the neck over the chest which allowed screwing it -to the breastplate. Garde-de-bras, coudiere and bras- sart were in use. An epaule de mouton (shoul¬ der of mutton shape) is often a reinforce¬ ment piece for the right elbow. By the second half of the 15th century armor began to at¬ tain a form of great beauty, the style called “Gothic® being considered the most perfect in graceful outline. In this period fluted decoration is usual on fine harness. Both salade and armet-a-rondelle belong to this period.

Transition Period (1500-25). — The closed helmet (armet) came into more general use and a skirt of chain-mail (a characteristic of this

period) was worn. The gorget was made up of laminated plates and extended over the chest and down the back. The “standard® or collar of mail came into vogue end of the period. The breastplate was “globose,® usually with taces of one or more lames. Pauldrons were reduced, less angular and composed of over¬ lapping steel lames, a pike guard (passe-garde) was usually on top. Brassards, vambraces, coudieres and gauntlets were of laminated steel ; the coudieres were reduced in size. Cuissarts, genouillieres and grevieres were composed of plate. Taces and tuilles are super-imposed on the mail-skirt. In general the characteristic changes of this period are reduced dimensions of some former parts, rounding of points and angles.

Maximilian Armor (1525-1600). — So termed from the name of the emperor (1459-1519), also has been termed “late Gothic.® The sur¬ face is adorned with close, narrow flutings (after that day’s fashion in dress) or channel¬ ings. The vogue began to fall off after 1540. It is more solid and less flexible than the former style. Breastplates are shorter and rounded out more. The left pauldron is usually larger than the right. Sollerets are of the square “bear paw® or “cow mouth® toe. The burgonet, morion, armet and cabasset (see Helmets) were worn in this period. Maxi¬ milian armor consists largely of decorative pageant pieces; it is a period of decadence. Breastplates with “tapul,® sloping forward to a median line, and the “peasecod® (bulging in an outward taper till nearer the bottom when it recedes sharply to the waist line) belong to this period. A frequent characteristic is the “rope® pattern on the edges of pieces. ‘Some of the harness suits have a flaring, fluted skirt (tonne- let). Noted German armorers of the period were Kolman

and Lorenz Helmschmidt, Mattheus Frauenpreis, Conrad Seusenhofer, Valentine Siebenburger, the Treyt family, etc. Tilting pieces were “Grande garde® for the left shoul¬ der and side; “volante piece® to protect neck and face up to the eyes; “manteau d’armes,® left side protecting plate; “polder mitten® or “epaule-de-mouton” (literally leg-of-mutton, its shape), attached to vambrace to protect inside the elbow ; “garde-bras® fastened to the cou¬ diere to protect the left arm. The shields were “rondaches® (see Shields) highly decorated. The decoration of this parade armor consisted of beautiful hammered (repousse) work, gold or silver inlay, damascening, etc.

Half Armor Period (from 1600). — The defensive quality of armor had passed in the former period; this period shows no fulLpano- ply but just a few uncouth “boiler-plate®^)ieces used as some protection against pistol shots, etc. The “three-quarter® suit contained, how¬ ever, much of the cap-a-pied set except leg- armor (jambarts and sabbatons). Gradually armor parts were being discarded, some officers using only a cuirass over a “buff® (leather) coat ; this, in Charles I’s reign, was so common for entire regiments as to cause them to be termed “cuirassiers.® Dragoons wore a buff coat and metal burgonet. Lance regiments wore close helmet, gorget, breast and back plates, pauldrons, vambraces, tassets, garde-de-rein and gauntlets. Arquebusiers wore triple-barred helmets, cuirasses with garde-de-rein, paul¬ drons, vambraces. Pikemen wore morion-form

of helmet, back and breastplates reaching to the waist, and tassets attached. In the Cromwellian period we get the <(pikeman’s pot® with cheek guards added. Musketeers wore morions till 1725, then felt hats with feathers. The 17th century armor pieces were thick, or heavy, enough to withstand pistol shots at short range ?nd the bullet test mark appears on each piece. Great collections of armor are exceedingly few ; the most representative in Europe are in Paris, Turin, Madrid, Vienna, Nuremberg, and in England those of the Tower of London, Wind¬ sor Castle, etc. America, in her New York Metropolitan Museum of Art, since the acquisi¬ tion of the great Riggs collection, possesses as fine an assemblage of arms and armor as any in the world.

Bibliography. — Ashdown, C. H., (British and Foreign Arms and Armour) (London 1909) ; Belleval, Comte de, (La Panoplie du XV au XVIII siecle) (Paris 1873) ; Boheim, W., (Handbuch der Waffenkunde)

(Leipzig 1890) ; Brett, E. J., (A Pictorial and Descriptive Rec¬ ord of the Origin and Development of Arms and Armour) (London 1894) ; Demmin, A., (An Illustrated History of Arms and Armour* (London 1877) ; Ffoulkes, C. J., (Armour and Weapons* (Oxford 1909) ; Gardner, J. S., (Armour in England from the Earliest Times to the Reign of James P (London 1897) ; id., (Foreign Armour in England) (London 1898) ; Gimlbel, K. G., (Tafeln zur Entwickelunsge- schichte der Schutz und Trutz Waffen in Europa* (Baden Baden 1894) ; Grose, F., (A Treatise on Ancient Armour and Weapons* (London n. d.) ; Jubinal, M. L. A., (La Armeria Real ; ou Collection des principales Pieces de la Galerie d'Armes anciennes a Madrid) (Paris 1838) ; id., (Notice sur les armes defensives et specialement sur celles qui ont usitees en Espagne* (Paris 1840) ; Haenel, G., (Alte Waffen* (Berlin 1913) ; Heffner-Alteneck, Dr. J. H. von, (Trachten* (Frankfort-on-Main 1884) ; Hewitt, J., (Ancient Armour and Weap¬ ons in Europe) (Oxford 1855-60) ; Kuppel- mayr, R., (Ein Beitrag zur Waffenkunde* (Munich 1914) ; Labarte, C. J., (Histoire des arts industries (Vol. IV, Paris 1866) ; La- combe, P., (Arms and Armour in Antiquity and the Middle Ages* (London 1902) ; Madrid, (Catologo historico-discriptivo de la Real Armeria de MadrkP (Madrid 1898) ; Main- dron, G. R. M., (Les Armes) (Paris 1890) ; Meyrick, Sir S. R., (A Critical Enquiry into Ancient Armour* (London 1824) ; id., En¬ graved Illustrations of Ancient Arms and Armour from a Collection of Goodrich Court* (Lorˆion 1854) ; Prelle, E. de, (Brusselles Musee Royal d'Armes et d'Armures) (Brussels 1903) ; Schulz, A., (Zur Waffenkunde des al- teren deutschen Mittelhalters) (Quedlinburg 1867) ; Specht, F. A. K., von, (Geschichte der Waffen* (Leipzig 1869-77) ; Viollet-le-Duc, E., E., (Dictionnaire du Mobilier frangais* (Vols. V and VI, Paris 1872).

Clement W. Coumbe.

PLATE GLASS. See Glass, Varieties of.

PLATE GLASS INSURANCE. After the repeal of the tax on glass windows in England in 1845 the glass industry took a great upward start, and in 1852 the Plate Glass Insurance Company was founded in London. The business spread rapidly; branches were

established in New York and Australia, and the General Indemnity Insurance Company of London (1853) included a Elate Glass® branch in its operations. Another company started a "Household Glass Department,® which in¬ sured mirrors, glass panels, chandeliers and windows, but not skylights. From these begin¬ nings has grown an almost world-wide branch of financial activity in which the actuarial calcu¬ lations of risk have reduced nearly to an exact science. The

liabilities can be fixed to a de¬ gree of exactitude that does not obtain in any other form of indemnity. Losses are adjusted by replacing the damaged property by paying an indemnity to the assured equal in amount to what it would have cost ihe company to repair the damage. A specific premium is at¬ tached to every size of glass manufactured, and where these have been cut to smaller odd dimensions, the nearest even dimension is fixed as the basis of the premium charged. An elab¬ orate system has been devised respecting the location of the windows, thickness of glass, depth of sash, etc., by which premiums charge¬ able can easily be arrived at. According to the (Cyclopedia of Insurance in the United States> (1918), the 35 American and British companies handling this form of insurance transacted busi¬ ness to the amount of $5,903,528 in 1917, while net losses paid amounted to $2,890,851. Consult Sterling, N. D., Elate Glass Insurance) in (The Business of Insurance) (Vol. II, New York 1912) ; (The Insurance Cyclopaedia* (Vol. V, pp. 415-422, London 1878) ; Winslow, E. H.,

(American Exchange and Review , Baltimore, June 1911).

PLATE-MARKS. See Hall-marks.

PLATE AND PLATED WARE. The

terms gold plate and silver plate are properly applied to articles or utensils of approximately solid metal, for use in the household or in re¬ ligious ceremonials or purely for decorative purposes, as a prize cup. Articles of this char¬ acter have from the remotest times and among all civilized nations been highly prized, and from their durability, intrinsic value and the beautiful forms into which they are often wrought have been esteemed the most precious heirlooms, and been held among the choicest family treasures through successive generations. The richest treasures of the temple of Solomon wrere of gold and silver plate, and such con¬ stituted the untold wealth taken by the Spanish conquerors of Peru from the ancient Incas. Though modern art has scarcely carried the manufacture of plate to higher perfection than that attained by skilful workmen of past cen¬ turies, it has succeeded in producing substitutes for it in what is called plated manufacture equally useful and almost as beautiful as the genuine plate, at prices that place within reach of those of moderate means what constitutes the luxuries of the rich. In the United States the industry of making silverware was begun by John Dixwell, Andrew Tyler and Edward Winslow of New England, and later Paul Revere, George Rideout and Richard Van Dyke made silverware in New York before the Revo¬ lution. Later Rogers of Connecticut was a prominent manufacturer. He developed elec¬ troplating methods, and also achieved an en¬ viable reputation for using the amount of silver

th.at £uaranteed to put on. Thus the name of Rogers became a hall-mark of quality, and m the course of time there were four concerns making Rogers plated ware. Meriden, Conn., and Providence, R. I., are centres of the plating industry. See Electro- metallurgy.

PLATEAU, pla-to, Joseph Antoine Fer¬ dinand, Belgian physicist: b. Brussels, 14 Oct. 1801; d. Ghent, 15 Sept. 1883. In 1835 he be¬ came professor of experimental physics and as¬ tronomy in the University of Ghent, in which capacity he continued to serve until 1871. He became noted for his extensive researches in optics and molecular forces, his experiments being all the more wonderful from the fact that they were mostly done after he had become totally blind, the result of previous labors in the field of subjective vision. He was helped in these experiments by his son and son-in-law, who acted as his visuals. His chief work, and wherein his experiments and researches are de¬ scribed, was (Statique experimentale et theo- rique

des liquides soumis aux seules Forces Moleculaires) (1873). Beside a short but com¬ prehensive article on Persistence of Vision> (1876), he also published a bibliography of works relating to optics.

PLATEAU. See Plains; Table-land.

PLATEN-HALLERMUND, pla'ten hal'- ler-munt, August, Count von, German dram¬ atist and poet, distinguished for his opposition to German Romanticism : b. Ausbach, Bavaria, 24 Oct. 1796; d. Syracuse, Sicily, 5 Dec. 1835. He received his education in the military acad¬ emy at Munich ; became a lieutenant in the Bavarian army and served throughout the cam¬ paign against France in 1815; subsequently ob¬ tained a furlough and took up the study of philology at Wurzburg for two years and from 1819-25 at Erlangen. About this time he was awarded a stipend by the king of Bavaria which enabled him to satisfy his desire to study Oriental languages and literature by extensive travel. As regards Platen's writings much has been said both in praise and criticism ; although in later years he became bitterly opposed to and often satirized Romanticism. Nevertheless his earlier works show to a great extent the effects of Romantic influence, and it is mostly for this contradiction that he is criticized. His first works, published in 1821, were poems writ¬ ten in the Persian form of the ((gazel" under the title ˆhaselenP These poems were closely followed by (Neue Ghaselen) (1824) ; Per glaserne Pantoff eP (1824), a poem which more than the others shows the Romantic influence; (Sonnette aus Venedig,* or (Sonnets from Venice) (1825), as beautiful a collection of son¬ nets as may be found in the German language; (Der Schatz des RhampsinD (1824) ; Pie verhangnissvolle Gable, } (The Fatal Fork) (1826), a satirical comedy attacking the Mate tragedy" ; Per Romantische CEdipus) (1829), directed against Romanticism; an historic drama, (Die Liga von CambraP. (1833) ; and the legendary epic, Pie Abbassiden) (1835). An edition of his collected works was published in two volumes (Stuttgart 1876). See Sonnets from Venice.

PLATFORM, Political. See Conventions, Political; Elections: Primary, Direct.

PLATING. See Electroplating; Plate and Plated Ware.

PLATINIRIDIUM, a native alloy of platt- inum and iridium in varying proportions. It is found in small grains and crystals associated with native platinum.

PLATINUM. The first published notice of platinum is contained in the (Relacion his- torica del viage a la America Meridional, } is¬ sued in

Madrid in 1748, wherein Don Antonio de Ulloa, o‘ne of the members of a French ex¬ pedition for the measurement of an arc of the meridian, records his observation of the metal about 1735, in the district of Choco, in what is now the Republic of Colombia. Here it bore the name (of Diderot and d’Alembert, published in 1774, wherein it is stated that some Hollanders on the South American coast had been deceived by having spurious gold ingots largely composed of platinum passed off on them. For this they took summary vengeance, as on their next voy¬ age to the coast, they seized the offending Spaniards and strung them up to the yard¬ arms of the Dutch ships. At about the same period, or not long after, a number of Spanish doubloons of platinum, with a thin nlating of gold, were struck and successfully passed for a time. As platinum was then many times less valuable than gold such counterfeits realized a handsome profit for their dishonest fabri-

- L’Or blanc cm le huitieme m6tal (Paris 1758).

cators, but to-day one of these counterfeit doubloons, the gold value of which if genuine would be about $8, would be intrinsically worth as much as $40. In the early part of the last century a number of similar counter¬ feits of United States $10 and $20 gold coins were made; several of which found their way to the Philadelphia Mint. Later still, however, from 1828 to 1845, a bona-fide platinum coin¬ age was struck in Russia in denominations of 1, 3, 6 and 12 rubles; the coins contained some 2 per cent of iridium. The coinage value of the platinum was reckoned at about $7.15 a troy ounce, but at the present price a three- ruble piece instead of being worth $2.32 would bring nearly $35 of our money. Of these Rus¬ sian coins 1,392,012 pieces were struck, having an aggregate weight of 473,907 troy ounces, or 14,738 kilos, and worth at the present price of the metal (1919) nearly $50,000,000.

The honor of making the first platinum mass in Europe has been accorded to the French chemist Chabaneau, who accomplished the task in 1783 in Madrid, whither he had been called by Charles III to fill a special chair of mineralogy, physics and chemistry. This ingot weighed about 23 kilograms (some 740 ounces troy). At about this time Chaba¬ neau made what is asserted to have been the first platinum article manufactured in Spain, a chalice which was bestowed by Charles III upon Pope Pius VI (1775-1800). The dedica¬ tory

inscription records that the chalice was made from <(The first fruits of platinum ren¬ dered ductile by A. Fr.co Chavaneau.® Almost contemporaneously the French chemist Achard worked the metal by alloying it with arsenic and then expelling the arsenic by heat. The method of making a compact metal out of platinum sponge by means of compression is said to have originated in 1800 with the Eng¬ lishman, Thomas Cocke, although the credit has often been given to Wollaston. The modern method, by fusion before the oxyhydrogen flame, is credited to Dr. Hare of Philadelphia, who in 1837 produced in this way a homogene¬ ous mass of platinum weighing 28 ounces (870 grams). The method was perfected by the French chemists Debray and Deville, and in the London Exhibition of 1862 the great English firm of platinum refiners, Johnson and Matthey, showed an ingot weighing 200 troy pounds, or nearly 75 kilograms. A platiniridium ingot made in Paris in 1874, in the course of the experiments to obtain proper material for the international pietric standards, weighed 525 pounds. The ingot from which the standards were eventually cut was made by Johnson and Matthey. Platinum was found in the gold mines of Dakovlov, in the Urals, Russia, in 1819, in the sands of Neviansk, Bilimbayensk, in 1822, and in the Kurshinsk factories in 1824. In 1825 the rich deposits of the Nizhni-Tagilsk district were discovered. The largest platinum nugget met with in Russia came from this re¬ gion ; it weighed 23j4 funts, or 9,628.88 grams (25 pounds, 9.45 ounces troy). Colombia, the first region where platinum was ever discovered and used, continues to furnish a notable quan¬ tity, the greatest of any land excepting Russia, though its production falls normally very far short of that of the latter land, which before the Great War supplied from 90 to 95 per cent

of the entire production. The largest nugget found in Colombia weighed 800 grams ; next to this comes one weighing 635 grams and con¬ taining 80 per cent of pure platinum.

Platinum is one of the most ductile of all known metals. It is so ductile that it can be drawn to the finest possible wire, then covered with a very thick coating of silver in wire form, then drawn again to infinitesimal fineness, the silver dissolved off, and this interior again coated with silver. So that one ounce of plati¬ num wire could be made to stretch as great a distance as from New York to New Orleans, or from Buenos Aires across the Andes to the Pacific Ocean.

Although 99 per cent of the world's produc¬ tion of platinum comes from Russia and Colom¬ bia, small deposits of it have been found in many different parts of the earth. In the United States it occurs in Oregon, California, Wyoming, Washington, Nevada, Idaho, Ari¬ zona,

New Mexico, Utah and Colorado, and it has occasionally been met with in other States, a fine nugget containing 38.1 grams, or almost one and one-quarter ounces troy, having been found about 1880 in glacial drift near Platts- burg, N. Y. It has also been mined in Ontario, Canada, as well as in British Columbia, and it is reported as occurring in Alaska. In Mexico and Honduras it has also been encountered. In South America, besides the important Co¬ lombian deposits, platinum occurs in Brazil, and a little has been reported from Ecuador and French Guiana, and from San Domingo. Bor¬ neo, Burma, Assam and Ava have also fur¬ nished small quantities, and a trifle has been discovered in the Bengal Presidency and in Mysore, India. In Europe it occurs in Norway, in Finnish Lapland, in Westphalia and in the Harz Mountains, Germany, as well as in Tran¬ sylvania, and a trifle has been found in County Wicklow, Ireland. Quite recently there have been discovered very promising deposits, cov¬ ering a wide area, in the Ronda Mountains, province of Malaga, Spain. On the African con¬ tinent platinum has been met with in Algeria, in the Kongo Free State and in Cape Colony, as well as in Griqualand. Finally, notable de¬ posits occur in Queensland and in New South Wales, Australia, and some has been found in New Zealand and in Tasmania as well. The chief sources of platinum are alluvial deposits, wherein it usually occurs either in rounded grains, or in scales which have been worn down by the attrition of the river gravel : occa¬ sionally, however, nuggets of quite considerable size are found. It is very commonly associated with gold, and usually with one or more of the different platinum metals, iridium, palladium, ruthenium, rhodium and osmium or the alloy iridosmium. It is opaque, with a metallic lus¬ tre ; the color and streak are light steel-gray, shading into silver-white. There is no recog¬ nizable cleavage ; the fracture is hackly. The hardness is fully four, and the specific gravity of native, unrefined platinum ranges from 14 to 19, this wide variation being due to the per¬ centage of iron,' or of palladium, ruthenium or rhodium that may be present ; the specific gravity of refined platinum is 21.48-21.50. The atomic weight is 195.21 (0 = 16). The co¬ efficient of refraction was determined bv Kundt to be 1.76 for red, 1.64 for white and 1.44 for

blue, and Donde found, in reflected light, 2.06 for Na, 2.16 for red. The specific heat is 0.032 + and the coefficient of linear expansion about 0.0000049. Platinum is usually unaltered before the blowpipe, but it is readily fusible in the oxyhydrogen flame and in the electric arc, the melting point being about 1779° Centigrade, making it, after

palladium, the most easily fusible of the platinum metals. It is not at¬ tacked by either boracic or phosphoric acid, nor by oxygen even when it is at a red heat, and but very slightly by pure hydrochloric acid, nitric acid or sulphuric acid. It dissolves soon, however, if treated with the mixture of nitric and hydrochloric acid, known as <(aqua regia,® into platinum chloride, although an admixture of iridium or even of rhodium renders it some¬ what more resistant. It forms alloys with gold and a number of other metals, the resultant alloy being more fusible than pure platinum. On the other hand, it gains greatly in hardness when alloyed with iridium, the product, called platin-iridium, being applied to a number of uses where hardness is especially to be desired. Chlorine, bromine and iodine attack it, and a mixture of bromine and hydrochloric acid works as actively as a dissolvent as does aqua regia. At a high temperature platinum com¬ bines directly with sulphur, phosphorus and arsenic. Easily fusible alloys of it may ibe made with potassium and sodium. As there is little difference between the specific gravity of gold and platinum, the miners are not able to separate the metals by the simple method of washing in habitual use, and recourse is had to quicksilver, which by combining with the gold to the exclusion of the platinum renders it possible to extract the latter. The method of refining platinum used in the United States assay office in New York is stated by the super¬ intendent, Hon. Verne M. Bovie, to be the fol¬ lowing: In the electrolytic process of refining gold, platinum remains in solution in the gold chloride electrolyte, from which it is precipi¬ tated by means of ammonium chloride. The precipitate is then well washed and reduced at a red heat to a metallic platinum sponge. This naturally contains impurities, and is, therefore, redissolved in aqua regia, and evaporated al¬ most to dryness, so as to expel the nitric acid, sulphuric dioxide being then passed through it until all the gold is precipitated. Upon this it is oxidated to bring all the platinum into a platinic state and precipitated with pure am¬ monium chloride. The precipitate is now re¬ duced in the usual way to metallic platinum sponge.

Chloroplatinic acid, H2PtCl6, is obtained by dissolving metallic platinum in aqua regia and then evaporating the solution. If this chloro¬ platinic acid is stood over caustic potash for a time arid the residue is heated in chlorine gas to a temperature of about 350° Centigrade, the tetrachloride of platinum (PtCh) is formed, one of the most important salts derived from the metal. The addition of sodium or potas¬ sium to the tetrachloride gives, respectively, the chloroplatinate of sodium or of potassium. The salts of platinum are usefully applied as chemical reagents and in photography.

The finely divided form of platinum, known as ((platinum black,® was discovered by Liebig. It possesses the striking property of absorbing

and occluding oxygen in great quantity, taking up as much as 800 times its own bulk of the gas. This quality is also possessed to a marked but somewhat lesser degree by platinum sponge. Melted platinum, on cooling, emits the oxygen it has taken up with an intermittent crepitation. Ammonium platinum chloride, when heated to redness, becomes finely divided. A character¬ istic of the so-called ˆplatinum-sponge,® which also absorbs and condenses gases, is that when brought into contact with hydrogen or coal gas, some of the occluded gas will be emitted as a flame. Many years ago Dobereiner utilized this property for a self-lighting lamp.

In the Bureau of Standards the purity of platinum ware is now tested by a simple ther¬ moelectric method which leaves the object that has been tested absolutely unharmed. As the thermoelectric motive force of platinum against many of its alloys has been almost exactly de¬ termined, this is used as a test of purity. In testing a crucible, for example, two wires of pure platinum only 0.1 millimeter or 0.2 milli¬ meter in diameter, are arc-soldered to the rim and are connected with an ordinary pyrometer- galvanometer or millivoltmeter. The junction-point of one of these wires with the crucible is heated by a small oxyhydrogen flame or other blast flame, while the corresponding junction- point of the other wire is kept cool by an air blast. An interposed sheet of asbestos prevents radiated heat passing from the heated to the cool part of the crucible ; the temperatures are measured by a platinum thermocouple. The significance of the result is shown by reference to a chart giving the isothermal curves for the iridium or rhodium content of platinum.

While during the Great War the use of platinum for catalyzing processes in the pro¬ duction of concentrated sulphuric acid for the manufacture of explosives, for dehydrating nitric acid and for aeroplane and other war machinery, has been made especially prominent, the wide employment of it in electric appliances of various kinds is of at least equal importance. Large amounts of it have been used for dental work, because of its durability and its resist¬ ance to the action of acids. The latter reason has made it of the greatest possible value for various chemical vessels, such as crucibles, re¬ torts, etc. Within the past 10 or 15 years it has been employed by manufacturing jewelers in many ways, for watch cases and for others of the smaller ornamental pieces, and for precious stone settings, more especially for diamond settings. Because of the imperative demand for

platinum in the great war indus¬ tries, the War Industries Board decreed that after 1 Oct. 1918 the use of this metal in the manufacture of new stocks of jewelry or for other non-essential purposes should be pro¬ hibited. The same law applied to iridium, palladium, osmium, ruthenium, rhodium and compounds thereof. It was said that the gov¬ ernment had a sufficient supply on hand after commandeering the stock of unmanufactured metal, and the prohibition, therefore, did not extend to platinum jewelry already made up, which could be sold as heretofore, that is, by manufacturers or dealers licensed by the War Industries Board. The decree was the result of a special emergency act to effect government control over platinum, iridium and palladium,

passed by Congress 6 Oct. 1917 and amended 1 July 1918. The situation at that time, after a careful survey, was recognized as serious. Platinum in the United States sold in 1890 at $16 per troy ounce and is selling now at $105 per troy ounce, five times the cost of gold. This situation arose directly from the em¬ bargoes of 1915 put upon the exportation from the countries at war, England, France, Germany and Russia, and from the practical cessation of the Russian supply, followed by increased de¬ mands after our entry into the war. Prior to the war Russia had furnished 95 per cent of the world's entire stock. All this has induced an active search for substitutes which might prove more or less satisfactory, and alloys of gold and palladium, or of gold and osmium, or gold and nickel, have been used with fairly good results in many cases. The shortage has also stimulated the search for platinum, not only in the metallic deposits of various parts of the United States, but throughout the entire world, and several new, minor sources have come to light. It is possible that a change in metallurgi¬ cal methods may furnish a quantity of platinum and palladium from certain Canadian sources that is not now recovered, and that United States and Colombian resources may be developed to a greater extent. Of the 5,000,000 or more ounces of platinum already in existence, it has been estimated very conservatively that catalyz¬ ing processes have claimed 500,000 ounces, dental uses 1,000,000, chemical apparatus 1,000,- 000 ounces, electrical devices 500,000 ounces and jewelry 500,000. These estimates are probably set rather too low in view of the fact that the total production of the metal has certainly been as much as 5,000,000 ounces ; indeed some au¬ thorities have placed the total Russian production alone as high as 7,000,000 ounces. Of course, this was crude platinum and would furnish only about 5,800,000 ounces of the

refined metal. In the period from 1900 to 1917 the imports of un¬ manufactured platinum, and of bars and ingots, into the United States, have had a total weight of 52,767.2 kilos, or 1,696,711 troy ounces and a total value of $48,981,879. To this must be added imports of crucibles, retorts, etc., worth $2,- 302,256, giving a total value of platinum in all forms of $51,284,115. Of course, a good pro¬ portion of the import was crude platinum.

For the fiscal year ending 30 June 1918, the imports of unmanufactured platinum, and of bars and ingots, weighed 1,613.1 kilos, or 51,862 troy ounces, and were worth $4,572,614; the re¬ torts, vases, etc., were valued at but $2,547, giv¬ ing a total of $4,575,161 for all platinum im¬ ports to the United States. Of this Colombia contributed $2,241,744 (27,030 troy ounces), just about half the total value and a little more than half the weight. A single, special ship¬ ment of 21,000 ounces from Russia, acquired for $2,000,000, accounted for most of the re¬ mainder.

The value of platinum, as measured by that of gold, has varied enormously in the course of years. About 1788 Colombian platinum was bought by the Spanish Royal Mint at a price equalling some 14 cents an ounce troy. At the time the Russian platinum coins were struck (from 1828 to 1845) the metal was reckoned to be worth but $7.15 an ounce troy. Fifty or

60 years later the price had increased greatly, rising from about $20 an ounce in 1906, to $45- $46 in 1911-13. With the advent of the great war, the interruption of Russian production and the increased demand for special uses caused the price to mount rapidly to $105 and even higher. When, in 1918, the United States government assumed control of the platinum market, it established the price of $105 per ounce for pure platinum.

The five allied platinum metals of the platinum group, making six in all, palladium, osmium, iridium, ruthenium and rhodium, as well as the combination osmiridium (iridos- mine), each have their special characteristics and usefulness.

Palladium was found in 1803 by Wollaston as a constituent of crude platinum from Choco, Colombia. Its name was suggested by the then recently sighted planetoid Pallas, discovered by the German astronomer Olbers in 1802. The melting point of palladium is between 1,360° and 1,380° C. and its hardness is from four to five; the specific gravity is 11.4. It is more easily fusible than platinum, indeed, it has the lowest melting point of any of the platinum metals. It has been

much used for alloys in astronomical instruments and also in dentistry. In clock-making it has found employment for springs and movements. In 1919 it sold for $135 the ounce, troy.

Osmium is one of the heaviest of these metals, its specific gravity ranging from 21.3 to 22.48. It was discovered in 1804 by Smithson Tennant in the residuum of South American crude platinum, after it had been treated with aqua regia. The name (from Greek osme, ˆsmell”) was bestowed because of the peculiar odor emitted by its volatile oxide.

Iridium was discovered by Tennant in 1804 and in the same way as osmium. Its hardness is between six and seven, that of platinum being only about four, and its specific gravity of from 22.6 to 22.8 makes it the heaviest of the platinum group. Its melting point is about 2,200° C. The name (from Iris) was chosen because of the variegated hues of its oxide.

The combination of osmium and iridium, to which the name osmiridium or iridosmine has been given, was first observed by Wollaston in 1805. Some mineralogists have used the desig¬ nations iridosmine and osmiridium as signifying a lighter-hued and a darker-hued form of the alloy, respectively.

Rhodium, discovered in 1804 by Wollaston, occurs in some platinum ores. The color is a grayish-white. Its fusion point is as high as 1,940° C. While very hard, the specific gravity is low, not exceeding 12.1. Rhodium has been less used than any other of the platinum metals.

Still another metallic element found in asso¬ ciation with platinum bears the name ruthenium. It is obtainable from the residuum resulting from the separation of osmium from osmiri¬ dium. The specific gravity is only 12.26. Ruthenium is practically unattackable by acids. It was discovered by Claus in 1845. The desig¬ nation, derived from Ruthenia, an ancient name of Russia, had been applied in 1826 by Osann to one of three new metals he claimed to have found associated with platinum, another of which, his pluran, was probably the true ruthe-

nium ; his ruthenium and (

Bibliography. — (Relacion historica del \7iage a la America

meridionaP (Don Jorge Juan and Don Antonio de Ulloa, 2 vols., Madrid 1748) ; Philosophical Transactions, Vol. XLVI, 1751, pp. 584 sqq., letters of Brownrigg and Watson; (La Platine, Tor blanc, ou le huitieme metaP (Paris 1758) ; Howe, J. L. and Holtz, H. C., (Bibliography of the Plati¬ num Group) (Smithsonian Institution, Miscel, Coll. No. 1084, Washington 1897; a new issue, considerably augmental, U. S. Geol. Surv., Bulletin 694) ; Annual Reports of United States Geological Survey, (Mineral Resources,* with articles by David T. Day, F. W. Horton, Joseph Struthers, Waldemar Lindgren and J. W. Hill; Annual Reports in (Mineral Industry* (Vol. I, 1892, to Vol. XXVII, 1918, with articles by Charles Bullman, Henry Louis, Joseph Struth¬ ers, L. Tovey, Frederick W. Horton, F. Lyn¬ wood Garrison and George F. Kunz ; Kunz, G. F., (Platinum with Especial Reference to Latin-America) (in Bulletin of the Pan-Ameri¬ can Union, November-December 1917 and

1919).

George F. Kunz.

PLATNER, Samuel Ball, American Lat¬ inist : b. Unionville, Conn., 4 Dec. 1863 ; d. 22 Aug. 1921. Graduated, Yale University, A.B. in 1883; Ph.D. in 1885. In 1885-90 he was instructor in Latin and French ; in 1890-92 assistant professor of Latin, and after 1892 professor at Western Reserve University. In 1897-1911 Dr. Platner was secretary to the managing committee and in 1899-1900 professor in the American School of Classical Studies in Rome. In 1900-01 he was president of the American Philological Association. He edited Muller's (Greek and Roman Versification* (1892) ; Selected Letters of the Younger Pliny* (1894) and wrote (Topography and Monuments of Ancient Rome) (1904; 2d ed.,

1911)..

PLATO (Gr. 7rldrro)v> <(broad,® a sobriquet given by Ariston, a teacher in athletics, and re¬ ferring probably to Plato's broad shoulders), was born in Athens in the deme of Collytus, in 427 b.c., of aristocratic parentage, and died there in 347. According to an ancient tradition he was born on the 7th of Thargelion, Apollo's Day, which, in Olympiad 88.1 (accepting the Metonian canon), fell on 29 May, Julian calen¬ dar. His qriginal name was Aristocles, the name of his grandfather. His father's name was Ariston, of the line of Codrus, last of the kings of Athens, and his mother was Perictione, of the line of Solon, greatest of the Athenian archons. In many respects Solon was Plato's political exemplar, for Solon was at once philos¬ opher and

statesman. Plato distinguished him¬ self in his early youth as an athlete, having wrestled in the Isthmian games at Corinth, and there is a doubtful tradition that he was once victor at Olympia. Before he was 20 he had written dramatic and lyric verse assiduously and

- Hintze, ‘ Handbuch der Mineralogie’ (Leipzig 1904, p. 141); Consult G. Osann, ‘ Untersuchung der russischen Platina’ (Ann. der Phys. Pogg. Vol. VIII, 1826, p. 505), and C. Claus, ‘ Untersuchung des Platinruckstandes, nebst vorlaufiger Ankundigung eines neuen Metalles (Ruthenium)’ (Bull. Arad Sci. St. Petersburg, Vol. Ill, 1845, pp. 38,

311. 354),

with success. The most important event in his earlier life was his meeting with Socrates in 407. This event was decisive for his later career. He had already studied philosophy un¬ der the Heraclitean Cratylus, but from 407 to the death of Socrates in 399 he was entirely absorbed in the dialectic of his new master, whose chief disciple and most complete inter¬ preter he became. Immediately after the death of Socrates in prison (Plato, owing to illness, was not present), the disciple went to Megara, where, with his friend Euclid, he studied the Eleatic philosophy. After a brief residence in Megara, it is probable that he returned to Ath¬ ens, and thereafter made extensive journeys to Egypt, Cyrene in Africa, Italy and Sicily. In Cyrene he visited the mathematician Theodorus. In Italy he was befriended by the famous ruler, Pythagorean philosopher and military leader, Archytas of Tarentum. In Sicily he formed an intimate friendship with Dion, brother-in-law of the elder Dionysius. Dionysius, then ruler of Syracuse, was offended by Plato’s free criticism of the government, and turned him over to the Lacedaemonian Ambassador, Pollio, to be sold as a slave. He was brought to Higina, where Amniceris (of the Cyrenaic school) ransomed him. After his release a plot of ground hard by the academy was bought for the use of Plato’s school, which then took the name of the adjoining gymnasium (academy). Plato estab¬ lished his academy in 387 and presided over it until his death in 347. The foundation of the academy thus dates from the exact middle of his life. Two later journeys were made to Sicily, one in 367, on the accession of Dionysius the Younger, and one in 361, both for purpose of political experiment, but without success. Indeed, on the last visit his life was put in jeopardy by the distrust of Dionysius. There¬ after he made no further attempts in practical statescraft, but carried forward continuously his scientific and literary work at the academy, where, in his early teaching, he employed a dia¬ logic method (after the manner of his master, Socrates), and later the more

dogmatic lecture. He died in 347 (according to tradition on his birthday, having thus completed exactly four score years), as Cicero says, scribens, (

Writings. — No work of Plato known to an¬ tiquity has been lost. On the contrary, the present corpus contains more than the genuine list of works. The traditional Platonic canon (that of Thrasyllus in nine tetralogies, accepted entire by Grote) contains 36 works (counting the letters as one), divided into 56 books. The works are written almost entirely (excepting the

eached. The most important dialogues are the (Symposium > (on Love), the (Phsedo> (on the Immortality of the Soul), the (Republic) (on the Ideal State), the (Theaetetus> (on the Na¬ ture of Knowledge), and the (Timteus) (on the Nature of the Physical World). Three periods of composition may be differentiated, namely :

(I) A Socratic or Ethical period, in which the anti-sophistic dialogues were written. This period may be regarded as extending from 398 to 387, that is, from the beginning of Plato's philosophical writing to the opening of the academy; (2) a Metaphysical and Constructive period, in which Plato builds the Socratic con¬ cept into its metaphysical form, develops the theory of ideas, invents his great myths, con¬ structs the ideal state, and reaches the climax of his intellectual and literary genius — a period extending from 387 to 360; (3) a third period, marked by increasing mysticism and decreasing literary and philosophic power, a growing as¬ cendency of Pythagoreanism and mathematical symbolism, a less daring civic ideal, a more dogmatic and less versatile manner of utterance and a greater emergence of religious interest — a period extending from the last Sicilian jour¬ ney, or about 360, to his death in 347. See Plato's Republic; Symposium; Platonism-

I. The Socratic and Anti-Sophistic Group,

398-387 : (1) (Apology > : (2)

(3) <

(II) (Gorgias) ; (12) ˆRepublic,* Books I and II ; or, in the pagination of Stephanus, from 327 to 368 A.

II. The Metaphysical and Constructive

Group, 387-360: (13) (Cratylus; (14) (Sym¬ posium } ; (15) (Phaedo) ; (16) Republic, > Book II, 368 A to Book V (inclusive), and Books VIII-X ; (17) VI-VII, and reconstruction and unifica¬ tion of the entire work, Books I-X ; (21)

‘Sophist* ; (22) (Politicus) ; (23) ‘Philebus.*

III. The Physico-mathematical and Politico- religious Group, 360-347 : (24) ‘Timaeus* ; (25)

The following are spurious: (Alcibiades I and II, * ‘ Hipparchus, > ‘Clitophon,* ‘Theages,* ‘Minos,* (EpinomisP (AxiochusP (LettersP ‘Hippias ip ‘Amatoresp (DefinitionesP ‘Ion,* (DemodocusP PryxiasP (De JustoP (De Vir- tuteP ‘Timaeus LocrusP ‘Menexenus.*

Bibliography. — Editions. — Aldus Manutius, first printed edition in Greek, folio (Venice 1513) ; Stephanus (with Latin translation, 3 vols., Paris 1578; the pagination of this edition is the basis of all modern references to the Platonic writings) ; Bekker (10 vols., Berlin 1816-23) ; Stallbaum (10 vols., Leipzig 1821 ff.) ; Baiter, Orelli and Winckelmann (2 vols., Zurich 1839-42; smaller edition in 21 vols.) ; Hermann (Teubner edition, 6 vols., new ed., Leipzig 1873 ff.) ; Schanz (Tauchnitz edition, incom¬ plete, Leipzig 1875 ff.) ; Burnet (Oxford edi¬ tion, incomplete, but most convenient, best printed and latest criticism, Oxford 1899 ff.).

Translations.— Schleiermacher (with intro¬ ductions, 3d ed., Berlin 1855-62) ; Cousin (13 vols., Paris 1825ˆ-40, 2d ed., Vol. I, by Bar- thelemy, Saint-Hilaire, ib. 1892) ; Jowett (3rd ed., 5 vols., New York and London 1892) ;

Fowler in (Loeb Classical Library* (New York 1913 ff.).

Biography. — Zeller, Plato and the Older Academy) (2d ed., London 1888) ; Grote, Plato and the Other Companions of Socrates* (2d ed., 3 vols., London 1885) ; Chaignet, ‘La vie et les ecrits de Platon> (Paris 1871) ; Pater, Plato and Platonism* (New York and London 1893) ; Van Oordt, Plato and His Times) (Ox¬ ford 1895) ; Ritchie, Plato) (New York 1900) ; Steinhart, Platon’s Leben) (Leipzig 1873) ; Taylor, A. E., ‘Plato* (Oxford 1908) ; Adam, J., Peligious Teachers of Greece) (2d ed., Edinburgh 1909); Ritter, C., Platon: sein Leben, seine Schriften seine Lehre) (Munich 1910) ; Christ-Schmidt, ‘Geschichte der griech- ischem Litteratur) (Munich 1908-).

William A. Hammond, Sage Professor of Ancient Philosophy, Cornell U niversity.

PLATOFF, pla'tof, or PLATOW, Matvei Ivanovitch, Count, Russian general and het¬ man of the Cossacks : b. on banks of Don River, Russia, 17 Aug. 1751 ; d. Tcherkask, Russia, February 1818. He entered young into the military service, was employed against the Turks in Moldavia, and was made a general of cavalry. When the French invaded Russia in 1812 Platoff was again called into service, and though defeated at Grodno and obliged to retire into the interior, returned during the retreat of the enemy from Moscow, and with 20 regi¬ ments of Cossacks harassed them in their flight, and contributed greatly to the advantages gained over them. In 1813 he defeated Lefebvre at Altenburg, and after the defeat of the French at Leipzig entered France, and was at Paris with the Emperor Alexander, whom he accom¬ panied to England. At London he was the ob¬ ject of popular admiration, and a magnificent sabre was presented to him. In 1815 he com¬ manded the Cossacks destined for the second invasion of France, and again made his ap¬ pearance at Paris. After the restoration of peace he retired to Tcherkask.

PLATONIC YEAR, the name given the period of time which the equinoxes take to finish their revolution, at the end of which the stars and constellations have the same place with regard to the equinoxes that they had at first. Tycho Brahe says this year or period re¬ quires 25,816 common years to complete it ; Ricciolus computes it at 25,920; and Cassini at 24,800; at the end of which time some imagined that there would be a total and natural renova¬ tion of the whole creation.

PLATONISM, the system of philosophy taught by Plato. The tripartite division of philosophy into Dialectic (Metaphysics), Phys¬ ics and Ethics is not explicitly made by Plato, although these several disciplines are discussed in the various dialogues and the classification is implicitly made.

Platonic Metaphysics. — The fundamental discipline in the Platonic philosophy is the Meta¬ physics, and the central doctrine in this dis¬ cipline is the doctrine of ideas. The basic ele¬ ments of the doctrine are derived from preced¬ ing philosophies, although they are here recon¬ structed with creative genius into a new system. The Platonic ontology is an attempt to mediate between the metaphysical antithesis of Heracli- teanism (the philosophy of becoming or "flux/

with the denial of all Being) and Eleaticism (the philosophy of static Being, with the as¬ sertion that all Becoming is illusory). The mediation was effected by means of the Socra- tic concept. Socrates did not carry his theory of the concept beyond its ethical implications; Plato in applying it to the resolution of the Eleatic and Heraclitean antimonies constructed a theory of reality. The Socratic concept is a gen¬ eral notion or universal idea in contradistinction to a sensation or perception, which is particular. The former is the content of rational thought or scientific knowledge ; the latter is the content of sense experience ; the former has universal validity and is stable; the latter is individual and variable. Plato correlated the concept, as the universally valid idea, with Being or the per¬ manent ; perception or sensation he correlated with the individual, that is, with the transient or Becoming. The one is the world of thought or ideas; the other is the world of perception or phenomena. The one is the world of reality; the other the world of appearance. The doc¬ trine of ideas is thus made to overthrow the Protagorean doctrine of the relativity of knowl¬ edge. General notions or ideas, in Plato's next step, are hypostasized, that is, they are erected into self-existant, transcendent entities, space¬ less and timeless. The Platonic idea is an archetypal form or notional entity, in which all particular things participate, in so far as they bear the name of the archetype as a class name. For example, in so far as the names man, jus¬ tice, wisdom are applied to Socrates, the indi¬ vidual Socrates participates (pedeiZs), in these generic notions, or these ideas of justice, etc., are present (napovoia) in him, or he is patterned (vapaderypa) after them. The archetype is the genus ; the individual is a particular subsumed under it. The archetype or generic idea is, therefore, the principle of classification of par¬ ticulars into groups, which groups exhibit the ideal or essential reality of particulars. Intel¬ ligible and sensible realities represent the One and the Many, and these logical relationships are interpreted by Plato ontologically. The re¬ lation of the universal to the particular is in certain dialogues described as that of arche¬ type or pattern, in others as participation, in¬ dwelling or communion. Further, these ideas are conceived as efficient causes or energies which give life, growth and significance to the world of phenomena, and they are furthermore final causes in terms of which the world's proc¬ esses are regarded as

purposive. Looked at ontologically the Platonic idea is the essentially real, absolute Being; looked at epistemologically, it is the absolutely knowable, the object of rational thought; looked at ethically and aesthet¬ ically, it is the norm. The supreme idea is the Idea of the Good, whose position and function in the world of ideas is analogous to that of the sun in the world of phenomena. The ethical and teleological character of the Platonic metaphysics is given in the supremacy of this concept, which is identical with God. This supreme idea is the rational conception of the total cosmic good, exhibited completely in the character of the Absolute, and imperfectly ex¬ pressed in the laws of nature and in the gov¬ ernment and conduct of men.

Platonic Physics. — Nature is a sphere that undergoes constant transformation. It is not a world of Being (to dvt ˆbeing,® connotes fixity

and stability), for it does not persist and is not invariable; it is not non-being, for it is the ob¬ ject of sense-experience; it is a world midway between Being and non-Being, that is, a world of Becoming, in constant transit from non-being to being. The idea appears in the phenomenal world veiled in matter and confusedly expressed. Matter is the principal of multiplicity and vari¬ ability and is one of the vaguest notions in Platonism (as it is in all philosophy). In the ˆTimaeus" (48 B seq.) Plato appears to identify it with space — the receptacle of ideas out of which (or more strictly, into which) the Demiurge fashioned or configured the extended and visible world. The world is not eternal, but is created. Space or matter is eternal, but time comes into being with the world's crea¬ tion. The efficiency of the ideas in reference to nature is personified in the mythical Demiurge, He is the cosmic energy of the ideal world of reason and goodness, and the created world is, therefore, reasonable and good. A world-soul is created by the Demiurge, that is, the world is made a living organic whole, self-moving, its motions mathematically determinate, developing in itself and in individuals consciousness, and teleologically imaging the ideal world. The goodness of the supreme idea is the ultimate cause of the world.

Platonic Psychology. — In the Platonic dual¬ ism of ideal and phenomenal, the individual soul occupies a mediate position, that is, it is so constituted as to be related to the ideas on the one hand and to the sensible world on the other. By reason the soul apprehends and is cognate with the first; by sensation it appre¬ hends and is cognate with the second. Reason is the function of the immaterial soul, while sensation is bound up with the material body, in which the soul lives

as in a prison. The soul is older than the body and existed prior to its union with the body. The doctrine of pre¬ existence is joined to the doctrine of the im¬ mortality of the soul. The three so-called parts or faculties of the soul are reason (vovq), the spirited element (dvpoeidig) t and the appetitive element (emOvpTjTiKov). The seat and organ of the first is the head (the Acropolis of the body,

5. The soul, as an immaterial entity, is essen¬ tially related to the immaterial, invisible ideas and these are eternal. 6. The idea of life is inseparable from the idea of soul (the Greek word tyvxn means ((principle of life® as well as <(soul®). 7. The soul is indiscerptible. That which is indiscerptible cannot be disintegrated. 8. The superior dignity and worth of the soul argue for its survival of the body. 9. The in¬ stinctive aspiration toward and longing for a future life shows that the doctine of immor¬ tality is founded in the soul's nature. 10. The world as a moral, just world demands a future existence for the rectification of the inequalities in this life.

Platonic Ethics and Politics. — Plato founds his theory of virtue on a psychological basis. The parts of the soul are regarded as having distinct and separate functions ; the right performance of these several functions pro¬ duces an organic well-being or moral health. The virtue peculiar to reason is wisdom ; to the spirited element, courage ; and to the appetitive element, moderation. A fourth cardinal virtue is justice, which is the harmonious condition of the entire soul resulting from the perform¬ ance of its own function by each <(part® and its non-interference with the functions of other parts. Piety, sometimes enumerated as a fifth virtue, is the aspect of justice which consists in the performance of what is due to the gods. It is the function of reason to furnish true principles of conduct to the individual ; of the spirited element, to be courageous, ready and eager in the execution of the principles of rea¬ son — principles which become commands for the lower faculties, and of the appetitive ele¬ ment to desire only that which reason prescribes as moderate. Thus in referring the content of virtue to reason, Plato puts in terms of his psychology the doctrine of Socrates that virtue is knowledge. The Socratic-Platonic conception of virtue is very similar to our <(acting on prin¬ ciple.® It is the ˆprinciple® that gives moral value to conduct and the reference of morality to knowledge (Socrates) or to reason (Plato) has essentially this meaning. The Summum Bonum, as described in the late dialogue, is to become, as far as man can, like God (d/LioLUGisTC) 0c

munistic character, a communism that extends not only to property, but to wives and children. The communism does not, however, apply to the citizens as a whole, but only to the two upper classes, whose lives are spent in the serv¬ ice of culture and the government. Plato in¬ sisted that the highest good of the individual is secured in the highest good of the state, and so the former is apparently merged in the latter. Finally, the Platonic communism is not aimed so much at securing equality of prop¬ erty, as at the exemption of the highest citi¬ zens from the distractions of the sense-world and at securing complete devotion to the pur¬ suit of philosophic truth.

Bibliography. — Editions and Translations: Stephanus (1578); Bekker (1816-23); Stall- baum (1821-25) ; Hermann (the Teubner ed.) ; Schneider and Diibner (Didot ed., 1846-74) ; Schanz (Tauchnitz ed., 1875 et seq.) ; Burnet (Oxford 1900 et seq.) ; Schleiermacher, German translation and introduction (1817-24) ; Cousin, translation into French (1825 — 40) ; Jowett, clas¬ sic translation into English (3d ed., 1892) ; Fow¬ ler in (Loeb Classical Library* (New York 1913 —). Life and Philosophy: Zeller, (Plato and the Older Academy,* translated by Alleyne and Goodwin (1888) ; Shorey, (The Idea of Good) (1893) ; Shorey, (The Unity of Plato's Thought> (Chicago 1903) ; Pater, (Plato and Platonism* (New York 1893) ; Lutoslawski, (The Origin and Growth of Plato's Logic> (1897) ; Ritchie, cPlato* (New York 1902) ; Windelband, (Eng. trans., by G. G. Berry, New York 1905) ; Stewart, J. A., (Plato's Doctrine of Ideas) (Oxford 1909) ; Grote, (Plato and the Other Companions of Socrates> (new ed., 1888).

William A. Hammond, Professor of Ancient and Mediceval Philosophy, Cornell University.

PLATOON, a French military term form¬ erly used to designate a body of troops usually half a company, who fired together. It is still used in the expression platoon exercise, which includes the manoeuvres connected with the handling and using of the rifle.

PLATO'S REPUBLIC. The title of Plato's (Republic* might seem to indicate that the main purpose of the dialogue was eco¬ nomical and sociological; but so to under¬ stand it is to run the risk of emphasizing what is eccentric in the author's thought, while missing what is essential and permanently human. The central theme of the argument is avowed clearly in the opening paragraphs of the second book (restated at other turning points), and is conditioned by the conclusions of the <(Protagoras® and <(Gorgias® and other dialogues which, probably precede (The Re¬ public in order of composition. In these earlier works Plato had been concerned

principally with two questions, which to him as a true Socratic, and indeed to any thoughtful Greek of his age, were really one: What is the nature of virtue? and, In what does man's happiness consist? In the <(Protagoras® it was suggested that virtue is that kind of action which in its ultimate consequences produces pleasure, and that happiness is the largest possible balance of pleasure over pain. This was the calculating

hedonism (from hedone, pleasure) which, ap¬ parently, Plato learned from Socrates. It was not in itself a base form of ethics, since tinder ˆpleasure" might be embraced the finer emotions of honor and sympathy; but it was likely to leave its votary in the lurch just when he most needed help, and at the best it was, and is, a treacherous guide. In the obscure complexities of life it is wont to bid the doubting soul ((take the cash and let the credit go.® Plato felt this,, and in the ((Gorgias® he started the search for quite another rule. Here pleasure is portrayed as the temptress who lures men to destruction by the urgency of momentary satisfaction. In contrast with the current ethical theory, which based itself on the so-called law of nature and defined justice as the right of the stronger to grasp whatever pleasures are available, he sets up the law of absolute justice. Only one thing I know, he says, speaking through the mouth of Socrates (being true in this to his master, though the law may seem at variance with the other Socratic law of hedonism), ((that it is better to be just than to be unjust, better, if need be, to suffer the extreme of injustice than to do injustice — -better because so one is hap¬ pier.® Happiness is thus no longer identified with pleasure, or with the sum of pleasures, but is a feeling different in kind and more momentous in character. From it is derived the ethics of eudemonism (from eudaimonia, hap¬ piness), which henceforth Plato will advocate in place of hedonism. In the first book of (The Republic,) after a marvellously beautiful mise en scene , the argument of the ((Gorgias® is virtually summed up in a refutation of the Nietzschean doctrine of might and right. Then, in the opening of the second book, the problem in its new form is stated in the most forcible terms. On the one side Socrates and his friends draw a portrait of the man who is altogether unjust and by his injustice wins for himself all the pleasures of this world. Fur¬ thermore, they will suppose that by some de¬ vice, such as the invisible ring of Gyges, he shall be able to escape detection and to acquire the reputation and honors of justice; even the gods shall be bought off, so that he is under no fear of punishment in the future world. On the other side they set

up the man who is just in every action, yet suffers all the misfortunes of life, including the ignominies of seeming in¬ justice. Which of these two men, they ask, will be the happier? Their answer, without hesitation, is that the good man, without any of the pleasures of life, will be happier than the bad man, with all the pleasures of life. This they admit, is a paradox, and needs to be examined. First of all what is this quality of justice whose consequences are so extraordi¬ nary? To answer this query Socrates suggests that, as the state is only a man writ large, it may be easier to discover the virtue they are seeking in the composition of society than in the individual soul. Now the principle of civilization is the division of labor, and this, to be effective, must be carried into the very constitution of the state. There are three main functions of society — production, defence and government. Hence there will be three classes of citizens — the producers, the fighters and the governors. And each class will have its specific virtue — temperance, regarded chiefly as obedi¬ ence, in the producers, courage in the fighters

and wisdom in the governors. The fourth virtue, justice, will be the effective principle of organization which keeps each class in its place and binds the whole together into one body politic. As a precaution against the tempta¬ tion to greed and tyranny, the two higher classes are deprived of all property beyond a few personal necessities ; even their wives are to be in common, and women are to partake, so far as their weaker nature permits, in all the employments of men. And the wisdom of the governors is to rise into that pure region of philosophy wherein the ordinary interests of the world are lost in the contemplation of eternal ideas. An echo of this belief in the efficacy of philosophy may still be heard in the words of John Stuart Mill: ((The moral and intellectual ascendancy, once exercised by priests, must in time pass into the hands of philosophers, and will naturally do so when they become sufficiently unanimous, and in other respects worthy to possess it® — but the una¬ nimity between Platonism and utilitarianism is still to seek. Plato's state may be described as an aristocratic communism. In criticizing it two things must be remembered : First, it was developed by Plato as an ideal, <(a model laid up in heaven,® rather than as a practicable sefieme ; secondly, its avowed purpose was not so much sociological as psychological, to throw light on the composition of the individual soul. Unfortunately Plato does not always keep this purpose before the eyes of the reader, nor does he himself always see the limits of the analogy he is proposing. The errors of his statecraft spring from his failure at times to distinguish between a society which is composed of units each with a will of its own, and an individual soul whose faculties are merely the

various aspects of one will. Corresponding to the three classes of society he finds in the soul three faculties — the appetitive, the thymoeides (an untranslatable term, signifying in general the emotions of anger, indignation, pride, self- respect, as distinguished from the physical de¬ sires of the appetitive faculty), and reason. The specific virtues of temperance, courage and wisdom belong to the faculties respectively, as they perform their special functions. Justice, then, would be that general principle of moral¬ ity which instigates each faculty to its right exercise, and binds them together in harmonious activity. Justice is to the soul what health is to the body. If this analogy is sound it should seem to follow without further words that the just man is the happy man. But to distinguish more clearly the nature of happiness itself, and to bring conviction to the doubter, Plato adds a series of portraits of the just character and of the characters that gradually fall away from justice, combined with an account of the state as it declines from a true aristocracy (that is, the rule of the best) to democracy (meaning by this mere mob rule). Looking on these ex¬ tremes, he asks, can any one doubt which is the happy man and the happy state? So he solves the problem proposed at the beginning of the discussion. But by the way he has touched on almost every aspect of human life, — education, literature, music, science, religion, all are con¬ sidered in connection with his central theme, and all are illuminated.

Paul E. More.

PLATOV, pla'tof, Matvei Ivanovitch, Rus¬ sian general: b. 17 Aug. 1751; d. 1818. He entered the Russian service in 1765 and won fame against the Turks and the French. In 1801 he was made Hetman of the Don Cossacks with the rank of lieutenant-general. After Napoleon's evacuation of Moscow, Platov and his cossacks, all expert cavalrymen, harassed the broken ranks of the retreating and defeated French, inflicting heavier losses, according to some, than those undergone by the French from privation, cold, etc. He occupied Marien- werder and on 28 May 1813 won a victory over the French at Altenburg, Prussia. He followed the French and cut off great numbers and at Laon won a great victory. He entered Paris with the allies in 1814. He had been made a count in 1812. At Novocherkassk, on the Don, a monument was erected to him. Consult Aubin, (Trente-neuf portraits> (Saint Peters¬ burg 1902).

PLATT, Charles Adams, American archi¬ tect, landscape architect and painter: b. New York, 1 Oct. 1861. His art education was ac¬ quired in New York and Paris, in which latter city he studied under Boulanger. In 1894 he gained the Webb prize of the Society of Amer¬ ican Artists for his painting (Clouds } ; and in 1900 his (Snow) was awarded a bronze m,edal at the Paris Exposition. He is a National Academian, a Fellow of the American Institute of Architects and in 1912 received the Medal of Honor of the New York Chapter of the In¬ stitute. He is the author of (Italian Gardens)

(1892).

PLATT, Orville Hitchcock, American legislator: b. Washington, Conn., 19 July 1827; d. there, 21 April 1905. He studied law, was admitted to the bar in 1849 and established a law practice at Meriden, Conn. In 1857 he was a clerk in the State senate, served as a member of the body in 1861-62. was elected to the Con¬ necticut house of representatives in 1864 and 1869, serving as speaker during the last year, and from 1879 until his death was a member of the United States Senate. As member of the Committee on Relations with Cuba he intro¬ duced the amendment which placed Cuba under the military protection of the United States.

PLATT, Thomas Collier, American po- tician: b. Owego, Tioga County. 15 July 1833; d. New York, 6 March 1910. He entered Yale in 1849, but ill health obliged him to give up his college course. He then entered business as a merchant in Owego, and became president of the Tioga National Bank when it was organized in 1865. He also had large number of interests in Michigan. He later (1879) became secre¬ tary and manager of the United States Express Company and in 1880 its president. His first political position was that of clerk of Tioga County, 1859-61, and here he supported the political interests of Roscoe Conkling; grad¬ ually gaining control of the Republican organ¬ ization of the district, he was elected to Con¬ gress in 1872 and 1874. In January 1881 he was elected to the United States Senate, and in May of that year resigned with his colleague, Roscoe Conkling, because of President Gar¬ field's disregard of ((senatorial courtesy® in ap¬ pointing the collector of the port of New York Vvithouc consulting them. They both sought re¬

election by the New York legislature, but Platt withdrew from the contest before it was de¬ cided. He had in 1880 been appointed a mem¬ ber of the board of quarantine commissioners of New York City, and from 1884 to 1888 was president of the board. He took no openly active part in politics until 1884, when he was delegate to the

National Convention. From that time, however, he slowly and unobtrusively gained control of the Republican party of New York State, until he became its acknowledged leader. For years he dominated Republican politics, apparently because he liked power, for he displayed no desire for wealth or personal preferment. He was widely known as the ((easy boss.® In 1896 he was elected United States senator and re-elected in 1902 for a term of six years. He attended every Republican national convention from 1874 to 1900; in 1896 was influential in obtaining an unqualified dec¬ laration for the gold standard; and in 1900 gained the nomination of Roosevelt for Vice- President. His power in his own State was due largely to his knowledge of every detail of the political situation and to his skill in dealing with men personally. James G. Blaine said of him ((He has strong common sense and a quick judgment of men.®

PLATT NATIONAL PARK, a tract with a total area of 848.22 acres, set aside for park purposes by the acts of Congress of 1 July 1902 and 21 April 1904 (629.33 and 218.98 acres re¬ spectively by each act) at the town of Sulphur, Okla. (then Indian Territory). It was at first designated as the Sulphur Springs Reservation, which, by joint resolution approved 29 June 1906, was changed to Platt National Park. The park extends in irregular form a distance of approximately three miles from northeast to southwest along Travertine Creek, including a portion of Rock Creek, into which the Trav¬ ertine empties, and it has a circuit of nine miles. Within the park are a number of known mineral and three non-mineral springs. The principal groups of springs are the Bromide and Medicine springs in the extreme western portion of the park; the Beach, Pavilion and Hillside springs in the north central portion, and the Bromide-Sulphur, Black Sulphur and Wilson springs in the south central part. Sul¬ phur springs predominate. Travertine Creek is fed by the Antelope and Buffalo springs, both non-mineral. About 20,000 individuals visit the park annually. About 50,000 gallons of the bromide and medicine water are bottled and shipped annually to distant points. Consult (Report to the Secretary of the Interior by the Superintendent of the Platt National Park> (Washington, D. C., annually).

PLATTDEUTSCH, plat'doich, NIEDER- DEUTSCH, or LOW GERMAN, the lan¬ guage of the lowlands of northern Germany, spoken from the borders of Holland to those of Russian Poland; its southern limit follows a line drawn from Aachen through Bonn, Cassel, Quedlinburg, Dessau, Wittenberg, Meseritz and Thorn ; its northern boundary reaches the Dan¬ ish frontier. It belongs to the same linguistic group as the Dutch, the Flemish and the Friesian, and it is nearer to English than is the High German. Low German, before the time of the

Reformation, was the language of literature as well as of common life within the

geographical limits mentioned; the Bible was translated into Plattdeutsch before any version into High German was made; but Luther's Bible having been composed in High German and circulated as no book ever before — one bookseller in Wittenberg sold in 40 years 100,000 copies, and before 1559 it was reprinted in 38 editions — the High German dialect was recognized thenceforth as the superior literary medium. The Plattdeutsch accordingly went into decline, the issues from the press in that dialect growing gradually fewer till, in the end of the 17th century, its literary use had prac¬ tically ceased. But in recent times there has been a revival of Plattdeutsch literature, and the several Low German dialects have received a good deal of attention from linguistic scholars. The oldest extant literary monument of the Low German language is the

PLATTE, plat, a river which rises in the Rocky Mountains, formed by the junction of two streams called the North and South Forks of the Platte. The total drainage area is over 100,000 square miles. The North Platte is formed by the union of several streams in the North Park, Colorado, and the South Platte takes its rise in the South Park. They flow east and unite in Lincoln County, Neb., about 400 miles from their source, while the united stream, also flowing mostly east, crosses Ne¬ braska and enters the Missouri on the border of Iowa, 15 miles below Omaha, after a course of about 1,600 miles. The principal affluents are the Elkhorn and the Loup Fork. The river is from one to three miles broad, but is so shallow that it is not navigable. The South Platte in its upper course is extensively used for irrigation and as a source of water power.

PLATTE COUNTRY, THE, in American history, a name applied prior to 1854, given to the territory stretching west from Missouri to the Rocky Mountains, and which now com¬ prises the States of Kansas and Nebraska. A bill was introduced into Congress in 1854 by Douglas of Illinois for the organization of the territory, the slavery question to be determined by the inhabitants, in direct violation of the Missouri Compromise.

PLATTENSEE, plat'ten-za. See Balaton.

PLATTER, plat'ter, Thomas, Swiss scholar and humanist educator: b. Grenchen, near Visp, in 1499; d. Bale, 1582. In his boyhood he was a goat-herder in the mountains, but later his mother sent him to the local priest for instruc¬ tion. He soon outgrew the narrow limits of the education obtainable from this source and became a wandering scholar. In company with a cousin he wandered throughout Germany, leading the wretched life of bacchants, but this became distasteful and he separated from his companion and entered the school at Schlestadt under Jean Sapidus to study Latin. Some time later he went to Zurich to study under My- conius, and while there learned the trade of rope-making, which enabled him to continue his studies of Greek and Hebrew. In 1541 lie be¬ came professor of Greek in the gymnasium at

Bale and continued in that capacity until 1578. Platter's most important work was his auto¬ biography, written at the request of his son Felix (1536-1614). The document gives an in¬ teresting history of education in the 16th cen¬ tury and shows the life of the students and scholars of that time, besides telling of his own travels. It was published in the original in 1840 and later the biographies of the father and son were edited together by Heman (Giitersloh 1882).

PLATTEVILLE, plat'vil, Wis., city in Grant County, on the Chicago and Northern and the Chicago, Milwaukee and Saint Paul railroads, near the southwest corner of the State and about 20 miles northeast of Dubuque, Iowa. It was settled in 1827. It is in a fertile agricultural region, and in the vicinity are lead and zinc mines. The chief manufacturing establishments are a foundry, creamery, wagon factory, cigar factory and machine shop. It is the seat of a State normal school. The city owns and operates the waterworks. Pop. 4,353.

PLATTNER, plat'ner, Karl Friedrich, Ger¬ man chemist and metallurgist : b. Kleinwalters- dorf, near Freiberg, Saxony, 2 Jan. 1800; d. Frei¬ berg, 22 Jan. 1858. Very little is known of his early life until 1842, when he became professor of metallurgy at Freiberg, a post he held there until 1857. During this time he experimented with marked success, but he became noted mostly through his application of the blow-pipe to the quantitative assay of metals. He pub¬ lished (Probirkunst mit dem LothrohU (1835), etc.

PLATTSBURG, plats'berg, N. Y., village, port of entry, county-seat of Clinton County, on Lake Champlain, at the mouth of the Sara¬ nac River and on the Delaware and Hudson and the Chateaugay railroads. It has steamer connection with Burlington, Vt., and all the lake ports. It is about 160 miles north of Albany. It was settled in 1784 by a colony from Long Island and Poughkeepsie in charge of Zephaniah

Platt, in whose honor the place was named. It was incorporated as a town the next year. It was the scene or near the scene of some of the important engage¬ ments of the Revolutionary War and the War of 1812. The first naval battle between Amer¬ ican and British forces took place 11 Oct. 1776, off Valcour Island, a short distance from Plattsburg. Benedict Arnold was in command of the American forces and Sir Guy Carleton of the British. This battle was won by the British. Plattsburg was headquarters for the American forces on the northeastern frontier in the War of 1812. On 11 Sept. 1814 another engagement took place on Cumberland Bay, an inlet of Lake Champlain (q.v.), while at the same time the British made a land attack. Commodore MacDonough (q.v.), commander of the American forces, won the naval victory and General Macomb was equally successful in de¬ feating the British forces on land. The steady growth of the village was checked by fire on two occasions, in 1849 and 1867, when many of the business houses were destroyed.

Adjoining the village on the south is a United States military reservation of 679 acres. In 1838 a United States military post was estab¬ lished here, and barracks erected sufficient to

accommodate a regiment of infantry. South of the “Plattsburg Barracks® and on Lake Cham¬ plain is Cliff Haven, the home of the Catholic Summer School of America (q.v.). Plattsburg and the region around are favorite summer re¬ sorts, and an important military training camp is located there. The lake on the east and the Adirondacks on the west furnish a variety of beautiful scenery and greatly modify the tem¬ perature during the summer months. It is the commercial and industrial centre for nearly all of Clinton County. The chief industries are lumber mills, sewing-machine works, type¬ writers, motors and automobiles, foundries, ma¬ chine shops, flour mills, woolen goods factory and wood-pulp mills. It has the Vilas Home for Aged Women, a government building, courthouse, several fine church and school buildings. It is the seat of the Plattsburg State Normal and Training School and of D’Youville Academy. It was a high school, public elemen¬ tary schools, a village public library and four other libraries. Pop. 10,909.

PLATTSBURG, Battle of. See Cham¬ plain, Lake, Battle of, in War of 1812.

PLATTSBURG BARRACKS, a military post established by the United States in 1838 on the west shore of Lake Champlain just south of the city of Plattsburg, N. Y., on the Dela¬ ware and Hudson Railroad. It has the usual equipment of a military post, but the surround¬ ing site has been frequently used as a practice camp, especially in 1916 during the “prepared¬ ness® agitation. Business men and college men were there trained to become officers under competent instructors furnished by the War Department.

PLATTSMOUTH, Neb., city, county-seat of Cass County, on the Missouri River, at the mouth of the Platte River and on the Chicago, Burlington and Quincy and the Missouri Pacific railroads, 21 miles south of Omaha. It is in a productive agricultural section and has consid¬ erable manufacturing interests. The chief in¬ dustrial establishments are the Chicago, Burling¬ ton and Quincy Railroad shops, clay product works, cigar factories and machine shops. The export trade is chiefly in grain, vegetables and live-stock. The public school system is excel¬ lent, consisting of a high school which cost $25,000, supplemented by eight graded public schools; there are 11 church edifices; a court¬ house erected at a cost of $80,000, and a large opera-house. There are three banks — one na¬ tional and two State — with a combined capital of $150,000. The city is lighted by gas and electric light; has improved waterworks and a sewerage system. There is a daily and a semi¬ weekly newspaper. The government is vested in a mayor, who holds office two years, and a council. Pop. 4,190.

PLATYHELMINTHES, a phylum of

the Metazoa, commonly known as the flat- worms, characterized by a bilaterally symmetri¬ cal body, somewhat flattened dorsoventrally and usually elongated. The primary body cavity is filled with parenchymatous tissue, giving char¬ acteristic firmness to the body. The alimentary system is sacoulate and provided with but a single opening, and the excretory organs are of the simple protonephridial type. On the

other hand the reproductive organs are unusually complex, and in all save a few species her¬ maphroditic. The phylum is well defined, con¬ taining three great classes, the Turbellaria or free-living flatworms, the Trematoda or flukes, and the Cestoda or tapeworms. Of the few aber¬ rant or little known groups formerly associated with this phylum only the Nemertinea are still placed here ; they are given independent rank, and usually treated as an appendix though often omitted entirely from the phylum. The body is covered in the

Turbellaria by a simple ciliated epithelium, and in the Trematoda and Cestoda by a so-called cuticula which has not been clearly interpreted as yet since the epithelial cells are apparently wanting though glandular cells sunk deep in the parenchyma are often interpreted as epithelial in origin. Directly beneath the epithelium or the cuticula one finds a well developed dermo-muscular sac in which longitudinal and transverse layers are always seen and often a third layer made up of oblique bundles. Dorsoventral muscles extend through the parenchyma from surface to sur¬ face and special muscles are also found in con¬ nection with organs like the suckers, spines, etc. There is no skeleton and the only hard parts present are hooks and spines that develop on the surface of the body or of some invagina¬ tion of the external layer.

Special circulatory and respiratory organs are entirely lacking, but the excretory system is well developed. It consists of so-called <(flame cells®, i.e., ciliated cells, that close the inner ends of minute tubules ; these form a branch¬ ing system that leads to one, two, or more external pores. Just within the pore one finds often a storage bladder formed by an ex¬ pansion of the tubule. Asexual reproduction by division is common in the Turbellaria and metagenesis or alternation of generations occurs in Trematoda and some Cestoda. Although nearly all Platyhelminthes are hermaphroditic a single germ gland produces only one kind of sex cells and the complex reproductive system, which forms the conspicuous part of the body in the sexually mature individual, comprises a complete set of male and of female organs. Development is simple in the free living Turbellaria and often very greatly involved in the parasitic Trematoda and Cestoda where alternation of hosts is the rule and even three or four hosts participate in the life history of a given species. Many efforts have been made to trace relatipnship between the Platyhelmin¬ thes and the Coelenterata on the one hand and the higher worms or simplest mollusks on the other. While one recognizes in general the intermediate character of the flatworms, it has not yet been feasible to trace more definite connections in either direction. The process of change within the phylum is distinctly traceable from the free living Turbellaria with ciliated epithelium and special sense organs that show adaption to independent existence through the ectoparasitic and endoparasitic Trema¬ toda to the Cestoda. In the latter the con¬ sistent endoparasitic habit is correlated with entire disappearance of the alimentary canal as well as with the loss of ciliary locomotor apparatus and special sense organs. Consult Lankester, (Zoology J (London 1901) and Her-

turg-Ringsley, (Manuel of Zoology' (New York 1912).

PLATYPUS, a genus of monotremes, called ornithoryncus, peculiar to New Holland, seemingly a link between the aquatic bird and the mammalia. It is about 12 inches in length, covered with a thick, soft fur, dark brown above, and whitish beneath. The muzzle is elongated, enlarged, flattened; the teeth are situate in the back part of the mouth, two on each side; the feet are webbed, and the hind legs are armed with spurs which secrete a poisonous fluid ; the tail is flat and obtuse ; there is no external ear and the eyes are very small. The echidna or spinous ant-eater is a genus resembling the platypus, but not amphibious. See Duckbill.

PLAUEN, plou'en, Saxony, town situated on the White Elster, 20 miles south by west of Zurickau. It contains an old castle, Rathaus, theatre, gymnasium, Realschule, teachers' train¬ ing school, etc. It is one of the most important cotton-manufacturing centres of the country, turning out great quantities of cambric, lace, muslin, batiste, embroidered goods, etc. Other industries produce pianos, paper, safes, machin¬ ery, etc. Pop. 121,272.

PLAUTUS, the third of the Roman drama¬ tists in chronological order and the first in lit¬ erary and linguistic importance. His full name was Titus Maccius Plautus; it was formerly supposed to be M. Accius Plautus and is so given in editions before 1850. He was born in Sar- sina, a small Umbrian town, about 254 b.c., prob¬ ably of free parents, but in humble station. Of the events of his life only three are known definitely: the was written by him for the plebian games in 200 b.c.; the (Pseu- dolus) was given at the dedication of the temple of the Magna Mater in 191; he died in 184. There is a brief notice of his literary activity in Gellius, iii, 3, 14, in which it is stated that after coming to Rome he was engaged in some work connected with the stage, that he used the money thus earned in trading by sea and having lost it, he returned to Rome in such straits that he was obliged to support himself by grinding at a mill ; that while so occupied he wrote three plays and began his career as a dramatist. This account is said to be taken from Varro, but it contains some evident inconsistencies, and it is not improbable that it is a grammarian's con¬ struction, based upon supposed personal refer¬ ences in the plays and put together after the analogy of the literary Lives written by Greek grammarians. The uncertainties which attend the attempt to reconstruct the earlier Roman history are especially great in matters of lit¬ erary history, which were not of sufficient im¬ portance to be

officially recorded.

Of the writings of Plautus, 20 plays have come down to us, with considerable fragments of a 21st. But it is probable that these consti¬ tute only a part of his work. During the cen¬ tury of dramatic activity in Rome (c. 250-150 b.c.) , there was no established theatre in the city, nor were there frequent presentations of plays. The genuine plays of Platus became confused with others which passed under his name, so that later traditions varied, some as¬ signing to him as many as 130 plays, others as few as 21. There was during his lifetime no reading public, but in the half-century after 150

the plays came into circulation for reading and efforts were made by critics to distinguish the genuine from the spurious. This culminated in the fixing by Varro of a canon of 21 plays which were regarded by all critics as Plautine, and which are beyond reasonable doubt the plays that we now possess. Of the 20, the best known are (The Captivi,' (Trinummus,' (Men- aechmi' and (Aulularia,' partly because they are most suitable for class-room reading; the (Bacchides,' (Pseudolus,' are superior to them in style and humor. About half the plays are corrupt in text, or fragmentary or of inferior merit.

The comedies of Plautus are based upon Greek plays of the New Comedy (c. 321-250 b.c.) , and in a few cases Greek poets — Menan¬ der, Philemon, Diphilus — are named. His plays therefore illustrate that fusion of Greek form with Roman spirit which is generally char¬ acteristic of Latin literature. The plots, with their fundamental element of trickery, are wholly Greek, as are the characters and situa¬ tions, at least in outline, and the subject-matter of the plays is the social and family life of a Greek city. Plautus was himself a man of Italian temperament ; he was able to make the Greek plots and characters the vehicle for the expression of a genuine and original humor, to fill in the Greek outlines with the rich Italian coloring. In some plays, for example, in the (Captivi,' the fusion is not complete and a cer¬ tain degree of incongruity may be detected ; in others, as in the cBacchides,' the hearty and almost riotous humor blends the two elements into a harmonious whole. That he truly ex¬ pressed the spirit of his race is evident from his popularity during his lifetime and from the long-continued presentation of his plays upon the Roman stage. His comedy has not been without influence also 'upon modern literature; Moliere founded his (L'Avare' upon the (Aulu- laria,> and Shakespeare's (Comedy of Errors' is an adaption of the (Menaechmi.'

Bibliography. — The best complete edition is the Teubner text by Goetz and Schoell, a con¬ densation of the great critical edition begun by Ritschel in 1848 and completed by his three pupils, Goetz, Schoell and Loewe, in 1894. There are good commentaries on single plays by Brix and Lorenz, and in English by Tyrell and Sonnenschein. In Sellar's (Roman Poets of the Republic' may be found an excellent essay upon the literary qualities of Plautus. No complete English translation has appeared since Thornton's (2d ed., 5 vols., 1769).

Edward Parmelee Morris, Professor of Latin Language and Literature,

Yale University.

PLAY. Various phenomena connected with the play of man and of animals have recently attracted the attention of both biologists and psychologists. These two lines of inquiry may be summed up in the two questions: (1) What is the function of play in the life of the or¬ ganism? and (2) what are the essential psycho¬ logical characteristics of play as distinguished from those of ordinary mental life?

In answer to the first question three theories have been advanced each of which seems to contain an element of truth. (1) There is the ˆsurplus-energy" theory of Spencer according to which play is the natural outlet of the sur-

plus energy that has accumulated in a vigorous organism. (2) The ((oractice" theory worked out most fully by Groos according to which play has a positive function in the life of the animal as affording practice and preparation for the serious activities of life. (3) The ((re-cuperative" theory that regards the play-activi¬ ties as fulfilling their proper function in afford¬ ing an opportunity for the rest or recupera¬ tion on the part of the other activities.

From the psychological side it has sometimes been held that (

PLAY CENSORSHIP. A censor of plays, especially in Europe, is a person whose permission is necessary for the production of stage performances. A relic of the censorship of the press survives in Great Britain in the licensing of plays. By an Act of 1843, no plays may be acted for hire till they have been sub¬ mitted to the Lord Chamberlain, who may re¬ fuse to license them in whole or in parts; the official who reads them for this purpose being the (

PLAY OF COLORS, in mineralogy, the rapid display of different colors on revolving a mineral. It is this property which adds so much to the beauty of the diamond (q.v.) and other gems. The play of colors in many gems is due to their high refractive and dispersive power. The magnificent play of colors of the precious opal was attributed by Brewster to microscopic cavities, but Behrends has proved that it is due to thin, curved lamellae of the mineral, the refractive power of which may vary by 0.1 from that of the mass. These lamellae are assumed to have been originally in parallel positions, but they were bent and broken in the solidification of the mineral.

PLAY GROUNDS. See Children's Play Ground; Recreation Centres.

PLAYA, pla'ya, mud deposits left by the drying up of temporary lakes in arid regions. They present a hard, barren surface, which shrinks and cracks under the sun's heat and in some instances becomes coated with efflorescent salts, resembling drifting snow. The Great Basin in the United States contains playa de- posits. of hundreds of feet in thickness. They are laid down by the desiccation during the dry season of large shallow lakes, known as sinks, holding in suspension a fine yellow silt, which form in the wet season. The deposits increase in depth by 'being thus intermittently covered by the silt-bearing water. Locally they are known by various names, such as mud-flats, salt-flats, alkali-flats, etc. The Black Rock Deserr in Utah is an example.

PLAYBOY OF THE WESTERN WORLD, The, in three acts, by John Milling¬ ton Synge, is a singularly arresting play by reason of its extraordinary combination of qualities that are ordinarily deemed contradic¬ tory. It is a comedy of Irish peasant life, ex¬ travagant, even boisterous at moments, yet based on the tragic theme of the murder of a father by his son; it is illuminated not only by the richest of humor but by poetic touches of poignant beauty, and all told in language so vivid and picturesque, so full of the zest and color of life, as to make ordinary English seem pale and tame, — ((that vivid speech which has been shaped through some generations of Eng¬ lish speaking by those who still think in Gaelic" (W. B. Yeats).

Christy Mahon comes to a lonely public house foot-weary, a stranger and a fugitive. The kindly curiosity of the tavern keeper, his daughter, Pegeen, and others, wrings from him the confession that he has killed his overbear¬ ing father in a fit of anger with a blow from a spade. This evidence of courage and over¬ mastering passion in a seemingly gentle lad so impresses his hearers that they talk themselves, and him, into the conviction that he is a hero. Inspired by his new-found confidence he makes love to Pegeen in one of the most delightful love

scenes ever written, and Pegeen is quite prepared to throw over her prosaic husband- elect for Christy. When Christy's old father turns up, at this juncture, not much the worse for his broken pate, it is quite natural that there should be a sudden revulsion of feeling against Christy. He has lost his hold on their imaginations, and poor Pegeen, her romance shattered, leads the oack against him. The ultra-Nationalists professed to regard the play as an attack on Irish morals and character and organized hostile demonstrations when (The Playboy) was first produced at the Abbey The¬ atre in Dublin in 1907, and later in London, and in the United States. In reality Synge has done the highest service to the Irish cause by creating dramas of artistic distinction and originality from purely Irish material. In his preface to the play Synge says, ((I have used only one or two words that I have not heard among the country people of Ireland or spoken in my nursery." Another quotation from Synge furnishes a most significant commentary on (The Playboy. } ((On the stage one must have reality and one must have joy; . . .

the rich joy found only in what is superb and wild in reality. ... In a good play every speech should be as fully flavored as nut or apple, and such speeches cannot be written by any one who works among people who have shut their lips on poetry."

Grace R. Robinson.

PLAYERS' CLUB, The, social organiza¬ tion in New York City, with commodious head¬ quarters at 16 Gramercy Park. Membership in the Club is confined as far as possible to artists, editors, authors, playwrights, etc., but eminent

lawyers and merchants are also eligible. The clubhouse was donated by Edwin Booth and was presented to the Club on 31 Dec. 1888. Nine directors, of whom five must be actors, playwrights or theatrical managers, manage the affairs of the organization.

. . PLAYFAIR, pluf'fer, John, Scottish phys¬ icist : b. Benvie, Forfarshire, Scotland, 10 March 1748; d. Edinburgh, 19 July 1819. He was graduated from the University of Saint An¬ drews in 1765, entered the ministry in 1770 and held various livings, in the meantime devoting much time to mathematics; in 1785 he was ap¬ pointed assistant professor of mathematics at the University of Edinburgh and

in 1805 ac¬ cepted the chair of natural philosophy there. He was secretary of the physical class in the Edinburgh Royal Society in 1789, subsequently general secretary and in 1807 was elected a member of the Royal Society. In 1815-16 he made a tour of France, Italy and Switzerland engaged in geological and mineralogical re¬ searches. He was a frequent contributor to the Endinburgh Review and his articles which are of great scientific value are collected in the 4th volume of the complete edition of his works edited by James G. Playfair (1822). He edited Euclid's (Elements> (1705) , and besides memoirs for the (Transactions) of the Royal Society of Edinburgh, wrote (Outlines of Natural Philos¬ ophy) (2 vols., 1812-16) ; (Illustrations of the Huttonian Theory of the Earth) ; etc.

PLAYFAIR, Lyon, Baron, British scien¬ tist and politician : b. Chanar, India, 21 May 1818; d. London, 29 May 1898. Educated at Saint Andrews, he also studied chemistry in Glasgow and began, but did not complete, the medical course at Edinburgh. After a brief period as a clerk in Calcutta he became labora¬ tory assistant to Graham in University College, London, and in 1840 was graduated at Giessen, where he studied chemistry under Liebig. In 1843 he became professor of chemistry in the Royal. Institution at Manchester and in 1858 professor of chemistry at Edinburgh, a post which he held till 1869. His political career began in 1868 with his election to the House of Com¬ mons as member of the universities of Edin¬ burgh and Saint Andrews, which he repre¬ sented till 1885, when he was elected for South Leeds. He became postmaster-general under Gladstone in 1873 and in 1880-83 was chairman and deputy-speaker of the House. In 1892 he was raised to the peerage as Baron Playfair of Saint Andrews. He published (Science in its Relation to Labor) (1853) ; (Primary and Technical Education* (1870) ; (Science in Re¬ lation to the Public WeaP ; and other works.

PLAYFAIR, William Smoult, English physician : b. 1836 ; d. Saint Andrews, Scotland, 13 Aug. 1903. He was educated at Saint An¬ drews and Edinburgh, was assistant-surgeon in the Bengal army in 1857 and professor of surgery at the Medical College, Calcutta, in 1859A30. He published (A Treatise on the Science and Practice of Midwifery* ; hand¬ book of Obstetric Operations* ; (A System of Gynecology) with Clifford Allbutt; etc.

PLAYING CARDS. See Cards.

PLAZA, pla'sa, Leonidas, Ecuadorean statesman: b. about 1868. He received his edu¬ cation at the University of Quito and soon was

launched into a political career, becoming presi¬ dent of Ecuador in 1901. Because of his oppo¬ sition to the clerical element his path was a difficult one; nevertheless he was successful in placing the Church under state control and otherwise curbing its activity in the country. He had been some time in retirement when Estrada died in 1911, whereupon Plazo tendered his services. Two years of internecine strife followed in which Plazo vanquished his prin¬ cipal opponents, Alfaro and Montero and again became president. He made earnest efforts to rehabilitate the state's depleted finances, to re¬ sume payments of the foreign debt and in¬ augurated extensive and rather ambitious sani¬ tary improvements. He was greatly hampered, however, by continued revolutionary outbreaks.

PLEA AND PLEADING. A plea is a

.presentation of a cause of action, made in a court, frequently a special answer to a bill of equity, making a charge or demand and request¬ ing a judgment of the court in the first instance on the ground that the plaintiff is debarred from an answer required by the bill — such, for example, as a plea to the jurisdiction of the court. In a broader sense, it is a formal statement of the position of either party to a suit at law, in some of the lower courts it may be made orally, but usually it is a care¬ fully prepared document, if for the defense, denying the plaintiff's declaration, in whole or in part, or alleging new matter, as a cause for annuling the action. A plea may be pre-emptory, that is meeting the issue squarely, as by deny¬ ing the allegations or it may be dilatory, rais¬ ing some technicality to delay the case. A Court of Common Pleas is one in which such pleas are heard, in the United States being usually equivalent to a County Court.

Pleading, in law, is the act of presenting a plea; a logical legal statement of facts con¬ stituting the plaintiff's cause of action or the grounds of a defense. It is the formal manner of alleging, as far as may be sufficient, that which either party to a suit expects to prove. The object of pleading is to make the matter in dispute between the parties plain and in¬ telligible. The whole system of legal procedure applicable to the presentation of a case is also termed pleading. It is an initial step in the trial of a case. The term ((special pleading® is often applied to a pleading that alleges new matter. See Demurrer.

PLEAS ANTVILLE, N. J., city in Atlan¬ tic County, on the West Jersey and Seashore and the Atlantic City railroads, five miles north of Atlantic City. It contains several handsome public structures and residences and is becom¬ ing a favorite summer resort along that coast of many resorts. Pop. (1920) 5,887.

PLEASONTON, plez'on-ton, Alfred, American military officer: b. Washington, D. C., 7 June 1824; d. there, 17 Feb. 1897. He was graduated from West Point in 1844; served on the frontier and in the Mexican War; in 1862 was commissioned major of the 2d Cavalry, served in the P.eninsular campaign, was pro¬ moted brigadier-general of volunteers and in the Maryland campaign commanded a division of cavalry. At Chancellorsville he performed important service by staying the farther advance of the Confederates. In 1863 he was promoted

major-general of volunteers and placed in com¬ mand of the cavalry corps of the Army of the Potomac, with which he led at Gettysburg, where for gallantry in action he was breveted colonel in the regular army. Transferred to the West in 1864, he defeated General Price at Marais des-Cygnes and forced the retreat of the Confederate forces trom Missouri. He re¬ tired from the volunteer service in 1866 and until 1871 was internal revenue collector and commissioner. During his military career he participated in 105 battles and at one time was tendered the command of the Army of the Potomac. In 1871 he 'became president of the Terre Haute and Cincinnati Railroad and in 1888 was placed on the retired list of the United States army.

PLEBEIANS, ple-be'anz (Plebs), an or¬ der of the Roman people, corresponding to the English Commons. The time at which the Plebeians were recognized as a distinct order in the state is not known ; they were at first excluded from almost every right of citizen¬ ship. They differed from the Clientes in not being obliged to choose a patron, were allowed to hold land, but had no share in the ager publicus ; they were obliged to serve in the army, but were excluded from all political privileges. The government of the state be¬ longed exclusively to the Patricians, with whom the Plebeians could not intermarry. This was their condition under the kings. The subse¬ quent domestic history of Rome is merely a record of struggles of the Plebeians to assert their claim to the place in the commonwealth. When Tullus Hostilius conquered Alba, he ad¬ mitted the chief of its citizens to the Patrician class, while the rest were enrolled as Plebeians. The same course was followed in other con¬ quests, so that the number of the Plebeians was constantly swelling, while they were of the same blood and possessed of the same courage, de¬ termination and other moral qualities as the dominant class.

The Plebeians, like the Patricians, were di¬ vided into gentes, but they

were excluded from the three Patrician tribes and from the curia, which formed the governing class. Tarquinius Priscus seems to have made an attempt to in¬ troduce the Plebeians to the privileges of citi¬ zenship, but was not successful. Servius Tullius organized the Plebeians in tribes, of which he constituted four for the city and 26 for the surrounding subject territories. Each tribe had a tribune. They had their own social and re¬ ligious privileges and were allowed to meet in comitia tributa convoked by the tribunes. A semblance of political power was at the same time conferred on them by Servius Tullius. He divided the whole body of citizens into five classes according to the amount of their prop¬ erty, upon which division was founded the comitia centuriata or great national assembly, to which the greater part of the legislative and judicial power of the comitia curiata was trans¬ ferred. The citizens, in this assembly, voted by centuries, but as the equestrian order and the first class of citizens had the majority of the whole number of centuries, and voted first, it was only in the case of differences among them that it was necessary to consult the lower classes. Some of the noble Plebeian families were also admitted into the equestrian order.

To follow the entire Course of concessions which followed this beginning would demand an examination of the most complicated details of Roman history. The establishment of tribunes (494 b.c.), the law of the 12 tables (451-450 b.c.) , the Lex Canuleia (445 b.c.), which permitted intermarriage; the admission to the consulate (366 b.c.), with the successive admission in 351 b.c. to the censorship, 336 b.c. to the praetorship and 300 b.c. to the offices of pontifex and augur, were the leading steps in a succession of victories which culminated (286 b.c.) in the Lex Hortensia, which gave the plebiscita of the people the force of law. From this time the privileges of the two classes may be said to have been equal ; the word populus now began to be used to designate the whole people and plebs were employed sometimes to designate the assembly of the comitia centuriata, or popularly to distinguish the general mass of the common people.

PLEBISCITE, a form of voting introduced into France under the Napoleonic regime, and named after the Roman plebiscitum. It was a vote of the whole body of voters ratifying some legislative enactment.

PLECTOGNATHI, an order of physo- clistous fishes, having incomplete ossification of the skeleton. Hard bony plates or spines cover the tough integument. The filefishes, trunk- fishes, globefishes and the like are examples. See Fish ; Ichthyology.

PLECTOSPONDYLI, an order of soft- rayed fishes represented by the

suckers (Catastomidce) , carps, etc. See Ichthyology.

PLECTRUM, a small instrument made of ivory, horn, quill or metal, with which (having it in his right hand) the player on a lyra or cithara sets the strings in vibration. Plectra are used by performers on the mandolin and zither, and serves the double purpose of saving the fingers from friction, and of avoiding the deadening of the tones that results from the soft touch of the human hand.

PLEDGE, or PAWN, a species of bail¬ ment, being the deposit or placing of goods as security for the payment of money borrowed, or the fulfilment of an obligation or promise. It is distinguished, in English law, from a mort¬ gage of chattels by the circumstance that the legal property in the chattel mortgaged is in the mortgagee, whereas the legal ownership of goods pawned remains in the pawner, though according to the definition of a pawn and and pledge the pawnee not only has the right of possession, but must be in possession. If the money is not paid at the time stipulated the pawn may be sold by the pawnee, who may retain enough of the proceeds to pay the debt intended to be secured. It is impossible to pledge a thing not yet made, as a machine con¬ tracted for but not built. The business of loaning on pledges is generally subject to license, and each State of the United States makes its own laws governing the conditions. See Pawnbrokers.

PLEHVE, ple-ve, Viatcheslav Konstan- tinovitch, Russian public official: b. 1846; d. Saint Petersburg, 28 July 1904. He received a legal training at the University of Moscow and in 1867 entered the Department of Tustice. He was for a time public prosecutor at Saint Peters-

burg and in 1881 was promoted to director of the department of secret police under the direc¬ tion of the Minister of the Interior. In 1884 Plehve became senator and 10 years later was appointed Secretary of State for Finland. He directed and executed the government repressive measures there and earned the lasting hatred and enmity of all lovers of liberty. In 1902 he became Minister of the Interior and by his harsh measures so fired the Revolutionists that they caused his assassination.

PLEIADES, pli’a-dez, the daughters of Atlas by Pleione, daughter of

Oceanus. Accord¬ ing to one version of their story they com¬ mitted suicide out of grief for the death of their sisters, the Hvades; but another version makes the fate of their father (see Atlas) the impelling cause. According to a third version, they were companions of Artemis, and being pursued by Orion (q.v.), were saved from him by the gods and translated to the sky. The versions agree in declaring that the Pleiades were transformed into stars, where they are all visible save one, Sterope, who hides herself for shame that she alone of the seven married a mortal (she being the Host Pleiad”) ; her sisters are Electra, Maia, Taygete, Alcyone, Celseno and Merope.

PLEISTOCENE (plis’to-sen) EPOCH, in geology, includes the time that elapsed be¬ tween the close of the Tertiary and the dawn of the historical or recent period. Measured in years, it is the shortest of the epochs, but geologically it is one of the most interesting. It includes the great Ice Age during which glaciers advanced and retreated across vast areas in North America and northwestern Europe. It is also the epoch, during which, so far as can be determined by the available evi¬ dence, man first appeared on the earth. For these two reasons it has been more discussed. Being so recent it left much evidence, not yet obliterated, of changes of land and water areas, and of variations in climate ; but the very abundance of the evidence increases the task of deciphering and summarizing it, since for re¬ mote epochs only the great changes are known through the evidence of the rocks.

It is fairly certain that at the close of the Tertiary great areas in northern North Amer¬ ica and Europe were more elevated than now. North America and Asia were perhaps united across Bering Strait; similarly the British Is¬ lands were part of a European continent that stretched out from Norway toward Iceland and north of Russia and Sibera over areas now covered by the Arctic Ocean. Regarding the equatorial land areas less is known, but possibly North and South America were united and it is possible that the Desert of Sahara was in part at least covered by an arm of the ocean. Of the distribution of land and water in the Ant¬ arctic regions the evidence found is not conclu¬ sive, though it is probable that the Antarctic continent was of greater extent than now, with a land bridge from Australia to South America. How much higher the land areas toward the north in Europe and North America were is un¬ certain, but it is probable that the regions about Hudson Bay and northern Sweden and Norway were much higher. The climate of these areas at the time was generally drier and cooler than it had been during the late Tertiary. During

the early Pleistocene river valleys were deeply carved and the topography was strongly ac¬ centuated. Gradually the climate in the

North¬ ern hemisphere became colder, and possibly moister. What produced this change is one of the most baffling problems in geology. In the course of years perennial snow stood on the higher ground and gradually accumulating formed vast ice sheets or glaciers which slowly advanced from these higher regions over the regions southward, and in the case of such mountains as the Alps, to northward. Thus began the great Ice Age which lasted thousands of years. The ice sheets advanced, retreated and advanced again. Some of the retreats must have been of long duration. In fact the evidence from rock decay and the formation of soils leads some geologists to believe that the time that has elapsed since the final retreat and disappearance of the great continental glaciers is not as long as that of some of the interglacial intervals. The probable number and succession of the glacial advances and retreats and the work done by the ice in modifying the topog¬ raphy of the glaciated regions are discussed elsewhere. (See Glacial Period). At the end of the Ice Age the regions in the North that had been the center of glaciation were much lower than at its beginning and the climate was moister. A subsequent elevation and a drier climate make the conditions governing life what they are to-day. Outside the glaciated areas the changes of level and climate have left less trace.

The advances and retreats of the ice neces¬ sarily meant great changes in climate. During the advances Arctic types of plants and animals were forced southward, during the retreats other types migrated northward, the Arctic types retreating or finding refuge on mountain ranges. One result of these migrations was the extinction of types that could not migrate readily and in particular of the great mammals. Man when he appeared waged war upon the large land animals that had withstood climatic changes. Thus it is that with the dawn of the historical period the fauna of Europe and America was impoverished as compared with periods immediately preceding, and the huge pachyderms, which, through Tertiary time, had been so striking a feature of the animal popu¬ lation of what are now the temperate regions of the world, disappeared, leaving only their gi¬ gantic remains to tell modern man the kind of monsters that have been the contemporaries of his prehistoric progenitors. See also Quaternary.

PLEKHANOFF, ple-kan'ov, George, Rus¬ sian political economist ; founder of the Rus¬ sian Social-Democracy: b. 1857; d. Petrograd, June 1918. He was of noble origin, attended the Petrograd School of Mines, and at an early age joined the Populists (narodniki) , later the Zemlya i Volya (Land and Liberty) Group. When the party split in the 70's, he stood at the head of the Chorny Peredyel (Black Divi¬ sion). In 1880 he was forced to seek refuge in western Europe and became

contributor to Narodnaya Volya (People's Liberty), but his aversion to Blanquism brought him back to the field of Marxist thought. In 1883, while in France, and later while living in Switzerland, to¬ gether with Axelrod and others, he was actively

agitating for the foundation of a Russian Social-Democratic Party, which from the start was dominated by the teachings of Karl Marx. His early pamphlets were Socialism and Political Action > (1883), (Our Differences)

(1884), and a translation and introduction to the (Communist Manifesto. } (See Karl Marx). Plekhanoff's chief accomplishment in this period was an elucidation of the differences between Socialism and Anarchism, and a strong opposition to the latter. He was also opposed to the theory that the Russian people were better prepared for the Social Revolution than others because of their traditional agricultural communism and proved from the writings of Marx and Engels that this would not obviate the necessity of passing through the stage of Capitalism to Socialism. <(Seizures of power®, such as all Russian revolutionists since the days of the Decembrists considered possible, he re¬ garded as foredoomed to failure owing to the lack of preparation on the part of the masses. Such seizure of power, he taught, could be undertaken only by a thoroughly trained work¬ ing class. In the 90's Plekhanoff began to acquire a more international reputation, through his scientific economic studies, in defense and elaboration of the doctrine of economic deter¬ minism. His (Contributions to the History of Materialism* places him at the head of those Marxists who would relate historic materialism closely with the physical sciences, and his book on Cbernishevsky made western Europe aware of the existene of this great Russian thinker. The famous schism in the Russian Social- Democracy 'between bolsheviki and mensheviki took place in 1903, and Plekhanoff at once joined forces with the latter; but after the Revolution of 1905 he was embroiled with his former associates. He was now outside of both factions, and this situation was empha¬ sized further by the outbreak of the War in 1914. Plekhanoff became a patriot and in¬ sisted on the necessity of a victory of the Entente Powers over the Central Empires, and therefore of supporting the government of the Tsar in the war. He therefore found himself, on his return to Petrograd 'from Switzerland (where he had spent all the years of his ma¬ turity), after the Revolution of March 1917 at variance with both mensheviki and bolsheviki, and was

able to retain leadership only of the small Yedinstvo (Unity) Group, which had practically no influence on the course of the proletarian revolution which came into power in November 1917. The last few months of his life were no doubt embittered by the oppo¬ sition of the entire working class population of Petrograd, which, weary of long months of hardships, was eager for a termination of the war, which consummation Plekhanoff was actively resisting, going so far as to ally him¬ self with the Cadet Party and the military and bourgeois organizations in the pursuit of this end.

Jacob Wittmer Hartmann.

PLEOCHROISM. See Physical Crys¬ tallography.

PLESIOSAURUS, a genus of extinct rep¬ tiles of the order Sauro pterygia. Several species have been described from very complete re¬ mains in European Lias rocks, first discovered in 18 22 and studied by Cuvier and his followers.

In these reptiles the head is small, the neck very long, the tail of moderate length. The typical species is P. dolichodirus, about 10 feet long; allied species are sometimes found 25 feet long. There is a fine skeleton preserved in the Berlin Museum, classified as P. guilelmi impera- toris. Over 25 species have been recognized in the Liassic seas of England, and they are also common in the continent of Europe. In the United States related species have been located in the Upper Jurassic and Upper Cretaceous. One of these uncovered at Fort Wallace, Kans., and known as Cope's Elasmosaurus had a neck 22 feet long and a total length estimated from the incomplete skeleton of at least 42 feet. These monstrous lizards swallowed stones like modern fowl, to aid their digestion. Their food was undoubtedly fish, as their dentition was adapted to grasping and tearing. It may reasonably be inferred that these reptiles were aquatic and inhabited the estuaries of rivers and shallow waters, occasionally swimming out to sea. Their gait on land would necessarily be awkward and difficult. The elongated neck would serve to enable them to descry their prey from among or over the tops of the reeds and vegetation amid which they might lie concealed in the banks of rivers or in estuaries, while this same length of neck would adapt them for readily seizing their prey, which consisted prob¬ ably in greater part of fishes. Some have thought that a few remain, and that their long necks and small heads have caused them to be taken for swimming serpents, thus accounting for the ever-recurring accounts of sea-serpents. Consult for particulars of structure Woodward, (Vertebrate Paleontology* (1898) ; and Willis- ton, S. W., (North American Pleiosaurs) (in (Field Columbian

Museum Publication 73,* Chi¬ cago 1903).

PLESSIS, pie -se, Joseph Octave, Canadian

Roman Catholic bishop: b. near Montreal, province of Quebec, 1763; d. Quebec, Canada, 4 Dec. 1825. He was educated at the Petit Seminaire, Quebec, taught belles-lettres and rhetoric at the College of Montreal, was or¬ dained in the priesthood in 1786, and soon after¬ ward became secretary to Bishop Hubert. In 1792 he was appointed cure of Quebec, and later became coadjutor to Bishop Denault, de¬ spite the opposition of the governor of the province, who feared the influence of Plessis with the French Canadians, and in 1806 suc¬ ceeded Bishop Denault in the see of Quebec. An effort made to introduce an exclusively Protestant system of instruction, and an attempt to prevent his taking the oath of allegiance as bishop resulted in the recall of Governor Craig. Sir George Provost was appointed in his stead, and the demands of the bishop were conceded. During the War of 1812 the bishop loyally sup¬ ported the English, and thereby gained the favor of the government, he was then recog¬ nized in his office of bishop, granted a seat in' the legislative council, and was pensioned. In 1818 he was nominated archbishop of Quebec. Consult (Life* by Ferland (1864).

PLETHO, surname of Georgios Gemistos (often called Gemistus Plethon) Byzantine scholar and philosopher of the 14th and 15th centuries: b. Constantinople. For many years he was the head of a philosophical school at Misithra in the Peloponnesus. Pic went with

the Emperor John VIII, Palaeologus, to the council at Ferrara, and remained until 1441 in Italy, where he gave great impetus to Greek studies, and was the means of establishing the Platonic Academy of Cosmo de' Medici. His treatise in praise of Platonism inaugurated the long quarrel between the disciples of the two great masters of antiquity, which produced a profound study of their systems. Pletho, how¬ ever, mingled with the Platonic philosophy the notions of the later Alexandrian school and of the spurious writings attributed to Zoroaster and Hermes. The best collection of his writ¬ ings is in Migne's (Patrologia Gneca) (Vol. XIX, Paris 1866). Consult Schultze, (Pletho, und seine BestrebungeiP (1874).

PLETHORA, or HYPERZEMIA, a con¬ dition of overfulness of the

blood-vascular sys¬ tem, a condition in which there is obvious ex¬ cess of blood in the body. It can hardly be called a disease. That is to say, the quantity of blood may be in excess of the normal, but its quality may be unaltered. On the other hand, there is a condition of plethora, called by pathologists hydraemic plethora, in which there is not only excess in the total volume of blood, but the excess is due to retention of water, so that the blood is more watery than usual. But the term plethora as ordinarily used signifies simply excess of blood.

Amputation is a frequent cause of plethora, as the digestive powers do not immediately ac¬ commodate themselves to the reduced wants of the system, and too much food is liable to be taken and too much blood formed. Plethora has two leading causes — the introduction into the vascular system of too much nutriment, and the deficient activity of tissue-change in the various organs, whereby the nutritive matter is insufficiently removed from the blood. A ten¬ dency to plethora thus generally develops at an advanced age, when the activity of tissue- processes has been considerably diminished. Plethora is often confounded with obesity, from which it is quite distinct. Plethoric persons, however, are usually unduly stout, much of the excess of nutritive material being deposited as fat under the skin. Plethora produces a diminu¬ tion of activity and a greater tendency to sleep than belongs with health ; these symptoms in¬ crease as it becomes aggravated, and culminate in lassitude and vertigo, turgid countenance, suf¬ fused eyes, palpitation of the heart, and similar phenomena. The treatment of plethora is en¬ tirely negative, and is suggested by the causes of the disease. Abstinence and exercise are its two most important elements, and their com¬ bination depends upon the circumstances of the individual case. Generally abstinence from malt liquors, wines or spirits is recommended.

PLEURA, the serous membrane lining the cavity of the thorax or chest, and which also covers the lungs. Each lung is invested by a separate pleura or portion of this membrane; the structure being spoken of rather as double pleurae than as a single membrane. Like all serous membranes, each pleura is a completely closed or shut sac, and does not communicate with its companion membrane ; and it further resembles the other serous membranes in that one side or part of the sac lines the containing cavity, while the other part or fold is reflected over the contained organs. In the thorax, there¬

fore, each pleura is found to consist of a por¬ tion lining the walls of the chest, this fold being named the pleura costalis or parietal layer of the pleura. The other fold, reflected upon the lung's surface, is named in contradistinction the pleura pulmonalis, or the visceral layer. These

two folds enclose a space known as the pleural cavity, which in health contains serous fluid in just sufficient quantity to lubricate the surfaces of the pleurae as they glide over one another in the movements of respiration. In front the two pleural sacs touch one another at a single point only, about the middle of the sternum, and they therefore enclose a space between them known as the mediastinum, which is again divided into anterior, middle, posterior portions. In the mediastinal space the heart and other organs of the chest, excepting the lungs, are situated. The pleura lines the ribs laterally, and a por¬ tion of the sternum or breast-bone in front. From the breast-bone it passes backward over the pericardium. The pleura of the right side is wider, shorter and extends higher in the neck than that of the left side. The outer aspect of the membrane adheres to the lung-surface, and also to the pulmonary vessels as these leave the pericardium. It is also attached to the dia¬ phragm below ; elsewhere it is but loosely con¬ nected to the contiguous surfaces. It is sup¬ plied with blood vessels from the internal mam¬ mary, intercostal, phrenic and other arterial trunks ; its veins corresponding in nature to the arteries. Its nervous supply is derived from the phrenic and sympathetic nerves, while the absorbent or lympathic vessels are also numerous.

The diseases to which the pleurae are sub¬ ject are chiefly pleurisy or inflammation of the membrane ; pneumothorax, with or without ef¬ fusion of fluid into the pleural cavity (hydro¬ thorax), and empyema. Haemothorax, or blood in the pleural cavity, generally results from accidental wounding of the intercostal arteries. Inflammation of the pleura of itself may ter¬ minate in hydrothorax or empyema, the inflam¬ matory products in this, as in other cases, ap¬ pearing in the form of serous fluid or pus respectively. See Pleurisy.

PLEURISY, an inflammatory disease of the pleura (q.v.). It is either dry or accom¬ panied by effusion. Dry or fibrinous pleurisy is characterized by an inflamed area, usually of small extent, covered with a layer of plastic lymph and somewhat roughened. Its invasion is accompanied with sharp pain and a dry cough, and friction-sounds are heard on placing the ear to the chest. Adjacent portions of the membrane may adhere together, forming ad¬ hesions which become permanent and limit the movements of the lung. Pleurisy is usually due to cold, unless secondary to another disease, such as penumonia, tuberculosis or cancer. Fre¬ quently an arrest of the inflammatory process occurs, and the fibrinous layer disappears from the surface of the pleura by absorption. If not, there may be an effusion of serum into the space between the two layers of the pleura. The amount of effusion may be so great as to cause serious displacement of the lung

or heart. If small in amount the fluid is often reabsorbed; but otherwise it must be removed by tapping. The fluid at first is pale and yellowish, or stained with blood-pigment. Later it becomes

turbid, and if it becomes infected by bacteria carried into the pleura by the lympathics, or entering through a penetrating wound or during the progress of malignant disease or tubercle, it is converted into purulent matter. The con¬ dition is then termed empyema, or chronic puru¬ lent pleurisy, and is grave. The pus may pene¬ trate the wall of the pleural cavity and the lung-tissue and burst into a bronchial tube and be coughed up. Or it may perforate the dia¬ phragm, enter the peritoneal cavity and cause a purulent peritonitis. Few cases recover with¬ out surgical treatment which consists of open¬ ing the suppurating cavity and providing drainage.

In all pleurisy breathing is apt to be shallow and difficult, and general weakness, loss of appe¬ tite, headache and rapid pulse are noted. When pus appears in a pleural cavity there is an ir¬ regular temperature, a succession of chills and recurrent sweats. Upon the entrance of fluid into the pleura the friction-sounds disappear, and a dullness and later a flatness is ascertained by percussion over the position of the effusion. Wet or sero-fibrinous pleurisy may continue for months, and the compressed lung may never ex¬ pand again to its former volume, but may be¬ come ˆcarnified.® Tuberculous pleurisy occurs as a result of tuberculosis of the lung, in a vast number of cases, as a primary disease. As a secondary implication, dry pleurisy always oc¬ curs when the tubercular process reaches the surface of the lung. Hemorrhagic pleurisy, or pleurisy with a bloody effusion, occurs fre¬ quently in cases of cancer, Bright’s disease and certain fevers, as well as in tuberculosis.

According to the situation of the lesion, pleurisy is termed diaphragmatic or interlobu¬ lar. When limited by adhesions which form pockets, it is termed encysted. In the treatment of pleurisy little medicine is used. A cathartic is desirable at the outset. Adhesive-plaster straps are employed, fastened around the chest, or half of it, to secure immobilization of the affected side. An ice-bag gives relief from pain and limits the inflammation. Counter irritation may be secured with iodine or mustard, but blis¬ ters and cups are now seldom employed. Vapor baths, to cause diaphoresis, and diuretics are rarely required. Salicylates are useful in some cases. Aspiration of the fluid is

secured by means of a hollow needle to which a suction- pump is attached, a method invented and intro¬ duced by Wyman of Cambridge and Bowditch of Boston. The needle is inserted generally in the axillary line and the operation is practically without risk. The fluid is withdrawn slowly, and even as much as a quart may be removed with safety. Often after a small fraction of an effusion is removed the remainder will be ab¬ sorbed spontaneously. In cases of empyema a free incision is usually made and open drain¬ age secured. Sometimes it is necessary to re¬ set a part of one or two ribs. After recovery from empyema the chest is usually sunken and flattened.

PLEURISY-ROOT, a perennial herb of the genus Asclepias (q.v.).

PLEURONECTIDzE. See Flatfish.

PLEUROPNEUMONIA, a disease com¬ mon to cattle, and occasionally communicated to other domestic quadrupeds. It is highly con¬

tagious, and exceedingly fatal, though a certain proportion of animals recover. It first mani¬ fests itself in a morbid condition of the general system ; but its seat is in the lungs and the pleura, where it causes an abundant inflamma¬ tory exudation of thick plastic matter. The lungs become rapidly filled with this, and the animal suffers from cough and difficulty in breathing. Many die in the course of a few days. It is believed to have been wholly eradi¬ cated in America and Europe. Consult Atkin¬ son, V. T., (Special Report on Diseases of Cattle) (Bureau of Animal Industry, Washing¬ ton 1912). See Cattle-plague; Rinderpest.

PLEVNA, plev'na, or PLEVEN, Bulgaria,

the chief town of the district of the same name, about four miles east of the Vid, a tributary of the Danube. Plevna commands a number of important roads, hence is a place of some strategical importance. It is noted for the gal¬ lant resistance of its Turkish garrison under Osman Pasha to the Russians during the Russo- Turkish War of 1877-78. Osman intrenched himself here in the early part of September, and the Russian attempts with superior forces to take the place by storm were failures. When food and ammunition had run short he made a bold effort to cut his way through his enemies, but was compelled to capitulate with 40,000 men (10 Dec. 1877). The Russians had to assemble a force of 100,000 men and starve the garrison before victory was accomplished. The area of the district is 1,851 square miles; population, 365,858; city population, 23,049. Consult Her¬ bert, W. V., (The Defense of Plevna* (Lon¬ don 1896).

PLEXIMETER. See Percussion.

PLEYEL, pli'el, Ignaz, Austrian composer: b. Ruppertsthal, near Vienna, Austria, 1 June 1757; d. Paris, France, 14 Nov. 1831. He studied composition under Haydn, and in 1786 made a tour through Italy and France, where he was everywhere received with the greatest favor. In 1787 (he was appointed chapel-master to Strassburg cathedral ; but in consequence of the revolution he was obliged to flee. He proceeded to London ; became again connected with Haydn, and gave a series of concerts in 1791-92. He soon after went back to France, and at a later period founded a musical business and piano factory which be¬ came one of the most important in Europe. In 1801 he commenced editing the (Bi;bliotheque Musicale,* in which he inserted the best works of the Italian, German and French composers. His own works, chiefly instrumental pieces, are light, pleasing and expressive. The earliest of them are the best. One of the most popular is the well-known hymn tune which bears his name.

PLICA, PLICA POLONICA, or TRI¬ CHOMA, a condition formerly regarded as a disease, indicated by a mattine of the hair of the head or body, in which the hair becomes agglutinated by a nauseous exudation from the roots, the bulbs become enlarged, and the hair swells and becomes soft. Plica is said to have appeared in Poland and adjacent districts about the end of the 13th century, and is now grad¬ ually wearing out. The condition is usually kept up by neglect, being deemed a safeguard against some internal disease, and no means being taken

to remove it. The treatment of plica is for the most part empirical, and beyond cleanliness and attention to diet there appears to be noth¬ ing in regard to it determined with certainty.

PLIMSOLL, plim'sol, Samuel (((The Sailors' Friend"), English reformer: b. Bris¬ tol, 10 Feb. 1824; d. Folkestone, Kent, 3 June 1898. Through his occupation as a coal dealer he became interested in the condition of sailors, and the dangers to which they were exposed by unscrupulous overloading of heavily insured vessels induced him to enter Parliament in 1868 as member for Derby. In 1873 he published (Our Seamen,' which succeeded in its purpose of arousing public attention, and in 1876 the Merchant Shipping Act, embodying many of his demands, was passed. Among its provisions was the load line known as "Plimsoll's line," which has since been marked on all English ships. He also wrote (Cattle Ships) (1890), with reference to securing reform in that direct¬ ion.

PLINLIMMON, plin-lim'mon, PLYN- LIMON, or PUMLUMON, Wales, a moun¬ tain-mass on the boundary between the counties of Montgomery and Cardigan, 10 miles west of Llamidloes. It has three principal summits (although the name means ((five beacons"), at¬ taining a maximum altitude of 2,468 feet. The Severn and the Wye rivers rise on its slopes.

PLINTH, in architecture, the lower square member of the base of a column or pedestal' In a wall the term plinth is applied to two or three rows of bricks which project from the face. See Architecture; Column.

PLINY, plin'y (Gaius Plinius Secundus), commonly called Pliny the Elder, Roman au¬ thor: 'b. Novum Comum, 23 a.d. ; d. Stabiae, 79 a.d. He came to Rome at an early age where he availed himself of the

best teachers. He served in Germany under Domitius Corbulo and Pomponius Secundus, and obtained the command of a troop of cavalry. During the intervals of his military duties he composed the treatise (De Jaculatione Equestri,' and began a (History of the Germanic War.' which he subsequently completed in 20 books. Appar¬ ently he fought in the Jewish war and was made procurator of Syria. It is known that he was also appointed procurator of the emperor in Spain. His nephew, Pliny the Younger (q.v.), has left an account of his life at this period, which was one of constant study. He made extracts from all the books he read, or had read to him, and at his death left his nephew 160 volumes of these notes. His (Natural History,' compiled from materials ac¬ cumulated in this way, was published about 77. This is his only extant work. He perished in the eruption of Mount Vesuvius which over¬ whelmed Pompeii and Herculaneum in 79. The (Historia Naturalis' is divided into 37 books, and is, according to his own account, a com¬ pilation from upward of 2,000 volumes. It em¬ braces the domain of natural history in the widest sense, including astronomy, geography and meteorology. It even goes beyond what natural history in any sense would include — treating of the fine arts and human institutions and inventions. The first edition was pub- ished at Venice in 1469. The edition of Hardouin 1685 is the first critical edition. The edi¬

tion of Panckouke (1829-33), with a French translation, and notes by eminent modern naturalists and scientific men, including Cuvier, is of great value. The best editions of the text are those of Sillig (1851—58) and Detlefsen (1866-73). Pliny was translated into English by Philemon Holland • (1601, two vols. folio). There is a translation (1855) in Bohn's Classic Library by Bostock and Riley. Pliny has been the chief source from which historians have obtained color and detail to embellish their de¬ scriptions of life at the opening of the Chris—tian era. While his accumulations were not scientific in the modern sense, and while he did not have the trained sense of a modern encyclopedist, yet he was an indefatigable worker, and has passed on to the modern a vast amount of early erudition which otherwise would have been lost. Consult Mayhof's re¬ publication of Jan's 1875 edition of Pliny's works (1909).

PLINY (Gaius Plinius Cˆcilius Secun¬ dus), called Pliny the younger, Roman author: b. Novum Comum, 62 a.d.; d. about 113. He was a nephew' of Pliny the Elder, bv whom he was adopted and carefully educated. He studied at Rome under Quintilian and Nicetes Sacerdos, in 76 wrote a work in Greek — <(What it was I know not; it was called a tradegy" — and in 81 made his first appearance as an advocate by pleading a case before the centumviri. After service in

Syria as tribune of the third legion, he entered public life, becoming successively quaestor Caesaris (emperor's quaestor; 87), tribune of the plebs (91), and praetor (93). He was then forced by the conditions of Domitian's government to withdraw from his office; and the discovery among Domitian's papers of a charge of treason against him makes it evident that his life was saved by the tyrant's assassin¬ ation (96). In September 100 he became con¬ sul (with Cornutus Tertullus). Trajan, with clear appreciation of Pliny's administrative tal¬ ents, made him augur (104 or 105), and later curator of the channel and banks of the Tiber and of the municipal drainage system. He was sent out in 111 as governor with special powers of the province of Bithynia. His official cor¬ respondence with the emperor ends in 113; and he then disappears from view. His miscella¬ neous letters are the best extant contemporary authority for an important period of Roman history. Those to and from Trajan afford the chief documentary evidence for the study of Roman provincial government; and they con¬ tain, also, the earliest information ab extra of the manners of the primitive Christians and their official treatment by the Roman adminis¬ tration. Through the extent and variety of his own works, supplemented by inscriptions dis¬ covered at Novum Comum, Pliny is perhaps more fully and accurately known than any an¬ cient writer save Cicero. His letters, however, unlike those of Cicero, were evidently written and arranged for publication. The order is largely chronological, although, to give an im¬ pression of carelessness, slight deviations ap¬ pear within the individual books. The diction is clear an'd smooth; and if, as Simcox thinks, his ((boundless self-complacency found here a safe opportunity for expansion," there is also manifest throughout a certain tone of culture and distinction which quite reconciles to any

such quality. Of Pliny's verses nothing re¬ mains and of his published speeches only a ful¬ some panegyric on Trajan whose florid style probably represents his oratorical attempts to imitate Demosthenes. The best edition is that of Keil (1873), who established the text and was aided by Mommsen. There are also many other excellent editions in whole or in part. There is an English version of the letters by Lewis (1880). Consult also Church and Brod- ribb, (Pliny's Letters (1872) in Collins' An¬ cient Classics ' for English Readers) ; and Schanz, Martin, (Geschichte der Romischen Litteratur) (Munich 1913).

PLIOCENE, according to Geological Sur¬ vey usage, the latest epoch of the Tertiary period. It is preceded by Miocene, and fol¬ lowed by

Pleistocene. Some authorities give it the rank of period. During this epoch the continent of North America had very nearly the same outline as at present, though a very narrow strip of marine beds on parts of the Atlantic and Gulf coasts show that at least for part of the epoch the sea had en¬ croached on the land. Florida was largely un¬ der water. A narrow belt of marine beds also exists on the Pacific Coast. Rather general uplift of the continent took place near the close of Pliocene time. The connection with South America, broken during Eocene (q.v.) time, was re-established during the Pliocene, with a resultant mingling of the faunas. The life of the epoch was not greatly different from that of modern times. The horse, which originated in the United States, had developed to its pres¬ ent genus. The rhinoceros, the mastodon and the sabre-toothed tiger were all present, though they ceased to exist on this continent during the Pleistocene. In Java, a skeleton has been found in Pliocene rocks, that may possibly represent an ancestral man. It has been called Pithecanthropus erectus (q.v.).

PLIOHIPPUS. See Horse, Evolution of. PLIOSAURUS. See Plesiosaurus.

PLOCK, plotsk, or PLOTZK, places in Poland, (1) town, capital of the government of Plock, on the right bank of the Vistula, 60 miles northwest of Warsaw. It has no less than 25 squares, of which one in the old town is very regularly built. It has a handsome cathedral, a considerable trade and several large fairs. Pop. (1915) 35,190. (2) The gov¬

ernment of Plock has an area of 3,641 square miles of level and moderately fertile territory. It was overrun by the Germans during the World War and sadly damaged. The region is agricultural ; wheat, rye and oats are grown and milled; there is a considerable beet-sugar industry. Lumber is cut and shipped. The Vistula is the principal river, but the Drewenz, which forms part of the northern boundary with Prussia, is a stream of good size. Pop.

786,000.

PLOMBIERES, plan-be-ar, France, a

health-resont in the department of Vosges, 14 miles south of Epinal. It became fashionable during the Second Empire through the favor of Napoleon III, though the virtues of its waters were known ever since the times of the Romans. There are nearlv 30 sorings, rang¬ ing in temperature from 66° to 150° F. ; their

waters are in great repute against skin diseases, gout, rheumatism, dyspepsia, female complaints, etc. A handsome casino was opened in 1876, and there are picturesque walks and a park in the valley in which the village stands. Perma¬ nent population about 2,000.

PLOTINUS, plo-ti'nus, the most famous of Neo-Platonists : b. Lycopolis, Egvpt, about 204 a.d. ; d. Minturnae, Campania, 270. In his intercourse with his pupils and acquaintances he avoided all reference to the antecedent circumstances of his life, his age, nativity or parentage. It is conjectured that he was of Roman descent, probably a freedman. It was in his 28th year that the desire to study philosophy awoke in him. He then fell into great despondency and was brought by a friend to Ammonius Saccas, a Christian, who had written some works on Christian theology, but returned to the Hellenic faith. He remained with him some 10 years. In 242 he joined the expedition of the Emperor Gordian to the East, in order to learn the philosophy of 'the Persians and Indians. After the death of Gordian he went to Rome where he subsequently lived and taught. About 254 his friends induced him to put his doctrines in writing. The works of Plotinus were highly valued by Longinus, al¬ though 'that philosopher was in no sense a Plotinist, and are distinguished by energy and enthusiasm. He was in fact a preacher. His teaching secured him great respect and popu¬ larity among those who did not receive Chris¬ tianity. Parents left their children to his care, and his house was full of orphans of both sexes entrusted to his guardianship. Although neglectful of his own temporal interests, he showed no want of shrewdness in looking after the estates of his wards. Plotinus enjoyed the favor of the Emperor Gallienus, from whom he obtained the privilege of rebuilding at the expense of the government two destroyed towns in the Campania, with a view to their being governed according to the laws of Plato. Plo¬ tinus was one of the great masters of phi¬ losophy. The value of his system depends less upon the intrinsic truth it contains than upon its historical importance and its adaptation to a certain class of human sympathies. The his¬ torical value of the system, great both in its antecedents and consequents, is due partly to the circumstances out of which it arose and partly to the genius and originality of its founder. It had its source at the junction of two independent streams of thought ; mysticism and dialectics, which, already fortuitously united, received a new direction from the in¬ dividual energy of the mind of Plotinus. He was well acquainted with the older Greek phi¬ losophy, the Ionian and the Eleatic schools, etc., and according to the eclectic tendencies of his day believed there was a fundamental unity in these various systems. It was to Plaito, how¬ ever, that he looked as his great authority. He believed himself a strict

follower of Plato; uses Plato's term, the Good, for his highest generalization ; but with Plotinus it is an ab¬ straction from which every determinate quality has been eliminated and would rather be de¬ scribed in modern philosophical language as the Absolute. Consult Jones, Rufus M., (Studies in Mystical Religion> (1909); Guthrie, K. S., (The Philosophy of Plotinus* (1910); Inge,

W. R., (The Philosophy of Plotinus5 (2 vols., London 1918).

PLOTZ, platz, Harry, American bacteriolo¬ gist : b. Paterson, N. J., 1890. In 1913 he was graduated at the College of Physicians and Surgeons of Columbia University and in 1914 discovered the bacillus of typhus. He sub¬ sequently proved the identity of Brill's disease with typhus and in 1915 he brought out a vaccine against typhus. The authorities of Mount Sinai Hospital sent him to Serbia in 1915, with a com¬ plete vaccination apparatus, in an effort to stem the tide of the typhus epidemic then raging in that country.

PLOVER, the general name employed to designate most birds of 'the limicoline family Charadriidcr, of which the true plovers are sometimes held to constitute the subfamily Charadrince , and to that extent are separated from the 'turnstones and surf-birds (qq.v.). Closely related are the sandpipers and snipes (qq.v.). The plovers have a short or mod¬ erate bill, never . exceeding the head, soft basally, but horny, somewhat enlarged and usually slightly hooked at the end. The legs are comparatively short and, with only a few exceptions, have no hallux, and the three remaining toes are not much lengthened. The body is full and plump, the neck short and thick and the head large. The long pointed wings reach to the tip of the short, 12-quilled tail. Plovers are small or moderate sized birds, remarkable for their ex¬ tensive migrations and found along the sea¬ shore or in plains and fields. They are strictly ground birds and with few exceptions lay four speckled pyriform eggs in a slight depression in the ground. About 75 species are known from all parts of the world, some of the exotic ones exhibiting remarkable modifications. With¬ in the limits of North America there occur three genera and 13 species, all closely related. The most distinct of these is the lapwing (Vanellus vanellus) , known by its crested head and long overlapping wings, a rare straggler from Europe which scarcelv belongs to our fauna. To the genus Charadrius

belong the black-bellied or bull plover (C . squatarola) and the golden plovers (C . dominions), et al. The former is nearly a foot long, and in the breeding plumage has the under parts largely black, but in the autumnal plumage, as usually seen in the United States, the black is limited chiefly to the axillary region. This plover may be distinguished at once from any closely re¬ lated American species by the presence of a distinct hind toe. It breeds in the far north sparingly as far south as Minnesota, and under¬ takes the most stupendous migrations, reaching South American on our side and South Africa, Australia and Tasmania on the other. .It mi¬ grates in flocks both coastwise and in the interior; and is equally common in this country and Europe where it is called the gray plover. The American golden plover (C. dominions), also known to gunners as the field plover and bull-head plover, is only slightly smaller than the last, from which it is easily distinguished by the absence of a hind toe and the paler finely mottled plumage, the upper parts of which have much golden-yellow in summer. This species breeds in Arctic America and winters as far south as Patagonia, passing through the United

States as a transient in the spring and again from August to November. At the latter sea¬ son their numbers are augmented bv the young of the year, and they migrate in great flocks or waves which often linger for several weeks in neighborhoods where food is abundant. Consult Elliot, (North American Shore Birds5 (New York 1895) ; Sandys and Van Dyke, (Upland Game Birds5 (New York 1902) ; Murphy, (American Game Bird Shooting5 (New York 1882) ; besides the standard works on ornithology.

PLOW, an implement originally drawn by horses, oxen, etc., used for breaking up or loosening the soil, preparatory to planting or sowing. The plow was the primary implement of civilization. The cultivation of the soil, which began with the invention of the plow, made it possible for men to live in permanent, populous communities, and civilization found a foothold wherever the pastoral tribes of the Stone Age learned the lesson of industry by following the plow. According to an Egyptian legend, ((Osiris taught the way and manner of tillage and good management of the fruits of the earth.55 It was undoubtedly in the valley of the Nile, or the Euphrates, that the plow was invented, for in these valleys are found the oldest ruins of agricultural settlements.

The first plow was roughly fashioned from a forked tree. One branch served as the beam, while the other branch was cut off and pointed, and the tail was trimmed to form a handle. Plows of this crude type are pictured on Egyp¬ tian monuments. After bronze tools came into

use, it was possible to make a more finished and efficient plow of dressed timbers, and many variations are found in the forms of wooden plows that were used 2,000 to 4,000 years ago. In the prevailing type, a block of wood, with the front end pointed or wedge-shaped, served as the bottom, to which the beam and a single handle were attached. In Latin America, and in many other parts of the world, wooden plows of this form, with iron points and one handle, are in use to this day. The extension of agriculture and civilization in Europe awaited the introduction of iron for plow points, which occurred shortly before the Christian era.

The ancient plow merely stirred or loosened the soil. Modern plows cut a furrow and turn it over so as to cover the sod and weeds, and leave fresh soil on the surface as the seed bed of the crop that is to be planted or sown. Eng¬ lish and American patent records show the evolution, in the past two centuries, of the mod¬ ern form of plow. The Colonial plow, which was used in the United States until the begin¬ ning of the 19th century, reflects English ideas in plow-making. The point was of wrought iron, sometimes tipped or edged with steel. The moldboard and all the other parts were of wood, but in some , cases the moldboard was covered with sheet iron.

In 1797 Charles Newbold, of New Jersey, patented a cast-iron plow, in which the share and moldboard were cast in one piece, but this plow did not prove successful, as the cast-iron point would soon wear off, and farmers could not afford the cost of renewal of so large and expensive a casting. The most practical im¬ provement of this period was made bv Richard B. Chenaworth, of Baltimore, one of the first

manufacturers of farm implements in the United States, who patented, in 1813, a cast-iron plow in which the share, moldboard and landside were cast in separate pieces. Jethro Wood, of New York, who took out patents in 1813 and 1819 on improvements in cast-iron plows, has been given credit for important work in the introduction of improved plows, although the main feature of his patent of 1819 was not a practical invention. He never engaged in man¬ ufacturing, and was unsuccessful in obtaining any income from royalties or licenses under his patents, but he gave his entire life to the work of advocating the use of cast-iron plows.

To James Oliver, of South Bend, Ind., is due the credit for the

invention of the chilled plow. He began the manufacture of plows at South Bend, Ind., in 1855. When iron is cast in a chill, that is, in a mold one side of which is a metal vessel filled with water, the sudden cooling of the molten iron in contact with the chill gives the casting a surface as hard as the hardest steel. But the chilled metal was not strong enough to stand the hard usage that a plow receives in the field, and it was impossible to prevent flaws and blow holes in the broad face of a moldboard. After many years of effort, Mr. Oliver mastered the problem. His first success was obtained in chilling the wing or outer end of the mold- board, where the friction with the soil is greatest and he ultimately succeeded in this purpose by the use of three inventions. The first consisted in the use of a chill filled with hot water. The heat dried out the moisture of the sand in the mold, and this obviated the flaws and blowholes that were caused by steam, which had been generated when the molten metal was poured into the mold. The next invention was the ventilation of the chill by means of checkered grooves on its face, which permitted the air and hot gases from the metal to escape from the mold. These two inventions produced a chilled casting which was free from flaws, but moldboards cast in this manner were not strong enough to stand ordinary usage in the field. This last difficulty was overcome by the invention of an annealing process which tempered and strengthened the moldboard without detracting from its wear¬ ing and scouring qualities and made the chilled plows a complete success.

A few of the notable improvements that have been patented by James Oliver are: The cast share, with chilled point and cutting edge, made by a simple process : the share with an upward, coulter-like extension, which fits against the front edge of the moldboard and gives a new vertical cutting edge to the plow when the share is renewed ; the curved malleable standard, which brings the beam over the line of resistance of the plow; the simple adjust¬ ment of the beam, which makes the plow bal¬ ance perfectly with two or three horses; the malleable gauge wheel, which regulates the depth of the furrow; and other devices to sim¬ plify and improve the work of the plow.

The next improvement in plows was the sulky or buggy plow, having two wheels and a seat, also a lever for regulating the depth of the share. Then came the gangplow or multi¬ plow, drawn by a tractor instead of horses. For such plows the share and moldboard was

often impracticable so the disc-plow was in¬ vented, consisting of a circular disced metal share that turned the soil as it rotated. A variety of plows are manufactured for special uses, as for ditching, plowing on a side-hill, for paring sod, or for cultivating particular crops. See

Agriculture.

PLOWDEN, Edmund, English jurist: b. Plowden, Shropshire, 1518; d. 6 Feb. 1585. He was educated at Cambridge and Oxford, admit¬ ted to practice physic and surgery in 1552 and later studied law. He was returned to Parlia¬ ment for Wallingford, Berkshire, in 1553, and in 1554 as member for both Reading, Berkshire, and Wootton-Bassett, Wiltshire; in 1554-55 he withdrew his company with 39 members who were dissatisfied with the proceedings of Parlia¬ ment. Proceedings were brought against them for contempt. Plowden defended his own case, and the matter was dropped. He was returned to Parliament for Wootton-Bassett in 1555. After the accession of Elizabeth he received no further political recognition, his steadfast adher¬ ence to the Roman Catholic faith barring his path though he was admittedly the greatest lawyer of his day. No proceedings were taken against him, though he often appeared in court as counsel for those of his faith, Bishop Bonner being one of his clients. His works are highly valued as a clear and authoritative record of the law proceedings of his time. (Les Commen¬ tates* (1571) fully sustains his reputation as a great jurist, and he also wrote (Les Quaeres del Monsieur Plowden) (trans. 1662). Consult Granger, (Biographical History of England* (1824) ; Wallace, (The Reporters* (1882).

PLUCKER, pluk'er, Julius, German mathe¬ matician and physicist: b. Elberfield, 16 July 1801 ; d. Bonn, 22 May 1868. He became a lec¬ turer at Bonn in 1825, professor of mathemat¬ ics there in 1829, and after holding a chair at Halle in 1834-36 was again at Bonn until his death. His contributions to mathematics were of much importance. He invented what is known as line (or linear) geometry, the theory of systems of rays, complexes and congruences, his uncompleted work on which was finished by Klein, his assistant, as (Neue Geometrie des Raumes) (1868-69). In his (Theorie der alge- braischen Curved (1839) he develops the <(six equations,** known by his name, concern¬ ing the singularities of algebraic curves. From 1847 he devoted much attention to physics. He made study of the magnetic properties of gases and liquids, spectroscopy and electrical phe¬ nomena of light in rarified air. He originated the Geissler tubes and discovered the fluores¬ cence of cathode-rays. His

PLUM, the popular name for several spe¬ cies of the genus Prunus, extensively cultivated in mild climates for their fruits. They are widely distributed in the North Temperate zone, especially in America and eastern Asia. They have alternate, simple, leaves ; white flowers mostly in cymes and generally appearing with the leaves; and drupaceous, one-seeded, bloom- covered fruits. They are closely

related to apricots, cherries and peaches.

PLUM

253

The most important species is the European plum (Primus domestica) , a native of the Cau¬ casus region, and thought to have been derived from the blackthorn (P. spinosa) . It has given rise to four distinct groups : Prunes, firm, thick- fleshed, sweet varieties of various colors (blues are best known), adapted for drying without the removal of the stone (see Prune) ; Damsons, little, firm-fleshed plums of diverse colors and usually clustered, frequent in fence corners; Greengages, small green, globular plums gen¬ erally of high flavor; Large, yellow, blue, red and purple varieties. The domestics are the leading plums from New England southward to Pennsylvania, westward to Lake Michigan, and upon the Pacific Coast. Some of the hardier Russian varieties are being tried in the colder regions of the West and North.

Next in importance are the Japanese varie¬ ties of Prunus tri flora, first introduced into America in 1870. This species is presumably a native of China. The fruits are generally rounder than those of the domestica varieties, and are more noted for their light reds and yellows. Their chief merits are : added variety to the list, especially of early maturing kinds, firm-fleshed fruits which ship well and vigor¬ ous, productive trees freer from the attacks of curculio and black knot (see below) than the domesticas. They succeed farther south than the domesticas, and in many instances farther north.

Several American species have also rapidly become popular in the United States and Canada. Prunus americana and P. angustifolia are the leading species, the former especially in the North and West, but also extending to the Gulf States; the latter popular from Pennsyl¬ vania southward. These are of still more recent introduction into cultivation than the Japanese varieties, and are valuable acquisitions where the two preceding groups fail. The wild goose plum is P. hortulana.

The following species are also cultivated: Myrobalan or cherry plum (P. cerasifera) , pre¬ sumably a Caucasian species, used largely by nurserymen for budding plums upon ; apricot or Simon plum (P. simonii), an introduction from China popular in California since 1880, but little grown in the East; beach plum (P. mari- tima) , common upon the coast from Nova Scotia to Virginia, but little cultivated except as an ornamental shrub; Pacific Coast plum (P. subcordata) ,

indigenous in Oregon and Cali¬ fornia, and somewhat cultivated ; and the sand plum (P . angustifolia watsoni), a shrubby species common in Kansas and Nebraska, but little cultivated.

Plums are propagated from seed only when new varieties are desired; varieties true to name are all propagated by budding or, to a very limited extent, by grafting. The process is the same as for the peach (q.v.). If domes¬ tica varieties are to be grown upon light soil they are generally whip-grafted on peach stocks, the peach being adapted to such soils. Similarly peaches to be grown upon heavy soil are often grafted upon plum stocks.

The various groups succeed upon a wide range of soil ; the domesticas are generally well adapted to heavy soils; the Japanese to medium and even light; and the American kinds often to very light. There are, however, varieties in each group adapted to other soils than Suit

the majority. The land is deeply plowed and thoroughly harrowed before planting. The trees are set about 20 feet apart in squares or hexa¬ gons (see Peach), or in rectangles from 8 to 12 feet asunder in rows 18 to 20 feet apart. In the last case cultivation is given only one way when the trees commence to touch. Usu¬ ally less than half a dozen main limbs, prefer¬ ably close to the ground, are allowed as the framework of the tree and after the first year or two little pruning beyond the removal of interfering, injured or dead branches is given. The trees are usually planted when two years old from the bud, extra vigorous growers some¬ times when one year old. Varieties of the Japanese and American groups should not be planted in blocks of only one kind, since they are often self-sterile and fail to set fruit ; two or more kinds should be alternated in the or¬ chard. (See Pear). Cultivation is practically the same as for apples and pears. In the West¬ ern States, however, a mulch of straw, marsh hay, etc., is often substituted for cultivation. The fertilizers usually employed are rich in potash and phosphoric acid. Cover crops of legumes should supply sufficient nitrogen, or a biennial dressing of stable manure may be used as a supplement. Occasional dressings of lime are often beneficial. Few fruits respond better to liberal feeding than the plum. The conserva¬ tion of plant food which follows thinning the fruit, to stand at least two inches apart, is also of great benefit to both tree, annual pro¬ ductivity, size of fruit, and in the prevention of fruit rot. (See Peach).. When fully grown and colored but before becoming soft the fruits are gathered and generally marketed, in the East, in eight-pound Climax grape baskets. The plums shipped to eastern markets from Cali¬ fornia (mostly of the prune and Japanese types) are packed in boxes and sent by refrig¬ erator express freight.

Some of the principal diseases of the plum are also common to the cherry or the peach, or both. Plum-pockets (Exoascus pruni) is a specific plum malady. Shortly after the blossoms fall the little plums swell rapidly to an inch long or more and become bladdery. As the disease progresses the light green color changes to deep brown or black, the walls thicken, the stone fails to develop and the fruit falls. Af¬ fected foliage and green twigs also become dis¬ torted. Spraying before the buds open and again after the flowers fall is recommended as a check. (See Fungicide). Black, or plum- knot (Plozurightia morbosa) is common to both plums and cherries. Swellings appear upon the twigs and branches, burst and reveal a golden brown or yellow interior with velvety appear¬ ance due to the rapidly forming summer spores. As the season advances the surfaces change to black with a more or less pimply appearance. In the spring a second crop of spores (winter spores) is liberated. Under favorable condi¬ tions spores from either crop may spread the affection through crevices in the bark, etc. The knots are perennial, gradually extending the infested area. Cutting and burning as soon as discovered; painting the wounds with kero¬ sene or Bordeaux mixture, thorough spraying with standard Bordeaux mixture before the buds open and with diluted mixture afterward are all recommended and should all be practised. One alone is insufficient. Badly infested trees

and trees of wild cherries, plums, etc., should be burned promptly. Leaf blight or shot-hole fungus is produced by two species of fungi, Septoria cerasina and CylincLrosporium padi. Small purplish spots upon the leaves gradually turn brown and drop out leaving shot-like holes. If badly infested the leaves turn yellow and fall, sometimes defoliating the trees. Spraying with diluted Bordeaux mixture at intervals of two weeks from the time the leaves expand until midsummer is considered a specific. This dis¬ ease is often found on cherries. Systematic annual spraying will hold all these diseases in check.

Comparatively few insects feed upon the plum. Some caterpillars and other leaf-chewing insects sometimes appear in devastating nuni- bers, but they can usually be controlled with Paris green (lime should be added to prevent injuring the foliage) ; plant lice are sometimes troublesome, but whale-oil soap, kerosene emul¬ sion, etc., are effective. (See Insecticide). But the most serious enemy is the plum curculio (Conotrachelus nenuphar) , which in many sec¬ tions has

completely destroyed the crop. The adults, small gray-black snout beetles less than a quarter of an inch long, appear in spring and until the fruit has formed feed upon the foliage. Then the females chew little crescent-shaped cavities in the young plums, and lay their eggs in holes bored beside the crescent or in the crescent itself. The white, footless larvae bur¬ row to the region of the stone where they live for about three weeks. The fruits fail to de¬ velop and fall, and the larvae burrow into the ground where they pupate for about four weeks, emerging as adults which hibernate. They have only one brood. Before the trees blossom arsenites may be used; but jarring the adults into sheets in the early morning while they are torpid and dropping them into kerosene is most practised. Special machines like inverted umbrellas on wheels are in use in large plum orchards. The plum gouger (Coccotorus scutel- laris) is a troublesome pest in the Mississippi River basin. Its habits are much like those of the curculio. It does not, however, make a crescent-like mark, and its larvae feed in the stone instead of around it.

Bibliography. — Bartrum, E., (Book of Pears and Plums* (New York 1903) ; Hedrick, W. P., (Plums of New York) (Albany 1911) ; Waugh, F. A., (Plums and Plum Culture) (New York 1901 ; this work contains a bibli¬ ography) ; Saunders, Unsects Injurious to Fruits) (Philadelphia 1889) ; Smith, (Manual of Economic Entomology) (Philadelphia 18%). The following Agricultural Experiment Sta¬ tions have published bulletins upon plums : Vermont, Nos. 53, 67 and 75, with references for 1896-1901 ; Wisconsin, Nos. 63 and 87 ; Cornell University, Nos. 38, 62, 106, 131, 139 and 175 ; United States Department of Agri¬ culture, Bulletin No. 172, contains by Wight, W. F., (Varieties of Plums derived from native American Species) (Washington 1915).

PLUM, Date. See Persimmon.

PLUM BLOSSOM, Order of the. See

Orders, Royal.

PLUM CURCULIO. See Plum.

PLUMAGE. Feathers are pre-eminently the distinguishing characteristic of birds: all

birds have them, while no other animal pos¬ sesses them. As elsewhere described (see Ornithology) feathers fill two important func¬ tions, the retention of animal heat in the body and the support of the bird in flight ; and since they cover practically the whole bird,

all the striking features of color and ornament so highly developed in this group, pertain to the feathers.

The typical or pennaceous feather consists of a hollow nearly transparent, cylindrical portion (calamus), which merges above into an apaque, . usually squared shaft (rhachis). The calamus, or quill, is composed of a series of oblong cells nesting into one another and containing the ˆpulp® from which the growing feather is built up. When the feather is complete these cells are empty. The shaft bears on either side the webs or vanes, soft flexible surfaces which upon slight tension split up into their component parts — rami or barbs. These are slender lamel¬ lae which branch off from the rhachis and in turn give rise to branches — radii or barbules. The anterior barbules of one barb overlie the posterior barbules of the next barb and the numerous cilia (barbicels) which they bear, many of which are hook-shaped at the tip, interlock with the thickened upper edge of the posterior barbules, binding the barbs together and form¬ ing the substantial web which is so essential to flight. In the inner web of a crane's feather 15 inches in length have been counted 650 rami each bearing about 600 pairs of radii, or nearly 800,000 radii for the inner web alone and far above 1,000,000 for the entire feather. At the point where the rhachis emerges from the cala¬ mus is a pit known as the umbilicus and here is frequently found a sort of secondary feather known as the hyporhachis or aftershaft; it is usually much smaller than the main shaft and more downy in character, but sometimes, as in the emu, is of the same dimensions and appearance.

Feathers are entirely products of the skin, being similar to the scales of reptiles rather than to the fur of animals so clothed. They do not grow continuously, but are periodically shed and replaced by other feathers. The first feathers appear as small papillae on the skin of the embryo. Each papilla is produced by a group of cells known as the Malpighian cells, which increase and divide, part of them growing down and forming the lining of the feather- follicle, the others forming the feather itself and surrounding the central mass or pulp, which is well supplied with blood-vessels and furnishes the requisite nourishment to the growing feather. The Malpighian cells which produce the feather form three layers — a thin exterior one, the sheath which covers the young feather in what is familiarly called the ((pin feather** stage and later scales off as the feather expands ; a middle layer, which forms the feather itself ; and a very thin innermost layer, which covers the pulp and which persists in¬ side of the calamus as a series of pithy caps left by the retreating pulp. This pulp is with¬ drawn to the base of the follicle when the feather is completely grown and becomes active again when the feather is shed, or at the time of the periodical

molting (q.v.).

Feathers are classified into (1) contour feathers — those which are outermost and give

form to the bird; (2) down feathers, — the dense undercoating; (3) filo-plumes; and (4) powder-down feathers.

The first are usually pennaceous in struc¬ ture, but in the various ornamental plumes, barbicels and even barbules may be wanting or reduced in number, producing a fluffy feather. The down feathers have no barbicels and usu¬ ally no rhachis, but consist of long fluffy barbs, all of which grow out from the tip of a very short calamus. Filo-plumes are exampled by the long ®hairs)> found upon the body of the domestic fowl after the feathers have been plucked and commonly removed by singeing. They show under the microscope a degenerate feather structure of barbs and barbules. In the case of some birds, however, they become very long, reaching out beyond the contour feathers and influencing the coloration and tex¬ ture. Powder-downs are down feathers which are constantly disintegrating into a fine powder and are found in the plumage of various birds, notably parrots, tinamous, herons and the spe¬ cies of Podargus.

With regard to age, feathers are divisible into two groups: (1) neossoptiles, or feathers of the young birds at the time of hatching; and (2) teleoptiles, or feathers of later life. The neossoptiles are of two kinds: (1) the pre- pennae which immediately precede the contour feathers; and (2) the preplumulae which pre¬ cede the down feathers. A further division is made of the pre-pennae into ˆprotoptiles® and “mesoptiles,® but these are important only to the scientific ornithologist. The neossoptiles are always downy in structure and after a vary¬ ing period they are superseded by the teleoptiles. In the penguins there are two distinct plumages of neossoptiles one succeeding the. other; the second growth beginning before the first is shed. The short calamus of the neossoptile never be¬ comes closed up and is split longitudinally as it is forced out by the teleoptile and for some time its slender downy barbs are borne on the tip of the new feather. When one generation of teleoptiles succeeds another the old feathers usually drop out, but in the emus and casso¬ waries they remain attached to the tips of the new feathers, just as do the neossoptiles. Neos¬ soptiles are best developed in the birds which run

about within a short time after hatching, such as the gallinaceous birds, ducks, sand¬ pipers, etc. In these species the body is thickly and completely covered with down. In the hawks and owls the covering is nearly as thick, but in the latter the neossoptiles grow out for a considerable time after hatching, sometimes completely altering the appearance of the bird. In the snowy owl, for instance, the newly hatched young with the tips of the neossoptiles showing, is pure white, while older ones, in which these feathers are full grown, appear dull gray, owing to the difference in color of the terminal and basal portions of the feathers.

In passerine birds the neossoptiles are not very abundant, while in several groups — notably the woodpeckers where the young are reared in hollowed trees and the kingfishers which bur¬ row in sand banks — the neossoptiles have been entirely suppressed, so that the first coat of feathers on these birds consists of teleoptiles and the young birds are naked until these appear. This is perhaps owing to the protection afforded by the nest to the young, which renders the

early downy covering less necessary. In the mound-builders a still more remarkable con¬ dition prevails. Here the neossoptiles are de¬ veloped but are shed before the bird is hatched and it actually leaves the shell clad in the teleoptiles.

Feathers are not distributed uniformly over the body of a bird as are the hairs of a cat or rabbit, but they are in well-defined groups or areas known as ˆpterylae,® with bare spaces, ˆapteria® between. In some kinds of birds the apteria are covered with down feathers. The pterylae are of characteristic outlines in differ¬ ent families and are thus of value in deter¬ mining relationships.

It is obvious that the early plumage condi¬ tion of birds is to some degree dependent upon their nesting habits and this must be clearly borne in mind when it is considered in con¬ nection with classification. Thus many appar¬ ently striking characters will be seen at once to have been very recently acquired.

Following the nestling stage, birds acquire one coat of feathers after another, the frequency of the change depending upon the number of molts. The first teleoptile or ˆjuvenal® plum¬ age is generally quite different from that of the adult, is worn for only a few months after the bird leaves the nest, when it is superseded by the plumage of the first winter, in which the characters of the adult generally appear. This may be retained for a whole year, or it may give way to a nuptial plumage in the early spring, the latter being always the case in birds

which are strikingly different in color in sum¬ mer and winter. It is now demonstrated that feathers cannot change their pigment after they are once developed and consequently striking changes are due to molt. There are some par¬ tial exceptions to this, in the case of birds whose plumage undergoes marked wear or abrasion, such as the snow-bunting. In this species the feathers of the back are black at the base, those of the head white, but both are broadly tipped with brown, and as they lie in place brown is the prevailing tint. In early spring the tips become brittle and fall away, leaving the black-and-white basal portions in strong contrast. In the crossbill, as shown by Dr. Dwight, the barbs are red and the barbules gray and in spring the latter fall off, resulting in a material brightening of the plumage.

The relation of the juvenal plumage to that of the adult bird is a matter of much interest, owing to the fact that it usually shows some ancestral characters, and often gives us a clue to the relationship of the species ; for example, the young of our rcdbin is spotted like the an¬ cestral thrushes, while the adult has departed widely from this type in its plain rufous breast and slaty back.

In a large number of species the plumages of the male and female differ materially; the lat¬ ter is always the more primitive, and the male generally assumes a dress similar to it for the winter, returning to his brilliant livery on the approach of the nuptial season. Darwin's the¬ ory of sexual selection, which was formerly held to account for the brilliant plumage and wonderful ornamental feathers of male birds is in the light of modern investigations not satis¬ factory, 'but no acceptable theory has yet been presented. Protective coloration in plumages has received a good deal of attention from

Wallace and others, and doubtless the theory in some cases has been unduly elaborated. While protective coloration plays a part in the evolution of plumage it is quite as likely that, for instance, pale desert forms are as much the result of the direct effect of the sun as purely protective development. The protective plum¬ ages of the ptarmigan both in winter and sum¬ mer, and the curious protective or ˆeclipse® dress acquired by certain ducks in summer when rendered temporarily flightless by their peculiar method of molting, deserve mention in this connection.

Molt varies in extent, may be complete or only partial. That which

takes place after the breeding season is always complete ; but the spring molt may be complete or reduced to a few feathers only, varying greatly. Molting takes place after a definite plan which differs with the species. In ducks, and certain other water birds, the quills are shed all at once. See Pterylography. Consult Chapman, F. M., (Handbook of Birds of Eastern North Amer- ica) (Rev. ed., 1912; pp. 84-96); Dwight, J., (Sequence of Plumages and Moults of the Passerine Birds of New York) (in Annals of the New York Academy of Science, Vpl. XIII, pp. 73-360, New York 1900) ; Stone, W., (The Molting of Birds> (in Proceedings of the Phil¬ adelphia Academy of Natural Sciences, 1896; pp. 108-167) ; Strong, R. M.,

1902).

PLUMB-LINE. See Plummet.

PLUMBAGO, a genus of herbs or sub¬ shrubs of the order Plumbaginacece ; the lead- worts. The species, of which about a dozen are known, are natives of warm climates, espe¬ cially western Asia and the Mediterranean re¬ gion. They have variously formed, usually alternate, entire leaves ; and white, pink or blue tubular flowers, arranged in terminal spikes or racemes. The best-known species are P. capen- sis and P. rosea , which are popular as green¬ house and garden plants. They are easily prop¬ agated by cuttings, and will thrive in any good potting or garden soil. In cold temperate cli¬ mates cuttings rooted in the early autumn, grown in the greenhouse during the winter, and transplanted to the garden in the spring, will blossom through the summer and autumn and may then be used as winter plants or kept in a cellar. In southern California and other mild climates the plants often climb 15 feet or more it not molested, but in greenhouses they are usually straggling shrubs.

PLUMBAGO, or GRAPHITE, also called

black lead. See Graphite.

PLUMBING AND STEAM FITTING.

The word ˆplumbing,® derived from the Latin plumbum (lead), as originally used, meant to seal or repair with this metal, but the term as now used, in its broadest sense, means the pipes, connections, fixtures, etc., used for the purpose of supplying water, gas, hot water, steam or hot air from outside places to the interior of a building, or of carrying these throughout the building; and also for the pur¬ pose of drainage. All the ancient nations em¬ ployed lead pipes to some

extent; water was

universally conveyed through them when the pressure was too great for earthenware pipes ; and ihe Romans used them in their aqueducts in crossing ravines or valleys where the con¬ struction of bridgework was difficult or im¬ possible.

The improvement in plumbing fixtures was remarkably slow, and has taken place within the last 78 years. The trade of plumbing was practically unknown prior to that time, but upon the completion of the Croton Aqueduct in 1842, more substantial and durable pipes and fittings became necessary, a condition which ultimately led to the establishment of manu¬ factories of plumbers' supplies. At first these concerns were engaged almost exclusively in the manufacture of lead pipe, sheet lead or iron pipe, which were the principal articles used by the plumber, but to-day lead has been largely replaced by other metals, and we find that the plumber and the gas, steam and water fitter use lead, copper, brass and various styles of plated pipe, and that the use of vitrified clay or sewer pipe has been almost entirely abandoned, ex¬ cept for connecting the house and street sewer¬ age systems. The grade of work done by the plumber has made a very material advance, the work being done largely by licensed plumbers, and in many cases under the direct supervision of expert inspectors employed by the city. In nearly all large cities plumbing is governed by rules and regulations, carried into effect by the department of the city government appointed for that purpose, and it is the duty of such de¬ partments to enforce the regulations which de¬ fine the class of work to be done, the sizes of the various kinds of pipes to be used, the class of fixtures, etc. Such work usually comes under the supervision of the building, or the sewerage and water supply departments. The service pipe, which connects the system of supply pipes in a building with the main in the street, is generally laid by the water depart¬ ment.

For many years the entire plumbing system of the ordinary dwelling consisted of a sink with hot and cold water faucets over it, and connected with the water-back and boiler at¬ tachments of the range. This was followed by the installation of the bath-tub — an unsightly affair, consisting of a wooden box lined with lead. This was in time replaced by the cast- iron tub, then the copper-lined tub, both of which were superseded by the modern porce¬ lain bath-tub, which is of cast-iron with a porce¬ lain finish. The fixtures supplied by the plumb¬ ing trade are almost innumerable. Faucets, cocks and valves are provided for each place where water is drawn ; laundry tubs, provided with hot and cold water pipes, are installed in the kitchen;

marble, cast-iron or steel wash bowls are placed in the bathrooms or sleeping- rooms of a dwelling; and shower and foot¬ baths are provided when desired..

The main feature of the plumbing in a modern dwelling lies in the water-closet and the system of pipes which carry off fouled water. In this division of plumbing more care and in¬ genuity have to be exercised by the plumber than in any other line of the trade, for it is with this division more than any other that the question of general public health is concerned. Hence this branch of work is often called

sanitary plumbing. Sewage is a constant menace to health and it is the carrying off of refuse upon which the manufacturers have turned their inventive facilities. Though water- closets have been in use as long as have bath¬ tubs no special attention was paid to their im¬ provement in construction till 1775, when the first patent was taken out in England by a watchmaker, named Alexander Cummings. This was of the siphon-trap style, and in 1778 was followed by a closet with a valve whioh worked on a hinge at the bottom of the bowl, the invention of Joseph Bramah. In 1792 an¬ other patent was granted for a valve closet supplied with a tank, the hopper of which was flushed by pressure on the seat. From that time .the inventions, were manv and various, until at the present time we have valve closets, pan closets, plunger closets, hopper closets, cistern closets, siphon closets and latrines. The old- fashioned pan closet, used almost universally many years ago, was one of the most unsanitary of all the plumbing fixtures in use, and because of its filth and stench has been generally dis¬ carded. It consisted of a metal pan which worked on hinges, and when let down emptied the contents into the discharge pipes. Then came the valve and plunger closets, whioh were later superseded by the siphon closets. The valve closet takes its water from the main service pipe, whereas the cistern closet receives its supply of water in the tank from the main, and it is then discharged in the bowl by pull¬ ing a hanging chain attached to a lever, whioh raises the valve in the cistern.

Water-closets are now most generallv con¬ structed of glazed earthenware, some are made of the finest bona china and others again are made of cast-iron with a china finish. The old-styled closed plumbing has given way to the most modern sanitary appliances, and open work is generally to be found even in the poor¬ est dwellings,

because of its cleanliness, health¬ fulness and ease of access to repair.

The next part of the general sanitary sys¬ tem to be considered is the arrangement of pipes and appliances which connect the basins, sinks and water-closets with the general sewer. Ventilation is one of the most important sub¬ jects which the sanitary plumber must under¬ stand. How to prevent gases arising from sewers — for where there are sewers there is sure to be sewer-gas — and how to prevent the air in a room from becoming foul, have been constant sources of trouble to the modern sani¬ tary plumber, and that he has solved these problems has probably resulted in more benefit and insured the public against more harm from diseases attendant upon these evils than any other one thing. It is an indisputable fact that the wise and exact observance of these sani¬ tary laws has ibeen a potent factor in materially reducing the death rate in our larger cities.

In this system of pipes the most important object is to prevent the air within them from gaining access to the building. This is most generally done by means of a trap or depres¬ sion in the pipe, or by making the internal pipes gas-tight. The inverted siphon, sealed by water lying in the bend, is probablv the best form of trap. Fresh air should have free access to the pipes, the air of the sewer should be shut off from that of the pipes within the vol. 22 — 17

house and fouled water should be immediately and completely removed from the vicinitv of the building. The ventilation largely affects the methods of connecting the main drain with the soil-pipes. The most general and easiest method of ventilating the soil-pipes is to extend the drain pipe to a point above the roof, and through this the current of air, which comes in at the manholes in the street and passes along the street sewers, flows upward and out. The method is most effective where the street sewers are constructed on the ˆseparate® sys¬ tem, but where the street sewers are built on the ˆcombined® plan, it is preferable to have a trap on the house sewer in connection with the fresh air inlet, because o*f the fact that the foul- air currents are thus diverted from the interior pipes and a current of fresh air is forced up¬ ward through the soil and ventilating pipe.

Waste pipes should be of lead, though some¬ times cast or wrought-iron is preferable because of the large diameter required and the soil ; waste and ventilating pipes should be exposed as much as possible for purposes of inspection or repair. The main house drain and the soil pipe should be of heavy cast-iron with lead- calked joints, and all iron pipes and fittings should be coated with coal-pitch varnish, both inside and outside. If plumbing work be car¬ ried out on the ideas set forth,

with proper traps, light, ventilation, simplicity, accessibility, good workmanship and a high grade of material throughout the public health will properly be insured against the ravages of disease so com¬ mon before the improved appliances came into vogue.

Another distinct division of the plumbing trade is the carrying of steam in pipes through¬ out a building. Prior to 1840 and even as late as the Civil War, the growth of steam heating had not assumed any great proportions. Eng¬ lish inventors had made many attempts at steam heating by means of small pipes connected with boilers, on the theorv that this would create a high temperature. But this soon gave way to the low pressure system because of the fact that there was little or no wear upon the ap¬ paratus, and the generation of the low pressure saved fuel. Joseph Nason, of New York, and J. J. Walworth, of Boston, were largelv instru¬ mental in the earlier development of the indus¬ try. Boilers were first used, but these were quickly followed by radiators constructed of wrought-iron tubes, both vertical and horizon¬ tal. In 1865 the manufacturers began to make heating boilers and radiators from cast-iron, and the manufacture of steam and hot-water furnaces has become an industry of great im¬ portance. The development of the modern office building has in a large measure added to the success of this branch of the trade, for it is in these that this system of heating is car¬ ried to its greatest degree of perfection. The boilers used in these buildings are of wrought- iron or steel, because the running of elevators, electric lights and pumps, necessitates that a high pressure be maintained on the boiler.

The industry is now so complex, drawing its supplies from several lines of manufacture, and consisting mainly of contracting work, that ac¬ curate statistics of its extent cannot be com¬ piled. Consult Starbuck, R. M., (Modern

Plumbing Illustrated) (1915); and Gerhard,

(Sanitary Engineering of Buildings* (1915). See Boiler; Bath ; Drainage; Public Health ; Sanitary Engineering; Sanitary Science; Valves; Waret: Its Relation to Disease, Etc.

PLUMBOJAROSITE, a lead ore consist¬ ing of a hydrous sulphate with iron, PbFee (OH) 12(504)4, occurring in mines in Colorado, Nevada, New Mexico and Utah.

PLUME-MOTH, or FEATHERWING,

one of the small moths of the family Ptero- phoridce , allied to the clothes-moths, which are readily distinguished from all others by the fact that their wings are deeply cleft at the edges, so as to resemble five (sometimes six) feathers on each side of the body. Some 70 species have been enumerated. The grapevine plume-moth (Oxyptilus peris celidactylus) as larvae leaves silk-like strands on the leaves of the grapevine. The caterpillars develop to pupae in the early summer. As moths they have slim bodies and 16 legs, and are of numerous colors. The Ooneodiace, having six side feath¬ ers, are also classed as plume-moths.

PLUMED KNIGHT, The, a name applied to James G. Blaine (q.v.). It was first used in a speech made by Col. Robert G. Ingersoll, when nominating Mr. Blaine for the Presidency in 1876.

PLUMIER, plu -me-a, Charles, French botanist: b. Marseilles, France, 1646; d. Santa Maria, near Cadiz, Spain, 1704. He studied under Joseph de Tournefort, and in 1689 went to the West Indies, engaged in botanical re- . searches under the government and on his return published description des Plantes de l'Amerique* (1693). Subsequently in 1693 and 1695 he made voyages to America at the request of the king, and he was about to sail on a fourth voyage when he died. His (Traite des Fougeres de l'Ameriques* (1705) is still an authority; among his other works are many valuable manuscripts in the library of Paris and in the Jardin des Plantes, and (Nova Plantarium Americanarum Genera* (1703). Consult Hal¬ ler, (Bibliotheca Botanical

PLUMMER, Alfred, English Biblical •scholar: b. Heworth, Durham, 17 Feb. 1841. He received his education at Exeter College, Oxford; was Fellow of Trinity College in 1865- 75; tutor and dean in 1867-74; and master of University College, Durham, from 1874 to 1902. He published translations of several of Dr. Dollinger's works (1870-75) ; commentaries on II Saint Peter and Saint Jude (1879) ; (Saint John's Gospel and Epistles) (1880-86) ; (The Pastoral Epistles) (1889) ; (Epistles of Saint James and Saint Jude* (1890) ; Untroduction to Joshua and Nehemiah* (1881) ; Handbook on the Church of the Early Fathers1* (1887) ; Commentary on Saint Luke's GospeP (1896) ; (Second Corinthians1* (1903; enlarged ed., 1914) ; (Saint Matthew) (1909) ; (Saint Mark) (1914) ; (Lectures on English Church History, 1 575—1649 > (1904) ; Cectures on English Church History, 1 509—1 575) (1905); (Lectures on English Church History, 1649-1 702) (1906) ; (The Church of England in the 18th Century* (1910); (The

Churches in Britain before A.D. 1000* (1911); (The Humanity of Christ and Other Sermons* (1913); Continental Refor¬

mation in Germany, France and Switzerland*

(1912).

PLUMMER, Mary Wright, American li¬ brarian : b. Richmond, Ind., 1856; d. 21 Sept. 1916. She was educated at Wellesley and at Columbia University, was librarian of the Pratt Institute Free Library, Brooklyn, in 1896-1904, also director of the Library School there from 1896 to 1911. After 1911 she was principal of the Library School of the New York Public Library. Miss Plummer was president of the American Library Association in 1915. Her publications include (Hints to Small Libraries* (1894; 4th ed., 1911) ; (Verses* (1896) ; Con¬ temporary Spain* (1899) ; (Roy and Ray in Mexico* (1907) ; (Roy and Ray in Canada* (1908) ; (Stories from the Chronicle of the Cid* (1910).

PLUMMET, or PLUMB-LINE, a leaden

or other weight let down' at the end of a cord to regulate any work in a line perpendicular to the horizon, or to sound the depth of anything. Masons, carpenters, etc., use a plumb-line fas¬ tened on a narrow board or plate of brass or iron to judge whether walls or other objects be perfectly perpendicular, or plumb as the artificers call it. Near a range of high moun¬ tains the plumb-line, as has been demonstrated by a number of experiments, is not perfectly true, but inclines toward the mountains ; and officers in charge of the United States Coast and Geodetic Survey among the Hawaiian Islands have observed that the deviation of a plumb-line from the vertical is greater in the case of mountains in an island than in conti¬ nental mountains, and greater in the neighbor¬ hood of extinct volcanoes than in that of active volcanoes. In given localities the plumb-line also varies according to the ebb and flow of the tide.

PLUMPTRE, plump'tr, Edward Hayes,

English theologian and scholar : b. London, 6 Aug. 1821 ; d. Tunbridge Wells, 1 Feb. 1891. He was educated at Oxford, and was succes¬ sively chaplain at King's College, London (1847), professor of pastoral theology there (1853), and professor of exegesis there in 1864. He was also appointed prebendary of Saint Paul's, London (1863), rector of Pluckley, Kent (1869), and vicar of Bickley, Kent, in 1873. In 1869-74 he was one of the revisers of the Old Testament and

was appointed dean of Wells in 1881, a position which he held until his death. Among his published works are (Lazarus and Other Poems (1864) ; (Master and Scholar,* verse (1866) ; cChrist and Christendom* (1867) ; an excellent verse translation of Soph¬ ocles (1865), and a similar one of TEschylus (1868); (Biblical Studies* (1870);

PLUNKET, William Conyngham, 1st

Baron Plunkett, British statesman : b. Ennis¬ killen, Ireland, 1 July 1764; d. Old Connaught, Wicklow, Ireland, 4 Jan. 1854. He was gradu-

ated from Dublin University in 1784, admitted to the bar in 1787 and in 1797 became king's counsel. In 1789-1800 he sat for Charlemont in the Irish Parliament and acquitted himself with much credit until the extinction of that body. He was appointed solicitor-general in 1803 and appeared for the prosecution at the trial of Robert Emmet; in 1805 he was ap¬ pointed attorney-general for Ireland and in 1807 and 1812-22 sat in the British House of Com¬ mons, where as a Protestant he made a resolute fight for Catholic emancipation. In 1822 he was raised to the peerage, was attorney-general of Ireland 1822-27, chief justice in 1827-30 and Lord Chancellor from 1830-41, when he retired from public life. Consult Plunket, David, (Life, Letters and Speeches of William Conyng- ham PlunkeD (1867).

PLUNKETT, Horace Curzon, Sir, Irish statesman : b. in Ireland 1854. He graduated from Oxford, and came to America, in 1879. After 10 years in Montana, he returned to the old soil, and soon became active in politics. He adopted the interests of the farmers, and in 1894 founded the Irish Agricultural Organiza¬ tion. He ha-d in 1892 gone into Parliament as a Unionist. He advocated discussion and har¬ mony, and urged a <(Recess Committee® to work on these lines. He was made chairman, and had on his committee Earl Mayo, John Red¬ mond, The O'Conor Don and Thomas Sinclair. Thereupon Plunkett worked up a long report in the systems of agricultural aid extended in other countries, and his committee backed it. The result was the act of 1899 establishing a Department of Agriculture in Ireland, with Plunkett as vice-president. He remained in the office even under the

Liberal opposition until 1907 when he was pushed aside by politics. In 1903 he was knighted; in 1911 he was returned to office, and 1914 was active in the effort to pacify Ulster. Later he advocated Home Rule. He published (Ireland in the New Century } (1904); department of Agricultural Instruc¬ tion and Technical* (Ireland 1907) ; (A Better Way:' an appeal to Ulster* (1914).

PLURALISM. This term is used in cur¬ rent philosophical discussion to denote the view that regards the world as composed of a num¬ ber or plurality of beings of distinct and inde¬ pendent nature. It is thus opposed to Monism (q.v.), which asserts that there is only one ultimate form of reality (as for example, with Spinoza, who regards all finite things as modes or manifestations of one substance, or with the idealism of the present day which interprets all forms of existence as parts of an Absolute Experience). In some sense both Monism and Pluralism, must he true; that is, in some sense the world is one, a single universe, and in some sense it is composed of many various parts. The ultimate problem of philosophy is to define the sense in which each of these. propositions is true, to reconcile the point of view of the one with that of the many.

The practical motive in the opposition be¬ tween Monism and Pluralism lies chiefly in the necessary implications of these theories regard¬ ing the place and importance of the human in¬ dividual in the world. Pluralism is a protest against a Monism that would merge the many individuals in a one all-embracing, absolute, sys¬ tem, and thus leave no place for their independ¬

ent life and power of free initiative. Against the <(block world® of Monism, the Pluralists in¬ sist on the separateness and uniqueness of the personal life of the human individual, which cannot be reduced to a mere part or element in a larger whole. On the other hand, the Monists point out that through over-emphasizing the in¬ dependence and separateness of individuals, the Pluralists are unable to reach any intelligible conception of a system or universe of things, or to discover any common standard of truth or of conduct. J. E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

PLURALISM, in canon law, the holding by the same person of more than one ecclesias¬ tical office of dignity or emolument. From early times it has been legislated against by various councils, but it is now very rare in the Catholic Church. In the Anglican Commission it is regulated by the Pluralities Act of 1838, as amended in 1850. Consult the ‘Catholic Encyclopedia* (15 vols., New York 1905-15).

PLURALITY, (1) in ecclesiastical law, the holding of more than one office by. the same person; also, one of the offices so held. (2) The greatest of three or more numbers; also, the excess of the highest number over the next highest. In this sense, the word is commonly used in elections in the United States when one candidate has received more votes than any one of two or more opponents. Thus, if one candidate receives 40,000 votes, a second 35,000 votes and a third 25,000 votes out of a total of 100,000 votes cast, the first is declared elected by a plurality of 5,000 votes.

PLUSH, a textile fabric, usually of wool, cotton or silk, having a cut pile on one side, distinguished from velvet in that the pile is longer. A well-made plush is costly but beau¬ tiful and may be produced to closely imitate seal-skin. It has become common to weave silk plush on a cotton foundation.

PLUTARCH, ploo'tark (Gr. n htirapxog), Greek writer : b. Chaeronea, Bceotia, about 46 a.d. ; d. there, about 125. He studied philosophy under Ammonius, a peripatetic philosopher of Attica, in 60 a.d., which is the only indication of his age. He several times visited Rome, where during the reign of Vespasian he remained for some little time, giving lectures in philosophy and collecting materials for his 'Lives.* He spent his later years at Chaeronea, where he had a priesthood and was also an archon and build¬ ing-inspector. To many friends he was guide, philosopher and mentor, expounding especially the tenets of the Greek moralists then very popular among men of culture. A school or group gathered about him to which he lectured on Greek and Roman institutions. He was a great admirer of the Spartans, but appears not to have been fully conversant with Roman institutions. His (Parallel Lives of Illus¬ trious Greeks and Romans) is the work to which he owes his fame. The lives are writ¬ ten in pairs, one Greek and one Roman, fol¬ lowed by a comparison of the two, which in some instances is wanting. A few of the (Lives) themselves are lost. In these (Lives) Plutarch is said to have quoted 250 authors, the works of many of whom are lost. The work is chiefly intended for the illustration of char-

acter, and as he makes use of incidents for this purpose without regard to their relative value, is only partially serviceable for historical purposes. In the arrangement of his incidents he does not always follow a chronological order. Their excellence consists mainly in their

fidelity in biographical portraiture. They traverse all of the classical antiquity, are the prime authority, and the only one, for numberless factors, and contribute more, perhaps, along certain lines to the knowledge of the ancient world than does any other one work. A knowledge of them was long considered indispensable to culture. A Latin collection, consisting of translations made by different persons of the separate lives, was printed in Rome in two volumes folio in 1470. The first edition of the text was printed in Florence in 1517. An edition by Bryan, with Latin translation (completed after his death by Du Soul), was published in 1729. There are editions by Coraes (1809-15), Sintenis (1839- 46), and Diibner (1846-47). Among transla¬ tions there is the fine French translation by Amyot (1559), and there is of this the worthy English version by Sir Thomas North (1579), characterized as ((Shakespeare's storehouse of learned history,® since to it the great dramatist was indebted for his outlook on classical history and some of his finest characters and plots, as also one by Evelyn, Garth, Creech and others, with a life by Dryden (1638-86); and one by John and William Langhorne (1770, with sev¬ eral subsequent improved editions). The trans¬ lation called Dryden's was corrected and re¬ vised by A. H. Clough, and published in 1859. George Long has translated and annotated some of the ; (On Chance> ; (On Virtue and Vice,5 all three containing numerous cita¬ tions, otherwise unknown to us; (Precepts About Health) is strewn with many platitudes enunciated in technical and difficult idiom; Ad¬ vice to the Married, > containing short precepts and anecdotes and a few citations; (The Ban¬ quet of the Seven Wise Men,5 a treatise in narrative form of what happened at a public

gathering near Cornith; (On Superstition,5 containing numerous quotations and many ex¬ cellent maxims applicable even in our day; it is one of the most interesting of the ; Consolation to His Wife,5 a feeling exhortation to a grief-stricken mother; (Short Sayings5; (Parallels,5 etc. Philemon Holland executed an English trans¬ lation of the (Morals 5 (1603), and there is also a translation revised by W. W. Goodwin (1874— 78). An edition of all the works of Plutarch, by J. C. Hutten, appeared at Tubingen (1791— 1805). There is also a Paris edition with Latin translation (1862-77). The latest English trans¬ lation is by Clough, A. H. (5 vols'., New York 1909). The best text of the (Moralia) is that of Bernardakis (1888-97). The name Plutarch is sometimes given to a collection of lives of distinguished men. Consult also Volkmann, (Leben, Schriften, und Philosophic des Plu- tarch) (Berlin 1873) ; Oakesmith, John, (The Religion of Plutarch5 (New York 1903) ; Greard, (De la morale de Plutarque) (Paris 1866) ; Trench, R. C., (A Popular Introduction to Plutarch5 (London 1873) ;

Wright, W. C., (A Short History of Great Literature5 (New York 1907). See Plutarch's Lives, North's Translation of.

PLUTARCH'S LIVES, North's Transla¬ tion of. Sir Thomas North was a soldier and public official rather than a man of letters, but he shared with other Elizabethans that striking versatility which enabled so many of them to attain distinction in more than one field of activity. His literary works were all translations, the most important being his Plutarch. Various other translations of the (Lives of the Ancient Grecians and Romans5 have appeared since North's, but none has sup¬ planted his in interest for the general reader. The scholar will not be satisfied by North's version, for North translated not from the Greek original, but from the French version of Bishop Amyot. His purpose was not to pro¬ duce a literally faithful translation, but one which would put the spirit of Plutarch into an Elizabethan body. His ulterior aim was to provide a series of (

cvas dignified, North frequently substituted homely and familiar images and phrasing. Thus where Amyot translates (

George Philip Krapp.

PLUTEUS. See Larva.

PLUTO, ploo'to, in Greek mythology, the giver of wealth, or Hades, the god of the lower world. The former name gradually superseded the latter, which was more commonly used by the poets. He was the third son of Cronus (Saturn) and Rhea, a brother of Zeus (Jupiter) and Poseidon (Neptune), and to him, on the partition of the world, fell the kingdom of the shades. But there was another view of his character. He became a benevolent being, who held in his hand the keys of the earth, and blessed the year with fruits; for from the depth of the earth proceed the grains and the plenty which attends "them. He fought with his brothers against the Titans, and received from the Cyclops, whom he had released, the helmet that makes its wearer invisible, which he lent to Hermes in the war of the giants, and to Perseus in his expedition against the Gorgons, and which afterward came into the possession of Meriones. He judges every open and secret deed, and to him are subordinate the three judges ZEacus, Minos and Rhadamanthus. The cypress, the box, the narcissus and the plant adiantum (maiden-hair) were sacred to him ; oxen and goats were

sacrificed to him in the shades of night, and his priests were crowned with cypress. He is represented in gloomy majesty, his forehead shaded by his hair, and with a thick beard. His head is sometimes covered with a veil. He frequently also wears his helmet, or a crown of ebony, or a wreath of adiantum or narcissus. In his hand he holds a two-forked sceptre, a staff or a key; by his side is Cerberus. He is either seated on a throne of ebony or in a chariot. Since he did not heed sacrifice or prayer, he was worshipped only on rare occasions. The Romans identified him partly with Orcus, partly with Dis. Consult Cayley, C. M., (Classic Myths in English Literature and Art> (Bos¬ ton 1911). See Persephone.

PLUTONIC ROCKS, those igneous rocks which were formed at great depths beneath the surface of the earth, under pressure, and have later been forced toward the surface. They have usually a distinctly crystalline structure, due to their having cooled slowly, and are contrasted with volcanic rocks which, while also of igneous origin, have been poured out at or near the surface of the earth and have solidified there. The granites are the chief of the plutonic rocks.

PLUTUS, ploo'tus, Greek god of wealth, son of Iasion and Demeter. He was blinded by Zeus in order that he might not confer riches on the good alone. In Greek statuary he is represented as a boy with a cornucopia symbolically indicating that through agricul¬ ture comes wealth. His residence is beneath the ground and this has sometimes confused his identity with that of Pluto. He comes to mortals weak and lame, but departs from them with winged feet.

PLUVIOSE, plii-ve-oz, in French chro¬ nology, the name adopted, in October 1793, by the French Convention for the fifth month of the republican year. It commenced on 20 Jan¬ uary and was the second winter month.

PLYMLEY, plim'li, Peter, pseudonym of Sydney Smith (q.v.). In 1807-08 he published (Letters on the Subject of the Catholics to my Brother Abraham by Peter Plymleyˆ which en¬ joyed a wide circulation and greatly furthered the cause of Catholic emancipation.

PLYMOUTH, plim'uth, Conn., town in Litchfield County, on the New York, New Haven and Hartford Railroad, 10 miles north of Waterbury. Saw mills and granite quarrying are its chief industries. Pop. 5,942.

PLYMOUTH, England, an important sea¬ port and commercial town of Devonshire, on Plymouth Sound, between the estuaries of the Plym and Tamar, 36 miles southwest of Exeter. Devonport on the west,

Stonehouse in the mid¬ dle, and Plymouth proper on the east, constitute the aggregate known as <(The Three Towns.® The area of Plymouth proper is four square miles; of the three towns eight square miles. Devonport has on the west the Hamoaze or lower part of the Tamar estuary, and is divided from Stonehouse and Plymouth proper by an inlet crossed by several bridges. (See Stone¬ house and Devonport). Plymouth extends from Stonehouse on the west to the Plym or Catwater on the east. The site is uneven, con¬ sisting of a central hollow and two considerable eminences, one on the north, and the other, called the Hoe, on the south, laid out as a prom¬ enade and recreation ground, from which a magnificent view is obtained. On the Hoe has been re-erected (Smeaton's) old Eddystone lighthouse, and there are also here a statue of Sir Francis Drake, and a memorial of the Armada. At the east end of the Hoe, on a bold headland, stands the citadel erected in the time of Charles II. The older parts of the town con¬ sist of narrow and irregular streets, devoid of architectural beauty, and often steep and wind¬ ing. But in the newer parts and suburbs many handsome terraces and villas have been erected. The public buildings include the guildhall, a handsome Gothic building; the Royal Hotel and theatre, in the Grecian style ; the post office ; the custom-house, the exchange, the Athenaeum, the Mechanics' Institute, the Plymouth and Cot¬ tonian public library, containing 10,000 volumes, and a collection of original drawings, prints, paintings and artistic articles, the grammar and other endowed schools, the Public Dispen¬ sary, Female Penitentiary, Eye Infirmary, South Devon and East Cornwall Hospital, etc. The laboratory and headquarters of the Marine Biological Association are located here. Among ecclesiastical buildings are the two parish churches, Saint Andrew's Church, a fine Gothic

'building of the 15th century containing some /fine rponuments, and Charles' Church, of the 17th century, with an elegant spire; Sherwell Congregational Chapel and the Roman Catholic Cathedral.

The manufactures include soap, sail-cloth, brushes, Roman cement, earthenware, rope and twine, etc., and there are also ship-building yards, foundries, two sugar refineries, brew¬ eries, starch-works and flax, saw and flour mills, together with limestone quarries. The fisheries, chiefly of whiting, hake and mackerel, are very productive. The trade also, both coast¬ ing and foreign, is very important. Steamers ply regularly to North America, the Cape, Australia, New

Zealand, the West Indies, etc. The parts of the port chiefly appropriated' for mercantile shipping are Sutton Pool and Mill Bay, particularly the latter, where there are extensive wet-docks, and the largest vessels lie in safety along its fine pier and pontoon at low water.

Plymouth owes its celebrity chiefly to its im¬ portance as a great royal naval station, for which the spaciousness of its sound renders it admirably suited. It has been the scene of im¬ mense activities during the World War. Originally, however, the sound, about three miles wide at its mouth, being open to the southwest winds, left vessels at anchor exposed to the greatest danger. With the view of pro¬ tecting the anchorage from the heavy swell of the sea, the stupendous Plymouth breakwater was undertaken, and finally completed at an expense of aibout $10,000,000. On the west end of the breakwater a lighthouse, 68 feet above the platform, and visible at the distance of eight miles, except in foggy weather, has been erected, but the entrance into the sound is guided by the still more celebrated Eddystone lighthouse, which stands on a large cluster of rocks in the channel opposite to it. To defend the port an iron-cased fort was built near the breakwater, and Saint Nicholas, or Drake's Island, within the breakwater, has been fur¬ nished with strong fortifications, mounted with heavy guns. Various other forts and batteries also defend the place. The chief naval estab¬ lishments are in Devonport and Stonehouse, the former having the royal dock-yard for building and repairing ships, the steam-yard for machin¬ ery and boilers, etc. ; while Stonehouse has the victualing yard, naval hospital, marine bar-, racks, etc. The Hamoaze is a favorite anchor¬ age for men-of-war.

Plymouth, originally a fishing village, bore in very early times the name of Tamarworth, which, after the Conquest, was changed to that of Sutton, or South Town. It had become a considerable town under its present name in 1438, when a charter, confirming its old and granting many new privileges, was conferred upon it by Henry VI. From Elizabeth it ob¬ tained a new charter through the solicitation of Sir Francis Drake, and on the threatened in¬ vasion of the Armada the British fleet had its rendezvous here. Bonaparte arrived here in the Bellerophon in 1815. The total tonnage arrived and cleared in 1915 was 4,078.000. Pop. (1914) 113,134. Consult the histories of the town by Worth (1871) and Williams (1898).

PLYMOUTH, Ind., city and county-seat of Marshall County, on the Lake Erie and

Western, the Vandalia and the Pennsylvania railroads, 82 miles

southeast of Chicago. It is the seat of the Julia E. Work Training School, Saint Michael's Academy, Plymouth Sanitarium, and has a public library, basket works, barrel factory, notion factories, grinder mills, etc. It is also a thriving commercial centre; was settled in 1835 and incorporated in 1852. The water- supply system is the property of the munic¬ ipality. Pop. 3,838.

PLYMOUTH, Mass., town, county-seat of Plymouth County, on Plymouth Harbor, a part of Massachusetts Bay, and on the New York, New Haven and Hartford Railroad, 38 miles southeast of Boston. It was here that the Pilgrims landed from the Mayflower, 21 Dec. 1620, and established the first permanent English colony in America. Plymouth Rock on which they first landed is carefully pre¬ served, and is now covered by a granite canopy. Other places of interest in the town are Pilgrim Hall, where books, pictures and other valuable relics of the Pilgrims and Colonial times are kept, Leyden street, on which the early settlers built, and Cole's Hill and Burial Hill, where many of the first settlers are buried. Ply¬ mouth also has the national monument to the Pilgrims, dedicated in August 1889. Its cen¬ tral figure is a granite statue of Faith, with the four figures of Morality, Law, Education and Freedom at the base; the height of the monu¬ ment is 81 feet. The town has a variety of manu¬ factures; they include cordage (the largest manufactory in the world of this kind, em¬ ploying about 2,000 persons and running night and day), woolen goods, tacks, insulated wire, nails and electrical supplies. The harbor is nearly land-locked, and contains about 2,000 acres of flats, on which are extensive (

Plymouth is an electrical centre, distributing to the surrounding towns light, power for street railways, and illuminating the Cape Cod Ship Canal each night on both sides of its entire land length of eight miles.

The manufacturing product of the town ag¬ gregates about $14,000,000 annually. On ac¬ count of its beautiful situation and historic in¬ terest Plymouth is also a popular summer and tourist resort, its annual visitation exceeding 100,000 and including many summer dwellers. It has a fine forest park of 200 acres. The waterworks are owned and operated by the town. Pop. 13,045. Consult Banvard, Ply¬ mouth and the Pilgrims) ; Davis, W. T., (His¬ tory of the Town of Plymouth* (Philadelphia 1885) ; Bradford, (History of Plymouth Planta¬ tion (1898) ; Baylies, Francis, (An Historical Memoir of the Colony of New Plymouth > (2 vols., Boston 1866) ; Bliss, W. R., (01d Colony Town and Other Sketches* (Boston 1893) ; Davis, W. T., (Ancient Landmarks of Ply- mouth) (2d ed., ib. 1899) ; Goodwin, T. A., (The Pilgrim Republic* (ib. 1888) ; (Records

of the Town of Plymouth * (Plymouth 1889-

.

.

•

•

92) ; Bradford, William, (History of Plymouth Settlement, 1620-50, ˆ edited by Paget (New York 1909). See Massachusetts.

PLYMOUTH, N. H., town, one of the county-seats of Grafton County, on the Pe- migewasset and Baker rivers, and on the Boston and Maine railroad, 40 miles north of Concord. It is in a region noted for fine scenery, and is a popular summer resort. It has a number of manufactures, including gloves, shoes, boxes, lumber, -etc. ; also a bank and a newspaper. It contains the county courthouse where Daniel Welbster pleaded his first case, and the house in which Nathaniel Hawthorne died. The town has a public high school and a public library and waterworks. It is also the seat of the State Normal School, and of the Holderness School for boys (Episcopal). Pop. (1920) 2,353. Consult Stearns, E. S., (History of Ply¬ mouth, N. HP (1906).

PLYMOUTH, N. C., town, county-seat of Washington County, on the Roanoke River, a few miles from where it enters Albemarle Sound, and on the Atlantic Coast Line Rail¬ road, 105 miles east of Raleigh, and 75 miles north of Newbern. It is the trade centre of ari agricultural region and ships lumber, cotton, rice and vegetables. There is a veneer factory. There is steamboat connection with Baltimore and Norfolk. It is the seat of a State Normal School. The population in 1920 was 1,847.

PLY'MOUTH, Pa., borough, Luzerne County, on the Susquehanna River, and on the Delaware, Lackawanna and Western Railroad, four miles west of Wilkesbarre. It was first settled in 1768, and during the trouble between Pennsylvania and Connecticut in regard to boundaries (1799) was claimed by both States In the last decade of the 19th century, its growth was particularly rapid. It is in the great

anthracite coal region of Pennsylvania, and its chief industries are the mining and ex¬ porting of coal; it also manufactures drills and other mining machinery, and hosiery. It con¬ tains a borough and a township high school and a parish school. Pop. (1920) 16,500.

PLYMOUTH. Wis., city in Sheboygan County, on the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul rail¬ roads, 15 miles west of Shelboygan. The county fair grounds are located here and there are also a public library, park, flour mill, furniture factory, cheese manufactories, feed-cutter works and gasoline engine works. The electric-light¬ ing plant and water-supply system are the prop¬ erty of the municipality. Pop. (1920) 3,415.

PLYMOUTH (N. C.), Engagements at.

When General Burnside had occupied Roanoke Island and Newbern in February and March 1862, the Union gunboats became active in pa-troling the waters of North Carolina and seiz¬ ing the coast and river towns. Plymouth was occupied in June by Lieut. C. W. Flusser, United States Navy, and was held by him until relieved 15 June by a company of the 9th New York infantry; 10 Dec. 1862 the town was held by about 300 men under command of Captain Ewer, 3d Massachusetts infantry. Early that morning Ewer was attacked by Lieut.-Col. John C. Lamb, with the 17th North Carolina, a few cavalry and some artillery, in all about 600 men. Ewer's pickets were quickly driven in, and his

men took refuge in the custom-house. Lamb's artillery opened fire ; the town was fired in sev¬ eral places; and the gunboat Southfield, lying aibreast of the place, received a shot in her boiler, which disabled her, and she drifted down the stream. The gunboat Commodore Perry coming up, Lamb retired after being in the town about an hour and reducing most of it to ashes. From 10 to 13 March 1863 the 17th North Caro¬ lina hovered about the place and made demon¬ strations upon it, but the regiment retired when the gunboats came up from Albemarle Sound. The gunboats had been relied upon to hold the place, but it was now strongly fortified on the land side and garrisoned, and early in April 1864 was held by Gen. H. W. Wessells, with four regiments of infantry, detachments of cavalry and artillery, in all about 3,000 men. As before, the principal reliance for the defense of the place was the navy.

In the spring of 1864 the Confederate au¬ thorities at Richmond determined that an at¬ tempt should be made to recapture Plymouth, and Gen. R. F. Hoke was put in command of a division for that

purpose, and was to be assisted by Capt. J. W. Cooke of the navy, with the Albemarle then nearly completed. The Albe¬ marle was an iron-clad vessel, similar to the Merrimac, carrying two heavy guns, and was built at Edwards Ferry, on the Roanoke, 30 miles below Weldon. She was built in a corn¬ field, and all the old iron in that section of the country was collected to make her armor. Hoke's division proceeded to the vicinity of Plymouth, drove in Wessell's pickets 17 April, surrounded the place on the land side from the river above to the river below, opened with ar¬ tillery, made assaults on parts of the line on the 18th, which, with the aid of the gunboats, were repulsed, and prepared to storm the works as soon as the Albemarle could clear the river front of the Union vessels protecting the place with their guns. On the 18th the Albemarle left Hamilton, passed down the Roanoke and, favored by unusually high water, ran over ob¬ structions placed in the river, ran past heavy shore-batteries, and at 3 a.m. on the 19th discov¬ ered the Union gunboats Miami and Southfield lashed together about half a mile below the town. Capt. C. W. Flusser was in command of the two vessels and had lashed them together with long spars, with chains festooned between

them, it being his intention to get the Albe¬ marle between the two vessels, which would have placed the Confederate vessel at a great disadvantage. Cooke avoided this by running the Albemarle close to the southern shore, and

then, suddenly turning toward the middle of the river, dashed obliquely into the side of the Southfield, the long knife-like prow of the Al¬ bemarle penetrating 10 feet, making a large opening into the side of the Southfield and car¬ rying her to the bottom within a few minutes, with a part of her crew. The Albemarle's prow had become entangled with the Southfield. The Miami, close alongside, opened with her heavy guns, and a shell fired by Flusser struck the Albemarle, rebounded and exploded, killing Flus¬ ser instantly. Lieutenant French took command, and attempted to board the Albemarle, 'but was repelled, and the Miami withdrew from the con¬ test and ran down into Albemarle Sound. Next morning the Albemarle opened fire upon the forts and works near the river, and Hoke,

•

moving around to that side, attacked the works. After being several times repulsed, he carried them, Wessells surrendering his entire com¬ mand. In killed, wounded and captured the Union loss was 2,834 men.

The Confederate loss is not fully known, but Ransom's brigade alone suffered a loss of about 500 killed and wounded.

Soon after the capture of Plymouth General Hoke was ordered to the army in Virginia, but the place was held by the Confederates in some force, aided by the Albemarle. On 5 May 1864 the Albemarle, with two other vessels, ran down the river into Albemarle Sound and engaged a Union fleet of seven vessels, inflicting much damage, and returned to Plymouth. There was no Union ironclad that could cross Hatteras Bar and enter the North Carolina sounds, no other vessels could cope with the Albemarle, and it was reserved for Lieut. W. B. Cushing (q.v.) to execute a plan for her destruction. On the night of 27 Oct. 1864 he entered Roanoke River with two steam lauches, each carrying a 12-pound howitzer and a torpedo. The launches carried 20 men, well armed with revolvers, cutlasses and hand-grenades. Pass¬ ing near the pickets on the shore, Cushing ap¬ proached the Albemarle at 3 a.m., and was hailed and fired upon with musketry from the shore and the vessel. Discovering that there was a circle of logs around the ship and about 10 feet from it, he turned back, and when about 100 yards away again turned, at full headway struck the logs and slid over them, and, in face of a crashing fire of canister and musketry, ex¬ ploded a torpedo under the vessel and tore a large hole in her, <(big enough to drive a wagon in,® her commander says, and she soon settled to the bottom. Cushing with his men took to the water, he and one or two others escaping, while two were drowned and 11 captured.

On the 29th October Commodore Macomb, with his fleet, went up Roanoke River, and, arriving at the wreck of the Southfield, ex¬ changed . shots with the Confederate batteries, but finding that the channel of the river had been effectually obstructed, he returned, next day went by way of Middle River into the Roanoke, and on the morning of the 31st en¬ gaged the batteries on shore, which were sup¬ ported by musketry from rifle-pits and houses. After an hour's contest, in which 10 vessels were engaged, a Confederate magazine was blown up ; the works were abandoned, and the Union forces took possession of the town. Con¬ sult (Official Records > (Vol. XXIII) ; < Naval War Records > (Vols. IX and X) ; the Century Company's (Battles and Leaders of the Civil War* (Vol. IV) ; iSoley, (The Blockade and the Cruisers.)

E. A. Carman.

PLYMOUTH BRETHREN, a religious sect which had its rise in the British Isles about 1827, when the Rev. John N. Darby, a minister of

the Episcopalian Church of Ireland, asso¬ ciated himself with a group of dissenters in Dublin and formed a religious society of Brethren on a platform of Evangelical Calvin¬ ism. Similar local societies existed in various towns of Ireland and England, and Darby, while visiting the society at Plymouth, won over to his views a large number of persons, among them two or three clergymen of consid-

erable distinction, one of them the Rev. Ben¬ jamin Wills Newton, another the Rev. James L. Harris, and the third the noted Biblical scholar, the Rev. Dr. Samuel Prideaux Tre- gelles. Plymouth now became the principal centre of the movement, and hence the popular title of the sect, Plymouth Brethren : the offi¬ cial title is ˆBrethren® or ˆChristians.® A weekly newspaper was edited by Mr. Harris, and the sect made rapid progress, congregations being formed in every considerable town in England. In 1838 Mr. Darby went on an evan¬ gelizing mission to Switzerland and spent seven years in that country, chiefly in French Switz¬ erland, where his success in gaining disciples and forming congregations was extraordinary among the Methodists and other dissenters: in Germany, too, in German Switzerland, in Italy and in France his opinions were received with no small favor: but French Switzerland, and in particular Geneva, Lausanne and Vevey, was his stronghold. When he returned to Plymouth in 1845 he sought to depose B. Wills Newton from the headship of the community there, charging him with a disposition to introduce priestly rule; but most of the Brethren upheld Mr. Newton, and Darby thereupon formed a separate assembly. At Bristol in 1848 there was a similar division, but this time into three sects, those siding with Darby, those siding with Newton and those siding with neither. Of these divisions there were subdivisions later. Four divisions of Plymouth Brethren had in the United States churches and membership at last report ; Div. I — churches 134, communi¬ cants 2,933 ; Div. II — churches 128, communi¬ cants 4,752; Div. Ill — churches 81, communi¬ cants 1,724; Div. IV — churches 60, communi¬ cants 1,157. The Plymouth Brethren hold that an official ministry is an unchristian institution; among them all the male members are on an equal footing, and have the right to exhort in the meeting; after the opening exercises — a hymn or prayer — there is usually a pause to wait for volunteer addresses. See Religious Sects.

PLYMOUTH CHURCH, a church in Brooklyn, N. Y., of which Henry Ward Beecher was pastor for 40 years (1847-87). The church was organized in 1847 ; the present church building was erected in 1849. Dr. Beecher was succeeded by Lyman Abbott, who was succeeded in

1899 by Newell Dwight Hillis. The church membership is about 2,200.

PLYMOUTH COLONY, The. See

Massachusetts, History ; Mayflower, The.

PLYMOUTH COMPANY, The, in Amer¬ ican history, a company formed in the 17th cen¬ tury, of Plymouth and Bristol merchants, and also called the North Virginia Company. It was incorporated in 1606, and obtained a char¬ ter from James I, with grant of land between Long Island and . Passamaquoddy Bay. This company was the rival of the London Company. In May 1607, two ships were despatched to America bearing a company of colonists com¬ manded by George Popham. An abortive at¬ tempt at permanent settlement was made on the Kennebec River, but Popham died and the remaining colonists returned home. The com¬ pany still continued to exist till its reorganiza¬ tion in 1620 as the New England Company or Council for New England,

PLYMOUTH ROCK. See Mayflower, The; Plymouth, Mass.

PLYMOUTH ROCK, a fowl. See

Poultry.

PLYMOUTH SOUND. See Plymouth,

England.

PLYMPTON, plimp'ton, Almira George,

American author: b. Boston, Mass. She was educated in the private schools of Boston and has gained a reputation as an author of juvenile books. Among them are ;

PLYMPTON, George Washington, Amer¬ ican engineer and educator : b. Waltham, Mass., 18 Nov. 1827 ; d. 11 Sept. 1907. He was gradu¬ ated from the Rensselaer Polytechnic Insti¬ tute, Troy, N. Y., in 1847, and was professor of engineering and architecture at the University of Cleveland in 1852, professor of mathematics at the New York State Normal College, Al¬ bany, in 1853—56, and in 1857-63 occupied the chair of physics and engineering of the State Normal School, Trenton,

N. J. He was pro¬ fessor of physics and engineering at Cooper Union, New York, from 1869 and director of the night school from 1879. He was also pro¬ fessor of physics and engineering at the Brook¬ lyn Polytechnic Institute from 1863, professor of chemistry and toxicology at the Long Island College Hospital 1864-86, editor of Van Nos¬ trand's Engineering Magazine in 1870-86, and published (The Starfinder) (1878); (How to Become an Engineer* (1892), etc.

PLYNLIMON. See Plinlimmon.

PNEUMATIC BUFFER, a mechanism consisting of a cylinder and piston, or of a series of cylinders and pistons, employed for various purposes, but more especially to absorb the recoil of large pieces of artillery, and to absorb the shock of falling elevators, printing presses, etc. The arrangement of pistons and cylinders varies according to the type and pur¬ pose of the engine to which the buffer is at¬ tached. The object in every case is to absorb sudden shocks and jars which otherwise would quickly wreck costly apparatus. The principle of the buffer is the transmission of the shock to the piston-rod, which thereupon forces the pis¬ ton-head against the volume of air within the cylinder. The air is compressed and absorbs some of the shock, while graduated holes in the cylinder permit the air to escape slowly, and gradually the piston and load behind it are brought to rest. See Air-Cylinder.

PNEUMATIC CLOCKS. See Clocks.

PNEUMATIC DESPATCH. See Pneu¬ matic Tubes.

PNEUMATIC TIRE. See Bicycle; Automobiles ; Rubber Tires.

PNEUMATIC TOOLS are a class of portable mechanical appliances operated by com¬ pressed air. The air pressure is conveyed through a flexible tube from a pressure tank to a . miniature self-contained motor, and the tool is adjusted and applied by the hand. They are of two types — percussion and rotary. In the former the work is accomplished by rapidly repeated' blows and in the latter by a boring action. They are used for a great variety of

mechanical operations, such as drilling, ram¬ ming, hammering, riveting, caulking, boring, screwing, expanding boiler tubes and carving. A good representative of the percussion tools is the pneumatic hammer. It consists of a cylinder in which a piston works with a reciprocating (back and forth) action, actuated by com¬ pressed air admitted to and exhausted from the cylinder by suitably

arranged openings.

A loose-fitting tool (such as a rivet-set, in case the appliance is employed as a riveter) is inserted in the front end of the cylinder, to which the compressed air is conveyed by flexible hose connections, and through the handle at the rear. To operate, the device is held by the handle and the tool is pressed firmly against the work. The operator then admits the air-pres¬ sure into the cylinder by pressing on the throttle lever, and starts the reciprocating hammer, which strikes the tool or rivet-set at each for¬ ward stroke. The action is similar to that of driving a chisel with a mallet or hammer, with the exception that the successive strokes are delivered with great rapidity, at a rate of speed as high as 20,000 blows per minute, and sound like a continuous buzz, the efficiency of the appliance being due to the frequency of the strokes rather than to the power of each indi¬ vidual stroke. Pneumatic percussion tools, in general, are made small enough to be operated by the hand, and they are adapted for various uses by simply replacing the tool piece at the front by other tools specially shaped to fit the particular kind of work. The arrangements for actuating and controlling the piston vary greatly in the different makes, but all of them belong to either the valve or the valveless form.

In the valve-hammers, a reciprocating valve acts in combination with the piston and regu¬ lates the admission and exhaust of the com¬ pressed air. They deliver a long stroke at a speed ranging from 1,500 to 3,500 blows a minute with great power, and are suitable for heavy riveting, chipping and caulking purposes. In the valveless hammers, the striking piston acts as a valve and controls the admission of the air-pressure to the alternate ends of the cylinder. They deliver a short stroke at a very high rate of speed, generally over 15,000 blows a minute, and are suitable for stone carving, beading flues, light caulking and other purposes requiring a light chipping action. Owing to their simpler construction, they last longer than the valve hammers and are more economical in air consumption relative to the number of blows delivered. For clipping purposes, the speed is greatly reduced, and the piston is constructed to act on a hinged link so as to impart a pincer- like action to the clipping jaws. As riveters, they range from the portable sizes to heavy stationary machines. Any ordinary pneumatic hammer may be employed in riveting, but such work is better accomplished, generally, by the regular U-shaped riveter designed for that pur¬ pose. (See Metal-working Machinery). In riveters the compressed air is used at a pressure of 125 pounds to the square inch, while in the other forms the intensity is somewhat less, gen¬ erally about 90 pounds to the square inch. Ro¬ tary pneumatic tools are commonly known as portable pneumatic drills. In wood-

working, they are used for boring and drilling; in metal¬ working, they are employed in the operations of

tapping, reaming, screwing nuts on bolts, boring cylinders, expanding tubes, turning crank-pins, cleaning castings, grinding steam-pipe joints, etc. They are made in a large number of sizes, rang¬ ing from the light forms used for boring small holes up to the large machines requiring a two or three-horse-power motive energy. Originally they consisted of a small rotary engine with an attached feeding mechanism. Subsequently, to avoid the consequent waste of power, small reciprocating engines were designed, bringing them to the present form, in which they are used with marked economy for all purposes where heretofore the hand brace was employed. They are made in two forms — with single-acting or with double-acting oscillating cylinders, and work with an air-pressure ranging from 70 to 85 pounds to the square inch. In the former, the motor consists of two pairs of single-acting cylinders coupled to the opposite ends of a crank-shaft, the pinions of which gear with the spur-wheels on the tool-shaft. The whole me¬ chanism is enclosed in a cylindrical metallic case. In the latter, two double-acting oscillating cylinders are geared to a crank-shaft carrying a single pinion which gears with a spur-wheel on the tool shaft. Another form — the Boyer pis¬ ton drill — consists of a motor in the form of an oscillating engine composed of three single-act¬ ing cylinders carried in a rotary frame. The pistons being attached to a fixed shaft, the frame is caused to rotate by suitable gears and imparts its motion to the tool-shaft. The com¬ pressed air connections are flexible hose similar to those used in the percussion tools. Other forms of pneumatic tools of special application are the hoist, jack, stay-bolt cutter, mud-ring riveter, ˆbull-dozer® press, paint sprayers, sheep shearers and sand blasts. Their names define the purposes for which they are used. The hoist has largely replaced the ordinary hoisting chain; the jack is a modification of the hoist and is used by being placed under the piece to be lifted. Pneumatic tools are of modern origin and have been principally developed in the machine-shops of the United States, espe¬ cially in connection with the repair depart¬ ments of the railroads, but they are being rapidly introduced in European and other countries.

PNEUMATIC TUBES. Pneumatic tubes are employed to despatch letters, parcels, tele¬ grams, etc., to a distance by the energy of compressed air. Their application was origi¬ nally suggested by Denis

Papin in 1667, when he read a paper before the Royal Society of London, describing a plan by which the air in a tube was exhausted in such a way that the piston working in the tube would be drawn in the direction of the suction, pulling with it an attached carrier. His idea was taken up and developed by several inventors, with more or less success, up to 1854, when the Electric and International Telegraph Company, of London, built in that city the first pneumatic despatch system which was actually operated for com¬ mercial purposes. It consisted of a lead tube 220 yards in length and one and one-half inches in diameter, in which the carriers were pro¬ pelled in one direction only. Subsequently, the diameter of the tubes was increased to two and one-fourth inches, which were arranged to send the carriers in two directions — onward from,

and inward to, the central station. At the latest report the English Postal Department operates about 601 miles of tubes, 40 miles of which are situated in the London district. In the English system the tubes radiate from the central station to the branch stations located at various points, the larger stations being equipped with two tubes — one for outward and one for inward traffic, while the smaller stations carry on the work through a single tube. The outgoing carriers are propelled by pressure and the incoming carriers are drawn in by the suction of a vacuum. The standard pressure used is about 10 pounds to the square inch, and a vacuum of about six pounds to the square inch, giving about the same speed in both directions. The tubes consist of lead pipes one and one-half inches to two and one-fourth inches in di¬ ameter, for interior use, such as the delivery of telegrams and parcels of small size, such as cash-carriers in stores, from one room to an¬ other in the same building; while the under¬ ground or street tubes are larger, ranging from two and one-fourth inches to three inches in diameter. The two and one-fourth-inch pipes weigh about eight pounds per linear foot and are made in lengths of 28 feet. When installed, they are enclosed in a cast-iron pipe three inches in diameter, made in sections of nine feet. The air-pumps are driven by steam-engines or by electric motors ; those in the London district are worked by four 50 horse-power steam- engines. All of the carriers have gutta-percha bodies covered with felt, and are provided with buffers or pistons of felt attached to the front ends, which fit tightly in the tubes. The ends of the carriers are closed by elastic bands to prevent the messages from falling out, but they can be stretched sufficiently to allow the insertion of the message forms. The de¬ spatching and receiving apparatus originally consisted of a very complicated double-sluice valve, but it has been superseded by the D-box, a contrivance much simpler in form, which al¬ lows

communication at will with either the pres¬ sure or vacuum mains, so that it is available for both sending and receiving. The carriers run at a speed of about 25 miles an hour.

In Germany, the Siemens system is em¬ ployed. Its first extensive use was made in Berlin, in 1865, when 5,670 feet of wrought-iron tubing, two and one-half inches in diameter, were laid and connected the telegraph station with the Exchange. In this system, the tube forms a com¬ plete circuit, into one end of which the air is introduced under pressure while it is exhausted at the other end, thus maintaining a constant circulation, and also enabling the inserting and despatching of the carriers without temporarily shutting off the air current. The carriers were stopped at intermediate stations by placing a wire screen across the tube. The sending and receiving apparatus was constructed of two short pieces of tubing attached to a rocking frame so that either of them could be swung into the main circuit by the hand, whenever desired. One of them was open at both ends, and was used in sending; the other was pro¬ vided with a wire screen at one end, and when swung into the line of the main tube, allowed the air to pass through but stopped the car¬ rier. At the present time, Berlin has in opera¬ tion about 30 miles of tubes serving about 40

stations. As in the first experimental line, the tubes arc laid in circuits, each of which serves a certain number of stations, but the air instead of being kept in constant circulation is stored up in large tanks, and turned into the tubes whenever it is required to despatch a carrier. Paris and Vienna have systems similar to that of Berlin. The. carriers are run in trains, des¬ patched at 15 minute intervals, with a maximum speed of 23 miles an hour. They stop at all of the stations on the circuit so that the carriers belonging to each station can be taken off, and those for the succeeding stations put in.

In the United States, the first attempt to establish a pneumatic despatch system was made by Beach, about 1872, who undertook the con¬ struction of a tunnel six feet in diameter, under Broadway, New York City. His system was called the “atmospheric railway® (q.v.) and contemplated the running of a car capable of seating 10 persons, through the tube, by the propelling energy of air pressure generated by a revolving fan. The project was abandoned after the completion of a small section of the tunnel. In 1904 the systems installed by the United States Post Office Department were as follows : The

Philadelphia lines connecting the city post office with the Bourse, a distance of 2,974 feet, and its extensions to the terminal stations of the Pennsylvania, and the Philadel¬ phia and Reading railroads, a total distance of about one and one-half miles; and the New York City lines, connecting New York City post office with that of Brooklyn, and with the Grand Central Station and the- intermediate postal sub-stations, a total distance of about 10 miles. The installation is on the plan of the Batcheller system, very similar to that employed by the English. Compressed air at pressures ranging from 5 to 10 pounds per square inch is forced through wrought-iron tubes ranging from six to eight inches in diameter. They are laid in double lines so as to allow traffic in opposite directions, and are provided with au¬ tomatic-sending and receiving apparatus at all stations. In addition to the lines operated by the government, they are extensively used by private concerns in a great many cities, of which the systems operated by the Western Union Telegraph Company in New York City and Chicago are the most important. Since the perfection of automobile delivery trucks, city transportation has so improved that there is a tendency to discard pneumatic delivery for mail.

Bibliography. — More detailed information may be obtained from the following named pub¬ lications : (Pneumatic Tube Service) (published by the Postmaster-General, Washington) ; Batcheller, (The Pneumatic Despatch System > ; Kemp, (Year Book) (London 1902) ; and various publications on the subject by the Brit¬ ish Postal Service.

PNEUMATICS, a former name for the science that discusses the properties of gaseous fluids both at rest and flowing, also the prop¬ erties of solids when the latter are immersed in gases. See Critical Point; Gas, Natural; Gas Poisoning; Gas Producer; Hydrodyna¬ mics; Liquefied and Compressed Gases.

PNEUMOGASTRIC NERVE, the vagus, or 10th cranial nerve (see Cranial Nerves), the lung-stomach nerve. It is formed by the junc¬ tion of from 10 to 15 filaments which arise in

the medulla oblongata. They form a flattened band which passes out through the skull with other nerves and pursues its course down the neck behind the carotids, being in the same sheath. Below the clavicle the right and left pneumogastrics go in different directions. The right pneumogastric enters the chest-cavity in front of the subclavian artery, gains the back part of the root of the right lung, breaks up into a coarse series of branches, being joined by the sympathetic, and forms the posterior pulmonary plexus. From this two cords of nerve-tissue continue downward on the right side of the oesophagus. An oesophageal plexus is formed about this tube, into which fibres from both sides enter. The fibres then converge to form a single trunk; this passes through the diaphragm and spreads out on the posterior surface of the stomach. The left pneumogastric passes into the thorax between the left common carotid and left subclavian arteries. It forms a plexus for the left lung corresponding with the right side. Its terminal branch passes in front of the oesophagus, and is finally distributed to the front portion of the stomach. The nerve contains both sensory and motor fibres and its function is complex. It is concerned in the functions of the lower part of the oesophagus. It is the important nerve of respiration; is the great cardiac regulator; and is the chief motor nerve of the stomach.

Diseases of the pneumogastric are compara¬ tively rare, but by reason of its wide distribu¬ tion, and because many of its fibres are dis¬ tributed to a great -number of structures, partial affections are not uncommon. The pharyngeal branches are occasionally involved in diphtheria and in nuclear disease. The pharynx becomes immovable and anaesthetic. Food may lodge in the gullet or enter the windpipe, causing cough¬ ing and strangling. Sometimes fluids regurgi¬ tate through the nose. In the larynx paralysis of the fibres may produce a confusing series of symptoms, with cough, diminution or loss of voice, hoarseness, impairment of respiration, pain, etc. The specialist is alone able to deter¬ mine which branches are involved. Affections of the pulmonary branches affect the nutrition of the lung, pneumonia usually resulting from destruction of the vagus. Protracted hiccough is an affection of the vagus, as is also bronchial asthma. Unusual rapidity of the heart action (tachycardia) is due to temporary loss of con¬ trol of the vagus on the heart. Cardiac palpita¬ tion is due to much the same agency; it is fre¬ quently associated with impaired stomach func¬ tions and is very frequent in hysterical and neurasthenic affections. An abnormally slow pulse (bradycardia) is usually due to an excess of stimulation of the vagus. Angina pectoris (q.v.) is a severe and usually fatal affection im¬ plicating the pneumogastric nerve. The involve¬ ment of the gastric branches may result either in loss of

motion or sensation or excess of each. Sobbing and vomiting are largely induced by excessive irritability of the vagus. Gastralgia is also associated with disorder in this nerve. Loss of function may result in serious impair¬ ment of motion and secretion, although the sympathetic nervous system makes an important part of the nervous supply of the stomach. See Heart; Stomach. And consult works referred to under these articles.

PNEUMONIA. See Lung, Diseases of; Pathology.

PNOM-PENH, pnom-pen', Indo-China, capital city of Cambodia, 140 miles northwest of Saigon, on the confluence of the Me-Kong and the Ton-le-Sap, lying partly in the plain and partly on a slight elevation, from which it gets its name, signifying in the vernacular ((hill of abundance.® It is the commercial centre of Cambodia, being situated near the Buon Phlau or Quatre Bras, the meeting place of Cam¬ bodia's four water ways. A palace of the king, and almost royal dwellings of the Buddhist priest, as well as the home of the French resi¬ dent, are on the hill ; the low ground near the river is occupied by native huts. The main commerce of the city is carried on by the Chinese. Pop. 62,255.

PNYX, niks, in ancient Greece, a hill in Athens where the people assembled to make de¬ crees, pass laws, etc.

PO, po (ancient Padus, or Eridanus), the largest river of Italy, in respect both of its length and its volume of water. It rises on the confines of France and Piedmont in Mount Viso, one of the Cottian Alps, and flows rapidly eastward through Piedmont in the character of a mountain torrent, till, after having been aug¬ mented by several other mountain streams, it reaches Lombriasco. Here it begins to move more slowly and after passing Turin, becomes somewhat sluggish. It again flows eastward to the Adriatic Sea. It is about 400 miles long, and its drainage basin covers* the larger part of northern Italy. In its lower course its banks are protected by levees and dikes, as the sur¬ face of the river is higher than the surrounding country. A number of rivers, chiefly from the Alps, flow into the Po. Its principal affluents are, on the left, the Clusone, Sangone, Dora- Riparia, Stura, Dora-Baltea, Sesia, Agogna, Terdoppio, Ticino or Tessin, Olona, Lambro, Adda, Oglio and Mincio ; on the right, the Vraita, Tanaro, Scrivia, Trebbia, Nura, Taro, Parma, Enza, Secchia and Panaro. It drains the

famous Lake Como, also Maggiore, Iseo and Garda. Pavia, Milan, Mantua, Parma and Modena are all located in its tributaries. After receiving the Adda its average breadth is about 650 yards. Below Piacenza, which it passes on the right, it is confined by artificial embankments, which are said to have originated with the ancient Etruscans, and notwithstanding the immense sums which have been expended upon them, and the engineering skill which has been exerted in order to render them perfectly secure, the most disastrous inundations have repeatedly taken place. The embankments themselves have added to the danger. The deposits made by the river are perpetually tend¬ ing to raise the level of the water. This makes it necessary to make a corresponding increase in the height of the embankment, and the effect of these combined operations has been To lift the river so high above its natural bed that it is actually on a level with the tops of the houses in the city of Ferrara. The Po is well supplied with fish, including, among others, the shad, salmon and sturgeon. The deposits brought from the mountains are increasing the extent of the delta, which advances into the Adriatic at the rate of 200 feet each year.

PO RIVER, Engagement on. After two days' terrific fighting in the Wilderness (q.v.), with a loss of over 17,000 men, General Grant concluded to continue the movement by the left, and on the evening of 7 May he put his army in motion for Spottsylvania Court House. The Second Corps, under General Hancock, the last to move, reached Todds' Tavern about 9 a.m. of the 8th and intrenched, being on the right of the army. A reconnaissance to Po River, two miles distant, developed Confederate cav¬ alry on the opposite bank. On the 9th Han¬ cock moved up to the right of Warren's Fifth Corps and took position and intrenched on high ground overlooking the Po and the Shady Grove road. The left of General Lee's line rested on a bend of the Po, and as reports indi¬ cated that he was moving in the direction of Fredericksburg, Hancock was ordered to ex¬ amine the stream with a view to crossing it and making a reconnaissance along the Shady Grove road on Lee's left, crossing the river again by the Shady Grove or Block House bridge, or below it, in order to turn and attack Lee's left. The stream, some 50 yards wide, was crossed by Barlow's, Gibbon's and Birney's divisions late in the afternoon, Birney meeting a stubborn resistance from cavalry and a bat¬ tery. After crossing, three pontoon bridges were laid and the troops were pushed toward the Block House bridge, Barlow in advance, but night coming on compelled a halt until morning, with Barlow's skirmishers close to the bridge. The orders for the 10th were that, while the rest of the army felt the Confederate position in front, Hancock was to ascertain the

position and force of the enemy in his front and the location of his left flank and to hold his corps ready to advance. At daybreak Hancock made a close examination of the Block House bridge with the design of carrying it by assault, but the Confederates (Mahone's division) had been sent to that point during the night, and had intrenched, commanding the bridge and its ap¬ proaches. Therefore Brooke's brigade of Bar- low's division went down the river to find a crossing and General Birney sent two regiments out on the Andrews Tavern road to cover Brooke's movement. About half a mile below the bridge Brooke threw across a regiment which, after going a short distance, discovered a Confederate line of strong earthworks oc¬ cupied by artillery and infantry. At this time, about 1 p.m., Hancock received a despatch from General Meade directing him to send two di¬ visions to General Warren's position for an assault with Warren on the Confederate lines at 5 p.m. Gibbon and Birney were withdrawn to the other side of the Po, and as Hancock was to command the movements of Warren's Corps and his own, he accompanied them, leav¬ ing Barlow to hold the ground south of the river. When Birney began to withdraw, the regiments he had sent toward Andrews Tavern, having driven back Wade Hampton's cavalry, were attacked by infantry, and this evidence that Barlow was likely to be attacked caused General Meade to order Barlow to be with¬ drawn, as he did not wish to bring on an en¬ gagement south of the Po. Hancock was directed to give the matter personal supervision. It was about 2 p.m. when Barlow began to with¬ draw, at which time Brooke's and Brown's

brigades were south of the Shady Grove road, and Miles and Smyth's brigades along the road, the left resting on a crest a few hundred yards from Block House bridge. In rear the ground was open back to the bridges and swept by the artillery of Lee's left. As the withdrawal be¬ gan Barlow was attacked; Heth's Confederate division of three brigades and a battalion of artillery, which had crossed the river below the Block House bridge, attacked Brooke and Brown vigorously as they were withdrawing, and was driven back with severe loss when the two brigades passed to the rear and took posi¬ tion on a wooded crest on the right of Miles. Heth followed closely, Miles and Smyth were now retired to a crest in front of the bridges, and all the artillery, except Arnold's battery, was withdrawn and put in position on the north bank of the river. Heth again attacked Brooke and Brown, and was again repulsed with heavy loss. During the heat of this contest the woods on the right and rear of the two Union brigades took fire and

the flames approached so close that upon the second repulse of Heth the brigades were ordered to abandon their position and fell back through the burning forest in good order. They immediately recrossed the river under heavy artillery fire. Many men were killed and wounded, numbers of the latter perishing in the flames. One gun of Arnold's battery, becoming entangled in the woods, was abandoned. Smyth's brigade was now crossed and deployed to protect the crossing of Miles ; but before Miles could move the Confederates opened a furious fire of artillery from the front and left. Under cover of this their infantry attempted to cross the open ground in front of Miles, but Miles held the infantry in check, and the many Union batteries on the north side of the river silenced the Confederate guns, and Miles, taking advantage of the repulse, with¬ drew in order to the two pontoon bridges, one of which was* immediately taken up, the other de¬ stroyed and the operation on the Po River was closed with severe loss on both sides. Consult (Official Records* (Vol. XXXVI) ; Humphreys, (The Virginia Campaign of 1864-65* ; Walker, (History of the Second Army Corps. *

E. A. Carman.

POA. See Grasses in the United States; Pasture; Prairie, etc.

POACHING. See Trespassing.

POCAHONTAS, po-ka-hon'tas, Indian princess: b. Virginia, about 1595; d. England, March 1617. She was the daughter of Pow¬ hatan (q.v.), a celebrated Indian sachem in Virginia and chief of the Chickahominy tribe. She discovered the warmest friendship for the English colonists, and undoubtedly did render many services to the struggling outpost. In¬ vestigations have, however, cast doubt on the traditional narrative of the rescue by her of Captain John Smith (q.v.). Smith, during his explorations, was taken .prisoner by Powhatan, and after six weeks sent back to Jamestown. But he makes no allusion to the familiar story until 1616, when Pocahontas was in England; although in his (True Relation) (1608) he had testified to her services to the colony. In 1616, in a letter to the queen, he says that <(at the minute of my execution she hazarded the beat¬ ing out of her own brains to save mine.** But

not until the appearance of his (Generall His¬ tone' (1624) does the tale appear in full elaboration. It has been thought that Smith's known tendency to embellishment and his desire to satisfy English curiosity led him to inter¬ polate the story. Several writers have, never¬ theless, contended for the general accuracy of Smith's account. It is

argued, among other things, that it is very difficult to understand Smith's statements in the (True Relation,* the employment of Pocahontas on difficult missions to the whites, and Pocahontas' own benefac¬ tions, such as the supplying of starving James¬ town with provisions, except on the supposi¬ tion that Smith's narrative is substantially veracious. After Smith had left the colony in 1609 Pocahontas fell into the hands of an Eng¬ lish expeditionary party (1613), who kept her as a valuable hostage. Her marriage to John Rolfe (q.v.) was solemnized in presence of the uncle of Pocahontas and her two brothers. This event relieved the colony from the enmity of Powhatan, and preserved peace between them. During her visit to England in 1616-17, Pocahontas attracted much attention, being ap¬ parently invested in English minds with quite a degree of royal dignity. She was often called the Lady Rebecca from the name received in Christian baptism. .Her remains lie at Grave¬ send, and the burial is noted in the parish records. Consult Deane's edition of Smith's (The Relation) (1866) ; Eggleston and Seelye, (Pocahontas) (1879) ; Robertson and Brock, (Pocahontas and her Descendants) (1887) ; Poindexter, C., (Captain John Smith and his Critics) (1893) ; Fiske, (01d Virginia and her Neighbors* (1897); Smith, E. B., (Pocahontas and Capt. John Smith) (Boston 1914).

POCATELLO, po-ka-tel'lo, Idaho, city, county-seat of Bannock County, on the Port Neuf River, and on the Oregon Short Line Railroad, about 135 miles north of Ogden, Utah. It is in a volcanic region that has been made productive by irrigation. It has large railroad shops, machine shops and stock-yards. There is an extensive trade in mining products, livestock and farm products. It has good banking facilities and a daily newspaper. Idaho Technical Institute and Holy Cross School are located here. The city has a Carnegie library, a modern high school building, and a Y.M.C.A. building. Pop. (1920) 15,001.

POCHARD, an English name for the male of a species of sea-duck (Aythya ferina), but often extended to both sexes and related species. It very closely resembles the Ameri¬ can red-bead duck, one of the book names of which is American pochard. The bill is broad and flat at the end with a terminal hooked nail and is less than the head in length. The hind toe bears a prominent flattened lobe. The in¬ ferior larynx of the male ducks is of strong bony construction. These ducks inhabit the Arctic regions, but migrate southward in winter to the coasts of Europe. Adults are 20 to 24 inches long and have a wing-spread one-half greater. They are marine in habits, and feed upon crustaceans, worms, mollusks and aquatic plants. The plumage is thick and dense, that of the male pochards being lustrous, darker and more brilliant than the plumage of the female. The pochard is represented in North

America by the red-head, canvas-back and scaup ducks

(qq.v.) and in Asia and Africa by related species.

POCKET-MOUSE, a small burrowing nocturnal gray mouse of the genus Heteromys, which inhabits the arid regions of the south¬ western United States and is related to the kangaroo rats and mice. They have cheek- pouches in which the carry into their burrows seeds, etc., for storage preparatory to winter famine.

POCOCK (or POCOCKE), Edward,

English Arabic scholar: b. Oxford, 1604; d. 10 Sept. 1691. He was graduated at Corpus Christi College, Oxford, in 1622; entered the Church in 1629; became chaplain to the Eng¬ lish Turkey Merchants in the same year; be¬ came lecturer in Arabic at Oxford in 1636 and Hebrew professor 1647 ; suffered some incon¬ venience because of his royalist sympathies un¬ der the Commonwealth ; and lived in comfort after the Restoration. The first English Arabic scholar of note and a great Biblical commenta¬ tor, Pocock is best known for his (Specimen Historic ArabunP (1649) and an edition of Abulfaragius (1663).

POCOCK, Richard, English Oriental ‘ trav¬ eler: b. Southampton, 1704; d. 1765. He studied at Corpus Christi, Oxford; took holy orders and was advanced rapidly. He wrote descrip¬ tion of the East) (1743) ; Observations on Palestine-1 (1745) ; and (Tours in Scotland) (1887, with biography by Kemp). He became bishop of Meath shortly before his death.

PODAGRA (Greek, (

podestA, an Italian word, equivalent in its original meaning to a holder of power or authority. In several of the Italian cities it is applied sometimes to the chief of police and sometimes to the chief magistrate or burgomas¬ ter. The office was first established in the 12th century by Frederick I in the principal towns of Italy, and was in the Middle Ages much more important than it is now. The podesta was entrusted almost with dictatorial power, the only limitation being that there was an appeal from his decisions.

PODIATRY (Gr. ttovc, ˆoS, foot, and Lardeia, treatment). The art of caring for the feet both to cure and to prevent affections of them,

called chiropody formerly (etymology usually given x£LP > hand, and nod, foot, as if treat¬ ment of hand and foot, but probably from Xtipvp-y , surgery, and n od, foot, euphony leading to the modification of the mid-syllable). The development of the art of caring for the feet has ied to the recognition of the necessity not only for a special name but also for the defi¬ nite evolution and regulation of the knowledge and practice of the art. The care of the feet has taken on a new significance in recent years. A number of serious constitutional diseases, as locomotor ataxia (perforating ulcer), diabetes (gangrene), Reynaud's disease and endarteritis obliterans (dry gangrene), as well as others, may give their first significant symptoms in the feet, so that it is all-important that the real meaning of them should not be missed at the beginning when most can be done for them.

The chiropodist had developed from the ((corn doctor,® but there was manifestly need of more scientific training and more clinical knowledge, and as a consequence of this need the profession of podiatry was created. Like modern dentistry it represents an evolution from unprofessional work to a profession that now does much for the comfort of mankind. Both developments are due to American enterprise and the prac¬ tical recognition and organization of valuable applications of knowledge.

The law of New York State (1919) regu¬ lating its practice defines : (

Special Reference to Podiatry (New York

1917).

James J. Walsh, M.D., Author of (Makers of Modern Medicine R

(Old Time Makers of Medicine T (History

of Medicine in New York,y etc.

PODICEPS, or PODICIPIDID2E. See

Grebe.

PODEBRAD, pod'ye-briid, George Bocz-

ko, Bohemian king : b. Podebrad, Bohemia, 6 April 1420; d. 22 March 1471. In youth he favored the Hussite movement, but remained with the moderate party during the reign of Sigismund; ˆafter die election of Albert V of Austria as Sigismund's successor he supported the Utraquists; invited Casimir of Poland to become king of Bohemia and compelled Albert to retire to Prague. Albert retained the title of king until his death in 1439 and Lipa was chosen regent of Bohemia. In 1444 after Lipa's death Podebrad became regent during the reign of Ladislaus, Albert's posthumous son, and though the young king came to reside at Prague in 1453 Podebrad continued to wield the authority of a monarch. Ladislaus died in 1457 and in 1458 Podebrad was unanimously elected king. He was crowned in 1459 and proceeded to in¬ stitute various reforms in the government. In endeavoring to conciliate the Pope he banished the Taborites and other sects from the country, but was excommunicated in 1463, and a Ger¬ man crusade was inaugurated against Bohemia in 1466. Podebrad then recalled the banished Taborites, crushed the insurrection, defeated the German invaders and in order to secure the support of the Poles declared Ladislaus, heir of the Polish throne, his successor, his own sons to retain merely the family estates. He suc¬ ceeded in firmly establishing his kingdom and died shortly after. Consult Jordan, (Das Konigtum Georgs von Podebrad* (1861) ; Richter, (Georg von Podebrads Bestrebungen >

(1863).

PODIUM, a foot-wall; in architecture, a low wall, generally with a plinth and cornice, placed in front of a building. A projecting low wall round the interior of a building, as a shelf or seat, and round the exterior for orna¬ mental adjuncts, as statues, vases, etc.

PODMORE, Frank, English psychical stu¬ dent: b. 5 Feb. 1856; d. 1910. He was educated at Oxford, was one of the founders of the Fabian Society and was a member of the So¬ ciety for Psychical Research. He has published (Appantions and Thought Transference) (1894) ; (Studies in Psychical Research' (1897) ; (Modern Spiritualism: a History and Criticism* (1902) ; (The Naturalization of the Super¬ natural 5 (1908) ; (The Newer Spiritualism*

(1910).

PODOCARPUS, a genus of trees and a few shrubs of the family. The species, of which about 60 have been described, are mostly tropical, distributed in the Australasian Archi¬ pelago, adjacent Asia, Japan, the South Pacific Islands, the Andes and in Africa. They are resinous,

have fern-like leaves, small monoecious or dioecious flowers borne singly or in spikes either in the leaf-axils or subterminally. The pistillate blossoms are followed by small, berry¬ like fruits upon thick purple stalks, and sub¬ tended by fleshy bracts. The fleshy seed-stalks

of some are used for food. In America a few are sometimes cultivated in greenhouses ; others are sparingly planted in the South and in Cali¬ fornia. Well-drained loam suits them. Where indigenous, several species are highly prized timber trees. Of these the best known are probably the following: Totarra or totarra pine (P . totarra) which approximates a height of 100 feet and a diameter of 12, is largely used for ship-building in New Zealand where it is native; the gagali (P . elata) of Queensland, rises 100 feet, but has a diameter of only about three feet and is used for cabinet work; and P. cupressina, a Java species, which approxi¬ mates 65 feet in height and whose easily pol¬ ished yellow wood is used for house-building, furniture, etc.

PODOLIA, po-do'li-a, or KAMENETZ,

ka'me-nets, a government of West or <(White** Russia, north of Bessarabia and bordering on the Rumanian frontier; area, 16,224 square miles. The surface is a table-land, strewn with hills ; nearly three-fourths is either arable or available for pasturage. The principal river is the Bug, although the Dniester forms part of the south¬ ern boundary. The capital is Kamenetz-Po- dolsk. It was the scene of serious upheavals in the Great World War. It has a fertile black soil which grows grain, tobacco and sugar beets. There is considerable manufacturing; the chief manufactures are flour, sugar, spirits and to¬ bacco products. Pop. 4,127,600.

PODOLSK, a town in Russia, 26 miles south of Moscow. Pop. about 5,000.

PODOPHYLLUM, MANDRAKE, or MAY-APPLE, genus of hardy perennial herbs of the family Berberidacece. The four species are natives, two of China, one of the Himalayas and one of North America. The last species grows about 15 inches tall, bears one or two dark green leaves ; in the axil of two-leaved specimens one or sometimes two fragrant saucer-like cream-colored flowers are borne. These are followed by a yellow, tender, insipid fruit which is somewhat edible. The dried roots and a resin obtained from them have been used in medicine, but are less popular than formerly. The fruits are sometimes called wild lemon and hog-apple. The name mandrake (q.v.) is more correctly applied to Mandragora, which is the mandrake of ancient history and romance.

PODURIDZE. See Bristle-tails.

POE, Edgar Allan, American poet and prose writer: b. Boston, Mass., 19 Jan. 1809; d. Baltimore, Md., 7 Oct. 1849. His father was of a good Maryland family and' his mother was a daughter of the once celebrated English actress Mrs. Arnold. Both parents were actors and were' engaged at the Boston Federal Street Theatre at the time of their son's birth. Mrs. Poe, who outlived her husband, died in great poverty, leaving three children, who were adopted by friends. Edgar was taken into the home of his godfather, John Allan of Richmond and was treated in many respects as a child of the family. He was a handsome, precocious boy; the over-indulgence and unwise petting of his foster-parents aided in developing a natu¬ rally imperious and self-indulgent nature. When he was six years old the Allans took him

to England and placed him in a school at Stoke-Newington, then a suburb of London. He remained at the school for six years and there laid the foundation of his curious classi¬ cal lore. The autobiographical story of William Wilson describes the old Manor House School and its quiet round of duties and pleasures. On his return to Richmond in 1821 he entered the English and Classical School of Joseph H. Clarke where he was prepared for college. He was quick and brilliant, excelling in languages and in athletics. But in spite of his talents Poe was unpopular; his extreme sensitiveness, his moody disposition, his pride of intellect kept his school fellows at a distance. He formed, during this time, a passionate de¬ votion to the mother of one of his school¬ mates and after her sudden death spent night after night of a bleak, dreary autumn, by her grave. At 17 he matriculated at the University of Virginia. He devoted himself to Latin, Greek, French, Spanish, Italian and took the highest honors in Latin and French. But his gambling debts were heavy and he was not allowed by Mr. Allan to return. After a short enforced stay in Mr. Allan's counting-house he determined to make his own career and ran away to Boston. There he published his first volume, (Tamerlane and Other Poems) (1827), verses without any special originality and rough in execution. Poor and friendless he now en¬ listed in the army. He made an efficient soldier, was promoted to sergeant-major and was so attracted to army life that he again asked Mr. Allan's aid, and, through his influence, was al¬ lowed to enter West Point. He disliked the dis¬ cipline of the school, however, and deliberately gave such grounds for offense that he was dismissed. Just before he entered West Point he

had published a second volume of poems con¬ taining among others a revision of of ˆenoreP He uttered his forebodings over her desperate ill¬ ness in (The RavenP and his grief for her

death in the tender stanzas (To One in Para- diseP and in the hopeless (UlalumeP

The letters he wrote to his mother-in-law are natural, simple and winning, and show Poe in a most attractive light. To her he wrote also the beautiful lines (To My MotherP In 1838 he moved with his family to New York where he held, for a short time, a position on the New York Quarterly Review, but the magazine was not so successful financially as had been hoped and Poe entered into an engagement with the Gentleman's Magazine and removed to Phila¬ delphia. Mr. William Gowans, a well-known bookseller, who boarded with Mrs. Clemm in New York, gives emphatic testimony to Poe's courtesy and sobriety at this time. In 1839 his best stories were published in two volumes entitled (Tales of the Arabesque and Grotesque) — among them (LigeiaP Poe's favorite tale, and the masterly (Fall of the House of Usher.' A year later he began his work for Graham's Magazine in Philadelphia, and the fame of his poems, stories and critiques, together with Mr. Graham's excellent management, in two years raised the subscription list from 5,000 to 52,000. Much of his best writing was done for this maga¬ zine ; in it were published among many other stories (The Murders in the Rue MorgueP which was immediately translated into French; (The Descent into the Maelstrom* ; and (The Mystery of Marie RogetP In 1842, either from native restlessness or because his fits of in¬ toxication were increasing, he resigned the editorship of Graham's and two years later again moved to New York. In 1841 Mrs. Poe ruptured a blood-vessel and the next six years were filled with poverty, illness and agonizing alternations of hope and fear. At one time Poe achieved his desire of having a magazine of his own, as he had sole management of the Broad¬ way Journal, but he had little executive ability and this enterprise failed. In January 1847 his wife died at Fordham, then a suburb of New York, and after this overwhelming sorrow, for two years and a half he struggled feebly against illness, weakness and opium. His most notable works during this period were (EurekaP (The Bells* and (UlalumeP In October 1849 he fell ill in Richmond as he was starting for New York and was found delirious in the streets of Baltimore. He died in the City Hospital and was interred in the burial grounds of Westmin¬ ster Church, near the grave of his grandfather, General David Poe.

Poe's character was complex and difficult; he was self-willed and self-indulgent, too often regardless of the rights of others, intensely proud

and reserved, sometimes courteous and kindly, oftener moody and abstracted. He was keenly sensitive to sound and easily excited by stimulants. That he was not the degraded ine¬ briate that Griswold depicted has been abun¬ dantly proved, but there is no doubt that his poverty and his frequent change of promising positions were caused in part by vacillating will and by recurring spells of intoxication. He was a dreamer and his imagination dwelt with the mystic and horrible ; his mind was brilliant and acute and his sense of form and proportion exquisite.

The themes of Poe's poetry were few — man's loneliness, the hopelessness of struggle, remorse for a wrecked life. His poems bring no breath from the outer world. Theirs is a

land of dreams, of tempest, of fantastic terrors, of ashen skies, and through this land glide ghosts, birds of ill omen and crawling shapes. His poetry is not stimulating and has no moral quality; but has frequently an almost faultless literary form, vivid, if distorted imagination, and a haunting melody. His theory was that a poem should have complete unity in itself, and consequently should never be of great length, and that the poet must compose only when in a state of highly excited emotion. Poetry he defines as the ((rhythmical creation of beauty.® His fame as a poet rests on a few short poems, (The Raven, >

His stories are weird, filled with horrors and often glow with the putrescence of physical decay. They are carefully wrought and in such masterpieces as (The Fall of the House of Usher, > and (Ligeia) every word heightens the desired effect. The disintegrating power of fear on a sensitive and highly organized soul has never been more powerfully portrayed than in the former story. Poe's analysis of morbid and tortured souls is unsurpassed. His acute ana¬ lytical powers are shown in such stories as (The Murders in the Rue Morgue) and (The Gold Bug) ; his speculations usually hovered about the improbable and the horrible. His originality, his literary craftsmanship, are unquestioned, but he lacked the will and the moral conviction which would have brought his great gifts to their highest fruition. Editions of Poe are

numerous. Griswold's (2d ed., 4 vols., New York 1856) contains a biased biography; the Stoddard edi¬ tion (6 vols., New York 1895) errs in the same regard. Good editions are those of Gill (Diamond Edition, Boston 1874) ; of Ingram (2d ed., 4 vols., Edinburgh 1880; New York 1894) ; Harrison (Virginia Edition, notes by Stewart, 17 vols., Boston 1892) ; Stedman and Woodberry (10 vols., New York 1898). The (Tales> were translated into French by Baude¬ laire; and also into German and Spanish. See Fall of the House of Usher, The; Gold-Bug, The; Raven, The.

Bibliography. — Biographies prefixed to the editions above-named. Baudelaire (in his (Oeuvres completes, ' Vols. V and VI) ; Brown¬ ell, W. C., (American Prose Masters) (New York 1909) ; Gill, W. F., XXVI, New York 1894) ; id., (Edgar Allan Poe' (in American Men of Let¬ ters Series,' Boston 1885), the best critical life of the poet; id., (Life of Edgar Allan Poe, Per¬ sonal and Literary' (2 vols., Boston 1909) ; id.,

(Edgar Allan Poe' (in (Great American Au¬ thors' (Boston 1914) ; Leigh, Oliver, (Edgar Allan Poe, the Man, the Master, and the Martyr' (Chicago 1906) ; More, P. E., Shel¬ burne Essays' (1st series, New York 1907).

Emilie Watts McVea, President Sweet Briar (Va .) College.

VOL. 22 — 18

POE, Orlando Metcalfe, American soldier: b. Navarre, Ohio, 7 March 1832; d. Detroit, Mich.; 2 Oct. 1895. He was graduated from West Point in 1856, and in 1861 was chief of engineers in the Department of the Ohio. In that year he was commissioned colonel of the 2d Michigan Volunteers, served in the Virginia and Maryland campaign, was appointed briga¬ dier-general of volunteers in 1862, and in 1863 was mustered out of the volunteer service and became chief of engineers in the 23d corps of the Army of the Ohio. He served in a similar position under Sherman in his invasion of Georgia, and was brevetted brigadier-general in the regular army in 1865. In 1865-70 he was engineer secretary of the United States light¬ house board, engaged in constructing the light¬ house on Spectacle Reef, Lake Huron, in 1873- 84, and had charge of various river and harbor works in the Great Lakes. He was a member of the United States board of lighthouse com¬ missioners, aide-de-camp to General Sherman, and at his death was chief engineer of the Northwest district.

PCECILE, pe'si-le, a stoa or portico in ancient Athens, containing a picture gallery. The philosopher Zeno (q.v.) taught his doc¬ trines

here. See (Stoicism.

POEM OF THE CID ((Poema de Mio Cid') is the most ancient monument of Spanish literature. The author, date and place of its composition are uncertain, but internal evidence points to some part of Castile, probably the neighborhood of Medina, as the place and 1 140— 60 as the date of its writing. The (Poema' falls thus in time between the (Chanson de Roland' and the (Niebelungenlied.' In archa¬ ism of diction and prosody it stands nearer its French prototype; in unity of conception and the clean-cut outlines of the development of its story nearer to its German successors. The 3,730 lines of the epic fall into 152 stanzas of very varying length, the lines in each having the same assonant, though not rhyming ending. The metre is a rude Alexandrine, doubtless some¬ what corrupted in the single manuscript, writ¬ ten apparently in 1307, which survives. The beginning is lost and a page, some 50 lines, from the body of the book. The theme of the (Poema' is the wrongs, martial achievements in banishment and final triumphant vindication of Ruy Diaz de Bivar, known to Moors as Sid-i, that is, my Cid, i.e., my Lord, and to his con¬ temporary 'Spaniards as El Campeador, i.e., the Warrior, German Kampfer, though curiously enough later writers of either race favored the designation given by the other. The historical Ruy Diaz was a Castilian of distinguished birth. His wife, Ximena, was a daughter of Diego, Count of Oviedo. He was banished through court intrigue in 1080 or 1081 and for some years distinguished himself in partisan warfare with and against Moorish chieftains, fought notable battles at Almenara, Zalaca and Tebar, captured Valencia in 1094, formed an alliance with Pedro of Aragon in 1096 and, after five years of troubled rule at Valencia, died in 1099. His wife and followers evacuated that town in 1102. Out of this energetic and successful con- dottiere legend had in a half century erected a hero of a loyalty to his king as utter and more abject than that of Roland or of the German Hagen, a pattern of valor, of magnanimity and

of honor as that age conceived it, but yet a thoroughly flesh and blood man. The opens with the Cid going into banishment. Pop¬ ular sympathy is repressed by dread of the king. He recruits his finances by cheating a Jew about security for a loan and his forces with (VIII of Castile ((kings of Spain are of his blood® (line 3,724) and Charles V in a royal charter of 1541 speaks of the Cid as ((our ancestor.® The most scholarly edition of (Poema de Mio Cid5 is by R. Menen- dez

Pidal (Madrid 1911). The most conven¬ ient, also by him, is in the (Clasicos Castella- nos) (Madrid 1913). An edition, in three vol¬ umes with text, translation and notes by Arthur M. Huntington, was printed for the Hispanic Society of America in 1897. John Ormsby's (The Poem of the Cid5 (London 1879), has a spirited version of the finer passages, with a much condensed prose rendering of the rest, a good introduction and a table of the ancestors and descendants of the Cid. The relation of the (Poema) to the facts is fully examined by R. Dozy in (Recherches sur l'histoire politique et litteraire de l'Espagne pendant le moyen age5 (Leyden 1881). For later developments of the legend consult (Chronica del Cid,5 the basis of R. Southey's ˆChronicle of the Cid5 (London 1808), and the more than 200 ballads collected by Duran in (Romancero general5 (2 vols., in (Biblioteca de autores espanoles5) and by C. Michaelis in (Romancero del Cid5 (Leipzig 1871). Benjamin W. Wells.

POERIO, po-a're-o Carlo, Baron, Italian patriot : b. Naples, 10 Dec. 1803; d. Florence, 28

April 1867. Having espoused the cause of the Neapolitan liberals in 1828, he participated in the conspiracy of Avellino, and thereby incurred a long imprisonment. He was again imprisoned after the unsuccessful revolutionary attempt of 1847. Liberated in January 1848, in conse¬ quence of the revolution begun at Palermo, he organized the historic demonstrations of the 27th of that month, from which resulted the con¬ stitution of 10 February, under which he was nominated director of police and minister of public instruction. He soon resigned and was chosen to the Parliament as deputy for Naples. In July 1849 he was charged with conspiracy and, although not justly convicted, was sen¬ tenced to imprisonment for 24 years. In 1859 he, with many other political prisoners, was placed on an American ship for transportation, but was landed at Cork and returned, by Lon¬ don, to Turin. In 1860 he was elected to Par¬ liament from Tuscany, and later became vice- president of that body.

POET LAUREATE, an officer in the lord- chamberlain's department of the royal house¬ hold of Great Britain. The appellation was de¬ rived from laurus, a bay or laurel, in allusion to the ancient practice of crowning poets with a laurel wreath. Graduates in rhetoric and versi¬ fication in the English universities were pre¬ sented with a laurel wreath and were, in con¬ sequence, styled Poetce Laureati. The royal laureate was merely one of these in the king's service. The first patent of poet laureate was granted to Ben Jonson in the reign of James I. The laureate was required to furnish an ode on the birthday of the sovereign or on the occasion of a national victory; but this custom was

dis¬ continued toward the close of the reign of George III. Since the time of Charles II the following poets have in succession held the office of laureate: John Dryden, Thomas Shadwell, Nahum Tate, Nicholas Rowe, Lawrence Eus- den, Colley Cibber, William Whitehead, Thomas Warton, Henry James Pye, Robert Southey, William Wordsworth, Alfred Lord Tennyson, Alfred Austin and (since 1913) Robert Bridges. The salary is $360 yearly.

POET AT THE BREAKFAST TABLE, The, a work by Oliver Wendell Holmes, first printed as a series of papers in the Atlantic Monthly in 1872. Like the earlier (Autocrat5 and the 'Professor at the Breakfast Table5 it consists of rambling discursive talks on many subjects — religion, science, literature — with a frequent excursion into the realm of philosophy. The principal persons at the table are the Poet; the Old Master, a scholarly philosopher; the Scarabee, a withered entomologist; the poetic young astronomer; Scheherazade, a young girl who writes stories; and the Lady. All of these occasionally take part in the conversation, but more frequently the writer in his own person addresses the reader directly.

POETICS OF ARISTOTLE, The. The

'Poetics5 of Aristotle, historically, and doubt¬ less intrinsically, is the most important of ex¬ tant works in literary criticism. Its relation to prior and contemporary treatises on poetry, in¬ cluding an Aristotelian dialogue 'On Poets,5 is uncertain ; yet this one surviving "Book® probably contains the net result of Greek re¬ flection upon epic poetry and the drama. It

looks like the draft of a lecture, to be ampli¬ fied in delivery, or else a record of the lecture, made by a student; or possibly a later Alex¬ andrian abridgment of one or more Aristotel¬ ian writings on poets and the theory of poetry. With the discussion of tragedy and (partly by implication) epic poetry, we should expect the treatise to include more extended remarks on the effect of tragedy (the "catharsis,® or purg¬ ing of emotion in the audience) and on the nature of comedy. The Aristotelian "purga- tion of pity and fear® must be partly explained bv a study of the actual emotions arousad and allayed in us by the best tragedies. Aristotle's conception of comedy must be inferred partly from scattered allusions in his other works, as the (Rhetoric) ; partly from a few specific refer¬ ences in the (Poetics, > and from the

general implications of that work; and partly from the (Tractatus Coislinianus,* a garbled fragment on comedy, of Peripatetic, if not strictly Aris¬ totelian, origin.

The history of the

In' the second half of the 15th century the Greek text was studied, in a number of manu¬ scripts, in Italy. A translation appeared in 1498, and the editio prince ps in 1508. Through Italian editors and commentators (as Castel- vetro) a knowledge of the

and reduce them to just measure,® he departs from Aristotle, whose conception was strictly medical — the tragic purge is complete, it leaves no residuum of "purified® fear and pity. The worst misconception, however, was peculiar neither to the Renaissance nor to the Middle Ages. To deem the (Poetics) a set of "rules® imposed upon the free activity of the poet is a mistake that is made whenever the value of the treatise is dimly discerned, and its firm general¬ izations are not seen to be mingled with tenta¬ tive suggestions and casual remarks which sometimes contradict one another. The correct attitude may be seen in Ben Jonson, who says (following Heinsius) : "Those that can teach him [the poet] anything he must ever account his masters and reverence ; among whom Horace and (he that taught him) Aristotle deserved to be the first in estimation. . .

But all this in vain without a natural wit and a poetical nature in chief ; for no man so soon as he knows this, or reads it, shall be able to write the better; but as he is adapted to it by Nature he shall grow the perfecter writer.®

For our own day, the best of modern editors says : "The ibook, taken as it is, with perhaps an occasional side-light from some of his [Aristotle's] other works, is intelligible enough; after a brief introduction, he gives us in out¬ line all that he has to say on the subject im¬ mediately before him, the technique of the drama and the epic. He tells one, in fact, how to construct a good play and a good epic, just as in the

To Aristotle, Homer is the greatest of poets, but tragedy the highest form of poetry. In tragedy, the nearest approach to his ideal is Sophocles' (CEdipus Rex,* though he pays much attention to Euripides' Uphigenia in TaurisP With Homer and Sophocles he mentions Aristo¬ phanes ; though his conception of comedy and tragedy was modified by the practice of his own age, his theory of the poetic art was in the main founded upon a study of these three. Of

PEschylus, for some reason, he has little to say. Lyrical poetry he does not discuss, doubtless because to a Greek it fell under the art, not of poetry, but of music.

Aristotle conceives of poetry and the other arts as forms of “imitation.® As a painter imitates a human figure in pigments, or as a sculptor imitates a man in bronze or in stone, so a tragic poet imitates an action — something done or suffered by human beings — in the medium of rhythmical language. This action is the very “soul® of the tragedy ; the moral bias of the agents (shown in their habit of choice) is, like their ways of reasoning and explaining, subservient to the plot taken as a whole. The plot or action must be unified and complete — this is the only “unity® demanded by Aristotle. “Oneness® of hero — the only other “unity® mentioned • by him — does not make a story an organic work of art. A good story is, in fact, like a living creature, no part of which could ‘be transposed or removed, and to which nothing could be added, without dis¬ torting the whole. It follows that the poet

(the Greek word means maker) is a (

Lane Cooper,

Professor of the English Language and Litera¬ ture, Cornell University.

POETRY. Poetry has been defined in many ways, and in the nature of the case the term means different things under different condi¬ tions. In general it may be defined as emo¬ tional and imaginative discourse in metrical form; that is, the representation of experi¬ ences or ideas with special reference to their emotional significance, in language character¬ ized by imagery and rhythmical sound. On the side of concrete imagery the art of poetry is closely related to the arts of painting and sculp¬ ture; but it differs from these in that it is better adapted to the representation of con¬ tinuity and movement, and also in that it can make use of purely abstract ideas as well as images. On the side of rhythmical sound it is closely related to music; but it differs from the latter in its capacity to represent both concrete and abstract ideas with some exactness. If the subject-matter is viewed by the poet objec¬ tively, — as existing outside and apart from his own personality, — the poetry may be narrative or descriptive ; if subjectively, — that is, pri¬ marily as a personal experience, — the

poetry is lyrical. Dramatic poetry combines these two points of view: it is objective for the poet, but presents the material subjectively through im¬ agined personalities. Since poetry may deal with general as well as concrete subject-matter, there also occurs a type best called expository or didactic ; but this, because of its small use of emotional values and imaginative expression, exists, as it were, close to the borders of prose. Further, on these types, see under Literary Forms.

Poetry is the most primitive of the literary arts ; that is, it normally develops before prose literature. Two theories of its origin have been proposed : that it arises from the elabora¬ tion and beautifying of prose discourse, and that it arises from emotional utterance in con¬ nection with song and dance. The latter view is the more widely held, and appears to be sup¬ ported by evidence still observable among primitive peoples. That is, primitive man often expresses the emotional aspects of common ex¬ periences by means of a kind of communal art which includes music, dancing and simple verse, each element at first inseparable from the others. Indian festival dancer, and groups of

singers at negro camp-meetings, still show this combination. As time goes on there is a tend¬ ency to differentiate the individual singer, com¬ poser or poet from the group, and eventually to differentiate the arts of music, verse and dancing. There is also a marked tendency, as civilization advances, to diminish the physical or sensuous aspects of emotional expression, and to increase the intellectual or reflective; so that poetry, originally existing only for vocal utterance, eventually becomes a thing to be read, and even to be read silently. But the rhythmic form remains as the evidence of its original connection with the other rhythmic arts. The persistence of this element is due, of course, not merely to historic, but also to psychological reasons : for rhythmic form fur¬ nishes a means of expressing emotion and at the same time of keeping it in control, and this is an essential condition of art. Moreover, by transforming the movement of ordinary speech, without depriving it of its normal meanings, rhythmic form seems to symbolize that idealiza¬ tion of reality which is another usual condition of artistic expression.

The precise nature of this rhythmic form naturally differs in the case of different peoples and languages, and according as the association between verse and music is more or less close. Thus the rhythms of Greek verse and Greek music appear to have been closely similar, whereas the rhythms of modern English verse and music differ very widely. For the modern Germanic languages, English included, rhythmic form results from the arrangement of speech in such a way

that the principally stressed syllables tend to recur at equal intervals of time; the number of syllables within these in¬ tervals also tends to be constant, but with many exceptions. In the most common type of Eng¬ lish verse two syllables normally occur for each measured stress, — that is for each measure or foot, — and the rhythm may be called double. Frequently, again, the norm is three, giving triple rhythm; less frequently four, giving quadruple. If the rhythm tends to open with an unstressed syllable it is called rising ; if with a stressed syllable, falling. The common types of English metre, then, are the double rising, called Iambic; the double falling, called Tro¬ chaic; the triple rising, called Anapestic, and the triple falling, called Dactylic. A line of typical verse is made up of a fixed number of these measured stress-units or feet, and thus may be described as (

Greek Poetry. — In the classical age of Greek literature, the 5th century b.c., a high degree of literary development had already

taken place, yet at the same time the close con¬ nection of the three rhythmic arts remained conspicuous, as is evidenced by the fact that the lyrical odes of Pindar and the dramatic odes of ˆEschylus and Sophocles were written for musical performance in connection with pro¬ cessional or dance movements of the singers. The Greeks divided their poetry into three chief classes, epic, dramatic and lyric, the third class including subtypes called elegiac, iambic and melic (for an account of these see under Lyric Poetry), all of which were charac¬ terized by different kinds of musical accom¬ paniment. It happens that the body of sur¬ viving epic and tragic poetry of the Greeks is more complete and representative than that of their lyric poetry ; but it is doubtless not for this reason alone that their epic and tragedy have largely influenced the great body of mod¬ ern poetry, whereas their lyrics have exerted no such influence. For the Greek epic deals with story material which has remained im¬ pressively interesting, and the best Greek tragedies are concerned with emotional and spiritual problems of lastingly vital character; whereas the Greek lyrics are centred more in local and temporary matters, and also lack, for the most part, the subjective and spiritual qualities which are valued in modern lyric poetry. In the later age of Greek literature centring at Alexandria in the 3d century b.c., a new type of poetry was developed, the Pas¬ toral, dealing with the environment and loves of real or imaginary shepherds, — a type widely imitated in succeeding ages.

Latin Poetry. — In the classical age of Roman literature, the 1st century b.c. and the 1st a.d., poetic composition was more largely confined to conscious imitation than in any other important period, and the poetic types of the Greeks became the types of Latin poetry. Certain differences of emphasis, however, nat¬ urally developed. Thus dramatic poetry occu¬ pied a much less important place than in Greece, while satiric, which by the Greeks was viewed as a minor form of the lyrical group, became highly important; indeed it is the Romans who gave us the type name Satire and who elevated the form, in the work of Horace, Persius and Juvenal, to one of prime significance as an expression of the spirit of their race and age. Another distinctive achievement was the eleva¬ tion of expository or didactic poetry in Lucre¬ tius's great work, (De Rerum Natural which remains the world's chief masterpiece of philo¬ sophic poetry.

Mediaeval Poetry. — The poetry of the Mid¬ dle Ages (that is, about 400 to 1400 a.d.) is divisible into two great classes, that arising from the mass of the people in the vernacular languages and that proceeding from the. culti¬ vated classes for whom Latin was the literary tongue. In the former class, narrative poetry takes an immensely preponderant place, develop¬ ing on popular lines, especially those of the metrical romance, independent of literary tradi¬ tion. It is to this vernacular poetrv that we chiefly turn for the expression of that naive or child-like spirit which is associated with the mediaeval <(age of faith® or ((age of wonder,® — the purely popular poetry of earlier ages being largely lost. Mediaeval Latin poetrv, on the other hand, follows certain elements of the classical tradition, but is especially marked by

the influence of the Church. Hence a number of new poetic types, most of them character¬ ized by a large didactic element : in place of the national epic, religious epic and legend; in place of the lyric of love or wine, the hymn ; and above all, appearing in many different types, the allegorical poem, — for the method of allegory is especially characteristic of the effort of mediaeval Christianity to interpret all mat¬ ters of this world in terms of the spiritual realm.

Renaissance Poetry.— The poetry of the Renaissance (that is, generally speaking, the period beginning in the late 14th century in Italy and the late 15th century in western Europe) is characterized by a turning away from the methods of mediaeval literature, par¬ ticularly allegory and didacticism, and a fresh interest in the types and methods of classical poetry, particularly Latin. Hence the effort to revive the formal epic and the formal satire; the imitation of the poetic tragedies of Seneca; a considerable development of pastoral

poetry; and the revival of unrimed verse in various metres imitative of those of Greek and Latin. One notes also the saturation of poetry with the old pagan mythology, and a tendency to devote the art to the things of this world as distinguished from those of the spirit. A new type of lyric came into prominence, devoted to courtly love, for which the sonnet form was chiefly used; this fashion arose in Italy and spread to France, Spain and England.

Neo-Classical Poetry. — The principal Euro¬ pean literatures were dominated, in the 17th and 18th centuries, by what may be called the neo-classical doctrines, which emphasized the theory and form, rather than the inspiring spirit, of ancient poetry. Poetry, in this school, was treated as a formal art, based on reason and on rules, with diminished emphasis on the elements of emotion and imagination; its spirit is well represented by Boileau's Art Poetique (1674) in France and Pope's Essay on Criticism (1711) in England. These poems also exemplify the revival of the didactic type, now frequently equivalent to the prose essay. Satire, formal epic and formal tragedy, are again characteristic of this age, as of the Renaissance; while in lyric poetry the more sentimental types, like the sonnet, tend to disappear and the more in¬ tellectual and elaborate, like the formal ode, to become prominent.

Poetry of the Romantic Movement. — The

latter portion of the 18th century and the early portion of the 19th were characterized, through¬ out western Europe, by various tendencies com¬ monly summed up in the vague term, ((the re¬ vival of romanticism.® The following are some of the marks of this era affecting the develop¬ ment of poetry: (1) A new emphasis on the lyrical, subjective and spiritual elements of poetry, with a disposition to view its imagina¬ tive processes as existing not merely for the sake of pleasure, but for the pursuit of truth by means of the higher intuitions of the mind. Important representatives of this aspect are Jean Paul Richter and his followers in Ger¬ many and Wordsworth and 'Coleridge in Eng¬ land. Wordsworth in his

truth. (2) A disposition to revive and value the natural or popular poetry of the mediaeval period, as exemplified by Percy's Peliques of Ancient Poetry* (1765) and the lectures and researches of Herder in Germany. (3) A cor¬ responding disposition to discard and contemn the formal rules of poetic art which had been taught since the

Renaissance and to exalt in their stead individual freedom and novelty of form. Representative documents in this con¬ nection are Victor Hugo's preface to (Crom¬ well * (1827) and a famous passage in Macau¬ lay's essay on Pyron* (1831), ridiculing the classicist's idea of ˆcorrectness® in poetry.

Poetry of the 19th Century.— The romantic attitude continued, for the most part, to domi¬ nate the modern period, with emphasis on in¬ dividuality, freedom, variety and intensity, as the qualities most highly valued in poetry; though this was tempered by the return, on the part of individual poets (like Goethe in Germany and Matthew Arnold in England), for guidance and inspiration to the poetry of the ancients. Extraordinary metrical variety, in contrast with the regularity and conserva¬ tism of the neo-classical schools, is characteris¬ tic of the whole of the past century. Another characteristic is the preponderance of the lyrical type, so marked that a distinguished critic has said that <(the history of modern verse is mainly the history of lyrical sentiment.® That is to say, modern drama has been increasingly writ¬ ten in prose, modern epic has been developed but slightly, and narrative art has found its chief expression in the form of prose fiction. Perhaps the most characteristic poetic type of the 19th century is the dramatic monologue, which combines some of the elements of narra¬ tive with the subjective expressiveness of the lyric.

Recent Poetry. — The opening years of the 20th century have been marked by a revival of interest in poetry as a vital literary form and by a rich development of the spirit of experi¬ mentation. In particular, certain new move¬ ments or schools have arisen, analogous to similar phenomena in the arts of painting, sculpture and music ; perhaps the most note¬ worthy calls itself by the name Imagism, a term brought into English from France. The qualities of this new poetry may be roughly de¬ scribed as consisting in (1) the attempt to represent freshly the fleeting impressions ex¬ perienced by individual personality; (2) the rejection of all effort to interpret experiences generally or didactically; and (3) a preference for approximation and suggestiveness as dis¬ tinguished from the attainment of finished form. The ((new poetry® is especially marked by abundant metrical experimentation, often reaching the point of the abandonment of recognizable metre for rhythmic forms more eccentric or obscure than have yet been suc¬ cessfully analyzed. As in this respect there is a tendency to abolish the line between the art of verse and that of prose composition, so in the style or diction of recent poetry there is a disposition to avoid all distinction between the vocabulary and tone of the two kinds of dis¬ course. This prosaic-poetic style was delib¬

erately introduced into English poetry by Wordsworth at the end of the 18th century, was developed in different ways by such dif¬

ferently influential poets as Browning and Whit¬ man and, in general, may be said to have gone far to do away with the older doctrine of a distinct vocabulary and style for poetry. On the other hand, it still remains doubtful whether the definite line between metrical and non-metrical composition can be blurred or neg¬ lected with lastingly pleasing results.

Bibilography. — For the general theory of poetry and the history of its forms, see Butcher's (Aristotle's Theory of Poetry and Fine Art,* including a translation of the (Poetics> of Aristotle (London 1898) ; Gayley and Scott's (Methods and Materials of Literary Criticism* (Boston 1899) ; Alden's (Introduc¬ tion to Poetry) (New York 1909) ; Gummere's (Handbook of Poetics) (Boston 1885) ; Gum- mere's (The Beginnings of Poetry) (New York 1901) ; Cook's (The Art of Poetry; the poetical treatises of Horace, Vida and Boileau* (Boston 1892) ; Leigh Hunt's (What is Poetry?* edited by Cook (Boston 1893) ; Neilson's (Essentials of Poetry) (Boston 1912) ; Alexander's Poetry and the Individual* (New York 1906) ; Cole¬ ridge's Piographia Literaria and 2Esthetical Essays, * edited by Shawcross (Oxford 1907) ; Mill's essay, <(Thoughts on Poetry and its Varie¬ ties,® in dissertations and Discussions> (Lon¬ don 1876) ; Raymond, G. L., Poetry as a Re¬ presentative Art* (New York 1885) ; Stedman's (The Nature and Elements of Poetry) (Boston 1892) ; Combarieu's (Les Rapports de la Musique et de la Poesie* (Paris 1894). For English poetic forms, see Omond's (Study of Metre) (London 1903) ; Alden's (English Verse) (New York 1903) ; Lewis's Principles of English Verse) (New York 1906) ; Saintsbury's dis¬ tory of English Prosody) (London 1910) and (Manual of English Prosody) (London 1910) ; Andrew's (The Writing and Reading of Verse,* (New York 1918)'.

Raymond M. Alden,

Professor of English, Leland Stanford Jr U niversity.

POETRY AND TRUTH. ((Aus meinen Leben; Dichtung und Wahrheit*). Goethe's Poetry and Truth) is one of the great auto¬ biographies of the world's literature. It is divided into four parts, the first three of which were written and published between 1811-14, while the fourth was written mainly in 1830—31 and published in 1833. Each part contains five books ; in style, composition and interpretation of life, the fourth part is in¬ ferior to the other three. The whole treats only of the first 26 years of its author's life, but Goethe held that <(the

most import¬ ant period of an individual is that of his development.® The material is distributed in such a way that Goethe's childhood is nar¬ rated from book one to the middle of book six; the account of his student-days begins with the latter half of the sixth book and con¬ tinues through the 11th; books 12-15 are given to the consideration of his early manhood, when his first great successes as an author were realized. In spite of important experiences, part four does not open a new phase in Goethe's development, but it does bring the outer course of his life to its most decisive turning-point — his departure from Weimer. Goethe wrote Poetry and Truth* from the point of view of the scientist, the historian and the artist.

As a scientist he desired to picture his life as developing stage by stage "according to those laws which we observe in the metamorphosis of the plants.® As a historian he portrayed the general conditions of the times and revealed the relations between them and the individual. As an artist he did not feel tied down to facts for their own sake, but selects those that were of significance and moulded them so that they might become parts of a work of art. In the much-discussed title the word "Poetry® refers primarily to the artistic form of the work. One of the chief objects of Goethe's autobiography L to furnish a commentary for the understand¬ ing of his works. The leading topics of the different hooks are as follows: Book 1, Goethe's birth (1749), family and native city, Frankfort-on-the-Main ; book 2, first inclina¬ tions toward poetry, fairy tale, (The New Paris) ; book 3, the French in Frankfort in consequence of the Seven Years' War, Count Thorane quartered with the Goethes ; book 4, the boy's many-sided education, study of the Old Testament; book 5, youthful love, corona¬ tion of a German emperor in Frankfort. Book 6, Frankfort period concluded (1765), Goethe a student of law and literature at the University of Leipzig; book 7, German literature in the middle of the 18th century, fundamentals of Goethe's poetic talent; book 8, studies in art, return to Frankfort (1768), experiments in chemistry, religious convictions ; book 9, Goethe a student of law and medicine in Strassburg (1770), German and French civilization, the cathedral, self-education and passion; book 10, mentor Herder, a trip through Alsace-Lorraine, love for Friedrike Brion of Sesenheim. Book 11, love-story continued, graduation as a stu¬ dent of law, alienation from French literature, admiration for Shakespeare, departure from Friedrike and from Alsace (1771) ; book 12, back in Frankfort, the Storm and Stress period, in Wetzlar, conditions leading to the conception of ; book 14, Storm and

Stress again, trip down the Rhine with Lavater and Basedow, influence of Spinoza, plan for a drama, (Mahomet) ; book 15, plans for an epic, (The Wandering Jew) and a drama, Prome¬ theus, > first meeting with the princes of Weimar, idea of settling permanently in Frank¬ fort (winter 1774). Book 16, Spinoza again, oetry and profession, first meeting with Lili chcenemann, Jung-Stilling ; book 17, engage¬ ment with Lili, social and political conditions of the time; book 18, problems in prosody, journey to Switzerland as far as Saint Gothard; book 19, return to Frankfort, Lavater and his (Physiognomy, > engagement with Lili broken, PgmonU begun; book 20, invitations from Weimar, the demonic influence in life, (Eg- mont) continued, journey to Weimar (Novem¬ ber 1775). Consult edition of Goethe's works in (Deutsche National-LiteratuU (Vols. XVII- XX. 1882-98) ; English translation by J. Oxen- ford, (The Autobiography of Goetheˆ "Truth and Poetry: From my own Life® (London 1846-48; new ed., rev., ib. 1881-84) ; Alt, C., (Studien zur Entstehungsgeschichte von Goethes Dichtung und WahrheiP (1898) ; Roethe, G., (Dichtung und WahrheiD (in Berichte des

Freien Deutschen Hochstiftes, Jahrgang 1901, Frankfort am Main).

Ewald Eiserhardt.

POETS' CORNER, The, a popular name given a corner in Westminster Abbey in Eng¬ land, where there are memorials to many famous poets. Among those represented are Addison, Beaumont, 'S. Butler, Campbell, Cowley, Daven- ant, Drayton, Dryden, Gay, Goldsmith, Gray, Dr. Johnson, Ben Jonson, Longfellow, of America, Macaulay, Mason, Milton, Philips, Prior, Rowe, Shakespeare, Shadwell, Sheridan, Spenser and Thomson.

POEY, po'ay, Felipe, Cuban naturalist : b. Havana, Cuba, 26 May 1802; d. there, 28 Jan. 1891. He was graduated in law from the Uni¬ versity of Madrid, but abandoned his law prac¬ tice and engaged in the study of natural his¬ tory, later continuing his studies in Paris where in 1827 he aided in founding the Societe Ento- mologique. He returned to Havana in 1833 where he made a study of Cuban fauna and in 1842 became professor of comparative anatomy and zoology at the University of Havana. In 1863 he was transferred to the chair of bot¬ any, mineralogy and geology. He published (Memorias sabre la historia natural de la Isla de Cuba) (1860) ; (Enumeratio Piscium Cuben- sium) (1875) ; (Geografia de Cuba> (19 edi¬ tions) ; etc. His most important work, Uctiologia Cubana,* was unpublished at the time of his death.

POGGIO BRACCIOLINI, podj o bra- cho-le'ne. See Bracciolini, Poggio.

POGROM, po-grom, in Russia, an anti- Jewish riot. The first manifestations of these occurred in 1881 soon after the assassination of Alexander II. The Jews allege that the pogroms were the work of a secret society which operated with the connivance of the govern¬ ment officials. It were more true to say that the actions of Jewish money lenders in exact¬ ing their pound of flesh from the Russian peasant was the primary cause which soon in¬ volved all Jews indiscriminately. As the re¬ sult of the persecutions of the 80's a great wave of Jewish emigration to America set in. In 1903 the pogroms were again instituted and in the following two years many Jews lost their lives. The greatest loss of life occurred at Kishinev, Bessarabia. A direct result was the emigration of hundreds of thousands of Jews to the United States and the British dominions beyond the seas.

POGY. See Menhaden.

POI, a native food or porridge made from flour obtained by grinding the roots of tara or taro, a plant grown in most of the Polynesian islands, especially in Hawaii. The tops are used by the natives as pot herbs. The root is ground on stones by the native women and made into mush, which, among the Hawaiians of the lower classes, is eaten with the fingers out of a com¬ mon dish.

POILU, pwa-lii' Fr. adj. "hairy,® from poil, hair, beard : popularly applied as a noun during the war to the French soldier in the field, as descriptive of his occasional unshaven appearance. This nickname appears to be now as firmly established as "Tommy Atkins® (q.v.) in the British army.

POINCARE, pwan'ka'ra', (Jules) Henri,

French mathematician and physicist: b. Nancy, 29 April 1854; d. Paris, 17 July 1912. He studied at the ficole Polytechnique in 1873 and two years later completed his work at the ficole Superieur des Mines. In 1879 he received the degree of Doctor of Sciences and took up his residence at Paris, where he soon became prominent at the University. In 1886 he re¬ ceived the appointment of professor of mathe¬ matical physics and calculus of probabilities; and 10 years later succeeded Tisserand in the chair of celestial mechanics. The Academie des Sciences elected him to its membership in 1887 and the Academie

Franqaise in 1908. Poin¬ care received many prizes for his work, among which may be mentioned the Prix Poncelet (1885) ; the prize awarded by the king of Sweden for the solution of the problem of the three bodies (1889) ; the Prix Reynaud (1896) ; the medal of the Royal Astronomical Society (1900) ; the Sylvester medal of the Royal Society (1901) ; the gold medal of the Lobachevsky Fund (1904) ; the Prix Bolyai (1905), and the gold medal of the Association Frangaise pour l'Avancement des Sciences (1909). Poincare's principal contributions to mathematical science were along the lines of theory of functions. His researches in physics were likewise marked by profoundly scientific research. The Fuchsian functions were intro¬ duced into mathematics by him. Among his most important works are (Legons sur la theorie mathematique de la lumiere) (2 vols.,

1889- 92) ; (Electricite et optique) (2 vols.,

1890- 91); (Thermodynamique) (1892); (Legons sur la theorie d'elasticite) (1892) ; (Les methodes novelles de la mechanique celeste* (3 vols., 1892-99) ; (Theorie des tourbillons'* (1893) ; (Les oscillations electriques* (1894) ; (Capil¬ larity (1895) ; (Theorie analytique de la propo- gation de la chaleur* (1895) ; (Calcul des proba¬ bility (1896) ; (Cinematique et mecanismes potentiels et mecanique des fluides) (1899) ; (Theorie du potentiel Newtonien) (1899). Some of these smaller works are embodied in his comprehensive (iCours de physique) (13 vols., 1890). A number of other works have appeared from time to time in the scientific journals of France, Germany and the United States. Consult Slosson, E. E., (Major Prophets of To-Day* (Boston 1914).

POINCARE, Lucien (Antoine), French physicist, mathematician : b. Bar-le-Duc, Meuse, 1862; d. Paris, 9 March 1920. He was educated at the Lycee of Bar-le-Duc, the ficole Normale Superieure and the Uni¬ versity of Paris. Dr. Poincare taught in various lycees between 1886 and 1893 and from 1894 to 1900 was professor at the ficole Normale of Sevres, also holding a chair in the Faculte des Sciences of Paris in 1899-1900. He was ap¬ pointed inspector-general of public instruction in 1902. His published works include (La phys¬ ique moderne, son evolution > (1906; English, as (The New Physics and its Evolution) 1907) ;

POINCARE, Raymond, President of the French Republic: b. Bar-le-Duc, Meuse, 20 Aug. 1860. He was educated at the lycees of Bar- le-Duc and Louis-le-Grand and studied law in

Paris. He practised for a short time and was a contributor to political

journals. In 1886 young Poincare was elected deputy and soon made his mark as an earnest student of govern¬ ment and legislation. He allied himself with the moderate Republicans, whose leader at that time was M. Meline. He did not take a prom¬ inent part in the Dreyfus case and opposed some of the policies of Waldeck-Rousseau. At the age of 33 Poincare entered the Cabinet as Minister of Public Instruction, which he re¬ linquished the year following to take the port¬ folio of Finance. In the many cabinet changes which followed he held various portfolios, but he acquired especial distinction as Minister of Finance in dealing with the involved and diffi¬ cult affairs of the budget. M. Poincare be¬ came a Senator in 1903, but he appeared to be indifferent to advancement in the public service and for nine years gave most of his attention to his legal practice, reaching the front rank of his profession. In 1912 M. Poincare became Prime Minister, taking charge also of the Min¬ istry of Foreign Affairs. He supported warmly the alliance with Russia and furthered the entente cordiale with England. As an advo¬ cate of proportional representation he sup¬ ported a bill on this matter in 1912, which passed the Chamber but was thrown out by the reactionary Senate. On 17 Jan. 1913 Ray¬ mond Poincare was elected to the Presidency of the Republic, the ninth to hold that office. The new President soon let it be known that he intended to be no mere figurehead, with cabi¬ net ministers directing the policies and wield¬ ing all the power. His election was particularly pleasing to Russia and to England because of his support of the entente and his advocacy of the new spirit of nationalism. The new Presi¬ dent was soon the most influential person in his government and was fully cognizant of the Teutonic menace which had administered more than one humiliation to France since the beginning of the century. To checkmate it, the three-year military service law was passed despite the violent opposition of the Radical elements; the amiable relations with England and Russia were fostered, the President mak¬ ing visits to the capitals of those countries, where he was enthusiastically received. All his efforts, however, were unable to avert the catastrophe, which like an avalanche burst upon France in 1914. The five ensuing years of Poincare's life are the history of France; his able voice urged on his countrymen to great deeds and despite the efforts of the Defeatists he kept the courage, enthusiasm and patriotism of his people keyed up to the highest pitch. He visited the soldiers in training camps, trench and hospital and to him no less than to his Premier, Clemenceau, is due in great part the successful outcome. M. Poincare has found time to devote to literary subjects and is the author of several works, including (Idees contem- poraines* (1906) ; (Questions et figures poli- tiques) (1907); (Causes litteraires et artistiques) ; (Ce que dernande la

cite* (1912; English trans¬ lation, entitled (How France is Governed,* 1913). Consult Dawbarn, Charles, (Makers of New France) (New York 1915) ; Fullerton, W. M., (Four French Statesmen* (Boston 1915) ; anon., (Raymond Poincare: A Sketch* (New York 1915).

RAYMOND POINCARE

President of the French Republic

“

•:*v

%

POINCIANA, a genus of leguminous trees oi the tamily Casalpiniacece, natives of tropical and subtropical regions. They are trees or shrubs, often with very showy scarlet, yellow, or orange flowers, called peacock flo"Cvers in some regions. One of the best-known species is the Bird-of-Paradise plant, P. gilliesii , a native of South America, but often cultivated in the warmer parts of North America.

POINDEXTER, poin'deks-ter, George, American politician: b. Louisa County, Va., 1779; d. Jackson, Miss., 5 Sept. 1853. He studied law, practised in Milton, Va., and in 1802 established himself in Mississippi Terri¬ tory where he was commissioned attorney-gen¬ eral in 1803. In 1806 he served in the terri¬ torial legislature, was a delegate to Congress in 1807-13, and in the latter year was appointed United States judge for Mississippi, an office which filled with much ability. His character was marred by his killing Abijah Hunt in a duel, in which he fired with undue promptness. He was the first representative of Mississippi in Congress after her admission to statehood in 1817, and in 1819 ably supported General Jack- son’s conduct of the Seminole War. He was twice elected governor of Mississippi, and in 1830 was chosen United States Senator, in which office he ceased to support General Jackson and was even suspected by the latter of complicity in the plot to murder him. In 1835 he removed to Kentucky, but subsequently returnedˆ to Mississippi, where he resumed his old political association.

POINDEXTER, Miles, American legisla¬ tor: b. Memphis, Tenn., 22 April 1868. He was educated at Fancy Hill Academy and Washing¬

ton and Lee University, and removed to Walla Walla, Wash., in 1891. In 1892 he was elected district attorney there, and in 1897 re¬ moved to Spokane, where from 1898 to 1904 he was assistant prosecuting attorney. FromT904 to 1908 Mr. Poindexter was judge of the Su¬ perior Court. He became a member of Con¬ gress in 1908 and soon identified himself with the Progressive wing of the Republican party. He was elected to the United States Senate for the term 1911-17 and re-elected for the term 1917-23. Senator Poindexter supported Roose¬ velt and the Progressives in 1912.

POINSETT, Joel Roberts, American dip¬ lomat: b. Charleston, S. C., 2 March 1779; d. Statesburg, S. C., 12 Dec. 1851. He completed his education at the University of Edinburgh and at Woolwich Military Academy, England, and in 1809 was United States commissioner to South America to investigate political conditions prevailing there. While in Chile he obtained the release of American merchantmen who had been seized by the Spanish authorities of Peru on a rumor of the declaration of war with the United States. He was elected to the South Carolina legislature on his return and in 1821-25 was a member of Congress ; he served in 1825-29 as minister to Mexico and afterward allied himself with the ˆUnion® party in strenuous opposition to the nullification issues. He was Secretary of War in 1837-41, and in 1840 was instrumental in the passage of the bill to reorganize the militia. The last years of his life were spent in retirement; he founded an academy of fine arts in Charleston, and pub¬

lished (Notes on Mexico, Made in 1822; with an Historical Sketch of the Revolution > (1824).

POINSETTIA, a shrub (Poinsettia pul- cherrima) of the family Eupliorbiacece. It is a native of shady and damp tropical and sub¬ tropical Central America and Mexico, whence it was introduced into cultivation by Dr. Poin¬ sett of Charleston, S. C, and distributed by Robert Buist of Philadelphia. The plant grows six feet or more high, bears small, yellow ter¬ minal flowers surrounded by brilliant vermilion bracts, for which the plant has become famous as a greenhouse subject. These bracts, in well grown specimens, are often nine inches long. They are sometimes cut for decorative purposes, but usually the plants are left in pots. In mild climates, such as Bermuda, southern Flordia and California, the plants are grown out of doors, but they never reach perfection, and must generally be grouped with other plants to conceal their bare, crooked stems.

POINT, that which has no part, but merely position. There are various definitions all to a degree unsatisfactory and defective because of the

elemental nature of the term. Consult Heath, T. L., (The Thirteen Books of Euclid's Ele- ments) (Vol. I, New York 1908).

POINT BARROW, a cape of Alaska in lat. 71° 25′ north and long. 156° 25′ west, the most northerly cape of the Alaskan penin¬ sula and the most northerly inhabited part of North America. There are a post office, Eskimo school, and a resident physician and a population of about 200. It is an important base for whale fishers.

POINT-DE-GALLE, point de gal, or GALLE, Ceylon, a fortified seaport town on a peninsula on the south coast, 21 miles west of Matura, and 66 miles south-southeast of Co¬ lombo. The appearance of Galle from the sea is singularly beautiful and picturesque. To the right is the fort, further on is the quay, sur¬ rounded by multitudes of canoes, while close to the harbor is the native town, white and shaded by numerous trees. Outside the town is a Buddh¬ ist temple. The trade of Galle consists chiefly in coir rope, cocoanut oil, arrack, chaya root, coffee, cotton, rice, ivory, cinnamon and tor¬ toise-shell. It was under Dutch control from 1642 to 1796, when it was acquired by Great Britain. Pop. (1911) 39,960.

POINT-LACE. See Lace.

POINT PLEASANT, Battle of, fought 10 Oct. 1774, in what is now West Virginia. The action took place at the mouth of the Great Kanawha River; on one side were some 1,200 Virginians commanded by Andrew Lewis (q.v.) ; on the other a force of Indians number¬ ing about 1,000, led by Cornstalk (q.v.), the Shawnee chief. The battle lasted throughout the day and was fought with desperation on both sides, Indian tactics being adopted by the whites, who finally gained the victory. Both sides lost heavily, the whites 75 killed and 150 wounded, among the killed being Col. Charles Lewis. The Indian loss has never been defi¬ nitely ascertained but is believed to have been quite as great as that of the men under Lewis. By a treaty following the battle the Indians gave up to the whites an extensive tract south of the Ohio River. The battle proved to be of much importance in connection with the Revolu-

tionary developments in that part of the coun¬ try, and its results had much to do with opening Kentucky to the whites. See Colonial Wars in America, Lord Dnnsmore's War.

POINTE-A-PITRE, pwant-a-petr, Guade¬ loupe, West Indies, the largest and richest town in the island of Grande Terre, the smaller of the two composing Gaudeloupe, with a good harbor at the mouth of the Riviere Salee, which separates Grande Terre and Basse Terre (see Guadeloupe). The city was built in 1763, was destroyed by earthquake, 8 Feb. 1843, and suf¬ fered from fires in 1871. Once a great port, it still carries on some business, exporting sugar, cocoa, hides, coffee, rum, molasses, etc. Pop.

22,664.

POINTED ARCHITECTURE, a name for the Gothic styles. See Architecture.

POINTER, a race of bird-hunting dogs, al¬ lied to the setters but smooth-haired. See Dog.

POINTERS, The, in astronomy , two stars, Merak and Dubhe, in Ursa Major, so called be¬ cause they point to the pole star.

POINTILLISM, the division of tones in painting by very small dots of equal size, caus¬ ing the spherical shape to act equally upon the retina of the beholder's eye. The accumulation of these luminous points is carried out over the entire surface of the canvas. The theory of complementary colors is systematically applied (see Impressionism). Pointillism is an off¬ shoot of impressionism, a movement that coin¬ cided with certain scientific research concerning optics : Helmholtz had published his works on the perception of colors and sounds by means of waves ; Chevreul had established his beauti¬ ful theories on the analysis of the solar spec¬ trum ; and Charles Heary, an original thinker, had applied these new principles to aesthetics and had the idea of establishing relations be¬ tween optics and the laws of painting. These researches found fruit in the work of the younger painters of the impressionist school, who thought of carrying its chromatic prin¬ ciples still further. These painters, working from about 1880 to 1889, endeavored to establish some laws concerning the reaction of tones — and particularly those concerning complemen¬ tary colors — in such a manner as to be able to draw up a kind of table or system. Georges Seurat and Paul Signac were the pro- moters of this research ; and to these two paint¬ ers is due the method of Pointillism. The works of Seurat, Signac and other artists who have strictly followed the rules of Pointillism are somewhat lacking in life, spontaneity, caprice and charm; for the dryness and mathematical quality of the style (which reduces a picture to a kind of theorem excluding all that gives charm to a work of art) afford scant

opportu¬ nity for the display of individual temperament. Besides Seurat and Signac other French paint¬ ers of this so-called Neo-Impressionist School are Maurice Denis, Henri Edmund Cross, Angrand and Camille Pissaro (1831-1903). The Belgian, Theo Van Rysselberghe, is also an exponent of the Pointillist method. There are also a number of painters in the United States who work in this style. The Neo-Impression¬ ists, like the Impressionists, are chiefly occupied with the problems of light, following the in¬

struction laid down by Manet : “The principal person in a picture is the light.®

POIRE, pwa-ra, Emmanuel, French cari¬ caturist, known also by his signature Caran d’Ache: b. Moscow, Russia, 1858; d. 26 Feb. 1909. He first gained considerable reputation in France by drawings in various Parisian»jour- nals. He made particular study of military types, and especially came to depict French cav¬ alry with great facility and truth. His w7ork was collected into albums that called (Psst!) (1898) containing drawings evoked by the Dreyfus case. His signature is an adaptation of the Russian word for “pencil.®

POIRIER, pwa'rya’, Pascal, Canadian leg¬ islator: b. Shediac, New Brunswick, 1852. He received his education at Saint Joseph’s College, Memramcook; was called to the Quebec bar in 1877 and to the bar of his native New Bruns¬ wick. Mr. Poirier became a dominion senator in 1885, sitting with the Conservatives. He was the leader of the so-called “Acadians,® those who professed descent from the French colonists of Nova Scotia, who were expelled in 1755. He has published

POISON ALDER, or SUMAC. See

Plants, Poisonous.

POISON GAS. In the four years’ World War (1914—18), gas was first used in 1915, by the Germans as a means of attack against the French and Canadian troops, who were holding positions on the Ypres salient. It came as a complete surprise to the Allies who retaliated and later employed poison gas as a weapon, using two methods of attack, commonly known as the gas cloud or mist attack and the gas shell attack. In the gas cloud attack the gases or asphyxiants used are chiefly chlorine and phosgene, which act through the lungs, causing death by suffocation. These gases are heavy, easily turned into liquids and are very poison¬ ous. They are liquified by cold and pressure and placed in metal cylinders, weighing over 100 pounds. The cylinders are taken up to the front line trenches and placed in special em¬

placements under the fire step. When the wind is favorable for an attack the gas is liberated by turning the stop-cock of the cylinders. The gas being heavy, is carried by the wind, close to the ground, towards the troops to be at¬ tacked, remaining in the bottom of the trenches, dugouts, etc., for several days if not removed. In the gas shell attack all areas within five miles of the front line are liable to be attacked. These shells are fired from heavy and light howitzers and trench mortars (Minenwerfer) . The greater part of the explosive is removed and replaced by a poisonous liquid, which when the shell bursts, turns into a heavy vapor that hangs about the position for a long time. When fired alone, the shells can be detected by the wobbly motion made coming through the air, by the slight noise made on bursting and by the ap¬ pearance of a whitish cloud when the shell bursts.

Gas shells contain a small bursting charge and a liquid chemical substance which is con-

verted into vapor and gas when the shell bursts. To insure satisfactory effects a large number must be discharged in a small space. The bursting charge, though less powerful than that of the ordinary shell, is nevertheless sufficient to produce a considerable explosive effect in addition to the actual gases. Protection of dug- outs, cellars, buildings, etc., is given by well¬ fitting doors or by blankets sprayed with hypo- solution from a Vermorel sprayer. Practically no gas passes through a wet blanket, and the protection depends on getting a good joint at the sides and bottom of a doorway, so as to stop all draughts. This can be effected by per¬ mitting the blanket to rest on battens, arranged with a slight slope, against the door frame. The blanket should overlap the outer sides and a fold should lie on the ground at the bottom. The protection afforded by these means is as complete against lachrymatory gases as it is against cloud gas and poisonous shell gases. Chlorine is greenish yellow in color, is two and one-half times heavier than air, and hence rolls along the ground. Phosgene is colorless and- is three and one-half times heavier than air. It acts as an asphyxiant, but is only half as strong as chlorine. It has a delayed action on the heart, which acts two days afterward, and hence in trenches after an attack troops and horses are rested for 24 hours, inasmuch as any exertion after being gassed by phosgene makes the effects much worse. It requires from three to six hours to clean away chlorine and phosgene by natural ventilation.

Carbon monoxide, gas shells and mustard gas (q.v.) are most commonly used in gas war¬ fare. Carbon monoxide is not used directly in attacks, but causes many casualties. It attacks the blood corpuscles and they no longer carry oxygen, and being lighter than air it cannot be used as a cloud gas. It cannot be easily liqui¬ fied and hence is not suitable for gas shells. Respirators do not protect against this gas. As a protection from this gas Salvus sets are issued to machine gunners and batteries. These sets consist of cylinders of oxygen opening into bags of waterproof material from which issue tubes leading to mouthpieces and cut off the men entirely from the outside air. Gas shells are ordinary shells from which the greater part of explosive has been taken and replaced by a poisonous liquid, which, when the shell bursts, turns into a poisonous gas or vapor, and being heavy, remains about the place where the shell bursts. Only enough explosive is used to burst the shell and set the gas free. Gas shells are usually divided into four main divisions — as¬ phyxiants, paralysants, lachrymatory and mus¬ tard gas, according to chemicals inside. The mustard gas shell contains heavy liquid which does not evaporate easily and affects the skin, forming ulcers, sores, etc. This gas causes a loss of the sense of smell for other gases tempo¬ rarily.

There are various methods of gas attacks — such as emanation, cloud or mist, and chemical shells. Emanation is the least important method and consists of scattering chemicals about trenches which are to be deserted. This chem¬ ical when brought in contact with moisture or stirred up by the digging of occuying troops produces a poisonous gas. The cloud or mist method consists of bringing gas up to the front

line in cylinders or tanks under heavy pressure and releasing it when the wind is in a favor¬ able direction for carrying it over enemy trenches. On a clear dry day the gas rolls along close to the ground as a faint green mist gradually growing thinner and less deadly as it advances and dissipates. On a damp day the gas, which has a strong affinity for moisture, appears as a greenish yellow cloud bank and is often harmless at as much as 200 yards. Chem¬ ical shells are dangerous because there is no warning. This method is used against the artillery which usually is too far back to be affected by cloud attacks except under very favorable circumstances. The average shell contains about five pounds of gas in liquid form which expands when released by the explosive charge in about the same ratio as water to steam. A heavy and concentrated attack with these shells produces the same effect as a cloud attack, but with the added element of surprise. Methyl sulphate and pelite are among the most poisonous gases used in shells.

The bromacetone and xylylbromide (used mostly in German shells) are classed as lach¬ rymal gases because they directly affect the lachrymal or tear glands of the eye causing a large secretion of tears and smarting of the eve which temporarily blinds the enemy. The effect of chlorine and bromine depend on the amount of gas in the atmosphere. Both kill by sufifrocation when in sufficient quantities. One part of chlorine to one thousand parts of air will cause paralysis of the glottis and men will tear their throats open with their fingers in their efforts to get air. Bromine effects are identical, but more violent. Phosgene gives a different effect, but the final result is1 the same. Men attacked by phosgene feel no serious effects for hours, when thev suddenly sink into a fatal collapse with all the symptoms of heart failure. The anhydrides, when they come in contact with the moisture of the lungs, like phosgene, form acids corresponding to their bases, with similar effects. The effects of prus¬ sic acid gas are entirely different from the other gases. It acts directly on the nervous system, in dilute form produces dizziness, headache, pains in the chest and difficult breathing, coma and sometimes convulsions preceding the end.

The accepted methods of defense against poisonous gases are the gas mask or helmet and the respirator. Those are of various kinds, but may be divided into two types — the P. H. helmet and the Box respirator. The P. H. helmet consists of a double flannelette bag with two eyepieces and a mouthpiece through which the breath can be exhaled, but which collapses if it is attempted to inhale through it. The flannelette is impregnated with solutions of carbolic acid and phenol, caustic soda, hexamine * and glycerine. The carbolic acid and phenol constitute the neutralizing agent for the chlorine gas. The caustic soda is a protection against prussic acid and hexamine takes out the phosgene. Signal stations, command posts, dressing stations and dugouts for troops in the support line when in the zone of gas at¬ tacks are generally provided with blanket cur¬ tains impregnated with these chemicals. The box respirator consists of a small canvas haver¬ sack (called a satchel), of two compartments, one of which contains the metal filter with its

charge of chemicals; the other fthe mask), called the facepiece, is made of rubberized ma¬ terial with mica eyepieces, a nose clip, a rubber mouthpiece shaped to be gripped in the teeth and terminating on the outside in a flat rubber valve similar to that on the P. H.

helmet. The mask fits the face closely and is held in place by broad elastic bands passing around the head.

•The anti-gas horse respirator consists of a flannelette bag with a canvas mouthpiece which goes into the horses mouth and saves the flannelette from being bitten through. The bag is provided with an elastic band which passes round the opening so as to draw the respirator close to the face when in use. In¬ side the bag and attached to the canvas mouth¬ piece there is a canvas frame which is stitched on to the bag in such a way as to prevent the material being drawn into the nostrils when the respirator is in use. The whole is folded and carried in a canvas case provided with a flap. Horses can stand a higher concentration of gas than human beings without serious damage and hence it is not necessary to protect them against cloud gas attacks when they are a great distance behind the trenches. Nor is it neces¬ sary to protect their eyes. The respirator is primarily intended for use on transport ani¬ mals when they are sent to the trenches with supplies, ammunition, etc. When not required for immediate use the respirator can be con¬ veniently carried on the supporting strap of the breast harness, or if a zinc wither pad is worn, still more conveniently inside this pad. However carried, the case is steadied bv being strapped on either side to the metal ring on the supporting strap, and its flap should be passed under this strap, between it and the numnah wither pad, and buttoned as in the alert posi¬ tion. Poisonous gases have been used in war¬ fare with the intention of forcing men out of action, hampering artillery, preventing supports from advancing, and inspiring terror, so that an advance may be made with a slight opposition and some military advantage secured. Apart from a question of an advance, poisonous gases have been used merely as a means of causing casualties on the opposing side and of inspiring general terror.

Rest is the most important point of all in the general treatment of gas casualties. Men, and especially officers, should be warned be¬ forehand that if lightly gassed they must re¬ frain from moving about or calling out orders. Physical strain after gassing may involve the loss of a life that might otherwise have been restored in a brief time. The principle of at¬ taining complete rest as soon as oossible under¬ lies the detailed advice for dealing with gas casualties, and) is the reason for their detention at the casualty clearing stations. Arrangements, ' should be planned beforehand at each casualty clearing station so that even a large number of gas casualties can be handled with discipline and control. Next in importance to rest comes the use of oxygen, protection from cold, special stimulants or drugs, venesection and methods for removing serous exudate from the lungs. Oxygen, if

slightly administered, will generally lessen cyanosis, but the lung surface available for absorption is so small that the oxygen must be given in high concentration. Venesection gives real relief to men with deeo cyanosis and a full pulse, but appears to be harmful in col¬

lapsed cases with poor pulses, and it should not be postponed until the patient passes into the dangerous state. Gas casualties, who show neurasthenic or cardio-vascular weakness after several weeks' treatment at the depot should be transferred to home hospitals.

Edward S. Farrow, Consulting Military and Civil Engineer .

POISON IVY, or POISON OAK, the

Rhus Toxicodendron, of the natual order Anacardiacece, a climbing plant with pinnately compound leaves. Its autumn coloring is very attractive, but its touch affects certain constitu¬ tions disastrously; even in a dry state it con¬ tains an oil, which soon after touching the skin, creates redness and violent itching, fol¬ lowed by fever and a vesicular eruption. The poison is most virulent when the plants are blooming. Immediate washing after contact with the plant will sometimes prevent the trouble and very hot soapsuds, or a solution of sugar of lead will alleviate the suffering. See Plants, Poisonous.

POISON-NUT, a name for Strychnos mix vomica. See Nux Vomica.

POISON OF SERPENTS. See Ser¬ pent: Rattlesnake, etc.

POISON SPRINGS (Ark.), Engagement

at. On 17 April 1864 a train of 198 wagons left Camden, Ark., and went westward 18 miles on the Washington road to collect forage and other supplies. It was guarded by 195 cavalry, 500 infantry and two guns, under command of Colonel James M. Williams, 1st Kansas Col¬ ored Volunteers. Next morning Williams was reinforced by cavalry, infantry and two guns, raising his force to 285 cavalry, 875 infantry and four guns. A greater part of the wagons had been loaded on the 17th, and on the morning of the 18th Williams started on his return to Cam¬ den, gathering forage on the way, and when about 12 miles from that place was intercepted by Marmaduke's cavalry. General Maxey soon joined Marmaduke, the united commands of about 3,200 men and four guns attacked Wil¬ liams, and, in a four hours' fight, routed him, capturing about 100 prisoners, his four guns and the entire wagon-train. The Union loss was 92 killed, 97 wounded and 106 missing. In¬ complete Confederate returns make their loss 17 killed, 88 wounded and 10 missing; their entire loss was about 155.

Consult (Official Records> (Vol. XXXIV).

POISONS AND POISONING. See

Toxicology.

POISSON, pwa-son, Simeon Denis, French mathematician: b. Pithiviers, France, 21 June 1781 ; d. Paris 25 April 1840. He was educated in the Ecole Polytechnique, Paris, and occupied positions as examiner and professor in that in¬ stitution for nearly 40 years. He was a member of the Bureau des Longitudes, professor of me¬ chanics on the Faculty of Sciences at Paris, was appointed a member of the council of the university in 1820, and in 1837 made a peer by Louis Philippe. He wote over 300 scientific papers and other works of great value, covering mathematics, physics, and astronomy, the most famous of his works being (Traite de Mecanique* (1811). Among other works are : (Theorie Mathematique de la Chaleur) (1835) ; (Recherches sur la Probability des

Jugements en Matiere Criminelle et en Matiere Civile* (1837).

POISSON'S RATIO. See Elasticity.

POISSY, pwa-se, France, a town in the de¬ partment of Seine-et-Oise, on the left bank of the Seine, 11 miles southwest of Versailles. The weekly cattle market, chiefly for the supply of the capital, is said to be the largest in France. The town possesses considerable- historical in¬ terest from the famous conferences of Poissy in 1561, in which the differences between Roman Catholicism and Protestantism were discussed at great length, but with no decisive result.. Among the attendants were Charles X and Catherine de' Medici ; the principal debaters were Theodore Beza and the papal legate Ippo- lito d'Este. It is also noted for its attractive church dating from the 12th century. Pop. prior to the world war about 6,000.

POITIERS, pwa-te-a (formerly spelled Poictiers) , France, the former capital of the province of Poitou, at present of the depart¬ ment of Vienne, 61 miles southwest of Tours. It stands mainly on an eminence at the junction of the Clain with the Boivre, and retains its old walls and towers. The principal edifice is the cathedral, founded by Henry II of Eng¬ land about 1162 and built in a style exhibiting the transition from Romanesque to the Gothic. Other ecclesiastical buildings include

the ancient church of Saint John, originally a baptistery; and the church of Saint Radegunda, the patroness of the town, with a crypt containing her tomb. The modern town-hall, the law- courts, occupying the palace of the former counts of Poitou, the museum, the library and university ibuilding, also deserve notice. There are some interesting Roman and early Gallic remains. The manufactures are not of much importance. Poitiers is historically celebrated for the battles fought in its vicinity between Poitiers and -Tours, when Charles Martel de¬ feated the Saracen army 18 Oct. 732, and when the French under their king John II were defeated by the English under Edward the Black Prince 19 Sept. 1356. It is one of the oldest towns in France and occupies the site of Lemonuen, the chief town of the Pictones, mentioned by Julius Caesar (((Bell. Gall.® iii, 11; vii, 75; viii, 26). Its neighborhood has been the field of three of the greatest and most decisive battles ever fought in France prior to the world war, the first resulting in the defeat of the Visigoths under Alaric a.d. 507 by Cloirs and his Franks. Pop. (1911)

41.242.

POITOU, pwa-too, or POICTOU, France,

a former western province now comprised in the departments of Vienne, Deux-Sevres, and Vendee. This district was anciently inhabited by the Gallic Pictavi, from whose name that of Poitou is derived. Henry II of England ac¬ quired possession of Poitou by his marriage with Eleanor, heiress of the last Duke of Aqui¬ taine. Philip Augustus conquered it in 1204. It was ceded to the English by the Peace of Bretigny (1360), but was recovered by Charles V. Its early history is identical with that of Aquitania. See France, History

POKANOKET, the name of a tribe of North American Indians. See Wampanoag.

POKER, or DRAW-POKER, a card game said to have originated in the United States, and of which there are several varieties, the most common being draw-poker, played with a pack of 52 cards and any number of players. The game begins by the dealer staking a sum agreed on, called the ante, after which he deals five cards to each person. Each then successively looks at his cards, beginning on the left of the dealer, and according to their value he may either throw up his hand or play, in the latter case putting double the ante into the pool. The dealer who looks at his hand last may in like manner either ((go out of the game,® or (

POKEWEED, POKEBERRY, POKE- ROOT, or POCAN, a strong-smelling peren¬ nial herb {Phytolacca americana of the family Phytol'accacece. It is a native of the United States from Maine to Florida and westward to Minnesota and Texas. It is 3 to 12 feet high, bears smooth, entire leaves, and long racemes of small flowers fol¬ lowed by dark purple berries which ripen in late summer and autumn. The young shoots and the seedlings are often eaten ; the former like asparagus, the latter like spinach ; the berries are a favorite food of birds, especially robins, whose flesh is often tinted by the deep crimson juice, which is used for coloring and adulterating wines. Its name is said to be de-

rived from the Indian pocan, a dye-yielding plant; for example, blood-root. Other popular names are garget, pigeonberry, inkberry and scoke. The dried roots and a fluid extract have been used in medicine for reducing corpulency, but they seem to be losing in favor. In Europe the plant has become naturalized and there, as at home, is sometimes a trouble¬ some weed. Two Asiatic species, P. esculenta and P. acinosa, as well as the above species are occasionally cultivated for their young shoots and foliage.

POLA, po'la, a maritime town in the peninsula of Istria, on the Adriatic Sea, 55 miles south of Trieste. It is a fortified town of the first rank, and formerly the chief station of the Austro-Hungarian navy. It was once a place of importance; but it had sunk to the level of a mere fishing village when the Austrian govern¬ ment (1855) selected it as their chief naval station and by the construction of dockyards, an arsenal, barracks and other government establishments infused new life into it. The entrance to the harbor is narrow, but the water is deep, and with it expands into a basin, land¬ locked and safe, and large enough to accom¬ modate the largest fleet. Forts and batteries on hills forming the background protect the har¬ bor. Among the ancient remains are the ruins of an amphitheatre, estimated to have been large enough to accommodate 18, .000 persons ; there are also two temples, one of which is in good preservation. Pola was most flourishing in the reign of Severus, when it is said to have had a population of 30,000, and was a station of the Roman fleet. A triumphal arch, erected by Salvia Posthuma in honor of her husband Sergius Lepidus, is in a good condition, and under the name of Porta Aurea is used as a gate of the town. The principal modern edifice is the cathedral, which dates from the 9th cen¬ tury. The population, which has more than doubled since 1880, was 70,145 in 1910.

POLACCA, or POLACRE, a small sail¬ ing vessel common in the Mediterranean. The masts are usually three in number, and consist of only one spar, so that they have neither tops nor cross-trees. They are usually rigged with square sails.

POLAND, po'land, John Scroggs, Amer¬ ican military officer; b. Princeton, Ind., 14 Oct. 1836; d. Asheville, N. C., 8 Aug. 1898. He was graduated from West Point in 1861, served in the Army of the Potomac until 1863, partici¬ pated in the battles of Antietam, Fredricksburg and Chancellorsville, and from 1863 to 1865 was commissary of musters for the Department of Washington. He was brevetted lieutenant- colonel for gallantry at Chancellorsville and was assistant professor at West Point 1865-69. He then engaged in frontier duty and in 1881-86 was chief of the department of law at the United States Infantry and Calvary School at Fort Leavenworth, Kan. In 1898 he was com¬ missioned brigadier-general of volunteers and died while in command of the 2d Division of the First Army Corps at Chickamauga. He wrote: (Digest of the Military Laws of the United States from 1861— 1868> (1868); (Saint Petersburg International Commission) (1886), etc.

POLAND, a republic of considerable size in eastern Europe, bounded on the west by Ger¬ many, on the east by Russia, on the south by Czecho-Slovakia and Rumania and on the north by Lithuania, East Prussia and the Baltic Sea. At this writing the exact frontiers of new Poland and hence its precise size are still in doubt, but approximately the country will contain some 149,042 square miles, with a population of. roundly, 24,000,000. Former Russian Poland has 13,000,000 inhabitants; Galicia 8,000,000; and former Prussian Poland, 3,000,000. The chief navigable river of this newly created Poland is, as was that of old Poland, the Vistula, which empties into the Baltic Sea at the now free city of Danzig. Ethnologically considered the popu¬ lation of Poland is made up of six chief ele¬ ments, these being Poles proper, Ruthenians, Lithuanians, White Russians, Jews and Germans. The Poles are a branch of the ancient Lekhs who dwelt on the borders of the Vistula as early as the 6th century, having settled there during that long Slavic migration when Slavs of every kind spread as far south as the Balk¬ ans and north as far as the Urals. There are indications that the forebears of the Poles, forming part of this great movement, were driven out by the Romans during the 3d and 4th centuries from their abodes along the Danube in Pannonia (now Hungary). Ethnically the Poles belong to the western Slav group, but they have undergone a thorough mingling and mixing process, both in historic and pre¬ historic times, and bear unmistakable marks of their multiform descent. They are slightly

below the medium height, mostly blond, and of lengthened skull, with fair skin. In actual numbers the Polish race is not easy to com¬ pute, but the nearest available approach to accuracy puts their number at about 15,000,000, viz.: In former Russian territory (census of 1912, being the most recent extant) 5,832,000 in (

on formerly Russian soil and about 100,000 in a certain part of East Prussia, are a branch of the Letto-Lithuanian group, standing ethnically about midway between the White Russians and the Baltic races. They dwelt mainly in the former Russian provinces of Kovno, Grodno, Vilna and Suwalki. Their idiom approximates old Sanskrit more closely than does any other European tongue, as in sukii, I turn ; dvesmi, I hate ; ranka, hand, etc., and there is absolutely no similarity with Polish. Bodily the Lithuan¬ ians are well-made, blond, of blue eyes, oval face, fair skin, and of medium height. The Letts are their closest of kin. Intellectually they are of fair ability. Their folklore and fairy tales are derived from vast antiquity and are quite distinct. The White Russians are the descendants of the ancient Slav tribes, the Dre-govitchi and Krivitchi, and for centuries they formed a part of Lithuania, where, in fact, White Russian speech was used as the official language for a long space. Strictly speaking, White Russian is not a dialect of Russian proper but rather a form of Slavic independ¬ ently developed, though most closely related to Great Russian. Those territories of White Russia now devolving to Poland number about 1,000,000 of White Russians among the popu¬ lation as a whole. The Jewish strain among the population of Poland is estimated at an¬ other 2,000,000, or slightly more or less, and belongs to the Eastern division of the Hebrew race. A large proportion of them are derived from those Jewish fugitives from Germany dur¬ ing the early Middle Ages who fled from reli¬ gious persecution and took the German idiom of those days with them to their new home on Polish soil, whence the Yiddish of to-day. In all the German element forming part of the recreated Poland of to-day numbers between three and four millions, but not all of it is purely German in race, some intermingling of Poles and Germans having gone on in the districts in question, especially since Polish territory had been appropriated by Prussia.

History. — The early history of the Polish people is shrouded in darkness, there being, as in the case of all other Slavic races, no reliable records extant. Certain slight indications point to a residence of shorter or longer duration of the Polish tribes (being grouped then under the names of Polani, Masovii, etc., by Roman chroniclers) somewhere along the banks of the Danube. Mythical chiefs, however, in the new homes of the Poles on the Vistula were Lekh and Popiel, and after the death of the last Popiel, a prehistoric hero named Piast seized the crown, and with the fourth of his suc¬ cessors, Miecislav I (962-992) begins the ac¬ credited history of Poland. He succeeded in unifying the scattered or isolated tribes be¬ tween the Vistula and Oder rivers into one state, and in 966 he was converted to Chris¬ tianity and founded the first bishopric at Posen. His son Boleslav I conquered Pomerania and Danzig, and for a time also Bohemia. By founding the archbishopric of Gnesen he estab¬ lished the independence of the Polish Church from Germany. But during the reign of his son, Miecislav II, the young state fell to pieces by internal discord. Under Casimir I (d. 1058) the nobility rebelled, and a bitter and costly war was waged on Bretislav of Bohemia.

However, the German emperor, Conrad II, ad¬ justed matters peaceably. Boleslav II was driven out of the country, because of his in¬ tolerable cruelty, and his son and successor was poisoned. The latter was succeeded by Ladis* las I (d. 1102), a brother-in-law of Emperor Henry IV of Germany, whose reign was pros¬ perous. But after the death of Boleslav III (1139), his son, Poland was divided up among his four sons. In 1177 Miecislav III once more consolidated Poland, but he was deprived of the throne by an internal rising, and Casimir II reigned in his stead. His son, Leszek .(11 94 — 1227) and the succeeding Boleslav V were weak rulers, and whole provinces were estranged by greedy neighbors. Thus, Silesia and Pomerania were lost. There were also constant bloody risings and tribal wars among the pagan Borussians and Lithuanians in the northeast. Dire necessity compelled Conrad of Masovia, a Polish ruler, to beg the aid of the Order of the Teutonic Knights, his neighbors, and enforced by the latter the Poles, in the great and de¬ cisive battle on the Sirgune (1233) signally de¬ feated the savage Borussians. There followed the awful period of Mongolian invasion. In the great fight at Wahlstatt, near Liegnitz, Silesia, the Tartars were victorious. A lengthy sort of interregnum followed, during which Silesia was taken from Poland and vast ter¬ ritories were wholly devastated by Mongolian hordes and other enemies. Finally, Venceslas III of Bohemia obtained the Polish crown. But with the latter's demise, Ladislas II (1306-33), scion of the Polish royal race, initi¬ ated the long era of Poland's power and

wealth, lasting till 1572. He nationalized Cra¬ cow completely and was solemnly crowned there, Cracow remaining from 1320 on the real capital of Poland. He also waged incessant and, on the whole, successful war against the Teutonic Order, thus strengthening the Polish national spirit. The son of Ladislas, Casimir the Great (1333-70) was forced to yield up some Polish soil to the Teutonic Order, but in 1366 he wrested Halicz and Vladimir from Russia, and also united Cuyavia with Poland proper. Louis of Hungary, as the near¬ est heir, reigned 1370-82, and the latter's daughter, Hedviga, was compelled to marry, (1386), the Grandduke Yagello of Lithuania. Thus, the Yagello dynasty, the greatest in Polish history, attained to power, and automatically the union of Poland and Lithuania was effected. Poland thus became by far the most powerful state in eastern Europe. During this time it comprised the kingdom of Poland proper, made up of Cracovia and Silesia, Cuyavia and Masovia, and Lithuania. On 15 July 1410, the great battle of Tannenberg was fought, in which the Teutonic Knights were worsted with great slaughter, and in the Peace of Thorn, 18 Feb. 1411, the Order had to cede Samogitia to Poland. In 1413 the complete incorporation of Lithuania was decreed, and this led to the recognition of the equality of the nobility of both countries, and in 1433 <(Red* Russia and Podolia were added to Poland. Yagello died in 1434 and was followed by his son Ladislas III who, in 1440, acquired by inheritance the crown of Hungary as well, but who lost his life in fighting the Turks at Varna, in November, 1444. An interregnum of three years ended

with the ascension of Casimir IV to the throne. An almost unintermittent war of 13 years' du¬ ration with the Teutonic Knights was success¬ fully ended for Poland in 1466 by a second Peace of Thorn, the order being compelled to yield up West Prussia and Ermland, retaining East Prussia as a Polish fief. Casimir IV (d. 1492) was succeeded in rapid rotation by his three sons, John I Albert, (1492-1501), Alex¬ ander (1501—06) and Sigismond I (1506-48), the latter's reign being a glorious and en¬ lightened one. Albert of Brandenburg, the Grandmaster of the Teutonic Knights, in 1525, was allowed sovereign rights over the territory of the Borussians, but only as a Polish vassal. Sigismond's son, Sigismond II Augusta, (1548- 72) after great pains finally achieved the con¬ solidation of Poland by an instrument termed the Union of Lublin, in 1569. During his reign Poland reached its greatest territorial expan¬ sion of about 380,000 square miles, with a popu¬ lation of some 15,000,000. All the

gradually acquired lands, namely, Lithuania, Borussia (or Prussia), Volhynia, Podolia and Ukrainia, were welded with the older dominion into one polit¬ ical and economic entity. From 1572 until the partition, in 1795, Poland was an electoral com¬ monwealth, and this method of choosing rulers, with its inevitable drawbacks, coupled with the lack of a middle class and the serfdom of the peasantry, gradually reduced the efficiency and the power of the whole state, finally ending in complete anarchy. With Sigismond II Augustus the male line of the Yagello dynasty became extinct, and thus the way was opened for in¬ ternal and foreign intrigue. The first king under the new dispensation was Henry of Valois, brother of Charles IX of France, but Henry fled the country, after a three months' reign, to succeed his brother in France. Two years later, in 1575, the Polish parliament chose Stephen Bathory, the Hungarian. In 1586 the Swedish prince Sigismond was elected king, and he endeavored to unite Sweden with Poland. But Sweden soon tore loose from Poland. This led to a train of hostilities which were only permanently adjusted in the Peace of Oliva, 1660. Prior to this Poland lost Livonia, in 1657, and also the suzerainty over Prussia. John Sobiesky (1674-96), who rescued Vienna from the grip of an enormous Turkish army, was the last Polish ruler of ability, and after his demise the throne practically fell in every instance to the highest bidder, every one of the big Powers purchasing constantly a fraction of the Polish nobility to do yeoman service in Polish state affairs. When the Elector of Saxony, Augus¬ tus II, (surnamed The Strong) maintained his candidacy to the Polish throne against that of the Frenchman, Prince Conti, and when he be— came the ally of Peter the Great of Russia, Poland was hurled into the so-called Northern War. When Charles XII of Sweden was vic¬ torious for a time, in 1704, the Diet of Poland declared that Augustus had forfeited the crown and elected Stanislas Leszczynski in his stead. But in 1709 the latter had to renounce his rights, and after the death of Augustus II, in 1733, Stanislas attempted anew, with French aid, to recover the crown. However, Russia and Austria intervened, and Augustus III (son of the second) became king, 1733-63. Later at the instance of Catherine II of Russia, Count

Stanislas Poniatovski was chosen king. When Russia, in 1765, championed the cause of the Dissidents, the Confederation of Bar was or¬ ganized by a faction of nobles in Poland, and this led to internal war and great disorder. This had to serve as pretext for the joint inter¬ vention of Russia, Austria and Prussia, culmi¬ nating in the first partition of Poland, 5 Aug. 1772. By this act of violence, sanctioned though it was in a measure a month later by the im¬ potent members of the Polish Diet, Poland lost all told a full one-third of its remaining

territory, the major portion going to Rus¬ sia, Prussia obtaining the province of West Prussia, and Austria most of Galicia. After this first partition a party of patriots was organized in Poland having the redemp¬ tion of their country in view. But Rus¬ sia, by a cunning system of bribery used among the nobility, neutralized these efforts, securing a body of partisans strong enough to issue, at Targovicza a decree declaring the new reform measures passed by the Diet, and more particularly the more liberal Constitution, an infringement of their rights and privileges, on 3 May 1791, and thus being null and void. This was the signal for new civil strife, and that fact again induced the ruler of Prussia, against previous promises, to side with Russia and to consent to a second partition of Poland, 4 Jan. 1793. By its terms Russia obtained the full half of the remaining territory of Poland, with 3,000,000 inhabitants, while Prussia claimed for herself Posen and other parts, with more than a million of population. Polish patriots rose under Kosciusko, but Russian and Prussian armies entered Poland from the north and south, and the Polish forces, after bravely re¬ sisting and with initial successes, were over¬ whelmed. Kosciusko, dictator at Warsaw, was rendered impotent by dissensions among his adherents, and on 10 Oct. 1794 he sustained a decisive defeat at Maciejovicz, and was taken prisoner. Soon after the Russian general, Suvaroff, entered Warsaw and all resistance ceased. The third and last partition was then in order, and by its terms of 24 Oct. 1795, Russia, Austria and Prussia divided the last of the spoils amongst them and Poland as an independent political configuration ceased to exist. Its last sovereign, Stanislas, died a few years later (1798) as a pensioner of Russia.

Napoleon made clever use of Polish aspira¬ tions, but the hopes built on him came to nought. True, after a Polish legion of volun¬ teers under Dombrovski had fought valiantly under his colors, he did create a grand duchy of Warsaw. This was done after the Peace of Tilsit, 1807, when he made the king of Saxony, Frederick Augustus I, its sovereign. But this fragment of ancient Poland, although by the Peace of Vienna in 1809 it was added to from Galicia, was merely meant to be a satellite of Napoleon's own ambitious schemes and after 1812 the whole so-called grand duchy of War¬ saw went to pieces. By the Vienna Congress Russia again obtained by far the lion's share of Poland. This Russian share now was called the kingdom of Poland and received certain assurances, under international guarantee, and in especial a constitution and administration of its own. In 1818 the first Polish Parliament was opened, but in 1825 already freedom of

y

ˆcjˆogen

?r

Legend

Territory taken by

RUSSIA

F =

— 1

PRUSSIA

II

Austria

With dates shown upon the areas seized

Partition of Poland 1772, 1793, 1795

Partition of Poland 1807, 1815, 1848

.

is I s

POLAND

289

the press and other privileges were curtailed or abolished. After the death of Alexander I of Russia Poland was again governed like a sub¬ ject province. The consequence was the rising of November 1830 under the inspiration of Mickievicz and Lelewel. The whole of Poland rose. Under General Chlopicki a provisional government was formed, with Prince Adam Czartoryski at its head. The Polish Parlia¬ ment pronounced the house of Romanoff as unworthy to rule Poland, 21 Jan. 1831. A Russian army of 120,000 under Diebitsch marched upon Warsaw. At Grokhov a battle unfavorable to the Polish cause was fought and the Polish forces had to retire toward Warsaw. . Prince Radzivill, who had succeeded Chlopicki, resigned in his turn, but

General Skrzynecki failed to beat the Russians at Ostrolenka and the cholera destroyed, besides, more Poles than the war. On 6 and 7 Sep¬ tember the Russians took Warsaw by storm and that was the beginning of the end. An amnesty 1 Nov. 1831 contained many excep¬ tions. The constitution was altogether abro¬ gated and a systematic process of Russification was inaugurated. A new revolution was planned and in February 1846 it broke out, but was put down at once. Cracow now lost its autonomous position and was incorporated with Austria. In 1848 as part of the great liberaliz¬ ing movement in Europe, another rising took place, but was drowned in blood. The move¬ ment for a restoration of Poland continued, however, in secret. On 15 Oct. 1861 there were new disturbances in Warsaw. Thousands were incarcerated by the Russians or deported to Siberia and the estates of many nobles were confiscated. On 8 Jan. 1862 a brother of the Tsar, Grand Duke Constantine, became gover¬ nor of Poland, with a great plan of reforms, and a Pole, Marquis Wielopolski, as coadjutor. But on 3 July an attempt was made to assassinate the grand duke and on 7 and 15 August similar attempts against the life of Wielopolski. On 15 Jan. 1863 the revolution broke out and on 22 January all Poles were called to arms. But neither Mieroslavski nor Langievicz or Czek-hovski could make headway against the Rus¬ sians. Wielopolski retired and General Berg, a Russian, was put in his place. The total failure of the revolutionary movement was, however, brought about by Russia's stratagem in winning the Polish peasantry over to its side, for Russia, by a simple stroke of the pen, made these, instead of serf-like toilers of the soil, freeholders of the land they tilled, freeing them of all forced labor (robot) and dues to their titled landlords. Thus, in 1864, the whole movement was dying off. Miliutine and Prince Tcherkaski did the Russifying in Warsaw and by a Russian ukase of 26 Dec. 1865 the entire property of the Catholic Church in Poland was taken over by the Russian government and all Catholic rpligious matters were decided by the Ministry of the Interior at Saint Petersburg. Lithuania was Russified by Muravieff and aRed}) Russia likewise. On 22 Dec. 1865 all persons of Polish blood in the nine Russian western provinces were forbidden by an im¬ perial law to acquire landed property. The University of Warsaw was entirely Russified and only Russian forcibly taught at school. Nearly every Polish civil and administrative in- vou 22 — ■ 19

stitution was rooted out. After 1883 General Gourko more than followed the footsteps of his two predecessors, Albedynski and Kotzebue in stamping out Polish life. In July 1884 another conspiracy was discovered and 200 Poles were either executed or deported to the Siberian mines. To prevent the infiltration of Polish ideas a ukase of

21 Jan. 1885 interdicted the purchase of land by Poles in the 10 western provinces of Russia. All intercourse of Poles with the Pope was barred. While all this was going on in Russian-Poland, in the Polish provinces of Prussia things veered about a good deal, there being no settled policy pursued by the Prussian government toward the Poles. Generally speaking, under William I the Poles were treated far more liberally than was the case during the reign of the last kaiser, William II. In the main the weapons used were eco¬ nomic and cultural. For sundry periods the teaching of Polish was rendered difficult in the Prussian provinces, and this caused deep dis¬ satisfaction. But Bismarck's pet scheme was to create a huge state fund and to buy up Polish estates and, by breaking these up into smaller holdings, to settle Germans on these lands and thus gradually Germanize the whole of the Polish provinces, more especially Posen. In these efforts, though, he and his successors were but measurably successful. But, on the other hand, Polish resistance grew and Polish counter-measures were taken which frustrated the attempts at Germanization. In a material sense, however, the Polish provinces of Prussia flourished more and more. Their economic wealth increased marvelously. In liquid capital there was, as to them, an increase of 350 per cent between 1846 and 1900, and in immobile wealth the figures were similar. As to the Austrian portion of former Poland, i.e. Galicia, the Poles, owing to Austrian internal political requirements, were practically given a free hand. No repression of any kind was practised there. Polish, in fact, throughout Galicia, was the official tongue, to the detriment of Ruthen- ian, or Ukrainian, although numerically the latter were slightly stronger than the former. At the University of Cracow, the Polish lan¬ guage and literature were fostered and nur¬ tured most carefully, and in the second univer¬ sity of Galicia, that of Lemberg, although situ¬ ated in the heart of the Ruthenian portion of Galicia, Polish likewise dominated, and Ruthen¬ ian was suppressed as far as was feasible. Thus Galicia for a generation or more formed the intellectual rallying point and centre of Polish aspirations, mentality and achievements, and it was in no small part due to this that at the very outbreak of the war, in 1914, the Poles seized instantly upon the opportunity thus afforded them.

From 1914 till the Present Time. — All the

same the situation for the Polish race was by no means devoid of complications throughout the more than four years of actual fighting, nor even since the armistice of 11 Nov. 1918. Dif¬ ferent currents of political thought just as much as different aims obtained in the three sections into which ancient Poland had been split. The largest and in every respect most important por¬ tion, that absorbed by Russia, had

as its most powerful political leader for many years prior to 1914 Roman Dmovski, chief of the so-called

Russian democratic faction. This man and his party, — the biggest in Poland — were in favor of remaining under Russian suzerainty, but with far-reaching autonomy, and this mainly for economic reasons. He and his party con¬ sidered the retention of the Russian market for the young industry and the "intelligentsiaˆ of Poland as absolutely essential, and their goal was, therefore, the democratization of Russia, and a close economic understanding between Russia proper and the new Poland that was to arise out of the ashes of the World War. On the other hand, the Poles of Galicia were, in their majority, in favor of the establishment of a united Poland, of which the most important nucleus was to be Galicia, the Russian and a small part of Prussian Polish portions to be added, and the whole to be under the rule of the Austrian archduke Charles Stephen, a man of avowedly strong Polish sympathies and affili¬ ations (two of his daughters married to Princes Czartoryski and Radzivill), either as a new and separate realm or else united to the Hapsburg crown. Over in Prussia minds were still more divided. In many of those districts where the men of Polish race were in the minority the latter inclined to the view that they ought to cast their lot with the rest of Prussia. Mean¬ while the three factions of the Polish race had to fight each other, as parts of either the Rus¬ sian, Austrian or German contingents, on the field of battle. In Austria alone, at the very beginning of the war, Polish legions were formed, and (these gradually were put under command of General Pilsudski, an able com¬ mander. Then came the Russian reverses, and finally the establishment of a new "Poland® under the aegis of, first, Germany, and, next, Austria-Hungary, and the entire collapse of Russia and at last the forming of the Soviet government under Bolsheviki control. From week to week, from day to day almost, at least during those crucial times, the views and pur¬ poses of the Polish masses shifted and changed of necessity. That neither Austria nor Ger¬ many meant to go as far as the most forcible and influential of the Polish patriots wanted to go became plain very soon. Jan Ignace Pade¬ rewski, known to the whole world so far only as a master musician, then by skilful diplomacy, being, besides, at an early date convinced of the ultimate collapse of the two Central Powers, made himself master of the situation on Polish soil by the tremendous influence his word had with the Allied Powers and the United States government. By his strenuous labors and those of other Polish patriots, notably those of

Dmov- ski, the rejuvenation, or rather the rebirth, of Poland became a fact in an almost incredibly short space of time. The victorious powers that had vanquished Germany and Austria pledged themselves to the re-establishment of Poland with boundaries drawn wide enough to make her a formidable neighbor and potential foe of post-bellum Germany, and a resilient buffer state against the spread of Bolshevism. For the moment it is too early to describe or predict the economic future and the other essen¬ tial features of the new Polish commonwealth. See Lithuania; Polish Language; Polish Literature; Ruthenes; Slavs; War, Euro¬ pean.

Bibliography. — Askenazy, S., 'Die letzte polnische KoenigswahP (Cracow 1886) ; Bain,

W., (The Second Partition of Poland* (inFm;- lish Historical Review 1891) ; Balinski and Li- pinski, 'Starozyna Polska) (3 vols., Warsaw 1844-48) ; Brueggen, K., (Polens Aufloesung) (Leipzig 1878) ; 'Kulturgesch. Skizzen* (ib. 1878) ; Chlebovski, (Slownik geogr. krol. pol- skiego > (14 vols., Warsaw 1880-1900) ; Dun¬ ham, Sami. A., 'History of Poland) (London 1834) ; Edwards, S. H., 'Private History of a Polish Insurrection* (London 1865) ; Ferrand, P. P., 'Les trois demembrements de la Pologne) (Paris 1864) ; Fletcher, Joseph, 'The History of Poland from the Earliest Period' (London 1831) ; Forster, T. I. M., (Vienna 1871) ; Kozmian, S. von, 'Das Jahr 1863) (Vi¬ enna 1896) ; Knorr, W., (Die poln. Aufstande* (Berlin 1880) ; Kalinka, W. J., 'Der vierj. poln. Reichstag* (2 vols., Berlin 1896-98) ; Finkel, L., (Fontes rerum polonicarum* (Lemberg 1901; French, Paris 1903); 'Poland in the Middle Ages* (Pol., Posen 1846-51) ; 'History of Lithuania* (Pol., Leipzig 1839; French, Paris 1861) ; Lelewel, Joachim, 'History of Poland) (Pol., Brussels 1837; French ed., Paris 1844; Ger. ed., Leipzig 1846) ; Moltke, Ad. D., 'Po- land) (London 1885) ; Morfill, W. R., 'The Story of Poland* (In 'Story of Nations Series,* New York 1893) ; Michael, W., 'Englands Stellung zur ersten Theilung Polens* (Hamburg 1890) ; Oginski, L., 'Memoires sur la Pologne) (4 vols., Paris 1826; in Ger., 3 vols., Leipzig 1845) ; Paw- inski, A., 'Poland in the 15th Century) (Pol., Warsaw 1886) ; Perlbach, Max, 'Preussisch- Poln. Studien* (Halle 1886) ; Pierling, Paul, 'Un arbitrage entre la Pologne et la Russie* (Brussels 1890) ; Reich, Emil, 'Hungary and the Slavonic Kingdoms) (In 'Cambridge Mod¬ ern History,* Vol. I, New York 1902) ; Roe- pell, R., and Caro, J., 'Geschichte Polens) (Hamburg 1840-63) ; and 'Polen urn die Mitte des 18ten Jahrhunderts*. (Gotha 1876) ; Rul- hiere, S. de, 'Histoire de l'anarchie de la Po- logne* (Paris 1807-19) ; Salvandy, J. C., 'His¬ toire de la Pologne* (Paris 1855) ; Schiemann, Theod., 'Russland, Polen und Livland* (Ber¬ lin 1885—87) ; 'Russland unter Kaiser

Nikolaus D (ib. 1904) ; Solovieff, V., ‘Geschichte des Falles von Polen) (Gotha 1865) ; Szujski, J., ‘History of Poland) (Pol., 4 vols., Lemberg 1865) ; ‘Die Polen und Ruthenen in Galizien) (Vienna 1882) ; Szaynocha, K., ‘Jadwiga and Jagiello) (Pol., 4 vols., Lemberg 1861); Tre¬ tiak, Jos., ‘History of the War of Chocim* (Pol., Lemberg 1893) ; ‘Scriptores re rum polo- nicarum* (Vols. I to XVII, Cracow 1872-1900) ; Wojciechovski, T., ‘Historical Sketches) (Pol., Cracow 1904) ; Wolski, L., ‘PolancP (London

1883).

Wolf von Scijierbrand.

POLANGUI, po-lan'ge, Philippines, a town in the province of Albay, Luzon, on the Inaya River, 18 miles northwest of Albay, the pro¬ vincial capital, near the boundary of Ambos Camarines (Sur). It is also on »the main road and its situation gives excellent advantage for trade in hemp. Pop. 7,960.

POLAR, or ICE, BEARS. See Bears.

POLAR CIRCLES, two imaginary circles of the earth parallel to the equator, the one north and the other south, distant 23° 28′ from either pole. The surfaces enclosed by these circles are known as frigid zones.

POLAR CLOCK, a tube, invented by W heatstone, containing a polarizing apparatus, turning on an axis parallel to that of the earth. It indicates the hour of the day on an hour circle by being turned toward the plane of maximum polarization of the light of the sky, which is always 90 degrees from the sun. See Polarization of Light.

POLAR DISTANCE, in astronomy, the angular distance of any point on a sphere from one of its poles; more especially, the angular distance of a heavenly body from the elevated pole of the heavens. It is measured by the intercepted arc of the circle passing through it and through the pole, or by the corresponding angle at the centre of the sphere. According as the north or south pole is elevated we have the north polar distance or the routh polar distance. The sum of the two polar dis¬ tances of any point is obviously 180 degrees.

POLAR EXPLORATION. See Polar Research.

POLAR RESEARCH. American explora¬ tion in the Arctic divides itself readily into three parts — the expeditions, 1851-55, incident to the Sir John Franklin search; those promoted by the United States government, 1870-72 and 1881-84, and those projected, financed and led by Rear Admiral Robert E. Peary, U.S.N., 1891- 1909. The first American ships to participate in

the Franklin search were the Advance and Res¬ cue, in command of Lieutenant De Haven, which leaving New York 24 May 1850, searched the Greenland coast as far north as practicable, returning late the same year, with no tidings of the lost explorer. Henry Grinnell, a New York merchant, who had given liberally to the work, renewed his offer of aid, and equipping the brig Advance, dispatched her from New York, 30 May 1853, in command of Elisha Kent Kane, U.S.N., surgeon of the De Haven Ex¬ pedition, with John Brooks as first officer and Capt. J. Wall Wilson navigator. The Advance wintered in Rensselaer Harbor, on the western coast of Greenland, 78° 37′ N., but, unable to free herself from the ice, was detained a second winter, during which a party retreated about half-way to Cape York, but were obliged to turn back, and on 17 May 1855 the whole com¬ pany, with their boats, left the Advance and after an arduous journey reached Upernavik 9 August. Dr. Kane found no trace of Sir John Franklin, but his explorations by sledge were extensive and the scientific results of his expedition valuable. William Morton, leading one of the sledge parties, reported that at Cape Constitution (82° 27′ N.) on 21

Tune 1854 he had seen the open Polar Sea, and upon this statement much sub¬ sequent discussion was predicated. One death, that of Christian Ohlsen, carpenter, oc-

.f roriLANiJ

I ’olus "ftf.

Capo r > > Tawin'

„ Bmx?v > <

AH »Jf »

t ¥trf

ptr JyZripr * > *»

t M i

makFhT#

COMSaia

'tinofl

■» r»u$r J'/NIAN'T *“

at*' . W/

/

Photo, by Underwood and Underwood, N. Y.

Authentic Record of Earliest Known Arctic Exploration 1594-95

The earliest illustrations of Arctic Exploration by Gerrit-Veer who accompanied the Dutch Expedition led by William

Earentz, 1594 – 95, the first attempt by Europeans to visit the Arctic Circle.

curred 12 June 1854, in the Kane Expedition, of which the last survivor, Capt. Amos Bonsall, carpenter, died in Philadelphia, 18 Oct. 1915.

In 1860 Dr. Isaac I. Hayes, surgeon of the Kane Expedition, returned to the North in the schooner United States, and during the spring of 1861 accomplished a memorable sledge jour¬ ney, crossing Smith Sound and carrying the flag of his country to Cape Lieber, Grinnell Land, 81° 35', and losing by death the astronomer of his party, Sonntag, at the head of Foulke Harbor, the winter quarters of the United States. In 1871 Capt. Charles Frederick Hall, who had extensive experience, principally among the Eskimos of Labrador and Baffin Land, sailed from New York on the steamer Polaris, outfitted and equipped by the United States, and on 3 September went into winter quarters in Thank God Harbor, lat. 81° 38′ N., long. 61° 44′ W. Captain Hall, on 10 October, left on a sledge trip, reaching 82° 2′ N., and on 8 Novem¬ ber, after an illness of a few days, died on board the Polaris, Capt. Samuel Buddington succeeding to the command. Scientific investi¬ gations were continued during the winter, but no extensive field work attempted, and on 12 Aug. 1872 the Polaris

started south. During the night of 15 October the floe to which the ship had been fastened parted from it, and from that date 19 men, women and children drifted over 1,500 miles, until they were picked up 30 April 1873 off Grady Harbor, Labrador, by the Newfoundland sealer Tigress. Captain Buddington and the remainder of the party wintered at Lifeboat Cove, north of Littleton Island and, retreating southward in the spring, were picked up 23 June by the whaler Ravens- craig and landed in due course at Dundee, Scotland, a relief expedition under command of Capt. afterward Adm. D. L. Braine, with JLieut. afterward Capt. George F. De Long, of the Jeannette, second in command, having made a fruitless search of the Greenland coast and of Melville Bay as far as Cape York.

The United States, participating with the principal European countries in a system of cir¬ cumpolar weather stations, on 21 July 1881 dis¬ patched from Saint Johns, Newfoundland, in the chartered steamer Proteus, an expedition in command of Lieut. Adolphus G. Greely, Fifth Cavalry, U.S.A., which took station at Lady Franklin Bay, Grinnell Land, lat. 81° 44′ N., long. 64° 45′ W., the Proteus returning after dis¬ charging supplies and equipment. The station, named Fort Conger in honor of the senator from Michigan, to whose efforts it was largely due, was amply equipped, and early in the sea¬ son Dr. Octave Pavy, surgeon of the expedition, made a sledge journey along the eastern coast of Grinnell Land to its extreme northern point, near Cape Joseph Henry, and other field parties worked in the interior, discovering deposits of coal at Water Course Bay, a few miles from the station. In April 1882 Lieut. James B. Lock- wood, accompanied by Sergeant (now General) David L. Brainard and Frederick, an Eskimo, supported by other members of the party, crossed Robeson Channel to the Greenland coast, and on 5 May 1882 reached 83° 24′ 5", the farthest north then attained by man, and for many years the highest reached by the Amer¬ ican flag. On 9 Aug. 1883 the entire party re¬ treated from Fort Conger, and in September went into winter quarters near Cape Sabine,

whence they were, on 26 May 1884, rescued by Capt. W. S. Schley, commanding the Bear and the Thetis, 19 of the party, including Lieutenant Lockwood, having perished from starvation. The scientific work of the Greely party was of the first importance, and its magnetic and meteor¬ ological data, all of which were preserved, com¬ plete and valuable. A privately equipped expe¬ dition, that of the Jeannette, under Lieut. George W. De Long, U.S.N., left San Fran¬ cisco in 1879, and passing through Bering Strait, entered the ice at about the 83d parallel. The Jeannette was crushed and sunk on 12 June 1881, when in lat. 77° 14′ 57″ N. and long. 154° 58′ 45″ E., and

upon retreating to the Siberian coast in three parties, one boat commanded by Lieut. Charles W. Chipp, U.S.N., was separated from the others, and never again heard of. Captain De Long, reaching the mouth of the Lena Delta, perished from starvation, only two of his party surviving, while the third boat under command of Chief Engineer, the late George W. Melville, U.S.N., reached land in safety without the loss of a man. The British government in 1875 dispatched the Discovery, Capt. George Nares, and the Alert, Commander Al¬ bert H. Markham, by way of Smith Sound to the north, during the following winter sledge parties accomplished much work to the west¬ ward of Cape Joseph Henry, carrying the re- connaisance to 75° 30′ W., while a party ad¬ vanced from Cape Hecla directly over the sea-ice to the Pole to 83° 20'. Both ships were beached during the winter, but were success¬ fully floated the following summer and returned in safety.

Lieut. Robert E. Peary, U.S.N., having, in 1886, made a summer's reconnaissance of the Greenland ice-cap, sailed from New York 6 June 1891 in the Kite, accompanied by Mrs. Peary and his own party of five, the expedition being sustained wholly by his private resources and the assistance of a few friends. Establishing winter quarters on the eastern side of Mc¬ Cormick Bay, lat. 78° 10', long. 69° W., the win¬ ter was passed in preparation for the land jour¬ ney, and on 10 /ipril 1892, accompanied by Eivind Astrup, Peary began his attempt to cross Greenland to the northeast, which ended on 4 July at Navy Cliff, Academy Bay, lat. 83° 27', long. 61° 10', where he gained an unbroken and commanding view of the Arctic Ocean, demon¬ strating the insularity of Greenland, an achieve¬ ment for which he subsequently received the gold medal of the Royal Geographical Society and the Collom gold medal of the American Geographical Society. Returning in 1893 with a larger party Peary established headquarters at the head of Bowdoin Bay, also an arm of Inglefield Gulf, lat. 77° 43', long. 63° 10', where, on 12 Sept. 1893, Marie Ahnighito Peary was born, and in March 1894 renewed his attempt to cross the inland ice-cap and to push his explora¬ tions farther to the northward. An unprece¬ dented equinoctial storm and a plague among his dogs frustrated his plans, and on 29 August the party, except Peary, Hugh J. Lee and Mat Henson, returned to the States. In the follow¬ ing spring the three men made a successful attempt to cross again the ice-cap, though failure to recover the provisions cached the pre¬ vious year, 120 miles from headquarters, was a serious obstacle and compelled return with only

LEGEND

Parry, /S/9-/820 — – - – — – - — – »•■■*/- u—u—

Franklin, 1848-1848 . — . . — . .

McClure's Northwest Passage 1850-1853 – — – —

Austro-Hungarian Expedition 1872-1873 . . — – —

Second German North Pole _ _ _

Expedition " Germania " 1872-1873

NordenskiolcT s Northeast Passage 1878-1870 — *- — ■*■ — ♦»

t De Long, in "Jeanette" 18S0-1SS1 – - — 1 — « — »— 1— 1

, Peary, in "Roosevelt" iSSb-rooq….. . .

\ Nansen, in “ Fram " /Sqj-/Sq6------ . — – 0—0— 0—0 —

Sverdrup, in "Fra in" 1808-/(702 . . . . . .

Capt. Cagni (Duke of Abrnxsi’s)

Expedition ** Stella Polare" >qoo

Ziegler Polar Expedition tQOj-tgos –

Amundsen's Northwest Passage iqoj./qob-

Ceck. 1773-75 – _ _ _

Bell itirshau sen. iSia-ii _

Weddell. t8ll-23 _ _ –

Bitcoe.iSjo-jl _ . + "* + . a. +

I&J4 — 00—00—06—00—0 9—00—00— 00— Balltny, l8j <) –

d' Uniltt.lSjS-fo — 0 — 0 — 0— o o o' _ o’—

Wilkes, 1830-40

Linen," Jaunt” iSqj w _ w_w_w_w _ _ _

Chun." Valdivia ' ' iSqS 99 _ w^v _ y__ _ _

de Gerlacke,"Belfica”

Bar. hgrevink." Southern Cron” v. Drygaltki," Gantt”

Scott," Discovery” IQ014 _

/ Brutt.-Sct lu" iwˆ-o — o—o—o—o — o — 11l20′

Nordensklold." Antarctic". tqo* 4 _x _ _ _ _ _

Shacklclon,” Nimrod ” iqoj -q .....

Charcot." Pourqnoi Pat ” nyaS 10- Amundsen," Pram” njtO-iQl* T – 1 – T ,

.. Scott. Expedition U)U tqn .

POLAR RESEARCH

293

about 15 miles farther north than had been made two years before. In 1896 and 1897 Peary again visited Greenland, bringing home on the former the smaller, and on the latter voyage the larger, the 90-ton meteorite, which had been seen 70 years before by Sir James Ross at Meteor Island, near Cape Sabine, and which had furnished the natives with tools and cutting implements, and is the largest known meteor in the world. Having organized the Peary Arctic Club, of a few of his personal friends, on 4 July 1898 Peary sailed from Saint Johns, New¬ foundland, in the Windward; wintered in her in Allman Bay, lat. 79° 10', long. 75° 20', on the west side of Smith Sound, rectifying and re¬ charting the whole Bache peninsular and Bu¬ chanan Sound country, and on 1 Jan. 1899, sledging along the ice-foot, reached Fort Con¬ ger, isolated since General Greely’s departure 18 years before. In June Peary pushed westward, crossing the divide of Grinnell Land, and looked down upon the open and ice-free sea beyond. Leaving his headquarters at Etah early in March 1900 and Fort Conger, 15 April, he reached (< Lockwood’s farthest,® 8 May, and a disin¬ tegrated pack and an open sea preventing further advance to the Pole, rounded the northern end of the Greenland archipelago, dis¬ covering the most northern known land in the world, which he named in honor of the presi¬ dent of the Peary Arctic Club, Cape Morris K. Jesup. Pushing his explorations southeastward to 82° 10', 61° 30′ W., on 21 May Peary saw before him to the south the peaks of Independ¬ ence Bay, which he had discovered nine years before, realized that the demonstration was complete, and that the mystery which had

surrounded the northern end of Green¬ land for a thousand years had been dis¬ pelled. The winter of 1900-01 was passed in the field, near Lake Hazen, Grinnell Land, and on 6 May 1901 Peary joined the Windward with Mrs. Peary and Miss Peary on board, which had been ice-bound since the previous September at Payer Harbor, near Cape Sabine. Wintering at Cape Sabine, 1901-02, in February, accompanied only by Matthew Hen¬ son and natives, Peary returned to Fort Con¬ ger and endeavored to attain the Pole, from Cape Hecla as a point of departure, but on 16 May, at 84° 17', the highest then attained by the American flag, he was com¬ pelled by insurmountable pressure ridges and the condition of the ice to give up the attempt, and * returning to Cape Sabine he was met, 5 August, by the Windward with Mrs. Peary on board, and reached Sydney, C. B., 15 September, thus concluding 12 years of arduous and most successful work. In the spring of 1906 he suc¬ ceeded in reaching 87° 6′ north latitude in the Roosevelt, or within about 203 miles of the north pole, thus creating another <(farthest north® record.

In 1893 Fridtjof Nansen in the Frani, spe¬ cially constructed for the purpose, entered the ice off the northern coast of Asia and for the next three years drifted northward, one of the objects of the expedition having been to demonstrate the theory of the drift from east to west. On 12 March 1896 Nansen, accom¬ panied by Lieutenant Tohansen, left the Fram in lat. 84° and with dogs and sledges pushed his way over the sea ice poleward to 86°

14′ on 20 May, when farther advance was impossible. Retracing his course Nansen and Johansen finally, without dogs, landed on the northern shore of Franz Josef Land, where in a hut and subsisting upon seal and walrus meat the two explorers passed the winter. While advancing southward on 12 May 1897 they were descried by Frederick Jack- son from his headquarters at Cape Flora, and remained with him at his camp until his return the following summer. The Fram, under com¬ mand of Captain Sverdrup, after Nansen's de¬ parture, drifted still farther to the north, at¬ taining only 18 miles less than Nansen's high¬ est, and by almost superhuman exertion, was broken out of the ice later in the season, reach¬ ing Tromso but a few days after Nansen. The entire party and ship returned together to Christiania, from which they had departed three years before.

Alfred C. Harmsworth (now Lord North- cliffe), the English newspaper proprietor, in 1892 dispatched an expedition led by Frederick G. Jackson, with Lieut. Albert H. Armitage, R. N., second in command, to Franz Josef Land for a thorough reconnaissance of the archipel¬ ago and an advance to the north as far as prac¬ ticable. The Windward

remained ice-bound near Jackson's headquarters at Cape Flora for the first winter, and for three succeeding sum¬ mers visited the station with supplies and rein¬ forcements. The work of Jackson included the charting and mapping of a large portion of the Franz Josef Land Archipelago, though in con¬ sequence of unfavorable conditions not attain¬ ing a latitude higher than had been previously accomplished. Mr. Harmsworth later presented the Windward to Commander Peary.

In 1899, Prince Luigi, Duke of the Abruzzi (q.v.) in the Stella Polare, reached Teplitz Bay, Rudolf Land, where the ship was beached and winter quarters established. The following spring the sledge parties led by Capt. Umberto Cagni achieved, on 25 April, 86° 33', the highest latitude then attained by man, for which achieve- . ment both the Prince and Cagni received upon their return gold medals from the Royal Italian Society and recognition by the scientific bodies of the world. Interest in these achievements is increased by the fact that during the Turco- Italian War of 1912, the Duke D'Abruzzi served as commander-in-chief and Captain Cagni as admiral of a division of the fleet operating against the Tripolitan coast, the latter command¬ ing the landing party, and both continued during the great European War, beginning in 1914, to exercise similar commands in the navy of their country. Some other attempts upon the Pole by the Franz Josef Land route have been made by Walter Wellman and Evelyn B. Bald¬ win, the latter under the patronage of William Ziegler, whose second expedition, led by Anthony Fiala, left Tromso in July 1903.

Capt. Otto Sverdrup, of the Nansen expedi¬ tion, sailed in 1899 to Smith Sound in the Fram, and after having been ice-bound for the winter of 1899-1900 in Rice's Strait, in the autumn of the latter year entered Jones' Sound, where he remained for the next two winters, pushing a line of the extensive exploration northward and westward by the former of which he practically determined the insularity of Grinnell Land and by the latter carrying the flag of his country to

85° 42′ and definitely mapping much coast which had before been inaccurate or imaginary. Cap¬ tain Sverdrup's surgeon, Dr. Jensen, died during the first winter in Rice's Straits, but with this exception his entire party, after a diligent and arduous three years, returned to Norway in good health (1903).

The year 1909 was particularly eventful in polar research. Not only

was the North Pole actually reached by Commander Peary on 6 April, but all previous Antarctic records were eclipsed by Sir E. Shackleton when he on 9 January came up to within 111 statute miles of the South Pole.

Peary prepared for his sixth and successful attempt to discover the North Pole as early as the summer of 1908, but delay on the part of his shipbuilder prevented an earlier start than on 17 Aug. 1908. His vessel was the Roosevelt, and his scientific assistants were as Ross G. Marvin, of Cornell, George Borup, of Yale, and D. B. MacMillan, of Bowdoin. The company included besides, 66 men and 140 dogs. The entire equip¬ ment was the very best, and the plan the ripest the experienced explorer could devise. Five separate detachments, each independently equipped and fully provisioned, were to ad¬ vance a certain distance to relieve or replenish some one of the various divisions at a point definitely prearranged and then return. In this way, one division after another having turned homeward, there remained but a single party to make for the goal.

Setting out from Etah on 17 Aug. 1908, the first objective, Cape Sheridan, was reached on 5 September. There, on the shore of the Arctic Sea, the party wintered. Winter camp was broken on 15 Feb. 1909 and the first of the five detachments proceeded toward Cape Columbia. In accordance with the general plan, relieving parties were met and turned back as soon as their purpose was accomplished. Only five men made the final dash to the Pole — Peary, Matthew A. Henson (Peary's colored servant), and four Eskimos. Five forced marches, under unusually favorable circum¬ stances, brought the long-sought-for goal to view on 6 April 1909. The entire distance from mainland to Pole, 475 statute miles, was covered at the unprecedented average speed of 13 miles per day — a feat which in itself would have made the expedition noteworthy.

Observations gave 89° 57′ just before the party finally halted. During the 30 hours spent there, a temperature of from — 12° to — 30° F. prevailed at the Pole. For the most part, the sky was clear, and, save for the ˆchalky® white¬ ness of its ice, nothing whatever struck the expectant observers. As was anticipated, no life of any kind was found at the Pole. After making all necessary records and photographs, the party planted the American flag to mark the imaginary pole and turned homeward.

The homeward marches, greatly favored by paths and stations made in the outgoing ex¬ pedition, were made at an average daily rate of 29.5 miles — more than double that of the out¬ going average. The

Roosevelt, which was used also on the return voyage, reached Indian Har¬ bor on 6 Sept. 1909. From there the news of the great achievement was cabled to the world.

Apart from the momentous discovery itself, data of scientific importance were gathered

along the way; of these, the most important were the soundings made at intervals, which furnished the first conclusive proof of the vast oceanic depths north of the American Arctic lands. In addition, the existence of large land masses still unknown has become even more doubtful since this expedition.

Rear Admiral Peary submitted to the Na¬ tional Geographical Society his data and proof and its special committee found in them con¬ clusive evidence that he had reached the North Pole on 6 April 1909. In recognition of his great achievement, numerous scientific societies have awarded him gold medals and otherwise honored the American polar explorer. See articles on Peary and Cook, Frederick Al¬ bert.

America and Canada were, in 1913, rivals in the North. The American Museum-Geograph¬ ical Society-University of Illinois expedition, whose departure had been postponed for a year through the tragic death of George Borup in an unsuccessful attempt to rescue a comrade from drowning, left New York 4 July with the unknown Crocker Island which Peary be¬ lieved he descried seven years before from Cape Thomas Hubbard, as its objective. En¬ sign Fitzhugh Green, U.S.N., Professors Ekblaw, geologist, and Tanquary, naturalist, of the university, and Surgeon Hunt of Bow¬ doin, made the party under the leadership of Donald B. MacMillan, leader of a Peary 1908 supporting party from Cape Columbia. The expedition, delayed en route, arrived in Smith Sound too late to reach its proposed base, Buchanan Bay, wintered at Etah, whence dur¬ ing the next spring MacMillan and Green, crossing Ellsmere Land, advanced far out upon the sea ice to the location as nearly as could be fixed from Peary's data, not only to find no land but no indications of it. Ap¬ pearances like those which greeted Peary were clear and positive, both before leaving the mainland and enroute, but MacMillan's conclu¬ sion that the land which they appeared to indi¬ cate did not exist was positive. Returning by slow marches to his headquarters at Etah, the winter of 1914-15 was spent in such field work as circumstances permitted,, no relief ship having arrived. Late in the summer of 1915 Prof. Edmund O. Hovey of the Museum on the auxiliary schooner George B. Cluett, left to bring the MacMillan expedition home, only to report, nine months later, that, disabled, the schooner had failed to reach Etah and

had wintered in Parker Snow Bay and he, himself an invalid, had turned back from Cape York to the Danish North Star Bay Station, while two others of the party had proceeded to the South Greenland settlements to report and bring re¬ lief. Professor Tanquary arrived in New York June 1916 by way of Copenhagen. The Museum chartered the Danish steamer Dan¬ mark to proceed to Smith Sound, gather the scattered members of the expedition and re¬ turn with them to civilization. Nothing, how¬ ever, was heard from the Danmark, which, it was later learned, had been hopelessly beset in the ice of Smith Sound and in August 1917, Capt. Robert A. Bartlett, in the chartered Nep¬ tune, brought home from the Etah base, Mac¬ Millan, Ekblaw and Hunt. Professor Hovey arriving at New York on the same day, by way

CDrawn from the painting by A. Operti) By permission of The Associated Sunday Magazine

2 The Discovery 2 The Gauss 3 The Fram 4 The Roosevelt (Peary Ship) 5 The Panther 6 The Polar Star

of the Danish Greenland-Copenhagen mail steamer.

Vilhjalmur Stefansson, whose ((blond Es- kimo) expedition brought him into the front rank of Arctic explorers, left Victoria, Brit- 1 f .1 ° Tlmbia, in June 1913 in command o the first official Canadian Arctic expedi¬ tion, more complete in personnel and equip- ment than almost any entering the North for half a century. The Karluk, in command °* ...?*■ Robert A. Bartlett, with two auxiliaries, which passed through Bering btrait and on 24 September, while Stefansson 'V1.th two ?r three companions was on shore, diifted in fog to sea with the pack; the South¬ ern scientific party, in command of Dr. Ander¬ son, working upon the land, had, however, fortunately been landed before this untoward event. In the following May, Captain Bartlett, accompanied by a single Eskimo, arrived at Saint Michael's, Alaska, reporting that after three months' drift the Karluk finally sank 27 Jan. 1914 and that the greater part of the ship's party had reached Wrangel Island, from which he, with his comrade, had made a sledge journey over the ice, along the ice¬ floe to Emma Harbor, Siberia. The entire scientific staff, leaving the ship before her final loss, had perished in a vain attempt to reach safety. Late in the winter the Wrangel Island company were rescued, except three who died from exposure and

illness, and were ultimately leturned to their homes. Stefansson, however, wintering at Captain Martin and the nearby Eskimo villages, ignorant of the fate of the Karluk, left the land, late in March, upon a due north course, seeking the unknown land- mass which years before with his leader, Capt. Ejnar Mikkelsen of Denmark, he had sought in his Duchess of Bedford expedition. Nothing was heard from Stefansson during the whole of 1914. Not until 1915 did Stefansson, having in the meantime by many of his friends and com¬ petent explorers been given up for lost, re¬ turn to announce that having wintered saf-ely on Banks Island he had, in 1915, resumed the reconnaissance and in May of that year dis¬ covered in approximately 73.43 N. and 115.43 W. land which human eye had never before seen; traversing a coast line northeast and southwest, apparently 100 miles, but with¬ out penetrating the interior. Stefansson, as the season was drawing toward the close, re¬ traced his steps, crossed the ice-free Banks Land after a short stay at his base, where he learned of the loss of the Karluk, char¬ tered immediately the Polar Bear, determined to push her in the farthest north winter quarters, whence in the spring of 1916 he would endeavor further to develop the outline and to map the land which belongs to him by right of discovery. Late in 1917 Stefansson returned to his land base and at Herschel Island fell seriously ill of typhoid. In the early spring of 1918 he made a difficult overland journey by dog sledge to Fort Yukon, whence after months in a hospital he returned to New York and Ottawa. Discussion of his data and collections will occupy several years, prior to publication by the Canadian government.

Two expeditions, depending on the drift of marine currents, were undertaken in 1918, Roald Amundsen from Christiania in a specially con¬

structed ship, thence to a point on the Siberian Coast, whence he proposed to enter the ice and drift four or five years, possibly to open water or land on the Western Hemisphere, and Storkersen's and Andersen's, Stefansson's vet¬ erans, whose attempt to drift with the ice west¬ ward from a point due north of Alaska, to the Siberian Coast, was frustrated by unfavorable conditions, leaving them to make the best of their way back to land, subsisting meanwhile on the food resources of the Arctic Ocean.

Among Antarctic explorations, those of Sir E. Shackleton during 1908-09, stand pre¬ eminent. Starting from Erebus Land, South Victoria Land, in the spring of 1908, four im¬ portant land journeys were made by Shackle- ton's expedition.

The first culminated in the ascent of the Erebus volcano — an altitude of 13,379 feet — on 10 March 1908. The second journey was for the South Pole. It was begun on 29 Oct. 1908 and lasted five weeks. Traveling over the Great Ice Barrier, the party passed Scott's farthest south, to find the coast of the Ant¬ arctic Continent directly to their right. Push¬ ing ahead, it found itself within 111 statute miles of the South Pole on 9 Jan. 1909, when farther progress was rendered physically im¬ possible through lack of food. On 1 March this party returned to winter quarters. Even while this expedition was still in progress an¬ other was under way to the northwest. This party passed across the interior ice cap and reached the South Magnetic Pole — 72° 25′ S. lat., 155° 16′ E. long.— on 1 Jan. 1909. A fourth party traveled far inland up the Ferrar glacier. The entire expedition returned home in the spring of 1909.

See Antarctic Regions, — Exploration.

Herbert L. Bridgman, Secretary Peary Arctic Club.

POLARIS, pd-la-ris, in astronomy, the bright star at the tip of the tail of Ursa Minor. It is at present less than a degree and a half from the true pole, and by a.d. 2095, through the precession of the equinoxes, it will be under half a degree. Two stars called the pointers (Merak and Dubhe), in the constellation Ursa Major (the Great Bear, commonly called the Plough), always point in the direction of the pole-star, and enable it to be found readily. There is no corresponding star in the southern hemisphere. The pole star is a convenient one for observing to determine the latitude and also the azimuthal error of any transit instru¬ ment.

POLARISCOPE, an instrument used for polarizing light and analyzing its properties. See Polarization of Light.

POLARIZATION OF LIGHT, an ef¬ fect upon the mode of vibration of light pro¬ duced by reflection, ordinary refraction or double refraction. The term polarization is due to Newton who in the development of his emis¬ sion theory of light made use of a supposed analogy between the phenomena of magnetism and those observed in optics. The distinction between polarized and unpolarized or as it is sometimes called natural light may be most readily illustrated by means of the phenomena observed when a beam of light is reflected from the surface of a plate of glass or from any

other transparent material. At whatever angle a beam may strike the surface a portion will be reflected and the remainder will penetrate the glass following a path the direction of which is determined by the well-known law of ordinary refraction. According to this law sin i/ sin r = n, where i (Fig. 1) is the angle

I

of incidence, r the angle of refraction and n the index of the glass or other material. The reflected ray, although weaker than the incident ray, appears, if we judge it by many of its or¬ dinary properties, to be precisely similar to the latter. It is not, however, in all respects the same, for if it be again reflected from the sur¬ face of glass the reflecting power of this second mirror will be found to depend upon its position. If for example both mirrors be so mounted (Fig. 2) that the angle of incidence for each is about 57 degrees and if the second mirror be turned upon an axis so situated as to permit of its rotation without changing the angle of inci¬ dence, it will be found that the second mirror reflects the beam received from the first mirror just as it would any ordinary ray so long as its position is such as not to divert the beam from the plane in which it is first reflected. When, however, in consequence of the rota¬ tion, the plane of reflection at the second mirror deviates from that at the first mirror, the proportion of light reflected diminishes. When the angle between these

Fig. 2. — Mirrors for polarization by reflection.

two planes becomes 90 degrees no light is re¬ flected from the surface of the second mirror. This striking phenomenon was first noticed by Malus in 1811.

It is clear that the beam of light, as the re¬ sult of the first reflection, has undergone some modification which renders it incapable of being

reflected the second time under the conditions just stated. Light thus modified by reflection is said to be polarized.

In accordance with the accepted theory, light consists of exceedingly rapid transverse vibra¬ tions of the luminous ether. These transverse vibrations, the progressive motion resulting from which constitutes the light-wave, are sup¬ posed to be rectilinear. When, however, in the case of a beam of unpolarized light, we attempt to determine the plane in which the vibrations take place we find that they appear to occur equally in all planes at right angles to the axis of the wave. This

is, indeed, the quality which is expressed by the term unpolarized light. This is not strange, however, when we consider that in one second of time about 500 million million vibrations of the ether have taken place. It is supposed that the plane of vibration gradually shifts so that, in the relatively very long inter¬ val of time necessary to produce an effect upon the eye, vibrations will have taken place in every possible plane to an equal extent.

That this shifting of the plane of vibration of light is really very slow appears from the in¬ genious experiments of Lummer and Gehrcke (Deutsche Physikalische Gesellschaft, 1902), who have shown that there is no appreciable shifting of the plane of vibration during an interval of time sufficient to allow of at least 2,600,000 vibrations of the ether. Better to grasp these relations, imagine a vibratory movement with a period of one second. More than 2,000,- 000 years would then elapse before the number of vibrations would equal that executed in the vibration which causes light in a single second of time. In the case of this slow vibration we should expect to be able to detect a slight change in the plane in which the vibrations take place after about four days. Even with this very gradual shifting of the plane of vibration, how¬ ever, it is obvious that in the course of 2,000,000 years the opportunities for variation are so great that one would not any longer be able to determine what the original plane of vibration had been.

We may for convenience in considering the effect of reflection on a beam of light regard it as made up of two sets of rectilinear vibrations, equal and at right angles to each other; and that one of these sets of vibrations is in the plane of incidence. When the ray reaches the surface of the glass obliquely the component which is vibrating at right angles to the plane of incidence will have its motion parallel to the surface, while the other vibration will penetrate the surface of the glass. One of these will pass on into the glass while the other will be reflected. The result of reflection, there¬ fore, will be to separate the beam of unpolarized light into two parts and the reflected ray will vibrate in a single fixed plane. Light modified in this way is said to be plane polarized. The complete separation of the two components by reflection occurs only at a certain angle of in¬ cidence, called the angle of polarization. Brew¬ ster ((Philos, Transactions, > 1815) discovered that this angle varied with different substances and that tan a = n, where a is the angle of polar¬ ization and n is the index of refraction. This relation is fulfilled whenever in a given case the refracted ray makes an angle of 90 degrees with the reflected ray (sec Fig. 1). When the polarized

beam reaches the second mirror it will be freely reflected provided the planes of incidence of the two mirrors coincide. When the second mirror is turned so that these planes are at right angles, the ray will penetrate the glass without reflection.

When the theory of light was first developed at the hands of Fresnel, Neumann and numer¬ ous other mathematicians, it seemed difficult to determine positively which component of the unpolarized incident ray at the first reflection would be transmitted and which would be re¬ flected. It became customary, therefore, to speak of the plane of polarization rather than of the plane of vibration of the polarized ray; leaving it undetermined whether polarized light vibrated in the plane of polarization or at right angles to the same. The plane of polarization is defined as the plane of incidence. According to the assumptions made by Fresnel, the plane of vibration is perpendicular to the plane of polarization so that it is the component of the incident ray whose vibrations are parallel to the glass, which is reflected.

Some remarkable experiments which afford direct experimental evidence concerning the plane of vibration of polarized light were made by Wiener in 1890 (Wiedemann's

Polarization by Double Refraction. — An¬ other method by which it is possible to separate a beam of unpolarized light into two polarized components consists in causing the beam to pass through a doubly refracting medium. Many crystals have a structure such that the velocity at which light-waves are transmitted by them depends upon the plane of vibration. A beam of light entering such a crystal is in general resolved into two components, one of which vibrates in the direction which will per¬ mit the light to travel with the maximum ve¬ locity, the other at right angles to the same. These two polarized beams travel through the crystal independently, the latter being more re¬ tarded than the former. If the light enters the crystal obliquely the index of refraction for the two components will differ. The component (O) which is most retarded will be more bent from its original path than the other (E) and will take a somewhat different direction through the crystal (see Fig. 3). If the two polarized

beams thus produced by the action of the crys¬ tal leave the crystal through a face parallel to that at which they entered, both will be restored

to their original direction and instead of one beam of unpolarized light we then have two beams traveling along parallel paths. The distance between them will depend upon the thickness of the crystal, the angle of in¬ cidence and the extent to which the crystal is doubly refracting. -If, for example, in the path of a beam of unpolarized light a diaphragm with a circular opening be placed and between this and a screen a lens be mounted in such a position as to produce an image of the dia¬ phragm upon the screen we shall have a circular spot of light at that point on the screen where the image falls. If now in the path of the ray we interpose a rhomb of calcite (Iceland spar) the surfaces of which form an oblique angle with the path of the ray, the latter upon enter¬ ing, the crystal will be bent from its course and divided into two as already described. These upon reaching the screen will form two images of the diaphragm. One of these polarized rays is spoken of as the ordinary and the other as the extraordinary ray.

To obtain a single beam of polarized light by means of the action of a doubly refracting crystal it is only necessary to interpose a screen which will intercept one and not the other of the two polarized components, or what is more convenient, to devise some way of intercepting one of these rays within the crystal itself. The device usually employed for this purpose was invented by Nicol (1828). The so-called Nicol prism consists of a rhomb of calcite of the form shown in Fig. 4. The rhomb is cut through

c.

Fig. 4. — Diagram of the Nicol prism.

diagonally at CD and is then cemented together by means of a layer of Canada balsam. The extraordinary ray meets the interface thus pro¬ duced at an angle which permits its passage while the ordinary ray which is more bent from its course is totally reflected at O and passes out through the side of the prism. In this way a single ray of polarized light the plane of polarization of which is known is obtained. This method of producing polarization has the advantage over the method of reflection that the intensity of the polarized light is nearly half of that of the unpolarized ray. The intensity would be exactly 50 per cent but for the slight losses by reflection at the surfaces and by the absorption within the crystal. Various modifi¬ cations of the Nicol prism have since been de¬ vised by Foucault, Gian, Thompson and others.

By means of certain doubly refracting crystals, of which tourmalin is the best ex¬ ample, it is possible to obtain a single plane polarized ray

of light without recourse to any artificial device for the separation of the two rays. Such crystals possess the property of absorbing one of the polarized com¬ ponents much more strongly than the other, so that when light is seen through a layer of moderate thickness a considerable percentage of one of the components is transmitted while the other component is completely absorbed.

The use of tourmalin has the disadvantage that the intensity of the transmitted ray is greatly reduced and that owing to the selective charac¬ ter of the absorption within the crystal the composition of the light is greatly modified. Thus white light transmitted by tourmalin is changed by the almost complete absorption of the blue and violet rays to a yellowish green color.

Polariscopes. — An instrument by means of which the investigation of the properties of polarized light and of the numerous effects ob¬ tained with the same is carried on is called a polariscope. In its simplest form this instru¬ ment consists of two parts. The function of the first, which is called the polarizer, is to pro¬ duce plane polarized light; that of the second to enable one to determine the direction of the plane of polarization of the ray thus produced. This part is called the analyzer. The most con¬ venient form of polariscope for many purposes consists of two Nicol prisms P and A, Fig. 5,

mounted in a common axis, each of which is capable of rotation about this axis. The posi¬ tion of the polarizing plane of each of these prisms is indicated by means of a pointer V attached to the prism and moved as the prism is turned around a graduated circle. The polar¬ ized ray produced by the passage of light through the first Nicol prism enters the second where it is separated into two components, one of which, the extraordinary, is polarized in the polarizing plane of this prism, while the other is polarized at right angles to that plane. The intensity of these components depends upon the angle which its polarizing plane makes with the polarizing plane of the first Nicol prism. When these two polarizing planes are parallel the ordinary component in the second prism becomes equal to zero and the whole of the polarized ray is transmitted, subject only to losses by reflection. As the angle be¬ tween the polarizing planes of the two prisms increases, the intensity of the extraordinary or transmitted rays falls off and that of the ordi¬ nary ray increases until, when this angle reaches 90 degrees, the intensity of the ex¬ traordinary ray is reduced to zero and no light

is transmitted. Whatever be the angle between the polarizing planes of the two prisms the intensity of the ray transmitted by the analyzer is proportional to / cos2 a where I is the in¬ tensity of the incident ray and « is the angle between the polarizing planes. When the angle is 90 degrees, so that no light is transmitted, the prisms are said to be crossed.

When between the polarizer (P) and analy¬ zer (A) of a polariscope (Fig. 5), with prisms crossed, a layer (C) of any transparent doubly refracting crystal is placed there is restoration

of light. Although as already explained the polarized beam from the first prism was un¬ able to pass through the second, the insertion of the crystal between the two prisms has en¬ abled it to do so. The explanation of this beau¬ tiful phenomenon is as follows:

The .beam of plane polarized light from the first Nicol, which we may suppose to be vibrat¬ ing in a vertical plane, enters a medium when it reaches the crystal, in which in general light vibrating in two oblique positions at right angles to each other, and in those positions mly, is transmitted. The beam then is resolved into two components having these oblique direc¬ tions of vibration. The light which reaches the analyzer after passing through the layer of crystal is vibrating in these two oblique planes each of which has a horizontal- component which is capable of passing through the prism. Not the whole of the light from the polarizer is transmitted by the analyzer, the vertical com¬ ponent of each of the oblique rays being sup¬ pressed.

A great variety of crystalline substances, such as quartz, mica, selenite, calcite and in¬ deed all doubly refracting substances, are cap¬ able of producing this effect. If the crystalline layer be of proper thickness not only do we have transmission of light but likewise a change of white light into light of other colors pro¬ duced by the interference of the two compo¬ nents after passage through the second prism. This production of colors by means of a polar¬ iscope is one of the most striking phenomena known in optics. The two polarized rays in the crystal, the ordinary and the extraordinary rays, move with different velocities. We have, therefore, emerging from the crystal two simi¬ lar rays, one of which is somewhat behind the other on account of its greater retardation and which consequently differs from it in phase. So long as these rays have planes of vibration at right angles to one another they cannot interfere, but in the second prism those por¬ tions of each which are transmitted are vibrat¬ ing in the same plane and interference becomes possible. The result of this interference is the destruction of certain of the wave-lengths of which the light is

made up. If the incident beam consist of white light that emerging from the analyzer will be white minus the particular constituent or color which has been destroyed by the interference and the beam will have a color other than white. The character of the color of the ray will depend upon the thickness of the crystal layer since it is this which de¬ termines the degree of relative retardation of the two components passing through it. If the thickness of the crystal be everywhere the same, the color produced in different parts of it will be uniform, but difference in thickness gives change of color so that the field of view is in many instances most varied and striking.

The effects produced by passing a beam of convergent or divergent light through crystals are still more striking. If plates of crystalline material, placed between the prisms of a polari¬ scope which is nrovided with a lens for the pro¬ duction of a conical beam of light, are viewed through the analyzer, symmetrical patterns in color the form of which depends upon the char¬ acter of the crystal and the plane, with refer¬ ence to its axis, in which the layer has been

cut, are seen. Any detailed description or ex¬ planation of these phenomena lies beyond the scope of this article, nor can any idea of the beauty and intricacy of the color-patterns thus produced be conveyed to the mind by words.

Isotropic substances, such as glass, show temporary double refraction, which manifests itself by restoration of light and display of colors between crossed Nicols, when subjected to distortion or stress. Such effects in glass, for example, are produced by compression under a clamp, by bending or twisting, by sud¬ den unequal heating or cooling, or even by setting up standing sound-waves within the substance. Permanent strains, which show themselves in the same wav, may be formed in glass by sudden chilling. Blocks of glass thus treated, and known, in French, as verre trempe, are among the most beautiful of objects under the polariscope.

Circular and Elliptical Polarization. —

When the vibratory motion to which a beam of light is due is capable of being resolved into two components at right angles to each other, of equal amplitude, and differing in phase by a quarter period, the beam is said to be circularly polarised.

The actual motion of the ether particles in such a case, could we observe it, would be found to consist of rotation in a circular orbit, either clock-wise or counter clock-wise (look¬ ing in the direction from which the wave comes) hence the names, right-handed circular polarisation and left-handed circular polarisa¬ tion.

Circular polarization may be produced by sending light through a crystalline layer of such thickness that the difference of phase of the two rays on emerging is ˆ 2 (a quarter period). Such a layer is caller a quarter-zoave plate.

When the difference of phase of the two components differs from ˆ 2 the emerging beam is said to be elliptically polarized.

Rotation of the Plane of Polarization. — Certain substances have the property of rotat¬ ing the plane of polarized light which passes through them. Quartz cut perpendicularly to the optic axis possesses this property to a re¬ markable degree, and many organic liquids possess rotatory power. Such substances are said to be optically active. A plane polarized ray upon entering such a medium is converted into two circularly polarized rays, respectively right-handed and left-handed. The resultant of the superposition of these two rays is a plane polarized ray the plane of polarization of which varies with the depth within the layer at which the angle is taken. We may, therefore, think of the plane of polarization as rotating uniformly aJbout the path of the rav.

The rotatory power of solutions of optically active substances depends upon the strength of the solution and this fact has been utilized, in the case of sugar, for determining the amount of saccharine matter present. The instruments employed in this process are special forms of polariscope of great sensitiveness. They are known as saccharimeters.

Magnetically Active Substances — When a beam of plane polarized light passes through a magnetic field in the direction of the lines of force, the plane of polarization is turned.

Looking along the lines of force in the direction in which, bv convention, they are as¬

sumed to run, the rotation is always clockwise to the observer, whether the light travels with or against the lines. The angle of rotation is proportional to the strength of the field, and to the distance through which the light passes. It depends also upon the medium through which the light moves ; being nearly four times as great in

carbon-disulphide than in water and more than five times as great in glass as in water. These relations may be expressed by means of the equation a — Y 1H ; where a is the angle of rotation, 1 the distance traversed, H the strength of the field and Y a constant (known as Verdet's constant) which depends upon the character of the medium.

This rotatory power of the magnetic field was discovered by Faraday (1845). To ob¬ serve it a tube containing carbon-disulphide or water (Fig. 6) is placed between crossed Nicol prisms.

\z\

Fig.

a

l

I \Z\

iitisimsiimi

6. — Rotation in the magnetic field.

The tube is surrounded by a coil of wire of many turns.

A beam of light is plane polarized by the prism (/>), traverses the tube of liquid (7), but cannot pass «, the polarizing plane of which is at right angles to that of p.

When a strong current is sent through the coil, lines of force of the magnetic field thus produced traverse the tube from end to end. Some light now passes through « and the angle of rotation may be measured by turning that prism until the light is again cut off. Upon reversing the current in the coil the direction of rotation is reversed.

Bibliography. — For popular discussions consult Spottiswoode, (Polarisation of Light' ; Tyndall, (On Light' ; Stokes, (On Light' ; Tait, (On Light' ; Wright, Lewis, (On Light,' etc. For a very complete modern statement of the theory see Drude, ^Theory of Light' (trans¬ lated by Mann and Millikan). See Light; Physical Crystallography.

Edward L. Nichols,

Professor of Physics, Cornell University.

POLARIZED HEAT. Radiant heat and light are found to be analogous

in their reflec¬ tion, refraction and absorption. See Radiation.

POLARIZED LIGHT. See Polariza¬ tion of Light.

POLDER, pol'der, a name used in Holland and Belgium for a class of agricultural lands consisting of extensive tracts reclaimed by drainage from what had originally consisted of lakes or morasses, and generally lying be¬ low the level of the sea. The transformation of the Lake of Haarlem is a striking illustra¬ tion of what can be effected through energy and patient perseverance. The usual method of procedure in the formation of a polder is to en¬ circle the portion to be reclaimed by an em¬ bankment, and construct a canal having its bed sufficiently high to cause a current toward the sea or river. The water is then pumped into this canal by means of various pumping ap¬ paratus, worked for the most part by means of

wind-mills, but not un frequently by steam power. After the water has been drained off, the land is put into the hands of the husband¬ man, and this kind of soil is in general found to be very productive.

POLE, Reginald, English Roman Catholic prelate: b. Stourton Castle, Staffordshire, 3 March 1500; d. London 17 Nov. 1558. He was the son of Sir Richard Pole, Lord Montacute, by Margaret, daughter of the Duke of Clarence, brother of Edward IV. He was educated at Oxford, where Linacre and Latimer were among his teachers, entered into deacon’s orders and received several benefices from Henry VIII, with whom he was a great favorite. In 1519 he visited Italy, and at Padua acquired the friendship of such men as Erasmus, Bembo and Sadoleto. He returned to England in 1525, but in consequence of the affair of Henry’s divorce from Catherine of Aragon, withdrew to Paris (1529), under the pretext of continuing there his theological studies. In 1536, in compliance with Henry’s order that he should give his opinion regarding the divorce, he drew up an elaborate epistle, (Pro Ecclesiasticae Unitatis Defensione,* in which he boldly condemned the divorce as un¬ lawful, and the rejection of the papal supremacy as a breach made in the unity of the Church. This act cost him the loss of all his preferment in England, and he endeavored to form a party against Henry, a design which ended in the destruction of his brother, Lord Montacute, and his aged mother, the Countess of Salisbury, whom Henry sent to the scaffold. Pole was declared a traitor by the king, a price was set on his head and he lived in exile during the rest

of Henry's reign. But papal support was given to him, and he was raised to the dignity of cardinal and employed on some important mis¬ sions. He was one of the three papal legates to the Council of Trent; and on the death of Pope Paul III, Pole came but little short of election as his successor. On the accession of Mary I his attainder was reversed, and in 1554 he returned to England as legate and plenipotentiary of the papal see, and endeavored to secure lenient measures for the reformers and correction of clerical abuses. On the death of Cranmer, Pole, then for the first time or¬ dained a priest, became archbishop of Canter¬ bury, and was at the same time elected chancel¬ lor of the universities of Oxford and Cam¬ bridge. He undertook to rebuild the churches and to re-establish the ancient discipline, and to a rigorous persecution of Protestants which was instituted he at least assented. His death occurred on the same day as that of Queen Mary, and he was buried in Canterburv Cathe¬ dral. Besides several treatises on questions relating to the Church, he wrote (Liber de Con- cilio) ; (De Summo Pontifice Christi in Terrae Vicaris,* and (A Treatise on Justification. * Consult Gairdner, J., fThe English Church in the 16th Century* (London 1903) ; Haile, M., (Life of Reginald Pole* (New York 1910) ; Lee, F. G., (Reginald Pole* (London 1888) ; Phillips, T., (History of the Life of Reginald Pole* (2 vols., Oxford 1764) ; Zimmerman, A., (Kardinal Pole: sein Leben . . .* (Regens¬

burg 1893).

POLE, William, English playwright: b. London, 1852. He was manager of Royal Vic¬

toria Hall, London, 1881-83, and in 1895 estab¬ lished the Elizabethan Stage Societv for the purpose of awakening interest in the Eliza¬ bethan drama. Among old plays which he has revived are Webster's (Duchess of Malfi* (1892); (Arden of Feversham* ; Marlowe's

(Dr. Faustus* ; Ford's (Broken Heart*; Ben Jonson's (Sad Shepherd* and (Alchemist* ; and (Everyman.* He has dramatized several novels, among others W. D. Howells's fore¬ gone Conclusion* as (Priest and Painter* (1884), and Baring-Gould's (Mehalah* (1886).

POLE, (1) in astronomy, the name given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens. (2) In spherical trigonometry, the pole of any circle drawn on the surface of a sphere is one of the points in which the per¬ pendicular to its plane through its centre cuts the sphere. (3) In

geography, either extremity of the axis around which the earth revolves is called a pole, or a terrestrial pole. The north¬ ern one is called the north pole, and the south¬ ern the south pole. Each of these poles is 90° distant from every part of the equator. (See Earth). (4) In physics, the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery. (5) mIn distance, see Perch. (6) In mathe¬ matics, the point from which the radius sector of any point is estimated, in the polar system of co-ordinates.

POLE, Magnetic. See Magnetism.

POLE-AXE, an axe attached to a pole or handle of which the length varies considerably. It was formerly used by mounted soldiers, and is yet used in the navv for boarding purposes; in the latter case the back of the axe is fur¬ nished with a hook and is called a boat-hook and a boarding-axe.

POLE STAR. See Polaris.

POLECAT, a small European carnivore (Mustela putorius) of the weasel family. It has an elongated body, short legs, long and flexible neck, and blunt muzzle. Its anal glands are large and discharge a fetid liquid of ex¬ tremely nauseous odor, almost impossible to re¬ move from clothing or any absorbent material upon which it falls. Hence it is known pro- vincially in Great Britain as fou'mart (that is, foul marten), and the term <(polecat** has been applied to the American skunk and other stink¬ ing animals; ((fitch** (or fitchew) is another name. The general habits are those of the fur¬ bearing animals (Mustelidce) generally, with a special predilection for preying on poultry and game. A domesticated variety is the ferret (q.v.).

POLEMON, pol' e-mon, surnamed Peri- egetes, Greek geographer: b. Troas, 2d cen¬ tury b.c. He removed to Athens, became a citi¬ zen there, and after traveling extensively throughout Greece wrote several geographical works which were especially valuable in that they contained definite information concerning public monuments, inscriptions, paintings, etc., which had hitherto remained unnoticed by geog¬ raphers. He wrote several polemical works against Timaeus and Eratosthenes, and refer¬ ences to his writings arc frequently made by lat4er writers, including Athenaeus and Pausa-

nias. A list of his works, 26 in number, on both geographical and historical subjects, is given by Clinton in his (Fasti Hellenici,* iii, 514, but none of these have come down to us entire. The few remaining fragments of his works were collected and published by Preller (1838). Polemon is considered the father of geographical guide books.

POLEMOSCOPE, a stand or frame high enough to rise above a parapet or other similar object, having a plane mirror at top so fitted as to reflect any scene upon another mirror be¬ low, and thus enable a person to see a scene in which he is interested without exposing himself. It is of somewhat ancient origin, but the prin¬ ciple has had a modern application to opera glasses and field glass, and, particularly, to the periscope used on submarines in the World War.

POLENTA, a food preparation common in Italy, consisting of semolina or Indian-corn meal, mixed with water, and boiled until it thickens. It is then poured into a dish, where it becomes firm enough to be cut into slices, in which state, after being seasoned, it is eaten.

POLENZ, pol'ents, Wilhelm von, German novelist : b. at Castle Oberkunewalde, Ober- lausitz, Saxony, 14 Jan. 1861 ; d. there, 13 Nov. 1903. Studying at the universities of Leipzig and Berlin he fell under the spell of modern ideas. In 1891 he published his first novel (Suhne> which was followed by a drama, 'Heinrich von Kleist> (1891).

His three greatest works are, 'Der Pfarrer von Breitendorf,* (1893) ; 'Der Buttnerbauer* (1895); and (Der Grabenhager) (1897). In this trilogy the three several influential personalities in the German country community are de¬ scribed — the pastor, the independent farmer, and the lord of the manor. In the first we find the life of a pastor whose inner spiritual nature develops away from outer churchgoing forms, so that he is finally prompted to give up his parish. In the second novel the life of an older type of unprogressive farmer is depicted, whose possessions fall into the hands of usurers and when the situation becomes unbearable, he com¬ mits suicide. In the third book the life of a Junker is described, who after tasting the pleas¬ ures of life in a large city, returns to his an¬ cestral estate and there learns the serious duties and responsibilities of a rich landowner. Among his numerous other writings are the novels (Thekla Ludekind) (1900) in # which Polenz in an indirect manner deals with the woman question; (Liebe ist Ewig} (1901); (Wurzellocker> (1902); (1904). Consult Bartels, A., 'Introduc¬ tion to the Collected Works of Wilhelm von PolenzU von Mach, Edmund, 'The German Classics) (Vol. XVII, New York 1914) ; Stern, 'Studien zur Literatur der GegenwarC (Dres¬ den 1904, pp. 235-253).

POLHEM, pol'hem, Christopher, Swedish engineer: b. Vi s!by, 1661 ; d. 1751. He was edu¬ cated at Upsala. Polhem invented a machine for hoisting ore, which proved so successful that the inventor was made director of mine mechanics by the king. In 1694-97 Polhem traveled in England, France, Germany and Holland, everywhere taking special note of all mechanical inventions and improvements. He subsequently invented quite a number of ma¬ chines for agriculture, mining and transporta¬ tion and from Charles XII received the com¬ mission to construct a canal between the Baltic and the Cattegat. He also invented a minting machine for George I of England and was knighted by his own sovereign.

POLICE, po'les (Greek, politeia, govern¬ ment, from polis, a city), a judicial and executive system, and an organized civil force for main¬ taining order and enforcing the laws. There are traces to be found in every organized soci¬ ety of some system of rules for the maintenance of peace and order. At the same time, a sys¬ tem of police in the special modern sense of the term did not exist in ancient times. In Greece it was mixed up with the totality of their insti¬ tutions. In Rome, not until the time of Augus¬ tus do we find the police becoming a special institution, with a numerous staff of various grades of officers. When the barbarians swept across the Roman Empire and obtained the mas¬ tery every trace of a regular system of police disappeared, and only when Charlemagne as¬ cended the throne was there a successful at¬ tempt made to re-establish anything of the kind. But after the death of Charlemagne everything fell into confusion again. The Normans, estab¬ lished in the north of France, were the first who made stringent police regulations for the assurance of public tranquillitv. In France, pre¬ vious to the middle of the 1 5 th century, the provost of Paris and his lieutenants were charged with maintaining the peace of the city and suppressing vagrancy. Under Louis XIV the police attained its highest measure of per¬ fection as a repressive force. A universal sys¬ tem of espionage was established, and the slightest indication of impatience under the yoke of oppression, or the smallest departure from the monarch's views of what was right, was visited with summary arrest and punishment. In 1794 the National Convention reorganized the police and defined its duties, which com¬ prised almost every department of administra¬ tive government. During the administration of Napoleon I the city police of Paris at¬ tained a high degree of efficiency. As existing at present the French police generally is pre¬ sided over by the Minister of the Interior ; the departments and communes are under the pre¬ fects of police and other municipal agents; Paris is under sub-prefects, and maires, assisted by commissaries, the prefect of police and his numerous assistants. The police organization on the Continent generally partakes largely of a military character.

In England, from the time of the Saxon kings there had existed an organization of a partially voluntary character for the repression of crime, the arrest of criminals and the main¬ tenance of good order. The population was divided into hundreds and these into tithings, or companies of 10 freeholders with their fami-

lies. As this system, however, was not always found to work well, the high sheriff of the county, his deputies and the constables ap¬ pointed by the parishes were eventually substi¬ tuted for the voluntary officers of the earlier period. But in process of time this system was also found ineffectual for the maintenance of public peace and security; yet no great improve¬ ment was made until 1829, when the remodeling of the police system of London led the way to the adoption of a uniform system for the whole country. In 1839 and 1840 acts were passed providing for the appointment of a county con¬ stabulary, organized and maintained in accord¬ ance with rules prescribed by the home secretary.

The Local Government Act of 1888 entrusted the control of the organization of the county po¬ lice in England and Wales to the standing joint committee of the quarter sessions and the county council. County boroughs and other large bor¬ oughs were left with the control of their police, but in the case of small boroughs the control of the borough police was transferred to the county council. The Police Act of 1890 makes provision for the payment of pensions to super¬ annuated constables. Gratuities may be paid to constables or to their widows and children in certain cases. The strength of the county and borough police of England and Wales in 1900 was 27,123, of whom 1,460 belonged to Liver¬ pool, 1,000 to Manchester, 700 to Birmingham, 500 to Leeds, 499 to Bristol and 465 to Sheffield. The Metropolitan Police has charge of an area of over 688 square miles, comprising 21 land divisions besides the river Thames. Each divi¬ sion is under the charge of a superintendent. The Criminal Investigation Department, organ¬ ized in 1878, comprises a central body at New Scotland Yard and branches in each of the divisions. The Convict Supervision Office, founded in 1880, is a branch of the last-men¬ tioned department. The strength of the Metro¬ politan Police in 1916 was 22,323,. comprising 36 superintendents, 650 inspectors, 2,995 ser¬ geants and 18,642 constables. The City of Lon¬ don Police are better paid than the other police forces of the kingdom. Their number in 1916 was 1,161, of whom 1,015 were constables.

In Scotland the organization of an efficient police in the large towns dates from 1833, when a statute was passed enabling burghs to estab¬ lish a general system of police. The strength of the Scottish police forces was 5,952 in 1916, of whom 2,100 belonged to county forces and 3,852 to city and burgh forces.

In Ireland, previous to 1814, the police was in a very disordered condition. In that year a law was passed by which some minor improve¬ ments were effected. The act of 1836 and its subsequent

modifications in 1848 and 1857 have greatly improved the police. In 1867 the title of Royal Irish Constabulary was conferred on the force by royal command. This force in 1916 numbered 9,860 and was organized on a semi-military plan. They live in barracks and are armed with rifles, swords and other weap¬ ons. They are under the immediate authority of the government in Ireland, and are controlled by an inspector-general. The city of Dublin and its suburbs, with an area of 32 square miles, is under a separate police force, known as the Dublin Metropolitan Police. The strength of the force in 1916 was 1,143.

In the United States the provisions for the repression of crime and the detection and ar¬ rest of criminals were copied from those of Great Britain. New York was the first of the cities to have a police force organized similarly to that previously adopted in London. The or¬ dinary police of a city are dressed in a particu¬ lar uniform. The secret police, more commonly known as detectives, are not uniformed. The regulation and control of the police in a city is usually in the hands of the municipal au¬ thorities, and the cost of their maintenance is paid out of the local taxes. In New York City a division of the force is known as harbor po¬ lice, and there are police boats for their con¬ venience in patrolling the harbor. In Washing¬ ton there exists a special force known as capitol police, employed by the government to patrol the buildings and grounds of the National Capitol. In most large cities there are squads of sanitary police and in some smaller towns volunteer bodies of citizens are organized under the name of fire-police. The secret police of the United States government are known as secret service agents.

Military police constitute an organized and uniformed body of men attached to the army for the maintenance of civil order, as distin¬ guished from military discipline. After the United States was forced into the World War a number of large cities organised women police to look after minor infractions of law, and also a body of reserve police to aid in re¬ pressing outbreaks, because of the shortage of the regular police who had entered the army. The varied functions of the police in the United States are specifically set forth in State and municipal enactments. In brief, it may be stated that if the police of a municipality are unable to cope with a disturbance the sheriff of the county may be called on for aid ; if the sheriff cannot suppress a trouble, after he has read aloud the riot act, ordered a mob to dis¬ perse and summoned civilians to his aid, he may appeal to the governor of the State for a military force; and should the latter prove in¬ effectual, the governor may call upon the Secre¬ tary of War for reinforcements from the regu¬ lar army. See Secret Service; also

Constable; Detective.

POLICE, Military. See Military Police.

POLICE COURT. See Court.

POLICE AND FIRE ALARM SYS¬ TEMS. The usual police alarm system con¬ sists of a bell signal and telephone arranged in boxes at desired locations. Keys to these boxes are held by the policemen on duty, who must report at certain times from these boxes to headquarters by telephone. On the other hand, if headquarters desires to get in touch with the policeman on a certain post, a bell is rung, at¬ tracting the party called. This system is, however, not satisfactory, inasmuch as in most cases the sound of the bell, confused with so many other noises of the city, is not heard. Due to the need for something better, within the past few years a combination involving also a visible signal has been installed in various cities, particularly those of Germany, where an elaborate system is to be found. Under this system, which is worked out in detail, the prin-

cipal feature is a green signal lamp that flashes when the policeman on post is wanted.

Closely analogous with the German police- alarm system is the fire-alarm system in general use throughout continental Europe, the chief difference being that the signal lamps are red instead of green. The advantage of the alarm box and telephone to fire headquarters is apparent, in that it permits the department to know immediately and exactly the location of the fire. It is of advantage, however, as is the practice in many places, to dispense with the use of the key to open the box and using a push-button or other handy device instead,, for the sake of saving time.

The fire-alarm lamps are, as a rule, about 15 feet above the sidewalk, while the alarm boxes are attached to the fire-alarm posts within easy reach, some four feet, of pedestrians. These boxes are generally provided with a han¬ dle or crank, which must be pulled or turned according to directions.

Under the ordinary system it is not unusual for the individual fire alarm to be sent into the central fire headquarters, and from there trans¬ mitted to the branch headquarters, with a con¬ sequent loss of

time. Under the system under description this is avoided, notice of each fire being sent to the nearest fire house and simul¬ taneously to the main or central headquarters.

A fire-alarm system based on the above prin¬ ciples has been installed in the city of Berlin, where the fire apparatus is also operated by electricity. According to the United States Consular Reports of 9 Aug. 1911, <(it takes but 12 seconds from the time an alarm is sounded until the department is fully under way on the street.®

The great extent of the fire losses through¬ out the country is rarely understood by the public. Yet, in the failure to take ordinary precautions against fire, and in carelessness and faulty construction, losses amounting to $750,- 000 per day are incurred throughout the United States. On the other hand, the fire losses abroad for six principal cities for a period of five years averaged 33 cents per person, as com¬ pared with losses of $3.02 per capita in the United States. It will, therefore, be seen that American cities are in need of adopting the most urgent measures and of installing up-to- date and efficient methods of fire and police alarm. The necessity is most apparent and will be recognized by all when it is remem¬ bered that the cost of adequate protection is but a small percentage of the yearly damage done by fire in each city.

POLICE JUSTICES. See Court. POLICE MAGISTRATES. See Court.

POLICE POWER. No adequate defini¬ tion can be given of this subject, the courts usually deciding in each case as to its extent. In its general acceptation it means the power of a municipal government to preserve the wel¬ fare of the public by prohibiting everything that is contrary to it, and demanding that which is best for its welfare and safety. The proper exercise of police power is merely to regulate the use and enjoyment of property by its owner; it is founded upon the duty of the State to aid in the protection of its citizens. Legislatures have jurisdiction of police power through a

federal system of government, and it is dele¬ gated by the State to the municipalities through¬ out the State, and is exercisable only within its limits. Standard laws and the preservation of the public health are one of the most im¬ portant duties of the police or State munici¬ pality, and they have the right to enact such ordinances as may be required for this purpose — such, for example, as preventing the spread of contagious diseases, and, in some instances, compelling vaccination, the killing of diseased cattle, the destruction of improper food prod¬ ucts, compelling proper drainage, prohibiting smoking and

expectorating where necessary and the regulation of burials. An important func¬ tion of the police power is to provide safety for the public in regulating places of public amuse¬ ment and meetings ; compelling the erection of fire-escapes, providing for street lighting and to protect the public morals by prohibiting gambling, improper publications, cruelty to ani¬ mals, prostitution and drunkenness. The mu¬ nicipalities' general welfare is another import¬ ant function, for example : protection against fire, regulation of buildings and the erection of telephone and telegraph wires, the care of the insane and poor, abatement of nuisances of all kinds and regulation and control of animals. The regulation of certain classes of business enterprises come within police power, for ex¬ ample : theatres, markets, paint shops, ware¬ houses and wharves, or any such business that if unrestricted may become injurious to the public welfare. Police power regulates the practice of law, medicine, surgery, also plumb¬ ers and the business of insurance, banking, trust and railroad companies ; it is also within their power to regulate the manufacture and sale of articles of food, the prevention of fraud and the hours of labor. The proper limitation of the police power is largely within the discre¬ tion of the legislature, but the reasonableness and character of the regulations and whether or not they are consistent with the constitution and proper public policy, are questions for the courts to decide. Police power cannot be exer¬ cised for the benefit of particular individuals, classes or for private purposes; it must not be arbitrary or unreasonable in infringing upon the personal rights of persons, and its main object must be for the public good. See Police.

POLICY, the name given a lottery or gambling system, common in large cities. A combination of numbers like 4-11-44 is selected by the player who marks his numbers or <(guesses® on a slip or ticket, for which he pays a small sum. The lottery drawing of three numbers awards prizes to those persons having guessed correctly. A favorite or common com¬ bination of numbers is called a ((gig.® The per¬ son playing policy stands only a very small chance of winning a prize.

POLICY, Insurance. See Insurance.

POLIDORO (Caldara) de Caravaggio.

See Caravaggio da Polidoro.

POLIGNAC, po-len-yak, Jules Auguste Armand Marie, Prince de, French states¬ man: b. Versailles, France, 14 May 1780; d. Saint Germain, France, 2 March 1847. He was implicated in a conspiracy against Napoleon in 1804, and imprisoned, but in 1814 escaped to

Edinburgh, where the Comte d'Artois, after-

ward Charles X, then was. After the restora¬ tion he entered the chamber of peers and in 1820 obtained from the Pope, as a reward for services to the Church, the title and arms of a Roman prince. In 1823 he succeeded Chateau¬ briand as Ambassador at London ; and in 1829 was placed at the head of the new ministry, with the portfolio of foreign affairs. On 27 July 1830 the people were roused to open insur¬ rection by the ordonnances issued on the 25th, and the dynasty of Charles X was overthrown. Polignac accompanied the king to Cherbourg, and then went to Granville, where he was appre¬ hended. The house of peers condemned him to imprisonment for life, but by the amnesty of 1836 he recovered his liberty and fixed his resi¬ dence in England.

POLIGNAC, Melchior De, French cardinal and diplomat: b. Puy-en-Velay, Haute-Loire, France, 1661 ; d. 10 Nov. 1741. He was educated for the priesthood and in 1693 was named am¬ bassador extraordinary from France to Poland, for the purpose of detaching John Sobieski from the league with Austria, and drawing him over to an alliance with France. On the death of Sobieski in 1696 he was employed in en¬ deavoring to effect the election of the Prince of Conti to the Polish throne. His intrigues, though successful in securing Conti's election in 1691, were defeated by Augustus the Strong; Polignac was compelled to leave Poland in 1702. He returned to Paris and in 1712 was appointed plenipotentiary to the Congress of Utrecht, and was afterward Minister to the court of Rome. He became cardinal in 1713. Banished during the regency by reason of his intrigues, he was recalled in 1721, and in 1725 was despatched as Ambassador to Rome, suc¬ cessfully performed his task of reconciling the quarreling factions of the Gallican Church and was raised to the archbishopric of Auch. He returned to France in 1732 and thereafter lived in retirement. As a writer Polignac is known by his didactic poem (Anti-Lucretius, seu de Deo et Natural planned to prove the existence of a Supreme Being, the maker and regulator of all things. The ninth book of this work was left unfinished by the author, and the whole poem was not published till after his death. It was later translated into French and Italian.

POLILLO, po-le'lyo, (1) a group of islands of the Philippine archipelago, lying to the north of the entrance of Lamon Bay, south¬

ern Luzon, and east of central Luzon. The group consists of the chief island Polillo and 21 small islands, lying to the south and east ; area of the island of Polillo, 131 square miles ; area of the group, 203 square miles. The formation of the islands is volcanic; the soil is good, and the inhabitants are engaged mostly in agri¬ culture and fishing for home consumption. The island of Polillo is mountainous; the central summit is Malolo, from which short ranges extend in every direction toward the coast. The chief town of the group, Polillo, is situated on the west coast on a bay that affords a good harbor. The group, which was included in the province of Infanta bv the act of the Philippine Commission of June 1902, was afterward an¬ nexed to the province of Tayabas. Pop. 2,164.

POLIOMYELITIS. Also known as In¬ fantile Paralysis, or Heine Medins Disease. An

acute infectious disease, chiefly involving the spinal cord and its membranes, at times pro¬ gressing into the upper parts of the mid-brain and brain itself. The agent itself has not been definitely isolated (1919) although the disease has been communicated to lower animals (chiefly monkeys) and has been transmitted through a number of generations of these ani¬ mals. It is known that it is a filterable virus of some kind, in some ways behaving like the filterable virus of the disease known as hydro¬ phobia. The mode oi ingress is not definitely known, but the naso-pharynx is supposed to carry it. It is a communicable disease and oc¬ curs in epidemic form, some epidemics having almost circled the globe. It is chiefly found in temperate zones, and the epidemics have oc¬ curred chiefly in the summer or autumn, though winter and spring epidemics are known. It is frequently confused with influenza, epidemic lethargic encephalitis and certain forms of cerebro-spinal meningitis. It affects children chiefly, but not exclusively.

The disease often begins with mild respira¬ tory or gastro-intestinal disturbances. There are vague neuralgic pains and headaches, there may be increased irritability to light, sounds and touch and in from 24 to 72 hours certain groups of muscles are partially or completely paralyzed. These paralyses are usually very unequally dis¬ tributed, and whole muscle groups or parts of a muscle are involved. The involuntary struc¬ tures are also at times involved, causing various trophic or vegetative disturbances. The nature of the changes in the spinal cord and meninges are those of an acute infiltrating inflammation in which the blood supply to the cord may be cut off or the inflammatory oedema cause swell¬ ing and pressure upon nerve structures. Thus there results a partial or complete destruction of the

nerve structures of the spinal cord which are correlated with muscle function. The large cells of the anterior horns of the spinal cord, which are stations in the pathways for the con¬ duction of motor nerve impulses, seem to bear the brunt of the inflammatory changes, and hence present the most obvious changes which were seen in the old cases. But it must be re¬ membered that the pathology which was de¬ scribed in the older accounts was framed upon the study of the old and long since active cases. The modern study has shown the widespread involvement of the nervous system and also shown that the disease may be traced to other than purely nervous structures, even if the lat¬ ter bear the brunt of the serious left-over de¬ structions. In certain patients the chief de¬ structions are found in the mid-brain tissues ; from these result paralyses of the cranial nerves, particularly of the eye-ball muscles and the muscles of the face.

The course of the disease varies consider¬ ably. As a rule its worst effects are present within the first week of the illness. After this comes the long and tedious stages of recovery which going on slowly at first may improve more rapidly and then a very long period, years it may be, of very slow and gradual improve¬ ment if the proper kind of treatment is pursued.

The treatment is preventive, palliative and restorative. In the preventive treatment great care should be taken not to come in contact with poliomyelitis cases, especially in the early stages.

As some of thosesick from the disease may have it in a very light form special quarantine measures are desirable for these suspects. All children taken sick during an epidemic should be carefully isolated and contacts with others made as light as possible. In the acute stages of the disease it is not known what may be beneficial. Lumbar puncture helps some, ergot help others, and specific sera are being evolved which may help others. These sera are con¬ stantly being improved and this article can only call attention to this fact and urge the afflicted parents to call upon such wide-awake physicians who would be most likely to be abreast of the times and know what is going on in medicine. In the treatment of the chronic phases great care and detailed attention should be given to conscious muscle training. Electricity, mas¬ sage and other similar types of therapy are usually unavailing. They are for the most part stupid. The sick and partly degenerated muscles must be activated into tonic action

through the only kind of stimulus to which the muscles are physiologically accustomed, namely, the conscious wish to perform movements. This type of therapy requires a detailed knowledge of the use of all of the muscles and the correct type of stimulus to bring out its physiological possibilities. The usual type of gymnastic studies or exercises are as a rule as valueless as the massage and the electricity. Consult Jel- liffe and White, (Diseases of the Nervous Sys- tenP (3d ed., 1919).

Smith Ely Jelliffe, M.D.

POLISH FOWL, a breed of domestic

fowls. See Poultry.

POLISH FRANCISCANS IN AMER¬ ICA. A religious community of the Franciscan order of Friar Minors established at Pulaski, Wis., in 1887, through the special efforts of the Ven. Augustin Zeytz, O.F.M., at the request of the Very Rev. Toachim Maciejcyk, O.F.M., the provincial of Galicia, Poland. Through the generosity of Mr. J. J. Hof, a grant of 120 acres of land was secured at Pulaski, in the State of Wisconsin, where three Polish settle¬ ments had been started, and on 27 April 1887 the cornerstone of the new monastery of the Assumption of the Blessed Virgin was con¬ secrated. The Rev. Erasmus Sobicinski, O.F.M., of Galicia was appointed the first superior. On 8 April 1889 the novitiate was formally opened and the first candidate was received in the order. From this time the institution grew and developed, under successive directors, Father Erasmus, the first superior, having died 4 Feb. 1890. In 1900 a new residence was opened in Green Bay, Wis., where in 1903 a new large convent was built and dedicated. At Pulaski, 9 Sept. 1901, Seraphic College was opened and the building subsequently enlarged to accommodate the ever-growing number of students. The community numbers among its members 14 priests, 31 professed clerics, 30 professed lay brothers, 7 brothers of the Order and 50 students.

POLISH LANGUAGE. The Polish lan¬ guage is one of the Slavic family of tongues and is most nearly related to the Bohemian branch of that family. It belongs to the western group of those languages and is spoken by about 15,000,000 people, in its various dialects. Remarkable for its phonetic richness, Polish

contains 10 vowels and 35 consonants. The alphabet is the Latin,

diacritic marks and Com¬ binations being used in addition. The prin¬ cipal peculiarities of pronunciation are the fol¬ lowing: c is pronounced like ts in English; ch is a strong guttural, as in German; cz is pro¬ nounced like ch in English ; rz has a sound compounded of that of r and the sound of z in the word azure, sometimes almost the same as the latter sound alone; sz is pronounced like our sh; w has the sound of v. The con¬ sonant c has a sound absolutely peculiar to the Polish language: it resembles that of t followed by or combined with a very soft sh. The barred / (t) has a sound common to the Polish with other Slavic tongues : it is produced by sounding the letter l with the point of the tongue firmly pressed against the teeth. The result is a sound approaching that of w. as the / in talk. Among the vowels e and a are pro¬ nounced respectively like the French semi-nasals in and on, \ i has the sound of i in the English word pique; and y has a sound resembling that of the German ii. The tonic accent in Polish words is nearly always on the penult.

The Polish is a highly inflected language. There were formerly three numbers, but the dual has been preserved only in the Masovian dialect. There are three genders, masculine, feminine and neuter; and seven cases, the nominative, genitive, dative, accusative, vocative, instrumental and locative or prepositional. The diminutives and augmentatives are numerous. The inflections of the verbs indicate not only person and number without the aid of personal pronouns as in Russian, but also the gender of the person speaking, and the person spoken about. The great variety of inflections in Polish permits the extensive use of inversion in the structure of sentences.

The principal dialects of Polish are the Masovian or Mazurian, spoken in the districts around Warsaw and in east Prussia; that of Great Poland, which is spoken chiefly in the districts around Posen, Gnesen and Kalisz ; the Silesian spoken to the east of the Oder ; the Cracovian or the dialect of Little Poland; and the Polish-Lithuanian as distinguished from the Lithuanian proper the language of some of the greatest Polish writers. Consult Polish diction¬ aries by Booch-Arkossy, F. (Polish-German, 2 vols., Leipzig 1893 and 1899) ; Chodzko, A. E. B. (Polish-English 1884) ; Dictionary by seven Polish scholars (2 vols., Vilna 1856-61) ; Karlowicz and others (Warsaw 1900-) ; Kierst and Callier (English, Leipzig 1906) ; Linde (6 vols., Lemberg 1854-60). Standard grammars include those of Malecki (ib. 1863) and a Com¬ parative Historical Grammar) by the same (ib. 1879) ; Krynski (Warsaw 1903) ; Malinowski (Posen 1870) ; Morfill (London T884) ; Kalina (Lemberg 1883) ; Manassewitsch (Vienna 1892) ; Poplinski (1901) ; Smith (1864) ; Vymazal (in German, Briinn 1884).

POLISH LITERATURE. Compara¬ tively nothing is known of the Polish lan¬ guage previous to the 15th century. No literary remains in Polish have come down to us previous to that time. For the 15th century itself we have only the dorian Psalter,) (The Song of the Virgin Mary* (Bogorodzico), (Queen Sofia's Bible,* (Jadwiga's Prayer Book,* and some Polish sentences in court de-

crees and town documents. But we have for that period the first Polish grammar, by Jacob Parkosz (+ 1455), in which the first attempt was made to stabilize the language. Whatever literary activity existed in Poland previously and for some time afterward, found its expres¬ sion through the Latin language. The oldest author, who wrote in the first half of the 12th century, was Martin Gallus, the chronicler. Cholewa (+ 1166) wrote the mythical history of Poland in the form of a dialogue; Kadlubek (12th and 13th centuries), Bogufal, Baszko, Polak, Janko of Czarnkow were historians be¬ fore Jan Dlugosz (1415-1480), the most famous of all the Polish historians. From the 13th century on there were many scientists in Po¬ land, such as the physicist Ciolek, the humanist Gregory of Sanska, the astrologer and medical writer Glogowczyk, and many others who wrote in Latin. There was also a considerable num¬ ber of famous preachers, such as Laskarysa, Nicholas of Blon, Vincent Kol.

In the 16th century Polish literature de¬ velops by leaps and bounds and soon reaches the Golden Age. The religious and political questions of the day, arising from the con¬ flict of Catholicism and Protestantism, brought into the field a very large number of writers, such as Wujka, Orzechowski, Modrzewski. One of the most famous orators was Peter Skarga (1536-1612), and among the historians of the time are Peter Bielski (1495-), his son Joachim Bielski (1540—) , Stryjkowski (1547—) , who wrote in Polish, and Matthew of Miechow (+ 1513), Kromer (1512-1589), Gwagnin (+ 1614), Bzowski (1567-1627), who wrote in Latin. Among the scientists the first place be¬ longs to Nicholas Kopernik, who wrote in Latin. In the belles lettres we start at once with a poet of the first order, Nicholas Rej (1515-1577), whose ˆPersonal View on the Life of an Honorable Man Enjoyed great popularity. Gornicki (1527-1603) dealt with the political troubles of the time, wrote his (The Courtier,* which was based on Castiglione's (I1 libro del cortegiano,* and translated Seneca. Kochanow- ski (1530-1584) wrote political satires and a large number of elegies and epigrams, which had a great influence, not only by his

trenchant criticisms of conditions, but also by shaping the language into a perfect instrument of ex¬ pression. Other poets were Klonowicz and Szymonowicz, who wrote both in Polish and Latin, the three Kochanowskis and Zimorowicz, who wrote in Polish, and Krzychi, Jan Dantyszek, Janicki, who wrote in Latin. The satire took a peculiar turn in the 16th century. In the village of Babin a landed proprietor and a judge formed a <(Babin Re¬ public, M in which prattlers were proclaimed as statesmen and other officers were lauded in pro¬ portion to the incumbent's incompetency. The Polish kings took interest in the humorous republic, and the Latin writings of the Babin republic exercised quite an influence on the politics and the literature of the time.

The second period, which lasted through the 17th and half of the 18th century, is one of decay, and is known as the <(macaronic, panegy¬ ric, scholastic® period, when the language itself was degraded by (

ing in political life. This period abounds in private memoirs, where chronicled events mingle with quasi-philosophic reflections. One of the sanest among these men, who wrote in Polish, was Starowolski (1588-1656) ; others were Pasek, Jerlicz, Andrew Fredro. Among the Latin chroniclers must be mentioned Piasecki (1586-1649), Albrecht Radziwill (1 580— 1656), Zaluski (+ 1711). Mlodzianowski (1622-1686), a Jesuit priest, excelled in the elegance of diction in a time which was rather poor in orators. Among the poets we have Twardowski (+ 1660), the most prolific versifier of contem¬ porary events in the 17th century, Opalinski (1609-1656), who wrote chiefly satires, Wac- law Potocki (1622-1695), chiefly known for his epic, (The Chocim War,* in which the language reminds one of the purity of the previous period, Kochowski (1633-1699), the official chronicler of John III, who also left a large number of Polish and Latin verses, mainly of a religious nature, Jerome Morsztyn (+1655), who stood under French influence and preferred satire, Andrew Morsztyn (1620-1700), a cousin of the former, who still more followed the French models, and also translated Cor¬ neille's Cid and the works of Tasso, Stanislaw Morsztyn (1630-), who translated Seneca and Racine, Elizabeth Druzbacka (1687-1760), one of the first Polish authoresses. The most famous of the poets who wrote in Latin was Sarbiewski (1595-1640), and there was a whole host of Latin panegyrists, who hardly deserve mention. The drama barely made a beginning, but none was good enough to survive.

The third period was one of regeneration and lasted until the appearance of Mickiewicz in 1822. In politics, Karwicki, Leszczynski and Jablonowski advocated a much more sober attitude than had

existed in the time of politi¬ cal anarchy, and their view had much to do with reshaping Polish literature. Konarski (1700-1773) did probably more than anyone else to bring reason back to literature, and much was done to improve and settle the literary norm. Among the grammarians must be men¬ tioned Kooczynski (1735-1817) and Mrozinski (1784-1839), while Linde (1771-1847) produced his enormous Polish dictionary in six volumes, the forerunner of Grimm's German dictionary and still the object of admiration of philologists.

We get now for the first time historians, as against the chroniclers of the previous period. Lojko (1717-79) wrote three volumes of (Polish and Lithuanian Institutions) and a large number of historical essays. Albertrandi (1731-1808), an Italian by birth, wrote much on Wladyslaw Jagiello, the Casimirs, and Polish history in general. Naruszewicz's (1733-96) (History of the Polish People) was a model for many historical writers. Other historians were Waga (1739-1801), Bandtke (1768-1835), Golebiowski (1773-1849), and documents were collected and discussed by Kitowicz, Wybicki, Niemcewicz, Kozmian, Kilinski and others. Mention must also be made of the political writers of the Four Years' Diet, Kollatay (1750-1812), Staszyc (1755— 1826). Nor was there any lack of orators, in whom Poland had before abounded. We have Soltyk, Count Casimir Sapieha, Count Adam Czartoryski, Matuszewicz and the preachers Lachowski and Woronicz. The arts flourished,

and in 1816 Czerwinski was able to write (A History of Polish Civilization and Learning i rom the Tenth to the End of the Seventeenth Century.' We have also the literary historians Chrominski (1759-1810), Ossolinski (1748- 1826), Bentkowski (1781-1852), Count Osinski

(1770-1842).

The first poet of this period is Trembecki (1 725— 1812) , who stood under the influence of Voltaire, and was interested in poetry just for poetry's sake. Wegierski (1755-1787) imitated Boileau and other foreign authors in his love lyrics. Krasicki (1735-1801) wrote mostly in a satirical vein. He gained his first reputation by his < Fables, > wrote a (Mouseid) and similar poems, several prose tales, and translated Os- sian, Lucian and Plutarch. Naruszewicz, who has already been mentioned as a historian, wrote fables, satires, idyls and

odes, translated Tacitus and composed two tragedies, (Guido > and (TancredP Karpinski (1741-1825), a court poet, wrote pseudo-classic idyls and religious songs of a more substantial value. Kniaznin (1750-1807), too, wrote to please the courtiers, but his (Centennial Celebration of the Victory at Vienna' has more real worth. He translated Lafontaine, Ossian, Anacreon, wrote idyls in. the style of the German Gessner, and a num¬ ber of historical dramas. A more sterling poet was Woronicz (1757-1829), whose larger works, Me¬ moirs of Ancient Poland) and others. He also wrote his own memoirs and a number of novels, among which (Jan of Teczyn) is prob¬ ably the best. With him begins the Polish novel. Other poets of this period are Koz- mian, Godebski, Keklewski, Morawski. The number of dramatic writers during this time is very great. The mediocre attempts of Prin¬ cess Radziwill (+ 1753) and Bogomolec (1720— 90) were soon followed by the successful adaptations from Beaumarchais and Moliere, by Zablocki (1750-1821), who satirized the negative sides of Polish society. Boguslawski (1760-1829) began his dramatic career by trans¬ lating for the stage ; then he became the founder and manager of the Warsaw Theatre, when he wrote his best original drama, (The Cracovians and the Mountaineers, ' in which he introduced folksongs. Other dramatists were Wezyk, Felinski, Dmuszewski, Prince Czartoryski.

The Romanticism of the West naturally af¬ fected Polish literature as well. As in Ger¬ many, so in Poland, collections of folksongs ap¬ peared in the beginning of the 19th century, such as by Zaleski, Wojcicki, Pauli and a little later, the monumental collection in dozens of volumes by Kolberg. With the growth of the new movement the pseudo-classicism which had prevailed heretofore came to an abrupt end. Brodzinski (1791-1835) stirred up a discussion in 1818 by his review of < Classicism,' and him¬

self set the example for a new movement by his heartfelt lyrics and still more with his lectures on esthetics, which he began in 1822. He is chiefly remembered for his idyl (Wies- law,' in which he introduced scenes from peasant life, and is considered as the forerunner of the great Mickiewicz. The romanticism brought to the front the writers of the Ukraine, the last stronghold of a romantic past, such as Malczeski (1792-1826), Goszczynski, Zaleski, Padura, Grabowski, Groza. Malczeski (1792- 1826) wrote an epic, (Maria, a Ukrainian Story'; Goszczynski (1803-76) is best remem¬ bered by his poem, (Saint John's Feast, ' which deals with the life of the Tatra mountaineers, and a number of ballads; many of Zaleski's (1802-86) lyrical poems have been set to music. These poets were far surpassed by the Lithuan¬ ian Adam Mickiewicz (1798-1855).

Mickiewicz gained his first reputation by some romantic ballads, (The Switez Maid,' and with his epic (Grazyna' and (The Wake' accentuated the quarrel between the classicists and romanticists. Probably the best of his ballads is (The Three Budryses,' though (Mrs. TwardowskaP (The Little Fishp and many others are of an equally high order. A nine months' stay at Odessa was productive of a series of love songs in the setting of the Tartar Crimea. In 1834 there appeared his famous epic (Pan ThaddeusP in which he treated the romantic episode of Lithuania's last raid to enforce a legal decision. The remaining days of his life were dimmed by a deep mysticism.

The period was particularly rich in poets. Count Krasinski's (1812-59) greatest work is his (Undivine ComedyP a highly imaginative poem; Slowacki (1809-1849) produced three dramas in verse, (Kordyan,' (Mazeppa,' (Bal- ladynaP and a number of poetical stories; Garczynski (1806-1833) wrote fiery sonnets of war; of Pol's (1807-1872) many songs, probably his (Sing of Our Land,' written at Mickie- wicz's request, excels for simplicity of diction and warmth of feeling; among the other lyrics of the time must be mentioned Gaszyn- ski, Morawski, Witwicki, Jaskowski, Wasilew- ski, Lenartowicz, Ujejski, Romanowski, Balza, Grudzynski. Not less numerous are the epic poets. Syrokomla (1823-62) treated sentimen¬ tally the history connected with his native home on the Niemen and also tried himself in the drama and translated the Latin poets of Poland into Polish. Zielinski (1809-81) wrote an .epic, (The Kirghiz,' based on his banishment to Siberia. Other poets of this class are Zmorski, Bielowski, Falenski, Odyniec, Chodzko, Korsak. Kaminski (1777-1855) was the first one to change the state into a national institution, and at the same time Alexander Fredro (1793-1876) and his son John Alexander Fredro (1 829—) produced for it a large number of comedies. Other dramatists were Korzeniowski, Magnu- szewski, Anczyc, Balucki, Asnyk and many more.

The novel first found its expression in Rzewuski's (The Memorable Deeds of Master Seweryn Soplica' (1839), after which Chodzko (1795-1861) produced his Lithuanian Pictures,' while Skarbek (1792-1866), Wojcicki (1807-79) and a large number of others enriched Polish literature with their excellent stories, but the

palm for productivity and manysidedness be¬ longs to Kraszewski (1812—) , who accomplished the phenomenal deed of writing not less

than 700 volumes in every imaginable line of literary endeavor. Among the distinguished historical writers must be mentioned Lelewel, Morawski, Moraczewski, Siemienski, Schmitt, Szajnocha, Liske, Szujski, while the history of literature is represented by Bentkowski, Wiszniewski, Lukaszewicz, Nehring; the history of language by Malecki ; bibliography by Estreicher. There is not a line of literary work which does not count some eminent authors.

The last quarter of the 19th and the begin¬ ning of the 20th century continue the activities so auspiciously begun a century earlier. Comte's positivism during this time finds its expression in Swietochowski's historical essays, while in the novel its representative is Eliza Orzeszko, who appears as the advocate of progress and science. Others belonging to this school are Zacharjasiewicz, who described the dark sides of bourgeois life; Jez, who gave sketches of the Yugo-Slavs; Balucki, who championed the lower middle class. The greatest poetess of this period is Konopnicka, but the period is par¬ ticularly rich in poets, — Brzozowski, Jankowski, Urbanski, Gomulicki and others. Sienkiewicz, too, had begun his career as a positivist, but when this fell into disrepute he turned his at¬ tention to the past, producing the famous trilogy, (By Fire and Sword, } (The Deluge, > (Pan WolodyjowskiP Among his very many novels dealing with antiquity, probably none gained such wide recognition as his (Quo VadisP Positivism finds its last adepts in Prus, some of whose novels have been widely trans¬ lated.

With Wietkiewicz's study, (Our Art and Criticism, > naturalism makes its entry into Polish literature, and to this school belong Dygasinski, Zapolska, Sever, Reymont, while Zeromski and Sieroszewski may be denominated as impressionists. Meanwhile Cracow develops a school of modernists, among whom excel Lieder, Komornicka, while Szczepanski gath¬ ered together all these forces in

Bibliography. — For a historical study of the Polish language consult the publications of the Cracow Academy of Sciences, and the works of Kaluzniacki, Leciejewski, Nehring, etc., and for grammar the works of Bruckner, Krynski, Malecki, Matusick, Ulaszyn ; for the dialects, Karlowicz, Dembowski and Blat. The Polish-English and English-Polish dictionaries of Rykaczewski (London 1849), Chodzko (Ber¬ lin 1874), Kierst (Leipzig 1896), will be found useful, while for a Polish-Polish dictionary Kar- lowicz's (Slownik jezyka polskiego) (still in process of publication) will far surpass the

excellent older one by Linde (Lwow 1854-60). In German we have the works of Brandes, (Polen) (also in English, London 1903), Bruck- near,

Kurtzmann, Lipnicki, Nitschmann, Wec- kowski and in English, N. Forbes, (Polish Literature,* a lecture (London and New York 1911). In English we have also the collections of E. C. M. Benecke, (More Tales by Polish Authors,* (New York 1916).

Leo Wiener.

POLISH SUCCESSION WAR, a con¬ flict arising in 1733 from the contest for the Polish throne, between Stanislas Leszczynski and Augustus III of Saxony. See Poland.

POLISHING, the production of brilliant or lustrous surfaces on metal, wood, ivory, hard rubber and other materials and compositions. In the mechanical arts, it is principally em¬ ployed on metals. The means used are emery or other abrasive grains glued to the face of polishing wheels. Several operations in gradu¬ ated degrees of fineness of the abrasives used are usually necessary, first, to reduce the sur¬ face from a rough to a smooth condition, and, second, to produce a brilliant or lustrous sur¬ face desired. The preliminary operations are similar to fine grinding except they are per¬ formed on a flexible instead of a solid wheel. In the finishing processes, the cut is usually modified by the application of grease or oil to the abrasive on the polishing wheel. The periphery speed varies from about 4,500 to 10,000 feet per minute for the coarser operations and is gradually reduced 50 to 75 per cent for the fin¬ ishing operations. Another character of pol¬ ishing is employed on white metal, nickel, sil¬ ver, etc., by using powdered pumice moistened with cil and water and applied to the surface of soft polishing wheels, usually felt. Brilliant surfaces on articles covered with paint or var¬ nish are usually secured by smoothing down the paint and varnish by means of sand paper, also by rotten stone or powdered pumice with oil or water as a base for the final lustrous varnish finish.

Polishing wheels are tools used almost ex¬ clusively in the metal trades — the surface of the wheel being coated with emery and glue. The wheels are constructed of suitable materials to provide the proper flexibility for the various operations. The common forms are circular laminated wood blocks faced with leather and having a metal hub ; discs of canvas or sections of cloth buffing wheels glued or sewed together into single units; discs of soft porous bullneck leather glued together, solid felt wheels, solid compressed paper wheels and discs of walrus hide; also wheels consisting of a ring of radi¬ ally arranged blocks of leather, canvas, felt, etc., compressed to desired densities and held in position by mechanical attachment to circular metal centres containing a hub. The efficiency of the various types of wheels

depends upon the character of the metal, contour of the piece, character of the operations and ability to prop¬ erly hold the glued-on abrasive.

Bradford H. Divine,

Member of American Society of Mechanical Engineers.

POLISHING SLATE, a rock occurring mostly in beds of the Tertiary formation. Tex¬ ture, earthy, soft, friable. It consists of the

silicious shells or envelopes of various species of Diatomacece, the number contained in a cubic inch having been reckoned to be about 41,000,-

000,000.

POLISHING WHEELS. See Polishing.

POLITIANUS, po-Hsh-i-a'nus, Angelus (Latinized form of Angelo Poliziano), Italian scholar and poet: b. Montepulciano, Tuscany, 14 July 1454; d. Florence, 24 Sept. 1494. His name was taken from his native town, the family name having been Am'brogini. He was educated at Florence, where he acquired great proficiency in the classics and in Hebrew; and studied the philosophy of Plato under Marsilio Ficino, and the philosophy of Aristotle under Argyropulo. The first production which brought him into notice was a Latin poem on the tour¬ nament of Giulio de' Medici. He assumed the ecclesiastical habit, and acquired by his accom¬ plishments the favor of Lorenzo de' Medici, who made him tutor to his children, and pre¬ sented him with a canonry in the cathedral of Florence. In 1484 he visited Rome, and met with a flattering reception from Pope Innocent VIII. After his return to Florence he lectured with distinguished success on the Latin and Greek languages. Among the most famous of his writings are an account of the conspiracy of the Pazzi ; a Latin translation of Herodian ; a collection of Greek epigrams ; the Latin poem

POLITICAL CONTRIBUTIONS. See

Corrupt Practices Acts.

POLITICAL CONVENTION. See Con¬ vention, Political.

POLITICAL ECONOMY. See Eco¬ nomics.

POLITICAL OFFENSES, those offenses considered injurious to the safety of the State, or such crimes as form a violation of the allegiance due by a citizen to the recognized supreme authority of his country. In the an¬ cient times of the Roman republic offenses of this nature were comprehended under the name perduellio, and were considered equivalent to making war upon the State. In modern times the crimes considered political offenses have varied at different periods and in different

states. In England the most serious political offenses are termed treason and those of a lighter nature, which do not aim at direct and open violence against the laws or the sovereign, but which excite a turbulent and discontented spirit which would likely produce violence, are termed sedition. (See Sedition). Political offenders of foreign countries are by English law not included in extradition treaties, and the secretary of state may order at any time a fugitive criminal accused or convicted of such crimes to be discharged from custody. In the United States also, and in most of the countries of Europe, the extradition treaties do not in¬ clude the giving up of political offenders. After the United States entered the World War, the term political offenses5 came to be applied to a considerable number of unpatriotic acts tend¬ ing to belittle or hinder the national efforts put forth to win the war, and in a large number of convictions, especially long terms of imprison¬ ment and heavy fines, were imposed by the United States courts.

POLITICAL PARTIES. See Conven¬ tion, Political; Elections; Vote, Voters, Voting; Ballot; Primary, Direct; Primary, Presidental Preference; Caucus; Congress, and the parties by name.

POLITICAL PARTIES IN THE UNITED STATES. See United States, Po¬ litical Parties in the.

POLITICAL PARTIES AND THE WORLD WAR. The fortunes of political parties depend to a large extent upon the popularity of the principles which they espouse, as indicated by their platforms and by the char¬ acter of the men whom they nominate for office. The principles advocated by the political parties are determined in accordance with their respec¬ tive points of view or reactions toward the leading questions or issues of a public character with which the country is confronted. Among such questions or issues, that of war is one of the most striking and important. This includes not only the question of entering the war but also that of the method of prosecuting it after it

has been entered upon, and also the condi¬ tions of terminating it. Upon all three pf these auestions relating to war, political parties are likely to take different attitudes and to en¬ deavor to attempt to carry out the policies which they respectively support through securing con¬ trol of the government and the administration of affairs.

There are difficulties, however, in the as¬ sumption by political parties of different atti¬ tudes toward questions of war which do not arise to the same extent in connection with their division over questions of domestic policy. The principal issues upon which polit¬ ical parties have divided in the United States, during most of our history, have been those of a domestic or internal character. This has been due largely to. our geographical isolation and lack of proximity to powerful or trouble¬ some neighbors. There has, on the whole, been little attention paid to questions of our foreign relations and little popular understanding of such questions, and political parties have conse¬ quently, during most of our history, subor¬ dinated such questions in their platforms to those of domestic policy. Thus in time of war,

partisan politics becomes comparatively quies¬ cent because the issues upon which parties di¬ vide are usually domestic questions, while in war questions of foreign policy and inter¬ national import become paramount, and these, being new and little understood by the mass of the voters, allow little opportunity for the ap¬ pearance of decided party cleavage. A ques¬ tion of our foreign relations, however, which affects our vital interests so intimately as that of war cannot well be ignored by the political parties. Upon a question of foreign war, how¬ ever, there is usually a much greater approach to popular unity and unanimity of public opin¬ ion than upon questions of domestic policy. Most persons subscribe to the view that party politics should stop at the water's edge and that, in case of war, it is the duty of every good citizen to support his country, whether right or wrong. It is true that, both in the War of 1812 and in the Mexican War, there was consider¬ able dissatisfaction in certain sections of the country with the war policy of the govern¬ ment, but there was nevertheless less apparent difference of opinion over these wars than over equally important questions of domestic policy. It may also be noted that the opposition of the Federalist party to the War of 1812 contributed largely to the demise of that party.

Another difficulty in the way of injecting party politics into the question of the conduct of war is the necessity for a considerable de¬ gree of continuity of policy and stability of government if the war is to be brought to a successful conclusion. A government's foreign policy, in order to be permanent and construc¬ tive, should not be made the plaything of party politics, and this is especially true of war. The see-saw and ups-and-downs of party change which may be the evidences of the healthy fluctuations of public opinion in time of peace become dangerous in times of war if carried too far. For this reason, the party in power during the existence of a war, usually appeals for the support of the voters in order that a continuous policy and a united front may be presented to the enemy. The re-election of President Lincoln in 1864 was advocated on the ground that it was unwise <(to swap horses while crossing a stream.® Appeals were also made to the voters on this ground by leaders and supporters of the party in power in 1898 to elect a Congress composed of a majority of members of that party, although the Spanish- American War was then practically over. In England it is possible to postpone a general election by mutual consent during time of war, and thus avoid presenting to the voters the op¬ portunity of swapping horses. Under the plan of astronomical government which we have in the United States, however, elections come regularly at stated intervals regardless of whether the country is at war or peace. For this reason, some sort of a party contest even during time of war is practically unavoidable. Moreover, on account of the organization of our national, state and local governments gen¬ erally in accordance with the principle of separation of powers, as well as on account of the numerous elections and the large number of elective officers, it is necessary for political parties in the United States to maintain stronger and more permanent organizations

than is required in other countries. Although a truce between the parties may be oatched up at the outbreak of war, it is likely to be of short duration and to be broken as soon as party exigencies demand it at the approach of an important election. At such a time the op¬ position party cannot expect to maintain its organization intact unless it makes a contest to secure control of the offices wherever there is a fair chance of success. Under these cir¬ cumstances, the necessity apparently rests upon the leaders of the opposition party to – find issues and to carry the contest to the polls in spite of the existence of war and in spite of the fact that a considerable percentage of the rank and file of both parties is enrolled in the armies at the front and unable to participate in the election on account of practical difficulties..

The war has reacted somewhat differently upon political parties in

European parliamentary governments than upon those in the United States. From one point of view the British cabinet is, in ordinary times, a party com¬ mittee. It is a body of politicians selected from the leaders of the majority party, rather than a body of non-partisan technical experts ; it is a parliamentary committee holding secret sessions and collectively responsible to the House of Commons. At the outbreak of the war it con¬ sisted of an unwieldy body of about 20 mem¬ bers. The war, however, has wrought funda¬ mental changes in its character. At the very outset a party truce was agreed to, followed shortly afterward by the creation of a coalition cabinet of about the same number of members, containing practically all the prominent leaders of the two major parties, but with a nonpartisan technical expert, Lord Kitchener, in charge of the war office. The formation of the coalition cabinet sealed the party truce and indicated a significant departure, at least temporarily, from the ordinary plan of party control and responsibility. Certain other changes also fol¬ lowed in the train of the coalition cabinet. The cabinet ceased to be a mere parliamentary committee and less attention began to be paid to proceedings in Parliament, inasmuch as the latter ceased to affect or control the policies and personnel of the cabinet. The responsi¬ bility of the cabinet was rather to the electorate than to the House of Commons. That this responsibility had become individual rather than collective was indicated by the resignation in 1917 of the Secretary of State for India with¬ out affecting the tenure of office of the other members. Under these circumstances, the necessity for holding general elections ceased and acts were passed from time to time putting off the elections by prolonging the duration of the House of Commons.

The British coalition cabinet proved unsat¬ isfactory, however, largely because of its un¬ wieldy size, and smaller committees, selected partly from the cabinet and partly from out¬ side were appointed to supervise particular phases of the administration. One of these com¬ mittees was the war committee, which subse¬ quently developed into the war cabinet of five members with Lloyd George at its head. The war cabinet, however, differed from the war committee in that the latter was a mere com¬ mittee of, and subordinate to, the large cabinet, while the war cabinet was a small compact

group of leaders of both parties which was superior to the ministry. For the most part, the members of the war cabinet were not bur¬ dened with the duties of administrative office, sc that they could

devote their whole attention to general matters connected with the war. The war cabinet was a manifest improvement over the cumbrous coalition cabinet, but even the war cabinet lacked the advantages which come from the concentrated power and respon¬ sibility of a single controlling head, such as we have in the United States.

We may now contrast the developments in the United States with those in Great Britain. In November 1917, Premier Lloyd George de¬ clared that he was almost the only minister in any land on either side who had been in office since the beginning of the war. Practically all the others had fallen by the wayside through one cause or another. This was not the case, however, in the United States. A few months after the re-election of President Wilson in 1916, many votes being undoubtedly cast for him on the ground that he had kept us out of war, he found himself unable longer to pre¬ serve peace and at the same time maintain the national honor and self-respect. The entrance of the United States into the war, however, pro¬ duced no cabinet crisis as it had done in Eng¬ land. The same cabinet that had served in time of peace continued to serve without change after a state of war had been declared. A de¬ mand arose from certain leaders and organs of the opposition party that, following the example of England, a coalition cabinet should be formed, but the demand was unheeded. The opposition to the President's conduct of the war culminated in the attempt to secure the en¬ actment of what was known as the Chamber- lain war cabinet bill, providing for the appoint¬ ment of a war cabinet ((of three distinguished citizens of demonstrated executive ability,® which should practically take the conduct of the war out of the hands of the President and usurp his constitutional functions as com¬ mander-in-chief of the military forces. This bill as proposed would probably have compli¬ cated the situation rather than simplified it, and was clearly unconstitutional, yet it was supported on the ground that such a war cabi¬ net had been established in Great Britain with resulting increased efficiency in war administra¬ tion, and we should consequently profit 'by her example. Such an argument, however, failed to take into account fundamental differences in the forms of the two governments. The Over¬ man bill, which was finally enacted instead of the Chamberlain bill and gave the President power to co-ordinate and consolidate the scat¬ tered administrative agencies, was much more in harmony with the form and spirit of our in¬ stitutions. The President neither could be, ex¬ cept by impeachment, nor ought to be sup¬ planted in the conduct of the war. Stability of policy and administration in time of war is more important than that the personnel of the government should change quickly and readily in accordance with the changing currents of

popular opinion and the ebb and flow of par¬ tisan politics. To secure such stability in Great Britain, a coalition cabinet was deemed necessary in order to avoid partisan criticism and struggle which might otherwise cause the

downfall of the government through the loss of confidence in it by the House of Commons, to which it was responsible. No such coalition was necessary in the United States, however, since the cabinet officers are not responsible to Congress and are in no danger of an upset so long as they retain the confidence of the Presi¬ dent, who is not only the head of the adminis¬ tration but also the leader of his party, and whose tenure of office is of course secure for the period of his term. The concentrated power and stability of tenure of the President makes for such efficiency in wpr administration as parliamentary governments are unable to at¬ tain except by abandoning the essential prin¬ ciple, that is, ministerial responsibility. to Parlia¬ ment, on which such governments are based. The argument that, because the establishment of the British war cabinet resulted in increased efficiency, such a plan would have the same re¬ sult in the United States failed to take into account the fact that the establishment of the British war cabinet was a move in the direction of concentration of executive power, while such a cabinet, if introduced in the United States, would be a move in the direction of the diffu¬ sion of such power and responsibility.

Upon the entrance of the United States into the war, a party truce of a somewhat limited character was tacitly agreed to by the two major parties. In the nature of things, how¬ ever, such a truce could be only temporary. As the summer of 1918 approached, President Wil¬ son, in calling upon the members of Congress to attend to legislation rather than to go home to mend their political fences, made use of his well-known, laconic expression, <(Politics is ad¬ journed.® Politics, however, was not adjourned sine die, but was liable to be reconvened in special session at the first opportunity. This opportunity came'with the approach of the Con¬ gressional elections of the fall of 1918, which were the only elections of any importance held in the United States during its participation in the war. It is true that even in this election some traces of the party truce remained. In Minnesota the Democrats did not oppose the re-election of the loyal Republican candidate for United States senator. In New York City an agreement was reached between the leaders of the two major parties, in accordance with which each party endorsed the candidates of the other in three Congressional districts. These instances, however, were exceptional and were probably due in part to the belief that the elec¬ tion of the candidates whom it was proposed not to oppose was, in

any event, a foregone conclu¬ sion. Party contests occurred generally in States and districts wherever there was a fair chance for the election of either candidate.

The Congressional campaign of 1918 at¬ tracted on the whole, as was natural, much less public attention than usual. Until a few days before election day, war news crowded political news out of the headlines of the newspapers. Underneath the surface, however, the political pot was simmering. The case of the Demo¬ crats, in the eyes of most of the Congressional leaders of that party, rested largely on the ground that, under their administration of affairs, the war was being conducted success¬ fully. A huge army had been placed in France — an undertaking more gigantic; than the coun-

try had ever before attempted, in comparison with which our efforts in the Spanish-American War were mere child's play — and yet there had been less mismanagement, inefficiency and graft than in former wars. President Wilson's claim for the support of his policies, however, rested on a loftier plane than mere military success or efficient management in the conduct of the war. In March, the President had is¬ sued an appeal to New Jersey Democrats in which he struck the keynote of service to hu¬ manity as the aim which the party should em¬ brace. (

this question and this question only. Is it just, is it for the benefit of the average man, without influence or privilege, does it embody in real fact the highest conception of social justice and of right dealing, without respect of person or class or particular interest?® That the politi¬ cians of either party were likely to measure up to such a high standard was doubtful.

In the 14 conditions of peace which the Pres¬ ident laid down in his January address and in other addresses he indicated his tenacious pur¬ pose of using force to the utmost, if necessary, in order to crush the German military autoc¬ racy, but at the same time showed his desire for a peace which would bring about reconciliation and brotherhood among the peoples, even in¬ cluding ultimately the German people if they threw off the yoke of their military masters. The President's holding out of the hope of peace to the German people on this condition was a powerful diplomatic weapon in his hands, as effective in its way as the military weapon of force, and he used it

with marked success in the diplomatic notes which he dispatched in reply to the German government's appeal for an armistice. The President's belief, however, in the possibility of making a distinction be¬ tween the autocratic German government and the German people was not shared by some of the more prominent leaders of the Republi¬ can party, and was also viewed with consider¬ able scepticism by many persons who were not politicians. Former President Roosevelt went so far as to denounce President Wilson's 14 points as thoroughly mischievous and other Republican leaders emphatically disapproved of the President's policy in sending notes to the German government. The Republican leaders indicated their belief that the war was to be won, not through diplomatic appeals to the German people to overthrow their masters, but through the -use solely of military force. This was natural, since any victory through diplo¬ matic weapons would redound to the advantage of the administration, while a victory through military force would be more truly the work of the whole nation. They succeeded, however, in making many people believe that the President's policy meant a peace by negotiation and con¬ ciliation instead of a peace by dictation and force and that the Republicans were in ad¬ vance of the Democrats in demanding the un¬ conditional surrender of Germany.

PrevSident Wilson wq§ handicapped, more¬

over, by the fact that there were many promi¬ nent members of his own party who were not wholly in sympathy with his policies, and, through the operation of the rule of seniority, some of these men had become chairmen of im¬ portant Congressional committees. He felt, nevertheless, that the Republican leaders were even more out of sympathy with his policies than the large majority of Democrats and that, by their utterances, the former had already broken the party truce. Shortly before the Congressional elections, therefore, he issued a public appeal to the voters to return a Demo¬ cratic majority to both the Senate and the House of Representatives in order to prevent ((division of counsel and leadership® and to avoid the necessity which might otherwise arise of carrying on the government <(amid con¬ test and obstruction.® The President's appeal was unusual, but was salutary as bringing about a public discussion of the political aspects of the war which had been partly lost sight of in the midst of important military developments. His main reason for issuing the appeal doubtless was that the possible control by opposite parties of the executive and legislative branches, re¬ spectively, would create an anomalous situation, — one liable to lead to difficulties if not dead¬ lock in ordinary times and one especially to be avoided in a period of war and of reconstruc¬ tion after the war when harmony between the

executive and the legislative departments be¬ comes even more important and desirable than usual. The election to the legislative body of a majority opposed to the executive would, in parliamentary governments, during ordinary times, lead to the resignation of the executive and to the establishment of an executive of opposite political complexion in harmony with the legislature. iSuch a mode of procedure on the part of the executive, however, is not fea¬ sible under the American system of government, for the resignation of the President would, of course, merely place the Vice-President in his office with no change of party control over the executive department. Under the circumstan¬ ces, therefore, in case the opposition party gains control of Congress, that party may also at¬ tempt to control the President and harmonious relations between the two branches of govern¬ ment become more difficult to maintain. The President is practically reduced to the alterna¬ tive of refusing to submit to the dictation of Congress, which may produce a deadlock, or of attempting by persuasion and by arousing pub¬ lic opinion through appeals to the country, to compel Congress to carry out his recommenda¬ tions. The vital importance to the President, therefore, of having a Congress in harmony with administration policies was the principal justification for the President's unusual action. His appeal, however, was not sufficiently effi¬ cacious to save his party from defeat in the Congressional elections. The resulting likeli¬ hood that a conflict between the President and Congress would occur was foreshadowed by the passage by the Republican senatorial caucus, shortly after the election, of a resolution declar¬ ing that <(Congress should assert and exercise its normal and constitutional functions, includ¬ ing legislation necessary for reconstruction.®

John M. Mathews,

Associate Professor of Political Science, Uni¬ versity of Illinois .

POLITICAL PARTY PLATFORMS.

See Democratic Party ; Republican Party, etc.

POLITICAL SCIENCE, the science which treats of the nature and organization of states with particular reference to their forms of government (q.v.). The late Sir John Seeley, one of the most profound students of political science, declared that «the state in the largest

acceptation of the word, distinct from the fam¬ ily, though not unconnected with it, distinct also from the nation, though sometimes roughly co¬ inciding with it, is the subject of political science; or, since the distinctive character of the state whereever it appears, is that it makes use of a contrivance called government, we may say that it deals with government as political economy deals with wealth, as biology deals with life, as algebra deals with numbers and as geometry deals with space and magnitude.® It is the province of political science to discover proper tests for the classification of govern¬ ments as well as correct principles for the organization or administration of government. Whether political power shall be vested in the few or the many, what shall be the qualifica¬ tion of those who choose and those who hold government offices and mandates, whether a written constitution is preferable to an unwrit¬ ten one, whether legislative, executive and ju¬ dicial functions should be exercised by the same or different organs, whether the bicameral form of legislature has advantages over the single chambered body, the relation between govern¬ ment and liberty, the proper sphere of govern¬ ment activity, the conception and organization of sovereignty, the principles governing the or¬ ganization and powers of the executive, the legislature and the judiciary are some of the problems of general political science. In its nature political science may be descriptive or historical. Descriptive political science deals with existing constitutions and treats of princi¬ ples which are applied in practice. Historical political science treats of constitutions which have obtained in the past and of the growth and development of political ideas. Political science is sometimes said to differ from politics in that the latter has to do rather with the prac¬ tical administration of government and from political philosophy in that the latter is concerned with a theoretical examination of the concepts which underlie political science. According to this distinction, political science has to do only with those political ideas which are scientific. It is closely allied to history and political econ¬ omy. Its relation to history is ingeniously de¬ scribed by the eminent authority referred to above. He says that history is the residuum left when one group of facts after another has been taken possession of by some science. As this process of appropriation goes on, the resid¬ uum will eventually become the property of a single science — political science, a science which has for a long time been insensibly growing up by the side of history and in close connection with it. Political science draws many if not most of its materials from history, and the prin¬ ciples which underlie it are for the most part based on historical facts. Its relation to eco¬ nomics arises from the great part which eco¬ nomic influences play in determining the func¬ tions and scope of government. Thus

the prin¬ ciples underlying the proper relation of govern¬

ment to industry as for example whether cer¬ tain industries should be encouraged by boun¬ ties, subsidies or tariffs, are affected largely by economic considerations.

Formerly there was a disposition to deny that the study of the phenomena of the state could properly be described as a ˆscience.® Political phenomena, it was said, are character¬ ized by so much uncertainty and lack of order that it is impossible to apply to them scienti¬ fic methods of investigation. This assumption,, however, was based on a conception of science which was too narrow and strict. If we con¬ ceive the function of science to be the classifi¬ cation and study of facts through investigation and analysis and the deduction of conclusions therefrom, we are justified in holding that the phenomena of government constitute an appro¬ priate subject of scientific investigation. It will be admitted, of course, that owing to the ab¬ sence of fixed and immutable laws such as govern the relations of physical phenomena, the facts relating to political and social phenomena are less capable of evaluation and analysis than those with which the physicist and biologist are concerned; nevertheless it is impossible to say that they cannot be studied according to the rules of scientific investigation.

The recognized methods of political science may be classified as the experimental, the so¬ ciological, the comparative and the historical. To some extent states may also be studied biologically and psychologically and recently these latter methods have received much atten¬ tion. The older and more generally accepted methods, however, are the comparative and his¬ torical methods. The comparative method was first employed by Aristotle and later by Mon¬ tesquieu, de Tocqueville, Laboulaye, Mill and Bryce. This method aims through the com¬ parison of existing polities to assemble a definite body of knowledge from which the ideal types of constitutions may be discovered. The historical method consists in the study of constitutions in their development and political working with a view to determining how far they have adapted themselves to existing needs and have fulfilled their original purposes. (

The experimental method in political science is obviously less satisfactory because the phe¬ nomena of government cannot be subjected to the process of artificial experimentation in the same way that physical phenomena may be analyzed and studied by the chemist, the physi¬ cist or the biologist. The latter may with the aid of applicances, heat, chemicals and the like isolate the phenomena which

he desires to study, subject them to artificial processes and exclude the operation of disturbing influences. But the political scientist cannot do this. He cannot select a state, create artificial conditions for its study, employ mechanical apparatus and draw precise conclusions from the results. Never¬ theless, the experimental method in politics is not entirely impossible. Indeed the whole po¬ litical life of the state is in a sense a succession of experiments. Every new law, every new institution, every new administrative policy is

experimental in the sense that it is regarded as tentative and provisional until experience has demonstrated its fitness to be retained per¬ manently. In this way what Bacon called ex- perimenta fructifera are constantly being made on every community, consciously or uncon¬ sciously.

Historically political science began with the ancient Greeks. Other primitive races lacked political consciousness. They had the conscious¬ ness of family and of class, but not of the state in the aggregate. By the common voice of posterity Aristotle (q.v.) is recognized as the founder of political science and his commenta¬ ries still occupy an important place in the literature of the subject. He it was who first gave to polidcs the character of an independent science. He mastered in the concrete a large number of constitutions, mostly Greek, and from the mass of facts thus gathered he laid down the body of general principles which constitute his system of politics. He was the first to classify governments as monarchies, aristoc¬ racies and democracies and although many of his other theories have long since been rejected this classification is still accepted as the most scientific and convenient. The corresponding perversions he designated as tyrannies, oli¬ garchies and democracies. He laid down the important maxim that man is by nature a polit¬ ical animal and that, therefore, the state is necessary to a complete and all-sufficing life; he drew a distinction between ethics and politics ; taught that the state was not an affair of mere convention but the result of growth and evolu¬ tion ; and discussed with scientific method the various types and forms of government, the theory of sovereignty, the institution of slavery and private property. Three elements, he said, were essential to every government. They were : a deliberative organization, a system of magistrates and a judicial organization. He asserted that the best constitution is one framed and administered for the common good, but that the best for one people was not necessarily

good for all ; that some are born to command and others to obey; he emphasized the principle of the responsibility of power and expressed the opinion that government by the middle classes was the most desirable. The chief merit of Aristotle's work was that he studied exhaus¬ tively the materials at hand and reduced to a clean-cut systematic form the general principles which he was able to gather from his studies. In other words he created a science of politics. Among his countrymen Plato (q.v.) was the only other scholar who contributed anything worth mentioning to political science and his treatment of politics was largely incidental to his ethical philosophy, it scarcely ever rising to the dignity of a science. In the (Republic, } which was the greatest of his works, he formu¬ lated the conception of a state in which abso¬ lute justice prevails — an ideal commonwealth such as has never existed, in fact, nor probably ever will. Three classes, he affirmed, were necessary to every state. They were producers, warriors and magistrates, and every member must be assigned to the class for which he is best fitted. He did not recognize the right of private property, but insisted upon a uniform system of public education. In fact he believed that the only true way to the perfect state was through education. The function of the magis¬

trates was to be limited — practically to the training of children, every detail of their early life being prescribed by the state. His idea of government was that of the aristocratic form ; but he believed in an aristocracy of merit rather than of wealth. He proposed that philosphers should constitute the governing class, to ex¬ clude poetry from the state, to place women on an equality with man so far as political and military obligations were concerned. Some of his teachings, however, were not purly utopian ; such for example as the opinion tha* the strength of the state was virtue and education, and that the guaranty of civil liberty could only be had in a well-balanced constitution. His classification of governments was the same as that of Aristotle except that he added two other types, namely, tyranny and oligarchy. In the 'Laws' which is his last and most extensive treatise, he abandons somewhat his utopianism and seeks to present a practical code for the government of men. It proposed regulations for the minutest details of domestic life and recognized the institutions of marriage and pri¬ vate property, which had no place in his earlier treatises. It was he, as Sir Frederick Pollock shows, who first worked out the theory that government is a special art and can be exercised only by competent persons. His idea of govern¬ ment by philosophers, however, would now be ridiculed. Strictly speaking, he had no theory of the state, and his political ideas generally have had little permanent influence upon the history of politics. The same may be said of the

post- Aristotelian Greek scholars, although it may be said that the Stoics contributed the idea of the law of nature and the idea of citizenship.

In the domain of political science the Romans were servile imitators of the Greeks and, there¬ fore, contributed little of permanent influence. They were successful rulers and administrators, were skillful in the formation of rights and ac¬ complished wonders in the domain of jurispru¬ dence, but when Rome became a world state, carrying with it the destruction of all indepen¬ dent political life, there was no place for theret- ical politics. The Latin mind, in fact, was not given to speculation. Polybius and Cicero are almost the only names among the Roman theorizers, and their investigations were con¬ fined entirely to the Roman state. Polybius produced a remarkable treatise on the constitu¬ tion of Rome which had an important influence upon later Roman politics. His discussion of the forms of government is also worthy of note. In Cicero's political writings, of which the

During the Middle Ages few or no im¬ portant contributions were made to political science. As James Bryce points out the Mediae¬ val period was essentially unpolitical. The de¬ cisive spiritual force was religion. Political self-consciousness was lacking. One and only one great question dominated the political and

intellectual life of the time and that was the long controversy between the temporal and spiritual powers. It involved the relation of Church and State and incidentally the nature of the civil power, the principle of the divine right of kings and the sovereignty of the people. A number of scholars, mostly theologians, arose to defend the claims of the Church to su¬ premacy over the civil power. Of these, John of Salisbury and Saint Thomas Aquinas were probably the most notable. In the (Polycrati- cus) the former discusses monarchy as a form of government and justifies the crime of tyran¬ nicide ; in the (Summa Theologiaˆ one of the greatest treatises of the Middle Ages, the latter discusses various kinds of law, natural justice, the nature and forms of political authority and the functions of government. On the other hand, Dante, Occam, Marsiglio of Padua and other jurisconsults defended the claims of the civil power. To mention the most important of the numerous treatises that followed, Dante's (De Monarchia) discussed the monarchial form of government as the best of all forms and as¬ serted that a- universal monarchy on the old

imperial lines was necessary for the highest de¬ velopment of mankind. A universal monarch, he said, having no rival to fear and no further ambition to satisfy, could have no motive for ruling unjustly. Occam's and Marsiglio's dis¬ cussion of sovereignty and representations are of interest only to the student of political theory. Modern political science really begins with Machiavelli, an Italian who wrote during the latter part of the 1 5th century. He was devoted to the study of political science and like Aris¬ totle regarded the state as the highest good. His chief works were the (Discourse on Livius) and the (Prince, } the latter a treatise which was designed to furnish advice to princes as to how they might best obtain their ends. The treatise is chiefly notable for its details of statecraft rather than for any theory of the state. It makes a complete separation of ethics and poli¬ tics, in fact takes no account of morality. Into politics he introduces cruelty and bad faith, and teaches that a prince is justified in resorting to deceit, treachery, treason, cruelty and even mur¬ der in order to accomplish his ends. For this purpose such conduct seemed to him to be per¬ fectly innocent and he recommended it without scruple. In the following century an important contribution to the literature of political science was Languet's (Vindiciae contra Tyrannos,* the first treatise which defined the relationship ex¬ isting between rulers and subjects as one of contract. This is not to be confused with the principle of contract as a theory of the origin of the state. The work was also notable for its strong plea for resistance to rulers who violate the contract existing between them and the peo¬ ple. A monumental contribution to political science was Jean Bodin's (De Republican pub¬ lished in 1577. It is a polemical treatise con¬ ceived on the plan of Aristotle's (Politics* and is notable for containing the first definite enun¬ ciation of the modern political doctrine con¬ cerning the nature and location of sovereignty. He shows that in every independent state there must be some authority, whether single or col¬ lective, whereby the laws are enacted. This au¬ thority is the sovereign and being the source of law must be supreme over the law. (

sovereign,® said Bodin, <(who sees no one greater than himself except God.® He defines sov¬ ereignty as a ((power supreme over citizens and subjects, itself not bound by the laws,® and asserted that it was a unit and hence indivisible. This view of sovereignty was in the following century adopted by Hobbes and ultimately came to be the generally accepted view of the pub¬ licists. He is entitled, says Sir Frederick Pol¬ lock, to share with Hobbes the renown of hav¬ ing founded the modern theory of the state. In the 17th century the two most distinguished names in the annals of political science are those

of Thomas Hobbes and John Locke, both Englishmen, one a defender of the absolutism of the Stuarts, the other a defender of the Revolution and a champion of the sovereignty of the people. Hobbes' most famous treatise was the (Leviathan or De Cive) and the two most important principles which he there lays down relate to sovereignty and the origin of society through contract. Like Bodin he taught that sovereignty was legally unlimited and sub¬ ject to no higher powers. The sovereign, he said, was a public personage vested with ab¬ solute power, it might be arbitrary, it might be benevolent. No subject had a right to resist the sovereign, for that would be violation of his contract with all the other members of the state. His political science made no place for popular sovereignty, but it was Hobbes' doctrine of the state of nature and the contract theory of the origin of the state that made his work most famous. His view of a state of nature was that of a presocial condition in which men were in a state of perpetual war with one another, each appropriating what he could get and hold by physical force. To escape from this intolerable condition and provide for the security of all, each was induced to resign certain of his so-called rights over all things and surrender them to some common authority, thus forming a mutual covenant for the protection of other rights. Each entered into a contract with all by which he agreed to divest himself of the natural liberty of hindering his fellow-men in their efforts to obtain the same right. Hobbes' doc¬ trine thus differed from that of the (Vindici3e contra Tyrannos* of Languet in holding that the sovereign is no party to the contract but only an authority set up as a result of contract among the subjects of the state. He, therefore, sur¬ renders nothing, but retains his natural rights as though he were in a state of nature. Nor can he be accused of breach of contract, because he has promised nothing. The idea of justice had no place in such a state nor had the con¬ ception of private property yet arisen. Locke wrote as a defender of the principles of the Revolution of 1688 and his (Essay on Civil Gov¬ ernment is one of the most notable treatises on political science published before the 19th century. Like Hobbes he accepts the contract theory of the origin of society as well as the idea of the state of nature. He differed from Hobbes, however, in his view of the state of nature, holding that it was not a state of license or anarchy or a condition of perpetual warfare, but merely a condition in which men have no common superior. Each individual is limited in his action by the law of reason or natural jus¬ tice, while the institution of private property, the right to labor, and the right of liberty, occupied an important place in the presocial state as he

understood it. Hobbes' doctrine of the renun¬ ciation of rights to an absolute ruler he also rejects. Locke's doctrine had more influence perhaps on American political philosophy than those of any other man.

Passing over minor writers of the period we are brought to Montesquieu, who about the middle of the 18th century made sev¬ eral monumental contributions to the litera¬ ture of political science, the most notable being his Esprit de Lois,5 published in 1748, a work which was the result of great study and research. It has been said that his two main ideas were: (1) the construction of a compara¬ tive theory of legislation and institutions adapted to the political needs of different forms of gov¬ ernment; and (2) a comparative theory of poli¬ tics and law based on wide observation of the actual systems of different lands and ages. He discussed intelligently the various forms of gov¬ ernment, the corruption of democracies, the in¬ fluence upon politics of the elements of air, sun, geography, climate, race,, etc. Perhaps the best known and the most permanent in its effects of Montesquieu's political doctrines was his theory of the separation of powers and of checks and balances in government. The idea of the three¬ fold character of governmental powers (legisla¬ tive, executive and judicial) was as old as Aristotle, but it remained for Montesquieu to show that the exercise of each group of these functions by separate and distinct organs was an essential condition of liberty. If all these func¬ tions are exercised by one and the same organ, that is, if the same organ legislates, interprets and executes, its legal sanction is that of a tyrant. This principle was destined to have a large influence upon the political development of the United States and was in the course of time adopted by all the States and by the na¬ tional government.

The last contribution of note in the field of political science in the 18th century was that of Jean Jacques Rousseau. This contribution con¬ sisted (1) of his theory of sovereignty and (2) of 'his theory of the social contract. As opposed to the doctrine of the jurisconsults who held that the will of the prince was law, Rousseau as¬ serted the omnipotence of the people. In the (Contra t Social,5 his most notable work, the theory of the origin of the state as enunciated by Hobbes and Locke was elaborated. Like Locke, Rousseau maintained that presocial men were not in a state of perpetual warfare nor in a con¬ dition of unrestricted license. During the 19th century the names of De Tocqueville in France, Bluntschli in Germany, and Herbert Spencer in England, are perhaps the best known. De Tocqueville's (Democracy in America) was a philosophical examination of political institu¬ tions in

the United States based to some extent on personal observation. Herbert Spencer's ˆPolitical Institutions,5 his Principles of Sociology5 and his (Man vs. the State) are substantial contributions to the literature of political science. The individualistic conception of government activity which he sets forth is perhaps the most notable plea for the laissez- faire principles to be found anywhere. Blunt-schli's (Theory of the State5 is a profound trea¬ tise on the nature and attributes of the state.

In the United States the contributions to political science have, for the most part, been of little consequence. The American mind is

practical rather than speculative, and while the Americans have shown great skill in the prepa¬ ration of constitutions and the formulation of rights, they have given little attention to the scientific discussion of the state. Most of the principles of our political science were inherited from England. The ideas of natural rights, popular sovereignty, representation, etc., were the familiar doctrine of the Puritan revolution, while the idea of the separation of powers came from Montesquieu. The first and one of the greatest American treatises on political science was the (Federalist,5 written by Hamilton, Mad¬ ison and Jay in 1788 to secure the adoption of the Constitution. But being a lawyer's brief, it lacks the element of an unbiased philosophical discussion. Thomas Jefferson contributed vari¬ ous ideas of a speculative character, but they never took the form of a systematic treatise and scarcely rose to the dignity of a scientific exami¬ nation of the subjects treated. John C. Cal¬ houn's (Disquisition on Government,5 written in 1850, is an original and profound essay on the nature of government, and has scarcely been surpassed by any other American contribution in this respect. Two other works deserving of mention are Francis Lieber's (Political Ethics5 and Theodore VVoolsey's (Political Science.5 Lieber's work was the first approach to a sys¬ tematic treatise on political science ever pub¬ lished in America and has had great influence upon the political thought of the nation. His (Civil Liberty and Self-Government5 also oc¬ cupies a distinct place in the literature of the subject. A more valuable treatise still is Woolsey's work first published in 1877 and is without doubt the most scholarly and systematic presentation of the principles of political science which has appeared from the pen of an Ameri¬ can. The most recent contribution is Burgess5 ˆPolitical Science and Constitutional Law,5 which discusses in a profound way the nature and origin of the state, the conception of sovereignty and the relation of government to liberty. Probably no contribution has had such influence in clarifying American conception on these phases of political science.

(See also articles State; Sovereignty; and the sections on Government of the various countries). In addition to the works cited con¬ sult Pollock, ‘History of the Science of Poli¬ tics5 ; Seeley, (Introduction to Political Sci¬ ence5 ; Dunning, (Political Theory of the Ancient or Mediaeval World5 ; Willoughby, ‘The Nature of the State5 ; also (Political Theories of the Ancients5 ; Garner, Untroduction to Polit¬ ical Science5 ; Leacock, ‘Elements of Political Science,5 and Gettell, Untroduction to Political Science.5

James Wilford Garner, Professor of Political Science, University of Illinois.

POLITICAL AND SOCIAL SCIENCE,

American Academy of. See American Acad¬ emy of Political and Social Science.

POLITICAL SOCIETY AND DEMOC¬ RACY. See Democracy, History of.

POLITICS. See Election ; Political Science.

POLIZIANO, po-let-se-a'no, Angelo. See Politianus, Angelus.

POLK

POLK, pok, Frank Lyon, American lawyer, grandson of Leonidas Polk, the Rebel bishop : b. New York, 13 Sept. 1871. In 1894 he was graduated at Yale University and three years later at the Columbia Law School. In 1897 he began his practice in New York City, was mem¬ ber of the civil service commission of New York in 1907-09, and in 1907 and 1910 was member of the New York board of education. On 24 Jan. 1914 Mayor Mitchel appointed him corporation counsel, in which office he remained until his appointment on 16 Sept. 1915 as coun¬ sellor for the Department of State at Washing¬ ton. During Secretary Lansing’s absence in Europe as delegate to the Peace Conference, Mr. Polk was acting Secretary of State.

POLK, James Knox, 11th President of the United States : b. Mecklenburg County, N. C, 2 Nov. 1795; d. Nashville, Tenn., 15 June 1849. He was of Scotch-Irish ancestry and was reared near the North Carolina frontier amid the hard, simple surroundings of plain farmers. He was graduated at the University of North Carolina in 1818 and settled in Ten¬ nessee, where he studied law under Felix Grundy, then

one of the foremost public men of the West. He was admitted to the bar in 1820 and he began the practice of his profession at Columbia in middle Tennessee. Becoming a member of Congress in 1823, he at once tbok sides against Henry Clay and became a leader of great force. He remained in the House of Representatives 14 years, serving two terms as speaker at a time when the bitterness of the sections, as displayed in Congress, made the office one of the greatest difficulty. He was recognized as an able Jacksonian Democrat in 1840, when he was occasionally discussed as a probable candidate for the Vice-Presidency. But the evenly balanced state of politics in Tennessee and the importance of the State in national affairs caused him to become a candi¬ date for the governorship of the State in 1839. He was elected and served two years, but was defeated in spite of all Jackson could do for him in 1841 and again in 1843. Under these rather adverse circumstances, his candidacy for the Vice-Presidency with Van Buren in 1844 was widely pressed. But the one issue which determined the nominations of that year was the proposed annexation of Texas. A group of ardent Southerners and Democrats, led by Robert J. Walker of Mississippi, was bent upon compelling Van Buren to agree to annex Texas in case he were elected. Van Buren had never been willing to make an explicit declaration of his views on the subject. He had been badly defeated for a second term in 1840, in a way which caused him and his friends to think he was entitled to a renomination in 1844. As the time for the assembling of the Democratic convention approached Senator Walker and other Southerners pressed for a declaration. Van Buren visited Jackson in April and on his return called upon Henry Clay at Lexington. On his return home late in April he gave out a public statement opposing the annexation of Texas. What made this announcement so ex¬ traordinary was the fact that on the same day Clay, then at Raleigh, N. C., made a similar public announcement. The excitement all over the South was intense. Walker and others se¬ cured the release of Southern delegates to the

convention which was to meet in May from their instructions to vote for the nomination of Van Buren. In the Northwest a similar deser¬ tion of the New York leader took place. When the convention met there was great turmoil. Van Buren was, however, promptly defeated. After some manceeuvring Polk was chosen as the party candidate. He was an ardent Texas man. Calhoun who was then, as always, a powerful leader in the South, supported Polk with enthusiasm and he was elected. It was one of the few cases in American history when the issue was perfectly clear and when the people understood what was to be done in the event of the success of Polk. The Democratic plat¬ form declared pointedly for the reannexation of Texas and the reoccupation

of Oregon, a vast region then little known to the country but held jointly by the United States and Eng¬ land. Polk favored the seizure of all of Ore¬ gon, upon the giving of a year's notice of his intention to Great Britain, and it was his known opinion on this subject that secured him the hearty support of Northwestern leaders like Cass and Douglas. It was what has been called the bargain of the Baltimore convention, that is, that Southern men would support the demand for all Oregon to the southern boundary of Alaska on condition that Northwestern men would support the plan for the annexation of Texas. Polk was an avowed expansionist and he was elected upon the issue. Clay being de¬ feated for the third and last time. George M. Dallas of Pennsylvania, a popular protectionist, was the candidate for the Vice-Presidency, notwithstanding the fact that Polk had always been known as an opponent of the principle as well as the practice of a protective tariff. In spite of the difference of opinion Polk and Dallas made an able and successful administra¬ tion. James Buchanan was Secretary of State and Robert J. Walker Secretary of the Treas¬ ury. George Bancroft was also a member of this Cabinet. Clay opposed the administration most bitterly and both Webster and Calhoun, in spite of the recent friendliness of the latter, were leaders of the opposition in the Senate. Few Presidents have met with such powerful oppostion in Congress, and Van Buren, with his friends, held aloof, refusing their support at critical times. Yet Polk completed the annexa¬ tion of Texas, solved the Oregon problem, but without securing all of the disputed territory, settled the long standing tariff dispute between the South and the North and established a new treasury system which continued till the out¬ break of the Civil War. No other President with the exception of Wilson has placed upon the Federal statute books so many and such vital general laws. Nor was this all. Polk sought to procure by treaty certain lands claimed by Texas in the autumn of 1845 and he hoped to purchase New Mexico and Cali¬ fornia, where only a few thousand Spanish- Mexicans lived. John Slidell was sent to nego¬ tiate these delicate matters. He failed and at the same time irritated the already angry Mexicans. Meanwhile a small American army under the command of Gen. Zachary Taylor had already occupied part of the area claimed by both countries. The Mexicans attacked Taylor and war ensued. Upon the receipt of the news of victories in northern Mexico great excitement was aroused in the United States. Westerners

and Southerners volunteered in great numbers. Polk pressed the war

with vigor but he did not restrain army and navy men or the land hungry elements of the country from crying for the annexation of the whole of Mexico. At one time Polk himself, urged by two or three mem¬ bers of the Cabinet, contemplated the dismem¬ berment of the unfortunate country. At the close of the war, not only the Texan claims but New Mexico, Arizona and California were demanded and received by the American com¬ missioners. Polk and his group of followers were undoubtedly the most imperialistic of American leaders. The result of their policy was the annexation of about 1,000,000 square miles of fresh and valuable territory. But in the imperialistic campaign, supported by the West and the South, a part of Oregon was lost to the United States. That created ill feeling in the North toward Polk. About the same time that Polk agreed to yield to Great Britain the northern half of Oregon, he angered North-westerners by vetoing a bill which proposed large appropriations for the improvement of harbors on the Great Lakes and for the dredg¬ ing certain rivers in the same region. This was the beginning of the schism in the Democratic party for which the defeat of Van Buren in the Baltimore convention had prepared the way; Lewis Cass, a friend of Polk, could not hold his followers in line. The Wilmot proviso, a direct attack upon the President's annexationist program, was attached to important legislation and became the cause of a most bitter conflict among those who had elevated Polk to the Presidency. As the Mexican War drew to a close, Polk saw that a renomination was out of the question. He recommended the nomination of Cass by his party, but Van Buren and his friends united with the Liberty Party men and the malcontents of the Northwest to form a new party which took the name of Free Soilers. They polled votes enough to defeat Cass and the Democratic party and Polk retired chagrined if not directly defeated to his home in the spring of 1849. But his work remained. He died the following June at the capital of his State. (See Mexico, American Diplo¬ matic Relations with). Consult Jenkins,

J. S., (Life of James K. Polk' (Auburn, N. Y., 1850) ; Tyler, L. G., (The Times of the Tylers) ; Smith, Justin H., (The Annexation of Texas' ; Reeves, Jesse S., (The Diplomacy of Tyler and Polk' ; Quaife, M. M., (The Diary of James

K. Polk' (4 vols., Chicago 1910).

William E. Dodd

Professor of American History, Chicago Univ.

POLK, Leonidas, American general and Protestant Episcopal bishop :

b. Raleigh, N. C., 10 April 1806; d. Pine Mountain, Ga., 14 June 1864. He was a cousin of President Polk (q.v.). Educated at the United States Military Acad¬ emy, he subsequently studied for the ministry, and in 1831 took priest's orders in the Episcopal Church. In 1838 he was consecrated missionary bishop of the Southwest Indian Territory, Ala¬ bama, Mississippi and Louisiana. In 1841 he was appointed bishop of Louisiana, and his plan for a system of higher education in the South had its outcome in Sewanee University and the University of the South, established in 1858. He was an ardent lover of the South and soon after the outbreak of the Civil War

was offered a major-generalship in the Con¬ federate army and, accepting it, proceeded to fortify strongly strategic points on the Missis¬ sippi. At Shiloh and at Corinth he commanded the First corps; in October 1862 "he was pro moted to lieutenant-general, and in November conducted the retreat from Kentucky. In De¬ cember 1863 he was promoted to the Depart¬ ment of Alabama, Mississippi and eastern Louisiana, and afterward joined Johnston in opposing Sherman's march to Atlanta. He was killed by a cannon ball while reconnoitring on Pine Mountain. Consult (Life' by his son, W. M. Polk (1893).

POLK, William Mecklenburg, Americaˆ physician, son of Leonidas Polk, the Rebel bishop: b. Ashwood, Tenn., 15 Aug. 184U d. 24 June 1918. He was graduated at the Virginia Military Institute in 1861 ; served in the Con¬ federate Army under his father and rose to the rank of captain. In 1869 he was graduated at the College of Physicians and Surgeons of Columbia University ; after which time h practised in New York. In 1876-79 he was pro¬ fessor of therapeutics at Bellevue Hospital Medical College; in 1879-98 professor of ob¬ stetrics and gynecology at New York University and after 1898 dean and professor of gynecology at Cornell University Medical College. Dr. Polk was consulting gynecologist to many hospitals in New York City.

POLKA, a dance of Bohemian or Polish origin, the name being derived from the Bo¬ hemian pulka, half, from the half-step that char¬ acterizes the dance, or from Polka, a Polish woman. Stainer and Barrett in their diction¬ ary of Music' credit the invention of the dance to Anna Slazak, a farm servant at Elbsteinitz, near Prague, about 1830. It was popularly in¬ troduced at Prague about 1835, and in 1839 was brought by a part of the musical band of the Prague sharpshooters, under the management of Pergler, to Vienna, where both the music and dance met with extraordinary acceptance. In 1840 it was received with the greatest ap¬ plause at the Odeon Theatre in Paris, and was soon the favorite dance at all the public and private

balls of that capital. It spread rapidly into every country of Europe, and is now com¬ mon in every part of the civilized world. The music is written in two-four time, the first three quavers being generally strongly accentuated.

POLKO, pol'ko, Elise Vogel, German nov¬ elist: b. Leipzig, Germany, 31 Jan. 1822; d. Munich, 15 May 1899. She was a sister of Eduard Vogel, the African explorer, and at¬ tained considerable fame as a public singer, but retired from the stage after her marriage to Polko, a scientist, and thenceforth devoted her¬ self to literature, in which field she won much notice. Her (Musikalische Marchen' (1852) was translated into English, as were others of her books. She published (Ein Frauenleben' (1854) ; (Erinnerungen an Felix Mendelssohn Bartholdy' (1868); Aus dem Jahre 1870'; Conversations' (1872) ; (Neues Marchenbuch' (1884), etc.

POLL-EVIL, a swelling followed by severe ulceration, on a horse's poll or nape of the neck, just between the ears toward the mane, which often results from a bruise, undue pressure of halter or similar injury to the flesh. As soon

JAMES K. POLK

Eleventh President of the United States

POLL-TAX

POLLARD

as it becomes evident that pus is forming warm poultices should be applied to hasten the proc¬ ess. When ripe the swelling should be lanced and kept open by a seton until thoroughly drained and clean and in condition to heal properly. Careful treatment is necessary to prevent serious injury to an animal so af¬ flicted.

POLL-TAX. See Capitation; Taxation.

POLLACK, or COALFISH, a dark green fish (Pollacliius Virens') of the cod family, a native of the Baltic, Northern and Mediter¬ ranean seas, and the name coalfish is derived from the dusky pigment which tinges the skin and which soils the fingers like moist coals. This species differs from the cod in seeking its food in shoals at the surface as well as near the bottom. In such surface excursions 'they pour out their spawn, which floats and quickly hatches. The flesh is highly esteemed

on the British and Canadian coasts, but is not com¬ monly known in the United States. Very simi¬ lar fishes occur in the north Pacific, one of which is highly important to the Alaskan coast natives who call it beshow. All of these fishes yield a valuable liver-oil ; and the eastern ones, at least, afford good sport with hook and line.

POLLAJUOLO, p61-la-yoo-6'lor Antonio, Italian painter, sculptor and goldsmith : b. Florence, 1429; d. Rome, 1498. He was a pupil of Lorenzo Ghiberti and assisted him in the celebrated gates of the baptistery of San Giovanni. Chiefly known as a sculptor, his paintings, however, have a distinct place in the development of Italian art from their power in the expression of action, which quality is best exhibited in his < Hercules Strangling Antaeus' in the Uffizi, and the (David' at Berlin. At Rome he made the monuments of Sixtus IV and of Innocent VIII. He was also a medalist and engraved several plates which are ex¬ tremely scarce. His other occupations lend a certain character of hardness to his painting, which also exhibits his superior knowledge of anatomy, he being the first to study from dis¬ section. His brother Pietro, — b. Florence, 1443 ; d. there, 1496, was associated with him in all his works and did much independent painting. Pictures assigned to him are the Annuncia¬ tion' in Berlin and a fresco of Saint Christo¬ pher in the Metropolitan Museum, New York.

POLLAJUOLO, Simone del (((Il Cro- naca"), Italian architect: b. Florence, 1454; d. 1509. He studied the architectural remains of antiquity at Rome for a number of years be¬ fore undertaking any original work; and his constant habit of describing them to his friends, after his return to Florence, won for him the title ((I1 Cronaca" (((The Chronicler®). His masterpiece is the cornice added to the facade of the Palazzo Strozzi, of which he had been appointed architect. He built at Florence the Palazzo Guadagni and the church of San Salvador al Monte, also the sacristy of San Spirito, the court of the Palazzo Strozzi and the great hall of the Pal¬ azzo Vecchio. He must be looked upon as one of the leading architects of the original Renais¬ sance style in Italy. Consult Geymiiller-Steg- mann,

POLLAK, pol'ak, Gustav, American editor; b. Vienna, 4 May i849; d. 1 Nov. 1919. After a course of study in the schools of his native city, he came to the United States in 1866, where he devoted himself largely to editorial work. A contributor to The Nation from 1874, and to the New York Evening Post from 1881, he wrote chiefly on foreign politics and literary subjects. In addition to copious work on leading encyclo¬ paedias, he published (The Century Book for Mothers, > in which he was joint editor with Dr. L. M. Yale; (Franz Grillparzer and Aus¬ trian Drama' ; (The Hygiene of the SouP ;

(Michael Heilprin and His Sons'* ; (Interna¬ tional Perspective in Criticism,' and (Fifty Years of American Idealism. '

POLLANARRUA, Ceylon, a ruined city and formerly capital of Ceylon, situated about 60 miles northeast of Kandy. There are numer¬ ous large stone figures of Buddha and remains of temples and other buildings. It flourished from the 8th to the beginning of the 13th cen¬ tury. It is now called Topare.

POLLARD, pol'ard, Charles Louis, Amer¬ ican botanist and entomologist: b. New York, 29 March 1872. In 1893 he was graduated at Columbia University; was assistant curator of the division of botany of the United States Department of Agriculture in 1894-95, and of the United States National Museum from 1895 to 1903. From 1907 to 1913 he was curator ot the Public Museum of the Staten Island Asso¬ ciation of Arts and Sciences and from 1897 to 1913 was editor of Plant World. Pollard con¬ tributed many botanical terms to the Supple¬ ment to Webster's (International Dictionary ' (1900) and the (Century Dictionary' (1903). He was the editor for botany and horticulture of Webster's

POLLARD, ˆEdward Albert, American journalist and author: b. Nelson County, Va., 27 Feb. 1828; d. Lynchburg, Va., 12 Dec. 1872. He was graduated from the Uni¬ versity of Virginia in 1849, removed to Cali¬ fornia where he engaged in journalism, and was preparing for the Episcopal ministry at the out¬ break of the Civil War, throughout which he was editor of the Richmond Examiner. An ardent supporter of the Confederacy, he was nevertheless a bitter and active opponent of Jefferson Davis. While endeavoring to run the blockade in 1865 on his way to England he was captured and imprisoned in Fort Monroe for eight months, when he was released by General Butler. He was an able writer, but bitterly opinionated and unfair where his prejudices were concerned. Among his numerous works are (Black Diamonds' (1859) ; Southern His¬ tory of the War' (1862) ; (The Lost Cause' (1866) ; (The Life of Jefferson Davis' (1869).

POLLARD, Josephine, American author: b. New York City, 1842; d. there, 15 Aug. 1892. She was an editorial writer on the Sunday School Times from the time of its establishment in 1876, qnd for 20 years was connected with the Methodist Book Concern. Her books are chiefly religious works and juvenile stories. Among them are (The Gypsy Books' (1873-74) ; (A Piece of Silver' (1876); (Decorative Sisters'

(1881); (Elfin Land* poems (1882); (Gellivor, a Christmas Legend* (1882); (The Boston Tea Party) (1882); (Vagrant Verses* (1887); (Favorite Birds and What Poets Sing of Them> (1888), and the hymn (Outside the Gate.*

POLLARD, Percival, American author: b. Pomerania, 1869; d. Baltimore, Md., 17 Dec. 1911. He came to the United States in 1885, engaged in journalism in 1891 and was after¬ ward engaged in editorial and literary work in Chicago and New York. Among his published works are (The Cape of Storms) (1895) ; Posters in Miniature* (1896) ; (Dreams of To¬ day* (1897); (The Imitator) (1902); (Lingo Dan* (1903) ; and (Recollections of Oscar Wilde.* He also wrote the plays (Nocturne * and (The Ambitious Mrs. Alcott,* the latter produced at the Astor Theatre in 1908.

POLLARDING, the practice of cutting off the limbs of trees at a given height in order to make the stubs throw out numerous adventi¬ tious limbs. These latter, after being allowed to grow for three or four years, are cut for fuel and the process'continued. In Holland and other parts of Europe where fuel is high-priced or scarce, the practice is very popular; but in the United States it has not come into vogue. It is also employed, like copses, for furnishing bark for tanning and withes for baskets, barrel hoops and wickerwork. Though the pollards, as they are called, are unsightly and are seem¬ ingly injured by the operation, they often be¬ come picturesque with age, and specimens still apparently thrifty are considered among the patriarchal trees of Europe. The species most used are willows, poplars, lindens, alders and certain elms and oaks.

POLLEN, John Hungerford, English

clergyman and historian : b. London, 1858. He was educated at Munster, Germany, at the Ora¬ tory School, Birmingham, under Dr. (later Car¬ dinal) Newman and at London University. In 1876 he entered the Society of Jesus and in 1891 was ordained to the priesthood. He has devoted his life principally to the study of the history of the Society of Jesus and of the lives of English, Irish and Scotch Catholics since the Reformation, and is vice-postulator for the beatification of the English martyrs. For pur¬ poses of research he has traveled in England, France and Italy. His published works are (Acts of the English Martyrs* (1891) ; (Life of Father John Morris) (1896) ; (The English Martyrs* (1908) ; (The Bedingfeld Papers) (1909). He edited (Papal Negotiations with Mary Queen of Scots* (1901) ; and (

Queen Mary's Letter to Guise) (1904), both published by the Scottish History Society; (TLe Memoirs of Father Parsons) (1906-07) ; (Documents Relative to the English Martyrs1* (1908), and contributions to (The Catholic Encyclopedia,* the Dublin Review , etc.

POLLICE VERSO, pol'li-se ver'so, the title of a famous picture by the French painter Gerome. The words mean ((with turned thumb,® and the artist represents the spectators in the gladiatorial erames turning their thumbs down as the victorious swordsman sets his foot upon the body of his vanquished antagonist. When the thumb was turned up it meant that the vanquished swordsman was to be dispatched

by the victor; it is not so plain that the down- turned thumb meant mercy.

POLLINATION. The pollen grains of seed plants are really microspores in a more or less advanced stage of germination. They are developed within anthers and, at the time of shedding, form a powdery mass which usu¬ ally has a distinctly yellowish color. The pol¬ len is the male product of the plant. The transfer of the pollen to the female structures — to the ovule of Gymnosperms and to the stigma of the ovary in Angiosperms — is called Pollination (Fig. 1).

Fig. 1 . — Diagrammatic section of a flower showing the

various parts.

The terms pollination and fertilization are often confused, but they are very different processes; for pollination is merely the trans¬ fer of the pollen grains from the anther to the ovule or stigma, while fertilization is the union of the sperms and egg, or many would define the term more closely as union of the sperm and the egg nuclei. The confusion in the use of terms is particularly persistent because the earlier writers used both terms indiscriminately and because a widely read book by Darwin on (The Fertilization of Orchids by Insects) deals entirely with pollination, there being no refer¬ ence whatever to the real process of fertili¬ zation.

The interval between pollination and fertili¬ zation varies in different species. In some cases it is only a few hours; in the majority of our familiar flowering plants the interval is probably less than a week; in some of the Gymnosperms it is several months, and in others, like the pine, it is a year; in the oaks, the interval is even longer.

Pollen is carried from the male to the fe¬ male by the wind, by various animals, such as insects, snails and birds, or by water. The

most primitive method is wind pollination ; plants pollinated by wind are said to be anemophilous. Probably all Gymnosperms are pollinated by the wind, although claims have been made that in a few species the pollen is carried by insects. Many of the lower Angiosperms like the grasses, oaks, chestnut, beech and birch are wind pollinated; but the great majority of the group are pollinated by insects, and so are said to be entonio philo us. In a few Angiosperms, growing in the water and with flowers resting on the surface of the water, the pollen floats on

the water from the anther to the stigma. Elo- dca, a very common submerged water weed, is a familiar example.

The relative position of the pollen and the ovule or stigma to which it must be carried is various in different plants. In most of our familiar flowers, like the lily, the anthers with their pollen are in the same flower with the stigma. Such flowers are ((bisporangiate® or hermaphrodite.® In many plants, as in corn, the male structures (the tassel with the an¬ thers) and the female (the ear with the stig¬ mas — called the ((silk®) are borne On different parts of the same plant but not in the same flower. Such plants are ˆmonoecious.® Many Gymnosperms bear male and female cones on the same tree and so belong in this category. In a smaller number of cases the male and female flowers are on different individuals, as in the willows. Such plants are (

In case of wind pollination, the pollen is produced in immense quantities. In Dioon, a Gymnosperm in the cycad family, the male cone produces about 10,000,000,000 pollen grains. The female cone produces 200 to 300 ovules, each of which exudes at its tip a small sparkling mucilaginous droplet, which catches any pollen grains that chance to fall upon it. The com¬ bined surface of the 300 droplets would be less than an inch square, and yet, if a female cone is within 100 feet of a male cone, the ovules are likely to be thoroughly pollinated. As the droplet dries, the pollen grains are drawn down to the place where they begin to germinate and form pollen tubes. The pollen may be car-

Fig. 2. — Longitudinal section of a Gymnosperm ovule showing the “pollination drop” with the very small pollen grains adhering to it. Below is the pollen chamber into which the grains will be drawn by

the drying of the drop.

ried for miles, but at such distance very few ovules of an ovulate cone are likely to be polli¬ nated. In pine forests, the pollen falls in such abundance that people call it ((sulphur showers.® The comparatively few plants in which the pollen is carried by water are mostly dioecious. The pollen simply floats upon the surface of the water until it reaches the sticky, mucilagi¬ nous secretion of the stigma.

In case of wind pollination and water pol¬ lination the male and female flowers are usually

upon different plants or, at least, upon different parts of the same plant. In these cases cross¬ pollination — the pollination of the stigma by pollen frpm another plant or from another flower on the same plant — results necessarily. Botanists agree that cross-pollination is the most efficient method and that close pollination, which results in close fertilization, is almost always bad for the species. However, there are some cases of efficient close pollination, chiefly in flowers which do not open, but always re¬ main closed and, therefore, are called cleistog- amous flowers. The common blue violet, in addition to its showy flowers, has small, nearly colorless flowers, looking like unpromising buds near the bases of the leaves. These flowers, entirely self-pollinated, produce good seed. But in most cases where the male and female struct¬ ures, the .anther and the pistil, are in the same flower, plants have worked out innumerable methods with innumerable variations in details to avoid close pollination. In nearly all of the cases, the pollen is carried from the anther to the stigma by insects. There are scores of books on insect pollination.

Most plants which are pollinated by insects have conspicuous flowers or a distinct odor or both. Some observers claim that the corolla does not attract insects, but none can deny the constant association of conspicuous flowers and insect pollination. All flowers pollinated by insects have nectar glands which secrete the nectar, which is the most usual cause of insect visits.

In many plants with stamens and pistils in the same flower, self-pollination is prevented by the maturing of the pollen and stigma at different times. The pollen matures and is shed before the stigma exudes the sticky sub¬ stance which makes the pollen adhere to it and at the same time affords a nutritive medium in which the pollen tube begins to form ; or the stigma matures and dries up before the pollen

is ripe; consequently, the stigma could be pollinated only by pollen from another flower.

In many cases, however, the pollen and the stigma of a flower mature at the same time. In such flowers the devices to prevent self-pollination are innumerable. Practically all such flowers are pollinated by insects. Some of the devices afford a general protection against self-pollination, but others are so complicated and specialized that only certain insects with certain peculiarities in structure can reach the nectar, and so none but these favored guests are tempted to visit the flower.

A common contrivance for the prevention of self-pollination is seen in species in which some flowers have long anthers and short pistils, while others have short anthers of the same length as the pistil in the other flower and long pistils of the same length as the anthers of the short-styled flower. The Bluet (Houstonia) is a familiar example (Figs. 3 and 4). As the insect, usually a butterfly, thrusts its proboscis down the tube of a flower with short anthers (Fig. 3) to reach the nectar at the base of the ovary, the pollen adheres to the proboscis ; then, as the butterfly visits a flower with a short style (Fig. 4) the pollen on the proboscis is at the right level to brush against the stigma

and, at the same time, pollen from the long anthers adheres to the proboscis at the higher level, so that this pollen will be deposited on the stigma of any long-styled flower the butter¬ fly may visit.

In the Snapdragon and similar flowers the two lips of the corolla are so tightly closed

Fig. 3. — Long-styled flower with anthers near the middle

of the corolla tube.

Fig. 4. — Short-styled flower with anthers near the top of

the corolla tube.

that small insects cannot get to the pollen or nectar, but the lips open when some heavy insect, like the bumble bee, alights upon the flower. Thus the pollen and nectar are not wasted upon visitors which would be of little or no use to the plant in effecting cross-pollina¬ tion.

The common milkweeds secrete a sticky, milky substance which hardens rapidly when exposed to air. The epidermis of those plants is very delicate in the region of the flower cluster, sd that the sharp claws of ants or other creeping insects, which would be of no use to the plant in effecting cross-pollination, break through and the sticky substance holds them fast and prevents them from reaching the nectar or pollen. On the other hand, butterflies, which are very effective in accomplishing pollination in milkweeds, alight directly upon the flowers, securing the nectar and carrying the pollen to other flowers on the same plant or on different plants. In the milkweeds and in most of the orchids, the pollen grains stick together in large masses, called <(pollinia® and, consequently, when pollination takes place at all it is very abundant.

The Catchfly (Silene antirrhina) as the flowers bloom exudes a sticky brownish sub¬ stance which forms a girdle around the stem below the flowers, preventing any creeping in¬ sects from reaching the nectar or pollen. Con¬ sequently, pollination is effected only by flying insects. This hint from the Catchfly is used artificially on a large scale in the sticky girdles put around tree trunks to prevent the ascent of various pests.

Many plants, like the Evening Primrose, blossom only at night when

there is not much danger from creeping insects, but when moths and other flying insects, particularly useful in effecting cross-pollination, are abroad in great numbers.

One of the Rosin-weeds, Silphium perfolia- tum, has large sheathing leaves which form a cup around the stem. The water in the cup prevents insects from crawling up to the flow¬

ers. Only flying insects, which could carry the pollen to other plants, can reach the flowers. Many plants prevent self-pollination in this way.

In most of the cases mentioned, it is true the pollen of a flower is dusted upon its own stigma, but it is practically certain that when pollen from its own anthers and pollen from the anthers of another flower fall together upon the stigma, the foreign pollen is more likely to germinate.

A couple of instances of insect pollination, no more remarkable than scores of others, may be given as illustrations of the complicated relations between certain insects and certain plants. In the Fig, pollination is effected by small wasps. There are two kinds of urn¬ shaped inflorescences which we call figs, borne on different trees. One, which is called Cap- rificus, has male flowers near the neck of the urn and short-styled female flowers farther down ; the other, called Ficus , has only female flowers with long styles. The wasp thrusts its ovipositor down through the short style of the female flower Caprificus and lays an egg in the ovary and a larva begins to develop, caus¬ ing the flower to become distorted into a gall. As the wasps mature, the males escape first and fertilize the females which are still in the gall flowers. The males then leave the urn before the pollen is ripe, but the females stay awhile — just long enough for the pollen to ripen — and then escape, becoming dusted with pollen as they pass through the narrow opening at the top of the urn. Then they visit the younger urns, dusting the stigma with pollen and laying eggs. In case of the short-styled flowers of Caprificus, galls are produced; but the wasp's ovipositor is not long enough to reach the ovary of the long-styled flowers of Ficus and, consequently, pollen tubes develop normally, fertilization follows and normal seeds are matured.

Another remarkable instance of insect pol¬ lination is seen in the Yucca, an arborescent member of the lily family, with rigid, sword¬ like leaves, which has given it the name of <(Spanish Bayonet® or C(Spanish Dagger.® Pol¬ lination is effected by the moth, Pronuba yuc- casella. The female visits the flowers for the pollen, which she

does not eat, but molds into a ball and carries to another flower. Here she bores through the wall of the ovary and de¬ posits her eggs in the young ovules and then crowds the ball of pollen into the funnel-shaped top of the stigma, thus effecting abundant pol¬ lination, which causes the young ovules to grow rapidly. The developing larvae eat many of the young ovules, but soon bore their way out and escape, while the ovules which are left develop into good seeds.

In the case of yucca and pronuba, the moth has been considerably modified so that it is adapted to rolling up the ball of pollen. Many flowers are adapted to pollination by certain in¬ sects and many insects are adapted to certain flowers, so that a scarcity of its particular flower means hardship or death to a certain species of insect; while a scarcity of some par¬ ticular insect may mean the extinction of the particular flower which it pollinates. These mutual adaptations are very numerous among the orchids.

In all the foregoing instances, pollination results between flowers of the same species. When effective pollination occurs between plants of different varieties, species or genera, and fertilization follows, the resulting individ¬ ual is called a hybrid. It often happens that hybrids are more vigorous than either of the parents and it is often possible to combine desirable characteristics of different species by artificial pollination. An anther is plucked out from a flower and its mature pollen is dusted upon the stigma of the other species. This method has been of immense value in improv¬ ing various fruits and crops. It is well known that the male and female are equally potent in transmitting hereditary characters, but cross¬ pollination has shown that, in some cases at least, some particular characters are regularly determined by the pollen. In corn, if self- pollination be prevented and field corn, which has a starchy kernel, be pollinated with sweet corn, which has a sugary kernel, the field corn stalks will bear an ear with sugary kernels; and, similarly, starchy kernels can be grown upon sweet corn stalks. In corn, pollination by a red-eared parent will produce ears with red kernels or with kernels showing various mix¬ tures of red and yellow. By pollinating differ¬ ent stigmas of an ear with different pollen, it is possible to produce on the same ear both red and yellow and also starchy and sugary grains.

There are scores of books on pollination and a vast number of articles in magazines. Dr. Knuth, in his exhaustive treatise, lists 3,748 titles,

most of . them dealing with pollina¬ tion in connection with other features of the life history but many of them devoted entirely to this subject.

Bibliography. — Knuth, Dr. Paul, hand¬ book of Flower Pollination (Oxford 1906). This work in three large volumes gives citations to practically all the literature up to 1906) ; Darwin, Charles, (The Effects of Cross and Self-Fertilization of Plants) (London 1888), and ' (The Various Contrivances by which Orchids are Fertilized by Insects) (New York

1892).

Charles J. Chamberlain, Professor of Morphology and Cytology, the

University of Chicago.

POLLIO, pol'i-o, Caius Asinius, Roman poet, historian and orator : b. 76 b.c. ; d. 4 a.d. He is known from the part he took in the politi¬ cal events of his time, but still more by his writings and love of literature. In the Civil War, he (49 b.c.) adhered to Julius Caesar, whom (after defeating Gaius Curius in Africa) he accompanied to Pharsalia and then to the African and Spanish wars. He was afterward appointed praetor and held the government of Further Spain, where he fought, without suc¬ cess, against Sextus Pompeius. When Lepidus and Antony were reconciled, in 43 b.c., he joined them with three legions and was made admin¬ istrator of Transpadane Gaul. At this time he became the friend of Virgil, whose property he saved from confiscation. After obtaining the consulship he commanded in Illyria and Dal¬ matia and for his victories was honored with a triumph 39 b.c. He afterward devoted his time to literary pursuits. He wrote speeches, tragedies and a history of the civil wars, com¬

prised in 17 books, which is quoted or referred to by several of the ancient writers. He was a great patron of literary men and introduced the custom (Recitatio) of reading aloud works, before publication, to a group of expert critics. Virgil addressed two Eclogues and Horace an ode, to him. His orations are frequently spoken of by Quintilian, but his style is condemned as deficient in clearness and ease. He founded the first public library at Rome. Three of his letters to Cicero are in the Ciceronian collec¬ tion and there are some extant fragments of his history of the civil wars. Wolfflin has on very inadequate grounds attributed to him the history of Caesar’s African campaign ((Bellum AfricanunP). He lived on intimate terms with Virgil and Horace, the latter of whom dedicated to him the first ode of his second book. Con¬

sult Aulard, (De Asini Pollionis Vita et Scripts > (1877).

POLLNITZ, pel'mts, Karl Ludwig, Baron, German author: b. Issomin, Prussia, 25 Feb. 1692; d. Berlin, 23 June 1775. He belonged to a noble family but became a soldier of for¬ tune, serving at different times in the Austrian, Papal and Spanish armies. He later gained the favor of Frederick the Great, who ap¬ pointed him his reader and master of cere¬ monies at his court, and he subsequently be¬ came director of the theatre at Berlin. Dur¬ ing his career he twice professed the Calvinist faith from interested motives, but before his death returned to the Roman Catholic Church. His works are witty and amusing and include (Etat abrege de la Cour de Saxe> (1734) ; (Lettres et Memoires) (1738-40), etc.

POLLOCK, pol'ok, Sir Charles Edward,

English judge and writer on law: b. 31 Oct. 1823; d. Putney, 21 Nov. 1897. He was a son of Sir Frederick Pollock, had no university training and read law with his father, beooming his private secretary during his service as At- torney-Ceneral. He was called to the bar in 1847, was elected bencher of the Inner Temple in 1866, acquired large practice, took silk (that is, became queen's counsel) in 1866 and was knighted in 1873. In the last-named year he was raised to the exchequer bench and through the judicature acts received in 1875 the status of justice of the High Court. For a number of years he reported special cases and wrote sev¬ eral works on County Court procedure, mer¬ chant shipping, the law of evidence and other subjects. As a jurist he exhibited a remark¬ able erudition, especially in curious and anti¬ quated phases of the law, and as a referee he was criticized, for a too common habit of com¬ promise. Among his works were (The Prac¬ tice of the County Courts) (1851; subseq. eds., with supplements), and (A Treatise on the Power of the Courts of Common Law to Com¬ pel the Production of Documents for Inspec¬ tion > (1851).

POLLOCK, Sir Frederick, English jurist: b. London, 10 Dec. 1845. He was educated at Eton and Cambridge; in 1871 was called to the bar of Lincoln's Inn, and in 1882-83 was professor of jurisprudence in University Col¬ lege, London. Since 1883 he has occupied the chair of jurisprudence at Oxford and during 1884-90 was professor of common law in the Inns of Court. Since 1895 he has been editor of the Law Reports. In 1888 he succeeded his

father in the baronetcy. He has several times visited the United States and in the winter of 1903-04 delivered a course of lectures at the Lowell Institute, Boston. Among his published works are Principles of Contract (1876; 6th ed., 1895) ; ‘Digest of the Law of Partner- ship) (1877; 7th ed., 1900; 10th ed., 1915);

(Spinoza, his Life and Philosophy) (1880; 2d ed., 1899; reissue with addenda 1912); ‘The Law of Torts> (1883; 5th ed., 1897) ; ‘The Land Laws) (3d ed., 1895) ; (Introduction to the History of the Science of Politics) (1890; revised ed., 1911) ; (Oxford Lectures and other Discourses) (1890) ; ‘Leading Cases done into English and other Diversions,* a series of parodies of English poets as well as of typical cases at law (1892); ‘The Law of Fraud) ; etc., in British India (1894) ; ‘A First Book of Jurisprudence) (1896; 3d ed., 1911) ; ‘The Etchingham Letters,* a novel in epistolary form (1899; with E. F. Maitland), etc. With F. W. Maitland he wrote a (History of English Law before Edward P (1895; 2d ed., 1899). Other works include ‘The Expansion of the Com¬ mon Law) (1'904) ; (Introduction and Notes to Main’s Ancient Law* (1906; 2d ed., 1908) ; ‘The Genius of the Common Law* (Columbia University lectures 1912).

POLLOCK, Str George, English soldier : b. London, 4 June 1786; d. Walmer, 6 Oct. 1872. He was educated at Woolwich, entered the East Indian service as lieutenant of Bengal artillery, in 1835 became colonel commandant and until his death retained this post. He commanded the Bengal artillery in the Burmese War of 1824, in 1842 was made commander of the armies west of the Indus, 5 April forced the Kyber pass, 16 September entered Cabul. He was military member of the supreme coun¬ cil of India in 1844-45, a director of the East India Company in 1854-56 and held other offices. In 1859 he was made general, in 1870 field- marshal.

POLLOCK, Robert, Scottish poet: b. North Muirhouse, Renfrewshire, 1799; d. Southampton, England, 18 Sept. 1827. He was educated at Glasgow University, studied divinity and was licensed as a preacher by the Associate Presbytery of Edinburgh in the spring of 1827. He is the author of a series of (Tales of the Covenanters, * published anonymously when very young and a blank verse poem, ‘The Course of Time,* which in spite of many faults of execution enjoyed a wonderful popularity both in Great Britain and the United States. The former work, republished with his name in a single volume, contains three of his earliest pro¬ ductions in prose; originally issued anony¬ mously, (Helen of the Glen,* (Ralph Semmell,* and ‘The Persecuted

Family. *

POLLOCK, Walter Herries, English jour¬ nalist and author: b. 21 Feb. 1850. He is a brother of Sir F. Pollock (q.v.) and was edu¬ cated at Eton and Cambridge. He was called to the bar at the Inner Temple in 1874 and from 1884 to 1894 was editor of the Saturday Review. He has published ‘The Modern French Theatre) (1878); (Lectures on French ' Poets* (1879) ; (The Picture’s Secret,* a novel (1883) ; ‘Verse of Two Tongues) (1884) ; ‘A Nine Men’s Morrice) (1889); ‘Old and New,* verse (1890); (Jane Austen: Her Contemporaries and Herself> (1899), and ‘Lectures on French

Poets) ; ‘King Zub) ; ‘The Paradox of Act- ing) ; ‘The Ballad-Monger* ; ‘Animals that Have Owned Us.*

POLLS. See Elections.

POLLUCITE, the chief mineral in which the rare element caesium occurs as an essential constituent, another being castorite, and, there¬ fore, its most important ore. It occurs in cubes, but usually in small crystalline, deeply etched masses, colorless, transparent and much re¬ sembling quartz. It is a silicate of caesium, aluminum and sodium. It is found only in Maine and in the granite of the island of Elba.

POLLUX, pol'uks, Julius, real name Poly- deucs, Greek sophist and grammarian: b. Nau- cratis, Egypt. He flourished about 180-192 a.d., was well educated by his father and afterward received instruction from Adrian the Sophist, later becoming a favorite in Rome of Marcus Aurelius and his son. Commodus, by the latter of whom he was appointed teacher of rhetoric at Athens. He wrote several works, all of which have perished except his ‘Onomasticon) or Greek vocabulary, dedicated to Commodus, whose preceptor he was. Each of its 10 books forms a separate treatise by itself and contains the most important words relating to certain subjects, with short explanations of their mean¬ ing. The words are not arranged alphabetically, but are given with little regard to rigorous system of any kind, according to the subjects treated of in each book. It has been found an aid of much value in the study of Greek art and literature. The first edition was published at Venice in 1502 and the best editions are those of Lederlin and Hemsterhuis (1706), Dindorf (1824) and Bekker (1846).

This scholar has been frequently confounded with another of the same name who lived in the 10th or 11th century of the Christian era and wrote a ‘Chronicle) or ‘Universal History) from the formation of the world to the time of Valeus. His work, which has come down to us,

was edited by Biancoree (Bonn 1779) and Hardt (Munich and Leipzig 1792).

POLLUX. See Castor and Pollux.

r

POLO, po'lo, Gaspar Gil (sometimes writ¬ ten Gil Polo Gaspar), Spanish poet: b. Valen¬ cia, Spain, about 1530; d. Barcelona, Spain, 1591. Details concerning his life are few and contradictory. He studied law, and is doubt¬ less identical with the Gaspar Gil Polo who was professor of Greek in the University of Valencia 1566-74. He occupied the office of town clerk at Valencia and in 1572 received an appointment under the government from Philip II, who apparently sent him to Barcelona in 1580. He wrote ‘Canto de Turia,* in which he sung the praises of his native city, but his fame rests upon the pastoral romance ‘Primera parte de Diana enamorada, cinco libros que prosiguen los siete de Jorge Montemayor* (1564), a con¬ tinuation of Montemayor’s ‘Diana.* Its origi¬ nality is questioned among critics, but his work is clear in delineation of plot and possesses beauties of diction and rhythm far surpassing that of the first ‘Diana. * It is also noted for the number and variety of its episodes, raising its author far above the lyric level of his day. It ran through many editions in Spain, of which the best is Cerda’s (1778) and has been trans¬ lated into English, French and Latin. Cer

vantes excepts it from the list of books con¬ demned to the flames, his somewhat puzzling statement that it should be guarded (

POLO, Marco, Italian mediaeval traveler: b. Venice, about 1250; d. there, 1324. His father, a man of noble rank, of Dalmatian origin, in 1271 took young Marco with him on a trading expedition to China and the East. 1 he youth of 20 entered the service of the Great Khan, and traveled extensively through China and the neighboring regions. The trav¬ elers were finally desirous of return, and were allowed to accompany an embassy to Persia. Thence they made their way to Venice, which they reached in 1295. Later Marco com¬ manded a fleet in a war with Genoa, in 1296 was taken prisoner, and did not secure his re¬ lease until 1298. At this time he dictated to Rustigielo di Pisa the work of travel known as (The Book of Marco Polo) published in French. Though his narrative made a great sensation, it

was for many years regarded as a mass of fabrications and exaggerations. It had an undoubted effect, however, upon explora¬ tion ; and later researches have confirmed the truth of many of the author's descriptions. It encouraged the Portuguese to find the way to Hindustan round the Cape of Good Hope, and it aroused the passion for discovery in the breast of Columbus, thus leading to the two greatest of modern geographical discoveries. It was long the sole authority possessed by Europe on the peoples of the Far East. The first Italian edition appeared in Venice in 1496, and has been often reprinted. There are now about 60 translations in various languages, in¬ cluding several English ones. The standard English edition is that of Yule (1875; revised 1904). An English version appeared in 1818.

POLO, an equestrian game, the object of the players being to strike the ball through the opponent's goal ; all are mounted on ponies not exceeding 14ˆ2 hands and carry mallets about four feet long with which to strike the ball, made of light wood. The grounds are usually 900 feet long by 450 feet wide, level turf, at each end of which are located goal posts 24 feet apart. The proper number of players is four on a side, but a less number can play; combination and interference are important ele¬ ments of success. But little is authentically known of the exact origin of the game, yet legends of the Orient give proof of its an¬ tiquity, and it is generally accepted that the game was played in Persia before the begin¬ ning of the Christian era, and had its origin in northern India. It is a matter of record that a game very similar to it was played by the Emperor Manuel Comnenus about the mid¬ dle of the 12th century. Some authorities claim that the original home of the game was Tibet and that it reached India through Afghanistan. It was known and popular in most of the Himalayan countries. In 1870 polo was intro¬ duced in England by army officers who had been stationed there, and about 1885 it was in¬ troduced into the United States. The rules of the game in England and America differ ma¬ terially, especially in the tendency of the Eng¬ lish game to lessen the freedom of the player in order to increase safety; the game has al¬

ways been popular with the British army officers, who have produced many of the lead¬ ing experts. In America there exists a system of handicapping the players, thus giving the less experienced an equal chance. The demand for suitable ponies has developed the industry in the United States of breeding them through crossing the thoroughbred with the hardy Western ponies. In addition to horsemanship the game requires control of temper, quickness of observation, judgment, nerve and endurance; the United States army has done much to en¬ courage the game at the various army posts, and introduced it at the West

Point Military Academy. The central authority on the game in the United States is the Polo Association, composed of 34 clubs located throughout the country; it forms the rules, regulates the handi¬ capping and arranges the tournaments, cham¬ pionships and other matches.

POLOCK, Moses, American publisher and bookseller: b. Philadelphia, 14 May 1817; d. there, 16 Aug. 1903. In his 14th year he began the book business, in which he continued until his death. He issued many books in fiction, the drama and general literature, and in addition dealt in old and rare books, becoming an au¬ thority in Americana. His shop for half a century was frequented by book lovers, and his collections of Washingtoniana and books printed by Benjamin Franklin were particu¬ larly notable. He had a profound knowledge of early Pennsylvanian history.

POLONAISE, po'16-naz, a national dance of Poland, characterized by a slow movement in three-quarter time, and made up of a march or promenade; also the music for such a dance, in a peculiar rhythm used by many composers, but specially elaborated by Chopin in some of his finest works.

POLONIUM, an element discovered by Mme. Skiodowska Curie (1898), who, while ex¬ amining some samples containing uranium ob¬ tained it from the complex mineral pitch-blende. Mme. Curie named it polonium in memory of her native land, Poland. Pitch-blende is a peculiar and very complex mineral found prin¬ cipally in Joachimsthal, Bohemia; Cornwall, England, and in some parts of this country, notably Colorado. It contains a large amount of the element uranium and is mined and worked over to obtain that element. It was from the refuse or waste left after the extraction of the uranium that Mme. Curie obtained polonium and afterward the far more important element radium. Polonium closely resembles bismuth in its chemical properties, and is found in com¬ pany with that element when it is separated from the rest of the above refuse during the process of analysis. To separate the polonium from the bismuth is a matter of great difficulty and no sample of polonium has yet been ob¬ tained that is free or even approximated free from bismuth. The method usually used is that of fractional precipitation of the basic nitrates. A solution of the mixed nitrates of bismuth and polonium is made in concentrated nitric acid. Water is added until the liquid becomes cloudy. The white solid basic nitrates that sep¬ arate at first contain a larger percentage of polonium than the original mixture dissolved in the acid. This process, repeated many times, gives a solid rich in polonium. The most im-

portant property of polonium is its radio-activ¬ ity (see Radium). While radium gives off three kinds of rays or radiations called «, P and 7, polonium appears to give only one variety, the a rays. Polonium loses its radio¬ activity slowly, thereby differing from radium. It should be noted that some noted investigators in this field of radio-active substances denv the existence of polonium, claiming it to be merely a radio-active form of bismuth, its radio-activ¬ ity having been induced by its association with radium in the pitch-blende.

POLTAVA, pol'ta-va. See Poltowa, Rus¬ sia.

POLYZENUS, pol-i-e'nus, Greek writer: b. Macedonia, about 85 ; d. Rome, Italy, about 170. He wrote a historical collection of in¬ stances of military ruses employed by Greeks, Romans and barbarians. It was entitled (Strategics,* or (Stratagems, > and was in¬ scribed to the emperors Marcus Antoninus and Lucius Verus. Two of its original eight books are lost, but the remainder contains much valuable information not found elsewhere. The first edition was published by Casaubon at Lyon in 1589; the best by Coreas at Paris in 1809; early English translation by Shepherd at Lon¬ don in 1793, and German by Seybold at Frank¬ fort in 1793-94.

POLYANDRY (Gr. polys, many, andres, men, husbands), a marital relation subsisting between one woman and several men. Poly¬ andry is found to exist in primitive and bar¬ barous peoples in every age and everywhere. In antiquity we have the testimony of Hero¬ dotus for the prevalence of this custom among the Scythian peoples Agathyrsi and Massagetae and the Nasamones, a people of northern Africa near the Greater Syrtis. A like report is made regarding the people of Libya by Aris¬ totle, by Diodorus Siculus regarding the Trog- loditae and the Ichthyophagi on the coast of the Red Sea, by Caesar regarding the inhabitants of Britain; Polybius finds unmistakable traces of the institution even among the Spartans. Till but a little while ago these reports of an¬ cient authors were held to be abnormal and exceptional, for it was assumed that the primor¬ dial family had everywhere its origin in the marital relation of one man with one woman (monogamy) or of one man with several women (polygyny or polygamy). But the re¬ ports of modern travelers concerning the mar¬ riage customs of barbarous and uncultured peoples prove that among them polyandry is universal or at least usual ; it is found in Mala¬ bar, the Marquesas, in New Zealand and throughout all the Pacific isles, in

North and South America — in short, wherever mankind has not risen above a certain stage of social culture ; nor is it confined to totally unculti¬ vated peoples; to cite one example only, it is a legitimate custom among the Tibetans. Usually, but not always, in the Tibetan polyan- dric family the joint husbands of a woman are brothers, and the elder brother is credited with the paternity of the children, while the other brothers are uncles. It is the report of travel¬ ers that the female head of a polyandric family enjoys a measure of consideration and author¬ ity very unusual among barbarians ; in some tribes it has grown into a real sovereignty. The universality of the custom is proof at least that

over against the patriarchal family and descent through the male head of a monogamous family must be set the matriarchal family in which descent is traced to the mother; and that gynaeocracy is of equal antiquity with patri¬ archy. Spencer, in his (Sociology,* mentions several curious forms of the relation, each con¬ sidered an advance on its predecessor, as (1) one wife has several unrelated husbands, and each of the husbands has other unrelated wives;

(2) the unrelated husbands have but one wife;

(3) the husbands are related; (4) the husbands are brothers.

POLYANTHUS, a name popularly applied to several unrelated plants, as a narcissus (Narcissus tazetta), and the tuberose (Polian – thes tuberosa) ; but most commonly a certain primrose thought to be derived from Primula elatior as a principal parent; but ˆerhaps a hybrid between P. officinalis and P. vulgaris, or a race developed from the last species. It is one of the most popular of its genus in Ameri¬ can gardens. It is a hardy perennial herb with entire, simple leaves, leafless scapes terminated by an umbel of several to many early spring flowers mostly red, yellow or both these colors together. Some of the numerous varieties have two corollas one within the other and are called hose-in-hose or duplex. The plants may be grown from seeds, but individual varieties are usually propagated by division. They delight in cool, moist, shady places and rich, loamy soil.

POLYBASlC ACIDS, in chemistry, acids which possess more than one hydrogen atom capable of being replaced by a metal equiva¬ lent.

POLYBASITE, a black, metallic mineral, occurring in hexagonal, tabular crystals of orthorhombic symmetry. It is a sulph-anti- monite of silver and copper, containing 75.6 per cent of silver, of which it is, therefore, an important ore. It occurs in many silver mines of Saxony,

Mexico and the western United States.

POLYBIUS, po-lib'i-us, Greek historian; son of Lycostas, a distinguished general and one of the heads of the Achaeans : b. Megalo¬ polis, Arcadia, about 205 b.c. ; d. about 120 b.c. He was educated for arms and political life, and when about 169 b.c. the design of the Ro¬ mans to make all the free states of Greece de¬ pendent became evident, Polybius took part in all the measures for the preservation of their independence. When, therefore, after the sub¬ jugation of Perseus (168), the Romans used less disguise, Polybius found himself among the 1,000 hostages whom the Achaeans were obliged to deliver up to the Romans. His learn¬ ing, virtues and talents soon gained him the favor of some of the most distinguished sena¬ tors, especially Fabius and Scipio, the two sons of Paulus ZEmilius. The hostages were not dismissed until 17 years had elapsed, when Polybius, who did not wish to see again his degraded country, remained in Rome, and en¬ tered into the service of Scipio ZEmilianus. He accompanied him on his expedition to Africa, and was a witness of the destruction of Car¬ thage in 146. He then went to Greece, where the Achaeans had become involved in a war with the Romans. After the Achaean defeat he did much to obtain favorable terms of peace. His services were gratefully recognized by the

erection of his statue in many towns. Po¬ lybius is the author of a historical work from the 140th Olympiad (220 b.c.) to the overthrow of Grecian independence (146 b.c.). It con¬ sisted of 38 books, besides two introductory books, containing a sketch of the Roman his¬ tory from the taking of Rome by the Gauls. The first part of the work comprised a period of 53 years, from the beginning of the Second Punic War to the overthrow of the kingdom of Macedonia; the second part began with the war in Spain against the Celtiberians and Vac-caeans, and ended with the destruction of Corinth. Although the affairs of Rome are the chief subject, contemporary occurrences in other countries are also related. We have of this great work only the first five books entire, and valuable fragments of the remaining books. Some of these fragments, as that containing an account of the Roman army, are of consider¬ able length. In extent of political and military knowledge, Polybius is surpassed by no his¬ torian of antiquity. To him is alsq attributed the introduction of didactic politics into his¬ tory — that is, of that manner of writing his¬ tory which, by intermingling views of the causes, occasions and effects of events, is a

useful introduction to politics. On the other hand, his style is destitute of 'beauty, and the narrative interrupted by lengthy digressions, which weaken the artistic effect. Livy was much indebted to Polybius after he came to the Second Punic War. Cicero mentions a par¬ ticular work of his on the Numantian War. Casaubon, in 1609, published a complete edition of all that had till then been discovered of his works and made a new Latin translation of the whole. The most valuable editions of Polyb¬ ius are those of Schweighauser (1789), Bekker (1844) ; L. Dindorf (1866-68) and Hultsch (1867-71). The history of Polybius has been well translated into English ibv Shuckburgh

(1889).

POLYCARP, pol'i-karp, one of the apos¬ tolic Fathers of the Church, and styled by his disciple Irenaeus a pupil of the apostle John: b. Smyrna, probably about 69 a.d. ; d. there, 155. According to legend he was brought up by a noble Christian lady named Callisto, and was consecrated by Saint John as bishop of his native city. When the controversy about the time of Easter arose, he went to Rome to con¬ fer with Anacletus, who then occupied that see; and though he did not succeed in recon¬ ciling the differences between the Eastern and Western usages, the questions were discussed in the most friendly manner. During the perse¬ cution under Marcus Aurelius Antoninus he was brought before the Roman proconsul at Smyrna and urged to revile Christ, but he re¬ plied, ˆEighty and six years have I served him, and he has done me naught but good, and how could I then revile my Lord and Saviour?® The people desired that he should be flung to the wild beasts, but he was sentenced to death by fire. The flames, however, according to the legend, played harmlesslv around him like a swelling sail, emitting a sweet fragrance. When the judges ordered one of the executioners to run him through with a sword, the flames were extinguished by the blood that flowed from the wound. Polycarp is one of the saints in the calendar of the Church, and the 26th of Janu¬

ary has been consecrated to his memory. He wrote several epistles, which were current in the early Church, but have all perished except one addressed to the Philippian Church, ex¬ horting them to the practice of their Christian duties and the maintenance of the purity of the faith. There is another writing of that age of which he is the subject, a relation of the manner of his death, written by the Church at Smyrna, of which he was the bishop, addressed to the church of Philadelphia. Both of these epistles may be read in an English translation in a volume, published by Archbishop Ware, con¬ taining all the genuine remains of the Apostolic Fathers. Consult also

Lightfoot, (Apostolic Fathers) (1891).

POLYCH2ETA, pol-i-ke'ta, one of the two subclasses (the other being Oligochceta) of an¬ nelid worms composed of a large number of marine species, but only a few from fresh water, whose most striking characteristic is the presence of fleshy outgrowths (parapodia) on either side of each somite of the body, each strengthened by a number of bristles, the term, in Greek, meaning much hair. The group is separable into Errantia and Sedentaria. The Errantia are wandering forms which, while they burrow, can swim readily. They have a well-developed head provided with eyes, sensory tentacles and usually the mouth is armed with strong jaws. The parapodia are well developed and form the organs of swimming and usually serve also as gills. They are carnivorous, feed¬ ing upon other worms, etc. The Sedentaria live exclusively in burrows, and in some cases have the power to secrete tubes of horny mat¬ ter, or even of lime, in which they dwell. Living in this way and not using the parapodia these structures have been reduced; while the head not infrequently bears gills and numerous long retractile tentacles which are used in ob¬ taining food. These feed largely upon the microscopic life in the water and are without jaws. In the life-history of the Polychsetes a larval form known as the trochophore is very common.

POLYCHROME BIBLE (Gr. iroMxpopoc, many-colored), an edition of the Old Testa¬ ment scriptures printed in different colored type so as to show the various literary elements out of which, according to modern Orientalists, the several books were compiled. The editor is Prof. Paul Haupt of Johns Hopkins Univer¬ sity, Baltimore, Md. The term is also applied to an American edition of the Bible, in which, in the New Testament, the words generally accepted as the utterances of Jesus Christ, and, in the Old Testament, the words quoted by him, or that have direct relation to incidents to which he referred, are printed in red.

POLYCHROMY, pol'i-kro'mi, literally the use of many colors and generally used in the sense of decorative work by means of brilliant coloring or that which is brilliant in compari¬ son with other work of the same class and character. Thus a fitting together of building-stones in patterns is polychromy, although the hues of the sandstone or limestone or marble are not positive nor strangly contrasted with one another. In French Romanesque architecture, as also in modern imitations of it, like Trinity Church, Bos.ton, Mass.,. th.e sandstones are of two or three different shades of reddish brown,

and an additional hue approaching buff ; and yet this very moderate degree of contrast, when used deliberately in pattern, is called polychromy. On the other hand, polychromatic painting is always assumed to be in primary col¬ ors, or those which nearly approach them in brilliancv. Thus the painting of a Grecian Doric temple in the 5th century a.d. is known to have been in great measure carried out in the unmixed natural pigments as strong and pure as they could foe procured; red and deep blue, with a free use of metallic gold in the form of gilt, bronze or the like, and the rather frequent introduction of such secondary colors as green and purple.

Color effects in architecture are as ancient as architecture itself. It never seems to have oc¬ curred to an Egyptian builder to leave his lime¬ stone walls unadorned with polychromatic ef¬ fects, nor to the sculptor engaged in carving re¬ liefs on those walls or statues to set up against them, that such human and animal forms could ever be left in the natural color of the stone. Sculpture was always completed by the paint¬ brush except in those cases where, chiefly for display or in the spirit of sacrifice, there was used a very costly and very hard material of some importance in its own surface and color. Thus an Egyptian statue of diorite or basalt, or a Roman statue of the imperial • epoch wrought in black marble, or a portrait bust with the head and neck of white marble inserted into the draped shoulders and torso wrought in the most precious Oriental alabaster or beautiful veined marble from Greece or Numidia, would not foe painted; and any polychromy that would be added by hand would be in the nature of gilding applied to the hair or the ornaments. So the bronze statue, highly esteemed for its material, which was always accepted as superior to marble or other nat¬ ural stone, would receive eyes of hard natural stone or of glass, and perhaps gilding as mentioned above, but nothing more. On the other hand, some modern work in experi¬ mental polychromy has been carried further; thus the statues and busts of Charles Henri Cordier have been adorned with enamel applied freely to articles of costume, to the harp of an Egyptian harp-player, in addition to the approx¬ imation of the natural color of skin and of drapery. In the Paris Exposition of 1900 there were exquisite statuettes wrought in the pre¬ cious materials, onyx, agate, alabaster and the like, with bronze of many colors or in other cases in carved and stained ivory. The most impressive piece of work of this kind was the statue by Ernest Barrias, (Nature .Unveiling Herself,* a statue somewhat larger than life, of which the whole lower part, representing the body from the bust downward with a drapery, is wrought of a single block of marble of un¬ usual beauty — a superb

piece of red and purple veining — while the breast and shoulders, arms and head, are in white marble, the hair and eyes being stained and the veil is of a natural stone of a delicate buff or perhaps greenish yellow tinge.

Polychromy in painting has not been so com¬ monly used in modern times. For some reason painting, when applied in merely flat and un¬ changing masses, is looked on with some con¬ tempt by modern decorators ; and the artist who controls a more complete skill, whose painted

work is characterized by all the art of grada¬ tion and harmony known to the modern world, abstains from doing such purely decorative work. It was not so in antiquity, for while no fragment remains to us of the highest develop¬ ment of chromatic effect in sculpture, on the other hand there were no texts more intelligible than those which set forth the practice of em¬ ploying painters of name and fame to adorn with color the works of the sculptors. An early but most interesting example of what this work must have been is seen in the draped statue dis¬ covered on the Acropolis in 1883 and 1886. The color is disappearing rapidly; but when it was taken from the ground it was brilliant. The outer garment (himation or peplos) has in every case a rich border of two or three con¬ trasting hues; the larger surfaces of the stuff are shown as covered with a pattern in spots or small foliated figures; and the under gar¬ ment (chiton), where visible, is often painted in a strong, deep green, which was probably in the first .place more nearly blue. Hair, eyes, lips and all the jewelry shown, such as ear¬ rings, are treated separately and with what seems to have been a free use of gilding.

The great masters of polychromy are, how¬ ever, the Persians and the civilized races of Asia generally. Beauty of pattern is especially the Persian gift; but this merit is shared by the people of the Indian Peninsula and by the Chinese and the Japanese, and in a lesser de¬ gree by the Malays and the inhabitants of farther India. Even the peoples of very low civilization in the north, the original inhabitants of Siberia, showed a marked gift in the arrang¬ ing of decorative patterns. Both the Japanese and Chinese use polychromy in their larger works, temples and the like, with great freedom and with perfect success; the Japenese limiting brilliant effects rather to the interior and to special details of the exterior, while the Chinese had at one time the great art of polychromatic building, using their enameled potteries with perfect freedom.

Russell Sturgis.

POLYCHRONICON, the name of a work of Ramolf Higden, a Benedictine (d. 1363). It is a history of the world according to Biblical chronology down to the year 1342.

POLYCLITUS (pol-i-kirtus) OF SIC- YON, Greek sculptor and architect. He was a pupil of the sculptor Ageladas, of Argos, in whose studio he became fellow-student of Phidias. He flourished 452-412 b.c. He stood at the head of the schools of Argos and Sicyon, and is held to rival Phidias, the head of the Athenian school. The latter was considered pre-eminent for his statues of the gods, and Polyclitus in those of men. He excelled par¬ ticularly in representing the graceful attitudes of youthful athletes. One of his most cele¬ brated statues was the Doryphorus (Spear- bearer), a figure to which the name of canon, or standard of beauty, was given, as in it the artist had produced a perfect ideal of the human form. Another statue of a young man, called ˆiadumenos,* represented the subject fasten¬ ing a band around his head. A group of two naked boys called ˆstragalizontes,* playing with bones the game of tali, is also celebrated, as are some statues of Canephorae, female figures carrying baskets on their heads. His

POLYCHROME ORNAMENT

1. Scallop Ornament from New

Zealand

2. Greek Meander

3. Assyrian Ornament

4. Scallooed Ornament from

Nineveh

5. Grecian Plant Ornament

6. Palmetto, conventionalized

7 and 8. Pompeiian Ornament 9. Egyptian Flower Ornament

10. Animal Forms, 13th Century

11. Geometrical Arabian Forms

POLYCRASE

POLYGALA

statue of Hera, in the temple between Argos and Mycenae, was thought by Strabo to be equal to Phidias* chryselephantine statues of Zeus and of Athena. The goddess was repre¬ sented enthroned, wearing a garland on which were wrought the Graces and Hours ; in one hand she held a pomegranate, and in the other a sceptre surmounted by a cuckoo. The head, breast, arms and feet were of ivory, and the robe of gold. As an architect Polyclitus won special fame from the theatre and rotunda, which he designed for Epidarus, which Paus- anias pronounced to be the finest buildings of their kind ever erected. Polyclitus also wrote a treatise on the proportions of the human form. In addition to his fame as a statuary he has that of an able architect. One of his works, the theatre within the precincts of the temple of ˆTisculapius, at Epidaurus, was considered by Pausanias superior for its symmetry and beauty to any similar edifice extant.

POLYCRASE, a black, resinous mineral, occurring in prismatic crystals, chiefly in the granite of the island of Hitterce, Norway, and in the Carolinas. It is of value for the rare earths which it contains, its composition being a mobate and titanate of yttrium, erbium, cerium and uranium.

POLYCRATES, po-lik'ra-tez, Greek tyrant of Samos ; d. 522 b.c. He was one of the most daring, successful and treacherous of the Greek tyrants. Toward the end of the reign of Cyrus, about 535 b.c., with the aid of his brothers, Pantagnotus and Syloson, he conquered the island of Samos which had until then been free, and by banishing one brother and executing the other firmly established his power as sole ruler of the island. He raised a fleet of 100 vessels manned by 1,000 archers, seized several of the surrounding islands, conquered Miletus and de¬ feated the Lesbians who came to assist the in¬ habitants of the latter city. Fired with the purpose of conquering the Ionian cities and the islands of the zEgean he formed an alliance with Amasis of Egypt. Herodotus informs us that Amasis, fearing the anger of the gods at the extraordinary good fortune of Polycrates in his many expeditions, persuaded him to make a sacrifice to the gods to avert misfortune. Poly¬ crates thereupon threw into the sea a signet¬ ring of great value, which was found a few days later in the maw of a fish presented to him. Amasis considering his ally’s doom cer¬ tain, withdrew from the alliance. Grote, how¬ ever, considers this story a fiction, and holds that it was Polycrates who broke off the alli¬ ance, perceiving it to be more to his interest to cultivate the friendship of Cambyses, who in 525 b.c. invaded Egypt. Polycrates sent to Cambyses 40 ships manned by the malcontents of his kingdom with

the understanding that they were never to return. They escaped, how¬ ever returned to Samos and made war upon Polycrates, but were defeated, whereupon they gained the assistance of the Spartans and Corinthians and laid siege to Samos for 40 days, then abandoning the war. Polycrates con¬ tinued prosperous, becoming more and more powerful until Orcetes, satrap of Sardis, nourishing a deadly hatred against him, treacherously contrived to lure him to his palace where he had him crucified. Herodotus says of Polycrates (iii, 125) that he perished in a man¬

ner unworthy of himself and of his high de¬ signs, and that none of the Greek tyrants, with the exception of those of Syracuse, were to be compared with him in greatness of character.

POLYDIPSIA, excessive thirst, such as usually accompanies diseases in which high temperatures occur. In diabetes especially it is a characteristic symptom, and the name polydipsia was formerly often given to this disorder. See Diabetes Insipidus ; Diabetes Mellitus.

POLYEUCTE, po'le-ekt'. Polyeucte was an Armenian Christian who suffered for his faith under the persecutions of the Emperor Decius and was afterward canonized, his day being the 9th of January. His name would no doubt to-day be no more widely known than that of the obscurest of the noble army of martyrs had not Pierre Corneille chanced to see in the story of his conversion and martyr¬ dom the material for a tragedy and created from it a masterpiece, with the result that, as he said, (

Arthur G. Canfield.

POLYGALA, a genus of annual and peren¬ nial herbs and shrubs of the family PolygalacecB. The species, of which about 200 have been described, are widely distributed in temperate and tropical climates; about 100 are North American. Some of the exotic species are cul¬ tivated in gardens and greenhouses ; for ex¬ ample, P. paucifolia, common from Nova Scotia to Manitoba and south to Georgia ; and P. chamcebuxus, a European species. The former is popularly known as .gaywings, fringed milkwort, flowering wintergreen, and fringed polygala ; the latter as box-leaved milkwort. P. lutea is one of the handsomest American species. The roots of P. senega and of P. cro-talarioides have been reputed remedies for snake bites, the former in America, the latter in the Himalayas. The American species is known

as snake-root, seneca-root, senega-root and mountain flax. P. polygama, a native from Nova .Scotia to Manitoba and southward to the Gulf States, has attractive flowers above ground and many flowers which are developed under¬ ground. In general the hardy species thrive best in moist soil in low situations. The seed is sown in early spring or in autumn. In green¬ houses the plants succeed well in ordinary light soil which must never be allowed to dry out. The first mentioned species may be propagated by division.

POLYGAMY, the condition of a man hav¬ ing more than one wife at the same time. Etymologically considered, the word would sig¬ nify plurality of husbands (polyandry) as well as plurality of wives (polygyny) ; it is em¬ ployed here in the latter (the usual) sense. Polygamy among barbarous people is customary, though among them — as indeed wherever po¬ lygamy is allowed — plurality of wives is not usual except in the upper classes. The law of monogyny (one wife), we learn from Tacitus, was most strictly observed among the Germani ; ˆalmost alone among barbarians," he says, ((the Germani are content each with one wife" ; yet he says that their chiefs had the right to marry several women at the same time. A custom of promiscuous marriage existed among the ancient Britons ; any number of men would form a society and take an equal number of wives in common ; the children born were the children of all; a like community of wives is suggested by Plato in his (Republic.) Polygamy was allowed among the ancient Greeks, but seems to have been rarely practised. It was never customary among the ancient Romans, though no Roman law prohibited it. Mark Antony is reputed to have been the first Roman to have at once two wives ; under the empire polygamous unions were not infrequent whether in the imperial house or in the class of the very rich. Laws to prohibit polygamy in the Roman state were first enacted under Theo¬ dosius and under his two sons, Honorius and Arcadius ; they were abrogated by Valentinian I. The Merovingian kings of the Franks, we learn from Gregory of Tours, were polygamous, and the same author says that Charlemagne had a numerous harem of wives. Martin Luther for¬ mally approved the taking of a second wife, the first living, by the landgrave of Hesse. The Jewish laws permitted polygamy, but probably here again the practice was confined to the wealthy class. In all Christian countries polygamy is condemned by the law of the churches and prohibited by the laws of the state under penalties. In England, till the reign of James I, matrimonial questions were mat¬ ters of ecclesiastical cognizance only; but under James a statute was enacted making death the penalty for polygamy. The Mormons in Utah openly professed and practised

polygamy from their first settlement there till 1890 when Con¬ gress enacted drastic laws for its suppression, and it was not till after the people of Utah had constitutionally abandoned polygamy that the Territory was admitted into the Union as a State (4 Jan. 1896). Since then it is declared that the sect still adheres to its belief in the lawfulness and the meritoriousness of polyg¬ amous unions ; and though they no longer openly practise it, polygamous unions among

them — crypto-polygamous unions — are not rare, as is evident from the testimony before the Senate committee in March 1904. See Mormons.

POLYGLOT (Greek, polys, many, and glotta, language), a work which contains the same matter in several languages, especially a copy of the Holy Scriptures in two, three or more languages. The most important of such works is the Complutensian polyglot, prepared under the direction of Cardinal Ximenes. It was printed (1514-17), in six folio volumes, at Alcala de Henares, called in Latin C omplutuni , whence the name of the work. It contains the Hebrew text of the Old Testament, with the Vulgate, the Septuagint, a literal Latin transla¬ tion, a Chaldee paraphrase (which is also ac¬ companied by a Latin translation). Next is the polyglot of Antwerp, called the Royal Bible, because Philip II of Spain bore part of the cost of publication. It was edited by the Spanish theologian Montanus, and appeared at Antwerp in eight folio volumes (1569-72), and, besides the Hebrew text, contains the Latin Vulgate, the Septuagint (with a literal Latin translation), several Chaldaic paraphrases (Targums), also accompanied by a Latin translation, and the New Testament in the original Greek, with the Latin Vulgate, and a Syriac translation in He¬ brew and Syriac letters (also with a Latin trans¬ lation). Still more celebrated is the Paris polyglot, executed principally under the direction of Gui Michel le Jay, who expended his whole fortune on the undertaking. It appeared in 1645, in 10 folio volumes, and contains, in ad¬ dition to the contents of the Antwerp polyglot, a Syriac and an Arabic translation (with Latin), and also the Samaritan Pentateuch (a Samaritan text, with a translation), and like¬ wise an Arabic translation of the New Testa¬ ment, with a Latin translation of the same. The London or Walton's polyglot, in 10 languages, appeared in six volumes folio, with two sup¬ plementary volumes (London 1654-57). It was conducted under the care of Bryan Walton, afterward bishop of Chester, and contains all that is in the Paris Polyglot, but with many ad¬ ditions and improvements, including the original text according to several copies, with an Ethiopic and a Persian translation, and the Latin versions of each. Cromwell Patronized the undertaking. Bagster's Polyglot (folio, London 1831, with later

editions) gives eight versions of the Old Testament and nine of the New. The term Hexapla is applied particularly to Origen's work, an edition of the Scriptures having nomi¬ nally six versions in parallel columns, though in places there were nine, viz.: (1) The Hebrew text in Hebrew characters; (2) the same text in Greek characters ; (3) Aquila's version ; (4) that of Symmachus ; (5) the Septuagint; (6) the version of Theodotion ; (7, 8, 9) Greek ver¬ sions of unknown authorship. Origen had also a Tetrapla, an edition of the Greek Testament in four parallel columns.

POLYGNOTUS, pol-ig-no'tus, Greek painter, flourished from 450 to 410 b.c. He was a native of the Island of Thasos, and with his brother Aristophon was instructed in their art by their father Aglaophon, a famous painter of that island. Cimon, the commander and rival of. Pericles, brought him to Athens on the sub¬ jugation of Thasos, and employed him to deco-

rate the Stoa Poecile, or painted portico at Athens. Micon and Panaenus assisted him in painting the Pcecile. His two principal pictures there represented (The Capture of Troy) and (The Battle of Marathon. > In the Lesche (hall) built by the Cnidians at Delphi he painted the (Conquest of Troy> and (Descent of Odysseus into Hades,* which are described by Pausanias. Polygnotus is represented as being the first who gave life, motion, character and expression to the countenance, and skilful disposition to the drapery. His works are without perspective or shading, and consisted only of outlines against a colored background. Yet the nobility and fineness of his drawing and the excellence of his composition, made them justly celebrated. Pliny describes him as <(the first who painted women with trans¬ parent drapery, and covered their heads with variegated caps. The first to begin to open the mouth and show the teeth of his figures, and to give them an expression of countenance dif¬ ferent from the ancient stiffness.®

POLYGON, in geometry , a plane figure of three or more angles and sides. A polygon of three sides is termed a triangle; one of four sides, a quadrilateral or quadrangle ; five sides, a pentagon; one of six sides, a hexagon; one of seven sides, a heptagon; and similarly we have octagon (8), nonagon, or more properly enneagon (9), decagon (10), and so on. Similar polygons are those which have their several angles equal each to each, and the sides about corresponding angles

proportional. All similar polygons are to one another as the squares of their homologous sides. If the sides are all equal and the angles are likewise all equal, the polygon is said to be regular ; otherwise, it is irregular. The angle of a regular polygon of n

sides is tt(i — . Every regular polygon can be

circumscribed by a circle and have a circle in¬ scribed in it. A skew polygon is a closed figure made up of consecutive linear segments not all lying in one plane. See Geometry.

POLYGON OF FORCES, a diagram used in graphic statics, depending upon the follow¬ ing theorem: ((If any number of forces acting upon a point be represented in magnitude and direction by the sides of a polygon taken in order, they will be in equilibrium,® or ftany side of a polygon, taken in reverse order, will repre¬ sent the magnitude and direction of the result¬ ant of any number of forces acting upon a point, when these forces are represented in magnitude and direction by the remaining sides of the polygon taken in direct order.®

POLYHALITE, a brick-red or yellowish, fibrous or massive mineral, occurring mostly in closely compacted fibrous masses. It is best known as one of the salts from Stassfurt, Ger¬ many, though it is found associated with salt, gypsum and anhydrite in other salt mines in central Europe. It is a hydrous sulphate of calcium, magnesium and potassium.

POLYHEDRON, in geometry, a body or solid bounded by many faces or planes. When all the faces are regular polygons similar and equal to each other the solid becomes a regular body. Only five regular solids can exist, namely, the tetrahedron, the hexahedron (or cube), the octahedron, the dodecahedron and the icosahe¬ dron, having respectively 4, 6, 8, 12 and 20 faces.

In the first, third and fifth the faces are equi¬ lateral triangles; in the dodecahedron they are regular pentagons ; and in the cube they are squares.

POLYHYMNIA, or POLYMNIA (Latin from Gr. no/lw/zvia or TLoTiVfivia), according to the later Greek poets the Muse of lyric song and of eloquence, daughter of Jupiter and Mnemosyne, who presided over singing and rhetoric, and was deemed the inventress of har¬ mony, to whom is attributed the invention of the lyre and of mimes and pantomimes. The Greek artists represented her enveloped in a mantle, crowned with a wreath of flowers, and in a meditating

posture. She was sometimes represented veiled in white, holding a sceptre in her left hand, and with her face raised up as if ready to harangue, or with the forefinger of her right hand on her mouth. See Muses.

POLYMASTODON, a fossil animal found in the Eocene beds of New Mexico. In some features it resembled the rodents and was about the size of the beaver.

POLYMIGNITE, a highly complex, black mineral found in the zircon-syenite of Freder- ickswarm, Norway, in slender orthorhombic prisms. It is a niobate, titanate and zirconate of the cerium metals, iron and calcium.

POLYMORPHISM, in biology, that con¬ dition in which different kinds of individuals appear in the same species. In the animal king¬ dom it has its greatest exemplification in the group of Siphonophorae, where the whole colony is made up of members, all reducible to a com¬ mon type, which are specialized for the func¬ tions of floating, swimming, reproduction, eat¬ ing and touch. Among the free forms it is not so common, but still is not rare. Thus among insects we find butterflies in which not only the males and females are different in their mark¬ ings, but among the females different patterns may be easily recognized; in fact, so different may they be that did we not know their life- history we should not regard them as belonging to the same species. Where but two forms are known, the phenomenon is called Dimorphism. See Evolution.

POLYNESIA (Greek, polys, many; nesos, island), a geographical name applied col¬ lectively by some writers to all the Pacific is¬ lands of strictly oceanic character, i. e., either of volcanic or coralline origin ; by others restricted to the vast island-dotted region extending from southeastern Asia across the Pacific, and from Bering Strait southward to the Antarctic Ocean, also called Oceania. In an ethnological sense the term applies to the eastern groups in¬ habited by the brown Polynesian race. A more exact method is the common division into sev¬ eral sections : Australasia comprises Australia, Tasmania and New Zealand, with other islands adjacent. The numerous islands extending from the Malay Peninsula to New Guinea are known collectively as Malaysia or the Malay Archi¬ pelago. The Philippine Islands are often as¬ sociated with those of Malaysia proper. The name Micronesia (Greek mikros, small, and nesos) is commonly used as a collective name for the numerous small islands in the north¬ western Pacific, between New Guinea and Japan; and Melanesia (Greek melas, black, and nesos) includes New Guinea and a chain

of islands extending southeastward to the Fiji Islands and New Caledonia, all chiefly in¬ habited by Papuan races. All the remaining is¬ lands, comprised for the most part within the parallels of 30° N. and 30° S. latitude, and between the meridians 180° and 120° W. longi¬ tude, constitute Polynesia in the more definite sense of the term. Yet it should be remem¬ bered that although the word ˆPolynesia® as a collective name for these islands has been sanctioned by general custom, the title expresses a purely arbitrary division that is founded upon no geographical, national, racial or linguistic basis. Polynesia has never formed a national unit, and the name must be taken only as a convenience to express certain islands and groups of islands in the Pacific which are in¬ habited by people of the same stock and linguistic family, but which do not by any means comprise the entirety of this people within their limits. The following table gives a survey of the size, approximate population and political connections of the three <(nesian® groups. For the sake of reference, those islands which be¬ longed to Germany before the World War are still marked thus in the table :

GROUP

Area

square

miles

Population

State

Polynesia:

Hawaii .

6,700

250,627

U. S.

Fanning .

15

200

Gt. Brit.

Ellice .

14

300

U

Tokelau .

12

1,000

a

Samoa .

1,000

44,000

Ger. & U. S.

Tonga .

450

24,000

Gt. Brit.

Kermadec .

40

Uninhab’d

it

Austral .

105

2,400

France

Cook (Hervey) .

140

11,500

Gt. Brit.

Tahiti (Society) .

600

30,000

France

Tuamotu (Low) .

360

4,000

u

Marquesas .

480

4,000

a

Micronesia:

Marianne (Ladrone). .

450

15,000

Ger. & U. S.

Pelew .

200

3,000

Germany

Caroline .

400

60,000

a

Marshall .

160

18,000

u

Gilbert (Kingsmill) . . .

170

30,000

Gt. Brit.

Melanesia:

Admiralty .

770

2,000

Germany

Bougainville .

5,000

20,000

it

Bismarck .

16,000

188,000

Germany

D’Entrecasteaux .

1,100

1,150

Gt. Brit.

Louisiade .

870

2,000

It

Solomon .

16,300

200,000

Ger. & Brit.

Santa Cruz .

200

5,000

Gt. Brit.

Banks .

190

4,500

(i

New Hebrides .

5,000

62,000

France & Brit

New Caledonia .

6,500

55,000

France

Loyalty .

1,100

20,000

it

Fiji . 1

8,000

140,000

Gt. Brit.

These groups of <(South Sea Islands® are scattered over a hundred degrees of longitude from New 'Britain (149° E.) to Easter Island (109° IT W.) and across 70 degrees of latitude from Hawaii (23° N.) to Stewart Island at the southern extremity of New Zealand (47° 20′ S.). In this vast area of about 11,000,000 square miles of water there is hardly more than 170,000 square miles of land, of which nearly two-thirds falls to the New Zealand Archipelago, lying within the Polynesian group. The total population is perhaps under 2, OCX), 000. Practically all the Pacific islands are now in the possession of Great Britain, France and the United States; until the World War 1914-18 some belonged to Germany. Spain at one time held extensive possessions in the Pacific; the Netherlands own the western half of New

Guinea and nearly the whole of Malaysia. The islands of Polynesia proper may all be classi¬ fied as volcanic or coralline, the former having an irregular surface and a higher elevation than the latter, which are low and rarely ele¬ vated above 500 feet. The atoll formation is common. Some of the smaller islands are of value only for their guano deposits. The in¬ digenous fauna is remarkably deficient in ter¬ restrial mammalia, the only kinds at all gen¬ erally distributed being bats. The avifauna is large and interesting and several species of snakes are found in the western islands, while insects and molluscs abound in profusion. The cocoa-palm flourishes throughout all Polynesia and the sago-palm in the west. Bread-fruit, yams and the taro are staple articles of cultiva¬ tion. Some of the islands, chiefly in the west, have an extensive and peculiar flora, but others, especially the more easterly, are poor in species. Though Polynesia lies almost entirely within the tropics, its climate is generally temperate and very salubrious, owing to the influence of the ocean.

The discovery of the islands began with Magellan's voyage in 1520, when he found the Ladrones, but it was not until Mendana's expedition in 1567 that any of the large groups became known to Europeans. Mendana also discovered the Solomon Islands. Finding gold in use among the natives, he concluded that he had found the Ophir of Scripture and named the islands after King Solomon. He made the mistake of charting them in the wrong longitude, with the result that for a long time the islands were <(lost)) and geographers, doubt¬ ing their existence, omitted them from the maps. Mendana himself could not find them on a second voyage in 1595, but he then dis¬ covered the Marquesas and one of the Union group. These, again, were ((lost® until redis¬ covered in 1769 by the French navigator Sur- ville. Quiros, formerly pilot to Mendana, dis¬ covered Tahiti and the northern of the New Hebrides in 1606. Ten years later, Schouten and Le Maire, Dutch navigators, discovered the most northerly islands of the Tonga group and several small Polynesian atolls, but they missed the main groups of Tonga and Fiji. These were left for Tasman (q.v.) to find some 26 years later. Van Diemen, the Dutch governor at Batavia, sent out an expedition under Tas¬ man in 1642 with momentous results, for not only were the remainder of the Tonga and Fiji groups discovered, besides numerous other islands, but also New Zealand, Tasmania and the great continent of Australia. French and English navigators led in discoveries during the 18th century. Wallis discovered the island that now bears his name in 1767 and De Bou¬ gainville discovered the Louisiades and the main islands of the Samoan group in 1768. The British geographer, Dalrymple

(1737-1808), concluded that there must be a vast southern continent stretching from Australia to the South Pole. To test this theory Captain Cook's famous expedition was sent out by the ad¬ miralty in 1772. Though he naturally failed to find the continent which did not exist, Cook discovered the Raratongan group (Cook's Islands), Savage Island, the Loyalty Islands and the Sandwich group (Hawaii), though it ap¬ pears from na.tive tradition that a shipwrecked

I European crew had been washed ashore at Hawaii some 50 years before. The French government despatched two frigates in 1785 under the command of the Count de la Perouse (q.v.) to pursue scientific discovery in the South Seas. On 26 Jan. 1788 La Perouse entered Botany Bay and handed the English governor there a package of papers to be sent to France. He set sail again on 15 March, after which the two vessels were lost to human ken. The papers duly reached their destination; the National Assembly published them and sent a naval expedition under D'Entrecasteaux to search for La Perouse. and his ships. On this voyage the D'Entrecasteaux group of islands on the eastern extremity of New Guinea were discovered. Forty years after the disap¬ pearance of La Perouse an Irishman, Peter Dillon, landed at Vanikoro, an island of the Santa Cruz group, and found the relics of the La Perouse expedition — but no survivors. D'Entrecasteaux might have found and saved them had he sailed further south. The last had died three years before Dillon's visit.

At the dawn of the 19th century Europeans were living on most of the large islands, mainly deserters from passing ships. The London Missionary Society sent out a number of ar¬ tisan missionaries in 1799 to Tonga, Tahiti and the Marquesas. The mission to Tahiti flourished ; the two others were subsequently abandoned. About that time whaling-ships be¬ gan to frequent the South Seas and from this era dates the real colonization of the islands by white men. Unfortunately, however, the frequent deserters from the crews of these ves¬ sels were not a desirable type of settlers, so that the natives acquired their first knowledge of Europeans from the worst specimens of the race. A stream of real immigration began about 1850 through the influx of white traders and planters. The 16th century of Polynesian his¬ tory belongs to the Spaniards; the 17th to the Dutch; the 18th to the English, and the 19th to the traders, whalers and missionaries of all nations. See Maoris ; Melanesia ; Micronesia ; Mythology, and the islands under their separate heads; also

Polynesians.

Bibliography. — xNbbott, J. H. M., (The South Seas) (Peeps at Many Lands, 1908) ; Alexander, J. M., (The Islands of the Pacific) (New York 1895) ; Alexander, W., (Account of the Polynesian Race* ('London 1885) ; Arm¬ strong, E. S., (History of the Melanesian Mis¬ sion* (London 1900) ; Baden Powell, B. F. S., Hn Savage Isles and Settled Lands) (London 1892) ; Bancroft, H. H., (The New Pacific '(New York 1900); Brigham, W. T., (An In¬ dex to the Islands of the Pacific Ocean* (Hono¬ lulu 1900) ; Brown, G., (Melanesians and Poly¬ nesians: their life-histories described) (London

1910) ; Brown, J. M., (Maori and Polynesian: their Origin, history and culture) (London 1907) ; Burnett, F., 'Through Polynesia and Papua) (ib. 1911); Caillot, A. C. E.,

1911) ; Codrington, R. H., 'The Melanesian Languages* (London 1885) and (The Melane- sians> (ib. 1891) ; Colquhoun, A., 'The Mastery

of the Pacific) (London 1902) ; Colwell, J. (ed.), 'A Century in the Pacific* (London 1914) ; Cooper, H. S., Hslands of the Pacific) (ib. 1888) ; Coote, W., 'The Western Pacific) (ib. 1883) ; Cowan, F., (English Words in South Sea Languages) (Greenesburgh, Pa., 1894) ; Davis, O. K., 'Our Conquests in the Pacific (New York 1899) ; Ella, S., 'Dialect Changes in the Polynesian Languages* (Lon¬ don 1899) ; Ellis, W., Polynesian Researches * (Society and Sandwich islands; New York 1833) ; Fornander, A., (The Polynesian Race* (3 vols., London 1878-85) ; Francis, B., Usles of the Pacific* (ib. 1882) ; Gaggin, (Among the Man-Eaters* (ib. 1900) ; Gill, W. W., (Myths and Songs from the South Pacific* (London 1876) ; and (Historical Sketches of Savage Life in Polynesia* (ib. 1880) ; Grey, Sir G., Polyne¬ sian Mythology* (ib. 1885) ; Grimshaw, Beatrice, Prom Fiji to the Cannibal Islands* (ib. 1907) ; Hagen, K., (Ueber die Musik einiger Naturvolker: Melanesier, Polynesier* (Ham¬ burg 1892) ; Hydrographic Office, London, Pa¬ cific Islands Sailing Directions* (periodical) ; Le Grand, M. A., (Au pays des Canaques* (Paris 1893) ; Lesson, P. A., 'Les Polynesiens, leur origine, leur migrations, leur langage* (ib. 1880-84) ; MacDonald, D., (South Sea Lan¬ guages* (Melbourne 1889) ; Mager, H., (Le Monde polynesien* (Paris 1902) ; Melville, H., (Omoo* and 'Typee* (London 1892) ; Moss, F. J., (Through Atolls and Islands* (ib. 1889) ; Quatrefages, J. L. A. de, (Les Polynesiens et leur migrations* (Paris 1866) ; Rannie, D., 'My Adventures Among South Sea Cannibals* (London 1912) ; Ray, S. H., Polynesian Linguistics: past and future* (New Plymouth, New Zealand 1914) ; Reeves, E., Prown Men and Women : the South Sea Islanders* (London 1898) ; Rivers,

W. H. R., (The History of Melanesian Society* (2 vols., Cambridge 1914) ; Seddon, Rt. Hon. R. J., ‘Visit to Tonga, Fiji, Savage Island and the Cook Islands* (Welling¬ ton, New Zealand 1900) ; Shoemaker, M. M., Hslands of the Southern Seas* (New York 1898) ; Stanford’s Compendium of Geography and Travel: Australasia* (Vol. II, London); Stevenson, R. L., Hn the South Seas* (New York 1911) ; Stewart’s Hand Book of the Pa¬ cific Islands* (Sydney, New South Wales 1908) ; Sundowner, Pambles in Polynesia* (London 1897) ; Tregear, E., Maori-Polynesian Com¬ parative Dictionary* (Wellington, New Zea¬ land 1891) ; Turner, G., ‘Nineteen Years in Polynesia* (London 1861) ; Williamson, R., (The Ways of the South Sea Savage* (ib. 1914) ; Woodford, C. M., Polynesian Settlements in the Neighborhood of the Solomon Islands* (Royal Geographical Journal, London, July 1916) ; also periodical publications of the Poly¬ nesian Society of New Plymouth, New Zealand, and of the Hawaiian Historical Society of Honolulu.

Henri F. Klein, Editorial Staff of The Americana.

POLYNESIANS. Many studies have been devoted to the origin and migration of the Polynesian people. It has been maintained, largely upon undigested linguistic material, that they are of the Aryan race ; with equal insist¬ ence certain other students on the same linguis¬ tic ground have assigned them to such intimate association with the Malay people as to predi-

cate a Malayo-Polynesian race. Our real knowl¬ edge of the Polynesian people dates from their discovery by the great navigators in the islands of the Pacific which they now occupy. By legitimate interpretation of, and inference from, the very considerable body of Polynesian tradi¬ tions, which have been collected, we may rea¬ son the past history of the Polynesian race back to its occupation of the islands now known as Indonesia, and at present occupied by Ma¬ layan peoples. Anterior to their residence at a remote epoch in Sumatra, which is abundantly confirmed by the persistence of a distinctly Polynesian strain in the Mentawei Islands, which lie off-shore along its western coast, we are lacking in data whereupon to predicate an earlier history of this race. Percy Smith, in (Hawaiki,> proposes the identification of their ancestral home in the valley of the Ganges ; dissection of certain of the linguistic material seems to suggest with equal plausibility an earlier home in conditions which

most closely correspond to those of the Hadramaut of south¬ ern Arabia in the present day. With our pres¬ ent material the matter seems incapable of solution. Assuming, then, as susceptible of satisfactory establishment, their former resi¬ dence in certain of the larger islands between Sumatra and the Philippines, we can picture to ourselves a race of people on a plane of culture which may fairly be classed as neolithic, that is to say, in possession of wooden and polished stone implements which could serve for offense or defense, according as the daily need arose. It is also clear that they were in possession of the arts of navigation to a very satisfactory extent. Upon people of this cul¬ tural plane broke in an irruption of a race of higher culture as shown by the possession of weapons of mild steel. In the datable chronol¬ ogy of Hindustan, this irruption may be estab¬ lished as the entrance of Malayan ancestors into Sumatra 400 years b.c. The possession of the superior weapon of offense meant the extermi¬ nation of the club-armed Polynesian ancestors or their migration in search of a safer home, and their possession of canoes and their knowledge of how to ply the sea, led to the adoption of the latter alternative. It now becomes incum¬ bent to examine the postulate of a Malayo- Polynesian race. This was proposed by Bopp in the second quarter of the last century, en¬ tirely upon linguistic grounds. It has been possible to collect the material which he was able to have under study and to determine that while the accessible material was sufficient to enable him to make an intelligent study of Malayan languages, the material at that time in existence pertaining to Polynesian languages was so scanty in extent and so poor in quality as to render his results entirely unworthy of credence. There remains, however, a certain speech community of Malayan and Polynesian; this amounts to little more than 250 words and the modern explanation of this community is that these words are Polynesian, which be¬ came incorporated in Malayan as loan material derived from their captives at the period of the great expulsion from Indonesia. Physically the Polynesians are one of the most attractive of the human race and are marked by a stature which, with the doubtful exception of certain Patagonian peoples, represents the highest growth of humanity. With some interesting

traces of the matriarchate, Polynesian society is rather genetic than political. Each family exists as 'a social unit, holding all its goods in common, the chief is the family head, who is selected by common agreement from the mem¬ bers of that family and it is not uncommon to find the position of chief thus held by women ; in general, there is no priestly class, but the functions whereby intercourse is had with the departed who have become family gods are exercised by the chief as

priest. There is a wide distinction among the gods, the higher gods are self-existent, their sole activity the original creation of this world and its in¬ habitants, indifferent to the course of current events and not to be moved by prayer ; the lesser gods are spirits which have already un¬ dergone a human existence and may, therefore, be the object of supplication, as possessing a certain sympathy with the affairs of mankind. In the highest degree the religion of the Polyne¬ sians has no connection with ethics, the moral sense and the doctrine of punishments being entirely dependent upon the tabu. The tabu is a moral prohibition; in its greater sense it may be considered as an unknown foundation of social life, in its minor sense it may be im¬ posed for temporary and temporal uses by any person in possession of authority over the ob¬ ject with which the tabu is associated. The tabu is self-executive, its violation provides its own punishment and in the sensitive conscience of the Polynesian this punishment is not to be evaded. It has been found possible to establish a beginning date of the Polynesian migrations as fixed by the Malayan irruption under Aristan Shar in 400 b.c. Detailed study of Polynesian traditions makes it plain that there were two ways of migration. The earlier, that to which the name Proto-Samoan has been applied, ap¬ pears to have reached the Central Pacific, that is, Samoa, Tonga and Fiji, about the Christian era. Upon this first settlement there swept a second wave of migration, that which by the Samoans is called the Tongafiti, some 600 years later. The Tongafiti were in possession of a decided advance in the arts of life and were able to rule the Proto-Samoans as a subject people for several centuries ; finally, at a period very nearly contemporaneous with the Norman conquest of England, the Proto-Samoans were able to throw off the yoke of the oppressor and then began the second era of migrations in the Pacific, whereby the Tongafiti, with more or less Proto-Samoan companionship, advanced to the settlement of the more remote islands from Samoa as a distributing point. It has been possible to establish this duality of the Polyne-* sian migration waves by a philological examina¬ tion of the different Polynesian languages. This diversity is also found in the scheme of the god-head. The Proto-Samoans recognize one god, Tangaloa, the creator, held in rever¬ ence but not the object of prayer nor of sacri¬ fice; the Tongafiti had arrived at a conception of four great gods. Tu, Rongo, Tane and Tangaloa, of whom the last was reduced to a position of small relative importance. The Tongafiti centred all their worship of the great gods in the act of human sacrifice. In certain of their branches they had arrived at the Messiah idea of a god who should return to bring blessing to his people ; the vanished god was Rongo, and it was an offshoot from the

belief that Captain Cook was Rongo, returning for the salvation of his people, that led to the death of that great navigator at Kealakekua, in Hawaii. The first result of the contact of European civilization with these happy islanders was deplorable, for to a people who had not acquired constitutional immunity the simplest ailments of our life, coughs and measles, led to a rapid increase of the death rate. For many years the population of Polynesia seemed to be progressing rapidly toward extinction, but in the present century, the records show an upward turn, and it is probable that the race will be able to adjust itself to the new con¬ ditions. In general the Polynesians have made but a superficial advance in the new culture, but in Hawaii, and among the Maori of New Zealand it has been abundantly established that they are capable of taking a position quite on an even plane with the British and Americans with whom they are associated. Much has been written upon the Polynesian race regarded as elements of a political problem, or as a social problem. As bearing upon their ethnic position, the principal works of reference are the Jour¬ nal of the Polynesian Society (New Plymouth, New Zealand, current), Smith, S. Percy, (Hawaiki* (Wellington, New Zealand 1910) ; Churchill (The Polynesian Wanderings) (Car¬ negie Institution, Washington 1911) ; Dixon, Roland, (Mythology of all Races: Oceanic* (Boston 1916). See also Polynesia; Bibliog¬ raphy.

William Churchill, Author of (Polynesian Wanderings f> etc.

POLYNICES, pol-i-ni'sez, brother of Eteo- cles. See Eteocles and Polynices.

POLYOLBION, pol'i-61'bi-an, The, a long descriptive poem (1613-22), by Michael Dray¬ ton. It is in effect a topographical survey of Great Britain, containing, with much other mat¬ ter, descriptions of shires, rivers, mountains and forest tracts, and is not only of interest to the antiquarian, but to others as well, its accuracy as an authority being generally conceded.

POLYP, a term variously and indiscrim¬ inately applied to different animal forms, but properly designates a ccelenterate of the class Actinozoa, represented by the sea anemones, corals and the like, or any member (or zooid) of a compound organism belonging to that class. The term polypide is also employed to designate each member or zooid of the com¬ pound forms in the Polyzoa. The name Pol-

ypidom applies to the entire outer framework or skin-system of a compound form, such as a hydrozoan, zoophyte or an individual polyzoon. The word polypite refers to each separate zooid or member of a compound zoophyte or hydrozoon, and is thus used in opposition to the term polypide already explained. The polypary of a hydrozoon specially refers to the horny or chitinous skin secreted by the hydrozoa. See Ccelenterata ; Hydrozoa; Mollusca ; Polyzoa, etc.

POLYPHASE SYSTEM. See Electrical Terms.

POLYPHEMUS, pol-i-fe'mus, one of the Sicilian Cyclopes. He was a son oi Poseidon and the nymph Thoosa and lived in a cave in Mount zEtna. Ulysses and his companions, driven by the storm to take refuge on the island, found shelter in the cave of Polyphemus

and were found there on the return of the monster. He devoured two of the company and shut the remainder in the cave. Ulysses contrived to intoxicate Polyphemus with wine and when he fell asleep put out his single eye and then with his comrades escaped. The storms which followed Ulysses at sea were visited upon him by Poseidon in answer to the prayers of Polyphemus. Polyphemus was a suitor of the nymph Galatea and upon her ac¬ cepting Acis the disdained lover killed his suc¬ cessful rival. In zoology the term is applied to a genus of Ostracoda, having a large head almost entirely occupied by an enormous eye.

POLYPHEMUS MOTH, a large Amer¬ ican silk moth (Telea olyphemus) of a yellow- brown color, with spotted wings. The cater¬ pillar is of a light-green color with yellow markings ; the cocoon is oval and is generally enclosed in foliage.

POLYPHONY, in musical composition, the harmonious combination of two or more parts, each of which forms an independent theme, but progress simultaneously according to the laws of counterpoint. A fugue is the best example of polyphonic compositions. See Counterpoint.

POLYPODIUM, a genus of ferns of the family Polypodiacece. The species, of which more than 350 have been described, are widely distributed throughout the world, mostly in dry situations such as banks, walls, logs and cliffs. Some tropical species are epiphytic. Many are popular as garden or greenhouse plants. Among the best known is the common wall- fern or polypody (P. vulgare), a widely dis¬ tributed native of Europe and North America. It is one of the most satisfactory garden ferns. See Fern and Fern Allies.

POLYPORUS, a genus of parasitical fungi, forming shelf-like growths on the trunks of trees and contributing to the decav of timber. It is the typical genus of Polyporacece. See Fungi.

POLYPTERUS, a genus of ganoid fishes of a single species, Polypterus bichir, inhabit¬ ing the Nile, Senegal and other rivers of Africa. It attains a length of about four feet and lives in the mud at the bottom of rivers, where it crawls by means of its fins. It is ca¬ pable of swimming with great rapidity. See Bichir; Ichthyology ; Mud-fish.

POLYPUS, in pathology, any tumor which forms chiefly in a mucous membrane, and which is more or less pedunculated and rounded in form. (See Tumor). In zoology a class of radiated animals having many prehensile organs radiating from around the mouth only.

POLYTECHNIC COLLEGE, an institu¬ tion of higher learning, located at Fort Worth, Tex. It was changed from a coeducational institution to Texas Woman's College (devoted exclusively to the education of women) in September 1914. The bachelor of arts is offered, the bachelor of science being discon¬ tinued, effective June 1915. In connection with the college are the school of fine arts, school of household economics and the academy. The commercial course has been discontinued. Buildings and grounds are valued at $300,000. The faculty numbers 40 and the average enrol¬ ment is in excess of 300 students.

POLYTECHNIC INSTITUTE OF BROOKLYN, founded in 1854 under the name of the Brooklyn Collegiate and Polytech¬ nic Institute. It conferred its first collegiate degree in 1871 by special authority of the State board of regents ; and in 1890 was reorganized under its present name with .larger corporate powers and a full college charter. The insti¬ tute now offers four undergraduate courses of four years: (1) chemistry, leading to the de¬ gree of B.S. ; (2) civil engineering, leading to the degree of C.E. ; (3) electrical engineering, leading to the degree of E.E. ; (4) mechanical engineering, leading to the degree of M.E. ; (5) chemical engineering, a five-year course leading to the degree of chemical engineer; also graduate courses of one year ; science, in the department of civil, electrical and mechanical engineering, leading to the degree of M.S. The laboratories are well equipped, and there is an observatory with an equatorial telescope, and museum collections in geology, zoologv and palaeontology; the

library, a memorial to Uriah D. Spicer, numbers 12,000 volumes. The pre¬ paratory school is closely affiliated with the in¬ stitute, and is not only designed to prepare students for the institute, but also prepares them for other colleges and scientific schools. The students, including those in the preparatory school, numbered more than 1,200 in 1918. The institute is one of the oldest educational institu¬ tions of Brooklyn, and counts among its gradu¬ ates many of the most influential men of the city.

POLYTECHNIC SCHOOLS. See Edu¬

cation, Scientific and Technical.

POLYTECHNIQUE, originally a French educational institution in which the technical sciences that rest in great part upon a mathe¬ matical basis, such as engineering, architecture, etc., are taught. The first school of the kind was established in Paris (1794) by the Na¬ tional Convention, under the name of School of Public Works. No students were admitted but those who intended to enter the public service, especially the corps of civil and mili¬ tary engineers and the artillery. The Poly¬ technic School, as it was called from 1795, has been repeatedly reorganized as the different political parties have succeeded to power. At the present time it is the institute in which France trains her artillery and engineer officers, her naval engineers, her directors of roads and bridges and of mines, her telegraph officers, in short, all her officials who require to know something of the higher branches of technical science. The Minister of War exercises super¬ vision over the school. The degree of bachelor of arts is a prerequisite for admission to the entrance examinations. The course extends over two years and successful graduates after the final examinations elect the special branch of the public service to which they wish to at¬ tach themselves. Soldiers in service are ad¬ mitted to the Polytechnique under special con¬ ditions.

POLYTHEISM, in sophiology, or the science of human conceptions, term employed to designate the doctrines peculiar to the ontologies of most mythological philosophy of a plurality of gods, as well as the primitive theories of knowledge out of which such doc¬ trines proceeded. Polytheism, thus character¬

istic of an ontological doctrine, designates in particular all theologies which are part and parcel of an exceedingly primitive world-con¬ ception. The most obvious task in sophiology in this connection is to restate the definition of a concept, an idea; and then briefly to lay open the common character inherent in the idea of a god, the idea of a

polytheon and the idea of God. And it is equally obvious that to find such common characteristics, modern prepos¬ sessions must be set on one side : we must boldly enquire : What is the minimum defini¬ tion of God?

Before proceeding to these definitions let us review the situation under polytheism as a whole. For the purposes of study, sophiologists conceive of three very general phases in the development of human thinking. Dis¬ tinguishing these according to the methodol¬ ogy peculiar to each of these phases, they have characterized human philosophies as mytho¬ logical, metaphysical and critical. As every philosophy implies at least an embryo-ontology, so have we characterized the doctrine of many gods, or of a polytheon, as the theological portion of mythological ontology. For, in truth, mythology is not religion ; it is primitive philosophy or science. It is religious in so far as it is theological science. And, of course, as theological it is philosophy or science of a sort that owes its origin to the existence of religious experience in the heart of man. The simplest savage who wonders at the unseen but mighty wind that streams from unknown realms of power has already felt that which abides unchangeably amid the flux of the phenomenal world; has already felt that which inspires religious feeling and its volitional con¬ sequents, cults and philosophically formulated theologies, such as polytheism. For religion is essential humanity. The wild beast to es¬ cape the storm shrinks growling into the cavern called its den. But on the same occasion the most abject human savage, awe-stricken, turns, falls and prays. The lowest man perceives a hand behind the lightning. He hears a voice abroad upon the storm, and for both these things the highest brute has neither eye nor ear. Nor is even an atheist without religious experience, unless he is inhuman. For there can be little doubt that there are at present those who are atheists only in this sense, that they merely deny every particular theism on the ground that it is an inadequate expression of the whole mystery of being. Now that can be no profound thinker who is without any sympathy for such a position. Again : to deny our need of religion is one thing; to deny its existence altogether in the human heart is quite another. Schleiermucher stood upon a rock when he asserted the self-authentication of the religious consciousness. For the varia¬ tions among theologies, polytheistic, herotheistic or monotheistic (which are philosophies), can no more affect the experiences which con¬ stitute and succeed the spiritual new birth of anyone, than the variations among biologists can affect one’s assurance that he is alive. Yet as some there be who have an atrophied intellectual consciousness, and are idiotic; so some, too, it may be granted there may be who have an atrophied spiritual sense

and are inhuman. But if any possess a religious mythological philos¬ ophy, or theology, we may be quite certain that

they likewise share the religious experiences. In this way even polytheism expresses the religious life of man.

Religion then, in a polytheist even, is not the intellectual formulation, in the shape of dogma, or doctrine, of mankind's conscious re¬ lation to God, a relation which all feel. Such formulation on the contrary is the work of philosophers. Principles thought to be dis¬ covered of man's relationship to the ultimate grounds of being are gathered and made into a group, a "science® ; and the cultivation of this "science, or mythic system becomes, in primitive culture periods, the duty of a special class. This class is that of the priest, shamans, rab-mags, biksbus, magicians or wabeno-men. All are primitive philosophers. Thus we come to the idea of religion in the widest sense, as the perception of the supernal world together with the effects of that perception on the com¬ plex nature of man; while theology, in a way commensurate with this idea of religion, is understood as that perception and its conse¬ quences reduced to system however crude. Ex¬ amples of such theologies are still extant; some systems are now building. The earliest systems are the mythical systems of polytheism which originated under influences of the experience of our most remote ancestors.

What meaning had his surroundings to primaeval man when eye and ear could be directed from the prior claims of the body? (See Mythology). In his first outlook upon the world man was altogether ignorant of the character of nature's real powers by which from the very beginnings of human life he was circum-environed. Poorly endowed with rea¬ son and blunt of sense-perception, he* beholds the cold wave sweep from the north ; and rivers and lakes he sees freeze over. Great forests are buried under a white mantle of snows. Piercing winds almost congeal the very life-fluids of man himself ; while his source of food — the lakes and streams — lie strongly encased in a carapace of ice. Another time the sky assumes the dull appearance of a dome of brass. Midsummer heat pours down its beams upon the sands ; and fiery blasts heated in a desert furnace destrov a scanty vegetation. And the fruits of the earth shrivel before the eyes of famishing men. Consider but one pas¬ sage from the Bible, one originating in com¬ paratively civilized times, under an experience, as

when the voice of Tehovah sounded amidst the bursting forth of a mighty natural con¬ vulsion : “A thick cloud was upon the mount. The smoke thereof ascended as the smoke of a furnace. There were thunders and lightnings. And the voice of the trumpet exceeding loud. The Lord descended upon the mountain in fire, and the mountain quaked greatly.®

This word-pitcure comes from Exodus. It details, we think, a gigantic volcanic eruption. Mount Sinai was a volcano. How much more terrifying must have been the grandeur inci¬ dent to such an experience in the soul of a poor, half-clad savage during the progress of a similar event? He stands nearby while light¬ ning shivers a great tree and rends the skull of his companion. To a savage all nature’s powers bring pain or joy, health or sickness, life or death. His well-being is involved in the answer he gives to his questions how? and why? No wonder then if at first man’s attitude

of awe degenerates into slavish fear, when he presumed to confront the worlds and question them. And yet withal we find that throughout the whole mythologic period of “science,® man’s sole measure of things was himself.

History in so far as it affects the inner life does not exhibit one continuous ascent. It reveals, not alone rise and growth of creative effort in the philosophic field but likewise en¬ suing, periods of exhaustion. It is in this way that it comes about that one finds recurring periods during which the human spirit manifests itself in tradition-guided behavior alone rather than in aspiration after philosophic formu¬ lation of its cosmic relations. It is only when again the human spirit retires into itself to take deeper root that new relations are perceived which need expression and explanation.

Even for the period, that of mythological philosophy, this is true. And as a consequence one may easily discriminate four phases of polytheistic thought. In one, perhaps this repre¬ sents the earliest phase, everything presented to the savage mind is conceived of as alive.

An “orenda® or living magic power inheres in everything; every object is possessed of will and design. Rocks, trees, animals and men think and speak-so the earliest philosophers testify in their earliest myths. All the bright stars of heaven, the snow-clad mountains, bubbling springs, rivers, all are possessed of will and design. In this stage, every insoluble event and object is a god.

Thereupon follows a period when the savage philosopher no longer attributes life indiscriminately to all inanimate nature. But all the powers and attributes recognized in self-examination he transfers, attributing them to animals. Nowhere is the line drawm between man and beast. Men are zootheists, they worship beasts. And all the gods are animals. Zootheism persisted down to comparatively re¬ cent times. What but representatives of these gods are the gigantic zoomorphs in Yucatan and the animal-headed gods of Egypt and Assyria? And indeed there was even a scaly fellow in Paradise! Survivals of the time when all the gods were animals, and all natural proc¬ esses were the doings of animal godo, are not difficult to find in mythologies.

In a third period a gulf is placed between man and all the lower animals. Animal gods are either dethroned or assume a subordinate station. Thereupon all nature's powers, all phenomena, are deified; and in the deification, anthropomorphized also. It is during this period that man worships the gods of the sun, moon, air, dawn, a deity of the darkness or one of night. Anthropomorphism is not absent from the Bible. In Genesis we find God walking about the Garden of Eden. With His own hands He fashions man and closes the door of the ark. He even breaths his own breath into man's nostrils, and makes unsuccessful ex¬ periments with animals ! He scents the sacrifice of Noah. And, Othin-like, appears to Abraham and Lot in the guise of a wayfarer ; or, as an angel calls directly out of heaven, God, in Genesis, verily speaks in all respects as does one man to another !

Finally a fourth, the highest, period of primitive philosophy is reached. During it, mental, moral and societal characteristics are personified, and thereupon deified. Thus was

horn the idea of a god of war, a trod of love, a god of revelry, a god of plenty. These gods differ from all older nature gods chiefly in that they possess distinctively psychical charac¬ teristics. Many of them are among the first <

Religious conceptions, ˆtheologies,** thus comprehend above all that group of concepts which spring from man's relations to the super¬ nal world; and this relation is of course al-1 ways considered by philosophicallv inclined savages as not due to any physical activity merely, for all such activities or natural proc¬ esses, they would

naturally account for with purely rationalistic conceptions, as a matter of course. It is plain, therefore, that as man's knowledge of nature's laws widens, the domain of his supernal world shrinks in proportion. Theologies are always attempts to formulate just those truths considered necessary in man's struggle for existence. Of such theological opinions, ideas or conceptions, that of the gods, and the idea of God, remain even to this day the most important thoughts in human life. In all humanity, as well the lowest as the highest, there is an effort of some kind to express in doctrine man's conscious relation to the abid¬ ing in the transitory of the world. Such con¬ sciousness of a higher power is necessarily given when first the simple savage comes to such a stage of maturity that the fragmentariness of his creature life is contrasted instinctively with that in which he lives, and moves, and has his being. Thus conscious of a being more power¬ ful, more abiding, greater than himself, man is constrained to establish some idea of that to which he must always submit. Hence arose those doctrines embodied in all polytheons, all pantheons, all aspirations to become one with God.

What is the minimum definition of God? A polytheon, a pantheon, or even the idea of God is always a world conception that domi¬ nates man's soul. In all polytheistic stages of belief, however, not all gods, even some of the higher orders, are necessarily objects of devotion. For there are in some polytheons, faineant deities, deities who are recognized as real but who do not exercise any influence in human affairs. Hence thev are not worshipped. We are riow prepared to understand a con¬ ception, and in particular that conception which at a minimum content conveys the idea of a polytheon, a pantheon, a god, or even of God. The definition of an idea, in particular a religious idea, and when it is familiar, even of its name, is an impulse to some activity, the usually sense-perceptive result of which is a term or member of the concept's scope. Now the word polytheism conveys the idea of many gods, monotheism signifies belief in God. What is common to both the nature of the idea of a polytheon, and the idea of God?

We understand by the nature of an idea its meaning. Now each and every creature prop¬ erly human has to respect some higher power, a power that curtails his wishes. And each and every human being, therefore, adjusts him¬ self to conditions; and so doing recognizes an authority of some kind to which he must sub¬ mit on all occasions ; and this authority of man's conduct, whatever it may be, is either his polytheon, his pantheon, his god or God. J'he mention of this authority even is an impulse

to religious behavior. Its moral significance is without question. For even the (to us) im¬ moral practices of savage and semi-civilized peoples prove that religion and moralitv, while distinct, are yet inseparable. A superstitious awe of a polytheon, yea even of God, leads to immoral practices. And in this way also a pure religion will unfailingly regenerate whoever possesses it.

But does it not make a difference whether or not the truth of the conception is mentioned in the definition of God? Mavbe it does. For what do we mean by truth in this con¬ nection ? In effect what one ought to mean by the truth or falsehood of the doctrine of deity is not the reality or otherwise of any events which are associated with its rise; but, on the contrary, the adequacy of the idea to inspire just such feelings and to constrain to just such religious behavior as will give expression to a believer's conscious relation to the ultimate grounds of existence, the abiding, in the meas¬ ure that he knows them. And we are led to a second consideration in this connection. The late association of moral ideas with deity proves also to have been a fact. True ethical con¬ siderations were originally foreign to ideas of deity. In the first three stages of mythology, of the four phases mentioned above, all gods are neutral in so far as ethical qualities are concerned. Sacred awe too easily degenerates into slavish fear in the savage heart. The lowly beginnings of theology are strangely un¬ like its fruition.. Only after having anthro¬ pomorphized the deities of his polytheon did man conceive of his gods as moral beings. For man, as a rational animal, alone is moral. Con¬ ceiving o*f his gods as possessing a human form, and in the days when ideas of kinship were first gaining clear recognition, early man trans¬ ferred his own qualities, societal and moral, to his gods. Thus too, contrary to what Mr. Spencer says, ancestor worship was not primor¬ dial, but late, owing to the late recognition of the ties of kinships. Gods in the polytheons of the anthropomorphic age are thus usually re¬ vealed in the mythologies which have survived as organized into a tribe or other social groups. Thus arose the kinship features in all the higher mythologies, those of Vedic India and pre- Zarathustrian Iran, the polytheons of Semnites, Assyrians, Babylonians, Egyptians, Greeks, Ro¬ mans, Chinese and Japanese, as well as in those of the Aztecs, Mayas, Peruvians, and in those of the natives of the Polynesian isles.

In the opinion of Jacob Grimm, polytheism almost everywhere arose in innocent uncon¬ sciousness. There is about it something soft and agreeable to one's feelines. It is never intolerant of other gods. Yet when the in¬ telligence is roused a polytheist will revert back to the monotheism from which his faith started. Proto-historic precursors of the prophets read the signs of the weather in the skies, and their still

prehistoric successors read the Will of God in their own hearts, and became priests and shamans, wabeno-men and rab-mags, un¬ told ages before the first hieroglyph appeared carved on an Egyptian tomb or monolith. In sub¬ lime egotism the primitive philosopher of early times interpreted nature and nature's God as an extension of himself. Dream life was to him revelation. And, indeed, to say that God spoke to one in a dream, is that not to say that

1-5. Cristatella mucedo (1, a statoblast; 2, anothei, more advanced; 3, a young stock or cormi- dium; 4, fully formed stock or cormus; 5, cross-section of Fig. 4). 6-8. Plumatella repens (6, young

individual; 7, young stock; 8, a portion of Fig. 7 enlarged). 10-12. Lophopus crystallinus (lOayoung stock; 11, young bud not yet opened; 12, another bud, more advanced, but not open.).

one dreamed that God spoke to one? Soon a personal life was attributed to the sun, the moon, clouds, rivers, seas, oceans and the very trees. Some spiteful demon rooted the latter to the ground! The ever-varying phenomena of the sky, at dawn, at noon and at even-tide — many were the deities of men. All this be it remembered was not pretty in¬ vention, allegory or poetic conceit ! The prim¬ itive philosophic theologian was no embryon Cabalist, no conscious fabler. On the contrary he and his disciples entertained the idea of a polytheon as their highest wisdom. He meant speaking of his gods, precisely what he said. Monotheism did not succeed polytheism. Nor did the latter succeed monotheism. They are twins, born together. For whenever the early thinker, at rare moments, though deeply and felt clearly he must have experienced, however feebly, or even grossly, the presence of an ever- abiding mystery pressing for interpretation. We have thus monotheism, in truth, through¬ out all ages, not in genuine conflict to poly¬ theism in the inner life nor yet clear to thought ; but potentially, in living intuition in the religious sentiment. Truly, it may be said of Him, He is not far from any of us.

POLYXENA, po-lik'se-na, in Greek leg¬ end, the daughter of Priam and Hecuba. She was beloved by Achilles, who in order to obtain her for his wife promised to bring about peace between the Greeks and

Trojans. While negotiating the marriage at the temple of the Thrymbraean Apollo, Achilles was treacherously slain. Afterward his shade appeared demand¬ ing Polyxena and she wast therefore, sacrificed to his Manes. Her sacrifice is represented in the Acropolis at Athens and forms a part of the (Hecuba} of Euripides.

POLYZOA, a group of animals, at first re¬ garded as radiates, then as mollusks and later as members of the heterogeneous group of worms. Its precise rank and position remain to be determined. All are small and all are aquatic, the great majority being marine. At the anterior end of the body is a circle of ciliated tentacles around the mouth. By means of these food is collected and brought to the alimentary canal. The intestine is flexed on itself and the vent is on the dorsal surface, either near the tentacles (Ectoprocta) or inside the circle (Entoprocta) while the central nervous system lies between the mouth and vent. In the Entoprocta the body-wall is solid, but in the Ectoprocta there is a spacious body cavity (ccelom). Besides reproduction by eggs all multiply by budding, the result being the formation of colonies, often of considerable extent. The Entoprocta, the characters of which are included above, embrace only a few forms, each individual being raised on a slender stalk, the colony being connected by a running root- stalk on the support to which the animals are attached. Umatilla gracilis occurs in the fresh waters of the United States. Most of the species are marine.

The Ectoprocta secrete a protective case, often rendered firmer by the deposition of lime around each individual, and into which the animal may quickly retreat, the opening in some cases being closed by a door or operculum. The great majority of the Ectoprocta belong to a group called Gyrnnolcemata, in which the

tentacles are in a more or less perfect circle. All but a few of them are marine, and are among the most abundant of animals along our whole coasts, some forming encrusting sheets on shells and stones, others forming bushy growths on rock and piles. The Pliylactolccmata are ex¬ clusively inhabitants of fresh water, and are characterized by having the tentacles folded into a horseshoe shape. In these, as in sponges, there is the formation of peculiar buds (stato- blasts) enclosed in a hard shell which preserve the species through the winter or in times of drought.

The closest allies of the Polyzoa (which are also known as Bryozoa, 50 named by Ehren- berg and accepted by J. W. Thompson) are the Brachiopoda, the two groups having formerly been united as a class Molluscoida. H. Milne- Edwards united the Polyzoa, Brachiopoda and

Tnnicata in his group Molluscoida ; but it has been since shown that the latter belong to the V ertebrata, and the relation of the first two rested on a mistaken identification of parts. The Polyzoa are also related to the Phoronididee , which in turn show resemblances to the An- nulata. Consequently the three groups have been united as classes in the phylum Molluscoida by Parker and Haswell, (Text-book of Zool¬ ogy > (1897).

POMACE FLY, a small yellowish fly of the genus Drosophila, frequently a nuisance in cider factories and wine houses. The eggs are laid in the pomace in which the larvae feed and from which the adults fly to the houses. They also visit dwellings in which decaying fruit is exposed. Sometimes they breed in other organic remains. Cleanliness and the prompt removal of fermenting or decaying mat¬ ter are preventive measures.

POMADE, POMMADE, or POMATUM,

a term originally applied to a fragrant ointment prepared with lard and apples, but now wholly restricted to perfumed solid greasy substances used in dressing the hair. In the preparation of pomades the first object of consideration is to obtain their fatty basis in as pure and fresh a state as possible. Lard, beef and mutton suet, beef marrow, veal fat and bear's grease are the materials commonly employed for this purpose, either singly or in mixtures of two or more of them. The fat, which should be that of a young and healthy animal, is pounded in a marble mortar in the cold, until all the membranes are completely torn asunder; it is then submitted to the heat of a steam-bath until its fatty portion has liquified and the albuminous and aqueous matter and other foreign substances have com¬ pletely subsided. The liquid fat is then care¬ fully skimmed and passed through a flannel filter. In this state it may be perfumed at will; after which, when it is intended that the pomade should be white, it must be constantly stirred with a glass or wooden spatula until it solidifies ; should it be wished transparent or crystalline it is allowed to cool very slowly without being disturbed. To prevent its becoming rancid a little benzoic acid, gum benzoin or nitric ether may be added and to increase its consistency a little wax or spermaceti. Pomade may be per¬ fumed by enfleurage, maceration or simply by adding the fragrant essences or essential oils in the required quantity. See Perfumes and Per¬ fumery.

POMBAL, Sebastiao Jose de Carvalho e Mello, sa-bas-te-an'oo ho-sa' da kar-val'yoo a ma'loo pon-bal', or pom-bal', Marquis of, Portuguese statesman : b. Soura, near Coimbra, 13 May 1699; d. Pombal, 2 May 1782. He suc¬ cessively entered the law and the army, but soon relinquished each because of incompatibility. In 1739 he was appointed Ambassador to Lon¬ don, but was recalled in 1745. He was then sent to Vienna to act as mediator between the Pope and the Empress Maria Theresa. Car¬ valho here gained general esteem and married the youthful Countess of Daun. In 1750 Car¬ valho obtained from Joseph I the post of Sec¬ retary of State for Foreign Affairs and soon rendered the feeble and sensual king en¬ tirely subject to his influence. Joseph I fell in with the most daring projects of his minister; and the latter now proceeded to the accomplishment of his four favorite objects — the expulsion of the Jesuits, the humiliation of the greater nobles, the restora¬ tion of the prosperity of Portugal and the absolute command of the state in the name of the monarch. After the earthquake of 1 Nov. 1755, which destroyed Lisbon, Carvalho displayed great vigor and resolution. He was now created Count of Oeyras and in 1756 First Minister. He then removed every one who ven¬ tured to obstruct his plans. The discontented vinedressers committed excesses in Oporto, but Pombal vigorously suppressed the riots and passed most comprehensive laws against treason. He also expelled the Jesuits from their flourish¬ ing missions in Paraguay. Carvalho finally determined to remove the Jesuits entirely from the person of the king and they were ordered (16 Sept. 1757) to retire to their colleges. A conspiracy against the life of the king, who was wounded on the night of 3 Sept. 1758, by assassins, he falsely laid to the charge of the Jesuits. Pombal denounced the Jesuits to the Pope as the contrivers of the scheme and caused some of them to be exe¬ cuted in prison. Pombal had already banished the whole order from the kingdom by a royal decree of 3 Sept. 1759 and those who did not comply with the mandate were seized and trans¬ ported to the states of the Church. A pro¬ tracted dispute with the Pope followed; in 1760 Pombal transported the papal nuncio be¬ yond the frontiers and was on the point of dis¬ solving all connection with Rome when Clement XIII died and Clement XIV, his successor, abolished the order in 1773. Through Pombal the Portuguese army received an entirely new organization and the fortifications on the fron¬ tiers were restored. He paid particular attention to the schools ; he also rendered the censorship less strict. Joseph I died 24 Feb. 1777 and was succeeded by his daughter, Maria I, who imme¬ diately deposed Pombal and deprived him of all his offices. The state-prisoners whom he had

incarcerated, 9,800 in number, were released, and all his regulations abolished. All those who had been attainted with treason under Pombal's charges were rehabilitated and he himself or¬ dered to retire to his estate, where he died. His record is one of the bloodiest in Por¬ tuguese history, yet it is said to his credit that he favored the establishment of various manu¬ factures ; encouraged the art of printing and agriculture; furnished the University of Coim¬ bra with a chemical laboratory, a botanic garden

and an observatory; and introduced into Brazil the cultivation of coffee, sugar, rice, cocoa and indigo. Consult Moore, (Life of Pombal > (1819) ; Opperman, (Pombal und die JesuiteiP (1845) ; Weld, (The Suppression of the Society of Jesus in the Portuguese Do- minions) (1877) ; Feval, (The Jesuits* (1878).

POMEGRANATE, a shrub or tree (Pu – nica granatum) , native of southern Asia, widely cultivated for its fruit. It is usually of bushy growth, with glossy entire leaves and red flow¬ ers. The fruit is globular, sometimes five inches in diameter, the interior filled with numerous seeds covered with a juicy red, pink or white pulp, usually of acid flavor. The cultivation of the pomegranate in the Old World is of great antiquity. The plant is supposed to have been introduced into southern Europe by the Car¬ thaginians, whose Latin name of "Punici® was applied to it. The fruit is cultivated in the United States along the Gulf Coast and more extensively in tropical America.

POMEGRANATE MELON. See Mel¬ ons.

POMELO, or PUMELO. See Shaddock.

POMERANIA, pom-e-ra'ni-a (German, Pommern), Prussia, a northern province and duchy, bounded north by the Baltic, west by the duchy of Mecklenburg, south by the province of Brandenburg and east by West Prussia; area, 11,629 square miles. It consists of a long and comparatively narrow tract of country, stretch¬ ing longitudinally east to west. The coast is generally low and sandy and is lined by a great number of lagoons, separated from the sea by narrow belts of land or low sandhills. Along the coast are a few islands, but none of them, except Riigen, Usedom and Wollin, are of great extent. The principal rivers are the Oder, Persante and Stolpe. The soil generally is sandy and indifferent ; but there are many rich alluvial tracts, particularly along the banks of the rivers and lakes, producing a surplus of grain for export. Flax, hemp and tobacco also are cultivated. The domestic animals, of which sheep and swine are the most important, are numerous, and of tolerably good breeds. The forests are of large extent

and well supplied with game. Fish also are abundant. The only minerals of any consequence are a little iron, salt and alum. Manufactures early made con¬ siderable progress, in consequence of the influx of French refugees on the revocation of the Edict of Nantes, who introduced the manufac¬ ture of woolens and other fabrics. Through the Oder the province carries on a considerable trade, both general and transit. The principal exports are corn, cattle, wood, wool, wax, amber and fish ; the principal imports are wine, cotton goods, coffee, sugar and other articles of co¬ lonial produce. The centre of trade is Stettin, which ranks as one of the most important com¬ mercial cities of Prussia. Pomerania was orig¬ inally inhabited by Goths, Vandals and Slavs. The first mention of it in history is in 1140. It long remained an independent duchy and was of much larger extent than at present. In 1637, on the extinction of the ducal family, the electoral house of Brandenburg claimed posses¬ sion, but was obliged to give way to Sweden. On the death of Charles XII the electoral house again claimed possession and the whole was formally ceded to it except a part which received

the name of Swedish Pomerania. This part having been ceded to Denmark, was by it given up in exchange for the duchy of Lauenburg, to Prussia, to which the whole of Pomerania now belongs. For administrative purposes it is di¬ vided into three governments (Regierungs- bezirke), Stettin, Koslin and Stralsund. Pop.

1,716,921.

POMERENE, Atlee, American legislator: b. Berlin, Holmes County, Ohio, 6 Dec. 1863. In 1884 he was graduated at Princeton Uni¬ versity and two years later at the Cincinnati Law School. In 1886 he was admitted to the bar and has since practised at Canton. In 1887-91 Mr. Pomerene was city solicitor; in 1897— 1900 prosecuting attorney of Stark County and in 1906 was appointed member of the Tax Com¬ mission of Ohio. On 8 Nov. 1910 Pomerene was elected lieutenant-governor of Ohio and on 10 Jan. 1911 was elected United States senator for the term 1911-17 and was re-elected for the term 1917-23 in 1916.

POMEROY, pom' or pum'e-rol, John Nor¬ ton, American lawyer: b.

Rochester, N. Y., 1828; d. 1885. In 1847 he was graduated at Hamilton College and became a practising law¬ yer in 1851. He practised in Rochester until 1864, when for four years he held the chair of law and political science at the University of New York. He returned to his law practice at Rochester in 1869 and from 1878 to 1885 held the chair of municipal law at the Univer¬ sity of California. Pomeroy edited Sedgwick's Statutory and Constitutional Law) (1874) and Archbold's (Criminal Law) (1876). He wrote (Introduction to Municipal Law) (1865) ; (In¬ troduction to the Constitutional Law of the United States* (1868; 9th ed., 1886) ; Reme¬ dies and Remedial Rights According to the Reformed American Procedure* (1876) ; trea¬ tise on Riparian Rights* (1884) ; treatise on Equity Jurisprudence* (3d ed., 4 vols., 1905).

POMEROY, Marcus Mills (((Brick Pom¬ eroy**), American journalist and humorist: b. Elmira, N. Y., 25 Dec. 1833; d. Brooklyn, N. Y, 30 May 1896. He was apprenticed to the prin¬ ter's trade when very young, established the Corning (N. Y.) Journal and the Athens Gazette, and in 1857 removed to Horicon, Wis., where he successfully conducted the Argus. Later he went to Milwaukee where he edited the Daily News and subsequently secured an in¬ terest in the La Crosse (Wis.) Union and Democrat. After the Civil War he removed to New York and founded the Daily Democrat, which in 1887 was merged in Pomeroy's Ad¬ vanced Thought. In the latter part of his life he undertook to tunnel the Rocky Mountains, and had cut nearly a mile on each side when the failure of the national government to aid him caused the abandonment of the project. His chief publications are (Gold Dust* (1872) ; (Brick Dust* (1872) ; (Perpetual Money*

(1878).

POMEROY, Seth, American Revolutionary soldier: b. Northampton, Mass., 20 May 1706; d. Peekskill, N. Y., 19 Feb. 1777. He was by trade a gunsmith, and early spent much time in the colonial military service, attaining the rank of colonel. In 1774-75 he was delegate in the provincial congress, in October 1774 was made a general officer, and in February 1775

became brigadier-general of militia. After hav¬ ing participated as a private soldier in the battle of Bunker Hill, he was appointed 22 June 1775 senior brigadier-general of the Continental army. His appointment, however, was the oc¬ casion of some difficulty in the adjustment of matters of rank, and he resigned from the service, without having acted. When New Jersey was overrun by the enemy in 1776, he headed a volunteer force and marched for the Hudson, but

died on the way.

POMEROY, Theodore Medad, American jurist and statesman : b. in Cavuga, N. Y., 31 Dec. 1824; d. Auburn, N. Y., 23 March 1905. He received his early education at Monroe Acad¬ emy and graduated from Hamilton College, taking his degree in 1842. He was admitted to the bar in 1846, practising until 1870. In 1851 he was elected district attorney of Cayuga County, holding that position until 1856, when he was elected to the assembly. In 1861 he was elected to Congress, remaining there until 1869 and during the 40th Congress acting as speaker of the House of Representatives. In 1875 he was elected mayor of Auburn, serving one year, and was elected to the State senate in 1878-79. After abandoning the practice of law he en¬ gaged in banking and at the time of his death was first vice-president of the American Ex¬ press Company.

POMEROY, Ohio, city, county-seat of Meigs County, on the Ohio River and on the Hocking Valley and the Kanawah and Michi¬ gan railroads, 125 miles southeast of Columbus. It was first settled in 1816 and incorporated as a city in 1846. It is built on a strip of land ly¬ ing between the river on one side and hills on the other. It is in a region rich in bituminous coal and salt, and is the centre of an important mining industry. It also produces calcium and bromine, and has numerous manufacturing in¬ terests. Its industrial establishments include rolling mills, salt works, machine and engine works, furniture factories, planing and lumber mills and flour mills. There is a public library. The city is governed by a mayor, who holds office for two years, and a city council. Pop.

(1920) 4,294.

POMFRET, a name given in Europe to a species of Stromateus, allied to our butterfish (Rhombus triacanthus) , found in the Mediter¬ ranean and Indian Ocean ; and in the Bermudas to a large fish (Brania raii) of the family Bra- midee. Both of these belong to the scomberoid series of percomorphous fishes. The latter is a fish of comparatively deep oceanic waters, and is quite cosmopolitan in its range. Occasionally it has been taken in our waters on both the At¬ lantic and Pacific sides. As a food fish it is of excellent quality, but is nowhere sufficiently plentiful to be of importance. The family Bra- midee is a small one, comprising only three genera and 10 or 12 species, which are remark¬ able for the changes which they undergo with growth. Brama raii reaches a length of four feet, and has a somewhat compressed form, with the dorsal and anal fins very long. The cycloid scales are peculiar in being provided with a deep

perpendicular bony plate, one side of which is embedded in the skin.

POMMADE. See Pomade.

POMO, a linguistic stock of northwest Cali¬ fornia also known as Kulanapan. It includes several tribes, once very numerous, but now almost extinct. Consult Barrett, S. A., (Porno Indian Basketry) (Berkeley 1908) ; id., 'Ethno- geography of Porno and Neighboring Indians) (ib. 1908) ; Mason, O. T., 'Aboriginal Indian Basketry > (Washington 1904).

POMOLOGY, the science of fruit-culture, especially apple-culture (Lat. pomunt, apple). It is divided into four main divisions : viticul¬ ture, or grape-growing; orcharding (itself di¬ vided into the cultivation of pomaceous fruits; drupaceous or stone fruits; citrous fruits, as oranges and lemons; nut-fruits; and palma¬ ceous fruits) ; small-fruit culture; and cran¬ berry culture. (See Fruit-culture; Grape In¬ dustry; Horticulture; and special fruits, as apple, pear, orange, etc.). Consult Bailey, L. H., 'Cyclopedia of Horticulture) (4 vols., New York 1912).

POMONA, Cal., city in Los Angeles County, on the Atchison, Topeka and Santa Fe and the Southern Pacific railroads. It was first settled in 1875 and incorporated as a city 12 years later. It is the commercial centre and shipping point for an agricultural and fruit¬ growing region, particularly noted for its oranges ; has pipe works, foundry, machine shops, a planing mill and a canning factory. It is a well-built handsome city, with a fine park from which a wide view of the surrounding countrv may be obtained, and is a health resort. It has a high school and a public library, and Po¬ mona College (q.v.) is located within a few miles at Claremont. The city is governed by a board of trustees ; the city officials are mostly elected directly by the people. Pop. 13,505.

POMONA. See Orkney Islands.

POMONA, the Latin goddess of fruit, orchards and gardens. Various legends are associated with her cult. The longest story as also the most famous concerning her is told by Ovid in his (Metamorphoses> (XIV, 623 et seq.). Consult Wissowa, Georg, (Religion und Kultus der Romer) (2d ed., Munich 1912).

POMONA COLLEGE, located at Clare¬ mont, Cal. It was established by

the Congrega- tionalists, and was first opened to students in 1888, but it is now non-sectarian in control. Women are admitted to all courses. The col¬ lege offers three general courses, classical, sci¬ entific and literary, for the completion of which the degrees of A.B., B.S. and B.L. are con¬ ferred. There is also provision for graduate work, a normal course and a preparatory de¬ partment. In 1917 the grounds and buildings were valued at $530,880; the amount of produc¬ tive funds was $1,105,358, and the annual income $204,957. The library (1917) contained 35,510 volumes ; the students number 542, and the faculty 46.

POMORYANS, a Russian sect founded in 1695 by Danilo Wiculin. Their teachings are called Danilowtchina, and inculcate the doctrine that since the deposing of the prelate Nikon (1667), Antichrist has reigned in the Orthodox Greek Church, and thus the true priesthood has been destroyed. As there are no longer true priests nor true sacraments, there is no authority to sanction marriage, and, therefore,

all should live in celibacy; and those married in the Greek Church should separate. Per¬ sons desiring to join the sect arc required to be rebaptized by those already members. The sect has monasteries and nunneries, and has amassed much wealth which they have expended in gathering a large and very valuable library treating principally on the fine arts — music, painting, poetry, etc.

POMPADOUR, Jeanne Antoinette Pois¬ son, zhan an-twan-et pwa-soii poii-pa-door, Marquise de, mistress of Louis XV : b. 29 Dec. 1721 ; d. Versailles, 15 April 1764. She was the daughter of Frangois Poisson, equerry to the Duke of Orleans, and not butcher to the In- valides as frequently stated. The paternity of the future favorite was, however, claimed by Lenormand de Tournehem, a rich fermier-gen- eral, who spared no pains to give her a brilliant education, and at his death left her the half of his immense fortune. In 1741 she was married to her cousin Lenormand d'Eti- olles. She succeeded in attracting the attention of the king, was formally presented to him and soon entirely engrossed his favor, appear¬ ing at court under the title of Marquise de Pompadour. Here she enjoyed the highest consideration, but did not at first interfere in political affairs, satisfied with appearing as the patroness of learning and the arts. She col¬ lected books, pictures and curiosities, and en¬ couraged the institution of the military school of which Paris du Verney was the founder. But when she could only maintain her influence with the king by furnishing him other objects for favor, she turned her attention to state affairs. She filled the most important offices with her favorites, and contributed to produce those evils which afterward pressed so heavily on France. It is said to have

been principally owing to her that France became involved in the war against Frederick II. The Empress Maria Theresa had propitiated her favor by writing to her with her own hand a letter in which she called her “dear cousin.® The bur¬ dens and sufferings which this war brought upon France must be laid at her door, since she removed Berms, who was in favor of peace, and supplied his place by Choiseul, effected the recall of Marshal d’Estrees at the moment of triumph, and promoted incapable generals to the command. She died little regretted by the king (see Louis XV), and hated and reviled by the nation. To her credit, however, is awarded praise for her patronage of literary men and artists. Consult Beauporist, ‘Secret Memoirs of La Marquise de Pompadour* (1885) ; Goncourt, ‘Madame de Pompadour) (1887) ; Pavlovski, ‘La Marquise de Pompa¬ dour* (1888); Fleury, ‘Louis XV intime) (1899) ; De Caraman, ‘La Famille de la Mar¬ quise de Pompadour* (1900).

POMPANO, an important food fish (Tra – chinotus ccirolinus) belonging to the teleosto- mous family Carangidce, and found chiefly in the southern United States, especially in Florida. These fishes are related to the mackerels, but lack the median finlets which are so general in the latter. The pompano reaches a length of about 18 inches and has a somewhat elevated and compressed bodv with a covering of very small scales and a stronglv convex steep forehead. The anal and soft

■

dorsal fins are both long and of nearly equal length and similar form, being very high in front and low behind. There T a spinous dor¬ sal fin from which the membrane disappears with age, and a deeply forked caudal without keels or bony plates on its peduncle. The jaws are at first provided with numerous small teeth which fall out with age, changes in other parts also taking place. The color is a beautiful polished silvery blue with golden reflections in parts and touches of orange on the paired fins. On the Atlantic Coast the pompano ranges from Brazil to Cape Cod ; but it is only in the warm waters of the south Atlantic and eastern Gulf coasts that it is plentiful. Although occurring on the Pacific side of the continent it is there nowhere common. Except at the extreme southern end of Florida the nompano is a migratory fish, coming in from the sea and en¬ tering the shallow 'bays in the spring, the migratory wave gradually moving up the coast

and reaching the waters of New Jersey and Massachusetts only when the summer is well advanced. In the fall they leave at a corre¬ spondingly early date. They approach the shores in large schools, swimming swiftly at the surface, but some time after entering the shallow bays break up into small parties to spawn and search for the shellfish which are their chief food. The largest runs come in April and May, and, as the dense schools ap¬ proach very close to the shelving shores, seines may be operated with great effect, and large quantities are thus taken in Florida and South Carolina. Farther north, in Chesapeake Bay and on the coasts of New Jersey and Massa¬ chusetts, they are taken in pound nets. The pompano is the favorite fish of the wealthy and commands a high price in Northern markets. The name pompano is also applied to other species of the same and related genera, but the Irish pompano (Gerres) and California pom¬ pano (Rhombus) are not closely allied. Con¬ sult Goode, (American Fishes) (New York 1888) ; Jordan and Everman, (American Food and Game Fishes) (New York 1902).

POMPEII, pom-pa'ye (Lat. pom-pe'yi), an¬ cient city of Italy, near the Gulf of Naples, and 12 miles southeast of Naples, lying at the south¬ east base of Vesuvius, and important as being preserved almost intact to our own time by a shower of ashes and pumice from Vesuvius 24 Aug. 79 a.d., which also covered Herculaneum. The city, according to Strabo, was founded by the Oscans ; it must have come under Hellenic influence by the 6th century forˆ a temple un¬ earthed in the city is of the Doric of that cen¬ tury. Held by the Samnites from 420 b.c. to the end of the Samnite War in 290, Pompeii then became dependent on Rome ; and two cen¬ turies later at the close of the Social War the city which had sided with the Italian allied forces was captured by Sulla, and was forced to cede a third of its territory for a Roman mili¬ tary colony. In the years that _ immediately followed Pompeii became a favorite resort of rich and fashionable Rome, being near the sea and having the glamor of Greek elegance. An earthquake in 63 a.d. nearly destroyed the city, and when it was rebuilt and resettled, Roman architecture somewhat took the place of Greek and the work of building seems to have been shabby and far from thorough in many in¬

stances. But the city had regained much of its old popularity when it was destroyed by the eruption of Vesuvius in the year 79. Few of the inhabitants escaped, but the better class of buildings was scarcely injured by the alternat¬ ing falls of ashes and rapilli, or pumice. These with the additional covering of earth now amount to about 20 feet. The eruption is described by Pliny the Younger in letters writ¬ ten to Tacitus telling of the death of 'the elder Pliny, who perished in the

city. The site, for a time occupied by a little village, was deserted after the eruption of Vesuvius in 472, and no attention was paid to this great storehouse of antique life until the middle of the 18th century. Indeed the precise position of the buried city was problematic, for the volcano had changed the coast line so that it is now some distance from Pompeii. In 1748 valuable finds were made by a peasant digging a well. In 1755, Charles III having become interested in the work, the amphitheatre and other public build¬ ings were discovered. But during the next 50 years nothing systematic was done : there was still search for rare objects, but when these were found houses and streets were left to decay or were covered up again. No one real¬ ized that the prime value of the city archaeol- ogically is that it is the genuine setting of Roman life, a very different thing from remnants, no matter how curious, in a museum. Under Murat (1808-15) houses and streets were again excavated; and since the establish¬ ment of the united Italian kingdom work has been carried on systematically by the govern¬ ment, notably under the management of Fiorelli, who devised a method of making casts of the human remains by pouring plaster into the hol¬ lows occupied by the bones of the victims. The streets are now nearly half exposed; the completion of the work may take 50 years more. The fear has occasionally been expressed that an eruption of Vesuvius might undo all this work, and, if lava were poured down on the city, all the ancient monuments be destroyed.

The importance of the city, as has been re¬ marked above, is that the very pose and setting of 1st century Italy is here preserved in a won¬ derful degree, even loaves of bread keeping their shape though turned to charcoal. It is, however, important to notice that the city is neither typical of Rome because of its being subjected to Greek influence, nor of Greece, because hastily rebuilt after the earthquake of 63 a.d. Hence generalizations as to Roman manners and customs founded merely on Pom¬ peian remains are liable to error. The city was an irregular oval, the length being east and west, surrounded by a wall with a circuit of a little more than a mile and five-eighths (2,925 yards), which is pierced by eight gates. At each there were sentry boxes in which the Roman legionaries were found, still ((on duty® when the excavations began. The most import¬ ant gate is that opening toward Herculaneum, on the west end of the ovoid. From this gate leads a road paved with tombs, the Pompeian Via Appia. Parts of this region, the Pagus Augustus Felix, were among the earliest ex¬ cavated; in 1771-74 the diggers discovered the villa of Diomedes, which got its name from the tomb of Marcus Arrius Diomedes across the street. It seems to antedate the empire. Thirty-four bodies were found in this one

house, 20 of them in the wine cellar. Within the walls the streets are straight but narrow (14 to 24 feet wide), paved with lava blocks, and with high stepping stones at crossings. The streets are deeply worn with ruts. On the walls there are scribbled inscriptions, the famous graffiti, which are full of the gossip, scandal and politics of the city. The forum, a little southwest of the geographical centre of the town, was an open market place surrounded by buildings, the temple of Apollo lying to the west, the temple of Jupiter to the north and that of Mercury to the east. The last temple was flanked by the curia on the left and the house of Eumachia on the right; south of this house, across a street leading to the Sarno gate, was a school. At the intersection of this street with that connecting the Vesuvian and Stabian gates were situated the public baths ; and near the latter gate were a second forum, called the ˆtriangular,® a temple of Isis north of it, a large and a small theatre to the east, the extensive gladiators' barracks to the south¬ east, noted for the fine arms, shields, hel¬ mets, etc., discovered here, and to the south a temple of Heracles. The gladiators' quarters include a large rectangular enclosure, which measures 183 feet long by 148 feet wide. It is surrounded on all four sides by a colonnade whose columns are painted red at the lower part, and alternately red and yellow at the upper. The wall back of the columns is covered with stucco. Other baths are on the street crossing the city from the Nolan gate. The unfinished temple of Venus Pompeiana in the southern corner of the city, near the old Sea gate and the modern hotel, seems to have been the repository of many valuables, probably left by the inhabitants who escaped from the city at the first alarm. Valuable finds of the same sort are to be looked for in villas out¬ side the city ; in 1895 in a well at Boscoreale a set of silver utensils, lamps, mirrors and cande¬ labra was discovered. The type of art in these pieces of silver and in the mural paintings is apparently Alexandrian, with a orofusion of Cupids. Amonp- the better known private dwellings, apart from the ((Villa of Diomedes® already named, are the house of Pansa, one of the largest residences of the city, a pattern of the Roman house which has often been re¬ produced, notably at Saratoga ; the house of the Tragic Poet, so called because of the incor¬ rect interpretation of one of its mural paintings, a small but tasteful house with remarkable scenes from the Homeric poems; the unusually elegant house of Sallustjius ; the double house known as Castor and Pollux ; and the house of the Vettii, excavated in 1894, the home of a rich fuller, with brilliant, fresh frescoes, and the interior equipment of the house in such good condition that it has

been left there in¬ stead of being carried to the Museum in Naples.

The discoveries produced by the excavation of the ruins of buried Pompeii and Hercu¬ laneum were of vast interest from the view¬ point of archteology; but a far greater effect produced was from a popular standpoint, namelv, the revolution in the modern world of art, and the decorative arts especially. The early excavations created a classic influence in the architecture and decoration in France dur¬ ing the reign of Louis XV, which, with the more advanced disclosures, entirely dominated

the style Louis XV, to become excuse for the debased copies of these antiquities in the em¬ pire style. In England the disinterment of these Greco-Roman ruins and relics brought into being the Adam Period of architecture and decorative art (1760-94).

Bibliography. — Atkins, S., (Relics of An¬ tiquity exhibited in the Ruins of Pompeii and HerculaneunP (New York 1826) ; Barre, L., and Rouxaine, H., (Herculanum et PompeP (Paris 1840) ; Cerillo, E., (Dipinti murali di PompeiP (Naples 1886); Clark, G., (Pompeii; its Destruction and Re-discovery* (London 1853) ; Dyer, T. H., (Pompeii, its History, Buildings and Antiquities) (London 1906) ; Engelmann, R., *

POMPEY, pom'pi (Cneius Pompeius), surnamed the Great (Magnus) : b. 30 Sept. 106 b.c. ; d. 28 Sept. 48 b. c. In 98-87 b.c. he served in the Social War with great distinction. For some years subsequently the party of Marius was in the ascendant in Italy, and Pompey, who belonged to the aristocratic party, kept in the background. Learning, however, that Sulla was about to return from Greece to Italy, he hastened into Picenum, and raised an army of three legions, with which he successively de¬ feated three generals of the opposite party, who attempted to prevent his junction with Sulla. That junction was accomplished in 83, and Sulla rgceived the young soldier with the great¬ est marks of esteem. When the war in Italy ended, Pompey was sent to Sicily against the Marian general. He won a complete and speedy victory, and on his return was received by the people with great enthusiasm, and greeted with the surname of Magnus. He was also granted a triumph, a noteworthy distinc¬ tion for one who had as yet held no public office. Subsequently he induced the Senate to send him to the aid of Metellus Pius, hard pressed by Sertorius in Spain. Pompey re¬ mained in Spain (76-71), but neither he nor Metellus could gain any advantage over Serto¬ rius. But when the latter was treacherously murdered by Perperna, his own officer, the war was speedily brought to a close. On his return he defeated the fragments of

the army of Spartacus, and claimed the glory of having fin¬ ished the Servile War. He now became a can¬ didate for the consulship, and although he was not of the legal age, and had not held any of the lower offices of the state, he was elected consul with Crassus at the end of 71. The aristocracy began to look upon Pompey with jealousy, and ceased to regard him as belonging to their

-

i F

IBili

ft. fv * >f &■

t-

■ ■-. –

\ fi^ y

t ■ ,\

*™*fi

■■'. Av • jS

hWftlRr-

:: 1

$mfm\

.V jhf i '

ksiS£~tl&

CTT^Je

i'

U.

i

I #

- K# &

la i

H|w f

jB/3

8/

I.Mg

I -M

wOˆBEr- . ;.. ;sac&J

/

ATRIUM, OR COURT OF A HOUSE, IN POMPEII

POMPEII

■nrtV.V „

lujms.'ii.a-n:!'

iiiTcaxna;nixji:irr,i,iJiajjiit-yiiuiiiiixuuira;wiaua;irroi[i(nttJi!j(;raiJUii;{ucrKm:Kiaiti;iafr{!Ri.

Wmm

GRAECO- ROMAN MURAL DECORATION

POMPEY THE YOUNGER — POMPEY'S PILLAR

345

party, as he and his colleague openly courted the people — Crassus, by profuse largesses, and Pompey by the restoration of the tribuneship and other popular institutions. In 67 he was invested with extraordinary powers by sea and land for three years, for the purpose of putting an end to the outrages of the pirates in the Mediterranean, in which he was successful. Meanwhile the war against Mithridates had been carried on with varying fortune, and the Romans were discontented with the slow prog¬ ress of Lucullus. The tribune, Caius Manilus, proposed that Pompey should have absolute power over the army and fleet in the East, and proconsular authority over all Asia as far as Armenia, a proposal supported by Cicero in the famous oration (Pro Lege ManiliaP It was opposed by the whole influence of the aris¬

tocracy, but carried triumphantly. In 65-62 he conquered Mithridates; Tigranes, king of Ar¬ menia ; and Antiochus, king of Syria. At the same time he subdued the Jewish nation, tak¬ ing Jerusalem by storm after a three months' siege. He returned to Italy in 62, and dis¬ banded his army, but did not enter Rome till the following year, when he had the honor of a third triumph. From this date, when he was 45, his star began to wane. The aristocracy still distrusted him, yet he was unwilling to throw in his lot entirely with the popular party, which had been steadily rising in power during his absence, and over which Gesar now pos¬ sessed unlimited control. The Senate refused to sanction his measures in Asia, and to make an assignment of lands which he had promised to his veterans. Pompey, therefore, resolved to ally himself closely with Caesar, who promised to obtain the ratification of his acts provided Pompey would assist him in the attainment of his ends. Througn the mediation of Caesar Pompey became reconciled to Crassus, who, in consequence of his enormous wealth, had a wide influence in Rome. Thus was brought about the coalition of these three powerful men, which is known in Roman history as the first triumvirate. In order to tighten the bonds of alliance Caesar bestowed upon Pompey his daugh¬ ter Julia in marriage. It was soon apparent that this alliance would not last long, as Pom¬ pey could brook no rival. The death of Julia in 54 severed one of the ties which bound the two men, soon to become open rivals. In con¬ sequence of the serious tumults which broke out in Rome on the death of Clodius in the be¬ ginning of 52, the Senate called in the assistance of Pompey, who was appointed sole consul for that year, and who succeeded in restoring order in the city. The most important state offices were now filled with Caesar's enemies, and Pom¬ pey persuaded the Senate to pass a decree by which Caesar was to give up the provinces of which he was governor, and the command of his army. This he refused to do unless Pom¬ pey would throw up his offices, which was a step the latter would not take. Caesar was pro¬ claimed an enemy to the state, and his rival was appointed general of the army of the republic. Caesar crossed the Rubicon in 49, and in 60 days was master of Italy without striking a blow. Pompey fled to Greece, where he col¬ lected a numerous army, and was followed by Caesar in January 48. At first the campaign was in Pompey's favor; Caesar was repulsed before Dyrrhachium with considerable loss, and

was compelled to retreat toward Thessaly. In this country, on the plains of Pharsalia, oc¬ curred the decisive battle which made Caesar master of the Roman world. His rival fled to Egypt, where he was murdered in the presence of the king and his army by the tribune Septimius, at the instigation of Achillas and He¬ rodotus, who feared the

anger of Caesar. His head was struck off, and was shown to Caesar, who, however, ordered the murderer to be put to death. Consult his life in Druman's (Ge- schichte Roms,* iv, 324-556; Merivale,

POMPEY THE YOUNGER (Sextus Pompeius) , Roman warrior, 2d son of Pompey the Great : b. 75 b.c. ; d. 35 b.c. He accom¬ panied his father in his flight into Egypt and after his death went to Spain, where he organ¬ ized a force of fugitives and malcontents and demanded from the Roman Senate restitution of his father's property. The Senate granted him a large sum of money and made him com¬ mander of the seas. He marched to Baetica, where he crushed all opposition and assumed the powers of a sovereign. Upon the formation of a second triumvirate in 43 b.c. he was pro¬ scribed and thereupon turned pirate, waging continued war upon Rome by cutting off her supplies. He made Corsica, Sardinia and Sicily, which islands he had captured, the seat of his power, and from them sent forth his marauders. When Rome reached the point of starvation the populace compelled Antonius and Octavianus to sue for peace and a treaty most advantageous to Sextus was signed, in which he was con¬ firmed in his occupation of Sicily, Corsica, Sar¬ dinia and Achaia, and promised the consulship. The war was, however, speedily resumed, and Sextus twice defeated the fleets of Octavianus, but his indecision permitted the Romans to re¬ build their fleets and in 36 B.c. he was signally defeated. He fled to Armenia, but being over¬ taken by his enemies and deserted by his troops, he surrendered, and was put to death at Mile¬ tus by the Roman legate, M. Titius, who wished to remove a man who might easily be the cause of a rupture between the triumvirs. He had assumed the name of Pius, because he endeav¬ ored to avenge the death of his father and his brother, and this surname appears on many of his coins.

POMPEY'S PILLAR, the name of a cele¬ brated column, standing on an eminence about 1,800 feet to the south of the walls of Alexan¬ dria in Egypt. It consists of a capital, shaft, base and pedestal, whicli last rests on substruc¬ tions of smaller blocks once belonging to older monuments. One of these blocks bears the name of a monarch of the 13th Egyptian dy¬ nasty, and another that of Psammetichus I. The total height of the column is 98 feet 9 inches; the shaft, a monolith of red granite, is 73 feet long, and 29 feet 8 inches in circum¬ ference. The name it is popularly known by was applied to it by ancient travelers for no assignable reason. An inscription on the base shows that it was erected by Publius, the pre¬ fect of Egypt, in honor of Diocletian, probably to commemorate his capture of Alexandria, and the suppression of. the rebellion of Achilleus. On the summit there is a circular depression of considerable size, intended to admit the base of

a statue.

POMPEY'S THEATRE, a theatre of an¬ cient Rome, erected by the great Pompey and completed in 52 b.c. It was the first stone the¬ atre of ancient Rome ; had a marble interior and is variously stated to have seated 10,000, 17,000 or 40,000 people. After surviving many confla¬ grations it finally collapsed in the 6th century. Some of the ruins are still discernible about the Palazzo Pio. Consult Platner, S. B., (The Topography and Monuments of Ancient Rome5 (2d ed., 1911).

POMPONATIUS, Petrus, pom-po-na'shi- us pe-trus (Latinized name of Pietro Pompo- nazzi) , Italian philosopher: b. Mantua, 1462; d. Bologna, 1525. He was one of the leading Greek revivalists of the Renaissance and taught peripatetic philosophy in Padua and Bologna, endeavoring to purify the current Aristote- lianism from the ecclesiastical admixture of scholasticism. In his essay cDe Immortalitate Animse5 he taught that the application of Aris¬ totle's method would necessarily result in a proof of the soul's mortality and confirmed the Greek criterion of (

POMPONIUS, Lucius, Latin writer who flourished about 90 b.c. He was a native of Bonia. He was the first author to give form and finish to the Atellanae Fabulae, the popular plays which before his time were largely im¬ provisations. He introduced a written text in the technical form of the Greek playwrights. The parts of his work which have come down to us show a skilful use of the rustic dialects and not a little obscenity. The fragments are contained in O. Ribbeck's (Scenicae romanorum poesis fragmenta> (Leipzig 1897-98). Consult Duff, J. W., (A Literary History of Rome> (London 1909).

POMROY, Rebecca Rosignol, American nurse: b. Boston, Mass., 1817; d. 1884. She was the daughter of Samuel Holliday and in 1836 married Daniel F. Pomroy. Her experience as nurse was gained within her own family circle, and at the beginning of the Civil War she offered her services to the government. Dur¬ ing the war she was stationed successively at Georgetown Hospital, West Hospital, Baltimore and Columbian University Hospital, Washing¬ ton, D. C. On two ocoasions Mrs. Pomroy at¬ tended the family of Abraham Lincoln. About the end of the war she had an attack of typhoid fever which left her an invalid for many years. Upon regaining her strength she was engaged as matron in a girls' reform home at Newton Centre, Mass.,

and subsequently in the Newton Orphan Home, since named the Rebecca Pom¬ roy Home.

ponap£, pd'na-pa, one of the Caroline Islands (q.v.) in Micronesia, in form nearly circular, with a diameter of 16 miles and an area of 140 square miles and ringed by a coral reef three miles distant. The interior is moun¬ tainous, the coast fertile. .Mangroves flourish and durian and vegetable-ivory nut are exported. Remarkable ruins consisting of great blocks of basalt have been found. The island belongs to

the group of Eastern Carolines, of which the town of Ponape is the seat of government. Pop. (est.) 2,000. Consult Pereira, (La isla de Ponape5 (1896).

PONCA (pon'ka) CITY, Okla., city in Kay County, on the Arkansas River, the Atchison, Topeka and Santa Fe and the Hutchinson and Southern railroads, 63 miles north of Guthrie. It contains flour mills, oil refineries, grain ele¬ vators, glass works and a tent-making factory and has extensive wheat-growing interests. There is a public library and a considerable trade is carried on with the Indians. Pop.

(1920) 7,051.

PONCA INDIANS, one of the five tribes of the so-called Dhegilia group of the Siouan family, forming with the Omaha, Osage and Kiansa, the upper Dhegilia or Omaha division. The Ponca and Omaha Indians have the same language, differing only in some dialectic forms and approximating the Quapaw rather than the Kansa and Osage languages. They are a partly civilized and peaceable race. They became sepa¬ rated into two bands ; one, numbering about 600, remained in the former Indian Territory, while the other, numbering about 225, retained their reservation in Nebraska. In 1906 the bands numbered respectively 570 and 263, total 833.

PONCE, pon'sa, Porto Rico, city, capital of the department of Ponce, three miles from the coast. It is the second largest city of Porto Rico and the first in commercial importance. Coffee is the most important export. Other ex¬ ports are sugar, rum, molasses and tobacco. The main part of the town is connected with the port, Playa, by a good road and electric railway. The harbor is large and accommodates vessels drawing 25 feet ; the custom-house is located at Playa. Ponce is connected with Yanco, 20 miles distant, by railroad and with San Juan and Arecibo by highways. The greater part of the inhabitants are engaged in commercial and mercantile pursuits ; but there are a few

mechanical industries, shoemaking, etc., and the mechanics of Ponce excel in the quality of their workmanship. The city is con¬ sidered the most progressive on the island; it is well built and modern in appearance, with wide streets, several plazas or open squares, the largest of which is the Plaza Principal and a number of handsome residences. It has also the best market-house and best market on the island. The water supply is excellent ; there are electric lights and electric railways ; the chief buildings include the church of Our Lady of Guadalupe (Roman Catholic), a Protestant church, the municipal hall and two theatres. There are also several asylums and hospitals. The city has a public library and a good public school system has been established since the American occupation. In 1918 the city had two earthquake visitations; in the second (15 October) Red Cross workers estimated that 600 families were rendered homeless.

PONCE DE LE6N, pon'tha da la-on', Fray Luis de, Spanish theologian and poet: b. Belmonte, La Mancha, 1527 ; d. Madrigal, Spain, 23 Aug. 1591. He entered the Augustian order at 16, was educated at the University of Sala¬ manca, where he later became professor of theology and of Thomistic philosophy. As a linguist and a theologian he became famous,

POMPEII

Helmets, Shields, Gauntlets, etc., found in the “ Gladiators’ Barracks ”

•

yj

.

but in 1572 was brought before the Inquisition on a charge of Lutheranism and of having translated into Spanish without authorization the (Song of Solomon. > He was held in prison until 1576, when he was reinstated in his offices in the university and subsequently became vicar- general and finally provincial of his order. His lyrical poetry is chiefly of a religious character and though small in quantity is of great merit. He translated the Vol. XIV, No.

2).

PONCE DE LE6N, Juan, Spanish discov¬ erer : b. Leon, about 1460; d. Cuba, 1521. He fought in the conquest of Granada and in 1493 shipped with Columbus on the admiral's second voyage. Subsequently he held under Ovando the post of governor of the eastern portion of Espanola, in 1508 undertook the con¬ quest of Porto Rico and in 1510 was made gov¬ ernor of the island. He had already played a brave part in the struggles attending Spanish colonization in the New World, when in 1512 he obtained from King Ferdinand permission to conquer Bimini. The Indians seem to have spoken of a land called Bimini, north of Es¬ panola and in the 1511 edition of the

not until 1521 did he attempt a new expedition. Then with a new patent for conquest and settle¬ ment, he set out with equipment for starting a colony. The hostility of the Indians, however, rendered the success of the enterprise doubtful. Ponce De Leon was severely wounded by an arrow and returned with the whole expedition to Cuba, where he died of his wound. He had not discovered that Florida was not an island, but he opened the path to this knowledge.

PONCELET, pons'la, Albert, Belgium clergyman : b. Liege, 30 Aug. 1861 ; d. Mont¬ pellier, France, 19 Jan. 1912. He was educated at Liege, Tronchiennes and Louvain; entered the Society of Jesus in 1878 and was professor of grammar at Saint Michael's College, Brussels, in 1884—85. In 1886-88 he was assistant editor of (Acta SanctorunP and was ordained to the priesthood in 1891. From 1892 to 1912 he was charged with the practical direction of Analecta Bollandiana) at Brussels. He compiled one volume of Acta sanctorum BelgiP (1911).

His works include (Anecdota ex codicibus hagio- graphicis Johannes Gielemans) (1895); (Cata- logus Codicum Hagiographicorum Latinorum Bibliothecarum Romanorum prseter quam Vati- canae) (1909) ; (Catalogus Codicum Hagio¬ graphicorum Latinorum Bibliothecae Vaticanae) (1910) ; (Bibliotheca Hagiographica Latina anti- quae et mediae aetatis) (1911). He edited Annales de l'Abbage de Saint Ghislain par Dom Pierre Bandry et Dom Augustin Durot) (Vols. X, XI, XII, 1897), etc., and contributor to (The Catholic Encyclopedia, > Analecta BollandianaP (Precis historiques,* Archivio della R. Societa Romana di Storia Patria,* Deutsche Literatiirzeitung , etc.

PONCELET, Jean Victor, French military engineer: b. Metz, 1 July 1788; d. Paris, 23 Dec. 1867. Between the years 1807 and 1810 he attended the Ecole Polytechnique, where he was a pupil of Monge. In 1812 he received the commission of lieutenant in the engineers, but on Napoleon's retreat from Moscow was taken prisoner and transported to Saratov, on the Volga. On returning to Metz in 1814 he worked out the geometrical problems he had begun to consider during his captivity, but these met with little recognition from the French Academy. In 1829 he published his (Traite des Proprietes Projectives des Figures.) He henceforth gave himself closely to the study of applied mechan¬ ics ; invented the water wheel which bears his name and published numerous works on me¬ chanics. In 1835 he was appointed member of the National Defenses Commission and pro¬ fessor of applied mechanics in the University of Paris. He was promoted general in 1848 and went to the Exhibition of 1851 at London as president to the Commission of Mechanics. In 1857 he published his important account of the progress of mechanical science, (Collection des Travaux de la Commiss' n FrangaiseP The work which he had begun in captivity in Sara¬ tov — Application d' Analyse et de Geometrie) — he published in 1862. He was really the founder of modern geometry and had gained great influence among German mathematicians at a time that his countrymen had accorded him only scant recognition. Among his other works are (Les Roues Hydrauliques Verticales) (1826); Experiences Hydrauliques> (1832); (Trait c de Mecanique Appliquee aux Machines >

(1845) ; applications d'analy. se et de geome- trie) (2 vols., 1862-64), etc. Consult Didion,

(Notice sur la Vie et les Ouvrages du General Poncelet) (1869).

PONCHO, a kind of cloak worn by the Indian and Spanish inhabitants of South Amer¬ ica. It resembles a narrow blanket with a slit in the middle, through which the head passes, so that it hangs down loosely before and behind, leaving the arms free.

POND, Frederick Eugene (<(Will Wild¬ wood55) , American author and journalist: b. Packwaukee, Wis., 8 April 1856. He was edu¬ cated at Montello, Wis., and early turned to journalism, in which he made sporting matters his specialty and was one of the first to urge the establishment of a National Sportsman's Association. In 1881-86 he was field editor of Turf, Field and Farm, edited Wildwood's Magazine in 1888-89, and when it was merged with Turf, Field and Farm, he became cor¬ responding editor. Since 1897 he has edited the Sportsman's Review. From 1893-95 he was secretary of the National Game Protective Association. He has published (Handbook for Young Sportsmen5 (1876) ; (Gun Trial and Field Records of America5 (1885) ; (A Strike5 (1897) ; edited Frank Forrester's works (1879) ;

(Sportsman's Directory5 (1892-93) ; Hallock's

POND, James Burton, American lecture manager: b. Cuba, Allegany County, N. Y., II June 1838; d. Jersey City, N. J.. 21 June 1903. His parents settled in Wisconsin in 1847 and there he learned the printer's trade. He edited the Weekly Journal of Markesan, Wis., 1860- 61, and becoming 2d lieutenant in the 3d Cavalry Volunteers of that State, rose to the rank of major and was among 17 survivors of the guerrilla Quantrell's massacre of a band of 118 soldiers at Baxter Springs, Kan., in October 1863. Between 1865 and 1874 he en¬ gaged in business and it was as the manager of the lecture tour of Mrs. Ann Eliza Young, the 19th wife of Brigham Young, when she renounced Mormonism, that he chanced to take up the business of manager and for the rest of his life he continued to <(manage55 platform speakers. He went to New York in 1879. Among famous men whom he (

POND, John, English astronomer: b. Lon¬ don, 1767 ; d. Blackheath, Kent, 7 Sept. 1836. He was educated at Cambridge, traveled exten¬ sively and on his return to England in 1798 set¬ tled at Westbury, near Bristol, where he en¬ gaged in astronomical observations. He erected there an altazimuth instrument, two and a half feet in diameter and by a series of observations proved that the quadrant then in use at Green¬ wich had changed its form through age, render¬ ing the re-equipment of the Royal Observatory a necessity. He removed to London in 1807, was elected a fellow of the Royal Society

and in 1811 was appointed astronomer royal. By means of the six-foot mural circle mounted by

the Royal Society in 1812 Pond compiled a cata¬ logue of the north polar distances of 84 stars, which he presented to the societv in 1813. In 1821 he substituted the mercury-horizon for the plumb-line and spirit level and in 1825 origi¬ nated the system of making observations alter¬ nately by direct and reflected vision, for further experiments in which direction he was subse¬ quently transferred to Queen's College, Belfast. Though his mathematical knowledge was slight and his work wholly technical, he nevertheless performed valuable services to science and suc¬ ceeded in introducing modern methods and in¬ struments at the national observatory. He first used two instruments for direct and reflected observations of the same star ; invented the method of observing in groups ; and was the first astronomer who advocated the practice of depending upon masses of observations for all fundamental data. He was pensioned and re¬ tired in 1835. He published a catalogue of 1,113 stars (1833), a work of great value and accuracy. His other publications include the volumes of (Greenwich Observations,5 during his astron- omership ; various (Papers5 in the transac¬ tions5 of the Royal and Royal Astronomical Societies; and a translation of the (Systeme die Monde5 of Laplace.

POND LAW, The, in American politics and legislation an act passed by the Ohio legislature in 1882, for the regulation of the liquor traffic. For eight years the liquor question had agi¬ tated Ohio politics and the Republicans finally adopted the Pond Law for the taxation of liquor selling. The law was afterward declared unconstitutional by the Supreme Court of the State.

POND-SKATERS, long, narrow bugs of the hemipterous family Hydrometridce which glide swiftly over the surface of ponds and quiet pools in search of prey. The front pair of legs, comparatively short, serve to seize prey or to cling to a support ; while the strong middle and hind legs carry the insect rapidly over the surface, the film bending but not breaking under the feet. The whole body is covered with a velvety fur; and when the insect dives it carries down a jacket of air, upon which it sustains breathing for a considerable time. Consult Howard, (The Insect Book5 (New York 1902). See Fresh-water Insects.

POND SMELT, a small surf smelt, nu¬ merous along the shores of Bering Sea and re¬ garded as excellent food.

POND SNAIL, a small fresh-water pul- monate mollusk of the family

Limnceidce. In this family the shell is large and thin, the lip sharp, the muzzle short and broad and the eyes are placed at the base of the tentacles. The genera Limncea, Physa, Ancylus and Planorbis are prominent. The first-named genus contains the gracefully spiral water-snails with triangular tentacles, numerous in all parts of the world and mostly less than an inch long; a widespread and familiar species (Limncea stagnalis) is often twice that length and the aperture widely flar¬ ing. This form is found in streams and pools and crawls upon the leaves and stems of aquatic plants. The equally common genus Plan¬ orbis possesses a flattened discoidal shell, the whorls of which are coiled round a central axis and lie in one plane. The shell aperture is crescentic in shape, and the foot is round and

short. The genus Physa, represented all over the United States by P. heterostroplia (see Snails and Slugs), has the spiral whorls of the shell turned to the left hand; the tentacles are long and slender and the edge of the mantle is fringed.

PONDICHERRY, pon-di-sher'i (French, Pondichery, pon-de-sha-re) , India, the capital of the French possessions in India, on the east or Coromandel coast, 85 miles by rail south¬ west of Madras. Its territory, with an area of 107 square miles, is surrounded on the land side by the British district of South Arcot. It stands on a sandy beach, and consists of two divisions separated by a canal. The ((White Town,® or European quarter, on the east, facing the sea, is regularly laid out, contains a spacious square, in which is the government-house, handsome planted boulevards and a number of well-built houses. The <(Black Town,® or native quarter, on the west beyond the canal, consists mainly of huts of brick or earth and a few pagodas. Its streets are broad and shaded by palm-trees, but filthy. The fortifications, formerly strong, were destroyed during the war with the British, and by the Treaty of Paris they are not to be rebuilt nor is Pondicherry to be garrisoned by a native French .force. The province is partly watered by the Gingee River, but is not very fertile : some rice, indigo, tobacco, betel, cotton and cocoanuts are raised; which, with cotton cloths and oil seeds, form the chief exports. The imports consist chiefly of manufactured goods. There is no harbor, but only a road¬ stead, where the surf beats almost as strongly as at Madras. There is, however, an iron pier. The town has been provided with a good supply of drinking water. The settlement was pur¬ chased by the French from the Bejapoor rajah in 1672. It was several times taken by

the British, the last being in 1803, being restored in 1815. The population of the town in 1916 was 47,398 ; of the province, 168,344.

PONDOLAND, province of the Cape of Good Hope, a maritime district; area, 3,906 square miles. Its vegetation is luxuriant, and it is well adapted for the rearing of cattle and sheep. The Saint Johns River flows through its southern part, and forms at it$ mouth an excellent harbor. It was the last part of Kaf- fraria that remained independent until it be¬ came a British protectorate in 1884, and was annexed to the cape in 1894. On 31 May 1910, the colony was merged in the Union of South Africa, thereafter forming an original province of the union. Pop. 234,637.

PONIATOWSKI, po-nya-tov'ske, the name of an illustrious Polish family descended from an Italian stock. Giuseppe Salinguerra (b. 1612), of the Italian family Torelli, having set¬ tled in Poland, took the name of Eziolek, and afterward that of Poniatowski, from the estate of Poniatow belonging to his wife. Among important descendants of his may be cited (1) Stanislas, Count Poniatowski (b. 1678; d. 1762), known for his connection with Charles XII, whom after the battle of Poltava he followed into Turkey, and as whose Am¬ bassador at Constantinople, he had the address to involve the Porte in a war with Russia. He wrote (Remarques d'un Seigneur Polonais sur l'Histoire de Charles XII par Voltaire) (1741).

(2) His eldest son, Stanislas Augustus (b. 1732) was elected king of Poland in 1764. (See Stanislas II). (3) Joseph Antony, nephew of King Stanislas (b. Warsaw, 7 May 1762; d. Leipzig, 19 Oct. 1812). When the Poles attempted in 1794 to drive the Russians out of their country, he joined the Polish camp as a volunteer. Kosciusko gave him the com¬ mand of a division, at the head of which he distinguished himself at the two sieges of Warsaw. On the creation of the duchy of Warsaw, Poniatowski accepted the place of Minister of War in the new state. In 1809 he commanded the Polish army against the su¬ perior Austrian force sent to occupy the duchy, and compelled it to retire. In the war of 1812, against Russia, he was again at the head of the Polish forces, and distinguished himself throughout this campaign. After the battle of Leipzig, during which Nalopeon created him marshal of France, he was ordered (19 Octo¬ ber) to cover the retreat of the French army; with a handful of men he protected the retreat till he was twice wounded, and then, being sorely pressed by the enemy on the banks of the Elster River, he spurred his horse into the stream and was drowned. His body was after¬ ward removed to Warsaw, and in 1816 was de¬ posited in the cathedral at Cracow. An eques¬ trian statue of Poniatowski was executed for the city of Warsaw by

Thorwaldsen.

PONS ASINORUM, ponz as-i-no'rum (((the bridge of asses55), a Latin expression ap¬ plied early in the 16th century to a diagram showing how to find middle terms to arguments. The original allusion seems to have been the difficulty of getting asses to cross a bridge. The name is also given to the fifth proposition of the first book of Euclid, which sets forth that, if a triangle has two of its sides equal, the angles opposite to these sides are also equal.

PONSARD, Francois, fran-swa pon-sar, French dramatist: b. Vienne, Dauphine, 1 June 1814; d. Paris, 13 July 1867. His first venture in literature was made with a translation of Lord Byron's (1837), and his first success was his (Lucrece,5 produced in 1843, and welcomed as a return from romanticism to classicism, and when played in 1853, with Rachel in the title role, very popular. Among other plays by him are (Agnes de Meraine5 (1846); (Charlotte Corday) (1850); Ulysses5 (1852) ; L'Honneur et 1'ArgenU (1853) ; (La Bourse5 (1856) ; (What Pleases Womankind5 (1860), a trilogy; (Le Lion amoureux) (1866) ; 'Galilee5 (1867). He became a member of the Academy in 1855. His complete works were issued in 1876.

PONSON DU TERRAIL, pon-son dii tar- a-e, Pierre Alexis, French romancer: b. Mont- maur, Isere, France, 8 July 1829; d. Bordeaux, 31 Jan. 1871. He wrote a large number of fictions which were very popular with an un¬ critical public. Among his works are (Les Coulisses du Monde5 (1853) which established his fame; (Gown and Sword5 (1857); (The King of Navarre's Mistress5 (1863) ; (The World's Great Bohemians5 (1867) ; (Aurora's Amours5 (1870).

PONT, Timothy, Scottish geographer, son of Robert Pont: b. about 1560; d. about 1630. He was graduated from Saint Andrew's in

1584, was Minister of Dunnct, Caithnessshire in 1601. In 1609 he subscribed for 2,000 acres of forfeited lands in Ulster and soon after con¬ ceived the idea of a Scottish atlas. In pur¬ suance of his plan he visited all portions of Scotland to the most remote and dangerous sec¬ tions, making his maps on the spot. He died some time between 1625 and 1630 and his maps, which were exceedingly neat and accurate, were ordered by King James to be purchased and published. In the troubleous times following they were forgotten until rescued by Sir

John Scott of Scotstarvet, and published in Bleau's < Atlas > (Vol. V, 1668).

PONT-A-MOUSSON, pon'ta-moo'son, France, town in the Department of Meurthe- et-Moselle, 16 miles northwest of Nancy, on the Moselle, which divides the town. It contains the Gothic Church of Saint Martin, begun in the 13th century, the town hall, an old convent now used as a petit seminaire, a communal college, blast furnaces and several industrial establishments, including potteries, textile mills, sugar factories, paper and card board mills, cable works, etc. The town was founded about the late 9th century and in 1572-1763 was the seat of a university. It suffered greatly in the Great War of 1914—18, being captured by the Germans early in the war and held by them despite several attempts by the French to retake it. In the autumn of 1918 after the Americans wiped out the Saint Mihiel salient the town was again close to the battle lines. Pop. 14,000. See War, European.

PONTA DELGADA, pon'ta del-ga'da, or PONTE DELGADA, Azores, town on the island of Saint Michael, the largest town in the islands. It is defended on the west side by the castle of Saint Braz, and about three miles to the east by the forts of Sao Pedro and Rosto de Cao. The principal buildings are churches, monasteries, convents, and an English chapel. The town has been lighted with gas since 1884. The harbor accommodations are good. The trade is considerable, and is chiefly with the British, of whom a considerable number are residents. The chief exports are wheat, maize and oranges ; and the imports, cotton and silk goods and hardware. Pop. about 16,179.

PONTANO, pon-ta'no, Giovanni Gioviano, or PONTANUS, Jovianus, Italian poet: b. Cerreto, 1426; d. Naples, 1503. He was edu¬ cated at Perugia and at 22 settled in Naples. There he received a government appointment ; became tutor to the sons of Alphonso the Magnanimous ; and finally became chancellor. He founded an academy of letters at Naples and was a favorite at court and with the literary men of that capital. For having wel¬ comed Charles VIII of France in 1495 Pontano was in disgrace after the Restoration. He is a figure of political importance in southern Italy but is best known for his poems and dissertations. His Latin is quite pure and his works are of interest in the study of fhe social life of the period. His chief works are (Urania,} Latin didactic poem in hexameter; (De hortis HesperidunP ; (De conjugali amore) ;

'Baiae.* His works were published at Venice (5 vols., 1505-18). Consult Ardito, (Giovanni

Pontano e i suoi tempi) (Naples 1871) and Symonds, (Renaissance in Italy.*

PONTCHARTRAIN, pon-char-tran', a lake of Louisiana, about five miles north of New Orleans, about 40 miles long from east to west, and nearly 25 wide. The water is gen¬ erally from 12 to 14 feet deep. It communicates with Lake Borgne on the east and with Lake Maurepas on the west. It is connected with New 'Orleans on the south, by Bayou Saint John and a canal, and also by a railroad. It is surrounded by marshes, which have a dense vegetation of water plants. The residential sections, Madisonville and Mandeville, are on the north shore.

PONTEDERIACE.ZE, a family of aquatic

plants, the pickerel-weeds, which are perennial water of marsh herbs, with perfect, mostly ir¬ regular flowers from a one-leafed spathe; peri¬ anth corolla-like, equally six-cleft. One genus is Pontederia, with one American species (P. cordata) ; another genus is Heteranthera, with three species.

PONTEFRACT, or POMFRET, England

market town and parliamentary borough of Yorkshire, 20 miles south-southwest of York, on the Midland, Lancashire and Yorkshire and Northeastern railroads. It has a grammar and other schools and has extensive agricultural in¬ terests. Licorice is a specialty for the manufac¬ ture of Pontefract lozenges since 1562. The remains of a Roman camp have been discovered nearby and there are ruins — an old castle in which Richard II died. The water-supply sys¬ tem, cemetery, markets and recreation grounds are owned by the town. Pop. 15,989.

PONTEVEDRA, pon-ta-va'dra, Philip¬ pines, (1) pueblo, province of Negros Occiden¬ tal, on the western coast on Guimaras Strait at the mouth of the Mangala River, 22 miles south of Bacolod, the provincial capital. It is a military station. Pop. 12,000. (2) Town,

province of Capiz, island of Panay, 12 miles southeast of Capiz, the provincial capital. Pop.

9,500.

PONTIAC, pon'ti-ak, Indian chief : b. on Ottawa River, about 1720; d. Cahokia, Ill., 1769. He became the principal chief of the allied tribes of the Ottawas, Ojibways and Pottawat- tomies, and it is thought that

he led the Otta¬ was at the defeat of General Braddock (q.v.) near Fort Duquesne. After the taking of Que¬ bec, Major Rogers was despatched to take pos¬ session of the western forts for Great Britain, under the terms of the treaty of Paris. Pon¬ tiac objected to this procedure, which he re¬ garded as an invasion of his domain, and as a result soon began to plot the complete extermi¬ nation of the English. In 1762 he sent out mes¬ sengers who secured the allegiance of all tribes as far as the lower Mississippi in a confedera¬ tion against the common enemy. The plan, as arranged, was that each tribe was to attack the fort nearest it, and that all were then to make a combined descent upon the undefended settle¬ ments. A great pow-wow or council was held 27 April 1763 near Detroit; Pontiac made a stirring oration, rehearsing the wrongs inflicted upon the Indians by the English. He was him¬ self to make an attempt to capture Detroit on 7 May, but the design was revealed, and Pon¬ tiac could lay siege only to the fort. But a long

investment was a thing foreign to Indian war¬ fare, and the lines were so loosely drawn that provisions were freely smuggled into the fort. Pontiac was supplied by the Canadians, and paid in promissory notes of birch-bark, later, it is said, scrupulously redeemed. Schooners sent through Lake Erie with supplies and reinforce¬ ments were captured by the savages, but at last one with ammunition and provisions did suc¬ ceed in reaching the fort. The besieged there¬ upon believed themselves strong enough to ven¬ ture a sally against the Indian encampment, but Pontiac, warned of the project, defeated them in the battle of Bloody Bridge (31 July). The siege was sustained until 12 October, when Pon¬ tiac withdrew his forces to the neighborhood of the Maumee. This part of the conspiracy had, it is true, been a failure; but elsewhere the suc¬ cess was remarkable. When the detached and unorganized character of Indian warfare is con¬ sidered, recognition must be made of the no¬ table diplomatic and military talent of the chief¬ tain who directed the largest and most powerful coalition in Indian history, and came so near to realizing his grand object. Of 12 fortified posts attacked, eight were taken, while the gar¬ risons of most were massacred; several English expeditions were annihilated; and the fron¬ tiers were desolated and terrified. Hostilities continued in a desultory fashion into 1764, but on 17 Aug. 1765 Pontiac formally made peace at Detroit, and in the summer of 1766 concluded a treaty with Sir William Johnson at Oswego, N. Y. In 1769 a Kaskaskia Indian, 'bribed by an English trader, murdered Pontiac; in

ven¬ geance the northern tribes made war on the Illi¬ nois group, which was all but exterminated. Consult Parkman, (The Conspiracy of Pontiac) (1851 ; new ed. 1898) ; (Handbook of American Indians) (Bureau of American Ethnology, Vol. II, 1910).

PONTIAC, Ill., city, county-seat of Living¬ ston County, on the Vermilion River, and on the Illinois Central, the Wabash and the Chi¬ cago . and Atlantic railroads, about 95 miles north by east of Springfield and 90 miles south by west of Chicago. It was settled about 1825, but was founded permanently in 1829, by colo¬ nists from Indiana and Ohio. In 1856 it was incorporated, and received a city charter in 1872. It is in a fertile agricultural region In which stock-raising is given considerable atten¬ tion. In the vicinity are extensive coal-fields. The chief industrial establishments are candy factories, a hook and eye factory, box factory, and large shoe factories. There is considerable tiade in coal, grain, livestock and manufactures. The principal public buildings are the State Reformatory for juvenile offenders, which will accommodate 1,500, the city hall, the public li¬ brary, and the church and school buildings.

(1920) 6,664.

PONTIAC, Mich., city, county-seat of Oak¬ land County, on the Clinton River, and on the Grand Trunk and the Pontiac, Oxford and Northern railroads, about 26 miles northwest of Detroit. It was settled in 1818-20, incorpo¬ rated as a village in 1837, and in 1861 was char¬ tered as a city. It was named after the Indian chief Pontiac. It is in a section of beautiful lakes in which there is considerable hunting and fishing. It is surrounded by an agricultural re¬ gion, and has a number of industries connected

with farm and forest products. The chief manufacturing establishments are automobiles and accessories works, farm implement works, foundry products, hardware works, carriage factories, machine shops, flour and lumber mills, knit-goods factory and gas and gasoline engine works. There is considerable trade in farm products, fruit, vegetables, wool and car¬ riages and wagons. It has the State Hospital for the Insane, a library building (ladies' li¬ brary), a public high school library, public and parish schools and churches. The government of the city is now conducted on ttie commission plan. The city owns and operates the water¬ works. Pop. (1920) 34,273.

PONTIAC'S WAR. See Colonial Wars in America; Pontiac, and consult (Handbook of American Indians) (Bureau of American Ethnology, Vol.

II, 1910).

PONTIANAK, pon-te-a-nak', West Bor¬ neo, town and capital of the Dutch settlements on the west coast of Borneo; on the Kapuas or Pontianak River, at the mouth of the Lan- dak, in the administrative division of the out- ports. It is on the equator and 110° 20′ E. longitude. It is in a region in which the chief productions are rice, sago, sugar, birds' nests, pepper and wax. Salt, opium, some clothing, wares and machinery are introduced. Pon¬ tianak is the chief port of West Borneo, which has an area of 55,825 square miles and popula¬ tion estimated in 1912 at 467,158. It has a Dutch resident. Pop. 10,000.

PONTIFEX, one of the highest priestly colleges at Rome, to which was entrusted the oversight of all religious observances, public or private. Their institution, like that of all im¬ portant matters of religion, was ascribed to Numa. The number of pontifices was origi¬ nally probably six, all patricians, exclusive of the king, whose place, after the abolition of the monarchy, was taken by the pontifex maximus, or chief priest. The Ogulnian Law (300 b.c.) raised this number to eight, or, including the pontifex maximus, to nine, five of whom were to be plebeians. Sulla increased the number to 15 and Julius Caesar to 16, including in both these instances the pontifex maximus. The duty of this dignitary was the inauguration of the priests, and in earlier time the care of the public records (annales maximi). He also su¬ perintended the sacred rites of Vesta, held his office for life, and could not leave Italy. The emperors afterward assumed this title until the time of Theodosius, and it was subsequently assumed by the Christian bishop of Rome. The pontifices also had the care of the calendar, and decided lawsuits which were connected with religion (hence the jus pontificum) . The exter¬ nal badge of the pontifex, at least on solemn occasions and while engaged in the duties of his office, was a dress bordered with purple (toga prcetexta), and a tapering hat made of the skins of sacrificed animals (galerum) . Con¬ sult Bouche-Leclercq, (,Les Pontifes de l'an- cienne Rome) (1871) ; Mommsen, (Romisches StaatsrechP (1887-88) ; Wissowa, (Religion und Kultus der Romer) (1902).

PONTIFICAL ORDERS. See Orders, (Royal) and Decorations.

PONTIGNY, pon-ten-ye, France, a village on the left bank of the Serein, in the depart-

ment of Yonne, on the railway between La¬ roche and Isle-Angely. Its abbey, founded in 1114 by monks from Citeaux, was itself the mother abbey of 43 monasteries. Thomas a Becket, Saint Edmund of Canterbury and Stephen Langdon spent their exile here, and Saint Edmund died and was buried in the mon¬ astery, which was devastated by the Huguenots in 1567, and destroyed in the Revolution. The abbatial church (mainly 1 150—70) is one of the finest examples of Cistercian architecture. The shrine of Saint Edmund (18th century) in this church was visited by a large number of Eng¬ lish Roman Catholics in 1874. Consult Chaillon des Barres, (L'Abbaye de Pontigny) (1844).

PONTINE (pon ten) MARSHES, Italy, a swampy plain, 18 to 30 miles long and 6 to 10 miles wide, lying 25 miles southeast of Rome, bounded on the south and west by the Tyrrhen¬ ian Sea and sand dunes covered with oaks, and on the east by Monti Lepini. Only a small part of this large area is actually marshy, but enough to make the whole region and much of its surroundings very unhealthy, the marsh vapors being carried to Rome itself by the south wind and being probably the cause of the Ro¬ man fever. In the early days of the Roman republic the Volscians possessed the Ager Pometinus, possibly so named from Suessa Po- metia, one of its cities, and by elaborate engi¬ neering made it habitable and fertile. But the inhabitants of its 33 cities were conquer* i and driven out by the Romans in 358 b.c., and the land soon became dangerous; even in 312 b.c. its centre was pierced by the great Appian Way built by Appius Claudius. Cethegus attempted to drain the marsh about 160 b.c. Julius Caesar planned to turn the Tiber into it, but died be¬ fore the undertaking was commenced. Augus¬ tus built several canals, and after him Nerva, Trajan, Theodoric, and 18 popes attempted to better conditions. A law passed in 1899 by the Italian government voted 7,000,000 lire to com¬ plete the work, which is estimated to take 24 years. The region has a scanty population of farmers and shepherds, who, however, only spend a part of the year here. Consult Blanchere, (La Malaria de Rome et le Drainage antique) (1882) ; Berti,

(1884); Donat, (Die Pontinischen Siimpfe5

(1898).

PONTMARTIN, pon'mar'tan, Armand Ferrand, Count de, French author: b. Avig¬ non, 1811; d. 1890. He received his education in Paris; became interested in journalism about 1830 and soon became

prominent as a critic. He is the author of many novels written in a brilliant style; his best works are (Causeries litteraires5 (1845-56) ; (Causeries du samedP (1857-81); (Semaines litteraires5 (1861-63); (Souvenirs d'un vieux critique) (1881-89). Consult his (Memoires5 (1885-86).

PONTOON, in military engineering a flat- bottomed boat, or any light and buoyant frame¬ work or floating body, used in the construction of a temporary bridge for the passage of troops over a river or arm of the sea. As pontoons form a part of the equipment of any army they must be as light in structure as is consistent with safety. The pontoons used by armies have differed greatly at different times, the two chief types being a kind of undecked boat, and a

decked boat or close cylinder. The introduc¬ tion of pontoons may be considered to date from the 18th century, although long previous to this similar means were used for the passage of streams. Darius passed the Hellespont and Danube by pontoon bridges. In the World War American engineers constructed many pontoons to afford passage across streams where the Germans had wrecked bridges.

PONTORMO, Jacopo Carucci (commonly known as Jacopo da Pontormo), Italian painter: b. Pontormo, near Florence, 1494; d. Florence, 1556. He was a pupil of Andrea del Sarto and painted history and portraits. At 13 he was left an orphan and sent to live at Florence as a pupil of Leonardo da Vinci. He also studied under Pietro di Cosimo and Mariotto Alberti- nelli. His early work won the approval of both Raphael and Michelangelo, who foretold his future greatness. His pictures are often mistaken for those of Andrea, and the best of them are those produced soon after he had been dismissed from the school of del Sarto who, it is said, had grown jealous of him. He, however, altered his style several times, and took at last to imitating Albert Differ. His work deteriorated in his latter years and when he admitted the public to see his

PONTUS, in ancient geography, a country of northeastern Asia Minor, originally the part of Cappadocia lying between Armenia and Col¬ chis and the Halys River; called first Cappa¬ docia on the Pontus (that is, Euxinus, or Black Sea), and then simply Pontus. The country on the east and south is mountainous, but along the coast there are large and fertile plains. A son of the Persian king Darius, Artabazes, received Pontus as a separate satrapy, with the right to transmit it as an inheritance to his, posterity. One of his successors, Mithridates (about 400 b.c.) , assisted the younger Cyrus, and refused to pay tribute to Artaxerxes. His son, Ariobar- zanes I (363-337), made himself

independent during the general insurrection of the governors of Asia Minor against Artaxerxes II. Mithri¬ dates II (337-302) transferred his kingdom voluntarily to Alexander. Afterward, in the division of his empire in 322, it fell to An- tigonus. His successor, Mithridates III (302- 266), enlarged his paternal kingdom by con¬ quests, and was succeeded by his son Ariobar- zanes III, who reigned from 266 to about 240 b.c., and he again by his son Mithridates IV,

whose reign extended to about 190 b.c. He drove 'back the Gauls, who at various times in the course of the 3d century b.c. invaded Asia Minor, formed settlements there, and attacked Pontus shortly after his accession. Pharnaces I, who succeeded Mithridates IV, and reigned till about 156 b.c., took possession of Sinope, and made it his residence. Mithridates the Great in 124 succeeded his father, in whose time Phrygia had become a part of Pontus. He carried on bloody wars with Rome until his death ; at last he submitted to Pompey, and killed himself, 63 b.c., from desoair. The

western part of Pontus was then annexed to Bithynia, and the remaining parts given away to the chiefs of some of the adjoining states. Pharnaces II, the treacherous son of Mithri¬ dates, obtained only Bosporus, and when he at¬ tempted to conquer again his paternal kingdom was vanquished by Caesar, and put to death by Asander, who had made himself king of Bos¬ porus. Still his son Darius received through Antony a part of Pontus. Polemon, who at the same time possessed the kingdom of Bos¬ porus, Asia Minor and Colchis, was his succes¬ sor. After the death of his widow, Pythodoris, Polemon II succeeded, as king of Pontus, 39 a.d. Nero took Bosporus from him, and Pontus, under the name of Pontus Polemoniacus, be¬ came, after Polemon's death, a Roman province. When the Latins in 1204 again conquered Con¬ stantinople, Alexius Comnenus founded a new kingdom in Pontus, which remained until Mohammed II united it in 1461 with his great conquests. The most noted town on the coast of Pontus was Trapesus, the modern Trebi- zond. Consult Clinton, (Fasti HellenicP (Vol. Ill, Appendix) ; Meyer, (Geschichte des Konigreichs Pontus) (1879).

PONTUS EUXINUS, uk-si'nus, the an¬ cient name for the Black Sea, still called the Euxine. The name, signifying in Greek ((hos- pitable,® is supposed to have been given as a good omen to this dangerous sea.

PONTYPRIDD, pont'e-prid', Wales, parish market town and urban district of Glamorgan¬ shire, also known as Newbridge, 10 miles south¬ east of Merthyr Tydfil, on the Taff River and on the Glamorgan Canal and the Taff Vale Railway. It has numerous coal mines, iron mines, anchor, cable and chain works, brass and iron foundries, and chemical works. In the middle of the 19th century it was a gather¬ ing-place for the followers of the Neo-Druidic cult. Pop. 43,211.

PONY (Lat., pullanns, pullus, a young animal), a horse of small breed, usually under 13 hands high. There are several breeds scat¬ tered throughout the world. The Shetland, Connemara, Galloway, Dartmoor and Canadian types are best known in northern countries. These horses are extremely hardy and are for their size much stronger than the full-sized horse. The Shetland is the smallest of the types named. In Corsica and Sardinia there are breeds of ponies which have long existed there.

PONY EXPRESS, the mail service between Saint Joseph, Mo., and California inaugurated in 1860. Eight days were allowed for the schedule; 190 stations were established; there were 80 riders and about 400 horses and over

300 station-keepers and their assistants. The service was discontinued in October 1861. Con¬ sult article in Century Magazine, Vol. XXXIV, New York 1898.

PONZ, ponth, Antonio, Spanish painter, archaeologist and art critic: b. Bexix, Valencia, Spain, 1725; d. Madrid, 4 Dec. 1792. He was educated at the University of Valencia, but, though he made sufficient progress in theology to be able to take the degree of doctor, his tastes diverted him to foreign languages and most strongly to the fine arts ; the latter led him to become a pupil of Richart at Valencia. He subsequently lived at Madrid and Rome (1751), but returned to his native land (1760) and received a commission to paint a series of portraits of Spanish authors for the Escorial. Among his published! works is (Viaje de Es- pana) (18 vols.), in which he relates his ex¬ periences as a commissioner appointed to col¬ lect paintings and statuary from suppressed monasteries. The book is full of art criticisms and sketches of Spanish social life of the period. He also wrote (Viaje fuera de Espana,* an ac¬ count of travels through England and France.

PONZA (pon'za) ISLANDS, or PON¬ TINE ISLANDS, two small groups

of volcanic islands on the west coast of Italy, 20 miles from the Gulf of Gaeta and not far from the Pontine Marshes. The larger and more west¬ erly group belongs to the department of Gaeta in the province of Caserta, and consists of: Ponza, off the coast of Naples, which attains at Monte Guarda a height of 900 feet, is four miles long and two-thirds of a mile wide, was the place where Tiberius ban¬ ished Germanicus' son, where Caligula sent his sisters and Domitian banished Flavia Domi- tillia; Zanone (Lat. Sinone), further north with a cloister at the summit of its mountain ; and Palmarola (Lat. Palmaria), whose rude and wild inhabitants brought upon the island the repute of being the home of the Devil. In the second group are Santo Stefano, the most easterly of the Ponza Islands, and Ventotene (Lat. Pandataria), the place of banishment of Julia, Augustus' daughter, of Octavia (q.v.), Nero's wife, and of Agrippina, wife of Ger¬ manicus.

POOD, or PUD, a Russian weight of 40 Russian pounds, equivalent to 36 English pounds of avoirdupois.

POODLE. See Dog.

POOK, Samuel Hartt, American naval con¬ structor: b. Brooklyn, N. Y., 17 Tan. 1827; d. Washington, D. C., 30 March 1901. He was graduated from the Portsmouth Academy, New Hampshire, in 1843, and became a shipbuilder, afterward1 settling in Boston, where as a naval architect he was engaged in building several clipper ships. At the outbreak of the Civil War he entered the government service, superintended the construction of the ironclad Galena and assisted in building the Monitor. He was ap¬ pointed assistant naval constructor in the United States service in 1866, promoted naval constructor in 1871, and served in different navy yards until his retirement in 1899.

POOL, Maria Louise, American novelist: b. Rockland, Mass., 20 Aug 1841 ; d. there, 19 May 1898. For several years she was a con¬ tributor to the New York Evening Post and

was also connected with the New York Tribune. She excelled in descriptions of life in New England and among her works are Hn Bun¬ combe County) ; (A Vacation in a Buggy) (1887) ; (Tenting at Stony Beach) (1888) ; (Rowena in Boston) (1892) ; (Mrs. Keats Brad¬ ford5 (1892) ; (In a Dike Shanty5 (1896) ; (In the First Person) (1898) ; (A

Golden Sorrow) (1898); (The Malvon Farm) (posthumous,

1899).

POOL, or POOLING, in commerce and finance, a combination of persons contributing money to be used for the purpose of increas¬ ing or depressing the market price of stocks, with a view to the settlement of differences. In pooling railroad interests the common method of dividing the traffic between competing lines, is to pool the receipts and to redistribute them on percentages based upon experience and de¬ cided Iby an arbitrator.

POOL, a game. See Billiards.

POOLE, John, English dramatist: b. Eng¬ land 1786; d. London, 5 Feb. 1879. His success as a dramatist came early in life, and beside his plays he wrote several satirical and humorous books. His dramas were played by the leading actors of the day and were almost invariably successful. His fame, however, rests princi¬ pally upon the widely popular comedy, (Paul Pry5 (1825), and' his farce, (Twixt Cup and Lip5 (1826). Other plays of his that may be named are (Hamlet Travestie5 (1813) ; (Who's Who, or the Double Imposture5 (1815) ; (Deaf as a Post5 (1823) ; (The Wife's Stratagem5 (1827) ; (Lodgings for Single Gentlemen5 (1829). He also wrote the satirical sketches:

POOLE, Matthew, English compiler: b. York, 1624; d. Amsterdam, 12 October 1679. He studied at Emmanuel College, Cambridge, and took orders, but in 1662 was ejected by the Act of Uniformity from his church of Saint Michaelle-Querne in London, and turned his leisure to good account by spending 10 years on his (Synopsis Criticorum Biblicorum,5 an at¬ tempt to condense into one work the opinions of all the biblical critics of all times and countries previous to his own. The work extended to five large folio volumes, and indicates great labor and! research as well as no small degree of learning; but it is now of little use, later criticism and research having done much to supersede it. Poole also wrote a defense of the non-conforming clergy (1662) ; (The Nullity of the Romish Faith5 (1666) ; Annotations upon the Holy Bible5 (1683-85), and other works, and took an active part in the leading contro¬ versies of his time, especially those with the Socinians and Roman Catholics. The intoler¬ ant spirit of the Stuarts compelled him to seek an asylum at Amsterdam.

POOLE, Reginald Lane, English educator and author : b. London, 29 March 1857. He was educated at Oxford and at the University of Leipzig, in 1880-81 was assistant in the de¬ partment of manuscripts

in the British Museum and since its establishment in 1885 has been editor of the English Historical Review. He has lectured in modern history at Jesus Col¬ lege, Oxford, since 1886 and is also lecturer on diplomatics in the University of Oxford. He

has published (A History of the Huguenots of the Dispersion5 (1880) ; (Sebastian Bach5

(1882) ; (Wycliffe and the Movement for Re¬ form5 (1889) ; edited Wycliffe (De Civili Dominio Liber I5 (1885) and (De Dominio Divino5 (1890) ; historical Atlas of Modern Europe5 (1897-1902) ; (John Bales' Index Britanniae Scriptorum5 (1902), with Dr. W. Hunt, (The Political History of England5 (12 vols., 1905-10), etc.

POOLE, William Frederick, American li¬ brarian : b. Salem, Mass., 24 Dec. 1821 ; d. Evanston, Ill., 1 March 1894. Graduated from Yale in 1849, he became assistant librarian of the Boston Athenaeum in 1851, and in 1852 li¬ brarian of the Boston Mercantile Library. From 1859 to 1869 he was librarian of the Athenaeum, in 1869-73 of the Cincinnati Public Library, which he organized, and in 1874— 87 of the Chicago Public Library, whose formation he also directed. From 1887 he was in charge of the Newberry Library at Chicago, founded by W. L. Newberry. In 1885— 87 he was presi¬ dent of the American Library Association, and in 1877 vice-president of the international con¬ ference of librarians at London. He was best known for his (Index to Periodical Literature,5 originally begun in 1848, in the preparation of which he was assisted by W. I. Fletcher and many other librarians. His writings, which were very numerous, include (The Battle of the Dic¬ tionaries5 (1856); (Websterian Orthography5 (1857) ; (Cotton Mather and Salem Witch¬ craft5 (1869) ; (Anti-Slavery before 18005

(1887). He also discovered and printed a manuscript of Gov. Thomas Hutchinson on

POOLE, England, a seaport of Dorsetshire, on the eastern coast of the county, 15 miles west of Bournemouth. There are extensive municipal and harbor improvements, an esplan¬ ade, a free library, etc. Ropes, cables, sail¬ cloth, tiles, etc., are manufactured, and there is a large coasting trade principally in clay and grain. Much of the property is owned by the town. Pop. 38,886.

POONA, or PUNA, India, (1) the capital of a district of the Deccan division, Bombay, at the confluence of the Mula and Muta, tribu¬ taries of the Bima in a plain nearly 2,000 feet above the sea, 119 miles

eastward from Bombay by the Great Indian Peninsula Railway. It is well built and has a European aspect. Its main street is wide and lined with buildings ornamented with paintings and carvings ; it has numerous pagodas; the Deccan College for classics, mathematics and philosophy; and a college of science, with special training in civil engineering; a training college for teachers of vernacular and Anglo-vernacular schools, a female normal school, a government first-grade high school, besides other schools : legislative council hall, public library, civil hospital, arsenal and barracks. The European canton¬ ments are on the north, where most of the Europeans reside. In the town are the ruins of the palace (burned in 1827) of the Peishwa or head of the Mahratta confederacy, whose capital was Poona. This station is famed for

salubrity, and from July to November is the seat of the Bombay government. It is an im¬ portant military post, and has some manufac¬ tures of silver and gold jewelry, combs, dice and other small articles of ivory, silk and cot¬ ton fabrics and articles of brass, copper, iron and clay. Important works supply Poona with water from the Mula Valley, 10 miles above Poona. Pop. 158,856. (2) The district is

bounded on the north by the district of Ah- mednagar, west by the Ghats, south by Satara and east by the Nizam's dominions. Area, 5,348 square miles. It is an elevated table-land, watered by the Bima and its tributaries, and abounding in isolated heights, formerly crowned with strong fortresses. The villages are mostly open, but sometimes surrounded by hedges of cactus.

POOP-DECK, in shipbuilding, a deck raised over the after-part of a spar-deck, some¬ times called the round-house. Ships formerly had several poops, the one above the other.

POOR, Charles Lane, American astrono¬ mer: b. Hackensack, N. J., 18 Jan. 1866. In 1886 he was graduated at the College of the City of New York and in 1892 received the de¬ gree of D.Ph. at Johns Hopkins. After 1891 he was successively tutor in mathematics, in¬ structor, associate and associate professor of astronomy at Johns Hopkins. In 1903-10 he was lecturer and professor of astronomy and after 1910 professor of celestial mechanics at Columbia University. In 1901-06 he edited the Annals of the New York Academy of Sciences and is author

of (The Solar System5 (1908) ; (Nautical Science in its Relation to Practical Navigation, together with a Study of the Tides and Tidal Currents) (1910).

POOR, Enoch, American soldier: b. Ando¬ ver, Mass., 21 June 1736; d. Hackensack, N. J., 8 Sept. 1780. He engaged as a shipbuilder at Exeter, N. H., until the battle of Lexington, when he raised a regiment of which he was commissioned colonel. He received rank of brigadier-general in 1777, and at Saratoga he performed brilliant service, his brigade leading the advance and bearing a heavy share of the American losses. He joined Washington in Pennsylvania after the surrender of Burgoyne, shared with him the winter at Valley Forge and in 1778 distinguished himself at the battle of Monmouth. He assisted in the campaign against the Six Nations in 1779 and by his able co-operation with General Sullivan gained ad¬ vantages which resulted in the victory at New¬ town. In 1780 at the request of Lafayette he was transferred to the leadership of a brigade of light infantry under his command. Shortly after he contracted the fever from which he died.

POOR, Henry William, American banker

and financial expert: b. Bangor, Me., 16 June 1844; d. 13 April 1915. In 1865 he was gradu¬ ated at Harvard University and three years later entered the brokerage business with his father under the firm name of H. V. and H. W. Poor. In 1890 Mr. Poor became a member of the New York Stock Exchange and was also senior member of the banking firm of H. W. Poor of New York and Boston. In 1868 Mr. Poor issued the first number of the annual which has taken such high rank as a guide to investors, (Poor's Manual of Railroads.5

POOR HANDMAIDS OF JESUS CHRIST. See Orders, Religious.

POOR AND POOR-LAWS. See Pauper¬ ism.

POOR BROTHERS OF SAINT FRAN¬ CIS SERAPHICUS. See Orders, Religious.

POOR CLARES. See Clare, Saint; Orders, Religious.

POOR DISTRICT. See District.

POOR RICHARD'S ALMANAC, an

American almanac published by Benjamin Franklin (q.v.) from 1732 to 1757. It was noted for the maxims it contained.

POOR ROBIN, the name of an English almanac which first appeared in 1663. It was published continuously until 1828. The title page bore the inscription <(Written iby Poor Robin Knight of the Burnt Island; well-wishes to the Mathematics.55

POOR-SOLDIER. See Friar-bird.

POORE, Benjamin Perley, American jour¬ nalist: b. Newburyport, Mass., 2 Nov. 1820; d. Washington, D. C., 30 May 1887. Placed by his father in a military school to prepare for West Point he ran away and apprenticed himself to a printer. In 1838 his father purchased for him The Southern Whig, which he edited until 1841 when he became an attache at the United States legation in Belgium. In 1814-48 he was engaged in France in ftiaking a collection of historical manuscripts for the State of Massa¬ chusetts, and he also traveled extensively in Europe, Egypt and Palestine as correspondent for the Boston Atlas in 1843ˆ18. On his re¬ turn to the United States in 1848 he edited the Boston Bee and Sentinel until 1854, when he became Washington correspondent for the Boston Journal and several other newspapers, a position he occupied for 30 years, with the exception of a brief period as major in the Union army. In 1884 he became clerk of the Senate Committee on Printing Records and edited several publications concerning govern¬ ment affairs. Among his works are Cam¬ paign Life of Gen. Zachary Taylor5 (1848) ; (The Rise and Fall of Louis Philippe> (1848) ; (Early Life of Napoleon Bonaparte> (1851); (The Conspiracy Trial for the Murder of Pres¬ ident Lincoln) (1865) ; (Federal and State Charters5 (2 vols., 1877) ; (The Political Reg¬ istry and Congressional Directory 5 (1878) ;

(Life of Burnside) (1882) ; (A Descriptive Catalogue of the Government Publications of the United States, 1774-188P (1885) ; Remi¬ niscences of Sixty Years in the National Me¬ tropolis5 (1886), a compilation of treaties be¬ tween the United States and foreign govern¬ ments, etc.

POORE, Henry Rankin, American painter and illustrator: b. Newark, N. J., 21 March 1859. He received his training under Peter Moran and the Pennsylvania Academy of Fine Arts at Philadelphia. Later he studied at the National Academy of Design in New York and under Luminais and Bouguereau in Paris. In 1916 he received a fellowship from the Penn¬ sylvania Academy. He has also been the re¬ cipient of the following awards : the first prize of the American Art Association ; the second Halgarten Prize of the National Academy of Design; the bronze medal of the Pan-American

Exposition (1901); the silver medal at the Saint Louis Exposition (1904) ; the gold medal at Buenos Aires (1910) ; and the silver medal at the Panama Exposition (1915). Poore ex¬ cels in his artistic grouping of human figures with animals. He has written several valuable books of criticism including Pictorial Compo¬ sition and the Critical Judgment of Pictures) (1903); (The Pictorial Figure*; (City Museum, Saint Louis) ; and (In the Meadow) (Art Association, Indianap¬ olis).

POPAYAN, po-pa-yan', Columbia, capital city of the department of Cauca, near the left bank of the Rio Cauca, in a plain plentifully watered by that river, 228 miles southwest of Bogota, at the foot of the volcanoes Purace and Sotara. An episcopal city, Popayan has a col¬ lege and a seminary for the training of priests. The products of its woolen mills and of the farms of the surrounding country are the main articles of commerce. The city, the first built by Europeans in this region, was founded in 1536 and was nearly destroyed by an earthquake in 1834. Pop. about 8,500.

POPE, the title of the Bishop of Rome, Su¬ preme Pontiff of the Roman Catholic Church. (See Papacy; Temporal . Power; Catholic Church, etc.) The following list of Popes has been compiled from the most careful authorities, but the dates up to the 3d century are only ap¬ proximate, the chronology being very obscure previous to that time :

Peter .

41-67

Felix II .

483-492

Linus .

67-79

Gelasius I .

492-496

Cletus or Anen-

Anastasius II . . .

496-498

cletus .

79-91

Symmachus .

498-514

Clement I .

91-99

Hormisdas .

514-523

Evaristus .

99-109

John I .

523-526

Alexander I .

109-116

Felix IV .

526-530

Sixtus I (Xystus)

116-127

Boniface II .

530-532

Telesphorus .

127-138

John II .

533-535

Hyginus .

138-142

Agapetus I .

535-536

Pius I .

142-154

Sil verius .

536-537

Anicetus .

154-165

Virgilius .

537-555

Soter .

165-174

Pelagius I .

556-561

Eleutherus .

174-189

John III .

561-574

Victor I .

189-198

Benedict .

575-579

Zephyrinus .

198-217

Pelagius II .

579-590

Callixtus I .

217-222

Gregory I .

590-604

Urban I .

222-230

Sabinianus .

604-606

Pontianus .

230-235

Boniface III ....

607-608

Anterus .

235-236

Boniface IV .

608-615

Fabianus .

236-250

Deusdedit .

’615-618

Cornelius .

251-253

Boniface V .

619-625

Lucius I .

253-254

Honorius I .

625-638

Stephen I .

254-257

Severinus .

640

Sixtus II .

257-259

John IV .

640-642

Dionysius .

259-268

Theodorus I . . . .

642-649

Felix I .

269-274

Martin I .

649-653

Eutychianus ....

275-283

Eugenius I .

654-657

Caius .

283-296

Vitilianus .

657-672

Marcellinus .

296-304

Adeodatus .

672-676

Marcellus .

308-309

Donus .

676-678

Eusebius . 309 or 310

Agatho .

678-682

Miltiades .

311-314

Leo II .

682-684

Sylvester .

314-335

Benedict II .

684-685

Marcus .

336

John V .

685-686

Julius I .

337-352

Conon .

686-687

Liberius .

352-366

Sergius I .

687-701

Damascus I .

366-384

John VI .

701-705

Siricius .

384-399

John VII .

705-708

Anastasius I . . . .

399-401

Sisinnius

708

Innocent I .

401-417

Constantine I. . .

708-715

Zosimus .

417-418

Gregory II .

715-731

Boniface I .

418-422

Gregory III .

731-741

Celestine I .

422-432

Zacharias .

741-752

Sixtus III .

432-440

Stephen II .

752

Leo I .

440-461

Stephen III .

752-757

Hilarius .

461-468

Paul I . •. .

757-767

Simplicius .

468-483

Constantine II . .

767-768

Stephen IV . . .

768-772

Honorius III. .

1216-27

Adrian I .

772-795

Gregory IX. . .

1227-41

Leo III .

795-816

Celestinus IV.

1241

Stephen V … .

. . 816-817

Innocent IV . .

1242-54

Paschal I .

. . 817-824

Alexander IV.

1254-61

Eugenius II. . .

. . 824-827

Urban IV .

1261-64

Valentinus. . . .

827

Clement IV. . .

1265-68

Gregory IV. . .

. . 827-844

Gregory X . . . .

1272-76

Sergius II … .

. . 844-847

Innocent V. . .

1276

Leo IV .

. . 847-855

Adrian V .

1276

Benedict III . .

. . 855-858

John XXI ....

1276-77

Nicholas I. . . .

858-867

Nicholas III. .

1277-80

Adrian II .

. . 867-872

Martin IV. . . .

1281-85

John VIII ....

. . 872-882

Honorius IV. .

1285-87

Martin II … .

882-884

Nicholas IV. . .

1288-92

Adrian III. . . .

884-885

Celestinus V . .

1294

Stephen VI…

. . 885-891

Boniface VIII.

. . 1295-1303

Formosus .

. . 891-896

Benedict XI . .

1303-04

Boniface VI. . .

896

Clement V .

. 1305-14

Stephen VII. .

. . 896-897

John XXII. . . .

. 1316-34

Romanus .

897

Benedict XII . .

1334-42

Theodorus 11 .

897

Clement VI. . . .

. 1342-52

John IX .

. . 898-900

Innocent VI . . .

1352-62

Benedict IV. . .

. 900-903

Urban V .

1362-70

Leo V .

903

Gregory XI . . . .

1370-78

Christopher . . .

903-904

Urban 'VI .

1378-89

Sergius III . . . .

. 904-911

Boniface IX . . .

. 1389-1404

Anastasius III.

. . 911-913

Innocent VII . . .

1404-06

Lando .

913-914

Gregory XII .. .

1406-09

John X .

914-928

Alexander V . . .

1409-10

Leo VI .

. . 928-929

John XXIII . . .

1410-15

Stephen VIII . .

. 929-931

Martin V .

1417-31

John XI .

. 931-935

Eugenius IV . . .

1431-47

Leo VII .

. 936-939

Nicholas V. . . .

1447-55

Stephen IX. . . .

. 939-942

Callixtus III. . .

1455-58

Martin Ill .

. 942-946

Pius II .

1458-64

Agapetus II. . . .

946-955

Paul II .

1464-71

John XII .

. 955-963

Sixtus IV. ... .

1471-84

Leo VIII .

. 963-964

Innocent VIII. .

1485-92

Benedict V. . . .

964-965

Alexander VI. .

.1492-1503

John XIII .

. 965-972

Pius III .

1503

Benedict VI . . .

. 973-974

Julius II .

1503-13

Benedict VII. . .

. . 974-983

Leo X .

1513-21

John XIV .

. 983-984

Adrian VI .

1522-23

Boniface .

. 984-985

Clement VII. . .

1523-34

John XV .

985

Paul III .

1534-49

John XVI .

. 986-996

Julius III .

1550-55

Gregory V .

. 996-999

Marcellus II . . .

1555

Sylvester II. . . .

. 999-1003

Paul IV .

1555-59

John XVII . . . .

1003

Pius IV .

1559-65

John XVIII . . .

1003-09

Pius V .

1566-72

Sergius IV .

1009-12

Gregory XIII. .

. 1572-85

Benedict VIII. .

.. 1012-24

Sixtus V .

1585-90

John XIX .

1024-32

Urban VII .

1590

Benedict IX . . .

. 1033-44

Gregory XIV . .

1590-91

Gregory VI. . . .

1045-46

Innocent IX . . .

1591

Clement II … .

1046-48

Clement VIII . .

1592-1605

Damascus II. . .

1048

Leo XI .

1605

Leo IX .

1049-54

Paul V .

1605-21

Victor II .

1055-57

Gregory XV. . .

1621-23

Stephen X .

. 1057-58

Urban VIII. . . .

1623-44

Benedict X . . . .

1058-59

Innocent X. . . .

. 1644-55

Nicholas II … .

1059-61

Alexander VII .

1655-67

Alexander II. . .

. 1061-73

Clement IX. . . .

1667-69

Gregory VII . . .

. 1073-85

Clement X . . . .

1670-76

Victor III .

1086-88

Innocent XI . . .

1676-89

Urban II .

. 1088-99

Alexander VIII.

1689-91

Paschal II .

.1099-1118

Innocent XII . .

. 1691-1700

Gelasius II … .

1118-19

Clement XI ....

1700-21

Callixtus II. . .

. 1119-24

Innocent XIII .

1721-24

Honorius 11 . . . .

. 1124-30

Benedict XIII . .

. 1724-30

Innocent II. . . .

1130-43

Clement XII .. .

. 1730-40

Celestinus II. . .

. 1143-44

Benedict XIV. .

1740-58

Lucius II .

1144-45

Clement XIII . .

. 1758-69

Eugenius III. . .

. 1145-53

Clement XIV . .

1769-74

Anastasius IV. .

. 1153-54

Pius VI .

. 1775-99

Adrian IV .

1154-59

Pius VII .

. 1800-23

Alexander III . .

. 1159-81

Leo XII .

1823-29

Lucius III .

1181-85

Pius VIII .

1829-30

Urban III .

. 1185-87

Gregory XVI . .

1831-46

Gregory VIII . .

1187

Pius IX .

1846-78

Clement III . . .

. 1188-91

Leo XIII .

. 1878-1903

Celestinus III. .

. 1191-98

Pius X .

1903-14

Innocent III . . .

.1198-1216

Benedict XV. . .

1914

POPE, Albert Augustus, American manu¬ facturer: b. Brookline, Mass., 1843; d. 1909. During the Civil War Mr. Pope served with the 35th Massachusetts Infantry and attained the rank of lieutenant-colonel. After his return to civil life he merchanted shoemaking supplies. He founded the Pope Manufacturing Company in 1877, which secured control of many minor patents; in 1877 also he imported bicycles, but in the next year began to make them. During the

'bicycle craze® Pope’s company acquired mil¬ lions. When the automobile had passed the ex¬ perimental stage Mr. Pope engaged in the manufacture of cars, but was unable to dupli¬ cate his success with the bicycle. The company was placed in the hands of a receiver in 1907.

POPE, Alexander, English poet: b. in Lom¬ bard street, London, 21

May 1688; d. at Twick¬ enham on the Thames, Middlesex, 30 May 1744. His parents were Roman Catholics. His father, to whom the poet ascribed a not-yet-established connection with the Earls of Downe, was a linen-draper ((who dealt in Hollands wholesale® ; his mother, Edith Turner, a second wife, was the daughter of William Turner, of Towthorpe, in Yorkshire. About 1700, Pope's father, hav¬ ing prospered in his business, retired to a small property he had purchased at Binfield, in Wind¬ sor Forest. Pope wras not a strong child. When he was born his parents were no longer young; and from his father he inherited a frail constitution, from his mother a life-long tend¬ ency to headache. But he had in his boyhood, and retained through life, a voice like a night¬ ingale. His education was desultory and mostly derived from Romish ecclesiastics. Writ¬ ing he taught himself by copying type. From his first school at Twyford, near Winchester, he was removed because he had been severely punished for lampooning his master at the tender age of nine. At a subsequent school in London, kept by one Thomas Deane, he learned little ; but he gave a taste of his future quality by tacking together an acting play from Ogilby's Homer, in which the school gardener personated Ajax. Leaving Deane, he became the director of his own studies at his home in the Forest. Here it is worth while to let him speak for him¬ self : ((;When I had done with my priests, I took to reading by myself, for which I had a great eagerness and enthusiasm, especially for poetry; and in a few years I had dipped into a great number of the English, French, Italian, Latin and Greek poets. This I did without any design, but that of pleasing myself : and got the languages, by hunting after the stories in the several poets I read ; rather than read the books to get the languages. I followed everywhere as my fancy led me, and was like a boy gathering flowers in the fields and woods, just as they fall in his way. These five or six years I still look upon as the happiest part of my life.® (Spence's (Anecdotes,ˆ by Singer, 1820, p. 193).

To this self-education his biographers have, with reason, attributed some of the peculiarities of his character and genius. His unremitting application no doubt injured his health and tended to make his life the ((long disease® he afterward called it. Its enforced seclusion, coupled with the disabilities to which Papists were then exposed, fostered some of that — to give it its mildest name — disingenuousness, which came to be one of his worst faults. On the other hand, his natural parts were so keen, and his critical faculty so early matured, that it may be doubted whether any more liberal training would have better equipped him for what he afterward achieved. He is an excellent illustration of Boswell's dictum about the su¬ perior flavor of animals who Meed excursively® as contrasted with those who are ((cooped

up.® One result of his course of study was that he began early to versify, or, as he puts it, ((lisp in

numbers.® His first dramatic essay has already been referred to, and he is said to have com¬ posed another on the Legend of Saint Genevieve. A third effort was an epic on Alcander, Prince of Rhodes, being four books of 1,000 lines each on the Dryden pattern, which opened under water in the Archipelago with a description of the Court of Neptune. By his own account this must have been a medley of many notes.

There was Milton's style in one part, and Cowley's in another ; here the style of Spenser imitated, and there of Statius ; here Homer and Virgil, and there Ovid and Claudian® (lb. pp. 24, 277, 279). (Alcander) he afterward burned; but detached couplets found their way into later works. He also translated part of Ovid's (Metamorphoses, \ of Statius, and Cicero de Senectute. His chief adviser was his father, who criticised his <(rhymes,® and ruthlessly <(sent him down® when he did not think them good enough. The Alcander epic occupied him from 13 to 15 (lb. p. 279), when he went to London to learn French and Italian. His education was completed by much study of Temple and Locke, of Rapin and Bossu, and of Dryden's <(Pref- aces.®

Already, while living at Binfield, he had made friends who served to influence his tastes. One was the old scholar and diplomatist, Sir William Trumbull of Easthampstead Park, who advised him to translate Homer; another, the wit and man of fashion, Henry Cromwell ; a third, the veteran dramatist Wycherley, who was foolish enough to submit his senile poetical effusions to the criticisms of his sharp-eyed junior, a circumstance which has generally been held to have brought about a cooling of their friendship, although the manipulation of Pope's correspondence has not made it an easy matter to understand the actual attitude of affairs (Courthope's Life, pp. 73, 387ˆ407). By Wych¬ erley Pope was introduced to William Walsh of Abberley, in Worcestershire, the critic and minor poet, who enjoined his young friend to make correctness his <(study and aim® (Spence, p. 280), in other words, ((to study not only accuracy of expression,® but also ˆpropriety of design and justice of thought and taste® (Court- hope's Life, p. 25). It has been shrewdly sug¬ gested that in all probability Pope's native bias to these things suggested the judicious coun¬ sels of the critic whom Pope afterward styles (Congreve, and Lord Lansdowne.

Pope's first important publication was his (Pastorals) (1709). After the

18th century fashion, these were much circulated in manu¬ script, and they were already well known to most of the contemporary literati long before they were printed. They appeared at the be¬ ginning of the sixth volume of Tonson's (Poetical Miscellanies* (which also included a modernization by Pope of January and May, Chaucer's Merchant's Tale*); and exhibiting, as Johnson says, ((a series of versification which had in English poetry no precedent,® met with complete success. Two years later appeared the (Essay on Criticism,) said to have been written in the year in which the (Pastorals* were printed. In this poem Pope aimed at oc¬ cupying much the same place in English as

Horace had occupied in Latin with the (ˆrs Poetical and Boileau in French with the (Art Poetique5 ; and the performance, though of necessity a cento, was certainly an extraordi¬ nary one for a youth of three and twenty. Addison, who noticed it in Spectator, No. 253, certainly did not <(damn it with faint praise" when he called it <(a masterpiece in its kind," which contained things that <(would have been very much admired in an Ancient Poet," though he regretted the freedom with which the writer already spoke of his brother moderns. But the commendation shows how closely Pope had fol¬ lowed the injunctions of Walsh; and moreover, fully justified him in offering to Steele's and Addison's paper (No. 378), his next effort, the (Messiah,5 a sacred Eclogue modeled on the (Pollio) of Virgil. By this time his style was formed, and his metrical skill developed to an extraordinary point of excellence. Nothing was wanting but a theme suited to his peculiar gifts.

This theme he found in a little piece which, as a matter of fact, in its first form, preceded the (Messiahˆ namely the hero-comic (Rape of the Lock,5 contributed in May 1712, to an¬ other (Poetical Miscellany,5 that of Bernard Lintot. It is a flawless piece of executive jewel-work, the fragile theme of which is the theft of a lock of hair by Lord Petre, a Roman Catholic peer, from a noted beauty, Miss Ara¬ bella Fermor. Out of this trifling amatory escapade had arisen a family estrangement, which Pope was invited to reconcile by his rhymes. His poem was more successful than his purpose. Upon this he extended his plan, and improved it. Not content with the ((let well alone" of Addison, who called it

He was now launched, and his future popu¬ larity assured. His next

works were (Windsor Forest, 5 of wThich he borrowed the design from Denham's (Cooper HilP ; and the in its extended form (1714) and another imi¬ tation of Chaucer, (The Wife of Bath,5 came a second modernization from the same source the longer (Temple of Fame.5 But the great event of 1715 was the publication in June of the first four books of the translation of the Uliad.5 Proposals for this had been issued in 1713, and the generous advocacy of a new friend, Swift, had largely swelled the subscrip¬ tion list. The task progressed until, in 1720, the Iliad was completed in six quarto volumes, dedicated to Congreve. Then came the Odys¬ sey,5 in which the poet was assisted by two subordinate ((hands," William Broome, 1683- 1745, and Elijah Fenton (1683-1730). By these two works Pope must have cleared from £8,000 to £9,000. But though he subsequently boasted, that, thanks to Homer, <(he was indebted to no prince or peer alive," it is only just to recall the fact that while he was right in contending that no bounty was involved, his subscription list would have been considerably contracted if his

patrician supporters were withdrawn. For this famous paraphrase itself, it must be admitted that its fame has somewhat — perhaps too much — faded at the present time. It may be that, in Gibbon's epigram, ((it is a portrait with every merit but that of faithfulness to the original," — it may be that, as Bentley said ((it is a pretty poem, which must not be called Homer"; but it is at least a triumph of uniform versification, and a surpassing example of sus¬ tained achievement. In that full-wigged Age of Anne, for the meridian of which it \vas ex¬ pressly calculated, it bulks largest of the poetical output ; and its influence extended far beyond its period of production. No one has written more indulgently of it than one of Pope's modern rivals, Professor Conington: ((It has been — I hope it is still — the delight of every intelligent schoolboy; they read (of kings and heroes and of mighty deeds5 in language which, in its calm, majestic flow, unhasting, unresting, carries them on as irresistibly as Homer's own could do, were they born readers of Greek; and their minds are filled with a conception of the heroic age, not indeed strictly true, but almost as near the truth as that which was entertained by Virgil himself." ((Misc. Writings,5 1872, i. 43.)

A minor incident connected with the (Iliad5 was the misunderstanding between the trans¬ lator and his first critic, Addison, to which it gave rise. Pope's frailty of constitution l^d him easily to magnify mole hills, and his liter¬ ary suceptibilities were painfully morbid. His relations, moreover, with Addison had already become strained. Addison, as we have seen, had deprecated that recasting of (The Rape of the Lock,5 which subsequently proved so fortu¬ nate. Pope's suspicious nature

resented this advice, especially in view of the result. When again Pope championed Addison against the rancorous old critic, John Dennis, Addison had not approved — he could hardly be expected to approve — the peculiarly Swiftian character of Pope's warfare. Finally, by an unfortunate coincidence, when Pope's Uliad5 was announced, a rival version was put forward by Addison's bosom friend, Thomas Tickell (1686-1740), which Pope perhaps not unnaturally regarded as prompted, if not edited, by Addison himself. Modern criticism has failed to find any valid ground for this supposition. But the cumulative result of Pope's irritation was the cruelly clever portrait of Addison as <(Atticus" which 18 years after Addison's death, found its final place in the Prologue to the Satires (((Epistle to Arbuthnot") . Upon the faith of Spence's (Anecdotes,5 pp. 148-149, it was long held that Pope, in his first anger, had actually sent the lines to Addison ; but this is now held not to be probable (Courthope's (Life,5 1889, p. 161) ; and Spence's entire account is con¬ jectured to be a fabrication by Pope arising out of his desire to establish beyond a doubt the fact that the character was not written after the death, but during the life of Addison. In any case, the <(Atticus" is a matchless piece of writing, and (as even Addisonians must allow), in some particulars, presents — to quote Thack¬ eray on Dennis portrait of Steele — <(a dread¬ ful resemblance to the original."

After the already-mentioned (Temple of Fame,5 Pope's published works were the v Elegy

to the Memory of an Unfortunate Lady,* a poem probably idealized from the story of a Mrs. W eston of Sutton, whose relations with her husband had not been of the happiest (Courthope, 133) ; the (Epistle of Eloisa to Abelard, > which is supposed to owe something of its passionate rhetorical imagery to the feel¬ ings entertained at this date by the writer for Lady Mary Wortley Montagu; and, in colla¬ boration with Gay and Arbuthnot, the dramatic skit upon Dennis and others entitled (Three Hours after Marriage* which ignominously failed at Drury Lane in 1717, to which year the pieces above mentioned also belong. In 1725, appeared an edition of Shakespeare in six quarto volumes which has no more authority than that of Johnson. Then, in May 1728, came the first edition of The Dunciad, Pope's famous onslaught upon those swarming hacks and poetasters of the day, whom his heated imagination exaggerated into an army of per¬ sonal enemies. In 1729 followed a more per¬ fect edition with a dedication

to Swift. Other issues succeeded; and, in 1742, was added a fourth book directed against dunces theologic and scientific. The scheme of the poem de¬ scribes the elevation, with fitting ceremonial, of Lewis Theobald (who had earned Pope's hatred by certain merited strictures on his Shakespeare) to the throne of Dulness, then vacant by the death of Dryden's (Mac Fleck- noe) Shadwell, —

" without dispute

Through all the realms of Nonsense absolute."

In 1742 Pope gratified a new antipathy by sub¬ stituting Colley Cibber for Theobald, a change which can scarcely be said to have been an im¬ provement. The Epos of the Dunces remains nevertheless a magnificent satire upon a subject which is not worthy of the powers it called forth, though it is perhaps the culminating ex¬ ample of the combative gifts of its author. Ruskin goes even so far as to call it <(the most absolutely chiselled and monumental work (exacted> in our country® (Lectures on Art, 1870, p. 70).

Swift has the credit of eventually prompting the 'Dunciad.* Pope's next effort, the 'Essay on Man,* is inscribed to another ((guide, philoso¬ pher and friend,® Bolingbroke. <(One truth is clear, Whatever is, is right® — which is the last line of the first of its four epistles, might be de¬ scribed as the keynote of his attempt "to vin¬ dicate the ways of God to Man.® The writer's metrical dexterity, his power of crystallizing precept, and his executive skill generally, were never shown to greater advantage than in this work ; but the consensus of criticism has come to the conclusion that he was not in complete sympathy with, if indeed he thoroughly compre¬ hended, the philosophical tenets of the meteoric genius whom Ife terms ((the master of the poet and the song.® Hence critics like the late Sir Leslie Stephen have come to describe the argu¬ ments as ((confused, contradictory, and often childish.® Yet, although the poem labors un¬ der these disadvantages, and although, more¬ over, it is only part of an unfinished whole, it had an extraordinary popularity with its first public, and also on the Continent, where, in its translated form, it must have made its appeal by its matter rather than its manner.

To Bolingbroke also Pope owed what must

ever be regarded as his greatest and most per¬ sonal performances, his (Moral Essays * and his (Satires and Epistles. * The 'Moral Essays) appeared from 1720 to 1735; the (Satires and Epistles* from 1733 to 1738. These last are un¬ rivaled in their pungent criticism and por¬

traiture of contemporary character and man¬ ners. <(It is no paradox,® said the late Rector of Lincoln College, Mark Pattison, ((to say that these

The discussion of Pope's untiring literary labors has left his life somewhat in the back¬ ground. In April 1716, not long after the ap¬ pearance of the first instalment of his Homer he moved from Binfield to Chiswick, where he lived in what is now known as Mawson's Row. In 1717 his works had become numerous enough to fill a handsome folio volume which was issued by Tonson and Lintot, with its author's portrait engraved by George Vertue after Charles Jervas. In October of the same year his father died; and he moved with his mother to a little villa at Twickenham in which he thenceforth resided, "twisting and twirling and rhyming and harmonizing® five acres of garden until it became "two or three sweet little lawns, opening into one another and surrounded with impenetrable woods.® Here he received his friends, among others the Joseph Spence, to whom we owe the bulk of our Popiana. In 1733 his mother, to whom he had always shown an exquisite filial affection, and whom he tended lovingly to the last, died at an advanced age. Ten years later he himself was passing away, prematurely old, and worn out with asthma and dropsy, though scarcely 55. To the end he continued to "dispense his morality® (in the form of his Ethic epistles), and to revise and rearrange his other poems. Finally he died at Twickenham, 30 May 1744, and was buried in the middle isle of the parish church, where 17 years later a monument was erected to him by his literary executor, Bishop Warburton. In 1730 Gilliver had published a second volume of his poems, and in 1737-41 had appeared two corresponding volumes of his letters, etc. The story of these last, — of the artifices employed to secure their publication, of their manipula¬ tion and readjustment to suit the writer's own views would take too long to tell here. But the subject has been amply discussed in Dilke's 'Papers of a Critic, * 1875, in the "Introduction to Pope's Correspondence® (Vol. VI,, 1871) of Elwin and Courthope's 'Works,) and in Court- hope's 'Life> (1889).

Pope was never married. At one period of his career he had cherished a passion for the brilliant Lady Mary Wortley Montagu, by whom he was encouraged and scorned, treat¬ ment for which he took his revenge fiercely in subsequent satires. But his greatest feminine friend was Miss Martha Blount of Mapledur- ham, an old acquaintance of the Binfield days, with whom he renewed his relations at Chis¬ wick and Twickenham, and whose friendship he retained at the close of his life. He had spent three or four hours a day with her for 15 years, he said in 1730; and the companionship,

which was prolonged for nearly 15 years more, seems always to have had a cheering effect upon his drooping and variable spirits. Into the tangle of gossip which has gathered about this connection, memorable among literary alliances, it is profitless to enter. But that Pope was de¬ votedly attached to his blue-eyed goddess there can be no manner of doubt.

Pope's character is so intimately connected with his personality that it is impossible to omit here some description of his habits and appear¬ ance. Though amiable and attractive in child¬ hood, his sedentary life and close application in early youth speedily affected a constitution not radically sound at the outset. He was remark¬ ably frail and small (four feet six), and he rapidly became deformed. As already stated he was a martyr to headaches. In his diet he re¬ quired to exercise the greatest caution ; and he suffered cruelly from any deviation from his regime. He was intensely susceptible to changes of temperature and climate. In his earlier days he was able to take horse exercise ; but in his manhood he could not dress himself without help, nor could he come abroad without being wadded with furs and stiffened with buck¬ ram. That these things reacted upon his views of life can scarcely be contested. <(He was the most irritable of the irritable race,® says one contemporary; Mens curva in corpore curvo, says another. <(He played the politician about cabbages and turnips,® says a third. Per contra, it must be remembered that, however sensitive, artificial and vindictive, he was a devoted son and an attached friend. And at least he was a genuine litterateur.

As a poet his general position is easy to de¬ fine. He was not a great lyrist; he was not a profound thinker; but he is a supreme artificer. Borrowing the heroic couplet from Dryden, he brought it, as the medium for didactic and satirical verse, to a pitch of perfection which has never been surpassed, though it has some¬ times been made monotonous by imitation. He could not, as we have implied, originate; but he could decorate to any extent. Granted the theme, he could develop it ; he could embroider it supremely; he could lend it every advantage in the way of condensed perspicuous and epi¬ grammatic exposition. The major part of his work is a triumphant exemplification of Addi¬ son's dictum that ((Wit and fine Writing doth not consist so much in advancing Things that are new, as in giving Things that are known an agreeable Turn.® This was Pope's chief function. With inspiration, with the unat¬ tempted or unimagined in poetry, he had

small concern. But he could express, in a given metrical form, and with faultless lucidity and finish, the best floating ideas in circulation at the time of writing. His gifts of wit and irony led him inevitably in the direction of the satire; and his high-water mark is his (Epistle to Ar- buthnotp which exhibits his varied and excep¬ tional powers in their fullest diversity.

Bibliography. — There are several early lives of Pope of which that by Johnson (

place to the 10 volume edition by Elwin and Courthope (1871-89). Good editions of the poems alone are (The Cambridge Edition,* edited by H. W. Boynton (Boston 1903) ; that edited with memoir by J. Dennis (London 1891) and the (Globe Edition* (New York 1899). Consult Spence's (Anecdotes,* by Singer (1820) ; Dilke's (Papers of a Critic) (above mentioned) ; Mark Pattison, (Essay on Man) (1869), and (Satires and Epistles) (1872) ; Con- ington (above mentioned) ; Abbot's (Concord¬ ance* (London 1875), and Montegut in Revue des deux Mondes (March 1888 for Pope's in¬ fluence abroad. Consult also Dennis, John, (The Age of Pope, 1700-1744) (London 1894) ; Chesterton, G. K., 'Varied Types) (New York 1903); Symonds, E. M., (Mr. Pope: His Life and Times> (ib. 1909).

Austin Dobson,

Author of (Life of Goldsmith, * iLife of Rich- ardsond etc.

POPE, Charles A., American surgeon : b. Huntsville, Ala., 1818; d. 1870. He received his education at the Cincinnati Medical College and at the University of Pennsylvania. From 1843 to 1847, Dr. Pope was professor of an¬ atomy and physiology at Saint Louis Uni¬ versity; from 1847 to 1853 professor of surgery and from 1848 to 1853 dean at the same insti¬ tution. From 1853 to 1867 he held the chair of surgery at the Saint Louis Medical College, the medical department of Washington University. He was president of the American Medical As¬ sociation in 1854 and after 1867 lived in Paris.

POPE, Franklin Leonard, American elec¬ trician: b. Great Barrington, Mass., 2 Dec. 1840; d. there, 13 Oct. 1895. He was a telegraph op¬ erator in 1857, assistant engineer of the Ameri¬ can Telegraph Company in 1862 and in 1864 while holding a similar position in the Russo- American Company made the first survey of the territory between British Columbia and Alaska. Later with Edison he invented the stock ex¬ change <(ticker,® in 1872. He invented the rail circuit for automatically controlling electric block signals, was editor of the

Electrical En¬ gineer, 1884-95; and president of the American Institute of Electrical Engineers in 1885. He published < Modern Practice of the Electric Telegraph) (1871) and 'Life and Work of Joseph Henry * (1879).

POPE, John, American soldier: b. Louis¬ ville, Ky., 16 March 1822 ; d. Sandusky, Ohio, 23 Sept. 1892. He was graduated from the United States Military Academy in 1842, was assigned to the topographical engineers, served in Florida in 1842ˆ44, in 1846 entered the United States Army in Mexico during its ad¬ vance on Monterey, was brevetted captain, and in 1849 conducted the exploring expedition which opened up Minnesota an€ demonstrated the navigability of the Red River of the North. In 1853 he was in New Mexico, employed in surveys for the projected Pacific Railway; and in 1854-59 explored the plains and the Rocky Mountains, being the first to experiment in the irrigation of arid western tracts by means of artesian wells. After his return from these duties, he criticized the policy of President Buchanan in a lecture delivered at Cincinnati in February 1861 and for this action was sum¬ moned to a court-martial. The trial was, how-

ever, dropped. Made brigadier of volunteers in May 1861, he was assigned to command in Missouri, quickly organized at Commerce, Mo., an army of about 12,000 and in March 1862 effected the capture of New Madrid and Island No. 10. He was promoted major-general of volunteers and made brigadier-general in the regular army. He was then placed in com¬ mand of the Army of Virginia and fought the battles of Cedar Mountain and the second Bull Run. In the latter he was badly worsted by ˆStonewall® Jackson (q.v.) and on his return to Washington requested to be relieved from his command. He was thereupon transferred to the Department of the Northwest, where he directed a campaign against the Sioux ; and in 1865 was appointed to the command of the military division of the Missouri ; subsequently made the Department of the Missouri. Later he was in command of various military districts, of the Department of the Lakes and that of the Pacific and in March 1866 was retired with rank of major-general. From his defeat in the second battle of Bull Run developed the trial, conviction and subsequent restoration of Gen. Fitz John Porter (q.v.). He published Ex¬ plorations from the Red River to the Rio Grande) (in (Pacific Railroad Reports* vol. Ill) ; and (The Campaign of Virginia, of July and August 1862 * (1865).

POPE, John Henry, Canadian statesman: b. Eastern Township, province of Quebec, 1824; d. 1889. He received his education at the Compton High School ; took an active interest in Conservative politics after 1857 and after 1867 represented Compton County in the Cana¬ dian Assembly. In 1871-73 Pope became Min¬ ister of Agriculture in Sir John A. Macdonald's first Cabinet and held the same office in that premier's second Cabinet from 1878 to 1885. After 1885 Pope was Minister of Railways and Canals. With Tupper and Macdonald he ne¬ gotiated the contract for the construction of the Canadian Pacific Railroad which was later approved by the Dominion Parliament.

POPE, John Russell, American architect: b. New York, 24 April 1874. He was educated at the College of the City New York, and in 1894 was graduated at the School of Mines of Columbia University. In 1895 he was Fellow of the American Academy in Rome, and in 1896-97 held the Schermerhorn traveling fellowship in architecture. In 1900 Mr. P

POPE, William Burt, Methodist theologian: b Horton, Nova Scotia, 1822; d. 1903. He re¬ ceived his education at Richmond College, Lon¬ don and from 1841 to 1867 held pastorates in England, after which he held the chair of

theology at Didsbury College, Manchester. He published discourses on the Kingdom and Reign of Christ) (1869) ; (The Person of Christ) (1875; 3d ed., 1899); Ehristian Theology * (2d ed., 3 vols., 1877-80) ; (The Prayers of St. PauP (1876) ; (Sermons and Addresses> (1878) ; (A Higher Catechism of Theology) (1883). Consult Moss, R. W., (The Life of W. B. Pope, Theologian and Saint> (London 1912).

POPERINGHE, pop'rang, Belgium, town in the province of West Flanders, about four miles from the French frontier and five miles west of Ypres, with which it is connected by rail. It is an ancient town and in the 14th century was a rival of Ypres. Nearby were great hop gardens, tanneries and bleaching grounds. Most of the city's ancient landmarks were obliterated during the War of 1914—18 in the exceptionally severe fighting in Ypres and its neighborhood. Laces, linens and woolens were manufactured in considerable quantities previous to the war, when the population totaled 12,205.

POPHAM, pop'am, George, English colo¬ nist: b. Somersetshire, about 1550; d. 1608. Be¬ coming a partner of Gorges in projecting the colonization of Maine, he collected 120 men and sailed from Plymouth in 1607 with two vessels and arrived in August of that year at the es¬ tuary of the Kennebec. There he erected a small fort and storehouse and named the place Fort Saint George. He was chosen

president of the colony, the first English settlement in New England, but his death in the following year and the severity of the winters dishear¬ tened his followers who soon after his death abandoned the colony and returned to England.

POPHAM, Sir John, English jurist: b. Wellington, Somerset, 1531; d. 10 June 1607. He was educated at Oxford, studied in the Middle Temple and became sergeant at law in 1571. After having been speaker of the House of Commons in 1581 and Attorney-General in 1585 he was made lord chief justice in 1592 and held this post 15 years. He was a brother of George Popham, and in 1607 was associated with him and Sir Fernando Gorges in estab¬ lishing the Popham colony in what is now the State of Maine, the three holding a patent to an extensive tract of territory in that region.

POPINJAY, a parrot ; a figure of a bird formerly put up as a mark for archers to shoot at. The green woodpecker is also so-called in provincial parts of Great Britain.

POPISH PLOT. See Oates, Titus.

POPLAR, England, a metropolitan and Parliamentary borough of London, on the Thames between Limehouse Reach and Black- wall Reach. Area, 2,328 acres. The district is poor, overcrowded and depressing, with a high deathrate and containing the largest proportion of paupers in London, the latter being 43, four per 1,000 at Christmas 1913. Blackwall and the Isle of Dogs are in the borough, and the docks — East and West India and Millwall — afford employment to the laboring population. Engi¬ neering, shipbuilding and chemicals are the chief industries. The metropolitan borough in¬ cludes the Bow and Bromley and the Poplar divisions of Tower Hamlets, each returning one member. Pop. about 162,442. Consult Cow- per, (Descriptive Account of MillwalP (1853) ;

Forrow, (The Thames and Its Docks> (1877) ; Simmonds, (History of Poplar* (1870), and the publications of the committee for the survey of Greater London.

POPLAR, a genus (Populus) of trees of the family Salicacecu which includes only one other genus, Salix, the willows. The species, which probably do not exceed 25, are widely distributed in the Northern hemisphere from sub-tropical regions to the limits of vegetation both

in latitude and altitude. Half of them are American. They are mostly of small or medium size, quick growth and short duration; bear deciduous, broad, heart-shaped or lozenge¬ shaped leaves on long slender petioles ; dioecious, naked flowers usually in pendulous catkins which appear before the leaves ; and small two- to four-celled fruits (capsules) filled with cot¬ tony seeds. Their wood is generally soft, light and white. It is little used for timber or lum¬ ber ; but it is an important fuel wood in regions such as the Western States, where fuel is scarce and costly. The trees are often planted for this purpose and for windbreaks, their rapid growth being in their favor. They are also favorites for copses and for pollarding (q.v.). The lumber called poplar is generally that of another tree, — the whitewood or tulip tree (q.v.). Poplars are used in enormous quan¬ tities for making wood-pulp paper, carboard, etc., especially in Ontario, Quebec and the New England States, where hundreds of acres of forest are cut for this purpose annually. As ornamental trees they are frequently planted to excess at summer resorts because they quickly make an effect. In such cases they give an air of cheapness to the place not observable where maples, oaks, etc., are prevalent. The latter should always be planted with poplars, in order to replace them.

Poplars are as easily propagated from cut¬ tings as currants or willows; in some cases the switches need only be stuck in moist ground. The choice horticultural varieties, especially the weeping kinds, are grafted. Suckers may be used, but since their removal generally induces the growth of many more suckers, this method must be practised with caution except where the ground is not valuable. The species will succeed in a great variety of soils from sand to clay, and in almost any situation, even in crev¬ ices on rocky mountain slopes. Some of them, however, especially the cottonwood, seem to thrive best in low alluvial land upon the mar¬ gins of streams.

The best-known species are probably the following: The Lombardy poplar (P . nigra, var. italica, also called P. pyramidalis, P. italica, P. fustigiata, etc.) is probably a native of Asia, whence it has spread to the Mediterranean re¬ gion and thence to temperate countries through¬ out the world. It is noted for its erect instead of spreading habit, which makes it a striking specimen in ornamental plantings. It grows very rapidly, attains a height of 100 to 150 feet, but is not long-lived in the coldest States and most of Canada. It is one of the worst species to produce suckers ; hence it should not be planted where the soil will be disturbed by cul¬ tivation.

The black poplar (P. nigra) is a native of northern Asia and Europe, and is occasionally seen as an escape in America east of the Mis¬

sissippi River. It is of rather pyramidal habit, less erect, however, than its variety the Lom¬ bardy, and of darker colored foliage and slower growth than the cottonwood. It seldom ex¬ ceeds 100 feet in height. The down from its seeds has been used for paper, hat and cloth¬ making in France, but the industry has been abandoned as unremunerative. The wood, which is not prone to shrink and swell, is used for turning, cabinet-making, toys, flooring, doors, etc.

The Carolina poplar (P. deltoides) is an American species well known from New Brunswick to the Rocky Mountains and south¬ ward to the Gulf States. It is the largest of the genus, specimens sometimes attaining 150 feet in height and more than six feet in diam¬ eter. It is also one of the most valuable, its timber being considered useful for nearly all the purposes mentioned. It is also more highly prized for ornamental planting than any other species, since it not only succeeds well in all soils, but possesses qualities of stability and strength lacking in other species. Its bright, glossy foliage, constantly in motion, adds cheeriness and life to plantations as few other trees can. It is one of the most popularly planted species in the Western States, not only for shelter and for fuel but for timber and lum¬ ber. In Europe it is often called the Canadian or Italian poplar. It has several horticultural varieties, among which a striking form >s the golden-leaved P. vangeertii, which is one of the choicest of yellow-leaved trees.

The balsam-poplar or tacamahac (P . balsam- ifera) is indigenous from Newfoundland to British Columbia and extends well into Siberia, its southern limits, except in the mountains, being about Pennsylvania. Its erect growth re¬ sembles the Lombardy poplar, but it is slower in growth, more rugged and hardy. The type species and its three well-marked botanical vari¬ eties exceed the cottonwood in variability. A closely related species is the balm of Gilead (P . candicans), a well-known tree, frequently planted, with large buds noted for their spring fragrance. It is indigenous from Nova Scotia to New Jersey and westward to Minnesota, and is less pyramidal than the type species, usually making a rather broad top. It seems to be dis¬ appearing from the woods, though formerly it was a large tree sought for its timber. For the dark tone of its foliage it is often planted as a background tree, but not in smoky localities.

The white poplar or abele (P. alba), a European and Asiatic species, which grows about 75 feet tall, has been introduced into America, where it has become naturalized, from Nova Scotia to New Jersey. In Europe it is used for many of the purposes mentioned above. The European aspen (P. iremula), common in both Asia and Europe, is

known in America mainly by its weeping variety (P. tremula, var. pcndula). The American aspen (P. tremuloides) is one of the first trees to ap¬ pear in clearings, thus acting as an important agent in reforestation, holding the soil until slower-growing trees can obtain a start. (See Aspen).

About 100 species of insects feed upon the poplars in America. Among these are several species of plant-lice, leaf-miners and! leaf- rollers (qq.v.). Among the caterpillars which

feed upon the foliage, the most common are probably the larvje of the antiopa butterfly, the io moth, tussock moth and poplar span-worm ; also several general feeders of the families Noctuida and Geometridcu. These creatures may be controlled by spraying, when practical, with arsenites. (See Fungicide). There are also a large number of borers which live in the trunks or twigs. The roots and trunk are attacked by Prionus laticollis, which also feed upon pine and apple trees and grape vines.

Consult Sargent, (Silva of North America> ; Packard, (Insects Injurious to Forest Trees) (Washington 1890).

POPLAR BLUFF, Mo., city, county-seat of Butler County, on the Big Black River, and on the Saint Louis, Iron Mountain and Southern, the Saint Louis and San Francisco and the Butler County railroads, about 125 miles south of Saint Louis. It is in a section where lum¬ bering and the manufacture of lumber prod¬ ucts are given much attention. Stock-raising is carried on to a considerable extent. In the vicinity are valuable clay deposits. The chief manufactures are foundry and machine-shop products, cooperage products, brick and lumber products. The city owns and operates the waterworks. Pop. (1920) 8,042.

POPLAR SPRING CHURCH (PEE¬ BLES' AND PEGRAM'S FARM, Vaughan Road), Battle of. In co-operation with the movement against Richmond from the north side of James River, 29 Sept. 1864 (see Fort Harrison, Battle of), General Grant ordered a movement from his left, south of the river, in a northwest direction toward the Boydton road and South Side Railroad, the intention be¬ ing to extend his intrenched line beyond the Weldon Railroad in the direction of the South Side Railroad. General Warren, with Griffin's and Ayres'

divisions of the Fifth corps, was first to secure the junction of the Squirrel Level and Poplar Spring Church roads, coming in from the southwest, at which point the Con¬ federates had intrenchments covering the roads. General Parke, with Willcox's and Potter's di¬ visions of the Ninth corps, was to follow War¬ ren and form on his left, then both were to advance toward the Boydton road. Gregg's cavalry division was to move on the Vaughan road and other roads on the left and rear to the crossing of Hatcher's Run, where the Con¬ federates had a redoubt at the termination of their intrenchments. At 7.30 a.m., 30 Septem¬ ber, Griffin and Ayres moved out of their in¬ trenchments at Globe Tavern, advanced cau¬ tiously three miles through a dense growth of woods and encountered a Confederate picket¬ line behind light works thrown up along the road in front of Poplar Spring Church. . This line was driven in, and the advance continued, until it came under a sharp fire from a line of works on Peebles' farm, held by Dearing's cavalry brigade and some infantry. A short halt was made, the order to assault was given and the works were carried with small loss. On the left Parke moved through a narrow belt of timber, in a northwest direction toward the Boydton road, and encountered the Con¬ federates on Pegram's farm. The forces hold¬ ing the Petersburg intrenchments were < A. P. Hill's corps and B. R. Johnson's division of infantry, with Wade Hampton's two divisions

and Dearing's brigade of cavalry, all under command of A. P. Hill. The main Confederate line of intrenchments had been extended in a southwest direction nearly to Hatcher's Run, covering the Boydton road and South Side Railroad. Hill threw out two divisions, which came into collision with Potter's division, flanked it on the right and drove it back in some confusion. A new line was now formed by Parke, with Willcox's troops, which, with Griffin's line on the right, after a spirited en¬ gagement, checked the Confederate advance about dark, after a loss in Parke's command of nearly 500 killed and wounded, and many pris¬ oners. Late in the afternoon next day (1 Octo¬ ber) Mott's division of the Second corps came up, and on the 2d Parke advanced, under a heavy fire of artillery and musketry, and estab¬ lished a line of intrenchments about a mile from that of the Confederates, connecting on the right with the line held by the Fifth corps, and on the left reaching the Weldon Railroad and extending to the left and rear. On the left and rear Gregg's cavalry, 30 September, drove back Dunnovant's cavalry brigade, and next day was heavily attacked by Hampton's cavalry on the Vaughan road, but he repulsed the attack, inflicting heavy loss. The Union loss, 30 September, 1 and 2 October, was 187 killed, 900 wounded and 1,802 missing. The

Confederate loss is not certainly known, but is estimated at less than 1,000. Consult (Official Records J (Vol. XLII) ; Humphreys' (The Vir¬ ginian Campaign of 1864-65 > ; Powell, his¬ tory of the Fifth Army Corps) ; (Battles and Leaders of the Civil War* (New York 1890).

POPLIN, in textile manufacture, a kind of finely woven fabric, made of silk and worsted. In the best poplins the warp is of silk and the weft of worsted, a combination which imparts peculiar softness and elasticity to the material; in the cheaper makes cotton and flax are sub¬ stituted for silk, which produces a correspond¬ ing deterioration in the appearance of the stuff. The manufacture of poplin was introduced into Ireland from France, where it originated, in 1775 by Protestant refugees, and Ireland is still famous for its production. The Irish fabrics having a silk warp and worsted weft and in the common grades cotton or flax is mixed with the silk. The term ˆpoplin® is a corruption of the French papeline.

POPOCATEPETL, po-po-ka-ta-pet'l, a volcanic mountain of the province of Pueblo, Mexico, about 40 miles southeast of the city of Mexico, whence it can be seen as if near at hand because of the clear air of the intervening country. ((Smoking Mountain® is the meaning of its name, an Aztec compound, and it is con¬ stantly sending out smoke and ashes, and occa¬ sionally cinders and stones, but has 1 ad only two or three small eruptions in the last four centuries, the last recorded being in 1540. Its height is 17,784 feet, considerably more than that of Mont Blanc, and it was long reckoned the highest mountain in North America. There are oak and pine forests on its sides to a height of 12,540 feet: then a stretch of sand and sul¬ phur before the snowline at 14,960 feet. There are small glaciers on the eastern slope of the mountain. The crater is much smaller than commonly reported, being probably not more than one-fifth of the famed three miles in cir-

cumference; its depth, reported as 1,000 feet, seems to be actually only 250. Indians gather sulphur from the rim of the crater. Some of Cortes' men explored the mountain in 1519; three years afterward Montano seems to have reached the top and let himself down into the crater; in 1827 Glennie and Taylor made the ascent.

POPOFTSCHINS. See Religious Sects.

POPOL VUH, po-pool' voo, the sacred book of the Quiche (q.v.).

POPP.ZEA SABINA, po-pe'a sa-bi'na, Ro¬ man empress, wife of Nero: d. 65 a.d. She was the daughter of Ollius and married Rufius Cris- pinus, Praetorian prefect, was divorced by him and married to Otho, who in his turn was set aside for the Emperor Nero. She was famous for her beauty, but heartless and immoral. At her desire Nero murdered his mother, Agrip¬ pina in 59, divorced and put to death his wife, Octavia in 62, after which thev were married. Three years later she was killed by Nero in a fit of rage. The one redeeming incident in her career seems to be the mercy she urged upon Nero in behalf of the Jews.

POPPY, a popular name for several plants of the family Papaveracece ; for instance, Cali¬ fornia poppy (Eschscholzia calif o mica) . horned poppy (Glaucium), Welsh poppy (Meconopsis cambric a) , prickly poppy (Argemone spp.), celandine poppy (Stylo phorum diphyllum) , tulip poppy (Hunnemania fumarice folia) and various species of genus Papaver. Unless mod- fied by some adjective as above the term usually refers to members of the last-named genus.

The 50 species of Papaver are annual and perennial herbs, mostly indigenous to the Medi¬ terranean region. One is South African, one Australian and a few North American. They are smooth or bristly; have a milky juice; usu¬ ally dissected or lobed leaves on long peduncles; showy flowers of very varied tints and forms, and capsules containing very numerous small seeds. For several centuries some of the species have been leading garden flowers, not only because of their color and form, but be¬ cause of their ease of cultivation. The seed should be sown very early in the spring where the plants are to remain. Any • good, well- drained garden soil will do, but it should be finely broken up and the seed covered very thinly. The seedlings should not stand closer together than six inches for the weak growing kinds and 12 inches for the strong. The re¬ moval of the pods as soon as the flowers fade will prolong the blossoming season. If allowed to ripen the seed will stock the garden as weeds. Such plants blossom about two weeks earlier than spring-sown ones. The perennial species should be replaced by new plants each second year, since in cold parts of the country they are likely to winter-kill when old.

The most cultivated species are the opium poppy (see below) and the corn poppy (P . rhceas), a European annual with rather small flowers and finely cut foliage.

The Oriental poppy (P. orientale). a native of southwestern Asia, is a

perennial with large flowers.. The Iceland poppy (P. nudicaule), an Arctic species, is a remarkably beautiful per¬ ennial, which is usually grown as an annual ; it is perhaps the best snecies for cutting as a

bouquet flower. Other species are popular with fanciers, but have not gained prominent places in general esteem.

As a garden plant the opium poppy (P. somniferum), an annual, is the most famous since it has probably the widest range of color and form. It is, however, noted as the source of poppy-seed oil and opium (q.v.). The seeds, which contain no opium, are rich in a bland, fixed oil (about 40 per cent), which is expressed for culinary uses, and to a small extent for painting and soap-making. The growing of the plants for this puroose has been an important industry in the Old World for centuries. In mild climates the land is made very fine by plowing and harrowing in the autumn when the seed is sown ; in colder regions the seed is either scattered on the snow or sown in early spring, the land being prepared previously. Drilling and broadcasting are both popular. Shelter from wind is advisable to prevent scat¬ tering of the seed.

POPULAR SOVEREIGNTY. See

Squatter Sovereignty.

POPULAR VOTE. See Aliens; Elec¬ toral Qualifications; Woman Suffrage; Elections; Naturalization; Vote.

POPULATION, Growth of World Popu¬ lation from 1800 to 1919. One of the most

striking facts which we encounter in searching for the causes of the wonderful growth of world commerce in the past century is the dis¬ covery that world population has doubled within that period. In all the untold centuries in which man had existed on the globe, the number of people in the world in 1830 was but 850,000,000; to-day the world total is 1,700,000,000, or double that at the time when the application of steam to transportation enabled population to expand into hitherto unpopulated areas and supplied the means by which the products of those areas could be transferred to the continents where population exceeded the food-producing power.

World Population Doubled in 100 Years. — We may fairly fix the date of the practical ap¬ plication of steam to transportation at the year 1830. Fulton had shown the use of the steam¬ boat on rivers as early as 1807, and the little American steamer Savannah made the first steam voyage across the Atlantic in 1819, but it was not until 1838

that steam transportation across the ocean was regularly established. Steam engines had moved wagons on lines of rail as early as 1804 but it was not until 1825 that the first railway for the regular transporta¬ tion of freights, the Stockton and Darlington Railway in England was put into practical operation. The world's railways in existence in the year 1830 were but 200 miles; the world's steamships but 100,000 tons and none of those crossing the ocean.

So we shall do no violence to history if we fix the year of the practical application of steam to freight movement on land and sea at about the year 1830, in which the world's population was 850,000,000 or just one-half of that to-day. The total world population in 1919 is set down by the best authorities at approximately 1,700,000,000 and most of this totalization is by actual count, for countries representing more than two-thirds of the people of the world now take periodical censuses of

their respective populations. See the following table :

The Population of the Earth by Continents.

CONTINENTAL

Area in

Inhabitants

Per sq.

DIVISIONS

sq. miles

(number)

mile

Africa .

11,622,619

142,751,000

12.3

America, North. . . .

8,589,257

144,084,000

16.4

America, South ….

7,570,015

60,854,000

8. 1

Asia .

17,206,000

872,522,000

50.7

Australasia .

3,312,613

16,229,000

4.9

Europe .

3,872,561

464,681,000

120

Polar Regions .

5,081,935

Total .

57,255,000

1,701,321,000

29.7

The above estimates of areas of North and South America, Europe and Australasia, and of populations are compiled from the Statistical Abstract of the United States) and (The States¬ man's Year-book0 ; the estimates of areas of Asia and Africa are based on planimetric measurements of shore lines; the estimate of polar areas is necessarily an approximation, founded on known data.

The latest estimate of the earth's fertile region in square miles is 29,000,000; steppe, 14,000,000; desert, 4,861,000; polar, 6,970,000.

The population of the earth according to race is based on an estimate by John Bartholo¬ mew, F.R.G.S., Edinburgh, revised to 1910:

RACE

Location

Number

Indo- Germanic or Aryan (White) .

Europe, Persia, etc.

Greater part of Asia

North Africa and Arabia .

796,000,000

630,000,000

70,000,000

134,000,000

. 35,000,000

27,000,000

Mongolian and Turanian

(yellow or brown) .

Semitic or Hamitic

(white) .

Negro and Bantu (black). Malay and Polynesian (brown) .

Central Africa ....

Australasia and

Polynesia .

American Indian (red) . . .

Total .

North and South America .

1,692,000,000

Chief Causes of Growth in Last Century.

— What are the causes of this wonderful growth in world population in the past century, the addition in less than 100 years of as many as had been accumulated in all the centuries pre¬ ceding? While there are many causes the most important is that implied by the fact already mentioned that this growth is coincidental with the development of steam power for transporta¬ tion on land and ocean. Before the advent of steam transportation, man was entirely de¬ pendent upon his immediately surrounding area for food, manufacturing materials and manu¬ factures. When the population of a city or community became greater than the food pro¬ ducing power of the surrounding area, the peo¬ ple went hungry, diseases developed and life was shortened. When bad crop years came, there was suffering and starvation, and epi¬ demics swept off population by millions. Life was short, infant mortality high, epidemics fre¬ quent, emigration from the congested districts difficult, immigration into the unpopulated areas

equally difficult. The walled cities of Europe and Asia with their insanitary conditions and underfed population were popularly designated <(man destroyers,® and yet men still thought it necessary to congregate in walled cities or towns for mutual protection, and even those engaged in agriculture lived in little villages, going out to their fields in the morning and re¬ turning to their unsanitary homes at night. Of the 850,000,000 people on the globe in 1830, ap¬

proximately 700,000,000 existed on the single continent of Eurasia (which we now subdivide into (

Opening New Areas to World Population.

— But the application of steam power to trans¬ portation on land and sea changed all this. Great areas, especially in the interior of the Americas, which had remained unpopulated be¬ cause there was no way of moving their pos¬ sible products to the markets of the more densely populated continent, have developed population and production as the railways were projected into the interior and steamships built to carry their products across the oceans. The population of the United States prior to the advent of the railway was chiefly along the ocean frontage or the navigable rivers. Turn¬ pikes were constructed to enable the areas within a dozen or 20 miles of the river or ocean to move their products to the water's edge, but the great bulk of the fertile interior was too distant from the rivers or ocean to enable its scattering population to send their crops to world markets to purchase the manufactures of other countries. As a consequence the United States only added 6,000,000 to its population in the first quarter of the 19th century, a period in which it had no railways. In the next 25 years, about 9,000 miles of railway were constructed and the additions to the population were 12,000,- 000, or twice as great as the preceding quarter century in which there were no railways to stimulate the development of the interior. In the third quarter century the new railway con¬ struction was 63,000 miles and the addition to the population 21,000,000, or three and one-half times as much as in the like period before the advent of the railway. In the fourth quarter of the century the railway construction was 115,- 000 miles and the additions to population 32,000,- 000, or five times as much as in the quarter century when there was no railroads on the land or steamships on the ocean. In the 19 years of the present century, railway construction has been about 75,000 miles and the additions to the population 28,000,000.

Increase of Population and Commerce Co¬ incidental with Railway Development. — The

population of the entire United States when railway building began in 1830 averaged only seven persons per square mile ; to-day it is 36 per square mile. The population of the Missis¬ sippi Valley when railway building began was but 3,500,000 and to-day is 52,000,000, or 15 times as many as when that valley had no rail¬ ways to connect it with the oceans and no steamships to carry the products to other parts

of the world. During this period in which rail¬ way construction has developed, 30,000,000 peo¬ ple came from other parts of the world to the United States seeking homes, chiefly in the in¬ terior of the country, and with their aid and that of the native-born Americans, the com¬ merce was built up from a little over $100,000,- 000 in 1830 to $4,250,000,000 in the year preced¬ ing the great European War which by its special demand upon our facilities coupled with increasing demand from other parts of the world brought the grand total of approximately $10,000,000,000 in the fiscal year 1919. Our international trade in the year which preceded the European War was 30 times as much as at the beginning of railway construction in the United States, and in the closing year of the war 65 times as much as in 1830 when the United States had but 23 miles of railway.

In the other parts of the American continent, the increased facilities of transportation on land and sea have been followed by a marked growth of population and commerce. The com¬ bined population of all America which was but 20,000,000, a century ago is in 1919 fully 200, 000,000, and their international commerce which was then $200,000,000 is now $15,000,000,000, or 75 times as much as a century, ago when there were no railways to carry the products to the water's edge or steamships to move them across the ocean.

Growth of Population in the Various Sec¬ tions of the World. — Population has shown dependency upon transportation in all the grand divisions of the world. Europe, with a short¬ age of food and an increasing power to produce manufactures, has, since the advent of steam transportation, drawn upon the other parts of the world for food and raw material, and to pay for them in the products ot her factories, and the other parts of the world with surplus stocks of food and a shortage of manufactures have de¬ sired to make the exchanges which Europe wanted, and with these exchanges Europe has been able to greatly increase her already dense population, by drawing food from abroad and paying for it with the products of her work¬ shops, while the Americas, Africa and Austral¬ asia have increased their population and natural products and thus greatly enlarged their com¬ merce. The population of Europe a century ago was but 200,000,000; it is now 465,000,000. Asia had at that date about 400,000,000; now it is 870,000,000. Africa's population at that time was possibly 100,000,000 ; to-day it is 140,000,000, while that of all America has, as already indi¬ cated, grown from 20,000,000 in 1830 to 205,000,-

000 at the present time.

Transportation Facilities, Distribution of Industries and Specializaton of Production. — Steam transportation has thus enabled the newer countries to develop population by giving them access to the vast interior areas having large producing power, while it has also in¬ creased the population of the more densely populated countries of the globe by giving to them an opportunity to bring food from other continents at such small cost Of transportation that they could pay for it with products from their factories and at the same time still further increase their dense population, the im¬ proved conditions of living and better sanitary methods giving to their people greater comfort,

better health and a longer span of life than when they were dependent upon the immediately sur¬ rounding areas for their daily requirements. The ability of the inhabitant of the densely populated country to obtain his food from the areas which can more readily produce it is illustrated by a recent statement by a very high authority that a workman in England can now with one day's wages pay the cost of transporting a year's supply of bread and meat from the Mississippi Valley ' to his own door. The farmers of the Mississippi Valley can produce food more cheaply than those of Europe and they willingly take in exchange the manufactures with which the dense population of that continent desires to purchase its food¬ stuffs and raw material.

The Span of Life Lengthened by Medical Science. — It must not be supposed however that the increase of transporting power has been the only cause of the marvelous increase in popula¬ tion which has characterized the past century. Medical science and hygiene have greatly de¬ creased infant mortality and increased the span of life for those reaching maturity. No exact figures can be given by which to compare these conditions of the present time with those of a century ago, but it is an accepted fact that the Expectation of life® for the average human being is now much greater than formerly. And this has been a factor of considerable im¬ portance in the growth of world population.

Use of Machinery in Food Production. — Another factor is the ease with which food may now be produced through the use of machinery, which has thus reduced the amount of human labor and time required to produce a given quantity of the requirements of man. The United States Department of Agriculture states that the amount of human labor now required to produce one bushel of wheat is but 10 minutes against 133 minutes in 1830. This marvelous change is the result of

the applica¬ tion of machinery to the preparation of the land, the planting of the seeds and the harvest¬ ing and threshing of crops, while the labor re¬ quired to turn it into form for food has also been greatly decreased. The great slaughtering houses which now turn cattle and swine into fit form for food receive an endless procession of living animals at one entrance and with a few minutes of labor turn out the finished product at the exit, sending the fresh meats by refrig¬ erator cars and vessels to the markets on the opposite side of the globe and at the same time so conserving the by-products that the waste which accompanied the crude methods of former years no longer exists.

New Foods Increase the Power to Sustain Population. — Another reason for the increase in power of the world to supply the require¬ ments of man is found in the acceptance of new varieties of food which the increased facilities of transportation can now bring from other parts of the world or introduce for adaptation to the soils of countries in which they did not formerly exist. We of the United States, for example, are now bringing into this country over $100,000,000 worth per annum of food oils or the material from which they may be produced as against $15,000,000 a decade ago, and this use by us of the untold quantities of a highly valuable food formerly going to waste in all parts of the tropics is also occurring in

other parts of the world, especially the densely populated countries of Europe, which are rapidly increasing the use of vegetable fats from the tropics. Sugar, an extremely valuable article of food, has developed with astonishing rapidity as a result of cheap transportation and better process of manufacturing, and the world's pro¬ duction of sugar in the year preceding the war was 40,000,000,000 pounds against 4,000,000,000 pounds a half century earlier. The world's corn crop of which the United States is the world's largest producer is now about five times as much as 50 years ago. Meantime we have brought from other parts of the world many grain and other food products and so adapted them to our own soils and climate as to materially increase our power of sustaining a large population.

Increased Density of Population no Longer Considered Alarming. — Even those sections of the world long looked upon as densely populated go calmly on increasing their populations at a rapid rate and producing the bulk of their own food by the exertions of their

own people. Japan, for example, one of the most densely populated countries of the Orient, has doubled its population in less than 50 years, yet it imports comparatively very little food¬ stuffs, drawing its chief food supply from its rice fields with which the mountain sides are terraced and the surrounding seas whose fish¬ eries supply practically all of the animal food consumed by the people of Japan. These require the time of about 2,000,000 people in accumulat¬ ing and preparing the nearly $100,000,000 of sea food which that industrious people draw from the surrounding waters. Java, the most densely populated island of the world, has doubled its population in less than a half century, and its people, who now average more than 700 per square mile for the entire island, draw most of their food from the rice fields and the fishing industry, and have rendered the island ex¬ tremely prosperous with such valuable products as coffee, tea, sugar, spices, cinchona, tin, petro¬ leum and India rubber, which they exchange with other parts of the world for such require¬ ments as they are not able to meet from their own sources of production. Germany, with an area less than our State of Texas, had doubled its population between 1840 and 1914, and with a population 10 times as dense as our own was, be¬ fore it entered upon the great war, looked upon as one of the most prosperous countries of the world, drawing much of its food and manufac¬ turing material from other sections of the globe and paying therefor with the product of the manufacturing industries. England, with a population much more dense than that of Ger¬ many and equally dependent upon other coun¬ tries for food and manufacturing material, doubled her population in the past 60 years and ranks among the most prosperous of the world's nations, bringing its food and manufacturing materials from long distances and paying for them with the products of her work shops.

Relative Density of Population in Repre¬ sentative Countries. — We of the United States can scarcely realize how much greater is the density of population in certain other coun¬ tries than that of our own. We have in continental United States, exclusive of Alaska, an average of 36 persons per square mile, while

Germany has 325 per square mile, Italy 332, Japan 392, Netherlands 499 and England an average of 624 per square mile, or 17 times as much as our own. If all the people of the en¬ tire world were set down in continental United States, exclusive of Alaska, our average density of population per square mile would he less than that of England to-day. Yet England is looked upon as one of the most prosperous countries of the world and feeds her dense pop¬ ulation in large part with food brought from other countries, often from the opposite side

of the globe, and paying for the same with the product of her factories.

The Drift to Industrial Centres. — With this change in the habits of life among the people of the world, the exchange of food of the agri¬ cultural areas for the manufactures of other areas, the density of population in the manufac¬ turing areas has gone on increasing without the danger of starvation or food shortage which existed a century ago when cheap transporta¬ tion of food across the ocean was impossible. In England, for example, the share of the popu¬ lation living in cities of 10,000 or more was in 1800 but 21 per cent and 66 per cent in 1900. The British census of 1851 classed 49 per cent of the population as (< rural® and in 1911 only 22 per cent was classed as “rural.® The population of the 12 great cities of England was in 1820 2,000,000 and in 1919 is 9,000,000. In Scotland in 1800 only 17 per cent of the people lived in cities of 10,000 or upward; now it is over 50 per cent. In Prussia in 1800 only 7 per cent of the people lived in cities of 10,000 or more; in 1890 it was 30 per cent and at the beginning of the war ap¬ proximately 40 per cent. These changes are the result of a transfer of labor in the older coun¬ tries from agriculture to manufacturing and reliance upon younger countries for food and manufacturing material.

This habit of accumulation of population in dense masses and of drawing food from other areas better able to produce material of this character is exemplified in a striking degree in the United States which has recently become a great manufacturing country. The share of our own population living in cities of more than 10,000 was in 1800 only 4 per cent ; in 1890 it was 28 per cent, while the share of the population living in cities of 2,500 or more in 1910 was 46 per cent and at the present time is approxi¬ mately 50 per cent. Thus it may be said that even in this comparatively new country, with its large agricultural powers, approximately one- half of our population now live in cities or towns and draw their food and manufacturing material from other areas, some of them on the other side of the globe. While the United States is still the world’s greatest producer of both food and manufacturing material, it now brings from other countries, mostly across the ocean, about $2,500,000,000 worth of food and manufacturing material annually, and these two groups of material actually form 85 per cent of the merchandise imported into this country, much of it traveling half-way round the world before entering our ports. Great Britain is another example of the reliance upon other parts of the world for food, since with a pop¬ ulation less than half our own she brings in normal years nearly $3,000,000,000 worth of merchandise, chiefly food and manufacturing

material from other countries, much of it across the ocean.

Will the Recent Growth of Population Continue? — Now a word as to the future. The population of the world has doubled in the past century. Will it double again in the next 100 years? Probably not. The rate of growth has perceptibly slowed down in the past quarter century and is now at the rate which suggests a net increase of little more than 1,000,000,000 in world population during the next century, giving a grand total of about 3,000,000,000 as the world's entire population a century hence.

Can the world sustain a population of 3,000,- 000,000 as against 1,700,000,000 at the present time? Undoubtedly. The developments of science and industry will bring under the control of man vast areas now contributing practically nothing to his support. The great tropical and subtropical belt which stretches round the world between the 30th parallels of north and south latitude has about one-half of the land area of the globe, but now supplies but one- sixth of the products entering international commerce, despite the fact that its producing power per acre or square mile is double or treble that of the like area in the temperate zone. With the lessons of the war, man has learned to substitute the internal combustion engine for the horse which could not perform a satisfactory service in the tropics, and with this new instrument of production and trans¬ portation he will now, after long years of wait¬ ing, be able to conquer the tropics and multiply the production of the food and manufacturing materials which they can so easily turn out and for which the other sections of the world are clamoring. The producing power of the older and longer cultivated lands of the world is largely dependent upon the soil foods sup¬ plied, and with the lessons of the war, man has learned to reach out into the air and obtain unlimited quantities of that most im¬ portant of soil foods, nitrate, utilizing for that work the power of the waterfalls which has been going to waste in the past. The great deserts of the world now producing noth¬ ing have shown that they only need the appli¬ cation of water to render them more productive per acre or square mile than those of the areas now under cultivation, and man is grad¬ ually learning methods of bringing to them the necessary moisture from beneath the surface or from distant water courses, and at the same time has learned through the application of <(dry farming® to obtain enormous Quantities of food from areas formerly considered of little value as food producers. The substitution of the

internal combustion engine, utilizing gasoline, kerosene, heavy oils or alcohol, will take the place of the horse and thus release enormous areas of land hitherto devoted to produc¬ ing food for that animal whose services will be no longer required. The scien¬ tists of the world are showing us every day the feasibility of utilizing for food purposes untold quantities of natural products which have been permitted to go to waste in the past, while the world is also gradually coming to understand the importance of so conserving the products of nature as to render them far more valuable in the future than under the wasteful methods of the past.

Division of Labor and Specialization of Industry. — All of these things, the disposition of the densely populated countries to continue their growth of population by drawing foods from abroad and increasing their output of manufactures to pay therefor, and the disposi¬ tion of the agricultural countries to continue their growth by increasing their output and ac¬ cepting manufactures in exchange, means the application to world industries of that great economic law <(The Division of Labor and Spe¬ cialization of Industry.® Man long ago learned that this system would give better results in the operations of considerable groups of people under a single management. The manager of the successful factory divides the various proc¬ esses required for producing the completed article among a large number of people or groups, but keeps each man or group of men steadily at the particular part of the work in which he has thus become especially expert. By this process of distributing the various parts of the proposed article to small groups of indi¬ viduals and keeping each group continuously employed upon that particular part of the work, he increases the producing power of the factory and cheapens the cost of producing the articles being manufactured.

This system, of a division of labor and spe¬ cialization of production, so successful in the operations of comparatively small groups of men, is now being applied, perhaps unconsci¬ ously, to the production of the world, through the co-operation of cheap and. plentiful trans¬ portation. Europe, the United States and Japan have become the world's great manufacturers and the agricultural, forestal and mineral areas in other sections of the globe have become the producers of food and manu¬ facturing materials. As a result of the distribution of labor and specialization of pro¬ duction in the great world industries, the quan¬ tity of the respective articles which each group of men can produce has been greatly enlarged and the cost of production, measured by man power, correspondingly reduced, while cheap¬ ened transportation developed by another group of specially trained men enables the interchange of these articles at small cost.

As these great principles of division of labor and specialization of industry are ap¬ plied from day to day to the world production of the staples required by man, they are being, little by little, extended to such new articles or industries as may be developed by the ingenuity of the human mind. The producing powers of the whole world are thus steadily increased, while the amount of man power required for the production and distribution of the respective products is being decreased by the same process of specialization.

As a result of these conditions, the division of labor, the specialization of production and the cheapening of transportation, the world to¬ day is able to sustain a population double that of a century ago, with greater comfort, greater prosperity and a higher degree of intelligence than at that time. When we consider what has been done in this line in the last century, we may confidently expect that the world will be able to meet the requirements of such fur¬ ther additions to its population as the future may bring.

Population of the World 1800 to 1919.

Based upon official returns and estimates by accepted authorities.

(In millions)

Total

popula¬

tion

Europe

America

Asia

Africa

Austral¬

asia

1800.

630

175

10

365

75

5

1820.

760

208

20

430

95

6

1840.

950

238

45

560

100

7

1860.

1,205

295

690

110

8

1880.

1,430

350

140

780

120

10

1900.

1,550

410

170

817

130

13

1919.

1,701

465

205

873

142

15

O. P. Austin,

Statistician, National City Bank of New York.

POPULATION, Relation to Wealth to.

See Capital.

POPULIST PARTY, The. See People’s Party, the.

PORBANDAR, por-bun'dar, India, a sea¬ port town, capital of a native state of the same name, in the political agency of Kathiaway, Bombay. It is built on a creek on the southwest coast of Gujerat and has an active shipping trade with Bombay and Malabar. Pop. 19,000. The state has an area of 636 square miles and a population of 85,785.

PORBEAGLE, a shark of the family Lamnidce, more usually called mackerel sharks (q.v.), on the northeastern American coast. The best-known species is Lanina cornutica, the Beaumoris shark, which occurs in the north Atlantic, attains a length of 10 feet and feeds chiefly on fishes. The porbeagle has two dor¬ sal fins, a wide mouth, lanceolate teeth and very wide gill openings.

PORCELAIN. An argillaceous substance characterized by its translucency and vitrifica¬ tion; hence the ware made from the same is often so termed. These two qualities are not found combined in other pottery, earthenware being porous and opaque and stoneware being vitreous but not translucent. The derivation of the word is not clear, but some claim it comes from the cowry shell named porcellana (Italian) or porcelana (Spanish), part of the enamel coating of which has the appearance of porcelain.

Technology. — The body or substance of which porcelain is made is termed paste or pate (French). The Chinese hard-paste porce¬ lain (first to become known to Western civiliza¬ tion) is made up of certain proportions of clays known as kaolin and petuntse or cornish stone. Kaolin is frequently called china clay and cor¬ nish clay on account of its most prolific source of high quality being Cornwall (also Devon), England. Both kaolin and cornish stone are the natural products of weathered granite (pegmatite) . Kaolin is a silicate or alumina and infusible, while cornish stone (petuntse) , a feldspar containing silicate of alumina com¬ bined with potash, soda and lime or barium, is fusible and acts in the furnace to produce with the kaolin a molten mass of homogeneous texture and having conchoidal fracture like glass. Porcelain is generally divided into two main classes known as hard-paste and soft- paste or natural and artificial. The French vol.

know them as pate dure and pate tendre, terms very frequently used by English-speaking con¬ noisseurs. In general it may be said that the hard-paste is not scratched with a file or steel point while soft-paste is abraded under such a test. Soft-paste is slightly porous. While hard-paste porcelain is, as before stated, produced (body and glaze) from koalin and china stone, soft-paste was made (the Chinese clays being unknown at first) in imitation of the Eastern wares from substitutes after an enormous amount of research. But the old Sevres soft- paste was an artificial body and glaze of as¬ tonishing beauty and perfection, its unctuous, soft tone contrasting much in its favor on com¬ parison with the glaring whiteness of the Chinese natural porcelain body. Brongniard, the great ceramist and director at the Sevres works (middle 18th century), gives the follow¬ ing formula as a favorite at the royal factory : molten nitre, 0.220; gray sea salt, 0.072; alum, 0.036; Alicant soda, 0.036; Montmartre gypsum, 0.036; Fontainebleau sand, 0.600; all made into a frit (fused into a vitrified mass, then pulver¬ ized). This glassy substance was mixed with the following ingredients, in the following pro¬ portions, to produce the actual pate: Frit (as above) 0.75 ; calcareous marl from Argenteuil, washed, 0.068. A glaze formula was : calcined Fontainebleau sand, 0.27; calcined flint, 0.11; litharge, 0.38; carbonate of soda, 0.09; carbonate of potash, 0.15. The physical softness of this pate and glaze allowed the colors in tiie decora¬ tion to sink into pate and glaze so as to leave a lovely mellowness like wax. In 1769 Sevres started hard-paste. One considerable advantage which soft-paste has over hard-paste from the manufacturing point of view is the fact that less heat is required in the baking; but, hard- paste firing at from 2,462° F. to 2,642° F. with safety, while soft-paste permits only a margin of heat of from 2,012° F. to 2,102° F. gives hard-paste a safety margin against crazing of 180° F. against a range of but 90° F. for soft- paste firing. The firing, which is done in specially constructed ovens, takes place after the wares are stacked in safety, protected by fire-clay covers, known as saggers. The in¬ candescent heat of the hard-paste furnace is generally called by experts by the French term grand feu, sometimes hard fire, while the lesser heat required in baking the body of other wares is termed demi grand feu. The preparation of the clays for porcelain is done in blungers, sifting machines, etc.; the forming or shaping of the mass or body on the potters' mold or in the modern turning lathes, ((jiggers,w jollies,® all of which processes common to all classes of pottery, do not belong under this specialized head (see Ceramics; Clay; Pot¬ tery, and related references).

Colors. — The only colors that will stand the grand feu heats of hard

porcelain are : blue from cobalt, red from copper and celadon green and brown from iron. These, therefore, arc used under the glaze. In order to extend the range of colors on hard porcelain ware a sepa¬ rate firing becomes necessary, either in an oven of less heat or exposed in parts of the incandescent oven which are not reached by the most intense temperature. Of such are turquoise blue from copper; purple from manganese; yellow from iron with a propor¬ tion of antimony. Colors which will stand

in kilns of lesser heat are red, from iron oxide; brown, from iron chromate or man¬ ganese; green from copper; yellow from anti¬ mony; rose and purple from gold.

History. — No industry furnishes a history so full of romance as that of porcelain. The discovery of the porcelain body was made in China ; the first production having the char¬ acteristics of translucence with vitrification would appear to have taken place at the end of the 6th century. The cause of its discovery is the great love and reverence of the Celestial for jadestone. Carved jade was, par excellence, the most valued of the Chinaman's possessions, and it was in the attempt to obtain a substance with the qualifications of this hard, semi-trans¬ lucent, greenish-yellow mineral (nephrite) that kaolin was used for a body or mass, combined with other silicious material, and celadon was the outcome from which magnificent vases, bowls, etc., were produced. Celadon could not be called translucent. By the 7th century, at least, we know that at Changnanchin, called later Ching-te-chen, true porcelain w,as in course of manufacture in large quantities having the qualities of being translucid, stone-hard, reso¬ nant and of vitreous fracture — the natives called it Tzii to distinguish it from W a, earthen¬ ware. A description of the different lovely wares of the Chinese dynasties will be found elsewhere (see Chinese Ceramics). Already in the 16th century Chinese porcelain ware was becoming known in different parts of Europe as rare and lovely works of art of great value and Florence (under the Medici) attempted to make imitations, at the end of that century, of Chinese specimens in their possession. It was an artificial glassy porcelain made from im¬ pure china-clay (Terra-Vicenza) , fine white sand and powdered glass. With the growing admiration of Europeans for the Oriental porce¬ lains and the increasing numbers of superb collections among the royalty and nobility grew up an intense desire to produce the ware at home. The Jesuit priest, Pere d'Entrecolles, during his prolonged stay in China

gathered a mass of information as to the methods of manufacture of the coveted ware and sent de¬ tailed accounts home of his discoveries among the kilns of Ching-te-chen from 1712 to 1722. They did not bring about the discovery of materials for the porcelain body, however, though they assisted greatly in giving invalu¬ able information on the Chinese methods of porcelain decoration. To meet the popular clamor for pieces of pottery similar to the Oriental porcelains at a cost within the reach of the bourgeoisie of wealth the lovely speci¬ mens of blne-and-white underglaze and some polychrome pieces (see Chinese Ceramics) were reproduced in earthenware coated with a tin-glaze opaque white slip by the 17th-century Dutch potters at Delft. (See Delft). In spite of diligent search, the clays which produce porcelain remain unknown. The Japanese nation claims that its knowledge of art pottery was gained from the Koreans, but Chinese in¬ fluence introduced porcelain manufacture to the realm of the Mikado. With the Japanese con¬ noisseurs porcelain took a secondary apprecia¬ tion and earthenware alone received their patronage. The peculiar decorative talents of these islanders produced clever porcelain styles that quickly attracted European attention and

demand and the trading companies of Hol¬ land and England were soon importing great quantities of Japanese alongside the Chinese wares. The porcelains of Japan are described fully elsewhere. See Japanese Ceramics.

European Porcelains. — While both Flor¬ ence and Venice had produced pieces of art ware of porcelain appearance, these were but of glass body with admixture (perhaps) of ground Chinese porcelain fragments. Of recent years the honor of making porcelain ware in industrial quantity has been awarded to Rouen, where a good quality of ware was produced in an admirable soft porcelain body. In 1673 Edme Poterat (talented faience master) se¬ cured a license to manufacture in his earthen¬ ware works porcelain as well as faience. It was carried on till 1696 by Louis Poterat, a son, who when he died had never divulged the secret working formula. Several pieces of this rare ware are in Europe and America (Morgan collection). Pierre Chicaneau's por¬ celain factory at Saint Cloud was active as early as 1670 and the letters of several con¬ temporary notables testify to the fact that both in painted decoration and beauty of form and finish the ware fully equaled that of the Chinese. It continued in operation till 1766. A number of pieces are found in present-day collections proving the high duality of this ware, which, besides cups and saucers, includes tea-pots, milk jugs, candlesticks, spice-boxes, handles for .knives and forks. The delicate relief work is remarkable, but the pieces are rather thick. Johann Friedrich Bottger, a German alchemist,

was the first to make hard porcelain in Europe. His claims of power to turn base metal into gold caused Augustus *11, Elector of Saxony, to hold him in captivity in preference to turn¬ ing him over to the king of Prussia, who was anxious for him to carry out his proclaimed powers in Berlin. Bottger, under the protec¬ tion of the Elector, set up his furnace and laboratory in Dresden. But his failure to bring forth the precious metal caused him to be moved from place to place as a prisoner under associates of the king. After several attempts at escape his life was in danger from anger at his deceptions till he discovered the process of making a red stoneware of extreme hard¬ ness which stood polishing on the lathe, much to the pleasure of the king, and by 1707 he was producing much of the ware for the courts. In 1709 Bottger discovered kaolin in his neigh¬ borhood (a barber is said to have been using the white powder on his wigs and told him whence the mineral was derived). His suc¬ cess was so quick that large quarters for the making of his true porcelain ware became neces¬ sary and he was transferred to Albrechtsburg Castle at Meissen. He died in 1719, but the factory and its ware became the most noted in Europe. The progress of the Meissen styles is one of extreme interest and is fully de¬ scribed elsewhere (see Dresden Porcelain). Of equal note with the beautiful productions from Meissen, Germany, are those lovely crea¬ tions in soft porcelain made at Sevres, France. Established first at Vincennes, in 1738, this factory, which had come into possession of the king, was transferred to Sevres. As already described, the development of the Sevres pate was a fine art carried out with the most ex¬ haustive research. The Sevres body tran-

scended in delicate beauty and softness any¬ thing produced at Meissen and we are indebted to the fact that kaolin had not been discovered in that section that we inherit an artificial por¬ celain body that is the admiration of the world. The wealth of royalty caused marvelous pieces in the most delicate color decoration to be made for the court and for gifts to foreign rulers, regardless of the great expense in production. A full account of the history and products of this world-renowned porcelain will be found under another title (see Sevres). Already in 1725 Ciquaire Cirou had established a por¬ celain factory at Chantilly under the patronage of Louis-Henri de Bourbon, Prince de Conde. Beautiful figures, but mainly table services, ar¬ tistically decorated, were its chief products. Japanese decoration frequently is found on earliest pieces, for the factory license was granted to produce pieces in imitation of the Japanese porcelains. For Japanese porcelains

were becoming vogue with their clever kakiemon decorative methods. Chantilly factory re¬ mained active till 1800. And from now on many members of royalty and nobility aided in the starting of porcelain factories in different parts of France, even when the laws protecting the royal Sevres monopoly forbade the com¬ petition. Soft porcelain was made at Mennecy- Villeroy from 1734 till 1773 when the factory was transferred to Bourg-la-Reine, continuing till 1806. Others opened as follows: Lille (1711), Sceaux (1749), Orleans (1753), Crepy- en-Valois (1762), Saint Amand-les-Eaux (1771), etc. But about 1768 kaolin was dis¬ covered at Saint Yrieix (Haute-Vienne) and France turned to making hard porcelain at Orleans (from 1768) ; Brancas-Lauragais (1764), where kaolin and petuntse were also found as early as 1750; Vincennes (from 1765), Niderviller (1765), Vaux (1769), Luneville (1769), Arras (1770). At Paris alone we find the following hard porcelain factories estab¬ lished : Rue de Bondy, named after the Due d'Angouleme (1780) ; Faubourg Saint Antoine (about 1773) ; factory of the Comte d'Artois (about 1769) ; Clignancourt (1771) ; La Courtille or Basse Courtille, in the faubourg du Temple (1771) ; ((Prince des Galles® factory, rue de Cressol ; Duke of Orleans' factory in Faubourg Saint Antoine (about 1784), then transferred to Pont-aux-Choux ; rue Popincourt factory (1782); rue de Reuilly (1774) ; rue de la Roquette (1774) ; rue Thiroux (1775), made (

1757. The sculptor, Ernest Heinrich Reich- hard, got possession but turned over the place to J. E. Gotzkowski in 1761. Friedrich Elias Meyer, the modeler, was engaged with Jaques Clauce, the noted enamel painter and other skil¬ ful craftsmen. Lacking success Gotzkowski sold the factory (1763) with a rich stock, 133 figure molds and other valuable material for 225,000 thalers and the place received the title (

as the loss of Passau and the factory at Engel- hardzell. By 1816 decline set in and in 1827 Niedermayer retired, the fifth period opening with Benjamin Scholtz directing. He used cheap clay and made poor quality of ware and the factory declined still further till 1833, when Scholtz died and Baumgartner, professor of physics at the university, succeeded. A small profit was now made by producing common porcelain for domestic use. Later more artistic work was undertaken (1856) by Alexander Lowe, but in 1864 the factory was closed to stop the continuous loss. Holland had porce¬ lain factories at Weesp (about 1763), Oude Loosdrecht (about 1774) and The Hague

(1778),. but none lasted long. Switzerland, in Zurich (1763) and Noyon (end of the 18th century), had porcelain factories but they soon closed. Kaolin was discovered in Denmark (1756) and a porcelain factory was opened the same year in Copenhagen, which after changing hands was followed by a new factory in 1772, but it was no success till, in 1779, the king took up the works and it is still running and producing beautiful art work worth lengthy comment. In Italy, besides Florence and Venice before men¬ tioned early in this article, Doccia (1737) made both soft and hard porcelain ; Capo-di-Monte also made soft porcelain of lovely character and refinement from 1742 till 1759, when the king of Naples and Sicily became king of Spain and removed his factory to his palace of Buen- Retiro, near Madrid, where work continued till 1808. At Saint Petersburgh, Russia, about 1745, Empress Elizabeth started a hard-paste factory which has continued to this day. The chief work strongly imitates Meissen (Dresden) dur¬ ing the Seven Years' War period as the work¬ men were from Meissen; then followed Sevres style.

English Porcelain. — So far as known the first English soft paste was made at Chelsea (earliest specimen dated 1745). Bow is said to have produced artificial porcelain as early as 1730, but 1740 is generally considered the date of work on a commercial scale. Derby works were started in 1756 and Worcester was established in 1751. Other factories are those of Longton Hall (1752), Davenport (1794), Minton (1798), Spode (after 1797), Lowestoft (1756?), Liverpool (Herculaneum 1800), Caugh- ley (1772), Coalport (after 1814), Pinxton (about 1795), Church Gresley (1795), Nant- garw (about 1813), Swansea (1814). Kaolin and petuntse for making hard-paste porcelain were first discovered by Cookworthy (1758) in Cornwall and the first factory to make true porcelain was at Plymouth (1764) ; he sold out to Champion of the Bristol works (1770). Full description of the history and characteris¬ tics of the wares of prominent factories will be found under the titles Bow, Bristol, Chelsea, Derby, Lowestoft, Worcester, etc.

With the 18th century certain proportions of bone had been used in the ingredients compos¬ ing the porcelain body by certain factories ; with the beginning of the 19th century this hone paste had become standardized in all fac¬ tories and, as a consequence, the English <(stand- ard® or <(bone® porcelain swept aside all other kinds and the factories of the Continent found themselves faced with a condition in which the English porcelain factories filled all the common needs of the European table services with a pure

white, inexpensive, hard-porcelain, impossible of competition. The

ˆstandard® ware has been universally used for commercial ware ever since.

Bibliography. — Auscher, E. S., (A History and Description of French Porcelain (London 1905, trans. by Wm. Burton) ; Boyer, — , Nou¬ veau manuel complet du porcelainier et du faiencier> (Paris 1846) ; Brongniart, A., (Traite des arts ceramiques) (2d ed., Paris 1854) ; Bruning, A., (London 1906) ; id., (A His¬ tory and Description of English Porcelain* (London 1902) ; Church, Sir A. H., (English Porcelain made during the 18th Century, as illustrated by specimens in the national collec- tions) (London 1904) ; Davillier, Baron C. H., (Les origines de la porcelaine en Europe) (Paris 1882) ; Chavagnac, Comte de X, and Grollier, Marquis de, (Histoire des manufac¬ tures frangaises de porcelaine' (Paris 1906) ; Dillon, E., (Porcelain) (New York 1904) ; Dietz, R., (Das Porzellan) (Halle a. S. 1907) ; Nightingale, J. E., (Contributions toward the History of Early English Porcelain) (Salis¬ bury, England, 1881) ; Salvetat, M. A., cLegons de ceramique professees a l'Ecole Centrale des Arts) (Paris 1837) ; Solon, M. L., (Brief His¬ tory of Old English Porcelain* (London 1903) ; Turner, W., (The Ceramics of Swansea and Nantgarw* (London 1897) ; Wylde, C. H., (How to Collect Continental China) (London

1907).

Clement W. Coumbe, Technical Art Expert.

PORCELAIN CLAY. See Kaolin.

PORCELAIN TOWER, a tower which was erected in the early part of the 1 5th cen¬ tury and destroyed by the Taipings in 1853. It was octagonal in construction, had nine stories, faced with variegated porcelain (from which it received its name), and from these lamps and bells were hung. A miniature reproduction of the tower may be seen in the Green Vault in Dresden.

PORCH, a covered place of entrance to a building and differentiated from its principal mass. Its forms are various, sometimes extend¬ ing above by more than one story, sometimes enclosed save for the doorway, then again open to the outside on three sides, with its outer corners supported by columns or piers. It may be simplified into an overhanging hood or baldachino. In Byzantine and Eastern churches the porch was an enclosed atrium or narthex, a feature that has developed with modifications into the mosque of the Moslems. The enclosed atrium was retained in the early basilican churches and contained a fountain where wor¬ shippers might wash their hands. —

the origin of the present universal Roman Catholic practice of dipping the fingers in the holy water of the piscina. In this space, probably always called the narthex of the basilica, the penitent or un¬ baptized persons were compelled to stay. Such a structure may be seen in the church of San Lorenzo, in Rome, and Saint Apollinaire in Clusse at Ravenna. The narthex extended across the front of the church and its inner wall contained three doors that gave upon the nave and aisles of the main body. Of Ro¬ manesque churches, the porch of the. church of

\ ezelay is an important example ; while the church of Saint Germain l'Auxerrois in Paris shows a Gothic edifice with a porch extending across the front, dating from 1431, its horizon¬ tal crown in sharp contrast to the climbing lines of the main edifice.

Porches are characteristic of the Gothic style in Italy, though instead of being placed in front they often occupy positions on the flanks, thus forming side entrances. A remarkable speci¬ men in three stories, the upper and surmount¬ ing one of a pagoda-like structure, is attached to the church of Santa Maria Maggiore at Bergamo.

PORCIA. (1) The plebeian gens of Rome, flourishing from the 3d century b.c. and whose most famous family was that of Cato. (2) An ancient lady living in Rome, the daughter of Cato, of Utica. She became the' wife of M. Bibulus, who was Caesar's colleague in the con¬ sulship, in 59 b.c., by whom she had three chil¬ dren, and after his death married M. Brutus in 45 b.c., who later murdered Caesar. After the death of Brutus she committed suicide.

PORCUPINE, a rodent of the family Hystricidce. Porcupines are distinguished by the peculiar nature of the body-covering, which consists, especially on the back and haunches, of hairs specially modified to form the so-called quills, or dense, solid, spine-like structures. These quills are intermixed with bristles and stiff hairs, and in the American subfamily SynetherincB are almost concealed beneath the hairy fur of the body. The incisor or front teeth number two in each jaw and spring from permanent pulps, so that they continue to grow throughout the lifetime of the animal as in the other members of the order. There are four molar teeth on each side of each jaw, exhibit¬ ing complicated foldings of the enamel on both the internal and external sides ; and sometimes they, . like the incisors, continue to

grow throughout life from persistent roots. The skull exhibits an infraorbital foramen of very large size. The muzzle is generally short and broad. The lip is divided and the ears short and rounded. The anterior feet possess four and the hinder feet five toes, all provided with strong, thick nails. The tongue is roughened or, as in the Javan porcupine, may be provided with horny plates or scales.

The family Hystricidce is divided into two groups, Histricina and Synethcrina, or two sub¬ families, Hystricince and S pliingurince. The Hystricince or Old World true porcupines are terrestrial, and have imperfect clavicles and open rooted molar teeth. Thev fall into sev¬ eral genera. Of these the most familiar is Hystrix, represented by the true porcupines. The common or crested porcupine, Hystrix cristata, found in southern Europe and in northern Africa, is the best-known species. The true porcupines have non-prehensile tails, which may be spiny or covered with scales or bristles. When fully grown the common porcupine meas¬ ures nearly two feet in length, and some of its spines exceed one foot. The general color is a grizzled, dusky black. The upper part of its head and neck is furnished . with long, light-colored hairs, capable of being raised or de¬ pressed at pleasure; and most parts of the back and sides are armed with spines, which are

longest on the centre of the back. In their usual position they lie nearly flat upon the body, with their points directed backward; but when the animal is excited they are capable of being raised. The quills are – loosely inserted in the skin, and may, on being violently shaken, be¬ come detached — a circumstance which may probably have given rise to the purely fabulous statement that the animal possessed the power of actually ejecting its quills like arrows or darts at an enemy. These animals generally lead a solitary life, and inhabit burrows during the day, coming forth at night in search of food, which consists of vegetable matter. The common species is quiet and peaceable, but shows no disposition to become familiar or domesticated. An Indian form (H . leucurus) resembles the crested porcupine, but is larger.

The genus Atherura, including three species, possesses a long scaly tail, which is terminated by a tuft of bristles. The species of this genus occur in the Malayan region and West Africa. Th§ Atherura fasciculata , or brush-tailed porcu¬ pine, is a familiar species of this genus. The Synetherince , or American tree-porcupines, are easily distinguished by their well-developed clavicles, molars with closed non-growing roots, usually prehensile tails, the feet with tubercu- lated soles and the absence of the pollex. The three genera are confined to America.

The Canadian porcupine (Ercthizon dor- sata) is the best known, and

is a robust animal with a short non-prehensile tail. It is about two and a half feet long; of a brownish color, mingled with white ; the spines are about four to six inches long, concealed in the fur and at¬ tached in a very slight manner to the skin, and, from being barbed at the tip with numerous small reversed points or prickles, they by de¬ grees penetrate very deeply into the flesh after having once pierced it. Small and insignificant as these defensive weapons may appear, they are capable of severely injuring dogs, wolves or indeed any animal that incautiously attempts to seize the porcupine. These spines or quills were much used among the Indians to orna¬ ment different articles of dress; they dyed them various colors, in a very permanent manner. The Canada porcupine is found in the thickly wooded parts of northeastern United States and in Canada, the northernmost limit of its dis¬ tribution being the shores of the Mackenzie River and the southernmost the high mountains of Pennsylvania. They feed on the barks of various trees, apples, corn, etc. Their flesh is said to be very unpalatable, resembling flabby pork. They pair about the latter end of Sep¬ tember and the female brings forth two young in April or May.

The genus Synetheres of South America to Mexico possesses a distinctive feature in the elongated prehensile tail, adapting it for an arboreal existence. They are the true tree por¬ cupines. About 10 species of these animals are indigenous to America, the spines, as in the Canadian porcupine, being of much smaller size than in the Old World forms. In length the typical species of this genus averages one and one-half feet, the tail measuring about 10 inches.

Consult Stone and Cram, American Mam- mals) (New York 1902) ; Merriam, Adiron¬ dack Mammals) (New York 1884),

PORCUPINE ANT-EATER. See

Echidna.

PORCUPINE FISH. See Diodon.

PORCUPINE RIVER, a tributary stream of the Yukon. Fort Yukon is at the confluence of these rivers. The Porcupine is navigable for steam vessels a distance of about 100 miles and for about twice that distance for smaller craft. The lower Mackenzie is most easily reached via the Porcupine, and portage to the Peel River.

PORCUPINE-WOOD, the timber of cer¬ tain Oriental palms. See Palms.

PORDENONE DE SACCHIS, por-da-

no'na da sak'kes (or De Corticellis) really named Giovanni Antonio da Pordenone, Ital¬ ian painter : b. Pordenone, 1483 ; d. Ferrara, January 1539. He painted in his native home and worked without much influence from abroad, until in his 27th year he visited Venice and was captivated by the productions of Gior¬ gione, Palma and Titian. In 1535 he settled at Venice and before the end of the year was knighted by the king of Hungary (taking in addition to his own the name ˆRegillo®) , and in 1538 was summoned to the court of the Duke of Ferrara, who desired his services to prepare designs for Flemish tapestry, but here he died suddenly the following year. These are the few incidents of his life with which we are ac¬ quainted. His works consist of altar-pieces and frescoes, painted in the spirit of the Renais¬ sance. Of these the most important are the New Testament series of frescoes in the church of San Salvadore, Cotalto ; the paintings on the walls and roof of the cathedral chapels at Treviso; and those in the cathedral of Cremona (1520-22). He also painted the altar-piece of the cathedral at Pordenone — (The Madonna Attended by Saints) (1515). Most of the fres¬ coes 'he painted in houses and churches at Venice have perished. Several of his paint¬ ings are in England, notably his colossal figure of (An Angel > in the National Gallery, and a large picture of himself and family at Hamp¬ ton Court.

PORE FUNGI. See Fungi ; Polyporus.

PORGY, or PORGEE, name applied in different localities to any one of several differ¬ ent fishes. In eastern United States the scup (Stenotomus argyrops) , and occasionally the menhaden (Brevoortia tyrannus) are so named. The moon-fish or angel-fish (Chcetodipierus faber) is rarely so called. The Pagrus pagrus of European waters is called the red porgy. Consult Kingsley, T. S., (Standard Natural His¬ tory* (Vol. Ill, Boston 1885).

PORIFERA, the phylum of animals which includes the sponges, the term referring to the apertures or pores which characterize them. See Sponge.

PORISM, in geometry, a name given by ancient geometers to a class of mathematical propositions having for their object to show what conditions will render certain problems indeterminate. Playfair defined a porism thus: ((a proposition affirming the possibility of

find¬ ing such conditions as will render a certain problem indeterminate, or capable of innumer¬ able solutions.® Euclid's three books on porisms have been lost, and in consequence there has been much controversy as to what the ancients

meant by the term. The porism partakes of the nature both of a oroblem and of a theorem, without being exactly either.

PORK, the flesh of swine, is one of the most important and widely used species of ani¬ mal food. Fresh pork, though by some con¬ sidered a delicacv, especially when killed young, is a much inferior article of diet to beef or mutton, and is much less used. The flesh of pork, particularly the lean, is coarser and ranker than that of the other animals chiefly used for food, but there are certain advantages which give pork a place in the supply of animal food that can be filled by no other article. The appetite of swine being much more catholic than that of their daintier neighbors, the feed¬ ing of them answers the purposes of economy, and extends very materially the supply of food. This, it is true, is attended with considerable dangers. If care is not taken that the feeding of swine should be wholesome and cleanly, their flesh becomes tainted with disease and unfit for food. Unscrupulous breeders sometimes take advantage of their exorbitant and omnivorous appetite to make them consume the most dis¬ gusting offal, and even when their feeding is not conducted with this utter recklessness of consequences it is often less careful than is consistent with sound sanitary conditions. There is in fact no animal to the perfection of whose flesh as an article of diet careful at¬ tention to feeding is more indispensable. The main recommendation of pork lies in its su¬ periority to other kinds of animal food in undergoing the process of curing. The quality of beef and mutton is seriously deteriorated when long kept, even under the best methods of curing; that of pork is decidedly improved, and when of good quality and! well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipid¬ ity of other salted meat. Another recommenda¬ tion of pork is the abundance and very digesti¬ ble quality of its fat, which makes it a very suitable diet for cold climates, but which is, on the contrary, rather a disadvantage in hot ones. For long sea voyages, especially before the in¬ troduction of modern methods of keeping fresh meat, pork was by far the most common and acceptable form of animal diet, and it is still one of the most valuable items in naval stores. The swine was among the unclean animals for¬ bidden to be eaten by the Mosaic Law. It is still regarded by the Jews as specially typical of the unclean animals. The Egyptians, Arabians and other Eastern nations had similar opinions as to the use of pork. See Hogs; Nutrition of Farm Animals; Packing Industry;

Swine.

PORPHYRITE, a porphyritic orthoclase rock free from quartz; so named bv some petrologists, by whom the name has been ap¬ plied to various rocks generally of this char¬ acter. Some of these rocks, however, include varieties in which the orthoclase constituent is more or less replaced by oligoclase. Manv porphyritic dolerites have been also included under this name. By the presence of horn¬ blende it often approaches the composition of a syenite, with which it is frequently associated.

PORPHYRY (Porphyrios), Greek philos¬ opher of the Neo-Platonic school, celebrated as an antagonist of Christianity: b. either at Tyre,

whence he is called Tyrius, or at Batanea, the Bashan of Scripture, a town of Syria, whence he is also called Bataneotes, about 233 a.d. ; d. Rome, about 304. His original name was Mal- chus, from the Syrophcenician nielech, king. Longinus, whose pupil he became, gave him the title of Porphyrios, that is, purple-clad. He early became the pupil of Origen, and afterward studied under Apollonius and Longinus in Athens. At 30 he came for the second time to Rome to place himself under the teaching of Plotinus. Porphyry at first disputed the doc¬ trine taught him, in a treatise in support of the position <(that the things perceived by the mind exist out of the mind,8 which he submitted to Plotinus. Amelius, his associate and assistant, wrote a treatise in reply; and after some fur¬ ther controversy Porphyry read a recantation in the school. This incident is important, as indicating the teaching of Longinus, and pos¬ sibly by implication of Ammonius, the instructor of Plotinus. Porphyry finished by entirely adopting the opinions and obtaining the con¬ fidence of Plotinus, whose literary assistant and executor he became, and whom he induced to commit his views to writing. Porphyry was naturally of a hypochrondriacal disposition, and the abtruse mysticism of Plotinus incited in him a tendency to cherish thoughts of suicide, which Plotinus perceiving recommended to him a change of situation, and about 268 he went to Sicily. Here he is said to have written his treatise against the Christians in 15 books. It was publicly burned by the Emperor Theodo¬ sius, and is known only from fragments in the authors who have refuted him. Porphyry, as well as Plotinus, recognized Christ as an emi¬ nent philosopher; but charged the Christians with corrupting his doctrines. The philosophy of Porphyry is completely identified

with that of Plotinus (q.v.). Porphyry represented chiefly the religious phase of this philosophy, and we need here only refer to its relation to the popu¬ lar mythology and theurgy, which has been merely adverted to in the life of Plotinus. The best ancient philosophers found no difficulty in reconciling polytheism with the belief in one supreme and omnipotent God. Plotinus and Porphyry joined a belief in good and evil demons and a respect at least for the Greek mythology with their philosophical tenets. These beliefs have been the ground of accusa¬ tions of inconsistency against Porphyry, who dwells on them occasionally in his writings. He believed, as did Plotinus, in enchantment as a means of acquiring power over demons and the souls of the dead; but always ranked philoso¬ phy higher than mythology, and from his letter to the Egyptian prophet Anebo it appears that at a later period of his life doubts of the popu¬ lar theology, and of the theurgical notions asso¬ ciated with it, had begun to prevail with him. The practical tendencies of his philosophy were ascetic. He held that all matter was polluted, and that no material sacrifice ought to be of¬ fered to the supreme God. He abstained from animal food, and would also, had it been pos¬ sible, have abstained from vegetable diet. He distinguished four degrees of virtue — political virtue, or that of moderation is the first grade; purifying virtue, which sets the soul free from passion, and by means of which men are made to resemble demons, is the second grade; in

the third grade, which corresponds with the absorbing devotion of philosophy, man becomes a god ; and in the fourth, answering to the ecstatic state of Plotinus, he becomes the father of the gods. He recognizes a soul in animals, and accords to them a certain amount of in¬ telligence and reason. Porphyry was a volu¬ minous writer, but comparatively few of his works are extant. Besides his editorial work for Plotinus, the most important are his Lives of Plotinus and Pythagoras, the latter supposed to be a fragment of a larger history of phi¬ losophers. Among his other works are prin¬ ciples Concerning Intelligibles,* a resume of the Philosophy of Plotinus; the (Cave of the Nymphs in the Odyssey*; four books, (On Abstinence from Animal Food) ; an (Introduc¬ tion to the Categories of Aristotle*; a Com¬ mentary on the Harmanica of Ptolemy,* a 10- volume work in verse, (De Philosophia ex Oraculis Libri,* and a contribution to a symbol¬ ical interpretation of Homer. Consult Bouillet, (Porphyre, son Role dans l'Ecole Neoplatoni- cienne) (1864).

PORPHYRY, any one of various kinds of compound rock having a basis in which the other contemporaneous constituent parts are im¬ bedded. The base is sometimes claystone, sometimes hornstone, sometimes compact feld¬ spar, jade, pitchstone, pearlstone and

obsidian. The imbedded parts are commonly orthoclase feldspar and quartz; the former in more or less distinct crystals. There are porphyries of dif¬ ferent ages. One variety is found graduating into granite and gneiss, but this does not pos¬ sess the characteristics of the rock in the highest perfection ; another is found in over- lying strata, and unconformable to other rocks, which is the true porphyry. Its color is often red or green, and when polished it is valuable for ornamental work, being superior to marble on account of its great hardness.

PORPOISE. Any small or moderate-sized cetacean is usually called a porpoise, but the name is applied chiefly to members of the fam¬ ily Delphinidcz, belonging to the suborder Odontoceti, or the toothed whales. Its principal characters are as follows : The anterior pairs of ribs are joined to the vertebrae by both a tubercle and a head. The sternal ribs are com¬ pletely ossified. The cervical vertebrae are more or less united. In the skull the pterygoid bones are inflated. The symphysis of the man¬ dible is short. The teeth are always present, but vary greatly in number in different genera ; they usually occur in both jaws and are simple and conical. The genus Grampus is without teeth in the upper jaw, and the genus Monodon with¬ out teeth in the lower jaw. The blowhole is single and crescentic in form.

Between 60 and 70 species of porpoises are known, representing 19 genera. They are greatly diversified in form and color. Some have a large, falcate dorsal fin, while In others the fin is reduced in size, or is represented only by a low ridge, or is entirely absent. The pec¬ toral fins are equally varied in size and pro¬ portions, being short and broad in some forms and very long and narrow in others. The beak may be long or short, compressed or depressed, and is sometimes replaced by a narrow rim, or is absent altogether. The representatives of

several genera of porpoises have received special names, such as killers (genus Orcinus), grampuses (genus Grampus), blackfish (genus Globicephalus) , beluga or white whale (genus Delphinaptems) , narwhal (genus Monodon) , etc.

The Delphinidce are chiefly marine, but some species of the genus Sotalia live in the Amazon River, and in the rivers of China, and one species af the genus Orcaella in the Irawadi River, Burma. The harbor

porpoise (Phoccena phoccena) and the bottle-nosed porpoise (Tur – slops truncatus) frequently ascend the Potomac, Hudson and other rivers of the eastern coast of the United States, and the beluga ascends the Saint Lawrence regularly every spring in large numbers.

The geographical range of the porpoises as a group extends over all seas from the Arctic to the Antarctic, but while some species, such as the common dolphin (Delphinus delphis) have a very wide distribution, that of others is more circumscribed. Thus, the narwhal is confined to the Arctic Ocean, and rarely leaves the ice. The beluga is also an Arctic species, though it ranges southward regularly in spring to the Saint Lawrence, as already stated, and occasion¬ ally individuals stray as far south as Cape Cod and the New Jersey Coast. The white-lipped porpoise (Lagenorhynchus albirostris) is com¬ mon about the British Isles, but is not found on the coast of the United States. The species of blackfish (Globicephalus melas) found on our east coast north of New Jersey is different from that occurring further south. Our commonest east coast porpoise (TursioPs truncatus) is not found in Greenland waters, while the harbor porpoise (Phoccena phoccena), which is abun¬ dant in the gulf of Maine and northward, does not range south of New Jersey. Many species occurring in the tropics and the south seas are never seen in North American waters.

The majority of porpoises feed upon fish, but the various species of blackfish, the nar¬ whal and the white whale subsist chiefly or ex¬ clusively upon cuttlefish, while the killers de¬ vour the young or other cetaceans and of vari¬ ous amphibious mammals, such as seals, sea-lions, etc. The stomach of a porpoise (Sotalia teuscii) recently discovered on the west coast of Africa was found to contain leaves of the mangrove tree and other vegetable matter. Porpoises are gregarious animals, congregating in large herds or ˆschools,® which sometimes comprise an enormous number of individuals. Schools of blackfish numbering hundreds of individuals occasionally approach the land at the Faroe Islands,- the Orkney Islands, Cape Cod, and other points, where they strand, or are driven ashore by the fishermen. They are the source of a considerable profit, on account of their oil, which is of a superior quality. The skins of the blackfish and of the white whale are valuable for leather, but the dermis of the majority of porpoises is too thin, or too irregu¬ lar in texture, to form good leather.

Besides the porpoises of the family Delphini- dce, there are a few species generally called river dolphins representing three genera, which belong to a separate family, the Platanistidce. The best known are the susu of the Ganges River, genus Platanista, a blind form which

sub¬ sists chiefly upon fresh-water crustaceans; the

inia, genus Inia, of the Amazon River; and the Pontoporia, found about the mouth of the La Plata River. These porpoises are remarkable for their long beaks, their broad pectoral fins, their free cervical vertebrae, and their rugose or otherwise peculiar teeth. They are regarded as highly specialized forms of ancient origin. Nu¬ merous fossil species of Delpkinidce and Platanistidce occurs in the Tertiary and latter geological formations, beginning with the Mio¬ cene. Consult Beddard, F. E., (A Book of Whales) (London 1900) ; Goode, G. B., fish¬ ery Industries) (Washington 1884) ; True, F. W., (Bulletin of the United States National Museum, No. 36J (Washington 1889).

PORPORA, pdr'po-ra, Nicolo, Italian com¬ poser: b. Naples, 19 Aug. 1685; d. there, Febru¬ ary 1766. He studied under Scarlatti and his first opera, (Ariana e TeseoP was brought out at Vienna, 1717. In 1725 Porpora went to Vienna with his celebrated pupil, Farinelli, and in 1728 accepted a pressing invitation from the court at Dresden. He had already composed 50 operas, and was regarded as without a rival. In 1729 a faction in London, discontented with Handel, opened another opera house, and called Porpora to take the direction of it. Porpora, supported by Farinelli and other distinguished singers whom he had trained, triumphed, and Handel accordingly gave up the theatre, and devoted himself to oratorio. Porpora now gave up his engagements in Dresden, and estab¬ lished himself in London. Here his reputation, especially as a singing-master, continued to be great; but after a few years he went to Venice and later was established in Vienna where in 1754, Haydn, for the sake of obtaining his in¬ structions, became his valet. In 1760 he pre¬ sided at the production in Naples of his last and feeblest opera, (I1 Trionfo di CamilloP Only a few of his operas are now known, and none of them have retained popularity ; but he is regarded as the most accomplished singing-master who has ever existed. His religious compositions, and especially his cantatas, are the works in which he appears to most advantage. Besides the 50 operas, he composed six orato¬ rios, many masses and other church music, and numerous cantatas, and published six (Sinfonie da camaraP Consult Marchese Villarosa (in 'Memorie dei compositoreP 1840, and Clement (in (Musiciens celebresU-

PORRAS, por'ras, Belisario, Panaman statesman : b. Panama, 1860. He received his education at Bogota and Brussels; was counsel for the French Canal Commission, and professor of international law at the Universities of San Salvador and Managua. He subsequently became judge of the Supreme Court of Colombia and served his country as consul-general in Belgium. He was Panaman delegate to the Hague

Peace Conference in 1907 and in 19KP11 was the Panaman Minister at Washington, D. C. In 1912 Mr. Porras was chosen president of Pan¬ ama.

PORRO, por'rd, Count, Italian general: b. Bologna, 1854. He passed through the Turin Military Academy and received his commission as sub-lieutenant of artillery at the age of 22. On reaching the rank of colonel, he was nomi¬ nated to the General Staff and later acted as director of the War School and under-secretary

of war in the Second Fortis cabinet (1905-06). Promoted lieutenant-general in 1911, he com¬ manded divisions at Verona and Milan, and was offered the portfolio of War in the Salandra cabinet. In 1915 he became under¬ chief of Staff. Together with General Cadorna (q.v.) he was relieved of his command after the Italian defeat on the Isonzo in October 1917, and in July 1918 both officers were placed on the retired list with loss of rank and pay. General Capello suffered the same fate.

PORSENA, por'se-na, or PORSENNA, a Lars (or “mighty lord®), king of the Etru¬ rian city of Clusium. According to the legend narrated by Livy, he received the Tarquins on their expulsion from Rome (b.c.) 508, and after endeavoring in vain to effect their restoration by negotiation, advanced with an army to Rome. He would have entered the city with the flying Romans had not Horatius Codes disputed the passage until the bridge was broken down. Porsena then besieged Rome, and a famine was produced in the city, when another Roman youth, Mucius Scaevola, gave striking proof of his patriotism. (See Scaevola). A truce was now agreed upon, and the Romans sent 10 young men, and as many girls, as hostages to the Etrurian camp. The latter escaped to Rome by swimming across the Tiber, but the consul Publicola conveyed them back again to Porsena, and was on this occasion treated with the greatest indignity by the Tar¬ quins. Indignant at the perfidy of the Tar¬ quins, and respecting the magnanimity of the Romans, Porsena separated himself from the former, and concluded peace with the latter without taking away their hostages. To relieve the wants of the Romans without offending their pride by a formal present, he left behind at his departure his camp with all its stores, and in remembrance of his magnanimity the senate erected to him a monument, and pre¬ sented him with an ivory chair and sceptre, a golden crown and a royal robe. Thencefor¬ ward

Porsena lived in undisturbed friendship with the Romans. The accounts in Dionysius (v, 33), Plutarch (

PORSON, Richard, English Greek scholar: b. East Ruston, Norfolk, 25 Dec. 1759; d. Lon¬ don, 25 Sept. '1808. He was educated at Eton and ' Cambridge, took the degree of M.A. in 1785, and not choosing to take holy orders, on account of conscientious scruples in regard to signing the 30 articles was obliged to relinquish the fellowship he had held from 1781. In 1792 he was appointed Greek professor, and in 1794 began the publication of the Tragedies of Euripides, with annotations, but continued his labors only through four — 'Hecuba,* 'Orestes,* 'Phoenissae* and 'Medea.* He assisted in edit¬ ing the Grenville Homer (1800), and corrected the texts of the tragedies of yEschylus for an

edition which issued from the Foulis Press at Glasgow. He had the reputation of being one of the best Greek scholars and critics of the age, notwithstanding which he experienced little patronage, a circumstance partly attribu¬ table to his intemperate ihabits. He was the author of 'Letters to Archdeacon Travis, in Answer to his Defense of the Three Heavenly Witnesses* (1790, 8vo.), in which he is allowed to have proved that the received text of 1 John v, 7, 8 is spurious. After his death were pub¬ lished his 'Adversaria, or Notes and Emenda¬ tions of the Greek Poets* ; and his 'Tracts and Miscellanies* (1815). In Porson acute discern¬ ment and solid judgment were united to intense application and a stupendous memory. Consult Watson, 'Life of Richard Porson* (1861).

PORT. See Harbors, Docks and Break¬ waters; Shipbuilding; Etc.

PORT ADELAIDE, Australia. See Ade¬ laide.

PORT ARTHUR, Canada, city and port of entry in Thunder Bay District, province of Ontario; on Lake Superior; the lake terminus of the Canadian Northern, also on the Canadian Pacific, and the Grand Trunk Pacific railways, about 200 miles northeast of Duluth, Minn., and about 500 miles from Manitoba. It is the prin¬ cipal commercial point on the northwest shore of Lake Superior. It is in a lumbering region and valuable mines of gold, silver and iron are adjacent. Large shipments of merchandise, coal, wheat, etc., are made to eastern ports. Iron is smelted here. The city is the iron cen¬ tre of the north shore and district, and there are also foundries, blast furnaces, brick yards and other manufactories, railway coal and ore docks, lumber yards, refrigeration plants, etc. Port Arthur has several churches, a high school, public schools and a Separate school, public library,

armory, sailors' institute, Y. M. C. A. buildings, and district courthouse. The city was first settled in 1870, became a borough in 1884, and a city in 1907. The government is vested in a mayor and council of 10 members. The city is the county-seat for judicial purposes. Pop. 18,500.

PORT ARTHUR, or LU-SHUN-KOU,

Manchuria, a strongly fortified seaport town at the southern extremity of the Liao-tung pen¬ insula, dominating the Lao-tie-shan channel en¬ trance to the Gulf of Pe-chi-li from the Yellow Sea and Korea Bay. Prior to its capture by the Japanese in the War of 1894 it was a Chinese fortress and naval arsenal. Its occupation by the Japanese was prevented by the Russian, German and French coalition, but on 27 March 1898, the Chinese government leased it to Rus¬ sia with adjacent territory for 25 years. Under the Russians it became the terminus of a rail¬ way line connecting with the Trans-Siberian Railway, the Chinese railway systems, and with modern Dalny, the important commercial sea¬ port city, 14 miles to the northeast. It was for¬ tified, its harbor and dock accommodations ex¬ tended, and it was considered one of the strong¬ est fortresses and navel stations in Chinese waters. At the outbreak of the Russo-Japanese War in 1904, it was the scene of a series of dis¬ asters inflicted on the Russian navy, not only by the torpedo boats of the enemy, but also by their own submarine mines and forts. It was surrendered to the Japanese, 3 Jan. 1905, after

a remarkable siege, for the term of the Rus¬ sian lease (25 years from 1898). The lease was extended in 1915, undue pressure being put on China by the Japanese. Pop. 17,000. See China; Dalny; Japan; Manchuria.

PORT ARTHUR SHIP CANAL, Texas, an artificial waterway, named after the town of Port Arthur, Tex., which is situated on Sabine Lake, a body- of water three miles long and 10 miles wide, which marks the boundary of Texas and Louisiana. Seven and one-half miles from Port Arthur Sabine Lake narrows into a long channel called Sabine Pass. This channel is from 26 to 40 feet deep and extends for seven miles to the south, terminating in the Gulf of Mexico. At the outer end of the pass is a bar which has been pierced by a channel formed by extending for a mile or more from shore two jetties of piled stone built

by the United States government. The jetties narrow the entrance to the pass from the Gulf, and the wash of the imprisoned waters to and fro, with the ebb and flow of the tide, scoured a channel over the bar of 16 to 25 feet deep. The opening of this canal signalized the creation of a new seaport on the Gulf for the largest ocean vessels, the con¬ nection of a land-locked fresh-water harbor with the terminus of a great railway system, and the reduction by 500 miles of the distance over which the export food products of the south¬ west States have been hauled by east and west lines. The canal was formally opened 25 March 1899. In 1912 further operations were begun to obtain a channel of 26 feet navigable depth, and 150 feet wide, a turning basin 25 feet deep, 600 feet wide and 1,700 feet long, to cost $2,000,000, and with $190,000 annually for maintenance. The work was completed in 1915.

PORT BLAIR, the principal port of the Andaman Islands (q.v.) on South Andaman. It is connected with Calcutta, Rangoon and Madras by a mail steamer line ; has a fine har¬ bor with safe anchorage, and is an important penal settlement.

PORT BRETON, a name given to the southeast part of New Mecklenburg (formerly and again called New Ireland), in the Bismarck Archipelago off Kaiser Wilhelm Land, New Guinea, the scene in 1879 of a disastrous colon¬ izing experiment by a company of French Legit¬ imists. In 1883, the Marquis Du Rays, who floated the company, and his associates were condemned to various terms of imprisonment for fraud and raising money by false pretenses. German New Guinea was occupied by an Australian force 12 Sept. 1914, and is now under Australian mandate.

PORT CARBON, Pa., borough in Schuyl¬ kill County, on the Schuylkill River, and on the Philadelphia and Reading Railroad, about two miles northeast of Pottsville. There are iron¬ works within the boroughs, but the mining of coal is the chief industry. Pop. 2,678.

PORT CHESTER, N. Y., village, West¬ chester County, on Long Island Sound, and on the New York, New Haven and Hartford Rail¬ road, 26 miles northeast of New York City. It was settled in the middle of the 18th century, and was at first called Saw Pit ; the name was changed in 1837, and the village incorporated in 1868. It contains foundries, screw and bolt factories, carriage works, shirt factories and a

woolen mill. It is also a summer resort. It contains a public hospital, also a public library and high school which has its own school library. The village is governed by a president and a board of trustees, all

holding office for two years. Pop. (1920) 16,573.

PORT CLARENCE, Alaska. See Clar¬ ence Harbor.

PORT CLINTON, Ohio, village, county- seat of Ottawa County, on Lake Erie at the mouth of the Portage River, and on the Lake Shore and Michigan Southern Railroads, 64 miles west of Cleveland. It has a good harbor and carries on a considerable lake trade, being the commercial centre of a region where the chief industry is grape and peach culture; lime and building stone are also obtained in the vicinity, and gyp¬ sum is mined. Fruit baskets are manufactured, and the fisheries are also of commercial impor¬ tance. The village contains a public high school. Pop. 3,928.

PORT DARWIN, Australia, one of the finest harbors of the Commonwealth, on the north coast of the state of South Australia. Its entrance is two miles wide, and vessels of any tonnage can float in it with safety. Palmerston, the chief town on its shores, is the land terminus of the overland telegraph, 1,973 miles from Adelaide, and of the cable to Java. Since 1891 it is also the starting point of a railway to the gold fields of the interior, 150 miles distant.

PORT ELIZABETH, South Africa, a sea¬ port city of Cape Colony, on the west side of Algoa Bay, about 420 miles east of Cape Town. It has many fine buildings, including a hand¬ some town hall, custom-house, hospital, college, public library, museum, Grey Institute, and sev¬ eral churches, etc. It is the great centre of trade for the eastern portion of the colony as well as for a large part of the interior, being the terminus of railways that connect it with Kimberley and other important inland towns. The exports and imports together amount to over $50,000,000. There are a seawall and two iron jetties, but the shipping is much exposed to easterly winds and extensive harbor works are being built. Pop. 18,190.

PORT ESSINGTON, Australia, an inlet in the Coburg Peninsula of the northern territory of South Australia, on the Arafura Sea, form¬ ing a fine harbor. The British Government had a penal settlement on its shores from 1831 to

1850.

PORT FAMINE, Chile, a deep bay on the east coast of the Straits of Magellan, so named in 1587 by Cavendish. It was a Chilean penal colony in 1843-53.

PORT GIBSON, Battle of. After much unsuccessful effort to reach

Vicksburg from the north, General Grant, late in January 1863, directed his attention to opening a canal which had been begun the year before across the peninsula on the west bank of the Mississippi. The canal proving impracticable and other plans failing, among them an expedition up the Yazoo River, Grant determined to move his army by land down the west bank of the river some 70 miles and across the Mississippi below Vicks¬ burg, while transports for crossing should run past the Vicksburg batteries. Admiral Far- ragut had already run two of his vessels past the

Confederate batteries at Port Hudson and Grand Gulf, and cleared the river of the enemy's boats below Vicksburg. On the night of 16 April, Admiral D. D. Porter ran the Vicksburg bat¬ teries with a fleet of six vessels and three transports carrying stores, one of the transports being lost. Six days later, five more transports, towing 12 barges, ran the batteries safely, a sixth being sunk and half the barges disabled. Meanwhile, Grant had marched McClernand's and McPherson's corps from Milliken's Bend for New Carthage, and upon arriving at that place and finding a limited number of transports the troops were marched to Hard Times, where a number of boats were collected from the dif¬ ferent bayous in the vicinity, and 29 April, hav¬ ing 10,000 troops on barges and transports, Grant was opposite Grand Gulf, prepared to land and carry the place by storm the moment the batter¬ ies beating on the river had been silenced by the navy. Admiral Porter, with seven ironclads, opened the attack at 8 a.m., and engaged at close quarters until 1.30 p.m.; but from the great ele¬ vation of the Confederate batteries, he found it impracticable to silence them with his guns, and therefore withdrew, when Grant immediately decided to land his men on the Louisiana shore and march them across the point to below Grand Gulf, the gunboats and transports to run the batteries. At dusk the gunboats engaged the batteries, and all the transports ran by, the gun¬ boats following. Grant had heard of a good landing on the east bank of the river, and at daybreak of the 30th transports and gunboats began the ferrving of the troops across to Bruinsburg, 10 miles below Grand Gulf and 32 in a straight line below Vicksburg. At noon Mc¬ Clernand's corps, four divisions, 18,000 men, had been landed, and at 4 p.m. McClernand pushed out into the country, and at 1 a.m. of 1 May met the Confederates 12 miles from Bruinsburg and four from Port Gibson, and after slight skir¬ mish the advance division, under General Carr, lay on its arms until daybreak. The Confederate force met was General Green's brigade, which had

marched from Grand Gulf on the afternoon of the 30th. During the night it was joined by General Tracy's brigade from Vicksburg, and line was formed about three miles west of Port Gibson, across two roads converging on the town and uniting just outside of it. Green was across the southern road, and Tracy across the northern one, the roads running on two ridges, separated by a deep ravine, filled by a dense growth of cane and underbrush. At 5 a.m. 1 May the battle was opened by the advance of Gsterhaus' division on the left, which was checked and repulsed by Tracy's brigade with much loss, and made no further progress until late in the afternoon. Carr's division, supported by Hovey's, advanced on the right and assaulted the ridge held by Green's brigade, and after a hard fight carried it, capturing two guns and over 300 prisoners, Green falling back toward Port Gibson. Gen. J. S. Bowen, commanding the Confederate forces at Grand Gulf, arrived on the field with General Baldwin's brigade, about 9 a.m., and formed line in Green's rear, Carr and Hovey continued to press Green, who was soon withdrawn and sent to assist Tracy, leaving Baldwin to oppo-se them. Early in the afternoon Baldwin was attacked, and a severe contest ensued, lasting nearly two hours, during which Bowen, with two regiments

of Col. F. M. Cockrell's brigade, which had arrived about noon, made a very deter¬ mined effort to turn McClernand's right, but the attempt was defeated, and Cock¬ rell's men joined Baldwin. Meanwhile, Lo¬ gan's division of McPherson's corps had come up and, part of it joining Osterhaus, both ad¬ vanced on Tracy's and Green's brigades and slowly forced them back. McClernand's troops on the right again attacked Baldwin, and just at sunset the entire Confederate force, Baldwin covering the rear, fell back through Port Gibson and destroyed the bridge over the south fork of Bayou Pierre, two miles beyond Port Gibson. Grant entered the place next morning. The Union forces engaged were four divisions of McClernand's corps and part of Logan's divi¬ sion of McPherson's, in all about 23,000 men, and their losses were 131 killed, 719 wounded and 25 missing. The Confederate forces, under Bowen, were four brigades of 6,000 men and 13 guns. They lost five guns and reported 68 killed, 380 wounded and 384 missing. Consult (Official Records* (Vol. XXIV) ; Greene, (The Mississippi* ; Grant, Ulysses S., (Personal

Memoirs* (Vol. II) ; (Battles and Leaders of the Civil War* (New York).

E. A. Carman.

PORT-GLASGOW, Scotland, a seaport town of Renfrewshire, on the

estuary of the Clyde, 20 miles west-northwest of Glasgow and about two and a half miles above Greenock. In 1662 the magistrates of Glasgow purchased here 13 acres of land on which they built har¬ bors and the first drydock in Scotland. The town was intended to be the seaport of Glas¬ gow and long did a large shipping trade ; but when the Clyde was deepened so as to enable large vessels to sail up to Glasgow the trade rapidly diminished. The staple industries are shipbuilding and marine engineering, and there are manufactures of sail-cloth, ropes, etc., iron and brass foundries, bolt and rivet works. Pop. about 18,000.

PORT HAMILTON, Chosen, formerly Korea, a spacious, well-sheltered harbor, formed by three islands of the Nanhow group in the Chosen or Korean archipelago, 30 miles south of Chosen or Korea and 45 miles north¬ east of Quelpart Island. It was explored and named by Belcher in 1845. In 1885 it was an¬ nexed by Great Britain as a prospective coaling station, but was abandoned the following year.

PORT HOPE, Canada, town, port of entry in Durham County, in the province of Ontario, on Lake Ontario, and on the Grand Trunk Railroad, about 60 miles east by north of Toronto. There are steamer connections with the principal lake ports and there is here a good harbor. The chief industries of the place are fishing (it has a large fishing fleet), and manufacturing of leather, machinery, steam en¬ gines, iron castings, buttons, woolen goods and woodenware. There is a large trade in its own manufactures, grain and lumber. Pop. 5,092.

PORT HUDSON, Siege of. Port Hudson, a small village of East Baton Rouge Parish, La., on the east bank of the Mississippi, 135 miles above New Orleans, was occupied by the Confederates, under General Breckinridge, after their defeat at Baton Rouge, 5 Aug. 1862. The place was in a sharp bend of the river, on bold

bluffs rising 75 to 90 feet above it, which for three miles along the river were strongly forti¬ fied and armed with heavy guns. In November 1862 General Banks was ordered to relieve Butler, in command at New Orleans, under in¬ structions from Halleck requiring Banks to clear the Mississippi River, also to occupy the Red River country as a protection for Louisi¬ ana and Arkansas and as a basis for future operations against Texas. He was authorized to assume control of any military forces from the upper Mississippi which might come

within his command, and to exercise superior authority as far as he might ascend the river. When these instructions were issued General McCler- nand had been given authority to organize an expedition on the upper Mississippi to reduce Vicksburg, and the intention was that Banks should ascend the river from New Orleans, join forces with McClernand at Vicksburg, and assume command for operations against that place. When Halleck gave the instructions, he did not suppose that there were any barriers on the river that would seriously interfere with Banks' movement to Vicksburg. Banks arrived at New Orleans with about 20,000 men 14 De¬ cember, relieved Butler, and was surprised to learn that the Confederates held Port Hudson, with 21 heavy guns on the bluffs and a garrison reported as numbering from 12,000 to 16,000 men. Nothing was heard from McClernand or Grant. On the 18th General Grover, with a division of 18,000 men and some artillery, was sent to occupy Baton Rouge, 25 miles south of Port Hudson, which was accomplished without opposition and was the first step in the reduc¬ tion of Port Hudson.

After providing for the security of New Orleans, Banks organized his available forces into a corps of four divisions, under command of Generals Augur, Thomas W. Sherman, Emory and Grover. Exaggerated reports of the strength of the Confederates at Port Hud¬ son forbade a direct attack upon it, and Banks endeavored to turn it on the west and reach Vicksburg by means of the Atchafalaya, the mouth of Red River and the various bayous connecting the Atchafalaya with the Missis¬ sippi, but was unsuccessful, and was turning his attention to a movement from Berwick Bay by the Atchafalaya,. when news came that two of Colonel Ellet's rams, after running the batteries of Vicksburg, had been captured. Admiral Farragut, who was co-operating with Banks, now proposed to run his fleet past the batteries of Port Hudson, recapture or destroy the rams and thus control the river as far up as Vicks¬ burg, and cut off supplies from the Red River country. Banks promptly assented and moved from Baton Rouge, with 17,000 men, to the rear of Port Hudson, on 14 March 1863, to co¬ operate with the fleet. That night Farragut started to run the batteries with nine vessels, carrying 116 guns. Most of the fleet, under the heavy fire brought to bear upon them, failed to get through, and put back; the Mississippi passed the lower batteries, then ran aground and, being under fire of three heavy batteries, was burned by her commander, the crew taking to boats and going back; the Hartford and Albatross made the passage and communicated with Porter's fleet above Vicksburg. Farragut's loss was 113 killed and wounded; one vessel had been destroyed and four disabled. The

navy now had control of the mouth of Red River, and Banks, reverting

to the execution of his turning movement by the Atchafalaya, re¬ crossed the Mississippi, drove back the Con¬ federate forces of Gen. R. Taylor, after two severe engagements at Fort Bisland and Irish Bend, in which he lost 353 men, and occupied Opelousas 20 April, from which place he marched to Alexandria, on Red River, reaching there 7 May, Taylor retiring before him to Shreveport and into Texas. He had captured a large number of prisoners and 22 guns, and Farragut had destroyed three gunboats, includ¬ ing those that had been taken from Ellet. Meanwhile he had received word from Farra¬ gut that Grant, 23 March, had written him that should river transportation be secured he would send 20,000 men through the Tensas, Black and Red Rivers to join in reducing Port Hudson, and at the same time a letter from Grant that he could spare him an army corps to enable him to get up the Mississippi. Upon arriving at Alexandria, Banks received a dispatch from Grant, dated at Milliken's Bend 14 April, pro¬ posing to send an army corps to Bayou Sara by the 25th, and requesting that Banks should, after the reduction of Port Hudson, send all the troops he could spare to Vicksburg. Banks assented to the proposition, saying that the troops could be shipped from New Orleans, but he was afterward informed by Grant, in a dispatch dated Rocky Springs 10 May, and re¬ ceived on the 12th that he had crossed the Mississippi to Grand Gulf and was then in close pursuit of the enemy and, under the cir¬ cumstances, could not retrace his steps, nor send the promised troops ; and as he had heard and believed that Port Hudson was almost entirely evacuated, he requested Banks to join his com¬ mand at Vicksburg. Regarding the proposed co-operation Grant says: (< While at Grand Gulf (3 May) I heard from Banks, who was on the Red River, and he said that he could not be at Port Hudson before the 10th of May, and then with only 15,000 men. Up to this time my intention had been to secure Grand Gulf as a base of supplies, dispatch McClernand's corps to Banks and co-operate with him in the reduction of Port Hudson. The news from Banks forced upon me a different plan of campaign from the one intended ; to wait for his co-operation would have detained me at least a month. . . . I therefore determined to move independently of Banks.® Halleck was intensely provoked at the action of Grant and Banks, and wrote sharply to both of them. That it was his in¬ tention that their two armies should unite or co-operate under the chief command of Banks, and first take Port Hudson, is evident from his letters. To Grant he wrote 11 May, after he knew that he was operating in rear of Vicks¬ burg, that his forces and those of Banks should be concentrated between Port Hudson and Vicksburg, so as to attack these places sepa¬ rately with the combined armies. Grant says that he received this letter on the Big Black on the 17th, and that in it he was ordered <(to return to Grand Gulf and to

co-operate from there with Banks against Port Hudson, and then to return with the combined forces to besiege Vicksburg.® To Banks, Halleck wrote a few days later : ((I assure you that the govern¬ ment is exceedingly disappointed that you and Gen, Grant are not acting in co-operation. I

thought to secure that object by authorizing you to assume the entire command as soon as you and Gen. Grant could unite.® When these let¬ ters were received both Grant and Banks had fully committed themselves to the independent sieges of Vicksburg and Port Hudson.

The failure of Grant to co-operate with him was a keen disappointment to Banks. He could not join Grant for want of water transporta¬ tion; he could not leave Port Hudson, with its large garrison in his rear, without endangering New Orleans and all the Red River region; and, therefore, he concluded to concentrate his command and move immediately against Port Hudson. On 14 May he marched from Alexan¬ dria for Bayou Sara, crossed the Mississippi on the night of the 23d, and on the night of the 24th was in rear of Port Hudson, where he was joined next day by General Augur, who had come up from Baton Rouge, defeating the Con¬ federates at Plains' Store, on the 21st, with a loss of 86 killed and wounded, the Confederate loss being about the same. The investment was completed on the 26th with about 14,000 men, Gen. Frank Gardner, commanding at Port Hud¬ son, having about 7,000 men. Gardner had been ordered by Gen. J. E. Johnston, 19 May, to evacuate the place forthwith and move toward Jackson, but the order came too late. Under the impression that Gardner's force was much less than it was in reality, as it was reported much reduced by troops sent to oppose Grant in rear of Vicksburg, Banks ordered a general assault to be made on the morning of the 27th. The Confederate fortifications on the land side of Port Hudson consisted of a series of strong works connected by rifle-pits, with their flanks resting on the river above and below the place. Their length was nearly four miles, and upon them were about 30 field-guns. The approach to them was difficult, being cut by ravines and for the most part covered by dense groves of magnolia and other trees. The investing line was seven miles in length. The brigade of General Weitzel and the divisions of Generals Dwight and Grover were on the right, Augur's division in the centre, and a part of Thomas W. Sherman's on the left. The assault, which was ordered simultaneously along the entire line, was preceded by a heavy fire of artillery, and at

10 a.m. Weitzel, on the right, commanding his own troops and Dwight's, moved forward fight¬ ing severely until late in the afternoon, and gaining some ground ; Grover, on his left, gained and held commanding positions within 200 yards of the Confederate works. In the centre and on the left Augur and Sherman did not ad¬ vance until 2 p.m., when they made a most determined effort, under a severe fire of canister and musketry, and reached the ditch of the works, but could not cross the parapet, and were withdrawn at night. The only advantages gained were the advanced positions held by Weitzel and Grover. The Union loss in the assault, in which 13,000 men participated, was 293 killed, 1,545 wounded, and 157 missing. The Confederate loss was about 235 killed and wounded. Regular siege operations began next dav, siege-guns were planted, and con¬ stant skirmishing was kept up, during which, with some checks, the Union lines gained some ground, which was immediately intrenched. On 10 June a heavy artillery-fire was kept up and at 3 o'clock on the morning of the 11th an

attempt was made to get within assaulting dis¬ tance of the works. A portion of the troops worked their way through the abatis, but were repulsed with loss and some captured. Mean¬ while Banks had reorganized his command. Sherman, who had been severely wounded on the 27th of May, was succeeded by General Dwight, and General Grover was assigned to the command of the right wing, consisting of his own and Paine's division and Weitzel's brigade. The line was formed in this order from right to left: Weitzel, Grover, Paine, Augur and Dwight. On 14 June, the line of investment being well advanced, Banks made a second general assault at daylight from his left and right. Dwight, on the left, endeavored to gain entrance to the works by passing a ravine, while the main attack was made on the right by Grover and Weitzel. The assault ended in a bloody repulse, the Union loss being 203 killed, 1,401 wounded, and 188 missing. The Confed¬ erates had 22 killed and 25 wounded. The only advantage gained was a few yards nearer ap¬ proach to the works on the right, and on the left an eminence commanding a strong part of them, and which later enabled Banks to get possession of the bluff within 10 vards of the enemy's lines. Siege-operations were continued and on the right saps were run to the very line of the Confederate works. On the left a mine had been prepared for a charge of 30 barrels of powder, and a storming column of 1,000 volun¬ teers organized, when, during the night of 6 July, news was received that Vicksburg had surrendered. Gardner soon heard the news, and asked Banks to give him an official assurance of its truth, adding that if true, he requested a cessation of hostilities with a view to consider terms for a surrender. Banks

furnished him a copy of Grant's despatch, terms were agreed upon, and on the 8th Gardner surrendered 6,340 officers and men, 51 guns, about 7,500 muskets, large quantities of ammunition, and two river steamers. In an address commending the gal¬ lantry of his men, Gardner stated that his sur¬ render was not on account of the fall of Vicks¬ burg, nor for want of ammunition or provisions, but was due to 'the exhaustion of his men, who had been without rest for more than six weeks, and who could not resist another attack. In all the operations against Port Hudson the _ fleet under Farragut had co-operated and assisted. The Union loss during the siege was 708 killed, 3,336 wounded and 319 missing, an aggregate of 4,363. Incomplete Confederate returns show a loss of 176 killed and 447 wounded. Consult ^Official Records* (Vol. XXIV, XXVI) ; Greene, (The Mississippi ; Grant, (Personal Memoirs,* (Vol. I) ; The Century, (Battles and Leaders of the Civil War* (Vol. III).

E. A. Carman.

PORT HURON, Mich., city, port of en¬ try, county-seat of Saint Clair County, at the mouth of Black River, the head of Saint Clair River, and at the foot of Lake Huron, on the Grand Trunk Western, and Grand Trunk, The Detroit, Bay City and Western, and the Pere Marquette railroads, about 58 miles northeast of Detroit. Port Huron is the most easterly point in the State. It has steamer and electric railway connection with Detroit, and steamer connection with all the principal ports of the Great Lakes. A railroad tunnel under the Saint

Clair River extends from Port Huron to Sarnia, Ontario. This tunnel is over a mile long directly across, but including the approaches it is nearly two miles long. It cost about $2,700,000, and was opened in 1891. The climate, scenery, min¬ eral springs and opportunities for fishing have combined to make Port Huron a favorite sum¬ mer resort. It has considerable manufacturing interests; the chief industrial establishments are shipbuilding works, knitting mills, overall factory, paper mill, wire fence factory, two large foundries, engine and thresher works, Grand Trunk car and locomotive shops, fibre works. Port Huron has an extensive commerce, especially with Canada. The exports in a recent year were valued at $37,000,000 and the imports at $8,100,000. The principal public buildings are the custom-house and post office, courthouse, auditorium, hospital and home, the Carnegie Library, and two Maccabee Tem¬ ples. The educational

institutions are several public schools, including two high schools. The city has just voted to build another $100,000 high school. The commission form of govern¬ ment is in operation. In 1686 the French under Duluth built a fort here but it was maintained for two years only. The United States built Fort Gratiot on the site in 1814 and maintained it until 1879. The village of Port Huron was organized in 1849 and became a city under a charter of 1857. Pop. (1920) 25,944.

PORT ISABELA, e-sa-ba'la, Philippines, harbor in channel between Malamaui Island and the northwest coast of the island of Basilan. It has a naval hospital, a small arsenal and equipment for the repair of small vessels. The town Isabela de Basilan is the capital of the island. Pop. about 1,331.

PORT JACKSON, Australia, the beautiful and extensive inlet on the east coast in New South Wales, forming the well-sheltered harbor on the south shore of which Sydney stands. See Sydney.

PORT JACKSON SHARK. See Cestra- cion.

PORT JERVIS, N. Y., city in Orange County, on the Delaware and Neversink rivers, where the States of New York, New Jersey and Pennsylvania meet, and on the New York, Ontario and Western railroads, 88 miles northwest of New York City. It was settled in the last of the 18th century, and laid out as a village in 1826. The first permanent settlers were descendants of the French Huguenots and the Dutch, who settled the town of Deerpark. It is a popular summer resort on account of the many waterfalls nearby and the beauty of the scenery in general. Its water-power and transportation facilities have contributed toward making the village of commercial and industrial importance. The chief manu¬ facturing establishments are railroad shops, glove, factories, silk mills, silver plating works, necktie factory, overall factory, saw factory, shirt factory, and other industrial works are a flour and planing mills, sash factory, printing works and a number of smaller establishments which supply local needs. The principal public buildings are the Carnegie Free Library, cost $30,000; Port J ervis chamber of commerce, two hospitals, the Y. M. C. A. building, Saint Marv's Orphan Asylum, and churches of several denonimations, Elks Home,

Federal building, and a new $35,000 parochial school. The educational institutions are pub¬ lic and parish schools, a new high school, two private schools, a conservatory of music and the public library. In recent years the city has paved several streets with brick, erected an electric-light plant, and installed a new electric¬ lighting

system. The Erie Railroad whose in¬ terests are closely identified with those of the city has erected a monument to the founders of the city. The demand for extra housing facilities has resulted in increasing activity in building operations. Pop. (1920) 10,171.

PORT LOUIS, loo'is or loo'e, Mauritius, capital of the British colony of Mauritius ; on the northwest coast, on a cove formed by a series of basaltic hills, portions of which are covered with forest. The streets are narrow, laid out at right angles with basaltic curbstones, and shaded by large acacias. A mountain stream traverses the town. The town and har¬ bor are protected by Forts Adelaide and George. The principal buildings and institu¬ tions are the Roman Catholic and Protestant cathedrals, the barracks, theatre, hospital, botan¬ ical gardens, an observatory and library. It is the chief commerical port of the island and a coaling station for the British navy. Great damage and loss of life were caused by a hurricane in April 1892. Pop. (with suburbs) 50,060. Consult Flemyng, (Mauritius, or the Isle of France > ; Decotter, (Geographie de Maurice et de ses DependancesP

PORT MAHON. See Mahon.

PORT-MOODY, Canada, a harbor at the head of Burrard Inlet, British Columbia, a little to the north of New Westminster. It was at one time intended for the terminus of the Canadian Pacific Railroad, but was abandoned for Van¬ couver, at the entrance to Burrard Inlet.

PORT NATAL, na-tal', South Africa. See Durban.

PORT ORCHARD (formerly Sidney), Wash., a United States naval station in Kitsap County, on Port Orchard Bay, an inlet of Puget Sound, about 20 miles west of Seattle. The station was established in 1891, when the government purchased here 200 acres of land, built a dry dock 600 feet long and 75 feet wide, and capable of holding vessels with a 30-foot draft. The original cost of the improvements, not including purchase price of land, was

$700,000.

PORT DE PAIX, por de-pa, Haiti, town on the Tortuga Channel, and on the right bank of Trois Rivieres, about 95 miles north of Port-au-Prince. The place was visited by Columbus in 1492, and by him was named Val¬ paraiso. It is in an agricultural region, in which coffee is the principal production. There is a large trade in coffee and fruit. Pop. estimated at about 10,000.

PORT PHILLIP, Australia. See Mel¬ bourne.

PORT-AU-PRINCE, port'o-prins' (Fr. por-to-prans), or PORT REPUBLICAIN, por-ra-piib-le-kan, Haiti, city, capital of the Re¬ public of Haiti; on the Bay of Haiti. It is the principal seaport, and although it has an ex¬ cellent harbor, the low marsh land surrounding it renders it undesirable as a place of residence.

The buildings are mostly of wood. There is considerable trade in fruits, the cocoanuts, and cabinet woods. It has municipal buildings, a mintˆ college and lyceum. The city was founded in 1745, and was completely destroyed by an earthquake in 1770. It has also been ravaged bv fires in 1791, 1843 and 1867. In recent local disturbances it was occupied (by American marines. Pop. about 100,000.

PORT REPUBLIC, Battle of. Gen. <(Stonewall® Jackson defeated General Banks at Winchester, 25 May 1862, drove him across the Potomac, and then retreated up the Shenandoah Valley, slipping between the converging forces of General Fremont and McDowell near Stras- burg on the 31st. Fremont pursued by the Valley road, and General Shields, commanding a divi¬ sion of McDowell's corps, endeavored to fall upon his flank and intercept him by moving up the Luray Valley. On the evening of 1 June Shields moved out of Front Royal, Col. S. S. Carroll leading, with some cavalry, infantry and four guns, to destroy the bridges over which Jackson might retreat to Stanardsville. But Jackson himself had destroyed the bridges by which his flank could be reached, and Shields halted his advance brigades at Conrad's Store and Columbia Bridge. On hearing that Jack- son had passed through Harrisonburg in the direction of Port Republic, and that Fremont had reached Harrisonburg in close pursuit, Shields ordered Carroll's and Tyler's brigades forward to head off Jackson while Fremont pressed his rear. The orders to the two bri¬ gade commanders were to guard the river at Port Republic and cut the railroad at Waynes¬ boro. Shields, with two brigades, remained at Luray to watch Longstreet, who was incor¬ rectly reported moving into Luray Valley, by the gaps of the Blue Ridge, with 10,000 men. Carroll, with less than 1,000 infantry, 150 cav¬ alry and Clark's regular battery of six guns, marched from Conrad's Store on the afternoon of 7 June, and halted in the night six miles from Port Republic, where his scouts brought information that Jackson's train was packed near the place, guarded by about 300 cavalry. Carroll, with his 150 cavalry and four guns, leaving his infantry to follow, started very early in the morning of the 8th, drove in the Confederate

outposts and put two guns in posi¬ tion commanding both ends of the bridge over the South Fork of the Shenandoah River, and ordered the cavalry to charge and seize the bridge. The charge was made and the bridge seized, Jackson, whose headquarters were in the village, narrowly escaping across it, while some of his staff were captured. Carroll, with two guns, followed his cavalry to the bridge ; some of the cavalry entered the village and at¬ tacked the wagon-train. By some misunderstand¬ ing the bridge was not burned as Shields says it was intended to be, and Jackson, the moment he crossed it, ordered batteries in position which opened on Carroll, and a regiment of infantry rushed down and over the bridge, driving him away and capturing one of his guns. Carroll retreated two miles down the river, with a loss of 39 men killed and wounded, the greater part of which was in the 7th Indiana, which came under artillery fire as it was moving to the support of the cavalry. Jackson moved Talia¬ ferro's brigade into the village to hold the fords

of South River, a branch of the South Fork of the Shenandoah, and placed Winder's brigade on the north side of the latter to observe Car- roll and by artillery check any renewed advance. While all this was transpiring the battle of Cross Keys (q.v.) was going on, and Jackson, hearing the sounds of the engagement, rode to the field. At 2 p.m. Tyler came up with his brigade and joined Carroll, and as senior officer assumed command. He had about 3,000 men and 16 guns, and took position with his right on the South Fork of the Shenandoah and his left on commanding ground, on which was dis¬ posed the greater part of the artillery. Jackson, who had repulsed Fremont at Cross Keys, on the 8th, returned to Port Republic during the night, leaving Ewell, with a small force, to con¬ front Fremont, and early in the morning of the 9th led Winder's brigade across the bridge and attacked Tyler's right, with the intention of turning it, but was repulsed. Winder, rallying a part of his brigade and reinforced by a regi¬ ment of Taylor's Louisiana brigade, made an¬ other effort and was again repulsed, with the loss of one of his guns and many men. Mean¬ while some of Ewell's troops from Cross Keys came on the field and Taylor's Louisiana bri¬ gade was ordered to turn Tyler's left and take his guns. Taylor moved under cover of dense woods to a position on the flank of Clark's battery of . six guns, from which support had been withdrawn, and charged it; but Clark, turning his guns upon him, repulsed him with shell and canister. The attempt was renewed on that flank, but Tyler's infantry was now supporting the guns, and the contest around and among them, at close quarters, was severe, but the Confederates were held in check. The fight had now raged more than four hours, Jack- son had withdrawn all his forces from Fre¬ mont's

front, crossed the bridge and destroyed it, and concentrated against Tyler, who saw that the time had come to retreat, and gave the order, Carroll having charge of the movement. The artillery and infantry on the right were with¬ drawn in good order, but on the left so many horses had been killed or disabled that but one gun was saved, the Confederates advancing and seizing five, as Tyler's men began the retreat, and turning them upon the retiring troops, throwing the rear of the column into some dis¬ order. The Confederate infantry followed four miles, the cavalry until Shields came up with the rest of his division, when pursuit was checked and Shields continued the retreat to Conrad's Store. After the retreat Fremont appeared on the opposite side of the river, which he could not cross, and opened upon Jackson with his artillery. During the morning Jackson had put his trains in motion for Brown's Gap of the Blue Ridge, and after the battle he followed them. The Union loss was 67 killed, 393 wounded, and 558 missing; the Confederate loss, 816 killed, wounded and missing. Consult (Official Records) (Vol. XII) ; Allan, (Jackson's Valley Campaign} ; The Century Company's (Battles and Leaders of the Civil War > (Vol.

II).

E. A. Carman.

PORT-ROYAL, port-roi'al, a Cistercian convent in France, which played an important part in the Jansenist controversy (see Jansen¬ ism). It was founded in 1204 by Mahaut de

Garlande, wife of Matthieu de Montmorency, was situated near Chevreuse in the Yvette Val¬ ley, at what is now called Les Hameaux, about 15 miles southwest of Paris, and was under the rule of Saint Bernard. The original name of the site was Porrais or Porrois; this was trans¬ formed first into Port-du-roi, then into Port- Royal. Port- Royal had declined from its origi¬ nal severity, when in 1609 the abbess Jacqueline- Marie-Angclique-Arnauld undertook its reform. The number of the nuns increased under her rule, and in 1625 amounted to 80. The building had become insufficient, and the situation was unhealthy. The mother of the abbess therefore presented to the nuns the house of Cluny, situ¬ ated at the end of the Faubourg Saint Jacques in Paris. The old site was subsequently im¬ proved by drainage, and a new house built on higher ground. The two sections of

the con¬ vent were now distinguished as Port-Royal des Champs and Port-Royal de Paris. About 1636 a group of eminent literary men of religious tendencies, mostly the relatives of the abbess, took up their residence at a house called Les Granges, near Port-Royal des Champs, where they devoted themselves to devotional exercises, manual and literary work, the education of youth, and the compilation of educational works. These were regarded as forming a joint com¬ munity with the nuns of Port-Royal, among whom most of them had relatives, and who in most matters followed their counsels. Among them were Antoine Arnauld, Arnauld D'Andilly, le Maistre de Sacy and his two brothers, the first two being brothers, the last three nephews of the abbess; Nicole, and subsequently Pascal, whose sister Jacqueline was a nun of Port- Royal. These men founded here an educational institution, which flourished till 1660, and be¬ came a rival to the institutions of the Jesuits, and as they adopted the views of Jansenius, subsequently condemned by the pope, a quarrel ensued, in which the Port-Royalist nuns, siding with their male friends, became subject to the opposition of the Jesuits, which culminated in the ruin of their institution. Port-Royal de Paris had, in the meantime, been growing rapidly in wealth and influence. It was pro¬ tected by many persons of high rank at the court, some of whom made it their last retreat and bequeathed their fortunes to it. It was under the direction of the Abbe de Saint Cyran (Duvergier de Hauranne), whose virulent Jan¬ senism led, during the last days of Richelieu, to his imprisonment in Fort Saint Vincennes. During the wars of the Fronde the house in the country exercised a liberal hospitality. The history of the struggle in which the two con¬ vents of Port-Roval successively succumbed to their foes is too long to be dealt with here. It has been related in detail by Racine, the most distinguished pupil of the Port-Royalist semi¬ nary, in his (Histoire de Port-Royal.) The most remarkable incident in it was the miracle alleged to have been wrought upon the person of the niece of Pascal, and firmly believed in by two such men as Pascal and Racine. The object of this miracle, wrought by means of a thorn from the crown of our Saviour, was to demonstrate the innocence of the nuns of Port-Royal, accused by their opponents of con¬ tempt of the holy sacrament. But this vindi¬ cation was unavailing. In 1664 Port-Royal de

Paris was occupied by the police. The nuns, save few who acceded to the terms of the court, and henceforth became declared enemies of their former associates, were imprisoned for some months and then sent to Port-Royal des Champs, which was put under military sur¬ veillance till 1669. In 1669 the two houses were permanently separated by royal authority. Port-Royal des Champs retained 80 nuns

and two-thirds of the joint property, Port-Royal de Paris 10 nuns and one-third of the joint prop¬ erty, and was placed perpetually under the nomination of the king. The nuns of Port- Royal des Champs still persisted in refusing to sign the papal edict condemning the doctrines of Jansenius, and on 29 Oct. 1709 the convent was finally suppressed by order of Cardinal Noailles, in execution of a bull of Pope Clement XI. The nuns were dispersed in different con¬ vents, and their property given to Port-Royal de Paris. This convent continued in existence till the Revolution, when its house was converted into a prison, and subsequently (1814) became the Maternity Hospital. In 1825 some Jansenist descendants bought the site at Les Hameaux, on which they have erected a museum rich in Jan¬ senist relics. The grounds have been restored as far as possible to their original appearances. (See Arnauld; Jansenism; Pascal, Blaise). Consult Gregoire, (Les Ruines de Port RoyaP (1809); Beard, Charles, (Port RoyaP (2 vols., London 1861) ; Cadet, Felix, (Port Royal Education* (Eng. trans., New York 1898) ; Barnard, H. C., (Little Schools of Port RoyaP (Cambridge 1913) ; Clark, W. R., (Pascal and the Port-Royalists * (New York 1902) ; Lown¬ des, M. E., (The Nuns of Port-Royal as Seen in Their Own Narratives) (New York 1909) ; Racine, Jean, (Histoire abregee de Port-RoyaP (Paris 1742; new ed. by E. Gazier. ib., 1908); Rea, Lilian, Enthusiasts of Port RoyaP (New York 1912) ; Reuchlin, H., (Geschichte von Port RoyaP (2 vols., Hamburg 1839-44) ; Ro¬ manes, Ethel,

PORT ROYAL, Jamaica, the principal naval station owned by the British in the Carib¬ bean Sea. Port Royal, the city, which was destroyed by an earthquake in 1693, was near the site of the present naval station. The pres¬ ent Port Royal is at the entrance to Kingston Harbor. It is strongly fortified and has a barracks, arsenal and a hospital.

PORT ROYAL, S. C., village in Beaufort County, at the southern end of Port Royal Island, on the Port Royal and Augusta Rail¬ road, 53 miles southwest of Charleston. Near here, a French Huguenot colony was established in 1664 by Ribault, which was taken by the Spaniards in 1665 and all the garrison killed. On 3 Feb. 1779, during the southern campaign of the Revolution, Major Gardiner, with 200 British soldiers, attempted to seize Port Royal Island, but was attacked and defeated by Gen¬ eral Moultrie with about the same number of men, the British loss being serious, that of the Americans slight. In the Civil War the harbor

PORT ROYAL BAY, BATTLE OF

of Port Royal was defended by two forts, Fort Walker and Fort Beauregard, built by the Con¬ federates and garrisoned by a Confederate force under Drayton and Ripley. On 7 Nov. 1861 an attack was made on these fortifications by the Federals with a force of two frigates, three sloops and seven gunboats, commanded by S. F. Dupont (q.v.). This fleet opened fire on both forts at once, on entering the harbor, but later concentrated the attack on Fort Walker till that fort surrendered ; Fort Beau¬ regard was surrendered shortly afterward. Port Royal has an excellent harbor, and a large drydock, and has been the rendezvous of the North Atlantic Squadron. Pop. about 700. Consult Parkman, (Pioneers of France in the New World) for an account of the Huguenot colony.

PORT ROYAL BAY, Battle of. As early as June 1861 the United States authorities, in order more effectually to maintain the blockade and to secure a military and naval base of oper¬ ations on the southern Atlantic Coast, deter¬ mined to seize a good port south of Cape Hat- teras, and in August a naval and land expedi¬ tion was ordered for the purpose. Capt. S. F. Dupont was ordered to organize the naval ex¬ pedition, and Gen. Thomas W. Sherman to organize a force of 12,000 men to accompany it. It was agreed between Dupont and Sherman to seize Port Royal Bay, one of the finest harbors on the coast, 56 miles south of Charleston and 25 north of Savannah. The destination was kept a profound secret. The fleet of 16 war vessels and nearly 40 transports, carrying Sher¬ man's 12,000 men with supplies, sailed from Hampton Roads on the morning of 29 October, and on the night of 1 November was struck by a furious storm off Hatteras and scattered. Four vessels and a few lives were lost, one war vessel was disabled and, with two trans¬ ports, returned to Hampton Roads ; but by the 6th the fleet had assembled off the entrance to Port Royal Bay, the gunboats, preceding, hav¬ ing. driven into the harbor three Confederate vessels that had run out and opened fire upon them, and coming under a long cross-fire from two works commanding the entrance to the bay. It had been the intention to silence and take these works on the afternoon of the 6th but necessary arrangements were not perfected until too late in the day. The bay was defended by two earthworks and some shore batteries, one earth¬ work on each side of the entrance, Fort Walker, on Hilton Head, the south side, and Fort Beau¬ regard, on Bay Point, Saint Phillips Island, on the north. These were strong and well-con¬ structed works, mounting 42 heavy guns, 22 of which were in Fort Walker, and garrisoned by nearly 3,000 men, under Gen. T. F. Drayton. The distance between the two works was two and one-half miles. In addition to the land- works, there were

three small Confederate gun¬ boats of two guns each in the bay, under com¬ mand of Com. Josiah Tatnall. The Wabash , the flagship of the fleet, carrying 46 guns, was to lead in the attack, followed by nine other vessels, a ship's length apart, and a flanking column of five gunboats was to move on the right. The fleet was to pass up the roads on the Bay Point side, delivering broadsides on Fort Walker until each vessel had reached a VOL. 22 — 25

point two miles above the fort, when they were to turn and come down and again deliver their broadsides at Fort Walker and enfilade its two water-faces. Having completed the circuit, the line w.as to repeat the movement until the forts surrendered. At the same time the five flanking gunboats were to pass and attack Fort Beaure¬ gard and, on reaching the turning-point two miles above it, remain there and hold Tatnall's fleet in check, with special orders to see that it did not make a dash upon the transports. At 9 a.m. 7 November the fleet crossed the bar and advanced in a long well-ordered column to the attack, while the transports lay at anchor out¬ side ready to land troops. Captain Dupont led the Wabash up the middle of the bay, receiving the first fire from both forts at 9.26 a.m., and replying to both, until two miles beyond them; then he turned to the left in a wide circle and led back past Fort Walker at 800 yards dis¬ tance, opening upon it broadside after broadside. The rest of the column followed, each vessel in succession opening its guns, as it came within range and maintaining a rapid fire as it slowly drew past. The gun-fire from the fleet was a terrific continuous roar and was replied to by a well-maintained fire, notwithstanding the fact that hundreds of shells were dropping into the fort and almost burying its defenders, under the dirt thrown up. At the same time the flanking column of five gunboats steamed up the bay, nearer to Bay Point, and poured broadsides into Fort Beauregard and then, steering to the other side, advanced against Tatnall's fleet, driving it into Scull Creek and, taking position near the shore and flanking Fort Walker, opened upon it a destructive fire, to which it could not respond, as the one gun on that flank of the fort had been shattered by a round shot. After the main column had passed down the bay about two miles, it turned, at 11 a.m., and again passed in front of Fort Walker, at 300 yards closer range than before, and with a more terrific fire, part of which was against Fort Beauregard. As the manoeuvre was repeated for the third time it was discovered that the Confederates'were aban¬ doning Fort Walker; its guns were silenced; a few shots were fired, to which there was no response ; a small party was sent ashore, the Confederate flag hauled down, and the Union flag run up at 2.20 p.m. Before the close of the action the Pocahontas , Commander Percival Drayton, which

had been delayed by injuries received in the storm, entered the bay and opened fire on the fort. Commander Drayton was a brother of the commanding officer of the Confederate forces. The Confederates had left in haste, leaving tents standing, and escaped across Scull Creek, being assisted by the boats of Tatnall's fleet. By nightfall the transports had come into the bay and landed Gen. H. G. Wright's brigade at Hilton Head. Fort Beaure¬ gard was abandoned about 5 p.m., after its com¬ manding officer had spiked the guns and de¬ stroyed the greater part of the powder. It was occupied next morning by General Stevens' bri¬ gade. The battle was of great value to the Federal government in its moral and political effect, in addition to the fact that it gave the Union army one of the finest harbors on the Atlantic Coast, as a base for future operations for both the army and navy. The Union loss

was 8 killed and 23 wounded; the Confed¬ erate loss, 11 killed, 48 wounded and 7 missing. Consult (War Records) (Vol. VI) ; (Naval War Records> (Vol. XII) ; Ammen, (The Atlantic Coast* ; Maclay, (History of the United States Navy* (Vol. II) ; (Battles and Leaders of the Civil War* (Vol. I).

PORT ROYAL-DES-CHAMPS, p5r rwa-

yal da shah. See Port Royal.

PORT ROYAL FERRY, Engagement at.

After the naval battle of Port Royal Bay (q.v.), 7 Nov. 1861, the navy explored the various sounds and creeks in the vicinity, capturing some abandoned guns. While the navy was thus em¬ ployed the army had completed a very large and strongly intrenched camp on Hilton Head, sur¬ rounding Fort Walker, and on 11 December oc¬ cupied Beaufort, some Confederate cavalry falling back across Coosaw River, taking to the farther side the ferry-boat and ropes and all other boats and covering the crossing by a blockhouse, which was soon destroyed by two adventurous soldiers who swam the river. By the end of December the Confederates had erected a strong field-work on the mainland opposite and commanding Port Royal Ferry, on the Coosaw, and they repulsed the efforts of the gunboats to dislodge them. The position was held by the 14th South Carolina regiment, four companies of the 12th South Carolina, about 45 cavalry and a section of Leake's

battery, all under command of Col. James Jones. Obstructions had been placed in the Coosaw above and below the ferry to prevent the ascent of the gunboats, and a battery put in position opposite Seabrook's Point. A com¬ bined land and naval expedition was set on foot to take the position and clear the river. Gen. I. I. Stevens' brigade, reinforced by two regiments, in all 3,000 men, was to cross the Coosaw several miles below Port Royal Ferry, advance up the left bank of the river and take the work in rear, while two gunboats, an armed tug and four boats armed with howitzers, all under Commander C. R. P. Rodgers, were to enter the Coosaw by Beaufort River. A naval co-operating force was to move up Broad River and thence to the Coosaw to attack the battery opposite Seabrook's Point. On the night of 30 December a large number of flatboats were col¬ lected and sent up Beaufort River, and at 1 a.m. 1 Jan. 1862 the embarkation began and, passing up the Coosaw, the troops were landed during the morning. At 1.30 p.m. they moved for Port Royal Ferry, marching parallel with and close to the river, the gunboats and launches shelling the woods in advance of the skirmish-line. A mile had been marched when a concealed battery opened its fire on Stevens' column, but Stevens soon drove it and its infantry support from the field and, closely following, reached the fort which had been abandoned, upon the appearance of the gunboats, the enemy leaving one gun. Meanwhile the gunboats moving by way of Broad River had cleared the Coosaw, beyond the ferry. During the night the ferry was completely restored, the captured fort leveled to the ground, and next morning the troops crossed the ferry and marched back to Beaufort with the captured gun and a few prisoners. The result of the action was an abandonment of any future at¬ tempt to plant batteries on the Coosaw or the adjacent network of waters; and, being almost

the first Union success since the defeat at Bull Run, it was considered of so much importance that the thanks of the government were given in general orders to General Stevens and his command for their victory at the battle of Port Royal Ferry. The Union loss was 3 killed and 14 wounded; the Confederate loss, 8 killed and 23 wounded. Consult (Official Records) (Vol. VI); Ammen, (The Atlantic Coast) ; Stevens, (Life of Gen. I. I. Stevens) (Vol. II) ; (Battles and Leaders of the Civil War.*

PORT SAID, sa-ed', Egypt, seaport at the Mediterranean end of the Suez Canal and capital city of the Egyptian department of the Isthmus. It lies in the easternmost part of an island between the Mediterranean and Lake Menzaleh, about 110 miles north-northeast of Cairo, in lat. 31° 16′ N. and long. 32° 19′ E. Its whole being is dependent on the canal and it was not founded until the canal was partly built. Hence

its architecture is European, and many of the houses are wooden with sloped roofs. North of the city on the coast of the canal and of the Mediterranean is an electric light about 173 feet high and visible 20 miles out. Two great concrete moles 5,300 and 7,400 feet long reach out into the sea. The trade of the city is almost entirely transit. The city was named for Said Pasha, viceroy of Egypt 1854-63. A fountain and statue of Queen Victoria was built in 1898, and a colossal statue of De Lesseps, by Fremiet, has stood since 1900 at the entrance of the canal. Attempts by the Turks in the World War to capture the city and wreck the Suez Canal proved signal failures. The population of Port Said and Ismailia, including more than 10,000 Europeans, mostly French and Greek, numbered about 90,000 in

1917.

PORT OF SPAIN, Trinidad, city, capital of Trinidad (q.v.), one of the West Indies group, belonging to Great Britain. The city has a large safe harbor, steamer connections with all the principal ports of the Caribbean Sea and Gulf of Mexico, and with many South American ports; and railroad connection with San Fer- nandino, to the south, and with several other places on the island. The most of the products of the Orinoco region are shipped from Port of Spain. The city is well built and has many fine residences. It has the government buildings, botanical gardens and the Immaculate Concep¬ tion College. It is a Roman Catholic archi- episcopal see. Pop. 60,000.

PORT TAMPA CITY, Fla., town, Hills¬ boro County, on Tampa Bay, and on the Atlan¬ tic Coast Line Railroad, eight miles .south of Tampa. It was founded in 1889 and incorpo¬ rated as a town in 1891. In the Spanish- Amer¬ ican War, the United States troops were mobilized here for embarkation to Cuba. It is the port of Tampa (q.v.), has a large and excellent harbor and is connected with the West Indies, Mobile and other ports by steamer. It is in a fruit-growing and agricultural region for the products of which it is the shipping point. Pop. 1,343.

PORT TONNAGE. Some interesting facts are shown as to the relative rank in ton¬ nage movement of the principal ports of the world, in a table prepared by the Bureau of Sta-

tistics of the Depaftment of Commerce and Labor at Washington. The

table is as follows:

PORT

Year

Entered

tons

Cleared

tons

New York .

1910

13,042,818

12,541,903

Antwerp .

1909

11,907,689

11,894,492

London .

1909

11,605,698

8,622,316

Hongkong .

1909

11,150,560

11,194,098

Hamburg .

1909

11,061,041

11,247,191

Rotterdam .

1909

9,217,493

8,902,570

Shanghai .

1909

9,092,427

9,400,382

Liverpool .

1909

7,747,904

6,593,094

Singapore .

1908

6,994,980

6,948,225

Colombo .

1909

6,593,591

6,587,028

Aden .

1909

5,973,065

3,055,376

Cardiff .

1909

5,771,476

8,888,756

Hongkong would show a much higher figure, but for the fact that Chinese junks en¬ gaged in the foreign trade are excluded from the estimate, the tonnage of these vessels en¬ tered in 1901 having been 1,126,931, and of those which cleared, 1,130,279. Singapore excludes native craft and vessels under 50 tons, except¬ ing vessels engaged in trade between the Straits Settlements.

In this connection it is interesting to note that during the fiscal year 1 July 1917-30 June 1918, the net tonnage of vessels that entered the various ports of continental United States ag¬ gregated 45,455,937 tons, of which 19,283,530 tons represented American vessels; and the net tonnage of vessels that cleared the ports ag¬ gregated 46,069,482, of which 19,261,733 were American. It should also be noted that during this period the imports of merchandize into the United States aggregated in value $2,946,- 059,403, and the similar exports from the United States, $5,928,285,641 — the largest totals on record. And this when the world was aflame from the Teutonic torch.

In the previous fiscal year the tonnage en¬ trances and clearances at United States customs districts aggregated 50,472,176 and 52,077,070 tons, respectively, as follows : Atlantic Coast, 24,010,685 and 25,047,868; Gulf Coast, 6,991,- 335 and 7,570,242 ; Mexican border, 65,670 and 64,396; Pacific Coast, 5,453,278 and 5,411,299; and Northern border, 13,951,208 and 13,983,265.

PORT TOWNSEND, Wash., city, county- seat of Jefferson County, on Port Townsend Bay, at the entrance to Puget Sound (q.v.), and on the Northern Pacific and the Port Town¬ send Southern railroads, about 70 miles north of Olympia. It has steamer connection with San Francisco, Alaska and many of the prin¬ cipal ports on the eastern coast of Asia. The harbor ranks with the largest in the world. The place was settled in 1851 and in 1860 was incorporated as a city. Port

Townsend is on the west side of the bay, five miles by land and two and one-half miles by water from the city, and other government fortifications are located on Admiralty Head, Point Hudson, Point Part¬ ridge and Marrowstone Point. The govern¬ ment has established a marine hospital and a quarantine station. The city is included in the Puget Sound customs district, through which about $140,000,000 in trade passes annually.

The city is in an agricultural and lumbering

region. In the vicinity are deposits of oil and valuable minerals. The chief industrial estab¬ lishments are lumber and planing mills, a ship¬ yard, machine shops, steam-boiler works, bot¬ tling works, herring pickling and curing works, salmon and sardine canneries, grain elevators and flour mills. The chief exports are grain, lumber, fish, oil, livestock, farm and dairy products and pig iron. The pig iron is from the Irondale furnaces. The principal public buildings are the government custom house, city hall, county courthouse, United States Marine Hospital, the quarantine station, a sana¬ torium and Saint John's Hospital. The educa¬ tional institutions are a high school, public elementary schools, private business schools and a public library. The scenery around Port Townsend is beautiful, surrounded as it is by water and mountains. The government is ad¬ ministered under a charter of 1890, which pro¬ vides for a mayor, who holds office one year, and a council. The administrative officials are appointed by the mayor or elected by the coun¬ cil. Pop. (1920) 2,847.

PORT WASHINGTON, Wis., city and county-seat of Ozaukee County, on Lake Michi¬ gan and on the Chicago and Northwestern Rail¬ road, 25 miles north of Milwaukee. Iˆs in¬ dustries include the manufacture of wooden- ware, foundry products, internal-combustion engines, etc. Pop. 3,340.

PORT WINES. The name of port wines, or Oporto wines, is given, in commerce, to the produce of the vineyards of Portugal, the dis¬ trict in which they are produced being a rugged and mountainous tract that begins about 60 miles above Oporto, and extends for 30 or 40 miles with an extreme breadth of about 12 miles. Port is naturally a very rich and delicate wine, vary¬ ing in color from a pale rose to a deep red. It owes its special character partly to the soil of the district, where it is grown, partly to the climate, which is cold in winter and very hot in summer. The harvest lasts from the beginning of September to the middle of October. The wines for export are very much mixed and are strongly fortified with brandy, partly to make them sooner ready for export and partly to suit the taste of the foreign

markets. The mixing of the various wines considerably reduces the variety of qualities of port exported, compared with those which are naturally produced. The English market has always been the principal market for port wine. English connoisseurs have tended more than anything else to spread its fame in other countries. The taste for this wine was introduced into England in the 17th century and English establishments were formed in Oporto to direct the purchase and shipping of the wines. These companies eventually united into a sort of corporation called the English Factory, which became completely master of the market. In the following century (1756) the Marquis of Pombal organized an association of producers to oppose this monopoly of buyers and the company then established imposed re¬ strictions on the trade which were not finally abolished till 1853, a new company having lat¬ terly taken the place of the old. In recent times the vines have suffered rather severely both from the oidium and from the more serious plague of the phylloxera. See Wine and Wine Making.

PORTAELS, Jean Francois, zhon fran- \va por-tals, Belgian painter : b. Vilvorde, near Brussels, 1 May 1818; d. Brussels, 8 Feb. 1895. He owed his early art training to Navez of Brussels and afterward proceeding to Paris became the pupil of Paul Delaroche, gaining the <(Grand Prix" in 1842. After traveling in Syria, Egypt, Palestine, Greece and Turkey, he was appointed director of the academy in Ghent, an office he retained for three years. He then resumed his travels which included the whole of Europe in their range. He ended his days as director of the Brussels Academy. His works are faulty in composition and deficient in living characterization, but in spite of occasional insipidity they are pleasing and full of expres¬ sion. Among them the most important are (The Journey of the Magi' ; (Funeral Proces¬ sion in the Desert of Suez) ; (Jeptha's Daugh¬ ter ; (The Daughter of Zion1* ; (The Flight into Egypt' ; (Leah and Rachel ' ; (The Young Witch' ; (The Simoon.)

PORTAGE, N. Y., town in Livingston County, on the Erie and Pennsylvania Railroads, 60 miles southeast of Buffalo. It is the distri¬ bution and marketing centre for a prosperous agricultural district and here also is Letchworth Park of 1,000 acr6s crossed by the Genesee Rivef, which is crossed by a fine bridge. The falls of the river and the canon at this point are very picturesque. The town contains a mu¬ seum. The park is the gift to the State of Wil¬ liam Pryor Letchworth.

Pop. 1,273.

PORTAGE, Pa., borough of Cambria County, on the Pennsylvania Railroad, six miles southeast of Ebensburg. There are several coal mines nearby and coal-mining is the principal industry. Pop. 4,804.

PORTAGE, Wis., city, county-seat of Co¬ lumbia County, on the government ship-canal between the Fox and Wisconsin rivers, and on the Chicago, Milwaukee and Saint Paul and the Minneapolis, Saint Paul and Sault Sainte Marie railroads, about 92 miles west by north of Mil¬ waukee and 35 miles north of Madison, the State capital. It was settled in 1835, incorporated in 1837 and in 1854 was chartered as a city. It is in a productive agricultural and lumbering region and is the commercial and industrial centre for quite a large portion of Columbia County. The chief manufactures are flour, brick, hosiery, knitgoods and farm implements. The educational institutions are a high school, public and parish elementary schools and a pub¬ lic library. In the vicinity are the ruins of Fort Winnebago (1828). The government is ac¬ cording to the commission plan since 1912. The city owns the waterworks. Pop. 5,582.

PORTAGE GROUP, in geology, a portion of the Devonian series, so-called by the geolo¬ gists of the New York State Survey because largely developed near the town of Portage, N. Y. The rocks of this period are chiefly sandstone and shale

PORTAGE LA PRAIRIE, por'taj la pra'ri, Canada, a town in Manitoba, on the Ca¬ nadian Pacific, Grand Trunk Pacific, Canadian Northern and Great Northern railway, 56 miles west of Winnipeg and 15 miles south of Lake Manitoba. It is an important railway centre and the receiving and distributing point for the fertile <(Portage Plains,® one of the

finest wheat-growing sections in the world. It has railway machine shops, a large flouring mill, grain elevators, a paper mill, brickworks, and is the seat of an Indian industrial school and the provincial home for incurables. Pop. 5,892.

PORTE, The, or OTTOMAN PORTE.

See Sublime Porte.

PORTE CRAYON. See Strother, David Hunter.

PORTEOUS RIOT, so called from the lynching of Capt. John Porteous, commander of the city guard of Edinburgh, 7 Sept. 1736, was

occasioned by various incidents connected with the trial and execution of Andrew Wilson, a smuggler, who with two companions had robbed the Kirkcaldy excise officer. The mob after the execution became disorderly and commenced throwing stones, whereupon Porteous ordered his command to fire into the crowd, with the result that seven people were killed and 20 wounded. Porteous, after trial, was condemned to death, but being reprieved, a mob broke into the jail and hanged him. The city was fined $4,500 for the benefit of the widow and the provost was imprisoned for a year and dis¬ qualified from holding any further official posi¬ tion. The Porteous Riot is one of the main features of Sir Walter Scott's (Heart of Mid¬ lothian.)

PORTER, Alexander, American jurist: b. Armagh, County Tyrone, Ireland, 1786; d. At- takapas, La., 3 Jan. 1844. He came to the United States in 1801, settled in Nashville, Tenn., studied law and was admitted to the bar in 1807. He established a law practice in Saint Martinsville, La., in 1810; was a mem¬ ber of the convention which framed the State constitution in 1811; in 1821 was appointed a judge of the Supreme Court of Louisiana. Dur¬ ing his 12 years' occupation of that office he established a fixed system of jurisprudence to supersede the chaotic mixture of Spanish, French and civil law in use. Elected United States senator in 1833 he voted to censure President Jackson for removing the deposits from the United States Bank, opposed the aboli¬ tion of slavery in the District of Columbia and the bill to compel specie payment for public lands, advocated the division of surplus rev¬ enue among the States and also the recognition of Texas' independence. He was re-elected to the Senate in 1843.

PORTER, Anna Maria, English novelist, sister of Jane Porter (q.v.) : b. 1780; d. near Bristol, Gloucestershire, 21 Sept. 1832. Before she was 15 she published two volumes entitled (Artless Tales.' The greater part of her life was spent with her mother and sister Jane in the neighborhood of London. She produced numerous novels, which enjoyed considerable popularity in their day. Among them are < Walsh Colville' (1797) ; < The Lake of Kil- larney) (1804) ; (The Hungarian Brothers' (1807) ; (The Recluse of Norway' (1814) ; (The Knight of Saint John' (1817) ; (Rocke Blanche' (1822); (Honor O'Hara' (1826); (The Barony' (1830). She also published (Tales of Pity' and (Ballads, Romances and Other Poems.' Nearly all her books were trans¬ lated into French and several were republished in this country.

PORTER, Benjamin Curtis, American portrait painter : b. Melrose, Mass., 27 Aug. 1843; d. New York City, 2 April 1908. He early became a pupil of Dr. Rimmer and A. H. Bicknell in Boston, studied art in Paris and Vienna in 1872-78 and first devoted himself to figure painting, but later made portraits his specialty. In 1880 he became a member of the National Academy. His work showed har¬ monious coloring, and his portraiture was ac¬ curate and striking. Among his works are (Henry V and the Princess Kate) (1868) ; (Cupid with the Butterflies) (1874) ; (Portrait of Boy with Dog) (1884), etc.

PORTER, Charles Talbot, American me¬ chanical engineer: b. Auburn, N. Y., 1826; d. 1910. In 1845 he was graduated at Hamilton College ; was admitted to the bar and practised law for many years before he adopted the career of engineer. He became a partner of John F. Allen and with him controlled the manufacture of the Porter-Alien engine. He was the first engineer to complete the resistances of the reciprocating type of engine and to evolve the high-speed stationary engine. He invented two successful steam-engine governors. His published works include (Mechanics and Faith, Spiritual Truths in Nature) (1885) and Engineering Reminiscences) (1908).

PORTER, Charlotte, American author; b. Towanda, Pa., about 1853. In 1875 she was graduated at Wells College. In 1886-88 she edited (1903). She is sole author of (Dramatic Mo¬ tive in Browning's (

(Browning Study Programmes) (1900) ; (Stage Version Browning's Return of the Druses> (1903) ; (Maeterlinck's Monna Vanna' (1904) ; (Shakespeare Studies — Macbeth) (1902) ; (The Tragedies) (1911) ; (The Comedies) (1912) ; (The Histories) (1913); (Poetic Translation of D'Annunzio's Daughter of Jorio) (1907) ; (Lips of Music,* poems (1910) ; (Revels of Father Christmas and the Bishop> (1917), etc., and contributions to periodicals.

PORTER, David, American naval officer; b. Boston, 1 Feb. 1780; d. Pera, near Constan¬ tinople, Turkey, 3 March 1843. He made voyages in the West Indian merchant service, was twice impressed by the British, but escaped, and in 1798 entered the United States navy as a midshipman. He was on board the Consti¬ tution in the fight with L'Insurgente in 1799, and served as a lieutenant in the war with Tripoli. Captured with the Philadelphia , he remained in imprisonment until the peace. In the War of 1812, he fought with distinction, capturing many English merchantmen, and seriously crippling Great Britain's whale-shipping in the Pacific. His vessel, the Essex , was blockaded in 1813 in Valparaiso Harbor by two English vessels, which he offered to fight either singly or together. This offer

having been refused, he attempted

to make a dash for the open sea, but his ship was severely damaged by a squall, and he put back, anchoring a half mile off the shore, and three miles from the town. There the English, regardless of neutrality laws, attacked him, and after a struggle of two and a half hours, one of the fiercest in naval history, compelled him to surrender. He described the situation in a com¬ munication to the Secretary of the Navy by saying, <(We have been unfortunate, but not disgraced,** and upon his return he was voted the thanks of Congress and several State legis¬ latures, and received with much distinction. He was sent in 1824, being then a commodore, to operate against pirates in the West Indies. An officer sent by him to make an investigation at Fajardo, Porto Rico, was seized and imprisoned. Porter compelled the Spanish authorities to apologize for the act ; was deemed to have exceeded his authority; and was suspended for six months by court-martial. On 18 Aug. 1826 he resigned his commission, and became rear- admiral in the Mexican service. From this, too, he resigned in 1829 ; and later was consul- general to the Barbary states and charge d'affaires at Constantinople. Among his writ¬ ings are (J°lirnal of a Cruise Made to the Pacifick Ocean) (1815), and Constantinople and its Environs) (1835). Consult (Trial of Com¬ modore David Porter before a Court-MartiaP (1825) ; Porter, D. D., (Life of Commodore David Porter* (1875).

PORTER, David Dixon, American naval officer: b. Chester, Pa., 8 June 1813; d. Wash¬ ington, D. C., 13 Feb. 1891. He was son of David Porter (q.v.). In 1826 he entered the service of the Mexican navy as midshipman, and while serving on board a vessel employed in damaging Spanish commerce was captured and for a time held prisoner in the Spanish guardship at Havana. Not long after his re¬ lease, he was made midshipman in the United States navy, and until 1835 was on duty on the European station. In the Mexican War he dis¬ tinguished himself as a lieutenant, and later as commander of the Spitfire. After the war he commanded passenger steamers during an ex¬ tended furlough. At the beginning of the Civil War he was made commander of the Powhatan for the relief of Fort Pickens. On 22 April 1861 he was made .commander, soon afterward was placed in charge of the mortar fleet, in March 1862 joined Farragut, and on 18-24 April exploded 20,000 bombs in the Confederate forts Jackson and Saint Philip, below New Orleans. Farragut's fleet was thereby enabled to pass them and capture New Orleans; and the forts finally surrendered on 28 April. At Vicksburg, also, Porter by his remarkably effective bom¬ bardment of the forts enabled the fleet to pass safely. He was ordered in September 1862 to command the Mississippi squadron as

acting rear-admiral. With an improvised navy-yard at Mound City, he quickly increased his squad¬ ron to 125 vessels, and in January 1863 aided Sherman in the capture of Arkansas Post. Not long afterward he ran the Vicksburg batteries, captured the enemy's fortifications at Grand Gulf, communicated with Grant, and then co¬ operated with that general in the well-known siege of Vicksburg. On 4 July 1863 the city fell. Porter's commission as rear-admiral bore that date ; he also received the thanks of Con-

gress. He then aided Banks (1864) in the Red River expedition, and only with difficulty res¬ cued his vessels. He was placed in command of the North Atlantic blockading squadron in 1864; and with Gen. A. H. Terry co-operated in the capture of Fort Fisher 15 Jan. 1865. After the war he was superintendent of the United States Naval Academy in 1865-69, and did much to improve it. He was promoted vice-general in 1866 and admiral in 1870. He wrote a 'Life of Commodore David Porter) (1875) ; a romance 'Allan Dare and Robert le Diable) (1885) ; 'Incidents and Anecdotes of the Civil War> (1885) ; (Harry Marline) (1886) ; 'History of the Navy in the War of the Rebellion > (1887), and other works. Con¬ sult Chesney, (Essays in Military Biography* (1874) ; Soley, (Admiral Porter) (1903).

PORTER, Fitz-John, American soldier, cousin of David Dixon Porter: b. Portsmouth, N. H., 13 June 1822; d. Morristown, N. J., 21 May 1901. He was graduated from the United States Military Academy in 1845, was assigned to the 4th artillery, served in the war with Mexico, and was brevetted successively captain for services at Molino del Rey and major for similar services at Chapultepec. After the war he was on garrison duty until 1849, and then was made assistant instructor of artillery at West Point, where in 1854-55 he was instructor of artillery and cavalry. Appointed assistant adjutant-general in 1856, he served under Gen. A. S. Johnston (q.v.) in the Utah expedition of 1857-60. In 1860 he was made assistant in¬ spector-general, with headquarters at New York; and in this post, during the Baltimore riots, he superintended the defense of the rail¬ way between Harrisburg and Baltimore. He became colonel of the 15th infantry, a newly- organized regiment, on 14 May 1861, and on 17 May brigadier-general of volunteers. After having been for a time on duty in Washington, he participated in the Peninsular Campaign (1862) in Virginia, and after the capture of Yorktown, in the siege of which he had fought (5 April-4 May), was for a brief while its governor. He was then made

commander of the Fifth corps, which he led at Mechanicsville (26 June 1862) and Gaines' Mills (27 June). He was in command of the left flank, the centre of the conflict, at Malvern Hill (1 July 1862) ; and for his conduct at the battle of Chicka- hominy was brevetted brigadier-general, United States army. On 4 July 1862 he was made major-general of volunteers. While he was temporarily attached to Pope's Army of Vir¬ ginia, the battle of Manassas or the second Bull Run occurred (29-30 Aug. 1862). On the first day his corps was ordered to advance, but found itself unable to do so; on the afternoon of the second day, however, it was in action, and by its stubborn bravery saved the defeat from being a complete rout. Pope was greatly de¬ jected by the reverse, which he attributed largely to Porter's failure to execute orders. He made a complaint in his report but preferred no charges. Porter was in the defenses of Washington 2-13 September, then commanded the Fifth corps, Army of the Potomac, Sep- tember-November, fought at Antietam (17 September), and afterward in the skirmish at Shepardstown (19 September). On 27 Nov. 1862 he was arraigned before a court-martial at

Washington, charged with disobeying orders at the second Bull Run. On 21 Jan. 1863 he was cashiered, and, for violation of the 9th and 25th articles of war, was ((forever disqualified from holding any office of trust or profit under the government of the United States.® This sentence for years remained unaltered. Its jus¬ tice was much debated. Numerous appeals were made for a reopening of the case, and Por¬ ter himself several times petitioned for a reversal of the judgment. Grant, while Presi¬ dent, declined to reopen the case ; but after his second term, upon an examination of all the testimony, published in an article entitled 'An Undeserved Stigma) (December 1882) his con¬ clusions to the effect that Porter was by the evidence vindicated of the charges against him. Under President Hayes a military board ac¬ quitted Porter of all fault save unwise criticism of his superior. On 4 May 1882 President Arthur remitted the sentence so far as disability to hold office under government was concerned but a bill for Porter's relief failed to pass. A subsequent bill passed the 48th Congress, but was vetoed by Arthur on a technicality. A third bill, however, passed, and was signed by Presi¬ dent Cleveland; and by the act of Congress of 1 July 1886 Porter was made colonel of infantry 5 Aug. 1886 to rank from 14 May 1861. On 7 Aug. 1886 he was placed on the retired list. Subsequent to 1863, Porter was superintendent of certain mining operations in Colorado in 1864-65; a merchant in New York 1865-71 ; su¬ perintendent of the erection of the New Jersey State asylum for the insane at Morristown ; commissioner of public works, New York, 1875-76; assistant receiver of the Central Rail¬ road

of New Jersey, 1877-82; police commis¬ sioner, New York, 1884-88; fire commissioner, 1888-89; and cashier of the post-office, 1893-97. An offer, received in 1869, from the Khedive, to command the Egyptian forces with major-gen¬ eral's rank, was declined by Porter. Among the best statements of the case for and against Porter may be respectively mentioned, besides the article by Grant above cited (Vol. 135, North American Review), Lord, (A Sum¬ mary of the Case) (1883), and Cox, 'The 2d Battle of Bull Run as Connected with the Fitz- John Porter Case* (1882). See also Pope, John.

PORTER, Gene Stratton, American au¬ thor, ornithologist and illustrator : b. Wabash County, Ind., 1868. She received a private edu¬ cation and in 1886 was married to Charles Dar¬ win Porter. For two years she was editor of the camera department of Recreation and two years on the natural history staff of Outing. Subsequently she was for four years specialist in natural history photography on the Photo¬ graphic Times Annual Almanac. Mrs. Porter is the author of many entertaining and deserv¬ edly popular works including 'The Song of the Cardinal* (1902) ; (Freckles) (1904) ; 'What I Have Done with Birds) (1907) ; 'At the foot of the Rainbow) (1908) ; 'A Girl of the Limberlost* (1909) ; (Birds of the Bible* (1909); 'Music of the Wild> (1910); 'The Harvester) (1911) ; (Moths of the Limberlost* (1912); 'Laddie* (1913); (Michael O'Hallo- ran) (1915) ; 'Morning Face) (1916) ; 'Friends in Feathers) (1917).

PORTER, Horace, American diplomat : b. Huntington, Pa., 15 April 1837; d. New York, 28 May 1921. He was graduated from West Point in 1860 ; served for a short time as instructor there and at the outbreak of the Civil War was assigned to duty in the Department of the East. He commanded the siege batteries at Fort Pulaski and was brevetted captain for his gallantry. After the battle of Antietam he was transferred to the Army of the Ohio and later to that of the Cumberland. He was engaged at Chattanooga, Chickamauga, the battle of the Wilderness and New Market Heights, and as aide-de-camp on the staff of General Grant wit¬ nessed the surrender at Appomattox. In 1865 he was brevetted brigadier-general for his serv¬ ices throughout the war. He was assistant to Grant when that general was Secretary of War for a few months in 1867 and upon Grant's election to the Presidency Porter became his private secretary. In 1873 he resigned from the army. After the close of Grant's second term as President, Porter entered upon a business career in which he was

eminently successful, became noted as an author and lecturer, and through his efforts the Grant Monument was completed. In 1897 he was appointed by Presi¬ dent McKinley, United States Ambassador to France, which position he filled with tact and ability till 1905. He succeeded in finding the burial place of John Paul Jones, the American naval hero, and recovered the body, later send¬ ing it to the United States for burial in Annapolis. He was awarded the thanks of Congress and the privilege of the floor of each House for life, and was a delegate to The Hague Peace Conference of 1907. He wrote (West Point Life> (1866) ; Campaigning with Grant) (1897).

PORTER, James, American Methodist Episcopal clergyman : b. Middleboro, Mass., 1808 ; d. 1888. In 1830 he became a member of the New England Conference and in 1856 be¬ came an agent of the Methodist Book Concern, and was reappointed in 1860 and 1864. From 1868 to 1882 Mr. Porter was secretary of the National Temperance Society; in 1852-55 was an overseer of Harvard University and in 1855— 71 was trustee of Wesleyan University. He was the author of several works on religious topics.

PORTER, James Davis, American politi¬ cian: b. Paris, Tenn., 7 Dec. 1828; d. Paris, Tenn., 18 May 1912. He was graduated from the University of Nashville in 1846; admitted to the bar in 1850; and sat in the Tennessee legislature, 1859-61. He served in the Con¬ federate army during the Civil War, and was adjutant-general on the staff of Major-General Cheatham. In 1870-74 he served as judge of the 12th judicial circuit and in 1874— 78 was governor of Tennessee. He was United States Assistant Secretary of State in 1885-89 and Minister to Chile in 1893-97. He wrote (The Confederate Military History of Tennessee.'

PORTER, Jane, English novelist: b. Dur¬ ham, England, 1776; d. Bristol, Gloucestershire, 24 May 1850. She was a sister of Anna M. and Sir Robert Ker Porter (qq.v.) and was brought up at Edinburgh and in London. She became im¬ mediately famous in 1803 by her historical romance, (Thaddeus of Warsaw,' and (The

Scottish Chiefs) (1810) was even more success¬ ful despite its high-flown sentiment and stilted characterization. Other works of hers were (The Pastor's Fireside' (1815) ; (Duke Chris¬ tian of Luneburg> (1824) ; (Tales Round a Winter's Hearth' with Anna M. Porter (q.v.) (1824) ; (The Field of Forty Footsteps' (1828), and (Sir Edward Seaward's Narrative of his Shipwreck and Consequent Discovery of Cer¬ tain Islands in the Caribbean Sea' (1831), a praiseworthy fiction, edited.

PORTER, Jermain Gildersleeve, astrono¬ mer: b. Buffalo, N. Y., 8 Jan. 1852. He was graduated from Flamilton College, Clinton, N. Y., in 1873 and studied at the University of Berlin. He was appointed to the United States Coast and Geodetic Survey in 1878 and since 1884 has been director of the Cincinnati Obser¬ vatory and professor of astronomy at the Uni¬ versity of Cincinnati. In 1894 he received the Astronomical Journal Comet Prize. His prin¬ cipal investigations have been on the motions of the stars and the variation of latitude. He published (Our Celestial Home' (1888) ; (The Stars in Song and Legend' (1901) ; also many catalogues of stars and nebulae, and memoirs on various astronomical subjects.

PORTER, Noah, American educator: b. Farmington, Conn., 14 Dec. 1811; d. New Haven, Conn., 4 March 1892. Graduated from Yale in 1831, he was a tutor and student of theology there in 1833-35, was pastor of Con¬ gregational churches at New Milford, Conn., 1836-43, and Springfield, Mass., 1843-46. In 1846 he was made professor of moral philoso¬ phy and metaphysics at Yale, and from 1871 until his resignation in 1886 was president of that institution. Flis administration was a dis¬ tinguished one. During it the curriculum was broadened by the introduction of new elective subjects, although Porter never favored the de¬ velopment of the elective system attempted at Harvard and supported the classic for the lead¬ ing place in a scheme of liberal training. The material progress was also of note, large addi¬ tions being made to the buildings and funds. Porter was also known as the editor of revised editions of Webster's (Unabridged Dictionary.' He ranked among the foremost American meta¬ physicians of his time. Among his writings are historical Discourse on Farmington' (1841) ; (The Educational Systems of the Puritans and Jesuits Compared' (1851) ; (The Human In¬ tellect' (1868; and many subsequent eds.) ; hooks and Reading' (1870) ; (American Col¬ leges and the American Public' (1871) ; (Science of Nature vs. the Science of Man' (1871), a review of the philosophy of Spencer; (Elements of Intellectual Science' (1871) ; (Evangeline; the Place, the Story and the Poem' (1882); (Science and Sentiment' (1882) (The Elements of Moral Science' (1885) ; a (Life of Bishop Berkeley' (1885) and (Kant's Ethics: A Critical Exposition' (1886).

PORTER, Peter Buel, American soldier: b. Salisbury, Conn., 14 Aug. 1773; d. Niagara Falls, N. Y., 20 March 1844. He was graduated at Yale College in 1791, studied at the Litchfield Law School, and in 1795 began practice at Can¬ andaigua, N. Y. In 1808 he was chosen a repre¬ sentative in Congress, where as chairman of the Committee on Foreign Relations he prepared and introduced the celebrated report of Decern-

ber 1811, recommending war against Great Britain. As soon as hostilities had been de¬ clared he resigned his seat in Congress, was appointed quartermaster-general of New York and took command of a body of Pennsylvania and New York volunteers and Indians of the Six Nations. Black Rock, where General Por¬ ter resided, having fallen into the hands of the British in June 1813, and his own house, from which he had barely time to escape, being their headquarters, he rallied a force by which they were expelled and their commander mortally wounded. In July 1814 he joined Brown's in¬ vading army with a brigade of 3,500 volunteers and Indians and distinguished himself at Chip¬ pewa and Lundy's Lane, and the siege of Fort Erie. He declined President Madison's ap¬ pointment as commander-in-chief of the army in 1815, and served again in Congress for a few months. Porter was one of the earliest projec¬ tors of the Erie Canal, and was named, with Morris and Clinton, on the first board of com¬ missioners to explore a route for it. In 1816 he was appointed commissioner under the Treaty of Ghent for determining the northwestern boundary. In May 1828 he was appointed Sec¬ retary of War by President Adams.

PORTER, Pleasant, Creek Indian leader: b. near Clarksville, in the Creek Nation, 26 Sept. 1840; d. Vinita, 3 Sept. 1907. His pater¬ nal grandfather, a native of Pennsylvania, was a captain in the United States army at the time of the Creek War and showed such consider¬ ation for the defeated Muskogees that they formally adopted him as a member of the tribe. Years later, Pleasant Porter's father, Benjamin E. Porter, settled in the Indian Ter¬ ritory, where he married the daughter of a prominent chief, Tah-to-pee Tust-e-nuk-kee, and became a planter. Pleasant Porter's early life was simple and uneventful. He was edu¬ cated at the Presbyterian mission school at Tal¬ lahassee. At the outbreak of the Civil War he entered the Confederate service as a private soldier in one of the Creek Indian regiments. He saw much active service and was promoted through the non-commissioned grades to the rank of a first lieutenant. The end of the war found him, like most of his fellow-tribesmen, penniless. He then began the life of a farmer. His first official position in civil life was that of superintendent of schools in the Creek Na¬ tion, in which capacity he reorganized the tribal public school system, which had ceased to exist during the war. His ability becoming recog¬ nized, his services were soon in demand as a representative of his people in Washington. As the commander of the Creek National forces during the intratribal

insurrection known as the Spiechee War, in 1882, he displayed not only courage but also good judgment and tact as well. During his later years he occupied the position of principal chief of the Creek Nation. In 1905 he was chosen as president of the Se¬ quoyah Constitutional Convention, which gath¬ ered at Muskogee to frame the organic law for a commonwealth to be composed of the tribal domains of the five civilized tribes.

PORTER, Sir Robert Ker, English artist, brother of Jane and Anna Maria Porter (qq.v.) : b. Durham, 1775; d. Saint Petersburg, Russia, 4 May 1842. He studied at the Royal Academy in London, and became famous for

his battle pieces. In 1804 he was appointed his¬ torical painter to the czar of Russia. In 1808 he served under Sir John Moore in Spain, and in 1811 returned to Russia, where he married the Princess Sherbatoff. He was knighted in 1817, and from then until 1820 was engaged in antiquarian studies in Asia. In 1826-41 he was British consul at Venezuela. Of his paintings the most notable were (The Storming of Serin- gapatam5 (1800, destroyed by fire) ; (The Siege of Acre) ; (Agincourt) ; (Peter the Great Plan¬ ning the Port of Cronstadt and Saint Peters- burg) ; (Christ at the Last Supper Blessing the Cup,5 etc. He wrote travelling Sketches in Russia and Sweden5 (1808) ; (lLetters from Portugal and Spain5 (1809) ; (Narrative of the Late Campaign in Russia) (1813); travels in Georgia, Persia, Armenia and Ancient Baby- lonia) (1821-22), etc.

PORTER, Robert Percival, American journalist: b. Norwich, England, 30 June 1852; d. 28 Feb. 1917. In his youth he emigrated to the United States and in 1872 was engaged on the staff of the Chicago Inter-Ocean. He spe¬ cialized in economics and statistics ; prepared census reports of the 10th census, and was ap¬ pointed member of the Tariff Commission in 1882. On behalf of the Tribune of New York and the Press of Philadelphia he studied in¬ dustrial and housing conditions in Europe. With Frank Hatton he founded the New York Press in 1887 and in 1890L-94 was superintendent of the 11th census. He became a member of the staff of the London Times in 1904, and subsequently investigated social and industrial conditions in Cuba, Porto Rico and Japan. His published works are (The West in 1880> (1882) ; (Breadwinners Abroad) (1885) ; (Free Trade Folly 5 (1886) ; (Commerce and Industry of Japan5 (1896) ; (1907); (The Full Recognition of Japan5

(1911).

PORTER, Thomas Conrad, American botanist: b. Alexandria, Pa., 1822; d. 1901. In 1840 he was graduated at Lafayette College and three years later at the Princeton Theological Seminary. After five years of preaching he became professor of natural science in Mar¬ shall College (later Franklin and Marshall). He removed to Lafayette College in 1866 as professor of botany. In 1897 he resigned his professorial duties and became curator of the botanical collection of the college and dean of the Pardee school. His published works are (Sketch of the Flora of Pennsylvania5 (1872) ; (Sketch of the Botany of the United States5 (1873) ; (Synoptical Flora of Colorado,5 with J. M. Coulter (1874) ; (The Carices of Penn¬ sylvania5 (1887); (The Grasses of Pennsyl¬ vania5 (1893).

PORTER, William David, American naval officer: b. New Orleans, La., 1809; d. 1864. In 1823 he entered the United States navy as mid¬ shipman ; was gazetted lieutenant in 1833 ; re¬ tired in 1855, but restored to active service in 1859 with rank of commander. He was ac¬ tively engaged during the war with Mexico in the ’40’s and organized the Lighthouse Service. When the Civil War broke out Porter was in command of the ironclad Essex, in the Missis-

sippi, took part in the taking of forts Donelson and Henry and effected the passage of the river from Cairo to New Orleans through the fire of several Confederate batteries. On his second engagement with the ram Arkansas of the Confederate navy on 6 Aug. 1862, he sank her and sometime afterward bombarded the bat¬ teries at Natchez, Port Hudson and Vicksburg. On 16 July 1862 he was made commodore.

PORTER, William Sydney, American short-story writer, well known under the nom- de-plume of ((0. Henry® : b. Greensboro, N. C., 1862; d. 5 June 1910. He received an academic education in Texas, in which State he spent some time on a cattle ranch before beginning his journalistic career as reporter on the Hous¬ ton Post. Shortly afterward he purchased Braun’s Iconoclast , which he converted into a 10-page fiction weekly, and for which he fur¬ nished himself most of the copy. He renamed it the Rolling Stone , but soon abandoned the venture and undertook a journey to Central America. This trip was in after years of great use to him as a mine from which to draw some of his best tales. He set about raising bananas on a large scale and the venture proving un¬ successful he returned to Texas and sought employment as a druggist’s clerk. Soon after¬ ward he removed to

New Orleans and there his literary work began in earnest. His stories were sent all over the country, but he remained in comparative obscurity until his removal to New York in 1901. Within a few years he became one of the most popular short-story writers in America. His (Heart of the West) (1907) and (Roads of Destiny > deal with West¬ ern life as he knew it, and his (Cabbages and Kings) deals with life and incidents in Central America. His fame, however, rests on his stories of New York life in its many phases, from the palatial mansion of the millionaire to the homeless wayfarer and tramp of the slums. His stories are marked by a freshness of style and by keen penetration and characterization, albeit deficient in psychological insight and abounding in slang. The short stories have appeared in the following collections: Cab¬ bages and Kings* (1905) ; (The Four Million) (1906); (The Trimmed Lamp* (1907); (The Gentle Grafter * (1908); (The Voice of the City* (1908); (Options) (1909); (1910) ; (The Two Women) (1910) ; 'Strictly Business* (1910); (Sixes and Sevens) (1911); (Rolling Stones * (1912). A complete edition of his works was published at Garden City

(1912).

PORTERANTHUS, an erect, perennial, medicinal plant of the rose family, growing in woodlands from two to four feet in height and bearing five-petaled white or pinkish flowers in May to July. Two varieties are known: P. trifoliatus, found in the area from New York and Lower Canada southward as far as Georgia and westward as far as Missouri; and P. stipulatus, found from western New York southward to Louisiana and westward as far as Oklahoma. The latter variety is smaller than the former and has five-parted leaves in¬ stead of three-parted leaves as in the former. The plant is popularly known by several names : False Ipecac, American Ipecac, Bowman's Root and Indian Physic.

PORTERS VILLE, Cal., city in Tulare County, on the Southern Pacific Railroad, 30 miles south of Visalia. The city is situated in the citrus-fruit region, which produces also great quantities of olives, deciduous fruits, ber¬ ries, etc. Cattle-raising is also an important industry. The warehousing and shipping of these gives employment to a great number of Portersville citizens. In addition, there are marble and granite works, canneries, creameries, cement works and lumber yards, a public li¬ brary, high school, recreation parks, etc. The water-supply system is the property of the municipality. Pop. (1920) 4,097.

PORTLAND, Conn., town of Middlesex County, situated on the Connecticut River, di¬ rectly opposite Middletown, on the New York,

New Haven and Hartford Railroad. It has manufactories of engine parts and there are brownstone quarries. Pop. 3,425.

PORTLAND, Ind., city, county-seat of Jay County, on the Salamonie River, Grand Rapids and Indiana, Lake Erie and Western and Chi¬ cago, Bluffton and Cincinnati railroads, and the Muncie and Portland Traction line, about 45 miles southeast of Fort Wayne. It is in the midst of a productive agricultural region. The chief manufacturing establishments are wood¬ working plants, automobile parts, flour mills, clay and tile works, machine shops, cooperage and creameries. The manufacturing investment aggregates $850,000 and value of products $1,400,000. The educational institutions are five public schools and a free public library. There is a public hospital. The city owns and oper¬ ates an electric-light plant and waterworks. There is a supply of natural gas. The five banks have annual clearings over $16,000,000. The city is especially noted for large mercantile trade. There are six miles of brick streets. Pop. (1920) 5,958.

PORTLAND, Me., the largest city in the State, an important seaport and county-seat of Cumberland County, is situated on Casco Bay, 106 miles northeast of Boston, with which it is connected by the Boston and Maine Railroad. The Maine Central and Grand Trunk railways connect it with the eastern part of the State and the British provinces. It has direct steam¬ ship connections with Boston, New York and other Atlantic Coast ports, and steamship lines to Europe. The government defense works here, recently enlarged, include Fort Preble, Fort Williams on Portland Head, Fort Levett on Cushing's Island and Fort McKinley on Great Diamond Island. Forts Scammel and Gorges, formerly strongly equipped, command the entrance to the harbor.

Topography.— The city proper has an area of 1 ll/2 square miles and is well laid out, with beautiful shade trees lining its streets and ave¬ nues. The site is one of great natural beauty, rising on a peninsula extending into Casco Bay, in view of many small islands, which have become popular summer resorts for Portland residents. In the vicinity are many other resorts and watering places, popular with people from all parts of the Union and an increasing num¬ ber of tourists from foreign countries. The drives around the two hills at the extremities of the peninsula are not surpassed in beauty by any in the United States. The city slopes

from the water front to two heights, forming a natural amphitheatre, giving the city a pic¬ turesque appearance from the sea. The harbor is protected by a massive breakwater.

Park System. — The extensive public park system of Portland includes over 115 acres and embraces the Eastern and Western Promenades, on the latter of which is a fine statue of Thomas B. Reed, Lincoln Park, Fort Sumner and Fort Allen parks, Deering's Oaks and Monument square, in the latter of which stands an elab¬ orate memorial, the work of Franklin Simmons, a son of Maine, to the Maine soldiers who were killed in the Civil War. These parks will soon be connected by a boulevard extending around Back Bay, forming a driveway of about three miles and affording extensive views of sea and mountains.

Public Buildings. — Among the prominent buildings are the United States Courthouse, the City Hall, the Custom House, Post Office, Mechanics' Hall, United States Marine Hos¬ pital, the Public Library, containing over 80,000 volumes, and the library of the Maine His¬ torical Society of 14,000 volumes ; the Portland Society of Natural History; the Maine Eye and Ear Infirmary, the New City Building, the Portland Society of Art, the Cumberland Club, the Trelawny building, the Fidelity building, Portland School for the Deaf, Old Men's Home, Home for Aged Women, Saint Elizabeth's Academy, Female Orphan Asylum, Episcopal and Roman Catholic cathedrals and several noted colonial mansions, including the Long¬ fellow House and Deering Mansion.

Government. — The city is governed under a charter granted in 1863, subsequently amended, and later acts, by a mayor elected annually, a bicameral council, consisting of 36 members, three councilmen and one alderman from each ward, and city officials, most of them elected by the people. The city marshal, commissioner of public works and members of the board of health are appointed by the mayor. The mem¬ bers of the board of education are elected by popular vote. The city has waterworks, elec¬ tric lighting system and electric street railways.

Schools. — The graded school system of Portland is excellent and managed by a school board of 12 members, including three women, who are elected as members at large. The mayor is chairman ex-officio of the board. There are two high schools, 19 grammar, 31 primary, nine kindergarten, besides a manual training school. The cost for maintaining the schools was for 1915 $303,822.35. The Roman Catholics maintain four parochial schools.

Fire Department. — There is an efficient fire department, under the charge of a chief and four assistants. The department is managed by a committee of the city government; the cost for the year 1915 was $157,037.93.

Churches. — Portland has 52 churches, among which are three Baptist, three Roman Catholic, 14 Congregational, four Episcopal, three Lutheran, 15 Methodist, one Presbyterian, two Second Advent, two Unitarian and five Universalist churches. No city of its size has more benevolent societies.

Courts and Police Department. — There are United States courts, circuit and district; supreme-judicial; superior; probate and munic¬ ipal courts. The police department is under

the charge of a chief and two deputies. The mayor is at the head of the deparment. The cost of maintenance for 1915, including pen¬ sions ($5,007.93), was $129,760.14.

Manufactures. — Portland has 271 manufac¬ turing establishments, of which by last public report the output was valued at $11,950,000. The industries include boot and shoe factories, rolling-mills, foundries, machine shops, loco¬ motive works, engine and boiler works, pe¬ troleum refineries, match factory, chemical works, carriage and sleigh factories, manufac¬ tories of stoneware, jewelry, edge tools, var¬ nishes, soap, meat-packing establishments, cooperage shops, lumber mills, etc. The capital invested in these industries, according to last census, was $9,597,000. Shipbuilding is still car¬ ried on, though of less importance, relatively, than in former years. Fishing and the shell¬ fish industry are extensively pursued. The assessed property valuation (1915) was $71,- 843,235. Net public debt, $408,937.71. Tax rate (per $100), $2.28.

Trade and Commerce. — In the earlier days Portland had an extensive and valuable trade with the West Indies, a portion of which it still enjoys. It has large commercial interests and is noted for its exports of grain, fruit and live¬ stock. Exports in 1916 from Grand Trunk piers and elevators : Grain, 1,092,6 22 tons ; package freight, 122,593 tons ; horses, 22,593 ; mules, 6,194; also 39,083 pieces of cooperage stock. Imports (trans- Atlantic), 16,260 tons; sulphur, 102,344 tons ; pulp wood, 20,205 tons ; china clay, 38,861 tons; fire clay, 13,315 tons; lumber, 1,575 tons; ore, 6,644 tons. The fish receipts were approximately 13,960 tons. Mis¬ cellaneous : Mexican crude petroleum oil, 21,- 769,104 gallons; coal, 1,511,168 net tons; salt, 3,184 tons; through this port by water, 75,614 tons. The harbor is of

easy access, capacious, safe, deep enough for the largest vessels and rarely obstructed by ice ; hence it is an import¬ ant seat of winter traffic between Great Britain and Canada. There are docks and other facili¬ ties for the repair of vessels. The greater part of the steamship-carrying trade to and from foreign parts is in British ships. The coasting trade is extensive. England, France, Portugal, Uruguay, Haiti, Argentine Republic, Norway and Sweden maintain consular service here.

Newspapers. — Portland has 14 newspapers ; six political, two religious, one agricultural, one Masonic, four miscellaneous.

Banks. — There are five national banks, with a capital of $2,000,000; five trust companies, with a capital of $1,000,000; two savings banks (resources), $34,186,217.25.

Insurance Companies. — Two, with assets of

$18,537,161.04.

History. — In 1623 Christopher Levett of York, England, visited the Maine coast and under a patent embracing the present site of Portland built on one of the islands in the harbor a fort, in which he placed 10 men and sailed for England, intending to return and plant a colony. To the site of his proposed plantation he gave the name York, from his native city. The project failed, owing to war between England and France, and the place remained uninhabited by Europeans until 1632, when George Cleeve and Richard Tucker of England made a settlement on the eastern ex-

RIVER FRONT OF PORTLAND

PORTLAND, MAINE

1 Birthplace of the Poet Longfellow

2 A View of Portland Head

tremity of the peninsula within the limits of the present city of Portland. The Indian name of the place was Machegonne and was entitled in the patent to Cleeve and Tucker Stogomor, from Stogumber, the birthplace of Tucker. This was shortly changed to

Casco Neck. In 1658 the name was changed to Falmouth. The In¬ dians made an attack on the town in 1676, burn¬ ing houses, killing some of the inhabitants and making many captives. It was completely de¬ stroyed by the French and Indians in 1690. The General Court authorized its resettlement in 1714, and in 1716 it was resettled by Col. Samuel Moody, who soon gathered about him about 50 families. On 10 March 1719 the first town meeting was held. The town suffered severely during the Revolutionary War from a bombardment by a British fleet in 1775. It was again rebuilt, and in 1836 received its first city charter. On 4 July 1866 a fire destroyed 1,500 buildings, involving a loss of $10,000,000. Long¬ fellow, N. P. Willis, William Pitt Fessenden, Neal Dow and Thomas B. Reed were natives of Portland. Pop. (1920) according to the United States census 69,272.

Bibliography. — Neal,

James Phinney Baxter.

PORTLAND, Ore., chief city of the State and county-seat of Multnomah County, situated just above the confluence of the Willamette and Columbia rivers, a position made doubly im¬ portant through the continuous improvement of these great commercial waterways by the United States government and the port of Portland. The city is 771 miles north of San Francisco, 115 miles from the ocean and covers an area of 66.36 square miles. The population of the city is steadily increasing at a rate approximating 10 per cent annually. It is called <(The Rose City** in appreciation of the fact that its people pay special attention to the beautification of their homes and especially to the planting of rose gardens and hedges. Portland is unique in its efforts to develop the country throughout the State and this policy has reacted very advan¬ tageously indeed on the trade of the city. Geo¬ graphical contours give a water-level route from far in the interior. Railway lines oper¬ ating on this grade pour their traffic into the city most economically as a consequence. The splendid fresh-water harbor is the best one on our Pacific Coast and there is better than a 30-foot channel to the sea at low tide with 35 feet assured in the near future.

Columbia River Entrance. — The entrance to the Columbia River is deeper than any other Pacific Coast port, the most recent government figures showing a depth of water in excess of 42 feet for a width of over half-a-mile and a depth of 35 feet for an additional half-mile of width. The United States government has spent $16,000,000 to remove what was once con¬ sidered a hazardous bar at the mouth of the Columbia. This obstruction has been entirely removed by the

construction of two long jetties, one on either side of the river entrance. The waters of the Columbia constantly are scouring the channel and the depth of water is increas¬

ing year by year. Portland is the chief lumber manufacturing city in the world. The by-prod¬ uct of lumber is the manufacturing of furniture, the city having some of the largest furniture manufacturing plants in the United States. Portland is also the chief wheat exporting port of the Pacific Coast and in normal times the second largest wheat shipping port in the United States, handling the bulk of the great crop produced in the Inland Empire (eastern Oregon, eastern Washington and Idaho), and in 1915 the wheat receipts of the city mounted to 18,718,755 bushels. Portland has 772.39 miles of improved streets ; of this, 384 miles are hard surfaced, 116.30 miles macadam and gravel, and 269.66 miles graded. Completed sewers show a total of 574 miles. The assessed valuation of taxable property in Portland at the end of 1918 was $305,200,640. The tax rate is $1.20 per hundred dollars and the net bonded indebted¬ ness of the city is $11,859,011.38.

Streets and Parks.— Portland is continu¬ ously improving its streets and in this respect stands among the most modern cities of the country. Blocks are 200 X 200 feet, with no al¬ leys, giving the city a fine appearance. The city is a huge park, in that great Dougla; fir trees, oaks and cedars and other large growths grow on the hills and close down to the border of the city limits. The streets are lined with shade trees and practically every home has its lawn and rose hedges. Boulevards run along each side of the river, both above and below the busi¬ ness district. Council Crest drive is one of the city's show places, because of the vast pano¬ rama of mountain, hill, valley and city that un¬ folds to the view of the spectator. Terwilliger boulevard, following the contour of the hills on the west side of the river, is a connecting link of an extensive chain of scenic roads that lead from the city into beautiful verdure-garbed val¬ leys dotted with orchards and farm homes.

Columbia River Highway. — The Columbia River highway, along the east bank of the Co¬ lumbia River, is said to be the most beautiful highway in the world. It traverses the gorge of the Columbia River for 50 miles east of Portland. Engineering skill and natural scenic beauty have made this roadway one of the most attractive tourist highways in America. It extends from Pendleton in eastern Oregon to Astoria, at the mouth of the Columbia River, a distance of 370 miles. The Pacific highway extending from Vancouver, B. C., to Tia Juana, Mexico, constituting the main north and south thoroughfare along the Pacific Coast, traverses Oregon from Portland south to the California line, a

distance of approximately 360 miles, and is a wonderful roadway. Portland's park area compares favorably with other cities of its size. Washington Park is situated on the edge of the western hills, a most sightly location, where some of the most magnificent views of the city and mountain peaks are to be obtained from an emi¬ nence in this park. Another one of the interest¬ ing parks of the city is Peninsula Park, where are to be found beautiful sunken gardens, said to be the largest rose park in the United States and accessible by street car from the centre of the city. Macleay Park is situated in the Wil¬ lamette Heights district and was donated by an early pioneer with the request that its natural ruggedness be maintained in its present state.

There are 21 parks and playgrounds in and about the city, many of which are highly im¬ proved. In addition to public parks, Portland has four splendid golf courses, one of which is controlled by the municipality, also a number of fine privately controlled amusement parks.

Libraries. — Portland is the seat of the magnificent new Multnomah County Library. This, with five tastefully designed and substan¬ tial branch buildings and 12 sub-branches and 22 deposit stations, gives easy access to its priv¬ ileges from every portion of the city; its circu¬ lating rural libraries throughout the entire county and affiliations with suburban communi¬ ties make this institution unique among Amer¬ ican libraries. A feature of the new building is a series of commodious halls, available without charge for meetings of a civic or development nature. More than 50 organizations regularly avail themselves of this opportunity. The cir¬ culation is about 1,385,964 volumes annually. Portland, according to the latest available gov¬ ernment statistics, is the most highly cultured city in the United States; the percentage of il¬ literacy is but 1.2 per cent.

Schools and Education. — • Portland has an excellent public school system. There are 71 school buildings in the city under the control of the school board. There are 1,202 teachers and supervisors employed, and 44,996 pupils en¬ rolled, segregated as follows : Elementary schools, 35,636 pupils ; high schools, 4,672 pu¬ pils ; trade schools, 1,623 pupils; night schools, 3,065 pupils. There are four special schools and many private schools of high class and effi¬ ciency, as well as numerous trade and technical institutions. The University of Oregon main¬ tains its medical department in this city. The largest

dental college on the Pacific Coast, teaching dentistry and pharmacy, is located in Portland, besides private medical institutions and law schools. A public art institution fosters the fine arts. The Reed College is an institu¬ tion offering courses of the highest order in the arts and sciences. It has a large endow¬ ment fund and is fast forging to the front as a school of national prestige. Music conserva¬ tories and voice culture schools rank among the highest in the country.

Newspapers. — Five daily newspapers are published in Portland, the Oregonian, Oregon Journal, Evening Telegram, Portland News and the Record-Abstract (Court News), with an additional 80 semi-weekly, weekly and monthly publications.

Climate. — Portland has an equable climate. The summers are cool and comfortable, the winters mild and rainy. For a period covering the last 30 years the United States Weather Bu¬ reau gives the average annual rainfall as 45 inches ; the average yearly temperature was 52.4°. There are no destructive storms, wind or electric disturbances.

Churches. — Portland has 213 churches, with church buildings valued at approximately $3,150,000. The Y.M.C.A. and Y.W.C.A have large memberships and splendid buildings of their own. The B'rai B'rith have also a build¬ ing of their own.

State Exhibit. — The State of Orgeon main¬ tains an exhibit of Oregon products, agricul¬ tural, mineral and manufactured, on the ground floor of the Oregon building, in which building

also is located the Chamber of Commerce with an information bureau for home-seekers. The Portland Chamber of Commerce maintains sev¬ eral bureaus where the home-seeker, investor or tourist may secure information pertaining to any particular subject in which he may be inter¬ ested. The Oregon development bureau of the Chamber of Commerce is of special interest to the home-seeker. Information as to lands and agriculture and advice is furnished free of charge.

Clubs and Commercial Organizations. —

Club life is well developed here. In addition to various social organizations there are strong commercial bodies. The Portland Chamber of Commerce is one of the largest in the world. The East Side Business Men's Club, Press Club, the Portland Ad Club, Civic League, Progressive Business Men, Realty Board, Rose Festival Association, Rose Society, Royal Ro- sarians, the Kiwanis and Rotary Club deal with public questions and do valuable publicity work. All have large

memberships, made up of the most substantial business interests in the city. There are many social, educational, liter¬ ary and musical clubs. The city is widely known for its symphony orchestra. Notable among the clubs owning their own homes are the Arlington Club, University Club, Elks Club, Multnomah Club, Oregon Yacht Club, the Hunt Club, Irvington Tennis Club, Rose City Park Club, the Laurelhurst Club, Portland Heights Club, Concordia Club, Waverly Golf Club, Tualatin Country Club, Portland Rowing Club. The holdings of these clubs would ag¬ gregate more than $3,000,000.

Lumber. — There is tributary to Portland 564,000,000,000 feet of merchantable timber, consisting of yellow and red Douglas fir, yel¬ low, white and sugar pine, spruce, cedar, hem¬ lock, larch and other commercial woods. Dur¬ ing the great European War, Portland, which is the largest lumber manufacturing city in the world, was governmental headquarters for spruce production for aeroplanes.

Manufactures, Commerce, etc. — The city is rapidly forging to the front as a manufacturing centre and is one of the chief manufacturing cities in the Pacific Northwest and is the centre of the jobbing trade. There are 950 manufac¬ turing establishments here, representing an in¬ vestment of $75,000,000. There are 40,000 fac¬ tory employees, officials and office men, whose wages amount to $65,000,000 per annum. The value of the product in 1918, not considering shipbuilding, was $200,000,000. The principal lines of manufacturing are lumber and its by-products, flour, furniture, woolens, harness and saddlery, machinery, fruit-canning and meat-packing and railroad cars and equipment. Portland's shipbuilding contracts for the period of the war approximated $230,000,000. Ore¬ gon and the Portland district were the largest producers of commercial ships, steel and wood, in the United States during the war. Port¬ land has been the business centre of the Ore¬ gon country _ since the earliest days, when the State name included the whole Pacific North¬ west. This city has been the banking centre for this corner of the United States and her banks are the largest and most substantial in the territory. They have a wide reputation for strength and conservative methods. Portland

PORTLAND, OREGON

1 View of Portland, showing Mount Hood

2 View of Portland Harbor

/»»

Scene in Portland harbor

Las 23 banks, eight of which are national insti¬ tutions. In 1918 the bank clearings amounted to $1,323,082,798.21 and the deposits for the year ending 31 Dec. 1918 aggregated $140,- 299,968.19. Postal receipts for 1918 were

$1,630,000; postal savings for 1918 were

$1,800,000.

Livestock Markets. — The rapid and sub¬ stantial growth of the Portland Union stock- yards since their opening in 1909 has conclus¬ ively demonstrated that Portland is the one great livestock centre on the Pacific Coast. In fact, it is the only competitive market west of Denver, and is growing in importance each year. Portland's livestock industry in 1918, including packing-house products, involved $75,000,000.

Railroads. — • Portland's growth as a rail¬ road centre within the past few years has been almost phenomenal. The fall of 1906, when the Spokane, Portland and Seattle (the North Bank Road, affiliated with the Hill system) was built down the north bank of the pic¬ turesque Columbia River at a cost of $53,000- 000, marked the opening of a new era in railroad development for Portland, since which time millions of dollars have been expended annually within the State in railway improve¬ ment and extension. The completion of this line opened up a vast new territory to Port¬ land. Then came the extension of the Oregon- Washington Railroad and Navigation Com¬ pany (Harrison system) and the building of the Oregon Trunk (Hill system). The city is also reached from the south by the Southern Pacific. Building of feeder lines, double¬ tracking and electrifying of present systems, is going on continuously in the territory con¬ tiguous to Portland and numerous electric in- terurban lines stretch out in all directions from the city throughout the Willamette Valley. Most notable among these latter are the Ore¬ gon Electric (Hill system) with a total mileage of 154 miles; the United Railways operate in connection with the Oregon Electric, which operates from Portland to Linnton and Wilkes- boro, in Washington County, a distance of 28 miles, and the Portland, Eugene and Eastern branch of the Southern

Pacific, which has a network of electric lines throughout the Wil¬ lamette Valley. Two main depots give excel¬ lent passenger accommodations and freight terminals and warehouse facilities here are constantly being enlarged to meet requirements of ever-increasing traffic. The great trans¬ continental railway systems operating into Port¬ land at present include the Northern Pacific, Great Northern, Burlington, Union Pacific, Southern Pacific and Canadian Pacific.

Water Transportation. — Portland's com¬ merce reaches every prominent port. Steam¬ ship lines ply to the Orient, to Pacific Coast ports and to the Atlantic Coast via the Panama Canal. The Panama Canal affords much closer connection with Atlantic ports and is having im¬ portant bearing on Portland's progress. Tramp steamers and sailing vessels carry lumber and wheat from Portland to world markets and the great foreign shipping-houses have branches here. The harbor is in the heart of the city and vessels dock close to wholesale and ware¬ houses.

City and Interurban Transportation. —

Excellent street car service is afforded by the

Portland Railway, Light and Power Company. The street car mileage of this company totals 215.49 miles within the single-fare zone. Only cars of the most modern type are used, em¬ bodying the latest improvements for safety and comfort of the passengers. Frequent inter¬ urban electric trains connect Portland and the surrounding district for a radius of from 25 to 125 miles.

Water, Electricity and Gas. — Portland's pioneers were far-sighted and made reserva¬ tions of Bull Run River, a splendid mountain stream, for the perpetual domestic water supply of the city. A municipal gravity system has been built that brings the water from its source, the Bull Run River, which is fed by melting mountain snows, through conduits for a dis¬ tance of 24 miles. There is ample supply for all purposes and the water is remarkably soft and pure. Over 67,000,000 gallons of water are carried through two huge pipe lines to the city every 24 hours. The city in 1918 possessed 738 miles of water mains. The chief supply and distribution of electricity for light and power purposes is made by the Portland Rail¬ way, Light and Power Company, which operates five water-power plants and four steam plants with a total capacity of 109,340 horse power. The power furnished by this company is all generated within 40 miles of Portland, the hydraulic plants being located on the Willa¬ mette River, Clackamas River and Bull Run River. This arrangement, in

connection with the five steam plants, ensured reliable service to all parts of the company's system. Some parts of the city are also supplied by the North¬ western Electric Company, with a hydraulic generating plant at White Salmon, Wash., and two steam plants in the city with a present capacity of 34,500 horse power. These two sys¬ tems combined have a generating capacity in excess of the present demand of approximately 65,000 horse power, ensuring an ample power supply for Portland to meet future demands. There are 50,000 consumers of electricity within the territory served by these light and power companies. Gas for lighting, heating and power purposes is adequately supplied to all parts of the city by the Portland Gas and Coke Com¬ pany.

History. — When William Overton in No¬ vember 1843 landed his Indian canoe on the river's western bank and examined the town site of Portland, now spreading for miles along both shores, his imagination probably did not suggest to him its present magnitude. A solid mass of forest and underbrush, skirted on the one side by the Willamette River and on the other by massive hills, was all that met his view. With William Overton was A. L. Lovejoy, having come from the Hudson Bay Company's resort at Vancouver, Wash., and decided this was the best location for a town site. Mr. Overton disposed of his property to F. W. Pettygrove and the latter and Mr. Lovejoy had the site surveyed and the boundaries estab¬ lished during the summer of 1844. They rec¬ ognized the advantages of the location and reasoned that some day it must not only become a metropolis of a vast region but also one of the chief seaports of the Pacific Coast. The first house, made of logs, was built in the win¬ ter of 1844. F. W. Pettygrove was a native

of Maine and A. L. Lovejoy of Massachusetts. The former wanted to name the new town Portland and the latter favored Boston. It was decided by the toss of a coin — • ((Heads it is Portland/ ® <(Tails it is Boston® — Petty- grove winning twice out of three. Portland was incorporated in 1851. The first city elec¬ tion held 7 April 1851 showed a total vote cast of 140. In 1860 the population was 2,874. The population has more than doubled each decade. If these founders of Portland could now return for one brief moment, the scene which would meet their eyes would without doubt surpass their most sanguine anticipations. They might easily recognize the beautiful snow¬ capped mountains and nature's many artistic environments of

their pioneer home, but this is all that would appear familiar to them. They would find a cosmopolitan city, large blocks of commercial buildings, massive and at the same time models of architectural beauty, while the residences, churches and school- houses are not surpassed by those of equally large cities of the East. Pop. 258,288. Consult Gaston, Joseph, (Portland, Ore.: Its History and Builders* (3 vols., Chicago 1911).

Sydney B. Vincent, Portland Chamber of Commerce.

PORTLAND, Isle of, a peninsula of the coast of Dorsetshire, England, about four miles long and of an extreme width of one and three-fourths miles. Only on the south is it accessible from the sea, its shores being wild and precipitous. Once an island the waves have built up a narrow ridge of shingle, Chesil Bank, which connects it with the main land. Great quantities of building stone have been taken from its beds of Oolitic limestone, in¬ cluding material for Saint Paul's, London. Portland Castle was built by Henry VIII in 1520. Pop. 17,011.

PORTLAND CANAL, a narrow body of water separating Alaska from British Columbia, and extending for over 80 miles in a north¬ eastern direction. Its shores are precipitous cliffs of from 3,000 to 6,000 feet in elevation.

PORTLAND CEMENT. Portland cement is the product obtained by finely pulverizing clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials with no additions subsequent to calcination excepting water and calcined or uncalcined gypsum.

The old Roman cements were natural cements or were a mixture of slaked lime and volcanic dust which was found in large quanti¬ ties in Italy. Indications are that concrete was prepared much as it is to-day and even this com¬ bination which is crude in comparison with the modern Portland cement concrete produced an artificial stone which has stood the test of time. There is a gap of about five centuries between the Roman times until the next record of the use of cement. In 1756 John Smeaton, an engineer who construoted the Eddystone light¬ house in the English Channel, while searching for a suitable mortar discovered that an im¬ pure limestone containing a certain amount of clayey matter possessed decided hydraulic prop¬ erties when calcined or roasted.

These early natural cements were very dif¬ ferent from modern cements, however. It was

necessary to use rocks with the proper propor¬ tion of material in their makeup and any varia¬ tion in the composition could not be regulated since the nature of the material was not under¬ stood.

Portland cement originated with Joseph Aspdin, a bricklayer of Leeds, England, who in 1824 took out a patent for a cement to which he gave the name of ˆPortland® on account of its resemblance when hardened to the famous stone used extensively for fine building and found on the Isle of Portland on the northern coast of England. It is interesting to note that about a quarter of a century later came one of the earliest recorded uses of the modern rein¬ forced concrete construction in the building of a reinforced concrete rowboat by M. Lambot, near Carces, France, which is the forerunner of the modern concrete ship.

In his patent, Aspdin signified that definite amounts of clay and limestone be used and described a process of putting these two ma¬ terials together, then calcining them in the manufacture of his

The history of the commercializing of port- land cement, is a. history of inventions and im¬ provements in its manufacture. In this, Ameri¬ can engineers and inventors have had remark¬ able success, for although this country was one of the last to begin the production of portland cement the output to-day has far outstripped that of Europe.

Aspdin's Portland cement was found greatly superior to the Roman cement, Puzzoulana cement and hydraulic lime previously used and its manufacture extended rapidly, especially in England and Germany. In this country it was first successfully made at Coplay, Pa.~ in 1878 but until 1890 practically all the Portland cement used in this country was imported from Europe. After that date the industry increased with great rapidity until the United States ranks as the chief cement producing country of the world. From a production of 42,000 barrels of Portland cement in 1880, the annual output in the United States rose to nearly 93,000,000 bar¬ rels in 1917.

Modern, portland cement is manufactured from a mixture of two materials, limestone rock or similar material like chalk or marl which is nearly pure lime and another material supplying the other ingredients needed which is usually shale or clay although blast furnace slag is also used in conjunction with limestone. The one supplies the calcareous materials and the other the argillaceous or clayey materials. It is essential that the mixed raw materials contain certain exact percentages of these ingredients ; this proportion differs slightly with different materials but ranges generally 75-80 per cent of carbonate of lime to 25-20 per cent of anhydrous clay.

Material for Portland cement must be com¬ paratively free from magnesia since the specifi¬ cations limit the magnesia content to 5 per cent. The clay or shale must be siliceous, preferably containing two and one-half to three times as much silica as alumina plus iron oxide. In preparing the mixture the proportions must be correct and uniform. It is found that the best results are obtained with mixtures in which the percentage of lime is = 2.8 silica + 1.1 alumina.

In the manufacture of portland cement, the first essential is to mix the raw materials in the correct proportions and grind the mixture to a high degree of fineness. Failure to produce cement of good quality results more often from neglect of the latter precaution than from all other causes combined. In England, the mix¬ ture of chalk and clay was generally made by the wet process, in which the materials were stirred with water in wash-mills and the <(slurry® allowed to settle in large reservoirs until firm enough to be cut into blocks and dried by the waste heat of the burning kilns. The dry process is generally used in the case of lime¬ stone and cement rock, both in Europe and America, although a number of plants using limestone and clay are operating on a semi-wet process. In the dry process, tne materials are crushed, dried and finally ground together in tube mills which consist of revolving cylinders partly filled with rounded pebbles. Marl and clay are usually treated by a wet process, in which the materials are mixed as taken from the beds and ground in tube mills with sufficient water to make a thick slurry.

The burning of portland cement was for¬ merly done in simple, intermittent vertical kilns similar to lime kilns or in ring kilns consisting of a number of chambers connected to a central stack into which the fuel was introduced through openings in the roof. Later, continu¬ ous kilns were adopted in which the bricks of dry slurry and the fuel were fed in at the top and the clinker periodically withdrawn at the bottom. These three classes of kilns required the materials to be molded into bricks and dried, an operation involving much labor.

In 1885 Ransome patented in England a process of burning cement material in the form of powder in revolving kilns heated by a flame of gas. The invention was a failure in Europe but was taken up and developed by American engineers and found to be especially adapted to conditions in this country. Petroleum was first used as fuel and later this gave place to powdered coal blown in by a blast of air. The rotary

process was found to yield cement superior in several respects to the product of the older types of kiln and to be adapted to the burning of cement mixture in the form of dry powder or wet slurry without previous molding into bricks. With the advantage of the rotary kiln, the American portland cement in¬ dustry began, about 1890, a career of wonderful expansion and development which is still in active progress. At the present time there are more than 600 kilns of this type in operation in the United States and many have been built after American designs in the leading factories of Europe.

There are three distinct and separate opera¬ tions from the preparation of the raw material to the finished product. The first is mechanical and includes the assembling, preparing, grinding

and amalgamating of the raw materials ; the second is chemical, during which the material prepared by the first process is calcined or roasted at a high temperature, bringing about chemical composition of the various ingredients. The third and final process is partly mechanical and partly chemical, in which the clinker result¬ ing from the calcination together with a small percentage of retarder is reduced to a fine powder.

In the dry process the raw materials are quarried, crushed, dried, pulverized, and mixed in the proper proportions. The powdering or pulverizing of the raw materials is one of the most important steps in cement manufacture and decided advances have been made in the last few years in grinding and pulverizing machines. Grinding machines nearly ajl work on the principle of striking or pounding the material between a hammer in some form and a solid metal mass.

After the raw material has been prepared for mixing this operation is accomplished by means of automatic weighing machines which weigh out just the right quantity of each of the two materials. These machines are always un¬ der the direct control of the chemist in charge of the operation day and night. There is then a perfect grinding of the raw materials to fine powder called the (

The modern rotary kiln consists of a steel cylinder lined with fire brick, generally 60 to 220 feet in length and from 6 to 12 feet in diam¬ eter, set in a slightly inclined position upon rollers so that the raw material when fed into the upper end gradually moves toward the lower or discharge end as the kiln slowly rotates about its own axis. The output of the rotary kiln is from 150 to 2,000 barrels each per day. In these kilns the raw mix is burned or ((calcined to incipient fusion® by powdered coal blown in at the lower end through a hood

with 50 to 100 per cent excess air over the amount theoretically required for combustion of the coal.

The cement mixture in powder or as wet slurry is continually fed in at the upper end and as it travels downward becomes dried (if wet) and is gradually brought to the white heat of the hottest zone, issuing finally in the form of black, rounded nodules of clinker vary¬ ing in size from birdshot to perhaps two inches. The clinker is cooled and then ground and pulverized to fine powder usually in mills of the pendulum type or in tube mills. About 2/2 per cent of gypsum is ground with the clinker to regulate the time of set of the cement. The fineness of grinding is such that at least 78 per cent of the product will pass a sieve of 200 meshes to the linear inch. After the cement has been ground it is usually de¬ posited in bulk bins holding several thousand barrels each. Samples are then taken and com¬ plete tests made for fineness, setting, sound¬ ness, strength, chemical analysis, etc.

Portland cement is a gray powder weighing from 80 to 110 pounds per cubic foot, depend¬ ing upon its fineness and how much it has been compacted; in actual practice a sack of

cement is ordinarily considered as containing one cubic foot and weighing 94 pounds net. Mixed with water to a paste it sets or hardens slowly, resisting pressure of the finger nail after several hours. After setting it gains rapidly in hardness during the first 30 days, the increase continuing, though more slowly, through a long period of years.

In testing Portland cement, the most im¬ portant qualities to be observed are fineness, time of setting, tensile and compressive strength and soundness. Fineness is deter¬ mined by sifting through standard sieves of the correct number of meshes and gauge of wire. The time of setting is determined by preparing a test piece of suitable form from neat cement and noting the time at which needles of cer¬ tain definite size and having certain definite weights cease to make appreciable indentations on the test piece. A needle exerting a different unit pressure on the test piece is used for de¬ termining the initial set from that used for determining the final test. For tensile strength briquettes one square inch in smallest section are made by filling standard molds with a plastic paste of cement and sand. These

are kept 24 hours in moist air, then immersed in water and broken in a testing machine at the age of 7 and 28 days and if desired at longer periods. Soundness or constancy of volume is tested by making pats of cement with thin edges on plates of glass, keeping them in moist air 24 hours and then exposing in a loosely covered vessel to an atmosphere of steam above boiling water for five hours. These pats should remain firm and hard and show no signs of distortion, cracking, checking or disintegration.

The use of concrete is continually extending and being applied to many new enterprises in the structural and commercial fields. The construction of concrete roads and streets is perhaps the most prominent develop¬ ment of the past decade and has reached such proportions that there are at the present time practically 150,000,000 square yards of such pavement in the United States, an amount sufficient to make nearly 15,000 miles of 18-foot highway. The recent war brought the prac¬ tical development of the ocean-going concrete ship of large tonnage and the concrete barge for harbor and inland waterway transportation, also the underground concrete tank of large capacity for the storage of crude oil, fuel oil, etc. New uses for the material are discovered almost daily so that the present century may well be called the Cement Age.

PORTLAND STONE, (1) in England, a limestone of the Upper Oolite, located between the Purbeck Beds, the highest of the Jurassic Epoch, and the Kimmeridge Clay. It is so named from the Isle of Portland. It was used in the construction of Saint Paul's Cathedral, Somerset House and other notable buildings. (2) In the United States, the name is applied to the brownstone, much used as a building stone in New York, quarried at Portland, Conn. This belongs to the New Red Sandstone of the Triassic Epoch.

PORTLAND VASE, a cinerary urn or vase and a beautiful specimen of Greek art found in the marble sarcophagus of the Emperor Alex¬ ander Severus at Monte del Grano, near Rome, during the pontificate of Urban VIII (1622-44).

It is formed of glass of a dark-blue color, and is ornamented with relieved figures in white enamel, representing the marriage of Peleus and Thetis. It is 10 inches high, seven in diameter at the broadest part, and is furnished with a handle on each side. It was placed in the Barberini Palace, where it remained till 1770, when it was purchased by Sir William Hamilton, from whose possession it passed into that of the Duchess of Portland. In 1810 the Duke of Portland gave it on loan to the British Museum, of which he was a trustee. In 1845 a stupidly

malicious fellow, or more probably a lunatic, who had been admitted to the museum as a visitor, deliberately smashed it with a stone. It was skilfully repaired, how¬ ever, and is exhibited to visitors.

PORTO ALEGRE, pdr'too a-la'gra, Brazil, capital city of the state of Rio Grande do Sul, about 710 miles from Rio Janeiro, on the left bank and near the mouth of the Jacuhy Riv'er, and northwest of the Lagoa dos Patos, on rail¬ roads connecting it with the interior. The streets are broad and clean with handsome squares. The charm of the city and its sur¬ roundings gave it the Portuguese name of <(Smiling Harbor® (Porto Alegre). A hospi¬ tal, theatre and cathedral are the main public buildings. There are good schools and a large colony of Germans, who, prior to the World War, handled most of the city's com¬ merce. This consists chiefly of the produce of the rich agricultural and grazing lands. It has several steamboat lines to Rio Janeiro, to the former German colony of Sao Leopoldo, etc. The imports are mostly English and German wares. Porto Alegre was founded in 1742 by colonists from the Azores. Pop. 100,000.

PORTO CABELLO. See Puerto Cabello.

PORTO MAURIZIO, Italy, the capital and chief town of the province of Porto Maurizio. It is situated on a promontory projecting into the Ligurian Sea, 14 miles from San Remo, 58 miles by rail southwest of Genoa and 41 miles by rail east by north of Nice. The harbor is formed by two moles and is entered from the south-southwest. Olives are produced in con¬ siderable quantities, and there is an extensive shipping 'trade in fish, agricultural produce and olive oil. The town consists of an old section on a hill and a new section near the sea, the latter containing a fine church, a theatre, a tech¬ nical school, a school of navigation and a library. Pop. 11,603. Pop. of province, 141,778.

PORTO RICO, por'to re'ko, or PUERTO- RICO, an island of the West Indies and a possession of the United States ; the eastern¬ most and smallest of the group of Greater An¬ tilles, about 1,400 miles from New York, 1,000 miles from Havana and less than 1,000 miles from Colon, Republic of Panama; lying be¬ tween lat. 17° 50′ and 18° 30′ N. and long. 65° 30′ and 67° 15′ W. The estimate of its area commonly accepted is 3,608 square miles, or, without Vieques, 3,550. Adjacent and subject to the same jurisdiction are the small islands Vieques and Culebra, in the passage between Porto Rico and the Virgin group; Mona, be¬ tween Porto Rico and Santo Domingo, and a few other islets.

Topography, Climate and Hydrography.—

A chain of mountains, the summits of which

PORTO RICO.

Estimated population, 1,216,083

DEPARTMENTS

’op.

Pop.

99,645

Aguadilla ....

. .B 2

127,566 Mayaguez .

.D 2

62,308

Areclbo .

...C5

203,199 Ponce .

D 5

11,986

Guayama ....

. D 7

160,046 San Juan .

.C 7

".1,859

Humacao ....

.C 10

Cities

1,406 Adjuntas .

. D 4

720 Lajas .

.D 2

909

Aguada .

...B2

2,751 Lares .

B 3

6,135 Aguadilla .

. . B 1

263 Las Marias .

G 3

1.166

Aguas Buenas.

...C8

394 Las Piedras ....

C 10

2,153

Albonito .

,..B2

1,021 Loiza .

B 9

3,064

Anasco .

...C2

1,159 Luquillo .

B 10

9,612

Arecibo .

. . . B 4

4,439 Manatl .

. .B 6

3,220 Arroyo . .

...E8

732 Maricao .

. .C 2

772

Barranquitas. .

...07

952 Maunabo .

D 9

1 .008

Barros .

. .C 6

16,563 Mayaguez .

. .C 1

693

Barceloneta . . .

. . .B 5

1,585 Moca .

. .B 2

5,272

Bayamon .

. . . B 7

1,063 Morovis .

. .C 6

3,847

Cabo Rojo ....

...D2

3,303 Naguabo .

C 10

10,354

Caguas .

. . .C 8

769 Naranjito .

.C 7

1.148

Camuy .

..A3

645 Palo Seco .

B 8

3,244

Carolina .

...B9

2,228 Patillas .

. . D 9

4,786

Cataflo .

. B 8

1,042 Penuelas .

. .D 4

4,498

Cayey .

...D8

988 Playa, Humacao

D 10

920

Ceiba .

...B6

35,005 Ponce .

D 4

1,683

dales .

. . C 5

1,224 Quebradillas . . . .

. A 3

1,535

Cidra .

...C8

308 Rincon . .

B 1

3,869

Coamo .

...D6

1,843 Rio Grande .

. B 1

1,908

Comerlo .

3.084 Rio Piedras .

. B 8

1,301

Corozal .

...B6

2,636 Sabana Grande .

,.C5

384

Culebra, Humacao

1,857 Salinas .

. .E 7

,.D10

4,999 San German. . . .

D 2

946

Dorado .

...B7

48,716 San Juan .

. .A 8

6,086

Fajardo .

. .C 10

2,663 San Lorenzo ....

. .C 9

1,768

Guanica. .....

. . ,E 3

1,920 San Sebastian . .

. B 2

8,321

Guayama .

...E8

1,290 Santa Isabel . . . .

.C 3

1,141

Guayanilla ....

.. D 3

905 Toa Alta .

. B 7

2 230

Gurabo . . .

1,759 Toa Baja .

. B 7

599

Hatillo .

. . . A 4

573 Trujillo Alto . .

B 9

348

Hormigueros . .

...D2

3,208 Utuado .

. .C 4

5,159

Humacao .

1,667 Vega Alta .

. B 6

1,268

Isabela .

3,082 Vega Baja .

. . B 6

750 Jayuya .

...05

3,158 Vieques .

.D 12

2,092

Juana Diaz . . .

. . .D 5

2,816 Yabucoa .

D 10

4,141

Juncos .

...C9

6,589 Yauco .

D 3

67°

66 * >

It

65 30

A /

L

£ d s?4

- i £> O jV:

1 #>£ i'-'i

i <

X *

^ sj/ ,o „///

'■$ -N*V ° v

— * -4r:

Longitude West from Greenwich

T C

0.a 0*

£

c*

£

/A°cf C? ^

— •<•■-

ffl. // A* ./

Mig/fM* 4f N*0ˆS#

&A0mj& J$f4t

V 4L£ˆr*taT ° • .v3&***

CabezaS '

Tc? y

/yyl ✓

//Vi * ˆ

ˆObispo **J pAU)MINai, ««, ˆ ' /at** <•*

•Zancddo j », **ˆA**

„ . n?0 .»*

0 Ramos

LˆV Cross Ca‘v \jf

.Ft. Fitnieroa \V' S. W. Cay V

Pt. Varas/

Fanduca Puer

Pt. Bocu-prietaˆ

Ft. Guaniquilla (Vy"

' " UVA-"” Pal mare jo a i "idct.ˆo/V l Susua

P,. Mehtnes r'£L') f

Aguila Pt.(

■V •:/ /> *

.or.

/PY? //?

- * <* * *

B

vw°' J <*

(7

£

/

Light 'Ay

Muertos 1.

B

A

N

S

A

ISLANDS

WEST OF

PORTO RICO

On Same Scale as Main Map.

i >

IE

&

iSECHEO

Island

y

>

MONITO

•ˆjlSLAXD

0

$

Northwest Cape -North CaP°

Afeja- ~

ht

West I’olDjy‘,‘ w J-’HO \ L'O 7ra4etfa AnrtS < ‘ \AFast Cape Caigo o noXJ* Flaya Pajaro Caigo Pt.

C A EIBBEAN

S E

A

PORTO RICO

SCALES

Statute Miles, 12 = 1 Inch.

0 1 2 3 4 5 10 15 20

Explanation:

Railroads — — — Roads – -

kilometres, 19=1 Inch.

10 15 20 25

Rand McNally’s 11 x H Map of Porto Rico. Copyricbt by Rand McNally A Co.

Pta. "ael Algarroho

Al/JARBOBOTtEEF-*- '

□Up n domco Hec f •Allbrt Bank "Wuite

WAYAGUEZ BAY. Scale p h ˆ h

°\

longitude “West -from Greenwich.

07° »’

CucliaraToint

CAYrroRKKP

J’enoncillo Point .

Carenero Toint^

Gat as Islets^

Arenas Cay o

RatonesI.

Xas "Hojas Xank

^ .Port Ponce

Cardenas 1.

c^> CARIBBEAN SEA

Scale.

0 7t H X 1 m

c4c ^ATLANTIC

Jslanix^s^'1*0′ "Morro ;Vtrf Point ri-T

0 CEA N

Cadena Rocks

Cadena Reef' C&nuelo Ft.

BayamonRoad

Port San Juan.

Scale.

X K K

66“ 30’

65“30′

13

18°

2430

PORTO RICO

401

are ranged in two nearly parallel lines with intervening tablelands and high valleys, crosses the island from west to east, culminating in the peak called El Yunque (3,700 feet) in the northeast. Lower transverse ridges, running northward and southward from the principal chain, sink into the wide plains which border the coasts, forming a large number of pretty scenes and valleys. The eastern and northern slopes, valleys and plains receive an abundant rainfall through all the year, while the regions on the other side of the mountains are often parched by drought. The mean temperature at San Juan ranges in different years from 78° to 82° F., the maximum on record being 99° and the minimum 57° F. The climate of the high¬ lands, where the mean annual temperature is 72° F. or less, is very agreeable all 'the year, although it contains an excess of moisture at some points. (See also paragraph History for statement in regard to hurricanes). The island is well watered. Streams are uncommonly numerous, and some of them are navigable for small craft near their mouths. On the north coast 17 rivers flow into the sea; on the east coast, 9; west of Cape Mala Pascua on the south coast, 16; on the west coast three, beside the outlets of several freshwater lakes. There are several falls of considerable size, the lar¬ gest being Comerio and Rio Blanco falls. Har¬ bors are those of San Juan, Culebra, in the island of Culebra (at both of which United States naval stations are established), Guanica, Hobos or Jovos, Guayanilla and Ensenada Honda.

Mineral Resources. — It is certain that large quantities of gold were found in the alluvium deposits during the early years of Spanish oc¬

cupation ; it seems probable, therefore, that lodes of gold-bearing quartz or conglomerate will be discovered in the central range from which the streams issue. A systematic geolog¬ ical and mineralogical survey is required. Casual explorations have shown the presence, in several places, of magnetic and specular iron in large quantity, especially in the eastern part of the island; copper, agate of good quality, garnet, malachite, manganite, etc. Here, as throughout the Antillean regions (see Cuba and Central America), the older metamorphic rock and conglomerates, even on the summits of the mountains, are covered with limestone formations.

Flora and Fauna. — The island was once covered with a beautiful virgin forest, but un¬ fortunately ((Forestry regulations,® according to Robert T. Hill, ((have not been more wisely ob¬ served in Porto Rico than elsewhere in the West Indies® ; however, in the highlands the conditions, both in soils and climate, are favor¬ able to vegetation. The trees, which are note¬ worthy on account of their size or beauty, are the several species of palms and tree-ferns, tillandsia, Cocobola macrophyila, lobelia, etc. Useful woods are the ausubo, cedar, aceitillo, mahogany, laurel, West Indian sandalwood, ebony and willow and a large variety of dye¬ ing wood. Trees producing edible fruits and plants valuable medicinally are especially numerous. The fauna includes no indigenous quadrupeds ; there are no beasts of prey or wild animals of any kind, and unlike the Carib- bees, or the tropical continent, Porto Rico is not

infested by poisonous snakes and other noxious reptiles, though centipedes and the tarantula are not unknown. There is a large variety of bees. Birds are multitudinous and are noted both for their fine singing and beauty of their plumage; they include the canary-bird, humming-bird, nightingale, parrots and doves. The tortoises of the island are said to be closely allied to those of the Galapagos Islands (q.v.). Some of the rivers are well stocked with fish, and the fisheries, on the north coast especially, are valuable.

Agriculture, the Fruit Industry, etc. —

— Compared with that of the other West Indian islands, Porto Rico's agriculture is re¬ markably diversified, the chief products being sugar, tobacco, coffee, pineapples, grape fruit, oranges and other tropical fruits, sea island cotton, textile fibres, bat guano, phosphate and vegetables. The sugar crop for three years was as follows: 1915, 488,943 tons; 1916, 483,- 589 tons; 1917, 502,390 tons. Sugar

exported in 1917 amounted to 488,943 tons, valued at $54,- 015,903, being over 66 per cent of all exports of the island. When 'the Americans occupied the island there were 250 sugar mills and about 20 centrals. The latter have been increased in number as well as in capacity, due to the pro¬ tection enjoyed by Porto Rican sugar in the United States markets, while the old-fashioned mills are gradually disappearing by their con¬ stant conversion into modern centrals. Next to sugar the tobacco industry takes the lead. But although the number of acres of land dedicated to tobacco has increased by tenfold during the last 20 years, and the quality has been much im¬ proved, it may be safely stated that the industry has not yet attained its full development. The cocoanut industry is also very promising; the farmers dedicate more land to it steadily, and better attention is paid to the selection of seed. At present hundreds of acres are dedicated to cotton, and much effort is. being made by mer¬ chants of San Juan to encourage farmers to increase the acreage as well as improve the quality. There is a ginnery in San Juan. Be¬ fore the American occupation the oranges and pineapples of Porto Rico were famous for their flavor and sweetness, but they grew wild and in such small quantity that seldom were they exported. Since then, however, the fruit indus¬ try has undergone such a favorable change, that while the number of acres dedicated to oranges or pineapples has not been exactly estimated, yet the former are now shipped to the United States in large quantity and in 1917 more than $900,000 worth of pineapples were exported. It may be safely asserted that the fruit industry will be the future industry of this island, as roads are built and better transportation facili¬ ties are offered to shippers. Rice, corn, bananas and beans are also raised, but not in sufficient quantity for export trade. Cattle-raising is an important industry, the best pastures lying on the northern and eastern slopes.

Commerce. — The exports of sugar are given above under Agriculture. In 1917 210,399,- 365 cigars and 9,571,250 cigarettes were ex¬ ported. Over 9,000,000 pounds of leaf and scrap tobacco, valued at $3,850,670, were ex¬ ported in 1917. The coffee crop, which in 1916 amounted to 32,144,283 pounds valued at $5,049,- 283, reached 39,615,146 pounds in 1917 with a

value of $5,892,081. In the same year oranges to the value of $1,009,737 were exported; fresh pineapples to the value of $916,415 ; canned pineapples to the value of $139,765 ; grapefruit to the value of

$939,677 ; and cocoanuts to the value of $438,564. The total imports of 1917 aggregated $53,545,224; domestic exports to foreign countries amounted to $7,855,693. United States goods to the value of $49,539,249 were shipped to Porto Rico in the same year and foreign merchandise to the value of $4,- 005,975. Porto Rican shipments to the United States in the same year were valued at $73,-

115,224.

Manufactures. — The chief industries of the island are manufactures of cigars, cigarettes, hats, embroiders, drawn-work, rum, etc. Ac¬ cording to the last census there were on the island 939 industrial establishments, employing 18,122 persons, of whom 15,582 were wage- earners, having a total capital -of $25,544,385, with an output valued at $36,749,742 ; of these there were 108 establishments connected with the sugar and molasses industry, employing 5,062 wage-earners and having an annual product valued at $20,569,000; there were 282 tobacco establishments employing 7,025 wage-earners, with annual products valued at $6,060,000. Other classes in order of their importance were bakeries and bakery products, boots and shoe factories, printing and publishing, lumber and timber products, etc.

Railways and Roads. — The undertaking to encircle the 'island with a railway dates from 1888. By 1892 there had actually been built 119 miles. There are now over 1,100 miles of road in the island and about 300 miles of railway. The railway system connects towns on the west coast and now almost encircles the island and penetrates the interior. A line is operated from Rio Piedras to Caguas inland. Extensions of existing linqs are being undertaken and a new line across the island, with many branches, is projected. There are 80 post offices and 73 tqfcgraph stations, 1,544 miles of postal tele¬ phone and telegraph wire. Passenger and freight lines connect Porto Rico with the United States, Cuba, Panama, France, Spain and other countries.

Finance. — The annual budget of the island has varied from three to four millions oi pesos, aside from city budgets. This budget in¬ cluded from 1,250,000 pesos to 1,500,000 pesos which the Island contributed to the national expense, under the subheads of Ministries of Colonies, War and Navy. In 1909 no appropri¬ ation bill was passed and Congress continued the appropriation of 1908.

The budget for 1898-99 (the first year under the home rule system) showed expenditures of 4,446,952 pesos and income of 4,782,500 pesos. The first budget under the civil government established by the Foraker Act was about $2,000,000 (expenditure) ; that of the year

1906 about $2,500,000 (expenditure). The main source of income under the Spanish rule was from custom duties on imports and exports, especially on sugar, as up to 1901 there was no regular system of taxation in the island. Porto Rico, however, was always able to meet its budget and besides have a surplus in its treas¬ ury. It is from this surplus that Spain drew $2,000,000 to fight the Cubans in 1895-96. This

money was lost to the island. The taxable property of the island at present is valued at $182,622,164. The present sources of revenue are customs and excise, general property tax, collateral inheritance tax, taxes on insurance companies and from various licenses and fees. The treasury statement of 1 July 1917 is as •follows :

Balance, 1 July 1916 . $2,910,648

Receipts, 1916-17 . 10,937,947

$13 839,595

Disbursements, 1916-17 . 9,733,750

Balance, 1 July 1917 . $4,105,845

The bonded indebtedness amounts to $9,280,000.

Porto Rico has had several currencies. The macuquina, which was introduced in the island as early as 1800 from Venezuela, was the legal tender up to 1857. This currency was very im¬ perfect it consisted of pieces of solid silver and copper, irregularly cut, bearing a poor imitation of the Spanish coat of arms and had a discount of 12 Yz per cent on the Spanish national cur¬ rency. To withdraw the macuquina money the Spanish government sent to the island 1,350,000 Spanish pesos, the island losing 215,466 pesos, which was necessary to cover the difference in value. In 1867 the island of Santo Domingo having gained its independence, its ' money, known as calderilla, was brought to Porto Rico. The same year a royal decree allowed the free circulation of foreign money in the island, fixing a relative value on the basis of the Spanish legal tender. This measure brought abundance of money into the island. In 1879 a royal order made the Mexican peso the official cur¬ rency, given it a value of 95 cents American money; and another royal order in 1881 authorized its free circulation. In 1895 the gov¬ ernment ordered the exchange of the Mexican money for what was called the <(special cur¬ rency® ; 6,426,393 pesos were thus exchanged, at a cost to the island of $1,210,000 for recoining, transportation expense, etc. This special

pro¬ vincial money was finally exchanged for the American legal standard at a discount of 66Rj per cent.

Banks. — These institutions were unknown in Porto Rico up to 1888, in which year the Span¬ ish Bank (known now as the Porto Rico Bank) was organized, but not opening its doors until February 1890; capital 1,500,000 pesos, 750,000 paid up ; in 1898 it had issued notes to the extent of $2,587,445; head office in San Juan. The Banco Territorial-Agricola (Agricultural Bank) was established in July 1894; capital 2,400,000 pesos; head office in San Juan. The Banco Popular was also organized in 1894 with a capital stock of $18,000; head office in San Juan. The Credito y Ahoro Ponceno (a sav¬ ings bank) was organized in November 1894, with a capital stock of $200,000; head office in Ponce. American Colonial Bank was estab¬ lished in 1899 with a capital stock of $400,000; head office in San Juan. National Bank, branch in San Juan, Porto Rico, opened in 1902 with a capital stock of $100,000. Union Bank of Hali¬ fax, in San Juan, with a capital stock of $1,500,000, was established in August 1906. There are now 15 banks with combined capital aggregating $2,250,000, deposits over $12,000,000.

Population. — On 14 Dec. 1920 the number

>01 -e>1 »ETItolT r*OT

1 Porto Rican Tobacco Fields

Copyright. Brown & Dawson, N. Y.

2 Harbor of San Juan

of inhabitants was 1,299,809 (consisting princi¬ pally of whites, mulattoes, negroes and Chi¬ nese). It is to be observed that while the cen¬ sus taken in 1887 shows a black population of 76,985, and that taken in 1897 reduces the figure to 75,824, the census of 1899 further reduces the figure to 59,390. If this decrease should con¬ tinue for a number of years, the black race would eventually disappear from Porto Rico, unless there is an immigration of that race from the other

West Indian islands in the future. This is the only island in all the West Indies where the white population is so overwhelmingly in the majority. At the last census there were 50,245 negroes and 335,192 mulattoes, 732,555 whites and 20 Chinese. In 1910 the colored population was 35 per cent of the whole. The estimated population in 1914 was 1,184,489. Of the working population 63 per cent are engaged in agriculture, fisheries and mining; 21 per cent in domestic and per¬ sonal service; 8 per cent in manufacturing in¬ dustries and 8 per cent in trade and transporta¬ tion. The percentage of illiteracy which was over 83 per cent in 1899 has been reduced to 66.5 per cent. The white population was divided into three classes: (1) the aristocracy of the country, not seldom colonial branches of excellent families of Spain ; (2) trades-people in the towns; (3) a peasantry plagued with anaemia, the so-called jibaros, of whom Mr. van Middeldyk says : “Intellectually the jibaro is as poor as he is physically. His illiteracy is complete.® But the jibaro, it must be admitted, has had hard luck. The descendants of the early Spanish colonists and in the majority of cases of the Indians, they retained the super¬ stition of the former and a little of the natural timidity and reserve of the latter. These atavic traits, added to the fact that they have been robbed and deceived by the Spanish merchants, who took advantage of their ignorance, reduc¬ ing them to a sort of serfdom worse than sla¬ very, have made them what they are to-day, a physically degenerated class with no ambition whatever. They are, however, naturally bright and generous, and once you have gained their confidence, dispelled their mistrust, they are most hospitable and loyal. Above all they love peace and fear the law. Education, which they never had a chance of getting, and the devel¬ opment of the interior, will improve their way of living, awake their dormant intellect and re¬ deem them from their present debased condi¬ tion.

The members of the first class who were rich and could receive a liberal education went to Europe or the United States, where they would become lawyers, physicians, engineers, etc., and return to their country to practise their profession. Those who were poor were compelled to remain home, contented with what knowledge could be acquired in a very reduced number of public schools, a normal school and a high school in San Juan (where the degree of bachelor of arts could be obtained) ; the second and third classes did not receive any education at all, except in rare cases, no efforts being made by the government to raise the standard of education either by making it com¬ pulsory or by furnishing sufficient public schools, the number never exceeding 124 and the system being extremely antiquated.

Education. — In 1899 only 16 or 17 out of 100 Porto Ricans could

read and write. Under the new government the number of schools was increased to 1,104; local authorities were re¬ quired to provide suitable school buildings; pri¬ mary instruction was made compulsory; and existing institutions of higher education were supplemented by normal, trades and high schools. In 1917 there were 1,666 school build- ings, with 115,000 pupils enrolled; and a well-distributed system of night schools and kinder¬ gartens. There are also a number of private schools. The University of Porto Rico, estab¬ lished in Rio Piedras, near San Juan, is co¬ educational. There are 41 school districts on the island, each under a supervising principal, who is appointed by and represents the Commis¬ sioner of Education. There are local school boards of three elected for terms of four years by popular vote.

Plistory and Government.— On 19 Nov.

1493 Columbus landed on the western coast, and named the island San Juan Bautista. On 14 Aug. 1509, Juan Ponce de Leon, who had dis¬ covered gold on the island, was appointed gov¬ ernor by King Ferdinand. The natives, who called their island Borinquen, and had chiefs of their own, were enslaved and forced to work the placer deposits. In June 1511 the Indians slaughtered about one-half of the Spanish force, but were reduced to submission. The aboriginal population at that time probably numbered from 80,000 to 100,000 (not 600,000 — an estimate often repeated, but resting upon a wholly unwarranted statement in Friar Abbad's ˆistoriaU ; on 27 April 1515 Counselor Sancho Velasquez wrote to the king that, excepting the Indians assigned to the royal estate and those of the Crown officers, "there are not 4,000 left.® The greater number of the natives perished; some poisoned themselves; others emigrated to the neighboring islands — so cruelly were they treated — and the rest gradually blended with the invaders. About this time it became cus¬ tomary to refer to the capital as "Puerto Rico,® instead of Caparra. Thus modern usage pre¬ cisely reverses the original intent ; for the name Columbus gave to the island is applied only to its chief town, while the name by which Ferdi¬ nand designated the settlement on the northern "port® has supplanted both "Borinquen® and "San Juan Bautista.® On 26 Feb. 1521 Ponce de Leon sailed on his second expedition to Florida. Again disappointed and repulsed, he did not return to Porto Rico, but sought refuge in Cuba, where he died. On 18 April 1533 the authorities of the capital petitioned the empress against the further introduction of African slaves. It appears from a letter written by Governor Lando to the emperor in 1534, that very few negroes had been sent to the island up to that time; but a few years later they ar¬ rived in large numbers, taking the place of the

Indian laborers. Palm Sunday 1554, the prin¬ cipal settlement on the south coast was de¬ stroyed by a landing party from three French ships. On 22-25 Nov. 1595 Sir Francis Drake, commanding a strong fleet, attacked San Juan. That port was well defended and the English withdrew. Two years later a large body of English troops, under the Duke of Cumberland, occupied San Juan, then garrisoned by a small body of troops, for a few months. From 25

Sept, to 2 Nov. 1625 San Juan was besieged by a Dutch fleet ; landing was effected, but the besiegers were compelled to withdraw with heavy losses. The city was under the command of Don Juan de Haro. From 1640 to 1780 ex¬ peditions were equipped in Porto Rico for the long struggle with the buccaneers. In 1702 some English troops landed at Arecibo, but were defeated by a body of militia under Cap¬ tain Correa. On. 17 April 1797 an English fleet, 15 ships and several transports, under ˆAdmiral Harvey, with troops commanded by Sir Ralph Abercromby, numbering over 6,000 strong, ap¬ peared before San Juan; the city was under the command of Don Ramon de Castro, who gath¬ ered with him among regulars, militia and vol¬ unteers, about 4,000 men. The forts were manned by Frenchmen, then the allies of the Spaniards. The invading force landed back of the city by the place known as Cangrejo, and marched on to the city, but 'before they came to the San Antonio bridge, they met such strong resistance, both from the infantry and artillery on the forts, that they were compelled to re¬ embark, apprehending an attack from the rear, with great losses both in war materials and men. The ineffectual siege was maintained only 15 days. This attack and that made by the Dutch in 1625 are jperhaps the most important events in the history of the island since the con¬ quest from a military standpoint. To the city, as a reward for gallant resistance at this time, was granted the privilege of adding the words <(very noble and very loyal® to its coat-of-arms. Loyalty was strikingly evinced early in the fol¬ lowing century. On 20 Dec. 1819, in February 1825 and November 1829 expeditions from Co¬ lombia landed in Porto Rico, to encourage the inhabitants to rebel against Spain ; they were not welcomed. Nevertheless, in 1837, Porto Rico was deprived of the right of representa¬ tion in the Spanish Cortes, which she had since 1808, as a result of the advent of Ferdinand VII to the throne. During half a century the captains-general as a rule favored a systematic demoralization of the common people. <(While they dance and gamble, they will not conspire,® said one of these pernicious governors. An¬ other means by which the

government encour¬ aged the demoralization was by promoting and giving good offices to those of the natives who would be traitors to their country by denounc¬ ing imaginary conspiracies and revolutions. But one fact about this little people is that, while they feel proud of their Spanish ances¬ try, yet neither money nor threats could ever win an intellectual Porto Rican to serve the cause of tyranny. On 20 Sept. 1868 the in¬ surrection of Lares® broke out — an insignifi¬ cant rising, quickly suppressed. The plan was to follow Cuba, which island was then strug¬ gling to throw off the Spanish yoke. Dr. Be-tances, the leader of this movement, escaped to the neighboring island, and then went to live in exile in Paris, where he died some 30 years later, never forgetting his little island, and never forgotten by those whom he once dreamed he could free. As one result of the revolution of that year in Spain and the subse¬ quent establishment of the republic, Porto Rico was again permitted to send representatives to the Cortes. On 22 March 1873 the slaves in Porto Rico were manumitted, 31,000 receiving

freedom in a single day. The slaveholders were paid in government bonds, which a foreign syndicate bought up at 15 per cent. Then fol¬ lowed a period of political unrest with the res¬ toration of the monarchy, marked by abuses of all kinds committed by the officials sent by Spain. By this time, 1873-74, political parties were organized following the line of the Cuban reform party and later (1886) the Home Rule party. This movement on the part of the Porto Rican patriots brought about in 1887, under General Palacios, what is called the <(Componte® era, when the people were tortured by the mounted police (Guard ia Civil), and the most honorable citizens were thrown into the dun¬ geons of ((E1 Morro® and barely escaped being shot. This is perhaps one of the darkest pe¬ riods of the colonial history of the island. By the end of 1896 the Porto Ricans again began to feel the influence of the Cuban ideas, and the western part of the island showed a disposition to revolt, and might have done so if some one of the Porto Ricans who had gained honor and renown in the Cuban War had landed to lead them. But as a rule the Porto Ricans are a peace-loving people ; they at all times preferred to gain what liberties they could bargain from Spain by means of the press and other means of propaganda, rather than resort to arms. It was about this time that some prominent citi¬ zens from Camuy were imprisoned and tortured and everything indicated that the horrible scenes under General Palacios were to be once more repeated under General Sabas Martin. It was now, however, too late for this, for although the Spaniards never doubted that they would ultimately come out victoriously from a conflict with the United States, nevertheless a little

ap¬ prehension as to the future made them more humane and cautious in their treatment of de¬ fenseless Porto Ricans. On 25 Nov. 1897 the royal decree conceding autonomy to Porto Rico was signed.

After 400 years of a military government of a most absolute character, Porto Rico finally secured what is called an Autonomic Constitu¬ tion, which gave the island a Parliament con¬ sisting of a senate of 15 members, eight of whom were elected by the people and seven ap¬ pointed by the Crown ; and a lower house, con¬ sisting of one representative for every 25,000 inhabitants. The system also provided for a body of five ministers, — Minister of Justice and State (Gracia, Justicia, y Gobernacion), of Fi¬ nance, of Education, Public Works and Roads, and of Agriculture, Industry and Commerce, — appointed by the governor, thus practically pro¬ viding for the separation of the three powers. The power of veto was retained by the govern¬ ment at Madrid. It has been asserted by the natives that this measure of home rule fully sat¬ isfied their ambition. Notwithstanding it has often been set up against this law that it was not in good faith, and was not to stay, being only a measure of war and a trick of Spain to induce the Cubans to lay down their arms. It is prob¬ able that the law was so intended ; those, how¬ ever, who so speculate seem to forget that colonizing nations never granted any degree of liberty to their colonies, except they were com¬ pelled to by the force of circumstances ; but no one will question the fact that once Spain had granted to her colonies in America a liberal

form of government, she could never have been able to restore on this side of the ocean her 16th century regime. This self-government, however, was of short duration, for a few months after the elections, 21 April 1898, Gov¬ ernor-General Macias suspended the constitu¬ tional guarantees and declared the island in a state of war. On that day war began between the United States and Spain, though not for¬ mally declared until the 25th. On 12 May 1898, the capital was bombarded by Admiral Sampson, only a few buildings being damaged and probably a dozen casualties. On 25 July 1898 American forces occupied Guanica; three days later Ponce; on 10 August skirmishes took place at Hormigueros and Guamani, on the west and southeast parts of the island, and on 12 August at Las Marias, on the west, and near the Asomante, on the Ponce road. On 12 Aug. 1898 the protocol was signed providing for the cession of Porto Rico, etc., to the United States ; 18 Oct. 1898 the last of the Spanish troops to sail embarked

for the peninsula ; the forces of the United States occupied San Juan, Maj.-Gen. John R. Brooke taking up the duties of military governor. His successors in that office were: on 6 Dec. 1898, Maj.-Gen. Guy V. Henry, and 18 May 1899, Brig.-Gen. George W. Davis. This government is noted in the his¬ tory of Porto Rico for its mildness and wis¬ dom. On 8 Aug. 1899 a hurricane, accompanied by excessive rainfall, devastated the island, 3,369 persons being killed outright, while thousands died from starvation. The army distributed 32,000,000 rations to the sufferers. Disasters of this nature have befallen Porto Rico, although probably never so severe, more than 20 times since the year 1515, occurring most commonly in July, August and September. On 12 April 1900 an act of Congress required that there should be established for Porto Rico a modified 'territorial form of government, consisting of executive, legislative and judicial branches. For the benefit of such government a tariff of 15 per cent was imposed on imports from the United States into Porto Rico, and vice-versa. On 1 May 1900 civil government was inaugu¬ rated, having the following general features: Governor, appointed by the President of the United States ; legislative assembly, consist¬ ing of an executive council or senate appointed by the President (six Americans and five Porto Ricans), and a house of delegates (35 mem¬ bers elected by the people) ; judicial includ¬ ing Supreme and United States District Courts. The first governor was Hon. Charles H. Allen. His successor, 15 Sept. 1901, Hon. Wil¬ liam H. Hunt; 25 July 1901 the President pro¬ claimed cessation of tariff duties between Porto Rico and the LTnited States. On 2 Dec. 1901 the Supreme Court of the United States decided that Porto Ricans were not ipso-facto citizens of the United States. In December 1902 the insular treasury had on hand a considerable balance from revenues produced by the system of local taxation enacted by the legislative as¬ sembly. On 4 July 1904 Beekman Winthrop took the oath of office as governor; followed by George R. Colton. Mr. Colton was suc¬ ceeded by Arthur Yager in 1913. The present constitution is determined by the (COrganic Act® of 1916, the main features of which are the granting of American citizenship to the people of Porto Rico, the separation of the legislative

and executive departments, extension of the ap¬ pointive judiciary system and an elective senate. The franchise is restricted to citizens of the United States 21 years of age or over, residence of one year and such additional qualifications as may be prescribed by the legislature, but no property qualification may be imposed. The governor is appointed by the President of the United States. The senate is composed of 19 members and the house of representatives of 39

members. The island is represented in the United States Congress by a resident commis¬ sioner elected for four years. Six heads of departments form a council to the governor.

There are two political parties in Porto Rico, both working to change the status of the island ; one, which is called the Republican party, with a marked tendency for Americanization, wants the island' to become a State of the Union, and the other, the Unionist party, with a platform advocating either home rule under a colonial government, statehood or independence. In one point both parties agree, and that is that the upper house, which is now appointive, should be elective, at least a majority of it.

Literature, History, Arts. — Porto Rico has a considerable literature. It is not very in¬ tense or varied, but it has originality. Poets: The natural beauty of 'the country, its exuber¬ ance, and the despotism to which it has been subjected, have fostered poetic production, the genre of literature more successfully cultivated. Among the poets who flourished between the years 1860 and 1880 are Jose Gauthier Benitez, of exquisite sensibility, a Lamartinean melan¬ choly and a rare sense of beauty; and Jose G. Padilla, better known as the ((Caribe,® a brave heart, who gave vent to his patriotic indignation in vigorous and well-rhymed stanzas. Deca¬ dence set in after the death of these two poets. There are, however, some younger poets of considerable talents, among who may be men¬ tioned J. de Diego, Lola Tio, R. del Valle, J. Gordil, Negron Sanjurjo, F. Cestero, E. del Toro, Negron Flores, and F. G. Marin who was killed in Cuba fighting for the cause of liberty. Historians (local) : By the middle of the 19th century Alejandro Tapia published his (Biblioteca Historica de Puerto Rico} ; later J. Julian Acosta published a revised and com¬ mented edition of the (History of Porto Rico) by Fray Inigo Abbad; and among the contem¬ porary authors we have Salvador Brau and Drs. Stahl and Coll. Orators: Manuel Cor- chado, who died while still young (1840-84), has been perhaps the most eloquent orator pro¬ duced by Porto Rico. His brilliant speeches in behalf of the liberties of his country are still remembered. He was also a poet and writer. Among the orators of the day are J. Hernandez Lopez and R. Matienzo Cintron, both powerful and brilliant, good specimens of the best parlia¬ mentary speakers, and Alvarez Neva, a power¬ ful forensic orator. Journalism: This was the means chosen by the Porto Ricans to contest the Spanish oppression from the middle of the 19th century. This journalism, however, is not as it is understood in the United States ; it is more of doctrinal and polemic character; but reporting is gradually creeping in, and we may sav that the influence of modern ideas in Porto Rico is nowhere better manifested than in the field of

journalism. Among 'the ablest news¬ paper men of the day are L. Munoz Rivera, Dr.

Zeno Gandoa, Manual Rossy and Matos Bernier. Music: The higher order of music is not cultivated in the island, so far as produc¬ tion is concerned ; there are, however, some clever composers of “danza,55 a dancing piece, a sort of a rondo andante which, being exceed¬ ingly graceful and melodious, evinces better than anything Porto Rican the nature and sen¬ sibility of this people. Painters: Campeche and F. Oiler.

Bibliography. — Abbad, Fray Inigo, (His- toria geografica, civil y natural de San Juan Bautista de Puerto Rico) ; Beadeker, C., (The United States, with Excursions to Mexico, Cuba, Porto Rico and Alaska) (4th ed., New York 1909) ; Brau, Salvador,

(History of the Islands of the West Indian Archipelago5 (New York 1899) ; Forbes-Lind- say. C. H. A., (America’s Insular Possessions5 (2 vols., Philadelphia 1906) ; Hamm, M. A.,

(Reports on the Agricultural Resources and on the Industrial and Economic Resources of Porto Rico5 (ib. 1900) ; (Annual Reports of the Governor of Porto Rico5 (ib.) ; (Monthly Summary of Finance and Commerce of the United States5 (ib.) ; Leslie’s (Official History of the Spanish-American War5 (ib. 1899) ; Morris, R., Cur Island Empire5 (Philadel¬ phia 1899).

PORTO RICO, University of, an institu¬ tion for the promotion of higher education, created iby an act of the insular legislature which was approved 12 March 1903. The president of its board of trustees writes that one of the first acts of the ((army officers55 dur¬ ing the occupation of the island by military forces of the United States at the close of the Spanish-American War was the establishment of a normal school. (For the need of instruc¬ tion, and of teachers to give it, see Porto Rico: Population and Education). That school was located at Fajardo on a site of 80 acres given for the purpose by the citizens of that town. It soon became evident, however, that a more central location was required, and, therefore, in 1901 'the school was transferred to Rio Piedras. When the university was founded 0903) the normal school with its land, etc., passed under

the control of the university board of trustees and became the first

department of that institu¬ tion to be put into full operation. In its building and equipment the normal department has enjoyed the liberality and interest of the people of Porto Rico. Its growth has been steady. At the April 1913 meeting of the board of trustees of the university resolutions were passed creating a college of law, college of pharmacy, university high school and extend¬ ing the course of the college of liberal arts to four years, giving authority for the granting of the degree of bachelor of science or bachelor of arts upon the satisfactory completion of this course. The college of liberal arts had, indeed, been legally constituted since 1911, but no particular effort had been made to attract students. The president of the University of Porto Rico states that the act of 12 March 1903 vested authority in a board of trustees composed of 11 members; that the bond of connection between this new university and the Department of Education was preserved through the appointment of the commissioner of educa¬ tion as president of the board of trustees and chancellor of the university, ex officio ; and that “except for this connection, the university is an independent and separate department of the insular government.55 The same act gave the board of trustees power to establish new departments and the right to confer degrees. Subsequently the number of members of the board of trustees was reduced from 11 to 7, the governor appointing four while the remaining three, namely, the commissioner of education, the treasurer of Porto Rico and the speaker of the house of delegates, are ex officio members. The work of that department known as the col¬ lege of agriculture and mechanic acts, at Mayaguez, was begun in 1912. Consult Annual Reports of the Governor of Porto Rico (in Annual Reports, War Department, Washing-' ton).

PORTO RICO EXPEDITION, Military and Naval Society of the, an association pro¬ jected at Caguas, Porto Rico, 11 Oct. 1898, and formed at Columbus, Ohio, 5 June 1900, to bring into permanent relationship the men connected with the military and naval operations during the Spanish-American War which led to the ac¬ quisition of Porto Rico by the United States. There are three classes of members, active, associate and honorary. The active members comprise those officers and enlisted men in any branch of the United States service who ac¬ companied the Porto Rico expedition and were on the island on or before 18 Oct. 1900, the day when the American flag was raised over the Capitol at San Juan. The associate members are those soldiers or sailors of good reputation who were attached to organizations or vessels which composed the expedition but who, through sickness, disability or by assignment to other duties, were detained in the United States and failed to actively participate in the expedi¬ tion.

Members of the Red Cross Society, vol¬ unteer nurses and others who served with the army in Porto Rico may also become associate members.

PORTO SANTO, por'too san'too, one of ihe Madeira Islands, 26 miles northeast of Madeira (q.v.). Its area is about 20 square miles. It is six to eight miles in length, two to

three in breadth and not more than 500 feet above sea-level, though the surface is rugged and hilly. It is of volcanic origin, and almost destitute of trees. The soil is poor; the only productions are limestone, maize, barley, vegeta¬ bles, a few fruits and a poor kind of wine. Its capital, La Vilha do Porto Santo, on a hand¬ some bay with a good harbor, protected by a battery, is frequented by vessels going to and from the Cape of Good Hope. Pop. of island about 1,600.

PORTOBELLO, por-to-bel'd, Scotland, a suburban watering-place of Edinburgh, three miles to the east, on the Firth of Forth. Its first house was built in 1742 by one of Admiral Vernon's officers, in the expedition against Puerto Bello, whence its name, but its progress dates like that of its east extension, Joppa, from 1804. It has some manufactures of glass, pot¬ tery, bricks, etc., and is fully equipped with the usual accompaniments of a popular summer sea¬ bathing resort.

PORTO VIE JO, por"td-ve-a-h6, Ecuador, the administrative seat of Manabi Province, 100 miles north of Guayaquil. It was founded in 1534, and was frequently captured and de¬ stroyed by buccaneers. It has manufactures of straw hats.

PORTRAITURE. See Painting; Photog¬ raphy.

PORTSEA, pdrt'se, England. See Ports¬ mouth.

PORTSMOUTH, ports'muth, England, the principal oaval station of Great Britain, a sea¬ port and municipal and parliamentary borough, in Hampshire, on the southwest extremity of Portsea, 68 miles southwest of London by rail.

The island of Portsea is bounded on the east by Langston Harbor, on the west by Portsmouth Harbor, and on the south by the roadstead or channel of Spithead, across which is the Isle of Wight; it is separated

from the mainland by a .narrow creek called Portbridge Canal. It consists of the four districts, Portsmouth proper, Portsea, Landport and Southsea, these being now more extensive than the towns to which they belong. The towns, united so as to form a fortress, are protected by one of the most extensive modern systems of fortifications, which have replaced the former moats, walls, and ramparts, entered by four gates, one of them designed by Inigo Jones. Landport and Kingston are adjacent to Portsea on the north, and Southsea, on the east side of the town of Portsmouth. The two first-named districts are for the most part occupied by artisans connected with the royal naval dockyard in Portsea. A fine park, the Victoria, is in a conveniently central situation. Southsea is one of the favorite English seaside resorts. Its situation commands fine views of the anchorage at Spit- head, and of the Isle of Wight. Southsea com¬ mon, which extends down to the beach, forms a fine public recreation ground, and on it troops from the neighboring garrisons are often assembled for field days and reviews. South¬ sea Castle with its adjacent earthworks, the batteries of the Gosport side, and the circular forts in the roadstead, command the entrance to Portsmouth Harbor. The town of Gosport on the opposite side of the harbor entrance, is

connected with Portsmouth by a floating bridge ferry.

The best street in Portsmouth is the High street, which divides the town into two nearly equal parts and contains the principal shops, hotels and places of business. The prominent public buildings include Government House, the splendid new town hall opened in 1890, the post office, the grammar school, Athenaeum, Theatre, hospital, Sailors' Home, Central Rail¬ way station, the parish church (Saint Thomas a Becket's), built about 1170, the Roman Catho¬ lic cathedral with schools adjacent, the Presby¬ terian Church, the Independent Chapel in King street, and numerous other places of worship.

The royal dockyard, which has been ex¬ tended by the addition of new docks and basins, covers an area of about 500 acres. It is enclosed by a wall 14 feet high, and entered by a lofty gateway. It includes vast store¬ houses, machine-shops, extensive slips and docks, ranges of handsome residences for the port-admiral and other officials, etc. Outside the dockyard an area of 14 acres contains the gunwharf, where vast numbers of guns and other ordnance stores are kept ; and there is an armory with 25,000 stand of small arms.

Portsmouth has no important manufactures except those connected with its naval establish¬ ments, and a few large breweries. Its trade, both coasting and foreign, is of considerable extent; the former

consisting chiefly of coals from the Welsh and Newcastle coal fields, cattle and sheep from the Isle of Wight and the west of England, and large quantities of corn and provisions from Ireland; and the latter of wine from different parts of the Continent, eggs from France, and timber from the Baltic.

Portsmouth is mentioned in the Saxon Chronicle as existing in 501. It appears to have taken the place of Porchester, which as Portus Magnus had been selected by the Romans for a naval station, but became unfit for that purpose in consequence of the silting of the harbor. During the reign of Alfred a fleet of nine ships fitted at the port defeated the Danes, who had long infested the coast; and immediately before the Conquest a large fleet was fitted out here to intercept the Norman armament. About 1256 Henry III assembled an army here for the in¬ vasion of France. In 1377 Portsmouth was at¬ tacked by the French, who succeeded in burn¬ ing a part of the town. This disaster appears to have shown the necessity of fortifying the place, and the works, commenced by Edward IV, were much improved and extended during succeeding reigns. The town was taken by the Parliamentarians in 1642. The Royal George battleship in 1792 heeled over and sank in Portsmouth Harbor, drowning nearly 1,000 per¬ sons. Pop. about 231,141.

PORTSMOUTH, N. H., city, one of the county-seats of Rockingham County, on the Piscataqua River near its mouth, and on the Boston and Maine Railroad, 57 miles north of Boston. It was first settled in 1623 by a com¬ pany under the direction of Fernando Gorges, and was under the jurisdiction of Massachusetts until 1679, when New Hampshire became a separate colony. It was incorporated as a town in 1653, when it received the name of Ports¬ mouth, and became a city in 1849. It was the capital of the State for some time, and is now

alternately with Concord the seat of the ses¬ sions of the United States District Court of New Hampshire. It is built on a peninsula, and has an excellent harbor, deep, well shel¬ tered and always free from ice; it is the only seaport in the State, yet has practically no foreign commerce, but a considerable coasting trade, particularly in coal. Over 1,000,000 tons of coal are shipped annually to Dover, Concord, Manchester and other inland cities. The harbor is protected by earthworks at Jaffrey's Point and Gerrish's Island. The manufactur¬ ing establishments are important; they include boot and shoe factories, cotton mills and

marble works, button works, tanneries, found¬ ries, oil refineries, lumber yards. Shipbuilding was formerly an important industry, and small vessels are still built. The industrial output of the city is valued at $3,000,000 yearly. It has railroad and trolley connection with York Beach, Hampton Beach, and other popular summer resorts; and, in the summer, daily steamboat connection with the Isles of Shoals. It is a quiet city and old-fashioned in appear¬ ance, containing many colonial houses of his¬ toric interest ; chief among these are the Went¬ worth house, the Warner house, the Moffatt house, the Pierce mansion and the Langdon house. Other buildings of note are the Saint John's Church, the North Congregational Church, the Federal custom house, the Athe¬ naeum, the Rockingham County courthouse, the Portsmouth Hospital, the three national banks, two savings banks and the trust company. The latter has a library of over 25,000 volumes, and there is also a public library of 20,000 volumes. The city contains a Home for Indigent Women, a Home for Children and other charitable insti¬ tutions. The navy yard, which is officially known as the Portsmouth navy yard, is situated on an island of the Piscataqua (formerly known as Fernald's Island), within the limits of the township of Kittery, Me. It has large dry- docks and in the days of wooden ships many were built here including the Ranger and the Kearsarge. For many years the historic frigate Constitution was kept at this navy yard, until taken to Charleston. In 1898 the Spanish prisoners from Cervera's fleet were brought here and given comfortable quarters on a small island connected with the navy yard island. The treaty ending the Russo-Japanese War was negotiated at Portsmouth in the <(Peace Build¬ ing,® on Leavey's Island. There are three pub¬ lic parks, Langdon, Haven and Goodwin. There is a statue of General Porter in Haven Park and a Soldiers and Sailors' Monument in Good¬ win Park. There is also a large public play¬ ground. The city government is vested in a mayor, who holds office for a year, and a legislative council. The police commissioners are appointed by the State. The waterworks are under municipal management. Pop. 13,569. The city claims among her illustrious sons Gov. Benning Wentworth, his nephew, Gov. John Wentworth, Gov. John Langdon, Tobias Lear, the private secretary of George Washington, Benjamin P. Shillaber, James T. Fields, Thomas Bailey Aldrich and Gen. Fitz John Porter.

PORTSMOUTH, Ohio, city and county-seat of Scioto County, at the confluence of the Scioto and Ohio rivers, at the southern terminus of the Ohio Canal, and on the Chesapeake and Ohio,

the Baltimore and Ohio, the Norfolk and West¬ ern, the Chesapeake and Ohio Northern and the Ohio Valley Traction Line railroads, about 80 miles in a direct line south of Columbus and 107 miles east by

south of Cincinnati. It has steamboat connection with all the Ohio River ports. It was settled in 1803 and in 1814 was incorporated. It is in an agricultural region, and in the vicinity are valuable deposits of fire-clay. It is the commercial centre of an extensive mining and manufacturing section. The chief manufactures of the city are steel mill products, foundry and machine-shop prod¬ ucts, paving and building brick, fire-brick, cars, lumber products, stoves, ranges, gas engines, paper boxes, wagons, carriages, furni¬ ture, veneer factory products and boots and shoes. The invested capital in manufacturing plants is $7,500,000; and the value of the products aggregates $10,000,000 yearly. The principal public buildings are the government building, county courthouse, municipal build¬ ings, some of the business blocks, the church and educational buildings. 'It has a city hos¬ pital, homes for old ladies and orphanages. The educational institutions are the public and parish schools, several private schools, a public library and the Hamilton Peebles reading room. The principal parks are Athletic, Grandview, York, Millbrook and Tracy. In the vicinity are interesting remains of the Mound Builders.

The government is vested in a mayor, who holds office two years, and a council. The ad¬ ministrative officials who are chosen by popular vote are the members of the school board, the justices of the peace, the board of public service, the assessors, city treasurer, city so¬ licitor and city auditor. The business manage¬ ment of the city is in charge of the board of public service. Other subordinate officials are appointed by the mayor, subject to approval by the council, or are elected by the council. The city owns and operates the electric-light plant and the waterworks. Pop. (1920) 33,011.

PORTSMOUTH, R. I., town and county- seat of Newport County, 10 miles north by east of Newport, on the New York, New Haven and Hartford Railroad. It has a public library, courthouse, good schools, churches, etc. Agri¬ culture and fruit-growing are the chief indus¬ tries. Pop. 2,861. •

PORTSMOUTH, Va., city and county-seat of Norfolk County, occupies the western or mainland side of the harbor of Norfolk-Ports- mouth, where the larger rail systems of the South — the Southern Railway, Atlantic Coast Line Railroad and Seaboard Air Line Railway — have their deep water terminals ; other lines serving Portsmouth are the New York, Phila¬ delphia and Norfolk (Pennsylvania System), Chesapeake and Ohio. Virginia, Norfolk and Western and Norfolk Southern. Norfolk which lies just across the harbor is connected by a commodious steam ferry which runs at 10 minute intervals, also by railroad ferries. The city is governed by a council of seven, one of

whom is the chairman and in all re¬ spects is mayor, excepting he is without the power of veto. The council selects a manager and the people expect results. This new form of government took effect 1 Sept. 1916. Real estate and personal valuations total $15,297,507, which together with railroad property assess-

ments and the government holdings bring the total to $32,297,507. Portsmouth was named for the city of that name in England. Its most notable feature is the navy yard ; although situated within seven blocks of the heart of Portsmouth, it is officially known as the Nor¬ folk navy yard. Built by the British in the 18th century, it was purchased by the United States in 1801. Burned by the Federals in 1861, it was rebuilt by the Confederates and held by them until Portsmouth was reoccupied by the Federals near the close of the war. It is now the most important and largest in the country, occupies 350 acres, has three large drydocks and another has been authorized by Congress. General travel is facilitated by the centring in this harbor of five other roads and numerous steamship and steamboat lines, while foreign transportation is represented by many of the great trans-Atlantic lines. It is estimated by the United States government that the value of the traffic passing through the harbor during the fiscal year 1915 approximated in value $1,373,- 142,923 and represented a tonnage of 36,433,935. Exports during the same period totaled $20,-000,000 and imports nearly $4,000,000. Seventy- five manufacturing concerns representing 42 industries have sprung up within a compara¬ tively short period, due to a manufacturing zone that followed the building of a belt line railroad to facilitate the interchange of freight between the eight rail lines. Cotton seed oil products, soap for textile purposes, talcum powder, creo- soted conduits, underwear, hosiery, excelsior, butter dishes, copper smelting, cotton seed hull products, blotting paper, paper boxes, dyeing, box shooks, etc., are among the many items that are manufactured here. Portsmouth con¬ tains a naval training station, a naval maga¬ zine and a United States Naval Hospital and park; also the King's Daughters Hospital, armory, public library, orphanages, homes for the aged, a Y. M. C. A. building, Trinity Church, built in 1762 and several large commercial structures. Pop. (1920) 54,387.

PORTSMOUTH, Treaty of. The treaty

of peace signed 5 Sept. 1905 at the navy yard, Portsmouth, N. H.,

which ended the Russo- Japanese War, 1904-05. After nearly 16 months of war between Russia and Japan over the former nation's occupation policy in Manchuria (q.v.), President Roosevelt in the early part of May 1905 made known his sincere belief that the time had come for the two belligerents to end the war and conclude peace. In accord¬ ance with these proposals Russia and Japan named their plenipotentiaries, who were sent to the Portsmouth, N. H., navy yard, which had been selected as the place of conference, and on 10 August the negotiations were be¬ gun. On 29 August an accord was brought about, the treaty signed by the plenipotentiaries on 5 September, and approved by the emperor of Japan and the tsar of Russia on 14 October to take effect on the 16th. Japan consented to yield some of the Manchurian territory won and Russia consented to Japanese supremacy in Korea. Incidentally, owing to racial sympathies and because of the prestige gained, Japan at¬ tained supremacy in Chinese affairs. See China; Japan — Russo-Japanese War; Rus¬ sia — History.

PORTUGAL, por'tu-gal (Port, por-too- gal'), the southwesternmost republic of Europe, on the Iberian or Pyrenean Peninsula, between Spain and the Atlantic Ocean. The Portuguese title is Republica Portuguesa. No natural boundaries separate Portugal from Spain, ex¬ cept on a small part of the frontier, the Minho River forming part of the northern boundary, and the Guadiana River part of the southeast¬ ern. The shape of Portugal is nearly that of a parallelogram. Its greatest length, north to south, is 353 miles, greatest breadth 138 miles, extending respectively between latitudes 36° 55′ to 42° 7′ N, longitudes 6° 15′ to 9° 30′ W. The territory is divided into the three provinces of Minho, 2,790 square miles; Tras-os-Montes, 4,163 square miles; Beira, 9,208 square miles; Estremadura, 6,937 square miles; Alemtejo, 9,219 square miles; Algarve (Faro), 1,93? square miles ; and, with the insular provinces, comprising the Azores, 922 square miles, and Madeira, 314 square miles, gives a total area of 35,490 square miles for the republic; but this does not include the colonies noted below. The only large cities are Lisbon (q.v.), the capital, and Oporto (q.v.), the chief port. Setubal, Funchal (Madeira), Braza and Coimbra have each over 20,000 population.

Colonies. — Besides the Azores and Madeira islands, mentioned above, the Portuguese African colonies are 823,334 square miles in area, with an estimated population of over 8,000,000. The largest of these is Portuguese West Africa, formerly called Angola ; nearly as large is Portuguese East Africa (q.v.), formerly called Mozambique. There are also the Cape Verde Islands (q.v.), Portuguese Guinea (q.v.), Principe (or Prince's) and Saint Thomas islands. Their Asiatic colonies of 8,933 square miles have an estimated population of 950,000. Goa,

Damio and Timor in India, and Maceo Island and some small islands in the Indian Archipelago complete the other dependencies.

Topography and Physical Features. — The coast-line, of great length in proportion to the extent of the whole surface, lies mainly north and south on the Atlantic, but extends some 50 miles westward to Cabo da Roca, the most westerly point of the peninsula and of con¬ tinental Europe. Here it becomes somewhat irregular, forms two bays — that of Lisbon and that of Setubal — by the interjection of the re¬ markable promontory which terminates in Cape Espichel, and again curves round in a south southwesterly direction till it reaches Cape Saint Vincent, where it suddenly turns east. This direction it retains to its termination at the mouth of the Guadiana. It is occasionally bold and rises to a great height, particularly at Cabo da Roca, where it presents a range of precipi¬ tous cliffs; but for the greater part is low and marshy, and not unfrequently lined by sands and reefs, which make navigation dangerous. It is indented by some 21 harbors; the only ones of importance, either from their excel¬ lence or the trade carried on at them, are those of Lisbon, Oporto, Setubal, Faro, Figueira, Aveiro and Vianna. The interior is generally mountainous, a number of ranges stretching across the country, either in west, southwest or south-southwest directions, forming a suc¬ cession of independent river basins, while their ramifications, penetrating in all directions, form

the watersheds of numerous subsidiary streams and enclose many wild and beautiful valleys. The loftiest range is the Serra da Estrella, which may be considered as a continuation of the central chain which stretches across Spain between Old and New Castile, and between Leon and Estremadura. Near the town of Guarda it forms a sort of fork, one limb of which proceeds north and another southeast, while the main chain, running southwest, attains its culminating point of 6,537 feet about five miles west of the town of Covilhao, and ulti¬ mately terminates in the lofty cliffs of Cabo da Roca. Nearly parallel to this chain, and at no great distance from it, are on the north the Serra de Alcoba, and on the south the Serra Moradal. In the north branches or continu¬ ations of the Spanish mountains enter Portugal, and attain heights of 4,740 feet in Peneda, and of 5,180 in Larouco. At the opposite extremity the Serra Monhique, stretching across the country at a short distance behind the south shore, attains, at its western extremity in Mount Foia, the height of nearly 3,000 feet. The rugged

nature of the surface makes the plains both few in number and of limited extent, but many valleys equally remarkable for beauty and fertility occur. The chief plains are those of Almedia and the Terra de Braganza, the former in the province of Beira and the latter in that of Tras-os-Montes ; the chief valleys, those of Chaves, Villarica and Besteiros.

Hydrography. — No rivers of importance take their rise in Portugal, and yet few coun¬ tries in proportion to their extent are better supplied with large and navigable streams. The Minho in the north, forming the boundary, be¬ tween Spain and Portugal in the lower part of its course; the Douro, first skirting the east frontier and then pursuing its course west to its mouth at Oporto; and the Tagus, all flow east to west ; the Guadiana is the only large river of Portugal which deviates from the general westerly direction, and flows mainly south, forming part of the boundary line with Spain. In addition to these rivers, for which Portugal is indebted to Spain, the purely local rivers are the Vouga, Mondego and Sado. Numerous small lakes are scattered over the plains and among the mountains and valleys. The fish¬ eries, especially those of sardine and tunny, are of considerable commercial importance, giving employment to about 45,000 people. The yearly catch is worth $5,000,000.

Geology and Mineral Resources.— The nu¬ cleus of the mountains is usually granite, over- lain in the north by micaceous schist and other metamorphic rocks. Crystalline rocks and Palaeozoic formations (especially Silurian) oc¬ cupy about two-thirds of the surface, but the Jurassic, the Cretaceous and various Tertiary formations are also represented in the more southerly parts of the country. Volcanic for¬ mations are very apparent in the Serra de Caldeirao, forming a continuation of that of Monchique. The mineralogical treasures seem more remarkable for their variety than for their value, though some are, and many more it is supposed might be, worked to advantage. They include argentiferous lead, copper, iron, cobalt, bismuth, antimony, fine marble, slate, saltpeter, lithographic stones, mill-stones and porcelain earth. Some gold also is washed from the sands

of the Douro, Mondego and other streams, and in several serras, particularly those of Estrella and Gerez-Larouco ; and many valuable pebbles and rock-crystals are found in a great number of places. Large quantities of salt are formed in bays along the coast by natural evaporation ; there are numerous salt marshes ; and over 200 mineral springs, mostly impregnated with sulphur.

Climate. — The climate is greatly modified by the proximity of the sea

and the height of the mountains, the former tempering the excessive heat of summer by refreshing breezes and the latter making the winter more rigorous than usual in countries under the same latitude. In general, however, winter is both short and mild, and in some places never completely interrupts the course of vegetation. In consequence of this many parts of Portugal enjoy the benefit of a double spring. Early in February vegetation is in full vigor; the plants shoot forth rapidly, attain maturity and either wither away or if of economical value are gathered and harvested. During the month of July the heat is often extreme, and, rain seldom falling, the whole country, particularly at its lower levels and along the coast, assumes a very parched appear¬ ance. The drought generally continues through¬ out August and far into September; but at last the sky, which had previously been serene, becomes overcast and copious showers descend. The second spring now begins, and the fields again become covered with flowers and verdure. Winter begins at the end of November. In the mountainous districts the loftier summits obtain a covering of snow and retain it for a greater or less period according to their altitude ; but in all the country south of the Douro, and at a moderate elevation, snow generally soon melts away. The mean annual temperature in the north of Portugal is about 50° F., and of the south 65°. Deluges of rain, however, continue to fall, with occasional violent hurricanes and thunderstorms. Shocks of earthquake are some¬ times felt, particularly in the vicinity of the metropolis, where those of 1755 were over¬ whelmingly disastrous.

Forestry, Flora and Fauna. — Many of the mountains are clothed with fine forests, chiefly pine and oak, both the ordinary species, or Quercus robur, and the cork-tree, or Q. suber, are conspicuous. In the central provinces, at a moderate elevation, magnificent chestnuts are very prevalent. Nearly one-sixth of the country's area is in timber, there being 2,000,000 acres of pines, over 1,000,000 acres of oaks, 800,000 acres of cork-trees and 210,000 of chest¬ nut. In the south, in the province of Algarve, both the date and the American aloe are not uncommon. There are few countries with a more varied flora than Portugal. The number of species has been estimated to exceed 4,000, and of these more than 3,000 are phanerogam¬ ous. Both the flora and fauna of the kingdom are similar to those of Spain (q.v.).

Land Tenure, Agriculture and Stock-Rais¬ ing. — The common forms of land tenure are peasant proprietorship, tenant farming, metay¬ age and emphyteusis (ground rent). Large estates and tenant farming are common in the south ; peasant proprietorship and emphyteusis prevail in the north. Agriculture is just about equal to the country's needs, one-fourth of the

area being in cereals or grass and 7 per cent in vineyards and fruit orchards, 17 per cent under forest and 43 per cent is waste land. Barley and rye are important crops in the north, else¬ where wheat and maize are of more importance. In swampy localities some rice is grown. The production in 1916 was: wheat, 7,115,790 bushels; rye, 2,676,107 bushels; oats, 3,189,078 bushels; barley, 1,158,461 bushels; beans, 1,102,- 401 bushels; potates, 1,709,527 hundredweight. In the north the chief products are maize and oxen, in the central region, wheat and maize and in the south, wheat and swine. Wine is produced in large quantities. In 1917 the vin¬ tage amounted to 109,808,265 gallons. Olive oil was produced the same year to the extent of 362,094,084 gallons. Figs and tomatoes are also important crops.

Fruits of excellent quality are common in every quarter, though it is only in the warmer and better-sheltered .districts that the orange, lemon and olive are cultivated with success on an extensive scale. The mulberry is admirably adapted to the climate, and by means of it a good deal of excellent silk is obtained; and a large extent of country is devoted to vine cul¬ ture, caused partly by the demand for Portu¬ guese wines in Britain. Among domestic ani¬ mals the first place is due to the mule, of which very superior breeds have long been possessed and are carefully preserved. Sheep, goats and hogs are numerous, but little attention is paid to their improvement. Cattle are of compara¬ tively less importance.

Manufactures and Commerce. — Manufac¬ tures are still limited, although they have been rapidly increasing of late years, and cotton goods are now exported. Among the articles made to some extent on a wholesale or com¬ mercial footing are textiles at Lisbon ; woolen cloth and other woolen stuffs at Portalegre, Covilhao, etc.; porcelain at Vista Alegre; delft and ordinary earthenware at Lisbon, Oporto, Coimbra, Beja, Estremoz, etc.; cottons at Oporto; prints and lace at Lisbon and Oporto; cotton-twist at Thomar ; silks at Braganza, Cha-cim, Oporto, etc. ; copper and tinware at Lisbon and other places ; corks, ribbons, embroidery, hats, confectionery, fine soap, jewelry and cut gems, glass, paper, wickerwork and tobacco. Shipbuilding is carried on to some extent, ves¬ sels being constructed at Lisbon, Figueira, Oporto and elsewhere. The principal exports besides wine are cork, cattle, cottons, olive-oil, sardines and tunny fish, fruits, iron and copper pyrites, tin and horses ; the principal imports are cereals, colonial produce, woolen, cotton, linen and silk tissues, iron, steel and

various other metals, machinery, cured fish, coal, petro¬ leum, timber, dyes and drugs, etc. In 1913 (the last normal year before the war) the value of the exports was over $40,000,000 (more than half foods), imports $78,000,000. The bulk of the trade is with Great Britain and France, and the chief export to the former is wine. The value of the wine sent to Great Britain annually is nearly $5,000,000. Coal and cotton goods have the highest value among the exports from Great Britain to Portugal, with considerable amount in iron (wrought and unwrought) and machinery.

Shipping and Navigation. — The mercantile shipping of the republic in 1911 comprised 66 steamers and 259 sailing vessels, with an aggre¬

gate of 114,000 tons. In 1914, 9,017 vessels of 20,505,334 tons entered, and about the same total cleared the ports of Portugal.

Communications. — The length of sea-coast, with the harbors found upon it, and the number of rivers, furnish great facilities for trade, but ah the other means of internal communication are defective. There are over 9,000 miles of public roads; in 1914, 1,849 miles of railway were open for traffic, of which 711 miles were owned by the state; in the same year there were over 5,945 miles of telegraphic line in operation. There are 4,300 post offices, handling annually 55,000,000 letters, 24,000,000 cards, and 50,000,000 pieces of printed matter.

Money, Weights and Measures. — The republic of Portugal established a new mone¬ tary system, the main unit being the escudo, worth a little more than one dollar, or 100 cen¬ tavos ; four and one-half escudos are legal ten¬ der for an English sovereign. Paper and silver are the chief media of circulation. The French metric system of weights and measures was in¬ troduced into Portugal between 1860 and 1863. The Portuguese libra was 1.012 pound avoirdu¬ pois, the arroba was 32 libras, the quintal four arrobas. The chief linear measures were the legoa, or league of 18 to the degree ; the milha, or common geographical mile; the braga, or fathom— 7.4 feet ; the vara, or yard, one-half of the former; and pe, or foot = about 13 inches. For dry measure the moyo = 22 bushels; and for liquids the almudo = from 3.7 to 5.6 gallons, were used.

Government. — The last king of Portugal was Manoel II, who came to the throne 1 Feb. 1908, on the assassination of his father and elder brother, Luiz Philip. In 1910 there was a short revolution, that culminated 5 October in the proclaiming of La Republica Portuguesa. A provisional government held authority until a constitution had been

formed and a regular election took place, in August 1911, when Manoel de Arriaga was chosen the first constitu¬ tional President (24 Aug. 1911-27 May 1915). He did not serve out his term, but was suc¬ ceeded by Theophdo Braga as provisional Presi¬ dent from 29 May to 5 Oct. 1915. The new constitution was patterned in some respects after that of the United States, though with several marked differences. There are two Chambers, the National Council, having 164 members, directly elected every three years, and the Second or Upper Chamber, of 71 members, elected by all the municipal councils, half of them elected every three years. The Chambers elect the President for a single term of four years. The President appoints the Cabinet or Ministry, but they are responsible to the Par¬ liament, consisting of the two Chambers. The constitution may be revised once in 10 years. Bernardino Machado was elected the second constitutional President of the republic, and took office 5 Oct. 1915. On 25 April 1917, he formed a new Cabinet, Affonso Costa being Premier and Minister of Finance, Lieut. Col. Norton de Mattos, Minister of War, and Au gusto Soares, Minister of Foreign Affairs. Machado held office until 8 Dec. 1917, when he was swept out of office by a revolution. A rev¬ olutionary Junta succeeded; it was led by Si- donio Paes, who, on 12 Dec. 1917, became Premier and on the 28th of the same month was

made acting President, pending the regular elec¬ tion of a President by Congress. On 28 April 1918 Paes was elected President. The new gov¬ ernment assumed the old public debt, which was about $800,000,000, and which has grown stead¬ ily, being at the billion mark in 1918. The reve¬ nue for the three years previous to the war was about $84,000,000 annually, with slightly greater expenditures. In 1917 the revenue fell off and the expenses were scaled to meet the funds. The war expenses were separate. (See Army and Navy). In addition the colonies of Portu¬ gal have an annual revenue of about $18,000,- 000, balanced by equal expenditures.

Banking. — The Government financial institu¬ tion is the Bank of Portugal, which has branches in 22 cities. Taking the last nor¬ mal year (1914) as the fairest statement the annual transactions are about 1,205,- 000,000 escudos ($1,301,000,000), and the cash on hand — gold 8,505,000 ; silver, 3,563,000 ; nickel, 104,000; copper, 13,517 escudos. Bills discounted, 66,000,000; loans, 2,327,000 escudos. There are 18 other banks, with 47,000,000 escu¬ dos capital, and deposits of

30,000,000 escudos.

Army and Navy. — The army consists of about 30,000 men on the peace footing and 175,000 on a war footing. Compulsory service was introduced in 1895, and all above 21, with certain exceptions, are liable to serve three years with the flag, five in the first reserve, and seven in the second. The reserve army, which was mustered during the World War, consisted of 35 regiments of infantry, eight squadrons of cavalry and 24 field batteries. The military bugdet for 1915-16 was over $100,000,000, to which was added $42,000,000 for extraordinary expenses. The navy consists of five protected cruisers, some old gunboats, five destroyers, four torpedo boats, three submarines, etc., with a program for constructing three more cruisers, three dreadnoughts, 12 destroyers and six sub¬ marines.

Ethnology. — The Portuguese are a mixed race-originally Iberian or Basque, with later Celtic admixture. Galician blood (derived from the ancient Gallaici, presumably Gallic in¬ vaders) predominates in the north; Jewish and Arabic blood are 'strongly present in the centre, and African in the south. The Portuguese dif¬ fer essentially from their Spanish brethren, whom they regard with inveterate hatred and. jealousy, mainly on account of their past at¬ tempts to subvert the independence of Portugal. They are short of stature, have a long cranial index, dark hair and olive skin. The opinions of observers, differ as to the national traits of the people. They are, however, generally sober, good-natured, obliging and patriotic, but shift¬ less and not over-clean.

Population. — At the last census there were 2, 828,691 males and 3,131,365 females. The urban population was 32.4 per cent and the rural 67.6 per cent of the total. The foreign population in 1911 numbered 41,197, comprising 20,517 Spaniards, 12,143 Brazilians, 2,576 Eng¬ lish, 1,832 French and 1,645 Armenians. The rate of illegitimate births is 12.5 per cent of the total births. In 1914 there were 193,942 births, 117,967 deaths and 41,724 marriages. In the same year 25,722 persons emigrated chiefly to Brazil and the United States.

The following table gives the population at the census of 1900 and 1911. The Azores and Madeira are regarded as an integral part of the republic :

'

PROVINCES AND DISTRICTS

Area, sq. miles

Population

1900

1911

Entre Minho-e-Douro

Vianna do Castello .

Braga .

857

1,040

893

215,267

357,159

597,935

227,420

382,461

679,978

Porto .

Tras-os- M ontes

Villa Real .

2,790

1,170,361

1,289,859

1,650

2,515

242,196

185,162

245,687

192,133

Braganca .

Beira

Aveiro .

4,163

627,358

437,571

1,065

1,937

1,508

2,116

2,582

303,169

402,259

332,168

261,630

216,608

336,243

416,860

360,056

271,816

241,509

Vizeu .

Coimbra .

Guarda .

Castello Branco .

Estremadura

Leiria .

9,208

1,515,834

1,626,484

1,317

2,555

3,065

238,755

283,154

709,509

262,558

322,753

853,415

Santarem .

Lisbon .

Alemtejo

Portalegre .

6,937

1,231,418

1,438,726

2,405

2,856

3,958

124,431

128,062

163,612

141,778

144,307

192,499

Evora .

Beia .

Algarve (Faro) .

9,219

416,105

478,584

1,937

255,191

274,122

Total Continent .

34,254

5,016,267

5,545,595

Islands:

Azores .

922

314

256,291

150,574

242,613

169,777

Madeira (Funchal) .

Total Islands .

1,236

406 , 865

412,390

Grand total .

35 , 490

5,423,132

5,957,985

Religion, Education. — The state religion was that of the Catholic Church, which largely prevails, though toleration is extended to all other creeds. There are three ecclesiastical provinces presided over by the cardinal patriarch of Lisbon, the archbishop of Braga, who is primate of the kingdom, and the archbishop of Evora; these dignitaries rule over 14 bishops. The monasteries were dissolved in 1834, their properties, yielding about 1,000,000 sterling an¬ nually, being appropriated by the state. Their books were collected, and form a library of 30,000 volumes at Lisbon. There are only about 5,000 Protestants, mostly foreigners, and 500 Jews. Education is superintended by a council, at the head of which is the Minister of the Interior, and is entirely free from the super¬ vision and control of the Church. Compulsory education was enacted in 1844, but was far from being fully enforced, until the republic took it up actively in 1911. In 1913 there were 5,563 public elementary schools and 31 second¬ ary schools, the teachers being trained in the uni¬ versities (three in number), of Lisbon, Coimbra

PORTUGAL

THE PICTURESQUE CASTELLO DE PENA AT CINTRA

PORTUGAL

1 Lisbon

2 Oporto

PORTUGAL

and Oporto. The secondary schools had 11,000 students in 1916 and the universities over 3,000. There are also numerous private schools ; poly¬ technic academies at Lisbon and Oporto; and clerical, medical, agricultural, naval and military training-schools. The university at Coimbra (established 1290), one of the oldest in Europe, has five faculties, 75 professors and about 900 students.

Judiciary and Local Government. — For

judicial purposes Portugal is divided into 193 comarcas, each having a court of first instance. There are appeal courts at Lisbon, Oporto and Punta Delgada (in the Azores) ; and a Supreme Court at Lisbon. For the purposes of local government the six provinces of continental Portugal are subdivided into 17 districts, and the insular province into four, the Azores three, and Madeira one.

History. — Portugal forms the greater part of ancient Lusitania. It was subjugated by the Romans, in the time of Augustus, and was con¬ stituted into a province. In the 5th century, on the overthrow of the Roman supremacy, Portu¬ gal was invaded by the Alans and Visigoths, and suffered with Spain, of which it was then a part, all the troubles and vicissitudes endured by the inhabitants of the peninsula till the 8th century, at which time the Arabs, called indif¬ ferently Saracens or Moors, possessed them¬ selves of the whole of Portugal, and kept abso¬ lute dominion for nearly 400 years. When the gallant Spaniards of the Christian kingdoms of Castile and Leon finally wrested the country between the Minho and the Douro from Moor¬ ish hands, they placed counts or governors over this region. Henry the Younger of Burgundy, whose grandfather Robert I, Duke of Bur¬ gundy, was grandson of the French king Hugh Capet, came into Spain about 1090, to seek his fortune in the wars against the Moors. Al¬ fonso VI, king of Castile and Leon, gave him the hand of his daughter, and appointed him (1095) count and governor of the conquered districts, which comprised the provinces Entre Minho e Douro, Tras os Montes, and a part of Beira, and the haribors of Oporto (Portus Calle), from which Portugal is said to have derived its name. The count resided at Guimaraens, owed feudal service to the Castil¬ ian kings, but was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus (1112). Under his widow, Theresa (1114-28) the country ac¬ quired a sense of national unity and a certain measure of independence. Their son, Alfonso I, made Portugal an independent kingdom (1143) — through the victory of a picked body of Portuguese knights over a picked body of Castilian

knights in a tournament — and gained signal advantages over the Arabs, whom he fought for 25 years, his greatest exploits be¬ ing the victory in the plain of Ourique, in Alem- tejo, in 1139, when he was saluted king of Por¬ tugal on the battle-field, the capture (with the help of English crusaders) of Lisbon in 1147, and of Alcacer do Sal in 1158. The Burgundian House, which continued in possession of the throne for 440 years, gave to Portugal some of its best kings. The immediate successors of Alfonso I were engaged in incessant wars against the Moslems and in severe struggles with the clergy and nobles, who were always ready to

combine against the sovereign; but, although often baffled in their attempts to uphold the in¬ dependence of the crown, the dignity of the kingdom was, on the whole, well maintained by the representatives of this family, who were, moreover, distinguished as the promoters and champions of the maritime glory of Portugal. Prominent among these was Diniz or Denis (1279-1325), son of Alfonso III. He encour¬ aged agriculture, manufactures, navigation and commerce. He admitted the representatives of towns to the Cortes. He liberally patronized learning, and founded a university at Lisbon, which in 1308 he transferred to Coimbra. By these and other acts of a wise and beneficent administration he earned the title of (III, fired with a holy zeal to extermi¬ nate the infields from his country, commenced a sanguinary crusade against the Moors, which he carried on through such repeated defeats that he eventually lost both his crown and life in the struggle. With Henry the Cardinal, his uncle, an old man of 70 who died after a reign of two years, the male line terminated, after enduring for 460 years. Spain once more laid claim to the vacant throne, and' Portugal again became a dependency of. the Spanish crown, the nation suffering all the injustice, exactions and tyranny usually inflicted on a conquered coun¬ try by its haughty masters. After enduring 60 years of intolerable hardships and exactions, a Portuguese nobleman named John, Duke of Braganza, pitying his unfortunate countrymen, excited a revolution, which again broke the Spanish fetters,, while the people hailed their deliverer as their kinp-. who, being crowned as John IV, commenced the dynasty of the House of Braganza, a family whose descendants still

sway the destinies of Portugal. During the 18th century, as an ally of Great Britain, Por¬ tugal became rather a commercial dependent, especially after the Methuen Treaty (q.v.) of

1703.

When Napoleon, in 1807, entered the country, and declared the family of Braganza had ceased to reign, the royal family of Portugal, con¬ sisting of Pedro, the old king and his imbecile wife, Maria Frances Isabella, queen-regent, the prince-regent and all the court set sail from the Tagus to Brazil, transferring the capital to Rio de Janeiro. On the death of the queen-regent, John VI ascended the throne of Portugal and Brazil. After the downfall of Napoleon, the history of Portugal is composed of a long suc¬ cession of political disturbances. The Inquisi¬ tion introduced in 1536 was abolished in the Portuguese dominions in 1815, and the Jesuits, established in 1540 and banished in 1759, were refused admission. The Jews, at the request of the pope in 1817, were allowed the same privileges which they enjoyed in the Roman states. The absence of the court was viewed with dislike by the nation ; the military were dissatisfied with the British influence of Mar¬ shal Beresford and the general feeling required some fundamental changes in the administra¬ tion and constitution of government. A revo¬ lution in favor of constitutional government was effected without bloodshed (1820), and the king invited to return home. Before land¬ ing in Portugal he swore to observe the consti¬ tution which had been adopted. A counter¬ revolution of the nobles and clergy was vig¬ orously repressed by the Cortes (February 1823) ; but the queen, a Spanish infanta, who exercised great influence over her son, Dom Miguel, gained the colonels of several regi¬ ments ; a new reactionary movement was organ¬ ized ; and the Cortes, being overpowered, dis¬ solved itself after a solemn protest on 2 June 1823. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. Her independence was recognized in 1825. John VI died 10 March 1826, having named the Infanta Isabella Maria regent. She governed in the name of the Em¬ peror of Brazil, Dom Pedro IV of Portugal, who granted a constitution with two chambers, modeled on the French, 23 April 1826. In May he abdicated in favor of his

daughter Maria da Gloria. He imposed on her the condition of marrying her

uncle Dom Miguel, who was entrusted with the government as regent ; but the Abso¬ lutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty and a revo¬ lution in his favor, notwithstanding the inter¬ vention of England placed him on the throne in 1828. In 1831 Dom Pedro resigned the Bra¬ zilian crown and returning to Europe, with the aid of English partisans succeeded in over¬ throwing Dom Miguel and restoring the crown to Maria in

1833. In 1836 a successful revolu¬ tion took place in favor of the restoration of the constitution of 1820 and in 1842 another in favor of that of 1842. Maria died in 1853. Her husband, Ferdinand of Saxe-Coburg, brother of Prince Albert of Britain, became regent for her son Pedro V. He placed the government on a purely constitutional basis, which was maintained by his son Pedro, who died in 1861 and by Louis I, who succeeded

him and who died in 1889. The abolition of monopolies, the improvement of finances, the formation of railways and the cadastral survey of the country, are among the measures which distinguished his reign. Slavery was abolished in 1868 in the Portuguese dependencies. Carlos I ascended the throne in 1889. His reign was marked by serious colonial, financial, social and political troubles. Carlos and his oldest son were assassinated and his second son driven from the throne. A national assembly was formed and on 19 Aug. 1911 it completed and signed the constitution of the Republic of Portugal and elected a President as stated under Government. Portugal came into the World War on the side of the Entente Allies in 1916.

Bibliography. — Official Publications : (Annuario Estatistico de PortugaP (Lisbon, yearly) ; (Recensement de la population de Portugal and 1 er Decembre 191 P (2 vols., Lis¬ bon 1914) ; Boletim commercial e maritimo (monthly) ; Boletim da Direcgao Geral de Agricultura (Annuario ColoniaP (Lisbon 1916 et seq.) ; (Conta Geral da administragao financeira do Estado) ; Foreign Office Reports; (Notas sobre Portugal (Exposigao Nacional do Rio de Janeiro em ˆOS* (2 vols., Lisbon 1908).

History, Description, Antiquities, Etc. : Adam (Madame) (La patrie portugaise* (Paris 1896 Aldama- Ayala, (Compendio • geografico-estadistico de Portugal y sus posesiones ultra- marinas) (Madrid 1880) ; Baedeker, K., (Spain and PortugaP (4th ed., Leipzig 1913) ; Barker, G., (A Winter Holiday in PortugaP (London 1912) ; Bell, A. F. G., (In PortugaP (London

1912) ; id., (Portugal of the Portuguese* (ib.,

1915) ; Boletim e Publicagoes da Sociedade da Geographia de LisbSa; Bettencourt, E. A. de, (Descobrimentos, guerras, e conquistas dos Portuguezas em terras do Ultramar nos seculos XV e XVP (Lisbon 1881-82); Brito Aranha, P. W. de (Bibliographie des ouvrages portugais pour ser- vir a l'etude des villes, des villages, des monu¬ ments, des institutions, des mceurs et coutumes, etc. du PortugaP (Lisbon 1900) ; Cartailhac, Emile, (Les ages prehistoriques de

l'Espagne et du PortugaP (Paris 1886) ; (Cambridge Modern History > (Vols. I, III-VI, IX-XII, New York 1902—10) ; Carqueja, B., (0 Povo Portugez: Aspectos Sociaes e Economicos) (Oporto

1916) ; Carvalho e Aranjo, Alejandre Herculano de, (Historia de PortugaP (4 vols., Lisbon 1848-53) ; Chagas, Pinheiro, (Historia de Portu¬ gaP (8 vols., ib., 1877) ; Coelho, Latino, (His- toria politica e militar de PortugaP (ib., 1874- 96) ; Corvo, J. de Andrade, (Estudos sobre as provincias ultramarinas* (4 vols., ib., 1883-88) ; Costa, Affonso, (Les finances portugaises) (ib.,

1913) ; Crawfurd, O. J. F., (Portugal, Old and New* (London 1880) ; id., (Round the Calen¬ dar in PortugaP (ib., 1890) ; Cunha, V. de Braganga, (Eight Centuries of Portuguese Monarchy * (New York 1911) ; Da Silva, (Dic- cionario bibliographico portuguez > (9 vols., Lis¬ bon 1858-70) ; (Annes de bibliographica portu- gueza) (Oporto 1889) ; Danvers, C. F., (The Portuguese in India* (London 1894) ; Dun¬ ham, S. A., (History of Spain and PortugaP (5 vols., Philadelphia 1842) ; Delbosc, R. Foul- che, (Bibliographic des voyages en Espagne et en PortugaP (Paris 1896) ; D'Urban and Mielle, (Histoire generale de PortugaP (9 vols., Paris 1829) ; Gama Barros, H. de, (Historia da ad-

ministragao publica em Portugal nos seculos XII a XV5 (2 vols., Lisbon 1895-96) ; Har¬ grove, Ethel C., Progressive Portugal 5 (Lon¬ don 1914) ; Herculano, Alexandre, (Historia de Portugal desde o comego da Monarchia ate ao fim do reinado de Affonso III, 1097— 1279 > (4 vols., Lisbon 1863) ; H,ume, M. A. S., (Through PortugaP (New York 1907) ; Jayne, K. G., (Vasco de Gama and his Successors) (London 1910) ; Joanne, P., (Espagne et PortugaP (Paris 1909) ; Johnston, Sir Harry, (The Colonization of Africa > (Cambridge 1899) ; Koebel, W. H., Portugal: Its Land and People5 (London 1909) ; Lucci, L. F. de L. S., (Emigragao e Colonizagao5 (Lisbon 1914) ; MacMurdo, M. M., and Monteiro, M., (History of PortugaP (3 vols., London 1888) ; Marvand, A., (Le Portugal et ses colonies5 (Paris 1912) ; Meyer, Hans, (Des portugiesische Kolonialreich der Gegenwart5 (Berlin 1918) ; Morris, H. C., (History of Colonization5 (2 vols., New York 1908) ; Nevinson, H. W., (Modern Slavery5 (ib., 1906) ; Nogueira, M. T. Alves, (Evolugoes da civilisagao em PortugaP (Paris 1893) ; O'Shea, H. G., (Guide to Spain and PortugaP (13th ed., New York 1905) ; Oldmeadow, E. J., PortugaP (Philadelphia 1910) ; Oliveira Mar¬ tins,

J. P. de, (Historia de PortugaP (2 vols., Lisbon 1880) ; id., Portugal contemporaneo5 (2 vols., ib., 1881) ; id., (Historia da civilisagao iberica5 (Lisbon 1879) ; id., Politica e eco¬ nomica nacionaP (Oporto 1885) ; id., (0 Brazil e as colonias portuguezas5 (Lisbon 1888) ; id., Portugal em Africa5 (Oporto 1891) ; id., Por¬ tugal nos mares5 (Lisbon 1889) ; Portugal, Atlas geografico de,5 maps by Chais, B., text in Spanish and Portuguese by Bettencourt, J. (Barcelona 1905-06) ; Portugal: Etats et colo¬ nies,5 edited by Larousse (Paris 1900) ; Ribiero, Carlos, (Estudos prehistoricos en PortugaP (Lisbon 1878-80) ; Salisbury, Portugal and its People5 (London 1893) ; Shillington, V. M., Commercial Relations of England and Portu¬ gaP (New York 1907) ; Schar, (Geschichte von PortugaP (5 vols., Hamburg 1836-54) ; Ste¬ phens, H. M., (The Story of PortugaP (New York 1895) ; Seignobos, C., (Histoire politique de l'Europe contemporaine5 (Paris 1897; Eng. trans., 2 vols., London 1900) ; Sousa, T. de, Para a historia da Revolugao' (2 vols., Coim¬ bra 1912) ; Vasconcellos, Ernesto J. de, (Com- pendio di geografia comercial5 (Lisbon 1916) ; White, G. F., (A Century of Spain and Portu¬ gaP (London 1909) ; Wood, Ruth K., (The Tourist's Spain and PortugaP (ib., 1913); Young, George, Portugal Old and Young. An Historical Study5 (London 1917) ; Zimmer- mann, A., Pie Europaischen Kolonien5 (lte Band., Berlin 1899) ; id., Pie Kolonialpolitik Portugals und Spani.ens5 (Berlin 1896-1901).

PORTUGAL, Orders and Decorations.

See Orders (Royal) and Decorations of Honor.

PORTUGUESE AND BRAZILIAN LIT¬ ERATURE. See Portuguese Language, Lit¬ erature, and Art.

PORTUGUESE (por'tu-ges, or -gez) EAST AFRICA, or MOZAMBIQUE. See

East Africa; Portuguese; and Mozambique.

PORTUGUESE EAST INDIA COM¬ PANY. See East India Companies.

PORTUGUESE GUINEA, a northwest African colony on the Atlantic Coast, extending from the Cacheco River southward to Katafine, and eastward to long. 13° W., its boundaries on all its land sides, fixed by the convention of 12 May 1886, being the French Senegambian pos¬ sessions. The climate is very hot and unhealth¬ ful for Europeans. The Bissagos archipelago with other islands off the coast belong to the colony, which has a total area of 14,440 square miles. The capital and

chief port is Bulama on Bulama Island; other trading ports are Bissao, Bubah, Geba and Cacheo. The coast is indented by the estuary of the Rio Grande River with its numerous deltaic islands; the colony from the eastern mountains westward lies on both sides of the river and is mainly an alluvial plain covered with tropical forests and vegetation. Rice and millet are cultivated. The chief commercial products, largely con¬ trolled by the French, are rubber, ivory, hides, oil-seed and wax ; the annual exports amount to over $6,000,000; the imports to $1,500,000. There is a small coasting trade, 150 vessels with an aggregate of 57,007 tons, entering the ports in one year. There is fine hunting, elephants and hippopotami being still common. The col¬ ony is administered by a Portuguese governor and council. The military force numbers about 250. The colony is non-supporting, the revenue being less than the expenditure. The United States in 1870 as umpire settled the long-stand¬ ing disputes between Great Britain and Por¬ tugal over this territory in favor of the latter. The population, almost wholly native blacks, is estimated at about 1,000,000. Consult Machat, J., (Rivieres du Sud5 (Paris 1906).

PORTUGUESE LANGUAGE, LITER¬ ATURE AND ART. — The Portuguese is one of the Romance family of languages, formed by the junction of the Latin-speaking Celts with the Teutonic races. Words of Greek, Phoenician, Iberian, Celtic and Carthaginian origin are found in Portuguese as in Spanish, indicating the relations into which commerce or conquest had brought the early inhabitants of the country. The Moorish occupation has further infused into it a Semitic element. Under the early kings of Portugal all documents were written in Latin; judicial sentences were written in Latin till a comparatively recent time ; it is still used in seals, coins and monumental inscrip¬ tions. It was only under Alfonso III and Diniz that Portuguese began to be generally used in documents. The differences between Portu¬ guese and Spanish are comparatively of mod¬ ern origin, the two languages being very nearly alike in the time of Alfonso I (1143). These differences are due partly to the different spheres of activity of the two peoples. The relations of Spain were with France, Italy, Austria, and the Low Countries; those of the Portuguese were almost exclusively with the Spaniards themselves, or with peoples removed from European civilization. The dialect of Spanish spoken in Portugal at the beginning of the monarchy, moreover, was the Galician, which was also that of the court of Leon ; but that court subsequently adopted the Castilian, which became the dominant language of Spain. The decline of the Galician dialect in Spain and the formation of the Portuguese language through the influences peculiar to the people

finally determined the separation of Spanish and Portuguese, and from cognate dialects made them distinct languages. Early French introduced by Henry of Burgundy and his suite also constituted an element in the formation of the Portuguese language, and old French words which have fallen into desuetude are still to be found in Portuguese. The heraldic devices of the oldest Portuguese families are in French, while in modern times the Portuguese have shown a strong tendency to imitate the French in everything, and the language has been considerably modified by the introduction of French expressions and grammatical forms.

The 16th century is the classical age of Por¬ tuguese literature, and the Royal Academy of Sciences began a dictionary in which all doubt¬ ful points in regard to the language are re¬ ferred to quotations from the writers of that age. There is no determined orthography ex¬ cept that which the rules of printers have made prevalent in printed books. Royal edicts and other public documents were formerly cited as models of language, but in later times they were far from being distinguished by accuracy.

The Portuguese language, by means of col¬ onization and emigration, has been pretty widely spread. It is spoken in Portugal, the Azores, Brazil, the Portuguese colonies in Asia, Africa, and in the United States, and among the Portuguese Jews scattered over Europe, particularly in Hamburg and Amsterdam. The Portuguese possesses the richness and concise¬ ness of the dialects founded on the Latin tongue. It appears to have derived from French the j sound and the nasal syllables, and it lacks the strong aspirations and guttural sounds of the Spanish. It has less dignity than the Spanish, but is superior in flexibility. In popular songs it displays a delicacy and variety of expression which have made the Spaniards call it the language of flowers. It makes free use of augmentives and diminutives. It is soft and sonorous in sound, but the too frequent oc¬ currence of the nasal do somewhat mars its harmony. The words are systematically grouped, every noun having in general an ad¬ jective, a verb and an adverb corresponding to it. Latin terms are preserved in Portuguese which are found in no other language in Eu¬ rope; but these, as well as its other Latin ele¬ ments, are more radically changed than else¬ where, so that it is often extremely difficult to trace the derivation of Portuguese words. Me¬ dial consonants, such as / and n, are frequently suppressed, doler becomes dor; pop-ulus, povo; ponere, por (Italian porre). The dialects of Portuguese differ only slightly from each other. Those of Minho, Algarve, the Azores in Europe, and of

Goa, Macao, East Africa and Brazil are farthest from the written. The lin- goa geral spoken on the eastern and western coasts of Africa, as well as in some parts of India and Ceylon, which bears an analogy to the lingua franca of the Mediterranean, may be re¬ garded as a dialect founded on Portuguese, and as containing reminiscences of the ancient mari¬ time power of the people.

Literature. — ■ The earliest productions of Portuguese literature do not go back farther than 1125, from which date the poetical com¬ positions of Egaz Moniz Coelho and of Gon¬ zales Hermiguez. These are written in the

Galician dialect. This closely resembled the Provenqal and the Provencal bards who were received at the court of the kings of Portugal just missed assimilating the Portuguese as well as other languages of southern Europe to their own. The Provencal literature for some time absorbed all the efforts directed toward the cultivation of the higher arts of writing, and in Portugal, as else¬ where, it retarded the development of the native literature. During the 12th and 13th centunes the Portuguese native literature could boast of nothing more than a collection of popular songs (chacras), remarkable for freshness and vigor. The first Portuguese collection of poetry (can- cioneiro) was made by King Diniz. It consisted of a selection of the court lays composed about this time by the Portuguese, Provenqal and Galician bards. The manuscript of this collec¬ tion, discovered in the Vatican by Ferdinand Wolf, has been published in Paris and Lisbon (1847) under the title of (Cancioneiro del Rey Dom Diniz. > To Dom Pedro, Count of Bar- cellos, son of Diniz, is attributed a (Cancioneiro do Real Collegio dos NobresP His half- brothers, Alfonso IV and Affonso Sanchez, were likewise poets. Some of the Portuguese poets of this time wrote in Castilian, and are reckoned among Spanish writers. Some poems on the death of his wife, one of which is in Castilian, are attributed to Pedro I, husband of Inez de Castro. There is also a prose chronicle of Pedro's reign by Fernao Lopez, from which are derived the chief particulars of his vengeance on the abettors of the murder. In the 15th century the court was still the cen¬ tre and source of the national literature. The sons and grandsons of John I were poets and patrons of the troubadours. Galician, Castilian and Provenqal were still cultivated as well as the native language. Garcia de Resende, a poet of some merit, who lived under Emanuel, has collected in a Cancioneiro (Lisbon 1516) the principal poetical works of this age. Ber- nardim Ribeiro wrote pastoral poems and ro¬ mances in imitation of the Italians and Spanish. Sa da Miranda, who succeeded him in the same line, marks the transition from the 15th to the 16th century and the separation of the Portu¬ guese from the other Spanish

dialects and from the language of the troubadours. This progress is also observable in the prose chronicles which record the current history of the day. The reign of King John, the discovery and conquest of Guinea, the career of Prince Henry and the first voyage of Columbus are among the sub¬ jects dealt with by the chroniclers. Literature still continued to be patronized by the royal family. King Edward (Duarte) wrote a book of morals for the use of his sons, and two works, (The Art of the Cavalier* and (The Loyal Councillor, 5 which have been republished in France. There is also a treatise on military art by Alfonso V. The 16th century is the classic era of Portuguese literature. Pastoral poetry, the epic and the chivalric romance flourished in an especial manner. The chief names are Sa da Miranda, Antonio Fereira, Camoens, Diego, Bernardes, Andrade, Caminha and Alvares do Oriente. Their compositions are distinguished by elegance and variety, but like other modern pastorals, exhibit rather a tedious affectation of rusticity than a life-like

representation of rural life. Sa da Miranda has also written epistles, sonnets, hymns and other compositions. In his hymns he has em¬ ployed for the first time the hendecasyllabic verse, which has become the chief instrument of Portuguese poetry. The numerous hymns, odes, elegies and sonnets of Camoens are equally distinguished for elegance, but are marred by numerous conceits according to the taste of the period. The principal epic and the greatest poem in the Portuguese literature, al¬ most the only one which has acquired a Euro¬ pean reputation, is (Os Lusiadas) ((The Portu¬ guese*) of Camoens, which has placed its writer in the rank of the few great poets of the high¬ est class whose genius is universally recognized by the whole world. (See Camoens). After Camoens as an epic writer comes Cortereal, who has celebrated the siege of Diu and the shipwreck of Sepulveda.

The Portuguese romance writers claim to be the originators of the character of Amadis, but the question remains undecided between them and the Spaniards. Vasco de Lobeiro, Fran¬ cisco Moraes and Bernardim Ribeiro are among the leading romance writers. Lopez de Castan- heda has written a Libro de Caballeria. The drama also began to be cultivated in the 16th century. The first autos and rustic dialogues were probably composed for the festivities of Christmas; a few rude comedies also pre¬ ceded the classic period. Sa da Miranda studied and imitated Plautus. Ferreira, who followed his example, composed the first regular tragedy, Ines de Castro, only a few years

after So- fonisba was produced at Rome by Trissino. Camoens wrote several theatrical pieces, among which are (Amphitryon and ˆeleucus.* Autos, farsas and comedias magicas were far more numerous than simple dramas.

The chronicles in the same age expanded into history. The events of their own day, in which their country played so large a part, af¬ forded ample matter of inspiration for his¬ torians as well as poets. Barros is esteemed the Livy of Portugal though he is also a writer of fiction. He wrote the (History of the Con¬ quest of India) in an elegant, pure and energetic style. The Commentaries of Alphonso d' Al¬ buquerque, 5 by a nephew of the conqueror; the Chronicle of King Manual and of Prince John,* by Damian de Goes, a Portuguese am¬ bassador; the (History of the Discovery and Conquest of the Indies,* by Lopes de Castan- heda; the Chronicle of King Sebastian,* by Diego Bernardo Cruz, are all works of great merit. Narrations of voyages are fewer than might have been expected, but there are a few of great interest — (A Letter to the King of Portugal on the Discovery of Brazil,* by Vas de Caminha, companion of Cabral; the (Voyages of Magellan,* narrated by some of his com¬ rades; and the 'Voyages of Pinto,* who visited China, Tartary, Arabia and other countries. This work is one of the classics of the 16th century.

The opening of the 17th century is distin¬ guished by the crowd of imitative epics which naturally followed the success of the Lusiad. Quevedo de Castro, Mascurenhas and Brandam are among the principal authors of these works, the most noticeable feature of which is the na¬ tional patriotism they continue to display after VOL. 22—27

the loss of the political independence of Portu¬ gal. This century is also distinguished by great historical compilations. It was the period of repose after an epoch of great activity and the absorption of the Portuguese nationality in the more powerful monarchy of Spain naturally turned all eyes to the recent period of its glory. The (Monarchia Lusitana> (1597-1690) ; Ber¬ nardo Brito's (Eulogy of the Kings of Portu¬ gal); Faria de Souza's (Europa Portugueza* (1667) ; (Asia Portugueza) (1666-75), (Africa Portugueza* (1680) ; (America Portugueza)

(left in manuscript), the historical works of Nunez de Laio, Manoel de Mello and others belong to this epoch. Antonio Vieira, a Jesuit preacher, is one of the most vigorous prose writers of this century. The letters of Alco- farrara are also among its notable productions. But the most prolific writer of all was the padre Macedo, who composed a

number of epic poems, besides 110 odes and numerous dis¬ sertations. He wrote chiefly in Latin, Spanish and Italian.

The Portuguese drama was nearly extin¬ guished during this century by the predomi¬ nance of the Spanish, to which even Portuguese writers contributed. Cocho Rebello has col¬ lected a number of the minor indigenous pro¬ ductions of the art, (A Musa Entretenida de Varios Entremeses) (Coimbra 1658).

In the 18th century the influence of the French writers of the age of Louis XIV so completely dominated Portuguese literature that it became almost entirely imitative. Transla¬ tions from and imitations of the French formed the staple of its products in every department, and the nation that gave birth to the Lusiad condescended to copy the Henriade and the Lutrin. Scholarship in this age made greater progress than literature. The academy called the Arcadia was founded in 1757 by Antonio Diniz da Cruze Silva, the Portuguese Boileau, and other promoters of the revival of learning. It became extinct in 1776 and was replaced in 1779 by the Royal Academy of Sciences of Lis¬ bon. Toward the close of this century two writers appeared who have formed schools, Francisco Manoel do Nascimento (1734-1829), an elegant lyrist, and Barbosa du Bocage, who introduced an affected and hyperbolical stvle of writing, which has been called, from the pen-name Elmano, which he adopted, Elmanism.

In the 19th century the classic school was represented by the followers of Manoel do Nas- comento, Domingo Maximiano Tores and Ri¬ beiro do Santos. Among poets of the century possessing some claim to originality are Roque, Carvalho Moreira, Mouzinho de Albuquerque, Feliciano de Castilho, Herculano de Carvalho, Almeida Garret, Joao de Lemos, Antonio de Serpa and Palmeirim. Through the efforts of these and other Portuguese literature has again begun to assume an aspect of native vigor. The drama has also been revived by J. B. Gomez, Pomenta de Aguiar, Mendes Leal and A. Her¬ culano. Alexandre Herculano and Rebello da Silva are also writers of history and historic romance. Castello Branco is a novelist. To the Coimbra School, which found inspiration in the leading writers of modern France and Germany, belong the lyric poet Joao de Deus, the historian Theophilo Braga, the philologist Coelho and other less-known writers. Science,

law and political economy are likewise well rep¬ resented.

Portuguese literature is also cultivated with considerable independence and success in Brazil, and the literary output of that country, especially in historical and poetical fields, is fully equal to the general average of other Latin American countries.

Art. — The principal architectural monu¬ ments which Portugal possesses are due to the Goths and Moors. There are also numerous architectural relics of the Roman dominion, such as the ruins of an amphitheatre at Lisbon, those of a Corinthian temple dedicated to Diana at Evora and a round tower named after Sertorius. The cathedrals of Coimbra and Braga and the church of Cedofeita at Oporto are due to the Goths. The chateaux of Pombal, Feira, Alcobaga, etc., were palaces inhabited by the Saracen princes. There are no native works of any importance. Although the art has been well patronized Portuguese painters are few and have never formed a recognized school ; the same may be said of native sculpture.

Bibliography. — Language: Aulete, Caldas, (Diccionario contemparaneo da lingue portu¬ gueza5 (Lisbon 1881) ; Coelho, F. A., (Theoria da conjugagao em latim et portuguez) (ib. 1870) ; id., (A lingua portugueza) (Porto 1881) ; id., (Diccionario manual etymologico da lingua portugueza5 (Lisbon 1890) ; Cornu, Jules, (Die portugiesische Sprache (in Groeber (Grundriss der romanischen philologies Strass- burg 1888) ; Da Silva, (Diccionario da lingua portugueza, com grande numero de termos novos usados no Brasil e no Portuguez da In¬ dia5 (Lisbon 1877-78) ; De Fonseca, (Novo dic- cionario da lingua portugueza5 (3d ed., Paris 1831) ; De Santa Rosa de Viterbo, ˆlucidario das palavras, etc., que em Portugal antigamente se usaram5 (2d ed., Lisbon 1865) ; De Lacerda, (A New Dictionary of the Portuguese and Eng¬ lish Languages5 (ib. 1871); Dozy and Engel- mann, (Glossaire des mots espagnols et portu- gais derives de l'arabe5 (2d ed., Leyden 1869) ; Dvj Souza, (Grammaire portugaise5 (Paris 1874) Diego, Garcia de, (Gramatica historica5 (Burgos 1909) ; Eleves, (A Grammar of the Portuguese Language5 (2d ed., London 1884) ; Michaelis, (Neues Worterbuch der portugies- ischen und deutschen Sprache5 (Leipzig 1887- 89) ; id., (A New Dictionary of the Portuguese and English Languages5 (ib. 1893) ; Monaci, Ernesto and d'Ovidio, F., (Manueleth d'intro- duzione agli studi neolatini5 (Vol. Ill, Porto- ghese, Imosa 1881) ; Ribiero, (Grammatica portugueza5 (3d ed., Rio de Janeiro 1889) ; Rodrigues, Barbosa, (Vocabulario indigeno com- parado para mostrar a adulteragao da lingua, complemento do Poranduiba amazonense5 (Rio de Janeiro 1892) ; Roquette, (Dictionnaire portugais-frangais5 (Paris 1855) ; Silva, Pacheco da and Andrade, Lameira de, (Nogoes de grammatica portugueza5 (Rio de Janeiro 1887) ; Vianna, Gongalves, (Exposigao da pro- nuncia normal

portuguesa5 (Lisbon 1892) ; id., (Mappa dialectologica do continente nortuguez, precedida de uma classificagao summaria das linguas5 (ib. 1897) ; Vasconcellos, J. Leite de, (Esquisse d'une dialectologie portugaise5 (Paris 1901) ; id., (Ligoes de philologia Portu¬ guese5 (Lisbon 1911); Vieira, (Grande dic- cionario portuguez, ou Thesouro da lingua

portugueza5 (Porto 1871) ; von Reinhards- toettner, Karl, (Grammatik der portugiesischen Sprache5 (Strassiburg 1878).

Literature: Almeida-Garrett, (Bosquejo da historia da poesia e lingua portugueza5 (in (Parnaso lusitano,5 Vol. I, Paris 1826) ; Bell, A. F. G., (Studies in Portuguese Literature5 (Oxford 1914) ; Bellermann, C. F., (Die alten Liederbiicher der Portugiesen5 (Berlin 1840) ; Braga, Theophilo, (Historia da litteratura portugueza5 (32 vols., Oporto and Lisbon 1870- 81; new ed., Lisbon 1913 et seq.) ; id., (Can- cioneiro da Vaticana5 (critical ed., ib. 1878) ; id., ˆurso de historia da litteratura portu¬ gueza5 (ib. 1886) ; Da Costa e Silva, J. M., (Ensaio biographico-critico sobre os melhores poetas portuguezes5 (10 vols., ib. 1850-56) ; Da Cunha Rivara, J. H., (Catalogo dos manu- scriptos da Bibliotheca Eborense5 (Evora 1850-70) ; Da Silva, I. F., Diccionario biblio- graphico portuguez5 (Lisbon 1858-70; supple¬ ment by Aranho, ib. 1883-90) • Diez, Friedrich, (Ueber die erste portugiesische Kunst- und Hofpoesie5 (Bonn 1863) ; De Figueiredo, Fi- delino, (Historia da litteratura romantica portugueza, 1825-18705 (Lisbon 1913) ; id., ˆHis- toria da litteratura realista5 (ib. 1914) ; Figa- niere, F. F. de la, (Bibliographia historica portugueza5 (ib. 1850) ; Ferreira, Andrade, and Branco, Camillo Castello, (Curso de litteratura portugueza5 (ib. 1875-76) ; Formont, Maxime, (Le mouvement poetique contemporain en Por¬ tugal5 (Lyons 1893) ; Lang, H. R., (Das Lieder- buch des Konigs Denis von Portugal5 (Halle 1894); id., (Cancioneiro galleyo-castelhano : The Extant Galician Poems of the Galleyo- Castilian Lyric .School5 (New York 1902) ; Mattos, R. Pinto de, (Manual bibliographico portuguez5 (Porto 1878) ; Menendez y Pelavo, Marcelino, (Historia de las ideas estaticas en Espana5 (5 vols., Madrid 1884—91) ; Monaci, Ernesto, (Cancioneiro da Vaticana5 (diplomatic ed., Halle 1875) ; Ortiz, A. Romero, (La littera¬ tura portugueza en el siglo XIX5 (Madrid 1869) ; Pereira de Sampaio, J. (((Bruno55), (A Geragao nova5 (Lisbon 1886) ; Pinheiro, (Curso de litteratura nacional5 (Rio de Janeiro 1862) ; Saintsibury, George, (The Later Nine¬ teenth Century5 (London 1907) ; id., (Portu- guese Literature to the End of the Eighteenth Century5 (ib. 1909) ; San Bonaventura, For- tunato de, (Collecgao de ineditos portuguezes dos seculos XIV e XV5 (Coimbra 1829) ; Storck, (Aus Portugal und Brasilien5 (Munster 1892) ; Vasconellos, J. Leite de, (Canconeiro-

portuguez5 (Porto 1880) ; id., (Geschichte der portugiesischen Literatur5 (in Gruber,

PORTUGUESE MAN-OF-WAR, a pneu-

matophore or air-sac, often seen floating on the ocean, supporting or carrying suspended be¬ low a colony of Physalia. They are usually found floating in tropical seas, but in the latter part of summer often seen off the southern coast of New England. The float is an oblong, crested bladder, flattened on the lower side, from which are pendent the various individuals of the colony. The gaseous contents of the air-sac or bladder appear to be under the con¬ trol of the individual, so that it can sail awash or submerged like a submarine. The long fila-

ments, sometimes trailing out to a distance of fully 20 feet, have batteries of nettle-cells numerous and powerful enough to paralyze fishes, and cause much discomfort to human beings, even when the organisms in question are dead on the beach. See Siphonophora.

PORTUGUESE WEST AFRICA. See

Africa.

PORTULACA, a genus of annual and per¬ ennial herbs of the family Portulacacece. The species, of which about 20 have been described, are natives of warm and temperate climates and are mostly American. They are often trailing, have fleshy stems, usually thick leaves and gen¬ erally terminal flowers followed by small conical capsules containing numerous tiny seeds. The flowers open in sunshine but close in shade. The two best known species are P. prandiflora and P. oleracea. The former is widely culti¬ vated in gardens for its very showy but ephem¬ eral flowers which have a wide range of color. The hottest, dryest, sunniest places and light soils suit the plant well. It is a native of Brazil. The other species is said to be a native of Persia, where it was used as a potherb more than 2,000 years ago. It is also said to be in¬ digenous in the southwestern United States. Popularly known as pusley and purslane, it is one of the commonest weeds in warm and tem¬ perate climates upon light loamy and sandy soils, but rarely upon heavy. It has several improved varieties which are cultivated, espe¬ cially by the French, for greens.

PORTUNUS, por-tu'nus, or PORTUM- NUS, Roman god of harbors. He

corresponds to the Melicerta or Palaemon of the Greeks and was originally the god of doors, symbolized and represented with a key in his hand. He had a temple on the Tiber where his festival, the Portunalia, was annually celebrated on 17 August.

PORUS, king of India: d. 317 b.c. He was of ancient and noble lineage, and his kingdom occupied the north of India between the Hy- daspes and Acesines. When Alexander invaded India in 326 b.c. he found the army of Porus barring his further passage at the Hydaspes. After considerable delay Alexander succeeded in fording the river higher up in its course, but was met by Porus and a terrific battle en¬ sued, in which the Indian king was wounded and taken prisoner. Brought before Alexander his noble bearing aroused the admiration of the conqueror and they became friends and allies. Alexander extended the kingdom of Porus to the Hyphasis and when he retired from India left him as ruler of the enlarged kingdom. Porus seems to have extended his domain still further after the death of Alexander, but in 317 b.c. was assassinated by the satrap Eudemus.

There appear to have been two other Indian rulers of the same name. One of these was a nephew and an enemy of the great king, and the other a king of Madura, on friendly terms with the Emperor Augustus. Consult Mc- Crindle, ‘Invasion of India by Alexander the Great5 (1896); Macdonell, ‘History of San¬ scrit Literature5 (London 1913).

PORY, por'i, John, English colonist: b. England about 1570; d. there, before October

1635. He was graduated from Gonville and Caius College, Oxford, in 1592, studied under Hakluyt and in 1619-21 was secretary to Sir George Yeardley in Virginia. His accounts of his excursions among the Indians are published in Smith’s ‘Generali Historic.5 He returned to England in 1621, but in 1623 was appointed com¬ missioner of the privy council, resided in Vir¬ ginia for another year, and the remainder of his life appears to have been spent in England. His letters are in the British Museum. He translated ‘Geographical Plistorie of Africa, written in Arabicke and Italian by John Leo, a More.5

POSADAS, a name given in Mexico to the nine consecutive days’ celebration immediately preceding Christmas day. From their nature the posadas would seem to have originated in a miracle play employed to teach the Indians the story of the birth of Christ. The Aztecs were accustomed to hold a year-end celebration of five days (an aboriginal week), beginning on or about 16 December. The Spaniards held an¬ other from 22 to 24 December. As it was im¬

possible to suppress the Indian heathen cele¬ bration, the Catholic Church extended the Christian festival to cover the nine days of the posadas.

POSEIDON, po-si'don, in Greek mythology the lord of the sea, identified by the Romans with the Italian deity Neptune. He was a son of Cronus and Rhea, and hence a brother of Zeus, Hades, Hera, Hestia and Demeter. His usual residence was in the depths of the sea near Htgse, in Eubcea, where he had a palace, and kept his horses, with brazen hoofs and golden manes. He is called the earth-holder or earth encompasser, as the sea surrounds the earth, and the earth-shaker, as the earth is shaken by the waves of the sea beating on the shore. He is the ruler of all other marine deities and of all animals that live in the sea. He gathers clouds and raises storms and allays them. In several myths he is represented as contending *with some land divinity for the possession of particular spots of earth. The horse, and more particularly the war-horse, was sacred to Poseidon, and one of the symbols of his power. The other well-known symbol of his power is the trident, or three-pronged scep¬ tre. During the Trojan War Poseidon was the constant enemy of Troy. The cause of this enmity was the ingratitude shown him by Laomedon, the second king of Troy, and the builder of the walls of the city. Poseidon had numerous offspring by mothers divine and human. The worship of Poseidon was con- mon throughout Greece and the Greek colonies, ibut especially prevailed, as is natural, in the maritime towns. The animals sacrificed to him were horses and bulls, sometimes also wild boars and rams. The Isthmian games, and the Panionia or festival of all the Ionians, cele¬ brated near Mycale, were held in his honor. In works of art Poseidon is represented with features resembling those of Zeus, but he has not the calm majesty of the supreme god, al¬ though he is more powerfully built. When rep¬ resented standing, he always bears the trident in his right hand and a dolphin in his left. (See Neptune). Consult Farnell, L. R., ‘Cults of the Greek States5 (Vol. IV, 1907).

POSEN, po'zen, Poland, (1) a fortified town and also the capital of the province and government of the same name, on the river Warthe, 149 miles east of Berlin and 103 north of Breslau. Fort Winiary, adjoining the town, serves as the citadel. It is a railway centre, en¬ joying an active trade also by water. Of its public edifices the chief are the Roman Catholic cathedral and the parish church, the former having the splendid <(golden chapel® attached ; the archiepiscopal palace ;

the town-hall, a Re¬ naissance building mostly of the 16th century ; the Raczynski Library; the Mielzynski Museum, the archaeological museum and library, the real- gymnasium and two other gymnasia (one Prot¬ estant and one Roman Catholic), an academy, normal and other schools, hospital, a theatre and some elegant private mansions. The manu¬ factures consist chiefly of agriculture and other machines, carriages, artificial manures, etc. There are also large breweries and distilleries. Posen is the see of an archbishop, the residence of a provincial governor and the seat of im¬ portant courts and numerous public offices. It was one of the oldest and most important towns of Poland, and its inhabitants still largely con¬ sist of Poles. It was at one time allied with the Hanseatic League. For years before Poland declared her independence on 9 Nov. 1918 it was one of 10 fortified cities of the first class in Germany. It was a Russian objective in their advance in 1914-15. Pop. about 156,691. (2) A component part of Poland, situated in the western part of the republic and, for considerably over 100 years prior to 1918, constituting a part of Prussia; area, 11,186 square miles. The sur¬ face is generally flat and extensively occupied by lakes and marshes. A small portion belongs to the basin of the Vistula, which touches it on the northeast ; the rest belongs to the basin of the Oder, which receives its drainage through the Warthe in the south and centre and the Netze in the north. The soil is for the most part light and sandy, and considerable tracts are covered with heath ; many parts are covered jˆith a rich alluvium or vegetable mold, yielding all the ordinary species of grain, millet, flax, hemp, tobacco and hops. The pastures are extensive and feed numerous herds of cattle, horses and swine ; considerable attention is paid to the rear¬ ing of poultry, particularly geese, and also to the rearing of bees. The minerals, compara¬ tively unimportant, include bog iron-ore, salt¬ petre, limestone and building-stone. The manu¬ factures consist chiefly of spirituous liquors, woolen stuffs, linen and leather. The trade in these articles and in horses and swine is con¬ siderable; other exports are corn, cattle, tallow, leather, honey, wax, goose- feathers and hogs'- lard. There are 1,200 miles of railway in the province. The inhabitants include a consider¬ able mixture of Germans and Jews, but the great majority are Poles. Prussia acquired Posen as a result of the dismemberment of Po¬ land. Under German rule it was divided into two governments of Posen and Bromberg and was granted a representative rule to overcome disaffection. It was represented in the Imperial Reichstag by 15 members and in the Prussian Landtag by 29 delegates in the lower and 19 in the upper chamber. As part of Poland, Posen was divided into the palatinates of Poznania, Gnesen

and Inowraclaw. At the first partition of Poland in 1772 the district of the Netze fell to Prussia, and the remainder in the second parti¬ tion of 1793. Between 1807 and 1815 Posen formed part of the grand duchy of Warsaw, but in the latter year reverted to Prussia. Pop.

2,099,831.

POSEY, po'zi, Alexander Lawrence, Creek Indian educator, journalist and poet: b. near Eufaula, Okla., 3 Aug. 1873; d. 27 May 1908. His father was a white man of Scotch-Irish descent, born about 1842 in the Indian Terri¬ tory, being the child of white intruders in the Cherokee Nation. His mother was a Muskogee Indian of unmixed blood. Until he was 12 years old, Alexander Posey spoke only the lan¬ guage of his mother's people. Then his father, who was in independent circumstances, em¬ ployed a private teacher and compelled the son to learn to speak and write English. A year or two later he was sent to the public (tribal) school at Eufaula. When he was 17 he entered Bacone Indian University at Muskogee, where he acted as librarian, learning to set type on The Instructor, a small paper published by the faculty, and discovered his own bent for liter¬ ary work. In October 1892 he published (The Comet's Tale,* a lengthy poem relating to the Indian tradition of the coming of the first ships of the white men to discover America. Imme¬ diately after his graduation, in 1895, he entered public life, being elected a member of the Creek House of Warriors, the popular branch of the tribal legislative council. In 1896 he was ap¬ pointed superintendent of the Creek Orphan Asylum at Okmulgee. A year later he became tribal superintendent of schools, but held it oply a short time, resigning to settle on his farm near Stidham. There he continued to write as inspiration prompted. He was pre-eminently a poet of nature and loved the solitudes of which he wrote. Then he was called back to educa¬ tional work as superintendent of the Creek National High School at Eufaula, with a brief term of service at a similar institution at Wetumka, but soon relinquished that work to take charge of the publication of the Indian Journal at Eufaula. There he found his liter¬ ary opportunity, developing marked ability as a satirist. His inimitable <(Fus Fixico® letters, in which he humorously discussed the white man's politics through the medium of dialogues be¬ tween fictitious characters who were typical of the older and more conservative Creek full- blood element — Wolf Warrior, Hot Gun and others — who talked in the broken Creek-Eng- lish dialect, were widely copied in States far from Oklahoma, where the force of their satire could not be appreciated because its object was unknown. Because of his sympathetic under¬ standing of the uneducated people of his tribe, whose interests were jeopardized in the read¬ justment incident to the allotment of lands in

severalty, he gave up newspaper work to be¬ come a field agent of the allotting commission, in which position he rendered valuable service. In 1905 he was chosen a delegate to the Sequoyah Constitutional Convention, which met at Muskogee, and of which he was elected sec¬ retary. The simple, terse, clear English of the instrument framed by that convention was said to have been largely due to his writing and revising. He met death by drowning in the

North Canadian River. A volume of his poems was published after his death.

POSEY, Thomas, American soldier: b. eastern Virginia, 9 July 1750; d. Shawneetown, Ill., 19 March 1818. He was quartermaster in Lord Dunmore's expedition against the Ohio Indians and was engaged in the battle at Mount Pleasant in 1774. In 1775 he was a member of the Virginia committee of correspondence and raised a company of which he became captain for the 7th Virginia Continental Regiment. He assisted in defeating Lord Dunmore at Gwynn's Island in 1776; in 1777 joined the Continental army at Middlebrook, N. J., and with his com¬ pany was transferred to Morgan's renowned rifle-corps, where he played a conspicuous part in the engagement at Piscataway, N. J. He served with great gallantry under Gates at the battles of Bemis Heights and Stillwater, and in 1778 was promoted major and had charge of the expedition against the Indians of Wyom¬ ing Valley in that year. In 1779 he commanded a battery under General Wayne at Stony Point and was one of the leaders in the assault which carried the enemy's works. He was present at the surrender of Yorktown, organized a regi¬ ment of which he was given command with the rank of lieutenant-colonel, and served under General Wayne in Georgia until the surrender of Savannah, where he routed the Indians under Gueristersigo. After the war he lived in Spottsylvania County, Va., until 1793, when he was appointed brigadier-general and served under General Wayne in his campaign against the Indians in the Northwest. He resigned in 1794, settled in Kentucky, entered the State sen¬ ate and was ex officio lieutenant-governor. He raised a company of which he was for a time captain in the War of 1812, and in 1812-13 he served as United States senator from Louisi¬ ana. He was governor of Indian Territory from 1813 until her admission into the Union as a State and from 1816 until his death was Indian agent.

POSIDONIUS, po-si-do'ni-us, Greek Stoic philosopher : b. Apamea,

Syria, about 135 b.c. ; d. after 51 b.c. He studied at Athens under Panaetius of Rhodes, after whose death in 112 he presently established himself as a teacher at Rhodes, whence he is called the Rhodian. He taught the Stoic philosophy with great applause, was at the same time a statesman and one of the Prytanes, and went at 50 as an ambassador to Rome. The most distinguished Romans were his scholars, and Cicero was initiated by him into the Stoic philosophy. He wrote many works on history, astronomy and geography, now lost. In his physical investigations he was more nearly a follower of Aristotle than of the Stoic school, the members of which he greatly excelled in this department of knowledge. Fragments of his writings were edited by Bake (1814), and by C. Muller in (1849). Consult Ritter-Prel- ler, (Historia Philosophiae Graeae> (1913).

POSILIPO, po-se-le'po, or PAUSILIPPO,

pow-se-le'po (Latin, Pausilipona), Italy, a hill and grotto to the southwest of Naples, the grotto furnishing a passage from that city to Pozzuoli. This grotto, or tunnel, leads directly to the village of Fuorigrotta; its height is about 70 feet, and the breadth 21 feet. Tt was long

supposed that it was earlier than the time of the Romans, but it is now supposed to date from the time of Augustus or Tiberius. It was widened in 1442 by Alphonso I, plastered by Pietro of Toledo, and again repaired in 1754 by Charles III. Since 1885 there has been a second ((grotto,® about 150 feet longer, which is more commonly used, as is also a road over the mountain built in 1822. On the hill above the grotto is the famous Tomb of Virgil. To the south is Cape Posilipo. The town of Posilipo on the hill has about 4,500 inhabitants.

POSITIVE, that which is active, affirmative, known, virile, definite, strenuous ; opposed to negative, which is quiescent, receptive, unre¬ sponsive, indefinite. The word has many spe¬ cific senses: (1) In electricity, the active pole, from which a current is regarded as flowing. (2) In photography, a picture so taken that the lights and shades appear naturally, which is opposite to a negative, in which they are re¬ versed. (3) In optics, a lens that shows a view naturally instead of upside-down. (4) In gen¬ eral, that one of two opposite things which is regarded as primary or active. (5) The thing that is known, can be seen clearly or sensed readily. (6) An adjective, characterizing a dogmatic person, who (

POSITIVISM, poz'ti-tiv-izm, originally de¬ notes any theory that takes the affirmative side and states its tenets in positive terms. In this sense

one speaks of positive Christianity or positive theology, as synonymous with dog¬ matism, indicating thereby that liberal religion which rejects belief in miracles, or a special revelation, or the traditional Church doctrines, is negative.

The term was appropriated by August Comte to denote a philosophy that would limit itself to the positive sciences and exclude all meta¬ physical speculation. Comte propounded posi¬ tivism as the ultimate aim of the evolution of knowledge, which (as Turgot had indicated) necessarily passed through three stages, the theological, the metaphysical and the positive. In the theological stage, the classified phenom¬ ena of nature are personified as gods — a view based upon a mythological interpretation of nature which reaches its climax in minotheism and leads to the metaphysical stage in which the laws of nature are conceived as imper¬ sonal essences or powers. The highest and last stage is attained when the scientist is satisfied simply to describe the facts and leave out all metaphysical speculation.

Comte felt that there was something wrong with metaphysics, and he eliminated it from the domain of his philosophy, but instead of solv¬ ing the problem, he ignored it on the plea that it was unsolvable. His great work (Philosophic Positive* (consisting of six volumes) contains simply a recapitulation of the whole range of human knowledge, the systematic arrangement of which he called the hierarchy of the sciences. Comte does not deny the existence of some¬ thing metaphysical, but only maintains that re¬ search in this domain is fruitless.

Eugen Diihring, a- German philosopher of great acumen, rightly criticizes Comte's posi¬ tivism in saying that <(its main contents,

strangely enough, consist in negativism,® and fta hierarchy of the sciences offering a digest of knowledge cannot pretend to be philosophy.® (Krit. Gesch. d. Phil. p. 486).

In a more advanced stage of his life, Comte felt the need of going beyond the standpoint of the positive sciences. In response to this need of his nature he invented a religion of mankind which should be based on science, re¬ placing the idea of God by the conception of ideal mankind. Comte's conception of a sci¬ entific religion is worthy of a great genius, but the rituals which he prescribes are too artificial,

and proved acceptable only to a very limited circle of his admirers.

Littre, the well-known author of a French dictionary, disavowed Comte's religion as fan¬ tastic, but he accepted his philosophy which he formulated as follows : ((The domain that lies beyond refers to the things that cannot be known. Positive science proposes neither to deny nor to affirm them. In a word, it does not know the Unknowable, but it recog¬ nizes its existence. This is the highest philos¬ ophy. To go beyond is chimerical, to go not so far is to miss the mark.®

The most prominent English representative of Comtean positivism, George Henry Lewes, sums up the tenets of positivism in this sen¬ tence: <(Our province is to study her (nature's) laws,' to trace her processes, and, thankful that we can so far penetrate the divine significance qf the universe, be content — as Locke wisely and modestly says — to sit down in quiet ig¬ norance of all transcendent subjects.®

The modern representative of Comte's posi¬ tivism in England, averring both his philosophy and his religion, is Frederick Harrison, presi¬ dent of the English Positivist Committee, and author of (Positive Evolution of Religion5 (New York 1913).

In spite of the shortcomings of Comte's philosophy, the conception of positivism is a great and recommendable ideal; but positivism in order to fulfil its purpose should be truly positive. Genuine positivism would be a philos¬ ophy based upon the facts of experience. Whether or not metaphysics is wrong depends entirely upon the definition of the word. If <(the metaphysical® is a mysterious essence or power behind nature, the scientist should not merely ignore it but deny its existence; but if, after the precedence of Aristotle, we under¬ stand by metaphysics <(the science of first prin¬ ciples,® we must grant that its study, far from being fruitless, is indispensable for every scientist.

The aim of a positive philosophy should be to understand the methods and general spirit of science, to systematize the results of the totality of human knowledge and to apply them to practical life. Accordingly, philosophy will serve three purposes: it will be (1) the propae¬ deutics (preliminaries) of science, (2) a synopsis of all knowledge and (3) ethics or the science of moral conduct. The first braqch of philosophy includes logic, epistemology and methodology, that is, the sciences which are equally needed as intellectual tools in all the several branches of inquiry. The second part, a synopsis of all knowledge, cannot be a mere compendium or a hierarchy of the sciences, but must be worked out into a systematic world-

conception, not a mere sum of the sciences but their product, which might be called <(ontology,® that is, the science of existence or ucosmonomy,)} the science of the world constitution. Ontology in the old sense is an a priori construction of a system of abstract thought; in the new sense it would be a methodical arrangement of the facts of experience, a monistic or consistent system of knowledge. Cosmonomy explains the prevalence of uniformities and their formulation as general rules, called laws of nature, etc. It points out the permanent back¬ ground of existence, the eternal conditions of becoming from which world-systems originate and, above all, defines man's position toward the whole of existence, toward his fellows and especially toward those factors that determine his destiny — in religious nomenclature called (

Paul Carus, Editor of (The Monistd

POSSE COMITATUS, pos'e kom-i-ta'tus, in law, the force of able-bodied male citizens whom the sheriff by the common law is au¬ thorized to call to his assistance in case of in¬ vasion, rebellion, riot, breach of the peace, forcible resistance to process, etc., in the county or district in which he holds office. All per¬ sons included in the posse comitatus are bound, under penalty of indictment, to assist the sheriff when lawfully called upon and are justified in killing a person in case of resistance. Unneces¬ sary violence on their part, however, is pun¬ ishable.

POSSESSION, a legal term, which has come to have a larger meaning than in com¬ mon usage of the word or the primary sense, from Latin possideo — to sit upon. It has grown to mean something distinct from mere custody. It is defined as the detention and en¬ joyment of a thing which one holds and exer¬ cises by oneself or through another in his name. It is the condition by which a person may exer¬ cise power over a thing at his pleasure and to the exclusion of all others. There are two requisites to complete possession : first, occu¬ pancy, and second, the taking with intent to possess — hence persons who are without legal wills — as children, idiots, etc., cannot acquire possession ; however, a child of sufficient under¬ standing may legally acquire possession of a thing.

One is said to be in actual possession when the thing is in immediate occupancy and con¬ structive possession when one claims to hold by virtue of a title without actual occupancy; pos¬ session may be enjoyed by the proprietor of a thing — thus the proprietor of a house possess¬ ing it by his tenant. A thief may have a thing he has stolen, but he does not rightfuly pos¬ sess it. One who borrows his friend's

horse has it in his custody, but is not a legitimate possessor.

To acquire possession: of _ a property it is requisite that there be intention of possessing as owner and also the possession of the thing.

Possession is lost when one transfers a property to another with the intention of di¬ vesting himself of the title or when he does some act which manifests his intention of abandoning possession. Though, of course, no proof of ownership or title to property or a thing, the possession is a fact in evidence of it and it is sufficient evidence against anyone who cannot show a better claim. Continuous possession of land for a time, which varies in the statutes of various jurisdictions, usually 20 years, will give the occupant title by adverse possession. With chattels a replevin suit is often instituted to regain custody, when the goods are illegally withheld from the rightful owner. See Bail¬ ment; Title; Replevin.

POST, Alfred Charles, American surgeon: b. New York, 13 Jan. 1806; d. there, 7 Feb. 1886. He was graduated from Columbia in 1822 and from the College of Physicians and Surgeons in 1827. After two years' further study in Paris, Vienna, Berlin and London he established a practice in New York, in 1831-35 was demonstrator of anatomy in the College of Physicians and Surgeons, in 1836 became an attending surgeon at the New York Hospital and throughout his life continued his connec¬ tion there, occupying at his death the office of consulting surgeon. He was appointed pro¬ fessor of ophthalmic surgery at Castleton Medi¬ cal College, Vt., in 1843, and of surgery in the following year. In 1851-75 he was professor of surgery in the University of the City of New York, vice-president of the New York Academy of Medicine in 1861-66 and its president in 1867- 68, president of the Pathological Society and for many years was connected with Saint Luke's, the Presbyterian and the Women's hos¬ pitals. He conducted a weekly clinic at the University Medical College in New York, for many years, was the first surgeon in the United States to perform an operation for the cure of stammering and was the inventor of several valuable surgical instruments and appliances. Besides numerous medical papers contributed to scientific journals, he published (Strabismus and Stammering* (1840) and (Observations on the Cure of Stammering) (1841).

POST, George Browne, American archi¬ tect: b. New York, 15 Dec.

1837 ; d. 28 Nov. 1913. In 1858 he was graduated at New York University and in 1859-60 studied architecture under the direction of Richard M. Hunt. In the Civil War he was commissioned captain of the 23d New York Volunteers and at the end of the war had risen to the rank of colonel. In 1865-67 he practised as an archi¬ tect in New York with Gambrill and there¬ after independently. He became one of the most successful of American architects of the late 19th century. Among his works are the old Equitable building, Produce and Stock exchanges, the World building and City Col¬ lege buildings in New York; also the residence of Cornelius Vanderbilt in the same city, the Prudential building, Newark, N. J., Liberal Arts building, Chicago, the Wisconsin State Capitol, etc. He was a member of several so¬ cieties, a chevalier of the Legion of Honor (1901), member of the National Academy of Design and of the National Commission of Fine Arts.

POST, George Edward, American mission¬ ary: b. New York, 1838; d. 1909. In 1860 he was graduated in medicine at the University of the City of New York and in the following year at Union Theological Seminary. He was appointed to the chair of surgery at the Syrian Protestant College of Beirut, where he re¬ mained until his death. He was an accom¬ plished linguist and wrote several Arabic works, including (Flora of Syria, Palestine and Egypt } ; (Textbook of Botany* ; (Textbook of Mammalia-* ; (Textbook of Birds* ; translation of Butler's (Physiology * ; Concordance to the Bible) ; (Textbook of Surgery) ; (Textbook of Materia Medica) ; dictionary of the Bible.*

POST, Melville Davisson, American lawyer and novelist: b. Harrison County, W. Va., 19 April 1871. He was graduated from the Uni¬ versity of West Virginia and has since prac¬ tised law in Grafton, W. Va. In 1898 he was chairman of the Democratic Congressional Com¬ mittee of West Virginia. He has published Che Strange Schemes of Randolph MasoiP 0896) ; (The Man of Last Resort) (1897) ; dwellers in the Hills> (1901) ; Che Gilded ChaiD (1910) ; Che Nameless Thing* (1912).

POST, Wright, American surgeon: b. North Hempstead, N. Y., 19 Feb. 1766; d. Throgg's Neck, N. Y., 14 June 1828. He received his medical education in New York and London and in 1786 established a practice in New York. In 1792 he was appointed professor of surgery at Columbia, where he later occupied the chair of anatomy and physiology, afterward holding the same chair in the Medical School of New York. For 35 years he was consulting sur¬ geon in the New York Hospital, president of the College of Physicians and Surgeons in 1821-26, and was prominently connected with numerous medical societies. He made himself famous by his surgical achievements, many

of which were departures from the old school.

POST-NUPTIAL CONTRACT. See

Law of Husband and Wife.

POST-OBIT BOND, a mode of contract¬ ing loans sometimes resorted to by heirs and others who expect a legacy on the death of some third party. The condition in the bond is, that the sum borrowed shall not be exigible till that party's death ; and hence, not only in conse¬ quence of the uncertainty of the event, but also sometimes in consequence of the uncertainty of the succession itself, which may be contin¬ gent, and perhaps never be realized, the creditor usually makes very exorbitant terms.

POST-OFFICE. See Post-office De¬ partment.

POST-OFFICE CLERKS, United Na¬ tional' Association of, an association formed in 1890, for the purpose of securing, through legis¬ lation and other means, the classification of post-office clerks with a view toward securing more equitable salary rates, regulation of hours of labor and other similar objects. The or¬ ganization also issues death benefit insurance policies.

POST-OFFICE DEPARTMENT. The

official title of one of the executive departments of the government; established in 1794. It is under the management of the Postmaster-Gen¬ eral, who since the time of Andrew Jackson has been a member of the President's Cabinet.

He is appointed by the President and confirmed by the Senate. The department is divided into four great bureaus each under the immediate charge of an assistant postmaster-general. The first assistant's bureau has charge of the large clerical and carrier forces and all the matters of actual management. It supervises an annual ex¬ penditure close to $100,000,000. The bureau of the second assistant has the immense task of providing for the transportation of the mails at a yearly cost of about $80,000,000. That of the third assistant looks after the financial side, furnishes the stamps and keeps the accounts. The fourth assistant has charge of the appoint¬ ment of 55,000 postmasters and directs the force of inspectors.

The Railway Post Office. — The idea of a railway post office was first brought officially to the notice of the department of First Assist¬ ant Postmaster-General Hobbie, who, in 1847, had been in Europe, and in his report gave his impressions of the traveling post office in Eng¬ land. Under Postmaster-General Holt, in July 1862, the first railway post office was introduced in this country. In 1864 the leading railroads were induced to alter the cars for the purpose of the railway post office, and from that time this service has grown, until now it is a model institution of its kind. In 1916 there were 3,479 railway routes, 8,027 mail messenger routes, 571 electric car routes, 264 wagon routes, 260 steamboat routes, 21 star routes (in Alaska), and six pneumatic tube routes. The cost of the railway mail service was $28,516,000, and railway mail pay $61,692,000.

Money-Order System. — The money-order system was established in 1864, under the ad¬ ministration of Postmaster-General Blair. In order to accommodate soldiers and others wish¬ ing to transmit small sums of money, he ad¬ vised the incorporation of this idea in our postal system. At its beginning only 138 offices were allowed to issue orders. The number in¬ creased to 34,547, which during 1903 issued 45,-941,681 domestic money-orders, and in 1917, 133,292,000 domestic orders, and 1,973,714 for¬ eign orders, this latter a decrease due to the war. See Postal Money Order Service.

Rural Free Delivery. — The rural free deliv¬ ery service was established under President Mc¬ Kinley, in 1897. That year 44 routes were put in operation. The service has grown steadily. By 1901 the mileage had grown to over 100,000, the cost was $1,750,321, and over 15,000 car¬ riers were employed. In 1905 the mileage was 721,237, cost $20,864,000, with 32,055 carriers. In 1910 the mileage was 993,068, cost $36,915,000. with 40,997 carriers. In 1917 the mileage was 1,112,556, cost $52,420,000, with 43,338 carriers. The net advantage of the Rural Free Deliv¬ ery system include (1) postal receipts increased; (2) value of farm lands enhanced; (3) farmers brought into touch with markets ; (4) social and educational benefits derived in country and town by being kept in touch through the daily receipt of papers and correspondence; (5) benefits to small towns. In three, at least, of these advantages the benefit of the postal serv¬ ice to commerce is distinctly notable. See Parcel Post.

Dead Letter Office. — The dead letter office dates back to 1825. An act of Congress made it the duty of postmasters to publish quarterly, or

oftener, whenever the Postmaster-General might direct, a list of letters

remaining in their offices, and once every quarter to forward those that could not be delivered to the department at Washington. Here are received annually about 15,000,000 pieces of mail matter.

The Postal Union. — Under the terms of a treaty concluded at Berne, 9 Oct. 1874, the ob¬ ject of which was to secure uniformity in the treatment of correspondence, and the simplifica¬ tion of accounts, as well as the reduction of rates within certain limits, and whose provisions were carried into operation generally 1 July 1875, the whole of Europe, the United States, Egypt, British India and all the colonies of France were at the outset, or shortly thereafter, included in the union, and many other coun¬ tries and colonies have since joined it. The international accounts in respect of postages are based on a month's return of correspondence taken every third year.

Postal Savings Banks were established by the Postal Savings Act of 25 June 1910. See Banks and Banking; Postal Savings Banks and Postal Savings System.

Increase of Rates. — In November 1917 the law for increased postage for war revenue went into effect, and first class mail, drop let¬ ters and post cards were raised one cent each. The rate on magazines containing over 5 per cent advertising was also increased, according to zones of delivery. Former rates restored 1919.

Post-Office Statistics. — In the United States in 1789 there were only 75 post offices established, the length of the post routes being 2,275 miles and the gross revenue of the de¬ partment being only $7,510. The expenditures for the same year were $7,560 and of this only $1,657 were paid in salaries to postmasters. In 1875 there were 278,000 miles of postage routes, a revenue of $27,000,000, with expenses of nearly $34,000,000. In 1900 there were 428,000 miles of post routes, a revenue of $110,000,000, and expenses of $120,000,000. The total number of post-offices was reduced from 74,169 in 1903 to 55,413 in 1917, rural free delivery causing the dropping of small offices. There were in 1910, 59,580 post offices in operation, 447,998 miles of post routes, 553,312,998 miles of mail service performed. The gross revenues of the depart¬ ment were $224,128,657.63, the expenditures $229,977,224.50, and $27,521,013.29 were paid as compensation to postmasters. In 1917 these figures had grown to 55,413 offices, 479,487 miles of post routes, $329,726,116 revenue, and $319,- 838,718 expenditure. In 1911, 1913, 1914, 1916 and 1917 the post office showed a profit, and it is the policy of the department to continue mak¬ ing a slight profit. From June 1847 to June 1851, 4,603,200 postage stamps were issued,

while in the single year 1910, 11,360,353,679 stamps were used by the people of the United States. In 1853, the year in which stamped en¬ velopes were first issued, 5,000,000 were used, while in 1910 the total was 1,506,861,593. The first year's issue of postal cards — 1873 — num¬ bered 31,094,000, while in 1910 726,441,000 were issued. The registry system was started in 1854, and in that year the registered pieces num¬ bered 629,322. In 1910 they numbered 42,053,- 574. In 1865 money-orders to the amount of $1,360,122 were issued, while in 1910 the total amounted to $647,736,327, and in 1917 it was

$855,000,000. The number of pieces of matter of all kinds mailed increased from 500,000 in 1790 to about 20,000,000,000 in 1919. For further information see Philately; Post and Postal Service; Stamps, Postage; and related refer¬ ences.

POST-PLIOCENE, that division of geo¬ logic time and the strata laid down in it which follows immediately after the Pliocene. The term has been used as designating all that period from the end of the Pliocene till now, in which sense it is equivalent to Quaternary (q.v.) or, by some geologists, as applied only to the earlier portion of this period, in this sense being equivalent to Pleistocene (q.v.).

POST AND POSTAL SERVICE. The

word post is derived from the Latin positus, meaning ((placed,)> because horses were put or

which the letter was addressed, and was willing to undertake the delivery of it. The Emperor Diocletian, at the end of the 3d century, appears to have been the first to establish a postal system for the benefit of private persons. At later dates Theodoric the Great, Charlemagne and others had well-organized services for com¬ munication with all parts of their empire.

Early History of the Public Post. — The earliest postal system was established in France by the University of Paris. From the end of the 13th century this institution maintained couriers, who at certain times took charge of letters and money for the students collected in that city from almost all parts of Europe. Louis XI established for his own use mounted messengers, and by an edict of 19 June 1464 instituted post stations on the chief roads of

Earliest British Postal Envelope (1840).

placed at certain distances to transport letters or travelers. From this ancient beginning, the post has developed into one of the most effective instruments of civilization. In the Old Testa¬ ment are frequent references to the posts. In 2 Chron. one will find : (

France. This system was continued under the following reign, and ultimately private persons began to make use of the royal couriers for the transmission of their own correspondence. During the reign of Louis XIII the French system of posts received a more regular form from the establishment of a comptroller-general of posts.

In Germany the first post was established in Tyrol in the latter half of the 15th century, by Roger I, count of Thurn, Taxis, and Valsas- sina. His son established another from Brus¬ sels to Vienna in 1516, by the wish of the Em¬ peror Maximilian I. In 1522 a post was estab¬ lished between Vienna and Nuremberg, and Charles V, anxious to have news as quickly as possible, on account of the vastness of his states, caused Leonard of Thurn and Taxis to establish a permanent riding-post from the Netherlands through Liege, Treves, Spire and Rheinhausen, through Wiirttemberg, Augsburg and Tyrol to Italy.

The postal system of Italy began in Pied¬ mont. Until 1561 the transmission of letters was in the hands of the communes or private persons, who were authorized by the state to charge for the service a sum which varied ac¬ cording to circumstances. In the year mem- tioned the posts wore farmed out by Emmanuel

Philibert, Duke of Savoy, to a postmaster-gen¬ eral. This arrangement continued until 1697, when Duke Victor Amadeus II added the pro¬ ceeds of the post office to the revenue of the state, an indemnity being paid to the postmaster, who had the contract for them. From 1710 downward the post office was administered directly by the state.

The British Post. — There were private posts in England from the time of Edward III. In 1635 a public post was established between London and Edinburgh. In 1644 Edmund Pri- deaux, then a member of the House of Com¬ mons, was appointed master of the posts, and first established a weekly conveyance of letters into all parts of the nation. In 1683 a penny post was set up in the metropolis. During the government of William III acts of Parliament were passed which

regulated the internal postal system of Scotland; and, by the ninth act of Queen Anne, the postal system of England was arranged on an improved footing. A general post office was instituted at London for the Brit¬ ish dominions with chief offices at Edinburgh, Dublin and other places, while the whole sys¬ tem was placed under the control of a post¬ master-general with power to appoint deputies for the chief offices. At this time the letter rate of postage was eight cents for 15 miles or under, with a rising scale to 25 cents for 300 miles. In 1837 Sir Rowland Hill inaugurated a movement for reform in the postal service. Penny postage resulted, in 1839, and on 6 May 1840 the first postage stamp, designed by W. Mulready, was first brought into use. In the same year the money-order system was adopted and in 1848 the book post was established. In 1855 pillar letter-boxes were introduced, and London was divided into 10 districts, for greater facility in the distribution of city letters. The British post-office system developed rapidly after 1860, and has long included a parcels post and banking and telegraph systems. The service is under the immediate control of the Postmaster- General, assisted by the chief secretary of the post office in London. There are also chief offi¬ cers in Edinburgh and Dublin. The Postmaster- General is a member of the Privy Council, and sometimes a Cabinet minister. In 1915 there were 24,509 post offices in the United Kingdom and 50,285 road and pillar letter-boxes. The total number of letters delivered during the year was 3,409,000,000.

The Colonial Post in America.-— In the American colonies the post office made its first appearance in Massachusetts in 1639, when the General Court of that colony issued the fol¬ lowing : <(It is ordered that notice be given that Richard Fairbanks, his house in Boston, is the place appointed for all letters, which are brought from beyond the seas, or are sent thither, to be left with him, and he is to take care that they are to be delivered or sent according to direc¬ tion : and he is allowed for every letter a penny, and he must answer all messages through his neglect of this kind.® In 1657 a postal service was established in Virginia. The colonial law required every planter to provide a messenger to convey the dispatches, as they arrived, to the next plantation, and so on, on pain of forfeit¬ ing a hogshead of tobacco for default. In 1672 the government of New York established a mail to go monthly between New York and Boston.

In 1674 the General Court at Hartford enacted laws to regulate the postal services in the colony. In July 1683 William Penn established a post office in Philadelphia, with weekly mails to various places near the city, and about the same time opened mail routes between Phila¬ delphia and the larger towns -of Pennsylvania and Maryland. These

represent the several colonial enactments in relation to postal com¬ munication.

Neale's American Post. — The beginning of the American post proper dates with the sign¬ ing of a patent 17 Feb. 1691 vesting in Thomas Neale the American post. On 4 April fol¬ lowing, Neale and the Royal Postmaster-General appointed Andrew Hamilton postmaster-gen¬ eral of America. Hamilton undertook the ar¬ duous duty of establishing an intercolonial post. He visited all the colonies, was trusted implicitly and satisfied each colony of his ability and re¬ sources in the new venture. The co-operation of all the colonies except Virginia having been secured, services began on 1 May 1693, and con¬ sisted of a weekly post from Portsmouth, N. H., to Boston, Saybrook, New York, Philadelphia, Maryland and Virginia. Five riders were en¬ gaged to cover each of the five stages twice a week. In winter, service was performed fort¬ nightly. Hamilton died in 1703, and his son, John Hamilton, succeeded him. In 1707 the Crown purchased the good will of the American post office and continued John Hamilton as postmaster -general. From 1707 to the year be¬ fore the Revolution the General Post Office in London controlled the service in America. In 1711 there was a weekly mail operation between Boston and Main, and fortnightly exchange between Boston and New York. In 1717 the mail ran weekly between New York and Wil¬ liamsburg, Va., and 10 years later there Was a fortnightly mail between Philadelphia and An¬ napolis, Md. The period of activity in the establishment of postal facilities began when Benjamin Franklin was appointed postmaster at Philadelphia in 1737. At the request of the deputy, postmaster-general for the colonies, he assisted him in the regulation and manage¬ ment of the various post offices then established, and when that official died, in 1753, Franklin, in company with William Hunter, was apnointed to succeed him. In consequence of some diffi¬ culty with Governor Hutchinson of Massa¬ chusetts, Franklin was removed in 1774.

The United States Post. — The Continental Congress met at its second session, in Phila¬ delphia on 26 July 1775, and its members re¬ solved to have a post-office system of their own, and Franklin was elected to carry on the work. A salary of $1,000 a year was voted him. How¬ ever, Franklin's great diplomatic talents secured him soon afterward a transfer to a wider field, and in 1776 his son-in-law, Richard Bache, was appointed to succeed him. Mr. Bache was suc¬ ceeded in 1782 by Ebenezer Hazard, who had, in 1775, been the ˆconstitutional postmaster® of New York, so termed to distinguish him from the British deputy at that place. The Colonial Congress in 1782 passed an act authorizing the postmaster-general to establish a

line of posts between New Hampshire and Georgia, and to such other places as Congress might direct and to appoint the necessary deputies, for whose faithfulness and honesty he was to be held ac-

Countable. On 8 May 1794 the Congress passed the first law for the proper management of the postal service. In 1799 the postal laws were revised, and flogging substituted for the death penalty for robbing the mails. This law, how¬ ever, was repealed by a subsequent enactment, and imprisonment for a term of years made the penalty. The office of Second Assistant Post¬ master-General was created in Madison's admin¬ istration, and the scale of postage changed. Sin¬ gle letters — that is, containing one piece — were charged from eight to 25 cents, according to distance. The Sunday delivery at post offices began in 1810, bringing forth vigorous remon¬ strances from various religious bodies, and the strife was kept up in Congress and occupied the attention of the Department for 20 years. In 1813 the mails were first conveyed in steamboats from one post town to another. The postal laws of 1816 made a change in the postage, which lasted until 1845. The new scale charged for letters, consisting of one piece of paper, not going over 30 miles, six cents ; not over 80 miles, 10 cents ; not over 150 miles, 12ˆ4 cents; and not over 400 miles, 18ˆ4 cents ; and for greater distances, 25 cents. The success of the postage stamp in Great Britain led local postmasters in a number of United States cities — notably New York, Baltimore, Saint Louis, Providence and New Haven — to issue stamps. They proved popular, and in 1847 the United States introduced stamps and the 5 and 10-cent denominations, with the faces of Franklin and Washington respectively. Previously the postage was collected entirely in money, its prepayment being in all cases optional. On 1 July 1851 a new series of stamps was adopted, consisting at first of denomina¬ tions of one and three cents, but afterward of larger amounts. Stamped envelopes were first used in 1853. The registration system was in- stitued in 1854, during the administration of President Pierce. The first fee was five cents; the price was raised in 1863 to 20 cents. It is now ten cents. In the administration of Presi¬ dent Lincoln the free delivery service was es¬ tablished. As early as 1825 provision was made by Congress for the delivery of letters by car¬ riers at a cost of two cents each to the persons receiving them. In 1836 this was further amended by allowing newspapers and pamphlets to be delivered at half a cent each. In 1863 Postmaster-General Blair introduced the free delivery system, beginning the practice in cities of 50,000 population. Receiving boxes

were also put up and deliveries provided for as often as the public convenience demanded. The postal card was introduced in 1873. For the further development of postal service see Post-office Department and related references.

POST-RENAISSANCE PAINTING,

painting as practised in Europe after the middle of the 15th century.

Seventeenth Century. — The great color school of monumental and decorative painting which was the glory of Venice was one of the last to disappear (see Renaissance Painting). Paris Bordone (q.v.), a pupil of Titian, did little to maintain it, but a much more vigorous and original talent was that of Jacopo Robusti (1518-94), called II Tintoretto from his father's occupation as a dyer, and also sur- named II Furioso from his manner of working. The number of his paintings was very great,

and their merit very unequal. From the school of Verona, which had been for some time rising in importance, and even in the 15th century had produced some painters of note, came another illustrious artist to add to the fame of Venice, Paolo Cagliari (q.v.), called Paolo Veronese (1532-88), one of the most brilliant of all dec¬ orative painters. The school of Bologna was founded by Lodovico Carracci, aided by his two cousins, Agostino and Annibale, in 1589, at the period of the rise of the Electric school, protesting against the Mannerists, and of the naturalisti, rejecting all tradition and professing to study nature directly. In Naples appeared an Hispano-Neapolitan school of which the chief was Jusepe Ribera, called Lo Spagnoletto. Spain produced a number of native painters in the 15th and at the beginning of the 16th cen¬ tury; and the influence of Italian art became more predominant toward the middle and at the close of the latter. But the authority of the Inquisition was strongly restrictive. Francisco de Zurbaran (q.v.) (1598-1662?) was pre¬

eminently a painter of monks. The three great names in Spanish art are Alonzo Cano (q.v.) (1601-67), a pupil of Francisco Pacheco, the master and also the father-in-law of Velasquez; Diego Rodriguez de Silva y Velasquez (q.v.) (1599-1660) ; and Bartolome Esteban Murillo (q.v.) (1618-82). The name of Velasquez has been raised by modern criticism to the summit of the art of painting. In Germany, no painter attained the eminence of Diirer and Holbein for more than two centuries ; after them, a baleful imitation of the mannerisms of the Italians suppressed any assertion of national individual¬ ity, and the so-called inspiration from Michel¬ angelo affected even foreign

painters visiting in Germany, — as the Hollanders Goltzius, Hubert and Hendrick. The works of Adam Elzheimer (1578-1620), though he visited Italy and died in Rome, displayed a curious and original talent, both in figures and landscape, unusual at this period.

But it was to the Netherlands that the chief seat of the art of painting was transferred in the 17th century, made illustrious by the great development of all resources of the art; the influence of Peter Paul Rubens (q.v.) (1577— 1640) not only revolutionized the schools of painting of his era but is still felt in those of our day. One of the most celebrated of his pupils was Anton Vandyck (q.v.) (1599—1641) , whose portraits constitute his chief title to emi¬ nence; another was David Teniers the elder (q.v.) (1582-1649), instructor of his still more famous son of the same name. In the works of the latter, and of a number of the painters of Holland, Adrian Brauwer (q.v.), Adrian Van Ostade (q.v.), Jan Steen (q.v.), Gerard Terburg (q.v.), Gabriel Metzu (q.v.), Gerard Dow (q.v.), is carried to the highest point the genre painting of contemporary life, the exteriorite, which so strongly differentiates this Northern art from that of Italy. In the paint¬ ing of landscapes, animals, marines and even still-life, this excellence of technique was also maintained, reaching its supreme development in the genius of Rembrandt (q.v.) (1607-69), the greatest master of light and darkness of any school of painters. Under Francois I, a number of Italian painters were induced to visit France, many of them being employed in the decorat-

ing of the palace of Fontainebleau, and their influence prevailed strongly for nearly two cen¬ turies. The art of the 17th century was largely the official art of Louis XIV and of his court painter, Charles Lebrun (q.v.) ; one of the most important events was the establishment of the Academy of Painting and Sculpture at Paris in 1648. A much more graceful and idyllic art was introduced by Nicholas Poussin (q.v.) ; and the classic landscape by Claude Gelee, called Claude Lorrain (q.v.). In England, also, for¬ eign artists, in this case French, Flemish and even Greek, were largely employed before the reign of Henry VII (1485-1509), in painting miniatures on glass, enamels, etc. The example of Henry VIII in encouraging the great Holbein was followed by his successors, — Mary Tudor employed Antonio de More (An¬ tonio Moro) ; Elizabeth, Lucas de Heere and Frederico Zuccari ; Charles I, Rubens and Van Dyck; Charles II, Peter Lely, of Soest in West¬ phalia, and Godfrey Kneller of Liibeck. The only English names

that assume any importance in these annals are those of Isaac Oliver, his son Peter, Samuel Cooper, a pupil of Van Dyck, Robert Streator, Henry Anderton and Peter Monamy.

Eighteenth Century. — During the 18th cen¬ tury the art of the Netherlands passed into an eclipse, recognized, and deplored, by the na¬ tional historians, and that of Germany into another, which was long hailed as a “revival.® Belgium, the battle-ground of Europe for so many years, exhausted and ravaged under its constantly changing rulers, could furnish no encouragement to the arts, and the painters, like those of Holland, with a very few excep¬ tions, abandoned their own initiative and the study of native art for the servile imitation of the works of their predecessors, — the portrait¬ ists and the figure painters, such as Rubens and Lebrun ; the landscapists, like Poussin ; the bat¬ tle painters, like Philips Wouwerman (q.v.), etc. In Germany, the revolt against the general decline was called the Classic Movement, the first of the three great epochs into which this revival is divided, and which is dated from the arrival of Raphael Mengs (q.v.) in Rome, in 1741. The future leaders in the second phase of this movement, Cornelius, Overbeck, Veit, Schadow, etc., were all born in the very last years of the century. Great Britain and France, on the contrary, developed, in a number of distinct schools each, fresh evidences of a national and original art, in practically all the branches of painting. In portraiture, the British record the names of Reynolds, Gains¬ borough, Romney and Raeburn ; in genre, not always satiric, Hogarth — one of the most pre¬ eminently national of all artists, and Wilkie; in landscape, Gainsborough, Old Crome, Con¬ stable and Turner. In academical and historic art, the Americans, Copley and West, rose to international eminence. In France, the last days of the monarchy were made illustrious by the delicate and graceful courtly art of Watteau (q.v.), Pater, Lancret and Fragonard, the frail idylism of Greuze (q.v.) and the admirable naturalism of Chardin (q.v.) — to be succeeded in their turn by the pedantic “classicism® of David and the Empire. This century is dis¬ tinguished also by the growing recognition of the popular interest in art, encouraged by the

opening of royal galleries and the dissemination of engraving. Three female painters appear, whose graceful talents entitle them to recogni¬ tion, — in Venice, Rosalba, Carriera (q.v.) 1675- 1757) ; in Germany, Angelica Kauffmann (q.v.) (1741-1807); and in France, Mme. Vigee-Lebrun (q.v) (1755-1842). In Italy, the last glories of the Venetian school flamed up in the daring and truly decorative work of Giambattista Tiepolo (q.v.) (1696-1770).

Nineteenth Century. — During the 19th cen¬ tury the supremacy in

painting and sculpture was transferred to France; Paris, with its annual official Salons, became the recognized capital of the fine arts for Europe and America. French art in this century has been considered to have passed through three great periods, cor¬ responding closely with changes in the national government, — Classicism, Romanticism and the third period, dating from 1848, the schools of the Second Empire and the Third Republic. All these have naturally had many subdivisions. The classicism of Louis David (q.v.), with its sacrifice of everything in painting to the outline and to what was considered to be an imitation of the antique, was obliged to jueld gradually to the Napoleonic art, representations of battles and of state ceremonies, and to genre painting, — the last not being officially recognized till 1816. Classical painting, which dominated in Europe for 50 years, was almost exclusively figure painting; its rigid formalism gave way to a greater sympathy with nature even in the works of David's immediate pupils and followers, Regnault (q.v.), Picot (q.v), Baron Gerard (q.v.), Gros (q.v.) and Ingres (q.v.). And much more living and sympathetic classic taste than David's was that of Prud'hon (q.v.). Ro¬ manticism found its first expression in painting in the works of Gericault (q.v.), though Delacroix (q.v.), more emotional and more of a colorist, is considered to have been the leader. The essential narrowness of this form of art was also gradually tempered by naturalism, so that its range became wider, — as in the very differ¬ ent art of Decamps (q.v.), first of the Oriental¬ ists, and of Ary Scheffer (q.v.) and Paul Delaroche (q.v.). Landscape painting began to assume that great importance which it has ever since maintained in modern art, and the way was opened for the famous Fontainebleau school of Corot (q.v.), Rousseau (q.v.), Troyon (q.v.), Diaz (q.v.), Daubigny (q.v.) and Jules Du¬ pre (q.v.), in which the painting of cattle is also raised to its highest eminence. The school of the peasant — as it might be called — which has played so large a part in contemporary painting, both of France and of all the na¬ tions whose students have imbibed French methods, and conceptions, permits of such a wide range of treatment as that between the very frank realism of Courbet (q.v) and the "hieratic gloom® of Jean-Frangois Mil¬ let (q.v.). Somewhere between these extremes are the rural scenes of Lhermitte (q.v.) and those of Jules Breton (q.v.), in which realism is tempered with a certain style, with a strong desire to avoid the merely commonplace.

The latter half of the 19th century saw the rise of so many and so widely differing move¬ ments and tendencies in French painting that no general classification is possible. Under the Second Empire the official art, that of the

Academie and the Institut, included such cele¬ brated names as those of Gerome (q.v.), Jules Joseph Lefebvre (q.v.). Bonnat (q.v.), Cabanel (q.v.), Baudry (q.v.), Bouguereau (q.v.) and Henner. In Genre, characterized usually by excessive delicacy and accuracy of finish, the highest place was held by Meissonier (q.v.) ; and but little inferior was the work of Louis Leloir and Vibert (q.v). Something of the haunting antique influence appears in the work of Gleyre, Couture (q.v.) and Flandrin (q.v.), protesting against the rising flood of “realism® ; something also in that of the so-called Neo- Grecs, of which the two most sincere and per¬ sistent were Hamon (q.v.) and Aubert. The most graceful of the Orientalists was Fromentin (q.v.), and the painters of Eastern subjects, in very varying methods, include many of the most celebrated names of this epoch, Gerome, Henri Regnault (q.v.), Benjamin-Constant (q.v.), Belly, Boulanger and others. Of the mystical school, uninfluenced by any conventions or traditions, the most striking example is that of Gustave Moreau (q.v.) ; and one of the most distinguished and honored of the older men is Hebert (q.v.), whose delicate, melancholy art has not varied since 1850. Nearly all the French figure painters are portraitists. Military subjects have been rendered with a realistic accuracy and a dramatic force never before attained, by Yvon (q.v.), Detaille (q.v.), De Neuville, Aime Morot, Roll and others ; mural paint¬ ing received a new inspiration from Puvis de Chavannes (q.v.) ; a warmer splendor of color than that of the Venetians was revived by Mon- ticelli (q.v.) ; and the still-life of the early Dutch painters equaled by that of Dosgoffe and Vollon (q.v.) One of the most im¬ portant manifestations of this contemporary school was that of the Impressionists (q.v.), with their new theories of presenting absolute realities, and of which the most uncompromis¬ ing advocates among the leaders were Manet (q.v.), Monet (q.v.), Sisley, Pissaro, Caillebotte, and others. While the influence of this innova¬ tion • still lingers, the contemporary art of the Salons shows - but very little trace of it. It is to be noticed that the great decline in all artistic value of these annual Salon exhibitions, and of the national art generally, within the last 10 years, has been admitted by the French themselves.

In Great Britain, the influence of the Pre- Raphaelite movement of 1851 is considered to be still very strong, especially among the younger painters, but it is certain that that of the Newlyn school, much later, and even of the Glasgow school in landscape painting, has had very much more to do with the introduc¬ tion of more purely

artistic conceptions and a much sounder technique. A few of these younger colorists, as La Thangue and Clausen, have been officially recognized by the Royal Academy (q.v.), and the works of a number of the others, as Edward Stott, Alfred East, Alfred Parsons and J. M. Swan, the animal painter, appear at its annual exhibitions. Un¬ like the Pre-Raphaelites, who advocated the dis¬ tinctly moral purpose of art — rejecting all but the sincerity and truth-seeking methods of Raphael's predecessors, and unlike the conven¬ tional characteristic art of the day with its in¬ sistence upon details and a subject, these mod¬ ern innovators paint the simplest themes with

breadth and with skilful rendering of atmos¬ phere and color. At the head of the academical school stands the name of Sir Frederick Leigh¬ ton, afterward Lord Leighton (q.v.) ; his imme¬ diate successors in the office of president, Sir John Everett Millais (q.v.) and Sir Edward J. Poynter (q.v.), sustain intelligently the tradi¬ tions of an art whose greatest defect is gener¬ ally in the brush-work. All forms of painting are represented in this school, historical, decora¬ tive, portrait, genre, landscape and marine. The British water color school has long been consid¬ ered to be one of the most important, branches of the national art; it likewise includes all sub¬ jects in its province and treats them with much the same seriousness of detail as the oil-painting. The most important of the official bodies after the Royal Academy are the Royal Scottish and the Royal Hibernian academies, and there are many minor societies representing various tend¬ encies of the art.

Unlike England or France, northern Ger¬ many has never possessed one recognized centre of the arts — the conflicting claims of Berlin and Munich being mutually disallowed ; but in Austria, the capital, Vienna, has long enjoyed this distinction — in the 18th century and in the 19th more particularly since the aggrandizement of the city following the razing of the outer ' walls in 1858. This period gave rise to a spe¬ cies of electicism in all the arts, in which a great variety of styles and influences prevailed. In Prussia and Bavaria, the second period of the great revival, led by Cornelius and Overbeck, began about 1810; and the third — the natural leaction against the mysticisms and devoutness of these "Nazarites® (q.v.), and hence consid¬ ered to be naturalistic — about 1830. Still an¬ other regeneration is placed immediately after the close of the war of 1870-71. The development of this latter, however, was slow ; the real leader in the modern movement is considered to be Franz Stuck (q.v.), who first became widely known at the exhibition in Munich in 1889. This move¬ ment was particularly directed against the academic formulas of the historic painters of the school of Piloty (q.v.) and the rural genre of Defregger (q.v.) and Vautier (q.v.). Much of the

influence of the older men, however, still survives and among those who escaped this general denunciation was the veteran, Menzel (q.v.). The three great “Secession® movements were those of Munich, Diisseldorf and Berlin, but the art of the latter capital is still largely official. The secession in Austria and the divi¬ sion of the painters into “the old and the new® dates from only about 1897. In Hungary, the national art, rising from the exhaustion and devastation of the numerous wars and revolu¬ tions, is considered to have taken form after the Revolution of 1848.

Contemporary Continental painting may be said to have been so greatly influenced by the art of France as to have fallen into a routine in which mere technical skill very frequently takes the place of any strong national or indi¬ vidual assertion. This is particularly true of Italy, Spain and Portugal. In the former, the Neapolitan painters, the chief of whom are Palizzi, Morelli and his pupil, Michetti, are the most interesting and the best known abroad; about 1887 a society of Roman paint¬ ers was formed to combat the commercial art of the day, for which Fortuny (q.v.) was con-

sidered to be largely responsible. Among the few painters with international reputations, two of the most prominent are Segantini and Madame Romani-Carlesimo. In Spain, also, but few traces are left of the brilliant Roman- Spanish school (q.v.) of Fortuny, even in the genre. In much broader methods all the bril¬ liancy of the contemporary cosmopolitan tech¬ nique appears in the luminous canvases of Sorolla y Bastida (q.v.), and what are con¬ sidered to be the qualities of Goya in the somewhat brutal scenes of daily life by Zu-loaga. Dignified historical art is worthily represented by Pradilla (q.v.) ; and the small Venetian scenes painted by Rico are widely known. Portuguese art has suffered from many national ills ; the list of contemporary painters is headed by the king, Dom Carlos I.

Painting in the Netherlands has not fol¬ lowed common lines of development in Hol¬ land and Belgium — in the latter, it has been susceptible to every new wind of doctrine from abroad, while the Dutch artists have remained faithful to what may be defined as the national principles for the last 30 years. This close appreciation of nature, the sense of the essen¬ tial and intimate quality of things, differs from the famous national art of the 17th century, both in conception and in technical processes, but it seems to be rather an

evolution than a revolution. The leaders in the movement against the undiscriminating assimilation of all other European methods, which prevailed in 1830, were Josef Israels (q.v.) and Jacobus Maris (q.v.) ; the renown of the latter is shared by his two brothers, Matthys and Wil¬ lem. The landscapes of Jongkind, Willy Mar¬ tens, Blommers and Anton Mauve, the ma¬ rines of Mesdag, the domestic genre of Albert Neuhuys, the church interiors of Bosboom, have given this art an international renown. Among the younger painters, a not very im¬ portant independent movement was set on foot within the last few years — that of the ((New Impressionists,® seeking the expression of greater vehemence, of more passion, in their works. The leaders in this were Isaac Israels, the son of Josef, and Georges Hendrik Breit- ner. In strong contrast with this national art is that of a few denationalized painters who have gone abroad — as Kaemmere, in Paris and Alma-Tadema in London. The some¬ what undiscriminating revolt against all the old traditions in Belgium was inaugurated by the founding of the Societe fibre des Beaux- Arts in 1868, followed by various associations, publications, manifestations and ˆdiscoveries.® So widely divergent are the principles of the modern school, however, that they include the historical paintings of Baron Leys (q.v.), the marines of Clays, the powerful and gloomy ren¬ derings of the fife and labor of the poor by Constantin Meunier and the impressionism of Evcnpoel, resembling that of the Spaniard Zu- loaga. Of the mystical and imaginative paint¬ ers, the most reticent and refined is Fernand Khnopff ; one of the so-called realists, very hard in design and color and sacrificing all tones and values, is Leon Frederic.

Scandinavian art, also, shows divergencies, following national characteristics — that of Norway being ruder, somewhat more direct; that of Sweden following more faithfully the

varying currents of foreign art, as does the scanty art of Finland; that of Denmark, seem¬ ingly more intimate, with comparatively little variety. The emancipation from foreign domi¬ nation, mostly German and latterly French, is recent and is not yet complete, dating in Den¬ mark from the commencement of the 19th cen¬ tury, under Thorwaldsen (q.v.) the sculptor and Eckersberg the painter; and in Norway from only about 1890. The sound technical training that permits of the rendering of even the dis¬ tinctively northern themes, the clear, cold, im¬ pressive aspects of nature, the sincere and inti¬ mate domestic genre, has in nearly all cases been acquired in foreign schools — Norway and Finland having none of their own ; and of the most brilliantly equipped of these painters, as the Swede, Zorn (q.v.), and the Norwegian, Thaulow, it is to be said that their art, like their celebrity, is cosmopolitan. Many of the artists trained in Paris have

identified themselves with the contemporary French school — the Norwe¬ gians generally excepted. Among the few paint¬ ers who have remained distinctly national, one of the most original and most decorative in his work is Carl Larsson of Sweden ; Gerhard Munthe of Norway, a good landscape painter, owes his international reputation to his very curious and novel renderings of ancient legends.

The art of Switzerland, like the best of all that of the minor countries, even the South American and the Danubian, reflects strongly the influence of the Parisian schools. In Basel, however, in 1897, was celebrated a double festi¬ val in honor of Holbein and Bocklin (q.v.), the latter a painter whose art was singularly free from all traditions whatever.

The art of western Europe was first intro¬ duced into Russia by Peter the Great; before him it was barbaric, or semi-Byzantine, like the civilization. The Saint Petersburg Academy of the Arts was founded by the Empress Elizabeth in 1757. In its curriculum the imitations of the various European schools of painting were taken up in turn, or simultaneously, from Carracci and Guido Reni to the classicism of David and Mengs. The reaction against these has naturally developed a number of painters who strive to give expression to the sympathy with their own race or their own ideals ; many of them share the depression, the pessimism, which character¬ izes so much of the contemporary literature. This affects strongly the landscape sentiment, even in the works of artists who have returned from studying abroad. Of these figure painters, the most important are Repin, Wasnetzoff, Se-rof and some others, the first named being one of the boldest of the realists of any school or time. Verestchagin (q.v.) is well known abroad by his very numerous and very large canvases in which he has sought to depict the horrors of war. In the Russian school are included the two Finnish painters, Edelfelt, whose figures and portraits are rendered with all the excel¬ lence of Parisian technique, and Axel Gallen, whose strikingly original paintings depict weird scenes in the national legends. Of the painters of Poland, the most widely known are Matejko and Josef Brandt (q.v.).

In the United States, painting has developed along the fines of technical excellence, rather than in any striking or inspiring development of a great distinct national art. Even in the

matter of technique, some of the early portrait painters, as Gilbert Stuart (q.v.) and the wood- engraver, A. B. Durand (q.v.), remain unsur¬ passed. Trumbull (q.v.) and Washington All- ston (q.v.) were not only portraitists but also painters of historical and imaginative composi¬ tions, the former excelling in the small heads in his large historical canvases, and the latter displaying more of a painter's feeling for tone and color. The art of Benjamin West and C. R. Leslie belongs rather to England and is to-day quite alien. The modern landscape may be said to commence with the pictures of the visionary Thomas Cole (q.v.), and is rapidly de¬ veloped in the work of the painters of the ((Hudson River School,® the most important of which were J. F. Kensett (q.v.), Sandford R. Gifford (q.v.), W. Whittredge (q.v.) (d. 1910), T. A. Richards (d. 1900) and Jervis Mc- Entee (q.v.). The great panoramic canvases of Albert Bierstadt (q.v.) and the far more dis¬ tinguished landscape compositions of Fred S. Church (q.v.), have no reflection in the work of to-day. This landscape art has culminated apparently in the renderings of tone and atmos¬ phere, and the sentiment of nature in her quieter moods, in the works of such artists as George Inness (q.v.), Homer Martin (q.v.) and A. H. Wyant (q.v.) (d. 1892), and, of the stronger moods, Winslow Homer (q.v.), a painter of the clearest insight and most truth¬ ful rendering. Wiiliam Page (q.v.) (d. 1885) and Daniel Huntington (q.v.) (d. 1906), each in his turn president of the National Academy of Design, enjoyed very considerable reputa¬ tions as portrait painters, the former devoting himself to an effort to discover the secret of the color of the Venetians. At the present day, Blakelock, Ryder, Horatio Walker, Murphy, Dewey and Dearth represent the imaginative school of landscape ; with them may be placed the more literal canvases of Tryon, R. Swain Gifford (d. 1905), Chase, Picknell, Bolton Jones and Theodore Robinson (d. 1896) — to mention only a few of a very long list. The portrait painters are also numerous; John S. Sargent (q.v.) enjoys an international reputa¬ tion as one of the greatest of any school ; Whistler (q.v.) (d. 1904; who resided in Eng¬ land), Eastman Johnson (d. 1906), Brush, Chase, Alexander (d. 1881), Vinton, Collins (d. 1903), George Butler, Wyatt Eaton (d. 1896), Beck¬ with, Tarbcll, Benson, Vonnoh, Metcalf, Wiles and Fowler (d. 1910), at home, are among the most distinguished, as is Miss Cecilia Beaux. Most of these also paint genre, or semi-decora¬ tive figure pieces; some of them having com¬ menced as illustrators, or still practising that art. Among the latter are Howard Pyle (d. 1911), A. B. Frost, W. T. Smedley and Hop- kinson Smith (d. 1915). E. A. Abbey (q.v.) (d. 1911), originally an illustrator, had trans¬ ferred his residence to England and painted both in historical and in large mural composi¬ tions.

John La Farge (q.v.) is in a way a link be¬ tween the old and the new, having been a pupil of Couture, and the first, practically, to seek color for its own sake, in oil, in his very numer¬ ous water-colors and in his later monumental work both on walls and in stained glass. An¬ other of the older men, Robert Weir (d. 1889), was noted for his important figure compositions,

apparently influenced by the European schools ; Alden Weir renders much simpler scenes in methods somewhat more affected by wholly modern processes; Thomas Moran, mountain landscapes and Venetian scenes inspired by the English painters of the early part of the cen¬ tury. A number of the figure aqd landscape painters have established themselves in Paris, MacEwen, Melchers, Julius Stewart, Edwin Lord Weeks (d. 1903), Johnston and others; Hitchcock in Holland, Ulrich in Germany, etc. The list of marine painters is also long; among the most talented are Arthur Quartley (q.v.) (d. 1886), Henry Snell, T. W. Richards, C. T. Chapman and some others, and, among the older men, James Hamilton (d. 1878).

In figure painting there has seemed to be a lack of popular appreciation for anything more ambitious than small examples of genre, usu¬ ally familiar and domestic themes, rather than for the historic or the more purely imaginative or mystical — the most important exceptions of late years being the dignified, almost monu¬ mental canvasses of Abbot Thayer, and the Oriental interiors of Siddons Mowbray. The increasing use of large mural paintings in pub¬ lic and private buildings has, however, devel¬ oped a school of truly decorative artists, of which the first in point of time wras Wm. Mor¬ ris Hunt, Frank Millet (d. 1912) ; the living painters are Mowbray, Dewing, Simmons, Blashfield, Vedder, C. Y. Turner, Robert Reid and a few others.

Bibliography. — Cunningham, (Lives of the most Eminent British Painters' ; Chesneau, (La Peinture Anglaise) ; Redgrave, (A Dic¬ tionary of Artists of the English SchooP (Lon¬ don 1878) ; Heaton, (A Concise History of Painting. > New edition revised by Cosmo Monk-house; Woltman and Woermann, (Geschichte der MalereP ; Bryan, (A Biographical and Crit¬ ical Dictionary of Painters arid Engravers' (1873); Ridolfi, (Le Maraviglie dell' Arte'; Harvard, (Histoire de la Peinture Hollandaise' (1882) ; Siret, (Dictionnaire Historique et Rai-sonne des Peintres de toutes les Ecoles' (1883) ; Stranahan, (A History of French Painting' (1888); Champier, Saglier, Walton, Exposi¬ tion Universelle, 1900; The Chefs-d'CEuvre' (1901); Benoit, Alex., (Russian School of Painting' (1904) ; Hanover, Emil, (Danische Kunet des XIX Jahrhunderts' (1907) ; Aubert, A., (Die Norwegische Malerei

im XIX Jahr- hundert' (1910) ; Isham, Samuel, (History of American Painting' (New York, new ed.,

1915).

William Walton,

Painter; Author of iChefs-d'CEuvre, Exposition Universelle Pans.

POST-TERTIARY PERIODS, the last main division of the Geological Record, and which includes all the formations accumulated from the close of the Tertiary Periods down to the present day. No sharp line can be drawn at the top of the Tertiary groups of strata. On the contrary, it is often difficult, or indeed im¬ possible, satisfactorily to decide whether a par¬ ticular deposit should be classed among the younger Tertiary or among the Post-Tertiary groups. In the latter all the mollusks are be¬ lieved to belong to still living species, and the mammals, although mostly of existing

species, include some which have become ex¬ tinct. These extinct forms are numerous in proportion to the antiquity of the deposits in which they have been preserved. Accordingly a classification of the Post-Tertiary strata has been adopted, in which the older portions, con¬ taining a good many extinct mammals, have been formed into what is termed the Pleisto¬ cene, Post-Pliocene, or Glacial group, while the younger deposits, containing few or no extinct mammals, are termed Recent. The Post-Ter¬ tiary periods are now generally termed Pleisto¬ cene and designate the units of geological time from the end of the Tertiary to the beginning of the Historic. This term was introduced by Sir Charles Lyell.

The gradual refrigeration of climate was prolonged and intensified in Post-Tertiary time. Ultimately the northern portion of the Northern hemisphere was covered with snow and ice, which extended into the heart of Europe, and descended far southward in North America. The previous denizens of land and sea were in large measure driven out, or even in many cases wholly extirpated by the cold, while northern forms advanced southward to take their places. The reindeer, for instance, roamed in great numbers across southern France, and Arctic vegetation spread all over northern and central Europe, and what is now the temperate zone of America. After the cold had reached its climax, the ice-fields began to retreat, and the northern flora and

fauna to retire before the advance of the plants and animals which had been banished by the increasingly severe tem¬ perature.

The insensible gradation of what is termed the Pleistocene into the Recent series of de¬ posits affords a good illustration of the true relations of the successive geological formations to each other. We can trace the gradual pas¬ sage because it is so recent that there has not yet been time for those geological revolutions which in the past have so often removed or con¬ cealed the evidence that would otherwise have been available to show that one period or group of formations merged insensibly into that which followed it. The Recent formations are those which have been accumulated since the present general arrangement of land and sea, and the present floras and faunas of the globe were established. They are particularly distinguished by traces of the existence of man. Hence the geological age to which these belong has been spoken of as the Human Period. But there is good evidence that man had already appeared on earth during Pleistocene time, so that the discovery of human relics does not afford cer¬ tain evidence that the deposit containing them belongs to the Recent series. Nevertheless it is in this series of the Post-Tertiary deposits that vestiges of man become abundant, and that proofs of his advancing civilization are con¬ tained.

During the Recent period the same agencies have been and are at work as those which have been in progress during the vast succession of previous periods. No trace can anywhere be detected of a break in the continuity of the evolution through which our globe has passed. See Geology (Divisions of Geologic Time) and consult the bibliography under that article. Consult also Fairchild, H. L., (Pleistocene Geol¬

ogy of New York State' (in Bull. Geol. Soc. America, Vol. XXIV, Washington 1913).

POSTAGE STAMPS. See Philately; Post and Postal Service; Stamps, Postage.

POSTAL MONEY-ORDER SERVICE.

A governmental agency, operating through the post offices, to promote public convenience in remitting small sums of money, and to ensure greater security in the transfer of money through the mails.

Notwithstanding the fact that England has been successfully operating a money-order serv¬ ice since the year 1839, the need for such a

facility in the United States does not appear to have been recognized until about 1857. On 31 January of that year Postmaster-General Camp¬ bell furnished the chairman of the Committee on the Post Office and Post Roads of the House of Representatives, on his request, with an outline of a plan for a postal money-order system such as might be put in operation in this country, but no action appears to have been taken in the matter. In the annual report of the depart¬ ment, dated 1 Dec. 1857, it was stated that the adoption of some method for the more con¬ venient. and safe remittance of small sums of money through the mails by means of orders had been frequently urged as a matter worthy of attention. The first definite recommenda¬ tion made by the department, however, appeared in the annual report for 1862. Postmaster- General Blair in setting forth therein reasons for the exclusion as far as practicable of money from the mails recommended the adoption of a money-order system as one of the remedies for the evils resulting from the common practice of enclosing currency in letters.

No action having been taken upon the rec¬ ommendation, it was renewed in the annual report of the department for 1863, Postmaster-General Blair expressing the opinion that such a system <(would not only prove a great con¬ venience to civilians and soldiers, but would almost entirely obviate the loss of many letters, the great majority of which enclose small re¬ mittances.”

The money-order service finally was author¬ ized by Congress in the act approved 17 May 1864, and on 1 November of that year the sys¬ tem was put in operation. The service was inaugurated at 141 offices, which had been des¬ ignated by the Postmaster-General in accord¬ ance with the authority conferred upon him by the money-order act. In making the selection of the new-fledged money-order offices, it was deemed expedient to designate first the larger post offices and then to extend the service to others as rapidly as possible. This method resulted in a register of 419 offices equipped for the transaction of money-order business at the end of the first year of operation.

Measures were early taken to extend the service to the army, and the fact that money- orders to the amount of $403,776.80 were drawn at the great centres of military operations dur¬ ing the first eight months of the system’s ex¬ istence is evidence of the extensive use to which it was put by the -soldiers in sending money to their families and friends.

For a number of years following the close of the Civil War, the government itself was a patron of the system. Money-orders

amounting to many thousands of dollars annually were

issued on the application of the War Depart¬ ment for the payment of claims for bounty and back pay due by the United States to colored soldiers for services during the war, the organ¬ ization of the money-order service rendering valuable assistance in insuring the proper pay¬ ment of the claims.

One of the means provided by the act ap¬ proved 13 June 1898 to meet expenditure caused by the Spanish War was the collection of a tax of two cents on each domestic order issued. The collections began 1 July 1898 and ceased 30 June 1901, by repeal of the law. During this period the system collected for and paid to tlje Internal Revenue Service $1,931,481.94, without any expense whatever to the Treasury Depart¬ ment and with practically none to the Post Office Department.

Aside from the ordinary service which it renders the citizen by affording him the practi¬ cal result of a checking account in making pur¬ chases and settling financial obligations by mail, the money-order service of the United States is now used by the foreign-born population to send money to relatives and to the postal-sav¬ ings banks in their own countries. Many per¬ sons in the past have found the money-order system a convenience for the temporary deposit of funds for safekeeping by having the order drawn on the office of issue and in their own names. The establishment of a postal-savings system in this country, however, served to re¬ duce the amount of money sent to postal-sav¬ ings banks abroad and to curtail the use of the money-order service for savings purposes.

The act of Congress establishing the money- order system limited the amount for which a single order could be issued to a maximum of $30 and a minimum of $1. It was stated by Postmaster-General William Dennison on 2 Nov. 1864, the day following the opening of the service, that (

The growth of the system and the con¬ tinuous simplification of business methods are reflected in the reductions that have been made

from time to time in the money-order fees, the principal source of

revenue from the business. It is a noteworthy fact that with few excep¬ tions the growing transactions of the system have permitted successive decreases in the charges to the public. These reductions were uniformly recommended to Congress whenever the receipts derived from the operation of the system were substantially greater than the ex¬ penses. The present low schedule is the re¬ sult of the extensive patronage of the system by the public and the progress that has been made in handling the business economically.

It was prophesied by Postmaster-General Dennison on 2 Nov. 1864 that —

“The establishment of the (money-order) system in this country will no doubt lead to arrangements for the inter¬ change of international money orders with the several foreign countries with which we have direct postal arrangements.”

This prediction was fulfilled on 27 July 1868 when the President signed an act authorizing the Postmaster-General to make conventions for exchange of orders with countries with which the Department had negotiated postal conventions. It was not until over a year later, however, that the first convention was con¬ cluded.

The service was initiated with Switzerland, pursuant to the terms of a convention signed at Washington on 2 July 1869 by the Post¬ master-General, under the authority given by the act of 27 July 1868 and at Berne on 26 July 1869 by the chief of the Federal Post Department of Switzerland. The new service commenced on 1 Sept. 1869, 150 post offices in this country being authorized to issue and pay the international orders.

Service was next established with Great Britain on 2 Oct. 1871. Germany and Canada were the next countries with which conven¬ tions were concluded. The service has gradu¬ ally been extended to other countries until at the present time conventions for the exchange of money orders exist with more than 50 foreign postal administrations.

The year 1880 saw important modifications in the terms of the original conventions with the United Kingdom of Great Britain and Ireland, the German empire and the Dominion of Canada. At the time the original conven¬ tions with these countries were concluded the value of United States currency was below par of gold and was continually fluctuating, which made it impossible for the issuing post¬ master to draw the order for a fixed sum in the money of the country

of payment and con¬ fined the actual exchange of orders between the respective countries to certain ˆinternational exchange offices.® The postmaster at the or¬ dinary international money-order office would draw on the exchange office and the latter would make the conversion from the money of one country to that of the other at the market rate of gold prevailing in New York. When the currency of this country became stable, therefore, a simplification of the mode of pro¬ cedure in the exchange of orders was made possible. Under the new method the post¬ master at the inland international money-order office was able to issue the order for a de¬ terminate amount by the use of conversion tables supplied him. The rate of commission to be paid by each postal administration ˆvas

lowered and the cost of the interchange of orders between the contracting countries was further reduced by the diminution of the num¬ ber and cost of the blanks and the amount of clerical labor required. These economies per-

$50 to $100 instead of two orders as theretofore. Following is a table showing the growth of the service from the time of its inauguration in 1864 to the close of the fiscal year which ended 30 June 1918:

FISCAL

YEAR

Number of money- order offices

Domestic money orders issued 1

International money orders issued in the United States 1 2 3

Number

Value

Number

Value

1865. . .

419

74,277

$1,360,122

52

1866 .

766

243^609

3,977,259

28

1867 .

1,224

474,496

9^229^327

72

1868 .

1,468

831,937

16j 197^858

47

1869 .

1,466

1, 264 j 143

24,848,058

93

1870 .

1 '694

1,671 |253

34,054,184

71

$22,189

70

1871 .

2 i 076

2 , 15 1 i 794

42|l64’ 118

03

38,489

56

1872 .

2,452

2,573,349

48'515i532

72

41,812

833 , 006

00

1873 .

2,775

3,3 55,686

57,516,214

69

91,847

1,863,512

37

1874 .

3,069

4,420,633

74,424,854

71

112,614

2,265,242

32

1875 .

3,404

5,006,323

77,431,251

58

102,250

1,964,574

88

1876 .

3,401

4,998,600

77,035,972

78

109,409

2,068,668

03

1877 .

3,697

4,925,931

72,820,509

70

104,816

1,844,053

98

1878 .

4,143

5,613,117

81,442,364

87

120,788

2,047,696

86

1879 .

4,512

6,372,243

88,254,541

02

137,088

2,240,454

95

1880 .

4,829

7,240,537

100,352,818

83

221,372

3,463,862

33

1881 .

5,163

7,663,232

105,075,769

35

291,098

4,683,926

38

1882 .

5,491

8,420,869

113,400,118

21

377,443

6,536,514

48

1883 .

5,927

8,807,556

117,329,406

31

466,326

7,717,832

11

1884 .

0,310

7,835,694

122,121,261

98

478,148

7,688,776

53

1885 .

7,056

7,725,893

117,858,921

27

448,921

6,840,358

47

1886 .

7,357

7,940,302

113,819,521

21

493,423

7,178,786

21

1887 .

7,853

9,232,177

117,462,660

89

615,405

9,035,530

31

1888 .

8,241

9,959,207

119,649,064

98

759,636

11,293,870

05

1889 .

8,727

10,130,140

115,081,845

79

824,427

12,280,516

67

1890 .

9,382

10,624,727

114,362,757

12

859,054

13,230,135

71

1891 .

10,070

11,451,274

119,122,236

50

923,896

14,443,667

47

1892 .

12,069

12,069,442

120,066,801

07

983,476

15,120,271

55

1893 .

18,434

13,309,735

127,576,433

65

1,055,999

16,341,837

86

1894 .

19,262

14,304,041

138,793,579

49

917,823

13,792,455

31

1895 .

19,691

22,031,120

156,709,089

77

909,278

12,906,485

67

1896 .

19,825

23,962,053

172,100,649

02

985 , 799

13,852,615

74

1897 .

20,031

25,169,055

174,482,676

94

944,185

13,588,379

33

1898 .

22,388

27,798,078

191,354,121

63

955,334

13,239,769

27

1899 .

26,784

29,007,870

211,213,592

84

968,501

13,744,770

37

1900 .

29,649

32,060,983

238,921,009

67

1,102,067

16,749,018

31

1901 .

30,529

35,586,379

274,546,067

34

1,247,888

20,072,613

65

1902 .

31,680

40,474,327

313,551,279

88

1,311,111

22,974,473

11

1903 .

34,547

46,229,354

357,851,458

32

1,626,476

31,014,125

14

1904 .

35,094

50,712,168

383,452,373

80

1,888,730

37,876,265

75

1905 .

36,832

53,722,463

401,916,214

78

2,163,098

42,503,246

57

1906 .

37,444

58,863,123

450,359,052

00

2,634,738

57,204,607

04

1907 .

37,572

62,530,408

486,478,146

65

3,179,511

77,252,907

05

1908 .

43,313

65,345,395

506,170,014

62

3,230,815

81,502,011

18

1909 .

50,043

69,304,395

498 ,.5 11, 747

14

3,175,014

69,317,899

97

1910 .

51,791

77,585,321

558,178,028

35

3,832,318

89,558,299

42

1911 .

51,809

81,906,206

590,034,432

52

4,060,431

97,681,211

85

1912 .

52,815

85,286,380

594,901,623

90

3,708,773

86,095,404

58

1913 .

54,594

91,412,698

636,814,179

46

3,850,310

90,703,205

12

1914 .

55,055

104,736,717

677,908,573

58

3,896,824

91,285,920

10

1915 .

55,670

105,728,032

665,249,087

81

2,399,836

51,662,120

65

1916 .

56,026

122,302,149

728,177,816

63

2,345,766

37,544,520

17

1917 .

56,170

133,291,973

822,679,622

83

2,798,465

32,284,182

85

1918 .

55,668

122,686.471

914,575,254

99

1,569,374

25,938,963

63

Postal notes issued 8

Number

Value

3.689,237

5,058,287

5,999,428

6,307,552

6,668,006

6,802,720

6,927,825

6,802,558

7,050,040

7,753,210

7,765,310

$7,411,992 48 9,996,274 37 11,718,010 05 11,768,824 81 12,134,459 04

12,082,190 73 •

12,160,489 60 11,753,849 28 11,895,765 51 12,903,076 73 12,649,094 55

1 Domestic money orders first issued, 1 Nov. 1864, under act of Congress approved 17 May 1864.

2 International money orders first issued, 1 Sept. 1869, under act of Congress of 27 July 1868.

3 Postal notes first issued, 3 Sept. 1883, under act of Congress approved 3 March 1883.

mitted the United States to lessen materially the fees charged for the issue of orders to the countries concerned.

In line with the increase in the maximum amount of domestic orders to $100, which was authorized on 3 March 1883 the limitation on international orders. was raised to a like amount by the act of Congress approved 30 Jan. 1889. Besides the advantage in uniformity between the two services that was gained by this legis¬ lation, the change tended to reduce the expense of the international system because only a single order was then required for sums from

International money-orders are of two kinds — those issued on what is known as the ((domestic basis® and the ˆinternational basis.® In the former class the orders are drawn on the ordinary domestic form and settlement is made between the two countries involved on the exchange of paid orders. In the latter class the orders issued in each country are recorded on descriptive lists at an exchange office designated for the pur¬ pose and accounts are settled on the basis of such lists, care being taken to give due credit to the country of origin for the amounts of

orders not presented for payment within one year from the time of issue.

Following are tables showing money-orders exchanged between the United States and for¬ eign countries during the fiscal year ended 30 June 1918:

Countries having postal money-order sys¬ tems arrange themselves into two general groups :

1. The United States, Great Britain, her colonies, protectorates and dependencies, com¬ prising Canada, the Commonwealth of Aus-

Domestic Basis.

COUNTRIES

United States domestic orders paid in foreign countries

Foreign domestic orders paid in the United States

Number

Value

Number

Value

Antigua .

1,519

$17,676 10

689

$3,882 45

Bahamas .

996

13,514 76

2,375

15,542 48

Barbados .

24,345

298,679 55

1,949

24,355 79

Bermuda .

1,748

22,705 13

2,494

19,415 93

British Guiana .

2,420

28,328 46

4,202

28,072 64

British Honduras .

187

2,119 68

5,999

51,298 19

Canada .

549,418

7,684,738 36

1,637,758

17,020,944 52

Canal Zone .

11,850

241,512 29

126,711

2,021,712 75

Cuba .

21,859

405,854 43

116,090

1,438,047 80

Dominica .

354

4,506 92

374

2,785 39

Grenada .

1,707

28,450 50

795

4,932 35

Jamaica .

32 , 760

357,565 63

2,689

40,170 95

Martinique .

84

1,138 45

132

8,001 40

Mexico .

18

1,633 00

Montserrat .

936

12,231 04

157

2,685 91

Nevis .

642

8,181 46

132

608 10

Newfoundland .

8,793

235,664 71

14,785

219,693 78

Philippine Islands .

13,955

430,629 84

60,494

1,054,087 03

Saint Kitts .

1,667

34,905 54

316

2,539 09

Saint Lucia .

756

8,836 06

994

21,011 92

Saint Vincent .

1,854

29,190 65

357

3,103 33

Trinidad .

4,095

58,489 21

4,131

28,629 19

Virgin Islands .

79

817 07

152

5,707 47

Total .

682,024

$9,925,735 84

1,983,793

$22,018,861 46

Excess paid in foreign countries

$13,793 65

274ˆ323 76

3,289 20 255 82

1,721 53 23,518 15 317,394 68

9,545 13 7,573 36 15,970 93

32 i 366 45

26ˆ087 32

29,860 02

$755,700 00

Excess paid in the United States

$2,027 72

49,178 51 9,336,206 16 1,780,200 46 1,032,193 37

6,862 95 1,633 00

623,457 19

i 2 [i 7 5 86

4,890 40

$12,848,825 62

International Basis.

COUNTRIES

International orders certified for payment in foreign coun¬ tries

International orders certified for payment in the United States

Excess certified by the United States

Excess certified by foreign countries

Number

Value

Number

Value

Australia .

6,744

$138,036 14

20,670

$273,697 09

$135,660 95

Austria. (n n business’) .

Belgium (no business! .

Bolivia .

45

671 12

397

3,434 17

2,763 05

Chile .

850

22,490 45

2,360

18,731 99

$3,758 46

Costa Rica .

350

6,120 67

343

2,938 48

3,182 19

Denmark .

24,487

404,072 69

2,609

66,855 16

337,217 53

Egypt ("no business!

France .

93,417

952,436 84

10,931

183,238 69

769,198 15

Great. Britain .

794,107

9,652,443 59

112,191

2,067,879 12

7,584,564 47

Germany Cnn business!

Greece .

5

373 04

04

373 00

Honduras .

59

1,024 63

17

172 17

852 46

Hongkong .

2,333

80,281 21

2,539

8,960 35

71,320 86

Hungary .

27

299 20

299 20

Italy .

275,585

5,400,923 28

1,708

26,268 35

5,374,654 93

Japan .

128,013

4,091,486 50

12,205

198,515 53

3,892,970 97

Liberia .

91

3,533 66

96

2,209 65

1,324 01

T.iiyemhurp .

3

23 99

1

26 51

2 52

Mexico .

4,707

124,986 77

913

12,515 61

112,471 16

Netherlands .

22,536

273,703 95

3,995

51,514 65

222,189 30

TSIpw ˆpalanH

2,101

50,705 53

16,859

408,957 90

358,252 37

N nr wa v .

65 , 208

1,475,796 77

3 i 597

91,709 66

1,384,087 11

510

16,419 68

16,419 68

Pn-rtiicral (nn

PiiQˆfa .

2,887

38,928 42

38,928 42

Salvador .

54

1,515 01

287

1,535 18

20 17

Swpdpn .

137,154

2,369,781 25

5,181

272,206 75

2,097,574 50

Swit.zprland .

36,389

717,616 29

2,681

59,684 26

657,932 03

1,426

28,680 65

4,618

59,464 88

30,784 23

Uruguay .

84

2,493 23

213

1,648 76

844 47

Total, international basis

1,599,172

$25,854,844 56

204,411

$3,812,164 95

$22,570,162 90

$527,483 29

436

POSTAL SAVINGS BANKS — POSTER ART

tralia, the Union of South Africa, Egypt and Hongkong.

2. The countries of Continental Europe — Austria, Belgium, Denmark, Germany, Greece, Hungary, Italy, Luxemburg, Netherlands, Nor¬ way,

Russia, Sweden and Switzerland.

The general distinction between the two groups is that the countries named in the first (excepting the United States) rely upon an advice to facilitate and safeguard payment; those in the second use a card order sent in open mail by the issuing to the paying post¬ master. In the first case, the intending remitter must file with the proper amount for order and fee a written application containing the full particulars of the remittance — amount, name and address of sender and of payee, from which the postmaster prepares the order, which is then handed to the applicant to be mailed at his own expense to the payee.

Card orders are printed on thin boards and supplied to applicants free or at a merely nomi¬ nal charge. The remitter fills in the required spaces on the card and hands it with the needed sum to the postmaster. Postage stamps repre¬ senting the amount of the fˆe are affixed to the card, which is then numbered, signed, stamped and mailed by the postmaster. No written application is required from the re¬ mitter who receives, however, for his protec¬ tion, a coupon receipt corresponding to the order. (The foregoing statements refer par¬ ticularly to Germany, but are believed to apply equally to the other countries named in the same class). When it reaches the office of de¬ livery, the order is given to a letter carrier, who calls at the designated address, pavs the amount to the payee and obtains the latter's signature to a form of receipt on the back of the card, which is then returned to the post¬ master at the office of payment.

France uses both forms of money-order and is in a class by herself.

As a separate feature or adjunct of the money-order systems, many countries issue postal orders or notes for small sums, limiting the amount to the equivalent of $5 or $10. The notes of Great Britain and Canada are printed in fixed denominations from 6 pence to 21 shillings in the one case and from 20 cents to $10 in the other. Twenty-two separate pieces are needed to complete a set of British notes and 18 of the Canadian. Intermediate amounts may be represented by canceled postage stamps affixed to the notes.

In the French service, it is understood, frac¬ tions being excluded, the amounts are expressed in writing, from one franc to 20 francs.

In effect, card orders and postal notes are money-orders without advices, issued by the postmaster with the minimum expenditure of time and labor consistent with a reasonable degree of safety. As already explained, postal notes are for small amounts only and, as

might be expected, greatly outnumber the issues of money-orders.

Alexander M. Dockery, Third Assistant Postmaster-General.

POSTAL SAVINGS BANKS. See Banks

and Banking — Postal Savings Banks.

POSTAL SAVINGS SYSTEM. The

Postmaster-General's Annual Report for the fiscal year ending 30 June 1918 registered an

increase during the 12 months of $16,516,803, at 6,678 depositories ; the depositors numbering 612,188 and the total deposits amounting to $148,471,499, an average of $242.53 per de¬ positor. Congress further amended the Postal Savings Act by increasing the amount that a depositor may have to his credit from $1,000 to $2,500, which largely accounted for the in¬ crease. The amendment also eliminated the 10-cent savings card, provided for in the orig¬ inal Postal Savings Act as one of the means of evidencing small deposits and stipulated that hereafter a card with 10 (instead of 9) sav¬ ings stamps affixed shall be accepted as a de¬ posit of $1, either in opening an account or in adding to an existing account or may be re¬ deemed in cash, the card provided for by the new legislation being furnished free of charge. By eliminating the savings card as a means of evidencing deposits, the accounting made neces¬ sary by the maintenance of both the card and the stamp was reduced by one-half.

The system is self-supporting. The profit in 1918 amounted to $1,135,288.61. At the close of the year $3,963,440 of postal savings funds were invested in the postal savings bonds au¬ thorized by the Postal-Savings Act. The board also purchased for investment $14,000,000 third Liberty Loan bonds.

POSTAL UNION, The. See Post and

Postage.

POSTER ART. Posters are a modern

field for the artist, having been developed within the last 50 years, along with advertising art. They are usually conventional in form and any degree of exaggeration is permissible, if it at¬ tracts attention. The earliest example of the poster dates back to the days of Pompeian splendor. During the Middle Ages managers of theatres and officers

recruiting for the army used pictorial advertisements. From these pictures, Jules Cheret of Paris (b. 1836), called the father of the modern poster, is said to have received his first suggestion of the possibility of adopting art to latter-day advertising. One of his first efforts was an announcement of a fairy play, °La Biche au BoisP in which Sarah Bernhardt was acting in 1867. Cheret's prin¬ ciples were conventionality, elimination of de¬ tail, arrangement and pure color. For a long time he was almost alone in his efforts and did not attain to the pre-eminence that has come in more recent years.

In order to produce a good advertising placard it must command the attention of the public. It should be attractive to the man in the street without being vulgar ; sufficiently startling, but not aggressively so. Jules Cheret understood the requisites and limitations of this kind of art better than any other of his time and his work gained for him a world-wide reputation. He can justly lay claim to founding a new school. He has defined his idea of a perfect poster as follows: (

not likely to go out of fashion as long as the poster is to be in use. I always make a point of designing the lettering of the actual advertisements. I do not believe in black and white letters, but have no objection to their being very dark blue, red or violet; this produces the effect of lack without giving a jarring note.®

Close rivals to Cherqi are Grasset and Stein- len and by some critics the two are considered to be in many respects superior to the -master. Eugene Grasset, a native of Switzerland, is a decorator and architect by profession. His work is characterized by a vital principle of design, effective yet subdued. His Napoleon and Jeanne d'Arc (Bernhardt) posters are superb creations. Grasset' s work is always re¬ fined and harmonious, yet less bright and strik¬ ing than Cheret's. There is more repose and it appeals more to the artist than to the public. The poster of the Salon des Cent in its tender¬ ness, its exquisite lines and its spirituality, is worthy of Rossetti.

Of the other French artists De Feure, Guil¬ laume, Ibels, 'Lautrec, Boutet de Monvel, Stein- len, Willette and Jossot are perhaps the most accomplished. Bossot is a great artist, es¬ sentially a caricaturist, who works with vaga¬ bond and artistic lines and in a morbid color-scheme — rusty greens and pale yellows. Stein- len is every way a charming artist. His ((Lait Pur Sterilise,® a child in a red dress

drinking from a bowl, envied by three eager tabby cats, is perhaps one of the most attractive posters ever made. Lautrec has not the refinement of Grasset, not the sprightliness of Cheret, yet he possesses an individuality which makes his work peculiarly interesting. His posters are gen¬ erally simple in composition and depend to a great extent for their effectiveness on the skil¬ ful arrangement of masses. Ibels is remark¬ ably clever in drawings that are inimitably and effectively grotesque. Aristide Bruant has done some things that are strikingly forcible in their broad masses of color. In Great Britain, Audrey Beardsley and Walter Crane were early ex¬ perts in the new art. They have been worthily followed by Gordon 'Craig, Will Owen, Hardy, Simpson, Bell and others.

In the United States the modern poster artists include Louis J. Rhead, Will H. Bradley, Kenyon Cox, W. H. Carqueville, Edward Pen- field, Ethel Reed, A. Friedler, Walter Fawcett, Max Parrish, Hy Mayer, Hamilton King, Clar¬ ence Tilt, E. Haskell, etc. The war brought forth a great demand for inspiring patriotic posters and many new men entered the ranks. By long odds the most successful of these war posters was a picture of a Red Cross nurse with a miniature wounded soldier in her arms and the inscription (

POSTING, in Europe, traveling by means of horses hired at different stations on the line of journey. Such a system appears to have been established by private enterprise on some of the main routes in England, at least as early as the reign of Edward II. It was afterward made a government monopoly. As letters were originally forwarded in the same manner, the name of post office has come to be applied to the institution charging itself with conveyance and delivering of letters, The custom still ob¬

tains in certain parts of the world where the railway has not penetrated.

POSTMAN POET, The. See Capern, Edward.

POSTMASTERS, National Association

of, an organization formed in Detroit, Mich., in 1898, taking in first and second-class post¬ masters and higher postal officials. They aim to improve the postal service by an exchange of information. In 1917 the president was D. T. Gerow of Jacksonville, Fla., and the secretary, W. C. Markham of Baldwin City. Kan.

POSTULANT, the canonical term for one who desires to take holy

orders in the Pro¬ testant Episcopal Church of America and whose name has been entered by the bishop upon a list of postulants, as required by Canon 2, Title 1 of the Digest. A postulant may in due course be recommended, by the Standing Committee of the diocese, to the bishop for admission as a candidate for holy orders. The term is applied in the Roman Catholic Church to those on probation befcjre entering a religious order. It is a preliminary stage for the novitiate and existed in the early days of monasticism. With modern decrees the postulant has to wait from three months to two years or more, usually in the novitiate's house.

POSTULATES, or axioms, are sets of propositions belonging to mathematical dis¬ ciplines from which the remaining propositions can be deduced. Thus the axioms of Euclid constitute a tentative set of postulates for ordi¬ nary geometry. The old-fashioned view was that these axioms constitute a set of self- evident truths, referring only to one system, that of the space in which we live. The work of Bolyai, Lobachevski and Riemann, however (see Geometry, Non- Euclidean), cast grave doubts on the self-evidence of these proposi¬ tions, and led to the more modern attitude, according to which the axioms are merely hy¬ potheses concerning space. As far as the mathe¬ matician makes use of the axioms it is a matter of entire indifference whether they concern space or not; in other words, strictly speaking, postulates are not propositions concerning a definite subject matter at all, but are merely forms of such propositions. Once this view is accepted it becomes easy to see that sets of postulates can be formulated for systems as unlike ordinary geometry or any ordinary mathematical system as you please, and that these sets will have just as much intrinsic, un¬ derived right to exist as that of Euclid. This has led to a large number of sets of postulates for various mathematical systems, such as non- Euclidean geometry, line geometry, analysis situs, algebra, the theory of functions of a real variable, quaternions, symbolic logic, etc. (qq.v.).

Furthermore, various sets of Postulates can be formed' for the same system. Thus, one can describe all the entities of geometry in terms of points and their distance-relations, or in terms of spheres and their relations of inclu¬ sion. Accordingly there are at least two possi¬ ble sets of propositions characterizing the properties of geometrical entities, or, in other words, two sets of postulates for geometry. Furthermore, it is possible to define all geo¬ metrical properties in terms of the same entities

by different sets of postulates. As a conse¬ quence of these facts it becomes a desideratum to determine those sets of postulates which are in some sense the most practical or simple. The criteria of simplicity usually employed are (a) the independence of the postulates — no set of the postulates must imply another; (b) their fewness in number. Independence of the pos¬ tulates is demonstrated by the exhibition of systems which fail to satisfy but one of the postulates, this postulate being each in turn. E. K. Moore of Chicago discusses a strength¬ ened form of independence, in which not only are the postulates independent of one another, but no postulate or its denial is dependent on any combination of the other postulates or their denials. Many mathematicians, however, con¬ sider this a rather unnecessary refinement. As to the fewness of the postulates, for some pur¬ poses of analysis the opposite extreme seems desirable as indicating a greater degree of analysis. However, no realty unequivocal definition of the number of distinct postulates in a set has yet been given.

Besides these properties of postulates that are more or less independent of the systems they define, there are others which are bound! up with the latter. In the first place,, though a set of postulates always . defines a class of mathematical systems, this may be the null class (see Logic, Symbolic). In that case the postulates are called inconsistent, otherwise they are consistent. The consistency of a set of postulates is demonstrated by the exhibition of a system which satisfies them. For all ordi¬ nary purposes the exhibition of a system formed from the natural numbers is regarded as sufficient. The policy of producing such a system in the case of all mathematical systems is called the arithmetization of mathematics.

Another desideratum of a set of postulates is that the systems they define be one from the mathematical standpoint — that is, that the set be categorical. A categorical set has the prop¬ erty that a one-one correspondence can be set up between any two systems which it defines; and that this correspondence will leave their structure invariant.

There is one set of postulates whose position in the theory is unique. This is the set of pos¬ tulates for symbolic logic (q.v.). Symbolic or mathematical logic consists in the criteria and methods of logical and mathematical reasoning in all fields. It is consequently in essence an individual system, not a type of systems. Con¬ sequently, if it can be treated by the postulate method at all, its postulates are genuine indi¬ vidual propositions, and not propositional forms. It is by no means

obvious that any finite set of postulates will suffice for symbolic logic, and the attempt of Whitehead and Russell to find such a set breaks down in certain de¬ tails, yet is sufficiently close to complete suc¬ cess to give promise of even better results in the future.

In the course of any attempt to formulate postulates for logic, two propositions appear which are not indispensable for the develop¬ ment of the simpler and many of the more com¬ plicated propositions in logic, and mathematics, but are continually involved in many processes of reasoning that were formerly accepted with¬ out question. There are the proposition that

there are an infinite number of things in the world, and the proposition that given an aggre¬ gate A of aggregates B, some aggregate C exists containing one member of each of the B's, and only one. This latter is essentially due to Zer- melo. See Assemblages, General Theory of.

There is no book devoted to postulate- theory at large, although almost any of the mathematical works of the writers already named or of Huntington, Veblen, Sheffer, Peano, Vailati or of many other writers of the last quarter century approach mathematical problems with this attitude in mind. By far the largest part of the literature is contained in the American Journal of Mathematics, the Transactions of the American Mathematical Society and the Annals of Mathematics for the past 15 years. For the postulates of logic consult A. N. Whitehead and B. Russell, (Prin- cipia Mathematica) (1910—) .

Consult the various articles on mathematical disciples for their peculiar postulates, and see especially Logic, Symbolic ; Assemblages, Gen¬ eral Theory of.

Norbert Wiener.

POSTULATION, in canon law, an appeal to a competent authority to remove a disability by which one who has been appointed to a benefice is prevented from entering upon it. The term was also applied to the method by which a bishop was translated. The canon law declared! that a person once elected to one see could not be elected to another; and when an electoral college desired the bishop of another see to occupy their own, they petitioned the bishop to make the change. No postulation could be made unless the electoral college were unanimous, while in the case of an election a majority was sufficient.

POT-HOLES. Cylindrical holes in rock ledges usually in or near beds of streams. They are caused by the wearing action of sand and pebbles whirled by the water. They have been called giant kettles, giant caldrons, In¬ dian kettles, wells and the Spanish name, re- molionos. Their size and character vary greatly, many of the larger ones being 10 feet in diameter and 25 feet deep. One in Saint Croix, Dallas, Wis., is 27 feet in diameter, another with diam¬ eter of 15 feet! is 65 feet deep, and one 12 feet in diameter is 160 feet deep. The pot-holes of the <(Glacial Gardens® of Lucerne in Switzer¬ land are famous. In some cases, notably on Kickinghorse River, near Field, British Colum¬ bia, a small natural bridge has resulted from the coalescence of the lower parts of two or more pot-holes. The canyon at Watkins Glen, N. Y., consists partly of coalescing pot-holes. Pot-holes develop only in streams that are eroding in fairly well consolidated rock. They evolve from small hollows due to solution, removal of a lense or pebble or a joint-crack. Such hollows are necessary to hold the first few pebbles which begin the grinding. Too much sediment stops the process, but otherwise flood stages of the stream greatly facilitate the erosion. The nature and jointing of the rock and declivity and volume of the stream are im¬ portant factors. Many holes, ˆmoulins,® are of glacial origin, not caused by the ice, however, but by water falling over the edge of the ice or into holes extending to the rock floor. Ir-

regular pot-holes or basins also occur along the coast, scoured out by tidal or other currents. Plunge pools are frequent at the foot of water falls and a notable one on the Canadian side of Niagara Falls according to J. W. Spencer is 72 feet deep. Small pits due to swirling of hard parts of sea urchins have been observed on sea coast in New Brunswick and at Biar¬ ritz, France. Consult article by E. D. Elson (in Scientific Monthly, Vol. V, pp. 554-567; Vol. VI, pp. 37-51, 1917-18) ; Gilbert, G. K„ (Bulletin, Geological Society of America* (Vol. XVII, pp. 317-370, 1906) ; Upham, W. (ib., Vol. XII, pp. 25ˆ44, 1900).

Nelson H. Darton.

POTAMIAN, po'ta-my'an, Brother (Mi¬ chael Francis O'Reilly), American physicist: b. County Cavan, Ireland, 29 Sept. 1847; d. New York, 20 Jan. 1917. He was educated in the public and Christian Brothers schools, New York City, London University, and the Chris¬ tian Brothers Scholasticate, Montreal, Canada. In 1859 he entered the Order of the Christian Brothers; taught successively at Quebec and

Saint Louis, Mo., professor at Saint Joseph's College, London, from 1870 to 1893, and pro¬ fessor of mathematics and experimental phy¬ sics at De La Salle Normal College, Waterford, Ireland, in 1893-96, and from 1896 to 1917 pro¬ fessor of physics at Manhattan College, New York City. In 1893 he was appointed by the British government a member of the jury of awards at the World's Columbian Exposition, Chicago. His writings include (Gleanings in Electrical History) ; (Franklin and De Romas, or the Lightning Kite1* ; (Gilbert of Colchester1* ; (The Rotation of the Earth.1* He was joint author of (Electric Illumination* (2 vols.) ; (Letter of Peregrinus on the Magnet* ; (The Makers of Electricity* ; (The Makers of As¬ tronomy* ; and Catalogue of the Wheeler Gift* or a brief illustrated account of works on elec¬ tricity and magnetism from the earliest times . to the middle of the 19th century.

POTAMOGALE, the generic name of a strange West African animal (P . velox), which might be called the insectivorous otter. It is a true insectivore, representing the family Pot- amogalidce, is somewhat larger than a stoat, perhaps two feet long being an average, and the appearance and habits are like those of an otter, save that it is not certain that it subsists on fish. A related smaller potamogale (Geo- gale anrita) inhabits the valleys of Madagascar.

POTASH, originally a vegetable alkali (so- called), obtained by leaching wood-ashes, evap¬ orating and calcining, commonly called car¬ bonate of potash or pearl-ash, K2C03. Soda and potash were not distinguished by old-time chemists, but in 1807 Davy separated them. Various plants take up potash salts, and the refuse of beet-roots has been utilized as a source of potash. After the electrolytic pro¬ duction by Davy and others, it came to be understood that a metallic element was being dealt with and potassium (q.v.) was developed.

Commercial Potash. — Previous to the outbreak of the World War nearly the whole potash supply of the United States market was imported from Germany. A glance at the im¬ portations of 1913 shows the various forms in which the potash came in and the amounts

consumed normally by the industries of the country. The figures are as follows : Kainit, 521,176 tons; manure salts, 250,529 tons; muri¬ ate of potash, 237,630 tons ; sulphate of potash, 44,349 tons; argol or bitartrate of potash (mainly from France and Italy), 14,499 tons; carbonate of potash, 11,003 tons; nitrate of potash, 4,826 tons; ferrocyanide of potash, 1,706 tons ; and much smaller quanties of other potash salts — cyanide, chlorate, permanganate, etc., a grand total of 1,092,588 short tons, having a con¬ tent of actual potash

amounting to 270,720 tons and valued at $18,073,865. Beside these, the figures of the imports of potash for 1917 indi¬ cate the remarkable change of conditions and values — 8,100 tons, valued at $7,788,406.

Although the world's supply of commercial potash had come almost wholly from mines in Germany and Austria, it was a matter of com¬ mon knowledge to geologists everywhere that potash occurs very extensively in nature, being a component of granites and most other igneous rocks, and occurring in smaller amounts in the various sedimentary strata and soils. It is esti¬ mated to form 3 per cent of the earth's crust. In the dry saline matter from evaporated river waters there is generally about 2 per cent of K20 (potassium oxide) and in the ocean from 1 to 2 per cent. Where these waters evaporate and the other saline components crystallize out, the potash accumulates in the remaining solu¬ tion so that on the evaporation of the final <(pan** the proportion of K20 may be high. There are deposits of this kind in various lake basins, both recent and of various older geo¬ logic periods. Alunite, a hydrous notassium- aluminum sulphate (K20.3A1203.4S03.6H20.), contains when pure 11.4 per cent of K20 which is made soluble by roasting.

The orthoclase feldspars which are of wide¬ spread occurrence in granite and gneiss contain from 16.8 per cent of K20 in combination with silicic acid and some processes for separating this ingredient appear to be commercially prac¬ ticable, especially when the residue can be util¬ ized for making brick. Some of the younger igneous rocks contain much potash notably the rhyolites, trachytes and phonolites, some of which carry 8 per cent. The mineral leucite KAlShOo contains a large amount of K20, the rock in Leucite Hills, Sweetwater County, Wyo., carrying from 9 to 11 per cent of potash. Sericite or altered mica schist in the southern Appalachians carries 10 per cent or more. Glauconite or greensand, which occurs in beds, notably in southern New Jersey, Maryland and Virginia, Kentucky, Tennessee and Georgia, contains up to 9 per cent, and in some cases 11 per cent of K20 in form of silicate. These deposits are from five to 20 feet thick and easily worked. These various silicates are ex¬ ceedingly difficult to resolve, but heat and ad¬ mixture with lime and other agents liberates most of the potash.

The largest known potash deposits exist in the Permian in central Germany, the Oligocene in Alsace, the lower Miocene in Galicia, in the early Tertiary near Sauria in northeastern Spain and in beds of unknown age in India. They are associated with the great deposits of common salt, dolomite and gypsum such as occur in the Permian beds

of the central United States, and it is hoped that domestic supplies may be de-

rived from these beds. The potash deposits in central Germany have been very extensively de¬ veloped by numerous mines, some of great depth. The annual production under ordinary conditions is about 7,000,000 metric tons valued at more than $30,000,000 and sold at a profit of about $4,000,000. The potash occurs in various compounds, the principal one being Kainite, $MgSO_4.KCl.3H_2O$, which is in the midst of a 3,500 foot succession of common salt and an¬ hydrite, the products of long-continued desicca¬ tion of a water body. The potash salt was deposited at or near the end of one stage of desiccation, but there was a later incursion of waters from which finally there were deposited anhydrite and common salt. Fortunately a thin overlying sheet of clay was deposited which protected the potash from solution by the water which brought the anhydrite and salt now covering the potash.

The larger percentage of potash consumed by the world is used in commercial fertilizers, although considerable is made into chemi¬ cals for the arts and medicine and for explo¬ sives. In the latter case, however, it is not as important as it was formerly, as the high explosives do not contain it. Potash is essential to plant growth and in agriculture is rapidly depleted from the soil, and must be returned in fertilizers. It also has an important stimulating effect on soils naturally deficient in this com¬ ponent. The production of potash-bearing ma¬ terial in the United States in 1917 was 126,961 short tons, containing an average of 26.4 per cent of K_2O, an equivalent of 32,573 short tons of potash; that is, 13.6 per cent of the normal consumption of the United States. This pro¬ duction was three times the amount produced in 1916 and 30 times the amount in 1915. Dur¬ ing the war the price rose from the normal rate of 50 to 75 cents a unit to about eight times as much. The average for 1917 was $4.26 per unit or a total of $13,791,922. The unit is 1 per cent K_2O per ton. The production in 1917 is shown in table below.

About 63 per cent of the total output was produced from brines in lakes, mainly from those in the Sand Hill district of western Nebraska and from Searles Lake in California. From the Nebraska lakes a total of 61,053 tons of crude potash material was marketed in 1917 ; equivalent to 14,588 tons of pure potash. The residue resulting from

the burning of kelp, the great sea weeds on the Pacific Coast, is a potential source, but as the raw material con¬ tains 90 per cent of water the expense of handling and drying it is great. The char or

clinker carries from 20 to 30 per cent of K20 and valuable by-products, including iodine, help defray the otherwise prohibitive cost of treat¬ ment. Charred molasses residue at alcohol dis¬ tilleries yields considerable potash, while waste liquor from one of the beet sugar processes is a minor source. Potash is extracted from the mineral alunite mined near Marysvale, Utah, the potassium sulphate being made soluble by calcining. Flue dust from cement mills is an important source, with constantly increasing product as mills utilize more material rich in potash and make provision to catch flue dust. The dust is leached and a high grade potassium sulphate is obtained by evaporation. In 1917 eight mills produced a total of 1,621 tons of actual potash. A very large amount of potash is given off as vapor in fumes from blast fur¬ naces, but no provision is made to collect this material. The present small output (1917) re¬ ported from three steel companies was recovered from the dust which collected in flues and stoves. The loss of potash in the furnace gases is not less than 22 pounds for each ton of iron produced. It is believed that if the large furnaces installed suitable flues the sup¬ ply would be sufficient for all domestic demands and at very low cost. A constantly increasing supply is derived from the old-fashioned source of leaching wood ashes. Considerable potash is extracted from the crude Chilian nitrate of soda. See Potassium.

In 1918 production increased to 192,587 tons of products, containing 52,135 short tons of K20. The producing capacity of American potash plants at end of 1918, classified according to sources of raw materials, is estimated roughly as follows :

Capacity of American Potash Plants.

Available

potash

(K20)

SOURCE (tons)

Natural brines:

Nebraska lakes . 50 , 000

Other sources . 28 , 000

Alunite . 4 , 000

Dust from cement mills . 3 , 500

Kelp . . . 5,500

Molasses distillery waste . 4 , 000

Steffens waste water . 3 , 000

Wood ashes . 1 , 000

Other sources . 1 ,000

100,000

This quantity is about 40 per cent of our ordi¬ nary consumption in pre-war times and the out¬ put that may be maintained if the demand con-

SOURCES

Number of producers

Mineral sources:

Natural brines .

Alunite (refined salts and crude and roasted alunite) .

Dust from cement mills .

Dust from blast furnaces .

Organic sources:

Kelp . _ . .

Molasses residue from distilleries .

Wood ashes .

Evaporated Steffens Water from sugar refineries .

Evaporated wool washings and miscellaneous industrial wastes

10

3

8

3

10

4 36

5 3

Total

production

Available potash (K2O)

Value at point of shipment

Short tons

Short tons

79,876

20,652

$8,219,912

7,153

2,402

892 , 763

13,582

1,621

700,523

2,133

185

68,841

11,306

3,572

2,114,815

8,589

2,846

1,130,907

700

424

406 , 856

*2 , 593

359

1 43 , 430

645

305

113,875

- Includes 1,333 tons of material produced but not sold in 1917.

tinucs and the industry is not crippled by for¬ eign competition.

Nelson H. Darton, United States Geological Survey.

POTASH FERTILIZERS. See Fertil¬ izers.

POTASH PRODUCTION IN THE UNITED STATES. See Fertilizers; Potash.

POTASSIUM (from (

Potassium is a lustrous, silvery-white metal, brittle at 32° F., but soft and wax-like at ordi¬ nary temperatures, so that it can be easily cut with a knife. It melts at about 144° F., and boils at about 1,250° F. (when heated in an at¬ mosphere of hydrogen), its vapor being green. It has a specific gravity of about 0.87 and, with the exception of lithium, is the lightest metal known. Its specific heat is 0.166 and its coeffi¬ cient of linear expansion (Fahrenheit scale) is about 0.0000467. It conducts electricity much better than mercury, does and it is soluble in anhydrous liquid ammonia (NH3), forming a blue solution from which metallic potassium is again deposited upon the evaporation of the ammonia.

Chemically, potassium has the symbol K (from kalium, Latin for potash), and the atomic weight 39.15. It oxidizes in the air with

great readiness, a freshly cut surface becoming almost instantly covered with a film of oxide. It also decomposes water vigorously, uniting with it to form potassium hydrate, KOH, in accordance with the equation

k + h2o = koh + h,

hydrogen gas being liberated at the same time. When potassium is thrown upon the surface of water it floats and the heat gen¬ erated by the chemical action is sufficient to set fire to the liberated hydrogen and to part of the potassium. This experiment is a favorite one in the lecture room, since it is beautiful as well as instructive, the flame having the purple color that is used in the laboratory as a test for the presence of volatile potassium salts. (See Blowpipe Analysis). Potassium never occurs in nature in the free 'State, but it forms an es¬ sential constituent of many minerals, among the most important of which are feldspar, nitre and carnallite. Chloride and sulphate of potas¬ sium are found in sea water and various springs. It also occurs in the animal body and in plants and in remote country districts its carbonate is still prepared (chiefly for the manufacture of soap) by leaching wood ashes. (See Potash). Wool yields an organic potas¬ sium salt, which may be washed out from the natural grease or suint.

Troast and Heutefeuille's experiments show that when potassium is heated to over 200° C. it occludes hydrogen gas. In a vacuum, when diluted with hydrogen, the compound will lose hydrogen above 200° C., down to a certain point.

The potassium compounds are exceedingly numerous and many of them are of great im¬ portance both in the laboratory and in the arts.

Two oxides of the metal are certainly known and others probably exist also. Potassium monoxide, K20, which is the oxide that is understood when <(potassium oxide® is mentioned without qualifi¬ cation, is formed when thin slices of the metal are allowed to oxidize in cool, dry air. It may be prepared more readily on the large scale by heating potassium just to its melting point and then leading over it a stream of air that has been dried and freed from carbon dioxide. The monoxide is a gray, brittle substance, which has a specific gravity of 2.66 and melts at a strong red heat. It has a powerful affinity for water, with which it combines with the evolution of much heat, to form potassium hydrate, KOH. Potassium tetroxide (or peroxide) is formed when potassium is burned in a stream of pure, dry oxygen. It has the formula K2O4, and is a yellowish substance at ordinary temperatures, melting, at a red heat, to a black liquid, which crystallize_s upon cooling. The tetroxide com¬ bines with water to form potassium hydrate and peroxide of hydrogen, oxygen being also set free at the same time. When heated to a white heat, the peroxide gives off oxygen and becomes reduced to the monoxid.

Potassium chloride, KC1, occurs native in large quantities at Stassfurt, Germany, chiefly in combination with magnesium chloride, with which it forms the mineral ((carnallite,® KCl.MgCk + 6H2O. Most of the commercial supply of potassium chloride is now prepared from this mineral by crystallizing its solution. In order to obtain a satisfactory product, how¬ ever, many practical details must be carefully

attended to, for which reference must be made to advanced works on inorganic chemistry and to treatises on alkali manufacture. Potassium chloride is very similar in its general properties to sodium chloride (common salt). It has a saline taste, is white in color and crystallizes in cubes. Its specific gravity is 1.94 and it melts at about 1,350° F. Potassium chloride is now extensively used as a source of potassium in the preparation of other salts of that metal.

Potassium nitrate or <(nitre® (q.v.), KNOa, occurs native, but the greater part of the com¬ mercial supply is now manufactured by acting upon the cheaper nitrate of sodium (NaNOa) by means of potassium chloride; the reaction being as indicated by the equation

NaNOa + KC1 = KNOa + NaCl.

Potassium forms two carbonates, known re¬ spectively as the ˆnormal® carbonate and the <(acid® carbonate. Normal potassium carbonate, KiCOa, may be obtained in an impure state by leaching wood ashes and evaporating the. result¬ ing solution to dryness. The residue is then strongly heated to destroy any organic matter that it may contain and is subsequently re¬ dissolved and redeposited by evaporation. The crude product as obtained from wood ashes is known as ((pearl-ash® or often simply as <(potash.® Pure normal potassium carbonate is best prepared by heating ordinary mono¬ tartrate of potassium (see below), which is thereby resolved into a mixture of free carbon and potassium carbonate, from which the latter salt may be obtained by solution, filtration and subsequent evaporation. Acid potassium car¬ bonate has the formula HKCO3, and may be prepared by passing carbon dioxide over the normal carbonate or through its concentrated solution in water; the reaction being as indi¬ cated by the equation

KaCOa + C02 + H20 = 2HKCO*.

The greater part of the commercial supply of normal potassium carbonate is now prepared by a method similar to the Leblanc process for the preparation of carbonate of sodium. (See Sodium). Normal carbonate of potassium is quite strongly alkaline and is deliquescent and very readily soluble in water. It is used in the manufacture of soap and as a raw material in the manufacture of various compounds of po¬ tassium. The acid carbonate is much less soluble than the normal salt and its solution is nearly neutral to litmus paper.

Potassium hydrate, potassium hydroxide or ˆcaustic potash,® KOH, is formed when me¬ tallic potassium is dissolved in water ; but the commercial supply is obtained either by the electrolysis of a solution of a potassium salt or by acting upon a solution of normal potas¬ sium carbonate by means of slaked lime, Ca(OH)2; the reaction, in the latter case, being as represented by the equation

K.COa + Ca(OH)2 = 2KOH + CaCOa.

The calcium carbonate (CaCOa) that is formed at the same time is practically insoluble and may be removed by filtration. The solution is then evaporated to dryness and the resulting hydrate of potassium is finally melted and cast into sticks in metallic molds. Potassium hydrate is a white substance, absorbing moisture from the air with great readiness and also taking up carbon dioxide gas from the air, being thereby

converted into the acid carbonate. The hydrate dissolves in half its own weight of water, the solution being intensely alkaline. The solid hydrate has powerful cauterizing properties (whence the name ((caustic potash®) and de¬ stroys the skin when brought in contact with it. It is used in the arts and in the laboratory for a great variety of purposes.

The bromide of potassium (KBr) and the iodide (KI) are soluble, crystallizable salts, which are largely used in medicine and in photography. The bromide may be prepared by adding bromide to a solution of potassium hydrate, the reaction being

6KOH + 6Br = 5KBr + KBrOa + 3H20.

To remove the potassium bromate (KBrOa) that is formed, the solution is evaporated to dryness after the addition of a small quantity of powdered charcoal and the dry residue is well pulverized and finally raised to a dull red heat. The carbon that is present then reduces the bromate to potassium bromide and free carbon dioxide gas. When this process is complete, the mass is cooled and redissolved in water, after which the pure bromide of potassium is pre¬ pared by evaporation and crystallization. Iodide of potassium may be obtained in a similar man¬ ner. Potassium chlorate; KClOa, which is used in the laboratory for effecting oxidatiqns and also as a source of free oxygen and which is likewise employed in medicine, may be prepared by passing chlorine gas through a warm, con¬ centrated solution of potassium hydrate; chloride of potassium being formed at the same time, as is indicated by the equation

6KOH + 6C1 = 5KC1 + KClOa + 3HaO, the reaction being entirely analogous to that given above for the formation of potassium bromide. As will be seen from the last equation, only one-sixth of the potassium of the original hydrate is converted, by this method, into the form of chlorate ; the remaining five-sixths being converted into the chloride. The process as given is, therefore, wasteful ; for, although the potassium chloride may be easily recovered, it is not available for the manufacture of fur¬ ther quantities of the chlorate until it has been reconverted into the hydrate. In practice it is, therefore, customary to prepare calcium chlorate, Ca(C10a)2 as the first step in the process ; potassium chlorate being then obtained by treating the calcium chlorate with potassium chloride, according to the equation

Ca(C103)2 + 2KC1 =2KC10a + CaCk

Several sulphates of potassium are known, the most important of these

being the normal sulphate, K2S04, and the acid sulphate, HKSCh. These may be prepared by the action of sul¬ phuric acid upon potassium chloride ; but the commercial supply is obtained in large measure from the mineral <(kainite,® which occurs in great quantities at Stassfurt and which con¬ sists of normal Dotassium sulphate in combina¬ tion with the sulphate and chloride of mag¬ nesium. It is also obtained as a by-product in the working up of beet root, vinasse and kelp, and in other chemical industries. Normal pot¬ assium sulphate forms, with aluminum sulphate, a compound familiarly known as <(alum® (q.v.) or ((potash alum,® which crystallizes in octahedra having the composition

Al* (SO4) a + K2SO4 + 24H2O.

POTASSIUM

443

Three important salts of potassium, known respectively as the cyanide, ferrocyanide and ferricyanide, are described under Hydrocyanic Acid, and the permanganate of potassium is described under Manganese. Several sulphides of potassium may be prepared, the best known being those having the formulae K2S, K2S2, K2S3, and K2Ss. These are all soluble and evolve sulphuretted hydrogen when heated with an acid. Common ((liver of sulphur® is a brown, ill-smelling substance, prepared by heating nor¬ mal potassium carbonate with sulphur. It con¬ tains various sulphides of potassium, together with more or less of the normal sulphate and carbonate of potassium. When potash and pul¬ verized quartz are melted together, a compound of potassium, oxygen and silicon is obtained, which is usually described as a silicate of potas¬ sium. This compound is soluble in water and is known in the arts as <(potash water glass,® the corresponding compound of sodium being known as <(soda water glass.® The residue left when a solution of water glass is evaporated has a glassy appearance, from which fact the pop¬ ular name is derived.

With tartaric acid, HefAOe, potassium forms two compounds (the acid being dibasic) Mono¬ potassium tartrate, or acid potassium tartrate, KHbCiOq, is formed in the course of the fer¬ mentation of wine, and, as deposited by the wine in a crude state, is known as ((tartar,® or <(argol.® When purified, it constitutes the sub¬ stance familiarly known as (

With the fatty acids (for example, stearic, palmitic, etc.), potassium combines to form salts that are familiarly known as ttsoaps® ; the

com¬ bination being usually effected by boiling potas¬ sium hydrate or carbonate with fat. The fats are composed of glycerine in combination with various fatty acids ; and the potassium, being more basic than the glycerine, replaces it in the compound, the result being the formation of a soap, and the simultaneous liberation of free glycerine. See Soap.

Sources of Potassium. — Since the largest deposits of potash salts are in Prussia, the United States experienced a scarcity as the war progressed ; in fact there had been a shortage of supply in America - and friction over the im¬ portation as early as 1909. The year before the war our importation of potassium salts from Germany was about 525,000 tons. When this was cut off we had to get along with less than a tenth of the usual supply, and potash as a fertilizer had to be foregone, as the price was prohibitive. These conditions caused active search for new sources of supply. Wood ashes were carefully saved for leaching. The Bureau of Soils, Department of Agriculture, obtained an appropriation for experiments as to the best methods of securing potassium in commercial quantities, and the United States Geological Survey also expended considerable time and money in searching for deposits. Small quantities were found in Arizona, Colo¬ rado and Nevada, but it was not until a large deposit was uncovered in Utah in 1915 that this source of supply assumed importance. In 1916 the Survey classified 24,656 acres of In¬

dian lands as potash land and prospecting com¬ menced. One of the most promising finds was Searles Lake, California, a dried-up salt lake with an area of 7,500 acres and a crust. 50 to 100 feet deep, saturated with a brine rich in ash and borax. The salt lakes of Nebraska also yield a supply. Potash feldspar and silicate of potash have been located at a number of places, and only await practicable methods of extrac¬ tion to become available: while a considerable group of inventors are striving to improve and cheapen methods of extraction. Investigation of the dust and waste of the (blast furnaces has disclosed a source that should be conserved. The dust that gathers around the bases of hot- blast stoves in such quantities is now carefully saved and utilized. Cement mills also yield a dust rich in potash, which is being gathered more or less, and the distillery wastes have con¬ tributed a little more. The 1915 production of potash salts in the United States was 9,720 tons; for 1917 about 32,000 tons and for 1918 the estimate is 40,000 tons, which is only one- eighth of the normal consumption.

The prospective supply of potash within the United States is summarized by the Geological Survey as follows : The 7,000 to 8,000 acres of Searles Lake, California, are estimated to con¬ tain about

20,000,000 tons of actual potash, enough to supply the present demands of the country for 80 years. About 100,000 tons an¬ nually may be recovered from the dust of cement mills. Approximately 380,000 tons of potash are annually volatilized in the blast furnaces of the United States, and much of this could be recovered by installing proper ap¬ paratus, not unduly expensive. The numberless salt lakes of Nebraska, chiefly in the Sand Hill region, range from an acre to a square mile in area, with a crust varying from a few inches to three feet in thickness. It has been discov¬ ered that below the hard pan bottom of these lakes is a layer of sand saturated with a strong potash brine, resting on a second bottom of hard pan. The possibilities of this source have not been estimated, but they are large. At the Salduro salt marsh, in Utah, wells have been sunk, and the brine pumped from them is found to be closely similar to the artificial brines of the German potash works at Stassfurt. The dumps of old copper and gold mines now being reground for treatment bv the flotation process are found to contain considerable amounts of potash easily recoverable. The present possi¬ bilities of the molasses distilleries is estimated at 30,600 tons per annum ; and from the beet sugar works it is expected to get 16,000 tons of pure potash a year. The supply from kelp is not regarded as especially promising. The diffi¬ culty of drying the raw material before it can be calcined, and the tendency of the great kelp plantations to become diseased and disappear entirely from a given locality renders the kelp- potash industry hazardous. The green sands of New Jersey are estimated to contain not less than 2,000,000,000 tons of actual potash.

The costs of getting ootash from these vari¬ ous sources is estimated as follows : From the brines of the Nebraska lakes, $120 per ton; from roasting alunite (as at Marysvale, Utah), $40 per ton; from cement mill dust (as at Hagerstown, Md.), $30 per ton; from the Ger¬ man mines at Stassfurt, $40 per ton. The Ger-

man product was sold in the American market at (about) $80 per ton and the investment in the German mines is about $150 per ton of an¬ nual product. This is not much less than the investment at the Hagerstown cement mills, where the net cost per ton is $10 less than at the German mines. The market price of actual potash in the United States in 1917 averaged about $423.50 per ton. See also Potash, Com¬ mercial.

Potassium in Medicine. — Caustic potash is a useful irritant and caustic and may be used to kill off warts and other morbid growths. Permanganate of potash is valued as an anti¬ septic and disinfectant. Where an old sore tends to gangrene it may be applied wet to oxidize the products of decomposition. A 1 per cent solution has been recommended for external use on snake-bites. Any potassium salts taken internally serve as cardiac depres¬ sants, and also reduce the nervous action. Very small quantities of potassium are admin¬ istered by the medical profession, in a variety of forms, internally, for several ailments; but it should be taken only under a physician's ad¬ vice, for it is properly classed as a poison. An overdose causes abdominal pain, burning, diar¬ rhoea and vomiting and should be treated with emetics, followed by lemon juice, then vegetable oil and white of egg. Washing out the stomach is of course advisable. Nitre paper, made with potassium nitrate, is burned by asthmatic patients, that they may inhale the fumes and relieve the paroxysms. Acetate and citrate of potassium are sometimes employed to increase the flow of urine. Potassium salts will neutral¬ ize the gastric acid, and small doses may thus relieve an acid condition of the digestive tract, but the tendency to induce inflammation and gastritis should not be overlooked.

Consult Bulletins of the United' States Geo¬ logical Survey; also Bulletins, United States Department of Agriculture, and Cushman and Coggeshall (in (Eighth Inter-Congress of Ap¬ plied Chemistry,* Vol. V, 1912).

POTASSIUM PERCHLORATE. See

Perchloric Acid.

POTATO, a perennial herb (Solarium tu~ berosum) of the family Solanacea. It is a na¬ tive of the Chilean and Peruvian Andes. Its tuberous roots send up weak stems which bear pinnate leaves and white or lilac flowers which in cultivation are rarely followed by fruits. When fruits are produced they are globular, yellow or purple, and about the size of a goose¬ berry. The plant is extensively cultivated in temperate climates for its tubers, which are used as a staple food for man, and to a less extent for animals. It was in cultivation before the discovery of America, and was taken to Europe (probably to Spain from Peru) in the early part of the 16th century. It seems that Sir Francis Drake introduced it into England in 1586, though Sir Walter Raleigh is said to have brought it with him the year previous. Gerarde mentions it in his Herball in 1597 under the name Batatas Virginiana, but it seems to have been regarded somewhat as a curiosity until the latter part of the 18th century, although the Royal

Society of London had recommended it in 1663 as a possible safeguard against famine among the Irish peasantry. Owing to the failure of grain crops in 1772 the potato soon com-

- * A “

menced to grow in popularity as a food-plant, but even as late as 1771 only two varieties, one white and one red, were listed. In 1900 it was no uncommon thing for agricultural experiment stations in the United States and Europe to test more than 150 varieties at one time. The crop is one of the most important in Germany, France, Ireland and the United States. In the last-named country the yield per acre averages less than 100 bushels (1917), but with proper attention to cultivation, etc., yields of 200 to 400 bushels are not unusual, and even 1,000 bushels have been obtained under the best conditions. By artificial methods 2,558 pounds of tubers have been grown from one pound of seed in one season; but this was in a competition for prizes. The crop in the United States for 1917 was 442,536,000 bushels. Besides being an important article of food the potato is largely used in the manufacture of starch, and in some countries for making alcohol, etc. For such purposes special varieties are generally grown; these are usually coarse and are little used for human food.

The culinary varieties have been found to contain about 78 per cent water, 18 per cent starch, 2.2 per cent protein, 1 per cent ash and 0.1 per cent fat. During storage these propor¬ tions change, since the tubers shrink nearly two per cent a month as an average for seven months. Since the potato is rich in starch and poor in protein it is valued chiefly as a carbohydrate food, the deficiency of protein being made up by eggs, meat, fish, beans, peas, etc., and that of fat being supplied by butter, fat, oat-meal, etc. During the process of cooking the cells are ruptured, the starch expanded and made (

Methods of Propagation. — The potato is propagated almost wholly by means of its tubers, which are cut in many ways intended to in¬ crease the amount of <(seed.® Some growers plant the whole tuber, others half-tubers, and others <(singl e-eye pieces.® Probably there is no one method which is best under all condi¬ tions of soil, cultivation, etc., but it seems as if the half-tuber of medium-sized, well-formed specimens is in most general favor. Extra la'rge and little potatoes are not favored. In the propagation of new varieties seed-balls are used, and after the variety is proved to be worthy it may be increased rapidly by means of cuttings made from the sprouts. These are rooted under glass in the same way as geranium cuttings, etc., and the rooted plants set in good soil when the weather has become settled. Some

growers expose their <(seed potatoes® to the sun for about 10 days before planting in order to hasten the growth. During this period of ex-'

posure small, rosettes of sprouts appear at the eyes, and it is claimed that some of the starch is converted into sugar, with the result that when the tubers are planted they make a more rapid growth than under ordinary conditions. With certain varieties and upon certain soils the period of growth may be shortened to eight weeks or even less.

The plants will thrive in the cooler tropics and even in the colder temperate regions ; in moist and dry climates; and on many kinds of soil. But the mild-temperate regions, fairly dry climates and light loamy soils generally suit them best. Such produce earlier, mealier, more highly flavored potatoes than the other conditions. While Americans demand potatoes of this order, Europeans seem generally to pre¬ fer the harder, less mealy tubers, produced in cloudy climates and upon rather rich, moist loamy soils. The soil should be well supplied with organic matter, but this should not be added fresh in the form of stable manure. Such applications should be made to a orevious crop, such as corn, since practice has shown that the quality of the crop is thus improved. Generous applications of commercial fertilizers should be given. Dried blood, sulphate of potash, super¬ phosphate, ammonium sulphate and wood ashes are ' favorite fertilizers for this cron. The amounts to apply will depend largely upon the character and quality of the soil. The plowing should be as deep as the surface soil will permit, six inches or more. It should be done as soon as the weather becomes settled. The <(seed® is dropped at intervals of 12 to 18 inches in rows about 30 inches apart. Generally this is done by hand in a furrow about four inches deep, but upon a large scale potato planting machines are used. These machines make their own furrows, sow the fertilizer, drop the ((seed® at regular intervals, cover the row and mark the position of the next row.

Before the young plants appear a weeder is run over the field once or perhaps twice to keep the surface loose and to destroy spouting weeds ; after the plants are up the cultivator is used between the rows until the vines cover and shade the ground. Flat cultivation is in general

vogue, but ridging or hilling has its advocates, who claim that the practice dries and warms the soil, thus hastening maturity, and that the young potatoes are less likely to be exposed to the sun and thus become green. When the tops begin to turn yellow the tubers may be dug; but late kinds, which are generally planted three or four weeks later than the earliest crops and about two inches deeper, are allowed to remain in the ground until the vines have died or until the weather becomes cold in the autumn. The num¬ ber of cultivations varies from a minimum of three for the earliest crops, to a maximum of eight or sometimes more for the late. Hand digging is usually practised upon small farms; a specially made plow, is also often employed; but upon large plantations machines which sift the tubers from the soil and leave them at the surface are in common use. In the South a second crop of potatoes often follows the first in the same season; in the North the land occu¬ pied by early potatoes is often planted to winter wheat ; that occupied by a late crop is left bare until spring when cereals frequently are sown. Potatoes are favorite crops for preparing the

land for such crops as strawberries, raspberries and other small fruits, truck crops, etc.

Insects. — Among the insects which feed upon the potato are tortoise blister and flea beetles. The three-lined potato beetle (Lema trilineata) and the tomato worm (Sphinx quinque-maculata) are also frequently seriously troublesome. The most widely destructive enemy, however, is probably the potato-bug or properly the Colorado potato beetle (Doryphora decemlineata) . Unlike most insect pests this beetle became troublesome first in the West and migrated eastward. When the potato was first cultivated in the West this insect left its original food plant the sand-bur (Solanum rostratum) , and traveled from field to field, living upon potato vines. In 1860 it had become troublesome in Nebraska; in 1870 it was busy in Ohio and Ontario; and in 1875 it was well known in the Atlantic States as far south as Virginia. Its spread in the South has been less rapid probably because the potato is there less extensively grown than in the North. The hibernating adults appear in the spring and lay yellow eggs in clusters upon the foliage, sometimes even before it appears above the surface. In about a week the red larvae appear, eat ravenously for about three weeks, pupate for about 10 days and emerge for feeding and egg-laying. From two to five broods appear in a season. This insect has a number of enemies, but farmers prefer to depend upon Paris green or other arsenites which are sometimes applied as a dust while the dew is on the plants, but usually as a spray. This is also more or less effective for the other species mentioned above.

Two stalk-borers are often troublesome; one, the larva of an owlet moth (Gortyna nitela), the other of a beetle (Trichobaris trinotatus) . Wilting of the vines is generally the first indication of their presence and the only remedy recommended is the burning of the vines as soon as observed to be wilting.

Two so-called plant diseases are reported troublesome in the North; early blight (Alter – naria solani) and late blight or rot (Phy – tophthora infestans). In the South Bacillus sol- anacearum is believed to be the cause of the brown rot. These three maladies are character¬ ized by the destruction of the plants and are thought to be spread by insects which feed upon the foliage. Hence the remedies most in vogue arc the control of the insects and the use of Bordeaux mixture, Paris green, and Pyrox. Care in selecting ((seed® potatoes from non-infected districts and rotation of crops, the potatoes being moved to fresh soil each year, are also recommended. The scabbiness of tubers is thought to be prevented by soaking the <(seed® in a solution of formalin or of corrosive sublimate, and by rotation of crops.

Consult Gilbert, A. W., (The Potato) (New York 1915) ; Grubb, E. H., and Guilford, W. S., (The Potato* (ib. 1912) ; Riley, C. V., (Potato Pests* (ib. 1876) ; Smith, J. B., (Economic entomology* (Philadelphia 1896) ; also bulletins of the United States Department of Agriculture and of the State Agricultural Colleges.

POTAWATAMI. See Pottawattomi.

POTEMKIN, po-tem'kin (Russ, pot-yom'- kin), Gregory Alexandrovich, prince of Tau¬ rida, Russian field-marshal : b. Smolensk, Rus¬ sia, 1739; d. Bessarabia, Russia, 16 Oct. 1791,

He came of a noble Polish family, entered the Russian army, was distinguished for bravery in the war against the Turks in 1771-72 and was promoted lieutenant-general. He soon sup¬ planted the brothers Orloff in the favor of the empress Catharine and for years was her ac¬ knowledged lover. When she found another more to her taste, choosing Zavadovsky as prime favorite, Potempkin was clever enough to retain his political supremacy with her, and she continued to rely on his advice, which per¬ mitted him to wield great power. He enlarged the Russian army, built a fleet on the Baltic Sea, annexed the Crimea, founded the cities Kherson, Kertch, Nikolaiev, Sebastopol,

etc., was hon¬ ored by Frederick the Great, Maria Theresa, Joseph II and other monarchs, and became recognized as an important factor in the poli¬ tics of Europe. He was waging a successful war against Turkey at the time of his death. In his private life he was mean and avaricious, though loaded with wealth by the empress, and his public life, though eminently successful, shows little indication of high ability as a states¬ man. Consult Cerenville, (Vie de Prince Potemkin) (1807).

POTENTIAL. In the third volume of the (Mecanique Celeste, > Laplace, in 1784, deter¬ mined the attraction exerted by a spheroid on a particle outside the mass, in the course of which he discovered the so-called potential function as the limit of the sum obtained by dividing every element of the mass of the attracting body by its distance from the point upon which the force is exerted. That is, in the case of gravitation, if A m denotes the element of mass, r the distance from the particle at P and V the potential func¬ tion, then

(1)

limit A m = 0

where the numeration includes all the elements that compose the mass M. Laplace then pro¬ ceeded to show that if the potential function of a mass was known at any external point, the attraction exerted in any direction by the mass upon that point could be found at once by per¬ forming a differentiation of. the function in the required direction and, finally, that such a poten¬ tial function would always be a solution of the differential equation

(2)

62v S2v

~b -f— f_j = 0

6yi Oz2

when v2 is a symbol generally employed to denote the operator

V2 — i – b "? – b i — •

(be2 Oy2 cz3

This is called Laplace’s equation and V is a potential function.

Poisson (1813), a student of Laplace, gave the form of the equation which V must satisfy for all points, situated either within or without the attracting mass, as

y2V = — 4 TTp.

This equation must be satisfied by the potential function for every conceivable distribution of attracting matter at any point P, where pis the density of the attracting matter at P. Since p = 0 for points outside, Poisson's equation reduces to that of Laplace in such a case.

In 1827, George Green, a self-educated mathe¬ matician, before he took his degree at Cam¬ bridge in 1837, noted the peculiar property of V ; namely, that it is a function of the initial and the final position only, thereby recognizing its universal application in dynamics in the treatment of a conservative system of forces, that is, a system that is independent of all inter¬ mediate conditions. For example, the work done in moving a mass against the force of gravity from P to Q is the same whether it is lifted directly up from P to Q or moved along any other path, as an inclined plane, provided al¬ ways there is no friction. That is the earth, and every mass connected therewith constitutes a conservative system with respect to gravity. The work done is independent of the path. But if, as in practice, friction is involved, some energy is dissipated in overcoming this force and the system is no longer conservative. Green recognized, therefore, that, so far as natural phenomena are concerned, forces that are func¬ tions of distances only constitute a conserva¬ tive system to which the theory of the potential is applicable and, in particular, that in addition to gravitation, forces exerted by electrified and magnetized bodies upon each other are of this nature. Green was the first to call V the poten¬ tial function. Its peculiar property may be said to be this : that it measures the work done in moving a unit of mass, electricity or magnet¬ ism from one position to another by virtue of the forces in action.

Attraction. — Newton's law states that every particle of a body attracts every particle of an¬ other body with a force that varies directly as the product of the masses of the attracting particles and inversely as the square of the dis¬ tance between them. Let P be any particle, or point, M any mass, p the average density of an element of mass, Ai >, Q a point of the element whose co-ordinates are x' , y' , z and take x, y, z as the coordinates of P. By definition the at-

pAv

traction at P in the direction PQ will be –

PQ2

and its components in the direction of the axes

pAv pAv pAv

become p^2 cos c, cos p, cos y, where

a, P, y are the direction cosines of PQ. But

QP2 = r2 = (x'_x)2 + (/ _ y)2 + (z' — 2)2'>

, x' — x 0 y' — y

whence cos a = – , oos p — – - , cos y =

z — z.

Denoting the components of the total

T

attraction by X, Y, Z, we have, by Newton's law:

— x)dx' dy' dz '

X = Y =

Z =

IJf-

jffjy

(IF

r?

— y)dxr dy ' dz'

/5

— z)dx' dy' dz'

r*

when the integration is taken over the mass M. It follows that the resultant attraction at P due

to M . will be R =VX2 + Y2 -b Z2. But by definition, the potential function of P due to M, assuming as the element of mass

dm — pdx'dy'dz' will be

C C C pdx'dy'dz' dv

JJJ — ˆ y’ z)’ and s

fffiy

pdx' dy' dz'

Iff-

x)2 + (/ ~ y)2 + (z' — 2)2]a

— x)dx'dy' dz'

r 2

differentiation under the sign of integration being possible when P is outside the mass M, since r, the radical in the denominator, can in that case never become infinite. By comparison observe that the last expression is the attraction X. That is

dv dv dv

fa = =Y’

whence

R = VX. +YHZ-= yj (£) + (g) f (£) !

That is, to find the component of the attraction in any direction for a point P, find the potential function at P and differentiate this function partially in the required direction.

Potential Function as Measure of Work. — By definition, the work done in moving a unit of mass along a path S against a force F is equal

to the product F X S. Let the attraction at any point of the path and opposing the force

_ , dv F be — -r

w ....

ˆ , negative since in the opposite direc¬

tion from the motion, and let As be an element of the path. Then, if the unit mass moves from Pi to P2, the work done is given by

limit 2 pAj _ — rp'p ds = V. 1 — Vt,

iˆOP, J pA

when Vi and V2 are the values of the potential function of Pi and P2 respectively. That is, the difference or loss in potential measures the work done.

Since the difference of potential is the meas¬ ure, we observe that the farther P2 is from the attracting mass the less Va becomes. For, in general,

„ _ limit 2 Am

Am =0 r , '

and if n denotes the distance of the nearest point in the attracting mass from P, then

V < — 2Am, orV < – . n To

That is, when P is at infinity r0 = 00 , and the potential is zero.

It follows that when P2 is at infinity,

W = Vi — V2 = Vi.

That is, the potential function or the potential at any point P, due to an attracting system, is equal to the work done in moving a unit mass considered as concentrated at P, from P to infinity along any path. In most modern works on mathematical physics the word ˆpotential® does not denote the value of the potential func¬ tion at a point but measures the work done in moving a mass from a given position to infinity in the presence of the system considered. W is used by some authors as <(the potential of the mass M' with reference to the mass

M.® Others use the negative of W as the equivalent of (

Laplace's Equation. — It is not difficult to

<5V dV dV

show that $_r$, -7—, -j— are ox oy oz

everywhere finite

and that, as a consequence, the potential func¬ tion is always finite and continuous. More¬ over, when P is outside f the masses, the

. dV .

expression under the radical in is every¬

where finite within the limits of integration and it becomes possible to differentiate under the signs of integration. That is,

d*V

dx2

(bV

dy2

d°-V dz 2

Iff-

xy — ri

fff-

fff^

r*

— y)2 — ■ r2

r&

— z)2 — n

rs

dx' dy' dz', dx' dy' dz',

dx' dy' dz' ,

whence we derive by addition Laplace's equa¬ tion as one to be satisfied by the potential func¬ tion at all points outside the attracting mass

v2V = ⁺ + ˆ dx"1 dyi dz*

0.

The generalized form due to Poisson re¬ quires an application of a form of Green's the¬ orem due to Gauss and is applicable to all points. As stated, Poisson's equation is v2V = — 47171.

For a clear treatment of the elements of the theory of the potential function, consult New¬ tonian Potential Function,) B. O. Peirce, 1886, from which the present article is in the main derived. Consult also the mathematical papers of George Green, reprinted by Ferrers; Thom¬ son and Tait, (A Treatise on Natural Philos¬ ophy ; Maxwell, (An Elementary Treatise on Electricity) ; Watson and Burbury, (The Math¬ ematical Theory of Electricity and MagnetisnP ; Clausius, (Die Potentialfunktion und das Poten¬ tial.0 J. Brace Chittenden, Ph.D

POTENTILLA, CINQUEFOIL, or FIVE-FINGER, a genus of herbs and shrubs of the order Rosacece. The numerous species are mostly perennials and widely distributed in the north temperate and Arctic zones. They have compound leaves and variously colored flowers like the strawberry, from which the species are readily distinguished by the dry re¬ ceptacle: that of the strawberry is juicy. They blossom throughout the whole season with a climax in midsummer. They may be readily propagated by division and by seed, and thrive well upon heavy soil. However, they may be¬ come persistent weeds in favorable situations. P. fruticosa is especially troublesome upon moist soils when it has once become established. P. tridentata is an evergreen species which forms a dense carpet of verdure.

POTENZA, po-ten'za, Italy, a river, prov¬ ince and city. (1) The Potenza River lies in northern Italy in the province of Macerata, rising in Monte Pennino, about 4,800 feet above sea-level, crosses the province in a northeasterly direction, and empties into the Adriatic at Porto Recanati, near Potenza Picena, the an¬ cient Roman colony of Potentia, founded 184 b.c., the site of the abbey of Santa Maria. (2) The province lies 200 miles south of the river, and was formerly called Basilicata, being de-

scribed under that name ; it has about 500,000 inhabitants. (3) The city, capital of the prov¬ ince, lies on the left bank of the Basento and on the railroad between Naples and Metaponto, is the seat of a bishop and of several import¬ ant courts, has a cathedral church, a liceo, a technical school and a great prison It is near an older city of the same name, the old Roman colony of Potentia in Lucania, which was captured by the Emperor Frederick II, and by Charles of Anjou. An earthquake 16 Dec. 1857 nearly destroyed the modern city. Pop. about 17,938.

POTIDiEA, pot-i-de'a, in ancient history, a city of the peninsula of Pallene in Chalcidice, founded as a Corinthian colony in the beginning of the 16th century b.c. It was successfully de¬ fended against the Persians under Artabazus in 479; in 432 revolted from the Athenian League, thus precipitating the Peloponnesian War, in which it was captured by the Athenians in 429 and occupied by Athenian colonists ; was de¬ stroyed in 356 by Philip II of Macedon ; and was replaced in 316 by Cassandreia, which pros¬ pered until its destruction by the Huns.

POTIPHAR PAPERS, The, a series of sharply satirical papers on New York society by George William Curtis, first published in Putnam's Magazine in 1853. The papers are somewhat in the manner of Addison’s satires on the pretensions and insincerities of society; but at times the bitterness becomes more scathing, and reminds one of Thackeray in its merciless analysis of folly and ignorance. One of the enduring characters is the Rev. Cream Cheese, who sympathetically advises with Mrs. Potiphar as to the color of the cover of her prayer-book.

POTLATCH, among American Indians of the Pacific Coast, a feast often lasting several days, given to a tribe by one of its members who aspires to the position of chief. The word is from the Nootka, meaning a gift, and at the potlatch feast numerous and valuable gifts are distributed among the members of the tribe. The token given at a potlatch is a piece of en¬ graved copper, whose value is usually estimated in blankets. At these feasts the guests are expected to accept whatever is offered, but there is a ˆstring® tied to every gift in that it must be later returned with excess. The wealthy chief who gives a potlatch will sometimes show his distinguished disregard of material values by burning a few hundred blankets, also a few canoes or other property he may have; the more he destroys the bigger chief he is. They have even been known to break up and give away the fragments

of a potlatch copper repre¬ senting a value of many thousand blankets. Consult Barbeau, C. M., (Du Potlatch en Colombie Britannique) (in Bull. Soc. de Geo¬ graphic de Quebec, Quebec 1911-12).

POTOCKI, pd-tots'ke, Ignanzy, Count, Polish patriot, cousin of S. F. Potocki (q.v.) : b. about 1751 ; d. Vienna, 20 Aug. 1809. He was grand marshal of Lithuania, and united with Malachovski, Kolontady and other patriots in support of the constitution of 3 May 1791. He procured the declaration of the king in its favor, and in 1792 went to Berlin to induce the Prussian court to protect the Poles from Russia. When the Russian troops took possession of the

country Potocki fled to Dresden, and was de¬ prived of his estates. In 1794 he returned to Warsaw to engage in the attempt of Kosciusko, and was appointed general and member of the Supreme National Council. After the capture of Warsaw he remained in the city, but was arrested and confined as a state prisoner until 1796. In 1806 he again engaged in public affairs, and exerted himself to effect the aboli¬ tion of serfdom, and to promote the progress of education among the people.

POTOCKI, Jan, Polish historian: b. 1761; d. Oladovka, 1815. At an early age he formed the resolution of clearing up the obscurity that rested on Slavonic history, and prepared himself for carrying out his resolution by a course of linguistic studies, and by traveling over the lands occupied by Slavonic nations. His chief works are (Essai sur l'Histore Universelle et Re- cherches sur la Sarmatie* (1788) ; (Histoire Primitive des Peuples de la Russie) (1802) ;

(Fragments Historiques et Geographiques sur la Scythie, la Sarmatie, et les Slaves) (1794).

POTOCKI, Stanislas Felix, Count, Pol¬ ish patriot and statesman: b. 1745; d. 1805. He adhered pertinaciously to the old constitution of Poland, and exerted his influence against the constitution of 3 May 1791. (See Poland). Potocki so far forgot his duty to his country as to form connections with Russia, and on 14 May 1792 joined with Rzeuski and Branicki in the declaration at Targovice against the con¬ stitution. He then united himself with the Russian army, and was one of the leaders of the Diet of Grodno, which abolished the constitution, and subscribed the act for the partition of the country. He was thought to aspire to the crown, and received important appointments from

Catharine II.

POTOCKI, Stanislas Kostka, Polish pa¬ triot and statesman, brother of I. Potocki (q.v.): b. 1752; d. 14 Sept. 1821. He distin¬ guished himself greatly by his eloquence in the various diets which were held between 1788 and 1792. When the king acceded to the Confed¬ eration of Targovice, and by that false step consummated the ruin of Poland, Potocki re¬ tired to Austria; but was arrested there and im¬ prisoned in a fortress. On his release he con¬ tinued to live in retirement till the creation of the grand duchy of Warsaw in 1807, when he returned to his native country, and as President of the Council of Education applied himself to the promotion of intellectual culture among his fellow-countrymen. When Napo¬ leon gave out that he meditated the restora¬ tion of the ancient kingdom of Poland, Potocki's talent and influence were called into action. In 1815 he was appointed Minister for Ecclesiastical Affairs and Public Instruction. He wrote a work on eloquence (1815) and an uncompleted Polish translation (1815) of Winckelmann's wrork on ancient art.

POTOMAC, po-to'mak, a river in the east¬ ern part of the United States, formed by the junction of two rivers on the boundary between Maryland and West Virginia. The river called North Branch rises in the western Alleghanies and the South Branch in the central Alleghanies, and flowing northeast they unite about 15 miles southeast of Cumberland. The North Branch

flows southeast from Cumberland for over 100 miles. From the junction of the two head- streams, the river flows generally east-southeast, forming the irregular boundary between Mary¬ land and West Virginia and between Maryland and Virginia, and after a course of over 400 miles enters Chesapeake Bay about 73 miles from the Atlantic Ocean. The chief branches are the Shenandoah from Virginia, and the Monocacy from Maryland. At Harper's Ferry the river breaks through the Blue Ridge, form¬ ing a picturesque gorge. There are a number of falls, especially in that part of the course through the mountains. About 15 miles above Washington begins a rapid descent which in two miles is 80 feet and which ends with the Great Falls, a cataract 35 feet high. At Wash¬ ington the river meets the tide, 125 miles from its mouth ; and about 25 miles below it becomes an estuary from two to eight miles wide. It is navigable for large vessels to Washington. The Chesapeake and Ohio Canal is parallel to and near

the river the whole length from Georgetown to Cumberland. The Potomac is the most important river in this section of the United States. It was the route whereby ex¬ plorers journeyed to the interior in the early days, and it has been closely associated with many of the important events in the history of the country. The nation's capitol is on its bank, the home of the first President, and his grave, is a few miles below, and Arlington (q.v.), with its white tombs, may be seen from the Capitol. The drainage area is about 15,000 miles. See Boundaries of the United States.

POTOMAC, Army of the, a great Federal army in the Civil War, which operated in the East, mainly in the Virginias. It was organized in 1861 by Gen. George B. McClellan. Under him, in 1862, it served in the Peninsula Cam¬ paign (q.v.) and later in that of Antietam. Under Gen. A. E. Burnside, who took com¬ mand in November 1862, it was defeated at Fredericksburg in the following month. In January 1863 command of the army passed to Gen. Joseph Hooker, and at Chancellorsville, in May, it met another defeat; but in July of the same year, under Gen. G. G. Meade, it won the decisive battle of Gettysburg. General Meade continued in command, under Gen. U. S. Grant, throughout the operations of the latter in

1864-65.

POTOMAC, Society of the Army of the,

a military organization which grew out of the Civil War. It was founded in New York City 5 July 1869, since when it has held annual reunions. All officers and soldiers who served in the Army of the Potomac and in the 10th and 18th army corps, Army of the James, are eligible to membership.

POTOMAC COMPANY, The, in Amer¬ ican colonial history, a land company chartered in 1784, with General Washington as president. It was organized for the purpose of connecting the Potomac Valley with the West by means of a canal, and for general land improvement. The Chesapeake and Ohio Canal Company suc¬ ceeded it in 1828.

POTOMAC FORMATION, the lowest deposits of the Cretaceous period in America, so-called from the location of some of its typi¬ cal beds. It is represented by a narrow belt in vol. 22 — 29

Maryland, running southward, east of. Wash¬ ington to North Carolina, by strips in New Jersey and in Alabama, Arkansas and Texas. The series has been found to be from 5 to 500 feet thick. It is

made up of various sandstones, gravel, sand and clays. Portions of the forma¬ tion have supplied glass sand, clay (at Amboy, N. J.) and iron ore for manufacturing pur¬ poses. Consult United States Geological Sur¬ vey Bulletins.

POTOSI, po-to-se', Bolivia, (1) city, cap¬ ital of the department of Potosi, on the side of the Cerro do Potosi, at an elevation of over 13,000 feet; about 80 miles southwest of Sucre, and 300 miles from the Pacific. It is one of the highest inhabited places in the world. The city owes its origin to the silver discovered in the mountains and at the site of the present city about 1540. The first mine was opened in 1545 ; the city was founded in 1547 ; a royal mint was established in 1562 at a cost of over $1,000,000. From the time of the first discovery to 1864 these mines supplied silver to the value of often over $5,000,000 a year; nearly 2,000 shafts were sunk. If the smuggled silver could have been taken into account no doubt the amount would be much greater. The number of mines worked was formerly 300. They are now exhausted. The city is still one of the most important in Bolivia. It has a mint, a cathedral, numerous churches, convents and various public buildings, but the general appear¬ ance is dilapidated and unattractive. In the 17th and 18th centuries the population was over 160,000. There are two banks besides the National Bank of Bolivia. Pop. about 24,795. (2) A department of Bolivia, in the south¬ west, bordering on Chile and Argentina. Area, 45,031 square miles. It is crossed by long mountain ranges ; but in the northwest is a low, saline marsh, called ((Grandes Salinas.® Many of the inhabitants are Indians. Since the silver mines ran out, there is little industry. Pop. 530,748.

POTOTAN, po-to'tan, Philippines, pueblo, province of Iloilo, island of Panay, on the Jalaur River, 17 miles north of Iloilo. It is well built and contains a large church and a convent. Pop. 14,500.

POTPOURRI, pot-poo-re', (1) Foods of various kinds, of meat and vegetables, cooked together. (2) A mixture of rose leaves and various spices, kept in jars or other vessels as a scent. (3) A vase or bouquet of flowers used to perfume a room. (4) In music, a med¬ ley; a collection of various tunes linked to¬ gether ; a capriccio or fantasia on popular melo¬ dies. (5) A literary composition made up of several parts put together without any unity of plot or plan.

POTSDAM, pots'dam, Germany, a district and a city of the province of Brandenburg in Prussia. (1) The administrative district of Potsdam lies between Mecklenberg-Schwerin and Anhalt in the western part of the province of Brandenburg, and is well watered by lakes, and the rivers

Oder, Havel, Spree and Ucker, with several connecting canals, and is marked by fine strips of forest and stretches of moor¬ land, and Has a flourishing commerce, good fisheries, agriculture and grazing. There are 18 administrative divisions in the district, and

10 electoral districts for the choice of deputies to the Reichstag. Area, about 8,100 square miles; pop. about 2,000,000, of whom 1,800,- 000 are Evangelical Protestants, 114,000 Ro¬ man Catholics, 9,250 members of other Chris¬ tian bodies and 20,780 Jews. (2) The capital city of the province is situated in its most pleasant and beautiful part, on an island where the Nuthe and several canals and lakes join the Havel, 17 miles southwest of Berlin. Most of the city is well built, with broad straight streets, fine houses, and trees planted in the squares and streets ; and the five different parts, the old city or Potsdam proper, and the Berlin, Nauen, Brandenburg and Teltow quarters are connected by bridges, steamers and tramways. Among the city's beautiful squares are the Wil- helmsplatz, with a bronze statue of Frederick William III, by Kiss; the Bassinplatz with Dutch architectural treatment; the Lustgarten with its parade-ground and park and a bronze statue of Frederick William I, by Hilgers, busts of the heroes of the War of Liberation and statues of the generals of the armies of Bran¬ denburg and Prussia and cannons captured be¬ tween 1680 and 1858; the Old Market with a red and white marble obelisk 75 feet high; and in the narrowest part of the river on the Freund- schaftsinsel a place with a bronze equestrian statue of the Emperor William I, by Herter, erected in 1900. The churches of the city, five Protestant and one Catholic, include the Gar¬ rison Church planned by Gerlach in 1730 (and rebuilt in 1898), with a tower 295 feet high and the graves of Frederick William I and Frederick II ; the Nicholas Church, begun in 1830 and finished in 1850, with a beautiful dome 240 feet high and four bell-towers; the French church, after the Pantheon; the church of the Holy Spirit, with a steeple as tall as the Garrison Church; and the fine Friedenskirche. Among the profane edifices the chief are the Branden¬ burg Arch, on the lines of the Roman triumphal arch, built in 1750, and leading to Frederick the Great's palace and French gardens of Sans Souci ; the palace of San Souci is a low build¬ ing on fine terraces, its historical associations quite out of all proportion to its poor appear¬ ance; the New Palace built at the close of the Seven Years' War; the Marble Palace, the former residence of the Kaiser, situated in a northeastern suburb ; northwest of this palace the Pfingstberg, an ornate building with two towers and a fine view. In

the extreme north¬ eastern part of the city in one of the broadest expanses of the river lies the large Pfaueninsel (or Peacocks' Island) with a park and a hunting lodge. Woods, hills and the stretches of water everywhere make the city an ideal one.

The city is situated on the Berlin-Magdeburg branch of the Prussian governmental railroad system, and has other fail connections with Berlin. The commerce is comparatively unim¬ portant; there are sugar factories, several breweries, etc. It is an important garrison post, and among the educational institutions of the city are a military school, a war-school for the training of officers and a military orphanage, in which there are 800 pupils. There are also excellent schools for girls, a normal school for women, training schools for gardeners, etc. Pop. 62,243, of whom 5,000 are Catholics and 500 Jews.

Potsdam was a Wendish fishing village founded about 1300, and attained no importance until 1660 when it was selected as a site for a palace by the Great Elector. In 1685 (8 Novem¬ ber) by the terms of the Edict of Potsdam he opened the city to the French refugees and made the city his residence. He not only built the palaces mentioned above as his, but erected many private houses to keep up the tone of architecture. Frederick William IV did hardly less for the city's scenic features with the help of Lenne and Meyer. The Peace of Potsdam was signed here 3 Nov. 1805, ratifying an alli¬ ance between Russia and Prussia against France.

Consult the works cited under the article Berlin; also (Geschichte der Koniglichen Residenzstadt Potsdam > (1883) and (Potsdam ein deutscher Fiirstensitz) (illustrated, 1893).

POTSDAM, N. Y., village in Saint Law¬ rence County, on the Raquette River, and on the New York Central and Hudson River Rail¬ road, about 20 miles from the Saint Lawrence River and 30 miles west of Malone. In 1786 the State of New York created a land com¬ mission to further the settlement of the unex¬ plored northern part of the State. Ten towns were established, one of which was Potsdam. Later Garrett Van Horn and David M. Clark¬ son purchased the town of Potsdam. In June 1803 their agent, Benjamin Raymond, arrived at the place to sell the property. A number of persons from Vermont soon purchased land and settled here. The village of Potsdam was incorporated in 1831. It is in a productive agri¬ cultural region, which has had extensive lum¬ bering interests from its foundation. The first industrial establishment built by Benjamin Ray¬ mond was a saw mill, and saw mills have been there for over 100 years. In a recent year, one Potsdam company alone had 1,000 men em¬ ployed in lumber

camps in the Adirondacks, and in spring floated down the Raquette River, to the Potsdam mills, 30,000,000 feet of log stock. The village has flour and lumber mills, paper mills, creameries and machine shops. An ex¬ tension of the water power is being developed in the vicinity. It has an extensive trade in lumber, paper, farm and dairy products, and men's clothing. The celebrated Potsdam sand¬ stone (q.v.) is quarried in the vicinity, and is used in nearly all the large buildings of the town. It has the Potsdam State Normal and Training School, which has a library of 8,000 volumes, the Clarkson School of Technology, founded in 1895, the Crane Institute of Music, a high school and public elementary schools. There are seven churches. The two banks have a combined capital of $200,000. The govern¬ ment is administered by a village president and a board of five trustees elected annually. The village owns and operates the waterworks. Pop.

4,036.

POTSDAM SANDSTONE, an American geological formation of the Cambrian Period of which a yellowish brown sandstone found at Potsdam, N. Y., is typical. The formation was long supposed to be the oldest of Palaeo¬ zoic time in America, but is now placed at the top of the Cambrian group. It is found to the north of the Adirondacks in New York and in Canada, and in Michigan, Wisconsin and Vir¬ ginia.

POTT, pot, August Friedrich, German philologist: b. Nettelrode, Hanover, 14 Nov. 1802; d. Halle, 5 July 1887. He studied at Gottingen, became a lecturer at Berlin in 1830 and in 1833 professor of the science of lan¬ guage at Halle. His reputation as a compara¬ tive philologian was established by his (Etymol- ogische Forschungen auf dem Gebiet der In- dogermanischen Sprachen) (1833-36; 2d ed., 1859-76), and he soon took place with Grimm, Bopp and W. von Humboldt among the stu¬ dents of the newly developed science. His re¬ searches were peculiarly thorough ; and this fact makes them yet of value despite the advances made in his subject in more recent times. His books, which have been compared, for their want of order, to the plain of Shimar upon the con¬ fusion of tongues, include further: (Die Zi- geuner in Europa und Asien) (1845) ; (Die qui- nare und vigesimale Zahlmethode) (1847) ; (Die Personennamen und ihre Entstehungsar- ten> (1853) ; (Anti-Kaulen) (1863) ; (Die Sprachverschiedenheit in Europa, an den Zahl- wortern Nachgewiesen) (1868) ; and (Wilhelm von Humboldt und die

Sprachwissenschaft)

(1876).

POTT, Percival, English surgeon : b. Lon¬ don, 1713 ; d. 22 Dec. 1788. He was assistant sur¬ geon in Saint Bartholomew's Hospital, 1745-49, and a chief surgeon there from 1749 to 1787. In spinal diseases he was a specialist, and won distinction by his investigation of angular cur¬ vature of the spine, the cause of which he found in a disease of the bones of the spinal column, called after him Pott's disease (q.v.). He wrote a number of works, including

POTT'S DISEASE, an affection of the spinal vertebrae characterized by tuberculous inflammation of their bodies; spinal caries. The nature and cause of the disease were first cor¬ rectly described by the English surgeon Percival Pott (q.v.), after whom it was named. The inflammation is sometimes followed by total paralysis of the lower limbs. On the diseased parts tubercles form, resulting in disintegration of the vertebrae. A curvature or hump is formed by the visible projection of spinal proc¬ esses beyond their normal situation. The treatment of the disease must always be hygie¬ nic and constitutional, and for surgical treat¬ ment special methods are now in general use whereby excellent results are often obtained.

POTTAWATTOMI (p6t-a-wot'd-mi) INDIANS, an American tribe of the Algon- quian family, early occupied what is now lower Michigan and upper Illinois and Indiana. Join¬ ing Pontiac, they surprised Fort Saint Joseph in 1763. During the Revolution they were hos¬ tile to the Americans, but joined in the treaty of 1795. The tribe was then composed of settled bands and the wandering prairie tribes. In 1812 they aided England. A few descendants are now living in Kansas and Iowa.

POTTER, Alonzo, American Protestant Episcopal bishop : b. Beekman, Dutchess County,

N. Y., 6 July 1800; d. San Francisco, Cal., 4 July 1865. He was graduated from Union College in 1818 and became a tutor there in the following year. In 1821 he was- made pro¬ fessor of mathematics and natural philosophy. Of Quaker parentage, he nevertheless studied for the Episcopal ministry and was ordained to the priesthood in 1824. He was rector of Saint Paul's Church, Boston, 1826-31, and then re¬ turned to Union College as professor of moral philosophy and political economy, which posi¬ tion he retained until his elevation to the epis¬ copate. He was consecrated bishop of Pennsyl¬ vania 23 Sept. 1845,

and became known as one of the most sagacious and practical prelates of his day, as well as a man of marked intellectual force and spiritual fervor. His plans of church extension and benevolence were large and costly but he found means to carry them into effect, and not a few flourishing institutions, including the Episcopal Hospital and the Philadelphia Di¬ vinity School, owe their origin chiefly to him. Among his published works are several educa¬ tional treatises and (Religious Philosophy * (1870), besides sermons and addresses, and the Lowell Institute lectures on natural theology and Christian evidences, delivered in Boston 1845-49. Consult memoir by Bishop Howe

(1870).

POTTER, Cora Urquhart (Mrs. James Brown Potter), American actress: b. New Orleans, about 1872. She first appeared on' the amateur stage in New York, where she was a society favorite; her professional debut was made at the Haymarket, London, as Anne Syl¬ vester, in (Man and Wife,* in 1887. Later in the same year she played in New York. She made several world tours and assisted in raising funds for the comfort and nursing of British troops in the Boer War. In recent years she has played mostly in and near London. She has written (My Recitations. *

POTTER, Edward Clark, American sculp¬ tor: b. New London, Conn., 26 Nov. 1857. He was educated at Amherst College; studied sculpture under Mercei and Fremo, Paris, 1888- 89. He collaborated with D. C. French in sculp¬ tures for the Chicago Exposition of 1892-93 ; executed equestrian statues of Grant at Phila¬ delphia in 1894; Washington at Paris in 1898; Hooker at Boston in 1904; and Derens at Wor¬ cester in 1905. The statue of General Slocum at Gettysburg and De Soto at the Saint Louis Exposition of 1904 are also by Potter. He is also represented in the Fulton Library, Wash¬ ington, the Appellate Court, New York, and the Michigan State House. He executed four groups for the Buffalo Exposition of 1901, two animal groups for the library of J. P. Morgan, New York. Potter is a member of the National Institute of Arts and Letters and was elected a National Academician in 1906.

POTTER, Edward Tuckerman, architect, son of Alonzo Potter (q.v.) : b. Schenectady, N. Y, 25 Sept. 1831 ; d. New York City, 21 Dec. 1904. He was graduated from Union College in 1853 and studied and practised architecture in New York City, giving his attention princi¬ pally to collegiate and ecclesiastical architecture. He designed and superintended the building of the church of the Heavenly Rest, in Fifth avenue, New York City, the Colt Memorial

Church at Hartford, Conn., the church of the Good Shepherd and the Memorial Hall at Schenectady.

POTTER, Eliphalet Nott, American edu¬ cator and Episcopal clergyman, son of Alonzo Potter (q.v.) ; b. Schenectady, N. Y., 20 Sept. 1836; d. City of Mexico, 6 Feb. 1901. He was graduated from Union College in 1861 and from Berkeley Divinity School in 1862, in which year he entered the Episcopal ministry. He was rector of a parish at South Bethlehem, Pa., 1862-69, and professor of ethics at Lehigh Uni¬ versity in 1866-71. He then accepted the pres¬ idency of Union College and when the college was made a university in 1873 he was elected chancellor. In 1884-97 he was president of Ho¬ bart College and in the latter year became pres¬ ident of the Cosmopolitan University, a corre¬ spondence school. He wrote (Parochial Ser- mons) ; 'Washington a Model in His Library and Life* (1895), etc.

POTTER, Henry Codman, American Protestant Episcopal bishop : b. Schenectady, N. Y., 25 May 1835; d. 21 July 1908. He was the son of Bishop Alonzo Potter (q.v.), and was educated at the Episcopal Academy, Phila¬ delphia, Union College and at the Theological Seminary of Virginia. In 1857 he was or¬ dained deacon and in 1858 priest. He was rector at Christ Church, Greensburg, Pa. (1857— 58).; and at Saint John's Church of Troy, N. Y. (1859-66) ; then became assistant at Trinity Church, Boston, and in 1868 rector of Grace Church, New York City. In 1883 he was con¬ secrated assistant bishop of New York, and on the death of his uncle, Horatio Potter, in 1887 became bishop. Under his energetic and suc¬ cessful administration, the site for Saint John's Cathedral on Morningside Heights was pur¬ chased and funds raised for building. In his decisions on theological questions and contro¬ versies he proved himself sagacious and toler¬ ant. He took a deep interest in political life of the city and nation, and wrote and spoke force¬ fully and freely on a wide variety of educa¬ tional and political subjects. He lent his influ¬ ence to promoting friendly relations between labor and capital, and to assisting the reform movement in New York City. His views were extremely liberal. He held that the beer saloon as a poor man's club was a necessity in a great city like New York, and that the church should try to elevate it, and not work — ineffectively — to smother it. In 1904 he established a tavern which was designed to be run as an ethical saloon. It was not well patronized and the newspapers ridiculed it, so it had to be aban¬ doned. He had a great big heart, and did able work among the poor.

He published (Our Threefold Victory* ; (Young Men's Christian Associations and Their Work) ; 'The Church and Her Children-* ; (Sisterhoods and Deacon- esses) (1873) ; (The Religion for To-day* (1877) ; (The Gates of the East> (1877) ; 'The Scholar and the State* (1897) ; (The East of To-day and To-morrow) (1902) ; (Law and Loyalty* (1903) ; (The Drink Problem* (1905). Consult Keyser, H. A., (Bishop Potter, the People's Friend* (1910) ; Hodges, George, (Henry Codman Potter) (1915).

POTTER, Horatio, American Protestant Episcopal bishop, brother of Alonzo Potter

(q.v.) : b. Beekman, Dutchess County, N. Y., 9 Feb. 1802; d. New York, 2 Jan. 1887. He was graduated at Union College in 1826, like his brother studied for the ministry, and was ordained deacon in 1827 and priest in 1828. In the latter year after having held one pastoral charge in Maine, he was elected professor of mathematics and natural philosophy in Wash¬ ington (now Trinity) College, Hartford, Conn. He was rector of Saint Peter's Church, Albany, N. Y., 1833-54, and was then (1854) elected provisional bishop of New York. His prede¬ cessor, Bishop Benjamin T. Onderdonk, after trial before a court of bishops, had been sus¬ pended from his office on a charge of immoral¬ ity, the truth of which, however, he never ac¬ knowledged. Thus the diocese remained for some time in an anomalous position, until finally a canon was passed authorizing the election of a provisional bishop. On the death of Bishop Onderdonk, in 1861, Bishop Potter assumed en¬ tire charge of the diocese, and ruled it prudently until his own death. The care of such a large and important diocese, especially in the trying times of the Civil War and the ritual contro¬ versy, required an unusual amount of courage, wisdom and impartiality. These qualities Bishop Potter exhibited in such a degree as to bring a large measure of unity and peace to New York diocese. His published writings are prin¬ cipally sermons, addresses and pastoral letters dealing with religious and occasionally with civic questions.

POTTER, John, English Anglican arch¬ bishop: b. Wakefield, Yorkshire, 1674; d. Lon¬ don, 10 Oct. 1747. Pie was educated at Oxford, and in 1694 became Fellow of Lincoln College, Oxford. In 1697 he printed an edition of 'Ly- cophron.* In 1697-99 appeared his 'Archaeo- logia Graeca,* or the 'Antiquities of Greece,) which has gone through many editions, and was long indispensable to the classical student. In 1708 he was appointed regius professor of di¬ vinity at Oxford, and in 1737 was appointed archbishop of Canterbury. His 'Theological Works) in three volumes appeared in

1753.

POTTER, Louis, American sculptor: b. Troy, N. Y., 1873; d. 1912. His art instruction was obtained under Charles and Montague Flagg. Potter went to Paris in 1896 and studied painting under Merson and Dampt. He exe¬ cuted a number of statuettes, including such excellent pieces as (The Snake Charmer) ; ‘Young Bedouin) ; (Tunisian Jewess, * etc. About 1900 he returned to the United States and specialized in American Indian subjects. Of these the best known are (The Taku Wind1* ; ‘Spirit of the Night) ; and ‘The Clam Diggers.* Other works are the heroic groups (Earth Bound) ; (Earth Unfoldment* ; and the (Earth Man* ; busts of Mark Twain and de Monvel, and the Horace Wells Memorial, Hartford, Conn.

POTTER, Paul, Dutch artist : b. Enkhui- zen, November 1625; d. Amsterdam, January 1654. He came with his father to Amsterdam in 1631, and in 1646 joined the Painters’ Guild of Delft and three years later that of The Hague. In 1653 he settled in Amsterdam. Of exceedingly precocious genius he early won a reputation as a painter and etcher, and al¬ though he died early takes the first place in the

Dutch school of painting as an animal painter. His life-size pictures such as (The Young Bull> in the museum of The Hague, and the (Bear Hunt) in the museum at Amsterdam, have contributed less to his reputation than the smaller canvases, in which are represented cattle, sheep, horses and swine out at pasture. Hisi clear and true color and the fidelity of his drawing and modeling are remarkable. His chief works are (The Cow) ; (The Sentence of the Beasts upon the Hunters) (at the Hermitage, Petrograd) ; (Horse Standing before a Cottage* ; (The Meadow) (Louvre) ; (The Shepherd’s Cottage* ; (Orpheus and the Beasts) ;

POTTER, Paul Meredith, American dram¬ atist : b. Brighton, England, 3 June 1853; d. 7 March 1921. He was foreign editor of the New York Herald 1876-83, and its London correspondent 1883-84. He was on the editorial staff of the Chicago Tribune in 1888 and in 1889 composed his first play, (The City Directory. * Among his many later plays may be cited (Our Country Cousin) (1893) ; a dramatization of (Trilby* (1895); (Under Two Flags> (1901); (Notre Dame> (1903) ; (Nancy Stair) (1905) ; (Queen of the Moulin Rouge) (1908) ; (The Girl from Rector’s* (1909) ; (Arsene Lupin)

(1909).

POTTER, Robert B., American lawyer and soldier, son of Alonzo Potter (q.v.) : b. Schenectady, N. Y., 16 July 1829; d. Newport, R. I., 19 Feb. 1887. He studied at Union College; began the practice of law in New York, became colonel of the 51st regiment New. York volunteers upon the organization of that regiment, and served with distinction at Newbern, where he stormed the intrenchments on the Confederate left, and at Antietam, where he carried the stone bridge and saved the day. He fought also at Fredericksburg, was made a brigadier 13 March 1863, commanded the second division of the Ninth corps at Vicksburg, and the corps at the siege of Knoxville. Under Grant he commanded his division from the Wilderness to the final attack on Petersburg. He was brevetted major-general in 1863. Re¬ tiring from the armv in 1866, he was chosen receiver of the Atlantic and Great Western Railway.

POTTER, William Parker, American rear- admiral : b. Whitehall, N. Y., 10 May 1850; d. 21 June 1917. He was graduated from the Naval Academy in 1869, and served several years as flag secretary, both of the North Atlantic fleet and of the European squadron. He took part in the destruction of Cervera's fleet at Santiago, 3 July 1898, and was advanced five numbers for ((eminent and conspicuous conduct.® Thereafter he served as commander and captain at several stations, being raised to the rear-admiralty in 1908, and placed in charge of the fourth division of the Atlantic

fleet. Later he was chief of the Bureau of Navigation, and in 1912 he retired.

POTTER'S CLAY. See Clay.

POTTER'S FIELD, the name commonly given a piece of ground usually adjoining a cemetery, and reserved as a burial place for strangers and the friendless poor. The name is derived from its use in the following passage from the Bible: <(And they took counsel and bought with them (30 pieces of silver) the potter's field, to bury strangers in.® Matt, xxvii, 7.

POTTER'S WHEEL. The wheel as used by the potter ranks among the earliest me¬ chanical contrivances. The Egyptians classed it among the inventions of the gods and claimed that Num, the creator, fashioned man upon it. As a broad principle the wheel consists of a flat disc, on an upright axle, rotating in a horizontal plane. The primitive form was simply a turn-table. The edge of the disc was made

of heavy substance to secure momentum and steady motion. It was rotated by the hand. The Chinese improved upon this by driving by a cord running in a groove. In Europe the favorite device was a lengthening of the axle of the wheel, enabling a heavy disc some three feet in diameter to be placed at the bottom. The potter seated himself at the wheel and propelled it with his foot, working on the lower disc. This was the first form of the <(kick® wheel. The next improvement was the application of a crank and handle which was kept in constant motion by one foot. The in¬ troduction of power gave rise to two forms of wheel. The special requirement – is that the speed of the wheel shall be variable at the will of the workman. This is accomplished either by cones in contact or by a traveling disc, or some similar device. In the former case a cone with a slightly curved face is fitted to the axle, so that it forms the base of the machine. In contact with this is an inverted cone faced with paper or leather and so arranged that the potter can, by pressure of his foot, bring the large end of one cone into contact with the small end of the other or vice-versa. Thus the speed of rotation is completely under con¬ trol. In the disc wheel the power is applied to a large steel disc revolving in a vertical plane. Upon the shaft of the wheel is a small disc faced with leather and free to move up and down the shaft, but rotating with it. A treadle enables the workman to place this either at the centre or the edge of the large steel disc, thus securing any desired speed. The potter's wheel is fast disappearing. It is now used mainly for shaping blanks, which are after¬ ward pressed into molds, or is employed by the makers of artistic pottery for the sake of the individuality of the work. Stoneware makers also use it for the nroduction of large jars. See Pottery, Manufacture of.

POTTERY (from the Latin potum, a pot) ; any article made with clay and fired. The or¬ igin of the formation of vessels from clay is lost in antiquity. It was the product of no one nation or people, but resulted from the neces¬ sity which arose for articles of domestic use when humankind emerged from savagery to barbarism and communal life was instituted. It required the aid of no metal tool; the fingers

of the primitive potter were sufficient to fashion it. Its history cannot be related chronologically and the stages that mark its progress are few. First came the knowledge that clay could be formed into any desired shape and that it hard¬ ened by exposure, that this hardness could be materially increased by fire and then some genius discovered

the potter's wheel. How long ago is unknown. The Chinese and Egyptians claim its invention and to the latter at least it was legendary, for they represent their god Ptah as creating the egg of the world upon it. There is a long hiatus before another stage is reached, the production of porcelain by the Chinese early in the Ming dynasty (1368-1644). Followed the use of flint by Astbury (1720) and printing from copperplates (1752).

Ceramic authorities differ considerably in their classification of pottery but it may broadly be divided into three groups: (1) Porcelain — (a) hard or natural; (b) soft or artificial. White and translucent with a vitrified break and a glaze not easily scratched with a knife. Examples: Chinese, Japanese and European porcelains; European potters, unaware of the composition of Chinese porcelain, tried by the mixing of various materials to imitate it, the Medici porcelain (1574) being the first of which we have specimens. The only artificial porcelain to survive is the English bone china. The glaze, fired at a less heat than the body, is softer and more velvety than that of hard porce¬ lain, the colors applied to it sink in the glaze and have not the applied look of those on hard porcelain. Examples : Early Sevres, Capo di Monte, English bone china. (2) Bodies made wholly or partially from clay, opaque with a non-vitrified break. This includes (a) wares made entirely from clays in their natural state which are found sufficiently pure to use without levigation, which, owing to the presence of iron, manganese or other impurities, cannot be used for white wares and which are termed un¬ washed clays. Examples: Terra cotta, yellow ware and some ornamental wares where the color of the body is concealed by a glaze or engobe; (b) Faience; the body covered with an opaque (tin) enamel, decorated on either the raw or fired enamel. The term came into use when Italians of Faenza introduced its manu¬ facture at Nevers in the 16th century. When its manufacture ceased toward the end of the 18th century and earthenware made on the English plan took its place, the use of the term ceased, the new body being termed terre de pipe or faiences fines. Examples: French pot¬ tery from 16th to 19th century; Delft, Alcora, etc.; (c) Mezza-majolica and majolica. The former had an engobe of white clay on its surface, the latter corresponded to faience ex¬ cept that it was enriched with metallic lustres. It is so termed because of the supposition that it was made on the island of Majorca, but this is disproved by M. Van de Put, who claims that the trade between Spain and Italy was con¬ ducted by Majorcan vessels and traders, the ware taking its name from this fact. Ex¬ amples: Hispano-Moresque, Italian 15th and 16th centuries. The term is now erroneously applied to wares covered with one or more colored glazes which might be

properly called such; (d) white and decorated household wares masquerading as Queensware, white granite,

semi-porcelain, ironstone, etc. 3. Stoneware : Opaque with a vitrified break. Examples : Gres des Flandres, Hohr and Grenzhusen wares. Doulton's Lambeth ware. Before quitting the subject it may be well to consider what part clay forms in these divisions. The lowest con¬ tent is that in English bone china which rarely exceeds 30 per cent; hard porcelain about 40; earthenware from 50 to 60 and stoneware from 70 to 80.

Buried in the dust of untold ages, specimens of the potter's art have and continue to be un¬ earthed, telling us of civilizations before un¬ dreamed of. Assyria and Babylon, in the im¬ mense library of Nippon, formed of clay cones and tablets, reveal the history and most intimate details of their existence 7000 b.c. The bricks of Babylon were coated with a stanniferous enamel, the secret of which was lost for ages, to reappear in the 13th century when the Moors drove the Arabs out of Spain and established the kingdom of Granada. Egypt on her painted walls at Thebes, 4000 b.c., depicts the whole proc¬ ess of the art, including the use of the potter's wheel, which even then as alreadv said must have been of great antiquity for they represent their god Ptah as fashioning the egg of the world on it. Glazes were early known to them, no less than seven colors being in use about 1500 b.c. The Greeks had obtained a certain technical excellence 2500 b.c. and later proved themselves magnificent potters. There is noth¬ ing finer in fictile art than their vases with friezes of figures, each one telling some story of mythology or of their warlike prowess, whilst the exquisite little Tanagra figures are distinguished by an inimitable grace. The art was at its best from 700 to 200 b.c. Much of this pottery which was unknown to Europe until the 18th century was found in Etruria and was for some time regarded as the product of that country, but Etruscan antedated the Greek period, dating from 1000 to 300 b.c., and though toward the close it was imitative of Greece it never equaled it. Etruscan civilization was merged in that of Rome, the natural suc¬ cessors of Greece, and the art was carried on by the Romans until the 1st centurv of our era. By them it was carried to Gaul, Italy and Eng¬ land and though never equaling that of Greece is distinguished by a black ware obtained by manipulation of the heat during firing and which when made by them in England later be¬ came known as Upchurch ware from the site of its manufacture; and by the beautiful Arren- tine, or Samian ware as it is erroneously called, a red body, the composition of which has never been determined. Mesopotamia, Crete, Syria possessed a knowledge of lustres, a Rakka bowl bearing a date equivalent to about 790 a.d.

though probably later. Persian pottery ex¬ erted a far-reaching influence. Their Arab conquerors were not in themselves an artistic race but fascinated by the beauty of the Persian style they largely adopted it and with the modifications demanded by their religion it is known as Saracenic art, the Arabs being known as Saracens during the Crusades. Probably much of the work ascribed to the Arabs was executed for them by Persian workmen. To Persia we are indebted for the beautiful reflets metalliques , which possibly may have been the Murrhine vases, those priceless treasures of

Rome of which no positive trace remains. These beautiful lustres made their reappearance during the Renaissance, the secret of manufac¬ ture again disappearing until rediscovered in the 19th century.

Before telling how the art was carried into Europe by the Moors another civilization, that of the Orient, demands notice. The Chinese, those indefatigable workers, the acknowledged past masters of the ceramic art, claim an antiquity equal to that of Egypt which until very recent times was not verified by actual specimens, but examples are now appearing lending color to the.ir claims. These examples differ little from those of other countries. The Han dynasty, 206 b.c.^-220 a.d., furnishes examples of glazed pottery and from that time progress must have been rapid. Unlike Euro¬ pean, Chinese civilization had not halted and the T'ang period, 618-906 a.d., was remarkable for the development of the ceramic and kindred arts. Even life size figures in pottery were made and which European potters a thousand years later considered a great achievement. The pottery of the Sung dynasty, 960-1280 a.d., had disappeared and became legendary in the 16th century, the C'h'ai and Ju wares made famous by Chinese writers. The period! marked the introduction of kaolin in the body, not as yet a true porcelain but perhaps best described as a porcellaneous stoneware. It was then that pieces of alternate colors of clay were made, the prototype of the agate ware of Whieldon, Wedgwood and other English potters of the 18th century. We are but just beginning to emulate their elusive flambe glazes, the crackled ware and the wonderful colors such as sang de bceuf produced by a reducing fire. With their characteristic reverence for age the Chinese have always delighted! in reproducing their own past triumphs and so skilfully has this been done that there are but few who may reasonably be classed as exoerts who can dis¬ tinguish the difference. The beautiful celadons are also of the period and were the forerunners of true

porcelain which was probably produced early in the Ming dynasty, 1368-1644. (See Porcelain). While the wares we have but hinted at continued to be produced, they were largely overshadowed iby the new body. The great centre of production has since the 7th century been the town of Ching-te-Chen and in spite of its having been several times destroyed, has always phoenix-like risen from its ashes. The Japanese learned much from the Chinese, as also they did from the Koreans who were responsible for the establishment of the indus¬ try at Karatsu (Hizen) end of the 7th century; Satsuma 1467-86; the Raku factories at Kioto 1550; Seto 1590, and later at Haji. It is diffi¬ cult to understand the Japanese preference for these Korean wares, which in no wise excelled their own productions except for some supposed superiority for use at their tea ceremonies. What merits Satsuma wares possess is due not to Korean but to Japanese influence, the art instinct being prompted by the work of the Chinese, whom they soon began to rival. Practically no good pottery was made in Japan until Kato Shirozayemon, called Toshiro, finished his five years' studies in China and came to Seto in 1200. Porcelain was not made until about 1513. Hav¬ ing obtained mastery of the art it spread all

over the kingdom and was patronized and en¬ couraged by emperors, princes and potentates. Two distinct styles are apparent, that made for use at home and that intended for export. The so-called old Japan, imitated and copied by nearly every manufacturer in Europe, is an example of the latter. Japanese pottery is largely the work of an individual or at least of a family, while Chinese is the result of com¬ bined workmanship. This individual work of recent years has been largely superseded by that of factories which to the great debasement of the national art have been induced to copy European designs with a result, with the single exception of price, disappointing and resretable. There remains, however, a number of artist potters who refuse to prostitute their talents, such as Miyagawa, Kozan, Seifer, Sobei, Watano and others. Even this edimpse of Japanese ceramics would be incomplete without reference to the great Imari artist Kakiyemon whose isolated designs on a white ground inspired the beauti¬ ful productions of present day Copenhagen porcelain and to whom many of the early Euro¬ pean factories were largely indebted.

African pottery was made at Bagdad in the 9th century and at Cairo in the 11th, the Moors having obtained their knowledge from the Arabs, largely adopting the style of the Sara¬ cenic potters. In the 8th century the Arabs conquered Spain but no ceramic specimens defi¬ nitely assigned to them at this period are known. Five hundred years later, 1235 a.d., the Arabs were driven out of Spain by the Moors and the wares known as Hispano-Moresque be¬ gan to appear, the most

notable example being the Alhambra vase made about 1230 The pro¬ duction continued until the 15th century, though its Moorish characteristics were gradually dis¬ appearing through coming into contact with Christian art, the late examples consisting of decorations of mock Arabic characters, with borders and diapers of leaves, principally of the vine and briony. The Moors had found in Spain a plentiful supply of tin and abandoned the calcarous covering they had hitherto em¬ ployed in favor of a tin enamel and which they enriched with brilliant lustres. As the wares lost their Moorish character, so the application of the lustre changed until finally it degener¬ ated into a ruddy copper. Much of this pot¬ tery found its way into Italy and it is probable that a Moorish potter gave assistance to Lucca della Robbia who in 1440 produced the first white enamel made in Italy. This led the way to those later triumphs in Italian ceramics which culminated in the period 1470 to 1530, a period remarkable for its awakening from the oblivion of centuries and one of the most splen¬ did epochs of the ceramic art. The painter had recognized in della Robbia's invention a mate¬ rial on which his art could be preserved for all time and loyally backed by the reigning houses, the princes of Urbino, of Pesaro and Florence, the Sforza, the Montefeltros, the Medici and the Fontanas, he found the opportunity to ex¬ press himself. These artist potters were the heroes of the moment; they were created mae- stros, entitling them to rank with princes. Never was an art so honored, so worthily expressed, and from the great centres at Castel-Durante, Urbino, Faenza, Gubbio and many other places there was a constant producing stream. This

Italian majolica was practically an art expres¬ sion confined to placques, vases, etc., and was not applied to utilitarian articles if we except the drug pots of the period. That came later when Italian workmen carried the art to France and in 1578 when the Nevers works were started. Except for the use of the tin enamel it had nothing in common with Italian majolica and in the early part of the 18th century had so degenerated as to become grotesque. Nevers pottery is important only on account of its ex¬ tent. Toward the middle of the 17th century Rouen came into prominence and in the early part of the 18th century potteries had become very numerous. Several distinct styles of dec¬ oration were introduced, owing nothing to for¬ eign influence, and the industry received an im¬ petus which extended all over France, some of the principal places being Moustiers, Marseilles, Lille, Strassburg and Bordeaux, and literally hundreds of other places

had their small pot¬ teries. The most original of those mentioned was Moustiers ; for the rest they relied for in¬ spiration on the parent factories • — Rouen stands pre-eminent, the faience produced there being characterized by the loftiest art ideals, combined with perfect workmanship. Another important pottery centre owing its influence to the Normandy potteries was at Alcora in Spain, which was of great extent, but which seems to have been somewhat neglected by ceramic writers. Delft in Holland came suddenly into life at the commencement of the 17th century and a tremendous trade was built up. Some English potters are known to have worked there, but the inspiration was no doubt Italian, for as early as 1560 Peccol Passo of Urbino had established at Antwerp a pottery for mak¬ ing Italian majolica so that the use of the tin enamel would be known to the Low Country potters. The manufacture of white ware in England, its superiority for use and durability and in the case of France the lowering of the duties on its importation, brought the manufac¬ ture of faience to a close. Recent years have seen the reproduction of much of the faience of the 17th and 18th centuries, their incontest¬ able artistic merit being highly valued by re¬ fined connoisseurs.

After the collapse of the faience industry the manufacture of earthenware on the Eng¬ lish plan was introduced. Many English pot¬ ters assisting in perfecting it. The principal factories were Choisy-le-Roi, Creil, Montereau, Chantilly and Sarreguemines. Ware of good quality was made for a time but gradually de¬ teriorated and the industry faced extinction, but was rescued by a scientist, M de St. Amans, who with the assistance of Brongniart succeeded in again placing it on a sound basis. About the middle of the 19th century there was a remarkable art revival as applied to ceramics which has practically revolutionized the pottery of France. The stoneware of Claude Louis Ziegler (1840-54), so pure in form and decora¬ tion, was perhaps the first evidence, followed by the remarkable reproductions of Palissy ware by Charles Avisseau of Tours (1842), his ex¬ ample being followed by Barbezet (1850) and Pull (1855), both of Paris. From 1854 to 1871 Sevres took the lead and a great impetus was given to the movement. In 1859 Theodore Deck, the greatest of French ceramists, demon¬ strated that the secrets of the Orient were se¬

crets no longer and he appeared to be able to duplicate at will the lustres of the Persians, the celadons of the Chinese, the intricacy of His- pano-Moresque or the inlaid work of Oiron. Still more recently an apparent army of artist potters have given expression to their ideals in gres, the royal factory assisting in the move¬ ment and restoring France to the position she seemed in danger of losing. No account of

French pottery would be complete without ref¬ erence to the work of Bernard Palissy and the faience of Oiron, though neither appears to have exerted any influence on French ceramics — Faience d'Oiron was made under the direc¬ tion of Helene de Hangest by her librarian, Jehan Bernart, and Franqois Charpentier and consisted mostly of small pieces, the decoration formed by inlaying different colored clays. The work was executed in a marvelous manner, so well, indeed, that for centuries it was impossible to reproduce it ; and owing to many of the late pieces bearing the monogram of the Dauphin (Henry II) it was long known as Henry deux ware. Its manufacture extended from 1524 to the middle of the century but the late period is much inferior to the early one. Some 50 or 60 specimens are known, each worth more than its weight in gold. Bernard Palissy, a iand surveyor, a glassmaker, a portrait painter, but poor withal, became obsessed with the idea of discovering the art of making enamel. Against difficulties and privations, disappoint¬ ments without number, he struggled against a fate which threatened to overwhelm him, con¬ tinuing his experiments for over 16 years, until at last success rewarded him and the secret of the enamel was discovered. The time of his triumph was also one of the greatest despair, for reduced to absolute penury, his credit ex¬ hausted, reviled by his neighbors as a madman, he could not procure fuel to finish the firing of his kiln and in a frenzy tore down the doors of his house, broke up and fed to the flames what little furniture was left him in the house, his mad act rewarded at last by success. He died in 1589.

In England tin enamel never seems to have obtained much popularity. No pottery worthy of record with the exception of the Encaustic tiles made by religious orders in the 14th and 15th centuries occurs until the awakening of the Staffordshire potters in the 18th century. We are not forgetting the quaint slip-painted wares of Wrotham and Staffordshire which were but the expression of the rude art of the old English potter who had no materials beyond his clay to work with, but rude as that art was it is the prototype of the most difficult and most beautiful ware of the end of last century, pate- sur-pate.

The advent of Elers who came to England in the train of William of Orange and had a small pottery at Bradwell Wood prior to 1698 is generally spoken of as the begirining of Staffordshire pottery, but as before his arrival there John Philip Elers is known to have been in litigation with some of these Staffordshire potters for infringing his rights there ap¬ peared at least to be an awakening for something better than the rude butter pots of their fore¬ fathers. Certainly Elers by his refined processes stimulated competition ; and when his carefully guarded secrets had been mastered by Astbury and Twyford

and by them freely communicated

POTTERY

(Various specimens of glazed earthenware of antique origin)

German escutcheon tile A (16th Cent.)

Dutch tile, styled the Hirschvogel tile (German. 16th Century)

Glazed earthenware in relief, by Lucca della Robbia; Florence (about 1500)

Vase from Delft (Fayence, 18th Century)

Japanese Satsuma bowl

Pot of Boettger porcelain (18th _ .. _ Century)

Spanish-Moorish Majolica jug (14th Century)

Wedgewood pitcher (English, — ˆ 18th Century)

Saucer, by Caffagiolo (Italian Majolica, _ 16th Century)

Palissy platter (French, 16th Century)

Plate by Urbino (Italian Majolica, 16th Century)

Paste porcelain (Minton, English. 19th Century)

Henry II. vessel (French, 16th Century)

Misnian coffee-pot (Old Saxon, 18th Century)

Saucer, by Gubbio (Italian Majolica

1519)

Persian platter (16th Century)

POTTERY

457

to their brother potters, the establishment of an important industry was laid. Whether the Elers introduced salt glazing in England is a moot point, but the process became prevalent at this period. Unlike

the gres de Flandres it was extremely .light in weight, much of it was beautifully designed and although the glaze was soft and scratched easily it made excellent tableware. Not content with the successes achieved the Staffordshire potter was but spurred on to further effort. New clays were searched for and tested in an endeavor to pro¬ duce a white body and when in 1720 Astbury discovered the invaluable use of flint, the end was practically obtained. It gives both strength and whiteness, the two qualities hitherto lack¬ ing. Other discoveries rapidly followed but it was given to one man, Josiah Wedgwood, whose forbears had played no unimportant part as pioneers, to systematize and turn into a manufacture. Much had been done already. Whieldon (1740-98) had greatly improved the body; Dr. Thomas Wedgwood (1731) had in¬ vented the agate ware; Booth (1750) introduced the dipping of ware in glaze held in suspension ir. water; plaster molds had superseded pitcher and brass ones and others had added their quota. Wedgwood (1730-95) organized and systematized all that had gone before; he labored assiduously to improve all existing processes as well as communications with the outside world which were in a deplorable state and in doing so not only enriched himself, but benefited the community at large. He invented a new body employing a material hitherto un¬ used in pottery, barytes, and which he called jasper. In this body he produced a series of vases ornamented with classical designs for which at the time there was a great vogue and which generally are regarded as his greatest work. These designs made by the best artists obtainable were made in white clay in slight relief in molds and afterward applied on the colored jasper. They are marvels of skilled workmanship. From this time English earthen¬ ware has steadily advanced, such men as Spode, Minton, Davenport, Ridgway, Adams and a host of others worthily maintaining its prestige. With the exception of Davenport the descend¬ ants of these men are still in business and to them must be added the name of Doulton who first as a manufacturer of stoneware at Lam¬ beth and later at Burslem shares honors with the older firms. Whilst ,<(The Potteries,® the five towns of Arnold Bennett, Stoke, Burslem, Hanley, Tunstall and Longton, were the centre of production the manufacture generally ex¬ tends all over the country, Liverpool and Leeds, which formerly produced extensively, are now extinct. In the United States nothing beyond spasmodic attempts had been made until the middle of the 19th century Taylor and Speeler starting to make white ware at Trenton in 1855 resulting in the establishment of a pottery centre there. At East Liverpool from 1840, yellow and Rockingham wares were extensively made and in 1872 Knowles, Taylor and Knowles com¬ menced making white wares, many other manu¬ facturers following their lead. The use of natural gas as a

cheap fuel and other causes has centred the pottery industry to the detri¬ ment of Trenton, and potteries have cropped up in the surrounding neighborhood. Probably

the largest in the world, Laughlins, is situated at Newall, W. Va., on the opposite side of the Ohio. Up to 1876 practically nothing but white ware was produced and that of a mediocre character, but of late years a decided change for the better has taken place and we now suc¬ cessfully compete with the products of the Old World. There is, it is true, a certain family resemblance in all makes owing to the exten¬ sive use of decalcomanies which of necessity are procured from sources open to all. By and by American manufacturers will recognize the value of originality and individuality and per¬ haps evolve a distinct American style. Men¬ tion must be made of the so-called hotel ware, a hard durable body possessing the best qualities of both porcelain and earthenware, first made by the Greenwood Pottery Company, Trenton, in 1863 and now extensively made by many firms. In art pottery the name Rookwood inevitably suggests itself. Born in the brain of a woman, Mrs Bellamy Storer, in 1880, it has been praised by critics the world over and it at its inception was worthy of such. Present- day Rookwood is much more so for it is domi¬ nated by a loftier art ideal. The naturalistic style of painting has given place largely to a more conventional one and the whole has become more ceramic. The Grueby pottery at Boston was responsible for some of the most artistic pottery conceivable, the restraint in ornament, the beauty of the matt glaze being beyond criticism. The manufacture is now princi¬ pally confined to tiles. These are the only two art potteries in America, but the women have largely made up any deficiency, the pupils of the Sophie Newcombe College, New Orleans, producing wares almost on a commercial scale, so well designed and executed as to undoubt¬ edly place them in the first rank. At Zanesville, Ohio, a large quantity of ornamented pottery is made, the best of which is the multi-colored glazes of the Roseville Pottery Company, ex¬ traordinary in the beauty of their color and challenging comparison with some of the best examples of Oriental art. Mention must also be made of the slip wares of the Pennsylvania Dutch of the last half of the 18th century, crudely conceived and executed but interesting for its individuality.

South America did not fail to contribute its quota, the truly remarkable pottery of Peru showing a civilization at a time so remote that it is doubtful whether it was the work of the Chinese or some older race of which we have no knowledge. In the 16th century Peru and other countries were sending to Portugal pot¬ tery impregnated with a delicate perfume which became known as Noble Buccaros and

about which many fantastic properties were invented, among others that if ground up and eaten it was a sure cure for all ills. An English firm claims to be able to reproduce them but no specimens have come under our notice.

Germany has always been noted for its stoneware, much of the gres de Flandres being made there, gaining its name from the fact that it was shipped from Flemish ports. The Hirschvogels of Nuremberg, the numberless potters of Hohr and Grenzhusen were pioneers in the work and modern firms with added knowledge have continued the work. Ceramic literature is of a most voluminous character

and only a few works can be indicated which will serve as an introduction to more intensive reading. Consult for Egyptian, South Kensing¬ ton and Bristol Museum Catalogs; Greek, Walters, (History of Ancient Pottery } ; His- pano-Moresque, Van de Puts, (Hispano-Mor- esque Ware of the 15th Century} ; Italian, Fortnums, cMajolica) and other works by the same author ; French, Gasnault and Garniers, (French Pottery } ; English, Llewellyn Jewett, (Ceramic Art in Great Britain> ; M. L. Solons, (Art of theiOld English Potter* ; Burton's Eng¬ lish Earthenware and Stoneware) ; Chinese, Bushell's (Oriental Ceramic Art* ; Japanese, Audesley and Bowes, (Keramic Art of Japan * ; General Introductory, Jervis's (A Pottery Primer) ; Technical, Segers, cComplete Works* ; Manufacturing Processes, Sandemans, (The Manufacture of Earthenware) ; Marks and Monograms, Burton's (Marks on Pottery and Porcelain.*

William P. Jervis,

Author of cThe Pottery Marks of the World? etc.

POTTERY, Manufacture of. Clay in it¬ self is not sufficient to make good pottery. The materials used for mixing with it are flint, Cornish stone and feldspar. The first process is to reduce all these materials to a common fineness by means of grinding and levigation. These in their proper proportions are mixed with water, the resultant liquid mass being known as slip. If plastic clay is required the slip is pumped into a clay press. The press consists of a number of what are termed cham¬ bers lined with very heavy cloth into which the slip is forced, pressure is brought to bear on them and the water expelled, leaving the clay mass inside the cloth or <(bags.® The presses are then opened, the

clay taken from the bags, but as it may not all be of exactly the same consistency a further process is necessary. This was formerly done by cutting off pieces with a wire and dashing it down on another piece until the whole was of the same density and moisture, and was known as wedging. This is now done by the pug mill, a cylinder down which runs an axle to which are attached blades of iron set at such an angle that they not only cut the clay but force it forward at the same time until it comes out at the bottom in a solid block about 6X4 inches. It is now in a plastic state ready for either the thrower or the presser. Throwing is perhaps the most fascinating oper¬ ation in all the industrial arts. Taking a ball of clay the thrower throws it on a revolving hori¬ zontal wheel and grasps it on the side with hands held rigid, which forces the clay to the exact centre. He then with an upward pressure raises it into a cone and when this has been repeated once or twice inserts his thumb in the top to make the aperture, and according to the shape required so guides and gently forces the clay to the proper contour entirely by the use of his fingers. Watching a skilled workman, the clay appears as if imbued with life, obedient to his slightest wish or thought. There is, how¬ ever, a good deal of nonsense talked about the expression of the thrower's individuality, and whilst this may be true of the few craftsmen who have mastered the process, it is ridiculous as applied to commercial wares, for when the individual work of the thrower is finished it

is passed on to the turner, who places it on a horizontal lathe and turns out all the marks of the potter's thumb and fingers until it as¬ sumes the exact size and shape required, no better and no worse than if it had come out of the mold. The process is very little employed to-day. For the presser much preliminary work must be done. An artist must design a shape, a model of it must be made and from this model must be made the molds, so constructed that the different parts of them lift cleanly away from the clay inside. Taking these molds, the parts held firmly together with a strap, the presser lines them with bats of clay, which he presses firmly down and then sponges the inside to make it smooth. Evaporation causes the clay to harden and the particles to shrink more closely together, and the piece can then be re¬ moved from the mold. If it requires a handle it is passed to the handler who presses the handles from molds and then with a little water or slip adjusts them to their proper place. Plates, saucers, etc., are made by ma¬ chinery, but the principal is the same, the molds being fixed on a revolving disc, which greatly facilitates the work. The ware is now in the ((green® state, and when thoroughly dry is ready for the first firing, after undergoing which it is called biscuit ware, the first form of pot¬ tery. If instead of the plastic clay slip is used it is

poured into a plaster mold, which being made somewhat softer absorbs some of the water, the clay particles floating to the side. The mold is kept full of slip until the requisite thickness is attained, the surplus slip is emptied out and the mold put away until the piece frees itself by shrinkage. All mold-made pieces re¬ quire fettling, that is, the mold marks are re¬ moved with a knife or sponge. Biscuit ware can be decorated either by painting with a brush or by printing. The former enables the artist to express himself just as , on canvass, except that his colors will be absolutely per¬ manent. For printing, the design is engraved on a copper plate; an impression on thin paper is obtained from this and transferred to the ware, the paper being afterward washed off. In both cases the colors are mixed with oil, and to remove this the ware is fired in the hardening on® kiln before the glaze is applied. Biscuit ware may also be dipped in a plain or colored glaze, which simply requires the <(glost® fire to complete. The glazing is done by im¬ mersion in a tub of glaze, the dipper holding the piece with the least possible contact with his finger and quickly and dexterously plunges it in the glaze, which covers it all over with a thin film. It is now ready for its final firing. In the biscuit kiln it is immaterial whether one piece touches another, but this would be fatal to glazed pieces, which are separated by means of separators called stilts, spurs, pins, etc., ac¬ cording to how they are used and which are easily removed when the firing is finished. A biscuit kiln will hold from 1,500 to 2,000 dozens of ware and takes from 45 to 50 hours to cool. A glost kiln does not take so long, the clay ware requiring a greater heat than the glaze. If the biscuit ware has been glazed and fired it can be decorated in a number of ways, either by painting with the brush, by applying decalcomanies or by printing. The colors used in this case are heavily fluxed

and only require a fire of about 8 to 10 hours. The average Centigrade heat for biscuit ware is 1,270°, for the glaze 1,210° and for decorations on the glaze 840°. The heat conditions in the kiln were formerly determined by the color and the withdrawal of certain trials, but small triangular cones made to melt from the lowest to the highest heat are placed in the kiln within view of the fireman and when the heat they represent is reached they bend and melt, show¬ ing that the firing is finished.

’ William P. Jervis,

Author of (The Pottery Marks of the World d etc.

POTTSTOWN, Pa., borough, Montgom¬ ery County, on the Schuylkill River, and on the Pennsylvania and Philadelphia and Reading railroads, 40 miles northwest of Philadelphia. It was laid out as a town in 1752 and was at first named Pottsgrove, after its founder, John Potts ; in 1815 it was incorporated as a borough and renamed Pottstown; the boundaries of the borough were increased in 1888. It is the trade centre of a fertile agricultural region. The immediate vicinity possesses considerable min¬ eral wealth and as a result Pottstown has grown to be o- importance as an industrial centre. Though at the time of the last United States census Pottstown was only 39th in size amongst the cities of Pennsylvania, it was 18th in vol¬ ume of products manufactured in its 78 indus¬ trial establishments. The total value of these products in 1909 amounted to $12,205,000, an increase of 68 per cent since 1899. The capital invested in these industrial establishments was almost $10,000,000, and the number of persons engaged in industrial pursuits was 4,123, more than 25 per cent of its total population. The borough is especially noted for its manufactures of iron and steel ; it contains rolling mills, blast furnaces, steel mills, bridge works, boiler works, nail factories and manufactories of agricultural implements ; also cigar factories, carriage works, planing mills and creameries. It has a public high school and library as well as a number of private educational institutions, the best known of which is High School, a non-sectarian sec¬ ondary school for boys. Pop. 15,599.

POTTSVILLE, Pa., borough, county-seat of Schuylkill County, on the Schuylkill JRiver, near its source, and on the Pennsylvania, the Lehigh Valley, the Philadelphia and Reading and the Central of New Jersey railroads, 95 miles northwest of Philadelphia. It was first settled in 1800, incorporated in 1828 and made the county-seat in 1851. It is situated among the Schuylkill anthracite coal fields and is one of the most important mining centres and ship¬ ping points of the region. Its manufacturing interests are also of considerable importance. The total value of products manufactured in 1909 in its 91 industrial establishments amounted to $9,138,000, an increase of 99 per cent since 1899. The capital invested was $13,982 000, and the number of persons employed 3,342, 16 per cent of the total population. Its industrial es¬ tablishments include steel mills, blast furnaces, rolling mills, foundries, planing mills, cotton- velvet and silk mills. It was in Pottsville that anthracite coal was first successfully used in smelting iron ore. Among its more important buildings are the county courthouse and jail, a public hospital and the Pottsville Athenaeum.

The latter contains a library and the borough also has a public library as well as the county law library. There are a public high school, public and parish graded schools and some pri¬ vate educational institutions. The chief execu¬ tive officer of the borough is a burgess, elected for three years ; the legislative body is a bor¬ ough council, possessing the power of appoint¬ ing many of the city officers ; the city auditor, city treasurer and the school directors, however, are elected by the people. Pop. (1920) 17,431.

POTTSVILLE CONGLOMERATE, the

name by which the Millstone-Grit at the base of the Pennsylvania series (coal measures) is generally known in Pennsylvania, because it has its greatest development at Pottsville, near the eastern edge of the anthracite fields. It is there more than a thousand feet thick, but toward the west and north grows thinner. The rock is composed of sand and pebbles, chiefly of quartz, giving it considerable hardness.

POTVIN, po-van, Charles, Belgian author: !b. Mons, Belgium, 2 Dec. 1818; d. Ixelles, 1 March 1902. He was educated at the Catholic University at Louvain, became professor of na¬ tional literature at Brussels, in 1883 conservator of the Wiertz Museum there, and in 1881 a member of the Belgian Academy. He was edi¬ tor of La Nation in 1850-53, and in 1862 be¬ came editor of the Revue de Belgique. For many years he was the recognized leader of the Liberal party in Brussels. His writings com¬ prise volumes of verse, history, political phi¬ losophy and criticism, including (L'Eglise et la morale) (1858, under the pseudonym Dom Jacobus) ; (Le Roman de Renard> (1860) ; Marbres antiques et crayons modernes* (1862) ; (Jacques d'Artevelde> (1861) ; (L'LIistoire des lettres en Belgique) (1882) ; and (L'Art Grec)

(1895).

POUCHED DOG. See Dasyure.

POUGHKEEPSIE, po-kip'si, N. Y., city

and county-seat of Dutchess County, on the eastern bank of the Hudson River, 72 miles north of New York, midway between the High¬ lands and the Catskills, and on the New York Central and Hudson River ancf the Central New England railroads. A ferry connects it with the West Shore Railroad. A cantilever bridge carries the Central New England lines across to the west bank of the river. Poughkeepsie has an elevation of 200 feet and a mean annual

temperature of 50°. The city is the seat of Vassar College (q.v.), of Glen Eden Seminary, Putnam Hall, Eastman Business College, Adriance Memorial Library, containing over 40,000 volumes, the Hudson River State Hospital for the Insane, Vassar Brothers' Institute, Vassar Brothers' and Saint Francis hospitals, Pringle Home, Columbus Institute and Riverview Mili¬ tary Academy. College Hill Park has an area of 100 acres and is finely situated, commanding a magnificent view of the Hudson. The Inter¬ collegiate regatta is an annual event in June. There are four national banks, one trust com¬ pany and one savings bank, with total resources of $30,000,000. There is also an active Chamber of Commerce of 822 members and having an annual income of over $22,000. The assessed value of property subject to taxation is as fol¬ lows : Real property, $24,844,845 ; personal property, $956,650; special franchise, $1,387,680;

shares of bank stock, $1,573,047. The city's funded debt is $2,135,000. The total tax rate is $25.97 per $1,000 valuation. There are 55 lines of manufacture in the city with products having an estimated total value of $15,000,000 and employing over 5,000 people. There are, all told, 176 establishments, employing 5,580 persons ; of the latter 147 are proprietors and firm members, 704 are salaried employees and 4,729 are wage-earners. The capital invested aggregates $13,935,000 ; wages, $2,284,000; sala¬ ries, $1,039,000. The cost of materials used aggregates $6,115,000, and the value added by manufacture, $6,676,000. The chief manufac¬ tures are mill supplies, underwear, trousers, cigars, candied fruits and preserves, cream separators, foundries, knitgoods, celluloid arti¬ cles, skirts, infants' garments, ball bearings, auto specialties, children's dresses, machine- shop products, linen and cotton mesh, shoes, ivory buttons, piano and organ players, dyes, etc. In September 1917 the average wage of 44 con¬ cerns employing men in Poughkeepsie was $16.01, and the 25 concerns employing women $9.90 per week. There are 11 grade schools with 5,500 pupils, five parochial schools, a $250,000 high school with 1,100 students. About $150,000 represents the municipal annual outlay on edu¬ cation. Poughkeepsie has steamer connection with Albany, New York and other Hudson River points. It is also a terminal point on the State canal system. What is now termed the city of Poughkeepsie dates far back of definite records. Its name is found in an Indian deed of date 5 May 1683, granting to Pieter Lam-

singh and Jan Smeedes each a farm, and to the latter also a waterfall near the eastern bank of the Hudson, to build a mill thereon. The waterfall is called Peoghkepesingh (((the place where the water breaks through®). A Dutch settlement sprang up about 1698, and during the Revolutionary War the place was a base for the Continental armies. In 1778 it became the State capital and in 1788 the Federal Con¬ stitution was ratified at a State convention held here. In 1799 it was incorporated and in 1854 was chartered as a city. The present charter was granted in 1874. Under it the people elect a mayor, a common council of 14 members and an alderman-at-large, who is president of the council. Pop. 35,000. Consult Platt, E., 'Eagle's History of Poughkeepsie> (Pough¬ keepsie 1905).

POULSON, pol 'son, Niels, Danish-Amer-

ican architect, ironmaster anl philanthropist : b. Horsens, Denmark, 1843; d. 3 May 1911. He studied architecture and building at Copenhagen and came to the United States in 1864. He was for two years employed in the United States government supervising architects' office at Washington and afterward was in charge of the architectural and engineering departments of the New York Architectural Iron Works. He engaged in business in partnership with C. M. Eger in 1876, the firm being incorporated as the Hecla Iron Works, New York, in 1897. Poulson was an active promoter of the welfare of his employees, a free technical school was established by the company and many of the men were enabled to establish themselves in business. He was also desirous of a closer understanding between the United States and Scandinavian countries and in 1910 gave $100,-

000 to be expended in an exchange of lecturers and students. His fortune, amounting to about $500,000, was left to the same cause and resulted in the establishment of the American-Scandina- vian Foundation and the American-Scandina- vian Society. Scholarships for Scandinavian students were established at Harvard, Yale, Columbia and the Massachusetts Institute of Technology; while those for American students were at Christiania, Copenhagen and Upsala.

POULTNEY, polt'ni, Vt., town, Rutland County, on the Poultney River and Lake Saint Catherine and on the Delaware and Hudson Railroad, 18 miles southwest of Rutland. It is in an agricultural region; slate is quarried in the town and vicinity and there are slate manu¬ factures, a foundry and machine shops. It is situated in a picturesque country in the Green Mountains and the lake affords facilities for boating and fishing; consequently the town has become popular as a summer

resort and con¬ tains several hotels. It has a public high school and is also the seat of the Troy Conference (Methodist) Academy. Pop. (1920) 1,371.

POULTON, Edward Bagnall, English

scientist: b. Reading, Berkshire, 27 Jan. 1856. He was educated at Oxford and was demon¬ strator in the anatomical department of the University Museum 1877-79, and lecturer in nat¬ ural science at Keble College 1880-89, as well as at Jesus College 1880-89. In 1889 he became a Fellow of the Royal Society and since 1893 has been Hope professor of zoology at Ox¬ ford. He was vice-president of the Royal Society 1909-10, president of the Linnaean Society of London 1912-16 and is a member or correspondent of many scientific societies. He delivered a course of lectures before the Lowell Institute, Boston, Mass., in 1894 on (The Mean¬ ing and Use of Colors in Animals.5 He is the author of (The Colors of Animals5 (1890) ; 'Charles Darwin on the Theory of Natural Selection5 (1896) ; 'Essays on Evolution5 (1908) ; 'Charles Darwin and the Origin of Species5 (1909) ; 'Viriamu Jones and other Oxford Memories5 (1911) ; 'Hope Reports5 (Vols. I-IX, 1897— 1913) , etc.

POULTRY. A term designating collec¬ tively all birds which have been domesticated for their flesh, eggs or feathers, for fighting or for pets, including fowls, ducks, geese, swans, turkeys, guineas, peacocks and pigeons. The word "fowl55 once included wild game birds but now applies only to the domesticated fowl (gallus domesticus) and does not properly in¬ clude turkeys, guineas or pheasants which be¬ long to a similar genus (Phasianus) which are now kept in semi-captivity and are only par¬ tially domesticated.

Origin. — The common fowl which makes up the largest class of domestic poultry is sup¬ posed to have originated in southwestern Asia. Darwin believed all domestic fowl to have sprung from a single species, the wild jungle fowl (gallus bankiva) which still is found in the jungles of India in the wild state. His belief was founded upon the fact that gallus bankiva closely resembled the common Black Breasted Red Game of to-day, one of the oldest varie¬ ties of domestic fowl known ; that it crosses readily with the common hen, producing fertile offspring; that it resembles the domestic fowl

COPYRIGHT, 1907, BY F. E. WRIGHT

t

. 1 *

A *

•

\

in voice and action ; that it is readily domes¬ ticated and that according to his observations it produced sterile offspring when crossed with other species of wild fowl and that sterile off¬ spring resulted when other wild species were crossed with domestic fowl. On the latter two points it is believed that Darwin was in error and that many varieties of common fowl have descended from several wild species and their crosses. In support of the belief it is known that several domestic varieties bear a much closer resemblance to other wild species than do gallus bankiva. The Oriental games, for ex¬ ample, resemble gallus giganteus much more closely than they do gallus bankiva; indeed, the gallus giganteus kept in domestication by the natives of the Malay Peninsula at the present time are so like the Malay breed of our do¬ mestic fowl that they might be considered the same. Among the wild fowl now in existence which may have contributed largely or in slight degree to the foundation of the common fowl are gallus bankiva or (gallus ferrugineus) from southern India only ; gallus sonneratii, found in Hindustan; gallus fercatus from Java; gallus stanleyi from Ceylon ; gallus giganteus, the Kulm fowl of the Malay peninsula, and others not so well known.

The principal characteristics of the domestic fowl are as follows: Beak, heavy; gullet en¬ larged to form.a crop; small stomach; gizzard strong to crush hard seed ; two long sseca ; body temperature 105 to 106, varying slightly accord¬ ing to temperature of the environment; feet adapted to scratching, running and perching; wings not suited to long flight; gregarious; polygamous ; domestic in the extreme ; prolific ; period of incubation 21 days ; young covered with down and able to run about as soon as hatched; brave in defense; flesh and eggs prized as human food.

History. — Fowls are the oldest of our do¬ mesticated animals so far as history records. The earliest record is to be found in a Chinese encyclopedia compiled from ancient documents, where it says <(fowls are creatures of the west.ˆ Fowls were introduced into China

1,400 years b.c. and the Chinese considered the Indian region as their source. They were also men¬ tioned by Aristophanes between 400 and 500 b.c., and it is said are figured on Babylonian cylinders between the 6th and 7th centuries b.c. Mention of fowls is also made in the writings of the Greek and Roman authors Theognis, Aristotle, Diodorus, .TEschylus, Plutarch, Plato and Pliny, and are supposed to have been taken into the British Isles by the Romans, who regarded them as sacred to Mars. The cock has in all ages occupied an exalted position as an emblem, symbolizing courage among the ancient Gauls and afterward among the French, who used it on their ensign after the Revolution. It figures also in the Bible and has been used in Christian art to symbolize the Resurrection. At the present day it is regarded by political parties as a herald of victory.

Extent and Importance of the Poultry Industry. — Poultry husbandry is an old art and a comparatively new science for it is only within the present century that special atten¬ tion has been given to raising poultry as a com¬ mercial enterprise and only within the past generation has any real effort been made to

classify the information on the subject into anything like a science. The explanation of this recent advance may be found, first, in the fact that this class of domestic animals sup¬ plies human food that is second only in im¬ portance and value to dairy products. The egg offers the most digestible form of meat known and one which can be cooked in the greatest number of attractive ways, and the flesh forms an article of diet universally prized for its attractive flavor, which is distinctly different with each kind of poultry. In addition to and perhaps of greater importance than the nutritive value of eggs is the vitamine value which eggs possess in large degree and which are essential to growth. The fact that eggs contain all of the nutritive qualities and also the life-giving vitamine principle complete and in proper proportions to sustain the developing embryo chick makes the egg superior even to milk in sustaining human life. The second reason is found in the fact that poultry, particularly fowls and pigeons, are variable and plastic in the hands of the breeder and can be rapidly and skilfully made to ac¬ quire new forms and colors. In no branch of animal husbandry have so striking results been accomplished as in poultry breeding. Ob¬ serve the large number of varieties at the present time and note the contrast between the mammoth Brahma, weighing 12 pounds, and the diminutive bantam of the same name, weighing 20 ounces ; the brilliantly spangled Hamburg and the sombre Orpington ; the long tail of the Yokohama and the inconspicuous, cushion tail of the Cochin; the clean, close feath¬ ering of the Indian game and the abundant, fluffy feathering of the Asiatics ;

the smooth shanks of the Plymouth Rock and the feathered shanks of the Langshan ; the great prolificacy of the sprightly Leghorn and the large, solid muscle of the unproductive, clumsy Indian Game. Also note the great variety of plumage, both in color, color pattern and form of feather in the different breeds and varieties of the domestic fowl. For example, the spangled, laced, penciled, striped barred pat¬ tern and the solid-colored feather, including red, buff, black, white and blue; and in feather forms — ragged in the Frizzles and downy in the Silky; varieties of fowls with eyes varying in color from black to pearl, bay or gray; fowls with rose combs, leaf combs, single or pea combs, spike combs ; fowls with or without beards and crests and showing in their plumage every color of the spectrum.

Equal in variability to the domestic fowl is the pigeon with its vastly different types of colors, sizes, shapes and physical characteristics. Then realize that all of these have been pro¬ duced within the history of man; in the case of the fowl from a single or, at most, a few wild species of jungle fowl, and in the case of pigeons, from the single rock pigeon; more¬ over, domestic fowls, including several hundred varieties, breed reasonably true.

Poultry Statistics 1910 and 1900 in the United States. — The tables on following page give the number of the various kinds of poultry reported in 1910 and 1900, together with their value, and the number of farms reporting each kind in 1910; the number and value of poultry by States, value of products, etc.

Poultry Statistics 1910 and 1900.

KIND

1910 (April 15)

1900 (June 1)

Farms reporting

Number of fowls

Value

Number of fowls

Number

Per cent of all farms

Total .

5,585,012

88. 1

295,876,176

$153,394,142

250,623,354

Chickens .

5,577,218

88.0

280,340,643

140,192,912

233,566.021

Turkeys .

852,679

13.4

3,688,688

6,605,640

6,594,695

Ducks .

503,673

7.9

2,904,359

1,566,176

4,785,850

Geese .

661,189

10.4

4,431,623

3,192,861

5,676,788

Guinea fowls .

339,922

5.4

1,765,033

613,282

0)

Pigeons .

99,409

1.6

2,730,996

762,372

(2)

All other * .

2,005

(3)

14,834

460,899

(2)

1 Included with chickens. 2 Not reported. 3 Less than one-tenth of 1 per cent.

The summary on poultry shows that the total number of farms reporting the different kinds in 1910 was 5,585,012, the total number of fowls being 295,876,176, and the total value $153,394,- 000. Of the total number of farms reporting, nearly all, or 5,577,218, reported chickens, num¬ bering 280,340,643, valued at $140,193,000. The number of farms in the United States report¬ ing poultry increased 489,732, or 9.6 per cent, during the decade. The total number of fowls increased 18.1 per cent, while the relative in¬ crease in their value was considerably over four times as great, amounting to 78.9 per cent. The average number of fowls per farm reporting increased from 49 to 53.

Poultry Statistics from the Census Report 1910, United States.

Number Poultry

1. Iowa. . . .

2. Illinois. .

3. Missouri.

4. Ohio ….

5. Kansas..

6. Indiana..

7. Texas . . .

8. Penn _

9. Minnesota 10. New York

by States.

23,482,880

21.409.835 20,897,208 17,342,289 15,736,038 13,789,109 13,669,645 12,782,341 10,697,075

10.678.836

Value Poultry

1. Iowa. . . .

2. Missouri.

3. Illinois . .

4. Ohio ….

5. New York

6. Indiana..

7. Penn. . . .

8. Kansas..

9. Michigan 10. Texas . . .

by States.

$12,269,881 11,870,972 11,696,650 9,532,672 7,879,388 7,762,015 7,674,387 7,377,469 5,610,958 4,806, 642

Value Products Sold.

$18,362,951

1. Ohio

2. Missouri..

3. Illinois . . .

4. Iowa .

5. Penn .

6. New York

7. Indiana…

8. Kansas. . .

9. Michigan . 10. California.

18,285,980

18,080,352

17,594,432

16,192,756

15,161,114

14,635,464

11,623,882

10,293,428

8,736,282

Dozens Eggs

1. Missouri…

2. Iowa .

3. Ohio ……

4. Illinois ….

5. Kansas….

Produced.

111,816,693

109,760,487

100,889,599

100,119,418

81,659,304

6.

Indiana. . . .

80,755,427

7.

Texas .

77,845,047

8.

Penn .

74,729,705

9.

New York .

72,349.034

10.

Michigan . .

59,915,851

Dozens Eggs Sold.

1.

Missouri. . .

71,886,145

2.

Iowa .

70,835,349

3.

Ohio .

69,575,637

4.

Illinois ….

62,036,857

5.

Indiana ….

53,899,416

6.

Kansas ….

52,833,166

7.

Penn .

52,446,077

8.

New York .

48,074,481

9.

Michigan . .

38,568,386

10.

Minnesota.

34,347,776

Value Eggs Sold.

1.

Ohio .

$13,608,860

2.

Missouri . . .

12,452,508

3.

Iowa .

12,387,353

4.

Illinois ….

11,747,315

5.

Penn .

11,560,908

6.

New York.

11,394,511

7.

Indiana.. . .

10,312,390

8.

Kansas. . . .

8,946,839

9.

Michigan . .

7,547,202

10.

California. .

6,717,426

Average Value per Dozen.

1.

Dist. of Columbia.

$.342

2.

Arizona .

.305

3.

Nevada .

.304

4.

Massachusetts ….

.303

5.

Rhode Island ….

.298

6.

Connecticut .

.290

7.

New Hampshire . .

.277

8.

Montana .

.276

9.

Washington .

.268

10.

New Jersey .

.264

I. American Classes of Poultry.

This class includes six breeds and varieties, as follows :

Plymouth Rocks, six varieties .

Wyandottes, eight varieties. .

Javas .

Dominiques.

Rhode Island Reds Buckeyes.

Barred.

White.

« Buff.

Silver Penciled. Partridge. Columbian. .Silver.

Golden.

White.

Buff.

< Black.

Partridge.

Silver Penciled. Columbian.

\ Black.

I Mottled.

S Single Comb. (Rose Comb.

1. History and Origin. — The oldest varie¬ ties in the American class are only about 55 to 60 years old. Youngest only 10 to a dozen years and new ones developing. All are of mixed origin. Composite breeds all originating in America.

2. Distinguishing Class Characteristics. —

(a) Purpose. General purpose, meat and eggs, and exhibition.

(b) Size and weight. Medium to large.

(c) Type compact, blocky, meaty, symmetri¬ cal, graceful.

(d) Plumage. Moderate in quantity. At¬ tractive in color patterns and types. Numerous colors to suit the fancy: Barred, Penciled, Laced, Mottled, Stripd, Red, White, Black, Buff.

(e) Skin. Yellow medium to coarse.

(f) Attractiveness. Attractive on account of type, carriage and color variations. <(Style Plus.®

(g) Rate of development. Moderately rapid, maturing three to four weeks later than Leg¬ horns under normal conditions, and three to four weeks earlier than Asiastics.

(h) Habits. Non-flying, active, low to medium fences will retain them. Very best of foragers.

JAPANESE & Game

BANTAMS

WHITE & BUFF

LEGHORNS

BUFF & WHITE

WYANDOTTES

RHODE ISLAND REDS

BARRED & BUFF PLYMOUTH ROCKS

BLACK MINORCAS

PTrfK\

LIGHT & DARK

BRAHMAS

BLACK & WHITE

ORPINGTONS

COPYRIGHT, 1912, BY F. K. WRIGHT.

(i) Temperament. Active, but not sprightly, slow but not sluggish.

(j) Hardiness. Very hardy, small to medium comb and wattles. Well-protected bodies.

(k) Maternal qualities. The very best. Courageous and strong. Brooding instinct largely developed, intelligent, kind disposition, medium size, not clumsy. Occasionally bred small for hatching and brooding wild game birds. Smooth shanks are an advantage in brooding.

(l) Disposition. Kind, somewhat combative, but not vicious.

(m) Prolificacy. Except in some instances. The very best of winter layers. Good all-year- round producers. Superior to Asiatics, but in¬ ferior to Mediterraneans.

(n) Eggs. Slightly tinted to very dark brown, mostly lighter tints. Size medium to large. Thick, uniform shells.

(o) Meat production. Excellent. Medium as to quantity and also quality and rapidity of growth. Rocks for large roasters, Wyandottes for broilers or medium to light roasters, and Rhode Island Reds for small to medium roasters.

(p) Breeding efficiency. Most of the breeds are reliable in transmitting their characters, but are not as prepotent as Asiatic or Mediter¬ raneans because a composite group and of more recent origin.

(q) Variable physical characters are: (1) Shanks smooth, yellow except Javas, and re¬ sponsive; (2) Skin yellow (except Javas) ; (3) Comb and wattles medium to large; (4) Ear¬ lobes red; (5) Molting normal.

II. Asiatic.

This class includes three breeds and eight

varieties as follows: Brahmas .

Cochins

Langshans

I

j Dark. •* (Light. Buff.

Partridge.

White.

Black.

\ Black. *• (White.

For breeds and varieties consult the Amer¬ ican Standard. >

1. History and Origin. — These are among the oldest known breeds. None are older ex¬ cept, perhaps, the games. They are of Chinese origin with a parentage too remote to be known.

The size of fowl appeared to be a religious requirement in the country of origin. Have exerted the greatest influence of any class of fowl in the formation of new breeds in this country.

2. Distinguishing Class Characteristics. —

(a) Purpose. Meat and winter egg production and for exhibition. Poor laying qualities. Among the best for heavy roasters and capons, particularly the Brahmas. Especially desirable for capons, especially for crossing for meat pur¬ poses. Rather coarse flesh. For village and gen¬ eral farm rather than large poultry plants, ex¬ cept on roaster farms, (b) Size and weight. The largest and heaviest class, weighing from 11 to 12 pounds for the cock; 7l/2 to 9l/2 for the hens.

(c) Type. Rangy, large bone, open organiza¬

tion. The shape of the breeds differs widely. Brahma erect, stately. Cochin squatty. Lang- shan fall and leggy.

(d) Plumage. Exceedingly heavy. The breeds are parti-colored and solid buff , black and white. The breed of feathers. Withstand cold

weather.

(e) Skin. Yellow and coarse.

(f) Attractive because stately and large.

(g) Rate of development slow, late matur¬ ing both in growth and in egg production. Have a pronounced lank and bony state in develop¬ ment.

(h) Habits. Non-flyers. Do not scratch. Feet on ground all time. Low fences and small yards are sufficient. Naturally good foragers because not timid.

(i) Temperament. Phlegmatic and inactive. Not easily frightened.

(j) Hardiness. Very hardy naturally ex¬ cept when bred in too close confinement for the fancy. Resistant to unfavorable conditions. Not responsive to disturbing climatic conditions.

(k) Maternal qualities. Brooding instinct largely developed. Persistent sitters. Kind, but clumsy mothers. Because of their large size and abundance of feathers, they can cover many eggs and chickens.

(l) Disposition. Kind. Not quarrelsome or combative.

(m) Prolificacy. Poor producers. A large proportion of eggs in late winter.

(n) Eggs. Medium to large in size, but small in proportion to the size of fowls. Fairly uniform in shape and size. Color, light to very dark brown and fairly uniform.

(o) Breeding efficiency. Prepotent because characters long established and proven. Mating efficiency low — Brahmas, 1 male to 8-10 fe¬ males. Langshan, 1 male to 12-15 females. Cochins, 1 male to 6-8 females.

(p) Meat quality. Considered coarse in tex¬ ture but large in quantity for Brahmas and Langshans but to a less extent of which Cochins are not meaty. Brahmas and Langshans are among the best for meat production of any of the larger breeds. Not equal to Orpington or Dorking, Lafleche or Faverolles, Sussex, but as satisfactory as the American class, as Rocks or Wyandottes and better than the Mediter¬ raneans, such as Leghorns, Anconas, etc., espe¬ cially satisfactory for ˆroasters,® but not as broilers.

(q) Variable physical characters, as indicat¬ ing laying condition and productive capacity. Less responsive to feed, fright and tempera¬ ture: (1) Shanks yellow. Feathered; (2) Skin yellow; (3) Comb, pea comb and single comb, small. Wattles medium in size; (4) Earlobes red; (5) Molting habits similar to other breeds.

■ -. v. (y

III. Mediterranean.

In this class are five breeds and 17 varie¬ ties as follows.

Leghorns

1

Single Comb Brown. Rose Comb Brown. Single Comb White. Rose Comb White. Single Comb Buff. Rose Comb Buff. Single Comb Black. Silver.

Red Pyle.

III. Mediterranean — Continued.

Minorcas .

Spanish .

Blue Andalusians. Anconas .

[Single Comb Black.

I Rose Comb Black.

-{ Single Comb White. Rose Comb White. Single Comb Buff.

...White Faced Black

\ Single Comb. . (Rose Comb.

1. Origin and History. — Next to the Amer¬ icans they are the most popular breeds. All from Italy and Spain or in the neighbor¬ hood of the Mediterranean.

2. Distinguishing Characteristics. — Active, non-broody, prolific.

(a) Purpose. Special egg breeds.

(b) Size and weight. Generally light to medium except Minorcas, which are heavy.

(c) Type. Well-balanced proportions. Small boned, compact.

(d) Plumage. Light and close feathered, in many colors, white, buff, brown, red, pyle and black, in the native country; black predominat¬ ing: mostly solid colors, mottled, penciled, striped.

(e) Skin. Fine in texture. Yellow except Minorcas and Spanish.

(f) Attractiveness. Graceful, sprightly, head points and plumage especially artistic.

(g) Rate of development. Rapid in both growth and reproduction, except Minorcas, which are like the breeds of the American class.

(h) Habits. Flyers. Only fair foragers be¬ cause timid. Especially active and industrious in scratching and foraging. Exceedingly active in hunting for food but timid in foraging long distances.

(i) Temperament. Alert, nervous, flighty, quick acting; that is, easily frightened.

(j) Hardiness. Very adaptable to wide ex¬ tremes but more suited to mild climates. Suffer from frozen head appendages, comb and wattles. Very responsive and sensitive to changes in climatic conditions, hence variable in production and physical characters due to environment.

(k) Maternal qualities. Unreliable, largely non-broody, except occasional individuals. Oc¬ casional individuals fairly satisfactory for brooding pheasants. Only about 5 to 10 per cent broodiness per year. Require artificial incuba¬ tion and brooding. Kind but fickle and fussy as mothers.

(l) Intelligence. Especially intelligent, in learning to eat and return to hover when young.

(m) Disposition. Courageous, strong in de¬ fense but not quarrelsome.

(n) Prolificacy. The very highest in fecund¬ ity. Exceedingly precocious. The first eggs laid when four and one-half to five and one-half or six months.

(o) Economical production. Economical pro¬ duction is their strongest point as layers. Cost of production among the least per dozen, or per pound of eggs, due to small size of body.

(p) Feeding advantages. Easy to feed; not as likely to get too fat as heavier, less active breeds. (Except Minorcas).

(q) Egg quality. Eggs are medium to large. All white with but slight tendency to tinted¬ ness. Uniform in shape.

(r) Meat qualities. Generally too small. Lack economical dressing quality. Unsatisfactory ex¬ cept for squab broilers, at three-fourths of a pound to one and one-fourth pounds. Flesh fine grained. Large proportion of breast meat. The muscles used in flight.

(s) Breeding efficiency. Prepotent. A dom¬ inant race well established. Run out other less prepotent races. Mating qualities one to 25 or 40 hens. Mate most freely of any classes. High¬ est fertility and hatching power.

Variable physical characters. Most variable and hence most expressive of laying perform¬ ance. (1) Shanks smooth, non-feathered and yellow (except Minorcas and the Mottled An¬ conas), and of great value in judging birds for quality of egg production; (2) Skin yellow, soft and fine; (3) Comb and wattles medium to large; (4) Earlobes white and very re¬ sponsive to change in color pigmentation; (5) Molting quick and regular.

IV. English Class.

This class includes (1) White, Silver and Gray and Golden Duckwing; (2) Redcaps; (3) Orpingtons, Single Comb Buff, Black. White and Blue; (4) Cornish, Dark, White and White Laced Red; (5) Sussex, Speckled and Red. The English class are, for the most part, de¬ veloped along meat-producing lines, although the general purpose idea of combining egg pro¬ duction has been attempted. The Orpingtons, the Cornish and the Sussex have been de¬ veloped particularly for meat type which has materially decreased egg production qualities. They form the basis, however, of some of the most desirable of our varieties for the pro¬ duction of high quality meat.

V. Polish Class.

This family consists of one breed having eight varieties ; namely, White-Crested Black, Golden, Silver, White, Bearded Golden, Bearded Silver, Bearded White and Buff Laced. They are medium in size, good

layers of white eggs and non-sitters. All have large, showy crests owing to which they fall easy victims to hawks and enemies. They have, in some cases, beards ; small V-shaped combs and slate and willow shanks. As they are chiefly ornamental they are not popular in the United States.

VI. Hamburgs.

This is a Dutch family consisting of one breed and six varieties. Golden Spangled, Silver Spangled, Golden, Silver and White Penciled and Black. They are unsatisfactory for meat and generally considered too small for popular use for egg production.

VII. French.

This class consists of four breeds and five varieties. (1) Houdans, White and Mottled; (2) Crevecours, Black; (3) La Fleche, White; (4) Faverolles, Salmon. All of these varieties are distinctly of the meat-producing type, al¬ though bred as general purpose fowls having fairly satisfactory egg-producing qualities.

VIII. Continentals.

This class consists of Silver and Golden Campines. They are Belgian in origin and are of small size, distinctly of the egglaying type, very prolific and extremely hardy.

POULTRY

1 A POOR LAYER — (a) Yellow color of head, shanks and plumage, (b) New plumage, (c) Small, hard, dried, scale-covered comb, (d) Wrinkled ear lobes, (e) Tucked up abdomen, (f) Full face

2 A GOOD LAYER — (a) Pale color of beak, eye-ring, ear lobes, face, shanks, (b) Old, unmolted, ragged plumage, (c) Full, bright, waxy comb, (d) Full ear lobes, (e) Deep abdomen, (f) Intelligent head

3 and 4 HEAD PARTS — 3 (a) Wrinkled ear lobe. (b) Full face. (c) Face, eye-ring and beak yellow.

4 (a) Full ear lobe, (b) Thin face, (c) Pale color of beak, eye-ring and face

5 and 6 EGG PRODUCTION INDICATED BY THE LENGTH OF TIME OF MOLTING AS DETERMINED BY THE SHEDDING OF THE PRIMARY FEATHERS — It takes about six weeks to completely renew

the primary feather (P) next to the axial feather (A) and an additional two weeks for each subsequent primary feather (P). (Photo¬ graphs taken on 4 December). 5 AN EIGHT-WEEK MOLT (Two feathers completely renewed) — Estimated date stopped laying 9 October. Second year record 164 eggs. 6 A SIX -WEEK MOLT (Primary feather next to axial feather renewed) — Estimated date stopped laying 23 October. Second year record 186 eggs

7 A TWENTY -FOUR WEEK MOLT (Ten feathers completely renewed) — Estimated date stopped laying 21 June. Second year record 75 eggs

8 A TEN-WEEK MOLT (Three feathers completely renewed) — Estimated date stopped laying 25 September. Second year record 121 eggs

9 and 10 HEAD PARTS — 9 LOW PRODUCER (not laying) — (a) Small, hard, dried, scale-covered comb and wattles, (b) Fat face, (c) Yellow color of beak, eye-ring, ear lobes, face, (d) Wrinkled, shrunken ear lobe, (e) Dull, snaky eye. 10 HIGH PRODUCER (full laying) — (a) Full, bright, stiff, waxy comb and wattles, (b) Thin face, (c) Pale color of beak, eye-ring, ear lobes, face, (d) Full ear lobe, (e) Bright, round eye

11 and 12 HEAD PARTS — Same as above

13 POOR LAYERS (in non-laying condition) — (a) Vent yellow, small, hard and puckered, (b) Distance between blunt pelvic bones short, (c) Body full, hard and plump

14 GOOD LAYERS (in laying condition) — (a) Vent pale, large, full and moist. (b) Pelvic bones wide-spread, (c) Skin soft and flabby

15 and 16 SHANKS — 15. (a) Shanks yellow, (b) Shanks full, hard, round in the back. 16. (a) Shanks pale,

(b) Shanks thin, and soft in the back

'

IX. Games and Game Bantams.

This class consists of 16 varieties, eight of which are Black Breasted,

Red, Brow-Red, Golden Duckwing, Silver Duckwing, Birchen, Red Pyle, White and Black, and eight varieties of bantams, minatures of the above. Their purpose is primarily for exhibition and fighting.

X. Orientals.

The Orientals are Sumatras, Black Malay, Black-Breasted Red Malay Bantams, Black- Breasted Red. The glass is primarily kept for exhibition purposes.

XI. Ornamental Bantams.

The Ornamental bantam class consists of (1) Golden and Silver Sebright; (2) White and Black Rose Comb; White Booted; Light and Dark Brahmas; Buff, Partridge, White and Black Cochins; Black Tailed, White, Black and Gray, Japanese Bearded, White, Buff Laced, Non-Bearded Polish and Millefleur (booted).

XII. Miscellaneous.

The miscellaneous class consists of the Silkys, Sultans and Frizzles which are pro¬ duced as oddities and primarily for ornamental purposes and for exhibition.

Education and Research in Poultry Hus¬ bandry. — Among the 62 State agricultural col¬ leges and experiment stations in the United States, only 10 offered courses of instruction in poultry husbandry in any form in 1904, whereas now nearly every State in the Union offers instruction in some form in poultry hus¬ bandry. To Cornell University is due the credit of having given the first regular, course of in¬ struction in poultry husbandry in the United States, which occurred in the winter of 1891 at Ithaca, N. Y. The first specialized short course where the students devote all of their time to poultry instruction occurred at Kingston, R. I., in 1898, at which time a six-weeks' poul¬ try course was given. The first poultry investi¬ gational work in the United States devoted to poultry was at the Maine Experiment Station, Orono, Me., in 1885. In New York State, at the New York State agricultural experiment stations at Geneva, N. Y., and at Cornell Uni¬ versity, experimental work with poultry was conducted in 1889 and 1890, respectively. At the present time practically every State in the Union provides facilities for experimental work in this subject and many States have made as large or larger provision for research work in poultry husbandry as for any branch of agri¬ culture.

More than 75 poultry and pigeon papers are published in the United

States alone, sev¬ eral of which report circulations of from 30,000 to 60,000 copies to each issue. In addition to this nearly all agricultural and livestock papers conduct poultry departments. In order to hatch the billions of chickens produced each year more than 50 kinds of incubators are manu¬ factured in the United States, which leads all nations in this field of inventive skill. In 1890 a 500-hen poultry farm was an object of wonder, but now there are thousands of poultry plants having 2,000 hens and many which have from 5,000 to 10,000 or more, besides broiler vol. 22 — 30

and roaster farms, squab duck and squab pigeon establishments, some .of which turn out more than 100,000 birds per year.

Evolution of Commercial Poultry Hus¬ bandry. — Among the more important discover¬ ies which have had a profound, influence upon the poultry industry may be mentioned: (1) The development of efficient hatching devices. Incubators and the increase in our knowledge of successful hatching have almost completely eliminated the natural methods of hatching by hens on the large commercial farms and has made possible a rapid and extensive expansion of the size of poultry enterprises; (2) The improvement of large flock-brooding systems which enables poultrymen to brood several hun¬ dred chickens in single flocks in portable build¬ ings, which is a material saving in labor and provides for rearing under free range condi¬ tions; (3) Standardized methods of feeding for special purposes which results in larger and more economical production of healthier stock ; (4) Large flock laying houses which reduce cost of construction per bird, economize labor and provide greater comfort, reduce mortality and increase production; (5) Improvement in the breeds as a result of discovery of methods of judging fowls for production by means of external characters and the perfection of methods of marking poultry for future identifi¬ cation, the use of trap nests and pedigree hatch¬ ing trays which enables the breeder to connect up the performance of the progeny with that of the parents, has resulted in greater progress being made in efficient production in the past generation than in the preceding century; (6) The use of artificial light in the control of egg production is one of the most important dis¬ coveries in the efficient management of poultry. By our knowledge of this factor in the eco¬ nomical production of eggs it is now possible to materially increase the proportion of eggs that are normally laid in periods of scarcity and high prices in the fall and winter months in the north temperate climate and to do so without proportionately decreasing the normal production during the remainder of the year. The influence is far reaching in its effect upon the poultry industry due to the fact that by the control of production by means of artificial

light, the poultryman increases the production of eggs laid during periods of high prices and reduces the cost of production without injury to the fowls.

Some of the more important variable physi¬ cal characters used in determining the laying quality of fowls are shown in accompanying plate and explained in the descriptive statement of method of judging fowls for egg produc¬ tion, prepared at the Judging School, State College of Agriculture, Cornell University, and approved by the American Association of Instructors and Investigators in Poultry Hus¬ bandry.

Method of Judging Fowls for Egg Pro¬ duction. — In order to lay well a bird must have a sound body. As a first consideration a bird must be vigorous and healthy if it is to be able to lay well. Vigor and health are shown by a bright, clear eye, a well-set body, a compara¬ tively active disposition and a good circulation. Further, the bird must be free from physical

i r Tjf • ■ ryj • • -yrT “ 1 "" r " 1 – *

.. ILLUMINATION ON PULLET S

✓ NO ARTIFICIAL. Li&HT.

PEN IB AT CORNELL. UNIVcSSITT ITHACA NEW M)RK

Pig. 1. — This graph shows the length of the light and the darkness each month of the year from 28 Nov. to 31 Oct. and the distribution of egg production each month stated in percentage. It will be seen that there is a very marked relationship between the egg production each period and the length of the day. It will be seen that on the 21st of Dec. in New York State the nights are approximately 15 hours long and the days 9 hours long, whereas on 21 March and 21 Sept, the nights and the days are equal and that on 21 June the nights are only 9 hours and the days 15 hours long. It has been found that the digestive system of the fowl has a capacity of about 12 hours between feedings and hence they cannot produce effi¬ ciently when the time between meals is more than 12 hours long. Under the normal day light conditions it will be seen that the largest production is in the months of April, May and June when eggs are cheapest, and least in October, November and December when eggs are highest.

defects such as crooked beak, excessively long toe nails, eyelids that over-hang so that the bird cannot see well, scaly leg or anything else that would keep the bird from seeing or getting an abundance of food.

Loss of Fat Due to Laying. — Color or pigmentation changes. (These should be ob¬ served by daylight). A laying fowl uses up the surplus fat in the body, especially it re¬ moves the fat from the skin. In vellow-skinned breeds this loss of fat can readilv be seen by the loss of the yellow color. The different parts of the body tend to become white according to the amount of fat stored in the body and the amount of circulation of blood through that part. The changes occur in the following order : The vent changes very quickly with egg production so that a white or pink vent on a yellow-skinned bird generally means that the bird is laying, while a yellow vent means a bird is not laying. It should be recognized that all yellow color changes are deoendent on the feed, coarseness of skin and size of bird. A heavy bird fed on an abundance of green feed or other material that will color the fat deep yellow will not bleach out nearly as quickly as a smaller or paler colored bird. The eyering, that is, the inner edges of the eyelids, bleach out a trifle slower than the vent. The ear¬ lobes on Leghorns and Anconas bleach out a little slower than the evering. so that a bleached earlobe means a little longer or greater produc¬ tion than bleached vent or eyelid. The color

ILLUMINATION ON HENS

6 A.M. TO 9 P.M.

PEN 13 AT CORNELL UNIVERSITY ITHACA Nt'AI YORK

Fig. 2 shows the change in egg production brought about by the use of artificial [light from 6 a.m. to dawn and from twilight to 9 p.M. The dotted line plots the curve of production shown in Fig. 1. and which shows in Fig. 2 that a large increase in production was secured in periods of highest prices and with only slight reduction in pro¬ duction in. periods of lowest prices, leaving a net gain of more eggs per year and a larger production of high priced eggs without injury to the hens.

goes out of the beak beginning at the base and gradually disappears until it finally leaves the front part of the upper beak. The lower beak bleaches faster than the upper, but may be used where the upper is obscured by horn or black. On the. average colored, yellow-skinned bird a bleached beak means heavy production for at least the past four to six weeks. The shanks are the slowest to bleach out and hence

indicate a much longer period of production than the other parts. The yellow goes out from the scales on the front of the shanks first and finally from the scales on the rear. The scales on the heel of the shank are the last to bleach out and may generally be used as an index as to the natural depth of yellow color of the bird. A bleached-out shank usually indi¬ cates fairly heavy production for at least 15 to 20 weeks.

The yellow color comes back into the vent, eyering, earlobes, beak and shanks in the same order that it went out, only the color returns much more quickly than it goes out. A vaca¬ tion or rest period can sometimes be determined by the outer end of the beak being bleached and the base being yellow.

Body Changes Due to Laying. — A laying hen has a large, moist vent showing a dilated condition and looseness as compared with the hard, puckered vent of a non-laying hen. The whole abdomen is dilated as well as the vent so that the pelvic arches are widespread and the keel is forced down, away from the pelvic arches so as to give large capacity. The more eggs a bird is going to lay the following week the greater will be the size of the abdomen. The actual size of the abdomen is of course, influenced bv the size of eggs laid and by the size of the bird. Heavy production is shown by the quality of the skin and the thickness and

stiffness of the pelvic arches. Fat goes out from the skin and body with production so that the heavy producers have a soft velvety skin that is not underlaid by lavers of hard fat. The abdomen in particular is soft and pliable. The sternal processes are very prominent and are generally bent outward. The thicker and blunter the pelvic arches and the greater the amount of hard fat in the abdomen the less the production or the longer the time since De¬ duction. One of the finer indications, but yet one of the most valuable in picking the high layer, is the fineness of the head and the close¬ ness and dryness of feathering. The head of a high layer is fine. The wattles and earlobes fit close to the beak and are not loose and flabby. The face is clean-cut. The eye is full, round and prominent, especially when seen from the front. The high layer is trimmer, that is, the feathers lie closer to the body and after heavy production the oil does not keep the plumage relatively as sleek and glossy, but the plumage becomes worn and threadbare.

Changes in Secondary Sexual Characters. — The Comb. Wattles and earlobes enlarge or contract, depending on the ovary. If the comb, wattles and earlobes are large, full and smooth or hard and waxy, the bird is laying heavily. If the comb is limp the bird is only laying slightly, but is not laying at all when the comb is dried down, especially at molting time. If the comb is warm it is an indication that the bird is coming back into production.

Molting. — When a bird stops laying in the summer she usually starts molting. The later a hen lays in the summer or the longer the period over which she lays the greater will be her production, so that the high producer is the late layer and hence the late molter. The length of time that a hen has been molting or has stopped laying can be determined by the molting of the primary feathers. It takes about six weeks to completely renew the primary feathers next to the axial feathers and an additional two weeks for each subsequent primary to be renewed.

Temperament and Activity. — A good layer is more active and nervous and yet more easily handled than a poor layer. A high layer shows more friendliness and yet elusiveness than a poor bird. A low producer is shy and stays on the edge of the flock and will squawk when caught. While the characters discussed have dealt specifically with the current year's produc¬ tion, it should be borne in mind that a high producer one year is, generally speaking, a high producer in all other years.

Bibliography. — American Pekin Duck Co., (How to Make Ducks Lay* (Boston) ; Bradley, O. Charnock, (The Structure of the Fowl * (New York) ; Brown, Edward, (Races of Do¬ mestic Poultry) (London), and (Poultry Hus¬ bandry (London) ; Dryden, James, 'Poultry Breeding and Management (New York) ; Kaupp, B. F., (Poultry Diseases) (Chicago, Ill.) ; Johnson. Willis G., and Brown, George O., 'The Poultry Book) (New York) ; Lewis, H. R., Productive Poultry Husbandrv) (Phila¬ delphia, Pa.) ; Lippencott, W. A., Poultry Pro¬ duction^ Pearl, Surface and Curtis, 'Diseases of Poultry*; Robinson, John H., 'Domestic Birds) (Boston) ; Robinson, John H., Prin¬ ciples and Practices of Poultry Culture* (New York) ; Reliable Poultry Journal (Quincy, Ill.) ;

Poultry Specialty Books, 'The Breeds,* Poul¬ try Houses and Fixtures,* 'Incubation, Brood¬ ing,) etc. (Quincy, Ill.) ; Watson, George C., Parm Poultry> (New York).

James E. Rice,

Professor of Poultry Husbandry, Cornell Uni¬ versity.

POULTRY AS AN INDUSTRY. The

information of the present article will be given under the following divisions: (1) The de¬ mand; (2) conditions of success; (3) details to be observed; (4) the necessary equipment; (5) the profit of the industry.

The Demand.

There is a steady and constantly increasing demand for first-class poultry products, both in the form of eggs and poultry for the table and when the production of either of these com¬ modities is combined with bure-bred poultry the producer has a doubly assured and considerably increased income.

There is certainly no danger of over-stock¬ ing the market, provided the quality be first- class. Statistics prove that the city of Greater New York consumes more eggs each year than the entire Empire State produces. The two States of New York and Pennsylvania consume five times as many eggs as they produce. The importation of poultry into these two States is even proportionately larger than that of eggs. The people who produce the choicest poultry for the tables of the more fastidious residents of our great Eastern cities realize prices more than double the average price of the average poultry products marketed in those same cities. The retail price of strictly first-class eggs dur¬ ing the fall and winter months is more than three times the average summer price of aver¬ age eggs in those same markets. There is a constant demand at these high prices for a product that can be guaranteed strictly first class, while it is only the second-class or third-class products that are at any time a drug on the market. The people are being educated to the fact that there is a vast difference between fowls of the same age for table purposes, and that even fowls of the same variety and age vary largely in quality according to the methods by which they have been fatted and dressed.

Conditions of Success.

There are a few general principles, there¬ fore, that he who hopes to succeed in the poul¬ try business should become familiar with be¬ fore embarking largely in this enterprise. 1. He must ever bear in mind that to acquire the greatest profit he must produce the finest qual¬ ity. The market is generally glutted with the lower grades of poultry and eggs. These are supplied at an actual loss. 2. He must decide upon

some one branch of the business which he will make his specialty, and, having made his decision, he must push that line to the limit, cultivating only as accessory the other minor branches of the industry. In making this de¬ cision he must give careful attention to his own adaptability to his chosen branch of the work, considering well his location and surroundings, his proximity, to market and the demands of that market. 3. He must be prepared to apply the business principles of the business man to

the poultry industry. He must apply the prin¬ ciples of industry, thrift and economy in poul¬ try production with the same energy and per¬ sistence as they are practised in our great manufactories. In fact, he becomes a manufac¬ turer, converting the raw materials of the farm crops into those finely finished products, eggs and poultry.

Details to Be Observed.

Having decided, for example, that egg pro¬ duction for the city markets shall be his chief aim, he must proceed in building up his busi¬ ness with that particular object constantly in view. In this work the following hints will be useful :

1. Selection of His Variety. — He must

keep but one variety, so that his eggs may be as nearly uniform in color and size as possible. Boston calls for a brown egg; New York pre¬ fers a white egg. Each city will pay a few cents per dozen more for eggs of its favorite color. The Asiatics — Brahmas and Cochins — and Americans — Plymouth Rocks and

Wyandottes — produce the brown eggs. The Mediterranean varieties — Leghorns, Minorcas and Anconas — are the largest producers of the white eggs.

He must, however, in selecting his variety, remember that the Brahmas and Cochins will produce but few eggs until eight months old, while the Plymouth Rocks will lay at six months, and the Wyandottes and Leghorns at five months.

If he intends to grow his own young stock he must provide incubators and brooders for the non-sitting Mediterranean varieties, while the Asiatic and American varieties will hatch and rear their own young.

He must also calculate on building warmer and more comfortable houses for the Mediter¬ raneans than will be necessary for the close-fitting rose-combs of the Wyandottes or the small pea-combs of most of the Asiatics. All the Mediterranean varieties have large combs and pendulous wattles, very susceptible to frost. The Plymouth Rocks, with their medium-sized combs, come between the extremes described, in this particular.

The time of year when he stocks his plant will decide whether he shall start by purchasing eggs for hatching or shall purchase fowls for his foundation. If he begins in the spring, and is equipped with incubators for hatching — and few now depend exclusively on the hens for hatching and rearing — then he will start more cheaply by purchasing eggs from some reliable breeder of his chosen variety. In the fall of the year it is best to start by buying pullets then four to six months old and ready to begin producing eggs.

2. Care of the Stock. — No hen can be a profitable egg producer unless she is kept com¬ fortable and happy. More poultry plants have been wrecked and abandoned because of neglect in caring for the fowls than by any other cause. The questions of food and shelter will be con¬ sidered under those headings, so we shall con¬ tent ourselves here with merely mentioning two items :

(a) Cleanliness.— The hen is not an exact¬ ing tenant but she is naturally rather fastidi¬ ous about some things, and she has a right to

be. She must have her bath, and that bath is not a water bath, but a dust bath in which she can wallow occasionally and sift her feathers full of fine dust. This looks to be dirty, but it is not ; simply dusty. Her quarters, further¬ more, must be frequently cleansed. All drop¬ pings should be removed from the dropping- board at least once each week, and a little sweetening of the surroundings by a liquid dis¬ infectant and insecticide is most advisable. Fresh straw as a litter for the floor of the house should be provided occasionally, and the nests — the receptacles for those fresh eggs so susceptible to any taint — should be renewed with fresh material frequently.

(b) Water. — Since an egg is two-thirds water, it seems useless to argue for a constant supply of pure, fresh water. If this is pro¬ vided, a hen will drink 20 times a day. If it is not supplied, her natural thirst will compel her to drink from filthy pools wherever she can find them, even from the cow tracks in the mud of the barnyard. Is it strange that fastidious people are becoming so particular as to specify how the hens that produce their eggs shall be supplied with food and water?

3. The Separation of the Sexes. — This subject is attracting much attention of late, and properly. So soon as the cockerels can be de¬ termined from the pullets they should be sepa¬ rated. Both sexes develop much more satisfac¬ torily when kept by themselves. The cocks should be removed from the yards at the close of the breeding season, say in June, not to re¬ turn until January or February. This much for the best interests of the fowls themselves.

But it is for a better and more certain qual¬ ity of the eggs that we urge a separation of the sexes. When a hen that has been mated pro¬ duces an egg, that egg has been fertilized at a certain point in its passage down the oviduct. From the moment of said fertilization until it is deposited in the nest — under normal condi¬ tions about 12 hours — the heat of the hen's body has caused the process of incubation to progress. If some great excitement prevents the hen from depositing the egg until the next day, the egg shows bloody streaks. We have known eggs to be thus retained by the hen for 60 hours, so that at the time the egg was laid the heart beats of the embryo chick could be seen with the naked eye.

While the process of incubation practically ceases as soon as the freshly-laid egg reaches a temperature as low as 80°, yet succeeding hens coming on the nest, perhaps several of them the same day, each warm that fertile egg up above 90° and the process of incubation is resumed. Where eggs are gathered at irregular periods — too often only ((every few days® — it can readily be seen that only absolutely infertile eggs, those laid by unmated hens, are safely fresh, and many institutions, and even private families, are now making their contracts for <(virgin eggs.®

On the other hand, eggs that are absolutely infertile may be kept in almost any temperature without spoiling. We have placed such eggs in an incubator and kept them there for three weeks at a temperature above 100° all the time, and at the end of that period amateurs could not distinguish them from fresh eggs. Only the infertile egg will bear transportation in warm

weather, and only those who will take care to have such can hope to realize the highest prices.

4. Poultry Diseases. — This subject is now very properly attracting

much attention in our agricultural colleges. All desire to be excused from eating the eggs of a diseased hen. One's comfort comes, however, in the fact that dis¬ eased hens do not lay many eggs. There is a further satisfaction in the knowledge that the much-talked-of fowl cholera is a rare disease. Only a very few well-authenticated outbreaks of this disease have occurred in this country. There are a few other diseases with somewhat similar symptoms that are frequently mistaken for cholera.

(a) Diarrhoea and Dysentery. — These dis¬ eases are both usually brought on by neglect in the matter of food and drink. Pure water is one of the first essentials, and the fowls usually having an unnatural thirst, the pure water is an easy medium for administering some of the simple remedies, such as the Douglass mixture 01 a little carbolic acid in the water. With brooder chicks many of these irregularities of the bowels are caused solely by extremes of heat and cold. Chicks under three weeks old will scarcely endure day and night extremes of more than 15 or 20 degrees without manifesting bowel trouble, however carefully they may be fed. With mature fowls in confinement, a fail¬ ure on the part of the attendant to provide them with grit, gravel, oyster-shell and broken bone is a fruitful cause of these two diseases. Sour and rancid food will also cause diarrhoea, while fowls nearby fed on sound grains will be free from it.

(b) Roup. — This is by far the most com¬ mon disease to which our domestic fowls are subject. It is generally considered contagious, but the most careful experimenters have failed to identify the germ or to inoculate a well fowl from a diseased one. Still we advise caution, and recommend that affected birds be isolated. Roup being simply an aggravated cold which rapidly takes on the catarrhal form, prevention is most advisable. Under buildings we shall urge freedom from draughts and dampness, which are the most prolific causes. The bird taken in the early stages, kept warm and dry, fed liberally, and the throat and nasal passages sprayed with a weak solution of carbolic acid or an emulsion of unrefined petroleum, will generally recover. If he gets seriously ill, kill and bury him.

5. The Kinds of Food. — This is a subject on which volumes could be written. In brief, since analyses show that the egg and the body of the young bird are almost identical, we may conclude that the food that is best for egg pro¬ duction is almost the best also for the growing fowl. When the fowl is grown and is about ready to be fatted for market, then a different ration is best, as will be shown.

For either the growing chick or the egg- producing hen, in addition to

the grits, bone and shell already referred to, the best results are obtained by a liberal supply, in large variety of form, of the three following classifications of food :

(a) The Grains. — These are the natural food of our domestic fowls. They grow in such a variety in this country that there is no excuse for limiting our fowls to a scanty vari¬ ety. Many erroneously suppose that what a hen

picks up first is best for her. Throw down a few handfuls of corn, wheat, oats and millet to a bunch of fowls and the corn will be taken first, the others in the order named. Notice that this is in the order of the size, instinct teaching them to take first that of which they can get the most in the shortest time. Now the corn is the grain that ordinarily should be fed the most sparingly. It is so rich in the carbon¬ aceous, or fat-making, elements that it is nei¬ ther a good egg-maker or a good flesh-pro¬ ducer.* To feed to fowls thin in flesh or to feed on a very cold evening, to enable the fowls to keep up their temperature through a long night, corn is best.

Of all our grains we esteem oats the best. Fowls do not take so kindly to oats as to wheat which we rank as second. Use these two grains alternately. Do not mix your grains. Give them something different each time if possible. Kaffir corn is one of our very best poultry foods. Sorghum seed and broom-corn seed are very similar. Buckwheat and sun¬ flower seed in moderate quantities are excellent. Never feed more grain than they will clean up in a few minutes, unless you bury it among the litter so that they must scratch and work forTt. Better that your fowls be kept slightly hungry and in working condition than too fat.

There is not so much necessity for soft foods as most people imagine. With plenty of grit to do the grinding, fowls will do well a longer time on the grains fed whole than on any other rations. There are, however, two forms of the grains that are urged to be used freely, namely, common coarse bran constantly in boxes, dry, where the fowls, young and old, can get all they will eat of it, and ground oats. This last should be fed mixed with bran for the middle-of-the-day feed — the only time that it is advisable to feed soft, wet food.

(b) The Greens. — The hen at liberty, or in a state of nature, in summer consumes a large quantity of green, succulent food — clover, white clover, alfalfa, lawn-grass, plantain and a score of other forms of greenness will be found in her full crop as she comes up to the perch at night. On such a ration, together with the grains she picks up, she

does her best at the egg-basket, or puts on good flesh the most rap¬ idly. This should teach us, therefore, what to supply her in the cold weather if we wish her to do then the work of summer. We must sup¬ ply these green things to her. Cabbages and mangel wurtzels, one each hung in her pen, are good. Clover and alfalfa, harvested before the stalks have become woody, cut into short lengths, steamed or wet with hot water, and then dried out in part with the bran or chopped oats — this is the most dependable of all green foods in winter.

(c) The Meats. — <(As full as an egg is of meaU is an old-time proverb. The white of an egg is largely albumen, and this is best supplied to the laying hen in some form of meat. The hen at liberty gets many a bug and worm. The hen in confinement must have these supplied if she is to produce eggs. The growing and fattening fowl also needs the meat in some form.

Avoid as far as possible the meat-meals of the trade, of uncertain origin and quite likely to be adulterated. Use the coarse granulated beef-scraps whose contents can generally be dis-

covered. These, having been prepared by steam cooking, keep well in any climate. Add to these an abundant supply of clean-cut bone and the combination is cheaper, richer and better than even the ground bone obtained by grinding fresh bones secured from the butcher.

(d) Fattening Fowls. — Where it is desired to quickly finish either young or old birds for the market, the crate-fattening process has no equal. Two birds are confined to a slatted coop two feet each way, and, for convenience in handling the droppings, the bottoms are slatted also. The most successful food is some skim milk or buttermilk, thickened to the consistency of batter with finely ground and sifted oats. Feed in a small trough in front of the coop all the birds will consume in 20 minutes, then re¬ move the trough, returning it clean for the next feeding. Some give an occasional feed of grit and cut bone with advantage. Three weeks is as long as (birds can be fed by this method; in that time many will gain 40 per cent, some 50 per cent. The improvement in the quality of the flesh is as noticeable as is the increase in quantity. To advance a cockerel weighing three and one-half pounds and worth 10 cents per pound, to one weighing five pounds, worth 15 cents per pound, in three weeks, at a food cost of eight cents, is to almost double one's investment, and many are doing

this very thing. The yellow-skinned bird takes on a quality of flesh well distributed and having the white skin and white flesh so much desired by epicures.

Ration for Fattening Poultry.

The following fattening rations are recom¬ mended by the Cornell Department of Poultry Husbandry :

Ration with Milk. — 50 pounds corn meal ; 20 pounds white wheat middlings; 10 pounds ground heavy oats. Mixed to a batter fresh at each feeding with buttermilk or skim milk. Will require approximately 1 quart (2 pounds) milk to 1 quart (1 pound) feed.

Ration with Meat Scrap. — 50 pounds com meal; 20 pounds white wheat middlings; 10 pounds ground heavy oats; 20 pounds meat scrap. Mixed to a batter fresh at each feeding with water. Will require approximately 1$ quarts (3 pounds) water to 2 quarts (2 pounds) feed.

Methods and Practice. — The Stock: Ra¬ tions recommended for both young and old stock. Birds ((off condition® or of low vitality cannot be profitably fattened. Before putting in crates grease for lice below vent and under wings with equal parts of vaseline and ((one- third strength blue ointment.® The quarters must be clean. Mite-free quarters are neces¬ sary to ensure keen appetites — the keynote of successful fattening.

Crate Fattening. — Construct the crates 36 inches by 20 inches high of slats, using false bottoms of one-inch mesh wire poultry netting and suspend trough outside. The capacity of this crate is 6 to 8 fowls or 10 to 12 broilers, determined by the number that can eat from trough at once. Locate crates in comfortable temperature — outside in shade or open shed for summer use and in reasonably warm house for fall and winter.

Pen Fattening. — For best results limit flock to 20 or 30 birds, allowing two square feet of floor space per bird. To prevent dirt and waste feed in troughs so built that the birds cannot walk in them. The milk ration is to be preferred where milk is available or can be bought at a price not to exceed 45 cents per

40-quart can (55 cents per hundred weight). Feed all they will clean up readily twice daily for about two weeks, which is usually as long as fowls will <(stand up® under such heavy feeding. Broilers may be held longer, espe¬ cially in the case of pen-fattening, when they should be fed grain in the litter at noon. Birds should not be fed for

the first 24 hours so they will eat the new ration greedily. Omit one feeding if at any time birds go (

(e) The Secret of Successful Feeding. — To put it in a word, it is variety. Whether feeding for eggs or for growth, your aim must be to have the fowl consume and assimilate the . largest possible quantity of food and then con¬ vert and manufacture this into eggs or flesh. With the hen as with the dairy cow, the indi¬ vidual with the best digestive apparatus is the one you can feed most profitably, and you must constantly cater to her appetite ; when she gets tired of one thing, have something else more appetizing to tempt her to eat more of it.

The Necessary Equipment.

(a) Houses. — We have already intimated that the houses must be clean and comfortable.

In order to be comfortable they need not be made warm with artificial heat. Fowls will en¬ dure intense cold if it is dry cold. Their bodies generate enough heat, if properly conserved, to keep them comfortable through the danger period — the night time. In the day they should have an opportunity to exercise and make their blood circulate in scratching in the litter on the floor for their grain ration.

The simplest and best houses are usually about 12 feet wide and of any length desired so as to be divided into compartments each 12 feet square. The rear posts are four and one- half feet high, the front posts five and one-half feet high, the rear rafter nine feet long, and the front rafters five feet long. This makes a house low at the iback and only seven feet high at the apex of the rafters, which, is about two- thirds of the distance from the rear to the front.

When the rafters are set, sheeting boards are put on the back and roof lengthwise. Over these the best quality of three-ply tarred paper is placed, running from the ground at the rear to the front eaves. This, if treated to a coat of hot gas tar, twice the first year and once each year thereafter, will last for a dozen years or more, and it will be a house ((air-tight at the back.® The front and ends may be covered with finished weather-boarding and painted, but if so the ends should be lined! with the tarred paper.

Be sure that the house is only four and one- half feet high at the back. Build the dropping- boards three and one-half feet wide, exactly half way between the floor and the roof. Use 2 X 4-inch scantling, flat side up, and running lengthwise of the house, for perches. These, if placed

six indies above the dropping-boards, will place your fowls at night 10 feet distance from the front or cold portion of the house and will give them a very limited space overhead, so the warmth of their bodies will not be scat¬ tered but will be retained where it will keep

most combs from freezing in the coldest weather.

Put one window in the front of each com¬ partment. Do not be too lavish of glass. It radiates the heat and makes the house cold at night. A window 2K X 4ˆ4 feet is large enough. If hung on hinges, it serves as a door through which one can step out from each compartment into its corresponding yard in front. A small exit hole, 8 X 14 inches, in the front for the use of the fowls makes sufficient ventilation in winter. In April the glass hinged windows may be removed and replaced until November or later with wire-screening doors.

All nest boxes, feed boxes, etc., should be attached to the front and sides of each com¬ partment, one and one-half feet above the floor, so as to leave the entire floor area for scratch¬ ing room for the fowls.

Each compartment being 12 X 12 feet, and each hen requiring a floor area of six square feet in order that she may have sufficient room for healthful exercise, it will be readily seen that 24 hens is the proper number of occupants for each compartment. A house of this kind, 120 feet long, divided into 10 compartments, holding 240 hens, should not cost more than $480, or $2 per hen. Do not be deluded into the idea of making the walls double and stuffing the space between with straw or sawdust. The thin walls, if made air-tight as directed, are bet¬ ter in every respect and the house will be dryer and more wholesome.

(b) Incubators and Brooders. — Better buy these from those who have learned how to make them. There are a dozen good incubators on the market. Purchase the one that seems to you simplest and best. After some experience you may learn to make large box brooders out of discarded piano boxes that will save you some money, and give greater area for the chicks than, the brooders you buy. Those of the writer are 5j4 X $y2 feet, two feet high at the back, three and one-half feet high at the front, with a 2 X 3 feet window in the front. They are built on 12-inch plank set edgewise for a foundation, thus allowing room for the lamp- box underneath the back. When chicks no longer

need artificial heat, the heating apparatus may be removed and this brooder used as a colony house for the youngsters until cold weather.

The Profit of the Industry.

This must depend largely upon the intelli¬ gence, skill, energy and location of the operator. On farms the cost of food seldom exceeds $1.25 per hen per year. Where everything is bought, in most localities it need not exceed $2.25 per hen. It is a poor class of hens that cannot be made to average 120 eggs each, and it is a poor manager, anywhere east of the Missouri River, who cannot realize three cents each for those eggs. Deducting food cost of $1.25 the re¬ turns for labor and investment are $2.35 per hen. Many are averaging 180 eggs per hen and receiving four or more cents each for the eggs, which brings the income on the egg business up to approximately $5 per hen.

The best poulterers are combining the branches of the industry by raising pure-bred birds of some variety popular and saleable. They sell most of their surplus eggs for hatch¬

ing during February, March, April and May, the price they realize varying with their reputa¬ tions, from five cents to $1.00 per egg.

Their next sales are from the cull male birds of their early hatchings. These go for broilers, at from 75 cents to $1.50 each, from April to July. The early hatched chicks at one pound each bring more than those three times as large but later, in the Eastern cities.

The early hatched pullets become egg-pro¬ ducers by August and September, just in time to replace the hens that have quit laying on ac¬ count of the molting. The choicest of both sexes are reserved for breeding, show or sale purposes and bring fancy prices. It is no un¬ usual return for such a fancier to have an in¬ come of from $5 to $10 for every hen that he starts the year with, before that vear closes.

For bibliography see article Poultry; also consult Valentine, C. S., (The Beginner in Poultry* 1912; id., (How to Keep Hens for Profit) (1910).

POUNCE (a corruption of pumice), cuttle¬ fish bone or gum sandarach. The resin of the sandarach tree, ground very fine, was used formerly to prevent the spreading of ink on the surface of vellum, parchment or paper where it had been roughened by erasures. In a more general way the term pounce was also used, previous to the invention of blotting paper, for the finely ground black sand which was gen¬ erally used for the purpose of drying ink. The container in

which this sand was kept and which was to be found) on every writing desk was known under the name ((pounce box® or ((pouncet ibox.® Finely powdered gum of the juniper tree or pipe clay, darkened by an ad¬ mixture of charcoal, is also known as pounce when used for the purpose of transferring de¬ signs from the original to some other material. This is accomplished by punching small holes along the outline of the original design and shaking through these openings the darkened pounce which will fall thereby on the material onto which the design is to be transferred in such a manner that the original design can easily be traced in its complete form by means of a pencil, brush or similar instrument.

POUND, Ezra Loomis, American poet: b. Hailey, Idaho, 30 Oct. 1885. He was edu¬ cated at Hamilton College and at the University of Pennsylvania. He later traveled in Spain, Italy and Provence, engaged in literary studies. He became known for his verse and has also produced several translations and some prose work. He was literary executor for Ernest Fenollosa's work on Japanese classical drama and on Japanese and Chinese poetry. He has contributed to the Fortnightly Review, the Quarterly Review, Blast and other publications, and makes his home in London, England. Au¬ thor of, verse, (Personas) (1909) ; (Exultations) (1909); (Ripostes) (1912); (Cathay) (1915); (Lustra) (1916), etc.; prose, (The Spirit of Romance) (1910) ; (Gaudier Brzesha) (1916). His translations include (The Sonnets and Bal¬ lads of Guido Cavalcanti) (1912-13) ; (Certain Noble Plays of Japan) (1916). He edited (The Catholic Authology) (1915).

POUND, Roscoe, American college profes¬ sor: b. Lincoln, Neb., 27 Oct. 1870. He was graduated at the Universitv of Nebraska in 1888 and later studied at the Harvard Law

School. He was admitted to the bar in 1890 and engaged in practice at Lincoln, Neb. He was assistant professor of law at the University of Nebraska in 1899-1903, and dean of the law faculty there in 1903-07. He was pro¬ fessor of law at the Northwestern University in 1907-09 and at the University of Chicago in 1909-10. He was Story professor of law at Harvard in 1910-13, and has since been Carter professor of jurisprudence there. He was commissioner of appeals of the Supreme Court of Nebraska in 1901-03; and commissioner from Nebraska on uniform State laws in 1904— 07. He was president of the Association of American Law Schools in 1911. Author of (Readings on the History

and System of the Common Law5 (1904) ; (Readings on Roman Law5 (1906) ; (Lectures on the Philosophy of Freemasonry5 (1915), etc.

POUND, (1) an English weight of two dif¬ ferent denominations, avoirdupois and troy. Since 1856 the legal original standard weight in Great Britain and her colonies has been the im¬ perial pound avoirdupois, a cylindrical mass of platinum, grooved near the top and bearing the mark <(P. S. 1844 1 lb.,55 the two letters P. S. signifying Parliamentary Standard.55 The pound troy in Great Britain is defined as 5,760 grains and is divided into 12 ounces, being used almost entirely for weighing gold, silver and precious stones ; the pound avoirdupois contains 7,000 grains, divided into 16 ounces, and is used for all ordinary commodities. The imperial stand¬ ard troy pound constructed in 1758 was the only legal original standard weight between the years 1824 and 1856, but previous to these years cer¬ tain weights, both troy and avoirdupois, had been the standards. These standards were not very accurately constructed, and through con¬ stant use became worn, but the pound avoirdu¬ pois probably contained as much as 7,002 of our present grains, while the pound troy weighed 5,759 grains. In the United States the British imperial pound avoirdupois has been copied to a great extent, but in theory the pound avoirdupois of Elizabeth is legal in this country. Edward III, from evidence in the official records, made the pound avoirdupois the standard, and Elizabeth probably copied her standard from his 56-pound weight, although standards had existed since 1497. The troy pound derives its name from the city of Troyes, where it was used as the standard of weight in the fairs held in that city. In 1497 it was made the legal weight for gold and silver and some authorities claim it was also used for bread, being known as the (

erally affixed to discriminate from the pound weight. (See Weights and Measures). (3) In law, an enclosed space for keeping cattle which have strayed on another man's ground, until they are replevined or redeemed. When cattle are put into pound it falls to the person impounding them to feed them, but he is en¬ titled to charge the owner of the cattle the cost of keeping them in settling with him for the amount of damages to be paid. In England, an attempt to release from a pound cattle lawfully impounded is punishable by a fine. In Scotland the seizing of stray cattle and keeping them till damages are paid is called poinding of catde.

POUND-NET FISHING, any fishing which is conducted by means of fixed en¬ closures of considerable size into which the fish are led by suitable guides, and within which they are confined by appropriate devices. Under this head will be included the pound-nets proper and

trap-nets, as well as the simpler forms of weirs, which together constitute a class of automatic fishing gear quite distinct from the various forms of seines, gill-nets, etc., on the one hand, and the small fish-traps, baskets and eel-pots on the other. Devices of this sort are employed in the prosecution of the fisheries in many parts of the world, but the method, al¬ though not originating in the United States, has here been more highly elaborated and is more characteristic of our fisheries than else¬ where. The precise form and construction of pound-nets varies greatly in different localities, owing to the necessity of adapting it to local conditions of bottom, tides, currents, the kind and number of the fish sought, the available capital, resourcefulness of the fishermen, etc. The terms weir and pound in connection with the fisheries are to a great extent used inter¬ changeably, according to local custom. The chief distinction between a weir and a pound- net seems to lie in the character of the en¬ closure within which the fish are confined. In the former this is more fixed and has no bottom which can be lifted; in the latter the pound is a netting bag which can be raised to the sur¬ face.

The most primitive apparatus of this sort in use in the United States is represented by the brush weirs employed in the herring fisheries of Maine and Canada. These consist of brush walls constructed of stout stakes driven into the bottom to a distance of about six feet and three feet apart. Between these brush, preferably of cedar or spruce for the bottom course, is woven in and out and held firmly in place by smaller stakes placed on the outside and bound to the large body-stakes. Toward the top a looser construction is adopted and the brush is placed vertically, as being less liable to be carried away by the current. Sometimes the brush is con¬ structed in sections ashore and subsequently attached to stakes driven in the proper positions. This has the advantage that the brush sections can be removed and saved at the close of the fishing season, whereas the ordinary weirs, with the exception of such brush as can be removed from the tops, are likely to be totally destroyed by the winter's storms. When weirs are located on a bottom of solid rock into which no stakes can be driven, recourse is had to the construc¬ tion of a platform of solid plank, which serves as a bottom to which the poles are fastened.

The whole is heavily weighted and held in place by loading it with stones.

A pound-net in tnisTcwˆoˆe restricted sense of the term is constructedra/itirely of cordage netting, supported and held in place by stakes, and consists of three essential parts; the pound or bowl, the wings and the leader. The pound is located off-shore, usually in from two to four fathoms of water and consists of a bag of very stout netting of about one inch mesh, the margin of which is supported above the level of the water by stout upright stakes driven into the bottom at suitable intervals which vary with the character of the ground and the force of the waves and currents. Where the bottom is rocky further security is found by the attachment of anchored guy ropes to some of the stakes. The only opening in the pound is the slit-like en¬ trance, usually about six feet across, on the in¬ shore side. At this point the walls of the net are carried inward, in order to render the open¬ ing less conspicuous from the inside, and are so arranged that by means of suitable ropes they may be used to close the opening when the net is drawn. The bottom of the pound is spread and secured by means of ropes which pass through loops or pulleys near the bottom of the stakes.

The wings are vertical fences of netting, diverging from the entrance to the pound and having a length of 100 feet or more. The ends directed toward the shore are carried toward one another in the form of a semi-circle, but leaving a wide opening between the two wings. The netting of which the wings are constructed is lighter than that forming the pound, and of about one and one-half inches mesh. It is sup¬ ported by stakes and reaches from the bottom to the surface, the lower border being weighted with a heavy chain.

Any form of enclosure employed in the cap¬ ture of fish may be called a trap, and trap-net is frequently used as an equivalent of pound- net. The best usage of the term, however, is to indicate those forms of pound-nets which are especially adapted to deep waters or a con¬ siderable tidal rise and fall by the attachment to the upper margin of the nets of floats which keep it always level with the surface. When surface-swimming fish only are sought, the parts which correspond to the leaders and wings of pound-nets frequently hang suspended above the bottom. The whole is of course held in position by a suitable system of ropes, anchors and moorings. This type of apparatus is an approach to the floating gill-net, the sets of which are often arranged in the form of leaders and enclosures. Much information re¬ lating to all phases of the use of pound-nets in the American fisheries will be found scat¬ tered through the cAnnual Reports) of the United States Bureau of Fisheries and of the commissions of the various States in which these fisheries are located, and especially in the fisheries Industries of the United States) (Washington 1884-87).

POUNDAL. See Force; Mechanics.

POURBUS, poor-bus, Frans, The Elder, Flemish painter: b. Bruges, 1545; d. Antwerp, 19 Sept. 1581. He was a pupil of his father Pieter, the Younger, and of Frans Floris, and became a free master of the Guild of Saint

Luke at Antwerp in 1564. He died of a malig¬ nant fever caught in the guard house of the civic guard of which he was standard bearer. His wife, the daughter of Frans Floris, married Jordaens, the painter, after the death of Pour- bus. He painted historical subjects, landscapes, animals and portraits ; in the last-named depart¬ ment his work is best known. Several re¬ ligious subjects are to be found in the cathedral of Ghent and in churches of Antwerp and Ou- denarde. Other works by him are in museums of Antwerp, Berlin, Brussels, Ghent, Petrograd and Vienna.

POURBUS, Frans (The Younger), Flem¬ ish painter : b. Antwerp, 1569 ; d. Paris, 1622. He was a pupil of his father Frans Pourbus, the Elder, and doubtless studied with others, for his father died when he was 12. He was a free master of the Guild of Saint Luke in 1591. After 1600 he resided at Brussels, then in Italy at the court of the Duke of Mantua, and after 1610 was court painter to Henry IV of France. Of the latter monarch he painted several portraits; he painted also Marie de'-Medici, the Louvre portrait of the queen being accounted his greatest work. Works by him are to be found in museums at Hampton Court, Madrid, Munich, Paris, The Hague and Vienna. His portraits are inferior to those of his father in warmth of color.

POURBUS, Pieter, The Elder, Flemish painter: b. probably Gouda, 1463. He is sup¬ posed to be the father of Pieter the Younger and grandfather of Frans the Elder. A por¬ trait of a goldsmith, now at Vienna, is assigned to him.

POURBUS, Pieter (The Younger), Flem¬ ish painter : b. probably Gouda, 1510 or 1513 ; d. Bruges, 1584. He was a pupil of his father and probably of Lancelot Blondeel whose daughter he married. In 1540 he entered the Serment des Arbaletriers de S. George and in 1543 became a free master of the Guild of Saint Luke, of which he was "doyen® in 1569 and 1580. As he did not buy his citizenship at Bruges it is argued that his father may have moved thither from Gouda before his birth. He worked as deco¬ rator and surveyor, having remarkable gifts as a geometrician; but he is known chiefly as a portrait painter. His portrait of Dr. Ambroise Pare is owned by the New York Historical Society. Other works by him are in churches of

Antwerp and Bruges and in museums of Brussels, Paris, Rotterdam and Vienna.

POURTALˆS, poor'ta-las', Count (Graf) Friedrich von, German diplomat: b. 24 Oct. 1853. He is descended from a noble French Huguenot family domiciled in Switzerland since the revocation of the Edict of Nantes. Three brothers were made Prussian counts in 1815, and members of the family have long served Germany in bureaucratic, military and diplo¬ matic capacities. The subject of this sketch served as lieutenant of Hussars in the German army and was attached to the Foreign Office in 1880. After serving in secretarial positions in Vienna, at The Hague and Saint Petersburg (Petrograd), he became Ambassador to Hol¬ land in 1899, to Munich in 1902, and to Russia in 1907. In the last-mentioned post he handled the negotiations preceding the European War. He did not figure prominently in the diplomatic

history of that war, though the British Am¬ bassador in Pctrograd telegraphed to Sir Ed¬ ward Grey on 29 July 1914: (

*POURTAL&S, Louis Frangois de, Swiss- American naturalist: b. Neuchatel, Switzerland, 4 March 1824; d. Beverly Farms, Mass., 17 July 1880. He studied engineering but turned to natural science ; was a pupil of Louis Agassiz (q.v.), whom he assisted in 1840 in an explora¬ tion of Alpine glaciers ; and in 1847 came with him to America, where the next year he entered the United States coast-survey. He was the first in this country to attempt deep-sea dredg¬ ing. Among his important researches in this field were those conducted during the Hassler expedition from Massachusetts Bay to Califor¬ nia by way of the Straits of Magellan. From 1854 until his resignation from the survey in 1873, he was in charge of the office and field work of the tidal division. His chief work was accomplished in marine zoology, and the large collections accumulated by him in con¬ nection with that subject were deposited in the Harvard museum of comparative zoology in which he was for a number of years an assist¬ ant, and as keeper of which he succeeded Agassiz in 1873. The genus Pourtalcsia of sea- urchins was named after him. His writings include, besides articles in scientific journals and contributions to the survey reports, the following works among several published by the Cambridge museum: Contributions to the Fauna of the Gulf Stream at Great Depths) (1863-69) ; Cist of the Crinoids Obtained on the Coasts of Florida and Cuba in 1867-69 * (1869) ; (Deep-Sea Corals* (1871) ; (The Zoological Results of the Hassler Expedition**

(with A. Agassiz, 1874) ; Corals and Crinoids (1878); a report on Corals and Antipatheria**

(1880).

POUSHKIN. See Pushkin.

POUSSIN, poo-saii, Gaspar, Italian painter : b. Rome, 1613; d. there, 15 May 1675. He was the son of a Frenchman named Dughet, who had settled at Rome but in signing his etchings he Italianized the paternal name into Duche. When his sister married Nicolas Poussin he took the name of his brother-in-law, whose studio he entered as pupil. The standard land¬ scape of his day was that of Claude Lorraine, but Poussin was not so conventionally classical but more true to the animalism of nature than his great rival, the transparent lucidity of whose aerial perspective he never attained to. As he painted on a red background his pictures have so darkened by age that it is hard to imagine their effect when first produced. It can, how¬ ever, be seen that he discerned the true lines of a landscape ; that he composed with natural grace his groups of forest trees and antique ruins; and that his land storms, in which the trees seem to quiver and bend, are genuine transcripts from tempest-harried plain and mountain. He was imitated by many painters of his day. The best of his pictures are at Rome. They are painted in tempera or oil, and examples of both styles may be seen in the Palazzi Doria, Colonna Barberini, Borghese and Corsini and in the gallery of the Accademia di

San Luca. At Rome he executed the frescoes (History of Eli j Elisha* in the church of San Martino "P ^^ffi. There are pictures of his to be fourP fin the galleries of Paris, Petrograd, Florence, Munich, Stockholm, Vienna, London, Madrid and Dresden, and a great number are scattered through the private gal¬ leries of England and through the public gal¬ leries of many small European cities. He was one of the most prolific and finished painters of his time so that to-day more than 200 of his pictures are to be found in various European galleries and collections. Two of his land¬ scapes are in the New York Metropolitan Museum of Art.*

POUSSIN, Nicolas, French painter: b. Les Andelys, Normandy, 15 June 1593; d. Rome, 19 Nov. 1665. He studied first in his native place, and then at Paris. He had already acquired considerable reputation when, in 1624, he went to Italy, where at Rome, Marini, the poet, in¬ spired him with a taste for the Italian poets, in whose works Poussin found many subjects for his art. After the death of Marini (1625), though left without patronage, he continued the study of geometry, perspective, architecture, anatomy, as well as the practice of his art. His conversation, his walks, his readings were also almost always connected with it. He copied antiques,

modeled statues and reliefs, diligently painted from nature; and all his works show the results of this study. At last he was at¬ tacked by an illness brought on by his labors. He was, however, taken care of by a French¬ man, Jacques Dughet, the father of Gaspar Poussin (q.v.). In 1630 Poussin married the daughter of his benefactor. About this time his affairs began to improve. He found patrons in Cardinal Barberini and the Cavaliere Cas-siano del Pozzo, for whom he painted the cele¬ brated (Seven Sacraments. These works like¬ wise gained him celebrity in France; and Cardi¬ nal Richelieu invited him to Paris to paint the great gallery of the Louvre. Louis XIII ap¬ pointed him his first painter, with a pension of 3,000 livres. Poussin arrived in Paris in 1640, and executed numerous works, particularly his¬ torical pieces from the Old Testament, but was much harassed by his enemies. The painter Jacques Fouquieres had been employed to decorate the gallery and the architect Mercier had overloaded it with ornament. Poussin found himself under the necessity of removing their labors. He also had to contend with the whole school of Simon Vouet. Harassed on every side he determined to leave Paris. In September 1642 while employed on cartoons of the (Labors of Hercules* for the gallery of the Louvre, he returned to Rome (ostensibly for the purpose of bringing his wife to France) and never again quitted that city. The second period of his life in Rome was even more pro¬ ductive than the first. Many of his works were the result of orders that came to him from admirers in Paris, especially from de Chantelou, an influential courtier, for whom he painted, between 1644 and 1648, a second series of (The Seven Sacraments.* As a painter his drawing is remarkably correct; his composition dignified and ndble ; his invention rich; his style grand and heroic. His expression approaches that of Raphael, and he has been called the Raphael of France. He has been censured for a too*

studied arrangement and a too great propensity to episodes ; too much uniformity in the atti¬ tudes, air and expression of his figures; an excessiye fulness in the drapery and too small proportions in his figures — faults which may have been owing to his close imitation of the ancients. But notwithstanding these faults Poussin may be compared with the greatest Italian masters. Among his most celebrated works are (Seven Sacraments) ; ; (Moses bringing Water from the Rock) ; (The Worship of the Golden Calf ' ; 'John Baptizing in the Wilderness,' etc., and many fine landscapes. The largest collection of Poussin's works is to be found in Paris, the Louvre alone containing 39. London, too, holds many of his paintings, and practically every one of the more important European galleries owns specimens of his work. Only comparatively few, however, have remained in

Rome. Three of his pictures may be seen in the New York Metropolitan Museum of Art.

Bibliography. — Advielle, Victor, 'Re- cherches sur Nicolas Poussin) (Paris 1902) ; Andresen, A., (Verzeichnis der Kupferstiche nach Nicolas Poussin' (Leipzig 1863) ; Bou- chitte, H., (Le Poussin, sa Vie et son CEuvre' (Paris 1858) ; Callcott, Lady Maria, 'Memoirs of the Life of Nicolas Poussin' (London 1820) ; Denio, E. H., (Nicolas Poussin, his Life and Work) (London 1899) ; Friedlaender, W., 'Nicolas Poussin) (Miinchen 1914) ; Gandar, E., 'Les Andelys et Nicolas Poussin) (Paris 1860) ; Gault de St. Germain, 'Vie de Nicolas Poussin) (Paris 1806) ; Landon, C. P., "Vie et CEuvre complete de Nicolas Poussin® (in 'Vies et CEuvres des peintres les plus celebres de toutes les ecoles,' Vols. IV-VII, Paris 1803— 20) ; Magne, Emile, 'Nicolas Poussin, premier peintre du roi, 1594-1665 > (Bruxelles 1914) ; 'Correspondance de Nicolas Poussin' (Paris 1911) ; 'CEuvres completes de Nicolas Poussin" (Paris 1841).*

POUT, or HORNED POUT. See Bull¬ heads.

POUTER, a variety of fancy pigeon, the chief character of which is its projecting highly inflatable breast. See Pigeon.

POUTRINCOURT, Jean de Biencourt.

See Biencourt de Poutrincourt, Jean.

POW-WOW, an American Indian term meaning (1) a ceremony, with conjurations, held for the curing of diseases; (2) a consulta¬ tion of chiefs or leaders; a deliberation over important tribal matters. In colloquial use pow-wow is used in American politics as ap¬ plied to any noisy meeting or gathering.

POWDER, a general name applied to ex¬ plosive as gunpowder, giant powder, etc. See Explosives.

POWDER-DOWN FEATHERS. See

Plumage.

POWDERLY, Terence Vincent, Ameri¬ can labor leader and lawyer : b. Carbondale, Pa., 22 Jan. 1849. His early education was ob¬ tained in the public schools and he then J1862) became a railroad switch tender. At 17 he became a machinist's apprentice, settled in Scranton, Pa., in 1866, and there worked as a

machinist until 1877. He was elected mayor of that city on the labor ticket

in 1877 and re¬ elected in 1880 and 1882. He was General Mas¬ ter-Workman of the Knights of Labor in 1879- 93, but resigning in the last-named year took up the study of law . and was admitted to the bar of Lackawanna County in 1894, and in 1901 to that of the Supreme Court of the United States. He was United States commissioner- general of immigration 1897-1902, special repre¬ sentative of the Department of Commerce and Labor to study causes of emigration from Europe 1906 and since 1907 has been Chief of Division of Information in Bureau of Immi¬ gration to distribute immigrants throughout the United States. He has lectured frequently, made many Republican campaign speeches in 1896 and 1900 and published 'Thirty Years of Labor 1858— 89> (1899-1900) ; 'History of Labor Day' ; and articles on economics in numerous magazines. In collaboration with S. C. T. Dodd he published 'Trusts) (1892) and also contributed with others to 'The Labor Move¬ ment (1887).

POWELL, Baden, English Anglican clergy¬ man and mathematician : b. Stamford Hill, Lon¬ don, 22 Aug. 1796; d. London, 11 June 1860. He was graduated from Oriel College, Oxford, in 1817, took orders in the English Church and became vicar of Plumstead, Kent, in 1821. He was elected a Fellow of the Royal Society in 1824, and in 1827 was appointed Savilian pro¬ fessor of geometry at Oxford, on which occa¬ sion he resigned his living of Plumstead. He was the father of the famous English general, Sir Robert S. S. Baden-Powell (q.v.). He con¬ tributed many papers on optics, radiant heat and other physical subjects to the 'Philosophical Transactions> ; and published a 'History of Natural Philosophy) (1834) ; but he is better known by his essay "On the Study of the Evi¬ dences of Christianity® (in 'Essays and Re¬ views, > 1860). Earlier theological works of a similarly liberal character are 'The Connexion of Natural and Divine Truth' (1838) ; 'Tradi¬ tion Unveiled) (1839) ; 'The Unity of Worlds' (1855) ; 'The Study of Natural Theology' (1856) ; 'Christianity without Judaism' (1857) ; and 'The Order of Nature' (1859).

POWELL, Edward Payson, American Unitarian clergyman and author : b. Clinton, N. Y., 9 May 1833 ; d. Sorento, Fla., 14 May 1915. He was graduated from Hamilton Col¬ lege in his native town and from Union The¬ ological Seminary, New York, in 1858. Enter¬ ing the Congregational ministry he was pastor at Adrian, Mich., 1861-71, and of the May¬ flower Congregational Church, Saint Louis, 1871-74. From 1874 to 1877 he held a Unitarian pastorate in Chicago and has since been editori¬ ally connected with secular and religious jour¬ nals to which he has contributed numerous articles on outdoor life and kindred subjects. He has published 'Our Heredity from God' (1886); 'Liberty and Life' (1890); 'Nullifica¬ tion and Secession in the United States' (1896) ; 'Wind-breaks,

Hedges and Shelters' (1900); 'The Country Home' (1904) ; 'In the Orchard and Fruit Garden' (1905) ; 'How to Live in the Country' (1910).

POWELL, Frederick York, English his¬ torian: b. London, 14 Jan. 1850; d. Oxford, 8 May 1904. He was educated at Rugby and

Christ Church, Oxford, and was appointed re- gius professor of modern history at Oxford, in 1894, succeeding Froude. He also acted as the University's delegate to the Clarendon Press. He was especially known as an Ice¬ landic scholar. Together with Dr. Gudbrand Vigfusson he edited (Icelandic Antiqua) (1876); Ucelandic Prose Reader) (1881); (Corpus Poeticum Boreale: The Poetry of the Old Northern Tongue from the Earliest Times to the Thirteenth Century (1883) ; and Eng¬ ines Islandicae) 1905. Although not possessing as great or as wide a reputation as some of his predecessors at Oxford, he was a scholar of deep learning and a man of broad sympathies. He was an extensive contributor to newspapers and journals on historical and literary subjects. He published a number of historical books, the most important of which are (Early England up to the Norman Conquest* (1876) ; (01d Stories from British History) (1882) ; his¬ tory of England from the Earliest Times to the Death of Henry VIP (1885) ; (The Tale of Throud of Gate* (1896) ; and (Quatrains from Omar Khayyam* (1901). He also acted as editor of (English History by Contemporary Writers* (1887) ; and (Scottish History by Con¬ temporary Writers* (1890). Consult Elton, Oliver, Frederick York Powell* (Oxford*

1906).

POWELL, John Wesley, American geol¬ ogist : b. Mount Morris, N. Y., 24 March 1834; d. Haven, Maine, 23 Sept. 1902. He was edu¬ cated at Illinois and Wheaton colleges, studied also at Oberlin and made researches in natural history and geology. At the outbreak of the Civil War he enlisted as a private in the 20th Illinois volunteers. As a result of a severe wound, suffered in the battle of Shiloh, he lost his right arm. At the expiration of his term of service in the spring of 1865 he returned to civil life, after having been promoted to the rank of major. In 1865 he was appointed pro¬ fessor of geology and curator of the museum at Illinois Wesleyan University at Blooming¬ ton, and in 1867 lecturer and curator at the State Normal University. He conducted in 1868 a perilous exploration of the grand canyon of the Colorado, and in 1870 took charge of the newly established geological and topographical survey of the Colorado River of the West. By this survey nearly 100,000 miles of the Colorado Valley were

carefully explored. The work was subsequently transferred to the Interior Depart¬ ment. By 1874 there were four surveys in the field, and this led in 1879 to the establishment of the organization known as the United States Geological Survey, in the formation of which Powell was largely instrumental. From 1881 to 1894 he was director of the survey. He also made a particular study of American ethnology and obtained the organization of the Bureau of Ethnology, of which he was the director until his death and which he trained to a high plane of scientific efficiency. His studies of the In¬ dians are deemed of great value. As adminis¬ trator of the survey, which included also eco¬ nomic geology, geography and palaeontology, he was very successful. Later in his life he de¬ voted considerable attention to philosophy and psychology. He secured valuable legislation in connection with the land laws affecting the de¬ velopment of the arid West. In May 1918 a

memorial in form of a stone altar supporting a bronze tablet engraved with a brief account of Powell's expedition to the Grand Canyon of Colorado was erected on the brink of the Grand Canyon in commemoration of the ex¬ plorations accomplished by the expedition. Among his writings are (Exploration of the Colorado River (1875) ; (Report on the Ge¬ ology of the Uinta Mountains* (1876) ; (Intro¬ duction to the Study of Indian Languages* (1877) ; (Studies in Sociology* (1887); Undian Linguistic Families of America, North of Mex¬ ico* 1891) ; (Canyons of the Colorado* (1895) ; (Truth and Error; or the Science of Intellec¬ tion* (1898) ; and (First Through the Grand Canyon* (1915).*

POWELL, Lyman Pierson, American college president: b. Farmington, Del., 21 Sept. 1866. He was educated at Johns Hopkins Uni¬ versity and the University of Wisconsin and in 1 893—95 he was a Fellow of the University of Pennsylvania. He was ordained deacon in the Protestant Episcopal Church in 1897 and priest in 1898; was rector at Landsdowne, Pa., in 1898-1903, and at Northampton, Mass., in 1901- 12. In 1912 he became professor of business ethics at New York University and since 1913 he has been president of Hobart College and William Smith College. He edited (American Historic Towns (4 vols., 1898-1902) ; Cur¬ rent Religious Literature* (1902) ; (Devotional Series* (3 vols., 1905-07) ; (Religion in Our Colleges and Universities* (1912) ; and is au¬ thor of (The History of Education in Dela¬ ware* (1893) ; (Family Prayers* (1905) ; (Christian Science — the Faith and its Founder* (1907; (Heavenly Heretics* (1910).*

POWELL, Maud, American violinist: b. Peru, Ill., 22 Aug. 1868; d. Uniontown, Pa., 8 Jan. 1920. She received her musical education at Chicago, Leipzig, Paris and Berlin, studying under William Lewis, Henri Schradiech, Dancla and Joachim and made her debut at Berlin in 1885.

She was married to H. Godfrey Tur¬ ner of London in 1904. She was soloist with many of the great orchestras, including those of Thomas, Siedl, Gericke, Nikisch and Damrosch. She toured Germany and Austria with the New York Arion Society in 1892 ; the British Isles and European countries in 1899-1901, and in 1903- OS; and also toured South Africa in 1905. After 1903 she appeared in America every musical season. She attained a high reputation and held a large and appreciative following. She was noted for her interest in new compositions and in arousing her audiences to appreciation of them, and she was likewise keenly on the alert for excellence in the work of American composers.

POWELL, William Byrd, American physi¬ cian and cerebral physiologist : b. Bourbon County, Ky., 8 Jan. 1799; d. Henderson, Ky., 3 July 1867. He became noted by reason of his work, (The Natural History of the Human Temperament (1856), announcing the theory known as Powell's life-line, and his novel views concerning the results of marriage within near or prohibited degrees of consanguinity. He was graduated from Transylvania University, at Lexington, Ky., in 1820, and from the Tran¬ sylvania Medical School in 1823. In 1835 he was appointed professor of chemistry in the Medical College of Louisiana, holding that posi-*

tion for several years. In 1843 he began a so¬ journ among the American Indians, adopting their dress and manners in order to study their habits, dispositions, longevity, etc., and secured the crania of many warriors and chiefs. In 1849 he organized at Memphis, Tenn., the Mem¬ phis Medical Institute, heading its department of cerebral physiology. He held a similar posi¬ tion in the Cincinnati Eclectic Medical Insti¬ tute 1856—59. In 1865 he was made professor emeritus of cerebral physiology in the New York Eclectic Medical Institute. He be¬ queathed his head to his literary executor to be preserved with his collection of crania con¬ taining some 500 specimens. He was a mem¬ ber of many domestic and foreign scientific so¬ cieties and a frequent contributor to medical journals. Beside (The Natural History of the Human Temperament (1856) he published (Eclectic Treatise on the Diseases of Chil¬ dren (1857) ; and, with Dr. Robert S. New¬ man, (The Eclectic Practice of Medicine>

(1857).

POWELSON, Wilfred Van Nest, Ameri¬ can naval officer : b. Middletown, N. Y., 15 Sept. 1872. He was graduated from the United States Naval Academy in 1893 and was then sent by the government to study naval

archi¬ tecture at the University of Glasgow. While serving on the Fern at Key West he was or¬ dered to pursue examinations regarding the de¬ struction of the Maine in the harbor of Havana and his published report stating that the Maine was sunk by an exploded mine was much dis¬ cussed by scientific periodicals. He was pro¬ moted lieutenant in March 1901 and retired in 1902. After becoming general manager of the Union Electric Light and Power Company of Saint Louis, Mo., in 1904, and president and treasurer in 1906, he has been, since 1908, a member of a New York firm of consulting engi¬ neers and managers of public utilities corpora¬ tions.

POWER, Frederick Belding, American chemist : b. Hudson, N. Y., 4 March 1853. He was graduated at the Philadelphia College of Pharmacy in 1874 and at the University of Strassburg in 1880. He was professor of ana¬ lytical chemistry at the Philadelphia College of Pharmacy in 1881-83; professor of pharmacy and materia medica at the University of Wis¬ consin in 1883-92; director of the laboratories of Fritzsche Brothers in 1892-96; and in 1896- 1914 was director at the Wellcome Chemical Research Laboratories, London, England. He was awarded the Ebert Prize of the American Pharmaceutical Association in 1887, 1902 and 1906; and received gold medals at the Saint Louis Exposition, 1904, at Milan in 1906, at the Franco-British Exposition in 1908; grand prize at Brussels in 1910; the gold medal at Turin in 1911, and the Hamburg gold medal in 1913. He was a member of the Committee of Revision of the United States Pharmacopoeia in 1890; and United States delegate to the International Congress for the Unification of the Formulae of Potent Medicaments at Brussels in 1902. With Dr. Fred Hoffmann he edited (Manual of Chemical Analysis) (1883).

POWER (William Grattan), Tyrone, Irish actor: b. near Kilmacthomas, Countv Waterford, 1795; lost at sea, 1841. He made his debut as Orlando in (As You Like It) in

*1811 at Monmouth, Wales. In 1822 he appeared in London, where he made a hit as Larry Hooligan O'Halloran in 1824, and henceforth devoted himself to impersonations of Irish char¬ acters in which he was inimitable. He visited the United States in 1833, 1836 and in 1840, and in 1841 embarked for Europe on the Presi¬ dent, which was never heard of. He published two novels, (T*he King's Secret) and (The Lost Heir) ; a number of plays; and Umpres- sions of America* (1836). Consult Winter, William, (Tyrone Power> (New York 1913).*

POWER, in arithmetic, and in the algebra of real numbers, the product obtained by multi¬ plying a given number by itself a specified number of times. If x is the given number, and n is the number of times that x is taken

as a factor in forming the product, then the product that is finally obtained is

x X x X xX . . . . X x X x X x

(n factors altogether)

This is called the ((nth power® of the number x, and is represented bv the symbol xn. As¬ suming for the moment that n (which is called the ˆexponent® of the power) is positive and in¬ tegral (since this is the only case in which the foregoing definition is applicable), we easily obtain the following general laws which the powers of numbers must fulfil :

Xm+n ; (xm) n = xmn; (ˆy) n = xnyn To

extend the conception of a (

us put m— 1. Then we have (—

\ xn

= x. Hence — must be interpreted as rep¬ resenting one of those quantities which, when raised to the nth. power, will yield x itself.

That is, we must interpret as equivalent to

n

V x. In general, this will be a many valued func-

n

tion. If x is real, V x is often interpreted as the positive real number which when raised to the nth power gives x. This is only one of the

values of — . In a similar manner it is easily xn

shown that the symol must be interpreted m _

as equivalent to V xm.

The significance of a power, when the ex-

ponent is irrational or imaginary, is considered in the theory of functions,

but these generaliza¬ tions are too difficult for sound treatment in the present article. For this aspect of the sub¬ ject, and for the discussion of the development of functions of a variable in a series whose terms are powers of that variable, consult Harkness and Morley, introduction to the Theory of Analytic Functions) (London 1898).

POWER, in mechanics and physics, the rate at which work is performed; or (what is the same thing), the quantity of work that is per¬ formed per unit of time. In ordinary engineer¬ ing practice in the United States and England, the unit of work is the <(foot-pound ;® a foot¬ pound being defined as the quantity of work that is performed when a force equJ to the weight of one pound of matter is exerted through a distance of one foot. (See Mechanics). Nothing is here specified, it will be observed, as to the time in which this work is done. A small motor, for example, might require 10 seconds to accomplish it, while a more powerful one might perform it in a very small fraction of one second. The work that is performed by a given motor or engine in one second, or in one minute, is therefore the true measure of the ®power® that is being developed. James Watt adopted the <(horse power® as the unit of power for steam engines and other large motors, and this has been universally adopted, since his time, in all English-speaking coun¬ tries. He estimated that a strong horse is capa¬ ble of performing 33,000 foot-pounds of work per minute; and although it is known that the horse cannot work continuously at this rate, his definition has never been modified, and in steam and hydraulic engineering a <(borse power® is still understood to signify the performance of 33,000 foot-pounds of work per minute, or (what is the same thing) 550 foot-pounds per second. The horse power of an engine or a water-wheel is therefore determined by observ¬ ing how many foot-pounds of work it is per¬ forming per minute, and dividing this number by 33,000. In the centimeter-gram-second sys¬ tem of units, which is in extensive and increas¬ ing use in modern physics, the unit of work is the ((erg,® and the unit of power is the <(watt® ; a watt being defined as the power that is de¬ veloped when 10,000,000 (that is 107) ergs of work are performed per second. The watt is. employed in practical electrical engineering, as well as in experimental physics ; it being then defined as the rate at which work is being done in a circuit in which the current is one ampere, and the electromotive force is one volt. This change in definition is merely a matter of con¬ venience, since it may be shown that the two definitions amount to precisely the same thing. A horse power is approximately equal to 746 watts. Consult Everett, (Units and Physical Constants. y See also the article Units of Measurement.

POWER, Utilization of. The economical production of manufactures and the convenient adaptations of time- and labor-saving devices in all the various lines of constructional work have exerted a wonderful influence in

the upbuilding of American industries. Among other signifi¬ cant features the present tendency is marked by the adaptation of compressed air and the ap¬ plication of electric power to machine driving.

In the use of compressed air, the facility of adaptation to various requirements which are in many cases additional to the supply of motive power, is a valuable feature peculiar to this system and one which is susceptible of exten¬ sion along many lines. The labor cost in most machine shops and other works is so much greater than the cost of power that any expedi¬ ent by which the labor cost may be appreciably reduced is justified, even though the efficiency of the agent itself be low. Whenever new methods or agencies cause an increased produc¬ tion with a given outlay for labor, these methods will supersede the old, even though the cost of the power required be greater than be¬ fore. The saving of power is a consideration secondary to the advantages and economical output obtained by its use. While economy in the use of power should therefore be secondary to increased output, yet careful attention to de¬ tails will often greatly reduce the useless waste of power. Engineers have recognized that there is a very great percentage of loss due to shaft friction, which, in railroad and other shops where the buildings are more or less scattered, may be as great as 75 or even 80 per cent of the total power used. In the ordinary machine shop this loss will probably average from 30 to 50 per cent. No matter how well a long line of shafting may have been erected, it soon loses its alignment and the power necessary to rotate it is increased.

Manufacturers are realizing the loss of power which ensues from the oresent system of mechanical transmission, and there is an in¬ creasing tendency to introduce different methods by which a part of this loss will be obviated. Among these are the adoption of hollow and lighter shafting, higher speeds and lighter pul¬ leys, roller and ball bearings in shaft hangers, and the total or partial elimination of the shafting.

Subdivided Power. — Independent motors are often employed to drive sections of shaft¬ ing and isolated machines, and among these are found steam and gas-engines, electric motors, compressed air and hydraulic motors, although the latter have not been used for this purpose to any appreciable extent. In the choice of motors, until quite recently the steam engine has generally been used, especially where the units are relatively large, but the advantages possessed by electric driving has caused the electric motor to displace the steam engine in many cases. An interesting example of this is noted in the Franklin Sugar Refining Com¬ pany of Philadelphia, in which there were formerly some 90 Westinghouse engines about the works, many of them being of 75 and 100 horse power each; others of 5 and 10 horse power only. At the present time these have all been replaced with electric motors. A similar subdivided-power plant

involving nearly 50 steam engines was erected some years ago at the Dunnell Print Works of the United States Finishing Company at Pawtucket, R. I. More recently many of the steam engines have been replaced by electric motors, but there are still 27 engines in use in this plant. It was not so many years ago that several large and eco¬ nomical Corliss engines were replaced at the Baldwin Locomotive Works by a greater num¬ ber of small, simple-expansion engines, which actually required about 15 per cent more steam

per horse-power hour than the Corliss engines. This loss, however, was only apparent, for by increasing the number of units and locating them at convenient centres of distribution much of the shafting and belting could be dispensed with and an actual saving of power was ob¬ tained. Later, the simple engines were re¬ placed by a number of compounds, some 18 be¬ ing in service and these showed a saving of 36 per cent over that obtained by the use of the simple engines. Subsequently, however, the electric motor (q.v.) has superseded the steam- engine for this work, as its economy and con¬ venience over the latter are now thoroughly recognized.

Water Power. — It is estimated that there are available in this country about 61,000,000 Water horse power that could be profitably util¬ ized, of which it appears that onlv 6,500,000 horse power have been developed ; that is, practically 54,000,000 water horse power is now going to waste. Nor does it seem likely that this power will soon be developed unless more satisfactory legislation be enacted which will afford a greater security and permit a better return to the investor in water-power develop¬ ment.

Electric Power. — The statistics of American manufacturing, compiled for the 1900 United States census, show that at that time electric power was less than 5 per cent of all that was in use in such plants, or about 500,000 horse power out of a total of 11,000,000. During the decade from 1899 to 1909 the total amount of primary power used in the industries through- out the United States has increased from 11,000,000 horse power to nearly 19,000,000, of which 76 per cent or a little over 14,000,000 horse power is derived from steam engines; the rest being distributed between water power, eleotric power and gas and internal combustion engine power. At the time of the last census there were in use in the industries nearly 5,000,000 horse power in electric motors, of which over 3,000,000 horse power, or 63 per cent, was generated by the particular establishment using the power. That is, 63 per cent of the electric power used in the industries is generated by the user, and 37 per cent is purchased. The introduction of*

electric power in machine shops and factories was at first looked upon with disfavor and was opposed by many manufac¬ turers, but the innovation obtained a foothold, and advantages which were at first unforeseen were found to attend its use, so that now it is being very generally adopted for a wide variety of work. A considerable difference of opinion exists as to whether individual motors should be used with each machine, or whether a num¬ ber of machines should be arranged in a group and driven from a short line shaft. There are well-defined conditions to which each system is best adapted, but there are wide limits be¬ tween which there appears to be no general rule, and both methods are occupying the same field. For isolated machines and for heavy machines that may be in occasional use, the in¬ dividual motor is particularly well adapted, as it consumes power only when in operation. It is, however, necessary that each motor thus connected shall be capable of supplying suffi¬ cient power to operate its machine under the heaviest as well as lightest loads. In certain cases, moreover, the load is liable to very great

irregularity, as for instance in metal-working planers, in which the resistance offered by the machine at the moment of reversal of the platen is far higher than at other times, and may be so great as to endanger the armature of the motor. Under these conditions it is necessary to use a motor of much larger ca¬ pacity than the average load would indicate. Ordinarily in machine driving the motor is shunt-wound, and the current through the field coils is constant under all conditions of load; but to obtain the best results with that class of machinery in which the load is intermittent and subject to sudden variations, the motor should be compound-wound so as to increase the torque without an excessive increase of current in the armature. In many cases with individ¬ ual motors, owing to wide variations in power required, the average efficiency of the motor may be very low ; for this reason a careful con¬ sideration of the conditions governing each case indicates that for ordinary machine-driv¬ ing, especially with small machines, short lengths of light shafting may be frequently em¬ ployed to good advantage, and the various ma¬ chines, arranged in groups, may be driven from one motor. By this method fewer motors are required, and each may be so proportioned to the average load that it may run most of the time at its maximum efficiency. When short lengths of shafting are employed the alignment of any section is very little affected by local settling of beams or columns, and since a rela¬ tively small amount of power is transmitted by each section, the shaft may be reduced in size, thus decreasing the friction loss. Moreover, with this arrangement, as. also with the inde¬ pendent motor, the machinery may often be placed to better advantage in order to suit a given process of manufacture; shafts may be placed at any angle without the usual compli¬ cated and often unsatisfactory devices, and set¬ ting-up room mav be

provided in any suitable location as required, without carrying long lines of shafting through space. This is an important consideration, for not only is the running ex¬ pense reduced and the lighting increased thereby, but the clear head-room thus obtained, free from shafting, belts, ropes, pulleys and other power-transmitting devices can be more easily utilized for hoists and cranes, which have so largely come to be recognized as essential to economical manufacture.

Distribution. — In arranging such a system of power distribution the average power re¬ quired to drive is of as much importance as the maximum, for in a properly arranged group system the motor capacity need not be the equivalent of the total maximum power re¬ quired to operate the several machines in the group, but may be taken at some value less than the total, depending upon the number of the machines and the average period of operation. On the other hand, as already shown, the motor capacity of independently driven machines must not only equal the maximum power required to drive the machine at full load, but it must be capable of exerting a greatly increased momen¬ tary torque. In any case large units should be avoided, for the multiplication of machines driven from one motor entails additional shaft¬ ing, counter-shafts and belting which may read¬ ily cause the transmission losses to be greater than those obtained with engines and shafting

alone, besides frustrating some of the principal objects of this method of transmission.

As far as the efficiency of transmission is concerned, it is doubtful whether, in a large number of cases, motor-driving per se is any more efficient than well-arranged engines and shafting. The principal thing to be kept in mind is a desired increase in efficiency of the shop plant in turning out product, with a reduc¬ tion in the time and labor items, without espe¬ cial reference to the fuel items involved in the power production. On account of the subdi¬ vision of power which results from the use of many motors, there is less liability of interrup¬ tion to manufacture, and in case of overtime it is not necessary to operate the whole works, witn its usual heavy load of transmitting machinery. Another advantage is the adapta¬ bility to changes and extensions ; new motors may always be added without affecting any already in operation, and the ease with which this system lends itself to varying the speed of different unit groups is a very potent factor in its favor. When power is delivered to the machine by direct connected motors, a serious difficulty is often experienced in obtaining speed variation, which

is so necessary with a large proportion of the machines in common use. A certain amount of variation can be obtained by rheostatic control — a wasteful method; or by using a single voltage system with shunt field regulation ; but the variation in either case is very limited. This, however, may be increased by using a double commutator if space will permit. The three-wire, 110-220-volt system, offers many advantages for both power and lighting systems, and is very frequently em¬ ployed. Variations of speed may be obtained with this system by using a combination of field regulation with either voltage, and, in rarer cases, by the use of a double commutator motor. A method which has been used with consider¬ able satisfaction involves the use of a three- wire generator, with collector rings connected to armature winding similar to that of a two- phase rotary converter. Balancing coils are used, and the middle points of these are con¬ nected to the third wire, which is thus main¬ tained at a voltage half way between the outer wires. This system is simple and economical, and possesses all the advantages of the ordinary three-wire method ; it permits similar variations in speed by field regulation with either voltage; and if still wider ranges are desired a double commutator motor may also be used.

In other installations the four-wire mutiple voltage system is used, which permits of very wide variations of speed in the operation of the tool. This system gives excellent results and removes one of the objections urged against direct-connected motor-driven tools, namely, that such machines are not sufficiently flexible in regard to speed variation, and that such vari¬ ation can only be obtained by throwing in resist¬ ances which cut down the efficiency of the motor or by varying the strength of field which reduces the torque. The multiple voltage sys¬ tem, however, has some serious disadvantages. It cannot usually be operated from an outside source of power without rotary transformers ; the generating sets and switchboard are com¬ plicated, and the total cost of installation is expensive ; yet with these drawbacks the system

is growing in favor, as it has manifest advan¬ tages which outweigh the objections. Storage battery power has been used to some extent to obtain multiple control and is suggestive of interesting possibilities, but in its present form it is not altogether desirable for this purpose. In many of the larger sizes of certain metal¬ cutting machines marked changes in design have taken place, and these machines are now built with direct-connected motors incorporated in them, possessing wide variations of speed and power.

Improvements in the manufacture of tool steel have shown indisputably that the older designs of machine tools are not sufficiently heavy to stand up to the work in order to obtain the economy of operation which results from the use of such steels. Higher speeds, heavier cuts and greater feeds

may be obtained if the machines will stand the strain, but in most cases the capacity of the machine is not commensurate with the ability of the tool to remove metal. With cutting speeds of 100 to 200 feet per minute, it is evident that the power requirements will be much greater than for those machines which use ordinary carbon steel with cutting speeds of from 10 to 30 feet per minute. Here then is an interesting field for the direct-connected motor with ample power and speed variation for any work which it may be called upon to perform.

*Compressed Air. — Reference has been made to the use of compressed air power, and its. # facility of adaptation to various requirements, *but it is evident from an inspection of some of the devices in use that enthusiasm for new methods, rather than good judgment, has con¬ trolled in many of its applications. For some years compressed air was used only in mines, where it produced marked economics in under¬ ground work. Later, compressed air was intro¬ duced into manufacturing lines, and to-day its use in railroad and other machine shops, boiler shops, foundries and bridge works is being widely extended. In the Santa Fe Railroad shops at Topeka there are over five miles of pipe in which compressed air is carried to the different machines and labor-saving appliances throughout the works. In such shops air is used to operate riveting machines, punches, stay- bolt breakers, stay-bolt cutters, rotary tapping and drilling machines, flue rollers, rotary grind¬ ers, rotary saw for sawing car roofs, pneumatic hammers, chisels and caulking tools, flue weld¬ ers, boring and valve-facing machines, rail saws, machine for revolving driving-wheels for set¬ ting valves, pneumatic painting and whitewash¬ ing machines, dusters for car seats and the operation of switching engines about the yard. It is also used in the foundry for pressing and ramming molds, and for cleaning castings by the sand blast; but its greatest field of useful¬ ness lies in its application to hoisting and lifting operations in and about the works. More re¬ cently its use has been extended to include the sand blasting of steel passenger coaches. In mines, where exhaust steam or gas engine ex¬ haust would interfere with proper ventilation, compressed-air engines and motors, which dis¬ charge pure air directly into the workings, are used for a variety of purposes, such as loco¬ motive haulage, hoisting, pumping, cutting and drilling. Probably nothing has called wider*

attention to the possibilities of the use of com¬ pressed air than the recent installation of a system of compressed air deep-mine hoists in the Butte, Mont., mines. This is especially re¬ markable in view af the fact that the com¬ pressors are operated electrically from trans¬ mitted water power; it

was found to be better to use electricity to operate compressors dis¬ charging into storage reservoirs from which the air passed through heaters on the way to hoist¬ ing engines than to operate the hoists electri¬ cally. One factor in this conclusion is the special construction of the engine, which as the cage descends operates as a compressor, storing air by the energy of the falling hoist, and acts as a brake at the same time.

New applications of compressed air are con¬ stantly being made, and each new use suggests another. This has a tendency to increase the number of appliances which are intended to be labor-saving devices, but in many cases the work could be done just as well and much more cheaply by hand. The success and economy which has attended the use of compressed air in so many lines of work has led to its adop¬ tion in fields which are much better covered by electrically operated machines. While com¬ pressed air has been used under certain condi¬ tions very satisfactorily to operate pumps and engines, printing-presses, individual motors for lathes, planers, slotters, dynamos and other work, it does not follow that it is always an economical agent under these various uses or that other methods could not be used even more satisfactorily. It has been proposed to use individual air motors in machine shops and do away with all line shafting, except possibly for some of the heavier machinery. This use of compressed air seems entirely outside the pale of its legitimate field; the general experience thus far indicates that rotary motors are not at all economical and generally are not as satis¬ factory as electric motors. Exceptions are to be found in the small portable motors for drilling and similar operations to which elec¬ tricity is not so well adapted and where com¬ pressed air has been found to give excellent results. Although these tools are very success¬ ful, they are still rotary motors, not exempt from some of the objectionable features which seem to be inseparable from them. It is not surprising, therefore, to find a tendency to employ reciprocating pistons and cranks in these portable machines, and such tools are now in use weighing only 40 pounds capable of drilling up to two and a half inches diameter. In most cases no attempt has been made to use com¬ pressed air power efficiently; its great con¬ venience and the economy produced by its dis¬ placement of hand labor have, until recently, been accepted as sufficient, and greater econo¬ mies have not been sought.

In the matter of compression, very inefficient pumps are still in use, but manufacturers gen¬ erally have found that it pays to use high-grade economical compressors. The greatest loss is that in the air motor itself. In a large number of cases it is impracticable or, at most, incon¬ venient to employ reheaters, and the air is used very generally at normal temperature for the various purposes to which it is applied. To obtain the most satisfactory results, the air must be used expansively, but usually where the

demand for power is intermittent no attempt has been made to reheat the air, and as a result the combined efficiency of compressor and motor is quite low, varying in general from 20 to 50 per cent. While low-working pressures are more efficient than high, the use of such pres¬ sures would demand larger and heavier motors and other apparatus which is undesirable.

The advantages of higher pressures in re¬ ducing cost of transmission are also well recog¬ nized, and the present tendency is to use air at 100 to 150 pounds instead of the 60 or 70 pounds formerly used. By reheating the air to a temperature of about 300° F., which may often be accomplished at small expense, the efficiency is greatly increased ; in some cases this has been shown to be as high as 80 per cent.

A remarkable development of compressed air power, in which very high compression is used, has recently been accomplished in the Porter compound compressed-air locomotive for use in mines, lumbering operations, powder works or other places where fire is much feared; also in hauling cars about the yards of large manufacturing plants, where cleanliness as well as avoidance of fire risk is important. In this case the air is stored in the locomotive tanks under a pressure of 800 pounds per square inch ; this air thoroughly dried by the high compression then passes through a, reduc¬ ing valve, where it produces kinetic energy due to expansion, which it immediately loses by impact, thus avoiding temperature drop when falling from 800 to 250 pounds per square inch. At this pressure and practically atmos¬ pheric temperature the air is admitted to and expanded in the high-pressure cylinder of the locomotive, exhausting into the receiver at as low a temperature below atmosphere as prac¬ ticable. Atmospheric air is blown through a series of tubes in the receiver, so that the working air takes up heat from the atmosphere and, subsequently expanding in the low-pres¬ sure cylinder, converts some of the atmos¬ pheric heat into work. This process is pecu¬ liarly interesting, in that it provides a means of reheating the working air directly from the atmospheric air and obtaining thereby an in¬ crease of 30 per cent in the economy.

While the lower pressures are in general more efficient, the loss due to higher compres¬ sion is not serious. If the compressed air be used without expansion, it will be seen that there is a material loss in efficiency; but, on the other hand, if it be used expansively with¬ out reheating, trouble may be experienced, due to the drop in temperature below the freezing point. When moisture is present, this will cause the formation of ice, which may clog the passages if proper precautions are not taken to prevent it. The low

temperature will not in itself cause trouble; if, therefore, the moisture which the compressed air holds in suspension be allowed to settle in a receiving tank, placed near the motor or other air apparatus and frequently drained, less trouble will be experi¬ enced from this cause. The greater adaptability of compressed air to various purposes causes its use to increase along with that of the elec¬ tric motor, for it has a different field of use¬ fulness, independent of power transmission ; at the same time, when the requirements are prop-

erly observed in its production and use, its economy as a motive power in special cases compares favorably with other systems. But compressed air possesses so many advantages that, however inefficient it may be as a motive power, its application to shop processes will be continually extended as its usefulness becomes better known. See Pneumatic Tools.

Hydraulic Power. — Mention has been made of the use of hydraulic motors as a factor in the subdivision of power but these are being used to such a limited extent for this purpose that they will not be considered here. There is, however, a growing field of usefulness for hy¬ draulic power in manufacturing operations which is peculiar to this agent alone, namely, its use in forging and similar work. Where hy¬ draulic power exists for this purpose it is also generally used for a variety of work which could be accomplished just as well, and often more economically, by steam or compressed air; but in forging operations where heavy pressures are required hydraulic power is in¬ finitely better than either. The compressibility of air is an objection in many lines of work, and it is now well recognized that the effect of a hammer blow is oftentimes merely local. As H. F. J. Porter has so ably shown, the pressure applied in forging a body of iron or steel should be sufficient in amount and of such a character as to penetrate to the centre and cause flowing throughout the mass ; as this flowing of the metal requires a certain amount of time, the pressure should be maintained for a correspond¬ ing period. Hydraulic pressure, instead of a hammer, should, therefore, be used to work the metal into shape. Under its influence the forg¬ ing is slowly acted upon and the pressure is distributed evenly throughout the mass, where¬ as under the high velocity of impact of the hammer the metal does not have time to flow, and thus internal strains are set up in the mass, which may cause serious results, especially with certain steels which have not the property of welding. Moreover the quality of the steel is very much improved by the processes of hy¬ draulic forging. There exists at present a marked tendency to substitute this method in a wide variety of work in which presses are employed

varying in capacity from 20 tons to 14,000 tons.

It is an interesting fact that the magnificent hammer, designed and built by the Bethlehem Steel Company, of a nominal capacity of 125 tons and an actual of 145 tons falling weight has been superseded by hydraulic presses for forging purposes. This hammer is no more in existence. The largest hammer at the Bethle¬ hem plant to-day is a 10-ton hammer. Among the numerous hydraulic presses at Bethlehem under which forgings are made they have one of 14,000-ton capacity, operated by the world's largest land engine of 16,000 horse power.

The different hydraulic systems are as fol¬ lows: (1) A pump or continuous intensifier using pressure corresponding to the resistance of the press. This pressure runs up to 7,000 pounds per square inch; (2) single stroke steam or air intensifiers where the hydraulic cylinder is filled with water, under a pressure of 2 to 50 pounds per square inch and then the pressure increased by means of the intensifier from 3,000 to 9,000 pounds per square inch.

The latest development at Bethlehem ha,; been in high speed processes where the water is pumped, electrically, to an accumulator and from there used in the presses. This is the most economical. In presses of this nature, the cylin¬ der is filled from a tank" through a valve of very large dimensions (to date up to 16-inch in diameter) withstanding a pressure of 10,000 pounds per square inch. A water intensifier is then used; this may be one, two or three-pres¬ sure intensifier. The nominal pressure used in the1 lines for operating auxiliary parts of the press, together with the intensifier, is 2,500 pounds per square inch line pressure. A line pressure lower than this makes the machinery bulky and cumbersome and does not take ad¬ vantage of modern steel construction, nor does it give high speed.

Any one of these presses will run up to 100 or more strokes per minute when needed. A press at Bethlehem has been tested up to 60 strokes of three feet length per minute. Most die forging presses are made of this last type. The speed of these presses may be understood when it is stated that as many as 10 projectiles are turned out per minute.

Presses are now built at the Bethlehem plant of 10,000 and more tons capacity for the manu¬ facture of die forgings, such as car wheels, which may be produced at the rate of one a minute.

The high efficiency of the presses has chiefly been accomplished by means of the large valves and the high initial pressure in the lines, the cushioned accumulator, and the shifting tables (both in top and bottom platen). These have all been developed by the Bethlehem Company, which, at the present time, stands practically alone in the building of these enormous ma¬

chines, a single one of which will weigh as much as 1,000 tons. All handling of pieces under these presses is done mechanically by hydraulic or electric power. The success which has attended the use of hydraulic power in forging is causing it to be applied to other and similar work to an increasing extent. In boiler works, railroad and locomotive shops, bridge works and shipyards it is used along with compressed air, but where heavy pressures are desired hydraulic power is greatly to be pre¬ ferred; hence we find it operating machines foi punching and shearing heavy plates and sec¬ tional beams, riveting machines, stationary and portable, flanging and bending machines, tube upsetting machines, wheel and crank-pin presses, lifting jacks and hoists of all kinds. For heavy boiler work hydraulic riveting seems especially well adapted, since an intensity of pressure can be brought to bear upon the plates which is obtained by no other method.

Transmission. — In the transmission of power by compressed air, within reasonable limits, the loss in transmission if the pipes be tight need not be considered, for although there is a slight loss in pressure due to the frictional resistances of the pipes, yet there is a corre¬ sponding increase in volume due to drop in pressure, so that the loss is practically inap¬ preciable. It has already been stated that com¬ pressed air as now used without reheating is not at all efficient as a source of motive power, since the combined efficiency of compressor and motor, even under favorable conditions, is not

more than 50 per cent of the available energy put into the compressor. In other cases the efficiency is as low as 20 per cent. There should be no comparison between the cost of power by compressed air and its brilliant rival, elec¬ tricity, since each has its own field of useful¬ ness. With a three-wire 220-volt-system, which is very suitable for ordinary shop transmission when both light and power are to be taken off the same circuit, the combined efficiency of generators and motors working intermittently with fluctuating loads will be about 60 per cent of the power delivered to the engine. For greater distances than those which obtain in plants of this character the loss in transmis¬ sion will be greater, and higher voltage must be employed in order to keep down the line loss. While it is possible to put in conductors suffi¬ ciently large to carry the current with any as¬ sumed loss, yet the cost of the line may become prohibitive with low voltage. Where cheap fuel is available it is found in many cases that electric power can be generated at the works more cheaply than it can be purchased from a central station ; especially is this the case if the exhaust steam be used for heating purposes. In isolated plants the cost of

transmission is very small as compared with the total cost of generation ; whereas in the average central sta¬ tion the cost of cransmission, which includes interest and depreciation on pole line, may constitute a large percentage of the operating cost.

As already stated the last census shows that 63 per cent of the electric power used in the industries is generated by the user. In those localities where the cost of fuel is high, elec¬ tric power can often be purchased more cheaply from a central station which possibly obtains its current from a water-power development many miles distant and transmits it electrically to a convenient distributing centre, where it is used for power and light. The recent ad¬ vances in electrical transmission are very marked, and one constantly hears of some new achievement more wonderful than anything previously accomplished. Distances have been gradually increased until it is now not un¬ common to transmit electrical energy economi¬ cally and in commercial quantities up to 150 or 200 miles ; in one recent case the transmission extends from the Sierras to Los Angeles, Cal., a distance of 240 miles.

If the available power cannot be utilized near at hand by centralizing the industries near the source, there is no reasonable limit to the dis¬ tance to which it can be transmitted if occa¬ sion should require. The problem resolves itself largely into a question of voltage, which has steadily increased from the 4,000 to 6,000 volts in use not so many years ago to 40,000 and 60,000 volts which are now quite commonly employed; but it appears that even 60,000 volts which was regarded as a high value a few years since has been far exceeded in the most recent developments. The Los Angeles transmission line for instance uses 150,000 volts, and the hydro-electric development at Victoria Falls, in South Africa, contemplates a line pressure of 200,000 volts through a distance of 700 miles. The possibility of electrical transmission thus permits the utilization of available sources of power at great distances from the centre of

distribution ; but while it is interesting to know that a certain amount of power may be trans¬ mitted a given distance with a high degree of efficiency, it is more important to know whether the same amount of power could be obtained at the objective point more economically by other means.

Petroleum Fuel. — It has been suggested that the future of long-distance transmission depends largely upon the development of oil as a fuel ; but at the present time the outlook for oil fuel in general competition with coal or long-distance transmission is not encouraging. While the development of the Texas and South¬ ern California oil fields has increased the visible supply and brought about increased activity in the use of liquid fuel, yet it is doubtful whether the advantages would be sufficient to cause it to come

into general use as a fuel, since with a limited production and an increased demand for this and other purposes the cost would be cor¬ respondingly increased.

A number of railroads contiguous to the oil-producing centres have equipped their loco¬ motives to burn this fuel, and it is used to an increasing extent for marine and naval boilers, with great satisfaction, — since its displacement for a given heating value is only about one-half that of coal and the labor cost is materially re¬ duced. It is also used quite extensively in certain sections of the country as a steam pro¬ ducer in power plants, but it is hardly possible that liquid fuel will be a serious competitor of coal for steam generation. At present, as far as power for manufacturing plants is concerned, it is largely a question of transportation, whether oil can be laid down and handled at a given point more cheaply than coal. It is prob¬ able, however, that oil fuel will supply a local demand in certain sections where transporta¬ tion charges, and possibly insurance, will permit its use at a low cost, and it is in this connection that it may become a competitor of electrical transmission.

Internal Combustion Engines. — One inter¬ esting phase of the power problem which forcibly presents itself at the present time is the vast possibilities possessed by the modern com¬ bustion engine, which includes the various types of gas and oil engines. While its use as a motor in industrial establishments has been somewhat limited, yet there is a marked tend¬ ency to employ the gas engine in manufactur¬ ing works, and consideration of its advantages and cost of operation, together with its high thermal efficiency and possibility of still further improvement, indicates that, for a great many purposes, both steam engines and electric mo¬ tors may be ultimately replaced by some form of internal combustion engine. That the gas engine in both large and small sizes has reached a point in its development where it can fairly rival the steam-engine in reliability and satis¬ factory running qualities there can be no ques¬ tion. In point of fuel economy, a gas engine of moderate size is on a parity with the largest triple-expansion steam engines, and will give a horse power on less than one pound of fuel. The high price of gas in this country has con¬ tributed largely to those causes which have prevented a more common use of the gas engine as a motor. For this reason the gas engine has generally been used, not so much because of its

high efficiency as a thermo-dynamic machine, but rather on account of its convenience and saving in labor. It is true that natural gas is cheap, but it

is equally true that natural gas is not generally available. Fortunately the manu¬ facture of producer gas has reached a high state of development, and there are now in suc¬ cessful use several processes by which power gas can be made from cheap bituminous coals as well as anthracite and coke. The leanness of such gases renders them less effective per cubic foot of gas, as compared with the richer coal gas or even water gas ; but this difference is more than compensated for by the low cost of production.

A prominent factor in gas engine practice which has attained a high degree of develop¬ ment in European practice is the small gas pro¬ ducer. These generators are very simple in operation, and furnish a convenient and eco¬ nomical means of obtaining power at a much lower rate than with the ordinary city lighting gas. The economy of these small producers is shown by tests which give one horse power on a 16 horse-power engine with a consumption of only 1.1 pounds of fuel. For engines above 40 horse power one horse power can be obtained on seven-eighths pound of fuel. The success¬ ful employment of large combustion engines with blast furnace gases as the explosive me¬ dium utilizes vast sources of power which a few years ago were allowed to go to waste or, at most, were used very inefficiently. The high thermal efficiency of the gas engine has long been recognized and the possibility of further development is a promising factor in this field. The accomplished efficiency of 38 per cent re¬ ported by Professor Meyer, of Gottingen, greatly exceeds the maximum theoretical effi¬ ciency of the steam engine. With higher com¬ pression even greater efficiencies may be ex¬ pected. But with high compression there is danger of premature explosion, due to the gen¬ eration of heat in compressing the gas in the presence of oxygen ; for this reason Herr Diesel compresses the air separately. Under a pres¬ sure of 500 pounds or more, which is used in the Diesel motors, the air becomes very hot and readily ignites a charge of liquid fuel which is injected into the compression chamber. There is no explosion; combustion occurs while ex¬ pansion goes on, and the heat generated dis¬ appears in the form of work. The United States census report for 1900 shows that about 135,000 horse power derived from gas or in¬ ternal combustion engines were used in the industries, whereas, according to the latest (1910) report 750,000 horse power from gas and internal combustion engines were so used. That is, an increase of more than 500 per cent had taken place during the decade. The present development is toward the improvement of the internal combustion engine similar to the Diesel type, and this is accompanied by a marked tendency to use this type in marine engines ; especially is this noticeable in European practice where it is employed in sizes up to 2,500 horse power per cylinder. In the larger sizes these engines are of vertical construction double act¬ ing two-cycle, and usually with six cylinders ; but the fuel consumption is slightly greater in this type than in the four-cycle. The experi¬ ence already

obtained with Diesel engines in

scores of vessels indicates that they may be made as reliable and that they are as suitable for ship propulsion as steam engines, which in a number of cases they have displaced. In many locations the crude oil used as fuel is available and cheap, and since its value in heat units per pound is from one-third to one-half greater than that of steam coal, the space occu¬ pied by the fuel in the vessel is greatly reduced ; moreover remarkably high thermal efficiencies are obtained in this type of engine and even greater may be expected in the future since tests with various oil fuels have shown that thermal efficiencies of 45 to 48 per cent are pos¬ sible. At the present time one ton of oil will accomplish approximately as much work in a Diesel engine as four tons of coal converted into steam power. In addition to the greater economies due to the fuel there is a marked saving in space and weight in the power plant, since the internal combustion engines weigh only about half as much and occupy only two- thirds of the space of the steam engines and boilers, which saving may be profitably used for cargo. These advantages and others indicate that internal combustion engines using crude oil, especially those of the Diesel or semi-Diesel type, must inevitably be used to an increasing extent both for land and marine engines.

Although this country has lagged somewhat behind Europe in adopting large gas engines, there is evidence that this state of affairs will not exist very long, for a number of firms are now in the field building gas engines from 1,000 to 6,000 horse-power capacity. The uses to which these large engines are put are about equally divided between the operation of blow¬ ing engines for blast furnaces and the driving of dynamos for general power distribution. While the gas engine in the larger sizes is thus used extensively for the generation of electric light and power, a growing tendency is observed to use the gas engines direct as motors. A num¬ ber of railroad and other machine shops have been equipped with moderate sized gas engines suitably located about the works, and in addi¬ tion, thousands of horse power are used in the smaller sizes for a wide variety of purposes, including village waterworks, isolated lighting stations and manufacturing plants of all kinds.

The gas engine, usually adapted to consume gasoline or other oil fuel, has invaded the agri¬ cultural field and is being used to an increasing extent for a variety of purposes and in many forms, not the least important of which is the gas tractor, which is especially adapted to agri¬ cultural service in that it is conveniently mobile in the field and on the road, nor is it burdened with steam boiler nor gas producer.

In the field of transportation in addition to its use in the familiar automobile and motor truck, the oil engine constitutes the power plant in

motor cars, in submarine vessels, in aero¬ plane service and also to a limited though in¬ creasing extent in railway motor cars.

Gas Engine Central Power Stations. — With the possibilities of high thermal efficien¬ cies still higher development of cheap fuel gas processes may be expected that will bring the gas engine into close competition with the elec¬ tric motor for power purposes, for it will doubtless be found that gas transmitted from a central gas-making plant at a manufacturing

works into engines located nearby, combined with the recovery of by-products from the fuel will produce a very cheap form of power. Where large amounts of power are involved, as in the various electro-chemical industries, it is quite feasible to locate such works near a cheap fuel supply; in which case the recovery of ammonia and liquid hydrocarbons from the solid fuel, and the use of the residual gas in internal combustion engines combined with the generation and distribution of electrical energy should effect a material saving in the utilization of power over any existing method. It is not to be presumed that the gas engine will displace either the electric motor or the steam engine ; each has its legitimate sphere of usefulness, and each will be more highly developed as the result of direct competition. Yet the economies al¬ ready obtained indicate that the field of the gas engine will be gradually extended into that of the steam engine and the electric motor.

Steam Turbines. — • Many of the questions involved in this consideration are at the present time in a transitional stage. The reciprocating steam engine has reached a high state of de¬ velopment, but it is not probable that it has attained its highest degree of perfection. While an economy of less than eight and one-half pounds of steam per horse-power hour has been obtained, even better results may be anticipated; the use of high pressure super-heated steam in compound, jacketed engines involves more per¬ fect lubrication, and this may demand modifica¬ tion in existing valve types ; however this may be, the outlook is promising for still higher efficiency.

Experiment demonstrates that both piston engines and steam turbines gain more in effi¬ ciency with a reduction in back pressure than they do with a corresponding increase in initial pressures ; and further that steam turbines gain more than reciprocating engines. Superheat is another important element in steam engine and turbine economy. A gain in thermal efficiency very nearly proportional to the superheat is to be expected, but since maintenance costs in¬ crease rapidly beyond a moderate degree of superheat practice has confined itself to values of about 100° ; occasionally going as high as 200° or 250° as the economic limit for recipro¬ cating engines. These amounts depend upon the boiler pressure so that the initial tempera¬ ture of the steam usually runs from 450° to 550° F. In steam turbines, owing to the ab¬ sence of rubbing surfaces in contact with the steam, the superheat may be higher and tem¬ peratures of 650° F. are not uncommon. With back pressures reduced to less than one-half pound per square inch absolute which are now in use, it is reasonable to assume that any in¬ creased gain in efficiency in the future must result from higher initial temperatures and pressures. In this respect it is significant to note that steam boilers have recently been con¬ structed for initial pressures of 400 pounds per square inch, and even 600 pounds pressure is being considered. At the same time high de¬ grees of superheat have recently been adopted in special cases in which final temperatures of 800° F. and 1,000° F. have been attained. Whether this will mean cheaper power than can be obtained in • other ways will depend upon many conditions. In any case, and especially

with intermittent or variable loads, it is not so much a question of maximum efficiency as it is economy of operation.

From this point of view the present activity in the construction and development of the steam-turbine is of interest to engineers and power users. The steam consumption of a mod¬ ern steam-turbine of moderate size compares very favorably with that of the better class of large reciprocating engines, but what is of greater importance is the evident superior steam economy under variable loads. The steam con¬ sumption per horse-power hour varies little from one-third to full load; at over-loads the econ¬ omy, as shown by numerous tests, may be even better. This feature predestines the steam-tur¬ bine to the special field of electric lighting and power generation, where it must inevitably be¬ come a formidable rival of the larger-sized, slow-speed reciprocating steam-engine.

The turbine is not only able to utilize a fairly large fraction of the possible gain due to reduction of back pressure, but is generally much cheaper to build than piston engines, especially for very low back pressures which require in piston engines abnormally large lowT- pressure cylinders. Thus

the practice has been established of using turbines for the low ranges of pressure in preference to piston engines, and of combining reciprocating engines and tur¬ bines to work together — the turbine taking the exhaust steam from the engine at whatever re¬ lease pressure it is discharged, usually from atmospheric to 25 pounds absolute. This prac¬ tice has been found especially valuable in adding capacity to existing overloaded reciprocating engines. In some cases the power has been doubled by this arrangement.

The high rotative speed of the steam-turbine is a prominent factor in favor of its adoption in connection with electrical generators, since the cost of the generator end of the equipment ought eventually to be very materially reduced ; but for many lines of work the high rotative speed of the present types of steam-turbine is prohibitive, nor can it be adapted successfully to belt-driving, except by the use of gearing.

The economies already obtained with both the steam-turbine and the gas-engine have brought each into a prominence which is at least suggestive of the important developments that are taking place in methods of obtaining and using power.

J. J. Flather,

Professor of Mechanical Engineering, Univer¬ sity of Minnesota.

POWER OF ATTORNEY. See At¬

torney.

POWER OF DARKNESS, The (Vlast' t'my). Leo Tolstoy had made in his youth several abortive attempts at writing dramas, but he scored a remarkable success when, in the eighties, under the influence of his moral re¬ generation, he published his first drama, (The Power of Darkness. } His intention was to strike terror into the hearers, not through the action of inexorable fate, but through the pos¬ sibility of being engulfed by the Power of Darkness; hence the subtitle, (

mother, Matrena, who has been compared to Lady Macbeth, to kill Anisya's husband, in order that he may marry her and live at ease. The terrible scene in which Nikita, at the in¬ sistence of his mother and wife, kills his il¬ legitimate child, by Akulina, had such a crush¬ ing effect upon audiences that Tolstoy was obliged to write a less terrible variant for its

performance. The Divine voice in the tragedy is represented by Akim, who encourages his son to stand at the street corner and make his confession to the people and his peace with God.

Although passed by the press-censor, the dramatic censor prohibited the performance of the play. It was later performed first in pri¬ vate houses, and in 1895 in Suvorin's Theatre, where it produced a deep impression. How¬ ever, on account of the surcharge of peasant details it was not a success at the Little Theatre or at the Moscow Art Theatre, where it was given later. In France it was performed as early as 1888 in Antoine's Theatre Libre and elsewhere, and in Berlin in the Deutsches Theater in 1900. It has been translated into English as (The Dominion of Darkness) in Sergei's Columbia Library, Chicago 1890, and several times since by the translators of Tolstoy's complete works.

Leo Wiener.

PpWER HOUSES. With the growth of electrical distribution, the generating-station has become a highly specialized structure which de¬ mands consideration both from the electrical and mechanical viewpoints. In the first instance it presents peculiar requirements as to location, differing widely according to its purpose. Broadly, one may divide power houses into two general classes, those designed for the utilization of water power and those using heat engines as prime movers. The former are nearly always power transmission stations con¬ nected by high tension lines with the centre of distribution and not themselves burdened with direct distribution of energy to consumers. The latter are generally within the area of distribu¬ tion. and the centres of distributing net works. In the cases where power is transmitted con¬ siderable distances from stations of the second class they are still generally to be regarded as distributing stations as regards the requirements of location.

Location. — The location of hydro-electric power houses is usually determined by purely hydraulic considerations. The area within which they may be economically placed is lim¬ ited by the topography, and the chief require¬ ments are as follows : First, the location must be such as to keep the power house free of floods under all conditions of stream flow. Sec¬ ond, within this limitation the location must be such as to utilize the maximum possible pro¬ portion of the available head. Third, in the interest of regulation the station must be placed so that it may be subject to the minimum variation of head. In plants working under high hydraulic heads, high enough to utilize impulse, wheels conveniently, these conditions are easily met. . At low heads there is often difficulty in placing the power house clear of floods and above any possible backing up of the tail water.

The location of a station driven by heat engines of one sort or another is usually kept

as nearly as may be at the centre of the elec¬ trical distribution. Since for the delivery of any given load at a fixed percentage of loss the weight of conductor required varies directly with the square of the distance from the load, the reason for a central location is obvious. Assuming, for example, an electrical load uni¬ formly distributed over a circular area, the most economical location of the power station, so far as the conductors are concerned, is at the centre. Transference of the station to a point at the edge of the area approximately doubles the cost of the distributing system. The causes which may justify removal from the central position are local conditions as to cost of real estate, of fuel and of water. The first item is part of the capital charge which may be taken as an offset to change in the cost of dis¬ tribution ; the last two affect the operating ex¬ pense, and the change in these with change of location must be capitalized for comparison with the concurrent change in the cost of dis¬ tribution.

Fuel. — • Fuel is by far the largest single item of expense in ordinary electrical power production, and a power house must be so lo¬ cated, on a railway spur or waterway, that it can receive its supply and secure proper storage space without incurring serious charges for cartage or other handling of fuel. This neces¬ sity usually compels a location somewhat out of the centre of distribution. Water supply is more easily secured, but occasionally it becomes an important factor in location. In cases where the principal office of the power station itself is to furnish energy at hig'h voltage for a dis¬ tribution from substations, the cost of con¬ ductors is relatively a smaller consideration and commonly a location meeting the requirements just laid down can be secured without serious increase in the cost of the conducting system.

Equipment. — The electrical equipment of a modern power station usuallv consists of a small number of electric generators directly coupled to their prime movers, whether hy¬ draulic, steam or gas operated. Except in small plants generators driven through inter¬ mediary belts, ropes or gears are rare, since these introduce added complications, cause some loss of energy, cannot well be used for large power, and serve no useful purpose of them¬ selves, save now and then in giving the gen¬ erators some specially valuable advantage in speed. In such case they should be used with¬ out hesitation if the conditions permit. The day of stations equipped with numerous small dvnamos has passed, and for good cause, since the small machines are more costly and less efficient for a given total output, and they re¬ quire also more space and more care.

Hence the number of generating units should generally be reduced to the

minimum that will satisfy the following condition, viz. : that the total number should be such that one unit can go out of service without seriously overloading the others, dividing its load among them. Good modern generators usually are able to carry 25 or 30 per cent over their normal rated loads for some hours without serious heating, so that ordinarily four or five generators suffice. If the load upon the plant is normally moderate, two or three generators may serve .admirably until such time as the normal full load nears the rated capacity of the machines.

In the case of a transmission or distributing network fed from several stations the total output rather than the individual output of the separate plants should be considered in deter¬ mining the size of units to be used, for as re¬ gards reserve _ capacity it makes little differ¬ ence whether it is in one location or another. Thus in some of the large hydro-electric net¬ works 8 or 10 plants co-operate and the size of the units in each is determined not by the possession of a theoretical reserve capacity in a particular station, but by considerations of convenience, though some of the stations may have only one or two generators where such an arrangement suits the hydraulic conditions, and any station is called into or out of action by the load dispatcher just as if all the gen¬ erators were concentrated under a single roof.

In steam-driven stations past practice has tended toward great aggregation of capacity, but more recently, since widespread distributing networks have become fairly common, the ad¬ vantage from the standpoint of distribution of several generating plants has gradually been recognized and in planning these it is again the total capacity on the system which counts. The vital point is to avoid on the one hand putting too large a proportion of the possible output into a single unit, and on the other splitting the output into a number of units too small for the most economical operation. Stations with more than five or six generators are now gen¬ erally relics of an early stage of design, except in certain cases of hydro-electric plants where the hydraulic conditions are such as to intro¬ duce the dilemma of choosing between rela¬ tively small units of normal design, or large units of special and sometimes disadvantageous design. Such cases arise in working at low heads where the available power from a single wheel or pair of wheels is comparatively lim¬ ited. Cases may also arise in which generators for different purposes, as for general transmis¬ sion, railway and electro-chemical service, may have to be installed in the same plant. In this case the number of machines for each use would be determined as if the other machines were located somewhere else. In plants in¬ cluding raising

transformers the capacity of these is determined on the principles already laid down for the generators. Recent practice tends toward the installation of a single three- phase transformer or bank of three single¬ phase transformers for each generator without further subdivision. As between the two, prac¬ tice is drifting toward the latter on account of the more convenient size of the separate units in large output and from the fact that in case of need two of them can be operated on open delta connection, thus giving an additional ele¬ ment of reserve capacity. Broadly, large sta¬ tions should differ from small ones only in the capacity of individual units, so that if a 2.000 kilowatt plant is equipped with four 500 kilo¬ watt units a 20,000 kilowatt plant would be equipped with four 5,000 kilowatt units and so on.

In either case the same allowance for re¬ serve capacity would naturally be made, but evidently the larger plant would have the advantage not only of greater economy in the larger units but of reduced attendance cost per unit of output, and would also cost less per unit of output.

Large power plants then evidently can pro¬ duce electrical energy at a lower cost than small ones. As the size is increased, however, the relative gain is diminished so that a size will finally be reached at which further increase in capacity ceases to be beneficial. Indeed since a very large station usually implies a large area served, the average distribution losses will be reduced by serving it from several intercon¬ nected power houses, so that the maximum economical capacity of a single power house is less than would be determined by considering only the effect of size on fuel and labor.

For example, if a certain considerable dis¬ trict requires 200,000 kilowatts, it is altogether probable that two 100,000 kilowatt plants will serve it more economically than a single gigan¬ tic power house and unless the district is of moderate area, four 50,000 kilowatt stations would probably do even better, provided they could all be well located. In other words a power plant of 50,000 kilowatts or thereabouts comes so near to giving maximum economy of operation that the difference is easily offset by lessened losses in distribution. The only cases in which size may be economically increased without limit are those in which the plants must for one reason or another lie far with¬ out the area served, as in great hydro-electric plants like those at Niagara, or in plants using coal at the mines for transmission of power on a colossal scale.

In any power house adequate provision for reserve capacity evidently can be most easily made if the equipment throughout is of a single kind so that everything may be as far as pos¬ sible interchangeable. Similar units of uniform size are, therefore, advisable throughout the entire plant unless

there is some good reason to the contrary.

The equipment of a power house may be divided into four parts : the prime movers, the electric generators, the accessory apparatus, and the switchboard, from which the output is regu¬ lated and distributed. The power-house struc¬ ture must be planned for advantageous loca¬ tion of all of these and in addition, if steam is the motive power, there must be ample provision for the storage of fuel.

Design and Arrangement. — In point of de¬ sign hydro-electric power houses present by far the simplest problem. In these the prime movers are the water wheels, which are rela¬ tively simple and compact, the generators are directly coupled to the shafts of these, and the output is delivered to a small number of lines so that the switchboard is relatively simple. As most such plants are for high voltage, the power house must often provide place for the transformers which raise the voltage from that of the generators to that of the line. Less frequently such transformers are found in steam-driven plants.

Structurally the ordinary power house con¬ sists of two parallel halls with a common di¬ viding wall, one containing the generating units, the other water wheels or boilers as the case may be. The generator room contains or has annexed to it space for the switchboard cop- nections and for the transformers, if any, while the boiler or wheel room has annexed to it space on the one hand for fuel, on the other for the hydraulic connections. .Usually the plant comprises only a single story, although more

rarely ground space is gained by superimpos¬ ing some of the parts.

One may now pass to consideration of the concrete arrangements usually adopted, the hydro-electric case being taken up first' as the simpler in design.

Fig. 1 shows the small plan of a typical hydro-electric power station using as prime movers water wheels under high head. Here A is the receiver terminating the supply pipe and provided with branches to the several wheels. At very high heads these branches are some¬ times made farther back, spreading finger-wise from a terminal chamber to secure a straighler run to the wheels. B, B, B are the water wheels, directly coupled to and on the same level with the generators C, C, C. The pipes from the water supply enter the lower part of

this case the inner tail-race wall would usually carry a partition wall separating the wheel room from the dynamo room proper and pro¬ vided with water-tight fittings for the turbine shafts to pass through.

In case raising transformers were to be used in such a plant the generators would be for perhaps 2,300 volts, the switchboard would preferably be turned around, facing the ex¬ citers, and the station would be extended far enough to the left of the cut to accommodate the transformers and the necessary accessories; or, if more convenient from the nature of the ground, space could be gained by widening the power house enough to accommodate the row of transformers. The size of the power house of Fig. 1 is about 40 feet by 85 feet and slight modifications of this simple design serve

the wheel cases and discharge into the tail race below the power-house floor. The wheel gates are controlled by the governors D, D, D. The generators are revolving-field, 400 kilowatts, three-phase machines, giving 13,000 volts at the terminals at 500 revolutions per minute. Their fields are excited by two 25-kilowatt direct- driven exciters, E, E, each of which is regu¬ lated by a separate hydraulic governor. The switchboard is located on the floor level at F, and the line wires leaves the power house just above and behind the switchboard. Room is provided for a fourth generator and a traveling crane running lengthwise the power house is available for handling the machinery if neces¬ sary. The material of this power house is brick, on concrete foundations, with a steel truss roof covered with reinforced concrete slabs and then with roofing felt and asphalt, as the location is in a cold climate.

The design here followed is thoroughly sim¬ ple and normal. At higher hydraulic head the somewhat unusual turbines here used would be replaced by impulse wheels in the same situa¬ tion ; at lower head by considerably bulkier turbines, which would require a wider tail race and power house for their accommodation. In

well up to very much larger capacities. In case the necessary width becomes too great to be conveniently covered by a single roof, separate roofs are placed over the wheel rooms and gen¬ erator rooms and in mild climates the wheel cases and tail race may sometimes be left uncovered.

In case of hydraulic plants operating at rather low heads one is often driven to the use of vertical shaft turbines, which results in a somewhat different arrangement of power house from that shown in Fig. 1. In such cases the forebay usually comes fairly up to the power¬ house wall instead of the water being received from a reservoir at the end of a pipe line. The generators like the water wheels are vertical shaft machines, the weight of

the revolving fields being carried by a combination of water pressure and step bearing. Fig. 2 shows a cross-section through one of the four 6,000 horse-power units in a recent hydro-electric plant operating under a head of 49 feet. The design is an interesting one from the fact that the wheels have but a single runner which operates at 116 revolutions per minute, while the spiral wheel case and its entrance and the discharge draft tube are smoothly molded in

(he concrete foundation of the power house, which is really built as a sort of annex to the massive forebay wall, and in the monolithic foundations, of which the wheel cases and the water channels are a part. The bus bar and switchboard galleries occupy in this structure their wonted position, but the power-house in¬ terior is otherwise very simple, containing

around, instead of containing, the hydraulic units.

It is necessary even in hydraulic plants to make the power station as nearly fireproof as possible and hence brick, steel and concrete are the most suitable materials of construction. Wood, even if treated by some fireproofing process, should be sparingly employed. For

nmn i uin#

nooci o

nootn

1 0 0 0 0 □

DODO II

10 OD D O

DOOOII

o o n /

K □ □ 0 1.

=4

= = r=

Fig. 2.— Section through power house No. 2, Appalachian Power Company, showing 6,000 horse-power hydraulic turbines

and generators in place.

merely the four great vertical-shaft units ris¬ ing above the floor over the wheels, the water- wheel governors and a few other auxiliaries. This power-house design is the latest type of those designed for the utilization of large pow¬ ers at fairly low head. The hydraulic con¬ struction has the advantage of combining very high efficiency with compactness and extreme simplicity. It is really a power house built

floors, concrete, reinforced when necessary, is probably the best material. The trans¬ formers and switchboard are the danger points, from the standpoint of fire risks.. The former should be placed so that even if they burn out no exterior damage will result. If, as is usual in high voltage plants, they are oil-insulated, provision should be made for dis¬ posing of the oil harmlessly in the rare case

where it ignites from an extreme short-circuit. Transformer oil is very difficultly inflammable, but it can be fired, and oil transformers should be guarded by pits with drains, so that the oil may not run about if it escapes from the cases. Generally the transformer cases are provided with drain valves from which the oil can be quickly run off outside the station.

The connections between generators and switchboard are generally made by cables laid under the floor in tile ducts, so as to keep the overhead space free for the crane. The higher voltage wires from the transformers should be taken out of the building by a very short route overhead or through very capacious ducts. In any case great care should be taken to locate all cables carrying heavy currents where a burn¬ out of one will not involve others.

In very large stations, both hydro-electric and steam-driven, the switchboard is fre¬ quently placed in a gallery overlooking the generator room. This position is in itself un¬ desirable as adding enormously to the com¬ plication of the wiring, but often becomes advisable. In such case the larger switches are not manually operated, but are worked by electric or pneumatic power controlled from the switchboard. The switches them¬ selves are then located under or behind the gallery and are commonly oil insulated and enclosed in masonry or concrete cells. With three or four generators and one or two main lines to be fed the switchboard is sufficiently complex, but when in addition numerous feed¬ ing lines must

be controlled the complication becomes something frightful and a large amount of space is required for the switching apparatus, so large and so subdivided for safety that manual control is practically out of the question. In large high voltage power sta¬ tions the transformers are commonly in a building entirely separated from the main sta¬ tion and provided with an independent high voltage switching equipment, a procedure which probably adds nearly as many risks as it avoids. On the whole a plant with few units and rela¬ tively simple equipment is likely to give the most reliable service at the lowest cost.

Automatic Stations. — The possibilities of the remote control switching system just re¬ ferred to have borne fruit in hydraulic generat¬ ing stations partly or wholly automatic in their performance. If the switching of a generator can conveniently be accomplished, as is the case, from a distant part of the power house with¬ out seeing the apparatus controlled, the work¬ ing of which is signaled back by electrical tell¬ tales, then it is evidently possible to work a wheel gate or a main switch or any other ap¬ paratus in precisely similar fashion from a distance of rods or miles. There have, there¬ fore, been introduced auxiliary generating sta¬ tions started and stopped from the main switch¬ ing station and regularly operated without other attendance than the occasional visit of an in¬ spector. The generators used in such case are commonly of the induction type, which do not require separate excitation by direct current and are consequently simpler to operate with¬ out attendance. When desired to start the sta¬ tion the motor-driven wheel-gate is opened by remote control of the circuit and the subsequent necessary operations of switching the generator

fully into circuit are performed either by other remote control apparatus or by a drum switch thrown into operation when the generator is at speed and performing the necessary switching operations in their proper sequence. In stopping the plant the same operations are gone through with in reverse order. Most stations of this type are of relatively small power and contain but a single generator, but the system is im¬ portant in that it enables small hydraulic priv¬ ileges to be effectively utilized without undue cost of attention. As the great majority of available water powers are of modest capacity economic utilization depends upon lowering the labor factor in the cost, which the generating station with remote control effectively does. It is likely to play a considerable part in the establishment of power networks utilizing, wherever available within the territory served, water powers of small capacity.

Steam-driven power stations are propor¬ tioned very differently from hydraulic stations owing to the large space needed for the boilers and their accessories. The general layout, how¬ ever, is quite similar, the common arrange¬ ment being in two long parallel rooms sepa¬ rated by a party

wall, one containing the boilers and boiler equipment, the other the generators and prime movers. It is a curious fact that whereas the prime movers and generators have increased enormously in available capacity in recent years the advance in the size of boilers has been relatively very slow. It is only recently that large boiler units have come into service, despite the fact that tests upon them show very material gains in efficiency.

Boilers are rated conventionally on a basis which gives the uninitiated no notion whatever as to their real steaming capacity. The canoni¬ cal boiler horse power has long been based on the evaporation of 34.5 pounds per hour of water from and at 212°. This nominal rating requires, when a boiler is to be applied to a prime mover, wholesale modification, on the one hand by reason of the actual steam consumption per horse power of the prime mover, and on the other hand on account of the fact that the steam is generally at high pressure and super¬ heated. In point of fact the steam capacity of a boiler in a modern steam plant may be counted as two to three times the conventional .rating so far as the actual operation of the prime mover is concerned.

But, even so, the boiler capacities have grown much more slowly than the capacities of the steam engines or turbines, the latter being almost invariably used in plants of any size. It is, however, a fact that boilers of large capacity may be counted on for con¬ siderably higher efficiency than those of small capacity, as in many other cases, so that larger and larger units are quite certain to come into use. At present boilers of more than 1,000 horse power nominal rating are rather unusual, although units of more than double that size have been successfully used for some years past. The chief difficulty in employing very large boiler units is in adapting the setting to withstand the extremely high furnace tem¬ peratures which result in added efficiency. It is usual, therefore, to find each large prime mover in a modern station supplied with steam by a group of four or more boilers, a number

which a few years back would have been doubled.

There is a collateral advantage in thus sub¬ dividing the boiler units, inasmuch as the boiler is the part of a steam plant which requires, probably, the most frequent repairs, and there is some advantage in having enough units for each prime mover group so that one can be cut out without seriously lowering the capacity, inasmuch as a boiler can at a pinch, particularly by help of forced draft, be driven temporarily 30 to 50

per cent above its working rate. A single boiler group of three or four units can readily be made an independent source of steam supply for its prime mover under ordinary cir¬ cumstances. Generally, however, the steam pip¬ ing in a modern plant is so arranged that in case of withdrawing a single boiler from serv¬ ice its place can be filled from steam from the general supply without exceptional forcing at any point

here shown are almost universal, as is the use of mechanical stokers for feeding the boilers, which are almost invariably of the water-tube type. This particular boiler plant delivers steam at 200 pounds' pressure and 160° F. super-heat, which is a fair example of present practice. There is a strong tendency, however, toward the use of higher pressures and super-heat in the interest of economy.

The generators in this instance are for 6,600 volts, a figure convenient where there is to be local distribution beside possible feeding of transmission lines and which is besides a con¬ venient voltage in the design of large gen¬ erators. Smaller machines are often wound for 2,300 volts and 6,600 is rarely exceeded. The reciprocating engine has practically passed out of existence in large electric generating plants owing to the lower cost, greater com¬ pactness and higher efficiency of the turbines, particularly at loads below the normal. The

Fig. 3. — A — 42,000-volt arresters; B — 42,000-volt reactance circuit breakers; C — three 4,000-kva. transformers per generator; D and E — 6,600-volt circuit breakers and bus structure respectively; F — control room; G — 50-ton crane; H — 12,500-kva. turbine-generator; J — smokestack; K — 420-ton coal bunker; L — 1,050-hp. boilers; M — 60-ton elevator; N — coal cars; O — coal shed; P — lavatory; Q — humidifiers for ventilating air; R — condenser circulating pump; S — cooling water tunnel; T — ash car; U — 5-ton lorry; V — condenser.

Fig. 3 shows in elevation the layout of a typical modern steam plant of fair size de¬ signed for feeding high-tension lines. It in¬ cludes a boiler room with typical provision for receiving and distributing the fuel, a turbine room parallel thereto containing the generators, with adjacent provision for switchboard trans¬ formers and auxiliary apparatus, while next, to the boiler room is a coal shed for the reception of fuel. This particular plant is planned for an ultimate capacity of 75,000 kva. in six 12,500 kva. generators. The location of the equipment is clearly shown in the cut. In larger plants the turbo-generators often run to 20,000 or 30,000 kilowatt units and occa¬ sionally higher. At the present time as here shown these turbo generators are built with horizontal axis, the vertical type of a decade since being now obsolescent. Very commonly the coal shed with its track for the reception of coal cars is replaced by a storage yard. equipped with

automatic conveyers for the maintenance of a large fuel supply, and crushing apparatus for dealing with run-of-the-mine coal is a not uncommon accompaniment. In small plants the transformers and circuit breakers would often be installed under the switchboard gallery in¬ stead of, as here, in an adjacent building.

The capacious coal bunkers above the boiler room with distributing apparatus similar to that

boiler units here employed are of 1,050-rated horse power each and can readily be forced to three times their nominal rating which is, as in the case of all boilers based on a conven¬ tional steaming capacity, long obsolete.

Each turbo-generator has its own bank of boilers, but the piping is so arranged that one set of spare boilers is sufficient for the entire plant. At Q will be noted an equip¬ ment for purifying and cooling an air-blast for the artificial cooling of the turbo-generators. As the size of such generating units has in¬ creased artificial cooling has been very gen¬ erally adopted, the air being forced through the ventilating slots in the machines. The ca¬ pacity of the individual boilers here noted is now a common one in plants of fair size, such boiler units having replaced very extensively those of a few hundred horse power generally in use until very recent years. In larger plants boiler units up to and' exceeding 2,000 nominal horse power have been introduced to material advantage in economy. In many plants the familiar tall stacks are replaced by rather short ones supplemented by forced draft. This ar¬ rangement is not particularly advantageous in plants working at moderate and fairly steady load, but gives great capacity for forcing the output when abnormally heavy peak loads have to be dealt with.

As steam turbines for efficient operation de¬ mand a rather high vacuum, 28 inches to 29 inches, they are usually fitted with highly-developed surface condensers and the power required for delivering water to these and for other auxiliary purposes is considerable. One of the moot points in station design is the source of this auxiliary power, whether it should be derived from steam turbines or from electric motors operated from the generating system. Practice ir about equally divided in this matter with a frequent tendency to adopt a combination of the two systems. It will be noted that the switching apparatus in this typical plant is some¬ what intricate and occupies considerable space.

cost and generally in complication, with the size of the station, particularly if as usual the num her of feeders is greatly increased. In view of this switchboard apparatus and connections should be protected with the utmost care, special pains being taken to locate cables and apparatus so that injury to one may not involve others and this injunction extends to all apparatus which from its connections can conceivably cause a short-circuit. It has repeatedly hap¬ pened that large stations have been put out of action by apparently trivial accidents oc- curr'ng at an unexpected and unprotected point.

The fundamental principles at the basis of modern station design are so to arrange the

Fig. 4.

This arises from two causes, first, the abso¬ lutely large amount of switching apparatus re¬ quired, and second, from the fact that it is desirable and usual to install high-power switches and circuit breakers in independent concrete cubicles, from which a burn-out will not extend. As plants, have increased in size the switching problem has become a very serious one. It is usual and sometimes necessary to operate all the generating units in parallel. In this case any unit which is the victim of a short-circuit may receive the aggregate output of all, so that each main protective switch has practically to be able to handle successfully the whole output of the station. In long-distance transmission plants this difficulty is often minimized by putting the high-tension trans¬ formers in parallel only at the far end of the line, but within the station and in ordinary dis¬ tribution plants the difficulty remains. Hence the switchboard equipment increases in relative

apparatus that nothing need be done by manual labor which can better be done by mechanism, and that no heat shall be lost which can be made to serve a useful purpose. In the sta¬ tion of Fig. 3, for example, the fuel is dealt with, mechanically from the time it drops by gravity from the cars to the moment when it drops as ashes into the ash cars beneath the grates, save for such attendance as is necessary to see that the mechanical stokers are function¬ ing properly and to lend what little aid may be needed. The steam piping is relatively short, simple and well jacketed, the surface con¬ densers are immediately beneath the turbines and the waste exhaust from the auxiliary tur¬ bines goes to heat the feed water.

Sub-Stations. — An account of power houses would be incomplete did it not take notice of sub-stations. The modern power house is al¬ most always fitted with alternating current gen¬ erators which transmit current either for gen-

oral distribution or for conversion into direct current for supplying electric railways or the old direct current lighting systems. Such con¬ version must probably be regarded as a make¬ shift, but at present a necessary one. The high voltage current from the power house is trans¬ mitted through cables or over aerial lines to the sub-stations, and there the voltage is lowered by reducing transformers to the amount appro¬ priate for the synchronous converters. The sub-station must, therefore, accommodate the reducing transformers, the converters, regu¬ lating apparatus, switchboards for both alter¬ nating and direct currents, and sometimes a storage battery and its accessories. The structure, therefore, becomes practically a power house for general service, less only the prime movers. Fig. 4 shows in eleva¬ tion a sub-station for city lighting and power service which is a masterpiece of compact¬ ness. It is a modern steel building two

The same principles of location and subdivision of units hold for sub-stations as for power houses in general, with the advantage that the location is not dependent on water and fuel supply. Sub-stations for the receiving ends of power transmissions for general service differ from those just described in the lessened im¬ portance of synchronous converters. The ordi¬ nary distribution from a high voltage transmis¬ sion service is very largely by alternating cur¬ rents, and is accomplished by substations de¬ signed accordingly. The high voltage current is received in large reducing transformers which in number, size and location are to be treated as so many alternating current generators fortu¬ nately exempt from the necessity of rotation. Regulating apparatus is an important feature of stations of this class, and being inductive can be applied with very small loss of energy to the exact regulation of voltage on individual feeders.

stories above grade and with a basement for the cable entrances and exits. The main floor contains, as Fig. 4 shows, arranged in order, the high-tension bus and main switches, the three-phase transformers, the regulators, and the rotary converters, of which there are four, each of 1,000 kilowatt capacity. The same room contains the booster set for charging the batteries at a variable voltage somewhat higher than that of the rotaries, and the switchboard, also a blower set for ventilation. Large aper¬ tures are left under the rotary converters and transformers so that a liberal air supply may be drawn in from below and exhausted by the blower. The second floor contains the storage batteries and their special switching arrange¬ ments. On account of possible leakage of acid from the batteries the floor construction is pe¬ culiar. The basis is tile arch over steel beams. Then comes a layer of concrete coated with asphalt, then a floor of

hard-baked brick, glazed all over, laid with narrow interstices which are finally filled with hot asphalt.

Sub-stations for railway service do not so commonly have the storage battery, and are gen¬ erally less compactly arranged, but after about the same general plan. The sub-station shown here covers only 3,150 square feet for its 4,000 kilowatts capacity. Ordinarily the switching ar¬ rangements in a sub-station are so intricate as to require a rather liberal allowance of space.

For arc light service constant current trans¬ formers are very widely used, taking energy from the lower voltage side of the reducing transformers. This service requires a special switchboard, and is generally set apart in the sub-station. Owing to the absence of rotating machinery in any considerable amount the sub¬ station for general service is compacter and requires less in the way of foundations and special construction than the sub-station of Fig. 4. Otherwise the principles of location and design are unchanged.

Out Door Sub-stations. — The needs of high voltage transmission have evolved in recent years an interesting and important form of sub¬ station which is coming into very wide use. One of the main difficulties of high tension practice is the large space required for switch¬ ing apparatus and the great difficulty of getting high voltage wires into and out of buildings while retaining adequate insulation. The re¬ sult is that a sub-station building and equip¬ ment rises to very burdensome cost in case the output required is not large. There has, there¬ fore, been evolved the outdoor sub-station de¬ rived by natural process of growth from the transformer mounted on a pole, and supplied with the necessary auxiliaries for protection and switching. To meet these requirements weather¬ proof apparatus has been designed which can be safely left in the open under all climatic

conditions. The common form taken by the outdoor sub-station is a concrete platform to bear the weight of the transformers and above it a quadrilateral of steel or wooden poles braced together and carrying switches, cut-outs and other auxiliary apparatus, as well as serv¬ ing to support the incoming and outgoing cir¬ cuits. In stations of the larger capacities elec¬ trolytic cell or similar lightning arresters, and oil switches form part of the platform equip¬ ment, while in the smaller stations air-break switches with very long swing and protected by horn-gaps, and horn-gap lightning arresters often take the place of the more expensive

apparatus. Fig. 5 shows in section and plan a typical station of this kind and of medium capacity. Here the transformers are of the usual oil-filled type, cooled by natural draft, and the lightning arresters are of the elec¬ trolytic form installed on a platform by them¬ selves. The switching equipment is of oil switches carried on a platform like that which supports the transformers. Above these con¬ crete bases for the heavy apparatus rises a latticed steel structure well braced together and supporting the busses, transformer connections and ingoing and outgoing lines. These last as well as the busses are borne by disc insulators carried in tension between the supporting mem¬ bers. In larger installations it is not uncom¬ mon to find the high-tension equipment in the open and the low-tension switches and appara¬ tus in a suitable adjacent shelter. The purpose of the outdoor sub-station in every case is to cut down the heavy expense of housing high-tension circuits and apparatus, and so success¬ ful has the expedient proved that a large pro¬ portion of all service sub-stations on the great transmission systems are now of this form. It is needless to say that they are protected against interlopers by thorough fencing in, and are otherwise treated with the respect due to their voltage.

Louis Bell,

Consulting Electrical Engineer, Boston, Mass.

POWER SIGNALS. See Block Signal System.

POWER TRANSMISSION. It is rarely

convenient to develop power at exactly the point where it is to be utilized, and hence the necessity of devices and systems for conveying it from place to place without loss, or with the minimum of loss. These systems of power transmission separate naturally into two groups : one in which the motion produced by a power is transmitted mechanically; the other where the power generated by one engine is used to operate another engine, the motion developed by the second engine being employed in work. To the first group belong the mechanical de¬ vices known as shafting, belts, chains, rope and cable drives, friction gearing, toothed gear¬ ing, link work and the like. To the second group belong the transmissions of power by compressed air, steam, hydraulic pressure and electricity.

Shafting.— Between the different parts of a given machine, or of a given mill, the trans¬ mission is often effected by means of a rotat¬ ing shaft, which is subjected to a torsional moment. In mill work the shaft is rigid, and is made of solid steel, or of steel tubing; while in small machines (as in dental drills and the

like) the shaft is often flexible, so that the point of application of the power can be varied at will, without disturbing the source from which the power is drawn. In mill practice it is essential that the alignment of the shaftiiig shall be as good as possible, — that is, that the centre line of each shaft shall be as nearly straight as it can be made. It is also essential that the "journals,® or bearings which support the shaft, shall be properly designed and well lubricated. If attention is paid to these points, transmission by shafting may be quite efficient; but if the alignment is poor, or the journals are poorly designed, or the lubrication is inadequate, a great deal of energy may be absorbed by the shaft, and dissipated in the form of frictional heat. In transmission by shafting, the speed re¬ mains invariable, that is, that of the engine as controlled by its governor, and if (as is usually the case) a change of speed is desired, it must be effected by the use of gearing o-r belting, or some similar device. The more common practice, however, is to transmit the engine power to one or more jack-shafts where it may be divided as desired, and distributed to the several machines where it is utilized.

Belts are employed more commonly than gearing, for transmitting power from one shaft to another. They are generally of leather, but rubber belts are in considerable use and belts of canvass are common for small farm ma¬ chines. Leather belts are single-ply or double- ply. The latter cost about double as much as the former, but are more economical in the long run as they deliver four times the power during life. The double-ply belt, however, is much less pliable, and cannot be used on small pulleys. Rubber belts are made of alternate layers of rubber and cotton duck compressed into a solid band. They are more resistant than leather to heat, cold and moisture but are easily ruined by lubricating oils and greases. If kept strictly clean they will long outlast leather, and are considered to give a better grip on the pulleys. Canvas belts are cheap, and are readily affected by the weather. They are much im¬ proved by waterproofing paints and dressings. Steel belts have been used with success. They are simply flat bands of tempered steel. For an equal power they are about one-fifth the width of a leather belt, and show only one-tenth the slip. They are run at speeds up to 10,000 feet per minute. The resistance of a belt to slipping is independent of the width of the belt, so long as the total stress upon the belt is con¬ stant. It depends chiefly, in this case, upon the arc of contact between the belt and the pulley; and a belt will slip just as readily upon a pulley four feet in diameter as upon one that is two feet in diameter, if the arc of contact (measured in degrees) is the same in both cases, and the surfaces of the two pulleys are in the same con¬ dition. The laying out of a successful system of belting, for use in mill work, calls for prac¬ tical experience with belts, since it must be ad¬ mitted that the formulae that have been given do not correspond with experience. The per¬ formances of

belts have made all the carefully devised rules seem ridiculous. There are too many variables in the problem. In most cases it is customary to make a computation accord¬ ing to Webber's rule for ordinary leather belt¬ ing of single thickness: A belt one inch wide

will safely transmit one horse power, when run at a speed of 600 feet per minute; and the power transmitted will be proportional to the width of the belt, and to the speed at which it is run. This rule gives no information with regard to the proper tension ; but it implies that the tension may be safely increased until the belt actually does transmit the computed horse power. For efficient operation, that is, the economical transmission of the power, the driver and driven pulleys should not be too close together. A large percentage of power is transmitted if a distinct sag in the driving side of the belt is arranged for. For narrow belts the pulleys should be at least 10 to 15 feet apart and the sag about 2 inches ; and for wide belts from 20 feet upward and the sag up to 5 inches. Where the distances between shafts are necessarily less than these either rope or chain drives may be more effectively employed. The angle at which belting is placed with ref¬ erence to the horizontal should never exceed 45 degrees. With a very stiff belt vertical belt¬ ing is practicable if necessary. In placing belt pulleys on the jack shaft they should be so arranged that the pull alternates in different directions. Unless absolutely impossible, the motion should be from the top of the driver to the top of the driven pulley: in this case the sag increases the arc of contact. The pul¬ leys should be as large as practicable to lessen the abruptness of bending in the belt but the speed (except for steel belts) should not exceed 4,800 feet per minute. If the pulleys are faced with leather, the tension of the belt may be reduced, with a larger transmission of power and an increased durability of the belt. The greatest efficiency in belt transmission of power is secured with narrow belts on large pulleys, run with low tension at high speed (4,000 feet per minute).

Rope and Cable Drive. — Rope drives are used where the shaft centres are too close together or too far apart for the economical use of belting, and generally where very large power is to be transmitted. The faces of the pulleys are scored with deep grooves narrow at the bottom, so that the rope will be gripped by the wedging of the sides of the groove. The width of the pulleys is governed by the power to be conveyed, ranks of 30 ropes being not uncommon for large powers. There are two methods of fitting out such a drive : the Eng¬ lish and the American. By the former method each complete wind of the rope is individual, and is spliced in its place. In the American system the entire drive consists of one continu¬ ous rope, with

but one splice. The slack of so long a rope is large, but is taken up by a tension carriage around which the rope makes a single turn. After a new drive has run a few minutes all the slack has been gathered upon this carriage, and the tension of all the coils of the drive is uniform, and is kept so by the tension regulator. In the English drives, on the contrary, it is rarely that any two coils are of the same tension, and a lack of efficiency results. The speeds at which rope drives are run vary from 2,000 to 4,000 feet per minute. They are most effective when run under full load. The rope used in such drives is prefer¬ ably a four-strand rope of long-fibre _ Zebu inanila twisted upon a core. This rope is not

only soft and pliable, but very durable. Cotton ropes have made remarkable records in some cases. In a certain Scottish cotton mill a rope drive of 24 cotton ropes one and three-fourths inches in diameter ran continuously at a speed of 4,400 feet per minute for 26 years without repair. This drive transmitted 826 horse power from a driving pulley 28 feet in diameter.

Wire ropes or cables are useful in very long horizontal transmission. They work acceptably up to 6,000 feet, if relay pulleys are provided at least every 500 feet, transmitting about 80 per cent of the power. They are generally woven of six strands upon a cotton core, each strand being a cable of from 7 to 19 wires of char¬ coal iron or low steel : the 7-wire cables make a stronger rope, but less pliable. On account of its great liability to rust a wire cable used in power transmission is usually treated with boiled linseed oil, which has also the effect of improving its .grip on the pulleys. The pulleys for wire cables should have a leather bed in the bottom of the groove to save wear of the cable.

Chain Drive. — For speeds of less than 1,000 feet per minute the chain and sprocket drive is highly efficient. The disadvantage with it is that the teeth of the sprocket wheel become worn so that the pull is not evenly distributed upon the wheel. In extreme cases the entire pull may fall upon a single tooth. The sprocket wheel should never have less than 12 teeth. The usual top limit is 60 teeth. This form of drive is particularly adapted to situations where the driving shaft and the driven shaft are neces¬ sarily close together. For very heavy powers the gear-chain is effective. It is so constructed that the ends of the links form a series of cogs on the inner side of the chain-belt, to en¬ gage with the cogs of a broad spur-geared wheels. Because of their noiseless running

these chains are sometimes called <(silent chains.®

Friction Gearing.— In some circumstances friction gearing is desirable, but as it depends for its' efficiency upon strong pressure, with the excessive

strains which accompany it, this form of power transmission is generally avoided. Where used the driving wheel is

usually of iron and the driven wheel of

leather, or faced with ldather. It has been

found, however, that the friction of aluminum on leather is 40 per cent greater than that of iron on leather.

Wheel gearing is discussed at length in a special article under that title, to which the reader is referred. This form of power trans¬ mission is effective in overcoming resistances in which belts, ropes and chains would be insuffi¬ cient. The efficiency of toothed gears ranges up to 98 per cent when the teeth are compara¬ tively small and the speed low, or very fast, medium speeds showing a lower efficiency. The breaking pressure on the teeth of toothed gears increases up to a certain speed, and above that speed decreases.

Link work includes the mechanical devices known as cams, eccentrics, cranks, connecting- rods, levers and the like. They serve to trans¬ mit motion from one part of a machine to some other part.

The second group of power transmissions depends upon the elasticity of fluids. Air,

steam or water are put under pressure, and this pressure is available for work at the farther end of the pipe-line which confines and conveys the fluid. In the case of electricity the con¬ dition is somewhat different, but is comparable to a hydraulic current flowing in a pipe.

Compressed air (q.v.) is employed in the transmission of power in many cases, especially in the operation of rock drills, and in mining generally, the air serving, in such cases, not only to operate the machinery, but also to aid in the ventilation of the mine. While the effi¬ ciency of the mains is 98 per cent that of the motors varies from 40 to 67 per cent. The compressed air may be delivered to the point at which the power is wanted by means of pipes directly from the compressors, or it may be stored at high pressure in tanks, from which it is drawn as wanted. For example, in mining locomotives are used which derive their power from large tanks of compressed air that take the place of the ordinary steam boilers of other locomotives; these tanks being charged at convenient points along the line

of travel. Steam is used in the same way but with much less efficiency as enormous amounts of heat are lost from naked steampipes and they are very rarely insulated. Power is also transmitted hy¬ draulically, when, as in cranes, presses and ele¬ vators, it is desired to exert great force in some slow-moving piece of machinery. In London and other European cities there is a regular public service of water under high pres¬ sure for use in small shops as a cheap source of power.

A great deal of attention has been given, in recent years, to the economical transmission of power by electricity, and the various problems that are involved have been solved so satisfac¬ torily that enormous quantities of power are now transmitted electrically, in some instances to a distance of upwards of 200 miles. The mechanical energy that is to be transmitted is first converted into electricity by means of a dynamo ; and the electricity thus generated is led along a conductor (usually of copper) to the point where the power is to be used, it being there reconverted into mechanical energy by means of electric motors. In certain shops and mills, the power is transmitted in this way from the engine room to 'the various machines that are to be operated, each machine being pro¬ vided with its own separate motor. Installa¬ tions of this kind are especially successful when the work is of such a nature that the machines are idle for a considerable part of the time, be¬ cause there is no loss, in electrical transmission systems, when the circuit is interrupted and no current is flowing; whereas in a mill that is fitted up with shafting and belts the shafting runs all the time, and the losses due to it's friction go on all the time, whether the ma¬ chines are running or not. The use of indi¬ vidual motors, as described, is also advisable in plants where the machines are run at high speeds, since the desired speeds can be attained electrically, without the losses incident to the use of pulleys and belts, of trains of gears, or any other method of direct mechanical multipli¬ cation.

In the transmission of power by electricity to considerable distances, the chief losses are those due to direct leakage of electricity along the

line, and to the dissipation of energy in the form of heat in the conductor. The losses due to the former cause can be kept down to a reasonable limit by paying proper attention to insulation, though the problems that are here involved are very serious, when the potential of the conductor is maintained at 60,000 volts or over. The loss due to the development of heat on account of the resistance of the conductor can theoretically be diminished as much as we please, by merely increasing the size of the conductor; but conductors sufficient in size to render the heat loss negligible are too expen¬ sive to be commercially practicable. Lord Kel¬ vin, in an attempt to determine the most econo¬ mical size of conductor for electrical trans¬ mission, came to the conclusion that the maxi¬ mum economy is

attained when the conductor is of such a size that ((the annual interest on the capital outlay is equal to the annual cost of energy wasted.® Under ordinary conditions, this is found to lead to the conclusion that the most economical current-density in the conduc¬ tor is about 380 amperes per square inch of sectional area of the conductor. For the case in which a given horse power is to be delivered at a given distance, the condition is somewhat different, and not so simple. Professors Ayrton and Perry, who have investigated this case, have given somewhat complicated formulae for determining the most economical cross-section of the conductor. (Consult Kent, (Engineer's Pocket Book, and the references there given). In long distance transmission it is customary to adopt, for the transmission line, a far higher potential than is desired for the operation of the machinery at the delivery end, since this artifice makes it possible to transmit a given quantity of electrical energy over a given conductor with a smaller heat loss than would be involved if the transmission were effected at a lower potential. When the transmitting current is alternating, the reduction of potential at the delivery end may be effected by means of a transformer; but when the transmitting current is direct, it is customary to employ a ˆmotor-generator,® which consists of a motor, actuated by the transmission current, coupled on the same shaft with a dyna¬ mo, which gives out a current adapted to the work to be done. The motor-generator is also used to transform an alternating transmission current into a continuous current, when the con¬ tinuous current is desired for delivery purposes. Some of the problems of electrical transmission have been solved on a very large scale at Niagara Falls, where the water power is par¬ tially utilized for mechanical purposes. A por¬ tion of the power that is developed in the tur¬ bine houses is transmitted electricallv to Buffalo, for the operation of electric railways and for other purposes, and the remainder is utilized, also in the electrical form, in factories in the more immediate neighborhood of the falls. The modern electric transmission line for high voltages is of aluminum cable on a steel core — to give it strength and lessen the sag between towers — or of copper-clad steel, known to the trade as ((Monnot metal.® The latter is an in¬ geniously devised steel core which is first al¬ loyed with copper on its surface, and then covered with a heavy coating of pure copper. The aluminum cable has to be 61.6 per cent larger in volume than a copper cable to obtain*

an equally low resistance. As the weight of aluminum is 30.2 per cent that of an equal volume of copper, the weight of aluminum re¬ quired for a stated conductivity is 48.8 per cent of the weight of copper having the same con¬ ductivity. An aluminum line is, therefore, much cheaper than a

copper line. For voltages up to 66,000 the "petticoat5 type of insulators, set upon iron pins, are commonly used. The "petticoats® or porcelain "bells® are nested one within another until the insulation is sufficient to prevent the current from the cable from leap¬ ing to the supporting pin. The protective power ranges about 15,000 volts to each bell; that is, for a current of 44,000 volts, three bells nested are required; for 66,000 volts, at least four bells in the nest. The great weight of these porcelain masses limits their use to the smaller voltages, so that above 66,000 volts the suspension type of insulation is used. This consists of a series of porcelain discs hanging in horizontal posi¬ tions one below another and suspended through their centres. As many discs may be added to the "string® as are needed to insulate the par¬ ticular current. On 110,000-volt lines five or six discs are used. On 140,000 volt lines the num¬ ber of dies is increased to 10 and the space be¬ tween the horizontal cables is not less than 12 feet. On lines of low voltage wooden poles of white cedar (arbor vitae) or chestnut are generally used. They have a "life® of from 10 to 12 years. Concrete poles are practically in¬ destructible, but very expensive to set, on ac¬ count of their great weight. For high voltage transmission lines the steel tower of lattice con¬ struction is favored. These are set from 400 to 1,000 feet apart. The longest known span is one reaching across the Saint Lawrence River at Three Rivers (Canada) which is a clear span of 4,800 feet from towers 315 feet high; the cable carrying 140,000 volts. Underground con¬ duits are common for electric transmission in cities. They are variously constructed : of arti¬ ficial stone — made by mixing limestone and Portland cement; or of fibre pipe — made of woodpulp saturated with a bituminous com¬ pound. The cables used in underground trans¬ mission are usually three-phase, three-conductor cables of the so-called "clover-leaf® pattern, the conductors being insulated by manila-rope paper of the finest quality saturated with resin and resin oil. This type of insulation is as durable as the lead sheath in which the cable is en¬ cased; which is all that can be desired. The voltage which such an underground cable can carry without loss, or perforation of the insula¬ tion, ranges up to a maximum of 300,000 volts.

Bibliography. — Collins, H. E., (Shafting, Pulleys, Belting and Rope Transmissions5 (New York 1908) : Fairbairn, Sir Wm, Prin¬ ciples of Mechanism and the Machinery of Transmission (Philadelphia 1903) ; Hiscox, G. D., (Mechanical Appliances, Movements and Novelties of Construction5 (New York 1914) ; Kapper, F., 'Overhead Transmission Lines5 (London 1915) ; Kerr, E. W., Power and Power Transmission5 (New York 1914) ; Lyn¬ don, L., (Hydro-Electric Power5 (2 vols., New York 1916) ; Lundquist, R. A., transmission Line Construction5 (New York 1912) ; Meyer, E. B., Underground Transmfssion and Dis¬ tribution5 (New York 1916) ; Robinson, H., (Hydraulic Power and Hydraulic

Machinery5 VOL. 22 — 32

‘London 1910) ; Turneaure, F. E., and Black, A., (Hydraulic Engineering5 (Chicago 1912).

POWERS, Hiram, American sculptor : b. Woodstock, Vt., 29 July 1805; d. Florence, Italy, 27 June 1873. He received his education at the district school, and on the removal of the family to Ohio in 1819 was employed as as¬ sistant to a clock-maker. At the same time he learned the art of modeling in clay from a Ger¬ man sculptor. He was subsequently appointed director of the waxwork department of the Western Museum of Cincinnati, an employment he pursued for seven years. In 1835 he went to Washington, and was for some time em¬ ployed in modeling busts of distinguished men. With the proceeds derived from these efforts, and the aid of Gen. John Preston, he was en¬ abled to visit Italy. In 1837 he established him¬ self at Florence, where he resided until his death. His statue of (Eve Tempted,5 which excited the approval of Thorwaldsen, was pro¬ duced in 1838; in 1843 was modeled the still more popular (Greek Slave,5 of which six copies in marble and innumerable casts and reduced copies are in existence. Among his other statues the most notable are (The Fisher Boy5 (1846) ; another (Eve Tempted5 (1850) ; (America5 (1854), destroyed by fire in 1866; (I1 Penseroso5 (1856) ; California5 (1858) ; and (The Indian Girl5 (1872) ; and statues of Washington for the State of Louisiana, of John C. Calhoun for South Carolina, of Daniel Web¬ ster for Boston, and of Franklin and Jefferson. He also executed several ideal busts, such as Cinevra5 (1840-65) ; Proserpine5 (1845) ; Psyche5 (1849); ‘Diana5 (1852); Christ5 (1866); Paith5 (1867); Clyde5 (1868); ‘Hope5 (1869) ; and Charity5 (1871) ; besides busts of Jackson, John Quincy Adams, Edward Everett, Van Buren, Longfellow, John Marshall, Philip Sheridan and others.

POWERS, Le Grand, American statis¬ tician : b. Preston, N. Y., 1847. He was gradu¬ ated at Iowa State University in 1872 and was engaged in active ministerial work 1874—90. He was commissioner of labor in Minnesota 1891— 99, and has since been chief statistician of the United States census, in charge of agriculture. He has published ‘Minnesota Bureau of Labor Biennial Reports5 (1890-99) ; Parmer Hay¬ seed5 (a reply to Coin's Financial School5) (1895) Twelfth Census of the United States (Vols. V-VI) ; Census Report on wealth, debt, taxation and other statistics of cities. He is also a frequent contributor to newspapers, American and English reviews and financial and statistical juornals.

POWERS OF CORPORATIONS. See

Corporations, Legal.

POWHATAN, pow-ha-tan', Indian sachem: b. about 1550; d. 1618. This was the_ name of his tribe; his own was Wahunsonacook. Origi¬ nally he was at the head of eight tribes, but being a man of great natural abilities he raised himself from the rank of a chieftain to the command of 30 tribes, numbering about 8,000. (See Powhatan Indians). His dominions in¬ cluded the country between the James and Pa¬ tuxent, and extended into the interior as far as the falls of the chief rivers. One of his abodes was a village of a few wigwams near the present site of Richmond. A large guard of warriors

usually attended him, and his dwelling was watched at night by sentinels. After the ex¬ tension of his power northward, he dwelt mainly at Werowocomoco, on York River, in the present county of Gloucester, a few miles from Jamestown. He was disposed to look with dislike upon the coming of the whites. Capt. John Smith, in 1607, was held for some time by Powhatan as a prisoner, and according to the tradition, when Smith had been condemned to death, the sachem yielded to the entreaties of his daughter Pocahontas (q.v.) and spared his life. Two years later Powhatan was crowned (

POWHATAN, Indian <(pawatan® (

force of 1,000 Powhatan at the battle of Paumunkey and destroyed their villages and crops. The Indians continued the struggle fiercely, but at a great disadvantage owing to the better arrangement of the whites. A peace made in 1636 lasted seven years, when the aged Opechancanough headed another massacre in which over 500 whites were killed in one day. The settlers retaliated and finally captured and shot Opechancanough and broke up the con¬ federacy (1642), after which each tribe made its peace as best it could with the whites. Again the Indians rose in revolt, but their stronghold, near Richmond, was stormed and men, women and children were put to the sword (1676). Some 46 years later a treaty was signed in Al¬ bany between the whites, the Powhatan and the Iroquois in which they mutually agreed to keep the peace. From this time on they gave no further trouble. They gradually mixed with the negroes and whites, and from time to time individuals, or even whole decimated tribes, joined other tribes not of their own tongue until finally they disappeared as a tribal organ¬ ization. The Powhatan are supposed to have numbered at one time at least 8,000. They lived in community houses which were well built and varying in length from about 35 to over 100 feet. Most of their villages were fortified with post-palisades about twice the height of a man. There were

from one to three of these walls, one within the other. They had gone a considerable way along the road to the sedentary life that leads to civilization. They had extensive plantations of corn, beans, pumpkins, melons, squashes, vegetables, tobacco and fruits; and they kept account of time and their business transactions on knotted strings much as the ancient Peruvians did. They are represented by a considerable number of Mestizos, most of whom are either farmers or fishermen; and they are as expert to-day as in olden times in the making and management of canoes and fishing nets. See Pocahontas ; Opechancano; Virginia. Consult Eggleston, E., (Pocahontas (New York 1879) ; Hamor, R. A., (True Discourse of the Present Estate of Virginia) (London 1915) ; Hodge, W. H.,*

(Handbook of the American Indians) (Wash¬ ington 1910) ; Price, W. T., (Historical Sketches of Pocahontas County, West Virginia) (Martin- ton 1901); Waston, V. C., (The Princess Pocahontas) (Philadelphia 1916).

POWNALL, Thomas, English statesman, colonial governor and author: b. near Lin¬ coln, 1722; d. Bath, 25 Feb. 1805. He was graduated at Cambridge in 1743. In 1753 he went to America as private secretary to Sir Danvers Osborn, governor of New York, and in 1757 was made governor of the colony of Massachusetts Bay. He showed considerable disinclination to carry out the policies of his superiors in London and as a result he was transferred to South Carolina in 1760 as gov¬ ernor of this colony. Without having gone to South Carolina -he returned to England in June 1760 and soon after his arrival resigned the governorship. In 1762-63 he was comptroller- general of the expenditures of the army in Ger¬ many, and in 1768 was elected to Parliament. He earnestly opposed the measures of the gov¬ ernment against the colonies. After being three times returned to Parliament, he retired in 1780

and passed the remainder of his life in anti¬ quarian studies. In the sphere of scholarship he achieved a greater reputation than that which he won in the field of politics. His writ¬ ings have a wide range of subjects, and among bis principal works are (Administration of the Colonies1 (1764) ; (A Memorial to the Sover¬ eigns of America1 (1773) ; (A Topographical Description of the Middle Colonies) (1776) ;

POYNINGS, poin'ingz, Sir Edward, Eng¬ lish statesman: b. 1459; d. 1521. As a result of his activity in the Kentish revolt against Rich¬ ard III in 1483 he had to flee to the Continent. In 1485, however, he returned to England in the train of the Earl of Richmond, afterward Henry VII. During

the life of this monarch he was one of the most favored and trusted members of his entourage, a position which he also occupied under his successor, Henry VIII. In 1493 he was made governor of Calais. He went as lord deputy to Ireland in 1494 and there defeated Perkin Warbeck at Waterford. Dur¬ ing his administration of Ireland he summoned a Parliament at Drogheda, which, at his insti¬ gation, gave to the English Crown and the king's Privy Council direct control of Irish administrative affairs. The act by which this was accomplished became known as the Poyn- ings' Law (q.v. ; also see Ireland, History). After his recall in 1496 he was made warden of the Cinque Ports. Henry VIII, immediately upon his succession to the throne after the death of Henry VII in 1509, made him a mem¬ ber of the King's Council. During the follow¬ ing years he was frequently entrusted with important diplomatic missions and military commands, and in 1520 he was especially active in arranging and preparing for the Field of the Cloth of Gold (q.v.), the famous meeting be¬ tween Henry VIII and Frapcis I of France.

POYNINGS' LAW, or STATUTE OF DROGHEDA, an act of the Irish Parliament, passed in 1495, whereby it was provided that no Irish Parliament should be summoned and no act passed without the previous approval of the English king and his Privy Council under the great seal of England. At the same time all laws that had so far been enacted and were in force then in England were declared of force in Ireland. It was so named from Sir Edward Poynings (q.v.). It was repealed in 1782. Con¬ sult (The Policy of Poynings' Law1 (Dublin

1770).

POYNTER, point'ter, Sir Edward John, English painter: b. Paris, 20 March 1836; d. London, 26 July 1919. He received his early education in Westminster School and in Ipswich, and was the pupil of Gleyre in Paris from 1856 to 1859. In 1860 he re¬ turned to London and was elected Royal Academician in 1876. From 1894 to 1905 he was director of the National Gallery. On the death of Sir John Millais in 1896 he was elected

president of the Royal Academy and the same year was knighted. He was created a baro¬ net in 1902. His paintings in oil and water colors are distinguished by originality of conception, faultless drawing and strong color qualities, and the most remarkable of them are (Israel in Egypt1 (1867) ; (The Catapult,1 an incident in the siege of Carthage (1868) ; (Faithful unto Death1 ; Proserpine1 ; Perseus and Andromeda1 (1872) ; (The Fortune Teller1 (1877) ; Phodope1 ; (The Golden Age1; (Zen- obia in Captivity1 (1878); Phe Meeting of Solomon and the Queen of Sheba1 (1891); Plone Serenae1 ; (Idle Fears1 (1894) ; Phe Ionian Dance1 (1899) ; Phe Cave of the Storm Nymphs1 (1903) ; (The Nymphs' Bathing Place1

(1904) ; Phe Cup of Tantalus1 (1905) ; Pesbia and Her Sparrow1 (1907); Prewing a Storm1 (1909) ; (A Naval Disaster1 (1912) ; (At Low Tide1 (1913) ; (The Sea Bath1 (1914) ; and portraits of King Edward VII and of numerous persons of prominence as well as many water colors, figures and landscapes. Also two sets of designs for the new coinage of 1894 and cartoons for mosaics of Saint George and Saint David in Westminster Palace. During the years 1872-73 he was engaged in frescoing the walls of Saint Stephen's Church, Dulwich. He also furnished de¬ signs for the decoration of the interior of the dome of Saint Paul's Cathedral with subjects from the Apocalypse, as well as for the mosaics in Westminster Palace. He also published Pen Lectures on Art1 (1879) ; (Classic and Italian Painting1 (with P. R. Head, 1880) ; (German, Flemish and Dutch Painting1 (with H. J. Wilmot Buxton, 1881). He acted as editor of (The National Gallery1 (1899), containing reproductions of all pictures in the National Gallery acquired up to the end of 1899. Du Maurier in Prilby1 draws a de¬ lightful sketch of Poynter in their old student Paris days and of his passionate study and admiration for all the great masters.

POYNTING, pointing, John Henry, Eng¬ lish scientist: b. Monton, Lancashire, 9 Sept. 1852; d. Birmingham, 30 March 1914. He was educated at Owens College, Manches¬ ter, and Trinity College, Oxford, was as¬ sistant to Prof. Balfour Stewart in the physical laboratory at Owens in 1876-79, and in 1880 was appointed to the chair of physics at Mason Col¬ lege (now Birmingham University). In 1905 the royal medal of the Royal Society was con¬ ferred upon him. He has contributed papers on electrical theory, gravitation, radiation and the mean density of the earth to the Philosophical Transactions1 and the Proceedings1 of the Royal Society; published his Adams prize essay on Phe Mean Density of the Earth1 (1891) ; and (A Text-book of Physics1 (with Sir J. J. Thomson, 1902-14).

POZZO DI BORGO, pot'so de bor'gd, Carlo Andrea, Count, Russian diplomat : b. Alata, Cors-ica, 8 March 1764; d. Paris, 15 Feb. 1842. He w.as educated at Pisa and became an advocate. In 1791 he was elected to the National Assembly. In his youth he was friendly with Napoleon Bonaparte and his fam¬ ily, but later joined Paoli in his opposition to Napoleon and became the bitter enemy of the latter. As a result he had to flee from France. In 1794, when the English instituted a protec-

torate over Corsica, he became president of the council, holding this position until the with¬ drawal of the English forces in 1796. At that time

he was specifically excluded by Napoleon from the amnesty which he extended to his other Corsican opponents and he, therefore, went for his safety to England where he re¬ sided for a number of years, working to the fullest extent of his power against Napoleon. In 1804 he entered the Russian diplomatic serv¬ ice and was employed in various missions of importance, continuing at all times his activities against Napoleon. As a result of this attitude he resigned from the Russian diplomatic serv¬ ice in 1807 after Emperor Alexander I had concluded a treaty with Napoleon. Again he retired to England where he resided until 1812 when he was recalled by Emperor Alexander. He now devoted himself more than ever to the prosecution of the war against Napoleon. He succeeded in persuading Bernadotte and Sweden to turn against Napoleon and was most active in forming the coalition against the French emperor. He played an important part at the Congress of Vienna. Throughout his whole diplomatic career he openly and constantly dis¬ played his friendship for France, which country honored him in 1818 by making him a count and peer of France. From 1830-35 he was Rus¬ sian Ambassador at Paris and from 1835-39 at London. Consult Uvarov, S. S., (Stein et Pozzo) (1846); Maggiolo, A., (Corse, France et Russie, Pozzo di Borgo) (Paris 1890) ; (Correspondance Diplomatique du Comte Pozzo di Borgo et du Comte de Nesselrode) (Paris

1890-97).

POZZUOLI, pot-soo-6'le, Italy, a city on the bay of the same name, six miles west of Naples, at the western foot of the Solfatara and in a volcanic country known to the Romans as the Phlegraean Fields. Near by is the Avernian Lake famed as the entrance to hell both in Virgil's sixth ,2Eneid and in early Christian leg¬ end, which pointed out here the place where Christ descended into hell. Remains of Cice¬ ro's villa are near the town, which is particu¬ larly famed for its amphitheatre, where 30,000 spectators could sit and in which there were naval battles as well as the ordinary gladiatorial contests. The so-called Serapeum is an archae¬ ological puzzle and may have been a town-hall ; traces of the action of sea water on several pil¬ lars not now touched by high water seem to prove that the coast, possibly from volcanic dis¬ turbances, has undergone marked and recurrent changes. The only other ruin of importance is that of the temple of Augustus, the site of which is occupied by the cathedral, which pre¬ serves six of the original Corinthian columns. Pozzuoli is a good fishing-port ; exports the vol¬ canic sands called pozzolana, which are used in making cement; has important mineral baths in the vicinity, and is the site of an ordnance factory, a branch house of Armstrong and Company, which makes armor plate and cannon for the Italian government.

Pozzuoli was founded by Greek exiles from Samos in the 6th century b.c.,

as Dicaearchia, but the Italians called it Puteoli, ((the wells,® be¬ cause of the sulphurous cavities in the earth, and the city continued to be known under this name after it was made a Roman colony in 194 b.c. The city became the greatest port of Italy and

on entrepot for Oriental commerce ; goods were sent overland hence to Rome and the dangerous navigation of the coast of Latium avoided. Even after Ostium was built the port retained its importance, and its beautiful coast and cura¬ tive springs and baths made it a famous resort. During the Middle Ages it suffered a great deal from frequent convulsions caused by nearby volcanos. Pop. (1910 census) 28,167. Consult Loffredi, F., (Antiquas PeteolorunP (in (Thes. Antiq. et Hist. ItaL, > Vol. IX, part 4, 1723) ; Paoli, P. A., (Avanzi delle Antichita che Esistano a Pozzuoli, Cuma e Baja) (Florence 1768) ; Stefani, Carlo de, (La Villa Puteolana di Cicerone) (in (R. Accad. d. Lincei. Rendic. (Classe d. Sci. Fis., Ser. V. Vol. X, part 1, p. 128, Rome 1901) ; Huelsen, Christian, (Inschrift von Pozzuoli > (in Kaiserliches Deutsches Arch- aeologisches Institut Mitteilungen, Roemische Abteilung, Vol. XXIII, p. 71, Rome 1908).*

PRADIER, pra-de-a, James, French sculp¬ tor: b. Geneva, 23 May 1792; d. near Paris, 14 June 1852. In his youth he was apprenticed to a jewreler in his native city where he engraved rings and watch cases. At this work he showed so much ability that he was placed in the Ge¬ neva School of Design. In 1809 he went to Paris where he studied design under Meynier, and sculpture in the studio of Lemot. In 1813 he gained the prize of the Academy for a bas- relief of Philoctetes and Ulysses, and this work procured his admission to the French Academy at Rome. Here he studied the antique and re¬ turned to Paris with two statues, one of Bac¬ chante and the other of a son of Niobe, now in the Luxembourg. In 1821 he went again to Rome, where he remained till 1823 and brought back a statue of Psyche, which he had made out of part of the shaft of an ancient marble pillar found at Veii.- This work, too, is now in the Luxembourg. From this period he worked constantly at Paris and produced a great num¬ ber of larger and minor sculptures, including a Venus, a group of the Three Graces (now at Versailles), a plaster statue of Jean Jacques Rousseau, after which the casting at Geneva has been made, and Cyparissus with his goat and a huntress. Admitted to the Institute in 1827, he afterward executed, among other works, a Prometheus, a Faun and Bacchante, a Phidias (now in the Tuileries Gardens), the bas-reliefs on the pediment of the Chamber of Deputies, the allegorical figures of Lille and Strassburg in the Place de la Concorde at Paris, the Industry in front of the exchange, the Flora, which he con¬ sidered one of his most successful works, the 12 colossal Victories on the monument of Napoleon in the Hotel des Invalides, the Ata- lanta in the exhibition of 1851 and the Sappho exhibited in 1852. The colossal fountain at Nimes is another example of his work, as is also

the monument of the Due de Berry in the church of Saint Louis at Versailles. The exe¬ cution of his works ranks him a sculptor of the first order, but he is deficient in originality of conception, his monotone borders on insipidity and he sometimes strives to give life to his creations by a touch of meretriciousness.

PRADILLA, Francisco, fran-thes'ko pra- del-ya, Spanish painter : b. Villanueva de Gal- lego, in the province of Saragossa. 24 Tuly 1848. His parents were very poor, and the young Pradilla, who early in his youth showed a re-

markable gift for drawing, had to undergo a hard struggle before he could find the ways and means, to devote himself to the develop¬ ment of this gift. In 1863 he came to Madrid where he devoted himself zealously to the study of the old masters and became a pupil of Serri. Before long he was sent to the Spanish Academy of Fine Arts at Rome, of which he was one of the first pupils. His first signal achievement was (The Rape of the Sabines' ; this was followed, in 1878 by (Joanna the Mad, following the Coffin of Philip the Fair, her Husband.' The latter was exhibited at the World's Exposition at Paris in the same year, where it created quite a sensation and was awarded a medal. It is now in the Prado at Madrid. His next important work was (The Surrender of Granada to Ferdinand and Isa¬ bella,' a picture remarkable for spirited de¬ lineation of character, lifelike action and grandeur of style. It was awarded a first medal at the exposition in Munich (1883) and may now be seen in the Senate Hall in Madrid. Still another picture of the same type is the (Last Sigh of the Moor.' In addition to these large canvasses he has produced many small genre pictures. Most of these illustrate mod¬ ern life, especiallv amongst the oeasants, and show keen observation, subtle power of indi¬ vidualization and a remarkable genius for real¬ ism. These small canvasses are masterpieces of their kind and have won for him an inter¬ national reputation. The best known amongst them are (High Mass in the Pilgrims' Chapel at Guia' (1891) ; (Market Day at Vigo'

(1892), and (Pilgrimage to the Shrine of Our Lady of Gocxi Counsel' (1895). He has also painted some mural decorations of great beauty in the Murgo Palace in Madrid. In 1892 he was made a member of the Berlin Academy and in 1896 he became director of the Royal Museum in Madrid.

PRADO, pra't'ho, Mariano Ignacio, Peru¬ vian politician: b. Huanaco, 1826; d. Paris, 1902. He engaged actively in a revolution which in 1854

overthrew General Echenique and led the opposition to President Pezet in 1865 which re¬ sulted in Pezet's resignation and his own desig¬ nation as supreme chief. He then formed an offensive and defensive alliance with Chile, and declared war against Spain. A Spanish attack upon Callao was repulsed 2 May 1866, but his own position having been declared unconstitu¬ tional, he was obliged to leave Peru in January 1868 and went to Chile. Returning several years later he was elected President in 1876 and in 1879 declared war against Chile. Prado went to Europe in the same year, for the pur¬ pose, as was then stated, of obtaining a loan and ironclads, and in his absence the Presidency was seized by Pierola. He returned to Lima in 1886, but ceased to be active in politics. Con¬ sult Markham, C. R., (A History of Peru' (Chicago 1892).

PRAED, prad, Mrs. Campbell Mackworth.

See Praed, Rosa Caroline Murray-Prior.

PRAED, Rosa Caroline Murray-Prior,

Australian novelist: b. Bromelton, Queensland, 27 March 1852. In 1872 she was married to Campbell Mackworth Praed (d. 1901) and in 1876 went to London where her Australian sto¬ ries soon made her well known. She has been

a prolific writer of popular fiction and many of her books have reached large editions. Amongst the most important of them are (An Australian Heroine' (1880); (Policy and Pas¬ sion' (1881) ; (Nadine' (1882) ; (Moloch'

(1883); (Zero' (1884);

Maker' (1893); (Christina Chard' (1894); (Mrs. Tregaskiss' (1896) ; 'The Scourge Stick' (1898) ; (Madame Izan' (1899) ; 'As a Watch in the Night' (1900) ; (The Insane. Root' ; 'Dwellers by the River' (1902) ; 'Fugi¬ tive Anne' (1903) ; (Nyria' (1904) ; 'A Maid of the River' (1905); 'The Lost Earl of El¬ ian' (1906) ; 'The Luck of the Leura' (1907) ; 'By Their Fruits' (1908); 'Opal Fire'; 'The Romance of Mademoiselle Aisse' (1910): 'Body of His Desire' (1912) ; 'Lady Bridget of the Never-Never Land' (1915). She also published 'My Australian Girlhood' (1902), an autobiography; with Justin McCarthy (q.v.), 'The Right Honorable' (1886) ; and with Justin McCarthy and M. Menpes, 'The Gray River' (1889). Consult McCarthy, Justin, 'Our Book of Memories; Letters of Justin Mc¬ Carthy to Mrs. Campbell Praed' (London

1912).

PRAED, Winthrop Mackworth, English poet: b. London, 26 July 1802; d. there, 15 July 1839. He was educated at Eaton and Trinity College, Cambridge, was elected to a Trinity fellowship in 1827, and in 1829 was admitted to the bar. In Parliament he sat for Saint Ger¬ mains in 1830-32, for Great Yarmouth in 1834- 37 and for Aylesbury from 1837. Praed made some successful speeches in the House and was requested by Wellington to write for the Morn¬ ing Post a defense against certain attacks on the Duke in the Times. He showed a remark¬ able gift for versification comparatively early in life, writing considerable poetry of the lighter sort even during his public school and college days. His political writing was too restrained wholly to reach its mark; but his verse is marked by a lightness of touch and a metrical ease and finish which in more recent times finds its closest resemblance in the work of Austin Dobson. He excelled in vers de societe, though he displayed, as in the 'Red Fisherman,' an imaginative force which suggests broader fields. Of his writings the following have been pub¬ lished in book form: 'Charades' (New York 1852) ; 'Essays' (London and New York 1887) ; 'Poems' (London 1865). Consult 'Kraupa, Matilde, 'Winthrop Mackworth Praed' (in 'Wiener Beitraege Zur Englischen Philologie,' Wien and Leipzig 1910).

PRZEFECT, the title of various civil and military officials of ancient Rome. Of these the most important was the prcefectus urbis, or warden of the city, originally called custos urbis. The name prcefectus urbi does not seem to have been used till after the time of the decemvirs. During the kingly period and the early years of the republic the custos urbis ex¬ ercised within the city all the powers of the chief of the state in his absence; he convoked the senate, held the comitia, and on any emer-

gency might take such measures as he thought proper. When the office of prcetor urbanis (see Praetor) was instituted the wardenship of the city was merged in it; but the conservative spirit of the Romans still induced them to ap¬ point annually a prcepectus urbi for the time during which the consuls were absent from the city to celebrate the Feriae Latinae, a festival held on the Alban Mount. Under Augustus, however, the office ceased to be a sinecure. The prospectus urbi was a permanent magistrate whom the emperor invested with all the powers necessary to maintain peace and order in the city. He had under him a sort of police called milites stationarii ; and the powers of the office were gradually so far extended that at last there was no appeal from his sentence except to the emperor. The prospectus prcetorio was the officer who commanded the troops who guarded the emperor's person. (See Piletor- ian Guards). The office was

first instituted by Augustus, and was at first only military and had comparatively little influence attached to it; but under Tiberius it became second only to that of the emperors. From the time of Sev- erus to that of Diocletian the prefects had the superintendence of all the departments of the state — the palace, the army, the finances and the law; they also had a court in which they decided cases. In addition to these function¬ aries there were the prospectus aquarum, charged with the regulation of the water sup¬ ply of the city; the prospectus oerarii, who had charge of the public treasury; the prcepectus vigilum, who commanded the night-watch; with others of less importance.

PRAEMUNIRE, pre-mu-nl're, the opening words of the writ issued preparatory to the prosecution of certain offenses supposed to im¬ ply legal contempt toward the sovereign or the government — prcemonere or prcemunire pacias A. B. (Cause A. B. to be forewarned that he ap¬ pear before us, etc.). Gradually the word ac¬ quired a wider meaning, being used to denote both the offense and the penalties incurred. The first statute of praemunire was passed dur¬ ing the reign of Edward I in 1306 and was in¬ tended to repress the papal encroachments on the rights of the Crown, and several subsequent statutes before the Reformation greatly ex¬ tended the number of penal acts under this title. By still later statutes acts of a very mis¬ cellaneous nature were rendered liable to the penalties of praemunire, as knowingly and wil¬ fully solemnizing, assisting or being present at any marriage forbidden by the Royal Marriage Act ; asserting by preaching, teaching or ad¬ visedly speaking that any person other than ac¬ cording to the acts of settlement and union has any right to the throne, or that the sovereign and Parliament cannot make laws to limit the descent of the Crown ; to assert that both or either of the Houses of Parliament have or has a legislative authority without the sovereign ; and so on. Cathedral chapters in England which refused to elect the bishop nominated by the Crown were liable to be prosecuted on praemu¬ nire. The punishment was forfeiture and im¬ prisonment during the sovereign's pleasure. Prosecution by writ of praemunire has been ob¬ solete, however, for a long time. Consult Statutes of the Realm5 ; Reeves, John, his¬ tory of the English Law5 (London 1869) ;

Stubbs, William, Constitutional History of England5 (Oxford 1875-78) ; Holdsworth, W. S., (A History of English Law5 (London 1903-09) ; Jenks, Edward, (A Short History of English Law5 (Boston 1912).

PRAENESTE, pre-nes'te. See Palestrina.

PRAETOR, originally the official title of the consuls at Rome. When the patricians were compelled to acquiesce in the consulship being thrown open to the plebeians, they stipulated that a new curule magistrate should be ap¬

pointed from the patricians exclusively, to act as supreme judge in the civil courts. On this magistrate the title of praetor was bestowed. In 337 b.c. the praetorship was thrown open to the plebeians. About 240 b.c., the number of aliens residing in Rome had increased to such an ex¬ tent that it was found necessary to appoint a second praetor, who should decide suits between aliens or between aliens and citizens. He was known as the prcetor peregrinus, the other prae¬ tor, prcetor urbanus, having cognizance of suits between citizens only. In 227 b.c., the number was increased to four, the two additional prae¬ tors to act as governors of provinces. By Sulla the number was augmented to eight, by Julius Caesar to 10, 12 and eventually to 16. The prae¬ tors held their offices for one year and were afterward sent out by lot as governors of prov¬ inces.

PRAETORIAN GUARDS, a body of per¬ manent troops, established by Augustus as Im¬ perial Life Guards, in imitation of the cohors prostoria, or bodyguard attached to the person of the commander-in-chief of a Roman army. The Praetorian guards were kept up by suc¬ cessive emperors and, being under special or¬ ganization and enjoying several privileges, they became in time so powerful that they were able to raise and depose emperors at their will. They were reorganized by Septimius Severus and were finally suppressed by Constantine the Great.

PRAETORlUM, (1) the official residence of a prastor or governor of a Roman province: hence, a hall of justice; a judgment-hall; a pal¬ ace. (2) That part of a Roman camp in which the general's quarters were.

PRAGA, pra'ga, Poland, a suburb of War¬ saw. See Warsaw.

PRAGMATIC SANCTION (Sanctio

Pragmatica) , a public edict relating to import¬ ant state business, pronounced by the head of a state and differing from the simple rescript, in that the latter was a declaration of law in an¬ swer to a question propounded on behalf of an individual. The pragmatic decree was consid¬ ered irreversible and formed part of the funda¬ mental law of the country. In European his¬ tory the following are the most important prag¬ matic sanctions: (1) The ordinance of Charles VII of France, drawn up at Bourges in 1438, conformably to the decrees of the Council of Basel and on which rest the claims of the Gal- lican liberties. It was repealed by Francis I. (2) The instrument published in 1713 by which the German emperor, Charles VI, being without male issue endeavored to secure the succession to his female descendants. It was in accord¬ ance with this instrument that he settled his dominions on his daughter Maria Theresa. He induced most of the European sovereigns to

guarantee it; but Charles Albert, elector of Bavaria, the next heir to his dominions, re¬ fused; this caused the Austrian War of Succes¬ sion after the death of the emperor in 1740. In the Peace of Fiissen (1745) Bavaria acknowl¬ edged the pragmatic sanction. (3) Charles III of Spain, when he ceded the throne of Naples to his third son and his successors in 1759, called the law of succession which he prepared for this branch of his family sanctio pragmatica. Con¬ sult Wolf, A., Pie Geschichte der Pragmatis- chen Sanktion bis 1740) (Wien 1850) ; Turba, De Gustav, (Die Grundlagen der Pragmatischen SanktioiP (in (Wiener Staatswissen-Schaft- liche Studten,' Vol. X, part 2, and Vol. XI, part 1, Leipzig and Wien 1911-12).

PRAGMATISM. The term pragmatism, as employed in philosophy at the present time, denotes the general tendency to subordinate log¬ ical thinking to the ends of practical life and to find the test of the truth of ideas in their practical consequences. There are thus two somewhat distinct sides to the doctrine, which we find differently emphasized by different writers. On the one hand, this view points out that thought owˆes its origin to the needs and de¬ mands of the practical life. Thought is thus a tool or instrument that is always invoked to meet a particular crisis or problem resulting from a concrete situation. Thought, therefore, does not aim at truth in general. Its business is to discover, in concrete circumstances, the best means to the realization of some practical end that life demands.

This side of the doctrine has been chiefly elaborated by Prof. John Dewey and those as¬ sociated with him at the University of Chicago as colleagues or students. These writers have connected their theory with the doctrine of evo¬ lution and support it mainly by arguments and analogies drawn from this source. On the other hand, to decide regarding the truth or falsity of any theory or conception, we must also appeal to the practical consequences that result from it. A theory is demonstrated in the only possible way when it is shown that it will Hvork" ; that is, that the results that we wish to obtain in a given situation follow from it. It is only in the light of these results that a conception has meaning. Apart from its prac¬ tical consequences, a conception is an abstrac¬ tion without meaning or significance and conse¬ quently without truth or falsehood.

This practical test of the truth of a theory through an appeal to its consequences is the element in pragmatism that has been mainly emphasized by C. S. Peirce and Prof. William James. Peirce first employed the term and out¬ lined the doctrine in an article in The Popular Science Monthly (January 1878), though he put it forward merely as a practical

method of avoiding abstractions by making clear to one¬ self the consequences in terms of action of general logical conceptions. The present cur¬ rency of the position in America add England is, however, largely due to Professor James, who has elaborated and enforced it in his psychology and in a number of popular works and articles. The names of Peirce and James are so closely connected with pragmatism that we quote here the formal definitions of the term which they have written for Baldwin's (Dictionary of Phi¬ losophy. ' Peirce describes the doctrine as fol¬

lows : ((The opinion that metaphysics is to be largely cleared up by the application of the fol¬ lowing maxim for attaining clearness of appre¬ hension : (Consider what effects, that might con¬ ceivably have practical bearings, we conceive the object of our conception to have. Then our con¬ ception of these effects is the whole of our con¬ ception of the object. ' " James defines pragma— , tism : (

Bibliography. — Caldwell, Pragmatism' (Mind, October 1900) ; Dewey, J., (Studies in Logical Theory' (Chicago 1903) ; James, W., Principles of Psychology) (New York 1890) ; lThe Will to Believe' (New York 1896) ; Pragmatism' (New York 1907) ; (The Mean¬ ing of Truth' (New York 1909) ; Perry, R. B., Present Philosophical Tendencies' (New York 1912) ; Royce, J., (The Eternal and the Practical' (Philosophical Review, March 1904) ; Schiller, F. C. S., ˆHumanism' (London 1903) ; (Studies in Humanism' (London 1907); Pid¬ dles of the Sphinx' (2d ed., London 1910) ; Seth, J., (The Utilitarian Estimate of Knowl¬ edge' (Philosophical Review, July 1901) ; Sturt, H. C., and others, Personal Idealism' (London 1902) ; Dewey, J., and others, Crea¬ tive Intelligences' (New York 1917) ; Adams, G. P., (Idealism in the Modern Age' (New Haven 1919).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell U niversity.

PRAGUE, prag (German Prag; Bohemian Praha), Czecho-Slovakia, the capital of Bohe¬ mia and of the Republic of Czecho-Slovakia, 217 miles by rail northwest of Vienna and 118 miles southeast of Dresden. Its site is a regular ba¬ sin, traversed by the river Moldau, from the banks of which the city's buildings rise in ter¬ races, till they are terminated and enclosed by hills of considerable height. Of nine bridges including two railway viaducts the mosj strik¬ ing is the Karlsbrucke, dating from 1357-1503, and reconstructed after damage by a flood in 1892; it is 543 yards long with tower gateways at each end and buttresses adorned with stat¬ ues of Saint John Nepomuk, the patron saint of Bohemia, and other saints. The mediaeval fortifications and ramparts have been gradually demolished since 1866 and their sites occupied by pleasure grounds, boulevards,

dwellings, etc. The city is divided into eight districts, the Alt- stadt, Josephstadt, Neustadt, Vysehrad and Lie- ben on the right, and the Kleinseite, Hradschin and Holeschowitz-Bubua on the left bank. Out¬ side the line of the old walls lie the suburbs Karolinenthal, Smichow, Weinberge, Zizkov and others. The Altstadt and Josephstadt, the

latter formerly the Jewish Ghetto, lie along the right bank toward the north. The streets of the Altstadt are narrow; it is the principal seat of trade and business and contains some of the best stores, besides numerous churches, ecclesi¬ astical and educational establishments. The Neustadt encloses the Altstadt on the northeast, east and southeast. Though newer than the other, it is still very ancient, having been built by the Emperor Charles IV in 1348. On the op¬ posite side the Kleinseite forms the aristocratic quarter, the chosen abode of the Bohemian nobles and the site of several remarkable pal¬ aces. The Hradschin, to the west of the Klein¬ seite, occupies the side of a steep hill, is of less extent and contains fewer houses than the other quarters, but the chief public edifices. Among these are the royal palace, formerly palace of the Bohemian kings, situated in the Hradschin, parts of which date back to the 14th century ; the Gothic cathedral, begun in 1344 and still uncompleted, also in the Hradschin; the Cle- mentinum, the seat of the theological and philo¬ sophical faculties of the university, erected by the Jesuits in 1653-1726; the Carolinum, the seat of the university since 1383 and still de¬ voted to the faculties of law and medicine; the Teynkirche, a Gothic church, begun in 1370, his¬ torically interesting as the place where the Bo¬ hemian estates made George Podiebrad their king, and containing the grave of the celebrated Danish astronomer, Tycho Brahe, who spent his last years at Prague; the palace of Wallenstein, originally a structure of great magnificence, but now much dilapidated; the Alte Rathaus (old town hall), an irregular Gothic edifice, partly of the 15th century and partly of the early 19th century, with a fine old clock dating back to 1490; the chief synagogue of the Jews, rebuilt in 1338 after the burning of the Jewish quar¬ ter; the military hospital, a large and magnifi¬ cent edifice, originally erected by the Jesuits as a college ; German and Bohemian theatres, the opera house, the national museum, museum of natural history, picture gallery, the German and Bohemian technical colleges, Landesbank (1896), municipal savings bank (1894), central market hall (1896), the new Ritterakademie (1896), the Municipal Museum, the Museum of Industrial Art (1899), etc. Besides the cathe¬ dral there are a number of other smaller churches of considerable interest and antiquity, such as the Karlov church (1351-77), church of Saint Mary the Virgin (1348-72), church of Our Lady of the Snows (about 1347),

Saint Thomas' Church (14th century), Saint George's Church (1142-50), etc. The university, founded in 1348, had 10,000 students at the beginning of the 15th century; but subsequently as a result of the Hussite disturbances it had a long period of inactivity. It received a new constitution in 1881, having now two co-ordinate sides or sec¬ tions, one German and one Czech, with re¬ spectively 184 and 249 teachers, and 2,067 and 4,713 students (1914). It possesses a library of 370,000 volumes and 3,920 manuscripts, a fine observatory, museums of zoology and anatomy, a botanical garden, etc. The manufactures consist of gold and silver embroidery, silk, woolen, cotton and linen goods, buttons, hats, leather, paper, soap, refined sugar, vinegar, liqueurs, refined salt, gloves, sugar of lead, stearine and tallow candles, machines, musical

and mathematical instruments, firearms, porce¬ lain, jewelry, etc. The trade is of great im¬ portance; Prague, owing to its central position, and to its facilities of transport by river, roads and railway, being the great entrepot for all the traffic of the kingdom. There are seven rail¬ road stations and two river steamship lines: It has also several important fairs, particularly one for wool, which lasts seven days, and dur¬ ing which a great amount of business is done ; that of Saint Wenceslas, the old patron saint of Bohemia; and that of Saint John Nepomuk, though these two are rather religious festivals than fairs, and are more crowded with devotees than dealers.

Prague is supposed to have been founded in 722 by the Duchess Libussa. In 1348 Charles IV founded the university, the first which Ger¬ many possessed, and it soon acquired such celeb¬ rity through the teachings of such zealous rec¬ tors as Huss and Jerome that it was resorted to from all quarters of Europe. In 1424 Prague was taken by the Hussites and almost destroyed, but after their submission to the emperor in 1433 the town was rebuilt. It reached its great¬ est prosperity and importance during the times of George Podiebead and his successors. It suffered severely in the Thirty Years' War, which, indeed, started in Prague, and in 1620 a battle was fought at the White Mountain in the neighborhood, in which the Elector-palatine Frederick V was defeated by the Emperor Ferdinand II and compelled to renounce his crown. In 1631 the city was captured by the Saxons, who were driven out a few months later by Wallenstein. In 1741 it was taken by the French and Bavarians, and three years later capitulated to Frederick the Great. After the Seven Years' War the city made rapid strides and enjoyed peace and prosperity until 1848, when the Austrian government caused it to be bombarded for two days, owing to the marked democratic demonstrations excited by the meet¬ ings of the Slavonic Congress within its walls. During the Austro-Prussian War in 1866 the city was occupied by the Prussians and here the treaty of peace was signed on the 23d of August.

Prague is the seat of the new government and a Roman Catholic prince-archbishop. The city is governed according to a charter dating back to 1850. At the head of its government is a burgomaster. The citizens elect a board of aldermen of 90 members from whom a second body of 24 members, the Stadtrat, are chosen. The city owns three of its four gas works, several waterworks, the electrical power- works and street railways and the slaughter¬ house.

Besides the two universities and technical colleges there are numerous public, normal, high, manual training, trade and grammar schools, both for German and Bohemian chil¬ dren, as well as a number of private educa¬ tional institutions. There are also nine public hospitals, a state insane asylum, orphan asylums and a large number of other charitable institu¬ tions. A number of newspapers are published daily in both German and Bohemian. Of the total population 90 per cent were Bohemians and 8 per cent Germans. Alrqost 90 per cent were members of the Roman Catholic Church and about 8 per cent Hebrews. Prague

shewed the least increase in population of all Austrian cities during the decade 1900-1910, namely, less jhan one-half per cent. Pop. (1910 census) 223,741. Consult (Privilegia Civitatum Pragentum> (Prague 1886) ; Tomek, W. W., (History of the City of Prague) (in Bohemian, Vols. 1-12, Prague 1855-1901) ; (Oesterreich- lsches Staedte-Buch> (Vienna 1899, to date) ; Neuwirth, J., (Prag) (Leipzig 1901) ; Luetzow, F. H. H. von, (Story of Prague) (New York 1902) ; Symons, Arthur,

PRAHRAN, pra-ran', Australia, a town in the state of Victoria, four miles southeast of and suburban to Melbourne (q.v.). It is a separate municipality and in 1879 was made a city. Pop. (1911 census) 45,367.

PRAIA, pra'ya, or La Praia, Cape Verde Islands (q.v), since 1770 capital of this group of 14 Portuguese islands; on the southeast coast of the island of Sao Thiago, the largest and most populous of the 14. It has a good harbor and commercial relations with all the cities of the islands. It is the seat of the gov¬ ernor-general, whose palace is located there; has a meteorological observatory; and is an im¬ portant cable station between South America, Europe and West Africa. Pop. 21,000.

PRAIRIE, a treeless region in the Missis¬ sippi Valley, adjacent to the forested area, so called since the time of the early French "explor¬ ers. _ The eastern border of the prairie region is an irregular line crossing

Minnesota and Wis¬ consin in a southeasterly direction and extending into western Indiana, thence crossing Illinois and Missouri southwesterly to the borders of Oklahoma and eastern Texas. From this forest line the prairies extend westward from 200 to 600 miles to the Great Plains, into which they merge quite imperceptibly. In general we may say that the characteristics of the prairies are intermediate between those of the adjacent for¬ ests on the east and the plains on the west. The soil, climate, rainfall, etc., of the prairies are much like those of the western edge of the forests. As we go westward the soil becomes more sandy, the climate more ˆcontinental" and the rainfall less, approaching the conditions which prevail on the plains.

The soil of the prairies is usually dark in color and rich in organic matter. It is com¬ posed of very fine particles, and when dried after wetting becomes very hard. It contains much finely divided sand, and is generally some¬ what deficient in clay. While very rich and often of great depth, it is by no means inex¬ haustible, and the better classes of farmers have found it profitable to add fertilizers from time to time.

The climate of the prairies is somewhat more severe than that of the adjacent forest areas, on account of the free sweep of the winds which intensify the cold of winter as well as the heat of summer. The annual rainfall is about 30 inches, diminishing somewhat as we go west¬ ward, and this is so distributed that by far the greater portion falls in the spring and summer.

Although the prairies are usually spoken of as treeless, this is not strictly true, since the streams are always fringed with trees, the tree¬ less areas extending over the higher lands from stream to stream. Yet since these forest fringes are often confined to the deep narrow valleys in which the streams flow, they are often scarcely

noticeable as one looks over the landscape. The vegetation of the prairies naturally divides itself into that of the open country and that of the woodlands. In the open country the grasses constitute the dominant vegetation, since they are mostly perennial, and very tenacious of life. The species which are most common are grama (Bouteloua oligostachya, B. curtipendula, B. hir- suta), buffalo grass (Bulbilis dactyloides) , drop- seed grass (Sporobolus , of several species), wild June grass (Kocleria cristata) , blue-stem (Andropogon , of several species), switch grass (Panic um virgatum) , beard-grass (Aristida , of several species), Muhlenberg grass (Muhlen – bergia, of several species), sand-grass (Calama – grostis), porcupine-grass (Stipa spartea), Eaton grass (Eatonia), spear-grasses (Poa), fescue grasses (Festuca), brome-grasses (Bromus), wheat-grasses (Agropyrum) , and wild-rye (Elymus), each of many species. Altogether about 150 native species of grasses grow upon the prairies, affording fine pasturage and hay for stock. In those portions of the prairies where the rainfall is abundant these grasses con¬ stitute a continuous sod which completely covers the surface, but where there is less rain they are in isolated clumps or bunches, and are then called ((bunch grasses." In all prairies there are other plants which grow intermingled with the grasses, the most conspicuous of which are the golden-rods (Solidago rigida, S. serotina, S. canadensis , and other species), asters (Aster patens, A. sericeus, A. rnultiflorus, and other species), sunflowers (Helianthus annuus, and other smaller species). A few shrubs are found scattered over the prairies, adding to the variety of the vegetation, most noticeable the wild roses, redroot (Ceanothus) , and shoe-string (Amor – phia canescens) , the last so-called on account of its long tough roots which trouble the plowman.

The woodlands are usually found bordering the water courses. In some cases they con- stitute'broad areas extending for many miles on each side of the streams, while in others they are narrow belts but a few rods in

width, or even mere fringes along the stream-banks. The trees of the prairies are all of species which have wandered away from the eastern forests, and pushed up the streams to a greater or less distance. There are more species along the eastern side of the prairies, and their number decreases as we go westward. The common species are oaks, hickories, walnuts, willows, cottonwood, elms, maples and ashes. As a rule these trees are not as tall as those which occur in the heavy forests eastward, and they gen¬ erally grow with more spreading tops. Oc¬ casionally, however, trees of gigantic dimen¬ sions are found in sheltered situations. Careful observation of the trees on the prairies shows that where they are protected from fires, stock and other adverse influences, they generally re¬ produce so rapdily as gradually to extend the forest areas. In many places the forest belts along the streams are widening, and also push¬ ing up the valleys. Since the stoppage of prairie fires this natural spreading of the forests has gone on rapidly, so that there is to-day more forest-covered land in some parts of the prairie country than when it was first visited by white men. The prairie lands are from 300 to 1,400 feet above sea-level and are broken by river channels which have been cut in places to depths of over 100 feet.

PRAIRIE CHICKEN, or PINNATED GROUSE, a familiar western gamebird (Tym – panuchus am eric anus) . The genus Tympanuchus (or Cupidonia) is particularly well characterized by a large patch of naked yellow skin on each side of the neck, ordinarily concealed by a tuft of narrow-pointed feathers attached to the skin at its anterior border. Beneath this patch is an air-sac connected with the respiratory system and which can -be inflated until the skin is dis¬ tended to the size and form of half an orange. The head-crest is small, the tail is rather short, rounded and formed of 18 rather stiff quills, and the tarsi are incompletely and lightly feathered to the toes, which are naked and con¬ spicuously webbed at the base. The plumage is plain, the colors being various browns and yel¬ lows with white and black, finely mottled above and more boldly barred transversely below. The neck-tufts of the male are two and one-half to three and one-half inches long, those of the fe¬ male being considerably shorter. A full-grown male prairie-chicken is fully 18 inches long, but the females are smaller.

The changes in the centre of population of the prairie chicken as related to human settle¬ ment of the country are interesting and still in progress. Formerly it ranged throughout all open country between the Appalachian and the Rocky Mountain systems, and from Manitoba to the Gulf Coast. As the country has become more thickly populated it has disappeared from many regions and the eastern limit of its range has moved more and more

westward. At the same time the clearing of the forests has pro¬ vided much new open country which it has been prompt to occupy, replacing other species of grouse less adapted to life on bare prairies, and becoming abundant in many places where, as in parts of Minnesota, the land is cultivated in large tracts. In this way its range has extended westward and northward as it has been cur¬ tailed eastward. Like most of the grouse the prairie chicken is gregarious, living in flocks which become very large in the winter, when the birds show a disposition to wander. Through¬ out most of its still wide range this species is not in any true sense migratory; but a definite northward and southward movement takes place in the upper part of the central Mississippi Val¬ ley, although according to some experienced gunners and ornithologists, this is limited to the females, the males being quite stationary. In the spring parties of the males congregate at dawn on knolls, perform various antics, and from time to time inflate and empty the air- sacs, thus producing a loud booming noise which is said to be audible, in the stillness of the time and place, for a mile. In a few days the females gather, when the cocks engage in fierce battles for the possession of mates, before whom they strut and swell, with drooping wings and spreading tail, with their Cupid's wings elevated and air-sacs inflated almost to burst¬ ing, until the conquest is complete. They are monogamous and the nest of grass and weeds is built in a concealed spot on the ground and from 12 to 20 eggs, of a grayish or buff color and either unmarked or speckled with brown, are laid. They are said to hatch in about 25 days and the young, which run at birth, are cared for chiefly by the female, which has also performed the labor of incubation. Through¬

out the summer and early autumn they remain in family parties, but later gather in larger flocks. The food consists of various kinds of berries, nuts, seeds, shoots and buds and in¬ sects. With the development of the prairie re¬ gion as a great grain-growing country the prairie chicken has come to be especially abun¬ dant in the cultivated districts and to adopt wheat and other grains as special articles of diet. The vast numbers of grasshoppers which they destroy should, however, more than com¬ pensate the farmer for any loss of grain which he suffers.

The prairie chicken is so prolific, that, ill spite of the enormous numbers destroyed an¬ nually by cold rains, hawks, skunks and other natural influences, and by man, it has held its own and continues to be abundant in many parts of the grain-producing prairie States. It is, therefore, of far greater commercial importance than all other species of our native grouse combined, and not only are immense numbers consumed within those States but many thou¬ sands are shipped to New York and other east¬ ern markets, where its rich and delicate flesh is in demand for table use. Most States have seen the expediency of establishing close seasons and of prohibiting the use of snares and traps in its capture, so that it i;s now

hunted almost ex¬ clusively with the shot-gun. Many States have also prohibited its shipment for sale and have limited the number which a gunner is permitted to shoot in one day, usually to 25 or 50. Natur¬ ally it is the great game bird of its range. Its great popularity with the masses, however, is probably due to the size of the bag which re¬ sults from a day's shooting rather than to its gaming qualities, for in speed and other at¬ tributes which test the true metal of the sports¬ man the prairie chicken cannot compare with the ruffed grouse. Early in the season, when the young are not yet strong of wing and when better cover and warm weather cause the birds to lie close, bags of 50 or even 100 may be made by a good shot on the best hunting- grounds, but with the advance of the season and cooler weather the birds become more alert, harder and swifter of wing, the long quick shots which are now necessary testing the skill of even the most experienced gunner. Still later noth¬ ing but the rifle and much hard tramping is likely to yield any returns. As in the case of all similar gallinaceous birds, a strong shooting gun and good dogs are required. Whether the lat¬ ter be setter or pointer is generally immaterial, as both may be equal in speed, ruse and train¬ ing.. For this work on the wide, little watered prairies, endurance is a prime qualification and many hunters, use their dogs in relays. The best time for the sport is in the early morning and late afternoon, not only because tramping under the noonday sun is very wearying to hunters and dogs, but also because the birds cease feeding at that time and retire to sheltered gulleys and ravines. The species is easily do¬ mesticated.

It is very commonly stated that the prairie chicken was found throughout the New England and Middle States a century ago ; but ornitholo¬ gists are now practically agreed that the eastern heath hen is a distinct species, properly called T. cupido. At one time it was common, but became practically extinct 75 years ago. At

the present time the only colony known to be in existence is one which inhabits the wooded hills and scrubby plains of the island of Martha's Vineyard, where the birds are seldom seen in the thick coverts which this region affords. In general habits the heath hen differs little from its western relative. This remnant of its race is absolutely protected by the Massachusetts game law and a generally sympathetic local sentiment. A third species (T. pcillidicinctiis) is found in the region from Kansas to Texas, and along the Gulf Coast the common prairie chicken develops a distinct local race in Texas and Louisiana. In parts of the northwest the sharp-tailed grouse (Pedioccetes phasianellus) is called prairie-chicken.

See Grouse.

Consult Baird, Brewer and Ridgway, (Birds of North America) (Boston 1887) ; Sandys and Van Dyke, (Upland Game Birds) (New York 1902) ; Coves,

(Shooting on Upland, Marsh and Stream5 (Chicago 1890) ; Elliot, Gallinaceous Game Birds of North America5 (New York 1897) ; Elliot, (Monograph of the Tetraonidse5 (New York; 1872); Palmer and Olds,

PRAIRIE DOG, a name given to either of the two species of marmot-like rodents of the western plains of the genus Cynomys, but es¬ pecially to C. ludovicianus. It is about a foot long, reddish-brown above, lighter beneath. Its habits are eminently social. It forms large com¬ munities on the higher and drier parts of the plains, each burrow having a little hillock at its entrance, forming a firm curb about the shaft, which leads steeply down to a series of cham¬ bers a dozen feet or more underground, where the animals spend the winter in comfort, sus¬ tained by a store of the stems and seed-heads of sunflowers and similar plants.

These colonies were naturally several acres in extent, forming ((towns55 of crowded bur- rpws ; and were frequented by weasels, wolves, badgers, snakes and birds of prey, which preyed upon the rodents and their young, and kept down their numbers. Since the general settle¬ ment of the borders and river-valleys of the plains region, the prairie dogs have been so favored by the decrease of . their natural ene¬ mies and by the spread of irrigated cultivated lands, supplying them with both water and food in vast abundance, that they have increased enormously, so that at the opening of the pres¬ ent century aˆeas of thousands of square miles in northern Texas, and in the region between the upper Arkansas and Platte rivers, were so infested with the animals as to be practically useless to man. The question of practical relief from this condition has been a subject of much discussion among naturalists, not only, but both general and local governments have been forced to act in assistance of the farmers and cattlemen. The most successful means of ex¬ termination seems to be suffocation in their holes by means of bisulphide of carbon, which is placed upon balls of absorbent material and rolled down their burrows. Consult publica¬ tions of the United States Department of Agri¬ culture since 1891.

PRAIRIE DU CHIEN, Wis., city, county- seat of Crawford County, on the Mississippi River and on the Chicago, Missouri and Saint Paul and the Chicago, Burlington and Quincy railroads, about 90 miles in direct line west of Madison. In the vicinity of the city of mineral springs. Previous to its settlement the ground on which the city stands now was open prairie land. It is said that it was then the seat of an Indian chief named <(The

Dog,55 from which the French gave it its present name. Prairie du Chien was settled in 1783, but a French fort was built here in 1685 and aban¬ doned a few years later. Another fort was built in 1755. In 1786 the British surrendered this place to the United States, but captured it again in 1814 and retained possession for two years. In 1872 it was incorporated. Prairie du Chien is the trade centre of a fertile agricul¬ tural section. The chief manufactures are pearl buttons, barrels, veneer, egg cases, woolen goods, pickles, dairy products. The trade is chiefly in eggs, poultry, farm and dairy prod¬ ucts, buttons and its own manufactures. The principal public buildings are the churches and schools; the ruins of Fort Crawford (1830) still remain. The educational institutions are College of the Sacred Heart, for boys and young men; Saint Mary's Institute, for girls; a high school, public and parish schools and a public library. The population in 1920 was 3,537. Consult (State Historical Society of Wisconsin Collections (Madison 1855-1916).*

PRAIRIE FOX, the swift or kit fox (Ft il- pes velox) of the western American plains. See Fox.

PRAIRIE GROVE, Battle of, an engage¬ ment between the Confederates under General Hindman and the Federals under Gens. F. J. Herron and J. G. Blunt, at Prairie Grove, Ark., 7 Dec. 1862. Blunt had been stationed for some time at Cane Hill, when he received informa¬ tion that Hindman, with a force of about 25,000, was advancing northward to enter Missouri. He immediately summoned Herron and his two divisions, then near Springfield, Mo., to his ! Herron reached Fayetteville, about 12 miles from Blunt's position, in the morning of 1 De¬ cember, and the Confederates at that time lay between the two Union camps. Early that morning Hindman, with 11,000 men, moved against Herron ; the Confederate cavalry at first had the advantage, but were in turn driven back by Herron, whose entire force came up ; Hindman then took up a strong position and awaited attack. Meantime Blunt hastened to Herron's aid, and Hindman thus faced a force superior to his own in both numbers and equin- ment. The battle lasted the greater part of the day, and the Confederates were finallv forced to retreat. The Confederate loss in killed, wounded and missing was 1,317; the Federal loss, 1,251. The battle was of importance as checking the further advance of the Confed¬ erates into Missouri. Consult (The War of the Rebellion5 (Series I, Vol. XXII, Part 1, pp. 67- 158, Washington 1888).

PRAIRIE HEN. See Prairie Chicken.

PRAIRIE PIGEON, name given in the prairie region of the western United States to both the golden plover and the upland plover. See Plover; Sandpiper.

PRAIRIE RATTLESNAKE, a name ap¬ plied to one of several rattlesnakes to be found on the prairies of North America, the massa- sauga (Sistrurus catenatus) . See Rattlesnake.

PRAIRIE SCHOONER, a type of cov¬ ered wagon, used by the pioneers in transport¬ ing their chattels across the western prairies. As a type they have vanished, but the covering of the modern army motor truck is arranged in many respects similarly to that of the early prairie-schooner — more or less of a horseshoe shape with openings in front and back.

PRAIRIE SQUIRREL, or GOPHER, a name for several animals of the genus Spermo- philus, found in the American prairies in great numbers. See Gopher.

PRAIRIE STATE, a name applied to Illi¬ nois from the fact that the face of the State is mostly a level table-land, elevated from 300 to 800 feet above the sea.

PRAIRIE WOLF, the coyote (q.v.).

PRAISE OF FOLLY, The (‘Moriae En¬ comium5), “the wittiest of all Erasmus’s writ¬ ings55 (Froude), was written at Sir Thomas More’s house in Bucklersbury immediately after Erasmus’s return from Italy in 1509, but was not published until two years later when Eras¬ mus went to Paris to see it through the press. At least 12 editions followed within the next 10 years, and several English translations quickly appeared, so that Milton in 1628 speaks of it as being “in everyone’s hands55 at Cam¬ bridge. In a dedicatory letter to More, Eras¬ mus tells us that <(the first hint (of the work) was your own surname of More, which comes as near the literal sound of the word (Moria) as yourself are distant from the signification of it, and that in all men’s judgments is vastly wide.55 From a subsequent letter to John Botz- heim (1523) it appears that Erasmus had in¬ tended at the same time to write three essays in praise of Folly, Nature and Grace, respec¬ tively, but that the carping disposition of cer¬ tain persons made him change his mind. ‘The Praise of Folly,5 which is very entertainingly written and is filled with proverbs, classical allusions and quotations from the poets, scourges the abuses and follies of the various classes of contemporary society, although not by lashing particular persons by name. <(I did not,55 Erasmus tells us, “so far imitate Juvenal as to rake into the sink of vices to procure a laughter rather than create a hearty abhor¬ rence.55 The entire work is put into the mouth of Folly •herself, who, after

describing her de¬ scent, education and attendants, proceeds to show that no class of human beings is free from her influence. In this process, it is shown tc what extent grammarians and poets, philoso¬ phers and theologians, religious and monks, princes and courtiers, popes, cardinals and bishops and all other classes of men are under Folly's sway. The work is comparatively free from the coarseness of speech prevalent at the time, and men like More said that it needed no defense. It has been charged, however, that it was a deliberate attempt to discredit the Church, but this charge is unfounded, unless by the words ((the Church55 one means (

of secular princes, many fellow-clerics and even Pope Leo X. Hard as he had struck at the ex¬ isting evils he had said nothing for which the Church courts could openly punish him. When it is remembered that 'The Praise of Folly5 ap¬ peared after the pontificates of such Popes as Alexander VI and Julius II, at a time when simony and similar abuses had made such an inroad into the Church that plans were laid for convening the great reformatory Council of Trent, it is not difficult to imagine that such outspoken works as the one under discussion were needed to speed the day.

Herbert F. Wright.

PRAISES OF THE CREATURES, The.

See Canticle of the, Sun.

PRAJAPATI, Hindu divinity, having the character of a creator; at various periods this name was given to different Hindu deities, such as Indra, Brahma, etc. Thus there were many Prajapatis, and the Puranas contain many leg¬ ends concerning them. Consult Monier-Wil- liams, Sir M., Brahmanism and Hinduism5 (4th ed., London 1891) ; Barth, A., 'The Re¬ ligions of India5 (Boston 1882) ; Hopkins, E. W., (The Religions of India5 (Boston 1895) ; Macnicol, N., 'Indian Theism5 (London 1915).

PRAJNA PARAMITA, the principal Su¬ tra (body of rules or precepts) of the Ma- hayana School of Buddhists. The words mean in Sanskrit "absolute or transcendental wisdom.55 Consult Walleser, M. G. L., 'Prajna Paramita; Die Voll Korumeubeit der Erkeuntris5 (in Quellen der Religions-Geschichte,5 Vol. VI, Gottingen and Leipzig 1914).

PRAKRIT LANGUAGES AND LIT¬ ERATURE. The term Prakrit is applied to the vernacular languages of India, in distinction from the literary idiom, the Sanskrit (sanis – krita, purified, refined; prakrit, natural, com¬ mon), and it is a sign of the venerable age of Prakrit that we find traces of it even in some very early Vedic hymns. Prakrit again is sub¬ divided into primary, secondary and tertiary, according to the period when each of

these three forms of the vernacular was in general use. There are two main groups of primary Prakrit, namely, the Aryavarta, or that spoken in the central part of India, the Madhya-desa, and that current in the zone beyond, the so- called "Outer Band.55 That of the Midland developed in its turn into literary Sanskrit about b.c. 300. Irrespective of that process, however, the primary Prakrits arose and grew in accordance with the usual courses of pho¬ netics, with a general tendency to simplify the different idioms, eliminating harsh consonants and diphthongs and also complicated grammar forms. Side by side, however, with the literary Sanskrit there developed in the central region of India a vernacular, though this was some¬ what hampered in its growth by the literary tongue. One of the secondary Prakrits at least, the Pali, grew into the literary vehicle of Buddhism and became a highly articulated tongue. Besides, other Prakrits in a measure went through the same process and blossomed out into literary languages, both for profane and sacred uses. Thus, Jainism (or the Jaina religion, a regenerated Brahmanism) was propagated by three distinct Prakrits, and in the Indian drama and in other branches of lit-

erary production some of the common dialects were likewise employed. Singularly enough, in such dramas the Brahmans, heroes and persons of high lineage and the female personages, the celestial nymphs, courtesans, etc., only, spoke generally in Sanskrit to the audiences, all the others in the various forms of Prakrit. In fact, our knowledge of the older Prakrits has been greatly enhanced by this Indian stage con¬ vention, because the vernaculars thus employed in plays by acting persons varied greatly, par¬ taking as they did of the provincial character assumed by each. Often as many as 10 dif¬ ferent forms of Prakrit are thus introduced in a single play to the audiences, and of some of the less prominent Prakrits, notably of those possessing no literature of their own, we should not have a single trace without the aid thus given our understanding. Distinguished again from Prakrit proper, or perhaps rather as its lowest expression, is the Apabhramsa ((language, or ˆpatois®), a name given to the "wholly unliterary form of Prakrit, the one quite devoid of grammatical niceties and ingenious refinements of speech. However, it might happen that the Apabhramsa itself grew into a literary vehicle and received a gram¬ matical construction, while a coarser form of the same vernacular remained as the speech of the totally uncultured masses. The secondary Prakrits again attained a double growth, that of the Madhya-desa, or Midland region of India, which was named Sauraseni, and that of the surrounding country district. Sauraseni extended as far as Lahore, overrunning Rajputana and Gujerat. Its vocabulary was nearly identical

with the primary Prakrit, but phonetically there was considerable change. The Prakrits of the Outer Band comprised the Magadhi, Ardhamagadhi and Maharastri. Pali grew out of Magadhi. Ardhamagadhi (half Magadhi) developed by itself. Maharastri was spoken and cultivated in the large kingdom of that name, reaching from the Nerbudda to the Kistna and including parts of Bombay and Hyderabad, all of it south of the Sauraseni territory. At one time the prevalence of Prakrit of the Outer Band extended up to and including Benares. As a general point it ought to be noticed that there was an Apabhramsa (corruption) to each proper form of Prakrit. But uniform with them all, Prakrit and Apabhramsa both had the inclination to do away with certain harsh consonantal sounds that existed in literary Sanskrit itself, and with as much grammatical restriction as possible. Thus, for example, the Sanskrit bratam (brother) develops into vatam in Pali and into vaam in Maharastri. A number of the Prakrits, . too, cast out the Sanskrit r. Of all these Prakrits it is Maharastri that deserves most mention. In the Indian texts it usually stands for Prakrit per se. It obtained literary prominence quite early, epical, lyrical and dramatical literature being alike cultivated. Ardhamaeadhi also produced much literature, though of a some¬ what inferior texture. However, the early jaini books were composed in it. Sauraseni is, on the other hand, the usual prose dialect of the plays and is also used exclusively by one of the Jaini sects in their writings. There is, then, a plentitude of material from which to study the earlier as well as the later Prakrits, and

there are grammars, too, to help. Throughout one notices a steadily proceeding decay of grammatical rules and forms in all the Prakrits, until, as in the Hindustani of to-day, a purely analytical vernacular is the result. In their general phonetic effect there was a flattening of the vowels and a pruning away of super- , abundant consonants. To be more explicit as to the poetical and literary uses made of the Pra¬ krits, the holy writings of the Jaina religion, the sutras, etc., were in Ardhamagadhi ; the non-canonical books of the Svetambara sect were in Maharastri, and the canon of the Di- gambaras was in Sauraseni. In lyrics, which all are of a highly artificial type, the Prakrit reigns supreme. Most admired by Indians is Hala's ˆSattasal,® a collection of lyrics com¬ piled some time before the 7th century a.d. There is much grace and playful fancy dis¬ played in this collection, though in range of subjects and thought somewhat narrow. Many imitations inspired by this volume have appeared in India, the best being probably the ˆSatsai,® of Bihari Lai (17th century). The sources whence Hala drew are, unfortunately, lost. It has been contended that the ˆMahabharata® also owed much to Prakrit, and that it had first been written as a folk-epic in the early vernac¬ ular before being done over' into Sanskrit proper. Maharastri was employed for lyrics, even in Sanskrit dramas, as Sauraseni was for most interspersed dialogue. In Prakrit epic

poetry the ˆRavanyavaha® (Death of Ravana), based on the ((Ramayana® of Pravarasena (about a.d. 700) occupies first place. Since then the (

Bibliography. — Cowell, E. B., (Prakrita prakasa) (London 1868) ; Goldschmidt, S., (Ravanavaha oder Setubandha> (Strassburg 1883) ; (The Kalpanhas of Bhadra bahu, (ibid., 1878) ; Haag, F., (Vergl. des Prakrit mit d. rom. Sprachen) (Berlin 1869) ; Hoernle, A. F. R., (Sketch of the History of Prakrit Philology* (in Calcutta Review, Vol. LXXI, Calcutta 1880) ; Hoefer, A., (De Prakrito Dialecto> (Berlin 1836) ; Hultzsch, E., (Sun- haraja's Prakritarupavavatara* (London 1900) ; Lassen, C., (Institutions linguae pracriticae* (Bonn 1837) ; Konow, S., (Maharastri and Mahrathi* (in Indian Antiquary, XXXII, 180 seq., London 1903) ; Muller, M., (Beitrage zur Grammatik des Dschainaprakrit* (London 1876) ; Pandit, S. P., (The Gaiidavaha, a His¬ torical Poem in Prakrit* (Bombay 1887) ; (The Kumarapalacharita* (ibid., 1900) ; Pischel, R., (Grammatik der Prakritsprachen* (Strassburg, 1900) ; (Hemacandra (Halle 1877-S9) ; Jacobi, H., (Ausgewahlte Erzahl. im Maharashtri* (Leipzig 1900) ; Weber, A., (Das Saptataca- takam des Hala* (ibid., 1881).*

Wolf von Schierbrand, Author of (America, Asia and the Pacific'; iGermany: the Welding of a World*

*Power * ; etc.*

PRAM, pram, Christen Henriksen, Dan¬ ish poet, critic and economist : b. Gudbrands- dalen, Norway, 4 Sept. 1756; d. island of Saint Thomas, West Indies, 25 Nov. 1821. He studied at Copenhagen and in 1781, as a member of the agricultural and commercial college of Copen¬ hagen, he undertook several tours, the results of which were published in the Commercial Journal, founded by him in 1782. In 1815 he was discharged from his office with a small pension,, and in 1819 became collector of cus¬ toms on the island of Saint Thomas. His numerous writings embrace a great variety of subjects, both in political and natural science. Among his poetical productions are (Heroide an Erich > ; and (Starkodder} (Copenhagen 1785), a heroic poem, in 15 cantos. He also edited J. H. Wessel's (Collected Writings) (1787). Besides the Commercial Journal he founded another, the Minerva , a critical monthly which rendered essential service, in the formation of literary taste in the Scandinavian kingdoms. As editor of the latter he was suc¬ ceeded by K. L. Rahbek, who edited and

pub¬ lished his (Works> (six vols., 1824-29). Con¬ sult Host, J. K., (Til Christensen Henriksen Prams Amindelse) (Copenhagen 1820).

PRANG, prang, Louis, German-American engraver and publisher : b. Breslau, Germany, 12 March 1824; d. Los Angeles, Cal., 15 June 1909. His part in the revolutionary movement of 1848 compelled him Jo leave Germany and he came to this country in 1850. He established himself as a wood engraver in Boston, later becoming a lithographer, and in 1861 engaged in publishing, making a specialty of color print¬ ing. He was especially known for his well- executed reproductions of famous paintings. He invented the Prang method of art instruc¬ tion and published the drawing books and materials used in that course. He was president of the Prang Educational Company of Boston and of the Taber-Prang Art Company of Springfield, Mass. He published (The Prang Standard of Color) (1898) ; and with John S. Clark and Mary D. Hicks, Suggestions for Color Instruction (1893).

PRASE. See Quartz.

PRATER, pra'ter, the most famous prom¬ enade of Vienna. See Vienna.

PRATI, Giovanni, jo-van'ne pra'te, Italian poet: b. Dasindo, near Trent, 27 Jan. 1814; d. Rome, Italy, 9 May 1884. He studied law at the University of Padua, from which he was graduated in 1834, but soon turned to litera¬ ture. Strongly anti-Austrian and deeply in sympathy with the movement for national inde¬ pendence and unity under the rule of the royal house of Savoy, he was frequently in political difficulties during the period of Italy's unifica¬ tion. He lived successively in Milan, Turin, Florence and Rome. His first major work,

in originality and depth. Some of his lyric poems are amongst the best of his time, but much of his work is mediocre. His works include (Canti Lirici, Canti per il Popolo e Ballate) (2 vols., Milan 1843) ; (Lettere a Maria> (Turin 1843) ; (Mcmorie e Lacrime) ; (Nuovi Canti) (Turin 1844) ; (Palermo 1844) ; (Nuovi Versi) (Venice 1848) ; (Poesie Politiche) (Italia 1850) ; (Rodolfo) (Turin 1853) ; (Satana e le Grazie) (Pinerolo 1855) ; (Turin 1860) ; III, Vol. 17, pp. 173 and 285, Vol. 18, p. 89, Rovereto 1911).

PRATINAS, Greek poet: flourished about 500 b.c. He was a native of Phlius in the Peloponnesus and became famous as a lyrical and dramatic poet. He is credited with orig¬ inating the satyric drama which he introduced at Athens. Fragments of his lyrical poetry have been collected and published by T. Bergk in (Poetae Lyrici GraecP (Leipzig 1843) ; Nauck, A., (Tragicorum Graecorum Fragmenta) (Leip¬ zig 1856).

PRATINCOLE, a genus Glareola of wad¬ ing birds of the family Glareolidce, allied to the plovers, inhabiting the temperate and warmer regions of the Old World. About half a dozen species are described in Europe, Asia, Africa and Australia, frequenting the borders of rivers, lakes and marshes in low and high regions; the food consists of worms and in¬ sects, which they pick from the ground or aquatic plants or take on the wing like swal¬ lows; they fly and run very swiftly; the nest is a slight structure on the ground, among the thick herbage of the marshes, and the eggs three or four in number. All scream noisily. The collared pratincole (G . pratincola, Pall.), plentiful in southern Europe, is about the size of a blackbird, nine inches long; it is br<5wn above, white on the rump and below ; the throat surrounded by a black circle; the base of the bill and the feet reddish.

PRATIQUE, prat'ek, a term used to sig¬ nify the permission given to a vessel to hold communication with the land after the port authorities have been satisfied that the ship is free from infectious diseases. See Quaran¬ tine.

PRATO, pra'to, Italy, city in the province of Florence, on the Bisenzio, 11 miles north¬ west of Florence, with which it is connected by a railroad and a street railway. It is sur¬ rounded by ancient walls and is a well-built, cheerful-looking place. The cathedral, begun in the 12th and finished in the 15th century, with a very beautiful open air pulpit by Dona¬ tello and Michelozzo, contains also some very fine frescoes by Fra Filippo Lippi (q.v.). Amongst the other memorable buildings are a court of justice, several other churches, mon¬ asteries, convents, an old castle, an ancient praetorium (Palazzo Pretorio), a college, called

after its founder Cicognini, a public library, a theatre and several hospitals. Its extensive manufactures of woolen, silk, straw hats, paper, candles, olive oil, crackers, clothing and fur¬ niture, together with its iron and copper works have made Prato a prosperous, up-to-date city. It is the seat of a bishop. Pop. (1910) 20,360 (city proper); 56,715 (commune).

PRATORIUS, pra-to'we-us, Michael, Ger¬ man composer: b. Kreuzberg, Thuringia, 15 Feb. 1571 ; d. Wolfenbiittel, Brunswick, 15 Feb. 1621. Details concerning his life are very meagre. He began his career as kapell-meister at Wolfenbiittel, was secretary to the Duke of Brunswick, and later was appointed prior of the monastery of Ringelheim, near Gozlar, with the privilege of making his residence where he chose. He was one of the most

prominent com¬ posers of his time and also an able writer on musical topics. His most noted literary work is < Syntagma MusicunP (Wolfenbiittel 1614- 20), and his compositions include (Musae Sioniae5 (published in 16 volumes, containing 1,244 vocal numbers, Wolfenbiittel 1605-10); (Musa Aonia) (9 ˆols.), etc. His works are now exceedingly rare. A detailed description of the contents of (Syntagma MusicunP may be found in (Grove's Dictionary of Music and Musicians > (Vol. Ill, p. 806, New York 1911).

PRATT, Ambrose, Australian journalist and author: b. Forbes, New South Wales, 31 Aug. 1874. He was graduated in law from Sidney University, but he soon left his profes¬ sion to join the editorial staff of the Melbourne Age (1905). His published works include the following: (King of the Rocks) (1900);

(The Loot of the Tien-ti-Hway1 (1900) ; (Franks, Duellist* (1901) ; (The Great Push Experiment (1902) ; (Vigorous Daunt, Bil- lionaire) (London 1903; New York 1904); (Three Years with Thunderbold> (1905) ; (The Countershake) (1906) ; (The Remittance Man* (1907) ; (The Emperor and his Double) ; (First Person Paramount (1908) ; (The Veiled Man* (1909), and many short stories.*

PRATT, Anne, English botanist : b. Strood, England, 5 Dec. 1806; d. London, England, 27 July 1893. She made a life-study of the nature of plants and her writings reveal a wide knowl¬ edge as well as a deep love of nature. Her books are illustrated with her own excellent sketches and achieved great popularity. She had the happy faculty of combining a popular style with a considerable amount of scientific accuracy, so that her books served not only the purpose of increasing popular interest in botany, but also added considerably to the sum total of knowledge regarding English plants, grasses, etc. The most important of her books, all of which were published in London, are (The Field, the Garden and the Woodland) (pub¬ lished under the pseudonym (A Lady, 1838) ;*

(Flowers and their Associations (1840) ; (Dawnings of Genius, or the Early Lives of Some Eminent Persons of the Last Century) (1841) ; (The Pictorial Catechism of Botany) (1842) ; (Chapters on Common Things of the Seaside* (1850) ; (Our Native Songsters* ; (The Green Fields and their Grasses) ; (Wild Flow- ers) (2 vols., 1852) ; (Flowering Plants, Grasses and Ferns of Great Britain* (5 vols., 1854) ; (The Ferns of Great Britain, etc.* (1855) ; (The Poisonous, Noxious and Suspected Plants of*

our Fields and Woods, etc.> (1857) (The British Grasses and Sedges, etc. (1859); c Haunts of the Wild Flowers) (1863). She also translated Ottilie Wildermuth's (Im Tageslicht* and published it in 1865 under the*

*title (By Daylight.**

PRATT, Bela Lyon, American sculptor: b. Norwich, Conn., 11 Dec. 1867; d. Boston, 19 May 1917. He studied at the Yale School of Fine Arts under Niemeyer and Wier, and at the Art Students League in New York under Augustus St. Gaudens, F. Edwin Elwell, William Chase and Kenyon Cox, working under St. Gaudens in his studio. Later he studied in Paris under Chapu and Falquiere and at the £cole des Beaux Arts. He received two medals and two prizes while in Paris and in 1892 he returned to the United States. He has been instructor of modeling at the Boston Museum of Fine Arts since 1893. He has produced many works in sculpture, including statues, memorials, portrait busts, tablets, medallions and other works. He is a member of the National Institute of Arts and Letters, the American Academy of Arts and Sciences and of the National Sculptors Society. He was awarded a gold medal at the Panama Ex¬ position in 1915. Among his works may be mentioned two colossal groups on the Water Gate of the Peristyle at the Chicago Exposition : the Eliot medal for Harvard University and the Yale Bi-centennial medal; six seven-foot spandrel figures for the main entrance of the Library of Congress, as well as a 12-foot figure of (Philosophy and a series of four medal¬ lions, (The Seasons * there; recumbent figure of Dr. Coit, Saint Paul's Church, Concord, N. H., which received honorable mention at the Paris Salon in 1897; (Study of a Young Girl,* second medal at the Buffalo Exposition in 1901 ; statues of Bishop Brooks, Gov. John Winthrop, Jr., General Stevenson and others; portrait busts of Gen. C. J. Paine, Bishop Hunt¬ ington, Dr. Homans, Dr. Richard Hodgson ; the Harvard Spanish War Memorial; statue of Nathan Hale, Yale Campus, etc.*

PRATT, Charles, American philanthropist : b. Watertown, Mass., 2 Oct. 1830; d. New York, 4 May 1891. He obtained a portion of his education at Wesleyan Academy, Wilbraham, Mass., after having saved the money needed by working as a machinist, and in 1851 re¬ moved to New York where he engaged with a paint and oil firm, of which he became a mem¬ ber in 1854. When the firm dissolved in 1867 he retained the oil interests and under the firm name Charles Pratt and Company organ¬ ized a most successful business. He grasped the possibilities of the petroleum trade when the oil fields of Philadelphia were being de¬ veloped in 1860 and devoted himself to pro¬ ducing the best quality of refined petroleum on the market, Pratt's astral oil becoming world-famous. He acquired an enormous for¬ tune and in 1874 his business was merged in the Standard Oil Company, with which con¬ cern he was, therefore, affiliated almost from its beginning and in the prosperity of which he shared to a very considerable extent. He after¬ ward devoted himself to philanthropic enter¬ prises and contributed generously to various religious, charitable and educational causes. His greatest philanthropic work was the founding

of the famous Pratt Institute (q.v.) in 1886, in which he embodied his ideas of a thorough and practical education. It was opened in 1887 with 12 students, a number which at the time of his death had increased to over 3,000. The entire cost of the buildings, equipment, groqnds and ample endowment was borne by Mr. Pratt and at his death he left a further endowment of $2,000,000. He was public-spirited in every way but firmly declined public office.

PRATT, Daniel, the <(Great American Traveler,** American eccentric: b. Prattville, Chelsea, Mass., about 1809; d. Boston, Mass., 21 June 1887. He was a carpenter by trade, but became mentally unbalanced and wandered about, a pensioner on general charity. Con¬ tributions of his, including certain ((pr°clama- tions,** appeared from time to time in print; and for several years he made annually a grand tour of New England colleges, delivering in each grandiloquent orations. He believed him¬ self unjustly deprived of the Presidency, as¬ serting he had been duly elected.

PRATT, Ella Farman, American writer for young people: b. New York; d. Warner, N. H., 22 May 1907. With C. S. Pratt, for a series of years she edited the juvenile periodical Wide Awake and later Little Folks. Among her books, many of which were published under her maiden name, are (Good-for-Nothing Polly) ; (How Two Girls Tried Farming) ; (A Girl's Money1* ; (The Cooking Club of Tu- Whit Hollow1* ; (A Little Woman* ; (Grandma Crosby's Household* ; (Mrs. Hurd's Niece* ; (Anna Maylie* ; (A White Hand* ; (Sugar

Plums* ; (Happy Children* ; (The Play Lady* and (The Little Cave-Dwellers.*

PRATT, Enoch, American philanthropist : b. North Middleborough, Mass., 10 Sept. 1808; d. near Baltimore, Md., 17 Sept. 1896. He was educated at the Bridgewater (Mass.) Academy, entered a commercial house in Boston and in 1831 removed to Baltimore where he became a wholesale iron merchant and engaged in various financial enterprises which gained for him great wealth. He presented to the city of Baltimore in 1882 the Enoch Pratt Free Library, endowing it to the extent of $1,145,000. He was one of the first amongst American million¬ aires to devote part of his wealth to the found¬ ing of public libraries. He also gave generously to different churches, libraries and schools, especially to the House of Reformation and Instruction for Colored Children at Cheltenham, Md., and the Maryland School for the Deaf and Dumb at Frederick. The residue of his large estate

was left to the trustees of the Sheppard Asylum, a hospital for mental dis¬ eases near Baltimore, which is now known as the Sheppard and Enoch Pratt Hospital.

PRATT, George Du Pont, American con¬ servation commissioner : b. Brooklyn, 16 Aug. 1869. He was graduated at Amherst College in 1893 and entered the employ of the Long Island Railroad, eventually becoming assistant to the president of that company. In 1915 he became conservation commissioner for the State of New York and rendered important service in prevention of forest fires and by an education campaign in the field of hunting and forest laws has made great progress in his conserva¬ tion of the natural resources of the State. Mr.

Pratt is also well-known foi pis philanthropic interests.

PRATT, John Francis, American scientist : b. Pomfret, Vt., 18 June 1848. He was gradu¬ ated from Dartmouth College in 1871 ; studied civil engineering and in 1871 became connected with the United States Coast and Geodetic Sur¬ vey, being made an assistant in 1884. He led the expedition to Chilcoot, Chilkat, Skagway and Dyea to determine the southeast boundary of Alaska ; conducted an expedition to the east side of Bering Sea and the lower portion of the Yukon River in 1898. Has commanded several different vessels of the United States Coast and Geodetic Survey in conducting various expeditions to Alaska, Bering Sea, Hawaiian Islands, central portion of the Pa¬ cific Ocean and the Philippine Islands. He has recently been appointed on inspection duty in Oregon, Washington and Alaska.

*PRATT, Orson, American Mormon apos¬ tle: b. Hartford, N. Y., 19 Sept. 1811; d. Salt Lake City, Utah, 3 Oct. 1881. After a com¬ mon-school education, he followed the lead of his brother, Parley P. Pratt (q.v.), and joined the Mormons in 1830, accompanied them in the ■westward migration and in 1835 became one of the original 12 apostles. With Erastus Snow he was the first to enter the valley of the Great Salt Lake. From 1840-78 he accomplished eight missions to Great Britain and in 1864—65 one to Austria. During his visits to England he edited at various times The Millennial Star, the circulation of ■which he increased greatly. He began in Washington in 1852 the publica¬ tion of The Seer, a monthly, of which 18 num¬ bers appeared. From 1874 until his death he was historian and general church recorder. He was also for many sessions a member of the Utah Territorial legislature and seven times its speaker. In spite of the lack of educa¬ tional opportunities which he had experienced in his early life, he became a well-versed scholar of higher mathematics, astronomy and Hebrew. In 1854 he announced his ((law of planetary rotation** to the effect that the cubic roots of the densities of the planets*

are as the square roots of their periods of rotation. Among his works are (New and Easy Method of Solution of the Cubic and Biquadratic Equations (Lon¬ don 1866) ; (Key to the Universe* (1879), and a large number of tracts and pamphlets deal¬ ing with the Mormon doctrine. He also edited and published in Salt Lake City The Doctrine and Covenants of the Church of Jesus Christ of Latter-Day Saints, Containing the Revelations Given to Joseph Smith, Jr., the Prophet. **

PRATT, Parley Parker, American Mor¬ mon apostle : b. Burlington, N. Y., 12 April 1807 ; d. near Van Buren, Ark., 13 May, 1857. He adopted the Mormon faith in 1830 and in 1835 was elected a member of the first quorum of the 12 apostles. He traveled in this country, Canada, South America and in England, en¬ gaged in missionary work and in 1840 estab¬ lished at Manchester, England, the Millennial Star. At various times he was put in charge of the Mormon churches and missions in Great Britain, New England and the Middle States. He was one of the party which explored the valley of the Great Salt Lake in 1847 and 1849 and Parley's Peak and Parley's Canon were

named in his honor. He assisted in forming a constitution for the Provisional Government of Deseret, the name then applied to the present State of Utah, served as a member of its senate and later, when Deseret became the United States Territory of Utah, as a member of its legislative council. Throughout the early days of Mormonism he suffered all the hard¬ ships and persecutions which were then inflicted upon members of his sect and had many nar¬ row escapes from injury and death. At last, while engaged in one of his frequent missionary tours, he was murdered by three men near Van Buren, Ark. He wrote (A Voice of Warn¬ ing5 (1837) ; history of the Persecutions in Missouri) (1839) ; (Key to the Science of

Theology) (1854), etc. His (Autobiography 5 edited by his son, Parley P. Pratt, was pub¬ lished in 1874.

PRATT, Samuel Jackson ("Courtney Melmoth55), English author: b. Saint Ives, Huntingdonshire, 25 Dec. 1749; d. Birmingham, 4 Oct. 1814. He was ordained in the English Church, but later went on the stage where his career was not notable and then turned his attention to literature. He was a very prolific writer and his works cover a wide range of subjects. Though undoubtedly possessing con¬ siderable literary talent, force of circumstances prevented him from giving sufficient time and effort to his work so that very little of it proved of lasting value. He is by some authorities credited with a translation of Goethe's bor¬ rows of Werther,5 which, in 1809, was pub¬ lished by a Dr. Pratt. Of his works, many of

which were published anonymously, the most important are (Tears of Genius5 (1774) ; (Liberal Opinions Upon Animals, Man and Providence) (6 vols., 1775-77) ; (Apology for David Hume5 (1 777) ; (Tutor of Truth5 (3 vols., 1779) ; (Emma Corbett, or the Miseries of Civil War. Founded on some events in America5 (1780) ; (The Fair Circassian,5 a tragedy (1781); (Sympathy,5 a poem (1788); (Gleanings through Wales, Holland and West¬ phalia5 (1795) ; (J°hn and Dame, or the Loyal Cottagers,5 a poem (1803) ; (Harvest Home: Consisting of Supplementary Gleanings, etc.5 (3 vols., 1805). In 1808 he edited and pub¬ lished the (Cabinet of Poetry,5 containing se¬ lections from the poets (Milton to Beattie) with short biographical notices (6 vols.). He also edited Specimens of the Poetry of Joseph Blacket5 (1809) and (The Remains of Joseph Blacket5 (2 vols., 1811), and with Dr. Mavor (A Collection of Classical English Poetry5 (1813). The epitaph on Garrick's monument in Westminster Abbey is likewise from his pen and perhaps has been criticised and con¬ demned to a greater extent than any of his other writings. Selections from his works were published as follows: (Pity's Gift5 (Lon¬ don 1801) and (The Paternal Present5 (Lon¬ don 1810). Consult Blackwood's Magazine (January 1895, pp. 121-125) ; Gentleman's Magazine (1814, pt. II, pp. 398-399).

PRATT, Silas Gamaliel, American pianist and composer: b. Addison, Vt., 4 Aug. 1846; d. Pittsburgh. Pa., 31 Oct. 1916. He studied in Berlin in 1868-71 with Kullak, Bendel and Kiel and with Liszt and Heinrich Dorn in 1875-76. His first symphony was performed in Berlin in 1871 and in the following year he organized

the Apollo Club of Chicago. His opera Zenobia5 was well received on its presentation in 1882; in 1884 he was director-general of the Chicago Grand Opera Festival. In 1890 he accepted an appointment as professor of piano at the New York Metropolitan Conservatory. In 1906 he became president of the Pratt Insti¬ tute of Music and Art, Pittsburgh, Pa., and in the same year he also organized there the Pittsburgh centre of the American Music So¬ ciety. He has published numerous songs, part- songs, symphonies, etc., the operas (The Tri¬ umph of Columbus,5 (Lucille,5 (011anta5 and the symphonic poems America5 and (A Tragedy of the Deep.5 He has also written (Lincoln in Story5 (1901) and (Pianist's Mental Velocity5 (1903).

PRATT, Kan., city and county-seat of Pratt County, 80 miles west of Wichita, on the Atchison, Topeka and Santa Fe and on the Chicago, Rock

Island and Pacific railroads. The city is situated in a rich agricultural and stock-raising district and a State fish-hatchery is located here. The population is increasing. Pop. (1920) 5,111.

PRATT INSTITUTE, a polytechnic school in Brooklvn, N. Y., established in 1887 by Charles Pratt (q.v.). Its aim is to promote manual and industrial education as well as cultivation in literature, science and art. Its organization includes the following depart¬ ments: (1) School of Fine and Applied Arts; (2) School of Science and Technology; (3) School of Household Science and Arts; (4) School of Library Science; (5) Department of Education ; (6) Department of Physical Edu¬ cation. The regular courses of the institute vary in length ; mostly they cover two or three years; the general course in domestic science is only one year, and the general art course four years. Normal courses are given in the schools of Fine and Applied Arts and of House¬ hold Science and Arts, evening classes in these two schools as well as in the School of Science and Technology. The library is open for the free use of the public, has a large children's room, and in equipment and management is considered a model library. It contained 114,775 volumes in 1918. The library school offers a one-year general course and provides practice work for students in the library (See Library Schools). The institute confers no degrees, but grants diplomas for the completion of any of the normal courses, and gives cer¬ tificates attesting the completion of the full¬ time day courses. It occupies 12 large buildings, the main building, the science and technology building, the electrical building, the chemistry building, the machinery building, the house¬ hold arts building, the practice house, the men's club house, the women's club house, the rest home, the library and the gym¬ nasium. The endowment is large and the tuition fees are small. The productive funds consist of the original endowment made bv the founder, to which large sums have been added at various times by members of the Pratt family. The students in 1918 numbered 3,799, including all those in the special and evening, as well as the regular courses. The faculty consisted of 195 members.

PRATZ, Le Page du, le pazh du prats, French explorer in the New World : b. Holland.

about 1690; d. 1775. Entering the French army and serving in Germany for a time he was sub¬ sequently a member of the French Compagnie d'Occident which acquired a grant of territory near New Orleans, La. Du Pratz led an expe¬ dition there in 1718 and made unsuccessful at¬ tempts

to found a colony. In 1720 he went up the Mississippi and settled among the Natchez Indians. Later he explored the region border¬ ing the Mississippi and Arkansas and was for some years treasurer of the land company at New Orleans. He returned to France in 1734. He wrote a valuable and detailed account of his life in Louisiana which was published under the title (Histoire de la Louisiana) (3 vols., Paris 1758). It was translated into English as (History of Louisiana) (2 vols., London 1763).

PRAWN, a small decapod crustacean of the family Palcemonidoe, allied to the shrimps, in which the beak or ˆrostrum,® which projects in front of the carapace, is large, toothed and of compresed shape. The common British prawn (Palcemon serratus) is three to five inches long, shrimp-like in form, half-transpar¬ ent and often beautifully tinted, and is taken for market in great quantities by means of nets operated on sandy shores. When boiled, prawns become of a pale pink color, and are highly esteemed as table delicacies in this and in other shapes. Several species occur on the eastern coast of the United States, but are little used.

PRAXEAS, a teacher of the errors of the Antitrinitarians or Monarchians. Data concern¬ ing his life are meagre and uncertain. It is claimed that toward the end of the 2d century, after suffering persecution in the reign of Mar¬ cus Aurelius for his open confession of the Christian faith, he came to Rome from his native Phrygia to acquaint Pope Victor with the erroneous teachings and vicious practices of the Montanists, and prevailed upon Victor to recall the letters of communion which he had given to those sectaries. But while at Rome and afterward at Carthage he became an apostle of the doctrine of the Monarchians, teaching that in the Godhead is but one Person, who proceeding forth of his own divine essence and called Son, entered the Virgin's womb, was born of her and suffered on the cross; hence the distinctive name of the sectaries who fol¬ lowed Praxeas — Patripassians. See Antitrini- tarian ; Monarchians ; Sabellius ; Unita¬ rians.

PRAXITELES, praks-It'e-lez, Greek sculp¬ tor: b. probably, about 400 b.c. He was an Athenian bv birth, the contemporary of Scopas (q.v.), and one of the greatest sculptors of ancient times. The date of his death is un¬ known; but his life must have been long, since nearly three score works are mentioned as executed by him. He lived in the age of great¬ est opulence in Greek art, an age succeeding that of Phidias and one which had outgrown the austere vigor displayed in the works of the earlier master. During the time of Praxiteles the life of the individual was less merged in that of the body politic, and became more highly developed. This fact consequent upon the growth of wealth in private possession made the work of the sculptor in demand for the adornment of private houses instead of temples of worship. Praxiteles worked for*

private buyers, and many of his statues went to Asia Minor as well as Greece. Antiquity placed the highest estimate upon his statue of Aphro¬ dite, and people traveled in large numbers to Cnidus to see it. Lucian records seeing it there about 150 a.d. The statue has disappeared, but an idea of its form may be derived from a Cnid- ian coin, bearing its effigy, struck in honor of Plautilla. The greatest of his extant works is the statue of the youthful Hermes bearing on his arm the infant Dionysus. This statue, de¬ scribed by Pausanius, was discovered in 1877 by German excavators, at Olympia, where it now remains. The face, which is perfectly pre¬ served, gives to posterity a revelation of the exquisite beauty of the Greek face. The muti¬ lated statue of Demeter from Cnidus, now pre¬ served in the British Museum, is probably by Praxiteles ; but the Hermes is the only un¬ questionable one. Pausanias records that Prax¬ iteles regarded his statue of Eros and one of a satyr as his greatest works. This Eros was presented to Phryne, the courtesan, who posed for the Cnidian Venus, and was afterward placed in the temple at Thespise. There was another Eros at Parium on the Hellespont. The Satyr, represented leaning gracefully with his arm on a support, is preserved in reproduc¬ tion in the Capitoline Museum at Rome, and furnished Hawthorne with his inspiration for his romance, (The Marble FaunP The (Apollo Sauroktonos) (Lizard-Killer), a motive original with Praxiteles, is also known to posterity in reproductions in the Louvre and elsewhere. Reproductions of other works of Praxiteles, the authenticity of which, however, is frequently very doubtful, may be found in many museums and private collections, especially in Athens, Berlin, Dresden, Florence, London, Naples, Paris and Rome. Good casts of his most im¬ portant works are to be seen in practically every art museum in this country, especially in the New York Metropolitan Museum of Art and in the Boston Museum of Fine Arts. Praxiteles produced in addition to statues por¬ trait busts and genre-scenes, the latter being in the form of sculptured reliefs. His work, which exercised a great influence upon the fur¬ ther development of Greek art, charms by its perfection of grace and itc refined and noble expression of human emotions. Consult Kekule, R. von S., (Der Kopf des Praxitelischen Her- mes) (Stuttgart 1881) ; Amelung, W., (Die Basis des Praxiteles aus Mantinea> (Miinchen 1895) ; Furtwaengler, A., (Masterpieces of

Greek Sculpture) (ed. by E. Sellers, London 1895) ; Klein, W.,

PRAY, Isaac Clark, American journalist, dramatist and theatrical manager : b. Boston, Mass., 15 May 1813; d. New York, 28 Nov. 1869. He was educated at Harvard and at Am¬ herst and entered journalism in Boston, where he was at various times editor of the Pearl, the Daily Herald, the Sunday Morning News, the Dramatic Guardian and the Ladies' Companion. He early engaged in play-writing and in 1836 became manager of the National Theatre where he produced some of his own

plays. In 1846- 47 he played the leading parts in (Hamlet, (Othello, * and other productions in London,*

Liverpool and Cork. He went to New York in 1850 as an editorial writer on the Herald, and he was afterward a theatrical manager. He wrote about 30 plays and was also author of (Poems > (1837) ; (Book of the Drama) (1851); (Memoirs of James Gordon Bennett> (1855), etc.

PRAY, James Sturgis, American landscape architect: b. Boston, Mass., 26 Feb. 1871. He was educated at Harvard and in 1903 engaged in independent practice. Since 1906 he has been senior member of the firm Pray, Hubbell and White. He was assistant professor of landscape architecture at Harvard in 1905-14, was appointed chairman of the School of Land¬ scape Architecture there in 1908, and since 1914 he has been Charles Eliot professor. He is author of various articles in the periodicals devoted to his profession and of (City Planning)

(1913).

PRAYER, a religious act taking the form of an entreaty for the grant of favor or the forgiveness of trespasses, and directed toward an object of worship in whose power the an¬ swer of this entreaty is supposed to reside. Since prayer is an act almost universal among the religions of the world, it is but natural that it should exhibit a vast range of variation in its form and its spiritual level. The savage may beseech his fetish like a human king, or he may bribe it by offerings and promises, or he may bully it into granting the favors desired. In any case, he is likely to adopt toward it an attitude no more spiritual than that which he adopts toward his fellow savage. His prayer is used for the same purposes as magic, and in¬ deed only differs from magic in that the desired very immediate and very material benefit is accomplished through the mediation of a super¬ natural person, and not by virtue of the mere wish for the benefit itself. It is rain, or the death of an enemy, or the fertility of his crops, for which he prays, and all notion of the puri¬ fication from sin is likely to be absent. This awaits the coming of a morality less hand-to- mouth, and the formation of a more or less unified ideal of conduct. While the germs of this inhere in the religion of many races of a low civilization, it is only in such faiths as Buddhism, Judaism and Christianity, which combine a background of vigorous intellectual activity with a fervent exaltation of goodness, that religion habitually expresses itself in (

Religion, however, does not run a continu¬ ally ascending course. The transition from a religion of morality to fetishism, demonology, and magic, easily takes place through the for¬ malism of religious senescence. The faith that has lent dignity to its prayer through a set formula of noble words, or the sonorous ca¬ dences of an ancient language, ultimately finds that the formula, the cadences are retained long after all memory of their significance is dead. A condition supervenes — as in many Christian denominations — where the objects of religious worship are held firmly enough in mind, but the prayer, understood but in part by the priesthood and by the laity not at all, has come to be but an induction of the worshipper into a state of devotion. This does not mark the end of the process, which culminates in the mechanical prayer-wheels of the Buddhists of

Tibet, who have all but lost their Buddhism in a degraded devil-worship. Here the idea of the object of the prayer has practically vanished, so that religion is about to be resorbed into the magic from which it has emerged with such difficulty.

Even in Christianity, and in cases where the prayer has undergone no significant degree of formalization, the nature of prayer varies be¬ tween wide limits. It may be like that of the savage, objective in trend, and directed pri¬ marily toward an almighty Deity, with the purpose of receiving definite physical benefits. On the other hand, as has been seen among those of a more sensitive religious constitution, prayer is rather an entreaty that the merciful God shall aid a sinner in his avoidance of temp¬ tation. This entreaty passes over into a state where full reliance is placed in the goodness and wisdom of God ; and entreaty gives way to an inner confession. In these instances the emphasis is not so much on the Deity and the answer expected of him as in the purging of the moral consciousness encompassed by the act of prayer itself. It is this awareness of pre¬ vious sin and rejection of it, this turning over a new leaf, that lends to prayer its chief value. As William James says, the object of prayer is by far the least important feature of it. The prayer becomes a resolution of good works, accompanied by a faith that this resolution can be realized. The Deity who receives this prayer enters into the prayer merely as a sym¬ bol and tangible object serving to fix this faith. (See Faith). Consult Frazer, J. G., (The Golden Bough (London 1911-15) ; James, W., (Varieties of Religious Experience) (New York 1902).*

PRAYER, Week of, a special period of de¬ votion set apart as a result of a resolution adopted at Manchester, England, in 1846 at a conference of the Evangelical Alliance (q.v.) which urged ((members and friends of the Alli¬ ance throughout the world to observe the week beginning witfy the first Lord's day of January in each year as a season for concert in prayer on

behalf of the objects contemplated by the Alliance.® An appeal from missionaries in In¬ dia some years later resulted in broadening this scope. The week of prayer has become a settled institution among Evangelical Christians of different churches and countries and has been successful to a considerable extent in promoting Christian union.

PRAYER BEADS, the polished seeds of a West Indian leguminous plant (Abrus preca- torius) called wild licorice. These seeds were formerly much used for stringing into rosaries, necklaces, etc.

PRAYER BOOK. See Book of Common Prayer.

PRAYER BOOK, Common. See Com¬ mon Prayer, Book of.

PRAYER FOR THE DEAD. The prac¬ tice of prayer for the dead prevails in the Ro¬ man Catholic, Greek and other Eastern churches. Its purpose is the remission of punishment for sin. The custom seems to have existed in most of the ancient religions, especially in those of India, China and Egypt. The doctrine and prac¬ tice came to the Christian Church through the Jews (2 Maccabees xii, 44, 45). The first of

the Christian fathers who mentions prayer for the dead is Tertullian; but he speaks of the usage as well known and long established in the Church; such prayers are frequently alluded to by Saint John Chrysostom, Cyril of Jerusa¬ lem and Saint Augustine. The Roman Catho¬ lic practice of prayer for the dead stands of course in a close relation with the doctrine of purgatory, and was discarded with the latter by Protestantism. In the burial service of the first Book of Common Prayer of the English Church some prayers for the dead appeared, but they were deleted from the second book, and are not found in the subsequent revision. Nevertheless, many Anglican clergymen of all periods have approved of such prayers. Con¬ sult Boggis, R. J. E., (Praying for the Dead) (New York 1913) ; Lucock, H. M., (Eucharistic Sacrifice and Intercession for Departed) (ib.

1907).

PRAYER RUGS, the Mohammedan rug used for prostration during prayer. In con¬ sidering anything to do with the Moslem we have to remember that of the many Oriental tribes most of them are nomadic or were so. Hence their customs. Their tent is their home, their furniture consists of rugs. Before the warmth of the fire they sit on the odjaklik ; their floor is carpeted with the sedjadeli ; they separate the tent into individual spaces

with hangings (berdelik) . But each devout Moslem (practically the entire population) must have his Sprayer® rug (namazlik). Being the chief piece of religious furniture his prayer rug is as valuable as his financial condition affords, and on it he prostrates himself five times each day at the prescribed hour. First he spreads his rug in correct orientation, assisted by his compass, seeing that the niche (mihrab) points due toward Mecca, the grave place of Mo¬ hammed. Next he removes all valuable belong¬ ings, such as jewelry, money, etc., from his person to symbolize his abject humility before Allah ; he combs his beard as symbol of cleans¬ ing, then he brings forth his rosary of 99 beads and a piece of earth or stone taken from Mecca, placing them below the niche. Now he bows his head to the earth, stretches out his arms and in this pose carries out his devotions. The mihrab or niche is a point, or projection, extending from the central field of the rug, and represents the niche in which the Koran is preserved in the temple at Mecca. Prayer rugs vary in size from two and one-half to four feet in width by four and one-half to six feet in length. Some are made specially for the owner and have his name in wool on it ; these are, of course, of the finest weave. Now and again we come across prayer rugs with a de¬ sign of three or more niches for combined family or children's worship ; mostly they are Caucasian. Some have three small medallions in place of the prayer niche; these spaces are for the knees and forehead of the devout.

Technique. — As each tribe follows closely the traditional designs (tereh), handed down through the centuries, more especially in its prayer rugs, they are the more easily assigned to the different localities of origin. The field of the prayer rug is divided into sections as follows: When a single panel (square) only appears it is always above the prayer space ; Kulahs have generally but one, also Anatolians ;

but Bergamos generally have two panels, Ghiordes (see Rugs, Oriental) nearly always, Kulahs seldom. When two panels are in the design one each is placed at the upper and the lower end. We find on some rugs emblems of the equipment crudely defined : a compass, a comb, sometimes the 99 beads of a rosary. A small rhomboidal motif is found on some prayer rugs of Asia Minor designating the place for the devotee to put the earth or stone. Odd motifs figure at the sides of some niches show¬ ing where to place the hands in worship. A characteristic of the Ghiordes prayer rug is the shoulder on either side of the base of the niche (see illustration). Pilasters used to support

Outline of the Divisions of a Typical Ghiordes Prayer Rug.

1. Mirhab or Niche.

2, 3. Upper and Lower Panels.

these in the old specimens ; some had scroll or floral decoration, but they gradually lost resemblance to pilasters evolving into floral motifs, disappearing altogether in some. Sus¬ pended from the niche was a lamp motif or a floral piece, also later disappearing often. Some plant life is usually depicted inside the niche and on the inner side of the border. In the upper panel may be a floral decoration, a scroll or a verse from the Koran. The reclining S (~) or pothook also occurs in panels. A large palmette or rosette partly enclosed by foliage, somewhat like the Herati motif (see Rugs, Oriental) is common in the central border stripe, or square flowers and fruit. The wide stripe is at times represented by several narrow ones decorated with small floral figures. Tekke rugs differ so much from the carpets (sedjadeli) they would not be known as of the same tribal make. The glaring reds are not there (in antiques), but are replaced by sober, soft tones of wonderful richness; mahogany color with deep copper bronze tones as relief are usual. The

motif in the border is a (

Bibliography.— Ellwanger, W. De L.,

Clement W. Coumbe, Technical Art Expert .

PRAYING INDIANS, The, in American colonial history the name given those New England Indians who were early won to the Christian faith. During Philip's War they re¬ mained friendly to the colonists, a company of them enlisting under Major Gookin in July 1675. They acted as scouts and spies and ren¬ dered valuable service against Philip. Consult Gookin, Daniel, 'An Historical Account of the Doings and Sufferings of the Christian Indians of New England (in transactions and Col¬ lections of the American Antiquarian Society,* Vol. II, p. 423, Cambridge, Mass., 1836) ; Markham, Richard, (A Narrative History of King Philip's War* (New York 1883).*

PRAYING INSECTS. See Mantis.

PRE-ADAMITES, those supposed inhab¬ itants of the earth prior to the creation of Adam. The legendary traditions of the East speak of nations and empires existing before Adam's creation, and of a line of kings who

ruled over them. In Europe the subject was taken up by Isaac de la Peyrere, who, in a work published in Paris in Latin in 1655, main¬ tained that the Jews were the descendants of Adam, and the Gentiles those of a long anterior creation, founding his opinions on Genesis iv, 14, 17; and Romans v, 12-14. Others maintain that only the white and dusky races descended from Adam, but that the black races existed be¬ fore him. In modern times the question became again a matter of extensive controversy. Con¬ sult 'The Genesis of the Earth and of Man) (ed. by R. S. Poole, London and Edinburgh 1860) ; M'Causland, D., (Adajm and the Adam- ite) (London 1872) ; Winchell, Alexander, 'Preadamites (Chicago 1880).*

PRE-CAMBRIAN FORMATIONS.

Those geological formations included in the sys¬ tems below the Cambrian are sometimes grouped under this name. In America they in¬ clude the earliest formations, namely, those of the Archean Period (q.v.), and those immedi¬

ately succeeding them, namely, those belonging to the Algonkian System (q.v.). According to to the earlier, European, nomenclature all the Pre-Cambrian formations fell within the Archean Period, their lower series being called the Laurentian and the higher the Huron- ian. The latter practically correspond to the Algonkian.

The time occupied by the deposition of the Pre-Cambrian formations extended from the solidifying of the crust of the earth to the be¬ ginning of the Cambrian period (q.v.) and as the first traces of life are found in these forma¬ tions, and as they already show in the variety of their types evidences of long development, the length of time that elapsed during the build¬ ing up of these formations must have been very great. See Geology; Archean; Algonkian; Proterozoic.

PRE-EMPTION LAW, United States.

The first pre-emption act was passed 3 March 1801 ; it was a special act affecting the Symmes colonization scheme on the Miami River. Be¬ tween that time and 1841 about 18 pre-emption acts were passed, all of a more or less special nature. The first general law was passed in 1830. That of 1841 granted, upon considera¬ tions of residence and improvement, freedom of entry upon 160 acres of public lands to any person over 21 years of age, provided he was a citizen or had declared his intention to be¬ come one. By act of Congress of 3 March 1891 the various pre-emption laws then in ex¬ istence were repealed. All bona-fide claims or rights under them, however, were saved. There are now no pre-emption laws on the statutes of the United States. Consult Mallory, John A., comp., (Compiled

Statutes of the United States, Vol. II, pp. 1854-56 (St. Paul

1914).

PRE-EXISTENCE, the drctrine that the soul of an individual had an existence previous to that of the body in which it appears. This opinion was very prevalent in the East, and was held by the Greek philosophers, Pythagoras, Empedocles and Plato himself. A similar doctrine has found some countenance in Chris¬ tian times among those who were anxious to explain how the soul becomes united to the body, but could not divine any more plausible hypothesis than that all souls were created before the world, and that each has its proper body allotted to it at the time of birth. In oppo¬ sition to the doctrine of pre-existentism is that of traducianism, which teaches that the soul, like the body, is propagated; and creationism, in accordance with which a new soul is im¬ mediately created out of nothing by God for each newly propagated body. Consult Muller, Julius, 'The Christian Doctrine of Sin (Edin¬ burgh 1852-53) ; Howison, G. H., 'Limits of Evolution* (New York 1901).*

PRE-RAPHAELITES, members of the <(Pre-Raphaelite Brotherhood® and their fol¬ lowers. The original brotherhood was founded by the association of three painters, Dante Gabriel Rossetti, William Holman Hunt and John Everett Millais. The inspiration, however, which gave life to the Pre-Raphaelites was derived from an artist who never joined the brotherhood, Ford Maddox Brown. In 1848 Rossetti became the pupil of Ford Maddox Brown, a great and original artist whose work

was quite neglected at a period when Victorian art in England had sunk to its lowest con¬ dition of commonplace prettiness, convention¬ ality and utter want of mysticism or spirituality. Ford Maddox Brown, the practical originator of the new school of Englisn painting, and the bringer-in of a new English Renaissance, had attracted the notice of Rossetti by his powerful picture, (Parisina's Sleepy which was exhibited at the British Institution 1845 and was con¬ spicuous for marvelous atmosphere, finish and fidelity of expression. Rossetti became the devoted disciple of this master. Rossetti was a poet, full of dreams and desires, and passion¬ ately striving after the true and the beautiful. At the academy schools he met William Hol¬ man Hunt, a man of profound religious feeling, yet reserved, hard working and bound on not¬ able and original achievement in art. With them was eventually associated John Everett Millais, already a brilliant and successful artist, and far in advance of his confreres of equal

age in all the skill that comes from knowledge and prac¬ tice. These men, strangely different in artistic temperament, formed a powerful trio devoted to making a fearless protest against the shallow and insincere banalities of the day. They called themselves Pre-Raphaelites; but, as W. Holman Hunt has said, ((Neither then nor afterward did they affirm there was not much healthy and good art after the time of Raphael ; but it appeared to them that afterward art was so frequently tainted with the canker of cor¬ ruption that it was only in the earlier work they could find with certainty absolute health. Up to a certain point the tree was healthy : above it, disease began ; side by side with life, there was death.® Their artistic doctrines were indeed to be summed up in the one word sincerity; the bond of union, between them, as enunciated by one of their number, was (1) to have clear ideas to express; (2) to study Nature attentively, so as to know how to express them; (3) to sym¬ pathize with what is direct and serious and heartfelt in previous art, to the exclusion of what is conventional and self-parading and learned by rote; and (4) most indispensable of all, to produce thoroughly good pictures and statues.

The three founders of the association which Ford Maddox Brown had inspired were subse¬ quently joined by Thomas Woolner, sculptor; James Collinson, painter, who eventually left the brotherhood; Walter Howell Deverell, painter; Frederick George Stephens, painter and art critic; and William Michael Rossetti, younger brother of Dante Rossetti, and like the latter, a poet. Ford Maddox Brown de¬ clined to join simply because he disliked coteries, and it certainly was not he who gave the doctrine its name of Pre-Raphaelitism. But, as his own work was an embodiment of this artistic creed, so his association with the members of it was always close and his sympathy with their work enthusiastic. Millais remained in the brotherhood 10 years (1849- 59) ; he then dropped out, became a fashionable portrait painter and famous for his power in painting children, and such textures as satin and velvet. W. Holman Hunt kept on an uncom¬ promising adherent to the principles of the brotherhood. But before the work the Pre- Raphaelites had to do was accomplished, they were compelled to run the gauntlet of criticism

and ridicule from those whose system and method of painting they were attacking. In the Times of 5 May 1854 a letter appeared signed by John Ruskin, boldly praising and defending the new school. It is doubtful, however, whether Ruskin understood the principle of Pre-Raphaelitism, and it is a mistake to think that his writings gave the first suggestion for the formation of such a league.

Pre-Raphaelitism has become a permanent influence in English art. The generation of English artists which succeeded that in which Ford Maddox Brown lived has followed the guidance of the Pre-Raphaelites, either as to

romantic motif, mystic religiousness or draw¬ ing and technique; sometimes in all of these. In certain quarters, 'however, there appeared a tendency in a somewhat perverted manner to carry out the traditions of the brotherhood, by an exaggerated mediaevalism, a deliberate crude¬ ness or grotesqueness of design and an in¬ sistence on minute detail. The most impor¬ tant English artists who were influenced by Pre- Raphaelitism were : William Morris, W. S. Burton, M. J. Lawless, Robert Martineau, Walter Crane, Sir Edward Burne-Jones and E. De Morgan.

Bibliography. — Ruskin, John, Pre-Ra¬ phaelitism5 (New York 1851) ; Young, Rev. E.f

PREACHERS, Orders of. See Domini¬ cans.

PREACHING FRIARS. See Dominicans.

•

PREAULT, pra-o, Antoine-Auguste,

French sculptor: b. Paris, 8 Oct. 1809; d, there, 11 Jan. 1879. He began his art studies with a decided tendency toward romanticism and en¬ tered the studio of David d'Angers, but soon left it and ever afterward aimed at a naturalistic treatment of art themes. This was proved by the first works he exhibited at the Salon (1833) — (Misery, 5 a group representing a girl dying in the arms of her mother; and two reliefs, (Death of the Poet Gilbert in Hospital5 and (Famine. 5 In the following years he ex¬ hibited numerous works, among them the statue (Undine5 ; and the relief (River Ama¬ zon5 ; (Queen of Sheba5 ; a sitting figure of Hecuba; the colossal statue (Charlemagne5 ; and the statue (Carthage. 5 None of these works were admitted to the Salon, but in 1849 the opinion of his merits had changed and the doors of the exhibition in the Champs Ely- sees were opened to him. After this he was

represented there by his (Christ on the Cross) (now in the church of Saint Gervais) ; the relief Ophelia5 ; the statue of (General Marceau) at Chartres; the statuette 'French Comedy) ; and many other works, amongst which there were many sepulchral monuments. The most famous of these, perhaps, is (in Vol. XVII, p. 3, Paris 1879) ; Chesneau, E., 'Pedutres et statuaires romantiques (Paris 1880).*

PREBEND, a stipend paid to an ecclesias¬ tic from the foundation funds of

a cathedral or collegiate church. Prebendary is the person who holds a prebend. A simple prebend has no more than the revenue which is assigned for its support; but if the prebend has a juris¬ diction annexed, the prebendary is styled a dignitary. Prebendaries, as such, have no cure of souls ; but a prebendary may, and frequently does, hold a parochial benefice as well. The prebendal stall is the seat of the prebendary in the church, into which he is inducted by the dean and chapter.

PREBLE, preb'l, Edward, American naval officer: b. Portland, Maine, 15 Aug. 1761; d. there, 25 Aug. 1807. When about 16 he ran away from home and joined a merchantman, on which he went to Europe ; on his return in 1779 he entered with his father's approval the Massachusetts State marine as midshipman on the Protector and participated in the attack on the British ship Admiral Duff which was de¬ stroyed. In 1780 he was captured on board the Protector and imprisoned on the prison-ship Jersey in New York Harbor. Upon his release he served on the Winthrop, another Massa¬ chusetts State ship, and with 14 men boarded an armed British brig and took her out of Penobscot Harbor in the face of the enemy's battery. At the conclusion of peace the Massa¬ chusetts navy was disbanded in 1782. For the next 16 years he devoted himself to commercial pursuits and made a number of journeys to various parts of the world. On the organiza¬ tion of the United States navy in 1798 he was one of the first five to be commissioned lieuten¬ ant, and in 1799 was promoted captain in com¬ mand of the Essex with which he convoyed a fleet of 14 valuably laden merchantmen from China. In 1803 he was assigned to the Consti¬ tution and given command of the squadron against the Barbary powers. He arrived at Tangiers in October 1803 and speedily forced from the Sultan of Morocco a renewal of the treaty of 1786. The Philadelphia of his squad¬ ron was captured while pursuing Tripolitan gunboats and Preble blockaded Tripoli for several months endeavoring to regain or de¬ stroy the ship. In July. 1804 he bombarded Tripoli and subsequently conducted six vigorous attacks in which he captured three gunboats and sunk three others. In September the relief squadron under Preble's senior officer, Captain Barron, arrived and Preble returned to the

United States _early in 1805. The treaty was signed in 1805 without further fighting and Preble received a gold medal and the thanks of Congress. After his return his health showed signs of serious impairment. And, without again assuming active duty, he died after much suffering in his 47t'h year from consumption. Consult (Naval Operations against Tripoli (in (American State Papers,* Class VI, Naval Affairs, Vol. I, 1794-1825, p. 133, Washington 1834) ; Waldo, S. P., (Biographical Sketches of American Naval Heroes in the War of Revolu¬ tionˆ (Hartford 1823) ; Sparks, Jared, ed., (The Library of American Biography * (Series II, Vol. XII, Boston 1847) ; Preble, Q. H., (First Three Generations of*

Prebles in Amer¬ ica (Boston 1868).*

PREBLE, George Henry, American naval officer: nephew of Edward Preble (q.v.), b. Portland, Maine, 25 Feb. 1816; d. Brookline, Mass., 1 March 1885. He entered the navy as midshipman in 1835, served in the Mediterranean on the frigate United States in 1836-38, on various boats of the West Indian and Gulf squadron in 1839-40, was engaged in the war against the Seminoles in 1841-42, and in 1843- 45 circumnavigated the world on the Saint Louis, attaining the distinction of landing the first American force in China. In the Mexican War he participated in the battles of Alvaredo, Vera Cruz, Laguna, Tampico, Panuco and San Juan de Ulloa; in 1848 he was commis¬ sioned a lieutenant; from 1853-56 he was in Japan and China with the Perry expedition and in 1854-55 he was engaged in several actions with Chinese pirates. In 1862 he com¬ manded the steam gun-boat Katahdin under Farragut at the capture of New Orleans, was commissioned a commander in that year and for failure to capture the Confederate cruiser Oreto was dismissed from the navy. Investi¬ gation proved him blameless, however, and in 1863 he was restored to his rank, placed in com¬ mand of the Saint Louis with which he engaged in pursuing Confederate rovers in foreign waters. In the latter part of 1864 he blockaded the North Edisto River, and a little later was placed in command of the fleet brigade organized by Admiral Dahlgren at Port Royal for the purpose of co-operating with General Sherman. Under his command the brigade en¬ gaged on 30 Nov. 1864, in the successful battle of Honey Hill. In April 1865 he was put in command of the steamer State of Georgia. From October 1865 to July 1867 he was inspector general of supplies at the Charlestown navv yard. From August to December 1867 he acted as chief of staff of the North Pacific squadron, commanding the flagship Pensacola and in March 1867 was com¬ missioned a captain. He was commissioned commodore in 1871, and in 1873-75 had charge of the navy yard at Philadelphia. In 1876 he received rank as rear-admiral, was in com¬ mand of the South Pacific station in 1877-78 and in 1878 was retired. He wrote (Chase of the Rebel Steamer of War Oreto) (Cambridge, Mass., 1862) ; (Genealogical Sketch of the First Three Generations of Prebles in America) (Bos¬ ton 1868) ; 'Our Flag. Origin and Progress of the Flag of the United States of America, etc. (Albany 1872) ; 'History of the Flag of the United States of America, and of the Naval*

and Yacht-Club Signals, Seals and Arms, etc. (1880); (A Chronological History of the Origin and Development of Steam Navigation (Philadelphia 1883).*

PRECEDENCE, in official life, the order in which men and women follow each other ac¬ cording to rank and dignity in a State proces¬ sion or on other public occasions. In England the order of precedence depends partly on stat¬ utes and partly on ancient usage and established custom. Questions arising on matters of prece¬ dence depending on usage are hardly considered as definitely settled and are in a great measure left to the discretion of the officers of arms. The sovereign, of course, is always first in or¬ der of precedence, after whom in descending order follow the Prince of Wales, younger sons of the sovereign, grandsons of the sovereign, brothers of the sovereign, uncles of the sover¬ eign, nephews of the sovereign, ambassadors, the Archbishop of Canterbury, the Lord High Chancellor, the Archbishop of York, the Prime Minister, and so on through the high state dig¬ nitaries, the various ranks of the peerage, etc. The order of precedence among women fol¬ lows the same rules as that among men, except that wives and daughters of men possessing official precedence do not participate therein and are ranked entirely by whatever personal stand¬ ing they may possess by virtue of inherited titles or dignities. By the acts of Union of Scotland and Ireland the precedence in any given degree of the peerage has been established as follows: (1) Peers of England; (2) Peers of Scotland; (3) Peers of Great Britain; (4) Peers of Ireland; (5) Peers of the United Kingdom and Peers of Ireland created subse¬ quent to the Union. The question of precedence in recent times has lost much of its former importance as a result of the spread of demo¬ cratic > institutions. England is, perhaps, still more interested to-day than any other country and has more extensive and detailed regulations concerning it, though, of course, rules govern¬ ing precedence are in existence in practically every civilized country in the world.

In the United States the most generally ac¬ cepted order in Washington official life is as follows :

The President,

The Vice-President,

President of the Senate,

Foreign Ambassadors,

Chief Justice of the Supreme Court,

United States Senators,

Speaker of the House,

Representatives in Congress,

Associate Justices of the Supreme Court,

Secretary of State,

Diplomatic Corps (other than ambassadors),

Secretary of the Treasury,

Secretary of War,

The Attorney-General,

The Postmaster-General,

Secretary of the Navy,

Secretary of the Interior,

Secretary of Agriculture,

Secretary of Commerce and Labor,

. General Staff of the Army,

Admirals of the Navy,

Governors of States.

Then follow the judiciary, diplomatic rep¬ resentatives of the United States, army and navy officers, chiefs of departments, foreign consuls, secretaries of legations, etc.

Questions of international precedence arising as a result of international commissions or of

the signing of treaties by several countries, are solved usually by arranging the names of the countries in alphabetical order. The precedence of diplomatic representatives is determined by the date of the presentation of their credentials, except that ambassadors outrank envoys and ministers plenipotentiary. Consult Burke, (Peer¬ age ; MacKenzie, Sir George, Observation Upon the Laws and Customs of Nations as to Precedency* (Edinburgh 1680) ; Hellbach, J. C. von, (Handbuch des Rangrechts* (Ansbach*

1804).

PRECENTOR (Latin, prce, before ; canere, to sing), a leader of singing. In

cathedrals of ancient foundation of the Established Church of England the precentor is a member of the chap¬ ter and in dignity ranks next after the dean ; in cathedrals of the new foundation, that is, those of sees created by Henry VIII or formed in later times, the precentor is only a minor canon and is removable at the pleasure of the dean and chapter. During solemn functions the precentor's place is on the north side of the chancel, while that of the dean is on the south side. In the Presbyterian churches of Scotland it was formerly the custom that half an hour before the arrival of the minister, the precentor would read to the congregation lessons from the Scripture ; when the minister entered, the pre¬ centor would give out a psalm and lead the sing¬ ing; hence his desk, below the pulpit, is still called lectern, or in Scotch dialect lettran, that is, reading-desk. In the rural districts of Scot¬ land it is still customary for the precentor to read each verse of a psalm before it is sung.

PRECEPTORS, College of, London, Eng¬ land, a training school for teachers founded in 1846 and granted a Royal Charter in 1849 ((for the purpose of promoting sound learning and of advancing the interests of education, espe¬ cially among the middle classes, by affording facilities to the teacher for acquiring a knowl¬ edge of his profession.® The college estab¬ lished examinations for teachers and for stu¬ dents in the secondary schools, issuing diplomas and certificates ; and performed pioneer work in the training of teachers for the secondary schools. The school examinations, established in 1853, served as standards by which teachers could guide their work. The first examination in the theory and practice of education was held in 1867 and in 1873 the first professorship in education in England was established by the college. There are practical examinations for certificates of ability to teach as well as the written theoretical examinations ; and there are, as well, winter meetings and short courses for teachers. The examinations conducted for pupils in secondary schools have proved of value as the marks obtained are recognized by the board of education and by many profes¬ sional associations. The college has power to inspect schools and decide upon their suitable housing and equipment, as well as upon the adequacy of the teaching staff and the general organization. Membership in the college is open to persons over 18 years of age who have passed the examination prescribed by the coun¬ cil and been thereafter elected. The college is located in Bloomsbury Square and has a library of 10,000 volumes. The organ of the college is the Educational Times, published monthly and one of the oldest educational journals in

England. Consult (Annual Calendar, College of Preceptors5 ; Board of Education of Eng¬ land's (Report of the Consultative Committee on Examinations in Secondary Schools> (1911) ; (Schoolmaster's Year Book) (London, annual).

PRECESSION OF THE EQUINOX.

See Equinox.

PRECIEUSES RIDICULES, Les, la pra- se-e re-de-kiil, a comedy by Moliere (q.v.), pro¬ duced for the first time 18 Nov. 1659. No one of Moliere's comedies is better known than this famous satire on the (

PRECIOUS METALS. Gold and silver are commonly included under this term, though plat¬ inum and quicksilver have sometimes been added. However, on the basis of their having sufficient value and being abundant enough for coinage, gold and silver are more accurately de¬ scribed as precious metals. America has con¬ tributed largely to the total amount of the pre¬ cious metals in circulation in the world. The United States, Mexico and Australasia are the three countries which rank highest in annual total production of these metals according to their monetary value.

Fine ounce of gold, $20.671834 + ; fine ounce of silver, $1.292929 +, coining rate in United States silver dollars.

The United States, therefore, while greatly surpassed in the amount of gold produced by Africa, and in silver by Mexico, far surpasses every other country in the total value of pre¬ cious metals produced. It is estimated that the total production of gold in all countries since the discovery of America amounted to 825,000,- 000 fine ounces in 1919, while the total produc¬ tion of silver in the same period was 12,000,- 000,000 fine ounces. See Commerce, History of; Gold; Mineral Production in the United States; Platinum; Silver; and consult Smith, E. A., (Sampling and Assay of the Precious Metals5 (Philadelphia 1914).

PRECIOUS STAR, Order of. See Or¬ ders, Royal.

PRECIOUS STONES. A substance to be precious must possess variety, beauty, durability and portability. Precious stones, phenomenal stones and semi-precious stones are such as may be used for ornamental jewelry. Strictly speak¬ ing the term precious stone is reserved to desig¬ nate the diamond, the ruby, the sapphire and the emerald, the others being called ˆphenomenal" and ˆsemi-precious," but the designation ((precious" has been loosely used to indicate all stones used for the jeweling of choice objects of adornment. The following are those which chiefly claim attention :

Diamond. — See the special article describ¬ ing this gem.

Spodumene has a hardness of 6.5 — 7, and a specific gravity of 3.13 — 3.19. The rich green variety, hiddenite , named after the late William Earle Hidden, was found at Stony Point (now named Hiddenite), Alexander County, N. C., in crystals furnishing gems weighing up to five carats each. A yel¬ low variety which occurs in Brazil is called triphane. Kunzite (q.v.) is a rich, lilac-hued variety of spodumene, of which fine examples come from Pala, San Diego County, Cal., It also occurs in crystals weighing up to 100 carats in Madagascar. Spodumene was at an earlier time called ((triphane," a name given it by the great crystallographer Haiiy.

Titanite (or sphene) is a calcium silico- titanite, having a hardness of 5.5 and a specific gravity of 3.5. It furnishes the most brilliant yellow and brown gem except the diamond. Fine examples have been found in Bridgewater, Bucks County, Pa., from which gems weighing from 10 to 20 carats could be cut. Other sources are the Tilly Foster Mine, New York, and the Pfitschtal and Zillertal, in Tyrol.

*Tiffanyite. — A name given to a hydrocarbon assumed to be present in certain diamonds, namely those which on that account exhibit fluorescence and phosphorescence. The sub¬ stance apparently has a bluish-white color. The blue white diamonds of Brazil are called Tiffanyite diamonds.**

Moissanite. — A natural carborundum, a car¬ bon silicide, of which the French chemist, Henri Moissan, found, in 1905, small blue or bluish- green crystals in the meteorite of Canon Diablo, Arizona, in association with microscopic dia¬ monds. It belongs to the rhombohedral division of the hexagonal system. The cleavage is poor ; the fracture conchoidal; the hardness is next to that of the diamond. The refractive indices are higher than 1.75. As many as 44 varieties of the crystal forms have been observed. The name was given in honor of the discoverer.!

Rubies and Sapphires. — The ruby and the sapphire are transparent varieties of corundum (q.v.), the first being carmine-red, and the sec¬ ond bright blue and velvet blue. Other colors also occur, as yellow, green and purple, called, respectively, Oriental topaz, Oriental emerald and Oriental amethyst. Corundum crystallizes in the hexagonal system, and consists of alumina nearly pure. In hardness it ranks next below the diamond, being rated as nine on the scale. The finest rubies are found in Burma, in the Mogok Valley, northeast of Mandelay. They are also mined in Siam, where they are of a darker shade, and in Ceylon, where they are of lighter hue and often of great brilliancy. The finest Burmese rubies have a peculiar tint, called ((pigeon's blood." Rubies of large size are extremely rare, and when they weigh four carats or more they are worth from two to five, and

formerly 10 times the price of dia¬ monds of the same size. Sapphires come prin¬ cipally from Ceylon, Cashmere and Siam, the finest tints being known as the <(cornflower" and the <(velvet blue." In Australia, especially at Anakie in Queensland, many dark-blue sap¬ phires are found, too deep in hue to be of

- *Appendix I, Dana 'System of Mineralogy,' p. 68, 1899; citing George F. Kunz, N. Y. Acad. Sciences, Vol. XIV, p.*

260; 1895.

t Second Appendix to the 6th ed. of Dana's 'System of Mineralogy,' New York 1909, p. 70.

value if cut into large gems, so they are gen¬ erally cut as calibre or small stones. Queens¬ land has furnished some wonderful golden- yellow corundums, these being the centres of blue crystals. Sapphires are also found in Montana at several points, generally under two carats each; the choicest are mined at Yogo Gulch, in Fergus County. These are of a rich blue color. Other mines are at Rock Creek, Granite County, where there is a great variety of shades ; examples also occur at Cottonwood Creek, and along the bars of the Missouri River, not far from Helena, Mont. Fancy colors are of little value compared to the blue.

Beryl, Emerald and Aquamarine are the same mineral, a silicate of aluminum and glucinum. The hardness is eight and the cry¬ stals belong to the hexagonal system. Beryl varies from blue through light green to yellow, when it is called "golden beryl,® and forms a gem resembling topaz. If colored a rich green by a little oxide of chromium, it becomes the emerald, a stone which is rarely flawless, but ranks in value with the diamond. The chief source of fine emeralds has long been the mines at Muzo, about 70 miles on a direct line from Bogota, Colombia, where they occur in a black limestone rock. The mine has been worked by Europeans for three centuries, and was previously exploited by the native peoples of the region. The emeralds known to the ancients came principally from Upper Egypt, near the Red Sea. These mines were long abandoned and left unworked, but are now be¬ ing operated on a small scale. Light sky-blue, rich ocean-blue, sea green or greenish beryls are known as aquamarines ; the finest examples have come from Brazil and Madagascar. A Brazilian crystal weighed 246 pounds. They also occur in the Urals and Siberia, as well as in Maine, North Carolina and Colorado. Golden beryls are found in Maine,

Connecticut and Pennsylvania. A variety of golden beryl found at Rossing in the former German South¬ west Africa has been given the trade name "heliodor.®

Phenomenal Gems. — The name applied to precious stones which change in color or else have a change of light or exhibit some phenomena other than the color itself. Notable among these are the sapphire asteria and ruby asteria; the ruby asteria or star ruby is found in Ceylon and in the ruby mines of Burma, and is a phenomenal gem in high favor. Then come the alexandrite, a variety of chrysoberyl changing from a dark green by daylight to a columbine red by artifi¬ cial light; the chrysoberyl cat's-eye, changing from pale honey yellow to dark brown, and, oc¬ casionally, the alexandrite cat's-eye, green by day and red by artificial light; moonstone, a white feldspar exhibiting the phenomena of lustre, and a white or bluish play of light; sun- stone, in which there are brilliant reflections from the interior of the feldspar or quartz; labrador spar, labradonite feldspar, which has a rich play of blue, blue-green and yellow, re¬ sembling a peacock feather. All of these are surmised to bring good fortune to the wearer.

Chrysoberyl, which has a hardness of 8.5, is a glucinum aluminate. It is a rare mineral, of various shades of yellow, brown, light green and dqrk green. One variety contains minute impurities distributed between the layers of the

crystal, and these layers are so arranged, by what is termed the "twinning® of the crystal, that when the stone is cut across them light is reflected or condensed into a transverse bright line; such a gem is called a chrysoberyl cat's- eye.

Alexandrite is a variety of chrysoberyl, colored by chromium. This name was given by Nordenskjold because the gem had been found on the day the Czarevitch, later Alexander II, came of age, in 1833. It was first discovered in the Ural Mountains at Takowaya, but now occurs in larger gems, up to 70 carats each, in the gem-gravels of Ceylon. It possesses the property of changing from a dark green to a columbine red when exposed to artificial light, thus displaying in turn what were the Russian national colors at the time it was first dis¬ covered.

Morganite is a rose red silicate of beryllium containing manganese, found in Madagascar, being the same in composition as the aquamarine and the emerald, differing only in color. It possesses the property of becoming phosphores¬ cent as does kunzite, a mineral with which it is associated. It appears in beautiful gems up to 200 carats each. It occurs, also, at Pala, in San Diego County, Cal., in crystals of some size, and example, small and

not of good color, are met with at Haddam, Conn,, but not in gem form. The name was given in honor of the late J. Pierpont Morgan.

Zircon, or Hyacinth (jacinth), sometimes called jargon, is a gem of 7.5 in hardness and having a specific gravity of 4.1 to 4.7, occurring brown, yellow, blue, green and white ; it is a zirconium silicate. Frequently the white gem is the result of the decolorization of a darker stone. These were frequently rose-cut in the East, and in the 18th century were called "Matura Diamonds.® The color sometimes re¬ turns after decolorization. The chief source of supply has been Ceylon, although many fine gems have been found in Australia and Tas¬ mania.

Topaz is a rather complex silicate of alumi¬ num, occurring in rhombic prisms and possess¬ ing a hardness of eight. It is generally yellow, but other examples are pale blue, pale green, pale brown and white or colorless. The favorite tint is a peculiar yellow known as sherry color. The finest come from Brazil or from the Ural Mountains, but some very handsome ones have been found in Colorado and Utah. The sherry-colored variety, if heated in vacuo, changes to a rich, almost magenta pink, then to a light pink and finally becomes colorless. White topaz is often found in large masses in Ceylon, and in Brazil, where a 23-pound mass was found. Fine blue and cinnamon colored crystals occur in the Urals, in Siberia, Japan, Mongolia and in Colorado, Texas and Maine; the cinnamon-colored variety changes, upon exposure to daylight, to colorless topaz. (See also Quartz; nearly all the so- called topazes are really citrines — decolorized smoky quartz).

Tourmaline is a complex silicate of alumi¬ num, occurring in prisms of six, nine or 12 sides. It is usually black, but also of trans¬ parent red, green and other colors, often singu¬ larly mingled in the same crystal. The gem is found in Brazil and Siberia, and examples of great beauty are met with at Paris and

Auburn, Me., Haddam Neck, Conn., and es¬ pecially in San Diego County, Cal. Mineral- ogically it occurs in a great variety of colors and forms ; the red is known as rubellite, the blue as indicolite, the white as achroite and the green is called <(Brazilian emerald® in Brazil. Wonderful red tourmalines rubellite are found in the Ural Mountains, Russia, and red and other colors in Madagascar. At times the crystal is green on the exterior with a white zone and a red interior, the iron which causes the green hue being neutralized by the manganese in the red color; this strange com¬ bination forms the so-called <(watermelon crystal.® Tourmaline is probably the most varied interesting mineral, with the exception of quartz, occurring in magnificent gems of • green, blue, red, yellow, brown, white and fre¬ quently three or more colors are present in dis¬ tinct zones in various parts of the crystal. Its electric properties, discovered in the 18th cen¬ tury, was discussed in most of the Euro¬ pean learned societies at that time, the name ((Aschentrekker® ((< Ash-attractor®) being given to the mineral in Amsterdam.

Garnet is the name of a group of minerals closely related in form and properties, but pre¬ senting a number of varieties. They are all very complex aluminum silicates, in which various metallic oxides enter as components. The principal gem varieties are almandine, or precious garnet, the carbuncle of the ancients, containing considerable oxide of iron; its color is a deep, rather purplish or brownish red ; pyrope, or Bohemian garnet, containing much magnesia, of a fine dark crimson, almost a ruby color. These two are the red garnets of jewelry; when cut en cabochon, that is, not facetted, but dome-shaped, they are called car¬ buncles. Manganese garnet, or spessartite, is sometimes of a very beautiful orange-brown color; elegant gems of this kind have been found at Amelia Court House, Va. Uvoro- vite, or chrome garnet, is a rare variety, of a brilliant dark green color, but the crystals are very small. Another green garnet of some¬ what different composition, and with very bril¬ liant lustre, from the Ural Mountains, is called demantoid, or Uralian emerald. Much fine garnet is found in the United States. North Carolina yields a beautiful variety that has been called rhodolite, — a brilliant light red gar¬ net, between

almandite and pyrope in composi¬ tion ; these are largely mined in the Cowee Val¬ ley, in Macon County. New Mexico and Arizona produce fine pyropes. often misnamed ((Arizona rubies,® and equalling those of any other known locality. They are found where ants and centipedes have carried them out in making the galleries of their hills. In South Africa similar pyrope garnets found with the diamonds are termed ftCape rubies.®

Quartz is pure silica, the crystalline, rock crystal type occurring as six-sided crystals. It embraces a great number of the commoner gem stones, specific gravity about 2.6. These fall into three distinct groups, — The transparent colorless variety, rock crystal, then the purple amethyst which is colored by manganese, and finally the smoky topaz or smoky crystal, the ordinary black variety, and the intensely black "morion.® When the black variety can be de¬ colorized by heat, it changes first to a deep brown and then to a transparent yellow, some¬

times becoming almost colorless. The original smoky quartz, deep brown in color, is called "cairngorm® ; it is mostly used in Scotland and is the Scotch national stone. The lighter colors produced by decolorization by heat are known as Spanish topaz and citrine. Nearly all the so-called topaz of commerce is a quartz variety, not true topaz.

The cryptocrystalline variety, agate, is usu¬ ally banded, and is generally the result of deposition of silica in the amygdules of a vol¬ canic rock. The structure is in thin layers, even though they may not be visible to the eye. The principal varieties are chalcedony, gray and blue-gray, the apparently unbanded variety; when banded it is called ((banded agate.® When this banded material has been broken and re¬ cemented, it bears the name of ((ruin agate® ; if the bands are irregular in outline it is denominated Mortification agate.® Chalcedony, when treated with iron salts and then highly heated, becomes red and is known as (

The uncrystalline, or slightly crystalline, varieties are notably red jasper and green jasper. When jasper is green with red spots, due to the oxidation of the iron in the stone, it is called ((bloodstone.® When the stone is yellow, brown or black, the term jasper is also used.

Opal is silica containing from 5 per cent to 10 per cent of water. When it contains more than 5 per cent of water, the opal is liable to fracture; with 5 per cent or less, it is a stone of considerable durability. Magnificent speci¬ mens of the white variety have been found in the mines of Hungary and in New South Wales, the white opals in New South Wales occurring in sandstone in which they occasionally re¬ place wood, shells and the bones of reptiles. The black variety offers a velvet black field broken with the

most intense red, green, yel¬ low, blue and other colors. This is greatly prized and highly valued; it is found in the Lightning Ridge region in New South Wales. Many thousand fine gems have been brought from this locality, single stones selling for $5,000. The fire opals are a rich, red, honey or honey-red variety, containing a high per¬ centage of water. The fire opal, or flame opal, found in Queretaro and other parts of Mexico is a rich honey-red — a brilliant variety with prominently large flames of light color, possibly due to inclusion of rutile (oxide of titanium). A colorless variety is also found, in which the play of color is in small flecks. This is known as the harlequin opal. Interesting opals re-

placing wood have been found in Humboldt County, Nev., brown, black and colorless.

Peridot, Chrysolite, or Olivine, deriving its name from its olive-green color, is a silicate of magnesia, found in magnificent examples in Egypt. Many magnificent specimens brought from the East are found in the church treas¬ uries, dating from the time of the Crusades, notably at Cologne. They were then called emeralds. After a close study of the peridots here and in other ecclesiastical jewels, the opinion is expressed that almost if not quite all the fine examples in modern jewelry had been derived from this source. In 1900, gem chrysolites were found on the small volcanic island Seberget (also called Zebirget or Saint John) near the Egyptian coast of the Red Sea, an interesting discovery as it serves to con¬ firm the ancient tale in early Greek and Latin authors that their chrysolite (which they called topaz) came from a mysterious <(Serpent Isle® in the Red Sea. They are also found in the Navajo Reservation in New Mexico, in small gems of considerable beauty; in Hawaii, as honey yellow and small gems; and at Lac La Hache, British Columbia.

Jade. — This name is commonly used to designate both nephrite (a silicate of magnesium and calcium), and jadeite, named by Damour in 1863 (a silicate of aluminum and sodium). Nephrite has a hardness of 6.5, its specific grav¬ ity being 2.8, while jadeite's hardness is 7 and its specific gravity 3.3. The Chinese name for jade is yu, or yu-shi; the most prized variety of jadeite is termed fei-tsui, ˆkingfisher-plumes,® jewel jade or imperial jade. The jade brought by the Spaniards from the New World was named by them piedra de ijada, ((stone of the flank,® whence our (

ever extracted was found by the present writer in 1899 at Jordansmuhl, Silesia; it weighed 4,718 pounds (2,140 kilograms). This is in the Heber R.

Bishop Collection in the Ameri¬ can Museum of Natural History, New York City.

The fondness of the Chinese for jade is proverbial, and the finest ornamental objects (both of nephrite and of jadeite) have been produced by Chinese lapidaries, although to Hindu and other Asiatic artists also may be credited admirable work, and in New Zealand, as well, the native nephrite has been quite skil¬ fully carved, as in the case of the curious hei-tikis, grotesque ancestral heirlooms with which some superstitious fancies are associated. In hue, jade runs through the gamut of the dif¬ ferent shades of green, from the darkest to the • lightest; some specimens are quite white. Jadeite is occasionally almost transparent, of a rich emerald green Jewel jade or Imperial jade, when containing a greater quantity of iron or chromium with a specific gravity up to 3.6 is called chloromelanite.

The color, translucency, hardness, toughness and fine structure are the properties that have rendered jade a very attractive material for the most artistic lapidaries of China, India, ancient Mexico, France, Russia and other countries. The Chinese have been the most pre-eminent in carving jade as is testified by the wonderful, beautiful and interesting carved objects in the Heber R. Bishop Collection in the Metropolitan Museum of Art, New York, and in the collections of the museums of Boston, Chicago, Paris, Berlin and Petrograd. The Russian objects are usually of stupendous size; the Chinese objects scarcely ever a foot high; some of the Russian works are from two to six feet long. Notable are the sarcophagus of Tsar Alexander II, and other work in the Imperial collections or among the Imperial gifts of the Russian tsars.

Nephrite is much tougher than jadeite, and as an illustration of its extraordinary toughness Dr. Heinrich Fischer relates that he placed a large block of jade under a steam hammer, and that as a result of the blow the anvil on which the stone rested was broken, while the stone itself was unharmed. This illustrates the great difference between hardness and toughness, for although the diamond has a hardness of 10 against 6.5 of nephrite, the former would have been broken to splinters by such a test.*

Owing to the shutting down of the European lapidary works due to the World War, the eastern Chinese lapidaries were called upon to supply the deficiency. The chromium-colored jadeite, because of its great beauty, has come into high favor, especially the rich translucent emerald green and yellowish green jewel-jade for bead necklaces, some of which have been sold for $20,000. Carved ornaments of jadeite have sold for from $500 to $2,000. Tade thumb- rings were formerly bought by wealthy Chinese for from a few dollars to $15,000 each. The exports of Burmese jadeite in worked form from China during the five-year period 1914—18 have been

valued at about $2,000,000.

Turquoise is a phosphate of lime colored with copper, found for many centuries in the

- *Tschermak's 'Mittheilungen' (1872. 2. Heft, p. 135); consult also Fischer's 'Nephrit und Tadeit'. (Stuttgart 1880, pp. 294, 299).*

Nishapur district, near Meshed, Persia, where it is highly valued and is sold in great quanti¬ ties, from gems weighing many carats each to minute, round discs not more than one or two millimeters in diameter. It is found also in the Sinai Peninsula, where the mines were worked by the Egyptians almost as far back at 4000 b.c. The color is a more intense blue than that of any other stone. In China, where it is worked into Oriental objects, it is found in great masses, weighing many pounds each, but impure. Gem turquoise occurs also in New Mexico, Arizona, Nevada and California as well as in Mexico, and it was used by the pre- Columbians for ornament as well as in mosaics in combination with various colored shells or obsidian and for the decoration of human skulls, daggers, clam shells and other objects. Many of these are of great beauty. As a ring stone the beautiful color of the best turquoise makes it a great favorite. In order to preserve the color, it is desirable to exercise care in subjecting turquoise to contact with liquids. In the Middle Ages, and later, the superstition prevailed that the wearer of a turquoise would be protected from injury by falls. In the 16th century this was called the Turkey stone, as it came to Europe from Persia via Turkey; the name was then converted to turquoise.

Benitoite, a titano-silicate closely related to titanite, a deep blue gem from California, is so named from its occurrence on the Mount Di¬ ablo Range in San Benito County. When cut, its beautiful blue color resembles that of the sapphire, which it exceeds in brilliancy be¬ cause of its higher refractive power.

Lapis-lazuli was valued as gem-material at a very early date and is mentioned as an article of tribute on Assyrian tablets of the second millenium before Christ. The stone is of a rich blue color and is a complex mixture of minerals, the most important constituent be¬ ing lazurite. It was originally used to produce the pigment ultramarine. Its average hard¬ ness is only about 5.5. Many of the old Egyp¬ tian scarabs and amulets are made of it and a proof that its beauty was greatly prized by the Assyrians is given in a hymn addressed to the moon-god Sin, where he is said to be

“bright as lapis-lazuli® (ukmi). Some of the earliest Babylonian cylinders were of this stone and down to the present time it has been highly valued for its rich and beautiful color. One of the chief sources has been the mines of Badak- shan, in the northwest part of Afghanistan, near the upper reaches of the Oxus. Still more ancient mines have been discovered in the val¬ ley of the Kokcha, a tributary of the Oxus. These mines have been worked for about 6,000 years and are evidently the oldest mines in the world. Near Lake Baikal in Siberia, especially along the river Malaya Bistraya, there are also productive mines and material of a some¬ what inferior quality has been found in the Chilean Andes of Ovalle near the watershed between Chile and Argentina. At this locality masses of several hundreds of pounds each have been found, but much white limestone permeates the lapis-lazuli. The stone desig¬ nated “sapphire® by the ancient Greek and Roman authors was probably lapis-lazuli.

Malachite is a basic carbonate of copper, with a hardness of three and one-half to four. It is an aggregate of minute crystals, is opaque

in the mass and is capable of taking a very good polish. Ornamental objects of various kinds have been made of this material, its won¬ derful variety of rich green hues and its ar¬ tistic markings enabling the lapidary to produce most attractive effects. Most of the fine work in this stone has come from the Imperial Rus¬ sian lapidary works at Ekaterinburg, where a wealth of vases, bowls,, table-tops, etc., have been made. The Medno-Rudiansk mine at Nizhni-Tagilsk furnished in 1836 the largest block of malachite that has ever been extracted. Its dimensions were : length, 10ˆ4 feet, width, 8 feet, height 3ˆ2 feet; the estimated weight was from 25 to 30 tons. As many as 125 horses were used to haul this mass from the mine to Ekaterinburg.

Amber, which the ancient Greek poets de¬ rived from the tears annually shed over the death of their brother Phaethon by the Heli- ades, is not a mineral but a vegetable substance, the fossilized resin of pine trees of far distant times; it has been and is still used in a variety of ways for decorative purposes, more espe¬ cially in the form of beads to be strung as necklaces or rosaries. Example of such beads have been found among the remains of the most ancient civilizations and they have been worn by almost all races and at all periods. The hardness of amber slightly exceeds that of gyp¬ sum, being about two and one-half, and it is thus easily shaped. It is quite strongly electric and this quality may have given rise to the supposed curative effects to be secured by wearing amber necklaces and to the belief of luxurious Romans that a cooling sensation was experienced by holding an amber ball in the hand. In Moham¬ medan countries many of the long rosaries car¬ ried or worn by the followers of Islam are com¬ posed of 99 amber beads. The broad dis¬ tinction between “clear® and “cloudy® amber, the former of a pure, light yellow hue and quite

transparent, the latter, passing through different degrees of opacity, variously marked and shaded and ranging in hue from whitish- yellow to light-yellow, is that commonly em¬ ployed, but a number of special designations are used in the amber industry. An interesting feature in some amber specimens is the inclu¬ sion in the fossil resin of insects or plant forms, that must have become imbedded in the substance while in a fluid state and thus have preserved for us the exact appearance of in¬ sects that died thousands of years ago. Cloudy amber can be clarified by heating it in oil, the latter being absorbed through the pores of the amber and rendering it more highly refractive. Another method of clarifying is. by burying the amber in sand and subjecting it to a heat of over 100° C. for a long period.

Phenomenal Feldspars. Aventurine. — There are three phenomenal feldspars : Sun- stone (Aventurine), Moonstone and Labrador Spar or Labradorite. Of these the sunstone owes its peculiar beauty to the presence of spangles of either hematite, gothite or mica. The name has also been applied to a compact quartzite, usually red, brownish or white, with spangles of mica. This aventurine quartzite is found in several parts of Siberia, sometimes in masses weighing more than a ton and is called by the Russians "orletz.® Numerous vases, cups and ornaments are made of this material by the Russians and two great vases formed of it

were presented, one to Sir Roderick Murchison and one to Baron Von Humboldt, when they visited Russia in 1850. A greenish or white quartzite, having spangles of mica, or a green¬ ish chlorite, or both, is said to come from India and is occasionally sold as jade.

Californite is a compact variety of yesuvia- nite, named by George F. Kunz and is found in Siskiyou County, Cal. A somewhat sim¬ ilar variety was discovered in 1889, on the Piz Longhin, Canton Grisons, Switzerland. When cut en cabochon, its bright green hue acquires great brilliancy and resembles that of the nephrite variety of jade, for which it is occasionally mistaken.

Among the finest gem collections in the United States are the Tiffany-Morgan collec¬ tion and the Bement-Morgan collections at the American Museum of Natural History, New York; the Isaac Lea collection, at the United States National Museum, Washington, D. C. ; the Tiffany collection of the Field Museum of Natural History, Chicago; the Tiffany collection of the Golden Gate Museum, San Francisco, and the Kunz collection at the New York State Museum, Albany, N. Y. The foreign collections contain

many fine gems and are in the collections of the British Museum ; the Musee d'Histoire Naturelle, Paris; the Na¬ tional Mineralogical Collection at Vienna, Austria; the Mining Institute, Petrograd, Russia.

Bibliography. — King, 'Precious Stones and Metals> ; Kunz, 'Gems and Precious Stones of North America5 ; Bauer, 'Edelsteinkunde5 ; Brauns, (The Mineral Kingdom5 ; Eng. trans. by L. J. Spencer; Smith, Catalogue of the Gems of the British Museum5 ; Streeter, 'Precious Stones and Gems5 ; Kunz, (Reports of the Department Mining Statistics5 ; United States Geological Survey, Bui. 1883-1905 in Re¬ ports on Precious Stones,5 in the annual Min¬ eral Industry (Vols. I-XXVII, 1882-1918, New York).

George F. Kunz.

PRECIPICE, The, by Ivan Aleksandro- vitch Goncharof, had for its chief purpose, even more distinctly than 'Oblomof5 (q.v.), to pre¬ sent the eternal struggle between the East and the West — the contrast between the lethargy or indolence of the Russian and the enterpris¬ ing spirit of European energy. The protag¬ onist of the story suffers not so much from con¬ stitutional laziness as from vacillation, from lack of resolution. Raisky had a good educa¬ tion and served for a time as a civil chinovnik at Saint Petersburg; but left his position as casually as he had accepted it. He had great ability as an artist but he never had the patience to finish the innumerable sketches that he be¬ gan. He might have been a talented musician but his masters could not induce him to practise. He had no ambition and if he found nothing to interest him in reading he would lie all day in bed as if exhausted by hard labor. He owns a pretty estate on the banks of the mighty Volga and thither he goes to visit his Aunt Tatiana, who has managed it for him with re¬ markable ability. There the action of the story unfolds, especially connecting itself with a high bluff (Obrnif) overlooking the wide stream, gliding peacefully between its overgrown banks, with here and there a bush-covered island.

The bluff, or precipice, was once the scene of a murder and was believed to be haunted by a ghost. It occurs to Raisky to make the place the scene of a novel and he writes at it in his usual desultory way, not realizing that the pas¬ sion and the dramatic color which he is seeking to impart to his imaginary characters are all about him. He finds himself interested in Viera, the elder of the two young girls reputed to be his aunt's grandnieces, but in reality her grandchildren, the daughters of her own illegiti¬ mate child. Viera is under the almost hypnotic influence of Mark Volokof, a political suspect, interned in the village and enjoying an evil repute as a thief and monster of iniauity. Volokof can hardly be regarded as a type of revolutionist like Turgenief's Bazarof. He is an exceptional character, somewhat overdrawn in his moral obliquity, but not impossible. In spite of

Viera's appeal to Raisky to save her from this human wolf, Volokof succeeds in his dastardly purpose ; but the girl finds an un¬ expected sympathy in Aunt Tatiana, whose own tragic story is revealed, bringing redemption to both of them. Raisky, finding his love for Viera hopeless through his own fault, throws aside his unfinished novel and goes to Italy to take up sculpture as a consolation. The minor characters are admirably drawn and the sub¬ ordinate strands of the romance are woven in with skill against a charming background of the Volga. 'Obruif5 was published in the Vyestnik Yevropui (The European Messenger) in 1868- 69, just 20 years after 'Oblomof.5 An English translation by M. Bryant was published in London in 1916.

Nathan Haskell Dole.

PRECIPITATE, in chemistry a solid body produced by the mutual action of two or more liquids. Thus if sulphuric acid be added to an aqueous solution of barium chloride, barium sul¬ phate is produced, and being insoluble in the menstrua present it precipitates or sinks as a solid to the bottom of the liquid in the vessel. So again, if a solution of potassium iodide be added to a solution of lead chloride, a reaction takes place resulting in the formation of lead iodide and potassium chloride, and inasmuch as the former of these bodies is, under the circum¬ stances, a solid, it is precipitated. As a general rule it may be laid down that if it is possible to produce an insoluble solid substance by the action of two liquids on one another, that solid will be produced when these liquids are mixed, and that therefore a precipitate will be formed.

PRECOCITY, pre-kos'i-tl, an early mental development, surpassing the normal. Generally speaking the precocious child differs from the prodigy in that his attainments constitute an act¬ ual acquirement rather than an intuitive posses¬ sion of knowledge; and the precocious child presents a general development of the mental faculties instead of a supernormal development in a special line, as music, mathematics or other arts and sciences. Precocity may be the result of either training or natural endowment and the course of the educator toward it is usually that of fostering a general development, at the same time exercising care in avoidance of physical overstrain. Precocity has sometimes been held an indication of general physical weakness or inherent physical infirmity and likewise as having a deleterious influence upon

adult attainments. As a rule, however, such un¬ fortunate results may be

ascribed to undue forcing, although the precocious child is no more immune to physical ills than any other. When due discretion is observed in its training the trait may generally be welcomed. It by no means presages genius, but on the other hand a preponderance of geniuses have pos¬ sessed it. The need for modifying educational methods to meet the requirements of the super¬ normal individual so as not to retard his natural development and at the same time avoid over- stimulation is one that has for some time en¬ gaged the attention of educators and physicians. Consult Donaldson, H. H., (Growth of the Brain> (London 1895) ; Sully, J., (Genius and Precocity) (1886) ; Galton, F., (Hereditary Genius) (London 1892) ; Constable, F. C., (Poverty and Hereditary Genius> (London

1905).

PREDESTINARIANS. See Religious Sects.

PREDESTINATION is the doctrine of God's will and counsel as revealed in the de¬ creed redemption of mankind. It includes in its scope two significant facts, namely, his be¬ neficent and allwise purpose and plan in refer¬ ence to those who are fore-known and fore- chosen to the enjoyment of eternal salvation; and his fixed, determinate attitude toward those who are permitted to perish in their sins. This doctrine, as thus defined, has been the subject of intense theological controversy, because of the many essential and apparently contradictory personal features involved in it. And yet its history, as it appears in the rise and develop¬ ment of Calvinism over against Pelagianism, gives evidence of the logical connection which it has with biblical and metaphysical truth.

The sources of this tenet are set forth in the Old and New Testament Scriptures. From the earliest times of the human race, the God who <(upholds, directs, disposes, and governs all crea¬ tures, actions, and things, from the greatest even to the least,® is manifestly a potent per¬ sonal factor in the world. His wisdom and might, his love and grace, are wondrously and sublimely illustrated in the lives and movements of his chosen people. Every stage of their his¬ tory, in the genesis and growth of their civil and religious institutions, to the closing tragedy of the life of Jesus Christ, furnishes a series of pictures of the divine method of government, as they are painted by his artist hand. Indeed, so evident is his own mind and purpose through¬ out the execution of his salvatory plan, that his nature, life and love at once and forever become inseparable elements within the domain of the human universe. And this is fully indicated (1) by the perfection of his nature; (2) in the marks of his infinite wisdom, power, holiness, etc.; (3) in the operations of his will, thought and counsel; (4) in prophetic utterances and their fulfilment; (5) in the coming of Jesus Christ, the true representative of God; (6) in the

unchangeable provisions of the redemption wrought out through him; (7) in the actual salvation of men from their sins; (8) in the establishment, upon a sure foundation, of the Fact of eternal life!

The historic birth of this doctrine can be traced to the fertile brain of Origen, who pos¬

sibly was its first supporter, although he did not fully accept the second portion of it, which consigns the unsaved to conditions of everlast¬ ing reprobation. From his time to the Augus- tinian Age there was little controversy over the sovereignty of God in its relation to man's free¬ dom and salvation. But during Augustine's sway, in the Western Church, the doctrine of man's inability to save himself and his absolute dependence upon God's eternal decree to be saved, was so strongly and vigorously taught that Pelagius, who represented opposite theolog¬ ical tendencies, declared that the true funda¬ mental conception of sin involved man's capac¬ ity of choice to be good or evil, apart from God's plan and grace. This controversy was waged with great earnestness — especially in the Greek Church — for half a century, till it was modified under the form of Semipelagian- ism.

Later theologians divided themselves into two groups, the Infralapsarians and the Supra- lapsarians. The former taught that the decree of predestination had no effectiveness until after man's fall, while the latter class held that the ultimate end which God had in mind was his own glorification in the salvation of some and in the reprobation of others.

During the Reformation the strongest ex¬ ponents of the true predestination idea were the Calvinistic thinkers under the leadership of John Calvin (1509), though the Lutherans and Ar- minians also accepted the doctrine in a less rigid form. Calvin's doctrinal ideas were incorpo¬ rated in his greatest masterpiece, (Institutes of the Christian Religion) (1535). The main fea¬ tures of this scholarly production, aside from the dissertations upon church, state and reli¬ gion, are embodied in the doctrines of plenarv inspiration of the Bible, free-will and predes¬ tination. Here God is the centre and man the object of his voluntary interest and love. But in this relation he is confessedly to be dealt with according to his Creator's established or¬ der. Everything in and about him which is out of harmony with that order must be adjusted or rejected. In this process of correction or of salvation God acts alone. Man is a passive agent without the power of free-will. His pre¬ destined salvation or reprobation depends upon the unlimited might and wisdom of God. Hence predestination is a divine necessity.

This view of predestination was presented more philosophically and clearly

by Calvin in his catechism published at Geneva (1545). And it was this treatise, without a doubt, that, a century later, furnished the Westminster divines the foundation outlines for the Standards which they drew up in England's great Abbey of West¬ minster during the years 1643-48. The three products of that representative body called by the English Parliament and made up of the most eloquent, pious and scholarly divines, Lords, Commoners and commissioners from every county of England and the universities of Oxford and Cambridge, are the Westminster Shorter and Larger Catechisms and the West¬ minster Confession of Faith.

In each one of these the doctrine of predes¬ tination is set forth, but more especially so in the 3d and 10th chapters of the Confession of Faith, which respectively treat ((Of God's Eter¬ nal Decree® and (

paragraphs in these chapters that most pointedly outline the doctrine read as follows :

III. By the decree of God, for the manifes¬ tation of his glory, some men and angels are predestined unto everlasting life and others foreordained to everlasting death.

IV. Those angels and men, thus predestined and fore-ordained, are particularly and un¬ changeably designed ; and their number is so certain and definite that it cannot be either in¬ creased or diminished.

As early as in the year 1831 the general assembly of the Presbyterian Church was con¬ fronted with the demand for more liberty in the interpretation of the Creed of the Fathers. The marshaling of the forces who stood for a change in the form of statement, involving the doctrines of election and predestination, con¬ tinued, as shown by the famous heresy trials of Drs. Barnes, Swing, Smith and Briggs. After their deposition from the Presbyterian fold, the consideration of a revision of its standards became a matter of serious import¬ ance. In view of this the general assembly of 1889 resolved to transmit an overture to the presbyteries, asking them to consider the propriety of a revision of the Confession of Faith. The result of this action brought about the sentiment in favor of a revision. The as¬ sembly of 1891 now asked the presbyteries for more suggestions. Again the answer came by a large majority of Presbyterial votes for a re¬ vision.

In 1893 the assembly was importuned once more for a new and shorter creed, but it voted to lay the matter aside. The battle of the theological

giants did not cease at this. Again they pressed to the front. In conse¬ quence, the general assembly of 1900 appointed a large committee to reconsider the matter of revision. After seven months they reported that ((the returns indicated plainly that no change is desired which would in any way im¬ pair the integrity of the system of doctrine contained in the Confession of Faith.® In spite of this negating motion, the general assembly of 1902-03 added the Declaratory State¬ ment to chapters III and X, which reads as follows :

((With reference to chapter III of the Con¬ fession of Faith : that concerning those who are saved in Christ, the doctrine of God's eternal decree is held in harmony with the doctrine of his love to all mankind, his gift of his Son to be the propitiation for the sins of the whole world, and his readiness to bestow his saving grace on all who seek it. That concerning those who perish, the doctrine of God's eternal decree is held in harmony with the doctrine that God desires not the death of any sinner, but has provided in Christ a salvation sufficient for all, adapted to all, and freely offered in the Gospel to all; that men are fully responsible for their treatment of God's gracious offer; that his de¬ cree hinders no man from accepting that offer; and that no man is condemned except on the ground of his sin.®

PREDICABLES, term of the Aristotel¬ ian system of logic, denoting a class of con¬ cepts which may be predicated affirmatively of several others ; it is now obsolete. The predi¬ cables are five in number, namely, genus, species, differentia, proprium- and accidens, and

were used in classifying objects on a systematic plan. Every object was conceived of as belong¬ ing to some species and that to some genus ; objects in the same genus — a dog and a wolf, for example, would belong to different species because of the differentia between their char¬ acters — the specific differentia; a property (proprium) would form a ground of difference between members of the same species, proprium expressing, not an ultimate distinction, but one resulting from some other character, for ex¬ ample, the peculiarity of the shepherd dog, which is founded in the dog's natural sagacity; accidens is something not inherent in the nature of the object, but incidentially present in it, for example, the high value of the diamond. See Logic.

PRE-ESTABLISHED HARMONY, The

Doctrine of, the philosophical theory of Leibuity as presented in his doctrine of the monads, which has as its purpose the explanation of the universe as composed of various orders of self¬ active beings. His belief is that the forces of nature are not externally controlled and that the action of no

single monad is influenced by another but was destined by God from the be¬ ginning to work out its individual progress unaffected by any other and toward an end of perfect harmony which is preestablished. The monads include the physical elements with their chemical affinities and plants with their sentient life, up to the class of humans with souls and power of thought. The soul becomes the dom¬ inating monad in human existence, while God is the monad monadum. The theory involves a progressive independent development of the monads toward ultimate perfection and re¬ gards evil as an evanescent quality in no way conflicting with sure progression of God's original plan. The theory obviates any neces¬ sity for interference by the Deity. While of necessity conjectural in its conclusions it is regarded as one of the most profund treatises of philosophical theology in existence. Leib¬ nitz left no elaborate exposition of his theory, its most complete summary being that he pre¬ pared for Prince Eugene of Savoy in 1714. See Leibnitz, Gottfried Wilhelm.

PREFECT, or PREFET, the title of a high civil official in France, created by a law of the 28th Pluviose in the year VIII (17 Feb. 1800). It was derived from the old Roman title Praefect (q.v.). There were 86 prefects in modern France, each at the head of the civil administration of a department. The prefect is an official of considerable power, although his prerogatives have been curtailed at various times since they were first established. He is appointed by the President and must be a French citizen. There are three classes of pre¬ fects, according to the size and importance of their department, with salaries ranging from 18,000 to 35,000 francs. The prefect is the chief representative of the government, whose decisions, laws and regulations he executes. Though directly responsible to the Minister of the Interior, he supervises all governmental in¬ stitutions and services in his department. He exercises considerable control over the conseil general, mayors and municipal councils of his department and possesses great power in re¬ spect to the administration of the police and of public institutions, both charitable and other-

wise. Formerly he enjoyed almost unlimited powers inˆ regard to the management of his de¬ partment's local interests. These, however, have now been transferred to a great ex¬ tent to the conseil general and to a depart¬ mental committee, elected by the former for the interval between its sessions. Under the prefects serve sous-prefets of which there are 362, each at the head of an arrondissement, a subdivision of the department. Various at¬ tempts to discontinue these officials, made on the part of the Chamber of Deputies by refus¬ ing to vote the amounts required for their

salaries, have failed. Consult Haas, C. P. M., Administration de la France) (Vol. II, Paris 1861) ; Larroque, P., (De l'Organization du Gov¬ ernment Republicain> (Paris 1870) ; Monnet, Emile, (Histoire de l'Administration en France) (Paris 1885) ; Dethan, Georges, (De l'Organi- sation des Conseils Generaux (Paris 1889) ; Lowell, A. Lawrence, Governments and Parties in Continental Europe,* Vol. I (Boston and New York 1896) ; Bodley, J. E. C., XIV, p. 215, Paris 1899) ; Rudloff, H. L., (Die Entwickelung der Selbstverwaltung Frankreichs im 19 Jahrhun- dert) (in (Zeitschrift fur die Gesamte Staats- wissenschafit,* Vol. LXI, p. 193, Tubingen 1905) ; Garrigues, J., (La Question de la Sup¬ pression des Sous-Prefets* (Faculte de Droit de l'Universite de Paris, Paris 1909) ; Caudel, M., XXIII, Tubingen 1913) ; Lachapelle, Georges, (L'CEuvre de Demain) (Paris 1917).*

PREFERENTIAL BALLOT. See Bal¬ lot.

PREFERENTIAL VOTING. See Vote, Voters, Voting; Elections.

*PREFORMATION, a theoretical view of embryological development widely held in the 1 7th century, and especially advocated ity Haller. It asserted that the germ held in infinitesimal proportions all the parts and organs of the be¬ ing, which were simply unfolded by growth. Hence this theory came to be known in Eng¬ land as the ˆevolution** theory and in French literature as the embditement theory. One class of thinkers regarded the egg as containing the whole of the embryonic material ; another class thought it all contained in the spermatozoon. This whole baseless fabric of philosophy was overthrown by the microscopical researches of Wolf and the other founders of the science of embryology (q.v.).*

PREGNANCY. See Abortion; Menstru¬ ation ; Obstetrics.

PREHISTORIC MAN. See Man, Pre¬ historic Races of.

PREHNITE, or EDELITE, a mineral, allied to zeolites and usually found with them, white or pale-green with a vitreous lustre, crystallizing in the orthorhombic system. It is a hydrous silicate of aluminum and calcium, having the formula H2Ca2Al2SisOi2. It is most frequently found in rocks of the basaltic type VOL. 22 — 34

and is obtained from a wide area, being found in the copper region of Lake Superior, at Paterson and Bergen Hill, N. J., in Scotland, France, China and South Africa. It was first found by Colonel Prehn in the 18th century at the Cape of Good Hope. It is cut into gems and slabs, resembling chrysoprase in appear¬ ance. Its hardness is 6-7, its specific gravity

2.8-3.

*PRELATE, a term used generally of bish¬ ops and archbishops of the Anglican com¬ munion, but bearing a more precise and specific meaning in the Roman Catholic Church, where it is applied to secular or regular clergy, who have a jurisdiction inherent in their office, and not merely delegated by a superior. The title is especially used of the prelates of the pope's court and household ; prelates of the Curia, who hold higher rank than other prelates, have the title (< Mon signore** and may wear apparel of violet color.*

PRELL, prel, Hermann, German painter and sculptor : b. Leipzig, 29 April 1854. He studied at Dresden and Berlin under Grosse and Gussow respectively, supplementing this by a course of study in fresco painting in Italy. He soon became one of the foremost German fresco painters of historical subjects. Return¬ ing home he was commissioned to paint the frescoes in the banquet hall of the House of Architects, in Berlin, and for this hall he executed in 1881-82 a series of 11 paintings on the (Main Epochs of the History of Archi¬ tecture^ His other mural paintings are to be found in the City Hall of Worms ((Justice, > (Valor and (Henry IV Granting Privileges to Worms in 1074,* painted in 1884) ; the City Hall of Hildesheim (1887-81); City Hall of Dantzic (1892) ; the Breslau Museum (1893- 94) ; Palazzo Caffarelli in Rome (1895-98) ; the Albertinum, Dresden (1901-05) ; the City Hall of Dresden (1908-12) ; sculptures by him are in the new Dresden City Hall and in the Albertinum, Dresden. He has also done some mosaics in the Cotton Exchange and in the North German Lloyd Building in Bremen (1911), and in the Staendehaus in Dresden (1907). The Dresden Gallery and the Breslau Museum contain specimens of his easel pictures. He has taught in the academies of Berlin and Dresden. In 1893 he received the Great Gold Medal at the Berlin Exhibition. He has pub¬ lished (Die Fresken im Rathause zu Hildesheim* (Hildesheim 1894). Consult Ianitsch, (Die Fresken im Treppenhause des Schlesischen Museums der Bildenden Kuenste) (Berlin 1895) ; Meissner, F. H., (Hermann PrelP (Wien 1897) ; Rosenberg, A., (Hermann PrelP (in (Kuenstler Monographien,* Vol. LIII, Leipzig 1901).*

PRELLER, prel'ler, Friedrich, German painter, son of the following: b. Weimar, 1 Sept. 1838; d. Dresden, 21 Oct. 1901. After studying under his father and later in Rome, he traveled much in Switzerland, France and Italy and painted landscapes. His wall-paint¬ ings in the new theatre at Dresden (especially his

Monastery of Santa Scholastica' and some other landscapes are in the

Dresden Gallery, his

PRELLER, Friedrich Johann Christian Ernst, German painter: b. Eisenach, 25 April 1804: d. Weimar, 23 April 1878. In the same year in which he was born, his parents moved to Weimar where he became acquainted with Goethe in his youth, and received encourage¬ ment and finally a pension from the Grand Duke Karl August of Weimar which enabled him to travel and study from 1826-31 first in Holland and later in Italy where he imbibed more from the classic than the Renaissance art and formulated a pictorial philosophy in which he saw man as the culmination of all earthy beauties. His important works, especially the series suggested by Homer's Odyssey, now in the Museum of Weimar, are bold and vigorous landscapes forming a setting for nude figures of heroic mold. To paint such subjects was the necessity of his artistic creed; yet he fre¬ quently turned to other fields, partly for finan¬ cial reasons, partly because of his deep interest in and love of all phases of nature. In 1840 he made a sketching trip to Norway, and frankly adopting the naturalism of Ruysdael, of whom he had been an ardent admirer since his early youth and one of whose pictures he copied when he first began seriously the study of painting, he painted landscapes for sale. Even these were vigorous and meritorious in execu¬ tion, if not fully representing his genius. He made unremitting sketches from nature and left behind him a long series of remarkable drawings. In later years he made other jour¬ neys to Italy, though most of his time was spent in Weimar where he taught at the Art Academy. Besides the Odyssey landscapes he also painted frescoes in the Wieland room of the Weimar palace showing scenes from Oberon. Paintings from his brush are to be seen in the National Gallery at Berlin and in museums at Weimar, Dresden, Leipzig, Stutt¬ gart and Munich. He was also interested in etching and etched many of his own paintings. Consult Gensel, J., (Friedrich Preller d.Ad (in (Kiinstler MonographienP Vol. LXIX, Leipzig 1904) ; Roouette, (Friedrich PrelleH (Frankfurt a.M. 1883).

PRELUDE, in music, a short introductory strain preceding the principal movement, per¬ formed on the same key as it, and intended to prepare the ear for the piece that is to follow. It may consist of a series of unconnected chords when the intention is simply to attract the attention of an audience, or to fill a singer's ear with the key in which the piece is written, in which case it is generally improvised. Tt is, however, usually composed of part of the lead¬ ing theme, more or less varied toward the close, and is not left to the invention of individual performance. Among classic models are the preludes to Bach's fugues and the preludes written by Chopin and Mendelssohn. See Music.

PRELUDE, The.

*to be introductory to a long philosophical poem, (The Recluse, > of which the second part alone, viz., ((The Excursion, w was completed. In (The Prelude * Wordsworth, addressing his friend, Samuel Taylor Coleridge, passes in review his own development as a poet, taking account of the circumstances which influenced him and analyzing the spiritual changes through which he passed. From the point of view of con¬ tent the work may be classed with such auto¬ biographies as Goethe's (Dichtung und Wahr- heit) and Coleridge's own (Biographia Liter- aria.) Throughout the work Wordsworth is chiefly occupied with defining the influence of nature as a determining factor in his spiritual life. As in (Tintern Abbey,) he distinguishes several stages in his relation to nature. In his early youth he is a thoughtless boy, using nature as the companion of his sports. There is no conscious nature love, but at intervals amid his sports there come to him moments of vision, ((gleams like the flashing of a shield, M and nature seems to him a living thing. A second stage is reached when nature, hitherto secondary in his thoughts, is sought for her own sake, with conscious love ; his imagination now leads him to see in nature the reflection of his own soul and to feel ((the sentiment of being spread o'er all that moves and all that seemeth 'still.® His residence in Cambridge comes as a partial interruption of his communion with the divinity in nature, but on his return to the scenes of his childhood during a summer vacation he experiences a renewal of his old affection and reverence, and now, too, he begins to interest himself in the human life about him. The incorporation into his thought of the sense of humanity marks a third step in his spiritual evolution. He be¬ comes conscious also at this time of his mis¬ sion as a poet. During the years which follow, Wordsworth passes through the great crisis of his life. He is caught up by the revolutionary enthusiasm while in France, and for the time being entirely loses sight of the earlier vision in his devotion to the new movement for the regeneration of society. But as the revolution progresses, Wordsworth, like other idealists of his time, begins to lose faith in it. He turns to abstract reason for comfort, becomes hopelessly entangled in the mazes of fruitless speculation, and ends in intellectual despair. From this condition he is rescued by renewed contact with the soothing influences of nature and foy his sister, who leads him gently back to the life of feeling and restores in him the spirit of joy and love. 1'he emotions are now more precious to him than the intellect, and he regains possession of the creative vision of his youth. But hence¬ forth humanity occupies a position in his heart higher even than that of nature.*

(The Prelude) is very important for the understanding not only of Wordsworth himself but of the spiritual history of his generation. It is, moreover, a poem of great beauty, abound¬ ing in descriptive and philosophical passages written in Wordsworth's most exalted manner, and

containing a relatively small proportion of the pedestrian element which is apt to mar his longer works. Consult (Poetical Works,) edited by W. Knight, 1882-89; (The Prelude, > edited by G. C. Moore Smith [Temple Classics] ; other editions are common. The best com-

mentary on 'The Prelude is E. Legouis' (The Early Life of Wordsworth,* translated by J. \V. Matthews. A selected bibliography of Wordsworth criticism may be found in Page's 'British Poets of the Nineteenth Century,* also in 'Cambridge History of English Literature) (Vol. XI).*

James H. Hanford, University of North Carolina.

*PREMIUM PLAN, a system of wage bonus awarded a worker for completing a cer¬ tain amount of work in less than the standard time allowed for it. The plan has been adopted in very many industrial establishments where there is a wage scale fixed by collective bargain¬ ing such as are becoming general under modern trades-union conditions. Henry R. Towne was the first to promote the plan in the United States in 1889 calling it "gain sharing.** Two years later it was adapted to specific industries by F. A. Halsey. Since that time many modifi¬ cations have been introduced, nearly all of which had regard to the proper adjustment of the standard time to be allowed for a specified task. James Rowan, of Glasgow, introduced a system of making the time saved on a task a percentage of the standard and then applying the percentage to the actual time. Under the Rowan plan the total earnings of a worker can¬ not be more than twice the regular fixed day- rate. See Wages.*

PREMONSTRATENSIANS, or NOR- BERTINES, a religious order, founded by Norbert, canon of Xanten in Cleves, who on account of his zeal as archbishop of Magde¬ burg in 1127 was canonized. In the forest of Saint Gobain, in a meadow pointed out to him, as he said, by Heaven (premontre , pratnm mon¬ stratum; thence the name of the order), he col¬ lected his first disciples (1120). The original establishment was built by the bishop of Laon. It contained 40 members who wore the white habit and cloak of canons regular and lived, according to the rule of Saint Augustine, a strict conventual life. In 1125 they were for¬ mally approved by Pope Honorius II. The order is composed of three classes: (1) priests and clerics under an abbot or provost; (2) nuns who embrace the rule of Saint Norbert; (3) lay members. Their order increased rapidly; several nunneries were established with the same rigid rules. The abbot of the original monastery Premontre, near Coucy, was general, and with three other

abbots formed the great council of the fathers of the order. The order was introduced into England in 1143 at New- house in Lincolnshire and its members were there regularly known as the White Canons. Some time before, in 1125, King David of Scot¬ land had brought a colony to his kingdom. Be¬ fore the Reformation they are said to have had 1,300 monasteries, among which were 500 nun¬ neries, mostly in Germany, the Netherlands, France, England and the north of Europe; but the Reformation diminished this number by more than one-half in the 16th century. In the 18th century the order lost many of its houses as a result of the French Revolution and at the end of the century there were only 27 houses in existence. It now consists of eight houses in Holland and Belgium, seven in Austria, two in Hungary, three in England, one in the United States and one in Canada. There are

*also eleven nunneries in Holland, Belgium, Spain, Austrian and Russian Poland, Switzer¬ land and Bohemia. Some of these monasteries have founded priories in Brazil to which col¬ leges are attached, others are doing mission¬ ary work in the Belgian Congo and in Mada¬ gascar. The entire order is divided into five circaries. At its head is a superior-general, the most recent one being Norbert Schachinger, abbot of Schlage, one of the Austrian monas¬ teries of the order.** In 1913 the membership of the order was made up of one bishop, 17 vicars, one apostolic praefect, 789 priests, 129 scholastics, 51 novices, 91 lay brothers and three lay novices. In modern times the order has become very active in teaching boys in high schools and academies. It possesses a college for its own members at Budapest and one at Rome, the head of the latter being the procura¬ tor of the order. The provincial house of the Premonstratensians in the United States was founded at West De Pere, Wis., by fathers from the abbey of Heeswijk, Holland. The very Rev. B. H. Pennings, O. Praem., is the present prior. The fathers conduct missions in the archdiocese of Chicago and the dioceses of Green Bay, Grand Rapids, Marquette and Hel¬ ena, as well as a flourishing classical and com¬ mercial college. The membership in 1918 con¬ sisted of 28 clerics, six scholastics, four novices and four lay brothers. Consult 'Statuta Sacri et Canonici Prasmonstratensis Ordinis, Reno- vata Jussu Regis Christianissimi, et Auctoritate Capituli Nationalis, Anni 1770* (Paris 1773) ; Currier, 'History of Religious Orders* (New York 1894) ; Gasquet, Rev. F. A., 'The Eng¬ lish Premonstratensians* (in Transactions of the Royal Historical Society, n. s. Vol. XVII, p. 1, London 1903) : Grassl, B., 'Catalogus Gen- eralis Totius Sacri Candidi, etc.* (Pilsen 1912) ; Heimbucher, M., 'Orden und Kongre- gationen* (Paderborn 1907) ; Helyot, P. and M. Bullot, 'Histoire des Ordres Religieux* (Paris 1714-19) ; Kirkfleet, Rev. C. J., 'History of Saint Norbert* (Saint Louis 1916) ; Win¬ ter, F., 'Die Praemonstratenser des 12 Jahr- hunderts und ihre Bedeutung fur das Nordost- liche Deutschland* (Berlin 1865).*

PRENCE, prens, or PRINCE, Thomas,

American colonist: b. Lechdale, Gloucestershire, about 1600; d. Plymouth, Mass., 29 March 1673. He was one of the Leyden band of Pilgrims which arrived at Plymouth on the ship For¬ tune 9 Nov. 1621, and his wealth soon gained for him considerable influence. In 1634 and in 1638 he was elected governor and was one of the assistants in 1635-37 and in 1639-56. He assisted in the settlement of Nansett or Eastham and from 1657 until his death was governor of Plymouth, the law requiring the residence of the governor in Plymouth being waived in his favor. He was also one of the commissioners from Plymouth at various times after the confederacy of the four colonies of Plymouth, Massachusetts, Connecticut and New Haven had been formed in 1643. He was zeal¬ ous in the religious affairs of the colony, an active promoter of educational matters, and was the real founder of the public schools in New England. Consult Baylies, F., 'An Historical Memoir of the Colony of New Plymouth (Boston 1866) ; Morton, N., 'New England's Memorial* (Cambridge. Mass., 1669) ; 'Mourt's*

Relation or Journal of the Plantation at Ply¬ mouth (London 1622).

PRENDERGAST, Edmond Francis,

American Roman Catholic prelate : b. Clon¬ mel, Ireland, 3 May 1843; d. Philadelphia, Feb. 1918. He came to the United States in 1859; was educated at the ecclesiastical seminary of Saint Charles Borromeo, Philadelphia, and was ordained to the priesthood in 1865. He was successively at Saint Paul's, Philadelphia, Sus¬ quehanna Depot and rector of Saint Mark's, Bristol, Pa., for four years. Until 1874 he was rector at Allentown, Pa., and from 1874 to 1897 was rector of Saint Malachy's, Philadelphia. In February 1897 he was consecrated auxiliary bishop of Philadelphia and in May 1911 became archbishop in succession to Dr. Ryan.

PRENDERGAST, Maurice Brazil, Amer¬ ican artist: b. Boston, Mass., October 1861. He studied at Julien and Colorossi academies and at the ficole des Beaux Arts, Paris, under Joseph Blanc, Courtois, Jean Paul Laurens and Jerome. He returned to the United States and settled in Boston, removing to New York in 1914. He works both in oil and in water color, and his favorite subject is a grouping of fig¬ ures against a landscape background. He is noted for his vivid coloring, his joyous vision of nature

and his unconventional but truthful presentation. His strength in design and indi¬ viduality in execution are remarkable. Among his works may be mentioned (Crepuscule,5 (Chrysanthemum Market, 5 (On the Cliffs, > (The Merry Maidens,5 (Seashore,5 etc.

PRENTICE, pren'tis, George Dennison,

American journalist: b. Preston, Conn., 18 Dec. 1802; d. Louisville, Ky., 22 Jan. 1870. He was graduated from Brown University in 1823; studied law, but did not practise, and was edi¬ tor of the New England Weekly Review at Hartford, a literary journal, 1828-30. He then removed to Louisville, Ky., where in November 1830 he founded the Louisville Journal and became its first editor, in which position he won widespread reputation for political ability, wit and satire. For many years the Journal was a leading advocate in the West of the policy of the Whig party, and at the outbreak of the Civil War maintained with zeal the cause of the Union. A collection of his poems appeared in 1876 and a selection from his newspaper paragraphs under the title of

1860.

PRENTISS, Benjamin Mayberry, Ameri¬ can military officer: b. Belleville, Va. (now W. Va.), 23 Nov. 1819; d. Bethany, Mo., 8 Feb. 8 Feb. 1901. He removed with his parents to Missouri in 1835, and in 1841 settled in Quincy, Ill., where he entered the commission business. He served in the Mexican War with rank of captain, and received honorable mention for services at Buena Vista. At the outbreak of the Civil War he reorganized his old company, was appointed colonel of the Seventh Illinois regiment and in May 1861 was made brigadier- general of volunteers. He routed a band of Confederates at Mount Zion, southern Missouri, 28 Dec. 1861, joined General Grant a few days before the battle of Shiloh and was taken prisoner in that battle on 6 April 1862, together with most of his command, while stubbornly holding the position to which he had been as¬

signed. He was released in October 1862, pro¬ moted major-general of volunteers in Novem¬ ber 1862, served as a member of the court- martial which tried Gen. Fitzjohn Porter, and in July 1863 defeated the Confederate forces under Holmes and Price at Helena, Ark. He re¬ signed his commission in October 1863 and set¬ tled in Bethany, Mo., where he practised law,

PRENTISS, Elizabeth Payson, American author: b. Portland, Maine, 26 Oct. 1818; d. Dorset, Vt., 13 Aug. 1878. She was married to George Lewis Prentiss (q.v.) in 1845 and after the death of two children turned her attention to literary work. Her most popular work,' (Stepping

Heavenward5 (1869), reached a sale of over 150,000 in this country besides being translated into French, German, Norwegian and Italian, where it met with great success. Many of her other books, too, achieved great success and were translated into foreign languages. Among her other works are (The Susy Books5 (1853-56) ; (1856) ; ˆLittle Threads5 (1868) ; (Fred, Maria and Me} (1868) ; (Nidworth and His Three Magic Wands) (1869) ; (The Percys) (1870) ; (Six Little Princesses and What They Turned Into) (1871); (Aunt Jane's Hero5 (1871); (Golden Hours5 (1873) ; (Urbane and His Friends) (1874) ; (The Home at Greylock) (1876) ; (Pemaquid) (1877) ; (Gentleman Jim5 (1878) ; (Avis Benson5 (1879). Consult Prentiss, G. L., (Life and Letters of Elizabeth Prentiss) (1882).

PRENTISS, George Lewis, American Presbyterian clergyman : b. Gorham, Maine, 12 May 1816; d. New York, 18 March 1903. He was graduated from Bowdoin College, Bruns¬ wick, Maine, in 1835, which gave him the de¬ gree of D.D. in 1854, studied theology in the universities of Halle and Berlin in 1839-41, and was ordained to the ministry in 1845. He was pastor of the South Trinitarian Church, Boston, 1845-50, of the Mercer Street Presby¬ terian Church, New York, 1851-58, when ill health compelled his resignation. In 1862 he established in New York the Church of the Covenant, and was its pastor until 1873, when he accepted the chair of pastoral theology, church polity and mission work at Union Theo¬ logical Seminary. He published CA Memoir of S. S. Prentiss) (2 vols., New York 1855) ; (A Discourse in Memory of Thomas Harvey Skinner5 (New York 1871) ; (Life and Letters of Elizabeth Prentiss5 (New York 1882) ; (The Union Theological Seminary in New York, Historical and Biographical Sketches of Its First Fifty Years5 (New York 1889) ; (The Agreement between Union Seminary and the General Assembly5 (New York 1891) ;

PRENTISS, Sergeant Smith, American orator, brother of G. L. Prentiss (q.v.) : b. Portland, Maine, 30 Sept. 1808; d. Natchez, Miss., 1 July 1850. He was graduated from Bowdoin College, Brunswick, Maine, in 1826, removed to Natchez, studied law, taught school, and in 1829 was admitted to the bar, after which he established a law practice, first in Natchez and later in Vicksburg, Miss., and rapidly

gained high rank in his profession. In 1835 he was elected to the Mississippi legislature, where he won a reputation as an orator, and in 1837 he was elected to Congress, but upon arriving at Washington to take his seat found it occu¬ pied by the Democratic candidate, Colonel Clai¬ borne. In a speech of great brilliancy and power, which continued for three

days, he argued his case before the House, attracting the attention of the country to the ˆMississippi Election Case.® The controlling vote was cast by the speaker, James K. Polk, and Prentiss was defeated, but at the polls in the election following was triumphantly elected. His speech against the sub-treasury bill sustained his repu¬ tation as an orator, but at the close of his term he declined re-election. In the campaign of 1840 he actively supported General Harrison, and in 1845 he strenuously opposed repudiation. In the same year, after suffering serious finan¬ cial reverses, he removed to New Orleans, La., where he spent the balance of his life in the practice of law. Consult Prentiss, G. L., Me¬ moir of S. S. Prentiss) (New York 1855).

PRENZLAU, prents'low, or PRENZLO W,

Germany, town in the province of Brandenburg, in Prussia, on the Ucker and Lake ticker, 57 miles north by east of Berlin. It is divided by the river into an old and a new town, is well built and has among its buildings a handsome Gothic church (erected 1325-ˆ40) , monuments of Emperor William I, Moltke, Bismarck and Grabow, some old city gajes and a gymansium. Of interest is also the Ukermar Kosche Mu¬ seum. It has a number of manufacturing es¬ tablishments, machine shops, woolen mills, tan¬ neries, sugar works, etc. In 1806 a Prussian corps under Prince Hohenlohe surrendered here after the battle of Jena to Murat. Pop.

21,431.

PREPOSITION. See Grammar.

PREROGATIVE, in British law a term used to denote an exclusive privilege of the Crown, the expression the prerogative being employed for the whole or any part of such ex¬ clusive privilege. The prerogative may be con¬ fined or limited by the supreme legislative au¬ thority • and has in fact been much restricted, notably by Magna Charta (1215), the Habeas Corpus Act (1679), and the Bill of Rights (1688). In a wider sense the term is used to denote a right attached to a rank or office to exercise certain powers or privileges to the exclusion of others. Consult Allan, John, in¬ quiry into the Rise and Growth of the Royal Prerogative in England) (2d ed., London 1849) ; Blackstone, Sir William, Commentaries (4th ed., Chicago 1899) ; Chitty, Jos., the Y., (A Treatise on the Law of the Prerogative of the Crown, etc.* (London 1820) ; Holdsworth, W., (A History of English Law) (3 vols., London 1903-09) ; Stubbs, W., (The Constitutional His¬ tory of England* (3 vols., Oxford 1875-78).*

PRESBYOPIA. See Vision, Defects of.

PRESBYTER. See Bishop; Presbyte¬ rianism ; etc.

PRESBYTERIAN CHURCH IN THE UNITED STATES OF AMERICA. The

history of Presbyterianism in the United States is closely interwoven with that of the country at large. The early colonists were, for the most part, those who had crossed the ocean to

find a home in the New World, in order to en¬ joy religious freedom. They came for con¬ science's sake, rather than for the advancement of their fortunes. They claimed the right to worship God according to the dictates of their own consciences and to govern themselves in the administration of church order and dis¬ cipline. They were bitterly opposed to the claims of prelacy. Alike among the Congrega- tionalists of New England, the Dutch of New York, the Scotch-Irish of Pennsylvania and the Huguenots of the Carolinas, the Calvinistic or Reformed system of doctrine was the prevail¬ ing belief. The Shorter Catechism of the West¬ minster Assembly, embodied in the New Eng¬ land Primer, had a more profound influence in the training of successive generations than any other book of that period, except the Bible. It was the working creed of the men who laid the foundations of free institutions in America. The organization of the church among the colonists was determined largely by their pre¬ vious associations in the Old World. The New England colonists were mostly of English-Puri¬ tan extraction and favored the Congregational polity. There were, however, two parties among them ; one zealously favoring Independ¬ ency, the other leaning toward the Presby¬ terian polity. The former belonged to the school called Brownists, the latter to Barrow- ism. A strictly Presbyterian colony was estab¬ lished in Salem, Massachusetts Bay, under Roger Conant in 1625. Among those who held to Presbyterian views was Rev. Richard Den¬ ton, who came from England in 1630, and set¬ tled in Watertown, Mass. Driven out by oppo¬ sition to his views, he removed in 1644, with some of his congregation, to Hempstead, Long Island, where a church was organized in ac¬ cordance with the Presbyterian form. The earliest organization of Presbyterianism in the New World was made in the Dutch settlement of New AmWrdam, in New York, in 1628. It was a Reformed Dutch church and the first Protestant church in America. Other churches of this denomination were organized at an early date among the Dutch settlements. (See Re¬ formed Dutch). While the Presbyterian ele¬ ment was found in all of the colonies from New England to Georgia, circumstances pre¬ vented its separate organization. In New Eng¬ land the prevailing form of government was Independency or Congregational; in New York Presbyterianism was of the Dutch type and only Episcopacy was allowed among the English. In Virginia, Episcopacy was established by law and was intolerant toward all forms of dis¬ sent. Conditions were more favorable to Pres¬ byterianism in the provinces of Pennsylvania, New Jersey, Delaware and Maryland. To these colonies came a large number of emigrants from the North of Ireland and from Scotland. The religious

intolerance prevailing under the reign of Charles II led them to seek refuge from it in the New World. It was among these emigrants that Presbyterianism took its organ¬ ized form. In answer to a request from one of the scattered groups ot Presbyterian's, the Pres¬ bytery of Laggan, Ireland, sent as its mission¬ ary, Rev. Francis Makamie, in 1683. He jour¬ neyed in his missionary work as far south as the Georgias, and as far north as New York. He finally settled in Rehoboth, in eastern Mary¬ land, where he organized the churches of Reho-

both and Snow Hill. In 1704 he returned to London, seeking aid for his work, returning in 1705, and bringing with him two additional ministers.

There was also, before the opening of the 18th century, a Presbyterian church in Phil¬ adelphia. Rev. Jedediah Andrews was its pas¬ tor, in 1701. In 1705 seven ministers, Maka- mic, Davis, Wilson, Andrews, Taylor, Mac- Mish and Hampton, met by appointment in the city of Philadelphia and organized a Presbytery. It was the first Presbytery in America and the beginning of the American Presbyterian Church in its organized form. The original minutes of this Presbytery are in the archives of the Pres¬ byterian Historical Society in Philadelphia. This Presbytery was subsequently divided into three, which were included in a Synod. The Synod held its first meeting 17 Sept. 1717, in Philadelphia. In 1741 a , division occurred in the Synod resulting, not from doctrinal differ¬ ences, but from those ecclesiastical passions and unregulated zeal which have so often disturbed the church. One party under the leadership of the Tennents, father and son, and greatly helped by the minister of the renowned evangelist, Whitfield, was earnestly solicitous for a revival in the church, charging it with formalism and world conformity. The other party, the con¬ servative, resisted the charge, and sought to re¬ strain by ecclesiastical action what they consid¬ ered the immoderate zeal of the revivalists. The parties were known respectively as the New Side and the Old Side. The result of these controversies was the establishment of two independent synods, the Synod of New York, composed mainly of those favoring the New Side, and the Synod of Philadelphia, favoring the Old Side. Both synods unanimously af¬ firmed their adherence to the Westminster Standards. This division lasted 17 years and was healed by the reunion of the two synods in 1758, under the name of the Synod of New York and Philadelphia. With' 'dhe reunion came renewed effort and enlarged prosperity. Churches were organized in the Carolinas, Georgia, Kentucky, Tennessee, Virginia and Western Pennsylvania. This enlargement of the Presbyterian Church had an important bear¬ ing on the subsequent efforts of the colonies to secure their independence. The Presbyterians everywhere were foremost in resisting civil and religious oppression and

when the period of the Revolution came, were unanimously in favor of independence and the establishment of a government on republican principles. Thirteen months before the signing of the Declaration of Independence, in Philadelphia, the Presby¬ terians of Mecklenburg County, North Caro¬ lina, had drawn up and signed a Declaration of Independence from England and also framed a system of local government. The Scotch-Irish Presbyterians in Western Pennsylvania declared for independence in May 1776. The Presby¬ terian element was everywhere a determining factor in the War of Independence.

In England, the rebellion was attributed especially to the Presbyterians. Walpole said in the English Parliament, (

which were required by the change of allegiance in civil affairs. At the same meeting it was re¬ solved to create a General Assembly, in which all the presbyteries should be represented by their commissioners. This General Assembly held its first meeting in the Second Presbyterian Church of Philadelphia, Thursday, 22 May 1789. At this time the church had 16 presbyteries, four synods, 177 ministers and 431 churches. Among the first acts of the General Assembly was one directing that efforts should be made to send missionaries to the frontier. Before the close of the century, numerous churches had been established in the West and South. To prevent collision with the missionaries who went out from the Congregationalists in New England, the General Assembly, in 1802, en¬ tered into the Plan of Union with the associated churches of Connecticut, providing for the orderly organization of churches in mission fields. This Plan of Union continued in force until 1836, when it was abrogated by the Gen¬ eral Assembly. It provided, in brief, that Con¬ gregational churches might settle Presbyterian ministers and the reverse ; and that if a con¬ gregation was composed partly of Congrega¬ tionalists and partly of Presbyterians, this fact should be no obstacle to their uniting in one church and settling a minister ; and that such a church, though not presbyterially organized, should have a representative in Presbytery. Its operation led to most favorable results in the extension of the church. The opening of the 19th century was a time of widespread religious revivals. ((The Great Awakening® began in Kentucky and it was attended there with some manifestations which met the disapproval of the more conservative element in the Church. In view of the great demand for ministers, some were authorized to preach who had not received a regular classical and theological education. There were also a few who held that the Con¬ fession of Faith taught fatalism. This led to the withdrawal of the Cumberland Presbytery, from which has sprung a large and influential body of Presbyterians known as the Cumber¬ land Presbyterian Church. This separation took place 1810. (See Presbyterianism). The first quarter of the century was one of rapid growth for the Church. The tide of

emigration poured westward, and new set¬ tlements and towns were founded. In all these, the missionaries of the Church found a hope¬ ful and fruitful field for their labors. During this period, the Board of Home Missions was organized (1816). Theological Seminaries for the education of ministers were also estab¬ lished; Princeton (1812); Auburn (1820); Western Theological Seminary, Allegheny, Pa. (1826) ; Union Seminary, Virginia (1828) ; Co¬ lumbia, South Carolina (1828) ; Lane (1834) ; Hanover, subsequently removed to New Albany, thence to Chicago and now known as McCor¬ mick Theological Seminary (1829). In 1825 appeared the beginnings of a controversy which ultimately resulted in the disruption of the Church. Various causes led to the formation of two parties, known subsequently as the Old School and the New School. Chief among these causes was the spread of New Haven Theology, or Hopkinsianism, which was supposed to be contrary to the doctrine of the Confession of Faith. It was also charged that through the Plan of Union, Presbyterian order had been

subverted and that innovations in worship were permitted in certain parts of the Church. In 1836 Dr. Albert Barnes, who sympathized with the new theology, was tried for heresy before the General Assembly and acquitted. The pre¬ vious year, Dr. Lyman Beecher, professor in Lane Theological Seminary, had been tried for heresy by the Presbytery of Cincinnati and ulti¬ mately acquitted. All these things produced in¬ tense excitement in the Church and widened the breach between the conservatives and the lib¬ erals. The Assembly of 1837, which met in Philadelphia, in response to a memorial signed by a large number of ministers and elders rep¬ resenting the Old School party, dissolved the Plan of Union with the Congregational Church, and exscinded the synods of Western Reserve, Utica, Geneva and Genesee.

At the meeting of the Assembly in Phila¬ delphia, 1838, the commissioners from the ex¬ scinded synods presented themselves and asked to be enrolled ; this being denied them, they with their friends proceeded to organize the Assembly and withdraw to hold its sessions in the First Presbyterian Church of Philadelphia. With the Old School party remained 140 com¬ missioners, while 136 gave their adhesion to the newly organized Assembly. Thus began the un¬ happy division which lasted 32 years. Both Assemblies had the same name and claimed to be the General Assembly of the Presbyterian Church in the United States of America; both held to the same confession and form of gov¬ ernment. Both Assemblies engaged zealously in the work of home and foreign missions and in the establishment of institutions of learning. Both, also, were troubled by questions concern¬ ing slavery. As early as 1787, the Presbyterian Church had declared itself in favor of the

edu¬ cation of the slaves and for the adoption of such <(prudent methods as would procure even¬ tually the final abolition of slavery.® In 1815 the General Assembly adopted a strong anti¬ slavery document, in which it expressed regret for the existence of slavery in the United States, urged the duty of educating slaves and expressed the hope for their speedy emancipa¬ tion. It further declared the buying and selling of slaves to be ˆinconsistent with the spirit of the Gospel.® These views were more clearly and positively avowed in the New School Gen¬ eral Assembly than in the Old School General Assembly. In 1858, in consequence of some decided action taken with reference to slavery and emancipation, six Southern synods with¬ drew from the New School Assembly and con¬ stituted themselves the (

right to define civil duties. The vote on the resolution stood 156 in the affirmative and 66 in the negative. The action resulted in the withdrawal of the synods in the seceding States and the subsequent formation of the Presbyterian Church in the Confederate States of America. In 1866 the General Assembly Old School and the General Assembly New School met at the same time in Saint Louis, when steps were taken with reference to the reunion of the two bodies, by the appointment of committees to consider a plan of union. These negotiations terminated favorably and the basis of reunion, which was the Confession of Faith, after being approved by the presbyteries, was ratified by the Assembly in 1869. In May 1870, the first General Assembly of the reunited Church met in Philadelphia. In 1837, the year preceding the disruption, the ministers num¬ bered 2,140, the churches 2,865 and the mem¬ bership 220,537. At the time of the reunion, there were 4,238 ministers, 4,526 churches and 446,561 members. Since the reunion, the prog¬ ress of the Church, has been marked and steadfast. Two notable trials threatened for a time to disturb its peace. The first was that of Rev. David Swing, 1874, for alleged heresy with reference to the divinity of Christ. This case was settled by the withdrawal of Dr. Swing from the Church. The second was the trial of Professor Briggs of Union Theological Seminary, for his advocacy of those views of the "higher criticism® which it was claimed af¬ fected the fundamental doctrines of the Chris¬ tian faith. This trial resulted in the condem¬ nation of his views, his suspension from the ministry and his subsequent withdrawal from the Church.

Since these ecclesiastical trials the Church remains conservative, but with an increasing tendency toward liberal interpretation of stand¬ ards. Though the General Assembly has re¬ peatedly stressed the inerrancy of Scripture and has made belief in such inerrancy requisite of teachers in seminaries and candidates for the ministry, in 1902 the Assembly adopted a brief statement of the Reformed faith, not as a legal standard but as an interpretation of the Con¬ fession. It repudiated the doctrine of infant

damnation, insisted on the consistency of pre¬ destination, of God's universal love, and incor¬ porated new chapters on the Holy Spirit, the love of God and missions.

During a number of past years repeated ad¬ vances have been made looking toward a union with the Southern Presbyterian Church, but so far without success. The Southern Church, while expressing the most cordial relations to¬ ward the Church of the North, has felt that the interests of Presbyterianism may be better con¬ served by their holding for the present to their ecclesiastical organization.

The last few decades have been remarkable in the extension of the missionary work of the Church. Up to the time of the separation between the Old and New School, the foreign mission work was carried on by the American Board of Commissioners of Foreign Missions. After the division, the Old School was estab¬ lished as the Board of Foreign Missions — the New School continuing as the American Board.

After the reunion in 1869 the separate Board was continued, embracing all the foreign mis¬ sion work of the Church. The extent of the

foreign mission activities in 1918 is indicated by the fact that the total contributions amounted to $2,131,387. The foreign missionary work is carried on in all parts of the world.

The home missionary work was carried on in early times by a committee of the General Assembly, but in 1816 the present Board of Home Missions was organized. The total home mission contributions for 1918 was $2,268,925. Its home mission work extends from Alaska to Porto Rico. The woman's home mission work was conducted as a branch of the Board of Home Missions until 1915, when it became in¬ corporated as a separate Board. The Minutes of the General Assembly for 1918 show a roll of 9,902 ordained ministers and 9,928 churches, with a Sabbath-school membership of 1,386,928, the number of communicants being 1,631,748. Its contributions for all purposes in 1918 were $33,148,407. Other Boards caring for its other branches of Christian service are Education, Publication and Sabbath-school Work, Church Erection, Ministerial Relief, Freedmen and Temperance.

The development of the modern American life has given it within the last 15 years new fields of service in immigration, social work, city evangelization and country church work.

It has also in connection with it numerous schools, colleges, universities and

theological seminaries. The national churches of Mexico and Brazil, both Presbyterian, have been estab¬ lished largely through its instrumentality. It has synods in India and China, and its mission operations are carried on in all parts of the world.

The Cumberland Presbyterian Church. —

The origin of this branch of the Presbyterian Church is to be found in the great religious re¬ vival which swept over Kentucky and Tennessee at the beginning of the 19th century. The de¬ mand at that time for an additional number of ministers in that region led the Presbytery of Cumberland, in connection with the General Assembly, to license and ordain a number of young men of the Presbyterian Church, who had no.t received the required classical and theological training, for the gospel ministry. This proceeding was contrary to the rules and traditions of the Church, and was strenuously opposed by those who stood for the old ecclesiastical order. The Synod of Kentucky refused to sanction the acts of the Presbytery, and this decision was finally confirmed in part by the General Assembly. There were also among those engaged in this controversy some divergencies in doctrinal belief, especially with reference to what were claimed to be the fatal¬ istic teachings of the Confession of Faith. The result was the withdrawal of those who were dissatisfied, and the formation of an in¬ dependent presbytery, called the Presbytery of Cumberland. Those who organized it recog¬ nized as their standard of doctrine the Confes¬ sion of Faith of the Presbyterian Church, but made provision for those who objected that fatalism was taught in it. The growth of this Presbytery was rapid. In three years it grew into a synod, composed of three presbyteries, and numbering 60 churches.

Its first meeting was held 5 Oct. 1813, when it proclaimed a summary of its doctrines. A year later it revised the Confession of Faith to meet its views regarding the articles to which

exception had been taken. These were, specially, the third chapter with reference to the decrees of God, and the article with reference to the salvation of infants. The new Church, filled with the revival zeal of its origin, made rapid advances. In 1827 it established at Princeton, Ky., an institution of learning, with a view to securing educated men for the ministry. In 1829 the General Assembly of the Cumberland Church was organized, consisting of five synods. At that time the field occupied by the Church embraced eight States, in which there were 18 presbyteries.

In 1906 it was adjudged that the doctrinal differences which had separated the Cumber¬ land Church from the Presbyterian Church in the United States of America had been largely composed. A union of the two Churches was affected. At the time of the reunion the Cum¬ berland Church had a

roll of 1,514 ordained ministers serving 2,869 churches, with a total membership of 185,212 and annual contributions aggregating $933,920. A small part of the Cumberland Church, however, refused to enter into the reunion and has continued the organiza¬ tion of the Cumberland Presbyterian Church. The principal reason given for refusing to enter the union was that the revision of the West¬ minster Confession had not brought the two Churches sufficiently into doctrinal accord to justify the cessation of the separate existence of the Cumberland Presbyterian Church. The question of property and institutions was car¬ ried into the courts ; but in almost all cases it was decided in the court of final appeal in favor of the body which had gone into the union. The number of ministers in the con¬ tinued organization is 996 and the total number of Church membership, resident and non-resi¬ dent, is 63,735. They carry on their benevolent work through Boards of Missions, Education, Publication and Ministerial Relief. They have a theological seminary — the Cumberland Pres¬ byterian Theological Seminary — located at Mc¬ Kenzie, Tenn., and the Cumberland College lo¬ cated at Leonard, Tex. During its history, various attempts have been made to restore its union with the Presbyterian Church in the United States of America, but they failed on account of doctrinal differences until 24 May 1906 when, in convention assembled, the former at Decatur, Ill., the latter at Des Moines, Iowa, the reunion was accomplished.

The Colored Cumberland Presbyterian Church. — Prior to the Civil War the number of colored people in connection with the Cum¬ berland Church amounted to 20,000. In times of slavery, they worshipped in the same build¬ ings with their masters, a particular portion of the church being assigned to them ; but they were not allowed to participate in the govern¬ ment of the church. After the Civil War, it was deemed expedient that these members should be associated in a separate organization. Accordingly presbyteries and synods were formed, which met in a General Assembly 1 May 1874. This organization, whose statistics are rather indefinite, now reports a membership of 25,000. It has one educational institution, but the poverty of the people has prevented them from obtaining a thoroughly educated ministry.

The Presbyterian Church in the United States (Southern).— This Church had its origin

at the beginning of the Civil War, and from causes connected with it. The action of the General Assembly, Old School, in 1861 was one of the leading causes. By the passage of the "Spring Resolutions" concerning the Civil War, it had determined for all under its jurisdiction that their

allegiance was due to the national government. A minority held that this action, whether true or false, was beyond the jurisdic¬ tion of the General Assembly, and that in mak¬ ing it the Church was transcending her sphere, and usurping the duties of the state, which alone had the power to define civil duties. A protest was presented against this action, in which it was urged that the Assembly in thus deciding a political question, and in making that decision binding upon those under its care, practically made a condition of church mem¬ bership which violated the constitution of the Church, and usurped the prerogative of its di¬ vine Head. Presbyteries in the seceding States generally coincided with this view, and con¬ cluded that a separation from the General As¬ sembly was demanded for the defense of a great truth, and for the protection of the liberty with which Christ had made them free. The organization of the Confederate States fur¬ nished another reason. It was, in brief, that the changed condition of civil affairs made it expedient and necessary that the presbyteries within the bounds of the Confederacy should be organized as a separate and independent body. Accordingly 93 ministers and elders, representatives from presbyteries, met in Augusta, Ga., 4 Dec. 1861, and constituted a General Assembly, under the name of the General Assembly of the Confederate States of America. They adopted at the same time, as their standards of doctrine, the Westminster Confession of Faith, and the Form of Govern¬ ment as held in the old Church. At the close of the war, the name of the Church was changed to the Presbyterian Church in the United States. In 1864 the United Synod of the South, com¬ posed of the presbyteries and churches which had seceded from the General Assembly (New School), on account of its action concerning slavery, was admitted into the General Assem¬ bly of the Confederate States. It consisted of 120 ministers, 190 churches and 12,000 com¬ municants. In 1869 that portion of the Synod of Kentucky which had separated from the Gen¬ eral Assembly (Old School) in 1867 was re¬ ceived into connection with the Southern Gen¬ eral Assembly, bringing with it 13,540 com¬ municants. In 1874 the independent Synod of Missouri, which had separated itself from the Northern Assembly on account of its action concerning civil affairs, united with the South¬ ern Assembly. The churches in connection with this Assembly are almost exclusively in what is known as the Southern States, and for that reason it is commonly called ((the South¬ ern General Assembly" in distinction from the Assembly, North. Its missionarv and benevolent operations are not conducted by organized boards, but through committees elected an¬ nually by the General Assembly, directly re¬ sponsible to it, and acting under its instruction. It carries on mission work in China. Africa, South America, Greece, Italy and Mexico. _ Its home mission work is conducted with vigor and efficiency, and includes work among Indians

and negroes, as well as the white population. It has under its care Union Theological Semi¬ nary at Richmond, Va. ; the Theological Semi¬ nary at Columbia, S. C., and the Theological Seminary at Louisville, Ky. The last-named institution, having been joined with Danville Seminary, is now under the joint control of both synods of Kentucky, one in connection with the Northern and the other with the South¬ ern Assembly.

In addition to these, the Southwestern Presbyterian University at Clarksville, Tenn., has a theological department, and there is also a theological seminary at Austin, Tex. For the education of the colored ministry there is the Stillman Institute at Tuscaloosa, Ala., mak¬ ing a total of six theological seminaries. This branch of the Church, while holding in common with other Presbyterian churches the West¬ minster Confession and Cathechisms, Larger and Shorter, lays special emphasis upon the' spirituality of the Church in its functions. It insists that church courts shall be governed by the articles of the Confession, which says, <(synods and councils are to handle or conclude nothing but that which is ecclesiastical."

The latest statistics for this Church are as follows: Number of ministers, 1,861; number of communicants, 348,223 ; number of Sunday- school pupils, 328,252; and total contributions,

$4,967,852.

The United Presbyterian Church of North America. — This organization is the result of a union between the Synod of the Associate Re¬ formed Church and the Associate Synod, com¬ monly known as the Seceders. This union took place in Pittsburgh 26 May 1858. The basis of it was the Westminster Confession of Faith, with a modification of the chapter on the power of the civil magistrate, the Catechisms, Larger and Shorter,- and a Judicial Testimony. Most of the articles in this testimony are held in common by all Evangelical churches, but there are five which are special to this denomination. The first declares that slave holding is a viola¬ tion of the law of God and contrary both to the letter and spirit of Christianity. The second de¬ clares that all secret and oath-bound societies are inconsistent with the genius and spirit of Christianity, and that church members ought not to have fellowship with such associations. The third is a declaration in favor of close communion ; none are to be admitted to the sealing ordinances of the Church except such as give their assent to its doctrines. The fourth declares the duty of public social covenanting at special times. The fifth affirms that it is the will of God that the songs contained in the Book of Psalms should be used exclusively in public worship, and that hymns, the composition of uninspired men, should not be employed in such service. In all other respects, the laws, government and discipline of this Church are the same as those of other branches of the

Presbyterian Church. It has been distinguished for the careful training of its ministry. It has in its connection two theological seminaries and six colleges. For the execution of its work the United Presbyterian Church has seven boards, namely: Home, Foreign, Freedmen's Mission, Church Erection, Publication, Education and Ministerial Relief.

Its foreign mission work is now carried on

in India, Egypt and the Soudan. In home mis¬ sions it has been progressive in work in the mountains of the South, among the foreigners and the Mormons and the freedmen of the South. It also has departments of work in Bible schools, evangelism, social service and industrial conditions. The latest statistics give 1,143 ordained ministers and 1,150 congrega¬ tions. The communicants in America are 156,954. The total membership, including the foreign field, is 200,879. Its contributions in 1916 were $3,006,508.

The Reformed Church in the United States (German Reformed). — Previous- to the Revolutionary War a considerable number of emigrants from the Palatinate, a district of Germany, emigrated to America and settled in Pennsylvania. They were members of the Re¬ formed Church in Germany and were men of sterling character and devoted piety. They be¬ came important factors in the settlement of middle and western Pennsylvania, and also took part in the Revolutionary War. The first German Reformed minister settled among these emigrants was Philip Boehm, who came to America in 1720. In 1747 there were five or¬ dained ministers and 46 organized churches. In 1793, at which ˆime the Synod was divided into classes, there were 22 ordained ministers and about 150 churches. Subsequently affiliated synods were organized in Ohio and in the neighboring States; but it was not until the year 1863 that organic union was established between them. The General Synod was organ¬ ized 18 Nov. 1863 in Pittsburgh, Pa. It holds its sessions triennially. It is a delegated body composed of an equal number of ministers and elders, elected by the several classes, constitut¬ ing eight synods. The General Synod has under its control the various boards to which are en¬ trusted the work of home and foreign missions, and also that of the Sunday school. The mem¬ bership of the Church is located in the northern belt of the country extending from the New England States to the Pacific slope and south¬ ward as far as North Carolina.

The last statistics give the number of minis¬ ters as 1,245 and of congregations 1,773, with a communicant list of 326,112 members. Their gifts for benevolence during 1916 were $687,446. Its principal foreign

mission work is in China and Japan, where evangelistic, educational and hospital work is conducted. It conducts a growing home mission work at an expense last year of $162,349.

The Reformed Presbyterian Church in North America. — This organization traces its ancestry to the Covenanters and claims to be a lineal descendant of the Kirk of Scotland. Its name has a twofold significance and is a resume of its history. It is called Reformed, to indicate that it was founded on the prin¬ ciples of the Reformation, and Presbyterian because of its adoption of and long struggle to maintain that form of government. The first presbytery of the Reformed Presbyterian Church in America was organized in 1774. In 1782 the majority of this presbytery united with the Associate presbyteries and formed the Associate Reformed Church. A few refused to accept the union and maintained their organ¬ ization in what was called ((praying circles.® Ministers having been obtained from Scotland,

in 1798 the presbytery was again constituted. In 1809 the Synod of the Reformed Church was organized with three presbyteries, in Phila¬ delphia ; through the increase of churches and presbyteries a General Synod was in time organized. But in 1833 a division occurred by which it was separated into two branches, known respectively as the Synod of the Re¬ formed Church and the General Synod of the Reformed Church. The distinctive features of the Reformed Church are, first, the kingly office of Christ in the sense that nations as well as individuals are his subjects and should acknowledge his authority. Hence Reformed Presbyterians ((decline to hold office or to exer¬ cise the right of suffrage in any government that does not clearly own Christ as king and his law as supreme.® Second, the exclusive use of the Psalms in praise. Third, opposition to secret and oath-bound societies. Fourth, communion restricted to church membership. The cause of the division of the Synod into two branches was a difference of opinion concern¬ ing the application of these distinctive principles, one party demanding a rigid and the other a liberal interpretation.

The Synod maintained that voting under the Constitution of the United States involves im¬ morality. The General Synod maintained that voting does not involve morality, a position that makes it so near like several other Amer¬ ican denominations as to dim its individuality. The General Synod has 20 ministers, 17 con¬ gregations and about 3,000 communicants. The Synod of the Reformed Church, representing the (<01d Side,® is the stronger of the two branches. It now has 8,481 communicants.

The Christian Reformed Church. — The organization of this Church took place in 1857. It is lineally descended from the Reformed Church of

Holland. About the year 1847 a large number of Hollanders, connected with the Christian Reformed Church of the Netherlands, emigrated to America and settled in Michigan. For a short time they became associated with the Dutch Reformed Church, now the Reformed Church of America; but after a time withdrew on account of what they deemed laxity in doc¬ trine and discipline, and formed an organiza¬ tion of their own. Its membership is to be found mainly in the States of Michigan, Illinois, Iowa and New Jersey, with a few scattered congregations in New York, Ohio, Indiana, Wisconsin and Minnesota. It is rigidly Cal- vinistic in its doctrines, accepting as its stand¬ ard the articles of the Synod of Dort, and the Heidelberg Catechism. It is opposed to secret oath-bound societies and uses almost exclusively the Psalms in the service of praise. It uses also a liturgy in the administration of the sacraments and in the ordination of ministers and elders. Its theological school is in Grand Rapids, Mich. It numbers about 160 churches and 36,296 communicants. Its General Synod meets biennially at Grand Rapids, Mich. Its ministers officiate in the English, German, French, Bohemian and Hungarian languages.

The Welsh Calvinistic Methodist. — This branch of the Presbyterian body is derived from the Calvinistic Methodist Church of Wales. The first church of this denomination in the United States was organized in Reinsen, N. Y., and three years later the first presbytery was

constituted. On 22 Sept. 1869 the General As¬ sembly was organized and held its sessions in Columbus, Ohio ; and it has met triennially ever since. Its standards of doctrine are the same as those of the parent church in Wales. Its system of government is presbyterian. The Church exists among the Welsh in 13 States of the .republic, and in 1916 had 14,326 members.

The Associate Reformed Synod of the South. — The origin of this synod dates back to the year 1821. It was the result of a seces¬ sion from the Associated Reformed Church on account of differences concerning psalmody and communion questions. Its membership is con¬ fined principally to the Southern States and numbers about 15,112. Its doctrinal symbols are the same as those of other Reformed churches.

There are also in the United States several organizations of Presbyterians known respec¬ tively as The Associate Church of North Amer¬ ica, The Reformed (Covenanted) and The Re¬ formed in the United States and Canada. The number of their adherents is small, not exceed¬ ing 2,000.

Presbyterian Churches in Canada. — Pres¬ byterianism in Canada is of Scottish origin, and in it are to be found representatives of every shade of Presbyterianism that has appeared in the British islands. Its early history is marked by divisions, which in course of time have been overcome. In 1831 the Synod of the Presby¬ terian Church of Canada, in connection with the Church of Scotland, was organized. Meanwhile other Presbyterian ministers, chiefly of the As¬ sociate Church of Scotland, organized them¬ selves as the United Synod of Upper Canada. These two bodies were united in 1840. Pre¬ vious to this union another church had been formed under the name of the United Presby¬ terian Church of Canada. On 10 July 1844, 25 ministers, in connection with the Church of Scotland, who were in sympathy with the Free Church movement in Scotland, withdrew from the Synod and constituted themselves a separate body, under the name of the Presbyterian Church of Canada. For 17 years these three bodies maintained a separate existence ; but in 1861 a union was effected between the United Presbyteries and the representatives of the Free Church, under the name of the Synod of the Canada Presbyterian Church. This synod en¬ tered upon a prosperous career, and in 1870 the supreme court of this Church was for the first time constituted as a General Assembly. In 1866 a union was accomplished between the churches of Nova Scotia and New Brunswick; and in 1868 the synods of Nova Scotia and New Brunswick, in connection with the Church of Scotland, formed one synod. A general union of all the churches took place in the year 1875, into which union, under the name of the Pres¬ byterian Church of Canada, came the Presby¬ terian Church in Canada, in connection with the Church of Scotland, the Canada Presbyterian Church, the Church of the Lower Provinces and the Church of the Maritime Provinces in connection with the Church of Scotland. This union was cordial, and it has been followed by marked progress and substantial prosperity. The united Church has 1,899 ministers, 1,675 congregations and 333,457 communicants. The total contributions for all purposes in 1916

amounted to $5,460,133. The home mission work is comprehensive, embracing such fields as evangelism, moral and social reform, con¬ gested city districts, church and rural life and church and industrial life. It is carrying on foreign missions. The 182 missionaries are en¬ gaged in China, Korea and India. It has five theological seminaries. See Presbyterianism.

Bibliography. — For the Churches of the United States: Flodge, Constitutional History of the Presbyterian Church in the U. S. A.'; Gillett, (History of the Presbyterian Church in the U. S. A.' ; Patton, (Popular History of the Presbyterian ChurchP ; Hays,

Charles L. Thompson, D.D., Ex-Moderator, Presbyterian Assembly.

PRESBYTERIAN COLLEGE BOARD,

an organization formed by the General As¬ sembly in 1883, for the' purpose of establishing colleges for the education of ministers, espe¬ cially in the sparsely-settled Western States. Colleges must be of professed Christian pur¬ pose and desirous of converting all students under their tutelage in order to receive assist¬ ance. Fifty-one colleges are now co-operating with this board. See Presbyterian Church.

PRESBYTERIAN COLLEGE OF SOUTH CAROLINA, a South Presbyterian institution of learning at Clinton, S. C., founded in 1880. The faculty numbers 10; the average annual enrolment of students is 120. The li¬ brary contains over 3,000 volumes.

PRESBYTERIAN SYSTEM, Alliance of the Reformed Churches Throughout the World Holding the. Previous to 1870 the desire had been frequently expressed that the various branches of the Presbyterian churches could be united in some general alliance which would express the generic unity of Presby¬ terianism. Some attempts had been made in this direction, but the first official step in this country was taken by the General Assembly of the Presbyterian Church, U. S. A., at its ses¬ sions in Baltimore 1873. As a result of this action, the alliance was formed by representa¬ tives from different Presbyterian churches in London, England, in the year 1875. The al¬ liance is composed of representatives from dif¬ ferent branches of the Presbyterian Church throughout the world. The action of its General Council is not legally binding upon any of the churches, but only advisory in its character. It has, however, been enabled through its counsels to regulate the mission work of the Church, and to bring different branches of the

Presbyterian family into closer relations, for mutual support. The alliance has held seven General Councils : the first was in Edinburgh, Scotland, 1877 ; the second in Philadelphia, U. S. A., 1880; the third, in Belfast, Ireland, 1884; the fourth in London, England, 1888; the fifth in Toronto, Canada, 1892; the sixth in Glasgow, Scotland, 1896; the seventh in Washington, D. C., 1899; the eighth in Liver¬ pool, England, 1904. The churches connected with the alliance number more than 90, and are located in all parts of the world. The adherents of the Presbyterian and Reformed churches rep¬ resented in the alliance number at the present time about 30,000,000.

PRESBYTERIANISM, a term derived

from the Greek word TTpecfivTcpog, meaning <(an elder,® defines, primarily, a system of church government. As such, it stands midway between Episcopacy or Prelacy and Independency or Congregationalism. It affirms that the Church, as to its government, is a theocracy under law to Christ, its supreme and only Head and Law¬ giver ; but the powers of government are vested in the body of believers, and are to be exercised through their chosen representatives called "elders.® It denies the claim of one man, or of a special class of men, to rule the Church by virtue of a divine right. In opposition to papacy and prelacy, it asserts the right of the Church to govern itself through its chosen rep¬ resentatives, administering rule and discipline according to the word of God. "The radical principles of Presbyterian Church government and discipline are : that the several different congregations of believers, taken collectively, constitute one church of Christ, called em¬ phatically, The Church ; — that a larger part of the church or a representation of it, should gov¬ ern a smaller, or determine matters of contro¬ versy which arise therein ; that in like manner a representation of the whole should govern and determine in regard to every part, and to all the parts united; that is, that a majority shall govern ; and, consequently, that appeals may be carried from lower to higher judiciaries, till they be finally decided by the collected wisdom and united voice of the whole church. For these principles and this procedure, the example of the Apostles and the practice of the primi¬ tive Church are considered as authority.®

The Presbyterian form of government is es¬ sentially republican. It differs from Congre¬ gationalism in that it asserts the visible organic unity of the Church in the sense that all local or individual churches are included under one government, in which the majority governs. In accordance with its representative form of government, it has a succession of church courts or judicatories. First in order is the session, or consistory, of the local church, chosen by its members. Next is the presbytery, having jurisdiction over the ministers and churches within a certain limited district. It is composed of the ministers, and one elder from each church in the district. The synod, likewise a representative bod5', has jurisdiction over the presbyteries; and there must be at least three presbyteries to compose a synod. The boundaries of synods in America are usually, and for the sake of convenience, co¬ terminous with the boundaries of the States in which they are located.

The highest court is called the General As¬ sembly, or General Synod. It is a representa¬ tive body, composed of an equal number of ministers and elders elected by the presbyteries. The number of representatives from each pres¬ bytery varies according to the membership of the presbytery; but each

presbytery is entitled to be represented by one minister and one rul¬ ing elder. The General Assembly represents all the churches under its care. It exercises ad¬ ministrative, legislative and judicial powers, and its decisions are final and binding upon all the lower courts, when made in accordance with the constitution of the Church. Anothei char¬ acteristic of Presbyterianism is the parity or equality of the ministry. According to its teachings, there are but two permanent official orders in the Church, bishops or elders and deacons. The first includes both teaching and ruling elders. The term deacon includes the two-fold distinction of male and female. The deacons are those to whom is especially com¬ mitted the administration of the charities of the Church (Acts vi, 3).

Presbyterians claim for their order and form of government apostolic and scriptural sanc¬ tion. Some among them have gone so far as to assert that the Presbvterian form of govern¬ ment is jus divinum, and that none other can be allowed in the Church. This extreme posi¬ tion, however, has had but very few advocates.

The general view is, that it is an ancient form of government having apostolic sanction, and that it is agreeable to Holy Scripture. The main argument by which this view is supported is in brief this : The office of elder was estab¬ lished in the Old Testament Church in the earliest time. The elders were a distinct class of office bearers in the Hebrew commonwealth, and ruled in the synagogue or local church. In biblical history they are mentioned as rep¬ resentatives of the people (Exodus iii, 16 and iv, 24; 1 Samuel viii, 4; 2 Samuel v, 3; 1 Kings viii, 1). They were especially prominent in the synagogue worship, familiar to the Jews from the time of the return from the Babylonian captivity. Each synagogue had a bench of elders, with a presiding officer known as the "chief ruler,® to which was entrusted the over¬ sight of the congregation. The "rulers® of the synagogue, mentioned in the gospel narrative, were these elders. The government of the synagogue, with its system of appellate courts terminating in the Sanhedrin, was Presbyterian (Edersheim, (Life of Christ, > Vol. II, p. 552). Jesus Christ and His chosen apostles, the found¬ ers of the Christian Church, had been trained in the synagogue and were accustomed to no other form of church government. They knew that it had been previously sanctioned by prophets, priests and kings, all through the history of the chosen people. It was but natural that the same form of government should be adopted in the new church or "Ecclesia ,» the body of those "called out® from the synagogue.

That the synagogue furnished the model for the government of the Christian Church is con¬ firmed by the statements of the apostles. Acts xiv, 23 and xx, 17—18 ; 1 Peter v, 1 ; 1 Timothy iv, 14 and v, 17. It is further claimed that the terms episcopos and presbyteros, signifying re¬ spectively

bishop and elder, are equivalent terms designating the same office. Elders and

deacons constituted the office bearers of the early Church. In course of time the (

His conception of the eldership was adopted in the Reformed churches of Scotland, France, Holland and practically in Germany. It was through the struggle to maintain a representa¬ tive form of government, as against the claims of prelacy, that the term ˆPresbyterian® was applied to the churches holding that form of government. The Church of Scotland and the Reformed churches of France and Holland are Presbyterian as to their form of government. Most of the Reformed churches have adopted, with slight modifications, the Presbvterian polity. The Methodist Episcopal Church in America, the largest of the Protestant bodies, while Episcopal in name, has become Presby¬ terian in fact, so far as polity is concerned. In the Protestant Episcopal Church there is now representation from the laity, and the powers of the presbyters have been greatly en¬ larged. The Lutheran Church in the United States is also presbyterian in policy.

The Doctrines of the Presbyterian Church. — While the term (

The accepted symbols of the Presbyterian faith are, the Canons of the Synod of Dort, 1619 a.d., the Westminster Confession of Faith with the Catechisms, Larger and Shorter, 1648 a.d., and the Heidelberg Catechism, 1563 a.d. (See

Dort, Synod of, and Westminster Assembly). These symbols are regarded as subordinate standards. Presbyterians receive the Scriptures of the Old and New Testament as the supreme standard, ((the only infallible rule of faith and practice.® In America, the most widely accepted symbol of faith is the Westminster Confession, slightly modified from its original form. In the year 1900 a movement was inaugurated in the largest denomination of the Presbyterian Church for a revision of the Confession of Faith. This movement resulted in the adoption in the year 1903 of an explanatory statement with reference to the third chapter of the Con¬ fession of Faith, and in sundry minor amend¬ ments. The Assembly also adopted a Brief Statement of Doctrine to be used in the churches under its care. The Confession of Faith as revised still remains the authoritative standard of the Church. Ministers and office bearers are required to subscribe to it in the following terms : (

While claiming that their polity is lawful and agreeable to the Word of God, and that their system of doctrine is that taught in Holy Scripture, Presbyterians recognize all other churches holding to the essential doctrines of Christianity as parts of the one Catholic Church.

History of the Presbyterian Church. — The history of Presbyterianism begins with the re¬ organization of the Church in the Reformation period, at a council held in Zurich, 26 Oct. 1523, at which the principles of primitive Presbyteri¬ anism were formally adopted, and thereafter be¬ came the distinctive features of the Reformed churches in Switzerland, France, Belgium, Hol¬ land and Prussia. They were adopted by the Church of Scotland which, under the leader¬ ship of John Knox, separated herself from the papacy. They were also introduced into Eng¬ land about 1572 by Cartwright. In Scotland, and in the north of Ireland, Presbyterianism has continued to be the dominant faith ; and from these great centres it has exerted an in¬ fluence extending throughout the world.

The Church of Scotland. — Presbyterian¬ ism in Scotland is divided into different branches, chief of which is the Church of Scot¬ land, commonly known as the Established Church. It is the state church, supported by the government. It was organized in 1560 and legally established in 1592 by the Scottish Par¬ liament. It is, numerically, the largest Church in Scotland, and its various enterprises, which are many and important, are carried on with great energy and liberality. According to the statistics of 1916 the Church of Scotland has 718,719 communicants.

The Free Church of Scotland. — This branch of Presbyterianism originated in a sepa¬ ration from the Established Church in the year 1843. The immediate cause of the disruption was diversity of views on the subject of pat¬ ronage. One of the principles of Presbyterian government is, that ((no minister should be in¬ truded upon a congregation contrary to its will.® By act of Parliament, the right to ap-

point ministers to vacant churches had been conferred on certain landed proprietors con¬ nected with the parishes. The General Assem¬ bly for many years protested against this enact¬ ment, but to no avail. The exercise of this legal right in a particular case led ultimately to the withdrawal of a large number of ministers and churches from the establishment, and to the organization of the Free Church of Scot¬ land. But the great underlying reason for this movement was, the determination to maintain the spiritual independence of the Church from the civil power,

and her liberty to obey the Lord Jesus Christ as the Supreme Head of the Church. The new organization grew rapidly and took a foremost place in missionary and educational work.

The United Presbyterian Church of Scot¬ land. — This organization originated 13 May 1847 in a union between the United Secession and the Relief Churches. These churches had originated from doctrinal differences in the past, and the harsh exercise of discipline in the establishment. The United Church has been distinguished for its missionary zeal and pro¬ gressive spirit. It has been said of it, that it has done more for the diffusion of the gospel throughout the world than any other denomina¬ tion of its size, except the Moravians.

As early as 1862 negotiations for a union of this branch of the Church with the Free Church were begun, and they were continued from time to time till 1873 without any manifest re¬ sults. In 1896 the United Presbyterian Church again took up the matter of union with the sister body, and the following year the Free Church responded by appointing a committee of conference. The United Presbyterian Church did the same and a remarkable and happy agreement was discovered between these two bodies both as to doctrinal standards and their methods of work. A common constitution was adopted and in 1900 the way for a complete union was open. The general assemblies of the two bodies met in their respective places on the thirtieth of October and the next day the (

While the general decision of the highest court remained, final arrangements for the use of the property of the <(United Free Church® were made, by which, in cases where the (

Free Church.® The allocation of the churches from the one body to the other has been slow, but in 1908 over 100 churches had been assigned to the use of the (

The Presbyterian Church of England. — Presbyterianism in England is associated with the great Puritan movement in that country. It manifested itself in the famous Westminster Assembly, 1643. When prelacy was abolished by the Long Parliament, Presbyterianism was established in its stead, 29 June 1647, and for 20 years it was the national church of England. But opposed by Cromwell and Independency, on the one side, and by the Episcopal Church on the other, it was destined to lose its position. After the restoration of Charles II, and on Saint Bartholomew's Day, it was disestablished and 2,000 ministers, most of them Presbyterian, were ejected from their parishes. In 1686 Presbyterianism was, by act of Parliament, denied civil and religious rights. The passing years brought some amelioration, as a more tolerant spirit pervaded legislation; but from that

time until 1850 it had only a feeble exist¬ ence. Since the latter date, through the union of various scattered churches, Presbyterianism has greatly revived in England.

Thus, in 1876, the English congregations of the United Presbyterian Church of Scotland, which was strong in the three districts of Northumberland, Lancashire and London, were gathered into one synod with the Church of England and known as the Presbyterian Church of England. In 1897 it founded the Westminster College at Cambridge for the pur¬ pose of securing a home-bred ministry for its churches. In recent years there has been some revision of its standards but without setting aside its Westminster Confession. Twenty- four Articles of Faith have been adopted. In these, however, there is no essential change of doctrine, but rather of emphasis. According to the statistics of 1916, the Presbyterian Church in England and Wales numbers 88,166.

Welsh Calvinistic Methodist (Presby¬ terian). — 'This Church represents Presbyterian¬ ism in Wales. The movement which resulted in the establishment of this Church began in 1736 and owes its origin to the evangelical re¬ vivals which were spreading throughout the country at that time. In 1864, the two synods, that of North Wales and that of South Wales, united in one General Assembly, whose deci¬ sions are binding upon churches in all matters of controversy between them. This Church maintains cordial fellowship with the Presbyte¬ rian Church of England. Its Confession of Faith in all essential articles is in harmony with the Westminster Confession, and with the Thirty-Nine Articles of the Church of Eng¬ land. Its leading theological seminary is at Bala, North Wales. It has also under its care a college at Trevecca, South Wales. It has both Home and Foreign Missionary societies, and a fund for the support of aged and infirm ministers. The above-named churches are the

principal branches of the Presbyterian Church in the United Kingdom of Great Britain. In addition to these there are in Scotland the Re¬ formed Presbyterian Church, and the original Secession Churcji of Scotland, with a com¬ bined membership of about 10,000, and in Eng¬ land a branch of the Church of Scotland.

The Irish Presbyterian Church. — Presby¬ terian ministers began their work in Ireland as early as 1594, but on account of persecution Presbyterianism did not obtain a permanent footing there until 1642. It found its home in the northern part of the island, and in the prov¬ ince of

Ulster. Its progress was at first hin¬ dered by divisions, and by the presence of Arianism which was openly avowed by some of its ministers. In 1840 the various churches were united in one body under the name of the General Assembly of the Presbyterian Church in Ireland. Since this union the Irish Presbyte¬ rian Church has occupied a commanding posi¬ tion in the country. It has at present more than half a million people under its care, 560 congre¬ gations, over 600 ministers, 5 synods and 37 presbyteries. For a time its ministers were supported by t)he Regium Donum — a grant from the state. About 33 years ago this grant was commuted into a general fund amounting to $3,000,000. This is the basis, of the Sustentation Fund, the income from which, increased by voluntary contributions from the churches, supports the ministry. The Church has large foreign missions, and has under its care the Assembly's College at Belfast, and the Magee College, Londonderry. For the last 150 years there has been a constant stream of emi¬ gration from the north of Ireland to America and the British colonies, so that the Irish Pres¬ byterian Church has been largely instrumental in establishing Presbyterianism in other parts of the world. Three small communities in Ire¬ land have failed to go into the United Irish Presbyterian Church and retain their separate autonomy under the names of the Reformed Presbyterian Church, the Eastern Reformed Church and the Secession Church.

Presbyterian Churches in Europe. — The Reformed churches of the Reformation period in Switzerland, France, Germany, Bohemia and the Netherlands were generally presbyterian as to their form of government. In addition to these is the ancient church of the Waldensians, dating from primitive times and now estab¬ lished in various parts of Italy and Switzer¬ land. In later years the Presbyterian Church has been extended to Spain, Hungary, Austria, Russia and Norway. The number of adherents in Europe is somewht over 14,000,000.

There are also scattered groups of Presby¬ terians in Africa, Asia, Australasia and South America, numbering all told about 2,600,000.

Bibliography. — For the Churches of Scot¬ land: Histories of the Scottish Church by

Calderwood, Spottiswoode, Row, Woodrow, Cook, Lee, Grub, Cunningham and Stanley; Hill, (View of the Church of Scotland) ; Dun¬ lop, Rook of the Universal Kirk' ; and (Collec¬ tion of Articles of Faith of Authority in the Church of Scotland.'

For the Churches of England: McCrie, (Annals of English Presbytery'; Skeats, his¬ tory of Free Churches in England' ; Brook,

(Life of Thomas Cartwright'; Grosart, Rep¬ resentative Noncontormists.'

For the Churches of Ireland and Continent of Europe: (Records of a General Council of the Presbyterian Churches' (1877-99).

Charles L. Thompson, D.D., Ex-Moderator, Presbyterian Assembly.

PRESBYTERY, in Presbyterian churches, a court of judicature consisting of all the min¬ isters of the denomination within a given dis¬ trict, and of ruling elders, one from each church session. Each meeting is opened with prayer by the moderator. The functions of the court are purely executive, not legislative. It has supervision of all the congregations within its territorial limits, 'hears appeals from decisions of the several sessions, examines can¬ didates for the ministry, issues licenses to pro¬ bationers, ordains ministers, and in general guards the spiritual interests of the congrega¬ tions under its charge in matters of doctrine or of discipline.

PRESCOTT, Albert Benjamin, American chemist : b. Hastings, N. Y., 12 Dec. 1832 ; d. 1905. He took his M.D. at the University of Michigan in 1864 and in 1864-65 was assistant surgeon of the United States volunteers. He was appointed assistant professor of chemistry at the University of Michigan in 1865, where he subsequently became professor of organic and applied chemistry in 1870, dean of pharmacy in 1876 and director of the chemical laboratory in 1884. He was president of the American Association for the Advancement of Science in 1891, and of the American Pharmaceutical Association in 1900. Author of Qualitative Chemical Analysis' (1874; 5th ed., 1901);

(Chemistry of Alcoholic Liquors' (1875) ; (Nostrums in Relation to the Public Health' (1881) ; (Manual of Organic Analysis' (1888), etc.

PRESCOTT, George Bartlett, American electrician: b. Kingston, N. H., 16 Sept. 1830; d. New York, 18 Jan. 1894. He studied electric¬ ity and telegraphy and from 1847-58 was man¬ ager of several telegraph offices in Connecticut and Massachusetts, becoming in the latter year superintendent of the American Telegraph Com¬ pany and in 1866 accepted the same position with the Western Union Company. He was electrician of the International Ocean Telegraph Company in 1873-80, was actively interested in various telephone and telegraph companies and was one of the promoters of the former. He discovered the electrical origin of aurora bore¬ alis in 1852, invented several improvements in telegraph and telephone instruments, was en¬ gaged with Edison in the invention of the du¬ plex and the quadruplex telegraph which he successfully launched on the market and in¬ troduced in this country the European system of dispatching messages through pneumatic tubes. He published in the Boston Journal and in the Atlantic Monthly accounts of his discoveries concerning the aurora borealis and also wrote (History, Theory and Practice of the Electric Telegraph' (Boston 1860) ; Elec¬ tricity and the Electric Telegraph' (New York 1879) ; (The Speaking Telephone, Electric Light and Other Recent Electrical Inventions' (New York 1879) ; (Dynamo-Electricity ; Its Generation, Application, Transmission, Storage and Measurement' (New York 1884) ; (Bellas

Electric Speaking Telephone: Its Invention, Construction, Application, Modification and His¬ tory } (New York 1884).

PRESCOTT, Oliver, American soldier: b. Groton, Mass., 27 April 1731 ; d. there, 17 Nov. 1804. He was a brother of Col. Wm. Prescott (q.v.). He was graduated from Harvard in 1750 and engaged in the practice of medicine, becoming one of the most successful and popu¬ lar general practitioners. He was a charter member of the Massachusetts Medical Society, incorporated in 1781. In 1780 he became a Fellow of the American Academy of Arts. He was also for many years one of the trustees of Groton Academy. He was an officer in the State militia with rank as major, lieutenant- colonel and in 1776 became a brigadier-general and a member of the board of war. In 1777 he was elected to the supreme executive council of his State and in 1778 received rank as third major-general of militia. He resigned soon after his promotion to second major-

general in 1781 and was empowered by the government to cause the arrest of any person whom he should consider dangerous to the Commonwealth. In 1779 he was made judge of the Probate Court of Middlesex County, Mass., and played an im¬ portant part in the suppression of Shay's rebel¬ lion in 1786-87. Consult Prescott, W., M.D., (The Prescott MemoriaP (Boston 1870).

PRESCOTT, William, American soldier, brother of O. Prescott (q.v.) : b. Groton, Mass., 20 Feb. 1726; d. Peppered, Mass., 13 Oct. 1795. He served with the rank of lieutenant in the expedition against Nova Scotia under Wilson in 1755 and was offered a commission in the British army. He declined the honor and lived in retirement until the battle of Lexington in 1775 when he joined the Continental camp at Cambridge with a regiment which he had organ¬ ized in 1774 and of which he was colonel. At the battle of Bunker Hill he was very con¬ spicuous, really commanding the patriot forces and displaying the greatest courage and ability. He served in the Continental army until the end of 1776 and then retired from active duty with the exception of a short service as a vol¬ unteer at Saratoga in 1777. After his retire¬ ment from the army he served as town clerk and selectman of Groton and for three years represented his town in the General Court of Massachusetts. For the balance of his life he was an acting magistrate. Consult Gardner, F. A., (Colonel William Prescott's Regiment (in Massachusetts Magazine, Vol I, pp. 149 and 235, Salem 1908) ; Green, S. A., (Colonel William Prescott and Groton Soldiers in the Battle of Bunker HilP (Cambridge, Mass., 1909) ; Parker, F. J., (Colonel William Pres¬ cott, the Commander in the Battle of Bunker HilP (Boston 1875) ; Prescott, William, M.D., (The Prescott MemoriaP (Boston 1870).*

PRESCOTT, William Hickling, American historian: b. Salem, Mass., 4 May 1796; d. Bos¬ ton, 28 Jan. 1859. In 1811 he entered Harvard College and was graduated in 1814. He long had trouble with his eyesight, which eventually became so weak that during the latter half of his life he could read only for a few moments at a time, and could scarcely see to write at all. He had early resolved to devote himself to a literary life and soon after leaving college went

to Europe and spent two years in traveling through England, France and Italy. The sub¬ ject for which his inclination and abilities more especially fitted him was history and he pub¬ lished his (History of the Reign of Ferdinand and Isabella the Catholic) in three volumes in 1837 in Boston. The success which this achieved was most decisive. It was received with the utmost enthusiasm both in America and Europe; was soon translated into French, Spanish and German ; and its author was elected a member of the Royal Academy of History of Madrid. Prescott's next work was the (History of the Conquest of Mex¬ ico, with a Preliminary View of the

Ancient Mexican Civilization and the Life of the Conqueror Hernando Cortez (3 vols., New York 1843), which was received with equal favor; and next appeared the < History of the Conquest of Peru, with a Preliminary View of the Civilization of the Incas) (3 vols., New York 1847). Prescott now began the (History of the Reign of Philip II.P and no pains nor ex¬ pense were spared by him to render the result commensurate with the undertaking. He re¬ ceived the most liberal co-operation from all quarters, public and private, and everywhere both public and private collections were thrown open to his inspection. In 1855 the first two volumes of the work appeared entitled, (The History of the Reign of Philip II, King of Spain,* and in 1858 the third volume. In 1857 Prescott published an edition of Robertson's (History of the Reign of Charles VC with notes and supplement, containing an account of the emperor's life after his abdication.*

The labors of Prescott afford a remarkable instance of the success of indomitable indus¬ try and perseverance carried out in the face of what might otherwise appear almost insur¬ mountable obstacles. Partial blindness pre¬ venting him from consulting personally the authorities from which he drew his materials, he had them read aloud to him. His first reader knew, however, no language but English. The historian <(taught him,® as he says, <(to pro¬ nounce the Castilian, suited, I suspect, much more to my ear than to that of a Spaniard.® He afterward obtained the services of a reader acquainted with several of the Continental lan¬ guages. Prescott's contemporaries laid strong emphasis and not unjustly, on the thoroughness of his research. But unfortunately modern dis¬ covery had done much to correct his pictures of early American civilization, for his informa¬ tion on which he had no recourse save the Span¬ ish chroniclers. Hence (The Conquest of Mex- ico> and (The Conquest of Peru are now to be valued less for their historical accuracy than for the sweep of the narrative and unfailing interest of the style. Indeed, this "easy flow of lan¬ guage® and ((faultless lucidity,® praised by Ban¬ croft, is everywhere apparent in Prescott's work. He has not escaped the charge of too highly coloring his scenes for the sake of dra¬ matic effect. He was not an analytical inves¬ tigator, but rested content with a splendid syn¬ thetic arrangement of the concrete facts which he sincerely labored to obtain. This artistic sense and breadth of scope gave to his work an interest and a popularity not known in the case of many historians. A collection of em¬ inent opinions on Prescott may be seen in the*

familiar dictionary of Authors, > by Allibone. 1 hat his reputation was

international is proven by the long list of literary honors which were showered on him. Besides being made a mem¬ ber of some 16 State historical societies in his own country, he was also elected to mem¬ bership in the American Philosophical Society, Royal Academy of Science of Naples, American Antiquarian Society, American Academy of Arts and Sciences, Herculaneum Academy of Naples, National Institute, French Institute, Royal Society of Berlin, Royal Society of Literature of London, Mexican Society of Geography and Statistics and Royal Irish Academy. He received honorary degrees from Columbia College, South Carolina ; Harvard ; Columbian College, Washington, D. C. ; Ox¬ ford University, England. His contri¬ butions to periodicals were collected under the title of (Biographical and Critical Miscellanies) (New York 1845; London 1861). A complete edition of his work has been published in 15 volumes (new ed. 1890). Consult Ogden, R., (William Hickling PrescotC (Boston and New York 1904) ; Peck, H. T., (W. H. Prescott (New York 1905) ; Ticknor, G., (Life of W. H. Prescott* (Boston 1864) ; Bassett, J. S., (The Middle Group of American Historians) (New York 1916).*

PRESCOTT, Ariz., city, county-seat of Yavapai County, on the Santa Fe, Prescott and Phoenix and on the Atchison, Topeka and Santa Fe railroads, about 135 miles north of Phoenix, the capital of the State. The plateau upon which the city is situated has here an altitude of 5,347 feet. Prescott was named in honor of the his¬ torian William Hickling Prescott (q.v.) and was formerly the capital of Arizona when it was still a Territory. It is in the midst of a rich mining region ; the chief minerals mined in the vicinity are copper, silver and gold. Consider¬ able attention is given to stock raising and farm¬ ing, and there is some lumbering. Prescott has a hospital, a Carnegie library, a courthouse, four banks with total deposits of over $6,000,000, and three newspapers. The educational institu¬ tions are Saint Joseph's Academy, public and parish schools. Pop. (1920) 4,380.

PRESCOTT, Ark., city and county-seat of Nevada County, 30 miles southwest of Arka- delphia, on the Saint Louis, Iron Mountain and Southern and on the Prescott and Northwestern railroads. It is located in a cotton-growing district, has a large trade in this article and also in lumber, livestock, eggs and poultry, but¬ ter, furs and wool. Pop. (1920) 2,691.

PRESCOTT, Canada, town and county- seat of Grenville County, Ontario, on Saint Lawrence River, opposite Ogdensburg, N. Y., 50 miles southwest of Ottawa, on the Canadian Pacific Railway. There are iron foundries, breweries, distilleries and creameries ; and manufactories of starch, emery-wheels and caskets. Pop. 2,801.

PRESCRIPTION, in medicine, a statement or formula, usually in writing and made by a physician, containing directions for the prepara¬ tion and

use of medicines or remedies for a patient. Formerly prescriptions were written altogether in Latin, but in this country and in Scotland, English is now chiefly used for the directions, Latin being reserved for the names of ingredients. In England both prescriptions vol. 22 — 35

and directions are still usually written in Latin. In prescribing the physician may, from the na¬ ture of the case, use an officinal or extempo¬ raneous preparation. Prescriptions are now much more simple than formerly. The parts of a regular prescription are four, as follows : (1) The superscription, with the date, name of patient and the sign R, an abbreviation of recipe (take) ; (2) the inscription, that is, the body of the formula, containing names and quantities of ingredients, the former in Latin, the latter according to apothecaries' measure or the metric system; (3) the subscription — directions for the apothecary; (4) the signa¬ ture, comprising directions to the natient re¬ garding the use of the medicines or remedies prescribed, and followed by the signature (sometimes initials) of the physician. In former times, when frequently very complicated prescriptions were used, every prescription was supposed to consist of four classes of in¬ gredients. The most active of these is called the base ; the adjuvant is meant to promote the action of the first; the corrigent or corrective is intended to modify that action; and to these is added the excipient, also called the vehicle for the purpose of imparting to the whole a form or consistency convenient and agreeable for use. Consult Barton, W. M., (Therapeutic Index and Prescription Writing Practice) (Boston 1917) ; Maitland, L., (How to Read and Write Prescriptions) (Chicago 1914) ; Mann, M. D., (Manual of Prescription Writing) (6th ed., New York 1906) ; Prichard, A. H., Practical Prescribing with Clinical Notes) (Oxford 1914) ; Swan, J. M., Prescription Writing and Formulary (Philadelphia 1910) ; Wall, O.,*

1917).

PRESCRIPTION. At common law, right or title to incorporeal interests in land, as ease¬ ments, acquired by possession for the time and in the method required by law. In some sys¬ tems of jurisprudence, as in the civil law, the term has a much more extensive signification.

At common law prescription was originally based on the legal fiction that open, peaceful and uninterrupted possession for a long term of years raised a presumption of a grant, with the further fiction that this grant had been lost, so as to avoid the rule of pleading requiring pro- fert. The fiction of a lost grant has now to a great extent been superseded. The doctrine is governed largely by statute in the United States. Formerly the period of possession necessary to acquire title by prescription was from time im¬ memorial, or (

drainage may be acquired by prescription in the United States, but not to lateral support or light. In some States it is denied that easements by prescription may be acquired against a rail¬ road, but in other States this right is declared to exist. As prescription is founded on the theory of a grant, the use or possession on which it is founded must be adverse. It is, therefore, a well-settled principle of law that use by express or implied permission, irrespective of. the length of time continued, cannot ripen into an ease¬ ment by prescription. In the United States generally evidence of adverse user must be clear and positive, and usually it is a question of fact for the jury. In England, however, the Prescription Act renders the possession a bar or title of itself, without the necessity of the intervention of a jury.

The term had several distinct meanings in Roman law. In procedure a prescription was a legal plea sent by the praetor to the referee to be examined before other disputed issues. The term was also applied to a right or title acquired by uninterrupted possession of property. In the case of movables the period required was fixed at three years by the legislation of Justinian, while for immovables it varied, being 10 years where the parties were domiciled in the same province and 20 years where domiciled in differ¬ ent provinces. However, title by prescription could not be secured to public property nor to property acquired by theft or violence. At one period it required continued possession varying from 40 to 100 years to give title by prescription to church property. Later the same rule was ' applied to church property as to public property. The term was also used in Roman law to apply to lapse of time after which actions were barred, first limited to equity, but later extended to all cases.

In the law of Scotland, the term is used in a broader sense than in England or the United States and includes limitation in English law. Though originating in the common law, it is governed by statute in Scotland.

Statutes of prescription are statutes of re¬ pose. Prescription is justified on the ground that public policy and convenience require that long possession should not be disturbed, and also because there is a social need of settling controversies and of affording relief to those who necessarily find it exceedingly difficult to furnish proof of title on account of great lapse of time. Concerning corporeal interests in real property and title to personal property by lapse of time, see Adverse Possession; Limitation of Actions.

Edward F. Donovan.

PRESENTATION, in ecclesiastics, means the nomination of one or several candidates to a vacant office in the church. In ecclesiastical benefices the usual rule is that if the patron fails to present within six months after a vacancy has been intimated to him, the jus devolutuni takes place; in other words, the patron loses his right, which in consequence devolves on the party before whom the presentation should have been laid, as the bishop under Episcopacy and the presbytery under Presbyterianism.

PRESENTATION AT COURT. See

Court, Presentation at.

PRESENTMENT, in taw, is properly speaking the notice taken by a grand jury of any offense, from their own knowledge or ob¬ servation, without any bill of indictment being laid before them at the suit of the government ; as the presentation of a nuisance, a libel or the like, upon which the officer of the court must afterward frame an indictment before the party presented can be put to answer it. The term is also used to include inquisitions of office and indictments by a grand jury; the Constitu¬ tion of the United States uses the terms "pre¬ sentment,® "indictment® and "charge® inter¬ changeably and as referring to the first step in the prosecution of a crime.

PRESERVATION, Fort. See Oswe-

GATCH1E.

PRESERVATION OF FOOD. See Food

Preservation.

PRESERVATIVES. See Antiseptic.

PRESIDENCY. See President; United States — President's Office.

PRESIDENT, signifying he who presides. The title is used for: (1) the principal member of a society or association, who takes the chair when present at meetings; (2) the chief official of a company or board; (3) the head of a uni¬ versity or college or of a learned faculty; (4) the elected chief magistrate of a republic. At the present time the following countries, all having some form of democratic government, have Presidents as chief magistrates : Andorra, China, France, Liberia, Portugal, Russia, San Marino, Switzerland. All the Central and South American countries, not any longer colonies of European countries, are now republics with a president at the head of their administrations. To this group belong Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua,

Panama, Paraguay, Peru, El Salvador, Uruguay, Venezuela. The powers, duties, etc., of the presidents of these countries are, of course, regulated by their several con¬ stitutions and differ to a considerable extent. Further details will be found in the articles on each country. In the United States the Presi¬ dent is the chief executive of the government. His duties, rights and election are defined by the Constitution of the United States, article II, sections I, II and III, and article XII of the amendments. He is commander-in-chief of the army and navy of the United States and of the militia of the several States when called into the actual service of the United States. He has the power to grant reprieves and par¬ dons for offenses against the United States except in cases of impeachment. With the ad¬ vice and consent of the Senate he has the power to make treaties and to nominate and appoint ambassadors, consuls, judges of the Supreme Court, most of the executive offices of the gov¬ ernment and a large number of judicial and administrative functionaries. He is elected for a term of four years and is eligible for any number of re-elections, though, in conformity with the precedent set by George Washington, no President has yet been elected more than twice. The President has a veto power. His salary was originally placed at $25,000. In 1873 it was increased to $50,000. In 1907 he was allowed an additional $25,000 for traveling ex-

penses and in 1909 the salary itself was in¬ creased to $75,000. His residence during his Presidency is the White House in Washington. He is elected by an electoral college, the com¬ position and procedure of which is regulated by the Constitution, article II, section I, paragraph II, and article XII, amendments to the Con¬ stitution. He may receive a minority of the popular vote and yet be legally chosen to the office. He can be removed from office on im¬ peachment for and conviction of treason, bribery or other high crimes and misdemeanors. On the entrance of the United States in the war in April 1917 the regular powers of the Presi¬ dent, as defined by the Constitution, were ex¬ tended and enlarged temporarily in various directions by means of special legislation. These extra powers, however, were given to the executive only for the duration of the war. In case of his death or total disability the func¬ tions of the office devolved on the Vice-Presi¬ dent, who is elected coincidently with the Presi¬ dent and is the presiding officer of the Senate. (See Presidential Succession). The follow¬ ing is the list of Presidents up to the present: George Washington, 1789 and 1793; John Adams, 1797; Thomas Jefferson, 1801 and 1805; James Madison, 1809 and 1813; James Monroe, 1817 and 1821; John Quincy Adams, 1825; An¬ drew Jackson, 1829 and 1833; Martin Van Buren, 1837; William Henry Harrison (died 4 April 1841), 1841; John Tyler

(elected as Vice-President), 1841; James Knox Polk, 1845; Zachary Taylor (died 9 July 1850), 1849; Mil¬ lard Fillmore (elected as Vice-President), 1850; Franklin Pierce, 1853; James Buchanan, 1857; Abraham Lincoln (assassinated 14 April 1865), 1861 and 1865; Andrew Johnson (elected as Vice-Presideint), 1865; Ulysses S. Grant, 1869 and 1873 ; Rutherford B. Hayes, 1877 ; James A. Garfield (died by assassination 19 Sept. 1881), 1881; Chester A. Arthur (elected as Vice-President), 1881; Grover Cleveland, 1885; Benjamin H. Harrison, 1889; Grover Cleveland, 1893 ; William McKinley, 1897 and 1900 (assassinated 6 Sept. 1901) ; Theodore Roosevelt (elected as Vice-President) 1901 and 1905; William H. Taft, 1909; Woodrow Wilson, 1913 and 1917.

Bibliography. — Beard, C. A., (American

Government and Politics (New York 1914) ; Bishop, J. B., Presidential Nominations and Elections, etc.* (New York 1916) ; Bryce, James, American Commonwealth* (new ed., New York 1914) ; Chancellor, W. E., (Our Presidents and their Office) (New York 1912) ; Cleveland, F. A., Organized Democracy* (Lon¬ don 1913) ; Cleveland, Grover, Presidential Problems> (New York 1904) ; Curtis, G. T., Constitutional History of the United States) (2 vols., New York 1896-1903) ; Dougherty, J. H.,*

(Boston 1916) ; Holst, H. E. von, Constitu¬ tional History of the United States) (8 vols., Chicago 1876-92) ; Jerome, E. S., (The Two Eras: Old and New; a Political and Historical Sketch of our Government from 1789 — 191 7 J (Los Angeles 1916) ; Lockwood, H. C., Aboli¬ tion of the Presidency (New York 1882) ; McClure, A. K., Cur Presidents and How We Make Them* (new ed., New York 1905) ; Mc¬ Kee, T. H., (The National Conventions and Platforms of All Political Parties, 1 789—1905 J (Baltimore 1906) ; McKnight, D. A., (The Elec¬ toral System of the United States * (Philadel¬ phia 1878) ; O'Neill, C. A., (The American Elec¬ toral System* (New York 1889) ; (The Presi¬ dential Counts* (New York 1877) ; Singleton, Esther, (The Story of the White House* (2 vols., New York 1907) ; Stanwood, E., (The History of the Presidency* (Boston 1898) ; (A History of the Presidency from 1897-1909) (Boston 1912) ; Stoddard, W. O., (Lives of the Presidents* (New York 1887-88) ; Taft, W. H., Cur Chief Magistrate and his Powers> (New York 1916); (The Presidency: Its Duties, its Powers, its Opportunities and its Limitations) (New York 1916) ; Taylor, H., (The Origin and Growth of the American Constitution (Boston 1911) ; Thorpe, F. N., (The Constitu¬ tional History of the United States* (Chicago 1901) ; Whiting, W., cWar Powers of the Pres¬ ident (Boston 1862) ; Willoughby, W. W., (The Constitutional Law of the United States) (2 vols., New York 1910) ; Wilson, Woodrow, Constitutional Government in the United States* (New York 1908).*

PRESIDENT, The, the name of an Amer¬ ican frigate of 44 guns, built in New York in 1794, and playing an important part in the early part of the War of 1812 (q.v.). In the summer of 1812 she was made the flagship of a small squadron under the command of Capt. John Rodgers, and in June of that year she had a fight with the British ship Belvidere. The lat¬ ter, after having been hit a number of times, just managed to make her escape. In the sum¬ mer of 1814 Commodore Decatur was trans¬ ferred to the President, the command of which he assumed. On 15 June 1815 the President, then lying in the Hudson, successfully ran the English blockade of New York Harbor with the intention of making a cruise to the East Indies for the purpose of attacking English shipping there. However, before she got very far she was attacked by four British ships-of-war of superior speed and strength. With one of these, the Endymion, she had a running fight lasting for two and a half hours. At the end of that time the other three British ships came up and made a simultaneous attack on the President. Appreciating the impossibility of further re¬ sistance Decatur struck his colors. The Endy¬ mion with her prize sailed for Bermuda, but before arriving there both ships were dismasted in a heavy gale.

PRESIDENT AND ENDYMION, Battle of the, in the War of 1812. The blockade of the American coast by British ships was very strict and so effective that the frigates United States and Macedonian were dismantled in April 1814 at New London, and Stephen Deca¬ tur (q.v.) and his crew were transferred to the President, then at New York. On the

night of 14 Jan. 1815 Decatur decided to run the blockade and as a severe snowstorm and heavy gale had driven the blockading fleet out of sight he attempted to make for the open. Through a mistake of the pilot the President grounded while crossing the bar but the wind forced her across and despite her injuries she was compelled to proceed. Decatur hugged the Long Island shore for 50 miles, but at early dawn ran into the British squadron consisting of the Baltic , 56, the Endymion, 50, the Pomone and the Tencdos, 38's. These three promptly gave chase but being the fastest sailer the Endymion left the others in the rear and at 2:30 p.m. exchanged shots from her bow chasers with the stern guns of the President. At 5 o'clock the Endymion crept up on the Presi- aenfs starboard quarter, raked her for half an hour and punished her so severely that Decatur attempted to board his antagonist with the idea of capturing her, scuttling his own ship and escaping on the British ship. But the British captain yawed his ship, whereupon Decatur poured such a galling fire into her that she was reduced to a wreck. He then attempted to escape but at 11 o'clock the

Pomone and Tenedos came up and opened fire. ((Vol. IX, pp. 65-70) ; Barnes, James, (Naval Actions of the War of 1812) (pp. 219-227) ; Cooper, J. F., (Naval History1 (Vol. II, pp. 235-238) ; James, William, (Naval Actions * (pp. 82-94) ; Maclay, E. S., (History of the Navy* (Vol. II, pp. 64- 70) ; Roosevelt, (Naval War of 1812* (pp. 402- 405) ; Spears, J. R., (History of Our Navy5 (V°l- II, pp. 215-228), and biographies of De¬ catur by T. C. Brady, S. P. Waldo and Mac- Kenzie.*

PRESIDENT AND LITTLE BELT, Affair of the. Prior to the War of 1812 Brit¬ ish ships were accustomed to hover off Ameri¬ can ports and commit depredations on Ameri¬ can merchantmen. Accordingly Corm John Rodgers (q.v.) was ordered to sail with his flagship, the President, 44 guns, to stop this unlawful interference. On 10 May 1811 Rodgers sailed from Annapolis and at noon of the 16th sighted a ship supposed to be the British Guerriere. At 2 o'clock he set a broad pennant and ensign whereupon the stranger began to make signals and stood to southward. Rodgers gave chase and at 8:30 came within speaking distance, but the stranger answered his hail with a solid shot in the mainmast. Be¬ fore Rodgers could prevent it, a lieutenant on the President replied in kind; the two ships then fought for 20 minutes when the stranger was completely disabled. She proved to be the British corvette Little Belt, 22, Capt. A. B. Bingham. The British lost 32 men killed and wounded and the Americans 2 wounded. Con¬ sult Dawson, (Battles of the United States (Vol. II, chap. XIII) ; the official records and evidence of the court-martial of Rodgers in (American State Papers, Foreign Relations) (Vol. Ill, pp. 473-498) ; Annals of Congress,*

12th Congress, 1st session, Pt. II, pp. 1874-1930; Lossing, (War of 1812 (pp. 181-184) ; Paullin, Charles O., (Commodore John Rodgers* ; Wiley and Rines, (The United States* (Vol. V, pp.*

246-247).

PRESIDENTIAL ELECTIONS. See

Elections; Votes; Electoral Qualifications; Electoral Commission; Electors, United States Presidential; United States — Con¬ tested Presidential Elections; Primary, Presidential Preference.

PRESIDENTIAL ELECTORS. See

Electors, United States Presidential.

PRESIDENTIAL SUCCESSION, the

order in which a vacancy in the office of .the President of the United States can be filled pending a new election. The 49th Congress passed a measure

*entitled ((An Act to provide for the performance of the duties of the office of President in the case of removal, death, resignation or inability both of the President and Vice-President.** The measure was ap¬ proved by the President 19 Jan. 1886. The text is as follows :*

§ 1. Be it enacted by the Senate and House of Repre¬ sentatives of the United States of America in Congress assembled, That in case of removal, death, resignation, or inability of both the President and Vice-President of the United States, the Secretary of State, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of the Treasury, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of War, or if there be none, or in case of his re¬ moval, death, resignation, or inability, then the Attorney- General, or if there be none, or in case of his removal, death, resignation, or inability, then the Postmaster-General, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of the Navy, or if there be none, or in case of his removal, death, resignation, or in¬ ability, then the Secretary of the Interior, shall act as Presi¬ dent till the disability of the President or Vice-President is removed or a President shall be elected: Provided, That whenever the powers and duties of the office of President of the United States shall devolve on any of the persons named herein, if Congress be not then in session, or if it would not meet in accordance with law within 20 days thereafter, it shall be the duty of the person on whom said powers and duties shall devolve to issue a proclamation convening Congress in extraordinary session, giving 20 days' notice of the time of meeting.

§ 2. That the preceding section shall only be held to describe and apply to such officers as shall have been ap¬ pointed by the advice and consent of the Senate to the offices therein named, and such as are eligible to the office of President under the Constitution, and not under impeach¬ ment by the House of Representatives of the United States at the time the powers and duties of the office shall devolve upon them respectively.

Consult Hamlin, C. S., (The Presidential Succession Act of 1886 (in Harvard Law Review, Vol. XVIII, p. 182, Cambridge 1905) ; Willoughby, W. W., (Constitutional Law of the United States* (2 vols., New York 1910).*

PRESIDENT'S MARCH, the title of a popular American national air, most likely com¬ posed about 1793 by Philip Phile, a Philadel¬ phian musician, although it is claimed by some authorities to have been played for the first time on Trenton Bridge as Washington rode over it on his way to be inaugurated. In 1798 Joseph Hopkinson of Philadelphia wrote the words of

PRESIDENT'S OFFICE. For the his¬ tory of the President's office, see United States — President's Office.

PRESIDENTS OF THE UNITED STATES, COATS-OF-ARMS

549

PRESIDENTS OF THE UNITED STATES, Family Coats-of-Arms of. One-half of our 28 Presidents possess either through the paternal or maternal side heraldic bearings, while four additional executives come into heraldic relationship by marriage. The study of these heraldic symbols is not only interest¬ ing, but profitable, since they suggest much which is of historic importance and bring to the surface accurate genealogical connections between them and great families of the past.

The grants of arms were not given in recog¬ nition of royal blood, but were honors con¬ ferred on the ancestors of our Presidents be¬ cause of some special merit, achievement, heroism or patriotic valor. Hence, the pride we have in their shields, crests or supporters is <(born of high record.® The frequent associa¬ tion of aristocracy with this meritorious form of heraldic bearings is an error and none so often has this misconception as the American. While the former pertains to regal blood the latter, an entirely different mode of distinction, relates to honor and personal worth and they have nothing in common other than the ex¬ pression of heraldic emblems. No relationship exists between these two branches of armorial devices, the latter antedating the caste or titled aristocracy by generations, centuries and dec¬ ades, for family arms and national insignia are of most ancient conception, as papyrus, stones, edifices and scripture will attest.

George Washington's people came from Eng¬ land, where centuries ago they were known- as De Wessingtons and their immediate ancestors came from France, with William the Conqueror, and the original family name was William de Hertburn and he was knighted in the 12th century. In the ((Balden Book® a record is made of all the estates of the people of Dur¬ ham; in 1183 is found the entry that William de Hertburn of Hertburn, France, took the manor Wessington in exchange for soldierly service. With this grant Sir William de Hert¬ burn became Sir William de Wessington. In these olden times ((when knights were bold and barons had their sway® this Wessington served his king, being among the preux chevaliers, fighting, hawking, gaming, conspiring, conquer¬ ing and feasting, the king granting him a silver shield upon which were two golden bars, sur¬ rounded by three spurs of the knight in red with a crest of the black raven emerging from a ducal coronet.

In the great struggle of Charles I, the Wash¬ ingtons remained loyal to the

king and upon the promotion of Cromwell the Washingtons eagerly sought refuge in the Virginia colony, where they prospered and were men of great estates. Washington, our first President, de¬ voted considerable attention to the investigation of his pedigree. The public is familiar with his frequent blazoning of the family arms on car¬ riages, books, plate, mirrors, private seal, dishes, pictures and practically every memorable family token was decorated with the old shield of the English Washingtons. As a book plate all the Washingtons employed the family arms, both in England and America.

John Quincy .Adams in a communication writes: ((That the fact of my father securing this high position and rank at Harvard was due rather to the position of the maternal

branch of the family than to the Adamses.® This is strange reading to Americans of this day. The coat of arms of the Adams family was a red shield with a silver cross upon which were five mullets of gold ; the crest, a demi-lion emerging from a ducal crown.

Jefferson was eager about knowledge of the early Jeffersons and was well acquainted with the lineage. On 20 Feb. 1771 he wrote Thomas Adams of London (Vol. 81, p. 205, Harper's) a letter, in which the following request ap¬ pears : ((One further favor and I am done ; to search the herald's office for the arms of my family. I have what I have been told were the family arms, but on what authority I know not.® Jefferson's book-plate and persqnal seal consisted of his monogram, about which were the words : (

The next stratum of American history brings us to the administration of James Mon¬ roe, of the ancient Monroe or Munroe family, noted for their studiousness and mildness of character. The family escutcheon of gold was of English origin and contained a spread eagle. In beak a sprig of laurel proper ; crest same as arms ; motto, <(Dread God.® Crest eagle's head erased gules.

The ancestors of Andrew Jackson were Scotch by blood, though they came from the geography of Ireland and in 1765 we find the Jackson family. Generations ago these people were prominent in the wars of Great Britain and the mark of distinction which came to them consisted of a silver shield with a fess or bar, with three birds blazoned ; the helmet had perched upon it a bird and a shell sup¬ ported the shield. The motto, ((I move care¬ fully.®

Then comes John Quincy Adams with an armorial device. He inherited a love for the heraldic and early in his life used the Adams crest as a book

mark, but later in life he em¬ ployed in connection with the crest a shield, upon which were blazoned the arms of his ancestors, both paternal and maternal. He was a deep student of things heraldic and while he was Secretary of State he devised and used — contrary to any authority — a private device as the seal of the Department of State. It was his heraldic idea of the constellation Lyra, infrequently referred to in the act creat¬ ing our national flag, the lines reading <(Thir- teen stars, representing a new constellation.® See Flag of United States.

The name Harrison throughout national life is redolent of patriotic intellectual greatness. The family insignia was ((a golden shield upon which were two ermine bars and, spangled on shield, five silver stars, with a lion as a crest.®

President Tyler's wife was a Miss Julia Gardiner, of a distinguished family who owned by kingly grant the island of Gardiner of New York. Their coat-of-arms, which can at this

lay be seen on the walls of this colonial manor house, was <(Arms of silver with three hunters' aorns and chevron (roof shaped), red crest, an armor with visor surmounted by an arm holding a baton.®

Millard Fillmore family arms were Sable, three bars in chief, three cinquefoils.

President James Buchanan was a descendant of James Buchanan, who came from Ireland just as the American Revolution closed, settling in Pennsylvania. From a book-plate and also from a tombstone at Christ Church Cemetery, Philadelphia, the coat-of-arms of his family is obtained a golden shield blazoned with lion, the helmet is surmounted by a rose, the mot¬ toes ((Supported by Courage® and ((Honoraible Reflection.®

In our backward journey we find Ruther¬ ford Birchard Hayes as one of an heraldic family. Little, indeed, is known of the ancestry of Mr. Hayes, though the family has cherished a purple shield, upon which are blazoned three lesser shields of silver. He was of Scottish ancestry, the first member of the family in America being George Hayes, who settled in Windsor colony of Connecticut in 1682. The Scottish ancestry were granted the arms early in the 15th century as a distinction for pro¬ found ability at the bar, a heritage which made the branch of progress easy for the scholarly Hayes.

Garfield's shield of gold, with its three bars of red and its right canton with cross and left canton with heart, is symbolic of the armorial ancestral device. As a crest the arm clasping a sword and for a motto those significant words <(In the cross I conquer.® The name and the arms are possibly of Saxon origin, for the name occurs in the Teutonic heraldic insignias as meaning <(Garfeld® or (

Benjamin H. Harrison was the 23d Presi¬ dent and his armorial device the same as Wil¬ liam Henry Harrison.

The name Cleveland is, in truth, not the name of this great American family, but rather the designation of the immense estate they once possessed in England, where these folks were known as ((De Cleveland® of Durham, Eng¬ land. This French nobiliary predicate <(de® formed a part of this family name up to the 13th century, some genealogists claiming their ancestry French and hence the French word «of» prefacing the name. The Clevelands have an armorial bearing which dates back to the remote period of the 12th century and the crest, which represents a spearman, is in token of Sir Guy de Cleveland, who commanded the spearman at the famous battle of Poiclien- Poitiers of 19 Sept. 1356. The Cleveland shield, with its black chief and silvery base spangled with stars and its argent chevron (roof) with stars, once formed the book-plate of Stephen Cleveland, father of the Hon. Grover Cleve¬ land. The motto in this coat-of-arms is especi¬ ally appropriate, meaning ((For God and Father- land.®

The Roosevelts were in old New York when the Pilgrims of Massachusetts were banishing men and women for freedom in religious wor¬ ship and executing so-called witches and tyran¬

nizing the wilderness with self-destruction. At this same time the Dutch of New York were welcoming the world and laying the founda¬ tion of our present public-school system. In this atmosphere the Roosevelts flourished as early as 1649. The Roosevelt coat-of-arms in its heraldic colors was painted on the dining¬ room wall of old Jacobus Roosevelt and op¬ posite in oils in a heavy frame was the like¬ ness of Klaas Roosevelt, the first emigrant Roosevelt, who came as early as 1649 when New York was still New Amsterdam. The Arms are a silver shield charged with red roses and Latin motto, meaning ((God who has trans¬ planted it will protect it.®

The ancient Dutch grant of arms is inter¬ esting, though too lengthy to reproduce. Suffice the statement that this shield of honor was conferred upon his kin early in the 1500's, dur¬ ing the campaign leading up to the founding of the Dutch Republic. Needless to say, these Roosevelts or Van Roosevelts, as they were entered in record, were of the Republican party and of the Protestant army.

B. J. Cigrand,

Author of c0Our Presidents' and (Heraldic Americana .**

PRESIDENTS OF THE UNITED STATES, Graves of the. Some writers and distinguished citizens have advocated bringing to the capitol the remains of all the Presidents and depositing same in a huge mausoleum pat¬ terned after the Westminster Abbey of Lon¬ don. This would be a mistake, since State pride and individual requests rebel against such procedure. Let the States have their spots of historic interest. This will impel people to visit various parts of the Union. Besides, a certain <(love of home® induces men, even of broad and liberal minds, to choose a burial spot, or God's acre, within the precincts of youthful days or within the vicinity of faith¬ ful friends. This latter sentiment was the one uppermost in our Presidents selecting their own last earthly home and Washington's notion on this theme was borne out by many of his successors.

While there are innumerable magnificent memorials, monuments, statues and tablets to the eminent dead who filled the highest chair in the gift of a republic, these are for the most part distant from their graves and though these markers in stone, metal or wood repre¬ sent a form of gratitude, yet the actual tomb, its surroundings and general care is the em¬ blem of our affections.

Washington.

The one of Washington, at Mount Vernon, is commonplace. It does not reflect the senti¬ ment of our people. The national treasury could very fittingly unlock one of the gold boxes and contribute toward the shrine of him who, when living, was <(first in war, first in peace,® and, in life or in death, <(first in the hearts of his countrymen.® Thousands are the men, women and children who annually make the pilgrimage to this patriot's grave. It is indeed a shrine worthy of national regard, and while the entire republic in all its material grandeur is as a monument to' his wisdom and heroic patriotism, yet his immediate tomb de-

Tyler

Jefferson

Harrison

Cleveland

Jefferson Seal

Roosevelt

Adams

Washington

Fillmore

Buchanan

COATS OF ARMS OF AMERICAN PRESIDENTS

PRESIDENTS OF THE UNITED

serves a. more extravagant materialization to be an equivalent to the popular regard.

Miss Alice Longfellow, youngest daughter of New England's beloved poet, told the story to the Warren and Prescott chapters, Daughters of the American Revolution, of how Mount Vernon was saved to the nation by a woman. Miss Longfellow told of Miss Ann Cunning¬ ham, a gentle woman of old Virginia, who, when passing up the Potomac River one day in 1853 and hearing the steamer bell toll when passing the grave of Washington, became pos¬ sessed with the desire to restore it. The place was then occupied by a great-grandnephew of the first President, John Augustine Washing¬ ton. It was in a state of decay and the gen¬ erous hospitality of the owner, who treated every passing stranger as a guest, made the expenditure of money for repairs utterly im¬ possible. When Miss Cunningham ventured to tell him of her plans he was filled with horror that women should do that which should so emphasize the degeneracy of men. But the determined woman sent out urgent appeals.

Her first call was to the women of the South and on 12 July 1854 the first meeting was held. Edward Everett was one of the first to offer his services and as the result of his lectures $68,000 was contributed to the fund.

In addition to the actual price of the plantation $300,000 had to be raised for re¬ pairs and when matters were progressing finely the Civil War broke out and confusion was the result. Mount Vernon was neutral ground throughout the bitter struggle. When the strife was ended Miss Cunningham went there to live, received the aid of Sumner in getting an indemnity from the government and went on with the noble work she had undertaken.

It may not be generally known, but such is the case nevertheless, that when the capitol of the United States was planned and erected at Washington a crypt was constructed in the basement of the capitol, directly underneath

the rotunda. This final resting place was de¬ signed for the body of Gen. George Washing¬ ton. Considerable mystery surrounds the delay or refusal of the entombing of the first Presi¬ dent in the foundation of the national capitol. Some claim that neglect of action on the part of our national Congress is responsible for the empty crypt, while others, equally good author¬ ity, states that Washington's wish dictated his present grave on the premises of old Mount Vernon, the spot of all others he so devotedly loved.

John Adams.

The death of John Adams and of Thomas Jefferson 4 July 1826 is the most remarkable necrological coincident in the history of our country. Adams married a minister's daughter and he was a devout Christian, affiliating with the Unitarians of Braintree, Mass., and under the pulpit of this antique religious structure reposes all that is earthly of the eloquent gen¬ tleman who made the Declaration of Inde¬ pendence an accepted national decree. He is incased in a leaden coffin, which is sealed in a stone sarcophagus. His son, John Q., placed a huge marble tablet at the right of the pulpit, with these inspiring words ;

STATES, GRAVES OF THE 551

*From lives thus spent ' T */*

Thy earthly duties learn;

From fancy's dreams To active virtue turn.

Let Freedom, Friendship, Faith Thy soul engage,

And serve, like them,

Thy country and thy age.

Thomas Jefferson.

Thomas Jefferson, whose labors so thor¬ oughly complemented those of John Adams, rests in Charlottesville, Va., beneath a plain and unassuming obelisk of granite, in the small family cemetery on the road leading to his famous homestead, Monticello. He did not regard having been twice elected to the Presidency the height of his accomplishments, as is shown by the burial tablet he wrote for his own tomb, the character of which he de¬ signed. The lines he wished blazoned on the granite read: < (Here lies buried Thomas Jef¬ ferson, author of the Declaration of Inde¬ pendence, of the statute of Virginia for re¬ ligious freedom, and father of the University of Virginia.®

The Democrats, aided by Republicans, will erect at Washington, D. C., the most elaborate memorial to Jefferson ever erected to any famed person. But his body will not be dis¬ turbed from its present resting place because of Jefferson's request to lie at the side of his loved ones. The spot he selected when yet a young man. On a fly-leaf of one of his old books was found this regarding his burial : (

James Madison.

He lies buried on the centre of his old farm at Montpelier, Va. A brick fence encloses his bier, a • lot measuring about 100 square feet. A granite obelisk 20 feet high marks the spot, and on its base are these words : <(Madison, born March 16, 1761.® The lovable and gra¬ cious Dolly Madison, his wife, has an obelisk of smaller dimensions near by.

James Monroe.

New York City for 27 years had the body of James Monroe, but on 4 July 1858, it was re¬ moved to the capital of Virginia, where it now rests in Hollywood cemetery. The monument is unique and patterned after the windows of a Norman abbey. The General Assembly of Vir¬ ginia looks after this grave, and it is kept up with reverential care.

John Quincy Adams.

In the crypt at Braintree, Mass., is the body of John Quincy Adams. He loved his parents

dearly, and it was his wish to be buried at their side. He was religious, and when Presi¬ dent he prayed the prayers of his childhood days. He related at a Cabinet meeting that the sweetest lines in the English language were those of the prayer which begins: <(Now I lay me down to sleep ; I pray thee, Lord, my soul to keep." On his tomb tablet are these lines : ((A son worthy of his father, a citizen

shedding glory on his country, a scholar am¬ bitious to advance mankind. This Christian sought to walk humbly in the sight of God.®

t.;

Andrew Jackson.

Eleven miles from Nashville, Tenn., is the famous shrine, ((The Hermitage,® the home of Andrew Jackson, and in the garden of this notable farm is the quiet resting place of the stern and fearless (<01d Hickory.® On the base covering the graves of Jackson and his wife are erected eight fluted columns which support a circular cope surmounted by an urn. This old plantation, with its sacred remains, was cared for by the women of Tennessee, and they have now presented this estate to Tennessee, hence the State is guardian. The words (

Martin Van Buren.

The grave of Martin Van Buren is at Kin- derhook, N. Y., and is marked by a plain granite obelisk with simple inscription stating he was the eighth President of the United States.

William Henry Harrison.

Fifteen miles west of Cincinnati, Ohio, lies all that was mortal of W. H. Harrison. The old brick vault was recently replaced by stone, the inscription is wanting and patriotic societies contemplate improving the surroundings.

John Tyler.

The American people have lost track of the grave of John Tyler. Church records place it near the grave of James Monroe. A magnolia tree serves as a marker ; neither stone, flowers nor urn indicate the place of his burial. While it is true that he did not remain loyal to the Union — taking up the cause of the Con¬ federacy, and being an ardent advocate of State's rights — he nevertheless was a dutiful and respected Virginian, and held the office of President. The government might appropriate the regulation soldier marker — costing about $5. This would serve to give designation to the spot until future generations more befittingly recognize it.

James K. Polk.

Within the capitol grounds at Nashville, Tenn., rest the remains of James K. Polk. He certainly has a beautiful resting place. The high hill on which it is located overlooks the great landscape of Tennessee, and miles away can be seen with fieldglass the grave of Jackson, and Nashville, the Athens of the Southland, is proud of these two graves and reveres the sacred remains there deposited. A lengthy and

praiseworthy inscription graces the Grecian Doric pillared grave.

Zachary Taylor.

A curious oversight regarding the death of General Taylor comes to light in the truth that the 12th President, who died in the office as President, has never received burial services. Gen. Richard Taylor, nephew of the Presi¬ dent, writes: <(General Zachary Taylor has never been buried, notwithstanding the many stories to the contrary. He died in 1850 and his remains were immediately brought to Ken¬ tucky by his brother, Commissary General J. P. Taylor, and placed in a vault in the Taylor cemetery.® This cemetery is about five miles from Louisville, Ky. On the monument are these splendid words from the General: ((My only regret is for the friends I leave behind me.®

Millard Fillmore.

About two miles from Buffalo, N. Y., is Forest Lawn cemetery, and here a plain obelisk rises into the sky to designate the final home of President Fillmore. The word <(Fillmore® is on the base, but it does not state that he was an American President. The grave .is kept in most befitting manner.

Franklin Pierce.

Far north in the hills of old New Hampshire, near the famous town of Concord, in Minot cemetery, a delicately designed pillar monu¬ ment marks the grave of Franklin Pierce. A strange mistake on the tomb shows: (

James Buchanan.

Pennsylvania, with all its glorious history, with its thrilling scenes in Philadelphia, has had but one man in the White House. This (

Abraham Lincoln.

To us the name of Lincoln is justly asso¬ ciated with all that stands for truth and jus¬ tice, and to his fair name time only can add the laurel. His great and grand character will be more thoroughly understood as time rolls on. His life will appear in clearer light and be more fully appreciated by the genera¬ tions yet to come. And the hour is close at hand when the name Lincoln will be nearer that of Washington than that of any other in the long calendar of fame.

The massive granite structure in which he (

memorial to be in the form of the White House, as that structure was at the

time of his tragic death.

Andrew Johnson.

Several years before the death of Andrew Johnson he chose the spot where he hoped to be buried. This place was on the heights of Greeneville, Tenn. It is not generally known that he had two sons in the Civil War. Charles was killed at Nashville and Robert, a colonel of a Tennessee regiment, died in 1869. Both are buried near the graves of the parents.

Ulysses S. Grant.

A most imposing structure on the banks of the Hudson marks the final resting place of Gen. U. S. Grant. Its grand proportions and its matchless location attract thousands an¬ nually. No President's death was made into such an expensive burial. It has been estimated that over $1,000,000 were expended. His fu¬ neral was the first real evidences that the North and South had become more than friendly; yea, the brotherly spirit here came to the surface. The Southland remembered the generosity of Grartt at the surrender of Lee. They recalled how modestly, how tenderly and how frater¬ nally he greeted General Lee on the day of Southern defeat. The death of the great Illinoisan brought not only wreaths of Southern posies, brought not only eloquence from South¬ ern lips, but, more and better, tears from the defeated Southern hosts. No man received such universal homage, and he grows dearer and his • character becomes nobler as time moves on. His tomb is a credit to the nation.

Rutherford B. Hayes.

The Hayes tomb or monument was designed by President Hayes, and erected over his wife, who died in 1881, and near it he, too, was buried. Its splendid proportions are well known to the visitors at Oakwoods cemetery, Fremont, Ohio.

James A. Garfield.

The tragic death of James A. Garfield brought forth general sympathy, and his costly tomb at Lakewood, Cleveland, Ohio, is evidence of his popular regard. Before his death he ex¬ pressed the wish of being buried in this scenic cemetery. The structure cost $150,000, half of which was donated by his personal friends in Cleveland — a remarkable witness of his lov¬ able character.

Chester A. Arthur.

Chester A. Arthur, the quiet, graceful and diplomatic New Yorker, sleeps in

Rural cemetery, Albany, N. Y. Arthur and the scholarly gentleman who preceded him rep¬ resented the two factions of the Republican party, but during the official life both were friendly.

. William McKinley.

President McKinley, whose tragic assassina¬ tion took place at a time when the country was just emerging from a cruel war and enjoy¬ ing the calm, quieting words of a man who represented the <(peace traits® of a happy peo¬ ple. His tomb at Canton, Ohio, and its speedy erection was due to the earnest and faithful co¬

operation of President Roosevelt and his praise¬ worthy Cabinet. The mammoth mausoleum cost

$600,000.

The heroic statue of McKinley graces his mausoleum erected at Canton, Ohio. The statue of McKinley is depicted as he made his last public speech, just before his assassination at Buffalo, when he urged that (

Grover Cleveland.

A handsome memorial is planned for Cleve¬ land though a simple marker now shows where he is buried at Princeton, N. J.

Benjamin Harrison.

Lies buried at Indianapolis, Ind., and a plain stone marks his resting place.

Theodore Roosevelt.

Theodore Roosevelt was buried on 8 Jan. 1919 at Oyster Bay Cemetery, overlooking the beautiful landscape and waterflow of historic New York. There amid giant trees, wild fern and ocean breeze he chose to rest ; great nature lover that he was it was but natural that the wildwood would claim his body. Quietly and without elaborate ceremonials he was deposited in the soil of his native State.

B. J. Cigrand,

Author of cOur Presidents' and (Heraldic Americana .**

PRESIDIO, pre-sid'i-o, a Spanish word which means <(a fort.® It is applied especially to four fortified Spanish forts on the coast of Morocco : Alhucemas, Ceuta, Melilla and Penon de Velez. The military settlements made by the Spaniards in California were also known as presidios. In 1729

there were 20 presidios in New Spain, some of them founded as early as 1680 and most of them in what is now Mexico. The chief presidios of Spanish California were massive forts at San Francisco, Monterey, San Diego and Santa Barbara. Of these two, at San Francisco and Monterey, continued to be military posts after California was acquired by the United States. They are known officially as Presidio of San Francisco (q.v.) and Pre¬ sidio of Monterey. The latter was founded in 1772 by the Spanish and at the present time contains 398 acres. Consult Richman, J. B., California under Spain and Mexico (Boston and New York 1911).*

PRESIDIO OF SAN FRANCISCO, Cal.,

a United States military reservation in the northwest suburbs of the city of San Fran¬ cisco. It contains 1,542 acres. It was estab¬ lished as a military post by Spain about 1776, and Mexico continued it until it was ceded to the United States in 1848. It was established as a United States military post in 1850, and is United States army headquarters for the De¬ partment of California.

PRESQUE ISLE, Me., town in Aroostook County, near Aroostook River, 135 miles, direct,

northwest of Bangor, on the Bangor and Aroostook and the Canadian Pacific railroads. The town is situated in an agricultural district and manufactures starch and lumber. The population is increasing. Pop. 3,452.

PRESS, in mechanics, see Metal-working Machinery; in printing, see Printing Press.

PRESS, Freedom of the, the right of every citizen to print whatever he chooses. The free¬ dom, however, does not prevent his being amen¬ able to justice for abuse of this liberty. The right of printing rests on the same abstract grounds as the right of speech, and it might seem strange to a man unacquainted with his¬ tory that printing should be subjected to cen¬ sorship, as it is still in some countries and has been at one time or another in all, any more than speaking, and that the liberty of the press should be expressly provided for in the con¬ stitutions of most free States. But when we look to history we find the origin of this, as of many other legislative anomalies, in periods when politics, religion and individual rights were confusedly intermingled. I<; is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right ; and to England and the United States the world is

particularly indebted for the establishment of this principle. The existence of a censorship of the press was for centuries, however, deemed essential to the safety of all European governments. Liberty of printing, as we understand it, is a compara¬ tively modern notion; Milton's plea for a free press met with no response from his own party, nor for many years later was it the cue of any party in the English commonwealth to re¬ frain from suppressing the writings of their political opponents. In England the liberty of the press, soon after printing was introduced, was regulated by the king's proclamations, pro¬ hibitions, charter of license, etc., and finally by the court of star-chamber. The Long Parlia¬ ment, after their rupture with Charles I, as¬ sumed the same power. The government of Charles II imitated their ordinances, and the press did not really become free till the ex¬ piration of the statutes restricting it in 1693, after which it was found impossible to pass new laws in restraint of it, and it has remained free ever since, the last restriction being done away with on the abolition of the newspaper stamp duty, in 1856. Such legal checks as re¬ main are merely intended to prevent outrages on religion or decency, to protect individuals from defamation and to conserve the copyright of authors. The Constitution of the United States specifically prohibits Congress from pass¬ ing any law abridging the freedom of the press. The constitutions of most of the United States declare, as we should expect, for the liberty of the press. The same may be said of all the South American republics. In other countries the amount of freedom enjoyed by the press varies considerably and is frequently regulated by executive laws. At the outbreak of the European War in 1914 the freedom of the press in all countries was involved, and even in some of the neutral countries, was greatly restricted, though these restrictions did not apply so much to the essential right of freedom as to details in connection with the printing of war news.

As recently as 1919 a decision of the Su¬ preme Court of Mexico in a contempt case against the editor and publisher of a local journal cleared up several points concerning the freedom of the press and the law of con¬ tempt of court. The editor of the publication was found guilty of contempt of court by the judge whose actions he had criticized in an editorial, concerning a legal proceeding which affected the publication. An appeal taken to the Supreme Court contended ((that the criticism made did not concern the official acts of the jurist, but merely -his private act,® and this con¬ tention was upheld by the Supreme Court.

While adhering to the rule that criticism calculated to obstruct the course of justice may be punished as for a contempt of court, the court held that cases of constructive contempt are criminal proceedings and that, therefore, the information, the authority of the court, the weight of the evidence (including all presump¬ tions and proof) and the regularity of the pro¬ ceedings are governed by the rules of criminal law. The information must

be strictly con¬ strued as well as the article alleged to be con- temptous,® and the court further savs ((the. de¬ fendant is presumed to be innocent until proved guilty beyond a reasonable doubt, the same as a defendant in any criminal case. There are no presumptions taken against him, but the pre¬ sumptions are all in his favor.® This is a wide departure from the attitude of those courts which seem to have presumed that their critics were guilty and to have thrown upon them the burden of proving the innocency of their in¬ tent. Certainly in contempt proceedings, where the offended judge sits substantially as accuser, judge and executioner, the rule announced is much more consonant with free press and free, speech guarantees. The opinion handed down by the Supreme Court asserts ((it is not the personal dignity nor the personal feelings of the court that justify contempt proceedings,® and that <(attacks on the character or conduct of a judge as an individual may, in some cases, be so gross as to amount to a contempt,® but <(only when they tend to influence the course of justice.® A most important holding of the court, especially at a time when the rights of free speech and free press have been so much clouded by voluntary and involuntary censor¬ ship and by so much public concern as to the effect of governmental control of many of the means of communication, is the reaffirmation of the principle that (

Bibliography. — Canadian Press Association, (A History of Canadian Tournalism, etcP (Toronto 1908) ; Coulon, H., (Paris 1894) ; Duniway, C. A., (The Development of Freedom of the Press in

Massachusetts) (in Harvard University, De¬ partment of Historv and Government, har¬ vard Historical Studies, Vol. XII, New York 1906) ; Fisher, J. R., and Strahan, J. A., (The Law of the Press* (new ed., London 1898) ; Huber, H., (Zum Begriff der Pressfreiheit nach Schweizerischem Rechte* (Bern 1891) ; Jau- mart de Brouillant, L., (La Liberte de la Presse en France aux XVIIe et XVIIIe Siecles* (Paris 1888) ; Kennedy, C., (The Liberty of the Press: Its Uses and Abuses* (Washington 1887) ; Lee, J. M., (History of American*

Journalism (Boston 1917) ; Le Poittevin, G., (La Liberte de la Presse depuis la Revolution, 1789-1815* (Paris 1901) ; Liszt, F. E. von, (Das Deutsche Reichs-Pressrecht* (in (Lehrbuecher des Deutschen Reichsrechtes,* Vol. VIII, Ber¬ lin 1880) ; Mill, James, ˆLiberty of the Press* (in (Essays on Government,* London, n. d.) ; Milton, John, (Areopagitica* (reprinted by The Grolier Club, New York 1890) ; Nagravow, W. J., (Moderne Russische Censur und Presse* (Berlin 1894) ;*

Petkov, P., (La Presse en Bul- garie (Paris 1910) ; Putnam, G. H., Censor¬ ship of the Church of Rome* (2 vols., New York 1906-07) ; Rutherford, L., (John Peter Zenger, etc.* (New York 1904) ; Salomon, L., (Geschichte des Deutschen Zeitungswesens, etc.* (3 vols., Oldenburg 1900-06) ; Smith, C. E., (The Freedom of the Press* (Philadelphia 1903) ; United States, Library of Congress, Di¬ vision of Bibliography, Cist of References on Freedom of the Press and Speech and Censor¬ ship in Time of War* (Select List No. 184, Washington 1917) ; United States, War De¬ partment, (Proper Relationship Between the Army and the Press in War* (War Department Document No. 528, Washington 1916).*

PRESS ASSOCIATION OF LONDON,

a subsidiary organization of the Reuter Agency, established in London in 1868 to furnish daily news to the povincial newspapers of the United Kingdom. See Press Associations.

PRESS ASSOCIATIONS, organizations for the gathering and distribution of news. The association of newspapers for the collec¬ tion of news began before the invention and use of the telegraph. In London the great dailies and other agencies supplied the interior press of the country with stereotyped news, and more especially with reports of the doings of Parliament; and in the United States, the shipping and other news, especiallv foreign, to be had at the Atlantic ports, was collected and distributed, by agencies, to subscribing news¬ papers, by fast boat and other means of trans¬ portation; and fast pony express was made use of for the conveyance of news from the national and State capitals to the larger and most important centres of population. A sys¬ tem of arbitrary signs was established at im¬ portant harbors for the fast transmission of news to the great dailies. But the coming of the telegraph gave to these earlier news asso¬ ciations a sudden impetus which was destined to increase with wonderful speed. The great newspapers of New York City formed an asso¬ ciation, in 1848, to pay jointly the expenses of the transmission, by telegraphy and other means, of comprehensive reports of the opera¬ tions of the American forces in the Mexican War. Owing to the fact that the telegraph lines were then not extended throughout the

South, the news was generally from a week to 10 days old when it appeared in print; but even with all this delay newspaper enterprise gen¬ erally outstripped the government in the secur¬ ing of early reports of war operations. The gradual extension of telegraph lines to the South rapidly widened the field of these early news-gatherers. The monthly news service of the Cunard Line between Europe and Boston was sent on to New York by wire; and from there it was transmitted to all parts of the country by various means of conveyance. With this European news went local market

reports and other important information to the press of interior cities and towns. The rapid organiza¬ tion of the news features of the great cities followed ; and to the current daily service were added full reports of happenings of general and national interest. The handling of news be¬ came a business of experts.

The Reuter Agency. — In the meantime Ju¬ lius Reuter, a Prussian government messenger, conceived the idea of a great associated press service that could be extended to all papers desirous of making use of it. In 1849 -he opened an office in Paris; but the French gov¬ ernment discouraged him. This and the fact that the German government was raoidly ex¬ tending its telegraph lines induced him to go to Aix-la-Chapelle where there was a gap be¬ tween the telegraph line which ended there and the French-Belgian line terminating at Verviers. Reuter opened a news-collecting and distribut¬ ing agency at each of these points and for¬ warded the news by carrier pigeon and other means of fast transmission. He extended his news service and finally removed his head¬ quarters to London in 1851. This he had been induced to do owing to the fact that the Dover-Calais submarine cable had iust been laid. Reuter's London office began the trans¬ mission of news by wire from London to Paris, at first, as correspondent for various news¬ papers on the Continent; for he had not been able to induce the great London dailies to pur¬ chase his news service. He used the wires wherever they existed and where they did not he employed special agents to transmit his news by carrier pigeon or fast messenger to all his subscribers. In his work of extending the news facilities of the press he overcame, by his tire¬ less energy, countless difficulties, and soon the Reuter News Agency became known to every newspaper in Europe. Its first important con¬ quest was the London Morning Advertiser, the second greatest newspaper in England in 1858. The Times and other British dailies soon fell into line and the Reuter Agency extended its news facilities still more rapidly than the rapidly extending telegraph lines. Reuter cor¬ respondents were to be found in all parts of the world. In 1866 Reuter connected Cork with Crookhaven by private submarine cable in order to be able to beat his competitors in fur¬ nishing news of the American situation. He 'also secured a concession for a submarine cable to Cuxhaven from the king of Hanover, and another for a cable between France and the United States, both in 1865. Reuter's Agency and the Anglo-American Telegraph Company made mutual use of this latter line. In 1868 the Press Association of London, a subsidiary affair, was formed to serve the provincial news-

papers of the United Kingdom with daily news.

The Havas Agency. — Among the other news agencies that had already sprung into ex¬ istence by this time were the Central News Agency, the Continental Agency, the Exchange Company, Dalziell's Cable News, the National Press Agency and the Havas Continental Agency. The oldest of these was the latter which dated back to 1835, when Charles Havas, a translator, opened an agency in Paris for the translation from English and Continental news¬ papers of interesting news for the French press. In 1840 Havas established a carrier pigeon news service between Paris, London and Brussels. This being the first attempt at the rapid trans¬ portation of news it naturally attracted much attention to the Havas Agency. Between this date and 1850 the name Havas became well known to the newspaper world, and more espe¬ cially to the capitals of Europe; for the Havas Agency had kept abreast of the times and had made use of telegraph and railway transporta¬ tion as rapidly as they had developed. Alreadv, at this early date, Havas furnished daily news reports of a commercial, financial and political nature ; and this had completely changed the nature of the news offered by the daily press. In 1856 the Havas Agency was amalgamated with the Bullier Advertising Agency; and among the patrons of the new concern were the foremost French dailies. Subagencies were opened in Madrid, Rome, Vienna, Brussels and, a little later, in various American cities. Work¬ ing agreements were entered into with the Wolff Agency in Germany and the Reuter in London. This was followed by the planting of Havas correspondents in all the important news centres of Europe and America and in almost every town and city of any importance in France; for the Havas Agency has always made a specialty of local French news. It was the first to make use of the principle of the mutual exchange of news between a central news bureau and the newspapers taking its service. It was also the first to furnish syndi¬ cated material to subscribers in the form of special news features ; and this part of the business it has developed very extensively. It furnishes feuilletons of a literary character, feature stories and novels written by the best- known and most popular of French writers. Fully 75 per cent of the typesetting of the French country press has been done away with through the ˆpatent® material furnished it in the form of <(mats® or stereotyped metal plates. Yet this local work has not prevented the Havas Agency giving much attention to the gathering of international news, a business which it has organized on a labor, monev and time-saving basis. Special trained Havas correspondents are stationed in all the capitals and other great news centres of Europe, Asia and Africa; and whenever there is a sudden need for a corre¬ spondent the nearest Havas man is wired from Paris to go at once to the place where his serv¬ ices are required. Ail these correspondents are carefully educated in the ways of the agency and they

know exactly what is expected of them. When it is necessary to depart from this routine they are so instructed by wire. The Havas Agency was the first to establish and perfect a very contracted figure and word

code for the transmission by wire of routine news to countries to and from which the cable rates for news were excessivelv high. In 1879 Havas Agency was reorganized as a joint-stock company with a capital of $1,700,000, divided into 1,700 shares of $100 each.

The Wolff Bureau and the Oversea News Service became, in 1917, a part of the adver¬ tising machinery of the German government which purchased a controlling interest in each of them. To strengthen this strong news and advertising medium control was also secured of more than 50 per cent of the stock of some of the foremost daily papers in Germany and Austria. Among these were the Deutsche Zeitung, Frankfurter Nachtrichten and the Lokal Anzeiger. This new combination of news agencies also secured control of the greater part of the advertising patronage of Germany, and through this control of adver¬ tising it secured a powerful influence over the policy of the most important dailies in Austria.

The Associated Press of New York was organized prior to 1860, and the Western As¬ sociated Press was formed during the Civil War period. The latter was a strong co¬ operative organization, and for many years it was an important factor in the business of news gathering in this country. For 20 years the New York Associated Press and the Western Associated Press worked together in harmony. The wires of the Western Union Telegraph were utilized for transmitting reports, and thou¬ sands of miles of leased wires were constantly in use. In 1882 the United Press was formed, using the Postal Telegraph wires for the trans¬ mission of news, and in 1883 a third and smaller rival, the Press News Association, entered the field. Meanwhile dissensions arose over con¬ tracts between the New York and the Western associations, and the disputes were carried into the courts. The evidence showed that the West¬ ern Associated Press had made contracts for franchises between January 1883 and January 1893 with newspapers in the Far West, calling for payments under the contracts of $118,410. Of this amount the books showed that $85,294 had actually been paid in. One-half of this amount was claimed by the New York Asso¬ ciated Press as its share of the money collected from such sales of franchises. Suits and counter suits were commenced and the Western Associated Press was finally dissolved. A new Associated Press was organized under the laws of Illinois and for several years a close rivalry existed between this company and the United Press. Then dissensions arose and in 1900 the Associated Press was reorganized and reincor¬ porated under the laws of New York State. In the meantime the Press News had died from financial mismanagement and soon afterward the United Press was wrecked. The

Associated Press now began a prosperous career with no rival worthy of the name. The New York City Press Association, a local concern, was incor¬ porated as a part of the Associated Press, which also began an exchange arrangement with Reuter's Agency in Europe. All the New York newspapers with the exception of the Sun re¬ ceived their foreign and domestic reports from the Associated Press. The Sun organized an independent news-gathering service, called the Laffan Bureau, and from the ruins of the

United Press co-operated with a number of newspapers between New York and San Fran¬ cisco, . thus building up a creditable organiza¬ tion independent of the Associated Press. A third organization, the Scripps-McRae Press (Western service) and the Publisher's Press (Eastern service) in 1903, was serving news to' several hundred newspapers. These two com¬ panies, practically one, divide the eastern and western fields between them. The three press associations were strenuous rivals during the Spanish- American War, and special correspond¬ ents were sent with the American fleets and the armies in the field. Reporters were also stationed at every port on the Southern coasts. An Associated Press correspondent was with Dewey at the battle of Manila Bay. All three associations maintain resident correspondents in the larger American cities, and in London, Paris, Rome and the foreign capitals. Through¬ out the European War correspondents of the Associated Press were maintained at the front in France, where Reuter's, Havas and other news agencies were also represented either directly or indirectly. Correspondents were also maintained in all centres where war or important political news was to be had.

Newspaper Syndicate. — Closely allied with the press associations is the-newspaper syndi¬ cate which instead of furnishing current daily news supplies special articles, correspondence, fiction and miscellaneous literary material to thousands of daily and weekly newspapers throughout the country. S. S. McClure was the pioneer in this field, followed by the American Press Association, the Bacheller and Johnson syndicate, the A. N. Kellogg Newspaper Union, the Leslie Syndicate, the Bulletin Press Asso¬ ciation and numerous others. The syndicate is enabled, by its sales of the same article to many customers, to purchase matter quite out of the reach of the individual newspaper, and to sell it on terms that each can afford. The scheme is found to be so advantageous that practically all the leading newspapers use syndi¬ cate matter to a considerable extent. Besides the firms engaged primarily in the syndicate business, several leading metropolitan daily newspapers, notably the New York Herald and the

American, dispose of their own matter to papers published in other cities. In addition to these there are now in the United States news syndicates for almost every kind of newspaper enterprise. If one wishes to start a local maga¬ zine, for instance, he can secure 32, 64 or 96 pages of material already printed and ready to bind in handsome cover, with or without advertising, at a very nominal price, if he pub¬ lish the advertising; and all that is necessary is to add a few pages of local to have a finely printed and illustrated publication.

J. H. Cornyn.

PRESS CENSORSHIP. See Censorship

of the Press.

PRESS-GANG, the name given in England to a detachment of seamen who (under the command of a naval officer) were empowered, in time of war, to take any seafaring men and oblige them to serve on board the king's ships. Consult Fletcher, W. J., (The Press-Gang) (in (The 19th Century and After, } Vol. L, p. 761, London 1904). See Impressment,

PRESSBURG, pres'boorg, or PRES- BURG (Magyar, Possony), Czecho-Slovakia, (1) free city in the west, capital of a county of the same name, on the left bank of the Danube, 35 miles east of Vienna. The site of the town is remarkably fine, being in the form of a semi-circle, bounded on the south by the Danube, from the banks of which it gradually ascends to the west and north toward ramifica¬ tions of the Carpathians ; and an extensive plain, covered with gardens, vineyards, meadows and corn-fields, forms its boundary on the east. The houses are built of brick and stone, and of two or three stories. The edifices most de¬ serving of notice are the Landhaus, or Hall of the Diet, in which the chambers of the kingdom used to meet, but now used as a courthouse; the cathedral, a huge Gothic pile with a lofty steeple, begun in 1090, consecrated in 1452 and rebuilt in 1845-67, less remarkable as a church than as the place where the kings of Hun¬ gary were formerly crowned ; a number of churches and monasteries, the Jesuit church, a synagogue, the city hall, begun in 1288, theatre, archbishop's palace, orphan hospital and barracks. The city possesses a number of in¬ teresting monuments, fountains and bridges. The old castle, formerly residence of the king of Hungary and located on a rock about 275 feet above the Danube, is now a ruin. Of edu¬ cational institutions there are a law school, gymnasiums for boys and girls, a military acad¬ emy, Protestant and Catholic lyceums and a well-equipped library. The industrial estab¬ lishments are devoted especially to the manu¬ facture of wooden ware, musical instruments, gloves, tobacco, silk ribbons, alcohol and wool¬ ens. There are also flour and sawmills and, in

the suburbs, a sulphur factory and slate quar¬ ries. The trade, chiefly in corn, is extensive. Outside the town there used to be an arti¬ ficial mound called the Coronation Hill, to which the newly-crowned kings of Hungary rode in grand procession and brandished the sword of Saint Stephen toward the north, south, east and west, signifying thereby that they undertook to defend the kingdom from danger, come from which quarter it might. Pressburg is a place of very great antiquity, being first mentioned in the 9th century. In 1541, when the Turks captured Buda, it became the capital of Hungary, till the Emperor Joseph II restored this dignity in 1784 to Buda. Press¬ burg, however, continued to be the seat of the Diet until 1848. The peace by which Austria ceded Venice to France and the Tyrol to Bavaria was concluded here in 1805. Soon after the establishment of this new republic of Czecho-Slovakia, the name of the city was changed to Bratislava. Pop. 78,223, of which 32,790 are Germans, 31,700 Hungarians and 11,600 Slovaks; 59,200 are Roman Catholics, 10,500 Protestants and 8,200 Jews. (2) The county of Pressburg, area, about 1,700 square miles, is traversed by part of the Carpathian chain in the north ; in the south it is flat and fertile. It is watered by the Danube, March and YVaag, and yields corn and grapes. The large forests furnish abundance of timber. Pop. 389,750. Consult Kiraly, J., (Geschichte des Donau-Mauth- und Urfahrt-Rechtes der Freistadt Pressburg (Pressburg 1890) ; Ortvay, T., (Geschichte der Stadt Pressburg bis 1526>*

(6 vols., Pressburg 1892-1903) ; (Pressburg's Strassen und Pliitze5 (Pressburg 1905).

PRESSED GLASS. See Glass, Varie¬ ties of.

PRESSEN.SE, Edmond Dehault de, ed-

mon de-olt de pra-son-sa, French Protestant theologian: b. Paris, 3 June 1824; d. there, 8 April 1891. He studied theology under Vinet, Tholuck and Neander and in 1847 was appointed pastor of the independent Chapelle Taitbout in Paris. Throughout his whole career he was an eloquent opponent of the connection of church and state and an able supporter of evangelical Christianity. He also took part in politics, in 1871 was elected to the National Assembly by the department of the Seine, and thenceforward constantly sought to consolidate the republic on a thoroughly liberal basis. He was elected a life senator in 1883. He founded the Revue Chretienne in 1854 and conducted it till his death. In spite of his many activities he found time for the publication of a large number of works: (Du Catholicisme en France1 (Paris 1851); (Histoire des trois premiers siecles de l'Lglise Chretienne5 (6 vols., Paris 1858-77 ; new ed., 3 vols., Paris 1888-89) ; translated by Harwood-Holmden, A., as (The Early Years of Christianity (2 vols., London 1877-78) ; (L'Ecole Critique et Jesus-Christ5 (Paris*

1863) ; translated by L. Corkran as (The Criti¬ cal School and Jesus Christ5 (London 1865) ; ^'Eglise et la Revolution Frangaise5 (Paris

1864) ; translated by J. Stroyan as (The Church and the French Revolution (London 1869) ; and by J. P. Lacroix as (Religion and the Reign of Terror) (New York 1869) ; (Le pays de l'evangile5 (Paris 1864) ; translated as (The Land of the GospeP (London 1865) ; (Jesus- Christ, son temps, sa vie, son oeuvre5 (Paris

1865) ; translated by Harwood-Holmden, A., as (Jesus Christ: His Times, Life and Work5 (London 1866) ; (£tudes evangeliques5 (Paris 1867) ; Tome and Italy at the Opening of the (Ecumenical Council5 (translated by George Prentice, New York 1870) ; (Le concile du Vatican, son histoire et ses consequences politiques et religieuses5 (Paris 1872) ; (La liberte religieuse en Europe depuis 18705 (Paris 1874) ; (£tudes contemporaines5 (Paris 1880) ; translated by Harwood-Holmden, A., as Contemporary Portraits5 (London 1879) ; (Les Origines5 (Paris 1883) ; translated bv Har¬ wood-Holmden, A., as (A Study of Origins5 (London 1883) ; (Varietes morales et poli¬ tiques5 (Paris 1885) ; (Les Lnglises Libres de France et la reforme frangaise du XVIe siecle5 (Paris 1887) ; (Alex. Vinet, d'apres Sa Correspondance inedite5 (Paris 1890). Of his sermons quite a number have also been pub¬ lished, the most important of which are (Le Redempteur, etc.5 (Paris 1854) ; translated as (The Redeemer5

(Edinburgh 1864) ; (Discours religieux5 (Paris 1859) ; (The Mystery of Suf¬ fering and other Discourses5 (translated by A. Harwood-Holmden, London 1868) ; (Le de¬ voir5 (Paris 1875). Consult Loyson, H., Ed¬ mond de Pressense5 (Paris 1891) ; Roussel, Th., (Notice sur la vie et les CEuvres de Pressense5 (Paris 1894); Thieme, H. P., 'Guide Bibli- ographique de la Litterature Frangaise5 (pp. 324-325, Paris 1907).

PRESSURE. See Force; Power.

PRESSURE FIGURES, in mineralogy, are certain radiating lines developed by the pressure of a point on a crystal or cleavage sur¬ face. They are diagonal to the percussion figures.

PRESTAGE, Edgar, English litterateur: b. Manchester, 20 July 1869. He was educated at Radley School, Abingdon, and Balliol Col¬ lege, Oxford. In 1902-08 he was engaged as law student and solicitor and at different periods was special lecturer in Portuguese lit¬ erature at the University of Manchester, exam¬ iner in Portuguese to the universities of Man¬ chester, London, Liverpool, Leeds and Sheffield and the civil service commission He is cor¬ responding member of the Lisbon Academy of Sciences, the Institute of Coimbra, etc., and commendador of the Portuguese order of Sao Thiago. Mr. Prestage's works are (Cincoenta documentos ineditos relativos a D. Francisco Manuel de Mello5 ; (Cartas de D. Francisco Manuel de Mello escriptas a Antonio Luiz de Azevedo5 ; Portuguese Literature to the End of the XVIII Century5 ; (Registo da Frequesia de Santa Cruz do Castello de Lisboa5 ; (Letters of a Portuguese Nun5; (Sixty-four Sonnets of Quental5 ; (Short Stories,5 and contributions to encyclopedias and periodicals.

PRESTER JOHN (Priest or Presbyter John), a semi-legendary character of the Mid¬ dle Ages. It was reported by travelers that there was a Christian prince who reigned in the interior of Asia under his name, and the same story was also known to the Crusaders. Albert of Aix and Otto of Freisingen speak of him in the 12th century; the Franciscan Rubruquis, in the 13th, attributes the name of Prester John to a Nestorian prince, Ung Khan, who had reigned in Karakoram over two Mongol tribes and perished in a war against Genghis Khan, above half a century before the time of his journey. Other travelers of the 13th century also mention this personage. Who this Prester John was cannot be determined. The supposi¬ tion that he was one of the chief priests of the Lamaites does not agree with the position as¬ signed to his residence by the travelers, nor do any etymological explanations seem satisfac¬ tory. The Portuguese in the 15th century, hear¬ ing a story of the Christian prince in the in¬ terior of Africa, whose name was Ogan, and who was in fact the negus (king) of Abyssinia, and being misled by the resemblance of the names Ogan and Ung Khan, made the mistake of transferring the throne of Prester John from Asia to Africa

and giving the name to the Abyssinian prince. Consult Baring-Gould, S., (Curious Myths of the Middle Ages5 (2 vols., London 1867-68) ; Brunet, G., (La Legende du Pretre-Jean5 (Bordeaux 1877) ; Hakluyt Society, 'The Book of Sir Marco Polo5 (2 vols., London 1874) ; Oppert, G., (Der Presbyter Johannes in Sage und Geschichte5 (2d ed., Berlin 1870) ; Yule, Sir Henry, 'Cathay and the Way Thither5 (2 vols., London 1866) ; Zarncke, F., (Der Priester Johannes5 (in (Abhandlungen der Koemgl. Saechsischen. Gesellschaft der Wissenschaften,5 Vols. XVII and XIX, Philologisch-Historische Klasse, Vol. VII, pp. 827-1030, Vol. VIII, pp. 1-186, Leip¬ zig 1879-83).

PRESTON

559

PRESTON, Ann, American physician and educator: b. West Grove, Pa., 1 Dec. 1813; d. Philadelphia, Pa., 18 April 1872. She was the daughter of Amos Preston, a Quaker, and her first knowledge of medicine was gained in many years of care for an invalid mother. Upon the opening of the Women's Medical College of Philadelphia in 1850 she enrolled as a stu¬ dent and was graduated in 1852. She engaged in practice in Philadelphia, achieving marked success, and in 1854 she became professor of physiology and hygiene at her alma mater, oc¬ cupying the office of dean after 1866. She was instrumental in the establishment of the Woman's Hospital in Philadelphia, which she later served as consulting physician. Her lec¬ tures and addresses were strikingly able, and her defense of her sex as medical practitioners when in 1867 the Philadelphia County Medical Society decided to make public objection to them resulted in a reversal of the decision. She wrote several essays on medical education for women and was author of a volume of verse, ' Cousin Ann's Stories for Children)

(1848).

PRESTON, Harriet Waters, American translator and novelist : b. Danvers, Mass., 6 Aug. 1836; d. Cambridge, Mass., 3 June 1911. At an early age she became noted as a linguist and has since achieved a brilliant reputation as a translator from the Latin and Provencal lan¬ guages and as an essayist. Much of her work was published in the Atlantic Monthly. , Her translations comprise Count de Falloux's 'Life and Letters of Madame Swetchine) (1867) ; Mistral's (Mireio> (1873) ; C. A. Sainte-Beuve's 'Memoirs of Madame Desbordes Valmore) (1873) ; Paul de Musset's (Biography of Al¬ fred de Musset (1877) ; C. A. Sainte-Beuve's Portraits of Celebrated Women) (1880) ; Virgil's (Georgics) (1881); F. M. A. de Vol¬ taire's 'Contes de Voltaire> in (Oxford Mod¬ ern French Series) (1912). Of her own original works the following have been published: 'As-*

pendale (1871); 'Love in the 19th Century) (1873); (Is That All ?> (1876); 'Troubadours and Trouveres, New and 01d) (1876) ; (A Year in Eden* (1887); with Louise Dodge, 'The Guardians) (1888) ; and 'The Private Life of the Romans) (1893).*

PRESTON, John Smith, American politi¬ cian and soldier: b. near Abington, Va., 20 April 1809; d. Columbia, S. C., 1 May 1881. He was a younger brother of William Campbell Preston (q.v.) and was graduated from the Hampden-Sidney College in 1824, studied at the University of Virginia and at Harvard, and after an extended tour of Europe settled in Columbia. He was a member of the South Carolina legislature in 1848-56 and gained a high reputation as an orator. He openly and ardently upheld the secession movement, headed his State's delegation to the Charleston Con¬ vention in 1860, and in the following year became one of the commissioners to Virginia, where he made a brilliant speech, urging seces¬ sion upon that State. He served in the Con¬ federate army throughout the entire war. He was engaged at the first battle of Bull Run and afterward was assigned chief of the con¬ scription department with the rank of brigadier- general. After the war he lived in Europe for a time, and after his return to the United

States remained a bitter opponent of the gov¬ ernment until his death.

PRESTON, Margaret Junkin, American author: b. Milton, Pa., 19 May 1820; d. Balti¬ more, Md., 28 March 1897. She was the daughter of George Junkin (q.v.), a well- known Presbyterian clergyman, who in 1829 moved with his family to Germantown, Pa., and in 1832 to Easton, Pa., where he became the first president of Lafayette College (q.v.). From 1841 —44 she lived at Oxford, Ohio, where her father had moved after accepting the presi¬ dency of Miami University. In 1844 he be¬ came once more president of Lafayette College, necessitating the removal of his family again to Easton. In 1848 her father accepted the presidency of Washington College, now Wash¬ ington and Lee University, at Lexington, Va., at which place the family continued to reside from then on. In 1857 she was married to John T. L. Preston, one of the founders and a member of the faculty of the Virginia Mili¬ tary Institute. Later on he served on the staff of Stonewall Jackson, who had married Mrs. Preston's younger sister. Mrs. Preston con¬ tinued to reside in Lexington until 1892, two years after her husband's death. She then moved to Baltimore, Md., where until her own death she made her home with her oldest son. In 1855 she translated the Latin hymn 'Dies Irae and in 1856 published her first book, a novel entitled 'Silverwood.* Her subsequent work is almost entirely in verse and is charac¬ terized by deep religious feeling and an ardent espousal of the Confederate cause. She pub¬ lished 'Beechenbrook ; a Rhyme of the War* (Baltimore 1866) ; 'Old Songs and New* (1870) ; 'Cartoons* (Boston*

*1875) ; 'Centen¬ nial Poem for Washington and Lee Univer¬ sity, Lexington, Va., 1 785—1885 J (New York 1885) ; 'For Love's Sake) (1886) ; 'A Handful of Monographs, Continental and English * (New York 1886) ; 'Colonial Ballads, Sonnets and Other Verse> (Boston 1887) ; 'Semi-Cen¬ tennial Ode for the Virginia Military Institute, Lexington, Va., 1839-89* (New York 1889) ; 'Chimes for Church Children) (Philadelphia 1889) ; 'Aunt Dorothy; An Old Virginia Plantation Story) (New York 1890). Her diary, giving an interesting and valuable his¬ tory of her life in the South, is published in part in Elizabeth Preston Allan's 'Life and Letters of Margaret Junkin Preston* (Boston 1903). Consult also Picket, L. C., 'Literary Hearthstones of Dixie) (Philadelphia 1912).*

PRESTON, Thomas Scott, American Ro¬ man Catholic clergyman : b. Hartford, Conn., 23 July 1824; d. New York, 4 Nov. 1891. He was graduated from Washington (now Trinity) College in 1843, from the General Theological Seminary of the Protestant Episcopal Church in 1846 and held assistant rectorates in New York. In 1849 he entered the Roman Catholic Church, and after study at Saint Joseph's Seminary, Fordham, N. Y., was ordained priest in 1850. He became chancellor of the archdiocese of New York in 1853, and in 1863 rector of Saint Ann's, New York. In 1872 he was made vicar- general of the New York archdiocese, in 1881 he was made monsignor and in 1888 prothono- tary apostolic. He vigorously opposed the land and labor movement of Henry George (q.v.) and was active in urging the excommunication

of Dr. McGlynn (q.v). He founded and for many years directed the Sisters of the Divine Compassion. As a preacher he enjoyed consid¬ erable popularity. Among his many contro¬ versial and devotional works are (The Ark of the Covenant; or, A Series of Short Discourses Upon the Joys, Sorrows, Glories and Virtues of the Ever Blessed Mother of God) (New York 1860) ; (The Life of Saint Mary Magdalene (New York 1860) ; (The Life of Saint Vin¬ cent de Paul* (New York 1866) ; (Lectures on Christian Unity* (New York 1867) ; cLectures on Reason and Revelation) (New York 1868) ; (Christ and the Church) (New York 1870) ; (Vicar of Christ* (New York 1878) ; (The Divine Paraclete* (New York 1879) ; (The Protestant Reformation) (New York 1879) ; (Protestantism and the Bible* (New York 1880) ; (Christian Unity) (New York 1881) ;*

(Protestantism and the Church) (New York 1882) ; (God and Reason) (New York 1884) ; (The Sacred Year> (New York 1885) ;

PRESTON, William, soldier, lawyer: b. near Louisville, Ky., 16 Oct. 1806; d. Lexing¬ ton, Ky., 21 Sept. 1887. He was educated at the Harvard College Law School, from which he was graduated in 1838. He then entered upon the practice of law in Kentucky and took much interest in politics. During the Mexican War he served as lieutenant-colonel of a Ken¬ tucky regiment. In 1851 he was a Whig repre¬ sentative in the Kentucky legislature, but when the Whig party broke up he became a Demo¬ crat. During Buchanan's administration he was Minister to Spain. He returned to America in time to see the beginning of the Civil War. In 1861-62 he was colonel on the staff of Albert Sidney Johnston. In 1862 he was made briga¬ dier-general. He was engaged in the campaigns of the Western army, notably at Vicksburg, Baton Rouge, Murfreesboro and Chickamauga. In 1864 he was sent to the Trans-Mississippi Department and in 1865 was made major-gen¬ eral. After the war he settled in Lexington, where he practised law until his death. In 1867 he was a member of the Kentucky legis¬ lature and in 1880 a delegate to the National Democratic Convention.

PRESTON, William Campbell, American legislator and educator : b. Philadelphia, Pa., 27 Dec. 1794; d. Columbia, S. C., 22 May 1860. He was graduated from the South Carolina College in 1812, studied law and was admitted to the bar in 1820. He established a law prac¬ tice in Columbia, S. C., in 1823, and speedily became prominent in his profession, excelling as a jury lawyer. He sat in the State legis¬ lature in 1828 and in 1830-32, where he boldly advocated nullification and won a high reputa¬ tion as an orator. In 1833 he was elected to the United States Senate, but refused to act with his colleague, Calhoun, in the latter's support of Van Buren, and resigned his office in 1842. In 1845-51 he was president of the South Carolina College and a trustee of it from 1851 to 1857 and proved an able and successful administra¬ tor. He established the Columbia Lyceum,

which he endowed with his own library of 3,000 volumes. Consult Miller, W. L., (William Campbell Preston) (in The Green Bag, Vols. XI and XII, Boston 1899-1900) ; O'Neall, J. B., (Biographical Sketches of the Bench and Bar of South Carolina) (Charleston 1859).

PRESTON, Canada, town in Waterloo County, Ontario, at the confluence of the Speed and Grand rivers, 55 miles, direct, southwest of Toronto, on the Grand Trunk and Canadian Pacific railways. It is an outport for Ontario and has flour and saw mills as well as manu¬ factories of iron castings, woolens, shoes, fur¬ niture, piano-players and other industries, in¬ cluding machine shops. The population is steadily increasing. Pop. 3,882.

PRESTON, England, an important manu¬ facturing town of Lancashire, 28 miles north¬ east of Liverpool, on a height above the north bank of the Ribble, near the head of its estuary, and on the London and North-Western and the Lancashire and Yorkshire companies railways. The river is spanned by five bridges. The handsome central railway station cost about $1,000,000. Other important buildings are the Gothic town-hall ; courthouse, in the Doric style; a new infirmary, the house of correction, the custom-house, corn-exchange, new gas offices, large and handsome market-shed, ex¬ tensive barracks, workhouse, theatre and as¬ sembly-rooms; the Literary and Philosophical Institution, provided with a library and mu¬ seum; the Harris Institute of Literature, Art, Science and Technical Instruction (formerly the Mechanics' Institute, and now greatly en¬ larged) ; The Free Public Library and Museum, in the Grecian style, with many valuable paint¬ ings, etc. The ecclesiastical edifices include a number of Established churches, beside Roman Catholic and other chapels. Among the former Christ Church is admired for the purity of its Norman architecture; and the parish church, which has been rebuilt in the decorated style of the 14th century, with a spire 196 feet high, is also a fine building. Saint Walburge's Ro¬ man Catholic Chapel, which has a beautiful spire 306 feet high, ranks as the most splendid place of worship in Preston. . The town is sup¬ plied with water from reservoirs situated near Longridge, 18 miles northeast of Preston with a capacity of 405,000,000 gallons. On the south side of the town are two beautiful public parks, and on the north side is the Moor Park. The original staple manufacture of the town was linen, which is still woven, but has been completely eclipsed by the cotton manufacture, especially spinning, first introduced in 1777. There are engineering works, machine-shops, iron and brass foundries, boiler works, brew¬ eries, malt-houses, roperies, tanneries, etc. A considerable shipping trade is carried on, though it was long obstructed by the condition of the Ribble. Since 1884 the river has been canalized and large docks have 'been built and a very considerable increase in the trade has taken place. Preston and Lancaster are connected by canal.*

Preston is said to have risen on the decay of Ribchester, the Roman Rigodunum, situated about 11 miles farther uo the river. Its name, originally Priest's town, it owed to the number of religious houses which it contained. About 600 it was a Saxon settlement; in 1322 it was

taken and burned down by Robert Bruce ; in the great Civil War it espoused the Royalist cause, and suffered severely during the contest, having been twice captured by the Parliamen¬ tarians, who on the latter

occasion were headed by Cromwell in person ; in the rebellion of 1715 it was occupied by the Jacobite forces, who erected barricades and made a brave resistance, but were ultimately obliged to surrender. Modern Preston is a Parliamentary borough, returning two members. Its municipal govern¬ ment is in the hands of a mayor, 12 aldermen and 36 councillors. Pop. about 117,113. Con¬ sult Clemesha, H. W., (A History of Preston in Amounderness5 (in Publications of the University of Manchester, No. 67, Historical Series No. 14, 5 Manchester 1914) ; Fishwick, H., (History of the Parish of Preston) (Roch¬ dale 1900) ; Whittle, P., (History of the Borough of Preston> (2 vols., Preston 1837).*

PRESTONBURG, Engagements at and near. In September 1861 Col. John S. Wil¬ liams began to organize a Confederate force at Prestonburg, in eastern Kentucky, to operate in the interior of the State. On 8 November Gen. William Nelson, who had advanced against him with three Ohio regiments, detachments of Kentucky infantry and cavalry and two sec¬ tions of artillery, with a part of this force en¬ countered a detachment thrown forward by Williams to cover his withdrawal. After a well-contested engagement at Ivy Mountain, Williams was forced from his position and re¬ treated through Pound Gap into Virginia, with a loss of 10 killed, 15 wounded and 40 missing. Nelson was recalled to Louisville, ' and Wil¬ liams returned to Prestonburg. Gen. Humphrey Marshall had been ordered, 1 November, to the command of the Confederate forces in eastern Kentucky, including those of Williams, and soon had in addition two Virginia regiments and a battery of four guns, making a total force of about 2,400 men, who were badly clothed, many of them barefooted, and generally badly armed, many of the men having only shotguns and squirrel-rifles. In the beginning of January 1862 Marshall had the greater part of his com¬ mand intrenched near Paintsville, on the main branch of the Big Sandy River, a few miles north of Prestonburg. On 17 December Gen¬ eral Buell assigned Col. James A. Garfield to the command of a brigade of about 3,000 men, partly cavalry, and sent him against Marshall and to clear the valley of the Big Sandy. On the 23d, when Garfield began his march up the course of the river, the greater part of the brigade was concentrated at Louisa, on the Big Sandy. On 6 Jan. 1862, after _ driving in several scouting parties, Garfield arrived within seven miles of Paintsville. Marshall, well in¬ formed of his approach, fell back from Paints¬ ville on the night of the 5th to the forks of Middle Creek, about three miles above Pres¬ tonburg. Garfield advanced through Paints¬ ville, defeated Marshall's cavalry at the mouth of Jennis' Creek on the 7th, and on the morning of the 10th attacked Marshall on Middle Creek with cavalry and was repulsed by artillery alone. Garfield now attacked with infantry and the fight continued from noon Jo near dark with varying success, several Union advances being repulsed; but Marshall finally

til next morning, when, being out of food for his men, he marched to Martin's Mill. Garfield did not pursue. He crossed the river on the 11th and occupied Prestonburg, and on the 12th and 13th withdrew to Paintsville. Both sides claimed the victory. Garfield had 1,700 men on the field, and his loss was two killed and 25 wounded. Marshall had 1,500 engaged, and lost 11 killed and 15 wounded. Consult (Official Records) (Vol. VII) ; The Century Company's (Battles and Leaders of the Civil War5 (ed. by R. U. Johnson and C. C. Buel, Vol. I, New York 1887) ; (War of the Rebellion: Com¬ pilation of Official Records of the Union and Confederate Armies5 (Series 1, Vol. VII, p. 21; Vol. XX, Pt. 1, p. 31; Vol. XXI, p. 1065; Washington 1882-88).

PRESTONPANS, pres-ton-panz', Scot¬ land, a small town in Haddingtonshire, on the Firth of Forth, nine miles east of Edinburgh, celebrated for the battle fought in the vicinity, 21 Sept. 1745, when the Highlanders, headed by Prince Charles, defeated the royal troops commanded by Sir John Cope. Pop. 1,923. Consult M'Neil, P., (Prestonpans and Vicinity5 (Tranent 1902).

PRESTWICH, Sir Joseph, English geolo¬ gist: b. London, 12 March 1812; d. Shoreham, Kent, 23 June 1896. He spent one year at Uni¬ versity College, London, continued his geological studies though at the age of 18 he entered his father's office and for many years he was a prominent wine merchant. The Geolog¬ ical Society conferred a medal upon him in 1849, and he received like honors from the Royal Society in 1865. In 1864 he became a member of the Water Commission and in 1866 of the Royal Coal Commission. In 1870 he be¬ came president of the Geological Society and in the same year married. In 1872 he retired from business. He became professor of geology at Oxford 1874 and though advanced in years for the adoption of a new profession his vast learning and the vigor with which he approached his new task enabled him to fill the position with great success. His most important researches relate to the Tertiary deposits, which he re¬ arranged and reclassified, and evidences con¬ cerning the existence of the prehistoric man. He also applied his knowledge to the practical question of obtaining from underground waters a better supply for cities. He retained his pro¬ fessorship at Oxford until 1888, was Connected with various important scientific societies and in 1896 was knighted. He was a Fellow of the Geological Society, the Royal Society, the Chemi¬ cal Society, the Geological Society of France, an associate of the Institute of Civil Engineers and an honorary and corresponding member of a number of English and foreign scientific so¬ cieties. Oxford University gave him the de¬ gree of D.C.L. in 1888. His writings reached the large number of 140. Of these the

follow¬ ing were published in book form: (A Geolog¬ ical Inquiry respecting the Water-bearing Strata of the Country around London, etc.' (London 1851 ; new ed., 1895) ; (The Ground beneath Us : Its Geological Phases and Changes, etc.5 (London 1857) ; (An Index Guide Jo the Geological Collections in the University Museum, Oxford5 (Oxford 1881) ; (Geology, Chemical, Physical and StratigraphicaP (2 vols., Oxford 1886-88) ; Collected Papers on Some

Controverted Questions in Geology } (London 1895) ; (On Certain Phenomena Belonging to the Close of the Last Geological Period, and on their Bearing upon the Tradition of the Flood (London 1895). The balance of his writings was published in scientific journals and maga¬ zines. Consult Lady Prestwich, (Life and Let¬ ters of Sir Joseph Prestwich) (Edinburgh*

1899).

PRESUMPTION, in law, is a supposition held as good or real before it is shown or cer¬ tainly known to be so. Presumptions are either juris, or juris et de jure. A legal presumption in law is one established in law till the contrary be proved. Thus, a person who has the pos¬ session of goods is presumed to be the owner, or a man is assumed to be innocent unless the contrary be proved. Presumptions are adopted from the necessity of arriving at some conclu¬ sion or other in most cases where the evidence is general or inconclusive. Thus, where a per¬ son has disappeared and has not been heard of, the law will in general presume that he is still alive, unless after a lapse of time considerably exceeding the ordinary duration of human life; but if there be evidence of his continuous unex¬ plained absence from home, and of the non¬ receipt of intelligence concerning him for a period of seven years, the presumption of life ceases.

PRETENDER, The. See Stuart, James Francis Edward.

PRETENDER, The Young. See Stuart, Charles Edward.

PRETORIA, prˆ-td'ri-a, South Africa, ad¬ ministrative capital of the Union of South Africa (q.v.) and the province of the Trans¬ vaal (q.v.), situated on the banks of the small river Aapies, a tributary of the Limpopo, 4,500 feet above sea-level, 46 miles northeast of Johannesburg, 349 miles by fail west of Delagoa Bay and 1,003 miles by rail northeast of Cape Town. The town is regularly laid out and many of the streets are planted with splendid willow trees. The most important public buildings are the government

buildings, in Church Square, surmounted by a statue of Liberty; the post office; the Dutch Reformed church, formerly in the centre of Church Square, destroyed in 1905 ; the Anglican cathedral of Saint Alban; a Roman Catholic church, with school and convent buildings ; a new Dutch Reformed church; the former presi¬ dency and residence of the late Paul Kruger (q.v.) ; the Jewish synagogue, a handsome build¬ ing ; the new market buildings ; the law courts ; a public library, containing English and Dutch books; the National Museum adjacent to the Zoological Gardens; a new opera-house. Pre¬ toria, since 1916, is the administrative seat of the newly constituted University of South Af¬ rica, consisting of six colleges in various parts of the Union with a total of 87 teachers and 560 students in 1915-16. The town is lighted by electricity, and public waterworks were opened in 1891. Just outside the town are the barracks, and near them the prison is situated. In 1896 the Boer authorities began the con¬ struction of a circle of six forts round the town, which since the Boer War have been dis¬ mantled. Pretoria was founded in 1855, and

was named in honor of Andries Pretorius, the first President of the South African Republic. Iti 1864 it replaced Potchefstroom as the seat of the central administration. In December 1880 the British garrison in Pretoria was be¬ sieged by a force of Boers, and on the retro¬ cession of the country in the following year the town was evacuated by the British troops. The gold-rush which began about 1886, and the working of the natural wealth of the neighbor¬ ing Witwatersrand, had a great influence upon the condition of Pretoria, which was rapidly improved in respect of architecture and sanita¬ tion. On 5 June 1900 the town was occupied, practically without opposition, by a British force under Lord Roberts, after President Kruger, who had for many years been the dominant figure of the town, had fled in May, and then became the headquarters of the British operations in the South African War (q.v.). It was at Pretoria that on 31 May 1902 the peace articles were signed. In 1907 the first Parliament of the Transvaal (q.v.), which by that time had become a self-governing part of the British Empire, met at Pretoria. It was later displaced by a Provincial Council. Since 1903 Pretoria is a municipality, controlling its sewers, water and electric-light systems, as well as its trolley lines. There are a number of at¬ tractive suburbs, in one of which, Bryntirion, is located Meintjes Kop which has become the site for the public offices of the Union. In the cemetery at the western end of the town are buried Paul Kruger and many of ,the British who fell in the Boer War. Nearby is also the big new Central Railway station and workshops. The world-famed Premier Dia¬ mond Mine is about 30 miles northeast of Pretoria. The population, which before the war was about 12,000, has increased to over 29,618. Consult Berthold, H., Pre¬ toria, die Hauptstadt des Neuen Suedafrika) (in (Zeitschrift fur Kolonialpolitik, Kolonial- recht, und Kolonialwirtschaft

(Vol. II, pp. 826-835, Berlin 1909) ; Hillegas, H. C., Pre¬ toria Before the War (in Harper's New Monthly Magazine, Vol. C, pp. 548-557, New York 1900) ; Pretoria. News of the Camp. A Journal Published in the Military Camp of Her Majesty's Forces Defending Pretoria, 25 Dec. 1880 to 9 April 1881 * (ed. by C. Du-Val and C. Decker, Pretoria 1880-81).*

PRETORIUS (Dutch, pra-to'ri-us), Mar- thinas Wessels, Boer soldier and politician: b. Natal, 1827; d. Potchefstroom, South Africa, 19 May 1901. He took part in the ((Great Trek® of 1836, and in 1852 became commandant-gen¬ eral of the Boers. He made a name for him¬ self in his capacity as commander of the forces making war upon the Kafirs, and shortly after¬ ward (in (1860) he was elected President of the Orange Free State; in 1864 of the South Afri¬ can Republic. Re-elected in 1869, he soon after¬ ward resigned. After the Boer trouble in 1877 and following years Pretorius formed part of the provisional Transvaal government in 1880. After Kruger's election in 1883, Pretorius took small part in the affairs of the republic, being persistently opposed to the war policy against Great Britain as destined eventually to subvert the independence it sought to secure. Pretoria, the capital of the Transvaal, was named in his honor.

PREVENTIVE MEDICINE. Generally the term ((preventive medicine® has been re¬ garded as almost synonymous with public hygiene and its application has been confined to the operations of the sanitary authorities in the prevention of the infectious and com¬ municable diseases. These operations have not in the past included even all of the more im¬ portant communicable diseases, although the list in recent years has been considerably ex¬ tended. Formerly cholera, plague, yellow fever, typhus fever, epidemic dysentery, small¬ pox, scarlet fever, diphtheria and typhoid fever practically comprised all of the diseases which came specifically under the supervision of the public health authorities. Recently this list has been considerably increased by some sani¬ tary boards. Many of the diseases referred to — for example, cholera, plague, yellow fever, epidemic dysentery — have practically passed from the supervision of the authorities, at least in the temperate zones, because either they no longer occur at all in these regions or only occasionally a case or a group of cases appears and calls for specific action and super¬ vision. The eradication of these epidemic diseases may be regarded as the greatest tri¬ umph of preventive medicine. It will of course be noted that public hygiene or preventive medicine, in this restricted sense, has taken little or no cognizance as yet of many exceed¬ ingly important communicable diseases, such as syphilis, gonorrhoea, puerperal fever and, generally

speaking, even of tuberculosis.

Preventive medicine in the proper sense has a very much broader scope than that indicated and may be defined as the sum of all medical knowledge applicable to the prevention of dis¬ ease — of all disease in the broadest sense and not simply of the communicable diseases. It presupposes the widest knowledge of medicine and has its essential foundation in our knowl¬ edge of the anatomy and causation of disease. Preventive medicine comprises, there¬ fore, the prophylaxis of disease ; it is general, comprising those measures which are applicable to the prevention of disease in the community (including especially the communicable dis¬ eases), and it is individual, as. applied to the prevention of disease of all kinds in the in¬ dividual members of the community. General prophylaxis refers to what are spoken of as preventable diseases and these in the broad sense may be regarded as all of the infectious diseases which are communicable. Individual prophylaxis has a still wider scope and in¬ cludes the whole sum of. medical knowledge as applied to the prevention of diseases (of all varieties) and the prolongation of life. Gen¬ eral prophylaxis and individual prophylaxis do not always run along wholly parallel lines; for what is best for the individual is not neces¬ sarily best for the community. Preventive medicine is an applied science and includes all purely medical knowledge applicable to. the at¬ tainment of its aim. In securing its aim pre¬ ventive medicine necessarily improves the gen¬ eral physical well-being of the individual and thus life is rendered not only longer, but happier.

General prophylaxis attains its purposes in different ways. Through the establishment of sea quarantine it attempts to exclude infectious

diseases which are endemic. These are spoken of as ((quarantinable diseases® and they of course must differ with locality, depending upon what communicable diseases are endemic in a locality. In the United States, plague, cholera, typhus fever, yellow fever and leprosy are the diseases which the authorities especially attempt to exclude from the country. Scarlet fever, measles, diphtheria and smallpox, being endemic, are not held at quarantine, but are referred to isolation hospitals for supervision until their termination. During recent years the quarantinable diseases have been almost completely excluded from this country. Oc¬ casionally a case has been admitted at some point and a group of cases or a localized epidemic has followed; but in almost all in¬ stances the outbreaks have been of a restricted and local character. It does not seem probable that in North America there will ever again be any serious danger of the prevalence of cholera, plague, typhus fever or leprosy. In dealing with the other communicable diseases specific methods have been devised, depending upon the nature of the disease and the method of its

transmission. In some instances the at¬ tempt is made to destroy the cause or prevent its entrance into the body; in other instances, to render the individual insusceptible to the cause and at the same time protect him from exposure to infection. For example, the cause of smallpox not being known, it is vain to attempt to destroy it in the individual ; but as vaccination renders a person insusceptible to smallpox, it proves an absolutely efficient means for preventing the prevalence of this disease. In cities and countries where vaccination and revaccination are enforced smallpox rapidly disappears, and even when cases are introduced from without, the disease does not extend. Thus in Prussia, where there is compulsory vaccination in infancy and revaccination at different intervals later in life, smallpox prac¬ tically does not exist. In different portions of the United States the prevalence of small¬ pox in epidemic form is determined in each instance by the thoroughness with which differ¬ ent communities have been vaccinated. In the recent Great War less than a dozen deaths from smallpox took place in an army of 4,000,000 men.

In typhoid fever the methods followed in prevention are of a different character. The typhoid bacilli which cause typhoid fever are practically always taken into the body through the mouth, usually in drinking water or food. The commonest sources of infection are con¬ taminated water, milk and oysters and also the direct infection of those in immediate contact with typhoid fever cases, by the transfer of the typhoid bacilli to the mouth on soiled hands or from eating or drinking utensils. Aerial infection plays a small part in the causation of this disease. The prevalence of typhoid fever has been very greatly restricted by the protection of the sources of water-supply, by the application of sanitary measures to the collection of milk, by proper disposal of sew¬ age and in recent years by preventive inocula¬ tion, which, in large armies, have made what was a formidable disease almost non-existent. Sewage is the medium through which the typoid infection reaches the water-supply. Milk

is infected, not when derived from the animal, but subsequently, from the washing of utensils with contaminated water or in some similar way. As yet no active measures have been adopted by the sanitary authorities to prevent the contamination of shellfish through the sewage-pollution of the water in which the shellfish beds are situated. This is probably a much more common source of infection than has been generally supposed. In the case of scarlet fever, measles, diphtheria, chickenpox, whooping-cough and mumps, prophylactic measures comprise the removal of the sick if possible to special isolation hospitals designed for this purpose and the adequate

disinfection of clothing, rooms, furniture, bedding, etc., which may have become infected by contact with the sick. At present no other means are available, except in diphtheria, largely because of the lack of knowledge as to the exact causes of these diseases. In diphtheria, besides these measures, there is now a method for rendering the individual insusceptible to the disease for short periods by administering immunizing in¬ jections of diphtheria antitoxin. By these in¬ jections the individual may be rendered insus¬ ceptible to the disease (as in smallpox by vac¬ cination), but the immunity is of short dura¬ tion.

Many sanitary authorities are now adopt¬ ing measures for the prevention of tuberculosis, which causes more deaths throughout the civi¬ lized world than any other single disease. Here again the problem of prophylaxis differs from that applicable to any of the other diseases mentioned. In tuberculosis the tubercle bacilli, which are the cause of the diseases, are solely contained in the discharges from the diseased tissues, but the only form of tuberculosis (the disease may affect any organ or tissue of the body) in which the discharges containing the tubercle bacilli are likely to be a source of danger to others is tuberculosis of the lungs or pulmonary consumption. In this form, tubercle bacilli are frequently present in the expectora¬ tion in almost incredible numbers. The pro¬ phylaxis of tuberculosis is, therefore, prac¬ tically comprised in the destruction of the ex¬ pectoration of persons suffering from pul¬ monary tuberculosis at the time of its exit from the body. If this could be absolutely accom¬ plished the transmission of tuberculosis from one person to another would be almost com¬ pletely avoided. A common source of infec¬ tion is probably present in the minute drops of atomized expectoration which are forcibly discharged into the air in coughing and sneez¬ ing, unless the mouth and nose are covered during these acts. The prevention of tubercu¬ losis only requires the exercise of scrupulous care with regard to the expectoration, the re¬ moval to isolation hospitals of those who are unwilling, too ignorant or unable because of weakness, to adopt proper precautions and the disinfection of rooms, with their contents, which have been occupied by tubercular patients. There remain to be considered, aside from this prophylaxis as applicable to the human being the measures necessary because of the possible transmission of the disease from animals, especially through the meat and milk of tubercular cows. But while this is a real danger, its importance has probably been

greatly overestimated. It is now well known that tuberculosis very rarely exists at birth. It is never inherited, in the strict sense, and only in very exceptional instances does intra¬ uterine infection occur.

General prophylaxis has as yet scarcely touched upon many of the other infectious and probably, to some extent at least, preventable diseases. The

venereal diseases have been ig¬ nored because the problem is so largely a social one. No preventive measures even promising in their character have been suggested for deal¬ ing with them. The prevalence of the puerperal diseases has been very largely reduced through individual prophylaxis at the time of childbirth.

The diarrhoeal diseases of infancy are not as a rule properly to be regarded as com¬ municable, but their prevalence has been greatly restricted through the work of health authori¬ ties in the sanitary control of milk and, to a less extent, of the water-supply. The reduc¬ tion during recent years in the death-rate from diarrhoeal diseases of children under two, which has taken place almost everywhere in this coun¬ try, is almost phenomenal, and indirectly the reduced prevalence of these diseases has ma¬ terially decreased others brought on by them — diseases of malnutrition, such as rickets, etc. The results which have thus been accomplished have been due almost entirely to increased medi¬ cal knowledge and its intelligent application to preventive medicine.

Preventive medicine, however, in the truest, broadest and best sense, includes not only this work in the general application of medical knowledge to restricting the prevalence of the infectious diseases in the community, but also the application of medical knowledge to the protection of the individual from disease of all kinds at every stage in life from birth to old age, and it is this individual prophylaxis which has received the least attention either from the medical profession or from the people. Here is a very large field for intelligence work. A moment's consideration shows at once the impossibility of formulating general rules or of applying the same rules to all individuals, for it is a matter of common observation that individuals differ widely in their physical and mental characteristics, susceptibilities and tendencies. The occurrence in different families of certain similar types of disease in successive generations is a matter of general observation, and the influences which are injurious at one period in life may be not only not harmful but beneficial at another. It is most unfortu¬ nate, from this point of view at least, that the family physician of former times is so gen¬ erally disappearing. The ideal family physician knew thoroughly the family histories of his patients, their tendencies, susceptibilities, weak¬ nesses ; he watched every stage in the life of the child from birth; he knew where to re¬ strain, where to encourage and what to pro¬ hibit, where dangers to the physical well-being lay and how to advise them for self-protection. In earlier days when the knowledge of disease was less extensive than at present, it was not within the power of the physician to advise as wisely as at present. It is well known now that disease as such is never inherited. It is too much the custom to think of disease as a definite entity, whereas it is really only an ah-

normal process. It is not possible to see or examine disease, as it has no existence as such, but in some instances the causes of disease may be studied, as is the case in the infectious dis¬ eases due to known micro-organisms. In these may be investigated the micro-organisms caus¬ ing the disease and the changes in the organ¬ isms produced by the germs ; so also may be studied the abnormal manifestations of life which these changes produce, those manifesta¬ tions, which are called the symptoms of disease. The so-called inherited diseases which are of an infectious nature are simply instances of infection during intra-uterine life, as tubercu¬ losis and syphilis. The diseases of metabolism, such as gout, diabetes, adiposity, etc, are not in¬ stances of inherited disease, when they occur in different generations in the same family, as is frequently the case, but are the result of the transmission from parent to children of func¬ tionally inefficient organs, which break down under the demands laid upon them.

Among the more recent additions to general prophylaxis are the movements now actively go¬ ing forward to prevent mental diseases. This whole movement of mental hygiene is one of the most important of modern times. While it has been recognized for years that a healthy mind can exist only in a healthy body, it is being more and more emphasized that there can be no healthy body without a sound mind.

An absolutely efficient prophylaxis applied to the individual would permit the conduct of a physiological life from birth to its termination in a physiological death, occurring when the vital resistance with which the individual was endowed at birth was exhausted. With advanc¬ ing medical knowledge and a higher civilization there should be a closer approximation to this condition in a larger and larger percentage of the population and a material prolongation of the mean lifetime.

Hermann Michael Biggs, M.D., New York State Public Health Commissioner.

PREVIOUS QUESTION, a question put to a parliamentary body with the object of sus¬ pending debate on the subject under considera¬ tion, the question being put upon a member's motion in order to ascertain if the assembly desire to vote upon the subject at once. The form of the question is : "Shall the main ques¬ tion 'now be put?® Any member may demand the previous question and if the vote be in the affirmative, the main question as ordered, whether a single motion or all the motions necessary to put the measures through all its stages to final passage, is put to a vote. _

If the previous question be ordered on a question on which there has been no debate, then 40 minutes of debate are permitted, but if there has been even a brief debate before the pre¬ vious question is ordered, an immediate vote must follow the ordering of the previous ques¬ tion. The 40 minutes are divided equally be¬ tween the supporters and opponents of the measure. In practice the member having charge of a measure and having the floor usually calls for the previous question at the end of his speech unless the measure is being debated un¬ der a special order. (See Closure; Parliamen¬ tary Law). Consult Hinds, A. C., (Digest and Manual of Rules and Practice of the House of Representative (Washington 1908).

PREVOST, pre-vo', Augustine, English soldier: b. Geneva, Switzerland, about 1725; d. England, 5 May 1786. He entered the army, served under Wolfe at Quebec as captain of the 60th regiment. He was promoted to the rank of lieutenant-colonel in 1761, and four years later he was made commander of the troops in the Southern Department and was stationed at Pensacola, and in 1778 captured the fort at Sunbury, Ga., for which service he was brevetted major-general. He then commanded the forces which defeated Gen. John Ashe at Briar Creek in 1779, but failed in an attempt to capture Charlestown in that year. He dis¬ tinguished himself by his successful defense of Savannah against the Americans and French in October 1779, and received full rank as major- general in recognition of his services. His son was Sir George Prevost (q.v.).

PREVOST, pra'vo', Eugene Marcel,

French novelist: b. Paris, 1 May 1862. He was educated at the Polytechnic School in Paris and until 1891 he was engaged in tobacco manu¬ facturing at Lille. His conceptions are clever and well worked out, his style easy and usually graceful, but his later work, though brilliant, shows a tendency to the delineation of morbid emotional types. His first book, (Le Scorpion) (1887), attracted great attention from its attack on the Jesuit system of education). His later works include (1892) ; (Lettres de femmes) (1893); Nouvelles lettres de femmes) (1893) ; (Demivierges) (1894) ; (Le moulin de Nazareth (1894) ; (Notre compagne* (1895) ; (Le jardin secret* (1897) ; (Dernieres lettres de femines) (1897) ; (L'Heureux menage* (1901); (Nimba* ; (Le mariage de Julienne*; {Les vierges fortes) (1901) ; (Lettres a Fran- qoise* (1902); (La pas releve* (1903); (La plus faible) (comedy 1904) ; (La princesse d'Erminge) ; L'Accordeur aveugle* (1905) ;*

*(Monsieur et Madame Moloch J (1906) ; (Femmes> (1907) ; (Lettres a Franˆoise mariee**

(1908).

PREVOST, Sir George, English soldier, sop of Augustine Prevost (q.v.) : b. New York, 19 May 1767 ; d. London, England, 5 Jan. 1816. He entered the army in early youth, distinguished himself in the West Indes, was promoted major-general in 1805 and created a baronet later in the same year. In 1808 he was appointed lieutenant-governor of Nova Scotia and in the autumn of that year he conducted a division of troops to the West Indies where he participated in the capture of Martinique as second in command. He was made lieutenant-general in 1811, and appointed governor in-chief of British North America, a position he held throughout the war that fol¬ lowed. In the War of 1812 he rendered im¬ portant service to his government, but his de¬ feat at Plattsburg in 1814 forced him to aban¬ don his attempt to invade New York and brought him under censure. He died before a verdict of the court-martial had been rendered.

PROVOST D'EXILES, pra-vo deg-zel, Antoine Francois, French author: b. Hesdin (Artois), 1 April 1697; d. near Chantilly, 23 Nov. 1763. He was at first a Jesuit, then

enlisted in the army, after a brief return to the order again turned soldier, and still later joined the Benedictines of Saint Maur. Subsequently he lived in Holland and England, and in 1735 became almoner and secretary of the Prince de Conti. He was a great admirer of England and things English and his writings, his influ¬ ence and his translations from English into French created a great interest in English literature; and this in its turn helped to pave the way for the democratic and liberal tend¬ encies which later took possession of the literature of France. Rousseau was the first great writer notably to exhibit this tendency. (Manon Lescaut, which became immensely popular, influenced most of the great writer's from the days of Prevost to Victor Hugo. He founded Le Pour et le Contre, a journal patterned after the Spectator, which ran through 20 volumes (1733-40) ; translated Rich¬ ardson and Hume's 'History of England) ; and wrote a (Histoire des Voyages* (1747-80), and several works of fiction, including (Le Doyen de Killerine* (1732-35) ; 'Memoires et Aven- ture d'un Homme de Qualite qui s'est Retire du Monde) (1728-56), which includes (Manon Lescaut,* a story of some celebrity in French literature, frequently reprinted, and the basis of a drama (1851) by Barriere and Fournier and (Contes, Aventures et Faits Singuliers) (1764). A selection from his works appeared at Paris in 1810-16. (See Manon Lescaut). Consult Harisse, 'L'Abbe Prevost* (Paris 1896) ; Schroeder, V., (Un romancier frangais XVIIe siecle, l'abbe Prevost* (Paris 1898) ;*

(Rousseau and the Cosmopolitan Spirit in Literature) (New York 1899) ; 'Sainte-Beuve, 'Causeries de lundi* (Vol. IXj Paris 1862).*

PR&VOST-PARADOL, pra-vo pa-ra-dol, Lucien Anatole, French writer: b. Paris, France, 8 Aug. 1829; d. Washington, D. C., 11 Aug. 1870. He was educated at the College Bourbon and the Lcole Normal, was editor of 'La Revue d'Histoire Universelle in 1854 and in 1855 accepted the chair of literature at the University of Aix, but resigned in 1856 to be¬ come editor of the Paris Journal des Debats. As a journalist, his keen irony, his brilliant, forcible style rendered him a formidable ad¬ versary. A believer in constitutional govern¬ ment he was opposed to Napoleon III. His articles were instrumental in recalling the French army from Mexico, but his contribu¬ tions to the Courier du Dimanche caused the suppression of that journal in 1866. After the formation of the Ollivier ministry in 1870 he became reconciled to the empire and accepted the post of Ambassador to the United States. The trying conditions of the war had generally, preyed upon his mind and he committed suicide shortly after his arrival. His editorials are still considerable models of journalistic style and his books include (Du Role de la Famille dans l'Education) (1857) ; 'Quelques Pages d'His¬ toire Contemporaine) (4 vols., 1862-66) ; (La France Nouvelle) (1868). Consult Gerard, 'Prevost-ParadoP (Paris 1894).*

PREWITT, proo'it, Theodore Freling- huysen, American surgeon : b. Fayette, Mo., 1 March 1832; d. Saint Louis, Mo., 17 Oct. 1904. He was graduated at the Saint Louis Medical College in 1856 and engaged in practice at Utica, Mo., but in 1863 removed to Saint

Louis where he remained. He was resident physician and surgeon at the City Hospital, chief surgeon of Saint John's Hospital and dean of the Missouri Medical College. After the consolidation of the Missouri Medical College with the Saint Louis Medical College as the medical department of Washington University he occupied the chair of surgery. He was president of the Saint Louis Medical Society, the Missouri State Medical Society and of the American Surgical Association.

PREYER, pri'er, Wilhelm Thierry, Ger¬ man physiologist : b. Manchester, England, 4 July 1841 ; d. Wiesbaden, Germany, 15 July 1897. He was educated in the universities of Bonn, Berlin, Heidelberg, Vienna and Paris, took de¬ grees in both philosophy and medicine and in 1869 was appointed professor of physiology at Jena. In 1888 he became privat-docent at Ber¬ lin. He has made valuable investigations in the fields of quantitative spectral analysis, the per¬ ception of sound and the precise qualities of the senses. He carried on important re¬ searches relative to the blood, respiration and similar subjects. Of his books the most famous is 'Die Seele des Kindes) (1881), and especially deserving of mention are

(Ueber Empfindungen) (1867) ; (Ueber die Grenzen der Tonwahrnehmung (1876); 'Elemente der allgemeinen Physiologie) (1883) ; 'Der Hyp- notismus) (1890).*

PRIAM, pri'am, the last king of ancient Troy, was the son of Laomedon and Strymo or Placia. He was the 6th of the Trojan kings and reigned 40 years. His territory included Lesbos, Mysia and the Hellespont. When a youth he marched with the Phrygians against the Amazons, and went as ambassador to the Thracians. After the death of his father he reigned in Troy. By his first wife, Arisbe, daughter of Merops, he had 2Esacus. He after¬ ward gave Arisbe to Hyrtacus, and married Hecuba, by whom he had, according to Homer, 19 children, among whom Hector, Alexander or Paris, Creusa, Laodice, Polyxena, Cassandra, Deiphobus, Helenus, Pammon, Polites, Anti- phus, Hipponous, Polydorus and Troilus were the most distinguished. By four concubines he also had 30 sons and four daughters. When he was extremely old the Greeks demanded of him the restoration of Helen, who had been carried away by Paris, and on his refusal to give her up they made war against Troy, took and de¬ stroyed the city, after a siege of 10 years, his son Hector having already fallen. According to later legends, when the Greeks entered the city he armed himself, to seek death in the midst of the enemy; but Hecuba prevailed upon him to take shelter at the altar of Zeus. Here he saw his son Polites fall by the hand of Pyrrhus ; and, unable to contain himself, hurled his javelin at the youth, who dragged the old man by the hair from the altar and plunged a sword into his breast. See Troy.

PRIAPUS, pri-a'pus, in Greek mythology, a field and garden god especially honored in Lampsacus, a town of Mysia, situated in a rich wine country. Aphrodite bore him to Dionysus when the latter was returning from India, though his father unwillingly acknowledged him on account of his ugliness. The first fruits of the crops were offered to him as the god of the fields, the protector of gardens, bees,

goats and sheep. Homer and Hesiod do not mention him and it was only in later times that he was honored with divine worship. He was represented with horns and goat's ears, and large phallus, having in his lap all kinds of fruit ; in his hand he held a sickle, and usually a horn of plenty. His worship spread from Lampsacus to Greece and thence to Rome. He represents the productive power of nature and is the god of sensual pleasure. His image was set up in gardens and fields to scare away birds ; and this was probably the origin of the modern scarecrow ; at any rate the

< idea had begun to take pos¬ session of the more educated before his wor¬ ship disappeared ; and his name was made the subject of many coarse jests by the poets and writers.

PRIBER, pre-bar, Christian, French Jesuit in America. He came among the Cherokee Indians in 1736 and took up his residence with them in Great Tellico Town in what is now East Tennessee. Intending to make a dictionary and grammar of the Cherokee language he adopted the dress of the Indians to lessen their feeling of his being a stranger, meanwhile striv¬ ing to civilize and convert them. His influence among the Cherokees grew to such an extent that they adopted a code of laws he prepared for them thereby exciting the distrust of the English government of South Carolina. Fear¬ ing French influence the English demanded Priber from the Indians, who refused to sur¬ render him, and the safety of the English envoy was secured only by Priber's interference. But while traveling in Alabama in 1741 he was seized by the English authorities and cast into prison in Frederica, Ga., where he soon died.

PRIBILOF, pre'be-lof, or «FUR SEAL ISLANDS, » a group of islands in Bering Sea, belonging to the United States, about 200 miles north of the Aleutian Islands and 320 miles west of Bristol Bay. The largest islands of the group are Saint George, Saint Paul, Walrus and Otter, while the others consist of a number of islets, all of volcanic origin. The total area is about 180 square miles. This group is of great importance as here is the breeding place of the fur-seal, sea-bear, otter and blue-fox. About May the seal come to Pribilof Islands, where the fog hangs over the land almost con¬ tinuously. The islands were discovered toward the end of the 18th century by Gerassim Priby- lof (or Pribyloff), a Russian, and first mate on the boat Saint George. He had been drift¬ ing about in the Bering Sea, looking for the breeding place of the fur-bearing seal, and at last he found it. He took possession of the island for Russia, and named it Saint George after his boat. Later the second island was discovered and called Saint Paul and the whole group was named after its discoverer. There are on the islands about 600 permanent resi¬ dents. Saint Paul, the largest island of the group, has an area of about 35 square miles and a population of over 200. Saint George has about half this population and an area of 27 square miles. In 1868 the Pribilof Islands were made a fur-seal reservation by the Ameri¬ can government ; and since then schools and churches have been built on the islands, rein¬ deer have been introduced and the condition of the natives has been very materially im¬

proved. Consult Elliott, H. W., (Our Arctic Province } (New York 1887) ; Greely, A. W.. (Handbook of Alaska) (New York 1914) ; Jones, E. L., 'Report of Alaska Investigations in 1914) (Washington 1915).

PRICE, Bonamy, English economist : b. Saint Peter Port, Guernsey, 22 May 1807 ; d. London, 8 Jan. 1888. He was educated at Worcester College, Oxford, and in 1830-50 he was assistant master at Rugby. He then en¬ gaged in business and literary work in London and from 1868 he was Drummond professor of political economy at Oxford. He was popular as a lecturer on political economy and was an advocate of free trade. He lectured in the United States in 1874. Besides numerous pam¬ phlets he was author of Principles of Cur- rency) (1869); 'Currency and Banking) (1876); 'Chapters on Practical Political Economy)

(1878).

PRICE, Ira Maurice, American Oriental¬ ist: b. Welsh Hills, near Newark, Ohio, 29 April 1856. He was educated at Denison Uni¬ versity, the Baptist Union Theological Semi¬ nary at Morgan Park, Ill., and at the University of Leipzig. He was professor of Greek and modern languages at the University of Des Moines (now Des Moines College) in 1879-80; and subsequently was connected with the facul¬ ties of the Morgan Park Military Academy, the Wheaton (III.) Theological Seminary and Har¬ per's Hebrew Correspondence Schools. He was instructor and later professor of Hebrew and cognate languages at the Baptist Theolog¬ ical Seminary in 1886-1900. In 1900 he became professor of Semitic languages and literature at the University of Chicago, and since 1910 he has also been secretary of that department. He has been associate editor of the Biblical World and of the American Journal of Semitic Languages and Literature since 1892, and of the American Journal of Theology since 1867. He was a contributor to Hastings' 'Dictionary of the Bible) and 'Dictionary of Religion) ; 'The Jewish Encyclopedia1 ; 'Standard Bible Dic¬ tionary) ; and the 'Encyclopedia Americana> ; author of 'Introduction to the Inscriptions Discovered by M. De SarzecJ (1887) ; 'A Sylla¬ bus of Old Testament History) (1890; 9th ed., 1915) ; 'The Ancestry of Our English Bible) (1907; 5th ed., 1911).*

PRICE, Julius Mendes, English traveler : b. London, England. He was educated in Brus¬ sels and at the Lcole des Beaux Arts, Paris ; entered journalism and was a special artist- correspondent of the Illustrated London News. In 1884-85 he served in the army with the Bechuanaland campaign in South Africa when he enlisted, for journalistic purposes, as a trooper, in Methuen's Horse, serving with the regiment until its disbandment. He went with the expedition to open up the Nordenskiold route to the interior of Siberia via the Kara Sea, the Arctic Coast of Siberia and up the Yenesei River. He became so interested in the country that he afterward traveled alone through Siberia, Mongolia, and the Gobi Desert via northern China, to Peking (1890-91). Four years later he visited the western Australian goldfields. He was with the Greek army in the Graeco-

Turkish War in 1897, was engaged in an expedition in the Northwest Territory, Canada, and down the Yukon River to the

Klondike in 1898 and was in China in 1900-01. He served as special artist for the Illustrated London News and war correspondent of the Daily Telegraph during the Russo-Japanese War (1904-05). In the European War he was with the French army at first and later with the Italian Headquarters Staff, where he was official war correspondent to the Italian govern¬ ment in 1917. He has published (From the Arctic Ocean to the Yellow Sea5 (1892) ; (The Land of Gold) (1896) ; (From Euston to Klon-dike) (1898); (Dame Fashion) (1913); (My Bohemian Days in Paris) (1913) ; (My Bohe¬ mian Days in London5 (1914) ; (Six Months on the Italian Front) (1917). He has also written many magazine and newspaper articles illustrated with his own sketches and drawings.

PRICE, Langford Lovell, English political economist: b. England, 20 July 1862. He was educated at Trinity College, Oxford; was lec¬ turer to the Toynbee Trust in 1886-87 and in 1895-96; Nuomarch lecturer in statistics at Uni¬ versity College, London ; governor of Dulwich College, 1897 ; examiner at Victoria Universitv in 1898 and in 1903 was called to that position at the University of Wales. He has published (Industrial Peace) (1887) ; (West Barbary5 (1891) ; (A Short History of Political Econ¬ omy in England5 (1891) ; (Money and its Re¬ lation to Prices) (1896) ; (A Short History of English Commerce and Industry5 (1900) ; (The Study of Economic History5 (1908) • (Co-oper¬ ation and Copartnership5 (1914) : (Ely and Wicker's Elementary Principles of Economics5

(1915).

PRICE, Richard, British Unitarian clergy¬ man and political economist and moral philoso¬ pher: b. Tynton, Glamorganshire, Wales, 22 Feb. 1723; d. London, 19 April 1791. In 1743 he became pastor of a Unitarian congregation at Stake Newington, where he continued most of his life. He published in 1758 (Review of the Principal Difficulties in Morals,5 which was followed by (Four Dissertations on the Im¬ portance of Christianity, the Nature of His¬ torical Evidence and Miracles, etc.5 (1767). In 1771 appeared his Observations on Reversion¬ ary Payments and Annuities,5 succeeded by the celebrated Northampton Mortality Tables,5 and other valuable works relating to life assur¬ ance and annuities. He also published (Appeal to the Public on the Subject of the National Debt5 ; and during the contest with the North American colonies, Observations on the Na¬

ture of Civil Liberty5 and the (Justice and the Policy of the War with America5 (1776). This work was widely circulated in this country, and Congress, through Franklin, expressed its desire to receive his assistance in regulating the national finances. When Pitt became Prime Minister he consulted Price in his schemes for the reduction of the national debt, and the establishment of the sinking fund was by his recommendation. Consult Morgan, William, (Memoirs of the Life of Richard Price5 (Lon¬ don 1815).

PRICE, Sterling G., American soldier: b. Prince Edward County, Va., 11 Sept. 1809; d. Saint Louis, Mo., 29 Sept. 1869. He was edu¬ cated at Hampden-Sidney College, studied law, removed to Chariton County, Mo., in 1831, and in 1840 was elected to the Missouri house of representatives, of which he was speaker until

PRICES

1844 when he was elected to Congress. He re¬ signed on the outbreak of the Mexican War and organized a cavalry regiment of which he was commissioned colonel. Under General Kearney he matched with his men from Fort Leavenworth to Santa Fe where he was left in charge. Attacked by the Mexicans he repulsed them severely and completed the conquest of California. In 1847 he was promoted briga¬ dier-general of volunteers, became military governor of Chihuahua, and in 1848 won a de¬ cisive victory over the Mexicans at Santa Cruz de Rosales. In 1853-57 he was governor of Missouri, and in 1861 presided over the con¬ vention called to decide the secession question. He was a ˆConditional Union55 man but later joined the Confederacy, and in 1861 was ap¬ pointed major-general of State forces, partici¬ pating under Gen. Ben McCulloch, in the de¬ feat of the Union forces at Wilson's Creek in August of that year. He then captured Lexing¬ ton-on the Missouri, but was forced to retreat before Fremont. He served Under Van Dorn at Pea Ridge in 1862 and was promoted major- general in the Confederate army. He com¬ manded one wing of Van Dorn's army at Cor¬ inth. He was defeated by Rosecrans at Iuka, MFss. ; accompanied Beauregard in his retreat to Tupelo, and afterward serving in the Trans- Mississippi department, was there engaged in the unsuccessful attempt to capture Helena in 1863. In 1864 he succeeded in preventing General Steele's advance toward Red River, and later made a raid into Missouri. He was driven into southwestern Arkansas toward the close of the war and after the surrender he became interested in a colonization scheme in Mexico. Consult Snead, T. L., (The Fight for Missouri5 (New York 1886).

PRICE, Thomas Randolph, American edu¬ cator : b. Richmond, Va., 18 March 1839; d. New York, 7 May 1903. He was graduated from the

University of Virginia in 1855, studied at the University of Virginia and at Berlin and Kiel. In 1861 returned home to enlist in the Confederate army in which he served through the war on the staff of General Stuart. In 1867 he became professor of Latin and Greek at Randolph-Macon College, being later trans¬ ferred to the Greek and English chair; and in 1876 he was appointed to the chair of Greek and Hebrew in the University of Virginia. In 1882 he was called to Columbia University as professor of English language and literature and remained at the head of the department until his death. He published (The Teaching of the Mother-Tongue5 (1877) ; (Shakespeare's Verse Construction5 (1889) ; edited (Othello5 in the Bankside Shakespeare (1890).

PRICEITE, a friable chalky mineral 3CaO.4B2O3.6H2O. A source of borax in Oregon.

PRICES. Price is value expressed in money. Thus, price is not identical with value. It is an expression of value in terms of some one commodity, which commodity is called money. Value is thus the more fundamental term; it is the thing expressed, whereas price is the ex¬ pression of the thing.

The general scale of prices may rise or fall without any material change in the supply of or the demand for commodities in general. The forces of supply and demand, however, operate

upon money as well as upon other commodities. It is quite possible for money to become cheap, in which case considerable quantities of money will be given in exchange for small quantities of other commodities. This makes what we call ((high prices.® Oii the Other hand, money may become dear, iii which case small quantities of money are given in exchange for large quan¬ tities of the other commodities. This is what we call ((low prices.® The causes of high or low prices therefore may operate on money alone or they may operate on the other com¬ modities for which money is exchanged.

It is commonly assumed that money is cheap or dear according as it is abundant or scarce. The abundance or scarcity of money is un¬ doubtedly a factor in determining its cheap¬ ness or dearness; but with money, as with all other commodities, demand is as important as supply. The supply or the quantity, therefore, is only one factor in the problem. With an abundance of money, if there is a general desire to hold on to it and a

reluctance to spend it or to let it go, it may remain dear and its pur¬ chasing power may remain high. That is, when every one who lacks money is anxious to get it, and every one who has it is reluctant to part with it, large quantities of other com¬ modities may be offered in exchange for small quantities of money. On the other hand, when there is no great eagerness to acquire money except as a means of purchase, no general disposition to hold on to it or reluc¬ tance to part with it, it is likely to be cheap ; and when every one who lacks money desires to possess it solely for the purpose of spending it quickly, and every one who has it is anxious to spend it for the purpose of getting other commodities as quickly as possible, the result is cheap money or high prices. Large quantities of money are freely spent in order to get small quantities of the other commodities.

If we assume, even for a short period of time, that no change has taken place in the quantity of money or in the desire to possess it, then such change of prices as occurs will be due to factors affecting other commodities. Any change of fashion with respect to dress goods, or change of habit with respect to food, will of course bring about a considerable read¬ justment of prices. Under such conditions, these changes in the price list become a fairly accurate expression of the desires of the people. That which is most desired will command the highest price. That which is least desired will command the lowest price, whether it be in ma¬ terial commodities or the services of labor which are under consideration. The price list is therefore a pretty safe guide to the desires or wants of the community, and he who is anxious to give the community what it desires could scarcely do better than to follow the price list, whether he be producing commodities or selling his labor. Consult Laughlin, J. L., (Money and Prices1 (New York 1919).*

Thomas N. Carver.

PRICHARD, James Cowles, English eth¬ nologist and physician : b. Ross, Hereford¬ shire, 11 Feb. 1786; d. London, 22 Dec. 1848. He studied medicine at Bristol, London and Edinburgh, began practice at Bristol in 1810, and in 1814 became physician to the Bristol in¬ firmary. In 1813 he published Researches into

PRICKLY PEAR

the Physical History of Mankind (extended to five vols., 1836-47) ; (The Eastern Origin of the Celtic Nations* (1831); (Natural History of Man* (1843) ; Unsanity and Other Disorders Affecting the Mind* (1835); (Different Forms of Insanity in relation to Jurisprudence' (1842) ; (The Relation of Ethnology to other Branches of Knowledge* (1847). In 1845 he was appointed one of the London commission¬ ers of lunacy.*

PRICKLY ASH, any of several prickly shrubs of the United States of the rue family (Rutacece) and genus Xanthoxylum, especially X. clavaherculis, whose aromatic and pungent bark is used in the Southern States as a rustic remedy for toothache. In the south this bush is therefore known as toothache-tree and pep¬ per-wood.

PRICKLY HEAT. See Miliaria.

PRICKLY PEAR, a genus (Opuntia) of American cactus. About 130 species have been recognized in the region they occupy from British Columbia through the western States, Central America and West Indies to southern South America. They are very variable in their specific characters, and the lines between species are very indistinctly marked. Some are very dwarf prostrate plants ; others are tree¬ like in height and spread of top. They have club-shaped, cylindrical or flat spiny or hairy, fleshy stems, and except upon the youngest joints bear no leaves. These leaves drop off very soon. The flowers, which are borne near the upper parts of the joints or stems and on the most bristly parts, are solitary or in corymb¬ like panicles and are usually yellow and very showy. The fruit is a modified stem, the ovary being sunken in its apex. It varies with dif¬ ferent species from dry to fleshy and succulent, in many species being edible. Prickly pears were in cultivation among the natives when America was discovered, and were introduced by the Spaniards to the Mediterranean region,, and finally to Asia, South Africa, Australia, etc. In all these places they are now regarded as troublesome weeds, though in many they are valued for their fruit. In Sicily they are one of the chief crops, the peasants living mainly upon the fruit from July to November. Since some of the varieties will produce about nine tons of fruit to the acre upon land too rocky, thin or poor for other crops ; since this produc¬ tion can be counted upon for a long series of years without any cultivation after the plants become established (in three years or less, usually) ; and since they are highly nutritious, their value is not over-estimated in climates adapted to their culture; namely, dry and frost¬ less. They contain about 14 per cent of sugar and nearly 2 per cent of fat. A crop of nine tons per acre would, therefore, be equivalent to about 2,500 pounds of sugar.

In view of these statements it seems strange that attention has not been directed to improve¬ ment of varieties, etc. They have not been ranked with horticultural fruits, though they are of far more economic importance than many that are. In many sections they are used for stock feeding, especially in seasons of drought. The spines are generally rubbed or burned off, but cattle often eat them without this treatment, and frequently suffer death because the spines pierce their intestines. Of

late, however, spineless varieties have been cultivated successfully and are used chiefly for stock feed. The plants are most used for fodder in the western States, Africa and Aus¬ tralia. In Tunis, dairymen are rarely without a plantation of prickly pear for their herd. The plants are also planted for ornamental pur¬ poses in gardens and greenhouses in many parts of the world not adapted to their cultiva¬ tion ; and in places adapted to them they are favorite hedge plants. The most esteemed spe¬ cies are probably the Indian fig (0. ficus- indica), the tuna (0. tuna), O. engelmanni, and O. fulgida, the first two being especially valued for the fruit, the last two for their fodder. O. vulgaris is a common species in the eastern States and is hardy as far north as Massa¬ chusetts.

PRIDE, Thomas, English Parliamentary officer: d. Nonsuch, 23 Oct. 1658. Early in life he was a brewer and began service in the Civil War as ensign under the Earl of Essex; he was finally promoted colonel. As a soldier he won considerable distinction, being conspic¬ uous at Preston (17-19 Aug. 1648), and com¬ manding a brigade in the Scottish campaign. An extreme anti-Royalist, he was selected by the army to exclude the Royalist members from the House of Commons. (See Pride's Purge). He was one of the judges of Charles I, whose death-warrant he signed. During the lord-pro¬ tectorship of Cromwell, he was knighted and made a member of the newly organized House of Lords. See Fairfax, Cromwell, and Charles I.

PRIDE OF INDIA, PRIDE OF CHINA,

a tree (Melia azedarach) , of the mahogany family, a native of Lebanon, Syria, Persia and the north of India, and cultivated in different parts of the world as an ornamental tree. It is known in different localities as Cape Lilac; Persian Lilac; China Tree; Paradise or Paraiso Tree; and in Southern America frequently, but incorrectly as Pepper Tree; and in Australia as White Cedar. It grows to the height of 30 or 40 feet with a trunk of 20 inches diameter; but in open spaces it is spread¬ ing and not so high. Its leaves consist of smooth, pointed, dark green leaflets, arranged in pairs with an odd one at the end. The flowers, hanging in clusters at the ends of the branches, are of lilac color and agreeable per¬ fume. They give place to bunches of berries about as large as cherries, and yellow when ripe. The fruit is sweetish, and edible, though generally supposed to be poisonous. In the cities of the Southern States where the tree was introduced by the elder Michaux early in the 19th century, and upon many of the plantations, rows of Pride of India trees are very common, and in autumn the branches and the ground beneath are covered with their berries. One of its most attractive forms is known as the Texas Umbrella Tree. A decoction of the bark of the root is administered as a cathartic and vermifuge. In large

doses it is said to produce narcotic effects, and such appears to be the action of the ripe berries upon the robin redbreasts, which are very fond of them, and eat them until they become stupefied and fall to the ground. From this state, however, they soon recover.

PRIDE AND PREJUDICE. An admirer of Jane Austen's novels is certain to regard as the best the one he happens to be reading, so admirable are they all in those qualities which make for perfect work; but on reflection he will probably give the palm to (Pride and Prejudice, if for no other reason, because he remembers it -the longest. This novel, with its clean-cut, logical plot, was published in 1813, though its first draft dates as far back as 1796- 97, when Jane Austen was in her 22d year. It is the novel of a girl — a clergyman's daughter — who had been bred in the country among the minor gentry. The scene, except for a few excursions, is laid in two English villages named Longbourn- and Meryton. Within these narrow limits, Jane Austen studies the Bennet family — consisting of Mr. and Mrs. Bennet and, their six daughters — in relation with their neighbors, and especially with the tenant of Netherfield Park, the young Mr. Bingley and his friend Mr. Darcy. In the end Jane, the eldest daughter of the Bennets, is married to Mr. Bingley; and Elizabeth, the second daughter, to Mr. Darcy; while a younger sister, Lydia, elopes with Mr. Wickham, the villain of the story, who holds a commission in the militia stationed at Meryton.*

The novel takes its title from the two lead¬ ing characters — Mr. Darcy, who is proud of his birth, fortune and attainments, and Eliza¬ beth Bennet, who resents his apparent con¬ descension and superciliousness, and, not under¬ standing his true character, becomes inordinately and unjustly prejudiced against him. Eliza¬ beth's prejudice is first awakened at a village ball, where she overhears a remark of Darcy's in disparagement of herself and the other girls ; it is strengthened by Darcy's attempt to detach Bingley from Jane, and by a false story about his dishonorable treatment of Wickham. All the time Darcy is falling in love with Elizabeth, attracted by her very fine eyes, her vivacity, her frankness, her keen intelligence and genuine charm. The climax is reached when Darcy proposes and Elizabeth spurns him. Thereupon Elizabeth soon learns why Darcy has cast off Wickham, the spendthrift and libertine ; she is made to understand why he has interfered in the match between Jane and Bingley; and she discovers that but for Darcy, who patched up a marriage between Lydia and Wickham, lasting disgrace would have fallen upon the entire Bennet household. Elizabeth and Darcy come to understand each other per¬ fectly. Pride and prejudice vanish: and the conclusion is as logical as a mathematical demonstration.

In tone and atmosphere, (Pride and Pre¬ judice } is the novel that approaches nearest to Shakespeare's (Much Ado About Nothing> (q.v.)

Elizabeth and Darcy give us much the same delight that we feel when we read of the wit combats between Beatrice and Benedict. All the other characters are also carefully differen¬ tiated. The novel is pervaded with pure comedy, which Jane Austen occasionally allows to ap¬ proach farce in the delineation of Mrs. Bennet, the match-making mother, and in the Rev. Mr. Collins, who would marry Elizabeth in order to promote his own happiness at the expense of hers. There is no tragedy in the novel. Over all the domestic affairs of life Jane

Austen lets her mind play, diverting the reader with Mollies and nonsense, whims and incon¬ sistencies.® Scott despaired of ever attaining to her delicate protrayal of character; and her art has had a potent influence upon Trollope and other later novelists down to Mr. Howells, who writes of her as <(the divine Jane.®

Wilbur L. Cross.

PRIDEAUX, prid'd, Humphrey, English scholar and divine; b. Padstow, Cornwall, 2 May 1648; d. Norwich, 1 Nov. 1724. He was graduated from Christ Church, Oxford, in 1672 and was appointed rector of Saint Clement's, Oxford, in 1679, prebend at Norwich in 1681, archdeacon of Suffolk in 1688, and in 1702 be¬ came dean of Norwich. He was a man of studious habits, a deep thinker, acquired a vast store of knowledge, and a wide reputation for judgment, integrity and wisdom. His greatest work was entitled (The Connecticut of the His¬ tory of the Old and New Testaments) (4 vols., 1715-18). Among his other works are (Mar¬ mora Oxoniensia) (1676) ; (Life of Mahomet (1697). Consult Thompson, E. M., for his letters to John Ellis, Under-Secretary of State, (published by the Camden Society in 1875) ; the (Bibliotheca Cornubiensis) (Vols. II and III) ; and a (Life of Humphrey Prideaux) (published anonymously in 1748).*

PRIDEAUX, John, English soldier: b. Devonshire, 1718; d. near Fort Niagara, N. Y., 19 July 1759. He entered the army in early youth, and attained the rank of brigadier-gen¬ eral in 1759. In that year he was given com¬ mand of one of the four divisions which were sent to conquer Canada, and while Amherst, Wolfe and Stanwix co-operated in the north, Prideaux attempted the reduction of Fort Niagara, one of the strongest fortresses in possession of the French. He landed before the fort on 7 July and opened an attack, re¬ pelled a sortie on 11 Julv and on the 19th prevented the landing of the French reinforce¬ ments sent by Frontenac, but was killed in the trenches on the same day by the premature bursting of

a shell. His work was not without results, however, as the fort surrendered on the 24th. Consult Parkman, Francis, (Montcalm and Wolfe) (Boston 1884).

PRIDE'S PURGE, the familiar name for the forcible exclusion of Royalist members from the House of Commons in 1648 by Col. Thomas Pride. See Pride, Thomas.

PRIENE, pri-e'ne, in ancient history, a city of Ionia at the mouth of the Gaeson in early times, but because of the alluvial deposits of the Maeander finally lay several miles from the coast. One of the 12 cities in the Ionian League, Priene was conquered by Ardys, a Lydian king, in the latter part of the 7th cen¬ tury b.c. It was mixed up in several revolts against the Persian power, notably the Ionic trouble (500-494 b.c.). Shortly after Priene fell into the hands of Athens. During the power of Alexander in Asia Priene flourished. A new city was laid out and it and the old beautified by additions of the best art of the day. Some¬ time during the reign of the Byzantine rulers, the city was deserted and it was subsequently covered by debris caused principally by earth¬ quakes, and on Croesus' overthrow became the property of Persia. The great temple of Athena

Polias, the scene of the festival called the Paniona, was here ; a dedication upon it by Alex¬ ander the Great is now in the British Museum. In 1868 the temple of Athena Polias (erected under the direction of Pythias) was excavated for the Dilettanti Society by Pullan and New¬ ton, who have shown that it was one of the finest pieces of Ionian architecture ever built. The plan of the ancient city has been made plain by explorations in 1895-99 under the manage¬ ment of the Royal Museum in Berlin. These show that the city had been planned with great care and had been looked after as the best of the Greek cities were. The excavations, there¬ fore, have made of the ruins one of the most important sources of information concerning the Greek city life of the period. The market place, theatre, temples and other public buildings, to¬ gether with a vast amount of sculpture and in¬ scriptions, were unearthed. Consult Baedeker,

, (Konstantinopel, Balkanstaaten, Kleinasien) (Leipzig 1914) ; Frothingham, A. L.,

(Century Magazine, Vol. LXII, 1901) ; Gart- ringen, H. von, Unschriften von Priene) (Ber¬ lin 1907) ; Lenschau, (De Rebus Prienensibus) (Leipzig 1890) ; Leutner, (Priene) (Classical Weekly, Vol. V, 1911) ; Pullan and Newton,

(Antiquities of lonia) (London 1881) ; Wie- gand,

PRIESSNITZ, pres'mts, Vincenz, founder of the Kaltwasskur, or system of hydropathy (q.v.) : b. Grafenberg, Austrian Silesia, 4 Oct. 1799; d. there, 28 Nov. 1851. Having effected by the application of cold water a cure of a severe injury he had received, he subsequently employed it in local cases as a healing agent. Two English physicians, Sir John Floyer and Dr. Currie of Liverpool, had anticipated him in advocacy of the method, and a Silesian, Hahn, had published a book on it derived largely from a work by Floyer. But Priessnitz was the first to develop hydropathic practice. He established with the permission of the government an in¬ stitution at Grafenberg which was much fre¬ quented, among the guests being many physi¬ cians who came to study his claims. He wrote nothing himself, but many records of experi¬ ences of his cure, most of them favorable and many enthusiastic, were written by others. Con¬ sult the study by Selinger (1852) ; and Philo von Walde, (Priessnitz als Begriünder des Was- ser- und Naturheilfahrens (1897).*

*PRIEST, Josiah, American author: b. New York, about 1790; d. western New York, about 1850. He was a harness-maker, but became self-educated and published several books, some of which became very popular. Among them were (Wonders of Nature) (1826) ; (View of the Millennium * (1828) ; (Stories of the Revolu¬ tion (1836); (American Antiquities* (1838); and (Slavery in the Light of History and Scrip¬ ture } (1843).*

PRIEST, one who performs the sacred rites of any religion, especially the sacrificial rites, and who is thus a mediator between the Deity and men.

In primitive times the function of priesthood was inherent in the head of a family, the pater familias ; but as states were organized priest¬ hood on behalf of the people was assumed by the chief or king, or was exercised, under him, by a special order of men ; but still the rites of domestic religion would continue to be per-

formed by the head of the household. In early Greece and Rome when kings were banished and the power of the state came into the hands of elected magistrates the priestly office of the king, or his headship in religious affairs, was vested in the archon basileus as at Athens, or the rex sacrorum as at Rome ; the term king (basileus , rex') being retained after kingship had been done away, doubtless because of some religious scruple, lest the gods should resent the lowering of the appellation of the head of the state religion. The priests of the state religion were now appointed by the public au¬ thority, whether their functions were general or were restricted

to the service of special gods in special temples.

In Rome there never was in pagan times any¬ thing like a priestly order or priestly caste or class, as the order of knights (equites) or patricians (patricii nobiles), nor was priesthood hereditary. In Greek states the priestly serv¬ ice in certain temples and places was restricted to certain families ; for the rest the priesthood was a function of the state. In Egypt the priesthood was a very close corporation, the members of which, with the king at their head, were the supreme arbiters of civil and even mili¬ tary as well as of religious affairs ; the priest¬ hood alone possessed whatever science existed of the mysteries of religion or of the secrets of statecraft, or the laws of nature.

In primitive Israel, as in other primitive so¬ cieties, priesthood was the attribute of the father of the family: the priest by vocation, as a man set apart to minister on behalf of the people in their relations to the Deity, does not come into view till the Mosaic epoch; and the fully devel¬ oped priestly system of Israel did not come into existence till the time of Solomon or even, perhaps, till after the return of the people from Babylon and the building of the second temple at Jerusalem by Zerubbabel in 520 b.c., nearly 500 years after Solomon's reign. Before the building of Solomon's Temple there were in Israel several temples or sanctuaries with ora¬ cles that were consulted to ascertain the will and pleasure of Jehovah, and with priests as their interpreters ; and the priests and the Le- vites constituted a distinct order of society; but after the secession of northern Israel every de¬ vout king of Judah earnestly sought to suppress religious worship or sacrifice everywhere save in the central national temple : this end was not achieved till after the return of the captives from Babylon. Henceforth the worship even of the true God elsewhere than in the temple at Jerusalem was denounced as impious and little different from worship of false gods. The entire priestly order was massed in Jerusalem and its neighborhood; the priests were distrib¬ uted into 24 classes, each presided over by a chief priest, and each class of priests ministering in the temple one week in rotation. Over the whole priesthood presided the high priest, be¬ lieved to be always a lineal descendant of Aaron, the brother of Moses.

The ministers of the several religions men¬ tioned, as well as those of Phoenicia, Babylon and other countries, are styled in English "priests® : in Hebrew, Greek and Latin, respec¬ tively, the priest is Kohen, hiereus and sacerdos. But the English word priest, derived from the Greek presbyteros, an elder person, has not in

itself any denotation of sacrifice or of priestly function but only of maturity of age.

In the Greek New Testament the priest of the Jewish law is always called hiereus and in the Latin Vulgate version sacerdos, never pres¬ byteros, or senior (elder). On the other hand, neither in the Greek original nor in the Vulgate Latin version of it is hiereus or sacerdos ever said of the minister of the religion of Jesus Christ, but always presbyteros and presbyter ; and in the authorized English version pres¬ byteros is invariably rendered elder, never priest. Nevertheless, in the Book of Common Prayer of the Anglican Church and in that Church's Articles of Religion the word priest is everywhere employed instead of elder; but this "priest® of the Prayer Book is not hiereus, sacerdos, a sacrificing priest ; for in the Articles the sacrificial function of the priest of the Catholic Church is classed with "blasphemous fables and dangerous deceits.® Hence for the Anglican Church, as for all the other Protest¬ ant churches, the priest, presbyter or elder is not the minister of a sacrifice. It is different in the Catholic Church and in the numerous Christian churches of the East. Those churches teach, with the Church of Rome, that in the Christian dispensation it is the chief of¬ fice of the priest to offer sacrifice, namely, the eucharistic oblation, which is a perpetual rep¬ resentation of the offering made on Calvary. In the belief of those churches the mass is the selfsame sacrifice which Christ offered — the victim the same, the priest the same : for the victim is Jesus Christ, his body and blood; and the priest is the incarnate Son of God in Heaven, the High Priest, who is represented in the mystic offering by the priest who ministers at the altar.

It is worthy of mention that till the middle of the 3d century no extant writing of any of the fathers employs the Greek or the Latin word for priest (hiereus, sacerdos) to designate the presbyteros. In the Roman pontifical the order of the priesthood is called both presby¬ ter atus and sacerdotium.

Bibliography.— – Brugsch, H. K., (Die

Aegyptologie) (Leipzig 1891) ; Deveria, Achille,

(Monument biographique de Bakenk-honson (Paris 1862) ; Erman, Adolf, (Life in Ancient Egypt* (New York 1894) ; Evans, H., (The Price of Priestcraft* (London 1904) ; Harper, W. R., (Constructive Studies in the Priestly Element in the Old Testament (new ed., Chi¬ cago 1902) ; Hatch, E., (The Growth of Church Institutions1* (4th ed., London 1895) ; Jevons, F. B., (Introduction to the History of Religion* (3d ed., ib. 1904); Lindsay, T. M., (The Church and the Ministry in the Early Cen- turies) (ib. 1902) ; Sanday, W., (The Concep¬ tion of the Priesthood in the Early Church and in the Church of England* (ib. 1899) ; id., different Conceptions of Priesthood and Sac¬ rifice* (ib. 1900) ; Schiirer, Emil, (Geschichte der Judischen Volkes* (4th ed., 4 vols., Leip¬ zig 1901-11; Eng. trans.) ; Steindorf, Georg, (Religion of the Ancient Egyptians* (New*

York 1905) ; Tyler, E. B., Primitive Culture (4th ed., London 1903) ; Wellhausen, Julius, Prolegomena zur Geschichte Israels* (5th ed., Berlin 1899) ; Wilkinson, J. G., (Manners and Customs of the Egyptians* (3 vols., New York*

1879).

PRIEST OF KIRCHFELD, The. The

folkplay in Viennese dialect, (Der Pfarrer von Kirchfeldp produced 5 Nov. 1870, in Vienna, is Anzengruber's most popular drama even if in the opinion of the critics it is not his best. It raised a struggling unknown author to fame, partly because of its freshness and inherent excellence, but more because it voiced popular feelings in regard to the celibacy of the clergy, mixed unions, enforced civil marriage and the relation of church and state as affected by the declaration of papal infallibility in 1870.

The scene is laid just outside of Austria in the most conservative portion of Old Bavaria among a simple peasantry ((whose passions, ex¬ pressed without reservation or but clumsily con¬ cealed® were a novel revelation of human nature to theatregoers. Priest Hell and his feudal ad¬ versary, Count Finsterberg, reveal by their very names the nature of the conflict which is pre¬ cipitated by Hell's innocent gift of a little gold cross to his ward, the orphaned, penniless Annerl. This gives the vagabond Wurzelsepp an opportunity to ruin the Priest with his parish as an expression of hatred caused by ecclesiastical prevention of his union to a Lu¬ theran girl 20 years before. In the best scene of the play Hell converts and wins the friendship of this enemy when he permits the burial of Wurzelsepp's suicide mother in con¬ secrated ground. But this employment of his own judgment against the law of the Church loses for him his parish.

Though a member of the <(church militant and regnant® he had sought like the (Monk of Wittenberg for a way short of the requirement to inquire ((May I do it, just as I mean it?®, a way which makes men <(indifferent or apos¬ tate.® Herein lies a part of the tragedy of his position. However, he becomes no champion of the ((Away from Rome® movement, which later gained such strength. He conquers self, and submits. More tragic, almost to the point of suicide, is his love for Annerl, who also learns resignation like all Austrians, by giving hand and allegiance to the peasant, Michel. It is this soul conflict, more than its politico- religious purpose, which makes the play great. First produced in the Folktheatre ((an*

der Wien,®' it gradually found its way over all Ger¬ man-speaking lands, being played 632 times be¬ tween 1899 and 1905. Text Vol. VI of Gesammelte Werke (1898). Criticism Sigismund Friedmann, (Ludwig Anzengruben> (Leipzig

1902).

Carl E. Eggert.

PRIESTLEY, prest'li, Joseph, English physicist and Unitarian divine : b. Fieldhead, Yorkshire, 13 March 1733; d. Northumberland, Pa., 6 Feb. 1804. After a secondary education he accepted an invitation to become Presby¬ terian minister of Needham Market, Suffolk, on an average salary of £30 a year. After three years he took charge of a congregation at Nantwich, Cheshire, to which he joined a school. Here his reputation increased, and in 1761 he was invited by the trustees of the Dissenting academy at Warrington to occupy the post of tutor of languages and belles-lettres under Dr. Aiken. A visit to London having introduced him to Drs. Franklin, Watson and Price, he was encouraged to compose a (History of Elec¬ tricityˆ which appeared in 1767. In the same year

he became minister, at a salary of £100 a year, of the Mill Hill chapel at Leeds, where his religious opinions grew decidedly Unitarian. At Leeds his attention was first drawn to the properties of <(fixed air® (carbonic acid gas) ; and about this time he completed his (History and Present State of Discoveries relating to Vision, Light and Colors.) In 1771 he agreed to accompany Captain Cook on his second voy¬ age in the capacity of astronomer, but his ap¬ pointment was canceled, as the Board of Longi¬ tude objected to his theology.

After six years at Leeds he accepted an invi¬ tation from the Earl of Shelburne, afterward Marquis of Lansdowne, to reside with him as a companion in the nominal capacity of librarian. While forming a part of the establishment of this nobleman, he occupied himself in scientific pursuits, and in 1773 gave to the Philosophical Transactions a paper on the different kinds of air, which obtained the prize of Copley's gold medal. On 1 Aug. 1774 he discovered oxy¬ gen or <(dephlogisticated air,® as he called it, a result quickly followed by other important dis¬ coveries, such as nitrous gas, nitrous oxide gas, sulphurous oxide gas, fluoric acid gas, muriatic gas and ammoniacal gas, etc. By these exploits he may be said to have been almost the first to render chemistry a precise science. In 1775 he published Examination of the Doctrine of Com¬ mon Sense, as held by Drs. Reid, Beattie, and Oswald,) and soon after the treatise of Hartley. He had already declared himself a believer in the doctrine of philosophical necessity, and in a dissertation annexed to his edition of Hartley expressed*

some doubts of the immateriality pf the sentient principle in man. This doctrine he still more forcibly supported in his disquisi¬ tions on Matter and Spirit J (1 777). Probably because of his ((materialistic® views, the con¬ nection with Shelburne was dissolved in 1780, Priestley retaining an annuity by original agree¬ ment. He next removed to Birmingham, where he became once more minister of a Non-Con¬ formist congregation, and occupied himself on his (History of the Corruptions of Christianity) (1782), and (History of the Early Opinions concerning Jesus Christ (1786). With Erasmus Darwin, Watt, Boulton, Wedgewood and other famous men he founded the now cele¬ brated Lunar Society, which rendered Birming¬ ham for the time of its existence almost the intellectual centre of England. His (Familiar Letter to the Inhabitants of Birmingham* was written in support of the claims of Dissenters for a repeal of the test acts. The era of the French Revolution, whose principles Priestley vindicated, added to the usual animosity of theo¬ logical dispute. The anniversary of the capture of the Bastile being celebrated at Birmingham, a mob assembled, and although Priestley was not present, burned his house, and nearly all his library, manuscripts and apparatus. The out¬ rage was countenanced by too many exercising both lay and clerical influence, and the legal compensation which he obtained fell short of his real losses by about £2,000. On 1 Aug. 1874, Birmingham made some amends for the wrong done to her greatest citizen, by the erection of a marble statue of him in front of the town-hall. On quitting Birmingham (1791) he succeeded his friend Price as preacher in the Gravel Pit Chapel, Hackney, where he remained some time*

in the cultivation of his scientific pursuits, until finally goaded by party enmity to seek an asylum in the United States, which he reached in 1794, and took up his residence at Northumberland, Pa. In America he dedicated his whole time to his accustomed pursuits. Some discourses of his led to the formation in Philadelphia of a Unitarian congregation and he held private meetings in his own house. He was never nat¬ uralized; and, curiously enough, never learned to make change in United States coinage. Priestley was an ardent controversialist, chiefly in consequence of extreme simplicity and open¬ ness of character; but no man felt less animosity toward his opponents than he did, and many who entertained the strongest antipathy to his opinions were converted into friends by his gentleness and urbanity in personal intercourse. As a man of science he stands high in the field of invention and discovery, and to few has pneumatic chemistry been so much indebted. On his own admission his researches in Jus favorite science were superficial, and his great discoveries to a considerable extent accidental.

But this should detract nothing from the honor due to the earnest pioneer. As a metaphysician his elucidation of Hartley's theory of associa¬ tion, his works upon philosophical necessity and upon materialism will always insure attention. As a theologian Priestley, who followed his convictions wherever they led him, passed through all changes, from Calvinism to a Uni¬ tarian system in some measure his own; but to the last remained a zealous opposer of infidelity. Of his theological and controversial produc¬ tions, those most generally esteemed are his (Institutes of Natural and Revealed Religion5 (1772-74), and 'Letters to a Philosophical Un¬ believer5 (1780-82). He also wrote many works of practical divinity. There is an edi¬ tion of his 'Theological and Miscellaneous Works, with Memoirs and Correspondence5

(1817-32).

PRIESTS OF THE MISSION. See

Lazarists.

PRIESTS OF SAINT JOHN THE EVANGELIST. See Orders, Religious.

PRIGG CASE, The, in American history, a famous slave case tried in 1837. Edward Prigg caused a fugitive Maryland slave-woman to be returned to her mistress, in violation of a Pennsylvania statute forbidding the carrying of any negro out of the State in order to enslave him. The case was finally brought before the Supreme Court of the United States, where it was contended that the statute was unconstitu¬ tional since it conflicted with the National Fugi¬ tive Slave Act of 1793. The opinion was handed down that the national law must be carried out by national authorities alone.

PRIM, Juan, hoo-an' prem, Count de Reuss, Marquis de los Castillejos, Spanish general and statesman : b. Reuss, Catalonia, 6 Dec. 1814; d. Madrid, 30 Dec. 1870. Destined for the law, he entered the ranks of the volun¬ teers in the cause of the infant Queen Isabella on the outbreak of the civil war, which in 1833 followed the death of Ferdinand VII. At its close in 1839, Prim threw himself into politics, and when Queen Maria Christina quitted Spain, worked in behalf of the Progresista party against Espartero, who, 8 May 1841, had assumed the

regency. In May 1843 he led the insurrectionist forces against Espartero, and upon the downfall of the Espartero ministry was rewarded by the queen by being created successively brigadier- general, Count de Reuss, and in 1843 governor of Madrid. Suspected later of conspiracy against the government in 1844, he was sentenced to six years' imprisonment but was released after six months, and made governor of Porto Rico. Dis¬

tinguishing himself in the war against Morocco at the battle of Los Castillejos, 1 Jan. 1860, he was given the title of Marquis de los Castillejos. He commanded the Spanish expedition, which acting jointly with the French and English landed in Mexico early in 1862 to enforce claims of indemnity against that country, but withdrew his troops almost immediately. Again accused of conspiracy, he was banished in 1864, but headed an uprising in January 1866 against the government and was compelled to flee to England in 1867. From there he p-ave support to a revolution started in Spain that summer and in September suddenly appeared in Cadiz and fought against the government in the mili¬ tary revolution headed by Topete and Serrano. Upon the defeat of the government Serrano ap¬ pointed Prim Minister of War in his provisional government. He became head of the Cabinet and procured the election of Amadeo, Duke of Aosta, second son of the king of Italy, as king of Spain. He was shot by unknown assassins while driving through Madrid. Consult Jime¬ nez, F., 'Historia Militar y Politica de D. Juan Prim5 (1860) ; Leonardson, 'Prim5 (1901).

PRIMARY, Direct. A direct primary is an election held by political parties at which candidates for nomination are chosen directly by the voters of those parties. Under this method, voters select their nominees directly, whereas under the delegate or convention system the voters send their delegates to a convention at which the party candidate is nominted (see Convention, Political). The convention system was so indirect in its methods and so many times accompanied by sharp practices on the part of rings of professional politicians and office-holders that a more effec¬ tive method of nominating candidates wras sought in order that nominees should repre¬ sent the will of the rank and file of the party who cannot make politics their business. More¬ over, the argument was advanced that the mass of the party members would regain control of the government of the party and the electors would exhibit a greater interest in party nominations. This has proven to be the case, the vote at the primaries as a rule being larger than under the delegate system, while the party electorate expresses its will more directly and effectively, thus making the party rulers more amenable to the party will. Even though the bosses may prepare a nomination (

afforded an opportunity to give widespread publicity to his platform or principles; the pictures and statements of all the candidates are printed and bound in a publicity pamphlet, which, for a small consideration, is distributed to the voters before the primary. In Wisconsin a candidates'

convention frames the platform, the convention consisting of all party candidates for State offices and for the legislature and of any members of the senate who have held over. Thus the voter receives a concrete statement of the policy by both the legislative and executive departments. In Missouri the State central committee, together with the party nominees for State office, for the legislature and for Congress, formulate the platform. In Oregon, when the petition is filed, the candidate may set forth his principles in a paragraph of not more than 100 words, and he is also allowed a 12-word sentence upon the ballot. If 10 per cent of the party voters in Texas petition, a question of party policy must be submitted to the voters at the primary and the party cannot be pledged to any policy which has not been endorsed by a majority of the voters.

In most States a mere plurality of votes cast determines the nomination, but in the Southern States a clear majority is often re¬ quired and if no candidate should receive the necessary number of votes a second primary is held at which only the two leading candidates are considered. Some States use the minimum percentage plan, Iowa requiring 35 per cent of the total vote, while Michigan requires 40 per cent for governor and lieutenant-governor. Idaho, North Dakota, Wisconsin and a few other States have adopted a system known as preferential voting, under which first and second choices for a given office are indicated and if no candidate receives a majority of first choice, the lowest candidate is dropped and the second choices are then distributed. The object of the preferential vote is to eliminate a second ballot and to prevent the choice of a candidate bv plurality only. In some cases even third choices may be indicated.

The advent of the direct primary has had a large influence on the personnel and character of the national government, since it affects the choice of senators, representatives, Presidential electors and delegates to national conventions. The application of direct primaries to senators and representatives has been provided for without extended discussion, but the States have been slow in applying the system to the choice of delegates to the national nominating conventions. Wisconsin started the movement and several other States have pro¬ vided for a direct vote for delegates. The next move is to have the electors of each party in each State at the direct primary instruct their delegates to the national convention as to the party preference for Presidential nominee. A primary law extended to Presidential nomi¬ nations was adopted by Oregon in 1910 and since that time the Presidential preference primary has been adopted by many States. (See Primary, Presidential Preference). After all the States have adopted the plan of choosing their delegates to conventions by direct primary, the next logical step (though its adoption is now very problematical) is to provide for the nomination of a Presidential

candidate by the direct popular vote of the en¬ tire party. This would soon result in a direct vote of the whole country for President and thus eliminate the antiquated electorial college (q.v.). In most cities the direct primary has been discarded in order to eliminate national party politics and in its place non-partisan pri¬ maries and nomination by petition only have been substituted. See Elections.

The earliest system of direct selection of candidates was the Crawford Countv system used in Pennsylvania in the sixties, but though this was adopted in the Southern, Central and Western States, its use was not general until the nineties. Minnesota adopted the direct primary for Hennepin County in 1899 but Wis¬ consin by her law of 1903 was the first State to adopt this method for ail nominations. The State-wide direct primary is now used in al¬ most all of the States ; it was adopted by Oregon in 1904; by Iowa, Missouri. North Dakota, South Dakota, Nebraska and Wash¬ ington in 1907 ; by Ohio, Kansas and Oklahoma in 1908; by California, Nevada, Idaho, Ten¬ nessee, Michigan and New Hampshire in 1909; by Arizona in 1909 and 1912 ; by Illinois, Mary¬ land and Colorado in 1910; by Wyoming, New Jersey, Massachusetts and Maine in 1911; by. Minnesota, Virginia, Kentucky, Mississippi, Louisiana and Montana in 1912; by New York, Pennsylvania and Florida in 1913; and by Ver¬ mont, Indiana and West Virginia in 1915 ; while in South Carolina, Georgia, Alabama, Arkansas and Texas it is conducted under the rules of the Democratic party but has not been established by statute for all parties. See Ballot; Convention, Political; Caucus; Elections.

Bibliography. — Aylesworth, L. E., Pri¬ mary Elections 5 (in American Political Science Review, Vol. II, pp. 578-85, Baltimore 1908) ; Beard, C. A., (American Government and Politics> (New York 1914) ; Commons, J. R., (Proportional Representation (ib. 1907) ; Fanning, C. E., (Selected Articles on Direct Primaries5 (Minneapolis 1911) ; Feldman, H., (The Direct Primary in New York State5 (in American Political Science Review, Vol. XI, pp. 494-518, Baltimore 1917) ; Ford, H. J., (Direct Primary5 (in North American Review, Vol. CXC, pp. 1-14, 1909) ; Griffin, A. J., Primer on Primaries, Direct and Indirect5 (New York 1913) ; Jones, C. L., (Readings on Parties and Elections in the United States5 (ib. 1912) ; Mechem, F. R., Constitutional Limitations on Primary Election Legislation5 (in Publications5 of the Michigan Political Science Association, Vol. VI, No. 1, pp. 125-149,

1905) ; Meyer, E. C., dominating Systems5 (Madison, Wis., 1902) ; Merriam, C. E., Pri¬ mary Elections5 (Chicago 1909) ; Metcalf, R., (Direct Primary Legislation5 (1907) ; Mills- paugh, A. C., (Operation of the Direct Primary in Michigan5 (in American Political Science Review, Vol. X, pp. 710-726, Baltimore 1916) ; Schaffner, M. A., Primary Elections5

(Madi¬ son, Wis., 1908) ; Tuttle, A. H., limitations on the Power of the Legislature to Control Political Parties and their Primaries5 (in Michigan Law Review, Vol. I, pp. 466-495,

1906) ; Verplank, J. D., (A Problem of Pri¬ maries5 (in (Annals of the American Academv of Political and Social Science,5 Vol. XXVIII,

No. 3, pp. 84-94, Philadelphia 1906) ; Wood- burn, J. A., (Political Parties and Party

Problems) (rev. ed., New York 1914).

PRIMARY, Presidential Preference, a

method adopted by some States of applying the direct primary to the choice of delegates to national political conventions. A widespread be¬ lief that the national conventions, in their entire membership, had not been truly representative of the party voters and did not reflect the pref¬ erence of the majority resulted in the enactment of laws for the choosing of delegates directly by the party voters in official primaries. The laws passed by the States vary regarding the degree of directness with which the preference is expressed and the measure of certainty of its being carried into effect. Under the Cali¬ fornia and South Dakota laws, a number of candidates, corresponding to the number of delegates to which the State is entitled, may file a nominating petition as a group, pledged to the interest of a given candidate for Presi¬ dent. These names are placed on the ballot together and the voter may by one mark cast his ballot for the entire group at once. Before a group may be placed on the ballot, the law requires that not less than one nor more than three of the persons named reside in the same Congressional district ; and the group must also have the endorsement of the Presidential can¬ didate whose cause it has espoused or of a State organization possessing his confidence. In Illinois, New Jersey, New Hampshire and Ohio the Congressional district is the unit for electing delegates. In Illinois the candidate for delegate must file with his nomination petition a statement of his preference for President or a statement that he has no choice ; and on the official primary ballot the preference or lack of preference is printed beneath the name of each candidate. In Ohio the delegate files a first and second choice for President, both of which are printed on the ballot, but the candi¬ date as an alternative may state that if elected he will support for President the candidate receiving the majority of the preference votes. The New*

Hampshire law simply permits candi¬ dates for delegate or delegates at large to pledge that if elected they will vote at the national convention for a given candidate for the Presi¬ dential nomination as long as his name remains before the convention. The delegates from Oregon and Montana are elected at large, but in order to secure minority representation the voter is allowed to cast his ballot for one per¬ son only as a delegate. Those candidates re¬ ceiving the largest number of votes are declared elected. A direct Presidential preference vote is held at the same time and candidates for delegate pledge themselves under oath to accept the popular choice. Delegates from Pennsyl¬ vania and North Dakota are bound by the pref¬ erence vote but the vote is not binding on dele¬ gates from Massachusetts, Minnesota, Nebraska, Texas and Wisconsin. The Iowa ballot con¬ tains the, names of candidates for President and Vice-President, party national committeemen, delegates at large, district delegates, and alter¬ nates of the last two. The voter is also called upon to decide by a vote of yes or no whether district delegates to the national convention shall be instructed bv the vote of the State at large or by the vote of the Congressional dis¬

trict. Maryland combines a preference vote with an election of delegates by a State con¬ vention. The county delegates to the State convention are instructed by the voters of the county to support a certain candidate and must do so as long as this candidate has the support of nine counties. The Presidential candidate receiving the votes of a majority of the dele¬ gates becomes the choice of the State party and must be given the support of the State delega¬ tion at the national convention. A majority of the Presidential primary laws are mandatory. Since Presidential primaries are held under the regular primary laws, candidates for delegate, in order to have their names placed upon the ballot, must file nominating papers. Likewise in most of the States having such laws, Presi¬ dential candidates, either personally or by duly authorized State organizations, must file peti¬ tions signed by a designated percentage of their party supporters in the State. In 1910 Oregon extended her primary law to Presidential nomi¬ nations and in 1913 applied direct nomination to the office of national committeemen ; she was followed in 1911 by New Jersey, North Da¬ kota, Nebraska and Wisconsin; in 1912 by Cali¬ fornia, Illinois, Maryland, Massachusetts, South Dakota, Montana and Michigan ; in 1913 by New Hampshire, New York, Pennsylvania, Ohio, Minnesota and Iowa; in 1914 by Texas, and in 1915 by Vermont, Indiana and North Carolina.

Bibliography. — Barnett, J. D., Presidential Primary in Oregon) (in Political Science Quarterly, Vol. XXXI, pp. 81-104, Lancaster, Pa., 1916) ; Dickey, F. W., (The Presidential Preference Primary1 (in American Political Science Review, Vol. IX, pp. 467-487. Baltimore 1915) ; Hart, A. B., 'Phe Direct Primary vs. the Convention1* (in Proceedings1* of the Academy of Political Science, New York, Vol. Ill, pp. 210-219, January*

1913) ; Woodburn, J. A., Political Parties and Party Problems (rev. ed., New York 1914).*

PRIMARY BATTERIES. See Battery.

PRIMARY ELECTIONS. See Elec¬ toral Qualifications ; Congress.

PRIMARY ROCKS, formerly applied by geologists to the earliest rocks, including par¬ ticularly those owing their present state to igneous agency. Gneiss, various schists and granite were so regarded. At the present time primary is used as equivalent to Palaeozoic (q.v.).

PRIMARY VOLTAIC CELL. See Elec¬ trical Terms.

PRIMATE, since the 4th century of the Christian Church, the title assumed by the bishop of the capital of a province, and hence equivalent to metropolitan or exarch. The Council of Chalcedon decreed that the primacy, or ((first place before all,® was to be accorded to the (

metropolitans in different countries, and en¬ deavored to subordinate the other metropolitans to them. The resistance to this arrangement was, however, so general and emphatic that the dignity of primate remained little more than a nominal one, entitling the holder of it merely to precedence on public occasions. In France the archbishop of Lyons was appointed primate of the Gauls by Gregory VII in 1079, and the archbishop of Rouen is also primate of Nor¬ mandy. In the German Empire the archbishop of Salzburg was primate. In Hungary the arch¬ bishop of Gran is primate ; in Bohemia that of Prague; in Spain that of Toledo. In Poland the primacy belonged to the see of Gnesen. None of these bishoprics any longer retain primatial rights of jurisdiction excepting that of Gran. The office belonged of right to the papal legate, who was president of the Senate and censor of the king. He governed the state during an interregnum, had a court, guards, and a marshal of the palace, and in general enjoyed the highest privileges. In the Church of Eng¬ land both the archbishops still retain the title of primate, the archbishop of Canterbury being distinguished as the primate of all England and the archbishop of York as the primate of Eng¬ land. In the Protestant Episcopal Church of Ireland the archbishop of Armagh is primate as formerly when the church was established.

PRIMATES, the name given by Linnaeus to his highest order or group of the Mammalia, which included the hats (Cheiroptera) , the apes, monkeys, and lemurs (Quadrumana) , and man (Bimania) . By common consent of

zool¬ ogists the bats have been removed, leaving the monkeys, lemurs and man as a fairly homo¬ geneous group. Formerly the definition of this order was comparatively easy, but owing to numerous recent palaeontological discoveries an almost unbroken series of forms between the lemurs and the Insectivora is now known, and the interrelationships between the former and the higher apes, and of the latter with one another and with man, have been shown to be more complex than was anticipated. Leaving out of account the prelemurine fossils, the order may be characterized as follows : There are always complete milk and permanent denti¬ tions, the latter having the various kinds of teeth well differentitated and usually the following formula: Incisors, ■§; canines, J- premolars, f or f, and molars f or | (rarely). Occasionally there is the loss of an incisor, premolar or canine. The molars are of the simple quadritubercular grinding type, and the premolars are still simpler. In all cases the orbit is surrounded by a bony ring and frequently separated from the temporal fossa by a plate of bone. The clavicles are- well developed, the radius and ulna and the tibia and fibula (except in one case) are never coalesced, the scaphoid and lunar bones of the wrist are distinct, and the pollex and hallux (except the latter in man) form opposable thumbs. With a few exceptions among the lemurs and marmosets, the digits are all ter¬ minated by flat nails. Except in isolated cases the stomach is always simple, there are two pectoral mammae and the testes are contained in a scrotum. Concerning the subdivision of the order in suborders and families there are several opinions; but the customary recognition

of the sub-order Prosimice or Lemuroidea for the lemurs and their allies, of Quadrumana for the monkeys, baboons and marmosets, and of Anthropomorpha for the apes and man will serve present purposes. Consult Hartman, (Anthropoid Apes) (1886); Forbes, hand¬ book of Primates) (1896-97).

PRIMATICCIO, Francesco, fran-ches'ko pre-ma-tet'chd, Italian painter : b. Bologna, 1504; d. France, 1570. He was a pupil of Inno- cenzo da Immola and Bagnacavallo, and began in 1525 to study under Giulio Romano. In con¬ nection with several of the pupils of the latter he painted the Palazzo del Te, in Mantua, from Giulio's designs. Through the recommendation of Frederick, Duke of Mantua, Primaticcio was engaged by Francis I of France in 1531 to deco¬ rate the palace of Fontainebleau. To his in¬ fluence were owing not only numerous paint¬ ings in fresco and works in stucco which the king caused to be executed, but several branches of painting, as, for instance, enamel painting, and designs for tapestry, were carried to greater- perfection through his exertions. Francis sent him to Italy to purchase antique statues, and casts of famous works of art. On the death of Rosso, the royal painter, Prima¬ ticcio succeeded to his post, and Francis II appointed him in 1559 superintendent of the royal buildings. He

furnished the designs of several architectural works, among them of the tombs of Francis I and Henry II. His works at Fontainebleau, however, gained him more reputation. His was a clever, facile pen¬ cil, but he w'as the slave of mannerism and meretriciousness, and that fluent but artificial elegance which remained so long the character¬ istic of French art. His frescoes and stucco work have been almost all destroyed ; we can only judge of their quality from engravings, and there are no oil-paintings which can with certainty be ascribed to him ; even the authen¬ ticity of (The Continence of Scipio) now in the Louvre is sometimes doubted.

PRIME, Edward Dorr Griffin, American Presbyterian clergyman and religious journal¬ ist: b. Cambridge, N. Y., 2 Nov. 1814; d. New York, 7 April 1891. He was graduated in 1832 from Union College, and from Princeton Theo¬ logical Seminary at Princeton in 1838. He filled several pastorates, including that of the Eighty-sixth Street Presbyterian Church, New York, and contributed articles to the New York Observer under the signature <(Euse- bius.® With his brother, S. I. Prime (q.v.), he edited the paper 1854-85, and continued to edit it a year longer after his brother's death. He published (Around the World) (1872); (Forty Years in the Turkish Empire5 (1875) ; (Notes, Genealogical, Biographical and Biblio¬ graphical of the Prime Family5 (1888), etc.

PRIME, Samuel Irenaeus, American Pres¬ byterian clergyman and editor : b. Ball- ston, N. Y., 4 Nov. 1812; d. Manchester, Vt., 18 July 1885. He was graduated from Wil¬ liams College in 1829, entered the Princeon Theological Seminary and in 1833 was ordained in the ministry. He was in charge of pastor¬ ates at Ballston Springs, N. Y., 1833-35; at Matteawan, N. Y., 1835 — 40. In 1840 he became editor of the New York Observer and con¬ tinued as such until his death, with the excep¬ tion of a period in 1849 when he was secretary

*to the American Bible Society, and another in 1850 when he edited the Presbyterian. He was one of the founders of the Evangelical Al¬ liance of America in 1866 and its corresponding secretary until 1884, was vice-president of the American Tract Society and was prominently connected with various religious and educa¬ tional institutions. From 1854 he was a regu¬ lar contributor to Harper's Magazine, where his ((Editor's Drawer** became famous, and in 1858 his literary earnings enabled him to pur¬ chase the Observer, which he made the lead¬ ing organ of his denomination. His (Power of Prayer* (1858) reached a sale of 175,000 copies in United States and England and was translated into French, Dutch*

and Tamil. Among his other books are (The Old White Meeting-House (1845) ; (Travels in Europe and the East* (1855) ; (Letters from Switzer¬ land* (1860) ; (Kirwan* (1870) ; Urenaeus Let¬ ters* (1st series, 1880; 2d series, 1885), etc.*

PRIME, William Cowper, American jour¬ nalist: b. Cambridge, N. Y., 31 Oct. 1825; d. New York, 13 Feb. 1905. He was graduated from Princeton in 1843, studied law, was ad¬ mitted to the bar in 1846 and engaged in law practice in New York in 1846-61. In 1861-69 he was editor-in-chief of the New York Jour¬ nal of Commerce, was first vice-president of the Metropolitan Museum of Art after 1874 and professor of the history of art at Prince¬ ton after 1884. He devoted much time to liter¬ ature and was an authority on numismatics and Egyptian antiquities. Among his publications are (The Owl Letters ; (The Old House by the River* (1853) ; (Boat Life in Egypt and Nubia* (1857) ; (Coins, Medals and Seals* (1860); <1 Go A-Fishing* (1873) ; (Holy*

Cross (1877) ; (Along New England Roads* (1892) ; (Among the Northern Hills* (1895), etc.*

PRIME. See Canonical Hours.

PRIME MINISTER, the title of the pre¬ mier, secretary of state or other officer of state, who in most European countries, at the summons of the sovereign, has succeeded in forming an administration, of which he is the head and which may be named after him. Those who accept office under him are assumed to agree with his policy in the main. Though each member of the ministry administers his own department independently of his colleagues, all important departmental matters are submitted to him, the most important being brought be¬ fore the whole ministry, and no appointment of moment is made or recommended to the Crown without his knowledge and concurrence. His own patronage is very extensive. In form¬ ing an administration, he selects all those who are to fill the various offices, though the ap¬ pointments are subject to the sovereign's ap¬ proval. In England it is on his advice that as vacancies occur the archhishops, bishops and deans and the highest judges are appointed and over 100 Crown livings are filled; and on his recommendation that the most en¬ vied temporal titles and honorable distinctions — peerages, baronetcies and the Garter, for ex¬ ample — are conferred and such high appoint¬ ments as the lord-lieutenancy of Ireland, the viceroyalty of India, the principal ambassador¬ ships and colonial governorships and lord-lieu- tcnancies of countries, are made by the Crown.

He is the leader of the House of Parliament, of which he is a member. Yet as prime min¬ ister he enjoys no legal precedence over his colleagues, his

official existence being indeed not recognized by statute. In European govern¬ ments the prime minister, or premier, is usually charged with the management of diplomatic af¬ fairs and in this respect resembles the Secre¬ tary of State of the United States.

PRIME NUMBER, an integer indivisible by any number save itself and unity, that is, one which cannot be factored; such number are

1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43,

47, 53, etc. They occur very frequently among the lower numbers and begin to be scarce among the higher thousands. The determination of the prime numbers has remained a mere matter of rejecting factorable numbers; this is done in a quasi-mechanical way by the table called Eratos¬ thenes' sieve, upon which all the numbers to be tested are written at equal intervals and covered in succession by gridiron-like slips of paper, covering first all multiples of 2 (the even num¬ bers may better be omitted at the start), then all multiples of 3 and so on. But even with the modern theory of numbers no rule has been laid down for the periodicity of the oc¬ currence of the prime numbers. Gauss dis¬ covered in 1810 that the number of primes less

/x dx

2 Chebicheff

*gave a formula for the determination of the number of prime numbers between any two primes ; in a monograph dated 1859, Riemann gave an even more exact formula and a very complicated one, also dependent on the integral used by Gauss. The theory of numbers has also shown that <(every prime number is (in general in more than one way) a sum of four squares,** but this is equally true of other num¬ bers, inasmuch as (1) every factorable number is the product of two prime numbers and (2) the sum of four squares into the sum of four squares is always a sum of four squares. There is a theorem of Goldbach to the effect that (*

PRIMERO, pn-me'ro, or PRIME, a card

game very popular in England in the 16th cen¬ tury, but now obsolete. The same or a very simi¬ lar game was played in Italy under the name primiera and in France under the names prime, ambigu, etc. Primero belonged to the family of games of which the old post and pair and the more modern brag and poker are members.

PRIMITIVE ART. See Aboriginal Art.

PRIMITIVE METHODIST CHURCH,

*a Christian community known previously to 1902 as the Primitive Methodist Connection. It originated with Hugh Bourne (1772-1852), a millwright of Stoke-on-Trent, England, who joined a Methodist society at Burslem, but whose open-air preaching, prayer and singing, the forerunner of the ((camp-meeting,** a de¬ parture from Wesley's methods, led to his ex¬ pulsion from the Wesleyan Connection. With William Clowes and some strong supporters, they built a chapel at Tunstall in July 1811, and*

in February 1812 adopted the name of (

PRIMITIVE SOCIETY AND DEMOC¬ RACY. See Democracy, History of.

PRIMITIVE THOUGHT. See Mythol¬ ogy.

PRIMOGENITURE, pri-mo-jen'i-tur, sen¬ iority of birth and the right by law of the eld¬ est son of a family (and of those who derive through him)

to succeed, in cases of intestacy, to the father's real estate, to the absolute ex¬ clusion of the younger sons and the daughters. This rule, system or right prevails in Great Britain ; but, following the example of revolu¬ tionary France, most of the countries of con¬ tinental Europe have abolished it. Several ex¬ ceptions to the rule are allowed in the United Kingdom, but, these apart, whenever a man dies intestate leaving real estate, his eldest son is entitled to the whole of it and the rest of the children not otherwise provided for out of the personalty are left without anything. If there is no male heir, the daughters succeed, not singly and in the order of seniority, but jointly. In the United States no distinction is made in the descent of estates to lineal descendants.

PRIMROSE, a popular name for many gar¬ den and wild plants, among which the following are probably the best known : Evening prim¬ rose (GELnothera biennis, etc.) ; Arabian prim¬ rose (Arnebia cornuta) ; Cape primrose (Strep – tocarpus spp.) ; and various species of the genius Primula. This last consists of about 150 species of mostly perennial herbs with ro¬ settes of leaves of various forms (especially under cultivation), and salver-shaped, generally showy, white, yellow, pink, lilac and purple flowers borne in clusters upon scapes. They are natives of the north temperate zone, one species South American, one Javanese, and gen¬ erally common in mountainous countries. About 40 are Himalayan ; a dozen North Ameri¬ can. They may be divided into five groups ac¬ cording to their uses as ornamental plants for which purpose they have long been popular. The auricula (q.v.) and the alpine primroses, neither of which are widely popular in America, the former because the climate is believed to be against them, the latter because alpine gardens have not become popular. Third, the yellow or purple-flowered outdoor species such as P. imperial is and P. japonica, which with winter mulching are grown in the Northern States; the polyanthus group, which contains the oxlip (P. elatior) and the cowslip (P. officinalis), very popular, fully hardy favorites blooming in early spring; and the greenhouse primroses, such as the Chinese (P . sinensis) , P. obconica

and P. forbesi (baby primrose), all of which are widely popular houseplants. Propagation is usually by seed, though varieties that do not come true to type may often be propagated by division or cuttings. Seed should be sown soon after its collection, since it quickly deteriorates if allowed to become dry. In general, prim¬ roses succeed best in deep, well-drained, loose, rich loam not exposed to the glare of the sun. The polyanthus kinds may be grown in cold frames during the winter, set in beds in early spring, removed after flowering to shady moist situations for the summer, divided in the autumn and planted in cold frames again. The yellow- blossomed kinds are favorites with florists. The greenhouse kinds are sown under glass in early spring and kept growing steadily in flower

pots of increasing sizes until the 6-inch size is reached in autumn when they should begin to blossom. The soil for them should be light, loose and rich both in plant food and humus. At the primrose shows there are often 200 to 300 distinct varieties on exhibition, mostly of P. sinensis, which has developed many remark¬ ably beautiful forms attractive in foliage as well as flower.

PRIMROSE DAY, in England the anni¬ versary of the death of Benjamin Disraeli, Lord Beaconsfield (q.v.), 19 April 1881. Every member of the Primrose League (q.v.) wears a bunch of primroses on that day in token of alliance with, and support of, the objects of the league.

PRIMROSE LEAGUE, an English politi¬ cal organization founded in 1883 by members of the Fourth party (consisting of Lord Ran¬ dolph Churchill and others) in memory of Benjamin Disraeli (q.v.), Earl of Beaconsfield. The primrose, as Lord Beaconsfield's favorite flower, was selected as the emblem and name of the league. The members include knights, dames and associates, and are divided into groups called habitations. In the propaganda to perpetuate Lord Beaconsfield's principles of world-wide federation, less reliance is placed on discussion, lectures, etc., than on the appeal to the social elements in human nature. The large membership is due mainly to the efforts of female members.

PRIMULA. See Primrose.

PRIMUM MOBILE, pn mum mob'i-le, in

astronomy, the ninth or highest sphere of the heavens, whose centre is that of the world and in comparison with which the world is but a point. This the ancients supposed to contain all other spheres within it and to give motion to them, turning itself, and all of them, quite round in 24 hours. See Astronomy.

PRINCE, Morton, American physician: b. Boston, Mass., 21 Dec. 1854. He was gradu¬ ated at Harvard in 1875, taking his M.D. there in 1879, and since 1880 has been engaged in practice in Boston. Since 1885 he has been physician for nervous diseases at the Boston City Hospital ; and in 1902-12 he was professor of nervous diseases at Tufts College, then be¬ coming professor emeritus. Since 1906 he has edited the Journal of Abnormal Psychology. Author of (Nature of Mind and Human Au¬ tomatism > (1885) ; (Disassociation of a Per- sonality) (1906) ; (The Unconscious) (1913).

PRINCE, Thomas, American clergyman and historian: b. Sandwich, Mass., 15 May 1687; d. Boston, 22 Oct. 1758. He was gradu¬ ated from Harvard in 1709, studied in England and was pastor of a church at Combs, Suffolk, England, 1711-16, then returned to Massa¬ chusetts accompanied by several of his congre¬ gation. On 1 Oct. 1718 he was ordained pastor of the Old South Church, as colleague of the Rev. Joseph Sewall. In 1727 appeared the first volume of his (Annals of New England, } ma¬ terials for which he had collected with great care while in England. It was approved by the legislature, but owing to the indifference of the public was never completed. He pub¬ lished also sermons, several works on phases of the early history of New England and (The New England Psalmbook Revised and Im- proved> (1758). He made a valuable collection of books by New England authors and manu¬ scripts connected with New England records; this was partially destroyed by the British in 1766, but the remainder was presented to the Boston Public Library in 1860.

PRINCE (from Lat. princeps), a title which means literally one who holds the first place. In ancient Rome the title of princeps senatus was given to the leading senator, being the one whose name came first in the list and who had the right to record his vote first. In modern times the title of prince (or princess) is given to all sovereigns generally, as well as to their sons and daughters and their nearest relations. In England, while not generally used, the title is applied in strict heraldic language, as a mode of address to dukes, marquises, and earls. In Germany there is a class of sovereigns, rank¬ ing next below the dukes, who bear the title of prince as a specific designation. The members of royal families are there called Prinzen in¬ stead of Fiirsten, to distinguish them from the class to whom the latter title more particularly belongs. On the Continent there are ancient families not immediately connected with . any reigning house who bear the title of prince. Formerly, in France, duke was a title superior to prince. In England the. only case in which the title is a territorial one is that of the Prince of Wales (q.v.). See Nobility.

PRINCE, The ((I1 Principe), by Niccolo Machiavelli (written 1513, published in a Latin version 1523, and in the original Italian 1532), holds a high place both in history and in litera¬ ture. Historically the chief document of the centralizing and nationalizing movements of Renaissance Europe, it was produced by the country that most conspicuously failed to cen¬ tralize and to nationalize. The Wars of the Roses had turned England from feudalism to the strong Tudor monarchy; Louis XI in France had subdued his great nobles and estab¬ lished a national postal system and a royal standing army; Ferdinand and Isabella had united Castile and Aragon, and at the expense of Moors, Jews and heretics had purchased the solidarity of Spain ; but Italy, long after these national consolidations,*

continued to suffer from the ambitions of local despots and con- dottieri, and from the incessant struggle of secular political bodies with the Pope. Dis¬ united, she was again and again the prey of foreigners; Charles VIII of France in 1494

had taken her without bloodshed, and, as the saying was, ((with chalk,® the chalk with which his unrestricted soldiers marked their quarters. It was no wonder that Machiavelli, Florentine historian, diplomatist and patriot, was looking about for the strong man who should liberate and unify Italy. For this imaginary personage

Cesare Borgia had almost carved out an Italian kingdom when his plans were frustrated by the death of his father, Pope Alexander VI, together with his own sickness in that emer¬ gency, and his neglect to prevent the election of Julius II. Both his success and his failure made him an ideal example for the ideal Prince to observe. His success was due to ruthless energy and cunning, an imposing personality and boundless self-assertion. His failure was due to adverse chance, which struck just be¬ fore he had quite consolidated his power, and to his own want of adaptability to his bad luck. The Prince, therefore, first should exercise virtu, in which Machiavelli sums up all the forces of the strong individual; and, secondly, should adapt himself to fortuna, in which are summed up all the forces of what we now call the environment. When fortune changes, the Prince must change too, lest she ruin him. He must, as Bacon wrote under Machiavelli's influence, <(make the wheels of [the] mind concentric and voluble with the wheels of for¬ tune.® The keeping of his promises, for ex¬ ample, after circumstances have changed, may clearly be inexpedient. Nor is his virtu to be any more (

Machiavelli evidently feels that the need for order and unity in the state ought to outweigh whatever ethical scruple the Prince may enter¬ tain. Just here is where (The Prince) becomes the classical document of Machtpolitik and raison d'etat. For in establishing order the Prince must of necessity not only police his own city-state, his Rimini or Perugia, but also ac¬ quire other city-states to be consolidated with it into a principality — else the old disorders between states will be kindled anew. Hence Machiavelli's policy of the strong unethical hand must be pursued both within and between states ; it is not only intranational but inter¬ national. The implication is that there is no room for morality either between individuals engaged in the process of forming possible states — i.e., in the process of competing for power, or between states — which are tacitly assumed to be continually struggling with each other to see which shall absorb the others. Just where, if anywhere, this ruthless compe-

tition is to cease — just how large the orderly group or principality must be before it can stop expanding for the preservation of its par¬ ticular type of order (Kultur) — (The Prince> does not tell us; it could not, after all, antici¬ pate the 19th and the 20th centuries.

What makes it permanently interesting, how¬ ever, is precisely the perpetual recurrence of these questions. In the 18th century, for ex¬ ample, Frederick the Great as Crown Prince writes an Anti-Machiavel, which, one is not surprised to find, never seriously affected his policy as king; in the 19th century Machi- avelli becomes one of the heroes of Italia Unita. In the 19th century, too, political Machiavel¬ lianism is strongly supported by a false appli¬ cation of the new competitive theory of evolution — evolution by the survival of those organisms which are stronger than others (Virtu), and which fit, or can make themselves fit, their environment (Fortuna). This bio¬ logical false analogy strikes back into actual politics in the Machiavellianism of the 20th century war. We are still confronted with a concept of the state which, assuming that sheer power is its end, aims not only to control all within the national territory, but to take in ruthlessly from without whatever the sovereign deems necessary to his quiet.

From being merely the document of a mo¬ ment in history (The Prince> has thus come to be the textbook of continuing political prac¬ tice, and a perennial source of biological, politi¬ cal and ethical theory. Its method, indeed, which at times seems purely inductive, as based upon the examination of historical facts, with¬ out illusions, prepossessions or hypotheses, is based also upon the .generalizations of classical writers, and proves in point of fact highly deductive and dogmatic. It assumes, for ex¬ ample, that men are naturally bad until com¬ pelled by the legislator or Prince (Carlyle's (lhero®) to be good; it supposes history to move cyclically; and in the person of the Prince, from whom a moral sense is omitted, it frames a political man who is quite as much an abstraction as is the ((economic man® of the laissez-faire school. So far from being merely factual (The Prince) embodies rather pure and universal types. Unhampered by repression or apology, it sets forth, expressly or impliedly, human tendencies that belong to no one time or place — the adoption of success as the criterion of conduct; the adoption of <(the verdict of history® instead of the verdict of ethics, espe¬ cially in international relations; the implication that what makes ethics is the state itself ; and, as has been already indicated, man's striving for fame, his adaptation to his environment or fortuna and his natural self-assertiveness or virtu.

To this universal content, as well as to its lucid straightforward classic style, are due (The PrinceV literary eminence and influence. Of the latter it

will be possible to mention only a case or two from English literature. Mar¬ lowe's (Tamburlaine) and Shakespeare's Rich¬ ard IIP belong to a type of Elizabethan trag¬ edy which takes for its theme the virtuoso or individualist on his career of rule and ruin. This theme, though derived, in all probability, from the mediaeval tragic theme of the Fall of Princes, is strongly tinged by Machiavelli,

with whom Elizabethan dramatists were well acquainted. Bacon's works, too, are under strong Machiavellian influence — his conception of man's dealings with his fellow-man in poli¬ tics, and with nature in inductive and produc¬ tive science, being that of ((morigeration,® or pliancy to the environment.

The best edition of (The Prince) is that by L. Arthur Burd, Oxford, 1891, with an intro¬ duction by Lord Acton, and valuable essays, notes and bibliography. There are convenient modern translations by Ninian Hill Thomson (3d ed., Oxford 1913), Luigi Ricci ((The World's Classics) and W. K. Marriott ((Everyman's Library*).*

Samuel Lee Wolff.

PRINCE ALBERT, a town in North Sas¬ katchewan, Canada, 542 miles northwest of Winnipeg, situated on the river of that name, on the Grand Trunk Pacific Railway and four branches of the Canadian Northern line. It has a Roman Catholic cathedral, Anglican pro¬ cathedral and Presbyterian, Methodist, Baptist and Lutheran churches, public and separate schools and colleges and hospital's. The indus¬ tries include three large lumber companies, cold storage, abattoir and packing plants, planing mills and granite works ; and the neighborhood, in addition to its suitability for stock raising, has areas of fine clay suitable for pottery and bricks, and 2,000 square miles of spruce and poplar extend northwards of the city. Pop. about 6,158.

PRINCE ALBERT LAND, Canada, an Arctic island of the Franklin District, separated from the Mackenzie District by Coronation Gulf, Victoria, Dease and the Dolphin and Union straits, along the Northwest Passage. Its southern and southeastern peninsulas are known respectively as Wollaston Land and Victoria Land; Prince Albert Sound is a deep inlet on its eastern coast, and Collinson Inlet another on the north coast. It has not been fully explored.

PRINCE EDWARD ISLAND, Canada, an insular province of the Dominion, and the smallest in area and population, in the southern part of the Gulf of Saint Lawrence, separated east to west from Cape Breton Island, Nova Scotia and New Brunswick by the curving Northumberland Strait, from 10

to 30 miles wide. The greatest length of Prince Edward Island on a curve is about 150 miles, breadth varying from 4 to 34 miles, area, 2,184 square miles ; it is the smallest province of the Dominion. The capital is Charlottetown (q.v.) which is connected by rail with all the princi¬ pal points of the island. Other towns are Sum- merside, Georgetown and Souris.

Topography, Physical Features and Nat¬ ural Resources. — The coast-line presents a re¬ markable succession of large bays and pro¬ jecting headlands. Of the latter the most prominent are North Cape on the northwest, West Cape on the southwest and East Cape on the northeast; the largest bays are those of Richmond on the northwest, Egmont and Be- deque on the southwest, Hillsborough on the south and Cardigan on the east. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The soil consists gen-

erally of a light reddish loam, sometimes ap¬ proaching to a strong clay, but more frequently of a light and sandy texture. The prevailing rock is a Triassic reddish sandstone. The island is well watered by numerous streams and springs. At one time the whole island was densely covered with beech, maple, fir and other trees, and it is still well wooded, only about two-thirds of the area having been cleared. There are no minerals of any importance. The fisheries are valuable; the total value of the catch was $933,682. The most valuable item is the lobster, followed by the mackerel, cod, her¬ ring and hake.

Climate. — The climate is much milder than that of the adjoining continent, and the air, gen¬ erally free from the fogs which spread along the shores of Cape Breton and Nova Scotia, is remarkably salubrious. During the greater part of July, August and September the thermometer during the hotter hours of the day seldom varies more than from 75° to 80° F.

Agriculture. — The island is eminently agri¬ cultural and pastoral. Of its total area of 1,397,991 acres, very little is unsuitable for cultivation, but little more than half the area is under cultivation for field crops. The prin¬ cipal products are oats, wheat, potatoes, turnips, apples, etc. In 1916 7,413,000 bushels of oats were raised, of a value of $4,522,000; 578,000 bushels of wheat of a value of $879,000; 6,386,- 000 bushels of potatoes, of a value of $3,321,- 000; and 338,000 tons of hay and clover of a value

of $3,907,000. Good breeds of horses, cattle, sheep and swine are reared, and dairy farming has become a thriving industry; large quantities of cream, butter and cheese being manufactured, the dairy products in 1916 being valued at $593,659. A recent and flourishing industry is the breeding in captivity of the silver black fox.

Manufactures and Commerce. — The manu¬ factures are chiefly confined to linen and flan¬ nels for domestic use; there are also several tanneries, boot and shoe factories, manufac¬ tures of tobacco, condensed milk, pork-packing establishments and some shipbuilding. The ex¬ ports for the year to 31 March 1917 were valued at $589,218, and the exports at $838,647.

Shipping and Communications. — In 1916 the shipping of the province was 130 sailing and 28 steamships, aggregating 11,518 tons, the ton¬ nage of the steamers being 3,495. The Prince Edward Island Railroad, built by the Dominion government, connects the principal points of the island and has a length of 276 miles and a car- ferry service gives connection with the main¬ land. Telephonic communication extends throughout the island, which is also traversed in all directions by good coachroads.

Government. — The province is administered by a lieutenant-governor nominated by the Crown, who appoints an executive council of eight members, with a legislative assembly of 30 members, half elected on a property qualifica¬ tion, and half on a popular franchise. The province was admitted into the Dominion of Canada in 1873, is represented in the Dominion House of Commons by four members, and has four representatives in the Senate.

Education and Religion. — Adopted in 1851 the free school system is administered by a gov¬ ernment superintendent and council. In 1916

18,362 pupils were enrolleJ in 476 schools con¬ ducted by 595 teachers, and $244,572 were ex¬ pended for education. The membership of the principal religious denominations in 1916 was, Roman Catholics, 41,994; Presbyterians, 27,507 ; Methodists, 12,209; Anglicans, 4,939; Baptists,

5,905.

History. — Sebastian Cabot is supposed to have sighted Prince Edward Island after dis¬ covering Newfoundland in 1497, but with more likelihood the honor is also assigned to Jacques Cartier (1634). It appears on Champlain's map under the name of Saint John and it was later included by the French in their vast and undefined territory of New France, and in 1663 was granted on a feudal tenure to a Sieur Doublet, a French naval officer. Little progress was made in settling the island till after the Peace of

Utrecht in 1715, when its fertility at¬ tracted numbers of settlers from Cape Breton. It was taken by the British in 1745; restored by the Peace of Aix-la-Chapelle ; again fell into British possession after the capture of Louis- bourg in 1757, and its inhabitants shared in the Acadian expulsion. It became a dependency of Nova Scotia, was partitioned among a small body of proprietors in 1767 and was erected into a separate province in 1769. In 1862 re¬ sponsible government was conceded. In 1873 the island was admitted into the Dominion of Canada, and in 1875 a scheme of land purchase expropriated the proprietors. Pop. (1901) 103,- 259; (1911) 93,727, of which 98.37 per cent were Canadian born. The density per square mile, 42.91, is the highest among the provinces of the Dominions ; but the population is declining. Consult Campbell, (History of Prince Edward Island) (1875); Dawson and Harrington,

(Geological Structure and Mineral Resources of Prince Edward Island) (1882-84).

PRINCE EDWARD ISLAND RAIL¬ WAY (Government Railways). It was one of the conditions of the entrance of Prince Ed¬ ward Island into the Dominion of Canada, which took place 1 July 1873, that the rail¬ way under contract and in course of con¬ struction for the government of the island should become the property of the Domin¬ ion. This railway extended from Charlotte¬ town, the capital, westward to Tignish and eastward to Georgetown, a distance of 195 miles. Other lines have since been constructed, as follows : Charlottetown to Murray Harbor, 48 miles; Montague to Montague Junction, six miles; Emerald Junction to Traverse, 12 miles; Halmira Junction to Elmira, 10 miles: the Ver¬ non Loop, four miles — giving a total of 275 miles. The gauge of the railway is three feet six inches. The cost of the railway and equip¬ ment to 30 June 1914 was $8,920,623. The gross earnings for year to 30 Tune 1915 were $412,520, of which $212,622 were for passengers, and $186,560 for freight. The rolling stock con¬ sists of 22 locomotives, 43 passenger train cars and 501 freight cars, besides service cars, etc.

A daily steamer service is maintained be¬ tween Charlottetown and Pictou, and between Summerside and Point du Chene during the season of navigation, and passengers and freight are carried by ice-breaking steamers during the winter season between Georgetown and Pictou.

PRINCE OF INDIA, a romance by Lew Wallace, published in 1893. The Prince of India is the Wandering Jew.*

PRINCE AND THE PAUPER, The, a

historical tale by Mark Twain (Samuel Lang- horne Clemens) published in 1881. The plot hinges on the remarkable resemblance of a poor street boy to the young English prince, after¬ ward Edward VI.

PRINCE RUPERT, Canada, sea-port and capital of the electoral district Comox-Atlin, British Columbia, on the north end of Kaien Island, about 550 miles northwest of Vancouver and 3,860 nautical miles east of Yokohama, and the Pacific Coast terminus of the Grand Trunk Pacific Railway. It has anchorage for the largest ships, and a marine station and quaran¬ tine hospital are located here. It has a hydro¬ electric plant, modern waterworks and telephone system. Industries include chiefly those allied to the lumber trade, and there are large cold- storage plants. Pop. (1911) 4,184; (1915) esti¬ mated 6,500.

PRINCE RUPERT'S DROPS, pieces of glass which have been cooled very suddenly from the melted state by having been dropped into water. They are called larmes bataviques (Dutch tears) by the French. The outside of the drop of melted glass is instantaneously solidified by the water, while the inside cools gradually, so that the outside shell is acted upon by very great stresses due to contraction of the internal portions when cooling. In fact the drop is kept in a state of excessive strain by stresses in unstable equilibrium; and if this equilibrium is destroyed by scratching the sur¬ face with a diamond, or breaking off the tip of the tail, the strained particles are violently re¬ leased, and the mass is instantly pulverized. Heat is produced during the pulverization of the drop. This explanation applies to the fall¬ ing out of the bottom of the very thick flask of unannealed blown glass called the ((Bologna flask,® when its surface is scratched. Glass articles — articles of any brittle material — ought to be cooled very slowly from the melted state. The process of slow cooling to which such articles are subjected is called annealing. To anneal glass it is placed in a large furnace which has nearly a red-heat at one end and a lower temperature than 100° C. at the other; after the glass has been passed very slowly from the heated to the cool end it is able to withstand sudden changes of temperature, etc., without fracture.

PRINCE OF WALES, The, in England, a title given to the eldest son of the sovereign and heir apparent to the throne. The title, created and not hereditary, dates from the reign of Edward III. When the principality of Wales came under English domination with the deaths of the native princes Llewellyn in 1282 and David in 1283, Edward I in 1284 is said to have presented his infant son Edward, born at Camarron Castle, to the Welsh people, as a native-born prince. He was not invested with the title, however, until 1301. A statute of the order of the Garter, dated 1805, declares that

the Prince of Wales shall, as soon as he re¬ ceives this title, becomes a knight of the Garter. The arms of the Prince of Wales are the royal arms, with the addition of a label of three

points argent, and the distinctive Welsh feature of a plume of three white ostrich feathers, circled by the ancient princely coronet of Wales, bearing the motto badge ((Ich Dien® (((I serve®).

PRINCE OF WALES ISLAND, the

official name of Penang, an island of the Malay Straits Settlement. See Penang.

PRINCE WILLIAM SOUND, Alaska, an inlet of the Gulf of Alaska, on the south coast, east of the Kenai Peninsula and with Monta¬ gue Island on the south. It offers an ice-free harbor, the most northerly on the coast, and has spectacularly beautiful scenery. Its glacial phenomena is particularly remarkable, the sound having 11 living glaciers, of which the most striking are the Columbia, Harvard, Yale, Ser¬ pentine, Harriman and Surprise. The Columbia is about four miles wide on the sound and reaches in places a height of 300 feet. The rich deposits of copper on the eastern shores and on some of the islands offer splendid pos¬ sibilities for development. Of the towns, Val¬ dez and Cordova have each about 1,000 popula¬ tion and are coast terminals of railroads run¬ ning into copper districts in the interior. Smaller towns are Onca, Ellamar and Land- loch. Consult Higginson, (Alaska ; Greely, (Handbook of Alaska* (1909) ; National Geographic Society Bulletin) (1914).*

PRINCEITES, pnn'slts. See Agapemone; Religious Sects.

PRINCE'S FEATHER, an annual plant

(polygonum orientale) of the buckwheat family, with erect spikes of dark-red flowers and leaves inclining to purple. It is a native of India, but has long been cultivated in gardens everywhere.

PRINCE'S ISLAND, or ILHA DO PRINCIPE, el'ya do pren'se-pe, a Portuguese island off the coast of West Africa; in the Bight of Biafra; nearly midway between Fernando Po.and Saint Thomas islands. It is of volcanic character, rising in the south to 3,000 feet; fertile and well-watered, but of little importance since the extinction of the slave- trade ruined its sugar plantations. Its fertility has gained it the name of the Garden of Africa. Cacao is the only important export. The popu¬ lation is concentrated mainly in Sao Antonio, a town with a fine harbor on the northeast coast. With the neighboring island of Saint Thome it constitutes a province under a governor.

PRINCE'S ISLANDS (ancient Demo- nesi) , a group of nine islets near the east end of the Sea of Marmora, about 10 miles south¬ east of Constantinople. Prinkipo is the largest of the group. They are a favorite summer re¬ sort of the Constantinople Greeks, and in old times were frequently a place of exile for those who were in disfavor at the Byzantine court. There are on the islands a Greek church, semi¬ nary, monasteries and a naval college. In 1894 an earthquake caused loss of life and destruc¬ tion of property. Pop. estimated 10,500.

PRINCE'S METAL, in metallurgy, a mix¬ ture of copper and zinc in imitation of gold.

PRINCE'S PINE, or PIPSESSEWA, a

low North American evergreen health-plant (Chimaphila umbellata) of the wintergreen family. From its leaves are made a powder and a fluid extract, used in making a herb- medicine for scrofula, rheumatism, etc. Another

species is the spotted wintergreen (C . macu- lata).

PRINCESS. See Nobility ; Prince.

PRINCESS, The, by Alfred Tennyson, pub¬ lished in 1847, reprinted in 1848 and in 1 850, was acclaimed as "the herald-melody of the higher education of women,9 a theme which Tennyson held to be one of the two great prob¬ lems of the England of his day. The poem is the expression of his belief in a larger train¬ ing and a fuller life for woman, based on her "distinctive womanhood,® her power of love. The story of the winning of the Princess Ida by the Prince who invades her college but re¬ spects her cause is frankly a "medley,® in which armored knights fight tourneys while gowned ladies lecture on the nebular hypothesis. Pro¬ logue and conclusion, set amid a Gothic ruin and a Victorian Chautauqua, strike the "mock- heroic® key-note. But Tennyson lacked the true comic spirit that could fuse his theme, satire and sentiment into entire unity of mood and style. Yet the interest and charm of the parts almost conpensate for the lack of inte¬ gral beauty. The characters, sketches though they are, embody all shades of opinion on women's education, from Lady Blanche, a true militant, to the old king, a father of "antis.® The Princess herself, the one full portrait, whom Tennyson held one of his noblest women, seems a trifle too heroic in her passion for freedom and too abject in her yielding to love. It is not she but the Prince who speaks the poet's famous verdict on the*

woman question.

No poetry is more Tennysonian than the blank-verse of (The Princess,) more filled with his richly-wrought word-harmonies, his mem¬ orable nature-pictures painted from the life. Lovelier still are the lyric links, added as an afterthought to ring the changes on the motif of the poem, the love of man and woman for each other and for the child. XIII, ch. 22, and bibliog¬ raphy).

Frances W. Cutler.

PRINCESSE DE CLEVES. (The Prin¬ cess of Cleves by Madame de la Fayette ap¬ peared first under the name of (Segrais) in 1678. It is a novel, but it is in form and con¬ tent in the sharpest contrast to the novels that had up to that time been in vogue. They had been interminable affairs, in 10 and 12 volumes, made up of the most extraordinary adventures, through which paragons of valor were made to pass before their love-laden sighs might with propriety melt the heart of the paragons of beauty who were the objects of their adoration and they might lead them to the altar. This was a short and simple story, scantily furnish¬ ing a thin volume, without heroic or gallant adventure, without paragons of beauty and valor and without wedding bells. It is a drama of conscience. A married woman is the heroine. What fixes our attention and interest is the moral experience of a noble character*

striving to realize a high ideal of duty in a difficult situation. It is such a victory of wise self-control and steadfast will over impulse and passion as Corneille loved to present in his tragedies. It is essentially a novel of charac¬ ter, in which psychological analysis and pene¬ trating observation of human conduct as it displays itself under familiar conditions take the place of breathless action and thrilling situ¬ ations. The influence of the "Princess of Cleves® was very great, and it is not too much to say that it marks an important turning point in the history of the novel. The great masters of the early 18th century, like Marivaux in France and Richardson in England, who deter¬ mined the course the modern novel was to take, developed her method and applied it on a much broader canvas, but not always with more perfect results. There is a translation by Thomas Sergeant Perry (Boston 1891).

Arthur G. Canfield.

PRINCETON, Ill., cit}ˆ and county-seat of Bureau County, on the Chicago, Burlington and Quincy and the Chicago, Ottawa and Peo¬ ria railroads, about 100 miles west by south of Chicago. It was settled in 1830, incorporated in 1838 and in 1884 was chartered as a city Since 1915 it

has been governed on the com¬ mission plan. It is in an agricultural and coal mining region. Its industries are connected chiefly with farm products and the mining and shipping of coal, and the shipping of livestock. It has a number of well-built business blocks, a township high school, the Maton Public Li¬ brary, a courthouse, city hall, Federal building and the high school library. The city owns and operates the electric-light plant and the water¬ works. Pop. (1920) 2,126.

PRINCETON, Ind., city and county-seat of Gibson County, on the Southern and the Chi¬ cago and Eastern Illinois railroads, about 27 miles north of Evansville. It was settled in 1804, incorporated as a town in 1814 and char¬ tered as a city in 1884. There is a local trac¬ tion line operated by a public utility company. Princeton is in an agricultural and coal mining region and is also rich in oil and natural gas. The chief industrial establishments are the Southern Railroad shops, the coal mines, oil wells, lumber mills, flour mills, clock works, handle factory, refrigerating and ice plant and several smaller establishments. There are large lumber and brick yards. The city has several churches ; and the educational institutions are a high school, public and parish schools and a Carnegie public library, Civic League Club and a Chamber of Commerce. The banks have a combined capital of $250,000. The govern¬ ment is vested in a mayor, who holds office two vears, and a council of six members. Pop.

(1920) 7,132.

PRINCETON, Ky., city and county-seat of Caldwell County, 140 miles, direct, southwest of Louisville, at a junction of the Illinois Cen¬ tral and Ohio, Louisville and Nashville rail¬ roads. It is the seat of the Princeton Colle¬ giate Institute. The repair shops of the Illi¬ nois Central Railroad are located here and the city has extensive interests in tobacco. There are flour mills, brickyards, an ice plant and a creamery. Pop. 3,689.

PRINCETON, N. J., borough in Mercer County, on an elevation about three miles from the main line of the Pennsylvania Railroad, with which it is connected by a branch line, 10 miles northeast of Trenton, and 50 miles southwest of New York City. It was settled in 1696, but remained a straggling hamlet for some years. The removal of the College of New Jersey from Newark to Princeton, in 1756, gave the place new life, and except when it was occupied by troops, and as a battleground, it has ever since remained a staid college town. On 27 Aug. 1776, the first State legislature of New Jersey met here. The 31st, the members elected William Livingston

as governor of the State. Congress assembled here June 1783, and remained in session until November. The re¬ moval of Congress from Philadelphia was oc¬ casioned by the threatening attitude of discon¬ tented soldiers. While in session here, 31 Oct. 1783, the news arrived of the signing of the treaty of peace with England. Princeton has broad, well-shaded streets, and its location on the ridge gives it a fine view over the surround¬ ing country. The colonial architecture has been preserved to quite an extent. The place is noted as being the seat of Princeton Univer¬ sity (q.v.). Other educational institutions are Princeton Theological Seminary (Presbyter¬ ian), the Rockefeller Institute for Medical Re¬ search, Princeton Preparatory School, Saint Joseph's College, the high school and the libraries. Pop. 5,917. Consult Hageman, his¬ tory of Princeton and Its Institutions) (Phila¬ delphia 1870) and Powell, L. P., (Historic Towns of the Middle States) (New York 1899).

PRINCETON, W. Va., city and county-seat of Mercer County, 75 miles southeast of Charleston, on the Virginia Railway and near the southern border of the State. It was the scene in 1862 of a skirmish between the United States and Confederate forces, the advantage resting with the Confederates. Pop. 6,224.

PRINCETON, N. J., Battle of, in the

American Revolution. After the battle of Trenton (q.v.), Washington recrossed the Dela¬ ware and on 2 Jan. 1777 occupied Trenton with strong outposts at Bordentown and Crosswicks. General Grant, commanding the British troops at New Brunswick, 30 miles distant, was joined by Lord Cornwallis (q.v.), who was preparing to return to England but had been ordered to resume his command in the Jerseys. The British and Hessians, about 8,000 strong, pressed forward to Trenton, whereupon Wash¬ ington took position on high ground behind Assanpink Creek. On 2 Jan. 1777 the British cannonaded the American position but deferred the attack until morning, when Cornwallis hoped <(to bag the old fox.® On the advice of his generals, however, Washington decided to strike the British in the rear, capture their stores at New Brunswick, attack three British regiments under Col. Charles Mawhood at Princeton and divert the war from the neigh¬ borhood of Philadelphia to the mountainous regions of New Jersey. On the night of 2-3 of January, leaving his camp fires burning, Washington sent his stores to Burlington, abandoned his camp, and in the morning fell upon the unsuspecting Mawhood, then marching to join Cornwallis. After the first volley the British charged and the Americans fled but

were rallied by Washington and soon put the British to flight. Washington then advanced toward Princeton where he routed another British regiment.

The British loss was 150 killed and 230 prisoners, while the Americans lost 30 killed, including Gen. Hugh Mercer, Meanwhile, hearing the cannonade, and fearing for his stores at New Brunswick, Cornwallis pursued Washington toward Morristown, but on crossing the Millstone River, the Americans demolished the bridge at Kingston and Corn¬ wallis abandoned the pursuit, taking up posi¬ tion at New Brunswick while Washington en¬ camped at Morristown. Consult Stryker, W. S., (Battles of Trenton and PrincetoiP ; Johnston, H. P., (Campaign of 1776} (p. 293 et seq.) ; Carrington, H. B., (Battles of the Revolution J (p. 276 et seq.) ; Lossing, (Field-Book of the Revolution (Vol. II) ; Wilkins, (Memoirs (Vol. I, pp. 140-150) ; Wiley and Rines, (The United States) (Vol. Ill, pp. 7-10) ; biogra¬ phies of Washington, Greene, Knox and others,*

PRINCETON, W. Va., Engagement at.

In the spring of 1862 General Fremont, com¬ manding a military department that included West Virginia, proposed to move from Mon¬ terey on Staunton, thence to the New River near Christianburg, his ultimate destination being Knoxville, Tenn. Gen. J. D. Cox, commanding on the Kanawha, was to co-operate by advanc¬ ing from Gauley Bridge, in two columns, one by Fayette and Raleigh Court House over Flat Top Mountain to Princeton and <(the narrows® of New River, the other by the turnpike to Lewisburg. Cox had four brigades; one was left to hold the lower Kanawha Valley; Col. George Crook was sent forward to Lewisburg; and Cox, with the two brigades of Colonels A. Moor and E. P. Scammon, about 2,000 men each, moved on the Fayette and Princeton route. Giles Court House and ((the narrows® of New River were reached 7 May, and on the 16th his two brigades, after leaving a detachment at Princeton, were on the East River, and Crook had reached Lewisburg, on the other side of New River, all prepared to joint Fremont's main column at Christianburg. But <(Stonewall® Jackson's appearance in the Shenandoah Valley sadly deranged Fremont's plans, and Cox was told to look out for himself. Meanwhile the Confederate brigades of Generals Humphrey Marshall, Harry Heth and J. S. Williams, all under command of Marshall, had been concen¬ trated to protect the Virginia and Tennessee Railroad, and on the 16th Marshall, leaving Heth to hold the passes of New River, marched with about 2,500 men and three guns by the Wytheville road on Princeton, driving out the small detachment Cox had left there, after a stubborn resistance of six hours, continued until 10 p.m., and capturing the camp, with several tents, horses and other things, including the headquarters correspondence. During the night Cox, with Moor's brigade, marched back from East River, ordering Scammon to follow, and at daylight of the 17th found Marshall with¬ drawing from the town and back to a wooded range of hills south and west of it. Cox ad¬ vanced and attacked, and Marshall again fell back a mile, to a strong position covering the Wytheville and

Wyoming roads, and waited for Heth to come up. Cox made some demon¬ strations, btit seeing that Marshall held a steep wooded ridge, not easily accessible, and had &

large force and some artillery, he waited until Scammon should come up, betore making a serious attack. Scammon came up in the even¬ ing, closely pursued part way by Heth, and brought information that the Confederates were in great force ; and Cox, realizing that his posi¬ tion at Princeton could be turned and his line of communication seized, retreated before day¬ light next morning to Flat Top Mountain, 25 miles from Princeton, a very strong position, and ordered Crook to halt at Lewisburg. Heth attacked Crook at Lewisburg on the 23d and was badly repulsed. (See Lewisburg, Battle of). The Union loss at and around Princeton was 23 killed, 69 wounded and 21 missing; the Confederate loss was much less. Consult (Official Records) (Vol. XII) ; The Century Company's (Battles and Leaders of the Civil War> (Vol. II).

E. A. Carman.

PRINCETON THEOLOGICAL SEM¬ INARY, a Presbyterian seminary at Prince¬ ton, N. J. It was organized in 1812, .and for a time the classes were held in the buildings of Princeton College (now Princeton University) ; in 1815 a tract of land was purchased for the seminary, and a building erected. <(The bibli¬ cal criticism is conservative,® and (

PRINCETON UNIVERSITY, located at Princeton, N. J. The first movement toward the establishment of the College of New Jersey was made in 1739 by a committee appointed by the Presbyterian Synod of Philadelphia, but this committee met with little success and the proj¬ ect was laid aside for the time. In 1746 the promoters of the new college, who in the mean¬ time had withdrawn from the Synod of Phila¬ delphia and with others had formed the Synod

of New York, again took up the matter and obtained a charter for the new college. In the same year the Log College, which had been conducted by Rev. William Tennent, Sr., near the Forks of Neshaminy, Pa., as a training school for ministerial candidates, was closed by the death of Mr. Tennent, and its leading men joined with the trustees of the new col¬ lege. A second charter for the College of New Jersey was obtained in 1748. The scope of the college and the powers of the trustees as stated in the two charters were essentially the same, but the second charter was obtained by the original trustees, both because of some doubt as to the validity of the first charter,

which had never been recorded verbatim in the records of the secretary of state, and also for the purpose of increasing the number of trustees, making the lay trustees equal in num¬ ber to the clergymen and giving other religious communions a share in the administration.

The college was opened at Elizabethtown, N. J., in April 1747, with Rev. Jonathan Dickin¬ son as president and was transferred to Newark in the autumn of the same year, where it re¬ mained until 1756. In 1752 it had been decided to fix the location permanently at Princeton, and in 1756 the college building (Nassau Hall) was completed and instruction was begun there. The college exercises were interrupted during the Revolution by the presence of both armies, but only one Commencement, that of 1777, was omitted. During the war Nassau Hall was badly damaged, the library scattered and de¬ stroyed and the scientific apparatus ruined. In 1783 the Continental Congress sat in Nassau Hall for several months. A law department was established in 1846, but discontinued in 1852 on account of lack of funds. The system of elective studies was introduced in 1870; the John C. Green School of Science was estab¬ lished in 1873 ; the Graduate School in 1877, and the School of Electrical Engineering in

1889.

In October 1896, on the occasion of the 150th anniversary of the founding of the college, the title of Princeton University was assumed. In 1900 a plan of alumni representation in the board of trustees was adopted, giving the alumni five elected representatives on the board. The other trustees are elected by the board it¬ self and hold office for life.

The courses now offered by Princeton Uni¬ versity may be classified as undergraduate courses in arts and sciences; graduate courses in arts and sciences; and technical courses.

The plan of undergraduate liberal studies provides for two distinct courses: first, the bachelors of arts course (A.B.), in which Latin is required for entrance and forms a pre¬ scribed part of the curriculum of the first year; second, the bachelor of science course (B.S.), in which a modern language may be substituted for Latin at entrance.

The Graduate School offers advanced and research work in arts and sciences, leading to the degrees of master of arts and doctor of philosophy.

The technical courses offered are a four- year undergraduate course in civil engineering; and a two-year graduate course in electrical engineering, leading respectively to the degrees of civil engineer and electrical engineer.

PRINCETON UNIVERSITY

1 Stafford Little Hall

2 Nassau Hall

Admission to the undergraduate courses is entirely by examinations, which are conducted by the College Entrance Examination Board. The subjects required for admission vary in the different courses and while certain subjects are definitely required, there is a considerable mar¬ gin for choice in the subjects offered by candi¬ dates. Distinguishing features of the under¬ graduate courses are: (1) the planning of the requirements for the bachelors degrees so that the student shall receive a broad general train¬ ing, preserving as far as possible the ideal of the old American college course; (2) the treat¬ ment of the student's preparation and college work as a whole and the requirement for gradu¬ ation of a specific number of units, part of which must be met before entering the univer¬ sity; (3) the requirement that a student shall have completed before the middle of his col¬ lege course a certain number of units in lan¬ guage including English, in mathematics, sci¬ ence and in philosophy; (4) the divisional elec¬ tive system, according to which a student must choose in his junior year at least three courses in a division (philosophy, literature, art or his¬ tory, politics, economics or mathematics, sci¬ ence), in which his work will thereafter be con¬ centrated. His other two courses are unre¬ stricted. Beginning with sophomore year which has only one required course, the stu¬ dent has a full choice of electives within cer¬ tain limitations; (5) an arrangement whereby students of high standing may by independent study during the summers qualify for gradua¬ tion in three years. And (6) the preceptorial method of instruction, by which the lectures are complemented by informal conferences between the professors and small groups of students on the reading connected with a course. The preceptorial groups usually con¬ sist of from three to six men, thus emphasizing the personal relation between teacher and student. All members of the faculty engage in preceptorial work.

In the undergraduate department there are 40 university scholarships and about 40 en¬ dowed scholarships, ranging in stipends from $100 to $500. The endowment plans of the uni¬ versity- include the founding of over 100 schol¬ arships in memory of Princeton men fallen in the service of the country in the recent Euro¬ pean War. The university also offers re¬ mission of part of the tuition charge to under¬ graduates of small means and good scholar¬ ship, but no student may hold a scholarship and remission of tuition at the same time. In the Graduate School there are the

Jacobus Fellowship and 10 Proctor fellowships with a stipend of $1,000 each, and in addition about 35 fellowships paying $600 to $700, of which 16 are wholly or partly endowed. There are also a number of graduate scholarships paying $250 and $100 respectively.

A feature of the Graduate School is the Graduate College of residence, where the grad¬ uate students may live amid surroundings which tend to emphasize the proper academic and social life of a community of young scholars. The Graduate College buildings were com¬ pleted in 1912. In connection with this group of buildings is the Cleveland Memorial Tower, erected in memory of President Grover Cleve¬ land.

The present University Library consists of the Chancellor Green Library, built in 1872-73, and the Pyne Library (1896-97), which are united by a delivery room, 50 by 20 feet. The library collection in 1760, when the first cata¬ logue was printed, consisted of 1,300 volumes. It now numbers about 410,000 volumes besides pamphlets. This includes several special col¬ lections and seminary libraries. The Garrett collection of Oriental manuscripts, the Garrett collection of coins, the Hutton collection of death masks and rhe Meirs collection of Cruikshankiana are also located in the library. There are six departmental libraries : art, as¬ tronomy, biology, geology and palaeontology, engineering and physics, each selected from the general collection and kept in the Art Museum and the several laboratories. These depart¬ mental libraries number over 31,000 volumes. The Princeton Theological Seminary Library of over 100,000 volumes is also open to students of the university.

The university campus contains about 700 acres. Besides Nassau Hall, the library and the Graduate College already mentioned, among the buildings are 16 dormitories, some of them of unusual architectural beauty; Dickinson and McCosh Halls, for classroom work; the Hal- sted Observatory, the Infirmary, the Marquand Chapel, Alexander Hall; the John C. Green School of Science, used chiefly by the depart¬ ment of civil engineering, the Chemical Labo¬ ratory, Palmer Laboratory, for physics and electrical engineering, Guyot Hall, the labo¬ ratory of the departments of geology and bi¬ ology and Madison Hall, containing the uni¬ versity dining halls.

The athletic equipment consists of the Pal¬ mer Memorial Stadium, for intercollegiate foot¬ ball, and track; University Field, for baseball; the Gymnasium ; Lake Carnegie for rowing ; the Brokaw swimming tank; Brokaw, Poe and Goldie fields, providing several baseball dia¬ monds and soccer fields ; and 28 tennis courts. Under the direction of the department of hy¬ giene and physical education all freshmen are required to take regular exercise and members of the other classes are encouraged to do so.

At least three-fourths of all the undergraduates take part in some form of intercollegiate ath¬ letics.

There are no secret societies at Princeton, but there are two literary societies, the Clio- sophic and the American Whig, founded prior to the Revolution. Most of the upper class- men are members of eating clubs. All fresh¬ men and sophomores are required to board at the university dining halls.

The productive funds, according to the latest report, amount to $6,565,000. The annual income from all sources averages $839,300. The yearly attendance of students is about 1,600, and the faculty numbers about 200.

PRINCIPAL AND AGENT. See Agent.

PRINCIPE, pren'the-pa, Philippines, sub¬ province of Tayabas, situated on the eastern coast of Central Luzon, bounded on the north by Isabela and on the south by Nueva Ecija; length along the coast, 64 miles; area, 1,216 square miles, with dependent islands, 1,218 square miles. The district is almost entirely mountainous ; there are two main ranges, one near the coast, following the coast line, the

other parallel with it, with narrow valleys be¬ tween. Near the towns rice, corn, coffee, cot¬ ton, sugar and vegetables are raised, but for home consumption only; there are a few simple mechanical industries, also for domestic use. The chief industry along the coast is fishing and the fish are exported to the provinces to the south. Game is abundant in the mountains and many of the inhabitants are engaged in hunting. The inhabitants of the, western slope of the peninsula of Tayabas use the Tagalog dialect ; those in the eastern, the Bicoe. In 1902 the former district of Principe was annexed to the province of Tayabas. Pop. about

14,470.

PRINDLE, prin'd'l, Cyrus, American Methodist clergyman: b. Canaan, Conn., 11 April 1800; d. Cleveland, Ohio, 1 Dec. 1885. He was licensed to preach in 1821 and until his retire¬ ment in 1877 occupied various Methodist pul¬ pits in New York, Vermont, Massachusetts and Ohio. Opposed to the attitude of the Methodist Episcopal Church with regard to slavery, he became in 1843 the chief leader in the move¬ ment that resulted in the founding of the Wes¬ leyan Methodist Church in America.

He was an abolitionist from principle and when he had seen the work to which he and his followers were devoted accomplished in the emancipation of the slaves, he returned to the Methodist Episcopal Church.

*PRINGLE, prin'g'l, Thomas, Scottish poet: b. Blaiklaw, Roxburghshire, 5 jan. 1789; d. London, 5 Dec. 1834. He was educated at Edinburgh University and in 1811 became a copyist in the registry office, Edinburgh. He began writing clever satire and attracted the notice of Sir Walter Scott, who in 1817 gave him his notes for an article on the gypsies, which Pringle contributed to the Edinburgh Magazine, started by himself and Cleghorn, and known after a rupture with the publisher as Blackwood's. In 1820, with 24 others, he emigrated to South Africa, settling finally at Cape Town, where *for three years he was li¬ brarian of the government library. Pringle worked hard to secure financial support for the colony by pamphleteering and started The South African Journal and The South African Commercial Advertiser. These were suppressed by Lord Charles Somerset, the governor of the colony, because of their liberal tendencies and Pringle was reduced to poverty. In 1826 he returned to London and in 1827 became secretary of the Anti-Slavery Society. After seeing the triumph of his humanitarian en¬ deavors in the abolition of slavery by England, in 1834, he died on the eve of returning to South Africa. His earlier poems were col¬ lected by him as*

PRINSEP, Valentine Cameron, English artist and author: b. Calcutta, India, 14 Feb.

1838; d. London, 11 Nov. 1904. He was edu¬ cated for the government civil service, but dis¬ played so much artistic talent that he became a pupil of George Frederick Watts. Oriental, classical, romantic and sporting subjects ap¬ pealed strongly to him. His first notable ex¬ hibition success was gained by his (The Linen Gatherers) (1876). He was elected R.A. in 1894, and subsequently became professor of painting to the Royal Academy. In 1876 he went to India to paint (The Declaration of the Queen as Empress, > which was exhibited in 1880. His other paintings include (Bianca Capella,5 his first Academy picture (1862) ; (The Fisherman and the Jinn5 ; (At the First Touch of Winter5 ; (A Minuet5 ; and (A

Bientot. 5 Of his two plays, (Cousin Dick5 appeared at the Court Theatre and (M. LeDuc5 at Saint James'. He was also author of (Im- perial India5 ; (An Artist's Journal5 ; (Vir- ginie5 ; and (Abibal, the Tsourian.5

PRINTING, the art of producing impres¬ sions from characters or figures on paper or other substance. Printing from movable types is of comparatively modern origin, it being less than 500 years since the first book was issued from the press; yet the principles on which it was

ultimately developed existed among the ancient Assyrian nations: Printing from blocks and clay tablets was practised in China as early as 50 b.c. The great discovery was that of forming every letter or character of the alpha¬ bet separately, so as to be capable of rearrange¬ ment and forming in succession the words, lines and pages of a work, thereby avoiding the labor of cutting new blocks for every page.

The city of Haarlem in Holland claims that Laurens Janszoon Coster there invented the art of printing in 1423, making use of movable types of wood and afterward of lead and tin; but no printed works of his can be identified. The claims of Johannes Gutenberg (q.v.) to this invention are now generally recognized. He without question was occupied in various ex¬ perimental researches of a secret nature in Strassburg, and possessed in 1438 printing ma¬ terials, a press, and as it appears movable types. No book, however, was brought out by their use until after Gutenberg had returned (which was about 1450) to his native city of Mainz. Here he associated himself with a wealthy citizen, Johann Faust, who, on learning the secrets of the art, entered into partnership with Gutenberg, and agreed to furnish funds for developing the process. They employed to assist them Peter Schoffer, a scribe whose previous occupation had been the copying of books, and who appears to have been a man of taste and genius, and well fitted to bring a new process of this sort favor¬ ably before the public. He has the credit of substituting metallic types cast in plaster molds in the place of those which Gutenberg had previously made by carving pieces of wood and metal, and of still further perfecting the art by the invention of punches in hard metal, by the use of which sharpness of outline could be given to the matrices in which the types were cast, and perfect uniformity be retained in the type by continuing to use the same punches for produc¬ ing as many matrices as might be required. The inventors succeeded in printing a con¬ siderable number of books, the first of which known to have been printed with movable types

PRINTING

1 A page form ready for electrotyping 2 A stereotype plate of a newspaper page

3 A roll of news paper ready for printing

were three editions of Donatus. Printing presses were in operation at Subiaco near Rome in 1465, and the types employed were more like those

now called Roman than like the Gothic forms of the Germans, which with the characters imi¬ tating handwriting had up to this time alone been used. In 1469 printing was introduced into Milan and Venice; and the productions of the presses of John de Spira and Christopher Val- darfar of the latter city attained great fame for their perfection and beauty. Printing was introduced into Paris in 1470 and into London in 1474. (See Caxton, William). Before the year 1500, it is stated, printing presses had been set up in 220 places in Europe, and a multitude of editions of the classical writers in their ap¬ propriate Greek and Latin characters were given to the world. A Greek grammar wholly in Greek types was printed in Milan in 1476. A Hebrew Bible was printed at Soncino in the duchy of Milan in 1488. Italic type was in¬ vented about the year 1500 by Aldus Manutius of Venice. From the 17th to the 19th century a great variety of ornamental type came into use, the styles differing from each other in the shapes of the letters, in the heaviness or light¬ ness of the lines and in the shading. Great ingenuity has been exercised in multiplying these varieties in so limited a field. The largest size of type for books was formerly called great primer, and is seen in the largest old Bibles; it is now seldom used. The other old names now going into disuse are English, pica, small pica, etc. See table below. The term pica, however, is retained, being one-sixth of an inch, a convenient standard unit for type measurement.

Great Primer, English, Pica,

Small Pica, Long Primer, Bourgeois,

Brevier, Minion, Nonpareil, Agate, Pearl, Diamond,

Late in the 19th century the ˆpoint® system was adopted generally by printers. In this new arrangement one inch equals 72 points and con¬ sequently 12-point would make six lines to the inch. The principal types are designated as follows:

Nonpareil . 6 point

Minion . 7 “

Brevier . 8

Bourgeois . 9 “

Long primer . 10 “

Small pica . 11 “

Pica . 12 “

For handbills or posters special types are em¬ ployed of extra large sizes and named in mul¬ tiples of pica, as 20-line pica. From about eight-line up they are commonly made of hard v/ood. A complete assortment of one size is called a font or fount, and the ((sorts® that make up an ordinary font of Roman type are as follows : Three complete alphabets in capi¬ tals, small capitals and small or ((lower case® letters, making 78 characters ; the double letters ff, fi, fl, ffi, ffl (each cast in a single piece on account of the kern or bend of the f not per¬ mitting it to stand separately against another f, an i or an 1), 5; the diphthongs 7E, CE, m, ce, ae, ce, 6; figures, 10; marks of punctu¬ ation, 6; the apostrophe, hyphen, parenthesis and bracket, 4; four sizes of dashes and braces

in five pieces, 9; the characters &, &, $, f,

*, 5; and the references *, t, t, §, II, t, 6; total characters, 129. Besides these, there are icquired for filling the blanks between words at the end of lines, etc., four sizes of spaces and four of quadrats (the former and the smallest of the latter being subdivisions of the em [m] or square of the size of the type, one equal to it and the other two multiples of it), making altogether 137 sorts.*

The early printers cast their own type ; made their own ink-balls, or ink-rollers; instructed some local blacksmith to make the iron frames or chases in which the types are confined for printing; and either made or designed the wooden cases and stands that held their type. With the advent of the iron hand press and the cylinder press or machine, press-building be¬ came a separate business. (See Printing Presses). Early in the 19th century the mak¬ ing of type or type founding was separated from the printing office. (See Type). Paper¬ folding machines began to be manufactured about 1860, and as these developed, and other conveniences were discovered, the business of binding became separated. (See Bookbind¬ ing). About the same time experimental type- composing machines were built, culminating in the linotype or slug-casting machine. (See Composing Machines). Stereotyping, elec¬ trotyping, photo-engraving, lithography, all have come from the printery and de¬ veloped into separate arts or industries, and to gain a broad view of modern printing all these subjects should Ibe consulted by the students. At the present time a very large part of the composition work on books and news¬ papers is performed by machine instead of by hand. One of the great troubles with hand composition is the time necessary for distribut¬ ing the so-called dead matter after it has served its purpose on the press or in giving the impression for an electrotype. Make-up is the term employed to designate the taking of com¬ posed type from the galley and building or making it into a page of the prescribed size, adding titles and folio or page numbers, etc. Proofs are taken from type in galley and also in page form. These are read for errors and corrections are made

before going to press. The form or number of pages placed on the press at one time varies from two to 128, ac¬ cording to the size of the type page and the size of the press. Imposition is the placing of the pages on the press in such a manner that when the printed sheet is folded the pages will fol¬ low one another in consecutive order. A letter or number called the signature is placed at the foot of the first page of each section and serves as guide to the binder in assembling or gather¬ ing the sheets. Stereotyping is the casting of a page in one piece. Its object is to save the wear on new type-faces and also to permit the release of the type for other work. Stereotyp¬ ing is now performed by electrotyping and by the papier mache process. In the former the type page is impressed on wax, which is then sprinkled with carbon and iron filings, after which it is immersed in a bath of sulphate of copper through which an electric current is passed. Thereupon a copper coating is de¬ posited on the wax filling out the convolutions of the type. After sufficient strength of copper

is so deposited the coat is backed up with softer metal, is taken out, trimmed and beveled, and if necessary is made type-high by affixing to a block of hardwood. Papier mache work is the favorite with newspapers. The autoplate machine is now in general use. Its operation is entirely automatic.

Printing rollers consist of a mixture of glue, glycerine, glucose and sugar. The formula of mixture is varied to suit the speed of the machine and the temperature of the pressroom. In summer it is a frequent happening in a press¬ room to have one or more rollers melt under high speed.

Previous to 1865, printing was largely a handicraft. It is true that power presses had come into use for daily newspapers, and also that in some of the printing offices the mass of printing was done on presses operated by man-power, either with a hand crank or lever, or by a treadle for the foot. The type was set wholly by hand. The few pictures in¬ troduced were either cut laboriously in wood (see Wood Engraving), or they were drawn on transfer paper, and printed lithographically, and these litho-presses were also run mostly by hand. In the period of about 1875 to 1895 the methods of printing underwent an almost com¬ plete change, so that modern printing may really be classed as a new art, or a series of developed branches of industry all working to a common end, the attractive and cheap reproduction of reading matter and illustrations. Printing is now mainly the product of machinery, of a great variety of types, intelligently guided by specialists, few of whom are all-round printers, knowing the art

in detail. The typecasting and typesetting or linotyping is almost wholly machine work; the presses all run by power, and are mostly fed from a roll of paper or supplied with sheets by automatic feeding- machines. Many presses deliver their product folded; if not folded it usually goes to a folder, and may be also ruled, punched, em¬ bossed, numbered or wire-stitched by machinery. The pictures are drawn by professional artists, photo-engraved, and may then be duplicated by electrotyping, and placed with type in forms for printing. Color printing has advanced, both from the lithographic and typographic side, until the most beautiful and artistic reproduc¬ tions of paintings are sold with cheap period¬ icals or given away to advertise goods.

When the term printing is used without qualification, typographic printing from relief p]ates is understood ; but there are many other processes properly included in the broad term printing. The most common of these is lithog¬ raphy, which was originally done from a flat porous stone, but is now executed chiefly from aluminum and zinc plates, which are available for rotary presses, and which have vastly increased speeds. Wallpaper printing is also a different art. The typewriter really prints, though we use the word writing for its accomplishment. The neostyle which reproduces typewriting effects, is really a print¬ ing machine, and so are a number of other duplicators on the market, as the mimeo¬ graph-, multigraph, etc.

Bibliography. — Bigmore and Wyman, bib¬ liography of Printing) (3 vols., London 1880- 86) ; id., dictionary of Printing and Book¬

making^ (New York 1894) ; (List of Books on the History and Art of Printing) (Boston 1906) ; Cochrane, (Modern Industrial Progress> (1905) ; DeVinne, Theodore, (Invention of Printing5 (2d ed., New York 1878) ; id., his¬ toric Printing Types) (ib. 1886) ; id., bractice of Typography (ib. 1904) ; id., (Notable Printers of Italy during the Fifteenth Century) (ib. 1910) ; Duff, E. G., (Early Printed Books) (London 1893) ; Foulman, Karl, (Geschichte der Buchdruckerkunst5 (Vienna 1882) ; Francis, (Printing for Profit) (1917) ; Gage, F. W.,

(Modern Press Work5 (Chicago 1909) ; Gress, E. G., (Art and Practice of Typography (New York 1910) ; Hansard, T. C., (Typographia : An Historical Sketch of Printing5 (London 1825) ; Heabler, Konrad, (Early Printers of Spain and PortugaP (London 1897) ; Hoe, Robert, (Short History of the Printing Press) (New York 1902) ; Hoe, R. M., biterature of Printing) (London 1877) ; Jacobs, C. T., (Printing) (New York 1904) ; Kennard, J. S., borne Early Printers and their Colophons) (Philadelphia 1902) ; Legros and Grant, typographical Printing Surface) (New York 1914) ; Madan, Falconer, (Oxford Books) (2 vols., Oxford 1912) ; Pasko, dictionary of Printing and Bookmaking5 (1894); Pollard, A. W., dine

Books) (London 1912) ; Putnam, G. H., books and their Makers during the Middle Ages5 (2 vols., New York 1896-97) ; Ringwalt, J. L.,

(American Encyclopedia of Printing) (Phila¬ delphia 1871) ; Sherman, George, bractical Printing) (New York 1911) ; Southworth, lohn,

(Modern Printing) (2 vols., Chicago 1914) ; Stewart, A. A., (Printer's Dictionary of Tech¬ nical Terms5 (Boston 1912) ; Thomas, Isaiah, history of Printing in America5 (2 vols., Worcester, Mass., 1810; 2d ed., in (Achaeologia Americana,5 Albany 18744 ; Waldow, Alexan¬ der, Hllustrite Encyclopadie der graphischen Kiinste5 (Leipzig 1880-84).

Charles H. Cochrane, Author of (Modern Industrial Progress .5

PRINTING PRESSES. The first printing presses were a development of the cheese or cider press common in all large mediaeval house¬ holds, and needed little change to adapt them to the uses of typography.

Gutenberg's press, upon which he printed his bible5 of 36 lines (1450?), his bible5 of 42 lines (1455?), and the betters of Indul¬ gence5 of 1454, 1455, 1461, consisted of two upright timbers with connecting crosspieces at top and bottom, and with two intermediate cross timbers. The lower one was the support of the form of type. Through the upper passed a large wooden screw, the lower end of which rested on the centre of a wooden platen. After the form of type was fastened to its bed it was inked by hand inking-balls made of wool covered with soft leather. The sheet of paper, previously dampened, was then laid carefully upon the type, and the bed pushed to its place. A wooden lever was thrust into its socket and the platen screwed down, held for a moment and then raised. The bed was drawn out and the printed sheet removed and hung up to dry. For 150 years this simple but effective form of the printing press continued in use, and the books thus printed by Faust and Schoffer at Mainz, Jenson and the Aldi at Venice, Caxton at Westminster, Plantin at Antwerp, the Elze-

virs at Leyden and at Amsterdam, and Bade and the Estiennes at Paris have brought their makers the highest fame.

First Improvements. — The first recorded improvements were those of William Janson Blaeuw, of Amsterdam, about 1620. He passed the spindle of the screw through a wooden block, which was guided in the wooden frame, and from it hung the platen. He also invented a device for rolling the bed in and out under the platen, and improved the hand lever for

ttirning the screw. This press was widely used on the Continent, and in England and America, and on such a one Benjamin Franklin worked in London in 1725. One of these, that from the Watt printing house, is now preserved in the Patent Office in Washington. For nearly two centuries this sufficed for books of small editions and for the little-circulated small news¬ papers and gazettes of the 17th and 18th cen¬ turies. The Earl of Stanhope in 1798 made a press with a cast iron frame and greater leverage that had some use in England. George Clymer, of Philadelphia, in 1816 substituted a combination of levers for the screws, and called his invention the Colum¬ bian press. He carried it to England and there in 1822 Peter Smith devised a toggle-joint, sim¬ ple and effective, that replaced the screw and levers.

The final development of the hand press came in 1827, when Samuel Rust, of New York, perfected the Washington press. The iron frame was lightened and strengthened, the

Fig. 1. — The Gutenberg Press.

toggle motion was improved and a screw top regulated the pressure. With this improved hand press came the substitution of composition inking rollers for the leather covered ink-balls previously employed. The bed was made to slide in and out on a track by turning a crank connected with two endless bands. A bent

lever working in a toggle-joint forced the platen down and coiled springs raised it. To the end of the bed was attached the tympan, a wooden or steel frame over which a cloth was tightly stretched and carrying the blanket to modify the force of the impression. When the bed was run out this was raised to an ob-

Fig. 2. — Washington Hand Press.

tuse angle. The paper was laid upon this and carefully fitted to adjusting pins; the frisket, a thin frame holding a sheet of paper cut to the size of the form, was folded over the paper to protect it, to steady it and to raise the paper from the type after the impression. This press has been improved in construction, but in prin¬ ciple and form substantially the same press is widely used to-day in the United States as a proof press and for the special work for which it is fitted. Its capacity is about 250 sheets an hour printed on one side. Alike in principle and construction, though differing in detail of depressing and raising the platen, is the Albion hand press as widely used in Great Britain.

The operation of the hand press when type, press, ink and paper had been prepared neces¬ sitated these 11 processes: The form was inked by hand;

the paper was fitted to its place on the tympan ; the frisket was folded over it to hold it ; the tympan was folded down over the form ; the bed was run under the platen by turning the crank; the platen was forced down by the workman's power applied to the lever; released, it was raised up by the springs ; the bed was rolled out by a reverse motion of the crank; the tympan was raised; the frisket opened, and the printed sheet removed. Mod¬ ern invention has sought to reduce all these to a single automatic process operated by mechani¬ cal power. Necessity divided the course of in¬ vention into three lines; the small job press and the large book and newspaper press soon widely diverging in type and construction to secure fine printing in one and the greatest speed in the other.

Bed-and-Platen Presses. — The development of the bed-and-platen power press for fine book work and illustrations reached its highest state in the Adams press, invented and patented by Isaac Adams, of Boston, in 1830 and 1836, and

improved in many ways by R. Hoe and Com¬ pany since that firm acquired his business and patents in 1858. Over 1,000 have been manu¬ factured, and a few were reported to be yet in operation in Boston in 1918. Adams, after a few experiments with a timber frame, built his presses of iron and fixed the platen im¬ movably in the frame. The form was placed on an iron bed beneath, and this bed was raised against the fixed platen and lowered by a sys¬ tem of cams straightening a toggle-joint. The ink fountain was placed at one end of the press, and the ink rollers in a movable f risket-frame passed over the face of the type and back while the bed was down. The sheets of paper were fed to grippers on the frisket which carried them over the form, and after the impression was taken the sheets passed forward on tapes to a sheet-flier, which delivered them to the fly-board. The speed of the larger sizes of the Adams press is about 600 sheets an hour.

Fig. 3. — Gordon Jobber.

The most successful press designed for small job work substituted for the hand lever and crank a rotary power wheel which could be driven by a treadle by the foot of the oper¬ ator, or by belt and shafting. The bed was set in a perpendicular frame, and the form was clamped to it. To the bed frame near the bot¬ tom was jointed the frame that held the platen. This opened to an angle of about 45 degrees. A crank rod fastened to the wheel brought the platen up to the type form and back at every revolution. On the

platen by adjustable pins or quads the position of the paper was exactly fixed. Two thin steel rods automatically folded over the margin of the paper as the platen rose. Above the bed of the press, and at a slight angle, was set a steel inking-disc, about the size of the bed, that slowly revolved, while at every revolution of the driving wheel a pair of ink rollers descended from the inking-disc over the form as the platen fell away, and back to the inking-disc as the platen rose to the dorm again. This automatic inking was even and uniform. This press prints cards, letter-heads, hand-bills and the like. The labor needed is that of a boy or girl to feed and take off the sheets one by one. Many varieties are made, with varying excellence of detail. The Gordon press here illustrated is typical and has been

widely used. The capacity is about 1,000 sheets an hour. The Gordon press was followed by a host of imitators. The first real improvement was the use of a cylinder instead of a disc for ink distribution, which came in the Globe ma¬ chine. This idea was more fully developed in Gally's universal press, and later in Thomp¬ son's Colt's armory press, which is also char¬ acterized by great strength and rigidity. The Gordon disc type of press was highly devel¬ oped by Golding of Boston, in a scientifically constructed and rapid machine. The old-style Gordon was reduced in cost of manufacture and has been made in enormous quantities by Chandler and Price, and sold all over the globe.

Cylinder Presses. — The basic principle of the cylinder press — a flat type form passed under an impression cylinder — is as old as Gutenburg's time, when from crude machines of this type copper-plate engravings wrere struck off; but no practical development of it was made until the beginning of the 19th cen¬ tury. So many patents have been issued since then for various devices to secure excellence or economy of operation that it is possible to note only the most striking and most success¬ ful. The first printer to work out a practical cylinder press was Frederick Konig, a Saxon by birth, who removed to England in 1806. He associated with him James Bensley, a London printer, and a machinist, a fellow-countryman, Andrew Bauer. The product of their labors was a press which they put in operation in London in 1812. The form of type was placed on a flat bed, which was carried under an im¬ pression cylinder that had a three-fold action. On the first third the sheet was fed at the top upon the tympan and gripped, on the second part of the revolution the sheet received the impression and was removed by hand; and on the third the empty tympan came up to re¬ ceive another sheet. The most efficient device which they invented to roll the bed holding the type form to and fro was this: A long shaft turned by^ gearing from the outside of the frame carried a pinion on its inner end; the shaft had in its length a universal joint that allowed for an up and down motion of the pinion as it revolved. Underneath and fas¬ tened to the bed was a rack, or row of teeth, with a crescent-shaped segment of metal and pins, or

studs, at each end. To the outer end of the shaft was attached the wheel connect¬ ing with impression cylinder; this wheel, when set in motion, revolved the pinion and moved the bed by means of the teeth in the rack. When the bed reached the end of its appointed course, the pinion turned around over one of the pins or studs against the segment in the rack and immediately re-engaged the teeth on the opposite side and carried the bed back again to the other end, where the reciprocating mo¬ tion was repeated. Konig followed this in 1814 by a continuously revolving cylinder, which was slightly reduced in diameter along that part of the periphery not used for the impression so as to allow the bed to return under it freely after the impression. He made also a two-cylinder press of this pattern, and two of these two-cylinder presses were set up in the London Times office in that year. Their capacity was 800 impres¬ sions an hour. This same year he devised i

two-cylinder press — the first perfecting press — by which a sheet was printed on both sides at one continuous operation. The forms were placed one at each end, and the sheet after being printed on one side under one cylinder was by tapes carried over a registering roller to the second cylinder for printing on the re¬ verse side. This machine Applegarth and Cow- per, by improvement, made very efficient. Every year showed patents on improvements, but the next of great value was that of Napier in 1828 and 1830. He discarded the tapes for the conveyance of the sheets and substituted ˆgrippers® or (

Koenig and Bauer went to Germany where they later perfected a machine having a bed that rested on and was reciprocated by a four- wheeled truck and crank. They and their suc¬ cessors were the principal makers of printing presses in Germany for 80 years.

The pioneers in introducing cylinder models into the United States were R. Hoe and Com¬ pany, who had been for some time manufactur¬ ing bed-and-platen presses. Robert Hoe sent Sereno Newton (later to be a partner in the house) to England in 1832 to study the new inventions and devise improvements. The Hoe single small cylinder, double small cylinder and large cylinder perfecting press were designed and built, and with added improvements are being manufactured by them to-day. Hoe and Company patented mechanism to drive the bed in 1847. Two racks facing each other on dif¬ ferent planes and separated by the diameter of the driving wheel were attached to a hanger fastened on the lower side of the bed. The driving wheel was on a horizontal shaft and moveable sideways, so as to

engage first one then the other, of the racks. A roller at either end entering a recess in a disc on the driving shaft in a half revolution brought the bed to a stop and started it in the opposite direction. This was a new principle; a crank action oper¬ ating directly upon the bed from a shaft having a fixed centre.

As the demand for printing presses grew other makes came into the field. Andrew Campbell designed, perfected and built, about 1865, a single cylinder newspaper and poster press, which became known as the Campbell country press, and which secured the widest sale of any press of that character in its time. By means of a very large gear and reversal mechanism keyed solidly on one end of a drum cylinder, he locked together the bed and cylin¬ der so that register was perfect. The rollers and other mechanism were extremely simple, and he was thus able to sell the presses at a low price. An improved form of this press, styled the complete press, was employed by the early color printers, as McLaughlin Brothers, of New York. Another great suc¬ cess of the Campbell Company was their book and job press, which enjoyed a large sale from 1875 to 1890. This had a small cylinder, called a two-revolution, because it revolved once while the bed was making the return stroke. Tt em¬ ployed improved features of ink distribution

and sheet delivery. A. B. Taylor and Company were among the early makers of cylinder and double cylinder presses in New York, closely following the lines of the Hoe machines. Cot¬ trell and Babcock began building cylinder presses about 1870, their most notable early production being the stop cylinder, which was popular for a dozen years. Because the cylin¬ der came to a dead stop in taking the sheet, a perfect register was secured, and the other details of the machine being well worked out, it came into use by the best printers. The Hoes also built a stop cylinder to meet the competi¬ tion. In time Cottrell and Babcock separated, and Babcock brought out the Optimus ma¬ chine, which was one of the first to deliver its sheet without chance of smutting, printed side up. C. Potter, Jr., also built many cylin¬ der presses, of rather light construction, which sold mostly to country newspaper and job of¬ fices. Whitlock followed with a very light and inexpensive cylinder machine, utilizing the Henry bed motion. Walter Scott, who learned printing press building with the Hoes, was one of the most fertile inventors of printing ma¬ chinery, and established press works in Plain- field, N. J., about 1875. He took out more pat¬ ents than any other inventor in this field, and developed a long line of useful machinery. About 1880 the half-tone illustration had made such headway, and the demand for superior printing became so imperative, that the dry paper printing on a hard surface came into universal use, and the

cylinder presses of the day were all too weak to meet the demands made upon them. All went to building heavier machines, but the Huber and Miehle press builders were among the first to recognize this need, and secured most of the market for fine printing. Automatic paper-feeding machinery has increased the demand for this class of presses. The Miehle, being the faster press of the two, forged ahead, and finally absorbed the Huber Company. It has been widely sold all over the world. The Hoes virtually abandoned the two-revolution fine jobbing press field, but Babcock, Scott, Cottrell and Whitlock built heavier, and remained in the market. Potter quit, and later Campbell, while the Cottrells gradually went into a different class of machinery.

Automatic Presses. — While the above de¬ scribed development of cylinder presses was going on, the small platen press was not forgotten by inventors, who improved upon these machines, and brought out a new class, that are properly styled automatic machines, because they do not require hand feeding of the paper, sheet by sheet. Kidder, of Boston, was one of the first to adapt the reciprocating platen press to use paper fed in from an endless roll, and cut off into sheets after printing. About the same time Meisel of Boston began building special ma¬ chines, roll-fed, and automatic in operation. These machines were confined to a limited class of work and printed from flat beds. Harris brought out a press in which the type-form was replaced by a curved electrotype plate, mounted on a cylinder, and this not only worked auto¬ matically but permitted high speed. This was so successful that a whole line of automatic presses has been brought out by the Harris

Company, which has sold them all over the world. Wood and Nathan improved the old type of Gordon jobber by adding a paper feed¬ ing and delivery device, which has become known as the Standard press. Kelly built a small cylinder, self-feeding, automatic press, which is sold by the American Type Founders' Company, and is largely used. The Autopress, Osterlind, New Era and Stokes and Smith presses are others which have successfully en¬ tered this field.

Offset Presses. — Late in the 19th century a New Jersey man named Rubel conceived an offset press, in which the printing was first done on a rubber cylinder, and this rubber cylinder rotated in contact with a printing cylinder, so that a continuous sheet of paper could be run and printed between the cylinders. The idea was developed and the first commercial ma¬ chines employed by A. H. Kellogg and Company of New York. This

machine brought litho¬ graphic principles into the field of the typo¬ graphic printer, and several concerns built them, among the most successful being the Harris Company. They are occupying a wider and wider field, because they permit beautiful artis¬ tic illustrations to be executed on a cheap, coarse-finish class of paper. The machines offer special convenience for combining text with illustrations, and are in increasing demand for the printing of illustrated catalogues.*

Newspaper Presses. — »The demand for faster presses of greater capacity grew enor¬ mously with the years of the 19th century, and invention kept pace. The first step forward was the Hoe type-revolving machine, which was put at work in the Philadelphia Public Ledger office in 1846. They had put into effect the basic idea of fastening the type to the main cylinder, while smaller cylinders carried the sheets of paper to receive the impression. There was designed an apparatus for fastening the columns of type in a form on a large cen¬ tral cylinder in a horizontal ˆposition, each page in its own cast iron bed. "V®-shaped column rules tapering to the base, with a special ar¬ rangement for locking up the forms, held the type in place with the surface forming a true circle. An automatic inking apparatus carried the main ink-well beneath the cylinder, with distributing rollers between the impression cylinders. This first machine was built with four impression cylinders touching the type cylinder so that two were on each side and one as far above the other as possible. The frame¬ work of the machine bore four feed tables. At each a boy fed the sheets of paper to the auto¬ matic grippers, operated by cams, on the im¬ pression cylinders, which carried them around against the revolving forms of the central type cylinder. The printed sheet was conducted out by tapes under the feed board, and the patented sheet-flier, with its long wooden fingers fastened to the shaft and operated likewise by cam and springs, piled them upon the delivery tables. Upon this machine, with 2,000 revolutions an hour, 8,000 sheets were struck off printed on one side. The capacity of the machine was found to be greatly in excess of this, and the number of impression cylinders and accessories was increased to 10, giving the machine a prod¬ uct of 20,000 sheets an hour. Though this machine was cumbersome, and at times threw

out type rather liberally, it met a need and the impetus given to the newspaper business was tremendous. Circulations that had been lim¬ ited to the capacity of the old bed-and-cylinder press were rapidly increased twenty-fold. Many new papers were started. This press maintained its supremacy for 20 years and 175 were built. In 1848 the first sent abroad was set up in the office of La Patrie in Paris. Marinoni afterward built similar presses in Paris. The next great step was when there was perfected the process of making curved stereotype plates by the use of flexible paper matrices. A simple adaptation of the bed of the type-revolving machine provided for the clamp¬ ing of stereotype plates on the cylinders in place of

the type forms. The forms could now be du¬ plicated. The large papers such as the New York Herald, the London Daily Telegraph and the London Standard each kept five presses in constant operation as circulation increased.

Web Presses. — There remained yet another step before the increasing requirements of speed could be met. It was taken when William Bul¬ lock, an American, of Philadelphia, invented in 1865 the first printing press to print from a continuous web or roll of paper. Thirty years before, Sir Rowland Hill had suggested the possibilities of such a machine based on those that printed cotton cloth from engraved cylin¬ ders. But no practical working out of the problem in its details was offered. The Bullock press consisted of two plate cylinders and two impression cylinders, the second of which was made very large to lessen the offset from the first printed side of the paper. The stereotype plates were shprt of filling the whole circum¬ ference of the form cylinders, because the sheets were cut before printing by knives set in the cylinders. This was the radical fault of the press. The sheets were then carried through the press by tapes and fingers and delivered by a series of automatic metal nippers on endless leather belts, placed at such a distance apart as to grasp each sheet successively as it came from the last printing cylinders. The Bullock press was perfected and came into considerable use. The New York Sun was the first newspaper to make use of them, and the New York Herald soon followed.

In 1868 the London Times had gone so far with its own experiments in constructing a ro¬ tary perfecting press that it set up the "Walter® press in its office. This had a capacity of 12,000 sheets an hour. It was similar in construction to the Bullock press, except that the cylinders were of uniform size and placed one above the other. The sheets, however, were severed after printing, brought up by tapes and carried to a sheet-flier, which moved back and forth and "flirted® the sheets alternately to boys on either side. This press was equipped with dampening cylinders containing sponges filled with water, and required a very strong and expensive paper. This press was also adopted by the London Daily News and the New York Times, but has now entirely gone out of use.

To satisfy the demands of small daily papers throughout the country for speed and economy the Duplex press appeared late in the 19th cen¬ tury. It is a flat-bed web-perfecting press and prints directly from the type form with a capac¬ ity of from 5,000 to 6,000 per hour of either 4-,

6-, 8-, 10- or 12-page papers. The flat-beds are stationary and the cylinders reciprocate over them. By an ingenious method of handling the web of paper, it is taken from the roll, led to the cylinders, printed on both sides and deliv¬ ered to the folder. It has been brought to a high degree of perfection.

Rotary Perfecting Presses. — About 1875 the modern rapid rotary perfecting newspaper press was born. Numerous inventors were try¬ ing to accomplish the feat of feeding from a continuous roll of paper, printing on both sides at one operation, and delivering the product folded and cut as a complete newspaper. They had to overcome the difficulty of offset, that is, the smutting of the second side from wet ink if printed on at once. They had to secure bet¬ ter and more uniform paper than then ordi¬ narily supplied. They had to cut the roll to separate the sheets while the roll was traveling at a rapid rate. These problems were solved more completely by Andrew Campbell than by any other one man, though the credit of the invention has not been usually accorded to him. He built and operated a press in Jersey City which was the first really satisfactory perfecting newspaper press, but through misunderstandings and disagreement with his financial backers he refused to sign the necessary patent papers, or to protect his invention in any way, and allowed it to become public property. In the meantime the Hoes had worked on the problem, and Stephen D. Tucker had patented a rotary col¬ lecting cylinder that was a verv useful ad¬ junct. The Hoes were, therefore, able to put together all this knowledge and produce a com¬ mercial perfecting press, and by continuing to absorb inventions they have become the leading manufacturers in the world of rapid newspaper presses.

The first machine of this type that R. Hoe and Company built went to London to Lloyd's Weekly, and the first to be set up in the United States was used in the office of the New York Tribune. The limit of capacity depended on the ability of the web paper to stand the strain of passing through the press. The average speed , was 12,000 papers an hour.

The pressure on the newspapers demanded larger than eight-page papers. It became neces¬ sary to devise some way to print 10-, 12-, 14- and 16-page papers at one impression. About this time Anthony and Taylor of England pat¬ ented devices by which the webs of paper could be turned over after printing on one side and the opposite, or reverse side, presented to the printing cylinder. Mr. Hoe bought the patent rights for England and the United States, and with them combined ideas patented by Luther C. Crowell of Boston, who had made a machine for forming paper bags. After costly experi¬ ments these ideas were incorporated in a so- called ˆDouble-Supplement® press, which was set up in the New York Herald office. Sim¬ plicity, speed, accuracy and efficiency had been combined. This press

turned out either 4-, 6-, 8-, 10- or 12-page papers at the rate of 24,000 an hour; the odd pages were accurately inserted and pasted in ; the papers were cut and deliv¬ ered folded. This press was really two presses built into one frame. In the secondary part the plate cylinders were half the length of those in the main pan and at right angles to them.

These were used for the supplements of two or four pages when it was desired to print more than eight pages. Each part was fed by its individual roll of paper. The plates being se¬ cured to the cylinders, the two rolls of paper were carried, each through its part of the ma¬ chine, between two pairs of plate cylinders and impression cylinders and printed on both sides. Then the two webs of paper passed over turn¬ ing bars, or ((angle bars,® with an edge at 45 degrees from its base, bv which they were laid evenly and exactly one over the other as a brush from the paste fountain glided along the inner fold, pasting them together. The papers passed on down a triangular <(former® that folded them along the centre margin. Thence the printed and folded web of paper passed over a cylinder, from within which a revolving blade projected and thrust the paper between folding rollers, while at the same moment a knife in the cylinder severed the sheet. A rap¬ idly revolving mechanism, resembling in its mo¬ tion the fingers of a hand, disposed of them accurately on traveling belts that hurried them on to final delivery. Hundreds of this press have been built and operated in this country and abroad. Their efficiency was increased about 1900 by an automatic stereotyping machine called the autoplate (q.v.).

Magazine Presses. — The demand for a higher grade of rapid printing adapted to maga¬ zines has been catered to by the Cottrell Com¬ pany, which has brought out an entire series of rotaries, less rapid than the newspaper ma¬ chines, but executing a very high grade of illus¬ trated printing. Hoe, Goss and Scott also built presses of this character.

Straight-Line Presses.— The angle-bar press stood alone for a decade as having the only device, though somewhat cumbersome, for assembling the several sheets into one complete paper. Joseph L. Firm, foreman of the press¬ room at Frank Leslie's publishing house, how¬ ever, solved the problem in a new way, and in 1889 patented the straight-line press. His first design was a simple tandem press. Three sots of cylinders were set in a straight line, and the printed product of the first passed over the second, and of the first and second over the third, thus assembling all three sheets over a triangular <(former® for folding, cutting and delivering. It was but a step, to secure econ¬ omy of construction and space, to build the press in tiers instead of tandem. Firm had the usual fortune of poor inventors. His first order, which was for a sextuple press, came from the New York World, and its building exhausted his resources. When set up, in 1891, it was so crudely and badly built that, failing to work properly, it was

condemned. Poverty followed, but not for long. The Goss Printing Press Company of Chicago became interested in the straight-line press invention, which was being pirated, and bought it, taking Mr. Firm into the company. Litigation followed and established the patent and harmonv among the printing press makers. Improvement was rapid. These presses mark the final development of the power printing press. Evolution and the re¬ quirements of the publishers of metropolitan newspapers have brought forward presses with various improvements of detail and in increasing sizes, until one press, so-called, is a compound of

two, four, six, eight, 12 presses built into one frame, one above the other, side by side or tandem, or all three for economy of space and power and efficiency, but the basic principle is the same, — a web of paper passes between two pairs of plate and impression cylinders and is printed on both sides; it is assembled (if on a double-supplement press or one of greater power), pasted, folded, cut or separated, folded again and delivered ready for the car¬ rier or mail-room, at a speed of 48,000 eight- page papers (the unit of manufacture) an hour ; and with an accuracy that denotes exact¬ ness and skill of manufacture, excellence of material and utmost care and nicety in adjust¬ ment and operation.

The first improvement in the Hoe type of fast press was the quadruple (or four-fold) press built for the New York World in 1887. A further advance in 1891 produced the sex¬ tuple (a six-fold press), so constructed that the cylinders were all parallel. Its delivery ca¬ pacity was 72,000 eight-page papers in one hour, or 20 a second.

and delivering its product on the mezzanine floor. In 1903 the New York Herald increased the size of its paper from a six-column page to a seven-column page. It was able to make over its presses to accommodate the increased width of the web, though web and cylinders now barely clear the framework. The Duplex Com¬ pany of Battle Creek, Mich., manufactures what they term a ((tubular® perfecting press, in which the plate cylinders are reduced in diameter, be¬ coming literally tubes, that print continuously. These presses are very speedy. H. A. Wise Wood brought out in 1917 an improved perfect¬ ing press designed to reduce the strains on the web of paper and permit more rapid printing.

Newspaper Color Presses. — Ever search¬ ing for new features, New York newspaper publishers in 1902-03 were planning and design¬ ing supplements and main sheets embellished with color printing. Their scientific pressmen and the press-builders were called on tp pro¬ duce the desired effects. Walter Scott of Plain- field, N. J., designed and built a very efficient press that was set up in the office of the New

THE GOSS THREE-DECK STRAIGHT-LINE PRESS.

Fig. 4. — Diagram of the sextuple unit. Dotted line shows the course of the three webs of paper, which are assembled on the triangular " former " or folder. This press is two plates wide, has a capacity of 24,000 four-, six-, eight-, 10- or 12-page papers an hour; or 12,000 16-, 20-, or 24-page papers. It weighs 42,000 pounds and requires 40 horse-power.

In 1896 an octuple (eight-fold) press was built for the New York World, with a corre¬ sponding increase in output, and four double sextuples, with color-printing attachment, were constructed for the New York Journal. Even larger are the six giant double-octuple presses which R. Hoe and Company designed for Lloyd's Weekly, and other great newspapers continue to purchase these enormous presses.

The 1902 patterns of the Goss press carry also (

York World in 1893. This had five two-page wide color cylinders for electroplates set tan¬ dem, with a pair of cylinders for printing the reverse side in a single color, usually black. Below was a complementary stereotype cylinder machine for printing four pages in a single color; so that this

machine could produce either a four-page paper, one Christmas supplement showing outside pages in five colors and the inside in a single color. By skilfully dividing the ink fountains and combining colors and over-printing, many shades are produced in the same paper, one Christmas supplement showing no less than 36 shades. This press was re¬ moved to the office of the Post-Dispatch, in Saint Louis, in 1902, where it is still doing very efficient work. To meet increasing demand The World had R. Hoe and Company build an angle-bar double color-press in 1894, each side of which printed four (the two outside and the two inside) pages in four colors, and four pages in a single color; and another, a straight-line press, in 1898 with a capacity for four pages in five colors, and four pages in two colors; these two eights can be collected and delivered as a

1. The Original Print

2. The Yellow Plate

4. Red and Yellow Combined.

3. The P.ed Plate

5. The Blue Plate

6. Combination of the Three Colors.

Showing the different steps in obtaining a picture in colors from a single negative

16-page paper. The press will also produce a 24-page paper with four colors.

Color printing presses have been widely adopted by the American newspapers, and in the new models all the manufacturers offer <(color decks.® The popularity of these colored sheets created a demand for illustrated supple¬ ments of pictures in one color. This has been supplied by what are called magazine webs and also by machines of the offset type, producing rapid photogravure work.

The skill of the American printing press manufacturers has produced so many designs, adapted to meet every demand of newspaper publishers, large and small, that it is impossible to enumerate the patterns. The presses here illustrated are sufficient to show the types.

In 1918 there were more than 80 factories in the United States producing printing presses, and 56 which made both printing and (binding machines. The gross annual production of the former is over $8,000,000, and of the latter over $3,000,000. (See Newspapers, American; Printing; Printing Trade, American). Con¬ sult Hoe, Robert, (Short History of the Printing Press (New York 1902), and Hoe, R. M., (Literature of Printing) (London 1877). Consult also works referred to under article Printing.*

Charles H. Cochrane, Author of i Modern Industrial Progress ?

PRINTING TRADE, American. Al¬ though the printing trade had its inception in America considerably prior to the Revolution¬ ary War, it was not until some time after the conclusion of that struggle for liberty that it began to assume the proportions of a national industry. In the year 1775, for example, there were less than 100 printing establishments upon American soil, and these were almost exclu¬ sively confined to the coast towns. Even as late as the year 1810 there were but 35 printing shops scattered about throughout the interior of the country, while, in 1775, with the exception of the two or three offices that were located in Massachusetts and Pennsylvania, the art of printing had no inland representation. A few years later a printing establishment was opened at Lexington, Ky. ; another soon followed at Pittsburgh, Pa., and the third office was finally located at Cincinnati, Ohio. In almost every instance these printing offices wrere established for the primary object of printing newspapers, although each of them not only possessed the necessary facilities for the production of job-work, but were also able to print and bind books on the rare occasions upon which such contracts presented themselves.

From the earliest days in the history of the printing trade in America, New York, Philadel¬ phia and Boston have been the three great centres of this industry. Other seaport towns had their local shops, but the bulk of their business was small. In fact, during the first 50 years in the life of the new nation it was Philadelphia that took the lead in every branch of the printing industry, and by the beginning of the 19th century the Quaker City presses, of which there were no less than 110 constantly in operation, were producing more English publica¬ tions than any city in the world, with the single exception of London. It was here that Matthew Carey, the first great American publisher,

established his plant, and with all its daily and weekly newspapers, and its book-printing and binding establishments, Philadelphia was indeed the most important centre of the American printing trade.

Gradually, however, as the demands for printed works increased other cities came into line, Albany, Hartford and Worcester being among those

that developed a comparatively large trade. Their chief industry was in the printing of pamphlets. The newspapers of that day contained so little matter that they were easily read, and, as they were passed from man to man, their numerical circulation was ex¬ tremely small. As the result, therefore, little effort was made to enlarge them, and persons who, like the politicians, wished to reach the general public were compelled to address them¬ selves to the people through the medium of pamphlets. So far as actual literature was con¬ cerned the country was practically devoid of authors, and the books which were printed upon American presses were almost exclusively those which had been pirated from English publish¬ ers. Later some religious and technical books appeared, but it was many years before general literature displayed any marked development.

In the beginning everything that was used in the art of printing was imported from Eng¬ land. The American printers had English presses. It was from England that they ob¬ tained their type. Even the better qualities of printer's ink were imnorted, for the ink that was produced in the United States was of such an inferior grade that it could be used only in the roughest kinds of jobs. From time to time various American printers made some slight improvements upon the old presses, but no great evidence of progress was shown until the estab¬ lishment of a permanent type foundry.

Although it was the latter part of the 18th century before there was any permanent estab- ment for the making of type in the United States, several attempts had previously been made to introduce such an innovation in the printing trade. As early as 1775 Benjamin Franklin had sent the complete equipment for a type foundry from Paris, but the attempt to establish this branch of the industry was not a financial success, and it was accordingly soon discontinued. Some 10 years later a Scotch firm opened a foundry in Philadelphia, but it did not thrive, and the few other scattered efforts that were made to provide American workmen with American-made type met with the same fate. In 1796, however, two Scotch¬ men opened a type foundry in Philadelphia under the firm name of Binny and Ronaldson, and, as the time now seemed ripe for such an establishment, they were sufficiently successful to be able to continue operations. In 1805 an¬ other foundry was opened by the firm of Wing and White, in Hartford, but they found them¬ selves unable to compete with the Philadelphia foundry until, in 1810, the establishment was re¬ moved to New York. Two years later the firm of David and George Bruce established a stereotyping plant in New York, and, when the already established foundries refused to supplv them with type for their operations, they began to cast it for themselves, and soon became one of the most successful type-making houses in America. Their success, in fact, as much as the increasing demand for type, inspired others

to follow their example. In 1816 a foundry was established in Boston; in 1817 another was opened in Baltimore, and, by 1830, there were no less than 12 foundries in full operation in various parts of the country. At the present time there are about 30 of these foundries in the United States, many of which are under the control of the American Type-Founders Company.

In the early days of the printing trade in America stereotyping was, of course, unknown, and the local publishers were accordingly com¬ pelled to recompose the type for each new edition that might be required. The introduc¬ tion of stereotyping by the Bruces in 1813, there¬ fore, suggested such economy that the enter¬ prise could scarcely have failed to meet with favor at the hands of the printers. While the plaster process, the first method of stereotyping in vogue, was invented in England by Lord Stanhope, tidings of this great discovery were soon brought to America, and David Bruce at once set sail for the Old World for the express purpose of securing the information that would enable him to make practical use of the new invention in America. Although the stories that had reached the United States had pictured the new discovery as a perfected in¬ vention, Lord Stanhope's experiments had act¬ ually by no means been concluded, and, as the result, Bruce found it impossible to acquire anything more than the most superficial knowl¬ edge concerning the process. Finding that all material facts were being withheld from him, and that it would be useless to attempt to per¬ suade Lord Stanhope to disclose his secret, Bruce returned to the United States. So far from admitting his defeat, however, he promptly went to work, and, with the little information he had obtained, he managed by his own genius and mechanical skill to make a plate that was in every respect superior to any that had as yet been cast in England. Through his own dili¬ gence he had mastered the defects which Lord Stanhope had been unable to overcome, for his plate was not only perfectly level on both sides, but it was of uniform thickness in every part. In fact, so successful was he that an Englishman named Watts, who had succeeded in learning his process, went back to Europe with his knowl¬ edge. There he found scores of master -printers who, disgusted with the English invention, were glad to be taught how the American plates were made, and it was through his efforts that both Austria and Germany acquired the art of stereotyping.

From the day on which David and George Bruce opened their foundry in New York they had all the orders that they could fill, for American publishers were quick to appreciate the economical advantage of the new

invention. It was the time when the public was just be¬ ginning to demand books, and as the plaster casts were not only made without great expense but also guaranteed plates of great durability, printers were eager to stereotype all books that might by any possibility require a second edition. From this simple beginning, therefore, came the great stereotyping industry of America. By 1850, the year in which the making of plaster plates attained its greatest development, there were more than 50 firms engaged in this busi¬ ness in the United States, while more than 1,000

men were employed in the work. Then came the modern improvements — the electrotyping for book-work and the introduction of the papier-mache process in the making of news¬ papers — since which time the making of plates has become practically an art by itself.

Prior to 1805 comparatively little printer's ink was made in the United States. Although printers were supposed to know how to mix the compound the preparations that they concocted proved such a poor substitute that all the good inks were imported. In 1805, however, two firms — one in Philadelphia and the other in Cambridgeport — began the manufacture of printing ink, and, since that time, the industry has been steadily extended until there are now about 35 firms engaged in this branch of the printing trade. About 1860 the cheapness of aniline colors inspired a more general use of colored inks, but as many of these tints soon lost their brilliancy they did not become very popular until the chemists had succeeded in cor¬ recting this fault.

The period between 1819 and 1833 witnessed many great improvements in the art of printing. One of the most important innovations was the substitution of iron for wood in the making of hand presses. Although wooden presses had been used since the time of Gutenberg they had always proved a handicap to good printing. Even the strongest wood was weak, and as the machine was liable to give way in some part at any pull, the pressman found it impossible to obtain a good impression, even when the type surface was no larger than 12 by 20 inches. As the natural result, all hand-presses were small affairs, and as they required the services of two expert workmen to keep them going the process was as costly as it was slow. In the adoption of the iron press American printers followed the example of their English brethren. The first iron press to be made in America was completed about 1820, but, sometime previous to that date, such presses had been imported from England. Recognizing the advantage of a machine that was capable of printing a sheet three times as large as the old press and with no greater muscular effort, American printers soon demanded them, but, in spite of this de¬ mand, it was several years before the wooden presses were relegated to the junk-heap, some of them having been in use, even in New York, as late as 1850. In the beginning presses

were made by Turney, Worrall, Wells and Smith, but gradually the business began to centre with Hoe in New York and Ramage and Bronstrup in Philadelphia, until, finally, nearly all the presses were manufactured by these houses.

Another invention that proved an invaluable aid to the progress of the art of printing was the making of elastic rollers for inking the type. The original method of inking was a most laborious system, the application of the ink being made with balls of pelt. Early in the 19th century, however, an English compositor dis¬ covered that a composition of glue and molasses, long used in the making of pottery, could be ap¬ plied in the inking of type, and from this idea was evolved the composition roller which was so necessary to the success of the first machine presses. This roller was first employed in America about 1826. Another invention that played an important part in the production of

cheap printing was the improved method of paper manufacture which came with the intro¬ duction of Fourdrinier's machine. This, too, was introduced in America soon after 1826, and since that time the growth of the printing in¬ dustry has been a steady and rapid evolution.

Of course, the great necessity under the new conditions was more rapid printing facilities, and this demand was met by the inventors about 1829. Some 15 years prior to that time a German printer named Konig went to England to produce a cylinder machine for the use of the London Times. While the press that he con¬ structed was rather successful, he returned to Germany before it was perfected, leaving the English inventors to complete the improvement of his work. This they did in many respects, but the credit for the first actual success in the making of cylinder presses is due to the Ameri¬ can manufacturers, firms like R. Hoe and Com¬ pany, who took the somewhat unsatisfactory foreign machines and brought them to a state of comparative perfection. By depending only upon good material and thorough workmanship they produced cylinders that were so much more satisfactory than the foreign goods, that, in spite of the fact that the home product is cheaper, English printers have long found it expedient either to import American printing machines, or to make their own presses from American models.

After 1833, therefore, America needed no further help from England in the development of her printing industry. With the best of paper, ink, type and presses, all made in the United States, and with plenty of money to invest

in manufacturing enterprises connected with this trade, it was unnecessary for her to turn to any foreign nation for assistance, and when, in 1830, the system of cloth book-binding was intro¬ duced, all the requisites for literary progress were in her own hands.

Of course, with the development of the power press the character of the newspapers of America also began to change. Whereas they had originally been small and dull, having but little news in them, the ability to print many copies enabled them to increase their circula¬ tion, as well as their size. In 1833 the New York Sun, printing a sheet 11ˆ2 by 17 inches on a hand press, could not produce more than 400 copies an hour. As the demand for the paper continued to increase, however, a cylinder press, propelled by a man at a crank, was introduced in 1834, and a year later this was supplanted by a double-cylinder operated by steam power. As other papers in other parts of the country met with similar experiences, the demand for rapid newspaper presses continued, and, by 1845, it was found that even the double-cylinder ma¬ chine was too slow for the requirements of the constantly growing circulation of the great dailies. See Newspapers, American.

It was to comply with this demand that R. Hoe and Company, in 1847, invented the type- revolving rotary printing press, a machine in which the type was fastened to the cylinder and successively presented to each of the impression cylinders placed around it. For more than 20 years this press was able to meet every demand of periodical publications, but, in 1869, finding that it had at last become too slow, R. Hoe and Company perfected their web-printing machine, a press which prints continuously from stereo¬

typed plates on a cylinder against an endless roll of paper. In spite of the almost incredible speed at which this press can be run, other in¬ ventions, which have since been perfected, now enable it, not only to print 4, 8, 12 or even more pages, but at the same time, to fold, count and paste them ; to insert sheets or add the necessary covers, or even to print illustra¬ tions in many colors. In 1854 William A. Bul¬ lock perfected the first cylinder machine that was capable of printing a newspaper from a roll on both sides at the same time, but the other improvements have been the work of R. Hoe and Company, or some of their business rivals like Cottrell, Babcock, Campbell, Potter, Huber, Miehle, Joss and others.

Great as has been the improvement in the making of machine-presses, however, the other branches of the art of printing have succeeded in keeping pace with it. In stereotyping, for example, the invention of the papier-mache process enabled printers to make a number of impressions of the same page of type, while the demand for a convex plate was met, in 1854, when Charles Craske of New York succeeded in stereotyping a

curved surface.

The period between 1833 and the outbreak of the Civil War also witnessed many improve¬ ments, in the art of printing, the most import¬ ant being the introduction of fast printing in fine book and job work. The invention of the power press had been a blessing to the news¬ papers, but, for a long time, book and fine job work was still done on hand presses. It was not until 1836 that Harper and Brothers intro¬ duced a power press, although Daniel Fanshaw of New York, the printer of the Bible Society, had 10 power printing machines in operation in his shop prior to that time. These machines were manufactured by Daniel Treadwell of Massachusetts, and, although they were both bulky and inconvenient, they were the best presses on the market until the Adams press came to take their place. During all this period, however, it was believed that cylinder machines were incapable of doing fine work, and it was not until Francis Hart of New York had demonstrated the fallacy of this theory that the incredulous could be persuaded to make the change which the proper development of the trade had so long demanded.

To Joseph A. Adams belongs the credit of devising the American method of making-ready woodcuts, and he it was who first demonstrated the feasibility of the new process of electrotyp¬ ing by making successful electrotype plates, in 1839. It was in 1838 that the typecasting machine was invented by David Bruce, and about 1850 that the method of printing illustra¬ tions on dry paper was discovered.

The art of engraving on wood was practised until comparatively recent times, but the intro¬ duction of the art of photo-engraving destroyed its usefulness, for, while wood engravings were extremely costly, the new process made the cheapest of illustrations possible. Lithography, or the art of printing upon stone, has been em¬ ployed in the United States since 1819. It was not until 1825 that its use became commercially practicable, but since that time this form of printing has developed rapidly.

One of the latest, and, unquestionably, one of the greatest improvements in the art of printing was the invention of the typesetting

machine, which is now in such general use in all large establishments that it may be said to have practically supplanted hand composition. It is by such inventions, however, that the printing trade has been revolutionized until it has grown from the small proportions of a business which engaged the

attention of less than 500 men to a great national industry.

Printing has increased in volume as much as in quality. In 1900 it was rated as about the 14th United States industry; in 1914 the census returned it as the sixth industry. In 1918 Charles Francis, generally known as the <(dean of the printing industry® in America, called attention to the fact that it was entitled to be classed as the third industry of the coun¬ try, and from some points of view as the second industry. He reminds us that paper is a very necessary part of printing, and that its value has been usually deducted in computing printing production. When gross products are figured the leading United States industries appear as follows, 1914 figures: (1) Slaughtering and meat packing, $1,673,000,000 ; (2) foundry and machine shop products, $1,373,000,000; (3)

printing and publishing, $1,233,000,000; (4) lum¬ ber and timber, $1,119,000,000.

When measured by net products, foundry and machine shop products comes first, and if the paper be included printing and publishing is second. The motion-picture industry is now approaching rapidly and bids fair to occupy one of the foremost places. In number of em¬ ployees drawing wages and salaries, printing, publishing and paper, considered as one indus¬ try, ranks third, and in wages paid come second. From the same point of view, in capitalization, foundry and machine shops are first, and lum¬ ber and timber, steel works and printing (with publishing and paper), are practically tied for second, third and fourth place. It also appears that one-fourth of the printing in the United States is done in the metropolitan district of New York, while Chicago, Philadelphia and Boston together do another fourth. The total gross United States production of printing and publishing and the paper used in 1914 was $1,233,000,000, which figure does not include paper used for other purposes. The newspaper end of the industry is discussed under American newspapers. The magazines and periodicals, meaning the larger weeklies and nearly all the semi-monthlies, monthly and quarterlies, are produced by what is commonly called the book and job printing branch of the industry, but which is beginning to be known as the periodical, book and job printing branch, be¬ cause the periodicals constitute the largest por¬ tion of its production. The great daily news¬ paper printing plants and the great printing houses that turn out periodicals, catalogs and books in large numbers, have all developed along factory lines of efficiency, and may correctly be classed with other factories.

Charles H. Cochrane, Author of (Modern Industrial Progress 2

PRINTZ, Johan, yo'han prints, Swedish colonial governor in America : b.

Bottneryd, Sweden, about 1600; d. 1663. He fought in Germany in the Thirty Years War with the rank of a lieutenant-colonel of artillery in the Swedish army, but having surrendered Chem- mitz in Saxony to the enemy, was deprived of his rank. In 1641, however, he regained the

good will of the Crown, was raised to the nobility and made the third governor of the colony established by the Swedes on the Dela¬ ware River in 1638. He landed at Fort Chris¬ tina in 1643 and until his departure from the colony in 1658 maintained the prosperity of the settlement, upheld the Swedish claims, almost unaided, against the English under Sir Edmund Plowden and Lamberton, and against his near neighbors, the Dutch. He built forts on the island of Tinicum near the mouth of the Schuyl¬ kill below Philadelphia, at Wilmington, and at New Castle, exerting much influence over the Indians along the Delaware and protecting his trade with them. At Tinicum he built himself a rude mansion, known as ((Printz Hall.® The influx of settlers during his rule was made up of a good class of farmers who dealt fairly with the Indians and established a precedent of kindliness and justice acted upon so successfully afterward by William Penn. The only record of Printz after he returned to Sweden is that he was made a general, and in 1658 was ap¬ pointed governor of Jonkoping. Consult Acrelius, (History of New Sweden) (extracts in (01d South Leaflet, > No. 96) ; Smith, (The Thirteen Colonies) (1901) ; Winsor, (Narrative and Critical History of America > (1889).

PRINZIP, Gabrilo, Serbian assassin: b. Serajevo, Bosnia, about 1893; d. a prisoner in an Austrian fortress near Prague, 30 April 1918. Though an Orthodox Serb and a member of the Greater Serbian party, he was an Aus¬ trian subject, the son of a small innkeeper of Serajevo. It was he who fired the three shots from a Browning pistol which killed the Arch¬ duke Francis Ferdinand of Austria and his morganatic wife, the Duchess of Hohenberg, in Serajevo on 28 June 1914. At the time a mere schoolboy and a printer's ((devil,® Prinzip may be credited with having precipitated the European War by furnishing the Austrian government with a suitable pretext for war against Serbia. He was immediately arrested after firing the shots and subsequently sentenced to imprison¬ ment for life. Prinzip confessed, on 2 July 1914, that he had previously informed the Pan-Serbian Union of his intention to murder the Archduke.

PRIONID.7E, a family or subfamily of longicorn beetles distinguished from its allies by the margined and usually toothed thorax. They are mostly insects of large size and robust form. Their larvae are large, soft grubs with small heads but powerful jaws, which bore in wood and are very destructive. They rest in a nearly straight position, not bent or doubled. A num¬ ber of conspicuous species are found in the United States, several of the most common belonging to the genus Prionus, in which the thorax bears

three marginal teeth on each side, the joints of the long antennae fit into one an¬ other in an imbricate fashion and number from 12 to 27. These insects are nocturnal, and the males are said to fight fiercely for possession of the females. One of the largest species is P. brevicornis, a common black beetle, which flies about in a heedless fashion at dusk. The huge larvae, as large as a man's finger, live for three years; and are very injurious to the roots of poplar and other trees. A smaller and more slender beetle is Orthosoma unicolor which bores passages through the roots of grape vines.

Other species are less destructive, confining their attacks chiefly to the dead wood of stumps and decaying tree trunks. Consult Fabicius, 'System EleutheratorunU ; Olivier, (Entomo- logia ou Histoire Naturelle des Insects) ; Gyllenhal, (Insects Suecica) ; Dejean, (Species General des ColeopteresP

PRIOR, prl'or, Matthew, English poet and diplomatist : 'b. Wimborne Minster, Dorsetshire (possibly Winburn, Middlesex), 21 July 1664; d. Wimpole, Cambridgeshire, 18 Sept. 1721. He was educated at Cambridge, and in 1688 was chosen fellow of his college, Saint John's. With Charles Montague he wrote in 1687 (The Coun¬ try Mouse and the City Moused a parody of Dryden's (Hind and Panther. > Through the Earl of Dorset he was appointed secretary to the English plenipotentiaries at The Hague in 1690 ; in 1697 he became secretary to the com¬ missioners who concluded the Peace of Rys- wick, and on his return from The Hague, secre¬ tary to the lord-lieutenant of Ireland, and finally Under-Secretary of State. In 1699 he produced his (Carmen Secular for the Year 1700. > He succeeded John Locke as commissioner of trade and plantations and sat for a short time in Par¬ liament. At the beginning of the reign of Anne he left the Whigs to join the Tories. Made commissioner of customs in 1711, he was em¬ ployed in secretly negotiating at Paris the terms of the Treaty of Utrecht, and he remained in France as secret agent and Ambassador till 1714. On the accession of George I, he was impeached on the charge of high treason and kept in custody two years in his own house. During his imprisonment he wrote (Alma, or the Progress of the Mind,} which, together with his more ambitious work, (Solomon, was pub¬ lished in 1718. Having been rendered nearly penniless, he published a folio edition of his poems by subscription. He was buried in West¬ minster Abbey. Prior made his way chiefly by his wit and social qualities. His poetical powers were at their best in short occasional pieces in the flowing ease and vivacity of narration. Consult Aldine edition of (Prior's Poetical Works } (1892).*

PRIOR, the chief coadjutor of an abbot in the government of an abbey, or

the actual ruler of a monastic establishment. Not till the 13th century was prior used as a term significant of authority of rule, but rather of superiority of any kind, as experience, wisdom, advanced age. Till that time the abbot's coadjutor was styled propositus (provost), but now he was called prior and under him in great abbeys was the sub-prior. Then, the head of a small monastery, of Benedictine monks, for example, was called prior. Finally, the chief officer of a convent of Augustinians, or Dominicans, or Premonstra- tensians, had the same title, while the corre¬ sponding officer of a Franciscan house was known as custos (guardian) ; but the heads of houses of the military orders of Saint John of Jerusalem, of Malta and of the Temple were given the title of grand priors. In church his¬ tory priors are of two kinds : conventual and claustral. A conventual prior is the head of a religious house, either independently, as among the Regular Canons, the Carthusians and the Dominicans, or as superior of a cell or offshoot from some larger monastery. In the former sense he has generally a sub-prior under him.

A claustral prior is appointed in houses in which the head is an abbot, to act as superior in the abbot's absence and to maintain the gen¬ eral discipline of the house. Prioresses in re¬ ligious houses of women, whether abbeys or simply conventual establishments, had much the same authority as priors in religious orders of men.

PRIPET, prep'et (Russian, Pripyat), a river in the western part of Russia. It has its rise in the government of Volhynia, and is the outlet of several lakes ; flows east and southeast and enters the Dnieper. It is about 500 miles long; navigable over 300 miles and is connected with the Vistula and the Niemen by canals. Its upper course is through a vast uninhabited forest region, with large areas of marsh lands. What has become known historically as the Pripet Marshes was the scene of a great offen¬ sive movement in the World War by the Rus¬ sians under General Brussiloff and the Ger¬ mans and Austrians under Field Marshal von Hindenburg. The Russian operations opened on 3 June 1916 and extended along the entire front from the Pripet Marshes to the Rumanian frontier. The Russians were the first of the Entente Allies to resume the offensive on the Russian front and this was their first signal blow, resulting in the achievement of sweeping successes. Between 4 and 23 June the Rus¬ sians captured 4,031 officers, 194,041 men, 219 guns, 644 machine guns, 196 .bomb mortars, 146 artillery ammunition wagons and 38 search¬ lights, and cleared all of Bukovina of the enemy.

PRISCIAN, prish'i-an (Latin, Priscianus Cˆsariensis, prish-i-a'nus se-za-ri-en'sis) , Latin grammarian of the 6th century a.d. From his surname ˆCaesariensis® it is supposed that he may have been born at Caesarea, and it is believed that he lived about 500 a.d , as he is mentionel by Paulus

Diaconus as contemporary of Cassiodorus (468-562). Almost all that is known of the facts of his life is that he taught Latin at Constantinople, probably to the im¬ perial court of Justinian, as he is known to have received a salary from the government. His Unstitutiones Grammaticae, in 18 books, a most thorough and comprehensive work, has chiefly preserved his fame. A transcript completed at Constantinople by one of his pupils in 527 was reproduced in 1,000 manuscripts in the Middle Ages. Priscian borrowed largely from the first 12 of the 20 chapters of the 3d century (De compendiosa doctrina) of Nonius Mar- cellus (q.v.), who was especially indebted to Verrius Flaccus and Aulus Gellius, and a re¬ vised and annotated edition of whose work was brought out by Julius Tryphonianus Sabinus in the 5th century. Priscian's Hnstitutes* and the grammar composed by Aclius Donates in the 4th century dominated the schools of the Middle Ages and formed the type and source of the Latin and Greek school grammars of modern Europe. The first 16 books treat of the eight parts of speech recognized by the ancient grammarians. The last two are on syn¬ tax and are preserved separately in one manu¬ script, these bearing the title (De Construc- tioneP The whole work, successively abridged, formed the basis of instruction in Latin up to the 15th century. The old phrase, (*

rules of grammar. The first edition of his complete works appeared at Venice in 1470, and what has been considered the best, by Krebel, at Leipzig (2 vols., 1819-20). See Language, Science of.

PRISCILLIAN, pri-sil'i-an, Spanish reli¬ gious sectary: b. about 350; d. Treves, 385. He was charged with teaching heresy resem¬ bling Gnosticism or the doctrine of the Mani- chseans and was excommunicated by the Synod of Saragossa (380). However, he was able by his eloquence to cause the judgment to be withdrawn and put to flight his chief opponent, the bishop Ithacius. The bishop later gained the support of Maximus, the usurper at Treves, and secured the condemnation and execution of Priscillian. The followers of Priscillian were known as Priscillianists. Their beliefs included peculiar views of the influence of the heavenly bodies upon men. The sect did not die with its founder, though there was considerable reaction against it at the close of the 4th century, and it disappeared as an organized body before the end of the 6th century, though at all times through the mediaeval period its traces appear under various names and forms, especially in northern Spain, in Languedoc and in northern Italy.

PRISM, in geometry, a solid consisting of the region intercepted by a

number of planes, known as the sides, parallel to a given line and two planes, the so-called bases, parallel to one another. It has similar and parallel bases and its sides form similar parallelograms. The bases may be of any form, and this form (triangular, pentagonal, etc.) gives its name to the prism. In optics, any transparent medium, comprised between plane faces, usually inclined to each other. The intersection of two inclined faces is called the edge of the prism, etc., the inclination of one to the other, the refracting angle. Every section perpendicular to the edge is called a principal section. The prism gen¬ erally used for optical experiments is a right triangular one of glass, the principal section of which is a triangle. It is used to refract and disperse light, resolving it into the prismatic colors. See Light.

PRISON. See Penology; Prisons.

PRISON ASSOCIATION OF THE UNITED STATES, National, an organiza¬ tion of reformers and philanthropists, founded in Cincinnati, Ohio, in 1870, under the presi¬ dency of Rutherford B. Hayes. There is a board of directors and an executive committee of seven. Meetings are held annually. There are standing committees on criminal law reform, prison discipline, juvenile delinquency, etc. The Association holds annual congresses at which the executive officers of penal institutions through¬ out the country and others engaged in prison work exchange experiences and discuss the problems that are constantly arising. The national and the various State associations are the outgrowth of a movement in New York City in 1846 which culminated in the organiza¬ tion and chartering of the Prison Association of New York. The purposes of all are sub¬ stantially to protect the public against crim¬ inals; to reform criminals; to defend those accused unjustly; to give first offenders a pro¬ bationary opportunity; to improve prison man¬

agement; to provide employment for released prisoners; to aid families of prisoners; to ex¬ ercise watchfulness over prisoners released on probation and parole, and to secure legislative action to make the purposes effective.

PRISON REFORM. See Penology.

PRISONER OF CHILLON, The, a nar¬ rative poem by Lord Byron based on the story of the imprisonment of Frangois de Bonnivard (1496-1570) in Chateau de Chillon, situated be¬ tween Clarens and Villeneuve on Lake Geneva, Switzerland. It was Sir Walter Scott's opinion that as a picture this poem, however gloomy the coloring, might rival any which Lord Byron had drawn. Bonnivard was the prior of Saint Victor, who, having by his efforts to free the Genevese rendered himself obnoxious to the Duke of Saxony, was carried off by emissaries of that potentate and confined for six years in

the chateau, which was really a fortress, believed to have been built in 1238. He was liberated when the Bernese and Genevese forced the surrender of the stronghold.

PRISONERS OF WAR. Ordinarily a

prisoner of war is a person belonging to the military^ and naval forces of a belligerent and who has fallen into the hands of the enemy by capture or otherwise. This definition, however, is both too broad and too narrow, since there are persons attached to an army who if cap¬ tured cannot be detained as prisoners of war, such for example as chaplains, Red Cross doc¬ tors and nurses, while there are others who fol¬ low an army without being attached to it, yet who if captured may be held as prisoners of war, such for example as newspaper corre¬ spondents, reporters, contractors and the like. But to be entitled to the treatment accorded prisoners of war, The Hague Convention (Art. 13) requires that they must be in possession of a certificate from the military authorities of the army they are accompanying. Until 1907 sea¬ men on a merchant vessel of enemy nationality if captured might be detained as prisoners of war, but The Hague Conference of that year adopted a rule exempting them from liability to be detained in captivity, provided they give a formal promise not to engage in military services during the period of the war. In case they are citizens or subjects of a neutral state they must be liberated unconditionally. The refusal for a time of the German government early in 1917 to release certain American sea¬ men who had been captured while serving as members of the crew of a British armed mer¬ chant vessel was in contravention of this rule. On the other hand, the Germans refused to treat as prisoners of war the masters and crews of armed enemy merchantmen who ex¬ ercised the right to defend themselves against attack by German submarines, and in pursu¬ ance of this theory they court-martialed and shot as a sea franc-tireur in 1916 Captain Fryatt, the master of an English Channel steamer, for defending his vessel against de¬ struction by a German submarine. In like man¬ ner the Germans refused to treat as prisoners of war Belgian civilians who upon the ap¬ proach of the German armies took up arms and resisted the enemy, without being under the command of responsible commanders and with¬ out being clothed in uniform, this in the face of The Hague provision which allows the civil

population in such a case to rise spontaneously and endeavor to beat off the invader, subject only to the condition that they carry their arms openly and conduct their operations according to the laws and customs of war.

The reason given by the Germans for refusing to treat such persons as prisoners of war was that they had sufficient time before the arrival of the German armies to perfect an organization and equip themselves with uniforms.

Practice, especially during the World War, makes a distinction between military prisoners and civil prisoners. The former category em¬ braces captives belonging to the armed forces of the enemy; the latter includes enemy aliens arrested and confined in internment camps. The status of both classes of prisoners is essentially the same, however, and the treatment of them has been substantially the same.

In early times it was the custom to torture and even kill prisoners. It was considered a mitigation of their lot to reduce them to slav¬ ery, and consequently enslavement, especially among the Romans, came to be a common prac¬ tice. During the Middle Ages the practice of ransom was introduced under which prisoners might obtain their release by the payment of a sum of money, or they were redeemed from captivity by the state of which they were sub¬ jects. But this practice is no longer followed.

The status of prisoners and the treatment which must be accorded them are now regulated in detail by The Hague Conventions of 1907 and especially the convention respecting the laws and customs of war on land. The latter convention at the outset condemns an ancient principle by laying down the rule that prisoners of war are in the power of the hostile govern¬ ment and not of the individuals or corps who capture them. They cannot, therefore, be ran¬ somed or sold into slavery by the individuals who take them. They must be humanely treated. They may not, therefore, be beaten, tortured starved or cruelly punished. Still less may they be put to death, except for crimes punish¬ able by death under the laws of the captor and after due trial and conviction, although the German war manual asserts that they may be killed whenever their presence becomes a dan¬ ger to the existence of their captor. But the British and American manuals take occasion to express doubt whether such extreme neces¬ sities can ever arise that will compel or warrant a military commander in killing his prisoners on the ground of self-preservation. They may of course be punished for acts of insubordination and reasonable measures may be taken to prevent them from escaping. They may indeed be shot while attempting to escape, but if after having escaped they are recap¬ tured they cannot be punished for having escaped. Prisoners are allowed to retain their personal property, except arms, horses and mil¬ itary papers. It is the duty of the government into whose hands they have fallen to feed and clothe them, and as regards board, lodging and clothing they are entitled to the same treatment as the troops of the government which holds them in captivity. The captor may require prisoners, except officers, to work according to their rank and

aptitude, but their tasks must not be excessive and must have no connection with the operations of the war. Work done for the state must be paid for at the rates in force

for work of a similar kind done by soldiers of the national army, or if there are none in force, at a rate according to the work performed. The wages so paid shall go toward improving their position and the balance shall be paid them after deducting the cost of their maintenance. Offi¬ cers taken prisoners must, receive the same rate of pay as officers of corresponding rank in the country where they are held, the amount to be ultimately returned by their own government.

The Hague Convention declares that pris¬ oners may be set at liberty on parole if the laws of their country allow it, but those so liberated and recaptured while bearing arms against the government which released them are not en¬ titled to the treatment reserved for prisoners of war. The Convention does not deal at all with the subject of exchanges. The Hague Confer¬ ence of 1899 made it the duty of belligerents at the outbreak of hostilities to establish a bureau of information to answer inquiries about pris¬ oners of war held by them, to collect and keep all objects of personal use, valuables, letters, etc., found on the battlefields and to furnish information to the parties interested regarding prisoners who have been released on parole, or exchanged, or who have escaped or died in hos¬ pitals, etc. The provision was renewed in 1907 and the scope of the bureau enlarged. Letters, money orders and postal parcels intended for prisoners of war, or dispatched by them, are exempt from postal charges in the countries of origin and destination as well as in those through which they pass. Finally, The Hague Convention requires that at the conclusion of peace the repatriation of prisoners shall be car¬ ried out as quickly as possible.

In all great wars the problem of caring for prisoners has been a difficult one and there have been few in which one or both belligerents were not charged with violating the law regard¬ ing the treatment of prisoners. Naturally dur¬ ing the World War when the number of pris¬ oners taken ran into the millions the prob¬ lem was very great and the charges and counter-charges in respect to ill-treatment have been numerous. Fortunately, in the early months of the war, arrangements were entered into between most of the belligerent govern¬ ments by which each consented to permit representatives of neutral legations and em¬ bassies to visit their prison camps, conduct in¬ spections and make reports to the governments concerned regarding the conditions of the camps in which their nationals were held as prisoners and the kind of treatment they were receiving. Until the United States entered the war, representatives of its legations and embas¬ sies in England, Germany, France, Russia and

Austria performed this service. They visited the camps without giving previous notice, in¬ spected the barracks, hospitals, kitchens, recrea¬ tion grounds, etc., conversed with the prisoners, heard their complaints, made recommendations to the camp commandants and in this way were able to bring about many necessary re¬ forms and improvements. Their reports con¬ stitute the most trustworthy sources of infor¬ mation regarding the treatment of prisoners that are available.

At the outset the various belligerent govern¬ ments issued general regulations concerning the treatment which they proposed to accord pris¬ oners held by them and those promulgated by

the British and French governments an¬ nounced that no distinction would be made be¬ tween the treatment of interned civilians and regular military prisoners. These rules are quite elaborate and cannot even be summarized within the brief limits of this article. They re¬ lated to housing, food,, clothing, medical attend¬ ance, pay of officers, wages to be paid prisoners employed, postal facilities, recreation facilities and the like. In the beginning, serious com¬ plaints were made in England in regard to the housing facilities provided for British prison¬ ers in Germany and the reports of representa¬ tives of the American embassy confirm in many instances the truth of the charges. So far as possible, prisoners captured by Germany were housed in the military barracks but during the early months of the war the number of prison¬ ers captured by the German armies attained such proportions that it became necessary to house them in tents or in hastily constructed buildings which were poorly heated and equipped. As a consequence, the sufferings of the prisoners in the German camps during the first winter of the war were particularly severe. Unfortunately also the camp sites were not well selected, some of them being located on the sandy plains in North Germany where the cli¬ mate was especially rigorous. According to the reports of the American representatives prison¬ ers in England and France were better housed and their exposure to cold was less serious. During the first year of the war there were many complaints that German prisoners were inadequately clothed and that the supply of blankets was wholly insufficient. The American inspectors found this charge to be true in vari¬ ous camps and called the attention of the Ger¬ man government to the facts.

The most serious complaint, however, re¬ lated to the quantity and quality of food rations served in the prison camps of Germany. Brit¬ ish and French prisoners complained that the food was not only inadequate in

amount but was of such a quality that they could not eat it. Food experts attached to the American em¬ bassy found this to be true in some of the camps but as to others they reported that there was no substantial ground for complaint. By the beginning of the year 1916 British and French prisoners were depending almost entirely upon the food which they received from home through the parcel post. Russian prisoners, however, appear to have received little or no food through this channel and were compelled, therefore, to subsist on the meagre ration fur¬ nished by the German government, which as the years passed became hopelessly insufficient.

Regarding the pay of prisoners who were of¬ ficers, the British government at the outset al¬ lowed German officers half the pay of the cor¬ responding ranks in the British army and with¬ out charging them for their subsistence. At the same time the British government offered to al¬ low full pay provided Germany would recipro¬ cate. To this offer, the German government never replied. Subsequently the British gov¬ ernment learned that British officers in Ger¬ many were receiving only 60 or 100 marks per month according to their rank, from which ap¬ proximately two-thirds was deducted for food. Thereupon the British government revised its scale of pay for German prisoners held in Eng¬

land and brought it into harmony with the Ger¬ man scale. The French government at the out¬ set adopted the British policy in respect to the pay of officers but altered it later to conform to German practice. Taking advantage of the right recognized by The Hague Convention, Ger¬ many organized an elaborate prison labor sys¬ tem, more than 2,000 labor camps being estab¬ lished in various parts of the empire. By the end of the second year of the war it was esti¬ mated that between two and three million pris¬ oners were working in the industries of Ger¬ many; in fact they largely replaced the millions of Germans who had been called to the colors. Where they were engaged in private work they were leased out to contractors. The rates of pay allowed appear to have varied in different camps and according to the skill of the prisoner, the most common wage being 30 pfennigs .per day, although in some cases it was 80 pfennigs, and in a few as much as 1.25 marks. Generally, prisoners were compelled to work and naturally there were many complaints in respect to long hours, .excessive tasks, brutality of treatment, starvation and the like. It was also a cause of complaint that the German government refused to permit neutral representatives to visit and in¬ spect the working camps, so that the govern¬ ments whose nationals were employed in these camps had no means of obtaining information regarding their treatment. There were also frequent complaints among the prisoners that they were compelled to work in industries that were engaged in the manufacture of war mate¬ rials. In March 1918 the British government committee on the treatment by the enemy of British prisoners made a report which charged the Germans with

systematically employing their prisoners in forced labor close behind the firing line on the Western front, thereby exposing them to the fire from the guns of their own and the .allied armies. In April 1917 an agreement had been reached between the British and Ger¬ man governments that prisoners on either side should not be employed within 30 kilometers of the firing line. But the British committee charged that the agreement was systematically violated by the German authorities and that the prisoners held by them were sometimes put to work within 10 kilometers of the firing line, in consequence of which many were killed by the fire of their own troops. The excuse given by the German authorities was that they were driven to this cruel measure as an act of retalia¬ tion against the British for having themselves violated the agreement. This charge, however, was emphatically denied by the British govern¬ ment. In France as in Germany prisoners were employed not only in camp work but in planting, cultivating the fields, harvesting the crops, re¬ pairing roads, work in coal mines, quarries, etc. In Great Britain the same policy was followed although no such extensive svstem of prison la¬ bor was ever organized as was put into effect in Germany. In the United States prisoners were employed in camp work and in the con¬ struction of roads in the neighborhoods of the prison camps. Germany's prison population proved an asset rather than a source of ex¬ pense, not only because of the elaborate system of compulsory labor which the Germans organ¬ ized but because of the comparatively small out¬ lay necessitated for the feeding of English and

French prisoners, since they depended mainly on the food they received from home through the medium of the parcel post.

Regarding postal facilities, all the belliger¬ ents placed restrictions upon the number and length of the letters which the prisoners were allowed to write. The British regulations al¬ lowed each prisoner to write two letters a week, each consisting of two pages of ordinary writ¬ ing paper. In special cases the number and length of letters allowed were unlimited. No limitation was set to the number of letters which a prisoner might receive. The German regula¬ tions, however, allowed prisoners to write but two letters a month and one postal card weekly, but exceptions were made in urgent cases. In France at first no restrictions were placed upon the number or length of letters which prisoners were allowed to write but in consequence of the abuse of the privilege and in consequence of the German regulations the French government sub¬ sequently felt obliged to introduce certain re¬ strictions. Prisoners in Germany were allowed to receive parcels not exceeding five kilograms in weight, and this privilege was availed of on a

large scale by British and French prisoners in Germany for obtaining food from home. There were of course many complaints that letters and parcels never arrived or were detained for long periods of time in the camps before being dis¬ tributed. There were also the usual complaints in regard to rigorous discipline, especially in the German camps and many charges were made of cruel and harsh treatment and the American representatives found these charges to be well founded in some camps. There was consider¬ able demand in England for the adoption of re¬ taliatory measures against German prisoners in consequence of the alleged mistreatment of British prisoners in Germany, but no such meas¬ ures appear to have ever been adopted. There was also considerable demand that the com¬ manders and crews of submarines who were guilty of sinking British merchant vessels should when captured be denied the treatment accorded to prisoners of war, but the British government declined to adopt such a policy. It did, however, introduce a policy of differential treatment in regard to such prisoners by seg- gregating them from other prisoners, but other¬ wise they were treated the same. This pol¬ icy aroused intense indignation in Germany and in consequence of the threat of the Ger¬ man government to retaliate in kind, the Brit¬ ish government abandoned its policy of differ¬ ential treatment. It is somewhat singular that considering the unprecedented number of pris¬ oners held by most of the belligerent govern¬ ments no serious efforts appear to have been made looking toward a general system of ex¬ change or releases on parole. At the outset the French government adopted the practice of re¬ leasing German officers on parole but it was sub¬ sequently abandoned in consequence of the re¬ fusal of the German government to accord reciprocity of treatment. Arrangements were concluded between the principal European bel¬ ligerents for the reciprocal repatriation of in¬ terned civilian prisoners of non-military age (see Enemy Alien Problems) and in the year 1916 an agreement was reached between Ger¬ many on the one side and Great Britain and France on the other for the transfer to Switzer¬

land of all wounded prisoners held by each gov¬ ernment, as well as all prisoners who were suf¬ fering from any one of 20 specified diseases or infirmities. In pursuance of these agreements many thousand wounded and incapacitated pris¬ oners were transferred to Switzerland, where although still held as prisoners they enjoyed the privilege of living in a neutral and friendly country. Shortly before the close of the war an arrangement was concluded for the recipro¬ cal repatriation of prisoners who had been in captivity as long as 18 months. The number of such prisoners thus repatriated or transferred to neutral countries was, however, a very small proportion of the total number held by the vari¬ ous belligerent governments.

Bibliography. — (American Rules of Land Warfare) (ch. 4) ; Bordwell,

(Law of WarJ (Pt. II, ch. 4) ; Cohen, (The Ruheleben Prison Camp ; Gerard, (My Four Years in Germany) ; Lawrence, Principles of International Law* (Sec. 164) ; Mahoney, ˆSixteen Months in Four German Prisons* ; McCarthy, (The Prisoner of War in Germany) ; Oppenheim, international Law* (Vol. II, Secs. 125-132) ; Spaight, (War Rights in Land Warfare) (Ch. 10).*

James W. Garner,

Professor of Political Science , University of Illinois.

PRISONS. A prison is a place of confine¬ ment or of involuntary restraint for the safe custody of criminals and others committed by process of law. There are detention prisons for persons awaiting trial and confinement; prisons for those convicted and sentenced to imprison¬ ment. The former are sometimes called jails and the latter are frequently called peniten¬ tiaries or workhouses or houses of correction or reformatories. See Reformatories;

Workhouses and houses of correction are supposed to be used for the older and for petty offenders while reformatories are for those ca¬ pable of learning a trade or of receiving an edu¬ cation in a school. Confinement prisons and penitentiaries are generally thought of as places for the imprisonment of more hardened or seri¬ ous offenders, where the discipline is supposed to be firmer and more arbitrary. In actual prac¬ tice, however, the statutes and sentences to im¬ prisonment do not recognize clearly these dis¬ tinctions.

Detention prisons came into general use be¬ fore confinement prisons and penitentiaries, as the former were needed for those whose cases had not been disposed of by the courts, whereas those convicted were, until the latter part of the 18th century, frequently put to death or branded or mutilated and let go, or were de¬ ported beyond the seas. Only in certain ex¬ ceptional cases were the guilty held in custody in surroundings which were always unpleasant and provided with coarse fare and rough lodg¬ ings and required to engage in irksome labor. Only one workhouse or house of correction was built in London up to 1550 and a workhouse was established in Amsterdam in 1588. In Lu- beck and Bremen there was no institution of this type until 1663. Berne in 1615, Hamburg in 1620, Basle in 1667, Vienna and Breslau in 1670, Luneburg in 1676, Florence in 1677 and Munich in 1687 were among the other European cities to establish and build one such institution, respectively.

PRISONS

The shocking picture of English prisons given us by John Howard during the latter part of the 18th century forced people to think about prisons and awakened the public conscience on both sides of the Atlantic to indescribable evils, particularly the evils of the English detention prisons, and enabled Howard to force a change in England's treatment of offenders. Howard made people see that these prisons were

" Pestiferous dens, overcrowded, dark, foully dirty; not only ill- ventilated, but deprived altogether of fresh air. The wretched inmates were dependent for food upon the caprice of their gaolers or the charity of the benevolent; water was denied them in the scantiest proportions; their only bedding was putrid straw. Every one in durance, whether tried or untried, was heavily ironed, all alike were subject to the rapacity of their gaolers and the extortions of their fellows. . . . Idleness, drunkenness, vicious in¬

tercourse, sickness, starvation, squalor, cruelty, chains, awful oppression and every culpable neglect — in these words may be summed up the state of the gaols of the time of Howard's visitation."

Hundred of these wretches were debtors, guilty only of breaches of financial rules. Hun¬ dreds more of them had been committed under legal fictions. The poor father of a family, often shiftless and unfortunate, was locked- up only to be joined by his wife and children, who were made penniless by his confinement. Though in¬ nocent before the law, yet these unfortunates remained in jail without trial and without re¬ dress.

Howard's recommendation that penitentiaries or confinement prisons be established finally bore fruit in the erection of Milbank Prison in England, which was begun in 1813 and partly completed by 1816. However, Newgate in Lon¬ don still remained a public den of iniquity in 1817 when Elizabeth Fry began her remarkable visitations and ministrations to the crazed crea¬ tures confined there.

Howard's work in England was paralleled by a similar movement in America, led by the Phil¬ adelphia Quakers. To relieve the horrible suf¬ fering in the city jail or prison of Philadelphia, these Quakers formed in 1776 The Philadelphia Society for Assisting Distressed Prisoners, but their activities were terminated by the British occupation of the city in the Revolutionary War. Immediately after the close of the war the leading citizens of Philadelphia began a suc¬ cessful agitation for the reform of the barbar¬ ous colonial Penal Code. In 1787 the Philadelphia Quakers and others interested in prison reform founded The Philadelphia Society for Alleviat¬ ing the Miseries of Public Prisons. This soci¬ ety still exists as the

leading force in Pennsyl¬ vania prison reform, its name having been changed to that of the Pennsylvania Prison So¬ ciety in 1887. It is, thus, the oldest prison re¬ form society in Europe or America. Its activi¬ ties were most effective in bettering prison con¬ ditions in Pennsylvania. It aided in the refor¬ mation of the Criminal Code, introduced preach¬ ing into the Walnut Street Prison, deyised the Pennsylvania or Separate system of prison ad¬ ministration and brought about a general im¬ provement of discipline in the city prison. The work of the society extended beyond the bor¬ ders of Pennsylvania. They carried on a cor¬ respondence with John Howard in England, ex-' changing ideas on desirable modes of prison reform and were the centre from which the re¬ form of criminal jurisprudence and prison ad¬ ministration spread into other States of this

country. Their success led to the establishment of similar organizations elsewhere. The Lon¬ don Society for the Improvement of Prison Discipline was formed in 1815; the Prison Dis¬ cipline Society of Boston in 1826; the New Jer¬ sey Prison Instruction Society in 1833 ; and The New York Prison Association in 1845.

America had its own ˆNewgate,® originally the Simsbury Copper Mine. Abandoned as a copper mine it was used by the colony of Con¬ necticut in 1773 as a permanent prison for Tor¬ ies, and then by the State military authorities. In 1793 it was made the State prison and con¬ tinued as such until 1827. Richard H. Phelps described this prison in the following language;

“ The appearance of this place forcibly reminds the observer of the walls, castles, and towers erected for the security of some haughty lordling of the feudal ages; while the gloomy dungeons within its walls call to remembrance a bastile or a prison of the Inquisition. Some rude buildings covering access to the caverns were constructed with an enclosure of half an acre or so built of planks with iron spikes upon the top. The passage down the shaft into the cavern was upon a ladder fastened upon one side and resting on the bottom. At the foot of this passage commences a gradual descent for a considerable distance, all around being solid rock or ore. The passages extend many rods in dif¬ ferent directions, sopie of them even leading under the cellars of the dwellings of the neighborhood. . . . On

the sides in the niches of the cavern, platforms were built of boards for the prisoners, on which straw was placed for their beds. The horrid gloom of this dungeon can scarcely be realized. . . . From thirty to one hundred were placed

together through the night, solitary lodging as practised at Wethersfield afterwards being then regarded as a punish¬ ment rather than a blessing to

them. The punishments inflicted for prison offenses were flogging, confinement in stocks in the dungeons, being fed on bread and water during the time, double or treble sets of iron, hanging by the heels, etc. A bell summoning the prisoners to work brought them up from the cavern beneath through a trap-door, in irregular numbers, two or three together, and sometimes a single one alone, when under guard of armed soldiers they were con¬ ducted across the yard to the smithy. The prisoners were heavily ironed and secured by fetters, and being therefore unable to walk, made their way by jumps and hops. On entering the smithy some went to the side of the forges, where collars dependent by iron chains from the roof were fastened around their necks, and others were chained in pairs to the wheelbarrows. The attendants delivered pickled pork to the prisoners for dinner at their forges, a piece for each thrown on the floor, and left to be washed and boiled in the water used for cooling the iron wrought at the forges. Meat was distributed in a similar manner for breakfast."

As stated, toward the close of the 18th cen¬ tury the Quakers of Philadelphia determined to attempt to reform the offender instead of de¬ stroying him or weakening him or mutilating his body. The agitations of John Howard and of the English reformers encouraged them in their activity. In 1796 Rev. Robert J. Turnbull visited the Philadelphia prison and commented upon the orderly condition of the prison as con¬ trasted with public convict labor conditions then abolished. He said of the former conditions :

" A grand and important defect, though not generally observed, appeared too plain to some of the promoters of the plan, to inspire them with sanguine expectations of its success. It was the. inefficacy of the punishments of labor, mutilation, and whipping, inasmuch as they destroyed an important end of punishment, that of the criminal's reforma¬ tion. . . . The convicts who were sentenced to the

wheel-barrow and dispersed along the streets and roads, exhibited, from the difficulty of superintending them, the most shameful scenes of drunkenness, indelicacy, and other excesses in vice. The inconvenience and mischievous effects of the punishment of public labor at length became so in¬ tolerable that it was regarded, and with much justice, as a common nuisance."

Caleb Lownes, a leader in the reform move¬ ment, thus described the effect of the improved discipline brought about following the changes introduced in 1790:

1 Inmate Band Concert in the yard of Auburn Prison

2 Improvised Bowling during Recreation Period, Auburn Prison

PRISONS

1 Model of the Eastern Penitentiary, Philadelphia, Penn

2 Front Elevation Eastern Penitentiary, Philadelphia, Penn

PRISONS

607

" When the present plan was at last attempted, the prisoners were informed that the new system was now to be carried into_ full effect — that their treatment would de¬ pend upon their conduct; and that those who evidenced a disposition that would afford encouragement to the in¬ spectors to believe that they might be restored to their liberty, should be recommended to the governor for a pardon, as soon as circumstances would admit; but if they were con¬ victed again, the law, in its fullest rigour, would be carried into effect against them. A change of conduct was early visible. They -were encouraged to labour, and a number were employed at carrying stone, and other laborious work, at the building of the solitary cells. Their good conduct was remarked. Many were pardoned, and before one year was expired, their behaviour was, almost without exception, decent, orderly, and respectful. This fact is one of im¬ portance, as it disproves an opinion, that has led to much distress and cruelty, and will, I hope, be an encouragement to those who can feel for this unhappy class of mankind, who have so long been victims to the sad effects of a contrary treatment."

The note struck at the Walnut Street Prison in Philadelphia following 1790 began a new era in prison management and treatment which revolutionized prison management all over the world so that the principle of the iso¬ lation of the prisoner in a single cell was widely adopted. This Walnut Street plan was later called the Separate or Pennsylvania Sys¬ tem as contrasted with the Silent or Auburn System. The Separate System was actually originated contemporaneously in 1790 in the Walnut Street Prison in Philadelphia and in the county gaol at Gloucester, England, but re¬ ceived its full development in the construction of the Eastern Penitentiary of Pennsylvania, authorized by the legislature of that State by a law of 20 March 1821 and erected between 1821 and 1829 according to plans drawn by John Haviland. New Jersey adopted the Pennsyl¬ vania system and erected an addition to its prison which was completed in 1820.

Under the Separate or Pennsylvania Sys¬ tem, each man was placed in a large cell of solid masonry, closed save for one small open¬ ing facing the inside corridor through which the prisoner crawled when he entered his cell, and save for a slit in the upper part of the outer wall far above his head, which provided the only natural light the poor creature had. The cell usually consisted of two rooms, one for the prisoner's bed and the other for his workroom. Each had a very high ceiling. When the heavy, massive wooden door closed over the small hole behind the prisoner who crawled into his cell; when he began his sentence, he was left in solitude to consult his Bible, his work and his own past. He never came out until he died or until his sentence expired. He was occa¬ sionally observed by his keeper through a hole in the bottom of the door, and sometimes vis¬ ited by the prison chaplain. Except for this, he was left to his awful loneliness and solitude.

The Silent or Auburn System provides for the confinement of each prisoner in a single cell by night and for work in silence in a workshop by day. These cells were built of solid masonry in rows, tier upon tier and back to back, with door openings on outside corridors. These cells were in effect caverns of uniform size, high enough for a man to stand in, long enough for him to lie in and about twice as wide as his body when he lay on his back. They were called cell blocks and were enclosed in a build¬ ing with massive side and end walls in which tiny windows were placed in such a position that the prisoner could never see through them to observe the sky or the earth. These side and

end walls were placed far enough away from fronts of the cells and ends of the cell blocks so as to provide a wide corridor on either side of and a wide area at the ends of the cell block and were covered with a solid roof, usually without openings.

The Auburn State Prison was authorized in accordance with this plan in 1816. In 1825 Sing Sing, another New York prison of the same type, was authorized by the legislature. This type of prison architecture, with few changes, has dominated prison construction down to the present day, almost without any exception. The reasons for its continuance have been undoubtedly its flexibility, its simplic¬ ity, its low cost of supervision and mainte¬ nance and its security. Most of these prisons were furnished with dungeons or sections built like the Pennsylvania system cells except that they were usually dark and were used for the confinement in isolation of those undergoing punishment for infraction of the rules of the prison. With these exceptions, the Silent or Auburn System has predominated in America, but in Europe the Separate System has been more popular. New York allowed separate con¬ finement in 1796, but abandoned it following 1821. Maryland introduced this system in 1809 and terminated its

existence in 1838. In Massa¬ chusetts separate imprisonment was utilized to some extent from 1811 to 1829. Maine experi¬ mented with it for only three years (1824-27). New Jersey introduced it in 1820 and abandoned it in 1828, only to reintroduce it in 1836 and utilize it until 1858. Virginia accepted the Pennsylvania system in 1824 and legislated it out of existence in 1850. Rhode Island found this system a failure after a trial from 1838 to 1844. In Pennsylvania the Separate System was abandoned in the Western Penitentiary in 1869 and legally terminated in the Eastern Peniten¬ tiary in 1913, long after it had ceased to exist as a practical fact. With these more or less temporary exceptions the Auburn System was universally adopted in the prison architecture and administration of the United States.

The strongest argument in favor of the Separate or Pennsylvania System is probably that found in the report of the Eastern Penn¬ sylvania Penitentiary inspectors to the legis¬ lature in 1830, 40 years after the establishment of the system, which reads in part as follows :

" Intemperance and thoughtless folly are the parents of crime, and the walls of a prison are generally peopled by those who have .seldom seriously reflected; hence the first object of the officers of this institution is to turn the thoughts of the convict inwards upon himself, and to teach him to think; in this, solitude is a powerful aid. Hence this mode of punish¬ ment, bearing as it does with great severity upon the hardened and impenitent felon, is eminently calculated to break down his obdurate spirit; and when that important object of penitentiary discipline has been gained (and in any prison it frequently is), and when the prisoner has once experienced the operation of the principles of this institution on a broken spirit and contrite heart, he learns, and he feels, that moral and religious reflection, relieved by industrious occupation at his trade, comfort and support his mental and physical powers, divest his solitary cell of all its horrors, and his punishment of much of its severity. The impression thus made, instead of being destroyed by the sneers of ruffians, is cherished and fixed by the officers of the prison."

Perhaps the most ardent defense of the Auburn or Silent System is the following de¬ scription of this system by Louis Dwight, who did more than any other person to secure the almost universal introduction of the Auburn

System throughout the United States. Writing in 1826 he said :

“ At Auburn we have a more beautiful example still, of what may be done with proper discipline, in a prison well constructed. It is not possible to describe the pleasure, which we feel in contemplating this noble institution, after wading through the fraud and material and moral filth of many prisons. We regard it as a model worthy of the world’s imitation. We do not mean that there is nothing in this institution, which admits of improvement; for there have been a few cases of unjustifiable severity of punish¬ ment; but, on the whole, the institution is immensely elevated above the old penitentiaries. The whole establishment from the gate to the sewer, is a specimen of neatness. The unremitted industry, the entire subordination, and subdued feeling of the convicts, has probably no parallel among an equal number of convicts. In their solitary cells they spend the night with no other book but the Bible. From one end of the shops to the other, it is the testimony of many witnesses, that they have passed more than 300 convicts, without seeing one leave his work or turn his head to gaze at them. There is the most perfect attention to business from morning till night, interrupted only by the time neces¬ sary to dine. Under these circumstances they are provided with the word of God, by a law of the state which requires that every cell shall be supplied with a Bible or Testament. They also receive the undivided attention of a most wise and faithful religious teacher, who spends all his time in the prison visiting the sick; teaching those who cannot read; preaching in the chapel on the Sabbath the unsearchable riches of Christ; and afterwards in going from cell to cell, to administer the reproof and consolation of religion, to individuals. The influence of the chaplain, according to the testimony of all the officers, is most salutary and power¬ ful; and the various expressions of confidence and affection exhibited towards him by the convicts, is most cheering to himself. It is hardly necessary to add that at Auburn there is an exclusion of all the positive evils of the old system, which arise from crowded night rooms, evil communication, instruction in all the arts of pick pockets, thieves, incendiaries, and counterfeiters; and, above all from the existence of a crime, which is not fit to be named among Christians. These great ends are gained, partly by discipline and partly by construction.”

Captain Basil Hall of the English royal navy visted America in 1827 and observed these two systems in operation, which he de¬ scribed in the following language :

“ The Auburn plan . . . consists in the strictest

solitary confinement at night — in hard lahor, but in rigid silence, by day, and always in company, though under constant superintendence; in solitary meals, under lock and key; in regulated marchings to and from their workshops; in subjecting the prisoners to stripes for infractions of the prison rules, and in their never being placed in absolute solitary confinement,

except as a punishment of a temporary nature; in having prayers morning and evening said regularly by a resident clergyman, with whom alone the prisoners are allowed to converse, and that only on Sundays.

" The Philadelphia plan is widely different from this. It is intended that the prisoners shall be subjected, during the day as well as night, to separate confinement, either in solitary idleness or in solitary labour; along with which they are to be allowed no more exercise than what they may themselves choose to take in their little courts. The keeper is the only person, besides the clergyman, who is ever to see them, and a Bible is to be placed in each cell. By these means it is expected that, while many of the prisoners will be reformed, a salutary terror will be spread over the evil spirits of the State, and crime will thus be doubly prevented."

The captain in condemning the Philadelphia System said:

"As far as I have been able to learn, all the experiments which have been tried in America on solitary confinement have proved its inefficiency for any purpose of reformation; while there is abundant reason to suppose that in very many cases — I believe a majority — it leads to insanity or to suicide. It is difficult, indeed, to see how any good can spring out of compulsory idleness in prison, when the whole analogy of external life proves it to be the parent of every mischief. It ought always to be borne in mind, also, that it is no part of the object of prison discipline to torture the prisoners, merely as a punishment for his offenses independently of its effect as an example to society. Neither, of course, should a jail be made a place of amusement. It ought certainly to be rendered exceedingly irksome to the culprit; but, as far as he is concerned, its discipline, bodily and mental, should not be more severe than will make him fully sensible to the folly of his past ways. In order to accomplish this at the least expense of permanent human suffering, the criminal should, if possible, be so treated that yvhen he gets out again, and starts afresh in the world, he

should be less inclined to do mischief than he was before. The only serious doubt is, whether there is much chance of amendment taking place in a vicious and ill-regulated mind, if left to commune exclusively with its own thoughts, in solitude, with or without labour, but deprived of every ray of cheerfulness to lend efficiency and confidence to virtuous resolutions. The occasional visits of the clergyman may certainly relieve the fearful misery of absolute solitude; but unless the prisoner's mind be more or less habitually enlivened, even these lessons will fall on a soil unprepared to give them efficacy."

Charles Dickens, the novelist, who visited America in 1843, was shocked by the Eastern Pennsylvania Penitentiary, which he described in his (

American Notes as follows:*

“ Standing at the central point, and looking down these dreary passages, the dull repose and quiet that prevails is awful. Occasionally there is a drowsy sound from some lone weaver’s shuttle, or some shoemaker’s last, but it is stifled by the thick walls and heavy dungeon door, and only serves to make the general stillness more profound. Over the head and face of every prisoner who comes into this dark, melancholy house a black hood is drawn; and in this dark shroud, an emblem of the curtain dropped between him and the living world, he is lead to the cell, from which he never comes forth until his whole term of imprisonment has expired. He never hears of wife or children; home or friends; the life or death of any single creature. He sees the prison officers, but with that exception he never looks upon a human countenance or hears a human voice. He is a man buried alive, to be dug out in the slow round of years; and in the meantime dead to everything but torturing anxieties and horrible despair. . . .

“ Every cell has double doors; the outer of sturdy oak, the other of grated iron, wherein there is a trap through which his food is handed. He has a Bible, a slate and a pencil, and under certain restrictions, has sometimes other books, provided for the purpose, and pen and ink and paper. His razor, plate and can, and basin hang upon' the wall or shine upon the little shelf. Fresh water is let on in every cell, and he can draw it at his pleasure. During the day his bedstead turns up against the wall and leaves more space for him to work in. His loom or. bench, or wheel is there and there he labours, sleeps and wakes, and counts the seasons as they change and grow old.”

William Crawford (who had investigated American prisons in 1832) and Whitworth Rus¬ sell, prison inspectors of the Home District of London, were sent to America in 1837 to re¬ port upon these two systems. Thev disagreed entirely with the Archives of Hall and Dickens. They felt that the ease of communication be¬ tween prisoners under the Silent or Auburn System was a grievous source of contamination which was inherent in that system. They rec¬ ommended the Pennsylvania or Separate Sys¬ tem for use in England, because they believed the Separate System of confinement would com¬ pensate for the necessary mistakes of the law and the requirements of economy in classify¬ ing and in housing prisoners, and also because they erroneously believed it advisable or possi¬ ble for human beings to be housed under the same roof without communicating with one another. Fortunately, however, their recom¬ mendations were never carried out, for the at¬ tention of the people of England and of Europe was then directed for a time to the problem of prison administration and away from plans of prison constructiqn.

The men who advocated the separate sys¬ tems were without a true conception of social living, social control and social growth. They had no proper conception of how dependent man is upon his ability to imitate the good in others if he is to grow and develop. Deprived of the opportunity to imitate others, he shrivels and shrinks up and cannot grow out of delin¬ quency into moral health and stability. The evils which Crawford and Russell saw in the Silent or Auburn System are inherent and in the Separate System also. The remedy for these

lies in classification of offenders, and in the erection of special hospitals, schools and prisons for each class or group. Within each such institution the prisoners must be split up into groups and governed in accordance with the needs of each such group. See Penology.

Both the Separate and Silent Systems presup¬ pose prison government which is autocratic or despotic in form. Transportation of prisoners overseas to Australia and Tasmania greatly changed and differentiated the methods of housing and governing them. Upon their ar¬ rival there they were usually placed in close confinement for a time, under some modifica¬ tion of the Separate or Silent System. Then during the next period they were permitted to associate at work under modifications of these systems, and finally were given a <(Ticket of Leave,® permitting them to go beyond the boundaries of the so-called prison to engage in work under more or- less supervision.

The fact that they could be allowed to go beyond the confines of prison to engage in work reacted profoundly upon the management of the prisons and led Capt. Alexander Maco- nochie, who was the superintendent of the Eng¬ lish prisons, to establish in Tasmania, then known as Van Dieman's Land, a new method of prison management, which has modified Eng¬ lish prison methods to a considerable degree since that time. He originated the plan, which he outlined to the transportation committee of the House of Commons in London in 1837, of rewarding men for service performed by the grant of marks or credits which should take the place of money as a pecuniary reward for work performed and would secure for them a more speedy release.

Captain Maconochie's system, applied after 1840 in Van Dieman's Land, was modified and extended by Sir Walter Crofton, director of Irish prisons, following 1853. This system, as developed by Crofton and known as the Irish System, may be described as follows:

“ The period of cellular incarceration was served at Mount- joy, where there was a prison in two departments, one for men and one for women. The second stage was that of ‘ progressive classification,’ a phrase of which he was the author. His male prisoners were transferred from Mountjoy to Spike ■ Island, where they were divided into five classes: the probation class, third, second, and first classes, and the advanced class. The probation class could be skipped by prisoners who had made a good record at Mountjoy. The majority of those transferred were placed in the third class, where they had to earn nine marks per month for six months, or 54 marks in all, as the condition of promotion. The num¬ ber of marks to be earned in the second class was the same; and in the first class twice as many, so that they could not pass from the first to the advanced class in less than one year. Under the English system they would then have been entitled to a ticket of leave; but Sir Walter would not grant it until after a test had been applied, in a condition of comparative freedom at a third prison, called an intermediate prison, at Lusk, where they slept in movable iron huts and were oc¬ cupied almost precisely as freemen would have been, in farm¬ ing and manufacturing. The prison at Lusk had neither bars, bolts, nor walls. Its aim was to make practical proof of the prisoner’s reformation, his power- of self-control, his ability to resist temptation, and to train him for a considerable period — never less than six months — under natural con¬ ditions, and so to prepare him for full freedom by the enjoy¬ ment of partial freedom as a preliminary step.”

The Irish Prison System was first introduced into America at Elmira Reformatory in 1876 by Superintendent Zebulon Brockway, aided by Gaylord Hubbell, E. C. Wines, Frank Sanborn and Theodore Dwight. Therefore, in America the Irish System was called the Elmira System, and applied chiefly to young first offenders.

The Elmira Reformatory building was con¬ structed on the Auburn plan, but the rigor of silence was relaxed in the schoolrooms and to a certain extent in the shops and in the admin¬ istration of the military system which Mr. Brockway introduced later on in the manage¬ ment of the institution. A modified marking and grading system was substituted for the definite sentence. The schoolroom and military drill were thus the American developments of the Irish Prison System. Later this enterpris¬ ing superintendent borrowed therapeutic baths from the insane hospital, which he substituted for the dungeon and the club.

The Irish prison plan was also recommended for State prisons by former Warden Gaylord B. Hubbell of Sing Sing Prison, who visited the Irish and English convict prisons and made a report thereon, to the New York Prison

As¬ sociation, in 1865. In this report Hubbell said:

“ Let a farm of two or three hundred acres be purchased (no matter if it is cheap, rough land) situated on the line of the Erie Railroad at some point where building materials and provisions can be procured at the lowest rates. This done, I would procure plans and drawings of the best prisons in this country and in England. Having selected a plan combining the advantages of both, I would erect a new prison, having three distinct divisions, near to one another and on the same farm. The first division should have a capacity of not more than 100 cells and should be arranged for separate confinement only. The second division should have a capacity of 200 cells and should be arranged with suitable workshops, in which to employ 200 convicts, who should work in association during the day and be separated by night. The third division should have dormitories to accommodate 100 to 150 men. In the first division, the prisoners, being kept in solitude, would, of course, take their meals in the cells. In the second division a comfortable dining-hall should be prepared. In the third division all the arrangements should be such as to give as much freedom as possible to the inmates.

“ All prisoners sent to the proposed system should, under proper restrictions, be allowed to work their way out; but it should be clearly understood that no prisoner can ever have this advantage more than once. Those who are convicted a second time, after being subjected to this training, should go to some other prison to serve out the whole of their sentence, without any chance or prospect whatever of release or pardon.”

The plan thus recommended for a New York State prison was never carried out, but in 1913 and 1914 the State legislature and the govern¬ ment of the city of New York authorized the construction of the New York City Reforma¬ tory at New Hampton, N. Y., situated on the main line of the Erie Railroad, 55 miles from New York City. This institution is being con¬ structed much in accordance with the plan out¬ lined by Hubbell, with such modifications of the original system as 53 years of prison and re¬ formatory management have indicated are necessary.

After the development of the Irish prison system and when transportation of prisoners came to an end, certain modifications were made in British prison management. This, as modi¬ fied, was made to provide three distinct periods or stages of confinement; that of probation endured in separate confinement at a so-called <(close® prison; a period of labor in association at a public works prison, and conditional leave for the unexpired portion of the sentence upon parole or <(ticket of leave.®

During the first period a prisoner was sup¬ posed to be confined under

autocratic govern¬ ment in accordance with Silent or Auburn System, as modified by certain features of the Separate or Pennsylvania System. In the sec¬ ond or intermediate period the prisoner was

allowed a little more freedom and to associate in work with his fellows, while in the third period he was allowed to go beyond the walls of the prison under more or less supervision after the original example of the grant of a <(ticket of leave® in Tasmania and in Australia. His permission to be abroad might be forfeited by breaches of the law or by failure to com¬ ply with the conditions governing his permit. Out of this has grown the modern parole system.

Reformatories established in most American States prior to 1890, while direct imitations of Elmira, also copied more or less the British ˆintermediate® prison, which was built for the confinement of the English prisoners during the second stage. . The English ((Borstal® system is the English adaption of her regular prison system, which provides educational and de¬ velopmental opportunities for juvenile offend¬ ers. It was also derived in part from English investigations of the Elmira System. Some re¬ formatory institutions established in the United States between 1880 and 1900 and nearly all established since that time have been patterned, not only after Elmira, but also after American industrial and vocational schools. The New Jersey and Connecticut reformatories for young men, while modeled after Elmira, have tended toward the British intermediate prison plan.

From the beginning of the 20th century public opinion has been concerned with the shortcomings of prison administration, which investigation has shown to be due in no small part to the antiquated and unserviceable type of building construction which the Silent or Auburn System provided. The form prevents proper classification, and adequate classification must always be regarded as one of the funda¬ mental bases' of prison administration. Not¬ withstanding this fundamental defect in con¬ struction, commendable efforts have been made to infuse a new spirit into the administration of these prisons. These attempts to build up a new type of administration in the old type of prisons have but emphasized the fact that ade¬ quate classification of prisoners is not entirely possible without the provision of different types or kinds of prisons. Modern penologists now demand that the modern prison system should never place men and women in separate parts of the same prison, and should provide :

1. Sufficient detention prisons for those awaiting trial.

2. Classification or reception prisons where all offenders are committed by the courts im¬ mediately after conviction to be observed and classified.

3. Educational, industrial and training school prisons for younger offenders.

4. Industrial prisons, preferably of the farm colony type.

5. Hospital prisons for the criminal insane and for border-line insanity cases.

6.. Custodial prisons for the low grade feeble¬ minded, for other abnormals and for habitual offenders.

A study of prisons constructed recently or at present under construction indicates that prison architecture has broken away from its slavish copying of the Silent or Auburn Systems. Prisons for juveniles, for the insane, for petty offenders, for crippled offenders, for the high

grade feeble-minded, for diseased prisoners and for all but the low grade feeble-minded and per¬ verts and habitual offenders, are now fre¬ quently designed more like industrial schools, hospitals and labor settlements than like the old bastile of the Auburn type. Small units built in accordance with modern adaptations of the Auburn plan are still serviceable as prisons for the perverted and the hardened offenders.

A very notable development of prison ad¬ ministration has taken place in the Philippines since American occupation. Of particular significance is its development of vocational and industrial training in the Bilibid Prison at Manila, of agricultural colonies and also of the Iwahig Penal Settlement, where prisoners are permitted to live in houses which they are per¬ mitted to purchase from their earnines as pris¬ oners. Upon their release they are in turn permitted to sell to the prisoners who have been given the opportunity of serving as part of their sentence at this very remarkable colony. Every division of the prison system in the Philippines aims to do its part in reforming the offender and reclaiming him from a life of evil by fitting him for his return to society. Insofar as it accomplishes this, each unit of that system and the system as a whole is performing the serv¬ ices required of a modern prison.

Bibliography. — Bacon, Corinne, (Prison Reform ; Brockway, Z. R., (Fifty Years of Prison Service* (New York 1912) ; Burt, J. T., (Result of the System of Separate Confinement as Administered at Petonville) (London 1852) ; Carpenter, Mary, (The Irish Prison System * ; Crawford, W., and*

Russell, W., (Extracts from Second Report of Inspectors of the Home Dis¬ trict (Philadelphia 1838) ; Dickens, Charles, (American Notes) (Chicago 1885) ; Ellwood, C. A., (The English Prison System* (in The Journal of the American Institute of Criminal Law and Criminology, 1916) ; George, W. R., (The Junior Republic (New York 1911) ; Gor¬ ing, Dr. Charles, (The English Convict (Lon¬ don 1913) ; Hall, Capt. Basil, (Travels in North America from 1827-1828) (Edinburgh 1829) ; Healy, William, (The Individual Delinquent (Boston 1915) ; Howard, John, (The State of the Prisons in England and Wales* (Warrington 1784) ; Henderson, Chas. R., (Modern Prison Systems) (Government Printing Office, Wash¬ ington 1903) ; (Penal and Reformatory Insti- tutions> ; Ives, George, (A History of Penal Methods* (London 1914) ; Jaffray, Julia K., (The Prison and the Prisoner, A Symposium* (Boston 1917) ; Lewis, B. G., (The Offender* (New York 1917) ; New Jersey Prison Inquiry Commission, Report (2 vols., 1918) ; Osborne, Thomas Mott, (Society and Its Prisons> (New Haven 1917) ; Prisons, American Prison As¬ sociation Proceedings (Indianapolis 1870-1917) ; Prison Reform Leaflets, National Committee on Prisons and Prison Labor (New York 1910— 18) ; Wines, F. H., (Punishment and Refor¬ matioˆ (New York 1910; new ed. by W. D. Lane 1919).

Burdette G. Lewis,

Commissioner of Department of Institutions and Agencies, State of New Jersey.

PRISONS, Military. See Military Pris¬ ons.

PRISREND, pres-rend', or PRIZREN,

pres-ren', Jugoslavia, a former town of Euro-

pean Turkey and capital of the vilayet of Kossovo, on the right bank of the Rieka, four or five miles from its confluence with the Driu. By the Treaty of Bucharest (25 July 1913), which brought a temporary peace to the Balkan states after three wars, and the agreements for the rectification of the Serbian- Bulgarian and Serbian-Montenegrin frontiers, Serbia obtained, among other territorial gains, 9,973 square miles of the Turkish region for¬ merly known as Kossovo. Here the Serbians created the administrative department of Prisrend, with its capital at the town of the same name. In the early part of the World War this entire region and the adjacent ones in Bosnia, Albania, Montenegro and Bulgaria were the scene of intense

fighting. Under the World Peace Treaty of 1919 Prisrend was in¬ cluded in the territory of the new republic of Jugoslavia. The town, under Turkish rule, was the residence of a pasha, and the seat of a Greek metropolitan and a Catholic bishop. Among its buildings were 42 mosques, one Cath¬ olic and five Greek churches. It had consider¬ able manufacturing interests, and a large trade with the adjacent country and beyond its bor¬ ders. Pop. (1915 estimates), department, 227,- 425; town, 21,244.

PRITCHARD, prich'ard, Jeter Connelly,

American jurist: b. Jonesboro, Tenn., 12 July 1857 ; d. Asheville, N. C., 10 April 1921. He removed to Bakersville, N. C., in 1873, and un¬ til 1887 was joint editor and owner of the Roan Mountain Republican. He served in the State legislature in 1884, 1886 and 1890. In 1887 he was admitted to the bar and engaged in law practice in Marshall, N. C., was presi¬ dent of the State Protective Tariff League in 1891, delegate-at-large to the Republican Na¬ tional Convention in 1892, served as United States senator to fill a vacancy in 1894-97 and in the latter year was re-elected for the term of six years. In 1903 he became an associate justice of the Supreme Court of the District of Columbia; in 1904-11 was United States circuit judge of the 4th circuit; in 1912 became judge of the United States Circuit Court of Appeals.

PRITCHETT, prich'et, Henry Smith,

American astronomer and educator: b. Fayette, Mo., 16 April 1857. He was graduated from Pritchett College, Glasgow, Mo., in 1875 and later studied astronomy under Asaph Hall in the United States Naval Observatory where he became assistant astronomer in 1878. In 1880 he accepted the position of directing astronomer at Morrison Observatory, Glasgow, Mo., and in 1881 was appointed to the chair of astronomy and mathematics at Washington University, Saint Louis, Mo. He was permitted leave of absence in 1882 in order that he might observe the transit of Venus at Auckland, and he also made pendulum observations at Auckland, Syd¬ ney, Singapore and Hongkong. He was in Europe on scientific work in 1894-95, was ap¬ pointed superintendent of the United States Coast and Geodetic Survey in 1897, in 1900 president of the Massachusetts Institute of Technology and in 1906 president of the Carnegie Foundation. Fourteen colleges and universities honored him with the degrees of A.B., Ph.D., LL.D. and Sc.D.

PRIVAT-DOCENT, pre-vat' do-tsent', in the German university system (and others modeled on it), an instructor whose lectures rank with those of the professor, but who un¬ like them has no standing in the faculty as a governing body of the university. He receives no fees except directly from

his pupils. He must have received the doctoral degree and also be habilitated, that is, successfully defended a thesis, the result of his own research. The post is commonly a means of preparation for university professorship. Many distinguished men, Kant among others, have held the post as a stepping-stone to higher university rank.

PRIVATE BANKERS. See Banks and Banking — Private Banks.

PRIVATE BILLS. See Bills, Private.

PRIVATE CORPORATIONS. See Cor¬ porations, Legal.

PRIVATE SAVINGS BANKS. See

Banks and Banking — – World's Systems, Private Banks — Bank Organization and Management.

PRIVATE SCHOOLS, institutions under private control as distinct from public, and im¬ plying maintenance by private corporations or individuals. But the school may be private, or not public, in its origin and government, and if there are no limitations as to who may be ad¬ mitted as pupils, it is usually classed as a public school. In the United States private schools embrace a large number of institutions ranging in purpose from elementary to professional edu¬ cation. Thus in the school-year 1915-16 there were reported 1,665,075 pupils in private ele¬ mentary schools of kindergarten, primary and grammar grades; 155,135 students in private high schools ; 6,958 students in private normal schools, and 57,540 students in the various pro¬ fessional schools. More than one-half of the private schools were under the control of re¬ ligious denominations and had 103,829 students of high school grade. The ordinary profes¬ sional schools comprised those of theology, law, medicine, dentistry, pharmacy, veterinary medi¬ cine and nurse training, the latter in general being connected with large hospitals. In spe¬ cialized work there were over 1,300 independent commercial and business schools and 762 private high schools giving business courses. These courses included stenography, typewriting, te¬ legraphy, telephony, accountancy and general office service. Soon after the outbreak of the World War in 1914 many large financial insti¬ tutions, chambers of commerce, boards of trade and colleges and universities established special schools of commerce in preparation for an ex¬ pected expansion of the foreign trade of the United States after the close of the war, and a larger private specialization of educational ef¬ fort was developed by the necessities of the government, especially after the United States entered the war. See Rugby ; Education, Agri¬ cultural, Secondary Schools.

PRIVATEER, the name applied in time of war to a ship owned by a private individual, which under government permission, expressed by a letter of marque, makes war on the ship¬ ping of a hostile power. To make war on an enemy without this commission, or on the ship¬ ping of a nation not specified in it, is piracy.

Privateering was abolished by mutual agree¬ ment among European nations, except Spain, by the Declaration of Paris in 1856; but the United States of America refused to sign the treaty, except on condition that all private prop¬ erty at sea, not contraband, should be exempt from capture. This ((Marcy,® or (< American,® amendment, as it was called, was not accepted. This doctrine was again affirmed by the United States delegates to the Peace Conference at The Hague in 1898, but was again rejected by the European powers. It is doubtful, however, how far the abolition of privateering would stand in a general war, for it is the natural resource of a nation whose regular navy is too weak to make head against the maritime powei of the enemy, especially when the latter offers the temptation of a wealthy commerce. It was usual for the country on whose behalf the pri¬ vateers carried on war to take security for their duty respecting the rights of neutrals and allies, and their observing generally the law of nations. In the wars of 1793-1814 many English pri¬ vateers were afloat. But in the same period no less than 10,871 English ships, with over $5,000,000,000, were taken by French (

The European War produced a new form of privateering, armed with torpedoes, guns and floating mines. The operations of such craft were confined for a while to enemy coast objectives and the waters of adjacent ((barred zones® ; but the voyage of the German com¬ mercial submarine Deutschland from Kiel, Ger¬ many, to Baltimore, Md., a distance of 4,180 miles, in 1916, and her safe return ' to Kiel, showed a startling menace to the world's ship¬ ping. It demonstrated that the new kind of under-sea craft could cruise in safety a long distance from a home base. The greatest feat of the U-boat type, up to that time, occurred in May and June 1918, when a number of such craft sank many vessels off the Atlantic coast of the United States.

PRIVET, a genus (Ligustrum) of shrubs or trees of the order Oleacece. About 35 species are known, natives of eastern Asia, Aus¬ tralia, with one of the Mediterranean region. They are deciduous or evergreen and bear ter¬ minal panicles of small, whitish, generally fra¬ grant flowers, followed by usually black berries which often remain on the plants during winter.

They are justly popular plants in shrubberies

and some are widely used as hedges since they are erect-growing and stand shearing well. They are readily propagated by means of cut¬ tings, seeds or layers, and will succeed in almost any soil, in full sun, on dry land and under partial shade. The common privet (L. vulgare) , L. ibota and L. ciliatum are fully hardy in the Northern States, but the so-cailed California privet (L. ovalifolium) , a Japanese species, is doubtfully hardy farther north than New York City. The common privet has half-evergreen, smooth, lanceolate leaves an ■ berries about the size of peas, black, rarely white, yellow or green. The flowers have a strong and sweetish odor; the leaves, mildly astringent, were for¬ merly used in medicine ; the berries, which hang on the shrub during winter, have a disagreeable taste, but are food for many kinds of birds, and supply a pink pigment used in map-making and in dyeing. The wood of some of the larger kinds is very hard and is used for making shoe-pegs and for turning. The only insect that is commonly troublesome upon the plants is the privet web-worm (Diaphania quadristig-malis) .

PRIVILEGE taken in its active sense is a particular law, or a particular disposition of a law, granting certain special prerogatives to some person contrary to the common right. Examples of privilege may be found in all systems of law, as in the case of members of Congress and of the several legislatures when in attendance at their legislative duties ; par¬ ties as witnesses while attending court, and coming to and returning from the same, electors while going or returning to the election, are all privileged from arrest except for treason, felony or breach of the peace. Privileges from arrest are either general and absolute, or limited as to time or place.

Ambassadors and their servants are abso¬ lutely so privileged.

A privilege of arrest for a legislature mem¬ ber is limited to the period of the legislative session and a reasonable time in going and returning.

In the civil law a privilege is a right which the nature of a debt gives to a creditor, enti¬ tling him to be preferred before other creditors.

Privileged communications are those state¬ ments made by a client to his counsellor or attorney in confidence, relating to some cause or action then pending; such communications cannot be disclosed without the consent of the client. The courts sometimes exclude from evi¬ dence, as privileged communications, matters of a judicial, political or professional nature on the grounds of public policy.

In many jurisdictions a writ of privilege or protection is issued by the

courts, affording one, under proper circumstances, protection against arrest or from the service of civil process.

A witness is entitled to the privilege of refusing to answer incriminating questions.

A physician cannot be compelled to disclose the secrets of the sick room ; a Roman Catholic priest to make confessions public; a clergyman to reveal the confidences of his pastoral rela¬ tions; or a juror to repeat the considerations of the jury room.

Of ancient and mediaeval legislation, the Privilege formed an important branch; in truth, the condition of the so-called <(privileged classes®

was different socially, civilly and religiously, from that of the non-privileged. In canon law, there were two privileges pertaining to the clergy, the privilegium canonis and the privile- gium fori. By the former, the person of the clergyman, of whatever degree, was protected from violence by the penalty of excommunica¬ tion against the offender; by the latter, known in England as the <(benefit of clergy,® the clergy¬ man was exempted from the ordinary civil tri¬ bunals, and could be tried only in the ecclesi¬ astical courts. Most of the purely civil privi¬ leges have been abolished throughout Europe by modern legislation.

PRIVILEGED COMMUNICATIONS,

statements made by a client to his counsellor or attorney in confidence, relating to some cause or action then pending; such communications cannot be disclosed without the consent of the client; the statements of a patient to his phy¬ sician, of a husband to his wife, of a man or woman to a spiritual adviser, in fact communi¬ cations or statements between parties placed in a confidential relation one to another are privi¬ leged in the sense that one of the parties to such will not be allowed against the objection of the other to testify with reference thereto in a court of justice. Another class of state¬ ments which enjoy a measure of privilege are defamatory statements which do not give the injured person a right of action. The state¬ ments of legislators, judges, and in some cases of litigants, their counsel, witnesses, etc., come under this class. In the United States, how¬ ever, it is held generally that such statements render their authors liable to a civil action when made in bad faith and with malicious intent. The privilege, therefore, is conditional rather than absolute. Conditional privilege is also extended to defamatory statements made by a person in the discharge of his duty,

whether the latter be public or private. As example of the latter is the information given by an em¬ ployer to another employer about a person who has been in his employ. If bad faith and malice are proven in such cases the employer giving such information is liable to action. Consult Hageman, Privileged Action) (Somerville, N. J., 1899) and McLaughlin and Hart Encyclo¬ pedia of American Government (3 vols., New York 1914).

PRIVILEGES AND IMMUNITIES,

are those privileges of citizens of each State, in the several States of the North American Union which may not be abridged by State or local laws. The Constitution of the United States, article IV, section 2, paragraph 1, provides that (

teen, which declares that cIII, paragraph 3, jury trial is guar¬ anteed for all crimes except cases of impeach¬ ment, and the furthermost important provision is made that such trial is to be had in the State where the crime has been committed, but when not committed within any State, the trial is to be had at such places as Congress may by law have directed. It has been held that the accused is not entitled to a jury trial in the case of petty crimes and misdemeanors, but only in the case of graver crimes, where at common law the accused was entitled to a jury trial. As additional precautions in criminal trials, Amendment Five provides that no person is to be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases oc¬ curring in the army or navy; or in the militia during war or in time of public danger. This amendment also provides that a person shall not be put in jeopardy of life or limb twice for the same offense, nor be compelled in any criminal case to be a witness against himself ; nor be deprived of life, liberty or property without due process of law. Article VI guar¬ antees a speedy and public trial by an impartial jury and with the assistance of counsel for his defense. Excessive bail, excessive fines, cruel and unusual punishments, all are forbidden by article VIII. Recent legislation, redolent of a period long since passed, shows that the fight of the citizens to safeguard these elementary and hard-won privileges must be never-ending, illustrating again the maxim that Eternal vigi¬ lance is the price of liberty.® (See Evidence; Libel; International Law ; Witness). Con¬ sult Cooley, T. M., Principles of Constitutional Law in the United States) (3d ed., Boston

1898).

PRIVY COUNCIL, in England, the body of advisers of the sovereign which formally

sanctions those acts of government not properly the province of Parliament. Privy councillors are nominated, without patent or grant, at the pleasure of the Crown, excepting certain per¬ sons appointed ex officio. They hold office for life, or for the life of the sovereign, so that at the accession of a new sovereign the council must be — nominally at least — reconstituted. The number of privy councillors is not limited by law.

Jurisdiction. — The duty of the council, in general, is to advise the king on affairs of state. The Lord President of the Council is required by statute <(to manage the debates in Council, to propose matters from the sovereign at the Council Table, and to report to the sovereign the resolution of the Council thereon.® This function, however, is largely theoretical, as there are in fact no debates in council, this body merely giving .formal sanction to orders in council, by which the king, on the advice of his ministers, expresses his pleasure with re¬ spect to various administrative matters, as for instance the bringing of treaties into effect, grants of charters, the government of colonies and the regulating of departmental business. So, too, the Privy Council performs certain ceremonial functions. For instance, in council a bishop does homage for the temporalities of his see, a minister takes the oath of office and the sheriffs for counties are chosen. The coun¬ cil has, besides, important duties of an adminis¬ trative or judicial nature which it performs by committee or commission. Several of these committees have only a theoretical connection with the council, acting to all intents and pur¬ poses independently. The Cabinet itself, the executive of the United Kingdom, is such a committee, composed of ministers belonging to the Privy Council, but it has completely out¬ grown the parent body in political importance, having practically superseded it in the functions which this formerly performed. The Board of Trade, now under its own president and re¬ garded as a distinct department of state, was from the first a committee of the Privy Council. The Local Government Board of Agriculture and the Board of Education are similar developments from the council, while the universities commit¬ tee, the committee (

History. — The Privy Council developed out of the curia regis (king's council) of the Nor¬ man period, which exercised judicial legislative and administrative functions. Out of the curia

grew the courts of law and equity and the houses of Parliament besides the Privy Council. After the time of Edward I appeared the con¬ cilium ordinarium, or ordinary council of the king, which in the 15th century gained the name Privy Council. The Select Council, ultimately the Cabinet,

began to emerge from the larger body about the same time. In the time of Edward III the Privy Council was occasionally merged in one assembly with the House of Lords, and in 1640 the Long Parliament reduced the powers of the council. In 1679 Sir William Temple made an unsuccessful attempt to reor¬ ganize it, but since then it has dwindled into insignificance when compared with its early authoritative position, and its governmental duties have been assumed by the Cabinet. Ire¬ land has a separate Privy Council. Bodies, somewhat similar and bearing the same name, formerly existed in several of the American colonies and States. Consult Macqueen, ap¬ pellate Jurisdiction of the Privy CounciP (1842) ; Finlason,

PRIVY-PURSE, Keeper of the, an officer of the royal household in England, in charge of the payment of the private expenses, including charities, of the sovereign. He has no control over any official or household ex¬ penses, and is independent of the great officers of the household.

PRIVY-SEAL (privatum sigillum), a British governmental seal formerly appended by the sovereign to such grant or documents as were afterward to pass the great seal; and sometimes used in matters of less consequence, which did not require to pass the great seal, as to discharge a recognizance, debt, etc. No writ, however, which related to the common law could pass the privy-seal. From the time of Henry VIII until the reign of Queen Victoria the privy-seal was the warrant of the legality of grants from the Crown, and the authority for the Lord Chancellor to affix the great seal. Such grants were termed letters patent. The officer who had the custody of the privy-seal was anciently called clerk of the privy-seal, afterward guardian del privy-seal; and later Lord Privy-Seal. The Lord Privy-Seal could not put the seal to any grant without good warrant ; nor with warrant if it was against the law or inconvenient without first acquainting the sov¬ ereign therewith. In 1884 the Great Seal Act stipulated that all documents required to pass the great seal need not be passed under the privy-seal, a warrant under the sign manual countersigned by the Lord Chancellor, Secre¬ tary of State or a high treasury official being sufficient. Although without salary and no def¬ inite duties, the title of Lord Privy-Seal, with its former rank as fifth great officer of the state and a seat in the Cabinet, is conferred usually upon a peer above the rank of baron, although a commoner may receive the honorary title.

PRIX DE ROME, pre de rom (French (

The institution was founded by Louis XIV, in 1666, at the suggestion of*

Colbert and was enlarged by Napoleon. Its object is to complete the education of promising stu¬ dents in all branches of art, bv study of the classics in Rome. Those eligible for the prizes are painters, sculptors, architects, musi¬ cians and engravers, and the privilege bestowed consists of an annual income of 4,000 francs for four years and exemption from military serv¬ ice. Candidates must be Frenchmen between the ages of 15 and 30, and must have done certain work at the Ecole des Beaux Arts or elsewhere. The competition is so arranged as to comprise only 10 students from each de¬ partment for the final competition, and these are allowed three months in which to accom¬ plish the work they put in for the prize. While studying at Rome the successful competitor is expected to send to the Salon, or if he be a musician to the Conservatoire, every year, specimens of the work he is engaged in, and thus report progress.

PRIZE, property taken from an enemy in war ; that which is seized by fighting, especially a ship, with the goods contained in her; any description of goods or oroperty seized by force as spoil or plunder. The law as to prizes taken at sea is regulated by international law. In order to vest the title of the prize in the captors it must be brought with due care into some convenient port for adjudication by a competent court. In the United States, the court of naval jurisdiction is the Federal Dis¬ trict Court, from which cases may be removed under certain conditions to the Circuit Court, or for final adjudgment to the Supreme Court. In Great Britain, the subject of prizes, captures, condemnation, etc., are vested exclusively in the Admiralty Division of the High Court of Justice. (See Admiralty Law ; Prize-money). Consult Barclay, T., (Law and Usage of War (Boston 1914).*

PRIZE COURTS AND PRIZE JURIS¬ DICTION. As a general rule when enemy property is captured at sea under circumstances that render it liable to appropriation and con¬ fiscation by the captor the rights of the original owner are extinguished. But it may be that there is doubt as to whether the property is really enemy-owned, or whether it was captured in waters where warlike operations may be lawfully carried on, or whether it was not immune from capture by reason of its being in a neutral vessel, and the like. It is now a well-established rule of the law of nations that in all such cases the right of the captor to the property in question ought to be made the sub¬ ject of adjudication by a court. It is generally admitted that the captor may destroy by sink¬ ing or otherwise an enemy prize when there is no doubt as to its character and ownership, and when for lack of a sufficient coal supply or inability to spare a prize crew he cannot take the prize in to a home port for adjudication by a prize court, or when the taking of it in would expose the captor to the danger of destruc¬ tion or his prize to liability to recapture. The right of destruction in such cases was gen¬ erally exercised bv Confederate naval com¬ manders during the

American Civil War, and it has been exercised on a large scale by German naval commanders during the present war. In

both cases the home ports of the captor were blockaded by the enemy and since neutral ports are not open to a belligerent for the sequestration of his prizes the captors had no other alternative than to destroy their prizes. But as to the right to destroy neutral prizes without submitting the question of the legality of the capture to a prize court for adjudication, the law and practice of the past is otherwise. Most text-writers on international law main¬ tain that in such cases a captor has no right of destruction. German naval commanders during the recent World War, however, acted on the contrary assumption and made no dis¬ tinction between enemy prizes and neutral, prizes, and whenever possible destroyed both alike without taking them in for adjudica¬ tion by the courts. Sir Edward Grey recently stated the customary rule when he said <(Great Britain has always maintained that the right to destroy is confined to enemy vessels only, and this view is favored by other powers.® Con¬ cerning the right to destroy neutral vessels, the view hitherto taken by the greater naval powers has been that, in the event of its being im¬ possible to bring in a vessel for adjudication she must be released. The prize courts of Great Britain for more than two centuries have held this to be a rule of the law of nations and there appears to be no instance during the wars of the 19th century in which a captor deliberately destroyed a neutral prize instead of taking it in for adjudication by a prize court.

The institution of prize courts for the de¬ termination of the legality of captures at sea is, however, of modern origin. Prior to the 16th century there does not appear to have been any such institution as a prize tribunal. When, therefore, a capture was made at sea the captor determined for himself by a summary inspec¬ tion of the ship's papers and an examination of the persons on board whether the vessel or its cargo should be confiscated as lawful prize or allowed to proceed. The only remedy of the owner in such cases was to petition' the king for redress. By a British order in council issued in 1585 it was decreed that henceforth all prizes should be brought in for adjudication. Ultimately it became the practice in all countries in time of war to set up tribunals for the purpose of deciding upon the validity of captures made by their cruisers at sea. These tribunals came to be known as prize courts. In England jurisdiction in all matters of prize was conferred upon the High Court of Ad¬ miralty by virtue of a special commission issued by the Crown at the outbreak of war, and by the Naval Prize Act of 1864 the Court of Admiralty was constituted a permanent court of prize, independent of any commission issued under the great seal. More recently the High Court of Justice was substituted for the Court of Admiralty as a permanent prize' court and its jurisdiction is actually exercised by the Pro¬ bate, Admiralty and Divorce Division. During the

Napoleonic wars the prize court of Eng¬ land was made famous by the decisions of Lord Stowell. During the Crimean War the court was presided over by Dr. Lushington and during the World War it was held by Sir Samuel Evans. Special commissions to de¬ cide questions of prize were also issued to various courts in the overseas dominions and the colonies, for example at Alexandria, Malta,

Ottawa and other places. Appeals may be taken to the judicial committee of the Privy Council. In the United States the Federal District Courts have original jurisdiction in prize cases but claimants may take appeals to the Supreme Court. In France the prize jurisdiction is ex¬ ercised by a Council of Prizes consisting of five members. In Germany there were during the World War two prize courts, one located at Hamburg, the other at Kiel, each held by five judges. Cases could be appealed to the Supreme Court of Prize at Berlin, composed of seven judges. Prize courts are municipal tribunals although the law which they apply is international law and the rights which they are called upon to adjudicate are in most cases those asserted by the citizens or subjects of foreign states. They are, in short, practically judges in their own cases and are exposed to the temptation, to the bias and prejudice which may be expected of courts in deciding issues between their own government and foreign claimants. Added to this defect is the absence of an international code of prize law and the consequent divergences of view regarding the rules to be applied. To remove these defects the second Hague Conference in 1907 adopted a convention providing for the establishment of an international prize court, and the Inter¬ national Naval Conference at London in 1909 formulated a code of prize law dealing with such matters as (blockade, contraband, the de¬ struction of prizes, transfer of flag, unneutral service and the like. The international prize court was to be composed of 15 judges and upon the court the eight principal maritine powers were to be always represented. From the decisions of national prize courts appeals might be taken to the international tribunal, which it was believed would be more likely to decide the questions submitted to it with less bias and prejudice than could be expected of national courts. Unfortunately, however, owing to differences of opinion among the nations in regard to the constitution of the court it has never been organized, and in consequence of the failure of the powers to ratify the Declara¬ tion of London (q.v.) there is as vet no inter¬ national prize code binding upon the national tribunals. Some states like Germany and France have put into effect prize codes of their own. The United States government issued such a code in 1900 but five years later it was revoked by President Roosevelt (see Laws of War, The). Great Britain

issued a manual of naval prize law in 1888 but it has since been withdrawn. British prize law is now found mainly in the Naval Prize Act of 1864, the Prize Courts Act of 1894 and various orders in council issued thereunder. The remainder con¬ sists of custom and judicial precedent. All authorities are in agreement that although prize courts are municipal tribunals the law which they must apply is international law, but as stated above there are wide divergencies of opinions to what that law is in respect to many auestions, and the failure to ratify the Declara¬ tion of London leaves the prize courts of each nation free to interpret the customary law ac¬ cording to their own notions and apply such rules as they consider to have become well established. The view that prize courts are bound to apply the law of nations was affirmed

by Lord Stowell in the case o'f the Maria as long ago as 1799 and the early commissions issued to the Court of Admiralty required that it should (

But suppose the municipal law of a state is contrary to international law. Must the prize court give effect to the former or the latter? The question was presented to Lord Stowell in 1811 in the case of the Fox and he disposed of it rather unsatisfactorily by saying that the court would assume that an order in council of the king which was believed to be contrary to the rules of international law was in accord with international law and that the court could not ((without extreme indecency® presume the existence of a conflict. The issue was again raised in England during the World War in the case of the Zamora which involved the question as to whether an order of the king in council contrary to the estab¬ lished rule of international law was binding upon the prize court, and upon appeal to the judicial committee of the Privy Council it was held that such an order was not binding. The Privy Council admitted that if an act of Parlia¬ ment contrary to international law were passed it would be binding upon the prize court, but orders in council stood on a different footing and they were not so binding when in conflict with international law. The idea that the king in council could prescribe or alter the law to be administered by the prize court, it said, was out of harmony with the principles of the British Constitution. The Supreme Court of the United States has long held to the same rule, that is to say, the courts are bound by munici¬ pal statutes even when they are contrary to international law, although they are not bound by executive orders which are in conflict with the established principles of international law.

The procedure of a prize court is in the nature of an inquest upon the property which has been placed within its custody, for the purpose of discovering whether it has been lawfully captured and whether it was liable to capture. The proceedings begin by the action of a representative of the captor government in libelling the property, that is, by petitioning the court

to hold an inquiry. He submits with the petition the ship's papers, affidavits and other documents which contain evidence of the liability of the ship or cargo to capture and of the lawfulness of the capture. Notice is then given to the claimant in order that he may come forward and assert whatever rights he mav have in the property libelled. Ordinarily enemy claimants are not allowed to appear but curing the World War the president of the British prize court made an exception in the case of enemy claimants who asserted any right, title or inter¬ est under any of The Hague conventions. All such persons were permitted to appear by counsel and assert freely their rights, in spite of their enemy character. Prior to the Ameri¬ can Civil War it was considered to be an estab-

lished rule of prize procedure that the evidence must come in the first instance from the ship's papers and the depositions of the officers and crew of the vessel. Ordinarily extrinsic evi¬ dence could not be adduced by the captor. Dur¬ ing that war, however, it was found impossible to adhere strictly to the old rule, especially in cases of continuous voyages where it was necessary to prove the actual intention of the shipper. In theory the burden of proof lies upon the captor, but generally in practice it is upon the claimant, and property brought in by the captor rarely escapes condemnation un¬ less the owner can prove that it was not liable to capture. If the character of the evidence referred to above, technically known as evi¬ dence (

The British prize court rules of 1914 intro¬ duced an important change in the established procedure by allowing cases to be decided in the first instance upon (

*When a decree of condemnation is issued the vessel in some countries, e.g., France, is condemned to the captors who divide the pro¬ ceeds of the prize among them. This was the practice in Great Britain until the outbreak of the World War when the rules relating to bounties were altered. The captors no longer receive the prize but the court awards a bounty of £5 to each person actually present or taking * part in the capture or destruction of the ships. In 1898 bounties for captures at sea were abol¬ ished by an act of Congress. It has always been the British practice to award compensa¬ tion to neutral merchants by condemning the captor in damages and costs when the latter fails to make out a case against a prize brought in for carrying contraband and there was no good ground for the seizure. But this practice has not been followed on the Continent.*

Bibliography.— -Allin, Minnesota Law Re¬ view (Vol. II, pp. 22-36) ; Lawrence, Princi¬ ples of International LawJ (Secs. 189-192) ; Moore, (Digest of International Law) (Vol. VII), ch. 25) ; Phillimore, Hnternational Law> (Vol. Ill, pp. 658ff.) ; Pyke, Paw of Contra¬ band of War (pp. 214-219) ; Rascoe, Prize Cases y ; Trehern, (British and Colonial Prize Cases> (1914-17) ; Wheaton, (International Law) (ed. by Dana, p. 480ft\).*

James W. Garner,

Professor of Political Science, University of Illinois.

PRIZE-FIGHTING, fighting with the fists for a reward or prize. The ancient Greeks were the earliest to have prize-fights among their sports, so far as our historic knowledge goes. The pugilatus (prize-fighter) fought naked except, at times, for a loin cloth. The sport was so popular that the nation placed gods and heroes among the victors in the ring, among them Apollo, Heracles, Tydeus, Poly¬ deuces. It was considered one of the hardest and most dangerous games and death during or soon after the encounter was common. They used the ccestus, made of thongs or strips of leather which were tied around the fighters' hands to make the impact of a blow more tell¬ ing. Later the ccestus was loaded with lead and iron, producing frightful weapons. First recorded statements of professional prize pugi¬ lism as a popular sport in England date from the end of the 1 7th century, and the champion¬ ship started with James Figg of London, who held the title from 1719 to 1730. He built an ˆamphitheatre® where, as (

not being quite clear, but none disputed the claim. Jack Broughton became the third cham¬ pion and introduced the sole bare-knuckled fight with the broadsword and other combats discarded. He also reduced the <(rules® of the <(ring® to a fine art. The next champion was John Slack, butcher, who beat Broughton in 1750. But the Duke of Cumberland, who had 'been a great and admiring patron of Broughton, and who had bet $50,000 against $5,000 on him, considered he had been swindled by a palpable fake fight, closed the old amphitheatre and set the police on the trail of the ex-champion. William Stevens, <(The Nailer,® pounded the fight out of Slack, after breaking his arm ; but only to hold the title some eight and one-half months. Then, from appearances, he ((sold® the championship by flagrantly leaving himself open to a blow on the head from his competitor, George Meggs, which felled him, he walking off laughing ((none the worse for the fray.® Meggs had to leave London on account of the scandal and

was beaten by Millsom, a Bath baker, who held the title for three years. In 1765 Tom Juchau, <(The Disher,® defeated Millsom, to be beaten the following year by William Darts, a dyer, at Guilford, with a stake of $5,000, the largest since the Broughton-Slack affair. Darts was knocked out, in 1769, by Lyons, the water¬ man, the betting 10 to 1 against the latter. Lyons retired and gave back the title to Darts who lost it to Peter Corcoran, a herculean six- foot Irishman, who held the championship till 1776, when he was beaten by Harry Sellers (13th champion) in a match for a stake of $500 and a wager of $3,000. Thomas Jackling (fre¬ quently mentioned as Tom Johnson) became 14th champion after beating a number of challengers. (

foot-three height and 333 pounds of trained fighting flesh and bone caused him to take the giant to England on an exhibition tour. Wil¬ liam Perry, <(The Tipton Slasher,® became 35th champion in 1850, passing the title over to Harry Broome on a foul in 1851. Tom Pad- dock was champion (37th) from 1856 to 1858, when he was defeated by Tom Sayers, who be¬ came 38th champion heavyweight after having beaten all comers as middleweight till Nat Langham defeated him. Sayers held his own when 1860 brought him a contestant in the American champion, J. C. Heenan (<(Benecia Boy®). This noted battle in 1860 was stopped by the referee in the 42d round, Heenan blinded in hoth eyes and Sayers with his right arm out of commission since the seventh round. The draw was never fought out, the world's title being held jointly by both, each presented with a belt. Heenan, in 1863, was beaten by Tom King in England, he becoming the 40th cham¬ pion. So England had held the championship for two centuries, losing but one battle to the Irishman, Peter Corcoran, and the draw with Heenan. Jem Mace became champion in Eng¬ land in January 1862, only to lose it back to Tom King in November. Heenan, returning to England as the American champion, was knocked out by King, he becoming world cham¬ pion. Mace next became (1863) champion, beating Joe Goss. America sent Joe Coburn, an Irish-American, to get the belt but in 1864 he returned without a fight and claimed the championship; later in the year Joe Wormald went to England to fight for the championship but on account of an accident lost his engage¬ ment stake without a fight. Squabbles and police interference made prize-fighting in Eng¬ land so difficult that the sport had to be carried on in America. Here the police made the carry¬ ing out of engagements quite difficult, and

in 1868 the meeting of Ned O'Baldwin, the Irish¬ man, and Joe Wormald at Lynnfield, Mass., was broken up by the police. But Mace met Tom Allen near New Orleans in 1870, defeating Allen in 10 terrific rounds. And with Mace's retirement in 1873 we have reached the last English champion. An attempt at reviving prize-fighting in England was made 1889-90, when the engagement was made between the Australians Slavin and M'Auliffe, but the fight at Walworth was stopped and, encountering later, they were both arrested. What the old- time sports called prize-fighting, however, was killed when gloves (even if only four ounces) had to be used by professionals. The brutality of the bare-knuckled prizefights gave place to the more scientific boxing. In 1885 James Smith won the heavyweight championship of England. In 1887 he was defeated by Jake Kil- rain of Boston, the latter now becoming the world's champion. John L. Sullivan, of Boston, defeated Kilrain in 1889 in what is thought to have been the last contest in America under London prize-ring rules. Sullivan remained champion until 1892 when he was defeated by James J. Corbett the cleverest boxer the world had hitherto known or perhaps will ever know. In 1897 Robert Fitzsimmons defeated Corbett, but only held the championship three years, los¬ ing it to James J. Jeffries at Coney Island, N. Y., in 1899. For eight years Jeffries defeated sev¬ eral aspirants for championship honors, but on

PRIZE-MONEY

PROBABILITY

019

4 July 1910 was defeated at Reno, Nev., by the colored pugilist Jack Johnson. The latter lost his crown to Jess Willard at Havana, Cuba, 5 April 1915. On 4 July 1919, Willard fought Jack Dempsey at Toledo, Ohio, and was de¬ feated in three rounds. (See Boxing). Con¬ sult (Fistiana) (London 1868) ; (American Fis- tiana) (New York 1876) ; Lynch, (London 1913) ; Miles, (3 vols., London 1863) ; O'Reilly, (Ethics of Boxing (Boston 1888) ; Doran, (Self-Defense> (Toronto 1879) ; (Boxing) (Badminton Library, London 1899) ;*

1900).

PRIZE-MONEY, in warfare, money paid to the captors of a ship or place

where booty has been obtained, the money being realized by the sale of the captured property after the es¬ tablished court, on full evidence, has adjudged it lawful spoil. The amount realized by the sale, placed in the hands of the official account¬ ant of the navy, is distributed ratably, according to rank,, among the officers and men who as¬ sisted at the capture. See Prize.

PRTEVALSKY, przha-val'ske, or PRE- JEVALSKI, pra-zha-val'ske, Nicholas, Rus¬ sian traveler : b. Otradny, government of Smo¬ lensk, 31 March 1839; d. Karakol, West Turke¬ stan, 1 Nov. 1888. Having joined the army in 1855 he assisted in quelling the Polish insurrec¬ tion of 1861. While stationed in Siberia in 1867 he explored the Usuri region, south of the Amur, and spent 1871-73 in traveling from Peking through southern Mongolia (region of the Ordus) to the Ala-shan, Koko-nor and the upper waters of the Yang-tse-Kiang. In 1876— 77 he explored Lob-nor on the borders of East Turkestan and China, and in 1879 reached a point some 160 miles north of Lhassa, when the Tibetan authorities turned him back. He reached Kiachta after a journey of nearly 15,000 miles. In 1883-84 he again crossed the desert of Gobi, but returned without being able to reach Lhassa. When the British began their war against the Tibetans in Sikkim he was placed at the head of a strong expedition, and ordered to reach Lhassa at all hazards. Al¬ ready weakened by years of hardship, he was unable to endure the fatigues and exposure of another journey, and died on the route to Vernoje, where he intended to equip his expedition. Prjevalsky brought back from these journeys valuable col¬ lections of animals and plants, all now preserved at Petrograd. On his return to Petrograd from Siberia, he published a volume of (Notes on the Ussuri. > Subsequently his accounts of his journeys were published in the (Proceedings) of the Petrograd Geographical Society in Petermanns Mitteilungen and other journals.

PROA. See Catamaran.

PROBABILISTS, those philosophers who maintain that certainty is impossible and that we must be satisfied with what is probable. This was the doctrine of the New Academy, particularly of Arcesilaus and Carneades. The last-mentioned philosopher distinguished three principal degrees of probability, according as a

representation might be probable when consid¬ ered by itself alone; probable and unimpeached when compared with others ; or thirdly, prob¬ able, unimpeached and in all respects confirmed. In morals probabilists are those who teach that in our actions we must follow what seems to us probably right, because in questions of morality demonstrative certainty is not to be attained. There are some Christian teachers (and among them Gury in his Compendium Theologise Moralist who taught that a man may

follow what is probably right, or what has been decided to be so by teachers of au¬ thority, although it may not be the most prob¬ ably right, or may not seem probable to himself. It is this view that Pascal in his famous Pro¬ vincial Letters holds up to ridicule. Butler in his*

PROBABILITY, Theory of, is that branch of mathematics which deals with the determina¬ tion of the degree of belief which, in the ab¬ sence of full information, should be given to certain classes of statements, or to the past or future occurrences of certain events.

In regard to the great majority of events there is in the mind of every one a state of un¬ certainty. Under differing circumstances one shows this uncertainty by saying that it is pos¬ sible or that it is, or is not, probable that some event did or will happen. Ordinarily no attempt is made to establish an exact measure of the probability of an event, such attempt being clearly foredoomed to failure. Not infrequently, however, the first step toward such a measure¬ ment is taken by the making of a rough com¬ parison of the probabilities of two events, the conclusion resulting that one of them is more probable than the other.

Equally Probable Events. — For certain sorts of events it is possible to proceed farther. Thus, as a next step, it is quite common to find that two events are regarded as equally prob¬ able. For instance, a coin being tossed, one says that head and tail are equally likely to ap¬ pear; or, a properly made die being thrown, one estimates that any one of the six faces is as likely to appear as any other. Of course these estimates are made in spite of the belief that, starting from a given initial position, the body moves completely subject to the laws of dynam¬ ics, and that from certain influences but one result can follow. The fact is that the observer is so ignorant of the forces applied to the body that his judgment is formed independently of them. He perceives that from the nature of

the body only a certain number of events are possible, and he finds no reason for concluding that one event rather than another will occur.

Probability of an Event. — Suppose now that five events are known to be equally prob¬ able and that one of them will and only one can happen. Suppose also that if and only if one or another of the first three occurs, a further event E will occur. Then it is commonly said that the odds are 3 to 2 in favor of the event E ; and since there are five equally probable events, of which exactly three are concurrent with E , it is said that the

mathematical probability of E is f . In general, when a specified event E is governed by n equally probable events, of which one will and only one can happen, and when, of m of these, each is decisively favorable to E, all others being decisively unfavorable, the

m

mathematical probability of E is defined to be —

ft •

In the extreme cases in which none and all of the events, respectively, are favorable to E, the probabilities are said to be 0 and 1, though in each case there is certainty regarding the oc¬ currence of E.

Assume now that, of n equally probable and mutually exclusive governing events, mi, m3,

. . ., nik are respectively favorable to the further events Ei, E2, . .., Ek, which are also mutually exclusive. Then the probabilities of Ei, Et, . . .,

Ek are respectively pi — Pi = —,... , pk =

n n

— . If now Wi + m2 + . . . + mk = n, one has n

mi , w2 , . mk

*~ *r — t • • • i –*

n n n

1 ; or p\ + pi + . . . -\-pk —

1. The result may be stated formally as

Theorem 1. The sum of the methematical probabilities of a number of events, of which one must and only one can happen, is unity.

The application of the definition requires the selection of a set of governing events, finite in number, which must be either equally probable or capable of being replaced by a set of equally probable events ; it then requires a correct enu¬ meration of the favorable events and of the whole set. Each of these steps may present difficulties, but failure follows most frequently from a wrong selection of the set of governing events. Consider the following example :

Ex. 1. A coin being tossed twice , what is the probability that head appears -twice? — One might say that the possibilities, or governing events, are three in number, viz., the appear¬ ances of two heads, of a head and a tail, and of two tails, respectively; that of these one is favorable, and that p — h. But the answer is incorrect because the appearance of two heads, or two tails, is not as probable as that of a head and a tail. The following are really equally probable events : the appearance of head, head; of head, tail; of tail, head; of tail, tail. They are four in number, one being favor¬ able. Hence p = i.

The solutions of the following problems il¬ lustrate the direct application of the definition. Nearly all problems in this subject require the use of the theory of permutations and com¬ binations. See Algebra. Permutations and Combinations.

Ex. 2. Two dice being thrown, what is the probability that the throw will be seven? — The

equally probable events are the appearances of the several numbers of the first die with those of the second die, and are 36 in number. The favorable cases are the following sets: 1, 6; 2, 5; 3, 4; 4, 3; 5, 2; 6, 1; they are six in number. Hence f> = -fo = £.

Ex. 3. Two dice being thrown twice, what is the probability that at least one double appears? — In either throw any face of one die may be associated with any one of the other. Hence there are 36 equally probable cases for each throw. Each case for the first throw may be associated with each case for the second throw. Hence there are 362 = 1,296 cases in ail. Of the 36 cases in either throw 30 will fail to yield a double. The association of each of these cases for the first throw with each of these for the second throw will yield all of the unfavor¬ able cases. Hence there are 302 = 900 unfavor¬ able cases, and accordingly, 1,296 — 900=396 favorable cases. Hence p — f£

Ex. 4. (a) From a bag containing five balls some are to be drawn. Find the probability that an even number of balls will be drawn, (b) Find also the probability if the number of balls be n. — (a) The total number of cases is the sum of the numbers of ways of drawing 1, 2, 3, 4-and 5 balls, which is 5+10+10+5+1= 31. The numbers of ways of selecting 2 and 4 balls are 10 and 5. Hence the number of favor¬ able cases is 15. Hence p =J£ = % — r, .

(6) The total number of cases is

nCi + nCt + . . . + nCn •

The number of favorable cases is nCi + nCt + . . . Now (1 + l)n = 1 + nC\ + nCi + . . . + nCn , and (1 — l)n =1 — nCi + nC3 ….

Hence 2n — 1 = total number of cases. Also 2° — 2=2(nCa+nC'«+ • • •)• and so p = — — – 1 —

Notice that an odd number of balls is more likely to be drawn than an even number.

Another problem remarkable alike for its apparent difficulty, the fine reasoning employed in its solution and the simplicity of its results is the following one:

Ex. 5. At an election two candidates A and B received respectively a and b votes, A being elected. What is the probability that during the counting of the ballots A was always ahead? — The solution is obtained easily after it is shown that of the orders of counting which are un¬ favorable to the result mentioned exactly one- half begin with a vote for A. The answer is

a —

T+V

i.e., the majority divided by the total

vote.

Total Probability. Compound Probability.

It may happen that the m governing events favorable to E can be classified into sets of m i, ni2, …. mk events respectively, where m=w+ m2+… +m&. The probability, pi, that E will be concurrent with one of the set of mi events

. mi . mi . m2 . , mk m

is — . Then since – r — + . . . H – =—

n n n n n

one

has pi + pi + . . . + pk — p. Stated formally one has

Theorem 2. If an event can happen in sev¬ eral mutually exclusive ways, the probability of its happening at all is equal to th •€ sum of the

probabilities of its happening in the several ways. — Here p is called the total probability, pi, p 2, etc., the partial probabilities. On the other hand the event E whose probability is sought may consist in the concurrence of sev¬ eral independent events. Suppose that these events are ex, et, . .., ek, and that for them the total numbers of cases are Wi, n2, . . ., nk , respect¬ ively, and that the numbers of favorable cases are wti, m 2, ..., ntk, respectively. Then for the event E the total number of cases is MiM2 . . . nk > and of these mira2 . . . mk are favorable. Hence

mm2 . . . mk m 1 m2

Mim2 . . . nk Mi n2

mk

Tk P'P'- ■ pk

Hence one has

Theorem 3. The probability of the concur¬ rence of several independent events is the prod¬ uct of the probabilities of their several occur¬ rences. — This theorem can be extended to the cases in which events, not independent, have a specified order, and in such cases the probability of each is to be computed on the hypothesis that the preceding events have happened.

These three theorems form the basis of the whole of the elementary theory. Their appli¬ cation will be illustrated in the solution of the following example:

Ex. 6. A with three coins endeavors to throw more heads in one throw than B can throw with two coins. In case of a tie they throw again. What is the probability of A's winning t — The following ways in which A can win in¬ clude all cases, and are mutually exclusive. He may (1) throw 3 heads, (2) throw 2 heads and win, (3) throw 1 head and win, (4) he may tie B on the first throw and win on a subsequent throw. Let p be the total probability of A's winning, and pi, p2, p3, pi the partial probabili¬ ties. The following table gives the chances of various throws by A and B :

Number of heads .

3

2

1

A’s chance .

1

8

3

8

3

8

B’s chance .

0

1

4

1

a

Then, by theorem 3, pi~i, p2~ I (1 — ?), pz~ 1(1 — i — £). Also pi is the product of the probabilities that a tie will occur and that A will subsequently win. The probabilities that a tie will occur with 3, 2, 1, 0 heads are 0, I X i, | X j, I X J- The sum is x5g. If a tie occurs, the initial condition is reproduced and A’s chance of winning is p. Hence pi = xx p. Then, by theorem 2, p = | p,

whence p = im¬ probabilities of Repeated Events.

An interesting part of the theory is that re¬ lating to repetitions of events. Consider an event whose probability is p, and let q — 1 — p. Suppose that n trials are made. The probabil¬ ity that the n trials will result in ˆ occurrences and (m — s) failures of the event, in a specified order, is psqn~s. But the number of different |m

orders is — – . Hence the probability that I s \n — s

in n trials there will be exactly j occurrences is

M

*- — psqn — *.*

I o' | n — ˆ

By considering different values

of ˆ one may find the probability that the num¬

ber of occurrences shall lie between specified limits. Thus if a coin be tossed 10 times, one finds the probabilities of the appearances of exactly four, five and six heads to be tWV xWk. xVg0?; and the probability that the number of heads will not differ from five by more than one is t%7/t or f£.*

An easy problem is the determination of that number of occurrences which is most prob¬ able. It is necessary only to compare the re¬ sults of giving to ˆ consecutive values between zero and n to discover that for the most prob¬ able case ˆ must be so chosen that the fraction

— is as nearly as possible equal to p. Hence

*in 10 throws, the most probable number of heads is 5 because X*V = \ = p. Likewise in 73 throws with one die the most probable number of throws of aces is 12, since p = £, and ff is the fraction having the denominator 73 and being most nearly equal to £.*

Of particular interest is the case in which the number of trials is very large. In this case the evaluation of the probability may be made approximately by_the use of Stirling's formula:

n = nn+\e~ n V 2tt, where e is the Napierian base. By this means many interesting re¬ sults may be derived. Thus if po denote the probability of that number of occurrences

1

which is most probable, po = , — — ; and if

V 2xnpq

Pi denote the probability that the number of occurrences shall not deviate from the most probable number by more than l, which does

not exceed a small multiple of V m, then

Pi

2 fy

V- J o

»dt 4-

g-72

where y =

l

V 2^npq

. – • . The results here obtained

V 2npq

■ – v #-s-27. > ?«ee~ '»*

are due to James Bernoulli, and are usually combined in a statement of what is called Bernoulli's Theorem. If an event has a com slant probability, p, and if q — (1 — p),.then, n trials being made, the most probable result is that in which the ratio of the number of occur¬ rences to the number of trials is most nearly equal to p. The number of trials being very great, the probability that the deviation of the number of occurrences from the most probable number shall not exceed l is

Pi

fy

0

*e-*dt +*

er~i –

*V 2nnpq **

where l = y V 2npq , and l does not exceed a small multiple of Vw.

For very many purposes in the Theory of

n

Probability the definite integral J e~l t2dt, is of

great importance, and so tables of its values for different values of y have been prepared. It may be shown, too, that a very good approxi¬ mation to the value of Pi is given by the equa¬

tion Pi

*_ 2_ n**

V n J 0

e — &dt, where / =

l 4~ \ V 2 npq

From the tabulated value of the probability

2 P'

integral, ~ I e—®dt, the following facts re-

*V * J 0*

622

PROBABILITY

garding Pi become evident. First , the deviation l being specified, the values of / and of Pi de¬ crease rapidly as n increases. In fact if the number of trials be increased sufficiently, the probability that the specified deviation will not be exceeded can be made smaller than any frac¬ tion assigned in advance. Second, if y' and hence Pi be specified, the corresponding devi¬ ation / increases rapidly as n increases, but the relative deviation, or the ratio of the deviation to the number of trials, decreases rapidly.

To illustrate these statements let it be re¬ called that, a coin being tossed 10 times, the most probable result is five heads and five tails, and the probability that the deviation of the number of heads (from five) should not exceed one was found to be fj. Consider now the cases of 10,000 and 10,000,000 trials. A careless ex¬ amination might suggest that for the same probability, ||, the corresponding deviations would be 1,000 and 1,000,000 respectively. As a matter of fact, simple computations show that they are not more than 50 and 1,500 re¬ spectively.

The very close relation which existed be¬ tween the theory of probability and the study of games of chance makes it exceedingly interest¬ ing to see

what conclusions can be drawn re¬ garding the probable results of persistent gambling. Bernoulli's theorem applies directly. Since the conclusions for all cases are similar it will be most satisfactory to consider a simple one.

Suppose, then, that A, with a capital of $1,000, repeatedly bets $10 evenly that the toss of a coin will yield head. The game seems fair, and it might appear that in the long run A would neither win nor lose. Notice, however, that A will be ruined whenever he shall have lost 100 times more than he has won. The theory shows that of all possible cases the most probable is that in which the numbers of heads and tails are equal. But the probability of

the result is

, and

it

evidently decreases

rapidly as n increases. Bernoulli's theorem shows that, if the number of trials be about 25,000, the probability that the deviation shall exceed 100 is about Hence the chance

that A will neither win nor lose the amount of his present fortune soon becomes inconsider¬ able. One may say, then, that in the long run A will either be ruined or will at least double his fortune; and the chances of these events appear to be even. As a matter of fact A is at a serious disadvantage. For many runs of results which might ultimately be favorable to him are excluded because in their beginnings he has so many losses that he must cease play for lack of money. On the other hand all runs which began favorably but ultimately become unfavorable must be counted because A does not stop as long as he wins. Hence the equality of the chances is destroyed.

Mathematical Expectation.

A person who has a possibility of securing without cost a property of any sort places upon that possibility a value which depends upon that of the property and upon the probability of his securing it. In our subject a definite valuation is placed upon such a possibility.

This valuation is called its mathematical expecta¬ tion and is defined to be the product of the value of the property and the probability of getting it. More generally, if there are several gains, di, a2, ..., on, with the respective

probabilities, pi, pz…, pn, the mathematical expectation arising from these gains is E — piOx + p2a2 + . . . – \-pnan ■ In this connection losses may be treated as negative gains. It is not denied that such an estimate involves the disregard of many elements, but unquestionably in the applications of this definition which are generally made such disregard is reasonable. To be more specific, it is extremely unlikely that a poor man would regard a possible gain of $2,000, whose proba¬ bility is £, as equivalent to the actual possession of $1,000. On the other hand such an estimate is made the basis of all insurance business and is justified by the results obtained.

The connection between mathematical ex¬ pectation and gambling is evident. If a person throws a die and is to receive $600 in case an ace appears, his expectation is $600 X £ = $100. Unquestionably $100 would be regarded as a fair entrance-fee to one who could afford to repeat the trial a number of times. In this connection the condition under which a game is said to be fair may be mentioned. Suppose that a player has to pay a stake b to enter a game in which his chance of winning a sum a is p. Then for a fair game b—pa, or his ex¬ pectation after his entry must be equal to his stake.

The derivation from the definition of mathe¬ matical expectation of certain results which seemed to him to be impossible of acceptance led Daniel Bernoulli to develop a theory of moral expectation which has received some considerable attention. Bernoulli laid down the principle that to the possessor of a fortune a the moral value, v, of' a small gain h is directly proportional to the amount of the increase, and inversely to this present fortune ; or that

v — k — (where k is a constant) ; and that if the

probability of this gain is p, the moral expecta-

pkh

tion arising from it is pv = – — . The results

a

obtained from this estimate differ widely from those obtained under the preceding one. They do, however, become less widely divergent from the latter as a increases, and in fact as a in¬ creases indefinitely the two sets of results tend to a perfect agreement.

Probabilities Derived from Experience.

Probabilities of Causes. — Hitherto the de¬ termination of the probability of an event has been based directly or indirectly upon certain governing events. A problem of another sort comes up for consideration. In the discussion of this problem and similar ones the word ■cause will be given an unusual meaning. For the present purposes the term will be used to mean a set of circumstances which might have given rise to an' event. The problem may be stated as follows :

It is known that an event E has happened, and it is known that one of several causes has given rise to the occurrence of E; it is required to determine the probability that E arose from a specified one of the causes.

A concrete example is furnished by the fol¬ lowing problem.

Ex. 7. Two bags contain respectively one white and one black ball, and one white ball and nine black ones. A ball has been drawn from one of the bags, has been observed to be white and has been replaced. What is the probability that it was drawn from the first bag? — Let p be the required probability. There are two ways of computing the probability of drawing a white ball from the first bag. In the first place it is necessary that the first bag should be selected and that, it having been selected, a white ball should be drawn. This gives $ X $ = i as a re¬ sult. In the second place it is necessary that a white ball should be drawn and that, having been drawn, it should have come from the first bag. This yields (§ • -§ + } • T^)p. Hence, equating these values one gets p = f .

Similar reasoning applied to the general case yields the following result :

Theorem 4. If an event E has occurred as a result of one or another of certain causes Ci, Ci i, . .., Cn, whose respective probabilities pre¬ vious to the occurrence of E were tt2) . . ,y rcnt and if, when any one of the causes, as Ci, is known to be operating, the probability that it will produce E is pi, th'en the probability, Pi, that E resulted from Ci is

p , _ Pi ft i

pi TTi + pi'JT2 + . . . T. priori

Apply the result to the following example :

Ex. 8. From a bag containing five balls, each of which is either white or black, four drawings have been made, the ball being re¬ placed after each

drawing. The result is three white balls and one black one. What are the probabilities that the bag contains (1) four white, one black ball, (2) three white, two black, (3) two white, three black, (4) one white, four black ? — There are four causes: (1) Four white, one black, (2) three white, two black, etc., and before the drawing they were equally probable. Hence rrl = TTi = Tr,—Tri = \. Also Pi = (iT h P = (1)3 f, p3 = (1)3 |, **4** = ()»*. Then Pi — A4 § .• Pi — tA > T 3 — x2 £ § , Pi — iA-*

When the number of causes is very great the formula of theorem 4 becomes unwieldy. It is found that a simpler formula gives an approximate result. The method used in de¬ riving this formula will be illustrated in the following example :

Ex. 9. From among an exceedingly great number, N, of balls, each of which is either black or white, n balls are drawn, each ball being replaced before the next drawing. Of these exactly s are white. What are the proba¬ bilities for the various possible numbers of white and black balls in the whole set? — Since before the drawings nothing was known as to the desired result, the a priori probabilities for all numbers of white balls from 0 to A are equal. Now the total number of white balls will be known if the ratio, r, of that number to N be known. Hence equally probable values of this ratio are all proper fractions having N as denominator. Since N is very great, r varies from 0 to 1 by very small increments. It will now be assumed that for purposes of approxi¬ mation r may be treated as varying continuously from 0 to 1. Also, if r is the correct ratio, the

probability that in n drawings .9 white and in — s) black balls would appear is

I n

- r«(l — r)» — ». If r varies continuously

n

from 0 to 1, the probability of any specified value of r is zero, but the a posteriori proba¬ bility that the ratio shall lie between r and r + dr is

pr — •

r« (1 — r)n—S(jr ˆ rs(l — r)n—sdr

I n f 1

n

*rs (1 — r)n—*dr,*

since the number of values of r (1 — r)« — « as r varies from r to r + dr is measured (see Geometri¬ cal Probability) by dr\ and the probability that r shall lie between tt and is „ |w + l*

\s \n-

Cr 2

: I rs(l — r)n- V „

■ *— sdr.*

A general theorem might be formulated em¬ bodying this result, and such a theorem jointly with theorem 4 would constitute what is called the Theorem of Bayes.

The maximum value (see Calculus, Infini¬ tesimal, Maxima and Minima) of rs(l — r)n~s

is obtained by putting r= , and is s (n

n

nn

Then the most probable cause is that in which the actual ratio of the number of white balls to the total number is the same as the corre¬ sponding ratio in the observed results.

A discussion of the value of P, which must be omitted, yields the following notable result:

Theorem 5. The probability that, under the conditions of example 9, the ratio of the number of white balls to the total number shall not

deviate from its most probable value, — , by

n

more than y

'2 s(n — 5)

n 6

is

wi:

e—vdt.

Empirical Probabilities. — The preceding theory finds application in connection with any sets of events which for the purposes of any discussion may justly be compared with the drawing of balls from a bag. In some of the important connections this theory is in fact indispensable. It will be noted that in both of the examples 8 and 9 the inquiry was in regard to the probability of the various possible num¬ bers of white and black balls. But if the ratio of the number of white balls to the total num¬ ber of balls be known, that ratio furnishes the probability that a further single drawing will produce a white ball ; and in general this proba¬ bility is what is most urgently sought. Proba¬ bilities estimated in this way from observed events are called empirical probabilities.

Two methods of deriving empirical proba¬ bilities are used, one theoretically correct, but leading to troublesome computations, the other avowedly approximate only. The latter method involves the assumption that, of the possible causes of the observed event, that which has the greatest a posteriori probability is the true one. These two methods will be applied to example 8.

Suppose that after the drawing of the balls from the bag the question be asked, < (What now is the probability of drawing a white ball?" By the second method the answer would be

obtained as follows : The most probable state of the bag is that it contains

one black and four white balls. Hence the probability of drawing a white ball is I.

The following is the other method of treat¬ ment : The probability that the bag contains four white balls and one black one and that a white one will be drawn from it is jW X i ; that it contains three white and two black and that a white one will be drawn is X § ; that it contains two white and three black and that a white one will be drawn is X f ; and that it contains one white and four black, and that a white one will be drawn is Tf X 5. Hence the probability that a white ball will be drawn*

ic 4 7 IS 73.

Where the number of causes is greater the difference between the two values is smaller, and theorem 5 shows that when the number is very great the difference can be very small indeed, as it becomes nearly certain that the

s

ratio r differs by very little from — .

n

Geometrical Probability.

In what precedes it has been assumed except in one case that the number of equally probable events governing the event E is finite. The definition may be extended to include the case in which the number of events is infinite pro¬ vided appropriate measures for the totalities of cases can be devised. Such measures are available when each case corresponds to a set of values or one or more continuous variables. Problems requiring the adoption of such measures are generally geometrical, and hence this branch of the subject is called geometrical probability. Merely an indication of its nature may be given by one or two very elementary examples.

Although the number of points on any line segment cannot be counted, yet their totality may be measured by the length of the segment. Similarly the totality of points in an area may be measured by that area; and so on. The probability that, all values being equally prob¬ able, a number less than unity is also less than one-half is j/2 because the totality of cases is measured by a unit segment, and that of the favorable cases by half a unit segment. Simi¬ larly, if all points within a circle of radius a are equally likely to be selected, the probability that one of them selected, at random, is not

distant more than ~ from the centre is

Many very interesting problems have been solved, some of them by exceedinglv ingenious methods, but this branch of the subject is quite special and cannot receive further attention here.

In what precedes some important parts of the theory have been indicated. A study of its important applications, notably those to the discussion of errors of observations and to problems of insurance, must be sought else¬ where. The growth of the importance of the subject has been remarkable, for in the begin¬ ning it was concerned with problems of gam¬ bling, and it has become the basis of all forms of insurance. It has attracted and held the deep attention of nearly all the ablest mathe¬ maticians from Cardan to Sylvester and Poin¬ care. Among its devotees have also been

Pascal, Fermat, De Moivre, Leibnitz, the Ber- noullis, D'Alembert, Euler, Lagrange, Bayes, Condorcet, Laplace, Poisson, De Morgan, Bert¬ rand and Czuber. The theory has been applied freely, and in many cases rashly, too little at¬ tention having been paid to the fact that its applications really lie in the domain of those events whose occurrences may properly be com¬ pared to the drawings of balls from a bag. Hence it is necessary to exercise considerable care in connection with the literature of the subject. See Least Square, Method of; Sta¬ tistical Method.

Bibliography. — Bertrand, (Calcul des Prob¬ ability (1889) ; De Morgan,

George H. Ling,

Dean of the Faculty of Arts and Science, University of Saskatchewan.

PROBATE, in law , legal proof of a will. In the United States, probate is granted usually by courts of special jurisdiction in the various States, but sometimes by chancery or common law courts. See Will.

PROBATE, Court of. See Court.

PROBATION, in law, a method of condi¬ tional release of persons convicted of crime, who are kept under constant surveillance and allowed their liberty during good behavior only. Usually the offender is under the super¬ vision of a probation officer. The system origi¬ nated in Massachusetts in 1878, and since then has grown rapidly in favor among penologists, as being expedient, economical, humane and tending to preserve the self-respect of trans¬ gressors. Usually only first offenders guilty of minor crimes are subject to probation. It was adopted in the United Kingdom by statute in 1908.

PROBATION AFTER DEATH, a doc¬ trine favored by some modern theologians as a means of reconciling the idea of everlasting punishment with that of God's supreme mercy and the universal redemption through Jesus Christ: the doctrine differs from the doctrine of Universalism in postulating an intermediate state of the soul after death, of which Uni¬ versalism knows nothing; and in rejecting the Universalist tenet that all will ultimately be saved. Something very like this doctrine of post mortem probation, and different from the Catholic doctrine regarding Purgatory, is taught by Clement of Alexandria (Strom. vi. 18) : <(Even if a man passes out of the flesh he must put off his passions ere he is able to enter the eternal dwelling® And he speaks of the angels (

PROBLEMATISCHE NATUREN

(Problematical Natures)• Like Freytag and Paul Heyse, Friedrich Spielhagen was chiefly concerned, in his novels, with defining the war¬ ring elements of German character and the opposing springs of German action in the period before and after the revolution of 1848. Like Freytag and Heyse, Spielhagen saw clearly the dangers that threatened the country, politically,*

religiously and morally from a reactionary aristocracy; like Heyse and unlike Freytag he saw the hope of the nation in the spread of an enlightened democracy rather than in a spiritual renascence of the ruling classes. Os¬ wald Stein, the hero of his most famous novel, (Problematische Naturen,) is the mouthpiece for Spielhagen's revolutionary social theories. He is modelled after those characters of whom Goethe wrote ((There are problematical natures that do not fit into any situation and who re¬ main always unsatisfied. For them there arises a terrible conflict that consumes life without enjoyment.ˆ For Spielhagen the conflict itself, even though it ends in defeat, is victory; the mere struggle against the domination of dead ideas is progress. For such a philosophy there could be no better historical background than the Germany of 1848 and after, and (Problema- tische Naturen> with its sequel (Durch Nacht zum LichtP although it squanders material for half a dozen novels, idealizes Teutonic mor¬ bidity, and forsakes art for tendency, tells with remarkable vividness, the story of the men and women who lived and thought and fought for freedom in Germany's day of hope. A notable description of the literature of this period is to be found in Julian Schmidt's (Geschichte der Deutschen LiteraturP

Edith J. R. Isaacs.

PROBOSCIS or NOSE MONKEY, a

rare Bornean monkey (Nasalis larvatus) , called ˆKahau® by the natives, and characterized by a greatly elongated nose, giving a peculiarly ludicrous appearance to the face. The general body-color is a sandy red; the tail is dark above, but light yellow beneath. These monkeys are arboreal in habits, and appear to frequent the neighborhood of streams and rivers, congre¬ gating in troops. They are closely allied to the apes of the genus Semnopithecus.

PRO BUS, Marcus Aurelius, Roman em¬ peror: b. Sirmium, Pannonia, 232; d. there, 282. He early attracted the notice of the Emperor Valerian, who made him tribune and soon placed him at the head of a legion. The brilliancy of his conduct in the African, Persian, Arabian and Germanic campaigns brought him into still more prominent notice. He was made governor of all the Roman provinces in Asia by the Em¬ peror Tacitus and when Florianus, who suc¬ ceeded his brother Tacitus, was murdered in 276 Probus was immediately proclaimed em¬ peror by universal consent. He drove back the Franks, Alemanni and Vandals, who had invaded Gaul; and in 277 secured the frontier wall between the Danube and the Rhine. He also freed the lands south of the Danube, Egypt and the East from devastating barbarian hordes and concluded an advantageous peace with the Persians. He gave new dignity to the senate, populated desolate tracts in Thrace and Moesia with barbarians (280) and paid par¬ ticular attention to agriculture. By 281 peace had been established almost everywhere throughout the Empire. Probus now, for the first time since his accession to the throne, found it possible to go to Rome where he cele¬ brated a triumph either in 281 or 282. < He kept his soldiers actively employed in public works. Irritated at being charged with occupations which they deemed degrading, a troop engaged in draining a swamp rose in insurrection and vol. 22 — 40

killed him. Probus ranks among the ablest of Roman emperors, combining the qualities of a good commander and wise statesman. Consult Dannhaiiser, E., (Untersuchungen zur Ge- schichte des Kaisers Probus > (1909).

PROBUS, Marcus Valerius, Roman gram¬ marian : b. Berytus, Syria, second half of the 1st century a.d. He is chiefly noted for his critical revisions of the most important Latin poets, as for instance Lucretius, Horace and Virgil. He applied to them the methods of the Alexandrian school of critics. A commentary on the Bucolics and Georgies of Virgil under his name has been preserved but is of doubtful authenticity. A

biography of Persius, written by him, remains in a commentary on the works of that poet. An extant fragment of his work (De NotisJ contains the abbreviations used for legal terms. Consult Aistermann, J., (De M. Valerio Probo Berytio) (Bonn 1910).

PROCACCINI, pro-kat-che'ne, the name of a family of artists of the 16th century who under the patronage of the Borromeo family, founded a distinct school of Italian painting at Milan, as the Caracci had done at Bo¬ logna. The members of this family were (1) Ercole Procaccini, called the Elder: b. Bo¬ logna, 1520; d. later than 1591. His works, principally at Bologna and Parma, are not re¬ markable for talent, but exhibit industry and care, although they are not free from the man¬ nerism of his contemporaries. He was in great request as a teacher and after his removal to Milan became the founder of the famous school bearing his name. (2) Camillo Procaccini, son and pupil of the former: b. Bologna, 1546; d. Milan 1626. He was the most accomplished artist of this school. He profited by studying the school of the Caracci and took Correggio and Parmegiano for his models. His imitation of them is obvious from his work but the re¬ sult is equally successful. His works are dis¬ tinguished for spirited composition, exquisite coloring and devotional elevation, but are man¬ nered. Among those at Milan are a (Madonna and Child> in the church of Santa Maria del Carmine and an (Adoration of the MagP in the Brera. Many other churches in Milan contain works of his, as do also galleries in Bologna, Dresden, Leipzig, Munich, Stuttgart, Vienna, Madrid. (3) Giulio Cesare Procaccini, brother of Camillo: b. Bologna, 1548; d. Milan, 1626. He likewise strove to equal the school of the Caracci and took for his model Correg¬ gio, whom he imitated with so much success that several of his pictures, though far from reaching the grace and harmony of that great master, have often been ascribed to him. This has been the case especially with cabinet pic¬ tures of the Fall. His works, all of a religious nature, are to be met with in many churches of Milan especially in the cathedral. In the An- nunziata in Genoa is his (Last Supper, > by some considered his masterpiece. Others of his works are in galleries in Florence, Genoa, Milan, Parma, Turin, Madrid, Edinburgh, Brus¬ sels, Berlin, Dresden, Munich, Petrograd, Stutt¬ gart, Vienna. (4) Carlo Antonio Procaccini, youngest brother of the two preceding: b. Bo¬ logna, about 1555, d. about 1605. He, too. was a pupil of his father, but the least gifted of the three brothers. He painted landscapes, fruits and flowers. Much of his work went to Spain,

though some may be found in private collec¬ tions in Milan. (5) Ercole

Procaccini, called the younger, son of Carlo Antonio : b. Milan, 1596; d. there, 1676. He was a pupil of his uncle Giulio Cesare whom he succeeded as head of the Procaccini School. He painted historical subjects and still life, excelling especially in the latter. Religious subjects by him can be seen in the church of Saint Maria Maggiore at Ber¬ gamo in the Brera, Milan, etc. Consult Blanc, C., (Ecole Bolonaise) (Paris 1874).

PROCEDURE, in law, the methods of ini¬ tiating and maintaining litigation, usually em¬ bracing practice, pleading, evidence and the rules governing them. The term is sometimes restricted in its meaning to include only prac¬ tice. Three widely differing systems of proce¬ dure were early developed in England by the courts of common law, courts of admiralty and courts of equity. While changed by statute and otherwise from the early forms, these systems are preserved to-day generally throughout the British Empire and the United States.

As developed in the common law courts, procedure differed radically from that in the courts of admiralty and courts of equity, being distinguished by extreme formality; and as a consequence the substantive rights of the liti¬ gants were often entirely disregarded by the rigid manner in which the rules were applied. Dating back to an early period, civil actions in common law courts were commenced by the issuance of the original writ at the instance of the plaintiff, commanding the sheriff to sum¬ mon the defendant to appear before the court. This writ gave jurisdiction to the court of the subject matter of the action and its service gave jurisdiction over the defendant. The court could compel the attendance of the defendant at any judicial proceeding by issuance of its process known as a judicial writ. The plaintiff's claim was set forth in a prescribed form in the decla¬ ration, stating the cause of action in one or more counts and ending with a prayer for re¬ lief. (See Complaint; Declaration). Then fol¬ lowed the plea or answer by the defendant, replication by the plaintiff and sometimes other pleadings, until an issue was reached. (See Answer; Plea; Pleading; Replication). The court then directed the attendance of the par¬ ties and witnesses at the trial, which was a for¬ mal examination of the material facts, usually before a jury. (See Jury; Trial). After ver¬ dict various remedies were provided for the unsuccessful party. For instance, he could move in arrest of judgment, for a new trial, for a writ summoning a new jury on the ground of misconduct, etc. After judgment the de¬ feated party had a remedy by writ of error, which was acted unon by a higher court. This writ stated the cause of complaint in a general manner and the assignments of error pointed out the particular errors of law alleged to have been committed by the trial court. On denial of these specifications by the opposite party, an issue was raised, which resulted in an affirm¬ ance or reversal of the judgment of the lower court. (See Error; Writ). After final judg¬ ment the writ of execution followed, by which the judgment was

enforced. This was usually effected by seizure of the person or property of the defendant.

Procedure in civil actions in the United

States to-day is to a large extent founded on the common law, modified by statutes or by the adoption of codes. Each State has its own distinct system and this is true also of the Federal courts. In both Federal and State courts, civil actions generally are commenced by the service of process called summons upon the defendant. This writ is in some States served by the sheriff or his deputy, but in other States it may be served by the attorney or agent of the plaintiff. In the usual administration of justice to-day, judicial process is indispensable. Until notice is given, the court has acquired no jurisdiction whatever to proceed to judgment. Even in proceedings in rem, notice, eiiher act¬ ual or constructive, is required in order that the judgment may be valid. (See Process; Sum¬ mons). Subsequently to the service of the sum¬ mons a declaration or complaint, stating the cause of action, is served on the defendant by the counsel for the plaintiff, after which may follow the plea, answer, demurrer and various other pleadings. A general demurrer by the defendant denies that a cause of action has been stated and thus a question of law arises to be decided by the court. If the defendant's demurrer is sustained, judgment is rendered for the defendant. In some States, if the de¬ fendant's demurrer is overruled, he is allowed to answer and the action proceeds. In some jurisdictions a motion to strike out immaterial matter has supplanted the demurrer as a remedy for formal defects. (See Demurrer). If the defendant fails to answer, judgment may be taken against him by default. By code in vari¬ ous States, including New York (1848), among other reforms, distinctions between pleading at law and equity have been abolished and liberal provisions made for amendments to pleadings. By statute in other States various similar re¬ forms have been accomplished. In the Federal courts of the United States in actions at law, the procedure of the State in which the court is located is followed, but in equity proceed¬ ings the procedure of the State is ignored and made uniform throughout the United States by court rules. A change is foreshadowed, however, in the procedure in the Federal courts in actions at law by the majority report of the Senate Committee on Judiciary (1917), favoring a bill authorizing the Supreme Court to adopt rules regulating the procedure and making it uniform throughout the United States. This bill has also been indorsed by the American Bar Association. Pressure of more important legislation due to the war, however, has caused a postponement of action on the bill. The term <(writ of execution^ in England at the present day includes the following : elegit, sequestration, capias, fieri facias and attachment. In the United States not all these forms are in use in every jurisdiction, the subject being one that is regulated to a large extent by statute. (See Execution). The writ of error has been abolished in many

jurisdictions in the United States and appeal substituted therefor. See Appeal.

Criminal procedure in England to-day is founded largely on the old system at common law in civil cases, which was superseded by the Judicature Acts, dating from 1873. The arrest of the defendant, usually by warrant, generally follows an indictment by a grand jury in the

case of the graver offenses, felony or treason. In the case of the lesser offenses a criminal information is filed by the attorney-general or, in his absence, by the solicitor-general. After an indictment has been found by the grand jury (twelve of whom must concur), the de¬ fendant on pleading not guilty is tried by 12 jurors in open court. Until 1907 a verdict in a criminal case of guilt or innocence was final, no appeal existing on the facts. However, a writ of error would lie for mistakes in proce¬ dure. By the Criminal Appeal Act of 1907, the right of appeal was given. The law of pro¬ cedure in criminal cases in Ireland largely fol¬ lows that of England, while that of Scotland differs to some extent, being regulated by stat¬ ute passed in 1887. The common law method of trying criminals by a jury of 12 has been adopted in modern times by some European countries. The English system of criminal pro¬ cedure, almost in its entirety, has been adopted by many of the British colonies. In the United States, criminal procedure is governed largely by statute or by code, but in a general way the procedure in use in England is followed. See Criminal Law; Grand Jury; Indictment; Information.

Procedure in admiralty closely follows that of the civil law, and is exceedingly simple, in marked contrast to the formalities of the com¬ mon law. An admiralty suit is commenced by the filing of a libel, or complaint, setting forth the nature of the action, after which process is served by a marshal or deputy. Process, in suits in personam, may be in the form of a monition in the nature of a summons to appear and answer the suit. In proceedings in rent the marshal seizes the vessel or other thing in controversy. The answer in admiralty courts corresponds to the plea of common law, and exceptions are equivalent to pleas in abatement and special pleas in bar. A monition need not necessarily be served personally on the re¬ spondent. The court seeks at all times to ad¬ judicate the controversy on its merits, to avoid delays, surprises and unnecessary costs. The rules of practice in courts of admiralty in the United States are substantially the same as those in England, but they are subject to change at any time when found necessary. Unlike the Federal courts in actions at

law, courts of ad¬ miralty do not conform to the practice of the State courts. Admiralty courts permit the ad¬ judication of several causes in one proceeding if adapted to the ends of justice and if no in¬ convenience will result therefrom, even extend¬ ing this t.o libels in rem and in personam and cases in contract and tort ; but causes entirely unrelated may not be joined. The admiralty courts, in addition to civil jurisdiction, have also limited criminal jurisdiction, but when act¬ ing in criminal cases the procedure in some particulars conforms to that of the common law courts, including trial by jury. Appeals from final decrees in the United States are usu¬ ally taken to the Circuit Court of Appeals, but in certain enumerated cases to the Supreme Court. By certiorari, in cases of great im¬ portance, the Supreme Court may review the judgment of the Circuit Court of Appeals. See Admiralty.

Equity procedure, like that of admiralty, lacks much of the formality of the common law. Suit is commenced by the complainant fil¬

ing a bill, after which, in some jurisdictions in the United States, service of process, called the subpoena, is made on the respondent, who then may answer. On his failure to do so, the com¬ plainant is entitled to a decree in his favor. Formerly he could compel the respondent to answer by attachment. Replication by the com¬ plainant follows the answer of the respondent. Beyond this equity pleadings do not go, but amendments are allowed in lieu of further pleading. Demurrers and pleas are generally used in equity the same as at common law. Demurrers test the legal sufficiency of a plead¬ ing of the opposite party. Liberal provisions are usually made in equity practice for the amendment of demurrers. A plea in effect is a special answer, setting up some fact or facts as a caus£ for dismissing, delaying, or barring the suit, or why some part of the bill should not be answered. Pleas and demurrers are to¬ day viewed with some disfavor, as being dila¬ tory and not going to the merits. Recently the Federal courts in the United States abolished pleas and demurrers, and substituted therefor motions and answers. In the absence of stat¬ utory modification the equity system does not provide for the trial of issues before a jury duly impaneled in that court, in which it dif¬ fers radically from the common law. How¬ ever, when the necessity of a jury arises, the equity court sends the issue to a court of law, where it is tried before a jury according to legal forms. The verdict thus rendered is re¬ turned to the court of equity. In the Federal courts usually and sometimes in other courts the judges who preside in the equity cases pre¬ side also over the trials at law. Issues are submitted to a jury at common law when mate¬ rial facts which are disputed seem doubtful to the judge of the equity court. Formerly a court of equity could not rehear a cause or reverse a decree after enrolment of the final decree, but to-day a court of equity may re¬ view and reverse its own decree on bill of re¬ view. This must be brought by a party to the original suit or by

some party in privity with him. Appeal also may be taken from a final decree. Appellate jurisdiction must be invoked by appeal, and not by a bill of review. The subpoena in chancery suits to summon a re¬ spondent to answer was abolished in England in 1852, and service of a copy of the bill substi¬ tuted, which practice is also followed by some jurisdictions in the United States. As stated above, by code in some of the States the dis¬ tinctions between pleading in actions at com¬ mon law and equity have been abolished. See Code; Equity; Subpcena.

Edward F. Donovan.

PROCESS, (1) in anatomy, an enlarge¬ ment, such as the zygomatic process of the tem¬ poral bone, the vermiform process of the cere¬ bellum, etc. ; (2) in botany, any extension of the surface; a protrusion whether natural or mon¬ strous; (3) in law, a term applied to the whole course of proceedings in a cause, real or per¬ sonal, civil or criminal, from the original writ to the end of the suit; properly, the summons citing the party affected to appear in court at the return of the original writ. This was sometimes called original process, being founded upon the original writ; and also to distinguish it from mesne or intermediate proc¬ ess, which issues, pending the suit, upon some

collateral interlocutory matter; as to summon witnesses, and the like; (4) the term generally applied to the various mechanical and chemical processes by means of which illustrations are reproduced in printing.

PROCESS OF LAW. See Due Process of Law.

PROCESSION, Religious, a solemn march of the clergy and people, attended with reli¬ gious ceremonies, prayers, singing, etc., in the churches or streets of a town for the purpose of returning thanks for some divine blessing, petitioning for assistance in some great calam¬ ity, celebrating the consecration or visitation of church dignitaries, or drawing attention to some great doctrine of the Church. The prac¬ tice of holding such processions is usually said to have been introduced into the Christian Church in the reign of Constantine. The most celebrated processions which now take place in the Roman Catholic Church are those of the eucharist on Corpus Christi day, and during the week in which it occurs. They owe their origin to John xxii. The. processions in honor of Saint Mark and those on Candlemas and Palm Sunday are said to have been instituted by Gregory the Great. Instances of celebrations of this nature are to be found among

the Jews in the Old Testament, and as a part of the sym¬ bolical worship of nature they were in use among the ancient heathens ; thus they formed solemn processions about the fields, which had been sowed, and sprinkled them with holy water to increase their fertility, and to defend them from injuries. The festivals in honor of Bacchus, Ceres, Diana, and other divinities, among the Greeks and Romans, were solem¬ nized with processions, in which the images of the gods were borne about; and similar rites are still found among most heathens. Among the Buddhists these ceremonials are especially imposing. The procession which accompanies the Emperor of China when he goes to offer sacrifices to an idol in some great pagoda is one of the most gorgeous description. In a more restricted sense the term is applied to the solemn entrance of the clergy and their as¬ sistants (choir, etc.) into the church proper for the purpose of holding a religious service, or of their departure to the sacristy after the serv¬ ice. Consult Eveillon, J., (De Processionibus Ecclesiastic^ (Paris 1641) ; Gretser, J., (De Catholicse Ecclesise Sacris Processionibus) (Ingolstadt 1600) ; Vatar, D.,

PROCESSION OF THE HOLY GHOST, in theology the relation in the Trinity between the Father and the Holy Ghost. The Western Churches believe in what is called the <(double procession® as expressed in the Nicene Creed, ((Who proceedeth from the Father and the Son.® The Greek Church maintains the <(single procession® and omits the words <(and the Son.® See Filioque.

PROCESSIONAL CROSSES. See

Crosses and Crucifixes.

PROCIDA, pro'che-da, John of, an Italian physician and nobleman : b. Salerno, about 1210; d. Rome, 1298. The tradition which makes him the prime mover in the conspiracy alleged to have brought on the Sicilian Vespers

(q.v.) has been discredited by careful investi¬ gators, but is the subject of a tragedy by James Sheridan Knowles (q.v.) (1840).

PROCIDA (ancient Prochyta), (1) an island in Italy, on the west side of the Gulf of Naples and about 12 miles southwest of Naples, lying nearly midway between the island of Ischia and the coast of the province of Naples. It is about three miles long, northeast to southwest, and little more than one mile broad. The principal town on the island is (2) Procida, or Castello di Procida, which stands on the southeast coast, 12 miles west of Naples. It is fortified, has a good harbor, and a considerable trade. There is a palace on the island which was occasionally used as a resi¬ dence by the

former kings of Naples. On festivals the women assume the Greek costume, consisting of a red upper garment with gold embroidery. It is from this island that John of Procida (q.v.), the reputed originator of the massacre known by the name of the ((Sicilian Vespers,® takes his name. Pop. about 15,000.

PROCLAMATION OF EMANCIPA¬ TION. See Emancipation Proclamation.

PROCLAMATIONS, Executive, docu¬ ments issued by an executive in accordance with the powers conferred or in fulfillment of the duties imposed on him by the constitution or expressly by statute, or even in regard to mat¬ ters toward which it becomes desirable or neces¬ sary to draw the attention of the citizens. The issuance of such proclamations is not regulated by any general statute enacted by Congress, and for some, such as the Thanksgiving proclama¬ tion, no provision whatever has been made. In accordance with the specific authority con¬ ferred on him by the legislative branch of the government the executive may act with special authority in the sale of public lands, establish¬ ing forest reserves, applying special provisions of the tariff act, regulating the treatment and status of alien enemies, the jurisdiction of foreign consuls over disputes among seamen, proclaiming a state of war, and extending pro¬ visions of the copyright or patent laws to citi¬ zens of another country, etc. In time of war the executive's powers are vastly increased, in¬ cluding regulation of railroads and other public carriers, food and fuel supplies, press censor¬ ship, establishing blocades, granting pardon to deserters, internment of persons guilty of sediti¬ ous utterances or of acts tending to impede the prosecution of the war, and not otherwise amenable to punishment or restraint. Presi¬ dent Lincoln covered the greatest range in his proclamations, in several cases going to the ex¬ tent of suspending the writ of habeas corpus in various places. The Supreme Court, how¬ ever, condemned his suspension of the writ in localities outside the theatre of war. (See Executive; President). Consult Fairlie, J. A., (The National Administration of the United States) (New York 1905).

PROCLU.S, philosopher of the Neo-Platonic school: b. Constantinople, 412; d. Athens, 485. He is usually called Diadocleus and sometimes the Lycian, because his parents came from Xanthus in Lycia. He received his first educa¬ tion at Alexandria from the famous Peripatetic Olympiodorus the elder, and completed it at Athens under Syrianus, who ultimately ap¬ pointed him his successor, and under Asclepi-

genia, who had learned from her father Plutar- chus the doctrines of the Orphic and Chaldaic mysteries and the united theurgic sciences. As a teacher at Athens he was very successful and not only endeavored to unite into a single whole all the philosophical schemes handed down from former ages, but made it his aim to embrace all religions by becoming filled with their spirit. Following out this maxim he com¬ posed hymns in honor of the pagan deities, de¬ fended and interpreted popular myths, and even conformed to the rites connected with their worship, and considered himself as under their protection. It was probably in consequence of this adherence to the ancient religion of Greece, in opposition to the decrees of the Christian emperors, that Proclus was compelled to with¬ draw from Athens. He traveled for a year in Asia to study the various religions of its inhabitants. All of them he held in reverence. On his return to Athens, where he remained till his death, he re-opened his school, but now performed his religious services in secret. By his pure morals and religious views he gave his scholars the idea that he had intimate inter¬ course with gods and demons, and could work miracles. He claims to resemble Plato in sup¬ porting his doctrines by an unbroken chain of reasoning, a method that had been altogether neglected by the previous Neo-Platonists. But these pretensions are not borne out by his works. A life of Proclus was written by Marinus, one of his scholars, and his successor in the school at Athens. His extant works in¬ clude a (Sketch of Astronomy, 5 in which he gave a short view of the systems of Hipparchus, Aristarchus and Ptolemy; (The Theology of Plato5 ; principles of Theology5 ; Principles of Philosophy5 ; (Commentary on the Works and Days of Hesiod5 ; (Life of Homer,5 etc. Many of his works have been collected and edited by V. Cousin in Procli Opera5 (6 vols., Paris 1820-27) and in Procli Opera Inedita5 (Paris 1864). There are also various other editions of some of his writings by J. F. Bois- sonade (Leipzig 1820) ; G. F. Creuzer (3 vols., Frankfort o. M. 1820-22) ; G. Friedlein (Leipzig 1873), and C. E. C. Schneider (1847). Quite a number of his works have been trans¬ lated into English. The oldest of these translations is called

klus5 (Rostock 1905); Diehl, Ernst, Per Timaiostext des Proklos5 (in (Rheinisches Museum fur Philologie,5 n. s., Vol. LVIII, pp. 246-269, Frankfort o. M. 1903) ; Lindsay, J., Proclus as Constructive Philosopher5 (in Pibbert Journal,5 Vol. CHI, pp. 279-288, Bos¬ ton 1917) ; Marinus, N., (Vita Procli5 (ed. by. J. F. Boissonade, Leipzig 1814).

PROCONSUL and PROPRIETOR, func¬ tionary of the ancient Roman Empire, to whom the administration of the provinces was en¬ trusted; proconsul or propraetor being one whose term of office had expired as praetor or consul. The first consul who received the title of proconsul, was Q. Pubilius Philo in 327 b.c. This was done in order that he might conclude a campaign successfully begun in southern Italy. It was afterward provided

by a law of C. Sempronius Gracchus that, at the consular and praetorial elections the senate should dis¬ tribute the provinces into two consular and six praetorial provinces, for which the consuls and praetors should cast lots or divide them among themselves by agreement, a few days after their entrance upon their term of office, on the ex¬ piration of which they took the provinces al¬ lotted them. But in 55 b.c. it was provided by a decree of the senate that no consul or praetor should enter on the government of a province till five years after his surrender of office. As the number of provinces increased, proconsuls were appointed who had not previously held the office of consul. The duties of proconsuls or propraetors were the administration of justice, the supervision of provincial affairs, and the command of the troops. They were assisted in their duties by. quaestors and legates. Within 30 days after his return to Rome the provincial governor was bound to make a report of his government. The Lex Julia in 61 b.c. further required that a copy of his report (rationes) should be deposited in the two chief cities of his province. He was liable to impeachment for extortion, peculation or embezzlement of the public money or for abuses in regard to the army. No withstanding these precautions the provinces were subjected to various oppressions and exactions. From the time of Augustus the government of some provinces was taken out of the hands of the proconsuls and propraetors, and entrusted to legates called procurators, or stewards of the Imperial household, who gov¬ erned under the immediate direction of the emperor: See Province; Procurator.

PROCOPIUS, pro-ko'pi-us, Byzantine his¬ torian : b. Caesarea, Palestine, about 500 a.d. ; d. Constantinople, about 565 a.d. After practising as a rhetorician and advocate at Constantinople for a short time he brought himself so much into public notice that in 527 Belisarius made him his legal adviser and private secretary. He found abundant opportunity for seeking the making of history at first hand, for he accom¬ panied Belisarius and counseled him on his most important campaigns. He was with him in Italy, Africa and Persia. About 542 he re¬ turned to Constantinople. The emperor Justin¬ ian made him senator and in 562 praefect of the city. He is the historian in chief to the reign of Justinian, to which his three most important works were devoted. These are the (History of the Wars5 (Historiae) in eight books, the

first two relating to the Persian War, the two following to the war with Vandals, and the rest to the Gothic War; the Secret History0 (Anecdota), a secret and more personal history supplementing the more formal (

*History5; the * History of the Edifices, built or repaired by Justinian> (Ctismata). Doubt has been thrown on the connection of Procopius with the Anec¬ dotes. 5 They are the repository of the scandals of Justinian's reign, filled with accusations, often of a ridiculous and improbable nature against Justinian and Theodora. On the other hand the histories are of great value, character¬ ized by accurate personal observation and truth¬ ful presentation of conditions. The best edi¬ tion of the complete works is that contained in Dindorf's (Corpus Scriptorum Historian Byzan- tinae5 (Bonn 1833-38). A more recent edition is that published by J. Haury, Arocopii Caesar- iensis Opera Omnia5 (3 vols., Leipzig 1905-13). The publication of the original Greek text with an English translation by H. B. Dewig has been begun as part of the Loeb Classical Library under the title Arocopius5 (Vol. I, New York 1914; Vol. II, New York 1916). Consult Dahn, F., Arokopius von Caesarea5 (Berlin 1865) ; Haury, J., Arocopiana5 (Augsburg 1891) ; (Zur Beurteilung des Geschichtschreibers Pro- kopius von Caesarea5 (Munich 1896-97).*

PROCOPIUS, Andrew, Hussite chief: b. about 1380; d. Bohmisch-Brod, 30 May 1434. He was distinguished as Procopius the Great, or the Bald, from as contemporary at times associated with him known as Procopius the Lesser or Prokupek. He received a good edu¬ cation, traveled extensively and upon his return entered the priesthood, receiving the tonsure from which was derived his nickname, the Bald. He fought with the Hussites under Ziska, and in 1425 after Ziska's death was chosen commander of the Taborites, the main division of the Hussites, and quickly made him¬ self master of a larger part of Bohemia. De¬ feating the German troops at Aussig in June 1426, he burned that town and soon after drove the Austrians across the Danube. Burning and laying waste large portions of Austria he led his bands toward Silesia; defeated a Ger¬ man army near Mies (1427) ; and in the next two years ravaged Silesa, Hungary and Saxony. The bands under the leadership of Procopius had by this time made the name of Hussites a terror throughout the provinces through which they pursued the armies of the Emperor Sigismund. Strife, however, ensued between the extremists, and the more moderate division known as the Calixtines, who in 1433 accepted the terms offered by the Roman Catholics. In a factional fight between the two parties Pro¬ copius was killed. In the same battle perished Procopius the Lesser, leader of a section of the Hussites called the Orphans, which had co-operated with the Taborites since 1427. Consult Sand, Georges, Arocope le Grand5 (in Auvres illustrees,5 Vol. I, Paris 1855) ; Wolf, J. H., (Leben der beiden Prokope5 (Prague

1784).

PROCRUSTES, pro-krus'tez, Attic robber, surnamed Polypemon of

Damastes. He pos¬ sessed a bed upon which he forced his guests to sleep, and if they were too tall to fit it he had their limbs chopped off, whereas, were they too short he had them stretched. The monster

was outwitted by Theseus, who made him suffer of the same bed and slew him at Erineiis. The <(bed of Procrustes55 has thus become a proverbial expression. Another version rep¬ resents him as having two beds, one short and one long, the first for tall visitors and the second for short ones. Consult Plutarch, Aives5 (in (The Loeb Classical Library,5 Vol. I, London and New York 1914).

PROCTER, prok'ter, Adelaide Anne, Eng¬ lish poet, daughter of Bryan Waller Procter (q.v.) : b. London, 30 Oct. 1825; d. there, 3 Feb. 1864. Her first verses were published in the (Book of Beauty5 in 1843. In 1853 she began to contribute to Household Words under the pseudonym <(Mary Berwick,55 and attracted much attention, gaining in particular the favor¬ able notice of Dickens, who did much to aid the young poet. While her work is not great it is marked by deep feeling and tenderness. Her poems with few exceptions first appeared in either Household Words or All the Year Round. She became a Roman Catholic in 1851. In 1859 she was appointed by the Na¬ tional Association for the Promotion of Social Science a member of a committee to consider new ways of providing employment for women, having always been interested in social ques¬ tions affecting women. Her collected poems were published under the title Aegends and Lyrics5 (1858), the 10th edition of which (1866) contains a biographical sketch of the author by Charles Dickens. Many of her poems have received a musical setting, the most famous being (The Lost Chord,5 which was set to music by Sir Arthur Sullivan.

PROCTER, Bryan Waller, «Barry Corn¬ wall,55 English poet: b. Leeds, 21 Nov. 1787 ; d. London, 5 Oct. 1874. He was educated at Harrow, subsequently studied law in London, and in 1831 was called to the bar of Gray's Inn. For many years he held the office of commis¬ sioner of lunacy, resigning in 1861. He had a particularly amiable disposition and a wide ac¬ quaintance among literary men of his day, being especially friendly with Leigh Hunt and Charles Lamb. His first appearance in litera¬ ture was in 1819, when he published (Dramatic Scenes and Other Peoms,5 under the pseudonym of (

PROCTER, John Robert, American civil service reformer: b. Mason County, Ky., 16

PROCTOR

March 1844; d. Washington, D. C., 12 Dec. 1903. He was educated at the University of Pennsylvania, but left there to join the Con¬ federate army in 1863 and served until the end of the war. In 1873 he became assistant in the Kentucky geological survey, and in 1880 State geologist. In this office he was brought into contact with the spoils system, to which his opposition was so uncompromising that he finally lost his position in 1893. In the same year, however, he was appointed president of the Civil Service Commission, a post which he held till his death. His criticism of the spoils system was based not only on its evil moral and social effects, but also on its absurd¬ ity as a method of conducting business and this view he constantly presented most effectively. His work as president of the commission was the means of increasing the effectiveness of the civil service, and of gaining for it recogni¬ tion in political life. He served as a member of the Jury of Awards at the Chicago World's Fair and was a frequent contributor to maga¬ zines and journals on geologic, economic and political subjects.

PROCTOR, prok'tor, Alexander Phimister,

American sculptor: b. Ontario, Canada, 27 Sept. 1862. Soon after his birth his parents moved to Colorado where he was educated, studying later in New York art schools. He was the pupil of Puech and Ingalbert at Paris, and was awarded the Rinehart Paris scholar¬ ship. He has been a frequent exhibitor at expositions and has been awarded the follow¬ ing medals : Designers Medal, Chicago Ex¬ position, 1893; Gold Medal, Paris 1900; Gold Medal, Saint Louis 1904; Gold Medal, Panama Pacific Exposition 1915. In 1904 he was made a member of the National Academy. Most of his works are representations of wild animals of which he has made a very close study by spending since early youth much time in hunt¬ ing on the western plains and mountains. As a producing sculptor and as a critic of sculpture his reputation is high and he was appointed a member of the sculpture jury at the Paris Ex¬ position of 1900 and at the Pan-American Ex¬ position of 1901 at Buffalo, and a member of the New York Art Commission in 1903. Among his works were the quadriga which he furnished for the United States pavilion at the Paris Ex¬ position of 1900 and which was much admired. Others of his sculptures may be seen in the parks of New York, Denver and Pittsburgh. The lions on the McKinley Monument in Buf¬ falo were designed by him. Other works by him are in the Saint Louis Art Gallery and in the New York Metropolitan Museum of Art. Consult Nelson, W. H. de B., (Phimister Proctor: Canadian Sculptor' (in Canadian Magazine, Vol. XLIV, p. 495, Toronto, 1915) ; Taft, L., (A. Phimister Proctor' (in Brush and Pencil, Vol. II, p. 241, Chicago 1898).

PROCTOR, Edna Dean, American poet: b. Henniker, N. H., 18 Sept. 1829. She was educated in Concord, has traveled extensively in Europe, and has

achieved a considerable reputation as a poet. Her most notable poems are (Heroes' and (Shenandoah.' Among her works are (Poems) (1866); (Poems' (Bos¬ ton 1890); (The Song of the Ancient Peonle) (Boston 1893) ; (Mountain Maid and Other Poems of New Hampshire' (Boston 1900) ;

(Songs of America and Other Poems' (Boston 1905) ; (The Glory of Toil and Other Poems' (Boston 1916). Her only prose work, (A Rus¬ sian Journey' was first published in 1872, but revised editions of it have been brought out in 1890 and 1899. She has also contributed to various magazines.

PROCTOR, Redfield, American politician: b. Proctorsville, Vt., 1 June 1831; d. Washing¬ ton, D. C., 4 March 1908. He was graduated from Dartmouth in 1851, and from the Albany Law School in 1860. He practised law a short time and in 1861 entered the Federal army as lieutenant; was soon promoted major and was mustered out as colonel. After a few years' law practice he devoted himself to business, acquir¬ ing large interests in marble quarries in Ver¬ mont. He began oolitical life as a Republican member of the lower house of the Vermont legislature, being first elected to that body in 1867, and again in 1868 and 1888 ; he was a member and president pro tern, of the State senate in 1874 and 1875 ; in 1876 he was elected lieutenant-governor, and in 1878 governor of the State. During his administration he brought about several reforms in the State finances and system of taxation. In 1888 he was chairman of the Vermont delegation to the Republican National Convention, and again in 1896. In 1889 he was appointed Secretary of War by President Harrison, and gave especial attention to the improvement of coast and border de¬ fense. In 1891 he resigned his secretaryship to accept the appointment to the United States Senate for the unexpired term of Senator Ed¬ munds, resigned, and in 1892 was elected to the Senate for the six years' term. In 1898 and 1904 he was re-elected. In 1898 he visited Cuba to investigate conditions in the island, and on his return delivered a speech in the Senate in regard to the reconcentrados, which aroused the attention of the whole country. The facts pre¬ sented by him were also influential in determin¬ ing the policy of intervention in Cuba by the United States. Consult Proctor, W. L., and Mrs. W. L. Proctor, (A Genealogy of De¬ scendants of Robert Proctor of Concord and Chelmsford, Mass.' (Ogdensburg, N. Y., 1898) ; (Redfield Proctor, Memorial Addresses' (in Senate Document, No. 764, 60th Congress, 2d Session, Washington 1909).

PROCTOR, Richard Anthony, English astronomer: b. Chelsea, 23 March 1837; d. New York, 12 Sept. 1888. He was educated at King's College, London and Cambridge, and began to read for the bar, but in 1863 took up with enthusiasm the study of astronomy and mathematics. In 1866 he

was elected a Fellow of the Royal Astronomical Society, and in 1872 one of its honorary secretaries and editor of its publications. He resigned these positions in 1873 and made a lecturing tour in this coun¬ try. As a lecturer he became at once popular, having in eminent degree the gift of lucid ex¬ position. A second tour to the United States in 1879 and a tour to Australia were followed by a second marriage and his settling at Saint Joseph, Mo., in 1881. In the same year he founded at London Knowledge, a scientific weekly, which in 1885, became a monthly. In 1887 he moved to Florida. He did much to popularize astronomy. His works include (Saturn and His System' (1865) ; (Handbook

of the Stars) (1866) ; (Half-hours with the Telescope) (1868) ; (Other Worlds Than Ours) (1870); (Light Science for Leisure Hours5 (1871); (The Sun) (1871); (Elementary Astronomy5 (1871) ; (The Orbs Around Us) (1872) ; (Essays in Astronomy5 (1872); (The .Expanse of Heaven) (1873) ; (The Borderland of Science) (1873) ; (The Moon) (1873); (The Transit of Venus5 (1874); (Our Place among Infinities5 (1875) ; (Myths and Marvels of Astronomy0 (1877) ; (The Universe of Stars5 (1878) ; (Flowers of the Sky0 (1879) ; (The Poetry of Astronomy 5 (1880) ; (Easy Star Lessons) (1882) ; (Familiar Science Studies5 (1882); (Mysteries of Time and Space5 (1883) ; (The Great Pyramid5 (1883) ; (The Universe of Suns5 (1884) ; {The Seasons5 (1885) ; (How to Play Whist5 (1885); (Other Suns Than Ours5 (1887); (Half Hours with the Stars5 (1887).

PROCTOR (Lat., procurator) , one who acts on another's behalf. It has in England these special significations: (1) In the convo¬ cations of the two ecclesastical provinces, Can¬ terbury and York, respectively, the official who represents the lower clergy and the capitular bodies of cathedral and collegiate churches; (2) a person who manages another cause in an ecclesiastical court or in a court of admiralty; owing to changes in the administration of law, made in 1873 and 1875, the business formerly confined to proctors may now be conducted by solicitors; (3) in the universities of Oxford and Cambridge, two proctors in each are charged with the duty of preserving the peace and repressing disorder among the students; to this end they are empowered to inflict sum¬ mary punishment and are assisted by a num¬ ber of pro-proctors and special constables. The rights and duties of the proctors are more ex¬ tensive at Oxford than at Cambridge, inasmuch as at Oxford they are ex officio members of all important committees and supervise all business transactions of the University. Both at Cam¬ bridge and at Oxford they are elected by the officials of the several colleges.

PROCTOR, Vt., village in the township of the same name, Rutland County,

five miles northwest of Rutland on the Rutland Railroad. Some of the largest marble quarries in the world are located in the district and there are marble finishing works. Pop. township, 2,871 ; village, 2,756.

PROCURATOR, among the ancient Ro¬ mans, an agent, steward, or overseer of an es¬ tate; at a later period the title of a provincial officer (see Province and Proconsul), who managed the revenue. In some of the small provinces, or in a part of a large province, the procurator discharged the office of a governor, and had the power of punishing capitally, a-s was the case with Pontius Pilate in Judrea, which was attached to the province of Syria. Procurator, in monasteries, is the conventual to whom is entrusted the care of the temporal concerns. Procurator di San Marco was the title of the chief officers or senators in the Venetian republic. Besides the nine actual procuratori, from among whom the doge was chosen, there were also many titular pro¬ curators, who paid a great sum for his title, which was much coveted by the Venetian patri¬ cians on account of the rank it conferred.

PROFERT

PROCURATOR-FISCAL, the public pros¬ ecutor in criminal cases which come up in Scot¬ land before the sheriff, magistrates, or justices of the peace belonging to his district. He also performs duties corresponding to those usually performed by coroners. Only when the public interest is concerned must he originate a prose¬ cution ; and when complaint is made by a per¬ son in a case in which the private interest of the complainant is rather at stake than the public interest, the procurator-fiscal must merely give his concurrence to the prosecution, and not institute the proceedings. He may, however, act as the complainant's agent; but even when he does so, if he only gives his con¬ currence, he is not liable to an action for mali¬ cious prosecution.

PRODICUS, Greek sophist; he came from Julis in the island of Ceos and was a contem¬ porary of Socrates. He is known only as the author of an apologue of (Hercules and the Two Paths,5 quoted by Xenophon, in which the young hero chooses the hard path of duty and turns his back on the flowery but dangerous path of pleasure. The Greek text of this work is to be found in (Epicteti Euchridion5 (pp. 99- 107, Oxford 1804). There are also two English translations of it: (The Choice of Hercules5 (translated by Bishop Lowth, in Roach, J., (Roach's Beauties of the Poets, etc.5 London 1794) ; and (The Judgment of Hercules5 (translated by Layng, P., Eton 1748). Consult Conguy, E., (De Prodico Ceio, etc.5 (Paris 1857) ; Kleemann, A. R. von, (Platon und Pro- dikos5 (in (Wiener Eranos,5 p. 38, Vienna 1909) ; Welcker, ˆrodikos von Keos5 (in (Rheinisches Museum der Philologie,5 Vol. I, pp. 1-39 and 533-545).

PRODUCER. See Internal Combustion

Engine.

PRODUCTION, in political economy a division covering the source and progress of the creation of wealth as constituted in the produc¬ tion of articles having an exchangeable value ; the word in this sense covering one of three divisions of which the others are distribution and consumption. The division deals with the process of production, circumstances favorable or unfavorable to it and the factors governing it, labor, land and capital. See Political Economy.

PRODUCTION, Cost of. See Political

Economy.

PR6ETUS, pre'tus, in Greek mythology, king of Tiryns. According to Ovid he founded the kingdom after making peace with his twin- brother, Acrisius, who had driven him out of Argos. The tragic legend concerning him deals chiefly with the fate of his three daughters, the Prcetidae. These, rendered mad by Hera or Dionysus, wandered through the Peloponnesus, in time communicating their frenzy to other women, so that they killed their children. One of the three sisters died, the other two were healed by the seer Melampus, who married one and was given a share in the kingdom, his brother, Bias, receiving also a share and marry¬ ing the other daughter.

PROFANITY. See Blasphemy; Swear¬ ing, Profane.

PROFERT, in laiv, an exhibition of a record or paper in open court. When either

party alleges any deed, he is generally obliged, by a rule of pleading, to make profert of such deed ; that is, to produce it in court simultane¬ ously with the pleading in which it is alleged.

PROFESSIONAL EDUCATION. See

Education, Professional.

PROFESSIONAL AND TECHNICAL SCHOOLS. See Education, Higher; Educa¬ tion, Professional.

PROFESSIONAL WOMAN'S LEAGUE, The, an association founded and

incorporated in New York in 1893, and composed of women engaged in the dramatic, musical, and literary professions. The dues are $7.50 per annum ; the league holds a bazaar each year, gives oc¬ casional entertainments during the winter sea¬ son and holds four regular meetings each month. Its headquarters are in New York City.

PROFESSOR, The, a novel by Charlotte Bronte, published in 1857. It was the first fic¬ tion that she produced but it failed to find a publisher until after her death. ((The plot in itself is of no great interest,® remarks Mrs. Gaskell, the biographer of Charlotte Bronte, but <(she never excelled one or two sketches of portraits which she has given in (The Profes¬ sor, > nor, in grace of womanhood, ever sur¬ passed one of the female characters there de¬ scribed.® Consult MacDonald, F., (Charlotte Bronte's Professor) (in Cornhill Magazine, n.s. Vol. XXXV, p. 519, London 1913).

PROFESSOR AT THE BREAKFAST TABLE, The, a work by Oliver Wendell Holmes (q.v.), first published serially in the Atlantic Monthly in 1859. It was published in book form in 1860 and has run since then into many editions. It furnishes a sequel to the well-known (Autocrat of the Breakfast Tabled which it resembles in tone and construction. Consult Ives, G. B., (A Bibliography of Oliver Wendell Holmes) (Boston 1907) ; Morse, J. T., Jr., (Life and Letters of Oliver Wendell Holmes) (2 vols., Boston 1896).

PROFIT. See Capital.

PROFIT SHARING, a method by which wage-earners receive a share of the profits of an industry in addition to wages. Strictly speak¬ ing, profit sharing implies that the bonus shall be given to workmen individually; but benefits and insurance, social and educational funds maintained out of the profits of a business are modified forms of profit sharing. Many sys¬ tems of profit sharing also provide for the em¬ ployees obtaining share in the capital stock on special terms, thus becoming part owners of the industry. Profit 'sharing differs from co-op¬ eration (q.v.), in that it is not democratic; both the initiative in establishing a system of profit sharing and the control of the industry rests with the employer. It is regarded, however, as a step toward co-operation. The International Congress on profit sharing in 1889 defined profit sharing as ((an agreement freely en¬ tered into by which the employed receives a share of profits determined in advance.® The arguments advanced in favor of profit sharing are: (1) Its justice; inasmuch as labor is equally necessary with capital to the welfare and success of an industry, it should justly receive a part of the profits; (2) its practical effect; it tends to interest employees in their work, to increase their efficiency and

their care of property. There are two lines of opposition to profit sharing:

(1) From the em¬ ployers, who claim that it is unjust that labor should share in the profits, when it does not share in the loss or risk of the business ; and that profit sharing does not necessarily result in increased efficiency; and (2) from the work¬ men who claim that their freedom is restricted, especially as in many instances a long term of employment and sometimes restriction of labor organization are involved in a profit-sharing system ; and that they obtain no compensating share in the management or control of the in¬ dustry. Profit sharing has been successful in many industries, especially where the labor is skilled and wages large in proportion to total cost of production ; on the other hand, many attempts to establish a profit-sharing system have failed, owing sometimes to industrial de¬ pression, sometimes to a trial too short to give fair results and sometimes to change in manage¬ ment. In the United States between 1889 and 1896, 50 firms had made trial of profit sharing; in the latter year, only 12 continued it perma¬ nently and five had abandoned it temporarily; in 1900, there were 23 firms with a system of profit sharing, 12 of which had adopted it within the year 1899-1900. In 1916 there were in operation in the United States 60 industrial and mercantile establishments with profit-shar¬ ing plans.

France formerly outranked other nations in the number and importance of successful profit- sharing enterprises. Among the more import¬ ant ones are Maison Leclaire (1842) (painter), the Godin Familistere at Guise and the Bon Marche (q.v.). France can still claim to have been the leader in the establishment of profit- sharing. In numbers, however, it is now out¬ ranked by Great Britain. In 1913 there were 141 profit-sharing plans in existence in the latter country, against about 115 in France in 1912. Other countries having' establishments with profit-sharing plans of one type or another are Germany, Holland, Switzerland, Italy, etc. Among the most important profit-sharing es¬ tablishments of the United States are the Nel¬ son Manufacturing Company of Saint Louis, Mo., the Eastman Kodak Company of Ro¬ chester, N. Y., the Underwood Typewriter Com¬ pany of New York City, the Ward Baking Company of New York City and Sears, Roe¬ buck and Company of Chicago, Ill. The Nel¬ son Company established its system in 1886, which, besides the direct sharing in profits by the employees, provides for the payment of sickness and accident benefits by the company as a part of the costs of the business ; the em¬ ployees are also encouraged to buy stock in the company. In 1896 an agreement was made by which the employees of the cabinet-making shop were to gradually purchase and take the man¬ agement of that department ; by 1902 they had sole control. The Proctor and Gamble Com¬ pany introduced profit-sharing in 1887 ; the ar¬ rangement was that the employees should re¬ ceive a share in the net profits in the propor¬ tion that wages bore to the whole cost of pro¬ duction. The fact that the employees were largely unskilled labor with low wages and re¬ ceived the

new arrangement with indifference made the management of the system particularly difficult. An improvement was made by classi¬ fying the employees into four groups in regard

to interest in work, excellence of work and care of machinery and tools; the best in ac¬ cordance with this classification received double the regular dividend, the second group, includ¬ ing the greater number of the employees, the regular dividend, the third group one half the dividend, and the fourth none at all. Since then various other changes have been made so that this concern cannot be any longer called a true profit-sharing establishment. In 1903, the United States Steel Corporation adopted direct profit sharing for its more responsible em¬ ployees and a system whereby any of its em¬ ployees may acquire stock on easy terms and as long as they remain in the employ of the com¬ pany, may receive a bonus of $5 a year extra for each share after the first five years. < Many other important industrial concerns in the United States have introduced modified or limited profit-sharing plans, among them be¬ ing the Ford Motor Company, the Studebaker Corporation, etc. The most exhaustive study of profit-sharing in the United States was pub¬ lished by the United States Department of Labor, Bureau of Labor Statistics, Bulletin No. 208, Miscellaneous Series No. 13 (Washington 1916). It also contains a very full bibliography of the very extensive literature on the subject. Consult Adams, H. B., ed., (History of Co¬ operation in the United States1 (in Johns Hop¬ kins University Studies in Historical and Politi¬ cal Science, Vol. VI, Baltimore 1888) ; Adams, T. S. and Sumner, H. L., (Labor Problems* (New York 1905) ; Aves, E., (Co-operative Industry* (London 1907) ; Bohmert, V. K., (Die Gewinnbeteiligung* _ (Dresden 1903) ; Brandt, H., (Gewinnbeteiligung und Ertragslohn**

(Dresden 1907) ; Burritt, A. W., and others, (Profit Sharing (New York 1918) ; Bushill, T. W., (Profit Sharing and the Labour Question* (London 1893) ; Duhamel, M., Participation aux benefices et participation au capital* (Lille 1912) ; Eliot, C. W., and others, Profit Sharing and Scientific Management* (Boston 1914) ; Fay, C. R., (Co-partnership and Indus¬ try* (Cambridge 1913) ; George, W. L., (La- bour and Housing at Port Sunlight* (London 1909) ; Giddings, F. H., Profit Sharing* (in 1 7 th Annual Report of the Massachusetts Bureau of Statistics, Boston 1886) ; Gide, C., P'Actionnariat ouvrier* (Paris 1910) ; Gilman, N. P., (A Dividend to Labor* (Boston 1899) ; id., Profit Sharing between Employer and Em¬ ployee* (New York 1896) ; Granier, J., (Les Actions de travail* (Paris 1910) ; Great Britain, Board of Trade, Department of Labour*

Statis¬ tics, Profit sharing and Labour Co-Partner¬ ship Abroad (Parliamentary Papers, Cd. 7283, London 1914) ; id., Profit sharing and Labour Co-Partnership in the United Kingdom* (Par¬ liamentary Papers, Cd. 6496, London 1912) ; Lloyd, IL. D., (Labor Co-Partnership* (New York 1898) ; National Civic Federation Welfare Department, Profit Sharing by American Em¬ ployers* (New York 1916) ; Payer, Andre, (La Participation aux benefices* (Paris 1911) ; Pease, E. R., Profit Sharing and Co-Partner¬ ship* (in Fabian Tracts, No. 170, London 1913) ; Peters, J. P., ed., Pabor and Capital* (New York 1902) ; Price, L. L., (Co-Operation and Co-Partnership* (London 1914) ; Robert, C., Peclaire, Biographie d'un homme utile* (Paris 1878) ; Schloss. D. F., (Methods of In¬ dustrial Remuneration* (London 1907) ; Smith,*

J. C., (Money and Profit Sharing (London 1908) ; Taussig, F. W., Principles of Eco¬ nomics* (Vol. II, p. 303, New York 1915) ; tay- lor, S., Profit Sharing between Capital and Labour* (London 1884) ; Tolman, W. H., (Social Engineering* (New York 1909) ; Trom- bert, A., (La Participation aux benefices, guide pratique* (Paris 1912) ; Vanlaer, M., (La Par¬ ticipation aux benefices* (Paris 1898) ; Wax- weiler, E., (La Participation aux Benefices* (Paris 1898) ; Williams, A., (Co-Partnership and Profit Sharing* (New York 1913) ; Id., (28 Years of Co-Partnership at Guise* (London*

1908).

PROGRESS, the advancement of the world, moral, mental and material, as exhibited in his¬ tory. Physical science, which has so recently demonstrated the gradual improvement of ma¬ terial types in the animal and vegetable world, has compelled metaphysical speculation to con¬ form its general principles to the axioms formu¬ lated by physical observation and experiment. The result of science, of historical inquiry, of inductive activity in every area of investiga¬ tion may favor neither optimism nor pessimism. They have brought into philosophy a third term, and that is meliorism, a term employed to de¬ note a doctrine so firmly based on fact that none can controvert it. Meliorism embodies the truth that as far as human experience and observation can extend there has been improve¬ ment in things, progress in the universe, ad¬ vancement in the world. Pessimism becomes a contradiction in terms ; for the physicist in his laboratory, the historian in his study, the sociologist in his inquiry among men, declares that things have been once worse than they are now, and that from the flower in the field to the beast in the stall, and from the beast in the stall to the working man, the ruler and the general condition of nations, things have been growing better. The lapse of centuries shows a sensible amelioration in the lot of humanity. The slave has been enfranchised, woman has been raised and enlightened, the rights of labor

have been more and more recognized. These, however, are only social and political examples of that universal amelioration and progress bv which a nebula is changed into a star, and a star into a peopled and conscious world. Meliorism is the principle that underlies all existence, or¬ ganic or inorganic, and comprehends in its widely extending connotation the discovery of drugs that abolish pain, of economic institutions that diminish poverty, of intellectual institutions that make ignorance and incompetency more and more rare and of tolerance and enlightment which give more and more freedom to the creeds, tastes and idiosyncrasies of individual men. In whatever direction we look over the field of human activity we see this improvement manifesting itself, and the phenomena which are the basis of meliorism furnish the best argument for that hopeful optimism which, as many believe, alone can give the mind a philos¬ ophical creed that renders life tolerable.

Meliorism is the doctrine of the positivist, because it is no metaphysical system which in¬ terprets facts by a priori assumption ; it is sim¬ ply an induction from a summary of those facts which physical science has most recently set forth as the proud results of the newest, the most unbiased, and the most uncontrovertible

deductions from experiment and observation, in the whole world of material, social and political phenomena. See Meliorism.

PROGRESS OF POESY, The.

James H. Hanford.

PROGRESS AND POVERTY, a famous work by Henry George, written in 1877-79. The manuscript was declined by publishers, but finally D. Appleton and Company agreed to publish the book if the author would bear the cost of making the plates. The latter were made under the author's personal supervision in San Francisco. Before being shipped east, late in 1879, an Author's Proof Edition5 of 500 copies was struck off. The first regular edition was brought out in January 1880. It soon went through many editions, both in the United States and England. It has also, been translated into almost every modern language and it is claimed that more than 2,000,000 copies have been sold. The best recent edition is the 25th anniversary edition (New York 1916). The author seeks in this work to solve a problem and prescribe a remedy. The problem is : (

They gave origin to the so-called Single-Tax movement (q.v.), a school of

economic philos¬ ophy which has still many adherents. Consult Dixwell, G. B., (Progress and Poverty: A Re¬ view of the Doctrines of Henry George5 (Cam¬ bridge 1882); George, H., Jr,

PROGRESSION, in mathematics, a series or sequence of terms such that each quantity bears the same mathematical relation to the pre¬ ceding. This relation may be either that of a difference or of a ratio; the first case is that of the arithmetical progression, the second that of the geometrical series.

In an arithmetical series each term is de¬ rived from the preceding by adding to it a con¬ stant, called the difference, which may have a plus sign or a minus sign, so that the series may either increase or decrease. In the accepted notation of the arithmetical progression, a is the first term, n the number of terms, d the difference, and / the last term. The value of the last term or of any (the wth) term may be determined from the formula, 1 — aM (n — 1)d, which is merely a notational statement of the evident fact that the coefficient of d in any term will be less by one than the number of term, so that the wth term must be the sum of the first term and of the difference taken (n — 1) times. Letting s stand for the sum of n terms we may write in ascending or descending order:

ˆ — a + (a + d) + (a + 2d) -p .

-f (/ — d) Ml, or s=l+(l—d) + (/ — 2d) + . +(o -p d) — a.

Adding these two equations we get the equa¬ tion, 2s — (a -p /) + (a -p /) -p (a M l) M . . . + (a M l) + (a + /), or 2s — n (a Ml), it be¬ ing evident that the factor (a + l) occurs n times in the second term of the preceding equation. The formula for the sum will then

be s~ˆjr (a "P /). Hence, if three of data are

given as to an arithmetical series, that is, three of a, d, n, l, s, the fourth (and the fifth, in general) can be found by the regular processes of algebra. Moreover the arithmetical mean be¬ tween two numbers, being the mid-term in a series in which the number of terms is odd, will be one-half the sum of the two numbers.

A geometrical progression is a series in which each successive term is derived from the preceding by multiplying it by a constant, called the ratio, which may be less or greater than unity, so that the series may decrease or in¬ crease, or may be either plus or minus, so that the terms may be either similar or constantly changing in sign. In the accepted notation of the geometrical progression, a is the first term, r the common ratio, / the last (or wth) term and s the sum of the series of w terms. The formula for l, the

wth term, since the exponent of r increases by one in each term will be / = arn — l.

To derive the formula for the sum of n terms, get the difference of the two self-evident equations,

s = a -p ar j ar2 f . . . . \ arn — », and

rs = ar f ar2 p . *p arn — 1 + arn.

The difference is rs — 5 arn — a, or (r — l)s=a

a(rn — 1), rl — a

(pn — i). The formula then is $ = – or –

r — 1 r — 1

With any three of the quantities given in these two formulas the other two may be derived by the use of quadratic equations (and in one in¬ stance of logarithms). An interesting variation of the problem of the summation of a geometric series is to find the value of a repeating decimal or repetend; as, for example, to find the value of

.545454 .... (or .54). Here cF=. 54, r=.01, and n — a. As n increases without limit, the value of / approaches zero; hence in the formula for rl — a,

the sum, – , rl becomes negligible, and the

r— 1

— a a

formula takes the form – or – . Substitut-

r— 1 1 —r

.54 6

ing the values above we have – = — .

.1— .01 .11

A harmonical progression is a series in which the reciprocals of the terms form an arithmetical series. Any problem relating to harmonical progressions may therefore be treated as problems in arithmetical progression by the mere inversion of each term. See Series.

PROGRESSIVE PARTY, The. In the

half century following the Civil War four serious disagreements threatened to break up the political homogeneity of the Republican party. In the order of their occurrence these were the Liberal Republican movement of 1872, the Mugwump party of 1884, the silver issue of 1890 and the progressive movement of 1912. The last named was by far the most serious and took its rise in the nineties, being at first largely an agrarian movement in the Middle West. Many prominent members of the Republican party felt that their party in the State and national legislatures was dominated to a dan¬ gerous degree . by the great corporations, in¬ cluding the railroad companies. The progres¬ sive spirit first took concrete form in the ener¬ getic protests voiced by Western Republicans against the tariff legislation enacted by their party in 1890, 1897 and in 1909. The Populists and Democrats secured several seats in Kansas and Minnesota upsetting for the first time the solid array of Republican States. Friction was constant within the old party and in 1910 the strength of the new movement was apparent in Congress when the Progressives secured the election of the Congressional Committee on Rules by the House itself and discarded the old method of appointment of the committee by speaker. The elections of 1910 showed the older Republicans of the <(stand pat® type that they might no longer treat the Progressives as a factious, troublesome and uninfluential minor¬ ity. The Progressives, foremost among whom were La Follette of Wisconsin, Cummings of Iowa, Dolliver of Iowa and Beveridge of In¬

diana were now most aggressive and their in¬ fluence was felt by both Democrats and Repub¬ licans alike. When the presidential campaign of 1912 approached the movement had acquired such momentum and strength that its leaders thought seriously of wresting the control of the Republican party from its old-time leaders, of dictating its platform and running the party machinery generally. No leader of sufficient strength as a presidential possibility having been developed within the ranks of the Pro¬ gressive Republicans, the majority declared for Theodore Roosevelt, ex-President of the United States. Delegates instructed to vote for the latter as Presidential candidate were sent to the Chicago Convention of 18-22 June 1912. The supporters of President Taft, however, 'by controlling the National Committee, were en¬ abled to pass upon all contested seats in the convention, with the result that the majority of the Progressive delegates were unseated and the remainder, led by Roosevelt, withdrew. The call for an independent convention signed by the ablest of the Progressives was

soon sent forth, and on 5 August Theodore Roosevelt of New York and Hiram Johnson of California were unanimously chosen as candidates for the Presidency and Vice-Presidency respectively.

The objects of the Progressive party, as set forth in the incorporation papers issued at Al¬ bany, N. Y., on 31 July 1912, are as follows: <(To promote by educational means and political action, social and industrial justice and political liberty in the State and Nation; to advocate such legislation and administration as will se¬ cure to the people the effective control of all of the agencies of their government ; to pro¬ mote such legislation as is demanded by the modern industrial revolution, and which will secure a better and more equitable diffusion of prosperity; and to take such political action as will result in the election to public office of candidates who are in accord with the policies and objects of the organization; and further, to unite in a common movement all associations and organizations formed for like purposes throughout the State of New York and the United States of America.® The preamble of the platform of the Progressive party states that <(The conscience of the people in a time of grave National problems has called into being a new party, born of the Nation's awakened sense of justice.®

The Platform. — The main recommendations of the platform are as follows:

Preferential primaries for Presidential can¬ didates; direct primaries for nomination of State and national officers; direct election of United States senators; the short ballot; the initiative, referendum and recall.

A more expeditious method of amending the Federal Constitution.

National jurisdiction on those problems which have expanded beyond reach of the indi¬ vidual States.

Social and industrial justice to be secured by legislation for the prevention of industrial acci¬ dents, occupational diseases, overwork, involun¬ tary unemployment; the prohibition of child labor; the minimum wage for working women, with prohibition of night work for women and an eight-hour day for the same sex; one day's rest in seven for all wage-workers; the aboli-

tion of the convict contract labor system ; pro¬ tection against the hazards of sickness, irregu¬ lar employment and old age through a system of social

insurance ; establishment of public con¬ tinuation schools ; the organization of workers, men and women, as a means of protecting their interests.

National regulation of interstate corpora¬ tions through a strong Federal administrative commission.

The appointment of diplomatic and consular officers solely with a view to their special fitness and worth.

A protective tariff to equalize conditions of competition between the United States and foreign countries, both for the farmer and manufacturer, and which shall maintain for labor an adequate standard of living; an imme¬ diate downward revision ; a non-partisan scien¬ tific tariff commission; the repeal of the Cana¬ dian reciprocity act.

Full and immediate inquiry into the high cost of living.

The improvement of the national currency system.

Conservation and national control of natu¬ ral resources.

Development of our rivers, especially the Mississippi and its tributaries.

Use of the Panama Canal for American benefit, free from control of American rail¬ roads, and American coastwise trade to be exempt from tolls.

Public ownership of the natural resources of Alaska.

Equal suffrage to men and women.

Limitation of campaign contributions and expenditures.

Registration of lobbyists; prohibition of- Federal appointees from holding office in state or national political organizations.

Restriction of the power of the courts.

Restriction as to injunctions and contempt proceedings in labor disputes.

Establishment of a Department of Labor.

The re-establishment of the Country Life Commission; development of agricultural credit and co-operation.

Establishment of a centralized National Health Service.

Revision of the patent law.

Power to value the physical property of railroads by the Inter-State Commerce Com¬ mission ; abolition of the Commerce Court.

Construction of national highways; exten¬ sion of the rural delivery system.

A graduated inheritance tax, and ratification of the income tax amendment to the Constitu¬ tion.

Judicial and other peaceful means for set¬ tling international differences; an international agreement for the limitation of naval forces.

Protection of the rights of American citizen¬ ship at home and abroad.

Increased care of our immigrant population.

A wise and just policy of pensioning Ameri¬ can soldiers and sailors and their widows and children.

Creation of a parcels post.

Extension and strict enforcement of the Civil Service Law.

Readjustment of the business methods of the national government.

Protection against worthless investments by

means of new legislation creating governmental supervision.

The campaign that followed will not soon be forgotten by the generation that witnessed it. Great numbers of Republicans allied them¬ selves with the new party and at the election, Roosevelt, the Progressive, received 4,126,020 votes, as compared with the 3,483,922 votes cast for Taft, the candidate of the stand patters. California, Michigan, Minnesota, Pennsylvania, South Dakota and Washington were carried by the Progressives, totalling 88 votes in the elec¬ toral college, while only Utah and. Vermont, with eight electoral votes remained in the Re¬ publican column. The elections of 1914 showed a drift of the Progressives back to the old party, with the exception of California where a heavy Progressive majority was rolled up. By 1915 many Progressives felt that their party had served its purpose by defeating the reactionary elements of the old party and the breach was almost healed during the presiden¬ tial campaign of 1916, in which Mr. Roosevelt, the leading Progressive, supported Mr. Hughes.

That perfect harmony did not prevail, how¬ ever, was shown when the electoral vote of California was thrown to Wilson because of differences between Hughes and Johnson sup¬ porters in that State. The Congressional elec¬ tions of 1918, however, showed that the breach had been closed and the Republican party again presented a united front to its doughty enemy, the Democrats. (See Republican Party). Consult Anon., (The Progressive Party, its Rec¬ ord from January to July 1916 (New York 1916) ; De Witt, B. P., (The Progressive Move¬ ment (New York 1915) ; Duncan-Clark, S. J., (The Progressive Movement (Boston 1913) ; McCarthy, C., (The Wisconsin Idea) (New York 1914) ; Payne, G. H., (The Birth of the New Party* (New York 1912) ; Roosevelt, T., ˆProgressive Principles1* (New York 1913) ; id., (The Progressive Party> (in Hibbert Journal, Vol. XII, o. 1, London 1913) ; Wal¬ ling, W. E., (Progressivism — and after) (New York 1914) ; White, William Allen, (The Old Order Changeth* (ib. 1913).*

Edward C. Carrington.

PROGRESSIVES, The. The term «Pro- gressives,® or. more popularly, ˆInsurgents,® was applied originally to those Republican Con¬ gressmen who contended that The House should itself elect the Committee on Rules, in¬ stead of allowing the Speaker to appoint the committee. These efforts, continued through several years, were finally successful on 17 March 1910, when such a change was ordered and the committee enlarged from five to ten members.

The name ˆProgressives® then assumed new importance and was applied especially to mem¬ bers of the Republican party in both branches of Congress who took issue with the adminis¬ tration of President Taft on several questions, notably the tariff, or who took what was gen¬ erally considered advanced or ˆprogressive® ground on other leading public measures. They have therefore added to their repertoire of policies and achievements, and been considerd sponsors for, or at least leading advocates of, many important public 'measures. The success of the Progressive movement not only almost reversed the political control of Congress in the elections of 1910, but paved the way for the

formation of the Progressive Party (q.v.) in 1912, and largely shaped the Democratic plat¬ form in the same year.

PROHIBITION, used in a special sense, means the interdiction by law of

the manufac¬ ture and sale of intoxicating liquors for use as beverages. Various forms of regulation or control over the liquor traffic have been adopted from time to time, but prohibition is the most drastic of them all. A prohibition wave swept over the Northern States about the middle of the 19th century, beginning in Maine, where the first State-wide prohibition law was en¬ acted in 1846. A more stringent law was en¬ acted in 1851 in the same State, and subse¬ quently a prohibition amendment to the State constitution was adopted. Up to 1906, 18 States had adopted State-wide prohibition, but the wave had receded so that, by that year, only three States — Maine, Kansas and North Dakota — still remained in the prohibition column.

The recession of the prohibition wave indi¬ cated that the movement had proceeded too rapidly and that the goal must be won by slower steps. State-wide prohibition in many States undoubtedly was contrary to the wishes of a considerable minority of the people throughout the State and probably of a major¬ ity of the people in certain localities of the State. It is axiomatic that, in a democracy, sumptuary legislation is difficult to enforce un¬ less supported by public opinion. Consequently, the line of least resistance in the movement for effective prohibition lay in introducing it only in those localities where the majority of the people favored it. This plan was carried out through what is known as local option, which was found in all but a few States where State¬ wide prohibition had not been adopted. Local option represents an effort to adjust the State liquor law to the sentiments and wishes of the majority of the people in particular localities. It enabled such local majorities to vote out the open saloon from their neighborhoods. In States allowing local option, some or all of the various political subdivisions, such as town¬ ships, precincts, cities, villages and counties, were given the privilege of voting out the saloon. Local official bodies, such as city councils, were also given by law in some States the authority to license, regulate or prohibit the sale of in¬ toxicating liquor within their jurisdictions. As a result of the spread of local option, a num¬ ber of States not having State-wide prohibition were largely dry. Such dry territory in local option States, however, was only relatively dry. Where wet and dry townships or counties ex-1 isted' side by side in the same State, the introduction of liquor into dry territory from adjoining wet territory was difficult to prevent. Open sale of liquor in dry territory was usu¬ ally prevented, but clandestine sales undoubt¬ edly continued to be made to a considerable extent.

The comparative failure of local option in bringing about thorough prohibition was one influence that affected the movement for the enactment of State-wide prohibition laws and constitutional amendments. Various prohibi¬ tory liquor laws of a partial character were enacted in a number of States. Thus, there were laws prohibiting saloons to remain open

on Sundays, election days, or after certain hours, and prohibiting the sale of liquor within a certain distance of educational and religious institutions. The Congress also prohibited the sale of liquor in the District of Columbia and on Indian reservations.- Partial laws, however, were not considered sufficient, and therefore a new movement for State-wide prohibition was got under way, beginning with the enactment of the Georgia law in 1907. This movement spread especially in the South and West, so that, by the year 1918, more than half of the States had in force State-wide prohibitory liquor laws or constitutional provisions.

Dry States had experienced difficulty in enforcing their prohibition laws for various reasons. Too often they had depended largely on local officers to enforce the State law and such officers had frequently been influenced by anti-prohibition sentiment in their localities either to ignore the law or to enforce it in a very lax and inefficient manner. This difficulty had to some extent been avoided in a few States by the provision of special State machinery of enforcement. But, in North Dakota, an act authorizing the governor to appoint an enforce¬ ment commissioner to enforce the prohibition law was declared unconstitutional by the Su¬ preme Court of the State on the ground that it violated the reserved right of the people to have such laws enforced by officers of their own selection. Difficulty in enforcing the State¬ wide prohibition laws had also been experienced on account of the inability of the States to pre¬ vent the introduction of liquor from wet States through the channels of interstate commerce, over which the States had no direct control. Congress, however, did the best it could to remedy this difficulty and to enable the dry States to enforce their prohibition laws. Thus, under the Wilson Original Package Act of 1890, all intoxicating liquor transported into any State was made, upon its arrival, subject to the operation of the laws of such State en-» acted in the exercise of its police powers. The Webb-Kenyon Act of 1913 prohibited the ship¬ ment from one State into another of intoxi¬ cating liquor intended to be used in any manner in violation of State law. The Webb- Kenyon Act was strengthened by a later act of Congress forbidding any person to order or cause intoxicating liquor to be transported for beverage purposes into any prohibition State.

For some time the Prohibition Party, the Anti-Saloon League of America and other or¬ ganizations had been working for national pro¬ hibition. The outbreak of the European War and the entrance of the United States into it strengthened their efforts. First the sale of liquors to soldiers and sailors was prohibited. Next, the President was empowered to prohibit the use of grains, fruits, etc., in manufacturing liquors for beverage purposes. Then followed the passage (21 Nov. 1918) of the War-time Prohibition Act, prohibiting after 30 June 1919 the sale, during the European War and thereafter until the termination of demobiliza¬ tion, of any intoxicating

liquors except for ex¬ port. Previously a resolution had been in¬ troduced in Congress proposing a prohibition amendment to the Constitution of the United States. In December 1917 this resolution passed Congress by the necessary two-thirds ma-

jority in both houses. The language of the amendment is as follows:

“ Section 1. After one year from the ratification of this article the manufacture, sale, or transportation of intoxi¬ cating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

“ Section 2. The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.

“ Section 3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several States, as provided in the Con¬ stitution, within seven years from the date of the submission hereof to the States by the Congress.”

By 16 Jan. 1919 this amendment had been ratified by three-fourths of the States and it went into effect 16 Jan. 1920. All but three States have now ratified it. On 28 Oct. 1919 Congress passed the Volstead Prohibition En¬ forcement Act over the President’s veto. It prohibits the sale, for beverage purposes, of liquor containing over one-half of one per cent alcohol. See Liquor Legislation.

J. M. Mathews.

PROHIBITION PARTY, The. When the Prohibition idea rose to prominence, prior to the Civil War, the idea of its support through political action was not wholly absent. When the Republican party was formed, it was by many regarded as the party of Prohibitionists, and James G. Blaine so speaks of it in one of his early editorials. Myron H. Clark was elected governor of New York in 1856, almost directly on the prohibition issue, and there was in that campaign in New York State an ((anti- dramshop party.® With the Civil War the prohibition question was largely pushed out of the public mind and, during the war or the years which immediately followed it, a large number of States which had adopted prohi¬ bition went back to the license policy. Further, the liquor power was organized by the revenue taxation policy adopted by the Federal govern¬ ment, and the

brewer for the first time ap¬ peared as a political factor in American affairs. The result was that, when the temperance ele¬ ment of the country began to turn its mind again to the anti-alcohol reform, it discovered that a new condition existed in American poli¬ tics and that by far the greater part of the political leaders of both parties were unwilling to give any toleration to the prohibition idea. This resulted in an agitation, which began in the Independent Order of Good Templars and centred chiefly around the Rev. John Russell, a Methodist clergyman of the State of Michi¬ gan, beginning as early as 1867 and culminating in 1869, in May of which year the Right Worthy Grand Lodge, in session in Oswego, N. Y., took action which resulted in the calling of a convention to consider the advisability of forming a political party upon the basis of the prohibition issue. The call was signed by resi¬ dents of some 20 States and resulted in the meeting of a convention of about 500 people in Farwell Hall in Chicago, 1 Sept. 1869. There were representatives present from 20 States, by far the greater part of them people who had never before taken part in political affairs and few of them widely known. Perhaps the most famous individual among them was Gerrit Smith of New York State, who had been prominent as an Abolitionist and had been a member of

Congress. One of the few remaining survivors, when this is written, is Col. John Sobieski, an exiled Polish prince, who served in the Federal army during the Civil War and against Maxi¬ milian in Mexico. Women sat in this conven¬ tion on equal terms with men, probably the first political convention of history in which that was the case. The convention was by no means a unit in deciding to form a new party and its formation was decided upon by little more than a majority vote.

The basis of the action taken, as deduced from a study of the literature of the party, may be briefly stated as follows :

I. Since the government of this country is administered and must be administered by means of political parties, it is obligatory upon honest citizens so to associate themselves politically that the administration of government shall attain the ends for which government is ordained.

II. The legalization of the liquor traffic, which robs, debauches and kills a vast multitude of the citizenship of this nation, together with the innocent who upon them depend and the unborn who will follow them in life, is in contravention of the first duties and the fundamental prin¬ ciples of government and repugnant to every right doctrine of political science.

III. Therefore, and the more urgently since the existing legalization of such traffic presents an issue which over¬ towers in its importance all of the other issues of the age, it is the duty of honest citizens to associate

themselves to¬ gether in a political party pledged to the enactment and the enforcement of laws which shall take away from this traffic the protection of legality and shall place it under the ban of legal prohibition.

The Prohibition party first appeared at an election in Ohio, in the fall of the year when it was organized, and Republican-Prohibition can¬ didates were voted for in both Maine and Minnesota that fall. In 1870 Prohibition tick¬ ets were nominated in six States and more than 20,000 Prohibition votes cast, not including 21,000 received in Massachusetts by Wendell Phillips, who, beside being the Prohibition can¬ didate for governor, was also the candidate of the Labor party.

The first presidential election in which the Prohibition party appeared was in 1872, and from that time it has nominated candidates for every presidential election.

Much of the history of the party, so far as it is of general interest, may be best told in tabular form.

National Chairmen.

1869-72. John Russell. 1887-99. Samuel Dickie.

1872-76. Simeon B. Chase. 1899-1904. Oliver W. Stewart.

1876-80. James Black . 1904—12. Charles R. Jones.

1880-84. C-ideon T. Stewart. 1912. Virgil G. Hinshaw. 1884-87. John B. Finch.

Presidential Candidates.

1872. James Black, Pennsylvania.

1876. Gen. Green Clay Smith, Kentucky.

1880. Gen. Neal Dow, Maine.

1884. Ex-Governor John P. St. John, Kansas.

1888. Gen. Clinton B. Fisk, New Jersey.

1892. Gen. John Bidwell, California.

1896. Joshua Levering, Maryland.

1900. John G. Woolley, Illinois.

1904. Silas C; Swallow, Pennsylvania.

1908 and 1912. Eugene W. Chafin, Wisconsin.

1916. Ex-Governor J. Frank Hanly, Indiana.

Of these men, six were lawyers; two, St. John and Hanly, had served their States as governors; one (General Smith) was an early governor of Montana; three (Smith, Dow and Fisk) were generals in the Federal army in the Civil War, in which St. John was also a colonel ; and Bidwell commanded the militia of California during the Civil War. Smith also

served in the Mexican War. Both Smith and Bidwell were members of Congress before joining the Prohibition party. Swallow was a clergyman, as was also Smith in the closing years of his life.

Vice-Presidential Candidates.

1872. John Russell, Michigan.

1876. Gideon T. Stewart, Ohio.

1880. Henry A. Thompson, Ohio.

1884. William Daniel, Maryland.

1888. John A. Brooks, Missouri.

1892. James B. Cranfill, Texas.

1896. Hale Johnson, Illinois. '

1900. Henry B. Metcalf, Rhode Island.

1904. George W. Carroll, Texas.

1908 and 1912. Aaron S. Watkins, Ohio.

1916. Ira Landrith, Tennessee.

The votes cast for the presidential candidates of the Prohibition party during this period are recorded as follows :

1872 .

. 5,607

1896 .

. 130,617

1876 .

. 9,737

1900 .

. 209,469

1880 .

. 9,678

1904 .

. 258,205

1884 .

. 149,772

1908 .

. 253, ?31

1888 .

. 249,918

1912 .

. 207,828

1892 .

. 263,480

1916 .

. 221,329

The party may be said first to have at¬ tracted general attention in 1884, when the wide popularity of John P. St. John, who had left the Republican

party because of its refusal to adopt prohibition, first resulted in an appre¬ ciable party vote and when votes were first cast for the party in almost every State of the Union. The fact that the vote nearly doubled in the next election created some political apprehension ; but it remained practically sta¬ tionary in 1892, and in 1896, owing to a split in the party and its desertion by those Pro¬ hibitionists who advocated the free coinage of silver (among whom John P. St. John was a leader) the vote was cut in half. In 1900, how¬ ever, under the leadership of Oliver W. Stew¬ art and with John G. Woolley, who ranked among the greatest of American orators, as a presidential candidate, the vote largely increased again and in 1904 came practically back to its high point.

But a bitter factional fight breaking out in the party during the 1964 campaign and the gaining of control in the party management, immediately thereafter, by the faction which regarded the mission of the party not spe¬ cifically to win political victory but to support prohibition as an abstract principle ended, in the minds of most political students, the pos¬ sibility that the Prohibition party should ever become a considerable political factor.

It should be noticed that there have always been two schools of thought in the Prohibition party, one of which may be called the strictly political, which insisted always upon absolutely independent political action and refusal to give support to non-partisan measures of any sort ; the other might be called a ˆco-operative® school, which, while retaining political organ¬ ization, was always willing to join hands in non-partisan efforts of all kind.

No history of the Prohibition party is com¬ plete without some notice of the large number of political ideas which had their first intro¬ duction to the world in Prohibition party platforms.

The first of these is Woman Suffrage, for which the Prohibition party began to declare in 1872 and has declared in every one of its national platforms. Of equal importance is

the direct election of United States senators, for which the Prohibition party declared in the platform of its first nominating convention in 1872. Prison reform, lower railroad rates, pos¬ tal savings banks, parcel post, regulation of in¬ terstate corporations, protection of government lands, civil service reform, cheap letter postage, are among the things for which the Prohibition party spoke before any other party gave them consideration. The tariff commission idea began with the Prohibition party, as did also the income tax; and the Prohibition party was the first to attack polygamy and the only political party that opposed the system of protected vice, for years so

common in American cities.

It should be added that the Prohibition party built, in its entirety, the argument upon which the prohibition issues finally won. It is a popular error to suppose that the Prohibitionists were chiefly concerned with the moral aspects of the liquor problem. Their literature is strong upon that subject but they were the foremost students of the economic phases of the problem and as well of its relations to prac¬ tical civics. The latest writers upon the move¬ ment have added almost nothing to the argu¬ ment that was formulated by the Prohibitionists

as early as 1888. WILLIAM p. F. Ferguson.

PROHIBITIVE DUTIES, the taxes or system of tariff imposed by a government on imported articles for the protection and en¬ couragement of domestic industries, or as a retaliatory measure in the case of a nation thus discriminating against the productions of an¬ other, or favoring those of other countries. Protective duties in their various mutations present problems of great commercial and polit¬ ical importance, affecting, as they do, the value of the markets of one country in regard to those of another. See Free Trade; Protection; United States — History of the Tariff.

PROJECTILES. To accomplish the dam¬ age or destruction of a target a projectile should have certain hardness, tenacity and weight. If it be soft and weak compared with the body struck, it will spread out laterally or break into pieces, and presenting an increased surface will meet with a greater resistance, and consequently will penetrate less than if it had retained its original form. High density gives to the mass the least possible volume, whereby the effect of the resistance offered by the air and by the body to be penetrated is diminished. Different materials have been used for projectiles. Stone, lead, wrought-iron steel, cast-iron, and chilled iron possess peculiar properties which render each advantageous according to the object to be attained.

Prior to the invention of gunpowder, large masses of stone without regard to form were thrown from machines constructed for that purpose. This material was very generally em¬ ployed until the year 1400; but its want of strength and density, qualities required in a projectile propelled by powder, necessitated its use in large masses and with comparatively small charges. Such projectiles were destruc¬ tive against unbacked walls of masonry, but broke if ricocheted on earth. As late as 1807, stone balls of enormous calibre were used by the Turks in defending the passage of the Dardanelles.

V

Lead, as a material for projectiles, possesses the essential quality of density; but it is too soft to be used against very resisting objects, since it is flattened even against water. From its softness and fusibility, large projectiles of this material are liable to be dis¬ figured, and partially melted, by the violent shock and great heat of large charges of powder. Its use is chiefly confined to small-arms and case-shot, which are generally di¬ rected against animate objects.

These defects of lead may be cor¬ rected, in a measure, by alloying it with tin, antimony, etc. From the first introduction of cannon wrought- iron projectiles have at different times been tried. This metal has great density and tenacity, but has not a hard degree of hardness, can¬ not be easily worked into the neces¬ sary shapes, and where used in large masses becomes very expensive.

Steel possesses the qualities required in a pro¬ jectile, but is very costly and difficult to manipu¬ late.

The adoption of cast-iron for projectiles caused an important advance in artillery. It has great hardness, sufficient density and tenacity; is cheap, easy to mold, and

through the air in the direction of its length ; numerous unsuccessful attempts have been made to ensure accuracy in its flight when fired from a smooth-bored piece. One of the sim¬ plest plans for this purpose is to place the center of gravity, or inertia, in advance of the

f — Lubricating and Crimping Crooves.

; [Loose Black Poirden ˆCentral Tube.

Steel Biapiiragm. \ ˆSleel Case.

I rSAnzpnel Balls. I j Bourrelet.

1 i p Matrix.

{■Steel Head.

{ rCombiualionFiue. rBrass Csver*.

'-Cover Cnmping Groove. /

Common Shrapnel.

centre of figure, or resistance. As these points should be in the longer axis of the projectile, the force of inertia and the resistance of the air, acting along the same right line and in opposite directions, will tend to preserve the line of light. This was tried on a hollow,

forms. Recent improvements in the manufacture of this metal have so greatly increased the strength of projectiles made from it, that they can be used effectively against heavy armor. Cast iron, chilled by being cooled rapidly, has its hardness, crushing strength and density in¬ creased. Projectiles so prepared are now employed with excellent results against the most powerful armor, and are found about as effective as those of steel and very much less costly. Compound projectiles, uniting the good and correcting the bad qualities of dif¬ ferent metals, have sometimes been used. Thus, at the siege of Cadiz, cast-iron shells filled with lead, forming projectiles of great strength and density, were thrown from mortars to a distance of three miles and three- quarters.

Projectiles may be either spherical or elongated. Spherical projectiles are commonly used in smooth-bored cannon, and for this purpose have certain advantages over those of oblong form: (1) They touch the surface of the bore at only one point, and are therefore less liable to wedge in the bore and en¬ danger the safety of the piece; (2) the cen¬ tres of figure and inertia coincide; (3) the mass is embraced in the least possible colume; (4) as they turn over in their flight, the sur¬ face presented to the resistance of the air is uniform and a minimum; (5) in ricocheting on land or water, their rebounds are more certain and regular, and less derivation occurs from the plane of fire.

In order that any advantage may be gained from an oblong projectile, it must move

pointed projectile in the time of Louis XIV ; the cavity was divided into two compartments ; the front one was filled with leaden balls and powder, and the rear one with powder only. The flight of these projectiles was uncertain and irregular, some of them bursting in the

— Base Couer

I

{ (— -Base Couer Groove and calking H-ire.

| | i —Rolaling Band. j — Steel Shell.

I – Base Belonahng iCuze, jifedium Caliber

Common Steel Shell.

air, and others striking the object sidewise. Another plan of this kind, proposed by Thiroux, is to make the projectile very long, with its rear portion of wood, and its point of lead or iron, somewhat after the manner of an arrow.

Attempts have also been made to give an elongated projectile a motion of rotation around its longer axis: (1) By cutting spiral grooves on the base for the action of the gas from the charge; (2) by forming such grooves on the forward part for the action of the air; (3)

combining the preceding methods in the same projectile; (4) by causing the air to enter a cavity at the front end, pass through nearly the length of the cylinder, and escape by radical openings at the sides. None of these plans have succeeded in practice, for the reason, per¬ haps, that the projectile naturally turns over end for end, and the charge and the air do not act with sufficient promptness, energy, and cer¬ tainty to prevent it. An oblong projectile, thrown under a high angle and with a moderate velocity, can have rotation about its shortest axis arrested by attaching to its rear portion a light body by means of a chain or cord; the resistance which this body experiences from the air will cause the projectile to move point foremost. Projectiles with wide flanges or wings, operated by springs by which they were extended after the shot left the piece, have been tried, but without success.

Projectiles may be further classified ac¬ cording to their construction and mode of operation, as solid, hollow and case shot. Solid projectiles produce their effect by im¬ pact ; they are used in guns and in small-arms ; those for guns are known as solid shot or shot, and those for small-arms as bullets. Such pro¬ jectiles are required when great range, ac¬ curacy and penetration are sought; they must, therefore, possess great strength and density, and be fired with large charges of powder.

Shells are hollow shot which act both by impact and explosion, for which purpose they contain an explosive and a fuse to ignite it at the proper time. As they have less strength, they are fired with smaller charges of powder than solid projectiles, and are used against animate objects and such

inanimate ones as will not cause them to break on striking. The thicker the sides of a shell, the greater its ability to resist the shock of discharge, and the greater the penetration and accuracy; on the other hand, a shell should be capable of con¬ taining sufficient explosive or incendiary ma¬ terial to accomplish the proposed end. The number of pieces resulting from an explosion varies with the brittleness of the metal, and is increased by giving to the interior the form of a regular polyhedron. A dodecahedral form has been found advantageous. The most rapid and violent explosive practicable should be employed ; the size of the fuse-hole should be as small as possible, and should diminish with the size of the cavity, to prevent the loss of too great an amount of gas. Case-shot act only by impact; they consist of a collection of small projectiles enclosed in a case or envelope. The envelope is intended to be broken, either in the piece by the shock of discharge, or at any point of its flight, by a charge of powder, inclosed within it ; in either case, the contained projectiles continue to move on after the rup¬ ture, but cover a large surface, and attain a greater number of objects. These projectiles can be used with effect only against animate objects situated at a short distance from the point of rupture; they are divided into grape, canister and shrapnel. Grenades are projectiles that are commonly thrown by hand, propelled by the rifle or otherwise. Larger projectiles of a similar type, designated as bombs, are pro¬ pelled at low velocities by mortars or other forms of bomb throwers, or are rolled down

the slopes of a work. They are designed to act only by the force of their own explosion. Hand grenades are thrown against troops in mass; for this purpose any spherical projectiles filled with powder only and weighing not over six pounds are suitable; these can be thrown from 20 to 30 yards; they are provided with a short fuse which is ignited with a match, or, in the act of throwing, by a special device. Projectiles have been designated especially for this service. Rampart grenades are intended to be rolled down a breach in its defense, or to be thrown over the rampart, etc. Spherical shells of any size will answer for this purpose ; those unfit for firing may thus be utilized. Shells are fired from guns, from howitzers and from mortars. They are made of cast-iron and their calibre is expressed in the same manner as solid shot of an equal diameter, the thick¬ ness of metal in spherical shells is about one- sixth of the diameter, and their weight, when empty, is generally about two-thirds of that of the corresponding solid shot. In the United States service there are two kinds of spherical shells; one for guns and another for mortars. Each consists of the sides, the cavity, the fuse- hole and the ears; and, in gun-shells, the rein¬ force. The sides are thicker in gun-shells than in mortar shells of the same size, to withstand the high charge of powder with which they are fired. The fuse-hole is used for inserting the charge and to hold the fuse for communicating fire to it. All shells of eight inches or more in diameter have to receive the

<(hooks):> used in lifting the projectile to the muzzle of the piece in loading. The reinforce of metal about the fuse-hole of the gun-shell gives a greater bearing surface to the fuse and prevents it from being driven in by the force of the dis¬ charge ; this reinforce also serves, in a meas¬ ure, to compensate for the metal taken out of the fuse-hole, and thereby render the shell more nearly concentric. In some services shells have in the upper hemisphere, a charging-hole, placed at an angle of 45° with the fuse-hole, through which the charge is poured immediately before the shell is used and after the fuse has been inserted. This is not necessary with the fuses used mostly in the United States service as the powder and fuse can be readily intro¬ duced at the moment of loading.

A carcass is a thick shell which has three additional holes of the same dimensions as the fuse-hole, pierced at equal distances apart in its upper hemisphere, their exterior openings being tangent to the great circle perpendicular to the axis of the fuse-hole. The object of a carcass is to set fire to wooden structures by the flame of an incendiary composition issuing from the holes. This shell has no fuse, and it is not intended to be exploded, although a charge of powder may be placed beneath the composition to prevent it from being approached by the enemy.

A stand of grape-shot is composed of nine small cast-iron balls, disposed in three balls each. The diameter of the balls for grape- shot varies with the size of the piece ; being used at long distances, they are larger than the shot for the corresponding canister. Grape- shot are employed only in the siege and sea- coast services ; as now constructed, they cannot be used in rifled pieces.

The envelope for a stand of canister-shot consists of a tin cylinder, closed at the bottom by a thick plate of cast-iron, and at the top by one of sheet-iron. The plates are kept in place by cutting the ends of the cylinders in strips about 0.5 inch long, which are turned down over the plates. A wire handle is at¬ tached to the top plate. To give more solidity to the mass, and to prevent the contained balls from crowding upon each other when the piece is fired, the interstices are closely packed with sawdust. For a gun 27 small cast-iron balls are used, arranged in four layers, the top of six and the remainder of seven each; this jnakes the diameter of the balls about one-third that of the bore. For howitzers the envelope contains 48 balls, in four layers of 12 each, the balls being smaller than those in a canister for the corresponding gun. Grape-shot and canister are no longer or seldom used, having been dis¬ placed by shrapnel.

Shrapnel are cast-iron shells, in which, be¬ sides the bursting charge of powder, is placed a number of small balls. Their sides are much thinner than those of ordinary shells in order that they may contain a greater number of bul¬ lets ; the thickness must be such that, when supported by the bullets, the case will not be broken by the force of discharge, but will yield readily to a small bursting charge. The weight of the case, empty, is about one-half, and, when filled, about equal to that of the solid shot of the same diameter. This projectile is prepared by filling the case with leaden musket-balls well packed in ; the interstices are then filled with melted rosin; this prevents the fracture of the envelope by the bullets when the piece is fired. The chamber for the powder is after¬ ward bored out. The case is strengthened by a reinforce, and to increase the effect of the bursting-charge, the lower portion of the fuse- hole is closed by a disc of wrought-iron, per¬ forated with a small hole for the passage of the flame from the fuse. A shrapnel may be made to explode at any point of its flight, and, as the bursting-charge should be only sufficient to open the envelope, without scattering the bullets too much, the execution depends on the velocity which the case has at the moment it is broken.

The advantages to be derived from the use of elongated projectiles having once been es¬ tablished, it became necessary that some means should be decided to make their flight accurate. It has been found that to do this with certainty a motion of rotation about its longer axis must be communicated to the projectile, and this end has been satisfactorily attained only by cutting spiral grooves, or ((rifles):> in the surface of the bore of the piece, with which the projectile is connected, and by means of which it starts with a motion about an axis parallel to or coin¬ cident with that of the bore. The rotation con¬ tinues during the flight of the projectile. With¬ out this rotation an elongated projectile will naturally turn over end for end and present a constantly varying surface to the resistance of the air. This «rifle-motion,» therefore, tends to cause the projectile to move through the air in the direction of least resistance, thereby in¬ creasing the range and the effect of impact, and, furthermore, giving steadiness to the pro¬ jectile by distributing the deviating forces uni¬ formly around its line of flight. The more

important advantages of elongated projectiles are that the form may be altered at any time, and the centre of gravity can be placed at any desired point; the projectile may be elongated so as to oppose, for an equal weight, a dimin¬ ished surface to any resting medium ; by this the range is extended, and a flatter trajectory with greater accuracy and penetration obtained. The chief disadvantages are increased strain on the gun; greater probability of jamming and in¬ jury to the bore irregularity of ricochet; increased complication and expense of manufac¬ ture and the liability of any soft metal on the exterior to be accidentally injured.

The different systems of projectiles for rifled pieces are classified according to the man¬ ner in which they are caused to follow the grooves. The systems are distinguished by some peculiarity of construction and are gen¬ erally known by the name of the person by whom designed or by the place at which first made. The same principles are applicable to different systems, and the same precision of fire may practically be obtained from several. All systems are comprised under three classes : (1) Projectiles with projecting ribs or studs, or having a peculiar cross-section. (2) Pro¬ jectiles having a portion that is expanded by the action of the gasses in the bore. (3) Those more or less of whose surface is compressed by the charge into the form. The first and second classes are applicable to muzzle-loading pieces; the third to breech-loaders only. The principal points to 'be considered, as regards the piece and the projectile, are the surest and safest means of causing the projectile to follow the grooves of the piece. To fulfill these condi¬ tions the projectile should be simple in construc¬ tion and of sufficient strength to admit of its use with the largest charge that may be desired; it must not be liable to jam in the bore in load¬ ing or firing, and must produce a moderate and uniform strain on the gun. The system that most nearly complies with these requirements, and gives insured accuracy of fire with uni¬ form and high velocities, should be the best. In many systems, one or more of these consid¬ erations have been sacrificed to some extent, to secure a closer compliance with others thought to be of greater importance or of easier at¬ tainment.

1st Class. — Solid flanges, projecting from the body of a projectile, and so shaped as to fit the rifling of the bore, were the means first used to communicate the rifle-motion in cannon. In some cases there was for each groove a rib extending the entire length of the cylindrical portion of the projectile, while in others sets of rounded buttons were employed. These projec¬ tions were of the same material as the body of the projectile, and, being of a very unyielding nature, frequently led to the bursting of the piece ; buttons of zinc, copper or bronze, firmly secured in mortises in the projectiles, were therefore adopted. The buttons are arranged in rows or two or more so that each row enters freely into a corresponding groove, in loading. When the bore of a gun is a twisted prism, with any plane figure for its base, the projec¬ tile, if shaped to it, will receive the rifle-motion when fired. The Whitworth cannon is rifled in this manner, the cross-section being a hexa¬ gon with rounded corners. Guns have also been constructed with ribs projecting from the

bore, fitting into corresponding grooves in the projectile. To the last system

belongs the Vavasseur gun, which has given good results, The principal advantages of systems of the first class are that the projectiles are strong and that the required motion is communicated to them with great certainty and regularity. The escape of gas around the projectile, as it causes injury to the bore, is an objection to the class; various experiments have been made to over¬ come it, one being by the attachment of a metal cup to the rear of the projectile, which, by the action of the powder, is expanded and presses against the sides of the bore. The French studded projectile, employed with muzzle-load¬ ing cannon, and the Woolwich system, similar to it are the best representatives of this class.

2d Class. — In projectiles of the second class the body is composed of a hard metal, as cast- iron, and there is attached to it, generally at the base, a cup, band or other arrangement of softer metal, which is expanded by the action of the charge into the grooves of the gun, when fired. Expanding projectiles are easy to load, are not liable to overstrain the piece, and those of different systems can generally be fired from the same piece — a point of great importance. Such projectiles do not always withstand the heaviest charges of powder, and are not certain to receive the rifle motion. The use of projec¬ tiles of this class is confined more particularly to the United States.

3d Class. — In breech-loading cannon the receptacle for the charge is of a larger diame¬ ter than the bore of the piece. The projectile is of the same size as this chamber, and must be reduced to enable it to pass into the bore. Such projectiles are embraced under the third class; the body has a coating of soft metal, which is compressed as the projectile is driven through the bore, the grooves compelling it to follow the direction of the rifling. The same result is sometimes accomplished by one or more rings of soft metal. The chief advan¬ tages of this class are that the projectile is gen¬ erally certain to take up the rifle-motion ; that its axis is steady on leaving the bore, and that the wear of the bore, from gas passing the pro¬ jectile or from any irregular movement of the latter, is prevented. The objections are that the necessary compression of the coating, the sud¬ den closing of windage and the fouling of the bore produce undue strain upon the piece ; that the velocity of the projectile is reduced by the force expended in compressing it ; and that the soft metal forms an extra weight, which is useless in penetrating resisting objects.

Edward S. Farrow,

Consulting Military and Civil Engineer.

PROJECTION. (From the Latin pro- jicere, to throw forward). In its general sense, the term signifies the representation of the form of a given

figure upon a given surface by means of a pencil of visual, light, or other rays in such a manner that the figure in the pro¬ jection corresponds point by point to the given figure. For example, shadows are the pro¬ jections of objects upon different surfaces which intercept the rays of light from any source, not already intercepted by the objects them¬ selves. They represent the most elementary forms of plane projections, and while corre¬ sponding in general outline to the objects pro¬

jected, yet differ from them to a greater or lesser extent according to the distance of the object from the source of light, the distance of the plane of projection from the object, the angle between the plane of projection and the direction of the rays of light, the position of the observer's eye, etc.

In the mathematical construction of pro¬ jections, however, instead of a single plane being used to intercept the projecting rays, another surface, such as one formed by two planes at right angles to each other, is taken and the various points of any object, plane or in space of three dimensions, projected to that surface from any point assumed as the center of the projection.

When the projection shows three dimensions of the object projected, it is commonly known as perspective, the mathematical theory of which together with the various classes of such pro¬ jections employed in mechanics and for solving the problems of applied mathematics, will be found under the title Perspective in this En¬ cyclopedia. The present article is confined to the consideration of the various projections used in connection with geographical and geodetical work in general, and to their em¬ ployment in the construction of maps for special purposes.

In general the word ˆprojection,® when used with reference to maps, has nothing whatever to do with geometrical projection from a point. It simply refers to a transformation of latitude and longitude on the spherical or spheroidal earth into planer magnitudes. A suitable in¬ troduction to this particular phase of the sub¬ ject is given under the title Map in this Encyclopedia, wherein the three principal per¬ spective projections of the sphere — the ortho¬ graphic, the stereographic and the gnomonic, are clearly explained and illustrated. Of these, the orthographic and the stereographic are rarely used at the present time except in the construction of what may be called pictorial maps ; but, the gnomonic and several of its modifications are extensively used for the con¬ struction of star charts in general, and espe¬ cially for charts showing the apparent tracks of shooting stars on account of the facility in determining the radiant point, the great circles on the celestial sphere appearing as straight lines on the projection. For similar reasons it is used in the construction of sailing charts showing steamship routes, and is much more satisfactory for this purpose than

Mercator's projection, which although almost universally used for nautical charts, is specially applicable for those used by sailing ships.

The chief value of the perspective projec¬ tions lies in their adaptability for representing large areas of the earths surface. Usually, they represent a hemisphere; but, by the employ¬ ment of the projection first proposed by Lahire in 1701 and subsequently modified by Lieut. Col. H. James of the Ordnance of Great Britain and Ireland, fully two-thirds of the sphere can be shown within the bounding circle. This is ac¬ complished by assuming the eye above the sphere at a distance equal to half the radius and perpendicular over the center of the plane of projection. The plane of projection is not that of a great circle, but is parallel to it and re¬ moved from it nearer to the eye by 23 degrees.

A simple and easily constructed projection which can be effectively used in representing a hemisphere may be briefly described as follows : Draw a circle and bisect it by horizontal and vertical diameters; divide the circle into equal parts representing degrees of latitude; divide the vertical diameter into a corresponding num¬ ber of equal parts; and divide the horizontal diameter into equal parts representing degrees of longitude. This will establish three points in every parallel of latitude, i.e., two in the cir¬ cumference and one in the vertical diameter, through which the arc of a circle may be drawn representing the corresponding parallel of lati¬ tude, and also three points in every meridian, i.e., one at each pole and one in the horizontal diameter or equator, through which the arc of a circle may be drawn representing a meridian.

The general method of constructing de¬ veloped projections has been briefly described under the title Map in this Encyclopedia; but, as all modern maps representing data ob¬ tained from precise trigonometrical surveys are based upon some form of developed projection, the mathematical theory and the practical meth¬ ods of construction of such will receive more extended treatment herein.

The various projections form three definite groups — (1) those possessing straight meridians and parallels, (2) those of mixed systems of straight and curved meridians and parallels, and (3) those in which both meridians and parallels appear as curved lines.

Of the first group, the one most extensively used is Mercator's projection. It was devised to satisfy the following condition : That the loxodromic curve

or the course of a ship on the surface of the sea, under a constant bearing or intersecting the successive meridians at the same angle, shall appear on the projection as a straight line having the same angle of bearing

with respect to the meridians intersected as that of the loxodromic curve.

The formula used in computing a table of <(meridional parts® or the (

Referring to Fig. 1, let / c be an element of the loxodromic curve between two consecutive meridians m e, m e' ; and let L C represent the corresponding element on the projection between the corresponding meridians M E, M' E\ Let / p and L P be taken parallel to

the corresponding equatorial elements e e' and E E' between the same meridians.

Then, the condition that the angles of bear¬ ing l c p and L C P shall be equal requires that

CPˆLP

c p l p

or since L P = E E'=e e' the element on the terrestrial equator, it is necessary that

C P e e

c p Ip'

Hence, putting d s for the meridional element c p of the terrestrial spheroid, d m for the meridional element C P of the projection, a for the equatorial radius of the earth, and r for the radius of the parallel represented by the element / p ; then, on account of the proportion¬ ality of the elemental arcs e e,' l p, to their respective radii a, r, we have the fundamental equation

dm a

d s r

which expresses the law of the Mercator pro¬ jection.

Then, if L be the latitude of the terrestrial parallel under consideration, R the radius of curvature of the terrestrial meridian at its. point of intersection with the parallel, c the compression of the earth, and e its meridional eccentricity; we have the folowing expression for the properties

of r, R, and e of the terres¬ trial spheriod considered as an ellipsoid of revolution :

a — cos L

R

d-e2 a (l

sin2 L) ˆ -e2)

(\ — e2 sin2 L) f

e — V 2c — c2 .

Now, since the radius of curvature varies inversely as the angle between consecutive normals, the element of the terrestrial meridian at its intersection with any parallel of latitude is equal to the product of the radius of curva¬ ture and the element of latitude at that point, and

ds — R. dL,

which being substituted in the fundamental

equation gives us the expression

, a R. dL

dm — – -

r

for the element of the projected meridian, or by substituting the preceding values of r and R, we have

dm- “ 0-fJ) rfL

the proper any finite

(1 — e2 sin2 L) cos L ’ which when integrated between limits give required length of portion of the projected or chart meridian cor responding to the meridional arc on the ter¬ restrial spheroid within the same limits.

For this integration, multiplying e2 in the numerator by sin2 L + cos2 L, we have

, a. dh ae 2 cos L. dL

am — ~ – ; — ■ i

cos L 1 — e2 sin2 L

again, multiplying the numerator and denomina¬ tor of the first term by cos L, substituting 1 — sin2 L for cos2 L, and resolving both terms into partial fractions, we have the expression

, a (cos L . cos L \ IT ae

dm = – I . — r + – : — r dL — —

2 \1 f sm L 1 — sin L / 2

e cos L . e cos L

(

1 -f e sin L 1 — e sin L

)

dL,

whence, by performing the integration or the limits of O and L, we find for the length of that part of the meridian of the projection in¬ cluded between the equator and the parallel of latitude L, the expression

*m = M [l log i>n * l0g 1 — e sin L/*

in which the logarithms belongs to the common system,, of which M is the modulus. Substituting for

1 t sin L 1 — sin L

its trigonometrical equivalent, and for

log

1 + e sin L. 1 — e sin L

its algebraic development, we have the final expression

m=ˆj[lo& tan (45°

• — a (e 2 sin L j ˆ e4 sin3 L + £ e6 sin5 L.)

which is the formula required for computing the meridional parts for the terrestrial spheroid.

This formula consists of two parts — the first ' term being the ordinary formula for computing meridional parts with the earth regarded as a sphere, while the second term consists of a series of negative terms, and represents the correction which must be applied for the meridional eccentricity of the earth under the hypothesis that it is an ellipsoid of revolution.

In using the formula to compute the ac¬ companying table, the following numerical values with their respective logarithms have been employed for the several constants.

The equatorial radius is expressed in minutes of arc, therefore, the unit of measure of the meridional part m becomes a minute of the equator or a geographical mile. •

10,800′

a — – =3437'.74677 . log 3.5362739.

7 r

The reciprocal of the modulus of the com¬ mon logarithms,

1

— = 2.3025851 . log 0.3622157.

M

Bessel's determination of the compression,

1

c = – = 0.003342 773 . log 7.5241069.

100.1528

The meridional eccentricity of the earth,

e=V 2c-c = 0.0816968 . log 8.9122052.*

The values of the several coefficients with their logarithms deduced are as follows:

— = 7915'.7055 . log 3.8984896

M

aca= 22'.9448 . log 1.3606843

h ae = 0'.05 104731 . log 8.7079734*

i ae9— 0'.000204425 . log 6.3105351

On account of the rapid convergence of the series of coefficients involving the eccentricity, two terms are generally sufficient for practical use, and the formula becomes

L

m = 791 5\7055 log tan 45° + — 22'.9448

2

sin L + 0'.05 104731 sin L.*

Table of Meridional Parts or Increased Latitudes for the Terrestrial Spheroid —

1

Compression – .

299.1528

Lats.

Increased

Lats.

(M.)

Lats.

Increased

Lats.

(M.)

Lats.

Increased

Lats.

(M.)

O

/

O

/

O

t

1

59.60

31

1,946. 19

61

4,629.12

2

119 22

32

2,016. 22

62

4,754.69

3

178.88

33

2,087. 02

63

4,884.46

4

238.59

34

2,158.64

64

5,018.76

5

298.38

35

2,231.12

65

5,157.98

l6

358.26

36

2,304.49

66

5,302.51

7

418.25

37

2,378.81

67

5,452.84

8

478.37

38

2,454. 12

68

5,609. 50

(9

538.64

39

2,530.48

69

5,773.10

10

599 . 09

40

2,607.93

70

5,944.31

11

659.71

41

2,686.53

71

6,123.96

12

720.55

42

2,766.34

72

6,312.97

13

738.62

43

2,847.43

73

6,512.44

14

842.93

44

2,929.86

74

6,723.64

15

904.52

45

3,013. 70

75

6,948.13

16

966.40

46

3,099.02

76

7,187.76

[17

1,028.59

47

3,185.91

77

7,444. 80

18

1,091.12

48

3,274.46

78

7,722.07

19

1,154.01

49

3,364.74

79

8,023.14

20

1,217.29

50

3,456.87

80

8,352.55

21

1,280 97

51

3,550.95

81

8,716.35

22

1,345.09

52

3 , 647 . 09

82

9,122.69

23

1,409.66

53

3,745.41

83

9,582.99

24

1,474.72

54

3,846.05

84

10,114.02

25

1,540.29

55

3,949. 14

85

10,741.71

26

1,606.41

56

4,054.85

86

11,509.61

27

1,673.10

57

4,163.35

87

12,499.22

28

1,740.38

58

4,274.81

88

13,803.54

29

1,808.31

59

4,389.44

89

16,267.70

30

1,876.90

60

4,507.46

90

Infinity.

On account of the space limitations the table gives the meridional parts for even degrees of latitude only; the values for intermediate minutes or seconds of arc may be computed iby the formula.

If the chart for which the projection is made includes the equator, the values given may be measured off for the successive degrees of latitude directly from the equator; (but, if the equator is not included in the map, the parallels of latitude to be projected should be succes¬ sively measured from a principal parallel, preferably the lowest parallel drawn upon the map, and the distance of any parallel from the principal parallel will be the difference of the values given for the two in the table.

These values, given in minutes of arc, may be converted into their equivalents in inches, yards, meters, etc., and laid off on the nrojection by means of properly divided corresponding scales, proportionately to the scale adopted for the map, or the values given may be laid off without previous numerical conversion, by means of a diagonal scale constructed on the map.

For example — suppose a Mercator projec¬ tion is required to embrace the coasts of Ice¬ land, on a scale of 1-inch = 150 statute miles. This island lies between latitudes 63° and 67° north, and between longitudes 13° and 25° west from Greenwich. The projection will in¬ clude four degrees of latitude and 12 degrees of longitude. The central meridian will cor- •respond to longitude 19° W., and the lowest parallel will correspond to latitude 65° N. See Fig. 2.

Draw in the centre of the sheet a vertical

straight line A B, for the central meridian, and statute miles; 660.72 5 150 = 4.40 inches or the near the bottom of the map construct very care- distance of the narallel of 67° from the iullv a horizontal line C D, at right angles to parallel of 63° on the map, on a scale of 1-inch

A B, for the parallel of 63° N., and assume it as the principal parallel of the map. From the table obtain the value 4884'. 46 for lat. 63° and 5452'.84 for lat. 67°, the differ¬ ence of which or 5452'.- 84 — 4884'. 46 = 568'.38, the value of the meri¬ dional arc included be¬ tween the lowest and the highest parallels of latitude of the map, for which one minute

of arc of the equator _

= 1.012 statute miles is taken as the unit of measurement. Convert¬ ing this value to its equivalent in statute miles and reducing it, to the scale of the map, gives 568'. 38 60 =

9°.47; 9°.47 X 69.77 statute miles (equivalent to a degree of longitude on the equator) 660.72

Scale. l-mch«ISD Stsl. Wile#.

Fig. 4.

= 150 statute miles. It is obvious that this measurement may be laid off on the map by means of any scale di¬ vided to the decimals of an inch, and the dis¬ tance of each of the other parallels from the principal may be ob¬ tained by the same method of conversion, and laid off in a similar manner ; but, having ob¬ tained the value 4.40 inches equal to the ver- _ tical extent of the map, v- we are enabled to de¬ termine a constant mul¬ tiplier by the use of which the tabular values may be laid off directly by means of a diagonal scale (q.v.) of one inch without pre¬ vious numerical conversion. As 1′ of arc of the equator is taken as the unit of the meridional

arc, 1′ of arc of latitude will measure 4.40 inches j 568'. 38 — 0.0077 inches, which corre¬ sponds to the scale of the map and by which all the

values obtained from the table must be multiplied if they are to be laid off on the projection by means of a diagonal scale of one inch.

The distances of the successive parallels from the parallel of 63° thus obtained are as follows:

0.0077 X (5018.76 — 4884.46) = 1.03 in. (64°)

0.0077 X (5157.98 — 4884.46) = 2.11 in. (65°)

0.0077 X (5302.51 — 4884.46). = 3.22 in. (66°)

0.0077 X (5452.84 — 4884.46) = 4.40 in. (67°)

These distances may now be laid off upon the central meridian from its intersection with the principal parallel in the order 1, 2, 3, 4 shown on Fig. 2, and through the points thus obtained straight lines may be drawn parallel to the principal parallel, and corresponding to the terrestrial latitudes of 64°, 65°, 66° and 67°.

On this map, a degree of longitude will measure 0.0077 inches X 60 = 0.46 inches and the distances of the successive full degrees of longitude east and west of the central meridian will be 0.46, 0.92, 1.39, 1.83, 2.31, 2.77 inches. Lay off these values on the lowest, middle and highest parallels of latitude, east and west from the central meridian, in the order a, b, c, d, e, f, and through the points thus obtained draw straight lines parallel to the central meridian and corresponding to the terrestrial longitudes of 13°, 14°, 15°, 16°, 17°, 18°, 19°, 20°, 21°, 22°, 23°, 24° and 25°, west from Greenwich. Another important projection in which both meridians and parallels are represented by straight lines is the cyclindrical equal area projection, formed by projecting the surface of the earth from its axis on to a cvlinder tangent at the equator and unrolling. While showing extreme distortion in regions remote from the equator, this map has the valuable property of representing areas truly.

The second group of projections, those hav¬ ing mixed systems of straight and curved merid¬ ians and parallels, including various kinds of <(equal surface® and "conic® projections, of which the "simple conic® is the most valuable for general purposes. In this projection it is assumed that a cone, the apex of which lies in the axis (produced) of the sphere, is tangent to the surface of the sphere along a parallel of lati¬ tude. When the surface of the cone is de¬ veloped on a plane, the parallel of tangency be¬ comes an arc of a circle, having for its radius the slant side of the cone which is equal to the cotangent of the latitude. A part of this de¬ veloped arc of a circle, of sufficient length to include the desired number of degrees of the proposed map, is drawn through the middle point of the central meridian and forms

the middle parallel of the map. The central merid¬ ian north and south of this line is divided into degrees of latitude laid off according to scale proportional to their true lengths on the sphere, and parallels of latitude concentric to the mid¬ dle parallel are drawn through the several points thus obtained. In a similar manner, the middle parallel is divided into degrees of longi¬ tude east and west of the central meridian and straight lines representing meridians are drawn through those points to the centre from which

the concentric parallels were swept. In the sys¬ tem of co-ordinates thus established, the parallels and meridians intersect each other at right angles, precisely the same as on the sphere. The lengths of the degrees on the central meridian and on the middle parallel are proportionately the same as those on the sphere, and the lengths of the degrees on all the other meridians and parallels are but slightly different from what they would be if laid off their true length proportioned to those of the sphere.

In general, a conical projection is one which transforms the meridians into a pencil of straight lines, the angle between two of which is in a fixed ratio to the angle between the two meridians which they represent. The parallels will then form a family of concentric circles, and the particular form of the projection will be determined by the relation which the radius of such a circle will bear to the polar distance of the corresponding parallel. Let the radius of the circle be r , the polar distance p, the angle between a meridian and a fixed meridian of reference on the sphere be 6 and on the map , Let our unit of distance be the radius of the earth. It is clear that the method of mapping will be completely determined by the equations

r=f (P)

The scale of representation of meridian dis

• dvˆ

tances on the map at (Pi, 0i) will be ~r—f' (Pi) The scale of representation of distances along

the parallels will be If our scale of

*sin Pi **

representation is to be the same in all direc¬

tions, r — k (tan –) c, where k is an arbitrary

constant. This gives what is known as the orthomorphic conical projection. If the scale representation at a point p remains fixed, while c decreases toward O, the map will approach a mercator projection. If c— 1, the angles be¬ tween meridians on the map will equal those on the earth, and we shall have the stereographic projection. If c— 1, no matter what relation the meridian and parallel scales bear to one another, our projection is said to be zenithal, as are similar projections, where other families of concurrent great circles replace the meridians. If the meridian scale of a zenithal projection is fixed we have what is known as the equi¬ distant projection; if the projection is coni¬ cal but not zenithal it is said to have rectified meridians. If the meridian and parallel scales of a conical projection are reciprocals, areas are preserved proportionally. If the projection is also zenithal it is sometimes called Lorgna's projection. A form of zenithal pro¬ jection in which the deformation is distributed and minimized is due to Sir George Airy.

Two other forms of projection which may keep the meridians or the parallels straight are that of Mollweide, in which parallels are straight lines and meridians ellipses, and areas are retained, although with great deformation of the peripheral parts of the map, and the prc>- jection which simply plots in cartesian

ordinates the spherical or spheroidal co-ordi¬ nates of points on the surface of the earth with reference to any given great circle or ellipse.

Of the projections, one of the most useful and extensively used is that devised by Bonne. It is sometimes called Flamsteed's modified pro¬ jection, but the latter, which is more correctly Sanson's projection, is really the particular case of the former, in which the parallel of reference is the equator. Bonne's projection differs from the ((simple conic" in that each of the con¬ centric parallels of latitude is divided into de¬ grees of longitude, the lengths of which are proportional to their true lengths on the sphere, and curved meridians are drawn through each corresponding series of points. The central meridian remains a straight line and the curva¬ ture of the arcs of the successive parallels is the same as that of the middle parallel, the radius of which is equal to the cotangent of the corresponding latitude. Thus, all the meridians intersect a parallel near the middle parallel at right angles and the outlines of areas on the projection are very nearly similar to those on the sphere. It not only preserves the propor¬ tionate

equality of the areas on the sphere and projection, but permits of the use of the same

l

i

9

9

Fig. 3.

linear scale for all parts of maps of only a few degrees in extent. This projection was adopted as the base for the important map of France constructed by the depot de la Guerre in 1803.

The step from the simple conic to the Bonne was an important one; but, the great obliquity of the meridians and parallels in the higher latitudes made it unsuitable for maps of large

extent and led to the invention of the "poly¬ conic" projection, which appears to have been conceived by F. R. Hasler, superintendent of the United States Coast and Geodetic Survey, between 1816 and 1820. It was proposed by him as the most suitable base for the maps of the Atlantic Coast of the United States, the great length of which, north and south, to¬ gether with its direction nearly diagonal to the meridians and parallels, made it subject to inadmissible deviations in magnitude and figure upon a Bonne projection.

In the simple polyconic projection, it is as¬ sumed that each parallel of latitude is devel¬ oped upon its own cone, the vertex of which is on the axis of the sphere at its intersection with the tangent to the meridian at the parallel. Theoretically, this involves the employment of an infinite number of tangent cones and the independent development of an infinite number of parallels of latitude. This has the effect of increasing the lengths of the successive degrees of latitudes and longitudes as their distances from the central meridian increases ; but the angles at which the meridians intersect the parallels, over the entire map, very closely ap¬ proximate to right angles, thus preserving a close similarity between the figure on the pro¬ jection and the corresponding figures on the sphere.

The mathematical theory of this projection may be briefly stated as follows : Referring to Fig. 3, the equatorial radius being a , the eccentricity e, and the latitude L, the normal produced to the minor axis is

(/ — e2 sin2 L)£

the radius of the parallel

Rp = N cos L;

and the sides of the tangent cone or radius of the developed parallel

r = N cot L.

If n be any arc of the parallel to be developed, and © the angle which subtends it at the vertex when developed

0— n sin L;

and as the developed parallels are circular arcs, the co-ordinates of curvature are

x — r sin 0,

y — r versin 0 = 2 r sin2 1 0 = r tan £ 0.

The radius of curvature in the meridian is

a(l — e2) Ns l — e2

Rm~(l — e2 sin2L)f as 1

whence the length of a degree of latitude is

3600 R m sin /".

and that of a degree of longitude is 3600 R p sin /".

For maps of large extent on a small scale, it is sufficient to compute r and 0, x and y,

i'or every whole degree, but for those of small extent, on a large scale, a more detailed pro¬ jection becomes necessary and these values have to be computed to every minute or frac¬ tion of a minute according to the nature of the data to be represented, and the value of the scale adopted.

To make a projection from the data fur¬ nished by a polycohic projection table, draw a straight vertical line for the central merid¬ ian and lay off

thereon the distances cor¬ responding to the intervals between the suc¬ cessive latitudes required, and through the points thus obtained draw horizontal lines at right angles to the central meridian. These horizontal lines will be tangent to the developed parallels.

Now suppose, that as in the case of the Mercator projection hereinbefore illustrated, the polyconic projection is required to embrace the coast of Iceland, which lies between lat. 63° and 67° north, and between long. 13° and 25° west from Greenwich, and that the scale of the map is adopted at 1-inch = 150 statute miles.

Referring to Fig. 4, inserted under Fig. 2, the central meridian of the map will corre¬ spond to long. 19° west, and the middle parallel will correspond to 65° north. On the cen¬ tral meridian lay off to the north from its intersection with the middle parallel, according to the adopted scale, 69.268 miles for lat. 66°, . and 69.277 miles for lat. 67°, and in a similar manner lay off to the south, 69.258 miles for lat. 64°, and 69.248 miles for lat. 63°. Through these points draw hori¬ zontal lines at right angles to the central meri¬ dian, and upon each of them set off to the east and to the west of the central meridian the values of x given in the table for the corre¬ sponding parallels of latitude. Through the points x, x1, x 2, etc., thus obtained, draw per¬ pendiculars toward the pole, and on them set off the proper tabular values of y. Through the. final points thus obtained, draw continuous curves for parallels of latitude and meridians.

Space limitations in this Encyclopedia make it absolutely impossible to insert a polyconic table computed to even full degrees only, and one giving the values of x and y for greater latitudinal and longitudinal intervals would be more or less useless. Tables of this kind may be readily obtained from the United States Coast and Geodetic Survey, and the United States Hydrographic Office, Navy Department.

Fig. 4 is placed under Fig. 2 in order to af¬ ford a direct comparison of the two projections.

In the rectangular polyconic projection, while the parallels are the same as in the simple polyconic projection and the central parallel retains the same graduation, the merid¬ ians are orthogonal trajectories of the parallels.

Bibliography. — For further information consult the. various authorities given under the title Map in this Encyclopedia. Consult also d'Avezac, (Coup d'oeil historique sur la projec¬ tion des cartes geographiques5 (in the publica¬ tions of the Societe de geographic de Paris for 1683) ; Craig, T., (A Treatise on Projections) (Washington 1882) ; Germain, A., (Traite des projections des cartes geographiques5 (Paris

1865).

Revised by Norbert Wiener.

PROJECTION, Oblique and Axonomet-

ric. See Drawinq, Mechanical.

PROJECTIVE GEOMETRY. See Geom¬ etry, Pure Projective.

PROLAPSUS ANI, falling of the anus. See Rectum.

PROLAPSUS UTERI, falling of the womb. See Womb and Its Diseases.

PROLETARIATE, prd-le-ta'ri-at, a gen¬ eral term applied to those Roman cities who stood in the sixth class, possessing less than 1,500 asses, or nothing at all. They were ever afterward distinguished by the name of capite censi, apparently because they were taxed only by head. The term has been revived in modern times as a designation of the lowest class of the community who possess no capital and is frequently used in socialistic literature. Con¬ sult Broda, R., and Deutsch, 1., cDas Moderne Proletariat (Berlin 1910) ; Crapsey, A. S., (The Rise of the Working Class) (New York 1914) ; Gongenot des Mousseaux, H. R., (Des Proletaires, etc.5 (Paris 1846) ; Halbwachs, M., (La Class Ouvriere les Niveaux de Vie) (Paris 1913) ; Huber, J., (Des Proletaries (Munich 1865) ; Kampfmeyer, P., (Das Moderne Pro¬ letariat (in (Moderne Zeitfrozen,5 No. 12, Berlin n. d.) ; Kantsky, K., (The Working Class) (translated by D. De Leon, New York 1911) ; McCarthy, J. P., (The Rise of Dennis Hathnaught5 (Brooklyn 1915) ; Magnon, F., (£tudes Sociales5 (Paris 1913) ; Proudhon, P. J., (De la Capacite Politique des Classes Ouvrieres5 (Paris 1865) ; Simon, J. F. S., (L'Ouvrieres5 (Paris 1861); Sombart, W., (Das Proletariat5 (Frankfurt 1906) ; Villard, A., (Histoire du Proletariat Ancien et Moderne5 (Paris 1882).

PROLOGUE, in dramatic poetry, (1) in the Greek drama, that part of a tragedy preced¬ ing the first appearance of the chorus. (2) In the Roman and English drama, an address to the audience preceding the piece itself. It may be either in prose or verse, and is usually pro¬ nounced by one person. Among the Romans the player who delivered this address was called the prologus, and usually considered as a per¬ son of the drama. Thus in the (Amphitryon 5 of Plautus (q.v.) Mercury appears as prologus. Prologues sometimes relate to the drama itself, and serve to explain to the audience some cir¬ cumstances of the action, sometimes to the situation in which the author or actor stands to the public, and sometimes have no immediate connection with either of these persons or sub¬ jects. Shakespeare makes use of the prologue, as in c Henry V5 and the

Restoration drama almost invariably employed it. Amongst other famous dramatists who have used the prologue may be mentioned Goethe, Schiller, Moliere, Racine, Ben Jonson and Dryden. It long since fell into disuse, but is occasionally revived for the effect of quaintness. Consult Archer, W., (Play Making) (London 1912) ; B. G. S., (A Study of the Prologue and Epilogue in English Literature from Shakespeare to Dryden5 (Lon¬ don 1884) ; Dryden, J., (Dramatic Pcesie5 (in (Essays,5 Vol. I, Oxford 1900) ; Freytag. G., (Technique of the Drama5 (Chicago 1908); Griffith, A. F., ed., (A Collection and Selection of English Prologues and Epilogues from Shakespeare to Barrick5 (4 vols., London 1779) ; Matthews, Brander, (A Study of the Drama,5

(New York 1910) ; Schlag, H., (Das Drama) (Essen 1909) ; Schlegel, A. W. von, (A Course of Lectures on Dramatic Art and Literature) (2 vols., London 1846) .

PROME, prom, India, (1) a town of Lower Burma, capital of a district of the same name, on the Irrawaddy, about 160 miles north of Rangoon by rail. It is a large town sur¬ rounded by a wall, with extensive suburbs ; owing to the flat ground on which it is built it is subject to inundations from the river. It has silk-weaving, lacquer and other industries, and exports silk, rice, cotton, etc. On one of the many hills near the town stands the Schwe-Tsan-daw Pagoda, one of the most famous pa¬ godas of India. Pop. about 30,000. (2) The district has an area of 2,914 square miles, and a pop. about 375,000. In ancient times there was a kingdom of Prome which is known to have flourished for many years, but regarding the history of which next to nothing is known now. At the end of the Second Burmese War in 1853, Prome together with the balance of the province of Pegu became British territory. Consult Beylie, L. M. E. de, 'Prome et Samara, Voyage Archeologique en Birmanie et en Mesopotamie) (in Societe Francaise des Fouil- les Archeologiques. Publications, No. 1, Paris

1907) .

PROMESSI SPOSI, I, pro-mes'se spo'ze e, an Italian romance by Alessandro Manzoni (q.v.), written between 1821 and 1825 and pub¬ lished in Milan in 1827, dealing with Milan under the Spanish rule of the 17th century. In fidelity to life, the interest of its principal characters and the beauty and truth of its de¬ scriptions, it stands as the greatest Italian his¬ torical romance, and its author as the creator of a school of historical novelists. A revised edition was published in 1842. Many other editions have been

published since then, the best being that prepared by P. Bellezza (Milan

1908) . A condensed edition was brought out by J. Geddes and E. H. Wilkins (Boston 1911). It has been translated widely, the best English translations having been published as part of 'Bohn's Novelists' Library) (London 1883) and 'Collier's Harvard Classic.s) (New York 1909). A number of dramatizations of the story have been made, none of them, however, approach¬ ing in importance the original. Consult D'Ovidio, F., 'Le Correzioni ai Promessi Sposi e la Questione della Lingue) (Naples 1895) ; Holland, R. S., (Builders of United Italy) (New York 1908) ; Howells, W. D., 'Modern Italian Poets (New York 1887) ; Negri, G., 'Sui Promessi Sposi di Alessandro ManzonP (Milan 1903-06).*

PROMETHEUS, pro-me'the-us, in Greek mythology, son of Iapetus the Titan and Clymene (according to Hesiod), or Themis (according to ˆEschylus), or Asia (according to Apollodorus). He is the legendary giver of fire and all its benefits to men. In Athens Prome- thus had an altar in the academy and a special festival was devoted to him. Hesiod and vEschylus (q.v.), the latter of whom made his story the subject of a trilogy of which one tragedy, 'Prometheus Bound > (q.v.), is alone extant as a whole, are our chief authority for the myth concerning Prometheus. He is repre¬ sented as the brother of Atlas, Menoetius and Epimetheus. According to yEschylus, Prome¬

theus took part with Zeus against his brother Titans and by his craft and sage counsel ren¬ dered Zeus victor and enabled him to ascend his father's throne. Later, objecting to the plan of Zeus to destroy mankind and create a new generation of beings, he helps the weak race of mortals by stealing fire from the lightnings of Zeus and giving it in a hollow reed to men, to whom it had been till then denied. In re¬ venge Zeus has Prometheus chained to a rock in the Caucasus by Hephaestus and his helpers Kratos and Bia, and sends a vulture to tear forever at his vitals, not allowing him to end his pain by death. Steadfastly Prometheus bears his doom, aware that in time Zeus will fall by the hand of a son born to himself and Thetis. Heracles, with the consent of Zeus, slays the vulture and releases Prometheus, who returns to Olympus and thereafter is the wise counsellor of the gods. It is in the above form that the myth has been most generally accepted, but it was varied in many ways by different poets and philosophic interpreters. His Greek name, meaning "Forethought® (that of his brother Epimetheus, signifying "Afterthought®) , makes the underlying allegory apparent. Pro¬ metheus, as the friend of men, the wise helper in necessity, and in some interpretations as a rebel against unjust authority, has been much referred to in literature, and in modern times was made the subject of Shelley's lyrical drama 'Prometheus Unbound, and of the fragment of a tragedy by Goethe. He has also been fre¬ quently*

represented in plastic art. The most famous English rendition of ˆEschylus' tragedy is Mrs. Browning's 'Prometheus Bound.) An¬ other more recent translation has been pub¬ lished by R. Whitelaw (Oxford 1907).

Bibliography. — Baenteli, M., 'Le Mythe de Promethee (in Revue Occid. Philos., Serie III, Vol. VI, p. 57, Paris 1914) ; Bapp, K, 'Pro- metheus) (in W. H. Roscher's 'Ausfiihrliches Lexikon der Griechischen und Romanischen Mythologies Vol. Ill, part 2, Leipzig 1902-09) ; Baumeister, A., 'Promethus) (in 'Den Kmaler des Klassischen Altertums,* Vol. Ill, Munich 1888) ; Delff, H. K. H., 'Prometheus. Dionysos. Sokrates. Christos. Beitrage sur Religions- geschichte) (Gotha 1877) ; Fraenkel, J., 'Wand- lungen des Prometheus* (Bern 1910) ; Gayley, Q. M., 'The Classic Myths in English Litera¬ ture and in Art> (Boston 1911) ; Gulick, C. B., 'The Attic Prometheus* (in Harvard Studies in Classic Philology, Vol. X, p. 103, Boston 1899) ; Harry, J. E., 'Problems in the Prome¬ theus > (in University of Cincinnati, University Studies, Series II, Vol. Ill, No. 1, Cincinnati 1907) ; Hermann, J. G. J., 'De SEschyli Pro¬ metheus Soluto) (Leipzig 1831) ; Holle, C, 'Die Prometheussage) (Berlin 1879) ; Murray, A. S., 'Manual of Mythology* (Philadelphia 1898) ; Preller, L., 'Griechische Mythologic) (4th ed., Vol. I, Berlin 1894) ; Reinach, S., 'Promethee* (in Musee Guimet Annales, Bib- liotheque de Vulgarisation, Vol. XXV, p. 81, Paris 1907) ; Spitteler, C., 'Prometheus und Epimetheus; Ein Gleichniss> (Jena 1911); Tatlock, J. M., 'Greek and Roman Mythology) (New York 1916) ; Walzel, O. F., 'Das Pro¬ metheus symbol von Shaffesbury zu Goethe) (Leipzig 1910) ; Welcker,, F. G., 'Die Aeschy- laische Trilogie Prometheus> (Darmstadt 1824) ; id., 'Nachtrag zu der Aeschvlaischen Trilogie Prometheus) (Frankfurt 1827).*

PROMETHEUS BOUND, The, of

ZEschylus, has been called ((the most sublime poem in the world.® Macaulay declares that by the principles of dramatic writing we shall instantly condemn, but if we think only of the poetry we must admit that it has never been surpassed in energy and magnificence.

The chief character comes from a remote past. ˆschylus was merely the conscious artist that gives the impressive figure final and im¬ mortal form. The play is the perfect type of the primitive tragedy, which Aristotle des¬ ignated <(simple.® It has one feature possessed by no other tragedy; it transports us to a mar¬ velous and fantastic sphere, to the most primi¬ tive period in the history of the world. The god that seeks to elevate man, that

gives him the light of understanding, engrosses our atten¬ tion. From the beginning to the end of the play the illusion is not broken. A god suffering for humanity is before our eyes; deities live and move in visible presence.

Zeus desired to create a new race after his own design. He was not satisfied with ephem¬ eral man, a creation of the crude Titan world. But Prometheus, pierced by our human mis¬ eries, champions the old race : he steals fire from heaven and teaches the arts to insensate creatures. But Zeus will brook no infringe¬ ment of his laws and resolves to punish the re¬ calcitrant. So he commissions his two satellites, Might and Force, to drag the rebel to a steep rock in Scythia, <(whose rugged brows are bent upon the swelling main.® Here the play begins.

Unfeeling Might turns the criminal over to Hephaestus, the smith, who clamps Prometheus to the cliff, where he will never see a human form: broiled by the sun's bright flame, he will welcome the spangled-robed night, and again the sun as it breaks the hoar-frost of the morn. Prometheus bears the taunts of Might in silence. Then the Titan invokes inanimate nature to witness the intolerable indignity to which he has been subjected: the divine aether, the rivers, the innumerable laughter of the sea- waves, Mother Earth and the bright circle of the all-seeing Sun. Suddenly a rush of wings is heard and a troop of sea nymphs enter in a winged car — ((maidens yet rosed over with the virgin crimson of modesty.® Prometheus appeals to their pity. They remind him that a new pilot is at the helm in Olympus. The Titan swears that he will do something yet, when times are ripe, to this raw, unthankful king. Exultantly he cries that threats will not make him cringe. Weak women that they are, replete with tenderness, the Oceanids cannot understand how one can dare resist the will of Zeus. They beg Prometheus to unfold his story. One faction of the deities determined to cast out Cronus and set up Zeus as their king. By the help of the resourceful Prometheus, Zeus gained the throne. But the new ruler did not give his supporter the recompense deserved. He resolved even to annihilate the human race. Prometheus alone opposed the sovereign. The sympathizing nymphs now exhort the sufferer to seek some release. They alight from the car to hear the details of the Titan's story, when their father, Oceanus, enters astride a winged horse. The old man of the sea remonstrates with his kinsman and bids him beg for pardon. But the Titan, like Satan, hardens in his strength,

From this homely scene ˆEschylus soars aloft to a height of poetry as beautiful as it is magnificent. The whole world makes moan : the daughters of Colchis, the Scythian hordes, Asia's martial glory, the surge of the sea, Hades in the abyss of the earth, and all the streams murmur and sigh in a pathos of woe. Prometheus then enumerates the benefits he has conferred on man : reason, house-building, tam¬ ing of beasts, science, literature,

mathematics, astronomy, navigation, medicine, divination, mining. The chorus admonish him that all these gifts were for naught, since weak, ephem- – eral man could not help him in return. Io enters. The only mark of her metamorphosis is her horns. In admirable verses the poet de¬ picts her fatigue, her despair and the tender sympathy she manifests at the sight of the suf¬ ferer bound on the storm-beaten rock. Pro¬ metheus tells her that h£ recognizes the daugh¬ ter of Inachus, who had set Jove afire with love and is now by vengeful Hera driven o'er the earth. In a melodiously plaintive narrative, full of charm and grace, Io relates how phan¬ tasms and dreams came to her at night and reached the organ of her fancy, urged her to go out to the meadow-land that Zeus might be lightened of his passion; how her father had driven her forth from home; and now by gadfly sharply stung, pursued by the; immitigable Argus, <(with frantic bound from land to land I fly.® Prometheus now tells the harassed maiden that she must traverse Europe, through a wild and dangerous country, to the Tauric Chersonese, cross the Thracian Bosporus to Asia and then proceed to the plains of Cisthene, where the Gorgons dwell, and to the land of the griffins and Arimaspians, through a region peo¬ pled by monsters. At last she will come to a far land, whence she must creep down the river Aethiops until she comes to the Delta. There in the city of Canobis Zeus will restore her to her pristine form with but the touch and gentle pressure of his hand; and she will bear a son, swarthy Touchborn, who is to rule over all the land watered by the Nile. In the fifth gen¬ eration 50 maidens, fleeing the proffered mar¬ riage of their cousins, shall return to her home in Argos and shall in the watches of the night put their lords to death. But one of the maidens will spare her mate. From this pair will spring a royal race, one of whose descend¬ ants is destined to deliver Prometheus. With a cry of terror the demented Io darts away, and the chorus moralize on the inadvisability of un¬ equal matches. A great change has now come over the Titan. He is reminded by the ap¬ pearance of Io that he will find respite; and so he resolves to await the retributive hour. The aeons which he contemplated a moment ago seem now but a pulse beat. The steadfastness with which he asserts his will in the face of disaster makes an impression of unusual gran¬ deur. <(Let him in calm assurance seat him sure, fixing his faith on the deafening crash rever¬ berating in the sky, and holding in his hand the thunder-stone high poised. He shall find a flame more furious far than the livid lightning's flash, a deafening crash to drown the thun¬ der's roar !® The chorus are horrified. They remind the Titan that those who bow down to Necessity are wise. He replies:

care aught for him. Homage may he have from all, but none from me?

Heaven s winged herald, Hermes, now sails downward on the bosom of the air. He com¬ mands Prometheus to yield up his secret. But the Titan observes the menial of the new crowned king with some surprise and thrice as much disdain : Zeus shall soon know that the victim holds a power above his oppressor: (

The second play of the trilogy was the (Prometheus Unbound? The Titan reappears bound to the same rock, but on the Caucasus. The other Titans, now released from Tartarus, urge Prometheus to yield. The eagle has been glutting his maw on the captive's liver every thing unfirm, thunder subterrane reverberates, with his arrow. Mutual concessions are made, and Prometheus returns to his place among the gods in Olympus.

The third play was called (Prometheus, the Fire Bearer? The theme was doubtless the in¬ duction of Prometheus into his high office as an Attic god and the establishment of a fes¬ tival, the Prometheia, a prominent feature of which was a torch-race.

Without fire there would be no art, no in¬ dustry, no civilization. Fire humanized man. The earth-fire came from the heaven-fire. To primitive man the production of fire was a miracle — in volcanic countries subterranean, in others super-terrestrial. Among all nations there is a tradition that fire was stolen, either directly from the gods or from some other tribe on whom the gods had bestowed the bless¬ ing. These myths closely resemble one an¬ other — in New Zealand, North America, Greece, France, India. Five hundred of the 1,000 Rig- Veda hymns invoke Agni (Ignis), a com¬ mon surname of whom is Pramati (Pro¬ metheus, Forethought). Among savages the thief is usually an animal, among barbarous races, a man, among civilized nations, a god, or demi-god. The myth of the Fire-Stealer is the

most popular of all among the aborigines of the Northwest. In Greece the legend goes back to the oldest period of mythology. Hesiod con¬ ceived the condition of man in the primitive period as a happy one. Prometheus brings pun¬ ishment on himself and troubles on mankind, whose cause he has espoused. Zeus sends Pandora, whose charms mortals cannot resist. The conception of ZEschylus is higher than that of Hesiod. The tragic poet insists on the bene¬ fit of the gift, and shows how fire was really the starting point of civilization, how all human culture had its origin in the spark which Pro¬ metheus filched for us in the fennel stalk. Primitive man was plunged in a heavy stupor, but in his beast-nature was capability. Pro¬ metheus taught him every art and science. The Titan's greatest crime was

"To render with his precepts less The sum of human wretchedness,

And strengthen man with his own mind,”

so that the pining sons of earth uplifted their prostrate brows from the polluting dust.

Joseph E. Harry,

Author of cThe Greek Tragic Poets,) etc.

PROMETHEUS UNBOUND: A Lyrical Drama is the greatest of Shelley’s longer poems. <(This poem, begun in the autumn of 1818, was chiefly written? says Shelley, ((in the mountainous ruins of the Baths of Caracalla.

. . . The bright blue sky of Rome and the

effect of the vigorous awakening spring in that divinest climate, and the new life with which it drenches the spirits even to intoxication, were the inspiration of this drama? This was his first experience of an Italian spring, and the reawakening of nature gave impulse and im¬ agery to a vision of the rebirth of iustice and happiness, on which the poet often fondly dwelt. <(That man could be so perfectionized? Mrs. Shelley notes, (

Urania. The central figure of Act II, she seeks for -truth, which she finally attains by the aid of Demogorgon. This mysterious person¬ age perhaps symbolizes destiny as the result of law, or the fundamental constitution of the uni¬ verse; the emotional nature penetrates to and accepts the ultimate truth. As Act I depicts the patient endurance which is the present lot of goodness, so Act II depicts future progress toward a true philosophy. When wisdom is wholly dominated by love, and love accepts truth, the consummation of things is at hand. In Act III the denouement follows; Jupiter weds Thetis, — a union from which he expects some culminating advantage ; instead, Demogor¬ gon appears and drags him to the abvss. Pro¬ metheus is set free and united to Asia. The intellect having attained its ideal, the emo¬ tional nature being centred on the true, ((the Golden Years return.® This act concludes with a description of redeemed humanity. Act IV (an after-thought written at the close of 1819), is wholly lyrical, and reveals universal nature joying in a regenerate world. ((No modern poet,® says Professor Herford, ((has come nearer making the morning stars sing to¬ gether.® Act IV is a crowning example of tensity of emotion, tenuity of thought and poetic beauty. ((The passages which are most thor¬ oughly stripped of doctrine, of definite ideas, and even of

humanity, are the most perfect of all, and Shelley is there most himself® (Elton).

This meagre outline, bare of all the beauty and passion of Shelley's poetry, is ludicrously incapable of suggesting the original. <(Pro- metheus,® while in some measure modeled on yEschylus, is, unlike it, — ((a lyrical drama,® an allegorical presentation of thoughts and feel¬ ings. It has no characterization, save perhaps in the hero, nor any plot interest ; such action as it has is difficult to follow. Its merits are of another order, and may be indicated in the words of William Rossetti : <(There is, I sup¬ pose, no poem comparable, in the fair sense of the word, to (Prometheus Unbound. The im¬ mense scale and boundless scope of the con¬ ception; the marble majesty and extramundane passions of the personages ; the sublimity of ethical aspiration ; the radiance of ideal and poetic beauty which saturates every phase of the subject, and almost, as it were, wraps it from sight at times, and transforms it out of sense into spirit; the rolling river of great sound and lyrical rapture; form a combination not to be matched elsewhere, and scarcely to encounter competition.® Consult Mrs. Shelley's Notes; Wm. Rossetti's paper in Shelley So¬ ciety's Publications, 1886; Todhunter's Study of Shelley; Miss Vida Scudder's annotated edition.*

W. J. Alexander,

Professor of English, University College,

Toronto.

PROMISE, an engagement entered into by one person to perform or not to 1 erform some particular thing. When there is a mutual promise between two parties it is termed a con¬ tract. A promise may either be verbal or writ¬ ten. See Contract.

PROMISE, Breach of. See Breach.

PROMISSORY NOTE, is an uncondi¬ tional promise in writing for the payment of money in a sum certain, absolutely, and at all

events; it is negotiable when it is transferable from one person to another by endorsement or delivery, so as to vest in the party taking it the legal title to the note and to the property it represents; they are of ancient origin and were in use by the Romans. Under the law, gen¬ erally, notes are assignable, so that 'the assignee may bring an action thereon in his own name. The usual parties to a promissory note are the drawer, the payee to whom it is drawn and the endorser. The important characteristic of a negotiable note is that the person receiving it does so for value and without

notice of any question of title of the previous holder. Any¬ thing on the face of a note sufficient to put a transferee upon inquiry subjects him to any defenses between all the original parties; one taking negotiable paper that is overdue does so under like conditions. Possession of a nego¬ tiable note which is payable to drawer, 'or which is endorsed in blank, or to the holder specially, is presumed to be legal in every re¬ spect. A note to which any signature is at¬ tached, through which the holder claims, that has been forged, is not good. The holder of a note can bring an action thereon, except that it is payable to another, especially a note en¬ dorsed in blank. If a note is made subject to any conditions as to demand or notice, same must be first complied with before action can be brought. Protesting of a note is the declara¬ tion by the holder against any loss on account of non-payment; its object is to give notice to the endorsers of their consequent liability; such notice is essential, and it is customary that pro¬ test be made by a notary public. Many import¬ ant subjects in relation to the laws governing promissory notes are the subject of statutes, which differ in various jurisdictions. See also Endorsement; Negotiable Paper; Note.

PROMOTER, in law, (1) one who pro¬ motes an undertaking or the like, as a corpora¬ tion. In this sense the term is applied spe¬ cifically to one who aids in the organization of a joint-stock company or corporation or (in Great Britain) to one who aids in the passage of an act of Parliament. In the United States it is used almost exclusively in the sense of one who aids in the organization of a corporation by soliciting subscriptions to its stock, planning its business operations and doing other similar acts in furtherance of that object. A promoter in this sense is held by law to act in the rela¬ tion of a trustee to such corporation, is held strictly answerable for any fraudulent misrep¬ resentations which he makes to intending in¬ vestors and is precluded from taking a secret advantage over the other stockholders. A pro¬ moter is personally liable on contracts made by him for the intended company after its failure to incorporate and also for subscriptions paid into such a company. A promoter is not al¬ lowed secret profits as between himself and the corporation, but he may purchase property for the corporation and later sell it at an enhanced price. (2) One who prosecutes offenders in an ecclesiastical court.

PRONGBUCK, or PRONGHORN, the

American pronghorned goat-antelope (Antilo – capra americana), one of the two sole living representatives on the American continent of the large series of Old World antelopes (Bo¬ wlder), the other being the Rocky Mountain

PRONOUN — PRONUNCIAMENTO

goat (Oreamnos montanus), which is more nearly a true antelope than a goat. Although almost universally known as <(antelope,** the pronghorn differs so greatly from the true ante¬ lopes that it is made the type of a distinct family (Antilocapridce) , having affinities alike with the giraffes, deer and goats. The horns, while resembling those of the true antelopes and the Bovidce generally in consisting of a bone-core covered by a horny sheath, differ from those of all Bovidce in the presence of a short anterior spur or branch. Furthermore, they are more or less densely and extensively covered with hair, thus resembling the horns of the giraffe. But by far the most remarkable peculiarity of these horns is that they are shed annually like a deer's antlers. So skeptical were zoologists as to the possibility of a hollow-horned ruminant shed¬ ding its horns, that, although the fact was known to hunters for many years and had been repeatedly reported, it was not until 1865 to 1868 that the truth of these reports became fully established. The entire horn is not shed as in the case of deer, but only the horny sheath, the bony core remaining intact and per¬ manent and its epidermal covering immediately beginning to regenerate a new horn.

The pronghorn is about three feet high and five feet long, with a very short tail, slender legs, pointed, erect ears and extremely large eyes. Two important characteristics are the absence of the small accessory hoofs from both fore and hind feet and the hairiness of the end of the muzzle except along a narrow median line. The color is a variable and somewhat mottled brown, with a chestnut colored mane and a brilliant white rump patch or so-called recognition mark. Both sexes have horns ; but those of the female and young are smaller and simple. Since the disappearance of the bison, the prongbuck is the most characteristic rumi¬ nant animal of the great Western plains. Al¬ though the progress of settlement has much diminished its numbers and reduced the limits of its range both easterly and westerly, the prongbuck still holds its own over an area ex¬ tending for about 30 degrees from Saskatche¬ wan- on the north to the Mexican state of Zacatecas on the south, and from the Dakotas and Kansas westward through the Rocky Mountains and in the Cascades into Oregon. It occurs in Arizona and at a few points in California, but is absent from large areas in Colorado, Utah, New Mexico and Arizona. Prongbucks live in bands on the open plains or in the hilly countries; bucks, does and fawns associating during the greater part of the year, but at the close of the gestation period, which varies from March to September, according to latitude, the pregnant does separate to drop their two fawns in solitude, and the old bucks wander into the wooded hills. Their natural food consists almost entirely of grass, though grain, apples, etc., will be eaten in captivity. They are wonderfully alert animals, with keen senses, and so timid that they retreat on the slightest alarm, but withal so curious that they soon pause to gaze at

the cause of their alarm. Their speed is marvelous, and their bounds of tremendous extent, but their power of en¬ durance is not great and they never leap over an obstacle of any height. They mav be domes¬ ticated with comparative ease and sometimes breed in captivity; and it is said that a fence of

*only three or four feet high is quite sufficient to confine them. Owing to the excellence of their flesh, though it is rather dry, and their splendid game qualities, they are much sought by hunters. The methods most in vogue are coursing with grey or deer hounds, running with relays of horses, and stalking, the latter especially requiring much skill, though they may be lured toward the concealed hunter by an appeal, by means of a fluttering colored cRth or handkerchief, to their inordinate curiosity. The Indians hunted them by stalking, some¬ times dressed in the skin of one of their kind; by driving them into brush enclosures, over which they would not leap ; and in other ways. Consult Canfield (in Proceedings of the Zoo¬ logical Society, * London 1866) ; Caton, (Ante¬ lope and Deer of America) (Boston 1881) ; Lyddeker, Richard, (Royal Natural History* (Vol. I, London 1895) ; Roosevelt, Theodore, (American Big Game Hunting) (New York*

1901) and (The Deer Family (New York*

1902) ; Seton, E. T.,

*PRONOUN, a part of speech which takes the place of the noun, to avoid too frequent repetition of the noun or to designate an object whose name is not known or, if known, is not desirable or available for use. Pronouns have the same properties as nouns, viz. : gender, per¬ son, number and case. It differs from the noun in this, that whereas the noun stands always for some definite object or concept or class of concepts, for example, Chicago, man, house, the pronoun may stand now for a given con¬ cept or class of concepts; but again for a totally different one; thus the pronoun has no fixed denotation: <(it** may stand for (III, Vol. V, Leipzig 1910); La Grasserie, D. de, (De la Veritable Nature du Pronoun* (in < Etudes de Grammaire Compare,* Louvain 1888) ; Maetzner, E., (An English Grammar* (3 vols., London 1874) ; Owen, E. T., (A Revision of the Pronouns* (in Wis¬ consin Academy of Sciences, Arts and Letters, Translations, Vol. XIII, p. 1, Madison 1901).*

PRONUNCIAMENTO, in Spanish-speak¬ ing countries, especially in Spanish-American republics a proclamation against the existing government, intended to serve as a signal of revolt. The word contrepronunciamento, that is, counterproclamation, also occurs.

PRONUNCIATION

PRONUNCIATION, the act of uttering words or articulate sounds of the voice. The alphabetic characters are designed to represent with more or less precision the voice-sounds of a language, and if all those sounds have each its proper sign, a written word will be a sure index of its pronunciation. The alphabet of the Spanish language is nearly perfect in this respect. In Spanish the vowels have each one quality of sound: in whatever situation, they have each but one value and a, e, i, o and u are pronounced respectively as a in father, ei in rein, ee in see, o in lone and oo in moon. The consonants, too, have only one sound, ex¬ cept that before the vowels a, o and u and be¬ fore consonants, c has the sound of k and g the hard sound of g in get ; also, to represent special sounds, / is doubled (lleno , pron. lyaino) or a diacritical mark is used (ano , pron. ahnyo). Not so in English. In English each of the vowel and consonant signs desig¬ nates various – sounds. Thus the vowel sign a denotes at. least six different vowel sounds; e at least four; i at least three; o (including oo) seven and u in four; often they are silent, representing no sound. Many of the con¬ sonants, too, though not to the same extent as the vowels, represent each, whether singly or compounded, two or more different sounds; examples : cede, call, child, machine, chemic. Other consonants which stand for more than one sound are s (sat, has, sure), t (tan, thin, thine, nation), n (sin, sing), etc.

The different sounds represented by the vowel sign a are: (1) the short vowel sound which it oftenest represents : it is heard in man, cab ; this sound is almost peculiar to English ; it differs slightly from the short a of French and considerably from the short a of German ; Germans who are beginning to learn English have difficulty at first in producing this English vowel and instead of man say men, het in¬ stead of hat. (2) The long sound of a as in hate, late; its sound is that represented in other languages by the second vowel e; in German and other languages the sound of the word bane would be represented by ben or behn or ben, etc. (3) The sound of a (however repre¬ sented — by a, or ei, or ea, etc.) — before r in the same syllable, as in share, bear. A vulgar mispronunciation of such words is shar, bar; in Irish pronunciation the a in share, bear, pear, etc., has precisely the same sound as in shape, lane, bane. (4) The sound of a in father, calm, far: this is usually styled the Italian sound of a. (5) The sound of a in ask, branch, pass, differing from the pronunciation of the same letter in at, tan, pan : it is the short sound of the a in father. In England and New England the distinction is made between the sound of a in branch, ask, etc., and the a in barn, ran ; elsewhere in the United States it is not ob¬ served. (6) The sound of a in all, warm, talk, is peculiar to

English ; it is much broader than a in German words all, fall. (7) The sound of a in what, wander, is peculiar to English ; it is represented by o in not, gone, etc. The sounds of e are (1) its short sound as in net, sent; (2) the long sound as in obese, mete, green; this sound is represented in most other languages by the third vowel i; (3) the sound which it has in vein, rein; in other languages this is the primary sound of this vowel; (4) the sound, peculiar to English, which it has

before the letter r as in per, confer. Three sounds are represented by i; namely: (1) the short sound as in pin, bin; (2) the correspond¬ ing long sound as in marine : this is the regular sound of i in other languages; in English i is so sounded only in a few words; (3) the long sound heard in pine, ride : this is a diphthong and equal to ei or ai. The vowel o represents the following sounds: (1) Its primary sound in English and other languages, as in ode, lone ;

(2) a short sound peculiar to English, as in not, nod: this is not the o of ode shortened; the shortened o of ode is unknown in English;

(3) the obscure short sound (same as that of u in but) heard in other, son, done; (4) the sound heard in prove, move : this is the long vowel u of German, Spanish, etc., and the on of French; (5) the same sound shortened, as in wool, book, took ; (6) a sound closely re¬ sembling that of a in all : it occurs when o is followed by r in the same syllable, as in order, corner; in Irish pronunciation this o has the same sound as a in all. The sounds repre¬ sented by u are: (1) that heard in rule, rumor, Lucifer: here it is equal to oo in moon, and it represents the sound of u in German, Spanish, Italian, etc., but not in French; (2) the cor¬ responding short sound heard in put, bull; (3) the peculiar sound given it before r in the same syllable, as in urge, urn ; (4) the diph¬ thongal sound that it has in union, pure: here it is equal to yu or eu. In the United States long n after / has always the sound of oo in ooze; but dictionaries which represent the pro¬ nunciation of such words as lurid, luce, in Eng¬ land, give to the u the same value it has in cure, that is, the diphthongal sound (l'yurid, l'yuce), though in the same dictionaries the u in luna, lunary, ludicrous, etc., is represented the same as in rule. In the United States the u in such words as duty, tulip, is commonly mispro¬ nounced as dooty, toolip, instead of d'yuty, tyulip ; the Irish mispronunciation of such words is jooty, tshoolip.

In the pronunciation of various consonants English is peculiar or differs from other lan¬ guages in sundry respects ; for example, ch in English words is equal to tsh (chat) or to sh (chivalry) or to k (chemism). The d and t of English are pronounced with the tip of the tongue touching the gums well above the teeth ; in other languages the contact is at the roots of

the teeth. The th in thin is almost peculiar to English, but the same sound exists in Spanish ; the sound of th in thy, that, is peculiar to Eng¬ lish. In Irish pronunciation the sound of th in thank, thousand, is produced by firm contact of the end of the tongue with the teeth and forcible emission of the breath. In the Irish pronunciation of thy, that, there is also contact of the tongue with the teeth and gums. For the value of the letters and their combinations in other languages see the articles on these languages and consult the works referred to under these heads. Consult also Bloomfield, Leonard, introduction to the Study of Lan- guage) (New York 1914) ; Passy, Paul, (Petite phonetique comparee des principales langues europeennes (2d ed., Leipzig 1912) ; Soames, Laura, introduction to English, French and German Phonetics) (3d ed., London 1913) ; Vietor, T. W., (Elements der Phonetik des*

Deutschen, Englischen und Franzosischen (6th ed., Leipzig 1914). See Accents.*

PRONY, pro-ne, Gaspard Clair Frangois Mane Riche, Baron de, French engineer: b. Chamelet, Rhone, 22 July 1755; d. Asnieres, Seine, 29 July 1839. He received his technical education at the Ecole des Ponts et Chaussees. As assistant to the civil engineer Perronet he was employed in building the bridge De la Con¬ corde at Paris and the restoration of the harbor of Dunkirk. Made head of the board of sur¬ vey, in 1791 he superintended the construction of new trigonometrical tables, extended to 25 decimal places, necessitated by the establishment of the metric system. This great work in 17 volumes is preserved in manuscript at the Ob¬ servatory at Paris. In 1794 he was appointed director-general of bridges and roads and at the same time was made professor of mathematics at the Polytechnic School, in 1795 he became a member of the Institute and in 1798 director of the Ecole des Ponts et Chaussees. Under Napoleon he executed improvements in the harbor of Genoa, Ancona and Venice and in the navigation of the Po. In 1810 he became a member of the commission charged with the drainage and improvement of the Pontine Marshes.. In 1818 he was made one of the 50 foreign members of the Royal Society and in 1835 a peer of France. He wrote several works of a technical character connected with the en¬ gineering operations of which he had charge, the most important of which is description Hydrographique et Historique des Marais Pontins) (2 vols., Paris 1822-23). He also published (Nouvelle Architecture Hydraulique (2 vols., Paris 1790-96) ; (Viede Pingre) (Paris 1796) ; (Mecanique Philosophique) (Paris 1800) ; (Legons de Mecanique Analytique5 (2 vols., Paris 1810-15).*

PROOF. See Evidence.

PROOF IN ART, the name given to an impression of an engraving "pulled® or struck off, from the plate, with or without the signa¬ ture of the artist. After the various "proofs® and "states,® there comes, finally, the "finished® or "publication state,® preceded by the last proof passed by the artist as "ready for print¬ ing.® Each of the impressions issued to the public is classed under one of the following headings: (1) Artist's proofs; (2) proofs be¬ fore letters; (3) lettered proofs (or proofs after letters), and (4) prints. These headings do not necessarily correspond with "states® of a plate. They are simply description of the amount of lettering printed on the impressions to which they refer. The "publication line® should be on every impression and is the only lettering which appears on artist's proofs. Proofs before letters have printed on them the names of the artist and engraver of the work, in addition to the "publication line,® but they are without the title. They are stamped on the right.

Lettered proofs have printed on them the names of the artist and engraver of the work and the title of the subject. They are also stamped on the right. Prints have all the above-mentioned printing, but the style in which the title is printed is altered in some manner from that appearing on the proofs. They are not stamped at all. To-day artists who "pull® their own proofs usually sign in pencil.

VOL. 22 — 42

A "wax proof® is a tentative proof by the engraver for the purpose of learning what re- touching may be necessary. It is obtained by filling in the lines with lampblack and applying it to a sheet of paper coated with white wax and exerting upon it a gentle pressure with a burnisher.

"Proof with gray letter® is applied to proofs in which the lettering is grilled with "hatch¬ ings® (small lines).

"Proof with white letter® is a proof in which the characters of the legend or inscription are only indicated by outlines.

"The word against which Whistler di¬ rected his fine sarcasm. But he also declaimed vigorously against the presence of any margin at all. A margin on the plate is not a neces¬ sity, but a proper amount of margin is un¬ doubtedly a protection for a print. In modern times the whole matter of (proofs> and (states) was brought into a regular system, impressive to the buyer and profitable to the producer. There may be, for example, successively trial proofs, finished proof, proof with remarque, artist's proofs, before all letters (or inscrip¬ tion), (state) with names of artist

only, with inscription, in open letters, with letters filled or solid, with publishers' address. And the (states > again may be on India or Japan paper and on plain paper.

"The importance of a good impression is paramount and the good impression is the re¬ sult of the printer's skill and the does not mean much in itself. The very fact that the artist thought it necessary to create a later

first 'stated says Wedmore. In the second < state > of Whistler's (Kitchen > a large amount of added dry-point work appears, especially on the walls leading to the window, increasing the richness and harmony to a remarkable extent. On the other hand, the luminous quality and reflected light in the first

Bibliography. — Weitenkampf, Frank, (How to Appreciate Prints . (New York 1916) ; Hamerton, Philip Gilbert, Etching and Etchers) (London 1880) ; Hamerton, Philip Gilbert, (The Graphic Arts) (London 1882).*

Esther Singleton.

PROOF, Ontological, or ONTOLOGI¬ CAL PROOF. See Ontology.

PROOF-READING, the process of read¬ ing the printed proof of matter to be printed, and marking errors, corrections, etc., on the margin. Proof-readers require to be expert in typography, as well as possessed of considerable education and general knowledge. An estab¬ lished set of signs is used. The specimen of a proof shown on this page exhibits most of these signs.

The immediate object of proof-reading or correcting is to mark every error and over¬ sight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is done on the presumption that the manuscript is correct, which is seldom the case; and, therefore, the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation, ab¬ breviations, etc., and in many cases to the veri¬ fication of quotations, dates and proper names. Where extensive alterations, omissions or addi¬ tions are likely to be made by writer or editor, it is more convenient to take the proofs on long slips called galley proofs, before division into pages. The making of new paragraphs, or the suppression of those in type and needless ad¬ dition or omission of words that involve reset¬ ting many lines, should be avoided as causing trouble and expense.

The duty of securing consistency in spelling and punctuation is especially important in the case of works on which several writers are em¬ ployed, such as newspapers and periodicals. The proof-reader has also to observe the num¬ bering of the pages ; arrangement of chapters, paragraphs and notes, running titles, etc. It is part of his business to observe the mechani¬ cal defects of the work — defective types, turned letters, inequalities of spacing between words, sentences and lines, crooked lines, and to secure symmetry in verses, tables, mathematical operations and such like. In almost all cases two proofs are taken, and in difficult works, such as those in foreign languages, tables, etc., even more. Lastly follows the revision, in which

**To rule the nations with imperia.*

(fry, to impose terms of peace, to spare the humbled, and to rcush the proud, resigning itto' others to de¬ scribe the courses of thejjheavens, and explain the rising stars ; this, to Use, the words of the poet of the yEneid in the apostrophe of Anchises to Fabius in the ShadesAwas regarded as the proper province of a Roman.

The genius of the people was oven more adverse to the cultivation of the physical sciences than thatAthe Euro¬ pean GreeksAand |seen| we have| that the latter left experimental philosophy chiefly in the hands of the tsian and African colonists The elegant litera¬ ture and metaphysical speculations

3 Z T ~ l

of Athens, her histories, dramas, epics,

and orations, (had a numer¬ ous host of admirers in Italy, but a feeling of indifference was displayed to the practi¬ cal science of Alexandria. [' This repugnance of the Roman mind at home to mathematics and physics, a extending from the Atlantic to the JndianO cean, from Northern Britain

A _ _ ✓

to the cataracts of the Nile, annihi¬ lated in a measure pure sciences

> Si

in the conquered districts where they had-ha4-been pursued, and prohibited it 9 attention to . them in the mother

A

country"")

OLong, indeed, after the age of Ptolemy, the school in connection with \yhich he flourished, remained in existence';

(1) A wrong letter. After every mark of correction a line / should be drawn, to prevent its being confounded with any other in the same line. (2) A word or letter to be transposed. Where letters only are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction. (3) A space to be inserted. This mark is also used when the spacing is insufficient. (4) A space or quadrat sticking up. (5) Alteration of type. One line is drawn under the word for italics, two for small capitals, three for CAPITALS. (6) Correction or insertion of points. (7) A word struck out, and afterward approved of (Latin stet, " let it stand "). (8) A turned letter. (9) An

omission. (10) A letter of a wrong font. (11) A word or letter to be deleted. (12) Alteration of type. (13) A new paragraph. (14) Insertion of a clause.. (15) A space to be removed or diminished. (16) A wrong word. (17) Straighten into line (18) Insert a hyphen. (19) No paragraph. (20) The manner in which the apostrophe, inverted commas, the star, and other references, and superior letters and figures are indicated.

little more is done than seeing that the com¬ positor has made all the corrections marked on the last proof. It is usual for the writer or author to reserve the correction of the second

*}**

**tr)*

•I

5 /tat. .

**,/*

5 5. C.

7 stet.

**9*

9 Of

6 ;/ a tr.

10 wf.

e ©

119

Ur.

14 Roman.

14 and its despotism, abroad

3# 15 0

16 the

18./

19 No 1 6 Caps.

proof for himself. The work of a proof reader is more difficult than the uninitiated would be¬ lieve. It requires extensive and varied knowl¬ edge, accurate acquaintance with the art of typography and, above all, a peculiar sharpness of eye, which, without losing the sense and con¬ nection of the whole takes in at the same time each separate word and letter. The proof¬ reader usually is assisted by a second person, called the copy-holder, who reads aloud from the original copy, spelling out names, words in foreign languages and other words offering special difficulties. Proof-reading now is usu¬ ally done by persons devoting themselves ex¬ clusively to this work. In earlier times it was the custom of publishers to employ scholars and writers and authors were in the habit of send¬ ing the proofs of their works to friends for the purpose of reading them. In the case of scientific books this custom is still frequently followed. (See Printing). Con¬ sult Appleton, D., and Company, (Of the Making of a Book5 (New York 1904) ; Booth, W. S., (Notes for the Guidance of Authors5 (New York 1900) ; Crapelet, G. A., (Etudes Pratiques et Litteraires sur la Typographic5 (Paris 1837) ; De Vinne, T. L., (Correct Composition5 (New York 1901) ; Henry, F. S., (Printing5 (New York 1917) ; Manly, J. M., and Powell, J. A., (A Manual for Writers5 (Chicago 1913) ; Smith, A. M., (Exercises in Proofread¬ ing5 (Philadelphia 1904) ; id., Proofreading and Punctuation5 (Philadelphia 1905) ; University of Chicago, (Manual of Style5 (Chicago 1911) ; Vizetelly, F. H., Preparation of Manu¬ scripts for the Printer5 (New York 1905).

PROPAGANDA, a shortened name for the congregatio de propaganda fide (congregation for propagating the faith), founded by Gregory XV in 1622. It consists of a number of car¬ dinals with the cardinal prefect at their head, has a general secretary and a vast number of inferior agents or employees. A special section is devoted to the Oriental rites. It is the cen¬ tral missonary association of the whole Roman Catholic Church, and superintends and guides missionary operations in all parts of the world. Under its direct control are now all countries in Europe and America where the ecclesiastical hierarchy is not established. Connected with it is the

collegium seu seminarium de propaganda fide , usually called the Collegium Urbanum after its founder, Urban VIII, who instituted it in 1627 for the education of missionaries, students of all nationalities subject to the Propaganda being here received and trained and maintained free of expense, from the age of 14 years. Converts to the Roman Catholic Church who have come to Rome are instructed and supported by its funds. Bishops and other clergy who have been missionaries are also wel¬ comed and supported there. The Roman Propaganda had, until within recent years, a printing-press, celebrated for the works which issued from it. The efforts of the propaganda are directed particularly to countries outside of Europe. In close connection with it stand a number of seminaries or colleges for mission¬ aries in various countries, including the United States. (See Missions). Consult Benigni, U., Propaganda5 ((Catholic Encyclopedia,5 Vol. XII, New York 1911); Freri, J., Missionary Work of the Church5 (New York 1908) ; Mar¬ tinis, . R. de, (Ius Pontiff cum de Propaganda

Fide5 (7 vols., Rome 1889-98) ; Mejer, O., (Die Propaganda, ihre Provinzen und ihr Recht5 (2 vols., Gottingen 1852-53) ; Pieper, A., (Griin-dung und Erste Einrichtung der Propaganda Kongregation5 (Munich 1901).

PROPAGATION OF THE GOSPEL, Societies for. See Missions, Protestant, Foreign.

PROPELLER. See Screw-Propeller.

PROPERTIUS, pro-per'shi-us, Sextus, Latin poet : b. Assisium, Umbria, about 50 b.c. ; d. Rome, between 15 and 2 b.c. He is ranked by many as the greatest elegiac poet of Rome. Comparatively little is known regarding his life. He was deprived of his estate in the course of the agragrian confiscation and reduced to com¬ parative indigence. Nevertheless he acquired a good education and was urged to take up the profession of advocate, but seems to have pre¬ ferred devoting his energies to light literature and affairs of the heart, in which his love for the woman in his poems called <(Cynthia55 (her real name was Hostia), finally gained the ascendant and is reflected in much of his best writing. Propertius numbered among his friends Virgil and Ovid and engaged the patronage of Maecenas. With Horace his re¬ lations do not appear .to have been friendly. He was of a delicate constitution, pale and thin in person and of an emotional temperament in which melancholy seems to have had a large share, particularly in his late years. It is said of him that he was very careful about his per¬ sonal appearance, almost foppish in his atten¬ tion to dress and gait. The poems of Proper¬ tius consist of a collection of elegies usually divided into four books, though some com¬ mentators claim that they ought to be divided into five. All existant manuscripts, however,

contain many gaps and have been in some in¬ stances more or less disfigured by corruptions. They are in their outward form modeled some¬ what after the manner of the Alexandrine poets Callimachus and Philetas. He excels in the presentation of quiet description and emo¬ tion, (

Butler (London 1912). There are also transla¬ tions into German, French, Italian and other modern languages. Consult Davis, J., (Ca_tullus, Tibullus and Propertius' (Philadelphia 1876) ; Gruppe, O. F., (Die Romische Elegie' (2 vols., Leipzig 1838) ; Havet, L., (Notes Critiques sur Froperce) (in Ecole Pratique des Hautes Etudes. Paris Bibliothcque. Paris 1916) ; Housman, A. E., (The Manuscript of Proper¬ tius' (in Journal of Philology, Vol. XXI, p. 101 ; Vol. XXII, p. 84, London 1893-94) ; Jacob, F., (Properz' (Liibeck 1847) ; Phillimore, J. S., Undex Verborum Propertianus' (Oxford 1906) ; Plessio, F., (Etudes Critiques Sur

Properce et ses Elegies' (Paris 1884) ; Rib- beck, O., (Geschichte der Romischen Dichtung' (Vol. II, Stuttgart 1900) ; Schanz, M., (Ge- scnichte der Romischen Literatur' (in (Hand- buch der Klassischen Altertumswissenschaft,' Vol. VIII, part II, No. 1, Munich 1899) ; Sellar, W. Y., (Horace and the Elegiac Poets' (Ox¬ ford 1892) ; Solbisky, R., (De Codicibus Pro- pertianis' (Weimar 1882) ; Teuffel, W. S., (History of Roman Literature' (Vol. I, Lon¬ don 1892) ; Ullman, B. L., (The Manuscript of Propertius' (in Classical Philology, Vol. VI, p. 292, Chicago 1911).

PROPERTY, Laws of. Anything, whether tangible or intangible, which can be reduced to possession or made the subject of ownership, comes within the legal definition of property. The sea, the waters of rivers and the atmos¬ phere enveloping the earth are for the common use of all men and can become the exclusive possession of no individual ; wherefore they are not designable as property. But a thing may be property and subject to ownership without be¬ ing the physical possession of the owner. With respect to intangible objects physical possession is impossible. One may own land without be¬ ing in occupation thereof either personally or by representation ; but a copyright is not a thing that one can put in a wallet and carry around on his walks. Here are two objects of owner¬ ship, one intangible and the other the most concrete of earthly things, in the case of which the fact of proprietorship may be, and in the latter instance must necessarily be, merely a matter of record. Some things are loosely spoken of as property which are not really objects of ownership in a legal sense. A man has a right to his good name, but he does not <(own," though

colloquially speaking he may be (

Primitive Law. — In early society one should not expect precise conceptions of pro¬ prietory and other legal rights to be prevalent.

Nothing is further from the truth than the theory of the ((Law of Nature" that the insti¬ tution of property is the result of a social con¬ tract, whereby each individual surrendered a part of his liberty — meaning the privilege of doing whatsoever he pleased — in consideration of being secured in the remainder of his rights, including the possession of his belongings. In the (

Between these two poles of extreme indi¬ vidualism there lie social ideals of many de¬ grees, varying longitudinally in point of time and latitudinally according to the stage of civil¬ ization attained by those who hold them. The periods of historic time and social progression do not synchronize, so that the greatest diver¬ sity of property laws may coexist in different parts of the world. The salient sociological fact, however, is that the institution of prop- erty, (when it has been raised above the cave man's level of anarchic self-sufficiency) has everywhere passed through a communistic stage. When this step in advance has been made a man may individually own his weapons and im¬ plements, a woman her distaff, spinning wheel and personal ornaments; everything else, how¬ ever, is usually owned in common — the land 'by the gens, clan or commune, the chattels by the family, the paterfamilias functioning as trustee, so to speak. But collective ownership is not found to be incompatible with individ¬ ual possession. Quite the opposite, in the social stage referred to the division of the common property for singular use and enjoyment is a subject of supreme concern. A partition of the arable land is made between the families of the commune or tribe, annually or less frequently, for the purpose of cultivation ; woodlands and pastures are preserved as commons, while the ground occupied by the family domicile is usu¬ ally granted for possession in perpetuity, with a reservation of ultimate ownership by the com¬ munity. Collectivism in this primitive form

has persisted to the present day in the Russian .mir.® When the system breaks down com¬ munal ownership is not superseded at once by individual ownership, but by the quasi-corpo¬ rate ownership of property by the family group. The homestead and farmed land became the in¬ alienable and indivisible family allod of early Teutonic law and, while chattels were let and hired and could be pledged and forfeited, the

alienation of patrimonial nroperty was an affair of families, not of individuals, which was ac¬ complished by a clumsy adaptation of the Ro¬ man hereditas universalis. Clear traces of the precedent communal system of proprietorship are found in the laws of republican Rome. The paterfamilias with all his despotic powers could not divest his descendants of their heritage and, when there were no descendants, property re¬ verted to the gens, whose right of succession could be defeated only by a will made with the consent, and in the presence, of the entire comitia, armed and drawn up in battle forma¬ tion. In the village communities of India the primitive Aryan collectivism has developed to a most complicated system of ownership, not only with respect to houses and land, but to all property. Everything a member of the com¬ munity acquires, from an elephant down to a soldering iron, theoretically becomes a part of the common stock, though there are minute regulations securing to individuals the posses¬ sion and use, and the disposition or bequest of the same. The conception of absolute individ¬ ual ownership is of modern origin, relatively speaking, among European nations, but it seems to have prevailed in the ancient monarchies of Chaldea, Assyria and Babylonia. The Mosaic law ordered the redistribution of property by tribes and families in the jubilee years.

Roman Law. — Early Roman law made a distinction between res mancipice and other things. With the former were classed immo- bilia, corresponding in a general way with what he calls real property, though the term was more comprehensive, extending not only over lands tenements and hereditaments, furniture, fixtures and everything that could be consid¬ ered as part of an estate, including some slaves (glebemen) and other chattels. Res mancipice were considered a more dignified kind of prop¬ erty than mere merchandise, and could.be trans¬ ferred only by mancipium, a ceremonial form of contract, at the execution of which many witnesses representative of interests in the sub¬ ject-matter of the bargain were required to be present. The absence of one of these, the mis¬ pronunciation of a ceremonial word or the omission of a gesture made the contract a nullity. Ceremonial impediments and the tram¬ mels of collectivism are incompatible with the rapid exchange of commodities. Rome is now generally believed to have been in its origin, an Etruscan trading post, established in the midst of' an agricultural Latin community. The power of the merchant or tradesman to dispose of his merchandise in his sole right has to be recognized if commerce is to be successfully conducted. Possession must be assumed to give, and a transfer without formalities suffice to pass, title. The rules applicable to articles of commerce brought to port by Greek and Punic traders, or manufactured in Rome by plebian artificers, were presently applied also to the

products of patrician Roman farmers, and, ultimately, to res mancipice without distinction. Possession, or dominium, was defined by the Ro¬ man

lawyers with great precision, .the jus pos¬ sessions being quite the most important part of the Roman law of property; nor are their reasonings mere speculative niceties. Posses¬ sion, as the saying still goes, is nine points of the law, and, as Bentham remarks, ((in defense of his possessions a man may lawfully strike, wound or kill, if need be.® To constitute pos¬ session or dominium two elements are required, the ability to take and the will to hold. The desire to have a bird in the bush does not give possession to one who is unable to catch it; the power to seize a stray cow does not make one a possessor who has not the least intention of exercising his power. These corporeal and mental constituents of the act of possession are designated corpus and animus domini.

One may have oossession of a thing, dom¬ inium, without being in actual contact. A soldier is in possession of his rifle lying within reach ; the purchaser of goods in storage is in possession when he holds the key to the ware¬ house where they are stored; an heir is in pos¬ session of the entire estate, though he may have entered only on a part of it or merely viewed it from a distance. The essence of possession is the power to exclude others. A man is in possession of things left at his domicile, though they have not been touched by him nor bv any¬ one in his behalf ; but not of a treasure buried on his grounds unless he may have dug for it and actually found it. The distinction is reasonable, though rather fine. One is in more complete control of one's house and its contents than of one's fields and what is hidden therein, and one may be forestalled by another in lifting a treas¬ ure. It should be remembered that these defini¬ tions have reference to dominium as a juristic fact and not to the rightfulness of the posses¬ sion. The will to control, animus domini, is manifested in perfection by those only who rightly or wrongly recognize no superior or parallel right in any other person to possess the thing held. The intention of a servant, who resists the taking of property entrusted to him by his master, is merely to protect it from vio¬ lence, without any assertion of right over the same on his own behalf. So also, where the intention to hold or dispose. of an object is limited by the distinct recognition of the out¬ standing rights of another — as in the case of a tenancy or bailment — the Roman law regards the holder as lacking the animus domini, i.e., the intention to act as owner to the complete exclusion of everybody else. The difference between the Roman and Teutonic and English laws in this respect is not so great in fact as it seems, however. The interdicts provided 'Teal® remedies for the protection of possessory rights, analogous to actions of replevin or suits in ejectment, of which only ((exclusive® possessors could avail themselves ; bailees and lessees having no rights in rem had to take recourse to personal actions to redress their injuries. Even to this rule the Roman law made import¬ ant exceptions. A non-contractual tenant, tenens precario, a ground-renter for a long term of unimproved agricultural land, emphy¬

teusis, the holder of a pledge, and a sequester (receiver or trustee) could resist dispossession

by actions in rent. Loss of the power to ex¬ clude or of the will to control, of course, makes an end of possession or dominium. A temporary interruption of use or occupancy, however, is not a relinquishment of the pos¬ sessory right. One who regularly pastures his cattle on a certain meadow during the summer does not abandon his use because he does not graze there in the winter also; nor may one who leaves his possessions in charge of a steward and goes abroad be presumed to sur¬ render his power of control. Neither does fail¬ ure to exercise the will to possess and to ex¬ clude others terminate a dominium , when the failure is due to a legal disability — the pos¬ sessor being a minor or a lunatic, for instance.

Ownership, proprietor, is a further develop¬ ment and amplification of the right of posses¬ sion. Indeed dominium or exclusive posses¬ sion implied ownership. But one may own a thing, though one have no actual control over the same — while property may be denuded of every attribute that gave it value and owner¬ ship therein still persist. In this condition the Roman law designates it nuda proprietas. The right of ownership includes the right to possess, and an owner out of possession obtains restitution in virtue of the jus vindicandi. Ownership has been defined as <(complete dominion over a thing.® The owner of prop¬ erty has the right of disposal ; he may sell it or give it away, and he may destroy it. But the owner's rights are limited by other rights. No man may use his own in a manner in¬ jurious to others, and all property is held subject to the right of the State to tax or take for public purposes, or to restrict the uses to which it may be put by the owner. The <(com- plete® dominion of the owner, moreover, is diminished by servitudes and co-ownership, and the right to possess is suspended by letting or hiring, deposits, pledge, mortgage, etc. Ownership is extinguished by conveyance, gift or bequest, by long-continued adverse possession and by the death of the owner. Ownership may be deriva¬ tive or original. It is derivative when acquired by purchase, gift or inheritance. Original ownership is established by occupatio, accessio, specificatio, or usucapio. Occupatio (literally, laying hold of) applies to ownerless things, res nullius, in which class the Roman law places wild animals, treasure buried by one in a stranger's land and derelicts — the latter in¬ cluding all the property, whether public or private, of enemies, which was conceived to have no legal owner and to be subject there¬ fore to capture. Accessio signifies an addition to property through no action of the owner as by the planting of a tree or the building of a house on one's

land by another person. Accessio includes alluvio, the gradual deposit of soil by the sea or a running stream, and avulsio the sudden accretion of soil torn from another's property by a freshet or landslide. Specificatio refers to property that comes into being when one works material belonging to another into something new and different (nova species). A sculptor owns the statue he has carved, irrespective of the ownership of the marble. Even more obviously, a work of literature is the property of the author, not of the owner of the paper on which the manu¬ script is written. One who works up material

for hire, or whose work is not creative in the same sense as an artist's, does not become a proprietor by specificatio. A tailor does not own the coat made from cloth furnished by his customer. Neither does the specief actor become the owner when the material he has worked up can be restored to its original con¬ dition. Good faith, of course, is a pre-condition to the establishment of ownership by specifica¬ tion. Usucapio , the taking of a thing to one's own and exclusive use, is indistinguishable from what is known to English law as adverse possession, except that the periods of prescrip¬ tion in Roman law are shorter — one year for movables and two years for immovables. Ac¬ cording to Roman law the right to possess can exist in such completeness as to constitute a dominium in only one person at a time. Partial or conditional possession of a thing does not make it property of the possessor in the juristic sense of the word. Ordinary leases create merely a contractual relation, not a proprietory right ; and things lost by, or stolen from, a bailee are recoverable in a procceeding in rent only by the owner. Property in land includes not only the surface but the mineral wealth contained therein to any depth beneath.

Mediaeval and Modern Law. — Teutonic custom distinguished less sharply than Roman law between ownership and inferior possessory rights. Delivery regularly passed title to movables. In some instances a bailee had the right of action, for a recovery of property to the exclusion of the owner. Possession was regarded as equivalent to ownership, except with respect to things lost or stolen, though a lender or pledgor had the reversion or equity of redemption, of course. The distinctions be¬ tween rights in movable and immovable prop¬ erty, which had almost become obliterated in the Roman system, was reasserted and broadened in the leges barbaroum. Rights in land could only be acquired by in¬ heritance or by ˆinvestiture,® and the transfer thereof was restricted, not only by the interests of the ruling classes, but by the rules of family community. The distinction became still more marked by the establishment all over Europe of the system of feudal tenures. This system gave paramount ownership, domin¬ ium eminens to the sovereign, in the first instance, and secondarily to the baronial and manorial lords — and made the pos¬ session and use of land dependent upon the performance of military and other public, or quasi-public duties

or, in the case of peasant leases, upon the rendering of customary services to the lord. Tenures (even peasant holdings in Germany) became hereditary, but the right of alienation was late in obtaining recognition. The eminent domain of the sovereign or lord gradually lost the character of a property right and became a governmental power, while the use and posses¬ sion, dominium utile, slowly developed into ownership. The hereditary peasant leases have been converted into full proprietorship by modern legislation. The reservation of forests to, and the control of hunting and fishing by, the feudal lords were the foundations for the exercise of similar powers bv the modern State. Wild animals, when objects of sport, could be hunted and taken only by those authorized or

licensed to do so and the sovereign prince claimed as his own many things regarded by the Roman law as res nullius and subject to private capture and appropriation — for example, aban¬ doned land, treasure trove, wrecks, flotsam and enemy property. The right to minerals under ground was separated from the owner¬ ship of the superficies, and mining privileges could be exercised only under license from the overlord, which was usually given to the first finder in consideration of a share of the profits. Nearly all these rights and the royalties — literally the king's fees — derived from them have passed into modern law as rights and revenues of the State. In modern European legislation the distinction of movables from immovables is nominally preserved, but has long since been obscured by the practical uni¬ formity of the rules governing the right to hold, dispose of or inherit property, irre¬ spective of its mobility or immobility. All property to which there is no one entitled to legal possession belongs, or escheats, to the State. The Code Napoleon awards tresor (treasure trove) to the finder and so does the Civil Code of Germany. The Roman rules of "accession® and "specification® have been generally accepted, though stress is laid in some modern codes upon the relative value of the nova species produced and the material out of which it has been fashioned. Such modern law terms as do- maine, Eigenthum and property define rights identical with those defined by dominium and proprietas, their Roman equivalents, except that modern law regardsˆ some forms of qualified possession as proprietory in character. The most advanced view of modern European jurists is that which regards possession as not a right, but a "social function,® the recognition and protection whereof by the State is con¬ ditioned upon the exercise of the privilege (or function) of ownership to the greatest possible advantage of the community as a whole. The Swiss Code declares the misuse of property to be unlawful.

English and American Law is character¬ ized by the cleavage between the rules govern¬ ing "real® and "personal® propertv. This cleavage is due in the first instance to the ex¬ ceptional character impressed upon estates in land by the feudal system — land being "held® not owned. The terms "real® and "personal® however, did not originally define two kinds of property, but indicated a distinction between various early forms of judicial procedure. A "real® action was one whereby possession of the thing itself, which was the subject matter of the controversy, could be recovered. In a personal action the suitor laid claim to, and could obtain no more than, an indemnity (damages) for the withholding of, or injury done to, a thing or his rights therein. The in¬ destructibility of land, and the powers and dignity attached to the tenure thereof, favored recourse to "real® actions to recover possession by those dispossessed, or prevented by tres¬ passers from the use and enjoyment, of such property. By the most obvious association of ideas the subject matter of "real® actions be¬ came "real® property. The distinction between real and personal property does not coincide, however, with the distinction between movables

and immovables, or between an estate in land and the ownership of goods and chattels. Not all interests in land could become the subjects of "real® actions. Leaseholding was deemed degrading to a "freeman,® the payment of rent in manual labor, in money or in kind, being considered an act of servility. The right of a tenant was not vindicable by a "real® action and, when dispossessed, even though the dis- possessor be his landlord, the tenant's only re¬ course was a "personal® action for damages. The measure ot damage being rent paid, if he paid nothing after dispossession, he could recover nothing. Easements, rents and profits, however, are real property, because they were rights to which the early common law extended the protection of "real® remedies. The right of property in chattels is absolute in the highest degree, a man may do as he will with his own. A man's right to his land, however, is not so untrammeled. No man has the right to excavate his own land so as to withdraw lateral support from his neighbor's land and the build¬ ings thereon; no man may vitiate the air over his neighbor's land by noxious gases or malodor¬ ous vapors, or impair the value and usefulness of other property by maintaining nuisances on his own ; no man may divert or otherwise un¬ reasonably interfere with watercourses running through his own and other land. Further limitations are placed on proprietory rights in land by building codes, and by zoning commis¬ sions and other public authorities. Intangible objects, such as patents, good will, etc., are property just the same as are tangible objects. Ownership is a right in rent, meaning a right which the owner holds against the whole world, as distinguished from a right in per¬ sonam, which is actionable only against one or more ascertained or ascertainable persons. When a right in rem is infringed a

right in personam comes into existence, which is en- forcible against the infringer. This right, how¬ ever, is not correctly defined as possessory. English and American legal terminology, whereby choses in action are called "property® is, therefore, rather confusing. In all essentials the American and English law of personal property is in harmony with the modern European and ancient Roman laws. Feudal tenures were never recognized in the United States and have been formally abolished in England by statute. The distinction between real and personal property survives mainly in the differences in the rights of succession and inheritance, and in the formal methods re¬ quired for transferring title to land, while ownership of goods is conferred by their mere delivery. Peculiar to American law are the Constitutional guarantees, which forbid the taking of private property for public uses with¬ out compensation of the owner, or the deprival of any man of his possessions except as punishment for crime and by due process of law.

Bibliography. — Alvarez, A., Duguit, L., Charmont, J, and others, (Progress of Con¬ tinental European Law in the 19th Century> (Eng. trans. by L. B. Register, Vol. XI of Continental Legal History Series, Boston 1918) ; Austin, John, ˆJurisprudence or the Philosophy of Positive Law (5th ed.. London 1885) ; Gaius, (Institutes * (Eng. trans. by E. Poste,*

Oxford 1890) ; Holland, T. E., (Elements of Jurisprudence) (11th ed., Oxford 1910) ; Maine, Henry Sumner, (Ancient Law> (New York 1888, London 1906) ; Pollock and Maitland, (History of English Law 'before the Time of Edward P (2d ed., 2 vols., Cambridge, Mass. 1903) ; Pollock and Wright, (Essay on Posses¬ sion in the Common Law (Oxford 1888) ; Raleigh, Thomas, (Outlines of the Law of Prop- erty) (ib. 1890) ; Savigny, Friedrich Karl, (3d ed., Boston 1896) ; Warren, E. H., Selected Cases and Other Authorities on the Law of Property* (Cambridge, Mass. 1915) ; Williams, T. C., (Personal Property) (15th ed., London 1900) ; id., Principles of the Law of Real Property* (19th ed., ib. 1901).*

Stephen Pfeil.

PROPERTY PROTECTION. See In¬ ternational Unions for the Protection of Property, a. Industrial ; b. Private.

PROPERTY TAX. See Taxation.

PROPERTY TEST FOR SUFFRAGE.

See Electoral Qualifications.

PROPHET. See Prophecy.

PROPHET, an insect, the praying mantis. See Mantis.

PROPITIATION, the act or means of ap¬ peasing or atoning. It is a Biblical and theo¬ logical term applying especially to Christ and his death. Saint John (1, ii, 2) says, ((He (that is, Christ) is the propitiation for our sins.® The end of all the sacrifices prescribed in the Old Testament was to obtain propitiation, to propitiate an offended Creator. See Atone¬ ment.

PROPOLIS. See Bee-keeping.

PROPHECY. I. Definition. — The word prophet is derived from the Greek word 7r po(prjTr]sy which doubtless meant originally an interpreter, then more specifically an interpreter of deity. Hence a prophet may be defined as a person who is considered to speak by the direct inspiration of a deity or spirit, while prophecy is the message of a prophet. The prevailing idea that the fundamental meaning of prophecy is prediction is thus erroneous, although predic¬ tion is often associated with the work of a prophet. Prophecy was thus an endeavor to ascertain the will of the deity by personal or subjective means, in contrast with omens and some forms of oracles which used external means.

II. Prophecy among other Nations aside from the Hebrews. — Prophecy was common in the early history of the world, although ordi¬ narily much less frequently than oracles and omens. It prevailed particularly in Greece. Specially celebrated was the Pythia, the priest¬ ess of the Pythian Apollo at Delphi, who spoke in an ecstatic state supposed to be caused by vapors from a chasm in the temple. There were also various sibyls in Greece, their number varying in the traditional accounts from four to ten. These sibyls were highly esteemed by the Romans and some of their written productions were regarded with great veneration. In the Semitic group of peoples, aside from the Hebrews, there is no explicit evidence of the presence of prophets among the Babylonians

and Assyrians, nor among the Canaanites, al¬ though their existence among the latter people is often inferred from their similarity to the Phoenicians. They are found among the Arabs, being there called by the name kahin, which is the same as the Hebrew word for priest, and the Arab prophets sometimes acted also as priests. They are also found in the service of the Phoenician Baal, as appears from the Old Testament accounts. No important written records of the utterances of any of these prophets outside of the Hebrew people have been preserved, the Sibylline

Books, reputed to be of Greek authorship, being almost entirely late Jewish compositions, thus really pseudony¬ mous, with some Christian fragments. Proph¬ ecy among other nations aside from the He¬ brews was ordinarily of the clairvoyant type, being given in answer to specific questions of individuals, and hence of no general or per¬ manent value.

III. Hebrew Prophecy. 1. General Con – ception. — The usual Hebrew word for prophet

is While the meaning of the word is

disputed, it seems probable that its etymological significance is ((speaker® ; hence it has the funda¬ mental idea of one who speaks for God, in accordance with the discussion above. The Hebrew prophet always spoke in the name of Yahweh. As among other nations, there are indications that in early times prophets and priests were connected; even some of the later prophets, as Jeremiah and Ezekiel were from priestly families.

2. Historical Development. — Considered his¬ torically, the Hebrew prophets may conveniently be divided into three classes, which are not, however, entirely distinct from each other, an individual sometimes exercising functions be¬ longing to more than one class, and all of them having certain characteristics in common. These classes may be called seers, oral prophets, and waiting prophets. The seer was consulted by individuals concerning personal matters, Samuel, according to one representation, belonging to this class, 1 Sam. ix, 7-8. This class seems to have been an early development, but it probably continued active until a late period. The oral prophets were concerned with the affairs of the nation and of the king as the representative of the nation. Their work, however, was specific, their usual task being to give advice concern¬ ing a particular situation, especially when con¬ sulted by the king. These may be called largely, but not entirely, professional. Many no doubt also acted as seers. The writing prophets were distinguished superficially by the fact that, while their messages were ordinarily proclaimed orally, later these messages were committed to writing, either by the prophet himself or by his disciples. But this really re¬ sulted from a deeper distinction. Their mes¬ sages were actually characterized by great and permanent significance; they not only gave ad' vice in reference to a particular situation, as Isaiah to Ahaz and Hezekiah, but they based this on fundamental and comprehensive teaching concerning God, his relations to men and his principles of action. The presentation of new truth is thus specially characteristic of the writing prophets, and some of the greatest messages of the Old Testament come from

them. These prophets were clearly not pro¬ fessional. What are usually called the prophetic books of the Old Testament contain the messages of this class, as well as other por¬ tions, such as the prophetic narratives of the Pentateuch known as J and E.

3. Characteristics of the Prophets — The prophets often formed guilds, living together in communities. These guilds are frequently called < (sons of the prophets, 5) compare also the designation «a band of prophets, » 1 Sam. x, 5, 10. Such guilds are mentioned several times during the life of Samuel, 1 Sam. x, 5, 10; xix, 18-19, etc., inˆ the time of Elijah and Elisha, 1 Kings xx, 35 ; 2 Kings ii, 3, 5, 7, 15, etc., and in the time of Amos, Amos vii, 14. Presuma¬ bly this was a continuing feature. Samuel and Elisha were particularly connected with these guilds. The writing prophets were independ¬ ent of them and sometimes hostile.

Gifts or fees to the prophets were customary. A fee for professional services was expected when a seer was consulted, 1 Sam. ix, 7-8; 1 Kings xiv, 3. A gift of first-fruits was made to Elisha, 2 Kings iv, 42. The prophets seem ordinarily to have made their living by proph¬ esying, as is indicated by Micah iii, 5; Eze¬ kiel xiii, 19 ; Amos vii, 12, etc. But no such gifts seem to have been made to the writing prophets, and Amos repudiates the idea, Amos vii, 14.

The prophets were often marked by a dis¬ tinctive dress, viz., a hairy mantle, 1 Kings xix, 13; 2 Kings i, 8; Zechariah xiii, 4. Naturally this would be especially characteristic of the prophetic guilds, the writing prophets appar¬ ently not following the practice. A distinctive sacred mark in the forehead is mentioned only once, 1 Kings xx, 41.

In the early times religious estacy or frenzy was a prominent characteristic of the prophets, 1 Sam. x, 9-13; xix, 18-24, as was the case also with prophets of the Phoenician Baal, 1 Kings xviii, 28; similar is the condition of Elijah when he runs before the chariot of Ahab, 1 Kings xviii, 46. In 2 Kings ix, 11 one of the prophets is called mad. This frenzied condi¬ tion was excited especially by music, consult 1 Sam.- x, 5; 2 Kings iii, 15. This condition is not mentioned in the later time and doubtless gradually ceased. Dreams and visions were also part of the experience of the prophets. But these, especially dreams, became less fre¬ quent in the later times.

The prophets, especially the oral prophets, often gave a message that suited those con¬ sulting them, in particular messages of pros¬ perity for the king and the nation. Such prophets may be described as professional, they regarded their work as a profession with no high conception of its religious

significance. Some of these prophets were no doubt insincere, other perhaps merely professional and con¬ ventional, repeating the messages of earlier prophets with no distinctive addition of their own. In the Old Testament these are not de¬ scribed as false prophets, but, at times, as prophesying falsely or prophesying lies. The writing prophets come into sharp opposition with prophets of this kind. The favorable message of such prophets is mentioned in Isaiah xxx, 10; Micah iii, 5 ; 1 Kings xxii, 13; Jeremiah xxiii, 17 ; xxviii, 1-4, etc. Several of the oral prophets, however, exerted a very

important influence in reference to national affairs. Thus Samuel anointed Saul as king, and later announced his rejection and anointed David; David followed the instructions of Gad, 1 Sam. xxii, 5; Nathan gave David direc¬ tions concerning the temple, 2 Sam. vii, Iff, and rebuked him for his sin, 2 Sam. xii, 7 ; while the importance of the work of Elijah and Elisha is well known.

The conviction of the prophets that Yahweh was speaking through them seemed universal. This appeared to be quite as strong in the case of the lower professional prophets as with those of a higher kind. How fully this con¬ viction was justified in each case, therefore, must be determined by careful study, especially by the contents of the individual message.

The dominant purpose of the actually sin¬ cere prophets may be stated thus : so to pre¬ sent the truth of God as to produce practical religious results. This appears from a study of the various elements in their messages, and of course applies more fully to those of the higher kind. The national interest has a funda¬ mental religious basis ; the social teachings, prominent as they are, are essentially re¬ ligious; and the ethical teachings, which are conspicuous, have a religious centre. The teaching is pre-eminently practical rather than speculative, the message of the prophet was fundamentally a message to his own time.

In connection with what has already been said, the matter of prediction and fulfilment may be noted. The message in prediction, as elsewhere, was for the time of the prophet ; the aim of prediction, therefore, was not to present a program for the future, but to teach the comprehensive truth concerning God and His principles of action for the sake of the present effect. Hence the prediction was not a statement of that which the prophet thought must necessarily take place, but rather a presen¬ tation of the prophet's expectation or ideal, with a view to the encouragement or warning of his hearers. Fulfilment of details, therefore, is not to be expected and does not ordinarily appear; there is a more general fulfilment in the reali¬ zation of the principles that are stated.

In the latter part of the Old Testament, chronologically considered, prophesy began to pass into apocalyptic, as in the book of Dan¬ iel and in small portions of other books, which finally replaced prophecy in the Jewish thought of the two centuries before Christ and the first century after Christ. See Apocalyptic Literature.

IV. Prophecy in the New Testament. In the New Testament the prophet is in general an interpreter of God's message, who speaks to the edification of the church, 1 Cor. xiv, 3, 24, 25, prediction being only rarely mentioned, as in Acts xi, 28; xxi, 10 — 11. Prophets formed a special class in the church, ranking next after apostles, 1 Cor. xii, 28; Eph. iv, 11, and much superior to the possessors of the gift of tongues, 1 Cor. xiv, 5, 39.

Bibliography. — Bennett, W. H., (The Re¬ ligion of the Post-exilic Prophets> (Edinburgh 1907) ; Buttenweiser, Moses, (The Prophets of IsraeP (New York 1914) ; Jordan, W. G., Prophetic Ideas and Ideals) (New York 1902) ; Kaplan, J. H., Psychology of Prophecy) (Philadelphia 1908) ; Knuldson, A. C., (The Beacon Lights of Prophecy5 (New York 1914) ;

Kuenen, Abraham, (The Prophets and Proph¬ ecy in Israel) (London 1877) ; Robinson, H. W., (The Religious Ideas of the Old Testament (London 1913) ; Smith, W. R., (The Prophets of IsraeP (New York 1897).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

PROPONTIS. See Marmora, Sea of.

PROPORTION, an equality of ratios; a series in which the first of any even number of terms bears the same mathematical relation to the second term as each other odd-numbered term does to the even-numbered term which immediately follows; thus 4, 12; 5, 15; 6, 18 (or 4 : 12 = 5:15 = 6:18, or 4:12: :5 :15 : :6:18, these forms being read (<4 is to 12 as 5 is to 15 as 6 is to 18,® etc.) is a geometrical proportion. The definition given above using the words (

a b

veniently be written — = — . The chief prop-

b c

a c

erties of a geometrical proportion, say — = — ,

b d

are the following: (1) the product of the means equals the product of the extremes, be — ad (clear of fractions) ; (2) the terms are in pro¬ of + h c + d

portion by composition, – = – (add 1

b d

to each member of the original equation) ; (3)

a — b

the terms are in proportion by division, – =

b

c — d

- (subtract 1 from each member) ; (4) the

terms are in proportion by composition and a f b c T d

division, – = – (divide the equation in

a — b c — d

(2) by the equation in (3)).

PROPORTIONAL REPRESENTA¬ TION, as its name suggests, is the result ob¬ tained when the members of legislative bodies are so chosen that each party or faction in the voting population is represented by a number of delegates proportionate to its numerical voting strength.

Proportional representation gained respecta¬ bility as a reform in England and the United States largely as the result of the able expo¬ sition of its principles made by Mr. Thomas Hare in 1859 and John Stuart Mill in 1862. Since its underlying principle, as will be later pointed out, is destructive of the two-party sys¬ tem which forms the framework of the present English and American political structures, it is natural that it

should have received scant recognition or approval from party leaders. It has been put into practice in the United States only in those rare instances in which the prin¬ ciple of non-partisanship has found expression, — instances thus far confined in the main to cities in which the new forms of commission or city manager organization have been adopted. The socialist party indorses its application in State and National governments, and one or two non-political organizations are conducting campaigns of education in its behalf.

Method of Operation.— The nature and working of proportional representation may best be made clear- by an examination of the two leading methods which have been devised to give it effect.

(a) The single transferable vote. — This system is applicable to an election in which sev¬ eral representatives are to be chosen from a large constituency. Suppose six vacancies are to be filled by an electorate of 60,000 voters. Under the usual bi-party system each party would nominate six candidates and the party which cast the majority, or even the plurality in case more than two parties had tickets in the field, would elect all six representatives. It might be, therefore, that 31,000 voters would elect all the representatives and the other 29,- 000 would go unrepresented. By the use of the single transferable vote each voter would vote not for six candidates but for one. Any candidate, therefore, who received 10,000, or one-sixth of the total vote cast, would be elected. In this way any group in the commu¬ nity which had this much voting strength could secure the election of one representative. With no other provisions for expressing a preference between candidates this system would, of course, tend to give the same representation to all groups of voters alike provided they could each cast a vote of 10,000. A voter might, therefore, find himself wasting his vote by casting it either*

for a man who had already received more than enough votes to elect him or for a man who did not receive enough to elect him. To avoid this difficulty the single vote is made transfer¬ able by allowing the voter to indicate his second, third, fourth, fifth and sixth choices or as many of them as he cares to indicate. If the man for whom he has expressed his first choice does not need his vote, or cannot be elected even with the aid of it, then his second choice vote is added to the total first-choice votes of the man for whom it is expressed, and so on. In this way, by counting as many of the later choices as are necessary to secure the election of six men each group in the electorate is able to elect approximately its proportionate share

of the whole number of representatives. In other words, 40,000 of the 60,000 could by ex¬ pressing their first four choices elect four men.

This system was roughly the one advocated by Hare and bears his name. It has been modi¬ fied in many ways especially in the matter of the counting of the votes and the procedure in the elimination of the weak candidates. A good many detailed problems arise in connection with its application which cannot be mentioned here.

(b) The List System. — This system gives the voter a chance to express a preference not only for an individual candidate but also for a party or group. The names of candidates are put on the ballot in lists or blocks so that those of similar views are grouped together. The voter, as in the first system described, has but one vote to cast and he casts it for one candi¬ date on one of the lists. This vote counts one in determining how many candidates the ad¬ herents of that list are to elect and it also counts one toward the election of a single candidate on that list. The proportion of the total vote which is cast for a single list determines the number of representatives which are chosen from that list; and when that number has been determined the highest candidates on the list are chosen. Thus a man may vote for a man who is defeated yet at the same time further the election of another candidate from the same list or party.

Minority Representation. — The chief dif¬ ference in principle between proportional repre¬ sentation and minority representation is that the latter system seeks to secure the representation only of the leading minority party or parties. It may be presented in terms of the Illinois system of minority representation adopted in 1870 for the election of the lower house of the State legislature. This is a system of cumu¬ lative voting. From each district three repre¬ sentatives are to be chosen and each voter js given three votes to cast. He may cast them in any way he chooses, — one for each of the three candidates, two for one and one for another, one and one-half each for two, or all three for one candidate. The result is that any party in any district which can cast one-third of the total vote may, by concentrating oi "plumpingˆ all their votes on one man, elect him. In prac¬ tice it has commonly worked out that the major¬ ity party has elected two candidates and the minority has elected one. The smaller minority parties go unrepresented. Under extraordinary circumstances the minority party by supporting solidly two candidates has been able to elect them both against the majority party which has*

unwisely scattered its vote among three candi¬ dates. To avoid this the party managers have usually tried to limit the number of candidates of their parties to the number they can reason¬ ably expect to elect. In this way the freedom of choice of the voter is somewhat abridged.

Arguments for Proportional Representa¬ tion. — The arguments in favor of propor¬ tional representation may be summarized as fol¬ lows : First, it would prevent the non-repre¬ sentation of any respectable minority in the body politic but allow. each group to enjoy that share in political power to which its numbers entitle it. The domination of majorities would be abolished. Second, attention would be cen¬ tered upon the selection of men who represent a definite body of opinion rather than upon men who, as now, represent a definite geograph¬ ical unit or district. Third, by the wide range of choice open in the election the necessity for complicated nominating machinery with all the evils attendant upon it would be obviated. Finally, it would tend to break up the bi-party system and the elaborate organizations and methods of control which that system produces, and replace it by a natural, informal and genu¬ ine alignment of the people along the lines marked out by the actual divisions in the public opinion of the community. This is peculiarly desirable in municipal government where the influence of State and National parties domi¬ nates municipal politics to the exclusion of local issues. For this reason proportional represen¬ tation has developed most rapidly and success¬ fully in cities.

Arguments Against.— The following argu¬ ments are advanced by the opponents of pro¬ portional representation : First, the system makes the formulation and development of a legislative policy very difficult. The legislature is composed of a large number of groups with no cohesive influence uniting them and the poli¬ cies they work out are usually compromises which really do not represent the real views of any group. Furthermore, responsibility is lost in such a case. Under the two-party system each party goes before the people on a certain platform and the successful one may properly be held responsible for the carrying out of that policy. With a large number of parties the policy which is ultimately agreed upon is one upon which the electorate may never have ex¬ pressed itself and no one group can be held accountable for it. Second, it is very hard to say just what is being represented in an elec¬ tion held under this system. The groups which may temporarily gather in support of a candi¬ date may be based upon racial, religious, social, or political grounds, and the legislative body which results may be a mosaic of widely diver¬ gent and incompatible interests with no common ground upon which to meet. Third, it is urged that the average voter would not be able to vote intelligently the somewhat complicated ballot necessary to a proportional representa¬ tion scheme; that it enormously increases the difficulties of counting the election and materi¬ ally augments its cost.

Extension in the United States. — Although roportional representation in its various forms as been used rather widely in Europe for many years it has but recently made its appearance in this country. The first instance of

its use was in the city of Ashtabula, Ohio, in 1915 where

under a new city charter it was used in the selection of the municipal commission. In 1917 it was incorporated into the charter of Boulder, Colorado. It is being seriously considered as a desirable adjunct to the commission and city manager types of municipal government.

Consult Humphreys, Eroportional Repre¬ sentation (1911) ; Commons, Eroportional Representation5 (2d ed., 1907) ; Hoag, Effec¬ tive Voting5 (1914; Sen. Doc. 359, 63d Cong. 2d Sess.) ; Holcombe, (State Government in the United States5 (1916) ; Proportional Rep¬ resentation Review ("published quarterly) ; Equity (published quarterly) ; Library of Con¬ gress, a List of Books and References to Pro¬ portional Representation (1904).

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

PROPOSITION, (1) in mathematics, a statement in terms of something proposed to be proved or done. (2) In grammar, a sentence, or part of one, consisting of a subject, a predi¬ cate, and copula. (3) In logic, a sentence, or part of a sentence, affirming or denying a con¬ nection between the terms ; limited to express assertions rather than extended to questions and commands. Logical propositions are di¬ vided ; First, as to substance, into categorical and hypothetical ; secondly, according to quality, into affirmative and negative; and thirdly, ac¬ cording to quantity, into universal and particu¬ lar. (4) In poetry, the first part of a poem, in which the author states the subject or matter of it. (5) In rhetoric, that which is proposed, offered, or affirmed, as the subject of a dis¬ course or discussion.

PROPRIETOR. See Proconsul.

PROPRIETARIES, in American history, a common name applied in colonial days to those indivduals to whom colonies had been granted by the Crown. Most of the 13 English colonies were originally proprietary but New York, New Jersey and the Carolinas became royal prov¬ inces and only Pennsylvania, Delaware and Maryland remained such until the time of the Revolution. In proprietary governments, the proprietor appointed the governor, and in gen¬ eral enjoyed all those prerogatives of govern¬ ment which in monarchies were attached to the Crown. The laws of Pennsylvania and Dela¬ ware were subject to the supervision and con¬ trol

of the Crown ; those of Maryland were not, Consult Edgerton, H. E., (A Short History of British Colonial Policy5 (London 1897) ; Id., (The Origin and Growth of the English Colo¬ nies and Their System of Government5 (Ox¬ ford 1903) ; Doyle, J. A., (The English in America5 (5 vols., London 1882-1907) ; Hart, A. B., ed., (The American Nation: A History5 (Vol. V, New York 1904) ; McCrady, E., (The History of South Carolina under the Proprie¬ tary Government5 (New York 1897) ; Mereness, N. D., (Maryland as a Proprietary Colony5 (New York 1901) ; Osgood, H. L., (The Pro¬ prietary Province as a Form of Colonial Gov¬ ernment5 (in American Historical Review, Vol. II, p. 644; Vol. Ill, pp. 31 and 244, New York 1897-98) ; Shepherd, W. R., (History of Pro¬ prietary Government in Pennsylvania5 (in Co¬ lumbia University, Studies in History, Econom¬ ics and Public Law, Vol. VI, New York 1896) ; Whitehead, W. A., East Jersey under the Pro¬

prietors5 (Newark 1875) ; Winsor, J., ed., (Narrative and Critical History of America5 (Vols. Ill and V, Boston 1884-87).

PROPRIETARY GOVERNMENT. See

Colonial Government, Proprietary.

PROPYL (C3H7), the third radical of the series Cn Hi «i. It does not exist in the free state, but enters into the composition of a large series of important compounds.

PROPYLZEA, prop-i-le'a, in Greek archi¬ tecture, the entrance to a temple. The term was employed particularly in speaking of the superb vestibules or porticoes conducting to the Acropolis (q.v.) or citadel of Athens, which formed one of the principal ornaments of the city. This magnificent work, of the Doric order, was constructed by Pericles (437-433 b.c.) after the designs of Mnesicles, one of the most cele¬ brated architects of his age, Pausanias says it was covered with white Peutelic marble, re¬ markable for the size of the blocks and the beauty of the workmanship. It was built on the foundation of an earlier gateway and was never fully completed. The imposing structure consisted of three parts : a central gateway with wings on the north and south. The building has suffered much from the ravages of foreign invaders, but even its ruins show clearly the wonderful beauty which must have been pos¬ sessed by the original structure. Consult Boet-ticher, A., (Die Akropolis von Athen5 (Berlin 1888) ; Bohn, R., (Die Propylaeen der Akropolis zu Athen5 (Berlin 1882) ; Doerpfeld, W., (Die Propylaen der Akropolis von Athen5 (in Kais , Deutsches Archdologisches Institut, Athenische Abteilung, Mitteilungen, Vol. X, pp. 38 and 131, Athen, 1885) ; id., (Zu den Bauwerken Athens5 (in ib. Vol. XXXVI, p. 51, Athen 1911) ; Elderkin, G. W., Eroblems in Periclean Buildings5 (in

Princeton Monographs in Art and Architecture, No. II, Princeton 1912) ; Frazer, J. G., Eausania's Description of Greece5. (Vol. II, London 1898) ; Harrison, J. E., Erimitive Athens as Described by Thucy¬ dides J (Cambridge 1906) ; Judeich, W., topo¬ graphic von Athen5 (in (Handbuch der Klas- sischen Altertums-Wissenschaft, Vol. Ill, pt. I, No. 2, Munich 1905) ; Middleton, J. H., Elans and Drawings of Athenian Buildings5 (in So¬ ciety for the Promotion of Hellenic Studies, Supplementary Paper, No. 3. London 1900) ; Dinsmoor, W. B., the Gables of the Propylsea at Athens5 (in American Journal of Archcelogy, Vol. XIV, p. 143, Norwood 1910) ; Penrose, F. C., Erinciples of Athenian Architecture5 (Lon¬ don 1888) ; Rohden, H. von, Eroylaen5 (in Baumeister, A., ed., (Denkmaler der Klassischen Altertums,5 Vol. Ill, p. 1414, Munich 1888) ; Stuart, J., and Revett, N., (Antiquities of At¬ hens5 (Vol. II, London 1784) ; Weller, C. H., the Pre-Periclean Propylon of the Acropolis at Athens5 (in American Journal of Archaeol¬ ogy, Vol. VIII, p. 35, Norwood 1904) ; id., < Athens and its Monuments5 (New York 1913).

PROROGATION OF PARLIAMENT,

in Great Britain, the continuance of Parliament from one session to another, as adjournment is a continuance of the session from one day to another or for a longer period. Prorogation determines the session, but adjournment does not. After a prorogation any bill which has previously passed both houses or either house, without receiving the royal sanction or the con-

currence of the other house, must be taken up de novo. Parliament is prorogated by the king in person or by his commissioners. The death of the crown or the calling out of the militia or reserves during a period of prorogation, im¬ mediately put an end to the latter. See Great Britain — Parliament.

PROSAURIA, a subclass and also an order Palaeozoic reptiles. See Herpetology.

PROSCENIUM, pro-se'm-um, in Greek and Roman theatres, the place where the actors appeared. It was in front of the rear wall or skene. The front part of it, where the actors stood, was called in Greek logeion or ocribas and in Latin pulpitnm and was elevated above the rest of the stage. The orchestra was in front of it. The place where the actors dressed and

undressed, was called postscenium. Pro¬ jecting wings on each side of the proscenium were called parascenia. In the modern theatre it designates that part of the stage located be¬ tween the curtain and the orchestra and usually including the proscenium arch. The boxes, im¬ mediately adjoining the stage, therefore, are usually called proscenium boxes.

PROSCRIPTION, in Roman history, a mode of getting rid of enemies, first resorted to by Sulla in 82 b.c. and imitated afterward in the years that closed the republic. It literally signifies <(a writing before^ and commonly meant an advertisement or announcement of articles to be sold. But Sulla applied it to a proclamation containing names of citizens and promising a reward to any person who should kill those named in the lists and a threat of death to those who should aid or shield them. The persons named were said to be proscribed. Their property was confiscated and their chil¬ dren were declared incapacitated for public office. The most notorious proscription after that of Sulla was that posted fiy the second triumvirate — Antony, Octavianus Caesar and Lepidus (43 b.c.), in which was included the name of Cicero.

PROSE LITERATURE. See Literary Forms.

PROSECUTOR, in law, is one who prose¬ cutes another for a crime in the name of the government, whether public or private. A pub¬ lic prosecutor is an officer appointed by the government to prosecute all offenses. In the United States the chief law officers that are public prosecutors are the attorney-generals of each State and there are subordinate officers known as State, district or county attorneys. Federal offenses are prosecuted by the attorney- general of the United States and the United States district attorneys. A private prosecutor is one who prefers accusations against a person whom he suspects to be guilty and if he acts from proper motives he will not be responsible to the party in damages, although he was mis¬ taken in his suspicions, but if from a motive of revenge he caused a criminal prosecution with¬ out reasonable foundation, he would be liable in an action for malicious prosecution. A prosecuting attorney bringing an action in the name of the people is presumed to have au¬ thority. His powers are limited to the prep¬ aration and trial of cases.

PROSELYTE (Greek, an arrival or new¬ comer), he who leaves one religion for another. In New Testament times there were proselytes

of two degrees, the proselytes of the gate who renounced idolatry and worshipped the only true God according to the (so-called) seven laws of the children of Noah, without subject¬ ing themselves to circumcision and the other commands of the Mosaic law, and were only admitted to the court of the temple, and stood at the door of the inner temple, whence their name;

having the right of dwelling in the land of Israel, but only in suburbs and villages; and the proselytes of righteousness who had been fully converted from paganism to Judaism, had been circumcised, and bound themselves to observe the Mosaic law. Before their circum¬ cision they were examined respecting the grounds of their conversion; after their circumcision they received baptism, being immersed with their whole body in a cistern full of water, on a festival, in the presence of three judges. This baptism, known under the name of proselyte baptism, was repeated in the case of those chil¬ dren of a proselyte who had a heathen mother. Boys under 12 and girls under 13 could not become proselytes without the consent of their parents, or, in case of their refusal, the aid of the magistrates. By the baptism every one was considered as born anew, so that his parents were no longer regarded as such, and slaves thus baptized were set free. Consult Bertholet, A., (Die Stelluing der Israeliten und der Juden zu den Fremden) (Freiburg 1896) ; Brandt, W., (Die Jiidischen Baptismen) (Giessen 1910) ; Graetz, H. H., (History of the Jews) (6 vols., Philadelphia 1891-98) ; Schiirer, E., (Geschichte des Jiidischen Volkes) (4 vols., Leipzig 1901—

11).

PROSERPINA, pro-ser'pi-na. See Perse¬ phone.

PROSODY (Greek, prosodia), the part of grammar that treats of quantity, accent, metre and the laws of versification. See Rhyme; Rhythm; Verse.

PROSPECT PARK, N. J., borough in Pas¬ saic County, on the Passaic River, forming a residential suburb of the city of Paterson, which it adjoins. Pop. 2,719.

PROSPER (Fr. pros-par) OF AQUI¬ TAINE, also called PROSPER TIRO, Chris¬ tian poet and religious controversialist: b. Aquitaine, about 400; d. soon after 463, prob¬ ably at Rome. He was a layman, probably a teacher of rhetoric and had settled in some city of Provence (perhaps Marseilles) when Saint Augustine's work on Correction and Grace) reached Southern Gaul. In that country there were many Semi-Pelagians who taught that Saint Augustine's doctrine of grace militated against the notion of Free Will. Prosper with a companion went to Rome after the death of Saint Augustine in 431 and induced Pope Celestine to write a letter against the Gallican Semi-Pelagians. Prosper also wrote a Latin dogmatic poem of over 1,000 hexam¬ eters, (On the Ungrateful,) as he styled the Semi-Pelagians who seemed ungrateful for the gift of divine grace; many essays on (Grace and Free WilP and a most valuable chronicle, Epitoma Chronicom, which brings the history of the French church down to 455; and he com¬ piled a Liber Sententiarum from Saint Augus¬ tine's works. There are many editions of his works. The best collection of them is to be found in Migne, J.

Completus) (Vol. LI, Paris 1846). The best recent edition of his chronicle is included in Momrusen, T., ed., (Monument Germanise His- torica Chronica Minora) (Vol. IX, Berlin 1892). Consult Potthast, A., (Bibliotheca His- torica> (2 vols., Berlin 1896) ; Valentine, L., (Saint Prosper d'Aquitaine) (Toulouse 1900) ; Worter, F., (Prosper von Aquitanien iiber Grade und Freiheit) (Frieburg 1867).

PROSPERO, one of the principal charac¬ ters in Shakepeare's romantic drama, (The Tempest> (q.v.). He is the rightful duke of Milan, but is dispossessed of his dukedom by his brother Antonio and the king of Naples, and with his daughter Miranda is put adrift at sea in a leaky boat. Having reached a desolate island he establishes a refuge for himself and daughter, with Caliban, a half-human monster, the only inhabitant he found on the island, as servant. He takes up the practice of magic which he had studied at Milan, raises a tempest which wrecks upon his island coast Antonio, the king of Naples and their suites, and saves them from drowning only to subject them to various punishments until he finally reveals himself, and gives them his forgiveness. All prepare to return home, Miranda meantime betrothed to the King's son Ferdinand. Pros- pero then breaks his wand and renounces magic. Consult Carpenter, W. B., (Shakespeare's

Tempest> (in (Religious Spirit in the Poets,5 p. 103, New York 1901) ; Furness, H. H., ed., (A New Variorum Edition of Shakespeare5 (Vol. IX, Philadelphia 1892) ; Moulton, R. G., (Shakespere's Tempest) (in New Shakespere Society, Transactions, 1887, Ser. I, p. 37, Lon¬ don 1887) ; Rolfe, W. T., ed., (The Tempest) (New York 1904) ; Stephens, G., (((The Tem¬ pest55 : An Outline Sketch of the Play by Wil¬ liam Shakespeare) (Stockholm 1836).

PROSSER, Charles Allen, American edu¬ cator: b. New Albany, Ind., 20 Sept. 1871. He was educated at the universities of De Pauw, Louisville and Columbia. He was superintend¬ ent of schools for the Children's Aid Society in 1909-10 and deputy commissioner of educa¬ tion for Massachusetts in 1910-12. In 1912 he became secretary of the National Society for the Promotion of Industrial Education; and he was director of the Minneapolis Survey in 1915, in which year he became director of the William Hood Dunwoddy Institute at Min¬ neapolis. Author of (New Harmony Movement (1903) ; (The Organization and Administration of Vocational Education5 (1913) ; etc. He was general editor of the

Vocational Educa¬ tion Series5 of the American Book Company in 1913.

PROSSNITZ (Czech prostejov) , Czecho¬ slovakia, a town of Moravia, 11 miles southwest of the town of Olmiitz, on the Rumza. There are two railway lines. It is the centre of a fertile and prosperous region. It has extensive manufactures of woolen and linen cloth, cash- mere and cotton goods, in all of which it car¬ ries on an important trade; numerous distiller¬ ies of brandy and rosolio, extensive breeding of geese and one of the largest corn-markets in Moravia. The city hall is an interesting an¬ cient building. There are German and Czech¬ ish schools. Most of its inhabitants are Roman Catholic Czechs, but there is a large Hebrew congregation. Pop. 31,462.

PROSTATE GLAND, the pale, firm body composed of both muscle and gland, in shape resembling a chestnut, which surrounds the neck of the bladder and the beginning of the urethra in the male. It consists of two lateral lobes and one middle lobe. The excretory ducts from the glandular substance of the organ open into the prostatic portion of the urethra. It is well supplied with blood-vessels and nerves and is enclosed in a thin but firm fibrous capsule. The secretion of the prostate is a milky, vis¬ cous fluid of acid reaction, discharged under sexual excitement with the semen and forming for the latter a fluid vehicle. Enlargement of one or more lobes of the prostate is very com¬ mon in men over 55. The cause is not known. It is said that such enlargement has never been found in eunuchs, or where the testicles have been lost. The enlargement encroaches on the rectum and urethra, interfering with their functions, the bladder becoming distended ; its walls may be thin and inefficient and a cystitis may be set up. In this disorder the stream of urine becomes slower; there is a frequent desire to urinate, even at night, but only a few ounces of urine are passed each time. Exhaustion, sepsis from retained urine and sometimes local hemorrhage cause enlarged prostate to be a serious condition. Treatment includes mild and easily digested food, regulation of the bowels, freedom from exposure to cold and damp and the careful use of the catheter. Sometimes enucleation of the enlarged gland (prostatect¬ omy) is of value; so are Bottini's operation, burning a channel through the obstructing mass, and vasectomy, the cutting of the vas deferens. Removal of the testicle to reduce the size of the prostate is sometimes resorted to. Acute pros¬ tatitis, an acute inflammation, is most often due to gonorrhoea or to strong injections for its re¬ lief, but may arise from the irritation of calculi or the use of instruments, etc. The symptoms are painful and frequent micturition, swelling, high fever, retention of urine and tenderness in the region of the lower bowel and the neck of the bladder. The inflammation may progress so far that suppuration (prostatic abscess) oc¬ curs. The treatment requires rest in bed, hot anodyne fomentations, leeches, purgation and opening of the abscess. Chronic prostatitis may be the sequel of the acute form, or it

may be primary. There is less swelling, pain and tenderness than in the acute. It is a condition which needs the supervision of the physician or surgeon. Tubercular disease of the prostate may either be primary or be secondary to simi¬ lar disease of the testes. There are nodular lumps, which may break down and produce an abscess. The disease may invade the bladder and the whole urinary tract. The prostate is subject, though rarely, to malignant tumors, carcinoma and sarcoma. Prostatic calculi about the size of millet-seed are quite common in old men. They rarely give rise to noticeable symp¬ toms unless inflammation occurs. Sometimes they are voided or they may form the nucleus of a prostatic calculus.

PROSTITUTION. See Vice, Regulation of.

PROSTYTE, in architecture, a portico in which the columns stand in advance of the building to which they belong. The term amphi-prostyle is used when there is such a

portico attached to a building both in front and behind.

PROTAGORAS, pro-tag'6-ras, Greek soph¬ ist : b. Abdera, Thrace, about 480; d. about

410 b.c. He studied the old Ionian philosophy paying especial attention to Heraclitus, and he was the first to assume the title of Sophist, and to teach for pay, a practice which, Plato in¬ forms us, proved very remunerative. He taught principally at Athens. When, about 443, a num¬ ber of Athenians left the city to join in found¬ ing the new colony of Thurii, Protagoras was appointed by Pericles to accompany them and subsequently drew up a constitution for the Thurians. Before returning to Athens he lived for some time in Sicily, where he acquired great fame. He returned to Athens before 430. In

411 he was brought before the Aeropagus for beginning one of his works (Concerning the Gods5) with the words, "Respecting the gods, I am unable to know whether they exist or do not exist,55 was banished for atheism, and per¬ ished at sea. He was the author of a large number of works, all of which are lost. The two most important of them were the ones al¬ ready mentioned, and another entitled

Bibliography. — Burnet, J., Creek Philoso¬ phy5 (London 1914) ; Diels,

H., ‘Die Frag- mente der Vorsokratikie5 (Berlin 1903) ; Erd¬ mann, J. E., (History of Philosophy5 (Vol. I, London 1890); Frei, J., ‘Questiones Protagorae5 (Bonn 1845) ; Gomperz, H., ‘Sophistik und Rhetorik5 (Leipzig 1912) ; Gomperz, T., Creek Thinkers) (Vol. I, London 1901) ; Grote, G., ‘A History of Greece5 (Vol. VIII, Boston 1852) ; Hallpass, W., ‘Die Berichte des Platon und Aristoteles fiber Protagoras5 (Leipzig 1882) ; Harpf, A., ‘Die Ethik des Protagoras5 (Heidel¬ berg 1884) ; Hegel, G. W. F., ‘Lectures on the History of Philosophy5 (3 vols., London 1892— 96) ; Herbst, L. E., ‘Des Protagoras Leben und Sophistik5 (in Petersen's Philologisch-Histori- sche Studien, Vol. I, Hamburg 1832) ; Jowett, B., trans., ‘The Dialogues of Plato5 (5 vols., New York 1892) ; Lachmann, B., ‘Protagoras, Nietzsche, Stirner5 (in Bibliothek fur Philoso- phie, Vol. IX, Berlin 1914) ; Lewes, G. H., ‘Biographical History of Philosophy5 (New York 1885) ; Menzel, A., ‘Protagoras als Ge- setzgeber von ThoriP (in Konigl. Sdchsische Gesellschaft der Wissenschaften zu Leipzig, Philologisch-Historische Klasse, Berichte, Vol. LXII, p. 189, Leipzig 1910) ; id., ‘Protagoras, der Alteste Theoretiker der Demokratie5 (in Zeitschrift fiir Politik, Vol. Ill, p. 205, Berlin 1910) ; Natorp, P., ‘Forschungen zur Geschichte

des Erkenntnissproblems im Altertum5 (Ber¬ lin 1884) ; Sattig, F., ‘Der Protagoreische Sen¬ sualism5 (in Zeitschrift fiir Philosophic und Philosophische Kritik, n.f. Vol. LXXXVI, p. 275, Halle 1885) ; Schiller, F. C. S., ‘Studies in Humanism5 (London 1907) ; id., ‘Plato or Protagoras ? > (Oxford 1908); id., ‘The Hu¬ manism of Protagoras5 (in Mind, n.s. Vol. XX, p. 181, London 1911); Windelband, W., ‘His¬ tory of Ancient Philosophy5 (New York 1899) ; Zeller, E., ‘History of Greek Philosophy5 (Vol. II, London 1881).

PROTANDRY. See Pollination.

PROTECTION is a term in political econ¬ omy, employed to describe the policy of indi¬ rectly promoting the growth of national indus¬ tries, either to secure the defensibility of the country in time of war, or to promote its gen¬ eral welfare, or both. It differs from Socialism in seeking this by indirect means, and with the minimum of interference with individual free¬ dom, recognizing that the true function of gov¬ ernment is to steer the ship of state in indus¬ trial matters, and not to propel it. It differs on the other side, from free trade, which excludes government from any kind of activity in the in¬ dustrial sphere, and especially objects to any legislation which will have the effect of divert¬ ing capital and labor into channels in which they would not otherwise flow.

More than one way to this end has been used, such as the absolute prohibition of speci¬ fied imports, premiums upon exports, bounties upon

home production, and the retention of raw material. But the usual way has been to impose, upon the competing product from abroad, a duty sufficient to discourage its use and to make it unprofitable to the dealer. Such duties are either ad valorem or specific. The former are levied upon the value of the imported commod¬ ity, and are either directly or inversely propor¬ tional to that value. Thus the duties imposed by the British Corn Laws rose as the price of wheat fell, and the converse. Specific duties are those which tax the commodity by number, weight or bulk, irrespective of differences in value. For protective purposes they are pre¬ ferable.

From the rise of national feeling in Europe, at the close of the Middle Ages, to the Con¬ gress of Vienna in 1815, all governments pur¬ sued the policy of protection to home industry. Among economic theorists a protest against this was begun by the French Economistes (Gour- nay, 1754; Quesnay, 1758 ;• Turgot, 1766). It found its finest exposition and defense in their Scotch disciple, Adam Smith (1776), who con¬ tended that the interplay of self-interest is quite sufficient to secure the best industrial develop¬ ment, and that when every man is left to "do as he will with his own,55 he will do what is best for society. The antipathy of Napoleon I to this theory, and the questionable means he em¬ ployed to counteract it in his Continental Sys¬ tem, seemed likely to give it a chance of being applied in the states represented at the Con¬ gress of Vienna. But a few years of actual ex¬ perience satisfied the rulers and cabinets of the Continent that the path to national prosperity did not lie in that direction. They returned to protection, which England and France, indeed, never had abandoned, and which Germany made

effective for the whole country through the Zollverein (1817-33).

It was in the United Kingdom, in 1846, after eight years of popular agitation by the Anti- Corn-Law League, that a European government first took steps to abandon Protection, and that after 510 years of it had lifted England out of the dire poverty of a merely agricultural coun¬ try, into the first rank among manufacturing nations. And even she continued to protect her silk and glove industries against French com¬ petition, until the Cobden Treaty of 1860 agreed to the abolition of these duties.

Twenty years later there began a reaction against free trade, which is now supported by the Conservative party. It grew out of the fail¬ ure of that policy to obtain the support of other countries, and the rapid growth of France, Ger¬ many and America in commerce and manufac¬ tures under

protection, while England became more dependent upon the rest of the world for food, and was obliged to keep up a great navy that her ports might be kept open in case of war with any one or several European powers. The outbreak of war in 1914 empha¬ sized this necessity. The destruction of many merchant vessels by German submarines, and the diversion of others to transport use, reduced her means of bringing food from abroad, so that importations are limited by royal order to things thought necessary. Even strenuous free traders now recede from the principle adopted in 1846, and propose that home production shall be fostered and importations restricted by im¬ posing duties on these. In this they revert to the principle laid down by Nassau W. Senior in 1835, that the economist has no right to dictate the policy of the statesman, since economic rea¬ sonings are only a part of the considerations which should influence him.

In America the need of a national govern¬ ment, which could extend protection to the prostrate industries of the States, was one of the most powerful motives to the formation and adoption of the Constitution of 1787, which authorized Congress to impose duties on im¬ ports <(to pay the debts and provide for the common defence and general welfare of the United States.® The harsh experiences of the war for independence had shown the country the need of manufactures for the defense of the nation. It was on this ground that Washington repeatedly pressed for adequate legislation; and in this he was supported by his secretary of the treasury, Alexander Hamilton.

The great President, in his address to Con¬ gress in 1790, said, ((A free people ought not only to be armed but disciplined, to which end a uniform and well digested plan is requisite; and their safety and interest require that they should promote such manufactures as tend to render them independent of others for essen¬ tials.®

Duties were steadilv adapted to this end, un¬ til the political revolution of 1801 brought Jef¬ ferson into office. From that time no advance in the direction of more adequate protection were made, although only the duty on salt was repealed, with the result that the country had a second salt-famine during the war of 1812-15. Its sufferings in this, and other industrial wants, effectually converted Jefferson from free trade but is was not until 1824 that the country re¬ turned to an effective protective policy.

The South, however, found that its adhesion to slavery precluded it from entering upon man¬ ufactures, and now began to antagonize protec¬ tion as an encroachment on the rights of the States, although her cotton-growing industry had been brought into existence and advanced to prosperity by a protective duty continued for many years. Her threats of nullification led to

the adoption of the tariff of 1833, which pro¬ vided for the gradual reduction of all duties to a 20 per cent level by 1840. The general suspen¬ sion of manufacturing through this reduction and the derangement of the currency brought about the severe depression of 1837-42, and caused another political revolution in the elec¬ tion of a Protectionist Whig to the presidency in 1840.

During the four years of the tariff of 1842 there was a great and general restoration of prosperity; but the influence of the example set by England, and the prospect of open mar¬ kets in that country for western and southern products, brought about another change. The tariff of 1846 embodied no economic principle, but effected a large reduction of duties below the protective level. In 1857 these duties were farther reduced by one-fourth, and another severe depression of industry helped to the election of Mr. Lincoln in 1860. Before he came into office the Morill tariff had been passed by Congress and signed by President Buchanan.

This was done in view of the certainty that a civil war at home was impending, and that it might involve the country in hostilities with England and France. It was therefore felt necessary to put the country in the way of equipping itself for any emergency. The rela¬ tion of home industry to national defense thus indicated, was amply shown in the distresses and disabilities of the Southern Confederacy, which solemnly committed itself to free trade in its Constitution, and was dependent upon its friends in Europe for military and other sup¬ plies. For over 30 years our country persisted in this policy of protection, with some unhappy experiments in the reduction of duties, — notably those on wool and woolens in 1883. The pres¬ ence of a surplus of revenue in the national treasury was made the pretense for demanding (

This continued until a division of the Re¬ publican party on other grounds, in 1912 brought back the Democrats to power under a Presi¬ dent devoted to free trade. The tariff of 1913 is a distinct step in that direction. It has not been so harmful as some earlier tariffs, because the vast develonment of wealth and industrial power under the long continuance of Protec¬ tion has given the country some power of re¬ sistance to legislation adverse to our industrial interests. Also the depression which followed upon its adoption was neutralized in many fields of industry by the outbreak of war in Europe, as this created an immense demand for the products of our two greatest industries — agriculture and metal wares. European com¬ petition was checked also by the diversion of

millions of men from industry to military serv¬ ice, and by the seclusion of Germany and Au¬ stria-Hungary from foreign commerce. At the same time we were shown the folly of depend¬ ing upon foreign producers for our supply of indispensible articles, such as dye-stuffs. Some of these were placed under a moderate pro¬ tective duty by the votes of the party which had enacted the tariff of 1913, and measures were adopted to prevent our markets being flooded with European goods at sacrifice prices after the close of the war, as was done in 1783 and 1816.

The Reasons for Protection are numerous and mutually supporting (1) The necessity of varied industries for the national defense has been indicated already. It was again shown in the Boer War, in which a brave people were handicapped by their being a merely agricultural population, in conflict with a great manufactur¬ ing country. It was amply illustrated in all nations involved in the great World War. (2) The variety of industry, which Protection estab¬ lishes, is not less necessary to defend the coun¬ try from the perils of famine. A country which produces food only, is liable to famine and its consequent pestilences, whenever the rains are too scanty or too plentiful for the harvesting of the crops. Such a country has all its eggs in one basket, and should that fall, it has nothing to fall back upon. Ireland and India became famine countries through the destruction of their manufactures by English legisla¬ tion and by English competition. They will remain such until they secure the independence which will enable them to enact the protection of their home industries they both desire. All the regions visited by famine in modern times — Persia, central Rus¬ sia, northern China, northern Sweden, Asia Minor, and even some districts of our own country, — are merely agricultural communities. (3) Protection secures the general welfare of the producers of the country, by bringing each class into the neighborhood with the others, which supply its wants and demand its goods. It thus saves the cost of carrying products over land and sea to find a market and bring back, at a like cost of carriage, whatever is taken in exchange. The railroads of the country save about $5 a ton on having their worn rails con¬ verted into new, through not being obliged to send them to rolling-mills in Europe. The farmer gets more for his crop when he has the artisan close at hand to consume it, and obtains in greater abundance what the artisan produces, even if he has to pay a higher money- price for it. All this advantage is lost when a country keeps its farms on one continent and its workshops on another, and spends both strength and money in transportation which could be avoided. (4) The naturalization of varied industries by protection gives the people of the country greater liberty to choose the kind of work they prefer, and a finer opportu¬ nity to develop their natural capacities in im¬ proving old methods or inventing new ones. This has been especially true of America, whose people were taunted for their backwardness in invention before this

became a manufacturing country. An English manufacturer declared we could not make so much as a mouse-trap for ourselves. American inventions have lightened the burden of toil for half mankind. They VOL. 22 — 43

have made many staple articles, such as steel, cutlery, cotton and silks, cheaper to the whole world. The American character has been dis¬ tinctly improved by emergence out of the stage, at which farming and shipping furnished al¬ most the only employments, and has grown in manifoldness and energy. (5) The variety of industry, at which Protection aims, is highly useful in drawing the people of the country in closer relations, and thus contributing to the unity of will and understanding, which underlie national unity. It was by the trade be¬ tween the English colonies that the fierce

prejudices of our earliest time were over¬ come. It was through the development of

foreign commerce at the expense of home trade that the Union was imperiled. As

Mr. Carey showed Mr. Lincoln, our rail¬ road lines ran only to the seashore, to facilitate exports and imports. They now run north and south as well. By the Zollverein and its foster¬ ing of home trade, Germany was helped to national unity. The English sneered at the

notion that the Germans could (

The Objections to Protection are many in form, but they resolve themselves into a few. (1) It is charged that ˆprotection is hostile to commerce. If we do not buy, we cannot sell. Thus we are deprived of the possibility of dis¬ posing of our surplus products.® But with the single exception of England since 1846-60, all the great commercial nations have practised pro¬ tection ; and under that policy our own exports have reached a figure not equaled by any other country in the world, our rate of progress in this respect being rivaled only by protectionist Germany. In truth, nations buy of each other iust what they must, and sell all they can, and

means of payment are always found. (2) It is objected that <(the interest of the consumer is that of society at large, while the interest of the producer is that of a class only. Free trade promotes the former, while protection seeks the latter. For the consumer is interested simply in getting what he uses as cheap as possible, and with this a protection duty must interfere.®

But "belter than a low price for any article is a fair price,® Mr. Lowell says. The times of especial cheapness are what we call "hard times,® and even the free trader fails to rec¬ ognize his own ideal in those times. Like other people he begins to talk of an improvement in prices,® meaning a rise. In considering the effect of protective duties upon prices it is necessary to look at both sides of the account. Nearly every one in the community has some¬ thing to sell, and it is of small use to him to be able to buy at a low rate, if he must sell at a still lower. Ireland is a land of cheapness, but not to the advantage of its people, who cannot find a market for their labor. Nova Scotia is another country of low prices, and its people flock in thousands to Massachusetts, to seek employment at such wages as they never can earn at home and to live in comfort there. The free trader fixes attention on one side of the account, to the neglect of the other. Nor is the consumer, in the long run, obliged to pay higher prices (because of pro¬ tection. Mr. Greeley used to challenge the free traders to mention a single article whose manu¬ facture had been protected for 14 years, with¬ out falling in price below the point at which it has stood. All kinds of commodities in this country are cheaper to the consumer than they were before the enactment of the Morrill Tariff. The national consumption of all has increased far more rapidly than the increase of the population. (3) It is alleged that "Protec- tion is but a method of forcing a hot-house growth of industries, which would have come to us naturally, when our density of population warranted the transition from farming to manu¬ factures. The latter arise when there is a real need and demand for them, without any inter¬ ference on the part of government.® This state¬ ment is not supported by any historic instances of this natural growth. Every nation, which now possesses such industries, made its begin¬ nings under Protection. Every great industry that is fighting for the markets of the world was built up by protective duties. On the other hand, everyone admits that the want of manufactures is the root of the misery of Ireland and of India. The governmental commission to in¬ vestigate the cause of Indian famines reported, in 1885, that nothing but the diversion of a large part of the labor of the people to manu¬ factures would put an end to them. The need of both countries is beyond question, for in both the density of population has passed the point at which people can live by the soil. But neither of them possesses the power of trans¬ forming mere need into effective demand, by native legislation. How long are they to wait for that <(natural growth?® (4) Adam Smith's argument from the beneficial effects of what he called "natural liberty® supposes that "indi- vidual self-interest is enough to secure all the industrial growth that any country needs or should want. If everyone be left free to do

as he will with his own, he will do what society needs to have done.® Those who repeat this argument are never willing to apply it to other forms

of the state's activity, which affect in¬ dustry. They do not propose to have the mer¬ chants of each seaport keep its harbor in con¬ dition by their individual or even their united action. They dare not assert that individual self-interest has not inflicted deep and lasting injury of our country in the devastation of its forests, the destruction of its game, and espe¬ cially the extirpation of insect-destroying birds. They sustain the government in making the coinage of money and the carrying of letters public monopolies, and punishing all who in¬ vade either. They have ceased to look to pri¬ vate self-interest for the maintenance of a school system adequate to our national need. They make all these exceptions to their own theory, and the protectionist adds one more. Adam Smith's principle, however, has great truth. It is the rule, and all these other things are the exception. The protectionist differs from the free trader in that he has no panacea or cure-all to offer to the public. He has only a specific for a single social defect, and he alleges in its favor that it interferes as little as possible with personal liberty. (5) It is objected that ((protection favors the manufac¬ turers at the expense of their laborers and of the farmers of the country.® As for the laborers, protection does not set aside the law which Carey, Bastiat and Atkinson have shown to govern the distribution of profits. The laborer's share of the joint-product of capital and labor constantly increases, while that of the capitalist constantly diminishes. Protec¬ tion makes that joint-product greater with every expansion of industry, and thus secures to the workman a higher standard of living and a greater opportunity to save. Between 1860 and 1880, the wages of labor, measured in the power to purchase the staple commodities, more than doubled in this country. While free labor in America was once little if anything above the slave's level, as to the enjoyment of the necessaries and comforts of life, it is now on the highest level that it ever has attained in history. The superior condition of American labor was shown by an investigation carried out by our own government in 1911, and still more strikingly iby one conducted by the British Board of Trade through the English consuls in 1912. The London Times sums up the result, <(The workman in America enjoys an enormous advantage over his fellow in England. . . .

He earns two and a quarter times as much money, and works shorter hours for it, so that his hourly rate of earning is as 240 to 100. Against that enormous difference in wages there is something to be set in the way of expenditures, . . . but the cost of living

is only as 152 to 100. The advantage in re¬ gard to the cost of food is less than it looks^ A workman living on the American scale pays only 25 per cent more for his food than he would in England.® The Board of Trade it¬ self says, ((The margin is clearly large, making possible the command of the necessaries and minor luxuries of life greater than that enjoyed bv the corresponding class in this country.® The farmer is directly cared for in the

tariff, be¬ ing secured by the great market for his produce

which our manufacturing districts furnish him. From that market the protective tariff shuts out his Canadian competitor, in spite of the demand of our free traders, seconded by some short-sighted manufacturers, that we shall re¬ turn to the reciprocity which existed from 1854 till 1867. The farmer is also benefited in¬ directly by having his market for produce brought into his neighborhood, thus making his exchanges more equal. As an English newspaper put this years ago, ((when the western farmer in America had free trade, he gave a pound of butter for a pound of nails. But under protection he gets 14 pounds of nails for his pound of butter.® (6) It is alleged that protection favors the formation of trusts, and thus destroys that domestic competition, which the protectionist himself relies upon to secure reasonable prices.® Yet a large number of our trusts, beginning with the Standard Oil Com¬ pany, are almost independent of the tariff. Of the rest, very few have been able to secure such a control of production as to have the power to dictate prices; and of these several avoid attempting it. Their especial product is as cheap as before the trust was formed, their new gains coming from the saving of ex¬ penses. Others still are international trusts, of the sort that would be sure to abound if we abandoned protection. Nor are the countries which practise free trade characterized by un¬ limited competition among producers. Wherever the trades-union has obtained the control of the rate of wages and of the hours of labor, capital¬ ists have been led to combine for mutual pro¬ tection. They naturally think that they cannot afford to buy labor in a close market and sell their product in an open one. Unified control has come to be the rule in the great English in¬ dustries, and they have improved upon our ex¬ ample by including the workingmen in their arrangements for adjusting prices and wages.

The general movement of American indus¬ try to better conditions under the protective policy is shown by some statistics of our national position at the beginning of our long¬ est period of protection and the 1910 national census.

I860 1910

Population . 31,443,321 91,972,266

Wealth . $14,183,000,000 $167,579,806,316

Share per capita . $454 $1,822

Exports . $333,576,057 $1,487,764,991

Imports . $353,616,119 $823,172,165

Wages . $378,878,966 $3,427,032,000

Wage earners . 1,311,246 6,615,046

Average earnings. . . . $289 $518

Savings banks deposits $149,277,504 $4,070,486,247

Thus while population in that half-century increased 180 per cent, our wealth increased 1,815 per cent, and the individual share in it 301 per cent. The increase in our exports was 331 per cent, and that of our imports only 130 per cent, or less than the growth of population. While the number of wage earners increased 404 per cent, the wages paid increased nearly 800 per cent; and the savings banks deposits nearly 2,702 per cent.

Bibliography. — Alison, (Free Trade and a Fettered Currency) (1847) ; Bigelow, (The Tariff Question> (1862) ; Bowen, Political Economy Applied to the Conditions and In¬ stitutions of the American People) (1864) ; Byles,

Popular Political Economy Examined) (1872); Carey, H. C., (The Harmony of Interests : Manufacturing and Commercial5 (1851) ; Col¬ well, (Memorial of Iron Manufactures to Con- gress) (1850) ; Carey, M., (The New Olive Branch) (1832); Dixwell, (A Review of Sun¬ dry Free Trade Arguments 5 (1882) ; Grothe, (Die Irrungen des Freihandels und die Umkehr5 (1878) ; Hamilton, (Report of the Secretary of the Treasury on Manufactures> (1791); Holland, (The Fall of Protection (1913) ; Hutchinson, (The Commercial Re¬ straints of Ireland Considered) (1779) ; List,

(Outlines of American Political Economy5 (1827); Mason, (Short Tariff History of the United States> (1884); Phipps, (Free Trade and Protection (1876); Phillips, Propositions Concerning Protection and Free Trade) (1850); Rae, (Statement of Some New Principles on the Subject of Political Economy) (1834) ; Roberts, Government Revenue5 (1884) ; Stanwood,

(American Tariff Controversies in the 19th Century) (1903) ; Sullivan, Protection to Native Industry) (1870) ; Syme, (Restriction on Trade5 (1873) ; Thompson, (Elements of Po¬ litical Economy, etc.5 (1882) ; Protection to Home Industry5 (1885) ; 'Ireland and Free Trade5 (1888) ; Young, (National Economy5

(1866).

Robert Ellis Thompson, Author of (Elements of Political Economy .5

PROTECTION, New England Order of.

See New England Order of Protection.

PROTECTIVE ASSOCIATION, Ameri¬ can. See American Protective Association, or «A.P.A.»

PROTECTIVE COLORATION. See

Coloration, Protective.

PROTECTOR, in the history of England, a person appointed to act as regent generally during the minority of the king. Those on whom it was conferred were the Earl of Pem¬ broke, in 1216, during the minority of Henry III; Humphrey, Duke of Gloucester (1422-47), during the minority of Henry VI ; Richard, Duke of York, February 1454 to February 1455, and November 1455 to February 1456; Richard, Duke of Gloucester, in 1483, before the death of the young princes, his nephews, and his own accession to the throne; and the Duke of Somerset (January 1547 to October 1548), dur¬ ing the minority of Edward VI. On the 12th of December, 1653, the title of lord-protector was bestowed upon Cromwell (q.v.), as head of the Commonwealth of England, Scotland and Ireland, by the provisions of the Instrument of Government. At his death, in 1658, he was succeeded by his son, Richard Cromwell (q.v.), who, however, abdicated in 1659.

PROTECTORATE, a term applied to the relationship existing between a strong nation and a weaker one wherein the former under¬ takes to protect the latter from hostile invasion or other form of aggression and in conse¬ quence exercises more or less control over its domestic and entire control over its foreign, affairs. The protectorate, unlike the colony, does not lose its individual sovereignty; its people do not become citizens of the protecting state; if the protecting state goes to war with

another power the protected state may remain neutral. The relation has, however, often been a mere cloak for absolute dependency on the part of the weaker nation, which for reasons of state it has seemed expedient to disguise. The term protectorate is also applied to the state thus protected.

The relation between a protectorate and its protector is usually estab¬ lished by treaty, although sometimes it is the result of mere understanding only. There are two classes of protectorates which differ es¬ sentially from the existing circumstances: (1) Where both nations are civilized; (2) where the protector is civilized and the protectorate is not. Most of the protectorates of the present day belong to the second class and are to be found in Asia and Africa and the islands of the Pacific Ocean. Notable examples of exist¬ ing protectorates are Tunis, Annam, Tonking, Madagascar and Somali Coast under French protection; and North Borneo, Bechuanaland, Somaliland, British Central Africa, British East Africa protectorate, Uganda protectorate, the Sudan and Nyassaland under British pro¬ tection. Italy also maintains a protectorate in Africa. The United States has from early times exercised similar control over weak na¬ tions in various parts of the world. One of these was Liberia on the west coast of Africa and founded by the American Colonization Society in 1820. It has been understood all along that no other nation would be permitted to annex it or interfere in its affairs. Like¬ wise Hawaii for a short time occupied the posi¬ tion of a protectorate until its annexation to the United States in 1898. From 1882 to 1897 the United States was one of the three powers to exercise a protectorate over the Samoan Islands. Likewise from 1836 to 1845 it exer¬ cised a protectorate over the republic of Texas. From 1846 to 1903 the United States as a result of treaty with Colombia exercised a quasi-pro¬ tection over the Isthmus of Panama for the purpose of ensuring the neutrality of the Panama Railroad. Partly as a result of Ameri¬ can aid Panama seceded from Colombia in the latter year and virtually placed itself under the protection of the United States. The most perfect example of an American protectorate at the present time is that of the republic of Cuba, which secured its independence of Spain in 1898 chiefly through the intervention of the United States and which upon demand of the American government inserted in its Constitu¬ tion a promise not to enter into foreign rela¬ tions with any other country without the con¬ sent of the United States and accepted other conditions which materially impair its inde¬ pendence.

PROTEID2E, a family of large Urodele or long-tailed amphibians characterized by three pairs of persistent gills besides lungs, the presence of both fore and hind legs, the absence of eyelids and maxillary bones and the presence of teeth on the premaxillaries, the vomers and the mandible. The vertebrae are amphicoelars. The family contains three genera, each con¬ taining one species. These are Necturus, com¬ mon in the eastern Mississippi Basin, the blind Proteus (q.v.), and the likewise blind Typhlomolge, found in artesian waters from Texas. The Proteidce are often known as mud-

puppies. (See Amphibia; Urodel). For the de¬ velopment of this group see Embryology.

PROTEINS, a large group of organic com¬ pounds, of which the white of egg or oval¬ bumin, may be taken as a typical example. They make up the principal bulk of the solid matter of all animal cells and tissues, and are found in various parts of the structure of plants, especially in seeds. The proteins found in nature are 40 or 50 in number, mostly amor¬ phous and indiffusible, and possess a complex chemical structure, whose nature is not clearly understood. They appear as non-crystallizable compounds of carbon, hydrogen, nitrogen, oxygen, generally, but not always, sulphur, and sometimes phosphorus; and occurring in a solid viscous condition, or in solution. Iodine is a usual constituent of the proteins found in marine animals. The different members of the group present differences in physical, and to a certain extent in chemical, properties; they all possess, however, certain common chemical re¬ actions, and are united by a close genetic rela¬ tionship. Thus, carbon is present in amount varying only from 50 to 55 per cent; hydrogen, from 6.9 to 7.2 per cent; oxygen, from 19 to 24 per cent; nitrogen, from 18 to 19 per cent; and sulphur, from 0.3 to 2.4 per cent — keratin of human hair, being a notable exception, having a sulphur content of 5 per cent. Proteins occur- ing in the vegetable kingdom are built up from simpler compounds ; but the animal system is believed to be incapable of performing a syn¬ thesis of this kind, and the proteins that occur in the animal body are believed to be derived wholly by a modification of those that are taken into the system in the form of food. The pro¬ teins in the food are largely converted, by the action of such digestive ferments as pepsin and pancreatin, into soluble substances known as ˆpeptones,® and these, after absorption through the intestinal walls, are (in large measure) transformed into the proteins that normally occur in the muscles and other tissues of the animal. Some of the protein portion of the food is, however, apparently transformed, in the course of digestion and assimilation, into glycogen and fat. In the changes which are inseparably

associated with the life of the animal, the proteins that are stored in the body (and especially those in the muscular and nervous system) undergo a process of oxida¬ tion, or slow combustion, by which they are transformed into other compounds that are much less highly organized ; the ultimate prod¬ ucts of this oxidation being mainly water, car¬ bon dioxide and urea.

The proteins, as a class, are so similar to one another in their ultimate composition, that Gerhardt believed them to consist mainly of one fundamental albumen-like substance, min¬ gled, or perhaps chemically combined, with varying amounts of inorganic matter. This view is not in favor among the chemists of to¬ day.

Efforts to determine the molecular weights of the proteins have been many, and not at all satisfying. The results obtained, while quite indefinite, seem to prove that the molecular weights of the proteins are very large as com¬ pared with those which have been determined for other substances. For example, the molec-

ular weight of egc-albumen, as obtained by the freezing-point method, is given as 14,270; that of hemoglobin, as determined by the iron con¬ tent method, as 14,000.

Chemically, proteins exhibit a wide variance, some being distinctly acid and others decided bases which form strong salts with strong acids. The most of them, however, are neither markedly acid nor basic, but react toward acids as bases and as acids toward bases. Re¬ cent investigation of the proteins has been chiefly along the line of hydrolysis, accom¬ plished by heating them with concentrated hydrochloric acid or strong sulphuric acid. A large number of amino-acids have thus been obtained from the simple proteins, but with the very unsatisfactory disappearance of about 30 per cent of the protein substance treated.

Though the proteins are mostly amorphous, a few are known that are capable of crystalli¬ zation, notably some which have been obtained from the seeds of hemp and the pumpkin, from Brazil nuts and from castor-oil beans. Some other proteins which are not found in nature in a crystallized form can be obtained in that phase by special treatment. Thus, if egg-albu¬ men is precipitated from its solution by ammo¬ nium sulphate and acetic acid, and allowed to stand, it gradually crystallizes. All the pro¬ teins are insoluble in absolute alcohol, but many of them are soluble in water, or in

dilute saline solutions. Dissolved proteins all rotate the plane of polarization of polarized light to the left, the extent of the rotation varying with the nature of the dissolved protein. Dissolved pro¬ teins are not diffusible, as a rule, and mineral matters with which they may be mixed can, therefore, be removed by placing the solution in a vessel which is separated into two parts by a vertical porous membrane, pure water being placed in one compartment, while the solution to.be dialyzed is placed in the other. The mineral salts will diffuse through the por¬ ous membrane, while the protein remains in the compartment in which it was originally placed. By renewing the water in the second compart¬ ment from time to time, the dialysis may be caused to proceed until practically the last trace of mineral matter has been removed from the protein. The peptones, however, are them¬ selves diffusible, and the proteoses (or <(albu-minoses®) are so to a lesser extent.

Many of the proteins that are soluble are precipitated from their solutions in a perma¬ nently insoluble condition by the action of heat, the substance which is thus thrown down being known as (

Coagulated proteins are exceedingly insol¬

uble, and in fact cannot be brought into solu¬ tion at all except by the action of some agent which changes their chemical nature pro¬ foundly. Pepsin (in an acid medium) or pan- creatin (in an alkaline medium) convert them into soluble peptones, when the experiment is performed at a temperature not very close to that of the human body. A protein which is precipitated from its solution by alcohol is not at first thrown into the <(coagulated® condition, but passes into it gradually upon prolonged con¬ tact with the alcohol. When a solution of pro¬ teins is saturated with ammonium sulphate, all of its proteins are precipitated except the pep¬ tones ; but the precipitate is not in the coagu¬ lated form, for it is capable of dissolving again, either in pure water or in a dilute saline solu¬ tion. This reagent is used, in the laboratory, for estimating the amount of protein in a given solution; the precipitate that it gives being re¬ moved by filtration ; washed with a saturated solution of ammonium sulphate; heated to 230° to produce coagulation ; and finally weighted, after the ammonium sulphate has been removed by thorough washing with pure water, and the precipitate has been dried. Many of the salts of the heavy metals (basic acetate of lead, for example), precipitate proteins from solution by forming, with them, an insoluble proteo-metallic compound. From this compound the metal may be subsequently removed by the action of sulphuretted hydrogen gas ; the protein then being set free in its original, soluble state.

Of the chemical reactions manifested by the proteins as a class, the following may be espe¬ cially mentioned : (1) The xanthoproteic reac¬

tion. When strong nitric acid is added to a solution containing a protein the protein is often (but not invariably) precipitated; and both the precipitate and the solvent turn yellow from the formation of xanthoproteic acid, the precipitate dissolving upon prolonged boiling, if the nitric acid is present in excess. The yellow color changes to an orange upon the addition of an excess of sodium hydroxide. (2) Milton's reaction. (

The classification of the proteins has been essayed by several groups of students both in Europe and America, and the work, extremely difficult in itself, has been complicated by the use of terms to which different meanings have been attached by various writers. The Amer-

ican Society of Biological Chemists and the American Physiological Society have agreed on the following classification, which is regarded as standard by American students.

Simple Proteins.

Albumins. — Those which are soluble in pure water, and coagulate when heated.

Globulins. — Those which are insoluble in pure water, but dissolve in neutral solutions of salts derived from the action of strong acids upon strong bases.

Glutelins. — Those which are insoluble in all neutral solvents, but which dissolve in very dilute acids or very weak alkalies.

Prolamins (Alcohol-soluble proteins). — Those whicti are insoluble in water, neutral sol¬ vents and absolute alcohol, but dissolve in alco¬ hol of 70 to 80 per cent strength.

Albuminoids. — Those which exhibit a high degree of resistance to solubility with all neu¬ tral solvents, while having apparently the same chemical structure as the soluble proteins.

Histones. — Those soluble in water and in¬ soluble in ammonia (unless ammonia salts are present), which yield precipitates with solutions of other protein's, and, when heated, a coagulum readily soluble in very dilute acids.

Protamines. — Polypeptids simpler than the proteins of the groups above

specified: soluble in water; not coagulated by heat; having the quality of precipitating water-solutions of other proteins ; and exhibiting strong basic character¬ istics, forming stable salts with the strong min¬ eral acids.

Conjugated Proteins.

Nucleoproteins. — Compounds of one or more protein molecules with nucleic acid.

Glycoproteins. — Compounds of the protein molecule with one or more substances con¬ taining a carbohydrate group other than a nucleic acid.

Phosphoproteins. — Compounds of the pro¬ tein molecule with phosphorus-containing sub¬ stance other than a nucleic acid or the lecithins.

Hemoglobins. — Compounds of the protein molecule with hematin, or similar substance.

Lecithoproteins. — Compounds of the pro¬ tein molecule with the lecithins.

Derived Proteins.

Primary Protein Derivatives. — Those

formed from the protein molecule apparently through hydrolytic changes, with but slight al¬ teration in the protein molecule : embracing (1) Proteins — insoluble products of the action of water, very dilute acids or enzymes; (2) Metaproteins — products of such action of acids and alkalis as alters the molecule, form¬ ing substances soluble in very weak acids and alkalis, but not soluble in neutral solvents (including the so-called acid-albuminates and alkali-albuminates); (3) Coagulated Proteins — insoluble products resulting from the application of heat to their solutions, or to the action of the alcohols on proteins.

Secondary Protein Derivatives. — Products of a more extended cleavage of the protein molecule: embracing (1) the Proteoses — those which are soluble in water ; not coagulated by heat ; and which are precipitated by saturating their solutions with ammonium sulphate or zinc

sulphate; (2) the Peptones — those soluble in water; not coagulated by heat; but not precipi¬ tated by saturating their solutions with am¬ monium sulphate; (3) Peptids — those com¬ pounds of definite structure in which two or more amino-acids are combined through the union of the carboxyl group of one with the amino group of the other and the loss of a molecule of water.

Albumins. — Serum-albumins have been sep¬ arated from the lymph and blood-serum of vertebrate animals, from milk and from cer¬ tain seeds. Lact-albumin is found in milk though in the small proportion of less than one- half of 1 per cent. The principal vegetable albumins are leucosin — found in wheat, rye and barley; and legumelin — of peas, beans and lentils.

Globulins are found in blood-serum and in certain body tissues and organs and in eggs, milk, seeds, etc. A typical globulin is fibrin¬ ogen, found in the blood of vertebrate animals. Upon being separated from the living animal the fibrinogen is almost immediately changed into fibrin or blood-clot by the action of an attendant enzyme. Musculin and myogen are globulins found in the tissue of what are known as a striped muscle. It is the coagulation of musculin after death which produces the stif¬ fening of a corpse, known as rigor mortis.

Glutelins and Prolamins are found in the grains, a familiar example being the gluten of wheat, which is a mixture of glutenin, a glute- lin ; and gliadin, a prolamin. Zein, of Indian corn, is another example of the same group.

Albuminoids. — In this group are found the protein substances which in large measure give stability to the structure of the animal body. Collagen is a typical example. It is the founda¬ tion of cartilage and connective tissue and en¬ ters largely into the bony skeleton. When boiled in water, collagen yields gelatin. When treated with tannic acid, as in the making of leather, it becomes tough and highly resistant to decay. To this group belong also keratin, the principal substance of hair, horns, hoofs and feathers ; and elastin, the largest constituent of the ligaments of the animal body.

Histones. — The most familiar example of this division of the proteins is globin, the pro¬ tein constituent of the red coloring matter of the blood, hemoglobin.

Nucleoproteins are comparatively numer¬ ous, forming the chief constituents of the nuclei of all nucleated cells and hence found in every part of the body and its organs. They are found also in yeast and in certain plants.

Glycoproteins. — A common example of this group is mucin, a constituent of the saliva. As previously noted, egg-albumen is probably to be classed in this group; and here belong also the mucoids of egg-albumen and blood-serum.

Phosphoproteins. — The most familiar ex¬ ample is the casein of milk,

regarded as a cal¬ cium salt in combination with calcium phosphate. When casein is coagulated with rennet, the prod¬ uct is paracasein, differing from casein chiefly in that its calcium salt is insoluble. Vitellin, found in the yelks of hen eggs, is another ex¬ ample of the phosphoproteins.

Hemoglobins. — The red corpuscles of the blood have a very large content of hemoglobin. When human blood is dried, the proper pro-

portion of hemoglobin in the red corpuscles is found to be about 94 per cent. Either acids or alkalis reduce hemoglobin to the histone globin and the iron compound hematin, which is not a protein, but a derivative of pyrrole, one of the decomposition products of the proteins.

Albuminates belong to the group Metapro¬ teins. They result from the so-called <(acid albumin,® obtained by treating an albumin or a globulin with dilute acetic or hydrochloric acid. Acid albumin is soluble in dilute acids or alkalis, but insoluble in a neutral mentsruum. When the original protein is treated with a small quantity of dilute alkali, it combines with the alkali to form <(alkali albumin® ; and this, like acid albumin, is soluble in weakly acid or alkaline media, but insoluble in a neutral one. Alkali albumin is likewise not coagulable by heat. The combinations here described may be taken as typical of the albuminates in a general way; but as the albuminates are doubtless very numerous and as they have not yet been fully investigated, it must not be inferred that they will all possess the characteristics of ordinary acid and alkali albuminates.

Proteoses and Albumoses. — Proteins de¬ rived from the albumins or globulins or al¬ buminates by the action of digestive ferments, such as pepsin and trypsin. They are interme¬ diate between the original proteins and the pep¬ tones into which these original proteins are ultimately transformed by the digestive fer¬ ments. They are precipitated from solution by nitric acid, the precipitate dissolving upon ap¬ plication of heat. They are also somewhat diffusible, but not to the same extent as the peptones.

Peptones. — Proteins which are formed by the prolonged action of digestive ferments upon other proteins. (Compare the proteoses in the preceding paragraph). While they are not precipitated by heat, nor by nitric acid, they are precipitated by tannin and by certain other reagents. It seems quite clear that peptones are polypeptids. The peptones are diffusible and they play an exceedingly important part in digestion and assimilation. Peptones

that are artifically prepared are commonly bitter, perhaps from the development of alkaloids or glucosides. Pure peptone has a meaty flavor.

Peptids. — The majority of peptids dissolve readily in water but not in alcohol. A few which are almost insoluble in water dissolve in acids or in alkalis. Most of them have a bit¬ ter taste. When heated with concentrated hy¬ drochloric acid for several hours they are com¬ pletely resolved into amino-acids.

Through this system of investigation it is hoped ultimately to discover the process of the upbuilding of the whole class of proteins from their primal elements.

Bibliography. — Cathcart, E. P., (The Physi¬ ology of Protein Metabolism (London 1912) ; Mathews, A. P., (Physiological Chemistry*

(New York 1915) ; Osborne, T. B., (The Vege¬ table Proteins) (London 1909) ; Plimmer,. R. H. A., (Chemical Constitution of the Proteins* (2 vols., London 1912-13), and Practical Or¬ ganic and Bio-Chemistry) (London 1915) ; Robertson, T. B., (The Physical Chemistry of the Proteins* (London 1918) ; Schryver, S. B., (The General Character of the Proteins) (Lon¬ don 1909).

PROTERANTHUS. See Gillenia.

PROTEROGLYPHA, a division of the Colubridae family of snakes, in which the grooved poison teeth or fangs are attached to the forward part of the upper jaw — those in which the fangs are at the rearward part of the jaw being known as Opisthoglypha (q.v.). The group includes nearly all the more deadly of poisonous snakes.

PROTEROZOIC (Greek proteros, early, and zoa life), a geologic time division generally given tne rank of an era. According to the United States Geological Survey it includes all time before the Paleozoic, and is divided into the Archean and Algonkian periods. Other geologists divide the time before the Paleozoic into two eras, the Archeozoic (Archean) and Proterozoic (Algonkian). This article follows geological survey usage. Proterozoic time is also frequently referred to as the Pre-Cambrian. The type sections are in the region of the Great Lakes, in northern United States and Canada. The rocks of the era readily fall into two systems, the Archean (q.v.) and Algonkian (q.v.), separated by a profound unconformity. The former are dominantly igneous, consisting of a great series of basic lava flows and minor amounts of interbedded sediment, cut by large granite intrusions. This period of volcanism was followed by long erosion, and Algonkian rocks, dominantly sedimentary, were laid down on

eroded Archean surfaces. Little is known of the geography of either period, except that in Algonkian time considerable limestone was deposited, pointing to probable submergence under an ocean. It is believed that glaciers occupied parts of Canada in the early Algon¬ kian, and in the latter part of the period vol¬ canism was again extensive.

There are no direct evidences of life in the Archean nor in the early Algonkian though limestones may point to the existence of mi¬ nute lime-secreting animals. A few imperfect fossils, probably brachiopods and crustaceans, have been found in very late Algonkian rocks. Two similar rock systems, under various names, are recognized in Europe and probably in other continents. The intense metamorphism that Proterozoic rocks have undergone in many regions makes it impossible to separate the two systems over much of the world, at least until much more detailed work is done.

PROTESILAUS, . pro-tes-Ma'us, Greek hero, son of Iphiclus, king of Phylace, Thessaly. He led a band of Thessalian warriors against Troy and was the first of the Greeks to land on the Trojan coast, whereupon he was killed by Hector. Another tradition makes Achates slay him. He is famed in ancient story for the affection which existed between him and his wife, Laodamia, who, when she learned of his death, prayed that he might return to her for three hours. The prayer was granted and Hermes conducted Protesilaus to the upper world. At the end of the three hours Laodamia died with her husband and returned with him to the lower regions. How¬ ever, there are also some other versions of his life and death. His tomb was near Eleus in the Thracian Chersonesus, a temple was erected to him there, and at Phylace a sanctuary was built in which funeral games were played in

his honor. The story is told by Wordsworth in one of his most beautiful poems, 'Laodamia, written in 1814. It was also the subject of a tragedy by Euripides of which only some frag¬ ments remain. In more recent times the Polish poet, S. Wyspianski, wrote a tragedy in verse (Krakow 1901) which has been translated into French by A. de Lada and L. Maury as (Prote-silas et Laodamie) (Paris 1913). Two ancient Roman sarcophagi, showing the history of the hero's life and death, have been preserved, one in the Vatican and the other in the church of Santa Chiara at Naples. Consult Preller, L., (Griechische Mythologie) (2 vols., Berlin 1872— 75) ; Roscher, W. H., ed., (Ausfiihrlichen Lexi- kon der griechischen und romischen My¬ thology (Vol. Ill, pt. 2, p. 3155, Leipzig*

1902-09).

PROTEST, a solemn declaration of opin¬ ion, commonly against some act, particularly a formal and solemn declaration in writing of dissent from the proceedings of a legislative body, or a like declaration of dissent by a minority of any body against the proceedings of the majority. In the commercial usage of the term, a protest is a formal declaration, made by a notary public, under hand and seal, at the request of the payee or holder of a bill of exchange for non-acceptance, or non-payment of the same, protesting against the drawer and others concerned for the exchange, charges, damages and interest. This protest is written on a copy of the bill of exchange, and notice is given to the drawer and endorsers of the same, by which they become liable to pay the amount of the bill, with charges, damages and interest. To be of legal effect the action of the notary must be taken on the day the payment was due. (See Bill — Bill of Exchange). A pro¬ test is also a writing, attested before a notary public, a justice of the peace or a consul in foreign parts, drawn by a master of a vessel, stating the severity of a voyage by which the ship has suffered, and protesting that the dam¬ age was not owing to the neglect or miscon¬ duct of the master.

PROTESTANT EPISCOPAL CHURCH,

The, the American branch of the Anglican Communion. The Church in America, though quite independent, is in full communion with the Church of England and inherits her eccle¬ siastical position. As the Preface to the Prayer Book states: ((This Church is far from intend¬ ing to depart from the Church of England in any essential point of doctrine, discipline or worship ; or further than local circumstances require.® To define her principles and position is to define Anglicanism, to interpret that move¬ ment in history known as the English Ref¬ ormation.

In the beginning of the 16th .century the Church of England was in full communion with the national churches of western Europe, ac¬ quiescing with them in the headship of the Church of Rome. In doctrine and discipline she had become identified with the prevailing type of Latin Christianity. By the end of the 17 century she had withdrawn from the Roman obedience and had gradually come to assume the position she maintains to-day. This period of transition constituted the Anglican Reforma¬ tion. The status of the Church of England was unique. Positively, the change involved a re¬

assertion of the principles of primitive Chris¬ tianity and an assimilation of the newly- awakened tendencies of modern thought. Negatively, it involved the repudiation on the one hand of mediaeval Roman Catholicism, on the other of Continental Protestantism. Angli¬ cans believed that the change involved no breach in the continuity of the English Church. They maintained that in rejecting much that was Roman and mediaeval they had

forfeited noth¬ ing essentially catholic.

The American Church inheriting this position claims to be a branch of the primitive Catholic and Apostolic Church. At the same time she is frankly opportunist in adapting herself to the needs and conditions of modern life. In the sense of being not-Roman, she is Protest¬ ant. As maintaining that her continuity with the ancient Church is guaranteed by her posses¬ sion of the Apostolic succession of bishops, she is Episcopal. She is Episcopal also in the sense of being not-Papal. This, perhaps, gives the rationale of her common legal title. Mem¬ bers of the Church are spoken of indifferently as Anglicans, Episcopalians or Churchmen.

The fundamental principles of Anglicanism as well as Anglican terms of inter-communion are indicated in what is known as the Chicago- Lambeth Quadrilateral. In 1886 a Commission on Christian Uificy reported to a General Con¬ vention held at Chicago. The substance of their report was embodied in a Declaration of the House of Bishops. Two years later this Dec¬ laration was, with slight modifications, adopted by the bishops of the whole Anglican Commun¬ ion, meeting in conference at the archbishop of Canterbury's palace in Lambeth. The wording of this Anglican Eirenicon, defining the essen¬ tials of the Christian faith, is as follows :

((1. The Holy Scriptures of the Old and New Testaments, as containing all things necessary to salvation, and as being the rule and ultimate standard of faith;

<(2. The Apostles' Creed, as the Baptismal Symbol, and the Nicene Creed, as the sufficient statement of the Christian Faith;

*<(3. The two Sacraments, ordained by Christ Himself — * Baptism and the Supper of the Lord — ministered with unfailing use of Christ's words of institution and of the elements or¬ dained by Him ;*

<(4. The Historic Episcopate locally adapted in the methods of its administration to the varying needs of the nations and peoples called of God into the Unity of His Church.®

This declaration may be taken as an offi¬ cial indication of the bases of the Anglican position.

It is the belief and hope of Anglicans that the position gives them good vantage-ground for promoting the cause of Christian unity. They have much in common with all bodies of Chris¬ tians. While their attitude toward Roman Cath¬ olics is one of resolute protest, their quarrel is only with a mediaeval Romanism by which they believe that the primitive Catholicism of the great Latin Communion has been obscured. Their

position more nearly approximates that of Eastern Orthodox Catholicism — Greek Christianity — and that of the Old Catholics. Their relations with both these communions are those of friendly interest and intelligent sym¬ pathy, although there is no inter-communion nor

immediate prospect of it. The many differences due to widely differing antecedents oppose diffi¬ culties to the adoption of a common platform. This, however, does not prevent many manifes¬ tations of present friendship and hope of closer relations in future. Recent years have seen a marked rapprochement between the Anglicans and the Russian Orthodox Communion.

On the other hand, the Anglican Church is in close sympathy with the life and aims of various bodies of Protestants. Her breach with the Christian past is not so great as theirs but she rejoices to feel that the fundamentals of her faith are the same as theirs, and that she is at one with them in striving to adopt and apply Christianity to the needs of modern times. Since the appointment of a Commission on Christian Unity in 1856 there have been confer¬ ences with the Presbyterian General Assembly, the General Synods of Evangelical Lutherans of the North and South and the Provincial Coun¬ cil of the Moravians. These have contributed somewhat to a better mutual understanding. Some idea of the nature of the Anglican claim and hope is necessary at the outset for an appreciation of the details of Anglican history.

The Church of England in the American Colonies.— The Church of England came to America with the first English explorers and colonists. The first English service, so far as is known, was held in 1579 on the coast of California by the Rev. Francis (or Martin) Fletcher, ship's chaplain to Sir Francis Drake. In 1607 an English clergyman was regularly es¬ tablished among the Virginia colonists at James¬ town. This missionary was the Rev. Robert Hunt, a man of simple piety and great zeal, who held daily services in the open air, and on 21 June 1607 for the first time in America admin¬ istered the Holy Communion. Virginia was a Church of England colony. Various missions were established as the colony grew. The clergy were most of them faithful missionary priests. Some, unfortunately, were men who had bad records at home, and whose lives tended to dis¬ credit the Church which they served. In the same year that Jamestown was settled, Prayer-Book services were held also on Saint George's Island, Maine. Within a short time there were English clergymen settled in Maryland, and before the end of the century missionaries working in New Hampshire, South

Carolina, Delaware, New York, New Jersey and Penn¬ sylvania. In 1692 grants of land were made for Trinity Church, New York. Five years later the Rev. William Vesey was established as rec¬ tor of what has become the most important parish in the country.

In New England the Church of England fared badly. The Puritans of Massachusetts Bay had on leaving England professed unalter¬ able attachment to their mother-church. They had, however, adopted a Calvinistic theology differing in various ways from the teaching of the Prayer Book. Shortly after reaching New England, they adopted also the ecclesiastical polity of the Pilgrims of Plymouth. In Eng¬ land, Puritans as well as Anglicans had done their best to suppress ˆIndependents.® Calvin¬ istic Congregationalism became the ˆstanding order® in Massachusetts and Connecticut. The use of the English Prayer Book was made a penal offense and Churchmen, so far as pos¬ sible were driven from the colonies. Among the

more notable victims of Puritan intolerance were John Checkley, William Blackstone, the Browns of Salem and Samuel Maverick. Some took refuge in Rhode Island, others in colonies farther south.

The 18th century saw increased effort on the part of the Church of England to minister to the needs of colonists in America. Since 1634 colonial churches had been under the supervision of the bishop of London. In 1696 Bishop Compton of London appointed as his (

English clergy met with much opposition in New England. There was a special outcry against them owing to secession from the Con¬ gregational ranks. In 1722 the president of Yale College, Dr. Timothy Cutler, and four tutors resigned their position to embrace Epis¬ copacy. One of these, Dr. Samuel Johnson of Stratford, became the most notable Churchman in Connecticut. One of the wisest and most far-seeing friends of America in England was Dr. George Berkeley, dean of Derry, afterward bishop of Cloyne. He wished to found a train¬ ing school for American missionaries. <(Saint Paul's College® was to have been situated in — it being a conveniently central point — the Ber¬ muda Islands. Dean Berkeley came to America and spent three years in Rhode Island. He was forced to abandon his project by failure to re¬ ceive funds which had been promised by the English Parliament.

John and Charles Wesley for a time worked in Georgia in the early days of the colony. This was before any Methodist societies had separated from the English Church. Later Methodist preachers, especially George White- field, were vehement in denouncing the Anglican clergy and did much to disturb the S. P. G. missions. However, the work prospered despite drawbacks —

greatest of which was the lack of bishops — and by 1775 there were about 300 parishes, ministered to by 250 clergymen. It is estimated that between 1607 and 1775 about 2,000 <(Clerks in Holy Orders® of the English Church had, for longer or shorter periods, labored in America.

Organization as an Independent Church.

— The outbreak of the War of the Revolution put an end to intercourse between colonial Churchmen and the authorities of the Church of England. Many of the clergy were Tories. These left the colonies for England and Nova Scotia. During the war services were main¬ tained in a few places, prayer for Congress being substituted for prayers for the king. The one man whose influence did most to hold to¬ gether scattered bands of Churchmen was Dr. William White of Christ Church and Saint Peter's, Philadelphia. Pie was in close touch with the fathers of the Commonwealth and

was for many years chaplain of Congress. Im¬ mediately after the recognition of American independence steps were taken to organize an independent American Church and to establish new relations with the Church of England, which should recognize ((the Change in our Situation from a Daughter- to a Sister-Church.® First to act — for themselves alone — were the clergy of Connecticut. They were con¬ vinced that the first step of all must be to ob¬ tain bishops. In 1783 a meeting was held at Woodbury, at which a petition was addressed to English bishops to consecrate for America and a candidate was chosen for the episcopal office. The bishop-elect was Dr. Samuel Sea- bury, a native of Connecticut, an S. P. G. missionary in the colony of New York and a chaplain in the British army. He sailed to England and asked for consecration. This he was unable to obtain. The English bishops, as officers of a state-church, were unwilling to act without formal authorization by Parliament. This was not forthcoming. After waiting a year Seabury, in compliance with instructions from Connecticut, transferred his application to the Episcopal Church of Scotland. The Scot¬ tish bishops willingly granted his request and he was consecrated in Aberdeen 14 Nov. 1784. He signed a ((concordate® with his consecrators, in which inter-alia it was agreed that he should use his influence to introduce in America a Communion Office like the Scottish. This dif¬ fers from the English one, being in some ways ((more agreeable to the genuine Standards of Antiquity.® Five years later Bishop Seabury was enabled to keep this promise. His enduring monument is the complete form in the American Prayer Book of the Prayer of Consecration in the Eucharistic Office. Bishop Seabury lived until 1796. He was a noble man

and a staunch Churchman. He was indefatigable in adminis¬ tering his diocese, but, partly owing to his <(war record,® did not exercise great influence outside of Connecticut. It was not until a cen¬ tury after his death that his fellow-Churchmen fully appreciated the extent of their indebted¬ ness to this first of all bishops in America.

In 1785 delegates from seven colonies south of Connecticut, laymen as well as clergymen, met in convention in Philadelphia. Their most important acts were to arrange for triennial General Conventions, and to make a new appli¬ cation to the archbishops of England to conse¬ crate bishops for America. There was some delay. The English bishops objected to pro¬ posed changes in the Prayer Book. Their ob¬ jections were met by action of a convention held in Wilmington, Del., in 1786. Finally, on 4 Feb. 1787, English bishops in Lambeth Chapel consecrated Dr. William White to be bishop of Pennsylvania and Dr. Samuel Pro- voost to be bishop of New York. Four years later, Dr. James Madison, president of Wil¬ liam and Mary College, was consecrated, in Eng¬ land, bishop of Virginia. The four American bishops in 1792 joined in the consecration of Thomas John Claggett, as bishop of Maryland, through whom the joint succession from the bishops of England and Scotland has passed to every member of the American episcopate.

The bishops of the Church are its chief officers, but the ˆConstitution and Canons,® adopted in 1789, provide that presbyters and laymen shall share their responsibility of admin¬

istration. Each diocese has a standing com¬ mittee, consisting of presbyters and laymen (in three dioceses, of clergy only) elected by the diocesan convention. This committee acts as a cabinet to the bishop. In case of vacancy in the episcopate, or sometimes during a bishop's absence or incapacity, the standing committee for canonical purposes becomes the ((Ecclesias- tical Authority® for the diocese.

Similarly, the House of Bishops is associated with a House of Deputies in General Conven¬ tion. The lower House is composed of four clerical and four lay delegates (communicants) from each diocese and one clerical and one lay delegate from each missionary jurisdiction. Either House may originate legislation, but con¬ current action is necessary to make it valid. The House of Bishops has a veto on the action of the lower House. All bishops are equal in rank. The senior by consecration acts as pri¬ mate or ((Presiding Bishop.® All general dis¬ ciplinary regulations are comprised in the Con- stitution and Canons of the General Convention- In addition to these, each diocese has its own constitution and canons.

A general convention was held in 1789. Bishop Provoost and some

delegates objected to the recognition of Bishop Seabury, but the objection was overcome by the influence of Bishop White. As Bishop Provoost was absent, Bishop Seabury and Bishop White constituted the first House of Bishops. Their chief work was the revision of the Prayer Book. All pro¬ posed changes emanated from the bishops and, with one exception, were ratified by the House of Deputies. The two bishops formed an effec¬ tive combination. To quote an apt comment of Bishop John Williams: ((For the results of that memorable Convention, in which so much was gained — may we not say so little lost? — we are indebted under the over-ruling wisdom of the Holy Spirit to the steadfast gentleness of Bishop White and the gentle steadfastness of Bishop Seabury.®

The Prayer Book adopted in 1789 (to which a few additional offices were later added) con¬ tinued in use for over a century. In 1892 a second revision was completed when the Prayer Book was given its present form. This Prayer Book, which contains all the public offices of the Church, is the best evidence of the doctrinal and ecclesiastical position of the Protestant Episcopal Church. Canons give regulations for practical administration, discipline and clerical education. They give a fair idea of the Church's methods of working. The Prayer Book alone can suggest the faith and spirit which constitute her life.

History during the 19th Century. — For 50 years the Episcopal Church was a small body. It could do little more than assert its right to exist in the face of hostile prejudice. It was suspected for its English antecedents and disliked for its assertion — distinct though timid — of ancient ecclesiastical principles in the midst of prevalent Protestantism. It was per¬ force apologetically apostolic. It was inevitable, however, that it should gain a firm footing in American life, when its representatives were such clergy as its first bishops and such laity as Washington, Jefferson, Hamilton, Franklin and two-thirds of the signers of the Declaration of Independence. For 50 years the most conspicu¬ ous figure in the Church was that of Bishop

White. His episcopate (1787-1836) was the most important the Church has seen. His wise and gentle guidance of his own people, his fair¬ ness and charity toward all others, did much to protect the Church in the critical period of its history.

There were other strong men in the House of Bishops. John Henry Hobart of New York (1775-1830) had the most forcible personality. He was, as

his epitaph states, <(the able and in¬ trepid Champion of the Church of God.® He was enthusiastically loyal to the principles of his Church and saw no wisdom or charity in hesi¬ tating to avow them. ((Evangelical Truth and Apostolic Order® was his motto. No Church¬ man of this time did so much to make explicit the principles of Anglican Catholicism.

Alexander Viets Griswold (1766-1843) of the Eastern Diocese (all New England except Con¬ necticut) was influential in a different way. He possessed New England virtues, a serious piety, patient hardihood and frugality and a great capacity for hard work. His faithful ministra¬ tions in all parts of his immense diocese did much to dispel Puritan supersition concerning Episcopacy and the episcopal order.

Philander Chase of New Hampshire (1775— 1852), first bishop of Ohio and later of Illinois, labored indefatigably as a missionary in many States. He was founder of Kenyon College and Bexley Hall, Gambier, Ohio, and Jubilee Col¬ lege, Peoria, Ill. For both of these he ob¬ tained funds in England. He was of an eccen¬ tric character, but a man of determination. His one aim was to spread the knowledge of his own two treasures, the Bible and the Prayer Book. These men were typical American Churchmen of the first half of the 19th century, their work indicates very fairly the kind of work done by their fellow-Churchmen in all parts of the country.

Parties. — The work of the Church has been largely missionary; its clergy, men of affairs rather than theologians. It has produced no pe¬ culiar school of thought, but has reflected the theological developments of England and Ger¬ many. There have been, generally speaking, three types of Churchmen, known respectively as High Church, Low Church and Broad Church. Each of these has emphasized some one side of Church teaching and has not es¬ caped the dangers of one-sided partisanship.

The Low Church represented the 18th cen¬ tury revival in the Church of England which took the form of Evangelicalism within the Church and Methodism without. The truths which it emphasized were the absolute depend¬ ence of the spiritual life on the person of Christ, the need of conversion, the reality of grace and purely instrumental character of "ordinances.® The Atonement was the central fact in Evangelical theology. (Men of this school were also noted for promoting the cause of foreign missions). The Evangelicals were dominant until the middle of the 19th century. They were strenuous in opposing High Church teaching as being thinly disguised "Popery.®

High Church principles were brought to the fore by the Tractarian (Oxford) Movement which began in 1833. These were the assertion of the character of the Church as a divine so¬ ciety, the special sphere of the working of the

Holy Spirit; of the character of sacraments as veritable means of grace; of the central place

in Christian worship of the Holy Eucharist. Among the more obvious results in this move¬ ment were increased reverence and beauty in church services, increased parochial activity, es¬ pecially among the poor; the revival of frequent Eucharists and (to some extent) of auricular confession. The later stages of the movement produced a party of Ritualists. They differed from the early Tractarians. Their ritual was largely in imitation of the Latin rite, whereas their predecessors copied a Laudian model; their ideals were mediaeval rather than patristic. The early Tractarians sought to revive the teachings and spirit of the first four centuries, the ritualists to reproduce the picturesque ex¬ ternals of the 14th. Both sections of the party emphasized the "sacramental principle® in Chris¬ tianity and made the Incarnation rather than the Atonement the central fact in their theology.

Parallel with the Oxford Movement was the development of what is variously described as the Liberal Theology or Latitudinarianism. The Broad Church platform is based on the funda¬ mental truth of the Fatherhood of God. It is well described in words of its most distinguished American representative, Phillips Brooks : "The broader theology, which had its masters in England in such men as Dr. Arnold and the Rev. Frederick D. Maurice, has likewise had its clear and powerful effect upon the Episcopal Church. A lofty belief in man's spiritual pos¬ sibilities, a large hope for man's eternal des¬ tinies, a desire for the careful and critical study of the Bible, and an earnest insistance on the comprehensive character of the Church of Christ — These are the characteristics of much of the most zealous pulpit teaching and parish life in these later days.® Broad Churchmen de¬ sire to vindicate the rational character of Chris¬ tianity, to develop its philosophic side, to bring formal statements of the faith into accord with modern knowledge and modern thought. They find themselves much in sympathy with the early theology of Alexandria and more or less opposed to the type of mind represented by Augustine.

There has been conflict between representa¬ tives of these several schools, not concerning positive principles but concerning their re¬ spective negations. Too often zeal for a half- truth has denied or disparaged another half- truth. In retrospect it seems easy to see that the special principles of the three schools are equally part of the Church's teaching. The dif¬ ference between them is largely one of em¬ phasis. They divide the Creed between them. The Church Catechism contains a question, "What dost thou chiefly learn by these articles of thy belief?® The answer is: "First, I learn to believe in God the Father, who hath made me and all of the world ; secondly, in God the Son, who hath redeemed me and all mankind; thirdly, in God the Holy Ghost, who sanctifieth me and all the people of God.®

This suggests a generalization which may characterize High, Low and Broad Church. Each has emphasized one section of the Creed, and, at times, failed to do justice to the others. The Broad Church are concerned for the Fatherhood of God, the moral and philosophical basis of Christian truth. The Low Church are chiefly concerned to pre¬ sent Christ as Redeemer and the Centre of all their thought. The High Church have had to emphasize a neglected portion of the Creed,

belief in the Holy Ghost, the Sanctifier, in Church and Sacraments as ordained means of union with Christ. The best men of the various schools have never been mere partisans. Party¬ lines are now less clearly defined. The tendency is to combine truths, to cultivate an all-round Churchmanship, which has more than one di¬ mension.

Controversy. — For over 30 years, Church¬ men were more or less disturbed by discussions aroused by the Tractarian Movement. Ameri¬ can Low Churchmen were strongly opposed to the ((Oxford Divinity.® The first important in¬ cident in the agitation was the <(Carey ordina¬ tion® in 1842. Arthur Carey, a graduate of the General Theological Seminary, who had ac¬ cepted Tractarian principles, was, in conse¬ quence, subjected to a severe examination by the chaplains of the bishop of New York. They declined to recommend him for orders. The bishop, Dr. B. T. Onderdonk, himself examined the candidate, was satisfied with his answers and proceeded to his ordination. This occa¬ sioned an outcry against the bishop and was the signal for a series of disputes and cam¬ paigns of pamphlet warfare, in various parts of the country. In many instances, Low Church bishops objected to the liking of High Church clergy for <(awkward chancel-arrangements® suggestive of High Eucharistic doctrine. Bishop Mcllvaine of Ohio refused to consecrate a church until the altar was removed from the east wall. Bishop Eastburn of Massachusetts refused to visit a Boston church for confirma¬ tions because the clergy kneeled facing the altar, which was surmounted by a cross and candlesticks. These were typical examples. There were discussions over vested choirs, preaching in surplice, stained-glass windows, flowers on the altar and .similar details. There was also an effort made by Low Church par¬ tisans to discredit High Church doctrine by impugning the moral character of its leading champions. Partisan motives mingled with the laudable feeling that a bishop like the wife of Caesar ((must be above suspicion.®

A revival of controversy followed the Civil War. At two successive General Conventions, 1868 and 1871, the main discussion concerned a <(Canon

of Ritual.® Various proposals were made to forbid the use of ceremonies recently revived and behind this was opposition to Trac¬ tarian teaching on the sacraments. In the Con¬ vention of 1871, Dr. James De Koven of Racine College took a firm stand as champion of <(the Real Presence® and challenged anyone to bring him to trial for erroneous doctrine. The chal¬ lenge was not accepted. In 1875, however, be¬ cause of his principles, the Church at large re¬ fused to confirm Dr. De Koven's election to the see of Illinois, as it had previously refused to confirm the election of Dean George F. Sey¬ mour. The Convention of 1874 passed a canon forbidding <(ceremonies or practices not ordained or authorized in the Book of Common Prayer and setting forth or svmbolizing erroneous or doubtful doctrines.® The accompanying discus¬ sion indicates that the framers had especially in mind <(the doctrine commonly known as Transubstantiation.®. In 1878 Dr. C. F. Sey¬ mour was elected bishop of Springfield. This time his election to the episcopate was confirmed by the Church. The event of his consecration

marks the end of the effort to deny that High Church doctrine is in harmony with Anglican formularies. Tt marks also the end of a cru¬ sade against ritual as such, although the Church has consistently disapproved any attempt to supersede Anglican by Roman doctrine.

At the time of this later discussion occurred the secession of the ((Reformed Episcopalians.® The occasion of this was a controversy over Baptismal Regeneration. A number of Church¬ men who held Zwinglian views of sacraments objected to the wording of the baptismal office. They found a leader in the assistant bishop of Kentucky, Dr. G. D. Cummins. He issued a call for a conference of all who wished to re¬ form the Church. The convention adopted an expurgated Prayer Book and organized as a new sect. Bishop Cummins was deposed by the House of Bishops. He continued, however, to act as bishop and consecrated as a colleague the Rev. C. E. Cheney, a deposed clergyman of the diocese of Illinois. Their following, was never large and has now dwindled to insig¬ nificant proportions.

The Church of the Confederacy. — It is

pleasant to turn to a striking episode in the Church's history where an unavoidable division was quickly and quietly healed. By the out¬ break of the Civil War, Southern Churchmen were isolated from their Northern brethren. Their position was analogous to that of colonial Churchmen at the Revolution. There was this great difference that there were 11 organized dioceses, each with a bishop. These 11 dioceses eventually united to form the Protestant Epis¬ copal Church of the Confederate States. For five years the Church of the Confederacy pur¬ sued its independent course. Bishop Polk of Louisiana, who had had a West Point educa¬ tion, assumed

command of a Confederate army and was killed in battle. At the end of the war the Church was confronted with the dif¬ ficult question of the relation of these severed parts. Some Northerners were anxious to take action which would have been very offensive to Southern susceptibilities. There were two specially difficult points, the precedent estab¬ lished by Bishop Polk and the case of Bishop Wilmer of Alabama, who had been consecrated during the war, without the consent of the Northern dioceses. Fortunately the wisdom of a few leaders, Hopkins of Vermont, Horatio Potter of New York and others, guided all to a satisfactory conclusion. The Convention of 1862 had ignored the absence of Southern dele¬ gates. In 1865 the Southern bishops were urged to attend and <(trust to the love and honor of their brethren.® Two bishops and delegates from three dioceses responded. In the Con¬ vention of 1868, the South was fully represented. By exercise of tact and patience on both sides, Churchmen had succeeded in ignoring <(the late unpleasantness.®

Christian Unity.— As has been already noted, the Episcopal Church believes that she has a special mission to promote Church Unity. For 50 years there has been a standing Com¬ mission to consider this subject. The occasion of its appointment was the presentation at the Convention of 1853 of a (

in conferring Holy Orders. It aimed at taking (

There is another side to this work for unity. Dr. Muhlenberg had in mind "the Protestant Christendom of our land.® There is a larger Christendom than this which the Church may not forget. Something has been done to estab¬ lish friendly relations with Eastern Orthodox and Old Catholics. Bishop Horatio Southgate in 1843 was accredited, as representing the Church, to the patriarch of Constantinople ; Dr. J. F. Young of New York (later bishop of Florida) in 1864, and Bishop Grafton of Fond du Lac, in 1903, have paid official visits to the Church in Russia. Bishop Whittingham of Maryland in 1872 attended the Old Catholic Conference in Cologne. Russian and Old Catholic bishops have on several occasions ac¬ cepted the official courtesies of the American Church. Polish Old Catholics in America have made definite proposals of union. Another century may see some result from these small beginnings.

Missions. — The Episcopal Church has al¬ ways been breaking ground in new fields. Her first duty was to extend her work in the West¬ ern States. Among the typical examples of the home missionaries were the Rt. Rev.

Jackson Kemper, missionary 'bishop of the Northwest, and Dr. James Lloyd Breck. Dr. Breck with two friends founded Nashotah House in Wis¬ consin as a training school for missionaries. Later he removed to Minnesota, organized work among Indians at Crow Wing and laid founda¬ tions for Church institutions in Faribault. Bishop H. B. Whipple developed and completed his work. Still later Breck organized the ˆAs¬ sociate Mission for the Pacific Coast.® His last work was the founding of schools in Benicia, Cal. The first bishops in the Pacific States were William Ingraham Kip of California and Thomas Fielding Scott of Oregon and Wash¬ ington. Most of the Western States contain one or more organized dioceses. There are still 16 missionary jurisdictions in the United States and four others in American posses¬ sions. Bishops have been recently sent to Alaska, Sandwich Islands, the Philippines and Porto Rico.

There are six foreign missionary jurisdic¬ tions, Western Africa (Cape Palmas) ; Shang¬ hai and Hankow in China; Tokio and Kioto in Japan, and Cuba. Bishops have also been con¬ secrated for independent churches in Haiti, Mexico and Brazil. The direction of missionary

work is entrusted to a Board of Missions with headquarters in New York. Contributions for missions of all kinds probably amount to a mil¬ lion dollars a year.

Institutions. — There are a number of Epis¬ copalian theological schools. The General The¬ ological Seminary in New York is a training school for the whole Church. It was founded in 1817, was removed for a time to New Haven, returned in 1820 to New York and was shortly after established in Chelsea Square. It owes its present buildings to generous gifts of Dean Eugene Augustus Hoffman. Of other semina¬ ries, the more important are the Episcopal Theo¬ logical School, Cambridge, Mass., Berkeley Divinity School, Middletown, Conn., the Divin¬ ity School of Philadelphia, Seabury Divinity School in Faribault and Nashotah House.

Trinity College, Hartford, Conn., Kenyon College, Gambier, Ohio, Hobart College, Gen¬ eva, N. Y., the University of the South, Sewanee, Tenn., and Saint Stephen's College, Annandale, N. Y., are all Episcopalian insti¬ tutions. Columbia University, New York, long had a Churchman for president and uses Church prayers in its chapel. Lehigh Univer¬ sity, South Bethlehem. Pa., is by direc¬ tion of its founder under Church auspices. There are many diocesan schools for boys and girls and special schools for. Negroes and In¬ dians. Of the larger Church schools for boys may be mentioned Saint Paul's School. Concord, N. H., Groton School, Groton, Mass.,/ and Racine College, in Wisconsin. Churchmen have always been active in promoting chari¬ table work. Saint Luke's Hospital, New York, is a conspicuous example of their zeal. There are numerous organizations for

the furthering of Church work and a number of religious orders for men and women.

The number of Churchmen is not large, but the rate of increase has been comparatively rapid. In 1800 there were 11 dioceses served by seven bishops and 208 other clergy; in 1916 there were 102 dioceses and missionary juris¬ dictions served by 122 bishops and about 5,800 other clergy. The number of communicants was about 1,060,000, a number which implies about 4,000,000 adherents.

*The materials for the history of the Protes¬ tant Episcopal Church are to be found in Jour¬ nals of the General Convention, the memoirs of distinguished Churchmen and collections of pamphlets in the libraries of Church institu¬ tions. Perry's (History of the American Epis¬ copal Church, > a collection of monographs, is the most complete formal history. There are smaller works by the Rt. Rev. Leighton Cole¬ man, D.D., bishop of Delaware, the Rev. C. H. Tiffany, D. D., and the Rev. S. D. McConnell. D.D. Consult also Addison, (The Episcopalians J (New York 1904) ; Cross, (The Anglican Epis¬ copate and the American Colonies.**

PROTESTANTISM. The Diet of Worms (1521) placed Martin Luther, the friar of Wit¬ tenberg who had presumed to criticise the Pope and to condemn certain ecclesiastical practices of his day, under the ban of the empire. He had already been placed under the ban of the Church by Pope Leo X, and thus stood con¬ demned by Church and State alike. But he had powerful supporters in Saxony and else¬ where and their influence was sufficient to pro-

tect him from personal harm and to promote his cause until, at the Diet of Speyer (1526), it was voted that each state of the empire should decide for itself whether the Edict of Worms should be enforced. This was the first step toward the legal toleration of the Lutheran faith. At the second Diet of Speyer (1529) this limited degree of toleration was withdrawn. Nineteen of the states of the empire protested against the reactionary measures of this Diet, and their formal protest caused them to be known as Protestants. This is the historical origin of the name which is now commonly ap¬ plied to all who in the 16th century broke away from papal Rome, and to their ecclesiastical successors down to modern times. The organ¬ ized Christian world of the West has ever since been divided into two great groups, namely, Roman Catholics and Protestants. The countries where Greek Catholicism held sway took no part in the Reformation movement, and

until recent times have remained for the most part uninfluenced by Protestantism.

The Protestant movement looks to Martin Luther (1483-1546) as its founder and chief leader, and to the University of Wittenberg as its original home. Luther's most notable early associate was Philip Melanchthon (1497-1560), a theologian and humanist, the author of the first Lutheran work on dogmatic theology, and the framer of the Augsburg Confession (1530). A well-known contemporary, Huldreich Zwingli (1484-1531),-— also a very able and influential preacher against ecclesiastical abuses, — led an anti-papal movement of almost equal import¬ ance in German Switzerland, and there laid the foundations of the Reformed faith. The chief scene of his activities was the town of Zurich. The movement which Zwingli inaugurated was, however, overshadowed and absorbed by the more constructive work of John Calvin (1509— 64), a Frenchman by birth, who made of Geneva a Protestant stronghold, — <(Little Rome,® as his opponents called it. From Geneva the principles of the Calvinistic Ref¬ ormation went forth to many other European lands. They were carried into Scotland by John Knox (1505-72), and that country became an important factor in promoting the growth of the Reformed faith in the Anglo-Saxon world. The Protestant forces of Europe, called into life by these leaders and others hardly less im¬ portant, fall into two main groups, commonly called by European historians the Lutheran and Reformed churches. The Lutherans were not only originally Teutonic, but for the most part have remained so. The Reformed, known in America more commonly as Calvinists, proved to be much more international in character. Among the Lutherans are included chiefly Ger¬ mans, Danes and Scandinavians; among the Re¬ formed, or Calvinists, are included Swiss, French, Dutch, English, Scotch, Irish and various minor nationalities found in America. Historians have sometimes attempted to ac¬ count for the wider extension of the Calvinistic type of Protestantism by pointing out that it sanctioned the employment of force in main¬ taining the faith, which Luther never did ex¬ cept reluctantly, that it emphasized popular education, offered greater freedom from tradi¬ tionalism (for instance in the interpretation of the Lord's Supper), and that it tended to

separate Church and State. The Lutherans for the most part were organized throughout Ger¬ many into a series of state churches, — a natural outgrowth of the German political principle, cujus regio ejns religio. The Protestant princes exercised control over the churches within their respective jurisdictions, and although this power was usually delegated to an officer known as the superintendent (the Lutheran analogue to a bishop), yet in each case the prince him¬ self was to a large degree the governor of the church.

Except in England, where ecclesiastical con¬ ditions were different, state control of religion among the followers of Calvin, even if it once existed, rarely lasted very long, for Calvinism always encouraged the growth of a republican type of government. One of the best examples of this growth is found in the French town of La Rochelle where a political as well as an ecclesiastical system was developed which for a time threatened the existence of royal absolu¬ tism in France. Although in not a few cases the Calvinistic regime produced intolerance, yet Calvinism itself was based upon a principle which sooner or later was bound to result in freedom. It would, therefore, be an error to assume that, because in Geneva or in Alassa- chusetts Bay there existed a theocracy, there must of necessity be theocratic government wherever the principles of Calvin are taught.

Lutherans and Calvinists may further be distinguished from each other by their attitude toward the Bible. Generally speaking Lutherans believed that the Church might properly retain whatever doctrines or ceremonies were not obviously prohibited in Scripture. Calvinists on the other hand believed that only such doctrines and ceremonies should be retained as were ex¬ pressly commanded there. The general prin¬ ciple of biblical authority was, to be sure, maintained in both churches, as over against the principle of ecclesiastical authoritv held by the Papacy, but the difference to which refer¬ ence has just been made proved to have an im¬ portant bearing upon the development of the two branches of Protestantism. It is obvious that the appeal to Scripture, constantly made by Protestants, contains within itself a' correc¬ tive for such errors as might from time to time come into existence through its use. Thus the verbal authority of Scripture, upon which in the latter part of the 16th century not a few Protestants both Lutheran and Calvinist relied, gave place in time to a much less mechanical conception. The more the Bible was studied and the better it was understood, the less it showed itself to be a legal code and the more it came to be regarded as a history and source of spiritual and religious power. Modern critical study of the Bible, including what is commonly called the Higher Criticism, is a legitimate outgrowth of the Protestant principle of Scriptural authority.

The connection between Protestantism, as a religious movement, and politics is real and historically of the highest importance. In French Switzerland is to be found a model of the self-governing churches which belonged to the Calvinistic wing of the Reformation. That model was Geneva, where religion was the controlling in¬ fluence, and where the ecclesiastical organiza-

tion was hardly less significant than the civil. In the history of the Netherlands, as well as of Scotland and England, one may find constant illustration of the interplay of the same two forces. James I's famous declaration, ((No bishop, no king,® was not only true for the Stuart monarchy at the time, but also affords a key to the history of the relations between politics and religion throughout the 17th cen¬ tury. It was the spirit of self-government, ex¬ hibited among Presbyterians and Independents which inspired the Puritan Revolution, that dramatic interruption of the Stuart line, and from the same spirit arose the long and tragic struggle for freedom in the Netherlands.

Lutheranism on the other hand proved hos¬ pitable to a union between Church and State; but in the Germanic lands in modern times it has produced a merely nominal religious con¬ formity. During the last 100 years some of the most undesirable effects of the state-church system have become visible in Germany, — secularism, formalism and the inevitable de¬ tachment of morality from the controlling sanc¬ tions of a vital religious faith. Within the United States Lutheranism has suffered from sectarian movements not unlike those which have divided and subdivided other Protestant churches. In spite of the traditional boast that Lutherans know no sects, there are more dif¬ ferent Lutheran organizations in the United States to-day than there are of any other Protestant denomination. Western and north¬ ern Germany and German Switzerland became almost wholly Protestant in the 16th century. The Reformed faith also made important gains in France, showing an especially vigorous growth so long as the Edict of Nantes continued in force (1598-1685). With the revocation of that edict a Roman Catholic reaction set in and the gains which Protestantism had made were mostly wiped out. Denmark and Sweden early received the Lutheran Reformation and have remained Lutheran down to modern times. The Calvinistic faith was the controlling one in French Switzerland, the Netherlands, the British Islands and New England. Protestant liberalism in the form of Socinianism early found a home in Poland and Transylvania. The European lands least affected by the Ref¬ ormation were Italy, Austria, Spain and the countries where the Eastern Church held sway.

Protestants of all types were agreed in their opposition to Roman Catholicism, how¬ ever energetically they might differ among themselves. This opposition took form at first in the rejection of the Papacy (q.v.). It next showed itself in the rejection of the Roman hierarchy and the sacramental system. The popular demand for a reformation of notorious abuses, such as simony, nepotism, pluralities, laxity of discipline, clerical ignorance, etc., — a demand which had long been heard on all sides, and which had been ably advocated by Erasmus and other humanists, — materially strengthened the forces which made for ecclesiastical revolu¬

tion, and prepared men's minds for the adoption of more radical measures than were at first contemplated by the leaders of reform. Not all Protestants, however, rejected the theory of church government by bishops, and the history of Protestantism shows a sharp distinction be¬ tween the churches which have retained the

episcopate and those which have rejected it. The best-known examples of the churches main¬ taining an episcopal type of government are the Church of England, the Protestant Episcopal Church, and the Methodist Episcopal Church of the United States.

The Anglican Church, so far as it may be regarded as detached from the Catholic Church of the West, owes its origin to a movement in the reign of King Henry VIII whereby the papal jurisdiction in England was abolished. For a time the English Church endeavored to maintain its doctrine and canon law in other respects unchanged. But Puritanism, which is only thorough-going Protestantism, soon grew up within the Church of England, and the long struggle of the 17th century, which in 1689 re¬ sulted in the toleration of Non-Conformity, left the English people religiously divided and created an ecclesiastical situation which, with some modifications, has ever since continued. Thenceforward there were in the kingdom (1) the Established Church, Episcopal but not Ro¬ man Catholic; (2) the Non-Conformist bodies, which for some time labored under various political disabilities which have since been re¬ moved; and (3) the Roman Catholics, who down to the period of Parliamentary reform and Catholic emancipation (about 1830) were also under serious political disabilities. It was partly in indirect consequence of the Oxford movement, and because of the going over of a considerable number of Anglicans to the Roman obedience, that Roman Catholicism in England received a considerable increase of strength and now includes in its membership an important fraction of the population. The Established Church at present comprises only about one- half of the English people.

Denominationalism found its special field of action and reached its highest development within the territory of what is now the United States. The earliest discoveries and conquests in North America were indeed made by Roman Catholic nations, especially by the Spaniards. At a somewhat later date the French, also Roman Catholics, explored and attempted to colonize the valley of the Saint Lawrence and region of the Great Lakes. The settlements however which proved most enduring and which gave permanent character to the political insti¬ tutions of the new world were those of Eng¬ lish origin. The two groups of English colo¬ nists, Anglican in Virginia, Puritan and Sepa¬ ratist in New England, proved not to be suffi¬ ciently unlike to render difficult a political union, which came about at the American Revo¬ lution. The existence of several varieties of Protestant

churches, as well as the abstract political theories held by the framers of the Federal Constitution, made possible the adop¬ tion of the American system of a free church in a free state. The Constitution, including its first amendment, prohibits the establishment of religion, and all interference with the free exercise thereof. As a consequence denomina¬ tionalism in the United States has had a free opportunity for development, with the obvious disadvantage of a rapid increase in the number of sects, but with the compensating advantage of an unmatched opportunity for judicious com¬ parison of their value and for the survival of the fittest.

Among the leading Protestant denomina¬ tional types represented in the United States are the Congregational and Baptist (which are very similar in polity), the Presbyterian, the Episcopalian, the Methodist and the Lutheran. Of most of these there are several distinct or subordinate varieties. Outside the leading groups lie many ecclesiastical organi¬ zations, some of them with a large con¬ stituency, each of which exhibits some special feature of doctrine or polity upon which its denominational existence is based. During recent years a movement toward affiliation and union has gained increasing strength among many Protestant bodies, and this movement is likely to be accentuated by centralizing influ¬ ences growing out of the Great War.

The distinctive characteristics of Protes¬ tantism continue to be those which the great reformers more or less perfectly perceived, but which they did not always follow to their con¬ sistent and logical conclusion. The two great Reformation principles were justification by faith alone through divine grace, and the sole authority of Scripture in matters of faith. In¬ volved in these was another principle, perhaps more comprehensive than either of them, namely, the inalienable right of private judg¬ ment in religion. The historv of Protestantism exhibits the gradual working out into full recognition and acceptance of these fundamental principles. But the process is still incomplete. It is obvious that many nominal Protestants have not as yet fully accepted these principles, yet modern Protestantism has recently begun to recognize more fully their true significance. Catholicism on the other hand, whether Greek, Roman or Anglican, is frankly based upon the principle of a divinely authoritative church, organized and governed according to apostolic precept, exhibiting a legitimate succession of bishops outside of which there is no authorized ministry, maintaining unimpaired an original deposit of faith, and thus furnishing a living organ for the exercise of divine authority throughout all the generations. For the exist¬ ence of such a divinely authoritative church it is immaterial whether

the authority be exer¬ cised by a Pope or by a council of bishops ; the principle remains the same.

The Protestant conception of the Christian ministry is very different from that outlined above. In spite of exceptions and inconsist¬ encies the logic of Protestantism requires that the Christian minister shall be essentially the pastor and teacher of his people, chosen by them to lead in public worship and to administer the sacraments, and that his position shall be rep¬ resentative, not sacerdotal. Strictly speaking there can be no such thing as a Protestant hierarchy. Nevertheless it must be freely recognized that in many Protestant churches a conception of the ministry still obtains very different from this — a conception which really involves the persistence of Catholic theories within the boundaries of nominal Protestantism.

The distinction between the two types of religion here contrasted has been stated thus : Catholicism furnishes to the individual believer an institutional guarantee of salvation; Prot¬ estantism insists upon personal assurance of sal¬ vation. Looking at the question from a slightly different angle, Schleiermacher said that Cathol¬

icism makes the relation of the believer to Christ depend upon his relation to the Church, while Protestantism makes the relation of the believer to the Church depend upon his relation to Christ. It is obvious that between these two conceptions of religion there is a fundamental difference.

Present-day Protestantism comprehends practically all of those who have dissociated themselves from the Catholic Church in any of its forms. It will, therefore, include many per¬ sons who are not actively identified with any Church, but who would refuse to be classified as Catholic. In the Protestant Churches there are wide divergencies of opinion upon theological matters and the constant tendency of Prot¬ estantism is away from dogmatic theology and toward the employment of simple religious formulas and the promotion of practical re¬ ligious and philanthropic activities. Dogmatism still lingers here and there in Protestant com¬ munities which are intellectually less progres¬ sive, but it no longer plays an important part in the more enlightened section of Great Britain and America. Protestant creeds and confes¬ sions of faith tend constantly to grow more simple and general in their language, and look toward a definition of Christian duty in practi¬ cal life rather than toward the formulation of a speculative theological system.

Protestant worship is characterized by simplicity and directness, especially in compari¬ son with the stately ritual of the Mediaeval Church. Catholicism makes the altar central, and emphasizes the sacrificial aspect of Christian worship; Protestantism substitutes the pulpit, and thus shows

its predominant characteristic to be that of a teaching church. The idea of mystery in worship gives place to intelligibility. In the early days of Protestantism this sim¬ plicity became at times barrenness, for example among the Puritans. But in modern times there has come a reaction against this tendency, and the forms of public worship have grown more elaborate, resulting often in the adoption of a liturgy not unlike the services of morning and evening prayer in the Church of England.

A great variety of philanthropic activities have been created by Protestants during the past 100 years. Missionary enterprises, both domestic and foreign, educational institutions of every grade, hospitals and other remedial agencies for mind and body, organizations for social betterment, young men's and women's Christian associations, and many related under¬ takings, here have their origin. Similar insti¬ tutions also exist among the Roman Catholics, and in not a few instances Catholics and Protestants now fraternally co-operate, to the obvious advantage of both. Many educational institutions within the United States, which owe their origin to a distinctively religious mo¬ tive, have lately become unsectarian and to the ordinary observer practically secular. This secularizing tendency, traceable in the history of Protestant education, finds little counter¬ part among the schools and colleges which are under the control of the Roman Catholic Church.

Reliable religious statistics for some coun¬ tries are hard to obtain, but the following table exhibits with a fair degree of accuracy the numerical strength of the various ecclesiastical

gioups throughout the world at the beginning of the 20th century:

Roman Catholics, about 250,000,000.

Greek Catholics, about 125,000.000.

Protestants (including Anglicans), about 175,000,000.

The approximate membership of the prin¬ cipal churches within the United States at the present time may be estimated as follows :

Roman Catholics, about . 16, 000 , 000

Methodists, about . 7 ' »00 OOO

Baptists, about . j ! ! 6 ! 500 j 000

Lutherans, about . 2,500, 000

Presbyterians (including Reformed) , about _ 3,300, 000

Disciples, about . 1,400,000

Episcopalians, about . 1,100, 000

Congregationalists, about . 800,000

United Brethren, about . 350,000

The Protestant groups here listed include in several instances churches which have separate organizations but which are sufficiently alike in doctrine and polity to be included under the same general designation. Some of the smaller churches are omitted entirely, except in the summaries given below. The membership of the Roman Catholic Church and of the Prot¬ estant Churches within the United States may be thus summarized :

Roman Catholics, about . 16,000,000

Protestants, about . 24,000,000

The actual constituency of both is of course much larger than the figures given above, which include only those who are in full membership.

Ever since the period of the Reformation, and until comparatively recent times, church his¬ torians have endeavored to show either that Protestantism was an unjustifiable departure from the principles and usages of the Church for more than a thousand years (the Catholic position), or that Protestantism finds its justi¬ fication in primitive Christianity, that the Mediaeval Church had grown increasingly cor¬ rupt with the lapse of time, and that the re¬ formers' effort to do away with its corruptions and to return to the simplicity of the New Tes¬ tament was not only legitimate but was also their obvious Christian duty. The latter is the Protestant position. These two tendencies find their best early illustration on the Protestant side in the (Magdeburg Centuries, and on the Roman Catholic side in the (Annals) of Baronius. It was only in the 19th century that the period of critical ecclesiastical historiogra¬ phy began. At the present day writers of all schools exhibit an increasing desire for the impartial treatment of church history, and many of them employ • a critical method which is making their subject a true science.*

Bibliography. — Among the more important books on Protestantism may

*be mentioned: Lindsay, T. M., (History of the Reformation, * (2 vols., 1906-07) ; Cambridge Modern His¬ tory, Vol. II, The Reformation* (1904) ; Beard, C., (The Reformation of the 16th Century in its Relation to Modern Thought* (Hibbert Lectures for 1883) ; Macmillan, K. D., Prot¬ estantism in Germany* (1917) ; McGiffert, A. C., Protestant Thought before Kant* (1911) ; Moore, E. C., (Christian Thought since Kant) (1912) ; Tulloch, J., (Movements of Religious Thought in Britain during the 19th Century>*

(1885).

John Winthrop Platner, Professor of Ecclesiastical History, Andover Theological Seminary.

VOL. 22 — 44

PROTEUS, pro'tus, or pro'te-us, in Greek mythology, according to Homer (whose account is the one chiefly identified with the name <(the old man of the sea®), a subject of Poseidon (the sea god), gifted with the power of proph¬ ecy, who pastured the seal herds of Amphitrite upon the shore of the island of Pharos near the mouth of the Nile. According to Virgil his abode is located on the island of Carpathos, be¬ tween Crete and Rhodes. ((Georgics IV, 386). He is represented ps of great age and able to change himself instantly into any form he might wish. To compel him to prophesy it was necessary to steal craftily upon him and hold him so that he might not escape whatever form he took. Menelaus, as told in the Odyssey (IV, 351), succeeded in doing this even though Pro¬ teus became in turn fire and water. Allusions to Proteus refer to his power of assuming many forms, as in the adjective, protean. Herodotus (II, 112, 118) relates that Proteus as king of Egypt entertained Paris and Helen, but giving Paris a phantom in her stead kept Helen with him and afterward restored her to her . husband, Menelaus. Consult Preller, L., (Griechische Mythologie> (2 vols., Berlin 1872-75) ; Weissaecker, P., (Proteus* (in Roscher, W. H., ed., (3 vols., Gottingen 1857-63).*

PROTEUS, a remarkable genus of urodele amphibians allied to the axolotls, sirens, etc., and often called ˆmud-puppies.® The gills in these are retained throughout the entire lifetime of the animals, in addition to the lungs with which they are also latterly provided. These animals are found only in the waters of certain subterranean caves in central and southern Europe. The animal itself is about 12 inches long. Its body is elongated, slender and some¬ what cylindrical, and averages about one inch or three-quarters of an inch in diameter. It is of a pale flesh tint — the absence of color being the necessary result of its non-exposure to light. The tail is broad and compressed. The limbs are weak, the front legs possessing three

and the hinder limbs only two toes. Three pairs of bright red or scarlet branchiae or gills project from the branchial clefts on each side of the neck. Two series of small teeth exist in the upper and in the lower jaw. The eyes are rudi¬ mentary and completely covered by the skin. The proteus is eminently aquatic in its habits, and in dry seasons, or when the water of the caves becomes dried up, is said to bury itself in the mud. See Proteidˆe.

PROTEUS ANIMALCULE. See Amceba.

ˆ PROTEVANGELIUM, pro-te-van- j el'i-um (Greek <(the first gospel®), term applied to the passage in the Old Testament, Genesis iii, 15, in which theologians see the first announcement of the coming of a Messiah. It is also applied to an apocryphal gospel, ascribed by some to Saint James the Less.

PROTHERO, proth'er-o, George Walter,

English historical writer: b. Wiltshire, 14 Oct. 1848. He was educated at Eton, Cambridge and the University of Bonn, was university lec¬ turer in history and tutor of Kings College 1876-94, and professor of history at the Uni-

*versity of Edinburgh 1894-99. He is a member of the Royal Historical Society, the president of which he was 1901-05. He is also a member of a number of other historical societies in Eng¬ land and other countries, an Honorary Fellow of King's College, Cambridge, holds honorary de¬ grees from Cambridge, Edinburgh and Harvard and is editor of the Quarterly Review. In 1910 he was Lowell lecturer at Boston and Schouler lecturer at Johns Hopkins, Baltimore. To¬ gether with A. W. Ward and S. Leathes he has edited (Cambridge Modern History * (14 vols., Cambridge 1901-12) to the fourth volume of which he contributed four chapters on English history, from 1625-49. He has also edited the (Cambridge Historical Series,* some early vol¬ umes of the (Pitt Press Series,* L. V. Runk's (Universal History) (New York 1885), and J R. Seeley's (The Growth of British Policy* (2 vols., Cambridge 1895). He is the author of (The Life of Simon de Montfort* (London 1877) ; CA Memoir of Henry Bradshaw) (Lon¬ don 1889) ; (Select Statutes and Other Consti¬ tutional Documents Illustrative of the Reigns of Elizabeth and James P (Oxford 1894) ; (British History Reader* (2 vols., London 1898) ; (School History of Great Britain and Ireland to 19KP (London 1912) ; (German Opinions and German Policy before the War* (London 1916) ; (A Lasting Peace)*

(London 1917) ; and with A. J. Philip, (Catalogue of War Publications to June 1916* (London

1917).

PROTHERO, Rowland Edmund, English

author, brother of G. W. Prothero (q.v.) : b. Clifton-on-Teme, 6 Sept. 1852. He was edu¬ cated at Marlborough and Oxford and was edi¬ tor of The Quarterly Review 1894-99. From 1875-91 he was a Fellow of All Souls College, Oxford. Since 1914 he is M.P. for Oxford and since 1916 president of Board of Agriculture. He is the author of (Pioneers and Progress of English Farming1* (London 1887) ; (2 vols., New Y'ork 1893) ; (The Psalms in Human Life* (London 1903) ; (The Pleasant Land of France* (London 1908) ; (English Farming

Past and Present* (London 1912) ; and has edited (Letters and Verses of Stanley* (Lon¬ don 1895) ; (Private Letters of Edward Gib¬ bon* (2 vols., London 1896) ; (Handbook for Travellers in the Isle of Wight* (London 1898) ; ˆLetters and Journals of Lord Byron* (6 vols., London 1901-04) ; (Letters of Richard Ford* (New York 1905).

PROTHONOTARY, also PROTONO¬ TARY, in Pennsylvania, and a few other States, the name given the judge of the Or¬ phans' Court. (See Court). Formerly the term was applied to chief clerks or registrars in most English courts of law. It is still ap¬ plied, usually in the form <(Prothonotary Apostolic** to certain functionaries connected with the papal court who receive the last wills of cardinals, make informations and proceed¬ ings necessary for the canonization of saints, etc.

PROTISTA, a group-name introduced by Ernst Haeckel to designate the simple forms of life appearing spontaneously in infusions of animal and vegetable matter, and known as the organisms of fermentation and putrefaction. They have all been proved to arise from pre¬

existing germs. The group includes both the protozoans and the unicellular plants.

PROTOAMCEBA. See Moner.

PROTOCOL, in diplomacy, the minutes of the discussions of a conference, or the tenta¬ tive draft of an instrument or transaction; a statement of the principles to be afterward em¬ bodied in a treaty or the original copy of such treaty, dispatch or other document ; a docu¬ ment serving as the preliminary to diplomatic negotiations; a diplomatic document or minute of proceedings, signed by the representatives of friendly powers in order to

secure certain political ends peacefully; a convention not re¬ quiring the formalities of ratification. By a protocol concluded and signed 12 Au,g. 1898, by William R. Day, Secretary of State of the United States, and Jules Cambon, Ambassador Extraordinary and Plenipotentiary of the repub¬ lic of France, at Washington, respectively rep¬ resenting for that purpose the government of the United States and the government of Spain, the United States and Spain agreed upon the terms on which negotiations for the establish¬ ment of peace between the two countries should be undertaken. Following the signing of this peace protocol, President McKinley issued a proclamation suspending hostilities.

*PROTOCOL, The Industrial, a juridical covenant formed in 1910 between the several associations of New York manufacturers, re¬ spectively, of dresses and waists ; of children's dresses; of ladies' underwear; of embroideries, and of house dresses and kimonos, and the 60,000 operatives employed by these industries. The agreement was brought about by the end¬ less conflict between the manufacturers and the workers, resulting in a series of strikes and lockouts in which both sides were losers. The condition arose from the very large number of small individual manufacturers, who, in the necessities of keen competition, pursued widely diverse shop methods, some to the benefit but more to the detriment of the employees. Friends of the workers joined with them in an endeavor to stabilize working conditions and wage incomes, and the protocol resulted. The instrument established certain foundational rights and principles on behalf of the workers, and provided that these should be forced upon the less scrupulous individual manufacturers by the large associations who joined in the signing of the protocol. The manufacturers were as¬ sured that there should be no strike ; that work should continue, no matter what the dis¬ pute, and that the differences should be referred to a board of arbitration, of which Justice Brandeis was the first chairman, succeeded upon his elevation to the Supreme Court by Justice Mack. A board of standards of nine members was created, with three representatives of the manufacturers, three of the employees and three persons representing the public. Its office was to enforce the provisional, standards set forth in the protocol and adjust from time to time the conditions of pay to the market values of the work produced. The instrument pro¬ vided for ((fair and reasonable** betterments from time to time, both in working conditions and wages. This was the seed of disruption, the workers claiming that these betterments did not materialize as rapidly as they should, and an open break occurred in 1915. The mayor's*

PROTOGENES

PROTOPLASM

((Council of Conciliation,® headed by Dr. Felix Adler as chairman, was successful in readjust¬ ing the difficulty, and the protocol was re¬ vived. It was again terminated in 1916, this time by the manufacturers, who claimed that the dictation of the union officials was ruinous to their business. The workers contended that the conduct of the business on the part of the manufacturers was so incompetent that they were shut out from the betterments which they had a right to expect. Since 1916 there has been much disturbance, and several strikes have occurred in spite of the provision of the protocol that work shall continue. The workers have gained substantial increases in wages and the 44-hour week. The protocol still remains as a psuedo-covenant, though hardly with its former prestige, both workers and manufac¬ turers having lost faith in it.

The idea is regarded favorably by social workers and has been adopted in Chicago, Philadelphia and Boston.

PROTOGENES, pro-toj'e-nez, Greek painter, contemporary with Apelles : b. Caunus on the coast of Caria. He lived about 350 b.c. and spent most of his life in Rhodes. He was one of the first of Greek realists in painting. Several masterpieces of his are mentioned, in one of which a Rhodesian local hero, Ialysus, was represented hunting with a panting hound which showed foam on his mouth. Pliny, who is our chief source of information ((Hist. Nat.p XXXV, 36), relates that for a long time the painter failed in the execution of the foam ; but at last, in a fit of anger, threw against the pic¬ ture the sponge which he used in painting, and thus accidentally produced a natural representa¬ tion of it. This picture saved the city of Rhodes when it was besieged by Demetrius Poliorcetes (305-304 b.c.) who refrained from making his attack on the weakest part of the city where the picture was placed. In the time of Cicero it was in that city, but Vespasian carried it to Rome, and placed it in the temple of Peace, in which it was burned under Corn- modus. Protogenes is said to have lived in comparative obscurity at Rhodes till the 50th year of his age, when his merits were made known to his fellow-citizens through a visit of Apelles (q.v.). Apelles offered Protogenes an enormous sum for each of his works, which the painter himself had been in the habit of selling for very insignificant sums. The Rhodians now wished to buy back the pictures from Apelles, in order that they might keep them among themselves, but Apelles refused to part with them except for an advance. Protogenes sub¬ sequently went to Athens, where he executed the (Nausicaa,> one of his finest pictures in the Propylaea. Amongst other famous pictures ascribed to Protogenes should be mentioned (Satyr playing on a Flageolet) ; (Cydippe}; (Tlepolemus) ; (Alexander and ParP ; portraits of Philiscus, Antigonus and Aristotle’s mother. He is also reported to have executed a number of statues in bronze,

especially of athletes, sol¬ diers and hunters. Consult Bostock, J., and Riley, H. T., (The Natural History of Pliny) (Vol. VI, London 1857) ; Brunn, H., (Ge- schichte der Griechischen Kiinster) (2 vols., Stuttgart 1857-59) ; Hauler, E., (in Kais -Deutsches Archaologisches Institut, Mitteilungen, Romische

Abtcilung, Vol. XIX, p. 317, Rome 1904) ; Hwiid, A. C., (Protogenes) (Copenhagen 1788) ; Maas, E., (Apelles und Protogenes (in Oesterreichisches Archaologisches Institut in Wien, Jalireschefte, Vol. XI, p. 29, Vienna 1908) ; Six, X-, XVIII, p. 34, Berlin 1903) ; Winckelmann, J. J., his¬ tory of Ancient Art Among the Greeks* (trans. by G. H. Lodge, new ed., 4 vols. in 2, Boston 1880).*

PROTOGYNY. See Pollination.

PROTOHIPPUS, or PROTOROHIP- PUS, genera of early fossil ancestors of the horse. See Horse, Evolution of.

PROTOPHYTES. See Fungi.

PROTOPLASM. The most fundamental characteristic of animals and plants is life. While no gne can, as yet, demonstrate just what the physical basis of life is, still there is general agreement that the substance known under the rather indefinite name of protoplasm is that physical basis. The term was first used in 1840 by Purkinje, who applied it to the whole substance of young embryos, so that it included cell walls as well as cell contents. Von Mohl, in 1844, restricted the term to the living con¬ tents of the cell. At present, it is still further restricted, being applied to the living contents of the cell, exclusive of the nucleus, so that the living contents are said to consist of nucleus and protoplasm. In this latter sense, some use the term cytoplasm, instead of protoplasm. Protoplasm is, typically, a viscid substance, usually colorless, and it will not mix with water. In some forms and under some conditions, it has more tenacity and in the resting, but still living condition, found in seeds, it may become as hard as bone. Between the soft, viscid con¬ dition and the bony condition found in seeds like the date and vegetable ivory, there is every conceivable gradation. Chemically, protoplasm consists principally of carbon, hydrogen, nitro¬ gen, sulphur and oxygen, but may contain also smaller quantities of chlorine, phosphorus, po¬ tassium, sodium, magnesium, calcium and iron. Living protoplasm is alkaline, turning the red litmus blue. In regard to the structure, there is great diversity of opinion, but most investi¬ gators believe that it is something like foam or honeycomb. There is a round substance con¬ taining globular bodies of various sizes, so that protoplasm looks like an emulsion, and its gen¬ eral appearance may be simulated by mixing olive oil and common salt. In active living cells, the protoplasm is always in

motion and in some cases the motion is so rapid that it can be seen even under a low power of the microscope. In the long cells of the stonewort, Chara, the protoplasm moves round and round in a definite path. In the stamen hairs of the Spider Lily {Trades cantia) , the movement is easily observed. Stinging hairs of various plants will generally show some movement and any very thin leaves of water plants are good subjects. The outer layer of the protoplasm is somewhat different from the rest and has been called the plasmamembrane (the Hautschicht of the Germans). It is sometimes visible and sometimes not, but it is claimed that it is al¬ ways present. The protoplasm of adjacent

cells is connected by extremely fine threads, called proto-plasmic connections, which bind the living parts of the plant into a more or less connected whole. These threads pass through almost inconceivably small pores in the cell walls. If the threads are unusually small, they can be demonstrated by using reagents which cause swelling, and then applying dyes to the swollen structures. When plants die and the living contents of the cells dry up and seem to disappear entirely, as in the case of seasoned wood, the threads still remain in the pores and can be demonstrated. There is abundant room for all kinds of investigations upon protoplasm. Consult Butschli, O., (Untersuchungen fiber mikroscopische Schaume und das Protoplas¬ ma ; Wilson, E. B., (The Cell in Development and Inheritance.**

Charles J. Chamberlain.

just 75 pounds. Another fragmentary specimen was still larger, and indicated a turtle 14 feet in length. The habitus being robust, this for¬ midable boatman of the Cretaceous seas repre¬ sents the culmination in size of not only the Protostegids, but the entire order. If the paleontologic record may be trusted, not until the comparatively recent Pliocene of the Si- walik Hills of Northern India do land species approach in size but scarcely rival the Cre¬ taceous Protostega and Archelon. That, which renders the Protostegids conspicuously interest¬ ing is, however, not so much their size as their structure. It is this group which has gone far towards yielding a convincing solution to one of the most instructive but difficult of all problems presented by reptilians, the origin of Dermochelys, the ˆleatherback® of present day tropic seas.

Fig. 1. — Dermochelys coriacea. Extreme weight about 1,500 pounds or half that of the Archelon shown in the plates. Carapace seven keeled, and

made up entirely of an osteodermal mosaic invested in a leathery hide.

PROTOSTEGIDS, a family of mostly gigantic marine Testudinata, or <(turtles,® now wholly extinct, from the mid-Cretaceous Nio¬ brara Chalk beds of western Kansas, and the overlying Fort Pierre formation of South Dakota. These turtles lived in the great but shallow supra-continental or <(epeiric® Nio¬ brara and Pierre seas. They were shell fish eaters, well able to navigate the open ocean and among the most formidable of marine reptiles. The group is of extreme osteologic interest.

The first specimens were discovered along the Smoky Hill River by Cope in 1871, and called by him Protostega gigas, being recog¬ nized as a new family type. The great Yale specimens of a second genus Archelon were secured by Wieland in 1895 to the east of the Black Hills along the Cheyenne River in the uppermost Pierre shales near the overlap of Bad Lands (Tertiary). Ten years later the veteran fossil hunter Charles .H. Sternberg, to whom American paleontologists owe many unique ((finds,® again collected Protostegas along the Smoky Hill River which aided greatly in completing the details of the skull and limb organization. One of these, made the subject of a restoration in the Carnegie Museum at Pittsburgh, is truly remarkable, the flippers hav¬ ing nearly all their elements in place.

The Yale Archelon from the Cheyenne River is only less complete, but much larger and an even finer fossil. It represents a huge turtle nearly 12 feet long with front flippers of an indicated 15-foot span. (See Plates). As a unit of size, it may be mentioned that the humerus as fossilized, and mounted, weighs

It should be recalled that Dermochelys dif¬ fers from all other turtles in the absence of a dorsal bony carapace of neurals, pleurals and marginals interlocked. This protecting roof is instead replaced by what may be termed a Pseudo-carapace of innumerable interlocking polygonal plates, all osteodermal in character and marked by seven ridges or dorsal keels. (See Fig. 1). Under this shield the ribs are slightly expanded proximally but neither unite with each other or with neurals, which wholly fail ; though oddly enough there is a large thin detached nuchal.

The osteodermal mosaic of plates also con¬ tinues around on the nether or plastral side presenting five more of the keels. But here the plastron is found in the underlying normal, that is subdermal position, except for the fur¬ ther anomaly of a missing entoplastron. That this element should lack, while an unsupported nuchal persists is singular. The plastral bones, however, are slender and thin, enclosing a vast fontanel, and having every appearance of ex¬ tensive reduction. Now, the sum of Dermoche- lan characters, despite certain cranial resemb¬ lances to other sea turtles and more remotelv to Chelydra, might lead to the view that of all the

Testudinata, Dermochelys is nearest to a primitive form with the ancient keels still present. But if evidence of osteodermal keels is found in fossil forms, and if additional skeletal resemblances are there recognizable, then Dermochelys is far more closely related to modern forms than at first appears to be the fact,— is in a word not the least, but the most specialized of turtles.

PROTOSTEGIDjE

1 Archelon ischyros Wieland. Dorsal view of the Cheyenne River specimen
2 Archelon ischyros Wieland. Plastral view of the Yale Cheyenne River specimen,

mounted at Yale. The right hind paddle was early in life bitten off by some preda- See Plate 1. Length 11 feet

ceous enemy, as a fish, shark or mosasaur, of the Pierre sea

PROTOSTEGIDiE

096

The latter alternative appears nearest the truth. Protostega Copei of the Niobrara has a shell as heavy as that of marine species in gen¬ eral, but there is some plastral reduction with digitation of the separate elements. In the contemporaneous Protostega gigas rib and plastral reduction are seen to have gone still further; while in Archelon of the considerably later Pierre, carapacial reduction has proceeded very far. The ribs (see Plate) only show a small thin proximal expansion, while the neurals are nearly eliminated and ridden by a median keel of elements as truly osteodermal as those of the Dermochelan carapace. There are moreover highly digitate marginals, with pretty clear evidence of a supramarginals row. Bearing in mind that the marginals of all Tes- tudinates are dermal, this accounts for the chief of the Dermochelan keels. With (1) segmenta¬ tion of larger into lesser interlocking dermal or epithecal elements; (2) gradual thickening of these into a heavier shell; (3) a corres¬ pondent elimination of rib expansion and neurals ; and (4) marked plastral reduction, the chief features of Dermochelys would be evolved in the late Cretaceous and Tertiary; though the actual line of descent might be a discrete one far back in geologic time.

neurocostal shield plus dermal marginals (see Fig- 3) ; (3) The Protostegids (and Toxo- chelys) have the most complex bithecal cara¬ pace known, retaining the subdermal elements with not only the marginals but supramarginals and a median keel of expanded epineurals ; (4) Dermochelys in contrast with Trionyx has an osteodermal (mosaic) carapace, plus only the subdermal nuchal; (5) The Testudinate plas¬ tron

is far less variant than the carapace. It remains complex in recent form only in Der¬ mochelys, with both subdermal and dermal ele¬ ments.

Taking both carapace and plastron, Der¬ mochelys and the Protostegids are thus closely apposed, and other forms variant. But as in¬ dicated by large nutrition canals of the epineu- ral keel, Archelon had a heavy leathery hide instead of an outer hornshield. It is, therefore, possible and probable that there were also dermal elements in the plastron. In this case the Protostegids were completely bithecal and fall still closer to the ((leatherback® than is in¬ ferred from the resemblances cited.

The deeply interesting paleontologic problem here briefly outlined, is in a measure solved. But many details and doubts yet remain which only discovery of further evidence can resolve.

Fig. 2. — Toxochelys Bauri Wieland. (From the Niobrara Cretaceous of Kansas).

Side view of carapace of diplogene type. The dermal elements (epineurals S, S, and marginals) are in solid black, and the subdermal elements (neurals and pleurals) in light outline. The hide being leathery, several rows of dermal elements must have intervened between the epineurals and marginals, thus fulfilling the old Prochelonian condition. See Fig. 3.

It is then virtually proved that in the primi¬ tive. carapace there are two overlapping bony layers — the neurals and pleurals (costals) un¬ derneath, with a neural, pleural, supramarginal and marginal keel above. In the great majority of turtles the underlying neuropleural layer early interlocked with the marginal dermal keel, and all traces of the other dermal keels were gradually lost, or the hornshields were formed instead. But the Protostegas with the related form Toxochelys (see Fig. 2) indicates that an epithecum of median and lateral rows of dermal elements could also reach prominence, finally replacing the endothecum as in Der¬ mochelys. The latter could not always have had so prominent an osteodermal mosaic as now, and it is difficult to believe that weak and thin neurals like those of Archelon were not once present in sequence with the nuchal It is also significant that the nuchal, the pelvis and the epiplastron of Archelon strongly resemble these several elements in Dermochelys.

In recapitulation it is seen that: (1) The Trionyx carapace is now completely endothecal or subdermal; (2) in the majority of Cryptodi- ran and Pleurodiran Testudinates the carapace is diplogene, — that is, equals the subdermal

The general biologic problem has been outlined for just 50 years and

naturalists who have suc¬ cessively given their attention to it are E. D. Cope, L. Dollo, G. Baur, O. P. Hay and G. R. Wieland; while especially J. Versluys and his students have considered the osteological evidence.

As a corollary the features of Dinosaurian armor are also brought into unity. In the Dinosauria as in the Testudinata there are the two armor forming strata. But while in the Testudines, Miolania affords the sole example of cranial armature, this occurs frequently in Dinosaurs and becomes extraordinary in the Ceratopsids, in which both the nether and upper layers take part in armor formation. Con¬ versely in Polacanthus the deep layer forms a lumbar hip carapace. In the Stegosaurs the simple dermal armor takes the most singular expression seen in reptilians existent or ex¬ tinct. Wieland, who was the first to point out this significant parallelism says:

(

ossicles in series resulting finally in a protective sub, and osteodermal armature or carapace is a profound change co-ordinated with striking endoskeletal alteration. The Dinosauria de¬ veloped their varied armor types late and when already highly specialized, apparently with only varying or far less success than the Testudin-

Fig. 3. — Hypothetical protochelonian. As in Fig. 2, the dermal elements are in solid black, and the subdermal or neuropleural shield in light outline.

ates. In them an early development of simpler patterns appears to have resulted in an exceed¬ ingly long lease of life.®

Bibliography. — Baur, G., (Systematische Stellung von Dermochelys Blainviile) (1889) ; Cope, E. D., (Cretaceous Vertebrata of the West (1875) ; Hay, O. P., (Fossil Turtles of North America) (1908) ; Versluys, J., (On Phylogeny, etc., of the Leathery Turtle> (in British Association Reports on State of Science, 1913); Wieland, G. R., (Archelon ischyros: A New Gigantic Cryptodiran from the Fort Pierre Cretaceous of South Dakota) (1896) ; id., (Osteology of Protostega) (in Memoirs of Carnegie Museum, 1906) ; id., (Revision of Protostegidce) (in American Journal of Science, Vol. XXVII, 1909) ; id., (Dinosaur-Turtle Analogy) (in Science, Vol. XXXV, 1912).*

G. R. Wieland, Yale University.

PROTOTHERIA, a division or subclass of mammals embracing the Monotremata (q.v.) and with more or less certainty some fossil forms classified as Protodonta and Allotheria • or Multitub erculata. In the living forms their most marked peculiarities are that though classed as mammals they are without teats, that they are oviparous or ovoviviparous, and that they have but a single opening for the digestive tract and the urogenital system; a feature which also obtains in the marsupials, beavers and some

other rodents. The sutures of the skull are obliterated, and while in the young there are peculiar teeth with many tubercles upon the crown, these are lost in the adult, the jaws being furnished with horny plates. Similarities in the teeth lead the fossil forms to be associated here. The only living examples are the duck-billed platypus (Ornithorhyncus) and spiny ant-eaters {Echidna). The marsupials are sometimes known as Metatheria, and all other mammals as Eutheria ; but the latter term is more scientific¬ ally made to include all mammals except the monotremes. Consult Beddard, F. E., (Mam- malia) (Cambridge 1902).

PROTOZOA. Fundamentally contrasted with all other types of animal life, which are together designated the Metazoa, in that the body consists of a single cell or a colony of simple cells, the group is still usually termed a phylum though it is evidently of a higher grade than the subdivisions of the Metazoa to which that rank is always assigned and the designation sub-kingdom seems better justified. The organ¬ isms included are all minute; the largest being barely visible to the naked eye and the smallest lying at or beyond the limits of optical vision. With great simplicity of structure they com¬ bine functional complexity equal in a general way to that in the Metazoa. Although for the most part the group is well defined yet there exist forms that constitute an unbroken series from such as manifest clearly animal character¬ istics to those which are equally certainly plants. Transitional forms that bridge the gap between Protozoa and Metazoa are also well known; these are colonial types in which a differentia¬ tion between certain cells marks the first step in the production of the Metazoan organism. While structurally simple the Protozoa have many specialized parts, the cell-organs or or- ganellae, for the discharge of particular func¬ tions. Thus for locomotion one finds projec¬ tions of the external layer, either in the form of soft, mobile protoplasmic lobes that undergo constant changes in form, the pseudopodia, or in fixed processes of contractile substance known as flagella and cilia that carry out vibrating movements which propel the body and aid in taking food. The simplest types con¬ sist, like the Amoeba, of a mere drop of naked protoplasm enclosing a nucleus. In most forms, however, a cell-membrane covers the mass and imposes evident limits on its activity, though it is on the whole an advance in specialization.

Many forms possess protective coverings like shells, scales and spines that are permanent, or cysts which are of a temporary character and related to special conditions such as repro¬ duction, drought and seasonal changes. Mem¬ braneless forms ingest food at any point but those species with a membrane have at least a mouth opening and sometimes a second orifice for the extrusion of solid waste. The mem¬ brane may form at the mouth an inturned fun¬ nel-shaped esophagus. Many parasitic species have an unbroken membrane and take nourish¬ ment by osmosis. Contractile vacuoles fed by delicate radiating canals serve to eliminate waste and excess of water from the protoplasm, thus serving both as respiratory and as excretory organs. The existence of anuclear forms, the Monera of Haeckel, is now strongly doubted. On the other hand the normal mononuclear con-

dition is varied by a binuclear type in some groups. One also finds a multinuclear condi¬ tion which may indicate a colonial organism or a phase in reproduction just antecedent to spore formation. Division is the ordinary method of reproduction and may be simple or multiple either in the free or 'the encysted state. Similar spores (isogametes) or dissimilar spores (micro – and macro-gametes) are produced by most Protozoa, and may develop asexually, but in many cases fuse by pairs as a preliminary phase in the life cycle that suggests the start of Metazoan development.

Many parasitic species exhibit the alterna¬ tion of two different generations, or a change of hosts as a characteristic factor in their life history. Parasitic Protozoa may infect an organ or an individual cell, or even be found in a nucleus; and the various phases in the life cycle may illustrate these different locations as the malarial plasmodium is successively a cell parasite in the red corpuscle, an organ parasite in the blood, and a tissue parasite in the wall of the mosquito's midgut. No less distinctly than in Metazoa are the effects of parasitism seen among Protozoa as in the degeneration of structures characteristic of free life, in the formation of hold-fast organs, in the increase of reproductive activity, in the occurrence of metagenesis, andl in the adjustment of the parasitic life cycle to the habits of the host. Protozoan parasites are the cause of serious and even fatal diseases when by tissue destruc¬ tion they produce ulcers or by tissue prolifera¬ tion they give rise to tumors. Metabolic prod¬ ucts resulting from the activity of the invading Protozoa may exert a powerful toxemic influ¬ ence on the host as is well recognized in malaria for instance. The source of human Protozoal diseases may be found in the inges¬ tion of encysted spores with impure food or drink, or it may be

traced to the active inocula¬ tion of such spores through the medium of some blood sucking insect, like the mosquito, bedbug or louse. The control of Protozoal diseases de¬ pends clearly upon knowledge of the life cycle of the organism and of its means of transmis¬ sion. The brilliant successes of recent years in controlling malaria, yellow fever and other Protozoal diseases depended absolutely on at¬ tacking the parasite at some weak point in its life cycle and by preventing its dissemination putting an end to the disease. In this great work American investigators have played an important role. The most important Protozoal diseases of man are amoebic dysentery due to several species of Entamoeba; sleeping sickness of tropical Africa caused by Trypanosoma, a flagellate blood parasite; malaria, a scourge of tropical and subtropical regions since history began, produced by Plasmodium. In yellow- fever the organism is yet undiscovered but ap¬ parently belongs in the Protozoa; and in typhus it is a minute spirillar structure some¬ times placed here and sometimes included under the Protophyta. To other less important human diseases must be added many formidable pests to which domestic animals are subject and a host of others that attack all sorts of animals. These facts serve to show the great and grow¬ ing importance of Protozoa in an economic way. Among the Protozoa are distinguished the following major sub-divisions, termed classes or less often phyla: (1) Sarcodina,

naked forms moving by pseudopodia; (2) Mastigophora, usually with a membrane and with flagella for locomotion; (3) Sporozoa, exclusively parasitic, without locomotor proc¬ esses of any sort. Spores without polar capsule ; (4) Cnidosporidia, exclusively para¬ sitic, sometimes amoeboid. Spores with one or more polar capsules; (5) Infusoria, with firm membrane, moved by cilia. Among groups in- certae sedis are the Spirochaetidae, often in¬ cluded near the Mastigophora, and the Chlamy-dozoa, possibly related to the Sarcodina ; the first contains the organism of syphilis, the sec¬ ond those of some obscure diseases, but the exact place of both is at the present date very doubtful. Consult Calkins, G. N.,

M. M., (Protozoa) (in Cambridge Natural History,' Vol. I, New York 1909) ; Minchin, E. A., introduction to the Study of the Protozoa) (New York 1912).

Henry B. Ward,

Professor of Zoology, University of Illinois.

PROTRACTOR, an instrument for laying down and measuring angles on paper, and by which the use of the line of chords is super¬ seded. It is of various forms • — semicircular, rectangular or circular.

PROUD, Robert, American historian : b. near Yarm, Yorkshire, 10 May 1728; d. Phil¬ adelphia, Pa., 7 July 1813. He came to America in 1759 and settled in Pennsylvania where he engaged as teacher of Latin and Greek in a Friends' Academy in Philadelphia. During the American Revolution he remained loyal to the crown, firmly convinced that the future of the new country would be ruined by the success of the American arms, and it was during the prog¬ ress of the war that his work of greatest im¬ portance (The History of Pennsylvania) (2 vols., 1797-98) was written. The work is of much value as containing original material and important information, but the narrative is not well sustained. The documents, letters, etc., which he used in writing his history formed a large and valuable collection and became known as the (Proud Papers.' As such they were sold at public auction at Philadelphia in 1903. Consult Henkels, S. V., Catalogue of the Proud Papers) (Catalogue No. 893, Philadel¬ phia 1903) ; (Letters of Robert Proud' (in Pennsylvania Magazine of History and Biogra¬ phy, Vol. XXXIV. p. 62, Philadelphia 1910) ; Thomson, C. W., (Notice of the Life and Char¬ acter of Robert Proud' (in Historical Society of Pennsylvania, Memoirs, Vol. I, p. 391, Phila¬ delphia 1826). Consult Thomson, (Life and Character of Robert Proud' (in (Memoirs of the Historical Society of Pennsylvania,' Vol. I, 1826; 1864).

PROUD FLESH. See Granulation Tis¬ sue.

PROUDFIT, David Law (<(Peleg Ark¬ wright"), American author: b. Newburgh,

N. Y., 27 Oct. 1842; d. New York, 23 Feb. 1897. He enlisted in the Union army as a private in 1862, was commissioned lieutenant-colonel of colored troops and served through the war. He afterward entered business, became interested in pneumatic tube experiments and later was president of the Meteor Dispatch Company. He was a frequent contributor to newspapers and

magazines. His poems enjoyed a great vogue amongst recitationists. His publications in¬ clude (Love Among the Gamins) (New York 1877) ; (Mask and Domino) (Philadelphia 1888); (From the Chapparal to Wall Street; or a Man from the West) (New York 1891).

PROUDHON, proo'don, Pierre Joseph,

French philosophical anarchist: b. Besangon, France, 15 July 1809; d. Passy, Paris, 16 Jan. 1865. He studied at the University of Besan¬ gon,

but left without completing his course there because compelled to find some means of self-support. He then learned printing and in 1837 became partner in developing a new typo¬ graphical process. He had continued his edu¬ cation by improving every opportunity for study; and in 1838 published a philological treatise, (Essai de Grammaire Generale,1 for which the Academy of Besangon conferred on him a pension which yielded an income of 1,500 francs for three years. Political economy now became his chief study, and in 1840 appeared his famous work (Qu'est-ce que la Propriete?1 ((What is Property ?1), to which question the first page of the treatise contains the answer, <(La Propriete c'est le Vol® (<(Property is theft®). This first treatise was followed in 1841 and 1842 by two pamphlets in the same strain, the second of which, (Avertissement aux Proprie taires,1 led to his prosecution and trial for his revolutionary opinions, resulting in an acquittal. In 1843 Proudhon undertook the management of a system of transports on the Rhone and Saone. But he still continued to write. In that year appeared his treatise (De la Creation de l'Ordre dans l'Humanite,1 a proposed system of political organization ; and in 1846 (Systeme des Contradictions Economiques) on (Philosophie de la misere.1 In 1847 he moved to Paris and soon became one of the best-known radicals. After the revolution of February 1848 he be¬ gan the publication of a journal at Paris called Le Representant du Peuple, which, however, was speedily suppressed. But he had by this time acquired so much popularity that he was elected the representative of the Seine in the Assembly. Here, however, he had little suc¬ cess, and again turned to writing and journal¬ ism. He published several pamphlets, and started three journals in succession, Le Peuple, La V oix du Peuple and Le Peuple de 1850. He was frequently fined for his statement of his radical theories, but the fines were paid for him by subscription. In 1849 he attempted to found a bank under the name of the <(Banque du Peuple® with the object of abolishing interest and finally putting an end to capital. This pro¬ ject failed, and he fled to Geneva to escape im¬ prisonment for violation of the press laws, but returning in June 1849 was imprisoned for three years. On his release in 1852 he went to Bel¬ gium, where he continued to write and in 1860 under an amnesty returned to Paris, where he lived in retirement till his death. His publica¬ tions in addition to those already mentioned in¬ clude (De la concurrence entre les chemins de fer et les voies navigables) (1845); (Solution du probleme Sociale) (1848) ; (Resume de la Question Sociale; Banque d'Echange1 (1849); Udees Revolutionnaires1 (1849) ; Organisation de credit, etc.1 (1849) ; (Confessions d'un revo- lutionnaire) (1849) ; (Actes de la revolution (1849) ; (Banque du peuple) (1849) ; Unteret

et principaP (1849) ; (Gratuite du credit1 (1850), the last two a resume of discussions he had with Bastiat (q.v.) on the subject of in¬ terest; (Le droit

*au travail et le droit de pro¬ priete1 (1850) ; (De la celebration du dimanche1 (1850) ; (Idee general de la revolution aux 19e Siecle1 (1851) ; (La revolution sociale demon¬ tree par le coup d'etat1 (1852) ; (Philosophie du progres1 (1853) ; (Manuel du speculateur a la Bourse1 (1856) ; (De la justice dans la revolu¬ tion et dans l'eglise1 (3 vols., 1858) ; (La guerre e la paix1 (2 vols., 1860) ; (Theorie de l'lmpot1 (1861) ; (Les majorats Iitteraires1 (1862); (La federation et l'unite en Italie1 (1862) ; (Du principe federative, etc.1 (1863). The following works of his have been published posthumously : *De la capacite politique des classes ouvrieres1 (1865) ; (Theorie de la propriete1 (1865) ; (Du principe de l'art1 (1865) : (Le Bible Annotee1 (2 vols., 1866-67) ; (France et Rhin1 (1867) ; Contradictions politiques1 (Paris 1870) ; (Du principe de l'art, etc.1 (1875) ; (La pornocratie, etc.1 (1875) ; Cesarisme et christianisme1 (2 vols., 1883) ; (Jesus et les Origines du Chris¬ tianisme1 (1896) ; Napoleon I1 (1898) ; Na¬ poleon IIP (1900). A collection of his works, (CEuvres Completes,1 has been published (37 vols., Paris and Brussels 1866-83), and an abridged edition, (Abrege des oeuvres de Proud¬ hon1 (Paris 1897). His correspondence has been edited by J. A. Langlois (14 vols., Paris 1875). Only a few of his many writings have been translated: (What is Property?1 (trans- later by B. R. Tucker, Princeton, Mass., 1876) ; (System of Economical Contradictions; or the Philosophy of Misery1 (translated by B. R. Tucker, Vol. I, Boston 1888).*

He was the first to formulate the doctrines of philosophical anarchism ; he maintained that property was unjustifiable, that labor only should give just claim to share in the product of labor, and that consequently rent and inter¬ est should not exist. He thus far agreed with the socialist doctrine of value, but he was neither a socialist nor a communist ; because the state depended upon and protected property he claimed that the State must be destroyed; and that the proper basis of society was a vol¬ untary contract between individuals.

Bibliography. — Beauchery, A., (Economic sociale de P. J. Proudhon1 (Paris 1867) ; Ber- thod, A., CP. J. Proudhon et la Propriete1 (Paris 1910) ; Bertrand, A. (ed.), (P.J. Proud¬ hon et les Lyonnais1 (in Institute de France. Academic des Sciences morales et Politiques. Seances et Travaux , n. s. Vol. LXII, p. 211, Paris 1904) ; Bougie, C., 96) ; Dimier, L., (Les Maitres de la Contre- Revolution au 19e Siecle1 (Paris 1907) ; Droz, E., (P. J. Proudhon1 (Paris 1909) ; Gide, C., and C. Rist, (Histoire des Doctrines Econom- iques depuis les Physiocrates jusqu' a nos Jours1 (Paris 1909) ; Lagarde, E., (La revanche de Proudhon1 (Paris 1905) ; Langlois, J. A., (P. J. Proudhon, sa Vie et son oeuvre1 (in

Proudhon, P. J., (Correspondance,5 Vol. I, pp. V-XLVIII, Paris 1875) ; Marx, Karl, (Das Elend der Philosophic Antwort auf Proudhons ((Stutt¬ gart 1898) ; Putlitz, G. zu, (P. J. Proudhon5 (Berlin 1881) ; Sainte-Beuve, C. A., (P. J. Proudhon; sa vie et sa correspondance, 1838- 485 (Paris 1875).

PROUSTITE, or RUBY SILVER,

AgaAsSs, the most beautiful silver mineral and one of the most important ores of silver. It occurs in acute rhombohedral, or, less com¬ monly, in prismatic crystals, also massive. Its lustre is brilliant adamantine, typical color cochineal-red, but changing to nearly black on exposure to light, losing simultaneously much of its transparency. Chemically, it is silver sulpharsenite, the silver percentage being 65.4. In the rich silver mines of Chile it is one of the chief ores and magnificent crystalized specimens worth thousands of dollars have been taken out. The royal Saxon mines are also celebrated for their ruby silver, and it occurs as an ore in many European, Mexican, Colorado and Ne¬ vada silver mines.

PROUT, prowt, Ebenezer, English com¬ poser and writer on musical theory: b. Oundle, Northamptonshire, 1 March 1835; d. Hackney, London, 5 Dec. 1909. He was educated at Uni¬ versity College, London. From 1860 till 1884 he was a professor of the pianoforte at the Crystal Palace School, and in 1876-82 professor of harmony and composition at the National Training School for Music. He occupied a similar chair in the Royal Academy of Music and the Guildhall School of Music, and from 1894—1909 the chair of music in Dublin Univer¬ sity. From 1876 to 1890 he was conductor of the Hackney Choral Association which under his guidance became soon one of the most promi¬ nent concert-giving institutions of London. His compositions include cantatas, concertos, quar¬ tets, symphonies, overtures, etc., among the first named being (Hereward) (1878) ;

(Counterpoint5 (1890); (Double Counterpoint and Canon) (1891); ˆFugal Analysis) (1892); (Fugue) (1892); (Musical Form5 (1893);

(Applied Forms5 (1895) ; (The Orchestra5 (2 vols., 1898-99). He was the first editor of the Monthly Musical Record (1871-74), a fre¬ quent contributor to musical journals, and musical critic of the Academy (1874-79) and of the Athenceum (1879-89). Dublin University gave him the honorary degree of Mus.D in 1895. Consult Anon., (Ebenezer Prout5 (in Musical Times, Vol. XL, No. 674, p. 225, London 1899).

PROUT, Father. See Mahony, Francis, Sylvester.

PROUT, Samuel, English painter: b. Ply¬ mouth, 17 Sept. 1783; d. Camberwell, 10 Feb. 1852. He early manifested a turn for drawing, but the only lessons he received were from a drawing-master in his native town. In 1801 he made the acquaintance of Britton, the architec¬

tural antiquary, who employed him in visiting the rural districts to make sketches, which were to be engraved in the (Beauties of England,5 but which finally were rejected. Later sketches, however, were used in that work. In 1818 he visited Normandy, returning with many strik¬ ing water-color drawings, whose merits placed him at the head of this department of art. He was especially happy in depicting monuments of mediaeval architecture throughout France, Germany and Italy, and also directed his at¬ tention to lithography, publishing several col¬ lections of lithographed sketches. He was a great water-color painter, in the English sense of the term, and relied altogether upon wash tones, whose depth was determined by the de¬ gree to which the white paper on which they were laid was permitted to appear. The prin¬ cipal features of his buildings he marked with strong lines and deep shadows, but his main characteristics are breadth, freedom of hand¬ ling, and power of coloring. He was one of the most active members of the Water-color Society and a regular exhibitor. His industry was great and his pictures were eagerly sought for, though he received only moderate prices during his lifetime. However, in 1868 his Nuremberg5 (21 x 28 in.) was sold for $5,010. He is the author of (Hints on Light and Shadow,5 the (Young Student's Drawing Book,5 and a series of lesson books published by Ackermann. A number of his water colors are in the South Kensington Museum, London. Consult Ruskin, J., (Notes on Samuel Prout and William Hunt5 (London 1880) ; Winslow, H., (The Drawings of Samuel Pront5 (in American Institute of Architects, Journal, Vol. IV, p. 485, Harrisburg 1916).

PROUTY, Charles Azro, American law¬ yer: b. Newport, Vt., 9 Oct. 1853; d. 8 July 1921. Lie was graduated at Dartmouth College in 1875 and in 1882 was admitted to the bar in Vermont. He was engaged in law practice at Newport, Vt., in 1882-96; served in the Vermont House of Representatives in 1888; and was a reporter of decisions of the Supreme Court of Vermont in 1888-96. In 1896-1914 he was a member of the United States Interstate Com¬ merce Commission, serving as chairman in 1912— 13; and after 1914 he was director of valuation for the Interstate Commerce Commission. Lie was appointed director of public service and ac¬ counting on the staff of the Railroad Adminis¬ tration, Washington, D. C., in February 1918.

PROVANCHER, pro-vaii-cher, Leon, Ca¬ nadian naturalist: b. Becancour,

*Quebec, 10 March 1820; d. Cap Rouge, Quebec, 1892. To devote himself exclusively to the pursuit of botany and kindred studies, he retired from the Catholic priesthood which he had entered in 1844. He established (Le Naturalist Canadien5 in 1868, and published (Traite Llementaire de Botanique5 (1858) ; (Flore Canadienne5 (1862); (Le Verger Canadien5 (1865) ; *De Quebec a Jerusalem5 (1882) ; (Petite Histoire du Canada5 (1887) ; (Une Excursion aux Cli- mats Tropicaux5 (1890).*

PROVENQAL (pro-van-sal) LANGUAGE. The term is used in two distinct significations, according to one of which it embraces only the speech of Provence; while according to the other, it includes the dialect not only of Prov¬ ence but of all the neighboring districts of

southern France where the langue d'oc is spoken, The term is even intended to include, in a literary sense, the sister dialects of Cata¬ lonia and the eastern coast of Spain in general and northern Italy. The term Provencal was applied to the literary language of all the sister dialects of southern France because of the early prominence of Provence in the literature of the early provencal period. Between 8,000,- 000 and 10,000,000 people speak Provencal using the term in its broader signification and includ¬ ing the Gascon dialects, which local jealousies have been inclined to look upon as a speech apart from Provencal, on account of its French peculiarities and its inability to identify itself with the dialectic and literary movement of southern France.

Provencal is distinguished from French no¬ ticeably by its tendency to strongly accentuate one syllable of a word at the expense of the others instead of more or less equally distrib¬ uting the accent over all the syllables. This accent almost always rests on the ultimate or penultimate syllable; and in this respect Pro¬ vencal resembles Spanish and Portuguese more than it does French. French has changed the Latin accented a of free syllables to e, and the Latin unaccented a to mute or slurred e, while the Provencal has retained the Latin form changing, however, in modern Provencal the final unaccented a into o ; as far example, Pro¬ vencal amat, French aime; Provencal bona, , French bonne. Another feature of Provencal which tends to connect it with the dialects of southern and eastern Spain is the tendency to convert the palatalized l into the palatal vocalic y, a tendency noticeable in Cuba and most of the central and South American countries. The lack of nazalization in vowels distinguishes Provencal from French and Portuguese and helps to relate it more to Spanish and Italian. As a result of this nazalization Latin final con¬

sonants have a tendency to disappear in Pro¬ vencal even when they are retained in French and Portuguese or converted into vocal endings in Spanish and Italian; as for example Latin bonum; French bon; Portuguese, bom; Spanish bueno; Italian buono ; Provencal, bo. But Pro¬ vencal is like French in that the ˆ used as the sign of the plural, is silent, where as in Spanish it is pronounced ; but unlike it and the other Ro¬ mance languages, in its retension of the Latin diphthong an. Examples: Latin aurnm, French or; Provencal aur; Latin pauper em; French pauvre; Provencal paubre. In this latter ex¬ ample although the French preserves the Latin au, in the spelling, in effect, it has not since the au pronounced as though it were written o. A general tendency of the Provencal dialects is to change the Latin termination following an, in open syllables into open o. Examples :

Latin French Spanish Provencal,

granum grain grano gro

manum main mano mo

panem pain pan po.

Another peculiar feature of Provencal is the change of the Latin a (following the tonic accent) into o. Example :

Latin French Spanish Provencal

terra terre tierra terro

amata amie amado. amado

It must be constantly kept in mind, in any study of Provencal that not only was the an¬

cient literary language much like the modern, but that in it as in the present speech there were many variations due to dialects and local conditions, hence the tracing of the phonology, morphology and texts of Provencal is largely a matter of noting these many local variations, and undertaking not profitable for the general reader, because so few of these variations are common to all the Provencal dialects and at the same time distinctly different from the other Latin tongues. This constant dialectic variation in High Limousin, Law Limousin, Marchese, Auverguese, Gascon, Bearnese, Roygerat, Lan- guedocian and Provencal proper has made the task of creating a modern Provencal literature very difficult. The leaders of the modern move¬ ment have, to a certain extent, disregarded the tendencies of the natural growth of languages and they have attempted to create a so-

called pure Provencal by the exclusion of words of foreign origin and also of those formed from Provencal through French influence. The lite¬ rary men of the modern Provencal school write in a literary tongue that is the speech of none of their readers. The lack of a Provencal school system and the constant and ever increas¬ ing encroachment of French upon the Proven¬ cal and other dialects and the indifference of the greater part of the masses to the literary future of their tongue, all tend to make a losing one of the battel the Felibres have been fighting, since the middle of the 19 century, for the re¬ vival of Provencal as the literary and folk tongue of southern France. The extension and improvement of the French school system and the consequent increase of literacy throughout the land, are slowly but surely creating a na¬ tional sentiment and a feeling of unity such as may be said to have never before existed in the country. The European War has made France realize, as probably no other one factor could have done, that her people are one and indivisi¬ ble and that there is no room for a supreme non-national tongue in the south or in any other part of France. Hence the Provencal tongues seem destined to disappear ultimately, not only from France but also from Spain and Italy. For the history of the Provencal movement in modern times see Felibres, and consult articles on Provencal Literature ; Catalonia ; Trouba¬ dours ; Appel, Karl, (Chrestomathie) ; and the publication Annales du Midi (Toulouse) ; Re¬ vue des langues romanes (Montpellier) ; Ro¬ mania (Paris) ; Romanische Forschungen (Er¬ langen) ; Zeischrift fur riimanische Philoloqie (Halle).

Bibliography. — Adams, E. L., (Word-For- mation in ProvencaP (New York 1913) ; Chabaneau, (Grammaire limousine> (Paris 1876) ; Crescini, (Manualetto provenzale) (Verona 1892) ; Diez, (Grammatik der roman- ischen Sprachen) (Bonn 1872) ; Farnell, (Lives of the Troubadours) ; Grandgent, C. H., Out¬ line of the Phonology and Morphology of Old ProvencaP (Boston 1905) ; Huffer, (Trouban- dours) (1878) ; Jourdaine, (Historie des Feli- bres) (Paris) ; Koschwitz, E., (Ueber die pro- venzalischen Feliber und ihre Vorganger> (Ber¬ lin 1894) ; Levy, E., (Provenzalisches Supple- ment-WorterbucIP (Leipzig 1892) ; Lienig, (Die Grammatick der Provenzalischen Leys d' Amors verglichen mit der Sprache der Troubadours) (Breslau 1890) ; Meyer, (Recueil d. anciens texts bas-latins, proveneaux et francais (Paris 1874-*

77) ; Meyer-Liibke, (Grammatik der roman- ischen SpracheiP (Leipzig 1890) ; (Gram- maire des langues romanes) (Paris 1890-1900; a translation of the above) ; Mestral, F., (Lou tresor dou Felibrige ou

Dictionnaire provengal- frangais> (Paris 1879-86) ; Preston, H. W., (Troubadours and Trouveres) (1876) ; Ray- nouard, (Lexique Roman (6 vols., Paris 1836- 44) ; Rowbothram, (The Troubadours and Courts of Love) (1895) ; Rutherford, trouba¬ dours* (1873) ; Schultz-Gorra, O., (Altpro- venzalisches Elementarbuch* (Heidelberg 1906) ; Stengel, (Die beiden altesten provenzalischen Grammatiken lo Donatz provensals und las rasos de trobar (Marburg 1878) ; Suchier, H., (Denkmaler provenzadischer Litteratur und Sprache) (Halle 1883) ; (Die franzosische und provenzalische Sprache und ihre Mundarten) (in Grober's Grundriss der romanischen Philologie, Strassburg 1888) ; (Le frangais et la provengaP (Paris 1891; a translation of the above).*

John Hubert Cornyn, Editorial Staff of The Americana.

PROVENQAL LITERATURE made its appearance in southern France toward the close of the 11th century; although previous to this date there undoubtedly existed ballad and other verse in the vernacular of the masses, which seems to have been handed down from one reciter or singer to another and not to have been committed to writing. At this time Latin formed the sole literary medium of the poets and other writers who lived the life of the court and courtly society. But while Latin maintained its entrenched position as the vehicle of the literary expression of the court and the nobility, the masses were shaping the Romanic tongue of southern France to their own ends. Just when this new tongue began to take form as a speech apart from Latin and the native language spoken in the country on the advent of the Romans is not known, but a considerable fragment of a poem of the first half of the 11th century which has been preserved shows that at this time the provengal had already assumed a strong individuality of form and a grammatical structure very different from those of the Latin tongue. This poem consists of 257 decasyllabic verses forming the beginning of a composition based on Boethius' (De consola- tione philosophic.) It is evident that the author was acquainted with Latin, which prob¬ ably influenced his handling of the vernacular; and the form of the poem suggests that it was composed to be sung or recited probably by some professional entertainer. This poem is of considereable interest, since it shows that the importance of the vernacular had already be¬ come great enough to induce a court writer to revamp, in the popular speech, the work of a noted Latin author, and also because it indi¬ cates that, while Christianity had already got the upper hand of Roman paganism, yet the pagan writings, reshaped and commentated, were still serving to entertain the Christianized public.

The poems of William IX, Count of Poitiers, consisting of love songs and occasional com¬ positions of various kinds, which belong to the end of the 11th and first quarter of the 12th centuries, are the earliest extant

representatives of the Provengal literature which was soon to

become so popular in southern France and the east of Spain. The form of these poems shows they were intended to be sung, probably at the court, to the courtly friends and guests of the sovereign, since the subjects are in no sense popular. They bear evidence that the Provengal tongue had already by the end of the 11th cen¬ tury become the language of the people of southern France, peasant and prince alike. Their lack of resemblance to Latin poetry would seem to prove the contention that they were imitations of the compositions of the joglars (jongleurs) or professional entertain¬ ers, who were welcome guests at the castles of princes and barons. William of Poitiers seems to have set the style in vernacular poetry for the Provengal writers who followed him. Those love poems in which profound respect is shown by the poet to his lady love, or to some lady of higher rank, perhaps the head of the household or court to which the singer was attached. These poetic effusions were always couched in the most respectful terms and in the highest refinement of language at the command of the poet. Growing up under these conditions and flourishing among the court followers and the families of the barons and knights, Provengal poetry remained, as it was when it first came into notice, the pos¬ session of the privileged class. It was, there¬ fore, undoubtedly more refined and Latinized than the speech of the masses. This explains the fact that, after a comparatively long period of vogue and noted popularity, it dropped almost completely out of sight for several centuries. Provengal poetry received its first encourage¬ ment and inspiration at the court of William of Poitiers, at a time when it had already acquired sufficient strength, character and indi¬ viduality to fit it to be the medium of the expression of the life and aspirations of the court and its followers. The example set by the royal poet of writing in the vulgar tongue, to the exclusion of Latin, was followed by many writers, not a few of whom were of noble birth. The writing of poetry was soon looked upon as a courtly accomplishment ; and it natu¬ rally became fashionable. It would seem as if every one at court wrote or tried to write songs, generally of love. Very often the author also composed the music to which his songs were sung either by himself, his friends or profes¬ sional singers and reciters. Songs of over 400 Provengal poets have been preserved while the poems of many more writers known by name or reputation have been lost. The very re¬ spectable body of Provengal poetry that has survived is a good indication of the great amount written during the period of its vogue. Being the expression of the sentiment and an idealization of the life of the court, the work of the Provengal poets could never have been popular in the sense that a modern poet is popular; and it is doubtful if it ever penetrated to the masses. Confined to the narrow court circle and idealizing to the extreme a life that was none too ideal, Provengal poetry rapidly became artificial and more and more character¬

istically the voice and the peculiar property of the aristocracy. This result was undoubtedly due to the illiteracy and low condition of the masses who were very far from the ideal con¬ dition pictured by the poets of the age. As

Provencal poetry became more and more arti¬ ficial it lost considerable of its virility and much of its earlier and charming appearance of naturalness. Its tendency was to assume a stereotyped form from which succeeding poets found it very difficult to break away. It was so inseparably identified with the court life and the ideals of the Provengal aristocracy that, when the latter fell from its high estate on the subjugation of the Provencal domains in the 14th century, the ornate literary branch that had been grafted on its ancient family tree fell by the wayside and perished with the local feudalism it had been used to glorify. But its own peculiar glory did not die with it ; for it had already impressed its peculiar mode of thought, its idealism, its literary artificiality on the feudalism of Europe; and left its impress strongly and indelibly upon the literature, prose and poetry alike, of France, Germany, Italy and Spain. The Provencal literary movement dur¬ ing this first or aristocratic period embraced not only the French Provengal country but also Catalonia and the outer east coast countries of Spain in which Catalan was and still is the native tongue, Gascony and northern Italy. In all these regions it showed the same character¬ istics ; and in none of them was it ever- the expression of the life of the masses; nor did it ever deal with the legend story or the history of the earlier life of the people. In this respect the early literature of northern France was superior in rugged strength, in human interest and real dramatic qualities.

Aristocratic Period. — Although the poetry of this period was largely lyrical, it naturally, during its more than 250 years of existence, reached out into other fields. Religious, epic, narrative, didactic and dramatic poets there were in the Provengal countries ; but even in these the lyrical influence is strongly in evi¬ dence, for the habit of public singing and recitation had fixed upon the poetry of the age certain easily recognizable marks which it con¬ tinued to bear so long as it remained under the influence of feudalism and the artificial rules it had set up for the government of literature, not formally, of course, but unconsciously, yet none the less inexorably. Lyrical poetry being the fountain head of Provengal literature is, natu¬ rally, its most characteristic expression. It was symbolical of the life of the court and of the chivalric spirit of the age to such an extent that the French word "courtoise® was often used in the sense of "lyrical® ; that is to say, that form of poetical expression which

belonged particularly to the court, which had under the influence of chivalry developed complicated and highly artificial court manners generally re¬ ferred to as courtesy. Gentle courtesy was the court manners of the gentle born. Of this the lyrical Provengal poetry was the expression in a very particular sense, not only in France but also throughout the other countries in which the Provengal tongue was dominant. It was this lyrical poetry, too, which appealed to the poets of Europe and set the style for poetry for years and later on for romances in prose. Love and the faithfulness, purity and devo¬ tion of the knight to the lady of his choice was the principal theme of Provengal lyrical poetry. This was carried to such an extreme that it became almost a cult ; and as such it has left

its impress upon the Latin and Saxon countries to-day in such a manner as distinctly to differ¬ entiate them from the other peoples of the world in their treatment of woman who was for the Provengal poet the centre and soul of all things courtly and chivalric. How much of this feminine sentiment was due, as French critics contend, to the powerful influenece of clever women during the most active period of Provengal literature it is, at this late date, hard to determine. It is certain, however, that Eleanor of Poitiers, at whose court the best of the Provengal poets were welcomed, in¬ spired these singers to sound her praise and that of courtly women in general. This un¬ doubtedly had a very strong influence on the general trend of lyrical poetry at this time. Eleanor, who was the wife of Louis VII of France and later on of Henry II of England, was a woman of excellent literary taste and sound judgment. As the consort successively of two of the most powerful sovereigns of her day; and possessed of the tongue of Provenge and the sympathies of her people, she exercised a powerful influence upon the life of her day in France; and the glamor of her name, her gifts and her courtesy spread to other countries, especially to Catalonia and northern Italy, from whence came noted vernacular poets to her court. Eleanor of Poitiers was to the most brilliant Provengal period what Queen Eliza¬ beth of England was to her own time. Thus it was quite natural that, in an age of chiv¬ alry, a powerful, clever, ambitious and popu¬ lar woman like Eleanor should set the ideal of the perfect woman before the eyes of the court poets in such a way that they never after¬ ward lost the vision so long as the system upon which Provengal poetry depended continued vigorous and dominant.

One of the most noted of the Provengal lyrical poets was Bernart de Ventadour, one of the singers at the court of Eleanor of Poitiers. Some 50 or more of his songs which have sur¬ vived are distinguished by their sincerity and passion ; and their elegance of form and expres¬ sion justify the judgment of his age which ranked him as one of the most inspired poets of his own day. Another poet who lived about the same time and who seems to have had great popularity and to have exercised strong in¬

fluence on Provencal lyrical poetry was Cer- camon, a Gascon who wrote "pastorals® in the popular tongue in an original style and with considerable originality of thought and forms of expression. At the court of Richard Coeur de Lion, himself a great lover of music and song, there were noted Provengal poets, Arnaut Daniel, Peire Vidal, Folquet of Marseilles and Gaucelm Faidit, some or all of whom un¬ doubtedly entertained the Crusaders on their long and venturesome journey. Bernart de Ventadour, already mentioned, appears to have been also at the courts of Ermengarde of Nar- bonne and Raimon V, Count of Toulouse. The other Provengal poets seem also to have gone from one Provengal court to another and even some of them were invited to the courts of France and Castile. Among the patrons of the Provengal period, in addition to those already mentioned, were in France, Raimon VI, Count of Toulouse; Alphonse II, Count of Provence; Raimon Berenger IV, also Count of Provence;

Barral Marseilles; William VIII of Montpel¬ lier; Robert of Auvergne; William du Baus, Prince of Orange; Savario de Mauleon; Henry I and Henry II, counts of Rodez ; Nunyo Sanchez, Count of Roussillon and Bernard IV, Count of Astarac. In Spain the courts of Alphonse II, Pedro II, Jamie I, Pedro III, kings of Aragon; Alfonso IX of Leon and Alfonso X of Castile extended the strongest sympathy and aid to the Provencal poets ; and some of these sovereigns, like Jamie I, entered actively into the lists for literary honors. Hence all the great names in the first period of Provencal literature are inseparably connected with one or several of these courts, or literary centres.

Arnaut Daniel, considered by his contempo¬ raries as the most gifted poet at the court of Richard Cceur de Lion, was greatly admired by both Petrarch and Dante. He was the origi¬ nator of the ˆsestina® and, incidentally, a lover of complicated and intricate versification, both of which he succeeded in making popular. Arnault of Mareuil, noted for his delicacy of style, symplicity and felicity of expression, had many of the qualities of a good poet, and his surviving work commends itself to the modern reader. Bertran de Born, a noted poet who lived at the court of Henry Curtmantle, son of Henry II of England, was a famous soldier, as well, who is said to have been known to all the courts of Europe of his day where Provencal poetry was known. He gained additional notoriety by the prominent part he took in the quarrel between Henry and his unruly sons. Peire Vidal of Toulouse, who was well and favorably known at all the Provencal courts, was looked upon as one of the greatest singers of his day, and in addition to being one of the favorite troubadours of Richard Coeur

de Lion, was on especially good terms with Raimon V of Toulouse and Barral of Marseilles, where his striking poetical gifts and his knowledge of the ways of the court and his natural tact made him a general favorite and incidentally enabled him to become one of the richest of troubadours. Girault de Borneil, who has been termed the master poet of the troubadours, was dis¬ tinguished for simplicity of style and other attractive poetical gifts. He was a great master of the trobar clus (close verse) which he made popular. Gaucelm Faidit, one of the favorite troubadours of Richard Cceur de Lion, has left, among other short poems of merit, a touching lament on the death of the great Crusader whose exploits caught the fancy of the Europe of his day and held it for several generations. Among the numerous troubadours of good family was the famous Folguet of Marseilles who later be¬ came bishop of Toulouse, and in that capacity savagely persecuted the Albigenses, all forget¬ ful of the passionate love songs he had sung in his youth, and the gentle ways of the court for which he had distinguished himself. Al¬ though many troubadours arose among people of lower rank yet, especially after the profes¬ sion became famous and kings like Jamie I of Aragon had lent it dignity by composing troubadour songs themselves, many men of noble birth entered the ranks of the poets; and of these not a few became professional trou¬ badours. Among these were Raimon de Mira- val who became one of the most popular trou¬

badours of the court of Pedro II of Aragon, and, later, of that of Raimon VI, Count of Toulouse ; Guillem Azemar and Raimbaut de Vacqueiras, a favorite at the court of Guillaume du Baus, Prince of Orange, in the latter half of the 12th and the beginning of the 13th centuries. But the patrons of the troubadours were no respectors of rank when it became a question of the recognition of the gifts of poetry and song. Bernart of Ventadour won the love of the lady of Ventadour through his wondrous lyrical gifts, and when he had to flee from the court, he found like favor in the eyes of the more famous Eleanor of Guienne. Yet he was the son of a house servant. Several troubadours were sons of trades-people, bourgeois, scrive¬ ners, clerks and persons in a position to give them at least the rudiments of education. Others began their poetical work as students as a means of paying expenses and continued at it because it appealed to them ; while another very considerable class of troubadours con¬ sisted of needy younger sons of noble families who found the wandering life of the troubadour a very pleasant means of making a living. On account of the high connection of this class of singers their existence at all the courts was agreeable, since it brought them constantly into public prominence without the restrictions of rank imposed upon gifted poets of more humble birth.

Marcabrun shows in his surviving poems that the age in which he lived was as appreciative of biting satire as the France of to-day. Pons de Capdoil,

Raimbaut de Vacqueiras and Peirol, all Crusaders, were writers of excellent love songs which helped to swell the fame of the Pro¬ vencal troubadours and their art. After the first century of brilliant success the quality of Provencal literature began to depreciate. The earnestness and enthusiasm of the earlier poets had been replaced by the artificiality and more or less stereotypes of succeeding generations who continued to follow the fashion set by the predecessors. The opening of the Albigensian Crusade in 1209 was the beginning of a move¬ ment which finally destroyed the power of the independent principalities of southern France, broke up the Provencal society and caused to disappear the centres in which the troubadours found welcome and support, and finally de¬ stroyed the Provengal tongue as an official speech and the vehicle of poetical expression. The French power, language and culture over¬ ran the Provencal countries and the troubadours and other Provencal poets disappeared almost suddenly about 1350.

Middle Period. — After the overthrow of the southern French principalities and the dis¬ appearance of the court troubadours Provencal literature, as the medium of expression of the aristocracy disappeared; but it did not alto¬ gether die out. As the courtly bonds which had bound it together into one homogeneous whole, that made the troubadour at home in southern France, eastern and southeastern Spain and northern Italy, were cut, and the patronage of the nobles and princes was withdrawn, the heritage of Provencal literature fell to the masses, who wrote more or less in the language of the country. As each district made Use of its own dialect, the old uniformity disappeared; and thus provencal literature lost its former prestige

and all hut very local interest, the work excepted, of a few singers and reciters who still made the rounds of the country appearing at the castles of the local nobility, town fairs and other places where crowds of people met together. Owing to the lack of encouragement and patronage, and its dialectic character, this literature was vastly inferior in quality, if not in quantity, to that of the period of the troubadours. The overthrow of the Provengal principalities also made it necessarily different in plan, form, composition and objective. After the disap¬ pearance of the brilliant Provengal courts with their charming and cultured ladies, their heroic and chivalrous knights, their cultured centres, their poet-princes and their literary contests, the reason for being of the trouba¬ dours and their semi-artificial language and literature largely ceased to exist. The trouba¬ dours themselves migrated to the Provengal countries of Spain and Italy where

they found a short respite from the fate that was rapidly overtaking their whole literature. But although the unity of the Provengal effort was thus broken an effort was made by the Academy of Toulouse (founded 1324), to encourage the lit¬ erary use of the tongue of the troubadours. Prizes and literary contests were offered and literary titles were given to the successful con¬ testants. Even after the discovery of America this society was still as active as it dare be, and throughout the centuries since then it seems to have maintained some sort of existence, though certainly not a very active one. Gradually, however, the French influence, even in this native society, gained the upper hand and suc¬ ceeded in finally shutting out the Provengal from participation in its contests or sharing its honors (1670). The latter, left to itself, de¬ veloped along the line of least resistance. Scarcely had the stream of courtly poetry ceased to flow, arrested and finally dried up at the fountain-head by the inflow of French cul¬ ture, when the Provengal districts became active in directions that had begun to make them¬ selves noticeable before the overthrow of the troubadours. While, as already stated, the dis¬ tinguishing feature of the literature of the period of the troubadours was the prominence of lyrical poetry to the practical overshadow¬ ing of every other department of literary en¬ deavor, yet Provengal showed, especially toward the latter half of this period, considerable ac¬ tivity in other departments of literature. Numerous epics belong to this period. Some of them were quite lengthy, though they have survived in only a fragmentary form. Various tales and romances presenting the life of the period, allegories, didactic poems, lives of the saints and other similar religious compositions of a moral nature occupied the attention of a class of writers of an inferior order, who ap¬ parently could not aspire to be troubadours. Between these and the troubadours was a body of romancers, some of whom at least found favor at the court. These composed lengthy poetical tales in the manner of the stories of Arthur and other heroes of lengthy romance. There is every reason to believe that these romances were popular in their day and prob¬ ably outlived their authors, though perhaps not everywhere strictly in their original form. The (Biographies of the Troubadours, } which gives

the lives of over 100 of the more popular of these poets, reads more like romance than a sober statement of facts. But it is of interest because of its subject and the added fact that it is in prose while most of the literature of the age was in verse form, ˆlamengaC a very long and artificial love story, instinct with the life of the period in which it was written (dur¬ ing the first quarter of the 13th century), shows the Provengal mind working along the line of romantic tales of intrigue later on developed by the Italian writers. Much in the same form is the long historical romance, the (Chanso d'AntiocheP whose inspiration was the first Cru¬ sade, with its glamor of tradition and its stir¬ ring adventures. The period that followed the

disappearance of Provengal as a court literature continued to imitate the literature of the pre¬ ceding period ; but the work produced, which was didactic, religious or educational, was of a very poor quality and served from the literary standpoint only to keep alive the habit of and facility in writing. For over 100 years little of interest appeared in Provengal literature, except a number of mystery plays dealing with re¬ ligious subjects. There was a tendency for each writer to make use of his own dialect to the neglect of the literary Provengal. This 100 years, devoid as they were of literary fruit of even mediocre value, were a preparation for a movement that promised to be in a sense more national than the literature of the troubadours. The leader of this new movement, Pey de Garros (b. about 1500; d. 1581), a Gascon, and a great lover of his native country and dialect, did his utmost through his long life to encour¬ age the use of his maternal speech in literature. To this end he translated the Psalms into Gas¬ con (1565) and wrote many poems. To this movement to restore the tongue of the south there adhered, among other writers of talent, Louis Bellaut de la Bellaudiere (1532-88) and Claud Brueys (1570-1660); in Languedoc also Pierre Goudelin (1579-1649) ; David Sage (middle of 17th century) ; the avocat, Bonnet de Beziers (active 1616-57), and Frangois de Cortete (1571-1655). This movement was car¬ ried on, not only without support from those in authority but with the avowed opposition of the French court. There was talent enough in the south at this period, had the writers worked together, to have made itself felt strongly all over the Provengal countries. But there was no unity of effort or aims and a surprising amount of most promising literary talent was dissipated and in a sense neutralized in more or less petty regional aspirations, jealousies and misunderstandings. (Le Don-Don internaP (1588), a collection of humorous poems made by Bellaud, illustrates well the spirit of the times throughout the Provengal country. It was very popular and ran through several editions. Brueys, whose (Jardin deys musos provensalos) was published in 1628, presents a very varied program of poetic effort which includes come¬ dies, songs, ballets, carnival pieces and occa¬ sional poems, and was immensely popular in his day. But for real merit he was surpassed by other contemporary Provengal poets. Among the writers of comedy of this period were Gas- pard Zerbin, Jean de Cabanes (1653-1712), Seguin de Tarascon (middle of 17th century), Nicolas Saboly (1614-75) and Bonnet de

Beziers. Saboly, who also entered other poetic fields, and whose works have passed through several editions, is still read in France; and the Felibrige movement has tended to bring him into vogue once more. (Las

Foulies dau Sage deˆ Mounpelie) (1650) of David Sage; and (L'Embarras de la foire de Beaucaire} of Jean Michel of Nimes, popular and much over¬ estimated by their contemporaries, contain too many obscurities for modern taste. In almost every respect they are inferior to the work of Goudelin and Bonnet. The latter was the cleverest of a number of writers who made their headquarters in Languedoc and wrote in the dialectic of that district. He was master of lyrical tragic and comic poetry. Among his works are (Jugement de Paris) (1616), a tragic- comedy, and (Histoire de Pepesuc, an allegory. (Lou Ramelet MoundP (1617) of Pierre Goudelin of Toulouse was one of the 'books of the age that became popular wherever Proven- Qal was spoken. He was a very prolific writer who gave all his time and energies to literature, almost every branch of which he attempted, generally with success. Odes, masques, songs, sonnets and occasional poems he wrote in a masterly style which attracted to him attention throughout France and made him the most favorite poet of Languedoc. Numerous edi¬ tions of his works have appeared and transla¬ tions of his most characteristic poems have been made into most of the languages of Europe. In his day he had a very large following and many imitators. Of these Jean Guiraud- Dastros was one of the best. His (Trinfe de la langue gascoune> (1642), which is still read, and which has gone through many editions, contains very natural and entertaining descrip¬ tions of the life and customs of the country. Francois de Cortete (1571-1655), of Prades, shares with Goudelin the reputation of being the best Provencal writer of the 17th century. His works, which have been looked upon as models for style and linguistic correctness, have never ceased to be read since his day. Among them are and ˆliramoundoP two comedies.

During the 18th century the standard of Provencal literature declined in originality of subject, form and purity of language. Most of the writers were little more than imitators of the popular poets of the preceding genera¬ tions. Yet here one meets with a writer who departs enough from this monotonous routine to attract attention. Among these are the Abbe Favre (1727-83), author of (Siege de Cader- ousse and (Lou Sermoun de moussu sistre, and Claude Peyrot, prior of Pradinas (1 709— 95), who wrote (Los Quatre sosousP Both of these authors are witty and jovially good- natured to a degree scarcely to be expected of ecclesiastics. To these should be added the name of Cassanea de Mondonville, whose play (Daphnis et Alcimadure) became immensely popular not only in the Provencal countries but throughout France; and finally had the honor of being played, by invitation, before the king, Louis XIV. In Provence and Gascony there were poets of much natural talent who, under more favorable circumstance, or even a little encouragement from the French court, might easily have made Provencal litera¬ ture approach the popularity of the days of*

its prosperity. But the lack of a spirit of unity here, as in the preceding centuries, caused most of these to fall by the wayside. Their eyes were ever so near to the ground that they failed of the vision that is ever necessary to make great poets. •

Yet there ever continued to exist in the Pro¬ vencal countries a spirit of racial pride in their customs, history, language and literature which was kept alive by writers and speakers, gener¬ ally of mediocre talent. The study of the language d'oc was kept by enthusiasts in an un¬ scientific and desultory way, and various gram¬ mars, vocabularies and dictionaries of the lan¬ guage were written, though the interest in this kind of work, even by scholars, was so small that often laborious works of this kind re¬ mained in manuscript for lack of encourage¬ ment to print them. Fabre d'Olivet (1 767— 1825), scientific investigator, musician, poet, philologist and enthusiast, was forerunner of the Felibrige. He aimed at writing pure Pro¬ vencal to the exclusion of dialect, and to unite the literary aspirations and efforts of all the Provencal countries. He was a poet and writer of very considerable vision and much talent ; and yet he labored from 1787 until the opening of the 19th century to stir up the local enthu¬ siasm and aspirations of his fellow-countrymen before he finally succeeded in catching the pub¬ lic fancy. But finally he succeeded in driving home the lesson that Provencal, if it deserved to produce a literature worthy the name, must throw aside its various dialectic efforts and set up before itself, as its chief aim, purity of language. He strove to establish a rational orthography and to have it generally adopted through the Provencal districts. He made col¬ lections of Languedoc poets with explanatory notes and wrote fine poems of his own in the native tongue; and in this way for almost a third of a century he continued to influence the public mind and to educate it in the apprecia¬ tion of its treasures of early Provencal litera¬ ture. His work in this direction influenced all the Provencal writers contemporary with him and created for him a large literary following, among whom was Jacques Jasmin (1798-1864), the greatest and most influential of the Feli¬ brige movement. For a study of the modern Provencal movement, see Felibrige. Also see Catalan ; Catalonia ; Catalan Literature ; Troubadours.

Bibliography. — Appel, Karl, (Provenzalischc Chrestomatie mit Abriss der Fromenlehre u ' Glossar) (Leipzig 1895) ; Bartsch, K., (Grun- drisz der provenzalischen Literatur) (Elber- feld 1872) ; Chabaneau, C., (Les Biographies des Troubadours (Toulouse 1885) ; Diez, (Die Poesie der Troubadours) (1827) ; Fauriel, C., (Histoire de la poesie provencale) (Paris 1847) ; Graudgent, C. H., (Outline of Phonology and Morphology of Old ProvencaP (Boston 1905) ; Mahn, K. A. F., (Werke der Troubadours) (Berlin 1853-56) ; (Gedichte der Troubadour* (Berlin 1856-73) ; Paris, Gaston, (Mediaeval French Literature) (London 1902) ; Raynourd, F. J. M., (Choix des poesies originales des Troubadours) (Paris*

1816-21); Restori, A., (Litteratura provenzale (Milan 1891) ; Stim- ming, A., (Provenzalische Litteratura* (Strass- burg 1893).*

John Hubert Cornyn.

PROVENCE, pro-vans, a province of ancient southeastern France, bounded by Pied¬ mont, the Mediterranean, Languedoc, Venaissin and Dauphine, and including what is now the departments of Botiches-du-Rhone, Var, Basses Alpes, and, in part, Vaucluse and Alpes Mari- times. Lesser ranges of the Alps, called the Alpines and in the south the Maures, break up the country. The principal rivers are the Var, Durance and Rhone ; the last river has a great marshy delta. Climate and soil vary greatly, from the damp, changeable, rather sterile and stony north to the south with its ideally mild air, its culture of bees and silkworms and its produce of olive-oil, wine, mulberries, oranges, citrons and all southern fruits. There is good sheep-grazing, but other livestock is less suc¬ cessful. The inhabitants of the Provence pre¬ serve to a large degree southern characteristics quite foreign to the northern Frenchmen, and keep a language and literature of their own, nearly as much akin to the Spanish and Italian as to the French. See Provencal Language and Literature.

History. — There are traces in Provence, as in the polished stones found in the Grotte de la Masque and elsewhere, the tunnuli, and dol¬ mens of Draguignan, Ponteve and la Blaque, and the lake dwellings of the mouth of the Var, of a civilization as early as the middle of the Stone Age. The Iberians held sway here until the 5th century b.c., when they were finally displaced by the Ligures. Greek and Phoeni¬ cian colonies, notably Massilia, the modern Marseilles (q.v.), had been founded here at least as early as this. The Greek city of Mar¬ seilles by its repeated appeals to Rome for help against the Ligures, first in 155 b.c., ef¬ fected the introduction of Roman influence, and in 124 b.c. Marcus Fulvius, pro-consul, and Gaius Sextius Calvinus, consul, destroyed the capital of the Saluvii and founded (123 b.c.) on its site the city of Aquae Sextiae (modern Aix-en-Provence). Victories over other tribes in the next few years gave all the country be¬ tween the Cevennes and the Alps to Rome. A Roman province, Provincia Romana, or Gallia Transalpina (or Narbonensis, from its capital Nar.bo, modern Narbonne), arose, was threat¬ ened 15 years later by the invasion of the Cim- bri and Teu tones, and was racked by the civil war between Caesar and Pompey, in which Mas¬ silia (Marseilles) siding with the Senate was captured and crushed by Caesar in 49 b.c. The amphitheatre of Frejus, the theatres of Arles, Frejus

and Orange, the triumphal arches of Orange, Cavaillon, and Carpentras, the temple of Augustus and Livia at Vienne, and the splendid Roman roads through southern France, are remains of the glory of Provence in the first four Christian centuries, when Arles was a great commercial centre and one of the resi¬ dential cities of Constantine and when Autun and Marseilles were great university towns, Marseilles being the seat of a Greek college and a medical school.

The Visigoths entered Provence in the be¬ ginning of the 5th century and about 470 Eurich captured Arles and made it his capital. The Ostrogoths held Provence from 510 to 536, re¬ ceiving it as the price of their assistance against the Franks, but losing it after a quarter of a century to the growing Frankish Empire. In

the 8th century Charles Martel rescued it from the Saracens. In the 9th century Provence was twice a kingdom (see Burgundy), and from 934 to 1113 was ruled by the counts of Arles (or of Provence), descendants of Boson whose male line failing in 1113 the country went as a result of the marriage of Provencal heiresses to Berengar of Barcelona. His claim was con¬ tested by the Count of Toulouse, who in 1125 by treaty secured Valence, Die, Orange and Venaissin; what had been retained by Berengar went to Aragon in 1162, the Count of Barce¬ lona having come to that crown in 1137. In Venaissin; what had been retained by Berengar IV, the last of the male line, married Charles of Anjou and Provence was a possession of the house of Anjou (q.v.) until 1481, when it was willed to Louis XI of France and lost its separate significance politically, though it was not united with France until 1487 under Charles VIII.

Bibliography. — Achard, C. F., description Historique et Geographique de la Provence) (Aix 1787) ; Arnaud, E., (Histoire des Pro¬ testants en Provence) (2 vote., Paris 1884) ; Arve, S. d', 'Miettes de l'Histoire de Provence (Paris 1902) ; Babeau, A., (Le Marechal de Villars, Gouverneur de Provence) (Paris 1892) ; Beauvais, G., 'Provence* (Paris 1914) ; Caird, M., (Romantic Cities of Provence) (London 1906) ; Camau, E., 'La Provence a travers les siecles* (Paris 1907) ; id., °Les Invasions barbares en Provence) (Paris 1909) ; id., LTn- vasion des Francs en Provence> (Paris 1910) ; id., (Premiers ravages des Sarrasins en Provence) (Paris 1911) ; id., 'Nouveaux rav¬ ages des Sarrasins en Provence) (Paris 1912) ; Castanier, P., 'Histoire de la Provence dans l'Antiquite* (2 parts, Paris 1893-96) ; Forrest, A. S., 'Tour Through Old Provence) (New York 1911) ; Guizot, F. P. G., (The History of France) (translated by R. Black, 8 vols.. Lon¬ don 1869-78) ; Headlam, C., (Provence and Languedoc) (London 191£) ; Isnard, M. Z., 'Etat Documentaire et Feodal de la Haute-Provence* (Digne 1913) ; Lavisse, E., ed., 'Histoire de France) (18 vols., Paris 1900—1 1) ; Lentheric, C., (La Grece et L'Orient en Provence*

(Paris 1877) ; Macdonald, J. R. M., (A History of France) (3 vols., New York 1915) ; Macgibbon, D., 'Architecture of Provence) (Edinburgh 1888) ; Oddo, H., 'La Provence : Usages, coutumes, idiomes (Paris 1902) ; Senes, C., 'Provenqaux, Historiens, Philosophes, Artistes, Soldats et Marins) (Toulon 1902) ; Staley, E., 'King Rene d' Anjou and his Seven Queens) (London 1912) ; Tar- dieu, G., 'Les Alpes de Provence) (Paris 1912) ; Thompson, J. W., 'The Wars of Re¬ ligion in France, 1559-76) (Chicago 1909) ; Viguier, J., 'Les debuts de la Revolution en Provence) (Paris 1894) ; id., 'La Convocation des Etats Generaux en Provence) (Marseilles*

1896).

PROVENCE II, a French transport, sunk by a German submarine in the Mediterranean on 26 Feb. 1916. Over 900 lives were lost.

PROVERB, a short, pithy saying, present¬ ing in striking form a well-known truth. They originate principally in the primitive stages of society, are colloquial rather than literary and constitute a form of folklore common to all races. While certain proverbs have undoubt-

i

edly strayed from one country to another the very nature of these pungent characterizations, founded on the common facts, experiences and observations of humanity, ensure their existing in similar form in different countries. New proverbs cease to appear as printed literature takes the place of folklore, the common catch phrase or valued quotation bearing no relation to these bits of wisdom with the stamp of ages of popular acceptance and use. Bacon calls them the ((edged tools of speech; Lord Russell's definition ((the wisdom of many and the wit of one* is concise and accurate ; as is South's ((the experience and wisdom of several ages gathered and summed up in one expres¬ sion.**

Bibliography.— French, R. C., (Proverbs and their Lessons) (1861; ed. by A. Smythe Palmer, 1905) ; Hazlitt, W. C., (English Prov¬ erbs and Proverbial Phrases5 (1868) ; Howell, J., c Proverbs or Old Sayed Saws and Adages5 (1659) ; Hislop, A., (The Proverbs of Scot¬ land^, Nieolson, A., ^Gaelic Proverbs) (1880); Vaughn, H. H., ^British Reason in English Rhvme) (1889) ; Barten, J., (A Collection of English and German Proverbs) (18%) ; Eckart, R., (Stand and Beruf in Volksmund) (1900) ; Belcour, G., Selection of French Proverbs> (1882) ; Leclercq, T.,

(Proverbs Dramatiques) (4 vols., 1886) ; Pancoucke, J., (Dictionnaire des proverbes frangois5 (1749); Payen-Payne, J. B. de V., (French Idioms and Proverbs) (1900) ; Sinbra, F. d', (Proverbi Italiani' (1886) ; Burke, U. R., (Sancho Panza's Prov- erbs> (1872) ; Collins, J., (Dictionary of Span¬ ish Proverbs) ; Binder, W. C., (Novus Thesaurus Adagiorum Latinorum) (1856) ; Shmad Midhat, (Osmanl Proverbs) (1898) ; Burckhardt, J. L., (Arabic Proverbs of Modern Egyptians5 (1830) ; Long, J., (The Proverbs of Eastern Nations5 and the collections; Bohn, H. G., (Polyglot of Proverbs5 (1857) ; Field¬ ing, V., (Select Proverbs of all Nations5 (1824) ; Lean, V. S., (Collectanea, Proverbs, etc.5 (5 vols., 1904) ; Ward, C., (National Proverbs in the Principal Languages of 'Eu¬ rope5 (1842).

PROVERBIAL PHILOSOPHY, a once popular didactic work by Martin Farquhar Tupper (q.v.), published in four series 1838- 67. It is a series of poems in blank verse, dealing with almost every emotion and con¬ dition of life. The book contains many wise sayings, but is for the most Dart merely padded commonplace. In spite of remarkably extensive sales, both in England and America, it was mercilessly criticized by all serious reviewers. It is claimed that more than 1,000,000 copies were sold in the United States and more than 5,000 per year for many years in England. The most recent American edition was brought out in Rochester, N. Y. (1904). It has also been translated into Danish, French, German and Italian. Consult Anon., (Tea Table Literature5 (in Fraser's Magazine, Vol. XLVI, October, London 1852) ; Tupper, M. F., (My Life as an Author5 (London 1886).

PROVERBS, Book of, a portion of the Old Testament. Date and Authorship. — The

book of Proverbs is the subject of much dis¬ cussion in reference to date and authorship. The old view that King Solomon was the au¬ thor of nearly or quite the whole of the book vol. 22 — 45

has been generally abandoned. Two classes of views are widely held at the present day. One is that all of the book or all but the last two chapters was written and compiled before the Babylonian exile. The amount attributed to Solomon varies, but is in any case an ap¬ preciable quantity, forming the kernel of the whole. The other view is that most or all of the writing and compilation are to be dated long after the exile, little or no part having been written by Solomon. The completion of the work of compiling is assigned to various dates from about 350 to 180 b.c., the whole composi¬ tion of the book being supposed to cover not more than a century. There is a growing tend¬ ency toward the second view, which is held by most of the very recent writers on the book.

Arguments for Late Date. — The chief argument in favor of the late date of the book is from language, that is, the occurrence of a considerable number of words found elsewhere only in late Hebrew and of words borrowed from the Aramaic. But the number of words which can with certainty be assigned to these two classes is much smaller than is often claimed. Historical indications also urged for the same conclusion are that the book makes no mention of polygamy and idolatry, which were common before the exile, and that it as¬ sumes the existence of a distinct class of sages, known as wise men, who are hardly mentioned in the historical and prophetical books before the exile, nor are any results of their activity apparent. These are arguments from silence and therefore, of course, to be used with cau¬ tion. The resemblance to the apocryphal book of Ecclesiasticus, which is also urged, has little bearing on the question, in view of the well- known habit of the author of Ecclesiasticus of borrowing from other books.

Arguments for Early Date. — In favor of the early date, the chief argument is the thought of the book. The oft-repeated teaching of the book concerning the problem of God's govern¬ ment of the world is this : the good will prosper, the wicked will be punished, in this life. This is generally acknowledged to be the pre-exilic doctrine, while the dominant view of the exile and after the exile is quite different. It is not difficult, however, to suppose that the pre-exilic doctrine had persisted after the exile, in certain quarters, in face of the teaching then current that the wicked prosper and the righteous suffer. Further, the frequent allusions to a king sug¬ gest the early date. Many passages speak of him as the promoter of justice and none refer to him as a foreigner. After the ex¬ ile the sovereignty of Palestine was in the hands of foreigners, with little justice in their administration. The syntax of the book, also, is of the classical, earlier type. The titles in chapter I, 1 ; x, 1 and xxv, 1, which attribute por¬ tions of the book to Solomon represent a tradi¬ tion, but have not necessarily much authority. In general, the background favors the late date ; there is nothing seriously inconsistent with this view. There is no sufficient reason, however, for denying the presence of pre-exilic, and even of Solomonic material.

Divisions of the Book. — As ordinarily viewed, although with some variation, there are eight different portions into which the book is divided, each of which is a separate compila-

lion. These divisions, in the chronological order usually, but not invariably,

assigned to them, are as follows: chapter x, 1, to chapter xxii, 16, containing the title in chapter x, 1, (

Solomonic Authorship. — That the first and fourth divisions are not entirely the work of Solomon is clearly shown by the fact that there are many repetitions of proverbs partly the same and by the further fact that some are not written from his standpoint, especially the utterances concerning the king. While it is not unlikely that Solomon uttered some of these proverbs, it is difficult to be certain of his au¬ thorship in any specific case. It is improbable that Solomon wrote any proverbs in the form now existent: 1 Kings iv, 32, does not mention Solomon as writing proverbs, but as speaking them.

Literary Characteristics. — The Hebrew word for proverb (mashal) probably meant originally a comparison and then was broad¬ ened to apply to any sententious saying, because often containing a comparison. The proverbs of this book do not bear in general the stamp of long popular use, but rather of the reflec¬ tion of individuals. The whole book is written in what is called, from the Hebrew standpoint, poetry; for the most part gnomic, although the lyric form is also found, especially in chapters i-ix. Like Hebrew poetry generally, parallelism of the members of a verse is the most prom¬ inent characteristic. Antithesis is found especially in chapters x-xv. Each verse ex¬ presses usually an independent thought, except in chapters i-ix and chapters xxx-xxxi, where connected discourse is found. Brevity and sententiousness of statement are implied in the very nature of a proverb, while simile, metaphor and paradox are common. An ex¬ tended personification of wisdom is found in the eighth chapter.

Purpose.— Although Proverbs has several authors and compilers, and much of it is dis¬ connected in form, yet a marked degree of unity pervades the whole. The book confirms the statement of purpose in chapter i, 1-6, that is intended to teach wisdom to men. especially to

the young and inexperienced, but also to those who already have some knowledge of wisdom. Wisdom, however, is a comprehensive term, it includes all that is desirable in character, folly all that is undesirable. Its foundation is reli¬ gious, it consists fundamentally in a right rela¬ tion to God, <(the fear of Jehovah is the begin¬ ning of wisdom® (chapter ix, 10). But all that pertains to humanity is included in the scope of wisdom, so that the book touches all phases of human life. Observation of the customs and habits of men, and conclusions therefrom, have a prominent place.

Relation to Philosophy. — Wisdom is thus practical rather than speculative. To speak of the book as philosophical, as some have done, is,

therefore, misleading. The book, it is true, iden¬ tifies virtue with knowledge. But this is done, not from a philosophical standpoint, but from a religious and practical one. For the practical purpose of the writers, men are divided into two classes, those who know the right and do it, and those who are ignorant of it and do not do it. The other class, always so common, con¬ sisting of those who know the truth and do it not, is simply ignored. The speculative element is wanting in the book. The teachings concern¬ ing wisdom often suggest philosophical specula¬ tions concerning the greatest good, but they are always religious, not philosophical. Some of the proverbs may reflect a general acquaintance with Greek philosophy, but not definitely with the doctrines of any specific school.

Ethical Teaching. — The ethical teaching of the book is on a high plane. Ceremonial is oc¬ casionally alluded to, but the sages agree with the prophets that the external act has no value without an inner reality. When, revenge is for¬ bidden, chapter xx, 22, and chapter xxiv, 29, and kind treatment of enemies is enjoined, chapter xxv, 21, the standard approaches closely to that of the New Testament.

Bibliography. — Baumgartner, A. J., (Etude critique sur l'etat du texte du livre des Prov- erbs) (Leipzig 1890) ; Baudissin, W., (Die alt-testamentliche Spruchdichtung) (ib. 1893) ; Cheyne, T. K., (Job and Solomon) (London 1887) ; Frankenberg, W., (Die •Spriiche) (in Handkommentar zum alten Testament, Gottin¬ gen 1898) ; Horton, R. F., (The Book of Prov- erbs) (in Expositor's Bible, 2d ed., New York 1897) ; Kent, C. F., (The Wise Men of Ancient Israel* (2d ed., New York 1899) ; Lagarde, P. de, (Anmerkungen zur griechischen Ueberset- zung der ProverbieiP (Gottingen 1863) ; Mar¬ tin, G. C., Eroverbs* (in (Century Bible,* Edin¬ burgh 1908) ; Meinhold, J., (Die Weisheit Is- raels) (Leipzig 1908) ; Perowne, T. T., (In (In- ternational Critical Commentary,) New York 1899) ; Wildeboer, D. G., (Die Spriiche* (in (Kurzer Handkommentar zum alten Testa¬ mentˆ Freiburg 1897).*

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Langauges, Colgate University.

PROVIDENCE, R. I., the county-seat of the county of the same name and the capital and largest city of the State, is situated at the head of Providence River, a tidal arm of Nar- ragansett Bay. It is 30 miles north, from the

open ocean, about 20 west from Fall River, 40 southwest of Boston and 188 northeast of New York. It is the Atlantic terminal of the Grand Trunk Railway system and is also served by the New York, New Haven and Hartford Railroad, and by several coast lines of steam¬ ships and by one transoceanic line. It covers an area of 18.29 square miles. The early set¬ tlement was on the river at the mouth of two small streams, and for nearly 200 years it grew in an easterly direction, many of its finest resi¬ dences being erected on the high hill overlooking the Providence River, this hill or ridge about 200 feet high dividing the valley of the two streams from that of the Blackstone or See- konk, a river of some size. Later on the settle¬ ments began to extend in a westerly direction over low and rolling ground, and to-day the West Side, as it is called, is the most densely populated section of the city; though within the past few years a movement has again set in toward the east, a large area having been built up in that part of the city adjacent to and run¬ ning west from the Seekonk. Situated near the sea the city has a rather humid climate with a considerable range of temperature, but the weather is neither as hot in summer nor as cold in winter as in places farther inland. The suburban seashore resorts are famous, and in the inland surrounding scenery is no less at¬ tractive to thousands of annual summer visitors. The prevailing winds in summer are from the southwest and in winter from the northeast or northwest. The city is more healthful than many large manufacturing cities and has been noticeably free from epidemics of serious dis¬ eases. The death rate is 14.71 per 1,000 and the birth rate 23.43 per 1,000. The centre of the city is given over to the business district. There are 253.21 miles of streets, curbed, graded and paved. There are 47 city parks with a combined area of 650 acres, the chief of which is Roger Williams Park. The chief monuments are those of Roger Williams, Thomas A. Doyle, for many year mayor of the city, the Soldiers and Sailors' monument and that of Gen. Ambrose E. Burnside. Providence possesses a civic centre which rivals anything of the kind in America. The principal buildings are the city hall, State house, State Normal School, public library, Roman Catholic cathedral, Rhode Island School of Design, buildings of Brown University, Prov¬ idence College, Roman Catholic, and the State armory. Among its charitable institutions are the Rhode Island Hospital, Rhode Island Homoeopathic Hospital Butler Hospital for the Insane, Saint Joseph's Hospital, Dexter Asylum and the State Institute for the Deaf. There are 160,000 volumes in the public library, while there are also the Law Library, that of the Providence Athenaeum, the Rhode Island His¬ torical Society and the Rhode Island Medical Society.

Commerce and Manufactures. — In 1681 Providence was the most compact settlement of the colony of which it was a recognized centre; but

its commercial growth for the ensuing hundred years was not as rapid as that of New¬ port, which on account of its geographical posi¬ tion was better adapted for the maritime trade of the East Indies, China and the western coast of Africa. Providence, however, eventu¬ ally became considerable of a seaport town, and for many years the wealth of the city was

mainly derived from its commerce of the seas. With the growth in size of the freighters of the coastwise and trans-Atlantic trade and a pro¬ portionate lack of increased facilities for ac¬ commodating these larger vessels, Providence began about 1840 to lose its prestige in the ship¬ ping world, until finally its foreign maritime trade entirely disappeared. It can hardly look for its return, until the city, State or private owners of water front privileges provide suit¬ able accommodations for the handling of that trade, which by reason of the natural advan¬ tages of a magnificent habor, easily entered, it should enjoy. It has a city quay 3,000 feet long, and State Pier No. 1, equipped to handle trans- Atlantic freight and passengers. Chief among the advantages of Providence as a centre of industry, commerce and trade are those per¬ taining to its geographical position, it being the natural outlet of southern New England, and the sources of supply and distribution which are the natural outcome thereof. For this reason it is designated as the southern gateway of New England. Though its reputation as a shipping port has gone, to-day Providence is one of the great industrial centres of the United States, noted for the variety of its manufactured prod¬ ucts, the greatness of its industries, the skilled workmanship of its artisans and for the inven¬ tion of those numberless ingenious accessories of modern life which have become necessities in this age of luxury. Pre-eminent among the varied industries of the city is the manufacture of jewelry with its allied interests, such as chasers, electroplaters, gilders, engravers, color- ers, enamelers, die-sinkers, etc., approximating a total of over 1,000 establishments, engaged in a manufacturing industry whose products are distributed alike among the civilized and un¬ civilized nations of the earth. Providence is the first city in the country in the manufacture of many things, including jewelry and silver¬ ware, these producing $35,000,000 worth of goods annually and employing 12,000 people. Providence has the largest mechanical tool fac¬ tory, file factory, engine factory, screw factory and silverware factory in the world, and al¬ most a dozen other establishments deserving of similar distinction. According to the recent census it had 1,080 large manufactories, employ¬ ing 46,349 operatives with an annual production worth $120,380,000. Besides there were from 1,500 to 2,000 smaller industrial establishments. In addition to the metal-working establishments there are textile mills, with an annual output valued at $523,000,000, dye-works, packing houses, rubber and elastic works and other establishments. The city ranks tenth among the seaports of

the United States in bulk of tonnage and value of cargoes. The general coastwise trade is very extensive. It is the leading oil port of New England. There are 18 banks with combined capital, surplus and un¬ divided profits of $27,607,322. The assets of national and State banks and trust companies amount to $203,063,356; savings banks, $57,659,- 673, making a total of $260,723,029. Individual deposits amount to $218,554,406, to which must be added $3,964,552 deposited in loan associa¬ tions. The assessed valuation in June 1917 was $388,715,600, including real estate $231,838,840; tangible personal property, $64,651,900; intangi¬ ble property, $92,194,860. The city's annual budget exceeds $7,000,000. Its gross debt

amounts to $24,276,830.28 ; net debt, $15,014,- 646.56, including water bonds of $2,069,856.44. The net debt per capita is $58.87. The tax-rate is $18.50 per $1,000 on real estate and tangible personal property and $4 per $100 on intan¬ gible personal property. About $600,000 is ex¬ pended annually on the fire department and about the same amount on the police depart¬ ment. There are 418.18 miles of low-pressure water-pipes laid in the city streets and 12.46 miles of high-pressure fire service pipes in the central district. There is also an excellent sewerage system.

The educational facilities include five high schools, 17 grammar, 17 primary, five for indi¬ vidual work, 10 ungraded for backward chil¬ dren, five open air, 12 evening, 28 training schools, 38 kindergartens, with 1,010 teachers and 212 evening teachers. The cost of main¬ tenance is about $1,600,000 annually. The at¬ tendance in public schools is 34,814, and in 13 parochial schools 6,156 and 599 in 12 private schools. The evening school enrolment is

6,538. _

History. — Providence was founded by that great apostle of religious liberty for the New World, Roger Williams, who arrived from Eng¬ land in Massachusetts Bay Colony in February 1631. He was well received by the Puritans as a <(godly minister® but because of his boldness in announcing his views regarding the power of magistrates in religious matters he was forced to seek refuge with the Pilgrims at Plymouth. Subsequently he went to Salem, where his convictions regarding religious free¬ dom incurred the displeasure of the General Court, and in January 1636 he was ordered to return to England ; he refused and fled into the wilderness. Accompanied by five other men from Salem he had no fixed

abode for weeks, but in June 1636 he began a settlement at a point north of the present site of Saint John's Church in Providence. Williams obtained a grant to lands covering what is now part of Rhode Island west of Narragansett Bay, from the Indians, the earliest deed on record being a memorandum dated 24 March 1637. In 1640 articles of agreement were adopted by the set¬ tlers as the basis of the town government, all affairs being regulated by a monthly town meet¬ ing. A royal charter was obtained in 1644 uniting various settlements about the bay, as <(Providence Plantations in the Narragansett Bay in New England.® Providence being on the mainland and more exposed to the attacks of Indians, grew less rapidly than Newport on the island of Rhode Island, and in 1676 was nearly deserted. Less favorably situated for shipping than Newport, Providence grew but slowly; in 1730 the population of Providence, which in¬ cluded four settlements, was 3,916. In 1750 the population of Newport was twice that of Prov¬ idence, and 1774 the population of the town of Providence proper was but 4,321, though by this time the population of Providence County was greater than that of Newport County. The first notice of a schoolhouse in the town records appears in 1752. A charter for a col¬ lege was granted in 1764, and Providence County raising the most money, the first build¬ ing was erected at Providence in 1770. This was the beginning of Brown University. Prov¬ idence was one of the first towns in America to have a public library, a set of books having

been bought by subscription before 1754 by a company formed for that purpose. During the whole of the 18th century Providence was a quiet community, where people lived simply with few amusements. The first theatrical per¬ formance was given by an English company in 1762. The first fire engine was purchased about 1755. The first advertisement of a regular stage line to Boston appears 1767; the stage made weekly trips. The first public market-house was erected in 1773. In the disputes with England that preceded the outbreak of the Revolution Providence took a considerable part. The first overt act of resistance to England was the de¬ struction of the armed schooner Gaspee in 1772. During the Revolution Newport was occupied by the British from 1776 to 1779, and the com¬ merce of Providence was almost cut off by the British fleet, though a number of privateers hailing from Providence preyed on English commerce. After the Revolution commerce slowly moved again, trade being with Europe, China and Central and South American ports. In 1801 a fire destroyed property valued at $300,000, and in 1815 a great gale wrecked many vessels and did damage to the amount of $1,000,- 000. From this time on the growth of Provi¬ dence was steady if not rapid, the population about doubling every. 20 years. Government by town meeting proving inadequate to meet the public needs, a city charter was adopted in 1831.

The history of Providence during the 19th cen¬ tury is largely that of the industrial progress of the nation. The government is vested in a mayor and bicameral council. The latter elects several of the administrative officers. Con¬ nected with the suburban but separate munic¬ ipalities of Cranston, Pawtucket, Warwick and East Providence, there is in a comparatively small area an aggregate civic population of over half a million, to which the city of Providence contributes (1920 census) 237,595.

Bibliography. — Bayles, (History of Provi¬ dence County5 (New York 1891) ; Greene, A. W., (The Providence Plantations for Two Hundred and Fifty Years) (Providence 1886) ; for early history a brief historical sketch in Vol. XVIII of the Tenth United States census; the (Early Records of the Town of Providence5 (15 vols., Providence 1892-99) ; Kirk, William (ed.), (A Modern City: Providence, R. I., and its Activities5 (Chicago 1912) ; Powell, L. P., '•Historic Towns of New England5 (New York 1898) ; Stokes, H. K., (Finances and Administra¬ tion of Providence, 1636-1901 5 (Baltimore

1903).

Clarence A. Cotton, Secretary Chamber of Commerce.

PROVIDENCE, in theology, the super¬ vision exercised by God over his creatures and the universe ; the doctrine being that divine power is possessed and exercised in every smallest detail of life. The doctrine differs from omnipotence, which does not insist that the power possessed by the Deity is exercised ; and from naturalism, which holds that the uni¬ verse is governed by natural laws with which God does not interfere. Religion and mythology agree, from their earliest records, in placing the affairs of men under the guidance of. divine power.

PROVIDENCE, Sister? of, a religious order of the Roman Catholic Church, founded

in France, according' to some accounts in 1806, to others in 1820 (Sceurs de la Chari te de la Providence), by Pastor Dujarie in the parish of Ruille, diocese of Le Mans (department of Sarthe). It gradually extended beyond this parish, and was authorized in 1826. The final approval of the rules and constitution was given by the Holy See in 1887. A colony from Ruille opened the first institute of the order in the United States on 22 Oct. 1840 at Saint Mary's, near Terre Haute, Vigo County, Ind. Establishments are conducted by the order in the archdioceses of Baltimore, Boston and

Chicago and in the dioceses of Fort Wayne, Rockford, Indianapolis and Peoria. In 1918 the order had charge of 74 parochial schools, 32 academies for higher education, one industrial school, one college and two orphan asylums, with a total of 25,841 pupils. The mother-house is located at Saint Mary-of-the-Woods, Vigo County, Ind., formerly the centre for 1,332 sisters. Another mother-house is located at Brightside, Holyoke, Mass., with 345 sisters, 20 novices and 10 postulants, conducting orphan asylums, homes for aged men and women, hos¬ pitals and working girls' homes in the diocese of Springfield, Mass.

PROVIDENCE PLANTATIONS. See

Rhode Island, History.

PROVINCE is a territory, section or dis¬ trict of a nation or government. Among the Romans a province was a district of conquered country, governed by a proconsul or propraetor. The first Roman province was Sicily, 241 b.c. From the time of Augustus they were divided into the senatorial provinces and the imperial provinces. The latter comprised those which were most exposed to hostile inroads, and the administration of which was left entirely to the emperor under the pretense of sparing the Sen¬ ate and people the trouble of managing them, but in reality to keep the army in his own hands. Under the empire the provinces were much better governed than they had been under the republic. One reason of this was that the emperors were more disposed to pay regard to the complaints of the provinces than the re¬ publican courts had been, for the latter were largely composed of men who had themselves profited, or who hoped to profit, by the same kind of maladministration with which the gov¬ ernors were charged, and were, therefore, al¬ ways willing if possible to connive at such offenses. In addition to this the provincial gov¬ ernors under the empire received fixed salaries, which lessened the temptation to resort to il¬ legal exactions to indemnify themselves for the expenses that they necessarily incurred in soliciting the office that was. an indispensable condition of their governorship.

In modern times the term has been applied to colonies or to dependent countries at a dis¬ tance, or to the different divisions of a king¬ dom itself. The name has sometimes been re¬ tained by independent states. Thus, the re¬ public of Holland, after it had thrown off the Spanish yoke, was called the United Provinces; and the Argentine Republic used to be called the United Provinces of La Plata. In the canon law the term is applied to the jurisdic¬ tion of an archbishop. In the Roman Catholic Church it is also given to the territorial divi¬ sions of an ecclesiastical order such as the

Franciscans, as well as to those of the Propa¬ ganda. For exhaustive

accounts of the Roman provinces and their administration consult Arnold, W. T., (Roman Provincial Administra¬ tion } (1879) ; Mommsen, (Roman Provinces

under the Empire) (1884), and Taylor, T. M., Constitutional and Political Historv of Rome5

(1899).

PROVINCE HOUSE, a brick mansion in Washington street, opposite the head of Milk street, Boston, Mass. It was built in 1679 for Peter Sargeant, a rich merchant, who used it as a dwelling. In 1716 it was purchased by .the provincial legislature. From then on it was the residence of the colonial governors. After the Revolution it housed some of the officers of the Commonwealth. In 1811 it was given by the State to the newly incorporated Massachu¬ setts General Hospital as part of its endow¬ ment. The trustees of this institution leased it in 1817 to a tenant who converted it to the uses of business. It finally became a tavern, a negro minstrel hall, and in October 1864 was de¬ stroyed by fire, only the walls remaining stand¬ ing. Nathaniel Hawthorne used it as the set¬ ting for his cLegends of the Province House5 (1838-39) which were later reprinted in (Twice-told Tales.5 Consult Drake, S. A., (01d Land¬ marks and Historic Personages of Boston5 (Boston 1876) ; Hawthorne, N., (Twice-told Tales5 (edited with notes by J. H. Scott, in Riverside Literature Series, Boston 1907).

PROVINCETOWN, Mass., town, Barn¬ stable County, at the extremity of Cape Cod, and on the New York, New Haven and Hart¬ ford Railroad. The earliest visitor to this place of which there is any record was Bar¬ tholomew Gosnold, 15 May 1602; it was visited by Capt. John Smith on his voyage to Vir¬ ginia in 1614, and on 11 November (O. S.) the Mayflower anchored in the harbor and remained one month before going to Plymouth, and here the compact for their own government, said to be the first form of constitutional gov¬ ernment in history, was prepared and signed; here Perigrine White, the first English child born in New England, first saw light, and here Dorothy Bradford, wife of the governor, was drowned. In commemoration of this visit, the United States government, in conjunction with the Commonwealth of Massachusetts and the Pilgrim Memorial Association of Provincetown, erected an imposing granite monument, 254 feet high, on Town Hill in the centre of the town, at a cost of $100,000, which was dedicated by President Taft on 5 Aug. 1910. The town re¬ mained a precinct for many years, and was in¬ corporated as a town in 1727. The principal in¬ dustry of the people is fishing, and in June 1915 a fleet of 75 vessels of all kinds were en¬ gaged in this industry. There are six large cold storage plants for fish freezing with a capacity of

80,000 barrels, a board of trade, one national bank, one savings bank, four Protestant and one Catholic churches, a public library, four private art schools, a high school and an art association. In recent years it has become popular as a summer resort. Pop. 4,370.

written to a friend in the provinces, mark an important stage in the great quarrel between the Jesuits and the Jansenists. These two parties were struggling in the 1 7 th century for the religious, moral and intellectual control of France. As the Jesuits painted religion al¬ luring and the Jansenists made it out almost oppressive in its austere majesty, the two sects were diametrically at variance. Arnauld, the great Jansenist theologian and friend of Pascal, was a leader in the controversy. In 1655 he was involved in a religious dispute, and his views were in January 1656 condemned by the Sorbonne or theological faculty. Arnauld, realizing that his own involved controversial writings could not appeal to the ordinarv man, sought the help of Pascal, who brought out the first (Provincial on 23 Jan. 1656. They lasted until March 1657. Pascal wrote 18 letters, began a 19th and had planned a 20th. They are supposed to tell a friend in the provinces what is happening in Paris between the Jesuits and the Jansenists. Pascal attacks both the dogma and the morals of the Jesuits. He argues the logically consistent Augustinian de¬ terminism, carried even beyond the doctrines of Saint Augustine, which was at the bottom of the teachings of Jansenists. He aimed to show the inconsistency of the Pelagians or semi-Pelagians, as he called the Jesuits, in try¬ ing to reconcile doctrines of God's foreknowl¬ edge and of salvation imparted bv grace with man's liberty to accept or reject what is offered to his choice. But Pascal's most effective as¬ saults were made against the morals of the Jesuits as Molinists or followers of the casuist Molina. The Jansenists were rigid, unbending moralists, unwilling to compromise in the slightest degree in word or in deed, even for the sake of a greater good. The Jesuits de¬ sirous of making converts had not invented but developed doctrines of casuistry, or the study of cases of conscience, by which in cer¬ tain contingencies allowance could be made for deviation from the path of rectitude. Pascal made the most of his opportunities to attack the Jesuits' excuses- for ˆequivocation® and ((mental restrictions,® and charged them with teaching hypocrisy, unchastity and other sins.

The Letters form one of the most important examples of pamphlet literature in history. They deal, of course, with conditions and events now largely

forgotten, but they were of ex¬ traordinary importance in their day and con¬ tributed greatly to the permanent discrediting with so many people of the Jesuit order. They are undoubtedly often unfair in their sarcasm and dialectical victories, perhaps sometimes even in statements of facts, but their vivid¬ ness and lucidity make them a monument in French literature and one of the chief examples of early classical French prose.

*Bibliography. — Important editions of the (Lettres provinciales) are by Feugere (2 vols., 1887-95), and in the edition of Pascal's works, edited by Brunschvicg, Boutroux and Gazier and published in the series of (Grands Ecri- vains de la France. **

Charles H. C. Wright, Professor of French Language and Literature, Harvard University.

PROVING GROUND, a space provided for testing ordnance and making ballistic ex¬

periments. The United States army's proving ground is at Aberdeen, Md. The navy has its proving ground on the Potomac River between Indian Head, Md., and Dahlgren, Va.

PROVO (pro'vo) CITY, Utah, county- seat of Utah County, on the Provo River, and on the San Pedro, Los Angeles and Salt Lake, the Rio Grande Western and the Salt Lake and Utah Electric railroads, about 45 miles south of Salt Lake City. It was settled in 1849, and in 1851 was chartered as a city. It is in a region in which the principal occupations are agricul¬ ture, stock-raising and cultivation of fruit. The chief manufactures are flour, lumber, tin and iron roofing, woolen goods and canned fruit. There is a large trade in farm products, live¬ stock, fruit, lumber and in the importing of groceries and textiles. The place is visited by many tourists on account of the Provo Canon, Utah Lake and Bridal Veil Falls in the vicinity. It has the State insane asylum and a Mormon tabernacle. It is the seat of the Brigham Young University (Mormon). Pop. 10,303.

PROVOOST, pro-vo', Samuel, American Protestant Episcopal bishop: b. New York, 26 Feb. 1742; d. there, 6 Sept. 1815. He was graduated at King's College (now Columbia) in 1758, at its first commencement; went to Eng¬ land in 1761 to prepare for ordination, studied at Saint Peter's College, Cambridge University, and was ordained deacon and priest in 1766. Returning to America he became assistant rector of Trinity Church, New York. He re¬ signed in 1771. In 1784 he was elected rector of Trinity Church. In the same year he was appointed a regent of the University of New York and was given the degree of D.D. by the University of Pennsylvania. Throughout the Revolution he took a firm stand in favor of

the liberty of the colonies, and was chaplain to Congress in 1785 as well as to the United States Senate in 1789. In 1787 he was appointed a trustee of Columbia College. After presiding at the general convention held in Wilmington in 1786 (the absent Seabury being the only bishop in America), he set sail for England in company with William White to receive episco¬ pal consecration, having been elected as bishop of New York. A special act of Parliament hav¬ ing been passed empowering the archbishops of Canterbury and York ((to consecrate to the office of a bishop persons being subjects or citizens of countries out of His Majesty's dominions,® Provoost and White were consecrated by these prelates and the bishops of Bath and Wells and Peterborough in the chapel of Lambeth Palace, 4 Feb. 1787. Bishop Provoost resigned the rec¬ torship of Trinity Church in 1800 and his see in 1801, but the House of Bishops declined to receive his resignation, giving consent, however, to the consecration of Dr. Benjamin Moore as assistant bishop. He is buried in Trinity churchyard. Consult Berrian, W., (An His¬ torical Sketch of Trinity Church (New York 1847) ; Dix, M., ed., (A History of the Parish of Trinity Church, New York1* (4 vols., New York 1898-1906) ; Francis, J. W., (01d New York) (New York 1858) ; Gallagher, M., (Chapter of Unwritten History* (New York 1888) ; Hartley, I. S., (Rt. Rev. S. Provoost* (in Magazine of American History, Vol. XXVI, p. 115, New York 1891) ; Perry, W. S., (Bishop Seabury and Bishop Provoost* (1862) ; (Pro-*

voost, A. J., (Biographical and Genealogical Notes of the Provoost Family) (New York 1895) ; Purple, E. R., (Genealogical Notes on the Provoost Family) (New York 1875) ; Schroeder, T. F., (Memorial of Bishop Hobart) (New York 1831); Wilson, J. G., ed., Cen¬ tennial History of the P. E. Church in the Diocese of New York, 1 785-1885 > (New York 1886) ; id., (Samuel Provoost, First Bishop of New York5 (in New York Genealogical and Biographical Record , Vol. XVIII, p. 1, New York 1887).

PROVOST, one who is set over others ; one who is appointed to superintend or preside over something; the principal, head or chief of certain establishments or bodies; applied to (1) a jailer; the keeper of a prison; (2) the head of the faculty or principal of several colleges in the English universities of Oxford and Cam¬ bridge ; the principal of the University of Dub¬ lin. In the case of a few colleges in the United • States (e.g., University of Pennsylvania) the term is used in the same sense; (3) in Scottish cities the mayor is called provost, and in Aber¬ deen, Dundee, Edinburgh and Glasgow <(lord provost® ; (4) in ecclesiastics it is sometimes used in the same sense as prior, or to designate the head of a

chapter, corresponding to the more frequent term ((dean55 ; in the German Lutheran State Church is applied to the pastor of the principal church in a district; (5) in France the judge of certain royal and feudal courts.

PROVOST-MARSHAL, in military af¬ fairs, an officer who takes cognizance of offenses against discipline, orders the arrest and the punishment of deserters and other offenders ac¬ cording to the sentence of a court-martial, and maintains order generally. In the British army the provost-marshal has the rank of captain, and superintends the preservation of order, and is really the head of the military police of a camp or military district. In the United States army there is a provost-marshal-general who supervises the work of the several divisions, and to this was added in 1917-18 the charge of the operation of the Selective Service (Con¬ scription) Laws, and the multitudinous duties incident thereto. See Court-Martial; Mili¬ tary Law.

PROXY, person who is empowered, or the instrument by which a person is empowered, to act or vote for another, most frequently used in the case of public assemblies, conventions, boards of directors, meetings of shareholders, etc. In Great Britain ever} member of the House of Lords was formerly permitted, on obtaining a nominal license from the Crown, to appoint another lord of Parliament his proxy to vote for him in his absence. Only a spiritual lord could be proxy for a spiritual lord, and a temporal for a temporal lord, and no peer could hold more than two proxies at the same time. Proxies were never used in judicial business or in committees of the House, nor could a proxy sign a protest. The practice of admitting proxies was discontinued in 1867.

PRUDDEN, prud'en, Theophil Mitchell,

American physician and author : b. Middlebury, Conn., 7 July 1849. He was graduated from the Sheffield Scientific School, Yale, in 1872; from the Yale Medical School in 1875 and re¬ ceived the degree of LL.D from Yale in 1897.

Besides contributing to the scientific literature of pathology and of bacteria and their influence in disease, he has written on these and other sci¬ entific topics for the general public. He is emeritus professor of pathology in the College of Physicians and Surgeons, Columbia Univer¬ sity, New York. Among his writings are (Handbook of Pathological Anatomy and His¬ tology } (10th ed., 1914), with F. Delafield;

(Story of the Bacteria5 (1899) ; (Dust and its Dangers5; (Water and Ice Supplies5 (1891); (On the Great American Plateau5 (1907).

PRUDENTIUS, proo-den'shi-us, Aurelius Publius Clemens, Christian hymn writer : b. Spain, probably at Saragossa, 348 ; d. about 410. He practised the profession of an advocate and afterward became a functionary of the gov¬ ernment. From a life of pleasure and worldli¬ ness he was reclaimed by his conversion to Christianity, retired to a cloister in his 57th year and there spent the remainder of his life. It was during these latter years that he wrote the religious poems which have made his repu¬ tation as the greatest Christian poet of the 4th and 5th centuries in the Latin Church. This was the golden age of Latin patristic letters and his contemporaries included Ambrose, Jerome and Augustine. It is quite evident that he was a profound student of classic latinity, for he shows a complete mastery of the epic and lyric metres of Roman literature, and at the same time these poetical works are purely Christian, full of devotional feeling and theological lore. His (Liber Cathemerinon5 consists of 12 reli¬ gious poems for daily use; while (Psychoma- chia5 is an allegorical description of the strug¬ gle between good and evil in the human soul. (Peri Stephanon5 is a metrical martyrology. Other works by him are (Apotheosis 5 ; (Ha- martigenia5 ; (Contra Symmachum5 ; and (Dit- tochaeon,5 the first three being polemic, the last chiefly of archaeologic interest. There are many manuscripts of Prudentius' works; the best of these is considered to be that in the Bibliotheque Nationale, Paris (Latin Department, 8084), dating from the early 6th century. There are also a great number of editions of his writings. Amongst these should be mentioned Giselin (Antwerp 1564) ; Arevalo (Rome 1788), the lat¬ ter reprinted in Migne, J. P., ed., (Patrologia Latina5 (Vols. LIX-LX, Paris 1847) ; Ob- barins (Tubingen 1845) ; Dressel (Leipzig 1886). A still more recent critical edition has been undertaken by J. Bergman and is still un¬ completed. There are a number of English translations of some of his works amongst which should be mentioned Anon., (Psychoma- chia; the War of the Soul: or the Battle of the Virtues and Vices5 (London 1743) ; Anon., the Cathemerinon and other Poems in Eng¬ lish Verse5 (London 1845) ; Pinder, N., ed., Selections from the Less Known Latin Poets5 (Cambridge 1866) ; Morrison, G., translator, (Hymns, etc.5 (London and Cambridge 1887- 91) ; Thackeray, F. St. J., translations from Prudentius5 (London 1890) ; Pope, R. M., and Davis, R. F., translators, (Cathemerinon 5 (New York, n.d.). Consult Baumgartner, A., (Die Lateinische und Griechische Litteratur der Christlichen Volker5 (in (Geschichte der Welt- litteratur5 Vol. IV, Freiburg 1900) ; Bergman, J., (Lexicon Prudentianum5 (Upsala 1894) ; id., (De Codicum Prudentianorum5 (in Kaiser-

liche Akademie dcr W is sense h often in Wien, Sitzn u gsberic h te, Ph il

os- His to rise he K lasse, Vol. CLVlT, No. 5, Vienna 1908) ; Bigg, G,

(Wayside Sketches in Ecclesiastical History' (London 1906) ; Boissier, G., (La Fin du Pa- ganisme' (Vol. II, p. 105, Paris 1891); Brock- haus, C., (Prudentius in seiner Bedentung fiir die Kirche seinere Zeit' (Leipzig 1872) ; Bur- nam, J. M., (Glossmata de Prudentio' (in Uni¬ versity of Cincinnati, University Studies, Ser. II, Vol. I, No. 4, Cincinnati 1905) ; Chevanne, P., (Le Patriotisme de Prudence' (in Revue d'Histoire et de Litter ature Religieuse, Vol. IV, Paris 1899) ; Delisle, L. V., (Note sur le Manuscrit de Prudence No. 8084, etc.' (Paris 1867) ; Ehrhard, A., (Die Altchristliche Lit- teratur und ihre Erforschung Seit 1880' (Frei¬ burg 1894) ; Glover, T. R., (Life and Letters in the 4th Century' (New York 1902) ; Lease, E. B., (A Syntactic, Stylistic, and Metrical Study of Prudentius' (Baltimore 1895) ; Mai- gret, F., (Le Poete chretien Prudence' (Paris 1903) ; Manitius, M., (Beitrage zur Geschichte Friihchristlicher Dichter im Wiltelalter' (in Philos o phis che Akademie zu Wien, Sitznugs- berichte, Vol. XII, p. 26, Vienna 1889) ; id.. XXIX, p. 166, London 1904).

PRUDHOMMES, Conseils de, kon-sa-e de pru-dom, courts of conciliation in France for deciding small disputes between workmen and employers. The first councils called by this name in Paris were formed in 1296 in the reign of Philippe le Bel, when 24 prud'hommes were appointed to assist the provost of the mer¬ chants in settling disputes between merchants and manufacturers at the fairs and markets. After the Revolution of 1848, at which period 75 towns had conseils de prud'hommes, the whole legislation on this subject was revised. All the patrons and workers of industrial establish¬ ments within the circle of jurisdiction of the council of prud'hommes were made eligible as electors. In June 1853 a law was passed which, with some modifications, is still in force. The patrons and the workmen are formed into sep¬ arate electoral colleges, each to elect an equal number of prud'hommes. Qualifications for election are a minimum age of 30 years, ability to read and write and citizenship. The office used to be honorary, but compensation, vary¬ ing locally, is now permitted by law. The gen¬ eral conseil, besides the president, vice-president and secretary, is composed of an equal number of patrons and workers, with a minimum mem¬ bership of six. They are elected for six years, one-half of the membership being renewed every three years. The jurisdiction of the con¬ seils is summary and without appeal for sums under 200 francs; above that sum an appeal

lies to the tribunals of commerce. The presb dents and vice-presidents of the conseils de prud'hommes are elected by the conseils for one year, one being a patron and the other a. work¬ man. The number of conseils de prud'hommes is now about 225. Consult .Block, R., and Chau- mel, H., (Traite Theorique et Pratique des Con¬ seils de Prud'hommes' (Paris

1912) ; Block, M.,

PRUDHON, Pierre Paul, pe-ar pru-don, French painter: b. Cluny, Saone-et-Loire, 4 April 1758; d. Paris, 16 Feb. 1823. He received his first instruction in his art at Dijon under Devosge. In 1780 he went to Paris. Two years later he won a competition for a Roman schol¬ arship offered by the estates of Burgundy. He ˆ arrived in Rome early in 1785 and devoted him¬ self assiduously to study, forming his style on that of the 16th century masters, especially Leonardo da Vinci and Correggio. He returned to Paris in 1789 and painted portraits, gaining with difficulty his living under the Terror. He gradually made himself known, although his misfortunes had been early aggravated by a marriage undertaken under circumstances of great imprudence ; and in 1800 he became fa¬ mous by his timely picture (Truth Descending from Heaven.' In 1808 appeared in the Salon his (Psyche Carried off by Zyphyrus' and (Crime Pursued by Justice and Divine Ven¬ geance,' the latter now in the Louvre. From this time his position was assured. In 1808 he received the Legion of Honor and in 1816 was made a member of the Institute. In these years he also found compensation for his unhappy marriage in the love and care of one of his pupils, Mile. Constance Mayer. Besides paintings and mural decorations he also made many designs for elaborate fur¬ niture for the emperor and his family amongst which may be mentioned the cradle for the Prince of Rome, the son of Napoleon I and Marie Louise. He also etched many of his works and almost innumerable en¬ gravings of many of them were made by etch¬ ers of his own times and of later periods. His importance in the history of French art history lies in the fact that he indicated a revolt from the cold classicalism of David, introduced freer and bolder pictorial effects than had so far ob¬ tained in French art and utilized the emotional and sentimental resources which lie in the skil¬ ful distribution of light and shade in a picture. Other works of his are (Cupid Chastised' (Na¬ tional Gallery, Dublin) ; (The Assumption' ; (The Crucifixion' ; Hnterview of Napoleon I and Francis II after Austerlitz' (Louvre, Paris) ; (Union of Love and Friendship' ; (Venus and Adonis' ; (An Unhappy Family' ; (Venus in the Bath.' The last four works are in private collections, as are also many others, as well as most of his portraits and sketches. Seventeen of the latter, however, are to be found in the Louvre. Works of his may also be seen in museums at Angers, Cherbourg, Di¬ jon, Montpellier, Orleans, Quimper, etc. A sketch of a ceiling in Dijon is owned by the Historical Society, New York. Consult Blanr,

C., (Histoire des Peintres> (Vol. Ill, (Ecole Franqaise,> Paris 1865) ;

Burty, P., (London

1913) ; Foster, J. J., (French Art from Wat¬ teau to Prud'hon > (3 vols., London 1905-07) ; Ganthiez, P., (Prud'hon) (in (Les Artistes Celebres, > Vol. XI, Paris 1886) ; Goncourt, E. de, ^Catalogue Raisonne de l'CEuvre Peint, Dessine et Grave de P. P. Prud'hon) (Paris 1876) ; id., and de Goncourt, J. A., (Paris 1880) ; id., (Note et Renseignments Inedito sue Prud'hon et sa Famille) (in Ga¬ zette des Beaux-Arts, Periode II, Vol. XXXII, p. 149, Paris 1885) ; Jean, R., (Prud'hon dans la Haute Saone. 1794-96) (in ibid., Periode III, Vol. XXXVIII, p. 273, Paris 1907); Quatremere de Quincy, A. C., (Notice His- torique sur la Vie et les Ouvrages de P.-P. Prud'hon, Peintre) (Paris 1824) ; Voiart, Mme. A. E. E., (Notice Historique sur la Vie et les Ouvrages de P.-P. Prud'hon, Peintre) (Paris

1824).

PRUE AND I, a work by George William Curtis (q.v.), first published in 1856. It is a series of sketches or meditations showing the enjoyment to be derived from even the most commonplace existence. The papers are sup¬ posed to be written by an old bookkeeper, who strolls down the street at dinner-time and with¬ out envy watches the diners-out. But whatever the genial old bookkeeper is thinking or relat¬ ing, his heart is full of Prue, and from begin¬ ning to end it is always (

1894).

PRUNE, dried plums of certain varieties and the varieties used for drying. They are extensively cultivated in the Danubian princi¬ palities, France, Italy, and in recent years in California, Oregon and Washington, from which States the American market is now chiefly supplied. The product is of great com¬ mercial importance and nutritious qualities. Any variety of plum having the requisite per¬ centage of sugar, plenty of solids and which, when cured, will keep for a long time without deterioration, is suitable for making prunes.

Prune growing was introduced into Califor¬ nia in 1856, from scions imported from France, and in 1863 prunes were for the first time pub¬ licly exhibited as a California product. The first large orchard was planted in 1870, yet in 1915 nearly 100,000 acres of bearing and 30,000 of young trees were recorded. Attempts have been made to cultivate the prune in eastern parts of the United States, but without success, owing to the absence of requisite conditions for curing. Cultivation has been successfully ex¬ tended to Australia and South America, and these countries will ultimately prove formid¬ able competitors in the trade. In California where

the wet and dry seasons are well defined, and from May until October rains

are infrequent, never exceeding a fraction of an inch in volume, exist the best natural conditions for perfect curing of the prune. The fruit is not picked until perfectly ripe, then it is gathered from the ground whence it has fallen naturally from the trees when ripe. It is then passed through a sizer which separates the various sizes in order to secure uniformity in drying, as small fruit will dry in a shorter time than will a larger size. Next it is dipped into a weak solution of boil¬ ing lye to take off the bloom and facilitate cur¬ ing. Sometimes the outer skin is punctured by needles to allow the surplus moisture in the fruit to escape readily. In large establishments endless-chain machines are employed in dipping, but where it is done by hand a wire dipper is used. The fruit is washed in fresh water after the process to clean off the lye. After spread¬ ing upon wire-netting trays, the fruit is taken to the field and exposed to the sun's heat until properly cured. The summer days in California are invariably hot and the raw fruit, after ex¬ posure to the sun's rays for 6 to 10 days, de¬ pending upon size, is thoroughly dried. (In eastern Europe it is customary to cook the fruit partly before exposing it to the sun). In coun¬ tries where periods of dry weather are liable to be interrupted, evaporators are used in ex¬ tracting the moisture of the fruit, the trays be¬ ing introduced into a chamber in which the temperature is raised to 140° to 180°, and where they remain from 12 to 48 hours. To under¬ stand the exact amount of time necessary per¬ fectly to cure the fruit is essential, as if this matter is ill-judged an inferior quality of prod¬ uct results. When sufficiently cured, the fruit is taken from the trays to bins, where it is al¬ lowed to (

Orchards of large size are found in various parts of California. They require the same careful cultivation as plums and frequent prun¬ ing, besides occasional irrigation. The nomen¬ clature of the prune-making plum is large and abounds in synonyms. The following varieties are most favored in America: Petite or Prune d'Agen, the most important in California; Italian (Fellenberg) in Oregon, with Tragedy

perhaps second and Hungarian third. Other varieties grown commercially are Pacific, Wil¬ lamette, Clairac, Mammoth, Columbia, Tennant, Silver and Sugar. Consult Bailey, 'Standard Cyclopedia of Horticulture, > titles

PRUNELLA, a kind of smooth woolen or mixed stuff of which clergymen's gowns were once made and which is still used for the up¬ pers of ladies'

boots and shoes.

PRUNING, the removal of parts of plants in order to economize and divert energy in desired directions. Fundamentally the various objects for which plants are pruned are (1) training, in which the limbs are started and dis¬ posed as desired; (2) pruning proper; (3) trimming or the shaping to some artificial form. The first is of prime importance in the early years of orchard fruits, but is of smaller and smaller application as the subjects dealt with are shorter-lived or less tree-like. The second is important, as a rule, during the whole life of the plant, in many cases, especially of trees, commencing when the plants are set. The third is usually of small importance, at least in Amer¬ ica, being employed mainly with such orna¬ mental subjects as hedges, topiary specimens and dwarf trees.

Popular opinion concerning the practice has changed within recent years. Formerly it was against pruning upon the ground that the plants suffered and that the practice was unnatural. But nature is an inexorable pruner, as the straight limbless trunks of forest trees and the dead twigs and branches of trees left to themselves sufficiently show. The horticulturist improves upon nature in doing his work intelli¬ gently, not only with respect to what shall be removed, and when, but how it can be best done, so as to enhance the healing of the wound. The practice is essential to successful orchard fruit culture and to a greater or less extent with other plants. With woody plants that have been grown in nurseries it is necessary to cut back the tops to -approximate a balance between the top and roots which latter have been necessarily reduced in digging. The usual practice in this matter is to remove at least one-half of each branch that is to remain and to cut off all the others. Many orchardists trim off all the limbs and some leave nothing but a switch or even a stub, claiming that they can then form the head of the tree where they desire and that the tree more quickly recuperates than if a larger proportion of top is left. Certain it is that in practice the trees untrimmed at trans¬ planting time generally suffer severely.

Among the principal objects sought in the pruning of fruit-trees the following may be mentioned: To divert plant-food from wood production into fruit formation and develop¬ ment of improved specimens ; to keep, not to force, the tree in bearing condition, which is secured by regular annual attention and not by intermittent neglect and butchery; to prevent the excessive production of wood which is usu¬ ally at the expense of fruit production and or¬ dinarily is a sequence of excessive pruning; to keep the tree within manageable limits so as to facilitate cultivation, spraying and harvest¬ ing; and to admit light and air to the tops so that the fruit may be well colored:

Before any pruning is done, however, it is essential to know the exact manner in which the trees or shrubs bear their fruits, for unless this is understood the operator may be working against his own interests and injuring the tree at the same time. For instance, apples and pears bear their fruits upon gnarly twigs called spurs, the plum and cherry usually upon spurs, but sometimes also on the axial growths; the peach bears usually upon the axial growth of the previous season, but also to some extent upon spurs which live only two or three years as a rule ; the quince bears upon terminal shoots of the present season ; the grape upon shoots of the current season ; the raspberry and black¬ berry usually upon shoots of the previous sea¬ son, the shoots dying after production ; and the currant and gooseberry upon wood one or more years old. Further advantage may be taken of the method of fruit production in preventing the necessity of thinning, the fruit-buds being re¬ moved by the cutting out of the fruit-bearing wood.

In the pruning of ornamental subjects the same principles apply. Except for removing straggling, unsightly or unnecessary growths, the pruning has mainly to do with flower pro¬ duction. Flowering shrubs and trees may be divided into two groups ; those which produce their flowers from buds which were matured during the previous season ; and those whose buds are developed during the current year. The one rule that will apply to these subjects is: Prune after flowering. If members of the first group are pruned during the winter they will generally suffer severe loss of flower buds ; members of the other group, however, should be pruned, preferably, in early spring about the time that growth starts. Properly done and at the right time the production of bloom should be greatly enhanced with each group.

There is considerable difference of opinion as to when subjects should be pruned, but if wounds are properly made, that is, close to the main stem without leaving any stub, and if the large ones are protected from decay during the healing process, they may be pruned at any time, preferably,

perhaps, just before the season of most active growth when the object is wood, and after this period if the object is fruit. Trees grown as cordons, espaliers, etc., require the greatest skill, but these practices are largely matters of training and are of rare application in the United States.

There is an immense literature on the sub¬ ject, consisting chiefly of short articles on spe¬ cial phases, to be found in horticultural jour¬ nals of this and foreign countries and in the publications of governmental departments of agriculture and of agricultural colleges and schools. For general treatment of the subject consult Bailey, L. H., 'The Pruning ManuaP (New York 1916) ; Hood, G. W., 'Laboratory Manual of Horticulture) (Boston 1915) ; Kains, M. G., 'The Principles and Practice of Prun- ing) (New York 1917) ; Newsham, T. C., 'The Propagation and Pruning of Hardy Trees, etcP (New York 1913); Udale, T., 'The Handy Book of Pruning, Grafting and Budding) (Evesham 1915).

PRUNUS, a genus of shrubs and small fruit trees of the rose family, about 75 of which are widely distributed, especially in the north

temperate zone, and include many leading fruits of the world and many species of ornamental value. They have alternate leaves ; solitary or clustered pink or white flowers which appear usually in spring; and drupaceous fruits con¬ taining one hard-stoned seed. The number of varieties and hybrids is legion ; they include weeping, double-flowered, variegated-leaved and diversely colored subjects, besides the host of varieties cultivated for their fruits. Their range of hardiness varies with the species, some being hardy in the cold North and Plains States, others tender even at the latitude of New York. The most important members of the genus or sometimes referred to it are treated under their own titles, as Almond; Apricot; Cherry; Nec¬ tarine; Peach; Plum; Prune; Sloe.

PRURITUS, itching, a symptom of vari¬ ous skin diseases. It may occur independently of any structural alteration of the skin, as a purely psychogenic affection and is then fre¬ quently a symbol of unconscious masturbation. It mav involve the skin of the entire body or be limited to a particular region, such as the anus, scrotum or vulva. The sensation is described as prickling, burning or crawling. It is very annoying when slight and may be so severe as to destroy all sense of comfort. Excitement and overheating, even the warmth of the bed at night, cause at times troublesome exacer¬ bations. The etiology of this affection is fre¬ quently obscure. Impaired general health and a neurotic tendency are predisposing

causes. Pruritus senilis is a distressing form occurring in advanced age and is due to degeneration of the skin. Pruritus hiemalis (winter itch) is peculiar to cold weather. Other causes are the change from light to heavy under-clothing; in¬ gestion of certain drugs, as opium ; sometimes hepatic and renal disease ; and the circulation in the blood of abnormal biliary constituents, as in jaundice, and of other abnormal material in diabetes. Localized pruritus frequently de¬ pends upon a venous congestion of the part ; thus pruritus ani is invariably aggravated by constipation and obstruction of the portal cir¬ culation ; and in pruritus vulvae, uterine en¬ gorgement and pregnancy are exciting causes. Worms not infrequently produce itching of the anus and of the nose, the latter being a reflex condition. The almost constant > scratching caused by a persistent localized pruritus is likely to produce eczema.

In treatment the general health is to be im¬ proved by hygienic measures ; sometimes an entire change of diet, scene, etc., is necessary. Internal medication should be left to the physi- cin. A psychoanalysis is necessary to cure cer¬ tain cases. Local remedies are palliative, only relieving the discomfort until the cause of the itching is removed. Among the palliatives are carbolic acid, borax, soda, starch, chloro¬ form in powder, liniments, solutions and ointments.

PRUSSIA (German, Preussen ; Latin, Bo- russia), a free state of Germany, and its largest, most populous and most important state, com¬ prising nearly two-thirds of its area. The boundaries of Prussia are on the east, Poland (See 1921 Statesman's Year Book), on the south, Czecho-Slovakia, Saxony, Bavaria, Hesse- Darmstadt, and the Thuringian states; on the north, the Baltic, Denmark, Mecklenburg and

the North Sea; on the west, Belgium and the Netherlands, Alsace-Lorraine and Luxemburg. The circumference of . Prussia measures 4,762 miles and except for some enclaves, including East Prussia and the Hohenzollern province, which is surrounded by Wiirttemberg, Prussia is a compact mass of land, taking up nearly the whole of northern Germany. In shape the main portion is, roughly, an enlongated oval. Its great¬ est length, from Leba to the borders of Alsace- Lorraine, is about 650 miles, and its greatest width something over 400. The frontiers of Prussia, however, are political rather than natural. The area is 113,852 square miles. The heart of it is the province of Brandenburg, from which small core the free state of to-day has grown by conquest or otherwise. Prussian ter¬ ritory encloses, wholly or nearly so, the small German states of the two Mecklenburgs, An¬ halt, Brunswick, Oldenburg, as well as the old Hansa republics of Hamburg, Bremen and Liibeck. Prussia holds some five-eighths of the population of Germany. The density of popu¬ lation by the square mile, in 1919, the last cen¬ sus year, was 325.6.

Topography.— Three-fifths of Prussia form part of the great northern European low¬ lands. This plain is much wider in the east, only the southern border of Prussia being there mountainous, than it is in the west. Roughly, an imaginary line run from about Bonn to Wittenberg would separate the lowlands from the highlands of Prussia. The Sudetian range divides Prussia from Bohemia and Moravia, and its highest peak, the Schneekoppe, lies on Prussian soil. The Harz range runs nearly parallel with the Sudetes and might be consid¬ ered a continuation of them. South of the Harz the Prussian boundary cuts the Thuringian Forest, and this again is prolonged by the Weser range of hills and the Teutaburg Forest. In the southwest the lower Rhine region includes the Hunsriick and Eifel, the Taunus, Wester- wald, Siebengebirge, Spessart and Sauerland, nearly all of it on Prussian territory. Again the Rhon mountains, the Vogelsberg and other small ranges interpose themselves between the Rhenish and Thuringian system. North of the Sauerland, in the region of the Ruhr River, are situated the most important coal-bearing lands of Prussia, while the extensive, but on the . whole not so valuable, coalfields are in eastern and northern Silesia. Prussia has an ocean front (ˆWaterkant®) of some 1,000 miles on the North Sea and the Baltic, being nearly the whole seashore that Germany can boast of. Tidal variations are not very great on the North Sea, and still less so on the Baltic, but fierce and frequently recurring northwest storms have caused great devastation along the rather flat seaboard of Prussia, so that during historical times alone thousands of square miles of coast have been swallowed up in the ocean. The Frisian chain of small islands (including Heli¬ goland) are the remnants of a former coast line, and dikes and other costly means of pres¬ ervation have to be kept in constant repair against the renewed inroads of the sea. Much of the coast land being marshy soil, it serves for pasturage only. The Baltic is much more shal¬ low than the German Ocean and is not distin¬ guished by well-defined ebb and, flood, and its coasts are mostly sandy and infertile dunes.

The only island along the Prussian line of the Baltic that deserves mention is Riigen, a fertile tract of great scenic, beauty. However, the Baltic coast has several deep indentations, such as those near Liibeck, Kiel and the Pomeran¬ ian bight. The so-called Haffs are semi-inland bodies of water but slightly brackish and formed by the waters of the rivers emptying themselves into hollows nearly cut off from the sea proper by dunes and small tongues of projecting main¬ land. Although Prussia is in its main part rather flat, so that no serious obstacles inter¬ fere with the railroad and canal systems, that does not mean that the land is quite level. In¬ deed,

hills and rocks rising to a height of 600 feet and more are of frequent occurrence on the long line between the mouth of the Ems River and the Polish border, these elevations dating from the Ice Age and being formed by accumulations of boulders and moraines.

Hydrography. — 'Prussia contains a large number of lakes, especially in her northeastern section, but none of them of great importance. There are also large swamps along the lower course of the Oder, Havel, Warthe and Netze rivers, and drainage work has been going on. All the river system of Prussia belongs to the basins of the Baltic and North Sea, the Danube, which empties into the Black Sea, being the only large river of Germany that does not figure in Prussia's national economy. All the other principal rivers of Germany, such as the Elbe, Rhine, Weser and Oder, with most of their tributaries, and the Vistula (Weichsel) and Niemen (Memel), coming from Polish or Rus¬ sian soil, in their most navigable and important portions, form part of the Prussian river sys¬ tem. The Rhine flows through Prussian ter¬ ritory about 200 miles, the Weser and Oder almost completely and the Elbe for about two- thirds of its course. There are also a large number of shorter coast rivers, such as the Pregel, Leba, Wipper, Rega, Peene, Ucker, Trave, all belonging to the Baltic, and the Eider, Ems, Werra, Fulda, Saale, Havel and Aller of the North Sea range. Prussia has also a con¬ siderable number of artificial water courses. Of these the Baltic-North Sea Canal, better known as the Kiel Canal), the construction of which entailed an expenditure of over $100,- 000,000, is in most respects of highest import¬ ance. Vistula and Oder are connected by the Bromberg Canal (now in Poland) ; Oder and Spree by the Mullrose Canal ; Havel and Elbe by the Plau Canal; Elbe and Trave by the Stecknitz Canal ; Eider and Baltic by the Eider Canal. Of late years these canals have been increased in size and depth, and since the be¬ ginning of the great World War just past Prussia has planned, and is now as a matter of fact executing, a great and ambitious plan in¬ tending to connect all the principal Prussian rivers with the Danube and with each other, so as to form a great Danube shipping canal that is to make the Danube available for large boats from Regensburg to the Black Sea. It can, therefore, be said that in its hydropathic aspects, as far as variety, diversity of direction and number of means are concerned, Prussia is singularly fortunate and well supplied.

Climate and Soil. — The climate of Prussia is wholesome and temperate. It is the distance from the Atlantic rather than mere latitude that

is the determining factor in its climatic varia¬ tions. Thus the mean temperature of Konigs • berg (far to the northeast of Prussia) is 43° F. ; that of Berlin but five degrees more, namely, ˆS0 F. ; at Aachen (Aix-la-Chapellc) , on the western border, 49° F. and at Koln (Cologne) and Trier

(Treves) 50° F. As one proceeds to more southerly latitudes, in Prussia, the higher altitudes even up differences. However, the greatest differences are between east and west, due to the prevailing northern and east¬ ern winds from Prussia and the Scandinavian north in the eastern portions of Prussia. Ex¬ tremes of temperature, therefore, are also greater in the eastern parts, wholly in the colder seasons. The average rainfall in Prussia is about 21 inches, being highest in some of the western provinces (31-34 inches) and lowest in the northeast portions (16 inches). The soil of Prussia, though in some of the western mountain regions (Rhon, Eifel, etc.) and in certain districts of the northeast very bleak and sterile and but of mediocre fertility in the northern central portion (Brandenburg), is on the whole fairly productive, and pre-eminently so in the bottom lands of the Rhine, Weser, Oder, Elbe, Unstrut, Warthe, Netze rivers. Even where in its natural state the soil is poor and meagre, much has been done by wise agri¬ culture, assiduously fostered by the government, to improve its yield from year to year.

Geology and Mineral Resources. — Of the two widely differing geological formations of Prussia, the entire flat part of it, being the larger, is covered with clay and sand of the Quaternary Age, having been spread over the surface since the Ice Age till the present day by alluvial and glacial action. And these deposits rest upon all formations from the Primary down to and through the various phases of the Tertiary. Cropping out here and there the harder rocks often emerge above the Diluvian and Alluvian. This is the case in Riigen with its chalk cliffs, in the limestone plateau near Riidersdorf, etc. The Rhenish and the Thur- ingian systems are part of the Triassic system of the upper Rhine. The Silesian ranges — Riesengebirge, Sudeten, etc., — are mainly of gneiss and granite, while Harz and lower Rhine belong to the Devonian and Silurian forma¬ tions. Prussia excels as a mining country, especially in coal, iron, lead, zinc, copper, potas¬ sium, leading by far the rest of Germany in mining products. About 89 per cent of Ger¬ many's coal supply comes from Prussia, mainly from the Ruhr Basin, Rhine province and West¬ phalia, while soft c

is very prolific, and in potassium it is the chief source of production. Petroleum is obtained in limited output in the province of Hanover. The far northern coast of the Baltic yields an abun¬ dance of amber. A large proportion of mines and salines in Prussia are under government control and ownership. In 1913 there were employed in the mining industry in Prussia some 769,584 persons.

Agriculture. — Prussia is the chief agricul¬ tural state of Germany. Of the total area of Prussia 52.3 per cent consists of cultivated fields, orchards, vineyards and vegetable gar¬ dens; 17.5 of meadows and pastures; 22.7 of forests and woods, and 7.5 only of untilled or unproductive land. The number of agricultural holdings in 1911 was 3,256,044, the farm lands totaling 20,781,147 hectares (one hectare — 2.471 acres). Of these by far the larger pro¬ portion was in small farms of less than 20 hectares, owned by 3,103,151 parties and making up 41.2 per cent of the whole cultivated soil. Of large estates of 100 hectares and over the percentage is more considerable in Prussia than in the remainder of the empire, because of ((East Elbian® political and economic conditions. In fact, in those provinces of Prussia where the landed gentry still keeps its traditional grip on the country and where thousands of them own estates each over 1,000 hectares agriculture is most backward and the soil yields, in propor¬ tion, the least per hectare. This is due to the system of tillage in vogue, the land being an¬ nually worked by so-called wanderhande (or season laborers) who come from the neighbor¬ ing districts of Poland or Galicia, and who re¬ turn thither after the crops are in. In a general way, however, although it cannot be denied that urban industry in Prussia, as elsewhere in Germany, has made large strides, somewhat at the expense of the former rural population, it must be conceded that the peasants, farmers and estate-holders, large and small, are in a fairly prosperous condition, attributable chiefly to in¬ tensive cultivation of the soil and to the foster¬ ing legislation of the government, as well as to the extensive use of agricultural machinery, much of it made available by the co-operative plan, to most progressive methods of tillage and to increasing diligence. The co-operative sys¬ tem in vogue, notably among the smaller farm¬ ers, enables them not alone to buy on shares or hire even the most improved types of farming machinery run by electricity, alcohol, petro¬ leum, etc., for all the processes of farming, such as ploughing, drilling, harvesting, binding, threshing, grinding, etc., but also to dispose of their produce to best advantage, much of it without any middlemen, by directly dealing between producer and final consumer. Alco¬ hol, used as a source of mechanical energy, is more extensively employed in Prussia than any¬ where else in the world, and distilleries for the wholesale manufacture of methyl alcohol are very common, a cheap grade of potatoes being mostly used in the process. The soil of Prussia varies greatly in quality. Of the cultivable land there some 29 per cent is loam and clay, 32 per cent middling, namely, loam and sand mixed, 31 per cent is predominantly sandy and 6 per cent bogs and marshes. Besides the basin of the Rhine and its tributaries, that of the middle Elbe, Saale, Unstrut, etc., the extensive

plain around Magdeburg, the so-called Bohrde, and some other large areas are most fertile. The chief cereal produced in Prussia is rye, which is

consumed for bread and other food by the people in general in preference to wheat. About 75 per cent of the entire rye crop or Germany is raised in Prussia; 72 per cent of the potatoes, the crop next in importance ; much of the latter is used in manufacturing alcohol; of the wheat Prussia yields 63 per cent, and of the oats 67 per cent. The vineyards of Prus- sia in 1919 aggregated 40,762 acres and yielded 8,679,735 gallons of wine. The orchards and private gardens produced all the fruits of the temperate zone in abundance and excellent qual¬ ity, notably cherries, plums, pears, apples, quinces, apricots and berries. In the whole of Prussia in 1919 there was grown of rye, on 7,965,296 acres, some 4,672,035 metric tons ; of potatoes, on 3,637,406 acres, some 14,886,800 metric tons; of wheat, on 1,760,386 acres, some 1,284,668 metric tons; and of oats, on 4,746,443 acres, some 2,983,196 metric tons. Prussia ex¬ cels also in livestock. The breeding of strong and generally serviceable horses has been made a special feature by the Prussian government. A score of istuds in Teakeheim, East Prus¬ sia, and elsewhere endeavor to keep up the grade suitable for army use, agricultural and general purposes, and the export of horses has been a regular feature. In 1920 the num¬ ber of horses in Prussia was 2,508,860; of cattle, 9,279,116; of swine, 9,777,193; of

sheep, 4,376,860. The total area of Prus¬

sia under forest is 22.7 per cent, and of this the fiscus owns about one-half, coniferous trees being in a vast preponderance. The gov¬ ernment derives some $22,000,000 of its revenues from the profits on the sale of wood, etc., of its Crown forests. As to viticulture, practically all the palatable and economically valuable wine grown in Prussia oomes from the Rhine and its chief tributaries, the Moselle, Nahe, etc. A number of the vineyards are owned by the state. All the wine-growers have suffered great losses for the past 30 years from the rav¬ ages of the phylloxera, but have got the trouble now under control. The better vintages of both Rhine and Moselle wines fetch high prices and are esteemed for their rare flavor. While fis ing, both on inland waters (carp, pike, pick¬ erel, trout, salmon, etc.) and the sea, is likewise an important source oi income for Prussia, the fisheries on the Baltic and its Hiaffs® (her¬ rings, sardines, anchovies, a species of cod, etc.) being of special value in pisciculture and deep-sea fishing Prussia is undoubtedly still far behind when compared with a number of other countries.

Manufactures. — From an industrially in¬ significant country Prussia during the last 50 years, with the remainder of Germany, has become a manufacturing centre of great im¬ portance. Among the industries that have grown up with almost spasmodic swiftness in Prussia within that period are the beet-sugar manufacture, in which Germany is leading the world and which flourishes mainly in the cen¬ tral provinces of Prussia ;

cotton spinning and weaving, which are of great importance in the Rhine province; the linen manufacture of West¬ phalia and Silesia ; the woolen industry of the district around Aachen, as well as the silk

and velvet production of Krefeld, Elberfeld, etc. In money value, however, the making of machinery of every description overtops all ; Berlin, Magdeburg, Buckau and several large towns in Westphalia and along the Rhine, lead¬ ing. The iron and steel industry centres in the coal region of the Ruhr Basin and is carried on on a very large scale, as in Essen, Remscheid, Suhl, Solingen, Diisseldorf, Elberfeld, Dort¬ mund, etc. The most considerable ship¬ yards in Prussia are located in Kiel, Emden, Stettin and Elbing. Cologne, Gorlitz, Konigs- berg and Diisseldorf are also noted for the making of smaller machines and mechanical devices, such as sewing machines, cash registers, typewriters, telephones, etc. Glass, paper, porcelain and pottery are turned out in the provinces of Saxony, Silesia and the Rhine, while the chemical and dye industry is mainly carried on in Berlin and in a number of towns by the Main and Rhine, as Hochst, Elberfeld, etc. Of those engaged in manufacturing and industrial establishments in 1911, 6,906,526 were employed in Prussia.

Transportation. — Prussia is well provided with all means of communication and transpor¬ tation. The first railroad was built in 1838 and since 1866, after Prussia's annexation of Han¬ over, Hesse-Nassau and Schleswig-Holstein, the railroad system was rapidly extended, until, with one or two exceptions, of the larger coun¬ tries Prussia possesses the closest network of rails. The same is true of her canal sytem. The shape of Prussia being twice as long as broad, these two systems, too, had to be laid out accordingly. Communication between the eastern and western provinces of Prussia is even more rapid and cheap than between the southern and northern ones. Steel lighters of large tonnage and small draft are now doing on the canals and rivers the transportation of the larger part of the bulky goods, manufac¬ tured goods and foodstuffs, carrying the latter westward and the former eastward. An enormous and steadily rising tonnage of such vessels, peculiarly adapted to their task, is de¬ voted to this traffic. It is to the excellence of her water routes and railroad lines that Prussia owes much of its rise to economic prosperity. Dating from the eighties the Prussian railroads were gradually purchased by the state, follow¬ ing out a plan of Bismarck's, and by special agreements (called ˆKonventionen®) with neighboring smaller states, such as Hesse, Saxony, Bavaria, and by embodying the rail¬ roads of a number of other adjoining states of less size, the serviceableness and income of the government-owned

roads were guaranteed. The proportion of railway mileage in Prussia has now caught up with that of Great Britain, though in point of volume of traffic it is con¬ siderably behind, owing to the canal competi¬ tion and to the fact that military-strategic rea¬ sons, rather than purely economic ones, have been deciding factors in laying out the rail¬ roads of Prussia. Significantly the most impor¬ tant trunk line of Prussia is that which runs from the western frontier at Herbesthal through Cologne, Berlin, Konigsberg in the direction of Paris-Petrograd. For 1919 the Prussian rail¬ road systems comprised 24,196 miles in length, all but 1,600 of which is state-owned and all but 400 miles being broad gauge.

It is admitted that in Prussia government own¬ ership of railroads has proved an unqualified success from the financial and commercial point. Before the outbreak of the war the Prussian government derived just about one- fourth of its entire revenues from the profits of operating its railroads, while by controlling freight schedules at all times it was also enabled to lend a helping hand to industry as a whole. As to its merchant marine, next to that of Hamburg and Bremen, it was the most import¬ ant of the several German states. Though the ports of the Baltic freeze over in winter, the one of Stettin, being nearest Berlin and, there¬ fore, of greatest moment, is kept free by ice¬ breakers. Emden, a Prussian port on the North Sea, already of economic importance, was intended to become the rival of the two Hansa ports near by. Authentic post-war figures as to the size of the Prussian merchant fleet are not available. In 1913 the number of vessels was 2,329 of 318,646 tons net.

Banking and Finance. — The banking sys¬ tem is the same in Prussia as in the remainder of Germany. The Reichsbank (Imperial Bank) is at the same time the fiscal agent of Prussia, and its resources, privileges and emolu¬ ments have been repeatedly widened and ex¬ panded since 1871. Prussia, of course, is financially in a dominating position for the whole of Germany, since Berlin has become by far the most important financial centre of Germany, having outstripped Frankfort long ago. In Berlin there are 11 great corporate banks (aside from some powerful private banks) and the volume of business transacted by them is nearly as large as that of the Reichs¬ bank with its 325 branches. The Deutsche Bank is the largest institution, followed by the Dresdner Bank, the Diskonto-Gesellschaft, etc. The Deutsche Bank has done enormous serv¬ ice in the spread of German commerce abroad, financing many transoceanic enterprises. Its capital and assets have increased 50-fold since 1871. Of vast importance, too, is the Preus- sische Seehandlung (Prussian Marine Associa¬ tion), which was founded by Frederick the Great and which was the main financial sup¬ port of the government for over a century. The Preussische Seehandlung was the forerun¬ ner of the credit mobiliers in France and other countries. While its capital stock is less than $10,000,000, its assets amounted, when

the World War broke out, to $130,000,000. The Prussian (and German) banking system pos¬ sesses great elasticity, a fact which is largely responsible for the avoidance of recurring great financial panics,, at least since the one of 1873. As to finance, it has expanded and con¬ tracted by leaps and bounds similarly to that of other countries. In a general way it may be said that since 1891 Prussian finance has made enormous strides. As in all other civilized countries, however, the state itself has veered a good deal in its finances, depend¬ ing largely in this on the diminishing or in¬ creasing revenues or the expenditures and vast economic state enterprises that have been un¬ dertaken from time to time, such as the pur¬ chase of the Prussian railroads, for instance. A certain degree of stability, though, is a consequence of the fact that a large section of the regular resources are coming in steadily

and in predetermined bulk, such as the profits of the various state properties (railroads, fiscal lands, mines, forests, etc.). Taxation is, on the whole, on a satisfactory basis, a progressive income tax and other imposts being quite fairly apportioned. It must be kept in mind that Prussian finances are quite separate from those of the empire. From 1901 the Prussian budget has shown a rapidly rising scale. In that year it was (in marks) 2,885,017,665, for revenues, and 2,688,595,268 for expenses, while in 1921 it had risen to 5,623,728,845 for revenues, and the same (estimated) for expenses. The public debt of Prussia has likewise bounded upward for many years ; in 1920 it amounted to 16,587,933,700 marks. By far the larger part of its load of debt has been incurred, up to the war, for pro¬ ductive enterprises, such as the acquisition of the railroads, domains, mines, etc.

Government. — In a certain limited sense Prussia was a country constitutionally governed. Its Constitution to 1920, the outcome of the short Revolution of 1848, dated from 1850 and was promulgated by the then king, Frederick William IV, but was in some (not vital) re¬ spects later amended or modified with royal sanction. The Constitution was a written in¬ strument and could only be changed by con¬ current resolutions, twice passed by the Prus¬ sian Parliament, the Diet, on these alterations being approved by the monarch himself. Exec¬ utive power was vested in the king alone, the latter attaining his majority at 18. The Crown was hereditary and descended to the first-born male heirs in a straight line of succession through all the branches of the Hohenzollern dynasty. The king himself was irresponsible and exercised his powers through a cabinet, the members of which were not responsible for their actions to the Parliament, but to the king alone ; he, too, both appointed and dismissed the ministers of the Crown.- Members of the Cabinet had a seat in the Diet*

and participated in the debates. None of the ministers exercised more power than his colleagues, although the one directing the foreign policy was styled "Minister-President,® and presided at their meetings. The power of legislation and of raising taxes and disbursing public moneys was vested in the Diet. This parliamentary body (Landtag or Diet) was composed of two houses, the Abgeordnetenhaus (Chamber of Deputies) and the Herrenhaus (House of Peers). The electoral system, however, on which the mem¬ bership of this Prussian Parliament was based was unfair, illiberal, antiquated and was stig¬ matized by Bismarck himself at a public session as "the worst in the world.® Despite repeated promises held out by the ex-Kaiser, as king of Prussia, to bring this election system more in accord with those in use in more enlightened countries, up to the end of the war no change had been made, due chiefly to the power of the "Junker® class of Prussia, who feared with reason to be deprived of their traditional pre¬ dominant influence within the state if represen¬ tative government were adopted in earnest. Each province has a governer, each government district a president and deals mainly with local affairs. Each rural circle has a Landrat and towns have a town council. The Herrenhaus (House of Peers), under the old regime, was made up of princes of the blood royal, of mem¬

**719*

bers of the higher no.bility, of special titled members chosen by the estate-holders of Prus¬ sia, of representatives of universities and cer¬ tain cities, and, lastly, of an indeterminate num¬ ber of persons appointed by the king at pleasure. In 1915 the number of members of the Herren¬ haus was 307, and about two-thirds of these represented, directly or indirectly, land-holding (Junker) interests. The Constitution adopted by the Free State of Prussia, 30 Nov. 1920, grants the suffrage to all citizens of both sexes, over 20 years of age. Prussia according to this Constitution is declared to be a republic. In addition to the Landtag there is also a Staats- rate or State Council, elected by the provincial assemblies on the basis of one representative to every 50,000 of the population. This State Council advises and controls the Landtag and in its general functions is analogous to the Reichsrat of all Germany. The State Council has the right to reject legislation passed by the Landtag. The Premier is chosen by the latter and he appoints the other members of the Cabinet. The members of the Landtag are elected for four years by secret and direct bal¬ lot on the principle of proportional representa¬ tion and the ministry is invested with the pow¬ ers of the former king. While the general judicial system is the same throughout Ger¬ many, the judges themselves are appointed by the state; their position, although inferior in emoluments and standing to that in more West¬ ern countries, is on the whole fairly independent of outside influences. Judges must all have gone through a prescribed course of study and training to be fitted for office, and the standard is rigid and rather

exacting. There are admin¬ istrative courts ("Verwaltungsgerichte®) of various grades, special courts, jury courts ("Schwurgerichte®), petty courts ("Schoffen- gerichte®), etc. The highest courts are the 15 "Oberlandesgerichte® ; next in grade the "Landesgerichte,® and "Schoffengerichte® being lowest. It is the "Reichsgericht® in Leipzig which decides, on appeal, cases handed up from the state courts, as an Imperial Supreme Court. As for local government in Prussia it is to-day largely the creation of Professor Gneist, the so-called "Kreisordnung® ("Kreis,® provincial district), which dates from 1872. It gives de¬ cidedly a larger measure of local autonomy and has worked out on the whole very satisfac¬ torily. For the purpose of administration Prus¬ sia is divided into 13 provinces, and these again into subdivisions, or "Regierungsbezirke® (gov¬ ernment districts), 35 in all. Below these are the smallest units, the "Gemeinde® (community) and "Amtsbezirk® (administrative district).

The Racial Population. — The table on fol¬ lowing page shows the area and population of Prussia in each of its provinces from 1871 to

1919.

Increase in population has, as seen from the table, been very rapid since 1871, but at a steadily diminishing rate. This growth has been most rapid in Berlin, Westphalia, Rhine¬ land, Brandenburg and Saxony, and least so in the rural districts ; in fact, in many purely agri¬ cultural regions there has been a positive de¬ cline in population. During the Great War there was an abnormal growth of population in a number of industrial and mining towns along the western border, d growth which, in

PROVINCE

Square

miles

Popula¬ tion, 1871

Square miles (1 Oct.,

1920)

Popula¬ tion, 1919

Brandenburg.

15,383.1

2,036,888

15,070

2,445,627

East Prussia.

14,286.5

1,822,934

14,286

2,229,290

Hanover .

14,868.5

1,961,437

14,869

3,017,366

Hesse- Nassau

6,062.5

1,400,370

6,062

2,273,502

Hohenzollern.

441.0

65,558

441

70,751

Pomerania. . .

11,633.7

1,431,633

11,654

1,787,193

Border Prov¬ ince (Grenz-

mark, Po-

sen — West

326,881

Prussia) . . .

11,193.6

1,583,843

3,026

Rhineland . . .

10,424.8

3,579,347

9,470

6 , 769 , 469

Saxony .

9,755.7

2,103,174

9,756

3,129,193

Schleswig-

5,805

1,462,187

Holstein. . .

7,343.2

1,045,419

Silesia .

15,573.4

3,707,167

15,268

5,271,896

Westphalia.. .

7,806.8

1,775,175

7,807

4,488,115

West Prussia. Berlin (city) .

9,866.7

24.5

1,314,611

826,341

338

3, 803,770

134,663.9

24,689,252

113,852

37,075,240

the case of a few cities such as Essen, Diissel- dorf, Dortmund, etc., amounted to 200, even 300 and 400 per cent, owing to new enormous munition plants and other ephemeral economic causes. Prussia, by the Versailles Treaty of 1919, lost 20,377 square miles and a population of 3,705,898.

Ethnologically considered, Prussia is by no means a country inhabited by a homogeneous population. Historically the core of. Prussia, that is, the province of Brandenburg, is largely Slavic in origin, the Teutonic settlers and con¬ querors over the Slavic tribes (Wends, Serbs) mingling with the latter ; the eastern and north¬ ern provinces of Prussia are also, in varying degree, a mixture of Slav and Teuton. The very name of Prussia (Preussen) is derived from a small pagan nationality in the northern regions of the present kingdom, the Preussen or Borussi, who became (with also their lan¬ guage) entirely extinct. This large admixture of Slavic blood in the original provinces of what is to-day Prussia, viz., in the so-called Transelbia, the provinces of Brandenburg (Slavic: Brennabor), Pomerania, East Prussia and Silesia, has, of course, considerably altered the resultant population, both physically and in point of character, when comparing it with the more purely Teutonic stock in the west and south of Germany. So far as the latest official census figures of old Prussia are concerned, those of 1910, they claim some 33,500,000 of the roundly 40,000,000 as Germans (the criterion being the language spoken at home) : 3,500,000 as Poles (in Posen Silesia, East and West Prussia), 115,000 Lithuanians (in East Prus¬ sia), 142,000 Danes (in Schleswig), 75,000 Wends (in Brandenburg, Silesia), 30,000 Czechs (in Silesia) and 78,000 Walloons (near the Belgian border). In the rural districts of Posen and in portions of east¬ ern Silesia and West Prussia the Poles form the vast majority of inhabitants. The above figures are merely approximative and do not include such fragments of foreign (Slav) race as the Kassubians of Pomerania and West Prussia, for instance, nor the 400,000

Jews or the foreign-born residents in Prussia, some 350,000 strong.

History. — The history of Prussia properly ought to begin, of course, with the assump¬ tion of the title of royal ruler over Prussia. The latter was a duchy (it is identical with the present province of East Prussia) to the far northeast of Brandenburg and had been wrested from its aboriginal owners, the heathen Borussi or Preussen, by the conquering and missionary zeal of

the Teutonic Knights, a militant order of semi-monkish warriors, who, after their labors in Palestine were no longer needed, were entrusted by the Church of Rome with the task of christianizing that northern land. The Borussi appear to have been near relations of the Lithuanians, of whom a rem¬ nant have survived in the province. The Elector of Brandenburg, Frederick the III, having become heir to the lands of the de¬ funct order of the Teutonic Knights, on the strength of an understanding with the then emperor of Germany, on 18 Jan. 1701, with elaborate ceremonies crowned himself in Konigsberg, capital of the territory, ((King in Prussia.® The emperor after much urging, acquiesced in this, but the proceeding created a peculiar status for the new king, who hence¬ forth spoke of himself as Frederick I, as the <(King in Prussia,® but remained nevertheless also Elector of Brandenburg and as such the subject lige of the emperor in Vienna. How¬ ever, the whole method pursued by Frederick I was symbolical of what was to come. Fred¬ erick I was a Hohenzollern, descendant of that Frederick, an insignificant burgrave of Nurem¬ berg, who, in 1411, by the grace of the Emperor Sigismond was called to wasted and utterly desolate Brandenburg as its margrave. From the accession of this energetic ruler in small Brandenburg dates, with several severe set¬ backs, the gradual rise to power of what be¬ came subseauently known in an enlarged sense as Prussia. The father of the first ((King in Prussia,® the wise and pushing ((Great Elector,® Frederick William (1640-88), laid the founda¬ tion to the greatness of his house by fortunate wars with Sweden and Poland, and his ac¬ quisitions of new territory in western Germany, as also by lucky treaties of hereditary accession. He defeated the Swedes at the pitched battle of Fehrbellin, helped the emperor with his troops in the War of the Spanish Succession, and left his somewhat scattered domains fairly prosperous and in good order. During the whole of the preceding century his predecessors had not played an important part, either in the Reformation era or in the Thirty Years' War, although they had seized the Church prop¬ erty within their lands and become adherents of 'the new religion themselves and had fallen heir to the dukes of Pomerania and thus prospectively enlarged their patrimony.

Frederick I, although a vain man and one who lived in a style of sumptuous luxury far beyond the scant resources of his state, never¬ theless knew how to play his cards well as the leading Protestant prince in Germany, his par¬ ticular rival, Augustus the Strong of Saxony, having been shortsighted enough to forego that role by forswearing his Lutheran faith in order to win the elective royal crown of Poland, a barren and costly honor. Nor was that all.

Fr :aerick T purchased or otherwise acquired :rom spendthrift Augustus some important Saxon territory; he gained from William III of Orange the territories of Lingen, Mors and Neufchatel ; he founded the University of Halle (1694) and at Berlin an Academy of Sciences and an Academy of Arts. Thus he left his states, overburdened by taxation and in an exhausted condition, though somewhat larger in size (1713). Fortunately for little Prussia his son, Frederick William I, was a man of quite a different calibre, a penurious, clear-headed, thoroughly practical man, with ((no nonsense about him.)) And while the new king's educa¬ tion had been sorely neglected, so that he scorned all mere learning and ridiculed the very institutions his father had created, he had an innate genius for administration and for obtain¬ ing tangible power. His savings filled the empty treasury of Prussia; his army was not large, but well-drilled and equipped ; by his wise economic policy he made Prussia the model of Europe in this respect; after lengthy bar¬ gaining with the Emperor Charles VI he was allowed the succession to the western duchies of Jiilich (Juliers) and Berg, close to the Bel¬ gian and Dutch borders. As for his share in the tremendous wars during his reign in the North — Poland, Russia, Sweden under Charles XIV and Denmark being engaged — and in the West, they proved in a measure advantageous to him, as he secured the larger part of Swedish Pomerania. Much of the king's time was taken up with the negotiations carried on with the emperor relative to the Pragmatic Sanction and the succession of that monarch's daughter, Maria Theresa, to the throne. On both sides there was much duplicity, and finally Frederick William turned to the hereditary foe of the Hapsburgs, France, and that was the state of affairs when he died from an attack of the gout consequent on imprudent diet, on 31 May 1740, and a man of a very different fibre, his son Frederick II, subsequently surnamed the Great, stepped into his shoes. This son had been grossly maltreated by his ignorant father (whom he hated), so that at one time the young man had planned flight to his uncle, the king of England, and had been sentenced to death by his autocratic father for this piece of youthful folly. The old despot even forced his son to witness the execution of his friend and fellow-plotter, a young army officer named von Katt, but finally forgave him and restored him to favor. Young Frederick had passed the years immediately preceding his accession far away from his father's boorish and niggard court, on a small estate of his own, Rheinsberg, among some choice spirits, both French and German, and had there cherished ambitious dreams and polished his mind in all the refine¬ ments of art and learning of the period. Now, with 28, a good-looking, slender, blue-eyed young man, he mounted the throne, his head and heart full of things he meant to do to render his name famous. When Frederick II began his reign, Prussia had but 48,000 square miles and was thinly peopled. His father had left him the best disciplined army in Europe, num¬ bering 80,000, and 9,000,000 thalers in the trea¬ sury, a

sum equivalent to five times the amount to-day. Now Frederick could realize those day¬ dreams of his. At once he began a war of

conquest against Austria for the possession of Silesia. After the first and second Silesian War had brought him this province, Frederick II, after a peace, began to consolidate and fructify hiis gains by wise economic measures. But in 1756 the so-called Seven Years' War broke out, Maria Theresa not having been able to reconcile herself to her loss. This tremendous and desperate struggle was waged with varying for¬ tunes, until at last, by the Peace of Hubertus- burg, Prussia was left in possession of Silesia. During the Seven Years' War, Frederick II had at times made headway against the com¬ bined power of France, Austria and Russia, and England, too, taking part, for or against Prussia. It was only by his undaunted energv and superior generalship that Frederick II was able to defend himself against these powerful coalitions. But when peace came, in 1763, Prussia was in a pitiful condition. In 1772 took place the first partition of Poland, in which Frederick II joined and by which Prussia profited. When at last, in 1786, Frederick died, he left his nephew and heir, Frederick William II (1786-97) a territory of 77,000 square miles with 6,000,000 subjects and an army of 200,000. During the 11 years' reign of Frederick Wil¬ liam II the chief event was Prussia's alliance with Austria in order to put down the French revolution, a purpose in which they signally failed, and next to that the further acquisition of 40,000 square miles by the second and third partitions of Poland. Frederick William III (1797-1840) succeeded, by his weak and vacil¬ lating policy, in isolating Prussia and arousing the wrath of Napoleon. In 1806 Prussia was completely defeated at Jena, and her domain was reduced to less than half its former area. In 1813, however, Prussia acting in concert with Austria and Russia, Napoleon was at last over¬ come by sheer force of numbers and definitely disposed of. At the Congress of Vienna the former possessions of Prussia were restored and new ones added, especially the larger half of Saxony and the remaining portions of Pomerania, as well as valuable territories in the Rhine district. The promise of a liberal con¬ stitution given to the Prussian people was not kept. The only statesmanlike act o£ Frederick William III was the establishment of the Z ollver ein (or free-trade zone) which knitted northern Germany closer together. Frederick William IV (184CM31), a well-meaning monarch of great natural gifts, but of shifting character and erratic mind, went far toward destroying Prussia's prestige and military power, submit¬ ting abjectly to the political yoke of Austria. The part played by him during the revolution of 1848-49 was not free from duplicity. However, under pressure he granted a sort of constitution to his people. The last four years of his life he was insane, and on his death was succeeded by William I (1861-88). It was in his reign, in

1866, that the latent jealousy between Prussia and Austria finally burst into flame in one of the shortest and yet most decisive wars, a war lasting but six weeks. At Sadowa the ancient power and glory of Austria were overthrown and the path for aggrandizement thus made clear for Prussia. Most of the German states, outside of Prussia, had sided against her in 1866, and of these she annexed several at the Peace of Prague, including Hanover, Hesse- Cassel, Nassau and Schleswig-Holstein, thus

raising Prussia to absolutely the dominant state within Germany and leaving her one of the leading military powers of the world. The Nord-deutsche Bund (North German Confederation) was formed by Prussia, under the successful statesmanship of Bismarck, and the latter's far¬ sightedness envisaged even then the war with France. This came about in July 1870 under circumstances which are not quite clear even to-day. Certain it is that Bismarck and the gifted Prussian chief of staff, von Moltke, together precipitated it by some clever juggling with a despatch from their king referring to the French Am¬ bassador, Benedetti, and King William rous¬ ing the French emperor, Napoleon III and the French parliament to outbursts of fury and wounded pride and bringing on a declaration of war from France. The War of 1870-71, in which unexpectedly to the duped Napoleon III, by special previous agreements with Prussia, not only the states belonging to the North German Confederation, but also the Southern ones — Bavaria, Baden and Wiirttemberg — joined, was disastrous for France from start to finish, and at the Peace of Frankfort, humbled France was forced to yield up Alsace and a portion of Lorraine, and an extortionate war indemnity of five billions of francs. While, however, the war still lasted, on 18 Jan. 1871, in the historical Salle de Glace at Versailles, the German princes offered the formal primacy of Germany and the imperial crown to King William of Prussia, who accepted and thus be¬ came the first German emperor. On 21 March 1871, the new Reischstag (or Imperial Parlia¬ ment) met for its initial session at Berlin. From then on, therefore, the history of Prus¬ sia is properly but a part of that of the Empire as a whole.

Bibliography. — Browning, O., 'History of the Modern World, > (2 vols., New York 1912) ; Biilow, Prince von, 'Imperial Germany, > trans¬ lated by M. A. Lewany (New York 1914) ; Friedjung, H., 'Prussia and the German Con¬ federation^ and G. Roloff, 'Bismarck and Ger¬ man Unity) (in 'Cambridge Modern History, Vol. XI, New York 1909) ; Henderson,*

E. F., 'Blücher and the uprising of Prussia against Napoleon) (New York 1911) ; Hueffer, F. M., 'When Blood is their Argument) (ib. 1915) ; James, H. G., 'Principles of Prussian Admin¬ istration) (ib. 1913) ; Lair, M., 'L'Imperialisme allemande) (Paris 1902) ; Lichtenberger, H., 'Germany and Its Evolution in Modern Times' (Eng. trans., New York 1910) ; Kruger, F. K., 'Government and Politics of the German Em¬ pire) (New York 1915) ; Pollard, J., 'Study of Municipal Government) (London i894) ; Priitz, H. B., 'Preussens Geschichte) (4 vols., Stutt¬ gart 1902) ; Ranke, L. von 'Memoirs of Branden¬ burg) (3 vols., London 1849) ; Reddaway, W. F., 'Frederick the Great and the Rise of Prus¬ sia) (New York 1904) ; Riemann, Ed, 'Neuere Geschichte des Preuss Staates) (Gotha 1882) ; Ronne, L. von, 'Das Staatsrecht der Preuss Monarchic) (4th ed., 4 vols., Leipzig 1881-84) ; Schierbrand, Wolf von, 'Germany — the Weld¬ ing of a World Power) (New York 1902) ; Schultze-Gavernitg, Gerh., 'Preuss Staatsrecht J (Leipzig 1888-90) ; ' Statist, Jahrb. fii d preuss. Staat) (Berlin 1910-13) ; Stenzel, G. A. H., 'Geschichte d preussischen Staates> (15 vols.,

Hamburg 1850-54) ; Toppen, Max, 'Geschichte d. preuss. Historigraphie (Berlin 1835) ; Treitschke, H. von, 'Deutsche Geschichte im 19th Jahrhundert* (Leipzig 1879-94) ; Tuttle, Herbert, 'History of Prussia) (4 vols., Boston 1884-90) ; Whitman, Sid., 'Imperial Germany' (London 1889).*

Wolf von Schierbrand, Professor of German Language and Literature ; Chief Correspondent of Associated Press, Berlin.

PRUSSIA, East, or OSTPREUSSEN,

ost-prois'sen, the northeasternmost pro\ince of Prussia, Germany. It is bounded south by Po¬ land, west by Poland and Danzig, northwest by the Baltic Sea, north by Memel and east by Lithuania. Area, 14,286 square miles ; pop. (1919) 2,229,290. Capital, Konigsberg. See Prussia.

PRUSSIA, West, or WESTPREUSSEN,

vest-prois'sen, a northeastern province of Prus¬ sia, Germany. It is bounded on the south and east by Poland, on the north by the Baltic Sea, and on the west by Pomerania. Area, 3,026 square miles; pop. (1919) 326,881. . Most of West Prussia was ceded to Poland in 1919.

PRUSSIAN BLUE. See Dyes.

PRUSSIAN BROWN, a color obtained by adding a solution of the yellow prussiate of potash to a solution of sulphate of copper, which throws down a precipitate of deep brown. This, when washed and dried, is equal to

madder, and possesses greater permanency.

PRUSSIC ACID. See Hydrocyanic Acid.

PRUTENIC, obsolete word meaning Prus¬ sian in astronomy, a term applied to certain planetary tables published by Erasmus Rein¬ hold in 1551 founded on the principles of Coper¬ nicus. They were dedicated to a Prussian duke of that time and thus acquired their name.

PRUTH, prooth (Ger. proot), a river of Europe, which rises on the eastern side of the Carpathian Mountains, in the southeast of Ga¬ licia near the Czecho-Slovakian frontier; flows circuitously east, then south-southeast, forming the boundary between Moldavia and Bessarabia, and after a course of more than 500 miles enters the Danube on the left, about 12 miles below Galatz. For about 200 miles, from Jassy down¬ ward, it is navigable. On the bank of Pruth, near Husi, in 1711, the army of Peter the Great was surrounded by the Turks, and the tsar was not allowed his freedom until he ceded Azov to Turkey.

PRUTZ, proots, Hans Georg, German his¬ torian : b. Jena, Germany, 20 May 1843. He is the son of Robert Edward Prutz (q.v.), was educated in Jena and in Berlin and became privat-docent at the latter place in 1873. He was engaged in a government expedition into Syria in 1874, and in 1877 accepted the chair of history at the University of Konigsberg, from which he resigned in 1902 and has since them resided in Munich. He has published 'Hein¬ rich der Lowe) (Leipzig 1865) ; 'Kaiser Fried¬ rich P (3 vols., Danzig 1871-74) ; 'Geschichte des Kreises Neustadt in Westpreussen) (Dan¬ zig 1872) ; 'Radewins Fortsetzung der Gesta Friderici Imperator's des Otto von Freising, etc.- (Danzig 1873) ; 'Aus Phonicien) (Leip¬ zig 1876) ; 'Quellenbeitrage zur Geschichte der*

Kreuzziige) (Danzig 1876) ; (Besitzungen des Deutschen Ordens in Heiligen Lande) (Leipzig 1877) ; (Geheimlehre und Gehedinstatuten des Tempelherrenordens (Danzig 1879) ; (Kultur- geschichte der Kreuzziige) (Berlin 1883) ; (Malteser Urkunden und Register) (Munich 1883) ; (Staatengeschichte des Abendlandes im Mittelalter) (in Onckern, W., ed., (Allegemeine Geschichte in Einzeldarstellungen,* Division II, part 6, 2 vols., Berlin 1885-87) ; (Entwickelung und Untergang des Tempelherrenordens) (Ber¬ lin 1888) ; (Die Konigliche Albertus-Univer- sitat zu Konigsberg in Preussen in 19 Jahr- hundert) (Konigsberg 1894) ; (Aus des Grossen Kurffirsten Letzten Jahren* (Berlin 1897) ; (Preussische*

Geschichte (4 vols., Stuttgart 1900-02) ; (Bismarck's Boldung; Ihre Quellen und ihre Ansserungen) (Berlin 1904) ; (Die Geistlichen Rotterorden) (Berlin 1908) ; Jac¬ ques Cceur von Bourges) (in Historische Stu- dien, part 93, Berlin 1911) ; (Studien zur Ge¬ schichte der Jungfrau von Orleans) (in Konigl. Bayerische Akademie der W issens chaff en, Sit- zungsberichte, Philos.Philologische und His¬ torische Klasse, Abbandlung II, Munich 1913) ; (Die Briefe Jeanne d'Arcs) (in Ibid., Abband¬ lung I, Munich 1914) ; (Die Friedensidee un Mittelalter* (in Ibid., Abbandlung I, Munich 1915). He has also translated (Herbods Leben des Bishofs Otto von Bamberg* (in Watten bach, W., ed., (Geschichtschreiber der Deuts¬ chen Vorzeit, 12 Jahrhundert,* Vol. VII, Leip¬ zig 1884-96) ; and has edited (Rechunugen fiber Heinrich von Derby's Preussenfahrten, 1390- 91-92* (Konigsberg 1893) ; and with others (Allgemeine Weltgeschichte* of which latter work he wrote (Geschichte des Mittelalters) (Vols. V and VI, Berlin 1891). To the his¬ tory of All Nations* (Philadelphia 1902) he contributed Vols. VIII-X: (The Age of Charle¬ magne* (translated by H. W. Hayley) ; (The Age of Feudalism and Theocracy* ; and*

PRUTZ, Robert Eduard, German poet and historian: b. Stettin, Prussia, 30 May 1816; d. there, 21 June 1872. He was educated at Berlin, Breslau and Halle, and edited, with Arnold Ruge, a radical periodical Hallesche Jahr- biicher designed to promote more liberal views in science, politics and religion. His liberal views made him unpopular with the authorities who refused him permission to teach. How¬ ever, in 1849 he became professor of literature at the university at Halle, but in 1859 resigned to devote himself exclusively to science and litera¬ ture. His poetry is of the patriotic order, as are also his dramas ; his novels display keen powers of satire, and his researches as a his¬ torian gave him high rank in that field of litera¬ ture. As a public speaker, too, he ranked very high and during the latter part of his life, in spite of poor health, he was in great demand as a public lecturer. He was one of the found¬ ers and editor in 1851-66 of the Deutsches Mu¬ seum. He also edited (Literarhistorisches Tas- chenbuch (6 vols., Leipzig 1843-44 and Han¬ over 1845-48) ; (Deutsche Dichter der Gegen¬ wart* (Prague 1859) ; (Holbergs Ausgewahlte Komodien* (translated from the Danish, 4 vols., Hildburghausen 1868). Amongst his plays, none of which are of great importance should be mentioned (Moritz von Sachsen*; (Erich, der*

Bauern Konig ; (Die Politische Wochenstube.* They have been collected as (Dramatische werke* (4 vols., Leipzig 1847-^-9). His novels, too, are of secondary importance, the best known, perhaps, being XXVII, Leipzig 1856) ; (Ludwig Holberg Sein Leben und Seine Schrif¬ ten* (Stuttgart 1857) ; (Deutsche Litteratur der Gegenwart* (2 vols., Leipzig 1859) ; (Menschen und Bficher* (Leipzig 1862). Consult Anon., (R. E. Prutz* (in (Moderne Klassiker,* Vol. XLIV, Cassel 1852) ; Buettner, G., (Robert*

Prutz (in Teutonia Arbeiten zur Germanischen Philologie, part 25, Leipzig 1913) ; Gottschall, R. von, (Robert Prutz* (in Unsere Zeit, Leip¬ zig 1872) ; Mahly, J., XXVI, Leip¬ zig 1888).*

PRYCE, Richard, English novelist and playwright: b. Boulogne, France, 14 May 1864. Among his fictions, many of which have been reissued in this country, are (An Evil Spirit (1887); (The Ugly Story of Miss Wetherby* (1889); (A Just Impediment* (1890); (The Quiet Mrs. Fleming* (1890) ; (Deck-Chair Stories* (1891) ; (Miss Maxwell's Affections* (1891) ; (Time and the Woman* (1892) ; (Wini¬ fred Mount* (1894) ; (The Burden of a Woman* (1895); (Elementary Jane* (1897); (Jezebel* (1900) ; (The Successor* (1904) ; (Towing-Path Bess* (1907) ; (Christopher*

(1911) ; (David Penstephen (1915) ; (Statue in the Wood* (1918). He has also written the following plays: (Little Mrs. Cummin* (1909) ; (The Visit* (from stories by M. E. Mann, 1909) ; (Helen with the High Hand* (from the novel by Arnold Bennett, 1914) ; together with F. Fenn, (Op-o'-me Thumb* (1904) ; (The love Child* (1910) ; together with W. P. Drury, (A Privy Council* (1906), and together with A. Morrison, (The Dumb-Cake* (1907). Consult Carney, F. T., (Richard Pryce. An Appreciation* (in Bookman, Vol. XXXVII, p. 520, New York 1913).*

PRYNNE, prin, Hester, the principal char¬ acter in Nathaniel Hawthorne's romance, (The Scarlet Letter (q.v.), published in 1850. For her sin with the young minister, Arthur Dim- mesdale, she was condemned to stand holding her child upon the platform of the pillory in*

the sight of the populace and wear a scarlet letter A embroidered upon her bodice. This badge of her shame was worn thereafter, while she did expiation by deeds of mercy among her townspeople. Consult Howells, W. D., (Heroines of Fiction) (Vol. I, p. 161, New York 1901).

PRYNNE, William, English author and politician : b. Swainswick, near Bath, Somerset, 1600; d. London, 24 Oct. 1669. He was gradu¬ ated at Oriel College, Oxford, in 1621 and ad¬ mitted to the bar in 1628. He early became a militant Puritan, wrote pamphlets against Arminianism and the frivolities of the age and in 1633 published a huge volume, entitled Vol. XLVI, London 1896) ; Gardiner, S. R., ed., documents Relat¬ ing to Proceedings against William Prynne) (in Camden Society Publications, n. s. Vol. XVIII, Westminster 1877) ; id., distory of

England 1603-42> (Vols. VII-IX, London 1884) ; id., distory of the Great

Civil War (3 vols., London 1888-91) ; Peach, R. E. M.,*

PRYOR, Nathaniel, American soldier, trader and explorer: b. (prooably) Amherst County, Va., about 1785; d. Los Angeles, Cal., 1850. He was a great grandson of Nicketti, daughter of Powhatan and sister of Poca¬ hontas. Left an orphan in infancy, he was taken to Kentucky by the family of his maternal uncle, Charles Floyd. In 1803, he enlisted as a private soldier in the army for the purpose of accompanying Lewis and Clark on the ex¬ pedition across the continent to the mouth of the Columbia. Returning in 1806 with the rank of a sergeant, he was commissioned an ensign and assigned to the command of the detach¬ ment sent to escort Shahaka, the Mandan chief to his home on the Upper Missouri in 1807, but failed because of the hostility of the Arikara Indians. He was promoted to a lieu¬ tenancy in 1808 and resigned from the service in 1810, engaging in trading and lead mining. During the War of 1812, he re-entered the military service and was discharged at its conclusion with the rank of captain. He then became a trader among the Osage Indians, in Oklahoma, operating a trading post near the mouth of the Verdigris River part of the time. In 1821 he joined Fowler and Glenn on their trading expedition to the Rocky Mountains. In 1824 he joined the Pattie's on their trading expedition to the Rocky Mountains and fol¬ lowed all of their wanderings until they ar¬ rived in southern California, where the entire party was imprisoned. After his liberation he settled at Los Angeles where he remained until his death. Pryor Creek and the town of Pryor, county-seat of Mayes County, Okla., were named for him. Consult Nuttall's Journal ; Long, Stephen N., (An Expedition from Pitts¬ burgh to the Rocky Mountains, Performed in the Years 1819 and 1820) ; Coues, Elliott, (The Journal of Jacob Fowler) ; Flint, Timothy, (Pattie's Narrative, and James, Thomas, (Three Years among the Indians and Mexi¬ cans.)*

PRYOR, prl'or, Roger Atkinson, Amer¬ ican lawyer: b. Dinwiddie County, Va., 19 July 1828; d. 1919. He was graduated at Hamp- den-Sidney College in 1845 and at the University of Virginia in 1848 and was admitted to the bar in 1849. For a number of years he was editor of newspapers in Petersburg and Rich¬ mond, Va., and in 1855 was appointed special minister to Greece by President Pierce; sat in Congress 1859-61 and in the Confederate Con¬ gress in 1862. He entered the Confederate army with the rank of colonel in 1861 ; was brevetted brigadier-general in 1862, but re¬ signed his commission and re-entered the army as a private. From 1864-65 he was a prisoner at Fort Lafayette, N. Y. After the war he settled in New York City where he was ad¬ mitted to the bar in 1866. From 1890-94 he was a judge of the Court of Common Pleas and from 1894 to 1899 was justice of the State Supreme Court. He then resumed the prac¬ tice of law. He published (Essays and Ad- dresses) (New York 1912). Consult Hardy,

S. E. M., (Roger A. Pryor* Vol. X, p. 161, Boston 1898).

(in Green Bag,

PRYTANEUM, the building in the capital of a Greek state possessing similar features to the town-hall of modern communities, but hav¬ ing in addition a religious significance and de¬ voted to purposes peculiar to the Greek state. It was dedicated to Vesta and contained the perpetual fire of the state hearth. At Athens (q.v.) the state here entertained as public guests its foreign ambassadors, its envoys re¬ turned from a public mission, its distinguished generals, victors in the Panhellenic games and citizens who had done important service to the state. In the latter case the privilege lasted for the life-time of the recipient. The exact loca¬ tion of the Athenian Prytaneum has never been determined. In the same manner each city and village had its prytaneum, forming the re¬ ligious and political centre of the community. Consult Michel, C., (Prytaneum) (in Saglio, E., and others, ed., (Dictionnaire des An- tiquites Grecques et Romaines,* Vol. IV, pt. 1, p. 742, Paris 1907) ; Poland, F., (Geschichte des Griechischen Vereihswesens) (Leipzig

1909).

PRZEMYSL, pzhem'isl, Poland, one of the oldest towns in Galicia, on the river San, 51 miles west of Lemberg. It is strongly forti¬ fied, being a place of strategic importance. It has an active trade and thriving industries. Przemysl was founded in the 8th century by the Polish prince Przemyslaw, and called aftei his name. The ruins of the ancient residential castle are on a neighboring hill. During the European War Przemysl was invested by the Russians in September 1914. For about two weeks in October the investment was broken, and troops, arms and provisions were hurriedly transported to the fortress. By 12 Nov. 1914 the town was completely cut off again and be¬ sieged by General Selivanoff. On 22 March 1915 the town surrendered with nine generals, 2,500 officers and officials and 117,000 men. In the great Galician drive of von Makensen in the summer of 1915, when the Austro-German forces stood at the gates of Przemysl, the whole Russian garrison disappeared from the town during the night of 2-3 June 1915.

PSALMANAZAR, sal-ma-na'zer, George ((

became a fine Oriental scholar and led a much respected life in London. He wrote (Essays on Scriptural Subjects) (1753) ; several volumes of the (

*Universal History * ; and completed Pal¬ mer's (History of Printing) (1732). Consult autobiographical (Memoirs of . . . commonly*

known by the name of George Psalmanazar)

(1764).

PSALMODY, sabmo-di or sa'mo-di, a singing of the Psalms (q.v.) of Scripture in metrical versions to simple tunes. Psalms and hymns were sung in the religious assemblies of the early Christians ; and the psalms of Scrip¬ ture form the bulk of the daily religious service or (< Divine office® of the Catholic Church, the custom having been borrowed from the syna¬ gogue and the temple of Jerusalem. After the Reformation in the 16th century psalmody was greatly encouraged in the Protestant churches of Germany, France and the Low Countries, and most of the psalm melodies now sung in churches were composed or adapted by German musicians of the 16th century. Metrical ver¬ sions of the Psalms were made in German, French and English. The Scotch reformers paid great attention to psalmody: in John Knox's psalter the Sternhold and Hopkins met¬ rical English version of the psalms was ar¬ ranged with four-part harmony. The metrical version now used in Scotland is the one made by Francis Rous during the Commonwealth and approved by the General Assembly of the Scot¬ tish Church. Consult Armknecht, F., (Die Heilige Psalmodie) (Gottingen 1855) ; Bonner, D. F., (The Psalmody Question) (New York 1908) ; Cooper, J. S., ed., (True Psalrpody) (Philadelphia 1859) ; Kent, C. F., ed.,

PSALMS, Book of. Title.— The Old Tes¬ tament gives no title to the book as a whole. The ordinary Hebrew designation for the book is Sepher Tehillim, meaning Book of Praises. The common title in the Setptuagint is Psalmoi, Psalms, a designation taken from one of the minor collections of the book. This Septuagint title has been followed in most of the versions, including the English.

Authorship, Date and Compilation. — The

titles of the individual psalms contain many statements which have usually been considered to be ascriptions of authorship to various per¬ sons. These statements consist of proper names preceded by the Hebrew preposition le, which may denote authorship, but may also mean be¬ longing to in more general significations. Most prominent of these statements is the title in which the Hebrew preposition precedes the name David, the combination being usually ren¬ dered of David. This is found with 74 psalms, the actual authorship of David being impossible in a large majority of these, as shown by the circumstances, language and thought. If this title was intended to indicate authorship, there¬ fore, it was in most cases erroneous. The 12

psalms with the title of Asaph, also, could not have been written by Asaph, who was a con¬ temporary of David, the psalms being of much later origin. The title of the sons of Korah, in 11 psalms, can hardly have been intended to

indicate authorship by a group. The sons of Korah, according to 2 Chron. xx, 19 and else¬ where, were a guild of temple singers after the exile. In the light of these facts it is now often and preferably held that these titles were not intended, in most cases, to indicate author¬ ship, but to show that the individual psalm had belonged to a minor collection of psalms designated by the name in question, sons of Korah designating a collection used especially by the guild of the sons of Korah, and Asaph indicating a collection used by the Asaphite guild, which was also prominent after the exile. Several other minor collections are also indi¬ cated by the titles, the Hebrew names of these collections being Shir, Miktam, Maskil, etc. Most of the psalms were in more than one of these minor collections, some in one only, a few in none. The evidence indicates that when a compiler used a psalm from an earlier collec¬ tion he put the name of the collection, or a term derived from the name, as a title at the head of the psalm ; when used again a second title was added, etc. It is probable that at least 10 of these minor collections which preceded the present psalter can be traced, the earliest hav¬ ing been made soon after the exile, and the latest in the early Greek period or somewhat later. The Elohistic Psalter, one of these minor collections, needs special consideration for some of its peculiarities. This embraces Psalms xlii-lxxxiii, and is characterized by a great pre¬ ponderance of the use of the divine name Elo- him, in the present text not to the entire exclu¬ sion of the term Yahweh, but perhaps originally so. This was probably partly a matter of orig¬ inal composition, but was certainly in some mea¬ sure due to editorial change. Such editorial change appears clearly from the fact that Psalm liii is an Elohistic recension of Psalm xiv, and Psalm lxx, of Psalm xl, 13-17, and also from a few other details. The reason for the use of the divine name Elohim, both orig¬ inally and editorially, is very uncertain. It cou'btless represents the usage of some circle or region. The documents of the Hexateuch, it is well knowm, present similar phenomena, but as those were written much earlier there may be no direct connection. It seems hardly probable that the usage is due to the supersti¬ tious avoidance of the divine name Yahweh, which was common later. Psalms cxx-cxxxiv constitute a collection usually called ((Songs of Ascents,® and supposed to be pilgrim songs sung by those who were going up to the great feasts at Jerusalem. The title should probably be rendered ((Exalted Songs,® describing the collection as distinguished by special

elevation of thought and feeling, which is in harmonv wTith their character. They have also unusual regularity of form. There are also indications of other small collections not as definitely marked as those which have been described. Thus Psalm cxxxv, 21 has the appearance of being a doxology originally closing a small col¬ lection. There are indications, also, that the closing doxology of book four was originally the doxology closing a small collection. Psalms xciii, xcv-c are marked by many simi¬ larities to one another, and probably formed originally a small theocratic collection. The complete Book of Psalms' as it now exists, or practically so, was probably compiled about 200 B.C., allusions in the book of Ecclesiasticus,

written about 180 b.c., making it probable that it was practically complete at that time. It is now generally held that only a small part of the psalms are of pre-exilic composition. The division into five books doubtless did not take place during the compilation, but later after the compilation was complete, following the analogy of the divisions of the law.

Other proper names appear in the titles of the psalms with the Hebrew preposition le. These are Solomon in 72 and 127; Moses, 90; Ethan, 89; and Heman, 88. It is probable that no one of these marks a collection, and hence that the titles were designed to indicate author¬ ship. But none of them were written by the respective authors indicated. It is probable, therefore, that these psalms should be regarded as pseudonyms, later compositions considered to be in the spirit of these men.

Davidic Psalms. — The number of psalms to be ascribed to David is a much-disputed ques¬ tion. The opinion was held earlier that nearly all the psalms were written by David. It is still believed by some that as many as 40 psalms were written by him. On the other hand, his authorship of any psalms is often denied at the present time. The character of David and the general level of the thought of his time are not favorable to the opinion that he was the author of many psalms. Nevertheless, compo¬ sitions similar to the psalms are earlier than David, and he is by tradition closelv connected with the psalms, while his general musical abil¬ ity is several times noted. The Davidic author¬ ship seems probable for Psalms iii, vii, xiii, xviii and xxiv, 7-10. These are simple in thought and style and have a pronounced war¬ like element.

Thirteen psalms contain in their titles refer¬ ences to specific events in the life of David which are said to have called them forth. The notice might be correct in the case of Psalm 18, but in every other case the notice is definitely out of harmony with the contents of the psalm, 10 of the psalms being quite certainly not of Davidic authorship. These notices are prob¬ ably later traditions of no historical value, or else illustrative additions

made by a later compiler.

Maccabean Psalms. — Some have thought that many psalms were written during the Mac¬ cabean period beginning in 168 b.c. The reli¬ gious devotion and patriotism of the early Mac¬ cabean period might naturally have prompted such expression, and some are in a measure ap- ropriate to that time. In the Maccabean period, owever, Hebrew, it seems evident, had been replaced as a spoken language by Aramaic (con¬ sult Buttenweiser, (Are There any Maccabean Psalms, > Journal of Biblical Literature, XXXVI, 1917, pp. 225-248). Hence Hebrew, if used, would have been employed in an arti¬ ficial and inexact manner such as does not ap¬ pear in the psalms. The Maccabean origin of any psalms is therefore improbable.

Musical and Liturgical Titles. — Besides the elements in the titles already discussed, musical and liturgical instructions are also found. Examples of the liturgical statements are: ((For the Sabbath day® in the title of Psalm xcii ; <(A song at the dedication of the house® in the title of Psalm xxx, etc. The liturgical titles are much later than the psalms themselves, and are added rnlv in a few cases,

in no systematic way ; they evidently represent the usage of the Jews at the time of their addi¬ tion. The Septuagint has several additional liturgical assignments.

Musical directions form part of the title in thirty psalms. It is probable that they were first added in the Elohistic Psalter, 20 of them being found there. These titles are of three kinds : references to musical instruments ; ref¬ erences probably to voices although possibly to the effects of musical instruments ; and refer¬ ences to the melodies in accordance with which the psalms are to be sung, a melody being usu¬ ally designated by one or more of the opening words of a well-known song with which it is associated.

Community Psalms. — In Psalm cxxiv it is explicitly said that the speaker is Israel. In a considerable number of psalms which are ex¬ pressed in the first person the obvious view is that the speaker is the community or the nation, or at any rate some considerable portion of the people. The question has been much discussed in recent years whether this is not the correct understanding of many or most of the psalms written in the first person singular, instead of the individual interpretation. The question is one to be settled in each case by the evidence at hand, with no definite

presumption in favor of either view. The indications of an individ¬ ual interpretation are strongly marked individ¬ ual traits. The indications of a community interpretation are the absence of such strongly marked individual traits, and also the presence of elements of experience which are difficult to reconcile with an individual interpretation, or more strongly suggest some community ex¬ perience. The result is that many of these psalms seem to be individual, and many to belong to the community. Doubtless in some cases an original individual psalm has been re¬ vised to make it more appropriate for commun¬ ity use, 'but this is a process difficult to trace.

The Poetical Character of the Psalms. — There is much difference of opinion concerning the essential nature of Hebrew rhythm. Many regard accent as its essential feature ; but the better view seems to be that, in the very nature of the case, duration of time, rather than ac¬ cent, is always the fundamental element in rhythm. The Hebrew foot, therefore, has the same essential nature as the classical foot, but is more elastic. The Hebrew foot may be de¬ fined as follows : A group of syllables, more or less in number, which, together with any silences that may be included, occupies in utterance a time relatively fixed, that is, the same as other feet in the same composition (consult Lanier, (The Science of English Versed p. 40). The number of feet in a line in the Psalms varies from two to six, there being a measure of uniformity in an individual psalm. The normal stanza consists of two lines, being ordinarily a verse. A division into strophes, a regular combination of several stanzas, is found occasionally, but is no regular feature of Hebrew poetry, although many consider it to be such. This division into strophes, when found, is sometimes marked by a refrain. Parallelism of the lines of a stanza is frequent but not universal, parallelism being also found in He¬ brew prose. Assonance, particularly the repeti¬ tion of the same word in lines near together,

especially in the two lines of a stanza, is fre¬ quent. Most of the Psalms are lyric, a few didactic while a few have a dramatic element. Psalms ix, x, xxv, xxxiv, xxxvii, cxi, cxii, cxix, cxlv have the alphabetic or acrostic structure, in which the separate lines, or stanzas (verses), or two successive stanzas, begin in Hebrew with the successive letters of the alphabet. Ps. cxix, however, is distinguished by being divided into sections of eight verses, each verse in a section beginning with the same letter.

The Thought of the Psalms. — As the psalms are for the most part lyric they are pri¬ marily an expression of feeling. Hence a pres¬ entation of thought would naturally be in a less connected form than in other parts of the Old Testament. Nevertheless, the book con¬ tains the principal phases of thought found elsewhere in the Old Testament. The impreca¬ tions found in abundance in several of the psalms constitute their principal defect

to the thought of the present day. Yet that feature is easily intelligible when approached historically and constitutes no real difficulty when under¬ stood in relation to the time. Several of the psalms show an attitude that is favorable to¬ ward the ritual worship, yet with no presenta¬ tion of its details. For the most part, however, the general attitude of the psalms is in accord with that of the prophets. The lyrical element in the psalms, their character as an expression of deep religious feeling, gives them an appeal to the feelings of men through the ages. While much is in form local and national, there is often an underlying universality of spirit which gives them permanent value as one of the supreme products of the thought and feeling of humanity in fellowship with God.

Bibliography. — Binnie, William, (The Psalms, their History, Teachings and Use) (London 1886) ; Briggs, C. A., (A Critical and Exegetical Commentary on the Book of Psalms) (ˆInternational Critical Commentary,5 2 vols., New York 1906-07) ; Cheyne, T. K., (The Book of Psalms) (New York 1904) ; id., (The Origin and Religious Contents of the PsalteD (New York 1895) ; Cobb, W. H.,

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

PSALTER, sal'ter, the Book of Psalms (q.v.) ; also a book containing the Psalms sepa¬ rately printed ; also specifically, the version of the Psalms in the English Book of Common Prayer. It is also the name of an ancient string instrument of music, the Hebrew Kinnor ; called by the Germans Rotta (Cithara Teutonicd) . Sometimes the rosary of 150 beads used by some order of nuns is called the Psalter, as the Psalter contains 150 Psalms. Consult Boveb F., (Histoire du Psautier des Eglises Reformies5 (Neuchatel 1872) ; Jordan, W. G., (Religion in Song, or Studies in the Psalter5 (London

1915) ; Mackmeeken, J. W., 'History of _ the Scottish Metrical Psalters) (Glasgow 1872) ; Strauss, O., (Der Psalter als Gcsang — und Gebet-Buch) (Berlin 1859) ; Whitham, A. R.,

(Christian Use of the Psalter 5 (London 1908).

PSAMMETICHUS, sa-met'i-kus (Greek ipa/j.fj.f}Tixog, Egypt Psammetk), the name of three rulers of the 26th dynasty. Psammeti- chus I, first

monarch (664-610 b.c.) succeeded his father, Necho, who had been chief of 20 local princelings and vassal of Astirbanipal, King of Assyria. He is first heard of as feudal lord of Sais, the chief centre of the west¬ ern delta. He formed an alliance with Gyges, king of Lydia, against the suzerain power of Assyria; and by the aid of Carians and Ionian Greeks supplied by Gyges, defeated the Assyrian vassal-kings and was crowned "lord of the two Egypts.55 Herodotus says he blockaded Azotus (Ashdod) for 20 years; and he may indeed fre¬ quently have besieged it. He made Phoenicia a vassal state, and devoted much attention to art and architecture. The demotic (or enchorial) writing which, because of greater facility, super¬ seded the hieratic, was invented during his reign, though it cannot be ascribed to his initiative. Psammetichus II (594-589 b.c.) , was grandson of the above. His reign is of note chiefly be¬ cause of the inscriptions made at Abu Simbel (q.v.), by his Greek, Carian and Phoenician mercenaries. Psammetichus III (526-525 b.c.) was last king of the dynasty. His reign was brought to a close by the Persian conquest, and Egypt became a province of Persia.

PSARA, psii'ra, or IPSARA (Gr. Psyra), an island belonging to Greece, in the yEgean Sea, seven miles northwest of Khios ; about five and a half miles in length, and as many in breadth. It consists almost entirely of rock, thinly covered with a vegetable mold. At one time it had considerable commerce, and a pop¬ ulation of 30,000. However, in 1824 it was invaded by Turkey, and after having been de¬ vastated most of its inhabitants were killed. As a result of the Balkan Wars (q.v.) of 1912-13 and of the Treaty of London it was, in 1914, annexed, with the consent of the Great Powers, by Greece. Pop. about 4,500.

PSEUDEPIGRAPHA. See Apocalyptic Literature.

PSEUDO-ISIDORIAN DECRETALS.

See Decretals.

PSEUDOLEUC2EMIA, su"do-lu-se'mi-a, or HODGKIN'S DISEASE, a disorder of the lymphatic glands and sometimes an affec¬ tion of the spleen, characterized by anaemia and progressive hyperplasia. It is also attended by secondary lymphatic growth variously dis¬ tributed in the body. Leucocytosis — excess of white corpuscles in the blood — which accom¬ panies many blood diseases, is not present in pseudoleucaemia. See Blood.

PSEUDOMORPH, the name applied to a mineral which has replaced another, or which appears in crystal forms which are foreign to its original formation. Massive varieties of minerals are more subject to such changes,

but the action is frequently more difficult to trace. There are three kinds : Pseudomorphs, epi- morphs, and paramorphs. See also Minera¬ logy,

PSEUDONYM (Fr. pseudonyme, from Gk. pseudonymos) . A name adopted by an author who desires to remain unknown, or as¬ sumed for the purpose of attracting more at¬ tention at first than might follow from the use of the author's own name. (See Anonymous). Pseudonymous authorship raises certain legal points as to the rights of the author under the Copyright Law (q.v.). In the United States it has been held, though not always, that a copy¬ right acquired under a pseudonym protects fully the actual author if he is the user of the pseudonym. In practically everv civilized country there have been published a number of works listing and revealing the pseudonyms used by their respective authors. For pseu¬ donyms used by the authors of France, Ger¬ many, Great Britain, the Middle Ages and the United States. Consult Barbier, A. A., (Dic- tionnaire des Onorages Anonymes et Pseu- donymes> (3d ed., 4 vols., Paris 1872-79; supplement, edited by P. G. Brunet, Paris 1889) ; Celani, H., 'Additions et Corrections au Dictionnaire des Anonymes de Barbier 5 (in Revue des Bibliotheques, Vol. XI, p. 333, Paris 1901); Courtney, W. P., (The Secret of our National Literature) (London 1908) ; Cushing, W., 'Initials and Pseudonyms) (2 vols., New York 1885-88) ; Franklin, A. L. A., (Diction¬ naire des Noms, Surnoms, et Pseudonymes Latins de l'Histoire Litteraire du Moyen Age, 1100-1530> (Paris 1875); Halkett, S., and J. Laing, 'A Dictionary of the Anonymous and Pseudonymous Literature of Great Britain5 (4 vols., Edinburgh 1882-88) ; Haynes, T. E.,

(Pseudonyms of Authors5 (New York 1882) ; Holzmann, M., and J. Bohatta, (Deutsches Pseudonymen Lexikon5 (Vienna 1906) ; La Fare, A., ed., 'Petit Dictionnaire des Pseu¬ donymes5 (in 'Tort-Paris,5 p. 802, Paris 1918) ; Manes, A., (Das Recht des Pseudonyms5 (Got¬ tingen 1899) ; Marchmont, F., 'A Concise Handbook of Literature Issued under Pseu¬ donyms and Initials5 (London 1896) ; Querard, J. M., ed., 'Les Supercheries Litteraires Devoi- lees5 (3d ed., 3 vols., Paris 1869-70) ; Thomas, R., 'Handbook for Fictitious Names5 (London 1868); Id., Aggravating Ladies: Being a List of Works Published under the Pseudonym of "A Lady55 5 (London 1880); Weller, E., 'Lexicon Pseudonymorum ; Worterbuch der Pseu¬ donymen aller Zeiten und Volker5 (Regens¬ burg 1886).

PSEUDOSCOPE, in optics , an instrument, invented by Wheatstone, for producing an ap¬ parent reversion of the relief of an object to which it is directed, by the transposition of the distances of the points which compose it. A false impression is thus conveyed to the eye, a globe becoming apparently concave and a hol¬ low body assuming a convex form. See Optics.

PSEUDOSUCHIA, an order of Croco- dilia. See Herpetology.

PSILOMELANE, a hard, dull, black min¬ eral, essentially a hydrous manganese mangan- ate, but part of the manganese often replaced by barium or potassium. It occurs abundantly massive or in botryoidal and stalactitic forms in Germany, England, Arkansas and many other localities. It is one of the commonest ores of manganese,

PSITTACI, sit'a-si, the parrot tribe, a fam¬ ily of scansorial birds, comprising over 300 species, of which the genus Psittacus is the type. See Parrot.

PSKOV, pskof, or PLESKOV, Russia, (1) town, capital of the government, on the right bank of the Velikaya, which here receives the Pleskova, 165 miles south-southwest of Petrograd, with which, as also with a num¬ ber of other cities, it is connected by rail¬ roads. There is also a steamship line between Pskov and Dorpat, It is walled, flanked with towers, all in a very delapidated state, as are also many of the houses. It consists of the Kremlin, the Central city, the Great city and a considerable suburb. All the private houses and the far greater part of the public edifices are of wood. The finest buildings are in the Kremlin. The principal manufacture is Rus¬ sian leather ; and there is a considerable trade in hemp, flax, tallow, hides, etc. Pskov is the see of an archbishop and possesses a theological seminary, a well-managed hospital, an ancient cathedral and other old churches and monas¬ teries, most of the latter being in ruins. It is said to have been the birthplace of the Princess Olga toward the end of the 10th century. Dur¬ ing the Middle Ages it possessed great im- • portance as a trading centre and for a long time maintained its freedom as a city republic, which it lost in 1509 when it came under the rule of Moscow. It went through a number of sieges and gradually deteriorated, though with the coming of railroads, it regained some of its former mercantile prosperity. Pop. 38,300.

(2) A government of Russia, bounded north by Petrograd, northeast by Novgorod, east by Tver, southeast by Smolensk, south by Vitebsk, west by Livonia ; area, 16,678 square miles. The surface toward the southeast is traversed by the Valdai Hills, but sinks gradually down near the centre, having only a gentle slope toward the north and west. The soil is through¬ out of poor quality and can only be made to yield tolerable crops by fertilization. Wheat is seldom grown, and the principal crops are flax, oats and barley, which are raised in con¬ siderable quantities, so as to leave a surplus for export. Forests are extensive; but the wood is not of the best quality. The only other manufacture of importance is leather. There are more than 800 lakes in the govern¬ ment, covering about 390 square miles. The largest of these is Lake Pskov (300 square miles). Over 1,200 square miles are covered by marshes. Pskov is divided into eight districts. The majority of its population are Great Rus¬ sians. Pop. 1,447,000.

PSORIASIS, so-ri'a-sis, chronic skin dis¬ ease, allied to alphus and lepra, non-contagious but often hereditary. It is characterized by an inflammatory condition, with slightly elevated patches, dry and various in number, size and shape, to which grayish scales adhere. These exfoliate, to be repeatedly renewed. The ex¬ tensor sides of the extremities, the elbows, knees, trunk and scalp, became first affected, and the flexor sides of the limbs are afterward attacked. Only the mucous membranes of the body are exempt from this disease, the cause of which is little understood, and which re¬ quires for treatment competent medical skill. It is mainly a disease of adult

life. The treat¬

ment is both external and internal, the former being the more efficacious. Arsenic is a favo¬ rite in internal treatment, but its use is open to serious disadvantages. <(Asiatic pills® is an¬ other arsenical preparation used in treating psoriasis. Salvarsan and neosalvarsan have proved ineffective. Hot baths at night, with a liberal use of soap, assist greatly in removing the scales. Sapo viridis is also used for this purpose. Consult Hutchins, M. B., Vol. VII, New York 1916).

PSOVIE, or BORZOI. See Greyhound.

PSYCHE, si'ke (Greek meaning

breath, soul, life), in Greek mythology, a beau¬ tiful maiden regarded as an allegorical personi¬ fication of the human soul. In a version of her story given by Apuleius in (The Golden Ass> she is the daughter of a king and far outshines in loveliness her two elder sisters. Men take her for Venus herself and pay her the homage due to the goddess. In anger Venus directs Cupid to inspire Psyche with love for some un¬ worthy wretch, but Cupid himself falls in love with Psyche. Meantime her father consults the oracle of Apollo regarding his daughter's marriage, and is commanded to convey her to the summit of a mountain and there leave her, for she is the destined bride of a monster dragon feared by gods and men. Sorrowfully he obeys, but when Psyche is left alone she is wafted by Zephyr to the palace of Cupid who visits her every night and departs unknown before morning. She is warned by her lover never to seek to know who he is, and no break would have occurred to her happiness had she not allowed her jealous sisters whom she ad¬ mitted to her confidence to half persuade her that she held a hideous monster in her arms. One night while Cupid slept she came with a lamp to see him and in her astonishment and joy at beholding the most beautiful of the gods she lets fall a drop of heated oil upon his shoulder. Cupid awakes, reproaches Psyche for her suspicions, and leaves her. After try ing in vain to drown herself, Psyche wanders from place to place seeking her beloved till she comes to the temple of Venus. Having Psyche at last in her power Venus treats her as a slave and imposes menial tasks, under which the maid would sink but for secret help ob¬ tained from Cupid. At length Venus orders Psyche to descend to the realm of shadows and bring away Proserpine's box of cosmetics. She succeeds in the adventure, but on opening the box is assailed by a deadly vapor issuing therefrom and perishes. Cupid now reappears, touches her with an arrow and restores her to life. Venus is reconciled, and Jupiter places Psyche among the immortals. Her marriage to Cupid is celebrated with great festivities, while her envious sisters cast themselve from a precipice. The story, as the name implies, doubtless was an adaptation of, and possibly*

was founded upon, the theory of the pre-exist¬ ence of the soul, its suffering in this life, and then final redemption. Various phases of the story are to be found in early Greek and Ro¬ man art, dating even from the 2d century b.c., Psyche being represented as a delicate maiden with butterfly wings. Consult a translation of Apuleius story in Walter Pater's (Marius the Epicurean } (London 1885; new ed., New York*

1902) ; and poetical versions of the tale in Morris' (Cupid and Psyche) in (The Earthly Paradise; and Bridges, Pros and Psyche > ; Conze, (De Psyches imaginibus quibusdam) (Berlin 1855) ; Rohde, E., (Psyche) (1894),*

*PSYCHIATRY, that branch of medicine which deals with diseases of the mind. Histor¬ ically while mental diseases have always been recognized, they have often been thought to be of divine or diabolical origin and their con¬ sideration has been hopelessly entangled with religion and with metaphysical speculation. Even after mental diseases came to be recog¬ nized as the legitimate occupation of medicine their study was for a long time confined to the more serious varieties, collected under the cap¬ tion ˆinsanity,** which were found only in the asylums, and correspondingly the study of these patients and their illnesses became a dis¬ tinct specialty of the asylum physicians (alien¬ ists). The practice of mental medicine in this restricted field tended for a long time to be little more than the custodial, albeit kindly care, of the seriously ill of mind. The great mass of practitioners of medicine had little or no interest in the subject. During the asylum period in the history of psychiatry very little was accomplished in the way of the scientific development of this branch of medicine. Its very isolation operated to prevent its growth and when finally progress did gain access to the asylum it was more occupied with humani¬ tarian than with more strictly scientific prob¬ lems. Then, too, the sciences upon the basis of which a firm foundation for psychiatry could be laid were not far enough advanced to warrant much progress. The science of psy¬ chology was honeycombed with metaphysical speculations and has only come to a systematic effort at an experimental elaboration of its data during the past generation. As a result of these conditions the early history of psychiatry is a history of more or less crude speculations, classifications and descriptions. Little was sus¬ pected of underlying causes and metaphysical discussions of the relation of mind and body effectually prevented all practical considera¬ tions of human behavior.*

Present-day psychiatry has been made pos¬ sible by the advances which

have been made in the sciences upon which it rests, particularly by the advances in psychology, or more particu¬ larly that department of psychology which deals with abnormal mental reactions, namely psychopathology. A better understanding of the nature of mind and its position in the gen¬ eral evolutional scheme has made it evident ihat mental disease is the psychological mani¬ festation of difficulties and defects of adjust¬ ment due either to causes operating within (endogenous) or from without (exogenous). Psychiatry thus becomes concerned with dis¬ covering these causes and makes a therapeutic approach to the problem presented by the symp¬ toms of mental diseases by attempting to se¬ cure a better adjustment by removing the causes, avoiding their operation, or effecting some compromise solution. Inasmuch as de¬ fects of adjustment of some sort arc present in practically every one, psychiatry has come to deal with all problems of mental health and not only the severe types of maladaptation found in the hospitals for the insane. Its therapeutic

armamentarium includes not only all of the mechanical (surgery) and chemical (drug) methods of general medicine, but psychological methods (psychotherapy) as well as efforts at social rehabilitation and readjustment. It therefore includes the whole field of mental medicine, reaching into the field of social adap¬ tation as a very important point of its domain and including, on the preventive side, the prob¬ lems of mental hygiene.

To particularize the more important fields in which psychiatry has become important in recent years. In the first place there is of course the field of the so-called insanities or the frank psychoses such as we see in the hospitals for the insane. This field has been greatly broadened of late by appealing to patients to seek the assistance of the hospital before be¬ coming seriously ill and availing themselves of the hospital's help after recovery to re-establish themselves socially. Then there is the immense field of the defective including the problems of the idiot and imbecile ; the backward child in the school ; and the innumerable problems of social maladaptation which have their roots in defectiveness such as many of the problems of prostitution, criminality and poverty. The whole field of criminology belongs essentially in the domain of psychopathology and thus comes within the practice of mental medicine- psychiatry. The most important field of mod¬ ern psychiatry is perhaps the neuroses and psy¬ choneuroses, which include those conditions known as hysteria, neurasthenia, obsessions, doubts, fears, impulses, etc. The persons who manifest this group of symptoms are not infre¬ quently well endowed mentally, but their effi¬ ciency is greatly impaired by their illness. They can now be greatly helped by appropriate psy¬ chotherapeutic treatment. A study of these conditions has shown so clearly the conditions from which they grow that a further advance in preventive medicine along these lines will project the

findings of psychiatry upon the problems of education and in fact the whole great group of problems involved in successful living. The principles which are found appli¬ cable to all these various abnormal conditions are as truly applicable to transient mental disturb¬ ances in quite normal people such for example as various types of nervousness, unhappiness or difficulties of adjustment dependent upon some character trait. The differences between the normal and the abnormal mind is only one of degree so that the field of psychiatry has now broadened to include what but a short time ago would have been considered the normal but where minor maladjustments prevent the full¬ est efficiency.

Bibliography — Kraspelin, Emil, 'Lectures on Clinical Psychiatry) (authorized translation from the German by Thomas Johnstone, New York 1904) ; Jelliffe, Smith Ely and White, William A., 'Diseases of the Nervous Svstem) (New York and Philadelphia 1917) ; id. (eds.), (The Modern Treatment of Nervous and Men¬ tal Diseases) (by American and British au¬ thors, ib. 1913) ; White, William A., < Mechan¬ isms of Character Formation) (New York 1916) ; id., Principles of Mental Hygiene) (New York 1917) ; id., (Outlines of Psychiatry (Washington, D. C., 1918) ; Tanzi, Eugenio, (A Text book of Mental Diseases) (authorized*

translation from the Italian by W. Ford Robertson and T. C. Mackenzie, London 1909) ; Tuke, D. Hack, (A Dictionary of Psychological Medicine) (London 1892) ; Jelliffe, Smith Ely, (Mental Diseases, Classification of) (in Refer¬ ence Handbook of the Medical Sciences, Vol. VI, New York 1916) ; White, William A.,*

(Mental Diseases, Classification of) (in Refer¬ ence Handbook of the Medical Sciences, Vol. VI, ib. 1916) ; The Psychoanalytic Review, a journal devoted to an understanding of human conduct, edited and published by William A. White and Smith Ely Jelliffe (Washington, D. C.) ; Mental Hygiene (Concord, N. H., quarterly) ; The American Journal of Insanity, under the auspices of the American Psycho¬ logical Association (Baltimore, Md.) ; The Journal of Nervous and Mental Disease, an American Journal of Neurology and Psychiatry (New York).*

William A. White, M.D.,

Superintendent of Saint Elisabeth's Hospital, Washington, D. C.

PSYCHIATRY AND WAR. In harmmiy with the general fact that it is man's mind that receives last consideration in questions of health it took

until the European War for any real appreciation of the incidence of mental disease in the military forces to get recogni¬ tion. The Russians in the Russo-Japanese War had a regular organized service for caring for the mentally ill, removing them from the front and taking them back to the hospitals at Mos¬ cow and Saint Petersburg, but it remained for the European War to develop a real compre¬ hensive appreciation of the nature of the prob¬ lems involved. The first of these problems, namely the examination of recruits for the pur¬ pose of eliminating the mentally defective or otherwise affected individuals who would prob¬ ably not be able to stand the stresses of actual conflict, was developed more elaborately in this country than in the European countries, prob¬ ably for the obvious reason that in America the man power was not so severely taxed, for when it is experience teaches, that all methods of examination which result in the elimination of recruits are looked upon with progressingly less favor.

The general plan in dealing with mental ill¬ ness in the American army was broadly as fol¬ lows : first, a weeding out of defective and otherwise mentally abnormal individuals in the various camps, the establishment in connection with the various hospitals, particularly, the large ise hospitals, of psychiatric wards in charge f a competent psychiatrist and assistants, with a detail of nurses who had had experience in institutions for the care of the mentally, ill. The mental cases thus in the large base hospitals received their proper classification and therefore treatment as did other varieties of illnesses and injuries. Coupled with this fundamental or¬ ganization there was an effort to segregate the mental case as soon as possible back of the fir¬ ing line and to place him under treatment at the earliest possible moment. Psychiatric de¬ partments therefore naturally took their place alongside of other departments in the great hospitals for the American troops on the other side. In these divisions of the hospital the men¬ tally ill received prompt treatment, the object

being to deal with minor mental ailments promptly before they had become aggravated or chronic, with the immediate object of getting the soldier back into service and avoiding the necessity of invaliding him home.

The European War developed no new forms of mental disease. The particular delusions or hallucinatory experiences of the mentally ill naturally varied and took their material from the immediate surroundings. Aside from this the pictures of mental illness were the same as we were accustomed to see in civil life. The one overwhelming feature, however, which distin¬ guished the mental cases in this war was the prevalence of the neuroses, grouped together under the somewhat misleading and general term <(shell shocks These neuroses did not offer anything particularly different from those that are seen in civil life, but were very numer¬ ous and a source of serious concern because of that fact. It was because many

of these neuroses could be dealt with effectively, if got¬ ten at early, that the scheme was to deal with them in hospitals on the other side. All of the chronic cases such as are seen every day in State hospitals and patients suffering from neuroses in whom the neuroses had become a pretty well-fixed affair, were ultimately in¬ valided home and distributed on landing to specially constructed psychiatric wards, for the most part along the Atlantic Coast. From here they were further distributed, some to military hospitals, some to Saint Elizabeth's Hospital, in .Washington, D. C., some to State and private hospitals, others to their friends and relatives.

The United States government will normally be responsible for those soldiers whose mental illness is directly traceable to the performance of their duties as soldiers. Naturally there were a number of cases whose mental illness was traceable to conditions which arose before they went into the service and were only discovered by the army. For these the United States will be responsible also. The treatment of these mental cases will be a part of the problem of the rehabilitation of the soldier, under the pro¬ visions of the War Risk Act.

The immediate dealing with mental disease as generally recognized merges imperceptibly in several directions into the handling of vari¬ ous psychological situations which are recog¬ nized as being more or less abnormal. For ex¬ ample, in the rehabilitation of the injured and crippled soldier the psychological problems in¬ volved are most important and strike at the very foundations of the capacity for social ad¬ justment. The crippled hero is not easily go¬ ing to be inducted back to the hum-dum drudg¬ ery of the shops, nor is the employer easily go¬ ing to be induced to hire a man who is severely crippled when he can just as easily get one who is not. The method of approach to these prob¬ lems is psychological and in the case of the at¬ titude of the soldier at least approaches, if it does not overstep, the limits of the normal.

In the same way numerous problems of de¬ fective psychological adjustment are arising in other directions. The highly trained, exquisitely sensitive flying men not only require a most careful and frequent sizing up of their physical resources, but it is beginning to be appreciated that they need the same kind of attention to their psychological resources and that perhaps

a number of the accidents which happened in this branch of the service could have been avoided if this sizing up had been effectively done.

The psychological examination of recruits in large numbers introduced methods of sifting out defectives, but in addition to that it intro¬ duced methods which serve as measuring rods of efficiency. So that the hundreds of thou¬ sands of men who went into the service were measured in a way in which the population has never before been measured, with a result that methods are growing up which will serve more and more effectively to fit the individual to his job and also to pick out all manner of defects in the usual way of accomplishing this end.

The army proved to be a great piece of efficiency machinery which demanded certain pretty well-defined results and the line officers and the scientific men worked side by side, not for the sole purpose of weeding out the unfit or treating those who had become ill but with the added purpose of saving those that were misfits by making readjustments in their rela¬ tions to the army machine either by transfers to other branches of the service, certain re- educational adaptations, or what not, which would render it possible for them to stay in the army and render good service in accord¬ ance with their capacities. Undoubtedly this great experience, projected into the civil popu¬ lation after the war, will result in the problems of psychiatry, of mental illness, of social ad¬ justability, all being viewed in a much broader aspect and being much more wisely dealt with.

In addition to the above definite efforts are being made along other lines which at first perhaps seem to have no relation to mental ill¬ ness but which really are closely related thereto, specifically the efforts in the direction of social hygiene, namely, the prevention of the high in¬ cidence of venereal disease which is so usual in military organizations. When it is appre¬ ciated that syphilis is responsible for upwards of 10 per cent of the cases of mental disease confined in our public institutions it will be also appreciated how efforts at limiting the in¬ cidence of this disease go directly to the root of the problem of the prevention of mental disease. A co-ordinate activity addressed in the same direction is the effort at providing adequate recreation and suitable occupation dur¬ ing the leisure hours for soldiers in camp. These are all efforts in the direction of mental hygiene and as such are addressed to the pres¬ ervation of mental health and the prevention of mental illness and, therefore, come within the scope of psychiatry in its widest meaning. The prevention of any material percentage of ve¬ nereal disease in the military organization by such methods as were addressed directly or indirectly to their prevention or cure will ultimately have an enormous effect upon the general health throughout the country since the soldiers have returned to civil life and to their various pur¬ suits. Ordinarily soldiers bring back into civil life an enormous amount of potential suffering and disaster in the shape of venereal infection, an unknown portion of which must necessarily result in the mental illness of themselves and others. Venereal prophylaxis and methods

of mental

hygiene will serve to curtail this danger very materially.

William A. White, M.D., Superintendent of Saint Elizabeth's Hospital, Washington, D. C.

PSYCHICAL RESEARCH. In its tech¬ nical sense psychical research refers to objects and methods of investigation employed by The Society of Psychical Research, which was founded in England in 1882. The function of this society is set forth in the following an¬ nouncement: ((It has been widely felt that the present is an opportune time for making an organized and systematic attempt to investigate that large group of debatable phenomena desig¬ nated by such terms as mesmeric, psychical and spiritualistic. From the recorded testimony of many competent witnesses, past and present, including observations recently made by scien¬ tific men of eminence in various countries, there appears to be, amidst much illusion and decep¬ tion, an important body of remarkable phenom¬ ena, which are prima facie inexplicable on any generally recognized hypothesis, and which, if incontestably established, would be of the high¬ est possible value. The task of examining such residual phenomena has often been undertaken by individual effort, but never hitherto by a scientific society organized on a sufficiently broad basis.® The society's membership has in¬ cluded the names of Henry Sidgwick (the first president), A. J. Balfour, W. F. Barrett, Bal¬ four Stewart, Edmund Gurney, Frederic W. H. Myers, Oliver Lodge, William Crookes, Lord Rayleigh and Alfred Russell Wallace. In 1884 an American Society for Psychical Research was established and later (1890) incorporated with the British society. In 1906 the societies again separated. Similar organizations have been formed in Germany and other countries. The records of the English society fill many volumes of Proceedings and Journals. Besides these offi¬ cial reports, individual members have published numerous works on psychical research. The investigations of the society have been directed by six principal committees to whom the fol¬ lowing tasks were severally assigned in 1882 : (1) An examination of the nature and extent of any influence which may be exerted by one mind upon another, apart from any generally recognized mode of perception. (2) The study of hypnosis, trance, clairvoyance and other allied phenomena. (3) A critical revision of Reichen- bach's researches with certain organizations called "sensitive.® (4) An investigation into apparitions and haunted houses. (5) An in¬ quiry into the various physical phenomena com¬ monly called spiritualistic; with an attempt to discover their causes and general laws. (6) The collection and collation of existing materials bearing on the history of these subjects. In brief, the work of the committees has covered the subjects of telepathy, hypnosis, trance, au¬ tomatisms, "magnetic sensations,® apparitions and

“spiritualistic manifestations.® Three prin¬ cipal methods have been employed by the com¬ mittees and by individual members of the society: (1) the examination of accumulated evidence and of current cases; (2) experi¬ mental investigation, and (3) statistical treat¬ ment. The first of these methods has been used widely in the study of apparitions and alleged spiritualistic phenomena — ghost stories

have been collected and noted mediums ex¬ amined ; the second, in hypnosis, in tests of Reichenbach’s claims and in the collection of evidence for telepathy; and the third, in inter¬ preting extensive data regarding apparitions and hallucinations.

The results obtained by the several commit¬ tees are quite unequal. Investigations into the ˆmagnetic sense,® into clairvoyance, haunted houses and the grosser physical manifestations of ˆspirits® — that is, raps, table-tipping, slate¬ writing, levitation and ˆmaterializations® — have turned out, on the whole, negatively. Many in¬ stances of fraud, of defective observation and of involuntary deception have been brought to light. Hypnosis and allied states have been investigated, not so much for their own sake as for the study of telepathy and of subcon¬ scious states. The work of the society may be said to centre in the question of telepathy and the existence of mind independently of the body. In order to secure evidence touching both these matters the Society for Psychical Research in¬ stituted, in the years 1889-92, an extensive cen¬ sus on hallucinations. Answers to the number of 17,000 were returned to the following ques¬ tion : Have you ever, when believing yourself to be completely awake, had a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a voice; which impression, so far as you could discover, was not due to any external physical cause? About one-tenth (1,684) of the answers were affirm¬ ative, and of this number 80 were ((death- coincidences ; that is, cases of recognized ap¬ paritions occurring within 12 hours of the death of the person represented, the death being unknown to the percipient at the time.® The committee in charge of the census draws the conclusion that ((between deaths and apparitions of the dying person a connection exists which is not due to chance alone.® In the last few years the society has devoted much attention to the study of trance states as produced in certain persons called (

The achievements of psychical research are difficult to estimate. The movement has un¬ doubtedly contributed to knowledge of the facts investigated and the conditions under which these facts arise. It has also

performed a serv¬ ice to mankind in its critical examination both into the validity of human testimony and into certain unreliable factors in the motives to the establishment of belief. The evidence offered for a telepathic agency and for the independ¬ ent existence of mind apart from cerebral func¬ tions is considered in some quarters as amount¬ ing to proof ; in others, as lending probability only to these hypotheses ; and, by many educated persons, as entirely lacking in cogency. It is of importance to notice, in this connection, that be¬ lief in the factual basis of telepathy — that is, in the influence of one mind upon another where no physical medium has yet been dis¬ covered — does not necessarily imply a theory regarding the nature of and the conditions un¬ derlying such influence. Various hypotheses in¬ tended to explain the facts in question have been offered, but no one of them has as yet found general acceptance.

Psychical research, in so far as it examines conscious experience, sustains a somewhat inti¬ mate relation to psychology ; although it is more closely allied to abnormal than to general psy¬ chology. It should be pointed out, however, that its aims and in some respects its methods also bring it into closer relation to certain practical aspects of life and to philosophy than to psychology.

Bibliography. — Abbott, D. P., (Behind the Scenes with the Mediums) (Chicago 1909) ; Gurney, (Phantasms of the Living) (1886) ; Holt, H., (On the Cosmic Relations) (New York 1915) ; Hyslop, J. H., (Psychical Re¬ search and SurvivaP (New York 1913) ; Jas- trow, J., (The Subconscious) (Boston 1906) ; Lang, A., (Cock Lane and Common Sense) (London 1894) ; Myers, (Human Personality and its SurvivaP (London 1903) ; Podmore, F., (Modern SpiritualisnP (New York 1902).

Madison Bentley,

Professor of Psychology, University of Illinois.

PSYCHIDiE, a family of moths (q.v.).

PSYCHOANALYSIS is primarily a sys¬ tem or method of medical practice which aims to interpret and treat various visceral, nervous and mental disorders through their most funda¬ mental causes in the nature and life of the in¬ dividual. These causes are discovered and a readjustment of the factors they represent is effected through the means which the name sug¬ gests, an analysis of the psyche or mind. This name was chosen by Sigmund Freud of Vienna to express the nature of his work when he elaborated this method in his experience with hysteria and other psychoneuroses. It was through his experience working with Breuer in hypnotizing such patients that he came to a realization of the existence and

continued ac¬ tivity of certain factors or groups of factors belonging to the mental life, which survived in the unconscious when consciousness no longer remembered their existence. He found that the bringing of these hidden factors into conscious memory or into free activity through hypnosis and the obtaining thus of an emotional reaction to them, even after a long period of years in which they were consciously forgotten, gave relief from various physical and mental symp¬ toms. As he proceeded with his work he came to realize that hypnosis was by no means a completely satisfactory method of procedure. Many patients could not submit to hypnosis ; the results were not always sufficiently perma¬ nent as it was more or less difficult for con¬ sciousness to retain the effect of the abreaction of affect or emotion which had been obtained during the hypnotic state. He felt that there should be more co-operation between the pa¬ tient and the physician, which could be better realized and more effectively handled if the patient retained consciousness and brought his own reason also to bear upon the problems and the facts involved. This would be a slower but a more effective method and one which would have an application to a larger class of people. The method consists briefly in a series of inter¬ views extending over varying periods of time owing to the mass of mental material to be ex¬ amined and to the emotional obstructions which have to be patiently understood and overcome as this long buried and highly emotional material is brought to light. The working principles of psy-

choanalysis lie in the acceptance of an uncon¬ scious side to the mental or psychic life, which forms the greater part of any individual life. This unconscious material should naturally be the reserve material conserved from the past lying ready for continual passage over into the superficial conscious life to furnish material for thought and action. It should be the store¬ house of all past experience and of the sum of feeling and tendency which constitute individual character. The way into consciousness should be sufficiently open so that such material may be selectively chosen according to practical and creative needs and yet so well guarded that su¬ perfluous material shall not thrust itself dis- tractingly into the field of thought and action. Therefore a certain amount of repression is necessary to hold the psychic material in useful control.

The ideas and the feelings which belong to past experience and which form the mental con¬ tent of each individual, however, have not al¬ ways established themselves in the past in proper proportion and relation to the facts of life and toward each other. There is a good deal of exaggeration, disproportion and distor¬ tion in any life and an excess of these things,

from the point of view of psychoanalysis, con¬ stitutes a neurosis. Here repression has become excessive because emphasis was laid upon cer¬ tain factors probably in infancy, which would thrust into undue attention certain things which society and the individual's own social, ethical and aesthetic sense would tend to banish. Yet these factors had not been properly attended to before repression occurred. Their exaggerated emotional importance had not been relieved by a reaction to them, "abreaction® Freud has called it, at the time when they were established. Therefore it is the work of psychoanalysis to search the unconscious for the existence of such hidden factors and bring them out through an understanding and interpretation of them and a recognition of their actual place in the econ¬ omy of the child's and the adult's growth and development. The discovery of these, their cor¬ rect appraisal and then the readjustment of them to the claims of reality and the demands of the social environment in which the indi¬ vidual has to live must be made by the patient with the guidance aind interpretative aid of the psychoanalyst. The searching of the uncon¬ scious takes place chiefly through the interpreta¬ tion of the dreams of the night, when accord¬ ing to the theory of psychoanalysis the uncon¬ scious emotional nature, which manifests itself as wish, speaks most freely, conscious control being largely withdrawn. Enough of the latter is present, at least at the moment of waking and remembering the dream, to cause the latter to take a distorted form, so that the wish, the pure expression of the unconscious impulses, is much disguised. For this reason psychoanaly¬ sis in the use of the dream is dependent fur¬ ther upon the free associations which are called forth by relating and thinking over the dream. These too are imperfect and fragmentary but, because they belong in the endless chain of mental associations, disclose more and more of the mental background out of which the dream arose. It is the endeavor of psychoanalysis to watch these, follow them patiently as they draw themselves together and gather insight and in¬ terpretation from them. Daydreams are of the

same nature as the dreams of the night, only a little more under control of conscious intellec¬ tual thought. From the same source are cer¬ tain sudden acts, facial expressions, attitudes, mistakes in speaking, sudden forgettings, spon¬ taneous displays of feeling. They all arise from the unconscious depth of the mental life to appear on the conscious surface. These are also watched and utilized in psychoanalysis for the discovery and understanding of the hidden mental life.

The cure in psychoanalysis is no mystery but occurs through the simple understanding of the hidden forces and desires within one, with the strange and unsocial or obsolete ideas which have surrounded these from earlier stages of individual development and which analogous to earlier or even more primitive periods of racial history. When the real nature of this inner

life is realized and its emotional dynamic force understood for the first time, it follows natu¬ rally that the life is reconstructed along new lines of usefulness and health. Yet because of the depth and the complexity of this inner psychic life such understanding and readjust¬ ment are not .arrived at quickly or easily. For this reason psychoanalysis necessarily has to pursue a pathway of serious duty, profound psychology and extensive knowledge of human life in its present extent as represented in all peoples and all varieties of individual and in the past history of men and the gradual devel¬ opment of the race as well. It must learn to know the history of human striving with these same emotions which belong to all ages, and to know the special manifestations of these which belong to any one age of history or evo¬ lution. For traces of all these are found in the psychic recapitulation of each individual and any one of these may help to understand any particular mental fixation which may lie as a basic cause of a neurosis.

Psychoanalysis finds its particular field in the psychoneuroses or borderland cases, so- called "nervous® disorders of a mental rather than a purely physical anatomical type. Such cases are particularly fitted for the intellectual co-operation which the method entails and they are also in particular need of a method which combines reason and a frank recognition of the feeling life. Strictly medical procedures fail to reach them and other forms of so-called mental healing do not enter as psychoanalysis does into the detailed investigation of individual difficulties and bring them one by one into the clear light of reason. A sweeping and revo¬ lutionizing "'faith® is supplanted here by per¬ sonal and patient examination and interpre¬ tation. Actual psychoses, pronounced mental derangements, are not always amenable to psychoanalytic treatment yet much has already been done here when the more lucid intervals or the still remaining reason of a patient could be utilized for co-operation. Psychoanalysis has proved itself invaluable in the understanding of such mental disorder and appreciation of the emotional conflict involved with an interpretation of the hitherto meaningless ideas and behavior of such patients. The field opens here for men¬ tal prophylaxis through psychoanalysis. A prom¬ ising field is opening up for the application of the principles of psychoanalysis to various physical diseases since on the side both of

psychology and of physiology new information is continually being discovered and reported in regard to the close interrelation between men¬ tal factors and physical manifestations. In its prophylactic function psychoanalysis bids fair to become an important pedagogical agent. It has

shown through its medical work the im¬ portance for the health and success of later life of the right attitudes in childhood and of a clearer knowledge on the part of the child of the mental life which he conceals within him. Its province certainly lies in the future in bet¬ ter instruction for children in regard to their own mental and physical lives and better under¬ standing and adjustment of the problems which arise in the course of their development and adjustment to the world in which they are to live. Though psychoanalysis began as a form of medical practice and its chief service lies in this sphere, still from its nature it is bound to find its way into other territories. In the first place it has done much to reveal the close connection existing between the province of medicine, that is, health and disease, and every other interest of life. Then in its strictly medi¬ cal application it has been shown how dependent it is upon all forms of human effort and interest for a complete understanding of the human problems and human strivings that make up the mental life of the patient. All this has tended to push it on into fields of wider in¬ terest. The principles of the unconscious men¬ tal life, preservation of the mentality of the past and present, the unconscious as the dyna¬ mic source of endeavor, as the fountain from which human creativeness must draw, give it also a peculiar interpretative value in all forms of artistic creation, a special power of evalu¬ ating these and a similar interest in the study of all forms of history, art, religion, language, material advance, in short of all human activ¬ ity. It has a practical application in the dis¬ covery of latent powers, the inhibitions and hindrances with which these are encrusted and, therefore, the spread of its principles of investi¬ gation and understanding should form the true basis of a practical psychology of efficiency.

The history of psychoanalysis as a move¬ ment dates from Freud's development of it in the last decade of the 19th century (1893) as he modified his own and Breuer's earlier treat¬ ment of hysteria. He worked privately with a sincere conviction of the reasonableness of his method and its peculiar applicability to the psy¬ choneuroses. His expectations were modest. Its radical character brought him opposition but he was content to work alone waiting for time to prove the correctness of his theories and the usefulness of the method. Soon, how¬ ever, he realized a growing interest about him. Other physicians gathered around him and in¬ terest began to be manifested in the wider ap¬ plication of psychoanalysis, outside the field of medicine. Two of the early followers of Freud were Bleuler and Jung who carried the teachings of psychoanalysis to Zurich and did much to disseminate them throughout the world Although they have since altered to some ex¬ tent the application of psychoanalysis to medical practice, they stand essentially for the original promulgation of these.

Psychoanalysis spread through other ad¬ herents into Germany, Russia, Holland, France, Italy and other countries of Europe though not

to an equal extent in all. England has been but slowly receptive, though experience in the World War has given it marked impetus there. The United States has proved itself especially hospitable to psychoanalysis. It was first intro¬ duced there chiefly by Drs. A. A. Brill and E. Jones and in 1909 by Freud himself when he delivered a series of lectures at Clark Uni¬ versity and psychoanalysis entered under the official sanction of G. Stanley Hall. Since then it has flourished chiefly in medical circles. These have been small but gradually a general acceptance of it is making its way into the medical body. It is represented officially by the American Psychoanalytic Association. One American periodical is devoted to the subject, the Psychoanalytic Review, and a wide litera¬ ture has sprung up and is being constantly in¬ creased. This consists of translations of Freud's works, some of which pertain strictly to medi¬ cal problems, some of which are a thoughtful application of psychoanalysis to other spheres of interest. Translations of other foreign writers on the subject are appearing from_ time to time. Original articles appear in increasing numbers in various medical and scientific jour¬ nals together with medical reports of actual psychoanalytic work. Various books on psychoanalysis, some popular in presentation, others more strictly technical, have appeared from time to time. It has been inevitable that a subject which so closely appeals to deeply laid human interests should fall victim to a great deal of misunderstanding and bitter re¬ proach on the one hand and become the prey of a flippant superficial interest in whatever is new and emotionally appealing on the other. Its true import and its actual service to the health and well being of the individual and society are matters for the test of time and for further development in meeting these individual and social needs. The application of the prin¬ ciples and methods of psychoanalysis to ner¬ vous and mental disorder resulting from the war gave a new impetus toward its acceptance and interest in its real significance in the United States as well as abroad. Consult Jelliffe, S. E., technique of Psychoanalysis, } and Jones, (Papers on Psychoanalysis ; Lay, W., (Man's Unconscious Conflict. >*

Smith Ely Jelliffe, M.D.

PSYCHOLOGICAL APPARATUS. The

object of the psychological laboratory is, in brief, to standardize the conditions of intro¬ spection (see Psychology) ; to make it possible that psychological observations shall be taken in the most favorable circumstances, so that they may be repeated (by the same or by other observers), isolated and varied. It is only under these experimental conditions that the results of introspection can lay claim to universal validity. The single, hap-hazard observation, made under all the distractions of ordinary life, is worth as little in psychology as it would be in physics or physiology. Hence it was nothing less than a revolution in

psychology when W. Wundt founded h; '879, at Leipzig, the first psycholog¬ ical laboratory that the world had known. \Vundt's example was quickly followed in America by G. S. Hall, who founded a labora¬ tory in 1881 at the Johns Hopkins University. At the present time all the more important seats of learning in Germany and the United States

are equipped with psychological laboratories, while there are a large number distributed through the other civilized countries of the world.

To give an idea of the problems with which the experimental psychologist is busied, we may mention some of Wundt's early apparatus and the questions which he hoped to solve by their aid. In 1861 Wundt devised the complication pendulum (Fig. 1) in order to determine the behavior of attention under the influence of two simultaneous stimuli. Suppose that I am sub¬ jected, at one and the same time, to a sight and a sound. Do I hear and see together? Do I see before I hear or hear before I see? The question was of great practical import¬ ance, since it was involved in the <(eye and ear® method then in vogue for a certain type of astronomical observations. Its general psy¬ chological importance is obvious. The instru¬ ment now ((consists of a large, heavy, wooden pendulum. The bulb carries a pointer, which as the pendulum swings passes over a circular scale. Near the point of rotation m there is fixed to the stem a horizontal metal bar ss. A movable vertical standard h has attached to it a metal spring, also in the horizontal line. The spring is fixed in such a way that the bar

in passing by produces a short single click, the end of the bar and the point of the spring just touching each other, while the shock is so slight that the course of the heavy pendulum is not noticeably affected. By watching the course of the pointer attached to the bulb of the pendulum, while the upper part of the instru¬ ment remains concealed, we can determine at what point of its passage to or fro the click of the spring takes place. For example, if the pointer appears to be at e at the moment of the sound, the bar ss will be in the position ab, and this will mean that the passage is put too early. If the pointer seemed to be at e", the bar would be in the position cd, and this would mean that the passage was put too late. If we know the duration and amplitude of the pendular vibra¬ tion and measure the angular difference between e' or e" and the actual point at which the bar

comes in contact with the spring, we can easily calculate the interval between the giving of the sound and its apperception.® The instru¬ ment has been gradually refined and its scope extended until it now has the form

shown in Fig. 2.

Another of Wundt's early experiments was made to determine the range of consciousness for auditory impressions. I hear a number of similar sounds ; say, of metronome strokes. How large a group can I keep in mind at once? I must not count ; for that would mean a sep¬ arate attention and a verbal association to every sound. Suppose that a group of 20 strokes, marked off by bell-tones, is followed by a group of 21 marked off in the same way. Do the two groups appear the same or can I tell that they are of different lengths? This question was answered by Wundt by aid of the instru¬ ments shown in Fig. 3. The metronome M gave the series of sounds, and the limits of the series were indicated by the bell G. Fig. 4 shows a later and better instrument for the determination of the range of consciousness to visual impressions.

A third experiment concerns our judgment

of time intervals. A wheel, driven by clock work, carries a pointer which clicks against cot tact strips arranged along the circumference The instrument is shown in Fig. a. It is pos¬ sible to give two clicks and to let the observer arrest the clock after an interval which seems to him to be equal to the interval that separates the clicks ; or to sound three clicks — two con¬ tinuous intervals — and to let the observer judgt of the equality or inequality of the times en¬ closed by them ; or, finally, to sound four clicks — two intervals with a pause between — and to see how the observer's judgment of equality or inequality of the times varies with variation of this intervening pause. A newer and more elaborate instrument is shown in Fig. 6.

A fourth experiment, known as the ((simple reaction experiment,® is important for the psy¬ chological analysis of attention and action. A simple stimulus (a flash of light or the sound of a ball falling on a wooden plate) is given to the observer, and he replies to it by making some simple movement, which has been deter¬ mined beforehand. Instruments are so ar¬ ranged that the giving of the stimulus starts an electric clock, and the responsive movement stops it : so that the time elapsing between stimulus and answer to stimulus can be exactly measured. It is clear that the <(reaction® ex periment reproduces for us, in an elementary form, the consciousness of voluntary action. We see or hear something and act upon it. Since the experiment can be repeated as often as necessary it is possible, by means of it, to subject the action consciousness to minute and refined introspective examination. We find, further, that the time of reaction varies accord¬ ing as the attention is directed predominantly to the stimulus or to the reaction movement, according as the stimulus attended to is to be apprehended in its qualitative or intensive character, according as the

observer is fresh or fatigued, etc. The apparatus employed are shown in Fig. 7. The falling of the ball upon the plate in F starts the electric clock H, whose unit is 1/1000 second. Pressure of the finger upon the key JJ stops the clock; this pressure constitutes the movement of reaction. C is a hammer, whose time of fall is constant; it serves to check the accuracy of the clock (chrono- scope). The other instruments figured are sub¬ sidiary. Fig. 8 shows an elaborate apparatus for giving visual stimuli in reaction work.

The reaction experiment may be adapted to more complex consciousness. Thus the ob¬ server may be told that he will hear either p noise or a tone ; he is not to move until he is sure of the stimulus given (discrimination re¬ action). Or he may be told that he will hear either a noise or a tone, and that he is to react to noise with the right and to tone with the left hand (choice reaction). Or again, the stimulus may be a spoken word, to which the observer reacts by speaking a second word which he has associated to the stimulus. Instruments have been devised which meet the requirements of these and of many other variations of the ex¬ perimental procedure.

The four experiments thus far discussed are typical of the problems with which experimental psychology set out. In a well-equipped modern laboratory the apparatus fall into three main groups : demonstration instruments, with which

For explanation see article

PSYCHOLOGICAL APPARATUS

For explanation see article

experiments may be performed upon the lec¬ turer's desk ; class instruments, which are put into the hands of undergraduate students for training and drill-work; and research instru¬ ments, the materials of investigation by grad¬ uate students and by the instructing staff. As an illustration of the demonstration group we may cite Wundt's apparatus for negative after¬ images of vision (Fig. 9). A large circle of colored glass, placed directly behind a ground glass plate and illuminated by a powerful lamp, is fixated by the members of the class for some 30 seconds. At the end of this time a screen is dropped between colored glass and lamp. The ground glass surface then appears, as a light gray ; and upon this gray

background the after¬ image of the colored stimulus develops. As an illustration of the second group we may men¬ tion an apparatus for the determination of the minimum visible of distance (Fig. 10). Two black points appear upon a white cardboard sur¬ face. The one point is fixed ; it is painted upon the back surface of a sheet of glass which cov¬ ers the cardboard. The other, painted upon the cardboard background, can be moved to or from the fixed point by means of a micrometer screw (reading to 1/200 mm.) placed at the side of the frame. The problem is to determine the last separation of the points which (under given conditions of experimentation) can still be perceived by the observer. Finally, as an illustration of a recent research instrument, we may refer to the drop-tachistoscope for range of visual attention shown in Fig. 11 (see Fig. 4).

The range of psychological instruments is very wide. In the sphere of sensation we have apparatus for work on color mixture, contrast, adaptation, after-images, color blindness and the spatial distribution of the retinal sensitivity; for work on tonal fusion, beats, combination tones; for work on the sensations of pressure, warmth and cold, on the sensations of taste and smell and on the organic (muscular, articular, etc.) sensations. In the sphere of affection we have instruments which register exactly the bodily changes that accompany change in the affective disposition (pleasantness and unpleas¬ antness) : pulse recorders or sphygmographs, breathing recorders or pneumographs, volume recorders or plethysmographs and strength re¬ corders, ergographs and dynamographs. In the sphere of attention we have instruments for measuring the duration and the range or span of the attentive state. In the sphere of perception we have, for example, all sorts of instruments for the analysis and synthesis of visual space perception : among them the famil¬ iar stereoscope and its converse, the pseudo¬ scope; instruments for the measurement of the various types of optical illusion, and so on. Memory and association have a whole labor¬ atory of apparatus of their own ; one of these, which exposes at regular intervals a series of words or syllables to be memorized, is shown in Fig. 12.

It should be clear, even from this hasty and imperfect survey, that the arrangement and fur¬ nishing of a modern psychological laboratory is a very complicated matter. There must be a large lecture-room, fitted with all conveniences for desk demonstrations and class experiments. There must be a dark room for work in psy¬ chological optics, and an absolutely quiet room for work in psychological acoustics. There

should be a special room, specially ventilated, for work on olfactory sensation and perception. There must be a series of fairly large and well-

lighted rooms for the group work of under¬ graduate students. There must be a series of closet-rooms for the research students. There must be research laboratories for the instruct¬ ing staff. There must be a workshop, or rather there should be two workshops — one in the general laboratory, in which the students them¬ selves may assemble complicated pieces, and make the necessary modifications in existing in¬ struments, and another sacred to the mechani¬ cian, who is an indispensable part of the staff of an adequate laboratory. Every new investi¬ gation — and experimental psychology presents far more novel problems than can be solved, at the present rate of work, in a human genera¬ tion — demands its own new set of instruments. It must be confessed that, as things are, psy¬ chology is for the most part rather shabbily housed. The science of mind appeared on the scene later than the science of life and of in¬ organic nature ; and, when it came, funds and buildings were very largely pre-empted. There are, however, some signs that it is coming to its rights in this regard; and the next 10 years should see a very considerable improvement in the material conditions under which experi¬ mental psychologists are called upon to work in colleges and universities.

Bibliography. — Wundt, W. M., (Grund- ziige der physiologischen Psychology (Leipzig 1902-03) ; Titchener, E. B., (Experimental Psy¬ chology, a Manual of Laboratory Practice) (New York 1901-05) ; Judd, C. H., labora¬ tory Equipment for Psychological Experiments) (New York 1907) ; Schulze, Experimental Psy¬ chology and Pedagogy) (New York 1912) ; Tigerstedt, (Handbuch der physiologischen Methodik) (Leipzig 1908-14) ; Whipple, G. M., (Manual of Mental and Physical Tests) (Balti¬ more 1914-15).

E. B. Titchener,

Sage Professor of Psychology, Cornell Uni¬ versity.

PSYCHOLOGICAL ASSOCIATION, American. See American Psychological As¬ sociation.

PSYCHOLOGICAL DETERMINISM.

See Determinism.

PSYCHOLOGICAL SCHOOL OF ECONOMICS. See Economics.

PSYCHOLOGY has been defined, from time immemorial, as the science of mind. This definition, which agrees well with the etymolog¬ ical meaning of the word ˆpsychology ,® may be accepted by the modern psychologist, provided that its two terms (ˆscience® and <(mind®) are themselves correctly defined. This is an import¬ ant point : for it is clear that the terms

of a definition must be mutually compatible. If we speak of a <(science of mind,® we must define the word <(science® in such a way as to make it cover the field of mental phenomena, and we must define the word ((mind® in such a way as to make it amenable to scientific treatment. To speak of a ((science of mind® when one meant by ((mind® something outside and beyond the reach of scientific method would be absurd.

The general characteristic of science is just its method. All science proceeds by obscrva-

tion ; but the term science is not usually applied to any body of knowledge until it has reached the stage of experiment, — the stage, that is, at which its observations can be taken under stand¬ ard conditions, can be repeated, isolated and varied at will. Further, the term science is usu¬ ally reserved for classified and coherent knowl¬ edge; for experimental observations that can be grouped together, as illustrative of some natural law or uniformity. One of the tests of a science, from this point of view, is its capacity to predict, on the basis of natural law, what will happen, under given conditions, in the individual case. Yet again, the term science, in its strictest sense, is reserved for explanatory knowledge : the observations must not only be accurate, must not only fall into groups, under general laws, and thus render it possible to predict the outcome of new observations, but must also be linked with and referred to their own causes or conditions in the world at large. Experiment, uniformity and explanation, — these are the three tests which psychology must satisfy, if it is to rank as a science among the sciences.

Within the scope of these general require¬ ments, the sciences are differentiated by differ¬ ences of their subject matter. Now the subject matter of psychology is mind : not mind as popularly understood, perhaps, but mind which is accessible to experiment, mind whose uni¬ formities we can discover, mind whose proc¬ esses we can explain. Descartes, when he set to work to reconstitute philosophy, took his stand upon the proposition ((I think.® It is a long 250 years since Descartes gave his (Dis¬ course) to the world; and what, to him, was metaphysical speculation has now become an unquestioned belief of common sense. We all tend to look at mind as Descartes looked at it ; we all tend to say (

If it be asked how precisely this material differs from the material upon which other sciences are working, what is the criterion that differentiates the subject matter of psychology from the subject matter of physics, the

reply is simple. Mental process, the material of psychol¬ ogy, is confined to the exeprience of a single individual ; psychological experience is unshared experience. The universe of nature is common to all of us; the universe of mind is open but to one, — to each man his own. The laws of physics and of physiology take no account of the individual : sound is a certain motion of the

air waves, digestion is a certain sequence of chemical changes; and the phenomena of sound and of digestion are treated abstractly, so that we can conceive of a deaf man as understand¬ ing acoustics, or of an anaesthetic patient as familiar with physiological chemistry. Psy¬ chology, on the other hand, deals with the sound as we hear it, with the hunger and thirst that we feel ; and these experiences, however ac¬ curately we may express them in words, are, as experiences, incommunicable.

Two results follow from this peculiarity of psychological subject matter. The first is that the method of psychology differs from the methods of the physical sciences. All science demands observation, we have said; all exact science demands experiment. So far, then, all scientific method is one and the same. But the observations and experiments of physics and chemistry, physiology and zoology, are made upon material that is common scientific prop¬ erty; the observations and experiments of psy¬ chology are made upon private property, and, more than that, upon property which is inalien¬ able. If we class the former all together as in¬ spection, we may oppose the latter to them as introspection. In the physical sciences we look out upon a world that is shared by everyone alike ; in psychology we look within, upon our personal world. From this difference in method it follows, in the second place, that the need of an experimental verification of results is more pressing in psychology than in any other de¬ partment of science. If we cannot, in some way, transcend the intrinsic defect of introspec¬ tion, its personal and individual character, we are likely to have as many psychologies as there are psychologists to introspect. In actual fact, the history of psychology records not a few cases of introspective deadlock, — of obser¬ vation pitted against contrary observation. It was not until the introduction of the experi¬ mental method in psychology that this danger ceased to be serious.

<(But,® it may be asked, ((is modern psychol¬ ogy really free from this danger? Are all psy¬ chologists always agreed? Are there not still schools of psychology?® To answer these ques¬ tions we must distinguish a little. In principle, modern psychology is free from the danger of introspective deadlock. Divergent observations are still made, in plenty; but psychology herself furnishes the means of reconciling the diver¬ gence. Let us take an illustration from physics. Two competent observers may be analyzing a compound body by the spectroscopic method : the one may find the lines of

a certain rare element, the other may be wholly unable to see these lines. Both analyses are published. We read them, and notice that they disagree. Do we at once lose confidence in the method? Not at all: we simply hold our judgment in suspense until further observations, by the same method, are forthcoming. We say that there must, in the one case or the other, have been some unsuspected source of error which vitiated the result; and we appeal to the method itself to indicate this source of error. More observa¬ tions are made, with stricter regard to the con¬ ditions of the analysis ; and presently we reach a final conclusion. It is precisely the same in psychology. Experimental introspection may yield conflicting results, as does experimental inspection. But we have merely to go on ex-

perimenting, and the true result will ultimately emerge. In principle, then, psychology has nothing to fear from this particular danger. On the other hand, it must be frankly admitted that there are many and various schools of psy¬ chology. Only, the points of disagreement are points that lie outside of psychology itself. Let us, again, take an illustration from the sciences of nature. Listen to a group of mathematicians discussing the character of the infinitesimal : to a group of physicists discussing the defi¬ nition of energy: to a group of physiologists discussing the mechanics of life. To hear them, one would think that the status of their respec¬ tive sciences was precarious in the extreme. Yet we all make use of the calculus; we build locomotives and power-plants and rely upon the balance and the thermometer ; nay, we trust our actual lives to the surgeon and the physician. Moreover, the practical work of all these sciences goes on, and goes on with in¬ creasingly fruitful result, despite the theoreti¬ cal difficulties that lie behind it. So it is in psychology. Psychologists are apt to dispute the greater and more fundamental issues that lie before and after their science: these issues will always be disputed, so far as we can see, while human nature remains human nature, and men are individualized by training and tem¬ perament to envisage the universe from dif¬ ferent points of view. In a general sketch, like the present, such differences must be baldly and plainly stated. The reader must, therefore, be warned not to lay too much stress upon them. The extreme opinions of opposing schools shade into one another by imperceptible gradations. And however extreme they may be, they have little if any bearing upon the practical work, the teaching and investigation, of mental science.

The Problem of Psychology. — We said above that the problem of a scientific psychology is to bring order into the chaos of the immedi¬ ate experience. We may now note that, chaotic as this experience is, it

neverthless is something more than chaos; it groups itself, roughly and indefinitely, no doubt, but still quite noticeably. If we reserve the wider term "mind® for the sum total of mental processes running their course between birth and death, we may say, first of all, that mind splits up into "conscious¬ nesses.® A consciousness is a mental present ; a mind that has a temporal <(now)) stamped upon it; a bit of mind that is occupied with a single, however complicated, topic. Thus, to put the matter crudely, we begin the day with a getting-up consciousness; this is followed by a breakfast consciousness; this by a newspaper or a correspondence consciousness; this by a daily-work consciousness; this by a luncheon consciousness; and so on. The divisions are real, even if they are not very accurate or pre¬ cise. We notice, further, that these conscious¬ nesses themselves fall into groups. Sometimes we are stirred and moved by the topic of con¬ sciousness : we are ill-humored, angry, anxious, pleased, relieved, aggrieved, hopeful, satisfied and what not. Sometimes we are passive, in¬ differently taking things as a matter of course. Sometimes we are hard at work, resolute to solve a problem or to overcome a difficulty or to extricate ourselves from an embarrassing po¬ sition, bending all our energies upon a given end. Sometimes, again, we are unable to con¬

centrate ourselves; we are talkative, reminis- cential, fanciful, dreamy, whimsical. A very little introspection of this sort will suggest the distinction of the great mental categories of memory, attention, imagination, emotion, etc. Once more, we notice that the consciousnesses which fall under these categories are complex. Take the emotion of anger. It is not a simple, unanalyzable experience, but is made up of part-processes. There is the idea of the scene or act that has called up the anger; the idea of retaliation; the feeling of injury or of wounded self-esteem; all sorts of memories of one's own or of others' conduct on similar past occasions; and all sorts of "bodily® feelings, — a choking or strangling, perhaps, or a feeling of strength and power, coming with a brace of the body and a clenching of the fist. These part-processes are readily distinguishable ; and they take us a step further in the analysis of consciousness, and show us the concrete proc¬ esses that are termed, technically, perception and idea, feeling and desire, etc. Lastly, we may notice, after a little scrutiny, that these processes in their turn are, literally, concrete : not simple, but made up of simpler elements. My idea of retaliation, for instance, is an idea of something that would take time for its ful¬ filment, of something that would run its course in stages or phases. And it is more than prob¬ able that each one of the stages would, under accurate observation, turn out to be a con¬ cretion and not an elementary process.

Now this work of analysis, which we have so far pursued without the aid of any technical method, constitutes the first part of the real problem of psychology. The psychologist is called upon, first of all, to determine the

num¬ ber and nature of the mental elements. Mind, like all other organizations, — like the natural world itself, — is built up from certain irre¬ ducible elements; and if we are properly to understand it, we must catalogue and describe its elementary processes. ' Psychologists are nowadays fairly well agreed that the mental elements are of two kinds or classes : sensa¬ tions (blue, gold, sour, tone C, the sensa¬ tions of pressure on the skin, of muscular con¬ traction, of smell, etc.), the ultimate constituents of the intellectual life, and affections (pleasant, unpleasant), the ultimate constituents of the life of feeling and emotion. There is no simple process underlying the volitional life; all acts of will, all resolutions and choices, are made up of sensations and affections in conjunction. On the other hand, mind is not adequately de¬ scribed as a resultant or derivative of the two elements. It is true that every consciousness, in the last resort, is compounded of so many sensations and a certain affection. But we find that the elementary processes of a conscious¬ ness may differ, not only in degree or intensity (as strong and weak, loud and faint), but also in clearness or distinctness. So we may speak of a "state® of consciousness, very much as we speak of the state of the roads, or of the weather or of a man's affairs. We speak always in terms of the same material : in terms of the road-bed, of rain and shine, of capital and in¬ terest. In the case of consciousness, we speak always in terms of the ultimate elements, sen¬ sations and affections. Only, as the road may be firm or muddy, the weather clear or threat¬ ening, the financial outlook good or bad, so

may the processes in consciousness be clear or obscure, distinct or indistinct, powerful and in¬ sistent or ineffective, overshadowed by rival processes. It is worth noting that modern psy¬ chology thus finds a use for the phrase ((state of consciousness® which is altogether different from its use in the older psychology. When consciousness was identified with the <(I,® the phenomena that we now call processes of con¬ sciousness were naturally identified with the <(states® or ˆmanifestations® of the active prin¬ ciple ; and even to-day, in popular writing, the phrase ((states of consciousness® is oftentimes employed with the meaning of (

The most important states of consciousness, in the normal life, are those of attention and inattention. In attention, the processes that make up a consciousness run their course at two different levels. The processes attended- to are more clear and distinct, sometimes are stronger and last longer than their fellows; the processes attended-from are depressed, checked, obscured. In inattention, all the processes run at the same low level.

Analysis, then, the first part of the problem of psychology, leaves us with the two elemen¬ tary processes, sensation and affection, and with the elementary states of attention and inat¬ tention. The psychologist is next required to bring the results of his analysis together, to make a synthesis, to formulate laws of the con¬ nection of the elements. The synthesis is tested, at every step, by appeal to introspection, that is, to the actual facts of mental experience. If the analysis has been faulty, the reconstruction will be faulty, will not square with the facts; the method thus becomes its own test of truth. Proceeding in this way, psychology is able to rise to laws or uniformities; it states the laws of color mixture, the laws of affective sequence and composition, the limits of the grasp and duration of attention. Proceeding still further along the same road, it states the laws of the association of ideas, or of the expression of the emotions. In time, it becomes quantitative, and gives numerical formulae for the intensity of a color contrast or the trustworthiness of mem¬ ory. In doing all this, it is simply following the example of the sciences of nature, organiz¬ ing and systematizing its material.

If, now, psychology went no farther, it would still have claims to rank as a science. But it would be a merely descriptive, not an explana¬ tory, science. As a matter of fact, it goes on to explan its phenomena, to give the conditions under which they occur or appear. And at this point we come upon one of those theoretical differences of which we spoke above. What are the conditions of a mental process? Some psychologists affirm that, as the mind is always found together with a living body, so it is always conditioned upon physiological proc¬ esses; a mental formation of concretion is to be explained by reference to the bodily condi¬ tion that underlies it. Others, again, make ap¬ peal to unconscious or subliminal mental proc¬ esses, which are the condition of our conscious experience, of the supraliminal mind. And yet others would explain mind by mind, deriving

mental process from mental process by a prin¬ ciple of mental causality. We cannot decide between these suggestions; limits of space for¬ bid us even to give an adequate account of them. It may be said, however, that the second is the least satisfactory of the three, while controversy is keenly concerned about the other two. The experimental psychologists tend, perhaps, rather toward the first than the last.

The Method of Psychology. — The special method of psychology is experimental intro¬ spection. Two questions arise with regard to it : Is introspective observation ever really

valid? And is the experimental method ade¬ quate to the whole mind, or only to its simpler processes?

It has been objected that introspection can never yield valid results, for the simple reason that it interferes with the course of conscious¬ ness. If consciousness is made up of mental processes, then introspection itself is a process or a group of processes. Hence, whenever I set out to observe a given complex, I introduce into consciousness (by the mere fact of obser¬ vation) another complex, which must clash with the object of my observation. But this is a poor method which interferes with the very thing which it purports to examine and de¬ scribe! The objection is usually met by the rule that one must wait to observe a mental process until after it has completed its passage; that introspective examination must always be a post mortem examination. On this rule, every introspection would involve memory, and be subject to the errors to which memory is subject; though the memory is in play so soon after the event to be remembered that these errors may be considered minimal. In reality, both the objection and its answer seem to beg the question of what introspection is. What the psychologist does, when he introspects, is to experience attentively, to live attentively, the process under investigation, and to make a report about his experience in words. No new process is introduced into consciousness. Whether the words that describe the experience are uttered as the process runs its course, or are pronounced after it is over, will depend upon the circumstances of observation and upon the psychologist's ability and training : no single rule can be laid down in the matter. As thus understood, there can be no question but that introspection is a valid form of scientific observation. And even apart from this theo¬ retical justification, introspection is justified by its results.

The second question, that of the scope of experiment in psychology, has been much dis¬ cussed, and with very different results. If we' face it in the light of history, it seems to an¬ swer itself. Psychologists were told, at first, that they could not push the borders of experi¬ ment beyond sensation. But they invaded the spheres of affection and attention. They were then told that expermient was adequate only to the simplest states and processes of mind. But they experimented upon perception and idea, upon association and memory and im¬ agination. They were told again that ex¬ periment could never attain to the purely intellectual, or indeed to any of the higher aspects of the human mind. But they made experiments upon judgment and reasoning, and upon the aesthetic consciousness. It is

true that these latter experiments are few and scattered, and that whole consciousnesses still await experimental investigation. But there seems to be no doubt that, in principle, the en¬ tire realm of mind is susceptible to

experiment. With a method thus justified, it can only be a matter of time for psychology to establish her¬ self as securely as physics or physiology.

The Various Departments of Psychology. — Many attempts have been made to classify the different departments of psychology in ac¬ cordance with some logical plan. As no such classification has received general acceptance, we may ourselves abandon the attempt to be logical, and simply pass in brief review the mpst important branches of psychology that exist at the present time.

We may distinguish, at the outset, an ana¬ lytical from a genetic psychology. Defining roughly, we may say that analytical psychology takes the human mind as it is, and aims to dis¬ tribute its elements and laws, while genetic psychology seeks to trace the growth of mind from its first beginnings, and to explain the present in the light of mental history. It is needless to say that the two psychologies over¬ lap at many points. Analysis can seldom be completed, except by help of genetic considera¬ tions ; and the study of psychogenesis implies, on its side, an analytical knowledge of the de¬ veloped mind. Genetic psychology is also termed comparative psychology, and has various subdivisions : animal psychology, child psychol¬ ogy, the psychology of adolescence, etc.

We may distinguish, secondly, between qualitative and quantitative standpoints within psychology. Suppose, for example, that I am interested to determine the least difference be¬ tween two weights that can be perceived by the lifting hand. The numerical result that I obtain is a quantitative result in analytical psy¬ chology. If, however, I attempt to trace out the various conscious factors that contribute to my judgment of difference or no-difference, — factors of expectation, of habit, of fatigue, of attention, that may affect the judgment; fac¬ tors of attentive comparison, of association, of first impression, of effort or ease, that may directly prompt the judgment — then I am per¬ forming a qualitative experiment. The two sorts of result should always go side by side, and should (in a perfect psychology) run ex¬ actly parallel, — a numerical statement accom¬ panying the introduction of every qualitative term. Both are indispensable _ to complete knowledge. Genetic psychology is, at present, almost entirely qualitative, and will probably remain so for a considerable period. It is but the other day that statistical methods were in¬ troduced into the study of organic evolution.

We may distinguish, once more, between psychology as a science of mental function and psychology as a science of mental structure. The difference is very much like that which obtains between anatomy and physiology. Structural psychology seeks to discover what consciousness is composed of, when the organ¬ ism is functioning in a certain way. I remem¬ ber, or I

recognize, or I imagine. What, then, are the constituent processes of the memory consciousness? What is my mind made up of, when I am recognizing? What actually takes place mentally, when I imagine? Many inter¬ esting facts have been brought to light by

structural psychology. Thus it has been shown that, when we recognize an object, we ordi¬ narily do so, not by way of a comparison of the perceived thing with its memory image, but simply by way of a diffused ((feeling of famil¬ iarity,)) consisting essentially of those organic (internal) sensations which enter into the bod¬ ily attitude of relief or freedom from tension. Functional psychology seeks, in its turn, to classify and derive the functions of conscious¬ ness, the uses to which mind is put in the service of the organism. Thus it may reduce the root-functions of mind to those of cogni¬ tion and interest, and trace the differentiation of the former into discrimination, integration, comparison, etc., and that of the latter into the manifold modes of conative (will) and emotive consciousness.

All these psychologies are, in one sense of the term, individual psychologies; they discuss the composition or genesis of a single, typical mind. There is, however, a specific, individual or differential psychology, whose problem it is to trace the correlation between the processes or functions characteristic of a certain type of mind, and to compare this with other minds of different types. Thus it is a fact of individual psychology, in this sense, that some minds de¬ pend mainly upon visual, other again upon auditory, and still others upon kinsesthetic (motor) images in the processes of memory, imagination and thought. Over against indi¬ vidual psychology, in this meaning of the word, stands national or racial psychology, which at¬ tempts to discover the forms of thought and feeling characteristic of the common mind of a people.

This common mind is, indeed, a fertile field for psychological cultivation. The mind of a people is, from one point of view, nothing more than the aggregate of the minds of the indi¬ viduals composing the people. There are no new processes in the common mind : common mental processes are impossibilities. From an¬ other point of view, however, the common mind offers a distinct problem to psychology. The mental productions of men in society differ from the mental productions of the individual. No single man would ever have invented language in order to talk with himself ; language is a product of the common mind. One mind may take on a habit ; it requires at least two to make a law or a custom. These products of the com¬ mon mind — mythology, and religious observ¬ ances, language, law and custom — are treated by social psychology, which approaches them by analytic, comparative and genetic methods, and seeks to explain them in part from the nature of the individual mind, in part from the cir¬ cumstances in which man, as a social being, has at various epochs of his

history been placed.

Lastly, we may contrast normal with ab¬ normal psychology. This deals with such tran¬ sitory abnormalities as sleep and hypnosis, or with the chronic derangements of insanity. In every case, the key to the abnormal mind is to be found in the status of attention. In dreams, we have a limited and irregular distribution of attention ; in hypnosis, an exaggerated passive attention, with its accompanying suggestibility. And we have misdirection, inertia and decay of attention variously exhibited in the various forms of mental disorder.

Here our list of the principal departments of psychology may come to an end. All through, introspection is the special psychological method, and the dictum of introspection is the final appeal. Animals and infants and the insane cannot, of course, be called upon to introspect. Nor, for that matter, can a "common8 mind. But we observe the conduct of children and animals, and interpret it in the light of our own adult introspections; we search for parallels to the abnormal in our own normal conscious¬ nesses ; and we base our study of social psy¬ chology upon the laws of the individual mind.*

Mind and Body. — The question of the rela¬ tion of mind to body is an old one in the history of philosophy; but it is a question that still awaits its answer. Psychology cannot avoid it; and we may, therefore, give here a brief indica¬ tion of current views.

The two rival theories now most in vogue among systematic psychologists are those of psychophysical parallelism and of interaction. The former declares that mental and bodily processes run side by side, without mutual influ¬ ence or interference. Every mental process is paralleled by a nervous process. But the nerv¬ ous processes are links in the unbroken chain of physical causation ; and this is complete in itself. Mind is wholly unable to work changes in matter. The latter theory affirms, on the con¬ trary, that mental process influences and is in turn influenced by bodily process : our grief makes us cry, our idea that it is late makes us run to catch a train, as truly as our fit of indi¬ gestion makes us gloomy, or a cold in the head makes us stupid.

Common sense is, naturally enough, on the side of interaction. Nevertheless, the theory presents grave difficulties. We must either admit that mind is a special mode of energy, capable of give-and-take with the

various forms of energy familiar to us in the natural world; or we must assume that the mind can, without expenditure of energy, deflect the course of physical molecules. Parallelism, while it sins against common sense by making mind causally inefficient, epiphenomenal, has at least the ad¬ vantage that it leaves the order of the natural universe intact. It has, indeed, further advan¬ tages. It has proved to be an admirable work¬ ing hypothesis for scientific psychology; and it is a purely empirical and non-committal state¬ ment of the relationship of mind and body, — a statement that may be reconciled with diverse forms of philosophical belief. It leads, per¬ haps, most directly to the philosophical doc¬ trine of panpsychism, according to which con¬ sciousness is the reality and the concomitant brain-process a phenomenal symbol of this real¬ ity. This doctrine serves to reconcile the con¬ flict between parallelism and interactionism, seeing that it guarantees the efficiency of mind while it insists upon the parallel relation of mind and body. It may be noted that Gustav Theodor Fechner (1801-87), the father and founder of experimental psychology, combined an acceptance of psychophysical parallelism, as

**“ Experimental psychology*’ is simply psychology approached by the experimental method ; it is not a special branch of psychology. “Physiological psychology” is a phrase used sometimes as an equivalent of experimental psychology, sometimes as an inclusive term, covering (be¬ sides experimental psychology) a portion of the physiology of the central nervous system.*

a working hypothesis for the laboratory, with a belief in panpsychism as the only tenable metaphysics.

The Relation of Psychology to Other Sci¬ ences and to Philosophy. — Psychology comes into manifold relation with the natural sciences. As a quantitative science, it requires the aid of mathematics; as an experimental science, it requires the aid of physics. In all its forms, it presupposes a knowledge of the physiology of sense-organs and nervous system: if it seek its explanations in physiology, this knowledge must be accurate and detailed. Insanity can be understood only in the light of pathological histology; comparative psychology rests upon comparative anatomy and comparative physiol¬ ogy.

Nor is the relation less close with the “men¬ tal sciences.® Social psychology comes into contact with anthropology and ethnology; with political history and sociology; with philology; with the history of art, religion, law, — the his¬ tory of civilization at large. It is, indeed, hardly too much to claim for psychology the central position in the classification of the sci¬ ences : a position that connects it equally with the sciences of

nature, on the one hand, and the sciences of the productions of the human mind on the other.

The relation of psychology to philosophy is less easily defined. Until very recently, psy¬ chology was not a science at all, but a branch of philosophy. Now that her independence is established, psychology naturally tends to em¬ phasize the breach between herself and the phil¬ osophical disciplines. Philosophy, on the other hand, unwilling to recognize the independence of a revolted subject, insists that psychology runs into danger as soon as ever she rejects metaphysical guidance. There is truth in both attitudes. One may be a good psychologist, at the present day, without having opened a philo¬ sophical book. Contrariwise, one cannot ap¬ proach the fundamental questions that lie be¬ fore and after psychology without plunging, at once, into problems of epistemology and of metaphysics. As with life and matter, so with mind; there is practical work to be done in physics and biology and psychology that may be done, and well done, without philosophical reference. But the practical work springs out of, and leads toward, theoretical issues of the widest kind.

It may he added that the central position of psychology is further warranted by its relation to the special departments of philosophy. Functional psychology is the necessary basis of logic; social psychology is the only straight path to a sound ethics; a psychological analysis of the sentiment of beauty is the prerequisite of aesthetics; the psychology of the religious consciousness is the propaedeutic to a philos¬ ophy of religion. See Apperception; Brain; Body and Mind; Duration; Emotion; Hyp- notism ; Idiocy; Insanity; Limina; Percep¬ tion ; Psychological Apparatus ; Psycho¬ physics; Sensation;' Sensation, Organic; Senses; Soul; Suggestion; Weber's Law; Will.

Bibliography. — General Works: James, (The Principles of Psychology) (New York 1890) ; Miinsterberg, H., Psychology, General

and Applied (London 1914) ; Sully, (The Hu¬ man Mind* (London 1892) ; Wundt, (Grund- ziige der physiologischen Psychologie) (5th ed., Leipzig 1902-03). Textbooks: James, W., (Psychology* (New York 1892) ; Titchener, (An Outline of Psychology) (New York 1903) ; Ward, J., Psychological Principles) (London 1918) ; Wundt, Eectures on Human and Ani¬ mal Psychology* (London 1894). Functional Psychology : Stout, Analytic Psychology)*

(London 1896). Structural Psychology: Kuelpe, ˆOutlines of Psychology (New 'York 1895) ; Titchener, Experimental Psy¬ chology } (New York 1901) ; (A Primer of Psychology) (New York 1902). Genetic Psychology: Baldwin, (Mental Development* (New York 1895) ; Hobhouse, (Mind ip Evolution) (London 1901) ; Morgan, (Habit and Instinct* (London 1896). National Psychology: Le Bon, (The Psychology of Peoples (London 1898). Social Psychol¬ ogy: Baldwin, (Mental Development (New York 1895) ; Betts, G. H.,*

Edward Bradford Titchener, Sage Professor of Psychology, Cornell Univer¬ sity.

PSYCHOLOGY, Animal. See Animal Psychology.

PSYCHOLOGY, Ethnic, a division of psychology under which some modern writers include their efforts at the analysis of the men¬ tal differentiations of communities, peoples, races or tribes. The term is not in favor with a great number of writers, who include this field under social psychology, ethnology, etc. Consult Le Bon, G., (The Psychology of Peo- ples) (London 1898).

PSYCHOLOGY, Social. See Social Psy¬ chology.

PSYCHOLOGY OF THE ABNORMAL.

By the psychology of the abnormal is meant the psychology of individuals who are classed as abnormal, or those individuals who evidence in their conduct or speech or in the character of their ideas or emotions responses that stamp them as being unusual or as differing from the usual, the average, along the lines that make them less efficient in dealing with the various problems of life which they meet and have in some way to adjust to. Considered in this way the psychology of the abnormal is not a different psychology from the psychology of the normal; it is only the application of psychological prin¬ ciples of explanation to the understanding of

the various kinds of failure of adjustment which may arise in the career of individuals.

An individual, from this point of view, may be considered as one considers a bit of material that is being tested as to its strength, its breaking point. A bar of iron, for example, may be tested by having a force applied to de¬ termine the number of pounds that must be added in order to break it. The breaking point is the function of two factors, the strength of the bar and the force applied. Some bars, the smaller ones, for instance, will break with the application of much less force than others, the larger ones, and theoretically any bar, no matter how strong, can be broken by a force if the

force is only great enough. Then again, the exact place where it, the bar, breaks and the way in which it breaks, whether by a clean cut fracture at right angles to the application of the force or in a jagged irregular line de¬ pends upon the nature of the material and its uniformity or lack of uniformity of texture at the point of application. So some individuals will fail at comparatively simple problems of adjustment, while others will only fail when the problems are very difficult. And further the way in which an individual fails will depend upon his personality make-up, the kind and character of material with which he meets the difficulties.

The individuals who can only meet the simplest problems of adjustment are the de¬ fectives : at the lowest level the idiots and imbeciles, higher up the backward children and still higher the types of so-called psychopathic individuals who present an outward appearance of normality but whose lives disclose a continu¬ ous series of avoiding, side-stepping responsi¬ bilities and an incapacity for that continuity of effort necessary for success. Stronger indi¬ viduals only break down under the most diffi¬ cult of problems, usually only after struggling more or less ineffectually for a long time and then often only as a result of some physical illness which temporarily has reduced their strength and so comparatively increased that of the stressing forces.

Still bearing in mind the analogy to the test¬ ing of the strength of material, those individu¬ als who only break as a result of great stress are the better organized and their failure is due rather to the degree of stress than to a faulty make-up — the failure is largely exoge¬ nous in origin. Those who fail to adjust to rela¬ tively simple problems show that the trouble is within, that it is more dependent upon a faulty make-up than upon the character and degree of stress. In these the failure is largely endogenous in origin.

Abnormal psychological reactions are thus failures of adjustment; failures of the person¬ality make-up of the individual to adequately meet the stresses and strains. His incapacity to meet these stresses and strains may be due to their very great strength or to his relative weak¬ ness and his weakness may be constitutional, that is, natural to him, the result of inherited in¬ fluences ; or acquired as the result, for example, of illness, infectious diseases, injury, more especially to the brain, or methods of life that he cannot escape, such as solitary confinement in prison.

The individual symptoms of the failure are

in their general characteristics dependent upon the personality make-up. I hat is, the disorder of the psyche must manifest itself in terms of the material disordered. Certain details of the symptoms, however, may take their coloring from the surroundings in which the dif¬ ficulty occurs. This is manifest in the false beliefs — delusions — which occur so frequently as symptoms. An individual may compensate himself for his failure by a belief that some baneful influence is exercised over him by others. Now-a-days he not infrequently be¬ lieves the influence to be brought to bear by means of wireless electricity. Manifestly, be¬ fore the days of wireless transmission no such belief would have been possible.

The psychological symptoms of individuals who are mentally ill indicate the nature of their difficulties and the means which they are bring¬ ing to bear to meet them. They indicate, in other words, the existing status of the problem of adjustment with which they are confronted, the degree and character of the failure.

The most familiar symptom of mental illness is delirium which commonly accompanies poisoning, as by alcohol (drunkenness, delirium tremens) or some physical illness particularly when accompanied by infection and high fever. In delirium the principal mental symptom is that of confusion. The patient sees all sorts of things which pass before his vision in kaleido¬ scopic procession and hears voices, sometimes emanating from the people of his visions, some¬ times just coming out of space. These false perceptions — hallucinations — are the charac¬ teristic phenomena of delirium and to the on¬ looker seem quite meaningless and incoherent. When the patient gets well, however, it is pos¬ sible to trace their references and to appreci¬ ate that they represent the outcroppings of wor¬ ries, anxieties and impulses which had before been held in check. Delirium results when ill¬ ness removes the power of efficient reaction and releases all those tendencies which otherwise had been under control. There is little capacity for adjustment. With recovery from the physical illness the delirium tends to subside. Similarly when we see a picture like this, a deliriod type of reaction but not the result of physical illness we feel that the powers of ad¬ justment are pretty well broken, that the con¬ structive forces of the personality are in abey¬ ance.

Delusions are false beliefs which represent a somewhat more definite situation as between the stresses and the personality. Delusions always represent definite attempts at adjustment, but because they are not successful, only com¬ promises. The weak man believes himself strong, the poor man rich, while quite com¬ monly the recognition of weakness within as a cause of failure is avoided by the delusion that malicious influences from without are the cause of the trouble. This is the mechanism of pro¬ jection and is at the basis of delusions of per¬ secution which are so

characteristic of that mental disease known as paranoia and. all sorts of paranoid types of reaction in other mental illnesses and also of those unhappy individuals who are always filled with suspicions of those about them.

Hallucinations and delusions may be the passing phenomena of some acute upset or, on the contrary, they may become fixed, stereo¬

typed and definitely organized into a system which is relatively unshakable and remains un¬ changed over long periods of time. Such a system represents a type of reaction to a de¬ fect of personality make-up which is the best that the individual can do and so comes to be a final solution. The delusion is like the scar tissue that fills up a wound. It remains perma¬ nently as a disfigurement but it nevertheless represents what has been accomplished by the repair processes.

In still milder forms of mental illness, the neuroses and the psycho-neuroses , conditions that are on the borderline between the normal and the abnormal and are consistent with a considerable capacity for adaptation and ap¬ parent normality, the forms which the symp¬ toms take are somewhat different. They take on the character of what are called obsessions or compulsions. The patient is the victim of certain ideas, feelings or necessities for action which he recognizes as abnormal or foolish but which he cannot control. Thus in the realm of abnormal ideas he may be forced to think certain disagreeable thoughts, he may be ob¬ sessed to think of certain numbers or certain phrases will recur to mind persistently or he may be forced to think how the people he meets would look if they were dead. The obsessive emotions come similarly without apparent rea¬ son. He may feel a nameless fear or anxiety or be depressed without apparent cause or he may have definite fears of certain things or situations — the phobias — such as claustro¬ phobia, fear of closed spaces, misophobia, fear of contamination, etc. Compulsive acts are equally common. The patient may be forced to touch every tree he passes or forced to step over every crack br start upstairs always with the same foot. In this group are the so-called manias such as kleptomania, the necessity for stealing, although there may be no desire for the stolen object, pyromania the necessity for set¬ ting fires, etc. All of these tendencies represent instinctive trends which force themselves to ex¬ pression but which, because they demand for their satisfaction inacceptable forms of conduct seek these devious ways of expression by at¬ taching themselves to what usually appear to be unimportant activities.

All these abnormal forms of expression, de¬ lusions, hallucinations, obsessions, compulsions are then efforts at expression of certain instinc¬ tive tendencies which are not acceptable to the individual. They represent

indulgences that at some past period were normal to the individual, that is, they are relatively infantile. The in¬ dividual who flies into a rage and curses and kicks the inanimate objects of his environment, breaks furniture and tears up books, is acting like a small child that has been thwarted in some of its desires. All the other abnormal reactions could be explained in a similar way so that we might say that the abnormal as a class are not yet fully grown in some aspect of their personality, they retain infantile traits of character. This is obvious in the idiots and imbeciles but less obvious as we have to deal with better developed personalities. This ex¬ planation, however, becomes again obvious in those very dilapidated types of chronic mental illness that degenerate into helplessness, who wet and soil themselves as do infants and have to be fed and otherwise cared for just like

children. Mental disease, therefore, shows re¬ actions that reproduce types of response that were at one time normal either in the history of the individual — infancy and childhood — or in the history of the race- primitive man and from this point of view their study has been termed paleopsychology.

There are two ways of reacting to these inherent difficulties — conflicts — of instinctive expression either by turning back within ones- self and reanimating infantile ways of react¬ ing — the method of introversion — or by run¬ ning away from the difficulty, so to speak, into reality and by developing a great activity and interest in everything about and so attempting to escape a reckoning -with onesself — the method of extroversion. The first is, in gen¬ eral, the more serious type and in it we find the malign types of the psychosis such as de¬ mentia precox : the second is less serious and here we find the more benign types such as the manic-depressive psychosis. A chronic delu¬ sional psychosis such as paranoia represents a more or less permanent compromise which is not as disintegrating as the first nor as recover¬ able as the second.

All these methods of reacting are found equally among the relatively normal ; the only differences are differences of more or less. In mental disease we find the mechanisms of normal mental life writ large because dispro¬ portionately emphasized in some direction. The symptoms of mental disease can thus be under¬ stood as the outward evidences of attempts at adjustment, made difficult by some psychologi¬ cal conflict and the language of the symptom, so to speak, can be translated when it is under¬ stood as expressing reactions of escape, de¬ fense or compromise in

the face of the problem presented. The study of these exaggerated forms of reaction found in the mentally ill has gone a long way to help explain the psychology of the normal because the failures represent an experiment of nature, so to speak, which throws certain of the aspects of the personality into relief. A complicated mechanism comes to be understood when it gets out of order and finally by taking it apart.

William A. White, M.D., Superintendent of Saint Elizabeth' s Hospital, Washington, D. C.

PSYCHOLOGY OF ADVERTISING AND SALESMANSHIP. See Advertising, Psychology of.

PSYCHOLOGY IN ITS APPLICA¬ TIONS TO MEDICINE AND PSYCHIA¬ TRY. See Medicine and Psychiatry, Psy¬ chology of.

PSYCHOLOGY OF EDUCATION. See

Education, Psychology of.

PSYCHOLOGY OF RELIGION. See

Religion, Psychology of.

PSYCHOPHYSICS. By some this science is regarded as synonymous with physiological psychology; by others, as dealing particularly with the phenomena which bring out the rela¬ tion of sensations to physical stimuli. In this character it deals with the study of Fechner's and Weber's laws as a separate department of psychological science. Psychophysics deals particularly with the measurements of intensity of sensations, and endeavors to establish gen¬

eral laws regarding the phenomena. See Dura¬ tion ; Limina; Reaction Time; Weber's Law.

PSYCHOZOIC, a term used by a few geologists to indicate the time since man came into the world. Some prefer to give it the rank of an era, but it is usually called the Recent Epoch of the Quaternary period, and the name Psychozoic is but little used.

PSYCHROMETER, an instrument for measuring the tension of aqueous vapor in the atmosphere. It is also known as the wet-bulb hygrometer. See Hygrometer.

PTAH, pta, or PHTHA, Egyptian god of the most ancient type, described in inscriptions as ((creator of the earth, father of the gods and all the beings

of this earth, father of begin¬ nings.® He was compared by the Greeks to Hephaestus, being, like him, patron of metal¬ workers and sculptors. Representing the begin¬ ning of all things he was shown as an unde¬ veloped child or dwarf (Ptah-Patack) , or as a mummy. He had a magnificent temple at Mem¬ phis. See Egyptian Religion and Sociology.

PTARMIGAN, tar'mi-gan, a grouse of the genus Lagopus, which differs from the ordinary grouse in having the legs feathered to the claws, giving somewhat the appearance of a hare's foot (whence the generic name). The trun¬ cated tail has 14 or 16 feathers, most of the species become white in winter, and the nasal groove is densely clothed with feathers. There are six or eight species described, inhabiting the northern and snow-covered regions of both hemispheres, being one of the few genera char¬ acteristic of the arctic fauna ; they are as much at home in snow as are the web-footed birds in water, and their plumed feet enables them to run over its surface without sinking in. They live in families during most of the year, and are monogamous ; the females incubate, but the males assist in rearing and feeding the young. The males have a loud harsh or sometimes clear cry, and the females cackle like a hen. They flv swiftly without a whirring noise, and run well. They feed upon berries, buds, mosses and lichens and insects. Their pursuit affords an exciting sport; they are very shy, but when started are easily shot on account of their regular flight. The summer plumage is varied with brown, black and gray, most of the wing remaining white; in the males the mottling is finer and the colors brighter. There are three well-ascertained species in America, besides several subspecies and races. The white ptar¬ migan or willow grouse (L. lagopus) is about 16 inches long and 24ˆ4 inches in alar extent; the bill is black, very stout and convex, and broad at the tip ; the general plumage in summer is rufous or orange chestnut on the head and neck ; feathers of back black, closely barred with yellowish brown and chestnut; most of wings and lower parts white ; tail brownish black; in winter white, with black tail; no black stripe through the eye. It occurs commonly in the northern parts of America, and in rare in¬ stances in the northern United States (Maine and Minnesota). It is found in open rocky grounds and among dwarf willows and birches. In winter they scratch in the snow down to the mosses and lichens on which they feed, collect¬ ing often in considerable flocks. In winter the flesh is dry, but is tender and with an agreeable aromatic flavor in summer. They breed in

Labrador about the beginning of June, placing the nest under the creeping branches of low firs; the eggs are from six to 14, of a fawn color or rufous ground with irregular spots of reddish brown ; only one brood is raised in a

season. The rock ptarmigan (L. rupestris) is 14ˆ4 inches long; the bill is slender, rather com¬ pressed at the tip; in summer the feathers of the back are black banded with yellowish brown and tipped with white ; in winter white, with the tail black (the four middle feathers white), and the male with a black bar from the bill through the eyes. It occurs in arctic America, from Alaska to Labrador and the Gulf of Saint Lawrence. The white-tailed ptarmigan (L. leucurus) is found on the alpine summits of the Rocky and Cascade Mountains from New Mexico to the Artie regions. This species is entirely white in winter; and in summer the tail, wings and lower parts of the breast are white, the remainder of the plumage being a fine mixture of gray, brown and black. A fourth species (L . welchi) is attributed to New¬ foundland. Of the Old World species the red grouse (L. scoticus) is peculiar to the British Islands and a famous game bird. Unlike the other members of the genus it does not become white in winter. A typical ptarmigan (L. alpinus) is found in northern Europe, especially in Norway. Our own willow grouse, or a closely related species, also occurs. Consul Baird, Brewer and Ridgway, (North American Land Birds) (Boston 1874). See Grouse.

PTERANODON. See Pterodactyls. PTERASPIS, a fossil fish. See Ostraco-

DERMI.

PTERICHTHYS, te-rik'this, a genus of extinct fishes belonging to the subclass Ostra- cophori and considered to be remotely related to the modern lampreys. Bothriolepis is a related genus from the upper Devonian formations of America, as well as the Old World. None of the species exceed a few inches in length. The affinities of these strange forms are little under¬ stood. See Ostracodermi.

PTERIDOSPERMAE, ter'id-o-sper'me, or PTERIDOSPERME2E, in paleobotany, a class, co-ordinate with Gymnospermce and An- giospermce, of fossil Paleozoic fern-like plants, including all such which on the evidence avail¬ able appear to have been reproduced by means of seeds. Potonie called this class Cycadofilices. And some paleobotanists even regard the group as a phylum, or primary division, and not as a class; and to this phylum they then apply the name "Pteridospermaphyta® ; but the idea of the group's being a class is gaining favor. A sin¬ gle plant of the group is a "Pteridosperm.® The cases in which the evidence available ap¬ pears to be decisive are but few ; and to these have been applied the names which follow: (1) Lyginodendron oldhamium; (2) Neuropteris boterophylla ; (3) Pecopteris Pluckeneti; (4) Aneimites fertilis; and (5) Aneimites tenui-jolius.

In the first named pteridosperm, Lyginoden¬ dron oldhamium, the structure

both of the vege¬ tative and reproductive organs is known ; and the evidence from comparison and association is sufficiently strong. So identification is cer¬ tain and easy. And in the other cases there is direct proof of continuity between seed and

plant; but only the external characters are known. In a great number of forms amount¬ ing to a majority of the Paleozoic plants of fern-like habit, the evidence — such as it is — is in favor of their having possessed seeds. They are pre-eminently plants resembling ferns in habit and in many anatomical characters but bearing seeds of the Cycadean type. Seeds and microsporangia, — or pollen sacs of the anthers, — are low on the fronds, and only slightly modified as compared with the vegeta¬ tive leaves in Pteridospermae. Pteridospermae, of which only a few examples have so far been considered by paleobotanists, evidently consti¬ tuted a group of vast extent in Paleozoic times. In a large majority of the fern-like fossils of that period the evidence is in favor of repro¬ duction by seeds rather than by the cryptiogamic methods of true ferns. The whole class of Pteridospermae though clearly allied to the typical Gymnospermae may be kept distinct for the present on account of the relatively primi¬ tive characters shown in the anatomy and morphology of the former. During recent years a number of Carboniferous and Permian plants have been very thoroughly investigated in the light of modern anatomical knowledge, and as a result it has become clear that in those times a large series of plants existed inter¬ mediate between the modern Gymnospermae, — especially the Cycads, — and the true ferns.

The first definite evidence of the mode of reproduction of Lyginodendron oldhamium was due to the studies of F. W. Oliver, who in 1903 identified the seed Lagenostoma Lomaxii by means of the glands on its capsule, which agree exactly with those on the associated leaves and stems of the plant. No similar glands are known on any other Palaeozoic plant. Lagenostoma Lomaxii is a small, barrel-shaped seed, 5.5 by 4.25 mm. when mature, enclosed in a husk or capsule, which completely envelops it when young but ultimately opens. The male organs of Lyginodendron oldhamium were dis¬ covered by Kiddon, a year or two after the seeds were identified. They are of the type known as Crossatheca, formerly regarded as a Maratteaceous fructification. This is the first case in which the pollen-bearing organs of a Pteridosperm have been identified. It will be noticed that while the seeds of Lyginodendron oldhamium were of an advanced Cycadean type, the microsporangiate organs were more like those, of a fern, the reproductive organs thus showing the same combination of characters which appears in the vegetative structure. It must here be mentioned that the family Calamo-pityeal, allied anatomically to Lyginodendreae, is of the Devonian and Lower Carboniferous age.

Bibliography. — Potonie, 'Lehrbuch der Pflanzen-palaontologie) (Berlin 1899) ; Renault, 'Cours de botanique fossile) (Vols. I-IV, Paris 1881-85); Scott, D. H,, 'Studies in Fossil Botany (2d ed., London 1908-09) ; Seward, A. C., 'Links with the Past in the Plant-World* (Cambridge 1911) ; Stopes, M. C., 'Ancient Plants) (1910).*

PTERIODOPHYTES. See Ferris and Fern Allies ; Paleobotany.

PTERODACTYLS, ter'o-dak'tilz, an order of extinct flying reptiles technically known as Pterosauria. They lived exclusively during the

Mesozoic period, from the beginning of the Jurassic to near the close of the Cretaceous. Their fossil remains have been found in Europe and North America, but are best known from the chalk deposits of western Kansas, where many hundred specimens have been collected. Of known reptiles they are nearest allied to the dinosaurs (q.v.) ; they are only distantly related to birds. They vare especially char¬ acterized by their very hollow bones and the extraordinary elongation of the fourth (accord-, ing to some authors, the fifth) finger, which supported a thin bat-like membrane that ex¬ tended to the sides of the body and the legs. Not only were the bones very hollow, more so than in any living birds, but they were com¬ posed of very dense osseous tissue and were pneumatic, that is, had openings, usually near the ends, for the ingress and egress of air, as in birds. The nature and extent of the wing membrane, or patagium, are known from impressions in the rocks, but the covering of the body elsewhere is still in doubt. That the body is not clothed with feathers is certain, but it may have had, like that of most reptiles, horny scales.

The neck was more or less elongated and very flexible ; the legs were relatively feeble and of but little use in locomotion upon land; the breastbone, which is poorly developed in other reptiles and wholly absent in early reptiles, was of great size, covering the whole under side of the thorax. Unlike birds, however, it had no real keel but only a stout projection in front for the attachment of muscles. The pel¬ vic or hip bones were well developed for the support of the hind legs, which were of ma¬ terial use in flight. The fifth finger was absent; the first three fingers were short and useful only for clinging to rocks and branches.

In all the early kinds, those from the Juras¬ sic, the skull, of moderate length, was provided with long and sharp teeth. The tail was long and flexible and had at its extremity a diamond¬ shaped expansion for use in

controlling flight. The bones of the skeleton were less hollow and the wing was proportionally less elongated. The first bone of the wing-finger, that is, its metacarpal, was relatively short, never longer than the forearm, and the first three fingers were articulated directly with the wrist. There were five separate toes and the feet were of some use upon land. None was of large size, not exceeding five or six feet in expanse. The best known form is Rhamphorhynchus (Fig. 1), and the group or suborder is known as the Pterodermata.

Fig. 1.— The Rudder-tailed Pterosaur, Rhamphorynchus phyllurus Marsh. From the lithographic shales of Solenhofen (Jurassic). One-seventh the natural size.

The later and much more specialized group, beginning near the close of the Jurassic, known as the Pterodactyloidea, had the skull more

elongated, the wing-finger longer, with its meta¬ carpal longer than the forearm, the first three fingers of the hand loosely attached in the flesh, the tail vestigial, the pelvis larger and firmer and the feet with only four toes. The earliest of these, of which Pterodactylus is the best known example, were small, some with a body not larger than that of a sparrow, and they had teeth in the jaws. The later ones, however, those from the Upper Cretaceous, of which so many are found in America, reached a size of more than 20 feet from tip to tip of wings. The skull was very long and slender, in some with an enormously developed crest upon the back of the head, and the jaws were without teeth. The neck was longer and more flexible, in many with additional articulations, giving greater strength ; the bones of the shoulder were united into a firmly ossified ring, which, unlike all other known animals, articu¬ lated directly with the spinal column; the wrist was firmer; the wing-finger still more elon¬ gated; the small bone of the legs had disap¬ peared, as in birds ; and the first bone of the ankle, the astragalus, had become indistinguish- ably united with the leg bone, as in birds. The most noted member of this group is Pteranodon.

In their maximum and final development the pterodactyls attained the highest volant powers of all creatures, whether of the past or present, being quite incapable of locomotion except in the air. Pteranodon, with a wing expanse of 22 or more feet, had a body smaller than that of a turkey. Nyctosaurus, an allied genus from Kansas, with a body only six inches long and five or six inches across the shoulders, meas¬ ured eight feet from tip to tip of expanded fingers, and probably did not weigh more than five pounds when alive. They doubtless spent most of their time in the air, resting suspended from cliffs by their small clawed fingers, much like the way of bats, except that their fingers, instead of their toes, are used for suspension. The presence of bony plates in the sclerotic membranes of the

eyes indicates either nocturnal or soaring habits. (Cf. Fig. 2).

In flight, unlike birds and bats, their Avings® served more as gliding surfaces, and could have been used only for upward and downward mo¬ tion. Flight was controlled by the legs, which were extended backward and connected by membrane, serving the purpose of the feathered tail in birds. The rudder-tailed Rhamphor¬ hynchus (Fig. 1) was a veritable monoplane.

Their food habits are only imperfectly known. Because so many of their remains are found in ocean deposits, it is believed that they fed largely upon fishes, and this assumption is strengthened by the discovery, in several instances, of the remains of their stomach con¬ tents containing comminuted fish-bones. But it is probable that they also lived in part upon other flying creatures, insects and small birds, which must have been swallowed whole. Their brain was better developed than in other rep¬ tiles, and because of this and of the highly- developed, pneumatic skeleton, it has been thought by some that they were warm blooded ; they have even been placed in a separate class of back-boned animals. They were, however, true reptiles, even though warm-blooded, which may have been possible.

PTERODACTYLS

Remains of young pterodactyls have never been found. Like most reptiles they were prob¬ ably oviparous, since otherwise, among the many hundreds of known specimens, embryonic young would probably have been found. The bones of the pelvis, unlike those of birds, were closely connected, and only eggs of small size could have passed through it, not much larger

young were cared for by the parents until able to care for themselves. These facts suggest limited breeding grounds, and extensive seasonal migration. (Note Fig. 3).

About a dozen genera are defined, of which Rhamphorhynchus, Dimorphodon, Pterodacty- lus, Pteranodon and Nyctosaurus are best known. In North America, with the exception

Fig. 2. — Outline of the skull of Pteranodon longicel's (from the Kansas chalk), showing the great steering crest. The crest is fully two-fifths the length of the skull, which measures nearly four feet from tip of sharp bill to end of crest.

Fig. 3. — Crested Pterodactyls as they appeared in life, hovering over the palm-lined shores of the Kansas inland sea of the chalk period. (The details

are scientifically accurate. A mosasaur and crinoid or “stone-lily” in the foreview).

than hens’ eggs, even in the largest kinds. Such small young would have been practically helpless, which, together with the greater intel¬ ligence of the adult animals, as indicated by their large brains, renders it probable that the

of some fragmentary remains from the upper¬ most Jurassic, Pteranodon and Nyctosaurus arc the only, though abundantly represented genera.

Bibliography.— Cuvier first named this group. Consult the (

and 1824). Also consult Buckland's Bridge- water Treatises, 1837. Later works are H. G. Seeley's (0 rnithosauria and Dragons of the Air* (1870 and 1901). The discovery and de¬ scription of the American forms is found in the scientific writings of O. C. Marsh, S. W. Williston and G. F. Eaton. Consult especially Eaton,

S. W. Williston.

PTEROPOD OOZE. See Pteropoda.

PTEROPODA, a group of mollusks, form¬ erly regarded as a distinct class, but now known to be only a suborder of the episthobranch gastropods, especially modified for a pelagic life. Like the other opisthobranchs, they are simple in structure, the heart being posterior in position and the nervous system without a trust. They are hermaphroditic. The name pteropod refers to the ring-like development of lateral processes (parapodia) of the foot, which serve as fins by means of which the animals swim. The head and usually the tentacles and eyes are lacking. Some of the species are naked, while others secrete delicate shells, which are in some cases spiral (Limacinidce) , or straight slender cones (Carolinidce) , or more or less pyramidal (Hya – leida). All of the species are small, many being almost microscopic in size. In certain parts of the ocean these animals are so abund¬ ant that their dead shells, accumulating on the bottom, have given the name ((pteropod ooze® to the deposits. In the northern seas one species (Clione pcipilionacea) occurs in enormous num¬ bers, forming a large element in the <(brit® on which the right whales feed. Fossil pteropods are well known from all rocks from the Lower Cambrian to the present. Consult authorities cited under Mollusca. See Ooze.

PTEROSAURIA, a subclass of Mesozoic reptiles, prominently characterized by the power of flight ; the pterodactyls. Anatomically, they have fixed quadrate bones, and the anterior limbs formed into wings, with enormously elon¬ gated ulnar finger carrying a patagium. The group consists of an order (Pterosauri) , di¬ vided into two suborders : Pterodactyli and Pteranodontes. See Pterodactyls.

PTERYGIUM, a fan-shaped patch of mucous membrane on the ocular conjunctiva, its base being usually at the inner angle of the eye (the canthus), its apex at the margin of the cornea or overlapping it. It may appear on the temporal side of the eye ; sometimes two of the patches occur in the same eye and cover the whole cornea as with a thick veil, preventing vision. Pterygium occurs in middle and ad¬ vanced life, and may be either

stationary or progressive. In the progressive form the patch is fleshy and the vessels are pronounced ; in the non-progressive form it is pale and flat. The ordinary (regular) pterygium is due to irritation of the conjunctiva by dust and minute bodies. It may become inflamed and lead to ulceration of the conjunctiva and cornea and to impaired vision. Irregular pterygium is usually the re¬ sult of burns or ulcerations. Paronychia is sometimes spoken of as pterygium digiti; pin- guicula, a fan-shaped yellowish patch on either side of the cornea in old age, due to irritation

from dust, etc., and leading to colloid inflam¬ mation, is sometimes called pterygium landa- ceum or pterygium pingue. Pterygium unguis is a condition in which the epidermis coats the nail with a thin transparent layer. For treat¬ ment of peterygium, removal by excision, stran¬ gulation, cauterization or curettement may be employed. See Eye and consult works re¬ ferred to under that article; also (Reference Handbook of the Medical Sciences) (New York 1916).

PTERYLOGRAPHY, the description of the arrangement and habit of growth of feath¬ ers (pterylosis) on the body of a bird. A bird's plumage does not grow evenly from the whole surface of the skin, but in certain tracts (pterylae), the form, extent and disposition of which differs in the various orders, families and .genera ; so that the pterylosis is a character of importance in classification. The fact that the nearest approach to a uniform clothing of fea¬ thers occurs now in the ratite birds, penguins and the like, which are lowest in organization and of most ancient origin among birds, indi¬ cates that pterylosis is a comparatively modern acquisition, and its more striking manifestations occur among birds otherwise referable to a high rank in classification. The principal feather- tracts are similarly disposed in all the groups and consist of a tract embracing the head; a tract along the spine ; a line along each side of the neck, down each side of the breast and along the side of the abdomen curving inward to meet at the vent ; a line lengthwise across the shoulders; two patches upon each leg; and the regions of growth of the wing and tail feathers. The disposition of the powder-down tracts is also a part of pterylography. This matter was first expounded by the German naturalist, Nitzsch, author of

(1893-96).

PTERYLOSIS. See Pterylography. PTOLEMAIC SYSTEM, in astronomy, the system by which Claudius Ptolemy tried to explain celestial motions. For 14 centuries this was the universally accepted and authorita¬ tive system of astronomy, only being com¬ pletely overthrown upon the development of the Copernican system by Kepler toward the middle of the 17th century. The very long time during which the system of Ptolemy was re¬ ceived may perhaps be more clearly realized from the statement that

though it was first pro¬ posed so early as the 2d century, a.d., in the early days of our American universities it was still taught in connection with that of Coper¬ nicus. This was doubtless because, so far as was evident from the rough, naked eye, obser¬ vations of the sun, moon and planets, it seemed to account for all of their complicated apparent motions in a wholly satisfactory manner. Ac¬ cording to this system the earth is the fixed centre of the universe; a vast sphere, the (

in an eccentric circle round the sun; all mo¬ tions in each order of circle being described uniformly, this explained the looped paths, the progressions, stations and retrogradations of the planets. But every new astronomical ob¬ servation required a new contrivance on this system, and at length the necessary cyclic and epicyclic combinations became excessively cumbrous. The discovery of the elliptical form of the orbits, in the 17th century, and especially the development by Newton of the principles of mechanics, which wholly govern all the motions of the planets, quickly made it evident that the reality of the Ptolemaic system was a manifest impossibility.

PTOLEMY, tol'e-mi '(Ptolemaios), the name of a line of Graeco-Egyptian kings, who ruled from the death of Alexander the Great till the Roman occupation of Egypt 323-30 b.c. The name Ptolemy, though the common, was not the exclusive name of the kings of this dynasty, and they are better distinguished by the surname Lagidae, from Ptolemaeus Lagus, the founder of the dynasty, also surnamed Soter. Consult Budge, (A History of EgypC (New York 1902) ; Mahaffy, (The Empire of the Ptolemies) (London 1895) ; id., (A History of Egypt under the Ptolemaic Dynasty } (New York 1899) ; Meyer, (Das Heerwesen der Ptolemaer und Romer in .TEgypten (Leipzig 1900) ; Starck, (Die Dynastic der Ptolemaer } (Berlin 1897).*

PTOLEMY I (called Soter, «the Saviour®): b. Macedonia; d. 283 b.c. According to Lucian he was born about 367 b.c., but on the supposition of his being a son of Philip it must have been some years later. In 330 b.c. he was admitted into the body-guard, and from this time appears in important transactions. During the Indian campaigns he was regularly em¬ ployed in the most important commands, and distinguished himself alike for valor and ca¬ pacity as a general. He continued on terms of intimate friendship with Alexander, and accom¬ panied him in his last campaign 324 b.c. On the death of Alexander he attached himself to the party of Perdiccas, and secured for himself the government of Egypt. He then proceeded to strengthen himself in his government, and concluded a secret league with

Antipater against Perdiccas. In the arrangements made after the death of Perdiccas Ptolemy retained Egypt; and subsequently strengthened himself by marrying Eurydice, daughter of Antipater. On the death of Antipater (319 b.c.) Ptolemy united with Cassander and Antigonus against Eumenes, and on the defeat of Eumenes by Antigonus joined Cassander and Lysimachus against Antigonus, who invaded Syria, 315 b.c., overran Phoenicia, and laid siege to Tyre, which he took in 314 b.c. Cyprus revolted in 313, and Ptolemy proceeded thither in person, and reduced the whole island. In 312 b.c. he in¬ vaded Palestine. In 311 a general peace was effected, but it was not of long duration and was broken by Ptolemy in 310 b.c. In 308 he in¬ vaded Greece, but made little progress, and Antigonus now resolved to wrest Cyprus from Ptolemy (307 b.c.). The Egyptians were totally defeated at Salamis, and Cyprus fell into the hands of the victor, who assumed the title of king. In 305 b.c. Ptolemy assisted the Rhodians against Demetrius, and from the Rhodians on

this occasion acquired his surname of Soter. In 302 a league was formed against Antigonus, but alarmed by a false report that Antigonous had won the battle of Ipsus he retired to Egypt. The defeat and death of Antigonus in this battle raised Seleucus to a position of great power, and a dispute ensued between him and Ptolemy 295 b.c. Ptolemy recovered Cyprus, which be¬ came a permanent dependency of Egypt. Ptol¬ emy had two sons by Eurydice, but determined to bestow the crown on Ptolemy Philadelphus, a younger son by his favorite wife Bernice. He announced his own retirement, and caused him to be proclaimed as his successor 285 b.c. Ptolemy is regarded as the most prudent of the successors of Alexander. His internal adminis¬ tration of Egypt was enlightened and success¬ ful. He raised Alexandria to the highest rank in commercial prosperity, and founded in that city a colony of Jews, to whom the special place taken by Alexandria in subsequent times in philosophy and literature, as well as in politics, was in great measure due. He was also an eminent patron of literature, science and art, and founded the library and museum of Alex¬ andria. He himself wrote a narrative of the wars of Alexander, used as authority by Arrian. For bibliography see Ptolemy.

PTOLEMY II (Philadelphus) : b. Cos, 309 b.c. ; d. 247. He was raised to the throne during the lifetime of his father Ptolemy I. He concluded a treaty with Rome after the defeat of Pyrrhus, and continued faithful to his allies during the Carthaginian War. There was a chronic but uneventful war carried on during his reign with Syria. Toward the close of his reign it was terminated by the marriage of Ptolemy's daughter Bernice to Antiochus III. Either by the treaty or in the course of the war Ptolemy acquired Coele-Syria and Phoenicia. He was also, in general, on hostile terms with Macedonia. But the chief care of Ptolemy was directed to the internal administration of his kingdom and the encouragement of commerce. He

founded Arsinoe (on the site of Suez) to protect the navigation of the Red Sea and Bere¬ nice on the Red Sea Coast, and from the latter place formed a road to Coptos on the Nile, by which the commerce of India and Arabia con¬ tinued for ages to pass to Alexandria. The chief glory of Philadelphus was his munificence as a patron of science and literature. He raised the institutions founded by his father to the highest degree of splendor and spared no pains to fill the library of Alexandria with all the treasures of ancient literature. Among archi¬ tectural works of merit erected during his reign were the lighthouse on the island of Pharos, the Alexandrian Museum, and the royal bury- ing-place. He founded numerous cities and colonies not only in Egypt, but in Syria and Cilicia. He is supposed to have been the patron of Manetho in his Greek rendering of Egyptian history, and there is a tradition that it was at his instance that the Seventy made their trans¬ lation of the Old Testament. During his reign the dominion of Egypt extended into Ethiopia, Arabia and Libya and embraced the provinces of Phoenicia and Coele-Syria, besides extensive tracts in Asia Minor and the islands of the Mediterranean.

PTOLEMY III (surnamed Euergetes). son of Ptolemy II; d. 222 b.c. He succeeded

to the throne at the death of his father 247 b.c. He was early engaged in an important war with Antiochus III of Syria, who had put away his wife Laodice to marry Berenice, daughter of Ptolemy II. On the death of Philadelphia he put away Berenice and restored Laodice. The resentment of Laodice, however, was not ap¬ peased, and she sacrificed to her revenge her husband, her rival and their infant son. To avenge his sister Ptolemy invaded Syria and advanced to the confines of India. Recalled to Egypt by intelligence of seditions there he brought with him the statues of Egyptian gods carried off by Cambyses, which he restored to their respective temples, and thus earned the title of Euergetes (benefactor) from his sub¬ jects. The fleets of Ptolemy had at the same time subdued the coasts of Asia Minor and carried his arms to the Hellespont and to the coast of Thrace. Ptolemy took some part in the affairs of Greece generally, as was the policy of Egypt, against the rulers of Macedonia ; main¬ tained friendly relations with Rome, but de¬ clined the assistance of the Romans in his war with Syria. He continued the patronage of lit¬ erature and added largely to the library of Alexandria. Like his predecessors he was the patron of scholars and his court was the resort of the most distinguished men of his day. In his reign the Graeco-Egyptian kingdom attained its highest prosperity at home, and its widest dominion abroad.

PTOLEMY IV (surnamed Philopater), son and successor of Ptolemy III; d. 205 b.c. He put to death his mother Berenice, his brother Magas and his uncle Lysimachur and abandoned the cares of state to his minister Sosibius, his adviser in these and other crimes. Roused from his lethargy by the loss of his Syrian possessions, wrested from him by Anti¬ ochus the Great, Ptolemv completely defeated Antiochus at Raphia, 217 b.c. By this victory he recovered Ccele-Syria, but speedily made peace and returned to his pleasures. He continued in general the policy of his ancestors, patronized literature and dedicated a temple to Homer as a divinity. During the Carthaginian War he supplied the Romans with corn.

PTOLEMY V (surnamed Epiphanes), son and successor of Ptolemy IV: b. 210; d. 181 b.c. He was but five years old at his fath¬ er's death and Philip of Macedonia and Anti¬ ochus III (the Great) of Syria combined to dispossess him and divide his dominions. In¬ stead of relying on the internal resources of the kingdom to repel this danger, the guardians of the young king took the fatal step of placing him under the protection of Rome. The charge was gladly accepted by that crafty state and Philip and Antiochus were commanded to re¬ store their conquests. Antiochus, to avoid em¬ broiling himself with the Romans agreed, 199 b.c., to give Ptolemy his daughter Cleopatra in marriage, with the Syrian provinces as her dower. In 196 b.c. Epiphanes was crowned, being declared of legal age. In 195 b.c. the priesthood of Egypt erected in Ptolemy's honor the famous Rosetta Stone (q.v.), commemorat¬ ing the remission of the sacerdotal dues. The marriage to Cleopatra took place 193 b.c., never¬ theless when war later broke out between Anti¬ ochus and Rome, Egypt espoused the cause of the latter. Ptolemy was cut off by poison while he was preparing to recover Ccele-Syria

from Seleucus, the successor of Antiochus. Nearly all the foreign possessions of Egypt were permanently lost during the unfortunate minority of this reign.

PTOLEMY VI (surnamed Philometor), son of Ptolemy V, was also a child at the death of his father. His mother Cleopatra, who as¬ sumed the regency, maintained peace and pre¬ served internal tranquillity by an able adminis¬ tration ; but the ministers who succeeded after her death (173 b.c.) provoked a war with An¬ tiochus Epiphanes and were totally defeated near Pelusium. Antiochus advanced to Mem¬ phis and took Ptolemy prisoner (170 b.c.). Upon this the brother of Ptolemy caused him¬ self to be proclaimed king at Alexandria, under the title of Ptolemy Euergetes II. Antiochus then re-established Philometor as king of Mem¬ phis, and returned to Syria. The brothers ruled jointly till 168 b.c. Dissensions now broke out between them, and Philometor, expelled from Alexandria, went to Rome 164 b.c. By the intervention of the Romans he

was replaced, but agreed to erect Cyrene into a separate kingdom for Euergetes, who afterward per¬ suaded the Romans to grant him Cyprus also. In 145 b.c. Philometor was mortally wounded in battle near Antioch, when arrayed against the Syrian Alexander Balas. In the latter part of his reign Philometor showed an energy of which he did not at first appear capable, and he is generally praised for the mildness and mod¬ eration of his character. During his reign a great migration of Jews, caused by factions in their own country, took place from Palestine into Egypt.

PTOLEMY VII (surnamed Euergetes II, and also Physcon), son of Ptolemy V, was king of Cyrene at the death of his brother Ptolemy VI, d. 117 b.c. Cleopatra caused her infant son to be crowned; but Ptolemy invaded Egypt, and by the intervention of the Romans it was agreed that he should marry Cleopatra and be recognized as king. Immediately after the marriage he put his nephew to death. Shortly after he married his niece, Cleopatra. The relations between the mother and daugh¬ ter were of continuous hostility. For many years Ptolemy's reign was one of tyranny and bloodshed, and compelled at length to flee from the indignation of his subjects led in revolution by the elder Cleopatra, he escaped to Cyprus 130 b.c.. He was restored to author¬ ity 127 b.c., and thereafter bent his energies to restoring the ravages of former years. He died in peaceable possession of the throne of Egypt. He was not only a patron of literature, but the author of a considerable work on natural history.

PTOLEMY VIII (surnamed Soter II, or Lathyrus) ; d. 81 b.c. He was the son of Ptolemy VII by the latter's niece Cleopatra. Already married to his sister Cleopatra at the time of his accession his mother compelled him to divorce her and marry his younger sister Selene, and for 10 years she continued to sway the government, although she and her son were frequently opposed in policy. She accused him of conspiring against her life, and he was com¬ pelled to flee. She recalled her younger son, Alexander I, from Cyprus, whereupon Soter II took control of his brother's kingdom and for 18 years he held Cyprus as an independent

kingdom. After the death of Cleopatra he was recalled to Egypt in the year 88 b.c. and governed till his death. The latter years of his reign were marked by the rebellion which re¬ sulted in the destruction of Thebes. He was succeeded by his daughter Cleopatra-Berenice.

PTOLEMY IX, or ALEXANDER I,

youngest son of Ptolemy VII ; d. Cyprus 88 b.c. On the expulsion of Ptolemy VIII he shared with his mother Cleopatra the throne of Egypt, although he appears to have had little power. The violence of his mother at length caused him to flee; but persuaded to return and suspecting her of designs against his life, he caused her to be assassinated 101 b.c. After reigning until about the year 89 b.c. he was expelled by an in¬ surrection of his own people and soldiers, who recalled his brother. Ptolemy IX was killed in battle the following year.

PTOLEMY X, or PTOLEMY ALEX¬ ANDER II, son of Ptolemy IX; d. 80 b.c. He was nominated king of Egypt on the death of Ptolemy VIII ; but the Egyptians having already placed Cleopatra-Berenice, the daughter of that king, on the throne, it was arranged that he should marry her and admit her to a joint sovereignty. Nineteen days after the marriage he caused her to be assassinated, upon which the Alexandrians rose in insurrection, dragged him to a gymnasium and put him to death. With him the legitimate male line of the Ptole¬ mies became extinct.

PTOLEMY XI (Auletes, surnamed Phi- lopator Philadelphus Neos Dionysus), an illegitimate son of Ptolemy VIII ; d. 51 b.c. He succeeded Ptolemy X, notwithstanding his claim to succession was doubtful. In vice and debauchery he appears to have rivaled the worst of his predecessors. The oppressive taxes he imposed caused his expulsion by the Alexan¬ drians in 58 b.c. In 55 b.c., A. Gabinius, pro- consul of Syria, by the influence of Pompey and a bribe of 10,000 talents, was induced to restore him. The Egyptians, who had placed Berenice, the daughter of Auletes on the throne, were defeated and Ptolemy put Berenice to death. During the rest of his reign Egypt was occupied by the Romans.

PTOLEMY XII (Auletes), son of Ptol¬ emy XI ; d. 48 or 47 b.c. He reigned jointly with his sister Cleopatra till 48 b.c., when Cleo¬ patra was expelled and raising an army in Syria invaded Egypt. It was at. this time that Pompey landed in Egypt after his defeat and was as¬ sassinated by the ministers of Ptolemy. On the arrival of Caesar, Cleopatra by her charms acquired an ascendency, over him, which made it manifest that he would decide her dispute with Ptolemy in her favor. Ptolemy put him¬ self at the head of the insurgents, was defeated by Caesar and drowned in attempting to make his escape.

PTOLEMY XIII (Auletes), youngest son of Ptolemy XI ; d. 43 b.c. He was declared king by Caesar in conjunction with Cleopatra in 47 b.c. He was married to his sister but was later put to death by her to make room for her son Caesarion (b. 47 b.c.), claimed by Cleopatra to be the son of Julius Caesar. From this time until Cleopatra's death in the year 30 b.c., the child was nominally coregent under the name of Ptolemy XIV. After the battle of

Actium,

Caesarion was betrayed into the hands of Oc¬ tavius who caused his murder and thereafter Egypt became a Roman province.

PTOLEMY (Claudius Ptolemˆus), Alex¬ andrian astronomer, geographer and mathe¬ matician: flourished about the middle of the 2d century after Christ, being probably born at Ptolemais in the Thebaid. The geocentric sys¬ tem of astronomy which he taught was accepted in Europe until after the time of Dante, whose poem takes this theory as its frame-work. In producing his principal work, (Meya?iTjGvvraˆigT7ˆ Aorpovofiiaq > Ptolemy relied very much on the labors of Hipparchus ; but his planetary theory is his own, as well as his theory of the moon's evection (q.v.). The Ptolemaic system of as¬ tronomy was only exploded by the arguments of Copernicus (q.v.). The mediaeval writers speak of the astronomical treatise of Ptolemy under its Arabian name of the Almagest. It consists of 13 books, the principal of which, the first, reveals the trigonometrical theory of the Greeks ; contains a method for calculating chords and demonstrates the basal doctrine of trigonometry, that the rectangle of the diago¬ nals of an inscribed quadrilateral equals the sum of the rectangles of the opposite sides. There is also to be found there sufficient spheri¬ cal geometry and trigonometry to enable a calculation to be made of the sun's declination to each degree of longitude. These principles are applied in detail through the remaining 12 books. The predecessor of Ptolemy in the field of geography was Marinus Tyrius, whose works he utilized and corrected. His geographical treatise is entitled TeuypaQudj 'Y (pT/ypo'.g, and contains little more than a list of places with their longitude and latitude. He also corrects the geographical methods of Eratosthenes, Hip¬ parchus and Marinus and he actually executed 26 maps in illustration of his theories. There are other spurious works of Ptolemy and many of his writings have been lost. The best and most recent edition of his works is that edited by Heiberg, T. L., (Claudii Ptolemaei Opera Quae Extant Omnia) (in (Bibliotheca Scrip- torum Graecorum et Romanorum TeubnerianaP 3 vols., Leipzig 1898-1907). Consult Ball, R. S., (Great Astronomers > (London 1895) ; Cooley, W. D., (Claudius Ptolemy and the Nile (Lon¬ don 1854) ; Cronin, H. S., (Ptolemy's Map of Asia Minor; Method of Construction (in Geographical Journal, V ol. XXV, p. 429, London 1905) ; Dinse, P., (Die Handschriftlichen Ptolemanskarten, etcP (in Zentralblatt fiir Bibliothekwesen, Vol. XXX, p. 379, Leipzig 1913) ; Eames, W., (A List of Editions of Ptolemy's Geography, 1475-1730) (New York 1886) ; Gerini, G. E., Researches on Ptolemy's Geography of Eastern Asia) (London 1909) ; Haskins, C. H., and Lockwood, D. P., (The Sicilian Translators of the 12th Century and the First Latin Version of Ptolemy's Almagest* (in Harvard Studies in Classical Philology, Vol. XXI, p. 75, Cambridge 1910) ; McCrindle, J. W., (Ancient India Described by Ptolemy* (Bombay 1885) ;*

Peters, C. H. F., and Knobel, E. B., ed., (Ptolemy's Catalogue of Stars) (in Carnegie Institution of Washington, Publications, No. 86, Washington, D. C., 1915) ; Roscher, A., fPtole- maeus und die Handelstrassen in Afrika) (Gotha 1867) ; Rylando, T. G., (The Geography of Ptolemy Elucidated) (Dublin 1893) ; Schiitte, G.,

(Ptolemy's Atlas ; a Study of the Sources^ (in Scottish Geographical Magazine, Vols. XXX- XXXI, Edinburgh 1914-15) ; Tudeer, L. O. T., (On the Origin of the Maps Attached to Ptolemy's Geography) (in Journal of Hellenic Studies, Vol. XXXVII, pt. I, p. 62, London 1917) ; Winsor, J., (A Bibliography of Ptolemy's Geography > (in Harvard University Library, Bibliographical Contributions, No. 18, Cam¬ bridge 1884).

PTOMAINES, a series of organic nitro¬ genous bodies, closely resembling the vegetable alkaloids in many of their chemical properties. They are present in many animal products, and are formed either by the chemical breaking down of complex nitrogenous molecules or by bacterial agencies capable of inducing similar decompositions. Most of the ptomaines are am¬ monia compounds. By the older chemists all of this group of so-called animal alkaloids were termed ptomaines, but later studies have given a series of groups of these bodies. Thus ptomaines, leucomaines and toxins are at pres¬ ent recognized; the former being the results of abnormal catabolic changes, due to chemical or bacterial agencies ; the leucomaines being usu¬ ally normal catabolic compounds of this group. The toxins are ptomaines, products usually of bacterial decomposition or ferment activity of some type or other, and which are poisonous. Many of the ptomaines are inert; others, the toxins are poisonous, some highly so. Ptomaine¬ poisoning resulting from eating altered sausage meat, mussels, tinned meats, etc., is due to some form of toxin. Chemically the ptomaines con¬ tain carbon, hydrogen and nitrogen. They belong mostly to the amines or substituted ammonia

/ H

compounds, monomethyl amine, N — H being

\CH3

one of the simplest of these bodies. It is present in many decomposing foods, and even as mercurialine in a living plant. Dimethylamine, (CH3)- NH and trimethylamine, (CHsCN, are similar ptomaines of this simpler group. Amines of higher alcohols are also common forms, ethylamine,

butylamine and others being examples. Putrescine and cadaverine are more complex ptomaines which have been isolated from putrescent meat. They are both diamines. Neuridin, C5H14N2, was one of the first of this class isolated by Brieger, the practical founder of the study. Choline, neurine, betaine and muscarine are four oxygenated ptomaines of closely related chemical structure that are pe¬ culiarly convertible one into another by simple chemical processes. Choline is non-poisonous, but neurine and muscarine are highly toxic. They are found in decomposing meat. Musca¬ rine, from the poisonous fly-mushroom, is thought to be identical or very closely similar to the choline, neurine, muscarine compound. My- tilotoxin is the specific poison of the mussel. Typhotoxin and tetanotoxin are ptomaines sup¬ posed to be the active poisons produced by the typhoid fever and lockjaw bacteria. Tyrotoxicon is a toxic ptomaine found in cheese and in ice cream. At least 200 ptomaines have been de¬ scribed. (See Toxins and Antitoxins). For a full consideration of the many lines of thought on this subject, consult Vaughan, V. C., (Ptomaines and Leucomaines and Cellular Toxins) (with Dr. Novy) ; (Protein Split Prod-

ucts> (with Vaughan, V. C, Jr., and Vaughan, J. W., 1913).

PTOSIS, to'sis, a falling or drooping of the upper eyelid owing to paralysis of the muscle that lifts it. It is somtimes congenital and it may be produced by various disorders of the brain.

PTYALIN. See Salivation.

PTYALISM. See Salivation.

PU-LU, poo'loo. See Ferns and Fern Allies; Fibre.

PUBERTY, the period in both male and female marked by functional development of the generative system. This period, when capacity for reproduction begins, is indicated in both sexes by certain characteristic signs. In the male puberty is generally reached, in temperate climates, between the ages of 15 and 18, and although it is commonly believed to be reached somewhat earlier in warm regions, climatic con¬ ditions appear to affect the male less than the female. Before the attainment of this period the physical powers have been appropriated to the nutrition of the body. This is in accordance with a well-known law of physiology, whereby the processes of nutrition and reproduction are mutually antithetic; the reproductive energies are opposed to the nutritive, and act as an im¬ portant drain upon the physical and nutritive powers. Therefore the generative instincts are limited or restrained until nutrition and growth

have been duly advanced.

In the male the occurrence of puberty is marked by a varied and general change in the physical constitution. The body attains, within a comparatively short period, a large relative in¬ crease in size. The form acquires greater ful¬ ness and stamina. The larynx particularly en¬ larges ; the voice deepens ; there is a growth of hair upon the face, the pubes, etc.; and the entire sexual system receives an unwonted stim¬ ulus, the testes secreting the seminal fluid char¬ acteristic of full sexual vigor. The male thus reaches sexual maturity. In ordinary cases his virile powers decrease after the age of 50 or 60, when the energies seem to be withdrawn from the reproductive function in the interest of nu¬ trition.

In the female the state of puberty usually begins, in temperate climates, between the 14th and 16th years. At this period the female form acquires a characteristic fulness and roundness. The breasts enlarge, depositions of fat taking place in the mammae and on the pubes, and over the body generally. The internal organs of generation also enlarge, and their functional perfection in woman is marked by the most unequivocal of the signs of puberty, the appear¬ ance of menstruation (q.v.). The production of ova, ready for fertilization, is the most essential and significant sign of the full attainment at once of puberty and of the true female generative functions. (See Ovary). Puberty in both man and woman may be retarded or advanced by in¬ dividual and inherited peculiarities of constitu¬ tion and by modifying circumstances and habits of life.

PUBLIC ARCHITECTURE. See United States Architecture.

PUBLIC BILLS. See Bills, Course of; Acts of Congress.

PUBLIC DEBTS. See Debts, Public.

PUBLIC DOMAIN. See Bounties; Pub¬ lic Lands.

PUBLIC FINANCE. 1. Definition and Scope of Public Finance. — Governmental or¬ ganization is necessary in any society which has passed beyond the lowest stage of social development, and in modern industrial states the functions and needs of the government are large and important. Public finance treats of the raising and application of the resources of the state. It analyzes the needs of the state and the means by which these needs may best be met, that is, it treats of public expenditure and public revenues. It also describes the methods by which these are determined upon and

raised, which leads to a discussion of finan¬ cial legislation and budgetary practice. And finally the subject of public credit, by which the orderly income of the state may be antici¬ pated, is included by most writers as falling within the scope of public finances. This gives a fourfold division of the subject.

2. Public Expenditures. — It is practically impossible to lay down any principles govern¬ ing public expenditures, since before we can do this a prior question has to be answered, namely, what are the proper functions of the state. The answers to this stretch all the way from the extreme individualism of Herbert Spencer, which would limit the duties of the state to the protection of life and property and the enforcement of contracts to the collec¬ tivism of modern Socialists, who would enlarge the activities of the state to such an extent that they would absorb all private enterprise. We may, however, treat the question of public expenditure as a practical problem in each specific case, to be determined on its merits without reference to any a priori theory.

Upon one point there is no difference of opinion : the tendency of public expenditures has shown a steady and universal tendency to increase. This has been true under central¬ ized administration, as in France, or under decentralized governments, as in the German states ; in large countries like Brazil or in small ones like Belgium ; in democratic countries like Switzerland or despotic ones like Russia; in old countries like Greece or new ones like the United States. Part of the seeming increase, to be sure, may be accounted for by the growth of the population, the growth of money pay¬ ments in lieu of payments in services or kind, the general advance in wealth and the decline in the value of money. But after making all these allowances there still remains a real increase to be accounted for, especially since the begin¬ ning of the 19th century.

The direction of the growth of public ex¬ penditures will become clearer if we distinguish three classes, namely, those for protection or defense, those involved in carrying on public works and those for the social welfare of the citizens. The first includes not only military expenditures, but also those for police, the courts and the preservation of domestic tran¬ quillity. Some years ago Herbert Spencer laid down the dictum that as society advanced it would expend less for militarism and more for amelioration, but the former part of this state¬ ment at least seems not to have been borne out by the facts. Responsible for this is the grow¬

ing cost of modern armament. War is incred¬ ibly expensive, the total money cost of the World War being estimated at about $186,000,000,000. Peace to-day costs the great modern powers more than the most expensive war of antiquity, and the greater the progress in invention the greater is the

expense involved in replacing obsolete equipment with new. Even in a country as free from war as the United States has been in the last 50 years, oyer two-thirds of the Federal expenditures to-day are directly or indirectly attributable to war and preparation for war. Police and court and similar expenses probably show a tendency to decrease, and it is possible that the future may also see a decline in the expenditures for war, but no such tendency can now be predicted.

There is a decided tendency for the second group of functions to increase. The number and variety of services undertaken by the state is daily increasing, and there is constant pres¬ sure from the citizens of all modern states that the government shall expand its functions still further. The post office, national railways, telegraph and telephone systems, municipal water, light and street car systems, are a few of the more important lines along which the state has entered the industrial field, while most governments own lands, forests and mines which they administer. As to whether these enterprises shall cause a corresponding increase in net expenditures or whether they will pay for themselves is a matter of public policy and administration. If managed on business prin¬ ciples the growth of this group will have no effect in increasing the burden upon the tax¬ payer.

Expenditures for social amelioration and for the development of the well-being of the mass of citizens fall in the third group. These in¬ clude such items as education, recreation, the care of the dependent and defective classes, and the control and regulation of private, industry for the purpose of eliminating unfair and un¬ desirable practices. That these have grown rapidly in the past needs hardly to be stated, and there is every reason to believe that they will increase even more rapidly in the future. From one standpoint they may be regarded as an investment which the modern state makes in its citizens, from which it reaps large returns in the form of greater efficiency, knowledge, contentment, decrease of suffering and improve¬ ment in the general standards of living.

The economic effects of public expenditures are far-reaching; if wisely directed they may greatly benefit a people while an unwise outlay may work positive harm. But there is probably no more widespread economic fallacy than that public expenditure, no matter to what purpose directed, is a desirable thing in itself, since it <(puts money in circulation.® Adam Smith, however, as early as 1775, contended that whether it was beneficial or not depended upon the purpose for which it was spent, and this is the correct view, though sadly overlooked in our pork-barrel and similar wasteful govern¬ ment expenditures in the United States. As to what is regarded as beneficial will again depend upon the particular point of view ; war is con¬ sidered so by some writers. In general it may be said in

conclusion that no general rule can be laid down to govern public expenditures.

Much will depend upon the stage of polit¬ ical and social development of a people. But that state may be considered to make the wisest expenditures which returns to its citi¬ zens relatively the greatest amount of benefit therefor, irrespective of whether these ex¬ penditures be large or small.

3. Public Revenues.— The revenues of the state have been variously classified by differ¬ ent writers, but it is possible to subsume all important sources under two heads, namely, (1) contractual or commercial revenues and (2) taxes or compulsory revenues. According to this classification, fees, special assessments and fines should be included in the second group, while such minor or unusual sources of revenue as gifts or indemnities would be included in the first. For all practical purposes such a broad classification serves as well as the more detailed ones of some writers.

Contractual revenues are derived in general from two main sources, public domains and public industries. Of these the former has been the more important in the United States. There are in general three policies which govern¬ ments have adopted respecting the public do¬ main. One is for the government to cultivate its own domain. This was the general practice in the mediaeval period when the revenues of the ruler were not sharply distinguished from those of the public treasury, and is still followed in many European countries which are influenced by feudal custom. Owing to the intensive nature of agriculture, which calls for close personal attention, this method has not yielded large revenues. In the case of forests, however, this policy may be heartily approved. A second possibility is for the government to retain the title but lease its domain for cultiva¬ tion. Such a policy would involve serious polit¬ ical dangers in the United States, owing to the pressure to make unduly favorable leases for partisan or personal reasons, and may be dis¬ missed as unworkable. In some of the Euro¬ pean countries, however, and notably in India, such a policy seems to work well and is highly endorsed by writers on public finance, especially in the case of mineral deposits. A third method, and this is the one which has been followed in the United States, is for the government to dis¬ pose of its public domain by sale or gift. If it is settled by an industrious and intelligent agricultural population the government will probably be able to secure larger revenues from taxation of the increased wealth and land values than from the receipts from direct farming by the state or from rentals from tenants. Solely from the standpoint of public finance, therefore, the policy

of the United States government may be approved.

Public industries vary greatly from country to country, as they have varied in number and extent from time to time. At one extreme stands Prussia, owning and operating its rail¬ roads, telegraphs and telephones, and in large part managing its mines and forests, to say nothing of its porcelain factories and other government plants. At the other stands prob¬ ably the United States, which until the war con¬ fined itself practically to the administration of the post office. Municipalities differ among themselves no less in regard to their public in¬ dustries, though here the movement for gov¬

ernment enterprises is much stronger than in the case of the central governments. The in¬ dustries selected for government management have usually been socially desirable but unre- munerative, as education ; of general interest to all the people, as the post office or waterworks ; monopolistic in their nature, as telegraphs or street railways ; and fairly simple in administra¬ tion. The revenues from public industries will, of course, differ greatly from country to country according to the policy of adminis¬ tration.

Taxation remains the principal source of revenues for all modern governments, and one that is growing rather tnan lessening in im¬ portance. A tax may be defined, in John Fiske's alliterative description, as a (

((1. The subjects of every state ought to con¬ tribute toward the support of the government, as nearly as possible in proportion to their re¬ spective abilities ; that is, in proportion to the revenue which they respectively enjoy under the protection of the state.

((2. The tax which each individual ought to pay ought to be certain and not arbitrary.

<(3. Every tax ought to be levied at the time, or in the manner in which it is most likely to be convenient for the contributor to pay it.

H. Every tax ought to be so contrived as both to take out and to keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the state.®

In addition to these requirements of justice, certainty, convenience and economy, a satisfac¬ tory tax system should also be productive of adequate revenues, and elastic or responsive to the needs of the government.

Some writers, as for instance the Physio¬ crats of the 18th century and the

single taxers of to-day, argue that a simple system of taxa¬ tion is preferable to a multiple system, and both of these schools have urged the substitu¬ tion of a single tax on land or on land values for all existing taxes. It may be urged, how¬ ever, that it is possible to realize the various ideals just enumerated, especially of adequacy and elasticity, only by a multiple or plural sys¬ tem of taxation. Moreover, only by the employ¬ ment of various kinds of taxes is it possible for a government to achieve other ends by means of the taxing machinery, as protection, regula¬ tion of the liquor traffic, etc. All modern governments use a plural system of taxation, in some cases leaving but a few sources of revenue untapped.

The canon of taxation upon which most emphasis has always been laid by writers on public finance is that of justice. The first question that suggests itself in this connection concerns the relative duty of citizens to pay taxes for the support of the state. How shall the tax burden be apportioned among the tax-

payers? Two main answers have been given to this problem : the benefit and the ability theories of taxation. According to the benefit theory taxes should be apportioned among the citi¬ zens according to the value of the services of the government to them — a sort of pay-as-you- use plan. It is evident that an attempt to carry out such a theory practically would result in imposing excessive taxes upon those least able to bear them ; the defectives in our state in¬ stitutions would bear the heaviest burdens. It may be observed, however, that every taxpayer should receive very real benefits from the gov¬ ernment which he helps to support, and indeed unless taxation yielded such benefits there would be no justification for it. This, however, is a very different thing from saying that the tax burden should be apportioned in accord¬ ance with the benefits which one receives from the government. The more generally accepted theory is the so-called ability theory, according to which each citizen is expected to pay for the support of the state in proportion to his ability as compared with the ability of others. It is the application of Christian ethics to public finance. This is stated in the first canon enumerated above by Adam Smith. ((In the observation or neglect of this maxim,® he went on to observe, ((consists what is called the equality or inequality of taxation.® His suc¬ cessors have carried on a lively debate as to what constitutes equality, and, particularly, whether a proportional or progressive rate of taxation corresponds most nearly with the de¬ mands of justice. To a consideration of this disputed topic we may, therefore, next turn.

By a proportional tax is meant one that is levied at a constant rate irrespective of the amount of property or income from which it is paid. For instance, a proportional income tax of 2 per cent would exact always the same proportion of the income no matter how large this might be: $20 if the income is $1,000, $200 if the income is $10,000 and $20,000 if the in¬ come is $1,000,000. On the other hand in the case of a progressive tax the rate increases as the amount of property or income to be taxed grows greater. Thus in the illustration given above the rate might be 2 per cent on incomes of $1,000 (tax would be $20), 5 per cent on in¬ comes of $10,000 (tax would be $500 instead of $200), and 10 per cent on incomes of $1, 000, 000 (tax would be $100,000 instead of $20,000). Un¬ der progressive taxation a relatively bigger slice of the large incomes in taken than in the case of the smaller incomes. The point at issue in determining the question as to whether propor¬ tional or progressive taxation best accords with the principle of justice or equity in the distribu¬ tion of taxation is whether a man's ability to pay is measured by the amount of property or income he enjoys, or whether his ability in¬ creases at a rate more rapid than the growth of his property or income.

The modern tendency is to affirm the latter proposition and to make more general use of the progressive principal. In support of this view a few of the leading arguments may be briefly summarized.

Probably the most popular argument in favor of progression is that it tends to break up large fortunes and to equalize the distribu¬ tion of wealth. This is doubtless the motive which has led to the approval of inheritance

taxes in this country, but in few cases has the application of the progressive principle been drastic enough really to bring about a redis¬ tribution of wealth. A second argument is the so-called equality of sacrifice idea: if the rich man is to make a sacrifice proportionate with that of the poor man he will have to give up a relatively larger per cent of his income, because as fortunes grow larger the utility of each dol¬ lar grows less. According to this view the burden of the tax is measured by what is left after payment rather than by the payment itself. Another reason has been suggested >by Prof. E. R. A. Seligman, namely, that a man's ability to acquire wealth increases progressively — <(money makes money® — and hence it is only fair to apply the progressive principle of taxa¬ tion to rich men. Finally Prof. H. C. Adams urges that there will be a social gain if the very rich older men be discouraged from fur¬ ther accumulation, and by withdrawing from active industry both give the younger men a chance and also devote their talents to philan¬ thropy, social betterment, etc. Against the pro¬ gressive principle is usually urged the familiar argument that it would discourage industry and saving, and hence mean an economic loss.

In the discussion thus far it has been as¬ sumed that when the legislator imposed a tax he knew what its effects would be. Such, how¬ ever, is not the case. Taxes are generally shifted by the person who makes the first pay¬ ment to the public treasury by being incorpo¬ rated in the price of the article taxed. The final resting place of the tax is called its in¬ cidence. Two rather simple theories of shifting and incidence have been held, the one, the dif¬ fusion theory, holding that wherever a tax is originally imposed it gradually diffuses itself throughout society; hence no tax is so good as an old tax. Another theory, which may be called the concentration theory, argues that the whole burden of taxation, no matter where originally placed, tends ultimately to be shifted upon some particular class or form of wealth; this was the idea underlying the impo't unique of the Physiocrats. The actual shifting of taxes is, however, much more complicated than either of these theories admits. See article on Taxation.

The actual tax system of any country is the result of a complex of historical, constitutional and political causes, and that of the United States is no exception. The Federal govern¬ ment has relied for the most part upon indirect taxes — customs and excise duties — though since the amendment of the Constitution in 1913 it has been able also to make use of an income tax, which has already grown heavier as the needs of the Federal government in¬ creased. Three-quarters of the State revenues are derived from the general propertv tax, though the unsatisfactory and inequitable ad¬ ministration of this tax has lead a number of the more progressive States to supplement or supplant this by corporation and inheritance taxes. The great expansion of municipal func¬ tions has forced the cities to overhaul their tax systems and to impose heavier burdens upon municipal utilities in addition to real estate.

4. Public Credit. — To say that a state makes use of public credit is equivalent to saying that a government borrows money. Public credit is a branch of general credit and like that depends

upon trust or confidence. But the fact that a sovereign state is the debtor in the case of public borrowing differentiates a government bond from other securities. In the first place a state cannot be compelled to pay its debts; but in spite of this fact government bonds are eagerly sought after. This is because the mod¬ ern state is compelled to maintain its credit un¬ tarnished as it is almost certain to need to borrow again. On the other hand, the state has eternal life and hence can make perpetual debts ; it has sovereign power to raise by means of taxation the funds for payment of

interest and repayment of principal.

In 1820 it was estimated that the civilized governments of the world were resting under a burden of indebtedness amounting to $7,750,- 000,000. By 1910 this had grown to $40,000,- 000,000, and since the beginning of the European War in August 1914 these debts have prac¬ tically quintupled. The growth of great public debts has been almost wholly a phenomenon of the 19th century, and has attended the develop¬ ment of a money market and improved credit facilities, better means of communication and transportation and of modern constitutionalism. The cause of the national debts has been al¬ most exclusively war and preparation for war; State and local debts are usually due to im¬ provements and investments, though sometimes improvidence has occasioned them. In general there are three objects for which a government may properly borrow money. These are to cover a casual deficit, to meet a fiscal emer¬ gency and to provide funds for industrial in¬ vestment.

Temporary but unforeseen deficits may prop¬ erly be met by the issue of short-term obliga¬ tions in anticipation of the next tax levy. It may be impossible or undesirable to disturb existing tax rates, and, unless there is a surplus on hand, it is preferable to borrow than to permit a floating indebtedness to be created. Such loans, however, are for short periods and for relatively small amounts.

Much more important is the second group, that designed to care for serious emergencies such as war. In such a case the government cannot wait for the slow increase in revenues from increased taxation; it must have the money at once. The only alternative method of guarding against such a contingency is the so-called <(war-chest policy® of Prussia, ac¬ cording to which that kingdom amassed a quantity of precious metals amounting to $60,000,000 and securities for use in case of war. How inadequate such a resource is be¬ comes evident when it is noted that this sum was spent in the first three or four months of the Great War. Only by the use of public credit, perhaps to the breaking point, is it pos¬ sible for modern nations to meet the cost of war.

The third occasion for public borrowing arises when a government wishes to undertake a scheme of public investment, such as the build¬ ing or purchase of a railway, a waterworks sys¬ tem, an electric-light plant, _ etc. If the business is a commercial one it will itself provide the means of repayment, and it is, therefore, un¬ necessary as well as undesirable to saddle it upon the taxpayers. Moreover, from an en¬ gineering point of view, it is desirable to have the whole amount of capital necessary for the

enterprise on hand at the start, so that no de¬ lays may occur. Debts for

this purpose should not, if the business is well conducted, impose any additional burden upon the taxpayers.

There is no magic in government borrow¬ ing; it means simply a postponement of the unpleasant necessity of paying one's debts to the next generation. One of the first and most obvious effects of public borrowing is an in¬ crease in the tax rate, for the interest must be paid even if the principal is not. If the sums borrowed by the government have been large this lessens the amount of capital available for private industry and consequently raises the rate of interest. Various social and political effects may also be noted, such as the creation of a district bond-owning class, as in France, or the lessened control of our legislatures over the disposal of public funds when existing debts absorb large amounts of revenue.

The technique of public borrowing will be discussed in another place. (See article Debts, Public). It is sufficient to point out at this time that in selling bonds the Minister of Finance must in general appeal to the same motives as the ordinary seller of commercial paper, ex¬ cept that in times of emergency like war the patriotism of the people may lead them to accept somewhat worse terms than they ordi¬ narily would. In fact loans are classified by numerous writers into the three classes of forced loans (such as the issue of irredeemable paper money) , patriotic, and voluntary loans, but the last two can really be considered to¬ gether, as they are both contractual rather than forced.

It frequently happens that when the emer¬ gency which forced the government to borrow possibly at very high rates is past, the rate of interest falls. Then, if the government has the right of repayment of the principal, it can avail itself of this opportunity to sell new bonds at a lower rate of interest and to pay off the holders of the old bonds with the proceeds. This is called conversion or refunding. By this process, without any extinction of the prin¬ cipal, the burden of the interest charge on a given amount of debt was steadily reduced for the nations of Europe during the 19th century.

But while conversion may reduce the inter¬ est charge it leaves the principal untouched, and states, like individuals, are faced at last with the unpleasant problem of debt payment. As yet it must be said that this problem has not been squarely faced by modern govern¬ ments. Except for the United States and to a lesser degree Great Britain, almost none of the civilized nations has attempted to pay off its national debt. And yet a sound financial policy requires that this be done as rapidly as is con¬ sistent with the economic development of a country.

5. Financial Legislation and Budgetary Practice. — Modern governments carry on their financial operations under well-defined constitu¬ tional

checks and budgetary practices. Certain general rules of financial procedure are laid down within which legislatures may vote taxes and legalize appropriations or incur debt. The study of these rules forms a fourth and last part of the subiect of . public finance.

The rise of constitutional arrangements in respect to financial matters undoubtedly orig¬ inated in England, and it is said that the Eng-

lish system has served as a model for the other European countries. While this is only partly true the English budgetary practice will serve as a convenient point of departure for our study of the United States.

By the word budget is meant a comprehen¬ sive report and balance sheet of the past and estimated receipts and expenditures of the gov¬ ernment for the next fiscal year. Such a state¬ ment forms the basis of legislative action on revenue and appropriation in practically every civilized country except the United States. In England, for instance, the budget for the fiscal year is prepared by the Chancellor of the Ex¬ chequer as a member of the Cabinet upon the •basis of reports made to him by the heads of departments. This contains a statement of the revenues and expenditures for the past year, together with an estimate of the revenues and the proposed expenditures for the coming year. The government then defends the proposed budget against criticism, modifying it where necessary, but resigning from power and re¬ sponsibility if the opposition overturns their plans.

Contrast with this highly centralized and responsible method the decentralized and irre¬ sponsible practice of the Federal government of the United States. A report is made to Con¬ gress to be sure by the Secretary of the Treas¬ ury, based upon data submitted by the various department heads, but until recently there was no certainty that the report was trustworthy, and even now Congress is but little influenced by the estimates of the executive department. According to our theory of separation of gov¬ ernmental functions there is no connection be¬ tween the executive and legislative departments and Congress prefers political independence to financial orderliness. The result is that tax laws and appropriations are determined by political rather than fiscal considerations.

Another striking point of difference between the English and American systems lies in the fact that in the English budget both revenue and expenditures are determined bv the same body, while in the United States

the taxing and spending powers are allotted to two differ¬ ent sets of committees. Under the English system there is thus possible a well-balanced budget in which the Ministry of Finance, re¬ sponsible for adjusting outgo to income, is able to avoid either surplus or deficit. At the same time the device of a variable rate for the in¬ come tax makes possible an exceedingly ac¬ curate equilibrium.

In the House of Representatives in the United States there are some eight different committees which bring in 14 different appro¬ priation bills, of which six are prepared by the Committee on Appropriations. As each of these committees is under the temptation to swell its bill asking for appropriations in order to mag¬ nify its own importance, there is constant pres¬ sure to extravagance. And when it is remem¬ bered that still a different committee, that on Ways and Means, has charge of revenue bills, it is not difficult to see that a well-balanced and harmonious budget is all but impossible under such a system. Not only is there no careful correlation between revenue and appropriations as a whole, but the relation between different categories of appropriations is haphazard and

unscientific as they are under the control of different sets of men.

The remedy for these evils is of course the adoption of a budget system for our Federal government. President Taft in 1912 requested Congress to provide for a budgetary form of statement of the annual report of the Secretary of the Treasury, and to follow such procedure in their financial legislation, but without avail. Probably nothing will be done in this direction until the force of public opinion compels Con¬ gress to adopt business methods and forms.

The State legislatures shadow forth, rather dimly, the same financial procedure that is found in Congress. It is practically impossible to speak of a scientific budget in any of the States. More progress has been made, on the other hand, in our municipal government, where under the highly centralized administration of the commission or city manager plans of gov¬ ernment a budget becomes possible. In the ma¬ jority of our cities, however, but little more progress toward this fiscal ideal can be recorded than in the case of our State legislatures. They are still in a chaotic state of transition.

Bibliography. — Adams, H. C, (Science of Finance) (New York 1898) ; Bastable, C. F., (Public Finance) (3d ed., London 1908) : Bul¬ lock, C. J., (Selected Readings in Public Fi- nance) (Boston 1907) ; Cohn, G., (Science of Finance) (trans. from the German by T. B. Veblen, Chicago 1895) ; Daniels, W. M., Ele¬ ments of Public Finance) (New York 1899) ; Jeze, G., (Cours des finances) (2d ed., Paris 1913; Leroy-Beaulieu, P., (

Science des Fi-

nances) (Paris) ; Plehn, C. C., Untroduction to Public Finance> (3d ed., New York 1912) ; Seligman, E. R. A., (Progressive Taxation in Theory and Practice) (Princeton 1908) ; Wag¬ ner, A.,

Ernest L. Bogart,

Professor of Economics, University of Illinois.

PUBLIC HEALTH, or the health of the people, i.e., of groups or communities of human beings, is to-day a great and growing subject which may be regarded either as a science — and is then nearly or quite synonymous with public hygiene — or as a state or condition of the physical well-being of human groups or societies. As a science, it has of late years, and especially since the great pathological dis¬ coveries of the last quarter of the 19th century, taken on new forms and extraordinary import¬ ance. As a state or condition, it has also re¬ cently attracted much attention in the improve¬ ments shown in almost all civilized countries. As a science, it is beginning to be recognized in schools and universities by the establishment of new courses, special teachers and even special training schools — notably at Harvard University and the Massachusetts Institute of Technology, at Yale and at the Tohns Hopkins University — an early step in this direction hav¬ ing been taken at the Universitv of Pennsyl¬ vania. As a condition, worthy of and demand¬ ing world-wide attention, it has led to the estab¬ lishment of a Federal Bureau in the Treasury Department of the United States government (formerly the United States Marine Hospital Service, later the United States Marine Hos¬ pital and Public Health Service and now the United States Public Health Service, having at its head a surgeon-general with several assistant

surgeons-general, with a large and important hygienic laboratory (in Washington) and a strong staff of medical men, sanitary chemists, sanitary biologists and sanitary engineers. Private and voluntary associations in great numbers, such as the International Health Board of the Rockefeller Foundation, the American Public Health Association, the American Association for the Study and Prevention of Tuberculosis, the American Society for the Prevention of Infant Mortality, and many others far too numerous to mention, have also been formed and are generallv ac¬ tively at work to promote and improve the pub¬ lic health. The latest step of great magnitude and promise in this direction is the diversion of some of

the vast machinery and effort of the American Red Cross remaining after the World War into channels of public health education and sanitary and hygienic betterment. It is plain that the problems of individual or per¬ sonal health or hygiene are sufficiently complex and uncertain, both of determination and amelioration, but if, instead of dealing with the individual, we deal with groups or masses of individuals in the form of communities, such as families, villages, towns, cities, States and nations, all the difficulties (and these are by no means few) connected with individual hygiene become enormously multiplied and complicated. It is easy to see that when the problems of the individual under varying conditions dealing with a variable environment are multiplied and com¬ plicated by the introduction of those of other individuals, with the inevitable effects which these produce upon the common environment, the public health problems with which we have to deal are by no means either simple or easy of solution. We need in the first place a precise knowledge of the quantity of life (that is, the population) with which we have to deal, and if over against this we set the total amount of dying within a particular period and then deter¬ mine the death-ratio (or death rate), we shall have at least a crude and general measure of the sanitary condition of the community. But if we determine simply the general death rate, we shall not have gone far enough, for it is now well understood that the death rate is pro¬ foundly influenced by factors other than dis¬ ease, such for example as the birth rate, a high birth rate naturally leading under present condi¬ tions to a high death rate. It becomes neces¬ sary then in any scientific examination of pub¬ lic health problems to go behind the general death rate and to study other conditions. One of the most important of these is the so-called specific death rate, that is to say, the death rate in any given population from particular dis¬ eases such as tuberculosis, typhoid fever, pneu¬ monia and the like; for it not infrequently hap¬ pens that in the presence of a fair general death rate the mortality from typhoid fever (for ex¬ ample) may be excessive. In determining popu¬ lation the census is of the first importance (see Census) and a well-directed census should furnish not merelv the total number of the liv¬ ing but the ((age periods® of the population, in¬ asmuch as the mortality at different ages varies widely, and no 'safe conclusions concerning the sanitary conditions of a population can be drawn without careful reference to the constituents of that population at the different age-periods. Space will not permit here a detailed treatment

of the sources of error to which students of sanitation, morbidity, death rates and the public health are exposed in various other directions, but which reference to any of the leading works upon vital statistics will readily disclose.

Epidemics. — From the practical point of view there is no more interesting

subject con¬ nected with the public health than the rise, progress and decline of epidemics, the study of which now forms a special science known as epidemiology. From time immemorial civilized communities have been ravaged by plagues, pestilences and epidemics, which have at times enormously increased the death rate, as in the famous black death (see Black Death; Pesti¬ lence; Plague), and have thus made serious inroads upon the public health. With the dis¬ appearance (until the Great War) of such dis¬ eases as typhus (ship fever, jail fever) and of scurvy, both of which formerly destroyed thou¬ sands even among civilized peoples, attention has of recent years been fixed more particularly upon the bubonic plague, which after a long absence from Europe has reappeared in great intensity in China and India, and has even threatened the shores of England and the United States. Asiatic cholera, which made a dramatic although brief appearance in the great commer¬ cial city of Hamburg, Germany, in 1892 has since been kept at bay in civilized countries. Typhoid fever, however, still remains a curse of some even highly civilized communities, largely owing to the fact that it is readily conveyed by food and drink, such as oysters, milk and water, while its specific germs appear to be more than usually hardy or resistant. But with the discovery of an effective serum or vaccine capable of conferring immunity against ty¬ phoid fever, the dread of this disease is largely done way. Tuberculosis popularly called (

these diseases have become almost household words, and the methods of dealing' with them have become familiar, not only to physicians, but to sanitary experts, trained nurses and the intelligent public in general ; and inasmuch as knowledge of this sort lies at the basis of ef¬ fective promotion of the public health, we may briefly describe the more marked features of some of these diseases and especially the methods of their dissemination and control.

Before we do this, however, we may point out the remarkable fact that certain diseases which only two or three centuries ago rav¬ aged the human race have been to-day almost completely exterminated from the higher civilizations. The most important of these is probably the bubonic plaque , which in one form or another appeared in Europe down to the 19th century under the various names of the black death, the plague and pestilence. This dis¬ ease is characterized (among other features) by swelling of the lymphatic glands, which turn black and suppurate, being then known as buboes, but it was not until the last decade of the 19th century that these buboes were found to be loaded with microbes (bacilli)

capable of producing the disease in certain of the lower animals. Very late in the 19th century this plague, which had previously been for many years almost unknown in Europe and had never, so far as known, visited America, suddenly spread both westward and eastward from China, and menaced the coasts of Europe and America. It has, however, for the most part been success¬ fully held in check, and is no longer greatly dreaded. Its method of dissemination is be¬ lieved to be by means of rats and fleas, rats being very susceptible to the disease, and fleas which have bitten rats being abundantly capable of transferring the bacilli to human beings.

Another disease formerly very prevalent in highly civilized communities, which has within the last century or two practically disappeared, is typhus fever (spotted fever, jail fever, ship fever, etc.). This disease, which for a long time was not separated from tvphoid fever in classifications, and which resembles it closely, but differs from it in the fact that it frequently causes extensive eruptions and is also lacking in the characteristic ulceration of the bowels which is the distinctive feature of typhoid fever, was formerlv greatly dreaded, but, doubtless owing to the improved sanitation (greater clean¬ liness) of crowded places such as jails and ships, has practically disappeared from among the most highly civilized peoples. How far better food and air have aided in the good work it is impossible to say. The main factor, how¬ ever, is greater cleanliness, for it is now known that this disease is transmitted by lice, and ihtit freedom from lice means, as a rule, free¬ dom from typhus fever.

*Smallpox, a disease formerly so prevalent that, according to one authority, ((scarce one in a thousand escaped it,® and so much dreaded that the pesthouse in the early American towns and cities, a constant as well as a repulsive feature, was regarded almost with terror by * many of the inhabitants, has of late years been nearly exterminated in the most highly civilized countries, and wherever sufficient pains have been taken to hold it in check by means of vac¬ cination and revaccination. In the German*

army, for example, this disease is now ex¬ tremely rare, apparently for the reason that vaccination and revaccination are most care¬ fully attended to. The only serious danger from smallpox to-day is that communities which because of its scarcity are unfamiliar with the horrible character of the disease and its ravages may come to rely upon improved sanitation or other supposed safeguards and neglect vaccina¬ tion which, according to all experience, is the only trustworthy defense against this extremely infectious and contagious disease. This danger is aggravated somewhat by the mistaken zeal of the so-called anti-vaccinationists, who, fixing their attention upon the occasional injuries con¬ sequent upon vaccination rather than upon the enormous saving of life wrhich has resulted from its use, maintain a propaganda against it, and seek to have vaccination

entirely done away. However earnest and honest these persons may be, there can be no doubt in the minds of those who will take the trouble to review all of the evidence, that their contentions are largely un¬ founded.

Typhoid fever, a diarrhceal disease, ever since its clear recognition, about 1840, as a mal¬ ady distinct from typhus fever, has gradually come to be recognized as one of the most in¬ sidious diseases of civilized societies. Its rav¬ ages among the uncivilized are doubtless exces¬ sive, and even among highly civilized societies it is far more frequent than it ought to be, ap¬ parently because the bacilli which characterize and cause the disease are capable of maintaining their life outside the human body in the environ¬ ment of man for a somewhat longer period and under somew'hat more trying circumstances than are the germs of many other diseases. These bacilli are, for example, fairly resistant to cold and to dryness, and, although they are not known to produce spores, they are apparently able to persist for a long time (in greatly di¬ minished numbers) in sewage, water, ice and upon fruits, vegetables and other articles of food. In milk under certain circumstances they may even multiply, and a verv large number of epidemics of typhoid fever has been traced to infected milk. The same thing is true of drink¬ ing-water, and, since 1894, when an extensive epidemic of this disease, due to infected oysters, occurred among the students and others in Wes¬ leyan University, in Middletown, Conn., many investigations have been made, both in Europe and in America, tending to show that raw oysters are not infrequently grown near the mouths of sewers and that such oysters may readily convey the germs of this disease. Furthermore, since it has become known that the bacilli of typhoid fever occur not only in the bowel discharges, but also in the urine, and even in the sputum of persons sick of this dis¬ ease, it has become easy to understand the fact that it is often .really, as well as apparently, con¬ tagious, although of course in far less degree than the eruptive diseases, such as smallpox, measles and scarlet fever. The control of ty¬ phoid fever is now largely within our power, for it has been shown by experience, in armies and navies, that it can be mostly avoided by ˆvaccination® with a serum made from the dead bacilli of the disease itself.

Malaria and' malarial fever had long been associated in the popular mind with swamps.

but until 1880 no germ characteristic of these diseases (Which are really one and the same) had been discovered. In that year Laveran, a French investigator in Algiers, discovered in the red blood-cells of persons sick of

the disease certain animal parasites, protozoan in character, which appear to be not only the constant accom¬ paniment, but the sufficient cause of the disease. Quite recently Ross in England, Celli in Italy and various other observers have proved beyond doubt that these germs are conveyed from one human being to another by means of certain female mosquitoes, belonging to the genus An¬ opheles, without the bite of one of which con¬ taining the microbes the disease does not ap¬ pear to be transferable. The life history of these parasites has been worked out thoroughly, and to-day it is universally believed that malaria is caused by the parasites mentioned above, which spend only a portion of their normal life in their human host, and the remaining portion in the bodies of mosquitoes of the genus Anoph¬ eles. The importance of this discovery can scarcely be overestimated, for although for¬ merly, as already stated, malarial fever was as¬ sociated with swamps, no one could tell pre¬ cisely how ; while to-day it is easy to see that if swamps contain infected malarial mosquitoes they may be dangerous sources of disease for human beings. Qn the other hand, it had long been observed that it was not swamps per se which produced malaria, inasmuch as thousands of swamps had never been brought under sus¬ picion. This circumstance is now interpreted as due to the fact that whatever mosquitoes may have been present in the swamps in ques¬ tion must have been of some other genus in¬ capable of transmitting the disease; or else, if of the right genus, then these Anopheles had never become infected by biting human beings suffering with malaria. The practical import¬ ance of these discoveries in regard to malaria cannot easily be exaggerated, for malarial fever has long been the dreaded pest of the engineer, and such enterprises as the digging of the Panama Canal had been enormously hampered and even prevented by the prevalence of malarial and other fevers. Nowadays it suffices to make sure that all sleeping huts or houses are covered with nettings which shall keep out mosquitoes, and that if possible the breeding places of these pests shall be either drained and altogether done away or else petrolized. that is, treated with oil of some sort which shall inter¬ fere with the breeding of mosquitoes.

Tuberculosis has long been recognized as one of the worst diseases afflicting the human race. It is characterized by certain cheesy masses called tubercles, which may be formed either in the lungs or upon the membranes of the brain, in the lymphatic glands or even within the tissues of the face, the disease in this last case being known as lupus fa wolf), and causing serious disfigurement. In 1882 Dr. Robert Koch discovered within these cheesv masses small microbic rods or bacilli to which he gave the name by which they are now uni¬ versally known, of the Bacillus tuberculosis. These bacilli frequently occur in the sputum of tuberculous patients, and if this sputum js cast out upon the streets or in public places,

it may become dried and disseminated in various ways, for example in dust. The bacilli are believed to be disseminated also by the coughing of fine

moist particles from the lungs of tuberculous patients into the air; by milk derived from the tuberculous udders of tuberculous cows; by kissing — as when, for example, a tuberculous mother kisses her young child; by the hands, — as when a tuberculous patient, coughing upon his hand, afterward, without having washed it, touches the hand of another, or articles of food which are eaten raw ; and in a great variety of other ways. Here also much is being done by boards of health and other sanitary organiza¬ tions which seek to control the spitting nui¬ sance ; by physicians who educate tuberculous patients to use destructible spit-cups, handker¬ chiefs and the like; by sanatoria, that is, estab¬ lishments intended especially for the benefit and cure of cases of incipient tuberculosis, and by a campaign of education consisting largely in the distribution of literature bearing upon the disease. Among the most noted sanatoria for tuberculosis in the world are those at Davos Platz, in the Italian Alps, and at Saranac Lake, in the Adirondacks. More recently State sana¬ toria have begun to be established, the first in America being that of the State of Massachu¬ setts, at Rutland, Mass. It was formerly thought necessary for incipent tuberculous cases to be removed to Colorado or other high, dry localities, but to-day it is commonly felt that, however, desirable a removal of this kind may sometimes be, it is not always wise, and that the essentials of a good sanatorium (which are largely rest, fresh air and good feeding) may often be found near a large city, the first institution of this kind to be established (namely, the Sharon Sanatorium at Sharon, Mass., only 16 miles from Boston, upon a slight elevation and a dry, sandy soil) having proved eminently successful.

Diphtheria, or malignant sore throat, has of late years come, unhappily, to be quite common, and is rightly much dreaded. The causative germ of the disease was discovered and de¬ scribed by Loeffler, a pupil of Koch, in 1884, since which time it has been very widely studied, and has been found to do its damage by producing in the bodies of its victims, or even when growing in beef tea, a highly poison¬ ous substance known as its toxin. Until 1892 no remedy for it was known, but in that year von Behring of Germany announced the dis¬ covery of that remarkable antidote for the dis¬ ease, now universally known as diphtheria anti¬ toxin. Behring was led to his magnificent dis¬ covery by reflecting upon the fact that some animals can be immunized to diphtheria toxin and that the blood of such immune ani¬ mals is capable of neutralizing the poisonous character of the toxin produced by the germs of diphtheria. The manufacture of diphtheria antitoxin is now a large industry, sometimes carried on under private and sometimes under State or municipal control. There can be no question that

its use has largely diminished the mortality from this disease.

There are many other diseases such as yel¬ low fever, leprosy, scarlet fever, measles and pneumonia, a knowledge of which has of late years become more precise and practical, but these cannot be referred to within the limits of this article.

Some Methods for Health Improvement.

— Engineering enterprises, such as drainage and sewerage, water supply, the filtration of

water, the purification of sewage, the cleaning of streets, and garbage collection and disposal, have had much to do in the past, and will doubtless have much to do in the future, with improvement of the public health ; and there is every reason to hope that the general death rate may continue to diminish, as it has dimin¬ ished, in the past, largely by virtue of these enterprises. In addition, however, much re¬ mains to be done; the more crowded sections of cities — the so-called slums — require the most careful supervision to prevent overcrowd¬ ing, bad ventilation and accumulation of nox¬ ious or even toxic wastes. The milk supplies of cities are as yet very largely in a primitive state so far as the production of milk is concerned, and it will become necessary in the near future either to improve radically the conditions of its production or else to abandon almost altogether the use of uncooked milk. Vegetables, fruits and berries, which are eaten in the raw state, such as celery, lettuce, radishes, watercress, cherries and strawberries are peculiarly ex¬ posed to infection either by handling or because they are occasionally treated with manure-water during the process of growth, and such water is not infrequently polluted and infected. The dangers from oysters have already been re¬ ferred to. How far uncooked or underdone meats are dangerous is uncertain, although it is well known that uncooked ham and other lean meat of hogs has frequentlv caused trichinosis, an infection due to minute parasitic worms.

Illuminating gas, particularly water gas, which contains a large percentage of carbonic oxide (CO), has an important bearing on the public health, not when properly burned or by its products of combustion, but because of leaks in the mains or the service pipes, or about the fixtures by which it is distributed. Many deaths occur annually from this source, and the use of water gas should be accompanied by spe¬ cial precautions.

As for the effect of Public gymnasia, play¬ grounds and other open places in cities or other crowded communities little need be said, inas¬ much as it is impossible to determine their precise value. There can be no question, how¬ ever, as to the general wisdom or advantage of such things in modern cities. Isolation hospi¬ tals for infectious diseases are gradually being established in our larger cities, and are filling a long-felt want. Best of all, the recent im¬ provements in transportation are making it pos¬ sible for large numbers of persons to live near, rather than within, cities and suburban life is becoming as characteristic a feature of modern life as is city life itself. Unfortunately this remedy for the evils of city life applies only to the fairly well-to-do, for the very poor will probably always find it easier, cheaper and more exciting to live closely crowded in the congested centres of population, where work is most abundant and where the incidental diversions of a varied and noisy city life may be had free of cost.

The public health problem is very largely, but not exclusively, a problem of the life of crowded communities. Yet something needs to be said concerning the sanitation of farms which, while they ought to be the most health¬ ful places in the world, are by no means always such. Damp or even wet cellars, bad ventila¬ tion, overheating and poor feeding; defective

sanitary arrangements, shaded houses and un¬ wholesome surroundings, or close association with domestic animals, such as dogs, cats and poultry or swine, too often make farm life un¬ sanitary, and boards of health having in charge the sanitation of States or Territories should give attention to these problems as well as to those of more crowded c'ommunities. Rail¬ way sanitation, steamship sanitation, and the more technical aspects of the work of boards of health, such as disinfection, scavenging . Quaran¬ tine, isolation, vaccination and the like, are nowadays subjects of great public consequence and are fully treated in special works or memoirs, reference to some of which will be found at the end of this article.

There are few more interesting matters re¬ lating to the public health than the control of the adulteration of foods and drinks. In spite of the increase of general intelligence, flaming advertisements of quack medicines too often disfigure the pages of the newspaper press and testify to the enormous use of patent medicines, drugs, etc., by the public at large. In many States special laboratories are maintained for the investigation of foods and drinks, and stringent laws exist for the regulation of their adulteration and sale. One of the most striking facts which these have disclosed is that many of the so-called compounds, tonics, sarsa- parillas and other patent foods or medicines are rich in alcohol, some of them containing as much alcohol as many kinds of wine or beer. Some which profess to contain certain in¬ gredients are totally lacking in them, and others which profess to cure the alcohol habit or the morphine habit actually contain alcohol or mor¬ phine

respectively, occasionally in large quan¬ tities. The revelations which proceed from these State laboratories are sometimes startling, and any one interested in the public health should inform himself upon this subject, as he may readily do by turning, for example, to the (Annual Reports of the State Board of Health of Massachusetts. >

State and Municipal Laboratories are thus an important and modern adjunct to the public health work of boards of health. In the best of these means are provided for the rapid and certain diagnosis of doubtful cases of diph¬ theria, typhoid fever, malaria, hydrophobia, glanders, anthrax and some other infectious diseases. In them also analyses of milk, water, ice, sewage, vinegar and other liquids, of illu¬ minating gas and of air, and of substances sub¬ ject to infection or adulteration may be made; foods and drinks may be examined; materials for pavements or buildings may be tested and a great variety of useful operations conducted, all tending to a better knowledge of local sani¬ tary conditions. It is doubtful if any arm of the public health service is to-day more impor¬ tant than this. Largely in consequence of all these and many other efforts now making for the improvement of the public healthy human life is probably to-day safer and healthier than it has ever been before, and the outlook for further progress is very bright. See Hygiene; Hygiene, Military; Sanitary Science and Public Health ; Sanitary Engineering.

Bibliography. — Buck, (Treatise on Hygiene and the Public Health) ; Sedgwick, Principles of Sanitary Science and Public Health) (1902) ; Harrington, (Manual of Practical Hygiene for

Students, Physicians and Medical Officers' ; Rosonau, Preventive Medicine and Hygiene' ; Palmberg, (Treatise on Public Health and Its Applications in Different European Countries' ; Blyth, (Manual of Public Health' ; Abbott,

(Hygiene of Transmissible Diseases' ; Baker'

(Municipal Engineering and Sanitation'; Chapin, (Municipal Sanitation in the United States' and Sources and Modes of Infec¬ tion' ; Annual Reports of the State Boards of Health of Massachusetts and Connecticut ; Monthly Bulletins of the State Boards of Health of Massachusetts, Connecticut, Vermont, Michi¬ gan, etc. The principal periodicals a'-e Public Health Reports (Washington, D. C.) ; Public Health (London) ; The Journal of State Med¬ icine (London) ; Journal of the Sanitary In¬ stitute (London) ;

Revue d'Hygiene (Paris) ; Zeitschrift fur Hygiene und Infectionskrankheiten (Leipzig) ; Archiv fur Hygiene (Munich and Berlin) ; Deutsche Vierteljahrssclirift fiir offentliche Gesundheitspflege (Brunswick) ; The American Journal of Public Health; The Jour¬ nal of Infectious Diseases, etc. Consult also Whipple, G. C., (Vital Statistics' ; MacNutt, J. S., (A Manual for Health Officers' ; An¬ nual Reports of the Rockefeller Foundation (International Health Board), etc.

William T. Sedgwick,

Late Professor of Biology and Public Health, Massachusetts Institute of Technology.

PUBLIC HYGIENE. See Social Hy¬ giene.

PUBLIC LANDS. The expression ((public

lands" or <(public domain" of the United States, is used to include such lands of the United States as are subject to sale or other disposal under general laws and are not re¬ served or appropriated for any special public purpose. This article will treat of the entire area which at any time has been included in the public lands of the United States.

The table below shows for the several States and the Territory of Alaska the total area in acres and the areas unappropriated and unreserved on 30 June 1915 subdivided into those which have been surveyed, those which have not been surveyed and the total area.

Unappropriated public lands are subject to disposition under general laws, the principal of which are the Homestead Law (q.v.), the Desert Land Law (q.v.), the Timber and Stone Law (q.v.), the Reclamation Laws (q.v.) and the Mineral Laws (q.v.).

The public lands of the United States were acquired by treaty, purchase and occupation. By the Articles of Confederation agreed to in Congress 15 Nov. 1777 and ratified by the several States in the four subsequent years the government of the United States of Amer¬ ica was organized and pursuant to that action took possession and control of the unappro¬ priated Crown lands of Great Britain as the successor of that government. By the defini¬ tive treaty of peace concluded 3 Sept. 1783 Great Britain formally relinquished all its <(propriety" (proprietary) and territorial rights, leaving the ownership of the United States and of the several States undisputed.

Public Lands Surveyed and Remaining Unsurveyed.

STATE OR TERRITORY

Alabama .

Alaska .

Arizona .

Arkansas .

California .

Colorado .

Florida .

Idaho .

Illinois .

Indiana .

Iowa .

Kansas .

Louisiana .

Michigan .

Minnesota .

Mississippi .

Missouri .

Montana .

Nebraska .

Nevada. . . .

New Mexico .

North Dakota. . .

Ohio .

Oklahoma .

Oregon .

South Dakota. . .

Utah .

Washington .

Wisconsin .

Wyoming .

Public Lands Surveyed and Remaining Unsurveyed

Land area

Acres

32.818.560 378.165,760

72,838,400

33,616,000

99.617.280

66.341.120 35,111,040

53.346.560

35.867.520 23,068,800 35,575,040 52,335,360 29,061,760 36,787,200

51.749.120 29,671,680

43 . 985 . 280 93,568,640

49.157.120 70,285,440 78,401,920

44.917.120 26,073,600 44,424,960 61 , 188,480

49.195.520 52,597,760 42,775,040 35 , 363 , 840 62,460,160

Total . 1,820,366,080

Surveyed during fiscal year ending 30 June 1918

Acres

12

183,225

1,504,874

’ 199 ! 700

154,837 1,201 993,080

6

185

1 ,902,254

1,104’ 190

1,076,386 409

. 25

194,157

32,552

1,057,881

202,099

21

71,775

8,678,869

Surveyed to 30 June 1918

Acres

32,818,560

1,046,479

29,265,516

33,616,000

80.579.460

63.563.461 30,934,070 34,875,857 35,867,520 23,068,800

35,575,040 52,335,360 29,061,760 36,787,200 49,828,091
29,671,680 43,985,280 74,487,300 49,157,120 44,088,656
59,357,545 42,987,788 26,073,600 44,424,960 52,768,830
48.772,628 32,773,465 34,581,078 35,363,840 58,779,547

Unsurveyed to 30 June

1918

Acres

377,119,281

43,572,884

19! 037ˆ 820

2,777,659 4,176,970 18,470,703

1,921,029

19,081,340

26.' 196 ! 784 19,044,375 1,929,332

8,419,650

422,892

19,824,295

8,193,962

3!<580'613

Public Lands Unappropriated and Unreserved on 30 June, 1918, and Available for Acquisition

Surveyed

Unsurveyed

Total

Acres

Acres

Acres

35,220

35,220

1,060,760

351,275,000

352,281,760

6,829,800

14,426,210

21,256,010

281,436

7,040

288,476

15,900,150

4,628,884

20,529,034

8,441,461

1,830,494

10,271,955

114,726

114,726

8,167,725

5,154,991

13,322,716

5,275

5,275

33,649

11,910

45,559

72,829

72,829

469,973

469,973

42,064

42,064

147

147

3,335,963

4,865.056

8,201,019

105,909

2,647

108,556

31,848,173

23,234,027

55,082,200

13,692,216

5,423,338

19,115,554

116,138

116,138

31,715

31,715

13.369,819

955,772

14,325,591

793,040

44,186

837,226

14,010,343

17,465,576

31,475,919

931,872

328,111

1,259,983

6,146

6,146

23,595,511

1,838,683

25,434,194

143,238,060

431,491,925

574,729,985

Note.— Definite reports regarding the areas disposed of in Alaska have not been published but the amount is probablv less than 200,000 acres.

During the existence of the government under the Articles of Confederation, Congress on 6 Sept. 1780 passed a resolution recom¬ mending the surrender and disposal by the several States of their waste and unappropri¬ ated lands to aid in paying the public debt incurred by the War of the Revolution. These lands lay to the west of the present boundaries of the then existing States.

In 1781 New York ceded without reserva¬ tion 202,187 acres now in the county of Erie, Pa. In 1784 Virginia ceded 169,559,680 acres north of the Ohio and east of the Mississippi rivers and known in subsequent legislation as the (

In 1785 Massachusetts ceded, without reser¬ vation, 34,560,000 acres, which now forms a part of southern Michigan and Wisconsin and northern Illinois.

In 1786 Connecticut ceded 26,600,000 acres, which now forms the northern parts of Ohio, Indiana and Illinois; reserving, however, 3,800,000 acres, a strip in northern Ohio 120 miles long, which was afterward known as the ((Western Reserve® and of which Connecti¬ cut donated 500.000 acres, subsequently known as <(Fire Lands,® to certain of her citizens who had suffered loss by fire and raids during the Revolutionary War.

The remainder of the lands reserved by Connecticut were sold to a company for $1,200,-

000.

In 1787 South Carolina ceded, without reser¬ vation, 3,130,000 acres, a strip 15 miles wide which now forms the northern parts of Georgia, Alabama and Mississippi; while in 1790 North Carolina ceded 29,184,000 acres, which now forms the State of Tennessee, reserving the right to satisfy therefrom certain donations made to her soldiers and other claims under its land laws, which absorbed the bulk of the lands embraced in her cession.

In 1802 Georgia ceded 56,689,920 acres, now forming parts of Alabama and Mississippi, in consideration of the payment to her of $1,200,- 000 and the satisfaction of certain outstanding obligations known as the ((Yazoo Claims,® the settlement of which finally cost the United States

$5,000,000.

By treaty of 30 April 1803 France ceded 757,961,920 acres, now known as the "Louisiana Purchase,® the government paying therefor $27,267,621, which includes the original price of $15,000,000, interest, settlement of claims, etc. These lands now constitute a part of Mis¬ sissippi, Alabama, Texas, Colorado, Wyoming, Montana and the States lying between them and the Mississippi River.

By treaty of 22 Feb. 1819 Spain ceded 37,-

931.520 acres, now constituting the State of Florida, at a total cost of $6,289,768.

By treaty of 2 Feb. 1848 Mexico ceded

334.443.520 acres, now constituting the States of California, Nevada, Utah and parts of New Mexico, Arizona, Colorado and Wyoming, at a cost of $19,250,000.

On 25 Nov. 1850 Texas ceded 61,892,480 acres, now constituting a part of New Mexico, Oklahoma and Colorado, for $16,000,000.

By treaty of 30 Dec. 1853 Mexico ceded 29,142,400 acres, known as the "Gadsden Pur¬ chase,® now part of New Mexico and Arizona, for $10,000,000.

By treaty of 30 March 1867 Russia ceded all of Alaska, embracing 378,165,760 acres, for

$7,200,000.

On 7 July 1898 the Territory of Hawaii was acquired, containing 4,127,360 acres. By treaty of 10 Dec. 1898 Spain ceded Porto Rico, containing 2,198,400 acres; Guam, 134,400 acres, and the Philippine Islands, containing 73,573,- 120 acres, for $20,000,000.

By treaty of 2 Dec. 1899 with Germany and Great Britain, Tutuila and other small Samoan islands, containing in all 49,280 acres, were annexed.

By treaty of 7 Nov. 1900 Spain ceded Sibutu and other small islands in the vicinity of the Philippines, containing in all 43,520 acres, for $100,000.

The Oregon Country, containing 183,480,960 acres and embracing Oregon, Washington, Idaho and part of Montana, was claimed by the United States through discovery and ex¬ ploration and that claim was

afterward recog¬ nized by England and Spain.

A controversy with Great Britain regard¬ ing the northern boundary west of the Rocky Mountains was not settled until the treaty of 15 June 1846, which, however, left undetermined the extreme western end of the boundary line at its junction with the Pacific Ocean.

The treaty of 8 May 1871 provided, among other matters, that the decision of this point should be left to the emperor of Germany, who decided in favor of the contentions of the United States, 21 Oct. 1872.

The total area of the acquisitions by State cessions was about 500,000 square miles or 320,000,000 acres at a cost of $22,200,000. The area acquired from foreign governments, in¬ cluding the Oregon Country, was about 2,400,- 000 square miles or about 1,500,000,000 acres, at a cost of $65,957,389.98. In addition to these costs, which include interest and settlement of private claims, the United States has paid more than $200,000,000 for extinguishing the rights of the Indians to these lands.

In forming new States from the territory obtained through these cessions from States and foreign governments, Congress has re¬ quired each new State to adopt an irrevocable ordinance that the State shall not tax the pub¬ lic lands nor pass laws to interfere with the primary disposal thereof by the United States.

The public lands of the United States were, in the beginning, regarded as an asset for the payment of the debt incurred in carrying on the War of the Revolution. Many plans for disposing of the lands were proposed and considered. The earliest efforts were to sell the land in large blocks and prior to the or¬ ganization of our present government Con¬ gress made three such sales. The first was the sale to the Ohio Company. This was orig¬ inally intended to cover 2,000,000 acres at $1 per acre, the land lying in the present State of Ohio on the Scioto and Ohio rivers. The area was reduced to 822,900 acres and the sale was confirmed 27 July 1787. The amount

actually received was two-thirds of a dollar per acre and payment was made in certificates of the public debt.

The second sale was to John Cleves Symmes, finally confirmed by the Act of 5 May 1792. The lands lie in the present State of Ohio on the Ohio River, between the Great and Little Miami rivers, near the site of Cin¬

cinnati. The tract was supposed to contain 1,000,000 acres, but its actual area was 248,540 acres. This was sold at the same rate of two- thirds of a dollar, paid in certificates of the public debt and military land warrants.

The third sale was to the State of Pennsyl¬ vania, a tract now in Erie County, containing 202,187 acres, ceded, to the United States in 1781 by New York. This was sold at the same rate and paid likewise in certificates and mili¬ tary land warrants.

By the Act of 2 March 1799 those who had made contracts with Symmes for lands not lying within his purchase, as finally deter¬ mined, were allowed to buy the lands con¬ tracted for at $2 per acre, payable in certifi¬ cates of the public debt. About 88,880 acres were sold under this law.

Practically the first act of general char¬ acter for the sale of lands was passed 18 May 1796 and related to a tract in the present State of Ohio. This provided for a system of rec¬ tangular surveys substantially as now in use. Townships were laid off six miles square con¬ taining 36 sections, each being one mile square and having an area of 640 acres. Alternate townships were to be subdivided into sections, while only the exterior boundaries of the others were laid out on the ground.

The subdivided townships were to be sold in tracts not less than one section or 640 acres each. The other townships were to be sold in tracts not less than a quarter township, ex¬ cluding the four middle sections which were reserved for future disposal, thus having a block of eight sections in each quarter town¬ ship, so that these lands, were to be disposed of in tracts of 640 acres and 5,120 acres, re¬ spectively.

The sales were to be made to the highest bidder at a public sale, but no sale was to be made for less than $2 per acre. One-half was to be paid within 30 days and of this one-tenth was required at the time of sale, with one year's credit for the remaining half. The land was forfeited in case of failure to pay the balance. A discount of 10 per cent was allowed on one-half the amount if the whole sum were paid within 30 days.

By the Act of 3 March 1797, passed the next year, the lands sold after that date could be paid for in evidences of the public debt.

The Act of 1796 remained in force for four years without producing very satisfactory re¬ sults, only 121,540 acres having been disposed of.

The total area sold prior to the Act of 10 May 1800 was 1,484,047 acres for $1,201,725.68, an average price of less than 81 cents per acre. This includes some small tracts sold before the organization of our present

government at the minimum prices of $1 and two-thirds of a dollar.

The Act of 1796 established the office of mrveyor-general with substantially the same

duties as that officer now exercises. The sales were made under the supervision of the Secre¬ tary of the Treasury. The smaller tracts were sold under the direction of the governor or secretary of the Western Territory and the surveyor-general at Cincinnati or Pittsburgh according to districts defined by the act. The quarter-township tracts were sold by the Secre¬ tary of the Treasury at Philadelphia, then the seat of government.

The Act of 10 May 1800 made further pro¬ vision for the sale of lands in the present State of Ohio, modifying in several important par¬ ticulars the Act of 1796.

Four land districts were designated each under the administration of a register and a ˆReceiver of Public Monies® with substantially the same functions as at present. Their offices were established at Cincinnati, Chillicothe, Marietta and Steubenville. Provision was also made for a receiver at Pittsburgh. Thus by 1800 there had been established substantially our present system of the surveys of the pub¬ lic lands under the supervision of a surveyor- general for a specified district and a system of sale by a register for each land district, not necessarily the same as the surveyor-gen¬ eral's district, and the receipt and accounting for funds by a receiver of public moneys for each district. New land offices were opened and new offices of surveyor-general were estab¬ lished from time to time as they became neces¬ sary.

Under the Act of 1800 the lands were offered at public sale in sections and half-sections for not less than $2 per acre, payable in cash or in evidences of the public debt. One-fourth of the price was to be paid within 40 days, one- fifth of that or one-twentieth of the whole, was required at the time of sale. The other three-quarters were payable in two, three and four years, respectively, with interest at 6 per cent per annum. A discount of 8 per cent per annum was allowed for advance payments. Provision was made for forfeiture and resale in case of default. The lands remaining un¬ sold after having been offered for sale could be purchased at private sale for $2 an acre.

The surveyor-general was authorized to lease the lands reserved for future disposi¬ tion, in sections and half-sections, for terms not exceeding seven years. The act also pro¬ vides that any person who has erected or has begun to erect a grist-mill or saw-mill upon the lands to be sold was ((entitled to the pre¬ emption® or preference right to purchase the section

on which it was located at $2 per acre.

Before 1789 deeds for the lands sold were executed by the Board of Treasury, corre¬ sponding to our present Treasury Department, or by the loan commissioners, agents of this board. After that date all patents for the lands sold were executed by the President, counter¬ signed by the Secretary of State and recorded in his office. It is to be noted that in a few cases Congress had made grants of lands in such terms that patent was not required, title passing directly by virtue of the act.

By Act of 25 April 1812 the General Land Office was established in the Department of the Treasury. To this office were transferred all the duties relating to the survey, sale and patenting of the public lands previously per-

formed by the Secretary of War and the Secre¬ tary and Register of the Treasury. All patents for lands were to be issued in the name of the United States under the seal of the new office, signed by the President and counter¬ signed by the Commissioner of the General Land Office.

To relieve the President of the great burden of personally signing the large number of patents issued, Congress by Act of 4 July 1836 authorized the President to appoint, by and with the advice and consent of the Senate, a secretary whose duty it would be to sign land patents in his name. This statute continued in effect until 19 July 1878 when the President was authorized to designate an executive clerk to perform this duty, instead of submitting a nomination for confirmation by the Senate.

The General Land Office became part of the Department of the Interior when the latter was organized 3 March 1849.

After the Act of 1800 the sales of public lands continued without material change in system but with gradual improvements in de¬ tail. As each new area was opened to sale, the existing system was extended to it pro¬ viding for sale at public auction with the right of purchase at private sale after the period of public offering, usually three weeks, part pay¬ ment in cash and the balance in four years.

Prior to the Act of 26 March 1804 the lands were offered for sale in not less than half¬ sections (320 acres). By that act the survey and sale of lands in quarter-sections (160 acres) was authorized. Before that time payment of surveying expenses and patent fees had been required, but was discontinued by that act.

Payments for land in evidences of the pub¬ lic debt were authorized by all the general land laws until the pa'ssage of the Act of 3 March 1803, which provided that in the purchase of the lands in Mississippi Territory, being the lands lying south of the State of Tennessee, such payments could not be made. The Act of 18 April 1806 discontinued such payments as to all public lands thereafter sold.

The Act of 24 April 1820 made a radical change, however, requiring immediate payment in full for all sales made from and after 1 July 1820. The credit system had been de¬ moralizing. Congress had been constantly im¬ portuned to extend the time for payment and acts for this purpose were passed at nearly every session. The privileges of these acts were limited to persons who had purchased not more than 640 acres. After 1820 such acts were passed nearly every year until the passage of the Act of 23 May 1828, which provided for the issue of certificates to represent the money paid for land which had reverted to the United States because of failure to com¬ plete the payments. These certificates were receivable in payment on the purchase of other lands within the same State or Territory.

This act was followed by the Act of 31 March 1830 and the Act of 9 July 1832 pro¬ viding for further relief in such cases, closing the long series of enactments for the relief of credit purchasers.

The total amount of land sold under the credit system was about 19,400,000 acres for about $47,700,000. This was scaled down by the operation of legislation, by reversions and

by relinquishments to about 13,600,000 acres and the receipts were about $27,900,000, an average of a little more than $2 per acre.

The Act of 24 April 1820 made other import¬ ant changes than requiring cash payments. It provided that from and after 1 July 1820 all public lands should be offered for sale in half¬ quarter sections, or 80-acre tracts. This had not been previously permitted except in six designated sections of each township, author¬ ized by the Act of 22 Feb. 1817. When dis¬ posed of at private sale the purchaser had the option of buying as much as a section (640 acres). The Act of 1820 also fixed the mini¬ mum price, whether at public or private sale, as $1.25 per acre. The act also provided that pub¬ lic sales should be kept open for two weeks.

By the Act of 5 April 1832 the sale of quar¬ ter-quarter sections, or 40-acre tracts, was authorized.

In pursuance of the early policy for the sale of the public lands in large blocks every effort was made to prevent settlement on the lands prior to

purchase.

On 15 June 1785 Congress, under the Articles of Confederation, passed a resolution forbid¬ ding settlement on the public domain. Other warnings were given in various ways. The Act of 3 March 1807 prohibited such settle¬ ment under penalty of forfeiting any right or claim that the settler may have, and the Presi¬ dent was authorized to use the civil and mili¬ tary forces to remove such persons from the lands. An exception was made in favor of set¬ tlers prior to the passage of the act who, upon application to the local land office, could ob¬ tain permission to occupy the lands as tenants at will, but must remove from them when a sale was made.

On 25 March 1816 a similar privilege of tem¬ porary occupation on application was given to all who had settled upon public lands prior to 1 Feb. 1816. The right to make such applica¬ tion was to continue for one year from the date of the act. On 3 March 1817 Congress ex¬ tended this time to 3 March 1818, and on 20 April for another year.

Meanwhile the difficulty of preventing settle¬ ment prior to sale, and the gradual abandon¬ ment of the idea of obtaining a large revenue from the sale of the lands, due no doubt to the increasing prosperity of the nation, induced the policy of encouraging settlement and home¬ making upon the public lands. Pre-emption entries based upon settlement were accordingly authorized from time to time for certain speci¬ fied areas.

The first right of pre-emption or preference right was given by the act of 2 March 1799 in favor of those who had made contracts with Symmes or his associates for lands which were not included in the area patented to them. This right was not based upon settlement, and the Act of 10 May 1800 was the first to give such a right based upon occupation of the land, namely, to those who had erected or had begun to erect a gristmill or a sawmill in the Ohio country before the passage of the act.

From time to time acts were passed provid¬ ing for pre-emption rights within certain areas and subject to varying conditions. By 1830 a large part of the public land was comprehended within the operation of these acts.

On 29 May 1830 the first pre-emption act of

general application was passed, allowing entry by those who had settled on the land before that date, and remaining in force for one year.

On 5 April 1832 ((all actual settlers, being housekeepers upon the public lands, » were al¬ lowed the right to enter, within six months after the passage of the act, a tract not exceeding 80 acres, to include their improvements. By vari¬ ous subsequent enactments these provisions were continued in force until the passage of the general Pre-emption Act of 4 Sept. 1841.

This act provides that ((every person being the head of a family, or widow, or single man, over the age of 21 years, and being a citizen of the United States, or having filed his declara¬ tion to become a citizen,® who since 1 June 1840 has made, or shall thereafter make, set¬ tlement in person on surveyed public land and shall live upon and improve the same, may enter not exceeding 160 acres at the minimum price of $1.25 per acre. No person was entitled to make more than one such entry, nor could any one make such entry who was the owner of 320 acres of land.

In 1853 and 1854 the right of pre-emption on unsurveyed lands was extended to a number of the States, and afterward, by the Act of 2 June 1862, to all unsurveyed public land.

The passage of the Pre-emption Act and the change in sentiment regarding the public lands rendered less important the early system of disposing of the lands at public sale.

Soon after the passage .of the Pre-emption Act the Commissioner of the General Land Office was, by the Act of 3 Aug. 1846, authorized to offer for sale isolated or disconnected tracts which had not previously been offered without the formality and expense of a proclamation by the President, which had previously been required.

In the course of time the practice of dis¬ posing of lands at public sale gradually died out, and now such sales take place only for isolated tracts and in certain other exceptional cases.

From 14 Aug. 1854 to 2 June 1862 there was in force a law providing for a modification in the price of lands taken under the pre-emption acts known as the Graduation Act. Its pur¬ pose was to reduce the price of public lands to actual settlers and cultivators. The price of all lands which shall have been in the market for 10 years or upward was fixed at $1 per acre ; when this period had reached 15 years the price was reduced to 75 cents per acre, and so on, by graduation of 25 cents for each five years till the period had reached 30 years, after which the price was 12 y2 cents.

The Pre-emption Law remained in force un¬ til 3 March 1891, when it was repealed.

The existing system was inaugurated by the enactment of the Homestead Law 20 May 1862. A detailed statement of its history and present status is found in the article Homestead Laws.

The Desert Land Law, now in force, was enacted 3 March 1877, and is treated more in detail under the title Desert Land Laws.

The treatment of the arid and semi-arid areas in the West required special attention and some experimenting which is discussed under the title of Reclamation Laws, the principal of these being that known as the ((Carey Act,® enacted 18 Aug. 1894, and the Reclamation Act of 17 June 1902.

A considerable area has been granted under the head of <(Private land claims, donations,® etc., recognizing claims based upon the laws of the governments formerly in control of the acquired territory and also upon claims based on settlement upon public lands not authorized by specific law. Considerable areas were granted to encourage wagon road, canal and river improvements to State and corporations.

Congress has also granted very large areas to encourage the building of railroads in the Western States, usually granting the odd-num¬ bered sections within a certain distance from the line of road, this distance varying from 6 to 20 miles on either side.

There have also been granted to the States large areas covered by swamp lands on the theory that the State would reclaim them, but comparatively little has been done in this direc¬ tion.

Congress in disposing of the public lands has been very liberal in grants for educational purposes, providing in each State large areas for the public schools and special grants for State universities. In the acts admitting the several States to the Union until recently two full sections of land in each township were set apart for public schools, being two square miles or 1,280 acres in each township of 36 square miles or one-eighteenth of the area. In recent years the school grant has been doubled, four square miles in each 36, or one-ninth, being set apart for public school purposes. Congress has made other grants to a number of the States for public buildings, internal improve¬ ments, etc.

Military and naval land warrants were issued in recognition of service in war, and about 61,- 000,000 acres of land have been so taken.

Scrip represents a form of authority to take public lands given in adjustment of rights claimed to lands which could not be satisfied by granting the particular lands claimed.

Reservations of various kinds have been made ; the largest areas are covered by the National Forests (q.v.). The National Monu¬ ments are established to retain for public use lands which have special historic or scenic

value.

The history of our public lands and the policy applied to their disposition divides itself into three distinct periods.

The first period is characterized by the de¬ sire to dispose of the land in large tracts and to secure as great and rapid a return as possible.

In the second period the desire for return becomes less important and the encouragement of settlement is the main feature.

In the third period the obtaining of funds from the sales of the lands is entirely subor¬ dinated and the main desire is to secure the es¬ tablishment of homes on comparatively small tracts and a utilization of lands available for grazing or mineral or other resources under regulations for the general public benefit.

The table in the beginning of this article shows that the area which has been disposed of and the area reserved for public purposes make a total of about 1,245,636,095 acres. This does not include lands in the original 13 States or Texas, because the United States had no lands in these States available for general disposition. Figures are not available to show the details which make up this total area disposed of by

the United States. The principal items are the following, being the areas disposed of to 30 June 1915, as published by the General Land Office, except where followed by the figures (1904), which are the results published in 1905 by the Public Lands Commission appointed by President Roosevelt. The figures of this com¬ mission here given have not changed very much to date as they refer to methods of dis¬ position not now in force.

Private land claims, donations, etc …. . (1904) 33,400,000

Railroad, wagon road, canal and river

improvement grants . 122,215,763

Swamp land grants . . – 63 , 832 , 583

Common school grants to States, in¬ cluding Alaska . 98 , 400 , 000

Other grants to States and Alaska . 34 , 900 , 000

Military and naval land warrants . . (1904) 61,000,000

*Scrip issued for various purposes . *. (1904) 9,300,000*

Homestead entries . 154,327,812

Timber and stone entries . 13 , 289 , 906

Timber culture entries . 10,866,529

Desert land entries . . 7, 210,562

Cash entries, including entries under the

Pre-emption and other acts . (1904) 270,000,000

National forests . 184,240,596

National monuments . 1 , 201 , 568

Indian reservations (excluding Alaska).. 33,334,261

Morris Bien,

United States Reclamation Service, Washing¬ ton, D. C.

PUBLIC LAW. In general public law as contradistinguished from private law, which determines the status and relationships of per¬ sons and property, may be defined as that branch of the law which deals with the organ¬ ization of the state and the relations which sub¬ sist between it and the individuals who compose it, as well as its relations to other states. The distinction between public and private law was emphasized by the Roman jurists who taught that publicum jus est quod ad statum rei Romance spectat, privatum quod singulorum utilitatem. It is equally recognized in the legal systems of continental Europe to-day and finds a place in their classification of the law. In England and the United States, however, while the distinction is recognized by the jurists, its importance has never been emphasized to the same degree.

What are the characteristics of public law and how does it differ from private law? Lord Bacon, who dwelt upon the distinction, said public law

was the <(sinews of property,® while private law was the ((sinews of government.® In private law the state is the arbiter rather than a party; in public law it is both arbiter and a party. Private law determines the rules of conduct to be observed by individuals in their mutual relations ; it defines their rights of per¬ son and of property; it deals with such matters as the ownership, use and disposition of prop¬ erty, contract, agency, partnership and business generally, the relations between husband and wife, parent and child, guardian and ward and the domestic relations generally, etc. Public law, as stated above, deals with the organiza¬ tion, powers and rights of the state, including its relation to individuals subject to its juris¬ diction and to other states. It may be con¬ veniently subdivided into five branches: (1) constitutional law; (2) administrative law; (3) criminal law; (4) criminal procedure, and (5) international law. Constitutional law contains the body of rules, written and unwritten, which determine in broad outline at least the organiza¬

tion of the state. It usually deals with the organization, mode of selection and the powers, of the chief organs of government, legislative, executive and judicial. It defines the suffrage, the relations, if any, between church and state, the relations between the state and its local subdivisions, etc. Administrative law is that part of public law which governs the relations of the executive and administrative authorities of the government to one another and to indi¬ viduals ; it defines the organization and deter¬ mines the competence of the administrative authorities, and sets forth the remedies of the individual in case his rights are violated by the administrative authorities. On the continent of Europe administrative law (Droit administratif in France; Verwaltungsrecht in Germany) is treated as a distinct branch of the law and is applied by a separate and distinct group of tri¬ bunals known as administrative courts com¬ posed in part of judges who are professionally trained or who are active administrative ex¬ perts. In England and the United States, how¬ ever, administrative law is not classified and treated as a separate branch of the law nor applied by a distinct set of tribunals ; but this does not mean that administrative law has no existence in those countries. It only means that no distinction is made between administrative controversies and controversies between private individuals ; both alike being determined by the ordinary judicial tribunals and the remedies of the individual being the same whether the issue is between private individuals or between an individual and the government.*

The criminal law is usually classified as a branch of public law because it deals with of¬ fenses against the state as the guardian of pub¬ lic order and the protector of individual rights. By the law of every country a crime is regarded not as injury to the particular individual who may be the immediate victim but as an offense against the whole society and the state provides the machinery for its punishment. The law, therefore, which

prescribes the punishment and organizes the machinery for the enforcement of the criminal law may very properly be re¬ garded as a part of the public law. For the same reason the law which prescribes the rules of procedure by which the courts try offenses against the state is regarded as a branch of the public law.

Finally, international law, or the body of rules, whether conventional or customary, which regulates the conduct of independent states in their relations with one another is treated as a part of public law. See Interna¬ tional Law.

The place of public law in the general classi¬ fication of law and its relation to the other branches of the law may be seen from the fol¬ lowing outline :

I. Private Law _

Persons.

Domestic relations. Property. Contracts. Partnership. Agency, etc.

II. Public Law

Constitutional law. Administrative law. Criminal law. Criminal procedure. International law.

James W. Garner,

Professor of Political Science, University of Illinois.

PUBLIC LIBRARY AND POPULAR EDUCATION

769

PUBLIC LIBRARY AND POPULAR EDUCATION. The Growth of the Demo¬ cratic Idea in Public Libraries. — Historically, the library has always been an adj unct to edu¬ cation. The temple libraries of the Egyptians and Assyrians, the public libraries of die Ro¬ mans, the monastery and cathedral libraries and the libraries of the mediaeval universities kept the educational purposes of the library consciously in the foreground.

Cassiodorus and Saint Benedict in the 6th century emphasized the spiritual benefit to be received from copying and studying the Holy Scriptures. Alcuin (ca. 735-804) was a librarian and a user of libraries as well as a great teacher. The early universities at Treves, Con¬ stantinople, Bagdad,

Cairo, Cordova, to say nothing of later universities, were noted for their libraries no less than their teaching fac¬ ulties.

Cathedral, monastery and other libraries for the clergy, founded in the early centuries of the Christian era, have persisted to our own time. In September 1537 an ˆinjunction® pro¬ vided that Bibles should be put at public ex¬ pense into every parish church in England for the free use of the parishioners. In 1651 Humphrey Chetham bequeathed several collections of books to different parishes to serve as parish libraries. Other similar bene¬ factions led Dr. Thomas Bray, the founder of the Society for the Propagation of the Gospel, to secure the passage by Parliament of <(An act for the better preservation of parochial libraries in that part of Great Britain called England.® The idea was not confined to Eng¬ land. Johannes Megapolensis, the first pastor at Albany, had a library of 25 volumes fur¬ nished by Patroon Van Rensselaer for pastoral use. The Rev. Thomas Bray in 1697 proposed the purchase of ((Lending libraries in all the deaneries of England and parochial libraries for Maryland, Virginia and other of the foreign plantations.® A number of these parochial libraries were sent to Annapolis, Albany, Bos¬ ton, New York, Philadelphia, Williamsburg and elsewhere. The provincial library at An¬ napolis, which was sent there in 1697, numbered nearly 1,100 volumes, and was <(probably the first free circulating library in the United States.®

Bray at first intended the parochial libraries to be for the use of the clergy. He soon changed their purpose to ˆlending libraries® open to all, the local collections to be supple¬ mented by the larger provincial libraries. He says : ((I hope, though the design seems more

immediately directed to the service of the clergy, yet gentlemen, physicians and lawyers will perceive they are not neglected in it. . . . And indeed those persons of quality whose eldest sons being commonly brought up to no employment have a great deal of time lying upon their hands, seem to me to be as nearly concerned as any to favor it. For many of these young gentlemen, when removed from the universities . . . residing all their life¬

time in countries where they can meet with no books to employ themselves in reading and whereby they may be able to improve the talent they have there gained ; they do therefore too commonly become not so conspicuous for their excellent knowledge and morals as will ever be expected from men of rank and station in their

country.® Bray here emphasizes the value of the library as a continuation school for the laity as well as its vocational value to the clergy. Nevertheless, broad as his ideas were, they were essentially aristocratic as well became a period almost devoid of any appreciation of the need of

universal education and in which lit¬ erary culture was a class distinction, not a rec¬ ognized public need. This is doubtless the chief reason why Bray's libraries failed, for the most part, to accomplish what he expected of them, and why most of them became not only inactive but actually extinct.

A more significant movement in the educa¬ tional purpose of the library was the founda¬ tion by Benjamin Franklin in 1731 of the li¬ brary of the Junto. Both club and library were deliberately planned for the self-improve¬ ment of the members. The library, which after¬ ward developed into the Library Company of Philadelphia, was the first of the subscription libraries which under the name of Mechanics', Athenaeum or Society libraries, Young Men's Institutes, etc., soon spread throughout the United States and England. Though this was a proprietary library, it was a collection for tradesmen and mechanics as well as for the gentry. Within a few weeks after the first books arrived the directors agreed that the li¬ brarian <(may permit any civil gentleman to pe¬ ruse the books of the Library in the Library room.® Franklin's democratic purpose is shown by the reference, in his (Autobiography J (Chap. V) to this library: (

Two notable library conferences (in 1853 in New York and 1876 in Philadelphia) greatly stimulated the development of the American public library. Many libraries supported by pub¬ lic tax for public use were already in existence. New York State in 1835 had established a sys¬ tem of <(district libraries® in each school dis¬ trict of the State for the free use of the people of the district. Similar legislation was passed in many other States but in few cases was the use of the library at all commensurate with the hopes of the founders. The chief reason was that the library existed, in most cases, as an unadministered collection of books, growing or diminishing by chance and with little or no ref¬ erence to the tastes or needs of its patrons. The idea that the education of the people through reading should be fostered by State revenues and not left by chance to proprietary or en¬ dowed institutions was of slow evolution. Many libraries had long been <(public® in the sense of allowing all to use them who wished to do so

but there had been little attempt to adapt the character of the library to the need of its com¬ munity. Thus the Free Library of Hamburg, founded in 1539, issued in 1869 but 4,000 vol¬ umes, though its collection numbered nearly 200,000 volumes, chiefly because it was never a really popular library. This is typical of nearly all of the so-called public libraries in Europe and America up to the last quarter of the 19th century.

The new type of public library was described in 1876 by Dr. William F. Poole as follows: <(The public library which we are to consider is established by state laws, is supported by local taxation and voluntary gifts, is managed as a public trust, and every citizen of the city or town which maintains it has an equal share in its privileges of reference and circulation. It is not a library simply for scholars and pro¬ fessional men . . . but for the whole com¬

munity — the mechanic, the laboring man, the serving-girl, the youth and all who desire to read, whatever their rank, intelligence or condi¬ tion in life. It is the adjunct and supplement of the common-school system. Both are estab¬ lished and maintained on the same principles — that general education is essential to the highest welfare of any people: and considered simply as a question of political economy, it is better and cheaper in the long run to educate a com¬ munity than to support prisons and reforma¬ tories.®

Massachusetts in 1847 had authorized Bos¬ ton to tax itself for a free public library; New Hampshire in 1849 passed a general law en¬ abling towns to establish and maintain libraries by public taxation. William Ewart secured in 1850 the passage of a bill permitting (

solutely democratic institution that man pos¬ sesses.® Andrew Carnegie gives as the greatest recent accomplishment of the public library: (

Democracy in any country cannot safely con¬ tent itself with developing a high average of intelligence, essential as this is. Exceptional citizens must be enabled to develop their excep¬ tional abilities, for the service of the whole community. Every public library must aim to collect some material which, though directly used by only a minority of its public, through them serves the whole community. Not only do the larger libraries aid the research student by their own collections, but -virtually the whole country can be served through inter-library loans of material valuable only to the excep¬ tional few.

Substantial agreement on the fundamental moral and social ideas whose sum forms the national ideal is essential for the welfare of any self-determining nation. This is the whole pur¬ pose of popular education at public expense. One more step is necessary. Present-day soci¬ ety is so rapidly developing new ideals and modifying old ones that constant self-instruc¬ tion in prevalent current opinion is necessary for good citizenship and, consequently, for na¬ tional stability. No school course can give this to the adult. The public library, whose duty is to contain books and periodicals on all phases of controverted subjects, is the only institution which can even measurably give this instruction at times and in forms

suited to Individual needs.

The recent war has shown clearly the im¬ portance of morale in military affairs and every well-considered scheme for the social readjust¬ ments which are following the war has in¬ cluded the development of peace-time morale. The library cultivates civic morale through its recreational reading as well as through its pro¬ fessedly educational books. Even the business library has this for one of its aims. The good library of this type usually includes recreational books as a welfare project.

Official Connection of Library and Public Education. — Many legal decisions in the United States, England, Canada, Scandinavia and elsewhere have officially recognized the li¬ brary as an educational institution. It is on this basis that the library chiefly bases its claims to tax exemption and to direct tax support. In virtually every civilized country the control of libraries is vested in the official department which directs public education.

In the United States the connection between the public library and popular education is usu¬ ally made by the State Library Commission or by making the library activities of the State a duty of the State Education Department (as in New York and Utah).

Since popular education in the United States most nearly follows a democratic ideal, it is natural that the connection of public education and public library is closer than in any other country. Canada (especially in the province of Ontario) and most European countries include both school and library under their ministries of education. In Norway and Denmark there

is a general tendency to consider both school and library essential in popular education. England is beginning to show a similar dis¬ position — an example followed in varying de¬ grees by many of her colonies. In Italy, the connection, though theoretically recognized, is not practically realized to any great extent. France and Germany, with their rigid courses of elementary and secondary training, dis¬ courage rather than encourage individual re¬ search for those below the university and make little attempt to establish or use public libraries for direct educational purposes. Several prov¬ inces of India (notably Baroda and the Pun¬ jab) have established library systems for the purpose of popular education.

Specific Educational Activities of the Pub¬ lic Library. — The main lines of direct educa¬ tional activity in vogue in American libraries are noted

below. They are characteristic of the work of nearly all of the better public li¬ braries of the country, though the emphasis on different activities will vary in different places. These are also in the main the same as those of other countries in which the public library is recognized as a part of the public educa¬ tional system.

(a) Work with Schools. — The school li¬ brary, definitely planned as an auxiliary to the school course, is rapidly assuming a place of its own. Its limited purpose will always more or less limit its independent development. The public library can and usually does supplement the school library in various ways. Instruc¬ tion in the use of books and libraries is often given in the public library. Books which the school library cannot afford or which it needs only occasionally are purchased by the public library and books and space are reserved in reading-rooms for the use of individual pupils as well as entire classes. Reference lists are compiled for the use of teachers and pupils and the attention of teachers is called to re¬ cent material of use in school work. School collections of pamphlets, clippings, maps, pic¬ tures and lantern slides are supplemented by loans from the local public library collection. Material is made accessible at the public library at hours when the school library cannot con¬ veniently be kept open. Much of the tech¬ nical routine of cataloging, classification, book purchase, etc., is frequently done through the public library. In some cases, especially in small places, school and oublic library unite to empldj^ a competent librarian who serves both. In others, branches of the public library, for gene 1 public use, are maintained in public school buildings. This interrelation of the two types of libraries tends to make habitual the use of the library after the pupil has left school. In a rather large number of cases, the public library selects the school librarian and admin¬ isters the school library subject to the general consent of the school authorities.

(b) Work with Children. — The children's room of the public library also supplements the work of the school. The story-hour and the collection of children's literature enable the child to read voluntarily along the lines of his individual tastes. A wider range of subjects and a greater freedom of treatment than the school can give are usually open to the chil¬ dren's librarian. This is especially important in

connection with elementary schools and the tendency of teacher, school librarian and chil¬ dren's librarian to work together in this direc¬ tion is increasing.

(c) Work with Clubs and Societies. —

This work may be either with children or adults. In the former case it is usually con¬ ducted by the children's department of the pub¬ lic library

either independently or in connec¬ tion with some distinct organization such as the Boy Scouts, Girl Scouts, etc. Carefully se¬ lected collections of books suited to the age and taste of the club members are provided, and in many cases meeting-rooms are provided by the library. Boys' and girls' reading, debating or social clubs are also often organized and con¬ ducted by the library. The voluntary character of these clubs and the usual insistence on self- government not only act favorably on the older boys and girls who have left school but react very favorably on those still in school.

The adult clubs whose activities are related to the library vary in character from trade unions and other industrial societies (to whom industrial as well as recreational books are sup¬ plied) to classes of aliens learning English and to social clubs with literary or sociological pur¬ poses. Suitable books and other printed ma¬ terial are furnished and the library often serves as a clearing-house for the club activi¬ ties. As a public institution, impartial in its aim to furnish any legitimate information on any question affecting public welfare, the li¬ brary is pre-eminently suited to be an agent in the demonstration of practicable democracy. Its educational service is especially direct in supple¬ menting the conscious attempt at self-culture which is the 'sual feature of these clubs.

(d) Lectures and Exhibitions. — Closely allied in purpose with the work of the public library with clubs are the lectures and exhibi¬ tions held under its auspices in the audito¬ riums which are. a part of most modern pub¬ lic library buildings. These are often con¬ ducted by outside organizations to which the library gives a meeting-place or exhibit-room. In such cases the library usually attempts to; de¬ velop and conserve the educational results by preparing lists of books, periodicals or prints relating to the subject of the lecture or ex¬ hibit or by making prominently accessible the selected resources of the library on the sub¬ ject. In other cases the library prepares the exhibit or plans and conducts the lecture-course and supplements it by its printed material. Exhibits of local industries, arts and crafts and current and local history have shown rather definite educational results. At present the pub¬ lic library is often the only substitute for the public museum. When the work of the public library and the public museum become more closely related, greater results may be expected.

(e) Civic Education. — The library's con¬ tribution to civic education has already been noticed. By supplementing the school course, by providing standard and current material on civic matters, by aiding clubs devoted to the study of social questions and by lecture and ex¬ hibit the library is an educational force. It fur¬ nishes the impartial publicity which promotes discussion of public affairs and which leads to more intelligent decisions concerning them.

The European War revealed the effective-

ness of the library as an agent in educational propaganda. The promoters of the liberty loan campaigns, the allied war service cam¬ paigns, the land army and similar movements found it an admirable agent for the effective, economical distribution of their printed mate¬ rial as well as for the display of their posters and other advertising material. It furnished material for speakers and writers for the vari¬ ous campaigns. Its effectiveness in this di¬ rection has led it to be used by other agencies for public service. Its use as a clearing-house for public information of all kinds seems destined to increase. Its public usefulness in this direction must obviously depend on the judgment shown by the librarian in deciding what organizations and movements are granted this library privilege and by the extent to which they are permitted or encouraged to use it.

In the broader field of international rela¬ tions the public library can play a very import¬ ant part through its selection of material deal¬ ing with the life, thought and natural resources of foreign countries and by using them to sup¬ plement the agencies for civic education al¬ ready mentioned. It is already proving of great service to schools with inadequate library facilities on whom the present program of Americanization has been imposed with little opportunity for preparation to carry it out.

In the special field of Americanizing the alien the library has been of very direct service. It has supplemented the efforts of the school and other social organizations. It has often anticipated their methods. To many foreigners the library has been the only public institution standing for equal opportunity for voluntary effort. Its auditorium has often been the only respectable meeting place open without taint of specific social or religious propaganda to the alien social group. It has kept alive the human relations of the alien by giving him books and periodicals in his own language, dealing with the United States as well as with his native land. It has organized classes for the study of English and of American institutions and has freely furnished its books to other instruc¬ tional agencies. Its service is to individuals, not to nationalities or to classes in the mass. Through the cultivation of individual thinking, — the motive principle of democratic educa¬ tion, — it discourages mob thinking and mob action and maintains the traditional American attitude toward civic rights and duties.

(f) ./Esthetic Education. — The growing consciousness of the American public to the im¬ portance of the cultural in American life is di¬ rectly

aided by the public library. The import¬ ance of the library in cultivating literary taste is generally recognized. Much of the support of its work is based on its success in getting the public to use the best books, from a literary and ethical standpoint, which the individual members of that public can read with profit. Its undoubted influence in the formation of public taste in this direction sometimes obscures its equally direct service in aesthetic education.

Nearly every large public library and many small ones maintain collections of prints and act as distributing centres for lantern slides, mo¬ tion pictures and other illustrative material either from their own collection or lent by larger or more special libraries or departments of education. (See Visual Instruction).

Under present housing conditions the public library is often the only practicable public place for the collection of nrints and the larger and more costly .illustrated books and monographs on art. Some libraries and education depart¬ ments lend framed pictures for school and home use. The library art collection promotes local arts and crafts as well as art appreciation in general.

Nearly all public libraries include some books on the history and criticism of music. Collec¬ tions of musical scores and single compositions, instrumental and vocal, are common. A few libraries maintain collections of music rolls for mechanical piano-players. The high cost and perishable character of talking machine records has so far prevented the establishment of many such collections for public use, but some li¬ braries, notably in California, have formed such collections. Many school libraries have collec¬ tions of these records selected for their direct educational value. The success of many re¬ cent <(community sings® has been partly de¬ pendent on the music collection of the local library.

In the matter of permanent art exhibits the library is properly subordinate to the public museum. In the absence of the latter and to supplement it, the library exhibits as noted above can have distinct educational value.

Bibliography. — Much material on this sub¬ ject is scattered through educational and library periodicals. Specific references may be found in Cannons, H. G. T., (Bibliography of Library Economy) (London 1910) ; (Library Work, Cumulated) (Minneapolis 1912) ; Hortzschan- sky, A., (Bibliographic des bibliotheks- und

buchwesens) (Leipzig, annual) ; and in the monthly summaries of library literature of the Library Journal. The annual volumes of the National Education Association also include many articles on the subject. The

reports of the United States Commissioner of Education include valuable summaries and special articles.

Among the more specific books and pam¬ phlets are the following: Adams, H. B., Pub¬ lic Libraries and Popular Education) (Albany 1900) ; Alexander, C. B., (The Librarv in the Economy of the State> (New York 1916) ; Ayres, L. P., and McKinnie, Adele, (Public Li¬ brary and the Public Schools> (Cleveland 1916) ; Bostwick, A. E., Relationship of the Library and the Public School > (New York 1914) ; Dana, J. C., (Toronto 1917) ; Hardy, E. A., (The Public Library, Its Place in Our Educa¬ tional SystenP (Toronto 1912) ; Powell, Sophia H. H., (The Children's Librarv a Dynamic Force in Education) (New York 1917).

Frank K. Walter,

Vice-Director, New- York State Library School.

PUBLIC LOAN BANKS. See Banks

and Banking — World's Systems and Fed¬ eral Reserve System ; Morris Plan, The.

PUBLIC PRINTER. See Government Printing Office.

PUBLIC RECORDS. See Archives.

PUBLIC ROAD AND RURAL ENGI¬ NEERING, Office of. See Agriculture, De¬ partment of.

PUBLIC SCHOOL ORGANIZATION

773

PUBLIC SCHOOL ORGANIZATION.

This article on school organization deals first with the kind, distribution and relation of schools in the community, second with the or¬ ganization of the supervisory and teaching force in the system and in the individual school. The ordinary units of school organization are rural districts, townships, villages and cities. Bv far the most of the rural schools have but one teacher who instructs all the children who attend, dividing them into as many grades as seem desirable. A few rural schools have two teachers and in occasional instances a larger number is employed. The township system usually includes a number of rural schools of one or more departments and a larger cen¬ trally located school where academic studies and perhaps industrial and homemaking courses are pursued. The proportions of the

total num¬ ber of pupils in the township registered in the outlying schools and in the central school re¬ spectively vary greatly. In some instances few if any outlying schools are maintained and pupils are brought to the central school by carryalls or auto buses. In other cases only the pupils of high school age or those of the upper grades and the high school, are brought to the central school, while the smaller children attend rural schools near their homes.

In order to explain most easily the school organization of communities of varying sizes, the development of a typical school system from village to city will be described. A small village usually maintains either a <(graded® school, that is, a school with teachers and pupils sufficient to maintain a full eight-grade organi¬ zation, or a combined grade school and high school. In this way the term ((high school® is sometimes used rather deoeptivelv to denote a school in reality consisting of both high school and grades. As the village grows there are likely to be added outlying grade schools, at first small with the lower grades only, and later with complete grade organization. At about this time the high school is likely to be sepa¬ rated from the grades and placed in a building adapted to its special needs. As the village de¬ velops into a large city grade schools multiply and the number of high schools increases. Special high schools for industrial, commercial, homemaking, vocational instruction are added, or these lines of work form recognized depart¬ ments of the regular high school. Grade schools will be placed as the density of the population demands and high schools will be so located as to serve definite sections of the city. Unless the city develop beyond the half million mark there will probably not be more than one or at most two special high schools such as those just named, and these will be centrally located.

The development of the Junior high school, a form of city school organization which at the time of writing is found in but comparatively few American villages and cities, seems likely to bring about within a period of years a gen¬ eral reorganization of school systems. It is sufficient to say here that the junior high school contemplates the division of the 12 years of public school education into three periods, prob¬ ably with one or the other of the following groupings: 6-3-3, or 6-2-4. There will be an elementary course of six years, a junior high school course of three or two years and a senior

high school course of three or four years. This change would necessitate the placing of six- year grade schools as needed, junior high schools as required as centres to which pupils from a number of elementary schools would come, and high schools in turn as centres to which the graduates of a number of junior high schools would come.

The chief administrative officer of a small school is the principal who has charge, under the direction of the local school trustee or trus¬ tees and usually of the county or State school authorities, of the organization and instruction throughout the school. In small schools the principal gives much of his time to classroom instruction, but as the schools grow larger less time is given to instruction and more to super¬ vision. Many principals in village high schools and nearly all principals of large village or city grade schools give all or essentially all of their time to supervisory duties. Although there is naturally much variation in this respect, it is seldom that a principal teaches more than a few hours weekly if he has the supervision of 15 to 20 teachers.

In larger communities the chief school ad¬ ministrative officer is the superintendent. In different parts of the country the term has very different significance as to size of the com¬ munity and the number of teachers supervised. Usually in a community having a superintend¬ ent there are more school buildings than one and the superintendent is not a part of the organization in any one building, but maintains an office frequently outside of the school build¬ ings and has the same supervisory relation to all of them. In its simplest form a typical school system organized under a superintendent consists of the superintendent, t\yo or more grade principals with separate teaching staffs, and ordinarily a high school principal and teach¬ ing force. This organization is subject to many possible variations. As has been said elsewhere in this article, development is along the line of additional groups of grade school, high school and technical school teachers, each group hav¬ ing its principal. In large city systems assist¬ ant superintendents, supervisors of instruction in the various subjects and officials charged with the care of buildings, records, finances, etc., are added.

Within the individual school there may or may not be further organization. This is largely dependent upon the size of the school. When the number of teachers in the grade school becomes too large for the principal to supervise effectively he is usually assisted by one or more of the following department prin¬ cipals : primary, grades one to three, intermedi¬ ate, grades four to six, grammar, grades seven and eight, or by an assistant principal with gen¬ eral duties. The high school principal in a school large enough to have about three or more teachers of each subject, i.e., of English, mathematics, etc., is assisted by heads or chair¬ men of departments, through whose hands goes more or less of the administrative work regard¬ ing the organization of classes and supervision of instruction in the respective subjects. In large city high schools assistant principals are frequently provided.

Randolph T. Congdon,

Principal , State Normal School, Potsdam, N. Y.

PUBLIC SCHOOLS. The idea of a free public school maintained entirely at municipal or State expense and altogether under State and secular control is a modern development, which was not realized until the 19th century. The growth of democracy in the last 100 years has been one of the chief causes of the rapid advance of the free and secularized public school system. Only in the United States, how¬ ever, has the public school system had a de¬ velopment such as a democratic society logically demands.

A system to be truly democratic must have the following characteristics: (1) It must be free to all ; (2) it must extend over all stages of education; (3) it must have what is called the <(educatiqnal ladder® ; that is, pupils must be able to pass upward freely from one grade to the next higher; and (4) it must be patron¬ ized by all classes of the community.

It may fairly be claimed that the American public school system has now reached a stage where all these ends have been attained. In Germany, France and until recently, at least, in England, public education has not been, and is not even now, generally free, since, though most of the expenses have been met from pub¬ lic or institutional (usually religious) sources, each pupil unless a pauper has had to pay school fees. No educational ladder exists in those countries, for secondary education begins at eight or 10 years of age and always in schools parallel to the elementary schools. The pupil who completes the public school at the age of 14 must go back from four to six years if he wants to have a secondary education. In the United States, however, the pupil enters the high school without loss of time, since the high school begins where the elementary school ends. It naturally follows that in European countries only the children of the <(lower classes® attend the elementary schools, and that it is only in exceptional cases that they ever find their way into schools of secondarv and higher education. From the beginning, in those countries, the sec¬ ondary schools, and later the universities, are patronized by the higher social classes, rein¬ forced to some extent by the children of thrifty and ambitious members of the lower ones. In sharp contrast to this state of affairs, it is the proud boast of the American school system at its best that the public school is open to the poorest and is good enough for the highest ; that in form, at lea: t, the system is so organ¬ ized that the road is open for every child in the republic to carry his mental development to the highest possible point ; for not only are elemen¬ tary and secondary schools free and properly articulated, but in most of the States a free education is

offered also in universities. It is furthermore a matter of daily observation that all classes of our population freely patronize the public schools. The only considerable ex¬ ception is the private religious, or parochial, school, where the motive for segregation is re¬ ligious, not social. Nearly 90 per cent of all children of elementary grade attend the public school.

Colonial Beginnings of Public School Evolution. — The beginnings of the free com¬ mon school reach back to the earliest colonial times. In New England, at least, the predomi¬ nant motive for promoting public education was leligious rather than political. The elementary

school of that period quickly merged into the academy or secondary school, where the promis¬ ing lads were prepared for college. However, the idea that the early education should be free, and in considerable degree compulsory upon all, found early expression. The General Court of Massachusetts in 1642 enjoined upon town authorities the duty of seeing that all children acquired at least the rudiments of an education. The order even went so far as to require the removal of children from those parents who persisted in bringing up their off¬ spring in ignorance. The selectmen of every town were further required (

More or less rudimentary beginnings of pub¬ lic education are found in the older colonies, as in New Jersey, Pennsylvania, Virginia and the Carolinas. In the South, however^ the free school idea was not so hospitably received as in New England and in New York. An oft- quoted expression by Governor Berkeley of Virginia may be cited. When the English Com¬ missioners of Foreign Plantations asked what course was taken in Virginia for instructing the people in the Christian religion, Governor Berkeley replied, ((The same that is taken in England out of towns, every man, according to his abilitv instructing his children.® He also added, ((I thank God there are no free schools nor printing presses, and I hope we shall not have them these hundred years ; for learning has brought disobedience and heresy, and sects into the world, and printing has divulged them and libels against the best of governments:

God keep us from both !» So far as Virginia and the remainder of the South were concerned, good Governor Berkeley had his wish, for it was not until after the Civil War that that sec¬ tion of the United States was supplied with any¬ thing like a system of free public schools.

The Revolutionary Period.— In all Euro¬ pean countries at this period, the

financial re¬ sponsibility for the education of children was held to belong to the parents, so that neither state nor community, religious or charitable organization, ever desired to make education free, except for children of paupers or others unable to meet the expense. The idea that free schools are only for paupers or the very poor permeated most of the American colonies dur¬ ing the Revolutionary period of American edu¬ cation. Even where the schools were not strictly private, the ˆrate-bill® for all who could pay was a common device for helping to meet the expenses of the school. This idea prevailed in Pennsylvania, Rhode Island, New York, New Jersey and the South. Some States raised taxes to school the paupers, but they made those pay who could do so. Only in Massachusetts and in the more democratic settlements west of the Alleghany Mountains did the pauper idea of free schools fail to obtain a firm hold upon the people. The fees were collected in various forms. In cities the assessment was usually in money; in country districts both East and West the rate frequently included a period of board for the teacher, who was thus obliged to ftboard round® among the families of his dis¬ trict. By 1848 all fees were abolished in Rhode Island. They lasted until 1864 in Vermont, 1867 in New York, 1868 in Connecticut and until 1871 in New Jersey.

Development of State Control. — From the earliest times in America the responsibility for the support of schools was focused upon the settlement, village or town, never upon the colony, or later upon the State as a political entity. This condition of things lasted well into the first quarter of the 19th century. Since that time, however, there has been a steady advance toward State support, supervision and control of public elementary education. In no State of the American Union has the right to control the public schools been abruptly assumed by State authority; on the contrary, State control has sprung almost spontaneously from natural con¬ ditions, chief among which have been the rapid growth of population and the equally rapid growth of State school funds. The process has been somewhat as follows : As soon as a given State, say Illinois, had at its disposal a consider¬ able amount of money for annual distribution among the school districts, it was natural that the legislature should lay down the conditions with which the district must comply in order to enjoy such aid. Among the first things pre¬ scribed would naturally be (1) a minimum num¬ ber of days during which the school must be held in session ; (2) a course of study that miust be taught; (3) the certification of teachers, usually be county authority, but in subjects prescribed by the State. Again, individual com¬ munities, however loath to relinquish the man¬ agement of their own school affairs in their own way, have been obliged to bow to the will of the State, in so far as it saw fit to assert its au¬ thority since the power to levy and collect taxes is derived directly from the State, At present

all State constitutions contain provisions relat¬ ing to popular education.

I he idea that has everywhere prevailed is that the State should in every way possible stimulate local interest and local effort for the support and improvement of schools, laying its hand of authority only upon those general es¬ sentials of the school system which are indis¬ pensable to efficiency. This is why the American public school system has manifested such astonishing elasticity. Every community can have as good or as poor schools (down to a certain point) as it desires. The salaries may be high or low, the equipment ample or inade¬ quate, the schools backward or progressive as the community wills. Again, this elasticity is felt also within the teaching body, quite aside from the general tone of the community. It is not uncommon to find public sentiment quick¬ ened and elevated by a corps of teachers led by an active and progressive superintendent. The absence of restrictive State control as to subject matter, methods of teaching and school organization opens the door to individual initia¬ tive, and to consequent progress. The inter¬ action of the two influences, that of the State on the one hand, with its general prescriptions and supervision, and that of the local com¬ munity, on the other, with its power of adjust¬ ment to circumstances, makes the American school system the most perfect adaptation to democratic needs that is to be found in the world. Any civilized European system main¬ tains standards with respect to given par¬ ticulars that the American public school as a whole can by no means measure up to; but it may be confidently asserted that no European system, however excellent, could, if put into op¬ eration in an American State, produce results so wholesome and excellent as those that come from the present system.

The Growth of Public School Funds. — In¬ dividual States began at a very early period to establish permanent funds for the support of common schools. In 1795 the lands known as the ((Western Reserve,® held by Connecticut, were sold for $1,000,000, and the money turned into the school fund. New York also made provision for common schools by setting aside a portion of the public lands for this purpose. New Hampshire began a school fund by exact¬ ing one-half of 1 per cent upon the capital of banks within the State. Other States made sim¬ ilar but less effective efforts, a favorite means being the granting of lottery privileges for the raising of funds. Much more fruitful sources of permanent school funds in the several States have been Congressional land grants that have been made from time to time out of the un¬ settled government land lying to the west of the original colonies. Each of the States subse¬ quently carved from this vast territory re¬ ceived a grant varying from one to three sec¬ tions from each township for school purposes. In addition to the direct appropriation of land, it has been the policy of the government to turn into the State treasuries, also, a percentage of the net proceeds from the sale of public lands within their borders. In some States, the school lands were sold

at an early date at low prices ; in others the lands are held to the present day. By act of Congress 1836 a surplus in the United States treasury was distributed among the States. The amount actually given was

something less than $30,000,000. In 16 of the 26 States then existing, this money was appro¬ priated in whole or in part to the permanent schools' funds. The present total annual in¬ come from permanent school funds and the rent of school lands is something over $17,500,000, but this amount is very unevenly distributed among the States. When we consider that the total annual expenditure for public schools now closely approximates $640,000,000, it can be seen that the income from permanent funds forms but a small fraction of what is actully expended ; yet it would be an error to assume that the in¬ fluence of these public funds has been limited to their comparative magnitude.

Systems of Administration. — Developing as the public school has done from the indi¬ vidual settlement as the starting point, it can easily be understood why the district system of administration has been so potent in the past, and why in some States the people still cling so persistently to this form of management. The "school district, w our oldest and most primary form of school organization, is the smallest civil division of our political system. It was early recognized by law and given legal func¬ tions and responsibilities. The district manages its school affairs in a simple way, a board of directors or trustees, usually three in number, being elected to employ the teacher, determine the amount of money to be expended and in general to conduct the school affairs of the dis¬ trict. This is the most elementary and at the same time the most democratic of methods for school administration. It is particularly well fitted to sparsely settled sections of country, but not so well adapted to denser populations, since it prevents the efficiency that arises from consolidation.

The township system forms the next natural stage in the development of school administra¬ tion, since it is based on a convenient political unit, not too large for effective local direction. In this system, one set of officers conducts the educational affairs of the whole township, erect¬ ing buildings where they will best accommodate the people, employing teachers, grading the schools, in many cases providing for the trans¬ portation of children to and from school, and usually crowning the whole with a township high school, to which pupils may be promoted upon the completion of their elementary course. The State of Indiana has been a pioneer in in¬ troducing the township system. A number of other States have adopted it

wholly or in part.

Most if not all the Southern States have a county system of school administration, because there the county rather than the township is the unit of government. While in the Northern States the county has never been the unit for civil or for educational organization, it is and has long been the unit for supervision of schools. With but few exceptions each county has a superintendent whose chief duties are: (1) the certification of teachers; (2) the personal super¬ vision of the schools through visitation; (3) the conducting of teachers' institutes.

The foregoing organization exists chiefly for the administration of rural and village schools. Nothing has been more marked than the de¬ velopment of cities. It is obvious that adminis¬ tration through the primitive district system would soon become altogether inadequate for the needs of a city. Legislatures have accord¬

ingly made special laws to meet the needs of cities of various classes. The largest cities in a State, like New York City, Buffalo and Roch¬ ester, in New York, usually have special charters enabling them to conduct their schools as they deem best. Cities as a rule have boards of ed¬ ucation for the administration of the system. These boards differ greatly in size and in the manner of their appointment. In most cities the members are elected by the people for stated periods, sometimes at large, sometimes by wards or subdistricts. In some of the larger cities the members are appointed by the mayor and city council acting jointly.

Housing and Equipment. — Nothing is more noteworthy than the development of public school architecture in the United States. In full accord with its democratic genesis, the hous¬ ing and equipment reflects completely the edu¬ cational status of the community. The rural school may be a mere unsightly box with the most primitive apparatus ; or it may be an artis¬ tic building, adequate in size, well heated, lighted and ventilated, supplied with separate wardrobes for boys and girls, and equipped with needed books and apparatus. State and county super¬ intendents have done much to inform their re¬ spective rural communities of what is desirable and practicable in country schoolhouses, fur¬ nishing freely plans and specifications, and even providing the builders with complete models for their guidance. In the State of Missouri over 600 rural schoolhouses were erected in a short time in accordance with a model furnished by the State superintendent of public instruction. The cost of a building of this type was $600.

The elementary school covering a period of eight years, the most common type of graded- school building in towns and small cities, is the eight-room

schoolhouse — one room for each grade. The heating, ventilation and light¬ ing of such a building has become an important problem. This problem is rendered much more complex in cities where the plan must be en¬ larged to accommodate from 1,000 to 4,000 pu¬ pils. A typical classroom in such a building should be approximately 24 by 32 feet in dimen¬ sions, and from 13 to 14 feet in height; it should be lighted entirely from one of its longer sides, the windows reaching to the ceilings; about 2,000 cubic feet of pure warm air per hour should be provided for each pupil ; and each room should be provided with a convenient wardrobe. By the use of steam indirect heating, supplemented by "plenum® and "exhaust® fans run by steam or electric power, it has been found practicable to meet the foregoing condi¬ tions of heating and ventilating. Practically all of the modern city school buildings secure these most desirable ends. The buildings are usually an architectural ornament to the neighborhood in which they stand. It has gradually come about, therefore, that the public school is one of the best-housed institutions of modern so¬ ciety. In the poorer districts of large cities, the school buildings are the palaces of the people; they are, moreover, the places where the chil¬ dren of the slums find warmth, light, pure air, beauty, and sympathetic humane treatment from their teachers. It is here that their hearts are warmed, their minds developed and supplied with useful and inspiring knowledge; it is here that they are enabled to rise to higher planes of living, and to nreoare themselves for a worthier

citizenship than their humble origin would seem to warrant. In well-to-do districts of the city, the same beneficent physical surroundings contribute more than any other instrumentality of society to develop the best that there is in democracy.

The Sex of the Teaching Force. — For the

first time in history, society has, since the be¬ ginning of the 19th century, undertaken to edu¬ cate all its children, boys and girls alike. Before that time only certain classes of boys were edu¬ cated, invariably by men teachers. With the new duty there appeared a new means, namely, the employment of women as teachers. So long as women remained uneducated, it occurred to no one, least of all the women themselves, that they could teach. So long as they could find productive labor in the home, as they could un¬ til steam-power and machinery drove industries to the factory, women felt no especial need of a new calling. But when remunerative labor for women failed in the home, when the schools be¬

gan to educate them along with their brothers, and when the new social undertaking of uni¬ versal education began to clamor for more and cheaper teachers, then it was that the world awoke to the fact that it had in its midst a new and hitherto unused force — its young unmar¬ ried women. Women began to be employed as teachers in large numbers in the United States before 1850, especially in the New England States, where the first normal schools were es¬ tablished. The period of the Civil War saw a rapid increase, owing to the natural withdrawal of the young men in order to enlist as soldiers. Since the close of the war the percentage of women in the schoolroom has steadily and rap¬ idly increased, throughout the Union, until in the cities, at least, men are rarely found as teachers in the grades. They are still employed to some extent in rural schools, especially in the newer States. The following table shows the increase in the number of women teachers in 13 typical States since 1875:

STATES

1875

1880

1886

1902

1916

Vermont .

85

83

88

82

92

Pennsylvania .

50

52

83

87

78

New Jersey .

71

76

79

87

95

Iowa .

63

67

76

86

89

Indiana .

42

48

49

55

68

Illinois .

57

61

67

75

81

Rhode Island .

80

78

87

91

92

Missouri .

39

43

40

66

75

Connecticut .

76

76

82

91

93

Massachusetts .

88

87

89

91

89

New Hampshire .

86

83

88

91

92

Ohio .

46

52

56

62

75

Maine .

69

67

65

86

88

•

The women now number 80.2 per cent of all the teachers in public elementary schools of the whole Union, while in city elementary schools they rarely number less than 90 per cent of all teachers. In New York State high schools about two-thirds of the teachers are women. The same phenomenon is seen in foreign coun¬ tries, but the increase in the number of women teachers there has in general been less rapid. In Great Britain

and Ireland the increase has been from 54.3 per cent in 1870 to 75.3 per cent in 1900. If one may judge by the attendance at

the normal schools, the number of men and women in French elementary schools is about equal. In Germany, as a whole, less than 20 per cent of all elementary teachers are women. In Italy, however, 93 per cent of the students of normal schools are young women, though the women form only about 58 per cent of the whole elementary teaching force. In the 11 State normal schools of Massachusetts there are 308 men and 2,811, or 90 per cent, women stu¬ dents.

The large, almost exclusive, employment of women as elementary teachers is the newest thing in our civilization. It is difficult as yet to interpret its full significance. There is no doubt that society has been well served at very small expense. The economic motive con¬ stantly appealing to communities that do not like high taxes is that they can get better teach¬ ing from women for a small sum than they can from men. A first-class woman teacher, they say, is always to be preferred to a second-rate man at the same salary. The assumption is that vigorous, active, well-prepared men can do bet¬ ter financially out of than in the school, and that only second-rate men will accept women's salaries. Ultimately, if the feminization of the school should prove not to be for the best wel¬ fare of society, it is pretty evident that the addi¬ tional cost will not prevent the employment of a suitable number of men. The public school system may be said to be now in its <(brick and mortar® stage, for it is expending vast sums to house and equip the school. When this has been done, the resources of the community may easily be turned to the improvement of the teaching force. Ex-President Eliot of Harvard University argues that the people ought not to spend less upon the minds of their children than they do upon their food. Were this stand¬ ard attained, it is probable that school support would be quadrupled. So far as present ex¬ perience teaches, it seems evident that for the first four or five years of school life women are the natural and the more efficient teachers. When it comes to the early years of puberty, society still holds theoretically that the influ¬ ence of men is essential to the proper unfold¬ ing of the minds and characters of both boys and girls. It is this conviction which, for the most part, enables the non-sectarian private school to maintain its existence in the more wealthy communities. It is probable, notwith¬ standing the aforementioned theory that men are indispensable as teachers of youth, that the availability of women and the difficulty of hold¬ ing the right type of men in such positions will confirm the present custom of almost exclu¬ sively employing women for grade teaching.

The Development of the Public School Curriculum. — Down to 1837, when Massachu¬ setts created her board of education and placed Horace Mann

at its head, the curriculum of schools not fitting boys for college was limited to the bare acquisition of the school arts, spell¬ ing, reading, writing, ciphering, relieved by a trifle of geography and history. The discipline was always rigid and sometimes harsh ; the school term was short and the years of school¬ ing few; the path of learning was not strewn with roses; but the intellectual, like the moral, discipline did honor to the straitest notions of our Puritan forefathers. In his seventh ajn.-

nual report, Mr. Mann, who had visited schools abroad, especially in Germany, where the new philosophy of Pestalozzi was earnestly applied, attacked with great vigor the old curriculum, the old Puritanic ideas and the old unsympa¬ thetic methods of teaching. He demanded new subjects more suitable to children, more humane and sympathetic treatment of pupils and new ideals of the ends to be attained by education. These criticisms and demands led to a spirited battle between Mr. Mann and his admirers and the (

This condition of things lasted until after the period of the Civil War, when the rapid development of the public high school, the still more remarkable expansion of the university curriculum and the rise of all sorts of social organizations for the moral and economic wel¬ fare of the community, forced upon the public school an amount of new subject matter that is little short of astounding. As already explained, the old curriculum was mostly confined to the studies through which the child was drilled in the use of the school arts. The children learned to read, but they never read anything ; they learned to spell and write and parse, but they produced nothing more than an occasional school essay. But now behold how this old course of study has been ((enriched !® — (1) by copious amounts of literature suitable to every grade, not only in the elementary but in the high school as well; (2) by systematic <(lan- guage lessons® throughout the full course ; (3) by the occasional introduction of elementary algebra and concrete geometry in the seventh and eighth grades; (4) by four years of history and as many of geography; (5) by nature work in all the grades ; (6) by a course in manual training or ˆoccupations® throughout the whole elementary period; (7) by extensive acquisi¬ tion in fine arts, such as drawing, painting, molding and music, and finally (8) by an obliga¬ tory course in physiology and hygiene, accom¬ panied by what is called scientific temperance instruction.

The foregoing may be called reform by ad¬ dition. Heretofore the method of relief from a congested curriculum has been by subtrac¬ tion. When the

<(reform® forces of a community have been in the ascendency, the new subjects have been added; when, on account of com¬ plaints of taxpayers, parents and children, the wave of reform has receded, the new subjects,

then called Mads,® are dropped and the curricu¬ lum assumes something of its old-time propor¬ tions. Obviously some method better than that of addition and subtraction is needed for over¬ coming this obtrusive dualism in the course of study. That of organization has been suggested by Prof. John Dewey, whereby the school arts shall be made to emerge from the acquisition of extensive bodies of life-giving knowledge. To effect this reform, however, teachers must be better trained, school facilities must be in¬ creased and, most important of all, teachers must have smaller classes. The ideal public school of the future will not require one teacher to teach more than 20 children. Now the num¬ ber often rises to 60.

For statistics of the public school, see Edu¬ cation, Elementary.

Bibliography. — ■ Reports of the United States Commission of Education; Boone, Edu¬ cation in the United States) ; Mann, Horace,

(Report to the Massachusetts Board of Educa¬ tion ; Proceedings of the National Educational Association; Martin, Evolution of the Massa¬ chusetts Public School System ; Barnard, American Journal of Education', Dewey, (The Situation as Regards the Course of Study* (report of National Educational Asso¬ ciation, 1901). For extensive references, con¬ sult Monroe, (Bibliography of Education.**

Charles DeGarmo,

= 180°. an infinite amount of power would be required to draw the rope out horizontal.

Emeritus Professor of Science and Art of Edu¬ cation, Cornell University.

PUBLIC UTILITIES. Defintion.— Pub¬ lic utility is a term which is not easy to define with precision. When used in a popular sense it applies to those services rendered to the public which are so intimately related to the welfare of the entire community that those who render them are subjected to varying de¬ grees of public control, assume special obliga¬ tions and duties to the public and enjoy special privileges. A public utility is commonly re¬ ferred to as a <(business affected with a public interest,® and one of its most obvious dis¬ tinguishing characteristics lies in the fact that those in control must serve equally all who demand its services instead of remaining free, as the ordinary business man is free, to refuse its services to those for whose patronage it does not care. Because of the many legal problems relating to public utilities it might be expected that a satisfactory definition of the term would be found in the literature of the law. We find, however, that lawyers and judges instead of developing an abstract defini¬ tion have resorted to the familiar practice of marking out the meaning of the term by the process of judicial inclusion and exclusion, i.e., by determining in each concrete case whether or not the business in question is a public util¬ ity. By this method it has been established in some or all of our States that the following are public utilities: common carriers of all kinds by land or water, water supply, gas, electricity, telegraphs, telephones, bridges, ware¬ houses, grist-mills, saw-mills, sewers, cemeteries, hospitals, grain elevators, stockyards, cotton gins, docks, hotels, ice plants, markets and news service.

Distinguishing Characteristics. — An ex¬ amination of the nature of the businesses just

mentioned will reveal the fact that there is no single characteristic common to all except the general fact that each of them has the some¬ what vague property of being (ie is not in a position to haggle over price or

quality nor to hunt for a possible competitor. This sort of monopoly may be temporary but it is none the less effective. It is this posi¬ tion of vantage which is enjoyed by the hotel keeper, the hackman, the commercial messenger and the telegraph company. In the fourth place the difficulty of distribution of services con¬ stitutes in some cases effective limits upon

competition and creates a natural monopoly. Fuel in the form of wood or coal may usually be brought to the consumer with an ease which encourages competition. Fuel in form of gas can be brought only through pipes and com¬ petition is for all practical purposes precluded. Those who furnish electric light or power, steam heat, water and the like enjoy what is in effect a natural monopoly based upon this difficulty of distribution. (4) Another char¬ acteristic of certain public utilities is their en¬ joyment of what may be called a virtual monop¬ oly, a monopoly which arises not from any of the causes which produce natural monopolies but rather from certain economic restrictions. In the first place, there are many public utili¬ ties' which represent a capital investment of many millions of dollars. The financial ob¬ stacles in the way of competition are sufficient to preclude it. This is apt to be the case with the various transportation facilities, railroads, bridges, terminals, tunnels, pipe lines, ferries and the like. Every business instinct warns the capitalist not to undertake to duplicate the costly equipment already engaged in these enterprises, for the hope of dividing with a competitor a volume of business frequently no greater than can be readily handled by one system. In the second place, virtual monopolies are created by the desirability or even neces¬ sity of service on a scale too large to dupli¬ cate. The value of the service rendered by a telegraph, telephone or express company de¬ pends in large part upon the number of per¬ sons, towns or places that are brought into touch with each other through one system. By reason of this fact they are practically sure to be free from competition when once well established. It was because of the virtual monopoly due to the size and complexity of its service that the Associated Press was held to be a public utility.

Obligations Resting upon Public Utilities.

— Because the interests of the entire com¬ munity are directly concerned in the manner in which a public utility is operated and because the public service company is almost invariably the recipient of some of the legal privileges already mentioned, it is necessary and natural that obligations and duties should be imposed on those who engage in public utility enter¬ prises which do not rest upon the ordinary business man conducting an ordinarv business. These obligations and duties may be set forth under the following heads: (1) The public utility must serve all who apply. The man who runs a dry-goods store or a carpenter shop may decline the patronage of persons with whom he does not care to deal. His reasons may be entirely arbitrary, but he is neverthe¬ less within his rights. Not so with the public utility corporation. The nature of its busi¬ ness makes necessary a very different rule. The law imposes upon it the obligation of serving any member of the public without dis¬ crimination. The railroad company or the

hotel cannot arbitrarily pick and choose their patrons. Refusal to serve any one who is entitled to demand its service not only sub¬ jects the public utility management to an ac¬ tion for damages but also will lead to the is¬ suance by the courts of a writ of mandamus compelling it to perform the duty of rendering equal service to all. This rule is, however, subject to certain reasonable qualifications. A public utility, for example, may be under a duty to serve only the members of a certain class. Thus common carriers and hotels are obliged to serve only travelers and not those who wish to use their facilities for other pur¬ poses. Also there is a duty to serve only those who comply with such reasonable regulations as may be made by the public utility manage¬ ment in the interests of the convenience, health and safety of the public. (2) The public serv¬ ice company must not only serve all who apply but it must give them equal service without discrimination. This does not mean actual identity of service nor does it preclude the establishment of proper systems of priorities, as in the case of emergencies of various kinds or in the transportation of perishable freight. But every member of the public must have the same chance to enjoy these special services. The requirement of equal service does not pre¬ vent the segregation of the races by the estab¬ lishment of so-called ((Jim Crow® facilities on common carriers and the like. In such cases, however, the accommodations afforded, though not the same, must in the eye of the law be equal. (3) The public utility must make the same charges to all for the same service. Dis¬ criminations and rebates are forbidden. This problem will be considered more fully at a later point. (4) The duty of furnishing ade¬ quate service and suitable facilities rests upon those who engage in public utility enterprises. The private business man is free to give poor service or sell inferior goods. Those whose businesses are affected with a public interest must meet the reasonable standards of ef¬ ficiency or quality set forth usually by corpo¬ rate charter, franchise or statute. Water, gas and electricity must be^ supplied continuously and in stipulated quantities and railway coaches must be heated and kept clean. (5) Finally, public utility corporations are subjected to special rules of liability for loss or injury to their patrons in certain cases. In this regard innkeepers and common carriers are in a pe¬ culiar position. They are held to have insured the safety of the goods or belongings of their patrons. They are liable for the loss of such property while in their possession, even with¬ out fault upon their part. This is a rule of unusual strictness and it does not apply to other kinds of public utilities nor does any such absolute liability attach to common car¬ riers or hotel-keepers for injuries to the per¬ sons of their patrons. In fact apart from these special cases the duty which rests upon public service corporations to exercise due care in behalf of the safety

of others is in no way peculiar. If the service rendered involves special danger of course special diligence is necessary to constitute reasonable care, but the law requires only the care which a reason¬ able man under like circumstances would exert. Public service companies, however, are not

permitted to enter into contracts by which they exempt themselves from all liability for loss or injury due to their negligence. Such con¬ tracts are regarded as contrary to public policy since they would tend to lower the standards of service rendered to the public. It is, how¬ ever, within limits permissible to make con¬ tracts limiting the amount of damages recover¬ able for losses or to require patrons to place a valuation which shall be regarded as final upon goods transported by a common carrier.

Rights of Public Utilities. — The special obligations resting upon public service corpo¬ rations are compensated not only by the special legal privileges already referred to but also by certain well-defined legal rights. (1) First, there is the right to reasonable compensation for the service rendered. There is no duty to furnish free service. This right may be en¬ forced by placing a lien upon the property or belongings of the patron. It is also permissible for the public service company to ensure pay¬ ment by requiring it in advance. (2) In the second place, there is the right to make rea¬ sonable rules and regulations regarding the conduct of its business. The non-compliance with these rules by any person is sufficient justification for denying him the service to which he would otherwise be entitled. Such rules are those requiring decent and orderly deportment in inns or public conveyances. Or the rules may bear upon the liability of the management of the public utility for losses suffered by patrons, such as the familiar rule restricting the legal responsibility of hotels to the loss of property placed in checkrooms pro¬ vided for that purpose.

The Need for Regulation of Public Utili¬ ties. — From the foregoing discussion it is ob¬ vious that the welfare of the public is vitally concerned with the manner in which the busi¬ ness of a public utility is carried on. Public convenience and economic necessity may de¬ mand that public service companies enjoy monopolistic privileges; but it is certainly im¬ perative that any such monopoly be subjected to strict regulation in the public interest. Wherever a business is endowed with privileges and rights not commonly enjoyed, such a busi¬ ness must be held rigidly accountable for the way in which those advantages are used. As public utilities have increased in number and variety, as modern society with the increasing complexity and insistence of its demands has become more vitally dependent upon the serv¬ ices they render and as it has grown ever more apparent that, left to their own devices, public service corporations will usually serve their own interests at the expense of those of the public, the necessity of subjecting them to adequate and scientific regulation has come

to be universally recognized. Public utility regulations may be conveniently grouped under three heads : first, regulation of rates or charges ; second, regulations to secure equality of service; third, special requirements in the interest of public convenience. Each of these forms of regulations may be briefly discussed.

Regulation of Rates. — Practically every public utility is subjected to regulation in the matter of rates. When a business is affected with a public interest either by reason of its monopolistic character or its enjoyment of pe-

culiar legal privileges, the public must be pro¬ tected from exploitation through the charging of exorbitant rates. Otherwise public utilities would speedily become agencies of oppression instead of public service.

The question who is to determine what rates shall be charged for public utility services has been answered differently at different times.

• At the outset the view was taken that the legis¬ lature should decide what the rate should be and that public service corporations who felt that the rate so fixed was unreasonably low had no remedy except to persuade the legis¬ lature to change its mind. This was the view adopted by the Supreme Court of the United States in the famous case of Munn v. Illinois (94 U. S. 113), decided in 1876, sustaining the right of the legislature of Illinois to fix the charges made by grain elevators. This doc¬ trine has been modified, however, in such a way as to subject the reasonableness of rates fixed either by direct action of the legislature or by commissions acting under its authority to scrutiny by the courts. The courts will not themselves determine what the rate should be as a rule of future policy but confine them¬ selves to the task of approving or invalidating the rates established by legislative authority when the reasonableness of such rates is ques¬ tioned by litigation.

Needless to say a public utility corporation cannot be deprived of the right to charge a reasonable rate for its services. To deprive it of this right would be to discriminate arbitrarily against it and thereby deny to it the equal pro¬ tection of the laws. It would also amount to a deprivation of property without due process of law. But to decide in a given case what is a ˆreasonable® rate is not so simple. The solution of the problem is not much furthered by quoting the rule which our courts have frequently an¬ nounced that a reasonable rate is one which ensures a (

It is not perhaps so difficult to say what is meant by ((fair return,® although it is naturally impossible to lay down as a general rule that it is this or that percentage of profit on a given investment. The courts have reached with practical unanimity the conclusion that a fair return from a public service enterprise is that measure of profit which would be realized from any other business where the risks and capital investment are the same. What this is in any given case depends of course upon the peculiar circumstances of that case.

There has been much diversity of opinion as to what is a "fair valuation of the property devoted to the public service.® Several different standards for measuring that valuation have received recognition. (1) First, it has been urged that the total original cost of the plant and improvements should be deemed the true valuation. There are many objections to this test. Except in the case of newer enterprises the original cost cannot usually be determined

with any accuracy. Furthermore, in such a figure may be included various items represent¬ ing unwise or unnecessary expenditure which ought not to be made the basis of earnings at the present time. (2) The present capitaliza¬ tion of the business is also suggested as a meas¬ ure of public utility valuation. This, however, overlooks entirely the not infrequent fact of over-capitalization, an abuse which public con¬ trol has only begun to mitigate. There is too little relation between the capitalization and the actual investment in public service companies. (3) Another proposal is to take as the proper valuation the cost of reproducing the plant less the existing depreciation of the equipment. Opinions differ as to whether this should be the cost of reproducing the original plant, per¬ haps with a somewhat antiquated equipment, or the cost of reproducing a new and modern plant. (4) Perhaps the weight of authority inclines to the view that <(fair valuation® means the present value of the plant as a going con¬ cern. This includes two elements, the physical valuation of the equipment and an additional increment representing the fact that the system is actually operating and producing earnings. It seems clear that any attempt to arrive at a fair valuation of a public utility investment must begin with an accurate appraisal of the value of the physical property. This fact has received a somewhat belated recognition and there is now a widespread tendency throughout the several States in the United States to pro¬ vide for the making of such a valuation on a scientific basis. In estimating the value of the business as a going concern it must be borne in mind that the value of the public utilitity fran¬ chise should be excluded. This franchise value is directly based upon the capacity of the cor¬ poration to earn profits and it would accord¬ ingly be absurd to include it in the valuation upon the basis of which those profits are to be computed. The Supreme Court of the United States has declined to adopt any one of the above methods of determining the fair valuation of the property devoted to public service but

has declared that all of them are to be given consideration. In Smyth v. Ames (169 U. S. 466, 1898), the court said: (

Regulations to Secure Equality of Serv¬ ice. — Inequality of service rendered by public service corporations may take three forms : First, the arbitrary refusal to some of service rendered to others; second, the rendering of service of unequal quality for the same charge, and third, the charging of higher rates for the same service rendered under substantially sim¬ ilar conditions. The illegality of the first two forms of discrimination has long been estab¬ lished, but discrimination in rates has been made illegal per se only in relatively recent years. Under the early common law one who

was not charged a rate unreasonable in itself had no cause of complaint because some one else was charged less. This rule was later modified so as to make discrimination in rates prima facie evidence of the unreasonableness of the higher rate charged. Finally, such dis¬ crimination came to be recognized as contrary to public policy and has been made illegal by statute practically everywhere.

The task of defining what is meant by dis¬ crimination, however, has not been easy and the different solutions of the problem arrived at by different legislative bodies have produced a highly variegated system of regulations upon the subject. Furthermore, it is not feasible to forbid discrimination of all kinds since abso¬ lute uniformity of rates is undesirable, and it has been necessary, therefore, to leave some leeway in the laws and regulations so that this legitimate discrimination may exist. The result has been to cast upon the courts a heavy bur¬ den in deciding in a multitude of concrete cases whether or not the particular discrimina¬ tion complained of is forbidden by the statute. The Federal Interstate Commerce Act, for ex¬ ample, enumerates a considerable list of dis¬ criminations which are illegal when practised by common carriers upon those <(in substan¬ tially similar circumstances and conditions,):) a phrase evidently designed to give a large meas¬ ure of elasticity to the enforcement of the law.

The forms of discrimination in rates which are now commonly forbidden by law are the following: (1) Discriminations for the pur¬ pose of destroying competition, such as the offering of lower rates to a competitor's patrons to induce them to abandon him; (2) conces¬ sions made to large customers when the differ¬ ence lies not in the amount of service rendered at any one time but merely in the total amount during a given period of time; (3)

concessions made to exclusive patrons as against those who divide their patronage; (4) discriminations in favor of special kinds of business when the service rendered is the same, as when a rail¬ road charges less for the shipment of goods to be used for one purpose than for another in order to develop particular industries in certain communities.

On the other hand, the law very generally recognizes the legitimacy of certain forms of discrimination. Among these may be mentioned the following: (1) Rates may differ where the services rendered entail different costs. Extra charge may be made, for example, for transpor¬ tation on a train of unusual speed. (2) Lower rates may be charged for services rendered in units which entail less cost and inconvenience. A carload of goods may be shipped at a cheaper rate than a single package, or a large party may be given reduced passenger rates. (3) Rates may be lowered for patrons who themselves furnish a portion of the public utility facilities, such as cars, wharves, etc. All such discrimina¬ tions are, however, closely scrutinized and strictly limited.

Special Regulations in the Interest of Public Convenience. — This point has already been touched upon in discussing the duty rest¬ ing upon public service companies to furnish adequate service and suitable facilities and need not be further elaborated here. Legislatures have passed numerous and highly various laws of this kind. An illustration in point is the re¬

quirement sometimes found compelling the es¬ tablishment of certain relations in the interest of public convenience between connecting rail¬ roads.

Machinery of Public Utility Regulation — Commissions. — Experience has demonstrated beyond doubt that public utilities can be effec¬ tively regulated neither by State legislatures nor by courts. As public utilities increased- in number and in the complexity of their re¬ lations to the public welfare it became appar¬ ent that some machinery of control was neces¬ sary which would remove the problems of their regulation from partisan politics, protect the public in the matter of rates and service, protect the public utility itself from ill-advised attacks of legislative majorities and secure a scientific, efficient and impartial supervision which should be based upon an examination of facts. It is now universally recognized that these needs are best met by the creation of pub¬ lic utility commissions, modeled roughly after the Interstate Commerce Commission, and such organizations exist in all but one or two States of the Union for the regulation of at least the more important types of public utilities such as common carriers.

These commissions are usually, though not invariably, appointed by the

State governor and are supposed to be non-partisan in personnel. The membership varies in number from three to seven, and the term of office varies from 2 to 10 years. The salaries paid range from $1,500 to $15,000. It is almost universally pro¬ vided that no one who has any direct or indi¬ rect pecuniary interest in the public utilities over which the commission has jurisdiction may be a member of it.

The powers of public utility commissions may be grouped under four heads. In the first place, the commissions exercise power over public utility franchises. This power may include the determination of the necessity of granting new franchises, the control over franchise terms and the enforcement of the obligations resting on the public service company. In the second place, control is exercised in some States over the issuance of stocks and bonds of public utility companies for the purpose of preventing over-capitalization. In the third place, the commissions have authority over rates and service. _ Their powers in this respect differ widely in the several States. They have com¬ monly, however, the right to make detailed in¬ vestigations and conduct hearings for the pur¬ pose of securing data upon which to determine what rates may be charged or what service required. The orders issued upon these points are not final but may be reviewed by the courts. They are, however, regarded as prima facie reasonable and will be nullified only when clearly unreasonable. Finally, public utility commissions are empowered to require public service companies to adopt a uniform system of accounting and periodically to file detailed reports.

The regulation of public utilities by commis¬ sion has not escaped criticism. Reference is made to the delays resulting from the system of appealing to the courts so large a proportion of the orders of the commission. It is pointed out that rates have not, as a rule, been ma¬ terially reduced under this form of control. It has also sometimes happened that State pub-

lie utility commissions have evinced an un¬ friendly attitude toward the public ownership of municipal utilities and have used their powers to block the progress of that movement. But on the whole it is generally conceded that commissions afford the only solution for the public utility problem. It has succeeded in large measure in taking the problem out of politics, has brought about very general improvements in service, and by creating an administrative agency of more or less expert ability has pro¬ vided a means for dealing in a scientific manner with the perplexing problems relating to public utilities which remain as yet unsolved.

Bibliography. — American Academy of Po¬ litical and Social Science, (State Regulation of Public Utilities5 (1914) ; Cathcart, (Public Service Corporations5 (Vol. VIII, (American Law and Procedure,5 1910) ; Freund, Rolice Power5 (1904) ; Holmes, Regulation of Rail¬ roads and Utilities in Wisconsin5 (1915) ; National Civic Federation, Commission Reg¬ ulation of Public Utilities5 (1913) ; Pond, Cub- lie Utilities5 (1913) ; Whitten, (Valuation of Public Service Corporations5 (1912) ; Wyer, Regulation, Valuation and Depreciation of Public Utilities5 (1913); Wyman, Rublic Service Corporations5 (1911) ; Reports of State Public Utility Commissions and of Interstate Commerce Commissions.

Robert Eugene Cushman, Associate in Political Science , University of Illinois.

PUBLIC WORKS, School of. See Poly¬ technique, The.

PUBLICANI, pub-li-ka'ni, Roman farm¬ ers of the public revenues. In ancient Rome the privilege of collecting revenues from foreign districts dependent upon Rome was sold at auc¬ tion by the censors for a period of five years. The security required by the state from these tax-gatherers was usually the price at which they had purchased the branch of the revenue to be collected and frequently was far in excess of the wealth of any single bidder, which resulted in the formation of companies for the purpose, called socii. Their business with the state was conducted under the name of one member des¬ ignated the manceps. The farmers of the rev¬ enue were of the wealthiest classes. None but Roman citizens could be a member of the publi- cani and magistrates and governors of prov¬ inces were not eligible. The revenues were derived principally from tolls, tithes, mining duties and scriptura (tax levied for the use of the public pasture lands). The collections were made by an inferior class who were often freed- men or slaves in the employ of the company and were cordially detested by populace. The high price paid for the privilege and the greed of the publicani resulted in great injustice which to¬ gether with the character of the collectors ex¬ plains the bitterness with which they are men¬ tioned in the New Testament. From about 150 b.c. they were usually of the equestrian order. Consult Greenidge, A. H. J., Roman Public Life5 (London 1901) ; Livy (xxiii, 49; xxiv, 18) ; and the article (

PUBLICITY OF POLITICAL EX¬ PENSES. See Corrupt Practices Acts.

PUBLICK OCCURRENCES, the first newspaper published in America, though it can hardly be called a newspaper, as no second number appeared, the colonial authorities sup¬ pressing it four days after its first appearance. It was issued at Boston 25 Sept. 1690 by Benja¬ min Harris and printed by Richard Pierce. As far as is known, there is only one copy

extant now which is in the archives of the Public Record Office in London. A reproduction of it is contained in Green, S. A., (Ten Fac-similc Reproductions Relating to old Boston and Neighborhood5 (Boston 1900). See News¬ papers, American.

P.UBLICOLA, Publius Valerius. See

Valerius, Publius.

PUBLISHERS' ASSOCIATION. See

Newspapers, American.

PUBLISHING, American. The book trade or publishing industry in the New World had its origin in a more remote period than is generally supposed. It began within 100 years of the invention of printing, and from the date of the first American book, 1535, to the year 1799, over 7,000 different books had been published, nine-tenths of them, however, being pamphlets. The 19th century saw almost the full development of book publishing, the establishment of colleges and schools and the founding of many libraries, creating an ever- increasing demand for the best in literature.

Early American Books. — The first book printed on the American continent is said to have been (La Escalera Spiritual de San Juan Climaco,5 published in Mexico in 1535. It was a translation from the Latin into Castilian. Other books were printed on the first press set up in Mexico and six or seven books are known to have been published in Peru before 1600. In the United States the earliest publication was a pamphlet called (The Freeman's Oath,5 printed in Boston in 1639. This was followed in the year 1640 by the Ray Psalm Book,5 printed by Stephen Daye at Cambridge, Mass. After its publication in the colony it was re¬ printed in England, where it went through 17 editions, the last one bearing the date of 1754. It was also a highly popular work in Scotland, 22 editions having been printed there, the last dated 1759. The first original American book published in this country was Mrs. Anne Brad- street's Roems,5 and this volume, issued in Cam¬ bridge, Mass., in 1640 was republished in Lon¬ don in 1650. Cambridge remained the only pub¬ lishing town for a long time, and for 21 con¬ secutive years issued about one volume a year. In 1653 Samuel Green published John Eliot's famous (Catechism5 in the Indian language, followed in 1659 by the Psalms in Indian, in 1661 by the Indian New Testament and in 1663 by the whole Bible in the Indian tongue. This was the first Bible printed in America.

Early Publishers. — In New York City the original book publisher was William Bradford, who became official printer in 1693, for ((40 pounds a

year and half the benefit of his print¬ ing, besides what served the public.55 In 1694 he issued the Raws of the Colony,5 the first bound book published in New York. In 1738 Christopher Sauer established a publishing house at Germantown, Pa., and issued the first German Bible printed in America in 1743. The firm of Little, Brown and Company was estab-

lished in 1784 in Boston while in the following year, in Philadelphia, Lea Brothers and Company and Henry Baird and Company began business. It was also in 1785 that S. E. Bridgeman and Company began publishing books at Northamp¬ ton, Mass. The existing house of J. B. Lippin- cott and Company was established in Philadel¬ phia in 1798. The firm of Harper and Brother began business in New York in 1817. From this date the publishing business had a rapid growth, among the firms established being the following in New York: Baker, Voorhis and Company, 1820; D. Appleton and Company, 1825; D. Van Nostrand, 1830; Ivison and Com¬ pany, 1831; John Wiley and Sons, 1832; John F. Trow, 1835; A. S. Barnes and Corrfpany, 1838. In other cities the early firms included the following: Cincinnati, Ohio, U. P. James, 1831; Springfield, Mass., G. and C. Merriam Corn- pan}', 1831 ; Louisville, Ky., John P. Morton, 1825 ; Richmond, Va., J. W. Randolph Company, 1831 ; Mobile, Ala., G. H. Randall, 1831 ; Mont¬ gomery, Ala., Joel White and Company, 1833; Lancaster, Pa., John Baer's Sons, 1817.

The Early Book Trade. — As an adjunct to publishing, the selling of books originated in Boston as early as 1652, when Hezekiah Usher opened the first shop. Many colonial book¬ sellers printed and published their wares. Ben¬ jamin Franklin (q.v.) was among the early book printers. In 1732, Richard Fry, an English man and bookseller of Boston, advertised :
<(Whereas it has been the common method of the most curious merchants of Boston to pro¬ cure their books from London, this is to ac¬ quaint these gentlemen that I, the said Fry, will sell all sorts of accompt books, done after the most acute manner, for 20 per cent cheaper than they can have them from London. . . .

For the pleasing entertainment of the polite parts of mankind, I have printed the most beautiful poems of Stephen Duck, the famous Wiltshire poet. It is a full demonstration to me that the people of New England have a fine taste for good sense and polite learning, having already sold 1,200 of these poems.® The first convention of booksellers for the regula¬ tion of trade seems to have been held in Bos¬ ton, 1724; it was for the special purpose of in¬ creasing the prices of certain wprks. Toward the close of the

century bookselling began to take rank among the most considerable com¬ mercial pursuits, though it then only fore¬ shadowed its present comparative importance. Works of standard character, involving large expenditures, were undertaken by publishers, who, in such cases, usually subscribed together as a guarantee for the printer's outlay. The trade was conducted upon established principles, and innovators were held in poor esteem. All these usages were, however, disturbed by com¬ petition, and after the publication of the Waverly novels, of which rival editions were issued, the individual members of the trade acted more independently of each other, and their customs afterward partook of a less narrow spirit. The American Company of Booksellers was founded in 1801. Books were formerly sold in sheets, to be bound as pur¬ chasers might desire, a practice which no longer obtains. The universal diffusion of education in America, and the inquiring mental character of its people, not only increased the circulation

of books but reduced their price, and the old- fashioned veneration which literary works had once inspired experienced no little modification. Externals were of small consequence to the great body of readers, and works were pur¬ chased not so much for preservation as for im¬ mediate reading.

Statistics. — From 1825 to 1840 the number of American publications show an aggregate of 1,115. Of these 623 were original and 492 were reprints from foreign works. The population of the United States in that year was about 17,000,000. In 1853, 733 new works were pub¬ lished in the United States, of which 278 were reprints of English works, 35 were translations of foreign authors and the remainder were orig¬ inal American works. The population of the United States had reached about 25,000,000, an increase of 50 per cent compared with 1840. The original American works published in 1853, compared with the 15 years ending in 1840, show an increase of about 800 per cent in less than 20 years. In other words, the original American publications of the book trade seem to have advanced about 15 times as fast as the population. In 1880, with a population of 50,000,000, the new books published during that year amounted to about 2,000 — nearly three times more than in 1853, whereas the population had only doubled. The total number of new books published according to the records of the Publishers' Weekly, for the years given below, is as follows:

1881 .

. 2,991

1896 .

. 5,703

1882 .

. 3,472

1897 .

. 4,928

1883 .

. 3,481

1898 . .

. 4,886

1884 .

. 4,088

1899 .

. 5,321

1885 .

. 4,030

1900 .

. 6,636

1886 .

. 4,776

1901 .

. 8,141

1887 .

. 4,437

1902 .

. 7,833

1888 .

. 4,631

1903 .

. 7,865

1889 .

. 4,014

1909 .

. 10,901

1890 .

. 4,559

1910 .

. 13,470

1891 .

. 4,665

1911 .

. 11,123

1892 .

. 4,862

1912 .

. 10,903

1893 .

. 5,134

1913 .

. 12,230

1894 .

. 5,134

1914 .

. 12,010

1895 .

. 5,469

1915. . .

. 9,734

It will be observed that there is a heavy falling off for 1915, due to abnormal conditions brought about by the war. While the number in other classes was unusually small, books of history numbered 758, as compared to 581 in 1914, the increase being due to the many pub¬ lications on the war.

As an illustration of normal conditions in the book trade the figures for 1914 are of more value. Of the total number of titles pub¬ lished during this period, 10,175 were new books and 1,835 were new editions. Imported books, editions printed abroad, but bound in this country, numbered 2,852. Of the various classes fiction leads. The output for 1904 may be compared to that of 1914 by the chief classes, showing the change in public demand within the past 10 years :

1904 1914

Fiction, American . 1,262 689

Fiction, foreign . 559 364

Law . 614 507

Education . 628 268

Theology . 717 1,032

Philosophy . 58 408

Sociology and Economics . 336 1 ,038

Considering only the books of American authorship for 1914, it will be seen that there is some change in the relative proportion of classes. Books on sociology and economics take the lead, fiction coming second almost 200 titles behind.

Books by American Authors Published in

1914.

class No. of titles

Sociology and economics . 876

Fiction . 689

Religion and theology . 677

Poetry and drama . . 558

Applied science . '. . 552

Science . 509

Law . 483

Medicine and hygiene . 414

Juvenile books . . 4C5

History . 400

Biography, geneology . 391

General literature and essays . 389

Geography and travel . 340

Agriculture . 335

Philosophy . 290

Education . 237

Business . 199

Philology . 190

Fine arts . 166

Games, amusements . 155

Domestic economy . 119

Music . 70

M iscellaneous . 119

Total.. . 8,563

Popular Books. — In 1903 there were 1,700 book publishers in the United States. While Boston and Philadelphia remain true to their earlier reputations as leading book centres, New York has become the largest book mart and the leading factor in the manufacture of books. Chicago too has assumed an important place in the book trade, while some hundreds of books are published annually in Cincinnati, San Fran¬ cisco, Cleveland and other smaller cities. The majority of American books are published by 100 firms in New York, Boston, Chicago and Philadelphia. During 1902 and 1903 the his¬ torical novels enjoyed widespread popularity, and nine books of this class circulated to the extent of 1,400,000 copies. This enormous out¬ put, however, did not lessen the sale of older and more standard books. These were largely reprints. A popular work 75 years after its first publication is often found to have been reprinted 20 times by as many different pub¬ lishers. Of the world's great standards, hun¬ dreds, and in some cases thousands, of editions have appeared. There is, nevertheless, a dis¬ tinction to be made between the manufacturer of books who takes old works and reprints them, and the publisher who issues entirely fresh and original matter. Among early suc¬ cessful books Mrs. Stowe's (Uncle Tom's Cabin had a phenomenal sale, 500,000 copies being sold in less than five years in the United States, and by April 1852 more than 1,000,000 had been reprinted in Great Britain. Of Longfellow's poems, without taking into account unauthor¬ ized English reprints, the American sales in 1839-57 amounted to 325,550; from the latter date till 1901, 220,000.*

School Books. — No small factor in book¬ making during the 19th century was the phe¬ nomenal production of school and college text¬ books. In 1902 the reports showed a list of 433 educational works, while in 1904 this was increased to 628, though there has since been vol 22 — 50

a marked decline in the production of this class. Of books for use in the public schools editions of 500,000 copies, intended for one year's con¬

*sumption, are not an unusual event. Messrs. D. Appleton and Company for many years sold over 1,000,000 copies of Webster's (Speller) every year; and W. B. Smith and Company of Cincinnati, Ohio, sold over 1,000,000 copies of the Eclectic Series during each year. The electrotype plates of schoolbooks, Bibles, prayer-books and hymnbooks, are very rarely changed and enormous quantities are sold every year. **

Miscellaneous Books. — In the United

States many encyclopedias, dictionaries, the com¬ plete works of standard authors in definitive editions, anthologies of literature, etc., are sold by subscription ; and the initial expense of such books being enormous, before a single copy of the book is made, the sales must be enormous also. Then there are many <(books which are not books® — such as city directories, which are usually published by a company devoted ex¬ clusively to the publication of this one book; State directories, list of dealers in each business and commercial agency reports (each of these agencies makes four revised editions of its books each year, each book measuring about 11 by 13 inches, and containing about 2,500 pages of matter in close print). There are also innumerable genealogies, indexes, catalogs, to¬ gether with many other productions which are truly books, but which cannot be called literature.

Commercial Value. — In the publishing of books the following are the items of outlay which need to be taken into account : Copy¬ right, paper, typesetting, author's corrections, electrotyping, press work, binding, advertising. Publishing means a great deal more than merely printing and binding a book. It means putting it where it is likely to sell. The machinery of distribution, which means the method of get¬ ting books finally into the hands of readers through the various middlemen, is vastly im¬ portant. The manufacture of a book now de¬ mands the assistance of various branches of mechanical skill. Besides the paper-maker, the type-founder and the printer, to whom it gives a large proportion of employment, it engages, exclusively, the bookbinder. Its material form has, till the present era of cheap publications, always borne a commercial value extravagantly disproportionate to its matter.

Copyright. — A common arrangement be¬ tween the American author and publisher is a payment of 10 per cent royalty on the retail price of all sales ; sometimes a cash sum is paid, and the publisher secures the copyright, which is granted for 28 years, subject to renewal by the author, his widow or children for other 14 years. A condition is that a copy of a title- page must be registered with the librarian of Congress, and two copies of the book lodged there not later than the day of publication. The entry fees are 50 cents for an American author, $1 for a foreigner and 50 cents

additional for a certificate of record. A copy of any new edition must also be sent to the librarian. (See Copy¬ right). By the provisions of the International Copyright Act (1886), a foreign author's rights are protected in Great Britain, Belgium, France, Germany, Haiti, Italy, Spain, Switzerland and Tunis. Colonial authors can also secure copy-

right without publication in the United King¬ dom, and a work copyright in the United King¬ dom is copyright in Canada. American cheap reprints of British books are admitted to Can¬ ada subject to a customs duty of \2l/2 per cent, to be paid over to the British author, but the returns from this source have been very small.

Bookbinding. — Since 1885, in the book¬ making industry, many improvements have been made in wire-stitching machines. One of these machines will stitch anything from two sheets to a book two inches thick, and with several of them either round or flat wire may be used. There has also been introduced a noteworthy combination folding and wire-stitching machine, which, by a continuous and automatic operation, takes the sheets from the feeders, and folds, gathers, collates, covers and wire-stitches them. Paper-cutting machines have been improved by the introduction of automatic clamps, indicators and gauges. The invention of a steam round¬ ing and backing machine has increased the ca- . pacity of from 500 to 1,000 books per day to a capacity of from 5,000 to 6,000 in the same time. The latest case-making machine feeds itself from a roll of cloth which it automatically cuts into pieces of proper size for use. The cloth is first covered with glue by contact writh a cylinder revolving in a pot of glue. It is then cut by the machine and nicked in corner sections ; boards are supplied from a holder and a back lining from a roll, both receptacles forming part of the machine. This process completed, the nearly finished product drops a little, the cloth is folded over the boards and back lining, and the binding, after passing through a case smoother, is delivered in a finished state. Among other inventions are a casting-in ma¬ chine, for putting the body of a book into its cover, and a gathering machine. This latter in¬ vention promises important developments in economy. See Bookbinding.

Book Plates. — 'About the year 1804 the art of stereotyping was invented in England, and in a few years was introduced into this country. With the type-printed book under the old con¬ ditions a publisher did not dare print a large number of copies of any book unless he believed it would have a quick sale. Books were bulky and took up too much space. Consequently, the types for a first edition were distributed when they left the press ; then

had to be reset with renewed chances of error in the second edition. Resetting for two or more editions added largely to the cost of the book and lim¬ ited its supply. The process of stereotyping first used, known as the plaster process, served book printers for about 50 years. The practice of the art was brought to New York by David Bruce in 1813, but the first book stereotyped in America was the (Westminster Catechising made by J. Watts and Company of New York in June of the same year. For the printing of books, all methods of stereotyping have been superseded by electrotyping, which was experi¬ mentally tried in New York as early as 1841, and was in general use before 1855.

Book Imports. — The summary of the chief imports of books and other printed matter for 1909 and 1914 shows the following:

Value of Books, etc., Both Free and Dutiable, Imported in 1909 and 1914.

IMPORTED FROM 1909 1914

United Kingdom . $2,819,302 $3,540,824

France . 394,620 566,572

Germany. . 1,671,679 1,416,658

British North America . 167,262 120,007

Book Exports. — The books and other printed matter of domestic manufacture ex¬ ported from the United States during 1909 and 1914 represent the following:

COUNTRIES TO WHICH EXPORTED

1909

**1914*

United Kingdom .

$1,334,499

$1,554,698

Belgium .

37,116

32,609

France .

229,129

86,476

Germany .

141,562

235,920

Italy .

29,576

32,992

Netherlands .

16,093

24,780

Other Europe .

59,566

106,216

British North America .

2,658,380

4,905,329

Central American States and British Honduras .

88 ,454

169,795

Mexico .

245,453

321 ,914

Cuba .

325,599

239,359

Other West Indies and Bermuda .

49,101

37,917

Argentina .

97,606

130,661

Brazil .

230,353

227,866

Chili .

68,856

109,509

Other South America .

134,921

236,222

Chinese Empire .

50,480

143,743

British East Indies .

22,813

35,110

67,371

115,962

British Australasia .

260,079

376,721

Philippine Islands .

156,199

317,995

British Africa .

22,823

38,734

All other Africa .

5,302

6,455

Other countries .

20,114

152,877

Totals .

$6,351,445

$9 , 639 , 860

- *Year ends 30 June, just before war began, thus covering period of normal conditions.*

During the two decades from 1894 to 1914 the only striking change recorded in the book¬ publishing trade was the enormous and phenom¬ enal circulation of popular novels. During this period the advance in good taste and in artistic beauty of product was a marked char¬ acteristic of the industry. Fashions in bind¬ ings changed annually, but a widening range of

materials and patterns, more daring use of designs and inks, and the invention and general use of automatic binding machinery supple¬ mented improvements in printing, permitting lower prices for books and promoting phenome¬ nal sales. It is a significant coincidence that the decade which witnessed extraordinary ad¬ vance in all details of mechanical productions in this industry should be characterized also by the most noteworthy advance in the good taste and appreciation of the general public.

Charles H. Cochrane.

PUCCINI, pu-che'ne, Giacomo, Italian op¬ eratic composer: b. Lucca, Italy, 22 June or 23 Dec. 1858. He came of a family of distin¬ guished musicians, his great-great-grandfather Giacomo, his great-grandfather Antonia, grand¬ father Domenico and father Michele all being famous. He was educated at the Conservatory at Milan, studying under Bazzini and Ponchielli. His first opera, (Le Villi) (1884), was pro¬ duced at the Teatro del Verme and was favor¬ ably received. His (Edgar (1889) was pro¬ duced at La Scala, but his first great success was with (Manon Lescaut* (1893) at Turin. Three years later his (La Boheme/ also pro¬ duced at Turin, achieved an extraordinary suc¬ cess and won world-wide fame for its author. 'Tosca* (1900) was followed by (Madame Butterfly) (1904), with which the composer*

again scored a triumph. His (Girl of the Golden West) ((La Fanciulla del WesG) en¬ joyed signal success at the Metropolitan Opera House, New York. The European War inter¬ rupted the production of his new compositions, but (La Rondine and (I Due ZoccolettP were both completed in the first year of the war. His work is highly original and he ranks among the foremost modern Italian composers.*

PUCK, in mediaeval mythology, a celebrated fairy of mischievous tendencies whose character and attributes are depicted in Shakespear's (Midsummer Night's Dreamt This fairy is known by a variety of names, as Robin Good- fellow and Friar Rush in England, and in Ger¬ many as Knecht Ruprecht ; but it is by his designation of Puck that he is most generally known in England, Germany and the more northern nations. He was the chief of the domestic tribe of fairies, or <(brownies,® as they are called in Scotland and innumerable stories are told of his nocturnal exploits.

PUD. See Pood.

PUDDING-BERRIES, the berries of the Canadian dogwood (Cornus canadensis), com¬ mon throughout North America. See Dog¬ wood.

PUDDINGSTONE. See Conglomerate.

PUEBLA, pwab'la, a state of Mexico. The state of La Puebla in the central plateau of the Anahuac has Vera Cruz to the north and east, Oaxaca to the south, Guerrero to the south¬ west and Morelos, Mexico, Tlaxcala and Hi¬ dalgo to the west. The area is 12,204 square miles. Pop. 1,101,600. (See Mexico). Con¬ sult Palacios, E. J., (Puebla su Territorio y sus Habitantes) (2 vols., Mexico 1917).

PUEBLA, Mexico (originally called La Puebla de los Angeles, more recently Puebla de Zaragoza), capital of the state of the same name, 116 miles east of the City of Mexico by the Mexican Railway, but only about 60 miles in a straight line ; altitude over 7,000 feet above the sea. The climate is most agreeable, the maximum temperature being 84° in summer and 75° in winter. The peaks Popocatepetl and Ixtaccihuatl are only about 25 miles dis¬ tant and those of Orizaba and Malinche are in plain view. Three steam railways, — the Mexi¬ can, the Mexican Southern and the Inter-Oceanic and electric street railways supply transportation. Straw hats, leather goods and numerous other articles are manufactured in considerable quantities, and in the immediate vicinity are several large cotton mills. Near by are the famous onyx quarries which have for many years supplied great quantities of beauti¬ ful onyx to Mexico and the United States. A manufactory in the city makes of the product of these quarries and endless variety of useful or ornamental objects, from store and saloon fixtures, table tops and wash basins to imita¬ tions of every fruit known in the country. The banking facilities of the city are supplied by the Oriental Bank, with $8,000,000 capital, and a number of other financial institutions. The city is noted for its many churches, clean streets, substantial business edifices and grand cathedral, which was almost 100 years (1552— 1649) in building, is 323 feet long, 101 feet wide and 80 feet from floor to roof.

The educational institutions besides the primary and high schools are the State College, School of Medicine, Normal School for Men, Normal School for Women, Normal School of Arts, Academy of Fine Arts and hospicio for the education of children. There are three pub¬ lic libraries, museum of archaeology, an art gal¬ lery, an observatory, a market hall, sulphur baths, a general hospital, founded in 1658, and a maternity hospital, state hospital for both sexes, hospital for the insane, children's hos¬ pital, military hospital, Interoceanic Railway Hospital and Spanish Beneficiary Hospital. The palace of the state government, which faces the principal part or zocolo, is one of the notable buildings of the city. The extensive and very

beautiful Alameda is a most attractive spot and contains a monument erected in 1898 in honor of Mexico's liberators, and the monu¬ ment to Gen. Nicolas Bravo. There are also the French-Mexican monument erected by the French colony in 1902, and the equestrienne statue of General Zaragoza, which surmounts a fine monument erected at the foot of the hill of Guadalupe. In the Government Palace is a most interesting collection of historic paintings and a library of 28,000 volumes. The zocolo or central park of the city is artistically laid out in vine and foliage covered walks, with foun¬ tains and statues here and there, and numerous small plazas supply needed breathing spots. There are three theatres, one of which, the ftTeatro Principal,® was built in 1790 and claims to be the oldest theatre on the American con¬ tinent. Since 1532, in which year the royal sanction was given to form a settlement here, Puebla has occupied second place among all the cities of the land, commercially, spiritually and in population, until very recently, when Guada¬ lajara forged ahead in population and material development generally.

The city of Puebla was founded in 1532 by the Franciscans, and is considered the military key to the capital of the republic. During the war between Mexico and the United States it was captured by Gen. Winfield Scott, who made his headquarters there from June to August 1847. It was captured by the French in 1863 and recovered by the Republican forces under Gen. (later President) Porfirio Diaz, in 1867. Tradition asserts that when Cortez came he found a city of 300,000 inhabitants, 400 temples and a legion of priests, six miles distant from Puebla, where now is the famous Pyramid of Cholula ; and that the Aztecs came there in great numbers to worship and offer up human sacrifices. Pop. about 96,121. Con¬ sult Carrion, A., (Historia de la Ciudad de la Puebla de los Angeles (Puebla de Zaragoza) (2 vols., Puebla 1897).*

PUEBLO, Colo., city, county-seat of Pueblo County, and second city in the State, on the Atchison, Topeka and Santa Fe, the Colorado and Southern (Burlington Route) , the Denver and Rio Grande, the Missouri Pacific and the Chicago, Rock Island and Pacific rail¬ roads, also on the Colorado-Kansas Railroad, about 120 miles south by east of Denver. Within its corporate limits are several former villages: North Pueblo, Central Pueblo, South Pueblo and Bessemer. It is in a valley on the eastern foothills of the Greenhorn Range of the Rocky Mountains. The old fort at Pueblo

was built about 1840, and here came the agents of the American ' Fur Company (John Jacob Astor's Company) to trade with the white trappers

and Indians for their furs. In 1846 there were 100 white people located here en¬ gaged in raising crops, and a real trading post was established in 1850. In 1854 the Ute In¬ dians massacred the residents of the post. In 1859 the present city was laid out, and in 1873 it was chartered as a city. The region of country east is largely devoted to agriculture and stock-raising. In the vicinity of the city are extensive coal and oil fields and deposits of limestone and ores. The silver and copper ores are brought to the smelters of Pueblo ; and lead, gold and zinc are here prepared for the metals of commerce. The iron and steel indus¬ tries have become quite extensive. The Colo¬ rado Fuel and Iron Company (steel plant) have 6,500 employees ; the railroad car-shoos and yards, 3,200 employees; the smelters, 2,200; the foundries and other manufactories, 6,000. There are invested in manufacturing industries a capital of about $18,000,000, and the products are about $65,000,000.

The principal public institutions are the State Insane Asylum, Saint Mary's Hospital and Sanatorium (1,000 patients annually), Minnequa Hospital (cost $300,000), and private sanatoriums. There are two systems of public schools, one on each side of the river ; two high schools, public and parish schools (16,000 school children), Loretto Academy, the McClel¬ lan public library with 14,000 volumes, law libraries, school libraries, and the State Mineral Palace and Park. A complete collection of the minerals of Colorado are in the Mineral Palace. The five banks have a combined capital of $800,000 and deposits of over $15,000,000. The government is administered under a special charter, adopted 19 Sept. 1911, amended 4 Nov. 1913 and again on 2 Nov. 1915. The charter provides for three commissioners, who select appointees from lists furnished by a civil service commission, which holds examinations twice a year. The civil service commission con¬ sists of three members, who are elected by the people. The police judge and city comptroller are appointed by the civil service commissioners and are not civil service officers. Their term of office is four years. The city clerk, city attorney and city engineer are appointed by the council, which is made up of the three city commis¬ sioners. They are not protected by civil serv¬ ice and are appointed for four years. The city commissioners are elected for four years and the civil service commissioners for six years. Elections are biennial; one city com¬ missioner is chosen at one election and two at the succeeding election. The city owns two systems of waterworks, which are operated by trustees elected by the residents of those water districts. The large majority of the population are native-born Americans; about 2,000 are Italians; 1,000 are Austrians, and 1,500 are colored. Pop. 42,908.

; _ P. A. Gray,

Secretary of Pueblo Commerce Club.

PUEBLO INDIANS (Spanish, “town,® “village®; hence Pueblos, “villagers®), a group of sedentary agricultural tribes comprising the Tanoan, Keresan or Queres, and Zunian lin¬ guistic stocks in New Mexico, and the Hopi or

Moqui of the Shoshonean stock in northeastern Arizona. There are also some Mexicanized remnants of the Tanoan stock on the Rio Grande below El Paso, in Texas, and Chi¬ huahua. For details see under the above stock names.

Physical Characters. — Disregarding those who have been more or less affected by Spanish contact, the Pueblo Indians are generally small in stature, particularly the women, some of whom are quite diminutive. After marriage the latter frequently become stout, but obesity is rare. The men are a rich brown in color, not so dark nor so reddish as their Navaho neighbors. The women are lighter, many of them being of a fine olive tint, which, with regular features and often with eyes almost oriental in type, make them decidedly comely. Albinism is common among the Hopi and Zuni, those of the latter tribe averaging one in 200. The hair is thick, black and glossy. That of the men is cut “terrace fashion,® that is, banged across the forehead, cut horizontally at the sides on a line with the chin, and allowed to grow to full length behind, but knotted and tied into a short queue. This is probably the more nrimitive style of hair-dressing, but it now varies more or less with the tribe. The front hair of the women is cut level with the chin, parted lat¬ erally, and allowed to fall over the face, neces¬ sitating continual brushing aside with the hand to permit them to see. The unmarried Hopi girls retain the primitive method of wearing the hair in large whorls over the ears.

Dress. — The costume of the men, now largely superseded by the clothing of civilization, consisted of a shirt, a poncho-like coat formed of a squarish piece with a hole in the middle for the head, and sewed down the sides, with partly open sleeves; a pair of loose trousers reaching below the knees, open half-way up the outer sides and fastened with a belt ; footless stock¬ ings, leggings, garters, moccasins or sandals, breechcloth, headband, hairband, and blanket. Dressed skin or native cotton formed the chief materials from which their costumes were made, but these gave place largely to woolen articles after the introduction of sheep by the Spaniards. The woolen blanket of later times was prob¬ ably preceded by a robe made of strips of rabbit or wildcat skin coarsely woven or plaited to¬ gether. Yucca strips, feathers, and even human hair also formed raw materials for clothing. The typical dress of the women consisted of a skirt of skin or cotton (now of wool) reaching from the neck to below the knees, and girded with a belt, the right arm and shoulder being bare; a manta hanging loosely from the neck and down behind or thrown over the head; stockings,

_ deerskin leggings, consisting usually of an entire skin wrapped many times around the calf, and sandals or moccasins, to which latter the leggings were attached. Among some of the Rio Grande Pueblos the women wear soft deerskin boots instead of the cumbersome leg- wrappings. Necklaces of seashell and tur¬ quoise beads, and pendants, ear-tablets, brace¬ lets, and other ornaments were worn by both men and women, but the shell necklaces ot the latter have been superseded by those of silver. Leather belts strung with large silver discs and silver-mounted wristguards are worn by the men who can afford them. Excepting the moc¬ casins and leggings, skin has largely passed out

■

.

-

,

of use for clothing, cheap cotton prints and a woolen blanket being almost exclusively em¬ ployed by the men.

Houses. — lhe typical pueblo is a many- celled, communal, defensive structure of several stories, opening on one or more courts or plazas in which dances and other ceremonies are per¬ formed. When the pueblo enclosed a single court, the outer wall was usually the highest, and was pierced with only small openings, or port-holes, to afford a view of the surrounding country. A slight elevation was usually pre¬ ferred, but there are many instances in which the site is a lofty mesa or a level plain, while other dwellings were built in natural recesses in the rocky walls of canons or cliffs, hence their popular designation, cliff-dwellings. The site depended on accessibility to water, to cultivable fields, or to the necessity for de¬ fense against enemies. Both rounded or polygonal structures were common, while some pueblos were semicircular in ground-plan, with a high rear wall and with the houses arranged in terraces, the tiers of dwellings successively retreating so that the roof of the lower formed the means of access as well as the <(front yard® of the tier next above, and so on to the sixth or seventh story. The ground tier usually con¬ tained only small wall openings, access being gained by means of a movable ladder to the roof, which was provided with a hatchway. Most of the pueblos still follow this

ancient form, but there are now but few whose ground- floor houses are not provided with doors and windows. Sometimes forming a part of and sometimes detached from the main house cluster, are chambers, wholly or partly under ground and usually circular, used in early times as gathering places and sleeping apartments by the men, and still employed for cere¬ monies and tribal councils. The fireplace was in the centre, the smoke escaping through the hatchway; so hot did these kivas become that the Spaniards likened them to stoves, hence their still popular name, <(estufas.® The structural materials depended largely on the immediate supply. Slabs of sandstone, being abundant, were commonly used ; they were sometimes neatly pecked and laid in adobe mortar or chinked with spalls, and al¬ though joints in the masonry were not ˆbroken,® the result was frequently a marvel¬ ously straight and strong wall that has stood the ravages of centuries. Pise construction was also employed in massive buildings, such as Casa Grande in southern Arizona. Molded adobe bricks, now so commonly used, were not made in pre-Spanish times, .but balls of mud mixed with ashes and sage, and dried, were in vogue as a building material in pre-historic times. The roofs of the houses consist usually of pine or cottonwood beams, with light poles laid transversely, which in turn are covered with brush-grass, and adobe mud, well tamped. The introduction of the horse, which permitted the transportation of heavy roof beams, seems to have had a decided influence in increasing the size of the rooms, the compartments of the ancient structures being usually mere cells. Flakes of selenite were pieced together for window panes, but these have given way to stock frames purchased from the white traders, while the corner fireplace and chimney have

been substituted for the central fire-pit, except in the kivas.

Industries. — As they are sedentary tribes, the Pueblos are agriculturists, their principal crops being corn, squashes, beans, and onions, to which were added wheat, watermelons, can¬ taloupes, grapes, peaches, etc., on the' advent of the Spaniards. Corn is prepared in very many ways, and wild fruits form a not unimportant part of the Pueblo pabulum. Their meat sup¬ ply was gained mainly through communal hunting, the mountains supplying bear, deer, antelope and elk, while the valleys and canons abounded in jack-rabbits, cottontails, prairie- dogs, wild turkeys, quails, and doves. The buf¬ falo was probably hunted to some extent by the Rio Grande Pueblos, who also conducted a brisk trade with the Plains tribes up to 25 years ago. For religious reasons, fish was probably universally tabooed, water, on which everything depends, being a sacred element. The turkey was domesticated, and eagles were and still are kept in captivity for their feathers. Cattle, sheep, goats, horses, and asses, which now form such an important part in the Pueblo economy, were unknown before the Spaniards went among them. The Pueblos are a provident people, their reserve food

supply usually being sufficient for a year's use, thus succoring them in event of drought. Most of their agriculture is conducted by means of irrigation, although patches of corn, melons, squashes, etc., and small peach orchards are otherwise successfully cultivated in favorable localities. The Hopi raised large quantities of cotton, which they wove into garments and traded with other tribes. Indeed they are still the leading cotton weavers among the Pueblos, the industry prob¬ ably having been introduced by clans from the far south. The Hopi and Zuni also weave excellent blankets, sashes, dresses, garters, etc., of wool, and a few of the Zuni men are expert silversmiths. The basket trays of the Hopi are noteworthy, although the art has greatly de¬ clined since the introduction of aniline dyes. Some of the other Pueblos make a coarse bas¬ ket for domestic use. As potters the Pueblos are far in advance of all other Indians north of Mexico. Purely primitive methods are still employed, and the decorative motive is gener¬ ally symbolic, intricate, and pleasing.

Social and Religious. — All the Pueblo tribes are composed of numerous clans, named after some animal, plant, or other natural ob¬ ject or phenomenon. Maternal descent is recognized, that is, the children belong to the clan of the mother. Marriage, which is not al¬ lowed between members of the same clan, is generally effected by mutual consent of the contracting couple and their parents, and is sealed after an exchange of gifts and a simple primitive ceremony. The vow, however, is not very binding and divorce is merely a matter of mutual agreement, the offspring, if any, invariably belonging to the mother. The status of the Pueblo woman is high. She owns the house and its furniture, while it is the husband's duty to provide for his family and he frequently makes his wife's clothes. The dead were formerly cremated or were buried in the houses or in the refuse heaps. Now, however, the dead are buried in a common cemetery in front of the Catholic Church, ex¬ cept among the Hopi, who deposit their dead in

crevices in the rocks. The social and religious organization of most of the Pueblos was con¬ siderably affected by the Spanish missionary and civil authorities, and among all the tribes except the Hopi a civil governor and other officers are now annually elected, although their power in some instances is only nominal. Originally the religious and social organization was insepar¬ able ; each clan had its priest or priest-chief, while both the internal and the external affairs of the tribe, where they affected the compli¬ cated and far-reaching religious organization, were controlled by a priesthood. There were also other socio-religious societies, grouped ac¬ cording to the several regions — north, south, east, west, upper, and lower

— some of which assumed control over certain affairs in winter, others in summer. The members of these so¬ cieties, where they still exist, are the medicine¬ men of the tribe, some of whose functions are the prevention as well as the cure of disease, the regulation of the communal hunts, the ex¬ termination of witchcraft, and the intermedia¬ tion between the tribesmen and the many nature gods which form the Pueblo pantheon. Com¬ munication with these nature powers was and is still conducted by means of secret or open ceremonies, consisting of the depositing of prayer-sticks, chants, dances, sacrifices, panto¬ mime, masquerade, and the recital of rituals.

History. — From the Pueblo tribes which have been more intimately studied it has been learned that they consist of many small accre¬ tions from various stocks and from many lo¬ calities, which left their former homes on ac¬ count of drought and the consequent failure of crops, through superstition, the depredations of enemies, or other causes. The migrations of these component clans or parts of clans were sometimes very slow, many years being con¬ sumed in their journeyings and village after village being successively built, occupied, and abandoned before the final settlement was made. Thus are many of the ruins of Arizona, New Mexico, Colorado, and Utah accounted for. The nuclei of some of the Pueblo tribes, however, had their mythical origin in the north, at a place called Sipapu, where they are supposed to return after death, and which is symbolically represented by an opening in the floor of the ceremonial chambers, in front of the altars erected during religious rites. Indefinite knowledge of a populous region in the north gained by the Spaniards in Mexico early in the 16th century led first to the journey in 1539 of Fray Marcos de Niza to the (

Population. — At the time of Coronado's visit the Pueblo tribes were said to inhabit 66 villages and to number 20,000 men, but it is doubtful if the entire population exceeded this estimate. With the exception of Acoma and Isleta none of the 28 pueblos now existing oc¬ cupy their 16th century sites, the remainder having been forced into new locations chiefly during the reconquest of New Mexico after the Pueblo revolt of 1680. The present aggre¬ gate population of the 27 villages is about

10,000, exclusive of several Hopi villages in Arizona and the two pueblos of Isleta and Senecu, below El Paso, which contain from 2,000 to 3,000 more. For their distribution see Keresan; Shoshonean Indians; Tanoan Family, and Zunian.

Bibliography. — Bandelier, A. F., (The De¬ light Makers) (New York 1916) ; id., Con¬ tributions to the History of the Southwestern Portion of the United States (Boston 1890) ; id., Final Report (ib. 1890-92) ;*

Benavides, Alonso, (Memorial of 1630) (Chicago 1916) ; Cushing, F. H., (Zuni Folk Tales) (New York 1900) ; Goddard, P. E., (Indians of the South¬ west^ (New York 1913) ; Haeberlin, H. K., (Fertilization in the Culture of the Pueblo Indians> (Lancaster, Pa., 1916) ; Hough, Wal¬ ter, (The Hopi Indians) (Cedar Rapids 1901); Lummis, C. F., (Pueblo Indian Folk-Stories (New York 1910) ; (The Land of Poco Tiempo) (New York 1893) ; Saunders, C. F., (The In¬ dians of the Terraced Houses) (New York 1910) ; also many papers in the publications of the Bureau of American Ethnology at Wash¬ ington. F. W. Hodge,*

Museum, of the American Indian, Heye Founda¬ tion.

PUELCHE, pwel'ke, South American In¬ dian tribe of Araucan stock, living in the pam¬ pas region of the Rio Negro and the Rio Colo¬ rado in southern Argentina. They are a wild and warlike people, lead a nomadic life and know practically nothing of agriculture. They succeeded in driving away the Spaniards after the first settlement of Buenos Aires but later withdrew before the Spanish cavalry. They have great herds of cattle and horse, and their chief weapons are the bola and the lasso.

PUERPERAL ECLAMPSIA, a form of eclampsia occurring in pregnant women, usually arising from blood-poisoning and often fatal. The exciting causes may be many, but some form of increased irritability of the nervous system is one of the most important features of the condition. The symptoms come on sud¬ denly, or following a headache, with irritability and perhaps slight impairment of sight or hear¬ ing, or with vomiting. Convulsions of an epi¬ leptic, hysterical or apoplectic variety constitute the main symptom. These convulsions may last for, from one to five minutes, and are then usu¬ ally accompanied by unconsciousness. They re¬ cur sometimes at very short intervals, most fre¬ quently hourly, and may vary from 10 to 30 or more in a day. Such convulsive seizures are always serious to both mother and child and prompt emptying of the uterus is the main remedy to be employed.

PUERPERAL FEVER, an infectious dis¬ ease of women occurring shortly after child¬ birth, or following a miscarriage, accidental or induced. It is caused by a micro-organism, usually a bacterium (Streptococcus) , and is communicated by contact with unclean hands, instruments or clothing which may have brought the infection, just before, during or after the birth of the foetus. Only in the rarest of in¬ stances does it occur when due precautions as to absolute surgical cleanliness have been ob¬ served. It usually begins within a week after the termination of pregnancy, ordinarily from the third to the fifth day, and is attended with acute inflammation of the reproductive organs

and with septic infection of the blood and body at large. It is always an infection from with¬ out, and is preventable by rigid aseptic mid¬ wifery. The symptoms will vary very widely according to the infecting organism and the severity of the infection. A slight amount of fever and some local extension of tenderness may be the only symptoms present in mild cases. In septicaemic cases there is usually a decided chill about the third or fourth day, and is attendant with acute inflammation of 102°, 103°, 104°, 105° F. with general depression and rapid pulse. The temperature usually remains high and then suddenly drops as the patient re¬ covers. In the severest cases, the pysemic infections, the blood-current becomes infected; chills, temperature, sweats occur and recur, and the patient usually dies. The treatment is purely medical, sometimes surgical, and needs the skilled physician and nurse. Prevention is the demand of the modern woman, and she is entitled to it. Unskilled and dirty midwives, unclean doctors and abortionists are responsible for practically all of the deaths due to childbed fever.

PUERTO CABELLO, pwar'to ka-bel'yd, Venezuela, port and capital of the state of Carabobo, on a low peninsula jutting into the Caribbean Sea and forming one of the finest harbors in the world. A lighthouse and forti¬ fications protect the entry. Railroads connect the city with Valencia, 22 miles southeast, and with Caracas, 78 miles east. The exports are coffee (six-sevenths of the whole), cacao, hides, cinchona, oxen, sugar, cotton, timber, including dye woods, and some copper ore. The city was the last stronghold of the Spanish (1823); it was blockaded by the German and British fleets in 1902-03, as the most valuable port of entry and the best place to collect their claims on Venezuela. Pop. (est.) 18,000.

PUERTO LA MAR, la mar. See Cobija.

PUERTO PLATA, pla'ta, Santo Domingo, port of the Dominican Republic on the north side of the island of Haiti. The entrance to the harbor is extremely narrow. Steamship lines connect with Europe, Saint Thomas and Ha¬ vana, and it is connected by rail with Santiago de los Caballeros. Puerto Plata is the export town of the rich tobacco, sugar and coffee plan¬ tations in the interior of the island. There are several valuable coal mines nearby and there is also an extensive trade in mahogany. A white cheesebox fort, a relic of the buccaneers, situated upon a small promontory, is the only defense of the town. Municipal authority is vested in a mayor and common council, elected by the people, the mayor being president of the council. The city has a police department, a school board

and a very good school system and a street cleaning department. It is well lighted and has waterworks. The town was settled in the first decade of the 16th century by Span¬ iards. About 30 per cent of the population speak English. Population about 10,000.

PUERTO PRINCIPE, pren'se-pa, or CAMAGUEY, Cuba, town, capital of the province of Puerto Principe, 170 miles north¬ west of the city of Santiago de Cuba. It was originally founded in 1515 at Nuevitas, the site of an old Indian village, on the northern coast, but was moved to its present site in 1516. For a time after 1800 it was the seat of government

for the Spanish West Indies, and until the end of Spanish rule was an important military post. It is the largest inland city of the island, and is connected with its port, Nuevitas, by railroad. It is the centre of a cattle-raising district, and exports cattle, hides, etc. Sugar also is culti¬ vated somewhat in the vicinity and exported. The town is very mediaeval in appearance, the streets are narrow and the houses old. During the American occupation artesian wells were bored to obtain a pure water supply, the streets were repaired, a good drainage system intro¬ duced and buildings for schools remodeled. Pop. about 30,000.

PUERTO PRINCIPE or CAMAGUEY,

province, east of the centre of the island, bounded on the east by Santiago de Cuba, and on the west by Santa Clara; area 11,000 square miles. The north of the province is mountain¬ ous, the most of the surface being high table¬ land affording excellent pasturage. The chief industry is cattle raising, and the number of cattle has largely increased. The finest horses on the island are also raised here. The prov¬ ince is well wooded, and lumbering is an im¬ portant industry. The minerals include iron, copper and asphalt, all of which are mined to some extent, asphalt being of the most com¬ mercial importance. General agriculture is car¬ ried on mostly in the vicinity of the town of Puerto Principe, and its port, Nuevitas. Sugar is the most important agricultural product. The province was a centre of the insurrectionary movement, and Cubitas in the northern part was the seat of the insurgent government in 1896-98. Puerto Principe is the second prov¬ ince of Cuba in size but is least densely popu¬ lated. Pop. about 160,000.

PUERTO REAL, ra-al', Spain, a seaport in the province of Cadiz, on the Bay of Cadiz, seven miles east of the city of Cadiz. The greater part of the town is modern, on the site of Portus Gaditanus, an old Roman place. It has considerable manufacturing; and the chief products are leather, pottery, linen goods, ce¬ ments, vermicelli and starch. It has a good harbor and an extensive trade ; the chief ex¬ ports are salt, fruit and manufactures. Pop. about 9,000.

PUERTO RICO, re'ko. See Porto Rico.

PUERTO DE SANTA MARIA, gener¬ ally known as (PUERTO, da san'ta ma-re'a (Port Saint Mary), Spain, city in Andalusia, in the province of Cadiz and seven miles northeast of the city of Cadiz, on the Guadalete, near its mouth in the Bay of Cadiz. It is on the railway from Seville to Cadiz. It has a town-house, theatre, a bull-ring, where was given the grand bull-fight to the Duke of Wellington, described by Lord Byron; five promenades, one of them planted with orange and other trees; infantry and cavalry barracks; a custom-house, a good edifice near the mole, a courthouse and a parish church in the Gothic style. Leather, soap, hats, wines, liqueurs, bran¬ dies, starch, flour and glass are manufactured, and some fishing is carried on in El Puerto. This is one of the Spanish ports from which sherry is exported. Its vicinity to Cadiz, the centre of exchange, is favorable for trade. The principal articles of import are wood and iron. Steamboats ply regularly between the Puerto and Cadiz. Pop. about 18,000.

PUFENDORF, poo' fen-dor f, Samuel,

Baron von, German publicist and historian : b. Chemnitz, Saxony, 8 Jan. 1632; d. Berlin, 26 Oct. 1694. He studied theology and law at Leipzig and in 1657 philosophy at Jena; was tutor in the house of the Swedish ambassador at Copen¬ hagen, and by his work, (Elementa Jurispruden¬ ts Universalis (1660) secured the appoint¬ ment, the first in Germany, to the professorship of the law of nature and of nations at Heidel¬ berg in 1661. Here he taught till 1670, and wrote (De Statu Rei Publicae Germanicae,* pub¬ lished in 1667 under the pseudonym of Severinus Mozambano, and which, from the hardy way in which some of the imperfections of the Ger¬ manic constitution are exposed, raised a storm of controversy. Partly with a view to escape unpleasant consequences, Pufendorf accepted in 1670 the post of professor of natural law in the university at Lund, offered him by Charles XI of Sweden. He there wrote his work on natural law, (De Jure Naturae et Gentium* (1672), which superseded the former; soon after ap¬ peared the abstract of this work, (De Officio Hominis et Civis) (1673), which has passed through numerous editions and been translated into several languages. Pufendorf in these works deviated still further than Grotius from the scholastic method of philosophizing, and consequently excited violent opposition. About 1677 he was appointed secretary of state, royal counsellor, and historiographer at Stockholm. There he wrote in Latin the (History of Swe¬ den from the*

Campaign of Gustavus Adolphus in Germany to the Abdication of Queen Chris- tina) (1676), and in German his (Einleitung zur Geschichte der Vornehmsten Reiche und Staaten) (1682). These works so much in¬ creased his reputation that in 1686 he was called to Berlin as counsellor, historiographer, and judge of the Supreme Court of Judicature. In 1690 he was made privy-councillor of the Elec¬ tor of Brandenburg, and in 1694 was created baron by the king of Sweden. Pufendorf's legal writings are regarded as marking an epoch in the history of natural law, treating it as based upon the social instinct and developing it as a philosophical morality, while allowing scope to revelation.

PUFF-ADDER, the popular name of an African viper (Bitis arietans), which should not be confused with the American puffing- adder or blowing-adder, of the genus Heterodon. (See Hognose). The hognose adder is harm¬ less, but the African viper is highly dangerous, its head appearing puffed, because of the large size of the poison sacs. See Serpents ; Vipers.

PUFF-BALLS. See Fungi.

PUFF-BIRDS, a family (Bucconida) of tropical American picarian birds, resembling kingfishers in form, but living on insects like flycatchers. They are closely related to the barbets.

PUFFER. See Globe-fish.

PUFFIN, a bird of the auk (q.v.) family, common on all far northern sea-coasts, where they breed on remote cliffs in large companies. The Fratercula artica is the most familiar, be¬ ing distinguished by the large and greatly com¬ pressed beak, which is deeply furrowed by three grooves on each side of the mandible.

*The colors of the beak also add to its singular appearance ; this structure being colored bluish- gray at its base, orange-red in the middle and bright red at the tip. A large portion of it is annually molted. The body is short, stout and rounded. These birds excavate burrows in sandy ground, each depositing a single egg of while color. They are able to bite and scratch severely by means of their bills. Puffins swim and dive with great ease; their food consisting of the smaller fishes and chiefly the young of the sprats and herrings. They are caught and their flesh is salted for food by the inhabitants of the Orkney and Shetland Islands. The ap¬ pearance of the bill in these birds has gained for them the British provincial names ((coulter- neb** and ((sea-pa rrot.** The crested puffin (Lunda cirrhata) has long light yellow plumes rising back of the eyes. Compare Auk ; Albatross.*

PUG. See Dog.

PUG MILL. See Clay.

PUGAREE, or PUGREY, a piece of silk, muslin, etc., worn around a hat or helmet in hot climates, the ends being left hanging, to pro¬ tect the back, head and neck from the sun.

PUGATSCHEFF, or PUGACHEV, poo'- ga-chef, Yemelyan Ivanovitch, Russian revo¬ lutionist : b. Simoweisk, on the Don, Russia, probably between 1730 and 1740; d. Moscow, Russia, 10 Jan. 1775. He was leader of a band of robbers in his early youth, served in the Seven Years' War in the Russian, Prussian and Austrian armies successively and on his return to Russia was implicated in a seditionary movement and imprisoned. He escaped and prompted by his resemblance to the murdered Peter III, pretended to be the tsar. The peas¬ antry flocked to his standard and were prom¬ ised relief from their oppressions. His forces constantly increased and success for a time at¬ tended him. With 16,000 men in his army he captured Kazan, the old Russian capital, and moved upon Moscow, where he was betrayed by his followers to Suvaroff, captured and taken in an iron cage to Moscow, where he was exe¬ cuted.

PUGET, Pierre Paul, pe-ar pol pii-zha, French painter, sculptor and architect: b. Marseilles, 31 Oct. 1622; d. there, 1694. He began his career in art as apprentice to a ship¬ builder named Roman, who set him to carving the figure decorations for the prow and poop of galleys which the prevailing fashion de¬ manded. At 17, however, he gave up this pursuit and traveled to Italy on foot, visiting Genoa, Florence and Rome and in the latter place entered the school of Pietro da Cortona. This master's influence was always apparent in Puget's painting. In 1643 he returned to Mar¬ seilles and to ship-designing. Later he spent six years at Rome in company with a feuillant monk on a commission from Anne of Austria to make drawings of antique monuments. After 1653 he painted pictures for churches of Marseilles, Aix and Toulon; but finally aban¬ doned painting on the advice of physicians. His first work as a sculptor, the caryatides supporting the balcony of the Hotel de Ville, Toulon, was a venture into realism, the figures being studied from the pofters on the quays. These received the praise of Bernini. He pro-

duced two works similarly conceived, 'Hercules Overcoming the Hydra, (now in the Musee de Rouen) and 'La Terre) for the Chateau de Vaudreuil,

Normandy. His other works are more in the manner of the Italians of the 17th century, an influence confirmed by another visit at the instance of Fouquet. The fall of that minister put an end to his commission and Puget settled in Genoa, where he sculptured a (Saint Sebastian and Saint Ambrose5 for the church of Santa Maria-in-Carignano and a (bas relief) and later the (Perseus and Andromeda, 5 all three at present in the Louvre. The (Alexander and Diogenes) has been called "the triumph of picturesque sculpture,® though, as Delacroix has pointed out, its subject is one impossible for sculptural treatment as the ray of sunlight which Alexander intercepts can¬ not be represented. His architectural works are not numerous, though he erected the church of the Charite and the Capuchines at Mar¬ seilles. Consult Lagrange, 'Pierre Puget, Peinteur, Sculpteur, Architecte) (1868) ; Emeric, David, (Histoire de la Sculpture Fran- qaise5 (1872) ; Auquier, (Pierre Puget5 (1903).

PUGET (pu'jet) SOUND is a large, irreg¬ ular inlet from the Pacific Ocean into the State of Washington. The Sound proper begins at the junction of Juan de Fuca and Georgia straits and extends south, dividing into two main branches, the eastern one called Admiralty Inlet, and the western Hood Canal. Some of the largest Sound inlets on the east shore are Elliot, Poverty and Commencement bays ; on the west shore, Dogfish Bay and Dye's Inlet, and on the south shore, Carrs, Budd and Tot¬ ten inlets. The area of this great landlocked body of water is about 2,000 square miles. It has a number of islands, Vashon and Bain- bridge being the largest. A number of rivers, having their headwaters in the Cascade Moun¬ tains, flow into the Sound, the principal river inlets are Duwamish, Nisqually, Nooksak, Puyallup, Skagit, Skokomish and Snohomish. The Sound has a number of large and safe harbors and many miles of deep-water front, and is mostly navigable by large vessels. The waters teem with fish ; 95 varieties of food fish have been found. The shores are well-wooded, although there has been extensive lumbering in the surrounding forests. Shipbuilding is a young and growing industry. The annual ton¬ nage entering exceels 2,000,000. A canal is be¬ ing built to connect with Lakes Washington and Union. The cleared lands in the vicinity make most productive farms. Seattle, Tacoma and Port Townsend are the largest cities on the Sound; all natural conditions exist for an ex¬ tensive commerce.

PUGET SOUND, College of, a coeduca¬ tional institution at Tacoma, Wash. It was organized in 1903 under the auspices of the Methodist Episcopal Church as the University of Puget Sound, and was reorganized under its present name in 1914. It has a college pre¬ paratory grade leading to its college grade and

schools of liberal arts, law, home economics, commerce, education, music and art. Its normal course is approved by the State Board of Edu¬ cation

and it conducts a six-weeks summer normal school. The college owns seven and one-half acres of ground in the heart of the city and has excellent buildings. The total enrolment in 1918 was about 400, of whom 18 were with the colors. The president in 1918 was E. H. Todd.

PUGHE, pu, William Owen, Welsh anti¬ quary: b. Tyn y Bryn, Merionethshire, 1759; d. 1835. Going to London at 17 he there met the Welsh literary student Owen Jones, and the two published in 1795 the poems of Dafydd ap Gwilym, a 14th century bard. They subsequently edited other Welsh poems, and, assisted by Ed¬ ward Williams, published the 'Myvyrian Archaiology of Wales5 (1801-07). Pughe edited also (The Welsh and English Dictionary5 (1793-1803) ; the 'Cambrian Biography5 (1803), etc. He accomplished not a little in arousing interest in Welsh language and literature.

PUGILISM. See Boxing; Prize Fighting.

PUGIN, pu'jm, Augustus Charles, English architect and draughtsman: b. Normandy, 1762; d. London, 19 Dec. 1832. He settled about 1798 in London, where for many years he was assist¬ ant to the architect Nash. He subsequently de¬ voted his attention to mediaeval architecture, and published 'Specimens of Gothic Architecture se¬ lected from various Ancient Edifices in Eng¬ land5 (1821-23). With John Britton he pub¬ lished 'Architectural Illustrations of the Build¬ ings of London5 (1824). Later works were 'Specimens of the Architectural Antiquities of Normandy5 (1825-28) with Le Keux; 'Gothic Ornaments selected from various Buildings in England and France.5

PUGIN, Augustus Welby Northmore,

English architect : b. London, 1 March 1812 ; d. Ramsgate, Kent, 14 Sept. 1852. He early displayed skill and facility in architectural drawing and acted as assistant to the Grieves in painting scenery for Covent Garden and Her Majesty's Theatre. His taste for Gothic art was turned to account in designing the furniture for Windsor Castle, and in supplying Messrs. Rundell and Bridge with designs for mediaeval plate. He became a convert in 1834 to Roman Catholicism, and devoted himself thenceforth to the illustration and revival of Gothic architecture in connection with the Ro¬ man Catholic Church. His treatise 'Gothic Furniture and Iron Work5 appeared in 1835, and attracted attention. In the following year he published 'Contrasts, or a Parallel between the Noble Edifices of the 14th and 15th cen¬ turies and Similar Buildings of the Present Day,5 in which he expressed in no measured terms his views as to the decadence of ecclesias¬ tical architecture. Other works of Pugin were 'The True Principles of Pointed or Christian Architecture5 (1841) ; 'An Apology for

the Revival of Christian Architecture5 (1843) ; 'The Glossary of Ecclesiastical Ornament5 (1844). He was employed by Sir Charles Barry in the decoration of the houses of Par¬ liament, and was connected with Hardman of Birmingham in the manufacture of the re¬ nowned Gothic brass-work, besides having a share in the manufactory of stained glass in the

»

same town. Latterly his intellect gave way, from the incessant excitement and labor to which it was subjected, and he was removed to an asylum.

PUISNE (pu'ne) JUDGE, in law, a former term for a younger or inferior judge.

PUJO, Arsene Paulin, American legislator: b. Lake Charles, La., 16 Dec. 1861. He was educated in the public and private schools of Lake Charles and was admitted to the bar in 1886, since when he has been engaged in practice at Lake Charles. He was a member of the Louisiana Constitutional Convention in 1898 and in 1903-13 served in Congress. He was chairman of the committee on banking and currency in 1912, and also chairman of the sub-committee which made the <(money trust® investigation in that year. He was chairman of the district board under the Selective Serv¬ ice Act of 1917.

PUKET, poo-ket', or TONKA, a port of Lower Siam, the chief town of Junk Ceylon or Salang Island, on the west coast of the Malay Peninsula. The town is on the east coast of the island at the entrance to a wide and deep bay. It is the seat of the commissioner of the west coast. Its importance is due to its valuable tin mines yielding an annual average of 3,500 tons. Pop. est. 25,000.

PULANGUI, poo-lan'ge, river of the Philippines, the upper part of the Grande de Mindanao. See Mindanao, Grande de.

PULASKI, pu-las'ki, Casimir, Count, Polish soldier of the American Revolution : b. Lithuania, 4 March 1748; d. Savannah, Ga., 11 Oct. 1779. He studied law, served in the army under Charles, duke of Courland, and in 1769 engaged with his father and brothers in the uprising against King Stanislas Augustus. He commanded the insurgents for a time after the death of his father and brothers and in 1771 made an unsuccessful attempt to capture the king at Warsaw which resulted in a sentence of outlawry

being passed upon him. Further re¬ sistance was soon rendered useless by the coali¬ tion of Russia, Austria and Prussia, and Pu¬ laski made his escape to France where he met Franklin and offered his services to the cause of American independence. He obtained letters from Franklin to Washington and in 1777 joined the army of the latter as a volunteer. He per¬ formed distinguished service at the battle of Brandywine and received from Congress pro¬ motion to the rank of brigadier-general in com¬ mand of a division of cavalry. He resigned his command after five months, joined the main army at Valley Forge and received per¬ mission from Congress to organize an inde¬ pendent corps of cavalry and light infantry which became known as Pulaski's Legion. In 1779 he marched with his men to join General Lincoln in South Carolina where he performed effectual service. In the siege of Savannah he commanded the French and American cavalry and in an assault on 9 October was mortally wounded and was carried on board the United States brig Wasp in Savannah harbor where he died two days later. Consult Griffin, (Count Pulaski* (1910).

PULASKI, Tenn., town and county-seat of Giles County, on Richland Creek 78 miles by rail southwest of Nashville on the Louis¬

ville and Nashville Railroad. The Martin Female College and the Massey School for Boys are situated here. It is a well-built town with a central square ; is situated in a prosperous agricultural and stock-raising district ; and has planing mills, an ice plant and manufactories of tobacco. Pop. (1920) 2,780.

PULASKI, Va., town and county-seat of Pulaski County, 50 miles, direct, southwest of Roanoke, on the Norfolk and Western Railroad. It is a growing town with a considerable busi¬ ness as a mountain resort. The district is rich in zinc and iron ores and coal ; and there are manufactures of iron and zinc and a sulphuric acid plant. Pop. (1920) 5,282.

PULASKI, Wis., a village of Brown County, northwest of Green Bay, the seat of the Polish Franciscan Monastery of the Assumption of the Blessed Virgin and of Seraphic College. Pop. 450. See Polish Franciscans in Amer¬ ica.

PULASKI, Fort. See Fort Pulaski.

PULCHERIA, pul-ke'ri-a, Byzantine em¬ press: b. 399; d. 453. She was the daughter of the Emperor Arcadius, upon whose death in 414 she became co-ruler with her brother Theodosius II, who was content to leave the reins of power in her hands. With her two younger sisters she took the vow of virginity, as she was determined that there should be no contests between three husbands for the empire. She condemned the Nestorian and

Eutychian heresies and was on the friendliest terms with Cyril of Alexandria, Pope Leo the Great and other great men of the time. She was a fine scholar, earnest in her devotion to the Church and active in promoting the welfare of her subjects. She arranged the marriage of her brother and after the marriage of his daughter with Valentinian III, she retired for a time from the court. On the death of Theodosius, however, in 450 she again assumed the throne, for state reasons was absolved from her vow of virginity and married the general Marcian whom she raised to the throne as 'her colleague. After her death she was canonized and her feast is still celebrated in the Greek Church.

PULCI, Luigi, loo'je pool'che, Italian poet: b. Florence, 15 Aug. 1432; d. Oct. 1487. He came of a family in which poetical talents were hereditary; and had two brothers who were also poets, Bernardo, who wrote elegies on Cosmo de' Medici and translated Virgil's Eclogues, and Luca, who composed stanzas on the Tournament of Lorenzo de' Medici. Luigi far surpassed his elder brothers in talent, and became an intimate of the household of Lorenzo the Magnificent. At the instance of Lucrezia Tornabuoni, mother of Lorenzo, he composed an epic poem, (U Morgante Maggiore, based on the tale of Roland, and recited it canto by canto at the table where such men as Poliziano, Ficino, Michelangelo Buonarotti, and Cristofero Landino gathered. This fact accounts for the diversity of its contents both in respect to the subject matter and the spirit in which it is handled. He assumed the tone of Florentine society at the time of its composition, and in¬ serted at will or to suit the changeable temper of his audiences passages of moving pathos or sincere devotion amid others of coarse buffoonery and broad humor. He fell in with*

the general Italian tendency of treating the Carlovingian legend with less seriousness than did Northern peoples, but he infused a specially bourgeois spirit by his use of many words of the Tuscan dialect. It has been asserted that Shakespeare's familiarity with Pulci is evi¬ denced in his creation of Iago and Othello. Byron was a confessed admirer, and translated the first canto of (Morgante Maggiore) which he published with and the (Vision of Judgment^ See Morgante Maggiore; Punch¬ inello.

PULCINELLO, pul-chi-nelo. See Pun¬ chinello.

PULILAN, poo-le'lan, Philippines, pueblo, province of Bulacan, Luzon ; on the Quingua, five miles above its junction with the Grande de Pampanga, eight miles northwest of Bu¬ lacan, the former provincial capital. Pop.

10,100, •

PULITZER, pu'lit-ser, Joseph, American journalist: b. Budapest, Hungary, 10 April 1847; d. Charleston, S. C., 29 Oct. 1911. He came to the United States in 1864 and joined a Federal cavalry regiment, serving till the end of the Civil War; then became a reporter on the iWestliclhe Post P which Carl Schurz had made the leading German newspaper in Saint Louis. Beginning upon the lowest round of a journalist's career, and at first enduring con¬ siderable hardship, he rapidly won recognition and rose to the position of managing editor and chief proprietor of the paper. In the mean¬ time he had acquired a knowledge of law, had been admitted to practice and been active in politics in the Republican ranks. He was elected to the Missouri legislature in 1869, was a delegate to the convention of the Liberal Republican party at Cincinnati, which nominated Horace Greeley for President, then became a Democrat and in 1874 was a member of the Missouri State constitutional covention. In 1876-77 he was Washington correspondent for the New York Sun, and in 1878 bought the Saint Louis Dispatch and united it with the Evening Post as the Post-Dispatch. In 1883 he purchased the New York World, soon building up a large circulation. He was elected to Con¬ gress in New York in 1885-87 but resigned after a few months. In 1887 his health was broken, due to overwork, and was followed by a steady loss of eyesight until he became totally blind. Mr. Pulitzer's career as an editor was marked by great ability and genius. In August, 1903, announcement was made of the endow¬ ment of a College of Journalism by him at Columbia University. He also endowed several scholarships at Columbia College and gave largely to other educational and charitable causes.

PULKOVA (pool'ko-va) OBSERVA¬ TORY, in Russia, founded by the Tsar Nicho¬ las, and built in 1835-39, is at the village of Pulkova; lat. 59° 46′ 18″ N., and long. 30° 19′ 40″ E. It was intended for the study of sidereal astronomy. The chief instrument, the refractor, with a 15-inch aperture, was not equaled 'by any other like instrument in the world, until 1870 when the Newhall Observa¬ tory in Newcastle, England, secured a 24-inch refractor. Next came the 26-inch re¬ fractor for the Naval Observatory (q.v.) in Washington, D. C. In 1885 the Pulkova Ob¬

servatory erected a 30-inch refractor made by Clark and Sons of Cambridgeport, Mass. The determinations of star places made at this observatory are regarded as most accurate and its investigations cover a wide field. The ob¬ servatory is not only doing remarkable original research ; but it is also a training school for astronomers and geodesists.

PULLEN, Henry William, English Angli¬ can clergyman and author: b. 29 Feb. 1836; d. 26 Dec. 1903. He was educated at Marlborough and

Cambridge, took orders in the English Church, became a minor canon of York in 1862, and was minor canon of Salisbury, 1863-75. He became chaplain of the Alert during its Arctic expedition of 1875-76, and for his services on that voyage was awarded the Arc¬ tic medal. He attained a sudden fame by the publication in 1870 of the brilliant (Fight at Dame Europa's School, > of which 193,000 copies were sold and 14 translations made. He also wrote (Modern Christianity, a Civilized Heathenism > (1872), the circulation of which reached 20,000 copies; (The Ground Ash, a Public School Story > (1873) ; (The Council of Canterbury } (1882) ; (The House That Baby Built > (1874) ; (Pueris Reventia) (1893) ;

(Venus and Cupid (1896) ; (Fred and Fritz* (1898). He edited Murray's (Handbooks to Italy, Rome and Greece) (1886-96).*

PULLEY, a mechanical device for the duplication and reduplication of the intensity of a force. By its application the power exerted may overcome a resistance much greater than itself, through a sacrifice of velocity.

In its simplest form it consists of a wheel of wood or metal which turns on a smooth axle at¬ tached to a supporting frame, usually in the form of a block. The rim of the wheel is grooved on its outer face so as to allow a rope, cord or chain to pass around it. Its principle of action was first enunciated by Stevin, about 1610, based on the fact that the tension of a rope is the same at every point of its length.

Theoretically a fixed peg in the . position of the axis of the pulley would serve the purposes defined just as well as a wheel. The latter is introduced for the specific purpose of reducing the friction.

In the single ((fixed)) pulley, Fig. 1, to satisfy the condition of static equilibrium, the tension of the rope must be the same on both sides of the wheel, therefore, the power applied is equal to the weight, and although no mechanical ad-

Fig. 3.

vantage is gained by its use, it serves to change the direction of the force applied. Incidentally, it loads the beam with twice the amount of that force.

In the single movable or ((free>:> pulley with parallel cords, Fig. 2, as in the fixed pulley,

the tension of the rope on both sides of the wheel is the same; but, since the weight is sup¬ ported 'by two upward forces each of which is equal to the force applied, the power is equal to one half the weight, the beam supporting the other half. In other words, the power that will lift a given weight by the use of a single fixed pulley will lift twice that weight by the employment of a free pulley.

Fixed and free pulleys may be combined in various ways to obtain a mechanical advantage. In the combination shown in Fig. 3, the tension on the beam at (a) is equal to the power ap¬ plied, and at (b) it is equal to twice that power; but the relation of the power to the weight re¬ mains the same as in case of the single free pulley.

If, however, the supporting cords pull at an angle (2 <(>), Fig. 4, the pulley is acted upon by three forces — the weight (w) acting ver-

Fig. 4.

tically downward, and two equal forces (p cos <(>) acting upward. The resulting effect, 2p cos = w, shows a mechanical disadvantage, since the power required increases with the an¬ gle, and p=^2W, as shown by Figs. 2 and 3, only when —o°, that is, when the strings are parallel. When ^ = 60°, the power is equal to the weight; and when

Combinations of pulleys or compound pulleys are usually arranged according to one of the three systems represented by Figs. 5, 6 and 7, which indicate the action of the supporting forces.

In the first system, Fig. 5, five independent pulleys are supported by an equal number of branches from the main cord. The mechan¬ ical advantage stated in terms of weight (w) and power (p) is w = 25p, = 32p; or in general w = 27» p(when (n) represents the number of pulleys.

In the second system, Fig. 6, the weight is

supported by the four forces, p + 2d + 2 p + 2 p 15p — (28 — l)p, or in general, w =(2» — l)p.

Fig. 5.

In the third system, Fig. 7, one continuous string is divided into six

branches by six pul¬ leys, and since the tension of each branch is

Weight

Fig. 6.

equal to (p) the power applied, w — 6p, repre¬ sents the mechanical advantage, or w = np, when (n) is the number of cords rising from

the movable pulley. This is the form most fre¬ quently used practically, its most extensive ap¬ plication being the block and tackle devices of the running rigging of ships. See Block; Tackle.

The differential pulley is made up of two pulleys of slightly differing diameter, so fas¬ tened together that they act as one. An endless chain passes around both, and in one of the bights is a movable pulley: the other bight is used to operate the pulley. As the chain is hauled down from the larger pulley it hoists the chain on the other side, but at the same time the nearer chain on the smaller pulley is un¬ winding, so that the lifting bight is lessened in length very slowly. The closer the two fixed pulleys approximate the slower the lift, and the greater the power — usually 1 to 60.

The term pulley is used in quite a different sense when applied to the belt-wheels used in

Fig. 7.

power transmission (q.v.). The many formulas given for calculation of their dimensions vary indefinitely with the material of which the pul¬ ley-wheel is made, the material and thickness of the belt, and the volume of power transmit¬ ted. The width of face of such a wheel is from one-eighth to one-fourth wider than the belt, whose width is determined by the power. In the case of shifting belts the pulley-wheels have a flat face, but otherwise they are slightly crowned, from one-ninety-sixth of the width of the face to as much as one-tenth of such width — as advocated by different authorities. The relative speed of any two pulleys carrying a given belt is inversely as their diameters. To vary the speed at will ®step® or ((cone}) pulleys are in use, the smallest wheel on the driving cone being opposite the largest wheel on the driven cone — and vice versa. Consult Collins, H. E., 'Shafting, Belting and Rope Transmis¬ sion (New York 1914) ; Goodeve, T. M., (Prin-

ciples of Mechanics> (London 1908) ; Kent's (Mechanical Engineer's Pocket Book) (New York 1915).

PULLMAN, George Mortimer, American inventor : b. Chautauqua County, N. Y., 3 March 1831 ; d. Chicago, Ill., 19 Oct. 1897. He learned the cabinetmaker's trade, and during the con¬ struction of the Erie Canal he successfully filled contracts for removing various large buildings in its proposed route. He then settled in Chi¬ cago and engaged in building, but devoted much time to the problem of making long railway journeys less tedious, the result being the con¬ version of two ordinary railway coaches into sleeping cars. They were a success and created a demand for more, and in 1863 he built the ˆPioneer® at a cost of $18,000, which was the first of the cars which have since borne his name. He organized in 1867 the Pullman Palace Car Company, of which he was presi¬ dent, and in 1887 originated the vestibule train. He amassed an immense fortune, founded a model town near Chicago, which he named Pull¬ man (q.v.), and was interested in various other large commercial enterprises.

PULLMAN, Ill., a former town, now part of the city of Chicago, on Lake Calumet, 12 miles south of the centre of Chicago. It was founded in 1880 by George M. Pullman, and in¬ tended especially for the benefit of the em¬ ployees of his company. Besides the Pullman Palace Car Company, which is located here, there are car wheel works, a foundry, and other industrial establishments. It was formerly un¬ der the government of the Pullman Company, but in 1889 the town voted for incorporation with the city of Chicago (q.v.).

PULLMAN, Wash., city in Whitman County, near the eastern border of the State, 70 miles northeast of Walla Walla, on the Northern Pacific, the Oregon-Washington and the Navigation Company's railroads. The State Agricultural College and School of Sciences are located here as well as a United States Govern¬ ment Experiment Station. The surrounding dis¬ trict produces grain and livestock and dairying also is carried on. The water supply is from artesian wells. The town is growing steadily. Pop. 2,440.

PULMONATA, an order of non-marine gasteropod mollusks, characterized by breathing atmospheric air; the snails. They are usually small, asymmetrical, and provided with a shell. The sexes are always united in the same indi¬ vidual, and the operculum is always wanting, except in Amphibola. The respiratory appara¬ tus, which seems to have been modified from that of ancestors who breathed oxygen mixed with water, by means of branchiae, is not lung¬ like in structure ; it is simply a pouch lined with blood-vessels, and is properly called a pulmo¬ nary sac.

PULMOTOR, a machine invented by Ber¬ nard Draeger for producing

artificial respira¬ tion. It was first used in Europe in connection with mine rescue apparatus. Later it was used by the United States Bureau of Mines in similar work. It was found to be so satisfactory in resuscitating after all kinds of suffocation, such as asphyxiation from gas, electric shock and cases of apparently drowned, that large gas and electrical companies have installed them ; also many hospitals and fire and police departments.

Formerly in cases of asphyxiation, morphine poisoning, drowning, or electric shocks, efforts to restore respiration consisted in laying the patient on his back and alternately pulling his arms over his head and forcing them down upon his chest, thereby causing an expansion of the lung cavity, and then compressing it, thus first producing artificial breathing. In such cases it became necessary to force the patient's mouth open and pull out his tongue, thereby affording free passage for the air, which alternately was drawn into the lung cavity and immediately expelled. This process is super¬ seded by the application of the pulmotor, which operates as follows: An iron cylinder 3}4×2 1 inches contains the oxygen at a pressure of about 2,250 pounds when completely filled and will operate the pulmotor 40 minutes con¬ tinuously. This life-sustaining gas also fur¬ nishes the energy which is required to induce breathing, in the following manner : The oxygen from the tank flows through a re¬ ducing valve, which at the outlet side main¬ tains a pressure of about 75 pounds, and from there to the controlling valve. Initially, the passage to the lungs is open through this con¬ trolling valve. The latter connects two flexible braided copper tubes leading to a metallic face cap with a rubber rim, which closely fits the patient's face. The patient's tongue is drawn down over the lower jaw and under the mask, by means of a set of tongue forceps which is provided. The oxygen then has free access to the lungs.

When the pressure in the lungs has reached a certain value, 20 centimeters, a bellows inter¬ connected with the lung cavity through the flexible braided copper actuates the controlling valve. The pressure of oxygen is now directed so as to create a suction over the connections which lead to the lungs, thereby causing ex¬ halation of the gases previously forced into the lungs. When a vacuum of 25 centimeters is reached in the lungs and bellows, the outer atmosphere acts on the latter, which in turn operates the controlling valve and again admits the oxygen to the lungs. The frequency of these reversals depends upon the size of the lung cavity, a larger space requiring greater time, while with smaller lung cavities the opera¬ tion is correspondingly more frequent. This process is continued until the patient shows signs of natural respiration. The pulmotor action is then discontinued and the patient is allowed to breathe the pure oxygen through another small face cap connected by a hose directly to the oxygen tank.

PULP. See Paper.

PULSE (from Latin, pulsus, a beating), the rhythmical motion of an artery, with al¬ ternate expansion and contraction, in practice considered as a beating. This motion is strong¬ est in the heart (q.v.), which is the centre of the arterial system; and from that organ it is prop¬ agated through all the minutest branches of the arteries. In those which lie immediately under the skin it can be felt with the finger, as is the case with the radial artery, the pulsation of which is very perceptible at the wrist. The state of the pulse is therefore an indication of the action of the heart and the whole arterial sys¬ tem and of the condition of the blood and the physical functions in general. The circum-

stances to be attended to in the pulse are either the number of pulsations which take place in a ˆiven time and the regularity or irregularity of their occurrence, or the character of each pul¬ sation. In the former case the pulse is said to be quick or slow according to the number of pulsations in a given interval; regular or ir¬ regular, as they occur at equal or unequal in¬ tervals. In the latter case it is strong or weak, hard or soft, full or small. It is affected by the age, sex and temperament of the individual, and by accidental circumstances, as sleep, food, ex¬ ercise, heat.

The pulse is most rapid in infancy, making from 110 to 140 beats per minute. During early childhood it makes from 100 to 110 and is regu¬ lar and rather soft and small. In youth it is much slower, making from 80 to 90 beats per minute. At this period it is regular, strong, rather soft than hard, moderately full. In ma¬ ture age the number of beats is on the average about 75 per minute and the pulse is regular, strong, or moderate, fluctuating between hard and soft, between full and small. In old age the number of beats sinks to about 60. In the female the pulse is more rapid, softer and smaller than in the male. In persons of a sanguine temperament it is quicker and fuller than in phlegmatic individuals. Sudden agita¬ tion and violent passions make the pulse rapid and irregular; joy makes it quick and strong; long-continued grief, languid and soft. The pulse is, therefore, a highly important indication of the state of the system. A deviation from the regular pulse of an idividual indicates a dis¬ ordered state. When the irritability of the sys¬ tem is so heightened as to produce fever or in¬ flammation the pulse is accelerated. If the action of the nervous system is irregular, or un- iuly heightened, the pulse becomes frequent and irregular.

In case of mechanical obstructions to die circulation, as in dropsy of the pericardium, polypus in the heart or in the great arteries, the pulse is irregular and interrupted.

The study of the pulse began with the an¬ cients. Galen wrote several works on it and for several centuries the subject of pulsation re¬ mained much as he left it. The demonstrations of the circulation of the blood by Harvey and of the irritability of the muscular fibre by Haller threw new light on it, and medical sci¬ ence at last has brought it under full investi¬ gation and has explained it in all its physiologi¬ cal aspects. See Arteries, Diseases of the; Heart.

PULSE GLASS, an instrument invented by Franklin to exhibit the ebullition of liquids at low temperatures. The bulbs are connected "by a slender stem and partially charged with water, the supernatant air having been expelled by boiling and the opening hermetically sealed by a blow-pipe. By grasping one of the bulbs the heat of the hand will cause the formation of vapor and drive the liquid into the other bulb, producing a violent ebullition in the latter.

PULSOMETER. See Pumps and Pump¬ ing Machinery.

PULSZKY, pul'ske, Franz Aurelius, Hun¬ garian archaeologist and publicist: b. Eperies, 1814; d. Budapest, 1897. When only 22 he was nominated to membership in the Archaeo¬ logical Institute of Rome. Joining the Liberal party under Kossuth he was elected a deputy

to the Hungarian Diet in 1840 and later under¬ secretary to the Hungarian Prince Esterhazy, Minister of Foreign Affairs in Vienna. He fol¬ lowed Kossuth to England and after the catas¬ trophe of Villagos accompanied the ex-dictator to America. His impressions of this country were embodied in a book entitled (White, Red, and Black. 1 Condemned to death by his coun¬ try for treason, he lived in Italy and joined cause with the Garibaldians. The sentence was removed in 1866; in 1872 he became inspector- general of museums and public libraries. He wrote (Philosophy of Hungarian History) (1882); (My Life and Times) ; and (The Jacobins in Hungary1 (1887).

PULTE, pult'e, Joseph Hippolyt, Ameri¬ can physician: b. Meschede, Westphalia, Ger¬ many, 6 Oct. 1811; d. Cincinnati, Ohio, 24 Feb. 1884. He took his M.D. at the University of Hamburg and in 1834 came to the United States where he engaged in practice at Cherrytown, Pa. He then adopted homoeopathy and later established himself in practice at Cincinnati. With others he founded the American Institute of Homoeopathy in New York in 1844; and in 1872 he was instrumental in establishing a

homoeopathic college in Cincinnati, where he held the chair of clinical medicine. He also held that chair at the Homoeopathic College at Cleveland in 1852 and of obstetrics in 1853-55. He edited the American Magazine of Homoeop¬ athy and Hydropathy in 1852-54 and the Quar¬ terly Homoeopathic Magazine in 1854. Author of (The Homoeopathic Domestic Physician1 (1850); (A Reply to Dr. Metcalf1 (1851); (The Science of Medicine1 (1852), etc.

PULTENEY, pult'm, William, Earl of Bath, English politician : b. London, 22 March 1684; d. there, 7 July 1764. He was educated at Oxford, and in 1705 entered Parliament. He was a partisan of Walpole, and after the accession of George I was made privy council¬ lor and secretary of war, 1714-17. In 1725 he became a political opponent of Walpole, gained great popularity by his crusade against his former friend, and when Walpole was forced from the ministry in 1742 Pulteney organized under the Earl of Wilmington a new ministry. The public was disappointed in the cabinet, and his acceptance of a peerage further de¬ stroyed his popularity. As member of the House of Lords he was not prominent, and when appointed premier in 1746 he held office but two days, being unable to form a cabinet.

PULTOWA, pool'tolva, or POLTAVA,

Ukraine, (1) capital of a former Russian gov¬ ernment; on the Vorskla River, 450 miles southwest of Moscow. It is walled and de¬ fended by a citadel on a small eminence. It is the commercial centre of a large farm and stock-raising region. The annual fairs, three in number, are of less importance than in for¬ mer years. Here in 1709 Peter the Great de¬ feated the Swedes under Charles XII. A monument in the principal square commemorates the event; and three miles from the town is the tomb of those who fell in this battle; it is still called the Swedish tomb. Pop. about 85,000. (2) The government is bounded on the north by Tchernigov, on the east by Kharkov, on the south by Ekaterinoslav, and on the west by Kiev; area, 19,265 square miles. The surface is h plain sloping from the northeast to the

southwest, and drained chiefly by the Dnieper and its tributaries. It is one of the most fer¬ tile and best cultivated departments of Russia; it exports about one-fourth of the whole prod¬ uce of wheat, oats and barley of the whole country. Tobacco is increasing in acreage. Stockraising and bee-keeping are given much attention. Manufacturing is limited ; the chief

products are leather, coarse woolen goods, brandy and saltpeter. Oil is made from the seed of the sunflower and of flax. Pop. about

3,000,000.

PULTUSK, pool toosk, Poland, historic town in the government of Lomza, on the Narev, about 32 miles north by east of War¬ saw. It has several old buildings of historic interest, some manufactories and considerable trade. It is noted as the scene of the defeat of the Saxons by Charles XII, in 1703, and of the Russians by the French in 1806. Pop. est. 16,000.

PULU, a substance resembling fine silk, of a rich brown color and satin lustre, used largely as a styptic by the medical practitioners of Holland, and introduced into some other coun¬ tries for the same purpose. It consists of the fine hairs from the stipes of one or more spe¬ cies of tree-fern, referable, to the genus Cibo- tium. It was exported from Hawaii into Britain first in 1844, under the name Pulu, or vegetable silk, and was proposed as a substitute for silk in the manufacture of hats, but could not be applied. In 1856 it was exported from Singapore under the Malay names Penghawar Djambi and Pakoe Kidang, and was said to have been used in Dutch pharmacy for a long period as a styptic. Several importations into western Europe have since taken place.

PULVERMACHER-CHAIN, a form of

galvanic battery consisting of a series of small wooden cylinders on which a zinc and a copper wire are coiled side by side, but without touch¬ ing each other : the zinc of one cylinder, touch¬ ing the copper of the adjacent one, forms a couple. The whole is immersed in vinegar di¬ luted with water. A chain of 120 couples forms a very powerful battery.

PUMA, or MOUNTAIN LION. See

Cougar.

PUMICE, a variety of lava of a porous and fibrous structure, resembling that of a sponge in appearance, containing from 60 to 75 per cent of silica, with alumina, iron, lime, soda, etc. It varies in color from whitish-gray to yellowish-brown and will float in water. It is essentially lava from which steam or gas has escaped in large quantities while it was being consolidated, the bubbles rendering it highly porous. It results from explosive volcanic erup¬ tions. Its extreme roughness fits it for use in polishing. In the solid state it is used to polish paint, wood, metal, etc. ; and, as a pow¬ der, for marble, ivory, bone, glass, and in the composition ot tooth-powder. Pumice may be considered because of its glassy composition

as a porous variety of obsidian (q.v.). Pumice is obtained in Mexico, Iceland and Hungary, but chiefly from the Lipari Islands.

PUMPELLY, Raphael, American geolo¬ gist: b. Owego, N. Y., 8 Sept. 1837. He was educated at the Owego Academy, and later studied sciences and mining engineering in Paris and at Freiberg, Saxony. He made geo¬ logical investigations in Corsica, and after his return to the United States in 1860 visited Ari¬ zona, and in 1861-63 was engaged in scientific explorations under the government of Japan. In 1863-64 he made a private investigation tour through central, western and northern China and Mongolia, and in 1864 engaged under the Chinese government in examining the northern coal fields. In 1866-73 he was professor of mining at Harvard, State geologist for Mich¬ igan in 1869-71, and in 1871-73 directed the State geological survey of Missouri. He was appointed to the United States geological sur¬ vey in 1879-81, 1884-91, in charge of the Ar¬ chaean division, and was organizer and director of the Northern Transcontinental Survey in 1881-84. The development of the iron ore in¬ dustry in Michigan and western Ontario was largely due to his investigations in 1867-1901. In 1903 he explored the Transcaspian country. He has published (Geological Researches in China, Mongolia and Japan (1866) ; (Iron Ores and Coal Fields of Missouri * (1873) ;*

(Geology of the Green Mountains > (1894) ;

Explorations in Central Asia) (1905) ; Pre¬ historic Civilization of AnarP (1908), etc.

PUMPERNICKEL, a coarse brown bread, originally made in Germany from unbolted rye. It is baked in large square loaves. Its proper manufacture depends upon the treatment of the dough, which must contain neither yeast nor leaven, and also on the management of the oven in which the batch must remain a long time.

PUMPKIN, any of the several annual vine¬ like herbs, especially Cucurbita pepo, of the order Ciicurbitacecc, probably of tropical Amer¬ ica, but not known in a wild state. It is a coars.e tendril-bearing vine frequently exceeding 20 feet in length, with prickly stems and leaf stalks ; bears large rough leaves ; large yellow flowers, the pistillate being followed by large variously colored but generally yellow fruits, with hard rinds, thick flesh and many seeds. The plant is widely cultivated in warm and temperate countries for its fruits, which range in weight from 10 to 40 pounds but in some varieties weigh far more. They are largely used for stock feeding and for making pies. The cultivation is essentially the same as for squashes; but in America the plants are most frequently grown in corn fields, the seeds being sown at intervals of about 12 feet and the plants allowed to shift for

themselves after the corn is laid by. It is affected by the same insect-enemies as the squash (q.v.).

V

d

§

|

I

I

I

1

I

I

|

1

1

I

1

I

1

I

THE

AMERICANA

JT

imzwr

U^IVEHSAL

J$[OWEDCEj

In Thirty Volumes

> » » » >

1922

CORPORATION

NEW YORK CHICAGO

I

|

-R

I

I

b

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

*

* ,

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

©CU654317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXIII

ABBE, ROBERT, M. D.

Attending Surgeon, Saint Luke's Hospital, New York; formerly Professor of Surgery, Post-Graduate Hospital

RADIUM THERAPY

ALEXANDER, WILLIAM J.

Professor of English, University College, Toronto

RING AND THE BOOK, THE

ANDERSON, ANDREW P.

Highway Engineer, Office of Public ‘ Roads and Rural Engineering, United States Department of Agriculture

ROADS AND HIGHWAYS

AVERILL, W. A.

New York State Department of Education

RETARDATION OF PUPILS

BABASINIAN, V. S.

Department of Chemistry and Chemical Engineer¬ ing, Lehigh University

RESORCINOL

BEACH, CHARLES F.

Author of “ Law of Railways,” *etc.*

RAILWAY CONSOLIDATION

BEETS, HENRY, LL.D.

Editor in Chief, “ The Banner ”

REFORMED CHURCH IN THE UNITED STATES :

REFORMED CHURCHES IN SOUTH AFRICA

BIEN, MORRIS, Ph.B., LL.B., LL.M.

United States Reclamation Service

RAILROAD AND OTHER LAND GRANTS

BONAPARTE, CHARLES J., LL.B., LL.D.*_

Attorney-General in the Cabinet of President Roosevelt

ROOSEVELT, THEODORE

BOWLER, ALAN T.

General Secretary, Chamber of Commerce , Raleigh, N. C.

RALEIGH, NORTH CAROLINA

BREWSTER, WILLIAM T., A.M.

Provost of Barnard College, Professor of English, Columbia University

REFLECTIONS ON THE REVOLUTION IN FRANCE

RETURN OF THE NATIVE

BURR, ANNA ROBESON

Author

ROUSSEAU'S CONFESSIONS

CAIRNS, WILLIAM B., Ph.D.

Associate Professor American Literature, University of Wisconsin ,

REPLY TO HAYNE, THE

CARMAN, E. A. *

RAPPAHANNOCK STATION, BATTLE OF

RAYMOND, BATTLE OF REAM'S STATION, BATTLE OF RESACA, BATTLE OF RICH MOUNTAIN, BATTLE OF RICHMOND (KY.), BATTLE OF RICHMOND (VA.), KILPATRICK'S EX¬ PEDITION TO

RICHMOND (VA.), SHERIDAN'S RAID ON THE COMMUNICATIONS WITH RICHMOND (VA.), UNION CAMPAIGNS AGAINST

RINGGOLD GAP, BATTLE OF ROANOKE ISLAND, BATTLE OF ROGERSVILLE, ENGAGEMENTS AT

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Political Economy, Harvard Uni¬ versity

RENT

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, •University of Cincinnati

RED ROBE, THE

CHILSON, A. R.

Of The B. F. Goodrich Rubber Company, Akron, Ohio

RUBBER

CIGRAND, B. J.

Lieutenant, U. S. Navy, Author of “ Real History of U. S. Flag “

ROSS FAMILY, THE

COOLIDGE, LOUIS A., A.B.

Formerly Assistant Secretary of the Treasury* Washington, D. C.

REPUBLICAN PARTY, THE

COPE, HENRY F., D.D.

General Secretary of the Religious Education Association; Author of “ Religious Education in the Family,” *etc.*

RELIGIOUS EDUCATION

CORNYN, JOHN HUBERT, LL.B.

Birmingham Southern College

RHETORIC RITE AND RITUAL ROMAN RELIGION ROMANCE LANGUAGES

* Deceased

Contributors to Volume XXIII— Continued

COUMBE, CLEMENT W.

Technical Art Expert

RELIGIOUS SYMBOLISM RINGS

ROSE, THE, IN ART AND SYMBOLISM

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphyics, Cornell Uni¬ versity

REASONING AND INFERENCE ROMANTICISM

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

ROMOLA

CUSHMAN, ROBERT EUGENE, A.B.

L — Associate in Political Science, University of Illinois

PURE FOOD ACTS

DERRY, JOSEPH T.

Author of “ History of Georgia ”

RED RIVER CAMPAIGN

DOBSON, AUSTIN, A.M.

Author of “ Life of Richardson,” *etc.*

RICHARDSON, SAMUEL

DODGE, CHARLES RICHARD

RAMIE

DOUGHTY, ARTHUR G., M.A., Litt.D.

Author of “ Quebec Under Two Flags ”

QUEBEC

DRUM, WALTER, S.J.

Professor of Scripture, Woodstock College, Mary¬ land

RESURRECTION

DUNLOP, F. D.

Secretary and Treasurer, Richmond Chamber of Commerce

RICHMOND, VA.

DUNN, SAMUEL O.

Editor of “ Railway Age”

RAILWAYS, GOVERNMENT OWNER¬ SHIP OF

EAKIN, HENRY M.

United States Geological Survey

RIVER ENGINEERING

EGGERT, CARL E., B.Ph., Ph.D.

Sometime Assistant Professor of German, Uni¬ versity of Michigan

REYNARD THE FOX

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

REISEBILDER

ERSKINE, JOHN E., Ph.D.

Adjunct Professor of English, Columbia University

ROSSETTI, DANTE GABRIEL

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Colgate University

ROMANS, EPISTLE TO THE

FARROW, EDWARD S., C.E.

Consulting Mining and Military Engineer

QUARRYING

RAILWAY ENGINEERING AND CON¬ STRUCTION RAILWAYS, ELEVATED RAILWAYS, GOVERNMENT CONTROL OF

RAILWAYS, STREET

FIELD, EDWARD

Author of “ The State of Rhode Island ”

RHODE ISLAND AND PROVIDENCE PLANTATIONS

C.

FLEMING, WALTER L., Ph.D.

Professor of History, Vanderbilt University

RANDOLPH, JOHN

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

RIGHT OF SEARCH

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

RIKKI TIKKI TAC ROUSSEAU, JEAN-JACQUES

GEER, CURTIS M., Ph.D.

Professor of Church History, Hartford Theological Seminary

PURITANISM REFORMATION, THE

GUITERMAN, ARTHUR, B.A.

RUBAiyAt OF OMAR KHAYYAM

GUMMERE, FRANCIS B., Ph.D.

Professor of English, Haverford College

ROBIN HOOD BALLADS, THE

HALE, EDWARD EVERETT, Ph.D.

Professor of English Literature, Union College

RAVEN, THE

Contributors to Volume XXIII — Continued

HAMLIN, A. D. F., A.B., A.M.

Professor of the History of Architecture, Columbia University

ROMANESQUE ARCHITECTURE

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

ROB ROY

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor, Department of German Language and Literature, College of the City of New York

QUIDDE, LUDWIG

HAUHART, WILLIAM F., Ph.D.

Assistant Professor of German, University of Michigan

RAABE, WILHELM

HILL, HENRY W.

President of the New York Waterways Association; author of " Waterways and Canal Construction in the State of New York," *etc.*

RAINFALL

INGERSOLL, ERNEST

Zoologist

REGENERATION

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages, New York Uni* versity

RELIGION, INFLUENCE OF THE GREAT WAR UPON

JELLIFFE, SMITH ELY, M.D., Ph.D.

Editor," Journal of Nervous and Mental Disease "

RESPIRATION

JOHNSON, EDWARD P., A.B., A.M., D.D.

Professor of' Sacred and Ecclesiastical History, Theological Seminary of Reformed Church in America

REFORMED CHURCH IN AMERICA

KAINS, M. G., B.S., B.S.A., M.S.A.

ROSES

KRAPP, GEORGE PHILIP, Ph.D.

Professor of English, Columbia University

RAMBLER, THE RELIGIO MEDICI

LEACOCK, STEPHEN, Ph.D., Litt.D.

Professor of Economics and Political Science,

McGill University

RIEL'S REBELLION

LENNOX, P. J., B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

REALISM AND NATURALISM IN LITERATURE

LIND, S. C.

Physical Chemist, Bureau of Mines, Mining Ex¬ periment Station, Golden, Ohio

RADIUM

MEADER, JOHN R.

Editor and Author

RELIGIOUS SECTS

MIMS, EDWIN, A.M., Ph.D.

Professor of English, Vanderbilt University

ROMEO AND JULIET

MOORE, J. PERCY, Ph.D.

• Professor of Zoology, University of Pennsylvania

REPTILES

NASON, ARTHUR H., Ph.D.

Instructor in English, New York University

RALEIGH, SIR WALTER

NEWCOMB, HARRY T., LL.B., LL.M.

Author of “ Railway Economics,” *etc.*

RAILWAYS OF THE UNITED STATES

NEWCOMB, SIMON, Ph.D., LL.D., D.Sc.*

REFRACTION

NORTON, EDWARD QUINCY

Author of “ Construction, Tuning and Care of the Pianoforte ”

REED, FLUE AND STRINGED INSTRU¬ MENTS, TEMPERAMENT, TUNING AND VOICING OF

NOURSE, EDWARD E., D.D.

Professor of Biblical Theology, Hartford Theological Seminary

REVELATION OF JOHN

PATTON, JOHN S.

Librarian, University of Virginia

ROME

PHILLIPS, H. B., Ph.D.

Professor of Mathematics, Massachusetts Institute of Technology, Cambridge, Mass.

RELATIVITY

PILLSBURY, WALTER B., Ph.D.

Professor of Psychology, University of Michigan

REACTIONS AND REACTION TIMES IN PSYCHOLOGY

* Deceased.

Contributors to Volume XXIII— Concluded

RINES, GEORGE EDWIN TRATMAN, E. E. R., C.E.

Editor of The Americana

REPUBLICS, THE HISTORY OF

RISTEEN, ALLAN D., Ph. D.

‘ *

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

RADICAL

RESISTANCE, ELECTRICAL

ROUTHIER, ADOLPHE B.

President of the Court of Admiralty for the Province of Quebec

QUEBEC

RUTHERFORD, Sir ERNEST, Ph.D., D.Sc., LL.D.

Langworthy Professor and Director of Physical Laboratories,
University of Manchester, England

BOLTWOOD, BERTRAM B., Ph.B., Ph.D.

Professor of Radio-Chemistry, Yale University

RADIOACTIVITY

SCHAEFER, EDWARD F., M.M.E.

Ingersoll-Rand Company, New York

ROCK DRILLS AND ROCK DRILLING

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ Austria-Hungary and the Polyglot Empire,” *etc.*

ramayAna

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois

QUEEN MAB

STANOYEVICH, MILIVOY S., M.A., M.L.

Lecturer in Jugoslav Literature, Columbia Univer¬ sity; Former Assistant Professor of Slavic Litera¬ ture at Zajecar College, Serbia

RUMANIA

RUMANIAN LANGUAGE RUMANIAN LITERATURE

STEVENSON, B. L.

Author of “ Socio Anthropometry: an Interracial Critique ”

RACES, ORIGINS OF

STRINGHAM, IRVING, Ph.D.

Late Professor of Mathematics, University of California

QUATERNIONS

STRONG, HOWARD

Secretary, Rochester Chamber of Commerce

ROCHESTER, NEW YORK

STURGIS, RUSSELL*

Author of “ The Appreciation of Pictures”

Associate Member American Society of Civil Engineers.

RAILWAY SHOPS AND MACHINERY

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni¬ versity

RASSELAS ROBINSON CRUSOE

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

RAPE OF THE LOCK, THE

VAN DOREN, CARL, Ph.D.

Associate in English, Columbia University

RAMONA

RED ROVER, THE

RISE OF SILAS LAPHAM, THE

VEBLEN, OSWALD, Ph.D.

Professor of Mathematics, Princeton University

REAL VARIABLE

WALTERS, FRANK

Vice-Director, New York State Library School

RURAL LIBRARIES

WALTON, WILLIAM

Painter, Author of “ Chefs d’CEuvre,” Exposition Universelle, Paris

RENAISSANCE PAINTING

WAXMAN, SAMUEL M.

College of Liberal Arts, Boston University

ROMANCERO DEL CID

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern French Literature ”

RECOLLECTIONS OF CHILDHOOD AND YOUTH

REDS OF THE MIDI, THE ROLAND SONG, THE ROMAN DE LA ROSE, LE

WIENER, LEO

Professor of Slavic Languages and Literatures, Harvard University

QUO VADIS

WRIGHT, WILLIAM KELLEY, Ph.D.

Assistant Professor of Philosophy, Dartmouth College

RELIGION, THE PSYCHOLOGY OF

YOUNG, STARK, B.A., M.A.

Professor of English, Amherst College

RIVALS, THE

* Deceased.

KEY TO PRONUNCIATION.

a far, father

a fate, hate

a or a at, fat a air, care

a ado, sofa

a all, fall

ch choose, church

e eel, we

e or e bed, end

e her, over: also Fr. e , as in de;

eu, as in neuf ; and oeu, as in boeuf, coeur; Ger. d (or oe), as in okonomie.

$ befall, elope

e agent, trident

ff off, trough

g gas, get

gw anguish, guava h hat, hot

h or h Ger. ch, as in nicht, wacht hw what

I file, ice

i or 1 him, it

i between e and i, mostly in

Oriental final syllables, as, Ferid-ud-din

j gem, genius

kw quaint, quite

n Fr. nasal m or n, as in embon¬

point , Jean, temps

n Span, h, as in canon (can'yon),

pihon (pen'yon)

ng mingle, singing

nk bank, ink

6 no, open

o or 6 not, on

6 corn, nor

6 atom, symbol

o book, look

oi oil, soil ; also Ger. eu, as in beutel

6 or oo fool, rule

ou or ow allow, bowsprit

s satisfy, sauce

sh show, sure

th thick, thin

fh father, thither

u mute, use

u or u but, us

u pull, put

u between u and e, as in Fr. sur,

Ger. Muller

v of, very

y (consonantal) yes, young

z pleasant, rose

zh azure, pleasure

‘(prime), ” (secondary) accents, to indicate syllabic stress

.

■’ i’,)wmosi4 or \ ? x ‘

t(. ‘ *■) < tit 2 \

r .<?. i , ift

/ 6 K> O

dytPti ■> ,• i/tb

locfi /- ,rrtofrj

(J

‘Ulvrnf ni gii ,1 j list o?Xr. ” »« .fit)

»*“•» -v> un to u

n PR t%, :r-Or ‘>£ : U’j > , ni es ,>{‘40 bits ˆ>5 ’.it’ ni ev ,u »

,S»tttO«o»o jit ee

-

&

a) >. . vl <t I I) imv/’bvf

u

<«

5 ,f 1ft

-KOI ,i nrˆKv’q

nr tgbeom

,U« . ;

<\k ‘ K\ .

PUMPS, Compressed-Air. During recent years much progress has been made in the art of pumping water by com¬ pressed air. At first all methods of lifting water or other liquids by means of compressed air were deemed extrava¬ gant, but the development of various systems has been such that water may be pumped with marked economy and rapidity by compressed air. The direct-acting piston or plunger pump, of simple or duplex type, is operated with little economy with steam as a motive power. One hundred and fifty pounds of steam per horse power per hour is a fair figure ‘to take for this machine. Experiments have shown that under average conditions hardly 50 per cent of the in¬ dicated horse power of the driving cylinder is utilized in the pump cylinder, the rest being absorbed partly by the engine as machine fric¬ tion and particularly by the friction of the water in passage through valves and chambers.

Compressed air is utilized in pumping in two distinct ways, (1) as the motive power in power driven pumps ; and (2) directly upon the liquid in displacement pumps.

Power Driven Pumps. — The advantage of the power driven pump over the displacement pump lies in the fact that it permits the ex¬ pansive use of the compressed air, resulting in a considerable saving and economy. Power pumps consist essentially of expansive air en¬ gines, which may be either directly connected, belted or geared to some form of duplex or triplex piston or plunger pump, or to the sim¬ ple, compound or turbine types of centrifugal pump in its various forms. Compressed air is supplied to the air engine from some more or less distant air compressor and this air engine, when specially designed for the use of air involving considerations of air valves and low clearance, operates with efficiency and economy. Where the magnitude of the operation justifies it, the use of the <(return pipe® system with expansive engines will, in connection with reheaters, se¬ cure the very highest efficiency.

This type of pump consists essentially of two parts, an air end and a

water end. The compressed air operates a piston which trans¬ mits its energy through the piston rod which, in turn, causes the pump piston or plunger to reciprocate and thereby pump water. In the “return pipe® or “closed circuit® system, the same air is used over and over again, the ex¬ haust from the pumps being piped back to the compressor under a limited back pressure. In this case the compressed air is a transmitter of

power just as a belt or transmission rope, but the air never wears out, may be carried to any distance and at any angle, has little inherent friction and possesses the highest efficiency in transmission. The system eliminates all trouble from freezing since the air is used repeatedly and moisture once removed cannot be returned. While it requires two pipe lines instead of one, the pipe cost is frequently less because of the smaller pipe size permitted. The pump cylin¬ ders may be smaller because of the higher effec¬ tive pressure per square inch and the losses in clearance, often enormous, are entirely elimi¬ nated. The great economy in this system is secured in the higher compression, since the scheme is based upon the well-known fact that the greatest losses in compression are thermo¬ dynamic, which losses are suffered chiefly at the lower pressures. For example 13.42 horse power will compress 100 cubic feet of free air per second to 60 pounds pressure, starting at atmospheric pressure. This same energy will compress 100 cubic feet of air to 350 pounds, when beginning compression at 60 pounds, giv¬ ing on the return pipe system 290 pounds avail¬ able pressure with 60 pounds back pressure. A reheater on the pump will secure additional economy. Losses through leakage and trans¬ mission are supplied by a small “booster® com¬ pressor. Where ‘the pressure is above 60 pounds two-stage pumps are employed; where above 300 pounds, three-stage pumps.

Another method of securing high economy is to employ compound or triple expansion pumps, reheating the air after each expansion. This may reduce the air consumption to or

its volume in the simple pump of the same capacity. In some cases this same result may be secured by the use of three pumps in series, reheaters being used as before after each ex¬ pansion and the exhaust from one pump being supplied to the next, with a larger air cylinder.

Displacement or Pneumatic Pumps. — The displacement pump is almost ‘the essence of pumping simplicity and, if its first promises had been borne out, it would be a most powerful factor in pumping

problems. As it is, within its recognized field, it has shown a fitness which qualifies it especially for the work. In brief, it consists of two chambers or cylinders which are filled and discharged alternately — the liquid in each chamber being directly displaced by the admission of the required volume of cpm-pressed air through a valve operating auto¬ matically.

The fundamental requirement is a complete

suhmergence of three to six feet, or the setting of the chambers in a dry pit at a level so much lower than the water to be pumped that the chambers may fill rapidly by gravity. The fill¬ ing is done at no expense of power and the discharge with a minimum of friction losses. Dirt, sand or grit will not interfere with its operation. Such a pump starts and stops auto¬ matically and uses air exactly in proportion to the amount of water discharged. It will run for weeks without attention and requires prac¬ tically no repairs. Standard sizes have capaci¬ ties up to 1,500 gallons per minute.

The height to which these pumps will lift water is limited only by the air pressure used, and by an arrangement of several pumps and reservoirs in series or steps almost any height may be attained with ordinary moderate air pressures. In mine work the displacement pump is especially useful in handling water accumu¬ lating in sumps, dips, entries, *etc.* It is also peculiarly effective in subways and tunnels, in automatically discharging the seepage or leak¬ age water which accumulates. It may also serve in the basement of factories and ware¬ houses which are subject to occasional inunda¬ tions by floods or high water. Another very important economic use is the lifting of sewage from low-level catch-basins into the trunk sewer at a higher level. The same apparatus, but in modified form, is employed for elevating acids and heavy chemical solutions or for pumping marl, paints and other semi-fluids. In this case the air valve is so located that it is not affected by contact with the liquid or by corrosive fumes arising therefrom. The capacity of the dis¬ placement pump is determined by the size of the cylinders or chambers and the volume of air available.

Employing air at ordinary pressure from a common single stage air compressor Wlth a hft not exceeding 250 feet, the efficiency of the displacement pump is higher than that of the usual reciprocating plunger pump under the same conditions of lift and pressure. There are three distinot types of these pumps known as the Latta-Martin, Halsey and Harris or <(return-air.®

The Latta-Martin system employs two tanks, side by side, with a valve arrangement to convey compressed air to a point near the bottom of the eduction pipe. The air pipe is connected with a compressed-air reservoir on the surface, which is in or near the engine room in which free air is compressed. Before turning on the air the conditions in the well show water at the same level on the outside and inside of the eduction pipe. At the first operation we must have sufficient air pressure to lift to the surface the column of water which stands in the eduction pipe. This goes out en masse, after which the pump assumes a normal condition, the working air pressure being then lowered to stand at a point corresponding with the normal conditions in the well. This is determined by the volume of water which a well will yield in a certain time and the elevation to which the water is discharged. It was first supposed that in all air-lift cases the water was discharged because of the aeration of the water in the eduction pipe due to the intimate commingling of air and water. Bubbles of air rising in a water column not only have a tendency to carry particles of water with the air, but the column is made lighter, and, with a

submergence or weight of water on the out¬ side of the eduction pipe there would naturally be a constant discharge of air and water. This is known as the Frizell system and where the lifts are moderate, that is, where the water in the well reaches a point near the surface, it is very likely that the discharge could be effected by simple aeration.

Most air-lift propositions are deep-well cases, that is, the water is lifted a distance greater than 25 feet. Aeration will not suffice to expel such water, so the idea of piston-like layers of expanding air alternating with blocks of water is developed. The upward urge of the air to reach the lower degree of pressure in the at¬ mosphere and thus restore its equilibrium as free air carries or impels the blocks of water ahead of it to the discharge gate where separa¬ tion takes place, the air escaping into the at¬ mosphere and the water flowing away in the con¬ duit provided. The economy of the air-lift sys¬ tem is in direct proportion to the capacity of the well to form these piston-like layers and the reason why they are formed is after the first discharge there is

kept up a constant struggle between the air under pressure and the head of water on the outside of the pipe, each one seek-to enter the lower end of the eduction pipe.

When the air pressure is greater than that due to the head of water, a certain volume of compressed air is admitted into the eduction pipe. If a sufficient quantity of air has been admitted in proportion to the diameter of pipe, and if there is a sufficient pressure in this pipe to prevent the free discharge of the air, it is readily seen how this bubble of air spreads it¬ self across the diameter of the pipe in a piston¬ like condition. The reason why this piston is not elongated and continuous is that the free discharge of the air, aided by the velocity with which everything in the eduction pipe is mov¬ ing, causes a fall in the air pressure just suffi¬ cient to allow the water head to press the water into the open end of the eduction pipe. In other words, as the air pressure is for the moment slightly lower, the water pressure which was nearly equal to the air pressure, becomes a little greater and the piston-like layer of water enters the pipe, shutting off the air. This chunk of water rises in the eduction pipe with a. velocity equal to that of the rising bubble of air and as it has plugged off the air nozzle, there is a momentary rest, during which the air has a chance to accumulate greater pressure, and just controlling the admission and discharge of water and air. In operation the pump is completely submerged and one cylinder fills by gravity while air is forcing out the water from the other. _ When this cylinder is empty, the air is automatically released, escaping into the atmosphere, and the water enters, the compressed air meanwhile being applied to empty the other cylinder. The discharge water flows continu¬ ously.

The Halsey system employs either a single tank or double tanks, as desired, and must be submerged to insure good operation. The tank nils by gravity, and as the water enters it causes a float to rise, which, when near the top of the tank, drops a valve and permits the

mun °* comPress9ˆ.a’r to discharge the water, lhe flow of water is intermittent with the single tank but continuous with the double tank. Neither the Latta-Martin nor the Halsey sys-

tem uses compressed air expansively, and as a result there is considerable energy lost through the escape of the compressed air into the at¬ mosphere — as with the high-pressure steam engine.

The ((return-air® system overcomes the dif¬ ficulty of not employing air expansively and in it no floats and no air valves, outside the engine room, are employed and the same air is used over and over again, thus eliminating the effect of clearance. This system employs two tanks and its operation consists in brief of pumping air out of one tank and forcing it into the other, and in so doing will draw water into the former and force it out of the latter. The content or volume of air in the system is so adjusted that when one tank is empty the other is full, and at that moment the switch will be automatically thrown, reversing the pipe action and thereby reversing the action of the tanks.

Figure 1 presents a conventional diagram of the displacement type of compressed-air pumps, drawn in this instance to show the action of the Harris or ˆreturn-air® pump. The air is being pumped out of chamber A and into cham¬ ber B, the water from which is passing up the discharge-pipe D, under the pressure exerted by the air on the surface of the water in B. When chamber A is full the valves on the air-pump reverse automatically and the air is pumped into A and out of B, the valves in the inlet box below the chambers reverse their positions and the water is forced out of A into the discharge-pipe, and a new charge of water

is sucked from the reservoir into B as the air content is exhausted by the air-pump. This diagram explains equally well the action of the Latta-Martin and the double-tank type of the Halsey pumps — supposing only that the cham¬ bers of the two last mentioned are submerged so deeply in the reservoir that they fill natur¬ ally by gravity through a valve in the top which

is tripped by an interior float when the chamber is full. The same trip opens the air valve and allows the compressed air to enter, driving the water before it into the discharge-pipe. With both these systems the air escapes into the at¬ mosphere instead of returning to the compressor.

Of all systems of pumping the Harris is certainly the most economical and efficient.

Fig. 2. Fig. 3.

Using the air expansively, all the inherent energy of compressed air is used, and no mech¬ anism being submerged, there is no chance for the system to become inoperative due to break¬ age or a demand for repairs. This system may be employed for pumping mixtures of sand and water, and operates with a marked degree of economy and reliability.

Air-Lift. — • Opinions differ as to the theory of the air-lift. A common air-lift is one where we have a driven well in which the water is comparatively near the surface. We place in this well a pipe for the discharge of the water. This is known as the deduction pipe.® This pipe does not touch the bottom of the well, but is lifted above it so as to admit freely the water through its lower end. Alongside this pipe, either on the outside or within, is a sec¬ ond but smaller pipe, properly proportioned ; as soon as this pressure overcomes that of the water, the conditions are reversed and another (<chunk® of compressed air is discharged into the pipe, shutting off the water for an instant. This process is continuous and as regular as the movement of a pendulum.

As these <(chunks® of air approach the sur-fact they are gradually enlarged, because of the reduced load upon them, and it is likely that before they reach the surface there is a general breaking up of the piston-like layer condition.

Figure 2 illustrates the action of the deep-well Pohle air-lift, where the pressure of the air has to be relatively high. The pipe F leads the air from the compressor to the foot of the eduction pipe E. Where the diameter of the eduction pipe is properly proportioned to the weight of the column of water to be lifted, the compressed air pushes out of the air-pipe in little pledgets, one after another, holding their piston-like shape across the diameter of the

eduction pipe, and each lifting its little load of water toward the free air at normal atmos¬ pheric pressure above. Where the lift is not so high and the weight of the water column not very great, the air is released at the bottom of the eduction pipe in bubbles, perhaps from several orifices at once, as in the Frizell system, and thus the water is aerated, rendering it so light that it flows freely upward with the air hastening to escape into the lower pressure above.

I he differential air-lift operates with a com¬ paratively low air pressure, and by using the air expansively achieves a considerable lift. The device consists of two (or more) air chambers, with the general arrangement shown in the explanatory diagram, Figure 3. It is to be supposed that the compressed air is being pumped into chamber A, exerting a pressure which forces the contained water upward through pipe G into chamber B. When the level of the water in A has sunk below the open end of pipe D the supply of compressed air is automatically shut off, and the compressed air then in A expands through pipe D into chamber B, there exerting a pressure which opens the valve at the foot of pipe F, up which the water contained in B is then forced. It is Teadily seen that the air pressure in B (sup¬ posing the chambers to be of the same dimen¬ sions) will be half that in A. If there is in the series a third chamber (C) of the same size and arrangement of pipes and valves, the air pressure in C will be one-third of the original pressure pumped into A. The possible lift from B to C will, of course, be just half that from A to B. Upon the final escape of the air at the top of the lift, chamber A fills with water by gravity and the cycle is renewed. A certain substantial amount of water pressure is necessary to smooth working of the air-lift. This is commonly secured by deep immersion of the eduction pipe. Where this cannot be secured an auxiliary air chamber is installed from which the air is pumped, the water flowing in to fill the vacuum as in the ordinary suction pump. On reversing the air, pressure is ex¬ erted downward on the water in the auxiliary chamber, thus forming an artificial “head® sufficient to lift the air-shaft.

The Pohle system of air-lift is probably the best known. Sand, grit and small stones are no obstacles in the satisfactory operation of this system. As a matter of fact, in many in¬ stances the capacities of the wells have been increased by opening up the well more thor¬ oughly through this removal of the sand. Water pumped by this system is

purified to some extent — more so in the Frizell system — by the aeration. The system is not limited as to the quantity of water that can be handled. This will depend upon the capacity of the wells to furnish the water. The height of the lift is limited only by the degree of pressure imparted to the air. Consult Greene, A. M., Jr., dump¬ ing Machinery) (New York 1911); Ivens, E. M., (Pumping by Compressed Air) (New York

1914).

PUMPS AND PUMPING MACHIN¬ ERY. In the modern acceptation of the term, a pump is a machine for exerting mechanical action upon fluids. It is commonly employed for raising liquids to a higher level ; for propelling

them through pipes and orifices under (hydrau¬ lic) pressure; and for the compressing and rarefying of gaseous substances. The pumps used for compressing gases are discussed under the title Air Compressors; those for rarefication under Air-Pump and Vacuum-Pump.

Pumps operate by two quite distinct methods, and are consequently classified as (1) suction or “bucket® pumps and (2) force pumps. The suction pump depends for its operation upon the constant pressure of the atmosphere — 14.7 pounds per square inch. The action of the pump is to release from this pressure that area under the influence of the pump’s piston : the

Fig. 1. — Section View of Modem Suction Pump.

air pressure outside of that area causes fluids affected by it to flow into the space in which the pressure has been diminished. In the force pump the force is applied directly by the pump mechanism to the fluid to be moved, regard¬ less of atmospheric pressure. In its’ simplest form, the modern atmospheric or suction pump consists of a cylinder (c) connected at the bot¬ tom with a pipe (/ >), the lower end of which is immersed below the surface of the water. In the cylinder are placed two valves (uv and Iv) , the lower stationary and the upper attached to a piston (/) at the end of a rod (r), which moves the piston

up and down under the motion oi a handle (h). A pipe or spout (j), attached to the cylinder near its upper end, receives and discharges the water raised by the working of

the pistpn. Both the valves open upward, and the action of the entire arrangement, based upon the physical fact that two bodies cannot occupy the same space at the same time, is as follows : When the downward stroke of the handle moves the piston upward, the air in the space A is rarefied, having to occupy a greater space, and the partial vacuum thus formed re¬ lieves the pressure of the atmosphere from the lower valve, which being opened upward by the pressure of the air in the space (B) of the pipe, allows a portion of it to pass into the space (A). When the piston descends under the upward stroke of the handle, the air in the space (A) is compressed, the lower valve is closed, . and when the density of the com¬ pressed air becomes greater than that of the atmosphere, the upper valve is forced open and the air passes into and out of the space (D). Thus, by the continued up and down movement of the piston, all the air in the space (B) is completely exhausted, the water rising in the suction pipe under the pressure of the atmos¬ phere upon its surface in the well, until it fills the space (B) up to the lower valve. The next upward movement of the piston empties the air in the space (A), which is immediately filled with water by the opening of the lower valve. The downward motion of the piston relieves the pressure and allows the lower valve to fall into its seat. The water then in the lower part of the pump flows through, the valve in the piston into the space (D), from which it is discharged through the spout by the next up¬ ward movement of the piston which at the same time refills the space (A) by suction. Under the laws of fluid pressure discovered by the ex¬ periments of Torricelli and others, the height to which a column of water will rise depends upon the atmosoheric pressure at any point on the earth's surface, and varies with the altitude of that point. At the level of the sea, the atmosphere exerts a pressure of 14.7 pounds to the square inch, and will support a column of water in a closed tube from which the air has been exhausted, between 33 and 34 feet in height, while upon the top of Mont Blanc, or Pike's Peak, 15,000 or 16,000 feet above the sea, the atmospheric pressure will support a similar column of water only about 16 or 17 feet in height. A knowledge of this fact is important not only in determining the maximum distance at which the lower valve of a pump may be placed

from the surface of water to be pumped, but also in every branch of hydraulic engineer¬ ing in which atmospheric pressure is utilized.

By far the greater amount of pumping done in the economic world is accomplished by force pumps. It is, however, generally the case that the principle of the suction pump is used in combination to a greater or less degree, at¬ mospheric pressure being relied on for pre¬ liminary lifts not to exceed 16 or 18 feet above the basic water level.

Force pumps are of two general types: (1) the piston pump, and (2) the plunger pump. In the former a well-fitted piston is driven to and fro in a smoothly-bored cylinder to which the water to be pumped is admitted. The pres¬ sure of the moving piston upon the water forces it out of the cylinder by any valve open¬ ing freely outward, and thus into pipes through which it may be raised to heights varying with the power exerted on the piston; or it may

transmit the pressure of the piston to all water in a long pipe line for power purposes. The plunger pump is similar in results, but develops its pressure by the forcible thrusting of the comparatively large mass of the plunger into a chamber already filled with water. The water being incompressible, a volume of it equal to the bulk of the entering plunger is driven out

of the chamber into the transmission pipes. Both piston and plunger pumps are usually designed to act bo'th on the outward and the return strokes — the piston sucking in a supply of water behind it as it moves in either direc¬ tion ; and the plunger beine double-ended, and working alternately into two chambers divided by a wall or a diaphragm carrying a packing ring or sleeve. These types are known as double-acting pumps. In the sectional diagram of a piston force-pump shown in Fig. 2, the piston P is represented as starting on its out¬ ward stroke. The water W before it is being forced upward through valve E into the dis¬ charge-pipe system D, while valves F and K are

held shut by the internal pressure. Valve H in the supply-pipe system opens by ˆsuction,® and the supply water flows in behind the advanc¬ ing piston. On the return or inward stroke,

valve F opens for the discharge of the water which has just come through H, and valve K opens to allow the supply to again fill the cylinder. The same description applies to the diagram of the plunger force-pump, Fig. 3; in which P represents the plunger which drives outward and back alternately into chambers W and Y, divided by the packing-ring R, R.

..A variation of the plunger pump is the “differential* pump, in which the valves and double-acting plunger are so arranged that while suction of the supply water takes place only on the outward stroke, a discharge occurs upon the strokes in both directions. Fig. 4

presents a sectional diagram of the most com¬ mon form of the differential pump, in which P represents the plunger, working in the sleeve K, K. On the inward stroke just beginning, the water in chamber W is forced out into the dis¬ charge system D, valve K opening to allow a supply to be drawn in (by suction) through pipe S into chamber Y. On the return stroke valve K is closed by the pressure, and valve E opens, and another discharge into D occurs.

While there are undoubtedly a larger num¬ ber PumPs worked by hand than by any other power, such pumps are relatively small, and are not operated continuously. By far the greater part of the world’s pumping, as to volume, is done with what are called power pumps, many of them being very large. The power generally employed is steam, although compressed air is coming more and more into use, being found more economical. (See Pumps, Compressed-Air). The attachment of the power to the pump has generally taken the tandem form, with the power cylinder at one end and the pump cylinder at the other, the piston rod of the steam cylinder being ex¬ tended to form the piston rod or plunger rod of the pump. This type is known as the direct-acting pump. In other arrangements the steam, cylinder may act upon a walking-beam to which the pump rod is connected; or it may work upon a shaft on which is a fly-wheel. Frequently the work is divided, two or three cylinders being provided for both steam and pumps, working alternately or in succession, and thus discharging a more nearly continuous and uniform volume of water. All of these power pumps discharge the water against a

cushion of air, the elasticity of which relieves pump, engine and piping of shocks which other¬ wise would sopn be disastrous to their mechan¬ ism.. These air chambers are, therefore, to be considered an essential part of the pump. They are proportioned to the volume of water de¬ livered per minute, and the pressure which is to be preserved in the pipe line into which the water is delivered, a certain specific volume of air being necessary to transmit the particular pressures of the individual installation. In some makes of pumps air chambers are placed also on the. suction pipe, to take up and distribute (in point of time) the strains of operation, aiding materially in maintaining a uniform dis¬ charge.

Rotary pumps, formerly in limited use, have become very numerous, as the electric motor offers an ideal power for small instal¬ lations. These pumps are of two general types, called conventionally (<piston* and ˆplunger.® In the piston rotary pump the piston-rod car¬ ries longitudinal wings or vanes which pro¬ duce a ((wiping» pressure on the water in the cylinder as the piston revolves on its axis. The more modern types are fitted with two “pistons* set parallel, the wings of which inter¬ lock to prevent a backward flow of the water. They are run usually at great speed by small dynamos,, and do excellent service in raising comparatively small quantities of water to the service tanks on the roofs of buildings of moderate height. The plunger type of rotary pump has a cylindrical plunger revolving on a

OUTLET

. Fig-5. — Sectional Diagram of Piston Rotary Pump P P pistons revolving in opposite directions.

longitudinal axis placed eccentrically as to the plunger, but in the centre of a larger cylinder in which the plunger revolves. A longitudinal backstop, actuated by springs, or by its own weight prevents the water crowded out of one-half of the cylinder from flowing back into the halt whence it was forced by the plunger. Another form of rotary pump is the <(screw* pump, a cylinder having a longitudinal centre shaft set with a series of blades like those of a screw propeller. This is sometimes called an impeller pump, and is of great utility in pumping sewage and similar heavy and hetero¬ geneous liquid mixtures which could not be

moved by the forms of pumps commonly in use. One of the last-named type was constructed at Milwaukee in 1889 to flush the Milwaukee River of its sewage-polluted waters. It has a screw wheel 13 feet in diameter, which, revolv¬ ing at a rate of 60 revolutions per minute, de-

Fig. 6. — Sectional Diagram of Plunger Rotary Pump. L, inlet; M, outlet; N, back stop; P, rotating plunger.

livers 550,000,000 gallons of water a day on a lift of four feet. This water is forced through a brick-lined tunnel 12 feet in diameter, and 2,500 feet long. A battery of 11 of these screw pumps are in use in New Orleans for discharging storm water from the city's drain¬ age system. They are 12 feet in diameter and run at a speed of 75 revolutions per minute. The screw is placed at the summit of a flat-topped siphon and is operated by an electric motor. The discharge is about 550 cubic feet per minute, the height raised varyine from five to nine feet. The efficiency of these pumps as shown by actual tests is 80 per cent.

The ((centrifugal pump* is the best known representative of the "impeller* type. It em¬ bodies the principle — that a body revolving around a centre tends to move away from it with a force proportional to its velocity; thus the rim of a revolving wheel imparts a portion

of its velocity to any substance adhering to it, and throws it off when the force of the velocity thus imparted exceeds the force of adhesion, as the mud thrown off by the wheels of a car¬ riage, or the water from a mop or towel, rapidly revolved by the hand. The first pump of this type was invented by M. Le Demour, who sent a description of it to the Academie Franqaise in 1732. It consisted of a straight tube

attached in an inclined position to a vertical axis, around which it was whirled by a crank-handle. Later forms were constructed by tubes joined in the form of a T, the vertical tube of which was placed in the water. The lower end perforated to admit the water, and fitted with a valve to retain the water in the vertical tube when the pump was not in operation, was placed under the surface of the water and supported upon a pivot. The ends of the horizontal discharge tube were bent down into a circular trough over which they were revolved. When the machine was revolved rapidly the centrifugal force which discharged the water in the horizontal tube was communicated to the water in the ver¬ tical, which was also drawn out, but in the meantime refilled by the atmospheric pressure on the reservoir. When it is required to lift large quantities of water to a low elevation, centrifugal pumps may be used with greater efficiency than reciprocating pumps, the effi¬ ciency of which diminishes with the lift. A pump of this kind, constructed in Massachusetts in 1818, was equipped with four blades set at right angles like those of a fan blower, and was used for many years. An improved form was exhibited by Appold in England, in 1851, which embodied all of the principal features employed in the best pumps constructed since that time. It is stated that Appold's pump raised continu¬ ously a quantity of water equal to 1,400 times its own capacity per minute. The "whirlpool chamber,* designed to utilize the energy de¬ veloped by the whirling water which in most pumps of this type is lost as eddies in the dis¬ charge pipe, was suggested by Thomson (Eng.), and consisted of a chamber somewhat larger than the pump, in which the water discharged by the pump disc, with considerable velocity, was allowed to rotate and impart its energy as an auxiliary aid to the driving power. A pump constructed by him for drainage purposes, in the Barbados, was equipped with a whirlpool chamber 32 feet in diameter, around a pump disc 16 feet in diameter. Others of large size were constructed by Easton and Anderson, for the North Sea Canal, in Holland, which were capable of delivering 670 tons of water per minute to a height of five feet; while the Gwynne pumps employed to drain the Ferrarese marshes in Italy, at the junction of the Po di Volano and the minor rivers of lower Lom¬ bardy, are capable of a combined delivery of 2,000 tons of water per minute.

A large class of pumps, involving the prin¬ ciple of centrifugal action in some degree are the turbine pumps.

The turbine pump is practically a reversal of the turbine water-wheel (q.v.), being a tur¬ bine run by power, generally steam, to produce motion or pressure in a body of water or other liquid. It differs from the centrifugal pump in adding the power advantage of the screw to

that of centrifugal force. A common applica¬ tion of this form of pump where the lift is

high and the pressure heavy is to place these pumps in series, the second taking its supply water from the first, and so starting its work with a considerable degree of pressure; the third pump taking water from the second' and so on. As many as 10 of these turbines may be thus combined to form the <(ten-stage® tur¬ bine pump. By this means the load is dis¬ tributed, the velocities of the rotors being trans¬ muted into pressure in the diffusing chambers. These multi-stage turbine pumps are used in the equipment of fire-boats, which are required to deliver great volumes of water at high pres¬ sure.

The injector and the pulsometer are also classified as pumps, though operating on prin-

Fig. 8. — Sectional View of Pulsometer.

ciples quite different from those exhibited in the machines more familiarly known under the title of ((pump.® The injector is described in detail in a special article (see Injector). The pulsometer consists of two bottle-shaped chambers (a) and (b) , the tapering necks of which incline toward each other in a com¬ mon passage at (c). At the lower end of this passage is a valve (d), which when moved slightly will simultaneously close the opening of the neck of one chamber, and open that of the other.

Water is admitted into the chambers through the passage (<?), and valves (/) (g) and forced out through the valves (h) (i), and passage (/) into the air chamber (k). The device oper¬ ates as follows: Suppose both chambers are full of water and the valve (d) to the right. When steam is admitted to the chamber (a) the water is forced out by direct pressure through the valve (h) into the air chamber (k), so that when the chamber (a) is nearly or quite empty, the valve (d) moves to the left, cutting off the

steam from the chamber (a) and admittting it to the chamber (b), from which the water is gradually forced out. In the meantime the condensation of the steam in the chamber (a) creates a partial vacuum, and the pressure of the atmosphere on the external water

forces it through the valve (/) into the chamber, so that when it is nearly full, the air it contains will be sufficiently compressed to force the valve (d) over to the right, thus producing a continu¬ ous action. The efficiency of pulsometers is equal to that of small direct-acting feed pumps, and they are extensively used on account of their simple construction and great durability. Nearly allied to the injector and pulsometer in point of the physical action involved is the ˆexplosion,® or (<internal combustion® pump — a typical example of which is the so-called Humphrey gas pump. It consists of a chamber

Fig. 9. — Sectional Diagram of Double-cylindered “Hum¬ phrey” Type of Gas Pump.

(A) in which an explosive mixture of air and vaporized gasoline is admitted through the valve (V). This mixture is exploded by an electric spark, and the expanding gases press downward upon the water in the chamber (B) forcing it out through the pipe-line (P), and into the reservoir (R) and up the standpipe (D). When the force of the gas has expended itself the escape valve (E) drops in the reduced pres¬ sure, and the burned gases pass out before the return surge of the water standing in the stand¬ pipe (D). Meanwhile, in the low pressure prevailing, the inlet valves (I) open and admit water from the basin (K), which pours into chamber (B) until the returning water from the pipe-line brings pressure enough to close them, and also the exhaust valve (E), and opens the gas valve (V) by a float. A backward surge of the water, in coming to an equilibrium sucks in a charge of gas through (G),and the vibrating water comes back once more and compresses the gas, at which juncture it is fired; and the cycle is repeated indefinitely. It will be seen that one delivery of water covers four vibrations in the pump. This leisurely action has been reduced to half the time by connecting two pairs of chambers to the suction pipe, so that the first resurge after firing com¬ presses the gas charge in the second gas cham¬ ber, and fires it, each resurge thus being sent forward as a discharge. The largest of these gas pumps in America is a 66-inch pump in To”lvˆIOn service at Del Rio, Texas, delivering z8,000 gallons per minute at a height of 38 feet.

((Impulse pumps® are those operated by the impact of a falling column of water or by the force of a moving column of water suddenly ariested, or by jets of steam, compressed air,

or water under high pressure. The hydraulic ram is an example of the first group. It was originally designed by Whitehurst, a watch¬ maker of Derby, England, in 1772, and subse¬ quently perfected by Montgolfier, the famous French balloonist, in 1796. It consists of a supply pipe (a) ; an air-chamber (b) attached to the upper side of the pipe (a), and fitted with a valve (c) at the pipe opening; a valve (d) at the end of the supply pipe, and a vertical pipe (e), opening freely into the air-chamber, through which the water is raised to the de¬ sired elevation. The device operates as fol¬ lows: The valve (d) is made just heavy enough to drop and open the lower end of the pipe (a) when the water filling the pipe is at rest. Now assume that this valve opens, allowing the water in (a) to run out. This water gradually acquires an increasing momen¬ tum, which finally carries the valve up against its seat and closes the outlet. The water in

(a) is thus brought suddenly to a state of rest and a part of it rushes into the air-chamber

(b) through the valve (c). But, the instant the water in (a) is again in a state of rest, the valve (d) drops again, opens the outlet, al¬ lows the water to run out, and is again closed when the increasing pressure is strong enough, bringing the water again to a sudden halt and forcing some more of it into the air-chamber, thence by the elasticity of the air cushion (b) to be pushed upward through the pipe (e) to the point of delivery — and thus the cycle is continued. The action of the valve (c) pre¬ vents the return of the water from the air-chamber to the pipe (a). This device is adapted to numerous locations and will operate auto¬ matically and continuously, without any atten¬ tion whatever, so long as the surface of the water at the source of supply is .kept at the same elevation so as to insure a uniform pres¬ sure against the valve (d). When the per¬ pendicular distance from the source of supply to the valve (d) is small, and the water is re¬ quired to be raised to a comparatively great height, pipe (a) must not only have a con¬ siderable fall but must be of larger diameter, and be of sufficient length to prevent the water from being thrown back into the

source of supply by the shock when the valve (d) closes. It is also necessary to maintain the supply of air in the air-chamber, which in time, under the great pressure, becomes depleted by being dissolved in the water. In small rams a suffi¬ cient amount of air enters through the valve (d), but in rams of considerable size a small ((snifting valve,® attached to another chamber immediately below the air chamber, automatic¬ ally supplies the additional air whenever it is necessary.

Jet pumps operating with steam or com¬ pressed air are termed <(ejectors.® They are in use for spraying or atomizing liquids in

various manufacturing processes. The jet pumps operating with high pressure water are known commercially also as ((eductors.® They have no valves or other moving parts, and are not subject to wear and tear, and, being also of low first cost, are very economical where a small supply of high-pressure water can be commanded. The construction is extremely simple. The high-pressure pipe is placed in the centre axially of a larger flow or discharge pipe and fitted with a conical mouthpiece. The discharge pipe is narrowed at the opening of the jet and then expanded gradually to its full size. With a three-inch discharge pipe and a one and one-half-inch jet pipe operating with a pressure of 40 pounds to the square inch (about 90 feet head) the discharge will amount to 5,000 gallons per hour. For lifting water the pressure in pounds per square inch of the jet opening is made two and one-half times the elevation in feet. Thus if the lift is 20 feet the pressure required is 50 pounds. The eductor works well on the level of discharge if the suction lift is not more than 15 feet.

The so-called ((high-duty® pumps are those in use for heavy work against great pressure. They include waterworks pumps, mine pumps, fire-service pumps, elevator pumps, hydraulic pressure pumps and the like. Practically all are direct-acting pumps operated by steam. They are built both in the horizon¬ tal and upright forms. One of the first American pumps designed for high-duty waterworks service was the <(Worthington direct-acting duplex steam pump.® It con¬ sists of two double-acting plunger pumps placed side by side with the piston-rod of each steam cylinder connected by a lever to the slide valve of-the adjoining steam cylinder, so that the movement of each piston instead of operat¬ ing its own slide valve, as in the simplex pump, operates the slide valve of the adjoining cylin¬ der. The valve motion is so adjusted that just before the piston of one cylinder has finished its stroke, the piston of the other begins its movement. *The load of the*

water column is then taken up alternately and produces a steady flow without serious strains, harshness of mo¬ tion and noise, which characterize the action of the simplex pumps, in which the water column is started into motion at the beginning, and arrested at the end of each stroke of the piston. Although the simplicity of their me¬ chanism, together with the cheapness of their first cost and the certainty of their action, placed them at the head of all the machines of their class, when considered from a mechanical standpoint, the loss of economy in the use of steam continued to militate against their general use for heavy duty purposes. Their light weight prevented the cutting off of the steam in the steam cylinder so as to complete the stroke of the piston by the aid of the ex¬ pansive energy of the steam thus cut off. There¬ fore the steam applied to move the pistons had to be applied in sufficient quantity and pressure to overcome the weight of the water column and its friction through the pump and connec¬ tions, at the very beginning of the stroke, and maintained without diminution throughout the stroke, up to its termination, since a falling off in either volume or pressure during any part of the stroke would have stopped the action of the pump instantly. This defect, however,

was completely eliminated by applying to them the principle of multiple expansion in the use of steam in compound condensing steam en¬ gines. Another steam cylinder whs added to the end of the one already in use, and placed in a diiect line with it so that the high pres¬ sure steam admitted to the first and smaller cylinder, after moving its piston, was exhausted behind the piston of the large cylinder upon its , retut n stroke. Still further economy was produced in the larger compound engines by using a condenser to create a vacuum in the large steam cylinder, thus bringing the effi¬ ciency fully up to that of the best high-duty rotative engines of the most important pump-

rod which is extended for this purpose through the outer end of the pump chamber. On the end of this rod is fastened a cross-head which moves in guides attached to the outer end of the pump. On this cross-head, and situated oppo¬ site to each other, are two hemispherical re¬ cesses. On the guide plates are two journal boxes, one above and the other below the plunger-rod, equidistant from it, and placed at a point equal to the half stroke of the cross-head. Each journal box carries a short cylinder hung on trunnions, which allow the cylinder to swing in unison with the motion of the plunger rod. In these cylinders are plungers or rams, which pass through a stuff-

Pump Discharge

Compensating Cylinder1

Fig. 11.— Sectional View of Worthington High Duty Pumping Engine.

ing plants of the world with yearly records ranging from a duty of 50,000,000 to 120,000,000 foot-pounds per 100 pounds of good coal.

. The duty of the Worthington pumping en¬ gines was still further increased, and the en¬ tire arrangement, from the power-producing to the pumping ends, was made to represent the highest perfection of modern pumping ma¬ chinery, by the application of the accumulator a device originally invented by J. D. Davis, in Jg79, and perfected by C. C. Worthington, in 1«S4. With it the steam may be cut off in the steam cylinder soon after the beginning of the piston stroke, a part of the power being stored and brought into play toward the end of the stroke so that the force exerted upon the pump plunger remains uniform through the entire stroke. In a compound direct-acting steam pump, the device is attached to the plunger¬

ing box on the end. The outer ends of the rams have rounded projections which fit into the recesses on the cross-head, which is moved in and out with the plunger, thus tilting the cylinders backward and forward. These cylin¬ ders are called “compensating cylinders.ˆ When t le engines are used for pumping water, they are filled with water, and when used for pump¬ ing oil, they are filled with oil. The pressure on their rams is produced by connecting the cylinders through their trunnions which are hollow, with an accumulator, carrying a ram which moves up and down as the rams of the cylinder move in and out. This accumulator 1S r° j * dl,ff.erential type, the small lower cylinder of which is filled with water or oil in which the ram moves, while the larger upper cylinder is filled with air. On the top of the accumulator-ram is a large piston-head which

Views of Large V.T.E. Pumping Engines installed for City of Cleveland, Ohio, by Allis-Chalmers Manufacturing Company

fits closely in the air cylinder. Therefore, the pressure per square inch on the accumulator-ram and also in the compensating cylin¬ ders is equal to the pressure of the air in the air cylinder per square inch multiplied by the difference between the area of the air piston and that of the accumulator-ram. It is a matter of calculation and construction, which varies according to the particular service for which a pumping engine is designed ; while the pressure in the air cylinder is controlled by the pressure in the main delivery pipe with which the air chamber is connected. The effect of this attachment on the successful operation of high duty pumping engines may be briefly described as follows : At the begin¬ ning of the outward stroke of the pump plunger-rod, the compensating cylinders point inward toward the pump, with their rams at an acute angle with the plunger-rod, and op-For the sake of economy in floor space most high-duty pumps are built in the upright or vertical form, the steam sylinders at the top, and the pump cylinders below. With the ex¬ ception of the Worthington, which still re¬ mains of tandem design, the high, intermediate and low pressure steam cylinders are set side by side in a rank. With the same exception also, most of the high-duty pumps are built to work on a crank shaft carrying fly-wheels, some of which are enormously heavy; weigh¬ ing, for instance, in the Holly waterworks pumps up to 32 tons each, and each pump carry¬ ing two such fly-wheels.

The term ˆduty® represents the work done ‘ by a steam pumping engine expressed in mil¬ lions of pounds of water lifted to the height ■’ of one .foot by the consumption of 100 pounds i of coal, 1,000 pounds of dry steam, or by

Fig. 12. — Pumps and Pumping Machines.

posing its advance with the full pressure of the accumulator load. As the plunger-rod ad¬ vances outward, the angle between itself and the

ram is increased gradually to 90 degrees. The rams recede into their cylinders, and their pressure against the rod is decreased until the pump plunger-rod has reached the halfway point of its stroke, when the rams will be at right angles to it — a position in which they neither retard nor advance its movement. As the pump plunger-rod continues on its outward stroke, the angle between itself and the rams is again decreased, but now the rams, pointing in the opposite direction, emerge from their cylinders, and exert their power to push the plunger onward to the termination of its out¬ ward stroke. It is obvious that similar con¬ ditions obtain during the return stroke of the plunger, the effect of the action being to store up power during the early part of the stroke, either forward or backward, when the steam is under its greatest pressure, and to release it at the end of the stroke, when the pressure in the steam cylinder has fallen away to its lowest point, that is, below the amount neces¬ sary to move the plunger against the pressure of the water column.

The Worthington pumps with this attach¬ ment and the use of multiple expansion steam engines operate with absolute freedom from the noise and shock so characteristic of the crank and fly-wheel machines.

1,000,000 British thermal units (B. T. U.). On account of the variable quality of coal, the two last-named constants give the more correct re¬ sults, and are the values now employed in de¬ termining the comparative efficiencies of pump¬ ing engines, which range from 20.6 per cent for the high-duty engines, to about 0.13 per cent for jet pumps. During the last 100 years, the development of pumping engines has increased their duty from about 5,000,000 foot-pounds for the Newcomen atmospheric engines, to over 170,000,000 foot-pounds for the crank and fly-wheel, or duplex triple expansion pump¬ ing engines of the latest construction.

Somewhat of an idea of the difference be¬ tween the first duplex Worthington pumping engines and those of their latest construction may be obtained by comparing that of the Charlestown, Mass., waterworks, with its ca¬ pacity of 5,000,000 gallons per day, with the installation at the Baltimore, Md., waterworks high service pumping station, which delivers 18,000,000 gallons per day. The former gave a duty of 70,000,000 foot-pounds, while the duty of the latter exceeded 140,000,000 foot-pounds per 1,000 pounds of dry steam.

Hydraulic pressure pumps are designed as a rule for driving water into

an accumulator, whence it may be drawn for power service in mains, or for use in hydraulic, presses (q.v.), hydraulic cranes (q.v.), and similar machines.

The pumps which do this exceptionally heavy work are of the plunger type of direct-acting pumps, the plungers being very small — about one and one-quarter inches in diameter and of six-inch stroke, while the steam cylinders are of the usual size, dhe high and low pressure cylinders are commonly placed side by side and work upon a crank-shaft which carries a heavy fly-wheel. These pumps work up to 4,000 or 5,000 pounds per square inch.

In all reciprocating pumps, valves play an essential part. In the simplest forms the valves are made of leather or rubber, and are lixed in position by a hinge on the edge, gen¬ erally, for the larger sizes, having a metal form which prevents too great relaxing. They are made in a great variety of forms and operate in response to certain pressure, or, as in the case of the Reidler valve, by mechanical means.

I hey consist essentially of a Halve seat,® to which the “disc® or valve proper is attached, the “stem® which controls the lift of the disc and prevents its displacement from the seat, the cover plate,® and the Halve spring,® intro¬ duced in some forms to take up slacks. When a valve is required only to prevent the back pressure or a reverse flow, a single flap or check valve is used. In large pumps a number of small valves are employed, equal in aggre¬ gate area to a single large valve of sufficient size to allow the passage of the whole flow, thus preventing injurious shocks when the valves are opened and closed suddenly, as all of the smaller valves do not close simultaneously but each as its critical pressure supervenes. Excepting the discs, all the other parts of a valve are made of bronze, while metallic ball and cone valves are extensively used in deep well pumps. A detailed description of the more commonly used valves will be found in the special article under the title Valve.

History. — The raising of water for eco¬ nomical purposes dates back to the remotest periods. It is not easy to determine just when mechanical appliances worthy to be classed as pumps first made their appearance, and it has been the custom of some writers to dignify the common water-pail by the name of pump if only it were lifted by mechanical means — as, lor example, with the oldtime well-sweep. In this connection mention has been made of the “shadoof,® ot Egypt, authentically recorded as having been in use over 1,500 years b.c., in the time of the Pharaohs, a period antedating the Exodus. It is still

used extensively in that region, myriads of them lining the banks of the Nile, where they are. worked unceasingly by relays of. men, without intermission, day and night. It is also used extensively all over Hindustan, where it is called the ((picotah.® In fact, the ((sweep® in some form is used exten¬ sively in all of the Oriental countries from Asia Minor to China and Japan and also in Mexico and South America, for domestic pur¬ poses and for the irrigation of land. For the latter purpose, however, it was superseded in India by the ((jantu,® an oscillating wooden trough involving the same principle, that of the lever, and worked by hand. The “windlass and bucket® arrangements operated by cranks or by tread-wheels, the latter worked by men or animals, appear to have followed the sweep,® first among the Chinese, and later

among the earliest Greeks and Romans. About the beginning of the Christian Era, Vitruvius, a Roman engineer, described a number of pumping machines involving a rotary principle — the “tympanum,® “noria,® “chain of buckets or pots,® the “screw® and the “pump.® The tympanum consisted of a series of gutters with their open ends joined to a shaft hollow at one end and placed above the surface of the water at the height to which the water was to be ele¬ vated. The gutters thus arranged radially ex¬ tended to a short distance below the surface of the water which they scooped up successively when the shaft was rotated. Each gutter as it passed above the horizontal position delivered its water to the shaft to be subsequently dis¬ charged through a trough at the desired point.

I his primitive device continued in use from the remote ages of antiquity up to the 18th cen¬ tury without any change of construction, when La Faye, a member of the Royal Academy of Sciences of France, improved it by substituting a series of curved canals for the original straight gutters, thus developing the progenitor of the “scoop wheel,® which, propelled by streams, are extensively used for draining pur¬ poses. La Faye’s improvement and the geo¬ metrical reasoning which developed it are ex¬ haustively described by Belidor (Tom. ii, 385, 387). While the tympanum consisted of a series of revolving gutters, the noria may be described as a number of “sweeps® arranged around a central shaft like the spokes of a wheel, each carrying on its outer end a vessel which fills as the rotary motion of the shaft plunges it beneath the surface of the water, and subsequently discharges its liquid freight into a reservoir placed at the upper part of the circle. It is commonly known as the Persian wheel. The “chain of buckets or pots® was an elaboration of the simple

bucket and cord arrangement, by the introduction of a pulley operating an endless rope or chain, to which several buckets or pots were attached. It was employed by all the foremost nations of an¬ tiquity, and is yet used in many parts of Eu¬ rope and Asia. Among half-civilized nations it was the highest type of hydraulic machines. Sometimes, when the source of supply was a rˆveJ* as *n the case of the Persian wheels on the Orontes, the driving wheels of the arrange¬ ment were placed in the river and propelled by its current. About the middle of the 17th cen¬ tury, European mechanics recognized that when the water was admitted into the receiving ves¬ sels of a noria or a chain of pots at the upper part of the circumference, it was converted into an overshot wheel, thus affording a means of power transmission to other machines, and in cases where the water supply was limited, but descended from a considerable elevation) it was substituted for the overshot wheel as a prime mover in operating mining pumps, dredg¬ ing, threshing and other machines of a similar character; while as a conveyor, originally used exclusively as a water elevator, it has also been employed to raise mortar in the construction of buildings, city walls and fortifications, and for carrying grain and flour to the different floors of a mill. In its original form, that of the sakia® of Egypt, it was unquestionably the pump introduced into Greece by Danaus when he dug the wells of Argos, 1485 b.c., about a

thousand years before the building of Baby¬ lon by the Persians. Danaus was a brother of the Pharaoh Rameses, who resigned during the period the Israelites were in Egypt. He was compelled to leave that country on account of domestic troubles, and accompanied by his fam¬ ily and friends sailed for Greece. They landed on the coast of Peloponessus, # and settled at Argos. According to Pliny (vii, 56), previous to the arrival of these Egyptians, the Greeks were unacquainted with wells and pumps ; there¬ fore, it is natural to conclude that the wells of Argos dug by Danaus were equipped with the Egyptian pumping devices most adaptable to wells, which was the chain of pots, and not a form of atmospheric or force pump, the pioneer of which is described in Hero's <Spiritalia) as invented by Ctesibius of Alexandria, one of the most eminent mathematicians and mechani¬ cians of that period, in the year 224 B.c. The most modern refinement of the chain of pots is the <(chain pump,® while Vera's <(rope pump® and the hydraulic belt are applications of the same idea, and consist of endless double bands of rope or woolen cloth passing over two roll¬ ers, one placed below the surface of the water, the other at the point of delivery. The rollers are driven at a velocity ranging from one to two thousand feet per minute, and as the bands pass over the upper roller, the water held be¬ tween them by capillarity is forced out by the pressure and discharged into a receiving cham¬ ber connected with the delivery spout.

Water-raising machines embodying the principles of the screw, stated by some authori¬ ties as invented by Archimedes, the < Greek geometrician and greatest mathematician of antiquity, and by others credited to the genius of Canon of Samos, a contemporary of Archi¬ medes, about the year 242 b.c., are described by Vitruvius as of Egyptian origin, and were, according to other authentic records, employed in Egypt, for draining and irrigating land, many centuries before Archimedes visited that country. It consists of one or more flexible tubes of lead or leather, wound spirally around a solid cylinder of wood or iron, the ends of which are pivoted to supports, so that the whole arrangement may be revolved upon its axis, which is generally placed at an angle of 45 degrees to the horizontal. The lower

end of the tube is placed below the surface of the water, and the upper end over a receiving trough at the desired elevation. When the machine is rotated the water entering the, lowest bend of the spiral is forced upward by each succeeding revolution into the other bends, and finally dis¬ charged out of the uppermost into the trough. The Roman screws were made with plank grooves arranged spirally around a solid cyl¬ inder, and the grooved cylinder thus con¬ structed was fitted into and revolved within a hollow cylinder of the same length. Thus foreshadowing the turbine pump of the present day.

The connecting link between the various more or less elementary forms of water ele¬ vators or <(lifts® already described, and the group of hydraulic machines designated as <(displacement pumps,® is the modern chain pump, consisting of a tube through which the water is raised by a series of pallets or pistons. The pump of Ctesibius appears to have been of this

character, although it consisted of only two single-acting pistons working in a cylinder, the water being raised by the up-stroke and ex¬ pelled by the down-stroke, into a common re¬ ceiving chamber. In this machine the atmos¬ pheric pressure was not taken into considera¬ tion, and its capabilities as a water-lifter re¬ mained unrecognized until 1643, when Torri¬ celli, the great Italian physicist, announced that water could be raised in a tube by the pressure of air. In 1641, Galileo, when consulted by a Florentine pump-maker, had failed to demon¬ strate why water failed to rise in a closed tube above a height of 33 feet under the action of a suction pump. A year or two later, after the death of Galileo, Torricelli undertook the ex¬ planation of that fact, his experiments finally resulting in establishing . the law that the heights attained by liquids in a closed tube, the upper end of which was a vacuum, under the pressure of the atmosphere, was proportional to their specific gravities. For example, under these conditions, the height of a column of mercury would be about 28 inches, while that of a column of water would be about 33 feet at the level of the sea. The direct result of this experiment was the invention of the siphon barometer, in which the empty space above the column of mercury is known as the Torricellian vacuum; but the further experiments of Pas¬ cal, a French mathematician and divine, in 1646, followed by those of Otto Guericke, a philos¬ opher and mathematician of Magdeburg, Prus¬ sia, and of Candido del Buono, a member of the Academie del Cimento of Florence, led to the Invention of the <(air pump,® an apparatus which is described under that title, and which must not be confounded with the atmospheric or

displacement pump used for pumping water, which was not unknown to the ancients, and was probably used in some of its innumerable forms, long before the days of Ctesibius.

The expansive energy of compressed air, hot air and steam, was probably employed by the ancients as the motive power of pressure en¬ gines to raise water many centuries before the Christian era. There are extant numerous au¬ thentic descriptions of devices equipped with piston bellows, employed for this purpose by the ancient Egyptians, Hindus, Chinese, Peruvi¬ ans and the Aztecs. Also descriptions of hot¬ air devices and pressure machines operated by steam, the majority of which were contrived by the members of the ancient priesthoods. A great many of these machines are described in the <Spiritalia,) written by Heron, or Hero of Alexandria, a celebrated Egyptian mathemati¬ cian and physicist, who lived in the 1st century a.d. The water-jet apparatus known as Hero's Fountain, although asserted to have been in¬ vented by him, was probably an old device at the time he described it. In either case, it is the oldest pressure engine ever described accu¬ rately in which a volume of air was used in¬ stead of a piston. In 1560 Baptista Porta, an Italian, published a work entitled (Natural Magic, > in which he described a method of pro¬ ducing a vacuum by the condensation of steam, and its application to devices for raising water. Similar descriptions are given in the writings of Jerome Cardan, also an Italian, published some time between 1515 and 1570. Therefore, although nothing new was discovered by De-14

caus, whose writings were published in Frank¬ fort in 1615 and in Paris in 1624, or by Fludd, Worcester, Savery and Papin, whose investi¬ gations and writings extended over the period from 1663 to 1698, the suggestions afforded by their experiments (subsequently elaborated by Freiburg in 1797 and Shone, Callon, Frizell and Pohle in the period extending from 1870 to 1900) have led to the development of the vari¬ ous forms of modern air-lift pumps operated by compressed air and pulsometers operated by steam.

Although pressure engines operated by air compressed under a head of water, as suggested by Papin in 1695, had been employed success¬ fully to drain mines as early as 1755, when Hoel employed one in the mines of Chemnitz, Hun¬ gary, the application of steam for that purpose did not become an accomplisheed fact until a much later period. It is, however, interesting to note that the idea was suggested by Lord Bacon prior to 1679, in connection with the Eng¬ lish mines, and probably was practically applied to a limited extent about that time. The his¬ tory of the modern pumping engine, however, more properly begins with the construction of the Cornish engine. Up to the close of the 18th century, the only practical use of steam engines was in connection with pumping devices, and many notable steam pumping engines had been erected and successfully operated in the mines of Cornwall, England. The various improve¬ ments made in this engine from 1800 to 1840 finally culminated in the evolution of one su¬ perior type which is now known as the <(Cornish.® This engine gave highly satisfactory service for the particular purpose for which it was designed — the raising of water out of deep mines where the constantly increasing depth of the shafts necessitated the adaptation of the same engine to the consequent increasing and changing loads. It is constructed upon the principle that the steam within the steam cylin¬ der is used to lift a weighted pump plunger which after being raised upward to the limit of its stroke, descends slowly by its own weight and forces upward a column of water equal to that weight. The economy produced bv the expansion of the steam in the steam cylinder when the steam is cut off during the descent of the plunger is due to the fact that the pressure and power of the steam first admitted is greatly in excess of what is necessary to lift the weighted plunger. This excess of power is taken up by the weights of the plunger at the beginning of its stroke and given out at the end when the power of the exhausted steam in the cylinder has fallen below the amount neces¬

sary to move the plunger, unless assisted by the power previously stored in it. The length of the stroke of the piston and of the plunger being determined solely by the operation of its steam, equilibrium and exhaust valves, it is absolutely necessary to maintain the steam pressure at a uniform rate, while the water raised must be received under a uniform head. In mine pumps the steam cylinder is placed at the top of the shaft, and the pump at the bottom, near the surface of the water. The steam piston is connected to the pump plunger by a beam made of heavy timbers, the weight of which, together with that of the weight of the plunger, forms the weight which, after being lifted by the steam

cylinder, raises an equal weight of water when the plunger descends.

In order to preserve the proper relation be¬ tween the weight of the pump rods and plunger, and that of the water columns, and also keep the engine and pump at the proper speed, by maintaining the proper difference in the weight of the pump rods so as to overcome the friction of their guides, and that of the water in the delivery pipes, a large box, called the <(balance bob,® in which the adjusting weights in the shape of stones or pieces of iron are placed, is attached to the upper end of the pump rods. When the shafts become deeper and require the lengthening of the pump rods, the additional weight of the new timbers is counterbalanced by a readjustment of the weights in the ((balance bob,® thus adapting the engine to the new con¬ ditions. In its particular field of application, re¬ quiring only a slow action with no demand for continuous flow, it is safe to state that it has never been excelled by any other engine ; but, its inordinate size, its action which requires the constant watchfulness of the engineer, its great first cost and expensive repairs, makes it unfit for waterworks, where the water has to be dis¬ charged through a long main to' a great height above the pump, with a continuous and uniform delivery. The shortcomings of the Cornish en¬ gine, named above, led finally to its complete abandonment for waterworks, and called for a pumping engine that would fulfill the new re¬ quirements. This demand was met by the de¬ velopment of the <(rotative® engine which, by employing revolving instead of reciprocating pistons, gave a positive motion. The steam power in the cylinder is applied to the pump piston in various ways — through the medium of long or short beams, bell cranks or gearing, and in some instances directly through the pis¬ tons themselves ; in all cases, however, the limit of the stroke of the steam piston and of the pump plunger being governed by a crank on a revolving shaft. Attached to this shaft is a fly-wheel which is designed

to assist the crank to pass the centre at each end of its stroke and also to give up at the beginning of each stroke of the steam piston the excess of power im¬ parted to it beyond that required to move the column of water. The function of the fly-wheel of a rotative engine is exactly similar to that of the weighted plunger in a Cornish engine; both of the devices being applied to their respective classes of engines to obtain the best economy in the consumption of steam, the early cut-off resulting in a high grade of expansion, much higher than it was possible to obtain by any other means at the time. They vary greatly in design and in the details of construction, and are made in sizes ranging from those used for supplying water to small towns, up to some of the largest and most expensive machines in the world, and operate either vertically or hori¬ zontally. They produce great economy in the use of steam at the expense of intricate ma¬ chinery, but require expensive and massive foundations, to absorb the shocks produced by their operation, while the momentum of the fly¬ wheel greatly increases the percentage of possi¬ ble accidents.

To follow further the progress of pumping-engine construction up to the invention and de¬ velopment of the <(direct-acting steam pumps,® which now represent the highest type of pump-

ing machinery, it is necessary to take up the historical thread in the United States. Al¬ though steam pumping engines of the direct-acting type, beginning with the device invented by Thomas Newcomen and John Cawley, of Dartmouth, England (which was subsequently improved by Watt, who developed it into an engine of the double-acting type), were in great use for many years; the greatest improvement in this class of pumping engines was made by Henry R. Worthington of New York in 1840. His invention was the outcome of a long series of experiments on the application of steam to the propulsion of canal boats. It was a single direct-acting steam pump and was employed to feed the boilers of his propelling engine, and was patented for the first time in 1841. Al¬ though steam pumps of this type came imme¬ diately into extensive use for feeding boilers

and for supplying moderate quantities of water under medium pressure, the intermittent action of their pump pistons and consequent irregular flow of water prevented them from being used in waterworks and for other purposes where large quantities of water had to be forced through long lines of pipes. To overcome this serious defect the same inventor produced the improved pump which is now generally known by his name.

Bibliography. — Butler, E., ‘Modern Pump¬ ing and Hydraulic Machinery) (London 1913) ; Davey, H., ‘Principles, Construction and Ap¬ plication of Pumping Machinery> (London 1905) ; Greene, A. M-., ‘Pumping Machinery) (New York 1911); Hague, C. A., ‘Pumping Engines for Waterworks) (New York 1907) ; Kelley, H. H., ‘Pumps: Including the Air-Lift Pump) (Atlanta, Ga., 1915) ; Nickel, F. F., ‘Di¬ rect-Acting Steam Pumps) (New York 1915).

Revised by Richard Ferris.

PUN, a play upon words alike or similar as to sound, but different as to sense. The pun has been familiar to all literatures, and in an¬ cient times was used even in serious context. This was true also in England of the 17th and 18th centuries. Puns are met with in the trage¬ dies of Shakespeare; in the works of the quaint Fuller; in the discourses of Bishop Andrews. The divines of colonial America did not lack for them. Mathey Byles won his reputation for wit chiefly through the appositeness and felicity of his puns. Thus, being a sturdy loyalist, he was for a time kept under surveillance by a sentinel whom he called his “observe-a-Tory .® A parishioner called upon him and Byles, not¬ ing his ulcerated jaw, sent him to Copley, the artist, to have his tooth drawn. Among famous English punsters may be cited Sydney Smith, Lamb, Theodore Hook, Wilberforce and, above all, “Tom® Hood, most inveterate and happy of the coterie, who even remarked of a certain undertaker that he appeared anxious to “win a lively Hood.® The pun has frequently been de¬ rided as an unworthy form of wit. John Donne is reported to have said that “He who would make a pun would pick a pocket® ; and Holmes, in the ‘Autocrat,* after denouncing verbicide, gives a pyrotechnic display of excellent puns. It is true, however, that the pun has found ad¬ vocates in divines, philosophers, statesmen and literati. Many puns convey a weight of mean¬ ing which could hardly be secured by sentences of paraphrase.

PUNCH, a well-known English comic weekly, the most famous journal of the kind. The success of Philipon’s Paris Charivari in¬ duced a staff

of several Englishmen — some, as Douglas, Jerrold, Thackeray and John Leech, since famous — to organize for the publication of a London Charivari, of which whole pages of text had been set up, when the scheme col¬ lapsed. This undertaking had, however, some indirect influence on the subsequent Punch. The idea of Punch appears to have been due originally to Ebenezer Landells, a Northumbrian wood engraver and draughtsman, and to have been developed by Henry Mayhew, a brilliant humorist of the time. “Mr. Punch® was the traditional jester of the puppet-show trans¬ formed into “the laughing philosopher and man of letters; the essence of all wit, the concentra¬ tion of all wisdom.® As finally agreed, May¬ hew, Mark Lemon and Stirling Coyne were to be coeditors, Landells was to find drawings and engraving, and Douglas Jerrold and Gilbert a Beckett were to be among the outside con¬ tributors. The first number appeared on 17 July 1841. In two days two editions, each of 5, p00 copies, were sold out. After some early vicissitudes, Punch became an English institu¬ tion. A list of its writers and artists includes many famous names besides the jovial Lemon and the caustic Jerrold; Thackeray, “Tom® Hood, Charles Lever, “Tom® Taylor, Cuthbert Bede, Horace Smith, Shirley Brooks, F. C. Burnand, Artemas Ward, G. A. Sala, H. W. Lucy, John Leech, H. K. Browne (“Phiz®), Sir John. Tenniel, George Du Maurier, Stacy Marks, Sir John Millais, Linley Sambourne and others. The editors have been Mark Lemon, 1841-70; Shirley Brooks 1870-74; “Tom® Tay¬ lor, 1874-80; Sir F. C. Burnand, 1880-1906; and Owen Seaman, 1906 — . Punch has done much to laugh out of court various shams, fads, affectations and forms of ostentation. In British politics it has remained wholly free from party bias. The present application of the word “cartoon® originated with Punch, the occasion being the first great exhibition of cartoons for the Houses of Parliament (July 1843), when Mr. Punch appeared with a rival series of sarcastic designs. Consult Spielmann, ‘The History of “Punch® *(1895) ; ‘An Even¬ ing with Punch) (1895), selections from the first 50 years; a Beckett, A. W., ‘The a Bec¬ ketts of Punch* (1903).

PUNCH, a beverage, commonly composed of wine or spirits,’ water, lemon juice and sugar, with occasionally an addition of some spice, as nutmeg or cinnamon. These are usually mixed in any desired proportions in a large bowl made for the purpose — hence called the punch¬ bowl. The beverage may be compounded as follows : Squeeze the juice out of three or four lemons, adding thereto the peel of one lemon cut in slices, 12 ounces of lump sugar and three and a half pints of boiling water; infuse this mixture for half an hour, then pour into the punch bowl, and add of rum and brandy rather less than a pint of each. Varieties of punch are called after one of their principal ingred¬

ients, gin, milk, orange, raspberry, tea, wine, *etc.* Punch was introduced into Great Britain from India, arid it appears to be so called from the

Hindu panch, five, which is the usual number of the ingredients.

PUNCH. See Metal-working Machinery.

PUNCH AND JUDY, in Great Britain and some European countries, a well-known puppet-show frequently exhibited in the streets. The show of Punch and Judy derives its origin from the Neapolitan Punchinello, but many of its features are purely English. The earliest ac¬ count of the adventures of Punch and his wife, Judy, is found in a ballad, the date of which does not appear to be anterior to 1795. This account corresponds pretty closely with the representations given in our streets. The show embodies a domestic tragedy, followed by a supernatural retribution, the whole of which is treated in a broadly farcical manner. Punch himself is represented as short and thick-set, with an immense hump upon his back, a wide mouth, long chin and hooked nose, and wearing a three-pointed cap. His wife, Judy, who is in some respects his counterpart, and his dog, Toby, are important characters in the perform¬ ance See also Puppet-shows.

PUNCHEON, a liquid measure of capacity containing from 84 to 120 gallons. See Weights and Measures.

PUNCHINELLO, pun-chi-nero (from pulcinello), an Italian mask or marionette. The Abbate Galiani derives the name from a mis¬ shapen but humorous peasant from Sorento, who had received it (about the middle of the 17th century) from his bringing chickens (pul - cinelle) to market in Naples, and who, after his death, was personated in the puppet-shows of the San Cailino Theatre, for the amusement of the people, to whom he was well known. See also Puppet-Shows.

PUNCTUATION, from the Latin punctus, <(a point,® is the term used to designate the use of points, or marks, for the purpose of separat¬

ing words from each other in sentences and parts of sentences. The convenience of such separation is obvious, yet for many centuries after writing had first been used there was nothing to indicate the pauses, or divide a book into sentences. No attempt to punctuate is ap¬ parent in the earlier manuscripts and inscrip¬ tions of the Greeks. It was in Alexandria that punctuation originated, when that city was the centre of ancient learning. The open space to the left of a line which indicates the beginning of a paragraph made its appearance on papyri at Alexandria. The early signs intended for punctuation were at first used in poetry only, to enable readers to comprehend the meaning hid¬ den in obsolete words and involved and difficult verses. Ages passed, however, before any form of punctuation became general, and it was not until the 9th century after Christ that the division of sentences by period, colon and semicolon marks took place. The comma was the same as to-day, a large dot or double dot indicated the full stop, and a high dot stood for a colon or semicolon.

The following rules for the use of the points are condensed from De Vinne's Practice of Typography. >

The chief purpose of the comma is to define the particles and minor clauses of a sentence. Reversed, and often in pairs, commas mark the beginning of a quotation. A reversed comma

marks the abbreviation of Mac in Scotch names, as M'Carthy. Reversed commas in tables are a sign for ditto. The comma fre¬ quently supplies the place of omitted words, as in addresses.

The semicolon keeps apart the more import¬ ant members of the sentence, and is most used in long sentences.

The colon is used after the particles or in¬ troductory words to another statement, as in to wit: viz: for example: Dear Sir: It is often used to separate hours from minutes, as 2:14, for 14 minutes past two.

The period marks the end of a completed sentence. It is also employed in abbreviations, as J. Smith, i.e., q.v., *etc.* It separates whole numbers from decimal fractions.

The dash has been substituted for almost all the points, being once much used to indicate suppressed words. It is employed to connect a side heading with the text that follows. It should be selected where there is an abrupt change in statement, as ((Thus the plot thickens -— but I weary you.® It serves to give addi¬ tional force to an anti-climax

: (<They will steal anything, and call it — purchase.® The inser¬ tion of a comma before the dash is now re¬ garded as unnecessary.

The parenthesis, usually shown in pairs, en¬ closes the words added to a sentence, which would be complete without it. The bracket has similar uses, but is preferred when the words introduced are not by the author, but added as explanatory by an editor.

The interrogation marks the end of a ques¬ tion that requires answer. It is not needed when the question does not call for an answer, as ((The Cyprians asked me why I wept.®

The exclamation marks a word or phrase in¬ tended to express great surprise or emotion; and is used also at the end of an exclamatory clause. <(Look, my Lord ! it comes !®

The apostrophe, most used to mark the pos¬ sessive case,, as in John's, is used also to show v the contraction of words, or omitted letters, as h'dV for handkerchief, I'll for I will, and the clipping of words in dialect, as nuthin' for nothing. . It is. also used to mark the close of a quotation, single or double. For all nouns in the plural number that end in s, the apostrophe must follow to make the possessive, as 'boys' games ; singular nouns ending in s call for 's, as James's book.

The first function of a hyphen is to mark the division of a word that carries into the next line, but it serves also to connect com¬ pounded words, as round-shouldered.

Consult Wilson, ˆTreatise on Grammatical

?iUonnxUation> 0850); Teall, <Punctuation> (1899) ; Cochrane, Punctuation and Capitaliza-tiotP (1908); Hart, <Rules for Compositors> (Oxford 1912).

PUNDIT, or PANDIT, an Indian title for men who devote themselves to the pursuit of learning, especially on religious subjects. It corresponds with the modern title of "Doctor.®

T-iˆec*aˆ applied to certain men who in the 19th century after being instructed by the English in the science of geodesy have ex¬ plored and surveyed Tibet, and other areas of Asia generally inaccessible to Europeans. The most notable of them were Mohammed i Hamid, who went (1863-64) over the Karakoram Pass

to the Yarkand River; the famous Naing Singh, who, between 1865 and 1875, brought back valu¬ able results from his travels in Tibet, and dis¬ covered the northern springs of the Indus ; Mirza Sudja, who (1868-69) crossed the Little Pamir to Kashgar and Ley; Haider Schah, who in 1870 made an expedition to Faizabad in the valley of the Oxus, and later explored the mountain ranges between Cabul, Bokhara and East Turkestan. Consult Garbe, Hndische Reiseskizzen) (1889).

PUNIC (pu'nik) WARS, in ancient history, the general name applied to three great wars between the Romans and the Carthaginians. The first (264-241 b.c.) was for the possession of Sicily, and ended by the Carthaginians hav¬ ing to withdraw from the island. The second (218-202 b.c.) , the war in which Hannibal gained his great victories in Italy, was a death struggle between the two rival powers ; it ended with decisive victory to the Romans. The third (149-146 b.c.) was a wanton one for the de¬ struction of Carthage, which was effected in the last-named year. See Carthage.

PUNICA. See Pomegranate.

PUNISHMENT, in the strict sense of the term, is a definite expression of public in¬ dignation, at least conventional, if not genuinely moral. It always aims, at least, at expressing the indignation of the social group, and in this resides the fact that it is only externally similar to the earlier custom of revenge which, theoretically, is private. Public indignation, like non-moral resentment, or revenge, is a re¬ actionary state of the group consciousness di¬ rected toward the cause of inflicted pain or other injury. And even punishment is, as in the cases of blood-revenge, frequently in¬ discriminate. In these cases punishment not infrequently falls on the relatives of the culprit. The nature of punishment necessarily involves suffering in the form of pain or loss of honor, place, power, liberty, property or even life. It implies forfeiture of what would otherwise have been admitted to be a right inhering in the sufferer, who suffers because he has per¬ petrated a wrong. The common will is not, as Rousseau informs us, <(the sum of the indi¬ vidual wills.® The common will is the product of social life, and it is the will of establishing the solid foundations of peaceable interrelations among the members of a community. There be¬ ing a stern necessity of social bonds under penalty of extinction, to the whole community, the common will develops a most powerful tribal conscience demanding universal obedience to certain general rules called laws. All the citizens of a community may well be said to agree in this, that everybody regards himself as exempt; wherever

there are laws all know there are some who will disobey them. The primary object of punishment is in every in¬ stance to maintain or restore the common will or social order. Our legal system in all its parts is a virtual confession of man's incapacity for individual self-government. (<It is when a man can do as he pleases,® says Huxley, <(that his troubles begin.® Statutory law is the will of a nation published in written and enduring form for the information of those subject to it. And yet after everything is done that can be done to instruct people as to what the public good requires, we always find two classes:

those who abide by the demands of the public will, and those who do not. How shall the state treat those who wilfully violate its statutes? What shall be done with those who are both mentally capable of understanding its demands and who are physically able to conform to them, but still act directly counter to their requirements ?

Such questions have been asked since man became a member of society: and the answer given was, punish them, or ((cure® them. Such was the origin of punishment. The advocates of this treatment of public offenders saw its justification in many principles. Some saw in punishment a vindication of the law; others protection (which too often is inspired, how¬ ever, by mere revenge and forgetful of the fact that two wrongs do not make a right) ; ®example® was the purpose of still others (but these not seldom revealed an inclination to ignore all sense of proportion, and the degree of guilt) ; a recent development is the idea of reformation. Of all the foregoing, the notion of making an example is perhaps the least worthy, being an (unconscious, it may be) ex¬ pression of mere vindictiveness. It is alleged to be a deterrent theory. Could the infliction have any deterrent effect at all upon just people unless it was supposed that the person punished was receiving his actual deserts? Reflection will, we feel certain, teach anyone that punish¬ ment out of all proportion to the degree of guilt would have just the opposite effect upon the just if they thought otherwise.

In every society the traditional notions as to what is right and wrong, obligatory or morally indifferent, are all too commonly accepted by the great majority without any further reflec¬ tion. At their source not a few of these notions have their origin (sociology shows this) in

sentimental likings and antipathies. The moral estimate all too frequently survives the cause from which it sprung; and no enlightened judge could fail to see that while this is so, the operation of ((example® as a punitive principle would lead to flagrant injustice, for many times the moral estimates that come down to us from our fathers have no foundation in existing conditions.

Considered etymologically the word punish¬ ment would, it was hoped, throw some light upon what was uppermost in the minds of its advocates through the ages. That etymology is as follows : Punishment derives from Old French punir, which in turn comes from Latin punire, to punish, from poena, punishment, ex¬ piation, pain; and this is from the Greek t volvt] (poine), meaning quit-money or fine for blood spilled. The Greek word finds its cognate in the Sanskrit Ki, to repay, which is related to the Zendish kitha, penance, and kcena, vengeance ; these Aryan words are re¬ lated to the Slavonic cena, a price. But valu¬ able as these suggestions are one cannot expect, as Professor Wundt observes, to find much help from etymology; for ((the phenomena of language do not admit of direct translation back again into ethical processes. The ideas them¬ selves are different from their vehicles of ex¬ pression and here as everywhere the external mark (or word) is later than the internal act for which it stands® (Wundt).

Remembering all this, it may not be far out of the way to admit that punishments should

be graduated according to the degree of harm of an offense to society and according to the attractiveness of the offense to the offender; and not out of a desire to set an example. Its intrinsic object is to remove the (<sin® not the <(sinner,® but the cause of danger and of pain.

Punishment, in Western countries and nowadays, is seldom applicable to civil actions though these also are followed by compulsory payments of moneys, or failing this, by depriva¬ tion of property, liberty, *etc.* As the legal consequence of crimes, however, punishment consists chiefly of infliction of pain on the body; and this ranges from capital punishment, or death, down to imprisonment. In some in¬ stances whipping is added ; and formerly in military and naval offenses, flogging. In crimes of lesser degree, imprisonment or penal servi¬ tude for a term of years is the punishment.

Since very early times a constant change in the. treatment of punishment has been going on in civilized states. Its treatment may be di¬ vided into two parts ; in the first place there is detection, arrest, trial and acquittal or convic¬ tion; in the second, treatment of the criminal alter conviction. The acquisition by the state of the power to dispense justice and to make and enforce law is one of the greatest events in the whole of human history. It is the treat¬ ment of criminals after conviction that concerns us chiefly here; but as this penology can scarcely be understood in its development with¬ out taking into consideration the other division of the treatment of crime, called criminal pro¬ cedure, we will approach it from this point of view.

The original motive in the treatment of offenders was that crude vengeance, the useful¬ ness ˚f which in maintaining the instinctive idea of order in primitive societies has been often studied by sociologists. The danger of free vengeance is not alone that the injured may wreak out atonement upon the innocent, but also that the infuriated avenger will limit the punish¬ ment he inflicts only by the degree of bitterness and hate he personally feels. In this way the original culprit feels that the vengeance he has felt (and his friends join him in his feeling), that the excessiveness of his suffering, now in¬ vites him to retaliate. Thus matters tend to grow worse and worse; and soon family and clan are embroiled in a permanent and destruc¬ tive feud. Then a want clamors for relief. It grows into a demand and

the demand finds a spokesman for reform in the person of a chieftain or other leader. For the hopeless tendency to engender feuds leads to reforms by which the chieftain seeks to suppress private revenge. Then <(Vengeance is mine, I will re¬ pay® is the claim of the savage ruler. It is at this point that we find the emergence of a primitive criminal and civil procedure in all eoples that have risen out of savagerv to bar-arism, and the earlier stages of civilization, for it is here that the offended party goes before a judge to demand vengeance against his adver¬ sary. The purpose of this primitive court is to inflict such penalties that the injured party and bystanders will feel that justice has been done, so that these persons will be con¬ tent to abstain from private revenge. Retribu¬ tive justice means just such severity as group consciousness at this low stage of progress can witness with satisfaction. Next cupidity is

pitted against hate, for the influence of au¬ thority is in favor of substituting redemption for penalties that kill or maim the fighting men of the tribe; and thus is instituted the compositio, the -wergild and other fines; that is where the complainant is willing and content to sell his right of vengeance.

Ihus the realization of <(right® is from the beginning a social function. The idea of right being incorporated in the chieftain played an important part in bringing about the acquisition by the state of power to dispense justice; and moreover the religious tendencies worked to the same end. Wickedness was held to be an in¬ jury to the deity, whose anger would be visited upon the entire land; a conception that lasted far down into the Middle Ages, and according to which the fate of Sodom and Gomorrah was held to be typical of the effect of the curse from God. Already in primitive times religion led to a strange idea of justice; secret societies conse¬ crated by the deity (Dukduk, Egbo) took upon themselves the function of enforcing (< right,® instituting reigns of terror in their districts, maintaining order in society and claiming authorization from the god with whose spirit they were permeated. Later influenced by all these tendencies, the social aggregate took over, the control of justice. It was already considered to be the upholder of right, the serv¬ ant of the gods, the maintainer of public peace, the dispenser of sacrifices ; and so the various elements conceived of as justice, which had previously been distributed among the single families, tribes, associations, societies, were at last combined and placed under state control.

Forms for the dispensation of justice judg¬ ing of crimes, determining

of punishments de¬ veloped into judicial procedure, which for a long time bore a religious character. The Deity was called upon to decide as to ((right® and ˆwrong.® Hence those terrible judgments of God through trial by water, fire, poison, ser¬ pents, scales, combat or decision by divining eye, so closely allied to the so-called trial by hazard. The cruel maltreatment of elderly people suspected of witchcraft in early New England is familiar to all. A peculiar variety of ordeal is that of the bier, according to which the body of a murdered man is called into re¬ quisition, the soul of the victim assisting in the discovery of the murderer. An advance in pro¬ gress is the curse, which takes the place of the ordeal. Thus arise those ordeals by invocation and by oath with cowipuvgQtoys . Witnesses sue-ceeded to conjurors; divining looks were re¬ placed by circumstantial evidence; and instead of a magical, a rational method of obtaining testi¬ mony was adopted. This development was not attained without certain attendant abuses; and the abolition of ordeal by God was among many peoples, notably among the inhabitants of east¬ ern Asia, some tribes of American Indians and the Europeans of the early Middle Ages, succeded by the introduction of torture! Years ago August Comte maintained that the institu¬ tion of slavery was the greatest single step up to his day in the progress of human culture, since it superseded a great amount of slaughter, with or without cannibalism. The practice of eating the criminals, which is quite a common form of cannibalism, seems to be largely due to revenge or indignation. In Lepers' Island,

in the New Hebrides, the victims of it were not generally enemies who had been killed in fighting, but it was a murderer or a particularly detested enemy who was eaten in anger and to treat him ill. In many lands torture stood in close connection with the judgment of God. That this is so is no more remarkable than the fact that religious intolerance which accom¬ panied the rise of monotheism was the result of the nature attributed to its God. Torture in other cases originated either directly or in¬ directly from slavery. To obtain evidence by torture the accused person was forced through physical suffering to make disclosures concern¬ ing himself and his companions ; and in case he himself was considered guilty, to a con¬ fession.

The development of Hebrew teaching on the subject will reveal the stages through which the notion of justice® passed. First there is the injunction to moderate vengeance and lex-talionis appears with its demand for an ((eye for an eye.® Second, we must leave vengeance to rulers. And lastly, ((love your enemies, do good to those who despitefully use you, for¬ give as you hope to be forgiven.®

Retaliation is finally seen to be a continua¬ tion of a moral disease ; not a cure. The idea of loving one's enemies .is found in the books of Saint Matthew, Saint Luke and Saint Mark; Lao-Tsze and Mang-Tsze voiced these sentiments in ancient China ; we find them expressed in the Brahman Laws of Manu; Buddha taught that the hatred and revenge is hot appeased by hatred (it ceases by non¬ hatred only) ; we find the same notion in Leviticus, Plato, Pliny and Epictetus, taught it to the classical world ; and in the same spirit Jesus taught in His Sermon on the Mount;

((Ye have heard that it hath been said: An eye for an eye, and a tooth for a tooth : But I say unto you, That ye resist not evil.® We only point out the truth of the sentiment which prompted these sayings and which should be expressed in the sentence : ((resist not evil with evil.® Evil must be resisted ; but we must not retaliate. The rule of retaliation and the rule of forgiveness are not so radically opposed to each other as they appear to be. What the latter condemns is in reality

not every kind of resentment, not impartial indignation ; but personal hatred. Jesus himself certainly was not free from righteous indignation. More¬ over the belief in a transcendental retributive justice, in an ultimate punishment of badness which we meet with in Taoism, Brahmanism, Buddhism and Christianity, side by side with the doctrine of forgiveness is founded on the demand that wrong should be resented. What is taught by all the great teachers who have been mentioned is good will to the good and to the bad alike. This is based on the con¬ sideration that all creatures, both good and bad alike, are ultimately products of circum¬ stances; and, therefore, that the bad deserve compassion, not hatred. A novelist (George Eliot) has told us that it was the illusion® of one of her characters that he trusted (<in his own skill to shape the success of his own mor¬ rows, ignorant of what many yesterdays had determined for him beforehand.® The modern Italian school of criminology strikes this note again and again ; it is a diapason whose slow and solemn vibrations, communicated to their

own meditations, all readers of the literature of the new criminological determinism of Italy, will recall.

The laws of ancient Rome still command respect and in cases obedience in many civil¬ ized communities. We note the following pun¬ ishments meted out to the offender in ancient Rome : There was the mulcta, or fine ; vincula , imprisonment or fetters; verbera, or stripes; talio, or infliction of punishment similar to in¬ jury, limb for limb; infamia, public disgrace, by which the delinquent, besides being scandalized, was rendered incapable of holding public office and deprived of other privileges of Roman citizenship; exilium, banishment (aquae et ignis interdictio accomplished this) ; servitus, or slav¬ ery; mors, death either civil or natural (banish¬ ment and slavery are civil death). Natural death was brought about by beheading, scourg¬ ing, strangling or throwing the criminal headlong from the Tarpeian rock, or from the place in a prison, from the Robur. Many have been the changes. Capital punishment has ceased to be a retaliation and has become more and more a mere protection against the repetition of a crime. As it would be wrong to leave a tiger abroad so a man who by his very nature is a murderer should not be allowed to remain at liberty. Since imprisonment is on the one hand not a sufficient guarantee for the safety of society and on the other hand is perhaps a more cruel treatment than death, capital punishment remains, under our present civilization, still a necessity of our penal code. Yet in all this the attempt is no longer made, to retaliate on the

murderer the cruelties which he has committed ; it is a maxim that the death punishment should be inflicted with as little pain as possible. The infliction of pain is not an act which men now regard with indifference, even in the case of the criminal, and to many enlightened minds it has appeared both unreasonable and unjust and cruel that the state should wilfully torment a criminal to no purpose. But while retributive punishment has been condemned, punishment in a new sense has been defended and looked upon in a different light, not as an end in itself, but as a means. It is to be inflicted not because wrong has been done but in order that wrong may not be done. Its object is held to be either to deter from crime or to reform the criminal and by means of elimination or seclu¬ sion to make it impossible for a criminal to commit fresh crimes. In the case of capital punishment the criminal is simply no longer allowed to live and it has ceased to be a re¬ venge or retaliation. It has become a cure founded on the experience that a man who com¬ mitted one murder is likely to commit a second murder. Hence a man who has killed another not on account of his innate or inbred murder¬ ous inclination, but through the unhappy com¬ plication of circumstances (under an unwritten law), will not be treated as an habitual mur¬ derer; and according to the laws of all civil¬ ized countries is not punishable by death.

Behind bars no criminal ought to be pam¬ pered, but should receive prison fare and prison treatment in accord with the regula¬ tion of the place where his deeds have brought him. For all this is curative. An execution for murder is merely the removal of a danger¬ ous member from society and this for the same reason that a limb of the body infected by in-

curable disease must be amputated. Some re¬ cent tendencies by some well-meaning people are so naive that one is tempted to call them childish ; the conventions of society cannot be abandoned to alleviate the sufferings of crimi¬ nals. To do so would be to act about as logi¬ cally as it would be to abandon all medicine that leaves a bad taste in a patient's mouth. At the same time most lawyers might well remember that life is preferable to rules of health and that not a few of our laws are capable of becom¬ ing outgrown. Our penal laws are not as yet fully adapted to the new view. All our minor punishments are still retaliatory, which fact makes our prisons all too frequently breeding places of crime and vice, instead of what they ought to be, namely, moral hospitals. Perhaps a just test of any penal system is to be found in the quality of discharged convicts, and accord¬ ing to Mr. Eugene Smith, president of the Prison Association of New York it is a notori¬ ous fact that the most desperate class of crimi¬ nals consists of discharged convicts.

PUNJAB, pun-jab', or PANJAB (Persian, ((Five Waters®), an extensive territory in the northwest of Hindustan, formerly under the dominion of the Sikhs, but in 1849 annexed to British India. It is so called from its position, being intersected by the five great rivers which unite to pour their waters into the Indus. In 1901 the northwestern part of the Punjab was separated to form a chief commissionership under the government of India (see North¬ west Frontier Province). The lieutenant-governorship as thus limited is bounded on the east by Kashmir, Tibet, and the river Jamna; on the south by Sind and Rajputana, the river Sutlej being in part a boundary river; on the west by Baluchistan and Northwest Frontier Province; on the north by the Northwest Fron¬ tier Province. For administrative purposes it is divided into divisions (Jalandhar, Lahore and Rawal Pindee). Lahore is the capital, while Amritsar, the sacred city of the Sikhs, is the next largest city, since Delhi has been detached. Simla, the mountain capital, is within the province, and is the residence of the viceroy during the hot season. Murree is the summer headquarters of the military corq-mand. The total area of the province is about 95,000 square miles, with a population of about 19,974,956. The area of the Native States is 38,299, with a population of about 4,250,000.

General Description. — The province of the Punjab is a triangular tract of land between the Sutlej and the Indus, and, with the excep¬

tion of the hill country on the slopes of the Himalayas, it is a great alluvial plain. On the northeast side is the margin of the Himalayas, on which there are beautiful sanitaria, or hill stations — ■ Simla (the mountain capital of India), Dagshai, Sabathu, Kassauli, Dharmsala, Dalhousie and Murree, the military headquar¬ ters of the province. The country between Jhelam and the Indus is known as the salt range, as it contains inexhaustible mines of rock salt which have been worked for many centuries. It is abundantly irrigated by six rivers. These rivers (proceeding from west to east) are the Indus, the Jhelam (ancient Hydaspes) , Chenab (ancient Acesines) , the Ravi (ancient Hydraotes) , the Beas (ancient Hyphasis) and the Sutlej (ancient Hesudrus).

The Jhelam and Chenab unite their waters, and then are joined by the Ravi; the united stream is then augmented by the Sutlej, whi.ch has pre¬ viously received the Beas. The combined waters of these rivers form the Panjnad, which joins the Indus near Mithankot. The rivers of the Punjb divide it into five districts, or doabs (countries between two rivers) : namely, the Sind-Sagar Doab, between the Indus and Jhe¬ lam; the Jech Doab, between the Jhelam and Chenab ; the R'echna Doab, between the Chenab and Ravi; the Bari or Manja Doab, between the Ravi and Beas; and the Jallandar Doab, between the Beas and Sutlej. Of these the first is by far the largest, but also the most sterile and least inhabited, abounding with bare eminences and rugged declivities, inter¬ spersed here and there with rich and fertile valleys. The second is mostly level, and has been described as (<a sterile waste of under¬ wood,® the abode of shepherds, and scantily irrigated ; the Rechna Doab is bare and neg¬ lected, though susceptible of high cultivation ; the Bari Doab, though bare, has a large sur¬ face under cultivation, and is the most popu¬ lous and important of all, containing the large towns of Amritsar, Multan and Lahore ; while the Jallandar Doab is highly cultivated, well peopled and excelled in climate and produc¬ tions by no province in India. Speaking gen¬ erally, the plains east of Lahore are the most fertile, wealthy and populous of the province, and the granary of the Punjab; while those on the west present a striking contrast. The soil of the level country varies remarkably from stiff clay and loam to sand, mixed with each other in variable proportions, and with vege¬ table matter; besides which, carbonate and sul¬ phate of soda are sometimes mixed with it in such quantities as to render the land almost worthless. The mineral wealth of the Punjab is almost confined to its rich deposits of rock salt. The climate is hot and dry, and little rain falls, except in the higher country and under the influence of the

southwest monsoon. The part of the province to the east of Lahore can be cultivated in most seasons without irriga¬ tion, but owing to this its crops are much more likely to fail from a deficiency of rainfall than those of the western irrigated tracts. The summer heat is very great, and in the early part of January sharp frosts are common.

Vegetation, Agriculture. — Wood is scarce, except upon the hills. In the west consider¬ able areas are occupied by date-trees ; and palms of other species, banyans and other trees are found here and there. The area under for¬ ests is over 4,250,000 acres. About 28,000,000 acres of the remainder are under cultivation, and over 20,000,000 acres more are available for cultivation. The principal grain crops are wheat, barley, rice, buckwheat and millet, pease, vetches and mustard; sesamum and other oil seeds, turnips, carrots, onions, cucum¬ bers and melons. Indigo and sugar are ex¬ ported. The tobacco plant grows luxuriantly, especially about Multan, and opium has been grown somewhat extensively. About 8,750,000 acres are under wheat, and over 750,000 under rice. The total irrigated area exceeds 9,000,000 acres, of which more than half is irrigated by canals. Among the fruits are the date, orange, fig, vine, apple, mulberry, banana and mango.

1 he livestock includes sheep, cattle, horses and camels ; buffaloes are common.

People.— The population of the Punjab is composed of various races, the chief of which are the Jats, Rajputs and Pathans. The Jats form the bulk of the agricultural peasantry, and are tall and athletic, with handsome, open countenances, long beards and fine teeth. The people, generally, are in physical respects supe¬ rior to those of Bengal. The native states subordinate to the Punjab government are 36 in number. Thirty-one are Hindu and five Mohammedan. The most important is Kash¬ mir, the next Patiala. The Mohammedan state of Bahawalpur is the next followed in order by Kapurthala, Mandi, Sarmur, Farid-kot and Malarkotla. The other states are in¬ significant in rank and consequence.

Religion. — The religion of the Sikhs, which is the national religion of the Punjab, was founded by Nanak, who was born a. d. 1469. The Golden Temple at Amritsar is the centre of the faith and the guardian of the sacred book known as the Adi Granth (see Sikhs). The distribution of the population according to religious profession is almost wholly Moham¬ medan and Hindu, there being some Sikhs, and a sprinkling of other religions. The American Presbyterian Board of Missions has important stations at Lahore, Ludianah and Umballa. Lahore is the seat of both a Church of England bishop and a Roman Catholic bishop. The Mohammedans form a very large part of the population of the Rawal Pindee and Multan divisions. The Hindus predomi¬ nate in the easterly divisions and in the moun¬ tainous district of Kangra. The Sikhs reside chiefly in the centre and east of the province and constitute the mass of the gentry. The few Buddhists of the Punjab are almost en¬ tirely confined to the small Spito district in the extreme northeast. The Pathans and Baluchis are the most numerous of the Punjab Moham¬ medans by race, but the Mohammedan strength consists largely in converted Hindus belonging to the Jat and Rajput tribes. The Hindu Jats form a large proportion of the population.

Language and Education. — The chief lan¬ guages spoken in the

Punjab are Punjabi (known as Gurmukhi), Hindi, Sindhi, Jataki, Kashmiri, Pushtu, Persian and English. Since the country came under British rule elementary education has received much attention. The total number of educational institutions in the Punjab is about 8,000. with a total of over a quarter of a million scholars. Of the higher educational institutions of the province the fol¬ lowing may be mentioned: — the Punjab Uni¬ versity at Lahore ; Lahore Government Col¬ lege; Oriental College; Saint Stephen's College, Delhi ; Lahore Medical School ; Saint Thomas College, Murree ; the Khalsa College, Amrit¬ sar; Bishop Cotton School, Simla; and the Lawrence Military Asylum, Sanawar.

Manufactures and Trade. — The manufac¬ turing industry of the Punjab is chiefly confined to the larger towns. Amritsar, Lahore, Mul¬ tan and Shujabad are distinguished for their silk and cotton fabrics, and the silks of Mul¬ tan called kais, and chiefly used for scarfs, possess a strength of texture and brilliancy of color for which they are much prized in the Indian markets. The shawls of Lahore, too, rank only second to those of Kashmir. Bro¬

cades, tissues and carpets, resembling the Per¬ sian, are also manufactured in the capital. In the east of the Punjab white cotton goods are prepared of a stronger and more durable tex¬ ture, as well as cheaper, than those of British manufacture. The Punjab enjoys from its position an extensive transit-trade. The im¬ ports comprise sugar, spices and other gro¬ ceries, dyestuffs and cottons, woolen and silk fabrics, metals and metallic utensils, cutlery, precious stones, ivory, glass and cochineal, asafoetida, safflower, fresh and dried fruits, wool, horses, *etc.* The. exports — partly of home produce, partly in transit — comprise grain, ghee, hides, wool, silk and cotton fab¬ rics, carpets and shawls, raw silk and cotton, indigo, tobacco, hardware, horses, *etc.*

Government and Revenue. — The province is under a lieutenant-governor, assisted since 1897 by a legislative council of nine members. The most important item of revenue is the land-tax, which, on the average, yields a net revenue, after deducting charges, of nearly £2,000,000; besides there are excise duties on spirits and drugs, duties on stamps, *etc.* The financial condition is so favorable that there is often a clear surplus of revenue over expendi¬ ture of £2,500,000. About one-half of the whole cultivated area of the Punjab is tilled by owners, and about 1 per cent by tenants paying a nominal or no rent. Of the remaining area one-fifth is cultivated by occupancy ten¬ ants,

and the rest is held by tenants-at-will, a class increasing in numbers from year to year. Rents vary from five annas to 40 rupees per acre, the average being about two and two-thirds rupees. On about two-thirds of the land held by tenants-at-wifl the rent is wholly or partly paid in kind, and the average rent payable in kind is for the whole province about two-fifths of the produce. Nearly 5,000,000 acres are under mortgage.

Army and Police. — The Punjab forms a military district called ((The Northern Com¬ mand, w under a lieutenant-general with head¬ quarters at Rawal Pindee. The military au¬ thority of this officer extends to the Northwest Frontier Province. The military cantonments are Rawal Pindee, Peshawar, Noroshera, Abbottabad, Sialkor, Jhelum, Lahore, Jullun-dur, Sirhind, Umballa, Forozepore, Kohat, Bannu and Murdan under a lieutenant-general. The military force stationed in the Punjab in 1900 consisted altogether of 68,806 men. Of cavalry there were 11,893, of infantry 50,504, of artillery 6,120, with some engineers, *etc.* There were thus more troops in the Punjab than in any other division of India. The police force is stated to be in a most effective condi¬ tion. It numbers about 20,000 men, divided into two divisions, the Trans-Sutlej and the Cis-Sutlej. Almost all the police are armed either with swords or guns. The Punjab has a jehief court with five judges, two of whom are natives — and four temporary judges.

History. — The Punjab plays an important part in the history of Hindustan and British India. It was invaded in 327 b.c. by Alexander the Great, who defeated Porus at Mong in Gujerat and overran the whole country. In 1022 it was overrun by the troops of Mahmud of Ghazni, whose successors held the country for 170 years, making Lahore the seat of their government. In 1193 it passed by conquest into

the hands of Mohammed Ghori, and Delhi be¬ came the capital. After his death the country was ruled by a succession of turbulent chiefs, principally Afghans, till at length in 1526 Baber, the founder of the Mogul Empire, having ob¬ tained possession of the country, ascended the throne, and established a dynasty whose sway prevailed for about two centuries, during which the Sikhs were rising into importance. In 1738 Nadir Shah overran the Punjab, and in the following year he defeated the Mogul army at Karnal and sacked Delhi. The Sikhs were ut¬ terly defeated by the Afghan conqueror Ahmed Shah Durani in 1762, and the Moguls nominally ceded the Punjab to him. The Durani dy¬ nasty maintained its ascendency till the begin¬ ning of the 19th century, when the Sikhs under Ranjit Singh began their career of conquest. In 1818 this renowned chieftain stormed Mul¬ tan and took Peshawar — in the following year conquering Kashmir and Deraj at west of the Indus; and in 10 years he succeeded in estab¬ lishing his power over the whole country. In 1839 Ranjit Singh died. His son Khorak Singh quietly succeeded, but died of a de¬ cline a few months after his father, on which Shere Singh, a natural son of the great Ranjit, assumed the sovereignty, but was assas¬ sinated 15 Sept. 1843. Dhulip Singh, the re¬ puted son of Ranjit Singh, succeeded his brother. This young prince was converted to Christianity and retired on a princely pension to England, where he died. But from' the close of 1843 to the period of its annexation to British India the government was in abeyance, or, what is worse, in the hands of an ignorant, bloodthirsty, rapacious and insubordinate army. At length it became manifest that the Sikhs of the Punjab were preparing for an irruption into the territories protected by the British on the east of the Sutlej. In the end of December 1845, the Sikh forces passed the Sutlej into the territories protected by the British, with a most formidable train of artillery, but they found themselves completely worsted after the hard-fought actions of Mudki, Ferozeshah, Aliwal and Sobraon. Lahore and other stations were afterward occupied by British troops : the Jallandar Doab, between the Sutlej and Beas, was permanently ceded to the British; and the province of Kashmir and the other provinces • of the Himalayas were vested in the Rajah Gholab Singh. In 1849 a conspiracy between several disaffected chiefs and the Afgans re¬ sulted in further hostilities against the British, Multan being the centre of their operations. The indecisive battle of Chillianwalla was fol¬ lowed by the capture of Multan in January, and the. victory of Gujerat in February 1849, since which period the former territories of the

Sikhs have formed an integral part of the British Empire. The most important subse¬ quent event in the history of the province was the Indian . Mutiny, when the Sikhs were loyal to the British government, and the present Sikh regiments of the British native army form the most important section of the military strength of the empire, the Sikhs and the Gurk¬ has being esteemed by many critics the finest soldiers in . the world. After the suppression of the mutiny the province was erected into a lieutenant-governorship under Sir [ohn Law¬ rence, the distinguished statesman.

Bibliography.— Consult Cunningham, ‘Ar¬

chaeological Survey of India, > Vol. XIV (Lon¬ don 1882) ; Gore, ‘Lights and Shades of Hill Life in the Afghan and Hindu Highlands of the Punjab) (London 1895) ; Latif, ‘History of the Punjab from the Earliest Antiquity to the Present Time) (London 1896) ; Medlicott, ‘Sketch of the Geology of the Punjab 5 (Cal¬ cutta 1888) ; Prinsep, ‘History of the Punjab5; Griffin, ‘The Rajas of the Punjab5 (2d ed., London 1872) ; Honigberger, Thirty-five Years in the East5 ; Edwards, ‘A Year on the Pun¬ jab Frontier ; Clark, ‘Thirty Years of Mis¬ sionary Work in the Punjab5; ‘Punjab Ga¬ zetteer5 (Calcutta).

PUNJABI LANGUAGE AND LITER¬ ATURE. Punjabi (also Panjabi from Persian Punjaubi—* Five Rivers55) is an ancient Indian or Hindi dialect. Of a total population of about 26,000,000 inhabiting the Punjab (or Panjab) a large district in northwest India, some 18,000,-000 to 19,000,000 speak Punjabi as their common vernacular; some 4,000,000 use Hindustani, the remainder speak the hill dialects; the Pahari 6 Hindustani is, however, employed in the law courts and officially in all intercourse with the natives. Punjabi has been enforced by many words borrowed from Persian and Arabic, and is, therefore, an Aryan language belonging to the central group. But the number of original Sanskrit words in its vocabulary (called tats am a) is small, especially when compared with Bengali and Uriya (two eastern forms of Hindi). Punjabi again has a number of dia¬ lects, fusing into one another, as is invariably the. case with dialects throughout India. The main ones of these are Multani (in the south) which partakes both of Punjabi and Sindhi* next, Jathki (in the Centre) and Chibhali-Dogeri (in the north). There are also several alphabets in use, the most ancient of which is Gurmukhi, derived from the Dervanagari al¬ phabet, a Sanskrit form, though somewhat altered, omitting also, a number of signs. The Gurmukhi is likewise in vogue among the Sikhs. Then there is the Lundi alphabet, used for com¬ mercial purposes.

However, the British gov¬ ernment adopted the Arabic character, as being the most convenient for the purpose. There is really no literature in Punjabi, with the single exception of the Sikh Granths. Parts of the Bible, though, have been trans¬ lated into Multani and Chibhali-Dogeri. The Sikh Granths in Punjabi, or Adi Granth, are a compilation of the laws and precepts of the Khalsa, a peculiar sect whose holy city was Amritsar, founded by Manak. The Khalsa (lit., the. Pure) aimed in their teaching partly for political, partly for religious reasons, at the brotherly amalgamation of Hindus and Moslems in the Punjab. For several centuries the Khalsa played a conspicuous role in that portion of India. This was more especially the case during the 17th century. Under British influence, however, the Khalsa gradually ceased to promulgate their doctrine. The Granths spoken of, show the Punjabi vernacular at its best. Consult Bhai Maya Singh, 'Punjabi Dic¬ tionary5 (Lahore 1895) ; Bailev, Wm, 'Punjabi Grammar5 (ib. 1904) ; Grierson, Sir G. E 'Linguistic Survey of India: Western Hindi and Punjabi5 (Vol. IX, part I, Calcutta 1908).

Wolf von Schierbrand, Author of ' America, Asia and the Pacified

PUNJNUD, or PANJNAD («the five rivers^), a stream of the Punjab, formed by the Sutlej, Beas, Ravi, Chenab and Jhelam, whose waters it carries to the Indus (q.v.), about 490 miles from the sea near Mithankot. The Punjnud bounds Punjab and Bahawalpur in part of its course.

PUNKAH, a large swinging fan used in India and other hot countries for ventilating rooms. It consists of a movable frame of wood covered with canvas or the like and suspended from the ceiling. It is pulled backward and forward by means of a cord, and thus causes a movement of the air in the apartment.

PUNO, poo'no, Peru, (1) town, capital of the department of Puno, on the west shore of Lake Titicaca, 12,870 feet above sea-level, and 90 miles east by south of Arequipa. It has two churches, a college and a hospital. A railway runs to Arequipa and to Mollendo on the Pa¬ cific.

Pop. 6,000. (2) The department of

Puno; area, about 41,198 square miles, is moun¬ tainous. The principal crops are potatoes and barley, but it is particularly distinguished by the extent of its pastures, cattle raising being the chief occupation. Its principal exports are the wool of the sheep, llama, alpaca and vicuna, and some cascarilla bark from the valley of Carabaya. Pop. about 540,000.

PUNSHON, William Morley, English Wesleyan Methodist clergyman: b. Doncaster, Yorkshire, 29 May 1824; d. London, 14 April 1881. He studied at the Wesleyan College, Richmond, and in 1845 was received into the ranks of the ministry, his ordination occurring in 1849. He held charges in Newcastle-on- Tyne, Sheffield, Leeds, London and Bristol and became famous as a preacher. In 1868 he went to Canada where he worked assiduously to strengthen the position of the Methodist Church and he became widely known as a preacher and lecturer in both Canada and the United States. He was five times president of the Canadian Conference, and in 1873 he returned to England. He was elected president of the Conference in 1874 and in 1875 became one of the general secretaries of the Wesleyan Methodist Missionary Society. Author of Sab¬ bath Chimes,* verse (1867) ; (Sermons and Lectures> (3 vols., 1882-84). Consult Mac¬ donald, F. W., (Life of William Morley Punshon) (1887).

PUNT, poont, an ancient country on the Red Sea, whether in Asia or Africa is disputed. The country is mentioned a number of times in the Egyptian hieroglyphics, and such records show that the Egyptians obtained from Punt ostrich feathers, leopard skins, gold, incense, ivory, precious woods and various ornaments. There are good reasons for locating Punt where is now Somali Coast and Abyssinia. Accounts are given of journeys to Punt, undertaken by command of monarchs. Queen Hatshepsut sent thither a whole fleet, and the account of the voyage, the persons and places seen in Punt were recorded on the walls of the temple of Deir el-Bahri. Consult Muller, (Asien und Europa) ; Naville, (Deir el-BahrP ; Erman, (Life in Ancient “Egypt. >

PUNT, an oblong flat-bottomed boat used for fishing and shooting in shallow waters. The most common mode of propulsion is by pushing with a pole against the bottom of the river, or

stream, a process which is hence called punting. Also a similar boat used for racing on the Thames, England.

PUNTA ARENAS, poon'ta a-ra'nas (Sandy Point), Chile, port and capital city of the terri¬ tory of Magellanes, at the extreme end of Pata¬ gonia (lat. 53° 10' S.), and lying in a plain bounded by the rivers Las Minas on the north and La Mano on the south, with wooded hills back of the river. The city is a coaling sta¬ tion for steamers passing throught the Strait of Magellan, and as such has of late years risen to considerable importance. The surrounding country produces rye, barley, potatoes and other similiar crops and the timber exported to the Falkland Islands. The seal fisheries are con¬ siderable. The city has banks, stores, hotels and an opera-house. The site was made a penal colony in 1843 and the town was founded in 1849. Pop. about 20,000.

PUNXSUTAWNEY, Pa., city in Jefferson County, situated on Mahoning Creek and on the Pennsylvania and North Western, the Buffalo, Rochester and Pittsburgh and the Buffalo and Susquehanna railroads, about 90 miles north¬ east of Pittsburgh. It is the business centre of a great bituminous coal and coke region and the headquarters of the second largest producers ot bituminous coal and coke in the United States. There are also large iron furnaces and numer¬ ous smaller industries. It is also the centre of a rich agricultural territory. Punxsutawney af¬ fords exceptional advantage for manufacturers of iron and steel products, as the pig iron is manufactured here and the coke to smelt it is also produced here, a combination that makes for the lowest possible cost of production. The cheap natural gas available here has attracted large glass manufacturing plants, which are very successful. The prosperity of the city is re¬ flected in the rapid growth of the three large banks serving the business interests of the com¬ munity, Punxsutawney is an Indian name. It was organized into a borough in 1850. Its growth since 1890, when it had a population of 2,792, has been rapid. Its Chamber of Com¬ merce is well organized and there is an active Business Men's Association. Greater Punxsu¬ tawney has a population (1920) 10,311.

PUPA, the name applied to the second stage in the metamorphosis of insects. In the typical complete or holometabolic insects, ex¬ emplified by beetles, the Lcpidoptera, flies, etc., the pupa stage is marked by quiescence and rest, and thus presents a contrast to the preceding and active larval stage. During the pupa stage the elements of the larval form are being re¬ modeled into that of the imago or perfect insect, which in' due time emerges from the pupa case. An insect may remain in the pupa stage from a few hours or days to weeks, months or even years.

The pupae of the hemimetabolic insects, or those which undergo an

incomplete metamor¬ phosis (such as grasshoppers, locusts, bugs, etc.), are called nymphs and differ from the perfect insect, which they resemble in form, chiefly in the absence or rudimentary nature of the wings. These latter structures in the pupa state of hemimetabolic insects may generally be perceived to be in course of formation, the per¬ fect insect or imago state being characterized simply by the full development of the wings. See Chrysalis; Insects; Metamorphosis.

PUPIN, Michael Idvorsky, American scientist and inventor: b. Idvor, Hungary, 4 Oct. 1858. He came to America in 1874, was graduated at Columbia in 1883 and as the first American holder of the John Tyndall Fellow¬ ship of Columbia studied physics and mathe¬ matics at Cambridge University and under the famous von Helmholtz at the University of Berlin, there taking his degree of Ph.D. He re¬ turned to teach at Columbia, was appointed ad¬ junct professor of mechanics there in 1892 and has been professor of electro-mechanics there since 1901. He is the inventor of long-distance telephony by means of self-inducting coils placed at intervals about the wire which pre¬ serving the vibrations and resonance transmits the sound a greater distance. Professor Pupin first announced the theory underlying his in¬ vention in March 1899, and brought his system to such perfection that in 1901 it was acquired by the Bell Telephone Company and by Ger¬ man telephone interests. He has perfected other valuable inventions in electrical-wave propaga¬ tion, electrical resonance, in iron magnetization and in multiplex telegraphy. He was appointed director of the Phoenix Research' Laboratories in 1911. In 1917 he presented to the United States government the use of his invention for eliminating static interference with wireless transmission. Appointed honorary consul-gen¬ eral in New York for Serbia, he was an active agent for that country during the World War, and organized for relief work a corps of Col¬ umbia students who served in Serbia in 1915. He has published (Thermodynamics of Reversi¬ ble Cycles in Gases,) *etc.*

PUPPET-SHOWS, an amusement or entertainment popular in Europe. One of the most common classes of puppets is called, in French,

marionnettes. These are images of ’the human figure moved by wires or cords on a stage and made to perform little dramas, the dialogue of which is carried on by the person in concealment, who moves the figures. In the common street performance in England of Punch and Judy (q.v.), however, the performer puts his fingers in the figures. Puppet-shows were common among the Greeks, from whom the Romans received them. Xenophon, Aris¬ totle, Gellius, Horace and others mention them. Such exhibitions, which are so pleasing to chil¬ dren and the uneducated, naturally passed through various degrees of perfection in dif¬ ferent ages and even now exhibitions of pup¬ pets are common in some countries which dis¬ play great mechanical ingenuity. Clocks often display . movable puppets and it is not infre¬ quent in Germany to find on anciefit town-clocks puppets which move whenever the clock strikes. In 1674 there was a puppet opera at Paris, which met with great applause. They have been popular in many European cities, especially in Italy.

PURACI2, poor-ra-sa’, a volcano of the Andes in Colombia, 20 miles east of the town of Popyan. Eruptions have occurred several times; the town of Purace at the base of the mountain was destroyed by the eruption of 1827 ; and the top of the volcano blown off and its height reduced to 15,420 feet by the erup¬ tion of 1849. It is still active and hot vapors issue constantly from the crater.

PURANAS, poo-ra’nas. See Sanskrit Language and Literature.

PURBECK (per’bek) BEDS, a series of geologic beds or strata consisting of limestones, clays, shales and sandstones, which in England form the uppermost member of the Jurassic system (q.v.). They are named after the Isle of Purbeck on the southeast coast of Dorset¬ shire, where they are exceptionally well de¬ veloped and yield among other building stones a limestone, susceptible of a good polish, which is known as Purbeck marble. The Msle® is in fact a peninsula 12 miles long by 7 miles broad, almost completely surrounded by sea. The Pur¬ beck beds appear in a chalky ridge which traverses the island from west to east.

PURBECK, Isle of. See Purbeck Beds.

PURCELL, per’sel, Henry, English com¬ poser: b. London, 1658; d. 21

Nov. 1695. He was the son of a musician of the chapel-royal, who left him an orphan in his sixth year. He was admitted a chorister in the king's chapel, where he studied music under Choir-master Cook and his successor, Pelham Humphrey, and afterward under Dr. Blow. In 1676, when only 18, he was made organist of Westminster Ab¬ bey and six years afterward was appointed to fill the same office at the chapel-royal, Saint James. From this period his fame increased rapidly, his anthems and other church music being popular in all the cathedrals of the king¬ dom; nor were his compositions for the stage and music-room less successful. He composed music, religious and secular, with equal facility ; and with respect to chamber music his composi¬ tions superseded all prior productions. Of his numerous works his (Te Deum > and jubilate5 were composed for the celebration of Saint Ce¬ cilia's Day, 1694. Of his instrumental music a collection was published two years after his decease and comprised pieces in four parts, for two violins, tenor and bass. Many of his songs were published after his death under the title of Orpheus Britannicus. (Ye Twice Ten Hundred Deities, > contained in this collection, is con¬ sidered the finest piece of recitative in the lan¬ guage; while his musk in <King Arthur* has maintained its popularity undiminished to our own day. In 1695, the year of his death, he set to music (Bonduca,> an opera altered by Dryden from Beaumont and Fletcher; but his chief opera is <Dido and yEneas* (1680). He was the author of a vast variety of catches, rounds, glees, etc., remarkable both for their melody and for their spirit, humor and origi¬ nality. He was buried in Westminster Abbey. A splendid edition of his works is published by the Purcell Society, founded in 1878. An earlier edition of his sacred compositions is that of Novello (1829-32). Consult Cummings (Life of Henry Purcell* (1882).

PURCELL, John Baptist, American Ro¬ man Catholic archbishop: b. Mallow, County Cork, Ireland, 26 Feb. 1800; d. Brown County, Ohio, 4 July 1883. He came to the United States in 1818, was educated at Mount Saint Mary's College, Emmitsburg, Md., received minor or¬ ders, and later studied at Saint Sulpician's Col¬ lege in Paris. He was ordained in 1826 and in 1827 appointed to the chair of philosophy in Saint Mary's College, of which he became presi¬ dent in 1828. In 1833 he was consecrated bishop of Cincinnati, and at once set about the im-

provement of the diocese under his charge, and in 1846 the number of churches under his con¬ trol had increased from 12 to 70, the number of Roman Catholics from 6,000 to 70,000. He founded schools and academies, built a convent for the Ursulines, and in 1847 the diocese of Cleveland was formed out of that of Cincinnati at his request and placed in charge of another prelate. In 1850 he was made an archbishop and in 1851 received the pallium from the Pope's own hands. He founded Mount Saint Mary's of the West, destined to become one of the leading theological seminaries of the country, and in 1855 presided over his first provincial council. New sees were formed from his dio¬ cese in 1868, but though their creation had limited his diocese in extent, it still contained 140,000 Roman Catholics. He attended the Vatican Council in 1869 and celebrated his golden jubilee with great rejoicing among his people in 1876. In 1879, however, his hitherto unbroken prosperity was interrupted. His brother Edward had been appointed his vicar-general and the financial affairs of the diocese had been left by the bishop entirely in his brother's care, trusting implicitly in the latter's financial ability, which was unfortunately as little as the bishop's own. When the crash, rendered inevitable by faulty business methods, came, Edward died broken-hearted. The in¬ debtedness reached nearly $4,000,000, and the crisis came at a time of general financial panic. The bishop, however, was never accused of any dishonesty, though the unwisdom of his con¬ fidence in his brother was widely criticised. His own light regard for the value of money was well known, as he had served as bishop for 25 years before he accepted even the "cathedrati-cum® of $5,000 a year, and when paid it usu¬ ally was given away before night. He tendered his resignation in 1880, but it was not accepted though he was given a coadjutor. At his death the Roman Catholics in his original diocese numbered half a million. He published a series of textbooks for the use of Roman Catholic schools in his diocese.

PURCELL, Okla., city and county-seat of •McClain County, on the Canadian River, 35 miles, direct, southeast of Oklahoma City, on the Atchison, Topeka and Santa Fe and the Gulf, Colorado and Santa Fe railroads. It is located in a cotton district which produces also alfalfa and grain. There are cottonseed-oil and flour mills, and grain elevators. Pop. 2,938.

PURCHAS, per’chas, Samuel, English

author and Anglican clergyman : b. Thaxted, Essex, about 1575; d. London, September 1626. He was graduated from Cambridge, took holy orders, was vicar of Eastwood, Essex, 1604-13, and in 1614 became rector of Saint Martin’s, Ludgate, London, where he remained until his death. He published in 1613 (Purchas his Pilgrimage, or Relations of the World and the Religions Observed in All Ages and Places, > supplemented in 1625 by (Purchas his Pilgrim-mes) in four volumes. The first is his own work and the latter a collection of the nar¬ ratives of different travelers, edited by him. The latter was illustrated with maps, and the edition of 1626 was supplemented by a fifth volume. It was a work of great value in its day, giving accounts of travels in Europe, Asia, Africa and America, and was soon imitated. It

is valuable to-day as revealing the ideas pre¬ vailing in England at that time concerning the rest of the world at large. He also wrote ‘Microcosmos, or the History of Man) (1619) ; ‘The King’s Tower and Triumphal Arch of London > (1623).

PURCHAS JUDGMENT, an English ecclesiastical decision rendered against Rev. John Purchas by the Privy Council of Appeals, 16 May 1871, in a case carried to it from the Canterbury Court of Arches, where an adverse decision was rendered 3 Feb. 1870. Purchas was charged with introducing and sanctioning Popish practices at Saint James’ Chapel, Brigh¬ ton, where he was perpetual curate; the objec¬ tionable practices, including the use of the cope, chasuble, alb, biretta, crucifixes, images, holy water, incense and the introduction of proces¬ sions. The charges were brought against Pur¬ chas in the Canterbury Court of Arches by Colonel Elphinstone, and a decision against Purchas was given on eight points, the defend¬ ant to pay the costs of the action. Purchas made no appearance at the trial, affirming illness and lack of funds to pay for counsel. The promoter of the suit was not satisfied with this decision and appealed to the Queen in Council, but died before the case was tried. It was then taken up by Henry Herbert, of Brighton, and a decision against Purchas was rendered on practically all the points raised. Purchas had meantime placed all his property in his wife’s hands, so that the costs could not be collected from him; and he was said to continue the illegal practices. He was suspended from the discharge of his clerical office 7 Feb. 1872, but he disregarded the order and continued his services as usual until his death at Brighton, 18 Oct. 1872.

PURCHASE SYSTEM, a system of ap¬ pointment and promotion for officers, prevailing in the English army from the time of Queen Anne until 1871,' when it was abolished by royal warrant. About half of the officers of the army received their appointments under it. It was possible to purchase an ensigncy or cornetcy for £450, a price fixed by government regulation, and subsequent promotion could be purchased, as vacancies occurred, up to the rank of lieutenant-colonel. The prices fixed by regulations were as follows :

Lieutenant-colonel .	£4 , 500
Major .	3,200
Captain .	1 , 800
Lieutenant .	700
Cornet or Ensign .	450

Vacancies in certain popular regiments, par¬ ticularly the Guards, commanded fancy prices, but no position could be purchased unless the officer holding it chose to sell. No rank above lieutenant-colonel could be purchased. Death vacancies, vacancies occurring through aug¬ menting a regiment and those resulting from the promotion of colonels to be major-generals were filled without purchase either by seniority or special merit. The purchase system did not exist in the artillery, engineers, marines, 19th to 21st regiments of cavalry and 101st to 109th regiments of foot.

In the United States aripy and navy dis¬ charge by purchase may be secured in peace times by enlisted men in the second year or

first six months of the third year of enlistment upon presentation and

verification of satis¬ factory reasons. The price of purchase in the first month of the second year is $120, and is $5 less each succeeding month during the period in which discharge may be secured by purchase. The favor will not be granted a second time.

PURDUE UNIVERSITY, the Indiana State College of Agriculture and Mechanic Arts, is located at Lafayette, Ind. It was es¬ tablished under the land grant act of Congress in 1862 and in 1869 was named for John Purdue, who gave $150,000 and 100 acres of land to the State for the institution. It was first opened to students in 1874. Its present organ¬ ization includes seven schools: (1) the School of Mechanical Engineering; (2) the School of Civil Engineering; (3) the School of Electrical Engineering; (4) the School of Chemical Engi¬ neering; (5) School of Agriculture; (6) the School of Science; (7) the School of Phar¬ macy. All of these offer regular courses ex¬ tending over four years and leading to the bachelor's degree. The School of Pharmacy also offers a two years' course and the School of Agriculture a special short winter course. The degree of bachelor of science is conferred in all departments. Graduate work is provided for leading to the degrees of master of science, master of science in agriculture, mechanical engineer, civil engineer, electrical engineer and chemical engineer. Under the Federal law establishing the institution, instruction in military science and tactics is required of all male students during the first two years. The institution is coeducational, women enrolling in the schools of science, pharmacy and agricul¬ ture. The institution owns about 1,000 acres of land, of which 600 are adjacent to its build¬ ings and used for campus and experimental farm purposes. There are 24 principal build¬ ings, including a library, erected in 1913, and the university auditorium, a gift of Eliza Fowler. .An important feature of the institu¬ tion is its series of laboratories, all well equipped with modern scientific appliances. The engineering plant is particularly complete, in¬ cluding a locomotive testing plant, the first of its kind to be installed. The library contains about 60,000 volumes and pamphlets, mostly of scientific and technical character. Tuition is free for residents of the State. The income of the university is derived from the land grant fund of 1862, from subsequent Federal appro¬ priations, from the State mileage tax, from student fees, *etc.* The total income of the institution for all purposes for the year ending 30 June 1916 was $972,233. Its property, build¬ ings and equipment has an estimated value of $2,400,000. The number of students enrolled for the year ending June 1916 was 2,398, of which over 1,900 were in college classes in courses leading to degrees. Co-ordinated with the departments of instruction are the Agri¬ cultural Experiment Station and the Department of Agricultural Extension,

maintained by Fed¬ eral and State appropriations, the former con¬ cerned with agricultural research and the latter with the diffusion of knowledge on agricultural subjects to the people of the State. The uni¬ versity ranks high* among schools of technology and holds an influential place in the educational system of the State.

PURE FOOD ACTS. Pure food legisla¬ tion has been rendered necessary by the will¬ ingness of producers to flood the markets with food products, drinks and drugs which are adulterated. These adulterations were induced by the desire of manufacturers to increase their profits. The practice resulted in wholesale frauds upon the public which unwittingly bought inferior articles labeled as goods of standard quality. It also involved a serious menace to public health, inasmuch as food prod¬ ucts and drugs, particularly meat, were com¬ monly sold which were impure, diseased or otherwise wholly unfit for human consumption. The grossness of the abuses which developed resulted in the enactment of laws both by the national government and the States.

Federal Pure Food and Drug Acts. — In legislating upon this subject Congress was con¬ fronted by certain constitutional obstacles. Under our Federal system of government Con¬ gress has only such powers as are conferred upon it by the express words of the Constitu¬ tion or which may be reasonably implied from the powers thus expressly granted. The Con¬ stitution gives Congress no authority to legis¬ late upon the subject of food and drugs nor to regulate the processes of manufacturing. Obvi¬ ously, therefore, it was impossible to pass a Federal law dealing in a direct and straight¬ forward manner with the evils of adulteration and misbranding. Congress does, however, have full power to regulate interstate com¬ merce and this authority was used as the con¬ stitutional basis of the national Pure Food and Drug Act. This act, signed by President Roose¬ velt 30 June 1906, does not forbid the production of adulterated and misbranded food products and drugs, except in the Territories and the District of Columbia where the authority of Congress is supreme, but merely forbids the distribution in interstate trade of such products as are fraudulent or unhealthful according to standards provided for in the law.

The principal provisions of the law are as follows: (1) It is unlawful to ship or receive in interstate or foreign commerce any adul¬ terated or misbranded food or drugs. (2) The Secretary of the Treasury, the Secretary of Agriculture and the Secretary of Commerce and Labor shall make regulations for putting the act into effect, including the

collection and examination of specimens of food and drugs. (3) Examinations of such specimens shall be made in the Bureau of Chemistry of the De¬ partment of Agriculture to determine viola¬ tions of the act. (4) Drugs are to be regarded as adulterated if they are sold under a name recognized by the United States Pharmacopoeia and differ from the standards of strength, purity or quality therein laid down, except in cases in which the standards of strength, quality and purity are plainly marked. Drugs are also adulterated if their strength or purity is less than the professed standard under which they are sold. (5) Food is adulterated, first, if anything has been mixed or packed with it which reduces its quality or strength ; second, if any substance has been substituted for it in whole or in part ; third, if any valuable ingre¬ dient has . been wholly or partially removed ; fourth, if it has been mixed, colored, powdered, coated or stained so as to conceal damage or

inferiority; fifth, if it contains any added poisonous or injurious ingredient which may render it harmful to health; sixth, if it consists in whole or in part of filthy, decomposed or putrid animal or vegetable substance or any part of an animal unfit for food, or if it is the product of a diseased animal, or one that has died otherwise than by slaughter. (6) Drugs are regarded as misbranded if the packages or labels contain false or misleading statements regarding the contents or place of production, if they are imitations of or offered for sale under the name of another article, if the origi¬ nal contents of the packages have been changed since they were labelel, if the label does not indicate the quantity or proportion of alcohol, morphine, cocaine and other narcotics, and finally, by an amendment passed in 1912, if the label contains false statements regarding the curative or therapeutic effects of the contents. (7) Similar provisions cover the misbranding of food which must also, under an act of 1913, be marked with the measure, weight or numer¬ ical count save in the case of very small pack¬ ages, and must not be labeled or branded in such a way as to deceive or mislead the pur¬ chaser.

The Meat Inspection Act. — This act was also passed 30 June 1906 and aims to provide special protection against the distribution in interstate commerce of unwholesome meat or meat products. Animals must be inspected by government officials before they are killed, the carcasses must be again inspected afterward, meats which are packed or canned must be further inspected and marked, and the estab¬ lishments in which meat is killed, packed or in any way prepared must also pass close scrutiny. The government pays the cost of these inspec¬ tions. To prevent corruption on the part of the inspectors they are frequently shifted from one part of the country to another on short notice. The administration of the law is in the hands of the Secretary of Agriculture who utilizes for that purpose the Bureau of Animal Industry. The beneficial results of these laws have been enormous. A large number of dis¬ honest and injurious products have been driven from the markets forever to the great advan¬ tage of the pocketbook and health of the con¬ sumer. Manufacturers and producers have come to realize the commercial advantages of purity and cleanliness

and have in numerous cases been glad to advertise the fact that they have gone far beyond the requirements of the law in those particulars. The commercial in¬ centive to fraud and adulteration has thus been largely removed.

State Laws. — Since the pure food and drug laws of the national government are limited in their scope to the products which are dis¬ tributed through interstate commerce it is only natural that the separate states should have legislation upon the same subject. Several facts should be noted about these State enact¬ ments. First, they apply to production, sale or distribution of food and drugs within the State. Second, they are in many cases more compre¬ hensive in scope and more rigorous in the standards set up than the Federal laws. Third, ihey must be so drawn as not to produce a con¬ flict with the Federal laws in their application or administration. For example, a State, under the guise of passing a law for the protection of

the health of its citizens, may not forbid the importation and sale within its borders of food or drugs in their original packages which meet the tests of the Federal law in the matter of purity or labeling. Few conflicts of this kind, however, occurred and the legislation of the Federal government and the States upon this important subject have merely supplemented each other.

Bibliography. — Breed, Abbott and Morgan, (Digest of National and State Food Laws* (1916) ; Freund, (Police Power) (1906) ; Hem¬ ingway, (Public Health5 (1914); Parry, (Food and Drugs5 (1911); Robertson, (Meat and Food Inspection (1908) ; Thornton, (On Pure Food and Drugs5 (1912) ; United States Bu¬ reau of Animal Industry, Annual Reports; United States Bureau of Chemistry, Reports and Bulletins; Wiley, (Foods and Their Adul¬ teration5 (1907).

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

PURGATIVES, cathartics ; medicines for evacuating the bowels. See Cathartic; Con¬ stipation.

PURGATORY, according to the doctrine of the Roman Catholic Church, a state or place in which the souls of those who depart this life in the grace of God suffer for a time, in ex¬ piation of their venial transgressions or in un¬ dergoing the penalty due to mortal sins, the guilt and eternal punishment of which have been remitted. Hence

purgatory is not a place or state of probation : for the souls in purga¬ tory the time of probation is past, and they are already assured of their everlasting bliss in heaven, though as yet they are not sufficiently pure and holy to be admitted to the vision of God. The dogmatic teaching of the Church goes only so far as to declare that, (1) there is a purgatorium (place of purification), and (2) that the souls therein are aided by the prayers of their brethren on earth. But though the definitive teaching of the Church stops here, the speculations of divines, the meditations of spiritual men and the beliefs of the general mass of the faithful go much further, and have developed an idea of purgatory which is very much more definite. Thomas Aquinas and Suarez, among the greatest lights of the theor logical schools, teach that instantly after passing out of the present life, the faithful souls are cleansed from the stains of all venial sin by their turning with perfect love to God; at the same time the debt of the temporal penalties of sin, whether mortal or venial, has still to be paid. Theologians formerly taught that the purgation was by material fire, but this view has been widely modified. While confessedly the doctrine of purgatory is not clearly and unequivocally deducible from any passage of the universally accepted books either of the Hebrew or the Christian Scriptures (for Mac¬ cabees is not received by all as canonical, and passages of the New Testament which Catholics believe to point decisively to this doctrine have no such signification for Protestants), it is ad¬ mitted on all sides that in the very earliest church liturgies that are extant are found forms of prayer for the dead, and that the existence of an intermediate state after death is taught by the fathers both Eastern and Western with

practical unanimity, so far at least as to admit that the dead can be aided by the prayers of the living. Buddhists, Theosophists and many others teach of a region where discarnate souls are purified before they can go higher.

PURIFICATION, in the Jewish ceremo¬ nial law, a body cleansing with water accom¬ panied by rites more or less elaborate according to

the nature of the uncleanness from which the person was to be purified: this physical cleans¬ ing being regarded as emblematical of an in¬ ward spiritual purification. For different oc¬ casions of purification and different rites, see Leviticus xi, 25y40; xv, 1-15; xv, 18; Numbers xix. Similar rites of purification are common to pagan religions whether of ancient or modern times. In the ritual of the Roman Catholic Church, the rinsing of the chalice after com¬ munion .and the ablution of the fingers of the celebrant after the same are called a purifica¬ tion.

PURIFICATION OF THE BLESSED VIRGIN MARY, Feast of the, a festival ob¬ served in the Roman Catholic Church on 2 February; in the calendar of the Episcopal Church in the United States, as well as in that of the Established Church of England, the Purification of the Virgin Mary is entered for the same day, and in the Book of Common Prayer there are collect and lessons for the day of ((the Presentation of Christ in the Temple, commonly called the Purification of Saint Mary the Virgin.® The events commemorated by the Church on this day are those recorded in the gospel of Saint Luke, ii, 22-39, namely, the go¬ ing of the Virgin to the temple 40 days after the birth of' her son, for her ritual purification after childbirth, according to the prescriptions of Leviticus xii; the presentation of the babe to the Lord ; and the prophecies of Simeon and Anna. The Christian festival of the Puri¬ fication was solemnized by the Church at least as early as the end of the 6th century. It is customary on this day, in Catholic countries, for the people and clergy to form processions, each one carrying a lighted candle, signifying the light which the Redeemer brought into the world.

PURIFYING APPARATUS, is of use in

many industries and economic processes, partic¬ ularly in the water supply of communities where the available source does not yield a pure product. Aside from the various chemical treatments of such waters the electrolytic sys¬ tem has found favor in that it purifies without adding some other ingredient. It has been found that certain metals are capable of produc¬ ing, while under the action of an electric cur¬ rent immersed in the liquid to be purified, an insoluble hydroxide of the chlorides and sul¬ phates held in solution, these being set free by the action of current passing through the liquid (see Electrolysis) ; the oxygen evolved at the anode decomposing and oxidizing impurities of animal and vegetable origin, leaving the water clear, free from odor and disease-breeding germs, sparkling, with a pure water taste (see Distillation). For municipal supply, means are provided for the generation of electricity by either hydraulic or

artificial power, using large basins containing the electrodes in which the oxidation takes place ; the water passing thence

into a coagulating section provided with means to retard the suspended matters; the water flowing thence down an inclined weir for the purpose of aeration, into another compartment of the basin containing screens, which clarifies it from all sediment, thence to storage reser¬ voirs, occupying small space as compared to sand bed filters and automatic in operation. The apparatus for potable and industrial use consists of vessels capable of working under high pressure as for boiler feed purposes, one of which contains the electrodes or a series of them for very large supply; the electrodes being connected to a suitable source of electric supply, the vessels being provided with air-valves and insulators to prevent the grounding of the cur¬ rent, and connected to other vessels by suitable conduits to remove the suspended matters, thus permitting a constant flow of the water through the apparatus, requiring small space and in¬ stalled at any convenient point. For apartment-houses and hotels, and establishments for bot¬ tling carbonated waters small installations are quite efficient. They are arranged so that the motor may be run by the hydraulic pressure in the water main if desired. The current con¬ sumption is very low as the resistance of the water is utilized in the treatment.

In the gas industry the “purifier® consists of a number of sieve-like trays placed in tiers. These are filled with the purifying material and the gas is compelled to pass through them con¬ secutively. In the first purifier the trays are filled with lime thiocarbonate and some sulphurets which remove the poisonous carbon dioxide, although increasing the content of sulphureted hydrogen. The second purifier contains slaked lime, and removes nearly all the carbon disulphide and part of the sul¬ phureted hydrogen. The third purifier may be a duplication of the second, or, if the gas is not too foul, it may go at once to the last purifier, filled with iron oxide, which removes the last traces of the sulphides and sulphurets.

In the flour-milling industry the purifying apparatus is pneumatic. After the grain has been through the fourth pair of breaking rolls and is in the form known as semolina, ready to be ground into flour, it is passed through the purifier, a long silk-covered sieve of varying meshes, enclosed in an airtight compartment. The sieve dips downward on a slight grade and is shaken by appropriate machinery. At the top of the purifier is an exhausting fan which sucks a draught of

air up through the sieve and the “semolina® which is traveling down the grade upon the silk. The chaff and light fibrous mate¬ rial which has no food value is carried off into side channels by the draught, while the heavier food parts of the grain continue down the sieve until they come to a mesh which they can pass through, being thus sorted as to size for further treatment. The material removed by the draught amounts to from 10 to 15 per cent of the grain. This is again passed through a purifier of somewhat different weave, and a part of it is recovered and added to the sem¬ olina to be ground. The purifying chamber is provided with glass windows through which the process may be watebed, and the arrangement of fan and air valves is such that the force of the draught may be adjusted with the greatest delicacy.

PURIM, poo’rim, the Festival of Lots, which was instituted by Mordecai (Esther ix, 2 7-x, 3), and is celebrated to this day by the Jews on the 14th and 1 5th of the month Adar (March), in commemoration of their wonderful deliverance from the destruction with which they were threatened by Haman. On these festive days the book of Esther is read, presents are inter¬ changed, and gifts are sent to the poor. The great popularity of this festival in the days of Christ may be gathered from the following re¬ mark of Josephus: ((Even now all the Jews that are in the habitable earth keep these days as festivals and send portions to one another.® It is supposed that it was this feast which Jesus went up to celebrate at Jerusalem (John v, 1). It is universally celebrated by the large Hebrew population in the United States. See Befana.

PURITAN CITY, a name applied to Bos¬ ton, Mass., referring both to the early settlers and the characteristics of its modern inhabit¬ ants.

PURITANISM. The Puritans were those who thought that the English Reformation had not gone far enough in its separation from the Roman Catholic Church, but that there were many ceremonies and forms still retained in the worship which were too suggestive of papacy. They held that it was not expedient or right to retain the use

of the cross in baptism, the clerical vestments, the custom of kneeling at the altar and other forms which had been rejected by the Reformed Churches on the Continent. They believed that the worship should in this way be purified and that only those who lived upright lives should be the ministers of the Church. To them the Church was a means of advancing religious truth, and it could not do this to the best advantage while hampered, as they thought, by useless, misleading and unscriptural forms and ceremonies, especially when these forms and ceremonies were obliga¬ tory for all and the observance of them en¬ forced by the civil authority. During the perse¬ cution of the Protestants in the reign of Mary, hundreds of the English reformers went to the Continent and were in the company of the lead¬ ers of the Reformed Church. When Elizabeth came to the throne, these men returned and became the leaders of English Protestantism. Some of them regarded the wearing of the vestments prescribed by the Church authorities as a matter of indifference, others refused to wear them. They did not object to the govern¬ ment of the Church of England or the close connection between Church and State or the doctrinal system, but objected to what they regarded as the remnants of popery.

Whether they would be allowed to do as they wished or not depended largely on the attitude of the queen. Elizabeth was a woman whose religious tastes were stronger than her religious convictions and the simplicity and bareness of the worship of the Reformed Church offended her. She disliked Puritanism because the teachings of men like John Knox opposed her idea of the royal power. She op¬ posed any puritanical modification of the Prayer Book or of the ceremonies of the Church. That there was to be no room for nonconformity was shown when her first Parliament passed the Act of Uniformity.

which made unlawful any form of public wor¬ ship but that of the Prayer Book, and the Act of Supremacy, by which the queen was ac¬ knowledged supreme governor of the realm in spiritual and ecclesiastical affairs. She re¬ solved to retain in the worship as much show and form as possible, and ordered uniformity in vestments. If any refused they were forbidden to pleach and deprived of their office. This law was not strictly enforced at first, but with greater rigor as the time went on. Large num¬ bers were ejected from their churches, but con¬ tinued to hold private meetings. Many were imprisoned and treated with severity. But non¬ conformity continued to grow notwithstanding the efforts to suppress it.

In early Puritanism the objection is mainly to the forms and

ceremonies in the worship of the Church. In the later years of the reign of Elizabeth, attention is given to the govern¬ ment of the Church and the relation between Church and State. Elizabeth claimed that in this her will was supreme. Some of the Puri¬ tans, above all others, Thomas Cartwright, taught that the only right form of Church government was that laid down in the New Testament and that it was Presbyterianism. He taught that the civil authorities are not to interfere in Church affairs, but they are bound to protect it. There is still to be a state church but with a Presbyterian rather than an Epis¬ copal form of government. This was directly opposed to the queen's supremacy, and her ef¬ forts to suppress this form of Puritanism were vigorous. These Puritan movements were within the Established Church, but there were some who believed that a church having any connection with the state was unscriptural and so there arose the party called Independents or Separatists. They taught that the local church was independent and should manage its own affairs. These were also called Brownists from Robert Browne, who was their first leader. The Separatists were severely per¬ secuted and many left the country. Thus, at the close of the reign of Elizabeth, there are three kinds of Puritans : those who desire a purified worship and still remain in the Church, those who would have a state church under the Presbyterian form of government and those who believed that an established church was wrong. Hopes were entertained that James VI, educated in Presbyterian Scotland, would be more favorable to Puritanism. The clergy petitioned him for freedom from the burden of human rites and ceremonies and the matter was considered at the Hampton Court Conference. But James' motto was ((no bishop, no king,® so they could look for little tolera¬ tion. Uniformity was enforced with great vigor and many Puritans deprived of all hopes of redress left the country. This condition continued with even greater severity in the reign of his son, Charles I, and there seemed in the early part of his reign no check on his tyranny in Church and State. Despairing of freedom in Old England, Puritan and Sepa¬ ratist turned to America to create there a New England. In 1620 a little company of Separa¬ tists after a sojourn in Holland came to America and settled at Plymouth. In the course of the next 20 years thousands of Puri¬ tans settled in Massachusetts. This Puritan

emigration stopped in 1640, when there seemed a better prospect of liberty in England. The Puritan emigrants came as members of the Church of England with no desire to separate. The Pilgrims were already separated from the English communion and were independent in their church government. But the Puritans because of their distance from the home coun¬ try and because of the influence of the Pil¬ grims very quickly adopted the Congregational or Independent form of church government. Modern American descendants of the Puritan settlers regard them as having been far too strict. Their so-called <(blue® laws are spoken of as indicating religious bigotry and intoler¬ ance.

Bibliography.— Byington, (The Puritan in England and New England) (1897); Campbell, ••The Puritan in Holland, England and America) (1892); Neal, (History of the Puritans* ; the English histories of this period ; works on Congregationalism.

Curtis Manning Geer, Hartford Theological Seminary, Hartford,

Conn.

PURITANS. See Puritanism.

PURKINJE'S FIGURES, in optics, fig¬ ures produced on a wall of uniform color when a person entering a dark room with a candle moves it up and down approximately on a level with the eyes. From the eye near the candle an image of the retinal vessels will appear projected on the wall.

PURPLE. A color located in the spec¬ trum between crimson and violet. It is poeti¬ cally termed the royal color. The ancients at¬ tributed the discovery of purple to the Phoeni¬ cians. The story of its having been discovered by a dog biting a purple-fish, and thus staining his mouth, is well-known. The purple-fish was found not only on the Phoenician coasts, but in all other parts of the Mediterranean, so that the use of it in dyeing came to be common with other nations. The modern discovery of pur¬ ple colors from coal-tar makes an important epoch in the history of the dye. Painters in oil and water-colors produce various shades of purple by mixing certain red and blue pigments. For work in oil, French ultramarine, often called French blue, is mixed with vermilion or some madder red (madder carmine is best), or one of these reds with cobalt blue if a pale purple is wanted. For permanent purples in water-colors the same blues are

used; but one of the madder reds, not vermilion, should be mixed with them. A much richer purple than any of the above mixtures will give is pro¬ duced by Prussian blue and one of the lakes from cochineal — namely, carmine or crimson lake — but it is not permanent. This purple, as well as that obtained by mixing Indian red with indigo, also fugitive, was much used by water-color painters in past years. Purple madder is the only simple purple pigment avail¬ able for the artist which is durable, and it is unfortunately costly. All purples are changed to neutral and gray tints by the addition of any yellow, pigment. For housepainting maroon lake with a little French blue gives a useful pur¬ ple. See Dyes; Purple Shell.

PURPLE-FACED MONKEY. See Lan¬ gur; Wanderoo.

PURPLE FALCON, Order of the. See

Orders, Royal.

PURPLE FINCH, a handsome American finch (Carpodacus pnrpureus) which in some one of its varieties is known throughout the United States and Canada. The male exhibits in spring a plumage beautifully tinged with a purplish crimson ; and sings a brilliant melody. These birds nest in orchard trees and similar places, and lay greenish speckled eggs. See Finch.

PURPLE MARTIN, one of the large,

lustrous, blue-black swallows of the genus Progne, several species of which inhabit South and Central America, while one (P . subis) is a familiar visitor in summer to almost all parts of the United States. They originally nested in hollow trees, but in both North and South America have at once associated themselves with mankind as soon as civilization approached their habitat, and now everywhere make their nests about buildings or in garden bird-boxes. They are among the most useful as well as in¬ teresting of our insect-hunting birds. See Martin.

PURPLE SCALE. See Scale Insects.

PURPLE SHELL, a gastropod mollusk of the family Muricidce and especially of one sec¬ tion of it of which the genus Purpura is typical. A great many species are found in all seas. The true purples form the subfamily, Purpur-ince. The Muricidce are carniverous marine snails very destructive to other mollusks, bar¬ nacles, *etc.* Many of the

tropical species of Murex and related genera are of large size and remarkable for the large spines borne upon the shells, but our representatives of the family are small and inconspicuous. (See Drill). Our true purple shell (Purpura lapillus) is found in great abundance on rocky coasts on both sides of the north Atlantic, but is infrequent in the United States south of Long Island Sound, where it is replaced to some extent by related species. The shell is very thick and solid, short oval with a low spire and a large aperture, the outer lip of which is marked with revolving ridges. It is extremely variable in size, shape, color and markings. Like the drill it is carniv¬ orous, but with us confines its attacks chiefly to the barnacles which encrust the rocks between tides, though in Europe it works great havoc on the mussel beds.

The name «purple shell® applied to this group of mollusks is derived from the use to which certain species were put by the ancients in the preparation of their most valued dye¬ stuffs, for which the city of Tyre was especially famous, and upon which its prosperity about 1000 b.c. was founded. The Tyrian purples were of several shades, varying from blue to a dull crimson, dependent upon the particular variety of shell employed and the substances mixed with the extract. Among the most im¬ portant species utilized were Murex trunculus, M. brandaris and Purpurea patula. These snails were gathered on both the African and European shores of the Mediterranean. The smaller ones were crushed in mortar-shaped holes in the rocks and mixed with soda, urine, sea-water and other substances ; the larger ani¬ mals were removed from their shells or the dye squeezed out. The desired colors were obtained by exposure to the sun and by various combina-

tions and the cloth was steeped in a large ex¬ cess of fluid until the proper effect had been produced. The fluid is contained in a saccular gland which opens into the mantle cavity and has at first the color and consistency of cream and a disagreeable odor, but changes to purple upon exposure to light. Consult Simmonds, ‘Commercial Products of the Sea.’

PURPURA. See Purple-shell.

PURSER, the cashier or chief clerk on hoard a passenger steamer. In the navy a purser was formerly an officer who took charge of the provisions of a ship of war and saw to their distribution among the officers and crew. He had very little to do with money matters, but generally bore an evil reputation among the sailors for unfair dealing and rapacity. The designation is now discarded for that of pay¬ master, whose duties are broader.

PURSLANE, a pot-herb and well-known weed forming a good fodder for pigs; often called ((pussley.55 See Purtulaca.

PURSUIVANT, per'swi-vant, a title used in the heraldry of England, Scotland and Ire¬ land and derived from the old Latin word (<Proseque,55 to follow. It is the lowest of heraldic offices, but from the pursuivants were usually selected the superior officials known as herald and king-at-arms. The English college of arms has four pursuivants, the Scottish her¬ aldic establishment has three and the Ulster king-at-arms in Ireland has four.

PURU-PURUS, poo-roo'-poo-roos', or PURU PULAS, a tribe of Brazilian Indians, now extinct or represented only by the Pamary or Paumary, but formerly living along the Purus River (q.v.) in western Brazil. They were naked savages, who slept on the sand in¬ stead of in hammocks, and were afflicted by a leprous disease which covered them with bluish and whitish spots. They used practically no shelter or covering, except leaf umbrellas, and wore their hair long and unkempt, cut only on the forehead in a square bang. Linguistically they seem to have been separate from the sur¬ rounding peoples. Consult Brinton, <The American Race5 (1891).

PURUANDIRO, poo-roo-an-de-ro, Mexico, a town of the state of Michoacan and capital city of the district of Puruandiro in central Mexico, situated on the southern shore of a small lake, about 42 miles northwest of Morelia. It does a large business in Mexican leather and in the agricultural produce of the surrounding country. Pop. 10,000.

PURURAVAS, in Vedic mythology a king of ancient India, son of Ila, a youth of many virtues, who is married to Urvasi. one of the celestial nymphs, Apsarases, usually loved by the Gandharvas. Urvasl's marriage to Pururavas is based on the condition that she shall never see him naked. The jealous Gandharvas cause a disturbance in the night and Pururavas springs up, whereupon the Gandharvas cause a flash of lightning to illuminate the room and Urvasi sees him and vanishes. Pururavas, dis¬ consolate, seeks the world over for her and at last discovers her in the form of an aquatic bird, swimming with

other Apsarases in a lotus lake. In response to his pleadings Urvasi promises that he may return to her for one night a year later. Purusavas keeps the tryst

and on the following day the Gandharvas make him one of themselves. Another version is that Urvasi spends four autumns among mortals and is besought by her lover, Purura¬ vas, to return, but refuses ; promising, how¬ ever, that his offspring shall worship the gods and that he himself shall enjoy heaven. Con¬ sult Macdonell, A. A., (Vedic Mythology5 (Strassburg 1897).

PURUS, poo-roos', an affluent of the Ama¬ zon, which rising in the east of Peru traversing the northwest corner of Bolivia and entering Brazil, a northeastward course of over 1,800 miles, joins the Amazon about 100 miles above the latter's confluence with the Madeira. It has a very winding course and a comparatively slight fall. In the flood season it is navigable almost throughout its length and steamers as¬ cend it for over 800 miles. Chief among its numerous tributaries is the Acre. Its source was discovered in 1864 by Chandless, an Eng¬ lish explorer. Throughout most of its course the shores of the Purus are covered with dense forests in which are to be found but few in¬ habitants. Those who are living there are, for the most part, native Indians.

PURVER, per'ver, Anthony, English trans¬ lator: b. Hurstbourne, Hampshire, 1702; d. An¬ dover, Hampshire, July 1777. He was at first apprenticed to a shoemaker, but mastered He¬ brew, and at 20 opened a school. Later he went to London where he became a Quaker and there began his translation of the Bible in 1733, a task which occupied him for 20 years. It was com¬ pleted in 1763 and published under the title (A New and Literal Translation of all the Books of the Old and New Testament5 (1764). The publication was known as the (Quaker's Bible5 and by many was pronounced crude and un-scholarly, while warmly approved by Southey and other critics. He also published (Youth's Delight5 (1727) ; (Poem to the Praise of God5 (1748), and (Counsel to the Friend's Children5

(1785).

PURVES, per'ves, George Tybout, Amer¬ ican clergyman : b. Philadelphia, Pa., 27 Sept. 1852; d. New York, 24 Sept. 1901. He was

graduated from the University of Pennsylvania in 1872 and from the Princeton Theological Seminary in 1876. He was pastor at Wayne, Pa., 1877— 80, and professor of New Testament, literature and exegesis at Princeton Theological Seminary 1892-1900. In the last-named year he accepted a call to the Fifth Avenue Presby¬ terian Church, New York. He wrote- (The Testimony of Justin Martyr to Early Chris¬ tianity5 ; (The Apostolic Age,5 *etc.*

PURVEY, per'vi, John, English Biblical translator : b. Lathbury, Buckinghamshire,

about 1354; d. about 1427. While associated with Wyclif, whose disciple he became, he un¬ dertook with other scholars the revision of the translation of the Bible made by Wyclif in 1380. The revision was substantially a new work merely based on Wyclif 's copy which had retained many Latinisms from the Vulgate. The new translation, on the other hand, was made in good idiomatic English. It was com¬ pleted about 1388, four years after Wyclif 's death. For his Wyclifite views he was impris¬ oned in 1390, recanted to escape martyrdom in 1401, and for two years was vicar of West Hythe, Kent. Purvey wrote against the corrup-

tion of the Church a work entitled (Ecclesiae Regimen.) Consult Leachler, (John Wyclif and his English Precursors, } translated by Lorimer (1884).

PUS. See Suppuration.

PUSEY, pii'zi, Caleb, American Quaker colonist: b. Berkshire, England, about 1650; d. Chester County, Pa., 25 Feb. 1727. He was educated a Baptist, but joined the Quakers and came with Penn's company to America in 1682, erected the first mills in the province known as the (< Chester Mills, w and of which Penn him¬ self laid the cornerstone. He laid out roads, treated with the Indians, was sheriff of Chester County for two years, justice of the peace and of the County Courts for many years, an asso¬ ciate justice of the Supreme Court and for 10

years a member of assembly. He published a great number of pamphlets and articles in de¬ fense of his creed, among them (A Serious and Seasonable Warning) (1675) ; <A Modest Ac¬ count from Pennsylvania of the Principal Dif¬ ferences in Point of Doctrine between George Keith and those of the People called Quakers) (1696) ; (Saturn's Harbingers Encountered)

(1700), *etc.*

PUSEY, Edward Bouverie, English scholar and theologian : ,b. near Oxford, 22 Aug. 1800; d. Ascot Priory, Berkshire, 16 Sept. 1882. He was a son of the Hon. Philip Bouverie (of the Radnor family), who assumed the name of Pusey by royal license on becoming lord of the manor of that name in Berkshire. He was edu¬ cated at Eton and Oxford University, where he was graduated with first class honors. Soon after he was elected to a fellowship at Oriel College. He studied for two years in Germany, taking up more especially Oriental languages, theology and German, and in 1828 was ap¬ pointed regius professor of Hebrew, a post which he retained all his life, and to which a canonry at Christ Church is attached. In 1826 he had published a book summarizing the prog¬ ress of German theological thought since the Reformation, expounding the rationalistic views regarding religion which were common in Ger¬ many, his account of which was founded on his own personal experience of what he be¬ lieved to be the evils of Rationalism. He be¬ came through the influence of his friends Hurrel, Froude and Newman an ally of the theological party who started the Tracts for the Times (see Tractarianism) , but the agita¬ tion had been going on a little time before he took an active part in it. His first tract was the 18th, (On the Benefit of Fasting) ; he sub¬ sequently wrote another (the 66th) on the same subject, and two (the 67th and 69th) <On Holy Baptism.) In connection with the same High Church movement he undertook the joint-editorship of the (Library of the Fathers) and the (Library of Anglo-Catholic Theology.) In 1843 he was suspended from preaching in the university pulpit for three years on account of a sermon on the Eucharist, in which he advo¬ cated the doctrines of the real presence, sacer¬ dotal absolution and of the duty and privilege of confession. Except for literary labors and occasional sermons, Dr. Pusey's life was hence¬ forward an uneventful one. Among his chief works are a treatise on the Ancient Doctrine of the Real Presence) ; (Letters to the Arch¬ bishop of Canterbury in Defence of Church

Principles); a treatise on (Marriage with a Deceased Wife's Sister) ; a

‘History of the Councils of the Church) (1857); a learned Commentary on the Minor Prophets) (1860-77), an important contribution to Hebrew scholarship. Nine lectures on (Daniel the Prophet) (1864), and (The Church of England, or Portion of Christ’s Holy Catholic Church: an Eirenicon) (1865). As a leader of the Tractarian or High Church party he kept a large section of that party from drifting into the Catholic Church and remained unshaken in his fidelity to the church of his baptism. On this ground, perhaps, the party received the popular name of Puseyites. Pusey House, containing his library, was founded and endowed as a me¬ morial to continue the tradition of his teaching. Consult Liddon, ‘Life of Edward Bouverie Pusey) (5 vols., 1893-99) ; Grafton, (Pusey and the Church Revival) (1902) ; Rigg, J., (Charac¬ ter and LifeWork of Dr. Pusey) (1883); Savile, B. W., ‘Dr. Pusey, an Historic Sketch, with Some Account of the Oxford Movement)

(1883).

PUSEYISM. See Oxford Movement, The.

PUSHKIN, poosh’kin, Alexander (spelled also Poushkin, Pouchakin), Russian poet: b. Moscow, 26 May (7 June) 1799; d. Saint Peters¬ burg, 29 Jan. (10 Feb.) 1837. He received his first education in the Lyceum at Tsarskoe-Selo. In 1817 he entered the service of the govern¬ ment in the Ministry of Foreign Affairs, in 1820 was retired to southern Russia because of his liberal opinions, until 1824 was a sub¬ ordinate in the office of the governor-general of Odessa, angered his superior by an epigram and was withdrawn wholly from the service and ordered to live on his estate of Mikhailov-skoe. In 1826 Nicholas I allowed his return to Saint Petersburg, where he was made imperial historiographer. His only work of research, however, was the (History of the Revolt of Pugachev) ; he labored in the archives on an account of Peter the Great, which came to nothing. He died from a wound received in a duel, and the Tsar appropriated 150,000 rubles to settle his affairs and publish his works. These included, above all, ‘Eugeni Onyegin) (1828), a metrical narrative* in a somewhat Byronesque fashion; and ‘Boris Godunov,) a tragedy dealing with the troublous period fol¬ lowing the death of Tsar Feodor. Pushkin per¬ formed a great service for the Russian lan¬ guage and literature; molding the former, which prior to his time was uncouth and un¬ wieldy, and freeing the latter from its French tradition and placing it solidly upon a native basis. - He has been called “undeniably and essentially the great national poet of Russia.)) There are English

renderings of ‘Eugeni Onye¬ gin) (by Spalding, 1881); of the (Poems) (by Panin, 2d ed., 1888) ; and of the ‘Prose Tales) (by Keane, 1896). A memorial work, trans¬ lations from Pushkin,) by Turner, appeared in 1899. Consult Shaw, (Sketch of Pushkin’s Life and Works) (1845) ; Flach, ‘Un Grand Poete Russe) (1894). See Boris Godunov; Eugeni Onyegin.

PUSS IN BOOTS, a well-known nursery tale by Charles Perrault, whose version, ‘Le chat botte) appeared in his (Contes de Fees) (1697). It was probably taken from Strapa-rola’s (Piacevoli NottiP The story is found

in a Norse version in (Lord Peter, 1 and in the Swedish (Palace with Pillars of Gold,1 in which the cat befriends a girl, whose adven¬ tures are similar to those ’of the Marquis of Carabas. In a Sicilian version is found the first hint of a moral which is lacking in the above-mentioned tales ; that is, the ingratitude of the man. Cosguin imagined from the moral that its origin was Buddhistic, for the story could only have arisen in a comparatively civil¬ ized community; but the only Hindu version, the (Match-Making Jackal,1 discovered about 1884 in Bengal, has no moral at all. The most complete moral is found in Zanzibar, in the Swahili tale of (Sultan Darai,1 in which the beneficent beast is a gazelle; the ingratitude of the man is punished by the loss of all that he had gained ; the gazelle, which dies of neglect, is honored by a public funeral. A well-known German version is that by Tieck, (Der gestiefelt Kater,1 1795).

PUSTULES. See Pimples.

PUT YOURSELF IN HIS PLACE, a

novel by Charles Reade, published in 1870. The scene is laid in an English manufacturing town, and the story narrates the struggles of Henry Little, workman and inventor, against the jealousy and prejudice of the trades unions. Like all of Reade’s stories, (Put Yourself in His Place) has a wealth of dramatic incident, and moves with dash and vigor. It is notable for its underlying purpose of exposing without censure the errors of early trades unions.

PUTCHOCK, pu-chok’, or PUCHUCK,

the root of Aplotaxis lappa, the ˆcostus11 of the ancients, a composite plant growing on the Himalayas in the vicinity of Cashmere. It has long lyrate leaves and heads of purple florets. It is exported to the Malay countries and to China, where it forms a main ingredient in the Chinese pastille-rods known as joss-sticks. In Upper India it is given as a medicine in various complaints ranging from coughs to cholera.

PUTLITZ, poot’lits, Gustav Heinrich Gans, Edler Herr von und zu,

German novel¬ ist and poet: b. Retzin, Prussia, 20 March 1821 ; d. there, 9 Sept. 1890. He was educated at Magdeburg, Berlin and Heidelberg, was en¬ gaged in the civil service in 1846-48 and made his debut in literary circles by his comedies which aptly portrayed high social life and ex¬ celled in humor. In 1863 he was appointed di¬ rector of the court theatre at Schwerin and his collected dramas were published in 1850-69. His poems were characterized by much beauty and grace and his charming fairy poem (Was sich der Wald erzahlt1 (1850) was widely cir¬ culated. His novels were also popular. Among his publications are (Vergissmeinnicht1 (1851) ; (Brandenburgher Geschichten1 (1862) ; (Novellen) (1863) ; (Funken unter der Asche) (1871).

PUTNAM, Emily James Smith, American author and educator, daughter of Justice James C. Smith : b. Canandaigua, 15 April 1865. She was graduated at Bryn Mawr College in 1889 and studied at Girton College, Cambridge University, in 1889-90. She was teacher of Greek at the Packer Collegiate Institute, Brooklyn, in 1891-93 ; Fellow in Greek at the University of Chicago in 1893-94, and dean of Bernard College in 1894-1900. She was mar¬ ried to George Haven Putman (q.v.) in 1899. vol, 23 — 3

She was a trustee of Barnard College in 1900-05, and vice-president and manager of the Women's University Club, New York, in 1907—11. In 1901-04 she was president of the League for Political Education. Author of Selections from Lucian) (1891); (The Lady) (1910); Creek Religion) (1913).

PUTNAM, put'nam, Frederick Ward,

American archaeologist and ethnologist : b. Salem, Mass., 16 April 1839; d. 1915. He be¬ came curator at Essex Institute in Salem in 1856, was graduated from Harvard in 1862 and in 1864 became director of the Essex Institute Museum. In 1867 he was appointed superin¬ tendent of the East Indian Marine Society's Museum at Salem and in 1875 was appointed civilian assistant on the United States surveys west of the 100th meridian, his duties being to make investigations and reports of the archaeo¬ logical and ethnological material collected. In 1876-78 he was in charge of the Agassiz col¬ lection of fishes at the Museum of Comparative Zoology and in 1886 was appointed professor of American archaeology and ethnology at Har¬ vard. He was chief of the department of ethnology at the World's Columbian Exposition in 1893. He is author of numerous pamphlets

on scientific subjects, was one of the founders and editors of the American Naturalist, and has edited many volumes of (Annual Reports of the Trustees of the Peabody Museum of Archaeology and Ethnology1 and Proceedings of the Essex Instituted

PUTNAM, George Haven, American pub¬ lisher and author, son of G. P. Putnam (q.v.) : b. London, England, 2 April 1844. He was educated in New York, Paris and Gottingen, leaving the university at the latter place to enter the Union army as a volunteer in 1862. He served through the war, was a prisoner at Libby in the winter of 1864-65, and attained rank as major of volunteers. He is head of the firm G. P. Putnam's Sons, was a leader in reorganizing the American Copyright League in 1887 and was instrumental in securing the pas¬ sage of the copyright bill in 1891. He has pub¬ lished (Authors and Publishers1 (1883) ; (The Artificial Mother) (1894) ; (Books and their Makers in the Middle Ages) (1896) ; (The Censorship of the Church1 (1906) ; (Abraham Lincoln) (1909) ; (Memories of a Publisher1

(1915).

PUTNAM, George Palmer, American pub¬ lisher and author: b. Brunswick, Me., 7 Feb. 1814; d. New York, 20 Dec. 1872. He entered the book store of Jonathan Leavitt in New York in 1828, became a member of the firm Wiley and Putnam in 1840 and in 1841 went to London where he conducted a branch business. In 1848 he returned to New York, opened a publishing house, engaged in the production of finely illustrated books and established Put¬ nam's Magazine 1853-56, which was resumed in 1868 and afterward merged with ScribnePs Monthly. In 1866 he established the publishing firm now known as G. P. Putnam's Sons. He was an ardent advocate of international copy¬ right reform, secretary for many years of the Publishers' Association, a founder of the Metro¬ politan Museum of Art, and wrote (A Plea for International Copyright1 (1837) ; Chronology1 (1833) ; (The Tourists in Europe1 (1838)';

(American Facts) (1845); <The World's Progress) (1850) ; (Ten Years of the World's Prog¬ ress) (1861), *etc.*

PUTNAM, Herbert, American librarian : b. New York, 20 Sept. 1861. He was graduated ˆ Harvard (1883); studied law at Columbia (1885-84), and was admitted to the bar (1886). He received also the degrees of Litt.D. from Bowdoin (1898), LL.D. from Columbian (now George Washington University, 1903), Univer¬ sity of Illinois (1903), University of Wisconsin (1904), Yale (1907), Williams (1911), Litt.D from Brown (1914). From 18844*7 he was librarian at the Minneapolis Athenaeum, and at the Minneapolis Public Library (1887-91). After this he practised law at Boston (1892-95), and became librarian at the Boston Public Library (1895-99). Since March 1899 he has been librarian of Congress. He was twice ?ironode1nL-v0f American Library Association r u j 1W4< • Numerous articles have been pub¬ lished by him in reviews and professional jour¬ nals.

PUTNAM, Israel, American Revolutionary soldter: b. Salem (now Danvers), Mass., 7 Jan. IMS; d. Pomfret (now Brooklyn), Conn., 19 May 1790. His education was a desultory one. In 1740 he removed from Salem and purchased in that part of Pomfret, Conn., which is now Brooklyn, the farm where he afterward resided. It is said that he also hung out a shingle adver¬ tising entertainment for man and beast. There is also the well-known anecdote of the exploit in which he crept into the lair of a destructive wolf and there dispatched the animal. But little definite is known of Putnam's life until he is found in 1755 in receipt of a commission as captain of Connecticut volunteers in a regi¬ ment sent by the colony to aid in repelling a threatened French invasion of New York. He was present at the defeat of the French and Indians under Dieskau near the southern end of Lake George, and later was very success¬ fully employed as a ranger and scout. In 1756 he commanded a company in Abercrombie's army, which had Crown Point as an objective, but was so outplayed by Montcalm as to be obliged to act rather defensively than offen¬ sively. He received a major's commission from the Connecticut legislature in 1757. During Abercrombie s expedition against Ticonderoga in 1758

Putnam commanded an advance guard and scouting party of 100. In the retreat fol¬ lowing the' rash and disastrous attack on the post he became aide to Abercrombie, replacing Howe, who had been shot. Having been sent out in August to capture from the enemy a large quantity of British stores, he was taken prisoner and tortured by the Indians, but rescued by a French officer. He was sent to Ticonderoga and thence to Montreal, where he was exchanged. Promoted lieutenant-colonel in 1759, he accompanied the force sent against Montreal, upon whose surrender Canada passed into English hands. In 1762 he commanded the contingent of 1,000 sent by Connecticut in the naval expedition against Havana. His vessel was wrecked off the Cuban coast, but those on board escaped by rafts, and took part in the successful attack on Havana. He was sent out against the Indians of the frontier, who, under Pontiac (q.v.), were menacing Detroit, in 1763.

A peace was concluded; Putnam returned to

his farm, and there remained in retirement until 1775. YVhen the news of Lexington reached him, he is said to have been plowing, Cincin-natus-like; and at Once to have turned loose the oxen and ridden to Cambridge. A Connecticut regiment was forthwith organized, and Putnam, with a brigadier's commission, appointed to command it. In May he led a battalion to Nod¬ dle's Island, where he captured a sloop and burned a schooner of the enemy. He was a participant in the battle of Breed's (Bunker) Hill, which he had helped to fortify; the chief command in the action has been claimed for him against Prescott. Trumbull, in his picture in the Capitol at Washington, shows Putnam in brilliant uniform defending a gun. Commis¬ sioned major-general in July, he was placed in command at New York, and was ranking officer within the fortifications during the battle of Long Island. After having been stationed at Philadelphia, Crosswick and Princeton, he was sent in May 1777 to command in the «Highlandsˆ of New York. Owing to the loss of Fort Montgomery and Fort Clinton, he was re¬ moved from his command; but later was re¬ stored on being acquitted by a court of inquiry. Subsequently, when he was commanding in Connecticut, Horseneck, an American outpost, was attacked by the British under Tryon. Put¬ nam, according to the story, escaped by dash-mg on horseback down-hill, and eventually pursued the retreating Tryon, from whom he took 50 prisoners. In the winter of 1779 he was stricken with paralysis and incapacitated from father service. Consult (Lives, > by Tarbox (1876), and Livingston (1901) ; Ober, 'Old Put, the Patriot) (1904).

PUTNAM, John Pickering, American

?mSlteu: b-Bost(?n' Mass-> 1847; d. 23 Feb. Ivl/. He was graduated from Harvard in 1868 studied later in the Ecole des Beaux Arts, Paris' and in the Royal Academy of Architecture, Ber-m. He afterward practised his profession in Boston and published < The Open Fire Place in All Ages'; 'The Principles of House Drainage ; Improved Plumbing Appliances); (The Outlook for the Artisan and His Art.)

PUTNAM, Mary Traill Spence Lowell,

American author, sister of James Russell Lowell (q.v.) : b. Boston, Mass., 3 Dec. 1810; d. there, 1 June 1898. She was married to Samuel R. Putnam in 1832 and later traveled abroad for several years. Her literary work was confined to magazine writing until 1844, when she translated from the Swedish Fredrika Bremer's (The Handmaid.) She afterward published (History of the Constitution of Hun¬ gary) (1850) ; (Records of an Obscure Man) (1861); (The Tragedy of Errors) and <The Tragedy of Success,) a dramatic poem in two parts (1862); < Fifteen Days) (1866); (Memoir of Charles Lowell) (1885), *etc.*

PUTNAM, Rufus, American Revolution¬ ary soldier: b. Sutton, Mass., 9 April 1738; d. Marietta, Ohio, 1 May 1824. He was ap¬ prenticed in 1/54 to a millwright, but acquired some knowledge of surveying and later found employment in that profession. In March 1757 he enlisted as a private for service in the French and Indian War, and re-enlisted yearly until 1761, being made ensign in 1760. His story of the campaigns in which he served may be read in the (Journal } which he kept

throughout. He was a farmer successively at New Braintree, Mass. (1761), Brookfield, Mass. (1765) and Rutland, Mass. (1780). In 1773 he went to Florida as one of an investigating committee appointed to examine lands granted by the Crown to Colonial soldiers and officers

who had fought in provincial regiments during the French and Indian War. Putnam was made deputy-surveyor of Florida by the governor of the province and accompanied the expedition up the Mississippi to the Yazoo, up the Yazoo to Haines' Bluff, back to the Big Black and thence in return down the Mississippi. He planned and directed the construction of the Continental lines of defense at Roxbury and for the excellence of his work was detailed by Washington as acting chief engineer of the army. On 11 Aug. 1776 he was appointed by Congress chief engineer of the army, with colonel's rank ; but preferring service in the field, he resigned in December and took com¬ mand of the 5th Massachusetts Regiment. With the northern army in 1777 he did con¬ spicuous service, particularly at Stillwater, where he headed the 4th and 5th regiments of Nixon's brigade. On 7 Jan. 1783 he was pro¬ moted brigadier-general. He was for several years a member of the Massachusetts legisla¬ ture and during Shays' rebellion (q.v.) (1786-87) was a very efficient aide on the staff of Gen. Benjamin Lincoln. In March 1787 he was chosen (with Gen. S. H. Parsons and Rev. Manasseh Cutler) a director of the Ohio com¬ pany, organized (1 March 1786) with a capi¬ tal of $1,000,000 in public securities, to be ex¬ pended in the purchase of land in the North¬ west Territory. In July a contract was made with Congress for one and a half million of acres and soon afterward an ordinance, famil¬ iarly known as the <(Ordinance of 1787,® was passed, providing for the government of the Territory. On 7 April 1788 Putnam, meanwhile made superintendent of the company, landed with a party of emigrants at the mouth of the Muskingum and on the present site of Mar¬ ietta commenced the first organized settlement in the Northwest Territory. He concluded in 1792 at Vincennes a treaty with eight tribes of the Wabash Indians and in 1793 resigned his commission in the army. He was one of the judges of the United States court in the Terri¬ tory, 1790-96, and from 1796 until his removal by Jefferson for political reasons in 1803 was surveyor-general of the United States. He was the founder of the first Bible society west of the Alleghanies (1812), a sturdy Federalist in politics and with the exception of Lafayette the last survivor of the general officers of the Continental army. Consult his (Journal,) edited, with sketch by Dawes (1886). Put¬ nam's papers, including the manuscript (Jour" naP and correspondence with Fisher Ames, Trumbull, Washington and others are pre¬ served at Marietta in the library of the col¬ lege there ; they were edited by Rowena Buell (1904) under the title (The Memoirs of Rufus Putnam and Certain Official Papers and Cor¬ respondence. }

PUTNAM, William Le Baron, American

jurist: b. Bath, Me., 12 May 1835; d. 5 Feb. 1918. He was graduated

from Bowdoin Col¬ lege in 1855, admitted to the bar in 1858 and practised in Portland, Me., 1858-92. In 1887 he

accepted an appointment by President Cleve¬ land as commissioner to settle with Great Britain the rights of American fishermen in Canadian waters and was also a member of the commission under the treaty of 6 Feb. 1896 between Great Britain and the United States. He had twice declined appointments as justice of the Maine Supreme Judicial Court, but in 1892 accepted an appointment as judge of the United States Circuit Court. In 1888 he was the Democratic candidate for goyer-nor of his State.

PUTNAM, Conn., city, one of the county-seats of Windham County, on the Quinebaug River, junction joint of New York, New Haven and Hartford main line and Norwich and Wor¬ cester branch, about 45 miles east by north of Hartford. It was incorporated _ from por¬ tions of the towns of Thompson, Killingly and Pomfret, by the State assembly in May 1855 and was organized as a municipality 3 July 1855 and in 1895 was chartered as a city. Near the centre of the city are Cargill Falls, noted for their beauty. It is the centre of an agricultural region and has a number of manufacturing interests. The chief industrial establishments are cotton and woolen mills, a tire fabric fac¬ tory, silk mills, manufactories of heaters and castings and a toolmaking plant. The number of employees in the manufactories is about 2,200. It has the Day Kimball Hospital, Mother House of the Sisters of the Holy Ghost and seven churches and a Jewish synagogue. The edu¬ cational institutions are a high school, State trade school, public and parish schools and a public library. There are two banks, one National, with a capital of $150,000 and one savings and the business annually is over $20,000. The government is administered un¬ der the charter of 1895, which provides for a mayor, who holds office two years, and a council of nine members. A board of three commissioners operates the municipally-owned water supply system. Pop. (1920) 7,711.

PUTNAM, Fort, a former Revolutionary fort at West Point, N. Y.

PUTS AND CALLS. See Stock Ex¬

change.

PUTTENHAM, put’en-am, George, Eng¬ lish author: b. about 1530; d. about 1600. He. is reputed to be the writer of a work entitled (The

Arte of English Poesie, contrived into three bookes ; the first of Poets and Poesie, the second of Proportion, the third of Orna¬ mentˆ which appeared anonymously in 1589. The Arte is a review of ancient as well as modern poetry and was written for the court. It shows considerable literary knowledge and no small critical power. Its author wrote sev¬ eral other pieces which have been lost. The authorship of (The Arte} also has been claimed for Richard Puttenham, his brother.

PUTTIALA, put-te-a'la. See Patiala.

PUTTKAMER, poot'ka-mer, Robert Vik¬ tor von, Prussian statesman: b. Frankfort-on- theOder, 1828; d. Karzin, Prussia, 15 March 1900. He was educated at Heidelberg, Geneva and Berlin, entered government service in 1854 and as a friend and relative of Bismarck his rise was rapid. He was elected to the Reich¬ stag in 1873 as a Conservative member and in 1877 was chief president of the province of

Silesia. In 1879 he became minister of edu¬ cation arid public worship and endeavored to carry out the compact Bismarck had made with the Clericals. . In 1881 he was appointed min¬ ister of the interior and vice-president of the ministry. He energetically enforced measures against the Socialist party and his methods in favoring the election of government candidates aroused the opposition of the Radicals and were bitterly attacked in a speech by Eugene Richter. After the accession of Friedrich III, Puttkamer resigned and though it was ex¬ pected that he would be reinstated when Wil¬ helm II came to the throne, he was merely appointed chief president of Pomerania in

1891.

PUTTUN. See Pattan.

PUTTY, a mixture compounded of whit-mg and linseed-oil, sometimes

with a slight addition of white lead, beaten together to the consistence of a thick dough. It is used by glaziers for the purpose of fixing sheets of glass in the frames of windows, etc., and also by painters for filling up holes in the surface they are about to paint. It becomes very hard when dried. Plasterers make a so-called putty of ground white, lime softened with water. Putty powder is tin dioxide, useful for polish¬ ing glass, *etc.*

PUTUMAYO, poo-too-ma'yo, or IQA, a South American river, rising in the southwest¬ ern part of Colombia on the eastern slope of the Cordillera. It flows southeast for about 1,000 miles, almost on the line of the equator in its midcourse, receives at the right the San Miguel and Yahuas and at San Antonio after about 150 miles in Brazil empties into the Amazon. It was explored by Reyes and Cre-vaux, is navigable within 100 miles of its source and promises to be a valuable commercial waterway between Brazil and Colombia. The name is also applied to the territory through which it flows, which was exploited early in the 20th century by an English syndicate. Sir Roger Casement headed an official investiga¬ tion, which disclosed the utmost barbarity in collection of rubber from the natives. The company was driven out of existence. Consult Hardenburg, (The Putumayo) (1912) and (The Putumayo Red Book) (1914).

PUVIS DE CHAVANNES, Pierre, pe-ar

pu-ves de sha-van, French painter: b. Lyons, 14 Dec. 1824; d. Paris, 25 Oct. 1898. He sprung from an old Burgundian family of strong Catholic traditions. His father was an engi¬ neer and he himself was destined to the same career, but an intervening illness and a journey to. Italy confirmed a predilection for painting. His first master was Ary Scheffer, with whom he studied but a short time and went for a second visit to Italy. Returning he put him¬ self under the tuition first of Delacroix, then of Couture, but parted from each of them after a short period, as he had with his former master, from an inability to submit to any leading but his own artistic instincts. Certain marks of the influence of these men are seen by critics, particularly of Delacroix, even in the very latest products of Puvis' life. These may be traced in the more fundamental traits of his drawing, in the composition, spacing and the like. Others incline to the belief that his work

rather suggests the influence of his early visits to Italy, in a sort of reminiscence of the fres¬ coes of Piero della Francesca. Such sugges¬

tions seem for the most part only an effort toward discovering subtle resemblances urged on by the really insistent originality of this artist's work. Working out his own theories which were at variance with all the ruling tra¬ ditions of his day it is not wonderful that he should have encountered opposition. The Salon refused his work nine times. In 1861 came his first recognition when he gained a second-class medal and sold his pictures <War) and <Peace) to the state. These were placed in the Museum of Amiens to which the painter later presented the companion pieces <Rest) and (Labors

In 1872, as member of the Salon jury, he disagreed with his colleagues and resigned. He was made president of the Society of French Artists, holding their exhibition in the Champs de Mars and in 1877 was made officer of the Legion of Honor.

As a wall-painter he was the great leader oi modern times in recognizing the limitations imposed by this branch of painting and in sub¬ mitting himself to its demands. He saw that fresco was only the agreeable decoration of a wall surface, which should not attempt to con¬ ceal its character a§, a wall by sharp contrasts of light and shadow and elaborate arrange¬ ments of foreshortening and perspective. Con¬ sequently he painted in flat tones of cool green, blue, brown or lilac, having always in mind the relation of his designs to their architectural surroundings. His pictures themselves were es¬ sentially architectural in their arrangements. Among his mural decorations are those at Marseilles, Lyons, Lille and Poitiers, those in the hotels de Ville at Rouen and Paris, the Hemicycle of the Sorbonne in Paris, the series on Saint Genevieve in the Pantheon and the decorations of the staircase of the public library in Boston. In the last-named work he sought, as he himself stated, ((to represent under a symbolic form and in a single view the intellectual treasures collected in this beauti¬ ful building.® The whole seems to be summed up in the composition entitled <The Muses of Inspiration hail the Spirit, the Harbinger of Light.) Apollo occupies the centre of this panel and the white-robed Muses, draped in filmy white, are ranged in mid-air against a background of pale green grass, with flowering bushes and slender trees, with the deep blue ocean and pale luminous sky stretching beyond. (<Out of this composition,® writes Puvis de Chavannes, (<others have developed which an¬ swer to the four great expressions of the human mind, Poetry, Philosophy, History, Science.® On the right-hand wall of the stair¬ case as one enters appear in three panels: (1) Pastoral Poetry (Virgil) ; (2) Dramatic Poetry (vFschylus and the Oceanides) ; (3) Epic

Poetry (Homer crowned by the Iliad and Odyssey). Consult Michel, (

Puvis de Chavannes) (1912).

PUY, Le, le pii-e, France, arrondissement

Cafltal clty tˆie department Haute Loire. (1) The arrondissement, a little to the south¬ east of the centre of the department, has an area of 8,680 square, miles and a population of about 145,716 and is divided into 14 cantons

and 115 communes. Its capital and that of the department is (2) Le Puy, or Le Puy-en-Velay, lying at the confluence of the Dolezon and the Born, on, the sides and top of the Mont Anis (whence its mediaeval Latin name of Anicium or Podium Anicense), so that its least elevation is about 2,500 feet above sea-level and its great¬ est, the volcanic dike called the Rocher de Corneille about 2,500. It is ill-built but pictur¬ esque. The Rocher de Corneille is topped by a statue of Notre Dame de France made from Russian cannon taken at Sebastopol. The city is a bishop's seat and has a cathedral at the top of a staircase with 136 steps; other important buildings are an old chapel of the Templars, known as Diana's temple, the Gothic church of Saint Michel d'Aiguille (962-984), the splendid marble and bronze Crozatier Fountain, and the Crozatier Museum, which is especially rich in exhibits of the industries of the town. These are chiefly laces, especially guipure, tulle, woolens, bells and clocks. Pop. 21,420.

PUY-DE-DOME, pii-e-de-dom, France, a central department of the Auvergne, bounded on the north by Allier, on the east by Loire, on the south by Haute-Loire and Santal, and on the west by Correze and and Creuse, and so named from the peak 4,086 feet in the Puy-de-Dome group of volcanic mountains in the northern part of the department. The southern range, called Mont-Dore is higher, and the geology and moun¬ tain structure of the region is interesting. The highlands are excellent pastures ; rye and oats grow at more moderate elevations ; and vine¬ yards, wheat, hemp and flax-fields cover the low¬ lands. The forest timber is valuable, as are the mineral waters and the coal deposits. Cap¬ ital, Clermont-Ferrand (q.v.). Area 3,070 square miles.

Pop. 525,916.

PUYALLUP, poo-yalTip, an American tribe, similar to the Nisqually family in Wash¬ ington and Oregon. They formerly occupied all the region about the Puyallup River. A rem¬ nant of about 300 of them reside on a reserva¬ tion near Tacoma.

PUYALLUP, Wash., city in Pierce County, five miles southwest of Tacoma, on the Puyallup River and on the Northern Pacific Railroad. The State Masonic Home is situated here and there is also a home for soldiers' widows. The surrounding district is largely de¬ voted to raising raspberries and there is a canning factory and also lumber interests. Pop.

(1920) 6,271.

PUZZOLANA. See Cement.

PYAEMIA (formerly suppurative fever, purulent infection, purulent diathesis, etc.), no longer means pus in the blood, but is a form of blood-poisoning (q.v.) of microbic origin, sep¬ tic infection due to the absorption of pyogenic germs. The typical pathological condition is the production of multiple abscesses in tissues remote from the seat of injury, produced by liv¬ ing bacteria (forms of cocci probably) trans¬ ported by the blood. Various experiments have shown that pus taken up by the blood-current does not produce pyaemia unless it contains virulent microbes. Sometimes the abscesses of pyaemia are metastatic or embolic caused by the lodgment of infected emboli in arterioles or veinlets, the inflammation of these vessels and its extension to surrounding areas. Formerly

when antisepsis was unknown it was quite com¬ mon. At the present time pyaemia is infrequent, except where injuries are much neglected. Yet it may begin in the veins of the face and the sinuses of the cranium, from acute and chronic otitis media, *etc.* It may be associated with or precede septicaemia (a poisoning due to living bacteria in the blood), and death may result from the general infection of the system. For¬ tunately absorbed virulent microbes are some¬ times killed or neutralized by leucocytes, by the chemical bodies called by Buchner sozins and alexins, by the tissue-cells of the liver, spleen, etc., or may be excreted in a living state by the glandular excretory organs. The onset of pyaemia is marked by depression of the vital powers, chills,

fever, sweating, and sometimes jaundice; by a coated dry tongue, a rapid feeble pulse, a foul breath ; by constipation, followed by foul-smelling loose movements and by scanty high-colored urine. When these symptoms fol¬ low a surgical operation or an injury, and ab¬ scesses are not so superficial as to be discovered, deepseated ones are surmised.

The treatment is preventive and curative. See that the patient's power of resistance is not lowered. Keep the bowels and kidneys active. Intestinal putrefaction must not occur. Sunlight, good air and nourishing food are necessities. As yet no reliable serum-injection has been found to grant immunity. Wounds should be treated antiseptically, and abscesses be antiseptically opened, cleaned and drained. Stimulants, quinine and other tonics are in¬ dicated.

PYAT, pe-a, Felix, French journalist and politician: b. Vierzon, France, 4 Oct. 1810; d. Saint Gratien, France, 5 Aug. 1889. He stud¬ ied law and was admitted to the bar in 1831, but confined his attention chiefly to literature and politics. He was an advocate of the attempted insurrection in 1849, a signer of Ledru-Rollin's appeal to the populace, and was forced to escape from France after the failure of the plan. He busied himself in forming further schemes for revolution, living successively in Switzerland, Belgium and England, and was a member of the ((European revolutionary committee.® When the general amnesty was granted in 1870 he returned to France, speedily attained leadership among the Paris Communists and was prominent in the destruction of the Vendome column. The fall * of the Commune rendered flight again impera¬ tive and for his part in the Communal govern¬ ment he was tried and placed under sentence of death in 1873, though then absent from France. He was pardoned in 1880, returned to France and in 1888 was elected deputy from Marseilles.

PYCNOGONIDA. See Pantopoda.

PYDNA, pid'na, in ancient history, a city of Pieria in Macedonia, originally on the west coast of the Thermaic Gulf, but removed three miles inland by Archclaus. The Athenians con¬ trolled it for a time, but lost it to Philip the Great. In 168 b.c. at the battle of Pvdna, Per¬ seus of Macedon was utterly defeated by the Romans under 3Emilius Paullus — the death¬ blow of the Macedonian empire. In Byzantine times the city of Kitron or Kitros grew up on the same site and this name is borne by the present town.

PYE, pi, Henry James, English poet-lau¬ reate : b. London, 10 July 1745; d. Pinner,

Hertfordshire, 13 Aug. 1813. He was educated at Oxford, and in 1784 entered Parliamentˆ from the county of Bucks, but played an unimportant part there. He was crowned laureate in 1790 and dutifully fulfilled the expectations of his office in producing his two odes a year. Other verse came from his pen, but nothing that rises above the dead level of commonplaceness. He was made one of the magistrates of Westminster in 1792. Pye was a voluminous writer, con¬ tributed to the literature of the stage and trans¬ lated Aristotle's (Poetics. } He seems, however, not to have set great store on his poetry himself, and observed that he had rather be thought a good Englishman than the best poet or the greatest scholar that ever wrote.

PYGMALION, pig-ma'H-on, (1) in Greek legend a son of Clix and grandson of Agenor, king of Cyprus. In the story told by Ovid (Met. x, 243) he conceived an aversion to women and devoted himself to art, but having made an ivory statue he became so enamored of it that he entreated Aphrodite to endow it with life. This was done: the statue became a beautiful woman whom Pygmalion married and by whom he had Paphos, founder of the city of that name in Cyprus. W. S. Gilbert's play, < Pygma¬ lion and Galatea, > is founded on this story. (2) Tyrian king and brother of Dido. He murdered Dido's husband Acerbas or Sichaeus upon which Dido took her dead husband's treas¬ ures and sailed for the coast of Africa where she founded Carthage.

PYGMIES, the name given by the ancients to a race of dwarfish men reported as existing in various parts of the world. Homer (II. iii, 6) fixes the habitat of the pygmies in the far south¬ land whither the cranes migrate at the approach of winter; after Homer the battles of the cranes and the pygmies are a favorite theme of poets, and are often pictured on vases. Ancient au¬ thors, whether travelers, historians, or miscel-lanists, like Herodotus, Ctesias or Pliny, de¬ scribe the pygmsei as little men, the tallest of them not exceeding in height two pygma (Gr. Pygme, a measure of length, the distance from the elbow to the knuckles — less than 14 inches). Herodotus locates

his pygmaei in the heart of Africa in a region traversed by a great stream — probably the Niger — flowing from west to east and modern geographical research gives support to his story after it had long passed for fabulous.. In recent times the actual existence of pygmies has been ascertained beyond any question, though when Paul B. Du Chaillu (q.v.) in 1861 published his (Explorations and Adventures in Equatorial Africa) his description of the pygmy tribes discovered by him was scouted by scientific men as mere fiction. But when his report was confirmed in every essen¬ tial particular bv the missionary Father des-Avanchers (1869), by Schweinfurth (1871), by Stanley (1876) and others, scientific skepticism gave way, grudgingly to conviction of Du Chaillu's good faith. Many different tribes of pygmies are now recognized as existing in the interior of Africa, all possessing these char¬ acteristics: stature ranging from 33 inches to 4 feet 4 inches, as reported of the Wambutti by Stanley: Schlichter makes the average stature 4 feet 6 inches ; complexion, from yellowish brown to reddish brown ; usually heavy growth of hair on body and face — a curious item of

accordance with the report of Ctesias regarding the pygmaei of India, who had (<beards and hair so long as to serve for vesture®; retreating fore¬ head; prognathic jaw; fingers long, tapering, and feet strongly arched ; in their villages the huts (8 feet long, 5 feet wide, 4 feet high) are clustered round the hut of the chief; their usual food is vegetable, but they eat almost anything; in hunting they show great intelli¬ gence; one tribe, the Wambutti, devise exceed¬ ingly ingenious nets, nooses and traps for secur¬ ing game great and small.

Three types of pygmies are now recognized: (1) The African pygmies above described; (2) the Island pigymies of the Philippines, Anda¬ man and the Tapiros, probably of African origin, but mixed breed; (3) the Asiatic pygmies, distinguished by wavy hair, found in the southern portion of the Malay Peninsula, in Celebes, and some Indian jungles. They are taller than the African pygmies and their heads are differently shaped, being dolichocephalic. Consult Wollaston, (Pygmies and Papuans)

(1912).

PYLADES, pi'la-dez, a legendary Greek hero, celebrated for the friendship which ex¬ isted between him and Orestes. He assisted

Orestes in murdering his mother Clytaemnestra, and eventually married Electra, the sister of his friend. See Orestes.

.PYLE, pil, Howard, American artist and author: b. Wilmington, Del., 5 March 1853; d. 1911. He combined literary and artistic talent, and in this double capacity began his career in New York City by contributing to various periodicals. Having achieved a reputa¬ tion he returned to his native place where he resided after 1879. He was instructor at the Drexel Institute, Philadelphia, but his time was largely occupied with original productions for current periodicals. In art he especially affected scenes of colonial life and of mediaeval folk¬ lore and was remarkably successful in conveying their spirit. . Some of the finest achievements in color printing in the magazines of recent times have been from his drawings. Works of which he was both author and illustrator are (The Merry Adventures of Robin Hood) (1883); (Pepper and Salt, or Seasoning for Young F°Iks) (1885); (Within the Capes' (1885); (The Wonder Clock) (1887); <The Rose of Paradise> (1887) ; <Otto of the Silver Hand) (1888): <A Modern Aladdin' (1891); 'Jack Ballister's Fortunes) (1894) ; (Twilight Land) (1895); <Semper Idem' (1903). He also wrote /Rejected of Men' (1903), the story of the Christ in modern setting; (The Story of Launcelot and his Companions' (1907); (The Ruby of Kishmoor) (1908); (The Story'of the GraiP (1910).

PYLOS. See Navarino.

PYM, pirn, John, English statesman: b. Brymore, Somersetshire, 1584; d. London, 8 Dec 1643. He was educated at Oxford, and in 1602 entered the Middle Temple, but was never called to the bar. He became member of Parliament for Caine in 1614, but from 1625 sat for Tavistock. He was prominent in the im¬ peachment of the duke of Buckingham in 1616, and in 1639, with seyeral others, held close cor¬ respondence with the commissioners sent to London by the Scottish Covenanters. When Parliament met again in 1640, Pym was one of

its most active and leading members, and in the Long Parliament, which met later that same year, he came most prominently to the front. Pos¬ sessed of great eloquence, he made a vigorous and effective speech as soon as Parliament had opened, dwelling at length upon the grievances of the nation with respect to parliamentary privileges and civil and religious liberty. A few days after he followed up his speech by bring¬ ing a charge of high treason against the Earl of Strafford, prime minister of Charles I ; and in the impeachment which followed, resulting in the death of Strafford, he took the leading part. In 1641 a motion was carried by the opposition party to submit a remonstrance to the king, ex¬ posing the defects of his administration since ascending the throne, and the zeal of Pym in this matter led Charles into the imprudent measure of going to the Parliament in person to seize him and four other members. Clarendon relates that Charles* I, feeling the necessity of gaining at any cost an enemy at once so im¬ placable and so skilful, offered to Pym the post of chancellor of the exchequer. In November 1643, he was appointed lieutenant of the ord¬ nance, but died the following December. He was buried with great pomp in Westminster Abbey. Consult Forster, Statesmen of the Commonwealth) (1841-44) ; (The Arrest of the Five Members) (1860); and (The Debates on the Grand Remonstrance) (1860) ; Smith, Gold-win, (Three English Statesmen* (1867) ; Gardiner, S. R., (The Great Civil War* (1893) ; Wade, (John PynP (1912).

PYNCHON, pin'chon, John, American colonist : b. Springfield, Essex, England, 1621 ; d. Springfield, Mass., 17 Jan. 1703. He accom¬ panied his father, William Pynchon (q.v.) to America in 1630, settling in the colony of Massachusetts. *He succeeded his father in the government of Springfield in 1652, gained, by purchase and through his father, great tracts of land, and laid out the towns of Northampton, Hadley, Hatfield, Deerfield, Northfield and Westfield. He was eminently successful in ■ gaining and keeping the friendship of the In¬ dians, with whom he negotiated many treaties for the colonies. He was one of the com' missioners to receive the surrender of New York from the Dutch in 1664. He was a deputy of the general court of Massachusetts in 1659-65, assisted under the first Massachusetts Royal Charter in 1665-86; and councillor from 1686 until his death.

PYNCHON, Thomas Ruggles, American Protestant Episcopal clergyman and physicist: b. New Haven, Conn., 14 Jan. 1823; d. 1904. Graduated from Trinity College in 1841, he was lecturer on chemistry there 1843-47 ; studied for the ministry, and was ordained priest in

1849. In 1849-55 he was in charge of parishes in Stockbridge and Lenox, Mass., and in 1854 ac¬ cepted the chair of chemistry and natural science at Trinity College which he held until 1877 when he exchanged for the chair of moral philosophy. He was president of the college 1874-83. In 1874-78 he superintended the erection of the college buildings on the west side of the quad¬ rangle and the transfer of the college to the new site. While in Europe 1855-56 he made a tour through southern France, Italy and Sicily, en¬ gaged in geological investigations, made a study of volcanic action, and ascended Mount vEtna

at night. In 1902 he became professor emeritus at Trinity. He is a member of the American Academy of Arts and Sciences, was one of the founders of the Meteorological Society, of which he is vice-president, and is connected with various other scientific societies both American and foreign. He has published (Treatise on Chemical Physics) (1869) ; (An Examination of Bishop Butler's Analogy* (1890).

PYNCHON, William, American colonist and religious writer : b. Springfield, Essex, England, 1590; d. Wraysbury, England, 29 Oct. 1662. He was a man of education, one of the grantees of the Massachusetts charter and came to America with Gov. John Winthrop in 1630. He held various offices in the colony, from 1632 to 1634 acting as treasurer. He first settled at Roxbury as one of the founders of the village and organizers of the church, but withdrew in 1736 with the company led by Rev. Thomas Hooker and Rev. Samuel Stone southward into Connecticut. Pynchon with his family and a small party settled at the junction of the Agawam and Connecticut rivers and founded the town, now the city of Springfield. For several years this place was included in the Connecticut colony and Pynchon sat in its legislature, but in 1641, under Pynchon's influence, the Massachusetts court as¬ sumed jurisdiction. In 1650, during a visit to England, Pynchon published a book entitled <The Meritorious Price of our Redemption.) In this the author took an anti-Calvinistic view of the atonement and so stirred up the colonists that the book was ordered to be burnt and the author cited to appear before the general court. His letter of explanation was deemed unsatis¬ factory and after being summoned a second time he left the colony in September 1652 and returned to England. He passed the remainder of his life at Wraysbury, near Windsor. His earlier book was republished with a rejoinder to the Rev. J. Norton, as (The Meritorious Price of Man's Redemption (1655). He also wrote (Jews Synagogue) (1652); (How the first Sabbath was ordained) (1654) ; (Covenant of Nature made

with AdanP (1662). Consult Green, (Springfield, 1636-1886: History of Town and City) (1888) ; Adams, (Pynchon Family > (1898).

PYORRHCEA ALVEOLARIS or RIGG'S DISEASE, a disease of the perice¬ mentum about the tooth, leading to receding gums, loose teeth, tooth abscesses and per¬ haps general body infection. It is of bacterial origin. Various forms of Staphylococci are found in the apical abscesses ; micrococcus can-dicans is one of these. The disease when treated early can be controlled by competent dentists.

PYPIN, Alexander Nicolaevitch, Russian scholar, historian and author: b. at Saratov in 1833 ; d. Saint Petersburg, 9 Dec. 1904. Re¬ ceived his academic education at the University of Saint Petersburg, where he was appointed to a professorship in 1860, resigned two years later to enter the literary field. He contributed largely to the Sovremennik (ˆContemporary®) , 1865-67 and from then until his death to the Vestrik Evropy (((European Messenger®). His first work, a comparative study of Russian, Byzantine and Roman folklore, was published

in 1859, followed by a (History of Slavonic Literatnres) (1865), (The Intellectual Move¬ ments in the First Half of the 19th Century) and a masterly biography in two volumes of Byelinski, the critic, in 1876. A four-volume work (The History of Russian Ethnography,* was published in 1892-94 and the (History of Russian Literature) in 1898-99. In 1897 he was appointed a member of The Academy of Sciences of Saint Petersburg, publishing for them the works of Catherine II.

PYRALIDiE, a family of moths (q.v.).

PYRAMID, in architecture, a structure of masonry generally having a recangular base and four triangular sides terminating in a point. According to Herodotus the Egyptians con¬ sidered the pyramidal form as an emblem of human life; the broad base was significant of the beginning and its termination in a point of the end of our existence in the present state; for which reason they made use of this figure in their sepulchres. The most remarkable pyra¬ mids are those of Egypt and Nubia and those of Mexico. The Egyptian pyramids have for ages been a source of interest and curiosity and are. regarded as forming one of the seven ancient wonders of the world. They are built mainly of a hard, rough-hewn limestone, but large blocks of granite are also used, especially on the outside. The four sides are so placed as to face the four cardinal points. Being in¬ tended both as monuments and as tombs, they contain one or more sepulchral chambers, quite small compared with the total mass. They appear to date from about 4750 to 3000 b.c. after which none were built. It is believed that most pyramids were begun over a sepul¬ chral chamber excavated in the rock and that the work went on during the lifetime of the king for whom it was intended. A low narrow passage was kept open as the tiers of stone were added, in order that access might be obtained to the central chamber from with¬ out, and when the monarch died the work ceased and the last layers were then finished off and the passage closed up. The angles formed by the recession of each superior layer were filled up with small stones and beveled off, so as to give a smooth sloping surface to the sides. The stones used varied in diameter, two to four feet being common, but much larger, well-squared blocks were commonly used in facing. The mechanical skill requisite to quarry these and to raise them to such great heights and adjust them in their proper places continues a matter of universal

astonishment. No indication of the mechanical contrivances used for this purpose has been left. The fact that an almost fabulous number of laborers were engaged in erecting these pyramids did not lessen the necessity for the employment of certain machines. The pyramids now stand¬ ing, all in Middle Egypt, are divided into five groups, containing in all about 40 pyra¬ mids. The district in which the pyramids stand begins above Dashur and extends by Sakkara and Memphis along the western mar¬ gin of the valley of the Nile for about 60 or 70 miles, the last or Gizeh group being but a few miles above Cairo. The group of Gizeh, in the neighborhood of the ancient Memphis, is the most remarkable. It consists of nine pyra¬ mids and comprises the three most celebrated

monuments of the kind in existence, namely, the pyramid of Cheops, called Khufu or the Great Pyramid; that of Cephren and that of Mycerinus — -the last much smaller than either of the others. According to Herodotus the Great Pyramid was built by Cheops. The tendency is to place the date earlier and earlier and one large volume has been devoted by V. P. McCarthy to demonstrate that it is at least 50,000 years old. It is estimated that it took 100,000 men working for 10 years to make a causeway 3,000 feet long, to facilitate the trans¬ portation of the stone from the Turah quarries, and the same number of men for 20 years more to complete the pyramid itself. Herod¬ otus further describes the method of build¬ ing by steps and raising the stones from layer to layer by machines and finally of facing the external portion from the top down. Diodorus calls the builder of this pyramid Chembes or Giabryes and by Manetho and Eratosthenes he is called Suphis. The latter name corresponds to Shufu, deciphered from the hieroglyphics upon some stones discovered by Colonel Vyse in his important investigations of this pyramid in 1835. The pyramid at present covers an area of more than 12 acres. The base is about 750 feet square, but was formerly about 768 feet. The perpendicular height, which before the disappearance of the apex was about 482 feet, is now 451 feet. The area at the top is about 12 yards square. The outer casing of small stones has been removed and the appear¬ ance the sides now present is that of a series of ascending steps. By these steps, which number 203, the ascent is made comparatively easy, though the lower ones are 4 feet 10 inches high. The content of solid masonry has been estimated at 82,111,000 cubic feet. The only en¬ trance is on the north face, 49 feet above the base, though the masonry about it has been so much broken away that the debris reaches nearly up to it. A passage 3 feet 11 inches high and 3 feet 5l4 inches wide conducts from the entrance, down a slope at an angle of

26° 41’, a distance of 320 feet 10 inches, to the * original sepulchral chamber, commonly known as the subterranean apartment; it is carried, reduced in dimensions, beyond this a distance of 52 feet 9 inches into the rock, though for what purpose remains a matter of conjecture. The sepulchral chamber is 46 feet long by 27 feet wide and \]/2 feet high. From the en¬ trance passage another branches off and leads to several other passages and chambers. One of the latter, known as the queen’s chamber, is situated about the centre of the pyramid, 67 feet above the base; it has a groined roof and measures 17 feet broad by 18 feet 9 inches long and 20 feet 3 inches high. The other, called the king’s chamber, is reached by an offshoot from the queen’s passage, 150 feet long. Its dimensions are 34 feet 3 inches long by 17 feet 1 inch wide and 19 feet 1 inch high. The chamber is lined with red granite highly polished,, single stones reaching from the floor to the ceiling and the ceiling itself is formed of nine large slabs of polished granite extending from wall to wall. The only contents of the apartment are a sarcophagus of red granite, which, judging by its dimensions, must have been, introduced when the building was pro¬ ceeding. It is supposed to have contained a

wooden coffin with the mummy of the king and that these long since disappeared when the pyramids were first opened and plundered. The second pyramid, built by Suphis II or Cephren, stands on a higher elevation than the Great Pyramid. Its original dimensions were /07 feet 9 inches square and 454 feet 3 inches high, but these now stand 690 feet 9 inches and 447 feet 6 inches, respectively, with an angle for its slope of 52° 20’. Part of the outer cas¬ ing of the pyramid is still preserved. This pyramid has two entrances and the passages to which they respectively give access lead to the same sepulchral chamber, in which is deposited a granite sarcophagus. It was reached with great difficulty by Belzoni in 1818. Belzoni found in it a Cufic inscription recording the visit of the Caliph Alaziz Othman Ben-Yusuf and the opening by him of the pyramid in 1196 a.d. The only remains met with were those of a bull. The third pyramid, built by Menkare or Men-kau-Ra or Mycerinus, is only 354 feet 6 inches square and 203

feet high. It also was explored by Colonel Vyse in .1837. He dis¬ covered several chambers, one of which con¬ tained a sarcophagus and a mummy case bear¬ ing the' name of Men-kau-Ra and also a body, supposed to be that of an Arab. The two lat¬ ter are now in the British Museum, but un¬ fortunately the sarcophagus was lost by the sinking of the vessel in which it was being transported to this country. This pyramid is the best constructed of the three; it was orig¬ inally cased halfway up with black granite. The six smaller pyramids which complete the Gizeh group are supposed to form the tombs of some of the relatives of the kings who con¬ structed the larger ones and are of much in¬ ferior interest to the three above mentioned. Of the other groups of pyramids that at Abusir contains five; another at Sakkara contains 11, one with a doorway inlaid with porcelain tiles and having a royal name, and a third group at Dashur contains five. Other pyramids are at Meydun and Illahun and there are two at Biahmu. The pyramids of Nubia are very numerous ; a single group north of Gebel Barkal comprises no fewer than 120. In Baby¬ lonia the Birs Nimrud or Tower of Belus was a kind of a step-shaped pyramid, built of bricks of different colors. It was erected by Ne¬ buchadnezzar and dedicated to the planets. Its height was 235 feet and its circumference 2,286 feet. The Mujellibe in Babylon, of which the ruins are still to be seen, was another pyra¬ midal structure of the same monarch. Ruins of pyramids are to be found at Benares in India and in other parts of the East. Certain monuments of the ancient inhabitants, found in Mexico, are also called pyramids. (See Mexican Archeology). Consult Lepsius, (Ueber den Bander Pyramided ; Vyse, (Operations carried on at Gizeh in 1837) ; Petrie, (The Pyramids and Temples of Gizeh) (1884) ; Maspero, (L'Archeologie Egyptienne) (1887) ; McCarthy, (The Great. Pyramid Jeezeh) (1900) ; Barber, Mechanical Triumphs of the Ancient Egyptians) (1900) ; Baedecker, <2Egypten) (1814 ed.).

PYRAMID, in geometry, a polyhedron with a polygon as base and triangular sides meeting in a common point called the vertex. A regular pyramid has a regular polygon for

base, while the perpendicular from the vertex to the base passes through its centre. The vol¬ ume of a pyramid is one-third the altitude multiplied by the area of the base. The per¬ pendicular distance between the base and the vertex is the altitude. The slant height is the height of any of the triangular sides of a reg¬ ular pyramid. The total area of the sides of a regular pyramid is one-half the perimeter of the base multiplied by the slant height. Pyra¬ mids are named according to the nature of their bases ; they may be triangular, quadrangular,

etc., according as their bases are triangles, quad¬ rilaterals, pentagons, *etc.* The base and lateral triangles are called faces ; the lines in which the faces meet are called edges.

PYRAMID PEAK, a name given to two mountain peaks in California and two in Colo¬ rado.

PYRAMUS (pir'a-mus) AND THISBE,

thiz'be, a pair of unfortunate lovers whom classical legend represents as living in Babylon. Their parents were enemies and would not sanction the marriage of the lovers, but the two contrived to converse with each other in secret through an opening in the walls of their adjoining houses. They finally determined upon a meeting at the tomb of Ninus. Thisbe was first to arrive, and meeting a lioness who had just killed an ox, she ran away, dropping her mantle in her flight. This the lioness soiled with blood, and Pyramus arriving shortly after and finding the blood-stained garment of his betrothed, imagined her to have been killed and ended his life beneath a mulberry tree, the fruit of which (according to the legend) has since been of a blood-red hue. Thisbe returning finds the body of her lover, whereupon she then kills herself in despair. The legend is em¬ bodied in Ovid's Metamorphoses1* and is cari¬ catured in the farcical interlude in Shakes¬ peare's Midsummer Night's Dream. >

PYRARGYRITE, pi-rar'ji-rit («dark ruby silver®), a rhombohedral mineral, usually of high metallic-adamantine lustre, color black by reflected light, rich ruby-red by transmitted light, hardness 2.5, specific gravity 5.85. It is a silver sulph-antimonite, and may contain 60 per cent of silver. It occurs in magnificent speci¬ mens in Germany, Mexico, Chile and Bolivia, and is an important silver ore in these countries and in the mining regions of the western United States.

PYRENE, a hydrocarbon product of coal-tar distillation (CieHio). Also the name of a commercial fluid for fire extinguishing.

PYRENEES, pir'e-nez, a lofty mountain chain forming the boundary between France and Spain. Its length, from Cape Creux, north of the Gulf of Rosas, to the Point of Figuier, near Fuenterrabia, is nearly 270 miles; and the area of its slopes is about 21,000 square miles. The chain is continued across the north of Spain by the Cantabrian Mountains. The di¬ rection of the chain is east-southeast, to west-northwest. It does not, however, lie in the same straight line, but rather consists of two lines, which form parallel ridges about 20 miles distant from each other, except near the centre, where they become

united by means of a re¬ markable rectangular elbow, in which some of the loftiest summits are found. Both on the north and south sides numerous branches are

thrown off, generally at right angles to the principal axis, and subside rapidly as they re¬ cede from it, forming various transverse but very few longitudinal valleys. The chain rises both from the east and west toward the centre; and, in accordance with a general rule which holds in regard to the European chains, which he in the direction of the equator, the descent on the south side is much more abrupt than on the north. Owing to this, the south has much fewer lakes than the north slope, but far sur¬ passes it in the boldness and grandeur of its scenery. As already observed, the loftiest sum¬ mits of the chain are near its centre. Its cul¬ minating point, Maladetta, situated there, has the height of 11,168 feet, and a great number of peaks in the same locality exceed 8,500 feet. 1 o the east of the centre the chain lowers so rapidly that its average height soon becomes lttle more than 2,000 feet. To the west the height diminishes much more gradually, and

ITia^^earlcS bave, heˆhts varying from’ 5, 000 t<? 7,000 feet, and even 8,000 feet. The prin¬ cipal passes in the Pyrenees formed by the meeting of valleys’ from opposite sides of the “s. take m the east part of the chain the name of Cols, and toward the centre that of Ports. No fewer than 75 are counted, of which 28 may be crossed on horseback and seven in wheeled carriages. The most frequented are those of Pertus and La Perche in the east and baint Jean Pied de Port in the west. The nucleus of the chain is evidently granite, which, with the primitive schists which overlie it, con—

summits, with the exception of Mount Perdu (10,994 feet), Marbore (10,673 feet), and some huge adjacent masses which are foimed of mountain limestone. The granite, however, seldom forms continuous ridges along the principal axis, but rather appears in a num¬ ber of remarkable protuberances situated to the north of it. Above the micaceous schist and

• i • , , * , ˆ ch occur in connection

with it, he largely-developed strata of argilla¬ ceous schist and transition limestone, forming two great belts parallel to the primitive chain, one on the north and the other on the south side. Above these secondary rocks appear, of which by far the most common is the mountain lime¬ stone, which occupies the greater part of the soutly slope, but on the north side attains little elevation, being there almost entirely confined to the lower heights at the bottom of the prin¬ cipal chain. Above the mountain limestone the principal rocks are Jura limestone and trap. The number of thermal springs existing ih the Pyrenees seems to indicate the presence of vol¬ canic agents, but basalt and other rocks of igneous origin are very rare. The minerals of the chain include iron, copper, lead, zinc, man¬ ganese, antimony and cobalt. There is no mine either of silver or gold, but particles of the lat¬ ter are found in department Ariege, and in the streams of several other districts. The only mineral which has hitherto been worked to much advantage is iron. Mineral springs, both cold ana thermal, are numerous, and much fre¬ quented by visitors. The limit of vegetation on

u l7renees is about 600 feet higher than on the Alps. The rhododendrons, which in the lat¬ ter are not found higher than 5,000 feet, are here found at 5,500 feet and alpine plants are found on the loftiest summits bordering on the region of perpetual snow. In the Pyrenees this

is found only on the north slope, where it does not, as in the Alps, form a snowy zone, the lower limit of which looks as if traced out by an almost horizontal straight line; but on the contrary, forms large isolated masses, the base of which is often concealed by the mountains in front of them. This makes it difficult to fix the snow-line with precision, but according to the most accurate estimate it is 9,190 feet, or nearly that of Mount Canigou. Glaciers are not numerous in the Pyrenees, and hence the torrents and rivers which rise in the chain are fed chiefly by springs. Those on the south side flow toward the Ebro and are carried by it to the Mediterranean ; those on the north side flow partly to the Mediterranean and partly to the Atlantic, the watershed between the two seas being carried northward by a branch which ultimately links with the Cevennes. The largest river of the chain, and the only one of impor¬ tance which preserves its name throughout its whole course, is the Garonne. In respect to average height and mass the Pyrenees are un¬ questionably the second

mountain chain of Europe, but its culminating point, Maladetta, ivˆSi? n ˆ ˆ . third place, being indeed lower than Mulhacen in the Sierra Nevada. Contrary to the general rule, that the loftiest summits of mountain chains are found in the line of the principal axis, Maladetta, Posets (11,047 feet) and Mont Perdu, the three culminating points of the Pyrenees, are situated on the south slope Basses-Pyrenees, Hautes-Pyrenees and Pyrenees-Onentales are departments in the south

SraJˆce See also Perpignan, capital

of P. Orientales.

Consult Taine, ‘Voyage aux Pyrenees, > especially the 4th ed. (1873) with illustrations hy Gore; Schrader, ‘Les Pyrenees, } in the Annuaire du Club Alpin franqais) (1885) ; De Margerie and Schrader, ‘Aperqu de la Struc¬ ture geologique des Pyrenees > (1891) and

ˆe la Forme et Relief des Pyrenees >

(1892) , Camena d Almeida, ‘Les Pyrenees : Developpement de la Connaissance geographique /?ona«\ˆbailiei) (1893) ; Trutat, (Les Pyrenees* InnVV V Bllbanus, ‘Flora Pyrenaea* (1897- /iqoq\’ Spender ˆThrough the High Pyrenees) (1898) ; Roussel, (Tableau Stratigraphique des Pyrenees* (1904); Cook, ‘Handbook to Health Resorts on the Pyrenees > (1910); Freeston, Passes of the Pyrenees) (1912).

.. PYRENEES, Peace of the, in European history the name given a treaty concluded between France and Spain by Cardinal Mazarin and De Haro, on the lie des Faisans, in the nver Bidassoa, 7 Nov. 1659, terminating a war which had lasted for 24 vears. By this treaty Spain ceded to France Roussillon, with the fortress of Perpignan, etc., so that the Pyrenees have since formed the boundary of the two kingdoms; and in the Netherlands, Artois and part of Flanders, Hainault and Luxemburg, with a number of fortified towns.

PYRETHRUM, a group of composite plants formerly considered a genus, but now ranking as a section of the genus Chrysanthe¬ mum. In garden literature the name’ is gen¬ erally restricted to Pyrethrum roseum, several hundred varieties of which are widely popular in European gardens. Under the name Chrysan¬ themum coccmeum it is extensively cultivated in southern France, California and westerq Asia

for its flowers, which are dried and ground as the material of insect powder. Another species (C. cineraria; f o lium) is also cultivated for this purpose. The well-known bedding-plant <(golden feather® is a variety C. Prceltum, but is widely known as Pyrethrum aureum among horticulturists. The plants are easy to grow in any good garden soil, if deeply dug and highly enriched. Since the seed is often disappoint¬ ing in its results, the plants are best propagated from choice varieties by division in the spring. The golden-feather pyrethrum is often propa¬ gated by cuttings made during the winter from stock plants.

PYRGOS, pir'gos, Greece, capital city of the monarchy of Elis and Achia, 13 miles west of Olympia, on the west coast of the Morea, near the mouth of the Ruphia (Alpheus), on the railroad from Piraeus to Olympia, and with branch connections with its harbor, Katakolon. The surrounding country is a fertile plain, growing currants, oranges and grapes. The commune has a population of about 27,000; the town, 13,690. Three other small towns in Greece bear the same name.

PYRHELIOMETER, an instrument for measuring the intensity of the heat of the sun's rays. Pouillot's instrument was the first called by this name. It is a form of radiometer, op¬ erated -on -an actinic* principle. A vessel con¬ taining water was used to float a black box with thermometer bulb sunk in the fluid. The difference between the heat shown under ex¬ posure and when the sun's rays were cut off was the basis of measurement. Augstrom's compensating pyrheliometer employs the thermo-electric principle. Two similar metal¬ lic strips, as of platinum, are blackened, and one exposed to sunlight while the other is in shade. The difference in electrical resistance of the exposed and the shaded strips is deter¬ mined by switching on a current, and this per¬ mits a determination of the relative tempera¬ tures. An improved form used bv the United States Weather Bureau was designed by C. F. Marvin. This employs twin strips of blackened silver, which are alternately exposed to the sunlight for one minute, by the use of a timed shutter. An electric resistance thermometer measures the heat through the difference in electric resistance. Consult Abbot, Smith¬ sonian Institution Miscellaneous Collections) (Vol. XVI, 1915).

PYRIDINE _ (CbHbN), an organic base, originally found in bone oil, as a decomposition product, now known to be obtainable from

bituminous coal, petroleum, etc., and also pro¬ duced synthetically by heating amyl nitrate with phosphoric oxide. The most common source is the lighter oils of coal-tar distillation. It is obtained pure by transformation into one of its salts, followed by repeated crystallizations. When pure it is a colorless liquid, boiling at 114.5° C. (238° F.). It is the base of many valued derivatives. The more important acids obtained are picolinic a., nicotinic a., quinolinic a., cinchomeronic a., carbochincomeric a., and berberonic a. Trigonelline and piperidine are two of the most important commercial deriva¬ tives.

PYRITE, or IRON PYRITES, the com¬ monest metallic mineral, like copper pyrites, is often called <(fool's gold,® owing to its resem¬

blance to gold. It may readily be distinguished by its much greater hardness, 6 to 6.5, brittle¬ ness, pale brass-yellow color, greenish-black streak, and specific gravity, 4.95 to 5.10. It crystallizes in isometric crystals often of great beauty, but is usually found massive as a vein material or in beds of great extent. It is an iron disulphide, FeS_2. Its high sulphur percentage, 53.4, and the ease with which it may be burned, leads to its enormous consumption in the manu¬ facture of sulphuric acid. Owing to its ready oxidation, with the formation of sulphuric or sulphurous acids, it is an active agent in the dis¬ integration of those rocks through which it is disseminated. It frequently contains gold and to some extent other valuable metals. It is not an economic ore of iron, on account of the diffi¬ culty of removing the sulphur content. Its most important commercial occurrence is at Rio Tinto, Spain. It is also extensively mined near Rowe, Mass., in Virginia, the Carolinas, Georgia, Colorado and in many other regions. The finest crystals come from Elba, Cornwall in England, Peru, Chester County, Pa., and Central City, Colo. See Mineral Production of the United States.

PYRITES, either of the various metallic sulphides, of which the most important is iron pyrites (see Pyrite). Copper pyrites (see Chalcopyrite) is an important ore of copper. Arsenical pyrites (see Arsenopyrite) fur¬ nishes much of the arsenic of commerce; mag¬ netic pyrites (see Pyrrhotite) is often an im¬ portant nickel ore.

PYRMONT, per'mont, Germany, a cele¬ brated watering-place of Prussia, in the dis¬ trict of Waldeck and Pyrmont, capital of the district; in a beautiful valley at the foot of a range of finely wooded hills, on the left bank of the Emmer, 34 miles south-southwest of

Han¬ over. It contains a palace, in which the Prince of Waldeck and Pyrmont resides during the watering season; and it was much frequented before the war by the aristocracy of Germany; from 10,000 to 20,000 visitors being annually recorded. One of the curiosities of the place is the Dunsthole or gas grotto, which emits vapors similar in nature and effect to those of the Grotto del Cane in Italy. Pop. about 1,700.

PYROCLASTIC, fragmental volcanic ma¬ terial resulting from violent explosive eruptions. The finest particles are known as volcanic ash, or simply as ash. This is not ash in the sense that it is a product of combustion, but is finely divided rock material that has been blown into bits. Volcanic ash has been an important fac¬ tor in the destruction wrought by volcanic eruptions. It may be wind drifted for long distances. Beds of this ash in the Great Plains of Kansas and Nebraska were probably drifted from the Rocky Mountain region. Volcanic ash is sometimes employed as a base for scour¬ ing soaps and polishing powders. Lapilli is much the same as ash, but slightly coarser, averaging about the size of peas. Bombs are larger masses of lava hurled from the craters, often in a partly molten state, in which case they are rendered rounded by the whirling mo¬ tion they assume in the air.

PYROGALLIC ACID, PYROGALLOL, TRI-OX Y-BENZENE, CsH3(OH)3, (1:2:3), is produced by the action of heat on gallic acid, carbon dioxide being eliminated in the process.

Fine colorless needles or plates, readily soluble in water, less so in alcohol or ether, melting point 132° C. Valuable because of its great affinity for oxygen, its alkaline solution is used to absorb oxygen in gas analysis. It is used extensively as a photographic developer, but has the disagreeable power of darkening the skin. It forms a number of derivatives, some being valuable in the treatment of skin diseases.

PYROGRAPHY, from fire and ypa<peiv, to write, literally to write by fire. A method of making impressions on wood, leather, etc., by means

of heated metal tools or burnt sticks. The art was early practised by the Egyptians who used crude iron bars that had been pre¬ viously heated in fire. A modern form of pyrographic apparatus consists of a tube about six inches in length and about half an inch in diameter provided at its lower extremity with a screw-cap and a small support. At the other end there is a rod to which the drawing point is affixed. For the formation of the com¬ bustible gas and heating of the rod sulphuric ether is usually employed. The gas when gen¬ erated is forced to the metallic point by means of air pressure, and after the flame has been regulated a person may work for two consecu¬ tive hours at an expense of about one-half cent per hour. The vapors disengage themselves constantly and feed the small flame which is barely perceptible. The heat is always uniform, and even on leather a sure and sharp execution of the design is possible. Electricallv heated points are also used. The effects produced by the pyrograph are equal in many respects to the fine crayon drawings, and when colored and varnished present a very pleasing effect. The finest and most delicate lines can be drawn and there is no danger of burning holes in the ma¬ terial. The right hand being engaged in the execution of the piece to be ornamented leaves the left free to turn the object in any desired position while the work is in progress.

Pyrography is taught in many trade schools, and is used mainly for ornamenting leather and wood. Consult Bolas and Leland, (Pyrography and Wood Roasting) (1899) ; Maude, (Pyrog¬ raphy } (1891).

PYROLIGNEOUS ACID, an impure, di¬ lute form of acetic acid obtained by the dry distillation of wood. The foliaceous trees, espe¬ cially the beech, or the oak and birch, which latter having been deprived of their bark are better adapted for its manufacture than the conifers. The dry distillation of wood is ac¬ complished in iron airtight retorts, of which there are many styles; and in accordance with the temperatures employed varying products, which are partly gaseous and partly liquid, are formed. The gases are consumed and the liquid component separates into two layers of which one is aqueous and dark brown, contain¬ ing the wood vinegar, while the other is oily, almost black, containing wood tar. During dis¬ tillation the first distillates, which contain very little acid, pass over at 175-235° F. (79-113° C.) while at 288° F. (142° C.) the lighter oils pass. As soon as the water shows a sufficient content of acid the temperature is raised to 315° F. 157° C). Above that temperature the heavier oils distil over. The quantities received vary, as has been said, according to the temperature employed : in general about 35 per cent of pyro¬

ligneous acid; 20 per cent of wood tar and 33 per cent of charcoal are the products.

Pyroligneous acid, as it is received from the still, is a reddish brown fluid having a rather dis¬ agreeable, sour, smoky, empyreumatic odor and taste. It is a very complex product, containing besides acetic acid, all the homologues of acetic acid from formic to caproic acid; methyl alco¬ hol, acetone, metacetone, aldehyde, *etc.*

Commercial acetic acid is prepared chiefly from pyroligneous acid purified by distillation and strengthened by rectification, the acetic acid obtained by the oxidation of ethyl alcohol being of limited concentration and used prin¬ cipally for table use, and preserving food articles. The crude pyroligneous acid is used for the preservation of wood and ropes, for embalming, in veterinary surgery for many dis¬ eases, and in some of the arts, as in calico printing.

PYROLUSITE, the most important ore of manganese. It is a black or gray mineral of brilliant metallic lustre. It is distinguished from manganite and polianite, which it much resembles, by being so soft (hardness 2 to 2.5) as readily to soil the fingers. Its black streak further separates it from manganite. While its crystallization is orthorhombic, it is usually massive or radiating-columnar. Chemically it is manganese dioxide, MnCU It has lon'g been used in the manufacture of chlorine and oxy¬ gen, and in decolorizing glass ; its present most important use is in the preparation of mangan¬ ese steel. It occurs abundantly in Thuringia and elsewhere in central Europe, also in Nova Scotia and Brazil. In the United States it is mined in Virginia, Georgia and Arkansas.

PYROMANIA, incendiary monomania, a form of insanity characterized by an irresistible desire to destroy by fire. In most forms of mental disease self-control is lost, but in pyromania the loss of the power of inhibition is the chief symptom; hence the affection is some¬ times spoken of as a form of inhibitory insan¬ ity, a psycho-neurosis caused by decreased psychological tension. The desire to commit arson manifests itself during certain periods between which the pyromaniac is sub-lucid and may even attend to his affairs, although he ex¬ hibits some nervousness or hysteria. Usually a period of depression precedes an attack. See Insanity.

PYROMETER, an instrument for measur¬ ing temperatures higher than the boiling-point of mercury (350° C.). Regnault and^ other

careful experimenters employed the expansion of air and vapors in measuring high tempera¬ tures. These pyrometers can only be used in a laboratory; for use in a manufactory less ac¬ curate methods of measurement have to be em¬ ployed. In Wedgwood's pyrometer (1782) it was assumed that dry clay, when exposed to heat, contracted regularly, and the instrument was constructed on this principle; but it is now lintrustworthy. An instrument in which the expansion of a metal bar (generally of platinum) was magnified by means of levers has often been employed to measure the tem-PeJ"a*Tre.°f A furnace. Morveau, Brongniart and Darnell invented instruments on this prin¬ ciple. The thermo-electric law of Tait may be used to calculate the temperature to which a junction of copper and iron has been sub-

jected, the electric current produced being measured by a galvanometer. In this way high temperatures have been measured with consid¬ erable accuracy. By Siemens' method tempera¬ tures are measured by observing the increased electric resistance of a platinum wire when heated, two coils of the same kind of wire being prepared so as to have equal resistances at the same temperature, their ends connected by rather long thick copper wires and the current from a constant battery passing through them measured by means of a galvanometer. One of the coils is kept at a known temperature, the other has the temperature which it is desired to measure. The law discovered by Siemens — R = aV T + /3T -f y

where R is the resistance at the absolute tem¬ perature T, and where «, /5 and y are certain numbers, enables the temperature to be calcu¬ lated. Pouillet determined the following tem¬ peratures by means of an air-thermometer. They correspond to the stages of incandescence of a metal bar.

Incipient red-heat . 525° C.

Dull red . 700°

Cherry red . 900°

Dark orange . 1100°

White . 1300°

Dazzling white . 1500°

In potteries cones and rings of clay are employed to measure temperatures. The cones are made to soften at a known heat and the rings indicate rising temperature by expansion. For optical purposes pyrometers are made to indicate by showing metallic colors that are compared with a standard. A simple form of pyrometer measures radiation and operates a pointer by a bimetallic spring. The thermo¬ electric principle is now employed in recording pyrometers that may be located at a distance from the furnace. See Thermometry.

PYROMORPHITE, a mineral occurring in hexagonal crystals, often cavernous and bar¬ rel-shaped, or in curious, nearly parallel groups tapering to a point. It is a lead phospate and chloride and occasionally occurs in sufficient quantities to be an important lead ore. Its hardness is 3.5 to 4, specific gravity 6.5 to 7.1, color commonly green, yellow or brown, lustre resinous. Its most notable occurrences are Ems, Germany; Cumberland, England; Broken Hill, New South Wales, and in the United States formerly at Phcenixville, Pa.

PYROPE, or BOHEMIAN GARNET, a

fine dark-red magnesium-aluminum garnet, often called ((precious garnet® because of its extensive use as a gem. It is slightly yellower than the true ruby. Peridotite, or serpentine derived from it, is the usual matrix of pyrope in Bohemia and in Kimberly, South Africa, but more commonly it occurs as rounded pebbles loose in the sands, as in the ant-hills of the Navajo Reservation in Arizona. It is also found in Colorado, New Mexico and Kentucky, in Scotland and Brazil. It is often incorrectly called ((ruby.)) Consult Kunz, (Bohemian Gar¬ nets, J trans. (Amer. Inst. Mining Engineers> (1893). See Carbuncle; Gems.

PYROPHONE, a musical instrument, in which the various notes are produced by the burning of hydrogen gas within glass tubes of various sizes and lengths. It is also called a

flame-organ and was invented about 1875 by a Frenchman called Kastner.

PYROPHYLLITE, or PENCIL STONE,

a mineral of soapy feel, the compact form of which is extensively mined in North Carolina as soapstone. Its uses are the same as those of the related mineral talc (q.v.). Some of the algamatolite used by the Chinese for carving into pagodas and images is pyrophyllite. The mineral is usually found in coarse lamellar ra¬ diations, occurring thus in fine specimens in Switzerland, Georgia, North Carolina and Cali¬ fornia. Chemically, it is a hydrous aluminum silicate.

PYROSCOPE, an instrument for measur¬ ing the intensity of heat radiating from a hot body, or the frigorific influence of a cold body. It is commonly constructed on the principle of a differential thermometer. Compare Pyrom¬ eter.

PYROSIS, or WATERBRASH, a burn¬ ing sensation in the epigastrium, usually fol¬ lowed by an acrid watery discharge into the mouth. It is a symptom of indigestion, and when felt simply as heat, without rising, is mis-termed heartburn. It arises from an excess of hydrochloric acid in the stomach. A reduction of the acid and avoidance of starchy foods are the recognized forms of treatment. See Dys¬ pepsia.

PYROTECHNICS, the art or business of manufacturing or displaying fireworks. The common ingredients are nitre, sulphur and charcoal, together with filings of iron, steel, copper, zinc and resin, camphor, lycopodium, *etc.* Gunpowder is used either in grain, half crushed, or finely ground, according to the de¬ sired effect. The proportions of the materials differ very much according to the speed of com¬ bustion and the color of flame desired, and the utmost care and precaution are necessary in the manufacture. Lampblack produces a very red color with gunpowder, and a pink with nitre in excess. Yellow sand is introduced to secure golden showers. Verdigris imparts a pale green, sulphate of copper and sal-ammoniac a palm-tree green. Camphor produces a very white flame, with aromatic perfumes, which mask the bad smell of the other ingredients ; benzoine and storax are also used on account of their agree¬ able odor. Lycopodium, which is often used in the manufacture of stage-lightning, burns with a rose color and a magnificent flame. The familiar types of fireworks are: (1) set pieces, that give off showers of colored sparks or flame, sometimes elaborately arranged to form pictures of fire in the air; (2) pinwheels, that discharge products of combustion from radiant spokes, and so rotate a burning wheel sup¬ ported by a central pin; (3) rockets, that are held by a light stick, discharged rearward, the reaction carrying them off in the air (a de¬ scription of sky-rockets will be found under Projectiles) ; (4) Roman candles, that dis¬ charge flaming colored

balls or stars or bombs ; (5) firecrackers, small paper cylinders having a charge of gunpowder ignited by a fuse. Nearly all of these are confined in cylindrical paste¬ board cases, with a fuse of paper cord enclosing a fine train of quick-burning powder. Great in¬ genuity has been expended in obtaining beauti¬ ful effects in pryrotechny. The indiscreet use of

fireworks by boys and incompetent persons re¬ sulted in so many accidents, especially on the fourth of July, in the United States, that “fire¬ less fourths® have resulted in most large cities, and the tendency is to confine exhibitions of pyrotechnics to displays under the management of trained experts, the combustibles being so placed that they are largely shut off from any crowd of spectators.

PYROXENE, a mineral formed commonly in crystalline limestone or dolomite, in serpentine and in rocks of volcanic origin. Less abundant in granite rocks and metamorphic schists. Crys¬ talline form, rhombic, monoclinic or triclinic. Brittle. Hardness, 5 to 7. Specific gravity, 2.8 to 3.7. Of a vitreous or resinous lustre. Color is usually some dull shade of green, but may vary to nearly colorless or to brownish black. Composition an isomorphic mixture metasili¬ cates, RSiOs, where R is Ca, Mg, Fe, sometimes Mn or Zn, rarely the alkali metals. Important varieties of pyroxene are diopside, hedenberg-ite, schefferite, augite. Pyroxene is one of the most important of the rock-forming minerals being an essential constituent of basalt, diabase trachyte, syenite, gabbro, pyroxenite and many other rocks. It is thus widely distributed in all parts of the world. Especially fine crystals occur in the Piedmont, in Sweden, northern New York and southern Canada and in New Jersey.

PYROXYLIN. See Gun-cotton.

PYRRHIC (pir ik) DANCE, a famous wardance of antiquity. It was danced to the sound of the flute, and its time was very quick and light. It was introduced into the Roman public games by Julius Caesar, and was danced by male and female dancers, having much of a dramatic

character.

PYRRHIC VICTORY, a victory so dearly bought that it is almost a defeat, so called from the defeat of the Romans at Asculum 279 b.c. by Phyrrhus. See Pyrrhus.

PYRRHO, pir'o, Greek philosopher: b. Elis, about 365 b.c. ; d. about 270 b.c. He was a pupil of the Democritean philosopher Anaxar-chus of Abde.ra, whom he accompanied to India in the train of Alexander the Great. During this journey he became acquainted with the doc¬ trines of the Brahmans, Magi and other eastern philosophers. His doubts concerning positive knowledge were strengthened as he proceeded in his studies, until at length he came to hold all knowledge uncertain, and considered virtue alone as valuable. In all disputes his answer to his opponents was, "What you say may, or may not, be true; I cannot decide,® and he taught in his school that truth could not be attained, and that we must be content to suspend our judgment on all subjects. He spent much of his life in solitude, and by abstaining from all decided opinions concerning moral and physical phenom¬ ena, endeavored to attain a state of tranquillity unaffected by fear, joy or sorrow. His country¬ men, the Abderites, made him high-priest, and exempted all philosophers from the payment of taxes. The Athenians erected a statue in honor of him, and his countrymen raised a monument to his memory. His skepticism is easily ac¬ counted for. His master, Democritus, held that except the immediate elements of bodies (atoms) nothing was real, and that all perception was

subjective. He was confirmed in these views by the doctrines of Socrates, to whom, in his character, he bore great resemblance, and his skepticism is allied to the irony of that philos¬ opher. Led by his temperament and manner of life to esteem uninterrupted tranquillity the great object of all philosophy, believing that nothing tended so much to destroy this quiet as the interminable disputes of the schools of the dogmatists, and that uncertainty was increased by their contentions, he determined to seek in some other way the peace which he despaired of finding in dogmatical philosophy. A dispo¬ sition to doubt is often called, from this philos¬ opher, Pyrrhonism. Consult Uberweg-Prachter, (Grundriss der geschichte der Philosophe) (Berlin 1914)..

PYRRHO NISTS. See Religious Sects.

PYRRHOTITE, pir'o-tit, or MAGNETIC PYRITES, a metallic mineral, in

composition an iron sulphide, probably FeuSi2, differing from common iron pyrites, FeS2, in percentage com¬ position, in being attracted by the magnet, in its bronze color, inferior hardness (3.5 to 4.5), and specific gravity (4.6). It rarely crystallizes in hexagonal, tabular crystals; usually it oc¬ curs massive. Though pyrrhotite contains over 60 per cent of iron and nearly 40 per cent of sulphur, it is only very recently that it has been regarded as of any value for these ingredients. Its commercial value was due entirely to the occasional presence as an impurity of varying percentages of nickel. Formerly the deposits of nickeliferous pyrrhotite at the Gap Mine, Penn¬ sylvania, were extensively worked, but the far richer and more extensive deposits at Sudbury, Ontario, are now the chief sources of nickel. Enormous beds of copper-bearing pyrrhotite, nearly free from nickel, are successfully worked in Vermont. Choice crystallized specimens are found in Austria, Brazil and at Tilly Foster, bl . .

PYRRHUS, pir'us, Greek military leader, king of Epirus: b. about 318 b.c.; d. Argos, 27 b.c. He was the son of yEacides, who Iraced his descent from Pyrrhus, son of Achilles. He spent an eventful youth, regained the throne from which his father had been deposed, and was himself expelled several years later. He became the friend of Demetrius Poliorcetes, whom he accompanied on the fatal campaign closed by the battle of Ipsus (301 b.c.), then proceeded to Egypt as hostage for Demetrius, and there married Antigone, daughter of Queen Berenice. With the aid of Ptolemy Soter he recovered his kingdom (296), agreeing to share the sovereignty with Neoptolemus, who had been king since his expulsion, but soon after put his colleague to death, and succeeded by courage, affability and generosity in gaining the admiration of his soldiers and people. He temporarily conquered Macedonia, and in 280 went to southern Italy at the head of a large army to assist the Tarantines against the Romans. Near Heraclea, on the Siris, the consul M. Valerius Laevinus was defeated by Pyrrhus, whose elephants played an important part in the conflict, his loss being so great that he is re¬ ported as saying "Another such victory and I must return to Epirus alone.® After having approached within 24 miles of Rome he re¬ turned to Tarentum. In 279 he again defeated

ihe Romans, but was glad to accept the offered truce, and passed with his army into Sicily, where he assisted the Greeks against the Carthaginians. At first he met with brilliant success ; but his attack upon Lilybseum failed. The war ended in the following year with the total defeat of Pyrrhus by the Romans under Curius Dentatus, near Beneventum. On this occasion the famous elephants of Pyrrhus rushed back upon his own army and contributed to his loss. He reached Epirus with a small remnant of his once splendid army. Nothing daunted, he again invaded Macedonia, and be¬ came its king a second time. He afterward turned his arms against Sparta, but was driven from before the walls of that city. In a night attack made upon Argos he was stunned by a tile thrown by a woman from a house-top, and being recognized by the enemy's soldiers was slain.

PYRUS, or PIRUS, a genus of fruit¬ bearing shrubs and trees of the rose family. There are about 40 species, natives of the southern hemisphere and especially of the cool temperate parts. They have usually simple leaves, clusters of showy white, pinkish or bluish flowers after the leaves appear, and fleshy fruits (pomes). Horticulturally this is one of the most important of plant genera, since it in¬ cludes the apple, pear, quince and medlar (qq.v.). The last two, however, are often separated into distinct genera. Some of the species, as crab-apples, are cultivated for ornament.

PYTHAGORAS, pi-thag'6-ras, Greek phi¬ losopher: b. Samos, about 582 b.c. ; d. about 507. His Father, Mnesarchos, was a merchant (prob¬ ably of Tyre or some other Phoenician city) who traded with Samos, where he received the rights of citizenship, and settled with his family. The biography of Pythagoras is mingled with many fables. He received his first instruction from Creophilus in his native city. He then went to the island of Scyros, and was a scholar of Pherecydes till the death of the latter; others make him also a scholar of Thales and Anaximander. Iamblichus says that Pythagoras, during his journey to Egypt, spent some time in Phoenicia in intercourse with the successors of Moschus, and other priests of the country, by whom he was initiated into their mysteries, and that he traveled through various parts of Syria in order to become acquainted with the most important religious usages and doctrines. He is said to have been recommended by Poly¬ crates, king of Samos, to the Egyptian king Amasis. In Egypt he became acquainted with the whole range of Egyptian learning. He re¬ mained in Memphis and Thebes 22 years, and was in Egypt when that country was conquered by Cambyses. Like many others of the sages in that kingdom, he was carried captive to Babylon, where he

conversed with the Persian and Chal-dsean Magi ; and traveled as far as India, and visited the Gymnosophists. After his return he opened a school at Samos, in which he taught his doctrines in a symbolic form, in imitation of the Egyptians. He also visited Crete, where the priests of Cybele took him to the caverns of Ida, in which Jupiter had been cradled. Here he met Epimenides, whom he initiated into the sacred mysteries of the Greeks. From Crete he went to Sparta and Elis, and from thence to Phlius, where, being asked by King Leon what

was his profession, he replied that he was a philosopher (or lover of wisdom), declaring that the name of sage (sophos) belonged solely to the Divinity. With augmented knowledge he returned home, where he now founded a philosophical school with great success. He laid claim to supernatural powers, and his ex¬ traordinary qualities gained over great numbers of the noble and wealthy classes. Three hun¬ dred of these were formed into a select fra¬ ternity or order, which has been frequently compared with the still more famous order founded by Loyola in modern times. The mem¬ bers were bound by a vow to Pythagoras and each other, for the purpose of cultivating the religious rites and ascetic observances of their master, and of studying his system of philos¬ ophy. They thus formed at once a philosophical school and a religious order, which in time also assumed the character and exercised the in¬ fluence of a political association. This influence, which became very considerable, was constantly exerted in the interest of the aristocratic party. The democratic party (perhaps, also, at times, an unfriendly aristocratic faction) reacted against the growing power of the order. At the head of this opposition party in Crotona was Cylon, a rich and respectable citizen, whose enmity Pythagoras had excited by refusing to receive him among his scholars. In revenge Cylon once attacked the house of Milo, where a number of Pythagoreans were assembled, sur¬ rounded it with his partisans and set it on fire. Forty persons perished, and but few escaped. Pythagoras was probably not in the house. Other authorities set down this event long after the death of Pythagoras, who, they say, was simply banished by Cylon to Metapontum. He fled to the Locrians, and when these refused to receive him, to Metapontum, where, accord¬ ing to tradition, he perished from hunger. For his system of philosophy see Pythagoreanism. Consult Burnet, J., (Early Greek Philosophy 5 (2d ed., London 1908) ; id., (Greek Philosophy 5 (London 1914) ; Cantor, M., (History of Mathematics) (Leipzig 1900) ; Fink, K., (Brief His¬ tory of Mathematics5 (Chicago 1900) ; Gomperz T., (Greek Thinkers5 (London 1901-05) ; Gow, J., (Short History of Greek Mathematics5 (New York 1884) ; Milhaud, (La Science Grecque5 ; id., (Philosophes

geometres5 ; Ueber-weg, F., (History of Philosophy from Thales to the Present Time5 (2 vols., New York 1884) ; Windelband, W., (History of Ancient Philos¬ ophy5 (New York 1899) ; Zeller, E., (Die Philosophic der Griechen in ihrer geschichtlichen Entwicklungen5 (5th ed., Leipzig 1892; English trans. by Alleyne, S. F., of 4th ed., 2 vols., London 1881).

PYTHAGORAS OF RHEGIUM, ret¬ urn, Greek sculptor : b. Samos toward the end of the 5th century before Christ. He was noted for his skill in giving the finest and justest pro¬ portions to his statues which often represented the human body in attitudes most difficult to represent. Such were his (Limping Philoctetes5 (in bronze) ; his (Apollo in Combat with the Dragon5 ; his (Duel of Eteocles and Polynices5 ; <Europa and the Bull.5 His favorite subjects were victors in the public games, and it was his habit as an artist to elaborate the details of his figures; he was learned as an anatomist, and in his statues the hair, sinews, and even

veins were represented with lifelike distinct¬ ness and individuality.

PYTHAGOREAN THEOREM, the 47th proposition of the first book of Euclid's Ele¬ ments, which shows that in any right-angled triangle the square on the hypothenuse is equal to the sum of the squares on the other two sides.

PYTHAGOREANISM, the philosophical doctrine of the Pythagoreans, or followers of Pythagoras (q.v.). The system of the Pytha¬ goreans was comprehensive and included a theory of being, that is, a religious cult; a met¬ aphysic; a cosmological theory, and a mathe¬ matical theory.

Pythagorean Cult. — The Pythagoreans be¬ lieved in immortality and the transmigration of souls. As they consequently considered all ani¬ mals to partake of human nature, they forbade the eating of flesh, and even that of beans, which they somehow associated with flesh. They formed a close corporation, and it was considered sinful to reveal any

imperfections in the mathematical work of the school to those outside.

Pythagorean Metaphysics. — The Pytha¬ goreans taught that the essence of all things was number; that everything in its final analysis could be resolved into number. This statement, which is recorded in Aristotle's Metaphysics, where he is enumerating the Greek schools of philosophy, has occasioned much dispute. We may perhaps see in this doctrine the basis of the 10 antitheses of Pythagorean teaching, especially that of the opposites, odd and even, the definite and indefinite, which are placed first in the list. Number was also an idea in which these opposites were each in¬ cluded, and was, therefore, sometimes spoken of as harmony. But other interpretations of the Pythagorean number make unity and duality as the root notion, and pronounce that these terms may be reduced to the opposition of the spiritual and corporeal, of form and of substance, of the Supreme Being and the material world. The Deity is the one, the Original Unity, the Infi¬ nite, out of which all finite things have come. The opposition between the limited or finite and the unlimited or infinite is by some phi¬ losophers regarded as the fundamental idea in the Pythagorean number. It is possible that the doctrine was from the first propounded as a vague generalization which might be and was interpreted in different ways by different mem¬ bers of the school. It is evident that nothing can exist without number, as is stated in the apocryphal Book of Wisdom, in some respects a product of Alexandrian Neo-Pythagoreanism. The numbers themselves are divisible into odd and even, thus suggesting . the contrast be¬ tween the limited and unlimited, the conditioned and the unconditioned, the relative and the abso¬ lute, matter and spirit, man and God. On the other hand, it is possible that the Pythagorean number was not arithmetical but geometrical. The great disciple of Pythagoras in the time of Socrates was Philolaus, but of the writings in which he expounded his views only fragments survive, and these are of doubtful authenticity. Philolaus may have been under the influence of Democritus, and his theory of number have been based on geometrical axioms and the in¬ tervals in the sounds struck from the seven¬

stringed lyre. Probably he was an atomist. The individual atom would in that case repre¬ sent to him a material spatial point, two of which made a line, three a surface, four a solid; of these solids, represented always by even numbers, the constitutents of earth were cubical ; those of fire tetrahedral, those of water icosa-hedral, *etc.* From the use of numbers as the ontological basis of things the passage was easy enough to the wild and fanciful application of them as mere symbols.

Thus the later Pytha¬ goreans made the soul correspond with the number six, while seven was the counterpart of reason and health. The imagination here stepped in and with curious ingenuity labored to give a rational basis to these axioms. Hence the famous oppositions of this philosophical sect; namely (1) limited and unlimited; (2) even and odd; (3) one and many; (4) right and left; (5) male and female; (.6) rest and motion; (7) straight and crooked; (8) light and darkness; (9) good and evil; (10) square and rectangle. It will be perceived that in these oppositions the idea of completeness, as repre¬ sented by an even number, and incompleteness by an odd number is the ruling element, and in the idea of incompleteness is implied the poten¬ tiality of indefinite extension, multiplication or variation. From the very beginning of Pythagoreanism many semi-mystical, semi-scientific speculations were made concerning square numbers; triangular numbers, of the form X* + $X--2

- ˆ - , representing triangular regularly

spaced aggregates of points; and rectangular numbers of the form X 2 + X, representing rec¬ tangular aggregates of points.

Pythagorean Cosmology. — Pythagoras, or at least the Pythagoreans, had some vague idea of a heliocentric solar system. They taught that the universe had as its centre a fire round which the earth and stars revolved. This cen¬ tral fire was not identified with the sun; the stars were luminous from reflecting its light. They taught that this fire was not visible from the earth ; that there was a counter earth which made up with the five known planets, the fixed stars, sun and moon, 10 celestial phenomena. The distance of the spheres from the central fire was determined according to simple nu¬ merical relationships. The harmony of the spheres was a melodious sound resulting from the revolution of the heavenly bodies in ac¬ cordance with the intervals of their distance from the central fire. The Pythagoreans dis¬ covered the connection between the length of the string in a lyre and the character of the note which was sounded on percussion, and developed a theory of the musical scale. In¬ deed this seems to have been the source of their medical and mathematical researches.

Pythagorean Geometry. — The Ionic school of Greek philosophy imported geometry from Egypt into the Greek world of intellectual ac¬ tivity. Its early development in Europe was mainly due to the followers of Pythagoras, who himself enunciated the theorem now known as the 47th proposition of the first book of Euclid, which says that the square of the hypothenuse of a right angled triangle is the sum of the squares on its legs. The three proposi¬ tions, arithmetical,

geometrical and harmonical, were known to them, having been intro-

• f

duced into Greece by Pythaguras, who learned them trom the inventors, the Babylonians. (See Neo-Pythagoreans; Pythagoras). Consult Burnet, (Greek Philosophy > (Part I, London 1914) ; Gomperz, (Greek Thinkers* (tr. New York 1901) ; Zeller, (Die Philosophic der Griechen in ihrer geschichtlichen Entwicklungen) (5th ed., Leipzig 1892; tr. London 1881).

PYTHEAS, pith'e-as, Greek navigator: b. Massilia (Marseilles) in the 4th century b.c. He made two voyages of discovery along the western coast of Europe from Gibraltar to Ice¬ land. The first voyage extended along the western coast of Europe, through the English Channel, and after somewhat extensive explora¬ tions in Britain he proceeded northward and reached Thule, which seems identical with Ice¬ land. Here he was deterred from farther advance by dense fogs and considered himself to have reached the point where the earth ended. He described the fog as a molluscous substance, in which earth, air and sea mingled and in which the universe was suspended. His second voyage seems to have extended along the coast of Denmark and to the Baltic. His ac¬ counts of his voyages were received as fables by the ancients, and though celebrated as a navigator and mathematician, little is known of him excepting through the brief and adverse criticism of later writers, among whom are Strabo and Pliny. His accounts were without doubt in the main correct, but the loss of his works makes it difficult to ascertain his real status. He was said to have been the first to determine the sun's meridian altitude at Mar¬ seilles at the summer solstice by means of a gnomon. The scanty fragments remaining of his writings were published by Arvedson (1824) ; Mullenhoff, (Deutsche Alterthums-kunde* (Berlin 1870).

PYTHIAN GAMES, in ancient Greece, a name given one of the four

national festivals of games, instituted in early times in honor of Apollo, the conqueror of the python. They were celebrated in the neighborhood of Delphi (formerly called Pytho), in the Crissaean fields, which for this purpose contained a hippodrome or race-course; a stadium of 1,000 feet in length, and a theatre, in which the musical contests took place. According to the popular mythological legend the Pythian Games were instituted by Apollo himself. They s-eem to have been originally only a musical contest, which consisted in singing a hymn to the Pythian god. Until about 586 b.c. they were under the management of the Delphians and took place at the end of every eighth year; but after that date they were conducted by the Amphictyons and were celebrated at the end of every fourth year and prizes were added for flute-playing, athletic sports and horse and chariot racing. Eventually contests in tragedy and other kinds of poetry, painting, sculpture and historical narratives were introduced. At first the prizes were silver or gold, but after¬ ward they consisted of the laurel wreath and the symbolic palm-branch. The statues of the victors were erected in the Crissaean plain. They continued to be celebrated, it is believed, until the end of the 4th century. Consult Gardiner, (Greek Festivals and Sports) (1910).

PYTHIAS, pith'i-as. See Damon and Phintias.

PYTHIAS, Knights of. See Knights of Pythias.

PYTHON, in Greek mythology, was the son of Gaea, an enormous serpent which was produced from the mud after the flood of Deu¬ calion. It lived in a cave on Mount Parnassus and was slain a few days after its birth by Apollo. Python really represents the fogs and vapor-clouds which arise from ponds and marshes and are dispersed by Apollo with his shafts — the rays of the sun. Consult Pascal, C., (Studii di antichita e mitologia) (1896).

PYTHON, a serpent of the subfamily Pythonince of the boa family. Pythons differ little from boas (see Bohle), but, except a small, aberrant species in Mexico, are found in Africa, India and eastward to Australia. They rival the boas (q.v.) in size and strength and have similar habits, hanging motionless from trees by their prehensile tails or lurking in the grass or in water where animals are likely to come or at the dririking places. They are especially fond of rocky places, affording snug retreats and are generally known in Africa as ˆrock-

snakes.ˆ Hence they pounce on their victims, which are instantly enveloped in folds of their flexuous and muscular bodies and crushed and rolled into a compact mass. Greatly exaggerated stories are told of the huge creatures these serpents are able to swallow, but, although a tiger or an ox might be killed by the great Indian python, a crushed dog or goat (horns and all) is the limit of its power to eat. The process of swallowing is very slow and many weeks may elapse before an¬ other meal is desired. In fact, however, small rodents and birds form the greater part of their fare and these are more frequently caught. These great serpents are justly dreaded by the natives of the regions they inhabit and the literature of travel, ancient and modern, abounds in narratives of their terrible deeds, and many legends and superstitions have clustered about them, especially in the Orient. Few trustworthy records exist of their hav¬ ing attacked human beings, however, and most of the species are readily tamable. They are nocturnal in disposition, hiding in holes or shady tree-tops during the day.

All pythons lay from 50 to 100 eggs on the ground in some dry, grassy place, and the female coils about them, guarding and warm¬ ing them for about two months when they hatch. The boas, on the contrary, bring forth their young alive.

The biggest pythons are those of southern Asia, the first place belonging to the netted python (Python reticulatur) of Indo-China and the Malay Archipelago, which sometimes exceeds 30 feet in length and is perhaps the largest kind of serpent known. It is light yellowish brown with squarish black markings and its skin glitters in the sunlight with splendid prismatic hues. It abounds in hot, lowlying regions and has a savage disposi¬ tion. Its rate of growth is slow and it prob¬ ably lives to a great age. The adigar (P. molurus) of all India, Ceylon and Malaya, reaches nearly the same length and is of heavier build; it varies from yellowish to dark brown in ground-color, with elongate, irregular dark blotches. The three African species known as

(< rock-snakes,® are smaller, none exceeding 18 feet long. One of

them, the royal python (P. regia), dark brown, with a row of light spots along the back, is the species most often seen in traveling menageries. Another (.P. sebce) is called (<fetch-snake,® on account of the superstitious regard paid it by the negroes of the West Coast. It is marked with many dark zig-zag cross-bars and a dark line along the spine. Australia possesses several pythons, which are smaller and more active than the tropical species. Two, the carpet-python and the diamond snake, are common and well known ; they are pests of the poultry-yard, but useful as destroyers of rats and rabbits.

Ernest Ingersoll.

PYTHONIN.5L See Boidˆ: ; Python.

PYTHONOMORPHA, a suborder of fos¬ sil marine reptiles whose remains are found in Cretaceous rocks of Europe, the Americas, New Zealand and South Africa. There are about 120 vertebrae in the vertebral column. The skull was long and much resembled that of the lizard. The two pairs of limbs were used as paddles in swimming. The mouth permitted these reptiles to seize large prey which they held by means of their stout conical teeth. Kansas has yielded many well-preserved speci¬ mens from its chalk-beds. Complete skeletons measuring 30 feet in length have been found. The chief divisions of the Pythonomorpha are Tylosaurus, Platecarpus, Clidastes and Mosa-saurus. The last named was the largest mem¬ ber of the group, sometimes reaching a length of 40 feet. Consult Osborn, Henry Fairfield, (A Complete Monasaur Skeleton) (in Me¬ moirs of the American Museum of Natural His¬ tory, } Vol. I, part iv, New York 1899) ; Von Zittel and Eastman, (Textbook of Palaeontol¬ ogy > (Vol. II, New York 1902) ; Williston, (On Monasaurs, etcP (in Kansas University Quar¬

terly, Vol. II, Lawrence 1893) ; id., in Univer¬ sity Geological Survey of Kansas* (Vol. IV, Topeka 1898) ; Williston and Case, (Kansas Monasaurs) (in Kansas University Quarterly, Vol. I, Lawrence 1892).

i

PYX, anciently any casket and in particular a jewel-case. The present significations of the word are: (1) The vessel, of gold or silver, in which, in Catholic churches, the blessed sacra¬ ment is reserved; called also ciborium; and the small silver-gilt vessel in which the host is car¬ ried to the sick for administration at their homes. In former times the pyx had the form of a dove and was suspended above the altar; in present usage it is reserved in the tabernacle or shrine above the high altar. (2) The box or chest in which, at the English mint, specimens of the coinage are deposited, to be tested by a jury of goldsmiths about once in three years; this test is called the ((trial of the pyx.®

PYXIE. The pyxie, or flowering moss (Pyxidanthera barbulata) , is one of the most beautiful and early-flowering plants of the moist, sandy, pine-barren regions of New Jer¬ sey and North Carolina. It is found only in certain localities even in this restricted district, but is abundant in its chosen haunts, blooming in April. The pyxie belongs to the Diapensia family, very closely related to the heather tribe, and is a small, evergreen, shrubby plant, lying, cushion-like, flat on the sand, and having long, tapering branches trailing in all directions. The small, rigid, pointed leaves are tinged with red at blossoming time and are very numerous, but are nearly hidden by the profusion of waxen, symmetrical, five-lobed flowers, coral-tinted in the bud, creamy white when open. The twin anther-cells of the five anthers are globose and transversely valved, whence the Greek generic name, meaning box-anther.

PYTHON (Python moiurus)

•

• .

;

‘

-

4 ‘

s

t

Q

Othe I7t'h letter of the English, Latin and other alphabets of western Europe. As in Latin so in English it is always followed by the vowel u: as in English so probably in ancient Latin qu was equal to cu or kw: q is, therefore, a superflous letter, and has no place in a scien¬ tific alphabet, save as standing for some sound differing from that of k : in A. J. Eillis's palaeotype alphabet q stands for nasal ng. Some of the ancient Latin grammarians regarded Q as a contracted form of CV (that is cu) ; but others, and with them modern nhilologists, recognize in Q a modified form of the koppa of early Greek Q, derived fro mthe Phoenician alphabet. (See Alphabet). This character occurs in very ancient Latin inscriptions; but later the down stroke was written aslant, Q, whence the form Q. Q was not employed in Anglo-Saxon writing, cw being used instead: cwen, queen ; cwellcm, to quell ; nor was it used in early German writing, except for words bor¬ rowed from Latin; but afterward words of native Germanic origin were spelled with q : qudlen, to torment ; quer, athwart.

In some systems for the transliteration of the Semitic languages Q is used for the Hebrew p, Arabic Q. The sound Qu in Germanic lan¬ guages is cognate with what appears to be an unlabialized guttural in the mother tongue of the Indo-Europeans. The labialized guttural Q is often related to pure labial sounds : thus the Latin quattuor, <(form,® corresponds to the Oscan petora. In words borrowed from the French, such as coquette, Qu is pronounced as a simple k. Q stands for ((Quintus,® Q. E. D. for Lat. quod erat demonstrandum, <(which was to be proved® ; Q. E. F. for quod erat facien¬ dum, <(which was to be done® ; qr. for ((quire® or ((quarter® ; qt. for C(quart® ; q.v. for Lat. quod vide, <(which see® ; q.d. for Lat. quasi dictum, ((as if said® ; Q. C. for ((Queen's Counsel.®

QUA (kwa) BIRD. See Herons. QUACKENBOS, kwak'en-bos, George Payn, American educator: b. New York, 4 Sept. 1826; d. New London, N. H., 24 July 1881. He was graduated at Columbia in 1843 and admitted to the' bar. Later he abandoned law and for many years conducted a large pri¬ vate school in New York. He published Ad¬ vanced Course of Rhetoric and Composition (1854) ; (School History of the United States) (1857); 'Natural Philosophy* (1859) , and many other once popiular textbooks.

QUACKENBOS, John Duncan, American physician, son of G. P.

Quackenbos (q.v.) : b. NewJYork, 22 April 1848. He was graduated from Columbia in 1866 and from the College of Physicians and Surgeons in 1871, and has since practised in New York. He became ad¬

junct professor of English at Columbia in 1884, and was professor of rhetoric in Barnard Col¬ lege 1891-93. He is a specialist in mental dis¬ eases and has published, amone various other works, ‘History of the World) ; (History of Ancient Literature) ; <Tuberculosis) ; ‘Typhoid Fever) ; ‘New England Roads and Roadside Attractions) ; (Hypnotism in Mental and Moral Culture) ; (Hypnotic Therapeutics) ; (Enemies and Evidences of Christianity* ; <Magnhild) (1919), *etc.*

QUACKENBUSH, kwak en bush, Stephen Platt, American naval officer: b. Albany, N. Y„ 23 Jan. 1823; d. Washington, D. C., 4 Feb. 1890. He entered the navy as midship¬ man in 1840, received rank as lieutenant in 1855 and lieutenant-commander in 1862. In the early part of the Civil War he had charge of the Delaware, Unadilla, Pequot, Patapsco and Mingo in the blockading squadron, covered General Burnside’s army at Aquia Creek and Roanoke Island, participated in the battles of Elizabeth City and New Berne, N. C., engaged the Confederate batteries at Winton, N. C., and destroyed the town. He later took part in the engagements at Sewell’s Point Landing, Wil¬ cox Landing and Malvern Hill and received at the last-mentioned place a wound from which he lost his right leg. In 1863 he captured the Princess Royal loaded with materials for a Confederate ironclad. In 1864 while dredging Charleston Harbor for torpedoes his ship, the Patapsco, was struck by a torpedo and sunk. Later he was in command of the Mingo, pro¬ tecting Georgetown, S. C. He became rear-admiral in 1884 and was retired in 1885.

QUADI, kwa’di, an ancient powerful peo¬ ple of southeastern Germany, of the Suevic race. They inhabited the country bounded by Mount Gabreta, the Hercvnian forest, the Sarmatian Mountains and the Danube; their neighbors being the Gothini and Osi on the north, the Jazyges Metanastae on the east, the Pannonians on the south and the Marcomanni on the west. With the last-named people they were on terms of alliance. In the reign of Tiberius the Romans erected a kingdom of the Quadi ; but in the reign of Marcus Aurelius the Quadi joined the great German confederacy against the empire, and in 174 were on the point of destroying the imperial legions in a great battle when a sudden storm, attributed to the prayers of the Christian soldiers in the em¬ peror’s army, enabled the Romans to recover from

their confusion and achieve a complete victory. The independence of the Quadi was recognized by Commodus in 180. They dis¬ appear from history about the close of the 4th century.

[51]

QUADRAGESIMA, the period of the 40

days' fast preceding Easter : the season has a like name in Greek, Tesserakoste, fortieth. The first Sunday of Lent is sometimes called Quadragesima, but in the Roman calendar it is Dominica prima Quadragesima, first Sun¬ day of Lent and the Sundays following are denominated, respectively, the second, third and fourth of Quadragesima, Passion Sunday (Dominica Passionis), and Palm Sunday (Dominica Palmarum) . In the Book of Com¬ mon Prayer these six Sundays are called the first, second, third, fourth and fifth of Lent and ˆSunday next before Easter® ; but this Sunday is also styled in England and the United States ((Passion Sunday,® and its week <(Passion Week®; its familiar name among Catholics is «Holy Week.®

QUADRANGLE, a square or four-sided

court or space surrounded by buildings, as often seen in the buildings of a college. Also in geometry, a figure having four angles, and consequently four sides.

QUADRANT. See Surveying.

QUADRATE BONE, the squarish bone developed in reptiles and birds, by means of which the lower jaw is articulated or joined to the skull. The lower jaw of these forms is thus not articulated directly or of itself to the skull, as in mammals; and in reptiles and birds each half of the lower jaw is composed of a number of distinct pieces. In mammals, on the contrary, the lower jaw consists simply of two halves united together in front. The os quadratum, or quadrate bone, which thus

forms a char¬ acteristic structure of birds and reptiles, is gen¬ erally regarded as corresponding in mammals to one of the little bones or auditory ossicles of the internal ear, named the malleus. See Ear.

QUADRATURE OF THE CIRCLE.

The problem involved in the quadrature of the circle requires the determination of the length of a straight line such that the square con¬ structed thereon shall have an area equal to that of a given circle. It can be shown in a variety of ways that, if r is the radius of the circle, the area will be equal to xr2 where tt can only be obtained approximately in terms of a finite number of fractions. On the other hand, it has become a matter of general information that the quadrature of the circle is impossible, and this is true only when the ancient Greek problem is understood, which involves a serious limitation; that is, the quadrature must be effected by means of a geometrical construction in which the mathematician is limited to the use of but two instruments, the straight edge and a pair of compasses. The problem is not solved, there¬ fore, if any other instrument or any equivalent analytic method is employed. For 4,000 years innumerable attempts have been made to discover this construction, all destined to fail, as it was demonstrated by Lindemann in 1882 to be impossible. In reaching this conclusion we are confronted by the fundamental question; What geometrical constructions are, and what are not, possible, when restricted to the use of these instruments? In analysis, operations cor¬ respond to constructions. The operation, a X b, involves taking b units a times, which, with an assumed unit of length, is equivalent to laying off a line having a X b units of length, which is accomplished by using the method of propor¬

tions. In a similar manner, the rational opera¬ tions of addition, subtraction, multiplication and division find a geometrical solution involving the straight edge alone.

Irrational operations are divided into alge¬ braic and transcendental. Any operation that involves the extraction of a square root only presents the simplest case of an algebraic irrationality, and any construction involving the determination of the points of intersection of two circles, or a circle and straight line, leads to an equation of the second, of the fourth or of some higher degree,' whose solution involves the extraction of square roots and rational opera¬ tions only. Conversely, the necessary and suffi¬ cient condition that unknown quantities can be constructed with the straight edge and com¬ passes

is that the unknown quantities can be ex¬ pressed explicitly in terms of the known by an analytic expression involving only a finite num¬ ber of rational operations and square roots. In other words a Euclidean geometrical solution is impossible when no corresponding algebraic

equation exists. When a number like V 2 is the root of an algebraic equation with integral co¬ efficients, for example, x 2 — 2 = 0, and still can not be expressed exactly in terms of a finite series of numbers it is an algebraic irrational number. When the number, like e, the natural base in the theory of logarithms, or tt, the ratio of the circumference to the diameter, is not the root of any algebraic equation, with in¬ tegral coefficients, it is a transcendental num¬ ber. Lindemann provided that^r is a transcen¬ dental number and, hence, since it is not the root of any algebraic equation, it cannot be con¬ structed to an assumed unit by the extraction of square roots, that is, by using the straight edge and compasses.

The possiblity of a geometrical solution of a problem in general depends upon a theorem in the theory of numbers to the effect that the degree of the irreducible equation satisfied by an expression composed of square roots only is alzvays a poiver of 2 ; whence, if an irreducible equation is not of degree 2™, it cannot be solved by square roots.

Next to the squaring of the circle, the most famous problems of antiquity are the Delium problem of the duplication of the cube and the trisection of an arbitrary angle. Granting the preceding general theorem, these are easily shown to be impossible when restricted to the straight edge and -compass.

The duplication of the cube requires the de¬ termination of the edge of a cube x, such that its cube shall be twice the volume of a given unit. That is „r3 = 2. This equation is irre-

3 _

ducible, since otherwise V2 would be rational. Moreover, the equation is* a cubic and its de¬ gree is not of the form 2n. Hence the solution is in general impossible.

The problem of the trisection of an arbi¬ trary angle corresponds to the solution of

x3 = cos 0 + v — 1 sin (f> and it follows that in general this is impossible by Euclidean methods.

History. — The quadrature of the circle is attempted in the Rhind Papyrus (2000 b.c.), the oldest known mathematical work, in which Ahmes, an Egyptian priest, lays down the em¬ pirical rule: «Cut off one ninth of the diameter;

the square on the remainder will equal the area

of the circle.® This rule affords 7r=(— J =

3.16 … . , a value reasonably accurate as

compared with ?r — 3, the value assumed in the Bible (1 Kings vii, 23; Chronicles iv, 2). Archimedes (200 b.c.) invented the method still used by students of plane geometry that depends on inscribing and circumscribing regular poly¬ gons, which, save for an improvement by Huy¬ gens (1654), remained in use until the invention of the infinitesimal calculus by Newton and Leibnitz in the last quarter of the 17th century. Hippocrates of Chios (470 b.c.) was the first to investigate areas bounded by curves and to bring into prominence the problems of squar¬ ing the circle and duplication of the cube. Ac¬ cording to Philoponus, the Athenians were suffering from a severe plague of typhoid fever in 430 b.c., and were told by the oracle at Delos that Apollo required an altar in the form of a cube twice the size of the one existing. A new one was, therefore, constructed, having each edge twice the length of the old one, but the plague was worse than ever. Suspecting some mystery, confirmed by the insistence of the oracle, the Greeks applied to Plato, the most illustrious of their geometricians, and were re¬ ferred by him to Hippocrates. He succeeded in reducing the problem to the determination of two mean proportionals: for, if a: x = x: y: — y : 2a, then x2 = ay and y2 — 2 ax, the equations of two parabolas, which intersect in a point whose abscissa is x3 = 2a3. This is equivalent to a graphical solution by means of conics, but to draw the curves, a different instrument would

be required than those prescribed by Euclid. The problem was thereafter known as the Delian problem. The Cissoid of Diocles (150 b.c.) and the Conchoid of Nicomedes (150 b.c.) are curves of the third and fourth degree, respectively, invented for the special purpose of duplicating the cube and trisecting any angle. The curve known as the quadratrix of Dinostratus (350 b.c.) which, however, had previously been constructed by Hippias of Elis (420 b.c.) for the trisection of the angle, suf¬ ficed also to determine the length of a circular arc and for the quadrature of the circle. It be¬ longs to the class known in modern times as in¬ tegral curves, since the ordinate can be expressed as an integral, such a curve being known to the ancients as a quadratrix. If OA and OB are two perpendicular radii of a circle and two points M and L move with constant veloc¬ ity one upon the radius OB and the other upon arc AB, such that starting from O and A at the same time they both arrive simultaneously at B ; then the intersection of OL and MP drawn parallel to OA is a point on the quadratrix. The ordinate, y, is proportional to 0, the angle between OL and OA, and since y= 1, when

0 = - , 0 y. But 0 = tan-1- , the equation 2 2 oc

y

of the quadratrix becomes - = tan - JIt cuts the axes of X at the point whose ab—

Limit y _ 2

scissa is x = = ___ Q „ — £•

tan-y

It follows that the radius of the circle is the mean proportional between the length of the

quadrant and the abscissa of the intersection of the curve with the axis of X. Hence any apparatus that will describe the quadratrix will enable us to determine x graphically. Evidently the curve y — sin n-lx is much more convenient for this purpose, since tt is one of the ordinates of this curve when x equals zero ; but this curve does not appear to have been used by the Greeks. It is called the sinusoid, the axis being vertical, and any transcendental apparatus which will trace the sinusoid by continuous mo¬ tion would afford a geometrical construction of tt. Such an apparatus has been invented recently by a Russian engineer, Abdank-Aba- kanowicz, and constructed by Coradi of Zurich. It is called the integraph, and with its aid it is possible not only to lay off ˆ but to trace the integral curve.

YˆF (x) = j f(x) dx, when the differen¬ tial curve y~f(x) is given.

The rise of modern analysis after Newton and Leibnitz developed many new methods for the evolution of tt, the best known being the so-called series of Leibnitz,

71 7= 1 ~ 7 i + i — v + • • •

After the invention of logarithms by Napier (1614), Euler, by the introduction of complex quantities, developed the celebrated relation be¬ tween the Naperian base e and tt, eix = cos .v -f-i sin x

which for x=-ˆ reduces to the most remark¬ able relation in mathematics,

ei7T = — L

The modern proofs of the transcendency of ˆ are based upon this relation, since they all de-pehd upon that of e. In 1873 Hermite ((Sur la Function exponentielle,1 Comptes rendus, 1873) first proved the transcendence of e, and this was followed, in 1882, by an analogous demonstration for tt, given by Lindemann ((Liber die Zahl ir,1 Mathematische Annalen, XX 1882). This demonstration is equivalent to proving that the Euclidean problem of the quadrature of the circle is impossible, and closes in this generation a question that has occupied mathematicians for 4,000 years. The long and difficult proofs of Hermite and Lindemann have been much simplified, first by Weierstrass (Ber¬ liner Berichte, 1885), and in particular by Hil¬ bert, Hurwitz and Gordon (Mathematische Annalen, Vol. XLIII). The questions involved treated without requiring a knowledge of the calculus have become familiar to English mathe¬ maticians through the translation by Beman and Smith of Klein's (Famous Problems of Ele¬ mentary Geometry1 (1897). Consult also the chapter on (The History and Transcendence of 7t, in (Monographs on Topics in Modern Mathe¬ matics1 (New York 1911), by D. E. Smith.

J. Brace Chittenden, Ph.D.

QUADRIENNIUM UTILE, kwad-ri-en'- l-um u-ti-la. (Latin, meaning <(four years use¬ ful11), a phrase in Scotch law, referring to the four years after majority, during which period a person may set aside or revoke any deed executed during his minority, if such deed is to his prejudice. The same law existed among the Romans, to protect the rights of minors by giving them, after majority, an opportunity to revoke any deed which had been made to their disadvantage when they were inexperienced minors or, in the eyes of the law, infants.

QUADRIGA. See Chariot.

QUADRILATERAL, a common name for the four fortresses of northern Italy: Mantua, Legnago, Peschiera and Verona, which form an outwork to the bastion of the mountains of the Tyrol. They have figured prominently in the wars between Austria and the several Italian states.

There exists also a combination of four fortresses in Poland called the Polish Quadri¬ lateral.

QUADRILATERAL. See Polygon.

QUADRILLE, kwad-ril, or ka-dril', (1) a dance of French origin, now forgotten in most civilized countries of the globe, which consists generally of five consecutive figures or dance movements, danced by four couples, each form¬ ing the side of a square; or by four sets (often pairs) of couples. (2) Also an obsolete game of cards played by four persons. The game is celebrated by Pope in <The Rape of the Lock.*

Tv/r-QUADRIVIUM, tˆie name given in the Middle Ages to the four mathematical branches of study, arithmetic, music, geometry and as¬ tronomy, in contradistinction to the Trivium, which consisted of the three remaining branches taught in the mediaeval schools, and which consisted of grammar, rhetoric and dialectics, the whole comprehending what was called the seven liberal arts. This program of study was outlined by Plato in the < Republic.)

QUADROON, or QUARTEROON, a

person of mixed blood, usually one who is one-quarter negro and three-quarters white; that is, one of whose grandparents was white and the other negro, and one of whose immediate par¬ ents was white and the other mulatto.

QUADRUMANA, the name applied by Cu¬ vier and others to denote the order of "four-handedˆ mammalia represented by the lemurs, monkeys and apes, from the fact that these forms agree in possessing a great toe so con¬ structed as to be capable of opposing the other digits of the feet, instead of being placed par¬ allel with the other toes, thus forming a kind of "hand® adapted for supporting the foot on the ground. Cuvier separated man as a col¬ lateral order Bimana or "two-handed® mam¬ malia. But in modern zoology, man is included m one order with the apes and monkeys — the order Primates (q.v.).

QUADRUPLE ALLIANCE, a union of four sovereigns or states to forward their com¬ mon policies. Notable among such unions was the alliance between Great Britain, France and the German Empire, concluded at London in 1/18, in which .Holland joined 1719; its objects were to secure to the house of Hanover the succession to the British Crown ; to secure France to the house of Bourbon ; and to prevent the union of France and Spain under one crown. Another

memorable quadruple alliance was that of Austria, Russia, Great Britain and Prussia, formed in 1814 to regulate the political system of Europe after the fall of Napoleon. In 1834 England, France, Spain and Portugal en¬ tered into an alliance to put down Don Carlos and his partisans.

QUADRUPLEX TELEGRAPHY. See

Electrical Terms.

QUAESTOR, kwes'tor, the title of a class of magistrates in ancient Rome who had charge

of the pecuniary affairs of the commonwealth: they were the treasurers of state. Of these one, quaestor urbanns or q. cerarii (urban quaestor, quaestor of the treasury), who remained at Rome, administered the public revenues and expendi¬ tures. Other quaestors, called provincial or mili¬ tary quaestors, served as assistants to the pro-consuls or propraetors who governed the several provinces: their duty was to provide for the payment and provisioning of the troops, to col¬ lect the imposts and, in the absence of the governor, to act in his stead. In very early times there was in Rome an official styled quaestor parricidii (tracker of murder) who prosecuted persons charged with capital offenses. A quaestor was ex officio entitled to a seat in the Senate.

QUAGGA, kwaga, a species of the horse (hquus quagga) , nearly allied to the zebras, formerly found on the plains of southern Africa but now quite extinct. It was striped like the zebra, but did not possess bands on the limbs. The color was dark brown on the head, neck and shoulders, the back and hind quarters being lighter, while the croup was russet gray. The under parts of the body were white, the upper

IHr.ˆ i°ˆ ancˆ tail being marked by

whitish bars. The quagga was smaller than the zebra, and bore a closer resemblance to the horse. The ears were short, the head being relatively small. The tail was tufted. These animals were gregarious, the herds which in¬ habited the Kaffrarian plains numbering each several hundreds of individuals, which would mingle with the zebra herds. The quagga was ˆu1Vti nimble and elegant in its movements, ihe Bushmen and Kaffirs esteemed the flesh as good palatable food,

and these animals were on the same account unremittingly pursued by the hon. It was tamed without much difficulty but domestication apparently altered its disposition thT Iˆncˆred it dull and less active in habits.

1 he Dutch colonists were said to be in the habit of keeping quaggas along with their cattle which the quaggas defended from the attack o hyaenas and other carnivora by trampling on the invaders and otherwise injuring them, ihe quagga bred with the common horse, and a mixed race of this kind, possessing great beauty of form, and retaining in a large degree the characteristic markings of the quagga is said to have existed in England at one time.

r .name “quagga® was derived from the cry of the animal, which may most nearly be ex¬ pressed by the word Coua-ag. The animal has received a variety of names from authors : thus Fennant terms it the quacha, and Masson the opeagha Consult Brvden, (Nature and Sport in South Africa* (1897), and early writers on South Africa, especially Harris, “Lichtenstein and Gordon-Cumming.

. QUAGLIO, kwa’le-6, name of a family of painters, originally belonging to Laino, Lago Maggiore, Italy, but afterward dwellers in Mu-h,/rAh.eimo1st eminent among them, Domenico ˆan‘ 17?6; Uohenschwangau, April 1837), was for 11 years decorative painter for the Munich Theatre. He subse¬ quently turned his attention to oil-painting and also executed etchings and lithographs He raveled through Germany, along the Rhine, to he Netherlands, to France, Switzerland and Italy, with the object of studying mediaeval

architecture as a subject for painting. During the latter period of his life he was engaged by the Crown Prince Maximilian of Bavaria in the restoration and decoration of the castle of Hohenschwangau. He was member of the Academy of Munich and Berlin and one of the first German artists to produce in painting architectural effects of a thoroughly artistic quality. He also published books on the mediae¬ val buildings of Bavaria; on the most note¬ worthy buildings of

Munich, and on the archi¬ tectural statuary of Bavarian mediaeval build¬ ings. His brother, Lorenz Quaglio (b. Munich, 19 Dec. 1793; d. there, 15 March 1869), directed his studies to genre painting and lithography. Jn this latter department of art he reached the highest excellence. His paintings consist of incidents from mediaeval life and his land¬ scapes are taken from the highlands of Bavaria. The third brother, Simon Quaglio (b. Munich, 23 Oct. 1795; d. there, 8 March 1878), was scene painter and decorator to the Hof Theatre and executed many exceedingly clever pictures in oil, chiefly of architectural subjects and dis¬ tinguished for faultless perspective, beauty of design and brilliancy of coloring. Angelo, son of the last (b. Munich, 13 Dec. 1829; d. there, 5 Jan. 1890), was scene painter to the Bavarian Hof Theatre and by his architectural decora¬ tions gained a worldwide reputation.

QUAHA, the side-striped African jackal (Canis lateralis). See Jackal.

QUAHOG, or ROUND CLAM. See

Clam.

QUAI D'ORSAY, ka dor-sa. See Paris.

QUAIL, one of several partridges (q.v.) ; in the eastern United States the bob-white (Colinus virginianus) and on the Pacific Coast partridges of other genera. The eastern bob-white requires no description beyond a state¬ ment of the differences between the sexes. Be¬ sides being larger, the male has the superciliary line and throat pure white, these parts in the female being buff and without black borders and she also has the colors generally more blended. The bob-white is widely distributed throughout the eastern United States; on the Atlantic Coast it barely enters Maine, farther west it is found northward in New York, On¬ tario and Minnesota; southward it is abundant in the Gulf and South Atlantic States and westward reaches to the elevated central plains from South Dakota to Texas. Farther west¬ ward at many points in this country, in Jamaica and other West Indian islands this species has been very successfully introduced, but similar attempts in Europe seem to have failed. The Florida and Texan birds present extremes of variation recognized as sub-species and a re¬ lated species (C. ridgwayi) occurs in Arizona. Although Jn New England and elsewhere called ˆquaiP and in the Middle and Southern States very generally ˆpartridge,® neither of these names is, properly speaking, correct. The ((bob-white® of the farmer's boy is a far more char¬ acteristic and appropriate name. Like related species it is gregarious, but the coveys consist of members of one family — a pair

of old birds and their numerous progeny of one or two broods — which remain in company until the next pairing season. They live where thickets, woodland borders or fence rows offer suitable cover. Throughout most of the year they feed

upon berries, seeds and mast and frequent grain-fields after harvest to glean the fallen seeds. Occasionally they attack fields of buck¬ wheat, of which they are very fond, but the slight damage thus done is repaid manyfold in the destruction of grasshoppers and other insects in the late summer and autumn. Most of their life is spent on the ground, on which they scratch like hens. When whistling or sometimes when alarmed they will perch upon trees or fences, but usually run to a cover, where they remain perfectly motionless or spring suddenly into the air with a loud whirr and fly swiftly straight away to a thicket. At night they commonly huddle togethe'r in a close bunch with heads outward in the concealment of a bush, but may occasionally roost on trees. The call is a clear loud whistle of two or three notes, variously interpreted as (<ah, bob-white,® ((buckwheat® and <(no buckwheat® or <(more wet® and (<no more wet.®

Being non-migratory, the bob-white is fre¬ quently exposed to privation during the winter. During a heavy snowstorm the members of a covey will often huddle together to keep warm and allow themselves to become completely cov¬ ered and should a crust form on the surface many will sometimes perish miserably. In April and May they construct simple nests of coarse grass stems, usually arched over at the top, in a depression on the ground under the shelter of a bush or tuft of grass. The many eggs are pure white and top-shaped and arranged with the pointed ends downward. The young run immediately after hatching and are won¬ derfully interesting and pretty creatures with a marvelous skill for concealing themselves when alarmed. Sometimes a second brood is raised in August. When this is the case the male takes sole charge of the first until the second is hatched, when both parents join the com¬ bined broods; thus are formed the largest coveys.

The bob-white combines all of those quali¬ ties which a sportsman seeks in an ideal game bird and it is, without question, the most sought and most generally appreciated by gunners of any game bird in this country. Every condition unites to make the sport exhilarating and healthful, to test the skill of the sportsman and to please his appetite at the close of his labors. In most States this perfect game bird is now rigidly protected by laws prohibiting snaring, netting and

trapping, by the enactment of a close season covering the breeding period and continuing until the young birds are strong of wing, or by other measures designed to meet local conditions or abuses. In several States at present the shooting of quail is prohibited for five or more years. Although the bird is so prolific it has numerous natural enemies, espe¬ cially hawks, weasels, skunks, cats, etc., which check its increase. When to this natural loss is added the enormous number annually sacri¬ ficed to the deservedly popular sport of quail¬ shooting, the necessity of legal protection be¬ comes manifest. The nature and method of the sport differs so much with the varied ac¬ tions of the birds due to season, locality, char¬ acter of ground, etc., and to the local and personal idiosyncrasies of gunners, that the reader must be referred to some of the nu¬ merous sporting books for details. The gen¬ eral method is to hunt singly or in couples,

with one or two clogs, which quarter the ground under the guidance of signs and whistled sig¬ nals from the sportsman. When the birds flush they spring up suddenly and immediately at¬ tain full speed, which keeps the gunners al¬ ways on the qui vivs. Either pointers or setters may be used according to the character of the ground and the personal preference of the sportsman. By many the-Llewellyn setter is considered to be the most perfect dog for rapid quartering of the ground and general adaptation to this class of sport. As to guns, tastes differ, but a hammerless arm of moderate weight, long range and 12 or 14 bore has the preference of experts.

These birds have been successfully bred in captivity, as is explained in the article Game¬ breeding.

Consult books mentioned under Birds and publications of the United States Biological Survey, especially Bulletin 21, Judd, (Bob-white and Other Quails … in their Economic ‘Relations > (Washington 1905).

QUAIN, kwan, Jones, English physician: b. Mallow, Ireland, 1796; d. London, 27 Jan. 1865. He studied medicine at Dublin and Paris and was professor of anatomy and physiology at London University

1831-36. He was the author of Quinn's (Elements of Anatomy } (1828; 10th ed., 1890), and published also a series of (Anatomical Plates) (1858) and a translation of Martinet's <Pathology) (1835).

QUAIN, Richard, English anatomist, brother of J. Quain (q.v.) : b. Fermoy, Ireland, July 1800; d. London, 14 Sept. 1887. He was appointed professor of anatomy and clinical surgery in University College, London, in 1837, and was elected president of the Royal College of Surgeons in 1868. Among his works are (Anatomy of Arteries, > with folio plates (1845); (Diseases of the Rectum* (1854); Observations on Medical Education > (1865) ; <Some Defects of Medical Education (1870). He bequeathed nearly $375,000 to University College, London, for the ((education in modern languages (especially English) and in natural science.®

QUAIN, Sir Richard, English physician, cousin of J. and R. Quain (q.v.) : b. Mallow, County Cork, 30 Oct. 1816; d. London, 13 March 1898. He studied medicine in University College, London, whence he was graduated in 1842. He was elected a member of the Royal College of Physicians in 1846; in 1871 was chosen a Fellow of the Royal Society and he was president of the General Medical Council from 1891 till his death. He was created a baronet in 189L His practice in London was large and lucrative and besides publishing sev¬ eral medical treatises he edited a well-known dictionary of Medicine> (1882; new ed., 1894).

QUAKER CITY, a popular nickname ap¬ plied to Philadelphia, which was planned and colonized by William Penn and other members of the Society of Friends.

QUAKER HILL, Battle of, in the Amer¬ ican Revolution, a notable battle fought 29 Aug. 1778. On the previous night, the 28th, the Amer¬ icans on Rhode Island fell back toward Butts Hill at the northern end of the island. Con¬ trary to Greene's advice the enemy was allowed to occupy Quaker and Turkey Hills From

these hills the British assailed the Americans, but were repulsed and driven back to Turkey Hill. The hottest of the battle took place on the low ground between the hills. The Amer¬ ican loss in killed and wounded was 206; that of the British 222.

QUAKER POET, The, a name often ap¬ plied to John Greenleaf Whittier, and long be¬ fore his day bestowed upon the English poet,

Bernard Barton (q.v.).

QUAKERS. See Friends, Religious So¬ ciety oe.

QUAKERTOWN, Pa., borough in Bucks County, 38 miles north of Philadelphia, on the Philadelphia and Reading and on the Quaker-town and Delaware River railroads. It manu¬ factures cigars, harness and stoves and has silk mills. Pop. 3,801.

QUALIFICATIONS FOR OFFICE.

See Electoral Qualifications.

QUALIFICATIONS OF VOTERS. See

Electoral Qualifications; Woman Suffrage; Elections; Naturalization; Votes, Voters, Voting.

QUALITY, in the language of logicians, is used to designate the nature of propositions as affirmative or negative : the proposition <(gold is a yellow substance® is of affirmative quality; (<gold is not easily fusible® is a proposition of negative quality. In metaphysics quality is either primary or secondary; primary qualities are those which are essential to the existence, or even the conception of the thing; secondary qualities are those not essential to such concep¬ tion ; whether primary or secondary, a quality is that which makes, or helps to make, any¬ thing such as it is. An essential quality is that which may not be separated from a substance or an individual without taking it out of its class. On the other hand an accidental quality mav be detracted from a substance or individ¬ ual without a change of classification.

QUANA, Parker, Comanche chief : b. about 1845; d. 1911; the most influential leader among the three confederated tribes of Kiowa, Comanche and Apache in southwestern Okla¬ homa. He was the son of Nokoni, the principal chief of the Comanche, and Cynthia Parker, a white captive. Quana became prominent in 1874, when he acted as leader of the band of 700 picked warriors from the confederated tribes in an attack on the South Canadian River fort, Adobe Walls. He was active in the Indian uprising of the following year and was the last to surrender when peace was ultimately made. His superior intelligence, however, in¬ duced him to acquire white habits and customs, and after some time spent in Texas, he became thoroughly convinced of the benefits of civilized life. On his return to his tribe he endeavored to persuade them to adopt his views. In 1882 he proposed leasing the surplus pasture lands of the reservation, a measure which increased

the income of the tribes by $100,000 yearly. In 1888 he was appointed a judge of the Indian Court, and in 1892 was the first signer of the treaty which opened the reservation lands to settlers in 1901 . Parker Quana did much to civilize the Indian tribes under his leadership. He. was himself a man of keen intelligence and a linguist, speaking several Indian dialects and English and Spanish. He recognized that the

only salvation for the Indian was to be found in education and the adoption of the ways of civilization. He established schools for the Indians and all his children were well educated. Two at least of his daughters married white men. After the division of the Indian lands, Parker Quana lived in a large modern house surrounded by a well-cultivated ranch. For considerably over a quarter of a century he was the most prominent member of the three allied tribes, Kiowa, Comanche and Apache, prac¬ tically all of whose tribal business was in his hands. In this' capacity he made several visits to Washington, where he always had the con¬ sideration of the government. He also traveled extensively throughout the United States and made a careful study of agricultural methods and of the ways of living among the whites, which he copied and taught to his people by example and precept. It was through his earnest and persistent efforts that the Indians of his tribes secured rights of citizenship.

QUANAH, Tex., city and county-seat of Hardeman County, 200 miles northwest of Dallas, on the Fort Worth and Denver City, the Saint Louis and San Francisco and the Quanah, Acme and Pacific railroads. Irriga¬ tion is carried on to a considerable extent in the vicinity, the crops being chiefly cotton, corn and wheat. Manufacturing includes flour, cement, cottonseed oil and cottonseed feed prod¬ ucts. The town is growing in size. Pop. 3,691.

QUANTIFICATION OF THE PREDI¬ CATE, supplying to the predicate in a logical proposition a word, as “some,® or “all,® or “no,® etc., to indicate whether the whole of it or only a part agrees with or differs from the subject. In the proposition ((all metals are elements® the subject “metals® is quantified by the use of “all® ; but the predicate is not quantified, and in form the proposition does not distinctly assert whether metals constitute the whole list of elements or not. But by in¬ serting “some® before the predicate, “elements® is quantified — “all metals are some elements.® It was assumed by Aristotle and was maintained by all logicians after him till Ploucquet and Lambert in the 18th century and Sir William Hamilton in the 19th, that the predicate of all affirmative propositions is “undistributed® (not taken in its

universal comprehension), while the predicate of a negative proposition is al¬ ways distributed. But after Sir William Hamilton had given notoriety to the doctrine of quantification, this was seen to be an error, through which an infinite number of affirmative propositions which are universal in both terms are excluded from the system of formal logic. Among the numerous changes in the theory of formal logic which follows from the adoption of the quantified predicate the most important are the reduction of the conversion of proposi¬ tions from three species to one, reduction of all the general laws of categorical syllogisms to a single canon, and the abrogation of all the special laws of syllogism. But the doctrine of the quantification of the. predicate has never been generally adopted in the exposition of formal logic, on the ground that there is no proposition that cannot be dealt with under the Aristotelian forms, and that quantification does not really simplify the theory of logic. At present both the old Aristotelian-formed logic

and the logic of quantification have been sup¬ planted by the symbolic logic. See Logic, Symbolic.

QUANTITY, in the language of Mathe¬ matics, is whatever can be measured: space, time, weight, number, force, etc., are quantities. Quantities are represented in mathematics by symbols, and these too are called quantities. In algebra quantities are distinguished as known and unknown, real and imaginary, constant and variable, rational and irrational. For the meaning of these terms, see Algebra, Def¬ initions and Fundamental Concepts ; Va¬ riable Quantities. A simple quantity is ex¬ pressed by a single term, as a or h; a com¬ pound quantity is one expressed by two or more terms connected by the sign of plus (+) or minus (—). Quantities having the plus sign prefixed are called positive or affirmative; those with the minus sign prefixed are called negative quantities. Similar quantities are such as con¬ sist of the same letters, and the same powers of the letters, as abc, — 2 abc, 4r4abc, *etc.* In Logic, quantity is the extent to which the predi¬ cate in a proposition is asserted of the subject: when the predicate is affirmed of the whole of the subject the proposition is a universal one, as in the example “all metals are elements® : but when the predicate is affirmed only of a part of the subject, as in “some metals are brittle,® the proposition is called a particular one. See Opposition. In Grammar and Prosody, quan¬ tity is the measure of a syllable, or the time in which it is pronounced. In Music, quantity is the relative duration of a tone.

QUANTRELL, William, American guer¬ rilla : d. Kentucky, 1864. His depredations first became widely known when he raided Lawrence, Kan., destroying 185 buildings, killing 140 in¬ habitants and leaving the town completely dev¬ astated. His operations were then continued through western Missouri and eastern Kansas, but upon his extending his ravages to Kentucky in 1864 he was outwitted and killed.

QUANZA, a river of Africa. See Kwanza.

QUAPAW (kwa'pa) INDIANS. See

SlOUAN.

QUAQUAVERSAL FOLD. See Folds.

QUARANTINE, a stated period (for¬ merly 40 days) during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, is forbidden in¬ tercourse with the place at which it arrives. Quarantine was first introduced at Venice in the 14th century, is now required in almost every important country except Great Britain. In the United States quarantine enactments were passed by the colonial legislatures and afterward for many years by the States. The first national quarantine act was passed 23 Feb. 1799, requiring Federal officers to aid in the ex¬ ecution of State or municipal quarantine regula¬ tions. On 29 April 1878, a national quarantine act was passed. On 3 March 1883, $100,000 was appropriated for maintaining quarantine points along the coast. On 1 Sept. 1892, owing to the presence of cholera, President Harrison proclaimed a 20 days' quarantine of New York. By law it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot or owner of any vessel entering a port of

the United States in violation of the act, or regulations framed under it. During the period of quarantine, all the goods, clothing, etc., that might be supposed capable of retaining infection are subjected to a process of disinfection, which is a most important part of the

quarantine system.

From 7 Nov. 1896, the system of quarantine ceased to exist in Great Britain, so far as re-gaids the British Islands. The Quarantine Act of 1825 required that quarantine should be im¬ posed on all vessels coming to the British Islands from places from which «the plague or other infectious disease or distemper highly dangerous to the health of his Majesty's sub¬ jectsˆ might be brought; but in recent years this act has applied only to the plague and yel¬ low fever, and has not often been used. Vessels arriving from infected places or carrying goods, etc., from such places, were required to be kept at some safe distance from the shore and from other ships — all their passengers and crew be¬ ing detained on board — until all danger of spreading infection was considered to have passed. Healthy persons were thus exposed to the risk of taking any disease there might be on the ship.

In some places quarantine establishments were maintained for receiving persons from suspected vessels, but most of these were long since abolished, and latterly the only receiv¬ ing ships were some old hulks at the Mother-bank in the Solent. These were maintained by the Privy Council, on whom devolved the administration of the Quarantine Acts. Orders in Council prescribed the system of quarantine. By the Public Health Act of 1875, the defense of the country against cholera was placed in the hands of the Local Government Board, and regulations were issued by that board for the purpose. Instead of quarantining the entire crew of an infected or suspected vessel, the method adopted consisted in the medical inspection of the persons on board, and the sepai ation and detention of those who were

f* . . ˆ or who were suspected

of being infected. All others were permitted to leave the ship, but were traced and watched by the local authorities. Infected articles on board were to be disinfected or destroyed.

Quarantine has long been considered in¬ effective against the introduction of disease besides being a source of much danger to those who were compulsorily detained under the sys¬ tem. The sanitary ideas of our day favor the less showy but safer methods long used in Eng¬ land in case of cholera.

, , ˆn, ˆnnˆHˆd St:ates under the law of 28 March 1890, known as the Interstate Quarantine Q,ct'. the supervising surgeon-general of the Marine Hospital Service is charged with pre¬ paring the rules and

regulations, under direc¬ tion of the Secretary of the Treasury, necessary to prevent the introduction of certain contagious diseases from one State to another, and he has also supervision of the medical inspection of alien immigrants, which under the law of 3 March 1891 is conducted by the medical officers ˚r JheTJNanne Hospital Service. Under the Act o 15 Feb. 1893, he is charged with the framing of regulations for the prevention of the intro¬ duction of. contagious diseases and the preven¬ tion of their spread, and he is also charged with

the conduct of the quarantine service of the United States. He has the direction of labora¬ tories established to investigate the cause of contagious diseases, and publishes each week under the title of < Public Health Reports, >' sanitary reports received from all parts of the United States and (through the State Depart¬ ment) from all foreign countries. Consult 'Quarantine in the Maritime Cities of the United States, > New York Acad, of Med

(1913).

QUARITCH, kwar'ich, Bernard, English

bookseller : b. Worbis, Prussian Saxony, 23 April 1819; d. Hampstead, Middlesex, 17 Dec. 1899. In 1839—42 he was employed in a publish¬ ing house in Berlin, and in 1846 established himself in London. He was naturalized as a British subject in 1847, and in that year issued his first book catalogue, a single leaf. In 1848 he began issuing a monthly catalogue, which in 1854-64 was printed as a regular periodical under the title 'The Museum. * His business increased rapidly and1 he became known as an authority on rare and valuable books of all classes. For 30 years he practically controlled the rare book market, attending in person or by proxy every important book auction in England and America. His catalogues are remarkable productions, the first large one being published under the title 'Bibliotheca Xvlographica, Typo¬ graphicˆ et Palaeography (1873) and after¬ ward. reissued from time to time with valuable additions, the last complete catalogue being the General Catalogue of Old Books and Manu¬ scripts > (1887-88, index 1892, 7 vols.) and in¬ creased by supplements in 1894 and 1897.

QUARLES, kwarlz, Francis, English poet:

b. near Romford, Essex, 1592; d. London, 8 pept. 1644. He was educated at Cambridge and before 1629 went to Dublin as private secretary to ˆ Archbishop Ussher. In 1639 he was ap¬ pointed chronologer to the city of London and at the opening of the civil wars wrote a work entitled ‘ Fhe Loyal ConvertP Of the works of Quarles, in prose and verse, the most cele¬ brated is his ‘Divine Emblems,* a set of de¬ signs illustrated by verses. A great part of them are borrowed from the ‘Emblems* of Hermanus Hugo, but the verses are his own His ‘Enchiridion of Meditations) (1641) is a collection of brief essays and aphorisms, in vigorous and occasionally eloquent language.

QUARRYING. Although there are at this time in the Lhiited States about 3,000 quarries in operation, with an annual product valued at above $75,000,000, the quarrying industry has not kept pace with modern tendency and prog¬ ress toward cheaper production. In building operations revolutionary changes have come about in the last few years in the erection of steel buildings and the manufacture of terra cotta and clay products, while quarrying has been, generally speaking, stationary. The nat¬ ural result of this has been a large increase in the use of the cheaper substitute materials for general bridge and building work, where the natural preference would have been for stone as an ideal and more permanent material, but for its prohibitive cost. As the rapid increase T j? use diese other building materials is the direct result of the use of modern methods and machinery to the elimination of hand labor

in the greatest degree, it follows that in this direction also lies the continued prosperity of the stone business. As a compromise between the minute subdivisions devised by scientists and the extremely general and often erroneous clas¬ sification of quarrymen, the following division may be adopted for quarrying operations :

Limestones and Dolomites. — The sedi¬ mentary and bedded rocks, composed essentially of lime carbonate, or the mixed carbonates of lime and magnesia, the latter receiving the specific title of dolomite. Such have been found to pass into each other by insensible gradations, certain quarries producing at the same time material which, if classed on purely chemical grounds, would be relegated to both divisions. Limestones may also carry a considerable per¬ centage of quartz, when they are called silicious limestones. When clayey, they are called argil¬ laceous limestones.

Marble. — Including stones identical in com¬ position with those noted under limestones and dolomites, but which through crystallization and other changes, mainly physical, have come to possess properties rendering them desirable for high-grade building or ornamental work. The marbles of New York, recently brought to light by The Adirondack Lumber and Mineral Cor¬ poration, for instance, are largely limestone, while those in Massachusetts, Berkshire County, are largely dolomite. With the marbles are also included a small series of serpentine rocks, which are likewise utilized for decorative pur¬ poses.

Sandstones and Quartzites. — Rocks com¬ posed essentially of sands cemented together with silica or with silica and iron oxide, being made over, as it were, from the detritus of pre-existing rocks. Those classed as quartzites are sandstones which have been rendered more or less crystalline through the deposition of silica between the original sand particles, as in the case with the jasper of Sioux Falls, South Dakota, or the Potsdam sandstone of Saint Lawrence County, New York. The tuffs and other volcanic fragmental rocks and the blue-stones are also here included.

Silica Sand. — Silica or silicious sand in¬ cludes not only sand suitable for the manu¬ facture of glass, but also a large quantity desig¬ nated as engine and furnace sand. It exists in several States as a sandstone, requiring crushing and screening; as a stone that readily disintegrates when exposed to the action of the elements and needs only washing or burning to reduce the amount of organic matter and other impurities. On account of their use in industry as sand, they are discussed under that title.

Siliceous Crystalline Rocks. — Here are in¬ cluded the true granites and syenites, together with trappean rocks, such as are often desig¬ nated as black granites ; the gneisses or so-called striped or bastard granites ; the mica schists ; and melaphyre, basalt, andesite, syenite, elaeolite, diabase, gabbro, norite, lisparite, diorite and other volcanic rocks.

Slate. — Including argillaceous rocks, which, through the process of shearing and incidental chemical activity, have undergone, a partial met¬ amorphism, resulting in the development of a pronounced tendency to split along certain planes, which may or may not be parallel with the original bedding, into thin sheets suitable

for roofing purposes. It is necessarily a conse¬ quence that such are restricted to the regions of pronounced earth movements, such as have resulted in the formation of mountain ranges.

The possible resources of the various States of the Union are as follows:

• STATE OR TERRITORY

Present and prospective resources

Alabama … Arizona … .

Arkansas… California. .

Colorado…

Connecticut

Delaware …

Florida… . Georgia ….

Idaho

Illinois… …

Indian Territory…

Indiana .

Iowa .

Kansas .

Kentucky .

Louisiana .

Maine .

Maryland

Massachusetts

Michigan .

Minnesota .

Mississippi .

Missouri .

Montana… .

Nebraska .

Nevada .

New Hampshire… New Jersey .

New Mexico .

New York .

North Carolina… .

North Dakota

Ohio .

Oklahoma. …….

Oregon .

Pennsylvania

Rhode Island .

South Carolina… .

South Dakota .

Tennessee .

Granite, Limestone, Marble, Sandstone, Slate.

Dolomite, Granite, Onyx, Marble, Sand¬ stone, Trappean Rocks, Volcanic Rocks and Tuffs.

Elasolite, Syenite, Granite, Limestone, Marble, Sandstone, Slate.

Granite, Limestone, Marble, Sandstone, Slate, Trappean Rocks, Verd-Antique Marble, Volcanic Rocks and Tuffs.

Granite, Limestone, Marble, Quartzite, Sandstone, Trappean Rocks, Volcanic Rocks and Tuffs.

Diabase, Gneiss, Granite, Limestone, Marble, Sandstone, Verd-Antique Marble.

Gabbro, Gneiss, Limestone, Quartzite, Serpentine.

Limestone (shell and oolitic).

Gneiss, Granite, Limestone, Marble, Sandstone, Slate, Verd-Antique Marble.

Dolomite, Granite, Limestone, Marble, Sandstone, Trappean Rocks, Volcanic Rocks and Tuffs.

Dolomite, Limestone, Sandstone.

Dolomite, Granite, Sandstone, Lime¬ stone.

Dolomite, Limestone, Sandstone.

Dolomite, Limestone, Sandstone.

Dolomite, Limestone, Sandstone.

Dolomite, Limestone, Sandstone.

Limestone, Sandstone.

Gneiss, Granite, Limestone, Sandstone, Slate, Trappean Rocks, Verd-An¬ tique Marble.

Gneiss, Granite, Limestone, Marble, Sandstone, Slate, Verd-Antique Mar¬ ble.

Gneiss, Granite, Limestone, Marble, Sandstone, Slate, Trappean Rocks, Verd-Antique Marble. _

Dolomite, Gneiss, Granite, Limestone, Sandstone, Slate.

Dolomite, Gneiss, Granite, Limestone, Quartzite, Sandstone, Slate.

Limestone, Sandstone.

Diabase, Dolomite, Granite, Limestone, Sandstone.

Dolomite, Gneiss, Granite, Limestone, Marble, Sandstone, Trappean Rocks, Volcanic Rocks and Tuffs.

Dolomite, Sandstone, Limestone.

Dolomite, Granite, Limestone, Marble, Sandstone, Slate, Trappean Rocks, Volcanic Rocks and Tuffs.

Gneiss, Granite, Limestone, Slate.

Diabase, Dolomite, Gneiss, Granite, Limestone, Marble, Sandstone, Slate.

Granite, Limestone, Marble, Sandstone, Trappean Rocks, Verd-Antique Marble, Volcanic Rocks and Tuffs.

Dolomite, Gneiss, Granite, Limestone, Marble, Norite, Sandstone, Slate, Trappean Rocks, Verd-Antique Marble.

Dolomite, Gneiss, Granite, Limestone, Marble, Sandstone, Serpentine, Slate, Trappean Rocks.

Dolomite, Sandstone, Limestone.

Dolomite, Sandstone, Limestone.

Dolomite, Sandstone, Limestone.

Dolomite, Granite, Limestone, Sand¬ stone, Trappean Rocks, Volcanic Rocks and Tuffs.

Diabase, Dolomite, Gneiss, Granite, Limestone, Marble, Sandstone, Slate, Serpentine.

Dolomite, Gneiss, Granite, Limestone.

Gneiss, Granite, Limestone.

Limestone, Quartzite, Sandstone.

Granite, Limestone, Marble, Sandstone, Slate.

STATE OR TERRITORY

Texas .

Utah .

Vermont .

Virginia .

Washington …

West Virginia . .

Wisconsin .

Wyoming .

Present and prospective resources

Granite, Limestone, Marble, Sandstone, Slate, Trappean Rocks, Volcanic Rocks and Tuffs.

Granite, Limestone, Marble, Onyx, Marble, Sandstone, Trappean Rocks, Volcanic Rocks and Tuffs.

Dolomite, Gneiss, Granite, Limestone, Marble, Slate, Verd-Antique Marble.

Diabase, Dolomite, Gneiss, Granite, Limestone, Marble, Sandstone, Slate.

Granite, Limestone, Marble, Sandstone, Trappean Rocks, Verd-Antique Mar¬ ble, Volcanic Rocks and Tuffs.

Calcareous Tufa, Limestone, Sandstone, Travertine.

Dolomite, Gneiss, Granite, Limestone, Sandstone.

Granite, Limestone, Marble, Sandstone, Trappean Rocks, Volcanic Rocks and Tuffs.

In the earlier days of the stone industry hand methods were employed almost exclusively in the work of quarrying and dressing. The past 25 years has, however, witnessed the in¬ troduction of machinery and consequent changes. The old method of drilling and blasting, formerly applied to all classes of rocks, is now done away with, excepting in the very hardest and toughest of materials, or where, in the case of granite and trappean rocks, the material is to be utilized only for roads. Even where drilling and blasting are now resorted to, it is the custom to drill a series of holes on the line along which it is desired the stone shall break; these holes are then charged somewhat lightly with a slow-burning black powder and fired simultaneously. In this way the force of the explosion is delivered along a consider¬ able surface and the danger of shattering the material through the sudden jar is reduced to a minimum. This process is at present largely limited to granite rocks which are too hard to be quarried by means of channeling machines.

Plug and Feather Work. — In quarries where good breaks require that the splitting strain be exerted well down in the ledge, ex¬ perience has shown that the best method for getting out the material is usually the plug and feather system, in which a series of holes from one and one-quarter to two inches in diameter and of a depth from two-thirds to the full thickness of the sheet are drilled at intervals depending upon the character of the stone and its manner of cleavage. Two feathers — -flat pieces of steel rounded on one side to fit the curve of the drill hole — are placed at the sides of the hole and the long-tapered wedge-shaped plug driven down between them. The material splits away in fairly regular blocks which must be otherwise cut to size by hand. The plug and feather method is still extensively in use for splitting large blocks of granite and marble. Holes three inches deep and five-eighths inch in diameter will serve for splitting blocks three feet deep and five-inch holes three-quarter inch in diameter for six-foot blocks. For marble and sandstone the holes have to be slightly deeper. In soft material such as sandstone, a drill mounted on the usual tripod finds frequent use, and this is far superior to hand methods, still in certain classes of work a drill mounted on a quarry bar will do much more and better work.

The advantages of the quarry bar are that all the holes are drilled to double length, intermediate ones being shallow. The lower half of the deep holes is drilled with a smaller drill bit so as to alternate the plug strain top and bottom and control the break by skillful sledging. In some instances compressed air at a pressure of 70 to 100 pounds is piped into the drill holes to ex¬ tend a crack already started.

The wedges of the short hole tend to split along the top and those of the long hole split along the bottom, thus distributing the pressure and tending to split the stone in a clean, smooth plane and largely avoiding any tendency to run off. This distribution of splitting strains is to be worked out by experience in the peculiarities of the different ledges. The wedges or plugs need not in all cases be of a length equal to the depth of the holes. In some marble quarries, plug holes only five-eighths inch in diameter are put clear through the blocks, sometimes 10 feet deep, to weaken the line and ensure a straight break, the plugs, however, being shorter. This operation is much simplified by the use of the hammer-drill actuated by steam or compressed air.

Broaching. — In granite and other hard stones holes must be placed closer together and, as a rule, splitting across the grain is abandoned

in favor of broaching. In this system, a series of holes is drilled, usually about three inches apart from centre to centre, leaving walls of three-quarters inch to two inches between, de¬ pending upon the hardness of the rock, and a flat bit or “broach® is substituted for the regular steel. This has a face about three inches by three-quarters inch thick and is forged with a blunt end to crush this wall or web between the holes. Drills used for broaching must have the release which is a simple device to throw the pawls out of action and allow the drill to work without rotating. Broach channeling is the best and cheapest method of cutting out key blocks, lumps, and making wall cuts, etc., in granite quarries, where the rock is too hard to be cut advantageously with the regular channel¬ ing machine.

Channeling Machines — Channeling ma¬ chines are utilized in the case of rocks of the nature of marble, limestone and the softer sand¬ stone, since they would be liable to injury through blasting and since it is desired to re¬ move the materials from the quarry bed with a minimum amount of waste and in such size and shape that they may be cut into suitable dimen¬ sions. The Wardwell channeling machine, the earliest in use, has given way to the direct-act¬ ing stone channeling machine, the design of which was based upon the conviction that the same principles which had made the Ingersoll-Sergeant drill famous would, properly applied, give the best results in cutting a channel. It was believed that the direct-acting machine pos¬ sessed points of decided advantage over the slow, cumbersome diamond and lever types of rock-cutting machinery of that day. Although certain shortcomings appeared in the first mod¬ els, still it is an interesting fact that some of these first machines are in service to-day after more than 15 years of continuous use and are still doing good work. The success of these pioneer types demonstrated beyond ques¬ tion the merit of the direct-acting principle

now everywhere conceded as the correct one and it remained only to develop to the utmost the details of mechanical construction.

This machine is primarily suited for the heaviest work and the deepest cuts, in open quarries of limestone, sandstone, slate and other materials, where the output is in dimension stone. In this service it has found its greatest field in making the long, deep, longitudinal cuts which are preliminary to further breaking by the plug and feather method. It has found another valuable field of application in certain classes of heavy contracting work, such as rock excavation for canals and reservoirs.

The channeling machine is mounted on a self-propelling carriage or truck which runs on a track from 10 to 30 feet in length. If it has but one cylinder drill it is called a simplex machine ; if two, a duplex machine. The stroke is about 10 inches and 250 blows are delivered per minute. The bits are usually used in gangs of three or five, set at varying angles, if the stone is uniform in texture. If uneven a single bit is used. In the usual quarrying operations the stone is channeled on two sides of a rec¬ tangle and then split off by wedges. In some instances it is channeled on three sides and also undercut at the bottom by a horizontal channeler called a ˆgadder.® The average cut with these channeling machines is from 8 to 16 feet in depth, depending upon the nature of the stone. The gauge or width of the cut will depend upon the final depth sought. It may be from one and one-half to four inches at the start, reducing to a width of one and one-eighth inches with the last steels. The length of the channel is limited only by the length of track which can be used. Cutting speeds vary with the quality of rock and the handling of the machine. There are cases on record where the machine channeled faces aggregating 700 square feet in 10 hours in oolitic limestone, during part of which time over 100 square feet per hour was cut. In Ohio sandstone of me¬ dium hardness, 260, 280 and 300 square feet per day of 10 hours have been channeled and these rates are being maintained as an average by the month. The average cost in this case runs from two and one-half cents to three and one-half cents per square foot cut. When channeling is

done on two sides of a block the bulk of stone taken out is about three and one-third cubic feet for each square foot of face channeled. Where the machine is used on three sides, the average product is two and one-half cubic feet per square foot of channeling. The extra cost of machine work is soon recouped, as in blasting out rough rock fully 20 per cent of the bulk is lost, being outside of the dimensions, and hence not paid for.

Helicoidal Saws. — Experiments with the so-called helicoidal saw for quarrying the softer rocks, as limestone and marble, have met with considerable success in the larger limestone quarries of the Middle West. The large amount of labor necessary for putting the saw in po¬ sition and the waste involved in cutting out the corners in which the pulleys are run are weighty disadvantages, but where long cuts can be made — 30 to 100 feet, this (<saw>:> is very profitable. The ˆsaw® consists of a three-strand twisted iron-wire rope, generally one-fourth of an inch in diameter, running over

sliding pulleys and fed continually with abra¬ sive material such as sand or grains of chilled iron. It is necessary in working on bedrock to sink well holes for the 20-inch pulleys on which the saw runs. It is more commonly used for making vertical cuts. With a new thin model of pulley wheels the use of this saw is increasing.

After the stone is removed from the quarry bed it is worked into the desired shape and size by a process dependent largely upon the hard¬ ness of the stone. Formerly a block after being reduced to an approximately rectangular form by means of hand plug and feather splitting was still further reduced by pitching tools, followed when necessary by such implements as the point, ax, peak-hammer and bush-hammer. Pneumatic tools are gradually replacing these hand imple¬ ments. Pneumatic surfacing machines, lathes and planers are now in use at the larger quarries. Indeed, the production of cylindrical columns by the old hand method has been al¬ most entirely superseded by the use of lathes similar to those used in turning metals. Except on the harder stone, like granite and quartzite, saws are extensively used for dividing up ma¬ terial into rectangular masses and slabs where smooth, even surfaces are desired.

Electricity in Quarrying. — The quarrying industry to-day constitutes an important field for the application of electric current, and the sub¬ ject has become so important as to create a literature and a technology of its own, for many of the problems involved are such as

do not arise in connection with other work. The flexi¬ bility of electric circuits and the general adapt¬ ability of electric power have led to a wide range of applications, some of which are still in the experimental stage. Motors and other necessary equipment have been designed for special requirements. Beginning with a small direct current station and leading up to a com¬ plete high tension transmission and converting system, the use of electricity in mining and quarrying is very similar to its application to street railway work. Special motors for the equipment of mine locomotives have been de¬ signed to meet the peculiar conditions con¬ fronted in mining and quarry work. A recent application is that of the gathering locomotive which is to a great extent replacing animal haul¬ age completely. This locomotive is equipped with a reel and cable, supplying power to it when gathering cars from rooms where no trolley is installed and where wooden rails are used. Standard motors are applicable to and are largely used on hoists, ventilating fans and drainage pumps.

The transmission of power over long dis¬ tances by polyphase alternating current is • one of the most notable and important developments in electricity. It has been a chief factor in the marvelous development of the Far West. Much of the progress in the country west of the Rockies is directly traceable to the use of elec¬ tricity which, in many cases, generated at a dis¬ tant waterfall, is transmitted to commercial cen¬ tres where the power can be used as desired. The development of the gasoline engine and its adaptation to the air compressor provide the quarryman with a cheap and effective power even in isolated locations. The success of a

quarry, however, must always depend on facili¬ ties for getting the product to a market.

In a typical quarrying operation 100 men were formerly required to produce 5,000 tons of marble ; now, since scrapping most of the plant and substituting modern machinery, 10 men pro¬ duce 6,000 tons in the same time. The argument has been presented that mechanical methods can-not.be used to the same advantage in quarrying as in the case of general manufacturing. To some extent this is true, depending upon the class of quarrying; for instance, in quarries producing rough rubble without regard to size or dimensions the mechanical features are con¬ fined to drilling, blasting and suitable hoisting apparatus and perhaps pumping or crushing, with the occasional use of steam shovels. There can be no question as to the economy of machine drilling over hand drilling, and the harder the material and the more difficult to drill by hand the greater is the advantage of machine drilling.

Successful quarries are those which closely approach the ideal of eliminating hand labor and, as in other profitable operations, are the result of heavy investments in all the machinery which can be used up to that point where addi¬ tional apparatus will not reduce the waste. The modern methods of channeling, plug and feather work, power wedge hole cutters and the use of compressed air, very nearly reach this point, as it calls for few machine operators, a few men to bar out the stone so loosened and a gang of derrick men to place it on the cars for shipment in that attractive form best calculated to hold and expand the market at the highest trade price for the product. In most quarries the operating period is limited by the comparative shortness of the working season, and therein lies another advantage of machinery. Again, the smaller the force the more easily it is con¬ trolled and the better the opportunity for sifting the men down to a picked gang of machine run¬ ners, men who, at a slight addition over the prevailing rate of wages, will not only do very much more work, but will come nearer to the production of a perfect output without waste.

Production.— The United States Geological Survey reported for the calendar year 1916 the number of active quarries in the country at 3,036, and the value of their combined produc¬ tion at $79,041,699. The State of Pennsylvania led in the number of active quarries, 516, and in the value of the product, $11,021,655 — nearly 14 per cent of the total for the entire United States. It may be noted in passing that more than 60 per cent of this total represented lime¬ stone quarried for flux used in the iron industry. Among the other stone-producing States Ohio ranked next, with an output valued at $6,611,- 266; Vermont third, with $5,691,420; and New York fourth, with $5,342,954.

As classified by the variety of stone pro¬ duced the value stood: limestone, $41,319,871; granite, $17,418,582; trappean or basaltic rock, $7,666,297 ; marble, $7,033,171 ; sandstone,

$5,603,778.

As classified by the uses in which it was em¬ ployed the 1916 output of the quarries shows values as follows:

Building Stone, rough and dressed, $15,- 001,390, of which $4,744,606 was in marble for both exterior and interior purposes ; $4,570,- 703 in limestone; $4,305,517 in granite, and $1,316,287 in sandstone.

Monumental Stone, rough and dressed, $7,031,536, of which $4,952,125 was in granite and $2,079,410 in marble.

Paving Stone, $2,692,605, of which $2,293,486 was granite and $327,264 in sandstone.

Curbing Stone, $1,611,001, of which $828,- /61 was in granite and $702,902 in sandstone.

Flagging, $409,665, of which $389,859 was in sandstone.

Crushed Stone reached a quantity produc¬ tion of 48,075,581 tons, valued at $29,462,952. Of this value limestone represented $17,715,834; trappean rock, $6,539,008; granite, $3,543,416, and sandstone, $1,664,694. The largest value of crushed stone consumed in any one particular use was $12,419,667 for road metal, at an

average price of 63 cents per ton. Concrete making absorbed a value of $11,869,844, at an average price of 67 cents per ton. Railroad ballast represented a value of $5,173,441, at an average price of 49 cents per ton.

Crushed limestone for furnace flux, not in¬ cluded in the above summary, amounted to 23,603,508 tons, valued at $13,936,882, an average of 59 cents per ton.

.The quarrying of limestone was carried on quite generally throughout the United States in 1916, Pennsylvania and Ohio showing the greatest activity, with values, respectively, of $8,167,639 and $5,337,085. Other States which contributed very largely to the grand total were ndiana, with a value of $4,657,813; Illinois, $3,362,751; Nejv York, $3,035,786; Michigan, $2,389,763, and Missouri, $1,990,419. In addi¬ tion to these, Kentucky, Virginia, West Vir¬ ginia and Wisconsin each showed an output in value above $1,000,000. These 11 States pro¬ duced nearly 80 per cent of the entire 1916 limestone production.

Although 30 States shared in the total out¬ put of granite in 1916, the bulk of the pro¬ duction came from eight States. Vermont's value was $2,500,579; that of Massachusetts, $1,997,150, and that of North Carolina, $1,798,- 087. In addition to these, California, Maine, Minnesota, New Hampshire and Wisconsin each contributed a value of above $1,000,000.

Marble was quarried in 22 States, but nearly half of the total production was by Vermont — in value, $3,062,743. Most of the remainder came from Tennessee ($1,000,266) and Georgia

($903,343).

Exports.— The export trade of the United States in products of its quarries is well nigh world wide. In 1916 the value of such ex¬ ports was $1,480,750, of which a value of $693,- 723 (about 47 per cent) went to Canada. Great Britain appears in the record as the cus¬ tomer of next importance, with purchases amounting to $169,672. Then follow in order Italy, $93,843; Cuba, $84,242; British East Indies, $62,311; Argentina, $42,194; France, $34,908; Australia, $21,753; Panama, $21,086; British South Africa, $20,730, and Brazil,

$17,365.

Imports for the same year amounted in value to $959,367, of which sum $723,411 repre¬ sented marble and onyx ($34,359), of which less than 20 per cent was manufactured. Most of the marble ($640,805) came from Italy, and the remainder from Mexico and France, with a small quantity from Greece. Mexico and Greece supplied the onyx.

There exists in the stone industry the same tendency toward the concentration of capital and the formation of stock companies as in other branches of trade. This is due not altogether to the desire for combination with a view to controlling trade, but in part at least to a change which has taken place in the character of the industry. The installation of costly machinery and the fact that the quarries in many cases now contract not merely to fur¬ nish the stone, but to furnish it cut and ready for its definite position in the structure, even if they do not contract to set it in place as well, involve a larger capitalization and supply of available funds. Consult Gillette, H. P., (Handbook of Rock Excavation) (New York 1916) ; Greenwell, A., and Elsden, J. V., Practical Stone Quarrying' (New York 1913). See Blasting; Building Materials; Mines and Mining; Mining and Milling Machinery ; Power Transmission.

Edward S. Farrow,

Consulting Mining and Military Engineer.

QUART. See Weights and Measures.

QUARTER. See Weights and Meas¬ ures.

QUARTER-CRACK. See Sandcrack.

QUARTER DAYS, in England, the days which begin the four quarters of the year, namely: 25 March, or Lady-day; 24 June, or Midsummer-

day; 29 September, or Michaelmas-day; and 25 December, or Christmas-day. In England and Ireland it is usually contracted between landlord and tenant that rent should be paid and that houses may be entered or left on these days. In Scotland there are two legal term days, Whit Sunday (15 May) and Martin¬ mas (11 November). There are also two con¬ ventional terms, Candlemas (2 February) and Lammas (1 August), on which rents are fre¬ quently paid. In the United States, in law, quarter days are the 1st of January, April, July and October. In the relation between land¬ lord and tenant in some of the States they are the 1st of May, August, November and Feb¬ ruary, respectively.

QUARTER DOLLAR, in American coin¬ age a silver piece of the value of 25 cents. Its issue was first ˆauthorized (weight, 104 grains) by Congress in 1792, and its coinage was begun in 1796. It was reduced to 93 grains in 1853. This coin is legal tender to the amount of $10. There were no issues of the quarter dollars dur¬ ing the years 1798 to 1803, inclusive, 1808 to 1815 inclusive, 1817, 1824, 1826 and 1830.

QUARTER SESSIONS. See Court.

QUARTER-STAFF, an old English weapon formed of a stout pole of heavy wood, about six feet long, loaded with iron at both ends.

QUARTERING ACTS, acts of the Brit¬ ish Parliament which did away with certain of the penalties of high treason as prescribed by law in ancient times. The offender, if a man, was drawn on a hurdle to the place of execu¬ tion, there hanged by the neck till he was dead, the head severed from the body, the body dis¬ emboweled and divided into four quarters, and the head disposed of at the pleasure of the king. If the offender was a woman she was drawn to the place of execution and there burned alive.

By successive acts of the Parliament (30 Geo. Ill, ch. 48, and 54 Geo. Ill, ch. 146) the punish¬ ment of a female traitor was changed to hang¬ ing; and in the case of men, the Crown might change the sentence to beheading, or might re¬ mit it wholly. Under the Felony Act of 1870 hanging is made the one penalty of treason ; but as the act 54 Geo. Ill, ch. 146 was not re¬ pealed, the offender, if a man, may by Crown warrant be beheaded.

QUARTERMASTER, (1) in military af¬ fairs, an officer who superintends the issue of stores, food and clothing, and arranges

trans¬ portation for a regiment when necessary. In the United States army, where the quartermas¬ ter is also in charge of paying the men, only officers of the Quartermaster Corps (q.v.) are accorded this title. The officer of the line de¬ tailed in a regiment for the performance of similar functions is known as the regimental supply officer. (2) In nautical affairs, a petty officer who, besides having charge of the stow¬ age of ballast and provisions, coiling of ropes, etc., attends to the steering of the ship. He is appointed by the captain.

QUARTERMASTER CORPS. In 1912

the Quartermaster Corps of the United States army was formed by the fusion of the old Quartermaster's, Subsistence and Pay Depart¬ ments, all of which date back in some form or other to the first two decades of the 19th cen¬ tury. The resulting organization is commanded by the quartermaster-general, who ranks as a major general. The corps is subject to the general supervision of the Chief of Staff. It combines the functions of its predecessors, and takes care of all the business needs of the army which have nothing to do with munitions of war or the special supplies of the Corps of Engi¬ neers, the Signal Corps and the Medical De¬ partment. Among its duties is the provision of transport by steamboats, railroads and trains of wagons, trucks and pack animals. It furnishes the personnel of the service of supply in the zone of communications and at the front — teamsters, chauffeurs, packers, *etc.* It pur¬ chases stores, and distributes equipment and food, and establishes the necessary supply and commissary depots. It furnishes field bakeries to keep the troops supplied with bread. It dis¬ burses the funds necessary for the pay of the army. It contracts for all services necessary for the troops, and for the construction of such buildings as may be needed. In short, its activ¬ ities are as varied as would be expected in a business enterprise of its magnitude. All offi¬ cers of the Quartermaster Corps ranking as captain or over are detailed from the line. The establishment of the Quartermaster Corps is one major-general; two brigadier-generals; 21 colonels; 24 lieutenant-colonels; 68 majors; 180 captains ; and such subordinate officers, non¬ commissioned officers and private? as the needs of the service may require. These are: pay clerks, ranking as second (or rarely first-lieu¬ tenants) ; field clerks, Quartermaster Corps; quartermaster sergeants, senior grade ; quarter¬ master sergeants ; sergeants, first class ; ser¬ geants, corporals, privates first class ; and pri¬ vates. In time of war, the Quartermaster Corps of the regular army may be supplemented by captains and majors from the Officers' Reserve Corps, and with non-commissioned officers and

privates from the Enlisted Reserve Corps. At present there are first and second lieu¬ tenants in the Quartermaster Corps, branch of the Officers' Reserve Corps, but this is not a permanent provision.

QUARTERMASTER-GENERAL, in the

army of the United States, a staff-officer with rank of brigadier-general. He is chief officer in the Quartermaster Corps (q.v.). In Eng¬ land he is a staff officer, specially appointed for duties connected with quartering, encamping, embarking and moving troops. In both armies in the field he is responsible for the general di¬ rection of the railway, postal, signaling and telegraph services. In the United States army he has charge of the pay service also.

QUARTERMASTER-SERGEANT, in the

United States army, a non-commissioned officer whose duty it is to assist the quartermaster. Formerly there were company quartermaster-sergeants, but their place is now taken by the company supply and mess sergeants. There are three regimental quartermaster-sergeants to each regiment, one to each battalion. The two highest grades of non-commissioned officers in the quartermaster corps are quartermaster-ser¬ geants, first class, and quartermaster-sergeant, respectively. (See Quartermaster Corps). In England the quartermaster-sergeant is the senior sergeant in the quartermaster's depart¬ ment of a regiment. He ranks next the ser¬ geant-major.

QUARTERN. See Weights and Meas¬ ures.

QUARTEROON. See Quadroon.

QUARTET, or QUARTETTE (Italian quart etto from quarto, a fourth), a musical composition for four voices or instruments, in which all the parts are obbligati, that is to say, each is indispensable to the just performance of the piece; no one part can be omitted with¬ out injuring the proper effect of the composi¬ tion. Also four persons who sing or play to¬ gether. Vocal quartets are generally accom¬ panied by instruments to sustain the voices, but the most artistic effect is

produced by their per¬ fect rendition unaccompanied. An interchange of melody, whereby the parts become in turn principal and subordinate, without any inter¬ weaving of them, does not constitute a quartet (see Polyphony). Quartets for stringed in¬ struments are generally arranged for two vio¬ lins, a viola or tenor violin and a violoncello. Haydn was the originator of the modern in¬ strumental quartet, and his contemporary emu¬ lators were Mozart, Beethoven, Gietry, Sam-martini, Onslow, the two Rombergs and Ries. Among later masters of the quartet form are Schubert and Brahms. See Music.

QUARTIER LATIN, kar-te-a la-tan. See Paris.

QUARTLEY, kwart'li, Arthur, American artist: b. Paris, 24 May 1839; d. New York, 24 May 1886. Coming to the United States in 1851, he studied in Baltimore and New York and was elected National Academician in 1886. His most important works are marines, and among them may be mentioned (New York from North River > ; (Afternoon in Aqgust — Coast of

Maine) (1878) ; (Low Country on the North Shore of Long Island) (1881); and (Off the Shoals.)

QUARTO (also written 4to), originally a sheet of paper twice folded, or a book made of a sheet folded twice, so as to have four leaves or eight pages to a sheet; now a book size, varying from about 15 X 11 inches (im¬ perial quarto), to about 6ˆ4 X 9 inches. In loose usage, any volume of large pages.

QUARTO DEC I MANS, kwar-to-des'i-manz, the name given to those Christians in the early centuries who celebrated the Easter fes¬ tival on the same day as the Jews celebrated the Passover, namely, the 14th day of the month Nisan. Most of the churches, both of the East and West, celebrated the Christian Passover al¬ ways on the Sunday next succeeding the day observed by the Jews, never on 14th Nisan, even if that day was Sunday. The Council of Nice (325 a.d.) enjoined on all the faithful this rule; thereafter the Quartodecimans were held to be heretics.

QUARTZ, the name given the native oxide of silicon, SiCfi. It is a widely distributed min¬ eral occurring not only in veins and segregated masses, but as a common constituent of igneous rocks. Detrital grains form sands, and when cemented, sandstones and quartzites. Owing to differences in color and texture and its use as a

semi-precious stone, the names given varie¬ ties of quartz are many. All these varieties, however, are included in two classes, the plainlv crystalline or vitreous, and the obscurely crys¬ talline called cryptocrystalline. All varieties have about the same hardness, seven, that is, can scratch window glass, and nearly the same specific gravity, 2.6. Pure quartz is fusible only at high temperatures.

Quartz crystallizes in the rhombohedral sys¬ tem, generally as six-sided prisms usually termi¬ nated at each end by six-sided pyramids. Among the crystalline varieties of quartz are rock crys¬ tal, amethyst, smoky quartz, rose quartz, milky quartz, the mineral being colorless when pure, but ranging through various shades of yellow, red, brown, blue and green to black when im¬ pure. Colorless quartz, or rock crystal, is often cut into gem shapes and sold as Lake George diamonds, Brazil pebbles, *etc.* Perfectly clear crystals of larger size are highly prized in Japan when cut and polished as spheres. Recently de¬ veloped uses of rock crystal are i» the manufac¬ ture of fibres for suspending the minute magnets and mirrors used as galvanometers and in the manufacture of spectrum tubes and test tubes, the quartz being fused by the oxyhydrogen blowpipe. Quartz fibres are used for galvanom¬ eters because they show no torsion ancl the • minors have no permanent set or deviation from the true position when at rest. Vessels made of fused quartz can be heated to a white heat and plunged into cold water without injury and on this account quartz tubes are used for study¬ ing the spectra gases at high temperatures.

Of the colored varieties of crystalline quartz amethyst is clear purple or bluish-violet, and is popular as a gem ; rose quartz, which always occurs massive, is rose red or pink; yellow quartz, or citrine, is often called topaz by jewel¬ ers,. but may be distinguished from true topaz by its inferior hardness; smoky quartz, called also cairngorm stone, varies in color from smoky yellow to brownish black; milky quartz, white, nearly opaque and often with a greasy lustre, is of common occurrence in veins; sagen-

itic quartz has inclusions of needle-like crystals of rutile, actinolite, asbestos (cat's-eye) or black tourmaline ; sapphire quartz, indigo blue in color, is a rare variety. Many quartz crystals contain small cavities partly filled with liquids, generally water, also inclusions of carbonic acid, either liquid or gaseous. The cryptocrystalline varie¬ ties of quartz include chalcedony, and its varie¬ ties, carnelian, chrysoprase, prase, plasma, agate, onyx and sardonyx ; also flint, hornstone, touch¬ stone and jasper. Chalcedony has a wax-like lustre, is translucent or transparent, and its color varies from white through pale brown to dark brown or black, though it is occasionally blue; carnelian or sard, is a red or brownish-red chalcedony; chrysoprase an apple-green variety; prase, a dull darker green ; plasma, a leek green or emerald green ; bloodstone, a dark green chalcedony with small red spots, like drops of blood ; agate, a chalcedony with delicate parallel bands of color, or irregularly clouded color effects, the colors being white, red, brown or even blue, while moss agate contains moss-like forms caused by oxide of manganese; in onyx the differently colored bands are straight and parallel ; sardonyx is onyx containing bands of carnelian (sard) ; flint differs from chalcedony in being more opaque, having a slightly vitreous lustre, being generally gray or brown in color ; it breaks with a sharp cutting edge; it was used by the early races of men for arrow heads, knives, *etc.* ; hornstone resembles flint, but has a splintery fracture, and is often white; touch¬ stone, known also as basanite or Lydian stone, a black hornstone or jasper, used for testing the purity of precious metals by rubbing them on it; jasper differs from the preceding varieties in being entirely opaque; it is often red, yellow or brown.

Common milky quartz is used for a variety of purposes. In metallurgical operations it is used as a flux in smelting iron and copper ores; when finely crushed it is used by porcelain manufacturers for making glazes, quartz sand and ground pure quartz are used in immense quantities for making glass. Another use is as an abrasive,

either as sandpaper or as sand or a fine powder. In these forms it is used for dressing stone, wood and leather; while the powder, mixed with soap, forms a widely adver¬ tised cleansing compound. See Mineral Pro¬ duction of the United States.

QUARTZ MONZONITE. An igneous rock resembling granite in general appearance but of mineral composition intermediate be¬ tween syenite and diorite and with less quartz than granodiorite. Several of the well-known New England “granites” and the gray “granites” of Minnesota and California are mostly quartz monzonite or granodiorite.

QUARTZORITE. An igneous rock of granular structure, mostly of dark color and extensively quarried as a variety of granite. The chief feldspar is plagioclase with which occur free quartz, generally some orthoclase and some of the darker silicates such as biotite, hornblende and augite. It is closely related to granodiorite and quartz monzonite and is chemically similar to dacite which is supposed to be an effusive equivalent.

QUARTZ PORPHYRY, an igneous rock characterized by containing crystals of quartz and feldspar with sometimes biotite and more vol. 23 — 5

rarely hornblende scattered through a ground mass that is glassy or contains fine crystals of quartz and feldspar. The name was formerly given to free Tertiary rhyolites and is still ap¬ plied to rhyolites that have crystallized as dikes or laccolites rather than as surface flows, but these distinctions have little value. In gen¬ eral quartz porphyries differ from rhyolites simply in being denser. Quartz trachyte is a name given rhyolite by European geologists. Quartz porphyries are of quite common occur¬ rence in the Western States and are of peculiar importance at Leadville, Colo. See Rhyolite.

QUARTZITE, a rock of common occur¬ rence in mountain ranges or when strata have been strongly folded. It is simply a meta¬ morphosed sandstone, its hardness and rather crystalline character being due to the cement of crystalline quartz that surrounds the grains of the original sandstone. A sandstone containing clay becomes a quartzite containing mica, and thus quartzites grade into quartz-schists and mica-schists. In general quartzites resist weath¬ ering and thus form ledges. They differ greatly in color.

QUASI-CONTRACT. A quasi-contract — often called a constructive contract — is one founded solely on an obligation of law and not upon the intention or consent of the parties. Such contracts are imposed by law on the theory that they are dictated by reason and justice. Quasi-contracts are usually founded (1) on a record, as a judgment; (2) on a statutory, official or customary duty, as the obligation of a husband to pay for necessaries supplied his wife; (3) on the doctrine that no one should be allowed to enrich himself un¬ justly at another's expense, as the liability to repay money paid by mistake of fact. A marked distinction between a quasi-contract and a true contract is that the latter is founded upon the cdnsent of the parties thereto, whereas the for¬ mer is founded on a legal obligation without any consent of the parties. As has been aptly said in the case of consensual contracts the agreement defines the duty, while in the case of quasi-contracts the duty defines the con¬ tract. Much real difficulty has been experienced in distinguishing between quasi-contracts and implied contracts, and some authorities hold that the distinction appears to be one of degree rather than of principle. There is authority for the statement that implied contracts embrace those in which there is an intent to contract or at any rate no intent not to contract. But in many cases of what are commonly called im¬ plied contracts the only intent apparent is in the imputation of knowledge that the law would impose a certain liability. This element is also present in many quasi-contracts. The test of definite intention not to contract, if applied to quasi-contracts, would exclude some from this classification, for example, an obligation to re¬ pay money paid by mistake of fact. Some au¬ thorities differentiate a quasi-contract from an implied contract by holding that the former is a mere legal fiction, a form imposed to adapt the case to a certain remedy, in which inten¬ tion is disregarded, whereas in an implied con¬ tract the intent is ascertained and enforced and according to the common understanding of men the intention to contract is mutual. Quasi-66

contracts are enforced by an action ex con¬ tractu.

By some earlier authorities the term “implied contracts,® is made to include (1) con¬ tracts implied in fact and (2) quasi or con¬ structive contracts. In the former the inten¬ tion to contract may be inferred to exist by the acts of the parties, while in the latter there is an absence of all intent to contract. This classification is favored by some authorities to¬ day.

Among typical cases of quasi or construc¬ tive contracts, in addition to those mentioned above, are the following: cases of account stated, from which an obligation in law arises which will cause an action of assumpsit or debt to lie; cases in which one person has been obliged to pay money which another should have paid and which the former may re¬ cover from the latter in an action in assump¬ sit for money paid to his use; cases in which one person has received money which another should have received, for which an action will lie for money had and received ; cases in which a person by wrongfully taking and retaining property is obligated by law to pay a reason¬ able price therefor; cases in which it is im¬ possible for the plaintiff to complete a contract and in which he may recover for the value of what he has already performed ; cases in which a defendant is in default under a contract which cannot be enforced because not in compliance with the Statute of Frauds and the plaintiff may recover for past performance ; cases in which a person is under a legal obligation to pay money and another pays it without request for him, in which event the money may be recovered by an action at law. See Contract.

Edward F. Donovan.

QUASIMODO, in the Roman calendar, a term applied to the first Sunday after Easter, from the opening words of the introit for that day, ((quasi modo geniti infantes ,® as infants lately born. Also the name of a well-known character in Victor Hugo’s novel (Notre Dame de Parish

QUASS, kwas, or KVASS, a Russian bev¬ erage, made by pouring warm water on rye or barley meal. It is sour and fermented.

QUASSIA, a genus of shrubs and trees of the order Simarubacece. The best known species (Q . amara) is indigenous to tropical America,

grows about 12 feet tall, bears large pinnate leaves with winged petioles and racemes of bright red blossoms. The wood is used for cabinet making and for furniture, since it is avoided by insects. It is excessively bitter, and was formerly in repute as a medicine and for augmenting the bitterness of ale, porter, beer and similar beverages. It is known also as. bitterwood, by which name the wood of Picrcena excelsa is likewise designated and used as a substitute for true quassia with which it vies in bitterness.

QUATERNARY, according to the United States Geological Survey, the last period of the Cenozoic era. It follows the Tertiary and includes the present. It is divided into the Pleistocene and Recent epochs, the former of which includes the great Ice Age, or Glacial Period. Some authorities disregard Quaternary and give Pleistocene and Recent the rank of periods. See Glacial Period and Pleistocene.

QUATERNIONS. Fundamental Prin¬ ciples. — A quaternion, or (<set of four,® is a quadrinomial of the form

w + xi + yj + zk,

in which w, x, y, z are numbers, and 1, i, j, k are four independent units, any three of which may be interpreted geometrically as a set of mutually perpendicular straight lines of unit length in three-dimensional space. The binary products xi, yj, zk are three mutually per¬ pendicular line-segments of lengths x, y, z respectively; they are called vectors, while pure numbers, positive or negative, are called scalars.

The calculus of quaternions is an algebra in which the fundamental operations of addi¬ tion, subtraction, multiplication and division, and the consequent operations of involution, evolution, etc., are employed, and whose ele¬ ments (operators and operands) are quater¬ nions. It is a multiple algebra, because a quaternionic symbol, as q, contains implicitly several independent quantities, and it is essen¬ tially geometric, because its operations, addi¬ tion, multiplication, etc., may be interpreted as geometric transformations. For example, in illustration of the last statement, if q, r be two quaternions and be taken to represent two line-segments meeting at a point, their sum is the diagonal of the parallelogram of which q and r are two adjacent sides. This is known as geometric addition; its law is that of the parallelogram of forces. Multiplication by a quaternion is equivalent to an orthogonal transformation in four variables plus an ex¬ pansion

or a contraction. The geometrical construction of a quaternion product, however, needs the hypothesis of a four-dimensional space for its proper presentation.*

Vectors in particular are so defined as to obey the law of geometric addition. If several vectors represent the successive parts of a broken line in space, their sum is the line-segment joining the free ends of the broken line. In this process of addition the line-segments representing vectors may be trans¬ ferred to any position in space, provided they remain parallel to their original directions, but the direction-sense must in every case be preserved.

In obedience to this interpretation a qua¬ ternion may always be written as the sum of a scalar and a three-dimensional vector ; thus,

$$q \sim Sq + V q,$$

wherein 5* and V are to be read “scalar of® and “vector of® respectively; for by the law of geometric addition $xi + yj + zk$ is itself a vector, while w, being a pure number, is by definition a scalar.

In the quaternion algebra the laws of asso¬ ciation and distribution in the four funda¬ mental operations, and the law of commuta¬ tion in addition and subtraction, are assumed, or they may be derived from the geometrical definitions of the processes, but the commu¬ tative law in multiplication and division is rejected except for such quaternions as have vector parts that are numerical multiples of one another.

The laws of combination by multiplication are determined in the following manner: The

,,T * See ” Bulletin of the American Mathematical Society ” (Vol. 11).

mutually perpendicular vectors xi, yj, zk are numerical multiples of the three independent units, i, j, k, and the combinatory laws for these units are derived from the assumptions

? = V — k2 = — 1, ijk = — 1, from which are obtained, through multiplica¬ tion by i, j , k in succession, the remaining binary products

jk — — kj — i, ki — — ik — j, ij = — ji—k.

From these laws it follows that the product of two quaternions is itself a quaternion. Thus q and r being given quaternions,

q = w + xi + yj + zk, r—w’ + x’i T* y’j + z’k,

their product has the form

qr = *W + Xi + Yj + Zk,

wherein

W — ww’ — xx’ — yy’ — zz’ ,

X — wx’ + w’x + yz’ — y’z,

Y = wy’ + w’y + zx’ — z’x,

Z — wz’ + w’z + x y’ — x’y.

If the order of the factors in this product be changed from qr to rq, the scalar part ww’ — xx’ — yy’ — zz’ is unaltered, but the terms yz — y’z , zx’ — z’x, xy’ — x’y change their algebraic signs and, therefore, the vec¬ tors of qr and of rq are different. This result shows that in general quaternion multiplication does not obey the commutative law. In order that the above terms may not change sign (by a reversal of the order of the factors q, r) the}’ must be separately zero, that is,

y _ z z *x x* y

y’ z’ * z’ x” x’ y’ ’

in other words, x’ , y’ , z’ must be the same numerical multiples of x, y, z respectively. This makes x’i + y’j + z’k a numerical multiple of xi + yj + zk, and it is the condition under which it is permissible to write qr — rq.

Division is interpreted by introducing the reciprocal, defined by the equation qr — 1, in which q and r are said to be reciprocal to one another, and, as in ordinary algebra, we write r= cr^ and q — r This product obviously obeys the commutative law and also it has no vector part, so that

x’ — nx, y’ — ny, z’ — nz, [n = a number] and

wnx — — w’x, w’ — — nw.

Hence the reciprocal of q must have the form

q — 1 = ~(w — xi — yj — zk),

where m is a number. By forming the product qq— 1, observing the laws r = f = k~ — — 1 , ij — — ji = k, etc., it is easily shown that

m — zt? + x2 + y2 + z2.

This number is called the norm of q.

It is now evident that if r — w'j-x'i + y'j + z'k and q — w + xi '+ yj + zk, the quotient rq — 1 is obtained by writing out the product

(w ' -f x'i + y'j + z'k . — w — xi — yj — zk),

and that this quotient is a quaternion.

Hence, barring critical cases, such as division by zero, indeterminate forms, etc., the applica¬ tion of the four fundamental processes of algebra to quaternion symbols leads always to

determinate quaternion results. The quaternionic algebra is, therefore, a closed system and satisfies the definitions of a group with respect to addition, multiplication, subtraction or divi¬ sion. See Groups, Theory of.

The positive square root of the norm of

q (— + \/w 2 + xx + y2 + z2) is called its tensor and the quotient of q by tensor of q is called its versor, so that a quaternion is always the product of its tensor and versor. The sym¬ bolic form of this statement is

q~ Tq-Uq,

where T and U stand for tensor and versor respectively.

In the strictly symbolic notation the recip¬ rocal of q has the form

i _ Sg — Vq

q '

and since qq~^—l it follows that S2q — V'q — T2q.

The quaternions Sq + Vq and Sq — Vq are said to be conjugates of one another.

A vector has no scalar part, but it has a tensor factor and a versor (vector of unit length);, and a scalar has no versor part, but it has a tensor, its positive numerical value, and a versor whose value is

always ± 1. It can readily be shown that the square of the versor of a

xi + yj + zk

vector is — 1. Let the versor be

x 2 + y2 + z2.

)

yz — yz

Its square will be

—x2 + y2 + z2 . . /

x 2 + y2 + z2 1 \x 2 + y2 + z2

, \ / sy-sy _

J \ x2 + y2 + z2 J \ x 2 + y2 + z* /

The symbolic statements are

Vq — TVq.UVq,

Sq = = ± TSq.

Therefore, also,

V2q = — T2Vq, S2q — T2Sq.

The equation S2q — V2q = T2q may now be written

S2q + T2Vq = T*q,

and hence, 6 being an appropriate angle, it may be assumed that

Sq — Tq. cos d, Vq — Tq.UVq . sin 6.

By the introduction of these expressions for scalar and vector the quaternion is presented in a new binomial form

q— Tq(c os 6 + UVq. sin 6),

one of great importance and utility.

The formula last written is a particular case of a more general geometric law. A recent interpretation makes quaternion symbols repre¬ sent straight-line segments (their directions include) in four-dimensional space.* Inter¬ preted in this way quaternions are called directors. It is shown that if two quaternion directors be perpendicular to one another their quotient is a vector. Let 6 be the angle between p and q, let j be the director perpen¬ dicular dropped from the terminal extremity of q to p, and r the director from the origin

* “ Transactions of the American Mathematical Society (Vol. 2, pp. 183-214, and Vol. 3, pp. 46-59).

(intersection of p, q) to the foot of this perpen¬ dicular. Then by geometric addition

$$q = r + s$$

and

q/ p ~ r/ p -f-s/ p ;

and s/p, being the quotation of a pair of mutu¬ ally perpendicular directors, is a vector. Hence, since if p be the ratio Us/Up, it is a unit vector,

q/p= (cos 9 sin 0).

l p

When p — 1 this equation reduces to the one previously written for the value of q. In this particular case 9 becomes the angle formed by the quaternion director q with the axis of real quantities, or scalar axis. When p and q are both vectors the formula expresses the fact, on which Hamilton early places emphasis, that the ratio of two vectors is in general a quaternion, but that if the vectors meet at a right angle the ratio is another vector, if they be parallel it is a scalar. But the formula also shows that these statements are true of quater¬ nions in general.

The two parts of the equation last written present the quaternion under its three most fundamental aspects :

1. It is the ratio of two directed, non-posited, straight-line segments.

2. It is the sum of a number and a directed, non-posited vector.

3. It is the product of a tensor (tensor of q/ p) and of a versor, the latter being expressed in terms of its angle 9 , and its vector axis p.

The geometrical and kinematical interpreta¬ tions of geometric addition and subtraction involye no special difficulties. They are fully explained in a variety of treatises in which this subject has its natural place, particularly in those parts of mathematical physics where the composition of velocities and of forces is explained. The first full exposition of the subject was given in the celebrated (Barycentrische CalciiF of Mobius, published in 1827, and was, therefore, well known about 16 years before the invention of the calculus of qua¬ ternions by Hamilton.

The non-commutative character of multi¬ plication greatly enlarges its powers of ex¬ pression and discrimination, but it also intro¬ duces troublesome transformation processes and calls for extended analysis. Fully ex¬ pressed, the quaternion product has the double form q()qi and involves eight scalar quan¬ tities. A first step in its analysis resolves it, in either of two important ways, into simpler factors :

1. Since by the law of association

q( )4i = l[<7(

it consists of the two special commutative operators q( )1, 1( )qx, applied in succession, or simultaneously, at pleasure.

2. It is always possible to determine four versor quaternions r , rh sif that satisfy the following conditions :

Uq — rs — sr, U qx = rx — *Si = sxrx — \

and

Sr = Srtf Ss = Ssi.i

* Not placed in a definite position.

t “ Proceedings of the American Association for the Ad¬ vancement of Science ” (Vol. 33, 1884, pp. 55-56).

The given product then assumes the form mq ( )qi = mr[s(— 1~ms[r( )rx —

where m is a number. It consists of a tensor factor and two rotational transformations r()rx — \ s()si which are commutative and may be applied simultaneously, or in succession.

The interpretation of the special products q( )1, 1( )qi, r( )rx — 1, s( ).fi — 1 *, as motions, “turns,® and “rotations,® generally in a space of four dimensions, has been successfully achieved.* An adequate account of them, however, would expand this notice beyond permissible limits. . No accurate description of the motion represented by the general product q( )qi has yet been given.

A simpler case than any of the preceding is the product q()q — \ Its complete inter¬ pretation as a rotation in three-dimensional space was an early achievement by Hamilton himself. The motion consists of a rotation through twice the angle of q(q being given in the form «i[cos 9 + p sin 0]) about the vector of q as an axis; that is, any vector, placed at the origin, moves, through the angle 29, on the surface of a cone having its vertex at the origin.f

Quaternion multiplication may be expressed in terms of matrices. This fact was first es¬ tablished by Peirce, % afterward verified by Spot-tiswoode,§ but more explicitly by Cayley. || It has also been shown that every similarity transformation in four variables is expressible as a quaternion product.fi Such facts as these bring out clearly the multiple character of the quaternion algebra.

The further development of the theory of quaternions, which follows the exposition of fundamental principles outlined in the pre¬ ceding paragraphs, includes the deduction of the formulae of scalar and vector products and quotients, the interpretation and transforma¬ tion of quaternion expressions in general, the differentiation of

quaternions, the solution of equations, especially of equations of the first degree, and the analytical theory of quater¬ nions.

But although the works of Hamilton and Fait contain a large mass of material concern¬ ing particular quaternion transformations, the general Analytical Theory of Quaternions has yet to be written. A brief outline sketch of a method is given by Cayley in the sixth chapter of Tait's Treatise.

Applications. — It is impossible, in the space permitted to this notice, to do more than name some of the subjects in which the method of quaternions finds its applications. The most important of these to which writers have thus far given attention are the following:

occ nctLUciwciy m .transactions oi tne American Mathe¬ matical Society" (Vol. 3, 1902, pp. 46-59), and Stringham in Proceedings of the American Association for the Ad¬ vancement of Science " (Vol. 33, 1884, p. 56).

t Tait's ' Treatise on Quaternions' (3d ed., pp. 75 and 289) t In a footnote in Linear 'Associative Algebra,' American Journal of Mathematics (Vol. 4, 1881, p. 132).

_r f *n 'Proceedings of the London Mathematical Society ' (Vol. 4, 1872, pp 156-159).*

i In jTa£'S , Tre,aF?e on Quaternions ' (3d ed., p.

5J8), and Cayleys Mathematical Papers' (Vol. 12, pp.

dll dldjf

.Ifln ‘Transactions of the American Mathematical Society (Vol. 2 1901, pp. 186, 187). See also the references to Cayley and Klein on page 184 of this volume, and 4 Compte

Rendu du deuxieme Congres Internationale des Mathe-maticiens ’ (Paris, 1900, p. 336).

09

The theory of matrices ; orthogonal trans¬ formation; geometry of the straight line, of the plane, of the sphere, of the cyclic cone, of surfaces of the second order, of curves and sur¬ faces in general, and of planes in four dimen¬ sional space; kinematics of a point, of a rigid system and of deformable systems ; axes and moments of inertia; statics of a rigid system; kinetics of a rigid system ; precession and nutation ; the problems of the pendulum ; geometrical and physical optics ; electro¬ dynamics ; the solenoid ; applications of the

operator, v = * + j ˆ + k and of La¬

place’s operator v3, to physical analogies, to line, surface and volume integrals, to the stress function; application of the v integrals to magnetic problems ; the hydrokinetic equa¬ tions ; applications of v in connection with Taylor’s theorem and the calculus of varia¬ tions.

By far the greater portion of extant knowl¬ edge of quaternions, both of the theory and of its applications, is due directly to Hamilton and is published in the (Elements, > but the applications to physical problems were mainly contributed by Tait and are efnbodied in the 12th chapter of his ˆreatiseP

History. — The development of the quater¬ nion calculus as an analysis of space relations was the work of Sir William Rowan Hamilton, Andrews professor of astronomy in the Uni¬ versity of

Dublin and royal astronomer of Ireland. The effort to create a new calculus of this type was a natural sequence of the many attempts that had been made to interpret geometrically the so-called imaginary and com¬ plex algebraic expressions of the forms a\f — 1 and a -f b\/ — 1. These attempts are recorded in the earlier works whose titles are given in the following bibliography.

Hamilton laid the foundations of the new subject during the years 1833—43. In No¬ vember of the latter year his first paper on Researches respecting Quaternions) was pre¬ sented to the Royal Irish Academy. His first full exposition of quaternion theory was pub¬ lished in 1853 in his (Lectures on Quaternions,* a book of over 700 pages.

Meanwhile, in 1844, Grassmann published his now celebrated work, (Die Ausdehnungslehre,* which occupies common ground with quater¬ nion theory, but plans a much wider range of investigation than was contemplated by Hamilton in his system. The two systems have a common body of fundamental prin¬ ciples, but they have different points of view, different notations and in part different pur¬ poses. Both form the foundations upon which all subsequent work of the kind must stand.

Hamilton's (Elements of Quaternions,* which still remains the storehouse of knowledge for its subject, was a posthumous work, published in 1866. A new edition has recently appeared in two volumes.

After the work of Hamilton and Grassmann had been finished the next most important forward step in the creation of new algebras was taken by Benjamin Peirce in his essay on (Linear Associative Algebra,* presented to the National Academy of Sciences at Washington in 1870, subsequently published in the Amer¬ ican Journal of Mathematics (1881). In this

work the author enumerates the types of linear associative algebras, and classifies them by a set of criteria which takes account of the num¬ ber and the assumed laws of combination of their irreducible elements (extraordinaries, or vids). These laws are exhibited in the form of a series of multiplication tables.

Some of the more recent attempts to apply the quaternion analysis and the Ausdehnungslehre to physical problems have appeared under

the title of (Vector Analysis,-* sometimes with modified, sometimes with wholly changed notations. Of these the contributions of Wil¬ lard Gibbs and of Heaviside should be men¬ tioned as of special importance. See Vector Analyses.

Bibliography. — Buchheim, (A Memoir on Biquaternions,) in American Journal of Mathe¬ matics (1885) ; Grassmann, H., (Die Ausdehnungslehre* (1844, 1862, 1878) ; Hamilton,

‘Lectures on Quaternions) (1853) ; id., Ele¬ ments of Quaternionns (1886); Hathaway, (Quaternion Spaced in Transactions of Ameri¬ can Mathematical Society (1902) ; Kelland and Tait, ‘ Introduction to Quaternions) (1873, 1882) ; Mobius, (Der Barycentrische CalcuP (1827) ; Tait, (Treatise on Quaternions) (1867, 1873, 1890). For further references consult Macfarlane, A., ‘Bibliography of Quaternions) (Dublin 1904).

Irving Stringham,

Late Professor of Mathematics, University of California.

QUATRAIN, a poetical stanza of four lines, usually rhyming alternately; loosely, a poem of four short stanzas.

QUATRE-BRAS, katr-bra (“four branches®), Belgium, in the province of Bra¬ bant, at the intersection of the main roads from Brussels and Charleroi and from Namur to Nivelles, about 20 miles south-southeast of Brussels. It is famous for the battle fought here, 16 June 1815, between the English under Wellington and the French under Ney. It was Napoleon’s plan at the opening of the campaign of 1815 to fight the armies of the allies singly, as he felt himself unable to cope with their combined forces. At the head of an army of 129,000 men, supported by 350 guns, he made a rapid march into Belgium, crossing the Sambre almost before the allies were aware of his movements. His army was divided into three corps : the right wing, 48,000 strong, being under Grouchy ; the centre, of 28,000 men, under the emperor himself ; and the left wing, of 48,000, under Ney. The Prussians and Eng¬ lish under Bliicher and Wellington lay between the French and Brussels. With the right wing and centre of his army Napoleon furiously at¬ tacked the Prussians, who, after a severe strug¬ gle, retired upon Wavre 16 June. On the same day Ney attacked Wellington at Quatre-Bras. The English, 32,000 strong, repulsed Ney, and maintained their position, though at a loss of over 5,000 men, including the Duke of Bruns¬ wick. The English general, hearing of the retrograde movement of the Prussians, fell back on the 1 7th on

Waterloo, where the decisive battle was fought on the following day. See Waterloo.

QUATRE-VINGT-TREIZE, katr-van- traz (<Ninety-Three>), a work of historical fic¬ tion by Victor Hugo, published in 1874. The-

time is, as the title indicates, 1793. The scene is Vendee, during the civil war. In its style it displays much unevenness, but in its charac¬ ters, vivid scenes and tragic catastrophe ranks among the author's best.

QUATREFAGES DE BREAU, katr-fazh de bra-o, Jean Louis Armand de, French naturalist: b. Berthezene, Gard, France, 10 Feb. 1810; d. Paris, France, 12 Jan. 1892. He was graduated from the University of Strassburg and in 1832 settled in Toulouse where he practised medicine and shortly afterward founded the Journal de Medecine et de Chirurgie de Toulouse. In 1838-40 he occu¬ pied the chair of zoology at the University of Toulous*e and in the latter year removed to Paris, where he made a special study of inverte¬ brates. In 1850 he was appointed professor of natural history at the Lycee Napoleon, Paris, and in 1855 professor of anthropology at the Musee d'Histoire Naturelle, which post he oc¬ cupied until his death. He was elected to the Academy of Sciences in 1852 and was widely known by his anthropological investigations. He was the first expounder of the doctrine of phlebenterism, and was strongly opposed to Darwin's theories. He was the author of many important works on zoology and anthropology, among which are ˆConsiderations sur les caracteres zoologiques des rongeurs> (1840); (De ˆOrganisation des Animaux sans vertebres des cotes de la Manches) (1844); (Recherches sur le Systeme nerveux, l'Embryogenie, les Organs des Sens, et la Circulation des Anne-lides5 (1844-50); 'Physiologie Comparee, Meta¬ morphose de l'Homme et des Animaux) (1862) ;

(Souvenirs d'un Naturaliste> (1854) ; <Histoire Naturelle des Anneles Marins et d'Eau Douce) (1865); (Les Polynesiens et leurs Migrations* (1866) ; (La Rochelle et ses Environs) (1866) ;

(Rapport sur les Progres de l'Anthropologie* (1867) ; (Ch. Darwin et ses Frecurseurs frangais) (1870), an attack on Darwinianism ; (La Race Prussienne* (1871); <L'Espece Humaine) (1877); (Nouvelles Etudes sur la Distribution Geographique des Negritos* (1882) ; (Hommes Fossiles et Hommes Sauvages* (1884); < Intro¬ duction a l'Etude des Races Humaines) (1887— 89) ; (Theories Transformistes) (1892) ; a series of papers entitled <Etudes sur les Tvpes Inferieurs de l'Embranchement des Anneles > ; and he also contributed a large number of articles to the Revue des Deux Mondes on the results of his scientific researches along the Atlantic and Mediterranean coasts and throughout Italy and Sicily.

QUATREFOIL, katr-foil, in heraldry, a bearing displaying a conventionalized flower of four leaves ; in architecture, an opening or a panel divided by cusps or foliations into four leaves, or, more correctly, the leaf-shaped figure formed by the cusps. It is an ornament which has been supposed to represent the four leaves of a cruciform flower, and is common in the tracery of Gothic windows. Bands of small quatrefoils are much used as ornaments in the perpendicular Gothic style and sometimes in the decorated.

QUATREMERE, katr'-mar, JEtienne Marc,

French Orientalist: b. Paris, France, 12 July 1782; d. there, 18 Sept. 1857. He was educated at the College de France, was employed at the Bibliotheque Imperiale in 1807, and in 1809 ac¬

cepted the chair of Greek in the University of Rouen. He was elected to the French Institute in 1815, became professor of Hebrew at the Col¬ lege de France in 1819, and in 1838 was made professor of Persian in the School for Living Oriental Languages. He made numerous valu¬ able translations and was author of important geographical and historical works in addition to his work as an Orientalist. He published (Recherches Critiques et Historiques sur la Langue et la Litterature de l'Egypte* (1808) ; ˆMemoires geographiques et historiques sur l'Egypte* (1811) ; . (Memoir le sur Nabateens) (1835); (Histoire des Mongols de la Perse) (1836) ; (Histoire des Sultans Mamelouks) (1837-45), *etc.* His extensive library, including a great number of old Eastern manuscripts, is preserved in the royal library at Munich.

QUATREMERE DE QUINCY, de kaii-se, Antoine Chrysostome, French archteologist and politician: b. Paris, 28 Oct. 1755; d. there, 8 Dec.

1849. He was prominent politically un¬ der the republic, consulate, empire and restora¬ tion, in 1791 having been deputy to the legis¬ lative assembly for Paris. After the dissolu¬ tion of the assembly, he was 13 months in prison, and after the proscriptions of 1793 he became one of the leaders of the insurrection of 5 Oct. 1795, for which he was condemned to death. He was later acquitted and in 1797 rep¬ resented the Seine in the Council of Five Hun¬ dred, but for his opposition to the revolutionists was banished, 5 Sept. 1797. The consuls re¬ called him in 1799 and in 1800 he was ap¬ pointed secretary to the council of the Depart¬ ment of the Seine; later was appointed to the class of history and ancient literature in the National Institute; was made permanent secre¬ tary of the Academy of Beaux-Arts in 1816 and was editor in that department of the Jour¬ nal des Savants; elected professor of archse-ology at the Royal Library in 1818 and serving as deputy in 1820-21. He wrote (Dictionnaire de 1 Architecture) (1786-1825) ; (Histoire de la vie et des Ouvrages de Rafael *(1824)*

<Canova et ses Ouvrages > (1834); <Le Jupiter Olympien, ou l'art de la sculpture antique) (1814) ; a treatise on ancient sculpture in ivory and gold; (Essais sur l'lmitation dans les Beaux-Arts) (1823) ; ˆMonuments et Ouvrages d'art antique restitues* (2 vols., 1826-28) ; <Histoire de la vie et des Ouvrages des plus celebres Architectes* (1836), *etc.*

QUATROCENTO, kwat-ro-chen'to-, in art, a term applied to the characteristic style of the artists, of the 15th century, that is 1400 and odd; it was hard, rigid and neculiar in color as well as in form and pose. It was the inter¬ mediate stage of that progressive period of art which, commencing with Fra Angelico, reached excellence with Leonardo da Vinci.

QUAY, kwa, Matthew Stanley, American politician : b Dillsburg, York County, Pa., 30 Sept. 1833; d. Beaver, Pa., 28 May 1904. He was graduated from Jefferson College in 1850, studied law, was admitted to the bar in 1854 and elected prothonotary of Beaver County in 1856 and 1859. During the Civil War he was m active service as colonel of the 134th Penn¬ sylvania regiment, being present at the battle of Fredericksburg; he was also assistant com¬ missary general of Pennsylvania, State military agent at Washington and military secretary to

the governor. In 1865-67 he was a member of the Pennsylvania legislature ; in 1872-78, and again in 1879-82, he was State secretary; re¬ corder for the city of Philadelphia in 1878-79; and State treasurer in 1885. As early as 1869 he was secretary of the executive committee of the Republican State committee, and after that became the undisputed leader of his party in Pennsylvania. In national politics he was a member of the Republican national committee after 1885, and in 1888 was its chairman, con¬ ducting a successful presidential campaign. In 1887 he was elected United States Senator, serving continuously till 1899; in that year a deadlock in the legislature prevented his re-election. This was in part owing to the fact that in 1898, on the failure of the People's Bank where State funds were deposited, he had been accused of being party to a conspiracy for the misappropriation of public funds; the trial occurred in April 1899 and resulted in his ac¬ quittal. He was then appointed Senator ad interim by the governor and elected to the Senate in 1901 for the term expiring in 1905. In the Senate he was one of the strongest oppo¬ nents of the Panama Canal. His power as a political organizer lay chiefly in his adroit methods of reconciling opposing factions and hostile interests. A striking example of this was his method of meeting the reform movement of 1902 by supporting as candidates for governor of the State and mayor of Philadelphia, men who were endorsed by the reformers and not prominent in the regular Republican organiza¬ tion, thus gaining the support of what might have been a dangerous opposition.

QUAY, an artificial landing-place on a watercourse or harbor, usually of stone. It differs from a wharf, which is a structure built out from the shore on piles, whereas a quay is properly solid. See Wharves and Wharf Construction.

QUAYLE, kwal, William Alfred, Ameri¬ can Methodist clergyman and author ; b. Mis¬ souri, 1860. He was graduated from Baker University, Baldwin, Kan., in 1885, was or¬ dained to the Methodist ministry the next year and has since held prominent pastorates in Kansas City and Indianapolis. He was pro¬ fessor of Greek at Baker Universitv, 1855-90 and president of that institution, 1890-92. In 1908 he was created a bishop. He has lectured widely and has published (The Poet's Poet and Other Essays) (1897) ; (A Hero and Some Other Folk)

(1899); (The Blessed Life) (1900) ; (The Gentleman in Literature (1902) ; (The Prairie and the Sea) (1905) ; (God's Calendar* (1907) ; (The Song of Songs) (1910); <The Climb to God> (1913); <Beside Lake BeautifuP (1914) ; (Recovered Yesterdays in Literature* (1916), *etc.*

QUEBEC, kwe-bek (Fr. ke-bek), one of the provinces of Canada, the largest in area and second in population, in British North America. Its capital is the city of Quebec.

Boundaries and Extent. — It is bounded on the north by Hudson Bay and Strait, on the east by Labrador and the Gulf of Saint Law¬ rence, on the south by the Bay of Chaleurs, New Brunswick and the States of Maine, New Hampshire, Vermont and New York and on the west and southwest by the province of Ontario. Its length is nearly 1,060 miles on a

due east and west course, its breadth from north to south 1,200 miles and its area 706,834 square miles (15,969 water). The annexation in 1912 of the district of Ungava (354,000 square miles), now called New Quebec, has doubled its area. It thus embraces nearly one-fifth of the total area of the Dominion. The surface of Old Quebec is varied and very picturesque, embracing several ranges of mountains and lofty hills, diversified by numerous rivers, lakes and forests.

Mountains. — The Notre-Dame, or Green, Mountains, a continuation of the Appalachian Range, extend along nearly the whole of the south side of the Saint Lawrence. That chain runs at varying short distances from the river, and, after crossing the frontier and the State of Vermont, joins the Alleghanies. The high¬ est altitude reached in the province is Mount Logan in Matane County (3,708 feet). The Laurentian Mountains skirt the northern bank of the same river and the Ottawa, somewhere near and somewhere at a distance of 10, 15 or 30 miles from the banks; but 130 miles west of Montreal, cross the Ottawa and curve in .he direction of Kingston, whence they run west¬ ward to the shores of lakes Superior and Huron.

Rivers, Lakes and Islands. — Quebec abounds in large rivers, bays and lakes. The Saint Lawrence, 1,900 miles to the head of Lake Saint Louis and navigable for large ocean¬ going ships as far as Montreal, flows through almost the entire length of the province, re¬ ceiving, a short distance above Montreal, the waters of the Ottawa, a river 685 miles in length. That last river is more abundant in water than the Nile and

the Rhine and has large tributaries, the rivers Gatineau and Lievre (Hare), which are over 200 miles long and three others extending over 100 miles to the north. The Saint Maurice, which rises in Lake Oskelaneo and empties into the Saint Lawrence at Three Rivers, is over 325 miles in length and is remarkable for its enormous flow of water and its falls. The principal, named Shawenegan, Grand 'Mere, La Tuque, Les Piles, are wonderful water powers, 150,000 horse power now having been developed. Large pulp mills and paper factories have been erected at Grand 'Mere and at Shawenegan, a few years ago and are now the centre of large and pro¬ gressive towns. The rivers Batiscan, Sainte Anne, Jacques Cartier and Montmorency, the last named famous for its falls, also enter the Saint Lawrence from the north. The Sague¬ nay (405 miles) rising in Lake Saint John and flowing into the Saint Lawrence at Tadousac, is one of the most remarkable bodies of water in the world, varying in depth from 100 to 1,000 feet. It is the great outlet of the Lake Saint John, into which flow six long rivers; the princi¬ pal one (the Peribonca) is 400 miles long and navigable for 30 miles. The Richelieu, drain¬ ing Lake Champlain, discharges into the Saint Lawrence from the south and so do the Saint Francis, Chaudiere, Chateauguay, Yamaska, Etchemin, Becancour and from the north, As¬ sumption, Matawan and du Loup. The rivers of New Quebec include the Big Nottaway, Ru¬ pert, Eastmain, Great Whale and Hamilton rivers. The principal lakes in the province are Melville (1,298 square miles), Mistassini (975).

Payne (747), Saint John (350). At three places the Saint Lawrence enlarges and forms lakes, named Saint Francis, the Saint Louis and the Saint Pierre. The principal islands in the river Saint Lawrence are the islands of Montreal, of Orleans, near Quebec, Anticosti and the Magdalen Islands, situated in the Gulf of Saint Lawrence, 50 miles north of Prince Edward Island.

Forests. — The province of Quebec abounds in forest lands, which extend to nearly 100,- 000 square miles, and the numberless rivers and their branches make the handling of lumber ex¬ tremely easy. The territory on the north side of the Saint Lawrence River is covered with forests which are to all practical purposes value¬ less owing to the abundance of small growth. Along the river Manicouagan and the Gulf and river Saint Lawrence, the timber is not only of good quality but grows in great quantity, including even scattering pine of value. Ex¬ tending westward from the Manicouagan to the eastern watershed of the Gatineau, pine of the best quality is found and lumbering has been successfully carried on for a number of years. In the district from which the Saguenay and its branches draw their waters is a vast quantity of pine, spruce, larch and other woods. In the district drained by the Saint Maurice and its tributaries pine and spruce are most abundant.

In the Lower Ottawa region, including the vacant and waste lands of the Crown on the northern tributaries of the Lower Ottawa and embracing the valleys of the rivers Assumption, Dunord, Petite Nation, the Blanche and du Lievre, in all 11,256 square miles, are to be found poplar, white and red pine, spruce, tama¬ rack and birch. In the Upper Ottawa territory is a great pine-growing district, but, while it is more valuable than the forests of the southern part of the province, it has not been worked to the same extent as that part, where the marvel¬ ous growth of brown birch, cedar, walnut, maple and pine has been a valuable source of income. Scattered throughout the province are to be found elm, beech, ash and cherry trees. About 175,000 square miles have been set apart as forest reserves. It is estimated that the forests of the province still contain 50,000,000,- 000 feet of standing pine. The value of the lum¬ ber cut was (1916) $13,722,883, and of pulpwood production $6,840,489. Since 1911 the exporta¬ tion of unmanufactured timber has been for¬ bidden and the result has been the creation of a valuable pulpwood industry.

Mines — There is no coal in the province. The Laurentian formation, in the central por¬ tion of the province, holds thick beds of lime¬ stone and iron ore, — titanic and magnetic, phos¬ phate, plombagine, mica and large deposits of graphite. Farther west the Laurentian forma¬ tion is succeeded by. the Potsdam sandstone. On this rests a dolmitic limestone and the lime¬ stone of the Lower Silurian Age, known as the Chazy and Trenton groups, are affording the best building stone of the province. There are many other minerals in the province of Que¬ bec ; but a few of them only are worked, namely, asbestos, ochre, chrome, copper, lead, silver and gold. There were 8,263 workers employed in the mining industry in 1916, the value oˆf pro¬ duction for that year being $13,070,566, an in¬ crease of 14 per cent over the preceding year. Of the total the products of the mines are valued

at $7,982,430, and building materials at $5,088,- 136; the former show an increase of 52.8 per cent; and the latter a decrease of 18.5 per cent. The values of the principal products were : as¬ bestos, $5,182,205; cement, $2,525,841; copper and sulphur ore, $1,273,724; brick, $742,163; magnesite, $525,966; chromite, $299,070. The Quyon mine, opened April 1916, and from which shipments were in that year made of the value of $129,267, is probably the largest producer of molybdenite in America.

Climate. — The cold in Quebec in winter is generally steady ; the thermometer often regis¬ ters 20° below zero and the snow falling to a great depth lies on the ground from November until April. The extreme heat of summer, which is generally warm and pleasant, is in¬ dicated at 90°. But it is only exceptional that it runs up to that figure. Autumn, which lasts six or eight weeks, is the finest season of the year.

Agriculture. — Vegetation develops rapidly; there is a rich and loamy soil in. much of the country. In the large valleys of the Saint Law¬ rence, of the Ottawa River, of the Matapedia, of the Richelieu, in the whole region of Lake Saint John, and in the eastern townships of the province, farming is the chief industry. The principal crops are wheat, barley, oats, rye, peas, buckwheat, potatoes clover, hay and corn. The lands lying in the vicinity of the State of Ver¬ mont are given to stock raising to a greater extent than to farming, and dairying has be¬ come an important branch of the trade of that district. In 1916 there were 660 butter fac¬ tories, 885 cheese factories and 445 combined cheese and butter factories, the products having a total value of $22,761,252.

In the stockraising districts horse and cattle breeding has assumed the most important position, while sheep and swine are also raised to a great ex¬ tent. Quebec had (1917) 379,276 horses, 91,- 102 mdch cows. 958,010 other cattle, 849,148 sheep and 712,0877 swine. The total area under field crops in 1916 was 4,590,200 acres and the value $102,937,300 The following are some of the details:

. The field crops in 1916 totaled $102,937,300 in value and were as follows :

PRODUCT

Spring wheat .

Oats .

Buckwheat .

Mixed grains .

Potatoes .

Turnips .

Hay and clover… . Fodder corn .

Area in acres

64,000

1,073,000

101,000

91,000

112,000

10,000

2,985,000

31,000

Total yield,

bushels Total value

960,000 $1,786,000 24,411,000 18,796,000

1,919,000 2,322,000

1,843,000 1,825.000

14,672,000 14,232,000

2,650,000 1,272,000

5,224,000 57,464,000 248,000 1,476,000

x iiu ivtai vaiuc ui tile UMleritS

of the province was in 1916 $2,076,851, and gave employment to nearly 9,000 men.

. Trade and Commerce.— The value of the imports entered for home consumption by the

KSn1AnoC,e/,nr theyear ending 31 March 1917 was $270,024,440 and exports $551,111,934. Quebec

has about 800 bank branches with clearing houses at Montreal, Quebec and Sherbrooke. Quebec has 7,158 manufacturing establishments, with capital of $549,000,000; 141,000 employees, and annual products worth $351,000,000. There are 2,064 vessels owned in the province of an aggregate tonnage of 123,052 tons. The annual receipts of the province are over $9,500,000.

Education. — • Educational matters in the province of Quebec are under control of a

longitude “West fromjGreenwich,

QUEBEC

McDonalds Cot / Sub. Office

Dbsfphtion Point

fepjif Guy Point

-l l-rr\

fable Head

Xtike

CNatuukimina

lc la Trhiite

[poiutiC ariboi

\moutcac\iou’

SouthWest .Point

casAranu*

‘jodbout

Ste. Anne des Monts

Otter Zake(

) Cormorant’, PL

P-0RT1QN

NORTH EASTERN

A ˆ) t—W’ v ‘ ‘ i V ‘

iutlVcaiio vA V

bjo r River v_\

‘^Griffin Coven l

a-v. ™Gran<l,Gryve ■N>Cayc Gaspe

pjl’oiut St. **<

Petite) Capuclr.

lkrslmis

WML

Onachiwag

‘CrCoiombi

Lai al Ray

Pouzlas-_ town

ˆRiviere

a’ L’ Ours

ITamuˆon Cove Mi lie VawWV’-

M v_Aj,

Lake Matapcdia.

Clair

Borecliouí d»-Mnlb

mieLz

Vache*

fit. FcllclenN St. Prime o

Pointe BleuoU lloberval V)l

Yaldalbert ’ Chambord

Rimout]

CornerTif, tbe Beaoli “V- ˆ J/Anse auUieauHlsJ

yr:;

Coeut

4«-:.‘vvly ‘•v\cs x’v’S AmquU*^^-^-^ SalmonXakqjˆpy ■* L a la Croix

8t. Florence !j 5; rVˆupeWor Lake k’S VS \ RouthicrvlUi

‘ˆiSagiienaj/

i ran le Bale

feX-Jtes Grandeq jf.

Dergc ront)£*/

erS.L polbcau

q \MZZMf(,i’“uSiU

1 r

td3 Portal’S) mM/f/f.

Bouleau V , * /

Dn-lˆZ j, h,UI.. Wrte. , !’ ‘St .tA’rjft

‘Dablod ” Lake 3ouchet a

3f i*tigvugeck* {

rufaPistolcs < 0 Sttˆfrancolee

J*oucAetf«|j, |Commi?sioner3 Lakˆi

s. I’.ilUni’i.

ojv. f’ZcrnenfST °9t. Vhuide la Croi ˆYlger AU

Tersil

Tort au

‘Klsklsink

Brook.

vaham

J St. Agnes de Oˆ/MJol

f Nnirn’* Knilˆ\

/ l Uotrn; lieyO

l /Pointe a Pio ?

. I /St. lreneeˆ

r\ / , BW

“\ Sl.iUrl,ai«°\, ®‘- 0.„?i • I Zee Rboqlementfjˆ-/ˆ,

tow /.\v

\ BaV St. Pauls «ien deˆˆapsˆ ail dere-St. Fraˆcois/|

■.Grand Viclori

SummH-

Gaotonagt

Andre

[Lake F.dwnjrd J ˆTriton Club XV Pearl Lake fl ‘■ˆStadacona ˆ

tleiene

» -jjo*

kJSoe*^

X/.a*e

Grand

lama

.‘Mguchette

z yr**ht*’ X. de* Xlapulees

4uV au Coudreˆ/Ju* So”?*

-*Elgin Roadˆ*S * t • j e an Port ** °’

VJW/ ° Stˆ Au%> oA/

w *Trois Sauraops o* !wiy /L’lslct o Lac N6i;

r x

iA:e Mhshamtngop*

/u JHondonaJc

*7 Jt - CS J’V

-aAre -lˆrt6a*«|jrr -ˆunk .or kakg

Qlaiicr L.tv

Zr. Antique*

‘ Grand

Lake1

..lOlncam jj R\vlqt, ˆ Plsn’.e J<

jˆCapˆt

/ignaceN

[ontmagny

L<(A« of Iro

Pertfe/uis mmiu MilL.

Angefl

Long 4’aA e\> Notre/T,ame d

Meklna

□tivleieMattawli

I. Tucafosm

Allens’ -‘b‘1 ‘

JncksoDS Sid.

s*bta _ L

Lyjlouge’

‘St. ClinVlM Jc.

Atinnpt

B«E I.L

t.liorvius *—

‘Bovin

* Grand

X. Tomaasino

Cr.CrapaudiQ. j I CVPayetU * y

SySS St: .

' a iSlacloirc/

)L. ‘Bnile

Tite tita. \

Ht.)L’asirair(

yimewaja

.Croix Craigs St. Apollinaire ˆ

t-D« cP

)anq”iu

St. ˆ

Cypre* j 1 8 •

jMaurico!

< x- <u, xi Claire

[hambault £Jcii*f \y V \ii« Ouareaji0’ Sv. Donate d<olt.’

Crock?

Komininque.

taniwak,

v St,.

0 Otrtrvdi

a/.

X. Xytongo’

tzˆ X. de* 1*le*tJ 3-Notre’Dame duTont Mai id or _ n

_ˆ3 = Aberde«n

Rpao/jlj

M’a »«

Graoefleld

■Wrl’gbt/

‘Wyilt’ort V\ yfCumborUndMUUl St.OoorRO >v ■ 8t. Oeorjte Eaatr.*
• -Umy ‘.Mills

nryrige IflLakt fLa Conwptlon

＞o’Qca»tor4 X＜L Mill

TeirafilU &l|

Pierre \

A ictorla.

.rthahaska

K A ififehaf

Lake ‘Du jrˆon t_

Aylwinˆx*

Xazubazuavjv

•JT\ ˆenotfa

f ! ar

[Farrelton

Lao St Marie1

:i. E»«rl«te •!* Fcrtvtl

;$tt.

leVxARTnˆBASKAVrA Belmim -)A5jtj < ,*’“*iW»iwirk i Sunbor

1(1 V ‘n. I -oSt-J4t?*ii,JlW

itland ilLin v?l 1 ? /8t.fvV’-‘*h*“t.OC 8t-borord J

ao/ CˆrAV Wattoow ‘lˆsedou Con.o *I* > *y J*T S(> Cow < 7«° Woodun J J

Lac Simon

ˆCoulcbi

Vlnto®ˆ

A‘6L.Elltlvo, ‘Ay Campb.llj,

fj\ B»y &

Latpbton SleSoQrnnd’

Cbenevj

Otter

§h«W..i>ˆ,

euil’Ssi;

Jo i;or

Stp. Atm£

‘rollt

W’bittor

Ruportl

Tˆiniakamininq (f Klpawa JAl iwer JieauckeTtt

JXLake\

DduJsdcns Mill X4”Z..a*f de* l’J > cauc,«neEm*,ranC Vv’i-l Lake*

• \ˆPortn(Ccjbdcxrt du F’

— ■Mei’*ourne yS’S-A1-”

bK *?iue* KeftW* „0 H I

f« 1/oyorFloddenJC Vˆodˆor U

V akou rtˆTR j.BjxkUuaLTKu, Su.

F O /R DjBroinptonJ T\

Km too \ j _ Tide! ˆ(•WntV >

BJtERBSoˆKE/g? tA V. N Shcrbrookc > a > j(/V’

-V.V Warren /B bek Fo rest, ■rvˆYˆ‘S0. ‘ -AftSˆBiˆkeli AH JJrˆr

% Uei > “‘‘i’TWOSt7rfu ˆl—lMOONTAINS

Lowell town

-anviUe

[illcrest

‘eg^

fir Jy A \J D ,RiO I L*

Lake Memewii

<rrst.

► r.s,./ f-) M nr I’rncvi/- if

LˆWlTite ˆ,lomm‘°?-ljacollr.1 ‘Cues /<JJ_NLT_ I ‘ N| G D ‘O H wr , _ £.

Alexandria

.Si. lodian

Western Portion of

QUEBEC.

SCALE \ Same as Main Map.

iti

>lauCn» | 01

facheence

lb.ibino y“f A owaaiV’r > iwl

‘V O.Onohnii

AO ® 6ottoo <

^^.FrellgbO

Lancnstei

•cn < »‘

ila HKtfAd’b

Bissett

{JUngeley

/ii] Olooslooki

Springs

vrˆ

DaslnV *’ M

Daaln /.

Depot e, * /*.

Mound Lake (Mh ˆGolden [Lake

£Uod McNeill’s S*w II x H M*p of •» Copyright b> Rend M. N-IW k Cr

3240

N

‘

superintendent of public instruction assisted by a council and divided into committees for the management of Roman Catholic and Protestant schools, respectively. Compulsory school age is from 5 to 16 years. The schools are maintained partly by local taxation and partly by govern¬ ment grants and are individually controlled by local boards. There are in the province 5,988 elementary schools and 721 model schools. In the elementary schools there are 252,000 pupils. The total number of schools, universities and colleges in the province is given at 7,156, teachers 16,634, pupils 470,839. Chief among the higher institutions of learning are Laval Uni¬ versity at Quebec and McGill University and the Presbyterian College at Montreal.

Government.— The system of government established in Canada under the Union Act of 1867 is a federal union having a general or cen¬ tral government controlling matters essential to the general development, the permanency and the union of the whole Dominion and a number of provincial organizations, each gov¬ erned by a lieutenant governor, nominated and removable by the government of the Dominion and advised by a council responsible to the people's representatives and with a legislature composed in Quebec of two houses — a council of 24 members appointed by the Crown, each representing a special territorial division and an elective assembly of 81 members. The Parlia¬ ment of Canada consists of a Senate and a House of Commons. The Senate, as at present constituted, has 81 members, 24 of whom are from Quebec. The House of Commons consists at present of 234 members, the basis of repre¬ sentation, fixed under the provisions of the Act of Confederation, being that the province of Quebec is always to have 65 representatives and each of the other provinces such a number as will give the same proportion of representa¬ tives to its population as the number 65 bears to the population of Quebec as ascertained by a decennial census. In the province of Quebec the qualifications for the electoral franchise are ownership or occupancy of real property; posi¬ tion as teachers or clergymen after five months' domicile in electoral district ; income or personal property of specified amount — real, or real and personal, valued at $300, $200 and $100 (fisher¬ men). Income, renters, $100 ;

others, $300. Ab¬ sentees in the United States may vote if they have returned with their families and have re¬ sided in an electoral district one month before election. Voting in elections is by ballot. No property qualification is demanded from a mem¬ ber of the Commons, nor is he limited to a resi¬ dence in the district for which he is elected. Hotel bars within the province were closed from 1 May 1918; and from 1 May 1919, no further licenses for the sale of intoxicating liquor were to be issued.

Municipal Institutions. — The municipal or¬ ganization of the province comprises townships, counties, being rural districts of no definite area, parishes, villages with a population of over 40 families, towns and cities erected by legisla¬ tive authority. No definite figure of population is requested. The townships, parishes, towns and villages are administered by a mayor and councillors; the cities by a mayor, councillors and aldermen.

Judiciary. — The judiciary of the province consists of appeal (King's Bench), superior.

circuit and district courts. The Superior Court and King's Bench judges are appointed by the governor-general in council. Appeal can be had from superior courts to King's Bench, and from King's Bench to the Supreme Court of Canada presided over by a chief justice and five associ¬ ate judges. Final appeal, except in criminal cases, lies, by leave, to the judicial committee of the Privy Council of England. Police magis¬ trates and justices of the peace, appointed by the provincial government, also have their place in the administration of justice.

Crown Lands. — The crown lands of the province not yet settled form an area of nearly 200,000,000 acres, of which about 75,000,000 are available for settlement and 7,000,000 acres have been surveyed, and are controlled by the government and administered by the minister of crown lands. They are sold at from 20 to 60 cents an acre, and the purchaser is required to take possession of the land within six months of the date of the sale, to occupy it during two years, and to fulfil various other obligations stipulated in the deed of sale.

Population. — The population of the prov¬ ince in 1911 was 2,003,232 (1916 estimate 2,309,427), almost equally divided into rural and urban, and giving an average density of 5.69 persons per square mile. Roman Catho¬ lics comprise 86 per cent of the

population, which is 80.5 per cent French and 19.5 per cent English speaking. Of the French-speaking wage-earners, 36 per cent are engaged in agri¬ culture and 24 per cent in manufacturing and mechanical industries. The numerous churches, colleges and convents of the province attest at every turn the wealth and power of the Church, and the tourist finds the whole land practically parceled out among its faithful, as far as concerns the nomenclature of the settle¬ ments and villages.

Twenty miles east of the city of Quebec, on the banks of the Saint Lawrence, is the church of Sainte Anne de Beaupre, more particularly known as La Bonne Sainte Anne, who for two centuries has won fame in Canada for miracu¬ lous cures. This historic place rests on a little plateau under the shelter of a lofty mountain of the Laurentides, and consists of a straggling street of wooden houses, with steep roofs and projecting eaves. Here one will see, on the fete of Sainte Anne and at other fixed times, a mass of people from every part of Canada, as well as from the United States. A handsome gray stone church attests the faith of the thou¬ sands who in past years have offered their sup¬ plications at the shrine of La Bonne Sainte Anne. Piles of crutches are deposited in every available corner, as so many votive offerings from the countless cripples who have been cured or relieved. The relic through which all the cures are said to be effective consists of a part of the finger-bone of Sainte Anne, which was sent in 1668 by the Chapter of Carcassone to Monseigneur de Laval.

The Country Life. — The situation of many of the villages of Quebec is exceedingly pic¬ turesque when they nestle in some nook by the side of the river or bay, or overlook from some hill a noble panorama of land and water. The spire of the stone church rises generally from the midst of the houses, always making the most conspicuous object in the surrounding

landscape. The houses are, for the most part, built of wood. The roofs are often curved, with projecting eaves, which afford a sort of veranda, under which the family sit in summer evenings. Some of the more pretentious struc¬ tures, especially the inns, have balconies run¬ ning across the upper story. Many of the barns and outhouses have thatched roofs, which are never seen in any other part of Canada. The interiors are very plainly fur¬ nished, in many cases with chairs and tables of native manufacture. A high iron stove is the most important feature of every dwelling in a country where the cold of winter is so extreme. Whitewash is freely used inside and outside, and there is, on the whole, an air of cleanliness and comfort in the humblest cottage. No class of the population of Canada is more orderly or less disposed to crime. Early mar¬ riages have always been encouraged by the priests, and large families are the rule in the villages. The temperate habits of the people make them valuable employees in mills and manufactories of all kinds, and until a recent period there was a steady exodus from the province to the manufacturing towns of New England. A large proportion of the men em¬ ployed in the lumbering industry of Canada is also drawn from the province of Quebec. In commercial and financial enterprises, however, the French Canadians cannot compete with their fellow citizens of British origin, who practically control the great commercial undertakings and banking institutions of Quebec, especially in Montreal. But they are remarkably progressing in that line. Nor, as a rule, could they compare formerly with the English population as agri¬ culturists. But they have largely improved their methods of farming, and they have estab¬ lished in every parish, butter and cheese fac¬ tories. The French population also had less enterprise and less disposition to innovations. But they do adopt new machines and improved agricultural implements like the people of the other provinces of Canada.

Literature. — In times past there was no na¬ tive literature, and little general culture, except in small select circles at Quebec and at Mon¬ treal ; but during the past half-century, with the increase of population, the establishment of colleges and universities, the dissemination throughout of classical education, and the de¬ velopment of self-government, the French Canadians have created for themselves a litera¬ ture, which shows that they inherit much of the spirituality and brilliancy of their race. The histories and poems have

attracted much at¬ tention in France, and some of their literary works have been awarded prizes by the French Academy. In history mention should be made of the names of Garneau, Ferland, Suite, Tasse, Turcotte, Dionne, Casgrain, Gosselin, Le Moine, Gagnon, Myrand, *etc.* ; in poetry, Cremazie, Chauveau, Frechette, Poisson, Le-roay, Chapman and many others; in science, Hamel, Laflamme, De Foville, *etc.* In art some progress has been made, and young men go to the Paris schools from time to time. The only sculptor of original merit that Canada has >et produced is Hebert, a native of Quebec, whose statues of eminent Canadians stand in several places. Science has not made as much progress as belles-lettres and history, though

Laval University has among its professors men who have done creditable work in mathematics, geology, chemistry and physics. In romance, however, little has been done, except by Mar-mette, Lemay and. a few others.

History. — Jacques Cartier discovered and explored the river Saint Lawrence in 1533, but it was not until 1608 that Samuel de Cham¬ plain founded the present city of Quebec, which, at the end of 12 years, had a population of only 60 persons. The Recollets were the first missionaries. The Jesuits came to the settlement in 1625, and thereafter played a leading part in its history. Montreal was founded in 1642 by Maisonneuve; but for many years as an agricultural or commercial settle¬ ment, New France, as it was called, remained a failure, its only trade being the fur trade. A change came under Louis XIV, when a systematic effort began to make the colony the starting point of a French and Catholic em¬ pire which should embrace the whole of the continent. The result of this policy was a long contest between the two races, which began in 1689 with the second advent of Count Frontenac as governor of New France, and ended in 1759 with the capture of Quebec by a British army under Wolfe. The capitulation of Montreal in 1760 completed the English con¬ quest of Canada, which, with all its de¬ pendencies, was in 1763 formally ceded to the British Crown.

The policy of the conquerors toward New France was, from the appointment of General Murray, a liberal one, and in 1774 took definite form in what was known as the Quebec Act, by which the British Parliament assured the French Canadians the free exercise of their re¬ ligion, the enjoyment of their civil rights and the protection of their own civil laws and cus¬ toms. The act also annexed larger territories to the province of Quebec, and provided for a governing

council partly composed of Catholics, and for the administration of the criminal laws as in use in England. There was, however, constant strife between the conquering and the conquered race, the object of which was to amalgamate the two races, and to put an end to it, Parliament, in 1791, divided Canada into two provinces — Lower Canada, or Quebec, for the French, and Upper Canada (now Ontario) for the British, many of whom had fled thence from the United States at the close of the Revolutionary War. Each province was to have, besides the governor who represented the Crown, a legislative council nominated by the Crown, and an assembly elected by the people for four years. But the two races were not separated by the division of the province, and in 1841, after a long and stormy agitation, a reunion of the provinces was effected under the name of the Province of Canada, and with it the establishment of responsible government.. The legislature consisted of a council and assembly, each province being represented in the assembly by 42 members, 84 in all, elected by the people; and the council numbered 20 members, appointed by the Crown. This ar¬ rangement lasted until 1867, when it gave way to a union of the provinces of British North America. The way for confederation was cleared by a convention of representatives of all the provinces, held in Quebec, in October

1864, which unanimously adopted a set of reso¬ lutions embodying the conditions on which the provinces, through their delegates, agreed to a federal union. These resolutions were duly laid before the various legislatures and adopted in the shape of addresses to the Queen, whose sanction was necessary to embody the wishes of the provinces in an imperial statute ; and in February 1867 the British North America Act was passed by Parliament. On 1 July of the same year the union of the provinces of Can¬ ada, Nova Scotia and New Brunswick was pro¬ claimed under the name of the Dominion of Canada, the names of Upper and Lower Canada being changed at the same time to Ontario and Quebec.

Adolphe B. Routhier,

President of the Court of Admiralty for the Province of Quebec.

QUEBEC, founded by Samuel Champlain iii 1608, is the seat of the Provincial Govern¬ ment. It is situated on the northeastern end of a narrow promontory, which is bounded to the southward by the river Saint Lawrence, and to the northward by the valley of the Saint Charles. The cliffs on the Saint Law¬ rence side run up the river for many miles, and average between 200 and 300 feet in height. The earliest buildings were constructed along the narrow shore at the foot of Cape Diamond, and gradually extended to what is now the lower town. In the course of time Champlain transferred his residence to the summit of the rock, and soon other buildings arose which marked the beginnings of the upper town. In a few places in the lower town a part of the river bed has been re¬ claimed, particularly near the old palace of the Intendants ; but with these exceptions the streets follow the original plan. Winding roads, cut out of the rock, and flights of steps, lead from the lower to the upper town, the streets of which bear the names originally given to them. Quebec claims the distinction of being the one walled city of the north, and although the march of progress has introduced many innovations, it has been powerless to destroy the impress of the founder. At the time of the death of Champlain, in 1635, the entire population of Quebec was only 80 per¬ sons. But shortly after, as a result of the cir¬ culation of the ˆRelations® of the

Jesuits in the mother country, an effort was made to col¬ onize New France. The first fruits of this movement were the establishment of the Ursuline Convent and the Hotel Dieu, in 1639. These two institutions, which have ever since exercised a beneficent influence, were founded by the zeal of two noble women, Madame de la Peltrie and Madame d'Aiguillon, whose names are consecrated in the pages of Canadian his¬ tory. The Ursuline Convent has continued to be the centre of education for the girls of Que¬ bec, both French and English. In this institu¬ tion, the Old World and the New run side by side. The rule of the order is the same as in 1639. In the nave of the convent chapel repose the remains of the Marquis de Montcalm; and in the Chapel of the Saints, through all the startling changes of two centuries, the Votive Lamp, first trimmed by Marie Repentigny in the days of the French regime, is still kept steadfastly burning. The Seminary of Quebec

founded in 1668, is another institution in which the customs of the Old World are preserved. From the Seminary sprang the famous Laval University, the chief seat of learning in the province for the French population.

From the earliest times Quebec has been fortified. In 1535, Jacques Cartier built a rude fort at the mouth of the river Lairet, and in 1608 the ˆHabitation** constructed near the site of the present Champlain Market, was mounted with cannon to protect the inhabitants against the incursions of the Indians. Twenty years after a fort was erected on the crest of the rock, which served as a residence for the in¬ vader Kertk until 1632. Frontenac put into execution the first scheme for enclosing the town with a wall, but like all the French works of defense, the profit of the contractor was of more importance than the solidity of the work¬ manship. In 1720, a new scheme was under¬ taken. Large sums of money were expended from year to year, but when Wolfe came before Quebec in 1759, the foot of rotten walls could be seen 500 yards off. After the battle of the Plains, temporary works were constructed in front of the old walls. In 1783 a temporary citadel was commenced beyond the line of forti¬ fication, and the remains of these works, still visible, are erroneously referred to in local guide books and maps, as of French origin. In 1823 the British government undertook a com¬ prehensive scheme of defense, the main parts of which are in excellent repair to-day. The picturesque old gates have been demolished, and in two instances, arches in keeping with the walls have replaced them, and the Martello Towers, overlooking the Plains of Abraham, stand as originally built. The

Fortress of Que¬ bec comprises the citadel on Cape Diamond, where the governor general's quarters are sit¬ uated, the town lines, and the forts on Levis Heights. The citadel is garrisoned by the Royal Canadian artillery.

Quebec has nine parish churches belonging to the Catholics, four others in the charge of chaplains, and 13 chapels attached to re¬ ligious communities, open to the public. The Church of England is represented by the Eng¬ lish Cathedral and six churches, while the Methodists, the Presbyterians and the Baptists have each separate places of worship. The first parish church was erected in 1633 under the name of Notre Dame de la Recouvrance; but it was destroyed in 1640. In 1647 the French cathedral was commenced under the name of Notre Dame de la Paix, in commem¬ oration of the peace concluded with the Iro¬ quois. It was opened in 1650. The pillars of the present church date from 1647, the towers from 1684 and the remainder of the building from 1745. The paintings in the cathedral brought from France are very valuable and there are many costly vestments of an early date. Notre Dame des Victoires, in the lower town, was commenced in 1688 under the name of Notre Dame de la Victoire. After Phips besieged Quebec in 1690, a pilgrimage to the church was organized, and in 1711, on the de¬ struction of Walker's fleet off Egg Island, the name of Notre Dame de la Victoire was changed to Notre Dame des Victoires. During the siege of Quebec in 1759, only the walls were left standing. Of the modern Catholic churches the Franciscan's is the most beautiful. It was

built for the perpetual adoration of the Blessed Sacrament.

After the Treaty of Paris in 1763, English services were held by the Protestants in the church of the Recollets. The drum was beaten at half past 10 for the Mass of the Recollets, at the conclusion of which the fathers tolled the bell for the English service. The English cathedral, situated on the site of the Recollet Church, was commenced in 1804. The paint¬ ings in the archbishop's palace, and in the Ursuline Convent and Laval University, are amongst the most valuable in Canada. In the governor's garden is a monument which always appeals to strangers. It is a plain granite col¬ umn. On one side it bears the name of "Wolfe,® and on the other the name of "Mont¬ calm,)} and on the base this simple inscription :

Mortem virtus communem Famam Historia

Monumentum Posteritas Dedit.

It is the only instance on this continent of a common monument to the victor and the vanQuished. Near the jail is the monument to Wolfe, with its inscription “Here died Wolfe Victorious,® and a little farther on, along the Sainte Foy Road, is the column to the memory of the French who fell in their endeavor to re¬ take Quebec in 1760. The name of the English general, Murray, is also prominent on this col¬ umn. These monuments of stone are more eloquent than words of the harmony existing between two races, mingling with each other, and still preserving their own laws, their lan¬ guage and their religion. In the upper and lower town markets, may be witnessed scenes typical of French Canadian habitant life, and even in the streets through which the electric cars run we may trace, at all times, the features of the French regime. The boys of the semi¬ nary still wear the long blue coat piped with white, with green sashes, as they did 200 years ago. The nuns passing to and fro in their pre¬ scribed costumes; the priests in their cassocks, the habitants in their old-fashioned vehicles or rude sleighs, look out of place in the 20th century; and yet the people of Quebec would not welcome any change. The city, however, keeps pace with the times in other respects. The streets are well paved, well lighted, always clean. All the waste places possible are con¬ verted into small gardens, and there is an ex¬ cellent civic administration. The hotel accom¬ modation, especially since the construction of the Chateau Frontenac, is the best in Canada. Laval University has a library of 125,000 vol-l,mes._ The Parliament buildings and grounds, the city hall, the courthouse and other public buildings, are better than in the larger cities of Canada, and yet there is still so much which belongs to a by-gone age. The tercentenary of the founding of the city was fittingly celebrated in 1908. According to the census of 1911, the population of Quebec was 78,710 (estimate of 1916, 110,000), a very large proportion of which is composed of French.

Most of the English reside in the upper town, although there is no marked division. The Grande Allee is the principal thorough¬ fare, and contains many fine dwellings. At one time the lumber trade flourished, and as large fortunes were amassed the wealthy mer¬ chants and traders built country seats along the

Sillery.Road ; but they are now mostly deserted. Shipbuilding was also a great industry for many years, as very large vessels were built there, but nothing now remains. The leather and shoe trade still give employment to thou¬ sands. The commercial and financial institu¬ tions are controlled to a large extent by the English. The lower town is principally devoted to business, and the suburbs of Saint Roch and Saint Sauveur to manufacture and the dwell¬ ings of the working classes. The small arms and the ammunition for the militia are manu¬ factured in Quebec. The port of Quebec is always active in season, and it is the landing place of immigrants; but Montreal has ab¬ sorbed a great deal of the commerce. The bridge which is being built across the Saint Lawrence will bring the grain from all quarters to Quebec, and its future commercial life may assume large proportions. As the seat of gov¬ ernment, it. will always retain a prominent place, and in its immediate vicinity there are so many places of picturesque and historic in¬ terest : Wolfe's Cove; the place where the gal¬ lant Montgomery fell in 1775; the Heights of Levis; the Island of Orleans; the village of Beauport, with Montcalm's headquarters ; In¬ dian Lorette; the falls of Montmorency, with Wolfes house; the Shrine of Sainte Anne, and the numerous places which may be reached by electric railway, the Canadian Pacific Railway, the Grand Trunk Railway, the Intercolonial Railway,, the Great Northern, the Quebec and Lake Saint John, and the boats of the Canada Steamship Lines. But the perpetual charm of Quebec, apart from its magnificent situation, lies in the fact that it is the cradle of New France; that upon its lofty rock a drama was u Uˆ*t which decided the fate of a continent ; that from its institutions, scarcely altered by the flight of three centuries, men went forth to rescue for civilization an untamed wilderness and paved the way for the great Republic of the United States.

A. G. Doughty,

Author of < Quebec Under Two Flags .>

QUEBEC, Battle of. See Colonial Wars in America.

QUEBEC, Siege of, in the American Revo¬ lution. After Ethan Allen and Benedict Arnold (qq.v.) had captured Ticonderoga and Crown Point (qq.v.), Continental Congress, at Washington s earnest

solicitation, decided to con¬ quer Canada as a measure of self-defense One expedition under Gen. Philip Schuyler (q.v.) was to proceed northward by way of Lake Champlain and another under Arnold through Maine, both converging on Quebec. Schuyler sent Richard Montgomery (q.v.) m advance to reduce Saint John's, ' about 150 miles north of Ticonderoga, while he returned to Albany to push troops to the front. On 13 Oct. 1775 a small British fort at Chamblet was captured but to offset this Sir Guy Carleton

ˆq'Vi 'a ,Tntlsh commander at Montreal, cap¬ tured Allen and a band of 80 men who, without consulting Montgomery, had attempted to sur¬ prise the garrison at Montreal. Allen was sent in irons to England. After an abortive at¬ tempt by Carleton to drive off the invaders, Saint John's surrendered 1 November, where¬ upon Carleton abandoned Montreal and fled to Quebec, Montgomery occupying Montreal 13

QUEBEC, CANADA

1 Parliament Buildings

2 City of Quebec, from Levis

QUEBEC, CANADA

1 St. Louis Gate and the Grand Allee

2 The Chateaux Frontenac, from Levis

November and later following Carleton with about 300 men.

Meanwhile, with 1,050 troops, Arnold had begun his march, reaching Point Levi, opposite Quebec, 9 Nov. 1775. ‘On the 13th he crossed the river with his army, which had been reduced to 600 troops, occupied the heights near the Plains of Abraham, and attempted to surprise the city, but finding the garrison prepared for defense, retired to await Montgomery’s arrival which occurred 1 December. The combined troops numbered 900 and, owing to the rigors of the winter march, were in an emaciated condition. For three weeks the Americans bombarded the city ramparts without effect and Montgomery decided to attempt the reduction by assault. Dividing the force, the two com¬ manders made a simultaneous assault from different points on the night of 31 Dec. 1775. Montgomery attacked the lower town but in attempting to storm a blockhouse was killed with several others and his troops retreated. Arnold assaulted the town from his side but his leg was shattered by a ball and the com¬ mand devolved upon Capt. Daniel Morgan (q.v.) who captured the first and second bar¬ riers. But when Montgomery had been re¬ pulsed, the troops from that quarter attacked Morgan on the rear and finally, after an obsti¬ nate fight, he surrendered, the prisoners num¬ bering 426. Arnold escaped capture and, col¬ lecting his dispirited troops, maintained an im¬ perfect blockade of the city until the spring of 1776, when he was succeeded by Gen. David Wooster (q.v.), who made several ineffectual attempts to capture the city. A large body of British troops arrived from England and the Americans were compelled to fall back on Montreal; finally on 18 June they evacuated the province, going to Crown Point. (See Champlain, Lake, Battle of). Consult Henry, John J., (The Siege of Quebec* ; Parker, Gil¬ bert, (01d Quebec/ pp. 342-363; Bradley, Ar¬ thur G., vThe Making of Canada/ pp. 89-111; Carrington, H. B., < Battles of the Revolu¬ tion/ p. 120 et seq. ; Codman, John, (Arnold’s Expedition to Quebec) ; Smith, Justin H., (Arnold’s March from Cambridge to Quebec* ; Coffin, C. C., (The Province of Quebec and the Early American Revolution ; Arnold, I. N., <Life of Arnold*; Thayer, ‘Journal of the Expedition to Quebec* (ed. Stone) ; Sparks, fared, Correspondence of the Revolution/ Vol. I; Lossing, B. J., ‘Field-Book of the Revo¬ lution/ Vol. I; Force, Peter, (American Ar¬ chives/ 4th series, Vols. III-VI ; 5th series, Vol. I; Massachusetts Historical Collection *2d series, Vol. II, p. 227 et seq.; Sparks, ‘Life of Arnold* Chaps. III-IV ; Fisher, S. G., (Struggle for American Independence/ Vol. I, pp. 394-424; Smith, Justin H., ‘Our Strug¬ gle for the Fourteenth Colony)

; Wiley and Rines, ‘The United States/ Vol. II, pp. 387-397.

QUEBEC ACT, the administrative measure passed by the British Parliament in 1774, for the purpose of adding the regions extending to the Ohio and Mississippi over which the French had exercised authority, to the province of Quebec, which had been limited by the Proc¬ lamation of 1763 to an area of about 100,000 square miles along the central Saint Lawrence. The act established also the body of the French customary law as the permanent civil code of

the region, the introduction of English civil law among the French-speaking inhabitants having been found impracticable; it admitted also to a partial franchise the Roman Catholic popula¬ tion, guaranteeing them freedom of public wor¬ ship, confirming them in the possession of their ancient churches and revenues, but withholding from them representative institutions, author¬ ity over this vast territory being vested in a council appointed by the executive power of Great Britain.

The act, which had for its main motives the welfare of the French Canadians and the secur¬ ity and unhampered progress of the colonies and of colonial trade, was viewed with indifference by the Canadians, was unpopular in England, aroused the indignation of the older American colonies and had considerable influence in di¬ recting the early course of the Revolution. To it the Declaration of Independence refers as follows: ((Abolishing the free system of Eng¬ lish laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries so as to render it at once an example and fit instrument for introducing the same absolute rule in these colonies.® For opposing views on the measure consult Coffin, ‘The Quebec Act and the American Revolution in The Yale Review (1895) ; Bancroft, ‘History of the United States/ Vol. IV, chap. V (1884); Hart, ‘The Quebec Act 1774* (1891); and McArthur, D., (Canada under the Quebec Act* in Canada and Its Provinces (Vol. Ill,

1914).

QUEBRACHO, ke-bra’cho, the name given to several trees of different genera, but with similar qualities, indigenous to South America, valuable alike for their wood and their bark. The red quebracho (

Loxopterygium lorentii, family Anacardiacece) is very hard, but splits easily. The bark and wood are used in tanning. The white quebracho (Aspidosperma que¬ bracho) is used for wood-engraving. Its bark contains an alkaloid (quebrachin) and is used therapeutically as a remedy for asthma, being employed as a decoction and a tincture. Its action is to lower the action of the heart with¬ out harmful result.

QUECHUA, ka'chwa. See Quichua.

QUEEN, the wife of a king, or the female sovereign of a kingdom. In Britain she is either merely a queen-consort, the king's wife, and his subject, not his equal, on an equal foot¬ ing, save as provided by law, with the rest of his subjects; or she is a queen-regent , regnant, or sovereign, holding the crown in her own right, as did Elizabeth or Victoria. The queen-doiu- ager, widow of the king, retains most of the privileges pertaining to a queen-consort. It is high treason to compass or imagine the death of a queen-consort, or to violate her person ; and if the consort is consenting, she is equally guilty. Under the constitution of Sweden, Belgium and other European countries a woman cannot be queen-)regent.

QUEEN ADELAIDE ARCHIPELAGO,

belonging to Chile, at the west entrance to the Strait of Magellan ; separated from the main¬ land by Smyth Channel. The islands are moun¬ tainous and present rugged faces to the sea. The summits of some are snow capped during the year ; but the vegetation at the base it varied and for a short season luxuriant.

QUEEN ANNE STYLE. See Renais¬ sance.

QUEEN ANNE'S BOUNTY, a fund es¬ tablished for the enlargement of the incomes of the holders of the poorer incumbencies in the Established Church of England, and to aid in¬ cumbents in rebuilding parsonages by granting advances of money. It was created by royal charter of Queen Anne, confirmed by act of the parliament, by which

the first fruits (the whole of the first year's profits) of all spiritual prefer¬ ments, and the 10th part of the annual profits of the same — both of which, prior to the reign of Henry VIII, had been paid into the papal treasury, but were then annexed to the crown — are set aside to form this perpetual fund. The fund is administered by a board of governors consisting of high ecclesiastical dignitaries, the speaker of the house of commons, privy coun¬ cillors, chancellors of the universities, *etc.* It amounts to over $35,000,000, and the annual grants and benefactions to nearly $300,000. To encourage private benefaction, the board of governors may give $1,000 to incumbencies of not exceeding $225 a year where an equal or greater sum is voluntarily contributed.

QUEEN ANNE'S POCKET-MELON.

See Melons.

QUEEN ANNE'S WAR. See Colonial Wars in America.

QUEEN OF THE ANTILLES, a name given to the island of Cuba on account of its size and superior natural advantages.

QUEEN CHARLOTTE ISLANDS, a

group off the coast of Canada, belonging to the Province of British Columbia; about 100 miles from the mainland and 135 miles northwest of Vancouver Island. Area, 5,100 square miles. The largest Islands are Graham and Moresby, each about 160 miles long and 70 miles wide. The surface of Graham is rolling land ; but the other islands are rugged and mountainous. Dense forests and a luxuriant growth of small plants cover the islands. Copper, anthracite coal, iron ore and gold-bearing quartz are found here; fishing is the chief occupation. The in¬ habitants, believed to number under 1,000, are mostly Indians.

QUEEN CHARLOTTE SOUND, the

body of water which separates Vancouver Island (q.v.), on the north, from the mainland of Canada.

QUEEN CITY, or QUEEN OF THE WEST, names applied to Cincinnati, Ohio, on account of its commercial importance, at a time when it was larger than Chicago and Saint Louis.

QUEEN CITY OF THE GOLDEN GATE, a name given to San Francisco on account of the name of the strait north of the city, and also that the

city was practically the gate or entrance to the gold fields of California.

QUEEN CITY OF THE LAKES, a

name given to Buffalo, N. Y., on account of its commercial importance and its commanding position on the Great Lakes.

QUEEN ESTHER. See Montour, Esther.

QUEEN MAB. Shelley's (Queen Mab) was written in the months of quixotic enthusi¬ asm following the youthful poet's first marriage.

and was printed for private distribution in 1813. When in 1821 a pirated edition appeared, Shelley characterized the piece as <(villainous trash.® It is indeed tediously long, vapid and visionary, 'but it possesses, in addition to its considerable metrical interest, a good deal of value as a mirror of the author's mind at 18 and as evidence of the charm exerted upon sensitive spirits of the age by the radical philos¬ ophy of the 18th century. Copious argumenta¬ tive notes indicate as sources of inspiration such writers as Godwin, Gibbon, Hume, Voltaire, Rousseau, and LocJke. In his survey of history Shelley attributes most of the ills which man¬ kind has suffered to false religion, monarchical institutions, marriage, customs, conventions and the eating of meat. In this sanguine vision of the future he represents a world regenerated through the emancipation of reason and passion, which we are to believe will lead to the aboli¬ tion of priests, kings, prisons and marriage vows and to the adoption of a vegetable diet. There is little or no common sense in the com¬ position but an abundance of intense young heady ardor for reforming society by that short method dear to the Godwinian idealist — let¬ ting every one do as he pleases, a method which in practice requires resort to the guillo¬ tine.

Stuart P. Sherman.

Q U E E N-O F-T H E-M E A D O W, or QUAKER-LADY, a spiraea. See Meadow¬ sweet.

QUEEN OF THE PLAINS, a name ap¬ plied to Denver, Colo., which rests on an emi¬ nence on the western border of the Great Plain and seems to overlook the vast region of plain-land stretching off to the east.

QUEEN’S BENCH. See Court.

QUEENS’ COLLEGJE, Cambridge, Eng¬ land, founded in 1448 by Margaret of Anjou, queen of Henry VI, and refounded in 1465 by Elizabeth, queen of Edward IV, is administered by a president and 13 foundation fellows. Richard Andrew donated the site and Dokett, the first master, secured the endowment. A fixed proportion of the revenues of the college is paid to a scholarship fund. There are nine church livings in the gift of the college and one in that of the president. There are in! addition four exhibitions named after their founders, and the president distributes 8650 per annum in grants to deserving students of limited means. A.bout 200 students are enrolled. The college buildings are among the most interest¬ ing in the university and include four courts of small size. In a tower in the pump-court are the rooms inhabited by Erasmus (1506). There are about 30,000 volumes in the library. John Fisher, Thomas Fuller and Bishop Pearson were members of the college. Consult Gray, J. H., (Queens’ College> (London 1899).

QUEEN’S COLLEGE, Oxford, England, was founded in 1340 by Robert de Eglesfield, chaplain to Philippa, queen of Edward III, for a provost and 12 scholars. The college now consists of a provost, from 14 to 16 fellows, about 25 scholars and two Bible-clerks. Six of the scholarships, annual value $400, are called Eglesfield scholarships, and are awarded to natives, of Cumberland and Westmoreland. There is also a scholarship called the Jodreli

scholarship, of the annual value of $450 and tenable for four years; and a considerable num¬ ber of other exhibitions. The college presents to 23 church-livings. The college buildings are of the 17th century; the hall was designed by Sir Christopher Wren. Wvclif, Edward the Black Prince, Henry V, Addison, Bentham, Jeffrey, Mitford and Wycherley are numbered among its distinguished alumni. See Oxford University.

QUEEN’S COLLEGES, Ireland, until 1909 the names of three

institutions of higher education situated at Belfast, Cork and Galway. They were chartered in 1849 in pursuance of an act of Parliament passed in 1845, granting $500,000 out of the consolidated fund for their establishment. The colleges were opened in 1850, being connected with Queen's University, then also instituted as a degree-conferring body. The corporate body of each college con¬ sisted of the president and professors, and the general government and administration was vested in a council consisting of the president and six members, elected by the professors from among themselves. In 1909 the Belfast College received a separate charter as Belfast University, while those at Cork and Galway became constituent colleges of the new National University (q.v.).

QUEEN'S METAL. See Britannia

Metal.

QUEEN'S PIGEON, a magnificent ground pigeon (Goura Victories) , inhabiting the islands of the Indian Ocean, named after Queen Vic¬ toria. See Goura.

QUEEN'S UNIVERSITY. Queen's Uni¬ versity, situated at Kingston on Lake Ontario, is one of the largest universities of Canada. It has faculties of arts, applied science, medicine, education and theology; and holds a yearly summer school for instruction in certain sub¬ jects in the arts and education courses. De¬ grees in agriculture are granted, but the final two years in this course must be taken at the Ontario Agricultural College at Guelph. The university extension department provides for instruction extramurally in the arts course, but degrees are not granted unless a portion of the course is taken in attendance.

The university was incorporated by royal charter on 16 Oct. 1841, and on 2 March 1842 the first session opened with 11 students. Dr. Thomas Liddell, formerE minister of Lady Glenorchy's Church in Edinburgh, was the Urst principal. The institution was modeled on the democratic lines of the Scottish universities with a view to bringing higher education within the reach of the humblest aspirant. One of the pressing reasons for its establishment was to provide for the education of the Presbyterian clergy in Canada. As no religious tests were imposed on students, the denominational char¬ acter of the institution faded into the back¬ ground, and, although the university was nominally under the aegis of the Presbyterian Church, its real function became that of a great national university, drawing students of all creeds from every province of the Do¬ minion. In 1911 the nominal

relationship with the Church, which prevented the obtaining of government assistance, was formally severed by the Presbyterian General Assembly, and in

April 1912 constitutional changes effected by an act of the Dominion Parliament made the university undenominational in form as it had long been in reality. The divinity faculty was federally incorporated the same year under the style of Queen's Theological College. It is still controlled by the Presbyterian Church, but its degrees are granted by the university, to which it is affiliated. The history of the early years of Queen's is the story of a continual struggle against straitened circumstances. In 1867 the grant from the provincial government was withdrawn and the crisis came in the following year when the failure of the Com¬ mercial Bank swept away the greater portion of the endowment fund. The situation, how¬ ever, was faced with determination. Rev. Wil¬ liam Snodgrass, who was then principal, at once began an energetic canvass for a new endowment fund. His efforts reulted in the collection of $113,000 and the crisis was safely passed.

Snodgrass was succeeded in 1877 by George Monro Grant, a figure of outstanding person¬ ality whose efforts made Queen's a university of the first rank. He was a man of tremendous energy, sound in judgment and utterly fearless in the expression of his opinion on public ques¬ tions. Endowed with the faculty of inspiring his associates with his own enthusiasm he soon attracted to Queen's, mainly from the univer¬ sities of Scotland and England, a number of young men of energy and ability and so im¬ bued them with the "Queen's spirit^ of service and self-sacrifice that, despite tempting offers from larger institutions of learning, they re¬ mained with Queen's to work out her and their destiny. Grant's principalship was a period of great expansion. The country was canvassed from the Atlantic to the Pacific for funds, new chairs were founded, new buildings erected and the movement began to sever the existing rela¬ tions with the Presbyterian Church. On his death in 1902 the institution had become one of the largest and most influential in Canada, and he himself was ranked among the foremost Canadian publicists.

The university has remained true to the democratic principles on which it was founded. The Scottish plan of allowing students a wide choice of subjects within certain prescribed lim¬ its has been followed. Students and professors are in close personal touch with one another, the seminary system being adopted in the honor classes.

There are no Greek letter or other societies making for class distinctions between the students. Discipline is maintained by the students themselves under sanction of the uni¬ versity authorities, and students' courts having the power to pass sentence of expulsion are held annually in each faculty to discipline offenders.

The university has been a pioneer in the movement for coeducation. In 1870 classes in English and other subjects were formed for women and in 1878 courses leading to a degree were thrown open to them. In 1880 coeduca¬ tion was extended to the medical course, whilst in 1883 a separate women's medical college was opened in affiliation to the university. This, however, was closed the following year as similar facilities were then offered to women elsewhere in Canada. The university has a residence for women.

A university extension department extends the benefits of university instruction to the people at large. Portions of the arts courses may be taken extramurally and the services of the professors are available for popular lec¬ tures. Research and practical work of the faculty of applied science in mining and metal¬ lurgy has done much to further mining develop¬ ment in Canada, especially that of the Cobalt district. In 1914 the department of political and economic science in conjunction with the Canadian Bankers' Association instituted a course in banking designed mainly to assist men already in the service of the Canadian chartered banks. This course is divided into two parts, the associates' course, in which the university merely acts as examiner for the Canadian Bankers' Association, and the Fellows' course, in which it supplies tuition by correspondence as well. In 1914 the registration in these courses was 680 and 375 respectively.

Physical culture classes under medical super¬ vision are compulsory for all first-year students except those taking military training. Since 1910 Queen's has maintained as part of the Canadian militia the Fifth Company of Cana¬ dian Field Engineers (Queen's). On the out¬ break of the Great War in 1914 the services of these student-engineers were at once requisi¬ tioned to lay out Valcartier Camp, near Quebec, where the First Canadian Expeditionary Force of 33,000 men was concentrated. This work finished, the majority of the company proceeded to France for service on the firing line. The university also supplied the imperial govern¬ ment with No. 5 Stationary Hospital (Queen's) which served in the Mediterranean field of operations at Cairo and later in France. In addi¬ tion two batteries of artillery the 46th and the 50th, were recruited from Queen's men. In all the university furnished for active service 897 officers and men, of whom 664 were for service overseas. The university buildings overlook Lake Ontario and are built of Kingston lime¬ stone. They consist of the Theological build¬ ing, the new Arts building, the gift of the city of Kingston ; Grant Convocation Hall, erected by the students in honor of the late Principal Grant; Ontario Hall (physics, mineralogy and geology) ; Fleming Hall (mechanical and elec¬ trical engineering) ; Gordon Hall (chemistry) ; Nicol Hall (metallurgy) ; the Medical building, the Medical Laboratories building, the gymna¬ sium and the observatory. The general univer¬ sity library, which contains 70,000 volumes and is particularly rich in original documents, pam¬ phlets and reports bearing on Canadian history, is housed in the Theological

buildine, but a new library building the cost of which was met by a donation of $150,000 from the chancellor, Dr. James Douglas, has been erected.

The faculty of applied science was incorpo¬ rated in 1893 as the School of Mining, in affilia¬ tion to the university. When the latter in 1912 threw off the ties connecting it with the Presby¬ terian Church, steps, concluded in 1916, were taken to amalgamate the School of Mining with the university. The faculty of applied science provides instruction leading to the degrees of B.Sc., B.Sc. (Agr.), M.Sc. and D.Sc. Four-year graduate courses are offered in mining and metallurgical engineering, analytical and applied chemistry, mineralogy, geology, chem¬

ical and metallurgical engineering, civil engi¬ neering, mechanical engineering and electrical engineering. The faculty of arts has a four-year undergraduate course and grants the de¬ grees of B.A., M.A. and Ph.D. The degrees of B.Paed. and D.Paed. are conferred by the faculty of education, whilst that of B.D. is given by the Theological College. The hon¬ orary degrees of LL.D. and D.D. are given by the university. The faculty of medicine grants the degrees of M.D., C.M., D.Sc. and D.Ph. The first classes were held in 1854. In 1866 it was separated from the university and con¬ ducted under the name of the Royal College of Physicians and Surgeons at Kingston, but it again became an integral part of the university system in 1892. Clinical work is provided in the Kingston General Hospital, the Hotel Dieu, Rockwood Hospital for the Insane and the Oliver Mowat Hospital for Tuberculosis.

Queen's has an endowment fund f $750,000 and an annual revenue from all sources of ap¬ proximately $300,000. The administration of .the university is vested in the board of trustees, the university council and the senate. The board of trustees consists of the chancellor, the principal and the rector, as ex-officio members, representatives from the university council, the benefactors, the graduates and co-operative members; and has charge of the external ad¬ ministration of the university including the finances. The senate consists of the principal, the vice-principal, the principal of Queen's Theological College, the deans of the several faculties and one or two professors elected from each faculty. It has to do with all matters of an academic nature, including instruction. Faculty boards consisting of the teaching staffs of the various faculties relieve it of much de¬ tail work. The university council is an ad¬ visory body, made up of the chancellor, the trustees,

the senate and an equal number of members elected by the graduates. It elects the chancellor, except when two or more can¬ didates are nominated, in which event he is appointed by the alumni and the registered graduates. He is the highest officer of the university and as such presides at convocation, the meetings of the university council and statu¬ tory meetings of the senate. See Canada — Higher Education.

QUEENSBERRY, John Sholto Douglas,

8th Marquis of, English sporting character : b. England, 20 July 1844; d. London, 31 Jan. 1900. He served in the navy when a youth, and in the army from 1859 to 1864. His life was marked by much eccentricity. He was one of the founders of the Amateur Athletic Club in 1860 and was a recognized authority on boxing and part author in 1867 of the prize¬ ring rules which bear his name. He sat in the House of Lords as a Scottish representative peer (1872-80). In 1881 he published (The Spirit of the Matterhorn,* a meditation in blank verse. He also came into prominence as a sup¬ porter of secularism, and as a defender of Charles Bradlaugh (q.v.), in 1882 creating a scene in a London theatre by rising in his seat and denouncing as <(an abominable caricature" the imaginary free-thinker in Tennyson's (Promise of May.* He was instrumental in effecting the imprisonment of Oscar Wilde (q.v.) in 1895, by defending the libel action

brought against him, on the grounds that what he had published was ˆjustifiable and for the public benefit.®

QUEENSBERRY, William Douglas, 4th

Duke of, British sportsman: b. 1724; d. Lon¬ don, England, 23 Dec 1810. He was devoted to horse-racing and was familiarly known as ((01d Q.® He was vice-admiral of Scotland in 1767— 76 and was then first lord of the police until the office was abolished in 1782. He succeeded to the dukedom in 1778 and was created a British peer in 1786. In 1789 he was removed from his office of gentleman of the

bedchamber and held no further office. He was notorious for his excesses and was satirized by Robert Burns in (The Laddies by the Banks o' Nith,* and in an (Epistle to Mr. Graham of Fintrie.* Words¬ worth addressed him in a sonnet as <(Degenerate Douglas,® and he was the original of the Earl of March in Thackeray's (Virginians.*

QUEENSBERRY PLOT, a presumed Scottish Jacobite conspiracy, so called owing to the connivance, in 1703, of the Proto-rebel James Douglas, second duke of Queensberry, with the intrigues of Simon Fraser, Lord Lovat (q.v.), to involve their common enemy, the Duke of Atholl, in a supposed conspiracy against Queen Anne. Atholl discovered the sham plot and re¬ vealed it to the queen. Queensberry, who had been a tool of Fraser, was compelled in conse¬ quence to resign his offices.

QUEENSLAND, Australia, a state of the commonwealth, prior to 1901 a colony. It oc¬ cupies the northeastern portion of the continent, north of New South Wales and South Aus¬ tralia, and east of the latter. The land bounda¬ ries are mostly artificial, the meridians of 138° and 141° east and the parallels of 29° and 26° south ; on the east it has the Pacific, on the north the Gulf of Carpentaria. The most northern part of it, forming York Peninsula, extends to Torres Strait, and a considerable portion is within the tropics. It has an area of about 670,500 square miles, and is divided into 12 large districts (besides smaller divisions) namely, Moreton, Darling Downs, Burnett, Port Curtis, Maranoa, Leichhardt, Kennedy, Mitchell, Warrego, Gregory, Burke and Cook. Besides the capital of the state, Brisbane, the other important towns are Ips¬ wich, Rockhampton, Toowoomba, Townsville, Mackay, Maryborough, Gympie, Bundaberg, Charters Towers, Normanton, Cooktown and Somerset.

Topography. — A series of parallel ranges of mountains traverses the state from north to south near the coast, among the numerous local names being Cook Range, Razorback Range, Dawes Range and Glasshouse Mountains. The Dividing and M'Pherson ranges run from the head of the Dumaresq River in the south eastward to the coast. There is a long range in the interior running east and west and forming a watershed between rivers flowing north and those flowing south. The peak of highest ele¬ vation is Wooroonooran in a spur of the Coast Range known as the Bellenden Ker Range. Its elevation is 5,400 feet. The coast which ex¬ tends for some 2,250 miles, is indented with numerous inlets, bays and harbors, some of the chief being Moreton Bay, Hervev Bay, Port Curtis, Keppel Bay, Broad Sound, Repulse Bay, Halifax Bay, Rockingham Bay, Princess Char-t

lotte Bay. Among the numerous islands along the coast are Stradbroke, Moreton and Bribie, at Moreton Bay; Fraser or Great Sandy Island, Curtis, Whitsunday, Hinchinbrook, all off the east coast; Prince of Wales, Banks, Thursday and others in Torres Strait; and the Wellesley Islands, in the Gulf of Carpentaria. Parallel to the east coast and at no great distance runs the Great Barrier Reef.

Hydrography. — There are four great river-systems : (1) Rivers draining to the Pacific Coast, the chief being the Burnett, the Fitzroy, the Burdekin and the Brisbane, the last entering Moreton Bay and having Brisbane, the capital, near its mouth ; (2) those draining to the Dar¬ ling, comprising the Macintyre, the Condamine or Balonne and the Warrego; (3) those drain¬ ing to the Gulf of Carpentaria, among them be¬ ing the Flinders, the Leichhardt, the Albert, the Nicholson, the Gilbert, the Mitchell ; (4) those flowing into the interior, the chief being the Victoria or Barcoo, which enters Lake Eyre in South Australia as Cooper's Creek, the Herbert, and the Diamantina or Mueller.

Geology and Mineral Resources. — The Cretaceous system is extensively developed in the west and northwest, covering an area of about 200,000 square miles. Tertiary strata occur along the coast of the Gulf of Carpentaria and elsewhere, and occupy a considerable area. The Desert or Eolian Sandstone, which renders extensive tracts barren and almost uninhabitable, is variously classed as Upper Cretaceous or Tertiary. Palaeozoic formations also cover a large part of the country, especially along the eastern coast. About 14,000 square miles are Carboniferous, and some 40,000 of Devonian age, and the Cambrian and Silurian also occur. Mesozoic formations older than the Cretaceous are well developed in some places. Granitic rocks are very extensively developed in the east coast districts and they have been estimated to occupy about 100,000 square miles. More than 30,000 square miles are covered by volcanic rocks. Gold was discovered about 1858, and there are now more than 25 gold-fields in the state, among them being Gympie (near Bris¬ bane), Charters Towers (on the Burdekin), Cape River, Croydon, Cloncurry and Jordan Creek. The production of 1915 is valued at £80,436,391. Other minerals of importance are copper, tin and coal, but antimony, silver, lead, bismuth, manganese, plumbago, asbestos and precious stones are also obtained. Bluestone, limestone, freestone, granite and other rocks are quarried. The coal production in 1915 amounted to 1,024,273 tons.

Climate. — The climate is healthful and the temperature comparatively equable. The mean temperature at Brisbane is 69°, the extreme range being from 35° to 106°. In the more northern parts the climate is tropical. The rainfall in the interior is scanty and variable; the mean at Brisbane is about 35 inches. In some parts it is now supplemented by means of artesian wells.

Forestry, Fauna, *etc.* — The state possesses various kinds of valuable timber, such as the red cedar, the Moreton Bay pine, the cypress pine and several species of eucalyptus. Some of the grasses are valuable as fodder plants. There are several good indigenous fruits. The animals and plants are similar to those of the

rest of Australia. Crocodiles are found in some of the northern rivers. Pearl-fishing is exten¬ sively carried on in the extreme north, and the beche-de-mer, dugong and other fisheries are also of some importance.

Agriculture.— The soil and climate are suited for the production of all the ordinary cereals, as well as maize, tobacco, coffee, sugar, cotton and other plants. Maize is more gen¬ erally cultivated than any other cereal crop. The next crop in point of importance is sugar. All kinds of semi-tropical and English fruits are abundantly grown. Sheep-farming is the chief industry and cattle-breeding is also important.

Commerce, Manufactures, Communica¬ tions. — The principal imports are apparel and haberdashery, cottons and woolens, flour, iron and steel, boots and shoes, tea, spirits, hardware, machinery, wine, *etc.* ; and the principal exports, wool gold, tin, sugar, preserved meat, cotton, wood, hides and skins. The imports come mainly from the United Kingdom and the United States. The value of imports for 1915-lb amounted to £7,000,912; the exports to £8,106,- 123. A duty of 5 per cent is charged on im¬ ports of yarns, woven fabrics, paper, stationery, *etc.* ; and duties at other and even higher rates on other articles.

The manufactures are comparatively unim¬ portant ; the chief

industrial establishments are sugar-mills, steam sawmills, soap-works, dis¬ tilleries, breweries, carriage-works, butter-fac¬ tories, boot and shoe factories, cordial-factories, *etc.* Ihere are 4,840 miles of state-owned railway open. The most important lines are the three which reach the coast at Brisbane, Rock¬ hampton and Halifax Bay. In 1915 the regis¬ tered shipping consisted of 164 sailing vessels of 6,107 net tons, and 124 steamers of 14,753 net tons.

Government, Education and Religion.—

The government is vested in a governor, who is the king's representative, an executive council, and a parliament of two houses, the legislative council and the legislative assembly. The council consists of 38 members appointed by the Crown for life, no limit being put to the num¬ ber ; and the assembly of 72 members elected by the people for three years, and repre¬ senting 72 electoral districts. In 1914 women were also enfranchised. The revenue for the year ending 30 June 1917 was estimated at £7,876,548; the expenditures at £8,034,624. Education is free and secular in the state schools, of which there are 1,550 elementary schools, six high schools and 10 grammar schools. There are also 147 private schools. A university was established for the state at Brisbane in 1911. There is no state church, each religious denomination being entirely self-supporting. Anglicans predominate, with Ro¬ man Catholic second. There are a number of charitable institutions maintained by public sub¬ scription supplemented by state endowment. The commonwealth also pays an Old Age and Invalid Pensions.

History. — The first settlement of Queens¬ land took place in 1825, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers.

It was originally a part of New South Wales, until in December 1859, it was organized as a separate colony under its present name instead

of the earlier one of Moreton Bay District. In 1901 it became one of the states of the Aus¬ tralian commonwealth. Pop 1916, est. 687,480. See Australia.

Consult Russell, H. S., (The Genesis of Queensland* (Sydney 1888); Gray, R., (Reminiscences of India and North Queens¬ land, 1857 — 1912 J (London 1913) ; Mathew, J., (Two Representative Tribes of

Queensland* (London 1914) ; Weedon, T., Queensland Past and Present* (Brisbane 1897) ; and Pugh's Queensland Almanac, Court Guide, Gazeteer, etc.*, an annual publication (Brisbane).

QUEENSTOWN, Ireland, a seaport town and important naval station, in the county and nine miles southwest 'of Cork, on Great Island, which is situated in Cork Harbor, and rises abruptly to a considerable elevation. The streets rise above one another, and present a picturesque appearance. It has a splendid Ro¬ man Catholic cathedral. Queenstown is almost solely dependent on its military and naval es¬ tablishments. It is an important port of call for mail steamers and was formerly known as Cove: of Cork. In honor of Queen Victoria's visit in 1849 the name was changed to Queens¬ town. Pop. about 8,000.

QUEENSTOWN, Ontario, Canada, village and picturesque summer resort of Niagara County, on the Niagara River, near the mouth of the gorge, seven miles below the falls, and opposite Lewiston, N. Y. Pop. 400. The Brock monument, 185 feet high, on the heights over¬ looking the village, commands a magnificent prospect, and commemorates the battle of 12 Oct. 1812, when General Van Rensselaer com¬ manding 6,000 United States troops near Lewis¬ ton, sent about 1,000 men across the river in the night to attack Queenstown preparatory to a further invasion of Canada. General Brock, the capturer of Detroit, commanded the British forces, but was killed early in the action. The rest of the American troops refused to cross the river, and the attacking party, overpowered by numbers, was compelled to surrender. The American loss in killed and wounded was 300; in prisoners 958; the British lost about 130 killed, wounded and prisoners.

QUEIROZ, ka-e-ros, Jose Maria Eca de.

bee Eca de Queiroz.

QUELPART, kwel'part, QUELPAERT, 9J TAMRA, an island off the southern coast of Korea, about 62 miles from the mainland, lamra is the native name of the island. In form it is nearly oval ; area, about 750 square miles. It is mountainous, the highest point Mount Auckland, or Han-ra-san, is 6,650 feet m height. This mountain is an extinct volcano-three well-defined craters exist, in each of which is a lake of puie water. One of the traditions held sacred by many of the natives is that from these lakes came the first three men of the ™°rld- . The principal town is Chyei Chyu. ihe chief industries are fishing, agriculture, cattle-raising and manufacturing fine split-bamboo hats pop. 130,000. Consult Hamel, Narrative of Captivity in Korea* (in

Griffis' Korea Without and Within, > New York 1885) ; Belcher, 'Narrative of H.M.S. Samarang (London 1848), containing an account of the survery and mapping of the island by the officers of the British ship Samaranq.

QUENSTEDT, kven'stet, Friedrich Au¬ gust, German mineralogist and geologist : b. Eisleben, Germany, 9 July 1809; d. Tubingen, Germany, 21 Dec. 1899. He was educated at Berlin and in 1837 became professor of geology and mineralogy at Tubingen where he remained until his death. He made valuable investiga¬ tions in geology and mineralogy and in the latter science was first to apply the analytic method to the study of crystalline systems. He wrote (Methode der Kristallographie > (1840) ; (Grundriss der bestimmenden und rechnenden Kristallographie) (1873) ; (Handbuch der Petrefaktenkunde) (1851; 3d ed., 1882-85).

QUENTEL, kven'tel, Heinrich, German printer: b. Strassburg; d. 1501. He established a press near the cathedral at Cologne and though the earliest dated work from his press is (Fratris Astexani Opus de Casibus Conscientiae) (1479) yet the earliest low German version of the Bible, usually stated 1470, is undoubtedly from his types and probably from his press. The business was conducted in his name for some time after his death.

QUENTIN DURWARD, kwen'tin der'- ward, a romance by Sir Walter Scott published in 1823. The scene of this tale is France during the reign of Louis XI ; the hero, Quentin Dur-ward, is a Scottish archer, who, having a rela¬ tive in the Scottish Guards of the French king, goes to France to seek his fortune. The book was written at the flood-tide of Scott's popu¬ larity at home; the ebb began with (St. Ronan's Well,* published six months later.

QUERARD, ka-ra'r, Joseph Marie, French bibliographer: b. Rennes, 25 Dec. 1791; d. Paris, 3 Dec. 1865. From 1819 to 1824 he was attached to a well-known Vienna book firm and while there prepared the first part of his (La France litteraireC in which he gives a complete bibliog¬ raphy of France for the 18th and the beginning of the 19th centuries, including not merely notices of French writers, but of foreign au¬ thors whose works had been reprinted or trans¬ lated in France. The whole work appeared in 10 volumes (1827-42). Among other works of his are (La litterature frangaise contemporaine,* of which Querard himself prepared only the first two volumes (1839-44) ; (Supercheries

litteraires devoilees) (1845-56).

QUERCIA, kwar'cha, Jacopo Della, Ital¬ ian sculptor : b. Quercia, near Siena, about 1371 ; d. 1438. He was the first Tuscan sculp¬ tor who combined observation of nature with study of the antique and thus reformed plastic art in Italy. His chief works are the sepul¬ chral monument of Ilaria de Caretto in the cathedral at Lucca; a fountain adorned with the Madonna and emblematic figures of the virtues, Faith, Hope, Charity, Prudence, Jus¬ tice, Temperance and Fortitude, at Siena; a marble font in the cathedral of the same city and the reliefs in the portal of the church of San Petronio at Bologna, which depicts five scene in reliefs from 'Genesis,* five from the (Youth of Christ,* nine figures of the prophets and a life-size Madonna and Saint Petronius. Consult Cornelius, (Jacopo della Quercia)

(1896).

QUERCITRON, kwer'sit-ron, the inner part of the bark of the black oak (Quercus velutina), one of the finest of North American

oaks. It is of great economic interest through its yielding the dyestuff (<quercetin® (CigHioOQ, known commercially as ((yellow flavin.® This substance exists in the quercitron bark in the form of its glueoside "quercitrin® (C21H20O11 '2H20). Quercitrin is also found in the market under the name of (<red flavin,® and is used in that form as a dye, but its color is less brilliant and less durable than quercetin.

Yellow flavin is obtained by digesting the powdered quercitron bark with a solution of common salt to separate the gummy ingredients, which are filtered out. The filtrate is dried and extracted with dilute ammonia, and while cold is treated with a slight excess of hydrochloric acid. The precipitate is removed, and the so¬ lution of the glueoside quercitrin, which re¬ mains as the filtrate, is boiled for half an hour, at the end of which time it has been hydro¬ lysed into quercetin, which crystallizes out in the form of pale yellow needles. These are gathered from the solution while it is yet warm, drained and washed. Quercetin is a strong dye for mordanted wool, yielding colors varying with the mordant, as follows : Bright orange with tin ; reddish brown with chromium ; brownish orange with aluminum ; and orange-black with iron.

QUERCUS, the generic name for oak (q.v.).

QUERES. See Keresan.

QUERETARO, ka-ra'ta-ro, Mexico. See Mexico — the States of.

QUERETARO, Mexico, capital of the state of Queretaro, distant from the City of Mexico by the National Railway 167 miles and by the Central 153 miles, and from El Paso, Texas, by the Central 1,071 miles and from Laredo, Tex., by the National 580 miles; eleva¬ tion 5,904 feet above sea-level. Here is the famous Hercules Cotton Mill, one of the oldest and most extensive in the Republic, employing almost 2,000 operatives, and here are also sev¬ eral other manufacturing industries, including woolen mills. Some miles distant are the famous opal mines, which have been worked for centuries, producing enormous quantities of the precious stones, but which are now becoming gradually exhausted. The water supply is ob¬ tained from the mountains through a great stone aqueduct five miles in length. The city has a complete system of electric lighting, a well-equipped street railway and many sub¬ stantial business structures. The Bank of Queretaro, with a capital of $1,000,000, a branch of the National Bank and an agency of the Bank of San Luis Potosi supply the financial needs of the community. There are numerous churches, one of the oldest and most prominent of which is the Santa Rosa. The Civil College is the most notable educational institution. In this are taught law, engineering, chemistry, *etc.* There are two museums, one of which is de¬ voted to history and the other to commerce ; and a library connected with the Civil College contains 9,000 volumes. Other notable build¬ ings are the Government Palace, built of basalt, the Iturbide Theatre and a bull-ring; there are also numerous parks. The city was founded by the Aztecs about 1440; was conquered by the Spaniards in 1531 and is noted in modern his¬ tory as the scene of the capture, imprisonment and execution of Emperor Maximilian in

1867 by the Mexican government. Pop. about

38,000.

QUERN, a mill, especially a hand mill for grinding corn, used from early times among almost all races of humankind before the inven¬ tion of water or windmills. The general form consists of two circular stones, the lower of which is slightly dished and the upper one pierced in the centre and revolved on a wooden or metal pin inserted in the lower. The grain is dropped with one hand into the central opening, while with the other the upper stone is revolved by means of a stick inserted in a small opening or hole near the edge. It is sometimes incor¬ rectly confused with <(churn55 (q.v.).

QUESADA, ka-sa't'ha, Gonzalo de, Cuban diplomatist: b. Havana, Cuba, 15 Dec. 1868; d. 1915. He was graduated from the College of the City of New York in 1888 and afterward studied at Columbia. He was secretary of the Cuban revolutionary party and associated with Jose Marti in the endeavor to effect Cuban independence. He served as special commis¬ sioner of Cuba to the United States in 1900, was Cuban commissioner to the Paris Exposi¬ tion, and in 1901 became a member of the Cuban Constitutional Convention. In 1912 he became minister to Germany and served as dele¬ gate from Cuba to the third and fourth Pan-American conferences. He has published <Patriotismo) ; <History of Free Cuba5 (1898) ; (Ygnacio Mora5 (1894) ; <La patria alemana5 (1913), and edited Jose Maite's (Obras litera-rias5 (1900-11).

QUESADA, Gonzalo Ximenes de. See

XlMENES DE QUESADA.

QUESALTENANGO, ka-sal-ta-nan'go. See Quezaltenango.

QUESNAY, ka-na, Frangois, French econ¬ omist; b. Mere, near Versailles, 4 June 1694; d. Versailles, 16 Dec. 1774. He was at first a surgeon, and in 1737 was made perpetual sec¬ retary of the surgeons' academy; but in 1744 he received a physician's certificate and became a favorite physician at the court of Louis XV. His works on professional subjects are wholly antiquated and he is best known as the chief of those economists whom Dupont de Nemours called the (<physiocrats.55 The principal tenets of this school were that there exists a natural order, with which human government should in¬ terfere as slightly as may be, and that all wealth is derived from the soil. Extravagant praise was heaped on Quesnay, who was called the

<(European Confucius,55 while his (Tableau eco-nomique5 (1758) was styled by Laharpe ((the Koran of economists.55 His economical works appeared in 1768. Consult Higgs, (The Physio¬ crats5 (London 1897).

QUESNAY DE BEAUREPAIRE, de

bo-re-par, Jules, French jurist and author, known also by the pseudonym Jean Glouvet : b. Saumur, 2 July^ 1838. He studied law, be¬ came for a time a journalist, later entered defi¬ nitely upon a legal career and in 1889 was made procurator-general of the Paris Court of Cassa¬ tion. In that capacity he appeared for the gov¬ ernment before the. Senate, constituted as a high court of justice with charges against Boulanger (q.v.) and the latter's accomplices, Dillon and Rochefort. In 1892 he was ap¬ pointed president of the chamber of the Court

of Cassation, from which post he was compelled in January 1899 to retire, owing to the fact that his aggressive attitude in the Dreyfus revision was interpreted by his colleagues as an evi¬ dence of bias. Among his works are (Le forestier5 (1880); (Histoires du vieux temps5 (1883); (L'etude chandoux5 (1885); (France, 1418-295 (1895) ; and (Le Panama et la Repub-lique5 (1899).

QUESNEL, ka'nel', Joseph, Canadian poet and dramatist: b. Saint Malo, France, 15 Nov. 1749; d. Montreal, Canada, 3 July 1809. In service aboard a man-of-war he visited Pon-dichery, Madagascar, Africa, French Guiana, the Antilles and Brazil, thence reaching Mon¬ treal through the Mississippi Valley. The re¬ mainder of his life he spent in Montreal and Boucherville. He engaged in writing plays, songs and verse and composed some sacred music. His (Colas et Colinette5 (1788) was first produced in Montreal. Other productions were an operetta, (Lucas et Lucille,5 and the comedies (L'Anglomanie and (Republicans Frangais.5 His writings are collected in the (Repertoire national5 (Vol. I).

QUESNEL, Pasquier (Paschasius), Ro¬ man Catholic theologian: b. Paris, 14 July 1634; d. Amsterdam, 2 Dec. 1719. In 1657 he entered the order of Oratorians, but subsequently through his publication of the (Works of Leo the Great5 (1675) with annotations, in which he maintained the independence of the Gallican Church, he incurred the displeasure of the Holy See, and as he refused in 1687 to subscribe to an anti-Jansenist declaration, he was obliged to take refuge in Brussels

with Arnould (q.v.) where he employed himself in completing his edition of the New Testament with moral re¬ flections. The Jesuits thereupon obtained from Philip V of Spain a writ through which Quesnel was taken in custody as guilty of Jansenism (1703). With the aid of his brother, how¬ ever, he escaped and fled to Amsterdam, where he lived to see 101 passages in his New Testa¬ ment condemned by the Holy See in the bull (Unigenitus.5

QUETELET, ket'la', Lambert Adolphe

Jacques, Belgian statistician and astronomer : b. Ghent, 22 Feb. 1796; d. Brussels, 17 Feb. 1874. In 1814, he became professor of mathe¬ matics at Ghent, in 1819 was appointed to the same chair in the Brussels Athenaeum and was lecturer in the Museum of Science and Litera¬ ture, 1828-34. Quetelet superintended the erec¬ tion of the Royal Observatory and was its first director from 1828 till his death. His writings on statistics and kindred subjects are very numerous, and among them may be named (Sur 1'homme et le developpement de ses facultes, ou essai de physique sociale5 (1835); (Sur la theorie de probabilities appliquee aux sciences morales et politiques5 (1846); (Sur le systeme social et les lois qui le regissent5 (1848); (Histoire des sciences mathematiques et phy¬ siques chez les Beiges5 (1864), and (L'Anthro-pometrie5 (1871). He applied the mathematical methods of averages and probabilities to the study of man both as an individual and as a member of society.

QUETTA, kwet'ta, British Baluchistan; city, on a railroad which belongs to the India railway system, and about 100 miles north of

Khelat. It is a commercial and industrial centre for a large region; but it is of great strategic importance, on account of its posi¬ tion among high mountains and that it com¬ mands both Bolan and Khojok passes. It is strongly fortified, and has an arsenal and a garrison. It has become a flourishing place since 1876, when a British residency was estab¬ lished here. Pop. about 30,000.

QUETZAL, ket-sal', a very beautiful bird of the trogon (q.v.) family (Pharomarcus mo-cinno), intimately connected with the mythol¬ ogy and history of the Maya, Quiche and Nahuatl races of Mexico, Yucatan and Guate¬ mala. The name of the bird in Aztec is de¬ rived from its bright green color. Its tail feathers, which are from two to three feet long, were used as decorations for priests of the Toltec god Quetzalcoatl and for people of noble birth. So much was it used in this con¬ nection and so stringent were the restrictions placed upon its use by persons other than those entitled to wear it, that the word came to have the sense of royal and sacred in the Aztec lan¬ guage. The Yucatecan king of Mayapam wore for a crown a plain golden circle sur¬ mounted with a plume of quetzal feathers. Only the king and the high nobles could wear these feathers which were used to mark very exalted rank in Mayapam, and such store was placed by the quetzal that the penalty of death was provided for any one killing one or wearing or having quetzal feathers in his pos¬ session. The plumage of the quetzal was com¬ monly used as a distinctive badge of the Toltec god of the air, Quetzalcoatl (q.v.), the in¬ congruous parts of whose compound name (quetzal-coatl, or feathered serpent) can only be properly explained when the fact is kept in mind that ((quetzal® came to be used as the badge of royalty or high rank in both men and deities. The shield and the mace or baton of authority of Huixtocihuatl, were orna¬ mented with quetzal feathers, and the long tail feathers of this bird were sculptured on stone in Yucatan, southern Mexico and Guatemala as the symbolical representation of the Maya and Quiche culture gods. Quetzalcoatl, the ((Fair God,® is presented in the form of a coiled serpent ornamented with feathers resembling those of the quetzal. Several stone effigies of him in this form are preserved in the National Museum of Mexico and others have been dis¬ covered in the ruins of ancient cities all the way from Central Mexico to Guatemala. Quetzal feathers were used as decorations for the armor of Mexican nobles in preconquest days and in the making of the wonderful feather pictures of the Aztecs and other cultured races of Mexico, and also in the manu¬ facture of wall tapestries whose beauty brought unstinted praise from the Spanish conquerors. The palaces and temples of the Toltecs and the magnificent new palace of Montezuma II were decorated with these brilliant feather hangings. But all work of whatever class into which the feathers of the quetzal entered was reserved for the use of the king, the nobles, the statues of the gods and the temples. It has been said that the trail of the serpent (the most graphic symbol of the god of the air) is over all Mexico, but wherever the serpent is sym¬ bolically present the quetzal is its inseparable

companion. In recognition of the important part played by the quetzal in the religion, his¬ tory and political life of the cultured races of Mexico and Central America, it has been made the central figure in the modern coat of arms of Guatemala.

The word quetzal seems, to have been used in compounds as a contraction for Quetzal¬ coatl ; and the name of one of the Chichimeca rulers is given as Quetzal, which is probably a contraction of his ecclesiastical title as head of the state religion. All accounts of the quetzal represent it as a very shy and retiring bird inhabiting thick forests where it is rarely seen. It is not probable, therefore, that the numerous towns and localities bearing its name should have been named from its presence there. It is more likely that in each of the places so named there was a shrine of the air god, Quetzalcoatl. The presence of names begin¬ ning with quetzal far down into Guatemala is an evidence of Nahua culture in these regions and would seem to indicate the subjection of them by the Aztecs or other Nahua races since almost always the compound name beginning with quetzal is Nahuatl. Thus Quetzalpan is <(place of the quetzal® ; Quetzalteuhtli ((the Lord Quetzal® ; Quetzalatl, the ((Quetzal River® or water; Quetzalpopoca, the ftplace of the smoky quetzal® ; Quetzaltepec, the ((hill of the Quetzal® ; Quetzalxochitzin, composed of quetzal, xochitl (flower), tzin (princess), the ((Quetzal — Flour — Princess®; the full name of Xochitl, the traditional discoverer of pulque, the national drink of Mexico. It would seem that among the collection of birds in the royal aviary or breeding place of Montezuma II in Mexico City, the quetzal was successfully raised. See Trogon ; Quetzalcoatl.

QUETZALCOATL, ka-tzal-kwatl, the Mexican <(Fair God,® is a nature deity trans¬ formed into a great national god and the founder of a priesthood. As he is a primitive deity the legendary lore connected with him assumes many forms. He is the god of the winds who, driving the clouds before him, causes the moisture to descend upon the earth. He thus becomes the deity of the beneficial influence of the air, of medicines and of the healing art. These functions and attributes made him the god of fertility. As originally all wealth came from the fertility of the soil Quetzalcoatl became the god of wealth and of all activities that produce wealth or increase it. Thus he became the patron of artisans, farmers, planters, gardeners and workers of the soil generally, of stone engravers, cutters and builders and of gold and silversmiths and other workers in metals. Like the wind gods of other countries, he was the patron of music and the messenger of the higher gods. He was the supreme culture deity of the

Toltecs and as such the revealer of all learning and the inventor and introducer of the useful arts, among them, the invention of writing and the making of books. He organized the religious ceremonies and rituals of the Toltecs and re¬ vealed to them the knowledge of astronomy and astrology. To him barren women prayed that they might be blessed with children and the agriculturist beseeched him that he might look with favor upon his fields. He it was who swept the sky clean for the coming of the

tialoques or rain gods. He was the patron of hunters, messengers, runners and of sports, and a temple devoted to his worship was always found at the entrance to the Aztec and Maya gymnasiums or courts where the native ball games were held. He was called the ((Cloud Pusher® because, in his capacity as the wind, he drove them before him; as the bestower of all wealth he was the god of gaming and for the same reason thieves prayed to him, and under various epithets, he was the deity of fishermen. He made the winds to blow and he calmed them, and for this reason he was invoked in periods of storm or of prolonged calm. He divided the year into seasons, in¬ vented the calendar and named the mountains, lakes, capes, bays, rivers and other prominent features of nature. He was the special patron of feather work, painting and sculpture, and all buried treasure, demented people and trav¬ elers were under his special protection. In some of the legends he is represented as the creator of the first man. All these attributes caused him to be looked upon as the special bestower of happiness. He was called Ehecatl, the personified air; Yolcuatl, the rattlesnake; Tohil, the rumbler, and Huemac, he of the big or strong hands (probably significant of his protection of the building and mechanical arts). He was addressed as lord of the four winds, lord of the eastern light, son of the White Cloud, serpent and the Morning Star. The most beautiful of singing birds accompanied him, and when he walked he shook fire from his sandals (emblematic of the lightning), and it thus became the property of mankind.

Quetzalcoatl was the tribal god of the Toltecs. He and Huilzilopochtli, the Aztec war god, Tezcatlipoca, the Texcocan tribal deity, and Camaxtli, the Tlaxcalteca tribal divinity were popularly thought by the Aztecs to have been brothers, and there is good reason to be¬ lieve that they were all tribal variants of the same mythological culture hero and god of the wind. The Tlaxcalans satisfied their own local pride by representing Quetzalcoatl to be the son of Camaxtli. The Otomi identified him with their god of hunting who seems to have been their supreme deity. Quetzalcoatl has been identified by later investigators with almost every nature deity, yet the earlier writers show that the natives regarded him as a wind god or the chief of the wind gods and the presiding deity of the air, and as such he was symbolized by the quetzal or royal bird, the cloud symbol; the snake, emblematic of the whirling' wind ; the flint, the material sign of the thunderbolt, and the cross, emblematic of the four regions of the earth

from which came the four winds, and in a secondary sense, symbolical of his con¬ nection with the deities of moisture and the gods of fertility. Quetzalcoatl was active be¬ fore the creation of man in which he seems to have taken a prominent part. Sahagun says that to him was assigned the task of sacrificing the other primal gods at Teotihuacan, on the occasion of the creation of the sun. This places him very far back in the antiquity of legendary lore. By the Toltecs and the Aztecs alike he was regarded as one of the oldest of the gods. At Tula his worship was developed to a high degree of ritual and ceremony, and it would seem that the Toltec sovereign was his repre¬

sentative upon earth and as such known as the Quetzalcoatl, a name used only in his religious capacity, and which m.ust, therefore, be re¬ garded simply as a title, since the king used his state name for all relationships outside the pontifical. This has caused a great deal of confusion, which began among the Toltecs and Aztecs themselves who represented the god as coming to the earth from the bright land of the sun and the mythical Tlapallan and teach¬ ing the people all the arts and sciences. This myth was elaborated by the ruling class who, as his representative, claimed descent from him. Thus the kings of Tula are sometimes known by their pontifical and sometimes by their executive names, as the story related was supposed, by the narrator, to be ecclesiastical or secular.

According to the myth, Quetzalcoatl ap¬ peared in the east from over the sea with a body of priestly attendants and made his way to the uplands of Mexico where tradition credits him with having preached the doctrines of peace in the Toltec capital of Tula, from which he was driven out by the wiles of Tez¬ catlipoca, god of the night winds. From Tula he went to Cholula where he remained 20 years teaching the arts and sciences and preach¬ ing peace. From Cholula he went to Coat-zacoalcos (Puerto Mexico), from whence he sailed eastward back to Tlapallan on a raft or boat of serpents. He left behind him four of his most trusted followers who were com¬ missioned by him to divide the land of Cholula among them and to rule it in his stead, they and their descendants, until his promised re¬ turn. The return of Quetzalcoatl was firmly believed in by Toltecs, Aztecs, Zapotecas and Mixtecas alike, and on the appearance of the Spaniards off the coast of Mexico, the belief was general that they were the Fair God and his attendants come back to claim the sov¬ ereignty of the land. This belief prevented the superstitious Moctezuma II from taking ener¬ getic measures against the conqueror, Cortes, and aided the latter very materially in his con¬ quest of the Aztec empire.

The worship of Quetzalcoatl, under various names having the same signification, was com¬ mon in Yucatan, Oaxaca, Chiapas and Guate¬ mala. where magnificent temples were erected to him There his cult shaped and ennobled the architecture of pre-Columbian days as no¬ where else in America. Everywhere through¬ out this land is the trail of the <(plumed ser¬ pent,® his most characteristic sign and a literal rendering into English of his name. See Mexi-Mythology ; Toltec; Maya; Uxmal-Chichen Itza ; Tula ; Palenque.

Bibliography.— Acosta, J. de, < History of the Indies*; Bancroft, H. H., (Native Tribes* • Brinton, D. G., (American Hero Myths* •

Brasseur de Bourbourg, C. E., (Quatres Lett res-* ; Clavigero, F. S., (History of Mexico) ; Kingsborough, < Antiquities of Mexico *; Mendieta, G. de, (Historia Eclesiastica Indiana Motohma, T. de B., (Historia de los Indios de la Neuva Espana* ; Muller, J. G., (Geschichte dci amerikanischen Urreligionen* ; Sahasrun B. de, (Historia General de las Cosas de Neuva Espana* ; Torquemada, J. de, (Monarquia In¬ diana > ; Tylor, E. B., (Primitive Culture.)

QUEUE ROUGE, ke roozh, a West In¬ dian name for a large spider much dreaded by the Negros. See Latrodectus.

QUEVEDO Y VILLEGAS, ka-va'fho e vel-ya'gas, Don Francisco de, Spanish author: b. Madrid, 26 Sept. 1580; d. Villanueva de los Infantes, 8 Sept. 1645. After study at the Uni¬ versity of Alcala, he was banished the country for haying killed a nobleman in a duel and went to Sicily, where he entered the service of the viceroy, the Duke of Osuna, by whom he was later made Minister of Finance in the adminis¬ tration of Naples. After his return to Spain he was arrested in 1639 on suspicion of having written some satiric verses against the king and ministry and subjected to a four years' imprisonment, the rigors of which caused his death. He is best known for his prose satires, such as (Historia y vida del Beescon, El gran Tacano) (1626), and (Los SuenosP <Visions) (1635). The latter were rendered into English by Sir Roger L'Estrange in 1708. There is a Spanish edition of

his works by Guerra y Orbe (1852). His prose has been published in (Biblioteca de autores espanoles* (Vols. XXIII and XLVIII) ; his verse, in Vol. LXIX. (See Los Suenos). Consult the study by Merimee

(1886).

QUEZALTENANGO, ka-sal-ta-nan'go, or QUESALTENANGO, Guatemala, city, capi¬ tal of a department of the same name, the sec¬ ond city of the republic in size and in import¬ ance, 80 miles west of Guatemala City, at an altitude of 7,500 feet above sea-level. The town is well-built with wide and well-paved streets; among its handsome public buildings are the cathedral, city hall and penitentiary. It has a considerable domestic trade and manufactures of cotton and woolen textiles. A railway about 50 miles long connects Quezaltenango with Champerico on the Pacific Coast. The city was founded in 1524 by Spaniards, on the site of a native city; there are numerous interesting antiquities in the neighborhood. An earth¬ quake destroyed the town in 1902, but it was rebuilt. Pop. about 30,000.

QUIANGAN, ke-ang-an', Philippines, a former Spanish commandancia, bounded on the north by Bontoc, now a oart of the province of Lepanto ; area, 64 square miles. Pop. 30,000.

QUIANGANES, ke-ang-an'as, a tribe of the Philippines, living in the commandancia of Quiangan, province of Lepanto, Luzon. They belong to the Ifugas linguistic stock and are a headhunting people.

QUIBDO, keb'do, Colombia, town in the department of Cauca, formerly the capital of the ancient province of Choco, on the Atrato River, about 30 miles from the Pacific and 200 miles northwest of Bogota. It was of comider-able commercial importance when the gold mines of the vicinity were being worked; but the majority of the mines are now abandoned owing to lack of use of modern methods of mining. The surface gold exists now only in small quantities. Pop. about 15,800.

QUIBERON, ke-bron, France, town, in the department of Morbihan, on the Bay of Quiberon, on a peninsula, about 22 miles south¬ west of Vannes. Nearby and on the peninsula are the noted megalithic monuments of Carnac (q.v.). Quiberon is now only a small fishing

town ; but it is of historical interest on account of the unsuccessful

attempt of an English force to land here, in 1746, at the time of the Seven Years' War. On 20 Nov. 1759 Admiral Hawke attacked and overcame a French fleet under Admiral Conflans in Quiberon Bay, near the town. On 27 June 1795 a body of about 1,400 of French emigrant royalists landed here from an English fleet and tried to arouse the people of La Vendee and Brittany against the Conven¬ tion. They were repulsed by a force under General Hoche, some returned to their ships, and those who were taken prisoners were shot. Pop. about 3,500.

QUICHE, ke-cha', or KICH]£, an ancient nation of western Guatemala, the people of which were civilized and of the Mayan stock. Their language was a dialect allied to that spoken by the Cakchiquel. Their extant chron¬ icles begin with the 8th century. In their sacred book, (Popol Vuh,> an account is given of the life of their great culture hero, Xbalanque. This book gives many of the national traditions, writ¬ ten in the Quiche dialect. The first part of the book contains mythological accounts of their history, people, events, *etc.* ; the second part is a detailed history of the origin of the tribe and some account of the Cackchiquel. The de¬ scendants of the Quiche now inhabit a large re¬ gion in the central and western part of Guate¬ mala. Consult Ximenez's Spanish translation of (Popol Vuh) (Vienna 1857) ; Abbe Brasseur de Bourbourg's French translation of cPopol Vuh> (Paris 1861).

QUICHUA, ke-choo'a, a very extensive South American Indian family composed of many tribes linguistically closely related. The Quichuas inhabit Peru and parts of Ecuador and Bolivia and neighboring territory, and their language is quite similar in grammatical struc¬ ture and vocabulary to that of the Aymara who, with them, formed the greater part of the an¬ cient Inca Empire. There seems to be some reason to believe that the Quichua, though lin¬ guistically one, was composed of the union of several races in the course of the many cen¬ turies of evolution which produced the various successive civilizations of Peru, Ecuador and Bolivia and probably the uplands of Colombia. The Quichua tongue, which was formerly the state language of the Incas, is still the chief speech of the Indian population of Peru, espe¬ cially in the mountainous districts; and it is also still extensively spoken, under the same conditions, in Bolivia and in parts of Ecuador and the north of Argentina. The viceroy, Toledo, writing in 1575, after nearly half a century of civil war and Spanish conquest had frightfully decimated the Quichuas, estimated that the population of Peru, which was still very largely native, was 8,000,000. This esti¬ mate, which is probably conservative, does not include the wild Indian tribes in the mountain¬ ous districts which had still partially or wholly maintained

their independence, nor the vast Quichua population of territory adjoining Peru. That the Quichuas were once a very numerous people is attested by their archaeological re¬ mains, by the evidence of eye-witnesses of their land and culture at the time of the Spanish con¬ quest and by the thousands of now deserted ˆandens® or terraced fields on the mountain slopes in the Andine regions, many of which

are situated at an elevation of 12,000 feet, and some even considerably higher.

The civilization of the Quichuas ranks among the highest produced by the aborigines of the American continents. Its architecture was not the equal of that of Mayas, Quiches and other cultured races of Mexico and Cen¬ tral America, but its political organization seems to have been much better and its social life and government superior. Its religious ideas and ecclesiastical system were purer, more civilized and humane, and its system of gov¬ ernment highways were vastly superior to any¬ thing else in the same line in the New World at the time of its discovery; and they were built on a much more extensive scale than anvthing then existing in Europe. Quichua was the name given by Friar Domingo de San Tomas, the first European who studied it grammatically. But Quichua was only one of many dialects of one great tongue. It was, however, one of the most important of the Quichua linguistic di¬ visions. This ancient language of the Incas is a noble tongue fitted for all the needs of a highly developed civilization. It is flexible, has an extensive vocabulary rich in plural forms and verbal conjugations, the power of forming compound nouns and, above all, in synonyms. It has the power to express intricate abstract ideas and relationships and to record poetical and rhetorical conceptions and imagery. There seems to be no doubt that the Quichuas pos¬ sessed an oral literature and drama at the time of the conquest. The latter was continued, for some considerable time after the downfall of the native dynasty, by the Indians. On several occasions their dramatic performances were officially prohibited throughout Peru. One of these, ‘Ollantay,* which depicts events in the time of one of the native rulers, has survived in an interesting, if somewhat mutilated form.

Quichua Culture. — The Quichuas were an artistic race in the pre-Columbian days and they were famous workers in metals, designers, builders, weavers, orators, lawmakers and traders. They are supposed to have carried their commerce for thousands of miles, throughout their own vast empire, and far to the north of it, into neighboring countries. They were probably further advanced in the knowledge of medicinal plants than any other American people and less given to superstitious practices in connection with their uses. The Quichuas developed a very complicated system of keeping account by means of

knotted strings of different colors which excited the wonder and admiration of the Spaniards. It has been asserted, on what seems very good authority, that these “quipus® were made use of by the Peruvians to record their history and traditions as the American Indians of the eastern States used their wampum belts, though with much more accuracy and extended application.’

In the land of the Incas, which seems to have been run on a curious combination of absolut¬ ism and socialism, every able-bodied person was expected to work, and the proper distribution of wealth was carefully looked after by the emperor, who was termed “the friend of the poor” ; so that, we are told, the land was enor¬ mously wealthy, and Cuzco, the caoital, was the richest of all the aboriginal American cities.

The Quichua Empire was divided into four quarters (corresponding to the four cardinal

points) by lines radiating from Cuzco; and the whole, known as the four United Provinces, was governed by viceroys, through whom the emperor kept his hand upon the reins of gov¬ ernment throughout his vast domains. A sys¬ tem of division and subdivision, with responsi¬ bility to the next highest immediate authority, made the government of the whole country and the control of it by the emperor wonderfully effective. Each “cunca® of 10 families formed a community and at the same time the unit of government. Thus a most scientifically worked-out feudal system placed the responsibility, in every case, where it belonged and maintained it there. This system of supervision permitted the Inca government to organize all the re¬ sources and facilities of the empire; and the result was that not a spot capable of cultiva¬ tion was neglected. Terraces were built on the sides of the mountains, from the foothills to the cold regions of the limit of vegetation, some of these upper terraces being not more than a yard wide. Irrigation was made a science. Canals starting at the snow-line carried the water down the mountain side from one terrace to another, while more extensive irrigation works brought the arid lands of the coast under subjection and rendered the pasture lands fertile. Even the flow of water was regulated by the government to the extent, altitude and nature of the land to be irrigated. Vast herds of llamas and alpacas supplied meat and the -°^ wo°l ˆor ˆie whole nation ; as did also the wild huanacus and vicunas. The Inca gov¬ ernment also looked after the distribution of the population and saw that the people were placed where they could most easily make a living and

contribute to the growth and great¬ ness of the empire. See Peru.

Bibliography.— Acosta, Jose de, < Natural and Moral History > (written in 1551); Juan Jose de Betanzos, (Suma y Narracion de los Incas (1551) ; Cieza de Leon, Pedro, ‘Chronicle oi Peru > (1554) ; Humboldt, A. von, ‘Vues des Cordilleres > (1810) ; Markham, C. R., ‘The Inca Cmhzation in Peru > (1889); Molona, Cristobal de, (The Fables and Rites of the Incas } (Markham’s translation, 1873) ; Montesmos,ˆ Fernando, ‘Memorias antiguas del Peru” (Jimenez de la Espada edition, 1882) ; Prescott Conquest of PenP ; Robertson, ‘History of America ; Santillan, Fernando de, ‘Relacion” (published in 1879) ; Valera, Bias, ‘Institutions; of the Incas* (fragmentary, 16th century) ; Vega, Garcilasso de la (Inca), ‘Commentaries Reales* (1607); Zarate, Augustin de, ‘Prov¬ ince del Peru* (1551)

QUICK, Sir John, Australian statesman and author: b. Saint Ives, Cornwall, England, 14 April 1852. He was taken to Australia by his parents in 1854 and was educated there. At the age of 15 he became a compositor on a local paper, where he successfully tried his hand at literary work. He worked on several daily papers and continued _ his studies at the Uni¬ versity of Melbourne from which he was grad¬ uated in arts in 1877 and in law the following year. Two years later he was elected to Par¬ liament where he became a prominent advocate of Australian’ federation. He was a member of the convention which framed the constitution of the commonwealth (1897-98) and chairman of the tariff commission (1905). He had al-

ready been knighted in 1901 for federal serv¬ ices, and was postmaster-general of the com¬ monwealth (1909-10). A recognized authority on constitutional law, he has written the his¬ tory of Land Tenure in Victoria) (1893) ; Parliamentary Government in Victoria > (1894) ; (A Digest of Federal Constitutions) (1896) ; ‘The Federal Constitution Explained > (1898) ; Annotation of the Constitution of the Australian Commonwealth) (1901) ; ‘Judicial Power of the

Commonwealths (1904) ; ‘Im¬ perial Unity and How to Promote It) (1908) ; ‘Workers’ Compensation Act* (1915).

QUICKSAND, a . tract of loose sand mixed with water which will not support heavy bodies. In appearance quicksands do not differ from the adjacent sands. They usually occur on flat shores underlain by stiff clay or other impervious materials and especially near the mouths of large rivers. Thev appear to be formed by the continued collection of water within the sand bank which is prevented from running off by the underlying impervious layer. The water which infiltrates the sand may be supplied, either by a river current, directed against the concave shore or spreading over a sea-beach ; by tides which at their ebb leave be¬ hind them imprisoned bodies of water; or by sea-currents running through narrow channels and forcing the water against the adjacent shore. The grains of quicksand have rounded surfaces, as distinguished from angular or “sharp® sand. It is, moreover, of very light weight. The infiltrated water separates and lubricates the particles, rendering them un¬ stable and unable to support a heavy weight, such as the body of a man. They have obtained a great reputation for treachery and danger, especially because they cannot be distinguished at sight. The subject has been drawn upon considerably in literature, notably in Hugo’s ‘Toilers of the Sea,) in Wilkie Collins’ ‘ Moon¬ stone > and in the ‘Bride of LammermoorJ with probably some exaggeration of the danger. The effect of quicksands, however, is well illus¬ trated by the sinking in 1875 of a locomotive and train at Pueblo, Colo., which sank beyond discovery though probed for to a depth of 50 feet. To make it possible to operate in quick¬ sands engineers are accustomed to congeal them by forcing into them brines and liquids at low temperatures.

QUICKSILVER. See Mercury or Quick¬ silver.

QUIDDE, Ludwig, German writer on mediaeval history and modern politics: b. Bremen, 23 March 1858. He became a pro¬ fessor at the University of Munich, a member cf the Bavarian Landtag and the board of aldermen of the capital of the kingdom. He edited a series of publications of German impe¬ rial documents of the 15th century and attained a widespread sensational reputation by the pub¬ lication, in 1894, of a work called ‘ Caligula, > ostensibly a biography of the dissolute Roman emperor, but actually a neatly veiled presenta¬ tion of the foibles of Emperor William II of Germany. The book passed through 30 editions in one year, which, as it was an historical work, was enough to attract the attention of the pub¬ lic prosecutor. Quidde was brought up for trial, but defended himself so ably that he was acquitted. On being asked by the prosecuting

attorney whom he had had in mind during the composition of his work, he answered, “Calig¬ ula, of course,® and confused the prosecutor by asking “Whom have you in mind?® Other works aie ‘Der schwabisch-rheinische Stadte-bund im Jahre 1384) (1884) ; ‘Militarismus, (1893) ; ‘Wetterleuchten der Reaktion> (1895) ; ‘Bayerische Steuerreform) (1909).

QUIDOR, John, American painter : b. Gloucester County, N. J., 1800; d. 1881. He removed to New York in 1826 and studied painting under John Wesley Jarvis and Henry Inman. While his work showed great clever¬ ness he Jailed to gain recognition in his life¬ time and earned a livelihood by nainting fire engines and panels for coaches. He excelled in fanciful subjects with a landscape background. His best-known work, now recognized as evi¬ dencing fine talent, illustrated scenes from the works of Washington Irving, whom he knew personally. His ‘Rip Van Winkle) is consid¬ ered an excellent niece of work. Other paint¬ ings, also from Irving’s works, and now in the Brooklyn Institute, are ‘Dancing on the Battery) ; ‘Peter Stuyvesant’s Wall Street Tale) (1864) ; ‘Voyage from Communipaw to Hell Gate* (1866) ; ‘Voyage of the Good Olaf Up the Hudson* (1866).

QUIDS, in American political history, a name applied to a faction of the Republican party led by John Randolph from 1805 to 1811. They were opposed to the nomination of Madi¬ son, Jefferson’s choice for the succession. They declared war on the administration party in 1806, as governing Congress by backstairs in¬ fluence. They opposed the restrictive system and nominated Monroe in 1808. Their leading ground of divergence from the administration was that it had moved away from the ground occupied by the party when in opposition, and in the direction of centralization and Federal encroachment. The name is derived from “tertium quid® and signifies their separation from both parties.

QUIETISM, a tendency in religious devo¬ tion rather than any specific system of religion or mysticism. It consists in making Christian perfection a state of uninterrupted contempla¬ tion of divine things, the soul meanwhile re¬ maining quiet and entirely passive under the divine influence, heedless of the customary pre¬ cepts of practical religion, and without thought of rewards or punishments in another world, which are the master motives of vulgar piety. The term Quietism was first used to designate the mystical teaching of Miguel de Molinos (q.v.) who died (1696) in the prison of the Holy Office at Rome to which he had been con¬ demned for teaching in sundry of

his writings that the perfect Christian life consists in pass¬ ive contemplation, unaffected by hopes or de¬ sires, and that the soul thus occupied neither gains by good works or acts of piety, nor suf¬ fers through the commission even of gross sins, for these affect only the lower nature of the devotee and cannot bring any strain upon the purity of a contemplative soul. The amiable Fenelon (q.v.) was won over to hearty accept¬ ance of some of the less objectionable features of Quietism by the influence of his disciple Madame Guyon (q.v.), several of whose mysti¬ cal writings he approved and defended when

they were condemned by the Gallican church authorities, among them Bossuet, bishop of Meaux, who declared them to be a <(mass of extravagances, illusions, and puerilities.® Fenelons published apology for the doctrines of Madame Guyon having been censured at Rome as containing propositions rash, scandalous, etc he promptly bowed to the judgment of the Holy bee, publicly committing his own book to the names. Consult Heppe, H., (Geschichte der quietistischen Mystik) (Berlin 1875).

QUIETISTS. See Quietism.

QUIGLEY, James Edward, American PreJate: b. Oshawa, Ontario, 15 Oct. 1854 d. 10 July 1915. He was graduated from Saint Josephs College, Buffalo, N. Y., in 1872. He then began his theological studies at the Vicentian Seminary, Niagara, N. Y., now Niagara University, and continued them at the University of Innsbruck, Austria, completing his ent.lre course at the Propaganda, Rome, where, in 1879, he obtained the degree of doctor °| theology, and was ordained priest 13 April ot the same year. Returning to the United states, he was appointed pastor of the Church at Attica, Wyoming County, N. Y., and in 1884 was named rector of the Cathedral, Buffalo, N. Y. In 1896 he asked to be transferred to the rectorship of Saint Bridget's Church Buf-calo, made vacant by the death of Monsignor Gleason, but his residence in that parish was short, as, on 24 F eb. 1897, he was consecrated bishop of Buffalo to succeed Bishop Ryan, de¬ ceased. Bishop Quigley was chosen arbitrator m the great labor strike in

Buffalo during 1904 and on 8 Jan. 1903 was promoted to the archiepi.scopal see of Chicago. The archdiocese comprises a Catholic population of approxi¬ mately 1,000,000; 619 priests; 316 churches; 168 parochical schools; 7 orphan asylums; 18 hos¬ pitals and many other charitable and educational institutions.

QUILL, the hollow stem of a feather (see Plumage) Many utilities have been found for those of the larger size, but their use is declin¬ ing I he principal use of quills is still for making pens, for which the feathers of the swan are most highly esteemed, but goose-quills are most commonly used. Crow-quills are said to be best for fine writing and drawing. In preparing quills for making into pens, they must first be cleaned inside and outside of tatty matter, which would prevent the ink from flowing freely. This is done by burying the quill-ends of the feathers for a few seconds m hne sand at a temperature of about 140° F. the quills are then polished and dried.

r .(kwil-la'ya) BARK, the bark

o a South American tree (Quillaia saponaria) belonging to the division Sprcea of the order Rosacea'. The tree has smooth, oval leaves, and white terminal flowers, solitary or in small clusters.

a ER-COUCH, kwil'er kooch, Sir

Arthur Thomas English author: b. Cornwall,

C ,• He was educated at Oxford

where he was classical lecturer in 1886-87, and won , some success with his first book, <Dead Mans Rock> (1887). In 1 887 he began a literary career in London, where in 1889 he joined the staff of the Speaker , the Liberal weekly newly established by Sir Wemyss Reid.

He was knighted in 1910, and succeeded to the professorship of English literature at C ambridge in 1912. He retained until 1899 his connection with the Speaker, a part of his con¬ tributions to which appear in the collections of short stories, (Noughts and Crosses } (1891) and <The Delectable Duchy) (1893). Among his further volumes are (Green Bays: Verses

?lnarodle,s> 0893); (The Golden Pomp) (1895), an Elizabethan* anthology; <Ia> (1896)- 'Adventures in Criticism > (1896) ; being sete!eAjeviews * <The ShiP of Stars } (1899); Old Fires and Profitable

Ghosts> (1900)- <The

L-d'sLuck' (1901); (The Westcotes> (1902); The \Yhite YVolU (1902); (The Adventures

PcW C903ˆ 'Hatty Wesley' (1903) and 'Shining Ferry> (1905); <Shakes-

?ACrri C)hn/!ˆnA> (19Q6>; 'From a Cornish Window> (1906); 'Poison Island) (1907);

Major Vigoreux) (1907); 'True Tilda) (1909); Lady ˆood-for-Nothing) ; 'Corporal Sam and

?ioie9rASt?\TˆSi ; 'Hocken and Hemken)

(1912); Nicky Nan, Reservist) (1915); <On

the Art of Writing) (1916); 'Memoir of Arthur John Butler) (1917). He published also three anthologies of English verse, which are marked by the finest appreciation of lyric quality.. His style is vivid, his humor subtle and poignant and his imagination vigorous and colorful. These qualities gained him the com¬ mission to complete the novel 'St. Ives) left unfinished by Robert Louis Stevenson Cq.v.).

aPPeared over the pseudonym n „ucb material he has derived from

Cornwall where he has made particular study of the Welsh poor.

QUILP, kwilp, a malicious and hideous dwarf who figures prominently in Charles Dick¬ ens novel, 'Old Curiosity Shop.) He torments and abuses his wife Betsey, and when about to be arrested for felony drowns himself.

QUIMBY, kwim'bi, Phineas Parkhurst

FeTTsn? ˆ yaIerWb-Lebanon> N. H., 16 i?02; d-Belfast, Me., 16 Jan. 1866. In

1838 his interest in hypnotism was awakened

through a series of lectures given in Belfast by

a Dr. Collyer. He made a special study of

the subject and afterward traveled through

Maine and New Brunswick giving exhibitions

of mesmerism. His interest was then aroused

in the relation of mesmerism and healing and

he thereafter devoted himself to mental healing

a though he later dispensed with mesmerism as

unnecessary m the diagnosis and mental cure

of disease. In 1859 he opened offices in Port—

Djf' ˆeWaIt\°ˆh retaining his residence in Belfast. Mrs. Mary Baker G. Eddy, then Mrs. Patterson, was one of his patients in 1862 but always disclaimed being influenced by him in the foundation of. the cult of Christian Science In an article written, by Quimby in 1863 he uses the term <(Christian Science,® and one of his pMient5 a Dr. Evans, made repeated use 9f teterm mental, science® in articles written

pUiimby s lnfluence in this field in the middle of the 19th century was considerable

<The Philosoph-capi,naPdtSy°mofThe|

Breton (Kemper,1 junction or confluence. It has the fine cathedral of Saint Corentin, built in 1424, and two churches — one, that of Locmaira dating from the lllh century; the other, Saint Mathieu, dating from the 16th. The old capital of Cornouailles, it figured in the religious wars. It has sardine-fisheries, breweries, paper fac¬ tories, tanneries and a population of about

20,000.

QUIN, kwin, James, English actor: b. Lon¬ don, 24 Feb. 1693; d. Bath, Somerset, 21 Jan. 1766. He was the son of an Irish barrister, and was educated in Dublin. In 1714 he went upon the Dublin stage, and a year after ap¬ peared at Drury Lane Theatre. In 1717 he went to the theatre in Lincoln's-Inn-Fields, where he remained 14 years, and acquired celebrity in characters of grave, dignified and sententious tragedy, as in Cato, Zanga and Coriolanus (in Thomson's tragedy of that name), and in those of strong, sarcastic, comic humor, as Falstaff and Volpone. In 1735 he re¬ turned to Drury Lane, on such terms as no actor had previously received ; and he retained pre-eminence until the appearance of Garrick in 1741. In 1747 he was engaged at Covent Garden with Garrick ; but the new actor ob¬ tained so great a share of attention that Quin retired from the regular stage in 1751. His last performance was Falstaff (1753), in which character he is supposed never to have been excelled. Garrick, once his rival afterward his friend, wrote the epitaph for his monument in Bath Abbey. Consult Doran, J., < Annals of the English Stage> (3 vols., London 1887).

QUIN AULT, ke-no, Philippe, French dramatist: b. Paris, 3 June 1635; d. there, 26 Nov. 1688. He studied law, but became a play¬ wright, his first dramas (Les rivales1; (L'Amant indiscret1 being produced when he was 18 and meeting with marked success. The continued success of his tragedies, comedies and tragi¬ comedies, of which he produced 16, made him a mark for the satire of Boileau, and he aban¬ doned tragedy and engaged in writing librettos for the operas of Lulli. In this field he dis¬ played great originality and though his success at the time was attributed to Lulli's music by Boileau and other critics, his verse is still read and admired while the music is forgotten. He was admitted to the French Academy in 1670 and his later years were spent in ease and comfort. Of his operatic pieces (Armide) and <Atys) are best known and of his dramas <Astarte) (1663) and (La Mere Coquette1 (1665). Editions of his works were published in 1739, 1842 and 1880. Consult Richter, E., (Philippe Quinault1 (Leipzig 1910).

QUINCE, a shrub or small tree (Cydonia vulgaris) of the rose family; a native of central and eastern Asia, where it was cultivated more than 2,000 years ago and whence it has been introduced into all cool temperate countries of the civilized world. It is a close relative of the apple and pear, with which trees some botanists class it, but from which it is distinguished by having its flowers solitary upon the ends of twigs of the present season's growth. The pop¬ ularity of the quince is limited because it is inedible in the fresh state, but it is highly prized for making preserves, jellies, etc., and as a flavoring for mixing with other fruits.

The plant is propagated mainly by stool layering, the rooted layers being grown in nur¬ sery rows usually two years after their removal from the parent bush. They are then planted from 10 to 15 or more feet apart, the distance depending upon the soil. On light soils the shrubs make rapid growth but are shorter lived and less productive than upon heavy. They should commence to bear when about three years old and reach full bearing when 10. Con¬ trary to popular opinion the quince will do best when cultivated, but the stirring of the soil must not be deep because the feeding roots are rather close to the surface, especially if the soil be very moist. To obviate this danger, growers often set the plants rather deeply and for the first few years work the soil away from them so as to induce deep rooting. They always use shallow rooting cover crops. It is another popular misconception that the plants do best in undrained soil. The best orchards of western New York, where the quince is an important crop, are upon well-drained land.

The tree seldom grows more than 15 feet tall. It should be trained in bush form; that is, with several stems, though some growers prefer the tree form with only one stem. The latter seems more likely to be injured by borers. Be¬ yond the removal of interfering, dead or un¬ necessary limbs the pruning consists of ((heading-in11 the twigs, a process which reduces the number of fruits. Being fairly hardy and a rather late bloomer the quince is a very regular annual bearer, but unless the tops be kept open and the quantity of fruits reduced the specimens will be inferior. Though the fruits ripen late and when gathered are generally very hard they should be handled very carefully and not be allowed to freeze. Except as indicated the man¬ agement of a quince orchard is much the same as for pear orchard.

Among the insects which feed upon the quince are several borers, scale insects, cater¬ pillars, plant-lice, etc., which are found on other fruit trees, especially apples and pears. These may be controlled in the same way. (See Apple; Pear; Insecticide.) The quince curculio (Conotrachelus cratcugi), a broad-shouldered snout-beetle of American nativity, lays its eggs in the fruit in early summer. It may be con¬ trolled like its relative the plum curculio. (See Plum). Several so-called plant diseases com¬ mon to the pear and apple are sometimes re¬ ported upon the quince. They have been com¬ bated in the same way as on the other fruits. Consult Bailey, (Cyclopedia of American Horti¬ culture 1 (New York 1900-02) ; Meech, (Quince Culture1 (New York 1896).

QUINCKE, Georg Hermann, German physicist: b. Frankfort-on-theOder 1834. He was educated at the universities of Berlin, Kdnigsberg and Heidelberg, and in 1859 was privatdocent at the University of Berlin. In 1872 he was appointed to a chair at the Univer¬ sity of Wurzburg, and in 1875 became professor of physics at Heidelberg. He has made im¬ portant investigations of capillary phenomena, and valuable researches respecting electric in¬ fluence upon different forms of matter. He was created D.C.L. by Oxford, LL.D. by Cambridge and became honorary Fellow of the Royal Society of London. Besides his contributions to physics and other sciences, he wrote (Ge-

schichte des physicalischen Instituts der Uni-versitat Heidelberg (1885).

QUINCUNX, an arrangement of five ob¬ jects in a square, one at each corner and one in the middle. It is particularly employed in reference to the arrangement of trees. The term is frequently used in astronomy.

QUINCY, kan-se, Antoine Chrysostome Ouatremere de. See Quatremere de Quincy, Antoine Chrysostome.

QUINCY, kwm'zi, Edmund, American au¬ thor, son of Josiah Quincy (1772-1864) : b. Boston, Mass., 1 Feb. 1808; d. Dedham, Mass., 17 May 1877. He was graduated from Harvard in 1827, was a prominent and able contributor to the anti-slavery press and wrote (Wensley) (1854); (Life of Josiah Quincy> (1867); <The Haunted Adjutant and Other Stories) (1885) tfnd edited Congressional Speeches) (1874).

QUINCY, Josiah, sometimes called Josiah Quincy, Jr., American lawyer: b. Boston, Mass., 23 Jan. 1744; d. at sea off Gloucester, Mass., 26 Apnl 1775. He was graduated from Harvard in 1763, studied law in the office of Oxenbridge Thacher and acquired a large practice. After the ˆBoston Massacre® (q.v.), he was selected with John Adams, by Captain Preston as coun¬ sel for the defense. He wrote many political pamphlets and contributed much to contempo¬ rary journals. In 1774 he sailed for England, where he consulted with the friends of

America, but died on the return voyage. An able orator, he was among the first to assume a bold revolu¬ tionary attitude. Though he incurred at the time some odium for his defense of Parker, his course was later strongly commended. His (Lif e) was published by his son Josiah (q.v.).

QUINCY, Josiah, American statesman and educator: b. Boston, 4 Feb. 1772; d. Quincy, Mass., 1 July 1864. He was graduated from Harvard in 1790, studied law and in 1793 was admitted to practice, and gave much study to political problems. By his oration in Old South 4 July 1798, he gained so extended a reputation that in 1800 he was made Federalist candidate for representative in Congress. Though de¬ feated then through the ridicule of Republican journals, he was elected in the autumn of 1804 after having in the spring of that year been chosen to the State senate. He remained in Congress until 1812, when he declined re-elec¬ tion. He was a finished orator, spoke boldly on many difficult topics of debate, and was one of the most efficient members of his party, which during his whole term of service remained hopelessly in the minority. His statesmanlike grasp of affairs is most clearly shown by the constant emphasis which he placed upon the increasing political danger with which the Union was menaced by the slave power. He feared civil war, and preferred a peaceable secession — a course not then seen, as it was later, to be impossible. In the State senate he urged Massa¬ chusetts to suggest to Congress an amendment of the Constitution, by which the clause permit¬ ting slave-States to reckon three-fifths of the slave population in obtaining a basis for repre¬ sentation was to be stricken out. Of course, such a measure, had it succeeded, would have resulted in the dismemberment of the Union. Quincy opposed the annexation of the Louisiana territory, and in his speech of 4 Jan. 1811 took

the advanced Federalist position that the Con¬ stitution did not confer on Congress power to admit any new States save such as might be formed from territory belonging to the United States in 1787. He declared that, if the bill passed, the Union was thereby dissolved, and that it would be the right of all States an<J the duty of some <(to prepare definitely for a sepa¬ ration. ® This is believed to be the earliest enun¬ ciation in Congress of the doctrine of secession. Eventually Quincy acquiesced in the purchase, upon each of the original 13 States signifying its assent. He attacked the Embargo, and opposed the War of 1812, though unlike many Federal¬ ists, he supported the administration, and on 25 Jan. 1812 made in the House a notable speech on the navy. Upon his retirement from Con¬ gress in

1813, he was at once elected to the State senate, where he remained until 1820, then entering the House of Representatives, of which he was speaker until his resignation in 1822 to become judge of the Boston Municipal Court. In this capacity he was the first to hand down the ruling then much criticized but now accepted in the United States and England, that the publication of truth with good intent and for a justifiable end is not libel. From 1823 to 1828 he was second mayor of Boston ; during his administration all the municipal departments were put in efficient working order. In 1829 he became president of Harvard, and this post he held until his retirement in 1845. In 1856 he was a supporter of Fremont for the presidency. Besides several speeches, he published (History of Harvard University* (1840) ; (History of the Boston Athenaeum* (1851); (The Munici¬ pal History of Boston) (1852); <Memoir of John Quincy Adams-* (1858) and other works. Lowell refers to him as <(a figure of admirable example in a democracy as that of a model citizen.® Consult Quincy, (Memoir* (1867) ; Lowell, (A Great Public Character* in (My Study Windows> (1867).

Vt'UiiNL,!, josian, American lawyer, son of Josiah Quincy (1772-1864) : b. Boston, Mass., 17 Jan. 1802; d. Quincy, Mass., 2 Nov. 1882. He was graduated from Harvard in 1821, served as president of the Massachusetts senate in 1842, was mayor of Boston in 1845ˆ19 and wrote (Figures of the Past* (1882).

QUINCY, Josiah, American politician, son of Josiah Phillips Quincy: b. Quincy, Mass., 15 Oct. 1859 ; d. 8 Sept. 1919. He was gradu¬ ated from Harvard in 1880 and was admitted to the bar but never practised. He was a leading member of the Democratic party, was chairman of that party's State committee and manager of the literary bureau of the National Committee in 1892. He served four years in the Massachusetts legislature and in 1893 was ap¬ pointed Assistant Secretary of State by Presi¬ dent Cleveland, serving six months. In 1895 he was elected mayor of Boston and in 1897 reelected, his progressive policy in regard to the extension of municipal functions attracting wide attention. He established the department of municipal statistics, a municipal printing-office and electrical construction department, greatly increased the number of public baths and provided public lectures and concerts and organized eight unpaid commissions to have charge of the city's charitable institutions, pub¬ lic baths and other improvements.

QUINCY, Fla., city and county-seat of Gadsden, 24 miles northwest of Tallahassee, on the Seaboard Air Line and the Georgia, Florida and Alabama railroads. It is situated near the northern border of the State in a productive cotton and tobacco district and there are also large deposits of fuller's earth ; the town has a considerable trade in these products. Pop.

(1920) 2,540.

QUINCY, Ill, city, capital of Adams County, on the east bank of the Mississippi River, 263 miles south of Chicago and 142 miles north of Saint Louis. It is built on an elevated plateau 160 feet above the high-water mark of the river. The trade of the city is extensive and is distributed on seven lines of railroad and the Mississippi River. The commercial in¬ terests of Quincy are represented by 1,500 firms with a capitalization of over $15,000,000, embracing almost every .kind of industry. Quincy is known particularly as a manufac¬ turing city, there being eight foundries with a capitalization of $2,000,000; seven machine shops with a capitalization of over $1,000,000; five carriage manufactories with a capitaliza¬ tion of $1,000,000; five flour-mills with a capi¬ talization of $500,000; also the largest steam-governor plant in the world, with a capitaliza¬ tion of $1,000,000; two breweries with a capi¬ talization of $1,000,000 and four incubator fac¬ tories with a capitalization of $1,000,000. There are also manufactories of furniture, plows, to¬ bacco, organs, soap, files and matches. Many of the streets are traversed by electric rail¬ ways, the total extent of which is 27 miles, giving access to all the principal business points and parks. The city is divided into seven wards. Of public and charitable buildings, the city contains two hospitals, with a combined ca¬ pacity of about 300 beds; a free public library and reading room, with 40,000 volumes ; 10 asylums and homes and 33 churches, represent¬ ing about all the denominations found in a community of the size of Quincy. Of public schoolhouses there are 15, having been built at an aggregate cost of $750,000, with a corps of 163 teachers. The attendance of the public schools number 5,400

children. Besides these there are 12 parochial schools that have an at¬ tendance of 2,400 children with an attendance among the three colleges located here that have an attendance estimated at about 1,500. Quincy's Federal building and courthouse are buildings worthy of any city, so is the city hall, Y. M. C. A. building, Masonic Temple, Cham¬ ber of Commerce building, State armory, Knights of Columbus building, Labor Temple. Quincy was settled and laid out by John Wood in the year 1821 and to his memory there has been erected a statue in Washington Park. Quincy has a series of 16 nicely located parks situated in different parts of the city connected by a boulevard surrounding the city and in all aggregating 300 acres. This in connection with the Illinois Soldiers' and Sailors' Home, which contains 225 acres, makes ample room for outdoor recreation. The Illinois Soldiers' and Sailors' Home, situated upon these beauti¬ ful grounds, is complete in every detail and has a capacity for 2,000 veterans and the aver¬ age attendance is about 1,700. The water sup¬ ply of Quincy is given from a reservoir with a capacity of 20,000,000 gallons at an elevation

of 229 feet above the city, giving an average pressure of 40 pounds, the water before enter¬ ing the reservoir being thoroughly filtered, mak¬ ing it absolutely pure. The pumping capacity is supplied by a triple expansion engine of 8,000,000 gallons daily and one compound en¬ gine of 4,000,000 gallons capacity daily, the water being filtered by 14 jewel gravity me¬ chanical filters, therefore, insuring the city over its distributing system of 45 miles of water mains, an inexhaustible supply of water as the water is derived from an intake pipe from the channel of the Mississippi River. The city owns the waterworks. The 40 counties within a radius of 75 miles of Quincy, comprise 21,337 square miles; a population of 861,000 ; 93,600 farms, worth $1,092,162,000, with annual prod¬ ucts worth $131,700,000. The urban population in these 40 counties is 210,000. The principal agricultural products are wheat, oats, corn, live¬ stock, fruit. The immediate retail trade terri¬ tory, 13 counties, comprises a population of 300,000. The immediate jobbing territory, Illi¬ nois, Iowa and Missouri, comprises a popula¬ tion of 11,000,000. Pop. of Quincy, 35,978.

QUINCY, Mass., city in Norfolk County, on Quincy Bay and on the New York, New Haven and Hartford Railroad. The city in¬ cludes within its corporate limits several vil¬ lages; its area is about 16j£ square miles, nearly four square miles of which are in public parks. It is bounded on the north by Neponset River and on the south by Fore

River. It was settled in 1625 and was first known as Mount Wollaston. About four years later Thomas Morton (q.v.) obtained control of the settle¬ ment and established his <(New English Canaan,® (<Merry Mount.® His institution of the <(May Pole® and other <(Idolls® and his manner of living in general, offended the Puri¬ tans of Boston and they thought him a danger¬ ous man in the new country. He was arrested by Miles Standish and sent back to England. The place remained a part of Braintree until 1702 when it was incorporated as Quincy, after John Quincy. In 1888 it was chartered as a city.

The first railroad in New England was con¬ structed here in 1826-27 ; it was two miles long operated by horses and used for carrying stone for building Bunker Hill Monument. There are many places of historic interest in and around Quincy and some of the buildings of Revolutionary days are still in existence. Quincy came into great prominence the last quarter of the 19th century, on account of an educational movement under the leadership of Francis Wayland Parker (q.v.). Many prom¬ inent people have lived in Quincy; it was the birthplace of John Adams, John Quincy Adams and John Hancock. The Adamses are buried under the old <(Stone Temple.®

Quincy is largely a residential suburb of Boston ; but the quarrying interests are still of importance. It has also a large ship building plant, machine and tools shops. It has a city hospital, the Woodward Institute for girls ; the Adams Academy, a high school, elementary public schools and the Thomas Crane Public Library, which contains about 25,000 volumes. The Metropolitan District System supplies Quincy with water. The government is admin¬ istered under a revised charter of 1900, which provides for a mayor and council, elected an-

nually. The school board is chosen by popular vote. The mayor appoints the heads of all de¬ partments except that of the school board. The council elects the other administrative officials. Pop. (1920) 47,876. Consult Adams, (Three episodes of American History5; Hurd (History of Norfolk County5 ; Pattee, <A History of Old Braintree and Quincy> ; Wilson, (Where American Independence

Was Born) ; Adams, ‘The Centennial Milestone) ; Report of United States Commissioner of Education, Vol. I (1902) on the Quincy educational movement; Partridge, <Quincy Methods. >

QUINET, ke-na, Edgar, French litterateur: b. Bourg, 17 Feb. 1803; d. Versailles, 27 March 1875. He was educated at the schools of Charolles and Bourg and the Lycee of Lyons His first publication was <Tablettes du Juif Errant) (1823), an apology for his abandon¬ ing the military career which had been planned for him. A visit to Germany introduced him to Herder’s < Philosophy of the History of Hu¬ manity, } which interested him profoundly and gave direction to his life studies. He published a translation with an introductory essay in 1827. Living at Strassburg he met Victor Cousin and Jules Michelet, the latter of whom became his closest friend. In 1829 he was chosen by the French Academy to go to the Morea as philol¬ ogist attached to a commission of savants, and on his return in 1830 published (De la Grece moderne et de ses rapports avec l’antiquite.5 His republican sympathies were stirred by the revolution in July and his feelings gained ex¬ pression in political pamphlets. He wrote a remarkable prose poem <Ahasuerus5 (1833) and later two other epics, < Napoleon > (1836) and <Promethee) (1838). His purpose in these three was to represent humanity as general, in¬ dividual and religious —Ahasuerus, the race; Napoleon, the individual and Prometheus, the martyr. In 1838 he published a reply to Strauss’ (Life of Jesus5; the next year was appointed professor of foreign literature at Lyons and in 1841 became professor of southern literature in the College of France. His Lyons lectures were published under the titles, (Genie des Religions5 (1842) and (Le christianisme et la Revolution Frangaise.5 His lectures delivered at the Col¬ lege of France attacking the Jesuits so aroused public feeling that the government closed his classroom in 1846. His republican opinions be¬ came so pronounced and his expression so out¬ spoken that after the coup d’etat of Louis Na¬ poleon in 1851 he was banished from France. His exile, which lasted until after the fall of the empire in 1870, was fruitful in such works as <Marnix de Saint-Aldegonde5 (1856) * (L’histoire de mes idees5 (1858); ˆMerlin l’enchanteur5 (1860) and the devolution fran-gaise5 (1865). Re-established in Paris, he was elected to the Chamber of Deputies and voted consistently against all monarchial reaction and for the secularization of laws. His last work,

(L esprit nouveau > (1874), contains an ex¬

pression of his social, political and intellectual <£eed. Hls comPlete works were published in 30 Vols. (1877— 82). Consult his (Lettres d’exiP (1884); < Edward Quinet depuis 1’exiP

(a biography by his widow, 1888-89) ; Heath (Edgar Quinet: His Early Life and Writings5

(1881). *

QUlfilGUA, keng'wa, Philippines, pueblo, province of Bulaca, Luzon ; on the Quingua River, seven miles from its mouth; six miles north of the town of Bulacan. It is a road centre and is a health resort for the surround¬ ing provinces because of its pure water. Pop.

8,860.

/r ?rUMIˆsIDINE' or CONQUININE

(L20H24N2O2) , an alkaloid found in Calisaya bark (Cinchona Calisaya), and in some other varieties of "Peruvian bark.55 It is prepared from the mixed cinchona alkaloids (quinoidine) by extracting the powder with ether; shaking with dilute sulphuric acid; neutralizing with ammonia; and precipitating with Rochelle salt. The filtrate is then concentrated, decolorized with charcoal, and precipitated with a strong solution of potassium iodide. The crude quini-dme hydriodide is then dissolved in alcohol, and precipitated with ammonia; dissolved in dilute acetic acid ; precipitated again with ammonia ; and finally crystallized from a boiling hot solu¬ tion in alcohol. It is also prepared from ihe mother-liquor remaining after the manufacture of quinine. Common soda is added, and the crude quinidine is precipitated. This is then turned into iodide, and the process continues as above described.

In medicine quinidine is known to be a more powerful febrifuge than quinine, being effect¬ ive in 17 per cent more cases. Its small yield, as compared with quinine, from the bark ex¬ tract restricts its manufacture and use. See Quinine.

t*t9UININE (kwin'en or kwi'nin), QUIN-IN A or QUINIA, a drug (C20H*N2O2) largely used in the cure of malarial fevers, in which it is regarded as a specific. It is also a valuable tonic. Quinine is one of the five most important of the 21 alkaloids obtained from the bark of the cinchona-tree (Peruvian bark; see Bark, Peruvian) ; the others being quinidine cinchomdine, cinchonine and hydroquinine .(q v.) . The curative power of these alkaloids

iSQAoCCU5ate y shown by the report, dated April 1«98, of a commission appointed by the British Indian government (Madras) aftef the sugges¬ tion of Clements R. Markham, C.B., F.R.S Cases of fever numbering 2,472 were' treated, and the result showed failures per 1,000 as fol-ows: Quinidine, 6; quinine, 7; cinchonidine, 10; cinchonine, 23. Quinine alkaloid is seldom used, as it is very insoluble (59° F,, 1,600 parts yjper) Ihe salt known as quinine sulphate (C2oH24N202)H2SO + 7H203 is generally in use but the acid hydrochloride (also called the

C j°rLte 1S Preferred by careful practitioners • and the tannate for children and the more susceptible, in doses two to three times as large.

Ihe average dose of quinine sulphate for adults in the United States is four to five grains every three or four hours beginning a few hours after a paroxysm and continuing until three hours before another is due, when a much larger dose is given If, as is to be expected, no paroxysm occurs, the treatment is renewed for some hours on the second day, and then again on the ninth ay, which completes the cure. In warmer and more fever-ridden countries, twice to three tunes this amount is given. Quinine is also used wnh great success as a prophylactic. Since 1902 it has been distributed free by the Italian gov¬ ernment in the malarial sections. The preven-

live amount for adults is five to seven grains of the sulphate per day divided into two doses. Children receive two to three grains daily during the malarial season. As a tonic the best results are obtained by doses of one-half grain of the hydrochloride twice daily. In the ad¬ ministration of quinine it has been repeatedly noticed that toxic symptoms have been de¬ veloped in some cases; and investigations have shown that in certain conditions both cinchonine and quinine develop poisonous isomeric forms, known as cinchotoxine and quinotoxine. This change takes place in the preparation of quinine when the heating at 212° is prolonged and acetic acid is present. The same changes have been noted at the temperature of the body in the presence of such acids as are sometimes found in the digestive tract, particularly acetic and citric acids. The poisonous symptoms are sometimes severe, and such patients should be treated with quinidine (q.v.). The average con¬ sumption of quinine sulphate in the world is 15,000,000 ounces a year, and the approximate average net cost of production is 18 cents per ounce. The importations into the United States in the fiscal year ended 30 June 1918 were 3,273, 628 pounds of cinchona and other quinine-yielding barks, valued at $810,775, and capable of supplying an average of 4 per cent (2,095.122 ounces) of quinine sulphate; and 1,445,702 ounces of quinia sulphate and other alkaloids and salts of cinchona bark, valued at

$656,945.

To manufacture quinine, the bark is ground to a No. 70 powder (screens of 70 meshes to the inch), and mixed with one-third its weight of slaked lime, made into a paste with water and dried thoroughly at 212° F. It is then powdered and mixed with petroleum and boiled about five hours, the alkaloids in the bark dis¬ solving in the oil, or amyl alcohol may be used for the solvent. The powder is then al¬ lowed to settle, and the oil is drawn off and agitated with hydrochloric acid. The alkaloids in mixture, known commercially as quinoidine, now leave the oil and go to the acid-water, in which they are more soluble than in the oil. The oil and water separate upon

standing, and the acid water is drawn off and neutralized with an excess of ammonia or soda, when the quinine and other alkaloids are precipitated together. The alkaloids are redissolved in very dilute sul¬ phuric acid and then the solution is almost but not quite neutralized by very dilute soda solu¬ tion cautiously added. It is then heated to the boiling point, and enough boiling water added to make 70 ounces of water for each ounce of mixed alkaloids. Upon cooling, crystals of quinine sulphate are thrown out, leaving the other alkaloids in the solution — called the mother-liquor (see Quinidine). The quinine is purified by recrystallizing several times from its solution in water at 212°.

History. — The virtues of the bark of what was afterward known as the cinchona-tree were discovered by the Jesuits in Peru about the year 1600. Prior to that date the Indians evidently knew that it had remedial powers, but they did not use it to any extent. In 1638 the Countess of Chinchon, whose husband, Don Luis Geron-imo Fernandez de Cabrera Bobadilla y Mendoza, was viceroy of Peru, was cured of an intermit¬ tent fever by the use of this bark administered by her physician, Don Juan dc Vega, on re¬

quest of Don Francisco Lopez de Canizares, corregidor of Loxa. Upon her return to Spain in 1640 the countess carried a supply of the bark with her, and through her it became known to the world. It was very fitting that 100 years later Linnaeus should name the genus of trees bearing this bark for the countess — Cin¬ chona (Linnaeus erred in spelling; it should have been Chinchona) .

The actual discovery and isolation of qui¬ nine is to be ascribed to the French chemists Pelletier and Caventon in 1820, although Gomez, a Portuguese, succeeded in isolating the febri¬ fuge principle, which was practically quinine, in 1816. Sulphate of quinine was first made in America in 1823, and the house of Powers and Weightman, which was founded five years be¬ fore this date, was undoubtedly the first to manufacture it for sale. Until about 1850 the only source of supply was found in the trees growing wild on the eastern slopes of the Andes from Colombia southward to Bolivia, and as quinine had become so valuable a remedy the world over, the native forests near enough to shipping ports to be economically available were almost exhausted so great had become the de¬ mand, for cinchona bark. The price had reached about $20 per ounce. The Dutch, knowing that they had in Java the soil, climate, altitude and temperature almost identical with those in the Peruvian Andes, determined to se¬ cure trees or seeds and

try to cultivate it there. (Cinchona requires an altitude of 5,000 to 7,000 feet, tropical temperature, without much vari¬ ation, from 100 to 200 inches of rain a year, and a volcanic soil). The British government made the same attempt in India, but with poor results, because the same conditions of soil and rain do not prevail ; and after about 50 years' endeavoring to raise cinchona in India and Cey¬ lon, there only remain a few gardens owned by the government, the product of which is con¬ sumed in the army and among the natives, to whom it is sold through the post office at cost. The variety Cinchona succirubra, yielding cinchonidine, succeeds well in India.

The Dutch experiment, however, proved to be very successful and remunerative, although it involved almost insurmountable obstacles, loss of years of time and lives of earnest working scientists. The trees now thrive better even than their Peruvian ancestors, for the congenial environment found in Java, together with the methods of cultivation discovered by the Dutch, the most faithful of whom has been Van Leersum, government director of Cinchona undertakings, gave yields of as high as 10 per cent quinine sulphate, while an average of 2 to 5 per cent was a fair yield of the Peruvian trees. The annual average export of the Java plantations is 16,500,000 pounds of bark.

There are now thriving plantations in Bolivia and Colombia and Ecuador as well as in Peru, and with the modern methods of strip¬ ping the bark have met successfully the com¬ petition of the Java product. Consult Mc-Gilchrist, A. C., ˆQuinine and Its Salts) (Cal¬ cutta 1911) ; United States Public Health Serv¬ ice Report No. 175, ˆQuinine Prophylaxis for Malaria) (Washington 1914).

QUINISEXT COUNCIL, or COUNCIL IN TRULLO, council of bishops held (692) in the hall named Trullus of the imperial palace

at Constantinople. The design of this council was to supplement the purely doctrinal canons of the fifth general council (553) and of the sixth (660) with canons regulating discipline; for this reason it has

been called in Latin, Concilium Quinisextum (Latin, quintus, fifth, and sextus, sixth), and in Greek Synodos Penthekte (Greek, pente, five; hektos, sixth). It was attended by 211 bishops, all Oriental, and its decrees have ever been repudiated by the Western Church. Among the rules of disci¬ pline enacted by this council is one declaring married men eligible to the orders of subdea¬ con, deacon and priest, but forbidding the mar¬ riage of one who is already in priest's orders.

QUINNAT SALMON. See Salmon.

QUINNIPIAC ((<long water land®), an In¬ dian tribe of the Algonquin linguistic stock, and probably forming a part of the Wappinger group, formerly residing on Quinnipiac River, New Haven County, Conn. Their principal vil¬ lage was on, or near, the present New Haven. In 1638 they numbered about 165; in 1735 they had increased to 250; in 1768 some of them moved to Farmington, where land was bought for them ; in 1774 the original settlements were reduced to 38 natives.

QUINOA, ke'nd-a, an annual herb (Chen - cpodium quinoa) of the order Chenopodiacece. It is a native of the Chilean and Peruvian Andes and extends intermittently to Mexico. It grows about three feet tall, bears triangular leaves, very inconspicuous greenish flowers and large seeds. In general the plant resembles the common lamb's quarters or goosefoot (C. al¬ bum), a well-known weed in American gardens. In South America and to some extent in Europe the plant is cultivated for its seeds, which are nutritious and are made into meal or fed to poultry. Its young tender foliage is also used like spinach, a related plant. Since it is a favor¬ ite food of certain insects it has not been profit¬ ably cultivated in California, where it was tried.

QUINOLINE, CHINOLIN, LEUCO-LINE, GHtN. Runge (1834) isolated at a high boiling point an oily basic substance from coal tar to which he gave the name Heukol.® Gerhardt (1842) obtained an oil by distilling quinine or cinchonine with caustic potash. He called it quinolein from its relation to quinine, but later the name was changed by Wohler to quinoline. Hofmann (1843) showed that leukol and quinoline were identical. It occurs also in bone-oil and the tar from brown coal, strych¬ nine and other plant alkaloids give it with caus¬ tic potash. As usually made in quantity by the interaction of 60 parts glycerine, 50 parts sul¬ phuric acid and 19 parts aniline, which mixture, after heating, is added slowly to 12 parts of nitro-benzine and the whole boiled for about two hours, or until the reaction is complete. The nitro-benzine remaining unchanged is re¬ moved by blowing a current of air through the mixture, and this is made alkaline

by adding caustic soda. It is then distilled with steam which carries oyer crude quinoline with some admixture of aniline. The latter is removed by fractionation and the quinoline is further puri¬ fied by oxidation with the dichromates. Quin¬ oline, when pure, is an oily liquid, with a spe¬ cific gravity of 1.095 and a boiling point of 460° F. ; at first colorless, but becoming dark on ex¬ posure to the air; possesses a penetrating, dis¬

agreeable odor; is slightly soluble in water and has strong antiseptic properties. It absorbs moisture from the air readily, forming the hydrate. It is a basic substance, forming solu¬ ble and easily crystallizable salts with acids. It is used to some extent in medicine and the arts as an antiseptic, its action being to prevent putrefactive fermentation but not to interfere with alcoholic fermentation. It is used as a throat wash in diphtheria, but has not displaced iodoform in surgical dressings. It gives rise to many compounds used in the manufacture of dyestuffs.

QUINONE, in chemistry, a class name which is applied to organic substances derived from aromatic compounds by the replacement of two <(ring® hydrogen atoms by two oxygen atoms. All the compounds of this class are colored and give colorless hydroquinones when reduced. Most of the quinones have the oxy¬ gen atoms in the ((para» relations to each other. A few ((ortho® quinones are, however, known. The simplest and first known of this class is ordinary quinone or benzoquinone, CgH402; obtained by oxidation of quinic acid, but now usually prepared by electrolytic oxidation of aniline with a mixture of dilute sulphuric acid and potassium bichromate. Its long golden yel¬ low prismatic crystals possess a peculiar pun¬ gent odor, and stain the skin yellow. Soluble in hot water or alcohol, they are volatile with steam and turn dark on exposure to the air, from which they absorb oxygen. On reduction it gives hydroquinone, C«H4(OH)2, a soluble colorless crystalline body that is used exten¬ sively as a photographic developer. Quinone is a very active chemical substance, forming a large number of derivatives of economic in¬ terest chiefly in the manufacture of dyestuffs. Another very valuable member of this class is anthroquinone, C6H4C202C6H4, a yellow crystal¬ line body obtained by oxidation of anthracene. Related to it and obtained from it is the very valuable dye alizarin, the substance to which madder owes its value as a dyestuff. See Alizarin ; Hydroquinone.

QUINONE-IMIDE DYESTUFFS. See

Coal-tar Colors.

QUINQUAGESIMA, kwm-kwa- j es'i-ma SEXAGESIMA, SEPTUAGESIMA, the

first, second and third Sundays before Lent. The words mean, respectively, 50th, 60th and 70th, and in the Roman calendar the names of the three Sundays are Dominica Quinquagesi-mce, D. Sexagesimce and D. Septuagesimce, re¬ spectively. The use of the words is ancient, dating at least from the 7th century, but their meaning is obscure. Alcuin (9th century) sug¬ gested the numeration of 70 days from Do¬ minica Septuagesimce down to Pascha Clausum, the octave of Easter; but that leaves the other two names unexplained. Another explanation offered by Alcuin was that these two names are formed on the analogy of Quadragesima (Lent), being, one and two weeks before the first Sunday in Lent : a false analogy, which assumes seven to be equal to 10; but false as it is, it led to calling the second week of Lent Tncesima (30th) and the third Vicesima (20th).

QUINQUARTICULAR C O N T R O - VERSY. See Arminianism.

QUINSY, an acute inflammation of the tonsils; acute parenchymatous tonsilitis. It is attended by fever, pain, headache, difficulty in swallowing (dysphagia), and frequently by sup¬ puration. One attack seems to predispose to another. It is not uncommon for individuals to have attacks year after year at about the same time of the year. Disturbances of the digestive organs — diarrhoea, constipation, loss of appetite, nausea, vomiting, etc., are predis¬ posing causes. Sudden changes of weather, exposure to damp and cold, especially after coming out of a heated room, are exciting causes.

Quinsy sets in with an uncomfortable feeling in the throat, and fever

sometimes high, pre¬ ceded at times by chilliness. The patient is restless and irritable, the tongue becomes cov¬ ered with a thick yellowish coating, the breath is unpleasant, saliva drools from the mouth, there is difficulty in opening the mouth, swal¬ lowing is attended with great effort and pain and sometimes food returns through the nose. Pain may be severe most of the time, shooting toward the ear upon the affected side. Swelling externally behind the ears and involv¬ ing the glands of the neck may be marked. A thick tone of the voice, thirst, headache, snor¬ ing and dryness of the throat are common symptoms. Sometimes breathing is impeded, especially if both tonsils are involved. On ex¬ amination of the throat one or both tonsils are seen to be bright red and sometimes covered with patches of yellow secretion. The soft palate is red, greatly swollen and cedematous, as is also the uvula, which not infrequently adheres to the tonsil. Quinsy may terminate either in resolution or suppuration. If resolu¬ tion is to take place, in about four or five days the inflammation begins to subside, and the patient in from 10 days to a fortnight may re¬ sume his ordinary employments. If suppura¬ tion is to occur, the tonsilar swelling becomes greater, and if both tonsils are inflamed they may meet, causing great discomfort. When pain and discomfort become almost unbearable, an inflamed tonsil generally breaks and great relief and speedy convalescence follow.

Occasionally, if the disease is taken at the outset, it can be absorbed by a saline purgative or an emetic and the use of one or two drops of tincture of aconite every hour. If it con¬ tinues in spite of early treatment, it will prob¬ ably run its course, though much can be done to palliate. Keep the patient quiet (sometimes in bed), and give hot or cold liquid foods, whichever he can swallow best. Washing out throat with hot water every hour may be com¬ forting, as also may inhalations of the steam of hot water, cooled by passing through a towel or a long tube. Saline laxatives are useful ; so are hot compresses about the neck. Ice and cool drinks have an efficacious value. Local applications and the use of medicines and stimulants should be left to the judgment of the physician. Abscesses should be opened (not left to mature) and astringent gargles af¬ terward used. Diseased tonsils should be excised.

QUINTAIN, an apparatus used in a mili¬ tary sport or exercise by men on horseback, formerly practised in England to try the agility of the country youth. The quintain was an up-vol. 23 — 7

right post with a cross-bar on the top of it, turning round on a pivot.

To one end of the bar was suspended a bag of sand, the other end was broad and flat. The horseman had to ride tilt at the flat end with his lance and endeavor to strike it and pass on before the bag of sand could whirl round and strike him on the back.

QUINTAL, a weight of 100 or 112 pounds, according to the scale used. See Weights and Measures.

QUINTANA, ken-ta'na, Manuel Jose,

Spanish poet: b. Madrid, Spain, 11 April 1772; d. there, 11 March 1857. He was educated in the University of Salamanca, studied law, en¬ gaged in practice at Madrid, where he occu¬ pied several government offices, and soon turned his attention to literature. He was author of almost all the manifestos and proclamations issued in the War of Independence and his patriotic poems soon won for him great popu¬ larity. He edited the journal Variedades de Ciencias, Literature, y Artes, founded the S emanario Patriotico and urged upon the peo¬ ple the necessity of resisting Napoleon. After the restoration he was imprisoned in 1814-20, and then was released by the revolution. He lived in retirement from 1823 until 1833 when he was appointed preceptor to the infant queen, Isabella, and president of public instruction. In 1835 he was elected senator and was afterward highly esteemed at court. He was one of the leading poets of his time, attaining a European reputation. As a historian he is well known by his (Vidas de los Espanoles celebres) (1807-34). His complete works are published in Rivadevieyra's (Biblioteca de autores espanoles) (Vol. XIX, 1852), and by Rojas (1897-98).

QUINTET, a musical composition for five instruments or voices, accompanied or unaccom¬ panied. (1) Quintets for stringed instruments have been written much less frequently than quartets, by reason of their complexity. Boc¬ cherini, nevertheless, wrote 125. Among famous string quintets are Beethoven's two in C and E flat, Mendelssohn's in B-flat and Schubert's in C. There are various quintet combinations, in¬ cluding brass and wood-wind, as Mozart's in E-flat for oboe, clarinet, horn, bassoon and piano. (2) Vocal quintets are also rare, but very effective. The most notable modern exam¬ ple occurs in Wagner's opera of (Die Meister-singer. >

QUINTILIANUS, kwin-til-i-a'nus, Mar¬ cus Fabius, Roman rhetorician : b. Calagurris (Calahorra), Spain, about 40 a.d. ; d. about 118. He was educated at Rome, where he studied under Domitius Afer, and about 69 began to practise as an advocate. Subsequently he be¬ came a teacher of rhetoric, and had Pliny the Younger and the two

grandnephews of Domitian as pupils. Domitian bestowed on him the consular rank, and under the endowment of Vespasian he was the first public instructor to be paid from the imperial treasury. His first important treatise, (De Causis Corruptae Elo¬ quential is no longer extant. His great work, (De Institutione Oratoria) (12 vols.), was written about 93, and embraces a statement of his theory of education together with a discus¬ sion of the principles, scope and matter of oratory; also its manner under the general term style. (See Institutes of Oratory). The

best editions of Quintilian are those of Bur-mann (Leyden 1720), Capperonier (Paris 1725), Gesner (Gottingen 1738), Spalding and Zumpt (Leipzig 1798M829) and Halm (1868-69). There are also special editions of the 10th book, among which are those of Bonnell (1851), Kruger (3d ed., 1888), Peterson (1891) ; this book criticizes Greek and Latin literature, from the point of view of the orator, and its useful¬ ness in forming a vocabulary. The work as a whole is remarkable for its perspicuity and well-balanced judgment, as well as for the beauty of its graceful diction. From the 15th century, when the manuscript was first discovered, Quintilian was considered the standard author¬ ity on classical education throughout the Re¬ naissance period in Europe. The effect of his system is still recognizable in the curricula of classical schools. Consult Schanz, M., ‘Geschichte der romischen Literatur) (Munich 1913) ; Woodward, T. H., ‘Education During the Age of the Renaissance) (Cambridge 1906).

QUINTILIUS, kwm-tiri-us, Aurelius Claudius, Roman emperor, 270 a.d. He was a brother of Claudius II and at the latter’s death was elevated to the throne, but as the army of Sirmium had elected Aurelian emperor, Quintilius, seeing himself deserted by his fol¬ lowers, committed suicide. He seems to have been a man of unblemished character and to have possessed the high attributes of his brother. The length of his reign is usually placed at 17 days, but the large number of his coins extant indicates that he held the office for some months.

QUINTUPLE ALLIANCE. See Quad¬

ruple Alliance.

QUINTUS CALABER, or SMYR-NZEUS, Greek poet: belonging probably to the end of the 4th century a.d. His surnames are derived from the discovery of his poem in Calabria (in a convent at Otranto), and his mention of Smyrna as the place of his resi¬ dence. His poem, UapaXeinopeva ‘0/ur/pu ((Sup¬ plement to Homer*), is a continuation of the ‘ Iliad, *in which he imitates, with very little originality, the poets of the epic cycles. A critical edition of this, by Tychsen, with re¬ marks by Heyne (1807), was published by the Bipont Society. There is also an edition by* Kochly (1853), and Zimmerman (1891). Con¬ sult Paschal, G. W., (A Study of Quintus Smyrnaeus* (Chicago 1904); ‘also Christ-Schmid, (Geschichte der griechischen Literatur> (Vol. II, Pt. 2, Munich 1913).

QUINZE JOYES DE MARIAGE, kanz/ jwa de ma’ri-aj, Les (the 15 joys of mar¬ riage), a famous French satire usually credited to Antoine de La Sale and written between 1448 and 1456. The title was borrowed from a popular litany, ‘Les Quinze Joies de Notre Darned its profanity being in keeping with the lack of humane or moral sentiments in the satire. However, its wit and masterly style are unquestionable. A chapter is devoted to each of the 15 “joys® which are made to desig¬ nate the miseries of husbands. Consult Jannet, P., (Les Quinze Joyes de Mariage* (1857); Henckenkamp’s edition (Halle 1901).

QUIRINAL, one of the hills of Rome, not included in the ancient Septimontium, or “City of the Seven Hills,® but part of the four re¬

gions of the city, and. included in the Servian Wall. Next to the Palatine and Capitoline, it is the oldest and most famous part of the city. 1 he temples of Flora, Salus and Quirinus were on the Quirinal and also the baths or the great thermae of Diocletian and Constantine. Pope Gregory XIII began here the erection of a summer residence which was completed by Paul V. Victor Emmanuel took possession of it in 1870, and it has since been the residence of the king of Italy. One of the principal treasures of the palace is the ceiling decoration of one room, — painted by Overbeck. The subject is (The Flight of Pius IX in 18482 Other treasures are an ‘Annunciation* by Guido Reni, and several other works of art. (See Rome). Consult Baedeker, K., ‘Central Italy and Rome* (15th Eng. ed., Leipzig 1909) and Platner, S. B., ‘The Topography and Monuments of Ancient Rome* (2d ed., Boston 1911).

QUIRINUS, kwi-ri'nus, Roman deity, ranking next to Jove and Mars. His origin ap¬ pears indistinct, but he is represented as a war god prepared for battle in times of peace. The third great flamen was assigned to his worship and his temple stood on the Quirinal Hill near the Porta Quirinalis. He was honored by the Offline Salii and a new building was erected in his honor 293 b.c., which after its destruc¬ tion by fire was replaced with an imposing structure by Augustus 16 b.c. In the 1st cen¬ tury b.c., however, the belief that Quirinus was Romulus raised to the rank of a divinity gained credence and this opinion was favored by Caesar and Augustus. His annual festival was cele¬ brated on 17 January, the date of the supposed translation of Romulus to heaven. Consult Fowler, W. W., 'Roman Festivals* (London 1899) and Wissowa, Georg, 'Religion und Kul-tus der Romer* (Munich 1912).

QUIRINUS, Publius Sulpicius (Gk. form

Cyrenius), named in Luke ii as governor of Syria. According to Tacitus he was elected consul in 12 b.c; accompanied Gaius Caesar as tutor in the East in 2 a.d. ; and was appointed! to make a census of the newly annexed district of Judaea, an innovation in that country. The difficulty in reconciling the date of this census with the historical facts concerning the birth of Christ has excited considerable controversy. Consult Cheyne and Black, 'Encyclopedia Biblica* (London and New York 1903).

QUIRITES, kwi-ri'tez, originally the in¬ habitants of Cures, a Sabine town, and a name afterward applied to that portion of the Sabines who at an early period dwelt in Rome. "Quirites® being applied to them in their civil capacity, while "Romani** was applied to them in their political and military capacity. On this account it was regarded by the soldiers as a great indignity to be addressed as "Quirites,** and Julius _ Caesar on one occasion quelled a rising mutiny among his troops merely by scornfully haranguing them under the appella¬ tion of "Quirites.** But the contumelious sense of this name had banished before the time of the Augustan Age.

QUIROGA, ke-ro'ga, Juan Facundo, Ar¬ gentine politician and soldier: b. Rioja, Argen¬ tina, 1790; d. in the barranca of Yaco near Cor¬ dova, Argentina, 1835. He was educated in Spain and, on his return to Argentina, he be-

came a soldier in the army of General Ocampo (1810). Later he joined the Army of the Andes, from which he deserted because he did not find conditions to his liking. He seems to have led a wild life and to have been so addicted to gambling that he frequently found himself penniless. Finally he was arrested in 1818 on a charge of treason and imprisoned with a com¬ mon herd of Indians and half-breeds in the fortress of San Luis. There is organized the prisoners, among whom were a number of officers and soldiers, broke out of the prison and led them to the mountains where he was received as a hero by the natives of the in¬ terior. He organized a band of rude soldiery which made him practically the ruler of north¬ eastern Argentina in 1820. In 1827 he ap¬ pointed a governor of La Rioja, secured the election of Dorrego as President and, though defeated by General Paz in 1830, became gov¬ ernor of Buenos Aires in 1834. He was assassinated in the following year. He was a man of very strong will power and his ascendency over his followers was perhaps greater than that of any other leader of his country at that time.

QUIROGA, Vasco de, Spanish-Mexican prelate: b. Madrigal de Castilla la Vieja, about 1470; d. Uruapam, Mexico, 14 March 1565. He was graduated in law from the University of Valladolid, and owing to his brilliant scholastic record, his success in his profession and his in¬ fluence at court, he was appointed oidor of the audencia of Mexico. He arrived in the capital of New Spain in 1531, 10 years after the fall of the empire of the Aztecs and while the con¬ quest of a considerable part of modern Mexico still remained to be effected. Quiroga, in a very troublesome age, surrounded by the turbu¬ lent soldiers of the Conquest and the un¬ scrupulous adventurers who accompanied or fol¬ lowed them, performed his part in the govern¬ ment of New Spain with justice and firmness and gained the respect of Spaniard and native alike. After six years' residence in Mexico, during which he had gained a vast experience of the country, he was appointed bishop of Michoacan, the ancient kingdom of the Taras-cans, with official residence at Patzcuaro (1537). There he interested himself in the wel¬ fare of the Indians, founded the College of San Nicolas and a girls' school; translated doctrinal works into the native tongue and has left a volume of sermons and numerous other works of great interest to the student of this early period in the history of Spain in A.merica. At the age of 95 Quiroga was still actively at work, when he took sick and

suddenly died while on one of his pastoral visits.

QUIT and GOAL, in astronomy , two terms introduced by Prof. H. A. Newton of Yale University to define the two points op¬ posite each other in the heavens toward one of which the earth is at the time moving in its orbit round the sun and from the other reced¬ ing.

QUIT-CLAIM, in laiv, a deed of release; an instrument by which some claim, right or title, real or supposed, to an estate, is relin¬ quished to another without any covenant or warranty, express or implied. See Deed.

QUITCH. See Couch Grass.

QUITMAN, kwit'man, John Anthony,

American statesman and soldier : b. Rhinebeck, N. Y., 1 Sept. 1799; d. Natchez, Miss., 17 July 1858. He studied law and in 1821 removed to Natchez, Miss., where he established a success¬ ful law practice. He was elected to the legis¬ lature in 1827 ; was chancellor of the Superior Court of Mississippi in 1828-31 and 1832-34. He was president of the State senate in 1835; in 1836 served as ex officio governor of the State and in 1839 was judge of the High Court of Error and Appeals. Interested in the cause of Texan independence he labored earnestly in its behalf. At the outbreak of the Mexican War he was made brigadier-general of volun¬ teers. He distinguished himself in various battles of the Mexican campaign ; was pro¬ moted major-general of volunteers and received from Congress a sword and a vote of thanks. He was appointed governor of the City of Mex¬ ico by General Scott and on his return was elected governor of Mississippi in 1850, which office he resigned the following year when ac¬ cused of complicity in the Lopez-Cuban ex¬ pedition, a charge of which he was acquitted. In 1855—58 he served in Congress, where he was an ardent supporter of States rights. Consult Claiborne, (Life and Correspondence of John A. Quitman* (1860).

QUITMAN, Ga., city and county-seat of Brooks County, 50 miles northeast of Talla¬ hassee, Fla., near the southern border of the State, on the Atlantic Coast Line and the South Georgia and West Coast railroads. It is situated in an agricultural district and pro¬ duces large quantities of hams and bacon, as well as stock and cotton. There is also a lum¬ ber industry. Pop. (1920) 4,393.

QUITO, ke'to, capital of the republic of Ecuador, situated only a few

miles south of the equator, but at a height of more than 9,000 feet above sea-level. Climatic results of proximity to the equatorial line are modified and nearly equalized throughout the year by those of alti¬ tude; the temperature is, therefore, spring-like. It is, however, an inaccessible inland place; un¬ til 1903 (see Ecuador) neither railway nor high¬ way connected it with the seacoast. A part, at least, of the journey to Guayaquil, 165 miles away, was usually made on mule-back, along a mere bridlepath which crossed the breast of Mount Chimborazo at a height of 14,000 feet ; and the rare action of the atmosphere at that altitude can seldom be supported without dis¬ comfort. For the transportation of freight from the port to the interior two or three weeks have hitherto been required. Owing to its re¬ moteness and the lack of highwavs, the city is visited by few strangers, and has no good hotels, no carriages or wagons. Yet the streets are lighted by electricity, and the list of public institutions devoted to education, the Roman Catholic Church and the government is quite impressive, including an astronomical observa¬ tory, botanical garden, school of agriculture, and other adjuncts of a ((central university ,}) with faculties of belles-lettres, science, law and medicine. The architecture in general is that of a country subject to earthquakes — low and substantial. Features deserving special mention are the beautiful park called the Alameda, and the Sucre Theatre. The estimate of population (probably much too liberal) in semi-official

publications is 70,000. It was originally the central town of an ancient Indian nation. In 1470 it was captured by the Incas, who in turn surrendered it to the Spaniards in 1534. Dur¬ ing the Spanish rule, it was the capital of the presidency of Quito. Frequent earthquakes have demolished the town, the last having oc¬ curred in 1887. See also Ecuador, History.

QUIVIRA, ke-ve'ra, a ˆprovince,® reputed to have been populous and rich in gold and other things, of which Francisco Vasquez Coronado, the Spanish explorer, received news from a plains Indian, known as

the ((Turk,® while in winter quarters on the Rio Grande in New Mexico in 1540-41. Coronado started from Pecos pueblo in New Mexico, with his army, guided by the <(Turk,® in the spring of 1541, and after long wandering over the buffalo plains of Texas sent the larger part of his force back to New Mexico and continued his journey due northward for 35 or 40 days, en¬ countering the first settlement of Quivira about the present Great Bend, Kan. The province was found to consist merely of a group of villages, composed of (grass lodges and in¬ habited by a tribe, recently identified as the Wichitas, which raised corn and hunted the buffalo. Coronado put the <(Turk® to death, and after exploring the country for several months returned by a more direct route to New Mexico. Coronado's disappointment hav¬ ing become forgotten, the name Quivira lingered in the minds of later Spanish explorers of the southwest and grew to be the watchword of an unexplored Eldorado. After the abandon¬ ment of the Indian pueblo of Tabira, in eastern New Mexico, about 1675, the idea of Quivira and its supposed wealth was transferred to the ruins of the New Mexico village, and the name (<Gran Quivira,® then applied to it, has since been popularly retained. Consult Hodge, (Coronado's March to Quivira, } in (Brower's Memoirs of Explorations in the Basin of the Mississippi (1899).

QUIXOTE, Don. See Don Quixote;

Cervantes.

QUO VADIS. Sienkiewicz, early in the nineties of the last century, devoted himself to a study of the Latin writers of the first few Christian centuries and the result of these studies was (Quo VadisP a historical novel of the time of Nero, which appeared in 1895 and immediately created a sensation through¬ out the world. By 1900 nearly 2,000,000 copies of the English translation, made in 1896 by Jeremiah Curtin, were sold, and in France, Italy and America there appeared dramatiza¬ tions of the story. The author's realistic treat¬ ment of the early Christians provoked heated discussions in the Catholic Church of Poland and an attempt was made to prohibit the reading of the novel, but elsewhere it was received with undivided enthusiasm. In Genoa it was, in 1899, made the subject of a social study by Semeria, (L'arte e l'apologia cristianaP in connection with the Superior School of Religion. In spite of some historic crudities, he proclaimed it a chef d'ceuvre of Christian art. The chief merit of the story consists in the ever-present contrasts between voluptuous and cruel Rome on the one hand and the meek spirit of the dwellers in the Catacombs on the other, which makes the char¬

acters appear in far greater relief than in Cardinal Wiseman's (Fabiola) or in similar stories by Cardinal Newman and Canon Farrar. Thus Petronius, the Stoic and Sybarite, rep¬ resenting the over-refinement of antiquity and his Greek slaye, Eunice, who passionately clings to him unto death, are contrasted with the pagan, Vinicius, and his Christian bride, Lygia; the royal performer in the circus is opposed to the fisherman who shall rule over the world; the trickster, Chilon, is brought in contrast with the meek <(forgiving Christian, Glaucus.® Over all of them, representing the struggle of two worlds, stand Nero and Saint Peter, the first laboriously limned in his moral degradation, thirsting for new impressions, no matter at what cost of human lives, the other, expressing himself in the fewest of words, which bear witness to the coming victory of the new Church over the ancient world. Among the numerous criticisms of (Quo VadisP the most elaborate is that by Tarnowski, in his (Studya do historyi literatury polskiej) (1897, Vol. V, pp. 268-344).

Leo Wiener.

QUO WARRANTO, in law, a writ issued by a court to a person commanding him to show ®by what warrant® he holds an office, franchise or the like. The writ originated at an early date in England, where it has been much modified by statute and is now called an information in the nature of a quo war¬ ranto. Though nominally a criminal writ, it has for a long time been considered a civil writ and has in recent years been judicially declared in England to be such. It may be-brought in England, on leave of court, by a private person.

In most jurisdictions in the United States it is brought by the attorney-general of the State either officially or in the name of a private person. In some States, as New York, statutory actions in the nature of a quo war¬ ranto have been substituted for it. Quo war¬ ranto proceedings may be instituted against municipal corporations, but in practice it is seldom done. It has been held that this writ may be used against militia officers, sheriffs, school trustees, lieutenant-governors, mayors and other municipal officers, but not against policemen. Another important use of quo war¬ ranto is to determine whether there has been a non-user or misuser of a franchise of a cor¬ poration.

QUODLIBET, (1) a form of scholastic argument in use in the 13th and 14th centuries, which might be founded on any subject, but was usually theological. The discussion was of an elaborate and subtle form and about a dozen books of quodlibets written between 1250

and 1350 are in existence. (2) In music the term designates a fanciful or humorous com¬ bination of well-known melodies, sometimes known as a <(Dutch concert® and popular in German student gatherings. The diversion con¬ sists of the singing of familiar melodies and upon coming to a word which forms the first word of another song transferring without a pause to its words and music until another word gives occasion for another change.

QUOIN, koin (French, coin; Latin, cuneus, a wedge), a technical word for a wedge; (1) in artillery, the wedge used to elevate and de-

press a cannon or other piece of ordnance ; (2) in printing, the wedge used to fix pages of type within the chase; (3) in architecture, the term is applied to any external angle, but especially to the angular courses of stone pro¬ jecting beyond the plane surface oi the wall at the corner of a building and specifically designated rustic quoins.

QUOITS, kwoits, a game somewhat resem¬ bling the throwing of the discus among the ancients ; only the discus was flat, while the quoit is ring-shaped. (See Discus). The quoits are made of metal, usually iron, and are com¬ paratively thick at the inner edge of the ring, but sharp enough at the outer edge to stick in soft clay when properly thrown. In size they vary from eight to nine and one-quarter inches. The game is played on a ground from 18 to 24 yards in length, at each end of which a pin called a hob is fixed in the ground to serve for a mark. The object of the game is to throw the quoits from one end of the ground to the other so as to make them stick in the ground as near the hob as possible. The best shot, called a ringer, is when the quoit surrounds the hob. The players are divided into sides and each player has two quoits, which he de¬ livers in succession. The winning side counts one for each quoit that it has nearer the hob than the nearest of the losing side and if it lias a ringer it counts two for it. The rules as to the size of the quoit, the distance between the hobs and other particulars vary with dif¬ ferent players. In the United States the game is often played with cast-off horseshoes. The game is popular in England, Scotland and Canada, and in the two latter countries is the

summer sport of the curling clubs. In the United States, under the auspices of the Grand National Curling Club of America, there is an annual contest for the Bell quoit medal, given by David Bell of Buffalo, N. Y., in 1868. Con¬ sult Spalding's Athletic Library, (How to Pitch Quoits) (No. 167; New York, published an¬ nually).

The game is popular in England, Scotland and Canada, and in the two latter countries is the summer sport of the curling clubs. In the United States, under the auspices of the Grand National Curling Club of America, there is an annual contest for the Bell quoit medal, given by David Bell of Buffalo, N. Y., in 1868. Con¬ sult Spalding's Athletic Library, (How to Pitch Quoits } (No. 167; New York, published annually).

QUORATE AN (kwo-ra-te'an) INDIANS, an American linguistic stock, comprising the Kworatem tribes, from which the stock derives its name. The name was proposed by Gibbs •and adopted by Powell. The tribes occupy Lower Klamath River from the mountains a little above Happy Camp to the junction of the Trinity and Salmon River from its mouth to its sources, in northwestern California. See Karok.

QUORUM, in old English law, a collective name for those justices of the peace whose presence is necessary to constitute a bench. Also such a number of officers or members of a body as is competent by law or constitution to transact business.

QVIGSTAD, kvig'stad, Just Knud, Nor¬ wegian educator and philologist: b. Lyngen, 1853. He was graduated at the University of Christiania and was rector of Tromso Semi¬ nary for Teachers 1883-1909. He published several works on the ethnography and lan¬ guages of the Finno-Ugrian and Lappish races, which are international standards. He was minister of public instruction under the premier¬ ship of W. Konow from 1909 until 1912, when he resigned to return to his rectorship at Tromso.

QVISTGAARD, kvist'gard, J. W. von Rehling; Danish miniature painter: b. Orsholt-gaard, parish of Tikjob, 1877. He was gradu¬ ated at the Royal Agricultural College of Copen¬ hagen and in opposition to family prejudice, as a member of the Danish nobility, selected art as a profession. After a brief course of study in Copenhagen under Johan Rohde, he came in 1901 to the United States, where, although prac¬ tically self-taught, his original and superior work soon attracted attention. In 1906 he visited London and Paris, and in 1909 by royal

command returned to Copenhagen to make miniatures of the king and queen and other members of the royal family. He returned to New York in 1912 where he has since resided. Special exhibitions of his works were held at Ghent in 1913 and New York in 1914, and have been prominent in the principal miniature ex¬ hibitions of Europe and America. Notable pro¬ ductions include an oil portrait of Theodore Roosevelt, and miniatures of Mrs. Paul Rein¬ hardt, Mr. and Mrs. Charles M. Pratt, and Dr. George C. Williamson, the well-known expert on miniatures.

Rthe 18th letter of the English and other alphabets derived from the alphabet of the Latins. The corre¬ sponding letter of the Greek alphabet, rho, has the form P, p, which is the f of the ancient Phoenician alphabet, with the loop turned to the right; in some very ancient Greek Italiot inscriptions occurs the form R which was adopted by the Romans. R is classed as a liquid or semi-vowel with l, m and n. Its normal sound is doubtless either the trill produced by vibration of the tip of the tongue raised toward the front palate or the burr, which is produced by a vibration of the lower part of the tongue and the uvula; the trill is heard in the speech of the Latin nations — Italians, French and Spanish; the burr in that of the Germans and Scandinavians. In present English speech the r is sounded with a very faint trilj or quite without a trill, save in the pronunciation of the people of certain counties of England, who produce it with a guttural vibration ; in the pronunciation of this letter by the Scotch and Irish the trill is dis¬ tinctly heard. When r begins a syllable and when it follows a consonant — as in race, trap, it is distinctly a consonant; but in other situa¬ tions, as in nerve, hard, never, it is really a vowel sound. This vowel sound is related to the vocalic r of Sanskrit and the Slavic lan¬ guages. In the faulty or affected pronunciation of certain classes r becomes equivalent to w, for example, vewy for very. The two liquids or semi-vowels, r and *, are sounded when the voice is modified by certain positions of the tip of the tongue relatively to the front palate; hence the 'two letters are freely inter¬ changed between one language and another and within the vocabulary of one language; Spanish azul is English azure; from parabola comes, indirectly, palaver. There are races or peoples who are unable to pronounce the r with either the trill or the burr or even with the slight vibration heard in English speech; in such case* takes the place of r. Besides the dental or trill r and the vocalic r, the Sanskritic languages and certain others have a cerebral r formed by the tongue-tip against the hard palate. When in Greek a word or syllable begins with r that r is always aspirated, as is the second r when r is doubled, and the ancient Romans represented this aspiration by inserting h after the r; this h we retain, though we recognize no difference between the rh of rhabdomancy and the simple r of rabid. In many English words the r found in their Anglo-Saxon orig¬ inals is dropped ; for example, sprcecan becomes speak; on the other hand, we insert r in words which in their ancient form were without it ; for example, Anglo-Saxon brydguma becomes

bridegroom; and French cartouche becomes cartridge. R,.stands for ˆroyal® in many abbre¬ viations. R in pharmacy stands for recipet (lake). See Alphabet.

RA, ra. See Re.

RA-MA'S BRIDGE. See Adam's Bridge.

RAAB, rab, Johann Leonhard, German

etcher and engraver : b. Schwaningen, near Anspach, Bavaria, 29 March 1825; d. Munich, 2 April 1899. He was educated at Nuremberg and at the academy in Munich and received an appointment as professor of engraving at the latter place in 1869, which he held until 1895. His work includes engravings after Raphael, Titian, Veronese, Kaulbach, Lessing, Schwind, Ramberg and others, besides a collection of 50 etchings reproduced from the most notable works in the old Pinakothek at Munich. He was a member of various art academies and received gold medals at Paris, Berlin, Vienna and Munich.

RAAB (Gyor, dyer), Hungary, capital of a province of the same name, situated at the confluence of the Raab with a minor branch of the Danube, the so-called Little Danube, 70 miles southeast of Vienna, a position uniquely advantageous from both a military and com¬ mercial viewpoint. Its importance dates from early Roman occupation when it was called Arabona or Rabona. The Turks held it 1594-98. In the 18th and earlv 19th century it was an important fortress. In 1809 the combined Austrian-Hungarian forces were defeated here by the French troops under Eugene Beauhar-nais. During the Hungarian revolution it was stormed by the Austrians on 28 June 1849. It is the centre of a number of railroad lines, seat of the provincial authorities and of a bishop, possesses high schools, normal schools and grammar schools, carries on an extensive trade in grain, horses and pigs, and has a number of industrial establishments for the manufacture of machinery, cutlery and oil. The population of the province is about 92,000, that of the city 44,300.

RAABE, ra'be, Wilhelm, German novelist and poet : b. Eschershausen, duchy of Bruns¬ wick, 8 Sept. 1831 : d. 15 Nov. 1910, in the city of Braunschweig. After attending the gymna¬ sia in Holzminden and

Wolfenbiittel, he en¬ tered a book store as apprentice in 1849. He used this opportunity for wide reading and enriched himself with the tales and folklore of his own and other countries. In 1855 he en¬ tered the University of Berlin to study the humanities. In the autumn of 1856 appeared his first book, (Die Chronik der Sperlingsgasse,* under the pseudonym Jakob Corvinus. The hook, which contains sketches of life among

the German bourgeoisie, was very successful and Raabe became well known. Being thus encouraged he gave up his studies and devoted himself entirely to literary work. From 1862 to 1870 he lived in Stuttgart. Then he again returned to Braunschweig and remained active until the end of the century, publishing upwards of 30 novels and a number of short stories and sketches.

His life work may be divided into three periods. During the first he wrote with a light touch, producing a series of pictures of Ger¬ man life from the abundance of his imagina¬ tion and experience, among which are (Die Chronik der Sperlingsgasse) (1856), (Die Kinder von Finkenrode5 (1859) and (Unser Herrgotts KanzleP (1862). The influence of the pessimism of Schopenhauer is evident dur¬ ing the second period. Representative works of this period are (Der Hungerpastor> (1864), <Abu Telfan) (1867), and (Der Schud derump) (1870). These three works are sometimes re¬ ferred to as a trilogy. While they are indepen¬ dent of each other in substance, they do rep¬ resent a distinct epoch in the life of Raabe.

During the third period of the novelist's life his works no longer show this pessimistic strain A genial humor pervades, them, though they frequently deal with serious subjects. <Horacker) (1876) perhaps best represents this tendency. (Der Draumling5 (1872), and (Deutscher Mondschein) (1873), also come un¬ der this head. Of his numerous later works (Das Odfeld) (1889) and (Die Akten des Vogel-sangs) (1895) seem to be most read.

Raabe has been continually gaining in the estimation of the German

people. This was especially shown at the celebration of his 70th birthday in 1901. He is perhaps the most dis¬ tinctly German of modern novelists and story writers. There is hardly a situation in the life of the average German that has not been portrayed by Raabe. His early works were in¬ fluenced to some extent by Jean Paul. Later he also shows evidences of having read Dickens and Thackeray. In 1911 a selection of Raabe's poems was published. Consult Brandes, W., (Wilhelm Raabe) (Wolfenbiittel and Berlin 1906) ; Gerber, Paul, 'Wilhelm Raabe, Eine Wiirdigung seiner Dichtungen) (Leipzig 1897) ; 'Gesammelte Erzahlungen5 (2d ed., Berlin 1901) ; Spiero, H., ' Wilhelm Raabe> (Bielefeld

1911).

William F. Hauhart,

Assistant Professor of German, University of Michigan.

RAB AND HIS FRIENDS, a short story by Dr. John Brown (q.v), an Edinburgh phy¬ sician, published at Edinburgh in 1859. Rab's friends are his master and mistress, James Noble, the Howgate carrier, and his wife, Ailie. Perhaps no truer, more convincing dog char¬ acter exists in literature than that of ugly, faithful Rab. The pathos in the simple lives of himself and his friends is heightened by the tinge of Scotch dialect, as well as by the au¬ thor's wise self-restraint. It has gone through many editions both in England and in the United States.

RABANUS, ra-ba'nus, or HRABANUS, Maurus, Carolingian prelate : b. Mayence, about 776; d. Winkel, near Mayence, 4 Feb. 856. His education was obtained in the cloister school

of Fulda, and later at Tour, where his instruc¬ tor, Alcuin, surnamed him Maurus after the legendary founder of the order of Saint Bene¬ dict in France. He took the Benedictine vows at an early age, was ordained deacon in 801 and priest in 814. He became the head of the school at Fulda, which under his guidance be¬ came the most famous monastery school in Germany, and in 822 was elected abbot of the monastery. In 842 he resigned and retired to Petersberg, but came again into public life in 847, when he was elected archbishop of May¬ ence. He was one of the bitterest of the op¬ ponents of the monk Gottschalk, the. originator of the predestination controversy in the 9th century. He was one of the most learned men of his time and greatly

advanced the spiritual, intellectual, artistic and material interests of his see. His literary activity was considerable, resulting in commentaries on the Old Testament,' on the Gospels of Saint Matthew, and Saint John and the Pauline Epistles, devotional books, homilies, hymns, polemics and a Latin-German Glossary to the Bible. He also wrote (De Universo) (22 vols.), a sort of encyclopedia. His (Opera Omnia) are comprised in J. P. Migne's 'Patrologiae Cursus Completus) (Vols. CVII-CXII, Paris 1851-52), reprinted from the uncritical edition of G. Colvenerius (Cologne 1626). This edition contains his life by the monk Rudolph, and by Johann Trithemius. His poems have been edited by E. Diimmler in 'Poetae Latini Aevi Caroline1* (Vol. II, Ber¬ lin 1884). His pedagogical writings have been edited in German by I. Freundgen (Paderborn 1889. A. Knopfler has edited his 'De Institu¬ tion Clericorum Libri Tres) (Munich 1901). Consult Hablitzel, J. B., 'Hrabanus Maurus> (Freiburg i B. 1906) ; Koehler, 'Rhabanus Maurus und die Schule zu Fulda> (Chemnitz 1870) ; Kunstmann, F., (Hrabanus Magnentius Maurus 5 (Mainz 1841) ; Richter, (Hrabanus Maurus) (Malchin 1882) ; Schaff, P., (History of the Christian Church) (Vol. IV, New York 1885) ; Spengler, T., 'Leben des Heiligen Rhabanus Maurus5 (Regensburg 1856) ; Tuernau, D., (Rhabanus Maurus, der Praeceptor Ger-maniae> (Munich 1900) ; West, A. F., (Alcuin and the Rise of Christian Schools) (New York

1893).

RABASA, ra-ba'sa, Emilio, Mexican law¬ yer and party leader: b. 1856. He was edu¬ cated at the University of Mexico, specializing in international law, and has written the best Mexican works on that subject. He was a leader of the Cientifico party in the later years of the Diaz administration, and was subse¬ quently slated for Ambassador to the United States. He was ranking member of the Huerta delegation to the A. B. C. Mediation Confer¬ ence at Niagara Falls, Ontario, in 1914. He is author of several novels under vthe pseudonym of Sancho Pola, and of many political treatises, among them (La organizacion politica de Mexico5 (1917).

RABAT, ra-bat (Ribat'), or ARBAt, also known as New Saleh, Morocco, in the prov¬ ince of Fez, on the Atlantic Coast, at the mouth of the river Bu Regrag and on its southern bank, 62 miles west of Mequinez. It stands on a rocky plateau and is surrounded by massive reddish-brown fortifications. A conspicuous feature from the sea is the Hasan Tower, a

minaret 180 feet high, a remnant of an ancient mosque. Rabat s manufactures are carpets woolen, cotton and leather goods. The Sallee pirates formerly built their ship at Rabat. It is one of the capitals of Morocco, and the sultan has a palace there in which he resides part of the year. At present it is also the seat of the government and the residence of the French president-general. Although the value of its harbor is decreased by the presence of a dangeious bar, its imports in 1916 were the second eSnAA all Moroccan ports, amounting to •KWO 000, while its exports in the same year totaled $638,500. It has a post office, telephone, telegraph and wireless station. On the hills west of the town are the ruins of Sala, a Roo%iq colon;£ PoP-about 37,548, of whom

9,/48 were Europeans.

RABBA, ra ba, British West Africa, prov¬ ince of Nupe in northern Nigeria, on the left bank of the Niger, about 200 miles above the confluence of the Niger and Binue. In the early part of the 19th century it was a town of considerable importance, having some 40,000 in¬ habitants and carrying on an extensive trade in s aves and ivory. By 1867 the African ex-p orer kohlfo reported that only some 500 peo-pl,e were living there. Since the establishment of British rule it has recovered its former position to some extent.

RABBI, a title of honor among the He¬ brews ; «my teacher » “master.” John expressly states that the word was equivalent to “teacher” (Ereek didaskalos, rendered in the Authorized Version “master” ; John i, 38). There is an¬ other form of title rabboni, found in the New Testament. The form rabban, the Chaldaic form of the Hebrew «rab,» was considered the most honorable, and was only applied to seven persons. Rabbi was also looked upon as a. higher title than rab. It is supposed that this title first came into use at the period immediately preceding the birth of Christ. In the time of our Lord it was applied generally to all religious teachers, and hence sometimes to Christ himself Now the term rabbi is applied to regularly ap-pomted teachers of Talmudic Judaism. Since 1831 these have in France been

salaried by the state. Their duties are not only to give instruc¬ tion in the Talmud, but also to draw up deeds of marriage and divorce, to examine butchers and to give their opinion as to what is legal and what is illegal in the Jewish ritual.

RABBINICAL ERATURE, that the Jewish scholars die Ages composed Judaism — Hebrew ture, ETC.

LANGUAGE AND LIT—

form of Hebrew in which and theologians of the Mid-their works. See Jews and Language, Jewish Litf.ra-

RABBINICAL LEGISLATION. See. Jews and Judaism — The Spirit of Rabbinic Legislation.

RABBIT, a name, when properly used, re¬ stricted to a single species (Lepus cuniculus) of the rodent family, Leporidce, to which the na¬ tive American hares (q.v.) also belong. The rabbit is of European origin, and, although W1 . ln many places, is better known in u-domesticated or. semi-domesticated state in which it has been introduced into the United States Although the habits of the rabbit af¬ ford the best distinction from the hares, the

wild species exhibits some structural character¬ istics, among which are its generally smaller size, the shorter ears of uniform brown color and the shorter limbs. The hind legs in the hares are proportionally longer than in the rabbits, and the eyes are larger and more promi¬ nent than in the latter animal. The face is also narrower and the skull lighter in the rabbit. The rabbit's fur in its native state is of a nearly uniform brown color, while under domes¬ tication the color may become pure white, coal r** u* Pleba^d > Sray and other hues. The texture tt riUr a^SO c^anges under domestication. Unlike the hares, which construct only sim¬ ple nests or forms, the rabbit lives permanently in underground burrows, large colonies of which are often to be found in some dry sandy bank overgrown with furze or brush, or other similar locality. Such "warrens" are often specially set apart for them in order that they may breed and multiply for the

market, their flesh being excellent as food, and their fur and skins of value. The burrows are irregularly disposed, and communicate freely with each other. Rab¬ bits are extremely prolific, and begin to breed when about six months old. They may breed six or eight times a year, producing from five to seven or eight at a birth.

The parturient rabbit excavates a special bur¬ row or tunnel for herself in which to give birth to and shelter her progeny, the nest being lined by down plucked from her own body. The young are hairless when born and have their eyes closed. The eyes open about the tenth or twelfth day. These animals feed on tender grass and herbage, and sometimes do great dam¬ age to young trees by stripping them of their bark.

These animals grow exceedingly tame and domesticnted, and may exhibit no small degree of intelligence. They are snared, taken by fer¬ rets and nets or may be shot. Rabbits are subject to certain diseases, such as rot, para¬ sitic worms and a kind of madness. The original home of the rabbit is believed to have been those parts of Europe and Africa around the western half of the Mediterranean, where it still abounds, but it is now widely spread throughout temperate western Europe, and has been conveyed by man to such distant lands

3L will? “‘.P Tc?lo”ies-Tierra del Fuego and •7 tˆaNarfl Islands. _ In Australia and New Zealand it has multiplied so enormously as to have become a serious pest to the colonists causing immense loss and damage by eating un the pasture intended for sheep and cattle. Various methods of extermination have been tried against them, but as yet none have had more than a moderate success. Large numbers are now killed and exported as food, frozen or otherwise preserved, and millions of skins are annually shipped to Europe and the United Mates. In some parts of South and Central and especiallV 1,1 Jamaica, the domestic

fntbi -fi .b?en Tintro.<luced and established in the wild state.. Darwin records several cases

where quite distinct, races of rabbits have resulted from their isolation on islands. An

tSˆV?**** <L-hi?piduS) is closely related

rabbit ?£ropear] rabblt, and a so-called tailless rabbit (Romer olagas) has been described from

the region of Mount Popocatapetl in Mexico

it is peculiar in the possession of well-developed

clavicles, All the domestic breeds or rabbits

Wild Rabbit. 2, 3. French Rabbits. 4. French Lop-Ear. 5. Norman Rabbit. 6. Angora Rabbit.

appear to have been derived from the feral species of southern Europe; and have been but little influenced by occasional crosses with hares. The Chinese, as early as the time of Confucius, appear to have bred rabbits for sacrificial purposes ; and domesticated varieties were mentioned by classical Greek and Roman writers. The most noteworthy change under domestication has been the great increase in size and weight, the latter having been raised from three pounds in the wild rabbit to as much as 18 pounds in the Flemish giant. This variety is bred chiefly for food, but for this purpose is less esteemed than the Belgian ˆhare,® so-called because of its large size and hare-like color, and the un¬ founded belief that it originated from a cross between the hare and rabbit. The qualities which recommend the Belgian variety for mar¬ ket breeding are its extreme fecundity, the ease with which it may be kept in confined quarters, its rapid growth, so that it is ready for eating in about four months after birth, and the simi¬ larity of flavor of the young to the wild rabbit. A wave of enthusiasm for Belgian hare breed¬ ing passed through this country a few years ago, but has largely subsided, though many large rab-bitries continue to supply the cities, particularly in the West. Of the purely fancy varieties the lop-ear is the most remarkable ; the external ears in fine specimens measure 23 or even 24 inches long and six inches wide. The Angora, which originated in Asia Minor, has the beau¬ tiful long, silky white hair peculiar to several animals of that region, and there and in parts of Europe is bred for its hair, which is clipped and woven into underclothes, *etc.* Other va¬ rieties are peculiar chiefly in color. For meth¬ ods of breeding, etc., consult Knight, (The Book of the Rabbit > (London 1889) ; Rayson, <Rabbits) (London 1880) ; Carnegie, Practical Game Preserving) ; for history, variations, hab¬ its,

etc., Darwin, (Animals and Plants under Domestication > (Vol. I, New York 1868) ; Palmer, (Jack Rabbits of the United States) (Washington 1896) ; Reports of the Royal Commission of Inquiry on the Extermination of Rabbits in Australasia, especially that of 1890.

RABBIT FISH, in the southern United States, a globe-fish (q.v.) of the genus Lago-cephalus. In Bermuda and other islands of the middle Atlantic, a common market-fish, caught in deep water. It is a rather large, reddish brown escolar (Promethichthys prometheus), and owes its name to its prominent front teeth which resemble the incisors of a rabbit.

RABELAIS, Francois, fran-swa rab-e-la, French author: b. Chinon, Touraine, about 1483 (according to other authorities 1490 or 1495) ; d. Paris, 9 April 1553. Regarding his birth, parentage and early youth nothing definite is known. It is a fact, however, established by still existing documents, that in 1519 he was a member of the Franciscan order at Fontenay-le-Comte, in Poitou, and being at first freely permitted to study, acquired Arabic, Hebrew and Greek, and read omnivorously on almost all subjects. Eventually, however, the Francis¬ cans came to distrust the new learning. Rabe¬ lais was deprived of his books, and in disgust fled the monastery. Shortly afterward, in 1524, he obtained permission of Clement VII to enter the Benedictine order; he moved to Maillezais,

but before long quitted this brotherhood also, and began to traverse the country under the habit of a secular priest. His biographers have found it difficult to follow him during this period of his life, but it seems that in his wan¬ derings he cultivated all the sciences of the day, and especially philology, with assiduity, and that in this he exhibited powers of acquisition such as few have possessed before or since. In 1530 he was enrolled as bachelor in the faculty of medicine at Montpellier, where he lectured on Galen and Hippocrates in 1531-32, although it was not till 1537 that he obtained the degree of doctor. In 1532 he went to Lyons, where he published (Manardi Epistolae Medicinales) ; (Hippocratis AphorismP ; and (Testamentum CuspidiP (1532). In the same year he also, probably, brought out the first germ of his (PantagrueP (1532), of which, according to his own account, more copies were sold in two months than of the Bible in nine years. He was made physician to the Lyons Hospital, and was a member of the Societe Angelique, a coterie of scholars that had gathered around the workshop of Gryphius, the printer. The first dated edition of (PantagrueP came out in 1533. This first specimen of

the power of Rabe¬ lais in the style that has rendered him famous has all the grotesque humor, amounting even to buffoonery, and the variety of marvelous ad¬ ventures of his later works of the kind, but wants the delicate raillery, the sustained alle¬ gory and profound philosophy which most students of Rabelais find in the subsequent ver¬ sions of ˆargantuaP and still more in the last three books of (PantagruelP The first part of ˆantagrueP appeared under the anagrammatic pseudonym of Alcofribas Nasier, within a year or so after the first work, and its success was such that it passed through three editions in one year. Under the same pseudonym he also published in 1533 the first of a series of alma¬ nacs, of which now only a few fragments exist, and Prognostication PantagruelineP In 1534 he accompanied, probably as physician, Bishop, later Cardinal, Jean du Bellay, on an embassy to Rome. The result of this journey was an edition of (Marliani Topographia Antiquae Romae) (1534). Not long after he is found again at Lyons, where the (Gargantua,* as we now have it, first saw the light in 1535. Late in 1535 he was again at Rome with Du Bellay, and on this occasion obtained from the Pope absolution for having neglected to enter a Ben¬ edictine house and other delinquencies. It was granted in response to his (Supplicatio pro Apostasia> (1535). In the year following he is known to have been practising his art at Paris, but his love of wandering had not yet ceased, and his place of abode for the next eight or nine years was as unsettled as it had been during any previous part of his life. From 1539-43 he appears to have been in the service of Guillaume du Bellay, the elder brother of the cardinal, and to have resided with him in Piedmont of which he was governor. In 1546 he was probably in Paris, when the third book of his (PantagrueP appeared. In this the fantastical and trivial adventures that crowd the previous books give place in a great meas¬ ure to regular dissertations, in which all the great moral and social questions of the day are discussed with the gaiety and irony peculiar to Rabelais, and with a freedom that roused the

suspicion of the clergy, who endeavored to have it suppressed. The

favor of the king se¬ cured the free publication of this book, but it was with more difficulty that a license was ob¬ tained for the fourth book from the next king (Henry II), who had succeeded Francis in 1547. A mutilated edition of this appeared sur¬ reptitiously at Lyons in 1547. The license to publish was not obtained till 1550, and it was only in 1552 that a complete and authentic edi¬ tion of the book appeared. In 1549 he was again in Rome and a description of some court festivities appeared under the title (Sciomachie) (Lyons 1549). Rabelais was installed in the cure of Meudon, which he had had bestowed on him by his former patron, Jean du Bellay, in 1553, and it is possible, though by no means sure, that he resided there chiefly during the re¬ mainder of his life, resigning two months be¬ fore his death. He left at his death the whole of the fifth book of 'Pantagruel* in manu¬ script- Sixteen chapters of this appeared under the title 'L'lsle Sonante* at Lyons in 1562. The entire fifth book was not published until 1564. The original manuscript was discovered in 1840, ending a long controversy as to its authenticity! A sixth book was intended to be added, but there is only a fragment of it indicating its sub¬ ject, (Les Noces de Panurge.* His enemies busily pointed out impieties, and he once fled to Metz to escape danger. Rabelais was one of the first to give flexibility and finish to the yet rude and harsh language of his country. Boileau calls him La raison en masque, and Rousseau, Le gentil maitre Frangois. His house was the resort of the learned ; his purse always open to the needy ; and his medical skill em¬ ployed in the service of his parish. His work cannot now be easily understood without a glossary and commentary. It has been widely regarded, especially in France, as a treasury of wisdom, wit and shrewd sense. See Garagan-tua and Pantagruel.

The first complete edition of the 'Gargantua* and 'Pantagruel* is that published by J. Martin at Lyons in 1567. During the next 30 years some 60 editions of one kind or another were brought out. Of later editions the most import¬ ant are that of J. Le Duchat (Amsterdam 1711) ; the Variorum edition edited by E. Esman-gart and E. Johanneau (9 vols., Paris 1823-26) • a splendid edition, illustrated by Gustave Dore and edited by Burgand des Marets and E. J Rathery (2 vols., Paris 1857-58; 2d ed., Paris 1870) ; a seven-volume edition by P. Jannet (Paris 1873-74) ; a very carefully annotated edi¬ tion by C. Marty-Leveaux (6 vols., Paris 1868— 1903) ; and a one-volume edition by L. Moland (Paris 1881). A new critical edition by A. Lefranc is in preparation. There are English translations by Urquhart and Motteux (Lon¬ don 1653-94) ; new edition, in the series 'Tudor Translations* (3 vols., London 1900), and by W. F. Smith (2 vols.,

London 1893). There is also a good German translation by G. Regis (Leipzig 1832-41; new ed., Munich 1906). Selections in English will be found in Besant, W. (Readings in Rabelais* (Edinburgh 1883) • (Hours with Rabelais) (London 1905) ; Wright, C. H. C., Selections from Rabe¬ lais s Gargantua) (New York 1904).

Bibliography.— Albenas, G. d\ <Les Por¬ traits de Rabelais* (Montpellier 1880) • Besant, W., <Rabelais> (Edinburgh 1879)!

Bourrilly, V. L., < Rabelais d'apres des

Travaux Recents) (in Revue d'Histoire Moderne et Contemporaine, Vol. VII, no. 598, 681, I'aris 1905-06) ; Brunetiere, F., 'His- ˆdlˆralure Frangaise Classique* (Vol I, p. 105, Paris 1904) ; Doubouchet, A., Rabelais a Montpellier* (Montpellier 1887) • Fleury, J., < Rabelais et ses (Euvres) (2 vols.' Paris 1877) ; Flint, A., (Rabelais as a Physiolo¬ gistˆ (New York 1901) ; Gebhart, E., <Rabelais, la Renaissance et la Reforme* (Paris 1897) ; Heulhard, A., 'Rabelais; ses Voyages en Italie, son Exil a Metz> (Paris 1891); Julliere, P. de la 'Les Images dans Rabelais* (Halle 1912) • Le Double, A. F., 'Rabelais, Anatomiste et Physiologiste* (Paris 1899) ; Lefranc, A, <Les Navigations de PantagrueP (Paris 1904) ; Mil¬ let, R. P., < Rabelais* (Paris 1892) ; Page, C. H., ed., 'Selections from Rabelais* (in 'French Classics for English Readers, * New York 1905) ;

p-» 'Bibliographic Rabelaisienne, 1532-171 1 (Paris 1904) ; Plattard, J., 'L'CEuvre de Rabelais } (Paris 1910); Societe des Etudes Kabelaisiennes, Revue des Etudes Rabelaisiennes (10 vols., Paris 1903-12); id., Revue du Seizieme Steele (Paris 1913-to date); Smith, W. R, Rabelais in his Writings* (Cambridge 1918); Stapfer, P., 'Rabelais: sa Personne, son Genie, son (Euvre* (Paris 1889) ; Thuasne, L., ViHon et Rabelais* (Paris 1911); Tilley, A.,

I he Literature of the French Renaissance* (Vol. I, pp. 165 and 262, Cambridge 1904) • id 'Francois Rabelais* (Philadelphia 1907) • Whibley, C., 'Literary Portraits* (London

1904).

RABIES. See Hydrophobia.

PA-PINO WITZ, Solomon, Yiddish hu¬ moristic author, known best by

his pen name Scholem Aleichem** : b. Kief, Russia, 1859-d New York City, 13 May 1916. He began his career as a writer of short Yiddish stories in

. JvlIssian-Yriddish press. Because of the Kishineft pogroms, he came to the United States m 1906, and was received with great acclaim by his coreligionists. He returned later to -ussia, where he met with pecuniary reverses which were at once relieved by his many thou¬ sands of warm admirers. At the beginning of the European War, Mr. Rabinowitz, who was at a health resort near Berlin, was detained and finahy sent to Denmark. He returned to the United States in December 1914, where he was again feted and lavishly entertained. In the United States he wrote stories for the Yid¬ dish dailies, many of which have been trans¬ lated into English. He is best known for his sympathetic, kindly, humorous treatment of Ghetto life His admirers in the United States have called him "the Yiddish Mark Twain **

. RABSHAKEH, rab-shakT, an officer of the kmg. of Assyria, mistaken in the Authorized version of the Bible for a proper name, but in fact an official title, probably that of a militarv commander. He is sent with Tartan and Rab-sans, also titles of high officials, to take a threatening message from Sennacherib to King Hezekiah. He delivers it in the Hebrew tongue and when requested to use the Aramaic dia¬ lect, the language of diplomacy, so as not to alarm the. people, he insolently refuses (2 Kings xvm-xix; Isaiah xxxvi-xxxvii) . Con¬ sult commentaries on 1 and 2 Kings and the

book of Isaiah; also Schrader, (Cuneiform In¬ scriptions and the Old Testament.*

RACCOON, the name, of Indian derivation, given to the typical members of the Procyonidce, a family of carnivorous mammals, resembling the bears in their plantigrade feet and other characteristics, but differing from them espe¬ cially in the long tail,

sharp snout, slender body and moderate size. All of the five or six known genera are confined to America, though the related Asiatic genus PElurus is now placed here. (See Panda). The members of the typical genus Procyon possess six incisors, two canines, eight premolars and four molars in each jaw, and the group is well exemplified in the com¬ mon raccoon (Procyon lotor) which derives its specific name of lotor, “a washer,-” from its habit of washing its prey before eating it, or of holding the food in the fore paws and shak¬ ing it violently backward and forward in the water so as to moisten and saturate it as thor¬ oughly as possible. The German name Wasch-bdr, or “washing-bear® and the raton or raton laveur are also applied because of this curious habit. The raccoon is a heavily built animal, about three feet long, with a pointed snout, short ears and bushy tail alternately ringed with black and white. The general body color is a sooty or blackish-gray, and the fur consists of a close set of under hairs, with larger outer hairs, the latter being marked black and white. The upper part of the head and the portion across the eyes are colored dark brown. Throughout most of the United States the rac¬ coon is abundant, and on the Pacific side reaches from Alaska to Central America. In spite of the settlement of the country and much persecution it generally holds its own, and in many sections is actually increasing in num¬ bers. These animals, although typically carniv¬ orous, yet seem to feed largely upon, and in¬ deed to prefer, vegetable matters. In the natural state their food consists of all kinds of small birds and their eggs, mice, reptiles, frogs, cray¬ fish, mussels, oysters, nuts, fruits, *etc.* Occa¬ sionally they catch fish or clear out a hen roost, and their frequent depredations upon fields of corn, of which they are very fond in the milk stage, has gained them the enmity of farmers. Raccoons are among the most strictly nocturnal of American mammals, and spend the day in sleep, usually in a hollow limb or tree trunk. During the winter they pass into an intermittent state of hibernation. About April, four to six young are born, which remain with the parents for a year or more, forming the small parties in which these animals are usually found. The raccoons are much hunted by means of dogs, which force the animal to take refuge in a tree, whence it is dislodged by climbing. The subtlety and cunning dis¬ played by these animals in their endeavors to escape have become quite proverbial — expres¬ sions such as “sly ’coon,® “wake as a ’coon,® indicating these qualities. They are, however, very easily trapped, and when taken young make very gentle and interesting pets. They use their fore paws almost as expertly as. a monkey its hands, and their great, curiosity prompts them to investigate everything which attracts their attention. The agouara. or crab¬ eating raccoon (P . cancrivorus) is found throughout South America. It is generally

larger than the common species, the tail being

shorter, of a grayish-yellow tint, and marked with six black rings. The fur is blackish-gray, tinted with yellow, and of variable lights and shades over the different regions of the body. The eyes are surrounded by dark-brown patches, which run into the ears, and terminate in a patch on the top of the head. Although denom¬ inated “crab-eating,® it does not appear to be specially addicted to this dietary.

Related genera are Bassaris, of which B. astuta extends from Mexico into the south¬ western United States, Nasna, the curious ar¬ boreal coatis of Mexico and South America, and Cercoleptes, represented by the Central and South American kinkajou, which has a long protractile tongue. Consult Stone and Cram, (American Animals *(New York 1902) ; Audubon and Bachman, (Quadrupeds of North America) (New York 1851) ; Beddard, (Mammals) (London 1902) ; Ingersoll, Ernest, (Wild Neighbors) (New York 1897) ; Merriam, C. H., (Mammals of the Adirondacks) (ib. 1893) ; Seton, E. T., (Life Histories of Northern Ani¬ mals* (ib. 1909) ; Stone and Cram, (American Animals) (ib. 1914).

RACCOON-DOG, a small wild-dog-like

animal (Nyctereutes procyonides) of eastern China and Japan, much resembling a miniature raccoon in appearance, especially about the head. It lives in burrows, gathers most of its food (fish, crabs, etc.) along the banks of rivers, and is frequently kept in captivity, especially among the Japanese, who also value its fur and eat its flesh. Its fur is long and grizzled, but hand¬ some; its muzzle sharp, ears short and tail short and bushy. Consult Mivart, (Dogs, Jack¬ als, Wolves and Foxes) (1890).

RACCOON-OYSTER, a name in the Southern States for the small irregular wild oysters, growing numerously in the salt marshes, and much eaten by raccoons and other animals.

RACE, Cape. See Cape Race.

RACEME, ra-sem’, in botany, a form of inflorescence in which the primary axis is elon¬ gated, and bears flowers placed on pedicels of nearly equal length, as in the currant. A raceme differs from a spike only in having the flowers being stalked, instead of sessile. See’ Flower.

RACER, BLACK RACER, or BLUE RACER, a blacksnake (q.v.),

especially the common lowland one (Zamenis constrictor) , so called from its swiftness.

RACES, Origins of. Any discussion of race is handicapped by four points of obscur¬ ity: firstly, there exists no very clear idea in the mind of many as to what constitutes race ; secondly, the marks of differentiation which serve to set off one race from another are often vaguely presented; thirdly, there seems to be no very reliable knowledge concerning the num¬ ber and the origin of races, and, finally, geo¬ graphical location is not invariably clearly de¬ fined. To produce type a certain set of elements must persist generation after generation and to trace this type is to go backwards to the very dawn of mankind's awakening and to inquire what beings existed on the globe at that time.

Geology supplies that there were roughly three great periods, called, respectively, the Mesozoic, Tertiary and Quaternary, and that these corresponded with the development of

(1) reptiles and the rise of the flowering plants, (2) mammals and the appearance of modern plant life, and (3) man, that is, the prevalence of the Stone, Bronze and Iron Ages, comprising the extinction of the great mammals and the dawn of mind, art and in¬ dustry. These facts may in essence reflect the zoological division of zoophytes, mollusca, ar-ticulata and vertebrata, the last named being divided into reptiles, fish, bird and mammals, the crowning apex of which order is man.

Whether or not man is the ape himself, there stood, nevertheless, man (or many men, say the polygenists who conceive the world to have been peopled simultaneously at various spots on the earth's surface, thereby refuting the monogenists who hold to the ˆBiblical® original pair), with skull, stature, skin and hair, which elements are the foci upon which subsequent races and nations are to be differ¬ entiated and determined. That concerning the time of the Rough Stone Age, when fauna and flora initiated their appearance, little is known of man but the formation of his skull, the only remainder that could have

come down to the present over a bridge of more than 100,000 years is evidenced in the single fact of the skull being of the nature denoted by scientists of enlightened days Neanderthal, that is, Cro-Magnon, dolichocephalic or long (the relation of the length of the head to its breadth is the formula upon which craniology orientates mod¬ ern racial division). Yet even this fact of long-headedness among the olden men is not didactically vouched for. Archaeology in giving the rough outline of those unknown ages which, under the name of Stone, Bronze and Iron, comprised early rudiments of human life, the transition to shelters, the correlation of animal existence as, for instance, the presence of the wooly mammoth, rhinoceros, reindeer and cave bear in successive waves of existence, can, after all, only rely upon scant evidence such as produced from caves, kjokken-moddings (kitchen leavings), and pile villages.

Early life was characterized by the very rudiments of human activity. Hunting and fishing must have been followed by agriculture, and all these occupations demanded tools. This demand set man's inventive energy to work to grapple with the making of tools, fire and the bow and arrow. Decorating, weaving, the mak¬ ing of pottery and the domestication of animals were gradually learned. No division of labor could have occurred until after the formation of the state, however, for division is dependent upon organization and the centralization of a directive agency. The simplest and most iso¬ lated industry must have preceded the institu¬ tion of trade, but that the associative element of trade must soon have begun to make itself felt is proven by the early occurrence of fairs. The making of homes presupposed some sort of marital condition necessary for the rearing of children, consequently promiscuous marriages, polygamy, polyandry and monogamy have vari¬ ously characterized primitive family life. The importance of the family was indeed not to be gainsaid in early days, for to it can be traced the rudiments of state organization in such forms as the patriarchal family. In the pa¬ tronymic grouping can also be detected the early beginnings of religious observances. The wor¬

ship of an ancestor antedated the rise of a priestly cult. With settled life, religion, associ¬ ated in the mind of a savage with nature wonder, took its first definable form. Slower to evolve but betokening a higher degree of specialization than industry or religion in primitive life is politics. The establishment of a state marks a climax in the transition of society from primitive to civilized form. It is the note of difference between tribal and civil society, where conditions of increasing wealth and population demand systematic cultivation of agriculture and

organized social life. Rest¬ lessness and lawlessness have to be overcome by the force of the state ; a machine of gov¬ ernment is organized and later towns grow up, considerations of citizenship and economic re¬ lations make their appearance. Upon economic relations are based science, commerce and in¬ vention and these relations become eventual fac¬ tors for differentiating kinds of states.

That a nation resembles an individual in being formed of certain elements is undoubted. Social, psychophysical and physical traits are present in each aggregate whole. One is a unit as the other is a unit. Individuals are units marked off and differentiated from each other by racial and national barriers, possessing, however, common intellectual, emotional, moral and physical faculties, therefore, participating in culture and civilization as a whole and ex¬ pressing art, religion and literature.

The physical characteristics in forming the basis for classification of all mankind in great stocks, or varieties, or races, divide men into color classifications as, for instance, Deniker's division of white, yellow, reddish brown and black-skinned strains. Furthermore, hair may be straight, slank, wavy, spiral, frizzy, curly, woolly or fleece-like. It may be long or short. The color may range from pale blond through the ruddy shades to jet black. The correlations of body height and head index added to color defines racial characteristics more narrowly. Head index of all body characteristics the least changed under the mutable conditions of en¬ vironment gives the final stamp to racial dis¬ tinctions in its dolichocephalic and brachycephalic classifications.

Hair, skin, eyes, stature and head index are characteristics common to all men and on these points Europe, Africa, Asia and America can be classified. Over these continents are dis¬ tributed the white, yellow, red * and black¬ skinned races — black in Africa, red in Amer¬ ica, yellow in Asia and white in Europe. The low-statured, black-haired Esquimau may re¬ semble the yellow-skinned Japanese in some points of classified likeness, yet that they should radically differ from the red-skinned American Indian or the black-complexioned African of New Caledonia bespeaks the existence of dis¬ tinct marks which may be taken as represent¬ ative of the continuity of a certain set of ele¬ ments persisting generation after generation in spite of the passage of the years — which is essentially race in unit.

. Sergi in classifying races principally accord¬ ing to cephalic index recognizes the Mediter¬ ranean district as the centre of dispersion of the European races, and consequently divides mankind into the

Eurafrican and Eurasian accordingly as the races have made their home

in Africa and Europe, or Asia and Europe. Subordinately Eurafrican stock is divided into two varieties, Mediterranean and Nordic. Eurafrican and Eurasian varieties are desig¬ nated by Ripley Teutonic and Alpine Mediter¬ ranean. The Teutonic type is white-skinned, blond-haired, blue-eyed, narrow of head and tall of stature ; the Alpine type is white-skinned, brown-haired, bluish-gray-eyed, round of head and mediumly tall ; and the Mediterranean type is olive-skinned, dark-haired, dark-eyed, long of head and mediumly tall. These latter three racial strains form the centre of world activity at the present. Anglo-Saxon Teutons colon¬ ized and together with Alpines and Mediter¬ raneans, reared and superimposed a state struc¬ ture upon the red-skinned racial base of the North American continent. Mediterranean Spaniards, Portuguese and other Europeans have peopled the southern American continent. Dark-skinned Africans, chocolate-colored dwellers of the Pacific and slant-eyed inhabit¬ ants of the Celestial Empire are all pushed into obscurity by the battling pre-eminence of Teutons, Alpines and Mediterraneans.

The old law of conflict, savage tribe exerting its will on another savage tribe, is illustrated in subordination of one nation by another, of ris¬ ing and falling powers, of destinies that wax and wane. In primitive form the subordination is physical, in the civilized it is ethnological, for language and customs are imposed instead of brute force.

Thus have the nations shifted, till to-day instead of unbroken areas of savage tribe, primitive hordes or the embryo state-formation of village life there are crystallized units pos¬ sessing a common language, common creed and inspired by identical ideals of statehood. The fact that a people is thus massed together produces a certain unity — thus it is possible to speak of ((the Englishˆ as a unit and mean a definite type. That the original Britons were dark and small of stature is generally supposed, after the dawn of history these primitive char¬

acteristics came to be identified with the traits of traders and invaders who visited the island, but who, anthropologically, were hardly im¬ portant. Danes and later, Normans, were in¬ vaders, but unlike the Romans they changed the anthro-ethnological type of Britain, for they came to settle and perpetuate the race. The significance of this contact between two rep¬ resentative strains of the Teutonic stock should not be disregarded, for in it are per¬ haps to be discovered dynamic elements which were to contribute to the eventual rise to world power and physical superiority of one of the participating nations. The Normanizing of English affected language, government, church and nobility. The Norman Conquest is really the birth of England because it was the last of the invasions and paved the way for the working out of the homogeneity of a people. A state is based on homogeneity of race, com¬ pactness of territorial possession, religious co¬ hesion and stability of government. But it is men who in the last analysis make a state, and when through the consciousness of the members of a slate there runs a consciousness of kind, a feeling of like-mindedness and a sense of brotherhood, a state is evolved. Upon the utilitarian character of the Briton has been

built the great structure of England's command¬ ing position in the world arena. Commercialism, based upon domestic security and an adequate financial foundation, has resulted in a growth of invention rapid enough to settle great indus¬ trial problems, and a scientific outlook keen enough to maintain a trade which brooks no rival. The statehood behind all this is a state with a policy of common sense and resolution. England, unlike un-Teutonic countries, has made no great contribution to the heart of religion, she has rather contributed to the think¬ ing powers of religion. Criticism and good taste are English churchly attributes. These qualities likewise characterize the Briton in art and literature, that is, cosmopolitanism. ,

On the other hand, what is most attractive in the life of the German strain of the Teutonic branch is what is most German. It is one of the most striking peculiarities of German cul¬ ture that it delights in the pedantic substitution of what is vaguely cosmopolitan for what is native and of the soil. Yet the supremely cul¬ tivated man is not the man of pedantic encylo-pedic knowledge, but the man who possesses the key to distinction of style, which is the finely culled result of scientific detachment and dispositional reposefulness.

Definite knowledge of Scandinavia's racial origin is lacking. The Neanderthal man of the paleolithic or diluvial period may be the

foun¬ dation type of Scandinavian races as of other European strains. At any rate it is believed that two race strains, the Cro-Magnon or dolicho¬ cephalic and the Dissentis or brachycephalic types, have existed in Scandinavia for a very long time. During the Bronze and Iron ages there were men in Scandinavia who ploughed and tilled the soil. The waves of civilization which no doubt swept over Europe touched the northern countries as well and brought changes in industry and language. At the dawn of history two races were known to be existing in Scandinavia and till to-day there are two dis¬ tinct strains to be observed in the population. History, however, has emphasized one type to the exclusion of the other, and the tall, fair, blue-eyed type has received the preponderance of attention.

That these fair-haired, blue-eyed Northmen were indeed quite similar to their kindred of the other Teuton districts is proved by the fact that great similarity characterized the tongues of the respective countries in the earliest of Saxon times. Not only could an Icelandic bard be understood in Norway, Denmark and Sweden but also by Frisians in England, for the root dialect of English as well as Norwegian, Dan¬ ish and Swedish belongs to the Teutonic branch of the Indo-European stem, according to Prof. Max Muller. The Frisians in coming to Britain brought their Low German dialect with them. The Scandinavians, using another but related dialect, gradually built up their separate philological system, as the English eventually did theirs. Dialect precedes language, as tribes, clans and families precede the state. A lan¬ guage grows by stages, there is the composi¬ tion of roots, the gradual discernments of mean¬ ings and the systematic elaboration of gram¬ matical forms. In the old Eddas of Iceland and the Beowulf of Britain great resemblances of speech are to be found. Nevertheless, with the

passage of time differentiation sets in and new forms are evolved. The Norman tongue, which was the Norse dialect Latinized, came to Eng¬ land to mix with the old Frisian Low German, and a new language eventually to be called English sprang into existence.

Thus, the ruddy, fair-haired Englishman is akin to the tall, blond Swede, and the short, dark Welshman is akin to the broad-headed Dane in the respect that in the beginning all have had a common ancestry and ethnological breeding. That one can go farther and say that from these similarities other similarities result is doubtful. True as it is that Scan¬ dinavians agree in reproducing Teutonic type identically with the English in some respects, in the Protestant form of religion, in the nature of their government and in their common quali¬ ties of love of independence, self-reliance, com¬ mon sense and in their allegiance to the prin¬ ciples of logic, nevertheless in many other respects these two representatives of the one type do differ strikingly.

Anthropologically distinct from the Teu¬ tonic type is the Slavic, Celtic or Alpine type. Differing not only in stature and coloring but markedly in head index, this second type has, in contradistinction to the Teutonic, its own location and geographical setting. It is the Eurasian race mentioned by Sergi, or the Al¬ pine by Ripley, and in ethnological terms it is called the Celtic race. Its habitat is, broadly speaking, northwestern Asia and central Europe. Its representatives are in the Slav nations, Russia and South Slavic states, Serbia, Rumania, Montenegro, etc., also Switzerland, France and Belgium. Anthropo¬ logically distinguished, the type is broad¬ headed, with eyes of blue or gray. Unlike as are the nations included in this type, neverthe¬ less, distinguished from the other extremes, the tall, fair and long-headed Teutons and the short, dark, swarthy Mediterraneans, they are easily recognized to belong to an intermediate type.

France and Russia may serve to represent the second or Alpine race. Unlike in some anthropologic, ethnographic and sociologic respects, these nations nevertheless have cer¬ tain bonds in common. In regard to the anthropologic type, there is a likeness of com¬ ponents rather than of wholes, for it is to certain strains in one that the other agrees. As to historic evidence of the men who lived early in Gaul and on the Russian plains, it may be said that Gaul was inhabited by what in eth¬ nology are called Celts, broad-headed indi¬ viduals who were mediumly tall; in Caesar's first conquest of the Gauls he found such men called Belgae, Gauls and Iberians, and Tacitus wrote of the Scythians living in the Car¬ pathian Mountains. But both of these Alpine districts were also to be intermixed with Teu¬ tonic strains, France with the Burgundians, yisigoths and Franks, and Russia with the Swedes migrating from the north and touch¬ ing Novgorod on their itinerant trail to Con¬ stantinople. Consequently, to-day Teutonic ele¬ ments are found in both the Russian and French

nations.

But it was long before the evolution of the finished French and Russian states that these events took place, and in the East the mixture

was destined to become increased to a yet greater extent before the real Russian nation was evolved. The early history of Russia is briefly told : the patriarchial family, the growth of the towns, the rise of the early cities of Kiev and Moscow, the growing power of the Coyars and of the princes, and the final concentration of power in one prince at Moscow, constitute the account. Early history thus politically told must also note the great anthropologic changes which have played a role in Muscovite history, that is, the Finnish and Tatar inroads which have been made upon Russian unity. Finns from the north came down to what is now known as Letto Lithuania. Tatars from the East, Chinese Tatary, sweeping oyer the im¬ mense Russian plains, brought an Asiatic in¬ fluence which was to affect Russia, but socio¬ logically and ethnographically more than anthropologically.

Foreign traits thus contributing to disposi¬ tion, character and type of mind distinguish the Russian people from the Teutons on one side and from their fellow Celts, the French, on the other.

The French type is convivial in character and creative in disposition. The French social traits of hospitality, desire to please, humor and extravagance show their conviviality. These character traits are governed and held in check by the creative power in the French disposition, which seeks thrift and the adapt¬ ability of means toward end. Furthermore, in the sphere of morals the possession of a dis¬ tinct power, the will, distinguishes French from Russian personality. It is will power applied to the vanquishing of acceptable odds, however, rather than to the overturning of repelling obstacles. The rationalism of the Teuton is absent. Intellectually, thinking ap¬ proaches the Latin or Mediterranean type, for it is deductive. Unlike the Saxon common sense thinking, there is a tendency to intel-lectualize for intellect's own sake which verges upon the dreaminess of the South.

Although all the western districts border¬ ing the Mediterranean Sea repeat the Mediter¬ ranean type, it is to Italy particularly that we look for the greatest historical and cultural manifestations of this type. And yet Italy it¬ self constitutes an anthropological problem. By whom was it peopled and how was it settled? Many theories are offered in explana¬ tion. Three contrasting theories of original Italian type have

been advanced-The Teutonic Aryan has been said to be the foundation type, also the Scythian or Slavic origin has been suggested, but Sergi holds to an original Mediterranean type.

Physically the Mediterranean figure pos¬ sessing a dolichocephalic head index, short stature and dark hair and eyes is accepted as the usual Italian individual. Italian disposition is a combination of the aggressive and instigative — aggressive as old Rome was aggressive and instigative as have been the cabals and political intrigues from the days of Lorenzo the Magnificent to the modern age. In char¬ acter as well as in disposition the Italian person¬ ality's a compound of two blends, austere and convivial austere as were the old lawmaking administrative magistrates, convivial as the beauty-loving Italian is convivial. As Italian

disposition and character are complex so is the type of mind. The calm, appraising quality of Italian judgment is combined with the hot impulsiveness of emotion, a combina¬ tion which makes the Italian a past master in the art of revenge, vengeance, cabal and in¬ trigue. As with all Latins, so with Italians, commerce plays a subordinate role to art. It is in the sphere of emotion, morals and intel¬ lect that Italy has won her great sociological achievements, namely, art and the Church. More productive in the realm of art than the Celt, and more productive in the realm of religion than the Teuton, the Mediterranean personality yet falls behind the Teuton in creative expression of governmental talents.

Thus have the nations developed and special¬ ized till to-day instead of physical entities such as wandering primitive men and woolly mam¬ moths roaming the earth's surface, there are definitely marked national aggregates : England, a crystallized unit of people, described in type as tall, fair-haired, long of head and light of eyes, possessing an emotional life which is bal¬ anced and logical, an intellectual type of mind which is inductive and reasoning, a capacity for commerce and industry; a France that is tem¬ peramentally, artistically creative, contributing more to literature and art than to church or state ; an Italy, cool and logical, contributing more to the heart than to the head of re¬ ligion. Akin to the Italian Mediterraneans, the Spaniards of the American continent vie with that related strain and yet partake of the Teutonic qualities of the North American con¬ tinent, recreating in the western section of the globe the commerce and industry of the Euro¬ pean Teutons, and coming to endure along with the clearly inductive, boldly logical and suc¬ cessfully worldly Teutons the absence of the introspective and dreamy quality of the emotion¬ ally constituted Latins and Slavs.

Bibliography. — Broca, P., (Memoires d'antropologie1* (Paris 1871)) Boas, F., (Changes in Bodily Form of Descendants of Immigrants) (Washington 1910) ; Beddoe, J., <The Anthropological History of Europe) (London 1912) ; Collignon, R., (L'indice cephalique des populations frangaises* (in L'Anthropologie, Vol. I, pp. 200-224) ;

Deniker, J., (The Races of Man> (London 1900) ; Gid-dings, F. H., (The Principles of Sociology) (New York 1896); Hrdlicka, A., Physical Anthropology and its Aims1* (in The Anatom¬ ical Record, Vol. 2, No. 5, 1908) ; Haddon, A. C., (The Study of Man1** (New York 1898) ; Ivanovski, A. A., (About the Anthropological Formation of the Population of Russia) (in Tidings of *tlie Imperial Society of Natural Sciences and Ethnography in the Moscow University, Vol. 105, Works of the Anthro¬ pological Division, Vol. 22, Moscow, 1904, Rus¬ sian) ; Livi, R., (L'indice ponderal ou rapport entre la taille et le poids* (in Archiv italiennes de biologic , Vol. 32, pp. 229-247) ; Muller, Max, (Lectures on the Science of Language) (New York 1890) ; Osborn, H. F., (Men of the Old Stone Age> (New York 1915) ; Quatrefages, A., (The Human Species > (New York 1881); Quetelet, A., (Du Systeme Social et des Lois qui le RegissenP (Paris 1848) ; Retzius, G., and Fiirst, K. M., (Anthropologia Suecica) (in Beitrdge zur Anthropologic der Schweden, Stockholm 1902) ; Ripley, W. Z., <The Races of

Europe* (New York 1899) ; Sergi, G., (The Mediterranean Race) (London 1901) ; Topin-ard, P., (Anthropology) (London 1878) ; Tarde, G., (The Laws of Imitation* (New York 1903) ; Ward, Lester F., (Pure Sociology* (New York 1903) ; Virchow, R., (Meinungen und Tatsachen in der Anthropologie* (in Anthropologie Gesellschaft Mittheilnngen, Vol. 30, pp. 14).

B. L. Stevenson, Author of < Socio Anthropometry : an Inter¬ racial Critiqued

RACHEL, in Bible history, the second daughter of the Aramaic cattle-owner, Laban. Jacob obtained her as wife by devoting 14 years to the service of her father. At the end of the first seven years he found in his veiled bride not the Rachel promised, but Leah, her elder sister, whom he did not love, and was obliged to serve seven years more in order to gain Rachel. She was the mother of Joseph and Benjamin, the birth of the latter causing her death. Her story is told in Genesis, especially in chapter xxix. Her so-called tomb, the authenticity of which, how¬ ever, is very doubtful, stands to this day on the road between Jerusalem and Bethlehem and is held in the highest veneration by both Jews and Mohammedans. Consult Archer, W., (Rachel of PadanaranP (London 1843).

RACHEL, ra-shel (Elisha Rachel Felix), French tragedienne : b. Mumpf, canton of Aargau, Switzerland, 28 Feb. 1820 or 21 ; d. Le Cannet, Provence, 3 Jan. 1858. Her father was an Alsatian Jew, naturalized in

France, and after much wandering about Europe in his trade of peddling established his family at Lyons, where the two oldest children, Sarah and Rachel, sang and begged in the streets and in cafes to help out the family support. About 1830 they removed to Paris and the two girls sang on the boulevards until discovered by Etienne Choron, teacher in the school of Sacred Music, who undertook to teach them singing. Rachel's voice was found to be too harsh for this, and in 1834 Choron induced his friend, Saint Aulaire, to train her for the stage. On the advice of M. Samson she entered the Consevatoire, where, however, her harsh voice and small stature seemed at first against her. She made her debut in a play called (La Vendeene*. at the Gymnase in 1837. The next year she joined the company of the Theatre Frangais and made her first appearance as Camille in Corneille's (Horace* 12 June 1838. She appeared in several parts successively and finally repeated in September her performance of Camille, was seen and applauded by the powerful critic of the Debats, Jules Janin, and her position estab¬ lished. After appearing in other parts in the French classic drama with increasing success, she visited England in 1841 and again in 1842, re¬ peating her triumphs there. Later while still supreme at the Theatre Frangais she made visits to other European cities, and in 1855 appeared in America. Here her success was only mod¬ erate, owing to her unfamiliarity with the language. A severe cold caught during her American tour ended in a consumption, from which she died at Le Cannet in the south of France. She was buried in the Jewish part of the Pere Lachaise in Paris. Her great reputa¬ tion was made in five or six roles of the ancient classic drama of France, of these Phedre being accounted her greatest. In the course of

her career she created 13 modern roles, written for her, (Adrienne Lecouvreur) alone of these still holding a place on the modern stage. She appeared in several other modern roles that had been acted before her representation. She excelled especially in the impersonation of evil passion. Both her voice which through careful training had been changed from its former harshness to remarkable flexibility and

melodi¬ ousness, and her restrained majestic acting, re¬ sulted in a rendition of her parts which was as perfect as it was thrilling. Consult B — , Madame de, (Memoirs of Rachel* (New York

1858) ; Beauvallet, L., (Rachel and the New World; a Trip to the United States and Cuba) (New York 1856) ; Darcie, J., and Corbin, W., ed., (Mlle. Rachel's Plays) (New York 1855) ; Faucigny-Lucinge, A. de, (Rachel et son Temps *(Paris 1910) ; Fleischmann, H., (Rachel Intime) (Paris 1910); Gribble, F. H., < Rachel; her Stage Life and her Real Life) (London 1911) ; Janin, J. G., (Rachel et la Tragedie* (Paris

1859) ; Kennard, N. H., (Rachel *(Boston 1886) ; Mirecourt, E. de, (RacheP (Paris 1854) ; Poin-sot, E. A., (Rachel, d'apres sa Correspondence* (Paris 1882) ; Thomson, V., (La Vie Senti-mentale de Rachel* (Paris 1910).

RACHITIS. See Rickets.

RACHMANINOV, rak-ma'ne-nof, Sergei Vasilyevitch, Russian composer and pianist: b. government of Novgorod, April 1873. He en¬ tered the Conservatoire at Saint Petersburg at the age of nine, and in 1885 went to Moscow to study at the Conservatoire there, specializing on the pianoforte. His masters for piano were Zvierev and Siloti, pupils of Tschaikowsky, Liszt and Rubinstein; and for composition and theory he studied under Taneiev and Arensky. He was awarded the. Conservatoire's gold medal for composition in 1892, and went on an extended concert tour of Russia. In 1893-1903 he was professor of piano at the Maryinsky Institute for Girls at Moscow, meantime acting as con¬ ductor at the Moscow Private Opera in 1897-99; and appearing in London in 1899 at the Phil¬ harmonic Society's concerts, where he dis¬ tinguished himself as composer, conductor and pianist. He conducted the Moscow Imperial Theatre in 1904—06, and afterward devoted himself to composition and concert tours in Europe and America. His work is strongly influenced by the Moscow school, and is splendidly characteristic and rich in variety and color. He is regarded as one of the foremost living Russian composers. He is author of many songs and choruses as well of piano pieces, of which his (Prelude in C Sharp Minor* is especially well known and characteristic. He has written three operas, <Aleko) ; (The Nig¬ gardly Knight-* ; (Francesco da RiminP ; two symyhonies, three concertos, the (Elegiac Trio,* in memory of Tschaikowsky, much chamber music and miscellaneous compositions.

RACINE, Jean Baptiste, zhon batest ra-sen, French dramatist: b. La Ferte-Milon, Picardy, 21 Dec. 1639; d. Paris, 21 April 1699. He

studied at the College of Beauvais, and subsequently at the Port-Royal Institution, where, under the care of Lancelot and Lemaistre, he became a profound Greek scholar. In 1658 he left the Port-Royal, and began the study of philosophy at the College d'Harcourt at Paris. To this period belong his first literary

efforts, and ode called (Nymphes de la Seined composed in honor of Louis XIV's marriage, and for which he was rewarded by Chapelain, then the dispenser of the royal bounty; and two comedies, now lost. About the same time he became intimate with La Fontaine, and this intimacy was so far from tending to make his life more regular, that those of his relations who took most interest in him, and who had destined him for the Church, began to be anxious about his prospects. In 1661 he went to live with an uncle, a canon-regular and vicar-general of the cathedral at Uzes (department of Gard), whose influence it was expected would suffice for procuring him a benefice. In this last particular they were dis¬ appointed ; and at the end of about two years, during which Racine had been vainly endeavor¬ ing to study theology, he returned to Paris and the world. In 1663 he was presented at court, and soon made the acquaintance of Boileau and Moliere, and began to write for the stage. His first tragedy, the (Theba'ide,* was first per¬ formed by Moliere's troupe at the Palais-Royal in June 1664, as was also his next, (Alexandre le Grand* in 1665. His first two tragedies were merely tentative pieces, containing but few in¬ dications of the author's dramatic genius. His first masterpiece was (Andromaque,* which on its performance in 1667 produced a profound impression and excited well-merited admira¬ tion. It was brought out at the Hotel de Bourgogne, Racine having in the meantime quarreled with Moliere. The immediate suc¬ cessor of (Andromaque* was a comedy (Racine's only extant comedy), (Les Plaid-eurs,* a witty and delightful imitation of the (Wasps* of Aristophanes. It appeared in 1668, and was at first rather coldly received, being indeed saved only by the laughter of the king. His next pieces were ˆBritannicus* (1669) ;

(Berenice* (1670), composed at the request of Henrietta of England, who had also invited Corneille to write a drama on the same subject; (Bajazet* (1672) ; (Mithridate* (1673) ; (Iphi-genie* (1674), considered by Voltaire the great¬ est work that the French stage has produced; (Phedre* (1677), the last piece that Racine pro¬ duced expressly for the theatre. Little is known of the private life of Racine during this period, almost all his correspondence hav¬ ing been burned from a too pious respect for his memory. In July 1673 he

obtained a seat in the French Academy. In 1675 he was nomi¬ nated by Colbert a royal councillor and treas¬ urer of France for the general government of Moulins (Bourbonnais), but never entered on the duties of his office His withdrawal from the theatre in 1677 was partly due to chagrin at the success of a hostile party of theatrical critics who set up for being fine wits and applauded one Pradon, a writer now never heard of, at the expense of Racine. Soon after (1678) he was appointed, along with Boileau, historiog¬ rapher to the king, whom he accompanied in his campaign in Flanders. About this time Ra¬ cine became reconciled with his relations and former friends at Port-Royal. His marriage belongs to the same period. It was happy and resulted in the birth of seven children. From then on Racine played, with considerable suc¬ cess, the part of a courtier. After a silence of 12 years Racine, at the solicitation of Madame de Maintenon, added two other pieces to, the

list of his dramatic works — <Esther) (1689) and (Athalie) (1691), the latter often spoken of by French critics as the most perfect of his works. They were both intended for the pupils of Saint-Cyr, the institution founded by Madame de Maintenon. The death of Racine is said to have been hastened by grief at losing the favor of the king. As a dramatist Racine is usually considered the model of the classical or national tragic drama of the French and in estimating his powers in this field it is necessary for the critic to take into account the stiff con¬ ventional restraints to which that drama is sub¬ jected. What Racine achieved within these limits is extraordinary. He added to the con¬ ventional drama as he received it a grace of which one would not have deemed it capable; he was greater as a poet than as a dramaturgist, and wrote in a style of finished perfection and distinction, developing French versification to its ultimate of rhythm and dignity. In his re¬ straint, proportion, balance, he is rightly re¬ garded as classic. (<Perhaps it would be no ex¬ aggeration to assert,® says Dowden, <(that grandeur and beauty are nowhere else so united in French dramatic art as in <Athalie.) ® Be¬ sides his dramas Racine wrote several stinging epigrams, some odes and hymns, an abridgment, of the history of Port-Royal, letters and his¬ torical fragments on the campaigns of Louis XIV. Among his letters are two in reply to a work of Nicole of the Port-Royal, entitled (Les Visionnaires) (1666), in which the author bit¬ terly denounces poets and still more dramatic writers. The tone of these letters is severely sarcastic and naturally caused great offense to his old friends and masters. Only one of the letters was published at the time they were written, the other after his death. After his retirement from the theatre Racine found it easy, as has been said, to reconcile himself with his old friends. See Athalie; Phedre.

The first collected edition containing nine tragedies then written was published in 1675— 76; another containing practically all of his important works appeared in 1697. Both are in two volumes. Since then there have been almost innumerable editions of varying perfection. Among these one of the best is that published at Paris in three volumes (1801-05), regarded as a marvel of typography. An

excellent edi¬ tion of (CEuvres Completes) was published in 10 volumes in 1865-73 in Hachette's collection of the (Grands Ecrivains de la France,) pre¬ ceded by an admirable essay on Racine and his time by Paul Mesnard. There is an English metrical translation by R. B. Boswell (2 vols., London 1913). Most of his tragedies have also been translated intornany other languages and have found many imitators, some of whom, however, succeeded in reaching Racine's perfec¬ tion. Consult Beyle, M. H., (Racine et Shaks-peare) (Paris 1854) ; Blaze de Bury, M. P. R. S.

(Racine and the French Drama) (London 1845) ; Canfield, D. F., (Corneille and Racine in England J (New York 1904) ; Deschanel, E. A. E. M., Racine5 (2 vols., Paris 1891); Ga-vault, P., ed. Conferences de 1'OdeorP (Paris 1916); Larroumet, G., (Racine) (Paris 1898); Lemaitre, J., (Jean Racine) (Paris 1908) ; Mas-son-Forestier, A., (Autour d'un Racine Ignore } (Paris 1910) ; Monceaux, P., (Racme) (Pans 1892) ; Morgan, J. P., Catalogue of Racine Col¬ lection) (London 1906) ; Racine, L., <Memoires vol. 23 — 8

de Jean Racine) (Lausanne 1747) ; Roy, J. J. E., (Histoire de Jean Racine) (Tours 1863) ; Sainte-Beuve, C A., (Port-RoyaP (7 vols., Paris 1908) ; Stapfer, P., (Racine et Victor Hugo) (Paris 1894) ; Trollope, H. M., Cor¬ neille and Racine) (in (Foreign Classics for English Readers,) Edinburgh 1881) .

RACINE, Louis, French poet and critic, second son of Jean Racine (q.v.) : b. Paris, France, 6 Nov. 1692; d. there, 29 Jan. 1763. He was deeply religious and after the death of a favorite son practically retired from the world. He attained considerable attention as a poet and critic though manifestly under a disadvan¬ tage as the son of so eminent a father. His poems (La Grace) (1720) and (La Religion) (1742) were highly praised and the latter ran through 60 editions. He also wrote a number of odes, chiefly of a religious character. His prose writings include <Reflexions sur la Poesie) (2 vols., 1742) ; Memoires sur la Vie de J. Racine) (2 vols., 1747) ; (Remarques sur les Tragedies de Racine) (3 vols., 1752). A vol¬ ume, (Poesies Fugitives,) published over his name in 1784, was repudiated by his widow and friends. He also published a prose translation of Milton's (Paradise Lost) (3 vols., Paris 1755). Of his various writings only (La Reli¬ gion) has been translated into English (London 1754). His complete works were published in six volumes in 1808. He was made a member of the Academie des Inscriptions in 1719. Con¬ sult De la Rogue, A., (Vie de Louis Racine) (Paris 1852).

RACINE, Wis., city, county-seat of Racine County, on Lake Michigan at the mouth of Root River, and on the Chicago, Milwaukee and Saint Paul and Northwestern railroads, about 22 miles south of Milwaukee and 65 miles north of Chicago. It has steamboat connections with all the lake ports, and electric lines extend to all the nearby towns. It is 40 feet above the surface of the lake, and 690 feet above sea-level. It was settled in 1834; in 1843 was in¬ corporated as a village, and in 1849 as a city. Racine has one of the best harbors on the lake. It is the commercial and industrial centre of a productive agricultural region about midway be¬ tween Milwaukee and Kenosha. There are many creameries and an extensive lumber and coal trade is carried on. The chief manufactur¬ ing establishments are knitting mills, machine shops, flour and lumber mills, carriage factories, foundries, boot and shoe factories, tanneries, valise and trunk factˆies, steel spring works, hosiery mills, furniture factories, plating works and woolen mills. The products from other manufactories are bedding, men's cloth¬ ing, paints, mangles, fanning mills, wind¬ mills, bicycles, bits, sheet iron, brass and copper goods, iron specialties, malted milk, chemicals, soap and other articles. The manufacturing interests are steadily increasing; it is the second city in the State in the value of its manufac¬ tures. In 1910 the capital invested in its 142 industrial establishments, employing 10,354 per¬ sons and having an annual payroll of $6,679,000, was $36,326,000, and the value of the output was $24,673,000. The prominent public buildings and institutions are the government building, the county courthouse, the municipal -buildings, Saint Luke's Hospital, Saint Mary's Hospital, Taylor Orphan Asylum and the Dominican

Convent. The educational institutions are Ra¬ cine College (P.E.), founded in 1852, the Racine Grammar School (P.E.), Saint Catharine's Academy (R.C.), a public high school, public and parish schools, a public library, two libra¬ ries connected with Racine College and the Y.M.C.A. library. In 1915-16 the total enrol¬ ment in its 191 public schools was 7,575 pupils who were instructed by 249 teachers. Racine, in 1918, had seven banks, three of which were national, with a total capital of $950,000 and deposits of $10,502,000. There were also two daily and three weekly newspapers, one each of the latter being English, German and Danish. In 1910, of the total population which in 10 years had increased over 30 per cent, only 112 were negroes. About 33 per cent of the white population, 12,509, were foreign born, chiefly in Denmark, Germany, Russia, Austria-Hun¬ gary and Great Britain and its colonies.

The government is administered under a revised charter of 1905, which provides for a mayor, who holds office two years, and a coun¬ cil. The mayor appoints the fire and police commissioners and, subject to the approval of the council, the members of the board of educa¬ tion. In 1914 the total receipts were $1,491,259; the expenditures for all purposes, $1,317,864; the assessed value of real estate and personal property, $49,759,719; the tax rate, $13.52 per $1,000; the funded debt, $940,000, less a sinking fund of over $10,000. The city has 12 parks, three playgrounds, some public beaches and 35 miles of paved streets. Pop. (1920) 58,593. Consult Anon, (History of Racine and Kenosha Counties, WisP (Chi¬ cago 1879) ; Leach. E. W., (Racine County Mili¬ tant J (Racine 1915).

RACING. See Horse-racing.

RACK, an instrument of torture in frequent use in the Middle Ages, and down to a compara¬ tively recent period. It is not known to have been used in the American colonies settled un¬ der British rule, but it is among the ancient in¬ struments of torture preserved at Montreal as relics of French rule in that country. The rack consisted of a large, open, wooden frame, within which the person to be tortured was laid on his back on the floor, with his wrists and ankles fastened by cords to two bars at the ends of the frame. These bars were then drawn or moved by means of levers and pulleys in oppo¬ site directions till the body rose to a level with the frame. Interrogations were then put, and

if the prisoner refused to answer, or if his answers were not considered satisfactory, the rollers were further moved, until at last the bones of the sufferer were forced from their sockets. The rack was also used s-imply for purposes of punishment, apart from desire to extort a confession. According to Coke it was introduced into England in 1447 by John Hol¬ land, Duke of Exeter, who was at that time constable of the Tower of London, hence its name <(the Duke of Exeter's daughter.® The question of the legality of the use of the instru¬ ment was raised when the Privy Council at¬ tempted to put John Felton, the murderer of the Duke of Buckingham, to the rack that he might be made to disclose the names of his accomplices. The judges, however, resisted, de¬ claring the proceeding unlawful. The rack was

also used in other European countries, by mem¬ bers of the Inquisition.

RACKETS, or RACQUETS, a game played in a prepared court, open or close, with a small hard ball and a kind of bat. The bat is about two feet in length, about two-thirds of which forms the shaft or handle, the remainder being an oval frame on which is tightly stretched a network of cat-gut. The part of the shaft by which the bat is held is covered with leather and ribbed, to enable the player to grasp it firmly. It is from this bat and the network, which is its principal feature, that the game derives its name (Italian, racchetta, for retichetta, an old diminutive of rete, Latin and Italian, a net; French, raquette). The close, that is, roofed court, is now generally preferred. It is an oblong rectangular space, and when of full dimensions is 80 feet long, 40 feet broad and has walls 40 feet high. The players, stand facing one of the narrow walls, which is called the front wall. Two horizontal lines are drawn across the front wall, one two feet two inches, and the other, the out or service line, eight feet above the floor. The surface between the floor and the lower of these lines is covered with wood, which serves as a sounding-board to enable the players to know when it is struck by the ball.

The game may be played either single or double, that is, with either one or two persons on each side. It is decided by lot which side goes in first, and when there is only one player on each side the first player assumes which side of the court he pleases (usually the right), while the other stands in the opposite corner. The first player then begins to serve, in doing which he must have one foot in the service box of his side. Service consists in striking the ball with the bat so as to make it

strike the front wall above the outline without previously strik¬ ing any other part of the court, and then re¬ bound into the opposite corner beyond the short line. In rebounding from the front wall it does not matter whether the ball strikes on the floor in the opposite corner of the court. If the ball is properly served the second player must strike it before it has made a second bound, so that it strikes, the front wall above the board; but in returning the ball in this manner the player may if he likes first make it strike either of the side walls. The player to whom a ball is served does not require to wait till the ball has bounded from the floor before he returns it. He may return it before it touches the floor. Such a stroke is called a volley. The ball being thus returned by the second player, the first player returns the ball in the same way, and this goes on until either player fails, which may happen in three ways, either by the ball being made to hit the sounding-board, or being struck into the roof or gallery, or later than the first bound. If it is the first player who fails, his hand is out, and it is then the turn of the sec¬ ond player to serve. If it is the second player, then the first scores one (an ace), and the first continues to serve, but goes to the opposite side of the court. The other details of the game must be derived from the rules drawn up bv the different racket clubs. Consult Miles, E.,

(Racquets, Tennis and Squash) (London 1902) ; Spalding Athletic Handbooks (New York, an¬ nually) ; Thompson, F. C., (Court Tennis, with

Notes on Rackets and Squash-Rackets) (Phila¬ delphia 1909).

RACOVIAN CATECHISM, the catechism of Rakow, Poland, where it was originally printed and published in 1605. It contained a popular exposition of Socinianism. There were two such catechisms, a smaller and a larger, both afterward published in Germany by Smal-cius, the former in 1605, the latter in 1608. In 1652 John Biddle translated the larger of the two into English. Parliament, on 2 April 1652, ordered all printed copies to be burned. A new English edition was brought out by T. Rees (London 1818).

RADANTZ, ra'donts, Rumania, city of Bukowina, 35 miles by rail southwest of Czer-. now'itz. It has a cathedral dating from 1402, and the 1 5th century monasteries of Putna and Suczawica are located near the town. The Austrian government maintained a stud of about 1,500 horses here. There are manufac¬ tories of paper, leather and machinery. The population is about 70 per cent German and 25 per cent Rumanian. Pop. about 26,084.

RADCLIFFE, rad'klif, Ann Ward, Eng¬ lish novelist: b. London, 9 July 1764; d. there, 7 Feb. 1823. She was married at 23 to William Radcliffe, afterward editor and proprietor of the weekly called The English Chronicle. Her first work was (The Castles of Athlin and DunbayneP a Highland story (1789). It had little success, but perhaps as much as it de¬ served. (A Sicilian Romance) (1790) is su¬ perior to it, and (The Romance of the Forest) (1791), a still further advance, was dramatized and translated into French and Italian. Her masterpiece is considered to be (The Mysteries of Udolpho) (4 vols., 1794), which was long very popular, and was translated into French. The last of her novels published during her life was (The Italian, or the Confessional of the Black Penitents) (3 vols., 1797), a romance of the Inquisition, which was dramatized as (The Italian Monk,* and translated into French by Morellet. The dramatization, very inferior to the original, was produced at the Haymarket, London, 15 Aug. 1797. A posthumous ro¬ mance, (Gaston de Blondeville,* together with some poems (4 vols.), though written in 1802, was not published until 1826. It, too, was translated into French. A small volume of verse, published first in 1816 and reissued in 1834 and 1845, contained poems inserted in her various novels, was brought out by an anony¬ mous editor and contains also some inferior poems of the latter. Another work of hers was <A Journey through Holland and Germany-* (1795). A collected edition of her novels with an appreciative preface by Sir Walter Scott was brought out in 1824. After the publica¬ tion of (The Italian,* Mrs. Radcliffe practically retired from the world, though the frequently reiterated story that she had become insane has no foundation in fact. Mrs. Radcliffe's novels were at one time very popular. In a way she may be regarded as the founder of a new school of English novelists, but none of her followers and imitators even equalled her in imagination and ability in devising super¬ natural events followed by natural explanations. She had considerable power in the description of scenery, and well understood how to excite and maintain the curiosity of her readers. She

was perfect mistress of the mysterious in romance and the first English

writer of note to introduce descriptions of scenery into fiction. (See Mysteries of Udolpho). Consult Beers, H. A., (A History of English Romanticism in the 18th Century* (New York 1899) ; Howells, W. D., (Heroines of Fiction) (Vol. I, p. 79, New York 1901).

RADCLIFFE, John, English physician: b. Wakefield, 1650; d. Carshalton, Surrey, 1 Nov. 1714. He was educated at University College, Oxford, was a Fellow of Lincoln College, 1669-77, graduated in medicine in 1675 and, at Ox¬ ford, began the practice of medicine, but remov¬ ing to London in 1684 soon established a large practice which he maintained, it is said, more by his witty conversation than his medical skill. In 1686 he became physician to the Princess Anne of Denmark, and frequently attended William III after his succession. His blunt¬ ness of speech lost to him the favor of Prin¬ cess Anne and later of King William, though he continued to number many of the nobility among his patients and prescribed for Pope and Swift. He was made a Fellow of the Col¬ lege of Physicians in 1687, acted for many years as governor of Saint Bartholomew's Hospital and in 1690 and 1713 was elected to Parliament. His learning was often depreciated; but he seems to have been an acute observer of symp¬ toms. and his immense practice gave him a wide field for observation. By his will, property was left in trust for the foundation of two medical traveling fellowships, and for the purchase of perpetual advowsons for members of Uni¬ versity College. He also left money for the erection of various public buildings, among which was £40,000 for the public library in Ox¬ ford, since called the Radcliffe Library. From estates left in trust to the executors to adminis¬ ter for charitable purposes according to their judgment were built the Radcliffe Infirmary, the Osbervatory at Oxford and enlargements to Saint Bartholomew's Hospital. Later money was granted toward the buildings of the College of Physicians in London, the Oxford Lunatic Asylum and Saint John's Church, Wakefield. His prescriptions were collected and published by E. Strother, as (Pharmacopoeia Radcliffeana> (2 parts, London 1716). Consult Macmichael, W., (The Gold-headed Cane) (New York 1915) ; Pittis, W., (Dr. Radcliffe's Life and Letters* (London 1715).

RADCLIFFE, England, an urban district, in the county of Lancashire, seven miles north¬ west of Manchester, on the river Irwell and on the Lancashire and Yorkshire Railway. The ancient parish church of Saint Bartholomew dates from the time of Henry IV. There are cotton and calico works, bleach-fields, dyeing establishments, iron foundries, machine and paper factories and extensive collieries in the vicinity. Pop. 25,692.

RADCLIFFE COLLEGE, a college for the education of women, affiliated

with Harvard University, Cambridge, Mass. Its forerunner was the Society for the Collegiate Instruction of Women, organized in 1879 to provide syste¬ matic instruction for women by professors and instructors in Harvard. This society was in¬ corporated three years after its organization, and its educational work proved so successful that in 1894 it was formally affiliated with the

university. At that time the name of the society was changed to Radcliffe College, power to grant degrees was conferred and the presi¬ dent and fellows of Harvard University were constituted the board of visitors of Radcliffe, which should have supervision over the ad¬ ministration of the affairs of the college, the granting of degrees, the appointment of in¬ structors, *etc.* All diplomas given by Radcliffe are, countersigned by the president of Harvard and bear the university seal. Most of the courses of study are identical with the Harvard courses, and graduate students are admitted to the graduate courses of the university. The courses are divided into three groups in the different branches of study: (1) courses primarily for undergraduates; (2) courses for graduates and undergraduates ; (3) courses

primarily for graduates. Courses in Semitic languages and history, history and theory of education pedagogy and the history and theory ot art and music are included in the curriculum Ihe degrees of A.B., A.M. and Ph.D. are con¬ ferred. There are two fellowships, one for the promotion of the study of Greek history, litera-Uire, art and archaeology at the American ocnool at Athens, and one for the promotion of the study of social problems at a settlement house m Boston; there are also 54 scholar¬ ships and a number of prizes. The college has laboratories of physics, chemistry, zoology and botany, a gymnasium, dormitories, etc.;' the library numbered 35,323 volumes in 1918; the Harvard University library and museums are also opened to students of Radcliffe; in 1904 a new hall fully equipped with auditorium, club rooms, etc., was built. The students in 1918 numbered 665 and the faculty 147. Le Baron Russell Briggs of Harvard University was appointed president in 1903. In 1918 income

producing funds amounted to $1,045,000 and the total income was given as $102,340. Since its organization 1,619 students have been gradu¬ ated. Consult Dowst, H. P., ‘Radcliffe College> (Boston 1913).

T, RADEGUNDA, Saint, Frankish queen: b. Thuringia, Germany, 510; d. Poitiers, France, 13 Aug 587 She was the daughter of the heathen Berthar, king of the Thuringians. After the victory of Clothaire, king of the Franks, over ler father, she was carried off, a prisoner She was eventually converted to Christianity and married to Clothaire (538). After her brother had been murdered by the Franks, she fled from her husband’s court and, in 553* took the veil, founded the monastery of Sainte Croix at Poitiers where she resided from then on devoting her life to religious practices and charity. Her life was written by her contemporary and friend, the famous poet, scholar and bishop, Venantius Fortunatus (q.v.). ConS» (Lives of the Saints5 (Vol. IX, Edinburgh 1914); Briand, E., ‘Histoire de Sainte Radegonde5 (Paris 1898) • ˆatrologiae Cursus Comp Ictus 5 (Vol. DXXII, p. 651, Paris 1849).

\xt -ˆAIpEiTZKY, ra-det’ske, Johann Joseph Wenzd Anton Fritz Karl, Count, Austrian military officer; b. Trebmtz, Bohemia, 2 Nov 1766; d. Milan, Italy, 5 Jan. 1858. He joined the Austrian army in 1784, served in the campaigns against the Turks in 1788-89, in Holland and Italy, 1793-96, in various parts of

Europe during the later Napoleonic campaigns, became lieutenant field-marshal in 1809 and served with ability at Aspern and Wagram. After the Peace of Schonbrunn he was ap¬ pointed a member of the state council of war. In the war with France he fought at Kulm and Leipzig in 1815, and in 1831 was made com¬ mander of the Austrian troops in Italy. He was created field-marshal in 1836 and in 1848-49 he crushed the revolution in Venice and Milan. He preserved Lombardy to Austria, routed the army of the Piedmontese at Cus-tozza and Novara in 1849, concluded a treaty which assured Austrian supremacy in Italy for the time, and governed the Austrian possessions there, until 1857 when he was retired after 72 years’ service and after having received 46 European decorations. He trained his soldiers to a very high degree of perfection, and, though a very strict disciplinarian, succeeded in be¬ coming the idol, not only of his troops, but of the people at large. He was kind, frank and scrupulously abstained from playing politics. A very extensive anecdotal literature, some of it in the form of fiction, has developed around his character. There are also many poems and songs about his person and deeds ; a

collection of songs was published as ’Radetzky lieder5 (Aschaffenburg 1851). After his death there were published ‘Den Kschriften Militarischen Inhalts und dem Nachlass Radetzkys5 (Prague 1858) ; ‘Hondschriftlicher Nachlass Radetzkys5 (Stuttgart 1858) ; ‘Briefe des Feldwar Schal-los Radetzky an seme Tochter Friederike, 1847-575 (Vienna 1892). Consult Duncker, C. von ‘Das Buch von Vater Radetzky5 (Vienna 1891); Gavenda, A. von, and F. de Vuko et Branco, (Reldmarschall Graf Radetzky * (Prague 1858); Hacklander, F., ‘Erinnerungen on die Feldzuge der Oesterreichischen Armee in Italien, 1848-495 (Munich 1852); id., ‘Bilder

?QQ‘7?enlrˆu1(lat?f1 leben im Kriege5 (Stuttgart 1887) ; Heller, F. von, ‘Der K. K. Oesterreichische Feldmarschall Graf Radetzky5 (Stutt-gai t 1858); Krones, F. von, ‘Feldmarschall Radetzky5 (Vienna 1891); Kunz, H., ‘Die Feldzuge des Feldmarschalls Radetzky in Obentahen 1848-49 5 (Berlin 1890) ; Sarm H

C?er,c<feldJmar.scha11 Graf Radetzky5 (Graz 1906); Schneidawind, F. J. A., ‘Feldmarschall Graf Josef Radetzky5 (Augsburg 1851); id., Aus dem Hauptquartiere und Feld leben des Vater Radetzky5 (Stuttgart 1854); Schonhalo, V; von> Erinnerungen eines Oesterreichischen Veteranen5 (Stuttgart 1852); Strack, J„ ’Die Generate der Oesterreichischen Armee5 (Vienna 1850) ; Trubetskoi, A. de, ‘Campagnes

Cornte Radetzky, dans le Nord de l’ltalie en 1848 et 1849 5 (Leipzig I860) ; Willisen, W. von <Der Italiemsche Feldzug 1848> (in ‘Theoria des Grossen Kneges,5 Leipzig 1868).

RADFORD, William, American naval offi¬ cer: b. Fincastle, Va., 1 March 1808; d. Wash¬ ington, D. C., 8 Jan. 1890. He entered the navy in 1825, was promoted lieutenant in 1837 served in the war with Mexico and performed gallant service at Mazatlan. In 1855 he was promoted to the rank of commander and for

wi? C rVS-eˆ7eˆ;Wltih tl?e East India squadron. When the Civil W ar broke out he was assigned

to. the Cumberland, but was not aboard her when she was sunk by the Merrimac; although a Southerner by birth, he was a firm supporter of

the Union; he was promoted captain in July 1862, and commodore in April 1863. During the assaults on Fort Fisher, in 1864-65, he com¬ manded the New Ironsides and the ironclad por¬ tion of Porter's fleet, rendering distinguished services. Later, and until the fall of Richmond, he was in command of the James River division of the North Atlantic squadron. He was com¬ missioned rear-admiral in July 1866, was in charge of the European squadron in 1869 and was afterward on duty in Washington until he was retired in March 1870. After his retirement he was on special duty with the Navy Depart¬ ment in Washington for two years.

RADFORD, Va., city in Montgomery County, on New River, 75 miles southwest of Lynchburg, on the Norfolk and Western Rail¬ road. It dates from 1756 and is chiefly engaged in manufacturing. There are flour mills, iron foundries, brick works and other industries. Pop. 4,627.

RADHANPUR, rad-han-poor', India (1) chief town, of a state in the Palanpur agency of the Bombay presidency, surrounded by a wall which encloses a fortified castle and the resi¬ dence of the native prince. A fine sort of salt¬ peter is manufactured and there is some trade in cotton, wheat and grain. Pop. about 11,567. (2) A native state in the northwest corner of Gujerat covering an area of 1,150 square miles. It first came under British protection in 1813. Its native prince, who bears the title Nawab, is a member of the Babi family. The country is a level plain with few trees and no hills whatever. The majority of the inhabitants, over four-fifths, are Hindus. In 1911 the gross revenue was $87,350. Consult (Gazetteer of the Bombay Presidency) (Vol. VB, Bombay 1914). Pop. about 65,567.

RADIAN. See Mechanics.

RADIANT STAR, Order of the. See Or¬

ders (Royal) and Decorations.

RADIATA, one of the great divisions of the animal kingdom in the classification of Cuvier, characterized by having the parts of the body arranged around a vertical axis like the spokes around the hub of a wheel. Later, it was shown by Leuckart that the group was un¬ natural, and it has been discarded for many years. Its chief numbers are now included in the Coelenterata and Echinodermata (q.v.). As

limited by Cuvier it also embraced some of the Protozoa, the Polyzoa, some parasitic worms and a few other forms.

RADIATION. The term radiation is ap¬ plied to a variety of cases in which energy is propagated through space like rays of light. The case most studied is that of heat. Heat rays are regarded as of the same character as light rays, the two merely differing in wave length or frequency. Writers sometimes speak even of the ˆcolor® of a heat ray to indicate its wave length or period. Conversely, every light rav is simultaneously a heat ray. According to Maxwell's theory these rays are all electromag¬ netic in character, consisting of states of elec¬ tric and magnetic intensity perpendicular to the ray and propagated through space with the velocity of light.

Heat conduction in a medium proceeds from points of higher to points of lower tempera¬ ture. If the temperature is constant, there is

no conduction. Radiation is, however, inde¬ pendent of the temperature ; for instance, the sun's rays can be concentrated by means of a lens of ice to a focus when the temperature is much higher than that of ice. Furthermore the rays passing through a point do not necessarily proceed in the same direction. They may pro¬ ceed simultaneously in many different direc¬ tions. Even the radiations in two opposite di¬ rections are quite independent; to specify the radiation completely, the intensity (rate at which energy flows across unit surface perpen¬ dicular to the direction of motion) must be known in all directions.

The creation of a heat ray is denoted by the word emission. Since this requires energy, only material particles can emit radiation. When we speak of the surface of a body as radiating heat, we mean merely that it allows part of the rays coming from the interior to pass through.

The radiation emitted by a substance de¬ pends on the substance and its physical condi¬ tion. With the exception of phenomena of luminescence, it is generally assumed that the radiation emitted by a given body depends only on its temperature and is otherwise independent of the presence or absence of other bodies or fields of radiation.

Heat rays are destroyed by absorption. They are then converted into other forms of energy. This can be accomplished only by material particles. Rays of different frequency may be absorbed very unequally,

but it is as¬ sumed that the fractional part of the rays of each frequency absorbed in penetrating a given distance through a given medium is independent of the intensity of the radiation.

A transparent, or diathermanous body is one through which the rays pass practically un¬ changed. If the rays pass freely but are de¬ flected, or scattered, the body is turbid. If the surface is smooth, the rays may be regularly reflected as by a mirror. If the surface is rough, the rays may still be practically all re¬ flected, but irregularly in all directions. The body is then white. A black body is one that absorbs all the incident radiation.

Normal, or Black, Radiation. — The sim¬ plest type of radiation is that which occurs in an enclosure at constant temperature. The total radiation from a given body under these conditions is called normal radiation.

Consider a number of bodies in an enclosure with perfectly reflecting walls. These bodies exchange heat until they settle to a uniform temperature. They then continue to exchange heat by radiation but each receives just as much as it nives out (Prevost's principle of ex¬ changes). The composition of the resulting radiation is independent of the nature of the bodies present. For, if it were not so, the in¬ troduction of a new body would change the composition of the radiation in the enclosure and, since the emissive power of each body is a function of its temperature only, the resulting changes in the amount of radiation absorbed would cause changes of temperature in contra¬ diction to the second law of thermodynamics.

For a region in temperature equilibrium, ac¬ cording to Kirchoff's law, a body not only re¬ ceives the same total energy it gives out ; but it absorbs precisely the same amount of each wave length that it emits; for the radiation

received and given out are both normal radia¬ tion. If any radiation is absorbed it must be replaced by precisely the same radiation in emission. It follows, for example, that a body which does not emit a particular wave length cannot absorb radiation of that wave length and conversely.

Since a black body merely emits and does not transmit or reflect radiation, and since emission depends merely on temperature, the radiation . from a black body is the same whether it is in an enclosure at constant tem¬ perature or not. Hence the radiation given out by a black body is always normal. For this reason normal radiation is often called black body radiation.

Composition of Black Body Radiation.—

Consider the radiation in an enclosure where the absolute temperature is T. We have seen that the character of this radiation is a function of the temperature only. If then m(A) dA is the amount of heat energy per unit volume which exists in wave trains of which the wave lengths lie between A and A + dA, the quantity u(h) will be a function of A and T only. The

determination of this function is one of the most important problems in the theory of radia¬ tion.

The first formula for «(A) was obtained by Jeans and Lord Rayleigh. Jeans' method was to start from the well-known result in statistical mechanics, that, in a dynamical system of a large number of degrees of freedom the energy on the average is distributed equally among the various degrees of freedom, so that each has an amount of energy \ RT, where R is an ab¬ solute constant. By counting the number of ways in which wave lengths between A and A dA can occur in stationary vibrations in a fixed enclosure and giving to each two de¬ grees of freedom, corresponding to the two plans of polarization, Jeans found that

«(A)

8nRT

A4 ‘

This is known as Rayleigh’s law of radia¬ tion. For large values of A it represents the facts fairly well. But for small values of A it disagrees entirely with experiment and leads to the rather questionable conclusion that the total energy per unit volume

«(A)dA

is infinite.

A formula that does not have these de¬ fects and that seems entirely in accord with experimental values was first obtained by Planck. His result is

where c is the velocity of light, li and R constants.

To obtain this formula, Planck assumed that molecular systems do not emit radiant energy continuously but in chunks or <(quanta.® Radiation of frequency v is only emitted in multiples of hv, where h is a uni¬ versal constant. The simplest proof of the formula is a modification of that given by Jeans. Consider a system of stationary electro¬ magnetic waves in a rectangular enclosure.

The number of ways per unit volume in which such waves with frequency between v and v + dv can be set up is

gnv^dv

as in Jeans’ proof. If now energy occurs only in multiples of £ = hv, and is distributed as is Gibb’s canonical ensemble, the average energy for a wave of particular frequency is

£ e 2 1

eeT RT _ o + £ e~~ RT + 2 e e~~RT + ...

e e

e RT — 1

£ 2£

1 +e~ rt + e rt + ...

Hence

uv dv — - -

*(

8’r£v2 grrh v3dv

~L PC71E V

eRT—\) \eRT—l)

By using the relations

Q

v = dA = uv dv ,

this gives the formula above.

This (<quantum theory® that radiant energy is emitted only in multiples of hv has been the subject of very general discussion. There are some who still doubt its validity. Poincare has shown, however, that any law of radiation in which the total energy in unit volume is finite requires discontinuities similar to those involved in the hypothesis of quanta. N. Bohr has given a suggestion as to the physical sig¬ nificance of quanta. He assumes that atoms consist of positive nuclei with negative electrons revolving like planets around them and that there is a series of stable orbits in which each electron can revolve continuously. If dis¬ turbed it will either return to its orbit and give out no energy or it will change to another orbit and, in so doing, give off energy equal to the difference of its energies in the two orbits. In this way he calculated the spectrum of hydrogen, the calculation as given by Millikan, agreeing with measurement to less than one part in a thousand. This and other equally striking results indicate that the quantum hypothesis has a substantial basis of truth.

Deductions from Planck's Law. — In a

constant temperature enclosure, radiant energy travels with the velocity of light, spreading out equally in all directions. The rate at which it crosses a given area in a given direction is then proportional to the density of radiation in the enclosure. If F(A) dA is the portion cross¬ ing unit area in unit time carried by wave trains with wave length between A and A -} - dA, by Planck's law

where ct and c2 are constants. This is also the radiation emitted by a black body at temperature T whether it is in a region of constant temperature or not.

The total radiation of all wave lengths

across unit area of the surface of a black bod}’ is

Ceu) d* = r ci

J J o tel SL

{err-,)’

Letting 1 T — z, this becomes

/oo

O

E(}) d* = T 4

r

J ° z 5

e W C\ d2

CM

= aT4,

where a is constant. This expresses Stefan's law that the total radiation from a black body is proportional to the fourth power of the absolute temperature. „

The value % m for which E 2 is a maximum must satisfy the equation

dE = o,

which reduces to

d’k

Since the left side of this equation is a func¬ tion of %T,

ImT = k,

where k is constant. This expresses Wien’s law that the wave length corresponding to maximum energy is inversely proportional to the temperature.

Both Stefan’s law and Wien’s law can be proved directly by thermodynamics. They, therefore, further corroborate Planck’s law.

A practical application of Wien’s law occurs in the problem of the luminous efficiency of a lamp. At ordinary temperatures A m is much larger than the wave lengths of visible radia¬ tion. Practically all the energy is radiated as heat. As the temperature increases % m de¬ creases and the proportion of visible radiation thus increases. Hence the efficiency of a lamp is increased by increasing as far as practicable the temperature of the incandescent element.

Optical Pyrometry. — • The laws of black body radiation indicate methods of determin¬ ing temperature. For example, since the total radiation of a black body is proportional to the fourth power of its absolute temperature, the temperature of a radiating black body can be calculated from the observed intensity of radia¬ tion, allowance being made for the size of the body and its distance from the point of observation.

Again, if we determine by observation the value of A which makes E(A) a maximum, Wien’s law

Am T = k,

enables us to determine T. In this way the temperature of the sun has been found to be about 5500° C.

By measuring the ratio of two values of

since C2 is a known constant, we can calcu¬ late T. This is essentially the basis of the practical form of pyrometer known as the Warner pyrometer.

These optical methods are all subject to error when the radiating body is not a black

•body. The value of these methods is that they can be used for temperatures much higher than can be measured by other means and by using a black body at the same temperature the error • can be determined. The most widely used optical pyrometer is one in which the carbon filament of a lamp is seen projected on the hot body whose temperature is to be measured. The current through the lamp is increased until the filament is no longer visible and the temperature is then inferred from the observed value of the electric current. The slight dif¬ ferences of color between the filament and background are eliminated by using a red glass.

Selective Emission, Reflection and Trans¬ mission. — A substance placed in an environ¬ ment not in temperature equilibrium usually gives out a radiation that is not the normal radiation for its temperature but contains a larger percentage of certain wave lengths than normal radiation and a smaller percentage of others. Such a substance is said to exhibit •selective action.

The total radiation coming from the body is partly emitted, partly reflected and partly transmitted through the body. The selective action may then be a case of selective emission, selective reflection or selective transmission. If one of these occurs, one or both the others must occur. For in temperature equilibrium the total radiation is normal, and any deficiency in emission must be made up by transmission or reflection. Now these qualities depending only on the nature of the body and its temperature persist when there is not temperature equilib¬ rium with proper allowance of course for the fact that the incident radiation is not normal.

The following are special cases of particular interest :

(a) Bodies Which Do Not Reflect Per¬ ceptibly. — Such bodies do not transmit (i.e., they absorb) those wave lengths which they emit in excess. The transmitted and emitted radiations are in a sense complementary. This is the case, for example, with gases. They do not

reflect perceptibly and they absorb in excess those wave lengths which they emit.

(b) Bodies Which Are Opaque , i.e., Do Not Transmit. — Such bodies emit radiation com¬ plementary to that which they reflect. For ex¬ ample, a polished metal plate is opaque and reflects nearly all the light falling on it. There¬ fore, it does not emit perceptibly. For this reason the walls of a thermos bottle are silvered.

(c) Bodies Which Do Not Emit Percep¬ tibly. — Such bodies reflect best those wave lengths they do not transmit. Thus many bodies have what is called surface color. They appear one color by reflected light, another by transmitted light.

(d) Opaque Bodies Which Do Not Reflect. — These on black bodies. They emit normal radiation.

Fluorescence. — Many substances when illu¬ minated by monochromatic light have the prop¬ erty of emitting light of a different color or frequency. This phenomenon is called fluor¬ escence. From his investigations, Stokes con¬ cluded that the fluorescent light is invariably of lower frequency than the exciting light. This is sometimes called Stokes' law. Later observ¬ ers have proved that it is not always true.

If the fluorescent emission lasts for some time after the exciting radiation has been cut otf the phenomenon is called phosphorescence. • There is no sharp line of demarcation between fluorescence and phosphorescence, as the dura¬ tion referred to may take almost any time from zero upward. In liquids and gases this dura¬ tion has always been found too small to meas¬ ure. Only in solids does phosphorescence prop¬ erly occur.

It is probable that phosphorescence is always accompanied by the liberation of electrons. The exciting light causes the emission of electrons from some constituent of the material and the ˆorescent light

arises from the recombination of these emitted electrons. The duration of luminescence is determined by the resistance to this i ecombination and is consequently greater in solids than in liquids or gases. This is fur¬ ther confirmed by the fact that fluorescence is strongly affected by changes in the physical condition of the bodies exhibiting it. Thus, some substances are only fluorescent when dis¬ solved in non-fluorescent liquids, while others are fluorescent in the solid state but not when dissolved.

Of particular interest is the work of R. W. Wood on. the fluorescence exhibited by the vapor of iodine. When stimulated by mono¬ chromatic light, the fluorescent spectrum is not continuous but consists of a series of fine lines whose frequencies are approximately equidistant with the line of the incident radiation forming one of the series. The positions of these lines change in a remarkable way when the frequency of the exciting light is altered. The absorp¬ tion spectrum of iodine has seven very fine lines within the width of the green line of mercury. When the green mercury line is used for ex¬ citation it is found that a large number of the fluorescent lines are made up of fine lines hav¬ ing a structure similar to these seven absorption lines. This line spectrum has the further prop¬ erty of being converted into a band spectrum by an admixture of certain inert gases like helium.

H. B. Phillips,

Massachusetts Institute of Technology, Cam¬ bridge, Mass.

RADIATION OF HEAT. See Heat.

RADIATOR. See Internal Combustion Engine.

RADICAL, or RADICLE, in chemistry (and particularly in organic chemistry), a name given to certain molecular groups whose con¬ stituent atoms possess such relations and affini¬ ties that the groups themselves persist and maintain their integrity, even when the com¬ pounds in which they occur undergo profound chemical change. The following example will illustrate the nature of a radical more clearly Ordinary alcohol (ethyl alcohol), when free from water, has the chemical formula GHsO.

If this be saturated with hydrochloric acid gas in the presence of chloride of zinc, a compound having the formula C2Hr.Cl is formed ; and by treating the alcohol with iodine under proper conditions, an analogous compound having the formula C2Hr,I is obtained. When

this last sub¬ stance is heated with water and metallic zinc, we obtain the hydrocarbon gas ethane, C2He! These reactions, and others of a similar nature, suggest that the molecular group C2Hs persists through all of these changes; and this

hypothesis is found to be justified in every way. 1 he group C2H5 is, therefore, a ((radical,® and to it the name «ethyl» has been given. The gas ethane, C2Hc, is the hydride of ethyl, according to this view, and its formula may be written C2H,H. Similarly, C2HSC1 and C2H5I are called ethyl chloride and ethyl iodide, respectively. Ethyl alcohol, in the same way, is regarded as the hydrate of the radical ethyl, and its formula is written C2H5.OH. Ethyl is thus seen to be a monovalent radical with a high degree of sta¬ bility, behaving, in its chemical relations, very much like the alkali metals, potassium and so¬ dium. Many compounds are known in which two or more molecules of ethyl occur, with their combined valencies satisfying a single divalent atom or radical. Ordinary ether, for example, is the oxide of ethyl, its formula being (C2H5)20. The analogy of this substance with the oxide of potassium, K20, is complete.

If the persistence of a radical were abso¬ lute, so that we could never destroy the rad¬ ical by any chemical or physical means, we ob¬ viously could not distinguish it from an element* and it is possible that some of the bodies that we now recognize as elements are merely radi¬ cals of extraordinary persistence, which we may some day succeed in breaking up into their con-

ˆ pure speculation, however, and until we know more about the ultimate con¬ stitution of matter, we are to regard a ˆradical® merely as a convenient conception, which enables us to simplify chemical formulae, and to form, a clear general view of the analogies and chemical relations that subsist among various chemical compounds. Radicals may be classed as. < acid® or «basic,» according as they have an acid or a basic character. Thus the radical winch occurs in sulphuric acid and in the sulphates, and which is called «sulphion,» is an acid radical, while ethyl, C2H5, is basic

Among the simpler inorganic radicals that are of frequent occurrence, the following are monovalent: Hydroxyl (OH), the «nitro® group (NO2), the «mtroso» group (NO), the armdo group (NH2) and cyanogen (CN) ihe following are divalent: Sulphion (SOO

tIle (<imido>) group (NH) and the thionyl® group (SO). In organic

chem¬ istry many radicals are recognized. The com¬ moner basic radicals of the fatty series may be regarded as derived from the saturated hydro¬ carbons (or paraffins) by the removal of one or more atoms of hydrogen. Thus we have the following series, which are derived in the man¬ ner described, the radicals in each column being obtained from the paraffin at the head of that column by the removal of hydrogen atoms:

CH4

Methane

CH3

Methyl

CH2

Methylene

CH

Methenyl

C

(Carbon)

C2H6

Ethane

CjH5

Ethyl

C2H4

Ethylene

C2H3

Ethenyl

C2H2

Ethine

CsHs

Propane

C3H7

Propyl

C3H6

Propylene

C3Hs

Propenyl

C3H4

Propine

C4H10

Butane

C4H9

Butyl

C4H8

Butylene

C4H7

Butenyl

C4H6

Butine

C5Hl2

Pentane

CsHn

Pentyl

C5H10

Pentylene

C5H9

Pentenyl

CsHg

The names here assigned to the radicals are due to Hofmann, and the system in accordance with which they are formed will be sufficiently evident, without further explanation. Hof¬ mann s names are now commonly adopted, but some of the foregoing radicals are still known by other names also. Thus Hofmann's

(ethenyl® is often called (< vinyl® ; and, similarly, his ((propenyl,® «butenyl,» «ethine,® ((propine,)) and ((butine)) are respectively known as «gly-ceryl,» «crotvl» "acetylene,® "allylene0 and "crotonylene.®

The radicals tabulated above and which are of constant occurrence in organic chemistry contain only hydrogen and oxygen. Many or¬ ganic radicals are known, however, which con¬ tain other elements also. The first oxvgen-bearing group to be recognized as a radical was "benzoyl,® C0H5CO, which occurs in benzoic acid, and in many other compounds that are re¬ lated to the oil of bitter almonds. This radical was recognized by Liebig and Wohler, in 1832. Many such radicals are now recognized, es¬ pecially in the organic acids and their deriva¬ tives. As an example, "acetyl® may be cited. This has the composition C2H3O, and acetic acid, C2H3O.OH, is its hydrate.

Many of the radicals are not capable of in¬ dependent existence, and hence cannot be iso¬ lated. Others may be obtained in the free state, or in the form of a compound in which two similar radical groups are united to each other. When methyl iodide is heated with me¬ tallic zinc the iodine is taken up by the zinc, and the methyl radical, CH3, is liberated. It is not obtained in the form of methyl, however, for at the moment of its liberation two of the radicals combine to form a molecule of ethane, C2H15. Ethane, therefore, may be regarded as "di-methyl,® having the formula CH3 — CH3, or as "ethyl hydride,®

having the formula C2H5.H. It is convenient to regard it from one of these points of view for some purposes, and from the other for other purposes. A radical of the series tabulated herewith can exist in the free state, save for a slight change in its internal linkage, provided its valency is an even number, and the free bonds belong to adjacent carbon atoms. Ethylene, for example, has the formula C2H4. When it exists as a radical, in combination with other atoms, it is divalent, and has the structure — CH2

; the two carbon atoms being connected

— ch2

by one internal bond, while each carbon atom also has one bond which is satisfied by the ex¬ ternal atoms with which the radical is com¬ bined. When the ethylene exists as a free hydrocarbon, the two free bonds shown in the foregoing rational formula satisfy each other, and the constitution of free ethylene, therefore, CH2 is || .

CH2

The idea of a compound radical is due to Lavoisier ; and the conception, although its val¬ idity was earnestly disputed for some years, has been of great importance in the development of chemistry. The definition of a radical, as given by Liebig in 1838 in his discussion of cyanogen, holds good at the present day. He said : ((We call cyanogen a radical because (1) it is the in¬ variable constituent in a series of compounds; (2) because it can be replaced in these com¬ pounds by other simple bodies; (3) because in its compounds with a simple body the latter can be replaced by equivalents of other simple bodies.® At least two of these three character¬ istics must be fulfilled by a group of atoms, be¬ fore that group can be regarded as a “radical.®

Consult Hjelt, (General Organic Chemistry) ; Meyer, (Modern Theories of Chemistry.*

Allan D. Risteen.

RADICAL, the name adopted by a large section of the Liberal party in Britain, which de¬ sires to have all abuses in the government com¬ pletely rooted out, and a larger portion of the democratic spirit infused into the constitution. The immediate aim of Radicals at different times has necessarily varied considerably ; and though the

party is now identified almost ex¬ clusively with political reform, the Radicals of the past achieved their greatest success in com¬ pelling attention to important economic changes tending to improve the condition of the laboring population. The term is applied in general usage to persons of extreme views in connection with so-called political and social reforms.

RADIGUET, Maximilien Rene, French explorer: b. Landerneau, Finisterre, 17 Feb. 1816; d. 1892. He was educated in the School of Fine Arts at Paris and in 1838 became secre¬ tary to Admiral Charles Baudin and Count de Las Casas, on a mission that had been sent to Haiti to negotiate with the government of that country for the payment of an indemnity to the descendants of the French citizens that had been murdered during the troubles of 1798-1803. His influence was of great value in bringing the negotiations to a speedy conclusion, several times preventing the impatient admiral from bombarding Cape Haytien. He was afterward secretary to Admiral Du Petit-Thouars, 1841-45, and traveled through South America and the Marquesas Islands, and afterward devoted him¬ self to literary labors. Among other works he has published (Album des Voyages de la Reine Blanche) (3 vols.) ; ˆSouvenirs de l'Amerique Espagnole : Chili, Perou, BresiP (Paris 1856; revised ed. 1874) ; (Etudes de moeurs sur

l'Amerique du Nord* (Paris 1857) ; Wes Derniers Sauvages, Souvenirs de l'Occupation Frangaise aux lies Marquises) (Paris 1861) ; (A travers la Bretagne) (Paris 1865).

RADIOACTIVITY. The discovery that uranium possesses the property of spontane¬ ously and continuously emitting penetrating rays, capable of passing through bodies opaque to ordinary light, was made by Becquerel in 1896. Since that time our knowledge of the subject of radioactivity has increased with great rapidity and a very large mass of experimental facts has now been accumulated. Only a very brief account of the remarkable properties pos¬ sessed by the radioactive bodies is possible in this short article.

Shortly after the discovery of this property in uranium, *Mme.* Curie and Schmidt inde¬ pendently found that the element thorium, which is used in the manufacture of Welsbach mantles, was also radioactive and to about the same degree as uranium. The latter substance is the chief constituent of the mineral pitch¬ blende and in an examination of the radioactive properties of this mineral, *Mme.* Curie was led to the conclusion that other and more radio¬ active substance must be present in it. By an admirable piece of chemical research *Mme.* and P. Curie succeeded in separating from it two new very active substances

which were called radium and polonium. The substance radium was well named as, in the pure state, it gives out radiations about 4,000,000 times as intense

as uranium. Polonium has not yet been chemi¬ cally isolated. It differs from radium in losing its activity with time. Several years after separation the activity has diminished gradu¬ ally to an insignificantly small fraction of its original value.

In addition to these bodies, Debierne and uiesel independently discovered another very active substance called actinium, while Hofmann found that lead separated from pitch¬ blende was active and called the radioactive substance present in it «radiolead.» Somewhat laici a radioactive substance called ionium was ˆplated from uranium minerals by Boltwood. With the exception of radium, none of these bodies have been chemically isolated.

The radiations from these substances are in¬ visible to the eye, but possess the properties ot acting on a photographic plate and discharg¬ ing an electrified body, ffhe rays from a very active substance like radium cause many phosphorescent substances to become luminous. An ordinary X-ray screen, crystalline zinc sulphide ?• . i minerals willemite and kunzite glow brightly when exposed to radium rays. A pho¬ tographic plate is rapidly affected by bringing near a few milligrams of radium bromide, and an electroscope quickly loses its charge.

The radiations from the active bodies have been shown to consist of three distinct kinds, nown as a, *9, and y rays. Unlike ordinary light-waves, the a and* 3 rays consist of a flight or charged particles projected with enormous velocity. They differ from ordinary light in¬ asmuch as a pencil of these rays is deflected bv a magnetic and electric field. These properties ot the radiations have allowed us to determine the size of the particle and its velocity of pro¬ jection. Rutherford found that the a rays con¬ sisted of atoms of matter carrying a positive and moving with a velocity of about ˆU,UU(J miles a second. The a rays are readily stopped by matter, being . absorbed by a few centimeteis of air and by a sheet of ordinary note paper. The (3 particles, on the other hand,

MASS VELOCITY rMrorv

a

o

—

o

•

Pig. l.

are far more penetrating and pass through sev¬ eral millimeters of aluminum or iron. The /5 particles differ from the a particles in carrying a negative charge and in their much greater velocity of projection. Some of them move with a velocity of over 170,000 miles per sec—

mu SpGˆdi Ve,ry nearly equal to that of light.

Partmle has been found by Becquerel and Kaufmann to be identical with the cathode

rrCleTfr,˚dUC?ud by a discharge in a vacuum tube. It has the smallest size of any bodv

™ TTcei fur its mass is on]y about 1/1/00 of that of the atom of hydrogen. It

was shown in a series of experiments conducted

by Rutherford that the a particles consist of

atoms of helium bearing a positive charge. I he relative sizes and velocities of the a and (3 particles are diagrammatically shown in Fig. 1. The relative energies of motion of the particles are also shown.

The y rays are of an extraordinary pene¬ trating character, readily passing through sev¬ eral inches of iron or lead and several feet of water. They are not deflected by a magnetic or elect i ic field and are a type of very pene¬ trating X-rays. The latter consist of pulses in the ether, akin in some respects to the very short waves of ultra-violet light.

If a magnetic field is applied to a pencil of

lu “, , • T ˆ . -Vi) are s ortea out into the three kinds. This is shown in Fig. 2, where

the magnetic field is applied at right angles to the plane of the paper. The a particles are bent to the left, the [3 to the right, while the y rays proceed in a straight line without deviation. Compared with the 3 rays, the amount of bend¬ ing of the a rays is much exaggerated in the hgure for a very strong magnetic field is re¬ quired to appreciably deflect the latter. The (3 rays consist of particles projected with different velocities, so that some are more easily bent by

themfi!ˆeC fieM than °therS’ This is sh°wn in The expulsion of a and /? particles from the atoms of the radioactive bodies appears to re¬ sult from an explosion in some of the atoms of these substances. About thirty-six thousand million of these a particles are expelled from one gram of radium element every second* and yet the number of atoms in a gram of radium is so enormous that this rate of expulsion can continue for several years without any sensible

radium100 ˆ diminution of the quantity of

The most important property of the a, 3, and

£ Tf5? theni of discharging an electri¬

fied body and this property has been utilized

ft! roˆef*nS of -quantitative measurements of the radiations. The ordinary gold leaf electro—

to°meaS«5»Ch ˆ S*h°Wn Fig‘ 3’ Can be used measure radiations of extremely small inA Simple gold leaf is attached to a tal, r,od Passing through an insulating cork of sulphur or ebonite. On giving a charge to

this rod, the gold leaf diverges and, under or¬ dinary conditions, the gold leaf collapses very slowly. If, however, a radioactive substance is brought near it, the charge on the system is dissipated and the gold leaf rapidly collapses.

The radiations produce a large number of positively and negatively electrified particles or ions, as they are called from the neutral gas. If the electroscope is charged positively, for

example, the negative ions are drawn into it and dissipate its charge. Under suitable con¬ ditions, the rate of movement of the gold leaf is a measure of the intensity of the radiations. A modified form of gold leaf electroscope is capable of detecting the presence of an extraor¬ dinarily small quantity of radioactive matter. One millionth of a gram of radium bromide causes the gold leaf to collapse in a few seconds, and, with care, the effect of one million mil¬ lionth of a gram can be accurately determined. As a means of detection of radioactive matter in small quantity, the electroscope far trans¬ cends in delicacy even the spectroscope. The ordinary quadrant electrometer is also a very convenient instrument for measuring the small ionization produced by the radiations in the air or other gas through which they pass.

In addition to their power of giving out the three kinds of rays, radium, thorium and actin¬ ium also possess another very remarkable propert}r. Each of these substances continuously gives off into the air a minute quantity of gas, which is itself radioactive. This ˆemanation,® first discovered by Rutherford in thorium, gradually diffuses from the radioactive body into the surrounding gas and can be carried away with a current of air. The ˆemanations,® however, only keep their power of radiating for a short time..

The activity of the emanation decreases in a geometrical progression with the time ; the emanation from thorium loses half of its activ¬ ity in about one minute; from radium in about four days; and from actinium in about four seconds.

These emanations have been found to pos¬ sess all the properties of radioactive gases

mixed in minute quantity with the air. The emanations of thorium and radium behave like heavy gases and are ‘chemically inert like the recently discovered members of the argon-helium family. The emanations can be removed from the air by the action of extreme cold. The emanation of thorium condenses at — 120° C., and that from radium at — 150° C. This property of condensation of the emanation from a very active substance like radium can readily be followed by the eye. Thq emanation re¬ leased from radium is stored with air in a small reservoir (Fig. 4). It is slowly passed through a U tube of glass, filled with fragments of the phosphorescent mineral willemite. The tube is immersed in a vessel filled with liquid air. The emanation condenses in the tube immediately below the level of the liquid air and the radia¬ tions from the condensed emanation cause the willemite to become luminous. On removal of the tube and closing the ends, the emanation, after some time, is again volatilized and dis¬ tributes itself throughout the tube, causing a uniform luminosity throughout it. With a large quantity of radium emanation, such an experiment is extremely striking.

Ramsay and Soddy succeeded in isolating the-emanation of radium This gas is brilliantly luminous and rapidly blackens the tube contain¬ ing it. The emanation has a definite spectrum of bright lines, similar in general character to that observed for the inert gases argon or helium.

Curie and Laborde first observed the striking fact that radium kept itself continuously at a temperature several degrees higher than the

surrounding air. The radium is continuously emitting heat at the rate of 132 gram calories per hour per gram of radium in equilibrium with its short-lived products ; that is, it would heat its own weight of water through more than 100° C. in one hour. Rutherford and Barnes showed that the greater part of the heating! effect of radium was not due directly to the radium itself, but to the emanation continuously produced from it. This emanation was separated from the radium, and condensed in a small glass tube immersed in liquid air. The heating effect of the minute quantity of emana¬ tion thus obtained was found to be three quar¬ ters of that originally possessed by the radium. Compared with its weight, the radium emana¬ tion emits a quantity of

energy more than a million times greater than that released in the most violent chemical reaction. The heating

effect of the emanation is not, however, peimanent, but dies away with the time at the same rate as it loses its activity; that is, it falls to half value in about four days.

If a cubic centimeter of the emanation were collected in a glass tube, it would probably give off sufficient heat to melt down the walls of the tube. It can readily be deduced that one pound weight of the emanation, after its separa¬ tion from radium, would emit energy at the rate of 10,000 horse power and, during the time that its activity lasts, would emit an amount of energy corresponding to 60,000 horsepower days. The heating effects of radium have been found to be directly due to the expulsion of a particles from its mass. Each of these particles is projected with such a great velocity that it has considerable energy of motion, which is transformed into heat when it strikes a body, ihese a particles are easily stopped by matter and, m a mass of radium, most of the a particles projected throughout its volume are not able to escape, but are stopped by the radium it-self. Radium is thus heated by the unceasing and vigorous self-bombardment by the a par¬ ticles shot out from its own ma-s. The heating effect of the emanation in a similar way is due to the energy of motion possessed by the a particles expelled from it.

. The emanations all show another very strik-mg property. If the emanation is drawn through a tube, the surface of the tube becomes coated with an invisible active deposit. This deposit can be dissolved in acids, and after evaporation of the solvent, remains behind on the dish. After removal of the emanation, the deposit gradually loses its activity but at a dif¬ ferent rate from the emanation itself. This . excited } or “induced® activity, as it is termed, ° *rac*i°active matter which arises from the decomposition of the emanation. The ex¬ cited activity of thorium falls to half value in 11 hours, that of radium in about 30 minutes and that of actinium in 36 minutes.

Considerable light was thrown on radio¬ active phenomena by some experiments of an(l Soddy that will now be con¬ sidered. It was found that an intensely active substance called thorium X could be separated by a single chemical process from thorium. If some thorium nitrate is dissolved in water and added, the thorium is precipitated.

If the ammonia solution is then evaporated and .ignited, a very active

residue is obtained, sev¬ eral thousand times more active, weight for weight, than thorium itself. The thorium itself is at the same time deprived of more than half of its original activity. A very interesting re¬ sult is then observed. The activity of this resi¬ due thorium X is found not to be nermanent but to decay according to a geometrical pro¬ gression with the time, falling to half value in Tour days. At the end of a month, the activity is less than 1 per cent of the initial value. At the same time, the precipitated thorium regains its lost activity, such that the sum of the activ¬ ity of the thorium and thorium X together is always the same, and equal to that of the orig¬ inal thorium before chemical treatment. At the end of a month's interval, the thorium has nearly recovered its old value, and a new quan¬ tity of thorium X can then be obtained by the same chemical operation. This process can be continued indefinitely provided sufficient in¬

terval is allowed to elapse between each pre¬ cipitation for the thorium to regain its activity. These results are very simply and fully ex¬ plained on the following hypothesis. A small fraction of the thorium atoms every second be¬ comes unstable and breaks up with explosive violence, an a particle being projected during the process. After the expulsion of an a par¬ ticle, the residue of the thorium atom is lighter than before and becomes the atom of the new substance, thorium X. This substance is again unstable and breaks up with the expulsion of a particles, half of the matter breaking up in four days. In ordinary thorium, there are thus two opposing processes at work. The substance thorium X is produced at a constant rate by the disintegration of some of the thorium atoms, and at the same time this thorium X breaks up and changes info another substance. A steady state will obviously be reached when the number of atoms of thorium X, which are pro¬ duced per second, is equal to the number of atoms of thorium X which break up per second. The constant radioactivity of thorium may thus be likened to the constant population of a coun¬ try, where the number of births is equal to the number of deaths.

It has been found experimentally that the property possessed by thorium of giving off an emanation belongs not directly to the thorium but to its product, thorium X. The amount of the emanation is always proportional to the amount of thorium X present, and thorium freed from thorium X does not emit any emana-tl?nk This sh?ws that thorium X is the parent of the emanation. According to the disintegration theory, advanced by Rutherford and ooddy, the atom of the emanation arises as a result of the expulsion of a particle from the atom of thorium X. In a similar way it has been shown that the

emanation is transformed into the active deposit which has been found to consist of a number of distinct substances, four m all, which are successive products formed from the thorium emanation. These con¬ stituents can be separated from one another by electrolysis, or by utilizing the differences in their volatility when subjected to heat.

The process of analysis which has been ap¬ plied to thorium has been applied with equal to uranium, radium and actinium. Sir William Crookes found that uranium has a product called uranium X, which is half trans-tormed in 22 days and gives out onlv 6 and y rays The product actinium X was discovered by Godlewski. The production of a series of dismtegradon products amounting to seven in all has been observed in the case of actinium .U is impossible in this short article to discuss in detail the experiments by which the presence and properties of these series of products re¬ sulting from the transformation of the radio¬ elements, have been determined.

It will be seen that seven distinct transforma¬ tion products have been found in radium The active deposit of rapid change arising from the emanation consists of three substances, called radium A, B and C, Which are half transformed in J, 2/ and 19 minutes, respectively. After these products have undergone transformation a residue of very slight activity remains. The properties of this residue were examined by Rutherford, who showed that it breaks up through three successive stages, called radium

D, E and F. The substance radium D gives out soft beta rays, and is transformed very slowly — about half value in 16 years. The examina¬ tion of this residue brought to light the very important fact that polonium is a product of the disintegration of radium. The product radium F is identical with polonium, for their chemical and physical properties are the same, and both lose their activity at the same rate. It has also been shown that radium D is the primary substance, which causes the activity ob¬ served in the radiolead of Hofmann. The ac¬ tive substances present in polonium, and radio¬ lead are thus proved to be members of the radium family.

The products obtained from the radio-ele¬ ments all possess some distinctive physical and chemical properties, which distinguish them not only from other products but also from the parent element. For example, radium — a solid substance with chemical properties closely allied to barium — is transformed into a gaseous sub¬ stance, the radium emanation. The emanation in turn is transformed into a solid. Each of these products must be considered a distinct chemical substance. They differ from the ordi¬ nary chemical elements in the fact that they are unstable and undergo transformation into other or new kinds of matter. On account of their very limited life, these products exist in very minute quantity, and it is only in the case of a comparatively slowly changing product like the radium emanation that a sufficient amount can be obtained to measure. There is no doubt, however, that both radium D and F will ulti¬ mately be obtained in sufficient quantity to ob¬ tain their spectrum and chemical constants.

In the radio-elements, we are witnessing the transformation of matter through a series of successive stages. The products represent the halting places where the matter is able to exist a short time before it breaks down into new forms. This process of transformation is spon¬ taneous and, as far as observation has at present gone, cannot be hastened or retarded by any physical or chemical agencies.

Since the radio-elements are steadily being transformed, the original matter must slowly disappear and be changed into other kinds. It can

be calculated with some confidence that radium will be half transformed in about 1,690 years. A feebly active substance like uranium will take several thousand million years to be half transformed. The radio-elements ap¬ parently only differ from their products in their length of life; that is, in the stability of the atoms composing them.

A mass of radium left by itself would, in the course of 20,000 years, be almost completely transformed. Since the age of the minerals in which radium is found is known to be much older than this, it is necessary to suppose that radium is constantly produced from some other substance. The ultimate parent of radium is the heavy element uranium, with which it is always found associated. Such a view was strongly confirmed by investigations of Boltwood, Strutt and McCoy. Boltwood found that the amount of radium in different radioactive minerals, obtained from different parts of the world, is always proportional to. their content of uranium. Such a relation indicates that radium is derived from uranium. If this is the case, a quantity of uranium, initially freed from

radium, should in the course of time produce some radium. Such a growth of radium from uranium has actually been recorded in some ex¬ periments by Soddy and Whetham. The rate of production observed is, however, much slower than is to be expected if uranium passes directly into radium. It has been shown by Boltwood that an intermediate substance, ionium, is first produced and that this in turn changes into radium. The evidence is thus very strong that one element uranium produces another element ionium, which then produces radium. Each of these radioactive products is quite distinct in physical and chemical properties from its parent.

The radioactive minerals must be considered as nature's laboratory in which all the products of transformation of the radioactive substances will be found. Rutherford and Soddy early suggested that the rare gas helium, which is always found associated with the radioactive minerals was a transformation product of the radio-elements. This prediction was verified by some very striking experiments made by Ram¬ say and Soddy. They removed the emanation from a quantity of radium and collected it in a tube. A discharge was passed through this tube and the light examined by a spectroscope. After standing several hours the spectrum of helium was observed, showing that this gas had been produced during the transformation of the emanation. Here again we have an example of the production of one element helium

from another.

It has also been observed that an element having chemical properties identical with those of lead is found in uranium minerals. This ele¬ ment is known as uranio-lead and is supposed to be the final disintegration product of the uranium. Its atomic weight has been found to be approximately 206 and in this respect it dif¬ fers from ordinary lead which has an atomic weight of over 207.

The helium found in radioactive minerals is thus a decomposition product of radium and also of the other radioactive substances present in it. It seems likely that we shall be able to form a rough estimate of the age of the radio¬ active minerals by measuring the amount of helium and lead found in them, since for a given amount of radioactive matter present, the amount of helium and lead will be greater the longer the mineral has been formed.

Although radium is found in the highest proportion in the mineral pitchblende and in all other uranium minerals, it is also found dis¬ tributed in minute quantity over the whole sur¬ face of the earth. This has been clearly brought out by the long series of investigations made by Elster and Geitsel of the radioactivity of dif¬ ferent soils and of the atmosphere. J. J. Thom¬ son, Himstedt, Strutt and many others have found that the radium emanation is present in springs and in well water. Bumstead and Wheeler found that the air and surface waters of New Haven, Conn., was impregnated with the radium emanation. Strutt and Allan have observed that the famous Bath springs contain a considerable amount of radium emanation, and the former has also shown that the water contains a minute amount of radium in solution. A similar result has been noted for the waters at Baden and. elsewhere. It has been suggested that the curative properties of these hot-water springs may possibly be due to the

presence of radium or the radium emanation. This has, however, by no means been estab¬ lished.

The atmosphere is found to always contain a small quantity of the radium emanation. This does not come from the atmosphere itself but diffuses up from the soil or is carried up by spring water. A large amount of investigation has been carried out to determine the amount of emanation present in the atmosphere at dif¬ ferent localities and under varying atmospheric conditions.

It has been suggested that the internal heat of the earth may be, in part at least, kept up by the heat liberated by the radium and other radioactive matter present in it. Observations, that have so far been made, seem to show that the amount of radium in the surface crust of the earth is sufficient to supply as much heat to the earth as is lost by conduction to the sur¬ face from the hot interior of the earth. It is only necessary that radium should exist in the earth to the extent of four parts in one hun¬ dred million million to account for the mainte¬ nance of the internal heat of the earth. The amount of radium or equivalent amount of other radioactive matter present in the earth cannot be greater than 270,000,000 tons or otherwise the earth would be growing hotter.

It is not possible to discuss here the physio¬ logical actions that are produced by radium rays. A large number of experiments have al¬ ready been made and the literature of this branch of the subject is already extensive and is very rapidly growing. For bibliography see Radium.

Ernest Rutherford,

Revised by Bertram B. Boltwood, Professor

of Radio-Chemistry, Yale University.

RADIOLARIA, a group of minute one-celled organisms which secrete shells of silica. These shells accumulate in great abundance, and where they make up 20 per cent or more of the bottom sediments are called radiolarian ooze. This material covers large areas in the Pacific and Indian oceans.

RADIOLARIAN OOZE. See Radiolaria.

RADIOMETER, an instrument used to measure mechanical effect of radiant energy. It consists of four crossed arms of very fine glass, having at their extreme ends thin vanes of mica, blackened on one side, the blackened sides all facing the same way around the axis. The instrument is suspended by a quartz fibre in a glass vessel exhausted of air. When the vanes are exposed to rays of light or heat the wheel

moves more or less rapidly in proportion to the strength or weakness of the rays. The phe¬ nomena of this radiometer (known as Nichols' radiometer, after its inventor) as determined by Maxwell, were shown to depend on the ab¬ sorption of heat by the blackened sides of the vanes. This heat being transmitted to the particles of rarefied gas remaining in the ex¬ hausted globe caused them to thrust against that side of the vane and so cause a revolution. The instrument has certain advantages, but is very slow as compared with the bolometer, radio-micrometer and thermopile, requiring from 12 to 45 seconds for a maximum swing.

It is, however, dependably accurate, on a single reading.

RADIOPHONE, an instrument that trans¬ mits or produces sound by means of radiant energy, particularly a device similar to the pho¬ tophone, whose receiver is a block of vulcanite, with no telephone, the vibratory contraction and expansion being produced by the heat of the beam while vibrating, which is accompanied by an audible sound.

RADISCHEV, Alexander Nikolaievich,

Russian author: b. Moscow, 20 Aug. 1749; d. Saint Petersburg, 11 Sept. 1802. He was descended from a noble Russian family, and after spending several years at court as a page, was sent to be educated at the University of Leipzig. He returned to Russia in 1771, and obtained a position in the department of cus¬ toms. He had been deeply impressed during his absence by the writings of the French phi¬ losophers of the time, and in 1790, under the influence of his liberal sentiments, he wrote his famous (Journey from Saint Petersburg to MoscojvP patterned somewhat after Sterne's (Sentimental Journey. > This work is a most striking picture of Russian serfdom as it ex¬ isted at the time, and contains a plan of emancipation, all the more bold for its appear¬ ance in a period of reaction. The book was immediately confiscated and the author was exiled to Ilimsk, in the government of Irkutsk, by the Empress Catharine, but was allowed to return to Russia in 1796. He was made a mem¬ ber of the legislative commission in 1801 by Alexander I. Soon after his appointment he was seized by melancholic attacks during one of which he committed suicide. His writings were collected in six volumes (Moscow 1807— 11), but permission to reprint the <Journey) could not be got even then. Consult Anon.,

(A. N. Radischt Schew) (in Archiv fur Wissen Schaftliche Kunde von

Rusoland, Vol. XIX, p. 77, Berlin 1860) ; Baring, M., <An Outline of Russian Literature) (New York 1914) ; Waliszewiski, K., <A History of Russian Literature) (New York 1900).

RADISH, several species of herbs of the family Brassicacece. The common garden radish (Raphanus sativus) is thought to be a native of Asia, but is not known in a wild state. It is cultivated for its edible roots, which in various varieties may be red, white, gray, brown or black, and vary in form from turnip¬ shaped to parsnip-shaped. They reach edible maturity in from three weeks or less when forced. Radishes thrive best in rich, light, well-drained sandy loam. Out of doors the seed may be sown as soon as the soil can be worked, since the plants are very hardy. The seeds may be dropped about an inch apart, covered an inch deep, in rows a foot asunder in beds by themselves, or, as in market garden practice, may be sown between slower-growing crops, such as carrots, cabbage or peas. Some¬ times they are even sown with the seed of parsnips, onions and other crops that are either slow to germinate or that are very in¬ conspicuous when they first appear. They then serve to indicate the positions of the rows, so that cultivation of the other plants may be¬ gin much earlier; they must then be removed promptly to prevent injuring the main crop. For succession, the seed should be planted at intervals of a week or 10 days. Winter rad-iS/ies are sown from midsummer to early

autumn, and when cold weather arrives are stored in pits or cellars like other roots. Clean cultivation is essential. A Japanese species (R . caudatus) is popularly cultivated in Asia for its long pods which are eaten raw or pickled. It is known as the serpent or rat-tailed radish. The pods are often a foot long. The roots are small, hard and inedible. The sea radish (R. maritimus) is more pungent than the garden species and is little known in American gar¬ dens. Horseradish (q.v.) belongs to a dif¬ ferent genus, Armoracia. Many of the insects which feed upon cabbage, turnip, mustard and related plants also feed upon the radish. The best known is the radish maggot which is the larva of a brown fly (Phorbia brassiccz) . The maggots tunnel in the fleshy part of the root and injure it for human food. Applications of fertilizers, especiallv quickly soluble ones, and rotation of crops have been recommended as preventives. Consult Bailey, (Standard Cyclo¬ pedia of Horticulture. >

RADIUM (Lat. radius, ray), was discov¬ ered in 1898 at Paris by Prof. Pierre Curie and Madame Sklodowska Curie in collabora¬ tion with Monsieur Bemont. It is the most important of over 30 newly discovered radio¬ active elements, and was found in the sulphate residues from pitchblende of the Austrian mines at Saint Joachinsthal, Bohemia, which had previously been worked for the metal uranium. Radium is a chemical element, symbol Ra, atomic weight 226.0, atomic number 88, very similar to barium in its chemical properties. Radium accompanies barium in many chemical reactions and is separated from it by repeated fractional crystallization of the salts, usually the chloride or bromide, the radium being en¬ riched in the crystal fraction. A sufficient num¬ ber of repetitions of the crystallization results in a pure radium salt, from which the atomic weight of radium and its spectral lines have been determined. The salts of radium most commonly prepared are the chloride and bromide (both readily soluble in water), the carbonate (soluble in acids) and the sulphate (insoluble — 100 times less soluble than barium sulphate). The salts are white when freshly prepared, have the same crystalline form as the corresponding barium salts, but on standing rapidly change to yellow or brownish tints owing to the effect of their

own radiations. The glass or silica tubes in which radium salts are usually retained also become colored by the radiations. The color is usually a bluish or deep violet, but some varieties of glass are colored brown. The color may be removed by raising the glass in temperature to a dull red glow. A most striking property of radium is its con¬ tinual emission of radiations and heat. The heat emission from one gram of radium ele¬ ment amounts to 132 small gram calories per hour. It was by means of its radiations that radium was originally discovered and by means of them that it can be detected in extreme dilu¬ tion. For example, in the ordinary commercial ores containing radium its content is about one part in 150,000,000 by weight. None of the ordinary elements could be detected at this dilution and their concentration or recovery in a state of purity would be impossible. Radio¬ active elements emit three kinds of rays named for the first three letters of the Greek alphabet

— alpha, beta and gamma. The first two, be¬ ing really corpuscular in nature, are more prop¬ erly. termed alpha and beta particles. Alpha particles have been proved to be helium atoms with a double positive charge ot electricity, and are emitted at very high velocities, one-fifteenth to one-twentieth of the velocity of light. Beta particles are electrons (single negative charge of electricity), and are emitted at various velocities from almost zero to that of light as a maximum. Gamma rays are ether vibrations (like ordinary light) but are of very short wave length and correspondingly high penetrat¬ ing power. Those of the shortest wave length are 10 times more penetrating than the most powerful X-rays. The continuous emission of heat and radiant energy by radium at first greatly perplexed all scientists, as it appeared to controvert the law of the conservation of en¬ ergy. The true explanation was proposed in 1903 by Rutherford (Sir Ernest E.) and Soddy (Prof. Frederick) on the hypothesis ot atomic disintegration or spontaneous transmutation of one element into another, accompanied by the emission of radiation. This theory has sub¬ sequently been tested from all possible angles and has not only received the strongest experi¬ mental confirmation, but has initiated a new area of progress in the study of the constitution matter; and has incidentally placed the atomic theory on a solid basis of fact.

According to the theory of radioactive dis¬ integration of the atoms, radium is only one member of the family of linear descendants from the parent element uranium (atomic weight 238). Each atomic change in the series is accompanied by the emission of a beta or an alpha particle, giving rise to an atom of the next lower member in the series,

a new chem¬ ical element wholly different in properties from the parent. These changes proceed with the utmost regularity according to a very definite law, namely, that the same fraction of change always takes place in the same interval of time (logarithmic equation). The interval in which 50 per cent of the element changes is called its half period, a very fundamental physical con¬ stant, since the rate of change is independent of all physical or chemical conditions, such as temperature, pressure and concentration. The phenomenon is strictly a property of the atom. Therefore, all radium salts have the same radia¬ tions as the radium metal itself. The metal was once prepared in a pure state by *Mme.* Curie and was found to have all the properties to be expected of a base metal like barium. On account of the ease with which it oxidizes in air, it must be maintained in an atmosphere of hydrogen. The table on following page shows all the members of the uranium-radium family in their order of succession, their radiations, half periods and atomic weight.

Only a few of the interesting deductions possible from this table can be pointed out. On account of the genetic relationship between radium and uranium, the former will be found in nature only when associated with the latter, and always in the same ratio, namely, that of the two life periods to each other, or about one part of radium to three million parts of uranium by weight. This fact has been veri¬ fied by examination of different uranium minerals from various parts of the world.

\ henever an atom emits an alpha particle it loses an atom of helium and hence its atomic weight is diminished by four units and its chemical valency by two units. The emission of a beta particle causes no change in atomic weight (since the mass of the beta particle is only one-seventeen hundredth of the atom of hydrogen), but the valency increases by one unit. These changes in atomic weight can be traced out in the accompanying table. That the atomic weight actually changes according to the theory has been verified experimentally for the atomic weights of uranium, radium and radium G (radiolead).

Table

MEMBER

Symbol

Half period

Rays

Atomic

weight

Uraniumi .

U .

5 billion years.

a

238

Uranium X\ .

U Xi.

24.6 days .

234

Uranium Xz .

U X2.

1.15 minutes. .

P

234

Uraniurm .

u2….

2 million years.

P

234

Ionium .

Io ….

100 thousand

years .

a

230

Radium .

Ra… .

1 600 years ….

a

226

Radium Emanation .

Ra Em

Cl

999

Radium A .

Ra A .

3.0 minutes…

a

z z z

218

Radium B .

Ra B..

26.8 minutes. .

0

214

Radium C .

Ra C..

19.5 minutes. .

a

214

Radium D .

Ra D.

16.5 years ….

P

210

Radium E .

Ra E..

5.0 days

P

210

Radium F (Polonium) .

Ra F..

136.0 days… .

a

210

Radium G

(Radio Lead).. .

Ra G..

Radium Emanation. — The first disintegra¬ tion product of radium is the only gaseous member of this series. It is given off from all solutions or fusions containing radium, and more or less freely from radium salts and ores. It has been estimated that the total quantity of radium emanation in the atmosphere cor¬ responds to 107 grams of radium. Radium emanation was named niton (shining) by Sir William Ramsay, signifying its property of emitting light; and also by the termination on that it belongs to the series of noble gases such as argon, krypton and xenon. Radium emanation is used in measuring small quantities of radium, also for therapeutic purposes fre¬ quently where the element itself was formerly used. On account of its very short life compared with the parent radium it must be collected at frequent intervals from the parent solution of radium salt to compensate its rapid rate of de¬ cay. Since the gas has all the properties of an ordinary gas it diffuses, when not confined to the surroundings and deposits its solid disin¬ tegration products, radium A, B, C, etc., on any object, thus imparting apparently radio¬ active properties termed <(induced activity® but now more correctly referred to as active deposit. The first three members below emana¬ tion in the series, radium A, B and C, accumu¬ late in a confined volume to maximum quantity in about four hours.

The practical uses of radium are confined

to two classes: (1) therapeutic and (2) for the production of luminous products by mix¬ ing with phosphorescent zinc sulphide. The therapeutic use of radium was suggested by the physiological effects of its rays which are very marked. Prolonged exposure to large quantities of radium produces painful and even fatal burns. By controlling the quantity of radium, the time of exposure and the thickness of metallic screening, radium may be used for the treatment of malignant growths, such as cancer, through the effect of its radiations. Some remarkable results have been achieved in this direction but much experimentation is re¬ quired to determine all the physical factors in¬ volved in obtaining the best results. Radium

therapeutics may still be regarded as in the ex¬ perimental stage, and is much hampered by the scarcity and high cost of radium.

By mixing a small proportion of radium with an especially prepared phosphorescent zinc sulphide, a fairly permanent luminescent material is produced which can be applied to the dials of instruments or to any other sur¬ face which it is desired to render self-luminous in the dark. During the European War such material was extensively employed on airplanes, battleships and in the trenches since it had the advantage of illuminating dials, gun sights, etc., without exposing a light to the enemy, since the luminosity, even that from the strongest preparations, can be seen at a distance of only a few yards. The proportion of radium em¬ ployed in preparing the luminous materials de¬ pends on the luminosity desired. About one part of radium element per 4,000 parts of zinc sulphide is the upper limit for radium. Much lower mixtures than this can be used for many purposes. The luminosity of radium paint in¬ creases for about three weeks after prepara¬ tion and then falls off for some months, finally reaching a value about 20 per cent of the orig¬ inal brightness which appears to remain con¬ stant for several years at least.

The natural sources of radium are prin¬ cipally the three uranium ores — carnotite, uraninite (pitchblende) and autunite. Carnotite (a vanadate of uranium) is found extensively in the arid regions of southwestern Colorado and southeastern Utah and now constitutes by far the most important source of radium. It is estimated that more than 55 grams (or about two ounces) of radium element have been pro¬ duced from this source. The principal source of pitchblende has been the Austrian mines of Saint Joachimstahl. Some radium has also been prepared in France from autunite (a phosphate of uranium), found in France near Autun and also in Spain. See Radioactivity; Polonium; Uraninite; Uranium, *etc.*

J * V r \ ˆ — Curie, Madame, <Traite de

radioactivite* (2 vols., Paris 1910) ; Gager, C.

/at Effects °1 the Rays of Radium on Plants* (New York 1908) ; Meyer and von Schweidler's recent work on radioactivity; Rusby, H. H (tn New York Botanical Gardens Journal, \ ol XVI, New York 1915) ; Rutherford, Ernest E, Radioactive Substances and their Radiations* (Cambridge 1913) ; Soddy, F., <Chemistrv of the Radio Elements* (2 parts, London and New York 1914). Consult also the following periodi¬ cals. Philosophical Magazine (London). Le Radium (Paris), Comptes Rendus de FAcademie

(Paris), S it sung sbcrichte (Vienna Academy), American Journal of Science (New Haven), Journal of the American Chemical Society (New York), Journal of the Chemical Society of London, Berichte d. deutsch chem. Gess. (Berlin).

S. C. Lind,

Physical Chemist, Bureau of Mines, Mining Ex¬ periment Station , Golden, Colo.

RADIUM THERAPY. Twenty years after Madame Curie announced the discovery of radium, and 15 years of experience with its use in treatment of diseased conditions, is long enough to give some idea of its usefulness and its limitations. Radium came into use as a sur¬ gical agent some five years after the discovery and similar application of the X-ray. The latter had already demonstrated its efficiency in curing some, and ameliorating other types of malignant disease, and it was at once surmised that radium might have similar effective force, inasmuch as its output of peculiar energy was not unlike that from X-ray tubes. Exaggerated hopes and claims for both have been modified with time, and one can now estimate somewhat the worth of both. The limits of its useful¬ ness have not yet been reached, — not only in the field of malignant disease but in other types of non-malignant tumors and skin diseases.

Everyone who aspires to the use of radium efficiently must have some fundamental knowl¬ edge of its effect on the vital growth of living, healthy cells. Without such intelligent under¬ standing, one is not prepared to ask what hap¬ pens in treating diseased cells. A series of simple experiments with garden seeds or bulbs will demonstrate convincingly the retarding effect on cell growth after exposure to radium. For example, if strong radium be placed an inch distant from any seed chosen, before planting, for from two to eight hours, these, after plant¬ ing, will grow in size and vigor exactly in pro¬ portion to the time of exposure, — the longest treated may be killed, the shortest may be scarcely retarded, the middle series will grow half the normal height.

This gives the clue to the results seen in tumors. It is admitted that cell growth, whether vegetable or animal, is actuated by the same vital force. Tumors are merely the massive and exaggerated growth of cells, which are found normally at the site of the tumor. The popular expectation that large tumors can be easily removed by radium is not borne out by facts; but early treatment of small growths of typi¬ cally malignant cells is successful in everyday practice, because, at that stage, there has been no wide dissemination of the disease. When the magnitude of the growth is too large for radium then surgery can remove it by knife or caustic, which only serves to emphasize the wonder of radium work, which can so alter wrong growing cells as to restore them to healthy action when small, without removing them as caustics, cautery and the knife do.

There are types of low-grade, malignant tumors which uniformly cure themselves after proper doses of radium therapy, and there are also other grave forms which yield to radium. Starting from and among the marrow cells of the bones, proceeding by absorption and destruction of the bone, if not arrested, the so-called myeloid tumors, wonderful to relate, disappear under radium treatment and new bone

reforms in shape like the one that disappeared. In one patient under the writer's care a part of the bone of the lower jaw was entirely re¬ placed by a tumor the size of a small hen's egg. When the radium had altered the cells they melted away, the bone was perfectly re¬ stored and has remained sound and well for 15 years. Again, tumors of lymph glands are well controlled by radium and often cured un¬ less they be tubercular. The disease of all the lymph gland system, known as Hodgkins' disease, is well treated by radium as it is also by the X-ray.

It is among the wonders of modern surgery to witness the disappearance of tumors which have overgrown parts of the body, like the eye-lid or lip, and to watch the complete res¬ toration of the original part. So completely does this illustrate the unique and subtle power of radium, that one example may be cited : A tumor had grown on the lower eye-lid so as to destroy all semblance of more than half of it. A fortunate use of the exact amount of radium necessary caused the complete disap¬ pearance of the tumor and perfect restoration of the eye-lid within eight weeks. For 10 years afterward it was impossible to say on which lid the tumor had been. This tells the story of the specific effect on disordered cells called tumors ; where the

healthy part was engulfed and lost in a malignant growth, whose wrong growing cells, being weaker, melted away under radium rays, and allowed a reassembling of the original healthy ones and restoration of the eyelid under its healing action.

This selective action against diseased tissue is now an accepted fact; alongside of that, however, is the discovery that many kinds of cells have such different degrees of resistance that only a few types of tumor yield to radium. The popular cry for a cancer cure is not met by any claim that its most ardent advocates can make for radium. This is not because the early growth of cancer cells is not controlled by radium, but because by the time the neg¬ lected trouble is brought to the notice of the surgeon, the system has been invaded beyond the reach of any remedy.

Methods of Applying Radium. — Very highly condensed radium salts in the form of carbonate, chloride, sulphate or bromide are incorporated with varnish and spread on metal surfaces of small size, — half an inch or one inch in diameter — or better still, fused with powdered glass in an indestructible enamel on a small metal surface; or the radium powder may be put in very fine glass tubes an inch long and as large as a steel knitting-needle; or, if dissolved in water, it will yield radium emana¬ tion which may be collected and condensed into glass capillary tubes scarcely larger than a pin, which, when protected by a delicate silver case, may be buried in tumors or laid upon the surface. Again, the minutest solution of ra¬ dium in sterile water may be injected beneath the skin with a hypodermic needle and a sys¬ temic effect can be produced,— (lowering of blood pressure, etc.) ; but the efficacy of this in any disease is, as yet, very problematical. Of late, also, there has been an attempt made to isolate the beta rays from radium, separated in large quantity in the magnetic field and projected upon diseased surfaces (psoriasis, etc.), with striking alterative effect. The beta ray has

been demonstrated to be the efficient factor in radium work. All methods, however, of using this extraordinary agent are still subject to

change.

Two facts are established: First, surface diseases can be treated by strong radium placed on the surface for a half hour, with gauze, paper or cotton interposed to the thickness of a quarter or of half an inch, as a filter to exclude the most irritating rays; second, when the disease is deep, insulation of the skin, which is a natural protector, prevents penetration of the efficient rays to a sufficient depth, without such a long application as would injure the skin, unless a thick screen of lead is interposed to cut off the burning rays and allow penetra¬ tion of the gamma, which generate secondary beta rays.

About one-tenth millimeter of lead for every hour's exposure of small amounts of radium (up to 100 milligrams) is about the correct screen to affect deep structures. With these facts in mind experience will dictate the care¬ fully gauged dosage of rays which must be dis¬ charged into the structure to produce a curative action.

. Speculation would lead one to surmise that, if its curative effect lies in the negative elec¬ trons which radium supplies, the disease might be due to the loss of the negative charges. Granting that the force activating any living cell is a well-balanced positive and negative charge of electricity, the equipoise is re-estab¬ lished by restoring the lost part with permanent benefit. While physiologists are in doubt whether the chemical change in metabolism of living tissue creates electric action, or, whether latent electric forces engender chemical changes and biologic metabolism, it would seem that this clean-cut supply of one electric element, with its resultant good, brings us one step neaier to understanding why cells grow and why they grow wrong. Inferentially, electricity and not biological change is the primary driv¬ ing force. In summarizing the acknowledged efficiency of radium results in surgical work, the most clear-out demonstration of its value is shown in the cure of many semi-malignant tumors of the skin — notably of face, scalp and hands; in the alterative and reducing effect on lymphoid structures, lymph gland tumors, lym¬ phangiomata of tongue, parotid, thyroid and splenic tumors ; in complete disappearance of bone myeloid tumors ; in prompt and complete disappearance of papillomata — warts in any pait, especially available in the larynx where one application is usually sufficient ; in altera¬ tive and often curative effect in patches of chronic itching eczema, psoriasis, Paget's nipple, vernal catarrh and keloids.

The public call on scientific medicine to find a cancer cure has been met with untiring zeal by thousands of earnest students. One use of radium lies in helping to understand the subject better and to

differentiate the various types of diat multiform disease; but as yet its use meets with a limited response. There is undoubtedly a curative action on small groups of cancer cells when found in nests in the neighborhood of larger growths. It may also be said that when radium is buried in the area from which a cancer has been imperfectly removed, it has sometimes shown curative action and has pre¬ vented recurrence, but as a weapon against

considerable cancer masses it is not yet avail¬ able. In mixed cancer tumors where adenoid structure exists, as in adeno-carcinoma of the rectum, it has a marked retarding value when properly used. Exact methods of applying this powerful agent have yet to be formulated and great experience and judgment are necessary to obtain the beneficial action of this remedy.

Robert Abbe, M.D.

RADIUS, the bone of the fore limb of vertebrate animals, which, as in man, when the arm is laid flat with the palm upward, lies to the thumb side of the limb. This side is, therefore, termed the radial side of the limb, in contradis¬ tinction to the ulnar or opposite side, so named from the ulna or neighboring bone, which, with the radius, constitutes the forearm. See Arm.

RADIUS, in geometry. See Diameter.

RADIUS BAR, or RADIUS ROD, one of

the guiding-rods in a parallel motion, jointed to the connecting links, to counteract the vibratory motion communicated by the beam by guiding the links so that the head of the piston rod may reciprocate in a line sensibly straight.

RADIUS OF CURVATURE. See Curves

of Double Curvature.

RADIUS VECTOR. See Mathematics.

RADIX. See Root.

RADOM, ra dom, Poland, (1) city and capital of the government of same name, on the right bank of the Radomka (or Mleczna) and on the Ivangorod-Dombrova Railroad, 100 miles south of Warsaw, and

one of the best-built provincial towns. Its special features are an ancient church and convent and the ruins of an old castle. The town is supposed to have been founded about 1350 by Casimir the Great, king of Poland. It has played an important part at various times, in the history of Poland (q.v.), being frequently the seat' of Polish diets. It was captured by the Germans in the e<a.rly pait of Great War. Its manufactures are of tin, oil, vinegar and leather. Two fA\rSˆ[e annual attractions. Pop. about 50,730. {Z) 1 he government covers an area of 4,768 square miles, and has a population of 1,180,200 chiefly Catholics. Its chief rivers are the Vistula and Pilica. It is divided into seven districts. Although there are extensive marshes a large part of its soil is very fertile, about 50 per cent being under cultivation and 28 per cent under forests. Wheat, rye, barley, oats buckwheat, hemp, flax and potatoes are the main crops and a considerable amount of grain is exported. There is also extensive rais¬ ing of livestock. The government is rich in iron ore and other minerals and important in¬ dustrial establishments employing some 75 000 workmen have been developed.

RADOWITZ, Joseph Maria von, Prussian

?707esmian6 b;- B1ˆnkenburg, Germany, 6 Feb. 1797; d. Berlin, Germany, 25 Dec. 1853. He

was of a noble, originally Hungarian, family, and in 1812 entered the Westphalian army as an officer and was wounded and taken prisoner same year at the battle of Leipzig. In o?n the cnterˆ the Prussian service, and in 1830 became chief of the general staff of artil¬ lery and a leader of the anti-revolutionary pnrty. He subsequently held diplomatic posts at C arlsruhe, Darmstadt and Nassau, was the

confidant and adviser of King Frederick Wil¬ liam IV, and after the revolution of 1848 supported the efforts of Prussia to give a con¬ stitution to Germany. For a few months in 1850 he was Prussian Minister of Foreign Af¬ fairs. In August 1852 he became Director of Military Education. He wrote several works, mainly political, which include Hkonographie der Heiligen, ein Beitrag zur Kunstgeschichte) (Berlin 1834) ; (Gesprache aus der Gegenwart fiber $taat und Kirche) (Berlin 1846) ; (Deutschland and Friedrich Wilhelm IV Devisen and Mottos des Spateren Mittel-Alters5 (Berlin 1850) ; (Neue Gesprache aus der GegenwarD (Berlin 1851). Consult Frensdorff, E., (Joseph von Radowitz) (Leipzig 1850) ; Hassel, (Joseph Maria von Radowitz (Berlin 1905) ; Lilieucron, R. von, (J. M. von Radowitz} (in (Allgemeine Deutsche Biographies Vol. XXVI, p. 141, Leip¬ zig 1888).

RADZIWILL, rad'ze-vil, ancient, very wealthy Lithuanian-Polish family, descended from Nicholas I (1366-1446), voivode of Vilna. Its members became princes of the empire in 1556. Among its most famous members are: (1) Nicholas VI the Black, son of John the Bearded and palatine of Vilna (1515-65), from whom the modern Radziwills are descended. King Sigismund Augustus gave him the com¬ mand, in 1552, in the war against the Polish knights. He also commanded in the war against Russia in 1561. Having become a convert to the Reformation, he financed the translation of the Bible into the Polish tongue and its publi¬ cation (Biblia swieta, Brzesc 1563). (2) Chris¬

topher II, military governor of Lithuania and palatine of Vilna, b. 1585; d. 1640. After the death of Sigismund, in 1632, he undertook the defense of the Protestants at the diet of War¬ saw and obtained complete toleration for them. Enjoying the confidence of Vladislav IV, he commanded in the war against Russia. (3) Boguslav, Prince Radziwill, son of Prince James and Sophie Elizabeth, margravine of Brandenburg, was governor in Prussia, 1657— 69, and rendered important services in endow¬ ments to universities and schools. (4) Charles, Prince Radziwill, palatine of Vilna and grand-commander of Lithuania: b. 1734; d. 1790. He was the enemy of Czartoryscy and the

Russians and an adherent of the Saxon party. He was an ardent supporter of the Confederation of Bar and was several times exiled. For three years he was a member of the constituent diet at Warsaw. In more modern times many of the members of the family have occupied im¬ portant military, diplomatic and political posts at the Prussian court. Some branches of the family, however, attached themselves to the Russian court. (5) Michael Geron, Prince Radziwill (1778-1850) fought under Kosciuszko and Napoleon I against the Russians. (6) Elsie, Princess Radziwill (1803-34) became the object of a youthful love on the part of Wil¬ liam I, German Emperor. Her nephew, (7) Anton (1833-1904) was attached for many years to the immediate entourage of the latter. Con¬ sult Anon., (Die historische Stellung des Hauses RadziwilP (Berlin 1892).

RAE, ra, Charles Whiteside, American naval engineer: b. Hartford, Conn., 30 June 1847; d. Washington, D. C., 13 May 1908. He was graduated at the Rensselaer Polytechnic

Institute in 1866 and at the United States Naval Academy in 1868. He remained in the navy, receiving regular promotion, becoming captain 3 Jan. 1903. In the Spanish-American War he served at the bombardment of San Juan, Porto Rico, and at the naval battle of Santiago, 3 July 1898, receiving a medal and promotion for his services. He was appointed engineerin¬ chief of the United States navy, with rank of rear-admiral and chief of the Bureau of Steam Engineering in the Navy Department, 9 Aug.

1903.

RAE, ra, John, Scottish explorer: b. near Stromness, Orkney Islands, 30 Sept. 1813 ; d. London, 22 July 1893. He studied medicine at Edinburgh, became surgeon in the Hudson's Bay Company's service in 1833, and from 1835 till 1845 was the company's resident surgeon at Moose Fort. In 1846-47 he made his first ex¬ ploring expedition, covering 700 miles of the northern coast of America along Committee Bay. He then went to London and in 1848-49 accompanied Sir John Richardson in his Frank¬ lin search in the Mackenzie and Coppermine region. He conducted two expeditions in 1851, during the first of which he explored a large part of the coast of Wollaston Land. During the second he traveled a distance of over 5,000 miles in eight months and explored much of the coast of Victoria Land. In 1853-54 he again

conducted an expedition and discovered the first traces of Franklin's fate, for which the party received the government grant of £10,000. He also proved King William's Land to be an island. In 1858, 1860 and 1864 he was member of expeditions to the American Arctic regions. In all he walked 23,000 miles and explored coast lines aggregating over 1,700 miles. Con¬ sult Richardson, (Arctic Expeditions* (London 1852-53) and (Polar Regions) (ib. 1861). He published (Narrative of an Expedition to the Shores of the Arctic Sea in 1846-47* (1850).

RAEBURN, ra'bern, Sir Henry, Scottish portrait painter : b. Stockbridge, near Edin¬ burgh, 4 March 1756; d. there, 8 July 1823. He was left an orphan at an early age and was apprenticed to a goldsmith, who, perceiving his talent for drawing, encouraged him in his am¬ bition to be an artist. The favorite portrait painter in Edinburgh at that time was David Martin, who was the only instructor Raeburn ever had. He formed his style, however, by copying in color, mezzotints from the paintings of Sir Joshua Reynolds, and while he learned the chiaroscuro of that master he never at¬ tained his almost Italian richness and solidity of coloring. His drawing was correct, but un¬ fortunately acting under the idea that a portrait was to be viewed at some distance above the level of the eye, he foreshortened the forehead and brought forward the nostrils and lower jaw. Thus Sir Walter Scott complained that his portrait by this artist caused him to look <(clownish and jolterheaded.** Acting on the advice of Reynolds, Raeburn spent two studious years in Italy (1785-87) which resulted in a marked improvement in his coloring, which had previously been thin and undecided. Wilkie actually wrote from Spain that the execution of Velasquez reminded him of Raeburn. His (Portrait of Mr. William Forsyth* in the New York Metropolitan Museum is a fair speci¬ men of his style and there are two

pictures of his in the New York public library. Another fine portrait may be seen in the Art Museum, Worcester, Mass. He confined his serious artistic efforts entirely to por¬ traits and painted every eminent Edinburgh man of his day. Among his sitters were Jef¬ frey Stewart, Braxfield, Erskine and Sir WalT)COd' .ˆ8ˆ he was made president of the Royal Society of Artists of Scotland and three years later was elected to the Royal 6,cˆdenSl He, was knighted by George IV in Io^2. i he public galleries of Edinburgh and Glasgow have several

of his works. He is also well represented in the National Gallery, Lon¬ don, the Royal Academy and many private col- /\t 10nS\ t *ni Poland. The Morgan collection (New York) contains two of his masterpieces. Consult Armstrong, W., <Sir Henry Raeburn* (London 1901); (Masters in Art* (Vol. VI Boston 1905) ; Clouston, R. S., (Sir Henry Raeburn' (New York 1907); Greig, James, bir Henry Raeburn: His Life and Works> (London 1911).

RAFF, raf, Joseph Joachim, Swiss com¬ poser: b. Lachen, Switzerland, 27 May 1822-d r rankfort-on-the-Main, 24 June 1882. He was educated at Wiesenstetten in Wiirtemberg and at the Jesuit Lyceum in Schwyz, and gained the notice of Mendelssohn and Liszt. In 1850 he removed to Weimar in order to be near Liszt and his opera 'Konig Alfred-* was shortly af¬ terward produced at the Court Theatre there with great success. In 1877 he was appointed director of the Conservat.oire at Frankfort a position he occupied until his death. He was an indefatigable worker, his compositions num¬ bering over 200, and his reputation rests chiefly 3\P°n yls symphonies, among which are (Im V\ aide ; Lenore* ; (An das Vaterland,* *etc.* .rie was also very successful as a song-writer and a notable composer of instrumental pieces^

"Is fnree operas were less successful, ■though not confining himself to any one style of composition, he was a supporter of the Wagner school.

RAFFAELLO, ra-fa-el'ld. See Raphael.

RAFFIA. See Fibre.

t? BAFFLES, raf'lz, Sir Thomas Stamford,

Unglish colonial administrator: b. at sea off Point Morant, Jamaica, 5 July 1781; d. High-wood, near London, England, 5 July 1826. He was employed in the East India House as a clerk when 14, soon attracted attention by his ability and in 1805 was appointed assistant sec¬ retary at Penang. He mastered the Malay lan¬ guage while on the voyage and in 1807 was appointed secretary and registrar of the Re¬ corders Court. He visited Malacca in 1808 ?nc , "3,. 1810 went to Calcutta where he met Lord Mm to, the governor-general, and by his advice the expedition against Batavia was fitted out in 1811. He accompanied Lord Minto to Java in that year and after its capture from the Hutch became its lieutenant-governor, an office which he held for five years. His admin¬ istration was eminently wise and successful •

.he retained the Dutch colonial laws, but abol¬ ished forced labor and instituted marked im¬ provements in taxation and the administration of justice. He returned-to England in 1816 when the island was given up to the Dutch, was knighted and commissioned by the prince regent to proceed to Holland to confer with

its king in r«gaiid to the government of Java. In 1818 lie was appointed governor of Bencku-len in Sumatra, where he found many abuses existing. He abolished slavery, reorganized the government of the colony, founded schools and otherwise greatly'improved the condition of the island. He explored with Joseph Arnold the intci ior of the island and discovered the great

7fnnPS named in their honor Rafflesia ArnolcLi. Ill health compelled his return to England in 1824 and on the voyage the ship caught fire, desti oying his natural history collection, manu¬ scripts, drawings and notes valued at $100,000 He was first president of the Zoological Society He published 'History of Java > (1817), and 'Malayan Miscellanies* (1820-22). Consult Lady Raffles, 'Memoir of Sir T. S. Raffles*

' Egerton, 'Sir Stamford Raffles* (in Builders of Great Britain* series).

RAFFLESIA, an East Indian genus of parasitic plants, reduced to apetalous dioecious flowers and named after Sir Stamford Raffles, the discoverer. R. Arnoldi was the first species discovered in Sumatra. It is a gigantic flower springing from the roots or stems of Vitis (ctssus) , three feet in diameter and consisting of a globular central cup, containing either the ovary, or the numerous stamens, crowned by a rmg, and the five-lobed calyx, fleshy and flesh-coloied, blotched with pink and yellow inside and with brownish or bluish scales exteriorly I he whole flower sometimes weighs 15 pounds. P remains expanded for a few days only, and then decays, emitting a putrid odor that attracts carrion-loving flies, which probably assist in cross-fertilization. The fruit is a brown, rough surfaced nut, holding innumerable seeds. Cer¬ tain Javanese species are valued there as power¬ ful styptics.

xr.uuyuiL, ra-ie-nesK , Constantine bamuel, American botanist: b. near Constan—

cn°? i'oˆllrT?y' 1784: d-Philadelphia, Pa., 18 Sept. 1842. He was of

French-German parent¬ age and was sent to America in 1802 where he made botanical investigations in Pennsylvania a • l , 1 daware and in 1805 returned to Turkey with botanical specimens. While sailing for the United States in 1815 he was shipwrecked off the coast of Long Island and lost his collection of .20 years. He settled permanently in the United States m 1815, and was made professor of botany in Transylvania University, Lexing¬ ton, Ivy., in 1818. Later, after lecturing in vari¬ ous places he removed to Philadelphia. He was a man of wide learning, but his work is in many instances rendered confusing by his in¬ satiate desire for novelties, and though evincing keen insight is frequently inexact. His publica¬ tions include 'Ancient History, or Annals of Kentucky' (1824); 'Medical Flora, etc., of the United States' (1828-30) ; <A Life of Travels and Researches m North America and South

vv °nn> 4229' Plcasures and Duties of W? o • t1840)- etc' Consult Call, R. E„ 'Life and Writings of Rafinesque* (Louisville 1895).

RAFT, a floating platform, usually com¬ posed of wooden logs or planks, fastened to-gethei by nails spikes or cordage, and used either as a vehicle of travel and for the carriage of goods or more generally for the purpose of transporting by river, lake or sea the materials composing the raft from the place of its con¬ struction to a market for sale. In all probability

the raft was the first human method of travel on water, next to floating on a large branch or tree-trunk, the use of which would naturally suggest the raft, just as a raft, with sail of skin or other material raised to catch the wind, would suggest the first rude sail boat or ship. Rafts have been in use in all historic ages, and doubtless far back in the prehistoric period, but they reached their most general use after the settlement of North America, when the vast forests were being cleared by settlers, and the raft offered almost the only method by which the pioneer on the Ohio or Mississippi could reach the settlements on those rivers, dispose of his surplus products, and buy some of the comforts and perhaps luxuries to be obtained in the

towns. The steamboat has almost en¬ tirely done away with the raft as a means of travel, but rafting is still the chief method of conveying the lumber product of northwestern forests to market, and immense rafts are some¬ times sent by sea from Maine to New York or Boston. On the Pacific Coast also the rafting business is most extensive. In the fall of 1902, a monster raft 700 feet long, 53 feet wide, 12 feet from the water's edge to the top, and drawing 22*4 feet of water was safely towed 700 miles from Columbia River to San Fran¬ cisco. The logs were 120 feet long, and from 12 to 20 inches in diameter, and there were in all 7,000 pieces, valued at $60,000. The con¬ struction of a raft of this size is a vast under¬ taking. A great "cradle** of heavy timbers is built on a slough connected with the Columbia River. A row of piling is driven in deep water, and the frame of the cradle floats up and down on the row of piling, and is held in place by it. A large scow with a derrick is anchored be¬ side the cradle. Log-booms or small rafts are towed to it, and the logs are lifted by the der¬ rick into the cradle, where they are fastened with chains and cables, from 80 to 100 tons of chain being used on one raft. When the raft is finished the keys that held the parts of the cradle together are drawn, the side of the cradle is pulled away, and the raft floats out on the water. Tugboats draw it into and down the Columbia, and out to sea on its voyage to the Golden Gate.

RAGATZ, ra'gats, Switzerland, a fashion¬ able Spa in the province of Saint Gall on the Tamina, celebrated for its hot springs, mineral waters and scenery. About 50,000 tourists visit Ragatz every year. Pop. 2,063. See Pfafers.

RAGGED ROBIN. See Lychnis.

RAGGED SCHOOLS, a name given in Great Britain to those institutions supported by voluntary contributions for the education of neglected children and the consequent preven¬ tion of juvenile crime. The idea of forming such schools was due to a Portsmouth cobbler, John Pounds, who about 1819 began to take in the ragged children of the district in which he lived and teach them while he was at work. This he continued till his death in 1839. The success of the plan caused a number of more influential persons to take the matter up, and in 1838 a ragged Sunday-school was opened in London. In 1841 the first feeding-school, in which the children are not only educated but kept and fed for the day, was started in Aber¬ deen, What gave a greater impetus than any¬

thing else to the ragged school scheme was Dr. Guthrie's 'Plea for Ragged Schools,* published in 1847. It had an immense circulation, and was followed by the extension of the system to every considerable town in the kingdom. The name ragged schools was first adopted in 1844. Owing to the education acts, and especially the introduction of compulsory school attendance and abolition of fees, many of these schools were absorbed by the school-boards, and gen¬ erally they may be said to be a thing of the past.

raghuvamSa, ra-g-hoo-van'sha, one of the two epics of the Sanskrit poet Kalidasa (q.v.). Its subject is the legendary history of the solar kings, or kings descended from the sun. See Sanskrit Literature.

RAGLE, a grain. See Eleusine.

RAGLAN, Fitzroy James Henry Somer¬ set, Lord: b. 30 Sept. 1788; d. Sebastopol, 28 June 1855. In 1804 he entered the army and in 1807 served on Wellington's staff in the expedi¬ tion to Copenhagen, while throughout the Peninsular campaign he served as military secre¬ tary. In 1814 he acted for a short time as secretary to the embassy at Paris, and from January to March 1815 was minister plenipo¬ tentiary there. At Waterloo he lost his right arm. From 1827 to 1852 he was military secre¬ tary at the Horse Guards, in 1852 became mas¬ ter-general of the ordnance and in October of that year entered the House of Peers as Baron Raglan. He was commander of the English forces in the Crimean War, where he suffered much from the early failures of the campaign and from the hostile criticism of the inefficient commissariat arrangements. Consult Kinglake, 'Invasion of the Crimea.*

RAGMAN ROLLS, documents contain¬ ing a record of the acts of allegiance extorted by Edward I of England from the nobility and gentry of Scotland in 1291-92 and 1296. The document was delivered back to the Scotch along with other records and muniments in 1329 in terms of the Peace of Northampton, when the independence of Scotland was for¬ mally acknowledged. It is now deposited in the British Record Office.

RAGNAROK, rag"na-rek, in Scandinavian mythology the day of doom when the present world will be annihilated, to be reconstructed on an imperishable basis. The title of the con¬ cluding portion of Wagner's great operatic trilogy 'Gotterdammerung* is a translation of this word. In that work is depicted the down¬ fall of Woden and the gods and the triumph of perfect human love. William Morris also treats this subject in his 'Sigurd the Volsung.* 'Rag-narok* is the title of a novel

by Ignatius Don¬ nelly.

RAGOZIN, ra-go’zen, Zenaide Alexeievna,

Russian-American writer : b. Russia, 1835. She traveled widely in Europe and in 1874 came to the United States. She is a member of the lead¬ ing American and European literary societies, and has achieved a wide reputation as an author. Her most important books are ‘The Story of Chaldea* (1886) ; ‘The Story of Assyria* (1887) ; ‘The Story of Media, Baby¬ lon, and Persia* (1888); ‘History of the World* ; ‘Siegfried, the Hero of the Nether¬ lands* (1898) ; ‘Roland, the Paladin of France*

(1899); (Salammbo, the Maid of Carthage*

(1899). *

RAGS, though valueless for most purposes, are yet of great importance in the arts, particu¬ larly in paper making. Woolen rags of a loose texture, and not too much worn, are unraveled by means of machinery, and mixed up with good wool, to form what is known as “shoddy, » with which cheap woolen goods are made.

. RAGTIME, a musical term of American origin signifying a rythm or movement of in¬ versions of emphasis and irregular accents, a sort of continuous syncopation and somewhat similar to “Scotch catch» or «snap.» It was formerly applied to the negro melodies of southern United States and to songs and dances caricatured from them, but has been extended in colloquial use to cover any popular song of similar melody. The music itself is supposed to have originated through the limitations of the crude African musical instruments, the em¬ phasized accents being effective on instruments of percussion.

RAGUENEAU, rag-no, Paul, French mis¬ sionary and explorer : b. Paris, 1608; d. there, o Sept. 1680. He joined the Jesuit order, and went to Canada in 1636 to work among the Indians, first visiting the Hurons. In 1640 he made an unsuccessful attempt to secure the re¬ lease of French prisoners from the hostile Iroquois. Becoming the head of the Jesuit mis¬ sions in Canada in 1650, he brought the remnant of the Hurons to Quebec to escape the Iroquois. On a visit to the Onondaga tribe of Iroquois he nearly lost his life. His chief success was with the Hurons, with whom he labored until 1666, when he returned to France and acted as agent for the Canadian missions. He wrote (Vie de la Mere St. Augustine, religieuse, Hos-pitahere de Quebec en la Nouvelle France* (1672) ; 'Relacion de ce pui s'est passe de plus remarquables es Missions des Peres de la Com-pagme en la Nouvelle France* (1647-57), the latter work covering the years 1645-52 ' and 16d6— 57. Consult Parkman, (The Jesuits of North America* (1867) ; <The Jesuit Relations*

(1896-1901).

. . RAGUET, ra-ga', Condy, American po¬ litical economist: b. Philadelphia, Pa., 28 Jan. 1784, d. there, 22 March 1842. He was edu¬ cated at the University of Pennsylvania, studied law, and later entered upon a commercial career. He went to Santo Domingo in 1804 as supercargo on a vessel and made a second voyage to that island in 1805. In 1806 he went into business on his own account and was emi¬ nently successful, amassing an immense fortune and playing an important part in the commercial affairs of the day. In 1812 he was active in providing for the defense of Philadelphia against the expected attack of the British fleet, and in 1815 was elected to the State legislature where he subsequently served in both houses He was appointed United States consul at Rio Janeiro in 1822 and in 1825 became charge

i*oo7 a Ss: to ,B.raziI> an °ffice he occupied until 182/. After his return to the United States he edited several journals devoted to free-trade doctrines among them The Free Trade Advo¬ cate in 1829; Examiner in 1834-35; The Finan¬ cial Register in 1837-39; he also published two small volumes relating to Santo Domingo ;

'Principles of Free Trade* (1835); <On Cur¬ rency and Banking> (1839), *etc.*

RAGUSA, ra-goo'sa (Slavic, Dubrovnik), a seaport town of southern Dalmatia, Jugo¬ slavia, on the Adriatic. It lies at the foot and on the slopes of Monte San Sergio and its streets rise in terraces from the Corso, the principal thoroughfare, which traverses the centre of the city. There are old walls flanked with towers and a fort erected during the French occupation in the beginning of the 19th century. Among the notable public buildings are the cathedral dating from the first years of the 18th century; the new Greek church; the older churches of the Franciscans, Domini¬ cans and Jesuits; the town-hall, anciently the governmental palace, completed in the early part of the 15th century after nearly 100 years in building, and forming a magnificent example of the Gothic-Venetian style; and the Dogona, of the same architectural type. The industrial in¬ terests of the town comprise chiefly manufac¬ tures of silk, leather and liqueurs. The coast¬ ing trade is important, but owing to the shallow¬ ness of the harbor, centres chiefly at Gravosa, some four miles to the north. The population is about 14,291. Ragusa was founded in the 7th century by refugees from the ancient Epidaurus, now known as Ragusa Vecchia, when that city was destroyed by the Slavs. Ruled in turn by the Byzantines, the Venetians and the Hungarians, it acquired in the 13th and 14th centuries, through trade and unscrupulous diplomacy, lordship over a territory of some /50 square miles and maintained its existence aˆ an arˆstocraBc republic, paying tribute, after 1440, to the Turks. The prosperity of the town was undermined by several epidemics in the !6th century and by repeated earthquakes of which that of 1667 was the most disastrous. In 1806 Ragusa was occupied by the French, two years later the republican form of govern¬ ment was abolished, and in 1809, with the rest of Dalmatia, it was annexed to the Illyrian kingdom. In 1814 it passed to Austria. The see of Ragusa was founded in -980, and from 1121 to 1831 it was the seat of a Roman Catholic archbishop. Under the European Peace Treaty of 1919, Ragusa passed from Austria to the new republic of Jugo-Slavia.

RAGUSA, a town of Sicily, in the province of Syracuse, on the mountain stream Erminio some 30 miles west-southwest of Syracuse It has considerable manufactures of cotton and other textiles, oil, furniture and asphalt and carries on an important trade in corn and wine.

It comprises two communities, Ragusa proper with a population of about 32,000, and Ragusa Infenore with 7,850 inhabitants. Ragusa is sup¬ posed to be the ancient Hybla Heraea.

RAGWORT, any of various composite weeds of the genus Senecio, common in most parts ot the world. These coarse, yellow-flowered plants are allied to the thistles, and some ot the numerous American species are known as squaw-weed, ragwort, and butter-weed, and in England as groundsel. See Senecio.

Vienna, 13 ’Aui:‘l812? d. there,’ 9 JulyTsMˆ At \ ) he won a prize at the Vienna Academy and then started on his first tour among the art

centres of Germany, Hungary and Italy. He made his home in the last-named country from 1836 to 1843, studying especially the painters of the Venetian and Roman school, from whom he derived the grandeur of conception and noble coloring for which his works are distinguished. In 1846, after two years’ residence as a portrait painter in Vienna, he resumed his travels and practised his art with success and profit in Hol¬ stein, Paris, Rome, Copenhagen and Munich. Among his historical paintings of this first period are (The Finding of Manfred’s Body) ; (Manfred’s Entrance into Lucera) ; (The Cata¬ combs during the Persecution* (in the Ham¬ burg gallery and a replica in the Berlin National Gallery). He was appointed professor in the Berlin Art Academy in 1850, but his political opinions were extreme and violent and he was compelled to leave the city. The private school which he thereupon opened became the most important seminary of painting in Austria. He meanwhile applied himself to much decorative work, as is testified by the painted fagade and vestibule of the church in the Old Meat Market at Vienna, the four compositions from the Greek heroic age, and the (Four Elements* in the palace of Baron Sina. In 1864 he painted in the Museum of Arms a series of allegorical figures of heroic size. To this period belong his fresco, (A Maid from Foreign Lands) ; and the designs for a ballroom in Oldenburg Castle and incidents of the Argonautic Expedition.* His last works consisted of designs for the decoration of the New Opera House at Vienna. These were executed by his pupils after his death. He unites in his pictures the rich color¬ ing of Rubens and Titian with

a harmony of grouping monumental in its impressiveness. Yet his handling of form inclines to coarseness and exaggeration. Among the most eminent of his pupils were Bitterlich, Eisenmenger, Lotz, Griepenkert, Gaul and Than. Consult George-Mayer, (Erinnerung von Karl RahP (1882).

RAHU, ra'hoo, in Indian mythology the demon who is imagined to be the cause of the eclipses of sun and moon. Rahu, having stolen of the nectar of immortality, was caught and beheaded before he swallowed the divine stuff. The head thus became immortal, and ever after¬ ward followed the sun and moon. When it oc¬ casionally caught them an eclipse resulted.

RAHWAY, rawa, N. J., city, in Union County; on the Rahway River, and on the Pennsylvania Railroad, about 20 miles south¬ west of New York City. It is a residential city, and its clean, well-laid-out streets, its parks and fine residences make it an attractive sub¬ urb. It has considerable manufacturing inter¬ ests ; the chief establishments are chemical works, printing houses, shirt factories, lace curtain factories, felt mills, steel works, cereal products and music-box factories. There is a large trade in manufactured articles, fruit and vegetables. It has a high school, public and parish schools and a library, which has about 20,000 volumes. The old Revolutionary name of the locality was Spanktown, and in January 1777 a skirmish took place, noted in some his¬ tories as the battle of Spanktown. Pop. 11,042.

RAI BARELI, ri ba-ra'le, India, (1) prin¬ cipal city of a district of the same name, on the banks of the Sai, 48 miles southeast of Luck¬ now It has a spacious fort, a magnificent pal¬

ace, four fine mosques and the tomb of Nawab Jahan Khan. Pop. 18,798. (2) The division of Rai Bareli is now part of the united provinces of Oudh and Agra, and has an area of 1,751 square miles. Pop. about 1,100,000.

RAI SANYO, ri san'yo, Japanese historian: b. 1780; d. 1833. He spent 20 years in pre¬ paring his (Nihon Gwaishi* ((History of Japan Outside the Court*), which was published in 22 volumes in 1827. It is a compilation gathered from a vast number of Chinese and Japanese works of history and covers the history of the Shogunate from its origin in the 12th century down to the setting up of the Tokugawa dynasty in the early 17th century. A second work, (Nihon Seihi,* in 16 volumes, was published in 1837, after Rai Sanyo's death. From a

literary standpoint his works are of little interest, no attempt being made at anything more than a dry chronological record of events. Their political effect, however, was of inestimable importance. Strongly imperialistic in sentiment the present¬ ment of the nation's history before the usurpa¬ tions of military feudalism was used with tremendous effect in re-establishing the power of the throne. The first five volumes of (Nihon Gwaishi* were translated by Sir Ernest Satow (1872). Consult Aston, W. G., (History of Japanese Literature) (1899).

RAIATEA, ri-a-ta'a, Polynesia, an island of the Society group, northwest of Tahiti ; area, 75 square miles. It is mountainous (3,400 feet), but fertile, and traversed by many streams. The chief products are cotton and copra. Pop. (Protestant) 2,300.

RAIBOLINI, ri-bo-le'ne, Francesco. See

Francia, Francesco.

RAID OF RUTHVEN, a mysterious event in Scottish history, which took place in August 1600. John Ruthven, Earl of Gowrie, and his brother, Alexander, then resided on the former's estate at Perth. The earl was bitter against James VI (later James I of England) who had put the earl's father to death for treason and who was in Ruthven's debt for a large sum. On 5 Aug. 1600, the king with a few attendants visited Ruthven's residence in order, as Alex¬ ander alleged, to confer with the earl in regard to the debt. After dinner the Ruthvens con¬ trived to separate the king and his attendants, bringing the former into a private study and taking the latter into the garden. The guests were soon informed that the king had ridden off and the earl left them for a moment and soon returned and confirmed the report. While the guests were puzzling over the circumstance, they heard the king shouting ((Treason!** from the study window. Suspecting a plot four of them rushed to the study where they found Alexander Ruthven struggling with the king. They killed Alexander, after which the earl and his servant. Cranston, rushed upon them and fought desperately to avenge his brother. How¬ ever, he was overpowered and killed. In the study the king had found a man in armor, who, it was later said, was Henderson, chamberlain of the earl. As Henderson had offered no violence to the king he was pardoned. Three of the servants were hanged for their part in the conspiracy, the Ruthven estates were con¬ fiscated and the castle, in which the attack took place, was destroyed. Considerable mystery surrounds the strange event. The suggestion

has been made that Queen Elizabeth, who may have wished to secure the king's person and to i ule Scotland in his name, used the Ruthvens as tools to accomplish this end. Others have sug¬ gested that there may have been no plot — merely a quarrel over the debt which led to the death of the Ruthvens, after which the king concocted the story of the plot to hide his own guilt. Consult 'Register of the Privy Council ot Scotland) (VI) ; Barbe, 'Tragedy of Gowne House* (Paisley 1887); Lang, 'Tames v l and the Gowne Mystery > (London 1902) • !5j?{0ry of Sc°tland> (Vol. II, Edinburgh ioˆVan Blirton> 'History of Scotland> (ib. 1807-70) ; Brown, Hume, 'History of Scotland* (Vol. II, Cambridge 1909).

RAID, in international law, an unauthor¬ ized invasion by an armed force of the ter¬ ritory of a state not at war. A raid must be carefully distinguished from an invasion, for in the latter either regular forces of a foreign state or regular forces of a body exercising its powers by delegation of that state must be guilty of the overt act. If so, it constitutes an act of war, whereas a raid, being unauthorized and unrecognized by any state, is not an act of war-The punishment of the offenders, if cap¬ tured, is, therefore, very different. In case of invasion, they are treated as prisoners of war, but in case of a raid the offenders, if captured,' ai e subject to the local law. The state invaded may compel compensation from the offending state or may retaliate by similar acts or by declaring war, but this is not true in the event of a raid.

Among the most famous of raids was that of Dr. Jameson (q.v.) who forcibly entered the 1 lansvaal in 1895 at the head of an armed force of 600 men, and was one of the causes of the war that followed between the republic and Great Britain. Dr. Jameson's force was cap¬ tured by the Boers and turned over to the British for punishment.

Among other raids may be mentioned those claimed to have been instigated by General Villa, head of the Mexican rebel forces, in the spring and summer of 1916, into territory in the southwestern part of the United States.

RAIFFEISEN, rif'f-zen, Friedrich Wil¬ helm, German economist,' famed

as the father of the peoples' banks : b. Hamm, near Coblenz Germany, 30 March 1818; d. 11 March 1888.' He entered the army in 1835, but was com¬ pelled by ill health to withdraw and then en¬ tered the civil service. During the agricultural troubles, of 1846-47 he perceived the difficulty with which the small landholder procured credit and he conceived the idea of establishing small mutual credit associations which freed the farmer from the exorbitant rates of the usurers. His first efforts were at Heddersdorf and Wyer-busch and he then proceeded to extend the opeiation of the plan throughout Germany.

Tn 1866 he broke down from overwork and re¬ tired for a time from public service. In 1878 he founded the "Landwirtschaftliches Genossen-schaftsblatP at Neuwied. He lived to see his plan in successful operation in Germany, Aus¬ tria, Switzerland and Italy. He wrote 'In-struktion zur Geschafts-und Buchfuhrung der Darlehnskassenvereine* (1869); 'Kurze Anlei-lung zur Griidung von Darlehnskassenvereipen* (1888), etc,

RAIKES, raks, Robert, English founder of Sunday schools: b. Gloucester, England, 14 Sept. 1735; d. there, 5 April 1811. He succeeded to his father's business as editor and publisher of the Gloucester Journal in 1757 and used its influence in exposing certain prison abuses in bis native town. In 1781 he founded several Sunday schools which he engaged needy women to teach at a shilling a day, and succeeded in inducing the attendance of the children of the city. In 1803, largely through his efforts, the Sunday School Union was founded. Consult Lives by Gregory (1877), and Eastman (1880) ; Harris, 'Robert Raikes : The Man afid his VVork> (1899). See Sunday Schools.

KAIL BONDS. See Electrical Terms. RAILROAD CARS. See Railway Cars.

RAILROAD CONSOLIDATION. See

Railway Consolidation.

RAILROAD ENGINEERING AND CONSTRUCTION. See Railway Engineer¬ ing and Construction.

TTmˆLROAD LABOR ORGANIZA-1IONS. See Railway Labor Organizations.

vˆroˆOAD AND . OTHER land GRANTS. Grants for railroad and other pur¬ poses were the subject of vigorous discussion from an early period of our history, many hold¬ ing that the Federal government had no author¬ ity to grant subsidies for internal improvements. Ihe decision reached was in favor of such sub—

ionoS: ˆrst tˆie kind was made 30 April

1802 in the Enabling Act of the State of Ohio which provided that one-twentieth of the net proceeds of the sales of public lands in said ptate should be given to the State for construct¬ ing public roads. Grants of land in aid of the construction of canals were authorized in later years. The first aid for the construction of a railroad was 2 March 1833 when the State of Illinois was permitted by Congress to divert its canal land grant of 2 March 1827 for the con¬ struction of a railroad, but this grant did not become effective. The first definite grant of lands to aid in the construction of a railroad was the Act of 20 Sept. 1850 to the State of Illi¬ nois. A number of grants of lands to States followed as aids to railroads.

, ˆ0 and the admission of the State

oi California into the Union a strong agitation deveJoped for the construction of a railroad to the Pacific Coast which resulted in the acts of 1 July 1862 making grants of lands to the Union Pacific Railroad Company, the Central Pacific Kailroad Company and other roads. There were many subsequent land grants to railroads up to 1871.

The land grants to the States and railroads for railroad purposes provided usually for a grant of the odd sections within 6 to 10 miles on either side of the line of road. In some cases the grant was 20 miles in width on either side. In addition the roads were authorized to select indemnity lands where any portion of the main grant had been otherwise disposed of.

The total area granted to States for canal purposes was 4,597,804.37 acres. The total area patented for wagon roads under their grants as reported to 30 June 1918 was 3,242,173.75 acres, hor the same date the area patented to State1? for railroad grants was 37,784,852.58 and for

the same date to railroads was 85,927,123.63. The total area thus disposed of for public improve¬ ments to 30 June 1918 was 131,551 ,954.33 acres.

In addition to this, the granting acts author¬ ized the issue of United States 6 per cent bonds in aid of the construction of the Pacific rail¬ roads on the basis of $16,000 per mile in the Great Plains east of the Rocky Mountains; $48,000 per mile for the portion crossing the Rocky Mountains ; $32,000 per mile for the line through the' Central Plains with similar grants to the Central Pacific for the western part of the line. These bonds of the United States were a second lien against the property of the companies.

The total bond issue for the Pacific roads was $64,623,512. All have made settlement ex¬ cept the Central Branch of the Union Pacific, which still owes the principal of the bonds, $1,600,000, and interest which amounted to $1,977,000 to 31 March 1919. This debt is being very slowly reduced by credits on account of the transportation of public property.

Morris Bien,

United States Reclamation Service.

RAILROAD SHOPS AND MACHIN¬ ERY. See Railway Shops and Machinery.

RAILROAD SPEEDS. See Sports.

RAILROADS OF THE UNITED STATES. See Railways of the United States.

RAILS AND RAIL SHOOTING. Any

birds belonging to the typical genera of the family Rallidce are popularly called rails, prob¬ ably in reference to their harsh rattling cries, but the name is more particularly applied to certain species, other being known as marsh hens, crakes, *etc.* The family is included

in the order GrallcC or Gruiformes. The family is a large one composed of numerous species of moderately sized birds of generalized structure, found in most parts of the world. The body is compressed, the legs strong, the feet very large with long toes, which are lobately webbed in the coots, the wings and tail very short, the bill strong and variously shaped, but never greatly elongated nor provided with a sensitive tip, and the colors are usually obscure and sober. About 35 genera and 180 species of Rallidce have been recognized, but authorities differ concerning the retention of some of the more aberrant forms within the family. Three subfamilies are represented in the North Amer¬ ican fauna: the Fulicince, or coots, with lobate marginal webs on the toes and a horny frontal shield; the Gallinulince, or gallinules, with a frontal shield, simple toes and usually richly-colored plumage, and the Rallince, or typical rails, in which the family characteristics are best displayed and there is no frontal shield nor any webbing on the toes.

Most of the rails are marsh-loving birds, their long toes admirably serving to support them on the soft mud and their narrow com¬ pressed bodies facilitating movements among the stems of grasses and reeds. Owing to their skulking and largely nocturnal habits they are difficult to observe and, except by gunners, their abundance is not generally known. They run well and to escape danger trust to their ability

to slip quietly into a place of concealment. They seldom fly and, owing to the shortness of the wings, only in a weak, uncertain manner, but nevertheless some of the species perform ex¬ tensive migrations. In feeding they are chiefly carnivorous, but never probe the mud for worms, etc., in the fashion of sni/pes, nor strain it as do the ducks. The nest is usually a rude bulky platform of dried rushes, etc., slightly elevated above the wet ground and the numer¬ ous eggs are thickly spotted. The young are fully downy and are said not only to run but to swim well as soon as hatched.

Besides the corncrake (Crex crex), which occasionally wanders from Europe to our shores, 12 species of true rails occur within the boundaries of North America. They belong to two genera. The king rail (Rallus elegans) or fresh-water marsh-hen is our largest spe¬ cies, reaching a length of 18 inches and a wing expanse of two feet. It is known by the rich cinnamon and chestnut hues of the under parts and the strong streaking of the plumage above. This species is abundant in the fresh-water marshes of the eastern United States but,

al¬ though occasionally seen in New England, is rather southerly. Except for its habitat and the character of its food, which consists largely of aquatic insects, leeches and wild rice in season, the habits of the king rail closely resemble those of the next species. In the salt-water marshes from Connecticut southward along the Atlantic and Gulf coasts the king rail is re¬ placed by the well-known clapper rail or salt¬ water marsh-hen (Rallus crepitans) , which is extremely abundant from New Jersey south¬ ward and is resident in the southern half of its range, but migratory northward. It inhabits the reed-covered marshes intersected by ditches and creeks which border so much of our coast within the beach line and its presence is espe¬ cially evident during the breeding season when the loud clattering cry is heard incessantly both by day and night. All kinds of snails, crusta¬ ceans and worms inhabiting such regions con¬ stitute its food. The nest is a heap of dried reeds and grasses elevated just above the water by the side of a ditch and usually concealed by an artful overarching of reeds. As many as a dozen, but more frequently about eight eggs, are laid ; they are oval, of a cream or buff color and thickly blotched with brown and lavender tints. The clapper rail is slightly inferior to the king rail in size and is of a blended grayish color tone, rather than a streaked red. Closely related species are the R. obsoletus of Cali¬ fornia and R. scottii of Florida. The Virginia rail (R. virginianus) is about 9 or 10 inches long and in color a perfect miniature of the king rail. Unlike the latter it inhabits salt and tide¬ water as well as inland marshes and is very widely distributed throughout temperate North America and southward. It is a regular mi¬ grant, in most of the Northern States and Canada remaining from April to September to breed. Although generally common, they are best known by their nocturnal and diurnal cries. In nesting and other habits they resemble the clapper rails, but the eggs are of course much smaller. The Carolina or sora rail or crake and the yellow rail belong to the genus Porzana, which differs from Rallus in having the bill short and stout instead of long and slender.

The former (P. Carolina) is eight or nine inches long, brownish above and unspotted be¬ low, the latter (P. noveboracensis) is only about six inches long, with much yellow above and the breast spotted. Both appear to range widely in North America, but the former is everywhere a far more abundant bird. The sora, also erroneously called ortolan, is the best known and during the migrations the most plentiful of the rails in all suitable reedy marshes along the shores of lakes and rivers, and it breeds in similar localities in the Mid¬ dle States and northward. A third related spe¬ cies, the black rail (P. jamaicensis) , is rarely taken. The North American rails are all marsh birds, but the European corncrake prefer the cultivated fields, and in New Zealand and other Southern islands many remarkable forms of field rails and some curious flightless and bur¬ rowing species are found.

Rail-shooting in the autumn, when they, and particularly the Carolina rail, congregate in im¬ mense numbers in the river swamps, has many followers; but it can hardly be called a sport, being nearly on a par with the annual slaughter of reed birds which occurs at the same time and places. The method is very simple. Each gun¬ ner has an assistant who poles him about in a flat-bottomed boat or skiff through the creeks and passages which everywhere intersect the swamps. Usually this is done at high tide, owing to the shallowness of the creeks at other times and because the rising water restricts the area on which the birds can run. Sometimes spaniels or other dogs are employed to drive the birds, but this is unnecessary, as they are easily seen as they run along the banks of the creeks or rise in short labored flight. Enormous numbers, often running into the hundreds, may be secured by a skilful shot who has mastered the problem of shooting from an unsteady boat. During the gunning season the sora feeds largely on the seeds of reeds and wild grains, becomes very fat and is a truly delicate morsel. The other species are also sought but to a less extent. At times of unusually high tides great numbers of clapper rails are killed along the New jersey coast as they huddle bewildered on little islands and masses of reeds in the flooded salt meadows. Immense numbers of the eggs of the same species are also gathered for food. Consult Baird, Brewer and Ridgway, (North American Water Birds (Boston 1884), and Roosevelt, <Game Water Birds* (New York, 1884) ; Newton, < Dictionary of Birds > (New York 1896) ; Evans, A. H., <Birds> (in < Cam¬ bridge Natural History, > Vol. IX, ib. 1900)

; Job, H. K., (Among the Water-Fowl* (ib. U02) and Bulletin 128 of the United States Department of Agriculture (Washington

1914).

RAILS AND STRUCTURAL SHAPES, Manufacture of. One of the most important branches of the iron and steel industry is the manufacture of rails. Up to about 1855, all rails were made of wrought iron. In England beginning about 1767, various forms of cast-iron and wrought-iron rails were employed, the first being a grooved rail for tramway purposes, which was subsequently developed into the regu¬ lar railway by the use of cast-iron flanged rails. The first wrought-iron rail was patented in England by Birkenshaw, in 1820, and on ac¬

count of its peculiar form was known as the “fish-belly** rail. It was the first to be rolled in continuous lengths embracing several spans and was laid in cast-iron chairs spiked to stone blocks set at intervals of three feet. It weighed about 33 pounds per linear yard. Its manufac¬ ture by the rolling process, however, was quite difficult, and it was superseded by the “flat-foot®

Fig. 1. — Tramway rail.

rail which combined a solid head with a flanged base and was laid by being fastened to timber sleepers or ties by spikes driven through the holes in the flange The flat-foot rail was fol¬ lowed by the bridge-rail, the double-headed rail and the bull-headed rail. The last named, al¬ though involving a great waste of metal, owing to the excessive thickness of the web, is used exclusively in England, while in the United States and almost all foreign countries the rail of the flanged T-section is universally em¬ ployed. It was invented by Col. R. L. Stevens, in 1830, but the form in use in America is a modification suggested by the special committee appointed by the American Society of Civil Engineers, in 1893; while the form used in Europe is that invented by Sandberg. It is usually made in lengths of 30 feet, but rails as long as 60 feet are used to some extent. In weight it varies from 25 to 100 pounds per linear yard, according to the amount of traffic, the speed of transportation and the gradients aird curves of the

roads upon which it is used.

Fig. 2.— Fish-belly rail, (a) Section, (b) Side view.

About 1865, a few years following the discov¬ ery of the method of manufacturing Bessemer steel, rails of that material were experimentally lolled in the United States and soon began to supplant those of wrought iron. At the present time all rails are made of steel, and they have, probably, contributed more toward the rapid development of this country than any other

single product of the steel industry. The raw materials consist of if on-ore, coke and lime¬ stone, mixed in proportion as follows — ore two pounds, coke one pound and limestone one snd one-third pound. Two fundamental proc¬ esses of manufacture are employed — the reduc¬ tion of the ore in the blast furnaces and the conversion of the molten metal into steel in the converter, followed by the operations of

the rolling mill. (See Iron and Steel Indus¬ try in the United States). The Bessemer process of conversion is generally em¬ ployed on account of its rapidity as com¬ pared with the open-hearth process, taken in connection with its capability to produce a grade of metal of a quality sufficiently high to satisfy the general specifications for rails. In the manufacture of steel rails, the work of smelting the iron in the blast furnaces is continued day and night, year in and year out, without inter¬ mission, but the converters and the rolling mills are generally shut down from 1.30 p.m., Satur¬ days, to 5 p.m., Sundays. During the intervening times, the product of the blast furnaces, instead of being poured into the mixers (by which the

casts obtained from the different blast fur¬ naces at varying temperatures and qualities are reduced to a common temperature and quality), are run into the pig-casting machine which consists of a series of parallel endless chains of molds arranged to pass in front of the pour¬ ing mouth of the ladle. The molds receive the metal at the lower end of the chain and de¬ liver the casts at the upper end of the chain, where they are loaded upon railway cars for shipment.

In the regular work, as soon as the ingot cast from the metal purified in the converters, is set, the mold is drawn from it by a hydraulic stripper and it is raised by an overhead electric crane and then lowered into the soaking pit,

where it is brought to the proper temperature (white heat) for rolling. It is then taken to the blooming mill and passed through the blooms (rollers) seven times and reduced to a section varying in size according to the size of the de¬ sired rail. The section of the ordinary rail used on the railroads is nine and one-fourth inches square, and the ingot when rolled to that section attains a length of about 15 feet.

It is then sheared into two or three lengths, as the case may be. These pieces called blooms after being heated in the bloom furnaces are carried to the rail mill, which consists of three sets of rollers — the roughing rolls, the inter¬ mediate rolls and the finishing rolls, through which the bloom is passed successively. Through the first set it is passed five times and reduced approximately to the section of the desired rail. It is then, without being reheated, passed five times through the intermediate rolls and reduced more closely to the desired shape. If the rail is of the lighter variety, weighing from 50 to 70 pounds per linear yard, it is then passed through the last set of rolls and finished on a single heat, with satisfactory results. But if the rail is of the heavier class, ranging in weight from 80 to 120 pounds per linear yard, its tendency to retain heat longer, and, there¬ fore, be passed through the finishing rolls at a

Fig. 6. — Bull-headed rail.

temperature too high to give good results, is overcome by allowing it to remain upon a cool¬ ing table for an interval of time ranging from 45 to 90 seconds, and it is then passed through the finishing rolls at a lower temperature, thus giving a rail of a much better quality of metal, especially in the head of the rail. The rail is now sawed into the desired lengths, usually of 30 feet, and then passed through the cambering rolls, where it receives sufficient camber to prevent warping when it is being cooled. After being cooled off on the hot beds it is straight-

FlG. 7. — Flanged T section rail — 80 lbs. per linear yard.

Standard Am. Soc. Civil Engineers.

ened, chipped and filed and is then ready for shipment as a finished product. Improved ap¬ paratus has in recent years greatly facilitated

the operations in rolling rails. Electricity has been a prime factor in their operations.

In the manufacture of ˆstructural® shapes (a term which includes a great variety of angle-irons, T-irons, I-beams, Z-bars, eye-bars, chan¬ nel-irons and built-up posts, beams and gird¬ ers), used in the construction of modern buildings and bridges, the shapes are rolled from basic open-hearth steel of three grades — the rivet steel with an ultimate strength ranging from 48,000 to 58,000 pounds; the soft steel from 52,000 to 62,000 pounds ; and the medium steel from 60,000 to 70,000 pounds. The elastic limit generally required is not less than one-

half of the ultimate strength, and the test pieces are required to be capable of being bent over through an angle of 180 degrees, without frac¬ ture. The raw materials, consisting of ore and pig-iron, are melted down in the cupolas and are then run into the open-hearth tilting fur¬ nace, where an equal amount of cold scrap, in the form of steel junk, crop-ends, punchings, etc., from the construction shops, is added. The contents of this furnace, sometimes amounting to 75 tons,' are poured into a hydraulic ladle crane, which is then swung over the casting pit, and the molten metal poured into the ingot molds in the usual way through the bottom of the ladle. The ingots when set are reheated in the soaking pit and then passed through the blooming mill and reduced to blooms and bil¬ lets of any required size. They are then rolled

ited to not more than 10,000 pounds below the test specimen of the grade of steel from which they are rolled. The eye-bar heads are formed by upsetting machines operated by hydraulic power, in which the heated end of the eye-bar is pressed to the desired circular form by th'e three-fold die of a hydraulic press, in a single operation. The head is then forged and punched at one heat, and then finished bored. Eye-bars are tested in a hydraulic testing machine capa¬ ble of exerting a

maximum pull of 700 tons. When an order of eye-bars is completed, one of the bars is pulled asunder in the machine. In general, they are required to show not less than 10 per cent elongation in the body of the bar and they must break in the body and not in the eye. See Building in the United States ; Electrochemical Industries; Iron; Iron,

to the desired shapes, sawed into the required lengths and then cooled on the hot beds. From the hot beds they are passed through the straightening rolls, and after being cut into ex¬ act lengths, as required, they are ready for the construction shop.

In the production of finished bridge mem¬ bers, the shapes are carefully laid out by wooden templates, in which the precise positions of rivets, # angles, gussets, etc., are marked. The operation of building up requires great care and accuracy. The shapes are sawed or sheared to exact length and the sides and ends faced and planed down as required by the drawings. The small holes for bolts and rivets are punched by lighter forms of machinery driven by elec¬ tric power; on the other hand, all pin-holes are first punched and then bored to exact diameter. In assembling, the rivet holes are properly reg¬ istered, being reamed if necessary, and the sep¬ arate parts bolted together and finally riveted up by hydraulic or pneumatic riveters. See Metal-working Machinery.

In the manufacture of eye-bars, used in bridge construction, the tensile strength is lim-

Manufacture of; Iron Founding, Chemistry of; Iron and Steel Industry in the United States ; Iron Ores ; Iron Skeleton Construc¬ tion ; Iron and Steel, Metallography of.

RAILWAY ASSOCIATIONS, LABOR.

See Railway Labor Organizations.

RAILWAY BRIDGE DESIGNS. See

Bridge Designs, Railway.

RAILWAY BROTHERHOODS. See

Railway Labor Organizations.

RAILWAY CARS. Passenger and

Freight.— Passenger cars on the earlist rail¬ ways usually had small bodies of the stage¬ coach type mounted on four-wheel frames. In 1833, however, cars long enough to seat 60 pas¬ sengers and having the body carried by a pair of four-wheeled swiveling trucks were designed and built by Ross Winans for the Baltimore and Ohio Railroad. Cars approximating the pres¬ ent American type were in use as early as 1835. Distinctive features of this type are* the long body mounted on four-wheel or six-wheel trucks and having cross-scats on both sides of a central aisle which, with end doors and plat-

forms, permits of passage through the train. A modified design has pairs of fixed chairs in place of the usual double seats. As the chair backs may be lowered for reclining more space is required and a 70-foot car may have seats for 84 or chairs for 64 passengers. Vestibules en¬ closing the car platforms and connected by flexible diaphragms were introduced in 1886, but similar connections between mail cars had been used since 1852. They add to the safety and convenience of passengers and decrease danger in collision since they make the train practically one long articulated car.

A long-distance train may have day cars (often called coaches), mail, express and bag¬ gage cars, parlor or sleeping cars, a dining car and perhaps an observation car with library and writing desks, while bathrooms and barber and stenographer service are sometimes included. American railways are noted for going rather to extremes in providing comforts and conven¬ iences for passengers, although this greatly in¬ creases the weight of car in proportion to the passengers carried. The American type of car is extensively used abroad, except in Europe where the existence of from two to four classes of passengers makes its application difficult.

European railways have always used cars of the compartment type, with transverse partitions and side doors. Each compartment has two opposite seats, so that half the passengers must ride backward The cars are in general smaller and lighter than those of American railways and many have only four to six wheels, but of late years the size and weight have been in¬ creased. Trucks which are called “bogies® were introduced on English cars in 1872. Cor¬ ridor cars, an innovation of about 1883, have a narrow passage along one side, with side doors to the compartments and end doors to vesti¬ bules between the cars. A 43-foot 18-ton com¬ partment car will seat 70 third-class passengers in seven compartments, or a 50-foot car may seat 80, while a 54-foot 23-ton car may carry 18 first-class and 40 third-class passengers. A 50-foot corridor car, however, may seat only 36. Special suburban cars for workmen carry 120 passengers in 10 compartments.

Car equipment of American railways amounted to 1,216,000 cars of

all kinds in 1891 and 2,600,000 in 1916. Of the latter, 56,000 were for passenger trains, 2,400,000 for freight trains and 100,000 for railway service. Passen¬ ger equipment included 40,000 day cars, 1,380 dining, 660 parlor, 750 sleeping, 1,600 mail and 10,000 baggage and express cars. These are exclusive of the Pullman Company's 7,750 sleep¬ ing, parlor, tourist, dining and observation cars. Private cars, officer's cars and hospital cars are special equipment. Cars having their own mo¬ tive power — steam or gasoline — are used sometimes on lines of light traffic. Freight cars included 1,050,000 box cars, 150,000 flat and gondola, 920,000 coal, 53,000 refrigerator, 88,000 stock and 10,000 tank cars, besides 95,000 caboose cars for the train crews.

Modern day cars 68 to 78 feet long over platforms seat from 60 to 90 passengers and weigh from 50 to 72 tons. A steel mail car was put in service in 1889 and a few experi¬ mental cars were built later, but in 1907 the Pennsylvania Railroad adopted steel construc¬ tion for all its passenger cars. Other railroads

followed and in 1908 there were 1,228 steel cars, 75 per cent of which were for suburban or rapid-transit service. In 1916 about 22 per cent of the passenger equipment was of steel, exclusive of cars having steel underframes and wood bodies. Steel 80-foot day cars for 88 passengers weigh about 56 tons ; 76-foot mail car, 64 tons ; 72-foot dining car, 70 tons ; 80ˆ4-foot sleeping car, 65 tons; and 64*4-foot sub¬ urban car for 72 passengers, 37 tons. While heavier than wooden cars they have advantages in safety, durability, maintenance and repair.

Sleeping cars were run between Philadelphia and Harrisburg on the Cumberland Valley Railroad in 1836. These had three tiers of fixed berths on one side. In 1856 T. L. Woodruff built and patented a sleeping car embodying some features of the present type. A similar design was patented by Webster Wagner in 1857. The more successful work of George M. Pullman began in 1859 when he converted two 42-foot day cars into 10-section sleeping cars for the Chicago and Alton Railroad. These were the first made with folding berths. His first car of the present type was built in 1864. The Mann car, with separate compartments opening from a side corridor, was put in service in Europe in 1873 and in the United States in 1883. The Pullman Company was organized in 1867 and eventually acquired control of com¬ peting concerns. Its standard car has at night two double rows of longitudinal berths shut off from the central aisle by curtains. While

strength and appearance have been improved, the cars still have primitive arrangements for dressing and toilet facilities. Compartment sleeping cars, which are used only to a limited extent, have greater privacy and convenience but carry fewer passengers. It is this type which is mainly employed in Europe, generally with berths across the car and sometimes with¬ out upper berths. For long runs, Pullman in 1867 introduced the hotel car, which was a sleeping car provided with a kitchen, meals be¬ ing served on portable tables fitted between the seats. This was soon superseded by the sepa¬ rate dining car.

Freight cars have been developed to great size and capacity by American railways owing to the long distances, the large amount of bulk freight such as coal and ore and the economy of large loads, since car weight per ton of load decreases as the load increases. Thus large cars and long trains are among the factors in the marked economy of railway freight trans¬ portation in the United States. The 10 and 15-ton car capacity of 1875 increased to 20 or 25 tons by 1885, when 30-ton cars also were being used. Few cars of less than 30 tons capacity are now in use ; 40 and 50-ton cars are common and there are numbers of 60 to 100-ton cars.

The maximum is reached in 120-ton steel coal cars on two or three railways. These are 50 feet long, have six-wheel trucks and weigh 37 tons. Other railways have 48-foot coal cars of 85 tons capacity weighing 30 tons. Steel construction for open cars and steel un¬ derframes for other types of freight cars are used very extensively. A 40-foot box car of 50 tons carrying capacity will weigh about 24 tons ; 45-ton refrigerator car, 30 tons; 100-ton gon¬ dola, 30 tons. Refrigerator cars for meat, fish, fruit, etc., have thick walls, roof and floor, in-

sulated by air spaces and packing and arc fitted with ice chests. Similar cars, without ice, serve in winter to protect perishable freight, being sometimes warmed by a small stove be¬ neath the floor.

Special classes of freight cars include coke, coal, dump, flat, horse, stock, ore, poultry, re¬ frigerator and tank cars. The ordinary length of car is 30 to 42 feet. Long cars with three trucks have been built ; also steel-frame cars with four or more trucks for carrying guns or very large and heavy castings.

European freight cars are in general much smaller and lighter than those of American rail¬ roads. Four-wheel cars 10 to 15 feet long, of 8 to 10 tons carrying capacity and 6 to 8 tons weight, form the bulk of the equipment. There are six-wheeled cars of somewhat greater size and up to 20 tons capacity ; also some 30 to 40-ton cars on four-wheel trucks. Closed or box cars are used less than in America, freight in open cars being protected by tarpaulin covers furnished by the railways. These small cars are suitable and economical for the system of prompt handling of small shipments which is characteristic of European— and particularly English — railway service. They are not eco¬ nomical for coal and other bulk freight, but though larger cars have been introduced the use of varying lengths of cars causes complica¬ tions at terminals, coal docks and mines. The American types of long freight cars on trucks are used extensively in India, South America, Australia and Africa; also in Europe, outside of England.

Cast-iron wheels are a feature of American cars and long experience in manufacture has led to the production of a grade of metal pecu¬ liarly adapted to this service. Steel and steel-tired wheels are used extensively, especially under passenger cars. For noiselessness, com¬ pressed paper centres in steel tires have been tried. Wood-centre wheels for passenger cars and wrought-iron wheels for freight cars are used in England and are generally larger than the 33-inch or 36-inch wheels common in American cars.

Automatic couplers for cars are used uni¬ versally in the United States. For the old link-and-pin coupler the drawbar of each car had an enlarged hollow head to receive one end of a straight link, which was secured by a pin dropped through a hole in the drawbar head.

Removal of the pin released the coupling. Ow¬ ing to the deaths and injuries resulting from coupling and uncoupling by hand, a campaign for compulsory use of automatic or safey coup¬ lers was started by L. S. Coffin, resulting in the passage of a law by Congress, in February 1893, providing that by 1898 all freight cars must be equipped with automatic couplers that would couple by impact and would not require men to go between the cars. The time was later extended and the application of these and other safety appliances w'as put under the juris¬ diction of the Interstate Commerce Commission.

Automatic couplers had been the source of innumerable patents and extensive trial, but the difficulty was to have all railways adopt and in¬ troduce one universal type. Designs patented by Eli H. Janney in 1873 and 1874 were modi¬ fied in 1879 to the general contours of the pres¬ ent coupler heads. At first this was for pas¬

senger cars but later it was adapted to freight cars. In 1884 the Master Car Builders' Asso¬ ciation adopted the principle that the coupling faces should be in a vertical plane, or free to move vertically. In 1887 it adopted the Janney type as standard in order to arrive at some uniformity. The inventor broad-mindedly re¬ linquished his claims to monopoly on the con¬ tours of the coupler heads, so that any manu¬ facturers could make couplers of this standard type but with their own details as to drawbars, springs, *etc.* Much has been done to simplify and standardize the designs in order to elimi¬ nate the varying details.

In the Janney or M.C.B. coupler each draw¬ bar has a deep claw-shaped head, to the claw of which is pivoted an L-shaped knuckle. When two cars are pushed together the knuckles inter¬ lock. To uncouple, a vertical locking pin is withdrawn from one coupler, the knuckle being able then to swing open and release the other when the cars are pulled apart. The lock is at¬ tached to a chain on a rod operated from the side of the car. Passenger cars now have this same coupling, but at one time there was exten¬ sive use of an automatic coupler invented by Ezra Miller in 1867. The drawbar had a fish¬ hook end, with inclined face ; when two cars were pushed together these contact faces forced the drawbars sideways until the hooks inter¬ locked. To uncouple, one drawbar was pulled sideways by a lever on the car platform.

Foreign railways make general use of coup¬ ling chains attached to hook-end drawbars, the free end of the chain on one car being hooked over the drawbar of the other car. The chain may be drawn tight by a

right and left hand screw until spring buffers on the ends of the cars are in contact, but on freight trains the chains are often left loose. Automatic coup¬ lings have been tried but have not come into use, except a combined hook coupling and cen¬ tra-! buffer applied to narrow-gauge cars. This differs from the American type in that the coupling faces are horizontal and narrow, the hook in one coupling riding up to engage a slot in the other.

Railroad Car Lighting and Heating. — For

lighting passenger cars, electricity and • compressed ml gas have superseded oil lamps .Other lluminants tried are coal gas, acetylene gas and air saturated with gasoline vapor. Electric lighting is applied generally by equip-Pmg csch car with a generator driven from one of the axles by a belt, storage batteries being used to maintain the light when the train is at rest or moving at slow speed. Another system is to supply the entire train from one generating plant placed in the baggage car and driven by a steam engine, though it may also be driven from a car axle. This system is more applicable for trains made up of the same cars for long distances.

Electric light for railway cars was intro¬ duced first in 1881 by the London, Brighton and South Coast Railway, of England, using cars equipped with storage batteries. The time (sevei al hours) and inconvenience of charging the batteries led in 1883 — to the addition of a dynamo driven from the car axle. The battery system was first used in the United States in 1882 by the Pennsylvania Railroad which applied it extensively. This was followed

by other railways, blit the system was abandoned in a few years owing to the time required for charging the batteries, the cost of equipment for brilliant lighting and the cost of mainte¬ nance due to the short life of the batteries. As the batteries for one car weighed about a ton, to change them would have been about as much trouble as to charge them.

Direct-dynamo lighting, with a generating plant to serve the entire train was introduced in 1882 on the Paris, Lyons and Mediterranean Railway, and in 1889 on the Chicago, Mil¬ waukee and Saint Paul Railway. This was sup¬ plemented later by batteries, either on each car or on the car with the plant, in which latter case some auxiliary light had to be supplied for use when the cars were separated.

Car heating on American railways is ef¬ fected almost universally by piping steam from the locomotive to coils and radiators, the cars being connected by flexible hose. Coal stoves caused so many disasters that their use has been prohibited. A special heater for sleeping and dining cars which may have to be separated from trains consists of a small and well pro¬ tected stove with boiler connected to the heater pipes. At large terminals the tracks on which passenger cars are stored are equipped with steam pipes with flexible connections for the car-heating systems. In Europe this system is used less extensively. In England the main reliance is upon portable <(foot warmers® filled with hot water or with acetate of soda, which latter retains heat for a period of several hours. For railroad car braking see Air Brake; for construction and repair machinery see Railway Shops and Machinery.

E. E. R. Tratman,

Associate Member American Society of Civil Engineers.

RAILWAY CONSOLIDATION. The

consolidation — or as the English say, the amal¬ gamation — of railways consists either (a) in uniting connecting lines into one continuous line, or (b) in uniting parallel or competing lines into a

system. Railways in the United States were originally built for the most part in short, disassociated lines — little stretches of road from A town to B town. Construction had progressed only a little before the desira¬ bility of connection between these lines became obvious. And almost at once such connection began to be arranged, so that, in the progress of our railway building and some time prior to about 1870, a great number of these little lines in every part of the country had been amalga¬ mated, with the result of developing our great trunk line systems. Before we had entered upon the last quarter of the 19th century, it had come to pass, speaking generally, as a result of this tendency to unite connecting lines, that very much the greater and more important part of our railway system consisted of long lines of road under a single management or control, made up, especially in the older parts of the country, of a less or greater number of for¬ merly disconnected and independent local lines, which had been one after the other taken over and incorporated into the greater continuous line or system. Almost all the valuable and well located local lines had, 30 years or more ago, thus been absorbed into larger and less local combinations. Such consolidation, working only benefit to the public and demonstrating its

usefulness as it went along, provoked only a small amount of opposition, and these amalga¬ mations of connecting lines usually secured legal sanction, whenever necessary, without the protest of the politicians. But about 1870 — now (1917) about a half century ago — a tend¬ ency in the direction of the consolidation of parallel and competing lines developed. What had long been known in Europe to be the true law of railway construction and the sound basis upon which railways must ultimately come to exist and be operated in every country where there is enough wealth and commercial activity to make them successful — namely a division of territory and the practical elimination of com¬ petition between parallel lines in the same ter¬ ritory — began to assert itself and to be felt to be applicable here : and directly we entered upon a period of consolidation, not now of con¬ necting but of competing lines ; and, summing up the whole matter in a single sentence, that process of amalgamation, having now gone on in this country for nearly 50 years, it results that we are now at the end, substantially, of the second stage of railway combination.

First, we built isolated and disconnected lo¬ cal lines ; second, we united these connecting lines — whenever they did connect — into con¬ tinuous lines ; and third, we divided up the ter¬ ritory between theretofore competing lines, by gradually amalgamating either the

ownership or the control of such lines in a defined territory, thus securing little by little to a single interest, a territorial monopoly of the carrying services of the locality. This process carried out to its logical conclusion roughly divides the whole country into railway territories of greater or less extent, within each of which one single railway system is paramount or absolutely con¬ trolling. This readjustment of ownership and control between the greater railway companies of the country goes steadily on. In some sec¬ tions of the country it seems ta have been fully and finally accomplished ; in other sections it is in progress; and only where the game isn't worth the candle or where the work has been done, is there an absence of activity in this di¬ rection, the tendency so to consolidate, first con¬ necting and then competing lines, has been universal and inevitable, and such consolidation is in the one case an accomplished fact and in the other an irresistible evolution. Very little effort was made to prevent the earlier consoli¬ dations, that of merely connecting lines. It is now well understood that such efforts, if they had been made, would have failed, and it is now not questioned that such consolidations have been beneficial both to the public and the railways. On the other hand a very great deal of effort has been made by courts and statutes to prevent and hinder the second form of con¬ solidation, that of competing or parallel lines. These efforts have also for the most part failed, and it is now coming more and more to be be¬ lieved that they will ultimately wholly fail to prevent what seems to be the inevitable in rail¬ way development. Moreover in the case of the amalgamation of connecting lines, the mischiefs which have been apprehended have generally not been realized ; so that now not only most practical railway men, but many students of the railway problem believe that in the outcome the balance of benefit both to the carrier and to the public will be also found on the side of terri-144

torial division between competing lines. The emphasis of our intelligent thinking and our most efficient effort is now put rather on regu¬ lation than repression.

The history of railway construction and combination throughout the world seems to in¬ dicate first, that the consolidation of competing lines is inevitable; second, that efforts by legis¬ lation or litigation to prevent it always fail ; and third, that such consolidations benefit both the public and the railways. The facts and figures concerning these consolidations in the United States are detailed elsewhere in this work, but the economic questions involved are still open ones with us. Elsewhere throughout the world these questions seem to be settled. Thus in England, where the railway problem has in many of its features been strikingly like our own, the question is now quite at rest. In France the question never really arose, and else¬ where in Europe it has been decided everywhere in favor of amalgamation and against the con¬ tinuation of competition between lines serving the same territory. (The writer's argument in the Supreme Court of the United States, Oc¬ tober Term, 1903, upon the appeal of The Northern Securities Company *et al.* v. the United States).

England. — In February 1872 a Select Joint Committee on Railway Companies' Amalgama¬ tion was appointed by the two houses of the English Parliament to investigate and report back the condition of the railways of Great Britain, particularly in respect of the consolida¬ tion of lines and the division of territory among the greater companies. Mr. Chichester For-tescue, in moving the appointment of the Select Committee in the House of Commons, on 23 Feb. 1872, said that "20 years ago a commit¬ tee had reported against the system of amal¬ gamation, but since that committee reported amalgamation had gone on as merrily as before — the fact being .that 5,000 miles of railway had been added to the greater railways since that time.®

This committee called a great number of witnesses and went fully into the details of the matter throughout the British Islands, and on 2 Aug. 1872, presented a voluminous report, from which it appeared that by the end of the year 1843, 71 separate and independent lines had been constructed, averaging about 30 miles each in length. During the following year the aver¬ age mileage per independent line was reduced one-half, so that by the end of the year 1844 the average was

only about 15 miles. Between 1844 and 1847, 637 separate companies had been chartered, with a total authorized length of about 9,400 miles of line. Eleven proposals, for example, were made to Parliament for lines of railway through a single narrow valley, where but one line was possible. This called so loudly for relief that consolidation began about 1847, and so proceeded, by the gradual absorption of the smaller lines by the larger systems, and by a consequent division of territory between the consolidated companies, that by 1872 it had come to pass that the railway business of the kingdom was substantially performed by no more than about six of these great amalga¬ mated companies. The first English railway charters contained .provisions intended to pre¬ vent competition both between the lines them¬ selves and between them and the canals, es¬

pecially in freight traffic. George Stephenson, the father of English railways, seems to have appreciated clearly the mischief to be avoided in the matter of competition, even at that ea rly day, and he, therefore, set himself to the task of getting the railway system in that country started right in this particular. His view on this subject was summed up in his much-quoted saying that “where combination is possible, competition is impossible.®

In 1836, a Mr. Morrison, M.P. from Inver¬ ness, made a remarkable speech in Parliament, in the course of a discussion of the then Eng¬ lish railway situation, in which he pointed out with uttermost clearness that a railway must in the nature of things be a monopoly; that com¬ peting roads will inevitably combine ; that par¬ allel lines are sheer waste of capital and that fixed maximum rates are useless. This utter¬ ance is the more remarkable because it stated clearly at the outset of railway building and before there was any basis of fact and experi¬ ence upon which to found such generalization, the ultimate principles which long experience has since demonstrated to be sound.

Thus it is seen that the English railways started right but that they soon got wrong, and for the first 30 years and more, blunders in plenty were made in futile endeavors to con¬ struct and operate railways on the principle of inter-competition. Uncounted treasure was wasted in these attempts, and absolutely nothing but experience was gained by it. By 1872 com¬ petition had been substantially eliminated through the operation of natural laws and in spite of hostile legislation and litigation. It was said in Parliament, in the de¬ bates over the appointment of the Select Committee in 1872, that

there was not at that time a single competitive fate exist¬ ing in the kingdom. With the legislation of 1873 the general railway situation in England was fixed and determined, and the agitation for competition ended. The railways ceased to be bugbears, and fears of mischief to the public from the growth of railway influence and power gave place to intelligent criticism of railway methods and to a public-spirited determination to get good service at fair rates while giving the companies a free hand to manage their finances in their own way. Thus, after nearly 40 years of experiment, agitation and disturbances, the English people came back about 1872 to their point of commencement. Mr. Adams, in his ‘Railroads and Railroad Questions, > says that then England “settled down on the doctrine of laissez faire ®; and President Hadley, in his ‘Railroad Transportation,* says: “It might bet¬ ter be said that it has settled down on the policy of specific laws for specific troubles.® By about 1872, as we thus see, the problem was solved by the operation of immutable economic laws, and the decision against competition between lines made beyond all possibility of reversion. To make a summary statement it appears that in 1847 there were about 5,000 miles of railway in England, owned and operated by several hun¬ dred independent and competing companies; 25 years later there were 13,000 miles of railway, owned and operated by 12 partly competing companies; in 1917 there were about 24,000 miles, owned and operated by about six non¬ competing companies.

The history of some of the greater English

companies taken a little in detail illustrates the situation. The London and NorthWestern Railway was first opened for traffic in 1837, about a month after the accession of Queen Victoria. In 1846 it consisted of a main line from London to Birmingham, with some insig¬ nificant branches. In 1852 a writer on the posi¬ tion of the company complains that it t(fell a few years back into the error generally commit¬ ted by railway companies of amalgamation with numerous other railway companies. From be¬ ing a line from London to Birmingham, 1 12 miles, it has become a line or lines of 53914 mile long — five times its original length.ˆ Since that time it has increased its mileage nearly fourfold, and has merged into its system the Chester and Holyhead lines on the west and the Lancashire and Carlisle on the north, be¬ sides numerous smaller undertakings too nu¬ merous to mention. The Great Western Rail¬ way has been absorbing smaller independent lines in its territory for many years, and altogether considerably more than 100 have been so absorbed within the last 40 years. Since 1896 it has taken over about 20 such lines, adding thereby 260 miles to its system. Of its total capital expenditure from 1892 to 1901, amounting to about £15,500,000, nearly £5,000,000 represented amalgamations. The NorthEastern Railway is a consolidation of various small lines which has resulted in a vast network of railway in the northeast of England without a single intruder in the terri¬ tory in the shape of a competitor. The report of the Select Committee on Railway Amalgama¬ tion in 1872 contained the following reference to this line :

The case of the NorthEastern is a striking illustration. That railway or system of railways is composed of 37 lines, several of which formerly competed with each other. Before their amalgamation they had, generally speaking, high rates and fares, and low dividends. The system is now the most complete monopoly in the United Kingdom; from the Tyne to the Humber with one local exception, it has the county to itself, and it has the lowest fares, and the highest dividend of any large English railway. It has had little or no litigation with other companies. While complaints have been heard from Lancashire and Yorkshire, where there are so-called competing lines, no witness

has appeared to complain of the NorthEastern; and the general feeling in the district it serves appears favorable to its management.

The Great Central Railway, which was opened for all classes of traffic in April 1899, has a total mileage of 665 miles. Of this mile¬ age 465 belongs to it and 200 are jointly owned with other companies. In addition the com¬ pany owns 111 miles of canals and tramways. It is, therefore, a system essentially made up of joint lines and canals. It is also the newest line in England and may stand for the most recent type of development in that country.

Working along essentially parallel lines all intramural transit in London which is wholly or partly underground, aggregating nearly 225 miles in length, has been in effect consolidated into two great substantially non-competing en¬ terprises, dividing the territory in a way be¬ tween them, upon a line (roughly speaking) which runs northwest and southeast through Piccadilly Circus, or dividing, along non-com¬ petitive lines as much as possible, about Picca¬ dilly Circus and converging severally therein. The Joint Parliamentary Committee of 1901 reported that it was desirable that the working of underground railways in and around London should be put under the control of some one vol. 23 — to

consolidated interest ; and that has been the ulti¬ mate solution.

The English courts commenced, about the middle of the last century, to break down the old common-law doctrines theretofore in vogue against monopolies, which were invoked in op¬ position to railway consolidation. Gradually the whole legal theory upon which those doc¬ trines were attempted to be sustained has been overthrown, until now there is in England no legal objection possible to be urged, and very little popular prejudice to the amalgamation of railway lines whenever and wherever it seems to be economically desirable. The legal argu¬ ments against these consolidations were always drawn from the old decisions against monop¬ olies and restraint of trade, which more than 50 years ago began to be repudiated in toto by the English judges. Thus in a leading case often referred to, which was decided in the House of Lords about 1850, Lord St. Leonards used the following notable language :

My Lords, there are just a few remarks that I wish to make upon public policy. I will not add a word to what has been already said by my noble and learned friends, but I will call your attention to what

fell from one of the learned judges (Mr. Justice Cresswell) as regards the restraint of trade. That learned judge says that with regard to the restraint of trade, there is a maxim in common law, and he refers to a case in Year Books (2 Hen. V., pi. 26), to prove it; but the learned judge did not tell your lordships upon what that maxim was founded. Nobody supposes that there was any statute upon the subject in those times. Upon what, then, was that maxim founded? Why, upon public policy for the good of the realm. It was not good for the realm that men should be prevented from exercising their trades. Now, let us see what this particular case is; it lies in few words and remarkable consequences have resulted from it. It was an obligation with a condition that if a man did not exercise his craft of a dyer, within a certain town, that is, where he carried on his business, for six months, then the obligation was to be void, and it was averred that he had used his art there within the time limited, upon which Mr. Justice Hull, being uncommonly angry at such a violation of all law, said, according to the book, " Per Dieu, if he were here, to prison he should go until he made fine to the king, because he had dared to restrain the liberty of the subject." I wish to draw your lordships' attention to this case. Angry as the learned judge was at that infraction of the law, what has been the result of that very rule without any statute intervening? That the common law, as it is called, has adapted itself, upon grounds of public policy, to a totally different and limited rule that would guide us at this day, and the condition which was then so strongly denounced is just as good a condition now as any that was ever inserted in a contract, because a partial restraint, created in that way, with a particular object, is now perfectly legal. Without any exclamation of the judge, and without any danger of prison, any subject of this realm may sue upon such a condition as Mr. Justice Hull was so very indignant at in that particular case. That shows, therefore, that the rule which the learned judge, whose opinion is now before the House, thought depended upon some rule of common law, regardless of policy, was founded upon public policy, and has been restrained and limited and qualified up to this very hour, and beneficially so, by that very policy which it is supposed had no bearing at all upon the foundation of the rule. (Egerton v. Earl Brownlow, 4 H. L. Cas., 1,

237, 238.)

It is now about 20 years ago that the notable consolidation of the London, Chatham and Dover and the London and SouthEastern lines was effected, which operated to merge two theretofore independent

parallel and competing lines and to allot the whole southeastern section of England to the amalgamated company. This, as is usual in that country, was accomplished through special Parliamentary powers, which in this case were sought and obtained without arousing any great opposition, engendering any considerable heat, or provoking any declamation about a sacrifice of the rights of the public. In point of fact, nothing but good seems to have flowed from it.

Previous to 1899 both these railways had

achieved an unenviable notoriety for the in¬ adequacy, slowness and unpunctuality of their sen ices, for the dilapidated condition of their stations and rolling stock, and generally for the backward state of their accommodation. In the case of the Chatham Company the financial position was also precarious, and though the oouth-Eastern at one time was nominally much stronger in this respect, it too had lost much

111 e Pre9eˆnS five years, and for 1 ul its ordinary dividend at the rate of only z per cent was the worst in its history. Com¬ petition of the worst kind between the South¬ eastern and Chatham companies was a normal state of affairs, and as the result both railways Wnt vast sums of capital and revenue for which there is at the present time little to show except duplicate lines and stations, and in¬ adequate provision for traffic where extended accommodation was most required. Many times a fusion of interests had been urged upon the two companies, but without result. Negotia~- tions for amalgamation were entered upon sev¬ eral times, but they always broke down at the crucial moment.

At last, in 1898, an agreement between the two companies was reached, not for a complete amalgamation, but for the pooling of gross revenue and working expenses and the division profits on a fixed percentage basis, with additional arrangements for the joint contribu¬ tion of capital required. It was not the inten¬ tion of the two companies to seek Parliamentary authority for this arrangement, as they were not bound to secure the sanction of any other body than their shareholders. But the gov¬ ernment virtually intimated that the new ar¬ rangement was so important and farreaching in its bearing on the interests of the public that the terms of agreement ought to be embodied in a bill. This bill received the royal assent on . 1 Aug. 1899, and seven months thereafter the new arrangement came into operation.

The preamble of the bill recites that

With a view to avoiding undue competition and unneces-frnm j?pen?f aiA delays and other inconveniences arising thV r«ˆr+?ty ˚f mterests,and to turning to the best account the respective powers and resources of the two companies

tW Xvl 1S+ e+xpeiient and. Wld be for the public advantage SnJk.W ’ 2 j16 provisl˚ns and enactments in this Act

undertakings of the two companies should be

?fw tT,prSd’-manf˜’ Taintained-and improved from and after the passing of this Act, as one undertaking .

The Act constituted a Managing Committee to administer the two railways as one company that new body being made up of the directors ot the two companies.

The committee of 1872 sum up their view upon the effect of hostile or prohibitory legisla¬ tion on this subject as follows: ((A long and yaned experience has fully demonstrated the tact that, while Parliament may hinder and hwart it, it cannot prevent it.» The theory of the British Constitution is that Parliament is omnipotent, and here there is formal admission dc»at 1 1Gre are ˆhngs *fiat omnipotence cannot

i Prance.-— The French railway system was developed a little later than the English, but we must look as far back as the reign of Louis XI in the latter part of the 15th century, if we are tully to understand and appreciate that develop¬ ment. 1 hat sagacious and masterful prince who reigned from 1461 to 1483, broke effectually the power of the great feudatories, and by a

consolidation of authority in the Crown laid the foundation of the absolute monarchy. His taking the postal service out of the hands of the feudal authorities and away from the cities and making it a matter of national administration, these 400 years ago and more, was one of the most notable acts of his reign, and was in a way steP toward the modern railway system of France. “Modern history,® says President Hadley, m speaking of the nationalization of the Prench post office, “ — the history of nations as such may almost be said to have begun at this point® W hat Louis XI did for the power of trie Crown and for the postal service of ‘the country, Louis XIV and Colbert did in laying the foundation of the national system of high¬ roads and canals. The Ecole des Ponts et Chausses was founded, and trained engineers graduated therefrom laid out, constructed and perfected that splendid system of canals and lghways, radiating from Paris and reaching every corner of the kingdom, which long ago made France the first country in the world in its roads and waterways. There was from the beginning complete organization, intelligent sur¬ vey and

construction and strict supervision • so that an almost perfect system of lines of com¬ munication existed in France before railways were known. In no other country had such re¬ sults been accomplished in roadmaking, and nowhere else was such completeness of organiza¬ tion and development possible. The genius of Highways had in some sort come down to France as an inheritance from Rome, whose military roads were one of her most characteristic monuments. In this state of case, with a per¬ fect system of roads and canals already built and in operation — which made railways seem less

necessary in France than in other countries _ it

is not strange that the French built railways slowly and cautiously. So it was not merely accidental that France moved tardily in this matte j. V ks not ln the French character to make radical changes, or to do things piecemeal ; and it was easy for her highway engineers to see that other nations were blundering in their first railway construction. The racial qualities that distinguished the French, their spirit of order and economy, their notion of proportion and their conservative good sense in business, all had something to do with their making haste slowly in railway building. It is very much the French way to let other people make the initial experi¬ ments in new things, and only to take a thing up when it is demonstrably sound and feasible It is almost a racial instinct, and this is what happened in the development of French railways, lhe result is that they now possess the onlv railway system in the world which was intel¬ ligently conceived from the outset as a unit which was scientifically planned and laid down by competent engineers working together to a common end, and which was built as a whole

3hlp b°Adˆ nS m ?r?nc? that made this pos¬ sible had their genesis in the dominating sagacity

and spirit of order of Louis XI. The highways

and canals led up to the railway lines, and the

governmental regulation and control of the old

,vn«ˆate/WT greW natVrally into the present system of railway supervision. The system of

roads and waterways existing in 1830 suited the rench nation exactly. They were so arranged and classified that each bore its exact propor¬ tion of importance, whether national, depart-

mental or local. They were regulated from Paris with ease and with military precision. Never was there so efficient a corps of en¬ gineers for carrying out such a scheme as that which is trained at the ficole des Ponts et Chaussees. The first step taken by the govern¬ ment looking to a general railway system was the appropriation of a sum of money to pay the government engineers for laying out a gen¬ eral system of railway lines covering the whole of France. When this survey was completed, and while the lines existed only on the maps and blue-prints of the engineers, the govern¬ ment next took up the question of ownership and management. While other countries had been acting and experimenting and making costly mistakes, France had been reasoning and thinking the matter out. There was a long series of debates in Parliament between 1837 and 1840. The plan finally adopted was the concep¬ tion of Thiers, and was settled upon in 1842. The plans then and thus deliberately conceived and matured — both of engineering and of legis¬ lation — have since been carried out consistently. They were sufficiently elastic to be practicable. It was at the outset a policy of support and con¬ trol without actual ownership, or, in other words, a policy of subsidies to encourage private companies, and in return for these subsidies a reservation of more or less important rights of state control. As the work proceeded and as new conditions arose, amendments and modifi¬ cations were incorporated into the plan as origi¬ nally conceived. In 1842 it was strictly a plan for subsidies ; in 1852, extensions of chartered privileges were granted to the companies; in 1859, a scheme for the guarantee of interest on the bonds was inaugurated, and, in 1883, the government guarantee was extended to dividends.

Under the plan adopted 33 different com¬ panies were chartered, contemplating about 2,500 miles of line. Building went on rapidly until the Revolution of 1848, and then again after the accession of Napoleon III in 1851. The lines have from the beginning been laid down with the idea of avoiding all duplication and all waste of capital; they were surveyed and traced by government engineers, and each part stood in its proper and intelligent relation to the whole. Parallel lines were forbidden as a matter of course, and competition

was. not conceived of as among the possibilities of the situation. By 1852 the number of independent systems had been reduced from 33 to 11, and in 1859 the 11 were reduced to six, of which five radiated from Paris. Each had a monopoly in its own terri¬ tory. Competition running riot, the construc¬ tion of needless lines as a mere speculation in the securities, rate wars, with their attendant iniquities, and the consequent wanton waste of money and effort in construction and operation are essentially unthinkable to a French railway engineer or official New construction is under¬ taken only as required, and to meet the neces¬ sities for more lines growing out of the devel¬ opment of any particular territory. About 1859 it became obvious that a considerable amount of new construction was necessary in order to bring the railway system up to a proper stand¬ ard of utility and efficiency, and in order to secure this construction, each of the six com¬ panies, and each in its own district, undertook to construct a large number of branch lines.

The government took the initiative, and in order to facilitate this new work and to secure it promptly recourse was had to a system of state guarantees of interest on the bonds upon which the money for the new construction was to be raised. This was the plan devised by De Franqueville. Money was, of course, easily raised by issues of bonds upon which the gov¬ ernment guaranteed 4 per cent, this guarantee making the securities instantly marketable and extremely valuable. There was, accordingly, no wasteful financiering, no iniquitous jobs, no lack of funds, no foreclosures, no reorganizations, receiverships or squeezing of investors. In 1865 a further plan was proposed in the Chamber for the construction of a network of local roads not to belong to the six companies, and the munici¬ pal authorities were given the right to subsidize such lines. Pursuant to this plan, several thou¬ sand miles of these local lines were built throughout the country within the next five years. It was not, however, contemplated that they should be combined into systems which might interfere in any way with the monopoly of the six companies. They were designed to be feeders. However, after the war of 1871, the prohibition to combine was successfully evaded, and these local lines by a series of combinations began to be serious competitors in many places to the main systems. This made it necessary for the government to take the mat¬ ter again in hand, and the problem was ulti¬ mately solved by having the great companies take over the local lines within their territories severally, upon terms. In 1879, by a decree of July of that year in the Chamber of Deputies, De Freycinet undertook to raise a loan of 3,000,000,000 francs for the construction of about 10,000 miles of additional line.

This plan has been slowly carried out since that time. There was at first some delay, but by the beginning of 1884 this last comprehensive scheme of railway development was settled upon, the leading points of which were these : first, that the state here¬ after should confine its own railway operations to the small district in the southwest occupied by what is known as the state line ; that isolated lines which the state owned in various parts of the country should be taken over by the one of the six great companies in whose territory it lay; second, that additional lines as needed should in future be constructed only by the companies in whose district they belong; third, that the state should guarantee each company a minimum dividend, and that when the amount available for dividends exceeded a certain per¬ centage — the rate differing for each line — two-thirds of the excess should go to the state. The limit, however, was placed so high that this provision has been practically inoperative. Thus, for example, on the Northern line, the guarantee minimum dividend i's 13.5 per cent, while the point beyond which the state shares the excess is 22.1 per cent. In the case of the Paris, Lyons and Mediterranean, the guarantee minimum is 11 per cent, the state sharing in anything beyond 15 per cent, and so on, with slightly lower percentages for the other com¬ panies.

All of the lines in France except the old state line in the southwest and the western line taken over by the state a few years ago to placate the Socialists, are owned and operated by private companies. They are

concedes and become state property upon the expiration of the concessions. Meantime they are subject to a strict governmental super¬ vision and control. The length open for traffic by the latest figures obtainable (1911) was 25,194 miles, which fully meets all the require¬ ments of the country. Of this total mileage 5,559 miles are state railways. The original scheme was for the government to contribute about 250,000 francs per mile; and private enterprise to find about 200,000 francs per mile, thus dividing the expense and the ownership. The concessions generally were to fall in, first in about 40 and later on in 99 years. When this occurs — about the middle of the present century — the government will, it is claimed, become possessed of an asset in the shape of railway property sufficient in realizable value to pay off in full the national debt. In 1892 the French railways were conservatively valued at 16,000,000,000 francs. The original plans of construction and joint ownership were some¬ what modified as time ran on. In the con¬ struction of the French lines there has been less waste of capital and better results for cap¬ ital than elsewhere in the world. French rail¬ ways have cost less and come to more than any others on earth. It need not be argued that the French scheme put in practice would inevitably reduce the cost of construction to a minimum and would secure the best results for the least money. Passing by the matter of the state guarantee of interest and dividends, it may be said that the net earnings of the five private companies have been upon an average far be¬ yond anything accomplished elsewhere in the world in that respect from railway operation. Furthermore, in face of the strong position of the French railways as monopolies, the govern¬ ment notwithstanding exercises a sufficient con¬ trol — one which is in many respects admirable and reasonable. The French plan, as is seen, forces the numerous independent companies to work in harmony with one another, while giving each of them an absolute monopoly in their own territory. It renders, therefore, the process of consolidation within that territory easy and inevitable. Whatever slight attempts have been made in the Chamber to check or prevent com¬ bination or monopoly have been promptly over¬ ruled as contrary to the-general scheme. This was particularly the case in 1875, when Phillip-part, a Belgium capitalist, undertook to consoli¬ date the local lines as against the six com¬ panies; and even the state itself in the operation of its own lines in the southwest has never succeeded in breaking into the monopoly of the Orleans Company in that territory. While France prohibits effectively

competition between her railway lines, she is constantly spending large sums in improving internal water com¬ munication ; and private carriers using these waterways without paying any toll carry off more or less traffic from the railways, and are allowed to do so. To make a summary state¬ ment, we find the facts to be that in France the railway system was intelligently planned as a unit from the outset; that the lines were laid down by competent government engineers and constructed without paralleling; that in con¬ sequence very little money was wasted in con¬ struction; that competition did not enter into the scheme as originally devised, and that when it arose — notably through the consolidations of

the network of local lines built between 1865 and 1870 — it was suppressed by the govern¬ ment; that railway investments have been al¬ most uniformly profitable, and upon the whole much more profitable than in other countries; that freight rates are not excessive and that passenger rates are very low; that the public is well served, the passenger service especially being of the very best ; that governmental regulation is not hampered or thwarted by the strength of the railways as monopolies ; that no mischief and much good seems to have come from the elimination of competition between lines, and that upon the whole the French scheme secures a maximum of adequate, efficient and satisfactory service at a minimum of cost and friction.

Belgium. — The policy of government owner¬ ship is perhaps best typified by the Belgian system. Of all countries in the world Belgium probably offered the best field for a state rail¬ road. The country is small, compact and rich, the population crowded, active and intelligent, and the industries varied, all which insured a large volume of local traffic. Moreover, Bel¬ gium is on the highway between England and Germany, so that, in addition to a dense local traffic, the Belgian lines were certain to secure considerable through traffic on commodities moving between England and Germany. There was in consequence of all this little room for mistake in locating the main lines, and they were, as in France, for the most part laid down intelligently and built economically. Railway construction began as early as 1833. Private companies were allowed to build lines when¬ ever the state did not choose to build, but competition between the lines owned by private companies and the state lines was not at any time part of the original scheme. Like the French, the Belgians saw from the start that competition would be uneconomic and wasteful. The private railways increased rapidly from 200 miles in 1850 to 700

miles in 1860, and 1,400 miles in 1870. i his rapid growth of the private lines was accompanied by their inevitable consolida¬ tion into systems, and in spite of the fact that competition had not been contemplated, there began in Belgium about 1856 a period of rail¬ way war between the state and the private lines and among the private lines themselves. Theo¬ retically, the state had and exercised the power to forbid the private companies from entering into any competition with the state lines, but, in spite of that, competition in Belgium after about 1856-57 was keen. The state had the better routes and in some sort the inside track, but some other advantages possessed by the pri¬ vate companies practically offset this advantage. This competition working the usual mischief finally drove the government to the expedient of buying out the private companies. This began about 1870. By 1874, the government owned moie than half the mileage of the country. By 1880, it owned two-thirds, and in 1902, there were 2,516 miles of railway in the country, all or practically all of which is controlled by the state, either through ownership or lease, and competition is in consequence wholly eliminated. The total mileage in 1912 was 2,913, of which but 217 miles were private lines. The state now owns more than 90 per cent of the total mileage and operates almost all of the remain¬ ing by lease. This is in brief the history of

the development of railways in Belgium. It ap¬ pears that competition was not part of the original scheme ; that it nevertheless arose and ran its course; that when the state realized the disadvantage of it, steps were taken to elim¬ inate it entirely, and that this was done by the purchase of. the competitive lines. There was at first the inevitable consolidation of the pri¬ vate lines, eliminating competition between those lines themselves, but intensifying it as between them and the government lines. Then came the consolidation of these lines with the state-owned lines by government purchase, and competition was at an end. It is another case of the universal tendency to combine, and of the powerlessness of government to prevent it.

Italy. — In 1878, a Parliamentary commis¬ sion in Italy undertook an investigation of the railway situation in that country. Testimony was taken throughout the kingdom and an enor¬ mous mass of material collected. In 1881 this commission made its report to the government, which was subsequently published in seven quarto volumes. It was the most thorough railway investigation ever undertaken in the world and the report is probably the most valu¬ able in existence. The material parts of it have been translated into French and are thus avail¬ able. From the work of this commission it ap¬ pears that, prior to the wars which resulted in the union of the Italian states in 1870, the prin¬ cipal railway lines of Italy not only were dis¬ connected and independent of each other, but also constituted isolated or strictly local sys¬ tems for each of the chief independent states. Thus the lines in Tuscany, in Lombardy and in Piedmont were wholly distinct both from one another and also from those centring in Venice, Rome and Naples. Some of the early charters had come from the emperor of Aus¬ tria and one from the Pope; the lines were in¬ adequate to the demands of the business of the country, the service was very poor and the companies substantially bankrupt and irrespon¬ sible, but there was plenty of competition. The problem after 1870 was to unite and consolidate these scattered and local lines into systems fit for united Italy, to construct new lines, to re¬ construct old ones, to re-equip and to reconsti¬ tute ; and then to operate the reconstructed lines as a whole. The range of mountains from north to south which constitutes

the backbone of the Italian Peninsula dictated a natural di¬ vision of territory for the amalgamated lines. There was as of course much local jealousy to overcome. Although Italy was too poor to spend much money in experiments, there was thought to be danger to the autonomy of the new state in permitting foreign capital to come into the railways, and it was prevented by the government, so that, in consequence of all these matters and hindrances, things at first moved slowly. Connecting links were first built, which served to unite the isolated local systems, the plan being to consolidate the local parallel and competing lines rather than the connecting lines. Finally the roads fell into four systems — that of Upper Italy, that of Rome, that of the east coast and that of Sicily and the south. Here, as elsewhere in Europe, competition between parallel lines did not enter into the scheme of construction and reconstruction, and conse¬ quently consolidation was not only inevitable,

but easy, and it was facilitated wherever there was duplication. Upon the division of terri¬ tory between the four systems and with the consolidation of lines within those four terri¬ tories respectively and the building of the con¬ necting links, the problem of construction was in a way to be solved ; or, in other words, the lines were laid down and ready for operation. Next came the problem of ultimate ownership and present maintenance and operation. Soon after 1870 the state had begun to buy up the lines, especially in the north, where there was danger from Austrian influence, and by about 1875 a considerable part of the mileage of the kingdom was owned and operated by the state. So that by that time Italy seemed committed to what may be called the Belgian system of state ownership and operation. But Belgium was rich and Italy was poor, and it was soon found that the state was neither managing the lines well nor making any money out of it; there was, therefore, general dissatisfaction through¬ out the country with the railway system ; neither the poorly served public nor the depleted treas¬ ury of King Victor Emmanuel was satisfied. It was in that state of affairs that the investiga¬ tion of 1878 was undertaken, the result of which was that the Italian statesmen who had the matter in hand came to the conclusion that it was not the proper function of the Italian state to run its railways : that state manage¬ ment in Italy had proved more costly and less satisfactory than private management, and that the carrying on of so vast an undertaking by the new state involved political risks and dan¬ gers of a serious nature. The outcome was the chartering in 1885 of three orivate com¬ panies, one, the Adriatic, for the territory on the east of the Apennines, a second, the Medi¬ terranean, for the territory

on the west, and a third, the Sicilian, for Sicily, the two systems in the peninsula being about equal consequence, while the one in Sicily was, of course, smaller. A fourth company has since been chartered to operate the lines in Sardinia. These companies were to take over the rolling stock of the lines within their respective territories at a valuation, and thus become the owners of it, and to main¬ tain . and operate the lines, dividing the gross receipts with the state on an agreed basis. So that the ultimate solution was that the state was to own the lines, where private companies were to operate them. Practically the railway busi¬ ness of Italy proper is in the hands of two com¬ panies, one on either side of the Apennines, the lines meeting at Naples, Rome, Florence, Milan and elsewhere. Between 1881 and 1897 the length of the Italian railway system almost doubled itself, and in 1898 there were 9,813 miles of line open for traffic. Since which time there has been practically no increase in the mileage. In 1912 there were reported 8,387 miles of state railways. The service is satis¬ factory and the railway system is making rapid progress throughout the kingdom. Thus we see that in Italy competition preceded combina¬ tion ; that it was found to work mischief and that attempts at combination were the inevitable result; that when the matter was taken seri¬ ously and intelligently in hand by the state competition was eliminated by law and the territory divided; and that then, and then only, were satisfactory results secured in railway

operation. It appears, therefore, that whether we choose state operation as in Belgium or re¬ ject it as in Italy, it is the same as far as com¬ petition and combination are concerned; that the same economic laws govern in each case, and that in the long run competition is elim¬ inated.

Germany. — Railways in Germany grew up very much as they did in England, at first with¬ out any general plan and without any real comprehension or appreciation of the problems involved. The Germans, however, like the Eng¬ lish, seem to have started right on the question of competition. Their earliest statutes explicitly recognized the right to a monopoly in their first lines. The country then consisted, aside from the central kingdom of Prussia, in large Part i°£ a number of semi-feudal principalities, and local railway system sprang up in each of the states, which in 1914 constituted the German Empire, so-called. Prussia followed Belgium in a general way in her early legisla¬ tion and initial construction. The first state

io!u?Vcn *n Germany was built in Prussia about 1848-50, from Berlin toward the Russian frontier. Other state lines followed, but pari passu, many private lines were laid down, some of them securing some state aid, by way of guarantees or subsidies or stock subscriptions from the principal states. Some, however, even of the smallest principalities, at first owned their lines outright and operated them too. So there was at the start every sort of a railway in Germany. This haphazard and piecemeal work begot the inevitable result — fierce com¬ petition everywhere among the private com¬ panies and between them and the state roads, i he results were extremely dissatisfactory; the service Was p00r an.d the rates higb-About lool Bismarck came into power, and from that time dates the influence of militarism upon the railway system of Germanv. It has since shaped and colored the whole development and opera¬ tion of the German lines. He saw clearly enough that the mixed and competitive system was a bad one, not only from a military point of view, but also from the point of view of the country at large. Steps were, therefore, grad¬ ually taken, in Prussia especially, to acquire the private lines and to consolidate competing and conflicting interests. The matter moved slowly because the country was poor, but the mileage nearly doubled between 1865 and 1875. After the war with France in 1871, more rapid prog¬ ress was made in unifying the railway system

taaa 6 .country-By 1878, there were about rfUOU miles of state-owned and operated lines, 2,000 miles of privately-owned and state-operated lines, and about 6,000 miles of privately-owned and privately-operated lines. In 1881, the government owned more than 7,000 miles of line, only about 3,000 miles remaining in the hands of private companies. In 1885 the government owned 13,000 miles of line in Prussia alone while only 1,000 miles remained in private hands. In 1900, there were 30 597

ˆ GS vj rai1way *n t£le German Empire, more than 93 per cent of which were owned and operated by the state. In 1913 the total mile¬ age was 37, 894,f of which 2,205 miles were private lines. The increase since 1900 consists almost exclusively of lines constructed for military reasons mostly on the western fron¬

tier facing France. Under the law the government was required to manage the rail¬ ways (<in the interest of general traffic as a single system, }) and in 1886 the government issued a Code of Railway Regulation, applicable to the whole railway system of the country. Competition practically ceased in Germany by about 1875, and for the past quarter of a century the railways of the country have been operated on non-competitive lines. Pooling arrangements with the canals and other competing waterways are sanctioned, in order fully to eliminate waste¬ ful competition and unjust discrimination.

Austria.— In 1912 Austria had 14,185 miles of railways, of which 863 miles were narrow gauge and 2,501 were private lines ; Hungary has at the same time 13,303 miles of lines, of which 2 098 were private lines. In 1901, Austria-Hungary had only 39,014 kilometers of line open for traffic. The first Austrian charter was granted in 1836, and construction went on actively thereafter until the revolution of 1848. the original idea was to follow the French system, and have the lines built and operated by private companies. Their statute of 1838, it may be noted, was the first general railway law enacted in any country in the world. It provided for undertakings by private companies, aJa<t f °r guarantees by the state of interest upon the cost of construction; it limited dividends on shares to 15 per cent, and absolutely prohib¬ ited the construction of paralled lines. It was discovered, however, as time ran on, that the Brench system was not well suited to the con¬ dition of things in Austria; and in spite of statutory prohibition, as the lines were con¬ structed and put into operation, competition ran riot. I here was also the usual iniquity grow¬ ing out of constructing lines for a chance to speculate in the securities; and the competition of the

waterways — of the Danube and the canals — although pooling between them and the railways was allowed and encouraged, added to the confusion and disorder of private maruigement. So in 1873, Austria fell into line with the other countries of Europe, and started off in the direction of state ownership and con¬ trol. in 1885, about three-quarters of the mileage in Austria was, however, still in the hands of private companies, but all the lines in Hungry were at that time owned and operated by the state. By 1898, more than half of the

fnUj a were under state management, direction tendencˆ sets more and more in that

• a \n Russia (including Russia—

in-Asia) had 41,622 miles of completed railway

andgnrn g-l n aiid With 2’039 miles o£ Bne,’ thed T1CS u”der. construction, including

g eat Trans-Siberian line, which is the greatest railway enterprise yet undertaken any- ˆ re-Work began on this line in March 1891 and it is now open for traffic. The esti-inated cost is about $500,000,000. The distance all rail from Paris to Port Arthur or Vladivostok is about 7,000 miles, with a through-car

and™ PekW “rh” d“ Nord t0 Port Arthur and Eeking The government furnished a

tfon6 °f the c5pital squired for construction and owns and operates about two-thirds the total mileage in European Russia* it ias in addition subsidized and thus controls and dominates the policy of the lines owned and operated by private companies.

The Minor Countries of Europe. — Else¬ where in Europe we find the same variety in railway operation and control as in other things ; but the tendency everywhere is to government ownership or to such a strict government regulation as effectually eliminates anything like competition between the lines. Thus in Norway, in 1915, there were reported 1,948 miles of line, all now owned and operated by the government ; whereas in Sweden, at the same time, there were 8,984 miles of line in operation, of which only 2,392 were government lines. But although in 1893 there were re¬ ported to be not less than 108 different owners of private lines in Sweden the law strictly and successfully prohibits competition between them, or between them and the state lines. The last available figures for the Spanish lines show 9,517 miles open for traffic in that country, all, as in Portugal, owned by private companies, but supported and controlled by the state. In Switzerland, where in 1915 there were 3,148 miles of line in working order, the gov¬ ernmental supervision has until recently been much the same as in Spain. In 1898, by popular vote, it was determined (in view of the evils of over-construction and some hurtful competition in spite of legislative prohibition) to purchase for the government the five chief lines, thus putting Switzerland in the Belgium class of countries owning and operating their railway lines. This scheme was gradually financed and carried out by the Swiss government. The railway history of these relatively unimportant European coun¬ tries is of much less interest and value to us than that of the greater states. The Italian system has been followed substantially in Holland, and in Denmark, and by some of the other minor Scandinavian countries.

India. — The construction of railways in In¬ dia, which commenced in 1853, has been con¬ ducted, on three different systems: first, the em¬ ployment of companies under a system of guar¬ antee ; secondly, by the state through its own officials ; and thirdly, by assisted companies either with or without guarantee or subsidy from the state, and working with capital wholly raised by themselves or partly with capital pro¬ vided by the state. Out of eight lines con¬ structed on the first system, five have been pur¬ chased by the state. Two of these are

worked by companies. The more important, the East Indian line, is carried on by the same company that constructed it in the first instance, on special terms as to the sharing of profits. The second, the South India line, is in the hands of a new company, whose capital was subscribed by the shareholders of the old one. The three remaining lines are worked by the state, and all five come into the category of state lines in the accounts of the government of India. The total number of miles of Indian railway open for traffic in 1915 was 34,572. Although con¬ struction began about the middle of the last century, the system has been developed almost entirely since what English writers on railway problems speak of as (<the rise and fall in Eng¬ land of the great fever known as the rail¬ way mania,® to which detailed reference has hereinbefore been made. The Indian railways were, therefore, planned and constructed in the light of the experience afforded by the home

construction and development, and many of the cruder home blunders were thus avoided. They now fall into one or other of four classes :

(a) State-owned lines, worked by companies;

(b) state-owned and state-operated lines; (c) lines constructed by guaranteed companies and (d) lines constructed by assisted companies. The English government, following the French lead in that respect, provided for a system of guarantees, by which the necessary funds were cheaply found; in laying down the lines paral¬ leling was avoided, and competition effectively prevented. Where there is no competition there is the less incentive for combination, and there seems, therefore, not to have been any great tendency in the Indian lines to combine. These Indian railways seem to be rather poor affairs; there is much complaint of indifferent service and high rates. How far these things may be chargeable to the inefficiency of the government or may be due to the system itself does not appear. They have up to the end of 1899 involved a yearly loss to the Indian reve¬ nues, but the working of the year 1900 resulted for the first time in history of the Indian rail¬ way system in a net gain to the state of Rs. 87,239, and in 1901 Rs. 1,154,1 19. From the commencement of railways in India, about half a century ago, to the end of the year 1899, the loss to the Indian revenues amounted to Rs. 57,- 811,487. Whatever else may be true of the Indian lines, they have been constructed and are operated entirely on the principle of non¬ competition and division of territory, and there being no competition there has been little tend¬ ency to combine ; in other words, the evil of competition not existing

or not being allowed to exist, there is no call for combination. This is, as has been said, negative evidence in sup¬ port of the contention that wherever competi¬ tion is possible combination is inevitable.

Mexico. — The railway situation in Mexico is fully disclosed in an exceedingly valuable re¬ port made some years ago to the government by Senor Limantour, Secretary of Finance. It purports to have been based upon a careful in¬ vestigation of the facts, and is on the face of it as intelligent and comprehensive a state paper as any that has emanated in recent years from any government office anywhere in the world upon the subject. The fact that Senor Liman¬ tour, who was then virtually prime minister of Mexico, and had been nominated by President Diaz as his successor in the presidential office suggests his high standing at home and gives weight abroad to his views on these questions. This report, which seems largely to speak the voice of the secretary himself, deals at length with the problems of competition and combina¬ tion, and discloses the fact that the policy of the Diaz administration, as now settled and de¬ termined, is to meet and solve these problems by absolute government ownership, rather than by any further futile attempts at legislative con¬ trol. The government, finding that the general railway law of 1898 (from which, when it was passed — as in the case of our original Inter¬ state Commerce Law — great things seem to have been expected) was proving inadequate to the due regulation and administration of the lines, and realizing the necessity of stronger and surer governmental control, has lately come to the policy of going into the open market and of

adopting the same tactics as private individuals or companies in purchasing the shares of such lines as it desires to control. Mexico is, there¬ fore, now fully committed to the theory of gov¬ ernmental ownership, if not to that of govern¬ mental operation. Those portions of Senor Limantour's report which disclose the proc¬ esses by which the government has acquired and is acquiring such a proportion of the shares of the leading lines as will give it due pre¬ ponderance in their control are very interest¬ ing. The explanations of the causes which have moved the government to this step, as contained m the report, are of an even wider interest and significance to students of the railway problem, n brief, Senor Limantour's explanation is this*

1 he government has until recently been in the usual elementary attitude of encouraging by concessions, subsidies and otherwise all the rail¬ ways which either citizens or foreigners would undertake to build and operate as private enter¬ prises , in the supposed interest of the most rapid possible development of the country. It was only in 1898 that a general railway law was passed, which, however, soon proved entirely inadequate. It was, therefore, in addition found necessary to prescribe new rules relative to granting concessions for competing lines be¬ tween points already connected, and to estab¬ lish a tariff commission — something like our Interstate Commerce Commission — which was an attempt, through the agency of a .govern-metal bureau, to prevent combinations in freight rates, and to regulate them in the public interest. In the light of the experience of other countries and, as it appears, especially in the light of the experience in the United States — competition between the lines is by this report pronounced harmful, except where traffic is large enough to support it® — whatever that means. Govern¬ ment ownership and regulation is declared to be the onl} real preventive or remedy against such disastrous competition— with its inevitable result of the consolidation of competing interests It is further suggested that the fact that groups of foreign capitalists had undertaken to consolidate several of the principal lines, obliged the govern¬ ment to take a definite attitude lest their great railway properties should thus be taken over and controlled by alien capital. It was clearly

uat 1 1CSe contests for territory between the hitherto conflicting interests would eventu¬ ally and inevitably result in either the forced or t c \o untary consolidation of the competing systems. The law as it

stood was inadequate to prevent the acquisition in the open market by any private interest of a control of the shares of any company sought to be acquired, and there was no way to prevent the consolidation of in-oeres.t| ˆrouFh .votiflg trusts or otherwise.

C1i-l3i sltVation *n the early part of 1A)2, which seemed to drive the government

™°fiy ln direction of state ownership and

wprlr°f’ WnS \hlS : ,The railways of the country were found already to be in the hands of no

more than four groups of capitalists, namely ie Central, the National (having lately absorbed the International), the Interoceanic and the Mexican -all but the last showing great expansive activity. The Central especially, by the

[3 nf! ;PEr?.h.?se °| exclusive port concessions and the building of new lines in and out of the Uty of Mexico, was threatening to cripple the .National line. Plainly, therefore, consolidation

between it and the Central would inevitably fol¬ low in the ordinary course. Meanwhile, through Messrs. Speyer and Company, the National was trying to acquire the control of the Interoceanic route, but this was frustrated by the govern¬ ment. Various circumstances ‘favored the government as against the foreign bankers in its secret move to secure control of the Interoceanic’s debentures. «The ability and high financial standing,® says the report, «of the firm representing the interests of the Mexican National constituted a serious obstacle to the attainment of our aims, and it was necessary to act as we did with decision, rapidity and absolute secrecy.® A proposition for a common exploitation by the government in association with the National, the International and the niei oceanic companies followed; <(but it was soon recognized that such an arrangement could pot have the necessary durability nor afford the indispensable conditions whereby the companies might secure themselves definitely against the hostility of other corporations to which they might be exposed in time.® The government thereupon, wisely declining to be drawn into any partnership arrangement with the com¬ panies, reverted to its original plan, namely, an arrangement such as would give the state pi unary and . absolute control of the three systems, and in such a way as to protect each °* i jP1 affainst

such future competition as °e sVUe to arase under the existing state of things. The report declares that the govern¬ ment has now determined to grant no con¬ cessions, hereafter . for competing parallel lines except in territories where dividends can be earned by each such line. Several voting trusts in some of which the government has had an interest, have existed in Mexico, but some of these have lately been dissolved upon the advice of American counsel.

It (was at first proposed ‘t-hat the government shoidd exercise control of the new consolidated system through the voting trust of the National . already in existence. But, ((according to the valued opinion of American attorneys, who are specialists in affairs of this nature, it would

wu b<ien attended with many objections of a legal character,, and have proved a fruitful ” °l htigation.® Accordingly, the consent of its three members was obtained, and the voting trust dissolved, an agreement being en¬ tered into with Messrs. Speyer and Companv whereby they were to secure for the govern¬ ment 40 per cent or more of the voting shares The report then enters into a detailed account <0 the steps by which this was successfully ac¬ complished, 4 7% per cent of the shares being thus secured. It also goes fully into the oues-tion of the probable earnings of the consolidated

for 8??Sqnnnnnn0fAthe 1.ssllance of treasury notes for $ 12 500,000, American gold, to pay for them.

he advantages to the government, growing

out of the control of the new consolidated

system, is summarized in the report as follows :

, - t-The having obtained by one stroke the control of losing | nSˆrtheˆnNtaeS„i?nd “ittout

cost2ofHSn„gpe“Ct”ioe„1 aanrSiderab’e tha <>“’

no wis?S VSSfiCS budgeTaan„ToauSt J}

funds winch in the long run will be recovered by the state.

reoofˆt refT,ce made throughout the jcpoit to the railway situation in - the United

States, and it is obvious that American experi¬ ence has influenced the Mexican govern¬ ment in its new departure in the direction of state ownership. From a return prepared by the French Ministry of Public Works, it appears that there were in Mexico in 1870 no more than 349 kilometers of line; that in 1880 there were only 1,120 kilometers, while in 1890 there vvere 9,713 kilometers, in 1900 a total of 15,454 kilometers and in 1917 15,805 miles of railway in operation — now, as we have seen, all substantially under government con¬ trol or presently to pass thereunder, as the re¬ sult of the investigation and comparison of the advantages of private versus government own¬ ership and operation set forth in Senor Limantour's report.

Australia, *etc.* — In Australia, state owner¬ ship and control has since about 1860 been ab¬ solute and universal. The latest available statis¬ tics show 21,959 miles of line open. This includes about 2,500 miles of line in New Zea¬ land. While there was at first some construc¬ tion by private companies, every mile is now state railway. The figures intimate that there is no serious competition there.

South America and Africa. — In South America the governments generally own the lines. In Brazil; in 1915, there were 15,491 miles of line open. Of this mileage the state actually owns but a small part, but it subsidizes the rest and thus exercises an efficient control over all, which effectually prevents duplication and competition. In the Argentine there were reported in 1915 20,593 miles of road, mostly government lines. Chile in 1915 reported 3,949 miles open, of which 1,458 belong to the state. The French possessions and dependencies in North Africa reported, in 1900, a railway sys¬ tem amounting to 4,628 kilometers in length, as against 3,595 in 1890 and 517 in 1870; British South Africa seems to have had, in 1900, nearly 6,000 kilometers of lines in operation. There were about 2,000 kilometers of line open in the Transvaal at the commencement of the Boer war and about 400 kilometers in the Kongo in 1900. The total length of all operated lines in Africa, including the foregoing, the Egyptian lines (2,063 miles), and some little development in Portuguese East Africa, amounted in 1915 to about 23,472 miles, sub¬ stantially all of which

is government line. Com¬ petition and combination are, therefore, not open questions in Africa. The several European countries that have built the lines there either operate them directly or see to their operation on a strictly non-competitive basis.

Conclusion. — From the foregoing general view of railway history and development throughout the world, it appears that there is a universal and irresistible tendency in competi¬ tive railways in the same territory to combine and to divide the territory between them; that attempts by legislation or litigation to prevent it have uniformly failed; that states which at first recognized and sought to enforce the prin¬ ciple of competition between railways have one after another ultimately abandoned the attempt; that nowhere, except in the United States, is the principle of competition now recognized or still sought to be enforced; that railways in new countries or colonies of old countries, con¬ structed during the last quarter of a century in

the light of the experience of the older coun¬ tries as to competition, have been constructed and operated from the start on non-competitive lines ; that the amalgamation of parallel and competing lines is entirely consistent with good service, reasonable rates and adequate govern¬ mental supervision and control ; that where rail¬ ways compete there is always an enormous waste of capital and effort and frequently poor service and high rates ; that the tendency every¬ where is to eliminate competition where any measure of it still exists ; that government own¬ ership is good or bad according to the point of view ; that there is a strong tendency in Europe and elsewhere except in the United States and in England, toward government ownership and operation; that the governments of Europe, with 10 times the police power of our own, have long since abandoned all attempts to hinder and thwart the laws of trade and commerce by re¬ strictive legislation, or to prevent the inevitable in railway development ; that, instead of oppos¬ ing this economic evolution, the most enlight¬ ened European governments have on the contrary legalized it and seek to enforce and regulate it in the public interest ; that the best and cheapest service is secured where competi¬ tion is impossible and where the state puts the emphasis of its effort, not on interference with railway finance, but on securing good service at fair rates.

Bibliography. — Hansard, ˆParliamentary Debates* ; Pendleton, (Our Railways, their Origin, Development, Incident and Romance* (London 1896) ; Paish, (The British Railway Position* (London, (The Statist,* 1902) ; Stevens, (Investment and Speculation in British Railways)

(London 1900) ; Picard, (Les Chemins de fer frangais* (Paris 1884) ; Nou¬ veau Dictionnaire d'economie politique/ by Leon Say and Joseph Chailley (10th ed., Vol. I, Paris 1900) ; Thery's <Histoire des grandes Compagnies des chemins de fer frangais* (Paris 1894) ; (Le Journal OfficiaP (Paris) ; Report of the Italian Parliamentary Commission of 1878 (Paris 1880) ; Cucheval-Clarigny, (Les Chemins de fer Italiens) (Paris (Revue des Deux Mondes,* July 1884) ; English Consular and Diplomatic Reports, Prussian Railways (London 1902) ; (L'Exploitation des chemins de fer de la Prusse depuis leur rachat par l'etat* (Paris, 'Revue des Deux Mondes,* May 1893) ; Haguet, (Le rachat des chemins de fer Suisses et des consequences) (Paris 1902) ; Bell, (Railway Policy in India) (London 1894) ; Re¬ port of Senor Limantour, Secretary of Finance, on the Mexican Railway System and Policy (Public Document, 1903) ; Argument in the Supreme Court of the United States on the Appeal of the Northern Securities Company *et al.* v. The United States (by Charles F. Beach, Jr., October Term, 1903) ; Report of the English Parliamentary Committee on Railway Companies' Amalgamation, 1872 (Public Docu¬ ments of the British Government).

Charles F. Beach,

American Lawyer in Paris; Author of (Law of Railways ,* *etc.*

RAILWAY CONSTRUCTION. See

Railway Engineering and Construction.

RAILWAY CONSTRUCTION, Street.

See Street Railway Construction.

RAILWAY ENGINEERING AND CONSTRUCTION. In railway engineering the railway track more than any other part of the railway machine had a crude beginning and has reached its present condition of ex¬ cellence by a continuous series of improvements. In the first stages of construction, tracks of numerous designs were built, the chief thought of the builders being to secure a solid structure that would not allow the rails to spread. The track was of necessity relatively heavy and expensive in relation to the weight of the rolling stock and volume of traffic. Three kinds of rails were used, the one most generally employed consisting of strong wooden beams, surfaced with strap iron. The iron rails first used were cast and their length did not exceed three and one-half feet. Rolled rails were soon substi¬ tuted for those of cast-iron and the length was increased to 15 feet, with a weight of about 40 pounds to the yard. Up to 1844 all rolled iron rails used in the United States were 15 feet in length. The T-rail now universally em¬ ployed was not much used during the first 20 years of railroad construction. Since 1870 rolled steel has been used instead of iron and the weight of the rail has been steadily in¬ creased to 110 pounds to the yard. One hundred pounds to the yard has become the standard upon tracks where traffic is heaviest. The standard length of rail has been maintained at 30 feet, but at the present time some track is being laid with rails 60 feet in length. Along with the improvements in the track, bridges and other structures have been strengthened to meet the necessities of the modern transportation methods.

The whole trend of modern engineering is toward constant increase, in the search after and adoption of labor-saving appliances, on the one hand, and constant increase in the develop¬ ment and elaboration of systems on the other. This is especially true in railway engineering, and an examination of recent subway, tunnel and bridge constructions and other engineering operations serve to point out the wonderful progress in engineering methods and the present

easy accomplishment of former undertakings either abandoned or considered impossible.

Construction. — A perfect and safe track is complete in all respects when full bolted, full spiked, well ballasted, surfaced, lined and

gauged. The best dirt ballasted track is made when laying it, by bedding the ties to a level surface on top before putting on the rails. If it is intended to ballast track with cinders, gravel or stone, as fast as it is laid, the tie bedding is omitted in order to have the full width of the grade upon which to deposit the ballast, but at the same time the ballasting should be kept well finished up to obviate the danger of spoiling the rails. When laying the rails care is taken to give the proper space at the joints for expansion. Too much space at the joints must be avoided in order to prevent the car wheels from battering the ends of the

rails. The coefficient of expansion for steel is .0000065 of its length for each degree. For a rail 30 feet long and a difference of 100 degrees, or from 10° below zero to 90°, the amount to allow would be one-quarter inch. To take up the flow of the rail one-eighth inch must be added, making a total allowance of three-eighths inch. A steel rail expands or contracts 1-100,000 of a length under a load of one ton (2,240 pounds) per square inch. This is also its ex¬ pansion under a rise of 15° of temperature: consequently, if a 30-foot rail is subjected to a rise or fall of 15°, it exerts a force of one ton per square inch if resisted. Where angle bar splices are used on joints the best method to hold steel and to keep it from creeping down

Rails

Wt. per yard

Long tons per mile

Lbs.

too

158

90

142

80

126

75

118

70

110

65

103

60

95

56

88

50

79

45

71

40

63

Ties

i

Distance c. to c.

No. per mile

Ins.

18

3,520

21

3,017

24

2,640

27

2,348

30

2,113

Joints

Length

No. per

of rail

mile

30 ft.

352

30ft. 10%

360

short

33 ft.

320

Spikes (4 to each tie)

aS

o

o

No. of kegs per

0)

pC

<N

U-l

mile for ties

u

o

<D

T3

bo

d

d

d

C

3

AS

4-i

4- >

rC

U

<D

cj

d

d

-t- >

00

c

a

Size

No. p lbs.

21 ins.

24 ins.

27 ins.

Ins.

Ins.

5$

t9s

360

33.0

29.3

25.7

5

tb

405

29.3

26.0

22.8

41

IB

460

25.9

23.0

20. 1

5

3

505

23.6

21.0

18.4

41

I

535

21.3

19.8

17.3

4

605

19.8

17.5

15.3

3*

670

17.5

15.9

14.3

4*

fB

690

17.5

15.5

13.5

4

IB

780

15.3

13.6

11.0

4 h

1

780

15.3

13.6

11.0

4

9

I

1 ,025

11.5

10.2

9.0

Bolts (4 to each joint)

Oj

$<$D

rZ

o

o

(N

No. of kegs per mile for rails of — •

u

V

-o

c

3

rC

00

G

3

Size

No. per keg o lbs. sq. nuts

30 ft.

3Q ft. 10% short

•P

*4-4

Ins.

5

Ins.

1

115

12.2

12.5

ti.i

4j

1

120

11.7

12.0

10.7

4

1

125

11.3

11.5

10.2

4 h

T

162

8. 7

8.9

7.9

4

l

170

8.3

8.5

7.5

3*

l

188

7.4

7.7

6.8

4*

195

7.2

7.4

6.6

4

f

200

7.0

7.2

6.4

3!

s

*

208

6.8

7.0

6.2

3}

9

I

216

6.5

6. 7

6.0

31

I

329

4.3

4.4

3.9

Quantities of material per mile of single track.

grades or from running ahead enough to throw the track out of line or kink the rails, is to use the slot spikes in the splices. Short rails (less than 10 feet in length) should never be used in making connections except in cases where it is absolutely necessary to use short pieces of rail as at the ends of frogs, in the round house tracks, *etc.*

Spiking and Gauging.— All track should al¬ ways be kept full spiked and in perfect gauge. Bad gauging detracts from the appearance of an otherwise good track, makes track easier to knock out of line and down below surface, and is the direct cause of wrecks. The spikes should be driven about two and one-half inches from the edge of a track tie. Both inside spikes should be driven on one edge of a tie and both outside spikes on the other edge in order to prevent the tie slewing and also to assist in holding the rail from creeping. The standard gauge on American railroads is four feet eight and one-half inches; according to conditions, broad gauge is greater and narrow gauge lesser than standard width.

Drainage. — In order to ditch a cut properly it is necessary to take measurements from the rail to the bottom of the face of the cut, at different points along the cut, and ascertain at what average distance from the track the back of the ditch should be located. The width of a cut and the slope of its face on each side of the track will govern, to a certain extent, how far from the track rails to place the back of the ditch. The ditch should be deep enough to thoroughly drain the track and the distance from the rail to the back of it should be in pro¬ portion to the depth of the ditch, giving the water an easy fall from the track and free pas¬ sage through the ditch, avoiding all danger of its washing the shoulder of the grade or under¬ mining the track. As a general rule the bottom of the ditch should be eight to 10 feet from the rails where the grade width will allow it, and about two feet below the bottom of the ties. When the track is ballasted with dirt the slope should commence in the centre of the track two and one-half inches above the ties, falling at the rate of one and one-half inches to the foot. From this point, which is three feet out¬ side the ties, and two inches lower, the incline should be greater, about in the

proportion of four inches to the horizontal foot. If the track is ballasted with gravel the slope toward the back of the ditch should commence about two feet outside the track rails, the ballast at this point being level with the base of the rails. To insure a. thoroughly good drainage all the water which falls upon the track or adjacent land should be conducted through ditches, cul¬ verts, bridges or other channels to the nearest running stream that will take it away beyond all possibility of injuring the track. Where muskrats or minks are plentiful and cause damage to the track by burrowing under it, a heavy coating of cinders and slag along the sides of the embankment is an effectual protec¬ tion against their depredations. The cinders form an acid in the water and at the same time are too sharp for the animals to burrow through.

Vitrified Pipe Culverts. — The use of vitri¬ fied pipe for culverts under railroads has con¬ tinued in constantly increasing volume since

1878; its advantages are now fully appreciated and experience has pointed out such treatment as will ensure the best results in efficiency and permanency. In northern latitudes especially, where severe cold prevails, the culvert should have a good fall, and be so constructed that no standing water be allowed to remain in the pipes and freeze. When drainage capacity greater than that afforded by one pipe is desired, two or more lines of pipe may be laid side by side. This practice is quite common, and gives an important advantage in that the full capacity of pipes is utilized at a lower depth of water,

k O-eentor

but the separate lines for pipe should be laid far enough apart to secure a solid bed for each one. No arbitrary rules can be made for work of this character. Varying physical conditions must be met and each particular work treated separately on its merits. Under especiallv favorable conditions of good soil, light embank¬ ment and good drainage, there is no doubt that the pipe culvert may be put in without cement and without end abutments, ensuring complete construction at minimum cost, but the durability of vitrified pipe being conceded, the permanency of the work is a prime considera¬ tion, and the wisest economy would seem in all cases to suggest the

use of concrete as a founda¬ tion for the pipe, and that each end of the pipe culvert be protected by parapet walls of sub¬ stantial stone or brick masonry.

Ballasting. — If stone is difficult to obtain a good track can be made with gravel and stone combined for ballast. The foundation for the track is laid with broken stone and above it placed a quantity of coarse gravel sufficient to bed the ties, surface the track and dress it. Cinders are equally effective as a ballast, except in wet cuts, where stone should be used, and are cheaper than either stone or gravel. Six inches of cinders will absorb about one inch of rain¬ fall, and will thus keep the foundation beneath the ballast dry. They make a superior ballast on clay fills or gumbo bottoms, and are a posi¬ tive exterminator of weeds. Where the sub¬ grade is well drained and solid, an excellent track can be made by ballasting with two cars of gravel in a place, and to accomplish the work in this way, estimates may be taken at the rate of 325 cars of gravel to the mile of track. The embankment should not be less than 14 feet wide on top before putting on the gravel. Al¬ though locomotive cinders, furnace slag, burned clay and gravel make excellent ballasts, within the past few years the best results have been obtained from stone ballast where the stones are sufficiently small to pass through a one and one-half inch ring. The first cost of stone ballast is large; but once in place and thoroughly tamped it is extremely solid, will arrest the

springing action of the track and will ensure a nearly perfect drainage.

Laying Rails. — Owing to the difference in quality and in the amount of traffic over the rails, it is quite difficult to form a correct esti¬ mate of the average life of the same. Good iron rails have been known to last, in service on the main track of a railroad doing a fair business, nine or 10 years, and steel rails 15 to 20 years. There is much discussion on the sub¬ ject of broken or even joints. The majority of track has heretofore been laid with even joints; but at the present time all rails are be¬ ing laid with broken joints, which consists in placing the rail joint on one side of the track opposite to the centre of the rail on the other side of the track. Outside of the general line and surface the principal defects in steel rails are pipes, gag marks and cinders, which result in flaws. (See Iron and Steel, Metallog¬ raphy of). Owing to heavy engines and cars of great weight now employed, heavy rails are demanded to be used and as the height gives vertical strength, in such heavy rails used, height should be the main consideration and should not be less than six inches. To give good wearing heads, the proportion of metal in the head should be kept down to the mini¬ mum, as owing to the present process of rolling steel rails at a great heat from a large ingot, a thick head will not give as good results as a thin head rail. The web should be thicker at the base than under the head, which in the high rail ensures greater strength, as the tendency is to break at this point, if too weak.

Wave Motion. — As all movements are on the principle of the lever, there is of necessity an undulatory motion on the passage of each train, the amount of which being dependent on the condition of the subgrade, ballast, ties, rail and weight of the rolling stock. The less sub¬ stantial the superstructure the greater ballast compression there will be, and, of necessity, a rough-riding track. The foundation of all ties being loosely compacted material, any move¬ ment or ˆchurning® of the tie necessarily throws unequal loading on the ballast at differ¬ ent times, causes its compression and movement, and destruction of the tie foundation. The wider the ties and the lighter the rail and heavier the loads, the greater such movement must be. Rails take a permanent set, as regards wear motion, in one of three forms: (a) Joint low and centre high; (b) joint and centre low, quarter high; (c) entire rail level. As the vibratory motion of the rail takes place some¬ thing has to give way. If the fastening to the tie is by push bolt or lag

screw, the tie will be raised with the vibration and ˆpump® the bal¬ last, and in time the fastenings will become loose.

Elevation of Curves. — The elevation of curves has been a subject of much discussion. Thirty years ago one-half inch elevation per degree of curve was considered proper ; but, now with faster and heavier trains a greater elevation is required. Engineers claim that one inch per degree for a speed of 60 miles per hour is proper for curves of three degrees or less, but for each additional degree the eleva¬ tion should not exceed three-fourths inch. While practice teaches the amount of elevation needed in any given case it is a safer plan to

follow the ensuing formula deduced from mechanics in following the theory of elevation :

$$E = \frac{V^2 G}{32.16 R}$$

, in which E represents the eleva—

tion in feet, V2 the square of the velocity in feet per second, G the gauge or the distance between the points supporting the wheel, or from the centre of one rail to the centre of the other, and R the radius of the curve in feet. This rule, though scientifically correct, cannot always be applied in actual practice, because all trains do not travel at the same rate of speed. Practical provision must be made for the aver¬ age speed of trains and the number in each class of service. For example, if a road have two trains whose speed is 50 miles per hour, four with a speed of 40, and six or eight with a speed of 25 miles per hour, one inch per degree of curve will be found suitable. The pressure by the fast train against the outer rail of a curve will not be sufficient to spread the rail or throw the track out of line. The elevation will be about right for the 40-mile trains, and while it may be excessive for the slow trains, yet they will do no particular damage to the track and will have a tendency to prevent the track being moved permanently outward by the fast trains. The liability of derailment of locomotives or cars is much greater on a curve track and a large percentage of such accidents is chargeable to the defects in the rolling stock as well as to the defects in the track itself. Heavily loaded cars often leave the track owing to the failure of a track to adjust itself to the curve of the track, caused, perhaps, by a defective curve roller, and the greater part of the load resting upon one side of the track.

Frogs and Switches.— The turnout, by which a car may pass from one track to an¬ other, consists of a frog, a rail leading to the

Throat

Toe

.ˆeft Wing Rail

Frog.

frog, a corresponding opposite rail and a de¬ vice connecting these rails with the main track known as the switch. If the switch is made to serve two turnouts, it is called a three-throw switch ; a trailing switch is one where a train on the main track passes from frog to switch; while a facing switch is one that approaches in the opposite direction. The common or stub switch consists of a pair of connected rails so arranged that one end is fixed; the other can be moved so as to be a part of either the main track or turnout. This switch has two serious defects — the want of safety, and the necessary space at the end of the moving rail, which jars the rolling stock, batters the switch rails and causes discomfort to passengers. The first cost of a point switch is more than a stub, but the split, which is more economical to maintain and safer, is cheaper in the end. In laying switches the general rule is to cut the least number of rails. When putting frogs into a track care should be taken to have them in a true line and level with the track rails which are con-RAILWAY ENGINEERING AND CONSTRUCTION

nected to them. The gauge rail, opposite the Irog, should be put to a perfect gauge for the full length of the frog.

Safety Appliances. — The greatest care must be exercised in the instalment of safety devices, as far as practicable automatic, without dis¬ couraging watchfulness on the part of engineers and others. The plan of sealing the stopping mechanism and imposing a severe penalty for breaking the seal is an excellent one. The most carefully planned automatic devices should be proyided, and no railroad train, traveling at terrific speed, and representing enormous energy, should be

allowed to run without any safeguard between itself and disaster beyond the watchfulness of one man, who may be taken ill, or suffer from a temporary mental aberra¬ tion, or may even die suddenly and unnoticed.

Curving Rails. — Before any rail is spiked to its place in a curve it must be evenly bent from end to end, so that it will assure the proper curvature when lying free. This curv¬ ing may be done by hammers, but that method is slow and the rail-curving machine is gener¬ ally employed. This machine is made with either screw or hydraulic power, and is used for bending rails rather than for curving them. For many curves no rail-curving is necessary, the friction between the rail and the ties being

Rail Curving Machine.

sufficient to hold the rail in position. The ex¬ tent of this flexibility depends on the weight and length of the rail, and can be found by trial. Three degrees and sharper curves usually re¬ quire a curving of rails. Knowing the radius of the curve and the length of the rail, the middle ordinate of the rail can be taken from prepared tables. Each half of the rail, from the middle point to the ends, should also be tested for its middle ordinate to ensure uni¬ form curvature. The middle ordinate of these half sections is one-fourth of the middle ordi¬ nate of the entire rail.

Grade Crossings. — The crossing of one railroad with another at grade is a common condition. This offers a dangerous condition which may be fully protected by a system of signals, derails, etc., which enables trains to proceed over the crossing at speed and with safety. The installation requires for aˆ single line crossing eight signals, four of which are erected about 500 feet each way from the cross¬ ing. These four signals are called home sig¬ nals. Beyond these, a distance of 1,500 feet or more, are located the distant signals. If we were certain that signals would be obeyed at

all times we would need no further protection; but we have not yet arrived at a degree of efficiency in discipline which ensures that trains will never run by a danger signal. It is the general practice in the United States to pro¬ vide a derail at the home signal which is opened

after all signals on the route are placed at stop. This derail is an ordinary switch point and if a train attempts to proceed to the cross¬ ing against a stop signal it is derailed. This seems a brutal method of compelling the ob¬ servance of a signal. Experience has demon¬ strated, however, that the derail is a moral agent and is effective in its presence and is sel¬ dom called upon to perform its office. A clear signal cannot be given for the crossing until the derails on the opposite route are open, and the signals on that route are in the stop posi¬ tion and the signals cannot be pulled to the safe position on opposing routes.

The opening of a switch under a train is guarded against by the detector bar. A thin bar 55 or 60 feet long is hung in a vertical position on the outside of the rail at the switch point fixed on links clamped to the rail, and so arranged in the general scheme as to make it necessary for the operator to move this bar vertically above the rail before the switch can be unlocked or moved. If a car or train is standing on or passing over the points the bar cannot be moved because the wheels of the car prevent its rising above the rail, consequently the switch cannot be opened under the train. These bars are also provided on each side of the crossing so as to ensure against changing signals where a short or light locomotive may have passed the home signal toward the cross¬ ing but has not passed the crossing. This con¬ dition may be better protected by employing a track circuit between derails controlling an electric lock which ensures against change of signals until the train has passed entirely out of the limits of the derails. Where signals and switches are operated by lines of inch pipe carried on rollers and are compensated for change in temperature by what is known as a ((lazy jack® these carriers, compensators and cranks are now usually fixed on concrete foun¬ dations.

Draw Bridges. — The protection of draw bridges is perhaps more important than grade crossings and for this work the interlocking machine is employed with the home and distant signals, and where practicable derails are used. The signal cabin may be located either over the pivot pier or on the shore. To ensure safety we must ensure that before a clear signal is given the rails at each end of the draw are down in place and locked, the draw itself locked to the abutment and the turning mechanism locked and that none of these conditions can be changed so long as the signal shows clear, and in reversing the order of movement the draw cannot be opened until the signals are at danger and the signals cannot be cleared until the draw is again closed, *etc.* The important device in this combination is the bridge coupler for pipe lines which must be uncoupled by the. operator from the cabin before the draw is opened.

Surveys. — Surveys are location surveys and construction or final surveys. The instrumental location of a railroad does not differ materially from that described for a new wagon road, but greater accuracy is desirable, and a much

more careful adjustment of curves and grades is indispensable. As with common roads, the grade will mainly follow the natural surface, but the line must be so located as to keep these grades within the adopted limit, which will usu¬ ally be 2 per cent, though in exceptional cases and for short grades 4 per cent is allowable.

Natural drainage lines present the most reg¬ ular and easiest gradients, and in a broad sense it may be said that every railroad location fol¬ lows lines of drainage. When the head or source of one drainage line is reached, the location crosses the divide to the next. With few exceptions, drainage lines have slopes not exceeding those permissible for railroad loca¬ tion. The first requisite in considering a rail¬ road location is to get the lines of drainage clearly in the mind. This done, start the ex¬ ploration from the initial point on a straight line for the objective.

Before the survey is started, the maximum grade and degree of curvature should be de¬ cided upon, and in surveying the line the in¬ strument men will know what their limitations are and will locate the line accordingly. This maximum grade should be the compensated grade. This is, when the grade occurs on a curve, an allowance of .04 per cent of grade should be added to the actual grade for each degree of curvature to give the compensated grade. When the level man finds the grade running steeper than the limiting grade, he will take a sufficient amount of side notes to determine the amount of excavation or filling that will be necessary to keep the grade within the prescribed limits ; and if he finds the amount of excavation excessive, he may have to call back the transit man and have the line relo¬ cated. This should not happen frequently as the transit man should know the maximum al¬ lowable angle of slope and should locate his line accordingly.

The virtual grade is the actual grade cor¬ rected to take advantage of the velocity head due to the speed of the train when the various grades are encountered. Its principal applica¬ tion is for economical construction, but even at moderate speeds it might occasionally permit the use of grades steeper than the so-called maximum. A pusher grade is an isolated case that cannot be kept down to the ruling grade nor compensated for by the velocity head. Here it is best to pass at once to nearly double the ruling grade and provide for a

regular engine for that special grade. They should not occur oftener than once or twice in a division.

Roadbed. — The roadbed or the support for the track generally consists of the foundation and the ballast. The latter should be a material the consistency of which is not affected by water, and especially which does not become slippery when wet. Sand will do if nothing else can be had ; gravel is better, and broken stone is the best of all. Cinders, shells, burnt clay and other materials are also used. The surface of the foundation on which the ballast rests is called the subgrade. Unless the natural ground is very unfavorable, it will not be neces¬ sary to use a separate material for ballast and the subgrade really disappears. Even then, the earth between and immediately under the ties which is dug into in surfacing the track is called

ballast. Such roads are usually called mud roads. The cross section of the roadbed must be decided upon before the level party starts on its work, in order that they may know the dimensions of the roadbed for which the stakes are to be set. The dimensions of the roadbed of a two foot six inch track would be, approxi¬ mately, 11 feet from shoulder to shoulder on a fill and 10 feet from shoulder to shoulder in a cut. The dimensions for a track of three-foot gauge will be about 12 feet from shoulder to shoulder on an embankment and about 11 feet in a cut. In excavations, plenty of depth should be allowed for ditches in order to ensure a dry roadbed.

Wherever the grades permit, the track is laid directly on the surface of the ground, and the necessary leveling is done after the track has been laid.

Bridges. — The engineer in the field during wartime on coming to an opening where a bridge is required plans the bridge so that the openings between the abutments, or between bents of piles or trestles, shall be from the lengths previously agreed upon and for which the chief engineer is prepared to send material without delay. This classification can only apply to single openings, because with several spans it will be impossible to include anything general about the necessary piers. Only in ex¬ ceptional cases will openings over 50 feet be provided for. Larger spans will be subdivided into spans of less than 50 feet by temporary piers wherever possible. In any stream the rate of the current and the amount of drift are im¬ portant factors in determining the span to be used. The length of time a bridge will be in use is also important, as the river may be at such a stage that one

length of span can be used, when if it were at a higher or lower stage an entirely different one would be neces¬ sary. On arriving at a bridge that has been destroyed, the first consideration is to get some sort of a line across to connect with the road on the other side. This can frequently be done by making a deviation which will carry the roadbed into the river bottom and up the other bank, necessitating only a very short, low bridge. This work is done by the advance party, and a second party follows and constructs the perma¬ nent bridge at the grade of the permanent track. Sharp curves on this diversion line should be avoided, since steep grades will be inevitable, and the combination may cause frequent derail¬ ments. Before the beams or trusses for the necessary spans can be decided upon, it is necessary to decide upon the location of the piers and abutments. The local conditions as to the banks and the bottom of the stream will, in general, determine the location and kind of abutments and piers that are to be used. In general terms, they will be either of piles, cribs or trestles.

Cableways. — In some places an overhead cableway can be used to great advantage in erecting or building a bridge or in transporting supplies across a stream that vehicles cannot cross. There are two classes, the ordinary cableway and the balanced cable crane. The first form can be quickly rigged if large trees are close to the bank and is very convenient when the load does not have to come in to the very foot of the supports. If towers must be

1 Chicago, Milwaukee and Saint Paul 3000 V. D. C. Electrification Train, descending 2 per cent grade on Eastern Slope of Rockies

2 Chicago, Milwaukee and Saint Paul Electrification. The Pass and Eagle Nest Tunnel in Ifi-mile canyon

used to support the cable they are difficult to erect and the material is too heavy to carry in a field equipment. A considerably longer span is always necessary than the actual width of the stream and the load must be pulled up hill over one-half of its journey and is only stable at the lowest point in the catenary. The balanced cable crane, on the other hand, can carry loads farther inshore than its points of support; the stress in the cable is constant whatever the position of the load and only sufficient force to overcome friction is required to move the load along the cable. The key to the construction of this cableway is that the length of the cable must be such that both counterweights cannot rest on the ground at the same time. The automatic rising and fall¬ ing of the counterweights as the position of the load on the cableway changes keeps the angles of the cable at the load symmetrical with the action line of gravity and hence the load at any point on the cable.

Turnouts and Crossovers. — A turnout is a curved track by means of which cars are moved from one track to another. The special parts of a turnout are the frog and the switch and the guard rails. The term <(switch)) is frequently applied to the part of a turnout from the point of switch to include the frog. The switch Proper may be either a stub or a split switch. The latter is the form now generally used. Stub switches are only used on unimportant lines or in yards. A double turnout is one

where two tracks diverge from the main line, either on the same side or on opposite sides. In a turnout from a curve, the curvature of the turnout for a given frog is different from the curve of turnout from a tangent, and is equal to the curve of the main line plus the curve of the turnout from a tangent for a cor¬ responding frog. The lengths of rail would not be exactly the same on the turnout from

Split Switch for Light Rails.

a curve as they would be on a turnout from a tangent. On account of this and because of the desirability of having a number of turn¬ outs ready for use at any time, it is best to lo¬

cate all turnouts on tangents, where practicable. These ready-made turnouts should include all material for the turnout, as shown in bill of material, so that by leaving out an exact number of 30-foot rails the track-laying can be con¬ tinued; and when the turnout is put in place the opening left will be exactly filled. Frogs and switches can either be bought outright from equipment companies or can be made in the shops.

The curves used in laying out turnouts and crossovers are ordinarily arcs of circles and are usually simple curves. It may happen that no frog is at hand, in laying out a double turnout, that will permit a simple curve to be run from the heel of the switch to beyond the farthest frog. In this case, use the frog that will require the sharpest curve as the crotch frog, allowing the flatter curve to lie between the two frogs.

Facing and Trailing Points.— These terms apply particularly to the switches of crossovers on a double-track line. A trailing point is one

o

WEST-BOUND SIDING

MAIN UN#

2 7

\

77/” —

MAIN LINE

EAST-BOUND siding

WEST-BOUND SIDING

MAIN LINE

l ^ - t -

Facing and Trailing Points.

which the trains move over from the point of frog to the point of switch; and a facing point is one which the trains move over from the point of switch to the point of frog. A con¬ sideration of the drawing will show the advan¬ tage of trailing points, in that if the switch is set wrong the train will run through it, forcing the switch points aside. This will break the switch, but the train will not be damaged. On some roads the policy is to have all main¬ line switches trailing points and although this requires a little more time in switching cars or going into a siding, it is safer.

Switch Stands. — A switch stand is a mech¬ anism by means of which the switch points are moved. The largest kind is more readily seen than the smallest one and would be used in cases where the engineman must be able to note a mis-setting of the switch. The smallest kind is the kind used in the interlocking plant, where it is next to impossible for a switch to be set wrong and the engineman not be notified of it long be¬ fore he reaches the switch. The middle type is one that is commonly used in yards. Economy of space and weight might dictate the use of the smaller switch in all cases on a supply road. For stub switches these stands should be on the engineman's side approaching in a facing di¬ rection. For split switches they should be on the side of the turnout.

Storage Tracks. — The number and length of these tracks depend upon the importance of the station, the number of depot storehouses that may be located at that point, *etc.* A study of these items shows that each must be dealt with as it arises and as it is impossible to tell how important a station may become at any future time, available track room will be left

for additional loading platforms and storage tracks. In locating the storage tracks, room should be left between the various tracks so that

zo o O O dn O O o

AMCRICAN 4-4-0

zo o O O O

COLUMBIA 2-4-2

zo OOO

ALANTIC 4-4-2 *

MOSUL 2-6-0

zoo O O O

zo oooo

TEN WHEEL 4-6-0

CONSOLIDATION 2-8-0

ooooa

MASTODON 4-8-0

OECAPOD 2-10-0

zo o OOO o

zo ..OOOO o

PACIFIC 4-6-2

MIKADO 2-0-2

Classification of Locomotives by the number and disposi¬ tion of their wheels: the larger circles represent drivers and the .smaller ones truck wheels, the direction of forward motion beng indicated by the cowcatcher.

at least one and preferably two lines of wagons can drive in and receive freight from cars on the storage tracks.

Tunnels. — • Few serious difficulties are met in tunneling operations except in subaqueous work, where the nature of the soil is largely unknown, and the work may have to encounter faults in rocks or springs or quicksands in the earth ; or the roof formed by a river bed may give way and tons of water may be precipitated into the workings below. Under these condi¬ tions work beneath the water has become a new science which has its own special class of work¬ men, tools and devices adapted practically for its own purposes as described elsewhere in this work under Tunnels and Tunneling (q.v.). See related articles Air Brake; Block Signal System ; Bridge Construction, American ; Bridge Construction, Modern Methods of; Bridge Designs, Railway; Car Building In¬ dustry; Locomotive; Locomotive Industry; Railways, Elevated; Tunnels and Tun¬ neling.

Bibliography. — Acworth, W. M., ‘Elements of Railway Economics (London 1905) ; Adams, C. F., (Railroads: Their Origin and Problems) (New York 1878) ; Byers, M. L., (Economics of Railway Operation5 (New York 1908) ; Crandall and Barnes, (Railroad Construction (New York 1913) ; Hadley, A. T., ‘Railroad Transportation: Its History and Its Laws) (New York 1899) ; Haines, H. S., ‘Railway Corporations as Public Servants5 (New York 1907) ; Morris, R., ‘Railroad Administration5 (New York 1911) ; Paine, C., ‘The Elements of Railroading5 (New York 1885) ; Welling¬ ton, ‘The Economic Theory of Railway Loca¬ tion5 (5th ed., New York 1896) ; Wright, R. V., and London, A. C., ‘Car Builders’ Dictionary5 (9th ed., New York 1919).

Edward S. Farrow, Consulting Military and Civil Engineer.

RAILWAY LABOR ORGANIZATIONS, or RAILWAY BROTHER¬

HOODS, labor unions formed by the em¬ ployees of railways to advance their interests and promote their social, moral and intellectual

welfare. The larger and more typical railway labor organizations are distinguished for their generally conservative attitude, their large mu¬ tual benefit and insurance funds and their organization of grievance committees for ar¬ ranging differences between their members and employers and avoiding strikes. As a rule they maintain pleasant relations with employers and have been instrumental in obtaining increased wages and general improvement in the condi¬ tion of railway labor. The five most prominent organizations are the Grand International Brotherhood of Locomotive Engineers, the Or¬ der of Railroad Conductors, the Brotherhood of Locomotive Firemen, the Brotherhood of Railway Trainmen and the Brotherhood of Railroad Telegraphers. These five have the same general form of organization, with the supreme power in the central representative body called the Grand Lodge or Grand Division, meeting in convention every two years, and the executive power vested in a chief executive (grand master or grand president) and an executive board. Their subordinate divisions include locals and section divisions, the latter made up of the employees of one railway line or system. Their provisions for dealing with grievances against employers are as follows : Any member or members having a grievance against an employer are to report the same to their local organization, which, in case the ma¬ jority vote to sustain the grievance, shall refer it to a local grievance committee. This com¬ mittee is to deal with the local management, and should no satisfactory settlement be made, refer the grievance to the general grievance committee of the section, who shall confer with the general manager of the railway system. Then, if no adjustment be made, the matter is to be referred to the chief executive of the union who shall make another attempt to adjust the matter with the employers, and, if he fail, he and the general committee shall have Dower to sanction a strike, provided a strike is agreed upon by two-thirds of the members involved. In some cases a board of adjustment is formed by the chairmen of three or more general com¬ mittees, in which case the matter is to be referred to this board before going to the chief executive. It will be seen that this arrange¬ ment makes a strike difficult to bring about and prevents strikes for trivial causes, yet all of these unions have established large protective or strike funds for the benefit of members when on strike. Another feature of these organiza¬ tions is the legislative board, organized in each State by representatives from each local for the consideration of questions of

legislation affect¬ ing their unions; and these boards have power to appoint one or two members to remain at the State capital for securing desired legislation. A ladies' auxiliary is affiliated with each brother¬ hood. A home is maintained at Highland, Ill., for aged and disabled railroad employees.

The Five Larger Brotherhoods. — (1) The Brotherhood of Locomotive Engineers was or¬ ganized in 1863. The locals have sick and death benefit funds and the Brotherhood has a fund for pensioning widows and children of the de¬ ceased. The insurance is under the manage¬ ment of an affiliated organization known as the Locomotive Engineers Mutual Life and Acci¬ dent Insurance Association. The Brotherhood

number 73,800 members in over 600 locals. The official journal is the Journal of the Brother¬ hood of Locomotive Engineers, published monthly. It ranks among the most important and influential labor organizations of the United States and is noted for its conservatism. (2) The Order of Railway Conductors was organ¬ ized in 1868 as the Conductors' Brotherhood, was threatened with serious difficulty on account of its prohibition of strikes and a rival union started which had a ˆprotective® policy, the Order adopted the same policy, established its protective® fund, and the two organizations were united under the present name. It has a mutual benefit fund and the strike fund pro¬ vides for payment to strikers for not over three months. The official journal is the Railway Conductor , published monthly. The member¬ ship is 49,100 in about 500 locals. (3) The Brotherhood of Locomotive Firemen was or¬ ganized in 1873, was involved in the great strike of 1877 and seriously crippled; for a time it adopted the policy of "ignoring® strikes, but in 1885 returned to its original policy and methods in dealing with strikes ; and a few years later conducted a large strike on the Chicago, Burlington and Quincy Railroad. Strikers are paid for three months or less. The official journal is the Locomotive Firemen's Magazine. The membership is 86,800. (4) The

Brotherhood of Railroad Trainmen was organ¬ ized in September 1883 and admits to member¬ ship conductors, baggagemen, yardmasters and switchmen besides trainmen. They have a sick and death benefit fund and a strike fund, pro¬ viding for a payment to strikers for three months or less. It has 126,100 members; its official organ is the Railroad Trainmen's Jour¬ nal. (5) The Order of Railroad Telegraphers was organized in 1886; its membership includes telegraphers, line repairers, levermen and inter¬ lockers. Its mutual benefit fund was estab¬ lished in 1898; it has never held quite the same position of importance as the other four broth¬ erhoods, as at the first it grew more slowly be¬ cause the telegraphers are scattered and it is difficult to get any number together, but since 1900 has grown rapidly. It numbers about 30,000; its official journal is the Railroad Teleg¬ rapher.

The Union of All Railway Employees. —

Though these brotherhoods have much in com¬ mon in organization and purpose there has been rivalry and discord among them, which has proved decidedly detrimental to their best in¬ terests. In 1895 an alliance between the five brotherhoods was formed, providing for the formation of a federated board of adjustment for the consideration of grievances and man¬ agement of strikes. A more centralized federa¬ tion was organized in 1898, but dissolved in 1900, leaving the agreement of 1895 in force. The first attempt to form a union which should unite in one organization all classes of railway employees was the American Railway Union, organized in the early part of 1893 by Eugene Victor Debs. This union lacked the complicated organization of the older brotherhoods, was rad¬ ical and aggressive and met with bitter opposi¬ tion from the older unions. It drew away some of their membership and grew rapidly; before the close of the year it conducted successfully a strike against the Great Northern Railroad.

In 1894 it inaugurated a sympathetic strike in behalf of the Pullman Car Company employees, was defeated and shortly afterward the organ¬ ization dissolved. A later attempt to unite all railway employees is the United Brotherhood of Railway Employees, organized in January 1901, which also resulted in failure.

Lesser Organizations. — Of the smaller or¬ ganizations those which closely resemble the five larger brotherhoods in organization are : (1) The International Brotherhood of Maintenance-of-Way Employees, organized in 1887 as the Brotherhood of Railway Trackmen; its membership includes those employed in track, bridge and building, water supply and fuel de¬ partments and signal and interlocking service ; it has a mutual benefit department and the same provisions for preventing strikes and dealing with grievances as the other brotherhoods; the official journal is the Advance Advocate ; the membership is about 10,000. (2) The Switch¬

men's Union of North America, organized in 1894, admits to membership those engaged in making up and disposing of trains. It has a beneficiary department, membership in which is compulsory for those physically sound. The organization is the same as in other brother¬ hoods. The membership in 1914 was 9,800; this is less than it would otherwise be because of the fact that the Brotherhood of

Railroad Trainmen, an older and more powerful organi¬ zation, also admits switchmen. The official organ is the Journal of the Switchmen's Union. (3) The Brotherhood of Railway Carmen, or¬ ganized in 1900 by a consolidation of the Brotherhood Car Repairers of North America and the Carmen's Mutual Aid Association. Its membership consists of those who are employed in oiling, repairing, inspecting and cleaning cars ; it is a comparatively unimportant organi¬ zation. (4) The National Railways Clerks' Association, organized in 1901, had in 1914 a membership of 5,000 in about 50 locals ; it publishes the Official Journal of the N. R. C. A. (5) The International Association of Car Workers, organized in 1901, includes in its membership those employed in the construction and maintenance of all cars ; it has no benefit department, but the arrangement for dealing with grievances and strikes by local and gen¬ eral grievance committees; its declaration of principles is conservative, including opposition to prison contract labor and a declaration in favor of reduction of hours of work and com¬ pulsory education. Its official journal is the Car Worker; its membership is over 20,000.

Other railway organizations are the Mechan¬ ical Trackmen, with 4,000 members; the Rail¬ road Freight Handlers, with 3,000 members; Railroad Signalmen, with 11,000 members; Railroad Station Agents, with 11,000 members; Railroad Station Employees, with 4,300 mem¬ bers ; Railway Express Messengers, and Rail¬ way Expressmen, and the Street and Electric Railway Employees, with 54,500. According to the Quarterly Journal of Economics there are about 600,000 members enrolled in the several railroad labor organizations. Consult Review of Reviezvs (May 1917) ; Quarterly Journal of Economics (passim) and publications of the Bureau of Labor Statistics of the United States Department of Labor. Consult also files of the official brotherhood journals mentioned above.

RAILWAY SHOPS AND MACHIN¬ ERY. Railway buildings and machinery are required for the maintenance and repair of loco¬ motives and cars and for their cleaning, inspec¬ tion and storage. Few railways build locomo¬ tives on a large scale, although their engineers design them. Many railways build freight cars and sometimes, passenger cars, but both cars and locomotives are built mainly by private firms. See Railway Cars; Locomotive.

Repair work, however, must be done by every railway. Usually there is one main shop plant where engines are sent for extensive re¬ pair or rebuilding. There may be more than one, but the tendency is to concentrate the heaviest work, this being economical in time and cost and in machinery investment. Im¬ portant division plants will have shops for gen¬ eral repairs, and at the ends of all operating divisions there will be facilities for such light repairs as are needed to keep the equipment in service. Economic use of engines and cars re¬ quires that they be kept in good condition, so that they may give the greatest mileage and service before they need be sent to the shops for extensive overhauling and repair. The plan and facilities at any shop plant will vary with its capacity, its site, its special purposes and the ideas of the designers. Provision must be made for future enlargement.

A large repair plant for locomotives will include a machine shop, erecting shop, boiler shop, tank — or tender — and sheet iron shop, iron foundry, pattern store and supply store¬ house. The first five of these may be separate or grouped in two or more large buildings. The erecting shop, where the engines stand while being dismantled, repaired and assembled, mav have several short transverse tracks for one or two engines each, or a few widely-spaced longi¬ tudinal tracks. To avoid blocking these latter, the engines may be lifted from their wheels and placed on the floor between or outside of the tracks. Pits in the tracks enable workmen to get under the engines.

Overhead traveling cranes shift the loco¬ motives. With the longitudinal plan, two cranes of 100 to 150 tons capacity must be used, one at each end of the engine. With the trans¬ verse plan one 200 to 250-ton crane can do the work. Similar but lighter cranes at a lower elevation may handle the various parts and materials. Less expensive arrangements for division shops, to permit of removing the wheels, are power-operated screw jacks which lift the engine by

beams under its ends, or drop pits beneath the tracks for small carrying hydraulic jacks which take the wheels from under the engines.

Longitudinal tracks extend through the building to yard connections, but the short transverse tracks extend usually through one side to the pit of a power-operated transfer table which has one track and travels laterallv so as to connect this with any one of the tracks leading to the pit. Usually two buildings are on opposite sides of the transfer table, each with room for an engine to stand between it and the pit.

A large repair plant for car equipment will include a coach or passenger-car repair and erecting shop, coach paint shop, coach truck shop, freight-car repair shop, cabinet shop, woodworking shop and outdoor repair tracks.

Also a lumber yard and dry kiln. A black¬ smith shop and machine shop are required, but in a combination plant these — and the foundry — may serve both the locomotive and car shops. Brass and steel castings are generally purchased.

Passenger car shops generally have short transverse tracks served by an outside transfer table, running between two buildings. Freight car repair work of the heavier class may be done in a building equipped with overhead cranes, but much ordinary repair is done on open tracks. These are arranged in pairs, the alternate wide spaces admitting intermediate tracks for trucks carrying materials. The re¬ pair yard has pipes supplying water for refrig¬ erator cars and compressed air for testing brakes and operating tools.

Shop buildings are usually one-story struc¬ tures, except that in the machine shop the lighter work may be done on a mezzanine floor at the side. Storehouses and pattern stores are usu¬ ally several stories high. Modern buildings are largely of steel frame or reinforced-concrete, with large window areas of steel sash, and with monitor or saw-tooth roofs for light and venti¬ lation. A power-house furnishes steam heat, water, compressed air and electric current for light and power, although electric supply is often obtained from an outside source. Ma¬ chine tools and other appliances are operated largely by electric motors. Auxiliary to the plant will be its water supply and sewerage, heat, light and power, sanitation and locker and wash-rooms for the workmen. Handling material between the several shops and depart¬ ments may be effected by motor trucks, narrow gauge

railways or small tractors hauling trailers on paved roadways.

Locomotives operate over fixed divisions, be¬ tween certain points, the distance averaging 100 miles. At each end must be an engine terminal with facilities for cleaning the fire, supplying coal and water, inspecting and cleaning the en¬ gine and making light repairs, and turning it for the return trip. Coal and water supply must be provided also at points along the divi¬ sion.

An engine which has just brought in a train and finished its trip goes to the engine terminal, where it takes water and coal if necessary and then has its fire cleaned or dropped at an ashpit. Tf not at once sent to an outbound track it is moved to the engine-house to be inspected and cleaned and given light repairs, especially those reported by the enginemen. Inspection is done sometimes at a pit in advance of the ashpit.

I he engine is held in the house until assigned for the return trip, when a new fire is lighted. Where no repairs are necessary, engines ready for service may be stored on outdoor parking tracks arranged radially or parallel. An en¬ gine going out to its train usually takes coal, water and sand just before leaving, so that facilities must be accessible to both inbound and outbound engines. Other facilities include a machine shop, storehouse, sand drier and oil-house. Also a rest room for the men, with quarters for engine crews whose homes are elsewhere.

Engine-houses on American railways are usually of the ˆroundhouse® type, being seg¬ mental in plan, with radial tracks converging upon a turntable by which an engine can be

transferred from any radial track to the ap¬ proach track connecting the turntable with the yard tracks. Rectangular houses are used in some cases, with parallel tracks connected di¬ rectly to an approach track or served by a trans¬ fer table traveling at right angles to them. A special design has short diagonal tracks open¬ ing from a track

extending along one side of the building. A turntable is like a revolving bridge and serves both to shift and turn loco¬ motives. If this is not provided there must be a Y-track, forming a triangle, for turning en¬ gines and cars. In Europe, engine-houses are generally rectangular with tracks parallel or radiating from a turntable inside the building. To provide against blockades there should be more than one track leading to the turntable.

Roundhouses rarely form a complete circle. They are of brick or concrete, with low roof, and have either double swinging doors or flex¬ ible steel doors that roll up at the top. To carry off the smoke, especially when new fires are being started, each engine stands with its smokestack under a smokejack or hood, which extends through the roof. To avoid a nuisance, the smokejacks may be connected to a flue served by an exhaust fan and led to a tall chim¬ ney or to a series of water-filled trays through which the gases rise and are discharged to the chimney while soot and dirt are retained. In such cases the smokestacks are lowered into contact with the engine smokestacks. A pit between the rails of each track permits men to go under the engines to inspect and repair them. Frequently a drop pit is provided for a truck with jack to take an axle and pair of wheels from under the engine. The machine shop is usually an annex to the engine-house and some¬ times one of the radial tracks extends into this shop.

Water stations comprise mainly a pumping plant with elevated tank which may supply the engines directly by spouts or may distribute a gravity supply to water columns. These are tall stands having a horizontal pipe at the top, the latter capable of being swung across the tender of an engine and discharging into the tank. When not in use this pipe lies parallel with the tracks. Water that is hard or of scale-producing quality may be treated in a chemical plant before going to the elevated tank, this being far preferable to the practice of putting chemicals in the tender or boiler. Track tanks for supplying water to moving locomo¬ tives were invented by John Ramsbottom, of England, in 1861 and are used on a number of main lines in the United States. The tank is a shallow pan about 20 to 24 inches wide and seven inches deep, laid upon the ties for a dis¬ tance of 1,200 to 1,500 feet and provided with steam and circulating pipes to prevent freezing. A hinged pipe on the tender is lowered so that its mouth or scoop dips below the surface.. The speed of the train causes the water to be driven up this pipe, which ends in an elbow discharging the water downward into the tender tank.

Coal is delivered to the engine tenders in various ways. Buggies or cars loaded by hand may be wheeled over a platform alongside the

coaling track and above the level of the top of the tender, or they may be wheeled on a bridge spanning the tracks and having hinged spouts to be lowered to the tenders. Locomotive cranes with grab buckets may deliver coal from

the stock pile to the tender. The most general method is to place the coal in elevated bins fitted with hinged spouts, the bin being either parallel with or across the. tracks. For loading the bins, coal cars may be pushed up an incline by a locomotive or pulled up a steeper incline by a cable hoist. In many cases the cars dump the coal into a hopper beneath the track, whence it is fed to an intermittent vertical bucket ele¬ vator or a continuous conveyor which delivers it into the bin.

Where oil fuel is used, special tanks, pipes and oil columns are required to supply the ten¬ der tanks. Economy demands that fuel de¬ livered to each engine should be weighed or measured and recorded, and special automatic apparatus for this purpose is in use.

Ashpits where locomotives have their fires cleaned consist frequently of two parallel shal¬ low pits — under the engine tracks — with a deeper pit between them for a car into which the ashes are shoveled or sluiced. The ashes may be dropped directly into small steel cars standing in deeper pits under the engine tracks, these being pulled out on an incline at the end or side of the pit; or with a pit transverse to the tracks the engines may drop the ashes into fixed steel hoppers from which they are dis¬ charged at convenient times into a small car running on the floor of the pit. This car is hoisted out and emptied by a crane at one end of the pit. Another plan is to put the engine tracks over the sides of a Y-shaped pit, the ashes sliding down into the deep part, which is full of water. The pit is cleaned by a grab bucket handled by a gantry or locomotive crane.

Cleaning passenger cars is provided for at terminals on groups of tracks usually connected at one end only, but sometimes at both ends. Wide spacing affords room for operations, and permanent staging may support the cleaners' platforms. The yard is paved and drained. Pipes with hose connections at intervals supply water for washing, steam for heating, com¬ pressed air for charging brakes; and sometimes there are pipes for vacuum cleaners, as well as electric connections for lighting cars and charg¬ ing batteries.

E. E. R. Tratman,

Associate Member, American Society of Civil Engineers, *etc.*

RAILWAY SIGNALS. See Block Sig¬ nal System.

RAILWAY SURVEYING. See Survey¬ ing.

RAILWAY TRANSPORTATION IN THE UNITED STATES. See United

States, Railway Transportation.

RAILWAYS, American Street. See

American Street Railways.

RAILWAYS, Elevated. Elevated railways presented one of the first potent factors for the solution of the problem of adequate transporta¬ tion for passengers between points in great cities. The street railway was an earlier fac¬ tor, but it met the growing inconvenience of congested streets in only a partial degree, af¬ fording but temporary relief. In New York, which city possesses the most extensive sys¬ tem of elevated railways in the world, without taking account of the large system in Brooklyn,

now a part of the greater city, two means of relieving the streets of some of the burden of passenger traffic began to be considered as long ago as 1860. Two possible solutions oresented themselves, one being to carry it underground through tunnels, and the other to carry it over elevated structures. The former met with more favor at the outset, but the first underground project undertaken was speedily' abandoned. Considerable ridicule was expended upon the other idea, but in spite of it an elevated rail¬ way, with a single track, was built from Battery place through Greenwich street and Ninth ave¬ nue to 30th street in 1866 and 1867, and opened to travel on 2 July 1867. It was operated by means of a cable for a short time, when steam locomotives were substituted as motive power. It did not gain popularity as an aid to local travel, and its lack of success caused it to pass into the hands of

the sheriff in foreclosure proceedings, and it was sold for the benefit of creditors in 1871.

The West Side Elevated Railroad Company, as the corporation which built and operated this pioneer elevated line was named, was succeeded by the New York Elevated Railroad Company, organized 3 Jan. 1872, under a charter granted by the State legislature the year before. A few months later, on 17 June, the Gilbert Elevated Railroad Company, which obtained a charter earlier in that year, was organized to build a line projected by Dr. Rufus H. Gilbert, and which was planned to be a pneumatic tube rail¬ way, suspended from lofty arches. For some reason the pneumatic tube idea was abandoned, sustaining at first a modification which, by cut¬ ting off the upper half of the tube, made it a mere trough wherein the cars were to run, and it was decided to build a simple elevated rail¬ way. Meanwhile there had been not onlv lack .of encouragement for this sort of enterprise, the West Side experiment not having succeeded yet in overcoming popular prejudice, but there was antagonism on the part of property owners who would be affected by the construction of such railways, and there was friction also be¬ tween the two existing companies. Litigation assisted to complicate and delay matters.

This was the condition of affairs when, in

1875, the State legislature passed what is known as the Husted Act, which provided for a com¬ mission to decide as to the necessity for an. elevated railway system in New York City, and to determine proper routes. Under this act a commission was appointed by the mayor of the city on 1 July 1875, and after a number of hearings given to all who favored or opposed such a system the decision arrived at was a favorable one. The commissioners announced on 11 December that their work was ended, the routes which they selected being four in num¬ ber and including respectively Ninth, Sixth, Third and Second avenues. The work of build¬ ing the lines was assigned to the two com¬ panies then existing, and both companies en¬ tered at once upon active construction and into equally active litigation, while each was under the necessity of defending the constitutionality of its charter against the attack of citizens, who were determinedly opposed to both. The New York Elevated had extended its line from the South Ferry to 61st street and Ninth avenue in

1876, and had opened it for travel to 59th street.

About this time the enterprise enlisted the in¬ terest of Cyrus W. Field, who secured a con¬ trolling interest in the company in the spring of 1877. The same vigor and determination that marked his connection with the first At¬ lantic Telegraph Cable was displayed here, and much of the credit for the eventual success which attended the new departure in urban pas¬ senger traffic was accorded to him.

Rivalry between the two existing companies had created much business for the couits in the meantime; the constitutionality of their char¬ ters was questioned; and there were injunctions and counter-injunctions. The Court of Ap¬ peals finally was asked to pass upon the consti¬ tutionality of the charters, and it sustained them both by a decision which was unanimous. All injunctions were dissolved and work was pushed forward, not only on the pioneer West Side line, but also upon the Sixth avenue line, which had passed from Dr Gilbert's control and was known now as the Metropolitan Elevated Road. This line, extending from Rector street to 59th street, was opened 5 June 1878. During 1879 the New York Elevated opened its West Side line to 83d street and constructed its Third ave¬ nue line which was opened to 129th street the same year. By this time the new means of travel within the city had commended itself to popular favor to such a degree that the permanency of the enterprise was assured. The Manhattan Elevated Railway Company, organ¬ ized under a Rapid Transit Act, passed in 1875, and chartered on 29 December of that year, took a lease of the roads owned by both the New York Elevated and the Metropolitan, the lease dating from 1 Feb. 1879. From that time the entire elevated system of New York City, of course not including the Brooklyn system, was known as the Manhattan Elevated Railway. In 1880 the Ninth avenue line was opened to 155th street; a spur from Chatham square created an additional terminus for the Third avenue line at city hall; a branch of the same line at 34th street afforded connection with the Second avenue line, which it crosses below grade, and gave access to the Long Island City Ferry from both lines; and a branch from the Third avenue line at 42d street connected with the Grand Central Railway Station.

Financial difficulties which had repeatedly beset the companies which had undertaken the development of this already gigantic project were of such magnitude in 1881 that the Man¬ hattan went into the hands of receivers on 14 July. After the difficulties had been straight¬ ened out and a reorganization of the company had been effected, each year was marked by ex¬ tension and improvement of the service until the system became, in 1904, an elevated railway consisting of four main lines with branches, its total trackage being 117.14 miles, divided as fol¬ lows : Main lines and branches, two tracks (each 37.68 miles),

75.36 miles; third track, used for express trains, 15.19 miles; sidings, 26.59 miles. The southern terminus of all the lines was at South Ferry. The Sixth and Ninth avenue lines ran through Battery Park to Greenwich street, diverging at Morris street, whence the Sixth avenue line extended through Church street to Murray street, through which it reached West Broadway; it traversed this thoroughfare to 3d street, passed through 3d

street to Sixth avenue, which it followed to its terminus at 59th street, the station being: at 58th. A branch running westward through 53d street connected it with the Ninth avenue line. From Morris street the Ninth avenue line ran through Greenwich street to Ninth avenue and through that avenue to 110th street, where a double curve on a very high structure carried it into Eighth avenue, which it followed to the terminus at 155th street. The Second and Third avenue lines were one from South Ferry to Chatham square. After leaving the ferry they made a sharp turn into Front street; thence through Coenties slip and Hanover square they entered Pearl street, which they followed to and through the New Bowery to Chatham square. They diverged here, the Third avenue line con¬ tinuing through the Bowery and Third avenue to the Harlem River. At 34th street passengers desiring to reach the Long Island Ferry trans¬ ferred to a ˆshuttle® train ; and at 42d street another ˆshuttle® train conveyed transfer pas¬ sengers to the Grand Central station. Trains from city hall followed the same line, and pas¬ sengers were transferred at Chatham square to the Second avenue line if they desired it, as well as at the two other transfer stations mentioned. From 129th street at the Harlem River the Third avenue line continued northward, cross¬ ing the river by a fine bridge, open also to foot passengers. North of the river the line ran over a private right of way to Third avenue at East 148th street, whence it followed the ave¬ nue to Pelham avenue in Fordham, opposite the entrance to Saint John's College. Pelham avenue was practically the end of the line, but from this point there was an extension to the Botanical Gardens in Bronx Park, about a half mile farther north. The Second avenue line, after leaving Chatham square, passed through Division,

Allen and East 23d streets to Second avenue, through which it continued to the terminus at 129th street and the Harlem River, where passengers going further north trans¬ ferred to the Third avenue line. Transfers were made at 34th street to either the Long Island Ferry or the Third avenue line via the branch operated on that street. Down-town passengers on either the East or West Side were transferred at South Ferry to up-town trains on the other side. There was also a system of transfers to the surface lines at various points, the transfer costing the pas¬ senger three cents extra.

Until 1901 steam locomotives were relied upon entirely for motive power. The matter of substituting electricity began to be agitated in 1885. The first experiments were made with a motor invented by Leo Daft which was kept in service intermittently on the Ninth avenue line, between 14th and 50th streets, from 27 Aug. 1885, until 19 October, when a series of carefully recorded daily runs was made, con¬ tinuing, except on Sundays and election day, until 22 December. The object of this series of runs was to ascertain measurement of coal consumed, *etc.* The Daft motor derived its power from an insulated third rail. It did not commend itself to the management of the road, and the inventor was unable to make such im¬ provement in it as to so secure its adoption. Dur¬ ing the latter Dart of 1886 F. T. Springer oper¬ ated an electric car successfully on the 34th street branch; and in 1893 an electric locomotive

designed by J. B. Enty which was operated by current derived from storage battery, or from a third rail, as might be found necessary, was tried on the same branch with excellent results, but neither of these inventions was regarded as wholly satisfactory. While New York led in adopting elevated railways, it permitted Liver¬ pool to be the first in adopting electricity as motive power, the Liverpool Overhead Rail¬ way, completed in 1893, adopting it at the outset. In the same year the Intermural Railway, a feature of the Columbian Exposition at Chicago, made successful use of electricity in the opera¬ tion of its cars. It was not until the spring of 1899 that the Manhattan Railway decided to use electricity, and the change from steam as motive power was made gradually, the first trains operated by electricity being run over the Third avenue line in 1901. It had already come into use on the elevated railways in Brooklyn. The number of passengers carried over the system in 1904 averaged 700,000 daily. The system went under lease to a corporation named the Interborough Railway Company, chartered 6 May 1902-Brooklyn, one of the boroughs of New York City, had in 1904 an extensive elevated railway system

which, like that in Manhattan and the Bronx, grew out of independent enterprises which finally consolidated. The first company was chartered 26 May 1874, under the somewhat peculiar name of the Brooklyn Elevated Silent-Safety Railway, afterward changed to the Brooklyn Elevated Railway. It encountered vicissitudes, chiefly financial, and was reorgan¬ ized 29 May 1884. Other companies were char¬ tered prior to the date last mentioned, and several later. The Brooklyn Union Elevated Railroad was chartered 30 Jan. 1899, to take over the properties of the Brooklyn Elevated, the Union Elevated and the Seaside and Brook¬ lyn Bridge Elevated railroads. On 7 July, in the same year, the Kings County Elevated Rail¬ road was chartered to succeed an earlier com¬ pany of similar name. This company was re¬ organized in July 1899, absorbing the Fulton Elevated Railway. Early in May 1900 this com¬ pany acquired the Sea View Railroad, and sub¬ sequently it and its acquisitions were merged in the Brooklyn Union Railroad, which was a part of the entire system of elevated and sur¬ face lines operated by the Brooklyn Rapid Transit Corporation. The first elevated line in Brooklyn was opened in May 1885. The vari¬ ous lines comprised in the system had termini af Fulton Ferry, the New York and Brooklyn Bridge, the Broadway Ferrv, the Williamsburgh Bridge, Ridgewood, East New York, Woodhaven (where trains followed the New York and Rockaway Beach Railroad to Rockaway), and at 65th street, Bay Ridge. All trains to and from the bridge either traversed the full length of the bridge to New York, or trans¬ ferred there to the bridge trains, which were operated formerly by the bridge authorities. The same conditions exist in regard to trains arriving at or leaving the Williamsburgh bridge. The total length of all the elevated lines in 1904 in Brooklyn was 28.70 miles, with a total trackage of 67.82 miles. Electricity was intro¬ duced as motive power in Tulv 1900.

Chicago opened its first elevated railway in October 1893. the pioneer company being the Lake Street Elevated Railway, chartered 24

Aug. 1892. Other companies were subsequently organized, and there

was, as in New York and Brooklyn, a series of reorganizations and con¬ solidations which gave to the city a large and convenient system, operated by electricity.

Boston also had a fine system, which from its opening was operated by electricity. The building of an elevated railway system was discussed in Boston as early as 1876, but pop¬ ular opposition and business interests combined successfully for years to defeat any action by the State legislature, which alone was com¬ petent to give the necessary authority. The Boston Elevated Railway Company obtained a charter, finally, in 1894, and the road, which was opened 10 June 1901. was constructed in a little over two years. Its total length was about six and two-thirds miles, and the total track¬ age, including sidings, was something over 16 miles.

The total of 308.94 miles of elevated track in 1902 has gradually increased to 429.67 miles in 1918, electricity being the motive power, with the exception of about 16 miles operated by gasoline motors. The present car equipment of the elevated roads in operation is relatively large, averaging about 12 cars per mile of track, and has kept pace in all general im¬ provements with the surface and subwav equip¬ ment. As a rule the car body is built through¬ out with structural steel and pressed steel shapes, and is designed with continuous struc¬ tural steel centre sills and plate side girders. The floor and side framing is designed to in-

The recent introduction of field control with the interpole motors has become a most positive power saver. This is simply a revival of the old control system used in some of the earliest railway motors. The early double¬ reduction motor made the most extensive use of this, since the control was entirely by com¬ mutating the field and employed no external re¬ sistance at all. It was used to a greater or less degree in these motors and in some of the single-reduction motors as well. This system worked with marked success in its application on the locomotives of the New York, New Haven and Hartford Railroad. These had single-phase motors of the series-compensated type, which permitted a wide range of variation in the field strength without impairment of the commutation.

In elevated and subway construction the great advantage of heavier rails lies in their in¬ creased conductance which tends to render un¬ necessary a paralleling feeder system. The length of rail used affects the labor of han¬ dling and the number of bonds necessary to a large

extent. The present practice of bonding presents no particular difficulty where third rails are properly supported and anchored. There has been much experimental work con¬ ducted with new and original sections for use as third rail. The chief considerations which led to these were (1) to produce a section which had a greater contact surface in propor¬ tion to its weight than the ordinary T-rail, thus giving a greater wearing surface and longer

Different Third-rail Sections.

elude cross-bearers which transfer the floor load to the side trusses. The entire car body, exterior and interior, is made fireproof and is thoroughly insulated against extremes of heat and cold, noise and the effect of vibration. In the latest pattern, an important feature of the underframing is contained in the body bolsters. These are made of two soft-steel plates with a cast steel separator in the centre. The steel casting, in addition to serving as a separator for the top and bottom plates, is designed to form a housing for the draft springs bv ex¬ tending it beyond the bolsters toward the end of the car body. Each bolster is equipped with a roller side bearing.

life, and (2) to obtain a section which could be more easily supported and which would pro¬ vide greater facility for bonding, anchoring, in¬ sulating, etc., than the ordinary T-rail. The drawing shows a number of third-rail sections. The section shown at A is the 80-pound stand¬ ard T-rail _ section commonly used. B is a special section used by the Long Island Rail¬ road. C is a similar section used by the New York Municipal Railway. All of these are used for over-running contact. The section shown at D is that used by the New York Central Railroad on rails with under-running contact. It was designed to provide a better support for this type of construction than was available

with the standard T-section. Section E is that of the Philadelphia and Western Railway, which was originally designed as an under¬ running rail, but has since been inverted, a change which was found necessary to meet local conditions. The remaining sections shown, F, G, H, K, L, M, O, are special tvpes for over¬ running third rail, and special shapes brought out to provide a more satisfactory means for supporting these sections and also for support¬ ing a protective covering.

Edward S. Farrow,

Consulting Military and Civil Engineer.

RAILWAYS, Government Control of.

The government's obligation to maintain an equitable relationship between the public and carriers is a continuing one, although the prob¬ lem has assumed a different form from time to time and is merged to some extent with the problems of the public control of corporations. In enacting the Sherman Anti-trust Law, Con¬ gress had only industrial combinations in view ; but the rulings of the Supreme Court have made the law an important part of the legisla¬ tion for the regulation of railroads. As a measure for the control of inter-railway rela¬ tions the law is faulty in that it makes practi¬ cally all co-operative action on the part of rival carriers illegal. While the Sherman Act and subsequent legislation have fixed the general scope of the governmental regulation of trans¬ portation, the efficiency of governmental con¬ trol has been determined by the actions of the courts in interpreting the law and in exercising their equity powers.

To understand the fine distinction between government control of railroads and govern¬ ment ownership of railroads, a study or exam¬ ination of the Railroad Control Law will greatly assist. This law, enacted in March 1918, au¬ thorized the President to contract with the com¬ panies for the payment of an annual sum not exceeding a specified maximum, to be deter¬ mined for each road by the average annual rail¬ way operating income during the three years ending 30 June 1917. The government agreed to pay all taxes, State or Federal, assessed dur¬ ing the period of Federal control, except the excess profits tax and the corporate income tax. These latter were to be paid by the company out of the payments made to it by the govern¬ ment. With respect to the effect of govern¬ ment control on State taxation of the railroads, the act expressly provided that it should not affect ˆexisting laws or powers of the States in relation to taxation.® The

President was au¬ thorized to initiate rates, but they were re¬ quired to be ˆreasonable and just® and they were subject to review by the Interstate Com¬ merce Commission. The act directed the com¬ mission to consider when reviewing the Presi¬ dent's rates the circumstances caused by war conditions and the need for additional railroad revenues. Federal control was to continue dur¬ ing the war and not exceeding one year and nine months after the ratification of the treaty of peace. Congress authorized the government to take control of street and interurban rail¬ roads necessary for the transportation of ship yard employees.

Among the most important of the needs of the situation is the compulsory Federal incor¬ poration of railroad carriers. So long as Con¬

gress confined itself to restrictive legislation of railroads as common carriers, it was not ma¬ terial whether they were Federal or State corporations, or indeed corporations at all. The working and operation of the physical properties and their relations as carriers to the public were the only matters of concern, and their corporate functions were not substantially affected. If only restrictive and oppressive legislation were intended now, Federal incorporation would not be necessary. But the time seems to have arrived for a comprehensive legislative plan for developing and sustaining necessary railroad transportation, or, in other words, for construc¬ tive legislation. The present system of regula¬ tion now imposes on the Interstate Commerce Commission, executive, judicial and legislative functions of great difficulty and importance, and all plans thus far suggested contemplate enor¬ mous additions to such functions. This com¬ mission should be relieved of its executive duties, for which such a body is least suited.

It is obvious that executive and administra¬ tive functions cannot be efficiently exercised by boards, commissions or committees. This was demonstrated during the European War. The larger the board or commission, the more cum¬ bersome or difficult becomes the task. Experi¬ ence has demonstrated the necessity for a national government officer to meet emergencies resulting from exceptional congestion in traffic or through blockades of transportation, by quickly mobilizing the transportation resources, and by the arbitrary diversion, if need be, of traffic from lines which cannot handle it to lines which can, and by other instant and heroic methods. It is generally conceded that there should be a Transportation Department of the government with a Cabinet member at its head in order that

railroad business might be prop¬ erly represented and have a (<friend at court.® In the matter of service, a Cabinet officer by calling in railroad executives and through in¬ formal discussions could bring about changes in train service, schedules and other things de¬ sired by the public, which if taken up with the elaborate formality and procedure inevitable in cases of a commission or similar body would not be accomplished for weeks or months. A single executive representing the government in all these important matters of service could get into instant touch with the railroad execu¬ tives and secure action with respect to these matters of such vital importance to the public very much quicker than would be possible by the slow-moving procedure of any board or com¬ mission. The secretary would not be hemmed about by any judicial conceptions and matters of importance could be promptly brought be¬ fore the Interstate Commerce Commission by formal complaint. The largest single industry in the United States, next to agriculture, and certainly there is none more vital to the very life of the nation, has, it will be seen, no de¬ partment, bureau, agency or officer of any kind or description whose duty it is to look after its interests, to defend it or to say a word for justice in its behalf. The Interstate Commerce Commission wTas conceived in hostility to it and the Interstate Commerce Act was designed to repress, regulate and punish it. The figures given out by the United States Railroad Ad¬ ministration, giving the results of government

control during the European War, show that 5,377,468 soldiers were transported in 14 months on American railroads, 7,173 special trains, car¬ rying 95,246 cars, being operated. The Overman Act, approved 21 March 1918, provided that the Interstate Commerce Commission should as¬ certain and certify to the President the average annual railway operating income to be used by the President in making agreements for com¬ pensation for the use of the transportation sys¬ tems of the country. In case the amount of compensation was not adjusted, claims could be submitted to boards of referees appointed by the commission, and the finding of such boards would be a maximum

of compensation which would be paid to the carriers. See Rail¬ ways, Government Ownership of.

Edward S. Farrow,

Consulting Military and Civil Engineer.

RAILWAYS, Government Ownership of.

After the World War began in Europe, con¬ ditions made it impossible to compile com¬ plete statistics regarding the railroads of the world. However, with the knowledge we have regarding the extent of government ownership before the war, and regarding the changes in the relations between the railways and the state which we know have occurred since the war began, it is possible to give an approximately correct idea of the present extent of govern¬ ment ownership of railroads. For several years before the war the Archiv fur Eisenbahn-wesen, the official publication of the Prussian Ministry of Public Works, issued annually a compilation showing the mileage of railways in the various countries which was owned by the governments and by companies. In the year 1913, according to this authority, the total railway mileage of the globe was 690,133 miles. Of this, 464,421 miles, or 67 per cent, was owned by companies, while 225,712 miles, or 33 per cent, was owned by governments. Most — or to be specific, 256,823 miles — of the mile¬ age owned by companies was in the United States. Even outside of America, however, the mileage owned by companies was 207,598 miles, or only about 18,000 miles less than the total mileage owned by governments.

It is often asserted in the United States that government ownership of railroads has become the policy of almost all the world except the United States. The foregoing statistics indi¬ cate that this is not the case, nor does a further analysis of the statistics of the world's railways lend support to this view. Before the war out of 75 countries which had railways, 40 had more mileage that was owned by companies than by the state, while 35 had more mileage that was owned by the state than by companies. In only seven of these countries were there no privately owned railways, while in 26 there were no government-owned railways. In some of the leading countries of the world private ownership preponderated while in other leading countries government ownership preponderated. In the United States and Great Britain all the railways were privately owned, and in France, Belgium, Spain, Sweden, Canada and Argen¬ tina private ownership preponderated. In Ger¬ many, Austria-Hungary, Russia, Italy, Mexico, British India, Japan and Australia government

ownership preponderated.

Since 1914, when the war began in Europe,

there probably has been a greater increase in the mileage owned by governments than in that owned by companies. For example, in 1913 Canada had 27,687 miles of railway, of which only 1,781 miles was owned by the government. Some railways whose bonds the Canadian government had guaranteed, fell into financial difficulties, however, and the govern¬ ment took them over, with the result that of the now existing 40,000 miles in Canada about 13,500 miles are owned by the government. The extension of government operation has been even greater than the extension of govern¬ ment ownership. All the private railways of France, Great Britain and the United States were taken over by the governments during the war, and, therefore, during the war about five-sixths of all the railway mileage of the globe was state-operated. When, on their entrance into the World War, the governments of France, Great Britain and the United States took control of the railways it was freely pre¬ dicted that in none of these countries would they ever be returned to private operation. This prediction was later shown to have been incorrect. The French seem disposed to re¬ turn to private operation the railways owned by companies as soon as practicable. The ex¬ perience of the French public with state opera¬ tion of the Western Railway, which was taken over in 1908, has created sentiment against government management. The British Parlia¬ ment passed a bill providing for a continui ance of government operation for two years. At one time nationalization of the British rail¬ ways seemed inevitable, but after the signing of the armistice strong opposition to it sprang up. The experiment of government operation in the United States resulted in the develop¬ ment of an overwhelming sentiment against that policy, and President Wilson announced that the railroads would be returned to opera¬ tion by the companies at the end of the year 1919. They were returned on 1 March 1920.

Therefore, in spite of the extent to which government operation was adopted during the war, it appears probable that the war will not result in greatly changing the proportion of the railways of the world owned by govern¬ ments, and that the question of government versus private ownership and management will continue to attract much public attention and be widely discussed for many years. Recently there was started in the United States a move¬ ment to have the government acquire the rail¬ roads, but, instead of managing them

itself, turn them over to the management .of a board of directors of 15 members, five to be ap¬ pointed by the President of the United States, five by the railway officers and five by the rail¬ way employees. Under this plan any surplus over fixed charges earned by the railroads would be divided equally between the employees and the government, while any deficit incurred would be paid by the public. While much energy has been put into the propaganda for this plan, and it has been endorsed bv most of the organizations of railroad employees, it has not met with much public favor. It seems probable that if the railroads of the United States are ever acquired by the public they will be managed by the government. One of th.e principal arguments which have been ad-RAILWAYS, GOVERNMENT OWNERSHIP OF

vanced in favor of government ownership in the United States as well as elsewhere is that an economy would be effected by reducing the return on capital which would have to be paid. The spokesmen of the railroad companies claim that they must be allowed to earn approxi¬ mately 6 per cent upon the value of their prop¬ erties in order to pay a return upon the exist¬ ing investment and raise sufficient new capital to provide needed additional facilities. As a matter of fact, the return paid by the com¬ panies upon their outstanding capitalization never has exceeded 5ˆ2 per cent in any year, but they have at times earned more, when most of their surplus earnings have been invested in the properties. It has been claimed that whereas the companies insist upon being al¬ lowed to earn 6 per cent the government would not have to pay more than 3ˆ2 or 4 per cent upon its bonds. It is pointed out in reply, how¬ ever, that in order to raise money to play its part in the Great War the government finally was obliged to pay interest at the rate of 4 Jq per cent; that in order to acquire the railroads it would have to issue at least $15,000,000,000 to $20,000,000,000 in bonds, and that it could not market such a vast amount of bonds unless it paid 5 per cent or more interest on them. Therefore, it is contended, the saving in the capital charge under government ownership would be small.

Another argument which has been made for government ownership is that under that policy large economies would be effected by consoli¬ dating the railways, eliminating all competition, together with the officers and the employees kept on the pay rolls to carry on

competitive activities, and operating the railways as a single system. Before government operation was adopted the operating economies which advocates of government ownership claimed could be made in the United States in these and other ways were estimated at from $400,- 000,000 to $1,000,000,000 a year. The opponents of government ownersnip claimed that the wastes of competition and the economies which could be effected by government management of the railroads as a single system were enormously exaggerated. They also claimed that while some economies undoubtedly could and would be effected under government opera¬ tion, the destruction of individual initiative and enterprise, and the introduction of political in¬ fluences, would result in increases of expenses which would much more than offset any economies that might be made. They contended that comparisons between the state managed and) the privately managed railways of the world showed that tffe latter were usually more economically managed than the former. The actual experience of different countries with government management of railroads before the war yielded widely differing results. The evidence indicated that the state railways of Prussia, of Japan and of British India were quite efficiently operated. Comparisons be¬ tween their operating results and those of the most efficiently operated private railways of the world, such as those of France, Canada and the United States, indicated that the most efficiently managed state railways probably > were not quite as economically run as, and did not give any better service than, the most efficiently managed private railways ; but when, as nearly

as was practicable, allowance was made for differences of condition, the impartial student was obliged to admit that the difference in efficiency indicated was not very great. An outstanding feature of the results of govern¬ ment operation was that all the state railways, the results of whose operation indicated an efficiency in management approaching the efficiency of management indicated by the re¬ sults of the leading privately owned railways of the world, were owned and managed by auto¬ cratic governments. The opponents of govern¬ ment ownership in such countries as the United States and Great Britain pointed out that under the autocratic governments of Prussia, Japan and British India, the railroad employees were practically without political influence and were not even allowed to form labor organiza¬ tions. They claimed that in countries having democratic governments, where railroad em¬ ployees constitute a large part of the voters and where they are allowed to form powerful labor unions, government management almost in¬ variably has been relatively

inefficient and un¬ economical. They made the inference that while state management may be successful when conducted by an autocratic government it cannot be made successful in a country having democratic institutions. They also cited statis¬ tics to show that in countries such as France and Canada, where there are both government managed and privately managed railways, the former are less economically operated than the latter, and that usually when railways have been transferred from private to government management, as in the cases of the Western Railway of France, the Northern Railway of Austria and the railways of Italy and Switzer¬ land, there usually has followed a marked in¬ crease of operating expenses.

Probably the most striking example of an increase in railroad expenses following a trans¬ fer from private to government management is that which occurred in the United States dur¬ ing the World War. In 1918 the operating ex¬ penses of the railways of the United States were $1,150,000,000, or 40 per cent more than . they were under private operation in 1917. In the first six months of 1919, under continued government operation, they were 51 per cent greater than they were in the first six months of 1917, although much less business was handled. The defenders of government man¬ agement claim that this great increase of ex¬ penses was not due to government operation but to advances in wages and increases in the prices of fuel and materials which were un¬ avoidable. The defenders of private operation concede that most of the increase in expenses was not due to government operation, but call attention to the fact that the huge savings it was claimed would be made under that policy have not been effected, and claim that a very large part of the increase of expenses was due to government operation and would not have occurred under private operation. It has been urged that the increase in expenses was largely due to abnormal conditions created by the war. The advocates of private management, however, call attention to the fact that during the year following the signing of the armistice operat¬ ing expenses continued to increase. Another argument which has been made in favor of government ownership is that under private

ownership the railroads make large profits which are received by private capitalists, while under government ownership the profits earned go into the public treasury, or, if no profits are earned, it is because relatively low passenger and freight rates are made under state manage¬ ment. In support of the contention that under government ownership the public may derive large profits from the railways the advocates of government ownership may cite the examples of Prussia and Japan. Before the war the state railways of Prussia usually earned from 5 to 8 per cent upon the investment and the earn¬ ings in excess of interest charges were used for public purposes. In the years 1910 to 1917 in¬ clusive the state railways of Japan earned from 5 to 7 per cent upon the government's invest¬ ment in them, which substantially exceeded the interest on the investment.

The opponents of government ownership point out, however, that in a large majority of the countries that have tried state management, and especially in those having democratic gov¬ ernments, state railways usually have incurred deficits. Deficits incurred by state railways must be paid by the taxpayers while railways which are owned by companies, alwa}^s, whether prof¬ itable or not, must pay large amounts in taxes. Among the state railways which have incurred large deficits are those of Italy, France, Can¬ ada, most of the Australian colonies, Austria, Russia and so on. Even the railways of the German states except Prussia usually have in¬ curred losses. During the first year of govern¬ ment operation in the United States (1918) a deficit of approximately $250,000,000 was in¬ curred, and in the first half of 1919 a deficit of approximately $300,000,000 was incurred in spite of the fact that in June 1918 the govern¬ ment advanced freight rates 25 per cent and passenger rates 50 per cent. The losses in¬ curred by most state railways cannot be fairly attributed to the lowness of their rates. In some cases they make relatively lower rates than private railways, as, for instance, has been the case on the Intercolonial Railway of Canada, but this railway usually has not even earned its operating expenses. In France the' passenger and freight rates of the state rail¬ ways have been about the same as those of the private railways, and before the World War the rates of the French private railways were slightly lower than those of the Prussian state railways. Generally speaking the tendency has been for private railways to make their freight rates lower than those of state railways, and for state railways to make their passenger rates lower than those of private railways. The opponents of government ownership contend, and apparently the facts favor their contention, that the deficits incurred

by most state railways are not due to the lowness of their rates but to the relative lack of economy in their operation. One of the arguments against government own¬ ership and management which have been pressed the hardest, and especially in the United States and other democratic countries, is that under that policy railroad management is thrown into politics, • with the result of both undermining the efficiency of management and demoralizing politics. The advocates of gov¬ ernment ownership claim, on the other hand, that under private ownership the railroad com¬

panies are always a demoralizing influence in politics and that the only way to remove them from, and keep them out of, politics is to have the government acquire and operate them.

Evidence can be cited in support of both these contentions. For many years the railway companies of the United States hired lobbyists, kept politicians on their pay rolls, distributed free passes and used other means which gave them a great, and sometimes even dominant, influence in the politics of many States and even of the nation. But since effective regula¬ tion of railways was adopted in the United States, beginning about the year 1906, the com¬ panies have been deprived of the opportunity to exert any considerable influence in politics.

The railroads and politics have not had much, if any, effect upon each other under state ownership in countries with autocratic governments such as those of Prussia and Japan before the World War. On the other hand, the evidence demonstrates that <(the rail¬ roads have corrupted politics and politics has corrupted the railroads® under the policy of state ownership in France, Canada, South Africa and numerous other countries. To keep the state railroads out of politics and politics out of the state railroad managements the gov¬ ernments of several countries, including those of the Australian colonies and of the Union of South Africa, have turned the management of the state railways over to railway commis¬ sioners who have been given by law a large amount of independent authority regarding rail¬ road operation. In Canada the state railways recently have been turned over for operation to a company called the Canadian National Railways Company. While the government is practically the sole stockholder in this com¬ pany, complete authority for the management of the railroads is given to the directors and officers of the company. It is generally agreed, however, by those who have studied state man¬ agement in democratic countries, that there is a

constant tendency for politics to break down all the barriers which are set up to prevent it from influencing railroad management, and for railroad employees to resort to political action for the promotion of their special interests.

The theoretical argument which may be made in favor of government ownership is very attractive and persuasive. The evidence indi¬ cates, however, that in all cases where state management of railroads has been measurably successful, it has been carried on under highly centralized and practically autocratic govern¬ ments. In no democratic country has there been attained anything approaching the success in the state management of railroads which has been attained in Prussia and Japan. The real explanation of this seems to be that the man¬ agement of railroads is chiefly a matter of ad¬ ministration. In governments such as Japan and Prussia had before the war, the adminis¬ trative branch is strong and highly developed and dominates the legislative branch to such an extent that there is little chance for inter¬ ference by the legislative branch with the man¬ agement of the railroads. On the other hand, in democratic countries the legislative branch usually, under normal conditions, dominates the administrative branch, which results, where railways are owned by the state, in constant

interference by the legislative branch with rail¬ road management. But the management of railroads is an undertaking to the efficient su¬ pervision of which a legislative hody is badly adapted. It would appear from past experience that if democratic governments are to make a success of government ownership and manage¬ ment of railroads, they will have to follow the example set by autocratic governments before the war, in giving the railroad management almost complete freedom from control and in¬ terference by the lawmaking body. Whether this would be consistent with democratic prin¬ ciples, or, in fact, with the permanent mainte¬ nance of democratic institutions, may be ques¬ tionable.

Bibliography. — Congressional Library, (List of Books relating to

Railroads in their relation to the Government (Washington, D. C. 1918) ; Dunn, S. O., Regulation of Railways) (New York 1918) ; Hungerford, E., <The Railroad Problem > (Chicago 1917) ; Phelps, E. M. (ed.), (Selected Articles on Government Ownership of Railroads) (New York 1917-19) ; Dixon, F. H., (War Administration of the Railways* (ib. 1918) ; (List of Publications Pertaining to Gov¬ ernment Ownership of Railways.'

Samuel O. Dunn, Editor of Railway Ag e

RAILWAYS, Laws Affecting. See Com¬ mon Carriers.

RAILWAYS, Military. See Military Railways.

RAILWAYS, Street. This designation is inclusive of what is commonly known as trolley line development and includes not only city and suburban but interurban electric roads. Elec¬ tric railways are by far the most important class of roads. Of the 986 companies included in this group, four use animal power, eight cable and two use gasoline motors as the motive power for a portion of the track. The electric rail¬ way companies operate about 99 per cent of the total trackage. Only nine companies in the United States use animal power exclusively, although this was practically the only kind of power used 35 years ago. The number of revenue passengers carried per mile of track indicates a steady increase in density of traffic from 212,259 in 1902 to 216,522 in 1907; 232,556 in 1912 and 251,684 at the present time (1919). The recent relatively large increase in cars, other than passenger cars, is due to the develop¬

ment of freight business on interurban lines. Since 1890 electricity has practically superseded all other kinds of power.

The percentage of trackage operated by elec¬ tric current increased from 15.5 per cent in 1890 to 99.6 per cent in 1919. Cable and steam power were never extensively used in the opera¬ tion of street railways, but they reached their maximum about 1890.

The track operated by all street and electric railways includes not only the first, second and other main tracks, but also sidings, turnouts, track in car barns, storage yards, *etc.* The length of these various kinds of track, in single-track miles, amounted to 41,064 miles in 1912, as compared with 48,638 miles in 1919. Electricity is used on 40,601 miles of the foregoing 41,064 miles of street and electric railway track. All classes of non-electric power are continuously decreasing.

The overhead trolley is rapidly de¬ creasing although it was practically in univer¬ sal use a few years ago, 38,958 miles being thus operated in 1912. The third rail system, being limited to elevated structures, subways, tunnels and tracks on private right of way, is still of minor importance. The conduit system, some¬ times referred to as conduit trolleys is the most expensive type of electric traction construction and is in use only where municipal regulations prohibit the use of overhead trolleys. The greater proportion of street and electric railway track is on streets or public thoroughfares, but the suburban companies often own their rights of way or have obtained the privilege of oper¬ ating tracks on private ways and in districts where interurban lines are extensively developed a large portion of the track is on private rights of way.

It is probable that more interest centres around the number of passengers carried than around any other feature of the railway serv¬ ice. While the increases in capital, miles of track, rolling stock, etc., show the development of the industry, no other fact is so impressive as the great number of people carried annually on the street and electric railways and the con¬ stant increase in passenger traffic. The total number of passengers in 1912 aggregated 12,- 135,341,716, as compared with 13,876,214,662 in 1918. The maximum density of passenger traffic centres in Manhattan and the Bronx boroughs of New York City.

No more startling changes in the street rail¬ way industry have been shown in years than

Summary for Street Railways of all Classes in 1918.

Sh owing operating companies, lessor companies, railways operated by electric power, cable roads exclusively, rail¬ ways operated by gasoline motor power and railways operated by animal power.

Operated trackage, classified by kind of power

Total

Operating

companies

Lessor

electric

companies

Electricity (wholly or in part)

Power other than electric exclusively

Cable

Gasoline

motor

Animal

Number of companies… .

1,276

983

293

986

9

6

7

Miles of line .

31 , 105.35

26,234. 18

4,971.17

31,021.56

13.84

58.64

11.31

Miles of track operated . .

41 ,531.91

35,118.64

6,413.27

40,972.60

20. 13

59.96

12.13

Cost of construction and equipment .

$4,680,831,680

$3,899,419,674

$781,412,006

$4,680,831,680

$2,641,372

$1,418,716

$68,431

Number of employees… .

314,871

314,871

297,580

364

42

Number of passenger cars

88 , 464

88 , 464

86,201

69

15

19

Number of revenue pas¬ sengers .

10,164,514,304

10,164,514,304

8,445,951,141

14,187,331

964,214

213,416

172

RAILWAYS, STREET

those in its cars. In the effort to deal with problems of congestion, low rates of fare, pub¬ lic convenience in entering and leaving cars, the full collection of fares and safety in opera¬ tion, an extraordinary number of new types have been evolved, each with its special merits. The past decade was particularly marked by an outburst of originality

in this respect and prob¬ ably no previous period in street railway history showed so many innovations. The modern stim¬ ulus in car design for city service may be said to have begun with the successful demon¬ stration of the pay-as-you-enter car, which originated in Montreal and was shown first in the United States at the Columbus convention of the American Electric Railway Association in 1906. The later developments were in the extension of this principle to centre entrances, with an increase in accessibility to the car, in greater attention to safety features and in re¬ newed use of one-man cars. Early in 1912 came first the New York stepless car with a body hanging near the ground between the trucks and then the low centre-entrance cars of Brooklyn and Washington and the centre-entrance, end-exit car of San Diego. These were accompanied by the low-floor car of Pittsburgh, in which 24-inch wheels and small motors elimi¬ nated one step and reduced the weight to an un¬ precedented figure. Double-deck cars based on these designs became almost obvious and came into use in 1913. In the meantime, the near-side principle, developed during 1911, had been ap¬ plied to one-man cars, thus supplying a need for light-traffic service which had existed, but had been neglected, since the bobtail horse car disappeared. One of the most extraordinary developments was the articulated car of Bos¬ ton, consisting of two old single-truck cars set end to end and flexibly connected by a low-hanging vestibule with centre side doors, Last among the radical designs came the storage battery stepless type, a four-wheeled car with¬ out a truck frame and of extremely light weight. The articulated car is primarily adapted to the rebuilding of old equipment and provides an answer to the question as to what disposition can be made of old rolling stock rendered ob¬ solete by the introduction of new types. The new types of cars for interurban service and for heavy electric traction are less numerous and less divergent from previous types. The steel cars of the Cambridge Subway probably show a greater departure from generally ac¬ cepted standards than any of the other large cars. They are equipped with three side doors and the usual platforms, bulkheads and plat¬ form doors are eliminated. In general the use of steel for car bodies has shown a marked increase. Most of the new types of city cars depend upon the girder effect of the side sheath¬ ing between belt rail and sills to support the load, the strains being carried around the door¬ way by heavy reinforcement. In 1913 the Chicago Elevated Railways brought out the all-steel arched-roof cars. This design was con¬ sidered more economical from a maintenance standpoint as it was believed that this type of car would have a much longer life than those of composite construction. (See Railways, Elevated). Storage-battery cars have recently come into notable use again and various types have

been adopted during the last few years in different cities and for various classes of

service. Batteries of the steel-nickel or lead-lead plates are employed and the cars them¬ selves exhibit a great variety of style and feature.

Maintenance of track is one of the large and serious problems of the street railway indus¬ try. A few years ago there were no fewer than 200 different types of rail in use. The girder rail development had reduced the number to four standard types, the nine-inch grooved rails and T-rails being most satisfactory. A very large amount of T-rail construction is in use throughout the country and there is abundant evidence as to its persistence as a type. In any track construction in paved streets the pavement is perhaps the most important feature, in relation both to total cost of the track construction and to the use of the street by the public and practically all of the objec¬ tion which has been raised to the T-rail con¬ struction should more properly have been brought against the type of pavement used in connection with that rail.

A very marked improvement has been seen in the illumination of street cars during the last decade. By reason of the universal use of elec¬ tricity in car propulsion, the lighting has also become electrical in like degree, but it has had to pass through considerable change and evolu¬ tion from carbon-filament, tantalum-filament and graphitized-carbon lamps up to the modern tungsten. Although the incandescent filament lamp has been used for the lighting of street railway cars practically ever since the electric motor cars superseded the horse or cable cars, it was not until very recently that any attempts were made to utilize the generated light to best advantage by means of scientifically manufac¬ tured shades or reflectors; and it was not until 1912 that the tungsten-filament lamp of an effi¬ ciency of 1.4 watts per horizontal candle or bet¬ ter was perfected to the extent of making it sufficiently rugged for street railway service. Lighting energy, being but a small fraction of the total energy used by motors and being rela¬ tively cheap to generate, has not been considered as a field for economy.

An increased amount of attention has been recently paid to the subjects of signaling and dispatching on electric railways, including the use of automatic stops, or such devices as the dictaphone ; while even the telegraphone, with its fine running wire to receive magnetically the record of vocal orders, has been under serious

consideration in large electric railway systems in cities for ((load dispatching® purposes, where it is desirable to know just what instructions have been given from one power plant to another. The main thing, of course, is the control of train movement or the automatic stopping of trains otherwise out of control. The rapid and noteworthy development in block and light signaling led to the standardization of apparatus of the different methods of control for signals; the continuous track circuit has maintained its leading position among installa¬ tions on high-speed lines. This may be due partly to conservatism in following a method so universally used by the steam railroads, al¬ though one of the advantages claimed for it, namely, that it indicates broken rails, can hardly be said to apply with much force to electric railways. It has, however, a similar advantage in that it indicates defective bonding by the

failure of the signals to clear. Various forms of the trolley-contact system have been in¬ stalled on a number of railways. Their greatly reduced cost offers a strong incentive to installa¬ tion. In addition, the possibility of introducing a car-counting device by giving the contactor a directional sense makes this system of unusual advantage where permissive signals, allowing cars to follow one another in the same block, are desired. Permissive blocking, however, ex¬ cept for very low speeds, is regarded with de¬ creasing favor. The use of the telephone in train or car dispatching has become so general a thing as to excite no comment.

It is difficult to enumerate all the improve¬ ments which, step by step, have brought the electric railway motor up to its present condi¬ tion of efficiency and durability. Its evolution began in the early eighties and is practically all confined to a period of about 35 years. The en¬ closed type of motor resulted from the large amount of trouble experienced from mud and water splashing into the early types and caus¬ ing their insulation to break down. The use of the four radial poles followed the attempt to get the most compact as well as -the lightest design for street-car motors. Laminated pole pieces were

introduced to decrease the loss from eddy currents in the pole faces which, with the high inductions introduced with the slotted armature and small air gaps, increased greatly the total loss in the motor. Later the generator practice of saturating the pole tips by cutting off alternate pole tips from the punchings was introduced The use of mummified strapwound field coils with asbestos insulation has become practically universal and the use of round wire is permitted only on the smallest sizes of motors, where no gain is secured by the use of the flat copper ribbon. No improve¬ ment has been marked or has done more to keep the motor cars out of the repair shop than the introduction of the standard type of bear¬ ing housing and method of lubrication. The life of the bearing on the motor may now be quite up to 400,000 miles. The modern arma¬ tures and brush holders are great improvements over the earlier forms not only in accuracy of adjustment but in simplicity of insulation, sub¬ stantialness of design and the use of adjust¬ able frictionless springs. Undoubtedly the most positive power saver which has been introduced with the interpole motors is field control. This, as is well-known, is simply a revival of the old control system, used in some of the earliest rail¬ way motors. The early double-reduction motor made the most extensive use of this, since the control was entirely by commutating the field and employed no external resistance at all.

The subject of fares is one of vital im¬ portance to every street and electric railway, as upon the income derived from transportation depend, the welfare and prosperity of the line, the ability to give good service, the proper up¬ keep of the system in all its physical details, the payment of wages acceptable to the employees, the increase of facilities for the public and the introduction of improvements. In practically all instances the fares now in existence are fixed by franchise, by agreement with the municipal¬ ity or by valuation of the property, but the elements and bases, in fact the very principles referred to in determining rates and fares, re¬

main a subject of constant discussion and experi¬ ment. The question of free transportation is governed quite largely either by franchises or by State laws and these have recognized to a large extent local conditions in cities and in States.

Modern street car development includes that of the elevated railways, restricted in this coun¬ try to a few of the largest cities, such as New York, Philadelphia, Chicago, Boston and Kansas City, in most of which they have become an integral part of the surface street car systems,

operating under the same management and pro¬ viding for exchange of traffic. The use of steam on the elevated roads continued for many years without complaint and the service ren¬ dered was remarkable for its efficiency, safety and regularity. Because of a rapid increasing travel, necessitating more frequent trains, and because of the inability of steam locomotives of the necessary size to haul heavier trains at higher speeds over the structures, as early as 1885 a plan was formed for equipping sections of the elevated railways in New York City with electricity. In considering the design of a steel rail to act as a conductor and at the same time to give a good contact surface for the col¬ lection of current by a moving train several im¬ portant features must be considered. Third-rail installations are generally divided into three classifications as to their point of contact with the collecting device, namely, over-running con¬ tact, under-running contact and side contact. The earliest installations were over-running or top contact in which the collecting device passed over and made contact with the open top of the third-rail. The first installation used a form of collector which depended on its own weight for contact with the third-rail and the installation was exceedingly simple. These first installations were on elevated systems where there was little or no danger of the public coming in contact with the rail. Later, when the use of the third-rail contact system was taken up by interurban roads and for steam road electrification where there were possibili¬ ties of accident to the public from coming in contact with a bare conductor, it became neces¬ sary to devise some better means for protecting the rail. This led to several types of protected third-rail, and later to the under-running and side-contact construction. See American Street Railways and Railways, Elevated.

Edward S. Farrow,

Consulting Military and Civil Engineer.

RAILWAYS, Suspended. See Suspen¬

sion Railway.

RAILWAYS, Supply. See Supply Rail¬ ways.

RAILWAYS, Underground. See Sub¬

ways; Tunnels and Tunneling.

RAILWAYS OF THE UNITED STATES. The aggregate length of the rail¬ ways of the United States on 31 Dec. 1917 was approximately 265,000 miles, or about 50,000 miles more than the total mileage of

European railways and about two-fifths of the total in the entire world. Excluding switching and terminal railways and a few minor lines per¬ forming strictly local services, as distinguished from interstate services, the total length of line, at the close of 1917, was 254,734 miles.

The development of the American railway sys¬ tem during successive decades is suggested by the following:

YEAR

Miles of line

Increase in miles

Increase per cent

Miles per 100 square miles of area

Popula¬ tion per mile of railway

1830 .

40

321,517

6,194

1840 .

2,755

2,715

6,788

0. 13

1850 .

8,571

5,816

211

.29

2,706

1860 .

28,920

20,348

237

.97

1,087

1870 .

49,168

20,249

70

1.66

784

1880 .

87,724

38,556

78

2.95

572

1890 .

159,272

71,548

82

5.51

384

1900 .

192,941

33 , 669

21

6.51

393

1910 .

240,438

47,497

25

8.08

382

1917 .

254,734

14,296

6

8.57

412

The unequal distribution of American rail¬ way mileage, with respect to population and area, is indicated by the following table:

Miles per

Miles of

100 square

Population

miles of

per mile of

line

area,

line,

30, June

30, June

31,- Dec.

STATE

1916

1916

1917

Alabama .

5,495

10.72

427

Arizona .

2,410

2.12

108

Arkansas .

5,294

10.08

331

California .

8,441

5.42

354

Colorado .

5,702

5.50

171

Connecticut .

1,000

20.74

1,254

Delaware .

335

17.05

640

Florida .

5,280

9.62

172

Georgia .

7,482

12.74

384

Idaho .

2,873

3.45

152

Illinois .

12,742

21.67

510

Indiana .

7,475

20.74

378

Iowa .

9,946

17.89

224

Kansas .

9,345

11.43

197

Kentucky .

3,836

9.55

623

Louisiana .

5,603

12.34

329

Maine .

2,263

7.57

342

Maryland .

1,428

14.37

958

Massachusetts .

2,133

26.54

1,757

Michigan .

8,876

15.44

335

Minnesota .

9,153

11.32

251

Mississippi .

4,439

9.57

442

Missouri .

8,270

12.03

419

Montana .

4,848

3.32

96

Nebraska .

6,169

8.03

207

Nevada .

2,318

2.11

47

New Hampshire .

1,252

13.87

362

New Jersey .

2,338

31.11

1,232

New Mexico . \ .

3,040

2.48

137

New York .

8,493

17.82

1,221

North Carolina .

5,537

11.36

437

North Dakota .

5,275

7.52

143

Ohio .

9,121

22.39

568

Oklahoma .

6,454

9.30

348

Oregon .

3,067

3.21

277

Pennsylvania .

1 1 , 635

25.95

739

Rhode Island .

203

19.03

3,054

South Carolina .

3,724

12.21

439

South Dakota .

4,279

5.57

165

Tennessee .

4,091

9.81

561

Texas .

15,867

6.05

290

Utah .

2,137

2.60

205

Vermont .

1,073

11.76

340

Virginia .

4,799

11.92

460

Washington .

5,698

8.53

275

West Virginia .

3,974

16.54

352

Wisconsin .

7,694

13.92

327

Wyoming .

1,906

1.96

91

District of Columbia.

37

61.45

9,917

Prior to 1890, the increase in railway mile¬ age was much more rapid than the growth in population but since that year the railway con¬ struction has lagged until a comparison between 1890 and 1917 shows an increase of 28, or 7.29 per cent, in the average number of inhabitants served by each mile of railway. It may or may

not be considered significant that Federal regu¬ lation of interstate rates, as embodied in the Interstate Commerce Law, began on 4 April 1887, or at about the same time as the retarda¬ tion of railway building. From 1877 to 1887, the mileage added to the American railway system was 1 10,164, or an average of 5,508 miles per year; from 1907 to 1917, the added mileage was 76,156, or at the rate of 3,808 miles per year. Unless it is conceived that the whole area of the United States is adequately sup¬ plied with railway facilities it must be concluded that in some way the relative incentive to the investment of capital in the railway industry has been diminished.

It is interesting, in its implications as to future development, to note that if the 11 States, California, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Okla¬ homa, Texas and Wisconsin, contained railway facilities as liberally proportioned to their area as

those of the Commonwealth of Massa¬ chusetts, their combined mileage would sub¬ stantially equal the present mileage of the whole United States. This is shown by the following table :

STATE

Railway mileage in 1916

To establish relation to area equalling Massachusetts

Total

miles

New

construc¬

tion

Per cent of new construc¬ tion to present mileage

California .

8,441

41,333

32,892

389.67

Illinois .

12,742

15,606

2,864

22.48

Indiana .

7,475

9,565

2,090

21.85

Iowa .

9,946

14,755

4,809

48.35

Kansas .

9,345

21,699

12,354

132.20

Michigan .

8,876

15,257

6,381

71.89

Minnesota… .

9,153

21,459

12,306

134.45

Missouri .

8,270

18,245

9,975

120.62

Oklahoma ….

6,454

18,418

11,964

185.37

Texas …

15,867

69,605

53,738

338.68

Wisconsin… .

7,694

14,669

6,975

90.66

Total… .

104,263

260,611

156,348

149.96

Considering the relative scarcity of capital, the rapidity with which new mileage was added from 1835 to almost the end of the 19th century is remarkable. Baltimore and Philadelphia were connected by railway in 1837 and Boston and Albany in 1842. During 1842. also, the last link in the chain of short lines connecting Albany and Buffalo was completed and the Baltimore and Ohio was extended to Cumber¬ land. In 1851 the Hudson River Railroad, fol¬ lowing the eastern bank of the Hudson from New York to Albany, and the New York and Lake Erie, connecting the west bank of the Hudson, opposite New York City, with Lake Erie, were placed in operation. The Baltimore and Ohio was extended to the Ohio River, at Wheeling, in 1853, and the Pennsylvania Rail¬ road to Pittsburgh in 1854. Buffalo and Toledo were connected by rail in 1853 and the year previous witnessed the completion of the third line between Ohio and Lake Erie, the first hav¬ ing been finished in 1848. Chicago was reached by rail in 1852 and the Chicago and Rock Island was extended to the Mississippi River in 1854. Two years subsequently, a second and a third line from Chicago westward to the

Year

Miles In Opera¬ tion

Miles

Con¬

structed

1840

2.818

516

1841

3.535

717

1842

4.026

491

1843

4.185

159

1844

4.377

192

1845

4,633

256

1846

4,930

297

1847

5.598

668

1848

5,996

398

1849

7 365

1.369

1850

9.021

1.656

1851

10.982

1.961

1852

12.908

1.926

1853

15.360

2.452

1854

16,720

1.360

1855

18,374

1.654

1856

22.016

3.642

1857

24.503

2,487

1858

26,968

2.465

1859

28.789

1.821

1860

30.626

1.837

1861

31,286

660

1862

32.120

834

1863

33.170

1,050

1864

33.908

738

1865

35,085

1.177

1866

36.801

1,716

1867

39,050

2,249

1868

42.029

2.979

1869

46.644

4.615

1870

52.922

6.078

1871

60.301

7.379

1872

66,179

5.878

1873

70.276

4.097

1874

72,393

2.117

1875

74.104

1.711

1876

76.816

2.712

1877

79.090

2.274

1878

81.755

2,665

1879

86.564

4.809

1880

93.267

6,706

1881

103.116

9,846

1882

114.685

11.569

1883

121.430

6.745

1884

125,353

3.923

1885

128.328

2.975

1886

136.346

8.018

1887

149.222

12.876

1888

156.122

6.900

1889

161.284

5.162

1890

166.703

5.378

1891

170.737

4.075

1892

175.178

4.441

1893

177.524

2.346

1894

179.423

1.899

1895

181.073

1.650

1896

182.777

1.704

1897

184.599

1,822

1898

186,818

2.219

1899

190.826

4.008

1900

194.262

3.516

1901

199.248

4,906

1902

204,368

5.120

1903

210.154

5.786

1904

215.213

5.059

1905

217.341

4.947

1906

226.227

6.067

1907

231.589

5.362

1908

232.065

3.214

1909

238.356

3,748

1910

243.107

4.121

1911

246.572

3.067

1912

249,569

2,997

1913

252,640

3,071

1914

254.172

1,532

1915

255,105

933

1916

256.204

1,098

1917

257.183

978

1918

257.905

722

SCALE

MILES OF RAILROADS IN THE UNITED STATES, 1830 TO 1919

Year

Miles in Opera¬ tion

Miles

Con¬

structed

1830

23

1831

95

72

1832

229

134

1833

380

151

1834

633

253

-

1835

1.098

465

1830

1.273

175

1837

1,497

224

1838

1.913

416

-

1839

2.302

389

-

MIL.ES OF RAILROADS. BT STATES. JANUARY 1. 1919

STATES

SCALE : 10.000

Alabama .

Arizona .

Arkansas .

California ….

Colorado .

Connecticut . .

Delaware .

Florida .

Georgia .

Idaho ……..

Illinois .

Indiana .

Iowa .

Kansas .

Kentucky …. Louisiana ….

Maine .

Maryland …. Massachusetts

Michigan .

Minnesota… .

Mississippi .

Missouri .

Montana .

Nebraska .

Nevada .

New Hampshire

New Jersey .

New Mexico … .

New York .

North Carolina . North Dakota . .

Ohio .

Oklahoma…

Oregon .

Pennsylvania Rhode Island South Carolina South Dakota .

Tennessee .

Texas .

Utah .

Vermont .

Virginia .

Washington … West Virginia .

Wisconsin .

Wyoming .

5.473

2.429

5,467

8.119

5,805

1.016

389

5.167

7.749

2,894

12.305

7.566

10.130

9.501

4,155

5.862

2.338

1,483

2.153

9,295

8,978

4.587 8,261 5,116 6.289 2.341 1.261 2.365 3,127

8.588 5,311 5,329 9,515 4,547 3,015

12.071

212

3,820

4.275

4,176

15.900

2.237

1,099

4,551

5,497

3.950

7,988

1.916

SCALE

1.000 2,000 3.000 4.000 5,000 6,000 7.000 8.000 9.000 10.000
11.000 12.000 13.000 14.000 15.000 16.000

Area In Square Miles

No. of

Mliesio eacli 36 Square Miles

51.279

3.84

113.810

.77

52.525

3.75

155,652

1.88

103.658

2.02

4.820

7.58

1.965

7.07

54.861

3.39

58,725

4.75

83.354

1.25

56,043

7.90

36,045

7.56

55,586

6.58

81.774

4.18

40,181

3.72

45.409

4.65

29,895

2.82

9.941

5.37

8.039

9.65

57.480

5.82

80.858

4.00

46,362

3.56

68.727

4.33

146.201

1.26

76,808

2.95

109.821

.77

9,031

5.02

7.514

11.32

122,503

.92

47,654

6.49

48,740

3.92

70,183

2.73

40,740

8.41

69,414

2.36

95,607

1.14

44.832

9.70

1.067

7.07

30,495

4.51

76.868

2.00

41.687

3.61

262,398

2.18

82.184

98

9.124

4.34

40,262

4.07

66,836

2.96

24,022

5.92

55.256

5.20

97,594

.71

10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000 100,000 110,000 120.000 13°-000 <40.000 150,000 160,000 170.000 180,000 130,000 200,000 210.000 220.000 230.00D 240.000 j»snnnn m 000

Rand McNally & Co,

-

v

■ A

* / i

- /

Mississippi were added and the Illinois Central was built to the junction of the Ohio and Mississippi. The Hannibal and Saint Joseph, now a part of the Burlington system of rail¬ ways, was the first line to reach the Missouri River, in 1859 ; in 1866 the Galena and Chicago was built to Council Bluffs, opposite Buffalo, and on 10 May 1869 the opening of the Central Pacific, with the Union Pacific and the railways already indicated, made it possible to travel by rail the whole distance from the Atlantic to the Pacific. Thus the outline of the American railway system was broadly sketched, the whole process being comprised within the years 1831 to 1866, or just half the (<three score years and ten,ˆ supposed to constitute the allotment of a normal lifetime. Subsequent construction has filled in this outline, adding numerous railway routes which parallel those first laid down and supplying old and new railways with ˆfeeders,® extending their services to all important sources of supplies of raw materials and manufactured products and to all considerable centres of population.

At present six great systems, not including Canadian lines which compete with them even for a substantial volume of traffic having both its origin and destination in the United States, connect the north Atlantic seaboard with Lake Erie, four of them reaching onward to Chicago and three of these operating to the eastern bank of the Mississippi over their own rails. In a railway sense, New England re¬ mains an independent province, but its rail¬ ways connect with the trunk lines and serve as collecting and distributing systems for inter¬ changed traffic. Two railways, terminating upon Chesapeake Bay, at Norfolk and at New-

independent line now in alliance with one of the northern transcontinental systems. One of these ˆgranger® railways has been extended to Puget Sound and four have built or acquired lines into Kansas City. Seven lines connect the Gulf of Mexico with Saint Louis or Chicago, while seven ˆtranscontinentalˆ svstems link the Pacific Coast with the Mississippi Valley. Seven railways serve the anthracite region of Pennsylvania .and, in the East, five are especially

characterized by heavy traffic in bituminous coal. Within this system certain railways have been developed along narrower lines and performing functions still more closely specialized, like the Virginian Railway, which is distinctively a carrier of soft coal; the Florida East Coast Railway, which handles the winter resort traffic of Florida; the Pere Marquette Railway, which is largely occupied in the service of the special agricultural pro¬ duction of the lower peninsula of Michigan, and the Bessemer and Lake Erie Railroad, which holds distinctive relations with the traffic in ore and coal between the Great Lakes and the Pittsburgh district. In addition there are many systems of minor extent which have industrial relations of less general significance but having relatively no smaller share in the economic existence of the nation.

There have been great changes in the geo¬ graphical distribution of railway mileage. In 1860 the whole region west of the Great Lakes and Mississippi River contained but 2,745 miles of line or 9 per cent of the country's mileage; in 1917 this region contained 128,733 miles or nearly 52 per cent of the total. The following table shows the changes in distribution in greater detail :

GROUP

Miles

M iles per 1 ,000 miles in whole country

1860

1880

1900

1917

1860

1880

1900

1917

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode

227

Island, Vermont, District of Columbia. Alabama, Florida, Georgia, Kentucky, Louisi¬ ana, Mississippi, North Carolina, South

10,013

21,129

29,983

32,095

327

155

129

Carolina, Tennessee, Virginia .

Illinois, Indiana, Michigan, Ohio, West Vir-

8,838

14,778

35,546

46,079

288

158

184

184

ginia . .

Arkansas, Kansas, Missouri, New Mexico,

9,030

22,645

36,704

43,040

295

243

190

172

Oklahoma, Texas .

Iowa, Minnesota, Nebraska, North Dakota,

1,162

12,515

32,744

57,303

38

134

169

229

South Dakota, Wisconsin .

Arizona, Colorado, Idaho, Montana, Nevada, Utah Wyoming .

1,560

14,884

4,324

2,992

33,924

14,056

33,246

21,649

51

160

46

175

73

133

87

California, Oregon, Washington .

23

10,389

16,535

1

32

54

66

Total .

30,626

93,267

193,346

249, 947

1,000

1,000

1,000

1,000

port News, compete for traffic between the north Atlantic seaboard and the Mississippi Valley, their services being supplemented by those of coastwise steamships with which they have traffic arrangements enabling the accept¬ ance of freight at through rates named for the combined water and rail service. Three systems connect the eastern cotton States with the Potomac River or the Chesapeake. The spring wheat States and those of the corn belt, west and northwest of Chicago, are served by six independent systems, and by a formerly

The relations of this railway skeleton to the economic resources of the country and their organization are apparent. The north Atlantic ports are the centres of export and import trade and, with the adjacent territory, are fields of great manufacturing activity. The lines which radiate from these ports distribute manu¬ factured and imported goods and bring to them raw materials and products for export. Chicago and the Mississippi and Missouri river cities are gathering centres for the food products of an area which now comprises nearly all of the

valley of the Mississippi and Missouri and stretches from the Canadian boundary to the Gulf of Mexico. Forest products for¬ merly moved from the West eastward but are now brought mainly from the South or the Southwest or from the Pacific Coast. The distinctive products of the Pacific Coast and trade to and from the Orient and Alaska seek the transcontinental lines in order to gain access to the centres of population in the East or Middle West.

The important place of the railways as a part of the economic organism of the United States may be statistically indicated. The fol¬ lowing table compares the number of employees with the total population, showing the steady increase in the proportion of the available labor of the country engaged in railway transporta¬ tion :

Railway employees

Per 10,000 of

year Population Number population

1880 . 50,155,783 418,957 84

1890 . 62,947,714 749,301 119

1900 . 76,085,794 1,017,653 134

1910 . 92,174,515 *1,699,420 184

1917 . 103,500,473 fl, 780, 235 172

* Not including employees of switching and terminal com¬ panies.

t For 458 companies operating 252,029 miles of line.

The foregoing data make no allowance for the large numbers. employed in industries, such as locomotive and car-building and coal pro¬ duction, which serve the railway industry.

All measures of national wealth are subject to wide margins of error and in a smaller de¬ gree the same is true of the effort to assign money values to the properties that constitute railway capital, but the following comparisons at least indicate approximate relations at suc¬ cessive periods :

Railway capital

Per cent of national

year National wealth Amount wealth

1890 . $65,037,091,000 $8,040,707,804 12.36

1900 . 88,517,307,000 9,035,732,000 10.21

1904 . 107,104,211,917 11,244,752,000 10.50

1912 . 187,739,071,090 16,148,532,502 8.60

Since 1893 there has been a heavy marking-up of certain elements of national wealth, particularly real estate. For example, between 1900 and 1910 the reported value of farm lands increased from $13,058,007,995 to $28,475,674,169, or 118.1 per cent, although the total area in

farms increased less than 5 percent, from 838,- 591,774 acres to 878,798,325 acres. The average value per acre indicated by these figures for 1900 is $15.57 and for 1910 $32.40, an increase of 108.1 per cent. There was no marking up of railway assets. The marking up of farm lands was made possible by the fact, among others, that while in 1900 there were 14.72 miles of ex¬ cellent and highly efficient railway per 100 square miles of farm lands there were in 1910 17.51 miles of better and more efficient railway for each equal farm area.

The utilization of railway service has in¬ creased much more rapidly than population. The following table compares the total trans¬ portation of passengers, measured in passenger miles, with the population at successive periods.

Passengers carried one mile

, - * - - - N

Per capita of

year Population Number population

1880 . 50,155,783 5,740,112,502 114

1890 . 62,947,714 11,847,785,617 188

1900 . 76,085,794 16,039,007,217 211

1910 . 92,174,515 32,338,496,329 351

1917. . 103,500,473 39,739,682,000 384

Although, as appears from the foregoing, the increase in railway passenger travel has been more than three times as rapid as that in population, the railway movement of freight has increased even more rapidly. This will ap¬ pear from the following:

Tons of freight carried one mile

Per capita of

year Population Number population

1880.. . 50,155,783 32,348,846,693 645

1890 . 62,947,714 76,207,047,298 1,211

1900 . 76,085,794 141,599,157,270 1,861

1910 . 92,174,515 255,016,910,451 2,767

1917 . 103,500,473 394,040,446,000 3,807

Thus in 37 years during which population doubled, the movement of railway freight in¬ creased 12-fold; in the last 17 years, while population increased 36.03 per cent, freight movement increased 178.28 per cent.

This augmented service has been performed at rates that, measured in purchasing power over railway labor and railway supplies, have rapidly decreased and that did not fail to de¬ crease steadily, even when measured in money, until the recent rapid decrease in the value of the circulating medium rendered some adjust¬ ment unavoidable. The following table shows the facts :

YEAR

Passenger service

Freight service

Passenger miles, per capita

Average rate per passenger mile, in cents

Average payment per capita

Ton-miles per capita

Average rate per ton-mile in cents

Average payment per capita

Total payment per capita

1880 .

114

2.442

$2.78

645

1.232

$7.95

$10.73

1890 .

188

2.167

4.07

1,211

.941

11.40

15.47

1900 . •. .

211

2.003

4.23

1,861

.729

13.57

17.80

1910 .

351

1.928

6.77

2,767

.763

21.11

127.88

1917 .

384

2.103

8.08

3,807

.728

27.71

135 . 79

- »4-i.x*vs * •

.QIl . > > ”•» “

•» /’* > iV5 *

* v v«t

‘■\V% ajtyw» »’%’

Copyright, Underwood & Underwood, New York

, * /modern 3000 volt locomotive built for the Chicago, Milwaukee and Saint Paul Railway, which has 400 miles of

electrified track in the Rocky Mountains

2 A modern 2400 volt locomotive for Chile, to be used on the railroad of the Bethlehem Chile Iron Mines Company. This is a very large locomotive — the same general type as used on the 400 miles of electrified road of the Chicago. Mi.waukee and Saint Paul in the Rockies 6 *

Analysis of the foregoing shows that the average American paid about three and one-third times (333.55 per cent) as much for rail¬ way service in 1917 as in 1880 but obtained, in 1917, about six times (590.23 per cent) as much freight service and about three and one-third times (336.84 per cent) as much passenger service. Since 1900 the total payment, in money, has about kept pace with the increase in travel and traffic movement, but the value of the monetary unit has so decreased that railway service is almost the only commodity which has not increased in price. The wages of a day's labor in any industry and the product of a day's labor or of a dollar of capital or of an acre of land in almost any industry would buy vastly more railway service in 1917 than in 1900. For example, the following values of American wheat, stated by the Secretary of Agriculture, are compared with railway rates :

Wheat —

Average farm price,

per bushel .

Average value of yield, per acre…

Railway Services —

Average rate per passenger mile …

Average rate per

ton-mile .

Wheat and Railway Service - —

Passenger miles per bushel of wheat . .

Passenger miles per acre of wheat ….

Ton miles per bushel

of wheat .

Ton miles per acre

of wheat . 1 , 043 .90 3 , 909 . 34

The foregoing are not exceptional, they are typical ; there is no commodity of commercial importance which will not show substantially similar results.

The results illustrated above have-been ren¬ dered possible only by the enormous improve¬ ments in the science and art of railway trans¬ portation which the managers' of American rail¬ ways have achieved. Nowhere else in the world have comparable results been accom¬ plished. American railwav men have been pioneers in fields exclusively their own and have so far succeeded that the American rail¬ way system was able, at the end of 1917, to handle far greater tonnage with relatively lower expenditure of power, including labor and fuel, at a lower capital cost per unit of traffic, and to carry both passengers and freight at the lowest rates in the world while paying the highest rates of wages anywhere received by men similarly qualified. The summary of this evolution is in the average train load of freight carried during successive years for there are few exceptions to the rule that every im¬ provement possessing genuine economic value ultimately resolves itself into higher train capacity. The data of the following table are, therefore, of the utmost significance.

The last increase, from 1915 to 1917, must astonish anyone not fully conversant with the railway conditions of 1917. The last contri¬ bution of private railway management to American efficiency in war was an increase in transportation of commodities per average train-mile of 145.55 tons in two years, or more than 50 per cent greater increase than that of any previous period of five years, with a per-

1900

1917

• Increase per cent

$0,619

$2,009

224.56

7.61

28.46

273.98

.02003

.02103

4.99

.00729

.00728

Decrease

30.90

95 . 53

209. 16

379.93

1,353.30

256.20

84.91

275.96

225.00

vol. 23 — 12

Average Freight-Train Load.

Increase, five-years period

year Tons Tons Per cent

1890 . . 177.42 .

1895 . 189.69 12.27 6.92

1900 . 270.86 81.17 42.79

1905 . 322.26 51.40 18.98

1910 . 380.38 58.12 18.04

1915 . 474.45 94.07 24.73

1916 . 534.95 *60.50* 12.75

1917 . 620.00 fl45 . 55 f30.68

* One year, only, t Two years, only.

centage increase for the two years greater than the percentage increase of any five years' period since the year 1900. Of this increase of 145.55 tons, no less than 85.05 tons increase, or 58.43 per cent of the total, was obtained during

1917.

The more salient features of the evolution by which such results have been attained are the addition of multiple tracks, including yard and terminal tracks, in order to secure more rapid handling of trains and cars and cargoes ; strengthening of roadbeds, bridges and other structures to enable the use of heavier locomo¬ tives having increased tractive power ; increas¬ ing the power of locomotives and the capacity of cars in order to concentrate greater tonnage in fewer trains, requiring less power and smaller track and terminal space ; reducing grades and lengthening the radii of curves in order to augment the efficiency of locomotives of given tractive power.

Some of these improvements are susceptible of statistical admeasurement. The propor¬ tionate mileage of additional tracks is shown below :

Additional tracks per 100 miles of line, in

miles —

1894

1904

1914

1917

Second track .

5.87

7.46

10.76

11.96

Third track .

.53

.69

1.05

1.11

Fourth track .

.40

.49

.81

.89

Yard track and sidings. .

23.88

31.34

38.32

41.72

Total, all extra

tracks .

30.68

39.98

50.94

55.68

Increase in the power of locomotives be¬ gan with the increase in the boiler pressure from 185 pounds to 220 pounds. With this ac¬ complished, progress theretofore considered im¬ practicable became a matter of developments in design and augmented size. The following shows what has been accomplished since 1902 :

Number of Average Tractive power, in pounds

loco-weight - - - -

YEAR motives in tons Average Total

1902 . 41,225 56.3 20,354 839,073,779

1907 . 55,388 69.1 25,811 1,429,636,658

1912 . *61,010 77.0 28,634 1,746,964,128

1917 . 63,828 89.5 33,617 2,145,698,000

* Excludes locomotives owned by switching and terminal companies, 534 Mallet locomotives and 718 unclassified locomotives.

Derived from the foregoing, the following percentages establish rates of development which show no slackening during the period of private management.

Increase, per cent

1902 to

1907 to

1912 to 1902 to

1907

1912

1917 1917

Number of locomotives.

34

.36

10

.15

4

.62

54.

83

Average weight .

22.

74

11.

43

16.

23

58.

97

Average tractive power.

26.

81

10.

94

17.

40

65.

16

Total tractive power …

70.

38

22.

20

22.

82

155.

72

178

During the same period the number and capacity of freight cars have increased as fol¬

lows :

Capacity, in tons

Number - 1 — * - n

year of cars Average Total

1902 . 1,546,101 28 43,416,029

1907 . 1,991,557 34 67,216,144

1912* . 2,215,549 37 82,976,895

1917 . 2,384,765 40 94,590,533

* Does not include cars owned by switching and terminal companies.

The foregoing shows an increase, for the 15 years' period, of 117.87 per cent in total freight car capacity, achieved by an increase of 54.24 per cent in the number of cars and an increase in average capacity per car of 42.86 per cent. The great value in the large car lies in the smaller proportion of the weight of the car to the paying load and the reduced effort required to move a load concentrated upon a relatively short aggregate wheelbase due to lessening of frictional resistance and air pressure.

Improvements in track and structures, sig¬ naling apparatus and methods of operation have kept pace with the more easily measured development of motive power and cars. Freight as well as passenger cars are now equipped with automatic couplers and air brakes. Safety ap¬ pliances have been developed and standardized as to type and position.

The aggregate amount of work performed per mile of line has increased with the develop¬ ment described and suggested, with the follow¬ ing results :

Per mile of railway line

- A - - - N

Passengers Tons

YEAR carried freight

one mile carried one mile

65,434 368,757

72,421 465,822

82,955 732,362

134,498 1,060,635 157,678 1,563,472

1880

1890

1900

1910

1917

The operating and financial results obtained may be further summarized as follows :

Per $1 available for

Per $100 of capital return upon investment

Passengers Tons Passengers Tons

carried carried carried carried

year one mile one mile one mile one mile

1890 . 156 1,006 36 232

1900 . 168 1,483 34 297

1910 . 226 1,779 39 309

1917 . 236 2,342 41 405

The period of inflation that accompanied and followed the Civil War had its natural reaction in the financial panic of 1873 and the years of business depression that ensued. The difficulties of this period produced the custom¬ ary crop of politico-economic fallacies, includ¬ ing ˆGreenbackism,® the precursor of the free-silver movement of 1896 and ˆGrangerism.® The latter, in its inception an agrarian move¬ ment, assumed many phases most of them ephemeral, but left its permanent impress upon American legislation in the form of laws con¬ trolling railway charges and services. As the proponents of these laws proclaimed them as curatives for nearly all social and economic discomforts, they inevitably proved disappoint¬ ing and were successively amended until by the

end of 1917 it was generally true that prompt adjustments of rates to such sudden and urgent conditions as those arising from the rapid rise in the cost of the labor, materials and supplies required in railway operation had become im¬ possible.

Private management of American railways was temporarily suspended at the end of 1917 by a proclamation of President Wilson, exer¬ cising an emergency power conferred to provide for the great exigencies of war, issued on 26 Dec. 1917. By this exercise of supreme authority all the railway properties, save a very few of the least importance, were taken into the possession of the Federal government which operated them through a director-general whose legal status was that of a direct repre¬ sentative of the President and whose respon¬ sibility was only to and through the President. The conditions which sanctioned this

temporary expropriation are much misunderstood although they are not difficult of discovery or compre¬ hension. By the end of 1917 every American industry had experienced enormous advances in its operating expenses by reason of advances in wages and in the prices of articles required as raw materials or for use in operation. All industries except the railways, and a few others subjected to similar public regulation, had made compensatory advances in prices and were en¬ joying an unprecedented degree of prosperity. The wages of railway labor and the prices of railway supplies had advanced with everything else but control of railway rates had been vested in the Interstate Commerce Commission and in the several State railroad commissions and without their express consent the necessary rate adjustments could not be made. The processes of these bodies were slow and their temper reluctant. While the railways waited for relief through official action the threat of financial disaster impended with increasing imminence, their credit faltered and it became evident that the fiscal condition of the railways might be¬ come an impediment to the financing of the war. The President recognized the situation, and having emergency power to take possession of the railways, as a war measure, although he had none to expedite or control the various commissions whose methods made the more radical step expedient, exercised his authority by taking the properties from their owners and vesting their management in a Federal officer, responsible only to himself. By this means he was able to provide for an almost immediate adjustment of rates of fare and freight, by increases regarded as adequate to compensate for increases in necessary costs of operation, and in the meantime to provide that the deficits should be borne out of the public funds. It cannot be too often or too strongly stated that the financial conditions resulting from public regulation were the sole cause and must forever constitute the sole justification for this step. The railways had never functioned as efficiently as throughout the 12 months which ended with 31 Dec. 1917 ; they did not, all things considered, function with in any degree su¬ perior efficiency during 1918.

By an Act of Congress, approved by the President on 21 March 1918, the conditions of this Federal possession were fixed and its dura¬ tion limited to the duration of the war with the Central Powers and 21 months thereafter,

subject to the discretionary power of the Presi¬ dent to relinquish possession at an earlier date. The constitutional right of the owners of the properties to ((just compensation" was protected, in the same act, by a grant of jurisdiction to the Court of Claims to entertain and determine suits to fix damages for such taking and use of corporate property, but provision was also made for contracts guaranteeing remuneration equivalent to the average earnings of the three years' period that ended with 30 June 1917. By the end of the first quarter of 1919, such con¬ tracts had been negotiated between the Federal authorities and a considerable number of the more important railway corporations, but there were still many which had not accepted the terms offered or as to which negotiations had not been pressed to completion.

The sudden transformation from private management, subject to public regulation, to public management, thus effected produced an entirely novel series of problems the charac¬ ter and dimensions of which are only begin¬ ning to become capable of recognition. They involved fundamental questions of public policy, of political and economic institutions and will require decisions which must be made within a brief period, that are certain to affect the moral and material welfare of the people for many generations. The American people have not been committed to and certainly do not desire gov¬ ernment ownership or operation of their rail¬ way system. In proclaiming the assumption of possession by the Federal government, the President declared his purpose to preserve the operating organizations and their personnel and to do nothing to impair the rights of ownership. Congress supplemented this by an explicit legislative disclaimer of any purpose even to lay a foundation for a permanent change of ownership or of immediate control. Moreover, as the experiment continued it became in¬ creasingly evident that it offered nothing of attraction adequate to replace the advantages experienced during the long period of progress under regulated private management.

Bibliography. — Daggett, S., Nailroad Re¬ organization (Cambridge, Mass., 1908) ; Davis, E. A., Nationalization of Railways) (London 1908) ; Droege, J. A., (Freight Terminals and Trains' (New York 1912) ; Edwards, C., Nail¬ way Nationalization (London 1898) ; Haney, L. H., (A Congressional History of Railways' (Madison, Wis., 1908) ; Hooper, W. E., Nailroad Accounting) (New York 1915) ; Johnson and Huebner, Nailroad Traffic and Rates' (New York 1911) ;

Johnson, E. R., Nrinciples of Railroad Transportation' (New York 1916) ; Mossop, C. P., Nailway Operating Statistics) (London 1911); Pratt, E. A., Nailway Nationalization (London 1908). Consult also Poor, (Manual of Railroads' (annual) ; Inter¬ state Commerce Commission, (Annual Reports' and Statistics of Railways of the United States' (Washington, D. C.).

H. T. Newcomb,

Author of (Railway Economics, ' *etc.*

RAIMOND, ra'mond, C. E. See Parkes, Elizabeth Robins.

RAIMONDI, ri-mon'de, Marc Antonio

(Marcantonto), Italian copperplate engraver : b. Bologna, about 1480; d. there, about 1534ˆ He acquired the goldsmith's art in France and

was especially successful in niello, but finally gave all his attention to engraving on copper. In 1505 he went to Venice and attracted atten¬ tion by his copy on metal plate of Diirer's Nife of the Virgin.' He was later attracted to Rome, where Raphael soon selected him as the engraver of his pictures. After Raphael's death Giulio Romano commissioned him to make plates from 20 of his best paintings, but having reproduced some licentious designs of that artist, Pope Clement VII ordered the plates to be destroyed by the public executioner and Raimondi was cast into prison. He was re¬ leased through the intercession of the sculptor Bandinelli, and to show his gratitude Raimondi made a copy in line engraving of Bandinelli's (Martyrdom of Saint Lawrence.' Losing his property in the sack of Rome (1527) he re¬ turned to Bologna, where he died a few years later. The value of his engravings after Raphael lies in the fact that they were executed under that artist's eye, and were many of them copies, not of completed pictures, but of rough draughts and tentative designs, which but for these copperplate reproductions would have been lost to the world. Being thus brought in intimate relation with the painter's methods, he became the best interpreter of Raphael in black and white, and no engraver has so completely entered into the spirit and power of expression which breathe in the canvas of the greatest Italian painter. His best engravings after Raphael include (Adam and Eve' ; Nod Com¬ mands Noah to Build the Ark' ; (The Massacre of the Innocents' ; (Mary with the Dead Christ' ; (The Judgment of Paris' ; (The Three Doctors of the Church.' Consult

Delaborde, (Marc-Antoine Raimondi' (1887).

RAIMUND DE SABUNDE, ri'moond da sa-boon'da, scholastic philosopher : b. Barcelona. In 1436 he appears at Toulouse as a teacher of medicine, philosophy and theology, and he labored especially to reconcile the apparent con¬ tradictions between nature or reason and the Bible, an undertaking which led him into the realm of mysticism. In his (Liber Creaturarum seu Theologiae Naturalis' he applied this prin¬ ciple so as practically to reconstruct the whole system of Church doctrine. He and his system have been discussed by Matzke (1846), Huttler (1851) and F. Nitzsch in the (Zeitschrift fiir historische Theologie' (1859).

RAIN (Lat. rig are; Gk. Bpexˆv, to wet), water dropping through the atmosphere. A mass of air in the atmosphere always contains some aqueous vapor, and if this air is cooled below a certain temperature, called the dew¬ point (which depends on the amount of vapor present), the vapor will condense into drops of water. The cooling may be due to radiation of heat to colder regions or to mixture with colder masses of air. When air rises in the atmosphere to colder regions, or comes in con¬ tact with a cold part of the earth, or passes from equatorial to polar parts of the earth, its moisture tends to condense into rain. In con¬ sidering the probable rainfall of a place we are concerned with its latitude, its elevation above the sea, its proximity to the sea, the laws affect¬ ing its seasonable variations, the prevailing winds and the configuration of the surrounding surface. Low latitudes have in general a heavy rainfall, because of the greater evaporation in

tropical regions, and the consequent formation of rain when the clouds due to evaporation get colder in the higher regions of the atmosphere. Hence also winds blowing from the equator are generally moist and winds blowing to the equator are generally dry. The presence of forests tends to increase the rainfall (see Meteorology), and the rain further encourages vegetation. Over the ocean the skies are clear where the trade-winds are blowing steadily, and heavy rain

falls by day in the zone of calms ; on land there is a regular alternation of dry and wet seasons. Toward the equator, where there is a considerable interval between the two passages of the sun across the zenith, there are two rainy seasons. In monsoon re¬ gions, however, the alternation of dry and wet seasons depends on the winds. Beyond the tropics we have variable winds and variable rainfall. The following table gives recent figures for the mean annual rainfall of a num¬ ber of stations in various parts of the world :

Greytown (Nicara—

Inches

Perth (Australia) …

Inches

32

gua .

260

Saint John

Freetown (Sierra

(New Brunswick)

31.75

Leone) .

125.8

Ottawa .

31.4

Rangoon .

99

Rome .

30.6

Bahia .

95.1

Berlin .

29.98

Batum .

93

Liverpool .

29.01

Rockingham Bay

Dublin .

28.4

(Queensland) .

90

Edinburgh .

28.32

Colombo .

88

Algiers .

26.72

Astoria (Oregon) …

86.3

Charlottetown .

26.71

Saigon .

82.96

Melbourne .

26.6

Nagasaki .

77.6

Smyrna .

25.63

Bergen (Norway) . .

73

Cape Town .

25.01

Batavia .

71.4

London .

25

Bombay .

70.3

San Francisco .

24.08

Vera Cruz .

67.9

Vienna .

23.42

Calcutta .

65.6

Nairn .

23.3

Tokio .

60.4

Bathurst …

23

Manila .

55.2

Mexico .

22.9

New Orleans .

55.17

Bloemfontein .

21.29

Saint John’s (New—

Moscow .

21.1

foundland) .

52.9

Upsala .

21.1

Brisbane .

52.36

Lahore .

21

Sydney .

49.86

Adelaide .

20.25

Madras .

48.69

Winnipeg .

20.12

Havana .

46.5

Marseilles .

20.08

Quebec .

46.07

Paris …

19.68

Glasgow .

45.4

Saint Petersburg …

18.8

Halifax

Tobolsk .

18.6

(Nova Scotia) ….

45.34

Kimberley .

18.26

New York .

44.76

Irkutsk .

16.5

Auckland .

43.62

Denver .

14.9

Saint Louis .

40.69

Santiago (Chile) ….

14.1

Durban .

39.48

Odessa .

14

Montreal .

39.28

Yakutsk .

13.7

Bogota .

39

Valparaiso .

13.5

Pietermaritzburg …

38

Vladivostok .

13.2

Chicago .

37.57

North Cape .

10

Kingston

Regina .

8.38

(Jamaica) .

35.79

Okhotsk .

7.5

Toronto .

34.4

Yuma (Arizona) ….

2.9

Buenos Aires .

34. 1

Cairo . *…

1.34

Belfast .

34

Walfisch Bay .

.3

It has been proven that rain has a most cleansing effect on the atmosphere, a five days' rainfall in London, England, having carried off not less than 3,738 tons of solid impurities, in¬ cluding 267 tons of sulphate of ammonia, and 2,000 tons of soot and suspended matters.

Rain water would be a chemically pure water but for the variety of impurities which it col¬ lects from the atmosphere in its descent. These include dust, soot, fungi spores, pollen, *etc.* Rain water also carries a small amount of nitro¬ gen, ammonia, oxygen and carbonic acid gas, and in certain areas, usually over large cities, there are also present minute quantities of nitric acid and sulphuric acid. Rain water thus car¬ ries several of the necessities of plant and

animal life to the earth's surface. It becomes safely potable for man only after filtration through the earth's strata, whence it emerges in springs, artesian wells, *etc.* Until about 1850 scientists supposed rain to be due to the mix¬ ture of cold and warm bodies of moisture-laden air. Espy first propounded the theory that it was due to the cooling of the atmosphere under the expansion of the more heated portions of

air. Lord Kelvin and others soon proved this theory correct. When air expands on the with¬ drawal of pressure the work done in expansion is evidenced by a lowered temperature of the expanding air. By convection the warm moisture-laden air ascends and in the course of its ascent is gradually cooled until it reaches the point at which its temperature is the dew¬ point of the original air. Cloud is then formed and if the moisture is abundant the smaller particles coalesce into drops and fall rapidly as rain. If they do not coalesce they may continue to reach higher areas until they become ice particles. The seasonal distribution of rain¬ fall is of greater moment to the agriculturist and stockraiser than the total annual amount. The ideal, seldom attained, would be an equable division of temperature, rain and sunshine throughout the year. For details of the dis¬ tribution of rainfall throughout continental United States consult Henry, A. J., (Rainfall in the United States) (in WVeather Bureau Bulletin DC Washington, D. C., 1879); Rain¬ fall and Charts of Rainfall* (in Monthly Weather Review, ib., April 1902); and Wallis, B. C. (in Monthly Weather Review, ib., Jan¬ uary, April, June issues 1915).

RAIN-BIRDS, various birds so called be¬ cause of their observed or supposed connection with rains or the foretelling of wet weather. The cuckoos seem to be most widely credited with foreknowledge of storms, as they are in the habit of calling most noisily at such times. Thus the yellow-billed cuckoo (see Cuckoo) is called ˆrain-crow® in the Southern and Western States. Further southwest and in Mexico and Central America the name is given to the anis; while in the West Indies two or three other cuckoos are so termed. These are fa¬ miliar species of the genera Saurothera, Hyetor-nis and Piaya, the last named extending over most of the Andean region. The rain-bird of India is a quail (Coturnix Coromandelica) , which recalls one of the names, <(wet-my-lip® of the American eastern quail ; and that of the Malay region is one of the broadbills (Cym - horynchus) . In England the green woodpecker is called ((rain-bird)) ; and in the Orkney Islands one, the loons, especially the red-necked, is known as ˆrain-goose.® The prophetic power of the birds is exaggerated in popular estima¬ tion ; but probably they do somewhat perceive a coming change of weather, especially of in¬ creased moisture, and those, like the above men¬ tioned, which are naturally noisy, do then call more loudly and frequently than usual.

RAIN-GAUGE, or PLUVIOMETER, an

instrument which measures the depth of the rainfall. In its commonest form it consists of a cylindric vessel closed at the top by a funnel-shaped lid, through a hole in the centre of which the rain falls. A

narrow glass tube, rising outside the vessel from near the bottom,

shows by the height of the water in it the height of the water in the vessel itself. A very simple rain-gauge consists of a copper funnel, the area of whose opening is exactly 10 square inches. This funnel allows the rain to pass into a bottle, and the quantity of rain caught is ascertained by multiplying the weight in ounces by 0.173, which gives the depth in inches. The Weather Bureau at Washington has perfected several forms of rain-gauge for more accurate observation. One of these weighs the water as it accumulates in the receiver and records regularly the gain in weight on a moving strip of paper. In regions where the rainfall is very slight there is a demand for gauges that will record the entire fall for a month or three months, and such have been made to meet these special demands. As a rain-gauge is nearer the ground it is found to indicate a greater rainfall. This is partly due to the cold rain¬ drops getting larger in falling through the very moist air near the ground and partly to the greater occurrence of eddies about the gauge at greater heights. Hence, when the rainfall at two places is to be compared, the gauges ought to be similarly situated. A rain-gauge must be placed in as open a position as pos¬ sible, out of the way of houses, trees and similar objects that may deflect the falling drops.

RAIN-MAKING. The problem of rain¬ making, or bringing rain from the clouds in a season of drought, has in all ages been of the greatest interest to humanity, as lack of ex¬ pected rain has assisted in producing many famines and the loss of many millions of lives. Attempts have been made to bring rain by ap¬ peals to Divine Providence in prayer in Chris¬ tian countries, while the ignorant heathen prac¬ tise various forms of fetishism, and even offer up human sacrifices with the same object. Owing to the large extent of arid lands in the United States the question of bringing about rain by scientific processes has often engaged attention. It was noted that for¬ est fires have often been followed by rain, and in 1834 James P. Espy of Pennsylvania proposed the building of enormous fires in the regions where rain was desired to bring about the needed showers. This was re¬ garded as impracticable both in America and in Australia, where it was also suggested. That great battles, and sometimes lesser ones,

attended by cannonading, were occasionally fol¬ lowed by heavy rainfalls has long been a popu¬ lar belief, and this gave origin to the opinion that explosions similar to those of artillery might bring about rain in a season of drought. This belief did not apparently take into ac¬ count the circumstances that important battles are usually fought in temperate regions, with normal rainfall, and where a disturbance of the atmosphere might easily bring a downpour from the skies. It is also averred by the opponents of this theory that the number of battles fol¬ lowed by rain has been comparatively small ; and we now know that the tremendous quanti¬ ties of explosives used in the World War had no appreciable effect on rainfall. In 1891, how¬ ever, Congress made an appropriation for a series of experiments in Texas, which were conducted by General Dyrenforth for the De¬ partment of Agriculture. There has been much

controversy as to the effect of these experi¬ ments which were conducted on the theory of provoking rainfall by concussion caused by ex¬ plosions, giant powder being the explosive used. General Dyrenforth claimed that the experi¬ ments were entirely successful, that the drops sometimes commenced to fall within 12 seconds after the initial explosion, and that (<the con¬ cussions from explosions exert a marked and practical effect upon the atmospheric conditions, in producing or occasioning rainfall, probably by disturbing the upper currents.® On the other hand, Prof. A. H. Hazen, basing his views on the newspaper reports of the experiments, argued that there was no evidence whatever that any rainfall had been produced by the ex¬ plosions, while W. K. Curtis, M.D., who was with the Dyrenforth party, substantially con¬ firmed Professor Hazen's view, and declared that rain fell before the experiments had be¬ gun. The weight of evidence was generally accepted by the public as supporting the views of Hazen and Curtis, and while the theory that rain frequently follows aerial explosions has not been wholly abandoned, no serious efforts have been made to follow up the experiments of General Dyrenforth. See Meteorology.

RAIN PRINTS, slight depressions made in mud surfaces by falling rain drops. They are usually formed only during showers in which but few very large drops of rain fall. If they are buried beneath drifting sand or clay they may be preserved as little pits on the surface of a rock layer, or as protuberances on the under surface of the layer above. They cannot occur in rocks laid down in the sea. They may sometimes be used to tell top and bottom of a rock layer.

RAINTREE, a leguminous tree (Pithe - colobium saman) of tropical America, now largely planted in India for the shade it fur¬ nishes, and because it flourishes in barren salt-impregnated soils, as well as for its sweet pulpy twisted pods, which are greedily eaten by cattle. Another species (P. dulce) with edible pods is a native of Mexico, but has been intro¬ duced into the Philippine Islands and also into India.

RAINBOW. The rainbow is the best known of all optical meteorological phenomena, consisting of a colored arch formed opposite the sun on falling raindrops, and visible when¬ ever the necessary conditions of a passing shower on one side and a clear and not too high sun on the other occur. Two bows are frequently seen, each exhibiting the full spec¬ trum of colors from red to violet; but in the inner or primary bow the red is the outer edge and violet the inner, while in the outer or secondary bow the order is reversed, the red being inside and the violet on the exterior. The colors are always arranged in a definite order, that of the solar spectrum — namely, red, orange, yellow, green, blue, indigo and violet, but shade imperceptibly into each other. The cause of this breaking up of the sunlight into its constituent colors is explained in most physical and meteorological textbooks, but may be briefly summarized as follows :

For the primary bow (Fig. 1), let PQR rep¬ resent the section of a raindrop, and SP a ray of light falling on it. The ray enters the drop at

P, meets the surface again at R, is reflected to

Q, where it leaves the drop in the direction of QE. The ray is refracted or bent on entering the drop at P and again on emerging at Q — the amount of this refraction depending on the acuteness of the angle at which the ray meets the surface. Now it may be shown that there is a particular point P, such that any ray from S striking the surface below P emerges again above Q, and any ray above P also emerges above Q — the former owing to the more acute angle of the reflection, and the latter to the greater refraction on entering and leaving the drop. The course of two such rays is shown by the dotted lines in Fig. 1. Q is thus a turn¬ ing-point in the emerging rays, and near it a

Fig. l.

very large number of rays pass out, and an ob¬ server at E sees a bright image of S in the direction EQ. This statement applies to any one color of sunlight; but, as the refrangibility increases from red to violet, the latter is bent more at P and Q, and the line EQ lies at a flatter angle. The observer, therefore, sees the violet rays reflected on drops at a less altitude than those that reflect the red, the other colors being intermediate. The raindrop being spher¬ ical, this reflection takes place in all directions, the fixed condition being the radius of the bow, that is the angle between the line from the observer to the bow and that passing from the sun to the observer, or, in other words, the ob¬ server's shadow. For red light this angle is 42° 39', and for violet 40° 13b If the sun were a luminous point each color would be sharply defined, but as the disc of the sun subtends an angle of about 30' each color is broadened to this amount, and they overlap.

Exactly similar reasoning explains the sec¬ ondary bow (Fig. 2). The light that forms it

has been twice reflected, at R and at R' ; the point Q lies above P, and rays entering either above or below P all emerge below Q. A glance at

the diagram will show that the greater bend¬ ing of the more refrangible rays makes the line

EQ more nearly vertical, and, therefore, the vio¬ let rays form the outer edge and the red the inner of the secondary bow. The radius of the red is 50° 5’, and of the violet 54° Ob The space between the bows gets no reflected light, but that inside the primary and outside the sec¬ ondary is faintly illuminated by rays such as are indicated by the dotted lines in Fig. 1 and their equivalents in Fig. 2, which are not shown. These rays ˆinterfere** with each other, and cause alternations of color which appear as spurious bows inside the primary and outside the secondary. They can only be seen with strong sunlight and small drops of rain.

The radius of the primary bow being roughly 40°, it is evident that it cannot be seen when the sun is at a greater elevation than this, as the highest part of the bow would lie below the horizon. See Light.

RAINBOW ARCH, Utah, a superb natural arch of red sandstone spanning Bridge Canyon on the north slope of Navajo Mountain in the southeastern corner of the State, at a point four miles above where that canyon empties into the Colorado River 16 miles below the mouth of the San Juan River. The arch rises 309 feet from the bed of the stream below. The abutments are 278 feet apart and

Rainbow Natural Arch, Southeastern Utah.

its width on top is from 33 to 42 feet. It could easily span the dome of the Capitol at Washington and very nearly overtop the Flat¬ iron building in New York. It has been made a national monument by the United States government. It is in a part of’ the Navajo country given over to the use of the Piute Indians, who called it Barohoini or rainbow. The Navajoes call it Nonnezoshe or stone

arch. Near one abutment are remains of an Indian altar doubtless built for worship of the arch, for it is held in great reverence by the Indians.. The arch is eroded from buff colored fine-grained sandstone, brick red upon its sur¬ face but stained darker in vertical streaks, a part of the upper La Plata sandstone of Jurassic Age. It was discovered by W. B. Douglass of the United States Land Office on 14 Aug. 1909. _ The arch may be reached from Gate, Utah, 37 miles distant in a straight line, by several days of hard riding. Gate is 180 miles north of Gallup on the Santa Fe Railroad or 140 miles from Dolores, Colo. Consult Pogue, J. E. (in National Geographic Magazine, Vol. XXII, pp. 1048-56, 1911).

RAINBOW (42d) DIVISION, The. For

a number of years before the World War dis¬ cussions have periodically taken place in our newspapers whether our national guard was sufficiently efficient to be of real use to the nation. The Rainbow (42d) Division seems to be a very decisive answer and emphatically in the positive. For valor and effectiveness in the battlefields, of France the ranks of the Rainbow Division take second place to none. Under authority of the Act of 18 May 1917, the 42d Division was organized in compliance with memorandum of the chief of staff for the adjutant-general of the army, dated August 1917. At its inception it contained 887 officers and 26,265 men. The division was made up of national guard troops drawn from all over the LTnited States. It was composed as follows : Division headquarters and headquarters troop ; 83d infantry brigade (165th, 166th infantry regiments and 150th machine gun battalion) ; 84th infantry brigade (167 th, 168th in¬ fantry regiments and 1 5 1 st machine gun batr talion) ; 67th artillery brigade (149th, 150th and 1 5 1 st artillery regiments, 1 1 7th trench mortar battery) ; 149th division machine gun battalion, motorized; 117th engineer regiment; 117th engineer train; 1 17th field signal battalion; 1 1 7th train headquarters and military police; 117th supply train; 1 1 7th ammunition train; 117 th sanitary train. These newly-created Federal units were made up from the following national guard troops : 4th regiment infantry (Alabama)

; 1st separate battalion engineers (California) ; field hospital company No. 1 (Colorado) ; field hospital No. 1 (District of Columbia) ; Companies B, C and F, 2d infantry (Georgia) ; 1st field artillery (Illinois) ; 1st regiment field artillery (Indiana) ; 3d infantry (Iowa) ; 1st ammunition train (Kansas) ; 1st separate troop (Louisiana) ; 1st ambulance company (Michigan) ; 1st field artillery (Minne¬ sota) ; battalion signal corps (Missouri) ; field hospital company No. 1 (Nebraska) ; ambulance company No. 1 (New Jersey) ; 69th infantry (New York) ; engineer train (North Caro¬ lina) ; 4th infantry (Ohio) ; ambulance com¬ pany No. 1 (Oklahoma) ; field hospital company (Oregon) ; 3d battalion of 4th infantry (Penn¬ sylvania) ; 1st battalion engineers (South Caro¬ lina) ; ambulance company No. 1 (Tennessee) ; supply train (Texas) ; 1st and 2d companies, coast artillery (Virginia) ; Companies A, F and G of 2d infantry (Wisconsin)..

The headquarters of the division was or¬ ganized at Camp Mills, Long Island, where it functioned for a short period. Major-General

Wm. A. Mann was in command till 14 Dec. 1917, when he was succeeded by Gen. Charles T. Menoher.

Considerable doubt was expressed by some experts as to the outcome of such an un¬ precedented fusion of citizens of such diver¬ sity of States into one body of fighting men, the fear of dissensions among them from local jealousies and differences of viewpoints. But the officers tell of the very pride of locality of origin made a rivalry to the Westerners to out¬ shine the Easterners, while the South and far North joined in the determination to uphold the fame of their sections of the States. And the emulation engendered a flame of patriotism on the field of battle that allowed no obstacle to delay the brave division's advance. The insignia of the division, worn during battle, was a rainbow superimposed on a field of black, carried on the left shoulder. Certainly a perfect symbol of the complex makeup of the unit, and the blending of the prismatic many-colored rays was admirably exemplified in the concord displayed by its members. Twenty-six different States and the District of Columbia were represented at first but later replacements brought in members (by volun¬ tary enlistment or by draft) from nearly every other State in the Union.

The first units sailed for France from Hoboken, the first ship being the Covington, on 18 Oct. 1917. The last units arrived in France on 7 Dec. 1917. Being already partly trained by their membership in the

national guard, the term of their final practice before taking an active part in the fighting line was short. And by 27 March 1918 we are told that after ((just completing a month's tour at the front® in the trenches they were assigned to occupy a sector on their own account near Baccarat. Here they maintained their front (about 15 kilometers) for three months in con¬ stant contact with the attacking Germans and suffering an average of 14 casualties per day, aitillery and patrol activities on both sides be¬ ing fierce in May. After the first few weeks No Man's Land in front of the combatants had become controlled by the 42d after having been dominated by the Germans till the Amer¬ icans' arrival, and already Huns were being made prisoners. The division was withdrawn from this sector 21 June, and transferred to a position east of Rheims after having (as Com¬ mander Menoher later informed them in a congratulatory speech) ((served continuously as a division in the trenches for a longer time than any American division.® They were also the first American division to hold a division sector. And all this without previous experi¬ ence in actual warfare. On their new front in the Champagne sector, under General Gouraud of the 4th French army and as part of the 21st French corps, a fierce attack in force of the Germans on the 15th July was repulsed. On the following day a terrific bombardment was followed by an infantry attack of the enemy which gained no ground but met a loss to the Germans of 27 prisoners and some machine guns, not to mention many dead left behind on their retreat. This brilliant work called for congratulations from the French commander, and, it appears, the Kaiser was present in this sector to see his 25 picked divi-184

sions break through here and make their last drive on Paris. It has been estimated that altogether 5,500 cannon had been in action dur¬ ing the engagement. The 167th infantry and the French mortar battery (Tennessee) were conspicuous for bravery in the action. No prisoners and none missing figured in the casualties. The French mortar battery ran out of ammunition, but Captain Gill in ‘command offered his services to the French chief in pref¬ erence to retiring, for which gallant act he was later decorated by General Gouraud. In the last week of July the Rainbow Division, the German advance being checked, was with¬ drawn to the Chateau Thierry section to relieve exhausted divisions who had been resisting the drive of the army of the Crown Prince. They first encountered the enemy at Trugny and drove forward toward the river Ourcq, which, on the 27th, they attempted to cross, but were driven back by heavy artillery fire. On the 28th they forced the passage ; by 9 o’clock in the morning reaching their objectives of the day from Hill 212, later taking Sering-es-et-Nesles, Nesles and Sergy in the face of the most desperate resistance by machine gun fire and machine gun attacks from airplanes extending back as far as Foret de Fere, as well as accurately directed artillery fire. So obstinate was the enemy’s resistance that Sergy, for instance, changed hands no less than nine times before being definitely occupied by the 42d Division. The Rainbows’ brave action elicited the compliments of the commander of the French corps for its speedy work that “enabled the French division on the right to advance.® From a prisoner it was learned that it was the 4th German Guards Division and the 201st Division that the Rainbows crumpled up so badly. And the day’s report to head¬ quarters includes in its recital the words : “The command is in good condition and, having con¬ solidated its lines, is preparing to advance as soon as orders are received.® In spite of the fearful machine gun fire maintained by the enemy the 42d Division was moving forward by 1 August, but its advance on the 3d was stopped in line of Mareuil-Endole Coulanges by machine guns, its opposing force being identified as the 1st Guard Division. The communique of the 5th states concerning the action of 2 August: “Shortly after day¬ break our troops commenced their advance on the right of our line. Our only fresh troops, the 117th engineers, acting as infantry, pushed over Hill 212, which had been the scene of bloody combats during the last few days. As this regiment neared Bois de la Pissotte they were halted by machine gun fire from the southern edge of the woods. The 167th and 168th infantry were

also halted by machine gun fire from the southern edge of the same woods and from Les Bonshommes and the woods to the north of it. On our left the 165th in¬ fantry and the 166th infantry, the latter in liaison with the French divisions to the west of us, pressed through the Foret de Nesles and up the open field to the west of the Foret. The 165th infantry on reaching the road Mareuil-en Dole-les Bonshommes Ferme was halted by the enemy's artillery fire in the woods. Meanwhile, the Bois de la Pissotte and les Bonshommes Ferme had been flanked and the

enemy's machine gunners put to flight so that the troops on our right were able to advance abreast of those on our left. Our artillery fol¬ lowed the infantry advance and to-night all our regiments and one regiment of the 155th have crossed the Ourcq . and are advancing slowly. Our most advanced elements, the 11 7th engineers, occupied Chery-Chartreuve at dawn on August 3.® After this unbroken spell of terrific fighting the 42d obtained a well-earned and necessary rest for a short period. But already by 12 September the gallant division and its replacements were called on for forced night marches to aid in the great effort that was to bring about the reduction of the Saint Mihiel salient. The communique for 22 September tells us: "We made two highly suc¬ cessful raids on Haumont and Marinbois farm, capturing 25 prisoners belonging to two enemy divisions. Aviation and artillery activities on both sides, enemy's artillery putting down bar¬ rage on our raiding party. Our casualties, four men killed, 15 wounded.® Concerning the brilliant action of-the Rainbow Division in the Saint Mihiel attack Commander Menoher says it was incorporated in the centre of 'the 4th army corps and : "Our men were instructed to deliver the main blow in the direction of the heights overlooking the Madine River.® Gen¬ eral Menoher thus graphically describes the wonderful activities of the Rainbow Division at the battle of Saint Mihiel : "The 42d took every objective in accordance with the plan of the army commander. They advanced 14 kilometers in 28 hours, and forward elements pushed five kilometers further, or 19 kilom¬ eters beyond their original starting point. They took more than 1,000 prisoners from nine enemy divisions, seven villages and 42 square kilometers of territory were captured by the division, and large supplies of food, clothing, ammunition, guns and engineering material were seized.® The Rainbow Division's prowess was soon again called for after the extinction of the Saint Mihiel salient for it was called on before the middle of October to take its promi¬ nent place in the Meuse-Argonne front. Start¬ ing active aggression west of Montfaucon its advance was phenomenal and best described by its commander

thus : “Some very desperate hand-to-hand fighting took place in the woods of the Argonne. Men even fought with their bare hands, and from tree to tree in Indian fashion, yelling at the top of their voices. Major Ross’s battalion of the 168th infantry (Iowa regiment) particularly distinguished it¬ self here. Both he and General MacArthur were cited for extraordinary gallantry in action. The 42d took Hill 288, La Tuilerie Farm and the Cote de Chatillon, and as the result broke squarely across the Kriemhilde Stellung, the last line of defense of the Hindenburg line, clearing the way for the advance beyond Saint Georges and Landres at Saint Georges. Marching and fighting day and night, the men of the Rainbow thrust through the advancing lines of the first army. They drove the enemy across the Meuse. They captured the heights dominating the river before Sedan and reached in the enemy line the furthest point attained by any American troops. The advance of the division to the outskirts of Sedan was probably one of the most rapid

ever made against opposition. The men were pushed day and night to the limit of endurance, but they responded here as they had always when called upon for extreme effort; They made 24 kilometers in 28 hours ; this was done through the most difficult country and in about the nastiest weather I ever saW in my life.® In his farewell address to his devoted division when, on 7 November, he left them, the gen¬ eral gave some of the remarkable facts con¬ cerning the exploits of the Rainbow Division in the following resume: <(Since 12 September you have taken over 1,200 prisoners; you have freed 25 French villages; you have recovered over 150 square kilometers of French territory, and you have captured great supplies of enemy munitions and material. Whatever may come in the future, the men of this division will have the proud consciousness that they have thus far fought wherever the American flag has flown most gloriously in this war. In the determining battle before Chalons, in the bloody drive from Chateau-Thierry to the Vesle, in the blotting out of the Saint Mihiel salient, and in the advance to Sedan you have played a splendid and leading part.® General Menoher left his command on 7 November to

become director of the air service. He received two French medals, Commander of the Legion of Honor and Croix de Guerre with palm.

The final personnel of the 42d Division consisted of the following officers: Maj.-Gen. C. A. F. Flagler, commander; Col. Wm. N. Hughes, chief of staff; Maj. James E. Thomas, adjutant; Lieut. -Col. E. J. Moran, division inspector; Maj. James C. Crossley, division judge-advocate; Capt. F. B. Verney, assistant provost marshal ; Lieut.-Col. George F. Graham, division quartermaster; Col. David S. Fairchild, division surgeon ; Col. John M. Johnson, division engineer; Maj. John A. Wheeler, division ordnance officer; Lieut.-Col. Ruby D. Garrett, division signal officer.

The insignia of the division, which was worn on the left shoulder during battle, is a rainbow, superimposed on a field of black. In acknowl¬ edgment of its valor and great services during the World War the Rainbow (42d) Division has received no less than 205 distinguished service crosses.

On 20 November (after the armistice) the division was incorporated with the 3d corps and entered Germany with the occupation troops 2 December. It was stationed at Abrweiler after 18 December. In April 1919 the division started entraining for its home journey and on arrival dispersed to its many home quarters. The entire list of casualties of the 42d Division as published bv the War De¬ partment to 10 January consisted of 1,702 killed in action; 723 died of wounds; 440 miss¬ ing in action ; 86 prisoners ; a total of 2,950, not including field signal battalions and trains.

RAINBOW FALLS. See Chelan, Lake.

RAINBOW TROUT, a fresh-water fish (Salmo irrideus) indigenous to the mountain streams and rivers of the Pacific Coast of the United States, but widely introduced into Eastern waters. From the eastern brook-trout (Salvelinus fontinalis) it may be easily dis¬ tinguished by its colors and the presence of teeth on the vomer bone ; from the related sal¬ mon trouts, with some difficulty, by its small

mouth, and the number of scales, about 135 in typical examples, along the lateral line. The rainbow trout is exceedingly variable and many distinct forms, which are considered by ichthyol¬ ogists to be modifications of this species but which have received distinct vernacular names, are found occupying particular streams or

watersheds. The complex relations of the various species of trout and salmon to their environment is little understood. From fish-culturists the McCloud River trout (S. irrideus sliasta) has received much attention since 1880. This variety is particularly well adapted for stocking streams and ponds in which the brook-trout no longer thrives, owing to the clearing of the forests and the resulting higher tempera¬ ture and increased muddiness of the water. To supply the great and constant demand for young fish for stocking purposes the Federal Fish Commission maintains several large hatch¬ eries and many States, others. Carefully selected breeding fish are kept in speciallv constructed ponds designed with reference to cleanliness, good circulation and ease of handling the fish. Spawning occurs during the winter. The ripe females are stripped in the usual way and the eggs mixed with the milt in a pan either with or without water. After a few minutes water is added and they are gently agitated and re¬ peatedly washed to remove the surplus sperm, and, after standing about an hour, are trans¬ ferred to the hatching trays, which are con¬ structed of galvanized wire. These travs are arranged in troughs with running water in such a way that the young fry fall into the latter as they hatch. As the fry grow and begin to feed they are distributed to other troughs and finally to rearing ponds, constructed in a manner to insure cleanliness and an abundance of flowing water. The young are fed on ground liver and are transplanted when several months old. They grow rapidly, but in the East never attain the large size which they do in their native streams. They feed on insect larvae, etc., and may be fed artificially on chopped beef or liver mixed with corn meal. For angling purposes the rainbow is inferior to the brook-trout, but is a fair sub¬ stitute.

RAINES, John, politician: b. Canandaigua, N. Y., 6 May 1840; d. 22 Feb. 1909. He was graduated from the Albany Law School in 1861, and admitted to the bar. He served in the Civil War as captain from 1861 to 1863 ; then began his law practice. He was a Republican member of the New York assembly in 1881-82 and again in 1885; of Congress in 1889-93: and of the State senate in 1886-89 and 1895-1909. In 1903-04 he was president pro tempore of the senate and chairman of the committee on rules. He is best known as the author of the Raines Liquor Law (q.v.), and he also framed the State Election Law.

RAINES' LAW (so called from State Senator John Raines, who introduced the measure), a law passed in 1896 by the legisla¬ ture of New York, and since amended in several particulars, but always retaining the essential features of State control of the liquor traffic and high license for cities. The law permitted hotels to sell to guests on

Sunday, and this led to the establishment of numerous places known as ((Raines' Law Hotels,® which complied with the strict letter of hotel regulations, but did

what was chiefly a liquor saloon business. The law brought large returns in money for city and State, the city receiving two-thirds and the State one-third of the net income from licenses, but it was generally conceded that this was at the expense of good morals. See License.

RAINEY, Paul J., American explorer and big game hunter. A man of wealth, he traveled and hunted in the Rocky Mountains, the Arctic region and in Africa and India. He became prominent through the motion pictures of wild life in the jungles of Africa and India which he succeeded in taking during his ex¬ peditions of 1910 and 1914 and which attracted worldwide interest. He has contributed to Outing, the Scientific American Supplement and other periodicals.

RAINFALL. Rainfall or precipitation, the generic term applied to the condensation of aqueous vapor into cloud, fog, dew, rain, snow, frost and hail, varies greatly in the several zones and in the successive seasons and at dif¬ ferent altitudes. Temperature, by which is meant the temperature of the air at a given place and elevation, is one of the controlling physical factors in determining its annual rain¬ fall or precipitation. The atmosphere, con¬ sisting according to Prof. Julius Hann of the University of Vienna of the following elements and proportions, nitrogen 78.03, oxygen 20.99, argon 0.94, carbon dioxide 0.03, hydrogen 0.01, neon,, 0.0015 and helium 0.00015 parts and sub¬ ject to rapid and continual changes in tem¬ perature, largely conditions precipitation over the earth, itself, owing to its varying topog¬ raphy, one of the controlling factors in the problem. The vast expanse of oceans, seas, gulfs and inland waters and the uplift and ex¬ tent of its various mountain ranges and the expanse and location of its continents in their relation to oceans and to the torrid, temperate and frigid zones, together with the rotation of the earth on its axis and its revolution around the sun, produce different atmospheric conditions, conducive to great variation in pre¬ cipitation. Furthermore the atmosphere rapidly decreases in density upwards from the surface of the earth and solar radiation likewise de¬ creases in its intensity. The sun's rays pene¬ trate the atmosphere at various angles and these are continually changing so that the amount of radiant energy is neither

constant nor uni¬ form in the different latitudes and seasons. Owing to these physical conditions and the inclination of the earth's axis to the plane of the ecliptic, producing unequal day and night in the four seasons, there are ceaseless move¬ ments in the atmosphere itself, such as currents, winds and storms, that affect its humidity and the amount of rainfall. Both terrestrial and solar disturbances affect the atmosphere and the amount of rainfall. In some localities periodic winds prevail with such constancy that they are denominated by such terms as "trade winds,® "monsoons,® Hand and sea breezes® and some ocean currents are no less constant. All these and other physical phenomena must be considered in accounting for precipitation and its variation in different localities.

Evaporation is the physical transformation of solids and liquids into gases, due to the kinetic energy of their molecules to diffuse themselves through space. Heat increases that

»+\

energy of the molecules of water in whatever form it may be, though the coefficient of dif¬ fusion for aqueous vapor is greatest at the earth's' surface. Professor Cleveland Abbe of the United States Weather Bureau has said that (<the vapor constituent of the atmosphere is not distributed according to the law of gaseous diffusion, but like temperature and the ratio between oxygen and nitrogen, is controlled by other laws, prescribed by the winds and currents, namely — convection.® That may be either horizontal, due to the winds, or vertical, due to upward or downward currents. Tem¬ perature is also one of the most important factors in the problem of evaporation and in the distribution of aqueous vapors. Atmos¬ pheric pressure is another important factor in the problem. Atmospheric gases retard the dif¬ fusion of aqueous gases and act independently of each other. Professor Adolph F. Meyer of the University of Minnesota states that <(water in the gaseous state has a specific gravity of .622, as compared with dry air,® and that (<the pres¬ sure of water vapor at a given temperature is greater than the pressure of an equal amount of dry air at the same temperature,® so that when dry air is displaced in part by aqueous vapor, the weight of the cubic content is reduced. Professor Meyer maintains that when water at 212° F. passes into a gaseous state, it increases in volume 1,658 times and stores up 970 British thermal units of heat for each pound of water so transformed. The United States Weather Bureau gives the elastic pres¬ sure of saturated vapor at 32° F. as 0.180 of an inch of barometric pressure, at 68° F. as 0.684 of an inch of barometric pressure, at 100° F. as 1.916 inches of barometric pressure and at 110° b. as 2.576 inches of barometric pressure. It thus appears that vapor pressure in¬ creases much more rapidly than does tempera¬ ture. Professor Meyer also states that "at ordinary open air temperatures, the elas¬ tic pressure® (also known as ((vapor ten¬ sion® and "gaseous pressure®) ((of saturated water vapor is substantially doubled for every 20° F. increase in temperature,® and <(at a given temperature and pressure only a certain definite amount of. water can oc¬ cupy a given space and as soon as the space is saturated with moisture, dew will be de¬ posited.® Then heat is liberated, which tends to retard a further fall in the temperature. The higher the temperature at sea-level, the greater may be the amount of aqueous vapor and stored-up heat and the slower will be the condensation and cooling. In the heat of summer, the air rises, expands, cools and as it does so, it loses its capacity to hold vapor and condensation may ensue. Professor Meyer says that

((If the temperature of the vapor is 68° F. it will cool 1° in rising 425 feet.® The heat so liberated warms the surrounding atmosphere and tends to prevent further condensation, so summer showers are often of short duration.

The atmospheric pressure at the level of the sea is 14.7 pounds per square inch, which is equivalent to a column of pure water at 39.2° F. 34 feet in height. That pressure decreases one pound for the first 1,880 feet, and two pounds for the first 3,900 feet, and three pounds for the first 6,080 feet above the level of the sea, and so on until it becomes negligible. The United States Weather Bureau has compiled

statistics giving the weight of a cubic foot of aqueous vapor of different percentages of saturation and at various temperatures at the level of the sea. At 32° F. a cubic foot of aqueous vapor ranges from .211 grains with 10 per cent saturation to 2.113 grains with 100 per cent saturation. At 68° R* a cubic foot of aqueous vapor ranges from .748 grains with 10 per cent saturation to 7.480 grains with 100 per cent saturation. At 100° F. a cubic foot of aqueous vapor ranges from 1.977 grains with 10 per ,cent saturation to 19.766 grains with 100 per cent saturation. At 110° F. a cubic foot of aqueous vapor ranges from 2.611 grains with 10 per cent saturation to 26.112 grains with 100 per cent saturation. Vapor is saturated, when it is at the point of condensation and evapora¬ tion goes on as long as there is any deficit be¬ low 100 per cent of such saturation. From the foregoing meteorological compilation, it will ap¬ pear that the point of saturation and weight of aqueous vapors per cubic foot vary greatly at different temperatures. The matter under this sub-title is involved in the problems of Water Supply and will receive further con¬ sideration under that title in a succeeding volume of this encyclopedia.

Controlling Factors in Rainfall. — At sea-level in the tropics over such large bodies of water as the Indian Ocean, the amount of aqueous vapor moving vertically upward may exceed the quantity in a column of air over the Arabian and Sahara deserts. Still the vapor contents of the air over Siberian and Lybian deserts average nearly as much as that of the air over Vienna and Paris. The heat prevents its condensation. Were it cooled, it would produce normal rainfall. Humidity is the amount of aqueous vapor in the atmosphere, as compared with the amount of such aqueous vapor in it, when the atmosphere at a given temperature is 100 per cent saturated. Hu¬ midity, therefore, is relative and in some zones and localities it varies inversely, as the tem¬ perature, especially where there may be a lack of moisture as there is east of the Rocky Mountains and over the desert regions of the earth. When water is vaporized, pressure is exerted on atmospheric gases. Thus both verti¬ cal or convective currents may be generated, clouds may be formed and heavy rainfall may ensue, as a result of the cooling of the satu¬ rated water vapor in

the upper strata of the atmosphere. The heat, liberated in the cooling process, retards the condensation and checks the rainfall. A rising barometer indicates the absence of vapor pressure, the expansion of dry air, slight evaporation and no rainfall. Humidity, temperature, topography and the physical phenomena already mentioned are fac¬ tors more or less controlling, in the problem of rainfall over a given territory. There are others, such *as the contour of the territory, its ele¬ vation above the level of the sea, the extent of its forests, the configuration of its mountains, the influence of continents upon humidity and character of its seasons. Notwithstanding the complexity of the phenomena, conditioning rain¬ fall or precipitation, the same has been observed over long periods and reduced to mean annual tabulations. There have also been deduced formulas to ascertain the presence and amount of evaporation, which, to slight extent only,

indicates the amount of rainfall or precipitation, for the former may be both a contributing cause and one of the results of the latter. Dalton, Bige¬ low, Russell, Meyer and others have proposed evaporation formulae to determine evaporation under various conditions of humidity, tempera¬ ture, wind velocity, vapor tension and baro¬ metric pressure. The results obtained from the application of such formulae are not identi¬ cal, nor do they always conform to actual measurements, which are difficult to make.

The United States Weather Bureau and the climatological stations of some other na¬ tions have compiled statistical tables of evapo¬ ration over various land and inland water areas, but not over oceans, seas and gulfs, which altogether cover three-fourths of the surface of the earth. From all such bodies of water evaporation is continuous and the greatest. These great fountains of the deep supply the vapor-laden clouds, which are swept landward and release their waters in refreshing rains, wintry snows or in some other form of precipi¬ tation. Frequently such vapor-bearing clouds are swept against mountain ranges, as those rising from the Mediterranean Sea are swept against the Alps and those rising from the Pacific Ocean against the Andes Mountains. In some regions precipitation is much greater than it is in others, and over the same region it varies greatly in different years. That is due to the operation and effect of the physical conditions already stated. However, over cy¬ cles of years it is quite uniform, as will here¬ inafter appear. Deforestation decreases and reforestation increases the general average. Forests promote rainfall, retard evaporation and run off and store up precipitation in pools, ponds and lakes, some of which are the sources of streams and rivers.

The United States and many other nations have bureaus, or depart¬ ments devoted to scientific forestry, one of the most important and necessary functions of government, if the habitable areas of the earth are to be preserved. Deforestation and conse¬ quent lack of rainfall have rendered many once populous areas now uninhabitable, as in¬ dicated in this article. This and other genera¬ tions ought not to neglect a matter of such vital importance to themselves and to succeed¬ ing generations, but ought to enter upon the systematic reforestation of all properly avail¬ able areas.

Regional Precipitation.— The amount of precipitation, over many portions of the habi¬ table earth, has been observed for long periods substantially as follows : In the polar regions there is no rainfall. Precipitation there is con¬ gealed in snow and icy particles. In the tropics there is little snow except on the highest moun¬ tains and most precipitation is in the form of rain. In the upper latitudes of the temperate zones there are both rain and snow. Over the Sahara, Arabia and other desert regions and in the desert regions in Australia and South America there is but little precipitation, while along windward coastal regions the annual precipitation is abundant, as found along the Atlantic and other continental coasts facing eastward. Usually those sides of mountain ranges that face oceans, or large bodies of water, have a much larger rainfall than do the opposite sides, which face inland areas. There

is more rainfall on the slopes of the Sierra and Coast ranges where many glacial lakes and ponds exist in the ranges themselves, such as Tahoe, Clear Lake and others, than there is rainfall on their eastern slopes. East of some of these and of the Rocky Mountains the annual precipitation is light and large desert areas had existed, but for irrigation. No one law has been deduced from all these varied phe¬ nomena, affecting precipitation over all parts of the habitable globe to determine its amount. Much data has been collated from actual meas¬ urements. Some of these will indicate the amount of precipitation in those regions and at various altitudes.

E. S. Bellasis, sometime engineer of the Pub¬ lic Work in India, in substance stated that ((the rainfall in India varied from 2 or 3 inches in Scinde to 450 inches at Cherrapunji in the eastern Himalayas and that at two sta¬ tions in the Bombay hills, only 10 miles apart, the annual rainfall were respectively 300 inches and 50 inches and that in England at Hem-stanton, it was about 20 inches, while at Seath-waite it was about 200 inches.® He stated that ((the annual rainfall at Mercara in South India was 119 inches, in King William's Town in Cape Colony 27 inches, at Melbury Moor, in England 50.7 inches, at Newport in the Isle of Wight 32 inches, in the basin of the Cataract River in New South Wales from 33.7 inches, in 1896, to 56.4 inches, in 1898 in the basin of the Nepean River in New South Wales 44.3 inches and in 1905 in the valley of Sudbury, Mass., 42.3 inches.®

The water supply of a country is largely conditioned upon its water resources and the latter are dependent to a large extent upon its rainfall, or rather precipitation, which includes rain, hail, sleet and snow. The amount of annual precipitation over a given territory in successive years is not constant, nor is it uni¬ formly distributed, except over a few such States as Wisconsin and Michigan, and over some foreign limited districts.

The annual precipitation in the State of Washington ranges from 12 to 120 inches in different localities, though in Seattle for a period of 19 years it averaged 38.8 inches. In different parts of Oregon it ranged from 8 to 138 inches and in Texas from 9.3 inches at Pasco to 48.2 inches at Houston. Nor is the annual precipitation over a locality constant from year to year. The Weather Bureau's report shows that the precipitation at Dodge City, Kan., has ranged from 9.9 to 33.7

inches. There are dry and wet years as there are dry and wet seasons. In the drought of 1894 and 1895, the deficiency in precipitation measured in the upper Mississippi Valley from 7.8 to 12 inches, in New England from 5.3 to 8.1 inches and in the south Pacific watershed from 4.4 to 4.6 inches. In three months of 1905, there was an excess of 2 inches in the rainfall at Yuma over its mean annual precipitation. In 1900, the rainfall at Bay Saint Louis, Miss., was 101.5 inches which was an excess of about 50 inches over normal precipitation for the State. The difference between the maximum and mini¬ mum rainfall on the Croton watershed (New York) in a period of 43 years was 26.8 inches and in Pittsburgh (Pa.) that difference was 25.3 inches in a period of 71 years.

Mean Annual Precipitation in the United States and Canada. — The United States main¬ tains several hundred observation stations in addition to those maintained by the States them¬ selves and by individual and corporate enter¬ prise, where meteorological and climatological observations are made and for half a century have been made and records kept of the annual precipitation at those stations. From all such official and authentic observations and the com¬ putations made therefrom, climatological tables have been compiled, showing in most cases over periods of years the mean annual precipitation at scores of stations in the United States. Foreign countries have made similar observa¬ tions and records. In nearly all of the tables, the measurements are the resultant of many observations and are denominated ((the mean annual precipitation.®

From such official and from other well-au¬ thenticated measurements, the writer has se¬ lected some and averaged others from approved records to ascertain and state the mean annual precipitation over the United States and Canada. The following represent the mean annual pre¬ cipitation over the localities mentioned, or they are aggregated from a number of stations over large areas, showing such precipitation. Many of these are from the reports of the United States Weather Bureau, extending over a num¬ ber of years and others from authentic data. The mean annual precipitation in the coastal region of Alaska varies from 60 to 110 inches.

United States. — The greatest annual pre¬ cipitation in the United States is over the west¬ ern slopes of the mountains forming the Con¬ tinental Divide which intercept the vapor-laden clouds from the Pacific and precipitate their moisture in some localities to an average of 70 to 135 inches.

Alabama. — The United States Weather Bureau gives the mean annual precipitation, as measured at 15 stations, as 52 inches, at Mont¬ gomery it is 50.8 inches and at Mobile 62.1 inches.

Arizona. — Along the Colorado it is less than 3 inches, at Phoenix 7.4 inches, at Fort Grant 15 inches and at Flagstaff 22 inches.,

Arkansas. — It averages 46.7 inches, being

49.6 inches at Little Rock, 55.2 inches at Helena and 41.8 inches at Fort Smith.

California.— It ranges from 32.2 inches over the Sacramento watershed to 10.2 inches at San Diego. Professor Meyer states that it averaged 9.6 inches at San Diego for a period of 65 years. At Berkeley it is 26.47 inches, at San Francisco 23 inches and at Los Angeles

17.6 inches.

Colorado. — It is variable. At Denver it is

14.7 inches, at Pueblo 11.6 inches, at Orchard 17 inches and at Long's Peak 16.7 inches. In other sections it varies from 7.01 to 26 inches and over Colorado River watershed it is 17.7 inches.

Connecticut — At Hartford it was 44.50 inches, at New Haven 47.2 inches, at New Lon¬ don 48.08 inches and at Waterbury 49.9 inches.

Delaware. — At Millsboro it was 47.3 inches.

Florida. — There is annual precipitation over the State as determined at 13 stations of 54.53 inches. At Tampa it is 53.1 inches, at Key West 37.9 inches, at Miami 58.3 inches and at Jacksonville 53.4.

Georgia. — The United .States Weather Bu¬ reau reported in 1906 that the annual precipita¬ tion in the northeastern part of the State was

54.1 inches, in middle Georgia 49 inches, in southeastern Georgia 50.7 inches, at Atlanta, for a period of years, it averaged 49.2 inches, at Savannah 48.67 inches andˆat Clayton 68.5 inches.

Idaho. — It varies from 6.3 to 40.4 inches, but in most sections it ranges from 12 to 13 inches.

Illinois. — It averages 36.5 inches. At Chicago for 40 years it averaged 33.5 inches. At Springfield it is 37.4 inches and at Cairo

41.6 inches.

Indiana. — The mean annual precipitation over the State is 38.4 inches. At South Bend it is 34.5 inches, at Indianapolis 41.9 inches and at Marion 37 inches.

Iowa. — From the measurements at 46 sta¬ tions scattered over the State, the United States Weather Bureau reported the mean annual precipitation over the State to be 31.5 inches, at Keokuk it was 35.1 inches and at Sioux City 25.8 inches, at Iowa City in 1890, it was 58 inches.

Kansas. — Measured at 19 stations, it aver¬ aged 27.3 inches, at Garden City it was 19.6 inches, at Wichita 30.4 inches, at Atchison 37.1 inches and at Topeka 34.1 inches.

Kentucky.: — At 10 stations it ranged from

42.5 inches at Lexington to 50.3 inches at Wib-blesboro. At Louisville it is 44.5 inches.

Louisiana. — There is great variation in the yearly rainfall. In New Orleans the annual rainfall has been as low as 31 inches and as high as 85.6 inches. For 67 years it averaged

56.1 inches. It ranges there from 55.4 to

62.6 inches and over the State from 46 inches over the southern stations to 55 inches over the eastern.

Maine. — At Portland it was 42.8 inches, at Lewiston 46.2 inches, at Eastport 43.4 inches, at Bar Harbor 48.9 inches, at Mayfield 52 inches.

Maryland and Delaware. — The annual precipitation ranges from about 44 inches in the former to 47.3 inches in the latter. At Balti¬ more it was 43.4 inches, at Washington and Dis¬ trict of Columbia 43.1 inches, in the valley of the Potomac 35.28 inches. Other unofficial records give annual precipitation at Baltimore as 40.7 inches, at Washington as 40.7 inches and in the District of Columbia at 38.77 inches.

Massachusetts. — At Boston it ranged from 43.7 to 45.3 inches, at New Bedford from

46.4 to 47.9 inches, at Blue Hill Meteorological Observatory 47.2 inches, at Williamstown 39.41 inches, at Lawrence 43.1 inches, at Fitchburg

45.4 inches, at Amherst 46.3 inches, at Nan¬ tucket 36.5 inches, over the Wachusett water¬ shed 47.1 inches and over the Sudbury water¬ shed 45.3 inches.

Michigan. — It averages 32.91 inches and is similarly distributed. At Detroit it has aver¬ aged 32.1 inches over a period of 40 years.

Minnesota. — It averages 26 inches, while at Duluth it is 29.5 inches, at Saint Paul 28.68 inches, over the Crow Wing Valley 30.81 inches and over Croix Valley 32.58 inches. Professor Meyer gives the mean annual rain¬ fall at Saint Paul for a period of 78 years at 27.3 inches.

Mississippi. — The mean annual precipitation is about 50 inches. In the Yazoo Valley it is 48 inches, at Natches 50 inches and at Vicks¬ burg 53.8 inches. Over the Tombigbee water¬ shed for a period of 50 years it has averaged

49.2 inches.

Missouri. — It ranges from 34 inches in the northwestern counties to 46 inches in the south¬ eastern counties. It averages 39.9 inches at

Saint Louis. The general average over the State is 39 inches.

Montana. — It ranges from 11.8 to 18.5 inches. At Kipp it is 18.5 inches, at Glendive 15.9 inches, at Butte 12.2 inches and at Great Falls on the Missouri 13.4 inches and at Havre 13.5 inches.

Nebraska. — As determined at 6 to 12 sta¬ tions it averaged 23.5 inches and was principally in rain. At Omaha it was 30.8 inches, at Lin¬ coln 27.7 inches and at North Platte 17.9 inches.

Nevada. — It ranges from 10.8 inches at Car-son City to 11.2 inches at Pioche, but varies in most parts of the State from 3 to 12 inches. At Reno it measures 7.52 inches.

New Hampshire. — At Bethlehem it was 37.7 inches, at Plymouth 42.4 inches, at Concord and at Keene 40.4 inches and at Nashua 43 inches.

New Jersey. — The annual precipitation is

47.7 inches over the State. At Dover it is 51.2 inches, at Asbury Park 48.1 inches and at At¬ lantic City 42 inches. Over the Pequannock watershed it is 50.1 inches and over the Hacken¬ sack River 46.15 inches.

New Mexico. — It varies from 7.2 to 15.8 inches, though there it has had a precipitation of 25 inches. At Sante Fe' it is 14.2 inches. There is slight snowfall, though the State's high¬ est peaks in the north are snow-capped much of the time, and those snows are its principal sources of water supply. Similar conditions prevail in some of the Rocky Mountain States, affording their principal water supply.

New York. — The mean annual precipitation at the United States Weather Bureau stations over the State for 25 years averaged 39.26 inches. Over Suffolk County it averages 45 inches. Over Long Island for 67 years it has averaged 42.56 inches, at New York City 42.87 inches, over the lower Hudson 44.93 inches, at the Croton Dam from 44.93 to 50.38 inches, over the Esopus watershed 46.6 inches, at Ox¬ ford 45.4 inches, at Albany 34.84 inches, at Little Falls 54 inches, at Utica 42.29 inches, at Bing¬ hamton 36.98 inches, at Elmira 33.23 inches, at Mount Hope 27.77 inches, at Ithaca 33.97 inches, at Cortland 44.7 inches, at Rochester 33.61 in¬ ches, at Buffalo 36.71 inches, at Oswego 36.57 inches, at Ogdensburgh 30.7 inches, at North Lake 55.7 inches and over northeastern New York 38.97 inches. Over the Taconic quad¬ rangle it is 42 inches.

North Carolina. — The resultant of meas¬ urements at 23 stations was 52 inches. In the western counties occasionally it ranges from 70 to 100 inches, thereby becoming known as a region of extraordinary rainfall.

North Dakota. — The mean annual precipi¬ tation is from 17 to 18 inches over the State. At Bismark it is 18.8 inches. High winds blow away much of the snows of winter.

Ohio. — This State has an annual precipita¬ tion of 38.4 inches, varying from 30.8 inches at Toledo to 42.1 inches at Marietta. At Ports-

mouth it averages 41.1 inches. Over the Ohio River during a long period it varies from 32.07 to 45.79 inches and over the Muskingum watershed it averages 40 inches. At Cleveland it is 35.6 inches, at Columbus 37.2 inches and at Cincinnati from 38.4 to 45 inches. Professor Meyer states that h averaged there 40.7 inches for a period of 80 years.

Oklahoma. — It was computed by the United States Weather Bureau from the measurements of 10 stations and found to average 31.7 inches, with great variations in succeeding seasons and different years.

Oregon. — It ranges from 8 to 138 inches and at Portland it ranges from 45.9 to 78.2 inches. At Astoria it is 77.2 inches.

Pennsylvania. — The resultant of the meas¬ urements of 16 stations is approximately 44 inches. At Erie it is 39.2 inches, at Pittsburgh

36.4 inches, at Harrisburgh 38.1 inches, at York 41.9 inches, at Mauch Chunk 50.5 inches and at Philadelphia 40.6 inches.

Rhode Island. — At Providence it was 44.6 inches, but by the records for 79 years it aver¬ aged 45 inches. At Narragansett Pier it was

47.4 inches and at Rock Island 45.3 inches.

South Carolina. — It was estimated from

measurements at 12 stations to be 49 inches. Monthly rainfalls in some localities and years have equalled 12 inches for a short period.

South Dakota. — It averages 20.3 inches, but only 1 to 2 inches fall in the form of snow.

Tennessee. — It averages over the State as measured at 18 stations about 50 inches, includ¬ ing 8 inches of snow. At Nashville it is 48.5 inches, at Memphis 50.8 and at Chattanooga 51.6 inches.

Texas. — The mean annual precipitation averages 30.9 inches over the entire State as determined at 19 stations, varying from 9.3 inches at Pasco to 48.2 inches at Houston. At Port Davis for 46 years it was 18 inches. At El Paso for 36 years it averaged 9.6 inches.

Utah. — It averages 11 inches, ranging from 6.1 inches at Saint George to 16.2 inches at Salt Lake, which is mostly snow.

Vermont. — • At Burlington 33.3 inches, at Rutland 36.54 inches, at Saint Johnsbury 35.6 inches, at Northfield 33.1 inches, at Woodstock 37.3 inches and at Jacksonville 50.3 inches.

Virginia. — It averaged from the measure¬ ments of 15 stations from 39.4 inches at War¬ saw and Blacksbury to 50.5 inches at Big Stone Gap. At Rutland it measured 43.6 inches, at Fort Republic 38.77 inches, at Roanoke 39.09 inches and at Norfolk 50 inches.

Washington. — In the northwestern part it ranges from 12 to 120 inches, and between the Olympics and Cascade mountains it ranges from 25 to 60 inches. At Seattle for 19 years it averaged 38.8 inches.

West Virginia. — There are 14 stations dis¬ tributed over the State and the average of their measurements is 42.48 inches. Over the high plateaus the annual precipitation ranges from 45 to 50 inches, while over the lower levels along some rivers it ranges from 35 to 40 inches. Over the Greenbriar it is 44.48 inches.

Wisconsin. — The mean annual precipitation is 31.5 inches and is uniformly distributed over the State; at Milwaukee it is 31 inches.

Wyoming. — It averages 13 inches, ranging

from 8 inches in some places to 20 inches in the Yellowstone Park.

Along the Appalachian altitudes from New York to the Gulf of Mexico there is a greater precipitation than there is at lower levels along the Atlantic Coast. From the United States Weather Bureau reports of the mean annual precipitation, measured at several stations in each New England State over a period of years, it appears that it averaged in Maine 44.6 inches, in New Hampshire 40.6 inches, in Vermont 38.2 inches, in Massachusetts 44.6 inches, in Rhode Island 49 inches and in Connecticut 47.2 inches.

Canada. — In Canada it varies in the western, central and eastern provinces as it does in the United States. At Victoria it averaged 37.77 inches, at Port Simpson 94.63 inches, at Regina 9.03 inches, at Prince Albert 14.45 inches, at Winnepeg 19.53 inches, at Port Arthur 23.58 inches, at Toronto 33.94 inches, in Quebec 28.76 to 41.5 inches, in New Brunswick 32.6 inches with 97.5 inches of snow, in Nova Scotia

39.6 inches and 77.5 inches of snow.

Latin America. — In other countries of the western hemisphere records of precipitation are meagre. However, the unofficial reports indicate that the annual precipitation is abundant for the water supply of all the principal cities whether or not they be located on lakes, rivers and other fresh waters. In Mexico, at Vera Cruz, it meas¬ ured 183 inches as maximum rainfall. In Cen¬ tral America precipitation varies greatly in different sections. Rainfall in the latter ranges from 50 to 200 inches annually. In Cuba at Havana it ranges from 40 to 80 inches. There is a great variation of precipitation in South America owing to its physical formation with the lofty Andes extending along its entire west¬ ern border and their many lateral ranges, its high arid plateaus and swampy regions, its vast area extending from 12° north latitude across the equator to 55° south latitude and from 35° to 82° west longitude, its tropical heat over most of it and its wintry climate in some other localities and its general location with reference to the Caribbean Sea, the Atlantic and Pacific oceans. The climate is as variable as all such physical conditions can produce. Generally speaking, the precipitation is not only abundant for its water supply in most of its coastal re¬ gions, but over some areas it is excessive. Over its interior elevated districts it is slight and great desert regions exist in Brazil, Bolivia, Peru, Argentina and Patagonia, where there is but little precipitation. The annual precipitation at Bogota is 44 inches, along the coast 73 inches, at Caracas from 24 to 34 inches, at Val¬ divia 108 to 115 inches, in Uruguay 43 inches, in Argentina from 2 to 63 inches and in Pata¬ gonia from 19 to 97 inches. In many parts of Brazil there is heavy rainfall and in other mountain sections there are heavy snowstorms. At Rio de Janeiro it is from 43 to 59 inches, at Blumenau 53 inches and at Ceara 60 inches. The precipitation is abundant in most of the Western States, where high mountains intercept the vapor-laden winds from the Pacific. There are many large lakes high above sea-level, one of them being Lake Titicaca, with an area of 5,000 square miles, 12,545 feet above the sea. It falls in rain and snow and not only waters vast areas but supplies the headwaters of the Amazon and other great rivers.

Europe. — In Europe a few measurements will illustrate the mean annual precipitation. In England the annual precipitation varies from 25 inches or less at the mouth of the Thames to 60 inches in the lake district and in a part of Wales, while in other districts it is 40 inches. In the western counties of England near high hills it ranges from 80 to 150 inches, while in other sections it averages from 30 to 45 inches. In the eastern counties it ranges from 20 to 28 inches. The mean annual rainfall on the Vyrnwy watershed is 65.16 inches. At Litton in Bristol watershed for 58 years it averaged 41.1 inches and at Bristol 30.9 inches. Over the Thames area for 21 years it averaged 26.9 inches. Over Derwent Valley it varies from 35 inches in the south to 61 inches in the north. Over the Sheffield waterworks catchment areas precipitation averaged about 47 inches. The average rainfall over the whole of England is about 30 inches.

In the west of Scotland it ranges from 39.37 to 100 inches while in the eastern counties it is only 26 inches. At Ben Nevis it is 151 inches. Over Edinburgh district waterworks for 6 years precipitation averaged about 48 inches. Over the headwaters of the Usk, Wye and Towy rivers in Wales rainfall ranges from 45 to 75 inches per annum. In Ireland there is heavy precipitation near the high hills in the west though less than in the Highlands of Scotland. Its general average is more than it is in the eastern districts of England. Over the valley of the river Vartry the annual rain¬ fall averages 48.82 inches. In Norway the annual precipitation varies from 12 inches at Dovre Fjeld to 83 inches between Bukken Fjord and Nordfjord. At Bergen it ranges from 73 to 89 inches. In Sweden the annual rainfall ranges from 12.32 inches at Karesuando to 45.82 inches at Cattegat. In Denmark the annual precipitation ranges from 21.58 to 27.87 inches. In Holland it averages 27.99 inches. At Utrecht it is 27.5 inches and at Tilburg it is 27.6 inches. At Amsterdam and The Hague it averages 27 inches. In Belgium the precipitation is approxi¬ mately 28 inches. At Brussels it is 27.6 inches. The annual precipitation in France averages about 32 inches. For many years it averaged at Marseilles 20.75 inches and at Nantes 35 inches. Over the Rhone it ranges from 20 to 63 inches, averaging 36.32 inches. Over the Meuse it is 28.33 inches, over Yonne

30.80 inches, and over the; Seine 22.7 inches. In the south of France precipitation is less than it is along the Atlantic Coast. In Switzerland the annual precipitation has been 21.7 inches, at Sierre, 32.7 inches, at Geneva, 36.6 inches, at Berne, 42.6 inches, at Montreux, 48.7 inches, on the great Saint Bernard, 65.4 inches, at Lugano, 87.3 inches, on San Bernardino Pass, 89.7 inches of rain and snow in the AJps, facing north or south, thereby intercepting vapor¬ laden winds from the Arctic Ocean or from the Mediterranean Sea. In the valley of the Inn River it ranges from 22.43 to 57 inches. Scores of glaciers are found in the great ele¬ vated valleys of the Alps, and' these feed the Rhine, the Rhone, the Po and the Inn rivers and their tributaries. The snows and glaciers cover the high ranges and intervening valleys, whose uplift resembles the foaming billowy ocean. At Saint Maria in the Alps the precipi¬

tation is 104.35 inches. In Germany it ranges from 20 to 34 inches. At Berlin it is 22.8 inches. Over the Moselle it is 29.48 inches, over the Rhine 36.69 inches, over the Main from 16 to 27.44 inches and over the Oder 24.60 inches. For 10 years it averaged 47.1 inches over the Mangfall Valley near Muhlthal. In Austria the annual precipitation ranges in various sections from 20.24 to 60 inches, and on the Dalmatian Coast it has been as high as 177 inches. At Vienna for 34 years it averaged 23.42 inches. In Hungary it averages 24 inches, at Budapest 34.32 inches, at Zagrab 70.39 inches, at Fiume and over the mouth of the Danube it is 35.12 inches. In Russia, where there are many moun¬ tains, high plateaus and extensive plains facing the Arctic Ocean, there is precipitation in the form of much snow, but not extensive rainfall. The average rainfall in Archangel is 16.2 inches, in Helsingfors, Finland, 19.6 inches, in Petrograd 18.3 inches, in Dorpat 24.9 inches, in Mos¬ cow 23 inches, in Warsaw, Russia, 22.8 inches, in Odessa 15.6 inches, at Batum 93 inches, at Sochi 80 inches, in Poti 64.9 inches ; while in Astrakhan it is only 5.7 inches and over the plains of Russia but 20 inches. In Portugal, whose westerly coast is exposed to the winds of the Atlantic, there are heavy fogs and precipi¬ tation in the north occasionally amounts to 192 inches, while in the interior and in the south there is far less rainfall. In Spain rainfall aver¬ ages at Madrid 15 inches, at Salamanca 11.3 inches, at San Fernando 30 inches, at Bilboa 46 inches, at San Diego 66 inches, at Oviedo 74 inches and over large areas there is but little precipitation and intense heat. Italy has moder¬ ate precipitation. The Alps in the north and its Apennines, extending nearly its entire length, intercept the vapor-laden winds of the Mediter¬ ranean and Adriatic seas. It projects southerly into warm latitudes and has a hot summer

climate. Over it in the classic ages Jupiter Pluvius reigned from sea to sea. Precipitation varies from 36 inches in the north to 20 inches in the south of Italy. In Sicily it averages 15 inches. Sunny Italy is characteristic of its central and southern sections, where there is infrequent and scanty rainfall in summer months. Over the Po the rainfall ranges from 30 to 48 inches and snow in the north and mists along the coast are not uncommon. The pre¬ cipitation at Tolmezzo is 96 inches. In Lom¬ bardy precipitation averages 22 inches, and irri¬ gation canals are necessary to supply the lands with sufficient water for agricultural purposes. Nearly all Italian cities are supplied with water from rivers and mountain or ground sources. Aqueducts and infiltration tunnels through tufa without linings have long been in use to main¬ tain such supplies. Through such tunnels 22 gallons per second are delivered at Mazzara and 40 gallons per second at Zappulla in Sicily.

Dr. Angot calculated the rainfall by months at Rome and found the annual precipitation there to be 12.03 inches and at Milan to be 12.01 inches. In Greece the annual precipitation ranges from 16.1 inches in Attica to 53.34 inches in the Ionian Isles. Olympian Zeus presided over atmospheric changes and his chief weapon was the thunderbolt. The Grecian states are well watered. In Bulgaria the mean annual precipitation is 29.59 inches. In Rumania rain¬ fall ranges from 15 to 20 inches. The water

supply of Constantinople is from streams, springs and rainfall in the forests where reser¬ voirs impound the waters that are conducted in aqueducts, one of which was built during the reign of Constantine.

Several rainfall maps of Europe have been made and these may be consulted for further information on this subject. However, it may be stated that all western and northern Europe are abundantly supplied with copious rains and all the mountains with heavy falls of snow that supply the headquarters of its large rivers flowing to the salted seas on the north, west and south. They supply populous areas ip many parts of Europe.

Africa. — In the continent of Africa pre¬ cipitation ranges from 1.5 inches in Egypt to 20 inches on the southwestern coast and to heavy rainfall in its tropical areas. In Abys¬ sinia it ranges from 30 to 40 inches, supplying some tributaries of the Nile. Along the south¬ eastern coast facing the Indian Ocean the rain¬ falls is 50 inches while in the interior of South Africa it ranges from 5 to 24 inches and at some places on the east coast it is only 40 inches. At Johnannesburg, it averages 30 inches, at Paarl and Weltevreden in Cape Colony it averaged for 14 years 34.67 to 35.97 inches. The annual rainfall at Durban is 42.46 inches and at East London, South Africa, it is 62.11 inches. Heavy fogs dampen some areas where there is but little rainfall.

Asia. — In Arabia are great waterless deserts while in some mountain areas living springs of water are found. There is some rainfall in northern and central Arabia. At Dhala in 1892 there was over 18 inches, while at Aden it averaged 2.97 inches. Sir A. Houtum-Schindler found the mean annual rainfall at Teheran for 15 years to average 9.86 inches and reported that at 15 stations in Persia for various years it ranged from 3.24 inches at Jask to 56.45 inches at Resht. The average at all these sec¬ tions was about 17 inches.

Asia presents so many physical formations of mountain ranges, elevated plateaus, great river basins, extensive arid regions, varying climates and oceanic influences as to cause ex¬ cessive precipitation of rain and snow in some great mountain areas and little in some other sections. Only a few measurements can be given. The mean annual precipitation over the Caspian watersheds is 7 to 8 inches, over

the Aral Sea 6 inches, in western Syria facing the Mediterranean a moderate rainfall, at Beirut it is 21.66 inches, at Jerusalem, 36.22 inches. The normal rainfall over Palestine is about 28 inches, while in the vicinity of the Lebanon range it is copious. There is very lit¬ tle rainfall east of Damascus and over eastern Syria. Between the Orontes and Euphrates some of the slight rainfall is caught and stored up for the water supply. The water of the springs in the vicinity of Mount Lebanon is conducted into cisterns and conserved for do¬ mestic and agricultural purposes. Hundreds of water-wheels, operated by the current of the Orontes, or by animal power lift its waters to supply communities along its banks and to irri¬ gate agricultural districts. Astride the Orontes 120 miles north of Damascus is the land of Hamath, supplied by six or more great under¬ shot water-wheels, some 80 feet in diameter.

that raise the water of the river into conduits extending through the city. Other sections are supplied with water drawn from wells by end¬ less ropes carrying buckets and operated by camels turning vertical spindles. Irrigation in its primitive form is practised in parts of Syria. The Romans also practised it about the Sea of Tiberias, where the remains of aqueducts may still be seen. The waters of the Abana rush¬ ing down over wheels placed in the falls of the Anti-Lebanon ranges develop power to propel the street cars of Damascus and to light that ancient city, which obtains its water supply through conduits from the same sources. In Asia Minor swept by the cool winds of the Black Sea there is much snow and there are occasional heavy rains. It has many springs fed by the underground flow produced by the melting snows of its high mountains. It has some lakes, whose waters are somewhat de¬ pleted during the long dry season. In 1912, Dutch engineers designed and French con¬ tractors constructed irrigation works to utilize the waters of Bey-Sjehir and Jaila lakes and a canal connecting with the Tsjartpjamba River to irrigate 126,000 acres of Konia Plain.

Over the territory extending from the Jor¬ dan to the Persian Gulf there is slight rainfall and much of it is a desert uninhabited.

In Siberia there is much snow and little rainfall. The latter ranges from 8 inches from Persia to Tobolsk and increases to 12 inches over Amur watersheds. Snow falls over vast areas in great quantities and in the mountains remains most of the year, feeding its lengthy rivers and its numberless lakes. Some of these, such as Baikal 400 miles long by 20 to 50 miles wide and Lake Kossogol 120 miles long by 50 miles, cover great areas in a basin that was once a much longer lake. In eastern

Siberia rain¬ fall averages from 15 to 20 inches. In Man¬ churia and northern China .ˆbetween the Volga and the Lena the rainfall ranges from 19 to 29 inches.

In China it ranges from 23 inches at Peking to 78 inches at Canton, which is swept bv monsoons. It is only 5 to 7 inches in the north of Mongolia. In some coastal regions it amounts to 100 inches. Over the coastal re¬ gions of the Malay Peninsula the rainfall ranges from 75 to 200 inches and over places in Java it is 78 inches, at Singapore it is 97 inches. Siam is occasionally swept by monsoons and the rainfall ranges from 180 inches at Mergni to 240 inches at Monlmein. At some other places it averages from 42 to 54 inches.

In India there is the greatest variation in precipitation in Asia. In its western coastal and Himalaya regions rainfall ranges from 75 to 100 inches on the west to 250 inches at ele¬ vated localities, also in the west up to 610 inches in the Khasi Hills, where for a decade it aver¬ aged 550 inches. If entirely caught and con¬ served it would form a column of water 45 feet high. At Cherrapunji for 40 years it aver¬ aged 426 inches. At Calcutta it averaged 65 inches. At Ceylon from 60 to 80 inches. At Madras 55 inches. At Bombay 75 inches and in the valley of the Ganges it falls to 25 inches and in that of the Indus to 6 inches. At Poovah it is 24 inches. North of Punjab, it ranges from 70 to 80 inches and also that amount on some of the lateral spurs of the Himalayas.

1 here are no available records of precipita¬ tion in countries to the north of India, but they are lierht, cold and covered with snows, which are their principal source of water supply. In Burma on the west coast it averages from 157 to 196 inches. Over the Irrawadi Valley in Burma it is only 39.27 inch€§, but in the delta it averages 98.42 inches. In Japan the average rainfall over the whole country is 61.8 inches.

Australasia and Oceanica — In Australia rainfall varies greatly in different sections. At Brisbane it averages 50 inches, at other places 70 inches. At Melbourne it averages 25.6 inches, at Port Phillip from 20 to 30 inches, at Adelaide 20 inches and in some parts of the Eyre Peninsula only 10 inches and this average extends to more than of the continent. In South Australia it averages from 8 to 10 inches. In 1889 the Department of Mines at Sydney collated rainfall data and estimated the amount at 50 or more watering places in Aus¬ tralia. Those showed the weekly rainfall to range from TV of an inch in some localities to an inch in others and still others it ranged from 2.25 to 3.10 inches. In most of the inhabited regions of New Zealand, rainfall ranges from 30 to 50 inches per annum. In New South Wales it ranges from 12 to 46 inches. At Hay it ranges from 10.94 to 25.84 inches.

In the Philippines there is great variation in rainfall. At Manila it averages 76 inches and ranges from 16.2 to 152 inches over different islands. At Kauai, one of the Hawaiian islands, it averaged for 4 years 518 inches. On the island of Mauritius rainfall on the east coast has been as high as 141 inches and on the west coast at the same time it averaged only 27.95 inches.

In Java a rainfall ranges from 70 inches at Batavia to 174 inches at Buitenzorg.

Except as otherwise stated, the foregoing are approximately the mean annual precipitation over the localities mentioned, as nearly as the measurements extending in most cases over a period of years disclosed. They furnish some data that may be considered in estimating such sources of their water supply.

Robert Lauterberg, meteorologist of Switzer¬ land, once suggested that most measurements fail to give all the rainfall and that ordinary measurements must be increased 25 per cent to arrive at the actual precipitation.

There are, however, many instances of well-known departures from the amounts heretofore given, when in wet years or cycles of years, or localities of excessive precipitation, the maxi¬ mum precipitation is greater than the mean an¬ nual precipitation. There are also dry years or cycles of years and dry localities, when the minimum precipitation is less than the mean annual precipitation. Such extremes are not constant, but may be considered in determining the hydrology of a given locality.

The foregoing records and measurements of rainfall are the mean annual precipitation over periods of years. Excessive precipitation, how¬ ever, occurs in storms, when the hourly and daily rates in the localities affected may be ex¬ traordinary. Such storms are usually of short duration and are confined to small areas. Records of some of such excessive precipitations and of monthly tabulations in localities, where meteorological stations are maintained, are ob-Vol. 2 3 -T3

tainable from the reports of the weather bureaus of this and other countries. Most of such measurements are included in the general aver¬ ages of mean annual rainfall hereinbefore stated.

Disposition of Precipitation. — The dispo¬ sition of rainfall or precipitation is quite fully considered in the article on <(Water Supply,® which is to follow under that title in a succeed¬ ing volume of this encyclopedia.

Henry W. Hill,

President of the New York State Waterways Association ; author of (Waterways and Canal Construction in the State of New Yorkd *etc.*

RAINIER, ra'ner', Mount. An old volcanic cone in central western Washington named from Admiral Rainier of the British navy by Vancouver the navigator, who saw it from Puget Sound in 1793. It is also known by the Indian name of Tacoma Peak and rises about 56 miles southwest of the city of Tacoma. Its altitude is 14,408 feet or about 8,000 feet higher than the adjoining Cascade Mountain region. It was once thought to be the highest peak in the United States but Mount Whitney in Cali¬ fornia is 93 feet higher and a few peaks in the

Rocky Mountains in Colorado exceed it slightly. Its upper part is mostly covered by snow and ice, the latter in 11 main glaciers radiating from the summit like the arms of a great starfish. The glaciers are from four to six miles long and equal in size and beauty those in the Alps. The larger one extends down to 4,000 feet. A luxuriant forest extends part way up the slopes, and the timber line is between 7,000 and 7,500 feet. Around the base are many natural meadows of most picturesque character with profusion of summer flowers. The peak, <(the noblest of the fire-mountains which, like beacons, once blazed along the Paci¬ fic Coast,® is the remains of a huge volcano built up of thick layers of lava and originally 2,000 feet or more higher, its top having been blown off by a great explosion a few centuries ago. A large crater resulted from this erup¬ tion and several small cones and craters have since been built. The latest eruptions were slight ones in 1843, 1854, 1858 and 1870. Now the only activity is a slight emission of steam at one locality. The first ascent by a scientific observer was made by S. F. Emmons in 1870.

In 1897 it was ascended and thoroughly ex¬ plored by a large party. ((Almost 250 feet higher than Mount Shasta, its nearest rival in grandeur and in mass,® they described it as ˆoverwhelmingly impressive both by the vast¬ ness of its snow-capped summit, its glacial man¬ tle and by the striking sculpture of its cliffs.® The total area of its glaciers amounts to 45 square miles, an expanse of ice far exceeding that of any other single peak in the United States. The region now forms the fully pro¬ tected Mount Rainier National Park created by act of Congress approved 2 March 1899. Cen¬ tred by the towering mass of Mount Rainier, the park reserve is nearlv a perfect square, the sides of which are 18 miles in length and con¬ tains 324 square miles, or sections of 640 acres each (207,360 acres). It is completely sur¬ rounded by lands embraced within the Rainier National Forest. Every year large numbers of tourists visit the park to camp in its meadows, and occasional ascents are made to the summit

of the mountain. Consult (Mount Rainier National Park, > and

Annual Report by the supervisor of the Mount Rainier National Park (Washington, D. C., Department of the Interior, 1915 et seq.).

RAINS, George Washington, American military officer and scientist: b. Craven County, N. G, 1817; d. Newburgh, N. Y., 21 March 1898. He was graduated from West Point in 1842, served in the engineering corps, was transferred to the artillery, and in 1844—46 was assistant professor of chemistry, mineralogy and geology at W est Point. He served on the staffs of Generals Scott and Pillar in the Mexican War, and received brevet rank of major, was active in the Seminole War, and in 1856 he resigned from the army and engaged in business. At the outbreak of the Civil War he entered the Confederate service, was commissioned a colonel and placed in charge of the building and equip¬ ment of a powder mill at Augusta, Ga., where he remained until the end of the war, receiving promotion to the rank of brigadier-general. In 1867 he became professor of chemistry and pharmacy in the University of Georgia, and was dean of the faculty there till 1884. He was interested in mechanics, and secured several patents on his inventions for improvements for steam-engines. He wrote (Steam Portable Engines) (1860) ; (Rudimentary Course of Analytical and Applied Chemistry) (1872) ; ˆHistory of the Confederate Powder Works* (1882), *etc.*

RAINSFORD, William Stephen, Ameri¬ can Episcopal clergyman : b. Dublin, Ireland, 30 Oct. 1850. He was graduated from Saint John's College, Cambridge, in 1872, took orders in the English Church, and in 1873-76 was curate at Saint Giles', Norwich, England. In 1876 he came to the United States and engaged in evangelistic services in New York. He was assistant rector at Saint James Cathedral, To¬ ronto, 1876-83, and in the last-named vear be¬ came rector of Saint George's Church, New York, from which he resigned in 1906. Under his management the work of the parish was greatly extended and many societies and mis¬ sions were established in connection with it. He became widely known as an earnest, fearless and eloquent preacher. He published (Sermons Preached in Saint George's) ; Reasonableness of Faith) (1902) ; (A Preacher's Story of His Work* (1904) ; Reasonableness of the Re¬ ligion of Jesus) (1913), *etc.*

RAINY LAKE, Canada, between Lakes Superior and Winnipeg, forms part of the boundary between Canada and the United States. It is very irregular in form, but about 55 miles in northeast by southwest dimensions, and mostly three to five miles wide. It receives the waters -of numerous small lakes from the east and northeast, and empties itself by Rainy River, about 90 miles long, into the Lake of the Woods.

RAISED BEACHES. See Beaches, Raised.

RAISIN, the commercial name for the dried or cured grape. In Europe the raisin product comes largely from Italy and France, and in the United States almost wholly from Cali¬ fornia. See Raisin Industry, The.

RAISIN INDUSTRY, The American, is

confined almost wholly to California. The raisin crop comes from the great San Joaquin Valley and from several counties in southern California. The California raisin grape culture began to be of commercial importance in 1874, when the output was 9,000 boxes, or 180,000 pounds of raisins. The industry advanced (<by leaps and bounds® up to 1894, when the crop amounted to 103,000,000 pounds. The markets (<broke® under this great output, and the crop sold for less than two cents per pound. As a result there was a sharp decline both in the acreage and in the output of raisins during the next four or five years. However, the growers protected themselves and their market by form¬ ing. in 1898, a Raisin Growers' Association, which controlled about 90 per cent of the yield. It had under contract in 1917, 155,000 acres of grapes. . This association still continues to handle the bulk of the raisin crop, and has been quite successful in distributing to the best ad¬ vantage the large output in the different mar¬ kets. As a result the California raisin indus¬ try has had a phenomenal growth. It prospered because of the war since raisins are such a con¬ venient and satisfactory fruit for shipping. Nearly all the raisins of the United States come from 11 counties of California, and 60 per cent of the product is from Fresno. The California product of raisins was : 1913, 130,- 000,000 pounds; 1914, 182,000,000 pounds ; 1915, 256,000,000 pounds; 1916, 264,000,000 pounds.

Of the 1916 product 178,000,000 pounds were Muscats, and 47,000,000 Thompson's Seedless. Before 1896 the United States was a large im¬ porter of raisins. From 1887 to 1891 the aver¬ age importation was 38,500,000 pounds ; from 1892 to 1896 the average was 17,746,000 pounds; it is now negligible, and a large export trade is developing. In 1914 the exports were 14,766,- 000 pounds of the value of $998,000; in 1915 the export was 24,895,000 pounds valued at $1,719,000; and in 1916, 75,014 pounds, of the value of $5,407,000. The raisins are packed and graded into layers, and one, two and three crown loose. The processes of curing, seeding and

packing raisins have been improved from time to time, and to-day machines do much of the work formerly done by hand. The first great device was a patent seeder, and the latest one is a raisin-packing machine, by which the packages, or cartons, are filled, weighed and sealed.

The leading varieties of grapes used for raisins are the Muscat and Thompson's Seedless. Grapes are ripe by the middle of August, and the season often lasts into November. The average time of drying and curing a tray of raisins is about three weeks, all depending on the weather. The earliest picked grapes dry in 10 days, and the later ones often 'take four weeks and even more. The method of drying is very simple. The bunches are cut from the vines and placed on shallow trays two feet wide, three feet long, and one inch high, on which the grapes are allowed to sun-drv, being turned from time to time by simply placing an empty tray ton side down on the full one, then turning both over, and taking off the top tray. After the raisins are dried they are stored away in the sweat boxes until they are packed and prepared for shipment. Some of the larger

growers, in order not to run so much risk in drying on account of rain, and also to enable them to handle the. crop fast enough, have cur¬ ing houses, where the curing is finished after having been partially done outside. The seed¬ ing, grading, packing and shipping have be¬ come separate branches.

RAISIN RIVER, Battle of. See French—

town, Michigan, Battle of.

raja, ra'ja, or RAJAH, a title of heredi¬ tary princes of the Hindus. The Hindustani form is rai, and it has also been rendered ras, rana and rawal. Before the subjugation of the country by the Moguls the various countries of Hindustan were governed by rajas, who belonged to the Kshatriyas or military caste. They were sometimes independent rulers and again feudatory, and the highest title, ((Maharaja,® was given to

those who controlled other sovereigns. The title is now usually merely honorary and is not confined to any caste, while those retaining some degree of actual authority under the British are now designated ((Maharaja.® Consult Foy, (Die konigliche Gewalt nach den altindischen RechtsbiicheriP (1895) ; Jolly, (Recht und Sitte) (1896).

RAJAMANDRY, ra-ja-man'dre, or RAJA-MAHENDRI, India, a town of the Godavari district, Madras, on the east bank of the God¬ avari (here three miles wide), 30 miles from the sea. Among buildings and institutions are the courthouse and judge's residence, churches, mis¬ sion of the American Evangelical Lutheran Church, provincial college, several schools, mu¬ seum, dispensary, public garden and large prison. Pop. 30,408.

RAJATARANGINI, ra' j a-ta-ran'ge-ne

(Sanskrit <(Stream of Kings®), a Sanskrit chronicle of the kings of Kashmir, written by Kalhana about the middle of the 12th century. The history is written in eight cantos and has about 8,000 verses. It is remarkable as the only work in Sanskrit literature, yet discovered, with any historical value. The work makes use of earlier writings now lost and the first six books cover the period commencing with tra¬ ditional history of early times down to the reign of Sangrama Deva, 1006; two later books, believed to be the work of Kalhana, bring the history down to the reign of Singha Deva, about 1156. The existence of the work first became known to Mohammedans in 1588, when during Akbar's invasion, a copy was given to the emperor. An edition- was published in the San¬ skrit text (Calcutta 1835) ; the text and trans¬ lation by Troyer (Paris 1840, 1852) ; and there are translations by Datta (Calcutta 1898) and by Stein (Westminster 1900).

RAJMAHAL, raj-ma-hal', India, on the eminence overlooking the Ganges, 170 miles northwest of Calcutta, for many years capital of Bengal. It is now noteworthy only for its palatial ruins, and as a station in an important transit trade. The range of hills on which it stands bears the same name. These hills in¬ clude a plateau with an area of 1,366 miles and support a population of hillmen or ((Paharias,® numbering about 75,000. The sides of the plateau are unusually steep and ascent is made largely by artificial stone steps. Consult Bradley-Bist, (Story of an Indian Upland)

(1905).

RAJON, ra-zhon, Paul Adolphe, French etcher: b. Dijon C. 1842; d. Anvers, 8 June 1888. He was trained at the fixole des Beaux Arts at Paris, and in 1865 produced his first etching after Meissonnier (Rembrandt at Work.* His many subsequent works won for him the leading position among French etchers, and on visiting England in 1872 he found his reputation had preceded him and was com¬ missioned to make an etched copy of John Stuart Mill's portrait by George Frederick Watts and of Tennyson's portrait by the same painter. He was eminently successful in these and other portrait etchings, but his most am¬ bitious and brilliant work was (The Emperor Claudis* after Alma Tadema.

RAJPUT ANA, raj-poo-ta'na, India, a west¬ ern political division, lying between 18 native controlled states and two chiefships. It con¬ sists of Sind and the Junjab; together with the British enclave of Ajmir-Merwara. The total area of the native states is 127,541 English square miles ; or including the British district of Ajmir-Merwara, 130,462 square miles. The maharajas and rajas are supreme in their own states, and settle disputes among themselves in courts of their own. A great portion of the surface of Rajputana is desert, and part of it wholly destitute of inhabitants, water and vege¬ tation. The whole of the soil is remarkably saline, containing many salt lakes, and much of the well-water is brackish. The rainfall is scanty, and the region frequently suffers from famine. In many places it is covered with the cactus and other prickly shrubs ; except in the Aravalli Hills which traverse the region from southwest to northeast, the territory is almost destitute of trees. Where practicable, pastoral and agricultural pursuits occupy the people. Conditions have slightly improved since British enterprise has opened up the country by a trans¬ versal line of railroad, with diverging branches, connecting with the rest of the Peninsular Rail¬ way system. The chief town is Jaipur (Pop. 137,000) ; other urban centres are Bikanir, Jodh¬ pur Bhartpur, Udaipur and Tonk. While the chiefs are of Rajput origin, the Rajput element is in the minority among the population, which consists chiefly of Hindus, with Mohammedans, Animists and Jains. Pop. 10,530,432.

RAJPUTS, raj-poots', a people of India, giving their name to Rajputana (q.v.), and said to be a branch of the Kshatriyas, one of the four great castes into which the Hindus were originally divided. They are essentially a mili¬ tary people, and many of their institutions bear a strong resemblance to the feudal customs which prevailed in Europe in the Middle Ages. They are celebrated for their chivalrous spirit in marked contrast to the usual effeminacy and duplicity of many of the Oriental nations. The practice of female infanticide, however, at one time was prevalent among them, until sup¬ pressed by British

influence; the profuse use of opium has likewise in many cases produced a lamentable deterioration in their physical and moral state. Notwithstanding these drawbacks the Rajput character contains much that is noble and generous. The Rajputs became first con¬ nected with the British government under the governorship of the Marquis of Wellesley, in the beginning of the 19th century. They num-196

RAJSHAHI

ber about 700,000. Besides Rajputana, the Rajputs are numerous in Sind and Guzerat.

RAJSHAHI, raj-sha'he, India, a division or commissionership of Bengal, extending from the Ganges to Sikkim and Bhutan. Area, 17,351 square miles ; pop. about 8,489,788. The dis¬ trict of Rajshahi, forming part of the division, has an area of 2,330 square miles; a population of about 1,400,000. The capital of the division and district is Rampur Beauleah.

rAk(5czy, ra'kot-se, a Transylvanian princely family now extinct in the male line. They were for some time rulers of the princi¬ pality of Siebenbiirgen, or Transylvania, and by a rigorous maintenance of the civil and re¬ ligious rights, of the inhabitants made their influence over their subjects such as to render them formidable to the power of the royal house of Austria. The first prince of the name was Sigismund Rakoczy, who obtained the govern¬ ment in 1606, but abdicated in favor of Gabriel Bathori in 1608. His son, George Rakoczy (b. 1591; d. 24 Oct. 1648), assumed the sover¬ eignty in 1629 and regained for his subjects many lost privileges. He was succeeded by his son George II (b. 1615; d. 8 July 1676), who at¬ tempted an invasion of Poland, was defeated and forced to abdicate, but regained his au¬ thority. He died after having been again forced to resign. His son, Francis I, never reigned, but was implicated in various political complications and the last of the family to hold sovereign power was his grandson, Francis II (q.v.).

RAKdCZY, Francis II, Transylvanian prince: b. 27 March 1676; d. Rodosto, Turkey, 8 April 1735. His attempts to free his country from Austrian rule resulted in his being sen¬ tenced to death for high treason, but he con¬ trived to escape, rallied the Hungarians to his support and was proclaimed protector. The alliance of certain of the Hungarian states with Austria afterward caused his defeat and he resigned his estates and went to Turkey. He wrote (Memoirs sur les revolutions de Hongrie)

(1738).

rAkc5czy march, the name of a Hun¬ garian military air by an

unknown composer of the 17th century, said to have been the favorite march of Francis Rakoczy II of Transylvania. See National Hymns.

RALE, ral (spelled also incorrectly, Rasle, Rasles, and Ralle), Sebastien, French Jesuit missionary in North America: b. Franche-Comte, 4 Jan. 1657; d. Norridgewock, Maine, 23 Aug. 1724. In 1675 he became a Jesuit novice at Dole, in 1677-84 was an instructor at Carpentras and Nimes, and in 1689 was sent to the Canadian missions. For two years he was among the Abenakis near the mouth of the Chaudiere in the mission of Saint Francis. Then he passed two years among the Illinois, and finally was placed in charge of the Abena¬ kis of Kennebec. He was believed by the English to be the cause of their difficulties with the Abenakis, and was accused of insti¬ gating attacks on the settlements and he was killed during an attack on the village of Nor¬ ridgewock by New England militia assisted by Mohawks. This is inferred by pro-English historians from a letter to Rale from Vaudreuil, governor at Quebec, expressing satisfaction at Rale's success in uniting the savages against

the English, and agreeing to furnish military assistance, should it be required. This com¬ munication, dated 25 Sept. .1721, was among papers obtained by the expedition sent out from Boston under Colonel Westbrook to seize Rale in 1721, and is now preserved in the archives of Massachusetts. Among these papers, also, was Rale's dictionary of Abenaki, now in the Har¬ vard library and printed in 1833, in the memoirs of the American Academy of Arts and Sciences. See Dummer's War.

RALEIGH, Sir Walter, English military and naval commander, and author : b. Hayes Barton, a farmstead in the parish of East Bud-leigh, Devonshire, about 1552; beheaded, Lon¬ don, 29 Oct. 1618. He was the son of Walter Raleigh by his third wife, Katharine, daughter of Sir Philip Champernowne of Modbury, and widow of Otho Gilbert of Compton. Raleigh was educated at Oriel College, Oxford ; served with the Fluguenot army in France in 1569; remained there for five years or more ; and, with his half-brother, Sir Humphrey Gilbert, engaged in vo3rages of ˆdiscovery® — and piracy — against the Spaniards in the West Indies. In 1579 he established himself at court in the friendship of men of influence — Leicester, Oxford, Sidney, Walsingham ; he served with distinction in Ireland (1580-81) ; and then, re¬ turning to court in December of the latter year, he won, and for some years retained, the high favor of Elizabeth. Through her successive grants of monopolies and estates he became one of the wealthiest of her

courtiers. In 1584 he was knighted; in 1585 he was appointed warden of the stannaries (i.e., of the mines of Devon and Cornwall), lord lieutenant of the latter county and vice-admiral of both; and in 1585-86 he was M.P. for Devon. He was also cap¬ tain of the queen's guard.

From this period, while Raleigh was the favorite of Elizabeth, dates his chief connection with the exploration and settlement of North America. In 1584, '85, '86, '87 and '89, he sent expeditions to Virginia; but as the Queen for¬ bade his personal participation, his efforts to colonize were unsuccessful. Raleigh's services against the Spanish Armada, 1588, were not conspicuous. He assisted in organizing the land forces, but there is no proof that he took any part in the sea-fighting. In 1591 and 1592 he was prominent in the preparation of squadrons for service against Spain, but was recalled from the latter expedition because of the queen's anger at Raleigh's intrigue with one of her maids of honor, Elizabeth Throgmorton. He was soon set at liberty and his marriage to Elizabeth Throgmorton followed. Not until 1597, however, did Raleigh regain the queen's favor.

Meanwhile' he was free to explore America in person. His objective point was Manoa, a city supposedly situated in South America and possessed of untold wealth. In 1595* with a fleet of five vessels, he captured the town of San Josef, Trinidad, and explored the Orinoco for 400 miles. He did not find Manoa ; but his brilliant service in the English attack upon Cadiz (June 1596) and as commander at the taking of Fayal (1597) completed his restora¬ tion to favor. In 1597 he was made M.P. for Dorset; in 1601 for Cornwall. In 1600 he was appointed governor of Jersey.

SIR WALTER RALEIGH

The death of Elizabeth, however, occasioned a change in Raleigh's fortunes. Raleigh's ene¬ mies had made James believe that Raleigh was opposed to his accession. James imme¬ diately deprived him of all offices, and on 17 July 1603 committed him to.jhe tower. On November 17 he was tried for treason. Accord¬ ing to modern rules the evidence was insuffi¬ cient, but Raleigh was declared guilty and was sentenced to be executed on 11 December.

On 10 December, however, he was reprieved and committed to the tower. Here for 13 years he lived in tolerable comfort with his wife, son and personal servants. He devoted himself to study and to scientific experiments, and, at the. request of Prince Henry, began his chief literary work, the (History of the World.' At length, in March 1616, on his promise to guide an expedition to a gold mine in America, Raleigh was released. The Spanish Ambassa¬ dor, fearing an invasion of Spanish possessions or an attack on the Mexican plate-fleet, pro¬ tested. The king, however, warning Raleigh that either act would be punishable by death, allowed him to proceed. Raleigh ignored the warning, captured San Tomas, and, failing to reach the mine, was kept from attacking the plate-fleet only by the refusal of his followers. On Raleigh's return to England, Gondomar, the Spanish Ambassador, demanded his immediate execution. Raleigh's admissions and perjuries left the king's commissioners no choice. On 28 October the justices of the King's Bench ordered Raleigh's execution under the sus¬ pended sentence of 1603. He was executed in the Old Palace Yard 29 Oct. 1618.

Of Raleigh's poetry, so highly praised by his contemporaries, but little was published during his life and much is probably lost. Many poems once attributed to him are now attributed to others. The poems, certainly his, have been col¬ lected by Dr. Hannah, 1885. Of Raleigh's prose works, the most important is his (History of the World5 (1614).

Bibliography. — The chief lives of Raleigh are those of William Oldys (1736) ; Thomas Birch (1751) ; Arthur Cayley (1805) ; Patrick Fraser-Tytler (1833) ; Edward Edwards (1868) ; J. A. St. John (1868) ; and Mr. William Stebbing (1891). That by Mr. Stebbing is the best. There

is also a popular sketch by Mr. Edmund Gosse (1886). Consult also Mr. S. R. Gar¬ diner's (History of England,5 and the publica¬ tions of the Hist. MSS. Comm., and, concerning Raleigh's literary work, the introduction to Dr. Hannah's edition of his (Poems5 (1885), the bibliographies of Dr. Brushfield, and his (Sir Walter Raleigh and His History of the World5 (1887). Among more recent works are Selin-court's (Great Raleigh5 and biographies (1914) by Marshall and Towle.

Arthur H. Nason,

Instructor in English, New York University.

RALEIGH, Sir Walter, English author and educator. He was educated at University Col¬ lege, London, and King's College, Cambridge, and was for many years professor of modern literature at University College, Liverpool. In 1900 he was appointed to the chair of English language and literature at Glasgow University; and since 1904 has held the chair of English literature at Oxford University. He was knighted in 1911 and elected a Fellow of Mer¬

ton College in 1914. He has published (The English Novel5 (1894) ; (Robert Louis Steven¬ son) (1895); (Style5 (1897); <Milton5 (1900); Wordsworth5 (1903) ; (Shakespeare5 (1907) ; (The English Voyagers5 (1904) ; (Six Essays on Johnston5 (1910) ; (Romance5 (1917).

RALEIGH, N. C., city, capital of the State, county-seat of Wake County, in lat. 35° 47' N., long. 78° 48' W., on the Southern, Norfolk-Southern and the Seaboard Air Line railroads, about 28 miles southeast of Durham, 148 miles northwest of Wilmington and 60 miles north¬ east of Pinehurst.

Topography. — Raleigh occupies an eleva¬ tion of 363 feet. It is just northeast of the geographical centre of the State, in the upper valley of the Neuse River, which flows south¬ east to Pamlico Sound. The city, platted around a beautiful park of 10 acres, which is called Capitol Square, is divided into four sections by four broad streets which extend from this centre. The magnificent oak trees in Capitol Square give Raleigh the popular name of ((The City of Oaks.55

Manufacturing. — In 1900 the manufacturing interests of Raleigh represented an invested cap¬ ital of $1,611,000, with products valued at $2,204,000. Cotton and fertilizer products are the leading articles

of commerce. The largest manufacturing establishments are phosphate works, foundries, machine shops, car shops, woodworking factories, ice factories, cotton mills and cottonseed-oil mills. Other manufac¬ tures are underclothing, hosiery, carriages and agricultural implements. In 1914 capital in¬ vested amounted to $2,012,000; products valued at $2,916,000.

Buildings and Cemeteries. — The State Capi¬ tol, a substantial granite structure, stands in Capitol Square ; nearby are the Supreme Court building, the State Library, State Geological Museum, Raney Library, Governor's mansion, United States government post office and court¬ house. Other prominent public buildings are the county courthouse, State insane asylum, State penitentiary, State institutions, for the blind, one for white and one for colored, State Institute for Deaf and Dumb, Old Ladies' Home and Rex Hospital. There are here National and Confederate cemeteries. The National Cemetery contains 1,207 graves, 572 of which are unknown dead.

Education. — The educational institutions are the Peace Institute (Presbyterian), Saint Mary's (Protestant Episcopal) and Meredith College for young women. The State College of Agriculture and Mechanic Arts, opened in 1889, has 26 buildings and accommodations for 800 students. Other schools are King's Busi¬ ness College; the Shaw University (Baptist) and Saint Augustine's School (Protestant Epis¬ copal) are for colored boys and girls. Several State educational institutions have been men¬ tioned. There are graded and normal schools for white and colored pupils. A large summer school for white teachers is held here each year. Not far distant from the city are the State University and the Wake Forest College (Baptist). The Supreme Court Library con¬ tains 21,375 volumes, the State Library 44,529 volumes and the Olivia Raney public library 14,121 volumes. All the religious denominations have handsome churches for both races. There

are two orphanages, one under the auspices of the Methodist Church, the other in charge of the Roman Catholic Church. There are two daily

and 10 weekly newspapers.

Banks and Finances. — There are three na¬ tional banks, one State bank and three savings banks. The banks have a combined capital of $545,000 and deposits amounting to $8,300,000. The assessed property valuation in 1915 was $13,708,000. There are excellent fire and police departments, and all municipal improvements are provided for by a regular tax.

Government.ˆ- The city is governed under the commission charter of 1912, which provides for a mayor and two other commissioners elected every two years. The administrative officials are chosen by the mayor and com¬ mission.

History. — The site of the present city was selected in 1792 by the legislature for the loca¬ tion of the State capital. In the same year the city was founded and named in honor of Walter Raleigh (q.v.). In 1794 the legislature held its first session in Raleigh. The city was incor¬ porated in 1795, and in 1803 was reincorporated. The city was occupied by General Sherman part of 1865. Pop. (1920) 24,418. Consult Battle, (The Early History of Raleigh.5

Alan T. Bowler,

General Secretary, Chamber of Commerce, Raleigh, N. C.

RALES, sounds heard in the respiratory passages, due to certain modifications in the normal structure of the bronchi or alveoli, or both. Sounds that originate in the pleural cavity are distinguished as friction sounds. Rales are new sounds, not common to healthy lungs, and are created either in the bronchi, bronchioles, air-vesicles or pathological cavities. They are due to a number of causes, the most frequent of which are (1) the passage of air through narrowed bronchi, such narrowing being the result of inflammation of the mucous membrane or of muscular spasm, and (2) the passage of air through or by a certain amount of fluid, either mucus, pus, blood-serum or combinations of these. Rales of the first type are dry; those of the second are called wet. The dry rales are usually musical, and on plac¬ ing the ear to the chest, where they are present, one hears either high-pitched whistling sounds, sibilant rales or low-pitched, blowing or sonor¬ ous rales, depending on the source of the sound, whether finer or larger bronchi. Both types may commingle. Such rales are common in asthma, in the chronic bronchitis of emphy¬ sema and in the early stages of a bronchitis, before the exudation of mucus has begun. The moist rales are usually of two kinds: (1) very fine or

subscrepitant rales, resembling in sound the rubbing of a lock of hair between the fingers, and (2) larger mucous rales. The former are common in various types of disease in which the air-vesicles are involved, broncho¬ pneumonia, lobar pneumonia, tuberculous pneu¬ monia, *etc.* They are due to congestion and the pouring out of blood-serum into the area. The most mucous rales are present in bronchitis. They occur in the larger bronchi, or in cavities, and resemble the bubbling and gurgling sounds of water in a pipe. It requires the trained ear of the physician to distinguish between the

different varieties, and much experience to be able to prejudge the significance of the rales after they are heard.

RALPH, James, American author: b. Phil¬ adelphia, Pa., about 1698: d. Chiswick, Surrey, England, 24 Jan. 1762. He was a clerk to a Philadelphia conveyancer, and in 1724 went to England with Benjamin Franklin, who praises him as “ingenious® and “extremely eloquent.® As an actor, editor and newspaper writer he was not successful. He then became a teacher in Berkshire, and was welcomed as an adherent of the Prince of Wales’ party, which he sup¬ ported by pamphlet, poem and newspaper con¬ tribution. Afterward bought into silence, he re¬ ceived a pension on the accession of George III. Pope ridicules “a thing of his, entitled (Night,5 a poem,® in the lines of the (Dunciad,5

“ Silence ye wolves! while Ralph to Cynthia howls,

And makes night hideous — Answer him, ye Owls!”

Franklin pathetically complains that he ((did his best to dissuade Ralph from attempting to be¬ come a poet® ; but apparently Pope was more effective. Ralph’s (History of England during the Reigns of King William, Queen Anne and George P (1744) is valuable for the informa¬ tion it contains.

RALPH, Julian, American author: b. New York, 27 May 1853; d. there, 20 Jan. 1903. At 13 he began newspaper work as typesetter and later engaged as reporter at Red Bank, N. J. From here he removed to Webster, Mass., to edit The Times of that place, and thence to New York, where he came into prominence in reporting the Beecher trial in 1875. He shortly engaged with the New York Sun and held a position on its staff for 20 years. He was in the East during the Chinese-Tapanese War in 1894 reporting that struggle and traveling in many

parts of Asia. Returning to London he ioined the foreign staff of the New York Journal and reported the Turkish-Greek War, Queen Vic¬ toria's Diamond Jubilee in 1897, and the crown¬ ing of the Tsar of Russia. The outbreak of the Boer War found him again a field corre¬ spondent, attached to the commands of Lords Roberts and Methuen. He returned to America in 1902 and continued his work of special cor¬ respondent up to the time of his death. He had a wide knowledge of affairs and a pictur¬ esque and vivid style. Some of his books are (On Canada's Frontier5 ; (Our Great West5 ;

(Chicago and the World's Fair5 ; (People We Pass5 ; (Alone in China5 ; (An Angel in the Web5 ; (At Pretoria5 ; (War's Brighter Side5 ; (The Making of a Journalist.5

RALPH IRON. See Schreiner, Olive.

RALPH ROISTER DOISTER, a play by Nicholas Udall. It was the first English comedy, although not printed until 1556, and probably written about 1540. At this .time its author was head master of Eton, and the comedy was written for the schoolboys, whose custom it was to act a Latin play at the Christ¬ mas season. An English play was an innova¬ tion, but (Ralph Roister Doister5 was very suc¬ cessful. It follows Terence and Plautus, Ralph, ((a swaggering simpleton, a feeble, con¬ ceited fop of the days of Henry VIII,® having his prototype in the (Miles Gloriosus.5 It is in rhyming couplets, interspersed with songs.

In recent years it has been produced at Tufts College, Medford, Mass.

RALSTON, ral'ston, William Ralston Shedden, English Russian scholar: b. London, 4 April 1828: d. there, 6 Aug. 1889. He was the son of W. P. Ralston ShecHen and educated at Cambridge. During the period of his college years his father entered upon a litigation to ob¬ tain possession of some Ayrshire property and in this effort dissipated his whole fortune. The name of Shedden becoming somewhat notorious in connection with the suit, the son adopted the additional surname of

Ralston; and obtained a post at the British Museum in 1853. He gave his attention to the study of Russian, a lan¬ guage then little known. He published (Kriloff and His Fables) (1868), a translation of Turguenieff's <Liza) (1869) ; (Songs of the Rus¬ sian People* (1872), and Russian Folk Tales) (1873). He made several journeys to Russia and became the lifelong friend of Turguenieff, and was also made a corresponding member of the Imperial Academy of Sciences of Saint Petersburg. He projected an exhaustive his¬ tory of Russia, but did not publish it. In 1874, however, he published his Oxford Taylorian lectures, (Early Russian History.*

RAM, Thomas, English bishop : b. Windsor, 1564; d. Dublin, 24 Nov. 1634. He was edu¬ cated at Eton and Cambridge, and in 1599 ac¬ companied Essex to Ireland, and in the follow¬ ing year was made dean of Cork. On 2 May 1605 he was consecrated bishop of the united sees of Ferns and Leighlin. Ram was a care¬ ful bishop, constantly resident, and did what he could to maintain schools, but the recusant clergy excommunicated all who used them. He was one of the 12 bishops who, 26 Nov. 1626, signed a protest against tolerating popery.

RAM, Battering. See Battering-ram.

RAM, Hydraulic. See Hydraulics.

RAMA, ra'ma, in Hindu mythology the name common to a personage appearing as three incarnations of Vishnu (q.v.), all great war¬ riors of surpassing beauty. These three forms are distinguished as Bala Rama or Balaram, Parasurama or Parasram. and Rama Chandra or Dasrat Rama. Rama first appeared in the sixth incarnation, and his deeds are celebrated in a poem called the (Ramayana,* the best great epic poem of ancient India. In this poem all three of the heroes are celebrated, but the last-named, or Rama Chandra, has his life and deeds detailed at greater length than the others. The story tells how Sita, his wife, was carried away to Ceylon by the king of demons, one Ravana, and how Rama rescued his wife, bridging the water between Ceylon and India by the aid of an army of monkeys. He slew the demons and became a great hero. The Ramayana is often likened to the cIliad,> to which it bears great resemblance. See Sanskrit Language; Sans¬ krit Literature.

RAMADAN, ra-ma-dan', or ram-a-dan', the ninth month in the Mohqmmedan calendar, has 30 days. Since the Mohammedan year is a lunar one, Ramadan comes at all the seasons, being eleven days earlier each year. In about 33 years the month has made a complete cycle of the year. Ramadan is important chiefly because it is supposed

to be the month in which Moham¬ med received his divine revelation and is there

fore made a month of solemn observance among the faithful. During the 30 days the true believer abstains, between dawn and sunset, from all eating, drinking, smoking; bathing and all other delights of the body are likewise for¬ bidden. The more devout of the Mohammedans remain behind closed blinds during the day and devote themselves to prayer and to reading the Koran, and particularly Sura, in the second book of which are found the references to the fast of Ramadan. There are special prayers, 20 in number, which during this month are added to the usual evening prayers, repeated at dusk by the true believer. Ramadan is also the month in which the Turkish government usually takes occasion to institute reforms, or to promise to institute them, apparently to cur¬ tail the national expenses and lighten the tax burden, and generally to undertake those meas¬ ures that tend to popularize the government with its subjects.

The fast of Ramadan terminates each day with nightfall, and as the Mohammedan keeps the letter rather than the spirit of the law of the Koran, the nights of this month are filled with feasting, the more joyous because of the abstinence during the day. These repasts often become wild revels, or even flagrant debauches, which last until daylight, when the glutted participants once more betake themselves to fasting and prayer. Following the fast of Rama¬ dan for three days there is celebrated the feast of the Lesser Beiram, during which all labor ceases and the Mohammedans give themselves to all sorts of table enjoyments. Consult Huart, C. I., (Histoire des Arabes) (Paris 1912).

RAMALEY, ram'a-li, Francis, American botanist: b. Saint Paul, Minn., 16 Nov. 1870. He was graduated at the University of Minne¬ sota in 1895, and was assistant instructor in botany there in 1894-98. Since 1899 he has been professor of biology at the University of Colorado ; and also director of the Mountain Laboratory, Tolland, Colo., since 1909. He has contributed articles on botany and public health to technical journals and is author of (Wild Flowers and Trees of Colorado) (1909) ; Pre¬ vention and Control of Disease) (1913).

RAMAYANA, ra-ma'ya-na. Like almost all Hindu masterpieces the Ramayana also is very lengthy. It has 24,000 distichs. It is well authenticated that Valmiki, the poet, wrote the chief part of this epic; minor additions are by unknown authors. The theme treats of Rama. It

tells at great length of the abduction of Rama's wife, Sita, by an evil spirit, Ravana, who took her to his cave, Lanka, in Ceylon, and whence Rama, aided by the cunning ruler of the monkeys, Hanuman, finally carries her off into safety. At a much later date, and probably due to priestly inspiration, an addition is made to the poem in which Rama becomes an incar¬ nation of the god Vishnu. This simple tale is enormously elaborated and spun out to un¬ reasonable and at times tedious lengths by various means, such as the injection of ex¬ traneous matter, fairy tales, anecdotes, animal fables, and so forth, until it acquired its present formidable length of nearly 50,000 lines, many of them of 11 syllables, others of 13 and 15. Parts of the Ramayana indeed resemble in their mechanism quite closely that of the (Arabian Nights,* one story leading to another,

often, too, independent tales being capsulated within others. It is quite evident, having due regard to the much greater antiquity of the Ramayana when compared with the (Arabian Nights,5 that the latter drew largely on the first, both for manner and substance. As to the meaning of the chief part of the Ramayana, it has been held by former scholars that it stands for a historical allegory, but now it is conceded by preponderance of opinion that it is merely an elaborated fragment of prehistoric Hindu mythology. It is more than likely that the main incidents and the kernel of the poem are of remoter origin than the oldest portions of the Mahabharata. It is also quite within the bounds of possibility that Ramayana, as well as Mahabharata, first existed in oral versions, recited at great sacrificial feasts and similar gatherings, before being reduced to writing and assuming a settled form. This, too, would account most readily for the varying forms these poems assumed. Indeed, there is a Hindu tradition that Ramayana was first chanted by Kuˆa and Lava, the sons of its principal hero. When making a comparison with Sakuntala, it would appear that Ra¬ mayana is of distinctly inferior quality so far as poetical standards go. In Ramayana there is frequently a tendency of <(piling Ossa on Pelion,55 of great extravagance of diction. On the other hand, there is greater exuberance of fancy. The French translation of Ramayana by

A. Fauche (Paris 1863) is the best, and the summary by Monier Williams (London 1886) is also good.

Bibliography. — Dutt, R., (The Epic of Rama, Prince of India) (London 1899) ; Hop¬ kins, E. W., (The Great Epic of India5 (New York 1901) ; Jacobi, (Das Ramayana5 (Bonn 1893) ; Ludwig, (Ueber das Ramayana und die Beziehungen desselben zum Mahabharata5 (Prague 1894) ; Roussel, (Le Ramayana5 (3 vols., Paris 1903-09) ; Weber, (Ueber das Ramayana (Berlin 1870).

Wolf von Schierbrand.

RAMBAUD, ran-bo, Alfred Nicholas,

French historian and litterateur: b. Besangon, 2 July 1842; d. 1905. He was educated at the Ecole Normale; in 1871 became professor of history at Caen and in 1875 was transferred to the same post at Nancy. In 1879 he became secretary to the ministry of public instruction, and in 1881 was nominated to a position in the normal school at Caen and shortly afterward made professor of modern history at Paris. From 1896 to 1898 he was Minister of Public Instruction in the Meline Cabinet. His chief works are (La Russie Epique5 (1876) ; (Histoire de la Russie5 (1878) ; (Histoire de la Civilisa¬ tion Frangaise5 (1887) ; Histoire de la Civilisa¬ tion Contemporaine en France5 (1888) ; in col¬ laboration with M. Lavisse, (Histoire Generale de la France du IVe Siecle a nos Jours5 (1892).

RAMBERG, ram'berg, Arthur, Baron, German painter: b. Vienna, 4 Sept. 1819; d. Munich, 5 Feb. 1875. He studied art at Han¬ over and early made a tour in Italy, Hungary and Styria. In 1840 he attended the university at Prague, while at the same time uniting the pursuit of art with his other studies. In 1842 he became a pupil at the Art Academy of Dres¬ den under J. Hubner, and among other early

pictures produced his (Wedding of Dwarfs5 after Goethe; and (The Emperor Henry I on His Hungarian Campaign.5 In 1850 he went to Munich and executed a series of genres illus¬ trating the works of Schiller. In 1860 he was appointed professor to the Art School in Wei¬ mar, and six years later took a similar position in the Academy of Munich. His subsequent productions include (The Court of Frederick II in Palermo5 ; and, among his genres, most notable are his (Hermann und Dorothea5 after Goethe; and ˆuise,5 after the poem of J. H. Voss,

which latter was much admired for its brilliancy in design and execution. He also frescoed the walls of Luther's chamber at Wartburg; and for the Grand Duchess of Saxe-Weimar illustrated the tale of the (King of the Frogs.5

RAMBERG, ram'berg, Johann Heinrich,

German artist: b. Hanover, 1763; d. there, 6 July 1840. He first showed his talent by draw¬ ings of scenes in the Harz Mountains. These became known to George III, king of England, his sovereign, as Elector of Hanover, who in¬ duced him to go to London, where he provided for him. He remained there nine years, and perfected himself under Reynolds. In 1788 the king sent him to Italy, whence he returned to Hanover where he was appointed painter to the court. He distinguished himself particularly in humorous drawings; as in his illustrations to (Reineke Fuchs'5 and (Eulenspiegel.5 The drawings in the magnificent edition of Wieland's works are all by him ; some he etched himself.

RAMBLER, The. Though no longer read with the enthusiastic admiration formerly ac¬ corded it, Johnson's (Rambler5 has at least re¬ tained the respect of the thoughtful student of the history of English literature. The essays were distinctly of their day and, like all John¬ son's writings, distinctly of their author. They followed the fashion of the periodical litera¬ ture established by Addison and Steele in ranging over as wide a field of social and moral conduct as the fancy or ingenuity of the author led him. Temperamentally Johnson was not so well fitted to write the familiar essay as he was for more serious discourse. (The Rambler5 consequently suffers in comparison with the essays of Addison and Steele. A cer¬ tain dramatic element in characterization ap¬ pears in (The Spectator5 which is very little present in (The Rambler.5 Johnson created -no such personages as Sir Roger de Coverley or Beau Tibbs. The essays are lacking also in variety. One (Rambler 5 seems very much like another, and though it is scarcely a fair test of them to sit down and read them as a volume, since they appeared periodically and were in¬ tended to be read one at a time at intervals, this disadvantage is one that must be faced by all literature of a journalistic character. One may at least expect that certain portions of such writing shall stand out with sufficient signifi¬ cance to carry the rest along with it. Then again Johnson's didacticism is presented with a simple directness that seems to have been enjoyed in an age when men suffered moral instruction more patiently than they do to-day. Johnson never sought for ingenious cases of conscience to form the foundation upon which his reflections were based. His didacticism re-RAMBOOTAN —

minds one of the obvious teaching of the ser¬ mon, a characteristic which led some one to pro¬ pose, facetiously, the influence of Dr. Johnson's ' Rambler) upon the high school graduation essay, as a subject for scholarly research. With all these qualifications, however, there still remains enough in JThe Rambler > to justify the student in giving to it respectful and serious consideration. If the essays never rise to great heights of imagination, they are never cheap or trivial. Throughout they are characterized by good sense, often by genuinely elevated thought and feeling. Their evenness of tone, from one point of view tending to monotony, is also not without its virtue. The essays appeared twice a week over a period of two years, and in the end they present if not a systematic code of conduct, something which is perhaps a good deal better, the detailed picture of a mind conscious of itself and of its riches, and sure of the position it wants to take in any situation in which it may be placed. One may be inclined to criticise some of Dr. Johnson's literary ideals, but the mastery of technique with which they were put into effect calls for no apologies. Granted the aim and the method, Dr. Johnson's prose is among the best in the English language, and (The Rambler) will repay the careful study of any one who wishes to see how a serious mind realizes itself in appropriate and effective ex¬ pression.

George Philip Krapp,

Professor of English, Columbia University.

RAMBOOTAN, the fruit of the tree N ephelium lappaceum, of the family Sapinda-cece, much prized in the Malayan Archipelago. It is about the size of a pigeon's egg, of a red color, rich and of a pleasant acid taste. The fruits litchi and logan (see Litchi) are ob¬ tained from other trees of this genus.

RAMBOUILLET, ran-boo-ya, Catherine (de Vivonne), Marquise de, French social leader: b. Rome, 1588; d. Paris, 2 Dec. 1665. She is worthy of remark as the founder of the Hotel de Rambouillet, whose hospitality was ex¬ tended to the learning and wit of Paris, and which became a literary and political centre. This salon was developed in opposition to the French court circle, whose vulgar and bar¬ barous

manners and speech it strove to offset by elegance and refinement in both, and it soon became the rendezvous of celebritv and wit. Among the critics, poets and scholars who re¬ sorted thither were Malherbe, Corneille, Chapalain, Scarron, Saint-Evremond, La Roche¬ foucauld, *Mme.* de Seviene. Henry IV and Louis XIII were quite indifferent to letters, and in default of royal patronage the Hotel assumed the role of arbiter in matters literary. Imitators perverted the original characteristics of the group into pedantry and affectation and oc¬ casioned the historic satires of the great Moliere in (Les Precieuses Ridicules) and cLes Femmes SavantesP The Hotel did much to add to the precision and finish of the language and the establishment of good taste; and it was unfortunate that through the playwright its name took on the nature of a derisive epithet. Consult Roderer, <Memoire pour servir a l'Histoire de la Societe Polie en France pendant le Dix-septieme Siecle> (1834) ; Brunetiere, <Nouvelles Etudes Critiques) (2d ed., 1886) ; Vin¬ cent, (The Hotel de Rambouillet } (1900)

RAMBOUILLET, a breed of sheep (q.v.).

RAMEAU, ra-mo, Jean Phillippe, French musical composer and theorist: b. Dijon, 25 Sept. 1683; d. Paris, 12 Sept. 1764. Having early acquired some skill in music he joined a company of performers, by whom when he was 18 a composition of his was represented at Avignon. He studied sacred music under Marchand at Paris; was appointed organist in Cler¬ mont Cathedral, and in 1722 made his reputa¬ tion as a musical theorist by publishing (Traite de l'HarmonieP Four years after appeared his (Nouveau Systeme de Musique Theorique,* which was followed by his Generation Har-moniqueP His greatest claim to musical repu¬ tation is based upon his dramatic compositions, of which (Hippolyte et Aricie) appeared in 1732 and was followed by 22 works of grand opera, of which the most notable is (Castor and Pol-lux) (1737). In 1750 he published his disser¬ tation sur le Principe de l'HarmonieB in which he reduces harmony to one single principle — the fundamental bass, on which he proves all the rest to depend. This work procured him an invitation from the court to superintend the opera at Paris. Louis XV granted him a patent of nobility, and the order of Saint Michael, and in 1876 a statue was raised to him in his native city. Consult Pougin, (Rameau, Essai sur sa Vie et ses CEuvres) (1876).

RAMEE, ra-ma', Louise de la. See

OuiDA.

RAMEE, Pierre, pe-ar ra-ma (Latinized, Petrus Ramus), French

humanist and mathe¬ matician: b. Cuth, near Soissons, 1515; d. Paris, 26 Aug. 1572. He went to Paris when he was but eight years old, and became lackey to a rich stu¬ dent in the College of Navarre, but devoted to self-improvement all the time he could spare. After attending a course of philosophy he was admitted to the degree of M.A., on which oc¬ casion he questioned the infallibility of Aristotle. His Unstitutionum Dialecticarum Libri IIP (1543), and (Animadversionum in Dialeoticam Aristotelis Libri XX> raised a storm against him in the university; their publication was pro¬ hibited, and extant copies ordered to be burned before the Royal College of Cambria. Having obtained the patronage of the Cardinal De Lor¬ raine, the prohibition of lecturing imposed in 1543 was withdrawn in 1547, and in 1551 he was appointed professor of rhetoric and philosophy in the College Royal at Paris. His spirit of free inquiry ultimately led him to become a Protestant, and he was obliged to flee from Paris, but he unfortunately returned in 1571 and was killed in the massacre of Saint Barthol¬ omew. His works, relating to grammar, logic, mathematics, etc., are numerous. His doctrines were widely diffused. France, England and particularly Scotland, were full of Ramists. His logic was introduced into the University of Glasgow and in the German universities. Con¬ sult Waddington, (Ramus, sa Vie, see Ecrits et ses Opinions) (1855); Desmaze, (Ramus) (1864) ; Lobstein, (P. Remus als Theolog* (1878) ; Voigt, (Ueber den Ramismus der Uni-versitat Leipzig) (1888); Owen, (Skeptics of the French Revolution } (1893).

RAMENGHI, ra-meng’ge, Bartolomeo.

See Bagnacavallo.

RAMESES, ram’e-sez, or RAMSES (in Egyptian <(the Child of the Sun®), the name of several Egyptian kings, especially of the 19th and 20th dynasties, of which the most notable are :

RAMESES II (Gr. Sesostris) , son of Sethos. He was the third king of the 19th dynasty, and reigned 1300-1280 b.c. He made a campaign

against Syria and advanced victori¬ ously as far as Berytus (Beirut), on the Phoeni¬ cian coast of the Mediterranean. He next ex¬ tended Egyptian dominion over Ethiopia and a part of Arabia and began the cutting of a canal between the Mediterranean and Red seas. But the great event of his reign was his war with the Khita, supposed to be the Hittites. He de¬ feated a confederation, among whom the Khita were the chief, in a great battle near the Kadeshon (Orontes) in Syria, and subsequently took Jerusalem and other places. He fortified the east of Egypt by erecting a great wall from Pelusium to Heliopolis and Tanis. In his reign Thebes rose to great magnificence. Here he erected the splendid temple known as the Rameseum, with a sitting statue of himself more than 60 feet high. The figure of Rameses II at Tanis, parts of which were discovered, was 92 feet high, or with its pedestal 125 feet. It was erect, with the left foot advanced, and probably the tallest of ancient statues. He is the king who oppressed the Hebrews, and the father of Menephthat, under whom the exodus took place. He had 111 sons and 59 daughters, and we have more records and statues of him than of any other Pharaoh. His mummy was discovered near Thebes in 1881 and in 1886 placed in the Egyptian Museum at Cairo.

RAMESES III, the Rhampsinitus of Herod¬ otus, belonged to the 20th dynasty, and was also a king of note, some of whose achieve¬ ments seem to have been ascribed to Sesostris. He reigned 1180-1150 b.c., during which period he had to withstand many invasions of the sur¬ rounding nations, but was uniformly successful in war, and active in great undertakings in time of peace. At Medinet-Abu he built a magnifi¬ cent temple in memory of his warlike achieve¬ ments in Nubia and Syria. The mummy of Rameses III was found in 1886. Nine other kings of the name of Rameses are mentioned as having belonged to the 20th dynasty (1150-1050).

RAMESES, a city of Egypt, in the district of the same name, supposed to be the same as Raamses, one of the treasure-cities built for Pharaoh by the children of Israel during their bondage in Egypt. It was from this point that the Israelites set’ out in their exodus from Egypt ; and its geographical, position is there¬ fore of great interest as determining their route toward the Red Sea. The district or <(land® of Rameses has been identified by some with Goshen, or a part of Goshen. As for the city, some have supposed it to be in the neighborhood of On or Heliopolis; others somewhere near Old Cairo, on the opposite side of the Nile from ancient Memphis; Dr. Robinson placed it in the valley of Wady Toumilat, toward the east end of that valley, in the line of the fresh-water canal to Ismailia; and Dr. Lepsius thought he had found its site at Tell-el-Maskhuta, in that

region. This site, however, has been identified by Naville with Pithom. It is argued in favor of the conjecture which places it in the neigh¬ borhood of Memphis, that Rameses must have been near the capital or residence of Pharaoh at the time of the exodus, and as this was Mem¬ phis, Rameses must therefore have been near this city. But though Memphis was the ancient capital, it does not follow that the Egyptian king invariably resided there. Tanis or Zoan was also a royal residence, and Brugsch identi¬ fies Rameses with it, an identification which suits the biblical narrative quite well. Upon the name of the city is based the theory which identifies Rameses II with the Pharaoh of the oppression.

RAMESSEUM, ram-es-se'um, a temple of ancient Egypt, on the western bank of the Nile, situated opposite Thebes, and near the modern village of El-Kurneh. Its ruins constitute one of the most interesting groups of ancient Egyp¬ tian remains, owing to the rich mural sculptures of great historical value which are there pre¬ served. The principal features of the temple were two great courts about 140 feet long by 180 feet wide, entered through a propylon 225 feet wide. The front court contains the frag¬ ments of a gigantic statue of Rameses II carved from a single block of granite and estimated to have weighed, when entire, more than 850 tons. The statue was 60 feet high and the monarch was represented as seated on his throne. The columns in both courts are among the most beautiful specimens of Egyptian architecture. On the wall of the second court is a great series of sculptures depicting a battle between Rameses II and the Hittites, in which the king is shown as victoriously pursuing the enemy's forces. Opening on the second court is a beautiful hall of pillars, the walls of which are adorned with battle scenes and religious subjects. A smaller chamber adjacent to the hall of pillars is notable for its astronomical ceiling. The temple was described by Diodorus Siculus under the name of the Tomb of Osymandyas. It is sometimes called the Memnonium.

RAMESWARAM, ra-mes'wa-ram, or RA-MESHWARAM, a low sandy island between the southern extremity of India and Ceylon, and between the Gulf of Manaar and Palk Strait, about 14 miles long and five wide. It is one of the islands that form the chain known as Adam's Bridge, and contains a famous Hindu temple of Dravidian architecture, which attracts many pilgrims from all parts of India. The port of the island is Pambam; it also contains a small town called Rameswaram. There is a passage for ships of moderate size between this island and the continent. Pop. 17,854.

RAMl£, RHEA, or CHINA GRASS,

Boehmeria tenacissima and B. nivea. Shrubs, five to eight feet high, producing in the bark of their stalks or stems a bast fibre. Technically ramie and rhea are derived from tenacissima and China grass from nivea. This distinction has never been regarded, however, in the economic literature of the subject, the term ramie being commonly used to designate all Bcehmeria fibre, China grasS being either a synonym or the trade name of the Chinese fibre as imported. In the statements which fol¬ low, therefore, ramie and China grass may be considered as synonymous terms, referring to

the fibres of both species, as they are prac¬ tically identical from the standpoint of com¬ mercial utility, and as regards culture, prepara¬ tion and manufacture.

The fibre is strong and durable, is least affected by moisture of all fibres and takes first rank as a textile substance. It is adapted to the widest range of uses of any known textile. It has been made into stuff goods for men's wear, ladies' dress goods, upholstery, curtains, laces and embroideries. The pile of velvets and plushes, stockings, underclothing and knit goods, table damask, napkins, handkerchiefs, shirtings, sheetings, sail duck, carpets, cordage, fishing nets and yarns and threads of all de¬ scriptions, and it makes a superior bank-note paper. It is also used to adulterate silk and for imitation silk goods. The plant has been the subject of experiment in nearly every country in the world, and probably millions of dollars have been spent or wasted, in attempts to ex¬ ploit the industry, or in the construction of machines to extract the fibre. Yet the fact re¬ mains that the commercial fibre is produced only in China and by rudest hand methods, Japan coming the nearest to establishing a com¬ mercial industry for the production of export fibre. Ramie is neither grown nor to any ex¬ tent manufactured in the United States, though its culture was experimented with for years, and inventors and textile manufacturers have struggled with the machine problem and with the after preparation and the spinning of the fibre. As far as this country is

concerned the fact that the Chinese fibre can be laid down in San Francisco for about four cents a pound condenses the entire ramie situation into a nut¬ shell. Cultivation in this country would not pay at such prices, and there is not a machine in existence that could produce enough marketable fibre in a day to pay for the cost of running the machines when American wages are considered.

Ramie manufactures have been on the market for years, derived from European sources, and made from raw fibre produced in China. And many manufactures made in whole, or part, from ramie are sold as some¬ thing else, because the fibre is unknown to the public, or because it is used as an adulterant, as in silk fabrics. See China; Cordage; Fibre; Hemp.

Consult (Report on Rhea Fibers (Watson 1875) ; Bulletin Royal Kew Gardens; Dictionary Economic Products of India; Reports (1, 2 and 7) Office of Fibre Investigations, Department of Agriculture; also the French publications of Favier, De Landtsheer, Michatte, Roux, Ringlemann, and the ramie literature published by the Ministry of Agriculture of France.

Chas. Richard Dodge.

RAMILLIES, ra-me-ye, a village of Bel¬ gium, in the province of Brabant, 13 miles north of Namur and 28 miles southeast of Brussels. On 23 May 1706 the Duke of Marlborough gained here a signal victory over the French under Marshal Villeroi and the Elector of Bavaria. The numbers were about 60,000 on each side ; the loss of the allies was about 4,000 men, that of the French 15,000. The conse¬ quence of this battle was the immediate evacua¬ tion by the French of the chief strongholds in the Netherlands. It was again the scene of

severe fighting in 1914. See Succession Wars; War, European.

RAMMAN, ram'man, or RIMMON, a

deity worshipped by the Babylonians and some¬ times called also Hadad. He was the god of the all-pervading atmosphere, especially of the winds. In this respect he may be likened to the Meeruts, or storm gods of northern India, for his name is derived from a Babylonian word meaning (<loud sounding® or <(bellowing.® In the Bible (<the House of Rimmon® is spoken of as his temple at Damascus (2 Kings v, 18). He is symbolized by the bull; is the god of storms and floods and of the charge of battle and is represented armed with

thunderbolt and battle-axe. Consult Baethgen, (Beitrage zur semitischen Religionsgeschichte) (1902) ; Jastrow, (Religion of Babylonia and Assyria*

(1898).

RAMMOHUN ROY, ram-mo-hun' roi, Hindu religious reformer : b. Burdwan district, province of Bengal, India, 1772; d. Stapleton Park, near Bristol, England, 27 Sept. 1833. He was a Brahman of strict education, but early renounced the polytheism of Brahminic the¬ ology. For five years he was dewan, or prin¬ cipal native officer in the collection of the revenues, in one of the districts of East India Company's services. He afterward studied Latin, Greek and Hebrew. A careful study of the sacred writings ot the Hindus had con¬ vinced him that the prevailing religious notions of the Hindus were grounded upon a gross per¬ version of their religion, the original records of which appeared to him to inculcate a system of pure theism. He now became anxious to reform the creed and practice of his country¬ men, and determined to devote his talents and his fortune to this undertaking. A work of his in Persian on (The Idolatry of All Religions) aroused much protest. In 1814 he went to live in Calcutta, where as early as 1818 he had united a number of intelligent Hindus in a species of monotheistic worship. He trans¬ lated the Vedanta, a compendium of the doc¬ trines contained in the Vedas or ancient sacred books of the Hindus, from the Sanskrit into the Bengali and Hindustani languages, and distrib¬ uted the translation gratuitously. This he after¬ ward published in English, for the purpose of proving to his European friends ((that the super¬ stitious practices which deform the Hindu reli¬ gion not having to do with the pure spirit of its dictates.® From the perusal of the New Testa¬ ment he found (he says) the doctrines of Christ more conducive to moral principles, and better adapted for the use of rational beings, than any other which had come to his knowledge. In 1820 he accordingly published the (Precepts of Jesus the Guide to Peace and Happiness,* con¬ sisting chiefly of a selection of moral precepts from the Evangelists, and Unitarian in its char¬ acter. On 23 Jan. 1830 he founded at Cal¬ cutta the Brahmiya Somaj, from which was de¬ rived the Brahamo Somaj.

Rammohun Roy, in his doctrinal views, was a Unitarian, holding, however, the pre-existence and superangelic dignity of Christ, and consid¬ ering the doctrine of the Trinity as a species of polytheism. He believed possible a combina¬ tion of Brahminism and Christianity. His views were at first much misunderstood ir»

England, and it appears that even Bishop Heber regarded him as an atheist. In 1830 he went to England in the character of ambassador from the king of Delhi (who gave him the title of Rajah). Consult Carpenter, CA Review of the Labors, Opinions and Character of Rajah Rammohun Roy> (1833) ; Fox, (Discourse on Occasion of the Death of Rajah Rammohun Roy> (1833) ; Max Muller, (Biographical Essays) (1883).

RAMONA. <Ramona> (1884), by Helen Hunt Jackson, was written to carry forward an indictment already begun in the author's (Century of Dishonor* (1881) against the treat¬ ment of the Indians by their white con¬ querors. (Uncle Tom's Cabin) comes at once to mind, but the two books have little in com¬ mon besides an analogous intention. Mrs. Jackson romantically eluded the problem by making Ramona, the heroine, and her Teme¬ cula husband, Alessandro, so near to high-caste Mexicans in color and nurture that their wrongs as Indians seem untypical of the real grievances of their unfortunate race. They suffer little more from the invading Yankees than do the full-blooded Mexicans. Indeed, the true conflict and injustice occur between the old Californians, Indian or Spanish, and the predacious vanguard of the Anglo-Saxon con¬ quest. California, for Mrs. Jackson, was a splendid paradise of patriarchal estates in vast fertile valleys, steeped in a drowsy antiquity, and cherished by priests as unworldly as Saint Francis. Against this rich background she set a story which begins in peace, blackens to hard and ugly tragedy and then grows at the end into peace again. The pomp of the setting, the strength of the contrasts, the eloquence, the intensity, the passionate color dominate, almost submerge, the problem stated, but they tend also to lift it into the higher regions of the imagination in which particular acts of in¬ justice take on the large significance of universality.

Carl Van Doren.

RAMPION, a biennial herb (Campanula rapunculus) of the family Campanulaccce. It grows about 30 inches tall, has a parsnip-like root, obovate leaves, lilac flowers in a spike or raceme, and very small

seeds. It is a native of Asia, Europe and northern Africa, where it is cultivated for its roots and leaves, the former of which are used like radishes, the latter like spinach. The plants do best in light, rich loam, partially shaded and well supplied with moisture but not wet. Since early spring sown plants are likely to run to seed, other sow¬ ings should be made in early summer. The plant is less popular in America than abroad.

RAMPOLLA, ram-pol'la, Mariano, Mar¬ quis del Tindaro, Roman prelate: b. at Polizzi, Sicily, 17 Aug. 1843; d. 1913. Born of an aristocratic family he was educated at Rome and took priest's orders at 23. Several years later he entered diplomacy and was made secretary to the Papal nunciature at Madrid. During the absence of the Nuncio Simonei in 1876 he acted so brilliant a part during the Carlist war as to secure his appointment as secretary of the Congregation of the Propaganda. In 1885, be¬ ing then Papal Nuncio at Madrid, he proposed

Pope Leo XIII as arbitrator in the dispute between Spain and Germany regarding the Caroline Islands. In 1887 he was created cardinal and made papal secretary of state, which post he held until the appointment of the new Pope Pius X in 1903. The foreign policy of the Vatican was influenced by him and con¬ sisted of a conciliatory attitude toward France together with an opposition to the Triple Alliance, with the ultimate end in view of re¬ establishing the temporal power of the Pope. Upon the death of Leo XIII, Cardinal Ram-polla was one of the most prominent candidates to the succession. Austrian interests opposed him and when Pope Pius X was elected, Ram-polla resigned as secretary, being succeeded by Cardinal Merry del Vail (q.v.).

RAMPUR, ram-poor', India, (1) capital of a state of the same name, on the left1 bank of the Kosila River, in Central India. It is the residence of the nawab, who represents the Rohilla chieftain of Rohilkhand. A lofty mosque is a specimen of oriental magnificence. The place is famous for its damask, sword-blades and jewelry. Pop. 78,758. (2) The state under the superintendence of the government of the United Provinces has an area of 893 square miles. Pop. 533,212. (3) A smaller In¬ dian town, capital of Bashahr, in southeastern Kashmir, formerly famed for its shawl manu¬ factures. Pop. 7,945.

RAMSAY, ram'zi, Allan, Scottish poet: b. Leadhills, Lanarkshire, 15 Oct. 1686; d. Edinburgh, 7 Jan. 1758. The death of his father in early

life forced him to seek a means of livelihood in the Scottish capital. There he became bound as an apprentice to a wig-maker, which occupation he continued after his ap¬ prenticeship had ceased. The exact period when he commenced bookselling is unknown, but he is said to have been the first who established a circulating library in Scotland. The library continued to exist till a comparatively recent period. His first shop, as we learn from the imprint of some of his books, was <(at the sign of the Mercury, opposite to Niddry's Wynd® ; but in 1726 he removed to a house at the east end of the Luckenbooths and adopted for his sign the heads of Ben Jonson and Drummond of Hawthornden. In 1721 he published a col¬ lection of his poems which was so liberally sub¬ scribed for that he is said to have cleared by it 400 guineas. These poems had originally ap¬ peared on separate broadsheets and sold for a penny each. In 1724 the first volume of <The Tea-Table Miscellany, > a collection of songs appeared, which was soon followed by two others. Shortly afterward he brought out (The Evergreen, being a Collection of Scots Poems wrote by the Ingenious before 1600, > which was equally successful. In 1725 appeared his famous pastoral, (The Gentle Shepherds Its success was instantaneous and edition followed edition with great rapidity. In 1728 a second quarto volume of his poems appeared; and his (Thirty Fables, > undoubtedly the best of Ram¬ say's lesser productions. He was now at the height of his celebrity and his shop was the common resort of the literary characters and wits of Edinburgh. He spent the last 12 years of his life in a quaint house he had built on the north side of Castle Hill, although he did not give up his shop until within three years

of his death. He was buried in Greyfriars' Churchyard, where a monument has been erected. Another monument, erected in 1865, stands in Princes' Street Gardens. Consult (Life) by Smeaton (1890); Graham, (Scottish Men of Letters in the 18th Century > (1901).

RAMSAY, Allan, Scottish portrait painter, son of the preceding: b. Edinburgh, 1713; d. Dover, 10 Aug. 1784. He studied art in Lon¬ don and in Italy and by 1758 had achieved a high reputation. George III appointed him principal court painter. Walpole regarded some of his portraits of women superior to Rey¬ nolds'. He painted portraits of Gibbon, Chester¬ field, Hume, Rousseau and many others, now in the National Portrait Gallery and the gal¬ lery at Edinburgh. The portrait of George III preserved at Independence Hall, Philadelphia, is his work.

RAMSAY, Sir Andrew Crombie, Scottish geologist: b. Glasgow, Scotland, 31 Jan. 1814; d. Anglesey, England, 9 Dec. 1891. In 1841 he joined the geological survey, with which he was connected until 1881. He became professor of geology at University College, London, in 1848; was lecturer at the School of Mines, 1851; president of the Geological Society, 1862, and director-general of the Geological Survey and the Museum of Practical Geology, 1872-81. He was popular as a lecturer and held the theory that many lake basins are the result of glacial excavations. As a geologist he devoted himself to stratigraphy to the exclusion of palaeontology and petrography. His works include (01d Glaciers of North Wales and Switzerland) (1860) ; (The Physical Geology and Geography of Great Britain) (1872), *etc.*

RAMSAY, Andrew Michael (Chevalier Ramsay), Scottish scholar: b. Ayr, Scotland, 9 June 1686; d. Saint Germain-en-Laye, France, 6 May 1743. He was educated at the universi¬ ties of Edinburgh and Saint Andrews and being deeply interested in theological matters he went to Leyden where he formed a friendship with the mystic Poiret through whom he visited Fenelon, archbishop of Cambrai, in France, in 1710. The latter took a deep interest in Ram¬ say, succeeded in converting him to the Roman Catholic faith and kept him with him until his death in 1715, when he bequeathed to Ramsay his papers. Ramsay

then became tutor to the Due de Chateau-Thierry and subsequently acted in the same capacity to the sons of the Pre¬ tender, Francis Edward, at Rome. He visited England in 1730, was elected to the Royal Society and on his return to Paris became tutor to the Vicomte de Turenne. His writings were published in excellent French, but though of considerable merit and very popular in his day, are now rarely read. They include (Essai Philosophique sur le Gouvernment CiviP (1721); <Vie de Fenelon> (1723); <Poems> (1728) ; cL'Histoire du Vicomte de Turenne) (1735), *etc.*

RAMSAY, David, American physician and historian : b. Lancaster County, Pa., 2 April 1749; d. Charleston, S. C., 8 May 1815. He studied medicine and practised in Charleston, where he soon acquired celebrity. He was a field-surgeon in the Continental army, was elected to the State legislature in 1776, was a prisoner of the British in 1780-81 and in 1 782—

86 served in the Continental Congress, acting as president in 1785-86. He was a member of the South Carolina legislature in 1801-15 and was president of the State senate when he was killed by a lunatic. He labored zealously with his pen to promote the cause of the American inde¬ pendence and among his publications are (The History of the American Revolution) (1789) ; (The Life of Washington (1807); (The His¬ tory of South Carolina) (1785) ; (Universal History Americanized, or an Historical View of the World, from the Earliest Record to the 19th Century) (12 vols. 1816-17), *etc.*

RAMSAY, Francis Munroe, American naval officer : b. Washington, D. C, 5 April 1835; d. 19 Tilly 1914. Appointed midshipman in 1850; graduated from the United States Naval Academy in 1856, and in the Civil War partici¬ pated in the engagements at Haines' Bluff, Yazoo River, Milliken's Bend and later com¬ manded the gunboat Unadilla of the North At¬ lantic Squadron. He was superintendent of the United States Naval Academy in 1881-86, was promoted rear-admiral in 1894, served as chief of the Bureau of Navigation in 1889-97, and in the latter year was retired on reaching the age limit.

RAMSAY, Nathaniel, American soldier: b. Lancaster County, Pa., 1751 ; d. 25 Oct. 1817. He was graduated from Princeton in 1767, studied law, was admitted to the bar in 1771, and in 1776 entered the Continental Army with rank as lieutenant-colonel. He greatly dis¬ tinguished himself at the battle of Monmouth in 1778, when he with Colonel Stewart checked the advance of the British while Washington

rallied the main army. He was severely wounded, taken prisoner and held until 1780 when he was shortly afterward retired. With the exception of 1786-87, when he was a mem¬ ber of Congress from Maryland, he saw no further public service.

RAMSAY, Sir William, Scotch chemist, nephew of Sir A. C. Ramsay, the geologist: b. Glasgow, 2 Oct. 1852; d. 23 July 1916. He was educated at Glasgow and Tubingen, was assist¬ ant in the ˆYoung® chemical laboratory 1872-74, and at Glasgow University 1874-80, and after seven years as professor of chemistry at University College, Bristol (six as its princi¬ pal), and from 1887-1913 was professor of chemistry at University College, London. A member of most of the royal academies, philo¬ sophical, physical and chemical societies of the world, he won his chief repute for his study of rare gases and their discovery; with Lord Raleigh in 1894 he discovered argon (q.v.) and alone isolated helium, krypton, neon and xenon (qq.v.). In the investigation of the nature and properties of radium he took a prominent part, and in November 1903 claimed that he had proof that helium is the gaseous emanation of radium (q.v.). In 1904 he was awarded the Noble prize in chemistry. He was created K.C.B. in 1902 and was an officer of the Legion of Honor and of the Prussian order Pour le Merite. He wrote (The Gases of the Atmosphere, the History of their Dis¬ covery } (1896). Consult Tilden, Wm. A., (Sir William Ramsay) (1918).

RAMSAY, Sir William Mitchell, Scottish archaeologist and historian: b. Glasgow, 15 March 1851. He was educated at the univer-

sities of Aberdeen, Oxford and Gottingen, was Oxford traveling student in 1880 and from that date onward has traveled extensively in Asiatic Turkey. In 1885 he was appointed to the chair of classical archaeology at Oxford, and since 1886 has been professor of humanity (Latin) in the University of Aberdeen. He has made a special study of the geography and topography of Asia Minor, and among his works are (The Historical Geography of Asia Minor* (1890) ; <The Church in the Roman Empire before a.d. 170) (1893), dealing with Saint Paul

in Asia Minor and the early persecutions of the Chris¬ tians; (The Cities and Bishoprics of Phrygia) (1895-97) ; (Saint Paul the Traveler and the Roman Citizen* (1895) ; Umpressions of Tur-key) (1897) ; (Was Christ Born at Bethlehem ?* (1898) ; historical Commentary on the Epistle to the Galatians) (1899) ; (The Education of Christ > (1902) ; (The Letters to the Seven Churches of Asia) (1905) ; (Pauline and Other Studies in Early Church History* (1906) ; (The Cities of Saint PauP (1907) ; (The Revolution in Constantinople and Turkey* (1909) ; Pic¬ tures of the Apostolic Church) (1910) ; (The First Christian Century *(1911) ; (The Teach¬ ing of Paul in Terms of the Present Day* (1913) ; (The Making of a University) (1915).

RAMSDEN, ramz'den, Jesse, English mechanist and optician: b. Halifax, Yorkshire, 6 Oct. 1735; d. Brighton, Sussex, 5 Nov. 1800. He was apprenticed to a cloth-worker, but sub¬ sequently applied himself to engraving and in the course of his employment having to engrave several mathematical instruments, finally con¬ structed them himself. He opened a shop in the Haymarket, whence he removed to Piccadilly, where he remained until his death. Ramsden obtained a premium from the Board of Longi¬ tude for the invention of a machine for the division of mathematical instruments. He also improved the construction of the theodite, the pyrometer for measuring the dilation of bodies by heat, the barometer for measuring the height of mountains, the refracting micrometer and transit instrument and quadrant. He made great improvements in Hadley's quadrant and sextant, reducing the limits of error from 5 minutes to 30 seconds ; and procured a patent for an amended equatorial. He was chosen a Fellow of the Royal Society in 1786, and such was his reputation that his instruments were bespoken from every part of Europe. He re¬ ceived the Copley medal from the Royal Society in 1795 in recognition of the importance of his various inventions.

RAMSEUR, ram'ser, Stephen Dodson,

American soldier: b. Lincolnton, N. C., 31 May 1837; d. Cedar Creek, Va., 19 Oct. 1864. He was graduated from West Point in 1860 and was assigned to garrison duty at Fortress Monroe. At the outbreak of the Civil War he resigned from the United States army to. enter the Confederate service with rank as major of artillery. He served in the Peninsular Cam¬ paign, was later attached to ˆStonewall® Jackson's command, performed gallant service at Chancellorsville and at Gettysburg in his capacity of brigadier-general and was conspicu¬ ous for bravery in the battle of the Wilderness. In 1864 he received temporary rank as major-general, was engaged in the Shenandoah cam¬ paign and was fatally wounded at the battle of

Cedar Creek, where he was captured while covering the retreat of the Confederate forces.

RAMSEY, ram'zi, Alexander, American politician and Cabinet officer : b. near Harris¬ burg, Pa., 8 Sept. 1815; d. Saint Paul, Minn., 22 April 1903. He took a partial course at Lafayette College (Easton, Pa.), studied law at Carlisle, Pa., was admitted to practice in 1839; in 1841 was elected chief clerk of the Pennsylvania house of representatives and in 1843-47 was a Whig representative in Congress. In 1848 he was chairman of the Whig State committee, and on 2 April 1849 was appointed governor of Minnesota, established as a Terri¬ tory 3 March 1849. He concluded treaties with the Ojibways and Sioux in 1851, and a second treaty with the Ojibways in 1863. In 1855 he became mayor of Saint Paul, in 1859 was elected governor of the State of Minnesota, being the Republican candidate for the first State campaign, and by re-election held the post until his resignation 10 July 1863. He then served in the United States Senate two terms, ending in 1875. While in the Senate he visited France in the effort to secure a cheaper rate of international postage. In 1879-81 he was Secretary of War in Hayes' Cabinet. He was a leading spirit of the Minnesota Historical Society, of which he was the first president (1849-ˆ63). He was the first Civil War gov¬ ernor to offer volunteers to Lincoln.

RAMSGATE, ramz'gat, England, on the Isle of Thanet, in the county of Kent, 65 miles east by south of London, is a seaport and popular seaside resort. It is situated in the valley between chalky cliffs and has a fine stretch of sandy beach. The chief places of interest are the theatre, music-hall, assembly-room, iron promenade pier and churches. There is an excellent harbor, extensive bathing establishments ; of historical interest are an ancient Anglo-Saxon graveyard on Ossengal Hill, about one mile from the town; Pegwell Bay, the landing place of Hengist and Horsa, and Cliffs' End, where a cross marks that of Saint Augustine. There is some shipbuilding, rope-making and a considerable fishery. Pop.

29,603.

RAMUS, ra'mus, Petrus. See Ram£e, Pierre.

RANA. See Frog.

RANAVALONA III (also written RANAVALO), last queen of

Madagascar: b. 1864. She succeeded her aunt, Ranavalona II, in 1883, and in that year married the Prime Minister, Rainilaiarivony, who had been prince consort to her aunt. She was only nominally queen, as the government had been controlled by the Prime Minister since 1864. The French suc¬ ceeded in establishing a protectorate over the island in 1895, but Ranavalona retained a nomi¬ nal sovereignty until 1897, when the island was declared a French colony and the queen was deposed and exiled to Algeria.

RANC, rank, Arthur, French politician and author: b. Poitiers, 20 Dec. 1831; d. 10 Aug. 1908. He was educated at Poitiers; studied law in Paris ; became involve'd in the disorders of the Democratic party, was arrested and de¬ ported to Africa. Returning to Paris after the

amnesty of 1859, he contributed to the Courier du Dimanche , the Nain Jaune, the Journal de Paris and other journals. For certain articles written for the Nain Jaune he was imprisoned for four months. Under Gambetta he became director of police and in 1871 was elected to the National Assembly, but owing to his dis¬ agreement with the arrangements for peace he resigned and was elected a member of the Commune. He resigned from that body on account of its violence. In 1873 he again be¬ came a member of the National Assembly. Later he was impeached for the part he had played during the Commune, and in 1875, during his absence in Belgium, was condemned to death in contumaciam. The amnesty of 1879 allowed his return to France, and in 1881 he became deputy from the Seine and in 1891 a senator. He succeeded Clemenceau as editor of L'Aurore and was later president of the Association of Republican Journalists. He wrote a political romance, (Sous l'Empire) (1872), also (De Bor¬ deaux a Versailles) (1877) ; (Le Roman d'une Conspiration) (1868).

RANCAGUA, ran-kag'wa, Chile, the capi¬ tal of the province of O'Higgins, 50 miles by rail south of Santiago. It is an agricultural centre with an active domestic trade. The Spaniards here won an important victory over the revolutionary forces in 1814. Pop. 10,380.

RANC&, ran-sa, Armand Jean le Bou-thillier de, founder of the reformed order of La Trappe: b. Paris, 9 Jan. 1626; d. 26 Oct. 1700. At 11 he was appointed canon of Notre Dame, and at 13 wrote a commentary on the Odes of Anacreon. After being graduated at the Sorbonne, he was ordained priest (1651) and before long was preferred to no fewer than six benefices. Residing at Paris, in receipt of a large income in addition to his private fortune, he gave himself up to a life of dissipation. In 1657, however, a change took place in his man¬ ner of life, and he determined to enter the cloister. He disposed of his estate of Veret, near Tours, applying the proceeds to religious purposes, and demitted all his benefices except the priory of Boulogne and the abbey of La Trappe. Retiring to the latter place in 1664, he began the strictest reforms. (See La Trappe). In consequence of his growing infirmities he resigned his charge of the abbey in 1695. Con¬ sult Marsollier, (Vie de Ranee (1703) ; Gail-lardin, <Trappistes) (1844); Pfannenschmidt, ˆeschichte der TrappisteiP (1873).

RANCHING, a term derived from the Spanish-American word “rancho,® originally meaning a place where herdsmen eat and sleep, but gradually extended to mean a grazing farm. One who owns or operates a ranch is a rancher or ranchman, or in Mexico a ranchero. Some of these ranches are of vast extent, especially in Old Mexico and in South America, where they are termed haciendas, and include hun¬ dreds of square miles. In Texas, Colorado and other Western States and Territories, also, there are very large ranches, from which come the supplies of cattle for the American and foreign markets. With the growth of population there has been a marked reduction in great individual holdings of land, but some of the cattle-farms are still very extensive. The cattle are herded by a mixed class of men known as cowboys,

which includes students from college, rough and honest frontiersmen and others with a record that has driven them from places where they are better known. The cowboys round up the cattle once or twice a year, when the steers three years old are separated from the main herd and sent to market, and the calves are branded. The cattle of the ranches have been much improved within recent years by crossing with domestic breeds. It was chiefly from the cowboy element that President Roosevelt re¬ cruited his Rough Riders for the Spanish-American War.

RAND, Edward Kennard, American phi¬ lologist: b. Boston, Mass., 20 Dec. 1871. He was graduated at Harvard in 1894 and later studied at

the University of Munich, and the Episcopal Theological School at Cambridge, Mass. He was instructor in Latin at the University of Chicago in 1895-98, and occupied that position at Harvard in 1901-05, becoming assistant pro¬ fessor in 1905, and since 1909 he has been professor of Latin there. He is Harvard trus¬ tee of the American Academy at Rome, and in 1912-13 he was annual professor there. Author of articles on classical and mediaeval subjects and joint author of (Dante's Alagherii Operum Latinorum Concordantˆ (1912). He also wrote (Ovid and the Spirit of Metamorphoses)

(1912).

RAND, rand, contraction of WIT-WATERSRAND, South Africa. See Wit-watersrand; Transvall Colony.

RANDALL, ran'dal, Alexander Williams,

American statesman : b. Ames, N. Y., 31 Oct. 1819; d. Elmira, N. Y., 25 July 1872. He studied law, was admitted to the bar and in 1840 estab¬ lished a law practice at Waukesha, Wis. He was appointed postmaster there and in 1847 was a member of the convention which framed the State constitution. In 1855 he was elected to the State legislature, was judge of the second district in 1856, and in 1857-61 was governor of Wisconsin, rendering important aid in raising troops for the Union army. In 1861-62 he served as Minister to Italy, was Assistant Post¬ master-General in 1862-66 and Postmaster-Gen¬ eral in 1866-69. He then retired from public life and engaged in law practice at Elmira until his death.

RANDALL, George Morton, American military officer; b. Ohio, 8 Oct. 1841; d. D June 1918. At the outbreak of the Civil War he entered the Union army as second lieutenant. He received steady promotion, was distinguished for gallantry at Antietam and Petersburg, and was mustered out of the volun¬ teer service in 1865 with the rank of lieutenant-colonel. He was commissioned captain in the regular army in that year, promoted colonel in 1890 for gallant services in the Indian warfare in Arizona in 1873-74; commissioned brigadier-general of volunteers at the outbreak of the Spanish War in 1898, and on the reorganization of the regular army in 1901 received rank as brigadier-general.

RANDALL, James Ryder, American jour¬ nalist and poet: b. Baltimore, Md., 1 Jan. 1839; d. Augusta, Ga., 14 Jan. 1908. He was educated at

Georgetown College, D.C., taught for a while in a Louisiana college, and then turned to

journalism. In 1861 he wrote < Maryland, My Maryland,* a song which when set to music became, next to (Dixie, *the most popular of the Confederate war-songs and is considered by many to be the best American martial lyric. None of his other songs achieved the fame of this, but several of them are of notable excel¬ lence. Among them are (Stonewall Jackson,* and (There's Life in the Old Land Yet.* After 1866 he was for many years the editor of the Constitutionalist of Augusta, Ga., and later of the Morning Star of New Orleans.

RANDALL, Samuel Jackson, American statesman: b. Philadelphia, 10 Oct. 1828; d. Washington, D. C., 12 April 1890. Educated in the schools of his native city, he began life as a silk merchant's clerk and later entered into partnership in a firm of wholesale iron mer¬ chants. But politics was more attractive to him than business. He served four years as mem¬ ber of the city council and in 1858 was elected to the State senate. He enlisted with the City troop of Philadelphia at the beginning of the Civil War and served under General Thomas' command in the 2d United States Cavalry. He was promoted to orderly sergeant, then quarter¬ master and finally captain of his company. During the battle of Gettysburg he was ad¬ vanced to provost marshal. In 1862 he was elected to Congress and was a member of that body for 28 years. The first eight years of his career in Congress were uneventful; but in the 43d Congress he served with Blaine, Garfield, Banks and S. S. Cox on the committee on rules and took the lead in the opposition to the Force Bill in order to defeat its passage as law and secure for himself the leadership of the Demo¬ cratic party in Congress. He was elected speaker of the House at the second session of the 44th Congress and reelected by the 45th and 46th ; hence it fell to him to preside during the dispute over the Presidential election of 1876. He was not in sympathy with the settlement of the difficulty by means of an electoral commis¬ sion. Although always a Democrat, he took the opposite view to that of his party on the subject of protection at the period when tariff discussions were uppermost in Congress. He was an indefatigable worker and never shirked the arduous labor of committees, insisting al¬ ways on economy and honesty in the manage¬ ment of public affairs. Hence he served as an immense safeguard of the national treasury.

RANDEGGER, ran'deg-ger, Alberto, Aus-tro-English composer and conductor : b. Trieste, 13 April 1832; d. 1911. He studied pianoforte

under Lafont and composition under L. Ricci, and before he was 20 was known as composer of several masses and two ballets. His next work was an opera, (I1 Lazzarone,* to a libretto by Rossi. He became musical director in vari¬ ous Italian theatres and brought out his second opera, (Bianca Capella,* at Brescia in 1854. In that year he removed to London, where he long resided, becoming naturalized. He was teacher and director of the Royal Academy of Music, conductor of Italian opera at Covent Garden and of concerts at Queen's Hall and the Norwich Festival. A comic opera, (The Rival Beauties, * was produced in 1864. He was made Knight of the Crown of Italy in 1892.

RANDERS, ran'ders, Denmark, in Jutland, capital of the province of the same name, lies

at the head of Randers Fjord, about 20 miles from the Cattegat. It is an important port, whose chief exports are butter and eggs ; chief im¬ ports sugar, petroleum, coal and iron. Its cele¬ brated gloves, its manufacture of hosiery, cut¬ lery, railway carriages, calico-printing works and distilleries are the chief industries. Pop.

22,963.

RANDOLPH, ran'dolf, Alfred Magill,

American Episcopal bishop: b. Winchester, Va., 31 Aug. 1836; d. 6 April 1918. He was grad¬ uated at William and Mary College in 1855 and at the Virginia Theological Seminary in 1858, and took priest's orders in 1860. He was rector of Saint George's Church, Fredericksburg, Va., 1860-62, chaplain in the Confederate army 1863-65, and rector of Emmanuel Church, Balti¬ more, Md,, 1867-83. In the latter year he was elected coadjutor-bishop of Virginia. In 1892 the diocese was divided and he then became bishop of southern Virginia. He published (Reason, Faith and Authority in Christianity)

(1902).

RANDOLPH, Edmund Jennings, Amer¬ ican statesman: b. Williamsburg, Va., 10 Aug. 1753; d. Clarke County, Va., 13 Sept. 1813. He was educated at William and Mary College and afterward admitted to the bar. He was Vir¬ ginia's first attorney-general, was

member of Congress, 1779-82 and governor of Virginia, 1786-88. He was a member of the convention that framed the Federal Constitution though he did not approve or sign the document when completed. However, he urged Virginia to ac¬ cept it, feeling the necessity of union of the States. He was a leader in the work of codify¬ ing the Virginian laws begun in 1788. In 1789 Washington appointed him Attorney-General and in 1794 he succeeded Jefferson as Secretary of State. During the pending of the Jay treaty, Fauchet, the French Minister to the United States, sent home some dispatches to his coun¬ try which were intercepted by an English ship and through the English Minister were trans¬ mitted to Washington. They were kept by the President for eight days before their contents were disclosed to Randolph. Feeling that others had been consulted regarding the matter before he was apprised and that he must consequently be prejudged, he resigned his office after deny¬ ing the allegations of the dispatches. He re¬ tired to Virginia and resumed the practice of the law, but his public career was blighted and his memory bore the stain of the accusations against him until his vindication was presented by Mon¬ cure D. Conway in an article (A Suppressed Statesman,* in Lip pine ott's Magazine for Sep¬ tember 1887, followed by a biography, (Omitted Chapters of History Disclosed in the Life and Papers of Edmund Randolph (1888).

RANDOLPH, Edward, British colonial agent: b. England, about 1620; d. West Indies, after 1694. He was sent to New England in 1676 with a governmental commission to obtain information concerning the resources and the general character of the leading men in the colonies. He was also the representative of Capt. John Mason who claimed the ownership of New Hampshire. Randolph's arrogant de¬ mands, overriding the charter of Massachusetts, caused Governor Leverett to refuse to recog¬ nize him as a royal agent. Randolph, on his return to England after a six weeks' stay, pre-

sentecl a report hostile to the public men of the colonies and greatly exaggerating the population and wealth of the country, in order to afford an excuse for increased taxation. In 1678 he was appointed collector and surveyor of cus¬ toms for New England. In the nine years of his tenure of office he made eight visits to England, and his misrepresentations were largely responsible for the abrogation of the Massachusetts charter in 1684. He served under Gov. Sir Edmund Andros in 1686-89, and upon the overthrow of the Andros administra¬ tion he was imprisoned but later was released. He went to the West Indies in 1694, and died there. A complete list of Randolph's reports is given in the (Andros Tracts) (Vol. III).

RANDOLPH, John, of Roanoke, American statesman: b. Cawsons, Chesterfield County, Va., 2 June 1773; d. Philadelphia, 24 June 1833. He was of an old and wealthy Virginia family and claimed to be a descendant of Pocahontas. His father died young, and his mother mar¬ ried St. George Tucker, who directed his early education. Later he attended the gram¬ mar school of William and Mary College; in 1787 went to Princeton for a few months, and the following session to Columbia College, which ended his academic training. In spite of his protestations of ignorance he was well edu¬ cated, and wrote and reasoned well. He read law and began to practise, but preferred politics, and in 1799 was elected to Congress on a plat¬ form denouncing the Alien and Sedition laws. Randolph was in the House of Representatives 1799-1813, 1815-17 and 1819-25. He was a mem¬ ber of the Senate, 1825-29, and in 1829 was a member of the Virginia Constitutional Con¬ vention. In Congress he soon became the leader of the Democratic-Republican opposition, and after the defeat of the Federalists was the leader of the administration party, but soon fell out with Jefferson, and became an inde¬ pendent with a few followers called ˆQuids.® Throughout his public career Randolph was a consistent, strict constructionist. In his first speech he advocted a reduction of the ((mer-cenary® army; he led in the impeachment (1804-05) of Justice Chase, of the Federal Dis¬ trict Court; he denounced the settlement of the Yazoo frauds; and was the enemy of fraud and corruption in every form. Brought up in the midst of war,

he hated it, opposing all meas¬ ures leading to the War of 1812, and his opposi¬ tion to the administration cost him his seat in 1813. Returned to Congress in 1815, he strongly opposed the national reaction that followed the War of 1812. He disliked slavery, but de¬ nounced the Missouri Compromise as a sur¬ render of principles by both sides. He in¬ vented the term (<dough faces, ® as applied to Northern men who made compromise with slavery for reasons of expediency. He sup¬ ported Jackson for the Presidency, and de¬ nounced the Adams-Clay understanding as <(a combination of Puritan and blackleg.® A duel with Clay followed (1825), in which Randolph threw away his fire and offered Clay his hand. In 1830 Jackson appointed him Minister to Rus¬ sia. Resigning because of ill health, Randolph returned to America (1831) and opposed Jackson in the Nullification controversy. Reelected to Congress in 1832, he died before taking his seat. Randolph was a strange compound of VOL. 23 — 14

contradictory elements. At times he was a deist; oftener an emotional Christian. He was a far¬ sighted statesman, an eloquent speaker, a master of satire and vindictive ; at times he spoke non¬ sense. Eccentric and irritable in public, at odds, sooner or later, with all of his associates and colleagues, he was fond of children and was loved by them. By his will he emancipated his 318 slaves, providing for their support. With clearer vision than most of his contemporaries, he foresaw the grave danger to the South from the slavery question in politics and pointed out the course which that section must follow. He was never married, his fiancee, the beautiful Maria Ward, having broken her engagement with him to marry his cousin, Peyton Randolph. An aristocrat, he believed in the democratic theories of the French Revolution, but admired Edmund Burke. In his later years, his mind was affected by disease and the use of drugs to deaden pain, and by domestic troubles. In per¬ sonal appearance Randolph was tall, very slender, with a dark, keen face and long thin fingers, which he pointed or shook at his opponents when speaking. ((Little Jack® was a beautiful boy; John Randolph was an ugly man. Consult Gar¬ land, (The Life of John Randolph of Roanoke) (1881) ; Adams, Henry, (John Randolph (1882) ; Trent, Southern Statesmen of the Old Regime > (1898).

4 Walter L. Fleming,

Professor of History, Vanderbilt University.

RANDOLPH, Peyton, American patriot, president of the first Continental Congress : b. Williamsburg, 1723; d. Philadelphia, 22 Oct. 1775. He was graduated at William and Mary College and, sent to complete his education in England, studied law at the Temple. In 1748 he became king's attorney for the colony and the same year was chosen a member of the house of burgesses. He was chairman of a committee authorized to revise the laws of the colony, and was among the most active and influential members of the assembly. In 1764 the Virginia house of burgesses voted an ad¬ dress to the king against the passage of the Stamp Act, which Randolph drew up. On 12 April 1766 he was made speaker of the house of burgesses, and resigned his office of attorney-general. In the measures of opposition to the English he now took a conspicuous part. In March 1773, on the reception of copies of an address and resolution from the Massachusetts assembly, Randolph was prominent in urging instant and bold action. In the convention which met in August 1774, at Williamsburg, he presided, and was one of the delegates elected to the Continental Congress appointed to meet in Philadelphia in the following September. On the assembling of that body he was unani¬ mously elected its president. In 1775 he pre¬ sided over the second convention of Virginia and was speaker of the house of burgesses.

RANDOLPH, Thomas Jefferson, Amer¬ ican legislator : b. Monticello, Albemarle County, Va., 12 Sept. 1792; d. Edge Hill; Albemarle County, Va., 8 Oct. 1875. He was for several years a member of the State legislature of Vir¬ ginia, where he introduced in 1832 a bill for the gradual abolition of slavery, and in 1842 another for the reform of the taxes, which was passed, and proved of assistance in placing the State on a sound financial basis. In 1851-

52 he was a member of the convention for the revision of the Virginia constitution, in Civil War time was a firm supporter of the Con¬ federacy and in 1872 presided over the Na¬ tional Democratic Convention which nominated Horace Greeley for the Presidency. He edited the (Life and Correspondence of Thomas Jefferson) (his

grandfather) (1829) ; and wrote also (Sixty Years' Reminiscences of the Cur¬ rency of the United States.)

RANDOLPH, Mass., town in Norfolk County, 15 miles by rail south of Boston, on the New York, New Haven and Hartford Rail¬ road. The Boston School for the Deaf is lo¬ cated here. Manufactures include shoes and boxes. Pop. 4,756.

RANDOLPH, Vt., town in Orange County, on the Central Vermont Railroad, about 25 miles south by west of Montpelier. The town includes Randolph Centre and North Randolph. It is in an agricultural and lumbering region and its industries are connected largely with farming and lumbering. It has woodenware factories, flour and lumber mills and creameries. Its most noted institution is the Randolph State Normal School. It has a free public library. Pop. of the town, 3,010; of the Centre, 1,819.

RANDOLPH-MACON SYSTEM OF COLLEGES AND ACADEMIES, a group of five institutions in Virginia, compris¬ ing (1) Randolph-Macon College at Ashland, a college for men; (2) Randolph-Macon Academy at Bedford City, and (3) Randolph-Macon Academy at Front Royal, preparatory schools for boys ; (4) Randolph-Macon Woman's College at Lynchburg; (5) Randolph-Macon Institute at Danville, a preparatory school for girls. These institutions are under the control of one board of trustees, which is self-perpetu¬ ating. The original institution is the college for men at Ashland, which was established under the auspices of the Methodist Episcopal Church, South, and received its charter from the Vir¬ ginia legislature in 1830, thus being the oldest Methodist college in America. It was located near Boydton, Mecklenburg County, Va., and opened to students in 1832. The college ob¬ tained no permanent endowment until shortly before the Civil War, and was closed during the war. Much of the endowment was also rendered worthless, and the college reopened in 1866 under serious embarrassment. In 1868 its site was changed to Ashland, Va., and since that time its work has been successful and in¬ fluential. The first of the affiliated schools was the Academy of Bedford City, founded in 1890; the academy at Front Royal was established in 1892, and the woman's college in 1893 ; the institute at Danville was affiliated with the sys¬ tem in 1897.

The Randolph-Macon College at Ashland offers courses leading to A.B. ; B.S., and A.M. ; graduation with distinction in four subjects ad¬ ditional to those required for the A.B. and a thesis are required for the degree of A.M. The A.M. courses are elective, and the elective system prevails to a limited degree in the A.B. course. Six students' aid funds

are provided, four of which are for ministerial students, and several scholarships, the largest of which has a fund of $10,000. Two literary societies are maintained by the students for literary and ora¬

torical exercises. The buildings include Pace lecture-room building, the chemical laboratory, Duncan Memorial Chapel, the library, the gym¬ nasium, the Pettyjohn Hall of Science and eight large dormitories. The library contains 20,000 volumes. The students in 1919 numbered 231, and the faculty 18. The grounds and buildings are valued at $153,140; the productive funds av¬ erage about $430,000 yearly, and the income about $58,000.

The Randolph-Macon Woman's College of¬ fers courses leading to the degrees of A.B. and A.M. One year of graduate work in courses elected by the student is required for the mas¬ ter's degree. For the A.B. course the work of the first two years is prescribed, the last two years is largely elective ; the electives are ar¬ ranged in eight groups, one course in each group being the free choice of the student. Courses in music are offered; one course in the history of music is open to all college students and counts toward the A.B. degree; and a completion of the course in either piano, organ or vocal music count three hours toward the degree. The col¬ lege occupies two large buildings, the main building and the Jones Memorial Library; the library contains 15,000 volumes; 610 students were enrolled and 49 instructors in 1919.

RANDOLPH PLAN, in American politi¬ cal history, the name given the scheme of a Federal Constitution proposed in the Conven¬ tion of 1787 by Edmund Randolph of Virginia. It contained 15 resolutions and proposed a cor¬ rection of the Articles of Confederation; rep¬ resentation by population in two branches of Congress, the first chosen by the people, the sec¬ ond by State legislatures; Congressional con¬ trol of taxation and commerce; Congressional veto of State enactments; that Congress should choose the executive; that the executive with part of the judiciary should have a limited veto on acts of Congress and other less important provisions.

RANELAGH, ran'e-la, a fashionable Lon¬ don pleasure resort of the 18th century, fre¬ quently referred to in English literature. The rotunda built on the model of the Pantheon at Rome accommodated 6,000 persons and stood in beautiful gardens. The grounds are now occupied by the Chelsea Hospital.

RANGE, (1) in gunnery, the horizontal distance to which a projectile is thrown. Strictly, it is the distance from the muzzle of the gun to the second intersection of the tra¬ jectory with the line of sight. The range of a cannon lying horizontally is called the right level or point-blank range; when the muzzle is elevated to 45 degrees it is called the utmost level. (2) In music, the whole ascending or descending series of sounds capable of being produced by a voice or instrument ; the com¬ pass or register of a voice or instrument. (3) In natural science, the geographical limits within which an animal or plant is now dis¬ tributed, and the limits in point of time within whch it has existed on the globe. The first is called range in space and the second range in time. In the case of marine animals, as the Mollusca, there is also a range of depth, as measured by the number of fathoms which con¬ stitute their superior and inferior limits. (4) As a nautical term, the length of cable a little

in excess of the depth of water, ranged on deck ready to run out when the anchor is let go. Also a large cleat in the waist for belaying the sheets and tacks of the courses. (5) A target range is a place prepared for shooting at a target.

RANGE FINDER. See Fortifications.

RANGELEY (ranj'li) LAKES, in Maine, near the western boundary: one of the lakes, Umbagog, is on the boundary between Maine and New Hampshire. The principal lakes are Umbagog, Richardson, Molechunkemunk, Mooselookmaguntic, Rangeley and Kennebago. A number of small bodies of water are con¬ nected with the lakes mentioned and all are joined by short streams. The Rangeley Lakes are at the headwaters of Androscoggin River. They are noted for the wild and picturesque scenery and the abundance of fish and game. The region is a favorite summer resort. Two railroads enter this section, one terminating at the town of Rangeley on Rangeley Lake and the other at Bemis on Mooselookmaguntic Lake.

RANGER, ran'jer, Henry Ward, American painter: b. western New

York, 1858; d. 7 Nov. 1916. He never attended an academy of art, but traveled through, France, Eng¬ land and Holland for several years and was elected associate of the National Academy of Design. Among his pictures are (The Top of the Hill5 (in the Corcoran Gallery) ; (East River IdylP (in the Carnegie Gallerv) ; Pas¬ ture Lot5 ; (Morning at High Bridge5 and (Spring Woods5 (in the Metropolitan Museum, New York) ; (Bradley's Mill Pond5 (in Na¬ tional Gallery, Washington, D. C.). Some of his pictures are marines, and as a landscape painter his works are fresh, vigorous and finely colored.

RANGOON, ran-goon', Burma, chief town and principal seaport of Lower Burma, on the left bank of the Hlaing or Rangoon River, in the Pegu division, covers an area of 22 square miles, and is populated by Hindus, Mo¬ hammedans and Christians. The town occupies a long stretch of high land, incorporating villas whose spacious grounds lend to certain parts almost a rural aspect. The wide streets are virtually boulevards bordered on either side by trees. The modern large town is of recent growth, dating from the British occupation in 1852. Among the buildings may be mentioned the cathedrals, churches, government buildings, town-hall, law-courts, custom-house, hospital schools and colleges and museum. The city enjoys most of the modern conveniences, in¬ cluding a good water supply. There is railway communication with Mandalay and Prome. A large foreign and inland commerce is also car¬ ried on by waterways. The main exports are rice and timber, besides raw cotton, precious stones, ivory, horns and a variety of other articles. Cotton and woolen goods, machinery, coal, silk, salt and sugar are imported. The annual exports exceed £10,000,000. Rangoon was built in 1753 by Aloung-Choosa, the founder of the Burmese dynasty, and has since been the scene of many wars between Burmans and Peguans. The British restored it in 1825 to the Burmese, but annexed it in 1852. Pop., includ¬ ing cantonment, 293,316.

RANJIT SINGH, run-jet' sing'h', founder of the Sikh kingdom in the Punjab, India : b. Gujranwala, 2 Nov. 1780; d. 27 June 1839. His father was Maha-Singh, sirdar of Sukur Chu-keah. He lost both parents before he was 18, and though wholly without education set vigor¬ ously about consolidating and extending his power. At 20 he was appointed governor of Lahore by the Afghan Amir and calculated upon the fanaticism of the Sikhs for establish¬ ing his power over them. He secured Euro¬ pean officers to organize his army, whose stead¬ fastness and religious zeal, Sir William Hunter has compared to the Ironsides of Cromwell. In 1809 he formed an alliance with the

English through Charles Metcalfe, defining the Sutlej as the boundary between their respective ter¬ ritories, and to this engagement he always re¬ mained loyal. Having removed the danger of English combination with any of his native rivals, he actively pushed forward his conquests until his territory extended to and embraced Multan on the south, Peshawar on the west and Kashmir on the north. He obtained from Shah Shuja, a refugee in Lahore, the Kohinur dia¬ mond that had been carried off by Nadir Shah from Delhi. Dissensions followed his death, as none of his sons was capable of continuing his rule. Consult Griffin, (Ranjit-Singh5 (1892) ; Gordon, (The Sikhs5 (London 1904) ; Burgess, 'Chronology of Modern India5 (Edinburgh

1913).

RANK, in the army and navy, is officially described as ((that character or quality bestowed on military persons which marks their station and confers eligibility to exercise command or authority in the military service within the limits prescribed by law.55 It is divided into degrees or grades which mark the relative posi¬ tions and powers of the different classes pos¬ sessing it. Rank is generally held by virtue of office in an arm of the service, corps or depart¬ ment, but may be conferred independently of office, as in the case of retired officers and of those holding it by brevet. While the Presi¬ dent of the United States is technically commander-in-chief, the highest rank in the Ameri¬ can army is general; in the navy, admiral. Next to general is lieutenant-general, then major-general and next brigadier-general. In time of peace the highest army officer is usually a major-general, the titles of general and lieu¬ tenant-general being bestowed only as marks of special distinction. The same conditions apply to the ranks of admiral and vice-ad¬ miral. Until 1917 there had been only four ((full55 generals in the American army — Wash¬ ington, Grant, Sherman and Sheridan; and three "full55 admirals in the navy — Farragut, David Porter and Dewev. The title of general lapsed with the death of Sheridan in 1888, and under the law of 1911 the rank of admiral ceased on the death of Dewey, 16 Jan. 1917. Besides the four generals mentioned, the rank of lieutenant-general has been held also bv J. M. Scofield, Nelson A. Miles, S. B. M. Young, A. R. Chaffee, John C. Bates, H. C. Corbin, A. McArthur and Winfield Scott (brevet). By act of Congress, 22 May 1917, provision was made for the appointment of three admirals and three vice-admirals; and another act, 6 Oct. 1917, revived the title of general for two officers, namely, the chief of

staff and the commander of the United States forces in France. The application of both statutes, however, extends to <(the existing emergency only® — the European War, the ob¬ ject being to place the American war chiefs on a rank level with that existing among the allied naval and military forces. The relative rank between officers of the army and navy is as follows, lineal rank only being considered : General with admiral; lieutenant-general with vice-admiral; major-general with rear-admiral; brigadier-general with commodore (the latter grade ceased to exist in the United States navy 3 March 1899); colonel with captain; lieutenant-colonel with commander; major with lieutenant-commander; captain with lieutenant; first lieutenant with lieutenant (junior grade), and second lieutenant with ensign. An Ameri¬ can general wears on his uniform the United States coat of arms and two silver stars ; a lieutenant-general, one large silver star and two small ones; a major-general, two silver stars; a brigadier-general, one silver star; a colonel, one silver spread-eagle; a lieutenant-colonel, a silver leaf; a major, a gold leaf; captain, two silver bars, and a first lieutenant, one silver bar. The naval officers have similar decorations plus an anchor. The lowest military commissioned rank is second-lieutenant ; in the navy, ensign. Brevet rank is the title of a rank superior to that actually held, without its pay or emolu¬ ments. At the close of the Civil War nearly all colonels, with good records, were brevetted brigadier-generals. See Army.

In the British navy and army the relative rank is almost the same except in the two highest grades, where an admiral of the fleet ranks with field-marshal; then admiral with general, *etc.*

RANKE, ran'ke, Leopold von, German his¬ torian : b. Wiehe, Thuringia, 21 Dec. 1795 ; d. Berlin, 23 May 1886. His preliminary educa¬ tion at Donndorf and Sculpforta was followed by courses in theology and philology in Leipzig. From 1818 to 1825 he taught classics in the gymnasium at Frankfort, and then became pro¬ fessor of history at Berlin, largely because of the promise of his (History of the Roman and Germanic Peoples from 1494 to 1 535, > of which the first volume appeared in 1824. His coming to Berlin was the beginning of his study of Venetian history, which was chiefly due to his discovery of the valuable (Relations of the Venetian Ambassadors,* a discovery which strengthened his belief in the importance of diplomatic and other documentary material. In 1827 he

began the important study of civiliza¬ tion, first entitled (Princes and Peoples of Southern Europe in the 16th and 17th Cen¬ turiesˆ and in its revised form called (The Ottomans and the Spanish Monarchy in the 16th and 17th Centuries) (1877) ; and in the years immediately following wrote on the. Ser¬ bian Revolution (1829); (The Conspiracy against Venice in 1618) (1831), and the lectures (On the History of Italian Poetry* (1837). To the lectures delivered in 1833 may be dated the rise of the historical school known by his name, which, like the Heidelberg School, was Prot¬ estant in sympathy and impulses, but unpartisan in methods; its members include Waitz, best known for his studies of constitutional history, Giesebrecht, who wrote on the German Empire,

von Sybel, author of the (History of the French Revolution,* von Sybel's pupils, von Noorden and Maurenbrecher, and Diimmler, one of the editors of the (Monumenta Ger¬ manise, *and Dove, Ranke's literary executor and one of the editors of volumes 7-9 of the (History of the World.* From 1833 also dates the foundation of the (Historisch-Politische Zeitschrift,* edited by Savigny, Ranke and others, and protesting against the extreme liberalism of the revolution of July; as well as the beginning of Ranke's great history of (The Roman Popes in the Last Four Centuries* (1834-37; 10th ed. 1900), with its clear outline of the varied political and religious influences at work in Rome and its wonderful grasp of the meaning in a philosophic schema of (World-History) of the Papacy. It was followed and balanced by (German History in the Time of the Reformation* (1839-47; 7th ed., 1894), and (Twelve (originally Nine) Books of Prussian History0 (1847ˆ18; revised 1878-79), thus ful¬ filling in part his function as Prussian histori¬ ographer, a post to which he had been appointed in 1841. He was ennobled by the King of Prus¬ sia in 1865, and since 1858 had been president of the Munich Historical Commission. His academic activity ceased in 1871, but his work of research, authorship and revision continued almost to the very day of his death. A monu¬ ment was erected to him in Wiehe in 1896.

He wrote (French History, Especially in the 16th and 17th Centuries) (1852-61) ; (English History in the 16th and 17th Centuries) (1859-67; revised and enlarged 1877-79), and various studies in German history, among which the sympathetic (History of Wallenstein* (1869; 5th ed., 1895) should be mentioned. But of the greatest importance as embodying Ranke's phi¬ losophical idea of universal history is the his¬ tory of the World> (1880-88; 5th ed., 1896 seq.), which is marked by thorough research, excellent critical judgment and sharp,

clear and felicitous characterization, with a poetical vigor of style.

Ranke's complete works were edited by Dove ; volumes 53 and 54 contain valuable auto¬ biographical matter. Consult also Dove's biography in the (Allgemeine deutsche Biog¬ raphic *; sketches by Sybel in ˆistor. Zeit¬ schrift,* Vol. 56; Prutz, in (Unsere Zeit* (1886), and his son F. v. Ranke, un (Deutsche Revue* (1903) ; Lorenz, (Ranke, die Genera-tionlehre und der Geschichtsunterricht* (1891) ; Guglia, (Leopold von Ranke* (1893) ; Ritter, (Ranke: Seine Geistesentwicklung und seine Geschichtschreibung* (1896) ; Nalbandian, (Rankes Bildungsjahre und Geschichtsauffas-sung) (1901).

RANKIN, Arthur McKee, American actor: b. Canada, 1841 ; d. San Francisco, Cal., 17 April 1914. His first appearance on the stage was at Rochester, N. Y., under the name of George Henley. He afterward resumed his own name and in the early '60s made his debut in London. In 1870 he appeared in New York with Lydia Thompson. His most famous role was in (The Two Orphans, *and he was also highly successful in (The Danites,* a dram¬ atized version of Joaquin Miller's novel (The First Families of the Sierras. * Later he ap¬ peared chiefly in Shakesperean roles. In 1883 he opened Rankin's Theatre in New York.

RANKIN, Jeannette, American member of Congress: b. near Missoula, Mont., 11 June 1880. She lived on a ranch until 15; received the degree of B.S. at the University of Mon¬ tana in 1902, and in 1908-09 was a student at the New York School of Philanthropy. In 1909 she was engaged in social work in Seattle and in the following year was active in the suffrage movement in Washington State, in California in 1911 and in Montana in 1912-14. Her gifts as a campaign speaker made her welcome every¬ where and in 1915 she visited New Zealand and worked as a seamstress in order to gain per¬ sonal knowledge of social conditions. In No¬ vember 1916 she was elected member at large from Montana to the 65th Congress (1917-19), being the first woman ever elected to the Con¬ gress of the United States. She was a

sena¬ torial candidate in 1918 but failed of election.

RANKIN, Jeremiah Eames, American Congregationalist clergyman and educator: b. Thornton, N. H., 2 Jan. 1828; d. Cleveland, Ohio, 28 Nov. 1904. He was graduated from Middlebury College, Vermont, in 1848 and en¬ tered. the ministry, serving in various pastorates in Massachusetts, New York and New Jersey. From 1889-1903 he was president of Howard University, Washington, D. C., resigning in the latter year. He was the author of numerous hymns, notably (God be with You,* and also published (Auld Scotch Mither and other Poems) ; (Christ His Own Interpreter,* *etc.*

RANKIN, Pa., borough in Allegheny County, on the Monongahela River, eight miles from Pittsburgh, on the Baltimore and Ohio, the Pittsburgh and Lake Erie and the Besse¬ mer and Lake Erie railroads. It is a growing town and manufactures steel and wire. Pop.

6,042.

RANKINE, ran'kin, William John Mac-Quorn, Scottish scientist: b. Edinburgh, 5 July 1820; d. Glasgow, 24 Dec. 1872. He entered Edinburgh University, where he gained several prizes in the department of physics ; in 1837 he took up civil engineering and in 1842 published his first book, (An Experimental Inquiry into the advantage of Cylindrical Wheels on Rail¬ ways.) In 1848 he began his researches in the domain of molecular physics, which occupied him at intervals throughout his life and form his chief claim to distinction in the domain of pure science. In 1855 he was appointed to the chair of engineering in Glasgow University, which position he held until his death. He pub¬ lished (Manual of the Steam-Engine and other Prime Movers) (1859) ; Manual of Civil En¬ gineering* (1861) ; (Treatise on Shipbuilding, Theoretical and Practical* (1866) ; Machinery and Millwork) (1869). Consult memoir by Tait prefixed to his Miscellaneous Scientific Papers* (1881).

RANNEY, William, American artist : b. Middletown, Conn., 9 May 1813; d. West Hobo¬ ken, N. J., 18 Nov. 1857. He learned drawing in Brooklyn, N. Y., and at the outbreak of the war with Mexico enlisted with the Texans. During the campaign he made sketches from the picturesque southwestern life, and after his return to Brooklyn, elaborated these into oil paintings of great interest, among which may be mentioned (Boone's First View of the Ken¬ tucky } ; (On the Wing> ; (Washington on His

Mission to the Indians* (1847) ; Muck-Shoot¬ ing* (Corcoran Gallery, Washington) ; (The Sleigh Ride,* and (The Trapper's Last Shot.*

RANOUS, Dora Knowlton, American writer and editor and translator : b. Ashfield, Mass., 16 Aug. 1859; d. New York City, 19 Jan. 1916. She married William V. Ranous in 1881. She went upon the stage, in the famous Daly Company, in 1879, but retired when she mar¬ ried. When it was necessary to support her¬ self, she became assistant editor in a house that published textbooks. From this she passed to the editing, and to a large extent translating of the works of Maupassant, Daudet, Flaubert, and Disraeli. In collaboration with Rossiter Johnson she edited (The Literature of Italy) (16 vols., 1906). She also edited many other works, including an elaborate cable code for the use of missions; and served on the staffs of the Century Magazine and the Standard Dictionary. She published anonymously (The Diary of a Daly Debutante* (1910), and (Good English in Good Form) (1916), and contributed many original articles to the foundation Library for Young People) (1911) and to other publications.

RANSDELL, Joseph Eugene, American legislator : b. Alexandria, La., 7 Oct. 1858. He was graduated at Union College in 1882, was admitted to the bar in 1883, and was engaged in practice at Lake Providence, La., in 1883-99, since which time he has been interested in cot¬ ton planting. He served in Congress in 1899-1913, and was elected United States Senator for two terms (1913-25). He has been president of the National Rivers and Harbors Congress since 1907, and has also been honorary chan¬ cellor of Union College since 1907.

RANSOM, Matthew Whitaker, American soldier and legislator: b. Warren County, N. G, 8 Oct. 1826; d. 8 Oct. 1904. He was graduated from the University of North Carolina in 1847, was admitted to the bar the same year and in 1852 was elected attorney-general but resigned in 1855. He entered political life and in 1858-60 served in the State assembly. He was un¬ tiring in his efforts to avert the Civil War, but when North Carolina seceded he entered the Confederate army and served with ability through the war, attaining the rank of major-general in 1865. Afterward he resumed his law practice, was elected United States Senator in 1872 and served until 1895, when he was ap¬ pointed Minister to Mexico and served until 1897 when he returned to the United States and re-engaged in law practice at Weldon, N. C.

RANSOM, Robert, American soldier: b. Warren County, N. C, about

1828; d. 1893. He was graduated from West Point in 1850, was breveted second lieutenant of dragoons and served in various parts of the West until ap¬ pointed assistant instructor of cavalry tactics at West Point. He was made captain of the 1st cavalry 31 Jan. 1861, but resigned on 24 May and entered the Confederate army. He became colonel of the 9th North Carolina Confederate cavalry; in March 1862 was advanced to briga¬ dier-general and on 26 May 1863 to major-general. In 1862 he commanded a brigade and the defenses near Kingston, N. C., and from April to June 1864 the Department of Rich-

mond. He was in command in November 1864 of the sub-district No. 2 of the Department in¬ cluding South Carolina, Georgia and Florida. At the close of the war he became express agent and city marshal of Wilmington, N. C., 1866-67 ; a farmer in Virginia, 1874-78, and later a civil engineer in the service of the United States in various river and harbor im¬ provements in Missouri and South Carolina.

RANSOM, Thomas Edward Greenfield,

American military officer: b. Norwich, Vt., 29 Nov. 1834; d. Rome, Ga., 29 Oct. 1864. He was educated at the Norwich University, studied civil engineering and settled in Illinois, where he engaged as a civil engineer and a real estate agent. After the outbreak of the Civil War he became a lieutenant-colonel of volunteers in July 1861, and commanded a regiment at Shiloh in April 1862. He was promoted brigadier-general in January 1863; served under General Banks in the Red River expedition, and later joined Sherman's army, took command of a division just before the capture of Atlanta, 2 Sept. 1864 and died as a result of overtaxing his strength while leading his troops in pursuit of Hood.

RANSOM (from Latin, redemptio), the sum required to be paid to the captors of a prisoner of war in order to procure his release. The practice of redeeming prisoners of war by a ransom was a very common one not only in ancient times, but in modern times up to the end of the 18th century. As late as 1780 a treaty was concluded

between France and Great Britain on the subject of exchange of prisoners, in which the various relations the different ranks bore to each other were specified, to¬ gether with the sums required to be paid by way of ransom. A French vice-admiral or an English admiral was estimated as of equivalent value in the exchange of prisoners to 60 sailors or private soldiers, as was also a French mar¬ shal or an English field-marshal. Ransom is now exacted only by brigands. Prisoners are generally retained until peace is restored, when they are released without ransom, or they may be exchanged during the progress of hostilities. Officers are frequently released during the war on pledging their word of honor to take no further active share in it.

RANSOME, ran'sum, Arthur, English

physician: b. Manchester, 11 Feb. 1834. He was educated at Trinity College, Dublin, Caius Col¬ lege, Cambridge and studied medicine in Lon¬ don and Paris. He was lecturer on biology at Cambridge in 1857-61, professor of hygiene at Owens College in 1886-95, became lecturer on phthisis at the College of Physicians in 1890 and is a recognized authority in pulmonary dis¬ eases. He has published (Stethometry) (1876) ; (Causes of Consumption* (1884) ; (The Prin¬ ciples of Open Air Treatment of Phthisis and Sanatorium Construction (1903) ; (A Cam¬ paign against Consumption (1914).

RANSOME, Frederick Leslie, American geologist: b. Greenwich, England, 2 Dec. 1869. He was graduated at the University of Cali¬ fornia in 1893, and in 1893-95 was Fellow in geology there. Ph.D. University of California 1896. In 1897-1900 he was assistant geologist and since 1900 he has been geologist of the United States Geological Survey. Since 1912

he has been in charge of the sections of western areal geology and metalliferous deposits. He was lecturer on ore deposits at the University of Chicago in 1907 and Silliman lecturer at Yale in 1913. He is president Washington Academy of Sciences, treasurer National Academy and treasurer National Research Council.

RANTERS, a term not in use in the United States, but formerly applied in England to the Primitive Methodists, on account of the enthusiasm and earnestness which characterized their worship. While this is the recent applica¬ tion of the word, it was formerly used in the period of the English Commonwealth to indicate an alleged sect whose practices attracted public reprobation and which was suppressed by the

authorities.

RANTOUL, ran'tool, Robert, Jr., Amer¬ ican statesman: b. Beverly, Mass., 13 May 1805; d. Washington, D. C., 7 Aug. 1852. His father, who survived him for several years, was long a member of the State legislature. The son was educated at Harvard where he was graduated in 1826. He studied law in Salem, was ad¬ mitted to the Essex bar in 1827 and for several years practised in Gloucester, which he repre¬ sented in the legislature 1834—37, and distin¬ guished himself there as a reformer and an ad¬ vocate of the rights and interests of the com¬ mon people.. He exerted himself for the aboli¬ tion of capital punishment and made a report to the legislature on that subject. In 1837 he was appointed a member of the Massachusetts board of education and gave much time and at¬ tention to the advancement of the system of public instruction. In 1843 he became collector of the port of Boston and in 1845 was made United States district attorney. In 1851 he was elected United States Senator to succeed Daniel Webster for the short remainder of his term, and having been prominent among opponents of the extension of slavery, the Free-Soilers of his district united with the Democrats in elect¬ ing him to the United States House of Repre¬ sentatives the same year. A volume of his speeches and writings with memoir appeared in

1854.

RANUNCULACE2E, the buttercup fam¬ ily, composed of herbs and shrubs. There are about 800 species, widely distributed in cold and temperate climates and to a very limited extent in warm ones. All are more or less acrid while fresh, but usually lose this property upon being dried. A few have been reputed poisonous, others have been used in medicine and several for food both for man and animals. The fam¬ ily is, however, chiefly noted for its ornamental species, many of which are widely popular garden flowers. The best known of these genera are probably Aquilegia, Clematis, Anemone, Delphinium, Hellehorus, Pceonia, Nigella, Caltha, Aconitum, Actcea and Ranunculus. (See Columbine; Anemone; Larkspurs; Peony; Clematis; Hellebore). The type genus, Ranunculus, which includes about 200 species, is also cultivated. The garden or Asiatic ranuncu¬ lus (R. asiaticus) is a native of western Asia and has been cultivated for about 300 years for its brilliant single or double variously col¬ ored flowers. The lesser celandine (R . ficaria), a European species, is cultivated for its foliage,

which is eaten like spinach and for its tubers, which are served like potatoes. Several species of buttercups, notably R. acris and R. repcns, are well-known weeds in pastures.

RANZ DES VACHES, rans da vash, “the lowing of the cows,” the popular title of the simple melodies which the herdsmen of the Alps in Switzerland sing or play on an instru¬ ment called the alpenhorn when they drive the herds. It consists of a few simple intervals, yet capable of producing a very striking effect in the echoes of the mountains. Consult (Sammlung von Schweizer Kuhreigen und Volksliedem> (Berne 1818). See National Hymns.

RAOUL ROCHETTE, ra-ool ro-shet.

See Rochette, Desire Raoul.

RAOULT, ra-oo, Frangois Marie, French chemist: b. Fournes, Nord, 10 May 1830; d. 1901. He was educated in Paris, where he re¬ ceived the doctorate in physical sciences in 1863. He went to the University of Grenoble to teach chemistry, was made professor in 1870 and dean of the faculty in 1889. In 1890 he was made correspondent of the Academy of Sciences. His researches were first in the field of electro-chemistry ; later he turned to the dis¬ covery of the freezing-point of a great number of solutions and also the determination of the tension of vapors of volatile liquids.

RAOUX, ra-oo, Jean, French painter: b. Montpellier, 12 June 1677 ; d. Paris, 10 Feb. 1734. He painted history, portraits and genre, and during his lifetime enjoyed a great reputa¬ tion in France and was even elected to the Academy (1717). He has indeed painted some good landscapes in the style of Claude Lorraine, but his historical pictures are stagy and arti¬ ficial. His portraits are said to have been good likenesses, and he is chiefly known nowadays for his portraits of fine ladies, on whom he bestowed the false and meretricious graces fashionable in his day. Many of his pictures were engraved.

RAP, familiar in the phrase <(not worth a rap,"a counterfeit Irish coin of the time of George I, which passed for a half-penny, though not really worth a fourth of that value. There was also a small Swiss coin called "rap-pen," worth a centime.

RAPE, an annual herb (Brassica napus) of the order Cruciferce. It is a native of the Old World, where it has long been cultivated for its foliage and its seed, the former of which is an important stock fqod, the latter a source of coleseed oil. It resembles the turnip in foli¬ age, but grows taller and lacks the turnip-like root. In America it is not grown for its seed at all, but toward the end of the 19th century became an important soiling and forage crop for sheep and beef cattle. It is usually sown after midsummer upon any good soil, and is especially popular in cool climates because it will stand considerable cold without injury.

RAPE, a word derived from German "raffen" and old English "rap," to seize and carry away, and meaning in law the crime of having carnal knowledge of a woman without her consent and by force. This has always been regarded as one of the highest crimes, and is still punished by death in some American States; in others by long terms of imprison¬

ment. In the case of a female who has reached the age of consent, and who is not an idiot, the element of force is essential to constitute the crime of rape. If consent is obtained by the use of threats which convince the woman that it would be useless to resist, it is not necessary to prove actual violence. It has long been es¬ tablished by court decisions in England and America that deception, as when a married woman is deceived into believing that a man not her husband is her husband, does not con¬ stitute rape. Within the past 20 years statutes have been passed in England and most of the United States raising the age of consent for girls. These laws have been of great service in protecting the young and promoting morality.

RAPE OF THE LOCK, The. Pope's (Rape of the Lock) (1714), a mock-epic of 814 lines in heroic couplets, remains the most famous and perhaps the most finished example of society verse in English. The serio-comic genesis of this brilliant, fanciful and vivacious poem was the very pretty social quarrel that resulted when a certain Lord Petre had stolen a lock of the hair of a Miss Arabella Fermor. Pope's friend Caryll asked the young poet, just then becoming famous, to heal the breach by friendly ridicule. Pope consented, and pub¬ lished his first

version of his poem in Lintot's Miscellany in 1712. The success of the charm¬ ing trifle was so great that the poet planned a more elaborate version in the form of the mock-epics then popular in France and England. He conceived the idea of parodying the supernatu¬ ral machinery of the epic by using the gnomes and sylphs of the so-called Rosicrucian phi¬ losophy instead of the classical divinities. These he very appropriately made attendant upon his heroine, and added also a scene of a game at cards and other details. The result justified the revision and elaboration. (The Rape of the Lock> as published in 1714 at once took its place as the supreme product of the drawing-room muse.

It does not sparkle so brilliantly after the lapse of two centuries. The heroic style is out of date ; the literary parody has lost its signifi¬ cance ; the beaux and belles belong to a past age ; the dainty filigree work has grown some¬ what tarnished. Under all this lies a more fundamental defect : despite Pope's dedication of the poem to Miss Fermor as a tribute to her charms, it is the product of an age and a class that regarded woman as little better than a fool. Even Addison, though urbane and gracious enough, assumes this in his Spectator satire; Pope, embittered by his sense of the personal deformity that rendered him unattractive to women, embodies in his clever epigrams impli¬ cations none too complimentary to the sex. His admiration is feigned; his satire is sin¬ cere. But such defects in the poem are coun¬ terbalanced by qualities that defy the passing of time and any change in taste and point of view. The story is admirably managed: Be¬ linda's toilet, her trip up the Thames to Hamp¬ ton Court, the game at cards, the afternoon tea, the rape of the lock itself and the ensuing bat¬ tle, the anxiety and the intervention of the attendant spirits, are clearly and firmly pre¬ sented. The preparation, climax and catas¬ trophe are the work of a master craftsman. The verse, with its plenitude of epigrammatic,

often stinging, couplets, is polished to the last degree. The language shows ((the most dex¬ trous transformation of ordinary social gabble

into mock heroic.® Many of the epigrams are characteristic of the age that ((knew how to refine shrewd sense into wit® ; and Pope's Ariel, though of course a mere parody of Shakespeare's, is a charming poetic fancy. As a whole (The Rape of the Lock* is the con¬ summate satirical expression of a social phase and a masterpiece of its kind by a master artist in poetry.

Marion Tucker.

RAPHAEL, raf'a-el, William, Canadian artist: b. Berlin, Germany, 1839; d. Montreal, Canada, 16 March 1914. He studied painting at the Royal Academy, Berlin, under Wolf, Begas and others, and in 1860 settled in Montreal, where he afterward lived and worked. He painted both figures and landscapes, and in addition to his work as a painter conducted a large drawing and painting class. He was the first to introduce in Montreal drawing from casts and from life. Among his pupils was Wyatt Eaton. He was one of the original members of the Royal Canadian Academy of Art; and in 1904 he was appointed a member of the Council of Arts and Manufactures of the Province of Quebec. His works were largely acquired for private collections. Among them are (Bonsecours Market, Montreal, in Summer and Winter* ; (Habitants attacked by Wolves) ; (The Early Bird Gets the Early Worm,) *etc.*

RAPHAEL SANTI, ra'fa-el san'te (called by the Italians Raffaelle and Raffaello, but generally in his own writings and in the sign¬ ing of his pictures, Raphael), Italian painter: b. Urbino, in Umbria, 28 March 1483 ; d. Rome, 6 April 1520. The mountain town of Urbino was the capital of the ancient duchy of the same name, which came to an end in 1626. The castle or palace of the duke is still a building of extreme interest; and there is evidence that during the lifetime of Frederigo and Guido-baldo — who reigned during the years of Raphael's youth — the palace was one of the most remarkable museums in Italy, being crowded with works of art both of antique and of Renaissance production.

The young Raphael was allowed to devote himself to art the more readily that his father (Giovanni) was himself a painter. It seems that the family had lost property; and there is much in the record concerning Raphael to in¬ dicate the existence in his character of tradi¬ tions of elegant life and that kind of sympa¬ thy which comes from ancestral cultivation. At a very early age for a student of art he entered the workshop of Perugino ; his possibly earlier studies with Timoteo Viti being of little con¬ sequence to his artistic growth. It is asserted that the young man went to Siena, where Pinturicchio was at

work; but this is doubtful, and it is only important because there has been so much question about the true influence which at first determined or modified Raphael's career. It was as early as 1504 that he first went to Florence, and the artists who would then have influenced him the most were Leonardo da Vinci and Michelangelo; because while the earlier Florentines would be more immediately recognized by him as painters of the ancient

and traditional manner, it is clear from his sub¬ sequent history that he was more quick than any other man would have been to adapt him¬ self to the larger conditions of a new world of art. The first absolutely modern painting may be said to have come into existence with Leonardo da Vinci, although that great master allowed himself but little time to devote to ex¬ ecutive work, and has left us almost nothing by which we can judge his full strength. As for Michelangelo (eight years Raphael's senior, and as precocious), his work must have revealed to Raphael the possibilities of magnificent design in which the human body is treated as the prin¬ cipal subject, without important assistance in the way of draperies, backgrounds or even nar¬ rative subject, as a work of art.

The earliest painting which can be ascribed to Raphael with some certainty is the Mar¬ riage or Betrothal of the Virgin (called (Lo Sposalizio*) at the Brera Gallery in Milan. This picture shows the Umbrian feeling, and has many resemblances to the full manner of Perugino, Raphael's master; but it is signifi¬ cant that no serious attempt has been made to dispute the ascription of it to Raphael himself, so great is the resemblance in the peculiar grace of its composition to the more mature works of the younger man. The most important record we have of his earliest stay in Florence, ending with his 25th year, is the Madonna with Saints in the National Gallery, commonly known as the (Ansidei Madonna,* which, however, is thought to have been painted during a visit which he made to Perugia; and other Ma¬ donnas, such as that in the Pitti Palace, called the (Madonna del Gran' Duca,* and the Ma¬ donna with the Goldfinch) in the Uffizi ; as well as a picture in the Louvre Museum at Paris, called (La Belle Jardiniere.) This epoch, how¬ ever, was one of constant production, and there are many small paintings, only less important, than those named above, which may with con¬ siderable certainty be given to this period, namely, the years of his life from 20 to 25. It was in 1508 that he went to Rome.

It does not appear that Raphael was sent for directly by the order of

Pope Julius II, but he began work there almost immediately on his arrival, and indeed the first of the famous halls in the Vatican which are covered with his paintings was completed, nearly as we see it now, as early as 1511. This room, known as the Camera della Segnatura. or Chamber of the Signature, is a hall roofed with a solid masonry vault, having one large window turned nearly to the north and lighting the room fairly well on bright days. On the west wall is the famous painting known as the (Disputa del S'acramentoP which should properly be called in English (The Glory or the Triumph of Re¬ ligion J ; and opposite this to the east is the (School of AthensP Over the window is the Parnassus presided over by Apollo ; and op¬ posite the window is, in the lunette, the magnifi¬ cent <Jurisprudence) ; while below this and on either side of the deep niche serving as the recess of a window now condemned, are paint¬ ings having to do with the Papal authority in earthly and spiritual things. Similar paintings adorn the dado beneath the great pictures, and the vault itself is covered with work by Raphael's own hand ; in fact, lovers of

Raphael's painting, considered by itself and without reference to its historical importance, have always found the Camera della Segnatura the most delightful place for the study of the master's individuality. There is every reason to suppose that the greater part of the work here is due to his own touch ; the employment of assistants being much less probable here than in later works.

When this first series of important wall paintings was completed Raphael was 28 years old and he had only nine years to live. During those nine years were produced the paintings in the four large rooms in the Vatican adjoining the Camera della Segnatura, and also the deco¬ rative frescoes in the Farnesina Palace, the out¬ door corridors and vaulted galleries fronting the Cortile di S. Damaso in the Vatican, which are known as the Loggie di Raffaelle, and also a great number of easal pictures in oil, por¬ traits, religious pictures sent as presents to the king of France and other foreign princes, and, toward the close of his life, two pictures of peculiar importance in his history, because they have always excited so much general admira¬ tion. These are the (Madonna di San Sisto,* now in the royal collection at Dresden, and (The Transfiguration, > left unfinished at his death, and now in the picture gallery of the Vatican. Raphael also made some designs, or at least undertook some superintendence as architect, especially in connection with the church of Saint Peter, and as designer of sev¬ eral palazzi, or stately mansions, in and near Rome. The excavations going on among the ruins of Rome also excited his interest and took up much of his time. He was surrounded by assistant artists who worked with him or for him, under his general direction and also from his studies and under his immediate con¬ trol. It is now impossible to discriminate be¬ tween these different wavs of work, except by means of the internal evidence of more or less characteristic handling in the painting. Thus it is generally agreed that the large frescoes of the battle at the Milvian bridge and the other paintings in the Stanza di Constantino are al¬ most wholly by the hand of his assistants; while

those in the Stanza dell' Incendio and in the Stanza dell' Eliodoro are, though not wholly by the hand of Raphael, his work as to their general designs, as to their composition both in mass and in color and largely his own creation. The remarkable fact concerning these and the smaller paintings is that they all, ex¬ cept some of those in the Constantine series, belong to that well-known family or class of works which have become familiar to all the European world, as typical pictures by the artist who is generally accepted as the first of re¬ ligious painters, while at the same time his name is used by artistic reformers as a symbol of the commencement of the decline of art.

His work shows little interest in realization of incident or of action ; he is regardless of the impossibilities of the Apostles in long and voluminous robes, and of men in a fishing boat much too small for them — indifferent to the contradictions of the famous picture of (The Conflagration in the Suburb } ((Incendio del

Borgo*), where flames are seen flickering among marble columns and walls of cut stone without anything to feed them; and yet this

lack of realism in his designs has never dimin¬ ished his vast popularity, as the typical painter toward whose work everyone turns when there is mention of Christian religious painting. There is no better instance of the purely artistic quality obtaining full recognition in spite of the absence of those qualities which are generally considered more popular; the main reason for this is in the extraordinarily perfect composi¬ tion in line and in mass, the figures filling the chosen oblong or the lunette or the circle in so many of his compositions, with absolutely fault¬ less harmony, producing the desired result — a picture of entirely harmonious effect. As a colorist he is not one of those painters to whom glow and splendor of hue is the important thing, who deem design in color supreme, as do Correggio and the great Venetians from the time of Vivarini to that of Tiepolo; but in¬ vested his noble linear compositions with a coloring wholly agreeable, never violent, always satisfactory to the student of sentiment in art, and to the lover of noble composition — those students being more numerous in the world than the lovers of color for its own sake.

Bibliography. — Ady, J. C., (RaphaeP (New York 1905) ; Berenson, Bernhard, *Central Italian Painters of the Renaissance) (ib. 1897) ; Bolton, S. K., (Famous Artists) (ib. 1902) ; Clement, Charles, (Michelange, Leonardo da Vinci, et RaphaeP (5th ed., Paris 1881) ; Crowe and*

Cavalcaselle, (Ranhael: His Life and Works> (2 vols., London 1882-85) ; Dohme, R., (Kunst und Kiinstler des Mittelalters) (Leipzig 1878) ; Ermers, Max, (Die Architek-turen Raffaels in seinen Fresken) (Stuttgart 1909) ; Fischell, Oskar, (Raphaels Zeichnungen) (Strassburg 1898) ; Forster, E. J., (RaphaeP (2 vols., Leipzig 1867) ; Grimm, (Das Leben Raphaels (Leipzig 1872; English trans., Bos¬ ton 1888) ; Gronau, Georg, (Aus Raphaels

Florentiner Tagen> (Berlin 1902) ; Gruyer,

F. A., (La vie de RaphaeP (Paris 1859) ; Hoff¬ mann, Theobald, (Raffael in seiner Bedentung als Architekt* (4 vols., Zittau 1900-11) ; Koop-mann, W., (Raphaels Handzeichnungen in der Auffassig> (Marburg 1897) ; La Farge, J.,

(Great Masters> (3d ed., New York 1909) ; Minghetti, Marco, (Masters of Raffaello*

(English trans., London 1882) ; Morelli, Gio¬ vanni, (Italian Painters* (London 1893) ; Muntz, Eugene, (Les historiens et les critiques de Raphael,* with bibliography (Paris 1883) ; Oppe, A. P., (Raphael* (New York 1910) ; Perkins, C. C., (Raphael and Michelangelo* (Boston 1878) ; Seidlitz, W., (Raphaels Jugend-werke* (Munich 1891) ; Springer, Anton, (Raffael und Michelangelo) (Leipzig 1878) ; Staley, E., (RaphaeP (London 1904) ; Stearns, F. P., (The Midsummer of Italian Arp (New York 1895) ; Strachey, H., (RaphaeP (London 1902) ; von Geymiiller, Heinrich, (Raffaello Sanzio studiato come architetto* (Milan 1884) ; von Wolzogen, K. A. A., (Raphael Santi : His Life and Works) (English trans., by F. E. Bunnett, London 1866).

Russell Sturgis.

RAPHAEL WARE. See Majolica and Mezza-Majolica.

RAPHALL, Morris Jacob, American rabbi and author: b. Stockholm, Sweden, September 1798; d. New York, 23 June 1868. In 1812 after receiving rabbinical education at Copenhagen,

he went to England to study its language and literature, and after a continental tour spent three years at the University of Giessen, re¬ turning to England in 1825. In 1832 he lec¬ tured on post-Biblical history in London, in 1834 began a (Hebrew Review and Magazine of Rabbinical Literature,5 which he edited with much scholarship, was associated with D. A. De Sola in a translation of 18 treatises of the <Mishna,) and with Messrs. De Sola and J. L. Lindenthal in a commentary on Genesis. In 1841 he was elected rabbi of the Birmingham Synagogue and in 1849 was called to the Con¬ gregation B'nai Jeshurun of New York, where he remained until his death. In 1855 he pub¬ lished his (Post-Biblical History of the Jews.5 In addition he wrote some learned pamphlets and was a contributor to The Jewish Messen¬ ger. His defense of slavery from the biblical standpoint ((The Bible View of Slavery5) aroused much controversy in the early days of the Civil War.

RAPHANIA, another name for the disease called ergotism (q.v.).

RAPHIA, a genus of low African palms with oval, gigantic pinnate leaves, and fruit spikes often weighing from 200 to 300 pounds.

RAPID CITY, S. Dak., city and county-seat of Pennington County, 125 miles southwest of Pierre, on the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul and the Rapid City, Black Hills and Western rail¬ roads. The city is located in the Black Hills mining region in which are deposits of gold, tin and mica. There are granite quarries and lumber interests, foundries, a chlorination plant, leather works and flour mills. The South Dakota School of Mines is located here and there is a United States government Indian school. Pop. (1920) 5,777.

RAPID-FIRE GUNS. See Ordnance.

RAPIDAN RIVER, a small river in Vir¬ ginia, rising on the southeastern slope of Blue Ridge and flowing in an easterly direction toward the Rappahannock, which it enters 10 miles above Fredericksburg.

RAPIDS. See Waterfall; Cataracts.

RAPIER, a sword-like weapon of two dif¬ ferent types: (1) a light, highly tempered two-edged and finely pointed weapon, about three feet in length ; a favorite weapon used with the dagger for dueling and fencing during the 16th and 17th centuries; (2) the ˆsmall-sword,® a pointed weapon used during the 18th cen¬ tury without the dagger.

RAPIN DE THOYRAS, ra-pan de toi-ra, Paul, French historian: b. Castres, Languedoc, 1661 ; d. Wesel, Duchy of Cleves, 1725. He studied at the Protestant Academy of Saumur, and was admitted an advocate in 1679. The revocation of the Edict of Nantes, however, drove him to England in 1686 and subsequently to Holland, where he entered a company of French cadets. In 1689 he followed the Prince of Orange and distinguished himself at the battle of the Boyne. In 1707 he settled at Wesel and devoted himself to historical com¬ position. His great work, (L'Histoire d'Angleterre) (1724), was very animated, but impartial, and contains much solid information. The style is clear, the facts are methodically arranged,

and he is always careful to cite his authorities. It embraces the period from the invasion of the Romans to the accession of William and Mary, but continuations by other pens were afterward added.

RAPP, rap (Johann) George, German sec¬ tary, founder of the communistic society called Harmonites : b. Iptingen, Wurtemberg, 1 Nov. 1757 ; d. Economy, Pa., 7 Aug. 1847. He studied in the village school, became a linen weayer, and seems very early to have had religi¬ ous doubts and visions, and dated his ((complete surrender® from the year 1782. His pe¬ culiar religious ideas were so tinged with polit¬ ical socialism that his followers were perse¬ cuted by the German government; and in 1803 he emigrated. In the next year he founded at Harmony, near Pittsburgh, a communistic col¬ ony, where work, unity, equality and celibacy were the rule. A new colony, called New Har¬ mony, was founded on the Wabash in Posey County, Ind., in 1815 and was sold to Robert Owen (q.v.) in 1824 when Rapp and his fol¬ lowers returned to Pennsylvania, founding on the Ohio River the town of Economy (q.v.). Consult Nordhoff, (Communistic Societies of the United States5 (1875) ; Knortz, (Die Christlich-kommunistiche Kolonie der Rappis-ten> (1892).

RAPP, Jean, Count of, French general: b. Colmar, Alsace, 27 April 1772 ; d. near Lor-rach, Baden, 8 Nov. 1821. In 1788 he entered the military service, accompanied Desaix dur¬ ing the campaigns in Germany and Egypt, and after Desaix had fallen at Marengo became aide to Bonaparte. On the breaking out of the war against Austria, in 1805, he accompanied Napo¬ leon, and after the battle of Austerlitz, where he threw the Russian guards into confusion by a bold attack with his cavalry, he was made brigadier-general. For distinguished service done in 1809 he was created a count of the empire, and in 1811 received the cross of grand officer of the Legion of Honor. He

was seven years commander of Dantzic, which he de¬ fended after the retreat of the French army from Russia, till 1814, during a severe siege of nearly a year, in which he displayed great talent and brilliant courage, and not till all means of defense were exhausted and he was compelled by famine did he capitulate. Returning to France in 1814 he was received with distinction by Louis XVIII, and in March 1815 was sent against Napoleon. But when the defection of the whole army rendered all resistance impossi¬ ble, Rapp also went over to Napoleon, who made him commander of the army of the Rhine. When Louis XVIII returned a second time to Paris, Rapp was pardoned, and retained the command of the 5th division, granted him by Napoleon, till the army was disbanded. After his death appeared the interesting (Memoires du General Rapp, ecrits par lui-meme5 (1823). Consult Spach, (Le General Rapp5 (1856).

RAPPAHANNOCK, rap-a-han'ok, a river of Virginia, formed by several small streams which have their rise in the Blue Ridge. It flows southeast into Chesapeake Bay, which it enters about 25 miles below the Potomac. It is about 250 miles long and is navigable over 90 miles from its mouth. The upper part of its course is through a mountainous country, where it is

a swiftly flowing stream with many rapids and low falls. At Fredericksburg (q.v.) is a fall which furnishes extensive water power. From Fredericksburg the river becomes a tidal stream, and the broad, long estuary which enters the bay is navigable for the largest steamers. The name of the Rappahannock is associated with many of the events of the Civil War. See Boundaries of the United States.

RAPPAHANNOCK STATION, Battle

of. In the fore part of October 1863 General Lee maneuvered the Army of the Potomac, un¬ der General Meade, from the Rappahannock River back to Centreville. Meade resumed the offensive 19 October, and in several encounters pressed Lee back to the Rappahannock, Lee crossing to the south side of the river and dis¬ posing his army on

both sides of the Orange and Alexandria Railroad, Ewell's corps on the right and A. P. Hill's on the left, with cavalry on both flanks. A part of Ewell's corps was left on the north side of the river at Rappahan¬ nock Station, in an intrenched position covering the pontoon-bridge, the railroad bridge having been destroyed. The position was first held by General Hays' brigade and four guns, to which was subsequently added General Hoke's brigade, under Col. A. C. Goodwin. The whole force numbered about 2,000 men. Lee had destroyed the railroad from Bristoe Station to the Rap¬ pahannock, a distance of more than 20 miles, and this had to be rebuilt before Meade could follow to the river. It was completed as far as Warrenton Junction on 2 November: sup¬ plies were brought up; and on the morning of the 7th Meade advanced to cross the Rappa¬ hannock. General French, with the left wing of the army, moved upon Kelley's Ford, five miles below Rappahannock Station, and forced a passage of the river (see Kelly's Ford, En¬ gagements at), while the Fifth and Sixth corps, under command of General Sedgwick, moved along the line of the railroad, forming line about midday within one and a half miles of Rappahannock Station, the right of the Fifth corps and the left of the Sixth on the railroad. Skirmishers were thrown forward and the Con¬ federate position reconnoitered, and as soon as it could be ascertained a plan of attack was formed. The works to be carried consisted of two redoubts, connected by a chain of rifle-pits, and a further line of rifle-pits ran from the left redoubt to the river and some distance along it. The Fifth corps was to gain the river bank on the left and the Sixth on the right, in order to establish artillery on a range of high ground in front of the works and drive the men from them. The river bank was gained both on the right and left, artillery put in position and the works shelled, but at dusk no impression had been made, the Confederate guns had not been silenced, nor had the infantry been driven from the works. General Russell, temporarilv com¬ manding Wright's division of the Sixth corps, said that he could carry the works by assault, and he was ordered to do it. It was now after dusk; artillery fire was kept up; Russell led parts of Ellmaker's and Upton's brigades, in all 2,117 men, and, under a heavy fire of musketry and canister, went over the works in a very few minutes, capturing 1,303 officers and men, the four guns, 1,225 stands of arms and seven battle flags. A part of the Fifth corps on

the left joined in the assault. General Wright says in his report that this was the first case during the war of an intrenched position being carried on the first assault, and one of General Lee's biographers writes that it was the saddest chapter in the history of the Army of

Northern Virginia. General Hays, with nearly 300 of his men and about 130 of Hoke's, escaped. The Union loss was 413 killed and wounded and six missing. General Lee reports his loss as 6 killed, 39 wounded and 1,629 captured or miss¬ ing, some of the missing being probably killed or wounded. Lee now abandoned his design of attacking General French, who had crossed at Kelly's Ford, burned the end of the pontoon-bridge remaining in his possession, the north end of it having been captured by Russell, and fell back during the night to Mountain Run. General Meade crossed the remainder of his army over the Rappahannock on the 8th and moved to Brandy Station, and Lee crossed to the south side of the Rapidan. Consult (Official Records> (Vol. XXVI) ; Humphreys, (From Gettysburg to the Rapidan) ; the Century Com¬ pany's 'Battles and Leaders of the Civil War> (Vol. IV).

E. A. Carman.

RAPPISTS. See Harmonists.

RAPPROCHEMENT (Fr., reconcilia¬ tion), in diplomatic language, signifies a reap-proachment or reconciliation between nations or governments after a period of enmity.

RAPTORES, an old name in classification, variously limited, for the predatory birds. See Birds of Prey.

RARATONGA, ra-ra-tong'ga, or RARO¬ TONGA, an island in the South Pacific Ocean, belonging to the group of Cook Islands (q.v.).

RAREY, John S., American horse tamer : b. Franklin County, Ohio, 1828; d. Cleveland, Ohio, 4 Oct. 1866. In early life he showed a marked fondness for horses and skill in their management, which he later developed by study and close association with them. In 1856 he went to Texas to further his knowledge and upon his return to Ohio engaged in startling exhibitions of his skill ; later he exhibited all over the United States. In training or taming the horse his methods were alwavs prompted by a humane spirit, the use of the lash not be¬ ing resorted to unless in extreme cases. In 1861 he visited England, Russia and other Euro¬ pean countries, where his mastery over the wildest steeds amazed and delighted his vast audiences.

RARITAN, a river in New Jersey, the headwaters of which are in the northern part of the State. It enters Lower New York Bay at South Amboy, through Raritan Bay. The latter is really the broad mouth of the Raritan River. The river is navigable to Brunswick Landing, about two miles above New Bruns¬ wick.

RASCAL LEAF-CRUMPLER, the leaf¬ folding caterpillar of a phycitid moth (Mineola indiginella) injurious to many American fruit-trees, as the apple, cherry, plum (qq.v.), *etc.* See Moth.

RASH, an eruption on the skin, character¬ ized by reddening without large pustules. The commonest rashes are those of the specific

fevers, the crimson rash of measles, the scarlet rash of scarlet fever, the rose-spots of typhoid fever, *etc.* But there are also numerous rashes due to disordered states of the body, and apart altogether from any infectious disease; such are nettle-rash and the like.

RASHI, ra'she, properly RABBI SALO-MON-BEN-I.SAAK, sometimes erroneously called JARCHI, the most famous of French rabbins: b. Troyes, about 1040; d. 1105. Enter¬ ing the Jewish school in Worms he made astonishing progress in ancient languages, philosophy, medicine and astronomy. His skill in explaining the Holy Scriptures and the Talmud was so remarkable that his contem¬ poraries honored him with the titles of inter¬ preter of the law and prince of interpreters. To satisfy his longings after knowledge he undertook an extensive tour through Italy, Greece, Palestine, Egypt, Persia and Germany, where he was particular in visiting the towns which possessed learned Jewish schools. The literary treasures thus collected he introduced into his writings, which were received at the time with the greatest enthusiasm, and are still held in high estimation. His Hebrew Bible commentary is still standard, also his famous commentary on the Pentateuch. He also wrote commentaries on the prophets ; but his 23 treat¬ ises on the Talmud comprise the work that gave him his lasting fame. He wrote much in Old French, and his books are to-day the final authority as to the word1 forms then in use. Consult Zunz, (Zeitschrift fur die Wissenschaft des Judenthums) (1822) ; Graetz, (History of the Jews) (Trans., Philadelphia 1891) ; Morris Liber (in rThe Jewish EncyP. New York 1905).

RASK, rask, Rasmus Christian, Danish scholar : b. Brendekilde, island of Funen, 22 Nov. 1787; d. Copenhagen, 14 Nov. 1832. He studied at

the University of Copenhagen, under¬ took a journey to Sweden and Russia, to in¬ crease his acquaintance with the northern lan¬ guages ; and in 1808, after a two years' stay in Iceland became assistant in the academical library of Copenhagen. His fame as a linguist is founded upon such works as (An Introduc¬ tion to the Knowledge of the Icelandic or Old Norse Tongue) (1811) ; an edition of Biornonis Haldorsen's 'Icelandic Dictionary) (1817) ; (Instruction in the Anglo-Saxon Tongue) ; Re¬ searches as to the Origin of the Old Norse or Icelandic, 5 and a series of grammars in nine languages. In 1822 he was appointed professor of literary history at the University of Copen¬ hagen, and subsequently professor of Oriental languages 3nd librarian to the university. Dur¬ ing this period he published, among other works, (Instruction in the Friesland Tongue5 ; (On the Antiquity and Genuineness of the ZendavestaP Consult (Samlade Afhandlinger5 (3 vols., Copenhagen 1834-38), these being his collected essays.

RASKOLNIKS, ras-kol'nyiks, or RAS-COLNICIANS, the name applied collectively to all the dissenters from the orthodox church of Russia, the Greek-Eastern Church. The schism, or raskol, was affected at two different times principally; first during the 17th century upon the occasion of the revision of the Testa¬ ments by Patriarch Nikou (1652-58) at Mos¬ cow ; and upon the further revision and the usurpation of secular powers by Peter the

Great (1689-1725). On both these occasions great bodies of Raskolniks, refusing to comply with the reforms instituted, left the Church and set up their own religious communities. The general characteristic of all the Raskolniks is conservatism. Their accessions have been due to the desire to cling to their old customs and beliefs.

The Raskolniks are of two great classes, each of which is subdivided with endless schisms and dissenting sects, more or less an¬ tagonistic to each other. The Popovtzi, those who have priests, pops, in Russian ; and the Bezpopovtzi, or those who have no priests. Of these the Bezpopovtzi are the more numerous, the most aggressive and the least conservative.

The Popovtzi have not changed from the beliefs of their old Church. They are, for the most, inoffensive and tolerant, and have latterly been treated by the state with less severity than before. A certain measure of civic rights was also granted them, together with liberty of religious services.

The Bezpopovtzi were much more inimical to the State and the Church, as these were con¬ stituted prior to the Revolution of 1917. They believe that the present age is one of the antiChrist, that the authorities to-day, both tem¬ poral and spiritual, are his servants and that, therefore, it would be sin to recognize their au¬ thority. Some of the principal sects of the Bezpopovtzi are: Duokhobors (q.v.), who in some respects resemble the early Quakers ; the Vozdykhantzi, who hold that the world at pres¬ ent is under the reign of the Holy Ghost, whom they worship by prayers and sighing; the Philippines, who observe only two sacra¬ ments, the Lord's Supper and Baptism ; the Stranniki, who believe the promises of the Lord concerning the Church are already fulfilled and that we are living in the first era of the resur¬ rection; the Molokaneh and the Obschie (the latter being communists), who reject all ex¬ ternal rites ; and the anarchistic Khlisti and Skoptzi. The Khlisti are ascetics and practise many fanatical rites under the direction of their prophets and prophetesses, one being that of bodily scourge. The Skoptzi carry the beliefs of the Khlisti to an even greater extreme, mutilating their bodies in horrible manner in the frenzy of their rites. The Khlisti and Skoptzi were treated as criminals and transported to Siberia by the government under the old regime ; other sects of the Bezpopovtzi were denied many of the civil rights enjoyed by the Popovtzi, were closely watched by the police and were much feared by the government..

The number of Raskolniks in Russia has been variously estimated as from 5,000,000 to

15,000,000.

RASMUSSEN, ras'mus'sen, Knud Johan Victor, Danish Arctic explorer: b. Jakobshavn, Greenland, 7 June 1879. He was educated at the University of Copenhagen, visited Lapland in 1901 and in 1902-04 he was a member of the Mylius-Ericksen expedition to Greenland. In 1905-08, 1909 and 1910 he was engaged in ethnological expeditions to Greenland, and in 1912-14 he headed an expedition for the re¬ covery of the Mylius-Ericksen records, which, however, were found by Mikkelsen. His trip resulted in the discovery of a considerable area of ice-free land and proved the non-ex-

istence of the Peary Channel. Rasmussen has made extensive reports of his explorations and ethnological researches. Author of <Lapland) (1907); (The People of the Polar Norths (1908) ; (Avangarnisalerssarutit) (1909) ; Ras¬ mussen sermerssuakut Tunuliarnilerssarutit' (1916), *etc.*

RASORES, ra-so'rez, group of birds and "scratchers,® so named from their habit of scratching the ground for food, represented by such forms as the fowls, partridges, grouse, pigeons, etc., which were long ago assigned to various natural orders and families. Illiger grouped them in two suborders, the Colnm-bacei and the Gallinacei. Later they were made orders of Carinate birds; the former (Colum-bse) including the pigeons, and the latter (Gallinse) with eight families: Cracidae, Opistleocomidae, Phasianidae, Meleagridae, Tetraonidae, Pterodidae, Turuicidae and Megapodidae. The Rasores of Vigors consist of the families Columbidae, Phasianidae, Tetraonidae, Struthionidae and Cracidae; those of Swainson, of Pavonidae, Tetraonidae, Struthionidae, Colum¬ bidae and Megapodidae ; and those of Gray, of Cracidae, Phasianidae, Tetraonidae, Chionidae and Tivamidae.

RASP AIL, ras'pa'y', Frangois Vincent,

French politician and scientist: b. Carpentras, 29 Jan. 1794; d. Arcueil, 7 Jan. 1878. He went in 1816 to Paris. He took part in the July Revolution of 1830, and later established a journal, Le Reformateur, which in 1834 was suppressed by the government, while in 1835 its editor was condemned to a six months' im¬ prisonment. On 24 Feb. 1848, at the head of a mob, he penetrated to the council chamber of the provisional government, which he compelled forthwith to proclaim the republic. He then founded L'Ami dn Peuple, later called Demo¬ cratic Pacifique, in which he proclaimed Jacobin principles. On 15 May he was a leader of the invaders of the Palais Bourbon and the hall of the National Assembly; for this he was condemned to six years in prison, but in 1855 the sentence was commuted to banishment. He lived in Brussels, but returned to France under the amnesty of 1859, was elected to the Corps Legislatif in 1869, retired to private life during the Commune, and from 1876 was a member of the Chamber of Deputies. From 1824 till 1830 he contributed many scientific articles, especially on chemistry, to the (Annals of the

Natural Sciences) and other works, and by many has been considered the creator of the system of organic chemistry. Among his works were (Annales des Sciences d'Observation* (1829-30) ; (Recherches Chimiques et Physiques sur le Developpement des Tissus Vegetaux) (1827); (Cours Elementaire d'Agriculture et d'Economie Rurale* (1831) ; (Sys¬ tem e Nouveau de Physiologie Vegetale et de Botanique) (1836) ; (Systeme de Chimie Organ-ique) (1837) ; (Histoire Naturelle des Ammonites) (1842) ; (Nouvelles Etudes Scientifiques et Philologiques) (1865) ; (Reformes Sociales) (1872). Consult Marchal, <Biographie de F. V. RaspaiP (1848) ; Querard, (La France Litteraire) ; <Nouvelle Biographie GeneraleP

RASPBERRY, a general name for those shrubs of the genus Rubus, whose fruits sep¬ arate from the receptacle upon attaining ma¬ turity. They are natives of the north tem¬

perate zone and are especially numerous in Europe and America. They are characterized by their perennial underground parts, usually biennial spiny stems which with few exceptions bear fruit the second season and then die. A few cultivated varieties, notably Saint Regis and Gault, bear some fruit on the young stems the same season as these develop. Several species are valued for ornamental purposes but the three following are the most important because of their edible fruits, for which the plants, except the first which is unsuited to Ameri¬ can climatic conditions, are widely cultivated, especially in the United States and Canada. The European raspberry (R. idceus), which has been cultivated in Europe for several centuries, was among the earliest European fruits intro¬ duced into America, but it has not made an equal headway with the next species because it has a very extended period of ripening, and is more adapted to the amateur than to the com¬ mercial berry-grower. Its fruits, either red or yellow, are of the best quality, but the plants are considered somewhat tender in northern climates. The American red raspberry (R . strigosus) resembles the preceding species in habit and color of fruit, but is rather inferior in quality. This defect, however, is offset by its hardiness, ready adaptability to many con¬ ditions and its prolific and rapid production of fruit. The black raspberry or blackcap (R . occidentals) is the most important species of its genus, since it is hardy, productive, adaptable to many soils and conditions, and its fruits, being firm, are useful for shipping con¬ siderable distances or for evaporating as well as for canning and eating fresh. It was intro¬ duced into cultivation in 1832, since when sev¬ eral hundred varieties have been offered for sale.

The red raspberries are propagated by means of suckers, or root-cuttings. The former may appear at any time throughout the growing sea¬ son ; the latter may be made by thrusting a spade deeply into the ground around well-estab¬ lished plants and thus severing the roots, each piece of which will produce a new plant. With new or scarce varieties the plants are often dug up, the roots cut in small pieces and rooted in greenhouses, hot beds and cold frames. In the field the plants are usually set not less than 3 by 5 feet apart, the plants being allowed to form a continuous hedge row, cultivation being given only one way. Except while the planta¬ tions are under three years old it is impossible with most varieties to cultivate in two direc¬ tions (checks) because the plants develop suckers abundantly.

The black raspberry does not produce suck¬ ers, except at the crown, but the tips of the canes bend over until they reach the ground and become covered and develop roots. Other buds near the end may develop short stems which also become rooted. These ((tips>:> are severed for planting, sometimes in autumn but usually in spring, and are set somewhat farther apart than the) red varieties, usually 5 by 5 or 6 by 6 feet part. They are generally culti¬ vated in two directions because of this ˆkilling® habit. There is a hybrid group of raspberries which propagate by both tips and suckers or root cuttings, usually by the latter. They are supposed to be derived from the black and the

RASPE

American red species, but since they are com¬ mon in the wild state and are fairly stable, they are often grouped under the species name, R. neglectus. Several varieties have been widely cultivated. Their fruit ranges from purple, through reds to yellow.

Raspberries succeed best upon deep, moist, but well-drained loamy soils ; the blacks upon the heavier and the reds upon the lighter. The more retentive of moisture the soil is the better, since the fruit ripens at a time when water is often scarce. Hence the addition of humus is usually desirable. It may be most easily ob¬ tained in the form of stable manure and green manures, such as clover grown at least one year before planting to raspberries. The ground should be plowed as deeply as possible without turning up the subsoil, and after harrowing, the plants set. Clean cultivation both ways is usually practised until midsummer when a cover crop of crimson clover or some shallower root¬ ing plant is sown to be turned under the fol¬ lowing spring. Sometimes, however, other crops, such as peas, beans, tomatoes and other shallow rooting vegetables which are not tall, are grown between the rows for one or per¬ haps two years. Wood ashes, muriate of potash, superphosphates and ground bone are favorite sources of potash and phosphoric acid. With adequate tillage during the sum¬ mer, spring plowing may be avoided.

The pruning of the red varieties consists in pinching back the shoots during the first season, allowing only about five canes to grow in each stool in after years, avoiding the pinching of shoots unless the soil is very strong and the growth rampant, and cutting out the old canes as soon as they have fruited. The pruning of the blackcaps consists in pinching off the tips each year as soon as they have reached a height of about 20 inches. This tends to make the canes stocky and self-supporting. Spring pruning consists in shortening in the branches to about 18 inches and removing pruny and ex¬ cess shoots. This latter amounts to thinning and should be carefully done.

For market the fruit should never be picked until after the dew has dried and should be shipped to market in small packages. Red raspberries are usually marketed in pint baskets. Black raspberries, especially for canning, are often gathered by jarring the ripe fruits into aprons with boxes attached, the fruit being passed through a fanning mill to blow away the leaves, *etc.* Generally, however, the picking is

done by hand with red raspberries and with both kinds for the best markets.

Among the numerous insects which feed upon the raspberry are two species of cane¬ boring beetles, Agrilus ruficollis and Oberea biniaculata; wilting of the canes is usually the first indication of their presence, cutting and burning the injured ones is the only remedy recommended. The striped tree-cricket {CEcan-thus nigricornis) often lays its eggs in the stems, but is considered to be a beneficial in¬ sect otherwise, since its food consists largely of plant-lice. Several caterpillars and other foliage-chewing insects, such as the raspberry saw-fly (Monophadnus rubi), occasionally prove troublesome, and some of the stink-bugs re¬ veal their presence by their disagreeable flavor when inadvertently eaten. General remedies have been recommended for these insects. (See

Insecticide). Several so-called plant diseases have been reported upon the raspberry. The orange rust has never been successfully com¬ bated. It attacks weak plants. Digging out and burning the plants attacked by it is the only remedy. It should be done as soon as the disease is discovered in May. Anthracnose has been held in check by spraying with Bordeaux mixture. See Fungicide.

Consult Bailey, (Standard Cyclopedia Horti-culure' (New York 1914-17) ; Card, (Bush-Fruits> (New York, 2d ed., 1917) ; books on insects listed under Insecticide, and numerous bulletins of Agricultural Experiment Stations and of the United States Department of Agri¬ culture.

RASPE, ras'pe, Rudolph Eric, German mineralogist and author: b. Hanover, 1737; d. Muckross, Donegal, Ireland, 1794. In 1767 he was made professor in the Collegium Carolinum of Cassel, and curator of the Landgrave's mu¬ seum of coins and antiquities. He published at this time papers on mineralogy and geology. In 1775 he went to England, where he was variously employed, generally as a mining ex¬ pert. He published in 1785 (Baron Miinch-hausen's Narrative of his Marvelous Travels and Campaigns in Russia,* founded in part on the hunting stories of one Baron von Miinch-hausen, of Hanover. His work appears as chapters ii-vi of the later Munchhausen (q.v.). Among his other writings, apart from his works on mineralogy, may be noted (A Descriptive Catalogue of a General Collection of Engraved Stones) (1791) and several philosophical stories. See Adventures of Baron Munch¬ hausen.

RASPUTIN, ra'spoo-ten', from the Rus¬ sian word rasputny, dissolute, profligate, liber¬ tine, licentious : an opprobrious nickname con¬ ferred upon a notorious Russian monk named Gregor Novikh (q.v.).

RASSAM, ras-sam', Hormuzd, Turkish archaeologist: b. Mosul, Asiatic Turkey, 1826; d. Brighton, England, 16 Sept. 1910. Having formed the acquaintance of Layard (q.v.) in 1845 when the latter was beginning his explora¬ tions of Nineveh, Rassam accompanied him on his return to London and entered Oxford Uni¬ versity, after which he went with Layard on several archaeological expeditions. In 1851 Ras¬ sam, upon commission from the British Mu¬ seum, collected for that institution a number of specimens of Assyrian art, particularly a series of sculptures representing the lion chase. In 1864 the British government dispatched him on a mission to Abyssinia to secure from King Theodore the release of their consul, Mr. Cam¬ eron, and others held prisoners; but he was himself taken prisoner and held until the de¬ feat of Theodore's army by Sir R. Napier in 1868. After 1876 he resumed his collections for the British Museum, the most notable of which were the bronze gates of Balawat, dating from Shalmanezer II, 858-824 b.c., and the <(Abu-Habba tablet, ** from the temple of the sun-god in Sippar, recording the restoration of the temple by Nabu-apal-iddin. The British Mu¬ seum was also enriched by his discovery of 5,000 tablets representing, probably, the library of an ancient Babylonish king. Rassam published a (Narrative of the British Mission to Theodore) (1869) ; (Asshur and the Land of Nimrod>

(1897); (The Garden of Eden and Biblical Sages, > and (Biblical Lands. >

RASSE, ras, a small arboreal civet (Viver - yicul a malaccensis) , which is widely distributed in southeastern Asia and the Malayan islands, and long ago became naturalized in Madagascar. It is slender, agile in tree-climbing, has no erectile mane and lives in holes in rocky and brushy districts. In confinement it is easily tamed and feeds on small animals, which it catches with cat-like dexterity. Hence it is often kept in houses in the East as a ratter, and also for the sake of its

civet, which is artificially removed from the glands. It is a handsome little animal of a yellowish or brown¬ ish gray color, with longitudinal bands on the back and regular spots on the side; tail 16-17 inches long with eight or nine complete dark rings; length of body and head about 24 inches; known, zoologically, as the lesser-civet. Consult Blanford, Jerdon, Tennent and other authori¬ ties on Oriental zoology.

RASSELAS, the name usually given to a moral story with an Oriental setting written by the famous lexicographer and essayist, Dr. Samuel Johnson, and published in the spring of 1759, in two volumes, under the title of (The Prince of Abyssinia: A Tale.* It reached a second edition the same year, and has since been often reprinted and translated, maintaining its rank as a notable if somewhat old-fashioned English classic. There is uncertainty as to just when and why and in how short a space of time it was written, but it seems clear that Johnson composed it rapidly at the period of his mother's death in January 1759, and that he probably used some of the money it brought him for filial purposes connected with that event.

Scholars have exercised themselves over the sources and the materials of the story, and have shown ithat Johnson did not invent his happy valley, his Abyssinian paradise ; but they have taken away none of the credit due him for selecting an impressive theme — the vain search of youth after happiness — and for treat¬ ing it with adequate weight, of thought, sound¬ ness of feeling and dignity of style. The book plainly belongs with the grave, solid, some¬ what magniloquent essays of his middle period rather than with the less stilted biographies of his old age, and it holds by his early years in owing something to his translation of theFrench version of Lobo's (Voyage to Abyssinia.) Everyone of its 49 short chapters, however little calculated to arouse the interest , of the experienced reader of modern novels, is thor¬ oughly representative of Johnson himself — of his sturdy morality, his common sense, his wide knowledge of men and books, his sombre but far from cowardly and depressing views of life.

The plot is simple in the extreme. Rasselas, shut up in a beautiful valley, <(till the order of succession should call him to the throne,)} grows weary of the factitious enter¬ tainments of the place, and after much brood¬ ing escapes with his sister Nekayah, her at¬ tendant 'Pekuah and his poet-friend Imlac. They are to see the world and search for happi¬ ness, but after some sojourn in Egypt, where they frequent various classes of society and undergo a few mild adventures, they perceive

the futility of their search and abruptly return to Abyssinia. That the plot should be so sim¬ ple, that local color should be almost non¬ existent, that episodic elements, e.g., the story of Imlac and that of the mad astronomer, should abound, is not surprising when one con¬ siders what didactic purposes the Oriental tale of 18th century western Europe was intended to serve and remembers that Johnson was a moral¬ ist and essayist, not a novelist. What does sur¬ prise is that with so little of incident, with no love-making, with few endeavors to charm the fancy, with but slight recognition of the claims of sentiment, (Rasselas) is none the less a story that deserves its fame. It does this, not so much because it is, like (Candide,> but in a very different way, an effective protest against shallow optimism, whether of deist or of ˆhustler,® but because it contains not a little of the courageous philosophy of life which a great, unique personality had formed for him¬ self. at the height of a literary career full of moving vicissitudes. Consult the editions of G. Birkbeck Hill and of O. F. Emerson.

William P. Trent.

RASTATT, ras'tat, or RASTADT, a town of Baden, Germany, on the river Murg, about four miles from the Rhine and about 15 miles southwest of Karlsruhe. It was formerly a fortress of the first rank but in 1892 the forti¬ fications were dismantled. The town has manufactures of lace, tobacco and cigars. Pop. about 15,196. Rastatt was the scene of two diplomatic congresses in the 18th century. The first congress of Rastatt met in 1713 to arrange 'terms of peace between the emperor and France, then still engaged in the war of1 the Spanish Succession. Peace was concluded 7 March 1714. In accordance with the terms of the treaty, signed by Marshal Villars and Prince Eugene, France gave up possession of the towns of Kehl, Freiberg and Breisach, and the electors of Cologne and Bavaria were rein¬ stated in power. The terms of the Treaty of Utrecht (q.v.) were ratified. The second congress of Rastatt met in 1797 for the pur¬ pose of terminating hostilities between France and the empire. After negotiations had been prolonged for more than a year, war broke out again between France and the allies and the congress suspended its sessions (April 1799). As the French representatives, Roberjot, Bonnier and Debry left the city on the evening of 28 April they, were set upon by a company of hussars wearing (the Austrian uniform and, the first two were murdered and the third; sabred and left for dead in a ditch. The papers of the legation were carried off, but no other spoil was taken. This violation of the law of nations aroused the indignation and horror of all Europe. Many attempts have been made to fix the responsibility for the deed. Some have ascribed the crime to the

Austrian! government which was desirous of obtaining certain papers in the possession of the ambas¬ sadors ; others maintain that the murderers were French emigres, while others still assert; that the act was instigated by Napoleon and other leaders of the War party in France for the purpose of exasperating the French people against Austria. In 1849 the town again be¬ came conspicuous as the stronghold of the Baden revolutionists.

RAT, any of several large rodents of the mouse family (see Mouse), especially two spe¬ cies of “house-rats® now habituated to civiliza¬ tion in all parts of (the world. The black rat (Musrattus) is of light and slender build, about seven inches in length, usually of a bluish black color, but sometimes grayish, and has quite large, thin ears. The brown rat (M. decumanus) or Norway rat, as it is often in¬ appropriately styled, is much heavier and larger, with short, rounded cars and a dull brown color. Both species are believed to be natives of China but the black rat was abundant in Europe at least as early as the 13th century. The brown rat migrated from western China, entering Russia in great numbers in 1727, and from there quickly spreading over Europe,, which was fully occupied by it by the middle of the 18th century. By its greater fecundity and; ferocity it quickly overcame the black rat, which it has now replaced in most parts. It infested ships and by this means has been carried to all parts of the world. Its wonderful capacity for increase (from 20 to 50 annually), its boldness, tough, elastic constitution and adaptable nature, make it everywhere dominant, and its omnivor¬ ous habits, voracity and destructiveness fre¬ quently lead it to become a source of great annoyance, loss and disease about human habita¬ tions. The ferocity of this species when brought to bay is well known ; and when driven by hunger it is so ravenous that neglected babies have been known to be killed and eaten by them, and a few cases are recorded where even able-bodied men have suffered a like fate when attacked by hordes of rats. They are also agents in the spread of disease, particularly bubonic plague and trichinoses. Against their many faults may be set the solitary virtue that they serve a useful purpose as scavengers in the city

sewers, *etc.* The albino and black and white pied rats sold for pets by bird dealers are derived from the black rat, which has a far milder disposition. The rats of the United States include the black and brown of Norway, above described; the roof, or white-bellied (M. tectorum) of the Southern States, named from its preference for thatched roofs for its abode; the Florida (neotorua Floridana) a habitat of the Gulf States, common to wild places and swamps, and frequently nesting in trees; the Cotton (Sigmodon hispidus), named from its use of cotton in forming its nest; and the Rocky Mountain, which is destructive to the trappings and stores of campers. Rat skins make fine leather for gloves.

RAT-KANGAROO. See Kangaroo.

RAT PORTAGE. See Kenora.

RAT-TAIL, one of the pelagic, cod-like fishes of the genus Macrourus, specifically Macrourus bairdi of the coast-waters of the eastern United States. The body terminates in a long, compressed, tapering tail, covered with spiny, keeled or straited scales. About 40 species are known.

RATA, any of several New Zealand trees of an Australian group of the myrtle family which includes the local ironwoods. Foremost among them is Metrosideros robusta, a tall strong tree, of very hard wood, used by the na¬ tives for making their war-clubs and by the colonists in cabinet-work and in shipbuilding.

Another species (M . florida) is a huge climber. These trees have very showy flowers, usually red, and characterized by many long erect stamens; and several species of the genus are cultivated as ornamental shrubs, and have been acclimatized in other parts of the world. One (M . foment osa) is known in New Zealand as “fire-tree.®

RATAFIA, rat-a-fe’a, generic name of a series of cordials, prepared usually by mixing an alcoholic liquor with the juice of some fruit or some flavoring material and sugar or syrup. The name is of French origin, and is said to have been given in consequence of the former habit of preparing a choice drink to be used at the ceremony of ratifying a treaty. A favorite flavoring is the almond — hence, bitter almonds, as well as cherry, peach, apricot, plum and other similar kernels, are much used; but many other flavors are also used, as orange flowers, goose¬ berries, raspberries, aniseed, chocolate, black

currants, *etc.*

RATANY, or RHATANY. See Rattany.

RATCHFORD, Michael D., American la¬ bor leader: b. Clare, Ireland, August 1860. He came to the United States with his parents in 1872, settling in Stark County, Ohio, and en¬ tered the coal mines soon afterward, studying in the evening schools. He became an active trade unionist in 1880, was elected president of the Massillon, Ohio, miners in 1890 and con¬ tinued active in labor organization, serving as president of the United Mine Workers of America in 1897-98. During his presidency of that organization he succeeded in gaining the eight-hour day in bituminous coal fields and secured an annual wage contract between mine workers and operators. He was a member of the National Industrial Commission in 1898-1900; served as commissioner of labor statistics of Ohio in 1900-08; was commissioner of the Ohio Coal Operators in 1909-12, and since 1913 has been commissioner of the Illinois Coal Operat¬ ors' Association.

RATEL, a South African badger (Melli - vora capensis), rather larger than the common European or American badger, which lives in burrows in open districts. It differs from the Indian honey-badger (q.v.) mainly in the pres¬ ence of a distinct white line along its sides, from the nose to the hocks, separating the black underparts from the blanket-like gray of the back. It is easily tamed, and is amusingly active in confinement, continually running about its cage and turning odd somersaults to attract attention of spectators, from which it seems to derive great pleasure.

RATHBONE SISTERS, Order of. See

Orders, Religious.

RATHBUN, Richard, American naturalist: b. Buffalo, N. Y., 25 Jan. 1852; d. 16 July 1918. He was educated at Cornell and at the Univer¬ sity of Indiana. He was assistant geologist of the Geological Commission of Brazil in 1875— 78, and assistant in geology at Yale in 1879-80. After 1880 he was curator of the United States National Museum. He was scientific assistant on the United States Fish Commis¬ sion in 187&-96, being in charge of the scientific inquiry after 1887 ; and in 1892-96 he was United States representative on a joint commis-i sion with Great Britain for the purpose of

preserving the fisheries in the waters contiguous to the United Slates and Canada. He was assistant secretary of the Smithsonian Institu¬ tion after 1897 and in charge of the United States National Museum after 1899. He con¬ tributed extensively to government and other publications.

RATICHIUS, ra-tik'i-us. See Ratke. Wolfgang.

RATIFICATION, in law, the confirmation, sanction or approval given by a person who has arrived at his majority to acts done by him during his minority. It has the effect of giving validity to such acts as would be otherwise voidable. ((An act performed by one for an¬ other, is adopted as his own act when by him ratified. Ratifications are either expressed or implied. The former are made in express and direct terms of assent ; the latter are such as the law permits for the acts of the principals."

In Scotch law the acknowledgment by a married woman, apart from her husband and before a justice of the peace, that a deed ex¬ ecuted by her is voluntary, and with full knowledge of its legal effect. In this sense the term corresponds to what is technically called in England and the United States an <(acknowledgment" by a married woman. In American political life the term is applied to a popular endorsement of an act by party leaders, as a nomination for public office. The term is also synonymous wifh ˆconfirmation," as when a verbal, telegraph or telephone agreement is con¬ firmed by a signed evidence from the parties in interest.

RATIO (from the Latin ratio, meaning reckoning, calculation), in mathematics, the measure of the relation which one quantity bears to another of the same kind ; that is, the number of times that one quantity contains another regarded as a standard. This is found by dividing the one by the other. The quotient or ratio thus obtained is the proper measure of the relation of the two quantities. Some mathe¬ maticians define the ratio of one quantity to another as the quotient of the first quantity divided by the second, and others define it as the quotient of the second quantity divided by the first. The operation of finding a ratio is purely numerical, and the resulting ratio is con¬ sequently an abstract number. Ratios are known as prime or ultimate,

according as the ratio of the variable quantities is receding from or approaching to the ratio of the constant quantities. Proportion is the relation of equal¬ ity subsisting between two ratios. See Mathe¬ matics ; Proportion.

RATION, in the army and navy, is the al¬ lowance of provisions given to each officer, non¬ commissioned officer, soldier and sailor. In the American army the ordinary ration is com¬ monly supplemented by additional articles bought with what is known as ((the company fund," money derived from certain allowances made to the soldiers. The American troops and sailors are as well fed as any in the world, whether in camp or war. The rations have varied with the time and place. A standard United States garrison ration includes 20 ounces beef, 18 flour, 2.4 beans, 20 potatoes, 2.8 prunes, 1.12 coffee, 2 sugar, 0.5 canned milk, 0.5 butter, 0.6 lard and minute portions of * salt, pepper and vinegar. For a field ration bacon

usually takes the place of beef, and the bread may be reduced with an increase of canned beans, tomatoes, *etc.* A forage ration for a horse is 12 pounds oats, 14 of hay; the mule being lighter is fed 9 pounds of oats, but the same quantity of hay. During the World War bakeries were maintained in the army to supply fresh field bread whenever possible. The cost of the United States army rations has ad¬ vanced steadily, being 13.18 cents in 1890. 14.42 in 1895, 16.97 in 1900, 16.18 in 1905, 21.44 in 1910, 25.32 in 1915, 26.81 in 1916 and 32 in 1917. British army rations are nearly identical with the American ; the German is less expensive, they introducing considerable rice, zwiebach, *etc.*

RATIONALISM, in its more general sig¬ nification, denotes a tendency or attitude of thought, either on the part of an individual or an age, to demand that prevailing beliefs, cus¬ toms and institutions shall be subjected to critical examination, and be required to justify themselves before the court of reason. In its more specific sense, the term refers to the doc¬ trines of a particular school of philosophical thinkers, which flourished mainly in France and Germany during the 17th and 18th centuries and which regarded reason as the only source of certain knowledge and the only test of truth.

In the general and more popular use of the term, rationalism is equivalent to a demand for a reasonable explanation in scientific terms. The rise of rationalism is thus in many re¬ spects identical with the development of the scientific spirit of inquiry. As such, it is op¬

posed to mysticism and supernaturalism. Lecky, in his (History of the Rise and Influence of Rationalism in Europe, } explains the word as follows : aBy the spirit of rationalism, I un¬ derstand not any class of definite doctrines or criticisms, but rather a certain cast of thought, or bias of reasoning, which has during the last three centuries gained a marked ascendency in Europe. … At present, it will be sufficient to say, that it leads men on all occasions to subordinate dogmatic theology to the dictates of reason and of conscience, and, as a necessary consequence, greatly to restrict its influence upon life. It predisposes men, in history, to attribute all kinds of phenomena to natural rather than miraculous causes ; in theology, to esteem succeeding systems the expressions of the wants and aspirations of that religious senti¬ ment which is planted in all men ; and, in ethics, to regard as duties only those which conscience reveals to be such." Between the claims of re¬ vealed religion and the spirit of rationalism the conflict has been especially sharp and long-con¬ tinued. This opposition shows itself even before the birth of Christianity in almost all of the older religions. In Greece, for example, where Religion was only to a very slight extent em¬ bodied in dogmas, the philosophers were never¬ theless frequently charged with atheism, or with perverting and destroying the national re¬ ligion through their rationalistic teachings. With the establishment of the Christian Church, the doctrines of religion were explicitly declared to be above reason and to rest upon a higher authority than human reason could afford. Nevertheless, from time to time there arose thinkers within the Church itself who strove to reduce the theological doctrines to a rationalistic

basis, interpreting them in such a way as to minimize or destroy the supernaturalistic ele¬ ments which they contained. Of these mediaeval rationalists Abelard (q.v.), 1079-1142, is per¬ haps the most famous. It was not until the 18th century, however, that rationalism became strong enough and bold enough to make open war upon the prevailing theological beliefs and doctrines. This century was called the age of enlightenment, and in it the demand arose on all sides that everything should be explained in terms of the clear and distinct ideas of rea¬ son, that mysteries and superstitions should be abolished, that the authority of Church and State should be limited and subordinated to the principles of reason and the interest of the indi¬ vidual members of society. The Deistic move¬ ment in England is especially noteworthy as maintaining the right of individual free thought in matters of religion, and as attacking the abuses and absurdities in . the existing theologi¬ cal creeds. Lord Herbart of Cherbury and John Locke may be regarded as forerunners of Eng¬ lish Deism (q.v.). The best-known representa¬ tives of the movement are John Toland (1670-1729), Anthony Collins (1676-1729), Matthew Tindal (1657-1733), Thomas Chubb (1679— 1747) and Thomas Morgan. The influence of this movement was felt throughout Europe. In Voltaire it found a spokesman of extraordinary literary power who had also the courage to carry its principles to its logical conclusions.

The spirit of rationalism, in so far as it represents the claims of free scientific inquiry, may be said to have already won its triumph. This triumph too, it must be admitted, was largely the result of the enthusiastic zeal of the apostles of the enlightenment. Nevertheless, the spirit of modern inquiry has been profoundly modified in many respects during the 19th cen¬ tury. In the first place, it has lost the narrow¬ ness and hardness that it necessarily exhibited so long as a large share of its strength was expended in negative criticism and in making war upon prevailing creeds and institutions. In addition, it has been transformed by the his¬ torical and evolutionary conceptions that have become dominant in every field of inquiry, lead¬ ing men's thoughts to problems of genesis and origin, and so to understand and sympathize with much that appeared absurd and unmeaning to the older rationalists. The 18th century rationalists regarded the world as static; they looked at each thing as it actually stood before them in their own day, and judged it by the unfailing standard that each individual was supposed to possess in the clear and distinct ideas of

his own individual reason. The his¬ torical point of view has brought with it a broader conception of reason and what is ra¬ tional ; it has taught us that it is only in the light of its origin and function that a thing can properly be judged, and that, accordingly, there may be a truer rationality in historical creeds, beliefs and institutions than in the self-con¬ fidence of the individual of clear and distinct ideas who ventures to criticize what he does not understand.

The philosophical doctrine known as Rational¬ ism owes its origin to Descartes (1596-1650), and has its home mainly in France and Ger¬ many, while empiricism (q.v.), the theory to which it was directly opposed, flourished mainly

in England. The rationalistic philosophers take mathematical demonstration as the perfect type of knowledge and seek to model their pro¬ cedure in all fields of inquiry on what they assumed to be its method. From the chaotic and contradictory material supplied by sense-perception they believed that real knowledge, science, could not be attained. Mathematics, however, reaches its results in independence of such a source. It begins with fundamental principles and conceptions which are self-evi¬ dent and proceeds by means of logical analysis and reasoning to show what further results are necessarily involved and implied in the starting-point. Now, the rationalistic thinkers maintain that what has been achieved in this particular science may be carried out universally by the application of the same method. That is, the true method of knowledge consists in first dis¬ covering by analysis the fundamental truths that lie at the basis of all thinking. These truths are not derived from experience, but, like the mathematical axioms and first principles, are native to the mind, innate ideas or a priori truths that are the starting-points for all demon¬ stration and all science. When these are once discovered, it is the further task of philosophy to deduce by logical reasoning the further re¬ sults that follow from them. In this way the rationalists supposed that it was possible to ar¬ rive at conclusions in philosophy that are as demonstrably certain as the propositions of geometry.

Besides Descartes, the chief representatives of rationalism are Spinoza (1632-77), who adopted the geometrical form of proof in his chief work, the (Ethics } ; Leibnitz (1646-1715), and Christian Wolff (1679-1754). The last-mentioned philosopher, though the least original, exercised a great influence over the thought of Germany by his terminology and by the sys¬ tematic way in which he divided the field of philosophy into the so-called sciences of rational cosmology or

physics, rational psychology, and rational theology. The first of these seeks to furnish demonstrative proof of the fundamental nature of the physical universe ; for example, that it is limited in space, had a beginning in time, is made up of indivisible parts, *etc.* Ra¬ tional psychology sets out from the conception of the soul as a spiritual substance and at¬ tempts to prove that it necessarily follows as a result of this initial conception, that the soul is simple, indivisible, indestructible and, there¬ fore, immortal, and, moreover, that it possesses certain faculties, such as those of representa¬ tion, desire, as essential to its true nature. In like manner, rational theology dealt in the same a priori and deductive way with the various proofs for the existence and attributes of God. This was the form of rationalism in which Kant was educated and it is against these so-called rationalistic sciences that he directs his attack in the dialectic of the (Critique of Pure Rea¬ sonˆ The criticism of Kant was so penetrat¬ ing and thoroughgoing that it annihilated at a blow the claims of rationalism. It did this by pointing out, in terms that could neither be mistaken nor denied, the falsity of the as¬ sumptions upon which this philosophical theory rests. Kant is thus the destroyer and finisher of rationalism.

Bibliography. — Lecky, (History of the

Rise and Influence of Rationalism in Europe ’ ; Stephens, (History of English Thought in the Eighteenth Century’ ; White, (The Warfare of Science and Religion’ ; Paine, (Age of Rea-son> ; Cairns, (Unbelief in the Eighteenth Cen¬ tury ’ (1881) ; Descartes, (Discourse on Method) ; (Meditations on the First Philos¬ ophy ’ ; Zeller, (Geschichte der deutschen Phi¬ losophic seit Leibnitz’ ; Windelband, (History of Philosophy’ (translated by J. H. Tufts) ; Fischer, Kuno, (Geschichte der neueren Phi¬ losophic’ (Vol. Ill) ; Kant, (Critique of Pure Reason.’

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

RATIONALISTS. See Religious Sects.

RATISBON, rat'is-bon (REGENSBURG,

ra'gens-boorg), Bavaria, Germany, 82 miles by rail northeast of Munich, partakes of the ar¬ tistic tendencies of the latter. Chief among its public buildings and institutions are the Gothic cathedral, library, art-gallery, seminaries and glass-staining factory. Trade, facilitated by its favorable position on the Danube, is consider¬ able. Ratisbon suffered much from bombard¬ ments at various periods of its history, espe¬ cially in 1809, when it was stormed by the French. It became a free port in 1853. Pop.

(1910) 52,624.

RATITZE, ra-ti'te, a group of birds broadly characterized as having a non-carinate sternum and little or no power of flight. The group originally was one of the two grand divisions of Aves, embracing all those whose sternum had no keel, as opposed to Carinatce; but this character alone will not define the Ratitce as at present constituted by the researches of Gadow and accepted by ornithologists generally. Its place is as a subdivision of the Neornitlies (q.v.) co-ordinate with the Odontolcce (lies - perornis, etc.) and the Carinatce; and the sum of many anatomical peculiarities distinguishes the group, which consists of the ostriches, cassowaries, kiwis, moas, rocs (AEpyornxs), and perhaps some of the fossil birds of Patagonia whose relationships are not yet perfectly clear. The conspicuous feature of all these is the rudi¬ mentary condition of the wings, so that the ratites are well-designated flightless birds, the disappearance of the tail and the great prom¬ inence of the functions and development of the legs and feet. These features are believed to be the result of changes, very long continued, from ancestors which possessed the power of flight and have lost it by disuse, and in adapta¬ tion to life upon plains and deserts. This group was introduced by Merrem in his (Attempt at a Natural System of Birds,' and contains his genus (Struthio,' since divided. Consult Evans, 'Birds' (1900) ; Newton, dictionary of Birds' (1893-96) ; Stejneger, (Standard Natural His¬ tory' (Vol. IV, 1885).

RATKE, rat ke, Wolfgang (better known by his Latinized name of Ratichius), German educator: b. Wilster, Holstein, 18 Oct. 1571; d. Erfurt, 27 April 1635. He was trained in the Johanneum at Hamburg and the University of Rostock. Between 1603 and 1611 he lived in Holland and was the inaugurator of a new plan of school reform. The essence of his system was to discard the old memory and rote

method of teaching children; to interest them, by presenting things to their observation, and, afterward, names — a reversal of the method then in vogue ; to teach them their mother tongue firs.t and thence proceed to foreign lan¬ guages. At first he met with little success in propagating his views. In 1618, however, he settled at Kothen, Anhalt, and Prince Ludwig von Anhalt furnished him with the means of opening a school to be conducted according to his own ideas. Owing to certain faults of his own, as well as to the unsettled religious con¬ dition of Germany at that time, he was obliged to leave Kothen and settled at Magdeburg in 1721. Here he made a second failure and after¬ ward led a somewhat wandering life. But his influence upon his contemporaries and posterity was much greater than would be supposed from the failure of his own attempts to put his plan in practice. Consult Krause, AVolfgang Ratke, im Licht seiner und seiner Zeitgenossen Briefe' (1872) ; Schumann, (Die echte Methode W. Ratkes' (1876).

RATON, ra-ton', N. Mex., city, county-seat of Colfax County, on the Atchison, Topeka and Santa Fe Railroad, about 130 miles northeast of Santa Fe and eight miles south of the north¬ ern boundary of the State. In the vicinity are extensive coal fields. It is the commercial and industrial centre of a large region devoted chiefly to farming and stock raising. It has railroad shops, stock-yards, grain elevators, wholesale houses and brick and lumber yards. Pop. (1920) 5,544.

RATTAN, rat-tan, a product of Calamus rotang, a scandent palm of Ceylon, but also found in India and Burma. While this species furnishes the best commercial rattan, there are about 200 species in this genus, inhabiting trop¬ ical and subtropical Asia, Africa and Australia. The most important species other than the above are C. rudentum, C. pachystemonus and C. radiatus, abounding throughout the damp forests of Ceylon up to 3,500 feet elevation. C. rotang and the first two species named above are manufactured into a great variety of useful articles such as baskets, chairs, the hoods of carts, and when split into strips can be twisted into cordage of great strength. C. rotang is often used in Eastern countries for rope bridges, or, used entire, is stretched across rivers as the supports of suspension bridges; and is also employed for the manufacture of Malacca canes. In China rattan is a favorite material for cordage, and the material also enters into the manufacture of umbrella handles and ribs, and as a substitute for whalebone. The cane is used for saddlery and harness and for wicker¬ work helmets, said to be sword-proof. The two smaller species (C. pachystemonus and C. radiatus) are largely

employed in the manu¬ facture of baskets for the Ceylon tea gardens, used in picking the tea leaves. C. radiative supplies the material for chair bottoms, being split into thin strips. In fact the many uses of rattan in Eastern countries are almost nameless. In the United States rattan is largely used for manufacturing chairs and other furniture, for chair-seating, baby-carriage bodies, baskets, floor mattings, brooms, corset-stays, whips and many other uses of minor importance. The ((reed" used in raffia fancy-basket manufacture is the split inner portion of rattan dressed in

cylindrical form like the true reeds. See also Fibre.

RATTANY, or RHATANY, a coarse plant of the genus Krameria and order Poly-galce, native to the Andean tablelands in Peru and Bolivia. The roots have medicinal value as an astringent, when finely powdered they furnish a frequent constituent of tooth-powders, and they also serve, especially in Portugal, to color wines ruby-red. This property is due to the presence of ratanhia tannic-acid. The root-bark also contains an almost insoluble free red substance called ratanhia-red.

RATTAZZI, rat-tat'se' Marie Studolmine de Solms, French novelist: b. Waterford, Ire¬ land, 1833; d. Paris, February 1902. She was the daughter of Sir Thomas Wyse, British Am¬ bassador to Greece, and Letitia, eldest daughter of Lucien Bonaparte. She was married to Frederic de Solms, a rich native of Alsace in 1850, to Urbano Rattazzi (q.v.) in 1863 and to M. de Rute in 1877. Twice, in 1852 and 1864, she was exiled. She wrote much in prose and verse, and was a prominent figure in politics and society. She was one of the first woman journalists ; for four years she wrote a feuilleton for the Constitutionel, and also wrote for the Pays and the Turf. In the early days of the Second Empire she was a woman of great personal beauty and gathered around her in her salon men of all shades of opinion — Hugo, Rochefort, Semenuais, Sue, About, *etc.* In Italy she was called the (Divina FanciullaP In 1881 she edited (Rattazi et son Temps,) and in the last two or three years of her life she published two volumes of

her own memoirs, and edited the Nouvelle Revue Internationale, to which she also contributed largely. Among her other works were Wes Manages d'une Creole) (1864) ; (Si j'etais Reine) (1868) ; W'Aventurier des Colonies) (1885), a drama; and the volume of tales, (Enigme sans CleP

(1894).

RATTAZZI, rat-tat'se, Urbano, Italian

statesman: b. Alessandria, 29 June 1808; d. Frosinone, 5 June 1873. He studied law at Turin and, after practising with marked suc¬ cess at the capital and at Casale, was elected a member of the Sardinian Parliament from his native town in 1848. He allied himself with the Liberal party and attained such speedy recognition that in August he was made Minister of Public Instruction. He left office after a few days, but in December of the same year as¬ sumed the portfolio of the Interior under Gioberti, exchanging it later for that of Justice. On the fall of the Gioberti ministry, Rattazzi was entrusted with the formation of a new cabinet (February 1849) but the disaster of Novara in the following month robbed him of power. From Democrat he now turned Mod¬ erate Liberal and formed the party of the left centre whose coalition with the right centre under Cavour (q.v.), the so-called Wonnubio,® brought about the fall of the d'Azeglio Cabinet in November 1852 and the organization of a new ministry by Cavour. Rattazzi gave up the presidency of the Chamber to become in 1853 Minister of Justice, and later, of the Interior, and in the second capacity precipitated a bitter struggle with the Clerical party by the introduc¬ tion of a law providing for the partial seculari¬ zation of church property and restricting the

influence of the religious associations. He left the cabinet in 1858 but in July of the following year, after Villafranca, succeeded Cavour as head of the cabinet, only to give place to his predecessor within six month's. His opposition to the cession of Savoy and Nice to France led to his retirement in 1860, but changing his views on this policy he became president of the lower chamber in the first Italian Parliament and in March 1862 succeeded Ricosoli in the govern¬ ment, retaining for himself the portfolios of Foreign Affairs and of the Interior. His course in checking the patriotic agitation against the Austrians in Lombardy and the papal rule in Rome brought him great unpopularity

and in December 1862 he retired from office. Once more he succeeded Ricosoli, as Premier, in 1867, but again had to yield to the storm of popular anger aroused by his hostile attitude toward Garibaldi (q.v.) and he resigned in October of the same year.

RATTIGAN, Sir William Henry, English jurist: b. Delhi, British India, 4 Sept. 1842; d. London, 4 July 1905. He was educated at King's College, London ; admitted to the bar in 1873; served four times as judge of the chief court of Punjab; was additional member of the supreme legislative council of India 1892-93, and member of the Punjab legislative council 1898-99. In 1895 he was knighted and in 1901 became member of Parliament for northeast Lanarks. He published (De Jure PersonarunP (1873) ; (The Science of Jurisprudence) (3d ed., 1892) ; (Private International Law> (1895), *etc.*

RATTLESNAKE, a distinctively Ameri¬ can group of poisonous serpents characterized by a peculiar horny rattle appended to the tail. They belong to the suborder Solenoglypha, all the members of which are poisonous and have the fang-bearing maxillary bones erectile. To this suborder belong the Old World families of Viperidcc (vipers) and the Crotalidce, or pit-vipers, which inhabit both hemispheres. The latter have the maxillary bone deeply excavated to lodge a sensory pit of unknown function opening on the face between the eye and nostril. There are two subfamilies, the Lachesince, which have no caudal rattle, and the Crotalince, or rat¬ tlesnakes. The former includes the copper¬ head, water moccasin and fer-de-lance (qq.v.). the banana snake, whose presence in bunches of this fruit so often causes consternation on fruit ships and in storage houses, and numerous others of tropical America, India and the Malay Islands.

The Crotalince, or rattlesnakes, represent the highest type of serpent development and spe¬ cialization. The caudal rattle, from which they take their name, consists of a series of dry horny epidermal rings so loosely fitted that any movement causes them to knock together with a sharp rustling rattle. They are formed in the following manner: Several of the terminal vertebrae of the tail are coalesced to form a dilated vertically enlarged plate. This is cov¬ ered with a thick vascular skin so cut by an annular constriction as to form a larger an¬ terior, and a smaller posterior knob, which to¬ gether may be considered to be a mold on which the joints of the rattle are formed. The epidermis covering this region is especially thick, and in the young snake forms a button

and ring, which arc the only indications of the rattle. When the snake sloughs, the horny cov¬ ering is loosened here as elsewhere and a new layer is formed beneath it; but instead of being cast off with the rest of the epidermis, the open end of the old horny ring fits over and by its elasticity clasps the new knob at the end of the tail, and by this means remains attached. With each subsequent molt a new ring and button are added, the latter serving to hold its prede¬ cessor in the series, and which continues to in¬ crease in size with the growth of the snake and its caudal knob. As well-fed snakes may slough three or four times a year, and as the rings sooner or later become worn out and detached, it is evident that the popular belief that the number of joints in the rattle indicate the years of the snake's age is unfounded. Rattles of more than 12 joints are rare, but one having 21 is known. When the snakes are irritated or angry, the end of the tail is more or less ele¬ vated and vibrated rapidly, producing a sound audible at a distance of 30 or 40 paces. Many snakes, both venomous and innocuous, have this habit of vibrating the tip of the tail when angry and many have a hard horny spur or cap at its end, but no others retain this through a suc¬ cession of molts. Many fantastic theories have been proposed in explanation of the utility of the rattle, but it is probably little more than a recognition character, which helps to bring the sexes together and to segregate the species. However, it is probable that its sounding for¬ merly saved the lives of many rattlesnakes by warning large animals acquainted with their deadly powers from the vicinity, but since the advent of the white man it has had a precisely opposite result.

Poison. — The venom apparatus of the rattlesnakes is the most complete and effective contrivance imaginable for injecting the poison¬ ous fluid into the circulation of a victim. The maxillary bones are very short and are freely movable on an articulation with the prefontals. Upon them are attached the venom fangs-at such an angle that with the movements of the maxillary they may be depressed in a fold of mucous membrane or erected vertically in the very front of the mouth in a most effective position for striking. The tooth substance of the fang is folded into a tubular form, with an opening at the base to

receive the end of the venom duct and another near the front face of the needle-pointed tip. Behind the functional fang, which may be nearly an inch long in large snakes, is a succession of smaller reserve fangs, which become functional in order as their prede¬ cessors are lost. The venom gland, which cor¬ responds to the parotid salivary gland of other animals, is situated on the cheek and has a duct running to a sinus at the base of the fang. All of the muscles and other parts are so arranged that the same movements that open the mouth and press the horizontal pterygoid bones for¬ ward to erect the' maxillaries with their fangs also compress the poison gland and squeeze out its secretion. Cope describes the biting move¬ ment as three-fold: ((First, there is the spring of the body, which never exceeds two-thirds of its length ; second, the bite proper, caused by the seizing of the jaws; and, third, the clutch with the fangs themselves, which are moved freely backward and forward." This movement

of the fangs may be easily seen by holding a rattlesnake so that it cannot strike, when drops of the pale yellow venom may be seen to fall from their tips and are sometimes blown from the mouth by forcible expirations. The active principles of the venom are several soluble pro-teids, one of which has a disorganizing effect on tissues with which it comes in contact and another is a powerful heart and respiratory de¬ pressor. The immediate effect of a bite is severe burning pain followed in 10 or 15 min¬ utes by prostration, with dizziness, vomiting and cold sweats ; the heart action is very feeble and the pupil dilated. This condition gives way in from 12 to 15 hours to one of fever and difficult respiration, while the part affected becomes greatly swollen and the neighborhood of the wound suppurates. Death may occur in either of these stages or as a result of secondary gan¬ grene. Treatment to be effective must be prompt and thorough. A ligature should be applied above the wound and the latter enlarged with a clean knife until the blood flows freely. Permanganate of potash, bleaching powder, chromic acid, silver nitrate or other substances which render the active albumens insoluble should be applied to the wound. Small and fre¬ quent doses of whisky, strychnine or ammonia should be administered as a stimulant, but an excess of alcohol may increase the depression. Every effort should be made to press or draw the poison from the wound before the ligature is removed, but sucking with the mouth is al¬ ways dangerous.

Species of Rattlesnake. — Of rattlesnakes three species of Sistrurus and 16 of Crotalus have been described, three of which are South and Central and the rest North American. None occurs in the West Indies.

The species of Sistrurus are small snakes with the snout and frontal region of the head covered with large plates. The ground rattlesnake or massasauga (S . catenatus) is found on low prairie lands from Ohio and Minnesota southward, but is now rare or exterminated in all settled parts. It reaches a length of three feet and is not con¬ sidered especially dangerous. About six young are born alive in September; and this is one of the snakes for which it is pretty clearly established that the newly-hatched young seek refuge from danger in the mouth and gullet of the mother. A related species (S', miliarius) is found in the Southern States.

In the genus Crotalus the entire top of the head is covered with small scales. The com¬ mon or banded rattlesnake (C . horridus) was formerly abundant throughout the entire eastern United States and it is the only species found in southern New England and the Middle States, but has been largely exterminated by the white man and his companion, the hog. The latter in roaming the woods in search of mast, etc., never fails to kill and devour the rattle¬ snake whenever possible. It is commonly be¬ lieved that the hog is immune to snake-bites, but the truth is that the poison is dissipated in the thick skin and layer of subcutaneous fat and never reaches the vascular tissues beneath. This rattlesnake prefers sparsely wooded rocky ridges with sunny exposures and in such locali¬ ties is still common in the mountains from Pennsylvania to Tennessee. It is a sluggish and generally peaceful creature, and seldom bites

except to secure food, unless it be trod upon or startled. When about to strike it coils with the head in the middle and elevated and the rattle sounding, delivers a lightning-like blow and immediately recoils or slowly retreats. It seldom attacks without provocation or follows a foe: All kinds of small mammals, especially mice, and occasionally birds, are its food, and it drinks water freely. The cold months of the year are passed in hibernation and frequently large numbers of these snakes congregate in caves or beneath rocks for this purpose. Mat¬ ing takes place in the early summer and about September from six to nine

young about nine inches long are born alive.. A length of five feet is sometimes attained, but ordinary examples seldom exceed four. Among the natural ene¬ mies of the rattlesnake are the kingsnake and blacksnake, birds of prey and herons. The diamond or water rattlesnake (C . adamanteus) reaches a length of more than eight feet and a circumference of 15 inches and is not only the largest of the rattlesnakes, but the bulkiest of all poisonous snakes, being exceeded in length only by the slender snake-eating cobra. It inhabits the Southern States and is particu¬ larly abundant on the Florida Keys. Except that it prefers the vicinity of water, in which it swims freely, it's habits are much like those of the common species. Because of its great size, and the large amount of venom that it secretes, this is an extremely dangerous reptile ; it is also sometimes inclined to be aggressive. The prairie rattlesnake (C. confluentus) inhabits most parts of the Western plains and deserts and is exceedingly abundant in unsettled re¬ gions. This is the species which plays a part in the famous triple alliance of prairie-dog, owl and rattlesnake, which, although popularly sup¬ posed to be a most amicable arrangement, is at best a state of armed neutrality and frequently of open warfare. The owls and snakes seek the burrows of the marmot as safe retreats and nesting sites, as well as for the purpose of feed¬ ing on the young marmots, while the latter fre¬ quently show their resentment of the intrusion in a variety of ways. A very distinct species is the horned rattlesnake (C. cerastes), in which the superciliary scales are produced into a pair of prominent horns surmounting the eyes. It is abundant in the desert region of the South¬ west, especially about Death Valley, and is known in Arizona as ˆsidewinder® from its peculiar habit of retreating sidewise from an in¬ truder. Several other species inhabit these hot dry regions.

Service to Man. — Rattlesnakes possess a certain economic importance. As checks on the increase of the native mice and rats, they, in common with many other snakes, perform an important service. Their venomous qualities are such a menace to man and beast as to render their destruction both expedient and certain in all thickly settled districts. By the Indians and by the whites in certain parts of the South their flesh is relished; an oil or salve, supposed by the credulous to possess peculiar medicinal virtues, is claimed to be manufactured from their livers and other fatty parts ; and the use of the skin for making purses, belts and other small arti¬ cles is well known. Certain tribes of Indians employ these snakes in their ceremonials and others formerly poisoned the tips of their war-arrows with rattlesnake venom, while the rat¬

tles always figured among the charms of the medicine-man.

Bibliography. — Cope, (Rcport U. S. Na¬ tional Museum for 1898 > ; Stejneger, <The Poisonous Snakes of North America* (1893); Mitchell and Reichert, (Researches Upon the Venom of Poisonous Serpents) (Washington 1886) ; Ingersoll, (Country Cousins* (New York 1885).

J. Percy Moore, University of Pennsylvania.

RATTLESNAKE ROOT. See Polygala.

RATTLEWING, a duck. See Goldf.n-eye.

RATTRAY, rat'ra, William Jordan, Cana¬ dian journalist: b. London, England, 1835; d. Toronto, Canada, 26 Sept. 1883. He went to Canada with his parents in 1848, was gradu¬ ated from the University of Toronto in 1858 and engaged in journalism as an editorial writer on the Toronto Mail. He also contributed to the Canadian Monthly and other periodicals and established a reputation as an able defender of Christianity against agnosticism. Author of (The Scot in British North America) (4 vols.,

1883).

RAU, row, Charles, American archaeolo¬ gist: b. Verviers, Belgium, 1826; d. Philadel¬ phia, Pa., 25 July 1887. He was educated at the University of Heidelberg and came to this country in 1848, where he engaged in teaching. From 1875 until his death he was curator in the National Museum at Washington, D. C., and devoted himself to the study of American archaeology, on which he became a recognized authority. He wrote (Early Man in Europe* (1876); (The Palenque Tablet in the United States National Museum* (1879); (Articles on Anthropological Subjects, 1853— 1877 > (1882).

He left unfinished a work on the types of early American implements, and what was projected to be an exhaustive record of American archae¬ ology. His great library and collections were bequeathed to the National Museum.

RAU, Karl Heinrich, German political economist: b. Erlangen, 1792; d. 1870. He re¬ ceived his education at the University of Er¬ langen, was privat docent there in 1812, becom¬ ing professor of political economy there in 1818. Four years later he removed to Heidelberg in a similar capacity. In 1835 he founded the Archiv der politischen

Oekonomie und Polizei-wissenschaft. He is the author of (Ueber das Zunftwesen und die Folgen seiner Aufhebung) (1816) ; (Grundriss der Kameralwissenschaft und Wirtschaftslehre* (1823) ; (Lehrbuch der politischen Oekonomie* (1826-37).

RAUCH, rowcH, Christian Daniel, Ger¬ man sculptor : b. Arolsen, western Germany, 2 Jan. 1777; d. Dresden, 3 Dec. 1857. In Arol¬ sen he received his first instruction in art from the sculptor Valentin, under whom he executed ornamental work chiefly. Going to Cassel he became a pupil of Kuhl, the sculptor, and was appointed groom of the chamber in the king's household at Berlin. This gave him an oppor¬ tunity of advancing in his art, and in 1802 he exhibited his (Sleeping Endymion) and mod¬ eled a bust of Queen Louise (1804). which he subsequently executed in marble at Rome. In this city he found a patron in Humboldt, as well as in the first sculptors of the time, Canova and Thorwaldsen. Among his Roman work

of early days must be mentioned the busts of the poet Werner, the life-sized busts of Queen Louise, Count Wenyerski, the painter Raphael Mengs, executed under the commission of Lud¬ wig of Bavaria, and the bassi-relievi of (Hippolytus and Phaedra* and (Mars and Venus Wounded by Diomedes.* By 1824 he had exe¬ cuted 70 busts in marble of which 20 were of colossal size. His colossal bronze statues of Bliicher are 13 feet in height, and he also exe¬ cuted the greater part of the 12 statues in iron which compose the national monument at Kreuz-berg, near Berlin. One of his finest works is the group (Faith, Hope and Charity,* which he presented to his native town, Arolsen, while his crowning work as a portrait and historic sculp¬ tor is his statue of Frederick the Great at Ber¬ lin (1851), the result of 20 years' labor. He was one of the first, if not the very first, among German sculptors of his time, combining in his work the pure lines of transcendent dig¬ nity and grace with genuine portraiture of the individual. There is a poetic freedom in his conception of ideal subjects which does not yet overstep the limits of truth and fidelity to na¬ ture, and he may be safely styled the founder of the great Berlin

school of sculpture. Con¬ sult Eggers, (Chr. n. Rauch* (1873) ; (Rauch und Goethe, urkundliche Mitteilungen* (1880).

RAUHES HAUS, row'es hows (corrupted from ftRuges Haus**), an educational and benev¬ olent institution at Horn, near Hamburg, founded in 1833 by Johanie Heinrich Wichern (1808-81), who long remained at its head. It is connected with the German Home Mission, and besides forming a refuge for neglected children receives boarding pupils from the higher classes, and serves as a training school for those wishing to become teachers, superin¬ tendents or assistants in hospitals, reforma¬ tories, houses of correction and the like. It is supported by voluntary contributions, the profits arising from the productive enterprises carried on in connection with it and the fees of the richer pupils. In recent years there has been an average of 100 poor and neglected children, about one-third girls, receiving instruction with¬ in its walls. They live in ® families® of from 12 to 15, each <(family® being under the care of one of the adult members of the mission training school. The educational department is in the hands of assistants, who also take part in the instruction of the institution, in order to prepare themselves for the work of the Home Mission in other localities. This indeed has became one of the most important features of the work carried on by the Rauhes Haus, and its graduates are found in every field of chari¬ table work in Germany. The whole staff of assistants, consisting of young men of 20 to 29 years of age, are formed into a kind of society (Briiderschaft) . Since 1844 the institution has carried on a printing and bookbinding busi¬ ness. Its organ is the Fliegende Blatter.

RAUM, rowm, Green Berry, American lawyer: b. Golconda, Ill., 3 Dec. i829; d. Chi¬ cago, Ill., 18 Dec. 1909. He was admitted to the bar in 1853 ; removed to Kansas and served in the Union army in the Civil War, rising to the rank of brigadier-general of volunteers. He sat in Congress 1866-69; was commissioner of internal revenue 1876-83, and LJnited States commissioner of pensions 1889-93. He pub¬

lished (The Existing Conflict between Republi¬ can Government and Southern Oligarchy* (1884) ; (History of Illinois 'Republicanism)

(1900).

RAUMER, row'mer, Friedrich Ludwig Georg von, German historian: b.

Worlitz, near Dessau, Anhalt, 14 May 1781; d. Berlin, Ger¬ many, 14 June 1873. He studied law at Halle and Gottingen, and entered the Prussian state service in 1801. In 1811 he accepted the chair of political economy at Breslau, and in 1819 was called to Berlin. He was for some time secre¬ tary of the Berlin Academy, and at different times between 1816-55 traveled extensively through Europe and the United States. In 1848 he was elected to the Parliament of Frankfort, and was sent to Paris as Ambassador. He was a member of the House of Lords of Prussia from 1851 until his death. He founded and edited in 1830-67 (Historisches Taschenbuch.* The first scientific historian to popularize his¬ tory in German, Von Raumer wrote (Geschichte der Hohenstaufen und ihrer Zeit* (1823-25) ; (Brief e aus Paris zur Erlauterung der Geschichte des 16 und 17 Jahrh* (1831) ; (Ueber die geschichtlich Entwickelung der Begriffe von Recht, Staat und Politik) (1832) ; (Geschichte Europas seit dem Ende des 15. Jahrhunderts) (1832-50) ; (Beitrage zur Neuern Geschichte aus dem Brit. Museum, etc.* (1836-39) ; (Die Vereinigten Staaten von Nordamer-ika* (1845) ; (Handbuch zur Geschichte der Litteratur* (1864-66), besides special works on (Prussian Municipal Law) (1828) ; (England, 1835 ˆ (1836); England, 1841 > (1842), and

Htaly* (1840).

RAUMER, Karl Georg von, German

geologist and educator, brother of the preced¬ ing: b. Worlitz, Germany, 9 April 1783; d. Er¬ langen, Germany, 2 June 1865. He was edu¬ cated in Gottingen, Halle and Freiberg, and in 1811 became professor of mineralogy at Bres¬ lau, was called to Halle in 1819 and in 1827 settled permanently as professor of natural his¬ tory at Erlangen. He published (Geognostische Fragmente) (1811) ; (A B C Buch der Krys-tallkunde) (1817, 1821) ; (Lehrbuch der allgemeinen Geographie) (1832) ; (Geschichte der Padagogik* (1843-51) ; (Beschreibrung der Erdoberflacue* (6th ed., 1866), *etc.* Consult his autobiography (1866).

RAUMER, Rudolph von, German philolo¬ gist, son of Karl Georg von Raumer : b. Bres¬ lau, Germany, 14 April 1815; d. Erlangen, Ger¬ many, August 1876. He was privat docent at Erlangen in 1840-46; professor there in 1846-76, and published (Untersuchungen fiber die Urver-wandtschaft der semitischen und indo-euro- paischen Sprachen* (1868 et seq.).

RAUPACH, row'paH, Ernst Benjamin Salomo, German dramatic poet : b. Straupitz, near Liegnitz, 21 May 1784; d. Berlin, 18 March 1852. He

studied theology at Halle, afterward went as a tutor to Russia, and in 1816 obtained a chair in the philosophical faculty of the Uni¬ versity of Saint Petersburg; but quitted the country in 1822, and after various changes finally settled, in 1824, in Berlin, where he em¬ ployed himself chiefly in writing for the stage. His dramatic works have been collected and published in two divisions, the one containing his comic pieces, under the name of (Drama-

tische Werke komischcr Gattung) (1828-35) ; and the other, cDramatische Werke ernster Gattung* (1830-43). In his earlier works he was an imitator of Schiller, and some of the trage¬ dies belonging to this period, such as (Die Er-dennacht,* show much real power. His popu¬ lar success was considerable ; but his dramas became more and more trivial in content. They display, however, considerable knowledge of stage effect, great creative power and a wealth of verbal wit. His early plays include (The Princess Chawansky) (1818) ; (Die Gefesselten* (1821) ; (Der Liebel Zauberkreis) (1824) ; (Isi-dar und 01ga) (1826) ; and (Die Tocuter der Luft* (1829) ; his comedies (Die Schleick-handler* ; (Der Zeitgeist,* and (Das Sonnett) ; his farces (Deuken Casar,* and (Schelle im Monde1* ; his posthumous works (Jacobine von Holland,1* (Der Kegelspider,* (Mulier taceat in Ecclesia* (1853), and (Seed and Fruit* (1854). A life of the dramatist was published by Paul¬ ine Raupach (1853).

RAUPP, rowp, Karl, German painter: b. Darmstadt, 1837. He began as a landscape painter, and between 1856 and 1858 studied genre under J. Becker at Frankfort, and under Karl Piloty at Munich Academy from 1860 to 1865. Subsequently he opened a studio, taking private pupils in painting, and in 1868 his repu¬ tation as a teacher gained for him the position of professor in the art school at Nuremberg, which he held up to 1879, when he was appointed professor in the academy at Munich. Among his works may be mentioned (A Boating Party on the Chiem See* ; (Home Before a Storm* ; (A Calm* ; (Ave Maria* ; (Sport and Work* ;

(Starting Home from the Monastery School.*

RAUSCHENBUSCH, rou'shen-bush, Wal¬ ter, American clergyman : b. Rochester, N. Y., 4 Oct. 1861 ; d. 25 July 1918. He was edu¬ cated at the classical gymnasium, Gutersloh, Germany, the University of Rochester and the Rochester Theological Seminary, and was ordained in the Baptist ministry in 1886. He was engaged in religious work among German immigrants in 1886-97, and in educating Ger¬ man pastors in 1897-1902. After 1902 he was professor of church history at the Rochester Theological Seminary. He lectured at Ber¬ keley College, Cal., in 1910; at the Ohio Wes¬ leyan University in 1911 and at Grinnell College in 1914. Author of Christianity and the Social Crisis* (1907) ; (Prayers of the Social Awaken¬ ing* (1910) ; (Unto

Me* (1912) ; (Dare We Be Christians?* (1914) ; (Theology for the Social Gospel* (1917), *etc.*

RAVAILLAC, Frangois, fran-swa ra-va- yak, French assassin: b. Touvres, near Angouleme, 1578; d. Paris, 27 May 1610. He was successively valet to an attorney, in which situa¬ tion he learned to read and write, attorney's clerk and schoolmaster. He could never suc¬ ceed in any undertaking, however, and was thrown into Angouleme prison for debt, where he remained for a considerable time. At last he was released, and turned out into the world a beggar. He entered the order of the Feuil-lants, but was expelled shortly afterward as a visionary. His naturally gloomy disposition degenerated into fanaticism when he began to meddle in the religious controversies that dis¬ tracted France. He came to consider King Henry IV as the arch enemy of the Church,

to destroy whom would be a meritorious work. On 14 May 1610, while the king's carriage was standing in the street, Ravaillac approached and stabbed him. He was condemned to be torn to pieces by four horses, and this he under¬ went, previously declaring that he had no ac¬ complices to his crime. Henri Martin in his (Histoire de France* and M. Poirson in his (Histoire de Henri IV* concluded, after an examination of all available evidence, that the crime was wholley due to monomania, resulting from fanaticism.

RAVANA, ra'va-na, in Hindu mythology, one of the Rakshasa, a class of evil spirits or demons, who, as attendants on Kuvera, the god of riches, were guardians of his treasures, and had the power of assuming any shape at will. They were cruel, hideous monsters, ever ready to oppose the gods. At the time of Rama, Ravana ruled over Lanka, or Ceylon, and having carried off Sita, the wife of Rama, to his palace, was ultimately conquered and slain by the latter. He is described as a giant with 10 faces, who in consequence of austerities and devotion had obtained from Siva a promise which bestowed on him immunity from the power of demons and gods. Vishnu became incarnate as Rama, and hence killed the demon giant, whose kingdom had been invaded by men with the assistance of monkeys, against whom Ravana, in scorn, had omitted to make any stipulations in his compact with Siva.

RAVEN, a typical species (Corvus corax) of the crow family (Corvidce) , of which, as indeed of all passerine birds, it is the largest representative. The size is quite variable, but is generally about two

feet in length and four feet in expanse. Plumage, bill and feet are all black, the former with rich purple and violet lustres, but duller in the young and females, which are likewise smaller. The raven inhabits Europe, a large part of Asia, and North Amer¬ ica from the Arctic Ocean to Guatemala. In North America two sub-specific forms are found, C. corax sinuatus being the western, and C. corax principalis the larger northern and eastern race. The former is generally abundant in the Rocky Mountain region ; the latter has been largely exterminated in the eastern United States, but is still found in many inaccessible waste and mountain districts and reaches a very large size in Labrador and northward. Northwardly the raven is mi¬ gratory, but may withstand the cold of the severest winters, as it often does in Canada and about the Great Lakes.

It is most abundant in rocky districts, near the banks of lakes and rivers, and is generally seen alone or in pairs, but sometimes in small flocks after the breeding season ; the flight is rapid, elevated and protracted, often sailing for hours at a time at a great height ; on the ground the gait is grave and dignified, with frequent opening of the wings. It is truly omnivorous, but by preference carnivorous, eating small ani¬ mals of all kinds, eggs and young birds, carrion, dead fish, mollusks, crustaceans, insects, nuts and berries. The European raven is reputed to destroy young rabbits and even lambs, It dis¬ gorges indigestible substances, as bones, hair and feathers, like birds of prey. It is very wary and cunning and is rarely caught in traps or shot by the hunter, but it often falls a victim

to the poisoned baits set by the trappers for the fur-bearing animals. It breeds according to latitude, between January and June, making a rude nest on inaccessible cliffs or tall trees, re¬ pairing the same for years in succession: the eggs are four to eight, two inches long, light greenish blue with numerous light purple and yellowish brown blotches, especially at the larger end; incubation lasts about three weeks, and the young remain in the nest several weeks before they are able to fly, fed at first on the half digested food disgorged by the parents ; only one brood is raised in a year, and this is bravely and successfully defended against the largest birds of prey. The raven is easily domesticated by kindness, and becomes much attached to its master, following him like a dog. Like others of the family it can be taught to imitate the human voice and to pronounce a few words with great distinctness; but the natural note is a deep, hoarse croak. The white-necked raven (C . cryptoleucus) of Mexico and the southwestern United States has the concealed bases of the neck feathers pure white. Several other raven-like species inhabit Africa. The large size, black color, mournful croak, charnel-house habits, together with the boldness, sagacity and wariness of the raven, have combined to make it an object of super¬ stitious fear and hate. As a bird of ill-omen it was watched by the ancient augurs with close attention ; it holds a prominent place in mythol¬ ogy and folklore, and receives frequent notice in literature.

RAVEN, The. (The Raven* by Edgar Allan Poe is the one of his poems which is most inseparably connected with his name in common recollection. It is entirelv expressive of the dominant sentiment of his life, the long¬ ing and regret for beauty which he had once known ; it is an excellent example of his most popular qualities as a versifier; and he him¬ self has selected it as a means of explaining how a poet might develop his ideas into poetic form. Like <Annabel Lee,* (Ulalume) and others of Poe’s best-known verse, (The Raven* is a recurrence of the thought of a beautiful love early known and early lost. In its form

it has all the quality of softness and sonorous¬ ness, of repetition and refrain which will be found elsewhere in Poe. In (The Philosophy of Composition Poe explains the steps by which these elements were built up and com¬ bined into the present poem. It is possible that he tells exactly what took blace in his own mind. He was, however, rather fond of hoaxing people; he was also fond of exact in¬ tellectual manipulation ; and it is very possible that his account is really an after-statement of what might have been. However that may be, the poem is a wonderful example of the emo¬ tional, even sentimental, lyric of the middle of the 19th century. It is a mistake to think of Poe's poetry as being more music than mean¬ ing. (The Raven * has a very distinct meaning although not such as could easily be reduced to a systematic statement. In our own day such reveries and meditations seem sentimental and old-fashioned ; a century ago they were the natural moods of hundreds of young men. And no poem in our literature better expresses just the mood that in that post-Byronic day was so common, not even anything by Byron himself.

As an expression of its author and its own time (The Raven* is perfect. It realises an ideal of beauty which is rare to-day and which many to-day find it impossible to appreciate, but it is an ideal of beauty and it is realised.

Edward Everett Hale.

RAVENEL, Henry William, American botanist: b. Berkeley, S. C., 19 May 1814; d. Aiken, S. C., 17 July 1887. He was graduated from South Carolina College in 1832, made a life study of the fungi and cryptogams and be¬ came one of the best botonical authorities in the United States. He made a critical study of the phsenogams of South Carolina, was botanist of the government commission to Texas in 1869 and was agricultural editor of the Weekly News and Courier. The genus Ravenelia of the Uredinece is named in his honor. He was credited with being the only American after the Rev. Moses A. Curtis, who knew specifically the fungi of the United States. The Uni¬ versity of North Carolina gave him. the degree of LL.D. in 1886. He wrote (Fungi Caro-liniani Exsiccati* (1853-60) ; and with M. C. Cooke (Fungi Americani Exsiccati* (1878-82).

RAVENNA, ra-ven'a, capital of the Ital¬ ian province of the same name, in the com-partimento of Emilia, about 45 miles east of Bologna. It i9 situated on marshy ground which was, within historic times, a lagoon and the scenes of extensive maritime movement. The

Corsini Canal and the two non-navigable streams, Montone and Ronco, connect Ravenna with the Adriatic, where there is a harbor at the mouth of the canal. The city has also railway connection with Bologna, on the west, Terrara, on the north, Rimini, on the south coast by the Adriatic Railways, which skirting the west shore of the Adriatic joins Ravenna with Brindisi in the far south. The connection with other places along the shore of the (<Boot** is made by the Mediterranean Railways. Ravenna is joined to all the great western centres of commercial activity by lines of rail¬ way connecting with the Adriatic Railways. It has extensive parks and gardens, most of which lie outside the compact centre of the city, which is occupied by the Piazza Vittorio Emanuele. This Piazza, and other public squares and parks, possess many interesting statues and other sculptured work. Owing to >the fact that it was an imperial, political and ecclesiastical centre for many years, Ravenna is now one of the greatest depositaries of ecclesiastical archi¬ tectural art in Italy, more especially of the art of the 5th, 6th, 7th and 8th centuries, which is a curious mingling of Roman, early Christian and Byzantine construction. Among the notable ecclesiastical edifices of the city, with the date of completion in each case, are Ecclesia Ursiana, known as the Metropolitan Church (390), San Giovanni Evangelista (425), Santa Agata (435), San Pier Crysologo (450), San Giovanni Bat¬ tista (450), Nazario Celso (450), San Pier Maggiore (458), also called San Francesco, San Teodoro (526), also known as Santo Spirito, Santa Maria in Cosmodin (526). San Martino (526), now called Apollinare Nuovo, San Vitale (530), Santa Maria Maggiore (530), San Apol¬ linare in Classe (535). The early cathedral, completed in 390, was destroyed toward the middle of the 18th century, and only some small parts of it and some decorations remain incor-

porated in the modern edifice. From 404 to 455, when Vienna was the official imperial resi¬ dence, was a period of great architectural activity in the city. This includes six great churches and the Basilica Petriana, which has been demolished. Most of the other churches have been remodeled, added to or almost alto¬ gether rebuilt, but they all have incorporated in them interesting reminders of the original struc¬ tures which preceded them. The modern churches are rich in mosaics, capitals, columns, crypts, frescoes, statuary, wall decorations and other paintings. The close of the period above indicated showed a very

decided decrease in the building activity and art creation of Ravenna. But the reign of Theodoric (493-526) again awakened the latent artistic life of the city. Theodoric himself built a huge palace in the eastern quarter of the capital ; but this has long since disappeared ; and he also erected for himself a massive marble mausoleum at the northeast of the city. This building, which is still standing, is circular, two stories in height and crowned by a monster monolith of more than 300 tons weight. It is now a church dedi¬ cated to the Virgin. San Apollinare Nuovo was built by Theodoric himself. In his day it was the largest and one of the handsomest of the Arian churches. The impetus given to building and art by Theodoric was communicated to the reigns of several of his successors. A part of the activity of this period is indicated by the list of prominent churches already cited. The city is rich in remains of the past and of the imperial and ecclesiastical occupations, in museums, tombs and other historical landmarks, among these being the palace and tomb of Theodoric already mentioned, the tomb of Dante and the temple containing it, Lord Byron's house, old Roman and other roads in the neighborhood and buried and partially ex¬ cavated ruins of the ancient city. Near to the modern city are also remains of the ancient harbor ; in the near-by. marshes stands the vast ecclesiastical edifice of San Apollinare in Classe, with its fine mosaics of the 6th and 7th cen¬ turies. Among the other notable monuments of the city are the granite columns of the Piazza yittorio Emanuele set up there by the Vene¬ tians (1483) and the statues of San Apollinaris and San Vitalis.

Industries— Among the industries of Ra¬ venna are lace manufacture, silk raising, wine manufacture, grape growing, spinning, weaving. The raising of grain, fruit, fishing and the making of glass, leather, bricks, musical and agricultural implements have tended lately to increase the commercial activity of the city.

History. — Ravenna is one of the most an¬ cient cities of Italy. Pliny says it was founded by the Sabines. In 191 b.c. it became part of the Roman dominions in Gallia Cisalpina. Augustus made Ravenna one of the important stations for his fleet, and by turning a branch of the Po through the city on its way to the Adriatic, increased the port facilities so as to accommodate a very considerable portion of the (<upper sea® fleet, which was apparently com¬ posed of vessels of lighter draught, for we are assured that its situation (<in the sea,® the devious nature of the waterways leading to it and their shallowness made it almost im¬ pregnable. For this reason and its apparent healthfulness it was the residence of numerous

emperors, among them Odoacer, who made his final stand against Theodoric, the leader of the Ostrogoths, sustaining a siege of three years conducted from land and sea. A few days after his surrender he was murdered by Theo¬ doric, who made Ravenna his official residence in 493. During the following 33 years of his reign Theodoric lavished all his care on Ra¬ venna, making it one of the most noted cities in his domains, and the pride of the Goths, who retained their power there for many years after they had lost Rome. In 539 Belisarius con¬ quered Ravenna and added it to the Roman Empire of Justinian, which formed a part of his Byzantine dominions, and to which it was destined to remain joined for over 200 years, as the centre of Byzantine power in Italy. Aistulf the Lombard captured Ravenna in 752 but soon lost it to the Frankish king Pepin. In the 13th century it and the surrounding country became an independent republic ; but was afterward subjected successively to the Polentani,' the Venetian and the papal authori¬ ties, remaining finally part of the papal see from 1509 to 1859, since which time it has formed a part of the Italian union.

Bibliography. — Agnellus, (Liber Pontifica-tis Ecclesiae Ravennatis) (written about 840) ; Allen and Williamson, (Cities of Northern Italy1 (Boston 1906) ; Blashfield, Utalian Ci ties > (New York 1912) ; Bormann, (Corpus Inscript1 (Berlin 1888) ; Diehl, (Ravenne, etudes d'archeologie byzantine) (Paris 1855) ; Goetz, <Ravenna) (Leipzig 1901) ; Gregorovius,

(Wander jahre in Italien) (Vol. IV, Leipzig 1892) ; Gsell-Fels, (Oberitalien and Mittelita-lien) (Leipzig 1912) ; Pasolini dalP Onda, Ra¬ venna e le sue grandi memorie) (Rome 1912) , Ricci, < Ravenna) (Bergamo 1902) ; Rivoira, (Origini delP (Architettura Lombarda) (Rome 1901); Quast. (Die altchristlichen Bauwerke Von Ravenna1 (Berlin 1842).

RAVENNA, Ohio, township, city and county-seat of Portage County, on the Balti¬ more and Ohio, the Erie and the Pennsylvania railroads, about 28 miles southeast of Cleveland. It is in an agricultural region, and has extensive industrial interests. The chief manufacturing establishments are foundries, machine shops, furniture factories, brick and tile works, electrical supply works, flour and lumber mills, iron and boiler works and cigar factories. It has a large trade in farm, clay and iron prod¬ ucts and in livestock. In the vicinity are a number of small and beautiful lakes, which have been made popular outing places. Pop. township, 7,219; city, 5,310.

RAVENNA GRASS. See Grasses in

the United States.

RAVENSCROFT, ra’venz-kroft, Edward, English dramatist, who flourished between 1671 and 1700. He was exceedingly popular in his day, though his work was never original, con¬ sisting of translations from older plays, and at times he even borrowed from his own previous works. His first play was ˆamamouchi1 (1671), taken from Moliere’s (The Gentleman Citizen.1 His plays include (The Wrangling Lovers1 (1676), after Corneille; (Scaramouch, a Philosopher1 (1677) ; (King Edward and Alfreda1 (1677); Ugnoramus1 (1678); Tame Dobson1 (16S3) ; (The Canterbury Guests1

(1695) ; (The Italian Husband* (1698) ; (The London Cuckolds) (published 1783), *etc.*

RAVENSCROFT, Thomas, English com¬ poser: b. near London, 1592; d. London, 1635. He was educated for his profession in Saint Paul’s choir, and at 15 received the degree of bachelor of music from Cambridge. In 1611 he published a collection of 23 part-songs, under the title ˆMelismata,* which are of remarkable beauty. Musical tradition has ascribed to him the compilation of two earlier works, similar in character to his <Melismata,) the <Pammelia,) comprising 100 pieces, and the <Deuteromelia,) containing 32, both dated 1609. In 1614 ap¬ peared his (Brief Discourses,* another collec¬ tion of 20 part-songs to which he has pre¬ fixed an essay on the ancient musical modes. In 1621 he published his (Whole Book of Psalms,* containing a chant for each psalm, many new, and all harmonized in four parts by Tallis, John Milton (the poet’s father), Ra-venscroft himself and other musicians. The Roxburghe Club published selections from the <Melismata,) cBrief Discourses,* (Pammelia> and (Deuteromelia) in 1823.

RAVENSHOE, ra’venz-ho, a novel by Henry Kingsley, published in 1862. The House of Ravenshoe, in Stonington, Ireland, is the scene of this novel; and the principal actors are the members of the noble family of Ravens¬ hoe. The plot is remarkable for its complex¬ ity,

and the book contains many bits of piquant humor.

RAVEN.STEIN, ra’ven-stin, Ernst George,

Anglo-German geographer and statistician : b. Frankfort-on-the-Main, 30 Dec. 1834; d. 13 March 1913. He was educated privately and in 1852 removed to London. In 1855-75 he was engaged in the topographical (now intelligence) department of the War Office, was a member of the council of the Royal Statistical Society in 1877-92 and of the Royal Geological Society it? 1894-96. He founded the German Gymnastic Society in 1861 and served as its president for 10 years and in 1882-83 he was professor of geography at Bedford College. He published <The Russians on the Amur) (1861) ; Geog¬ raphic und Statistik des Britischen Reiches) (1863) ; Systematic Atlas> (1864) ; (Map, Equatorial Africa) (1884) ; (Handy Volume Atlas) (1895, 1907) ; (The Strange Adventures of Andrew Battell* (1901) ; (A Life’s Work) (1908) ; (The New Census Physical, Pictorial and Descriptive Atlas of the World* (1911).

RAVESTEIJN, ra’ve-stin, Jan van, Dutch painter: b. The Hague, about 1572; d. there, 21 June 1657. He was elected into the old Painters’ Guild of Saint Luke at The Hague in 1598; the new guild was organized in 1655, and a Jan van Ravesteijn is enrolled among its members, but this may have been his son who bore the same name. He probably began his artistic studies under Frans Hals. His special department was portrait, in which he took rank among the first painters of Holland. Two large pictures of his with grouped portraits are to be seen in the Hall of the Company of Archers at The Hague; and in that city and at Antwerp are several portraits of individuals. His por¬ trait picture of his .own family is at Brunswick. His faces are lifelike, his handling vigorous

and his coloring transparent, although somei what too red to be quite natural.

RAVIGNAN, ra-ven-yan, Gustave Xavier Delacroix de, French Jesuit pulpit orator: b. Bayonne, 1 Dec. 1795; d. Paris, 26 Feb. 1858. He had already enlisted in the Bourbon cause in 1815, and, after juristic studies, been made audi¬ tor of the Paris Supreme Court (1817) and substitute Attorney-General (1821), when in 1822 he entered the Jesuit novitiate at Montrouge. In July 1828 he was ordained priest, and sub¬ sequently was professor of theology at Saint Acheul (1828-30) and at Brieg (Canton Wal¬ lis), Switzerland. He returned in

1835 to France, where he was for five years head of the Jesuit establishment at Bordeaux. In 1837 he took the place of Lacordaire (q.v.) at Notre Dame, and continued the ˆconferences** there until 1846. He spoke with much simplicity, but with intense conviction. Crowds flocked to hear him, the cathedral being, it is said, often filled hours before the sermon began. He has been considered one of the greatest preachers of his time. Among his writings were (De l'Existence et de l'lnstitut des Jesuites) (1844; 7th ed., 1855) ; and (Clement XIII et Clement XIV> (1854). Consult the sketches by Pou-joulat (1858) and Ponlevoy (1860, 13th French ed., 1890; Eng. trans. 1873).

RAVINE-DEER, the name among East Indian sportsmen of the common gazelle of India (Gazella bennetti), which is numerous in open rocky places and on the plains from cen¬ tral India to Persia; known also as the duikara, goat antelope and kalsiefie or blacktail See Gazelle.

RAVOGLI, Augustus, American surgeon : b. Rome, Italy, 7 Feb. 1851. He was gradu¬ ated from the University of Rome in 1873, studied medicine at Vienna, Prague and Berlin, served as surgeon in the Italian army with the rank of major and came to the United States in 1880. He settled in Cincinnati, Ohio, in 1881 and shortly after became professor of derma¬ tology and syphilography at the University of Cincinnati. He has published numerous scienti¬ fic articles and (The Hygiene of the Skin) (1888), and (Syphilis in its Medical, Medico¬ legal and Sociological Aspects) (1907).

RAWAL PINDI, ra'ul pin'de, India, in the Punjab, (1), the administrative capital of the division and district of its own name be¬ tween the Indus and Jhilam, on the railway from Lahore to Peshawar. It is modern in ap¬ pearance, well-built and an important grain market. There are an arsenal, a fort, a fine public park, several European churches and the headquarters of the Punjab Northern State Railroad. Transit trade is carried on with Cashmere and Afghanistan. The Sikhs sur¬ rendered here after their defeat at Gujrat in 1849, and in 1885 a great durbar or review was held during which the queen of Afghan¬ istan and Lord Dufferin, then governor-general of India, met in an important conference. Pop. 86,483. (2) The Rawal Pindi divi¬

sion comprises four districts with a total area of 15,435 square miles. The district contains many towns connected with the campaign of Alexander the Great. Pop. 4,212,794.

RAWDON, Francis. See Hastings, Francis Rawdon.

RAWHIDE, a form of leather in which the curing process stops short of destroying the life of the material. The result is a material remarkable for toughness, durability, tensile strength and pliancy. It is used for belting rope, hydraulic packing, laces of various kinds, pinion wheels, washers, harness, mauls and mal¬ lets, trunks, saddles, artificial limbs, whips, lar¬ iats, *etc.*

RAWLE, ral, Francis, American lawyer: b. Freedom Forge, Pa., 7 Aug. 1846. He was garduated at Harvard in 1869, studied law there and in 1871 was admitted to the bar. . He was treasurer of the American Bar Association in 1878-1902, and presided in 1902-03 ; and was overseer of Harvard in 1890-1902. He is au¬ thor of articles contributed to legal journals and edited Bouvier's 'Law Dictionary > (eds.,

1883, 1898, 1913).

RAWLE, William, American lawyer : b. Philadelphia, Pa., 28 April 1759; d. there, 12 April 1836. He studied law in New York and in London, was admitted to the Pennsylvania bar in 1783, in 1791 was appointed by Wash¬ ington as district attorney of Pennsylvania, and in 1794 assisted in the prosecution of the of¬ fenders in the Whisky Rebellion. He acted as counsel for the United States Bank for many years, was chancellor of the Associated Mem¬ bers of the Bar of Philadelphia, and of the Law Association of that city and was a trustee of the University of Pennsylvania from 1796 until his death. He assisted in the revision of the civil code of Pennsylvania in 1830, was one of the founders of the Historical Society of Penn¬ sylvania in 1824, serving as its first president and was also president of the Abolition Society. His publications include 'A View of the Con¬ stitution of the United States> (1825) ; '^Dis¬ course on the Nature and Study of the Law) (1832) ; A vindication of the Rev. Mr. Hecke-welder's (History of the Indian Nations) ; 'Biographical Sketch of Sir William Keith > ; (A Sketch of the Life of Thomas Mifflin*; and a translation from the Greek of Plato's 'Phaedo.* He left in manuscript

an ‘Essay on Angelic Influences,* and a dissertation on ‘The Evidences of Christianity.* Consult Wharton, ‘Memoir of William Rawle) (1840).

RAWLE, William Henry, American law¬ yer : b. Philadelphia, 31 Aug. 1823 ; d. 19 April 1889. He was graduated at the University of Pennsylvania in 1841 and three years later was admitted to the bar, where he rapidly attained prominence. He enlisted in the Union army during the Civil War (1861) and re-enlisted in 1863, then serving as quartermaster. He was vice-provost of the Law Academy (1865-73) and vice-chancellor of the Law Association from 1880 to the time of his death. He pub¬ lished ‘Law of Covenants for Title) (1852) ; ‘Equity in Pennsylvania> (1868) ; ‘Some Con¬ trasts in the Growth of Pennsylvania in English Law* (1881) ; ‘Oration at Unveiling of the Monument Erected by the Bar of the United States to Chief-Justice MarshalP (1884) ; and ‘The Case of the Educated Unemployed>

(1885).

RAWLING, Cecil, English general and explorer: b. 1870; killed in action, 28 Oct. 1917. His early military career was spent in India, where he took part in the NorthWest Frontier

campaigns of 1897-98. His “passion for high mountains and the waste places of the earth** led him to surveying work on the Tibetan frontier, where he mapped some 40,000 square miles of territory in 1903 and gained local knowledge that proved valuable in the Tibet Expedition of 1904. With a small party he next explored the northern slopes of the Hima¬ laya and the sources of the Bramaputra, which he traced to its sources. The record of his dis¬ covery was published in his book, ‘The Great Plateau. * His next undertaking was an ex¬ pedition to Dutch New Guinea, where, in the course’ of an adventurous journey, the party discovered a new pigmy race. The outbreak of the European War prevented him from carry¬ ing out a bold plan to attempt the ascent of Mount Everest from the Tibetan side. He raised a battalion himself and fought on the Western Front at Hooge, Ypres and at the Somme. The Royal Geographical Society awarded him the gold medal (June 1917) for his exploring work. He was killed by a stray shell.

RAWLINS, ra/linz, John Aaron, American military officer: b. East Galena, Ill., 13 Feb. 1831 ; d. Washington, D. C., 9 Sept. 1869. He

took up the study of law and in 1854 began practice in his native town. In 1861, soon after the storming of Fort Sumter, he made a bril¬ liant war speech at a meeting presided over by Ulysses S. Grant, who was so greatly impressed that he requested Rawlins to act as his as¬ sistant adjutant-general. He then entered the army and throughout the war was Grant's closest friend and adviser. He took an active part in the campaigns of 1862-63, and was ap¬ pointed brevet major-general, 13 March 1865. He was a man of marked ability as a soldier, although he never had military training. Gen¬ eral Sherman said that Rawlins "was an intense thinker and a man of vehement expressions, a soldier by force of circumstances rather than of education or practice, yet of infinite use to his chief throughout the war and up to the time of his death.® He was Secretary of War dur¬ ing Grant's first administration.

RAWLINS, Joseph Lafayette, American legislator : b. Salt Lake County, Utah, 28 March 1850. He received a classical education at the University of Indiana, but was not graduated and was a professor at the University of Des¬ eret in Salt Lake City 1873-75. He was ad¬ mitted to the bar in 1875 and practised until 1892, when he was a successful candidate for Delegate in Congress. Defeated for a second term in 1895 he was elected to the United States Senate in 1897, where he served till 1903, and was a member of the committees on For¬ eign Relations, Immigration, Geological Survey, Indian Affairs, Pacific Railroads, Public Build¬ ings and Grounds and the Philippines.

RAWLINS, Wyo., city, county-seat of Carbon County, on the Union Pacific Railroad, about 135 miles west by north of Laramie. It is the commercial centre of an extensive stockraising and mineral region. Its manufac¬ tures are chiefly for local use ; but the railroad shops give employment to a number of persons. It ships annually a large amount of minerals, sheep, wool and live cattle.- The State Peni tentiary is at Rawlins. Pop. 4,256.

23?

RAWLINSON, ra'lin-son, George, Eng¬ lish Orientalist : b. Chadlington, Oxfordshire, 23 Nov. 1815; d. London, 6 Oct. 1902. Educated at Oxford, he took orders and was made a Fellow and Tutor of Exeter College in 1840. In 1845 he became sub-rector, delivered the Bampton lectures in 1859, and in 1861 was made Camden professor of ancient history. He received from Mr. Gladstone a canonry of Canterbury Cathe¬ dral in 1872, and in 1888 accepted the living of All Hallows, Lombard Street, London. An indistinct utterance interfered with his public speaking and his pulpit was mainly filled by proxy. His learning was large and various and his services to biblical scholarship of the high¬ est importance. With his brother, Sir Henry Rawlinson (q.v.), and Sir George Wilkinson he published an annotated edition of Herodotus (1850-60). Among his other works are (The Historical Evidences of the Truth of Scripture Records) (1860) ; (The Five Great Monarchies of the Ancient World* (1862-67) ; historical Illustrations of the Old Testament (1871) ; (The Sixth Great Oriental Monarchy, or the Geography, History and Antiquities of Parthia* (1873) ; (The Seventh Great Monarchy *(Per¬ sian Empire) (1876) ; (The Origin of Nations) (1877) ; (Saint Paul in Damascus and Arabia) (1877) ; history of Ancient Egypt* (1881) ; (Religions of the Ancient World) (1882) ; (The Antiquity of Man Historically Considered* (1882) ; (The Early Prevalence of Monotheistic Beliefs* (1883) ; (Egypt and Babylon from Scripture and Profane Sources) (1884); (Religious Teachings of the Sublime and Beautiful in Nature) (1884) ; (Ancient History* (1887) ; (Ancient Egypt* (1887) ; hoses: His Life and Times) (1887) ; (A History of Phoenicia* (1889); (The Kings of Israel and Judah* (1889); Hsaac and Jacob: Their Lives and Times* (1890) ; (Parthia* (1893) ; (A Memoir of Major-General Sir Henry Creswicke Raw¬ linson * (1898) ; and others in the department of biblical commentary.

RAWLINSON, Sir Henry Creswicke,

English diplomatist and Orientalist : b. Chad¬ lington, Oxfordshire, 4 Nov. 1810; d. London, 5 March 1895. He went to Bombay in 1827 as a military cadet in the service of the East India Company, at once

applied himself assidu¬ ously to the study of the Oriental languages and was soon in request as an interpreter. After five years' service with the First Bombay Grenadiers, he was employed in military work in Persia (1833-39). When the rupture with Persia compelled the withdrawal of Brit¬ ish officers from that country he proceeded to Afghanistan and in June 1840 was appointed political agent at Kandahar. Throughout the troubles that ensued he held the southern capi¬ tal of the Afghans safe from all intrigues with¬ in and attacks without. In 1843 he was ap¬ pointed political agent in Turkish Arabia. His stay in Persia had made him acquainted with the cuneiform inscriptions at Behistun and on being appointed in 1844 consul at Badgad, he set himself to copy and decipher the chief in¬ scription. The result was his great paper on (The Persian Cuneiform Inscription at Behis¬ tun, } printed in the Journal of the Royal Asia¬ tic Society in 1846. Though not without im¬ portant predecessors in the same field, Rawlin¬ son is justly regarded as the chief founder of

the study of Persian cuneiform and the first successful decipherer of cuneiform writings. Having shown great zeal and ability in the dis¬ charge of political duties, he was raised in 1851 to the rank of consul-general. Resigning in 1855, he returned to England and in 1856 was created K.C.B., promoted lieutenant-colonel and appointed a crown director of the East India Company. In 1858 he was elected to the House of Commons for Reigate as a conserva¬ tive and again sat there in 1865-68 as a member for Frome. In 1859-60 he was minister-pleni¬ potentiary at Teheran, in 1889 became a G.C.B., and two years later was created a baronet. Rawlinson received many honors both at home and from foreign countries. He was president of the Royal Asiatic Society in 1878-81 and of the Royal Geographical Society in 1871-72 and 1874-75. His chief published works are (A Commentary on the Cuneiform Inscriptions of Babylon and Assyria) (1850) ; (Cuneiform In¬ scriptions of Western Asia* (1861-80; 2d ed. of Vol. I, 1891), with Norris, E., Smith, G. and Pinches, T. G. ; (England and Russia in the East) (1875), a strongly anti-Russian pamphlet; notes in the translation of (Herodotus* by his brother, George Rawlinson (q.v.), and many papers in the journals of the Royal Asiatic and Royal Geographical Societies. See the (Life) by his brother (1898), with an introduction by Earl Roberts.

RAWNSLEY, ranz'li, Hardwicke Drum¬ mond, English Anglican clergyman and poet : b. Henley-on-Thames 28 Sept. 1851. He was educated at Oxford, took orders in 1875, was vicar of Wray, Windermere, 1878-83, and has been vicar of Crosthwaite, Keswick,

from the last-named date. Among his many published works are (Sonnets Round the Coast* ; bon¬ nets at the English Lakes) ; (Literary Asso¬ ciations of the English Lakes* ; (Village Sermons) ; (Sonnets in Switzerland and Italy)

(1899) ; (Memories of the Tennysons) (1900) ; (Ruskin and the English Lakes* (1901) ; (A Rambler's Note Book at the Lakes) (1902) ; Sketches at the English Lakes) (1903) ; (Flower-time in the Oberland* (1904) ; (The Sacrum Commercium of Saint Francis) (1904) ; (Sermons on the Sayings of Tesus, from the Oxyrhyncus Papyri *(1905) ; (A Sonnet Chron¬ icle, 1900-05) (1906); (The European War: Poems) (1915) ; <Past and Present at the Eng¬ lish Lakes* (1916).

RAWSON, ra'son, Albert Leighton, Amer¬ ican author and artist: b. Chester, Vt.. 15 Oct. 1829; d. New York, November 1902. He studied law, theology and art and traveled extensively in the Orient, later exploring the Indian mounds in the Mississippi Valley, and traveling in Cen¬ tral America and in the Hudson Bay territories. He founded the Theosophical Society in the United States, was adopted into the tribe of the Adwan Bedouins of Moab and initiated by the Druses in Mount Lebanon. His books, illus¬ trated by his own maps and drawings, include (Bible Dictionaries* (1870-75); (Histories of All Religions) (1870) ; (Antiquities of the

Orient* (1870) ; (Vocabulary of the Bedawin Languages of Syria and Egypt* (1874) ; (Cho-rography of Palestine) (1880) ; (Historical and Archaeological Introduction to the Holy Bible) (1884) ; (The Unseen World* 0888) ; <History of Mysticism* ; *etc.* He illustrated Rev. Dr,

Charles F. Deems's 'Jesus' (1868), and Rev. Henry Ward Beecher's (The Life of Jesus) (1871). At the time of his death he was com¬ pleting an elaborate history of Freemasonry. His priceless collection of manuscripts, sketches, photographs and various art treasures were destroyed by fire in 1893.

RAWSON, Edward Kirk, American edu¬ cator: b. Albany, N. Y., 21

Feb. 1846. He was graduated from Yale in 1868, from Andover Theological Seminary in 1872, and was ordained in the Congregationalist ministry. In 1871-90 he was chaplain in the United States navy, serv¬ ing at the Naval Academy from 1886, and in 1888-90 professor of ethics and English there. In 1897-1902 he was superintendent of naval war records ; in 1902—08, head of the department of English and law at the Naval Academy; in latter year retired. He published 'Twenty Famous Naval Battles: Salamis to Santiago'

(1899).

RAY, Anna Chapin, American author of juvenile fiction: b. Westfield, Mass., 3 Jan. 1865. She was graduated at Smith College 1885 ; received the degree of A.M. in 1888, and re¬ moved to Quebec, Canada, in 1903. She pub¬ lished (Half a Dozen Boys-* (1890); 'Half a Dozen Girls) (1891) ; 'In Blue Creek Canon' (1892); 'Dick' (1896); series of six (Teddy) books (1898-1904); 'Each Life Unfulfilled> (1899) ; 'Bumper and Baby John' (1903) ; 'The Dominant Strain' (1903) ; 'By the Good Sainte Anne) (1905) ; series of six ' Sidney) books (1905-10); 'The Bridge Builders) (1909) ; (A Woman with a Purpose) (1911) ; three (Buddie) books (1911-13), *etc.*

RAY, George Washington, American ju¬ rist: b. Otselic, Chenango County, N. Y., 3 Feb. 1844. He was educated at Norwich Academy; served in the Civil War as private and brigade clerk; was admitted to the bar and began prac¬ tice at Norwich, N. Y., in 1867. He was a representative in Congress in 1883-85 and 1891— 92, resigning in the latter year to become United States district judge in the Northern District of New York. He opposed the free silver bill of 1892, was chairman of the com¬ mittee on invalid pensions and of the com¬ mittee on judiciary.

RAY, Isaac, American physician : b. Bev¬ erly, Mass., 16 Jan. 1807; d. Philadelphia, Pa., 31 March 1881. He was graduated from Bowdoin in 1827, practised medicine, and in 1841-45 was superintendent of the State insane asylum at Augusta, Maine. In 1845-66 he had charge of the Butler Hospital for the Insane at Provi¬ dence, R. I., and then removed to Philadelphia, where he engaged in medical practice. He pub¬ lished Conversations on Animal Anatomy' (1829) ; 'Medical Jurisprudence of Insanity' (1838) ; 'Education in Relation to the Health of the Brain' (1851); 'Mental Hygiene' (1863); 'Contributions to Mental Pathology' (1873), *etc.*

RAY, John (at an earlier period spelled by him Wray), English naturalist: b. Black Not-ley, near Braintree, Essex, 29 Nov. 1627 ; d. there, 17 Jan. 1705. He was educated at Trinity College, Cambridge, was made Greek lecturer in 1651 ; mathematical lecturer in 1653; humanity reader in 1655 and junior dean in 1658. He made long botanical and zoological tours in

England, Scotland and Wales, and in 1663-66 traveled about Europe with Francis Willoughby in an attempt to accomplish a systematic de¬ scription of the entire organic world. It is thought that much of the credit bestowed on Ray as the founder of English natural history should properly attach to Willoughby. Ray was elected F.R.S. in 1667. Among his works are 'Catalogus Plantarum Anglise' (1670), the basis of all subsequent English florae; 'Methodus Plantarum Nova' (1682), giving a new system of classification; 'Historia Plantarum' (1686-1704) ; 'Synopsis Methodica Animalium Quad-rupedum et Serpentini Generis' (1693), and three posthumous volumes on birds, fishes and insects. He also arranged and classified Wil¬ loughby's collection of materials for an ex¬ tensive work on the animal kingdom, published under the titles of 'Ornithologia' (1676) and 'Historia Piscium' (2 vols. 1686). These volumes noted many species of birds and fishes not observed by previous naturalists. In 1844 The Ray Society was founded at London for the publication of scientific works of established merit. Consult the 'Memorials' by Lankester

(1844).

RAY, a group of elasmobranchs forming the suborder Batoidei. The skates and the rays are nearly allied to each other, and are recog¬ nized by their broad flattened bodies, which are generally of a rhomboidal shape, and consist in greater part of the enormously developed pec¬ toral or breast fins, which are supported upon a modified portion of the anterior skeleton. On the upper surface of the disc-like body the eyes are borne, together with spiracles or apertures, by which water may be admitted to the gill-sacs. The mouth, nostrils and gill-openings (five on each side) are in the lower surface of the body. The mouth is generally furnished with broad flat teeth of rhomboidal shape, and is of small size. The tail is elongated and slender, and is generally armed with sharp spinous processes. (See Sting-ray). Two or more dorsal fins may exist, whilst the caudal or tail fin is heterocercal. These fishes produce eggs, which, like those of

sharks, are enclosed in cartilaginous capsules, known as “mermaids’ purses,” *etc.* Occasionally the rays may attain very large dimensions and weights. They are bottom-fishes, and feed upon other small fishes, crustaceans and mollusks. They swim chiefly by peculiar undulating motions of the edges of the pectoral fins. In the true rays (Rajidce) the snout is more or less pointed and prolonged, and two dorsal fins exist near the end of the tail. The most common members of this group are the sting-rays (q.v.). The European sharp¬ nosed ray (R . oxyrliynchits) is a favorite French food-fish; the homelyn ray (R . maculata), also, is frequently sold in the London markets. The American species are called skates (q.v.). The eagle rays (Myliobatida) possess projecting heads, with the pectoral fins extended laterally in a great degree so as to imitate wings. The teeth are hexagonal, flat and pavement-like. The slender tail possesses one dorsal fin and is armed with a notched spine. These include the California “batfish” (Myliobatis calif or nicus) , and a famous whip¬ tailed species of the Mediterranean (M. aquila). Allied to these are the huge blanket-rays (Mantidcc) , so much dreaded by swimmers and

divers in all warm seas. Specimens weighing more than 1,000 pounds have been taken in the Mediterranean. (See Devilfish). Other fam¬ ilies are the sawfishes (Pristidce) , the guitar-fishes (Rhinobatidoe) and the electric rays or torpedoes {Narcobat idee) , elsewhere described. See Fishes; Ichthyology.

RAYAHS, ra’yaz, the Christian peasantry, laborers and small farmers who lived under Turkish rule in the Balkan peninsula. The word means <(cattle,” and as cattle these people were treated by their Turkish masters in Bosnia, Servia, Bulgaria and the neighboring states. The term is also applied in Turkey to non-Mohammedan subjects who pay the haratch or capitation tax.

RAYLEIGH, ra’li, John William Strutt,

Baron, O. M., English physicist: b. 12 Nov. 1842; d. 30 June 1919. He was educated at Cambridge, became a Fellow of Trinity College in

1866 and succeeded as 3d Baron Rayleigh in 1873. From 1879 till 1884 he was professor of experimental physics at Cambridge; from 1887 to 1905 was professor of natural philoso¬ phy in the Royal Institution; from 1887 till . 1896 was secretary to the Royal Society and the latter year scientific adviser to Trinity House. Beside contributions to the proceed¬ ings of scientific societies, he contributed the articles <(Optics" in the Encyclopaedia Britannica) (9th edition) and (The Theory of Sound' (1877-78; new ed. 1894-96). He also edited Maxwell's (Heat' (1891-94). He was asso¬ ciated with Prof. William Ramsay in the latter's discovery, in July 1894, in atmospheric nitrogen of a new gas, called by them argon, for which in 1904 he was awarded the Nobel prize in physics. He became lord chancellor of Cam¬ bridge University in 1908. His work was the most productive in chemical physics, theory of gases, flow of liquids, photography, optics, color vision, wave theory and in electric and magnetic problems of all kinds.

RAYMOND VI, ra'mond, count of Tou¬ louse: b. 1156; d. 1222. He succeeded to the territory in 1194. He protected the Albigenses, against whom Pope Innocent III sent an army in 1208 to avenge the assassination of his legate. Raymond's territories were ravaged, he himself twice excommunicated, 1208 and 1211, and his lands given over to Simon de Montfort. After the death of de Montfort at the siege of Tou¬ louse in 1218 Raymond recovered his territories, but again espousing the cause of the Albigenses he was once more excommunicated.

RAYMOND VII, son of Raymond VI and last count of Toulouse: b. 1197; d. 1242. He engaged with his father for the recovery of Toulouse from Simon de Montfort, and finally forced the latter's son Amalric to a complete surrender. Forced to make peace with the Pope and King Louis IX of France in 1229, he ceded Narbonne and other territory to France and made Alphonse, Count of Poitiers, brother-in-law of the king and the husband of his only daughter Jeanne, heir to the remainder of his estate.

RAYMOND, Andrew Van Vranken,

American clergyman : b. Visscher's Ferry, N. Y„ 8 Aug. 1854; d. 7 April 1918. He was graduated at Union College 1875, and at the New Bruns¬ wick Theological Seminary 1878, He was pastor

of the First Reformed Church, Paterson, N. J.,

1 878—81 ; Trinity Reformed Church, Plainfield, N. J., 1881-87, and of the Fourth Presbyterian Church, Albany, N. Y., 1887-94; president of Union College, Schenectady, N. Y., 1894-1907, and pastor of the First Presbvterian Church, Buffalo, N. Y., from 1 July 1907.

RAYMOND, Bradford Paul, American educator: b. Stamford, Conn., 22 April 1846; d. Middletown, Conn., 27 Feb. 1916. He was graduated from the Theological School of Bos¬ ton University in 1873, ordained to the Method¬ ist Episcopal ministry in 1874, and studied in Germany in 1880-81. He held successive pas¬ torates in New Bedford, Mass., Providence, R. I., and in Nashua, N. H., was president of Lawrence University, Appleton, Wis., in 1883— 89; president of Wesleyan University, Middletown, Conn., in 1889-1908, and professor of ethics and biblical literature there from 1909. He published Christianity and the Christ.)

RAYMOND, Evelyn Hunt, American writer of juvenile fiction: b. Watertown, N. Y., 6 Nov. 1843; d. Baltimore, Md., 18 April 1910. She was educated at Mount Holyoke College, and was married to John B. Raymond in 1869. Among her many popular books may be cited (Mixed Pickles) '(1892) ; (A Cape May Dia¬ mond' (1896); (Little Red Schoolhouse' (1897); (A Daughter of the West' (1899); (Reels and Spindles' (1900) ; (The Sun Maid' (1900); (A Daughter of the Forest' (1902); Polly the Gringo' (1905) ; (The Heroine of Roseland' (1907) ; (Carlota of the Rancho' (1909), and the (Jessica Trent' series (2 vols.), and the (Dorothy' series (6 vols., 1907-10).

RAYMOND, George .Lansing, American educator: b. Chicago, Ill., 3 Sept. 1839. He was graduated from Williams College in 1862 and from Princeton Theological Seminary in 1865. After spending three years in Europe he entered the Presbyterian ministry and was pastor at Darby, Pa., 1870-74; professor of oratory at Williams 1874-80; professor of ora¬ tory and aesthetic criticism at Princeton 1880-93, of aesthetics at Princeton 1893-1905, and at George Washington University 1905-12. Among his many published works in verse and prose are <Life in Song' (1886) ; (Poetry as a Rep¬ resentative Art' (1886) ; (Ballads of the Revolu¬ tion' (1887) ; The Representative Significance of Form' (1900) ; (The Aztec God and Other Dramas' (1900) ; (The Essentials of ˆEsthetics' (1907) ; Psychology of Inspiration' (1908) ;

(Fundamentals in Education, Art and Civics' (1911); Suggestions for the Spiritual Life' (1912) ; (An Art Philosopher's Cabinet' (1915).

RAYMOND, Henry Jarvis, American journalist: b. Lima, N. Y., 24 Jan.

1820; d. New York, 18 June 1869. He was graduated from the University of Vermont in 1840, went to New York, studied law, and contributed to The New Yorker , a literary weekly published by Horace Greeley Upon the establishment of the New York Tribune in 1841 he became as¬ sistant editor. While editorally connected with the Courier and Enquirer (1843-51) he en¬ gaged with Greeley in a spirited controversy on the subject of Fourierism, which had at that time taken a strong hold upon the American people resulting in the establishment of com¬ munities more or less resembling Brook Farm.

He was elected to the State assembly in 1849 and 1850, the latter year becoming speaker. In 1851 he established the New York Times, the first number being issued on 18 September. In 1854 he was elected lieutenant-governor of the State. He was one of the prominent organizers of the Republican party, and drew up the ((Ad¬ dress to the People,® promulgated by its first national convention held in Pittsburgh February 1856. His choice for President in 1860 was William H. Seward, and he used his influence to place him in the Cabinet after Lincoln's election. After the disaster at Bull Run he proposed a provisional government, feeling that Lincoln's policy was too hesitating. He was again member of the assembly in 1861, where he was chosen speaker; and in 1864 was elected to Congress, giving his support to President Johnson's policy. He was the author of the ˆPhiladelphia Address® to the people of the United States, promulgated by the National Union Convention, which he helped to organize in 1866. He was an effective public speaker and exerted a marked influence on the elevation of the tone of journalism. He wrote (Political Lessons of the Revolution (1854) ; (Letters to Mr. Yancy5 (I860) ; (History of the Ad¬ ministration of President Lincoln (1864) ; (Life and Services of Abraham Lincoln) (1865). Consult Maverick, < Henry J. Raymond and the New York Press for Thirty Years) (1870).

RAYMOND, John Howard, American educator: b. New \ork, 7 March 1814; d. Poughkeepsie, 14 Aug. 1878. He was graduated at Union College in 1832; studied law in New Haven; entered the theological

seminary at Hamilton, N. Y., in preparation for the Baptist ministry in 1834; was appointed tutor in He¬ brew before graduation; became professor of rhetoric and English literature at Madison Uni¬ versity in 1839, and removed to the newly estab¬ lished Rochester University as professor of belles-lettres in 1850. As an organizer of edu¬ cational institutions he showed remarkable aptitude, performing that service for the Col¬ legiate and Polytechnique Institute in Brooklyn in 1856 and for Vassar College in 1865. He filled the post of president and professor of mental and moral science at Vassar until his death. Consult his (Life and Letters5 (1880).

RAYMOND, John T., American actor: b. Buffalo, N. Y., 5 April 1836; d. Evansville, Ind., 10 April 1887. His original name was John O'Brien. His first appearance was at Rochester in June 1853, as Lopez in (The Honeymoon.5 In 1861 he made a great hit as Asa Trenchard in (Our American Cousin,5 and in 1867 went to England and appeared in this character in the company of E. A. Sothern, who was the famous Lord Dundreary. In 1874 he achieved his greatest success as Colonel Mul¬ berry Sellers in a dramatization of Mark Twain's (Gilded Age.5 He was widely popular and depicted certain types of broad, humorous character with great success.

RAYMOND, Miner, American Methodist Episcopal clergyman: b. New York, 29 Aug. 1811 ; d. Evanston, Ill., 25 Nov. 1897. He was graduated at Wesleyan Academy, Wilbraham, Mass., in 1831, and was a member of the faculty there in 1831-41. After holding pastorates at Worcester, Boston and Westfield he returned to Wesleyan Academy and was its principal

in 1848-64. He became professor of systematic theology at Garrett Biblical Institute, North¬ western University, Evanston, Ill., in 1864 and remained in that position 30 years. Author of Systematic Theology5 (3 vols., 1877).

RAYMOND, Rossiter Worthington,

American mining engineer : b. Cincinnati, Ohio, 27 April 1840; d. Brooklyn, N. Y., 31 Dec. 1918. He was graduated from the Brooklyn Poly¬ technic Institute in 1858 and spent three years in study at Freiburg, Munich and Heidelberg. Returning from Europe he entered the Union army and served from 1861 to 1864 as additional aide-de-camp with the rank of captain. From 1864 to 1868 he was consulting engineer in New York, at the end of which time he was ap¬ pointed

United States commissioner of mining statistics and held this post until 1876. From 1870 to 1882 he was lecturer on economic geol¬ ogy at Lafayette College. In 1885-88 he was New York State commissioner of electric sub¬ ways for the city of Brooklyn. One of the original members of the American Institute of Mining Engineers, he became its vice-president in 1871, was its president 1872-74, secretary 1884-1911, and secretary emeritus from 1911. He was a member of scientific and technical societies in. Europe and America, including the Society of Civil Engineers of France. In 1903 he became lecturer on mining law in Columbia University. He published (Reports on the Mineral Resources West of the Rocky Moun¬ tains5 (1869-76) ; <The United States Mining Industry5; (Mines, Mills and Furnaces5; Sil¬ ver and Gold5 ; (Brave Hearts,5 a novel (1873) ; (The Man in the Moon and Other People5 (1874); (The Book of Job5 (1878); <Camp and Cabin5 (1880) ; (A Glossary of Mining and Metallurgical Terms5 (1881) ; (Memorial of Alexander L. Holly5 (1883) ; (Life of Peter Cooper5 (1901) ; also technical works and papers, especially on mining law.

RAYMOND, Walter, English novelist: b. Yeovil, Somerset, 13 March 1852. He was edu¬ cated at private schools, and was partner in a glove manufactory, but in 1895 gave up busi¬ ness for literature. Among his works, several of which appeared under the pseudonym <(Tom Cobbleigh® are (Misterton's Mistake5 (1890) ;

(Gentleman Upcott's Daughter5 (1894) ; (Love and Quiet Life5 . (1894) ; (Tryphena in Love5 (1895) ; (Two Men o' Mendip5 (1898) ; (The Idler Out of Doors5 (1901) ; (Jacob and John5 (1905) ; (The Book of Simple Delights5 (1906) ; (Tales from Gossip-Corner5 (1907).

RAYMOND, William Galt, American civil engineer: b. Princeton, Iowa, 2 March 1859. He was graduated at Washington Uni¬ versity as a civil engineer in 1884; was in¬ structor of civil engineering at the California State University 1884—90; was professor of geodesy, road engineering and topographical drawing at the Rensselaer Polytechnic Institute 1892-1904, and since 1904 professor of civil engineering and director of the School of Ap¬ plied Sciences at Iowa State University. He published (Plane Surveying5 (1896); (Elements of Railroad Engineering5 (1908) ; (Railroad Field Geometry5 (1910) ; (Railroad Field Manual for Civil Engineers5 (1915).

RAYMOND, Battle of. After the battle of Port Gibson (q.v.), 1 May 1863, the Con-

federates fell back beyond the Bayou Pierre and destroyed the bridges. General Grant followed on the 2d, occupied Port Gibson, and the same evening the Confederates continued their retreat across Big Black River, at Hankinson's Ferry, leaving a lorce behind to prevent the crossing, which was attacked on the morning of the 3d by Crocker's division of McPher¬ son's corps. The Confederates stoutly con¬ tested the ground, retiring very slowly, until late in the day, when Logan's division came upon their flank, when they hastily crossed the river. McPherson's corps was moved forward to Hankinson's Ferry and McClernand's to Willow Springs, where they remained until the 7th, when, Sherman's corps having crossed the Mississippi, the advance was resumed, the main body of the army moving along the line of the Big Black toward Edwards' Station, midway between Vicksburg and Jackson, while Mc¬ Pherson, on the right, was directed upon Jackson, the capital of the State, 45 miles east of Vicksburg, and the geographical and railway centre of the State. On the night of the 11th McPherson bivouacked five miles northeast of Utica, on the road to Raymond, and early in the morning pushed rapidly for Raymond, 18 miles from Jackson, hoping to capture some commissary stores, but before 9 a.m. Logan's division, in the advance, encountered a strong body of the enemy, upon which the division was deployed and continued its advance for two hours, when, coming to a small stream crossing the road about two miles from Raymond, Gen¬ eral Gregg's brigade of about 3,000 men, with two batteries, was seen beyond the stream, dis¬ posed to enfilade the road and bridge .over the stream. Logan threw out skirmishers and advanced, bringing on a severe engagement which continued more than two hours, when the leading brigade of Crocker's division came up to his support, upon which Gregg, leaving two dis¬ abled guns, abandoned the field and retreated toward Jackson, being joined on the way by Walker's brigade, and when overtaken by night, bivouacking five miles from the field. The Union loss was 66 killed, 339 wounded and 37 missing. Gregg reported a loss of 73 killed, 229 wounded and 204 missing. Consult (Official Records,* Vol. XXIV ; Grant, (Personal Me¬ moirs, } Vol. II.

E. A. Carman.

RAYNAUD'S (ra-noz') DISEASE, a va¬ somotor affection, occurring mostly in children and young adults, and characterized by coldness and whiteness of the toes, the tips of the fingers, the end of the nose and sometimes of the lobes of the ears. It may exist with other functional nervous disorders, such as hysteria and neu¬ ralgia, and occurs especially in persons of neurotic heredity or temperament. It was first studied by Raynaud in 1862. He believed that the local manifestations are due to constrictor spasm, probably originating in the gray centres of the spinal cord. No central lesions have been found. After exposure to cold, the toes, fingers, nose, etc., become cold, numb and white (local syncope), and pricking draws no blood. When warmth and color return, there is fre¬ quently pain, also congestion, swelling and a purple color (local asphyxia). Either of these stages may be recovered from, or the second stage may end in gangrene of the parts (Ray-

naud's gangrene, local or symmetrical gan¬ grene). Recurrences of the disease are com¬ mon. The prognosis is not good, especially in debilitated children. For treatment avoid cold, use warm baths, electricity and massage. Ichthyol ointment sometimes alleviates the pain. Other remedies should be advised by the physi¬ cian.

RAYNER, ra'ner, Emma, American novel¬ ist : b. Cambridge, England. She was grad¬ uated from Cambridge University in 1888, came to this country and was employed on the staff of the Youth's Companion in 1896-1902. She published (Free to Serve* (1897) ; (In Castle and Colony) (1899) ; (Visiting the Sin* (1900) ; (Doris Kingsley: Child and Colonist* (1901) ; (Handicapped Among the Free) (1903) ; (The Dilemma of Engeltie) (1911).

RAYNER, Isidor, American lawyer and politician: b. Baltimore, Md., 11 April 1850; d. Washington, D. C., 25 Nov. 1912. He received his education at the University of Virginia, and entering on the practice of law in 1870, soon became one of the leaders of the Baltimore bar. In 1878 he was elected to the State legis¬ lature for two years, in 1885 was chosen a State senator for four years, but resigned in the mid¬ dle of his term to become the Democratic candi¬ date for Congress, in which he served in 1887— 89 and 1891-95. In 1899-1903 he was attorney-general of Maryland, and from 1905 till his death, United States Senator. In early youth he practised declamation and became an ef¬ fective speaker.

RAYNOUARD, ra-noo-ar, Frangois Juste Marie, French poet and

philologist: b. Brig-noles, department of Var, 18 Sept. 1761 ; d. Passy, 27 Oct. 1836. He studied for the bar at Aix and practised law at Draguignan with great success. _ Elected a deputy to the legisla¬ tive assembly in 1791, he attached himself to the Girondins, and on the proscription of that party was thrown into prison. The fall of Robe¬ spierre set him at liberty, whereupon he re¬ sumed his profession of advocate in his native province and acquired a fortune. Having previously made two unsuccessful attempts to live by his pen, he once more settled in Paris. His poems (La vertu necessaire dans les re-publiques) (1803) and (Socrate dans le Temple d'Aglaure) (1804), obtained prizes from the French Academy. These were followed by two tragedies, (Eleonore de Baviere* and (Les Tern-pliersˆ the latter performed at the Theatre Frangais in 1805 by order of Napoleon. In 1806 he was elected a member of the Corps Legislatif. In 1817 he was nominated per¬ petual secretary of the Academy, a post he re¬ signed in 1826, when the ministry presented to the chambers a bill which had for its object the limiting of the liberty of the press. Of most value to the world is the work in the field of Romance philology, his writings including (Grammaire comparee des Langues de l'Europe Latine dans leurs Rapports avec la Langue des Troubadours) (1821) ; (Choix des Poesies originates des Troubadours* (1816-21) ; (Lex-ique Roman ou Dictionnaire de la Langue des Troubadours comparee aux autres Langues de 1' Europe Latine) (posthumous, 1838-44) ; (Ob¬ servations Philologiques sur le Roman de Rou, et sur quelques Regies de la Langue des Trou-veres au Xlle Siecle* (1829).

RAZIN, ra'zen, Stenko, Russian bandit : d. Moscow, 1671. He was the leader of Cos¬ sacks who plundered caravans and fisheries along the Volga. Being captured he was par¬ doned by Alexis, but rebelled again, and gath¬ ered about himself the dissatisfied elements, captured cities and ruled along the Volga as far as Nijni-Novgorod. He was finally taken and executed at Moscow. Thereupon he be¬ came the hero of epic song of the 17th century and was regarded as the champion of the people against the nobles.

RAZOR, the well-known keen-edged in¬ strument for shaving off the beard or hair. Razors seem to have been in use at a very early period of the world's history. They were used by the ancient Egyptians. The Levitical code expressly forbade the shaving of the beard, and many Jews in some countries re¬ move all superfluous hair with the scissors until this day. It is believed by many authorities that the primitive shaving-instruments were made of sharpened flints; the savages of Poly¬ nesia still use two pieces of flint of the same size, or pieces of shells or sharks' teeth ground to a fine edge, for this purpose. Among civil¬ ized nations the blade is metal, usually steel, the finest cast steel being preferred. The handles are made of a great variety of materials, as silver, ivory, tortoise-shell, bone, horn, *etc.* The Chinese and Japanese razors are very rarely furnished with handles. In the United States a modern form, known as a (<safety» razor, has become widely popular.

RAZOR-BILL, the Alca torda, the sole species of the genus, the Alca impennis, or great auk, being extinct. It is intermediate in struc¬ ture between the guillemots and the great auk; but characterized by its compressed, elevated, hooked and furrowed bill, its peculiar stiff wedge-shaped tail and ample wings. It is about 18 inches long, generally black above and white below; but in the breeding plumage the head and neck become lustrous black all around, with a very characteristic fine white line run¬ ning from the eye to the base of the bill. This bird is abundant in the North Atlantic, fre¬ quenting rocky islands and coasts to breed with puffins and guillemots, but at other seasons keeping farther out at sea, and in winter migrat¬ ing as far south as the Mediterranean and the coast of New Jersey or even North Carolina. On the American side it breeds in the Bay of Fundy and in great colonies in the Gulf of Saint Lawrence, about Labrador, *etc.* A sin¬ gle much blotched and streaked whitish egg, about three inches long, is deposited on a ledge or in a fissure of some precipitous rocky cliff. It feeds upon floating refuse or fish, worms, etc., for which it dives or which it pursues in the water, using both wings and feet in swim¬ ming. When molested it sometimes fights vi¬ ciously, at the same time uttering harsh cries. The large eggs are much gathered for food. It is also known as the black-billed auk, the murre, and the tinker.

RAZOR-CLAM, or RAZOR-FISH, a

bivalve mollusk of the family Solenida, known on all sandy shores. The shell is long and nar¬ row, like a razor-handle, and gapes at both ends, the siphons are short, the foot is large and powerful. The shell is handsomely orna¬ mented and in some tropical species is of great

heauty. These mollusks always live buried in the sand in an upright position, leaving only an opening shaped like a keyhole, which corre¬ sponds with the two siphon tubes. They are generally found at a depth of one or two feet, and when they make their burrows, as they are often in the habit of doing, among the rocks, not even an iron hook can draw them from their retreat, but they may sometimees be be¬ guiled by pouring salt water on the spot, de¬ ceiving them into the impression that the tide has risen and they may begin to feed. They are edible, but rather tough. A familiar and typical species on the eastern coast of the United States is Ensis americana. Consult Kingsley, (Standard Natural History* (Vol. I,

1885).

RAZORBACK, one of the large whales of the genus Balccnoptera, called also finbacks and rorquals. (See Finback; Whale). The B. musculus, the common rorqual or razorback, is 60 to 70 feet long, black above and brilliant white below. The B. rostrata, or lesser rorqual, resembles the other, but is much smaller. The rorquals are widely distributed and some of them are found in almost every sea. Razorback is also a name for the thin and agile semi-wild hogs which range the woods in the less settled parts of the southern United States.

RE, ra, the sun god, first and most impor¬ tant of Egyptian divinities. Re is supposed to be the son of Neith (q.v.), the goddess of the upper air, and to have had for his wife Mout, the mother of nature: He had for children Athor, the light; Mu, the sunlight; and Mat, spiritual light, and was widely worshipped by the ancient Egyptians, and in course of time every local divinity became identified with Re; thus, Ammon became Ammon-Re ; Sobk changed to Sobk-Re. The attempt to unify the person¬ ages of mythology under Re and thus erect a monotheism is credited to Amenophis IV of the 18th dynasty. Re is represented, like Horus, with the head of a hawk and bearing the disc of the sun on his head, and was more exten¬ sively worshipped than any other Egyptian deity except Osiris.

Rl£, rˆ or RHlS, lie de, France, a small lowlying island three miles distant from the coast of the department of Charente-Inferieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. It is about 18 miles long and three broad and meas¬ ures 28 square miles. The inhabitants are chiefly engaged in the

preparation of salt, pro¬ ducing 32,000 tons annually. The west coast is rocky; on the east side there are some good harbors. Oyster farming has become an im¬ portant branch of industry, yielding 35,000,000 annually. Wine is made and exported. The chief town, Saint Martin, was fortified by Vau-ban. Pop. of island about 15,000.

REA, ra, Samuel, American railroad pres¬ ident and engineer : b. Hollidaysburg, Pa., 21 Sept. 1855. He entered the engineering depart¬ ment of the Pennsylvania Railroad when 15 years of age, becoming locating and construction engineer on various branches of the road. He was afterward connected with the Pittsburgh and Lake Erie Railroad, and was chief engineer in the construction of the belt line and tunnel under Baltimore for the Baltimore and Ohio Railroad. He returned to the Pennsylvania

Railroad in 1892 and became its president in 1913. He was in charge of the construction ot the New York tunnel extension and the station of the Pennsylvania Railroad in New York, for which the University of Pennsylvania conferred upon him the degree of Sc.D. in 1910. He was appointed a member of the executive committee of the special commission on na¬ tional defense in the United States Railroad Administration in 1917. Author of (The Rail¬ ways Terminating in London) (1888).

REACTION, in chemistry, a general term for any chemical change that is brought about by the mutual interaction of two or more sub¬ stances. Reactions between two primary sub¬ stances may be conveniently divided into three classes, as follows: (1) Those in which the two substances combine additively, so as to form a single third substance by their union. (2) Those in which one of the primary sub¬ stances is broken up, the other primary sub¬ stance combining additively with one or all of its parts, so as to produce one or more new substances. (3) Those in which there is a double decomposition of the two primary sub¬ stances, the several parts of the first combining with those of the second so as to produce two or more new substances. The first of these is illustrated by the action of oxygen gas upon metallic sodium, the combination taking place additively according to the equation 2Na + O = Na20. The second is illustrated

by the action of chlorine gas upon an excess of methane (CH4) ; methyl chloride and hydrochloric acid being formed (upon exposure to diffuse day¬ light) in accordance with the equation CH4 + 2C1 = CHaCl + HC1. The third general type of reaction between two primary substances (that, namely, in which there is a double decomposi¬ tion) may be illustrated by the action of hydro¬ chloric acid upon caustic potash, KOH, as indi¬ cated by the equation KOH + HC1 = H20 + KC1, the products of the reaction being water and chloride of potassium.

Reactions take place with widely varying degrees of intensity. This intensity is known in chemistry as ˆaffinity,® and is evidenced by an exhibition of great heat, violent ebullition, explosion and like physical manifestations. These phases are more noticeable when the two combining substances are of different (<electricities ,® that is, one positive and the other negative. Temperature has a decided effect upon the velocity with which chemical reactions take place, and many reactions may be re¬ strained by cold. On the other hand, after a reaction has taken place a sufficient rise in tem¬ perature may decompose the new compound into its primary constituents.

In all reactions it is observed that substances combine in certain definite proportions, and these are called their ((combining weights,® or ((constant proportions.® The law which is found to obtain in all cases is that the elements combine in the ratios of their combining weights, or in simple multiples of such ratios — the term (<combining weight® standing for the smallest relative mass of the element (that is, the smallest number of atoms) in which the element enters into combination with other ele¬ ments. Thus, 110.34 parts of potassium bromide are required to supply the exact amount of bromine to convert 100 parts of silver into silver

bromide. Conversely, 100 parts of silver com¬ bined with chlorine will form 132.845 parts of silver chloride — no more and no less, though a much greater quantity of chlorine may be present.

The subject of chemical reaction is inti¬ mately connected with the entire question of chemical constitution, of which much remains to be learned. See the article Chemistry; also Catalysis ; Chemical Affinity ; Equilibrium, Chemical; Periodic Law; Valency.

REACTION TIME. One of the cardinal problems of psychophysics is the measurement of the duration of mental processes. The men¬ tal

processes themselves are always inaccessible to direct temporal measurement, but certain physiological-psychological complexes are easily available. These consist in the entire aggregate of phenomena which occur between the recep¬ tion of some stimulus and the conscious, vol¬ untary response to the stimulus. The duration of the aggregate is known as the reaction of time and is measured by various types of chronoscope (q.v.). A simple reaction times is one where the response follows directly upon the stimulation. The length of a simple reaction depends on the sense and mode of reaction employed, and on whether the attention is di¬ rected toward the stimulus or the reaction. The following table gives an idea of the order of magnitude of reaction times :

, Attention toward

Attention towards stimulus. reaction.

Reaction to light .270 seconds .180 seconds

Reaction to sound .225 seconds .120 seconds

Reaction to preasure .210 seconds .110 seconds

Besides these simple reactions, reaction ex¬ periments may be performed which demand a recognition or a discrimination before the sub¬ ject can press the reaction key. These experi¬ ments will require .03 to .05 seconds more than a simple reaction experiment of the same sort with the attention directed toward the stimulus. It may be thought that this is the actual time of the process of recognition. This interpretation is dependent on interpreting the reaction as an ordinary sensory reaction inter¬ rupted by an act of discrimination or cognition. This is in all probability an over-simplification of the facts. Reaction-experiments have also been used to determine the duration of an act of choice and of various types of association. In this latter connection they have been used by some investigators to determine the mental con¬ tent of. a subject who is concealing something. Consult James, W., Principles of Psychology* (New York 1890) ; Kiilpe, (Outlines of Psychology) (trans. London 1895) ; Pilzecker, A., Pie Lehre von der sinnlichen Aufmerksam-keiU (1889); Titchener, Experimental Psychology > (New York 1905) ; (Textbook of Psychology) (New York 1909-11) ; Wundt, (Grundzuge der physiologischen Psychology (6th ed., Leipzig 1908-11).

REACTIONS AND REACTION TIMES IN PSYCHOLOGY. Owing to the large place occupied by movement in man’s life and the practical

importance of knowing the time required in movements in making records in physics and astronomy, much labor has been spent by the psychologist and physiologist in measuring the lime used in making different reactions. The first interest in the topic was

aroused when it was found that different men recorded the time at which a star crossed a wire in the telescope differently. Experiment showed that this was in part due to the varia¬ tion in the time needed to make the recording movement. Later experiments were devoted to measuring the times of other mental processes that were involved in more complex mental and physical operations, with the object of explain¬ ing movement in general. All measurements involve determining the time that elapses be¬ tween some stimulus and a prescribed move¬ ment. The times are recorded electrically. The apparatus most frequently employed is a Hipp chronoscope with instruments for giving stimuli and keys to make or break circuits as the move¬ ment is completed. The Hipp chronoscope is a clock controlled by the vibration of a fork or metallic tongue which vibrates 1,000 times per second. The hands are so adjusted that an electric magnet will articulate them with the clock work. As the stimulus is shown a cir¬ cuit is made through the clock which engages the hands in the gears, and they continue to revolve until the movement breaks the circuit. One reads the time elapsed in thousandths of a second (ordinarily designated c). One distin¬ guishes simple and compound reactions. The simple are made as quickly as possible after the stimulus, the compound are delayed until some mental operation is introduced. The simple reaction varies in length with the individual and with the mental attitude. If one attends ‘ to the movement alone the response is quicker than if one attends to the stimulus and makes sure that one knows what it is before one acts. The latter or sensory times for auditory stimuli range from 180 cr to 220c; for visual stimuli from 200ff to 290cr, and for tactual stimuli are about 210(7. The muscular reactions require about 100(7 less. It was at first asserted that they were always less by this amount, but in most of the more recent experiments the differ¬ ence has been smaller and has varied

for indi¬ viduals. Sound stimuli involve times of 1 10— 125cr; light, 170-180(7, and tactual, 105-110(7. The mean variation for the muscular reaction is smaller — from 6-9(7, as compared with 24-28(7 for the sensory, and premature reactions are more frequent. The time required for any movement may be analyzed into four parts : the time required to stimulate the sense organ, the time of transmission along the nerve fibre, the time involved in passing from one nerve element to another and the time needed to ex¬ cite the contraction in the ‘muscle. The more important variables are the time required in the sense organ and the time for passing from one neurone to another. The greater length of the visual reaction is due to the longer time required to excite the retina, a photochemical process. The fact that reactions are shortened by training and by the attitude or preparation is a result of reducing the time needed to pass from one nerve element to another. The very short time of the reflex winking on stimulation of cornea (as little as 35(7) is probably explained by its having a path in the subcortical tracts with relatively few elements to pass over. The simplest of the compound reactions is the dis¬ crimination reaction. In this the reactor is asked to discriminate between two or more stimuli before he responds. The time required increases with the number of objects or quali¬

ties between which discrimination must be made. Distinguishing between two qualities adds 20-30 to the sensory time, and when one must distinguish between 10, the time may be in¬ creased by 500(7 or more. In the choice re¬ action, the reactor must make a different move¬ ment for each of the qualities. He may, e.g., react with the right hand to red and with the left to white, or he may be shown one of 10 colors and react with a different finger or thumb to each. The times for the choice re¬ action vary greatly with the individual and the amount of practice as well as with the com¬ plexity of the response demanded. They add to the discrimination time from 60-80(7 when one of two movements may be chosen to 400(7 or more when 10 movements are possible. In addition to these motor processes and processes essential to movement, measurements have been made of association times and the times in¬ volved in other more complicated mental proc¬ esses. Association times are usually investi¬ gated by showing the observer a word and asking him to give some other word as quickly as possible. To think this word takes from 400(7 to two seconds or more longer than it does to read a word. This time varies greatly with the individual and also with the conditions pre¬ scribed for the association. When one is left free to give any word whatever, one uses more time than when one is restricted in some

way. Thus, when two numbers over each other are shown and one has been told in advance that one may either add, subtract or multiply, the response is more delayed than when one is told to add. In general, the smaller the number of possible associates the shorter the time. To name a member of the class when a class is given takes longer than to name the class when one member is shown. It might be noted that the association time is increased when the word arouses an emotion. This fact has been used by Jung as an aid in the detection of emotional complexes that may be responsible for hysteria. In explaining all responses and attempting to allot portions of the time to different acts, we must recognize that preparation of the act be¬ gins with the instructions. We may divide the process into two parts, the fore period from the time of receiving the instructions until the stimulus is given and the time between the stimulus and responses. During the fore period there is apparently a process of partially arous¬ ing the possible paths of discharge, and all that is necessary after the stimulus presents itself is to select the appropriate response from those that are already prepared. This ˆdetermining tendency® acts with the stimulus in deciding both the form of association and the nature of the response. This fact, that instruction and stimulus unite in determining the act, makes it impossible to divide the compound reaction into a number of part processes each distinct from the other. One does not see first, then dis¬ criminate, then choose and finally react, but the various processes overlap. Much of the choice is made before the stimulus is shown and the way for the association begins to be prepared when the instructions are heard. Studies of these conditions are valuable, for the explana¬ tion of action in general as well as for under¬ standing the nature of reaction times. Consult Titchener, (Textbook of Psychology) (pp. 428-447) ; Ladd-Woodworth, (Elements of Physi-READ

ological Psychology > (pp. 47GH99) ; Myers, lext-book of Experimental Psychology > (ch. XI) ; Ach, (Die Willenstatigkeit und das Den-ker} ; Alliotta, (La misura in psicologia experi¬ mental!.11

Walter B. Pillsbury,

Professor of Psychology, Univ. of Michigan.

READ, red, George, American patriot and jurist, one of the signers, of the Declaration of Independence: b. Cecil County, Md., 18 Sept. 1733; d. New Castle, Del., 21 Sept. 1798. He •was educated at Chester, Pa., studied law and was admitted to the bar in Philadelphia, soon afterward settling in New Castle, Del., where he practised his profession. He served as at¬ torney-general for the Crown for the counties of Delaware, Kent and Sussex from 1763 to 1764, when he was elected a member of the first Continental Congress. Early an opponent of independence, at last he saw no alternative, and signed the petition to George III, the Dec¬ laration itself and later the Federal Constitution, the three fundamental documents of the Ameri¬ can government. He was chairman (1775-77) of the first naval committee of the colonies, and is to be considered as one of the chief founders of the primitive American navy. The new con¬ stitution of Delaware (1776) was drafted by him and he was president of the convention which adopted it. He was made vice-president and acting president (governor) of the State of Delaware, whose laws he codified. In 1782 he was appointed judge of the United States Court of Appeals for Admiralty Cases. He was a delegate to the Annapolis Convention (1786) and to the Constitutional Convention (1787), and was elected to the United States Senate in 1789 and in 1791. Resigning in 1793, he became chief justice of Delaware and held that office during the rest of his life. Consult his (Life and Correspondence11 (1870).

READ, John Elliot, American journalist: b. South Amherst, Mass., 4 Jan. 1845. He was educated in the public schools and wrote much for agricultural, religious and literary period¬ icals. He was associate editor of The Working Farmer in New York 10 years, and correspond¬ ing editor of The Practical Farmer, Phila¬ delphia, for 12 years, and on the editorial staff of (Men of Mark in America) in 1903-09. He published (Farming for Profit* (1880) ; (Life Triumphant: A study of the Nature, Origin and Destiny of Man* (1900) ; also wrote (A Brief History of the Principal Earlier Arc¬ tic Explorations from the 9th Century to the Peary Expedition11 as the concluding section of (Nansen in the Frozen World) (1897). In 1910 he became connected with the Gazette, Schenectady, N. Y., and the Knickerhocker-Press, Albany, N. Y.

READ, John Joseph, American naval offi¬ cer: b. Mount Holly, N. J., 17 June 1842; d. 24 Oct. 1910. He was graduated from the United States Naval Academy, 1861, served under Farragut during the Civil War, and on the Atlantic blockades, and in 1866 was promoted lieutenant-commander. He received steady advancement, was made rear-admiral in 1900 with command of the receiving-ship Richmond, in 1901 was placed in command of the navy yard at Ports¬ mouth, N.

H., and in 1904 was retired.

READ, John Meredith, American jurist: b. Philadelphia, Pa., 21 July 1797 ; d. there, 29

Nov. 1874. He was a son of George Read, signer of the Declaration of Independence, was graduated at the University of Pennsylvania in 1812 and admitted to the bar in 1818. In 1822-23 he occupied a seat in his State's legis¬ lature, and later as city solicitor drew up the first statement of the finances of Philadelphia. He was United States attorney for the eastern district of Pennsylvania in 1837-44, and served as solicitor-general of the United States; attorney-general of Pennsylvania and chief justice of that State from 1860 until his death. In 1845 he was nominated for associate justice of the United States Supreme Court, but his confirmation was opposed in the United States Senate because he had been a founder of the free-soil wing of the Democratic party, and he withdrew his name. With the formation of the Republican party he became one of its mem¬ bers, and by it was elected judge of the Supreme Court of Pennsylvania in 1858. His name was proposed as a candidate for the presidency of the United States in 1860 and several votes were actually cast for him in the Chicago convention, though he used his per¬ sonal influence in favor of Abraham Lincoln. His (Views on the Suspension of the Habeas Corpus) (1863) became the basis of the act of 3 March 1863, authorizing the President to sus¬ pend the habeas corpus act. His legal opinions extend through 41 volumes of re¬ ports, while of his published addresses the principal are (Plan for the Administration of the Girard Trust) (1833) ; (The Law of Evi¬ dence11 (1864) ; (Jefferson Davis and his Com¬ plicity in the Assassination of Abraham Lin¬ coln11 (1866).

READ, John Meredith, American diploma¬ tist: b. Philadelphia, Pa., 21 Feb. 1837; d. Paris, 27 Dec. 1896. He was a son of Judge Meredith Read (q.v.), was graduated at Brown University in 1858, and at the Albany Law School in 1859. He pursued the study of in¬ ternational law in Europe, was admitted to the bar in Philadelphia and settled at Albany. From 1860 to 1866 he was adjutant-general of the State of New York. In 1869 he was ap¬ pointed United States consul-general at Paris, and during the period of the Franco-Prussian War he acted there also as consul-general for the German government, for which he re¬ ceived the thanks of both the French and Ger¬ man governments, and personal recognition of his services from Prince Bismarck. From 1873 to 1879 he was United States Minister to Greece, and during the latter

part of his tenure of office personally paid the expenses of the legation, when the government refused the ap¬ propriation, he believing that the time was too critical to close the mission. His important services during his term were his securing the revocation by the Greek government of an order prohibiting the sale of the Bible in Greece; the release of the American ship Armenia, and the report of an open Russian port during the Turkish War, to which he urged the despatch of a grain fleet. After his relinquishment of diplomatic duties he con¬ tinued to reside in Europe, engaged in ar¬ chaeological, historical and art studies. He was the author of a historical Inquiry Concerning Henry Hudson) (1866).

READ, Nathan, American inventor : b. Warren, Worcester County, Mass., 2 July 1759; d. near Belfast, Maine, 20 Jan. 1849. He was graduated from Harvard in 1781 ; studied medi¬ cine; in 1796 established with others the Salem iron foundry, where chain cables and other iron work for ships were manufactured, and in 1798 patented a nail-making machine. In 1788 he became interested in steam navigation, and as his first task attempted the construction of a boiler that should be at once compact, light and safe. He made, in 1788 or 1789, the first draw¬ ings of what he styled his “portable furnace boiler,® which was devised for use on steam car¬ riages and steamboats, and for which he ob¬ tained a patent 26 Aug. 1791. He had built a steamboat in 1789, and by a trial of this craft, which was fitted with paddle-wheels and a crank operated by hand, was satisfied that his method of applying steam to the propulsion of vessels would work suitably. This steamboat is said to have been substantially identical with that of Fulton’s of 1807, and it is further stated thaQhe withdrew his application for a patent in 1790, under a misapprehension. There is no evidence, however, that he succeeded in even an experimental demonstration of his plans. His model steam carriage, exhibited by him while endeavoring to obtain aid in his schemes, was never developed. He did, how¬ ever, invent the vertical multi-tubular firebox boiler, which has long been in use as a standard form. Among his other inventions were sev¬ eral forms of pumping

engines, and a plan for utilizing the force of the tide by means of reser¬ voirs alternately so filled and emptied as to produce a continuous stream of water. Much credit belongs to Read for his early and clear perception of the importance of steam navi¬ gation. From 1800 to 1803 he was a Fed¬ eralist representative in Congress, and after his removal to Maine was for many years chief justice of the Court of Common Pleas of Hancock County. Consult Read, 'Nation Read5 (1870) ; Thurston, 'A History of the Growth of the Steam Engine) (1878).

READ, Opie Percival, American journal¬ ist and novelist: b. Nashville, Tenn., 22 Dec. 1852. He was educated in Gallatin, Tenn.; entered journalism at Franklin, Ky., and later removed to Little Rock, Ark. He edited the Arkansas Gazette in 1878—81 ; founded the Arkansaw Traveler in 1883, and edited it for eight years, and then removed to Chicago, where he devoted himself to literary work. His pub¬ lications include 'Len Gansett5 (1888) ; (Up Terrapin River5 (1889) ; 'A Kentucky Colonel 5 (1890); 'My Young Master5 (1896); (In the Alamo5 (1900); 'Our Josephine5 (1902); 'An American in New York5 (1905) ; 'The Mystery of Margaret5 (1907), *etc.*

READ, Thomas Buchanan, American poet and painter: b. Chester County, Pa., 12 March 1822; d. New York, 11 May 1872. His father was a farmer and he received but little school¬ ing. He lived at various times during his youth and young manhood at Philadelphia, Cincinnati, New York and Boston, occupied in ways that satisfied his tastes, such as portrait painting and writing verses, when he could ; and in other ways that supplied his necessities, such as sign painting, cigar making, play acting, when he must. He published his first verses in the

Boston Courier in 1843-44; later a Revolution¬ ary tale (Paul Redding5 (1845) and 'Poems5 (1846), before his removal to Philadelphia, where he edited (The Female Poets of Amer¬ ica5 (1848), and brought out his (Lays and Ballads5 (1849). In 1850 he went to Europe and joined the circle of American artists living at Rome. Here he had the first opportunity for the seriops study of painting, and for the rest of his life, save for occasional visits to America, he made his home at Rome. His bet¬ ter known paintings are (The Water Sprite5 ; 'The Lost Pleiad5 ; (The Star of Bethlehem5 ; 'Sheridan and his Horse.5 He made portraits of Mrs. Browning, the ex-Queen of Naples, Henry W. Longfellow and a group of Long¬ fellow's children. His portrait of George Pea¬ body is at the Institute in

Baltimore. A sculptured bust of General Sheridan was exe¬ cuted late in life. It is as a poet, however, that he will be remembered, especially by his stirring (Sheridan's Ride,5 written for the elocutionist and actor, James E. Murdock, and the ex¬ quisitely musical lyric (Drifting. 5 His volumes of verse are 'The New Pastoral5 (1855) ; 'Sylvia or the Last Shepherd5 (1857); 'The Wagoner of the Alleghanies,5 in which occurs the fine lyric 'The Maid Who Binds Her War¬ rior's Sash5 (1862). A complete edition of his poems was published in 1882.

READE, red, Charles, English novelist and play-writer: b. Ipsden House, Oxfordshire, 8 June 1814; d. Shepherd's Bush, London, 11 April 1884. He was graduated at Oxford in 1835, at which he obtained a fellowship, and was called to the bar in 1843, but, finding litera¬ ture more attractive than law, devoted himself to the former and never practised. He became first known by a comedy (in conjunction with Tom Taylor) called (Masks and Faces,5 which he presently elaborated as the novel of 'Peg Woffington5 (1852). This was followed by (Christie Johnstone5 (1853), in which he showed considerable appreciation of certain characteristics of Scottish life. The appear¬ ance, in 1856, of 'Never Too Late to Mend,5 one of his ((novels with a purpose,55 in which he attacked the English prison system with perhaps greater zeal than unbiased judgment, secured for him a wide reputation. His next great work, the most scholarly and artistic of his writings, 'The Cloister and the Hearth,5 deal¬ ing with the lives of the parents of Erasmus, appeared in 1861, is decidedly his masterpiece, and has been described by Besant as the great¬ est historical novel in the language; but it has not attained the popularity, with the general reader, of some of his more melodramatic novels. Among the more important of his other works are (Love Me Little, Love Me Long5 .(1859); 'Hard Cash5 (1863); 'Griffith Gaunt5 (1866); 'Foul Play5 (with Dion Bouci-cault, 1869) ; 'Put Yourself in His Place5 (1870) ; 'A Terrible Temptation5 (1871) ; 'The Wandering Heir5 (1872) ; 'A Perilous Secret5 (1884). He was also the author, either alone or in collaboration with others, of several dramas, including 'Gold5 ; 'Two Loves and a Life5 ; 'The King's Rivals5 ; and 'Drink,5 the last adapted from Zola's 'L'Assommoir.5 None of these won much success for Reade. His 'Courier of Lyons,5 renamed 'The Lyons Mail,5 has been made famous by Sir Henry

Irving in the dual role of Lesurques and Du¬ bose. Reade was enthusiastic by nature, and continually filled with new enthusiasms toward any cause which roused his easily excited in¬ terest. The abuses in the convict prison sys¬ tem produced, as was said, one of his best-known novels; the system of private lunatic asylums furnished the motive for (Hard Cash,5 as the trades-union outrages at Sheffield did for (Put Yourself in His Placed while in 'Foul Play5 he attacked the alleged practice of over¬ loading and over-insuring ships. His writings show considerable skill in the delineation of character, much narrative, descriptive and dramatic power, combined at times with coarse¬ ness and theatricality, and they were based on much painstaking research. He may, perhaps, be said to rank first in the second order of English novelists of the 19th century, and was as popular in this country as in his own. See Cloister and the Hearth, The. Consult Swinburne's article in his (Miscellanies) (1886); 'Charles Reade: A Memoir) (1887); Ireland, 'Extracts,5 with an introduction (1891) ; and the Gentleman's Magazine for

1882.

READE, John, Canadian journalist: b. Ballyshannon, Ireland, 13 Nov. 1837. He was educated at Queen's College, Belfast, and in 1856 went to Canada, where he founded the Montreal Literary Magazine, engaged in teach¬ ing, practised law at intervals, and in 1864 took orders in the Church of England, after¬ ward beginning his association as editorial writer with the Montreal Gazette which he has ever since maintained. In 1887 he was elected president of the Montreal Society for Historical Studies. He wrote 'The Prophecy and Other Poems5 (1870) ; (Language and Conquest5 (1883) ; (The Making of Canada5 (1885) ; 'Vita sine Liberis5 (1886) ; (Aboriginal Ameri¬ can Poetry5 (1887), *etc.*

READE, William Winwood, English trav¬ eler and novelist, nephew of Charles Reade (q.v.) ; b. Ipsden, Oxfordshire, 30 Jan. 1838; d. Wimbledon, Surrey, 24 April 1875. He vis¬ ited the western coast of Africa in 1862, and in 1868 started from Sierra Leone and reached close to the source of the Niger. He was special correspondent for the London Times in the Ashantee War, 1873-74. Of his literary work perhaps his most notable effort is 'The Martyrdom of Man5 (1872), a_

history of human slavery. His other works include (The Veil of Isis) (1861) ; (Savage Africa) (1863) ; ‘The African Sketch Book) (1873) ; (Story of the Ashantee Campaign) (1875) ; (The Outcast5 (1875), *etc.*

READER, Francis Smith, American jour¬ nalist: b. Coal Centre, Pa., 17 Nov. 1842. He served with the Union army throughout the Civil War, and was connected with the United States Civil Service for 10 years. Later he be¬ came editor of the Beaver Valley News. He published (Life of Moody and Sankey5 (1890) ; ‘History of the 5th West Virginia Cavalry5 (1890) ; ‘History of New Brighton, Pa.5 (1899) ; ‘Some Pioneers of Washington County, Pa.5 (1902) ; ‘History of the Newspapers of Beaver County, Pa.5 (1905) ; ‘History of Schools, New Brighton, Pa.5 (1910), and a number of historical monographs.

READER. See Holy Orders.

READING, red’ing, England, parliamen¬ tary and county borough and capital of the county of Berkshire, 28 miles southeast of Ox¬ ford. It has handsome municipal buildings ; a public hall and free library; a museum, uni¬ versity college and excellent schools and a fine public park. There are remains of the magnifi¬ cent Benedictine Abbey founded by Henry I, in which he was buried. Henry VIII con¬ verted the castle into a palace ; later it was de¬ stroyed during the Cromwellian wars, and the gateway alone has been restored. Other churches are Saint Mary’s, rebuilt from a nun¬ nery founded by Elfrida to expiate the murder of her stepson (Edward the Martyr) ; Saint Lawrence (Norman), rebuilt in the 15th cen¬ tury; Saint Giles’ (mixed architecture), and Greyfriars Church. Reading was the head¬ quarters of the Danes in 871 ; was a refuge for the students who defied the Parliament ; for the law courts obliged to leave London to escape the terrible plague, and was the fighting ground of rival armies during the conflicts of the re¬ bellion. Reading is the centre of a large agri¬ cultural district, and is celebrated f.or its bis¬ cuits and seeds. Archbishop Laud and Gold-win Smith were natives. The borough re¬ turns one member to Parliament. Pop. 89,419.

READING, Mass., town in Middlesex County, on the Boston and Maine Railroad, about 10 miles north of Boston. It was settled in 1638, and six years later was incorporated. It is a beautiful residential town, and has con¬ siderable manufacturing interests. The chief manufactured products are imitation leather, wire brushes, boots and shoes, rubber and rub¬ ber goods, games, church organs and organ pipes, toys and furniture. The public library contains nearly 10,000 volumes. The

govern¬ ment is administered by town meetings, which convene annually. Pop. (1920) 7,424.

READING, Ohio, village in Hamilton County, on the northern outskirts of Cincinnati, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad. It is the seat of Mount Notre Dame Academy. Manufactories include fireworks, cigars and bottles, and there is also an industry in mineral waters. Pop. 3,985.

READING, Pa., city, county-seat of Berks County, on the Schuylkill River and the Schuylkill Canal, and on the Pennsylvania and the Philadelphia and Reading railroads, about 58 miles northwest of Philadelphia, and 54 miles east of Harrisburg. Its area is about 10 square miles. Reading was first settled by English colonists, sons of William Penn, and was named after Reading in England. In 1748 it was laid out, and in 1783 was incor¬ porated as a borough. It was chartered as a city in 1847. It is in an agricultural region. It has extensive manufacturing and commercial interests. Immediately east of the city is Mount Penn, and south of it is Neversink Mountain. Electric railways encircle both mountains. Mount Penn is 1,140 feet above sea-level. The chief industries are connected with iron and steel productions. The chief industrial estab¬ lishments are railroad shops, machine shops, foundries, optical goods, builders' hardware, paper mills, breweries, knitting mills, hosiery mills, hat factories, carriage works, cigar fac¬ tories and iron and steel works. The capital

invested in manufacturing in 1909 (Federal census) was $45,334,000 and the average annual output was valued at $53,232,000. The iron and steel industries had the largest invested capital and about one-fourth of the output. There were, in 1910, over 500 manufacturing estab¬ lishments, representing about 100 different in¬ dustries. The principal public buildings of Reading are public library, Y. M. C. A., Boys' High School and the churches. The charitable institutions are Saint Catherine's Orphan Asylum (girls), Saint Paul's orphanage (boys), the Home for Friendless Children, House of the Good Shepherd, Saint Joseph's, the Reading, and the Homoeopathic

hospitals. The educa¬ tional institutions are the Schuylkill Seminary, two high schools and a business school.

The city has an excellent park system cov¬ ering in all nearly 200 acres. The city is gov¬ erned by a commission, a mayor and four councilmen. The members of the board of education are chosen by popular election. Dur¬ ing 1915-16 there was an enrolment of more than 15,000 children, the total expenses for the year being $550,000. The annual municipal ex¬ penditures for maintenance and operation are about $1,052,000; the chief items being, for streets and public improvements, $190,000; park and public property, $150,000; public safety, $140,000; public affairs, $125,000; accounts and finance, $25,000. The waterworks cost the city originally $1,937,762. They are owned and operated by the municipality. In 1867, 1869, 1914 and 1915 the city boundaries were enlarged. Pop. (1783), when it became a borough, 2,100; (1847), when charted, 12,000; (1900) 78,961;

(1910) 96,071; (1920) 107,784.

READING OF EARLEY, Rufus Daniel

Isaacs, 1st earl, British jurist: b. London, 10 Oct. 1860. The son of a fruit merchant, he was educated at University College School, London, and in Brussels and Hanover. For a time he was a seaman on a coal ship running to South America, and acted as his father's agent in Magdeburg. He took up the study of law, was called to the bar and in 1898 became queen's counsel. In 1904 he was elected to the House of Commons as a Liberal member for Reading. In 1910 he was knighted and made successively solicitor-general and attorney-general. His part in the libel suit against Edward Mylius, who had published an old fiction to the effect that King George V had contracted an early secret marriage, won Isaacs increased royal favor, for he had already been a personal friend of the previous king. As a lawyer, Sir Rufus held a high reputation as a fair attorney, with a remarkable mastery of financial and technical details acquired as a member of the Stock Ex¬ change. His brilliant powers of cross-examina¬ tion and forensic erudition marked him for the highest honor. He was invited to a seat in the Cabinet in 1912, the first time that an at¬ torney-general received that distinction. To¬ gether with the then Chancellor Lloyd George, he was accused of speculation in Marconi stock, admitted the charge and seemed to lose nothing in political prestige with his own party He was one of the staunchest defenders of the Liberal financial policy in the Home Rule Bill of 1913. Late in that year the lord chief

jus¬ tice, Lord Alverstone, retired on account of ill-health and Sir Rufus Isaacs succeeded him.

He was the first Jew to hold that important position. In 1914 he was elevated to the peer¬ age, and in 1915 headed the Anglo-French com¬ mission to the United States to arrange for the American loan of $500,000,000. On 7 Jan. 1918, the Earl of Reading was appointed British High Commissioner in the United States <(in the character of Ambassador Extraordinary and Plenipotentiary on Special Mission,® with full authority over the members of all British mis¬ sions sent to the United States in connection with the active prosecution of the war. Con¬ sult Gardiner, A. G., (Prophets, Priests and Kings) (London 1908).

READJUSTERS, or REFUNDERS, the

name of a political party in Virginia, which passed several bills providing for the scaling and partial rejection of the public debt of the State. Virginia, at the close of the Civil War, was greatly improverished, burdened with a large indebtedness, and shorn of part of its territory, which had been erected into the State of West Virginia. The reconstruction govern¬ ment added considerably to the debt, and a keen controversy arose over the question of meeting the obligations. An act passed in the legisla¬ tive session of 1870-71 to refund the debt was repealed, but the repeal was declared uncon¬ stitutional by the courts. In 1878 the legislature passed a measure known as the McCulloch bill, which provided for new bonds, to be exchanged at par for outstanding bonds, and to bear in¬ terest at 3 per cent for 10 years, 4 per cent for the following 20 years, and 5 per cent for 10 years, when the principal would fall due. This act did not satisfy those opposed to payment of the debt in full, who became known as <(Readj usters,® and included in their ranks both Democrats and Republicans. Under the leader¬ ship of H. H. Riddleberger they succeeded in getting control of the legislature, and passed a bill scaling the debt from $31,102,571 to $19,- 665,196. This bill was vetoed by the governor. In 1881 the Readjusters obtained complete con¬ trol of the State, and laws were enacted in ac¬ cordance with their policy, the same course being pursued in 1884, 1886 and 1887. The United States Supreme Court delivered nine opinions declaring the readjustment measures, so far as they prohibited the receipt of State bond coupons for taxes, as provided by the Mc¬ Culloch law, to be in conflict with the provision of the Federal Constitution, upholding the obli¬ gation of contracts. The State could not be

coerced into payment, and matters remained unsettled until a compromise was agreed upon between the State and holders of the bonds.

REAGAN, re'gan, John Henninger, Amer¬ ican politician: b. Sevier County, Tenn., 8 Oct. 1818; d. Palestine, Tex., 6 March 1905. He acquired a limited collegiate education, studied law and was admitted to the bar and in May 1839 settled in the republic of Texas to practice. He was a deputy surveyor of public lands in 1839 — 43, was elected to the State house of rep¬ resentatives in 1847, served as judge of the District Court in 1852-57 and was a Democratic representative in Congress in 1857-61. In the latter year he was a member of the Secession Convention of Texas, a deputy to the Provi¬ sional Confederate Congress, and became post¬ master-general of the Confederate States, and acting secretary of the Confederate treasury,

He was a member of the Texas Constitutional Convention 1875, member of the Congress 1875— 97, United States Senator 1887-91, and chair¬ man of the Texas State Railroad Commission in 1897-1903. He introduced the ((Reagan InterState Commerce Bill,® on which the subsequent interstate commerce legislation has been based.

REAL, re'al, a Spanish coin, the old unit of value in Spain. By the monetary law of June 1864, the silver real was made to weigh 1.298 grams, .81 fine and equivalent to 4ˆ4 cents. It has varied in value from Al/2 to 10 cents.

REAL NUMBERS. See Algebra.

REAL PRESENCE, the doctrine of the actual presence of the body and blood of Christ in the Eucharist. See Consubstantiation ; Eucharist ; Mass ; Transsubstantiation.

REAL PROPERTY. See Property, Laws of.

REAL VARIABLE, Theory of Functions of the; a mathematical science. A variable is a symbol (such as x or y or ((time® or ((temperature®) which stands for any member of a class of things. A particular member of the class is called a ((value® of the variable which is said to (<take on® its values. One variable, y, is said to be a single-valued function of another variable, x, if to every value of x there corre¬ sponds one and only one value of y. This is the case, for example, if x stands for any num¬ ber and y =x2. It is customary to express such a relation between y and x by the equation y=f(x) ; x is called the independent and y the dependent variable. If the restriction that only one value of y shall correspond to each value of x is removed, y is called a multiple-valued function of x. Unless otherwise provided, the word function in the following pages shall mean single-valued function.

While the notions of variable and function as thus defined apply to any class of objects whatever, they are usually thought of only in connection with classes of numbers. In fact the phrase Theory of Functions is at present understood by mathematicians to mean either the theory of functions of a complex variable (q.v.) or the theory of functions of a real vari¬ able. In a certain abstract sense, the theory of the complex variable might be supposed to include the theory of the real variable, since all values of the real variable Xi are included as special values (x2=0) of the complex vari¬ able Xi + ˆ2V-1. As matter of fact, however, the theory of functions of a complex variable has yet concerned itself but little except with analytic functions, i.e., those functions which may be thought of as defined by a power-series together with its continuations. This theory, therefore, leaves untouched the widest class of functions of the real variable. On the other hand, since the theory of functions of a com¬ plex variable gives a broader and hence more unified theory of analytic functions than can be furnished by the real function theory, these functions are not ordinarily given special at¬ tention in the latter theory. For a discussion of algebraic functions the reader is referred to the article on Algebra ; for transcendental func¬ tions, i.e., functions which are not algebraic, see Trigonometry; Harmonic Analysis; Equations ; Series, *etc.*

The theory of functions of a real variable is a product of the critical tendency of mathe¬ matics in the latter half of the 19th century. It has yielded comparatively few new theorems about the functions hitherto studied in applied mathematics, and has therefore had less in¬ fluence on these sciences than has the complex variable theory. Its main business has been the restatement in rigorous form and with proper

limitation of generality, the brilliant though sometimes inexact theorems won by the earlier students of infinitesimal calculus. For example, the study of vibrating strings, membranes, etc., and of the conduction of heat led to the celebrated trigonometric series of J. B. J. Fourier (q.v.), .which was at first in¬ correctly supposed to furnish a method of repre¬ senting an arbitrary function. The reconsid¬ eration of this series and the attempt to deter¬ mine exactly what functions are expansible by trigonometric series has led to many of the most abstruse theorems about point-sets. The theory of point-sets (Punktmengen, Assem¬ blages of Points> ; see article Assemblages, General Theory of), it should be remarked in explanation of the proportionately large space allotted to it below, is the most character¬ istic feature of real function theory.

The Real Variable. — The real numbers are, first, the whole numbers positive and negative; second, the rational fractions of the form m/n where m and n are whole numbers, and, third,

the irrational numbers such as \J2 and tt. On this subject, see the articles on Arithmetic and Algebra and the Bibliography8 at the end of this sketch. (Reference numbers such as that on the word Bibliography correspond to the numbers attached to works in the Bibliography).

The totality of real numbers is a field (Korper), i.e., a set of elements upon which can be performed the operations of addition and multiplication, according to the well-known rules.8 We suppose also known the derived operations of subtraction, division and raising to a power. A special symbol is used to dis¬ tinguish the numerical from the algebraic value of a number: if x is positive, \x\ — x, if x is negative, — \x'= =x. The relation of greater and less is indicated by the symbols <;, >. ; aˆ>b means a is greater than b, a<ˆb means a is less than b. Considerable attention has been given to the problem of stating explicitly the hypotheses of the real number system. We state here only that one the discussion of which has had the most farreaching consequences.

Principle of Continuity. — If [x] is any set of real numbers all less than a certain number,

b, then there is a number, x, such that_every number of [x] is less than or equal to x, and such that x is the smallest number of which this

is true. In other words, x∼x for every x of [x], and if a<ˆx, there is a number x’ of [x] such that a<U

Any number, such as b in the statement above, which is larger than every number of a set [x] is called an upper bound of [x] ; a num¬ ber smaller than every number of a set [#] is called a lower bound of [>]. In this language the principle of continuity says that every set having any upper bound has a least upper

bound. It follows immediately that every set having a lower bound has a greatest lower bound. The greatest lower bound or least upper bound of a set may or may not belong to the set. Thus, zero is the greatest lower bound of the set of all positive numbers but does not belong to it : on the other hand, zero is the least upper bound and does belong to the set of all real numbers which are not positive.

A very large proportion of the advances in critical sharpness of the modern analysts over those of the 17th and 18th centuries is due to the recognition of places where the earlier analysts had unconsciously assumed, or had neglected to apply, the principle of continuity. The form in which this postulate is here stated is due to K. Weierstrass 1’ 2. Other forms have been given by R. Dedekind3 and G. Can¬ tor4. Indeed, the theory of continuity and irra¬ tional numbers is due about equally to these three great Germans.

Segment, Interval, Limit Point. — By the

method of analytic geometry (q.v.) there is a correspondence between the totality of real numbers and the points of a line ; likewise be¬ tween the set of all pairs of numbers (x, y) and the points of a plane, the pair (x, y) cor¬ responding to the point of which x and y are the co-ordinates. On account of this corre¬ spondence, it is customary to use geometrical language in the theory of real functions ; thus, the word point is used interchangeably with the word number. A linear

segment is the set of all numbers x, a x < b, or the set of all points between a and b ; a planar segment is the interior of a parallelogram with sides parallel to the co-ordinate axes, or the set of all num¬ ber-pairs (x, y), a < x <Cb,c < y < d. The word interval is used for a segment plus its boundaries, i.e., <; is replaced by <" in the

definition just given. A segment linear or planar as the case may be, including a point, is called a neighborhood of the point.

Among the most important consequences of the principle of continuity is the following theo¬ rem which was first stated in a slightly different form by E. Borel 11 in 1895. Since its method is essentially involved in the proof of the theo¬ rem of uniform continuity (see below) given by E. Heine5 in 1871, it is usually called (after A. Schoenflies6) the Heine-Borel theorem : <(Every setof segments [ff] such that every point of an interval, i, is an interior point of at least one <y , has a finite subset au a2, ..., crn, such that every point of i is an interior point of at least one aK (k — 1, 2, ... , n).®

We shall prove this theorem only for the linear case, the proof of the planar case being quite analogous. Let the end points of the interval i be a and b, a<^b. Let [b'] be a set including every point, b' , of i such that the interval ab' is contained in a finite number of segments of [<r]. There is at least one b' ; for one of the end points of any segment of [cr] which includes a is evidently a point of [b']. By the principle of continuity, the set of all

points, [b']f has a least upper bound B, B — b. We shall prove that B is a point of [bf] and that B=b.

Let a " b ", a" <fb", be a segment of [ff] includ¬ ing B. Since B is the least upper bound of f b']

there is a point of [br], bi between a" and B. But if cq, <t2, ..., oe is the finite set of segments

including all points of the interval abf, this set together with a " b" will include B, which proves that B is a point of [b']. Moreover, if B<fb,

the set Oi, a2 . °e together with a " b" would

include every point of an interval ac, c being a point between B and b" '. c would therefore be a point of [b'\ contrary to the hypothesis that B

is an upper bound of [b’]. Hence B—b and the Heine-Borel theorem is proved.

A point a in every neighborhood of which there are points, distinct from a , of a set [x] is a limit point of [x] ; a either may or may not be a point of the set [x]. If [x] is a linear set, a is either the greatest lower bound of the num¬ bers of [x] greater than it or the least upper bound of the numbers of [x] smaller than it. A linear point-set without an upper bound is said to have the limit point + °o and one without a lower bound to have the limit point — 00 . The following theorem of Weierstrass is a simple corollary of the Heine-Borel theorem.

(<Every infinite set of points lying on an in¬ terval has at least one limit point.® If it had no limit point, then about every point of i there would be a segment including not more than one point of [+]. This set of segments, by the Heine-Borel theorem, would have a finite subset including all the points of i. But each interval of the subset not containing more than one point of [x], [x] could contain at most a finite number of points, contrary to hypothesis.

If [x] is a linear point-set, and if we allow + oo — puE oo to figure as limit points, the theorem may, of course, be modified to read : Every infinite linear point-set has at least one limit point.

Theory of Linear Point-sets. — The set of

limit points of a set [x] is called the first de¬ rived set of [x]. The first derived set of the first derived set is the second derived set, *etc.* The theory of successive derived sets has been highly developed by the aid of the transfinite numbers of Cantor.4 (See Assemblages). Aset which includes its first derived set is said to be closed (abgeschlossen) . A set included in its derived set is dense in itself (insichdicht). A set which is the same as its first derived set, i.e., which is both closed and dense in itself, is said to be perfect. An example of a set closed but not dense in itself is furnished by the num¬ ber 0, together with the numbers r-(»= 1, 2,

3, …). A set dense in itself but not closed is the set of all rational numbers. The set of all numbers is an example of a perfect set.

A set whose derived set is the set of all real numbers on a certain interval is everywhere, dense (iiberalldicht) on this interval. Such a set has a point between every two points of the interval. A set which is everywhere dense on no interval is nowhere dense. The first of the examples above is a nowhere-dense set, the second and third are everywhere-dense.sets.

If [x] is a closed set, nowhere dense on an interval ab, and c any point of ab not in [x] then there is a segment, including c, whose end points belong to [.r], but which contains no point of [.*•]. Such a segment is called a point-free segment of \x]. Thus, for every closed set [.r] there exists one, and only one, set of point-free segments. No two of these segments overlap.

Therefore they are an enumerable (or denumer¬ able) set (see Assemblages), namely, there can

be only a finite number of length a

finite number of length > — — , and in general

& - d

only a finite number of length ■> ‘ • The set

[•?] of end points and limit points of end points of the point-free segments is evidently a closed set and is identical with [*•]. Since the set of point-free segments is enumerable, its end points are enumerable and thus the nowhere-dense closed set is the derived set of an enumer¬ able set of points together with the enumerable set itself. A consequence of this which we do not stop to prove here is that there is a one-to- one correspondence between the continuum and any perfect subset of itself ; the argument de¬ pends on the theory of point-free segments and the fact that the continuum is the derived set of the enumerable set of all rational numbers.8

The notion, length of an interval, finds a generalization in the content of a point-set. [.*•] being any set of points on an interval i, let au a2, • • • , °n be any finite set of intervals of length h y ˆ2y • • • y 1 71) including every point of [x]. Let L=/i+/2+ … + /n-There are, of course, an infinity of numbers, L. Their greatest lower bound is called the content of [jr] and written c[x]. If [x] is a closed set and .S’ is the sum of the finite or infinite series obtained by taking the lengths of the point-free segments in the order of their magnitude, we have c[x]— l — S, where l is the length of the interval i. Thus in the case of a closed set [x] and its com¬ plementary set [x], which consists of all points of the interval not points of [jr] , we have c[x] \c[x]=B. This, however, is not true of sets in general. For example, the set of all rational numbers between 0 and 1 has the con¬ tent unity and the set of all

irrational numbers on the same interval has the same content. The notion of length is, therefore, extended by the definition of content, only to closed sets and not to sets in general. A much more farreaching generalization of length has,. however, been suggested by E. Borel11 and carried out by H. Lebesgue12 in connection with the theory of definite integrals (see below). (See also Measure and Measurable Assemblages, under Assemblages, General Theory of).

Functions Defined on an Interval. — On ac¬ count of the generality of the definition, prac¬ tically no theorems are known which apply to all functions on a given interval. One of the most general theorems known is obtained by introducing the restriction that on a certain interval, f(x) shall have an upper bound. By this it is meant that there shall be a number, B, such that for every x on the given interval f(x)<ˆB. From the principle of continuity it

is clear that a function having an upper bound upon an interval, i, has a least upper bound Bo, and by aid of the Heine-Borel theorem, it is easily proved that there is at least one point, Xi, on the interval, such that for every interval of i which includes Xi, Bo is the least upper bound of f(x). This is a theorem of Weierstrass.1

Another broad class of functions is that of

the monotonic functions.1 A function, f(x), is monotonic increasing if whenever X\<fx2, f(xi)<ˆf(x2); it is monotonic decreasing if whenever xi<ˆx2, f(xf)”>f(x2).> In the case of a monotonic function, f(x), not only is there a single value of y—f(x) for every value of x, but for every value of y taken on by f(x) there is one and only one value of x. In this case it is the custom to write x =/— 1 (y) and to call f~Ky) the inverse function of f(x). Thus every monotonic function, f(x), has a single valued inverse which, however, is not neces¬ sarily defined for all values of y.

In antithesis to the monotonic functions stand oscillating functions, those such that on the interval under consideration there are three values of the independent variable, Xi, x2, x%> Xi <” X2, x2<ˆx3 such that* f(xi) <f(x2) /(**)>/(*«), or f(xi) >f (x2), J(x2) <f(x3). There exist functions which oscillate on every interval ; indeed, a function may oscillate on every interval and still be continuous and have a continuous derivative.6 The definition of conti¬ nuity is given below and of derivation in the article Calculus. In most investigations hitherto the functions considered have had only a finite number of

oscillations, i.e., there would exist a finite set of points such that on the intervals between successive points the function would not oscillate. It is to be noted that a non-oscillating function is not necessarily mono¬ tonic ; there may be intervals upon which it is a constant.

The word oscillation is also used to denote a measure of the total amount of variation of a function on a given interval, that is, the differ¬ ence between the upper and lower bounds of f(x). This is a satisfactory measure in case f(x) is monotonic. In other cases, especially in case of functions with oscillation on every interval, this scheme is naturally extended as follows: Let X\, x2, xz, … , xn — i be any fi¬ nite set of points on the interval ab in the order a < i Xi <ˆ xˆxz … <ˆ xn— i < b. Calling a = Xo and

b = xn, we have 2(f(x) — /(*«— rf)) = /(6) — /(a).

K = 1

rt

But 2 !/(*«) — f(xK—i)\ = R is, except for non—

k = i

oscillating functions, different from/(6) — f(a). For every infinite set of points Xi, x2, … , Xn— i, there is a value of R. The least upper bound, V, of the set of all possible numbers, R, is called the variation of fix') on the interval ab. A function for which V is finite is called a function of limited variation; such a function can always be expressed as the difference be¬ tween two monotonic functions. Functions of limited variation were first defined and studied by C. Jordan in connection with the theory of lengths of curves.

Theory of Limits. — Turning from the de¬ scription of a function by its properties on an interval to a consideration of its appearance in the immediate neighborhood of a point, we are led to consider the notions of limits and of continuity. If a is a limit point of a set of points [x], then the variable x is said to approach a on the set [x]. In case all the values of x ar e > a, the approach is said to be

from above, and in the opposite case, from be¬ low. Let f(x) be a function which is defined

and bounded on an interval ab, a<ˆb, and let xi, x2, … be any set of points of ab of which a is the only limit point. Such a set is, for example,

b — a . b — a . b — a

a + — - — , a -\ - - — , … H - ….

2 4 ft

The points whose co-ordinates are (xi, f(xi)),

(x2, f(xi)), etc., in the graphical representation of fix) are a bounded set in the plane, and, therefore, have at least one limit point. The x co-ordinate of this point cannot be other than a, since every other x co-ordinate may be sur¬ rounded by a segment including at most one point of the set, Xi, x2, … . Call the y co-ordinate of this point, yo. The value yo is such that for every pair of positive numbers, £ and there is a value of xˆ>a, such that \x — o| <f ˆ and | f{x) — y0| < £. A number, y0, satisfying this condition is called a value approached by fix) as x approaches a from above. If in every in¬ terval ax of ab, f(x) is without an upper bound, f(x) is said to approach the value of + 1=0 as x approaches a from above; if fix) is without a

lower bound in every interval ax, fix) ap¬ proaches — 00 . Thus we have the highly im¬ portant theorem that as x approaches any finite value from above (and by parity of reasoning, from below) fix) approaches at least one value, finite or infinite.

A finite value approached by fix) as x ap¬ proaches + °° is a number, yo, such that for every pair of positive numbers, £ and d, there is a value of x such that xˆ> d and \f(x) — y0| < £, f(x) approaches + °o as x approaches -f oo if, for every £ and d, there is a value of x such that xˆ>$ and f(x)ˆ> £. The definition of approach to — <*> is analogous. In the case where x approaches a finite value, Xo, from above or below or from both sides, fix) ap¬ proaches yc if for every pair of positive num¬ bers, £ and d, there is a value of x (x=ˆXo), such that \x — Xo\ <f d and | f(x) — fix o) | <T £. The theorem of the last paragraph now extends to all cases: if .v approaches any value finite or infinite, fix) approaches at least one value, finite or infinite.

If fix) approaches only one value as x ap¬ proaches a, the value approached is said to be the limit of f(x) (or limiting value of fix)) as x approaches a, and is indicated by the sym¬ bol L f{x) or simply Lfix). If Lf(x)—f(a) x—a

the function fix) is said to be continuous at the point x = a. A necessary and sufficient condi¬ tion for the existence of the equality Lfix) ~b is the following: for every £ ˆ> 0 there exists a d£ > 0, such that for every x4=a for which \x — a\y de, | f{x) — b\ < £. This condition, which is frequently taken as the definition of a limit, 6,7 has to be appropriately modified in the cases where a and b are replaced by + 00 or — oo. The following is a necessary and sufficient condition that Lfix) shall exist and be finite:1'9 for every £ > 0 there exists a<V> 0, such that for x' and x" distinct from a and such that \x' — a\ < d£ and \x" — a\ <, de, |/ (*') —

/(*")! <®.

The proof of these necessary and sufficient conditions and also of the following theorems must be omitted for lack of space. If fiix) and fiix) approach definite limiting values as x ap¬ proaches a, then fiix) + fiix), fiix) — fiix),

and fiix)- fiix) approach Lfiix) + Lfiix), Lfiix) — Lfiix), and Lfiix)- Lfiix) , respec¬ tively, as x approaches a; if Lfiix)- f=0, then fiix) *fiix) approaches Lfiix)* Lfiix) . These propositions are evidently to be thought of also as propositions about continuous functions. To them should be added the statement that if fiix) is continuous at x = a and *2(y) is con¬ tinuous at y* = (a), then fzifiix)) is continu¬ ous at x=a. Also, if f ix) is continuous at a point x=a, and if /(a) is positive, then there is a neighborhood of x=a upon which the func¬ tion is positive.1

In the above propositions about limits it is not necessary that fix) be defined at every point of an interval. Everything we have said about Lfix) remains valid when x takes values on any set of which a is a limit point. Indeed, in one of the most important cases, that of the summation of series (q.v.), the independent variable takes on only integral values, and a= + °o. For the following theorems, how¬ ever, we assume that fix) is defined at every point of an interval.

Continuous Functions. — fix) is continuous on an interval ab if it is continuous at every point of the interval; in particular, it must be continuous at a and b. One of the most famous propositions of real

function theory states the principle of uniform continuity:5 if e is any positive number, there is a G “> 0, such that on every interval of ab of length less than A-the oscillation of fix) is less than £. Other propo¬ sitions in this connection are that a continuous function has a finite maximum value fix i) and a finite minimum value fix 2) and takes on all intermediate values.5 An important corollary of this is that every algebraic equation of odd degree with real coefficients has one real root. If a function is monotonic and continuous, it has a monotonic and continuous inverse.

If fiix) and fiix) are continuous on an interval ab and if fiix) = fiix) on a set every¬ where dense on ab, then fiix) = fiix) at every point of the interval ab. The last theorem en¬ ables us to say that if a continuous function is known at every point of an everywhere-dense subset of an interval, it is known on the whole interval. Since there are enumerable every¬ where-dense subsets, a continuous function is thus capable of determination by an enumerable set of conditions. This phenomenon is also manifested in the theorem that any continuous function may be expressed as a convergent series of polynomials. Generalizations of this theorem to discontinuous functions have been obtained by R. Baire,13 the next class of func¬ tions beyond the. continuous being those discon¬ tinuous functions which are representable by series of continuous functions.

The class of continuous functions includes as a subclass the differentiable functions, i.e., those continuous functions which possess at every point a derivative. (See Calculus). The existence of a derivative, which amounts to the condition that the graph of fix) shall possess a tangent, puts a limitation on the manner in which a function may oscillate.7 The earlier students of calculus assumed that every con¬ tinuous function may be differentiated, in fact, several proofs of this statement were offered. Weierstrass2 was the first to give an example of a function which is everywhere continuous

and such that for no interval is it differentiable at every point.

A subclass of the differentiable functions is constituted by those functions for which the second, third and in general the nth derivatives exist. For such a function a formal expansion by means of Taylor's formula (see Series; Cal¬ culus) is always possible, but as has been shown by A. Cauchy and A. Pringsheim,1 this series need not always converge and, if con¬ vergent, need not represent the function. A function which may be represented by Taylor's series is called analytic. Necessary and suffi¬ cient conditions for the expansibility of func¬ tions by Taylor's series have been given by Pringsheim, but the full significance of the ex¬ istence of all the derivates of a continuous func¬ tion is still to be determined.

Another outstanding problem in connection with continuous _ functions is that of the orders of infinites and infinitesimals. A function f(x) becomes infinite or infinitesimal at a point if it approaches + oo , — - co , or 0. If f(x) and 0 (*) both become infinite (or infinitesimal) at the same point, a, we may have their quotient ap¬ proaching (1) more than one limit, (2) a unique finite limit, not zero, (3) zero, (4) :£oo. For the first case no extensive theory has been de¬ veloped. In the second case the functions are said to be of. the same order; in the third case f(x) has an infinity of lower order or is infini¬ tesimal of higher order than <t>(x) ; in the fourth case f(x) has an infinity of higher order or is an infinitesimal of lower order than </> (x) . For analytic functions the notion of order is well established, for other functions not.

Discontinuous Functions. — A function may fail to be continuous at a point in several ways. In the first case, Lf(x) may exist but be dif¬ ferent from f(a). In this case the discontinuity is called removable (hebbar), because by modi¬ fying the value of f(a) to be the same as Lf(x) a continuous function is obtained. If Lf (x) fails to exist, f(x) may still approach definite limits from above and from below. These limits are usually indicated by *(a + 0) and* (a — 0). /(a) may coincide with either

of them or differ from both. All these cases are referred to as discontinuities of the first kind.1 If /(a + 0) or /(a — 0) fails to exist, that is, if f(x) approaches more than one value as x approaches a from the right or from the left, f(x) is said to have a discontinuity of the second kind at x — a. For this to occur, f(x) must have an infinity of oscillations in every neighborhood of x—a. Such a function is

. 1

sin — in the neighborhood of x = 0.

oc

It is easily provable that there is a finite or infinite greatest value approached by f(x) on either side of x — a and likewise a finite or in¬ finite least value approached. These four num¬ bers are generally denoted by f(a + 0), f(a — 0), f(a + 0), f(a — 0), The differences among

these four numbers and /(a) give a variety of ways of defining a measure of the amount of discontinuity at a point. For example, the lower bound of the oscillation of f(x) on every interval which includes x = a is the difference between the greatest and the least of these five numbers and is called the oscillation of f(x) at x = a.

In classifying discontinuous functions ac¬

cording to the distributions of the points of discontinuity over an interval there are two cases of which other cases are compounds. On the one hand, are the totally discontinuous func¬ tions, i. e., functions discontinuous at every point such,, for example, as the function which is + 1 if x is a rational number and — 1 if x is an ir¬ rational number. On the other hand every in¬ terval may contain a point where f(x) is con¬ tinuous ; such a function is called point-wise discontinuous, though there is some divergence of usage in this particular.1 A point-wise dis¬ continuous function has the property that the points where the oscillation is greater than any fixed positive number, e, constitute a nowhere-dense closed set. On considering an infinite e e

sequence e, — , — , … of such numbers, it is

evident that the set of points of discontinuity of a point-wise discontinuous function is an enumerable set of nowhere-dense closed sets.

The theory of discontinuous functions has received perhaps its main impetus from the study of definite integrals. (See Calculus). The integral of f(x) between a and b, written

/b k — 4t — 1

a f(x)dxy stands for^^ ^ a where

Xk lies between a +

n

k—o

k + 1

(6 — a) and a-j - (b — a).

The function is said to be integrable if this limit exists and is unique. It is easily seen b> aid of the principle of uniform continuity that every continuous function is integrable and it is also evident that a totally discontin¬ uous function is not integrable. Riemann proved that a necessary and sufficient condi¬ tion for the integrability of a discontinuous function is that the set of points at which the oscillation of f(x) is greater than any positive number shall be of content zero. Thus an in¬ tegrable function is continuous or so point-wise discontinuous that the set of points of dis¬ continuity is an enumerable set of sets of con¬ tent zero.

The content of a point-set is the definite in¬ tegral of a function which is equal to unity for all points of the set and to zero for all other points. Corresponding to the Borel-Lebesgue generalization of content (see Measure and Measurable Assemblages in Assemblages, General Theory of) is a generalization of the definite integral, due to Lebesgue,12 which ex¬ tends the notion to a very broad class of func¬ tions. This generalization has been guided largely by the aim to state the definitions of differentiation and integration in such a way that they shall be inverse operations. Accord¬ ing to the usual definitions (see Calculus) this is true for a limited class of functions, but there exist, on the one hand, functions whose integrals cannot be differentiated and, on the other hand, functions whose derivatives cannot be integrated. The only effective generaliza¬ tion of the derivative that has been suggested in this connection is the substitution for the regular limit of [f(x) — f(xi)]/[x — xi\, one of the upper and lower bounds of the values ap¬ proached by it as x approaches Xi, from above or below.

Attempts to generalize the limiting process in various directions are characteristic of the

present tendencies in analysis. The principal results so far have been obtained in connec¬ tion with infinite divergent series by Cesaro, Mittag-Leffler, Borel13 and others. Another class of problems is the solution of functional equations. For example, it is known that among continuous functions, if f(x + y) — f(x) + f(y), then f(x) = ax --b. But is this true if the restriction of continuity be removed?

Functions of More than One Variable. — The above account has dealt entirely with func¬ tions of one variable. A single-valued function of several variables, f(xi, x2… Xn) is a variable y such that to every set of values (xi, x2, …. xn) there corresponds one, and only one, value of y. The theory of such functions differs from that which we have been considering mainly in that the point-sets involved are no longer linear, but, rather, n dimensional. The approach to a point in a limiting process may now take place not only from two sides but by an infinity of paths. In grasping this situation, the principal idea so far advanced is that of uniform convergence f cf. Series). But on this subject the reader is referred to the treatises cited below.

Bibliography. — References by number have been made above to the following works. The pages to which particular reference is meant are indicated in parentheses:

(1) The article by A. Pringsheim on (Grundlagen der Allgemeine Funktionenlehre) in the <Encyclopadie der Mathematischen Wissenschaften,* II A. 1, contains a more extended bibliography.

(2) Weierstrass, K., (Mathematische Werke) (Berlin, 1894-1902).

(3) Dedekind, R., (Essays on Number,* translated from the German by W. W. Beman (Chicago 1901).

(4) Cantor, G., (Beitrage zur Begrfindung der transfiniten Mengenlehre* (Mathematische Annalen, Vol. 46, 1895).

(5) Heine, E., (Die Elemente der Funk-tionenenlehre,* Crelle's (Journal fur Mathe-matik * (Vol. 74, 1872, pages 172-188).

(6) Schoenflies, A., (Bericht fiber die Mengenlehre, Jahresbericht der Deutschen Mathe-matiker Vereinigung) (Vol. 8, 1899, p. 86).

(7) Dini, W., (Theorie der Funktionen einer veranderlichen Reelen Grosse) (German trans¬ lation from the Italian by J. Lfirouth and A. Schepp, Leipzig 1892, page 317).

(8) Stolz, O., and Gmeiner, J., (Theore-tischen Arithmetic (Leipzig

1900).

(9) Stolz, O., and Gmeiner, J., (Einleitung in die Funktionentheorie) (Leipzig 1904).

(10) Jordan, C., (Cours d'Analyse* (2d ed., Paris 1893, page 54).

(11) Borel, E., (Leqons sur la Theorie des fonctions* (Paris 1898, page 42).

(12) Lebesgue, H., <Leqons sur l'integration et la recherche des fonctions primitives> (Paris

1904).

(13) Baire, R., (Leqons sur les fonctions dis¬ continues J (Paris 1905) .

(14) Borel, E., (Leqons sur les series divergentes) (Paris 1903).

Oswald Veblen,

Professor of Mathematics, Princeton Univer¬ sity.

REALF, ralf, Richard, Anglo-American poet: b. Framfield, Susˆgx, 14 June 1834; d

Oakland, Cal., 28 Oct. 1878. He was the son of a rural constable and florist, and in his 17th year published a volume of crude but promis¬ ing poems under the title of (Guesses at the Beautiful. > The work was edited by Dr. Phyrne, afterward bishop of Chichester, and Realf became an idol of a circle which included Lady Byron and her daughter, Ada Lovelace; the Rev. Frederic W. Robertson, the banker-poet Rogers, the sculptor Behnes, Leigh Hunt and others. Becoming partly demented in a mysterious love affair, Lady Byron sent him to New York, where he was assistant superin¬ tendent of the Five Points House of Industry in 1855-56. Then he entered the Kansas Free-State struggle, which led him to a close connec¬ tion with John Brown, by whom he was selected as Secretary of State for the new form of government he had planned for the people he expected to set free. In August 1862 he en¬ listed in an Illinois regiment and served under various commands till 1867. Then he passed several years in editorial work in Pittsburgh, Pa., and subsequently appeared on the lecture

platform, where his (Battle-flashes) and (The Unwritten Story of the Martyr of Harper's Ferry) attracted wide interest. His life was a sad and strange story. He wrote some of our strongest war poems while in the army. Among his best-known productions are (My Slain,) Undirection,* <Symbolism) and (An Old Man's Idyl. > A collection of his poems was edited by his friend Richard J. Hinton in 1899.

REALGAR, a gorgeous, aurora-red mineral, found massive and in transparent or translu¬ cent, monoclinic crystals of short prismatic habit. Its lustre is resinous, hardness 1.5 to 2; streak orange-red. Analysis shows that it con¬ tains sulphur 29.9, arsenic 70.1, yielding the formula AsS or arsenic monosulphide, though it is usually regarded as arsenic disulphide, As2S2. Upon exposure to light it soon disin¬ tegrates, changing to a pulverulent, orange-yellow orpiment (As2Ss) and white arsenolite (As2Os). It is found massive, disseminated or crystalized in the vicinity of volcanoes and in many igneous rocks, and it occurs abun¬ dantly in fine crystals in Hungary and Transyl¬ vania. It has recently been discovered in Mace¬ donia, at Mercur in Utah, and massive, in enor¬ mous deposits, in the State of Washington. Its previous rarity precluded its use in the manu¬ facture of arsenious oxide, for which purpose it is now extensively mined in Washington. Artificial realgar, known as (<red orpiment® or ((ruby sulphur,® when mixed with nitre forms <(white Indian fire.®

REALISM, (1) a term in at least two fun¬ damentally different seems in the history of phi¬ losophy. (a) During the period of scholasti¬ cism (q.v.), realism denotes the doctrine that universals have an existence which is in some sense independent of the particular things that appear to the senses. This theory is de¬ rived from Plato's doctrine of ideas, and goes back ultimately to the Socratic view that only through the concept, or universal idea, is it pos¬ sible to obtain real knowledge. Plato, develop¬ ing this position, maintained that the universals, as ideas, exist apart from the world of sen¬ sible appearances, and from the true and abid¬ ing reality, while the latter is merely the world of imperfect copies, the transitory and inade-

quate representations of this true world of supersensible existence. In spite of the differ¬ ences in name, then, and the necessary differ¬ ence of interest in the problem due to the special intellectual outlook of the times, mediae¬ val Realism in its earlier and extreme form is identical in standpoint with Platonic Idealism. The later mediaeval realists, under the criticism of nominalism (q.v.), modified the extreme view that universals exist apart from things, in the same direction in which Aristotle modified Plato's doctrine of the separate existence of ideas. That is, instead of defending the ex¬ treme proposition that universals exist prior to and independent of things (universalia ante rent), they maintained with Aristotle that the universal, the type or form, is an essential factor in constituting the particular an in¬ dividual thing, and that the two are, there¬ fore, always found together (universalia in rebus). The whole problem of the rela¬ tion of the universal and the particular, as it presented itself to the scholastic mind, received its most adequate statement and solu¬ tion at the hands of Thomas Aquinas. He pointed out that there is a sense in which all of the formulas that had been proposed by realists and nominalists alike are true and justifiable. We may say that the universal is prior to the thing and independent of it, inas¬ much as we must suppose that the idea as a universal existed in the mind of God before particular things were created; and in this sense we may, therefore, accept the statement univer¬ salia ante rent. But it is the presence of uni¬ versals that gives to particulars their reality, and it is through their presence in things that they are known to us ; therefore, the formula universalia in rebus is justified. Furthermore, it is the particular, not the universal, that is first known to U9. So that from the standpoint of our knowledge, we may admit the nominal¬ istic proposition universalia post rem.

(b) In modern philosophy, Realism has an entirely different meaning, and is directly op¬ posed to Idealism (q.v.). Realism in modern systems assumes many forms, just as Idealism does, and the two views approximate to each other in so-called doctrines of ideal-realism. But yet the fundamental distinction between these two types of thought remains and may be definitely stated as follows: Realism main¬ tains that the universe is composed of a larger or smaller number of (<

reals® that exist in and for themselves, independently of any relation to mind. Its main historical contention has been in opposition to any theory that would reduce the world to a system of ideas. Usually the argument of the realists has been directed against the type of idealism that attempts to interpret reality in terms of the consciousness of finite individuals. But it also maintains that real things possess a being outside and in a real sense independent of the absolute experi¬ ence of God. We may grant, the realist would argue, that God knows all things, yet these things are not merely his ideas, but possess a reality and independence of their own. These real things are variously conceived in the dif¬ ferent systems. In the Scottish philosophy (founded by Thomas Reid 1710—96), we have the doctrine of <(Natural Realism.® That is, things are regarded as real just as they are given through immediate perception. In know¬

ing, the mind deals directly with independent real things. This reality is guaranteed by “Common Sense,® or the fundamental intuitions of mankind. By Kant, on the contrary, the world of perceptive experience is regarded as merely a phenomenon of consciousness. There remains for Kant, however, a world of things-in-themselves beyond experience which can never be known, but which we are necessarily obliged to think as the basis of the phenomenal world. As completely unknown and unknow¬ able, this world of ultimate reality is incapable of any description or theoretical treatment whatever. Herbert Spencer, who speaks of his view as <(Transfigured Realism,® occupies fun¬ damentally the same position as Kant. Herbart (1776-1841), while agreeing with Kant that the world of sense-experience is phenome¬ nal and exists only for a knowing conscious¬ ness, still holds that it is possible to define and determine by means of metaphysical investiga¬ tion the nature of realty in itself. He, there¬ fore, postulates the existence of a plurality of absolute <(Reals® (Reale), each of which is sim¬ ple and unchangeable, and between which rela¬ tions obtain which give rise to the phenomenal order of. experience. Leibnitz (1646-1715) in his doctrine of monads, Fechner (1801-87), and Lotze (1817-81), regarded the ultimate of nature of reality to be a system of physical forms of existence or souls. At present, es¬ pecially in England and America, there is an active philosophical school which calls itself and is called the New Realism. Its distinguish¬ ing characteristic is a view of the mind which finds the unity of consciousness largely or en¬ tirely in the structural relations of the system of mental states, which when combined after • another fashion are not mental at all, but com¬ ponents of the physical universe. It is apparent that this demands a view of relationship which considers the

terms of a relation as capable of entering without change into another relational context. The New Realism is usually associated with a view that true knowledge consists in an identity of structure, and possibly also of con¬ tent between the state of knowledge and the object known. In England the best known ad¬ herents of this school are B. A. W. Russell and G. E. Moore. In America the New Realists comprise R. B. Perry, E. B. Holt, F. J. W. Woodbridge, W. P. Montague, W. T. Marvin, W. B. Pitkin, E. G. Spaulding, G. S. Fullerton, J. E. Boodin and E. B. McGilvary.

(2) In the fine arts and in literature, Real¬ ism is opposed by Idealism. In general, it may be said that Realism insists on correspondence with nature, on representing things as they are actually found in experience, while idealism tends toward an imaginative treatment which does not limit itself to reality as actually known. These two methods of treatment can never be absolutely exclusive of each other. In the work of any given individual one element or the other may be most prominent, but both must be present if the picture or statue or writing is to rank as an artistic production. Both in the choice of subject and in the details of his treatment the realistic artist idealizes: that is, he interprets the actual by isolating it from the context or environment in which it appears, and which serves to some extent to hide its true significance; and, secondly, he also idealizes by representing in his treatment what

is universal and essential, omitting certain things and selecting others with this end in view On the other hand, the idealist who ‘‘bodies forth the forms of things unseen,’ or sings of “a light that never was on sea or land, must nevertheless be “true to nature,” in the sense that his imagination must word; in ac¬ cordance with the laws of reality. Otherwise the result is something grotesque and fantastic. We do, however, speak of the work of any particular individual as realistic or idealistic according as the treatment shows more promi¬ nently one tendency or the other. There are three ways in which these different tendencies, or attitudes of mind, are shown in the. fine arts and literature. In the choice of a subject mat-ter, the realist selects either something actually existing, some familiar scene or well-known event, or at least, if he does not make an exact transcript of a particular object or set of oc¬ currences, it is the concrete individual things of experience with which he deals. Idealism, aim-ing more directly at the representation of what is universal and typical, constructs for itself its forms and matter, choosing to express itself through a representation, it may be, of angels. Graces or Madonnas, or through a literary portrayal of events and occurrences of some past time that admits of free imaginative treat¬ ment. This difference in choice of subject mat¬ ter also carries with it important variations in manner of portrayal. As realism aims, more directly than idealism at correspondence with nature, it is clear that it must emphasize to a greater extent fullness and accuracy of detail. But there is also difference in the kind of detail that is chosen, and in the emphasis that is given to details of different characters. As it is the object of realism to represent its subject matter in concrete, individual form,, the details which are essential to produce this impression are naturally emphasized. An idealistic treatment, on the other hand, seeking to represent more directly the universal and essential, necessarily gives an entirely different value to the various details, omitting, it may be, much that would be regarded as essential in the school of realism and giving a prominent place to what the latter might keep in the background. It is false art and a false realism, however, that emphasizes what is ugly, unpleasant and pathological in such a way as to make these the most prominent features of the total work. This realism has rightly been held to be characteristic of a de¬ cadent art, of an art that is inevitably suicidal. For the real, which it is the business of art to reveal and portray, in nature and in human nature alike, is the universal, the abiding and hence the normal ; what is. diseased and mon¬ strous are necessarily

particular and transient and, therefore, not real in the fullest sense. Art', like all conscious activity, can only live so long as it assumes that what is rational in the fullest sense must be that which is in the deep¬ est sense real. See Idealism.

Bibliography.— Realism in philosophy : Boo-din, J. E„ 'Truth and Reality' (New York 1911) • Case, 'Physical Realism' (London 1888); Hamilton, Sir W., 'Lectures on Metaphysics' (London 1859); Holt, E. B., and others, 'The New Realism' (New York 19R) , Lotze, 'Metaphysics' (Leipzig 1841; tr. 1884); Lowe, 'Der Kampfzwischen Nomenalismus und Real-

ismus im Mittelalter' (Prague 1876) ; Maurice, 'Mediaeval Philosophy' (London 1854) ; Perry R B 'Present Philosophical Tendencies (NewYork 1912) ; Russell, B A W ˆ Prob¬ lems of Philosophy' (London 1911) ; 'Scientific Method in Philosophy' (Chicago 1914); DeWulf M., 'History of Mediaeval Philosophy'

(tr. London 1909). For realism in art consult Brunetiere, F, 'Le roman Naturahste (Pans 1892) ; Knight, W., 'Essays in Philosophy (London 1890) ; Martino, P-, .'Le roman reahste sons le second empire' (Paris 1913) ; Zola, E., 'Le roman experimental' (Paris 1880).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

REALISM AND NATURALISM IN LITERATURE. Realism in literature means that the writer represents persons, scenes, things, and facts as they are, life as it is. The word is used in manv senses — as opposed to romanticism, to conventionalism, to sentimentalism, to. ideal¬ ism, and to imaginative treatment. Sometimes it is a term of praise, in cases in which precision and vividness of detail are considered meritorious , sometimes it is used as a term of reproach as, for example, when it is contrasted with ideal¬ ized description or representation. In modern times, and in particular during the greater part of the 19th century and the earlier years of the 20th, the use of the word realism has often im¬ plied that the details brought out were of an unpleasant, sordid, obscene, or generally of¬ fensive character. Naturalism in literature should mean a style or method of writing characterized by close adherence to, or faithful representation of, nature; but. in the hands of its most notorious modern exponents, it quickly degenerated into a connotation of the more sinister features of

realism. Thus a writer in the London Daily News, in June 1881, speaks of “That unnecessarily faithful portrayal of offensive incidents for which M. Zola has found the new name of ‘Naturalism.’ ” This “new name” soon thereafter became a technical term to denote that remarkable outflowering of real¬ ism which predominated in French and other literatures for some 35 years from about 1860. It is obvious that in essence a distinction may properly be made between realism and natural¬ ism as the words have come to be used. In practice, however, they are often regarded as one and the same thing, and in this article they may conveniently be treated together, although, in the course of it, it may be necessary from time to time to draw attention to the difference which actually exists.

In recent usage, the term realistic is tech¬ nically applied to a 19th century school of writers; but realism, in its prime and proper sense, is as old as literature itself. We find it in Homer and Aristophanes; in the Old Testa¬ ment; in the ancient Egyptian writings; in the earliest Saga literature of the Norse peoples; in the Indian, Tapanese, and Chinese rogue stories of the 6th, 10th, and 13th century, re¬ spectively; in the mediieval Fabliaux; in Boc¬ caccio and Chaucer; in the picaresque novels of Spain; in the Elizabethans; in Rabelais, Cervantes, and Voltaire; in Aphra Behn and Bunyan ; in Richardson, Fielding, and Smollett, as well as in Swift and Defoe. Realism was a pronounced feature of some of the later Greek

and Latin literature. Thus Lucian (b. c. 120 a.d.), in satirizing, in his (True Story, > the extravagances of Eastern Greek romance, gives us himself very realistic details side by side with many a romantic and impossible adventure, and he is even more outspoken in (The CarousaP and in Lucius, or the AssP if in¬ deed he is truly the author of the last-mentioned work. Still more realistic in aim is the African Lucius Apuleius (b. c. 125 a.d.) in his Meta¬ morphoses, or Golden AssP written in Latin. Unrestrained realism is exhibited by Gaius Petronius Arbiter (1st century a. d.) in his 'SatiriconP in which he describes the debauched and dissolute condition of Roman society dur¬ ing the earlv empire.

While the modern realistic novel may be said to take its remote origin from the Spanish (Lazarillo de Tormes) (1553), the first of a great number of picaresque, or rogue, stories — the begetters of Thomas Nash's (Unfortunate Traveller, or Jack Wilton) (1594) and Richard Head's (The English Rogue > (1665), in Eng¬ land, and of Sorrell's <Francion) (1622), Scarron's Toman comique) (1651-57), Furetiere's (Roman bourgeois J (1666), and Lesage's Gil Blas) (1715), in France — it is nevertheless the fact that the realism which sprang up in France early in the 19th century and afterward spread to other countries — England, Spain, Germany, the United States of America — was primarily a protest against romanticism. It may perhaps be reasonably said to derive, directly or indi¬ rectly, from Tean Jacques Rousseau, who, in his (Confessions, } had taken care that the whole of male experience, even in things considered shameful and wicked and therefore usually kept secret, was revealed to an attentive world. Leaving out of account the practicallv isolated case of the 18th century Nicolas Edme Restif (1734-1806), known as Restif de la Bretonne and sometimes called <(the Defoe of France,® sometimes <(the Rousseau of the gutter,® we shall probably be chronologically correct in say¬ ing that the newer phase of realism began with Charles Paul de Kock (1794-1871), a master of the art of working up an interesting story by the use of simple and commonplace details, gathered from observation at first hand. He was author of about 100 works, the best known of which are perhaps (Gustave le mauvais

sujeP (1821), (Le barbier de Paris) (1826), (La laitiere de MontfermeiP (1827), and (Andre le Savoyard.* Although (Le barbier de Paris* was translated into nearly every European language, de Kock, owing to a poor style — he was of Dutch descent — and a cer¬ tain aloofness from literary and political move¬ ments, exercised no great influence on his French fellow-countrymen. The first of the 19th centurv realists to do that was Marie Henri Beyle (1783-1842), known as Stendhal, who, in <Armance) (1827), (Le rouge et le noir) (1831), and (La chartreuse de Parme> (1839), put forth vivid studies of social types, brimful of energy and passion. He was soon followed by Honore de Balzac (1799-1850), the novels of whose (La comedie humaine* (1829-47), while ideal in conception, aimed to be real in detail — ((human documents,® in fact — and shrank from the fullest exposition of neither vice nor passion. Next came Gustave Flaubert (1821-80), who, according to Zola, gave, in < Madame Bovary* (1857), the formula of the

modern novel. ˆMadame Bovarv,* a close and minute study of provincial bourgeois life, is the epic of the commonplace, and was meant to be, as it certainly is, a bitter satire on the last ex¬ aggerations of romanticism. In (Salammbd) (1862), a study in epic realism, Flaubert ap¬ plied the same method to the civilization of ancient Carthage, and he continued it in his celebrated picture of Paris life, (L'Lducation sentimental (1869) and in his oessimistic (La tentation de Saint -Antoine) (1874). There is no doubt that Flaubert made a profound im¬ pression upon his own age. Yet it is a strange commentary on his professed efforts that one of the keenest of modern French critics, Ferd¬ inand Brunetiere, decided that, while Flaubert was a master by as just a title as Balzac, and a far greater stylist, he still was a romanticist at heart. To a certain extent, his (Trois Contes * (1877) might be adduced in justifica¬ tion of that opinion.

Soon after the appearance of the second of Flaubert's great works, Taine, bv publishing (Le Positivisme anglais: J. St. Mill* (1864), in which he gave an excellent summary and criticism of Mill's (Logic, J with its insistence on the collection of attributes and on detailed description, supplied, for the assimilation of the materialistic philosophy and its application to literature, a medium and a technique of which his compatriots were not slow to avail them¬ selves. This method, joined to the scientific sensualism which Comte had established, and Renan had developed, under the name of Posi¬

tivism, rapidly became a working theory for the adventurous litterateur. From that time on¬ ward the collection of data of a biological and sociological kind, or, in other words, of de¬ tailed information concerning heredity and en¬ vironment, became for many French novelists the basic principle for the study, creation, and development of character. The brothers de Goncourt (Edmond, 1822-96 and Jules, 1830-70) in (Germinie Lacerteux) (1865) immediately put into practice that minuteness of observation and that reporter-like assemblage of facts which was to become a special characteristic of the new realistic, or, as it now began to be called, naturalistic school. In (Manette Salomon) (1867) and (Madame Gervaisais) (1869) they jointly continued the method, in which, in (La fille Elisa* (1878) and other novels, Ed¬ mond persevered for many years after his brother's death. Of the new school the de Goncourts regarded themselves as the legitimate heads, and fimile Zola (1840-1902) as their most promising disciple, with Henri Ceard, Joris-Karl Huysmans, Leon Hennique, Guy de Maupassant, and a host of others as lesser satellites. Of these, de Maupassant, while re¬ maining a naturalist, outgrew the circle in virtue of his native genius. Huysmans, in (Marthe* (1876), a study in sordid prostitution, gave a striking example of the naturalistic, as distinct from the merely realistic, novel. Zola, however, speedily became the high-priest of the, cult, the protagonist and propagandist of a savage naturalism. His theory of the experi¬ mental novel, as he called it, was that it <(is a consequence of the scientific evolution of the age; it continues and completes the woik of the physiologist,® although he rather nullified this position when he laid down the definition that <(the realistic novel is a corner of Nature

seen through a temperament.® He had been publishing since 1864. His series of 20 novels, produced under the collective title (Les Rougon-Macquart) (1871-93) and including (Le ventre de Paris) (1873) ; <L'Assommoir) (1877), and (Nana> (1880), are tainted with a grossness against which there were loud outcries, but many of them, just on account of that gross¬ ness, had an enormous circulation. When (La terre,* which appeared to pass all limits of decency, came out in 1887, even Zola's own disciples joined in its condemnation. Soon afterward, while realism remained the inspira¬ tion of most French fiction, naturalism began to decline, and when Zola died in 1902 he had survived by nearly a decade the movement of which he had been the chief exponent and spokesman. Alphonse Daudet (1840-97), a writer who also aimed to describe life as it is, was certainly influenced by the naturalistic school in (Sapho) (1884), but on the whole he stands apart from naturalism. Paul Bourget (b. 1852) endeavored, in <Mensonges> (1887) and other works, to carry realistic observation beyond mere externals into what he called

ˆctofoc fV|p cniil ®

In Russia, Nikolai Gogol (1809-52), with (01d World Proprietor and (How the two Ivans quarreled) (1835), minute studies of life in the Ukrainian villages, had already antici¬ pated much of the <(human document® theory and practice, and realism was still further illustrated by the novelists Gontcharov (1812— 91), Turgenev (1818-83), Dostoyevsky (1821-81), and Tolstoy (1828-1910), and by drama¬ tists like Ostrovsky (1823-86). Realism is by no means a spent force in Russia, as witness Artsybashev's <Sanin) (1907), Chapygin's <The White Hermitage) (1913), Shmelev's <The Man from the Restaurant* (1913), Kuprin's (The Pit,* the naturalistic short-stories of Korolenko and Potapenko, and the underworld tales of Maxim Gorky. Real¬ ism entered Germany from both France and Russia. Its principal exponents were Max Kretzer (b. 1854), sometimes known as (<the German Zola,® with his socialistic novel <Meister Timpe) (1888); Hermann Suder-mann (b. 1857), with (Der Katzensteg* (1889) and Uolanthes Hochzeit* (1893) ; Gerhart Hauptmann (b. 1862), with his dramas, <Vor Sonnenaufgang) (1889), (Das Friedensfest* (1890), and {Rose Bernd> (1903) ; and Max Halbe (b. 1865), with his dramas, <Jugend> (1893) and (Mutter Erde) (1897). In Sweden, Karl Almqvist (1793-1866) was in the main a romanticist, but his later

work, Ut's All Rights a grim picture of the evils of conventional mar¬ riage, is in the realistic vein. August Strind¬ berg (1849-1912) produced in (The Red Room> (1879) what was at that period in Sweden a startlingly realistic novel, and in his novel, (Marriage* (1884-86), and his dramas, (The Father* and (Miss Julia,* he aimed to be both realistic and naturalistic. In Norway, Bjorn-stjerne Bjornson (1832-1910), beginning with works of a lyric and romantic-religious char¬ acter, produced in (The Newly Wedded Pair) (1866) a realistic problem play, and in a long series of dramas and novels from 1874 to 1889 he exhibits the same realistic and analytic tendencies. Ibsen is also a realist, but he is a great deal more, for his works are, as a rule, too subtly complicated and too spiritual to be

reducible to one classification. In Italy, Mathilde Serao (b. 1856) and, especially,

Gabriele d'Annunzio (b. 1864), with his pagan sensualism, are perhaps the best-known repre¬ sentatives of the realistic school. In Spain, Jose Maria de Pereda (1833-1906) was the pioneer modern realist, and he was followed by Benito Perez Galdos (b. 1845), Armando Palacio Valdes (b. 1853), and Emilia, Countess of Pardo Bazan (Sehora Quiroga, b. 1851). Juan Valera (1824-1905), though not techni¬ cally a realist, but rather tending consciously toward idealism in his novels, is, for all that, none the less real. In England, Henry Fielding (1707-54) insisted that the novel should show real life, and in his practice he found many 18th century imitators. In the 19th and 20th centuries among the great realistic novelists are Jane Austen (1775-1817), William Makepeace Thackeray (1811-63), Charles Dickens (1812— 70), (<George Eliot® (1819-80), George Mere¬ dith (1828-1909), Thomas Hardy (b. 1840), George Moore (b. 1853), Herbert George Wells (b. 1866), John Galsworthy (b. 1867), and Arnold Bennett (b. 1867). Realistic dramatists are Sir Arthur Wing Pinero (b. 1855) and George Bernard Shaw (b. 1856). Many of the modern Hiberno-English novelists and drama¬ tists are starkly realistic, and one or two of them frankly naturalistic. In the United States of America many realistic writers sprang up in the wake of the propaganda which William Dean Howells (b. 1837), under the influence of Tolstoy, Valdes, and Galdos, carried on for many months in Harper's Magazine. The prin¬ cipal American realists are Howells himself, who may be looked on as the creator of the Ameri¬ can novel of character as distinct from the novel of incident, Henry James (1843-1916) with his subtle psychology and his peculiar style, Hjalmar Hjorth Boyesen (184S-1905), and Paul Leicester Ford

(1865-1902).

In poetry realism has not had so much sway as in the novel or the drama. Poetic realism is mainly impressionistic and tends to symbol¬ ism. It is found more or less developed in some of the poems of the German Arno Holz (b. 1863) and the French Paul Verlaine (1844-96), and it is the motive power of many of the writers of modern vers libre of all countries, especially when they record the impressions of observed phenomena.

The recent tendency has in general been away from crude naturalism to a saner and soberer realism. Truthful portraiture is de¬ sirable in literature, and in so far as realism and even naturalism supply solid and stabilizing literary elements they are to be commended. The high seriousness of much of modern fiction is attained by a proper use of such elements. It is against the abuse of the genre that the true artist, no less than the moralist, must always protest.

Bibliography.— Zola, E., <Le roman ex¬ perimental } (Paris 1880) ; id., (Le naturalisme au theatre (ib. 1881) ; id., (Les romanciers naturalistes* (ib. 1881) ; Dupuy, C. E., (Great Masters of Russian Literature) (New York 1886) ; Brandes, G., (Menschen und Werke* (2d ed., Frankfort 1895) ; Howells, W. D., (My Literary Passions) (New York 1895) ; Brunetiere, F., (Le roman naturaliste> (7th ed., Paris 1896) ; Steiger, E., (Das Werden des neuen Dramas* (Berlin 1898) ; Wells, B. W., <A Cen-

tury of French Fiction5 (New York 1898) ; Abernethy, J. W., (The Invasion of Realism) (in Education, Vol. XXI, No. 8, April 1901); Schiitze, M., (The Services of Naturalism to Life and Literature) (in Sewanee Review, Vol. XI, No. 4, October 1903) ; Hudson, W. H., (Rousseau and Naturalism in Life and Thought (New York 1903) ; Chesterton, G. K., (Varied Types) (ib. 1903) ; Stoekins, A., (Naturalism in the recent German Drama) (ib. 1903) ; Cross, W. L., development of the English Novel5 (new ed., ib. 1905) ; Chandler, F. W., Ro¬ mances of Roguery) (2 vols., Boston 1907) ; Dornis, J., (Le roman italien

contemporain) (3d ed., Paris 1909) ; Gonzalez-Bianco, A., (Historia de la novela en Espana desde el romanticismo a nuestros dias) (Madrid 1909) ; Phelps, W. L., (Essays on Modern Novelists) (New York 1910) ; id., (Essays on Russian .Novelists5 (ib. 1912) ; Samuel, H. B., (Modern-ities 5 (London 1913) ; Collison-Morley, (Mod-ern Italian Literature> (ib. 1913) ; Saintsbury, G., (The English NoveP (in (Channels of Lit¬ erature Series, 5 ib. 1913) ; Henderson, A., (European Dramatists5 (New York 1913) ; Martino, P., (Le roman realiste sous le second empire5 (Paris 1913).

P. J. Lennox,

Professor of English Language and Literature, The Catholic University of America.

REALSCHULEN, ra-al'shoo-len, a class of institutions in the German system of secondary education characterized by the em¬ phasis laid upon the study of the sciences, mathematics and modern languages as opposed to the gymnasia in which the classics constitute the principal feature of the curriculum. The Realschule took its rise in Germany in the early part of the 18th century, but did not attain its full development until the second half of the 19th century, when the tremendous progress of science compelled, after a long struggle, the recognition of this type of school as of equal rank with the gymnasia in the national system of education. In the struggle, however, between the classical school and the scientific school a mixed form was developed, approaching more nearly to the Realschule in the importance attached to the non-humanistic branches, but including Latin in its lists of studies. This type of school is known as the Real-gymnasium, and between it and the gymnasium the differences are growing less every year, especially since the study of Greek in the Prussian gymnasia was rendered non-obligatory in 1900. Real-gymnasia are, how¬ ever, included under the general designation of Realschulen, a term which, in its broadest signification, includes the following classes: (1) Oberrealschulen (Upper Real schools), scien¬ tific schools with a nine years' course, giv¬ ing no instruction in the ancient languages ; (2) Realgynmascien (Real-gymnasia), scientific schools with a nine years' course, giving instruc¬ tion in Latin; (3) Realschulen (in a stricter sense), the same as the Oberrealschulen, with¬ out the highest class; (4) Realprogymnasien, bearing the same relation to the Realgymnasien as the Realschulen to the Oberrealschulen; and (5) Hohere Burgerschulen (higher middle schools), offering a six years' course without Latin. While the Real-gymnasium has been approaching the classical school in character,

the Real-schools proper have been extending their scope so as to include various forms of technical and even industrial education. Gradu¬ ates of Real-schools are ineligible for admis¬ sion to various departments and faculties in the universities, the most liberal conditions prevaling in Prussia, where only the faculty of theology is closed to them. See Germany ; Education; Gymnasia, and consult Bolton, F. E., (The Secondary School System of Ger¬ many5 (New York 1900) ; and Russell, J. E., (German Higher Schools5 ib. 1907).

REALTY and the terms real property and real estate denote the interest one has in lands ; it applies not only to ground but to everything which is attached or a part of it, as trees, stones, houses or other structures. Timber, grain and grass rooted to the soil are realty, though when severed they become personalty. Any crop which is an annual product of the soil when ripe is considered as personal property. Permanent buildings erected on one's land with¬ out permission become the property of the owner of such land, without regard to the own¬ ership of the materials. Fixtures or things which have been attached to the realty and can¬ not be removed without injury to it, or which have become so adapted to the building or land as to be necessary to its use, are considered a part of the realty. In addition to the elements of realty which have been above described, are rights which are connected therewith, such for example as a right of way, a right to the use of a water course and easements. An uninter¬ rupted use of any easement or right for 20 years or any less period fixed by statute raises presumption of title. The various estates which one may possess in realty had their origin in the feudal system of England, the fundamental principle of which is that the king was the original proprietor of all the land in his king¬ dom, and no one came into any part of it except by gift from him, or in return for feudal services, and thus the land was divided among a graded body of owners beginning with the king's noblemen. In the United States all the instances of feudal tenure have been abolished. In Canada the tenure by which land is held varies in the different provinces, some being largely regulated by a statute enacted during the reign of George III.

Title has been defined as a means whereby the owner of lands has the just possession of his property ; title may be acquired by descent, that is, through the death of an ancestor, by purchase or by operation of law. The legal title of land is usually transferred from one person to another by means of a deed, the many essentials of which are fixed by the statutes in various jurisdictions.

The assessed valuation of real property in the United States in 1916 was $51,159,000,000, of which more than one-fifth ($11,146,000,000) was in New York State, and nearly one-tenth ($5,088,000,000) in New York City. Estimates of the actual value vary between $100,000,000,000 and $200,000,000,000.

REAM, Norman Bruce, American finan¬ cier: b. Somerset County, Pa., 5 Nov. 1844: d. 9 Feb. 1915. He was educated in the public and normal schools, and in 1861 enlisted as a private in the 85th Pennsylvania Volunteers. He was promoted lieutenant and served until

invalided out of service after being wounded in action near Savannah. He afterward en¬ gaged in the livestock and grain commission business in Chicago and became one of the principal figures in the Chicago market. He was connected with the Armours in their cor¬ ner of the pork market in 1879 and in 1883 assisted in averting a collapse in the grain market. He was active in the organization of the National Biscuit Company and the United States Steel Corporation. After 1888 he de¬ voted himself to his real estate, manufacturing and railroad interests and served as director of many railroads, banks and trust companies.

REAM'S STATION, Battle of. As the

extension of General Grant's left to Globe Tavern on the Weldon Railroad (see Globe Tavern, Battle of) did not prevent General Lee's use of the road as a line of supply up to a point within a day's wagoning to Petersburg, General Grant determined to destroy the road as far down as Rowanty Creek, 13 miles beyond Globe Tavern. On 22 Aug. 1864 General Han¬ cock, with Miles' and Gibbon's divisions of the Second corps and General Gregg's cavalry division, in all about 8,500 men, moved to the left and by night of the 24th had destroyed the road from Globe Tavern to a point three miles south of Ream's Station and 12 miles from Petersburg. During the 24th Gregg's cavalry was sharply attacked by General Butler's di¬ vision of Confederate

cavalry, and at night General Meade informed Hancock that Con¬ federate infantry was moving in his direction, but as yet none had been seen by Hancock. At daylight of the 25th a cavalry reconnoissance drove in the Confederate pickets and Gibbon was ordered to move out from Ream's Station and complete the destruction of the road. Gibbon had hardly gotten well on the road, when the Union cavalrv was driven in by cavalry supported by infantry and he was ob¬ liged to deploy a strong skirmish line to check the enemy in pursuit. Prisoners taken from three of Gen. A. P. Hill's divisions showed that the Confederates were in strong force and Gibbon was ordered back to the Ream's Station intrenchments, where he arrived at 10 a.m. and united with Miles' division. The intrench¬ ments were very light and had been hurriedly thrown up by Gen. James H. Wilson in his cavalry fight near that place late in the pre¬ ceding June. They ran along the railroad about 700 yards and then were drawn back on the right and left about 800 or 900 yards, at nearly right angles. Both flanks were exposed to reverse fire from the front. Miles held the right half of these works, Gibbon the left half. Gregg's cavalry held the approaches in the di¬ rection of Petersburg and Dinwiddie Court House. When Hancock's movement became known to the Confederates, Gen. A. P. Hill with the larger part of his corps, together with G. T. Anderson's brigade of Longstreet's corps and Gen. Wade Hampton's two cavalry di¬ visions, marched to prevent the destruction of the railroad, and at 2 p.m. of the 25th General Wilcox's division made two attacks upon Miles, which were repulsed, leaving killed and wounded within a few yards of Miles' front. At 5 p.m. Hill opened a heavy artillery fire and, at the end of 15 minutes, Generals Heth and Wilcox, with five brigades and three regi¬

ments, made another assault upon Miles and a part of his line, held by raw recruits, gave way, abandoning a battery. At the same time the right of Gibbon's line gave way and two more batteries fell into possession of the Con¬ federates. Gibbon was ordered to retake his lost ground, but his troops, many of whom were new recruits and drafted men, responded feebly and fell back under the first fire. Miles rallied the 61st New York and by desperate fighting retook a part of his line and his lost battery. Hampton's cavalry now attacked Gib¬ bon and drove him entirely from his works, but was checked by a heavy flank fire from Gregg's dismounted cavalry, upon which Hamp¬ ton turned on Gregg and forced him back to the left of a line which Gibbon had established a short distance in rear of the intrenchments from which he had been driven. An effort made to retake the intrenchments failed be¬ cause of the inability of the Union

commanders to induce their men to go forward. At dark Hancock withdrew from the field. General Hill made no attempt to follow up his advan¬ tage, but returned to the Petersburg intrench¬ ments, leaving Hampton's cavalry at Ream's Station. The Union loss was 669 killed and wounded and 2,073 captured or missing, to¬ gether with 12 stands of colors and nine guns. The Confederate loss, as reported by Hill, was 720, chiefly, if not entirely, killed and wounded. Consult (Official Records' (Vol. XLII) ; Hum¬ phreys, (The Virginia Campaign of 1864-65' ; Walker, (History of the Second Army Corps'; The Century Company's (Battles and Leaders of the Civil War' (Vol. IV).

E. A. Carman.

REAPERS AND BINDERS. Technically

the <(reaper" is a grain harvesting machine which, in addition to cutting down the grain, gathers it into bunches ready for tying into sheaves. Speaking generally, however, the mowing machine is classed as a reaper, along with the sickle and scythe and other such simple implements. The scythe, when provided with a cradle, may be regarded as the earliest type of reaper. The first machine for reaping which actually accomplished the task was that of Henry Ogle, invented in 1826. It consisted of a straight scythe blade which ran back and forth at the rear angles of a series of triangular fingers. The cut grain fell upon a collecting board and was raked off at intervals by a work¬ man walking beside the machine. In 1826 the Rev. Patrick Bell constructed a machine in which a number of blades on the cutting bar worked with a scissors action. At a slow speed this machine was quite effective. The first machine of the type, which is now universal, was invented in America by C. H. McCormick, who patented it in 1834. Another patent had been issued in 1833 to Obed Hussey, but the manufacture of these machines in quantity did not begin until 1845, when 150 were built by a Cincinnati firm. As many more were built in the following year. From this time onward inventors busied themselves with varying models, so that in 1852, at a contest held at Geneva, N. Y., nine different machines were entered by as many manufacturers. Com¬ pared with the highly refined reapers of the present day these machines were all exceed¬ ingly clumsy and required an excessive amount

Corn Binder (Complete Machine)

Deering Knotter

Binder Attachment

Courtesy International Harvester Co.

I

y

of power to operate them. Not one of them could be started in standing grain ; the machine had to be backed up on clear ground to get the mechanism under way before the knives entered the grain. However, improvement was rapid and production increasingly large, and by 1855 nearly 10,000 of these machines were in use on the farms of the country. It is a matter of much interest to note that the Ameri¬ can ((mower and reaper® as it was called, at the French Exposition of 1855, in contest with French and English machines, cut three times the area in the same time as the French ma¬ chine and three and one-fourth times the area cut by the English machine. A number of new models were brought out, and in 1857 at the New York State Fair at Syracuse 19 dif¬ ferent machines were entered for competition, and of these only three were unable to start in standing grain.

These mowers and reapers were fitted with a revolving real or rack of <(wipers® which swept the grain firmly against the advance of the cutter, gathered the cut grain on a table and shoved it off automatically when enough had been gathered to make a sheaf of the de¬ sired size. The tying was done by laborers following the machine. The next development was the Marsh ˆharvester,® having a platform on which two men rode and tied the bundles of grain as they accumulated. In 1870 the self-binding reaper was in¬ vented, in which the bundles of grain were tied with wire.

This machine fell into great disfavor after bits of the wire amongst the grain had de¬ stroyed valuable mill-stones.

The twine binder came into use in 1875, through the adap¬ tation of a tying device in¬ vented in 1859 by John F.

Appleby, who later went into the army and forgot all about it until he had invented a new rifle. The Appleby binder on the Marsh ma¬ chine offered the first perfect reaper.

Reaping machines include three classes — manual delivery, self-raking and self-binding machines. The manual delivery is but little used now

except on small holdings or when a mowing machine is converted into a reaper by being fitted with a sheafing attachment. In very hilly districts the light draught of the manual delivery machine makes it a convenient machine to work, and as at high altitudes it is often injudicious to bind the sheaf at once, as drying is impeded thereby, it may be the most profitable machine to use. On the large farm it has its place for cutting out badly storm-broken patches where bigger and heavier machines cannot be conveniently used. The or¬ dinary manual-delivery reaper differs little from the grass mower, except that it is not necessary for it to be so highly geared and that it is pro¬ vided with a sheafing rack. The operator keeps up a continuous sweeping motion, pulling the crop on to the knives and loading it on the sheafing rack, which during the time it is being loaded is brought to a somewhat vertical po¬ sition, being held there by a lever controlled by the operator's foot; when loaded, the rack is allowed to fall and the sheaf slips off. The self-raking machine has a platform in the form

of a quarter circle, to which the grain is reeled by the rakes, as well as removed to one side far enough to clear a fresh horse walk for the next round. The cutting bar and knives are like those of the harvester. Like the manual-delivery machine this type has but a limited use because of the fact that the grain remains unbound. For buckwheat and peas it is a favorite in some regions. It cuts usually a swath of five-foot width, requires two horses and harvests from six to eight acres per day.

The self-binding reaper, the one in most general use, consists essentially of a large trav¬ eling wheel acting as the driving wheel, which carries the framework and about and above which are the various gearings and parts neces¬ sary for sheafing and binding, and of a smaller ground wheel on the off side of the cutting plat¬

Reaper (complete machine).

form. The power is distributed from the driver to the various parts by gearing or sprocket chains. The cutting parts are very similar to those of the ordinary reaper or mower, of the serrated reciprocating knife type, driven by a Pitman rod from a crank and having the usual split fingers or guards on the bar to hold the grain while it is being cut by the sliding out of the bar. The cut grain falls upon a horizontal

platform, about which is an endless canvas ; the latter conveys the grain to two vertical can¬ vases parallel to one another and moving in different directions. By these the grain is elevated and conveyed to the sheafing platform. The mechanism on the sheafing platform col¬ lects the grain as it is being constantly poured upon it and separates it into sheaves ; next a binder attachment binds the sheaves and re¬ leases them, allowing them to fall straight to the ground, or, as is now more common, upon a carrier which collects a number before de¬ positing them in convenient lots to be shocked or stooked. In binders made without vertical canvases the crop is conveyed by the platform canvas directly to the packing arms and is then gripped by the grasper carrying the twine and tied. The sheaf is lifted by a mechanical fork or arm and placed outside the horse-walk for

the next round. A few years ago five-foot cuts were common with six-foot cut machines a close second. At the present time, however, seven-foot cut machines are in highest favor, and there are also a large number of eight-foot cut machines at work. The eight-foot cut is a four-horse machine and it is advisable to put this number to a seven-foot binder. If one has as much as 30 acres of grain to harvest each year, the eight-foot machine will be found economical.

Some writers have claimed that the self-binder is not profitable on a farm where less ihan 30 acres of grain are grown annually, although they admit that during the average life of these machines they will reap and bind about 2,000 acres. In actual practice, however,

it is demonstrated every season that a self-binder is profitable, other things being equal, cn a farm where 10 or more acres of grain are harvested yearly. Progressive farmers usually approach the binder proposition as follows : An initial investment of $125 at least for a three-horse self-binder; interest on this investment at 6 per cent; depreciation and repairs, 10 per cent: thus cost of binder, $125; annual interest at 6 per cent, $7.50; depreciation and repairs, 10 per

cent, $12.50. According to this esti¬ mate the annual cost of the binder is $20, or $2 per acre for reaping and binding 10 acres of grain, exclusive of the cost of binder twine, man, horse or tractor labor. If more than 10 acres are to be reaped the corresponding cost per acre is lower and the greater the number of days the binder is at work the greater the return on the investment. To secure the latter it is not uncommon for a farmer owning a binder to reap his neighbors' grain in addition to his own at a price running from $1.50 to $2.50 per acre, in which case the reaper invest¬ ment may be turned into an income producer instead of a liability. Another plan becoming general in regions of small farms is for two or more adjoining landholders to purchase a reaper jointly.

In western United States and in Australia a binder is used. The machine is an adapta¬ tion of the binder with cutter bar, knives, plat¬ form and reel similar to the latter. It is pushed ahead of the team of from four to six horses and cuts a strip of from 12 to 20 feet. The

ears of grain are cut off and are then raised to wagons drawn alongside the header. A com¬ bined header and thresher is also in common use, by which the grain is cut, threshed and placed in sacks. Some of the larger types of header and thresher in use on the prairies have a capacity of 100 acres per day.

In Australia and other sections where the climate is very dry and the straw dries to brittleness, a reaper of different design is in favor. It has long comb-like teeth which strip the grain from the stalk, passing it into a mechanism which by a rubbing motion divests it of the husk and it is then winnowed, and on some large machines is ground as the har¬ vesting proceeds.

Bibliography. — Ardrey, (American Agricul¬ tural Implements) (Chicago 1894) ; Casson, H. V., < Offi¬ cial Retrospective Exhibit of the Development of Harvest¬ ing Machinery at the Paris Exposition, 1900) (Paris 1900) ; id., (The Romance of the Reaper) (New York 1908) ; Davidson and Chase, (Farm Machinery and Farm Motors) (New York 1908) ; Ramsower, H. C., (Equip¬

ment for the Farm and the Farmstead) (Boston 1917) ; Scott, (Textbook of Farm Engineering) (London 1885); Shearer, I., (Farm Mechan¬ ics) (1915); Swift, <Who Invented the Reaper?) (Chi¬ cago 1895) ; United States Department of Agriculture, Farmers' Bulletins Nos. 303 and 313 (Wash¬ ington 1913-14).

REAR (from old French arere, modern arriere, mediaeval Latin ad retro, to the back, backward), the hinderpart, or the part that comes last in order, of anything. A particular military or naval term as opposed to Wan® abbreviated from vanguard, derived from the French avant, in front.

REAR GUARD, a body of troops detailed to protect the rear of a marching column. It is organized like an advance guard reversed, consisting, from front to rear, of reserve, sup¬ port, rear party, rear point, rear cavalry. From the reserve to the point the units decrease in size. The distances between units are approxi¬ mately the same as those between the corre¬ sponding units of an advance guard, i.e., in the case of a division, say one, or two miles from the main body to the reserve, 1,000 yards be¬ tween the reserve and the support, 500 yards between the support proper and the rear party, 500 yards between the rear party and the point and about four or five miles between the point of the infantry and that of the rear cavalry. Rear guards will often have to be stronger than advance guards, for they are likely to cover defeated retreating troops, which obtain time to reorganize. They should hold a succes¬ sion of strong positions in such a manner as to delay the enemy as much as possible with¬ out suffering overwhelming losses, but should sacrifice themselves for the main body, if this is the only way of delaying the enemy. They,

Binder (complete machine).

1 Mowing-Machine attached to Medium-powered Tractor ‘ 2 Modern Reaper and Binder drawn by Tractor (Daily capacity about 10 acres)

I

1 Modern Reaper and Binder with Tractor as Motive Power

2 Nine Tractor-Drawn Reapers with a daily capacity of 90 acres

REARHORSE

therefore, need to be mobile and consist largely of cavalry; engineers are also useful for demoli¬ tions ; advancing troops may need rear guards in hostile territory; these march behind the trains. See Advance Guards.

REARHORSE. See Mantis.

REARICK, Peter Anton, American naval officer: b. Maryland, 12 Nov. 1838; d. Wash¬ ington, D. G, 9 Feb. 1901. He entered the navy in 1860, was appointed third assistant en¬ gineer and served through the Gvil War with promotion, becoming first assistant engineer in 1864. After the war he was on duty with the Pacific squadron on the north and south At¬ lantic, on European and Asiatic stations, at various navy yards and as a member of the steel inspection board. In 1874 he was made chief engineer and served in that capacity until 1900, when he was retired with rank of rear-admiral.

REASONING, or INFERENCE, is the

mental process in which we advance from some known fact or principle to the truth of some other fact which is different from the start¬ ing-point. The basis for the transition is always found in the knowledge from which we set out. This is taken or assumed to be real, and in it is found the ground and justification for the advance to something else. The differentia of reasoning thus appears to be mediation ; when we reason we infer that something is true because something else is true. Knowledge derived from reason¬ ing may, therefore, be termed mediate, as opposed to the immediate knowledge obtained from sense perception and memory. The ques¬ tion at once arises how any mental content can justify an advance to something different from itself? How are we ever warranted in passing from the known to the unknown? This is not merely the question that Mill raised as to whether all syllogistic reasoning — all advance from premises to conclusion — was not a petitio principii; but it concerns all reasoning, induc¬ tive and deductive alike. The dilemma is that if the result is not contained in the starting-point the advance does not seem to be justi¬ fied; if it is already present, the reasoning shows

nothing new. The view of Leibnitz was that all reasoning is analysis, a drawing out and fuller explication of the original datum of the mind. Kant pointed out that thinking involves also synthesis, new constructions and additions to the material from which it starts, and he takes as the fundamental problem of his (Critique of Pure Reason) the question how such synthetic judgments are possible. His an¬ swer is essentially identical with that which Aristotle gave, namely, that the mind or reason (vovc) itself enters into the process as a premise — or, in other words, that it is through the creative activity of the mind that the new truth is reached. Whether or not one can connect one fact with another in a logical way depends upon one's intellectual ability to dis¬ cover points of essential resemblance or iden¬ tity between facts. The good reasoner is he who can look beneath the surface and detect identities that are not at once obvious, as New¬ ton, for example, did when he reasoned from the' fall of the apple to the movements of the heavenly bodies. Reasoning, then, may be de¬

fined as the process of discovering essential re¬ semblances or points of identity between things.

It follows from what has been said that reasoning is not a process or function of mind that can go on apart from experience. The thinkers of the modern period down almost to the end of the 18th century continued to be¬ lieve that reason was a kind of special organ or faculty that could yield truth of the highest order of certainty quite apart from ordinary experience. It was Kant who first clearly and incontestably showed the impossibility of de¬ riving knowledge from reason taken in ab¬ straction from ordinary sense experience. Kant, however, uses the term ˆUnderstanding® (Verstand) for the thinking faculties as em¬ ployed in interpreting experience, and reserves the name (<Reason® (Vernunft) for the vain and illusory attempt of thought to operate in inde¬ pendence of any given material of experience. Apart from this terminology, however, which has not been generally followed, the result of Kant's teaching was to exhibit the close and essential connection that exists between think¬ ing and sense-perception : on the one hand, thought is empty apart from the material of sense-perception, and, on the other, what we call ordinary perceptive experience is constantly in¬ terwoven with more or less explicit processes of reasoning. Reasoning does not go on in a vacuum, nor is it a separate and distinct func¬ tion of mind that in some mysterious way spins truth out of itself. But reason is on one side a universal function of receptivity; it receives its material from every channel of experience, and is itself just the unifying, co-ordinating and

systematizing life of experience. De¬ duction and induction are often spoken of as if they were distinct species of reasoning. Reasoning, however, is always one and the same process. It consists, as we have seen, in con¬ necting parts of experience by the discovery of some identical element in them. This identity, as present in various particulars, we may speak of as a universal, or general, principle, and, therefore, say that when we reason we unite particulars through a general law or principle. Now, the difference between deduction and in¬ duction is a difference in the starting-point and in the direction in which we proceed. If we are already in possession of the general law, and set out to apply it to particular cases, we are using deduction. If, however, our starting-point is the particular instances, then we reason in¬ ductively to discover the universal law of con¬ nection. In both cases the structure of the completed inference is the same, and consists in the connection of particulars, in virtue of our insight into the universal law or principle ex¬ pressed in them.

In this reference to a universal principle, we have also that which distinguishes reasoning from the transition from idea to idea of the associative process. In a large part of the con¬ scious life that usually is described as think¬ ing, one idea by its very presence seems to call up another, without the apprehension of any universal or essential law of connection. But this is mere drifting on the part of the mind. In reasoning, the mind is fully awake ; it sets a definite purpose before it, and proceeds by active attention and analysis to discover essen¬ tial and necessary points of connection. It thus uses association for its own purposes; so that if

we define reasoning as a process of association, we must add that it is association guided and controlled at every step by the purposes of thought itself. How conscious and explicit must this direction be before we can call the process reasoning? Can animals properly be said to reason? These questions do not admit of any off-hand answer. The conscious direction of the mind, the clearness with which it appre¬ hends the universal in the particular, is a mat¬ ter of degree.

We may say that some direction on the part of the mind there must be, as well as some apprehension of the terms as universal, if reasoning is to occur, without attempting to determine just when these conditions are ful¬ filled in anv individual mind or in any species. What we call conscious reasoning is doubtless continuous with associative and instinctive men¬ tal processes that seem entirely mechanical and irrational, and the connection between the two extremes may be mediated by actually ob¬ servable processes. This continuity, however, gives no justification for refusing to regard the differences as important, or for explaining either extreme of the process in terms of the other. See Deduction ; Induction ; Logic.

Consult Bosanquet, <Logic) (Vol. II, Lon¬ don 1888) ; James, (The Principles of Psychol¬ ogy J (Chap, xxii, New York 1890) ; Creighton, (An Introductory Logic) (3rd edition, Part III, New York 1908) ; Stout, (Analytic Psychology* (London 1896) ; Baldwin, (On Selective Thinking) (in Psychol. Review , Vol. V 1898) ; see also the bibliography under Logic.

J. E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

REAUMUR, ra-6-miir, Rene Antoine Fer-chault de, French physicist: b. La Rochelle, 28 Feb. 1683; d. La Bermondiere, Me., 17 Oct. 1757. He studied under the Jesuits at Poitiers, and afterward at Bourges, and went to Paris in 1703. His relative, the president, Henault, introduced him to the savants of the metropolis, and in 1708 he was chosen a member of the Academy of Sciences, to which he had pre¬ sented some memoirs on geometry. For nearly 50 years he continued to be one of its most active members, his labors embracing the arts, natural philosophy and natural history. He was appointed to assist in the description des Divers Arts et Metiers,* published by the Acad¬ emy, and in executing his part of ihe under¬ taking pointed out the way to various improve¬ ments by the application of the principles of physics and natural history. He made import¬ ant observations on the formation of pearls and discovered that the ˆturquoises® of Langue¬ doc consisted of the fossil teeth of extinct ani¬ mals; but among his most useful researches must be reckoned those of which he gave an account in his (Traite sur l'Art de Convertir le Fer en Acier, et d'Adoucir le Fer Fondu* (1722), in which he first made known in France the process of manufacturing steel. He re¬ ceived therefor a pension of 12,000 livres (about $2,400). As a natural philosopher he is principally celebrated for the invention of an improved thermometer, which he made known in 1731. (See Thermometer). The fabrication of

porcelain also occupied much of his atten¬ tion, and led him to the discovery of a kind of enamel, called the porcelain of Reaumur, in

1739. His (Memoires pour Servir a l'Histoire des Insects) (1734-49) places him in the first rank of modern naturalists. In it he demon¬ strated, among various things, the correctness of Peysonnel's assumption that corals are not plants, but animals. He bequeathed his price¬ less collections of minerals, plants and manu¬ scripts to the Academy of Sciences.

REAVIS, James Bradly, American lawyer and jurist: b. Boone Countv, Mo., 1848. He entered Kentucky University, but did not com¬ plete the course, was admitted to the bar in Hannibal, Mo., in 1872, and for two years was editor of the Monroe City Appeal. In 1874 he removed to the West, and in 1880 settled in Washington Territory, where he established a law practice. He was a member of the upper house of the Territorial council in 1888 and a regent of the Territorial University, until Washington became a State. In 1889 he was an unsuccessful candidate for supreme judge, and from 1896 to 1902 was chief justice of the Washington Supreme Court.

REBAPTIZERS, those who taught that the repetition of baptism was under certain circum¬ stances imperative. The term is specifically used of the Baptists who enforce rebaptism in the case of all who have not been baptized by immersion. Views with regard to rebaptism have been varied. Many early Christians de¬ clared it unnecessary even for one who had been baptized by an unbeliever or by a child in play. In doubtful cases the hypothetical or con¬ ditional form was enjoined, as in the Book of Common Prayer, and in accordance with the decretal of Alexander III (1159-81).

REBEC, or REBECK, a stringed musical instrument of the violin kind, said to have been introduced by the Moors into Spain. It soon became oopular all over the Continent, being the favorite instrument of minstrels and of village musicians, and up till the end of the 17th century playing the same important part at fairs, rustic games and weddings as does the violin at the present day. It was somewhat larger than the latter instrument, but had only three strings, which were tuned in fifths, and rubbed with a bow. The earliest known repre¬ sentationˆ of the instrument, however, taken by the Abbe Gerbert from a manuscript of the 9th century, gives it but one string. The neck of the rebec terminated in a more or less grotesque representation of a human head. Milton in his (L' Allegro* alludes to the instru¬ ment as

the (< jocund rebec.® The minstrels of the Middle Ages used four classes of rebecs, the treble, alto, tenor and bass.

REBECCA, a character in Scott's (Ivanhoe,* daughter of the Jew, Isaac of York. She falls in love with Ivanhoe and nurses him after the tournament of Ashby, and he in turn saves her life by appearing as her champion in the lists after she has been convicted of sorcery and condemned to be burned at the stake. She leaves England with her father to live in Spain.

REBECCAITES, or REBEKAH'S DAUGHTERS, a singular association formed in South Wales, in 1839, for the destruction of turnpike-gates and tollhouses. The rioters were generally dressed in women's clothes, under a leader in the same guise, and made their at¬ tacks by night on horseback. The curious ap-

266

pellation by which they designated themselves was derived from the scriptural passage re¬ garding Rebekah — <(Let thy seed possess the gate of those who hate them.® Successful for a time they were emboldened to greater law¬ lessness and were attacked and dispersed by the military.

REBEKAH LODGES. See Odd Fellow.

REBEL YELL, the cry of the Confederate troops as they rushed to battle in the Civil War, although as a matter of fact they frequently shouted the names of their States, as <(On Vir¬ ginia !® ((On North Carolina! ® — and so forth. It is difficult to interpret the rebel yell in writ¬ ten language. It was very different from the full-toned (<hurrah® of the North, being more like a shriek. Near the crisis of a charge the men would change from a double-quick to a mad rush, wildly yelling ((Y-Yo Yo — Wo-Wo,® for the triple purpose of encouraging each other and confusing and terrorizing the enemy.

REBELLION, an uprising with force and arms against established authority. A rebellion may be an armed outbreak for the purpose of obtaining the redress of a grievance or pre¬ venting the enforcement of an obnoxious law; Shays' Rebellion in Massachusetts having been an example of the former, and the Pennsyl¬ vania Whisky Insurrection of the latter. Re¬ bellion of a more formidable character is that which attempts to establish a new and inde¬ pendent organization in place of the existing government. Such was the American Revolu¬ tion and such also was the unsuccessful at¬ tempt to perpetuate the Southern Confederacy. Old World rebellions have been chiefly dynastic, at least up to the 19th century — that is, wars between reigning families and others, usually akin to them, which claimed the right to rule. The rebellion against Charles I of England was of a different character, being prompted by aspirations for civil liberty and religious re¬ form. The expulsion of James II was of a similar motive and the American Revolution was a struggle for the inalienable rights of man.

In former ages and up to a very recent pe¬ riod conquered rebels were treated with great severity, being put to death, maimed or en¬ slaved. In partly civilized countries such as China, rebels are treated now with the greatest cruelty. The more advanced nations, however, while retaining on their statute books the Draconic code of times gone by, treat beaten insurgents with leniency. After the downfall of the Southern Confederacy the only nenalty inflicted was the

disfranchisement for a time of the leaders of the rebellion, all being eventu¬ ally admitted to the full rights of citizenship. British subjects who took sides with the Boers in the late South African War were, when con¬ victed, imprisoned for short terms and dis¬ franchised, although most of them probably escaped all punishment.

With the extension of suffrage came a con¬ sequent ability of the people to secure redress of wrongs without resort to violence. The causes which provoked rebellion in olden times are disappearing, while, apart from Carlist in¬ surrections in Spain, there were no dynastic rebellions in Europe until after the opening of the World War in 1914', when the most notable ones were in Russia, where the Romanoff dynasty was displaced, Tsar Nicholas an¬

nouncing the abdication of himself and his son, the immediate heir, 17 March 1917 ; and in Greece, where King Constantine abdicated 12 June 1917; the abdication of the ruling houses of Germany and A.ustria-Hungary in 1918, con¬ sequent on their defeat in the Great War. Con¬ stantine regained his throne in December 1920.

REBELLION, War of. See Civil War in

America.

REBER, ra'ber, Franz von, German art-historian: b. Cham, Bavaria, 10 Nov. 1834. He studied in Munich, Berlin and Rome, became a lecturer at the University of Munich in 1858, was appointed professor at the Polytechnicum there in 1863 and in 1869 occupied the chair of history of art in that institution. In 1873 he became director of the Royal Gallery. He has translated Vitruvius' (Architecture) (1865) and Rooses' (History of the Antwerp School of Painting> (1880), and has written (Geschichte der Baukunst im AltertunP (1864-67) ; Kunstgeschichte des Mittelalters5 (1886) ; (Geschichte der Malerei vom Anfang des 14. bis zum Ende des 18. Jahrhunderts) (1894) ; (Die phrygi-schen FelsendenkmaleU (1897), *etc.*

REBER, ra-bar, Napoleon Henry, French composer : b. Muhlhausen, Alsace, 21 Oct. 1807 ; d. Paris, 24 Nov. 1880. After studying with Reicha and Le Sueur, he wrote chamber music of remarkable merit and in 1851 was appointed professor in the Conservatory, and succeeded Halevy in the chair of composition 1862. Among his works are (Le Diable Amoureux) (1840), a ballet; (Le Nuit de NoeP (1848); (Le Pere Gaillard) (1852) ; (Les Papillotes de M. BenoisD (1853), and

(Les Dames Capi-taines) (1857), all four comic operas. He also produced some instrumental work of a high order — four symphonies, one overture, one series for the orchestra, three stringed quartets, one stringed quintet, one pianoforte quartet, seven pianoforte trios and miscellaneous pieces. His (Traite d'Harmonie) (1862) is a standard work.

REBISSO, Louis T., American sculptor: b. Italy, 1837; d. Norwood, near Cincinnati, Ohio, 3 May 1899. At 20 he joined in Mazzini's attempt to establish an Italian republic (see Mazzini, G.), and was obliged to leave Italy. Taking refuge in the United States he settled in Boston, Mass., where he worked for several years in monumental yards. Subse¬ quently he went to Cincinnati, Ohio, where his fame as an artist developed. He had studied in Italy with the sculptor Rubalto and in the Art Academy under Professor Varni, and in Cincinnati he worked with T. D. Jones. His leading works are the equestrian statues of General McPherson in Washington, D. C. ; of General Grant in Lincoln Park, Chicago, and of Gen. W. H. Harrison in Cincinnati.

REBOUND CHECKS, devices attached to the running-gear of automobiles and designed to check the rapid reaction of a spring which has been suddenly compressed, and thus prevent the bouncing movement of a car, which is in¬ duced by the extreme resiliency of modern springs. This reaction causes a bouncing move¬ ment, which affects the steering, and by its lift¬ ing action tends temporarily to diminish the grip of the driving wheels on the road. It is also calculated to produce side-slip, sets up a

violent sway at corners and causes discomfort to passengers. Rebound checks are of varied types, one in very general favor consists of two arms, one attached to the frame and the other to the spring centre. These arms form an L-shaped link connected by a disc. The disc forms a friction-grip which tends to make the car spring drag when recovering, so that any vio¬ lent reaction of the frame is absorbed by the check. Another variety, often seen on light cars, consists of a circular box attached to the frame and containing a wound-up spiral spring of great strength, the outer end of which is at¬ tached to the axle or spring clip. The action in both varieties is the same, a too-great reaction of the frame being prevented in both cases. Another method consists in introducing friction in the working of the springs. This is some¬ times done by clipping together the leaves of the springs. Check-leaves are also introduced above the long spring leaf and help to retard the action of the latter when it shoots its load upward on the rebound. Another device, a cam¬ shaped piece with an arm, is set in a depression. When the arm is rotated — which only happens when the spring is suddenly compressed — the two rings are separated more and more from one another which action tends to squeeze to¬ gether the parts of a minute clutch, one part of which is affixed to the frame and the other to the movable cam and arm-piece. See Shock Absorbers.

REBUS, a mode of expressing words or phrases by pictures of objects whose names bear a resemblance to those words, or to the syllables of which they are composed. Many of the ancient coats of arms were rebuses on the names of those who bore them ; thus a lock and a heart for the name of Lockhart, an eye and a tun (a barrel) for that of Eyton, *etc.* Many family badges bore mottoes of similar im¬ port, as (Ver non semper vireC of the Vernons. In heraldy, a rebus is a device intended to repre¬ sent a proper name by a picture ; a bearing or bearings on a coat of arms, containing an allu¬ sion to the name of the owner; as in the coat of the family of Arches, which consists of three arches, two simple and one double, borne on a shield ; and that of the Dobell family, who bore on a sable shield a doe passant, between three bells argent. In the Middle Ages rebuses were very common among ecclesiastics and others who had no right to use armorial designs.

RECALL, The, or as it was formerly termed, the ((imperative mandate,® is a process by which the people, at their will, may vacate

any office before the expiration of the term for which the person holding that office was elected. Should any public official fail properly to per¬ form the functions of his office or be guilty of any act indicating that he is unworthy of the future confidence of the people, a reasonable minority of the voters may petition for his recall. The recall is not a new development but has been found in Greece and in the gov¬ ernment of the early Germanic tribes, and in the United States has been known since Revolu¬ tionary times — Pennsylvania's delegates to the Continental Congress who refused to sign the Declaration of Independence having been <(recalled® and others sent in their places. Article 5 of the Articles of Confederation gave to each State the power ((to recall its delegates or any of them, at any time within the year, and to

send others in their stead for the remainder of the year.® The chief difference between the old and modern methods is that under the former the representative assemblies recalled the officers whom they had elected while in modern times this power of removal rests with the individual voter in the ballot booth. Los Angeles was the first American city to adopt the recall, the amendment to its charter, passed in 1903, being modeled after the cantonal law of Schaffhausen, Switzerland. From Los Ange¬ les the movement has spread to many of the western cities, particularly to those which have adopted the commission form of government. In 1907 Iowa applied the principle to cities of 25,000 or more population and in 1908, by a large majority, Oregon made every State offi¬ cial, including judges of every grade, (<subject to recall by the legal voters of the state or of the electoral district from which he is elected.® As applied to public officers, the Oregon law is typical, though later laws differ in minor details. In Oregon the recall petitions must bear the signatures of 25 per cent of the number of electors who voted at the preceding election in the district of the person whose recall is de¬ manded. Should the official refuse to resign within five days after the petition is filed, his name, as well as that of any other candidate nominated, is placed upon the ballot for a special election, to be held within 20 days. This ballot contains a paragraph of not more than 200 words setting forth the reasons why recall is demanded, and a similar space is allowed the official to plead his case. If the official fails to obtain a' majority of the votes cast, the success¬ ful candidate serves the unexpired term ; the discredited official is deemed removed when the successful candidate has qualified for the office. But the Oregon statute contains a prohibition against the circulation of a peti¬ tion to remove a State official unless he has been in office for six months, while members of

the legislature may be recalled after the lapse of five days from the opening of the legislative session following their election. If a recall be unsuccessful, any further petition must be accompanied by sufficient money to cover the cost of a new election, this sum to be raised by the petitioners. Boston employs a limited power of recall. The mayor's term of office is four years but at the State election one month prior to the expiration of the mayor's second year in office the ballot must contain the question : ((Shall there be an election of mayor at the next municipal election?® If the vote be in the affirmative any number of candidates may run against the mayor at the ensuing elec¬ tion. A general average of the laws would place the percentage of petitioners at about 25, California requiring 12 per cent for State offi¬ cers, with special restrictions, while 15 per cent is necessary under the commission government laws of South Dakota and under the special charters of Oakland, Modesto, Vallejo and Santa Cruz, Cal. ; 20 per cent under the com¬ mission government laws of Washington and the special charters of Grand Junction, Col., Mankato, Minn., Pontiac, Mich., Fort Worth and Denison, Tex., Parkersburg, W. Va., Stockton, Cal., Wyandotte, Mich, and Lowell, Mass. ; 25 per cent under commission government laws of Montana, Wyoming, New Jersey, Kansas and the special charters of San Luis Obispo, Eureka,

Bartlesville and McAlester, Cal., Sapulpa, Okla., Austin, Tex., Lawrence and Haverhill, Mass, and Gardiner, Me. ; 30 per cent under commis¬ sion government laws of Nebraska and under charters of Ardmore and Enid, Okla., and Colo¬ rado Springs, Col. ; 33 per cent under the com¬ mission government law of Louisiana ; 331/ 3 per cent under the commission government law of Wisconsin and the special charter of Corpus Christi, Tex. ; 35 per cent under commission government law of Idaho and in Dallas, Tex., Oklahoma City and Tulsa, Okla. and Wilming¬ ton, N. C. ; 40 per cent under the special char¬ ters of Holdenville, Okla. and Knoxville, Tenn. ; and 55 per cent under the commission .govern¬ ment law of Illinois.

In South Dakota the recall may be invoked against city officials, and this process of re¬ moval has been adopted in some cities of Massachusetts, New Jersey, Florida, Alabama, Louisiana, Kansas, Nebraska, North Dakota, Wisconsin, Wyoming, IdahOj Nevada, Wash¬ ington, *etc.* Sweeping recall amendments have been adopted in California (1911), Nevada and Colorado (1912, the law of the latter State applying to judicial decisions also), and in 1912 Arizona struck from the recall provision in its

1911 constitution the clause which excepted elective judicial officers from the operation of the recall. In 1912 Idaho and Washington, in 1913 Michigan and in 1914 Louisiana adopted amendments which made the recall operative against all State officials except the judiciary. In 1914 Kansas adopted a law which applies to appointive as well as to elective officers. In

1912 the Arizona legislature adopted a measure the intent of which was to apply the recall to United States senators, representatives and judges, but since these officials hold office un¬ der the Federal Constitution they are not di¬ rectly amenable to recall in a State election. As regards a Federal judge the people may advise his resignation and suggest to the Presi¬ dent a person they deem fitted for the position, but the question of action on the advice given depends entirely upon the judge and the Presi¬ dent. Respecting senators and representatives, however, the advisory recall is of great

moment; the candidates, who are nominated in direct primaries, are afforded the option of pledging or refusing to pledge themselves to obey an advisory vote of recall and few care to incur public opposition by withholding the pledge.

The recall of judicial decisions was proposed by Mr. Roosevelt in 1912, his idea being that the people should have the right not only to recall a decision itself but to ratify or dis¬ approve the constitutional principle upon which the decision was based. On 21 Feb. 1912, when addressing the Ohio constitutional convention, he said: ((If any considerable number of peo¬ ple feel that a decision is in defiance of justice, they should be given the right by petition to bring before the voters at some subsequent elec¬ tion, special or otherwise, as might be decided, and after the fullest opportunity for deliberation and debate, the question whether or not the judges' interpretation of the constitution is to be sustained.® In 1912 the people of Colorado initiated and adopted an amendment to the State constitution providing for the recall of judicial decisions, the use of the referendum being granted to the people for the purpose of

ordering the enforcement of a statute which, after passage by the legislature and approval by the governor, has been vetoed by the State Supreme Court. See Initiative; Refer¬ endum.

Bibliography. — Beard and Schulz, docu¬ ments on State-wide Initiative, Referendum and Recall5 (New York 1912; gives text of laws of various States) ; Barnett, J. D., (Operation of the Initiative, Referendum and Recall in Oregon5 (ib. 1915; gives bibliography relating to Oregon) ; Bourne, J., Jr., (Initiative, Referendum and RecalP (in Atlantic Monthly, Vol. CVIII, pp. 122-30, 1911); Bacon, E. M. and Wyman, M., direct Elections and Law¬ making by Popular Vote5 (Boston 1912) ; Hen¬ drick, B. J., (Recall in Seattle5 (in McClure's Magazine, Vol. XXXVII, pp. 647-63, 1911); Lowell, A. L., (Public Opinion and Popular Government5 (New York 1913) ; McLaughlin, A. C., (The Courts, The Constitution and Parties5 (Chicago 1912) ; McCall, S. W., Representative against Direct Government5 (in Atlantic Monthly, Vol. CVIII, pp. 454-66, 1911) ; Munro, W. B., initiative, Referendum and Recall5 (New York 1912) ; Oberholtzer, E. P., Referendum, Initiative and Recall in America5 (ib. 1912) ; Phelps, E. M., (Selected Articles on the RecalP (2d ed., White Plains, N. Y., 1915) ; Wilcox, D. F., Government by all the People : The Initiative, the Referendum and the Recall as Instruments of Democracy5 (New York 1912) ; Gome Indirections of Direct

Government5 (in The Nation, Vol. CII, pp. 243-44, 2 March 1916) ; Woodburn, J. A., ˆPolitical Parties and Party Problems (rev. ed., New York 1914). In The National Municipal Review (Vol. Ill, pp. 693-701, Octo¬ ber 1914) is a summary by Charles F. Taylor of the uses of the initiative, referendum and recall in various cities up to 1914.

RECAMIER, ra-ka-me-a, Jeanne Fran¬ cois Julie Adelaide Bernard, French social leader: b. Lyons, 4 Dec. 1777; d. Paris, 11 May 1849. She was educated at the convent of La Deserte. At 16 she went to Paris, whither her father, a wealthy banker, had transferred his business. Her extraordinary beauty and talents brought round her shoals of suitors belonging to the world of letters, finance and politics, and in 1793 she was married to Jacques Recamier, a rich banker, more than double her own age. The Recamier salon was long filled with many of the celebrities of the day. Though she wrote nothing, she, by her confidential intercourse with Chateaubriand and others, exercised no slight influence on French literature. Under the empire she was opposed to Napoleon, as he had placed her father under surveillance for his royalist tendencies, and Napoleon took his re¬ venge by refusing to support the bank of her husband during a crisis. It accordingly failed, and Madame Recamier was obliged to quit Paris. She took up her residence with her friend Madame de Stael at Coppet, and after¬ ward traveled, like her, until the downfall of Napoleon, when she again opened her salon in the Abbaye-aux-Bois at Paris. Consult (Souve¬ nirs et Correspondance tires des Papiers de Madame Recamier5 (1859, 4th ed., 1873) and (Madame Recamier5 (1872), both edited by her niece, Madame Lenormant ; also the biography by Brunier (1875).

RECAPITULATION, or BIOGENETIC

LAW, in zoology, terms applied to the parallel which exists between the embryonic develop¬ ment of an individual animal (ontogeny) and the historical evolution of its race (phylogeny). This parallel is explained by the theory of evo¬ lution (q.v.), according to which, in the words of Sidgwick, ((the developmental history of the individual

appears to be a short and simplified repetition, or in a certain sense a recapitulation, of the course of development of the species.® This class of facts was recognized more or less completely by the earliest naturalists, and was extensively studied and formulated by Von Baer and Agassiz previous to the explana¬ tion of them by means of the doctrine of descent; but it should be added that obscurities still exist, concerning the explanation of which embryologists are in doubt or at variance. Ex¬ amples may be found in the embryological de¬ velopment of all vertebrates. Thus the frog develops through stages in which the embryo just before hatching is very fish-like, after hatching becomes a tadpole which exhibits many newt-like characters ; and finally reaches the permanent frog stage. This accords with the comparative rank of the fish, newt and frog groups in classification ; and also with the suc¬ cession appearance of these groups. Man, as the highest animal, exhibits most completely these phenomena. In the earliest stages the human embryo is indistinguishable from that of any other creature. A little later the cephalic legion shows gill-slits, like those which in a shark are a permanent feature, and the heart is two-chambered or fish-like. Further develop¬ ment closes the gill-slits, and the heart changes to the reptilian type. Here the reptiles stop, while birds and mammals advance further; but the human embryo in its progress to the higher type recapitulates and leaves features character¬ istic of lower mammalian forms — for instance, a distinct and comparatively long tail exists. Most of these changes are completed before the embryo is six weeks old, but some traces of primitive and obsolete structures persist throughout life as ((vestiges® or <(rudimentary organs,® and others appear after birth in infancy, as the well-known tendency of babies to turn their feet sideways and inward, and to use their toes and feet as grasping organs, after the manner of monkeys. This recapitulation of ancestral characters in ontogeny is not com¬ plete, however, for not all the stages are repro¬ duced in every case, so far as can be perceived ; and it is irregular and complicated in various ways among others by the inheritance of ac¬ quired characters. The most special students of it, as Haeckel, Fritz Muller, Hyatt, Balfour, etc., distinguish two sorts of recapitulation <(palingenesis,® exemplified in amphibian larvae and <(ccenogenesis,® the last manifested most com¬ pletely in the metamorphoses of insects. Palin¬ genesis is recapitulation without any funda¬ mental changes due to the later modification of the primitive method of development, while in coenogenesis, the mode of development has suf¬ fered alterations which obscure the original process of recapitulation, or support it entirely. See Embryology, and consult authorities men¬ tioned thereunder.

RECAPITULATION IN PLANTS. See

Plants, Recapitulation in.

RECEIPT, in law, a written document, de¬ claring that certain goods or a sum of money have been received. When made out in full, a receipt should contain (1) the date when the merchandise or money was received, (2) the name of the person or firm from whom re¬ ceived, (3) the name of the person who received it and (4) for what the money is paid or deposited. A receipt may be in full or in part payment of an account, and operates accord¬ ingly. A receipt, though evidence of payment, is not absolute proof, and this evidence may be rebutted by proving that it was given under mis¬ apprehension. A receipt made by an authorized agent is as good as one made by the principal. A joint trustee who signs a receipt for money, only because the receipt without his signature would have no effect, may, unless he is him¬ self in default, show that he did not receive the money, and can thus remove or limit his lia¬ bility; but a co-executor who is not under the necessity of signing a receipt to give it effect, is bound by the receipt that he signs.

RECEIVER, in law, is an officer of the court through whom the court, on account of its jurisdiction, takes possession of property which is the subject of a suit, for the purpose of pre¬ serving it from injury or loss, secures the pro¬ ceeds and finally disposes of them according to the rights of all parties interested. Receivership is a remedial agency for the purpose of preserv¬ ing the property in question from waste, de¬ struction or deterioration pending litigation; it is auxiliary to the main' action. It is a remedy which originated in the English Court of Chan¬ cery and is purely equitable. Under the existing English law, and also that in Canada, a receiver may be appointed when the court deems it just or convenient. In the United States, courts of equity have .general authority to appoint receiv¬ ers, and in most States by statutory provision. The courts are generally disinclined to appoint a receiver, except that from all the circum¬ stances it appears essential for the purpose of the preservation of the property in controversy. Technical injuries and circumstances which are doubtful are insufficient. A receiver will be ap¬ pointed to prevent a fraudulent transfer, or pos¬ session of property, or for the protection of estates, or of property of a partnership where dissolution is desired and the partners cannot agree; of mortgaged property, foreclosure pro¬ ceedings, corporations which are insolvent, or which are fraudulently managed. The appoint¬ ment of a receiver rests entirely within the

dis¬ cretion of the court to which the application is made, and the court also has discretion as to its choice of receiver. One will not be appointed a receiver who is not qualified to perform his duties, and he must be impartial, independent and disinterested. A corporation may be ap¬ pointed a receiver if authorized by its charter. In order to obtain a receiver one must show the right to the property, or a lien upon it, or that the property in question was obtained by fraud, or is in danger of loss from waste, or the misconduct or insolvency of the party in possession, and the circumstances must show extreme necessity. A receiver is created by the court whose officer he is and is under its con¬ trol, supervision and protection. His duty is purely ministerial and the utmost good faith is required of him ; his acts should be with the

general or special authority of the court and must be without discrimination for the interests involved. A receiver may employ counsel, agents and assistants, make necessary repairs, pay taxes and bring suits. He must keep the property insured and is required to give a bond for faithful performance of his duty. He takes complete possession of the property at the time when appointed ; his liability is generally official, and he is responsible to any person who sus¬ tains loss through his negligence or misconduct in relation to his trust ; he is entitled to a com¬ pensation for his services, which is in some jurisdictions fixed by statute, in others by the discretion of the court. Consult Alderson, W. A., (Practical Treatise on the Law of Receivers> (New York 1905) ; High, J. L., (Treatise on the Law of Receivers) (4th ed., Chicago 1910) ; Kerr, (Law and Practice as to Receivers) (6th ed., Toronto 1912) ; Smith, J. W., (The Law of Receivership) (Chicago 1897).

RECEIVING STOLEN GOODS, in law ,

the taking possession, with felonious intent, of goods known to have been stolen. Positive knowledge of the theft is not required to prove guilt if the circumstances are such that ordinary powers of observation would detect theft. The fact that one receiving the stolen goods may

not intend to profit by it does not change the character of the offense, the act of aiding the thief being criminal. An intention to hold for a reward also comes under the classification of fraudulent intent. The offense is a felony or a misdemeanor, according to the value of the goods received and is either classed with lar¬ ceny or punished with similar severity.

RECENT PERIOD. That division of the geological time-scale including the most recent portion of geological history. It is usually thought of as beginning with the appearance of man on the globe and running down to the present, and is, therefore, sometimes called the Human Epoch. It follows immediately .upon the Pleistocene Period (q.v.) and is treated as a subdivision of this by some geologists, while others group Pleistocene and Recent under the Quaternary Period (q.v.). See Geology.

RECHABITES, rek'a-bits, members of a kind of religious order in ancient Israel whose rule was in some respects like that of the Nazir or Nazarites. Like them they were bound by vow to abstain from the use of wine. .In their contempt for luxuries and the ways of settled life, they chose to live in tents rather than houses, and refused to sow grain or plant vine¬ yards ; their ideal was the nomad patriarchal life amid their flocks (35 Jer., 2-19). The order had its origin in the northern kingdom of Israel and was founded by Jonadab or Jehonadab, son of Rechab (whence the name Rechabites), in the reign of Jehu, king of Israel (2 Kings, x). After the fall of the kingdom of the North a body of the Rechabites entered the kingdom of Judah and continued to live apart from cities and towns till the approach of Nebuchadnezzar they took refuge in Jerusalem. Independent Order of Rechabites is the style of a total-abstinence beneficial society founded in Eng¬ land 1835 and of which a branch was instituted in the United States 1842. In 1916 the order had 701,040 members in the United States and Great Britain, organized in four grand and 4,037 subordinate tents.

RECIDIVISTS, in law, offenders who re¬ lapse into former criminality. Statistics show that a large percentage of persons convicted of crime are old offenders, or recidivists. Figures differ in various countries and in various parts of the same country as to the percentage. Per¬ haps at least 40 per cent is the average, but in some countries as high as 70 per cent has been reported. It is quite probable that more than half the serious crimes committed to-day in the United States and in other civilized countries as well are committed by recidivists, who have adopted crime as a profession. Modern penal systems have proved

unable to cope with the evil by present-day methods, and it is admitted that a change is imperative. Indefinite terms of imprisonment have been suggested and are being adopted in many countries to meet the condition. In the United Kingdom, by the Prevention of Crime Act of 1908, the courts have been empowered to add a further period of from 5 to 10 years on habitual criminals in addition to a sentence of penal servitude.

In the United States the indefinite term has been accepted also as one methpd to combat the evil of recidivism, and the general tendency in some States is in this direction. However, in other States there seems to be a strong sen¬ timent growing in favor of supplying industrial training for criminals while in prison and secur¬ ing employment for them on their discharge. In addition to these methods, segregation of defectives, who make up a considerable part or the inmates of prisons, and organized care of. penniless children, whether orphaned or de¬ serted, from among whose ranks many crim¬ inals are later developed, are advocated and are being put into effect. This is attacking the problem at its source, and its general adoption would, it is believed, lead to a great decrease in crime. See Penology.

RECIFE, Brazil. See Pernambuco.

RECIPROCAL, in grammar, reflexive. Applied to verbs which have as an object a pro¬ noun standing for the subject; as, (<Bethink yourself.® It is also applied to pronouns of this class ; as a noun, that which is reciprocal to another thing. Specifically, in mathematics, the quotient resulting from the division of unity by the quantity. The reciprocal of a vulgar fraction is the denominator divided by the numerator.

RECIPROCITY. See United States, Reciprocity.

RECITATIVE, res”i-ta-tev’ (Italian, reci-tativo) , a species of musical recitation, forming the medium between song and rhetorical decla¬ mation, and in which the composer and per¬ former, rejecting the rigorous rules of time, endeavor to imitate the inflections, accents and emphasis of natural speech. Although the rules of time and rhythm are not strictly ob¬ served, recitative is written generally in com¬ mon time, in order to facilitate the reading. In its approach to speech, therefore, recitative is mostly syllabic song, that is, each syllable has generally but one tone, and the tones themselves are less prolonged than in song strictly so called. Hence recitative has not a distinct, developed melody and a regular modulation ; it may, according to the meaning of the words, pass with comparative freedom through the

various tones. On the other hand, the tones

of recitative are generally musical tones, of dis¬ tinct height or depth generally, because in rccitativo parlante, in the opera bnffa, the tones become closely allied to those of speech. When recitative approaches still more to strict song, in respect to time and melody, the arioso originates. In short recitative may be called declamation in musical tones. Recitative in¬ cludes the simple (by some also called the parlante) and the accompanied, or more prop¬ erly, the obbligato. In simple recitative ac¬ companiment also takes place, but it consists only in simple chords, which are given continu¬ ously, or interruptedly. In the obbligato recita¬ tive the instrumental accompaniment is of more importance, and consists of either sustained chords by the greater portion of the orchestral instruments, or even of florid passages. In the recitative much is left to the singer in respect to time, rhythm and melody, which require much musical judgment and knowledge of har¬ mony, in order to agree with the obbligato ac¬ companiment. Recitative was used largely in the ancient drama, and is frequent in the mod¬ ern opera to express some action or passion, to relate a story, reveal a secret or design, *etc.* Giulio Caccini (abt. 1546-1615), called by An¬ gelo Grillo ((the father of a new style of music,® Emilio del Cavalieri (abt. 1550-99), and Claudio Monteverde (1567-1643) are each credited with having introduced the recitative in Rome. See Opera.

RECKE, rek'e, Ernst von der, Danish poet : b. Copenhagen, 14 Aug. 1848. His first work was a lyrical drama, (Bertram of Born) (1873), performed with great success at the Theatre Royal at Copenhagen. Following this came (King Liuvigild and his Sons' (1878), a tragedy; a dramatic poem (Archilochus' (1878) ; (Knud and Magnus' (1881), a tragedy; (Fru Jeanna' (1891), a tragic opera; and the (Duchess of Burgundy' (1891). Between 1876 and 1890 he published several collections of lyrics and in 1881 a great work representig six years of labor in a field in which he is a recognized master, Principles of Danish Versi¬ fication as Manifested in Its Historic and Sys¬ tematic

Development.' Besides writing books for children he has published translations of Bornier's (La Fille de Roland' (1876) and Rostrand's (Les Romanesques' (1896).

RECKLINGHAUSEN, rek'ling-how-zen, Prussia, in the province of Westphalia, 15 miles northwest of Dortmund, 31 miles southwest of Munster. It has good Catholic and Protestant schools. Its manufactures include damasks, wicks, tobacco, cabinet wares and bricks. There are coal mines in the vicinity. Pop. about 35,000.

RECLAMATION LAWS. Under this heading are treated two groups of statutes known respectively as the Carey Act and the Reclamation Law.

The Carey Act provides for the grant of 1,000,000 acres of desert land in each of the States in which desert land occurs upon condi¬ tion that the State will secure the reclamation of these lands whereupon patent will issue to the State or its assigns. Recent legislation has increased the grant to 2,000,000 acres each for Idaho and Wyoming.

The usual plan is for the State or Terri¬ tory to make a contract with a corporation by

which the latter is to build the works and may make certain charges for the water rights, the State selling the lands at a price which is usually nominal.

A comparatively small amount of land has been reclaimed under the Carey Act. Of the 14 States that could have taken advantage of this act nine have requested segregations with a view to reclamation, amounting to about 3,700,000 acres. The total area which has been patented upon proof of reclamation up to 30 June 1915 is 601,573.38 acres.

It is evident, therefore, that the Carey Act did not meet some of the more difficult con¬ ditions of reclamation in the large area of arid lands that might be reclaimed, variously esti¬ mated at from 20 to 50 million acres.

As early as 20 March 1888 Congress had authorized a thorough study of the water supply of the Western States where irrigation is needed, and on 2 October of that year had made an appropriation for the selection of reservoir sites which when designated by the director of the geological survey were to be held reserved until further action of

Congress. The following year another appropriation was made for continuing the work. After that no further appropriation was made for a number of years. The reservoir sites which had been reserved, numbering several hundred, were still to some extent available for use and some of them have been used by the government. A number have been take by private parties under a gen¬ eral permissive act of 26 Feb. 1897.

On 17 June 1902 Congress went a step further toward completing the policy initiated by the irrigation survey of 1888 and 1890 and appropriated the proceeds from the sales of public lands in the arid and semi-arid States for the construction of irrigation works. Under this act the Reclamation Service was organized and has constructed a large number of irrigation systems. The cost of construction is repaid by the water users and these repay¬ ments, together with the annual receipts from the sales of public lands, constitute a revolving fund to be used indefinitely in continuing this work. The Reclamation Service has now under irrigation more than 1,500,000 acres of land. The completed systems which have heretofore been constructed and are partially in use will provide for the irrigation of about 3,000,000 acres, and under the plan of re-expending the amount returned for the cost of the work this area may be ultimately much increased.

For a detailed statement of the work under the Reclamation Act see United States Re¬ clamation Service.

RECLUS, ra-klii, Jacques Elisee, French

geographer: b. Sainte-Foy-la-Grande, in the Gironde, 15 March 1830; d. Brussels, Hol¬ land, 4 July 1905. After being educated in the college of his native town and at the Uni¬ versity of Berlin he traveled in Germany, Eng¬ land, Ireland and America. In 1859 he began to contribute to the (Revue des Deux Mondes' articles on geography, geology, literature, poli¬ tics, social economy and other subjects, and also became associated with several geographical journals. During the siege of Paris and the Commune he was a member of the National Guard. Captured early in 1871 he was con¬ demned to deportation, but his sentence was

commuted to exile and he spent some years in Italy and Switzerland. In 1883 the Tribunal at Lyons passed sentence upon him and Prince Kropotkin as being anarchist leaders associ¬ ated with the International Workingmen's As¬ sociation, but Reclus escaped punishment by his absence from the country. In 1892 he was ap¬ pointed professor of comparative geography in the free university of Brussels. His greatest work is his (Nouvelle Geographic Universelle : La Terre et les Hommes> (1875-94), a splendid monument of the best geographical learning of our time. There is an English translation by Ravenstein and Keane (1887 onward). His other works include (La Terre : Description

des Phenomenes de la Vie du Globe) (1867-68), translated into English as (The Earth* (1871) ; (Histoire d'un Ruisseau* (1869) ; (Nice, Cannes, Antibes, Monaco, Menton, San Remo) (1870); (Les Phenomenes Terrestres: Les Mers et les Meteores* (1873) ; (Histoire d'une Montagne) (1880), translated as (The History of a Mountain (1881) ; and ^'Evolu¬ tion, la Revolution et l'ldeal Anarchique)

(1898)^ treating of his social philosophy. His publications relating to the United States in¬ clude (Le Mississipi, etudes et souvenirs) (1839) ; (Le delta du Mississipi et la Nouvelle Orleans* (1859) ; (De l'esclavage aux Ltats-Unis, le code noir et les esclaves) (1860) ; (Les planteurs de la Louisine et les abolitionistes* (1861) ; (Le Marmorisine et les Ltats-Unis* (1861) ; (Le caton et la crise Americaine*

(1862); (Les livres sur la crise Americaine:

guerre de la secession* (1862) ; (Les Noirs Americains depuis la guerre civile aux fitats-Unis) (1863) ; (Histoire de la guerre civile aux Ltats-Unis* (1864) ; and (La commission sani-taire de la guerre aux fhats-Unis, 1861— 1864>

(1864).

RECOGNITION MARKS. See Colora¬ tion, Protective.

RECOGNIZANCE, or RECOGNI¬ SANCE, in law, an obligation of record, which a man enters into before some court of record or magistrate duly authorized, with condition to do some particular act ; as, to keep the peace, to pay a debt or the like. If the condition is not performed, the party bound by the bond forfeits his recognizance, as,

in the case of a debt, the amount specified becomes immediately due.

RECOLLECTIONS OF CHILDHOOD AND YOUTH. Renan's (Recollections of Childhood and Youth) ((Souvenirs d'Enfance et de Jeunesse*) were written between 52 and 60, as the matured Orientalist and philosophic interpreter of religious evolution looked back with Celtic sensitiveness of poetic fancy on his own impressionable and strangely-ordered youth and the struggles of his adolescent man¬ hood for intellectual emancipation. It is one of the world's rarest books of psychic interpre¬ tation and, except perhaps his (Life of Jesus,* the work for which Renan is most widely known. It tells of his childhood at Treguier in Brittany, subtly bringing out the divided in¬ heritance from a father of old republican sea¬ faring folk, and a mother, half Gascon, half Breton, of the royalist trading middle class, in¬ tense in the sincerity of her simple, exceedingly narrow devotion. The resultant psychic com¬ plexity can be traced, with his words as guide,

through his whole after career. There are pleasant pictures of the seminary at Treguier, with warm appreciation of the virtues of the Breton clergy and fascinating digressions on Breton piety. Then the (Recollections* tell how, not yet 16, he was suddenly summoned to Dupanloup's just reorganized seminary, Saint Nicholas du Chardonnet at Paris, (<morally fixed, but as ignorant as one could be, with everything to discover.** How his mind un¬ folded here and later at the Sulpician houses at Issy and in Paris is told with kindly dis¬ criminating account of his teachers and their ways. Gradually his philosophical and then his Hebrew studies brought about a struggle be¬ tween vocation and conviction, the more inti¬ mate details of which were first revealed after his death in the correspondence with his sister Henriette, a very remarkable woman and the strongest personal influence in his life. With his breaking away from Saint Sulpice in 1845, a brief experiment at teaching in an Oratorian college, and his final self-emancipation, the Recollections* end. This simple story of a young man's struggle to be true to his higher self is told with a frank directness, a subtlety of psychic perception, a sympathy for all noble feeling and honest conviction that give the book singular charm. An abridgment of the (Recollections> has been edited for schools (Boston 1902).

Benjamin W. Wells, Author of (Modern French Literature .*

RECOLLET, rek'6-let, or RECOLLECT,

the name given to certain reformed bodies of the Franciscan and other orders in the Roman Catholic Church. Among orders of men, an offshoot of the Augustinian hermits, which, un¬ der Louis de Montaya, obtained considerable popularity in Spain, was called by this name, and the order still exists at Medina-Sidonia, Leon and Pamplona; but outside of Spain the order is better known under the title of Re¬ formed Franciscans, who were established in France under Henry IV and Louis XIV, and spread thence into Belgium and Germany. In France, before the Revolution, this order had 168 houses, forming seven provinces, under the direction of the general of the Cordeliers. It is also known as the Friars Minor of the Strict Observance of Saint Francis. In Spain an off¬ shoot of the Cistercian order of nuns was also called by the same name. See also Orders, Re¬ ligious.

RECONCENTRADOS, re-kon-sen-tra'do, a Spanish term applied to the inhabitants of the rural districts of Cuba forced by the Spaniards, during the final war for liberty, to go to reten¬ tion camps. Governor-General Weyler issued a decree that all of the peasant class not ac¬ tively engaged in the insurrection but at their homes or ranches should be ˆconcentrated® in or near certain towns. Disobedience to this de¬ cree incurred the penalty of death. General Weyler's purpose was to desolate the island in certain parts so that the insurgents could not get aid and food. With this end in view, the aban¬ doned homes were frequently destroyed and whatever remained of value to the Spaniards was confiscated. Whole districts in the most productive part of the island were thus laid waste. Sugar mills were burned and other in¬ dustrial property destroyed. Nearly 400,000

<(reconcentrados® were forced within the Span¬ ish lines. General Blanco permitted the (<reconcentrados® to return to their homes.

RECONNAISSANCE, re-kon'a-sans, the examination of a territory, district, etc., or of an enemy's position, for the purpose of direct¬ ing military operations. Also the preliminary examination of a country or district in refer¬ ence to its general natural character, prepara¬ tory to a more particular survey for the pur¬ poses of triangulation or the construction of public works, as of a road, canal, railway, *etc.* The

development of the aeroplane has entirely altered the character of reconnaissance in war. Formerly the cavalry were relied upon to make quick dashes into an enemy's territory and dis¬ cover the nature of the roads, the high points, woods, streams, etc., and all they could learn of the enemy's strength and disposition of his force. But since the formation of aero squad¬ rons, they have taken over nearly all this work wherever they exist, as they obviously can per¬ form it to much better advantage. But for minor operations and for irregular warfare where aeroplanes are not available the old methods of observation obtain. Small bodies of independent cavalry are best, but where roads permit, automobiles and motorcycles are some¬ times employed; or sometimes the duty will fall upon the infantry. In fact, a certain amount of reconnaissance must fall upon the infantry un¬ der any system, for the commander of forces in the field must keep himself informed as to his surroundings and guard against surprise at¬ tacks. It is common to send out small bodies of men at night to wander over the area be¬ tween opposed armies and learn all they can of what is going on. A reconnaissance in force is the advance of a considerable body of troops with the idea of being able to fight effectively if attacked, or perhaps to form the vanguard of an attack. Reconnaissance is always closely al¬ lied with signaling (q.v.). See also Aero¬ nautics, History of, and various military titles.

RECONSTRUCTION. See United

States, Reconstruction.

RECORD includes anything which is set down in writing for the purpose of preserving memory and may be of a public or private na¬ ture. A record in a lawsuit is a complete writ¬ ten history of it from its beginning to its de¬ termination made by an officer duly authorized. In general, the rule is well settled that the pleadings which make up the record do not en¬ ter into details of the evidence, but merely set forth the conclusions or inferences, leaving the details of evidence to be supplied at the trial be¬ fore a jury, or, if there is no jury, at the hear¬ ing before the judge or court. A trial by rec¬ ord means that one of the parties has set up some former decision of the court, while the other denies that such a decision ever existed; whereupon the only mode of solving the ques¬ tion is by producing the record of the former action. All books and memorials kept by pub¬ lic officers in accordance with the law, or which are connected with the proper discharge of their duty, are regarded as public records, as are also copies of papers which statutes require to be filed in public places. Generally anyone has a right to inspect public records and in many jurisdictions the removal of public rec¬ ords is regulated by statute,

some of which hold

that to destroy, or remove, or injure the rec¬ ords is a criminal offense.

RECORDE, rek'ord, Robert, English mathematician: b. Tenby, Pembroke, about 1510; d. London, 1558. He studied at Oxford, was elected to a fellowship of All Souls' in 1531, studied, and probably taught, mathematics and medicine at Cambridge, and later was in¬ structor in a variety of subjects at Oxford. Having gone to London, he became, it is said, physician to Edward VI and Queen Mary. In 1551 he was made general surveyor of the mines and money; but despite this post seems to have been imprisoned for debt in King's Bench prison, where he certainly died. Among his works were {The Grounde of Artesˆ (1 540— 1699), a work on ((teachinge the worke and prac¬ tise of Arithmeticke® ; (The Urinal of Physick> (1547), a comprehensive treatise on medicine; (The Pathway to Knowledge, or First Prin¬ ciples of Geometry) (1551-1602) ; (The Whet¬ stone of Witte, or the Second Part of Arith¬ metic (1557), the former a treatise on geom¬ etry, the latter on algebra; (The Castle of Knowledge, a Treatise on Astronomy and the Sphere) (1551). For over a century his mathe¬ matical works were used as textbooks in the schools of England. He was the first to use the sign = for equality and to discover the method of extracting the root of multinomial algebraic expression. Besides his mathematical pre-emi¬ nence, Recorde was considered to be a skilful physician, an able lawyer and an accomplished philologist.

RECORDER, a title of ancient English derivation, the recorder in England being a person associated with the mayor and other magistrates of any city or borough, having jurisdiction in a court of record, for their better direction in matters of justice and proceedings according to law. The title is also given in some American States to an official having charge of real estate and other records and in New York it is applied to one of the criminal judges.

RECORDER, an obsolete musical instru¬ ment, formerly popular, resembling a flageolet in shape, with a mouthpiece like a bird's beak. The instrument was wider in the lower half than in the upper; its tones were soft and pleasing and an octave higher than the flute. Milton speaks in his (Paradise Lost) of

The Dorian mood of flutes and soft recorders:

it is also mentioned by Shakespeare in (Ham-let> and Bacon, in his (Natural History) says <(The figures of recorders, and flutes, and fifes, are straight; but the recorder hath a less bore.®* The instrument was also used to teach birds to sing.

RECORDING OF CONVEYANCES

OR DEEDS, the official and public registra¬ tion in all States of all conveyances of land, made at full length, either in the office of the clerk of the county where the land is situated, or in what is known as the register's office. The statutes requiring these records are known as Recording Acts, and their purpose is to ap¬ prise subsequent purchasers or encumbrancers of the property, of the existence of the prior deeds of conveyances and of their contents ; the due recording of a conveyance is by these <(acts® made constructive notice to all subse-

quent purchasers or encumbrancers ; and unless a conveyance is so duly recorded it is void as against a subsequent purchaser or encumbrancer in good faith who has no notice of the exist¬ ence of such conveyance and whose deed is first duly recorded. In some States an un¬ recorded deed is fraudulent and void as against all creditors of the grantor and as against sub¬ sequent purchasers or encumbrancers for value without notice, even though their deeds be not recorded; but it is generally valid as against the grantor, his heirs and devisees, or against all persons having actual notice of it; in only one of the States is an unrecorded deed void as between the parties. Recorded deeds, other things being equal, take priority according to the time of record; and a deed is deemed re¬ corded in most of the States from the time it is filed for record, i.e., from the time the minute is made on the deed, index, or entry-book by the register or county clerk. This minute con¬ sists of the day, the hour and the minute of filing. Records of all deeds must be entered alphabetically in two indexes, one under the grantors' names, the other under the grantees' names ; separate indexes and record books are kept for conveyances and mortgages. Com¬ monly after record, the deed is delivered to the person entitled to it. In nearly all the States, in order that a deed may be recorded, a certi¬ ficate of acknowledgment, before a proper offi¬ cer, of its due execution is necessary, or else its execution must be proved by an attesting witness and the proof must be properly certi¬ fied by a proper officer; in addition to this, a seal of the grantor is generally necessary. Generally all deeds of real estate, mortgages, contracts relating to and affecting real estate, may be recorded. A duly recorded conveyance or instrument or a certified copy thereof may be read in evidence without further proof. If the land is situated in several counties, the deed or a certified copy thereof ought to be recorded in each of the counties. The Record¬ ing Act or statute usually prescribes the manner of recording. In England the grantee receives from the grantor all the deeds affecting the property, the so-called muniments of title. This is due to the fact that conveyances are not generally recorded in that country, while such a practice is unnecessary in the United States, where the title is shown by the public record and the deed of conveyance is the only document delivered to the buyer. See Tor¬

rens Land System.

RECREATION CENTRES. It is only in

recent years that serious consideration has been given to the subject of recreation as a fixed phase of municipal life. The awakening of civic spirit, however, has shown that in order to receive the best from its citizens, the city is under obligation to endow them with both brain and brawn. As an economic and political entity, the strong, clean-minded and healthy person is the solution of many of the abusive shortcomings of city life, and to secure such, the idea of public recreation centres has taken firm hold. At first, the centre was a develop¬ ment of the gymnasium of the public schools, or of a place where young children might find amusements. But the idea has grown, so that to-day facilities are offered for persons of all ages or tastes.

In the United States, recreation has taken a

firm hold. The parks of the Upper part of the City of New York have been laid out with the idea of giving recreation facilities to the public. Central Park, with its tennis court, zoological park, art and natural history museums, mall and public concerts, rowing and skating, is the great city playground for those unable to go to the country. The athlete, golf player, tennis player and others interested in outdoor sports and civic meets finds every facility in Van Cortlandt Park, while Bronx Park, with its zoological and botanical attractions, is the re¬ sort of thousands.

For purely athletic purposes, however, there recently has been planned and instituted a series of parks throughout the older down¬ town sections of the city, particularly in the tenement districts. The region known as ((Five Points® — once the centre of poverty and crime — has been opened up, and a large recreation centre established in the centre of the Italian colony, known now as Mulberry Bend Park. Hamilton Fish Park is another that has been created among the tenements, while De Witt Clinton Park is noted for its' ((farm school,® showing children the possibilities of rural life. The most interesting, perhaps, is Battery Park, at the extreme southern point of Manhattan Island, a place of interest to every visitor in the city for its notable aquarium, the immigrant landing, the view of the harbor and its

shipping, and its nearby trip to the Statue of Liberty. Numerous steamboats leave from Battery Park to the many bathing and resort beaches, picnic grounds and recreation centres, such as Coney Island.

Perhaps the greatest advances in the subject of recreation have been made in Chicago, a city that a generation ago ranked very low in per capita park space. Being of a level con¬ tour in general, there were but few points that offered special park features. Recently, with the quickening of civic spirit, the city govern¬ ment has taken steps to improve and extend its park system, particularly with the idea of serv¬ ing the public in its recreations, and to-day Chicago has not less than 60 playgrounds, which, together with the parks, cover an area of about 35,000 acres. Of chief interest, however, is the fact that recreation centres in Chicago have been developed on a plan which, for completeness, ranks with the best. The neighborhood park is a reality, a civic centre where persons of all ages may find recreation. Ball grounds, golf courses, tennis grounds, bathing beaches, swim¬ ming pools, bath houses, sand piles, lakes, read¬ ing rooms — most frequently in connection with branches of the Public Library — halls for public meetings, debate, and neighborhood theatricals, restaurants and lunch rooms, and even savings banks, are to be found in these parks. Grant Park, on the Lake Shore con¬ tiguous to the “Loop,® or business district, is one of the more recent additions. It is built in great part on made ground extending into Lake Michigan. Its chief point of interest is the Chicago Art Institute, the leading art museum of the city. Jackson Park, the former site of the Columbian Exposition, is likewise a place of interest to the lover of outdoors, on account of its golf courses and other grounds for games, but principally for its boating facilities, the many miles of lagoons for w’hich the Exposi¬ tion was noted being left in almost their original

state, and the islands formed by them are now wooded with apparently their primeval foliage.

A most significant single event in recent years has been the Massachusetts playground law, essentially a local option measure. It re¬ quires every city of 10,000 or more inhabitants to vote as to whether or not it would maintain playgrounds. Nearly 100 cities have voted and over 90 per cent favorably. New Jersey passed an enabling act in 1907 and Ohio in 1908, fol¬ lowed by Minnesota in 1910, and since by over 20 States ; by most of these acts the larger cities are empowered to issue bonds to acquire and improve sites for playgrounds and recrea¬ tion centres. City playground associations have popularized the movement in the cities. Vari¬ ous municipalities have playground commis¬ sions which look into the needs of the cities and make plans for the future. Some of the cities with such commissions are Minneapolis, San Francisco, Oakland, Berkeley, Philadelphia and New York. In the last-named city there is a special recreation commission which has inventoried all the recreational facilities of the city and endeavors to make them adequate to actual needs. In Buffalo tramping trips with the playground children have been tried with great success. The Chicago playground asso¬ ciation has been conducting similar trips for adults. New Orleans is accepting only such new school sites as have ample play space and is acquiring additional ground adjoining its present school buildings as fast as funds will permit. Cincinnati is also purchasing at great expense plots adjoining its older school build¬ ings. Spokane is making similar provisions for recreational space, as are many other cities, conspicuously Rochester, N. Y. A State law of Washington requires a minimum of 100 square feet of play space per child on all new school sites. Wading pools, swimming pools and field houses are common features that add much to the attractiveness and utility of American playgrounds.

In the United States at present more than 500 cities containing populations of 5,000 or over now possess playgrounds of which about 30 per cent are maintained by voluntary contributions, 20 per cent by boards of education and the remainder in some other way by the municipalities.

The New York board of education main¬ tains about 40 evening

recreation centres for young people of both sexes. In these centres the unit of organization is the boys' or girls' club. The aggregate attendance is about 2,000,000, or an average evening attendance of 10,000. Over 100 vacation playgrounds are maintained, while in several congested districts the playgrounds and rooms of schoolhouses are open to mothers and babies of the tenements. In summer the average daily attendance at the vacation playgrounds is 77,000. In rela¬ tion to recreation piers the department of docks and ferries constructed recreation piers with an upper story used for recreation purposes in eight river-front localities. These piers are open to the public from May to September or October and are maintained at an annual ex¬ pense of over $170,000 for music, lighting, at¬ tendants, *etc.* There is a concert on each pier every evening from 8 to 10. The piers vary in size from 300 feet to about 800 feet. On hot Sundays there have been as many as 12,000 peo¬

ple on the larger piers In Cleveland over four-fifths of the 114 public schools have audi¬ toriums, nearly one-third possess gymnasiums, while about one-half have one or more inside playrooms. Provision is made for the club and play activities for the after-class and evening periods which will draw boys and girls off from the street. Recreational and de¬ velopmental opportunities are afforded for young people's use during leisure time, while adult public discussion of school and civic mat¬ ters is facilitated in assembly halls. Many of the assembly-rooms are fitted with stereopticons, screens, stages, dressing-rooms and pianos. The after-class and evening utilization of the school edifices has assumed two main forms : (1) regular night-school sessions and (2) let¬ tings to various clubs and organizations for miscellaneous gatherings, entertainments and indoor games. In addition, there are a small number of affairs — entertainments, dances or bazaars — gotten up by or for the pupils of the schools. Public libraries and parks are also adapted to recreational purposes. Pittsburgh's playgrounds and recreation centres comprise 13 plots costing in the aggregate over $2,000,000. Washington, D. C., has over 30 recreation centres, well equipped and supervised. New¬ ark, N. J., maintains 17 school playgrounds, while Essex County, in which it is located, has a park commission which maintains playfields and outdoor gymnasiums in each of the city's five public parks.

In England, great strides have been made recently in providing recreation. The English are very fond of outdoor life, and provision has been made generally for grounds for cricket, football and golf in the suburban parks of the great cities. In London, the parks within the

city are mostly in districts too con¬ gested to allow for sports, but the many small squares that ‘have been opened in connection with the extension of streets and boulevards have been adapted to the needs of recreation, in particular playgrounds for children. Great changes have been made in the thickly populated Whitechapel district. Open places have been provided to give breathing space, where chil¬ dren may romp while their parents of the labor¬ ing class listen to music. Likewise, the open spaces around churches and schools have been devoted to the same purpose, in many cases suitable playground equipment being provided, along with qualified athletic instructors. When connected with the schools, this instruction is under the teachers. Saint James Park has a shallow wading pool that may be flooded to a considerable depth and used in winter for skat¬ ing. The greatest recreation park, however, in the city is Victoria Park, Bethnal Green, in the northeast of London. Outside of the greater cities, and in the smaller towns, every induce¬ ment is given to sports of all kinds. The new garden cities, of which there are many in con¬ nection with the great industrial centres, have been built with the primary purpose of giving every advantage of recreation to their inhabit¬ ants, young and old, and playgrounds, public band concerts, bathing facilities, reading rooms, theatres and club rooms have been amply pro¬ vided.

In Europe almost every city has its facilities for recreation, be it in public playgrounds, public baths, military concerts, or the many other pas-

times that local needs may suggest. In Ger¬ many the policy of the city and of the govern¬ ment is to encourage the spirit of outdoor life. Facilities have been provided in the cities on a scientific basis. Figuring on the average size of the German family, it has been estimated that of a population of 100,000, the number of children is from 12,000 to 15,000, and for each thousand of these there should be provided from 30 to 40 acres for recreation purposes. Such plans in effect have been carried out in many cities. Playgrounds have been provided near the centres of congestion. A great propor¬ tion of these

are located in connection with the public schools, and their control is vested in the teachers, who direct the outdoor exercises of their pupils as a part of the curriculum. As a rule, the children using the playgrounds are divided into groups, each of which has the freedom of the grounds twice a week, Sundays being reserved for students of the apprentice schools. These grounds in connection with the schools are suitably provided with the usual athletic and gymnasium equipment.

Modern ideas of recreation have taken firm hold in France to a great extent, but the French have never been accustomed to outdoor games to the same extent as the English or Americans. Taking Paris as an example, there are many large and small parks and squares where the inhabitants are accustomed to congregate and listen to martial music, but athletics are never of the violent sort. However, in connection with the public school system, in which education is compulsory, gymnastic and outdoor exercise and games are required. In some of the modern and model schools, grounds are fitted out with the most modern equipment with competent in¬ struction. The city has, however, a wonderful system of attractions that further the cause of recreation. The beautiful series of boulevards leading to the Bois de Boulogne and the Bois de Vincennes is an incentive to the inhabitants to walk a great deal, and in the evenings, on Sun¬ days and holidays these two parks are thronged with families that have gone there to spend the day, or even further, to Versailles or Saint Germain, two magnificent parks at some dis¬ tance from the city. The city has one particu¬ lar attraction — its numerous small steamboats on the Seine. For a few sous they will carry one far without the city limits to the country, where there are many spots that are the picnic grounds of the Parisians. Within the city are the Gardens of the Tuileries, the great chil¬ drens' playground. See also Baths, Public; Parks, Public.

Bibliography. — Curtis, Henry S., Educa¬ tion through Play1* (New York 1916) ; contains good bibliographies; id., Elay and Recreation5 (Boston 1914) ; Playground Association of America Publications and Yearbooks furnish complete details of the movement in America and in foreign countries (New York) ; Perry, C. A., Educational Extension) (Cleveland, O., 1916) ; Parks and Playgrounds Association, Statement Relating to Recreation in Greater New York) (New York 1910) ; Sperling, H., (The Playground Book.5

RECREATIVE RELIGipNISTS, the name of an association formed in London 1866 for the purpose of providing on Sunday even¬ ings popular lectures on scientific subjects with sacred music at intervals. An effort was made

to suppress the work of the association under the provisions of the <(Sunday Act,® 21 Geo. HI, ch. 49, but it failed, and the Recreative Religionists or Sunday Lecture Society now figures in the registrar-general's report among ((sects having registered places of worship.®

RECRUITING. See Army; Army Organ¬ izations; United States, Army of.

RECTANGLE, in geometry, a plane quadrilateral figure whose angles are all right angles. All rectangles are parallelograms, i.e., have the opposite sides parallel. An equilateral rectangle is a square. A rectangle is said to be contained by any two of the sides about one of its. angles; thus, if A B and B C represent two adjacent sides, the rectangle is said to be con¬ tained by A B and B C, or, as it is sometimes expressed, it is the rectangle under A B and B C. The area of a rectangle is equal to the product of its base and altitude. Rectangles haying equal bases are to each other as their altitudes; rectangles having equal altitudes are to each other as their bases.

RECTIFY, to refine common alcohol or spirit by distillation. The process of rectifying begins after the spirit itself has been distilled, and consists in removing the impurities from the spirit by fractional or repeated distillation, so far as possible, for it is impossible in this way to get rid of fusel oil. Whisky, brandy and. rum, if genuine, are made from rectified spirit. To rectify, in geometry, means to con¬ struct a straight line equal in length to a definite portion of a curve ; to rectify the globe, in astronomy or geography, means to bring the sun's place in the ecliptic on the globe to the brass. meridian or to adjust it in order to pre¬ pare it for the solution of a prepared problem. See Distilled Liquors.

RECTOR, specifically, one who rules, gov¬ erns or administers. In the Established Church of England a clergyman who has the care of a parish and has the parsonage and tithes — the clergyman of a parish where the tithes are not impropriate, as distinguished from a vicar; in the Roman Catholic Church, the head of a religious house; among the Jesuits, the head of a house that is a seminary or college; in Scot¬ land, the headmaster of an academy or im¬ portant public school; in France and Scotland, the principal of a university; in England, the heads of Exeter and Lincoln colleges, Oxford. The canonical signification of the term, strictly, is a clergyman appointed to govern a parish vchere the chief parochial jurisdiction was vested in a religious corporation or in some non-resident dignitary. In some monastic

orders the term is applied to the head of a con¬ vent. Consult Phillmore, Ecclesiastical Law5 ; Cripp, Eaw of the Clergy5 ; Whitehead, c Church Law.5

RECTORITE, a clay, or hydrated alumi¬ num silicate similar to kaolinite, mined in Gar¬ land County, Arkansas.

RECTUM, the lower portion of the large intestine or colon. The term, however, is a misnomer so far as the human anatomy is con¬ cerned, for the bowel adapts itself to the curves of the sacrum and at one point doubles upon itself. The rectum is from six to eight inches long, extending from the sigmoid flexure to the anus, and is narrowest at its two extremities.

The largest and most dilatable portion (am¬ pulla) just above the levator-ani muscle, forms a sort of pocket in which faeces, etc., lodge. The rectum has a mucous coat (membrane), gath¬ ered into transverse folds (Houston's valves), forming compartment-like spaces ; a submucous and a muscular coat ; and at the upper portion, where there is little motion, a peritoneal coat (mesentery).

The tendency of specialists is to consider the rectum as only that part of the bowel below the third sacral vertebra and devoid of mesen¬ tery, and to divide it into two portions, the fixed rectum and movable rectum. The rectum is in close opposition with large pelvic vessels and nerves and a portion of the small intestine; also, in the male, with the bladder, urethra and prostate gland, and in the female, with the uterus, vagina and Douglas' cul-de-sac. Its lower portion is surrounded by the hsemor-rhoidal plexus of veins. The vessels forming this plexus, as also those of the vaginal and vesico-prostatic plexuses, are very large, fre¬ quently communicate and have many valves. It is in the lower portion of the rectum that haemorrhoids or piles and many other painful affections occur, as blood-vessels and nerves are numerous and the muscles powerful.

Diseases of the Rectum. — These include congenital imperfections.

The rectum may eyen be absent, or partially developed, terminating in a blind pouch; or it may abnormally open into the bladder, vagina, uterus or urethra. These imperfections can be usually remedied by the surgeon.

Threadworms or pinworms frequently in¬ habit the rectum and cause itching about the anus (pruritus ani). They may be destroyed by injections of lime-water or a solution of ox¬ gall. Abscesses (caused by blows, perforation, sitting upon cold, damp seats, etc.) may form in the loose areolar tissue about the lower part of the rectum and open externally or into the rectum, leaving a fistulous tract (fistula in ano). Benign tumors, fibroma, papilloma and ade¬ noma and also carcinomatous and sarcomatous tumors may form in the rectum. Haemorrhoids, due to disease or a weakened condition of the haemorrhoidal veins, are common, especially in persons who are on their feet a large part of the time and who are engaged in seden¬ tary occupation. Haemorrhoidal affections may be relieved by astringents or by operation. Polypus of the rectum (soft and hard), com¬ paratively frequent in childhood, is a tumor resembling in shape a berry or a pear and hav¬ ing a peduncle. It sometimes bleeds and pro¬ trudes at the anus after stool. It is composed of elongated follicles and a network of small blood-vessels. It may be removed by a ligature or by an appropriate instrument. Prolapsus of the rectum, due to a relaxed state of the sphincter-muscles and the coats of the rectum, may be either incomplete or complete, with piotrusion from the anus (prolapsus ani). It is observed generally in young children and women, and is brought on by bearing-down strains. Treatment requires the replacing, of the bowel and keeping of it in place, and astringents, caustics and operation are em¬ ployed as may seem advisable. Stricture of the rectum or narrowing of its calibre may be very limited in extent or may include a con¬

siderable portion of it, and is due usually to malignant or syphilitic ulceration. The symp¬ toms include difficult defecation, more or less purulent and bloody discharges and pain. If not relieved, it affects the general health. Treat¬ ment consists of dilatation with rectal bougies or division of the cicatricial tissue by instru¬ ments (colotomy). Ulceration of the rectum may be due to simple inflammation or to dysen¬ tery, tuberculous disease, syphilis or malignant disease. Symptoms vary with the character of the sores and their location. There are usually discharges of pus, blood and mucus, and some pain and tenesmus. Treatment depends on the nature and extent of the disease and the con¬ stitutional condition of the patient. It includes

the keeping of the bowel as quiet and free from faecal matter as possible, the use of simple food, saline aperient and vegetable astringents or nitrate of silver. Fissure of the anus or a tear of its mucous membrane may extend into the rectum or a fissure of the rectum may exist by itself. In either case the fissure is usually produced by the passage of hardened faeces and the attendant straining. It is some¬ times obstinate. Treatment calls for regulation of the bowels, dilatation and the application of nitrate of silver or other astringent. Neu¬ ralgia of the rectum is sometimes mistaken (before an examination of the rectum is made) for fissure. Treatment is as in other neuralgias, except when it is caused by pressure of a dis¬ placed coccyx upon sacral nerves. This bone must then be replaced or removed.

Intestinal calculi (enteroliths), gallstones and faecal concretions containing, it may be, fruit-stones or berry-seeds, are occasionally found in the rectum. They give rise to more or less tenderness and abdominal pain, severe and intractable constipation, cold perspiration, vomiting, thready and rapid pulse, etc., and they must be removed. Invagination or in¬ tussusception of the rectum, of the upper por¬ tion into the lower, as the result of strain and weakened rectal walls, requires surgical aid.

Regular and free movements of the bowels, unattended by straining, are of the greatest im¬ portance in the treatment of most rectal ail¬ ments and preventive of many. The fact that the lower portion of the rectum is capable of holding a large amount of hardened faecal ma¬ terial, while the more liquid matter readily flows by it and out of the body, is not gen¬ erally understood. Consult Lynch, J. M., dis¬ eases of the Rectum and Colon5 (Philadelphia 1914) and deference Handbook of the Medi¬ cal Sciences5 (New York 1916).

RECURRING SERIES. See Series.

RECUSANTS, rek’u-zants or re-ku’zants, a term in use under the penal laws of England, when it was sought to force the consciences of the people by legal punishments. Recusants were those persons who refused or neglected to attend divine service on Sundays or holydays in the Established Church or to worship accord¬ ing to its forms. The word is first met with in temporal courts in the first year of Queen Elizabeth, when it was enacted that all persons who, without reasonable excuse, failed to attend some usual place of prayer, should be censured and fined for every offense 12 pence. In 23 Elizabeth the fine was made for every month

£20, and later in the same reign it was enacted that if recusants did not submit within three months after conviction they might, upon the requisition of four justices of the peace, be compelled to abjure and renounce the realm, and if they did not depart or if they returned without due license, they were to be treated as felons, and suffer death without benefit of clergy. In the case of Roman Catholic recu¬ sants the laws were more severe. They were liable to a forfeit of 100 marks (£66 1 3s. Ad.) for hearing mass; for saying it the fine was doubled and in both cases they had to undergo a year's imprisonment. They were disabled from taking lands either by descent or purchase after the age of 18, unless they renounced their errors, and could not keep or teach schools under pain of perpetual imprisonment. After a first conviction they could not keep arms in their houses, could not appear within 10 miles of London, could not travel five miles from home without license, could not hold any public office, could not have marriage, baptism or burial performed, except by a minister of the Established Church ; could not bring any action at law or equity, all under penalties of fine and imprisonment. By the Toleration Act (1 Wil¬ liam and Mary, ch. 18) all persons dissenting from the English Church, except Roman Catho¬ lics and anti-Trinitarians, were allowed to meet for purposes of worship according to their own forms on taking the oaths of allegiance and supremacy. The act was extended to include Unitarians in 1813 and in 1829 the Catholic Emancipation Act granted toleration to Roman Catholics.

RED, one of the three primary colors. Mixed in equal strength and proportion with the other primaries, it yields secondaries, for example, with yellow it forms orange ; with blue, violet, *etc.* Also a pigment. The most useful red pigments are carmine, vermilion (sulphuret of mercury), chrome-red, scarlet-lake (biniodide of mercury), madder-lake, light red, burnt sienna ; these are yellow reds. Venetian red, Indian red (carbonate of oxide of iron) and crimson-lake are blue reds. Red pigments are derived from the three kingdoms of nature, *viz.* : carmine from the cochineal in¬ sect, the lakes and madders from the vegetable world and the others from the mineral

world.

RED ADMIRAL, a butterfly of the genus Vanessa , especially V. Atalanta, so-called by British collectors. See Admiral.

RED-BACKED MOUSE, a small, chest¬ nut-backed wood-mouse (Evoiomys gap-peri) closely related to the meadow-mouse (Arvicola riparins), which is common throughout the eastern half of the United States and in the Saint Lawrence Valley and has the general habits of a meadow-mouse.

RED-BACKED SANDPIPER, the dun¬ lin (q.v.).

RED BANK, N. J., town in Monmouth County, on the Shrewsbury River, at the head of navigation, and on the Central of New Jer¬ sey, the New Jersey Southern and the Penn¬ sylvania railroads about 25 miles south of New York. It has regular steamer connection with New York, Atlantic Highlands and other ports. Settlements were made in the vicinity in 1650, by English and Dutch colonists. It was

incorporated as a town in 1872. It is an at¬ tractive residential town and a favorite sum¬ mer resort. It has a number of industrial es¬ tablishments, chief of which are a large can¬ ning factory, carriage shops, clothing factory, boiler works, gold-beating works and brush factory. About 500 persons are employed in the factories. The trade is chiefly in manu¬ factures, farm products and fruit. It has nine churches. The educational institutions are the Shrewsbury Academy, several private schools, a high school which cost $60,000, public and parish schools and a public school library. The government is vested in a board of commis¬ sioners of five members, elected annually. Pop.

(1890) 4,145; (1900) 5,428; (1910) 7,398;

(1915, State census) 8,631; (1920) 9,251.

RED BAT, a small reddish bat (Lasiurus boreales) common in the temperate parts of North America; length about two inches; fur long and silky, generally light russet, tinged with yellow, darker and richer on the back. See Bat.

RED-BELLIED HAWK. ‘ See Red—

Shouldered Hawk.

RED-BELLIED SNAKE, a harmless

snake (Storeria occipitomaculata) of the East¬ ern United States, whose belly is salmon red. It is dull brown above, with a paler stripe along the spine, bordered by one or more rows of blackish dots; a constant feature is three pale reddish blotches on the occiput. Its size and habits are similar to those of the garter-snakes. Two or three other species in the West have red bellies and are sometimes locally known by the same name.

RED BLUFF, Cal., city and county-seat of Tehama County, 120 miles northeast of Sacra¬ mento, on the Sacramento River at the head of navigation, and on the Southern Pacific Railroad. The district produces wheat, lumber and wool, and there are canneries, fruit-drying and packing plants and flour mills. Pop. 3,530.

RED BOOK, an English government book containing the names of all persons in the service of the State; also an official publica¬ tion of the Austro-Hungarian government giv¬ ing its views op the Austro-Serbian controversy shortly after the opening of the World War in 1914.

REDBREASTED, or ROBIN, SNIPE,

a dowitcher (q.v.).

RED BUG, or COTTON-STAINER. See

Cotton Insects.

RED CEDAR. See Cedar.

RED CLOUD (Maq-pf.-yah-luta), Sioux Indian chief : b., according to his own testi¬ mony, 1822 ; d. Pine Ridge, S. D., 8 Dec. 1909. He first came into prominence as leader of the Indians in the Fetterman massacre near Fort Phil Kearny, Wyoming, in December 1866. In this event 100 men under Captain Fetterman and Lieutenant Brown, comprising the entire command, were slain. Red Cloud then became the acknowledged leader of the warrior Sioux, established a military dictatorship and terror¬ ized the region over which he ruled. He was a much more powerful leader than the some¬ what famous Sitting Bull, though he was not a hereditary chief, but rose to distinction through his inborn qualities. In 1874 the Indians aban-

doned the North Platte country and went to the Red Cloud Agency on the White Earth River, whence they continued under Red Cloud to make frequent raids. In 1880 he made a treaty of peace with the government which he faithfully observed.

RED CLOUD, Neb., precinct and city, county-seat of Webster County, on ‘the Republi¬ can River and on the Chicago, Burlington and Quincy Railroad, about 110 miles in direct line southwest of Lincoln. It is in an agricultural and stockraising region. The chief manufac¬ turing establishments are flour mills and ma¬ chine shops. It has large lumber and stock-yards and grain elevators. Its chief shipments are livestock, wheat, cqrn, vegetables and flour. Pop. precinct, 2,329; city, 1,856.

RED CROSS, Order of the Royal. 1. A

decoration instituted by Queen Victoria, 23 April 1883, to be conferred on women, not necessarily British subjects, rendering distin¬ guished service in the care of sick and wounded soldiers and sailors. The badge is a cross of enameled crimson edged with gold, bearing the words Hope, Faith and Charity and the date on the arms. The centre has a gold circle with the queen’s effigy in relief. 2. A Russian Order of the Red Cross was instituted in 1878 and conferred by the empress upon women.

RED CROSS SOCIETIES, a general name for those societies founded for assisting the wounded in time of war, so named because their distinctive badge is a red cross on a white ground. Such societies have been established in all civilized countries as a result of an inter¬ national conference held at Geneva in 1863, which was followed next year by an interna¬ tional convention agreed upon at the same place, at which the International Treaty of Geneva was accepted and signed by a number of differ¬ ent nations. According to this all hospitals and hospital officials and all in any way en¬ gaged in attending the sick and wounded in war are treated as neutral parties. The society in England has four branches, two ambulance branches, one volunteer

nursing branch and one branch to raise funds and supplies, and societies in other countries. There is an international committee at Geneva which serves as a centre of communication between the different Red Cross societies throughout the world. In con¬ nection with this may be mentioned the decora¬ tion of the Royal Red Cross instituted by Queen Victoria in 1883, as a reward for women who have exerted themselves in aid of sick and wounded soldiers and sailors in time of war. The enameled crimson-and-gold cross bears the words (<Faith, Hope and Charity, with the effigy of her majesty, the royal and imperial cipher, etc., and is attached to a blue ribbon and worn on the left shoulder.

The first war to bring the Red Cross service into activity was that of 1866 in Germany, Aus¬ tria and Italy. Austria had not yet joined the compact, but her citizens raised and gave to the service almost $500,000. Germanv's socie¬ ties supplied over $3,000,000 and 500 volunteers, men and women, entered the service. The Red Cross work during the war proved the incal¬ culable value of the organization. The next call on the service was the Franco-Prussian War. In Germany more than 2,000 committees were formed at the beginning of the conflict,

with a central committee at Berlin. More than $14,000,000 was raised and used. France had less resource in readiness, but she raised and used nearly $2,000,000, and her service cared for more than 100,000 wounded men. The next demand on the Red Cross was in 1876-78, when Turkey, Serbia, Montenegro, Greece and Rus¬ sia became embroiled. In the beginning of this period of its work the Red Cross service was regarded with suspicion by the military, but was soon solicited to take control of its treaty-province. It raised almost $17,000,000 and ap¬ plied over $13,000,000.

The Red Cross emblem found its first op¬ posing force in Turkey. The Turkish soldiers regarded it as of religious significance and so violent was their prejudice that a red crescent was substituted in order to secure speediest recognition and cooperation. In the Japanese army the Red Cross service has been wonder¬ fully effective. In 1886 Japan entered into this international treaty, and the mikado became president of a Red Cross Society in a civil capacity. In the Turko-Russian contest, in the Tunisian, the Tonkin and the Madagascar wars, the Red Cross was notably active. In the Graeco-Turkish campaigns its work and sacri¬ fice were heroic.

National Red Cross. — This is an American body incorporated under the laws of the Dis¬ trict of Columbia, 1 Oct. 1881, reincorporated 17 April 1893, and reincorporated by act of Congress June 1900; for the relief of suffering by war, pestilence, famine, flood, fires and other calamities of sufficient magnitude to be deemed national in extent. The organization acts under the Geneva Treaty. The United States gave its adhesion by act of Congress 1 March 1882; ratified by the Congress of Berne 9 June 1882; proclaimed by President Arthur 26 July 1882; headquarters, Washington, D. C. The intro¬ duction and development of the Red Cross movement in the United States were chiefly due to Miss Clara Barton, the founder of the American branch. Previous to the organization of this branch there were many members of the Red Cross Society in the United States with Miss Barton as their representative. When the national branch was regularly formed Miss Barton was chosen leader. In the United States no laws have been passed to regulate Red Cross work. The national branch has no sub-societies or sub-committees; but patriotic and sympa¬ thetic men and women as individuals, or united in societies, are at liberty to assist and to co¬ operate with the Red Cross in raising money and in providing nurses and whatever the serv¬ ice requires. Whenever needed, this co-opera¬ tion is active in every State and in most of the Territories.

The American National Red Cross did re¬ lief work in the Russian famine of 1892, and in Armenia in 1896.

The Red Cross work in Cuba during the war, as measured by service and contributions, was phenomenal. The total value of gifts, in¬ cluding cash donations, reached nearly $4,000,- 000. When peace was declared, there yet re¬ mained starvation, sickness, disease, destitution, and desolation on the island. The Red Cross continued indefatigable in its work. In all its Cuban undertakings volunteer assistance and contributions of supplies were received from France, England, Belgium, Holland, Switzer-

land, Germany, Italy, Denmark and Mexico. The American National Red Cross also rendered efficient aid after the following disasters: Johnstown flood, 1889; Galveston flood, 1900; San Francisco earthquake and fire, 1906; Cherry Mine disaster, 1909; Chinese famine, 1910; Italian earthquake, 1908; Minnesota forest fires, 1910; Luzon eruption, 1911; Triangle waist factory fire, 1911; Titanic sinking, 1912; Mississippi flood, 1912; Ohio flood, 1912; Salem (Mass.) fire, 1914; Eastland disaster, 1915; Indiana cyclone, 1917, and many minor casual¬ ties. In the Mexican guerrila warfare and the Balkan Wars the society was also active as well as in Manchuria, in the pneumonic plague.

National Support. — The governments of the United States, Great Britain, Germany and Italy give no regular financial support to the Red Cross societies. In 1882 Congress appro¬ priated $1,000 for printing Red Cross litera¬ ture ; and since then, from time to time, has appropriated various sums for special purposes. Before the war, in Germany the government granted the society permission to hold occasional lotteries to secure funds. France allowed an indemnity of 20 cents a day for each sick or wounded soldier cared for by the society in time of war. The Netherlands government paid the salary of the secretary, provided office quarters, allowed $400 a year for office ex¬ penses, paid the traveling expenses of an officer whose duties in connection with the work of the society may necessitate his leaving his home. Belgium gave financial support in time of war. Denmark contributed annually $1,000. Austria gave $2,400 annually for assistance in case of epidemics or great calamities. Switzerland ap¬ propriated $5,000 annually for a special pur¬ pose. The emperor and empress of Japan gave annually $1,250. Russia paid for men taken care of by the society in time of war, at a rate agreed upon with the minister of war. In 1900 the emperor sanctioned a tax of two and one-half cents on certain railroad tickets and $2.50 on passports, such extra tax to be for the benefit of the Red Cross Society. The mem¬ bership of the society just before the war was approximately as follows : In the United States, 298 members of the National Society; France, 55,000; Austria, 52,209; Hungary, 42,041; Japan, 894,814;

Germany, main branch and affiliated societies, 300,000.

The American Red Cross has experienced a tremendous development growing out of the World War. In May 1917, President Wilson, as the head of the organization, appointed a war council to supervise its activities. The mem¬ bers were Henry P. Davidson (of J. P. Morgan and Company), Charles D. Norton, Cornelius N. Bliss, Jr., and Grayson M. P. Murphy of New York; and John D. Ryan, of Butte, Mont.; also (ex officio) William Howard Taft and Eliot Wadsworth (chairman and vice-chairman of the executive committee). By proclamation the President made the week of June 1&-25 the period for a nation-wide campaign for funds, and this resulted in the raising of over $100,000,000 for Red Cross work. During the five months, May to October inclusive, the membership rose from less than 500,000 to 5,000,000, and the number of chap¬ ters from 582 to 2,736. Arrangement was made by which the medical department of the army gave rank to leading Red Cross officials as

follows: Chairmen of central committees and war council were created major-generals; members of the war council were made brigadier-generals; the director-general was commissioned a colonel, and his assistant and the commissioner, lieutenant-colonels ; while the various Red Cross directors were assimilated as majors. Harvey D. Gibson, president of the Liberty National Bank of New York, was named as general manager of the Red Cross at Washington, with colonels under him as director-generals of the various activities. The chapters throughout the country were gathered into 14 divisions, under division managers : New England, office Boston; Atlantic, office New York; Pennsylvania, office Philadelphia; Potomac, office Washington; Southern, office Atlanta; Lake, office Cleveland; Central, office Chicago; Gulf, office New Orleans; South¬ western, office Saint Louis; Northern, office Minneapolis; Mountain, office Denver; North¬ western, office Seattle ; Pacific, office San Francisco; Insular and Foreign, office Wash¬ ington, D. C.

The workers in the chapters manufactured surgical dressings, hospital supplies, knitted gar¬ ments and comfort kits. Through the bureau of supplies they received their materials at cost. The war council and most of the important positions commanded no salaries ; all time was given free, except routine workers, many of whom received small salaries to provide their living. The individual chapters each delivered their productions to the warehouse of their division. Major Gra}‘Son M. P. Murphy was one of the first to reach France, where he

established American Red Cross headquarters in Paris, and made the arrangements to serve the American troops. He was made a member of General Pershing's staff to facilitate his work. A program was laid out to work in harmony with the Young Men's Christian Association, which also had headquarters in France. Hospital units were systematically organized, with a minimum personnel of 241, and mustered into the United States Army Medical Corps. Each unit was designed to serve at least 500 patients. Nearly 50 such hospital units had been organized by 1 Jan. 1918. This quick work would have been impossible, had it not been laid out and started long before America's entrance into the war. The Red Cross organization is rightfully proud of the fact that within six weeks after the President's declaration that a state of war existed, they had six hospital units ready, which were the first detachments of the American armv to join the Allies. Their efforts were by no means confined to caring for American troops. They had a chain of warehouses and motor trucks, that was supplying (Tan. 1918) 3,500 war hos¬ pitals in France. They served hot meals to allied soldiers at the railway stations, furnished bathing, disinfecting and resting facilities for the men who had retired from the trenches to recuperate, and did an immense amount of use¬ ful service. Especially did they care for refu¬ gees and mutilated soldiers. They housed the refugees who came in, looked after their health and started them in the work of rebuilding destroyed villages and the like. These activities were of course handled in cooperation with the French government, so that the work was harmonious with their own. Special efforts

were also nut forth to aid orphans, lost chil¬ dren and babies for whom support was not provided. Because of the distressingly low French birthrate, and increased mortality, this work was of importance, and three groups of children's specialists were formed, a part of whose duties was to aid prospective mothers, and to make healthy children of the babies that were born. The German government shipped out of their lines practically all of the inefficient French population, and most of these found their way back to France via Switzerland. The American Red Cross helped an immense num¬ ber of refugees, and carried on this work until a considerable time after the close of the war. _ They established a vast system for bringing in not only hospital supplies, but clothing and food. The shipping board co¬ operated to assist them, and they sent sup¬ plies and medical relief to nearly all the Allies, except Great Britain. Most of the cargo space for these supplies was donated by the steam¬ ship companies, army transports accommodated them and passenger rates for Red Cross work¬ ers were placed at the lowest possible figure.

The total American Red Cross war appro¬ priations in France up to 15 Oct. 1917 was a little over $15,000,000, and in other European countries nearly $4,000,000, while the United States work had cost nearly $8,000,000. Of this Russia got $323,000, Roumania $247,000, Italy $210,000, Serbia $223,000, England $17,000, Armenia $638,000, _ Belgium about $300,000. The sums appropriated to these countries by the close of 1917 were about double these amounts. By arrangement with Germany the Red Cross shipped food supplies regularly to Allied prisoners in German territory and 95 per cent of these were properly receipted for by the prisoners of war themselves. It is believed that the principal dependence of many of these prisoners for food, as well as small change, was on the c<every fifth day® shipments of the Red Cross.

In the training camps for soldiers in the United States the Red Cross was also active,- maintaining a bureau of sanitary service, and looking after their comfort and welfare in a hundred minor ways. Ambu¬ lance corps were provided as fast as called for, and the hospital work was efficient. There is a great corps of home workers in the Red Cross, and a part of their activities consisted in looking after soldiers' families, who for any reason were improperly provided for. At the personal request of President Wilson, the Red Cross entered into co-

operative arrangements with various other relief societies, to avoid duplications and omissions of service. Among these were the National Surgical Dressing Committee, the Needlework Guild of Amer¬ ica, the War Service League of the Salvation Army, the American Fund for French Wounded, the American Committee for the Relief of French War Orphans, and in France the Ameri¬ can War Relief' Clearing House, American Distribution Service and Les Tuberculeux de la-Guerre.

Consult (Red Cross Society in Foreign Countries, 5 Senate document No. 178 (1903— 04) ; Du Camp, <La Croix-Rouge de France5 ; Criegen, Das Rothe Kreutze in Deutschland5 ; Barton, C., (The Red Cross5 (1898) ; Board-man, (Under the Red Cross Flag5 (1915) ;

Billington, M. F., (The Red Cross in War5 (1914), quarterely bulletin published by the In¬ ternational Committee of Geneva, ˆBulletin In¬ ternational des Societes de la Croix-Rouge5 ; (Memorial des Vingt-cinq premieres annees de la Croix-Rouge,5 and American Red Cross Relief Reports (New York).

RED DEER, or STAG, the common deer (Cervus elephas) of Europe and western Asia, which is typical of the family, and the ordinary <(deer55 of literature and poetry as well as of the chase. It much resembles the American wapiti, but is smaller and rather darker in general color. A fine specimen will stand four feet tall at the fore-shoulder and will weigh about 300 pounds, but exceptional ones have weighed much more. Even larger are those of the Asiatic border and Asia Minor. The antlers of Scotch and Irish stags rarely exceed 33 inches in length ; but those of eastern Europe and Siberia are far longer. Several different names have been given to the related deer of northern Asia, but they seem to be essentially the same as those of Europe, where they sur¬ vive sparsely and under legal protection in al¬ most all the countries. In the British islands the wild red deer remains only in the Highlands of Scotland, but is ((preserved55 on many large estates and protected moors in both England and Ireland. The species is supposed to have been originally introduced into England from France, where it became very numerous, but since the 17th century it has been killed off in most parts of that kingdom to make way for the fallow deer, .the venison of which is far superior, and the animal itself of a more man¬ ageable and placid disposition.

The stag has a fine eye, an acute sense of smell and a good ear. When listening, he raises his head and erects his ears. When going into a

coppice or other half-covered place, he stops to look round him on all sides, and scents the wind, to discover if any object be near that might disturb him. Though a simple, he is a curious and crafty animal. When hissed or called to from a distance, he stops short, and looks steadfastly, and, with a kind of admira¬ tion, at horses or men ; and if the latter have neither arms nor dogs he moves on without betraying any symptoms of alarm. He eats slowly; and after his stomach is full, he lies down and ruminates at leisure.

In winter and spring this animal rarely ever drinks, the dews and tender herbage being suffi¬ cient to satisfy his thirst ; but during the parch¬ ing heats of summer, he not only frequents the brooks and springs, but searches for deep water wherein to bathe and refresh himself. He swims with great ease and strength, particularly when he is in good condition, his fat contribut¬ ing to his buoyancy. His voice is stronger, louder and more tremulous in proportion as he advances in age; and during the rutting season it is really fearful. The cry of the hind, or female, . is not so loud as that of the male. The pairing season is in August; the time of gestation is between eight and nine months; and she seldom produces more than one at a time. The usual season of parturition is about May, and at that season the hinds are very cunning in concealing and tending, and exceed¬ ingly courageous in defending their young, which are exposed to many enemies. The (<calf55 (as the fawm is called by gamekeepers)

never quits the dam during the whole summer ; and in winter, the hind, together with all the males under a year old, assemble in herds, which are more or less numerous in proportion to the mildness or severity of the season. At the approach of spring they separate, none but those of the age of one year remaining asso¬ ciated. Stag-hunting, as carried on in the Highlands, is a sport capable of rousing all the manly ardor and energy of youth and manhood. The beauty, graceful and magnificient bearing of the animal, his sagacity in evading the strat¬ agems of the hunter, or deer stalker, and his courage when at bay, add greatly to the pleas¬ ure of the chase. When the stag stands

at bay, his effort is to do so in a river or lake, where he has a great advantage over the dogs, for he firmly stands and holds his position, whilst they swim powerless around him. On land, even, a stag at bay has great advantage over the hounds, who exhaust themselves with their clamor, while he is in a comparative state of rest, and recovers his wind. In stalking deer, the animal is generally shot; but if he is only wounded, and has power to fly, then the dogs are slipped to the pursuit. But, in olden times, the chief reliance for pulling and killing the deer was in the dogs ; and the fleetness and courage of their hounds were the pride of nobles and kings.

At the present day another sort of stag hunting takes place near Windsor Castle and in some other parts of England. In this sport, which is contemptuously regarded by many per¬ sons, a captive stag is carried in a covered cart to the place where the chase is to occur and then turned loose. After brief interval, called giving the deer “law,® a pack of hounds is sent upon his trail, and if the stag has spirit enough to run, the hunters following on horseback have a lively chase across the country, at the end of which the deer is retaken, unharmed if possible and saved to run another day. This is a rather tame tradition of the ancient sport.

From the most remote periods, the stag has been the favorite object of the chase; and the severe forest laws of the earlier Norman monarchs sufficiently attest the importance which they attached to the sport. The afforesting of vast tracts of country, by which not only single cottages were destroyed, but whole villages swept away, and churches desecrated and de¬ molished, was the fertile source of misery to the poorer inhabitants, and of injustice to the ancient proprietors of the soil ; and the cruel inflictions of the oppressive laws which were enacted to preserve the deer, increased tenfold the curse arising from this tyrannical passion for the chase, — for it was a crime less severely penal to kill a man than to destroy or take a deer.

The ancient customs and laws of Wenerie,* that science which our simple ancestors looked upon as one of the first accomplishments of the high-bred noble, and a knowledge of which was essential to his education, were formal and technical to an extreme degree. A few of the terms, betokening the different ages of the stag and hind, are still retained, though some¬ what altered. The young of either sex is called a “calf®; after a few months the male becomes distinguished by the growth of the bossets, or frontal protuberances, on which the horns are afterward developed, which during the first

year are merely rounded knobs, whence he takes the name “knobber.® In the second year they are longer and pointed, and are called dags, and the animal has now the name of “brocket.® In the third year, the first, or brow antler, has made its appearance, and the deer becomes a “spayed.® In the fourth, the bez-antler is added, and he is then termed a “stag-gard.® He is a “stag® in the fifth year, when the third antler, or royal, appears; and in the sixth, the commencement of the sur-royal, or crown is formed, when he takes the name of “hart,® which name he retains through life. At this time he is called a “stag of ten,® prob¬ ably because the branches, including the sur-royal, frequently amount to that number. After the seventh year he is said to be croched, or palmed, or crowned, according to the number of branches composing the sur-royal. The fe¬ male is a “calf® in the first year, a “brocket’s sister® in the second and third, and ever after¬ ward, a “hind.®

See Deer, and consult authorities there cited.

RED EAGLE, Order of the. See Orders, Royal.

REDEYED VIREO. See Vireos.

RED GAME, or GROUSE. See Grouse.

RED GUM-TREE, one of the Australian Eucalypti (Eucalyptus resinifera) , yielding a gum-resin valued for medicinal uses. (See Eu¬ calyptus). Also the North American liquid-ambar (q.v.).

RED HORSE, a fish. See Sucker.

RED JACKET, American Indian, chief of the Senecas : b. Old Castle on Seneca Lake, about 1751; d. Seneca Reservation, 30 Jan. 1830. His Indian name was Sagoyewatha; he was called Red Jacket on account of the scarlet jacket he always wore, which had been given him by a British officer. He was one of his tribe who served with the British during the Revolutionary War; and was noted as an orator. He became widely known through his attitude toward the treaty of Fort Stanwix in 1784; a council had been called to negotiate between the United States and the Six Nations for the cession of lands, and on the occasion he spoke eloquently against the proposed treaty, but with¬ out avail. It was shortly after this that he was elected chief of the Senecas. In 1792 on the occasion of the signing of a treaty of peace between the United States and the Six Nations, Red Jacket had an interview with General Washington, who gave him a silver medal which he always wore afterward. In 1810 he gave information to the agent of the

government of the attempt made by Tecumseh to draw the Senecas into the western combination ; and in the war with England of 1812 he offered the service of his tribe to the United States, and proved his bravery in several skirmishes. The latter years of his life were passed on the Seneca Reservation ; he became very intemper¬ ate, and was at one time deposed from the chieftainship on that account. He always op¬ posed the advance of civilization, the mission¬ aries and the work of education among his people. Consult the <Life) by W. L. Stone.

RED JACKET, Mich., village in Hough¬ ton County, on the Chicago, Milwaukee and Saint Paul, the Chicago and Northwestern, the Mineral Range and the Copper Range rail-

roads, about 15 miles north of Houghton. It is in the famous copper region in northern Michigan, near Lake Superior. Its industries are connected with the mining of copper and preparing it for market. Pop. (est.) 4,700.

RED-LETTER DAY, in the Roman Cath¬ olic Church days set apart for especially im¬ portant festivals, and so named because of being indicated in red letters in the old missals and breviaries. Formerly they were so indi¬ cated in the calendar of days in the Book of Common Prayer, and some prayer-books are still printed in this fashion. In general usage the term has come to mean especially fortunate or auspicious days in a person's life, or days to be remembered because of some important event or benefit.

RED LINE MAP, a map which attracted considerable interest about the time of the dispute between the United States and England over the boundary line between Canada and Maine. It was made by the Frenchman D'Anville in 1746. It had been sent to Vergennes, the French minister, by Franklin in 1782, and was discovered among the Paris archives by Jared Sparks. A strong red line drawn near the ridge, in which the Kennebec and Penob¬ scot rivers rise, more than favored the English claims, respecting the northeast boundary of the United States. Sparks sent it to Webster, then Secretary of State, who was

anxious lest the English should hear of it. It was used in a secret session of the Senate, and with the Maine commissioners to induce a ratification of the treaty, and was afterward made a ground of reproach against Webster by opponents of the treaty.

RED LODGE, Mont., city and county-seat of Carbon County, 170 miles southeast of Helena, on the Northern Pacific Railroad. It is situated in a district with deposits of coal, gold and silver; and farming and stockraising are also carried on. The city's chief business is as a shipping centre. Altitude, 5,500 feet. Pop. 4,860.

RED MEN, Improved Order of. See

Improved Order of Red Men.

RED OAK, Iowa, city, county-seat of Montgomery County, on the Nishnabatona River, and on the Chicago, Burlington and Quincy Railroad, about 48 miles southeast of Council Bluff and 38 miles east of the Missouri River. It was founded in 1857. It is in a fertile agricultural and stockraising region ; and its industries are connected chiefly with farm products. The chief industrial establish¬ ments are flour mills, machine shops, cream¬ eries, lumber and brick yards, and stock yards. The city has 13 churches, six schoolhouses, county courthouse, municipal buildings, and several good business blocks. The three banks have a combined capital of $200,000. Pop.

(1920) 5,578.

RED RIDING HOOD, Little, a popular

nursery story of a little girl going to visit her grandmother and being eaten by a wolf dis¬ guised as the grandmother whom he had pre¬ viously devoured. The story has many ver¬ sions, but that of Perrault, (Le petit chaperon5 in (Contes du temps passe5 (1677) forms the base for most of them. The brothers Grimm use the tale but in their version Red Riding

Hood is rescued through the timely arrival of some woodsmen who cut open the wolf and release her.

RED RIVER, a large river of the United States, the southernmost of the great tributa¬ ries of the Mississippi River. Its headwaters are in the

northwestern part of Texas, on the eastern edge of the Llano Estacado, and it flows east-southeast, forming the boundary be¬ tween Texas and the Indian Territory and the northeastern boundary of Texas, entering Ar¬ kansas at the southwest corner of the State. After entering Arkansas it turns south and pursues an exceedingly irregular course to Shreveport, La., where it again takes a south¬ east course to Avoyelles County, making a large northern curve in crossing this county, and entering the Mississippi River opposite the southwest corner of the State of Mississippi. The mouth of the Red River is about 340 miles from the mouth of the Mississippi River. The whole course is nearly 2,000 miles. The chief tributaries are the Washita, which joins it in Louisiana; and the False Washita and the Kiamich, both of which it receives in the Indian Territory. Much of its course is through rich prairies, with red soil which colors the water. About 100 miles above Natchitoches, which lies 100 miles above the mouth of the stream, com¬ mences a swampy expansion of the river called the Raft, 70 miles long and 20 miles to 30 miles wide, produced by the river dividing into a number of channels, sometimes shallow, which have been obstructed by fallen trees and other matter brought down by the stream. At great expense this obstruction has been cleared away so far as to admit the passage of steamboats. About four miles, above Natchitoches the va¬ rious channels again unite, soon, however, again to separate into numerous creeks and bayous. Above Shreveport was another such Raft, about 32 miles in length. In 1873 a channel was cut through, making this part of the river navigable, but constant care is exercised in removing the floating timber so as to keep the stream open. In the upper part of its course it flows through lofty canons whose perpendicular sides are from 300 to 800 feet in height. After leaving the canons it enters the sandy lands, where the waters extend out to a shallow stream from 500 to 3,000 feet in width. Then as it enters the wooded country the stream becomes slug¬ gish and spreads out for miles.

A peculiarity of the lower course of the river is the bayous which it sends out. Some of the bayous return to the main stream and others flow directly to the Gulf of Mexico. The Atchafalaya River originally left the Mis¬ sissippi at a great bend below the mouth of the Red River; but the Mississippi has cut across the bend, forming Turnbull Island, and here . the Red occupies the channel once the Mississippi, and flows south of the island, so that the head of the Atchafalaya is now in the Red River, from which it flows south to the Gulf. The Mississippi receives the flood much earlier than the Red River, and at that time, the Mississippi floodwaters flow back past Turnbull Island and down the Atchafalaya. The floodplain of the Red River in

Louisiana ex¬ tends along the river until it is merged into the floodplain of the Mississippi at the mouth of the Black River. This plain is from 10 to 20

miles wide and is known as the Red River bottoms The plain is below the level of the river and is protected by levees. The river bed above Natchitoches has changed. Many years ago the river left the old bed and cut a new way for itself, a channel about 20 miles long. The new channel is called Bon Dieu River and the old channel is called Cane River. .The gov¬ ernment is improving the navigation of the Red River and engineers have worked to force all the waters of the Red River into the Mississippi ; thus cutting off Atchafalaya. The river is navigable for nearly 1,300 miles and with its tributaries, over 2,000 miles. Small steamers can ascend almost to the Texas boundary at high water and to Shreveport at all seasons except when the water is very low. Consult Marcy, (Exploration of the Red River of Louisiana.*

RED RIVER, or SONG-KOI, a river of Tongking, formed by the junction of the Leteen and Song-shai, the former rising in the Yun-nan province of China, the latter in Laos. It flows southeast, passes Hanoi and after a course of about 700 miles falls by several mouths into the Gulf of Tongking. The river is navigable to Lao-kai, on the border of China and Tong¬ king and along it the French have developed a trade with the Chinese.

RED RIVER CAMPAIGN. In 1864 Gen¬ eral Banks, to reduce Texas, asked for rein¬ forcements in order to take in rear the Confed¬ erate works at Galveston and the mouth of the Brazos ; but Halleck advised operating by way of the Red River, capturing the Confederate depot and dockyard at Shreveport and repos¬ sessing western Louisiana and Texas at a blow. The Mississippi squadron under Porter was to co-operate ; the army must be back for the trans-Mississippi operations of spring and sum¬ mer; but no movement could be made till the spring rains had raised the Red, with only four feet at low water and full of obstructions. The fleet left Vicksburg 10 March and landed A. J. Smith's troops at Simsport on the 13th ; Gen¬ eral Franklin had

already come up and driven Gen. Dick Taylor from Fort De Russey guard¬ ing the stream; the fleet passed up without op¬ position; and on the 1 5th and 16th the forces met at Alexandria. But the Union movements were difficult of co-ordination ; Banks did not arrive till the 26th, the rest of Franklin's corps on the 28th. Meantime the Confederates had strongly fortified Shreveport and placed several gunboats there. Banks, with Franklin, went by land to Natchitoches, routing a Confederate force at Cane River on the 28th; Smith's com¬ mand went by the river in transports, to Grand Ecore, four miles below, arriving 3 April, the day after Banks. On the 8th and 9th Banks advanced by a road away from the river; the Confederates had laid a V-shaped ambush for him, and his command of 8,000 men was ut¬ terly routed and would have been annihilated but for reinforcements from Franklin, 2,000 being killed or wounded (battle of Mansfield) ; Banks retreated; the next day the Confederates advanced, but were met by a counter-ambush of Franklin's and one wing of their army was driven back with heavy loss. But the other wing was so successful that the Federals re¬ treated that night and hurried on to Grand Ecore and finally to Alexandria, abandoning

the campaign. Meantime the fleet was caught in the falling water of the Red and would have fallen into the hands of the Confederates but for the engineering skill and resolution of Lieut.-Col. Joseph Bailey, who built a dam of stones and logs, which raised the river and floated all the vessels down with a narrow escape from destruction.

Banks' army in this campaign numbered 31,303; but after detaching two divisions sent to different points, he had a marching column of 25,736 officers and men of all arms. His losses, including those lost on the retreat from Alexan¬ dria, were 454 killed, 2,191 wounded and 2,600 captured or missing, a total of 5,244. Taylor's Confederate army numbered 11,000 and its total losses in the campaign were 3,976 in killed, wounded and missing. See Sabine Cross Roads.

Joseph T. Derry,

Author of (History of Georgia .*

RED RIVER OF THE NORTH, a

stream which has its source among the lakes in the west central part of Minnesota. It first flows south and southwest, then west to the boundary between Minnesota and North Da¬ kota, where it turns

north and forms the bound¬ ary between the States mentioned. It enters Canada in the province of Manitoba and flows into Lake Winnipeg. Its source is about 1,600 feet above sea-level and its mouth 710 feet. It is nearly 700 miles long, tfie greater part of its course is in the United States. Its drainage area is about 43,500 square miles, three-fourths of which is in the United States. It is navigable almost to the source. The river and its tribu¬ taries have in many parts of the plain cut channels through the clay from 20 to 30 feet deep. The Red River is connected with the Mississippi through its southern branch, Lake Traverse, and the Minnesota River. At high water small boats can pass from the Red River to the Mississippi. It is connected with Hudson Bay by means of Lake Winnipeg. A number of small rivers enter the Red River from Minnesota and North Dakota. The larg¬ est tributaries from North Dakota are Cheyenne and Pembina. The latter river has its rise in Manitoba. The chief tributary it receives in Manitoba is Assiniboine.

The Red River flows through a productive agricultural region, famous for the quantity and quality of its wheat. The greater part of the basin of this river has been twice submerged beneath the sea, and it was covered with an extensive glacial drift which left an immense lake, now called Lake Agassiz (q.v.), that had an outlet to the Mississippi River. The beaches are still well defined, even those showing the gradual contraction of the lake. The lakes of Manitoba are the remains of this vast lake. The deposits made by means of ice and water have made the Red River Valley an exceedingly fertile region.

RED RIVER SETTLEMENT, Canada, founded in 1812 by the Earl of Selkirk, on the banks of the Red River, and since 1870 forming part of the province of Manitoba (q.v.).

RED ROBE, The. One of the most pow¬ erful of the plays of social criticism written by Eugene Brieux is (The Red Robe* ((La Robe rouge*), produced in 1900. It is a scathing indictment of the system of criminal justice peculiar to France. It satirizes the unscrupu-

lous place-hunting of lawyers who, desiring to rise to judgeships,, can do so only by pleasing the people and accumulating convictions of the supposedly guilty. If a crime be committed, the police and the prosecutors must find the crimi¬ nal, or, failing of this, must fasten the deed upon the innocent, in order to satisfy public demand. The ruin of one such innocent victim is depicted, together with the hideous methods of the chief prosecutor for bullying the poor devil and his wife into submission. Eventually the Basque peasant Etchepare is acquitted through the courage of an honest lawyer who revolts against the trickery of his colleagues and thus forever forfeits advancement for himself. But the unhappy Etchepare is already hopelessly injured in property and reputation and his wife, against whom he has been turned by the villainous Mouzon, when the latter laughs at her claim for reparation, slays him with the knife of one of his victims kept as a trophy. Every incident of the plot of this piece, every scene and every personage is contributory to the central thesis of the dramatist, who has elsewhere confessed: ((Had I lived in the 17th century I would have been a preacher; but now I write plays.® It should be noted, however, that (The Red Robe) is far superior in point of structure, characterization and dramatic appeal to such other didactic works of Brieux as (Damaged Goods5 and ‘ (Maternity J ; for the dominant idea and purpose are here more art¬ fully embodied in a story that excites emo¬ tional interest apart from any doctrine. (The Red Robe) has been translated in English by F. O. Reed (1915) and A. Bernard Miall (1916) and is discussed in a monograph on Brieux by P. V. Thomas (1913).

Frank W. Chandler.

RED ROVER, The. (The Red Rover, J Fenimore Cooper’s second sea tale, was written in France and published early in 1828 at Phil¬ adelphia. Cooper felt that in writing of nautical affairs he must take care to avoid the themes and characters preferred by Smollett and so was at some pains to invent all his details <(without looking for the smallest aid from tra¬ ditions or facts.® Actually, his plot follows the romantic mode with fidelity: an imperial-souled hero, wounded in his sensibilities, has long been a successful and splendid pirate un¬ der the scarlet flag, but, in spite of his evil deeds, has so much conscience left that he can be converted in a dramatic moment, later to expiate his sins by services to the Revolution. The story itself could not have made (The Red Rover) one of Cooper’s two or three best sea romances, as it undoubtedly is. There must be taken into account also the solid basis of reality exhibited in the book’s seamanship, and, not quite so notably, in such persons as the memorable old tar Dick Fid and the devoted negro Scipio Africanus. The book’s represen¬ tations

of life in Newport seem less veracious, pointed even though they are with the author's customary sharpness toward the faults of New England. Fortunately, the action takes place largely at sea and is abundantly varied with chases and storms which succeed each other with exciting speed. What secures to the book, however, its position of excellence is something richly imaginative, something finely poetical, about the conception of the sea which colors the

entire narrative. The ocean here plays a great part. It is the voice of the very tumult of nature, which romantically frees men from the narrower limits of existence on land and yet at the same time shapes their characters with a firm and noble discipline.

Carl Van Doren.

RED RUSSIAN. See Ruthenians.

RED SANDSTONE, an obsolete term in stratigraphical geology, used to designate a group of formations of which a red sandstone of various shades was characteristic. These sandstones, however, were later found to belong to two series, a lower one, the Old Red Sand¬ stone (q.v.), now generally known as Devo¬ nian, and an upper one, the New Red Sand¬ stone (q.v.), separated from each other by the formations of the Carboniferous Period (q.v.).

RED SCALE, an insect affecting the orange (q.v.). See also Scale-insects.

RED SEA, or ARABIAN GULF (an¬ cient, Mare Rubrum, Mare Erythrceiim, or Sinus Arabicus; Arabic, Bahr-el-Hejaz) , a branch of the Indian Ocean, extending from the Strait of Bab-el-Mandeb, in a north-northwest direction between Arabia on the east, and Abyssinia, Nubia and Egypt on the west, and connected with the Mediterranean on the north by the canal, about 100 miles long, across the Isthmus of Suez. The Red Sea is a compartively nar¬ row expanse, 1,450 miles long with a maximum breadth on the tropic of Cancer of 200 miles and a general average of about 180 miles, but diminishing gradually at its south and north ex¬ tremities; at the former, across the strait it has a width of only 14 miles, further subdivided by the island of Perium into two channels, a larger on the east, of 11 miles, and a less on the west of one and one-half miles, and forking at the latter into two branches, the one of which, forming the Gulf of Akaba, penetrates north by east into Arabia for about 100 miles, with an average

breadth of about 15 miles; while the other, forming the Gulf of Suez, follows the general direction of the sea, and penetrates be¬ tween Arabia and Egypt for about 200 miles, with an average breadth of about 20 miles. In the fork between these two branches is the celebrated Mount Sinai, or Jebel Musa (Mount of Moses). To the biblical student the Red Sea possesses considerable interest, from the ac¬ count of its miraculous passage by the children of Israel when journeying from Egypt. The place at which they crossed the sea was the Gulf of Suez at its northern extremity, but opinions differ as to the exact point of transit, some maintaining that it was in the neighbor¬ hood of the town of Suez, and others that it was about 18 miles farther south, at the mouth of the Wady Tuarik. The marine temperature ranges from 70° to 94° F.

The climate is tropical and depressing; both shores of the Red Sea east and west consist generally of a low tract, mostly sandy, though sometimes swampy, varying in width from 10 to 30 miles, and suddenly terminated by the abutments of a lofty tableland of 3,000 feet to 6,000 feet high. The Red Sea may thus be considered as occupying the bottom of an im¬ mense longitudinal valley, which probably at one time extended between the tablelands without interruption, but has since been partially filled

up by coral-workings, which, extending in paral¬ lel lines at a short distance from either coast, have subdivided the sea into three different channels, and have also studded its shores with numerous small islands. In the main channel the depth reaches in one place 1,200 fathoms, but diminishes toward the extremities, where the depth in general does not exceed from 40 to 50 fathoms; the mean depth may be taken at 375 fathoms.

In the Gulf of Suez, which in earlier times is supposed to have extended considerably far¬ ther north, this depth gradually decreases to 30 fathoms, and still continues to shoal, till at the harbor of Suez it amounts to only three fathoms; in the Gulf of Akaba, on the contrary, the depth of the main channel is fully main¬ tained, and in some

places even exceeded. The currents of the Red Sea are the result of pre¬ vailing winds. These winds, whether proceed¬ ing either directly north or south, affect only the main body of the sea, and leave a consider¬ able belt along the coasts subject to alterna¬ tions of land and sea breezes, and not unfrequently to sudden squalls. The chief dangers to navigation arise from the number of shallow reefs, of the presence of which no intimation is given, as the sea never breaks upon them. This absence of breakers is accounted for by the porous nature of the coral, which offers so little resistance that the sea diffuses through it without commotion, as if it were passing through a sieve. The principal harbors of the Red Sea are, in the African Coast, Suez, Kosseir, Suakin and Massowa ; and on the Arabian Coast, Jedda (the port of Mecca), Hodeida and Mocha. The trade from shore to shore is not of much importance, consisting chiefly of the transport of pilgrims and some grain from Egypt ; but the trade up and down the sea, be¬ tween Europe and the East Indies, has become very large since the construction of the great ship canal across the Isthmus of Suez.

A telegraphic cable enters the Red Sea at Suez, passes down to Kosseir on its western shore, thence to Suakin on the same side, about lat. 19° 10’ N., and then proceeds in a south-southeastern direction close to the island of Rerim, and out into the Indian Ocean by the Strait of Bab-el-Mandeb, and arrives at Aden (q.v.).

RED SHIRTS, the name given to an or¬ ganization in North Carolina, whose object was to establish and maintain white supremacy in that State and keep the negroes under. It flourished in the reconstruction period after the Civil War. The members wore red shirts.

RED-SHOULDERED HAWK, a large American buzzard-hawk (Buteo lineatus) , known popularly as one of the hen-hawks (q.v.) and common over most of North Amer¬ ica; but western examples differ from the east¬ ern ones and are called the red-bellied hawk (variety elegans). It is most numerous south of the Great Lakes in winter, by reason of the accession of northern migrants. It is of large size and distinguished by the rufous tinge of the head, neck and shoulders, and plumage gen¬ erally, the breast with shaft-streaks of blackish and the tail clear brownish-black, crossed with six sharply defined narrow bands of white. The young are darker and more obscurely marked. The habits of this bird are much

like those of its congeners, the red-tail and broadwing. They may be seen at all seasons “sweeping in graceful curves over the country,

rising and falling in spirals, unless after noting prey, when they sometimes dart down hundreds of yards in a very few seconds. Although they feed much on birds and rabbits and are fre¬ quent visitors to the farmyard, they seem to have a special predilection for squirrels.® They make their nests of sticks in the tops of tall trees and very early in the spring four or five large, globular, heavy blotched eggs are laid. Consult Fisher, <Hawks and Owls of the United States* (1893).

RED SNAPPER, a fish. See Snapper.

RED SNOW, the color of which is caused by iminute organisms, vegetable or animal. Aristotle hinted at its existence; Saussure in 1760 discovered it on the Saint Bernard and Captain Ross in 1819 brought specimens from the Arctic regions. He had found eight miles of cliffs, 600 feet high, colored by it, in many places to the depth of 12 feet, where the rock was reached. Captain Parry and other Arctic explorers have since met with it abundantly.

RED SPIDER, a small, scarlet web-spin¬ ning mite (Tetranychus telarius), which dam¬ age the leaves of plants in greenhouses. They should be killed off by a kerosene emulsion spray.

RED SORREL. See Hibiscus.

RED STONE, Old Fort, a Pennsylvania structure which figured in the struggle between the French and English for mastery in the Ohio region. It was first a storehouse of the Ohio Company, was a rendezvous for the English when they gathered to advance against the French in 1754 and was burned by the French later in the conflict. At its ruins the leaders of the Whisky Insurrection held a meeting in August 1794 to plan opposition to the Whisky tax.

RED SUNSETS, brilliant phenomena which attracted attention in North America and other parts of the globe in the autumn of 1883 and for several succeeding months. A vivid red glow suffused the entire western sky, remaining for upward of an hour, when it would slowly fade away. This strange sight w?as first noticed in India, where, it is said, the sun assumed a distinct greenish tinge on near¬ ing the horizon. In striving to account for these strange manifestations a number of solu¬ tions were offered, but the theory that met with greatest acceptance was that they emanated from volcanic dust and gaseous matter vomited by Krakatoa, in Sunda Straits. Calculations demonstrated the fact that the manifestations of the red glow coincided with the course which such vapors would take on being

wafted away by winds.

RED TAPE, a term applied to unnecessary routine and formality in official affairs. It is derived from the fact that official documents were bound together by red ribbons or tapes. Dickens in (Little DorritR and Mark Twain, in one of his humorous sketches, have illus¬ trated the working of red tape.

RED WATER, (1) a disease of cattle. See Rinderpest. (2) A marine worm of flagel¬ late protozoa, class Mastigophora, order Dino -

flagcllata, infecting harbor waters, destroying fish and mollusks. Varies in color from yellow to reddish brown and is so called as it turns the water red when present.

RED WING, Minn., city, county-seat of Goodhue County, on the Mississippi River, at the head of Lake Pepin, and on the Chicago, Great Western, the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 40 miles southeast of Saint Paul. It was settled in 1853, incorporated in 1854 and chartered in 1864. It is in a produc¬ tive agricultural region in which are deposits of fireclay. Red Wing is the commercial and industrial centre for a large part of Goodhue and Dakota counties. The chief manufacturing establishments are sewer-pipe works which em¬ ploy about 450 persons; furniture factories, about 250 employees; stoneware works, 120; other manufactories, with about 130 employees. The prominent public buildings are the churches, schools and several business blocks. The edu¬ cational institutions are a State training school, Red Wing Seminary, Hague Synod Theological School, Lutheran Ladies' Seminary, high school, public and parish schools, a public library, and private school libraries. There are two hos¬ pitals. The three banks have a combined capi¬ tal and surplus of $730,000. The government is vested in a mayor and a council of nine members, elected biennially. Pop. (1920) 8,637.

REDAN, a fortified work having two faces forming a salient angle in

the direction from which an attack may be expected. It is open at the gorge. A double redan has a re¬ entering angle for mutual defense. The redan is the simplest field work, and is used for de¬ fending the avenues of approach to a village, bridge or defile. In front of another field work, it is called a fleche. When flanks are added to the faces, the work becomes a detached bastion or lunette. The redan at Sebastopol in the Cri¬ mean War was the scene of stubborn conflict between the Russians and the English.

REDBIRD. See Cardinal Grosbeak.

REDBREAST, or ROBIN RED¬ BREAST, a familiar European warbler (Ery-thacus rubecula), which by its familiar habits has endeared itself to children, and has caused it to be protected and welcomed more than any other bird. The red breast of the male is the distinguishing feature of the species, but the females have duller colors. In Great Britain the redbreast is a permanent resident, but in more northern countries it is migratory, flying southward in winter. It also occurs in Asia Minor and in North Africa. The nest is made of moss and leaves, and is lined internally with feathers. The eggs number five or six, and are white, spotted with pale brown.

These birds, in winter especially, become very bold and confident in habits, approaching doors and windows without fear, and soon learning even to know the hand which deals out crumbs and scraps of food to them during the inclement season. On the approach of the milder spring the redbreast returns to its native haunts and wilder state. During the breeding season these birds are very pugnacious and they may attack and drive away all the smaller birds from the vicinity of the nest. The food in spring consists chiefly of insects, while in autumn fruits and seeds constitute the dietary.

The song is sweet, but not specially remarkable, and continues during spring, summer and autumn, often in rainy weather. In Germany it is termed Thomas Gierdet ; and in Norway, Peter Ronsmad.

REDBUCK. See Duiker-bok.

REDBUD, a tree. See Cercis.

REDCAP, a variety of Hamburg fowls. See Poultry.

REDDING, Cal., city, county-seat of Shasta County, on the Sacramento River and on the Southern Pacific Railroad, about 172 miles north of

Sacramento. It is in a mining and lumbering region, in which there are some excellent farms in the fertile valleys. The chief industrial establishments are lumber mills, machine shops, foundries and tool shops. The shipment trade is chiefly in lumber and min¬ erals. It has a well-built courthouse and a sanatorium. Pop. 3,090.

REDDLE, a red ochre or red chalk occur-ing in Arkansas but not yet utilized.

REDEMPTION, in Christian theology, the liberation of sinners from the penalties of the violated divine law ; it is effected through the expiating vicarious sacrifice of Christ upon the cross. In law, the freeing of an estate from mortgage, or the taking back of mortgaged property upon fulfilling the terms or conditions on which it was conveyed to the mortgagee. See Equity of Redemption.

REDEMPTIONERS, or INDEN¬ TURED SERVANTS, emigrants to the American colonies who sold their services to planters or others for a term of years — four, five or seven, according to the contract — after the completion of which they acquired their liberty with a grant of land. There were re-demptioners in the first colony founded in Vir¬ ginia; the system was introduced in Massachu¬ setts in 1631 and later in Maryland, New York, Connecticut and Pennsylvania. With these in¬ dentured servants were brought in many per¬ sons who came not of their free will but were kidnapped and held in servitude. See Villeins.

REDEMPTIONISTS. Under the name Trinitarians, a monastic order founded in the year 1197 by Pope Innocent 111 for the ransom of Cnristians captured by the Moors and the Saracens. John de Matha (d. 1213) and Felix de Valois (d. 1212) were the leaders of the order, the former becoming its first general and the latter its first abbot. By 1200 a.d. 200 Christians had been redeemed out of slavery in Morocco by the Trinitarians, and the society spread rapidly in France, Italy and Spain. Aided by Honorius III and Clement IV it afterward spread into Portugal, the United Kingdom, all of south-central Europe and finally to America. From the character of the work done by the order its members came to be known as Redemptionists, and in France by the middle of the 1 7 th century there had been 246 redemptions, releasing 30,720 prisoners, while the numbers for Castile and Leon were 362 redemptions and 11,809 prisoners. By the 18th century the order possessed over 300 houses, but it was rapidly nearing its end, which came in the latter half of that century; it is now almost extinct, having outlived its useful¬ ness.

REDEMPTORISTINE NUNS, or OR¬ DER OF THE MOST HOLY REDEEMER,

a religious order of women in the Roman Cath-i olic Church, founded in 1732 by Saint Alfonso de Liguori. They are strictly cloistered, leading the contemplative life, and by their prayers as¬ sisting the missionary priests of the order of Redemptorists (q.v.).

REDEMPTORISTS. See Orders, Re¬ ligious.

REDEYE, the name of two or more com¬ mon fresh-water fishes: (1) the rockbass or goggle-eye (Ambloplites rupestris) (see Bass) ; (2) in England the rudd, a reddish roach-like fish (Leuciscus erythropthalmus) , sometimes two pounds in weight, and highly esteemed by anglers both in Great Britain and on the Con¬ tinent.

REDFIELD, Edward Willis, American artist : b. Bridgeville, Del., 1868. After early training at the Pennsylvania Academy of Arts, he studied under Fleury and Bonguereau in Paris. In 1896 he won the gold medal of the Art Club of Philadelphia, the first of a long list of medals and awards that his paintings received. Excelling in landscape painting, his inspiration largely drawn from his home surroundings in Delaware, he is represented in the leading art collections and museums of the country, in the Luxembourg (Paris), in the Honolulu museum and in the National Gallery, Buenos Aires. In 1904 he was elected a mem¬ ber of the National Academy.

REDFIELD, Isaac Fletcher, American jurist: b. Wethersfield, Vt., 10 April 1804; d. Charlestown, Mass., 23 March 1876. He was graduated from Dartmouth College in 1825, ad¬ mitted to the bar and engaged in law practice. He was attorney-general for Orleans County, Vt., in 1832-35, judge of the Vermont supreme court in 1835-52, chief justice in 1852-60, and in 1857-61 occupied the chair of jurisprudence at Dartmouth. He removed to Boston in 1861, and in 1867-69 was special counsel in Europe for the United States. He was editor for New England of the (American Law RegisteU and published (Law of Railways) (1857) ; (Law of Wills) (1864-70) ; (Leading American Rail¬ way Cases) (1870), *etc.*

REDFIELD, William Charles, American scientist: b. Middletown, Conn., 25 March 1789; d. New York, 12 Feb. 1857. In 1803 he was ap¬ prenticed to a mechanic at Upper Middletown (now Cromwell), in 1811 set up for himself at Middletown as a mechanic and small merchant, and in 1821 began his study of the subject of Atlantic gales by observations of the region in eastern Connecticut and western Massachusetts devastated by the storm of 3 September, long known as the ((great September gale.® By his investigation of the course and direction of prostrated objects, he became convinced that the storm was a progressive whirlwind. The per¬ fecting of his theory of storms became his chief object. In 1831 he began the publication .in the American Journal of Science of a series of articles on the laws of storms; and in 1834, in an article in the same journal on hurri¬ canes of the West Indies) gave a complete syn¬ opsis of the main points of his theory as de¬ veloped by a more extensive analysis of ob¬ served phenomena. His views, known as the <(rotary theory of storms,® were accepted after

some slight opposition; and Redfield, by his explanation of the mechanism of extended hur¬ ricanes, became one of the principal contributors to a scientific knowledge of the earth's atmo¬ sphere. He wrote also on geography and geology. As a naval engineer he devised the system of ((safety barges,® by which passenger service via the Hudson between New York and Albany was conducted by means of a passenger boat drawn by two steamers at such a distance as to avoid danger of explosions, the frequent occurrence of which had caused general terror. Thus originated the idea of tow-boats for the conveyance of freight. Redfield was also prom¬ inently interested in railway construction. A list of his published papers, from 1829 to 1857, includes 62 titles.

REDFIELD, William Cox, American Cab¬ inet officer: b. Albany, N. Y., 18 June 1858. He engaged in the manufacture of machinery, be¬ came president of J. H. Williams and Company in 1905, of the Sirocco Engineering Company in 1907, and was vice-president of the American Blower Company in 1909-13. He served in Congress in 1911-13, and on 4 March 1913 be¬ came Secretary of Commerce in the Cabinet of President Wilson, serving to 1 Nov. 1919. He wrote (The New Industrial Day) (1912).

REDFIELD, S. Dak., city, county-seat of Spink County, on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 35 miles south of Aberdeen. It is an agricultural and

stockraising region. It has a State Institution for the Feeble-Minded and the Redfield College, opened in 1887 under the auspices of the Congregationalists. Pop.

(1920) 2,755.

REDFIN. See Shiner.

REDFISH, the name of several fishes notable for their color: (1) In Alaska, the sal¬ mon more familiarly known by its name ablue-back® in the Columbia River Valley; also called redfish about the lakes of northern Idaho. (2) On the California coast, a gaudily tinted wrasse (Pimelometopon pluchcr), related to the eastern tautog, which reaches a weight of 12 or 15 pounds, and is taken in large numbers in the kelp offshore with hook and line. The Chinese salt and dry them. (3) The rosefish (q.v.) of the Atlantic Coast. (4) The red drum. See Drumfish.

REDGAUNTLET, red-gant'let, a novel by Sir Walter Scott, published in 1824. Sir Alberick Redgauntlet, ardently espousing the cause of the Young Pretender in 1745, pays for his enthusiasm with his life. His widow, ascribing her bereavement to the politics of the Redgauntlets, desires to rear her children in al¬ legiance to the reigning dynasty. Her efforts prove ineffectual and the tale is concerned with the plots to enthrone the Chevalier, into which young Redgauntlet is hurried by his uncle, an ardent Jacobite. Though showing haste, the story does not flag in interest, and even the minor characters — notably Peter Peebles, the crazy litigant, Wandering Willie, the vagabond fiddler, and Nanty Ewart, the smuggler — are living and individual.

REDGRAVE, Richard, English painter: b. Pimlico, London, 30 April 1804; d. London, 14 Dec. 1888. After studying at the Academy, he was elected an A.R.A. in 1840, an R.A. in

1851. From 1847 he took a prominent part in art instruction, and in

1857 was appointed in¬ spector-general of art schools, which office, with that of surveyor of the royal pictures, he resigned in 1880. His principal pictures include (Gulliver on the Farmer's Table) (1837) ; (The Daughter of the Reduced Gentleman5 (1840) ; (The Return of Olivia5 ; and (Country Cous¬ ins.5 He wrote with his brother, (A Century of English Painters5 (1866), and edited several valuable catalogues.

REDHEAD, a duck (Aythya americana) , related to the pochard and canvas-back (qq.v.). From the latter the redhead may be readily distinguished by its much shorter, broader, more strongly hooked bill, and brighter chestnut head, though it is frequently sold to the uninitiated as the more expensive canvas-back, to which it is little inferior in flavor. It is found in North America generally, breeds from the northern tier of States to high latitudes, and winters in Chesapeake Bay and southward. The nest is built of reeds, etc., with a lining of down, and either on the ground or on a platform of reeds in the water; the seven or eight eggs are buff-colored and unmarked. Eastwardly this is one of the commonest species of ducks and congre¬ gates in great numbers in the sounds and estu¬ aries of the Atlantic Coast, consorting with canvas-backs, scaups and other species of gen¬ erally similar habits. It feeds on various aqua¬ tic animals, but more particularly on water celery and other aquatic plants. In the in¬ terior about the Great Lakes and elsewhere, these birds usually appear in flocks for a short time during the migrations and are said to visit the woods for the purpose of feeding on acorns and other mast like the wood-duck. The redhead is perhaps the best known and gener¬ ally appreciated by gunners of all our ducks, but there is nothing especially distinctive of the method of its pursuit. Consult Grinnell, (American Duck Shooting5 (1901) ; Job, (Among the Waterfowl5 (1902).

REDING, Aloys von, Swiss patriot: b. Schwyz, Switzerland, 6 March 1765; d. there, 5 Feb. 1818. He became captain-general of his native canton in 1788, and defeated the French republicans at Morgarten Pass in 1798. In 1802 he founded a league in the eastern part of Switzerland with the purpose of re-establishing the old federal constitution, but was thwarted by French interference. In 1803 and in 1809 he was elected chief magistrate of Schwyz.

REDISCOUNTING. To foreigners it has always been a subject of wonderment that re¬ discounting remained in American banking history a branch of financial service availed of little or not at all. Rediscounting has even been looked upon by American bank authorities askance as a ((bad55 practice and an evidence of weakness

on the part of those establishments who had resort to it. What little work in this branch of the financial exchange business has been done was largely confined to country banks, chiefly in the southern States, who have had resort to the system to a small extent, re¬ discounting with their depositary banks in the large cities as an accommodation. But of the total of loans and discounts the rediscounts have figured as a small item only. In Europe, on the other hand, rediscounting constitutes a very large proportion of the great banking

business. The Bank of France at Paris and the Reichsbank at Berlin transact a great volume of business in the rediscounting department, and all the great central banks of Europe find it forms a most important branch of their serv¬ ice. It is generally asserted that the main reason for non-usage of this form of exchange in our commercial life on a larger scale is, that the favored commercial instrument has been the single-name promissory note, iust as the bill of exchange has always been the European standby. The consequence has been that, upon its being discounted by the bank, the promis¬ sory note has lain as a ((dead asset55 in the safety vault, as a commodity not capable of being converted into cash until the arrival of date of maturity. The great advantage of the bill of exchange or <(acceptance,55 as in such general use in Europe, is evident in its com¬ mercial course. The bill, once drawn by a customer and accepted by his bank, acquires the value of an instrument salable anywhere — it is freely discounted in open market and passes from merchant to merchant or bank to bank, accumulating fresh endorsements at each transaction until it at last reaches the counter of one of the central banks. Here it is appreciated as accommodating the banking business in the voluminous collecting and trans¬ ference of funds as well as a source of cash supply for the general class of banks. A fundamental obstacle to the general use of a rediscounting system has, of course, been the fact that here we have had no central bank, the great rediscounting factor in European finance. The National Bank Law has not per¬ mitted national banks to accept time drafts and the Federal Reserve Act failed to give relief here except for bills based upon foreign trade. But the Federal Reserve Act now enables the reserve bank's members to handle commercial paper and the rediscount system's future is brighter in the United States, and a dozen re¬ gional banks in different sections of the country are enabled to pool and convert some of their assets into cash by rediscounting good commer¬ cial paper as defined under the act. Now, the strength of the popularity in European banking concerns of rediscounting is the fact that the rediscounting makes the paper a surer asset and the more endorsements it receives the more the

security is enhanced, except that each lapse of time makes the note more and more of a temporary. security. A1 bankers acceptances are so liquid as to be a desirable investment of pri¬ vate bankers.

REDLANDS, red'landz, Cal., city in San Bernardino County; on the Atchison, Topeka and Santa Fe and the Southern Pacific railroads, about 68 miles east of Los Angeles. It was settled in 1881 and in 1888 was incorporated. It is on the foothills of the San Bernardino Mountains, 1,360 feet above sea-level, in a region famous for its scenic beauty. It is in a fruit section noted for its oranges. It is the largest orange shipping centre in the' world. Fireclay is found in the vicinity. The principal manufacturers are clay and lumber products; and the trade is chiefly in oranges, raisins and other fruits, wheat, barley, brick, lumber and building stone. It has high school, public and parish schools, and the A. K. Smiley Library, University of Redland. Eight parks,

among them Smiley Heights, add to the attrac¬ tions of the city. The government is vested in a board of trustees. They hold office four years. Pop. (1920) 9,571.

REDLEG, one of the best known of Old World partridges (Caccabis rufa), which is es¬ pecially numerous in France, where it is the principal object of sport in the autumn. It has been introduced into England, but is not much liked because slow to fly, running speedily be¬ fore the dog and so puzzling both the dog and the gunner trained to the different behavior of the British gray partridge. Several other spe¬ cies of the genus share the name, as the Bar¬ bary partridge (C. petrosa) of North Africa, the chukar (C. chukar) of India, *etc.* See Par¬ tridge.

REDLICH, ratdicH, Joseph, Austrian au¬ thor and professor of law : b. Goding, Mahren, 18 June 1869. He was educated at Vienna, Leipzig and Tubingen, and from 1906 was a member of the faculty at the University of Vienna. He lectured at Harvard in 1910, and was in the United States in 1914 in connection with the Carnegie Foundation. He has written (Englische Lokalverwaltung) (1901; English trans.. 1903) ; (Recht und Technik des Englischer Parlamentarismus) (1905; English trans. 1908) ; (The Common Law and the Case Method in American University Law Schools } (1914), *etc.*

REDMOND, red'mond, John Edward,

Irish political leader: b. Dublin, 1851; d. March 1918. He was educated at Trinity College, Dublin, studied 'law and was admitted to the bar. In 1876 he was elected a member of the House of Commons from New Ross, and later held a position in the vote office. From 1885 to 1891 he sat for North Wexford and from 1891 to his death was member for Waterford. In the House he became a Svhip® for the Irish party, and was one of the most active sup¬ porters of Parnell in his organization of the Irish Nationalist party. He made several trips to the United States and Canada in behalf of the Nationalists. When the party was divided over the question of the continuance of Par¬ nell's leadership, he supported Parnell. In 1900, when the factions were

united, he was made the leader of the united party, which he effectively organized. When the Liberals re¬ turned to power in 1906, Redmond's position became one of supreme importance to Ireland and for the following eight years he ably led the movement having for object a measure of self-government for Ireland. His final triumph came when the Home Rule Bill was passed in 1914. On the outbreak of the war with Ger¬ many, Redmond, assuming to speak for all Ireland, pledged her support without condition in the war. Meanwhile, Redmond and his party had alienated the support of the younger generation of Irishmen, who disliked the machine methods of the Nationalists at the elections. However, the party and Redmond had grown old during the strenuous years in which they fought for an equitable settlement of the land question and they were not re¬ ceptive of the new ideas and ideals of nation¬ ality which had permeated the younger genera¬ tion through the work of the Gaelic League and similar organizations. The Insurrection of Easter week 1916 showed to what a point

cleavage had come between Redmond, his party and young Ireland. The stern methods with which the insurrection was suppressed drew all Ireland (Protestant Ulster excepted) together in opposition to the hidebound methods of a leader and party who had become impotent. At by-elections in 1916 and 1917 members of the Sinn Fein or revolutionary party defeated Redmond's candidates and he saw nothing ahead but the breaking up of the old political machine which had outlasted its usefulness. It is believed his end was hastened by the trend of events in Ireland. Redmond was a skilled parliamentarian and an eloquent and forceful orator. He published historical and Political Addresses) (1898), Ureland and the War> (1915).

REDONDO BEACH, Cal., city in Los Angeles County, on the Pacific Coast, 18 miles southwest of Los Angeles, on the Atchison, Topeka and Santa Fe Railroad. It is a pleas¬ ure resort with ample amusement facilities ; and is also important as a shipping point. The city is growing rapidly. Pop. (1920) 4,913.

REDONDA (ra-don'da) ISLAND, West

Indies, one of the Leeward group, situated be¬ tween Nevis and Montserrat. Iron and alumina mines constitute its economic importance. It is a' dependency of Antigua, and with Barbuda, another

dependency, makes an area of 62 square miles. The total population of the three islands is about 35,000.

REDOUBT, Alaska, active volcano in the Aleutian Range, near the west coast of Cook's Inlet. Its altitude is 11,270 feet, and it was active in 1903.

REDOWA, red'o-ˆ, the name of a Bohe¬ mian dance introduced into England about 1846. The dance resembles the Polish mazurka. It was introduced into one of Meyerbeer's operas in 1849.

REDPATH, James, journalist: b. Ber-wick-on-Tweed, England, 14 Aug. 1833; d. New York, 10 Feb. 1891. He emigrated to De¬ troit, Mich., in 1848, and in 1852 removed to New York and became connected with the Tribune. In 1855 he went to Kansas and took part in the Free-Soil movement which he de¬ scribed for northern papers. Being already a confirmed anti-slavery advocate he traveled in the South for personal investigation of slavery conditions. With others he then undertook a scheme of colonization in Haiti and during his visits to the island was aopointed by President Giffrard commissioner of emigration in the United States. The breaking out of the Civil War put an end to his plans, and he entered the field as war correspondent principally attached to the armies of Generals Sherman and Thomas. At the close of the war he became superin¬ tendent of education in Charleston, S. C., re¬ organized its school system, and established colored schools and the Colored Orphan Asylum. In 1868 lie established the Lyceum Bureau in Boston which arranged for the pub¬ lic appearance of lecturers and* readers, which business was afterward purchased by Maj. J. B. Pond (q.v.). Resuming editorial work on the Tribune, he went to Ireland to report the famine of 1879-80. There he became interested in the Home Rule movement and devoted sev¬ eral years to its interests. In 1886 he became

attached to the staff of The North American Review. He assisted Jefferson Davis in pre¬ paring his history of the Southern Confederacy, and wrote, among other works, (The Roving Editor, or Talks with Slaves in the Southern States5 (1859) ; (The Public Life of Captain John Brown5 (I860) ; and (Talks About Ire¬ land5 (1881).

REDPOLL, a small linnet-like finch of the far northern regions, two to three species of which visit northern Europe, Canada, and the northern United States in winter. The males have the head and neck beautifully rosered in hue.

REDROOT. See Ceanothus.

REDS OF THE MIDI, The. The first book written in modern Provencal to be pub¬ lished in English was (The Reds of the Midi5 ULes Rouges du Midi,5 1896). In a Prologue, Felix Gras gives a charming picture of his own boyhood and of his juvenile admiration for the Napoleonic veteran Pascal. Then he intro¬ duces us to the little company at the shoe¬ maker's shop where in the evenings old Pascal was wont to tell stories of his campaigns from the Pyramids to Moscow to a little company of whom the boy Felix was not the least eager listener. (The Reds of the Midi5 is based in part on what Gras learned from his grand¬ father and from Pascal who is made to tell here of the wanton feudal oppression at which his boyhood revolted, of the perils that beset his youth, of his enlistment at Avignon in the famous Marseilles Battalion, the 516 who gave to France its battle song, and, on the memorable

10 Aug. 1792, led the attack on the <(King's Castle,55 the Tuileries. This rising of a people is shown as the simple, brave, honest soldier boy might have seen it, and with great art is made to appear wholly objectively from the peasant's point of view. Notable as fiction, the story has, as the author wrote to William E. Gladstone, also the historical purpose <(to prove

. that it was the men of the South who were the first to rise up against despotism, and that to them the triumph of the Revolution was due. And to prove also that from them came the first protest against the errors, and the violence and the excesses of the Reign of Terror.55 There are graphic glimpses of the September massacres and of the guillotine. The translation by Catherine A. Janvier is of exceptional merit. The story is continued as to several minor characters in (The Terror5

(1898).

Benjamin W. Wells.

REDSHANK, or GAMBET, a large mi¬ gratory snipe-like sandpiper (Totanus calidris) of Europe and Asia, representative of a large group, the American species of which are called willets by gunners; its average length is about

11 or 12 inches; and its popular name is derived from the red color of the legs. The spotted redshank (T. fuscus) and the greenshank (T . glottis) are allied species.

REDSTART, in the United States a small active migratory warbler of the genus Seto-phaga, especially N. ruticila of the eastern part of the country, whose colors are a charming contrast of black and orange-red in the male, the female being more nearly brown and yel¬ low. It has a sharp, exclamatory, but pleasing

spring song, and makes a pretty nest of bark-shreds, etc., in an orchard tree or garden bush. The European redstarts are small brownish birds, closely related to the redbreasts, but dis¬ tinguished by a bright red tail. They construct nests chiefly among the ivy of ruined buildings, the eggs numbering five or six, and being of a greenish-blue color. The redstarts are active birds, feeding on fruits, seeds, and insects which they pursue on the wing. The song is low, but sweet, and these birds are said to imi¬ tate very skilfully the notes of other feathered songsters.

REDTAIL, a common American hen-hawk (q.v.).

REDTOP. See Grasses in the United States.

REDWAY, Jacques Wardlaw, American geographer: b. Nashville, Tenn., May 1849. He was educated at the University of California and at Munich, Bavaria. He occupied the chair of physical geography and chemistry at the State Normal School of California, was en¬ gaged in mining engineering and exploring in California and Arizona in 1870-80, and later pursued geographical investigations in South America, Europe and Asia. He has published (Manual of Geography5 (1887) ; (Manual of Physiography5 (1900); (New Basis of Geogra¬ phy5 (1901) ; Commercial Geography5 (1902), *etc.*

REDWING. (1) An American blackbird (Agelaius phoeniceus) found

throughout the United States and wintering south of Virginia. The male is jet black except for the wings which are a bright scarlet with a border of buff color. The nest is made of coarse grass or reeds built in a marsh or swamp. Its call is loud and clear. (2) A European thrush (Turaus iliacus) , visiting Great Britain and southern Europe in winter, when they flock in the fields in search of insects and worms. The summer is spent in the north of Europe and Asia. The summer song is pleasing, but the winter notes are harsh and unmusical. The head, upper part of the body and tail are a rich brown ; the lower part of the body is white with streaks of brown.

REDWOOD, Sir Boverton, English chem¬ ist: b. London, 26 April 1846. He was educated at the University College School and accom¬ panied Sir Vivian Majendie on an inspection tour of the petroleum fields of Europe, Canada and the United States. He became a consulting engineer and chemist and was appointed ad¬ viser on petroleum to the Admiraltv, the Home office, the India office and the Colonial office. He was created a baronet in 1911. He served on the war committees of the board of trade, the ministry of munitions and the Admiralty board of invention and research during the European War. Author of < Cantor Lectures on Petroleum and its Products5 (1886) ; (The Transport of Petroleum in Bulk5 (1894); (A Treatise on Petroleum5 (2 vols., 1896 ; 3d ed., 3 vols., 1913) ; and joint author of (The De¬ tection and Estimation of Inflammable Gases and Vapors in the Air5 (1896) ; (Handbook on Petroleum5 (1901) ; (Petroleum Technologists' Handbook5 (1915), *etc.*

REDWOOD, the name of various sorts of wood, as an Indian dyewood, the produce of

Pterocarpus santalinus; the wood of Lap lac ea hcematoxylon, the redwood of Jamaica; that of Pterocarpus dalbergioides, or Andaman wood ; that of Colubrina ferruginosa, the red¬ wood of the Bahamas; that of Soymida febri-fuga, of which the bark is used in India for fevers. In the United States, Sequoia sem-pervirens of the Pacific Coast. See Redwood of California.

REDWOOD OF CALIFORNIA, the

great cypress-like forest tree (Sequoia semper-virens) of the Pacific Coast. It is of the same genus with the big trees (S . gig ante a) , botanically described under Sequoia ; the latter occurs in scattered groups on the west slope of the Sierra Nevada, while the redwood forms dense forests on the west slopes of the Coast Range, where it forms the most important timber re¬ source of the State. The forests were thor¬ oughly studied by the government bureau of forestry in 1902, whose report furnishes the fol¬ lowing facts : The redwood is popularly thought to occupy a strip of country 10 to 30 miles wide, from the Oregon line to the Bay of Monterey, but these boundaries do not cover its actual distribution. Two thousand acres of redwood exist in Oregon along the Chetco River. South of the Chetco a continuous redwood belt begins, and increases its width from 10 miles, at Del Norte County, to 18 or 20 miles, and keeps on unbroken to southern Humboldt County. Here is a break, but in Mendocino County the belt be¬ comes dense again, and widens out to 35 miles. South of that county the tree grows in isolated patches as far south as the Santa Lucia Moun¬ tains.

The climate and topography that have brought about this limited distribution of the redwood deserve attention. North and south along the coast, in nearly parallel ridges, lie the mountains of the Coast Range, steep and rising to altitudes of 1,000 to 2,000 feet. A few large rivers and many smaller streams cut through them to enter the sea, and along their courses in places are broad bottom lands and gentle slopes. West of the Coast Range the climate is even and moderate, with a range from just below freezing to 80° F., and a yearly average of from 50° to 60°. Snow lies on the tops of only the highest ridges.

Thirty to 60 inches of rain falls in the autumn and winter, and in the summer sea fog bathes the coast. But east of the mountains, less than 50 miles from the sea, lie hot interior valleys, never visited by the fog, parched and rainless in the summer, and wet only occasionally by the winter rains — condi¬ tions too unfavorable to permit the growth of the redwood. The forest may be considered in two types — the “slope® and the “flat.® The common type is the “slope® — that is, the growth on the steep sides of the Coast Range, which is a mixture of redwood, red fir, tanbark oak and white fir, with an occasional madrona or hem¬ lock. As the slopes become moderate, the alti¬ tude lower, the soil deeper and the water sup¬ ply better, the redwood steadily gains on tfie other kinds and the forest becomes denser, until on the rich flats and in the gulches the second type is developed ; on the best redwood “flats® no other tree grows.

The redwood grows to a greater height than any other American tree, but in girth and in age it is exceeded by the big trees of the

Sierras. On the slopes 225 feet is about the maximum height and 10 feet its greatest diam¬ eter, while on the flats, under better conditions, it grows to be 350 feet high, with a diameter of 20 feet, and occasional giants exceed this. Most of the redwoods cut are from 400 to 800 years old. After the tree has passed the age of 500 years it usually begins to die down from the top and to fall off in growth. The oldest tree scientifically examined began life 531 a. d. The tree, when normal, has a straight, slightly tapered bole, clear for more than 100 feet, and a crown of horizontal branches that may oc¬ cupy from a third to a half of its total length. The roots strike downward at a sharp angle, and are so large and so numerous as to form a compact mass of wood, in shape like an in¬ verted funnel. The bark of the tree offers such a remarkable resistance to fire that except under great heat it is not combustible. It is of a reddish-gray color, fibrous in texture, and gives to full-grown trees a fluted appearance. The tree, however, assumes many shapes.

The redwood requires little of the soil ex¬ cept that it be moist, and those trees in” a gully or along a creek are larger than their neighbors on the ridges. It is, however, so dependent on moisture of the air that this factor mainly or wholly determines its distribution, and the east¬ ern limits of the forests are determined by the distance inland to which the sea fogs may drift.

The enemies of the redwood are few, and it suffers from them less

than other trees. “The wind,® remarks Fisher, “can scarcely uproot it, insects seem to do it little harm, and fungi sel¬ dom affect it. Even fire, the great enemy of all trees, though it may occasionally kill whole stands of young redwood growth, is unable to penetrate the fireproof sheathing of shaggy bark with which the old trees protect themselves.® A large area of redwood forest in Santa Cruz County has been reserved as a national forest-park.

Reproduction. — The redwood forest consists of a mixture of trees of widely varying type, and keeps itself stocked by reproduction under its own shade. Seeds grow up very seldom, the seed itself seeming to have little vitality and the opportunities for its germination being rarely present, because it demands plentiful light. Hence new growth is almost exclusively by suckers, which supported and nourished by full-grown roots and stems, thrive under shade in which seedlings would wither. They thus survive and grow slowly, with little or no sun, until an old tree falls, lets in the light and they shoot up in rings about the stump into strong young trees. In 30 years, under favorable con¬ ditions, trees will result 16 inches in diameter and 80 feet high; and it is certain that it will be profitable to hold cut-over redwood lands for future crops. This second-growth timber has not the density and fine quality of the original, but is useful for many purposes, and large quantities have already been utilized.

Quality of the Wood. — Redwood is fitted for many uses. In color it shades from light cherry to dark mahogany; its grain is usually straight, fine and even; its weight is light; its con¬ sistency firm, yet soft. It is easily worked, takes a beautiful polish and is the most durable of the coniferous woods of California. It re¬ sists decay so well that trees which have lain

500 years in the forest have been sent to the mill and sawed into lumber. It has no resin, and resists fire, a fact which has recommended it as material for house-building, especially in San Francisco. Insects seldom injure it, be¬ cause of an acid element its lumber contains. In sea water, however, the marine teredo eats off redwood piling as readily as other timber. Redwood is used for all kinds of finishing and construction for shingles, railroad ties, electric-light poles, paving blocks, tanks and pipe staves. As a tie its average life, under heavy traffic, is six to eight years ; as shingles it will last as long as 40 years. The chief difficulty in working redwood lies in the seasoning process, to dry it thoroughly being a slow and difficult process.

Lumbering. — The cutting of redwood for market began about 1850, and has steadily in¬ creased since with the market demand and growth of means of transportation. Its use is mainly confined to the State, and the greatest demand is from the southern counties. Occa¬ sional cargoes are sent across the Pacific, but it is rarely sent East, on account of the expense ol transportation. It has never been a business giving extravagant profits. Several hundred thousand acres have already been cut over. A large part of this area has been completely cleared and cultivated or used for pasture but much remains as wild brush, believed to be use¬ less ; but it is now known that ordinarily a profitable second growth will arise, so that the anticipated extinction of the tree is no longer to be feared.

Felling one of these enormous trees is an operation requiring great experience and skill on the part of the woodsman, who must cause the vast trunk to fall precisely where he in¬ tends it to lie, and must take care that it is not split or broken by the concussion, to pre¬ vent which a bed is smoothed and prepared for it. A platform is first erected surrounding the trunk from six to eight feet above the ground. With a long saw in the hands of two men an undercut is made through the trunk, not quite to the centre, and from the opposite side a crosscut is sawed, ending a foot or two above the undercut and leaving a section of solid wood between. When the exact place where the tree is to fall is selected, the choppers ascend the platform and with axes hew out an angular-shaped piece having the undercut as a base. When this cut is made the second or crosscut is wedged till the tree topples over and falls to the ground, the solid section of the trunk, not pierced by the cuts, supporting the tree till the centre of gravity is

passed, and then the mighty frame falls on its prepared bed almost intact.

The next operation is performed by the ˆringers® and “peelers.® Every 12 or 14 feet, as required, a ring is cut around the circum¬ ference of the bark, and afterward the peelers with crowbars and wedges “peel® the bark from the prostrate trunk. All of the trees are stripped, but surrounded with an immense ac¬ cumulation of debris of bark and branches, which must be removed before the trunks can be sawed into suitable lengths for conveyance to the mill. The ground is cleared of this debris by fire, precaution being first taken to plug up the “splits® in the trunk with clay so that the fire may not reach the interior of the

tree. A foggy day is chosen and a still one. Fire is started and in a short time the tract is burning with a fierce heat that quickly re¬ duces the piles of bark and brush to ashes, and leaves an unobstructed field for the removal of the solid timber which has been scarcely charred by the intense heat to which it has been subjected.

The trunks as they lie are then sawed into stated lengths, and then follows the arduous task of conveying these enormously heavy sec¬ tions to the railroad. Temporary skidways arc laid down and roads constructed. Chutes down which the logs pass have to be planned, and on these, guided by the skilful woodsmen, the un¬ wieldy logs at last reach their destination. The work is assisted by donkey engines on sleds, which are hauled to the top of the steep banks and into seemingly impossible situations.

The yield of virgin redwoods on the northern flats varies from 125,000 to 150,000 board feet per acre. About Humboldt Bay it was from 50,000 to 75,000 feet per acre; and on slopes like those in Sonoma County, from 20,900 to 30,000 feet. The redwood cut of 1916 was 491,000,000, the largest recorded, being about 35 per cent of the entire lumber cut of the State. The amount of timber got out of a redwood forest is only a small proportion of what the stand contained. At least a quarter of the timber is destroyed in felling and in the burning that follows, and of what remains all the broken and misshapen logs are left on the ground.

Bibliography.— Fisher, ‘Report on Red¬ woodˆ Bureau of Forestry (Washington 1903) ; and authorities on California, especially Muir, and on forestry. See Forestry.

REED, red, Andrew, English philanthro¬ pist : b. London, 27 Nov. 1787 ; d. there, 25 Feb. 1862. He was educated at Hackney College, London, ordained pastor of the Congregational Chapel at New road, London, in 1811 and re¬ mained in this charge until 1861. He visited the United States in 1834 to study educational and religious systems and established in London the Orphan Asylum (1813), Infant Orphan Asylum (1827), Asylum for Idiots (1846), Royal Hos¬ pital for Incurables (1855) and an Asylum for Fatherless Children in Croydon. He published (Visits to the American Churches^ (1836); ‘Advancement of Religion the Claim of the Times) (1847), *etc.* Consult ‘Memoirs,* edited by his sons (1863).

REED, Sir Charles, English politician and philanthropist, son of Andrew Reed (q.v.) : b. near Sonning, Berkshire, 20 June 1819; d. Tot¬ tenham, Middlesex, 25 March 1881. He amassed a large fortune in the typefounding business, took an active interest in the philanthropic works of his father, served in Parliament as member for Hackney in 1868-74 and was re¬ elected for Saint Ives in 1880. He was presi¬ dent-chairman of the London school board in 1873-81 and in 1874 he was knighted.

REED, Charles Alfred Lee, American sur¬ geon : b. Wolf Lake, Ind., 9 July 1856. He was educated at Miami University, Oxford, Ohio, and studied medicine at the Cincinnati College of Medicine and Surgery. He was professor of gynaecology and abdominal surgery at the Cincinnati College of Medicine and Surgery 1882-95; became gynaecologist at the Cincinnati

Hospital in 1896, and was president of the American Medical Association in 1900-01. He has published various professional monographs and a (Text Book of Gynaecology' (1900).

REED, Sir Edward James, English naval architect: b. Sheerness, 20 Sept. 1830; d. 30 Nov. 1906. He was educated at the School of Mathematics and Naval Construction in Ports¬ mouth, was at one time connected with Sheer¬ ness dockyard, and having become an authority on naval architecture was appointed chief con¬ structor to the navy, for which he designed a number of ironclads and other vessels. He re¬ signed in 1870 on account of his objections to rigged seagoing turret ships which he found to be growing in favor. He sat in Parliament for the Pembroke boroughs 1874—80, for Cardiff in 1880-95 and again 1900-06. In 1886 he was a junior lord of the treasury under Mr. Glad¬ stone. In 1878 he visited Japan on the invita¬ tion of the government of that country. He published cJaPan» its History, Traditions and Religions' (1880) ; (The Stability of Ships' (1884) ; (Modern Ships of War,' with Admiral Simpson (1888) ; (Poems' (1902).

REED, Elizabeth Armstrong, American

author: b. Winthrop, Me., 16 May 1842; d. 16 June 1915. She was married to H. V. Reed in 1860. She was chairman of the Woman's Con¬ gress of Philology in Chicago in 1893 and was a member of several learned societies. She pub¬ lished (The Bible Triumphant' (1866); (Hindu Literature: or the Ancient Books of India' (1891) ; (Persian Literature, Ancient and Modern' (1893) ; (Primitive Buddhism, its Origin and Teachings' (1896), *etc.*

REED, George Edward, American educa¬ tor: b. Brownville, Me., 21 March 1846/ He was graduated from Wesleyan University, Mid¬ dletown, Conn., in 1869 and after studying the¬ ology in Boston University entered the New England Southern Conference in 1870. He filled important appointments in the Methodist denomination 1870-89 and in the year last named became president of Dickinson College, Carlisle, Pa.

REED, Hugh T., American military offi¬ cer: b. Richmond, Ind., 17 Aug. 1850. He was graduated from West Point in 1873 and served chiefly on frontier duty until 1881 when he was appointed inspector-general on the staff of Gov¬ ernor Porter of Indiana. He was retired for disability in 1889. *He has published (A Calen¬ dar of the Dakota Nation' (1887) ;* Cadet Reg¬ ulations' (1881); (Broom Tactics' (1883), *etc.*

REED, James A., American legislator: b. near Mansfield, Ohio, 9 Nov. 1861. He re¬ moved with his parents to Lynn County, Iowa, in 1864, studied at Coe College, Iowa, and was admitted to the bar in 1885. He engaged in practice at Cedar Rapids in 1885-87, then re¬ moving to Kansas City, Mo. He was prose¬ cuting attorney of Jackson County, Mo., in 1898-1900, and mayor of Kansas City in 1900— 04. He was elected to the United States Sen¬ ate for the terms beginning 1911 and 1917.

REED, John Oren, American physicist and educator: b. New Castle, Ind., 31 Dec. 1856; d. 22 Jan. 1916. He was graduated at the Uni¬ versity of Michigan in 1885, studied at Harvard in 1891-92 and took his Ph.D. at the Uni¬

versity of Jena in 1897. Pie was a member of the faculty at the University of Michigan from 1892, becoming professor of physics and director of the physics laboratory in 1909, and serving as dean of the department of litera¬ ture, science and the arts from 1907. He was joint author of (Manual of Physical Measure¬ ments' (1902); (College Physics' (1902); (High School Physics' (1913).

REED, Joseph, American soldier and statesman: b. Trenton, N. J., 27 Aug. 1741; d. Philadelphia, 5 March 1785. He was graduated from Princeton and spent two years studying law in the Middle Temple, London. He re¬ turned to Trenton and took up the practice of law and in 1767 was appointed deputy secretary of New Jersey. In 1774 he was appointed a member of the committee of correspondence for Philadelphia and in 1775 was president of the 2d provincial convention held in Pennsylvania and endeavored to defeat the intention of arm¬ ing the province. His English connections through his marriage inclined him to a concilia¬ tory view of the English position, though he opposed the principle of Parliamentary taxation. On Washington's appointment to commander-in-chief, Reed became his military secretary. In 1776 he was made adjutant-general, but re¬ signed the next year and refused the office of brigadier-general and

also first chief justice of Pennsylvania, preferring to remain Washing¬ ton's volunteer aide, without rank or pay. In September 1777 he was elected to the Conti¬ nental Congress but continued with the army and took part in many engagements. In 1778 he was made chairman of a Congressional com¬ mittee to confer with Washington concerning the management of the ensuing campaign. In December 1778 he was chosen president of the supreme executive council of Pennsylvania and continued in office for three years, during which time he was one of the founders of the University of Pennsylvania and favored the doing away with the proprietary powers of the Penn family. After the English peace commis¬ sioners had failed to treat with Congress, at¬ tempts were made to bribe Reed together with other high officials. He replied : (<I am not worth purchasing, but such as I am, the king of Great Britain is not rich enough to do it." In 1780 he was invested with extraordinary powers and was principally successful in quell¬ ing the dissatisfaction of the Pennsylvania troops in the army. Consult (Life' by Henry Reed (1846) ; Reed, W. B., Wife and Corre¬ spondence' (1847).

REED, Myrtle, American author; b. Chicago, Ill., 27 Sept. 1874; d. 1911. She has published (Love Letters of a Musician' (1899) which has been widely read; Water Love Let¬ ters of a Musician' (1900) ; (The Spinster Book' (1901); Wavender and Old Lace' (1902; new ed., 1907) ; (The Master's Violin' (1904) ; (A Spinner in the Sun' (1906; new ed., 1909) ; (01d Rose and Silver' (1909) ; (Master of the Vineyard' (1910; new ed., 1911); (Threads of Grey and Gold' (posthumously, 1913).

REED, Thomas Brackett, American states¬ man : b. Portland, Maine, 18 Oct. 1839; d. Wash¬ ington, D. C., 7 Dec. 1902. He was graduated from Bowdoin College in 1860, winning the first prize in English composition. He then took up the study of law, went to California in 1863,

and was admitted to the bar there. In 1864 he was appointed assistant paymaster in the United States navy and assigned to a gunboat patrol¬ ling the Tennessee, Cumberland and Mississippi rivers. On receiving his discharge from the navy, he returned to Portland and established a law practice. His interest in public affairs and ability as a speaker soon made him promi¬ nent in the Republican party in Maine and in 1868 he was elected to the lower house of the State legislature, where he served two years. He then entered the State senate and before his term had expired, was elected attorney-gen¬ eral of Maine. From 1874 to 1877 he was city solicitor of Portland and in 1876 was elected to Congress and served there continuously until his resignation in 1899. He first attracted at¬ tention in April 1878 by a speech in opposition to a bill to reimburse William and Mary Col¬ lege for losses sustained at the hands of the Federal troops during the war. From that time his readiness in debate, knowledge of par¬ liamentary law and marked executive ability made him a power in the House. In 1885-89, while the Republicans were in the minority, he was their acknowledged leader on the floor and in 1899 was chosen speaker of the House. The Republican majority was small and the business of the House continually delayed by the “fili-bustering55 course of the Democrats. Speaker Reed did not hesitate to enforce strict rulings against such tactics and ordered the clerk to count as present all members actually in the House, whether they answered to the roll-call or not. This aroused the strongest opposition from the Democrats; his conduct was de¬ nounced as tyrannous and illegal and the epi¬ thet of “Czar® applied to him. His rulings were, however, sustained by the House and later by the decision of the Supreme Court; and in the next Congress, when the Demo¬ crats were again in power, he had the satisfac¬ tion of seeing his rules adopted by the party that had so violently denounced them. In 1895 and 1897, he was again elected speaker and this time his conduct of the business of the House met with the approval of both parties. As speaker, he had a powerful influence in con¬ structing and guiding legislation, though his name is connected with no single important measure and he raised that office to a position second only to that of the President of the United States. He was a consistent opponent of free silver and was largely instrumental in defeating the free silver bill of 1890. He was also a strong advocate of the policy of protec¬ tive tariff but was opposed to the administra¬ tion policy in regard to imperialism and the questions resulting from the Spanish War. To this fact his resignation from Congress in 1899 is

sometimes attributed. In 1896 lie was a prominent candidate for the presidency and at the Republican National Convention received 8414 votes, being second to McKinley. After 1899 he was engaged in the practice of law in New York. He contributed frequently to the magazines, edited a series of volumes on ora¬ tory entitled (Modern Eloquence,5 and pub¬ lished (Reed's Rules of Parliamentary Pro¬ cedure. J

REED, Walter, American military surgeon and bacteriologist : b. Harrisonburg, Rocking¬ ham County, Va., 1851 ; d. Washington, D. C.,

23 Nov. 1902. He was graduated from the medical department of the University of Vir¬ ginia and from the Bellevue Hospital Medical College of New York and was made first lieu¬ tenant assistant surgeon, United States army, 26 June 1875. His promotions were captain as¬ sistant surgeon, 26 June 1880, and major sur¬ geon, 4 Dec. 1903. In 1890-91, while stationed at Baltimore, he made particular study, of bac¬ teriology in the laboratory of Prof. William. Welch, of the Johns Hopkins University; and established a laboratory of his own, in which he gave instruction to the student-officers of the Army Medical School. As curator of the Army Medical Museum, at Washington, D. C. (from 1893), he continued his researches and soon became known as one of the leading bacteri¬ ologists of the country. His ability was es¬ pecially displayed in his investigations of the cause and progress of epidemic diseases. In 1898 he was made head of a board for the study of the epidemics of typhoid occurring among the troops collected for the Spanish-American War. After the war he made several voyages to Cuba and was on duty at Havana, studying the diseases of the island and more particularly yellow fever, as a member of a board for its investigation. After a series of brilliant ex¬ periments, he was able to announce that yellow fever is conveyed by a certain variety of mosquito (Stegoniyia fasciata), individuals of which become infected by biting persons ill with the fever and by their bite introduce it into the blood of non-immunes. The United States military government at once proceeded to measures of extermination which banished the fever from Havana, where it had prevailed for three centuries. The Atlantic seaboard of the United States was also thereby freed from constant peril. This achievement must rank among the important triumphs of bacteriologi¬ cal science. Consult Keane, Scientific Work and Discoveries of the Late Major Walter Reed5 (Senate Doc. 118).

REED, William Bradford, American law¬ yer: b. Philadelphia, 30 June 1806; d. New York, 18 Feb. 1876. He was graduated from the University of Pennsylvania in 1825 and accompanied Joel R. Poinsett to Mexico as pri¬ vate secretary. Then taking up the practice of law, he became attorney-general of Pennsyl¬ vania in 1838. In 1850 he was appointed profes¬ sor of American history at the University of Pennsylvania and in 1857 became United States Minister to China. The next year he negotiated the treaty with China which regulated commer¬ cial relations as well as made more secure the rights obtained by the previous treaty of 1844. Subsequent to his return to America in 1860 he settled in New York and corresponded for the London Times besides contributing to The American Quarterly Reviez v and the North American Review. He engaged in a contro¬ versy with George Bancroft, concerning cer¬ tain statements repeated by the historian to the effect that his grandfather, Joseph Reed, medi¬ tated abandoning the American cause and going over to the British. In this controversy Reed wrote (President Reed of Pennsylvania, a reply to George Bancroft and Others5 (1867). Ban¬ croft responded with (Joseph Reed, an histori¬ cal Essay5 (1867), to which Reed replied with (A Rejoinder to Mr. Bancroft's Historical Es-REED — REED, FLUE AND STRINGED INSTRUMENTS

say) (1867). He published (Li£e and Corre¬ spondence of Joseph Reed) (1847) ; (Life of Esther de Berdt) (1853).

REED, (1) in music, the sounding part of several instruments, such as the clarinet, bas¬ soon, oboe and bagpipe, so called from its being made from the outer layer of a reed (Arundo sativa or donax) found in the south of Europe. The name is also applied to the speaking part of the organ, though made of metal. Reeds are generally divided into two kinds — the beating reed, used in the organ, clarinet, etc., requiring to be placed upon a tube to produce a musical sound, and the free reed, used in instruments of the harmonium and concertina kind. (2) In weaving, an appurtenance of the loom, consist¬ ing of two parallel bars set a few inches apart and furnished with a number of parallel slips or reeds, called dents, between which the warp threads are passed. The reed is set in a swing¬ ing frame, called a lathe, lay or batten. In the hand lathe, the bottom of the batten is furnished with a shelf, called the shuttle race, along which the shuttle is driven. The

office of the reed is to beat the weft up to the web and the force of the blow determines the com¬ pactness of the fabric.

REED, FLUE AND STRINGED IN¬ STRUMENTS, TEMPERAMENT, TUN¬ ING AND VOICING OF. Temperament. —

The intervals of the perfect octave are divided naturally into 53 parts or commas, the succes¬ sive sounds of the diatonic scale being separated by these commas into the following intervals :

C to D 9 commas . 9

D “ E 8 “ 17

E « F 5 “ 22

F 8 G 9 “ 31

G “ A 8 “ 39

A “ B 9 “ 48

B “ C 5 “ 53

Nature’s arbitrary division of the octave, into intervals of exact dimensions, is not satis¬ factory, nor does it admit of an exact equaliz¬ ing; the only possible approach to it being by the method known as the <(even temperament,® which method or principle was discovered and established by John Sebastian Bach, in the early part of the 18th century, who learned that cer¬ tain intervals would bear being tuned sharp (in excess of) or flat (short of) perfect; the thirds and fourths being tuned sharp and the fifth tuned flat of perfect, thus distributing among all the 12 keys of the octave, the three commas or points by which the major tones exceeded the minor, thus rendering equal the five tones in the diatonic series. Previous to this time, it had been the custom to tune to perfect inter¬ vals, those keys having not over three sharps or flats and play in those keys only. The prob¬ lem to be solved was to so divide the octave into 12 semitones by fixed sounds, that each one of the 12 sounds could be made the key note upon which a properly proportioned dia¬ tonic scale could be based, either in the major or minor form, and a melodic or harmonic pro¬ gression made possible through the whole 24 major and minor scales;

so that from any one of these 12 notes a uniform chromatic scale could be constructed, thus making possible modulations of unlimited variety and beauty.

The method then of tempering the notes of keyed instruments consists in arbitrarily ad¬ justing the enharmonic diesis, that is, the dis¬

tinction there is naturally between D sharp and E flat, G sharp and A flat, by tuning these notes too sharp for one and too flat for the other of these natural tones or intervals, and by making a similar compromise between the more minute discrepancies of the diatonic scale. Thus while no interval will be exactly true, yet none will be so adjusted as to shock the ear by false intonation, but rather add a color or quality to the tonality of the instrument, which, though harmonious, would otherwise be characterless.

Rule for Tempering Pianos and Organs.-ˆ

Tune middle C to desired pitch, then tune F — - fifth below — sharp of C, until between C and F, there result three beats in five seconds. Next tune A-sharp — fourth above F-sharp of the latter, until there results one beat, each second. Next tune G — fourth below middle C — flat of C, by one beat a second ; then tune D — fifth above — flat to G, by three beats in five sec¬ onds; A — fourth below — flat to D; E — fifth above — flat to A; B — fourth below — flat to E; F-sharp — fourth below — flat to B; C-sharp — fifth above — flat to F-sharp; G-sharp — fourth below — flat to C-sharp ; D-sharp — fifth above — flat to G-sharp, which will make D-sharp as sharp of A-sharp, as the latter is sharp of the first F tuned.

In all the above intervals, the fifths beat three times in five seconds ; the fourths beat once a second, or five times in five seconds. All the 12 notes, from F below middle C to first E above, have now been tuned ; the temperament has been confined to the smallest possible com¬ pass to lessen the liability of errors, and if the first F above middle C is now tuned three beats in five seconds, flat of A-sharp below, it will be a perfect octave to the first F tuned.

Tuning. — ‘The art, principle or act. of so adjusting the intonations of keyed musical in¬ struments as to make possible consecutive mu¬ sical tones agreeable to the ear. The method varies according to the kind or character of the instrument. Where strings are used, as in pianofortes, harps, violins, violas, guitars, zith¬ ers, etc., tuning

consists in adjusting the ten¬ sion of the strings by turning the pins or pegs around which the strings are wound. In band and orchestral wind instruments, a crook or joint is used, sometimes called a slide, because it slides in and out to adjust the length of the column of air in the tube to the point where the desired pitch of the fundamental note is obtained.

In reed organs it depends upon the adjust¬ ment of the comparative weight, length and thickness of the reeds, and in pipe organs upon the length of the vibrating column of air in the flue pipes.

In the tuning of strings, the pitch is deter¬ mined by the size, length and tension of the wire. In reed tuning the desired pitch is ob¬ tained by filing or scraping the reed; at the base or fixed end to flatten the tone and at the point or free end to sharpen it.

Organ pipes are tuned according to their construction. The large open flue wood pipes are lowered or flattened in pitch by being lengthened by a sliding cap or by a board fas¬ tened to the back, at the top, and is raised or sharpened in pitch by being shortened.

The large open metal flue pipes are tuned by cutting away or adding to the length or

by a slit in the back near the top, making two flaps to be opened or closed as required ; clos¬ ing them lowers the pitch, opening them raises it; the small metal pipes being tuned by the use of a conical horn, with which the tops of the pipes are contracted or expanded, as the pitch is to be lowered or raised respectively. Stopped metal pipes are tuned by a cap, raised or lowered as desired, and reed pipes by adjust¬ ing the wire which bears upon the reed, the raising or drawing up of the wire increasing the effective length of the reed and so flattening it and vice-versa. In the tunning of pipe organs, the reed pipes are the last to be tuned, since they are the most liable of all the pipes to be¬ come disarranged.

Voicing of Keyed Musical Instruments. —

The voicing of organ pipes consists in the ad¬ justment of their various parts, consisting of the mouth, throat, lips, languid and ears, the correct method of treatment having been learned by experience many years ago and of late years demonstrated by mathematical calcu¬ lations and by the investigations of scientists.

The languid is that flat piece of the pipe which lies horizontally above the upper part of the foot, and it is against this languid the <(sheet of wind® is forced from the ((wind way® below. Some of the pipes, have the languids grooved upon their face, as one method of voicing, and some metal pipes are voiced by bending the ears, which are placed on either side of the mouth. Pipes once voiced at the factory seldom need any alteration.

The voicing of reeds in the common house organ is accomplished by giving the free end of the reed a slight curl or circumflex, and this also causes the reed to speak or sound more promptly and with less pressure of wind.

The voicing of pianos consists in the stab¬ bing of the felt of which the hammers are made, by several needles fastened in a handle. The thrusts should be made directly toward the centre of the hammer and not through the top of the felt, from the sides. In the making of hammers, which is done by machinery, one entire set being covered with felt at a time, there is a variation as to hardness in the indi¬ vidual hammers, and voicing is relied upon to lighten up the felt and give a uniform char¬ acter of tone throughout the entire scale of the piano.

Edward Quincy Norton, Author of c Construction, Tuning and Care of the Pianoforte 4

REED-BIRD. See Bobolink.

REED CANARY GRASS, a grass of the genus Phalaris. See Grasses in the United States.

REEDBUCK. See Reitboks.

REEDER, Andrew Horatio, American politician, first governor of Kansas Territory: b. Easton, Pa., 6 Aug. 1807 ; d. there, 5 July 1864. He practised law at Easton and was a prominent Democratic politician when, in 1854, he was appointed by President Pierce the first governor of the newly-formed territory of Kansas. Upon arriving at his

post he at once rendered his position difficult by declaring his intention rigidly to put down the violence re¬ sulting from the conflict of the two parties respecting slavery. In the election of March 1855 more than three-fourths of the votes cast

were illegal, but the governor issued certificates of election to all claimants whose papers were regular and against whom no protests or official notice of frauds were presented. His action he defended as strictly legal and declared that any other would have been revolutionary, though he confessed to knowledge of the fraudulent voting. He was dismissed from office by the President and he returned to Lawrence to re¬ side and to join forces with the Free-Soil move¬ ment. He was nominated by this party as Territorial delegate to Congress. A legislature of the Free-State party formed under the in¬ strument known as the Topeka constitution elected him to the United States Senate in 1856. But the election was refused ratification by Congress. President Lincoln appointed him a brigadier-general at the outbreak of the wrar, but considerations of age induced him to de¬ cline. Consult Spring, (Kansas) (1885) ; Rob¬ inson, (The Kansas Conflict (1892).

REEDFISH, a crossopterygian ganoid fish (Calamoichthys calibaricus) , which, with the bichir is the only survivor of a group prominent in palaeozoic time, which dwells in the sluggish reedy rivers of the Senegal coast of Africa, searching the mud of the bottom for prey.

REEDSBURG, Wis., city in Sauk County, 150 miles northwest of Milwaukee, on Baraboo River and on the Chicago and Northwestern Railroad. It has lumber, dairying and livestock interests, manufactures woolens and flour and is a shipping point for potatoes, apples and other products. Pop. 2.997.

REEF, the part of a sail comprehended be¬ tween the top or bottom and a row of eyelet holes generally parallel thereto. The object of the reef is to reduce the surface of the sail in proportion to the increase of the wind ; for which reason there are several reefs parallel to each other in the superior sails ; thus the top¬ sails of ships are generally furnished with three reefs and sometimes four; and there are always three or four reefs parallel to the foot or bot¬ tom of those main-sails and fore-sails which are extended upon booms. When a reef has to be taken in the sail is slightly lowered; the men climb out along the lower boom or yard, which they lean over, with their feet supported by the foot-ropes, fold the loose portion of the sail around the yard and tie

them up with the cords inserted in the eyelet-holes. As the operation of reefing is dangerous in stormy weather many ships are now fitted up with a patent apparatus by which sails may be reefed from the deck.

Reef also implies a chain of rocks lying near the surface of the water.

REEL, a revolving contrivance on which fibre, thread, cord, rope, fabric, etc., are wound to form them into hanks or skeins, and for vari¬ ous other purposes. The term is applied in agriculture to a device having radial arms carrying horizontal slats and rotated by gear or pulley connected with the axle of a harvester, for pressing backward and holding the stalks of grain in position for being severed by the knives. In angling, a skeleton barrel attached to the butt of a fishing rod, around which the inner end of the line is wound, and from which it is paid out as the fish runs off with the bait, and is gradually wound in again as his struggles become less violent, bringing him to land or

to the landing net. In baking, a cylinder with radial arms rotating in a heated chamber, carry¬ ing pans in which loaves of bread are placed for baking in the reel-oven. In cotton machinery, a machine on which cotton is wound, making hanks of thread. In domestic industry, a spool or bobbin of wood on which cotton, thread, silk, etc., is wound for use in sewing.

Also the name of a lively rustic dance in which the couples sometimes swing or whirl round, and sometimes pass, forming the figure 8. In the United States the Virginia reel was widely popular. Also the music for such dance, generally, written in common time, but some¬ times in jig time of six quavers to a bar. The Scotch dance known as a reel is executed by two couples, the music for which is generally written in common time of four crotchets in a bar, but sometimes in jig time of six quavers.

REEM, in Scriptural zoology, Bos primi-geniiis. In the Authorized

Version the influence of the Septuagint has pjevailed, and the word is translated < <unicorn,)) but erroneously, as the mention of two horns on one reem (Deut. xxxiii, 17) proves. The word unicorn has dis¬ appeared from the Revised Version, wild ox being substituted for it; but in Num. xxiii, 22, the alternative rendering ox-antelope (Oryx leucoryx) is given in the margin. The term is still a vernacular name among the Arabs of the Sahara for a gazelle (Gazella lodcri).

RE-ENTRY, legal term designating the re¬ suming or retaking possession of lands or tene¬ ments by the landlord in case of non-payment of rent or public dues. Usually a clause providing for re-entry in case of non-payment is inserted in the lease ; and under this the landlord may enforce ejectment either through notification of his wish to re-enter or, if necessary, through process of law.

REES, res, Abraham, English Presbyterian clergyman: b. Llanbrynmair, Wales, 1743; d. 9 June 1825. He prepared for the ministry at Hoxton Academy, where in his 19th year he was appointed mathematical tutor to the insti¬ tution, and soon after resident tutor, in which capacity he continued upward of 22 years. He was pastor to the Presbyterian congregation of Saint Thomas', Southwark, 1768-83, and of a congregation in the Old Jewry from 1783 till his death. In 1776 he undertook a revision and expansion of (Chambers' Cyclopaedia,* which he completed in 1785. The success of this work led him to a new undertaking, similar in its nature, (The New Cyclopaedia, > in 45 volumes (1802-20), republished at Philadelphia in 47 volumes.

REES, John Krom, American educator: b. New York, 27 Oct. 1851; d.- there, 9 March 1907. He was graduated from Columbia in 1872 and from the Columbia School of Mines in 1875. He filled the position of assistant pro¬ fessor of mathematics in the Columbia School of Mines 1873-76, and was professor of astron¬ omy in Washington University, Saint Louis, 1876-81. He was director of the observatory and instructor in geodesy and practical astron¬ omy in Columbia 1881-84, and from 1884 pro¬ fessor of astronomy there. He was president of the New York Academy of Sciences in 1894-96, was elected Fellow of the Royal Astronom¬ ical Society of London; and in 1901 received

the decoration of Chevalier of the Legion of Honor.

REESE, res, Michael, American pioneer : b. Heinsforth, Bavaria, 1816; d. Germany, 2 Aug. 1878. Apprenticed to a tanner, he worked at his trade until he emigrated to the United States, and there after some

reverses he estab¬ lished a jewelry business in which he was suc¬ cessful. In 1850 he went to California and' began investing in San Francisco real estate. When the Fraser River excitement was at its height, Berri, a Swiss banker, disheartened as to the future of San Francisco, expressed to Reese his desire to part with his holdings. Reese having a firm belief in the coming importance of the city purchased Berri's property and thus laid the foundation of his great wealth. Among his benefactions was his gift to the University of California of the Lieber Library. The Michael Reese Hospital of Chicago, Ill., is his memorial, while his legacies to charities in the aggregate reached half a million dollars.

REEVE, Richard Andrews, Canadian phy¬ sician : b. Toronto, 1842. He was graduated at Toronto University in 1862 and took his M.D. at Queen's University in 1865. He engaged in practice at Toronto and specialized in the treat¬ ment of the eye and ear. In 1867-72 he was assistant surgeon at the Toronto Eye and Ear Infirmary, and subsequently became lecturer on opthalmology and otology at the Toronto School of Medicine (now Medical Faculty of the Uni¬ versity of Toronto). He was dean of the faculty in 1896-1908, when he resigned. He was president of the British Medical Association in 1905, and was then elected a life vice-president.

REEVE, Tapping, American jurist: b. Brook Haven, L. I., October 1744; d. Litch¬ field, Conn., 13 Dec. 1823. He was gradu¬ ated from Princeton in 1763 and in 1767-70 was engaged as a tutor there. In 1772 he established a law practice at Litchfield, and during the war served as a recruiting officer and as a member of various committees of safety and defense. In 1784 he opened a law school at Litchfield which became justly famous and for years was without an American rival. He conducted it without assistance until 1795, when he became associated with James Gould, who succeeded him in 1820. He was a judge of the Supreme Court of Connecticut in 1798— 1814, served as chief justice for a short time and subsequently served a single term in each the legislature and the council, after which he declined to hold further office. He was a Federalist, a lawyer of high ability and was the originator of the movement to secure to mar¬ ried women the legal right to dispose of their own property. He published (The Law of Baron and Femme; of Parent and Child; of Guardian and Ward; of Master and Servant,* *etc.* (1816), republished in numerous editions; and (A Treatise on the Law of Descent*

(1825).

REEVE, a bird. See Ruff.

REEVES, Arthur Middleton, American philologist: b. Cincinnati, Ohio, 7 Oct. 1856; d. in railway accident near Hagerstown, Ind., 25 Feb. 1891. He was graduated at Cornell in 1878. He specialized in the study of languages and after 1879, when he visited Iceland, he devoted much of his time to European travel

and the study of the sagas and ancient manu¬ scripts. Willi Reamish and Anderson he wrote (The Norse Discovery of America) (pub. post¬ humously 1906) Author of (The Finding of Wineland the Good' (1890; new ed., with biog¬ raphy and correspondence of the author, 1895).

REEVES, revz, Helen Mathers, English

novelist : b. Misterton, Somerset, 26 Aug. 1853. In 1876 she was married to Henry Albert Reeves, a London surgeon. (Cornin' Through the Rye,> her first story (1875), was widely popular both in this country and her own, and among her later fictions are (Cherry Ripe* (1877) ; (As He Comes Up the Stair) (1878) ; (My Lady Green Sleeves) (1879) ; (The Sin of Hagar* (1896) ; (Becky *(1900) ; (Tally HoP (1906); (Pigskin and Petticoat* (1907); (Love the Thief) (1909). Her style is pleasing and animated and the interest of her novels is well sustained.

REEVES, John Sims, English tenor singer: b. Woolwich, Kent, 26 Sept. 1818; d. Worthing, Sussex, 25 Oct. 1900. He studied music and, in 1832, became organist in the church of North Cray, Kent, and made his first appearance as a singer in 1839 on the Newcastle stage. He first sang in London in 1842, and having studied in Paris and Milan made his first appearance at the La Scala Theatre of the latter city as Egardo in Donizetti's opera, (Lucia di Lammermoor.* His voice was of wide compass and great beauty — mellow and powerful, capable of the ten-derest pathos and of the most stirring martial appeal, but always controlled by genuine artistic feeling and knowledge. He was heard to most advantage in the concert hall and in oratorio parts, and

in such pieces as (Guy Mannering) he displayed considerable histrionic ability. He published (Life and Recollections* (1888) and (My Jubilee) (1889).

REFEREE, in law, (1) a person who tries or examines an issue or question of fact sent to him by judicial order. (2) A person au¬ thorized by judicial order to take testimony and investigate on a given case. In England, under the Judicature Act of 1873, in the High Court of Justice trial before referees is ordered only on the consent of the parties or in cases in which accounts or documents are complicated and necessitate long investigation or involve local or scientific facts incapable of trial in the usual manner. Assessment of damages and inquiry and report may be ordered in any case. In the United States referees are appointed in bankruptcy cases and often in divorce proceed¬ ings, cases in which accounts are complicated and those in which secrecy is desirable.

REFERENCE AND RESEARCH BU¬ REAUS, or SCHOOL RESEARCH BU¬ REAUS, a type of office maintained in connec¬ tion with the office of superintendent of schools, the functions of which are' (1) to prepare sta¬ tistical data from current reports to keep the superintendent informed as to the work of each school in the system, the relative standing of the schools and grades in educational accom¬ plishment and the cost of operating the system;

(2) to act as a clearing-house of current infor¬ mation, bringing the experience of other sys¬ tems to the attention of local authorities ; and

(3) to conduct standard classroom measure¬

ments and other research work as will aid the superintendent and his supervisors in their administrative work. The object of such a specially organized bureau is to do this work during the current school term, so that the schools may make immediate use of the findings obtained and that preventive and remedial measures and economies may be put into effect during the same school year in which they are discovered. The most notable example of such a bureau is in Rochester, N. Y.

REFERENDUM, in the United States, the submission of the legislative acts of a represen¬ tative assembly to the people for acceptance or rejection by popular vote. Under its Ameri¬ can application, the referendum means that a specified time must elapse before a law (or,

in case of a city, an ordinance) may go into effect, but if, during the period, a reasonable minority of the people should petition for a referendum on the law, it remains inoperative until after the following election, when it is either ratified or rejected by a majority of the popular votes. The period usually allowed be¬ fore bills may become laws is 60 days and the percentage of voters who must sign a petition to secure a referendum varies from 5 per cent in South Dakota to 10 per cent in North Dakota. In 1906 Oregon amended her law so that the referendum might be invoked not only upon en¬ tire laws but also upon individual items or parts of laws. Every measure to be submitted to the people, on demand of initiative or referendum petitions, must be filed not less than four months before the general election. A comprehensive ballot title for each measure is formulated by the attorney-general and a campaign book is prepared by the Secretary of State. The proposed law is printed in full in this book as well as any arguments that may be advanced by the advocates or opponents of the measure, the interested parties paying the exact cost of the paper, and printing required to present these arguments. A copy of this book must be mailed by the Secretary of State to every registered voter in the State eight weeks before the general election, the State bearing the cost of printing the text of the law and postage as a legislative expense. This enables the voter to familiarize himself with the authentic details of the proposition the fate of which he is called upon to determine and allows sufficient time for discussion between individuals and by every variety of organization through¬ out the State. Under this device the people may kill bad laws and overthrow the work of tools of political bosses who intend to foster their private or political fortunes in the State legislative body; moreover, by a threat of invoking this remedy, much pernicious legisla¬ tion can be prevented, franchise stealing elimi¬ nated and the corrupting lobby rendered unprofitable. On the other hand if the legisla¬ ture exhibits indifference to public require¬ ments and persistently refuse to enact the necessary legislation, the people have an ef¬ fective remedy in the initiative (q.v.) and to a considerable extent in the recall (q.v.).

Since the 16th century a form of referen¬ dum has existed in some of the cantons of Switzerland. Under the Swiss Constitution all constitutional amendments must be ratified by the electorate before they become law. In

eight cantons an obligatory referendum is in vogue, requiring the submission to the electorate of every law and every expenditure above a fixed maximum, and no demand for such sub¬ mission to the electors is necessary. Other measures of national importance must be sub¬ mitted to popular vote if, within 90 days after their publication, the governments of eight cantons or 30,000 votes throughout the republic should demand such submission. While the terms initiative and referendum were almost unknown in American politics prior to 1890, yet an analogy is to be found in colonial days. In the Plymouth colony, even after the towns be¬ gan to send deputies to their representative legislature, the <(whole body of the freemen® appeared at the June court to make laws and repeal such of the laws enacted by the legisla¬ ture as appeared ((pre judicial to the whole.® Even in the Massachusetts constitution of 1780 the bill of rights expressly reserved to the voters the right to instruct their representatives in the legislature, and both prior to and after the Revolution this right was freely exercised. Almost from the beginning, with a few excep¬ tions, the State constitutions and amendments thereto have been referred to the voters of the State for ratification or rejection. (See Con¬ ventions, Constitutional). Some of the States have introduced another type of referen¬ dum by amending their constitutions so that legislative acts, which relate to specific subjects (such as incurring a State debt or the sale of school lands), must be subjected to popular vote. In a few States, the constitutions of which contained no such authorization, the legislatures attempted to submit to popular vote miscellaneous questions of a perplexing nature, but this practice was checked by court decisions on the ground that such action on the part of representative assemblies was an unwarranted delegation of their lawmaking powers. In 1901 Illinois enacted a law which might be termed an ((advisory initiative,® providing that upon petition of 10 per cent of the registered voters a given proposal, such as a <(question of pub¬ lic policy,® must be submitted to the electorate of the entire State. A similar law has been passed in Delaware and several other States.

The first referendum league in the United States was organized in New

Tersey in 1892 but South Dakota was the first State to adopt the optional or facultative referendum, the neces¬ sary amendment to the constitution being adopted in 1898. Her example was followed by Oregon (1902), Nevada (1905 and 1912), Mon¬ tana (1906), Oklahoma (1907), Maine (1908), Missouri (1908), Arkansas (1910), Colorado (1910), Arizona (1911), New Mexico (1911), California (1911), Idaho (1912), Nebraska (1912), Ohio (1912), Washington (1912) , Michi¬ gan (1908 and 1913), Massachusetts in a limited form (1913), North Dakota (1914), Maryland (1915) and Mississippi (1916). In 1900 Utah and in 1912 Idaho adopted amendments provid¬ ing for the initiative and referendum, but the legislatures have not passed enabling acts; New Jersey is experimenting with the referendum in cities and in 1916 Minnesota rejected the plan. The Oregon amendment was bitterly at¬ tacked by its opponents who took the matter to court, where a minor judge, declared the measure unconstitutional and not in accord with the provisions of the Federal Constitution.

Appeal was taken to the Supreme Court of the State which tribunal not only reversed the de¬ cision of the lower court, but held that the referendum <(does not abolish or destroy the representative form of government or sub¬ stitute another in its place. The representative character of the government still remains.®

In 1897 the Nebraska legislature enacted a law permitting the cities of that State, upon the vote of a majority of their citizens, to adopt direct legislation methods in the conduct of their affairs. In the same year Iowa ex¬ tended the initiative to all questions of fran¬ chise save those of public ownership. Many Western cities have adopted the direct legisla¬ tion reform, beginning with Seattle, Wash., in 1892, this city being quickly followed by Buck-ley, Wash., Alameda, Vallejo, San Francisco, Sacramento, Los Angeles, San Diego, Pasadena and many of the smaller cities of California; Portland, Ore., Grand Rapids and Detroit, Mich., Denver, Des Moines, Minneapolis, Nash¬ ville and others. Altogether the initiative, referendum and recall are used more or less completely in about 300 municipalities' some under general State laws and some under special charters. See Initiative; Recall.

Bibliography. — Beard, C. A., (American Government and Politics) (rev., New York 1914) ; Bacon, E. M., and Wyman, M., Pirect Elec¬ tions and Lawmaking by Popular Vote) (Bos¬ ton 1912) ; Beard, C. A., and Schultz, B. E., (Documents on State-wide Initiative, Referen¬ dum and RecalP (New York 1912, gives text of laws of various States)

; Boyle, James, (The Initiative and Referendum* (Columbus, Ohio, 1912) ; Baker, F. A., (The Initiative and Refer¬ endum* (Detroit 1911) ; Barnett, J. D., opera¬ tion of the Initiative, Referendum and Recall in Oregon) (New York 1915) ; Butler, N. M., (Why Should We Change Our Form of Gov¬ ernment (ib. 1912) ; Cleveland, F. A., Organ¬ ized Democracy) (ib. 1913) ; Coker, F. W., ˆSafeguarding the Petition in the Initiative and Referendum* (in American Political Science Review, Vol. X, pp. 540-545, Baltimore 1916), and (Interworkings of State Administration and Direct Legislation (in (Annals of the Ameri¬ can Academy of Political and Social Science, *Vol. LXIV, pp. 122-133, March 1916) ; Com¬ mons, J. R., (Proportional Representation (New York 1907) ; Cushman, R. E., Pecent Experience with the Initiative and Referendum) (in American Political Science Review, Vol. X, pp. 532-539, Baltimore 1916) ; Carey, C. H., limitations on the Use of the Initiative and Referendum) (in Case and Comment, Vol. XXIII, pp. 353-357, Rochester, N. Y., 1916) ; Eaton, A. H., (The Oregon System* (Chicago 1912) ; Galbreath, C. B., Provisions for State¬ wide Initiative and Referendum) (in (Annals of the American Academy,) Vol. XLIII, pp. 81-109, September 1912; gives results of votes on various measures in the several States) ; Galbreath, C. B., (Initiative and Referendum) (Columbus, Ohio, 1911) ; Gardner, C. O., Problems of Percentages in Direct Govern¬ ment } (in American Political Science Review, Vol. X, pp. 500-514, Baltimore 1916) ; Gove, F. E., (The Initiative and Referendum* (Wash¬ ington 1912) ; Hendrick, B. J., (The Initiative and Referendum* and Paw Making by the Voters * (in McClure's Magazine, Vol. XXXVII, pp. 235-248, 435-450, 1911); Haynes,

G. H., (People's Rule in Oregon5 (in Political Science Quarterly, Vol. XXVI, pp. 32-62,

1911) and Reople's Rule on TriaP (in ib. Vol. XXVIII, pp. 18-33, 1913); Jones, C. L., Reading on Parties and Elections in the United States5 (New York 1912) ; Kales, A. M., Un¬ popular Government in the United States5 (Chicago 1914) ; Lowell, A. L., Rublic Opinion and Popular Government (New York 1913) ; Lowell, A. L., and others,

(The Referendum in Operation 5 (in Quarterly Review, Vol. CCXIV, pp. 509-538, 1911) ; Lobingier. C. S., (The Peo¬ ple's Law5 (New York 1909) ; Lodge, H. C., (The Compulsory Initiative and Referendum and the Recall of Judges) (Washington 1912) ; Lowrie, S. G., (The Wisconsin Plan for the Initiative and Referendum5 (Philadelphia

1912) ; McCall, S. W., Representative against Direct Government (in Atlantic Monthly, Vol. CVIII, pp. 454-466, 1911) ; Munroe, W. B., initiative, Referendum and Recalt (New York 1912) ; Oberholtzer. E. P., (The Refer¬ endum in America with Chapters on the Initia¬ tive and Recalt (New York 1912) ; Ogburn, W. F., initiative and Referendum Tested in Hard Times) (in Survey, Vol. XXXIII, pp. 693-694, 27 March 1915) ; Phelps, E. M,, ˆSelected Articles on the Initiative and Refer¬ endum5 (3d ed., White Plains, N. Y., 1914) ; Potter, E. S., Reforming the Initiative and Referendum5 (in Review of Reviews, Vol. II, pp. 212-215, February 1915) ; Schnader, W. A., Rroper Safeguards for the Initiative and Referendum Petition5 (in American Political Science Review, Vol. X, pp. 515-531, Baltimore 1916) ; Slosson, E. E., (The Referendum in Action5 (in Independent, Vol. XLIX, pp. 734-740, 1910) ; Schaffner, M. A., (The Initiative and Referendum5 (in Wisconsin Library Com¬ mission, Comparative Legislation Bulletin,5 No. 11, Madison 1907) ; Talbot, C. H., (The Initia¬ tive and Referendum5 (Madison, Wis., 1910) ; Wilcox, D. F., (Government by all the People: The Initiative, the Referendum and the Recall as Instruments of Democracy5 (New York 1912) ; Woodburn, J. A., Rolitical Parties and Party Problems5 (revised ed., New York 1914) ; (The Initiative and Referendum, the Australian Ballot and the New England Town Meeting5 (in Massachusetts Law Quarterly, Vol. II, pp. 281-283, Boston 1917) ; (Further Referendum Election Results5 (in Survey, Vol. XXXVII, p. 206, 25 Nov. 1916) ; Rome Indirec¬ tions of Direct Government5 (in The Nation, Vol. CII, pp. 243-244, 2 March 1916).

REFINING, in metallurgy, the last step in the purifying of gold, silver, tin, copper, lead, *etc.* Gold and silver are commonly mined to¬ gether, and are sent from the smelters in bul¬ lion bars of mixed metal. It is the work of the refinery to part or separate this mixture into pure gold and silver. Both nitric and sul¬ phuric acid are used in parting. In refining iron, the process has been developed on several lines, as converting and puddling. See Metal¬ lurgy; Assaying; Gold; Silver, *etc.*

REFLECTING GALVANOMETER, a

most sensitive galvanometer, devised by Sir William Thompson for use in connection with the Atlantic submarine cables. A short needle is

rigidly attached to a small concave mirror and suspended by a silk fibre in the centre of a vertical coil of small diameter. This mirror is

adjusted by means of a directing magnet to throw the rays of light (falling on the mirror through a hole having a fine wire stretched up¬ right across it and placed just under the grad¬ uated scale opposite the mirror) back on the scale. An image of the wire is thus thrown on the scale, and the slightest motion of the needle and its mirror will produce a much greater mo¬ tion of this image.

REFLECTION. See Light.

REFLECTIONS ON THE REVOLU¬ TION IN FRANCE, published in 1790, re¬ mains to-day one of the most interesting and important of the writings of Edmund Burke (1729-97). The immediate object was an answer to a famous sermon which Dr. Price had preached in favor of the Revolution, but it amounts to a very comprehensive indictment of the entire revolutionary movement. Re¬ garding the issue as of unparalleled importance, Burke devoted the greater oart of the year to the preparation of the book. The spirit animat¬ ing him was his dislike of revolution in com¬ parison with the slower and less disrupting proc¬ esses of reform. As such, the book has been cited (cf. Lord Hugh Cecil's Conservatism5) as the Bible, primer and textbook of modern British conservatism, as the most distinguished commendation of the princinles which domi¬ nated the present Conservative party in England, at least up to the outbreak of the World War. The book is a great philippic and jeremiad against the spirit of revolution in general and the French Revolution in particular. It is re¬ plete with sound, sober principles on the one hand and warnings and prophecy of disaster on the other. Many of these prophecies were justified by the Napoleonic event, and Burke's wisdom appears in very favorable and dignified light. The Reflections5 were written with great care and elaboration in Burke's most weighty style, and no one of his writings is more replete with political philosophy and striking aphorism. He discusses such fundamental matters as the use of prejudice, superstition and power as forming valuable assets in government. Some of these passages are famous, such as his dia¬ tribe against revolutionary finance or his analysis of the principles of the great bad men like Cromwell ; but the most resplendent paragraph in the book is that describing the Dauphiness and lamenting the decay of chivalry in the world. John Morley's (Burke 5 gives the best short account of the Reflections5 and their re¬ lation to Burke's other writings.

William T. Brewster.

REFLECTOR, a smooth polished surface by which the rays proceeding from a luminous or heated object are thrown back or diverted in a given direction. The reflecting surface may be either plane or curved. In practice it is often made spherical or parabolic. The former does not bring the rays to a true focus, but is easily formed, and is consequently generally em¬ ployed where extreme accuracy is not sought for. A mirror is a familiar example of a plane reflector. The reflectors of lighthouses have been very highly developed. (See Lens; Light; Lighthouse). In telescopes, where a re¬ flector is used the entire instrument has come to be known as a reflector. See Telescope.

REFLEX ACTION, a non-voluntary re-

action affecting a muscular apparatus in re¬ sponse to some kind of sensory stimulus. Such a reaction implies the traversing of the sen¬ sory stimulus to some nerve centre or centres in the brain, the medulla, or the spinal cord, and the setting free of a muscular response, gen¬ eral or local, to certain organs of the body, without the participation of willed conscious action, although consciousness of a reflex act performed may precede or accompany the act. Many of these reflexes are extremely intricate, so intricate in fact that certain philosophers have attempted to show that all life-processes are of the type of reflex actions. Many reflex actions, by reason of the fact that their muscular equivalent acts on blood vessels, may increase or decrease ‘ glandular activity. This fright may destroy the ability of the stomach to digest. Dryness of the mouth is frequent as a result of certain forms of unconscious excite¬ ment, and many if not all of the emotions may be regarded materially as intricate forms of vasomotor reflexes. Further reflexes are con¬ stantly operative and affect the normal metabol¬ ism of the skin or the bones, and still others are concerned in the general nervous equilibrium of the entire body — the so-called neuromuscular tone. See Consciousness ; Emotion ; Muscle-Sensation; Nervous System; Telepathy.

REFORESTATION. See Forestry. REFORM ACTS. See Reform Bills.

REFORM BILLS, in English history three bills, introduced in 1832, 1867 and 1882, for the purpose of increasing the electorate for the House of Commons and removing certain in¬ equalities in representation. The first Reform Bill disfranchised many boroughs which en¬ joyed undue representation and increased that of the large towns, at the same time extending the franchise, and was put through by the Liberals. The bill of 1867 was passed by the Conservatives under the urging of the Liberals, while that of 1882 was introduced by _ the Liberals and passed in 1884: these two provided a more democratic representation. See Great Britain; Political Parties; Parliament.

REFORM JUDAISM. See Jews and Judaism — • Reform Judaism.

REFORM MOVEMENTS IN POLI¬ TICS. See Electors; Vote, Voters, Voting; Corrupt Practices Acts; Civil Service Re¬ form; United States — The New Democracy and the Spoils System ; Labor Legislation ; Prohibition; Primary, Direct; Primary Presidential Preference; Electoral Frauds and Safeguards against; Initiative; Refer¬ endum; Recall; Woman Suffrage.

REFORMATION, The. The Reformation was the movement in the religious life of western Europe in the 16th century which re¬ sulted in the formation of the Protestant Church. At earlier periods there had been a feeling that conditions in the leadership of Christendom needed improvement and attempts at betterment were made along two dis¬ tinct lines. The first was through the ef¬ forts of individual men, monastic orders and general councils to bring about changes for the better within the Church. Such a movement was undertaken by the Reforming Councils of Pisa, Constance and Basel in the 15th century where an unsuccessful attempt was made to reform the Church in head and members. The

second way in which efforts had been made to improve the condition of Christendom was to form separate organizations outside of the Roman Catholic Church such as the Albigenses and Waldenses. These early separatist move¬ ments were not of any great importance be¬ cause they affected only a comparatively small number of the Christians of Europe. These efforts to reform the Church from within and to establish other churches outside of Roman Catholicism had not met with success as the 15th century came to its close. The papal chair had been occupied for half a century by men who were more interested in the revival of learning and Italian politics than they were in giving Christendom the kind of leadership which it needed. Some of the popes con¬ tributed largely to the success of the Renais¬ sance. Some were indifferent to religion and of immoral lives. The Reformation of the 16th century started as an effort to bring about re¬ forms within the Roman Catholic Church, and it was only after this seemed impossible that the leaders withdrew from organized Roman Catholicism.

There are a number of reasons why the separation from the Church and the formation of a new organization met with success in the 16th century when the earlier efforts had failed. Most important of all was the revival of learn¬ ing. Men were thinking for themselves as they had not before for centuries. The invention of printing brought about wide diffusion of knowl¬ edge. There was an opportunity through the

study of the writings of the Early Church fathers to compare the Church of the first centuries in its belief and organization with the Church of the 16th century. It was evident to students that there was a wide difference between the two. The circulation of the New Testament also tended to bring about a diversity of opinion on religious matters. There was a growth of the national feeling in some of the nations of Europe, and an increasing desire that ecclesiastical affairs be handled within the nation rather than by the distant papacy, es¬ pecially as the popes were involved in Euro¬ pean politics. There was also a group of men who were fitted for leadership in the establish¬ ment of a separate Church. These men were able to accomplish what they did because of the growing consciousness that the Church as then organized and governed was not meeting the needs of the times, nor was it furnishing the moral and spiritual leadership which it had given in earlier centuries.

The Reformation began in Germany through the work of Martin Luther. A peasant by birth and a university graduate, he desired to make sure of his own salvation. He became an Augustinian monk and practised all the austerities of the order but did not find as¬ surance of salvation. Through the help of friends in the order, by his study of the Ger¬ man mystics, and especially through the study of the New Testament he came to the belief that a man is not justified by works but by faith alone in Jesus Christ. Justification by faith came to be the foundation of his theology. He became professor in the University of Wit¬ tenberg and preached in that city. While he was here, the indulgence seller, Tetzel, began his work near Wittenberg and Luther preached against the sale of indulgences because it was

contrary to his conception of salvation by faith in Jesus Christ. On 31 Oct. 1517 he posted his 95 theses, in this way stating his own position on the subject and challenging to a debate. This brought him into conflict with the papal authorities and it was found that there were great numbers in Germany who accepted his views. Efforts were made to bring him back to the Church but in vain. His further study of the New Testament and the Church Fathers led him to take views directly antagonistic to the papacy. He taught that a general council could make mistakes, that all Christians were priests before God and that in matters of doc¬ trine the papacy had departed from the teach¬ ings of the Bible. He was excommunicated and at the will of Emperor Charles V, placed under the ban of the empire but continued to be the leading spirit in the German Reformation. His most important assistant was his fellow-teacher at Wittenberg, Phillip Melancthon, the thinker and scholar of the Reformation as Luther was the aggressive leader. The Ref¬ ormation spread rapidly after 1517 but was somewhat checked in 1524-25 by the Peasant Revolt because, in the minds of many, Luther's preaching led directly to such outbreaks. Luther's marriage also alienated some of his followers who did not believe that monastic vows ought to be broken. Efforts were made repeatedly at the German diets to come to some agreement but in vain. Feeling between Catho¬ lics and Lutherans became more bitter till war broke out between them, which was settled by the Peace of Augsburg in 1555 by which it was agreed that each prince should have it in his power to decide the religion of his people. The principle was expressed in the words cujus regio ejus religo. Another part of the agree¬ ment was the Ecclesiastical Reservation, accord¬ ing to which if an ecclesiastical prince changed his religion he must resign his benefices. This settled the ecclesiastical question in Germany for nearly a hundred years, but was unsatis¬ factory because it gave no room for the grow¬ ing numbers of Christians outside of the Catholic and Lutheran bodies.

Meanwhile a similar movement was going on in Switzerland under the leadership of Ldrich Zwingli. He was a humanist and a great admirer of Erasmus. His study of the Bible led him to question some of the teachings of the Church and while preaching at the cathe¬ dral at Zurich he presented His new views. To settle the kind of preaching which should be allowed at Zurich a public disputation was held and the city government decided in favor of the Reformation. Similar action was taken by other cities of German Switzerland. The Lutheran

and Swiss reformatory views were much alike, but with some striking differences. In order that there might be united and har¬ monious action by the two, a conference was arranged between the leaders of the two divi¬ sions at Marburg in 1529. They could agree on all points except on the Lord's Supper, the fol¬ lowers of Zwingli looking upon it as a me¬ morial, while the Lutherans insisted upon the literal sense of the words, (<This is my body,® holding to the actual presence of the body and blood of Christ in the bread and wine but not to the change of the elements into the body and blood. All later attempts to bring about an agreement between the Swiss or Reformed

branch and the Lutherans failed. The Swiss forest cantons remained Catholic while the city cantons accepted the Reformation. There were other disagreements of a political nature so that war broke out and Zwingli was killed at the battle of Cappel in 1531. Zurich continued to be important as a centre for the propagation of the Reformation, but the leadership of the Reformed Church passed to Geneva.

There were many who believed that the Lutherans and Reformed did not go far enough in their rejection of error, and dependence upon the New Testament. These radical reformers were known as Anabaptists, because most of them rejected infant baptism and held that be¬ lievers only should be baptized. They varied in life and belief from the learned and saintly humanist, Hubmaier, to the fanatic, John of Ley¬ den. They were persecuted by Protestants and Catholics and many of them died as martyrs. The worst side of the movement appeared in the city of Munster, where an Anabapist king¬ dom was established and polygamy was intro¬ duced. The large majority of the Anabaptists were sincere Christians, intent upon following the simple teaching of the Bible. They are the spiritual ancestors of millions of our present-day Christians.

In France there was no leading figure in the early days of the Reformation corresponding to Luther and Zwingli. The nearest approach to this was Jean Jacques Lefevre, better known perhaps by his Latinized name, Faber Stapulen-sis, who was the leading humanist of his day in France. He came to a belief in justification by faith rather than by works before Luther did, and his translation of the New Testament into French greatly aided the Reformation. One of his pupils was Brigonnet, bishop of Meaux, who undertook reformatory work in his own diocese and invited preachers of Re¬ formed views to assist. He never went so far as to break with Roman Catholicism and when protests were made against the preachers he had brought in he

ordered them to withdraw. But the work which had been begun went on in secret in Meaux and in other parts of France. Faber never withdrew from the Roman Catho¬ lic Church.

The attitude of the French king, Francis I, varied from time to time according to politi¬ cal exigencies, but became more hostile to Protestantism as time went on. He was greatly disturbed by the Peasant Revolt in Germany, fearing that the spread of the new faith might bring anarchy into his own country. In his closing years the laws against heresy were rigidly enforced but Protestantism continued to spread. The great growth of Protestantism in France came after the Frenchman, John Calvin, became master of Geneva and made that city the centre of the Reformed branch of Protestantism. Frenchmen went to Geneva and returned to their homeland to distribute copies of the New Testament and to preach, when they knew that they risked their lives by so doing. The persecuted Christians were organized into churches under the direction of Calvin. The Presbyterian system was established and even in the days of persecution a national organiza¬ tion was effected. The French Protestants were called Huguenots and became a political as well as religious party. As in so many other nations of Europe, war broke out between the

followers of the two faiths. These wars suc¬ ceeded each other rapidly for a period of half a century with varying results. Finally Henry of Navarre became king. He was a Protestant, but to put an end to the civil wars he became a Roman Catholic. In 1598 he published the Edict of Nantes which gave a limited tolera¬ tion to the Huguenots and under which they increased in numbers for nearly a century.

A second and more important branch of the French Reformation was that which had Geneva as its centre. Geneva had accepted the Reformation principally through the efforts of French evangelists of whom William Farel was the leader. He attempted to make the people of Geneva live up to their professions but was unable to do so. The work which he began was carried on by John Calvin in such a way that Geneva became the model city of Protes¬ tant Christendom. John Calvin was famous before his coming to Geneva as the author of the <Institutes,) a book which more than any other became the textbook of the Reformed Church. Calvin fled from France because of the persecution and hoped to find some city where he could spend his life in scholarly work for the Reformation. On his journey he chanced to come to Geneva to pass the night. Farel was trying to organize the Church and he persuaded Calvin to assist him. After a pro¬ longed conflict Calvin gained control of the city. He reorganized the Church under the eldership system by which ministers and lay elders had control of the spiritual affairs of the city. He established theological lectureships, thus making possible an educated ministry. Geneva became the educational centre of the Reformed Church and large numbers of men, fleeing from persecution in England, the Nether¬ lands, France and other parts of Europe, came to Geneva, studied under Calvin and carried his theology and form of Church organization back to their home lands.

The Reformation came early into the Neth¬ erlands because of its close commerical and political connection with Germany. Charles V attempted to put a stop to the spread of the movement but the laws against heresy were not executed with strictness in his reign. His son Philip II entered upon a more vigorous policy of persecution and

through the Duke of Alva and his successors tried in vain to suppress the political and religious liberties of the Netherlands. The great leader in the struggle for independence was William of Orange, at first a Catholic and in his later years a member of the Reformed Church. The inquisition of the Spanish type was introduced and the laws of the country were suspended. Persons ac¬ cused of heresy were executed by the hundreds. Philip resolved to root out heresy even if it meant the ruin of the country. In vain the best generals in Spain were sent to overcome the resistance of the people. Under the guid¬ ance of William of Orange the northern prov¬ inces which were almost wholly Protestant de¬ clared their independence of Spain, which was finally established at the close of the Thirty Years' War.

England had been influenced by the Human¬ istic movement through the work of More, Colet, Erasmus and other leaders of the Renais¬ sance but their effort was rather to purify the Old Church than to form a separate organiza¬

tion. The immediate cause of the separation was the act of the king who desired a divorce from his queen, Catherine. The Pope was not willing to grant this and so Henry took the matter into his own hands and declared himself the supreme head of the Church of England, obtaining his divorce through Cranmer, arch¬ bishop of Canterbury. Parliament, under the control of Flenry VIII, passed a law which took all authority in England away from the Pope and the king became supreme in all mat¬ ters relating to the temporal affairs of the Church in England. No appeal could be taken on any ecclesiastical matter to any power out¬ side the realm. It was the plan at first to make no changes in doctrine but there was a strong Protestant tendency under the leader¬ ship of Archbishop Cranmer. This was made evident by the publication of the Ten Articles which formed the first statement of belief of the separated English Church. Henry encour¬ aged the reading of the Bible because he thought this would strengthen the movement away from Rome, not realizing that the study of the Bible would bring independence and diversity of be¬ lief amongst his people. There was a strict understanding that all the people should walk in the ecclesiastical path which Henry had marked for them. Those who refused to do so were subjected to the king's displeasure and in a few instances were executed for refusing to acknowledge him as supreme head of the Church in England or for declining to follow him in his doctrinal changes. One of his most drastic changes was the dissolution of the monasteries. A royal commission was ap¬ pointed to investigate their condition and this commission brought in an adverse

report so that they were dissolved, the smaller ones at first and the larger ones later in his reign. The property of the monasteries was used in part for educational and religious purposes but the larger part was used to enrich the king and the landed gentry. Henry's reign closed in 1547, and he was succeeded by his 10 year-old son, Edward VI, who because of his youth was under control of regents. The movement to¬ ward a Reformation of the Continental type was rapid in his reign under the leadership of Cranmer. Theologians from the Continent were brought in to assist in the movement. The first Prayer Book of Edward VI was published largely through the influence of Cranmer. This is the basis of the present Book of Common Prayer. Forty-two articles of Faith, afterward reduced to Thirty-nine, formed the doctrinal basis of the Church.

In 1553 Mary the daughter of Henry VIII and Catherine became queen and attempted to undo all that had been done in the direction of Protestantism in the preceding reigns. She tried to have the men who had been enriched by the abbey lands give back these lands to their former owners, but in this she did not succeed. The nation returned to allegiance to the Pope with an ease that made it clear that England was not yet ready for the change to Protestantism. Mary enforced the heresy laws, especially against those who had been promi¬ nent in the overthrow of Roman Catholicism, some of the leading Churchmen of England being included in the list of her victims. The fortitude of these unfortunate ones as they were burned at the stake did much to turn the

minds of England to a study of the Reforma¬ tion. More and more in the reign of Mary, England was becoming Protestant and the queen had the consciousness in her closing years that her efforts to turn the nation to the Old Church had been a failure. When Elizabeth succeeded to the throne in 1558 she found conditions which required the exercise of great wisdom to keep the nation from civil war. She was herself a Protestant by taste if not by conviction. The changes introduced by Mary were quickly abolished. A new Act of Supremacy

was passed which made her Supreme Governor on Earth of the Church in England. With her accession the Protestant leaders who had fled to the Continent when Mary began her prose¬ cutions came back and brought with them ideas which were in conflict with the thoughts of Elizabeth in regard to the royal supremacy. These Puritans as they came to be called were not opposed to the idea of Episcopacy but they did object to what they considered the remnants of popery in the system which still retained forms and customs suggestive of Roman Cath¬ olicism. They desired a State Church purified from all that had suggestion of popery and one in which there was a large degree of freedom in the way of forms and ceremonies. In the later years of Elizabeth there was a party believing in Presbyterianism as the only proper form of Church government and they desired to have one established State Church but of the Pres¬ byterian type. There also appeared the vari¬ ous independent movements out of which the Congregationalists and Baptists later arose.

While we associate John Knox more than anyone else with the Reformation in Scotland, there were several men who prepared the way for him. One of these was Patrick Hamilton, a young nobleman who studied at different uni¬ versities on the Continent and came to the Prot¬ estant position. He returned to Scotland and preached the new views. Cardinal Beaton was primate of Scotland and resolved to suppress heresy. Hamilton refused to change his views and was burned at the stake. George Wishart was another enthusiastic preacher of the Prot¬ estant views. He was protected by the nobles who were friendly to his teachings and he made evangelistic journeys in different parts of Scot¬ land. One of his followers was John Knox. Wishart was captured and executed for heresy and Knox became the leader of the Scotch Reformation. He had obtained a priestly edu¬ cation and soon showed marked ability as a Protestant leader. He worked in England in the reign of Edward VI and went to the Con¬ tinent when the persecution broke out in the reign of Mary. He studied at Geneva and adopted Calvin's views in regard to Church organization and theology. On his return to Scotland in 1559 he became virtually the head of the Protestant movement in that country. He gave his support to the Lords of the Congrega¬ tion in their attempt to maintain Protestantism against the wishes of Mary Stuart, who desired to hold the nation to Catholicism. The conflict resulted in a victory for Protestantism and Presbyterianism was established by law. After Knox's death in 1572 his work was ably carried on by Andrew Melville.

The Reformation was also introduced into Denmark, Sweden and Norway. The leaders were men who had been pupils of Luther and

the Reforamiton was under state control. It was in some cases forced upon the people be¬ fore they had been thoroughly informed of the meaning of the change. Educational work was carried on later so that the Scandinavian coun¬ tries became thoroughly Protestant.

The Lutheran Reformation also extended into Bohemia, Hungary and Poland. In Bo¬ hemia the way had been prepared by Huss and his followers. It spread rapidly here but was almost entirely overthrown by the work of the Jesuits and the Thirty Years' War. In Hun¬ gary and Poland the progress of the Reforma¬ tion was greatly hindered by the rivalries of Lutherans, Calvinists and Unitarians.

Attempts were made by the Roman Catholic Church to recover the ground lost and to gain new territory in the non-Christian world. The principal agency in this effort was the Society of Jesus, an organization founded by the Span¬ ish monk, Ignatius Loyola. The new religious order placed itself under the power of the Pope to be used unreservedly by him in the service of the Church. It worked along two lines — educationl and missionary — and was so successful that in some parts of Europe the Reformation was held in check, in other places large numbers who had been Protestants were won back to Catholicism. In non-Christian lands the members of the Society worked as missionaries and thousands were won to Cath¬ olicism. (See Counter Reformation). Consult Fisher, (History of the Reformation* (1893) ; Newman, ˆManual of Church History *(1903) ; Walker, (The Reformation* (1900) ; Lindsay, (History of the Reformation) (1907) ; (The Reformation) in the (Cambridge Modern His¬ tory > (1907).

Curtis M. Geer,

Professor of Church History, Hartford Theo¬ logical Seminary.

REFORMATORIES. See Penology.

REFORMATORY SCHOOLS, schools instituted for the training of juvenile offenders who have been convicted of an offense punish¬ able by imprisonment. The first reformatory managed under legislative control was the one established in New York in 1824, known as the New York House of Refuge. Its success was so marked that at present there are 56 institu¬ tions in the United States for the reformation of juvenile offenders. Among them are a num¬ ber of admirably conducted establishments under the control of religious

denominations, to which children are sent, according to the re¬ ligious creed of their parents, when the same can be ascertained.

REFORMED CATHOLIC CHURCH, a

religious body established in New York in 1879 by several priests who had left the Roman Catholic Church, and under the leadership of Rev. James A. O'Connor. It adopted the Protestant doctrine as expounded in the Evan¬ gelical churches, and protested against the doc¬ trine, government, discipline, practice and sacramental system of the Roman Catholic Church. They believe that the believer finds salvation through faith in God through Christ and needs no mediation through the church. They have six churches, eight ministers and about 3,000 members. The sect is established iti New York, Massachusetts, Pennsylvania and Illinois.

REFORMED CHURCH. See Calvin, John: Calvinism; Reformed Church in America ; Reformation.

REFORMED CHURCH IN AMERICA, The, is one in denominational polity and doc¬ trinal type with the Reformed Protestant Dutch Church of the Netherlands, and bore that name until the year 1867. The beginnings of dis¬ tinctive Reformed Church theology should be credited to <(The Brethren of the Common Life.® This was a unique organization of Chris¬ tian community-life throughout the Nether¬ lands, indirectly inspired by the consecrated mystic, John Ruysbroek of Brussels, designed and formally established at DeVenter and Zwolle in North Holland by Ruysbroek's de¬ voted pupil and friend, the enthusiastic evangelist-missionary, Gerard de Groote, in the last year of his life, 1384, and fully organized and developed by de Groote's like-minded fellow-worker, Florentius Radewyn, during the last 16 years of the 14th century, which were also the closing and crowning years of the life of this truly diligent and admirable man. Absolute loyalty to the will and person of the Lord Jesus Christ in everything, as necessarily exemplified in continual personal study and obedience of the Holy Scriptures, was the one all-important purpose in the daily

life of these single-hearted Christian leaders. For the more practical and complete realization of their one supreme purpose many varied per¬ sonal and community activities were developed ; conspicuous among these were transcribing and multiplying copies of the Old and New Testa¬ ments, the early Church Fathers and other truly good books ; the grouping of these “copyists® in community-families of not more than 20 persons under the same roof ; daily study of the Scriptures, the classic languages and the simpler sciences ; the establishing and employing of schools, academies and colleges for the educat¬ ing of the youth; providing needed teachers as well as needy students in already flourishing schools — with the special design of encourag¬ ing and helping every ambitious boy to an edu¬ cation anywhere in the Netherlands; and daily, ordered and useful work of some kind for every person ; for preaching Christ and Chris¬ tian duty, teaching, publishing, farming, gardening, sharing handiwork of any and every useful kind, made up the regular program of the “Brethren of the Common Life.® This carefully organized Christian system, during the century preceding the dawn of the great Reformation, produced such men as Thomas a’Kempis, saintly author of (The Imitation of Christ 1 ; Rudolph Agricola, famous for reviving classical studies and freeing learning from scholastic fetters; Alexander Hegius, the great¬ est educational reformer of his age; Desiderius Erasmus, the foremost humanist, scholar and author of the Renaissance; and John Wessel, more popularly known as Wessel Gansfort, philosopher, physician and pioneer organizer of the earliest Protestant theological system.

Besides these eminent men, the schools of the “Brethren of the Common Life® trained a great number of lesser leaders, who were in¬ fluential for better things in education, and morals and spiritual life. De Groote and Florentius appreciated the value of the spirit¬ ual treasures bequeathed to them by the great-

est of all the mystics, Ruysbroek, the vener¬ able abbot of Gruenthal, and Tauler, the im¬ passioned evangelist of the Rhine Palatinate; and realizing clearly the supreme crisis of their time, and their own supreme obligation through the service of fellow-men to seek the greater glory of God, they established wisely and per¬ manently their efficient brotherhood of Chris¬ tian communities, which directly for nearly two centuries, and indirectly for all succeeding time, was influential in making Holland pre-emi¬ nently the home of civil, intellectual and re¬ ligious liberty. And to these founders and trained leaders of the “Brethren of the Com¬ mon Life® the Reformed Church

in Holland and in America is indebted — above all others — for a religious faith always scriptural, simple and spiritual, which exalts to supreme place the salvation and imitation of the Divine Redeemer, the imperial authority of Holy Scripture, the Fatherhood of God and the true love and serv¬ ice of mankind. These men in Holland shared with Wyclif of England and Huss of Bohemia the honor of faithful preparatory work in the 14th and 15th centuries as evangelical re¬ formers before the Reformation.

Early in the development of 16th century reform the people of Holland showed marked preference for the doctrinal system of Zwingli and Calvin rather than that of Luther. This may have been partly due to their long-time neighborly intercourse and friendship with the Evangelicals living on the banks of the Rhine, and partly due to their sympathy with the per¬ secuted disciples of Calvin in France; but chiefly due, it may well be urged, to the clear, convincing and fearless propaganda of Wessel Gansfort — a man of such culture, conviction and persuasive power that his two years' pro¬ fessorship at Heidelberg University established a virile and abiding evangelical influence in those academic halls which had marked effect upon Ursinus and Olivianus and the Heidel¬ berg Catechism. Without doubt also Gansfort directly, or indirectly, helped to shape the Bel-gic Confession as truly as that great symbol influenced the countrymen of Gansfort in later years. It may be remembered that Martin Luther himself wrote concerning the writings of Gansfort: "If I had read his works earlier, my enemies might think that Luther had ab¬ sorbed everything frorti Wessel, his spirit is so in accord with mine.®

The persecutions for heresy under Charles V of Spain (1519-55), and his son Philip II (1555-98), brought long-continued distress and suffering to the Netherlands people, and con¬ tinued with occasional brief intervals for more than half a century. The period of horrors, par excellence, was the bloody six years' regime of Alva (1567-73), during which time, as the princely butcher boasted, there were more than 18,000 authorized executions; and it is claimed that in this little country more than 100,000 persons gave up life rather than faith. The more cruelly they were persecuted, however, the more inflexibly the Hollanders refused the obedience their Spanish king demanded. In 1584 William of Orange, the shrewd, self-sac¬ rificing, invincibly fearless and confident de¬ fender of Holland's faith and freedom, was treacherously assassinated by Balthazar Gerard ; yet his son Maurice proved himself a skilful military leader, and with some little help from

England the struggle with the oppressor con¬ tinued for some years; but finally in 1609 the “twelve years’ truce® was agreed upon and Holland’s long-protracted agony for con¬ science’s sake was over. Yet during the dark¬ est days of persecution proscribed evangelists continued their fervent preaching in the fields, and the people prayed and sang praises to God, after the example and spirit of the imprisoned apostles — the appeals of the field-preachers and the inspiring hymns of Beza and Marot continually strengthening them all to persevere in ((witnessing a good confession.®

Just before the coming of Alva, in 1566, a few Dutch and Walloon pastors organized the first evangelical Church Synod at Antwerp ; and with the aid of a few noble laymen a complete Church organization was effected. The Belgic Confession, written by Guido de Brey five years before, was adopted, with slight changes; and the Heidelberg Catechism, now for three years the authorized symbol of the Palatine reformers, was accepted tenta¬ tively, to be fully and finally adopted a few years later. Yet it was distinctly professed, whatever doctrinal standards were honored or endorsed, that the Word of God was the only recognized rule of faith. The Synod of Wesel in 1568 somewhat modified and adopted Calvin’s Presbyterian polity; the necessity for a learned and consecrated ministry, loyal to the Word of God and the Church standards, was plainly set forth, and the various classes and duties of church officers were clearly defined. In 1571 came the Synod of Emden, which endorsed the acts of previous synods and formulated cer¬ tain new features of church government. The first Synod of Dort, 1576, defined the four grades of ecclesiastical bodies as fol¬ lows : the General Synod, the highest court, its members delegated from the Classes, and meet¬ ing once a year; the Particular Synod, also a delegated assembly of ministers and elders, meeting annually; the Classis, a permanent body including the pastors and one elder each from a number of nearby churches, and meet¬ ing twice a year, and the Consistory, the court of the individual church, consisting of an equal number of elders and deacons elected by the church, with the pastor as president. The same Synod also limited* certain conditions of church membership. Five years later the Synod of Middleburg assembled in 1581 to complete the organization of the Church and to deter¬ mine certain matters relating to schoolmasters, professors of theology, liturgy and creed. A month later the sovereignty of Philip II was formally renounced, and the Reformed Church was declared the

established Church of the Netherlands. The great Arminian controversy early in the 1 7th century made necessary the calling of the second Synod of Dort in 1618, to which all the Reformed Churches of Europe were invited, and most of them con¬ sented, to send delegates. James I commis¬ sioned as England's representatives the bishop of Llandaff, Samuel Ward, professor of Cam¬ bridge, and Joseph Hall, afterward a bishop of Salisbury. Foreordination, perseverance of the saints, man's conversion and free will and the divine atonement were elaborately discussed; under the leadership of Episcopius (Arminius having died before the Synod convened), the

Remonstrants warmly favored the system of Arminius, which, in certain points, was finally adjudged contrary to sound doctrine; the Arminian Remonstrants were excluded from office in the Reformed Church, as consciously and wilfully traversing their own solemn pledges of loyalty to the Church and its standards ; and in an elaborate formula known as the (<Canons of the Synod of Dort,® the Synodal decisions concerning the great doc¬ trines of grace were carefully defined. The "Post Acta® of the later sessions of the Synod set forth authoritatively certain important de¬ tails concerning the call to the ministry, festival days, hymns for worship, baptism of adults and the sick, professors of theology and their relations to the Church, a new translation of the Bible into Dutch, foreign missions, the Liturgy and ministers' salaries. The Heidel¬ berg Catechism was again heartily adopted, and a ((Compendium® of its teachings was prepared that it might be included with the other standards of the Church.

Four years before this time the Hollanders began emigrating to America ; for that new-discovered world became increasingly attractive year by year, since the Holland government had formally annexed the country discovered and partially explored as "New Netherland,® and had issued a charter to the East India Company, with specified rights of trading, set¬ tling and colony improvement. Within a half dozen years after Henry Hudson, in 1609, had discovered the river that bears his name the Dutch trading posts at New York and Albany had the services of specially qualified and or¬ dained Christian laymen (Jan Huyck and Sebastiaen Jansen Krol by name) as "Com¬ forters of the Sick® and leaders of public worship on Sundays. A distinctly aggressive religious influence was also due to the con¬ secrated personality of the first director of the colony, Peter Minuit, who had been for years an ordained elder of the French Reformed Church of Wesel.

In seeking their comfort and growth, spiritual as well as temporal, at both Albany and New York, these three Christian laymen served their fellow-colonists for some years before the com¬ ing of the first missionary minister of the Dutch colony, the Rev. Jonas Michaelius, in the year 1628. Soon after the coming of this minister the first Reformed church was or¬ ganized with 50 communicants. Many of the early settlers of New Netherland were French Huguenots, more commonly called ((Walloons.® The name of the Long Island locality, “Walla-bout,® shows the nationality of most of the people who settled there. In 1642 the people of Albany (Fort Orange) were no longer obliged to content themselves with the spiritual ministry of the ((Comforters of the Sick,® for Kiliaen van Rensselaer, the first patroon of Rensselaerswyck, secured for them the services of a well-qualified minister, the Rev. Johannes Megapolensis, and in August of 1642 the first minister of Albany began his seven years’ pastorate. It is worthy of note that the Classis of Amsterdam (having sole ecclesiastical juris¬ diction over New Netherland), which commis¬ sioned Megapolensis for his work, also speci¬ fied in his ((call® that his duty was to minister to the spiritual needs of the Indians as well as

the Dutch, and the same duty was prescribed in many other Classis ˆcalls,® which served as official commissions of the ministers for their work, whether on the Hudson River, the Dela¬ ware, the Mohawk or the Raritan. Early in his ministry at Albany Megapolensis prepared and published a detailed account of the Mohawk Indians, one of the earliest trustworthy books on the life, customs and characteristics of the American Indian. In 1654 a third Reformed church was organized at Flatbush, L. I., with Polhemus as pastor; and other churches were established during the next 10 years, so that at the time of the English occupation in 1664 they numbered 13 in all.

During the next century the need of minis¬ ters for the steadily growing American church became more and more urgent ; there were no American colleges and seminaries available to prepare students for ministerial service ; but few young men could afford the time and ex¬ pense necessary for seven years of academic and theological study in Holland; and the Re¬ formed Church was thus hindered and dwarfed in the most important stage of its growth. Another condition limiting the increase of the Church was the continued and exclusive use of the Dutch language for more than half a century after it should have been clear to any thoughtful person that this persistent stand of the Dutch Church was a steadily losing policy which must finally bring disaster. Whether among Dutch settlers in America of the early 17th century or among German settlers in America of the early 20th century — to make the language of the street, and social life and business, the language of the school, the news¬ paper and the Church, is evidently a policy profitable, sensible, Christian and patriotic.

Another obstructive influence, which co-oper¬ ated all too well with the injurious tendencies already noted, was the propaganda of many leading Episcopalians, crafty or aggressive, per¬ suasive or argumentative, but at all times per¬ sistent, which often triumphed, in capturing from the Dutch Church many of her most wealthy and influential communicants. Yet an¬ other influence, most lamentable of all in its injury of vital interests, was the long <(Coetus-Conferentie® controversy, which seriously crip¬ pled and divided the Church from

1755 to 1771. Harmony was at last restored through the wise and gracious activities of Dr. John Henry Livingstone. He was a graduate of Yale Col¬ lege, and later of the theological department of the University of Utrecht, Holland; and he brought with him, as a Dutch doctor of divinity set apart by the Classis of Amsterdam as min¬ ister of the Collegiate Church of New York, a most valuable content of influence in the approving counsels and hearty cooperation of the churches of Holland in his plan for re¬ conciliation and peace. (The adoption of the Plan of Union virtually removed the Ameri¬ can Church from the jurisdiction of the Classis of Amsterdam ; 21 years later absolute inde¬ pendence came with the new constitution). Dr. Livingstone later in life was professor of the¬ ology in the New Brunswick Theological Semi¬ nary for many years (1784-1825), and 15 years before his death he was also elected president of Rutgers College. Long-cherished plans for a Church college were realized when Governor Franklin granted a charter in 1766; but Queens

College (later Rutgers) was organized under a second and improved charter in 1770, and was permanently located in New Brunswick, N. J. Besides the theological seminary at New Bruns¬ wick, the Reformed Church has a second theo¬ logical seminary at Holland, Mich., and a third in connection with the Arcot Mission of the Reformed Church in India.

Near the middle of the 19th century there was an extensive immigration from Holland to Michigan and the neighboring States ; and the rapid growth of this large Holland colony led to the founding of Holland Academy, which afterward so steadily prospered that it was chartered as Hope College in 1866. Youngest of the colleges of the Church is Central College, located at Pella, Iowa, which, after 63 years of work under the auspices of the Baptists, was transferred to the control of the Reformed Church in 1916. A board of education was established in 1828 with the design of aiding the most desirable young men in preparing for the ministry; and in 1865 the board was em¬ powered by General Synod to aid the Classes of the Church in establishing academics and classical schools. Since 1844 the board of do¬ mestic missions has done efficient work in strengthening feeble churches and in supporting infant churches. With several other denomi¬ nations the Reformed Church was associated in the foreign missionary work of the Ameri¬ can Board from 1832 to 1857 ; since then it has had its own separate missionary work with special responsibility for fields in India, China, Japan and Arabia.

In government the Reformed Church in America is Presbyterian; in public worship the use of the Liturgy is optional, with the excep¬ tion of the Offices for Baptism, the Lord's Supper and ordination of ministers, elders and deacons.

In 1792 the constitution of the American Church was formed, the 84 articles of the Synod of Dort being enlarged by adding 73 explanatory articles, more perfectly adapting the church law of the older Church to the requirements of modern Christian life in the ((new world.® During the last 10 years also many constitutional changes, in form or in sub¬ stance, have been proposed, discussed, modified and finally ratified. Four officers of the Church are recognized : ministers of the Word, pro¬ fessors of theology, elders and deacons. The judicatories of the Church are also four: the Consistory, the Classis, the Particular Synod and the General Synod. The Consistory of each church includes the minister with the elders and deacons in active service ; the elders being charged with spiritual functions and the deacons with the care of the poor; the Consistory are usually the sole trustees of church property; the elders and deacons are elected by the church members for a term of two years; and rotation in office changes half the Consistory each year; the great Consistory is an advisory body of elders and deacons formerly in service. The Classis must have not less than three min¬ isters and three elders, representing at least three churches; it meets twice a year, to license, ordain, install, dismiss, suspend or depose min¬ isters, and legislate on the affairs of the churches, trying cases appealed from them. The Particular Synod has jurisdiction over its con¬ stituent Classes, forms new Classes or transfers

congregations from one to another, and decides cases of appeal ; it meets once a year and is composed of four ministers and four elders from each Classis. The General Synod, the court of final appeal, convenes early in June of each year; has jurisdiction over the entire Church ; has a representation of at least two ministers and two elders from each Classis; and sends down to the Classes proposed and desirable changes in the constitution of the Church, to be finally decided for or against by their majority vote. In 1918 the Reformed Church in America had one General Synod, four Particular Synods, 38

Classes, 730 churches and 759 ministers, with 132,937 communicants. Consult Miller, (Life and Writings of Wessel GansforC (1917) ; Kettlewell, (Thomas A'Kempis and the Breth¬ ren of the Common Life) (1882) ; Hansen, (Reformed Church in the Netherlands) (1884) ; Demarest, (Reformed Church in America) (1889) ; (Centennial Discourses on the Re¬ formed Church) (1876) ; (Centennial of the New Brunswick Theological Seminary) (1884) ; Corwin, (Manual of the Reformed Church) (4th ed., 1902) ; Corwin, (Digest of Constitu¬ tional and Synodal Legislation of the Reformed Church in America* (1906).

Edward P. Johnson,

Professor of Sacred and Ecclesiastical History, Theological Seminary of Reformed Church in America.

REFORMED CHURCH OF AMERICA, Board of Education of, a body organized in 1828 by the General Synod to administer funds for the sustenance of needy students in the ministry. It was incorporated in 1869; since then it has managed the scholarship funds inde¬ pendently of the synod. Rutgers College is named for the first president of this board, Col. Henry Rutgers. See Reformed Episcopal Church.

REFORMED CHURCH IN THE UNITED STATES (The), formerly known as the German Reformed Church, was founded by immigrants from Germany and Switzerland who came to the New World during the 18th century, in several instances driven hither by persecution. Some went to Virginia, in which the first congregation was organized as early as 1714. Most of the immigrants settled in Pennsylvania. There the scattered bands were organized slowly into congregations through the efforts of John Philip Boehme, a school¬ master, and of the Revs. George Michael Weiss and Michael Schlatter, aided by men and money sent by the Reformed Church of the Netherlands (q.v.). The assistance given them by the Dutch Church naturally led to their subjection to the Classis of Amsterdam, which from 1725 till 1792 exercised jurisdiction over the Coetus, as the ecclesiastical gathering in America was called which met from year to year, composed of the pastors of the congre¬ gations and one elder from each consistory or local session. In 1793 the German churches assumed independence by constituting them¬ selves as a Synod, which at the time enrolled 22 pastors, 178 congregations and about 15,000 com¬ municant members. The churches multiplied considerably during the next half century, by means of increased immigration, the effects of a revival, which lasted from 1829 till 1844, and by the use of modern methods

in church work,

such as the Sunday school and missionary efforts, although in some districts the growth was impeded by the vexing problem of the inevitable transition from the use of the Ger¬ man language to that of the English in church services, something which in some instances caused deplorable divisions. The lack of ordained ministers also interfered with the prog¬ ress of the denomination, a couple of attempts to found theological seminaries ending in dismal failure. In 1844 the Church began to be dis¬ turbed by the so-called liturgical controversy, which did not end until 1878, when a peace com¬ mittee was appointed to settle the difficulty. In 1863 the Eastern Synod and the Synod of Ohio united to form the General Synod, meeting every three years. At present there are nine synods, *viz.* : those of the Southwest, Interior, Central, German of the East, Potomac, Pitts¬ burgh, Northwest, Ohio and Eastern. The membership of these various synods totals (1918) over 330,000 communicants, forming 1,785 churches, served by 1,300 ordained ministers. The theological seminary of Lancaster, Pa., is the oldest ministerial train¬ ing school of the Church, dating from 1825.

In Dayton, Ohio, the Central Theological Semi¬ nary is located. A third theological school is near Sheboygan, Wis., called the Mission House. Several colleges and academies are under auspices of the denomination, Franklin and Marshall College being the oldest. An extensive home mission work is carried on by two boards, under various nationalities, notably among the Hungarians and Germans. Foreign mission work is carried on in China and Japan, in each country with about 30 ordained pastors. The publication work of the denomination is very extensive, including several periodicals, of which the Reformed Church Messenger (Phila¬ delphia) is the oldest. The doctrinal standard of the Church, the Heidelberg Catechism, is regularly taught to the youth of the Church. The rite of confirmation of the new communi¬ cant members is celebrated with solemnity. The Sabbath school is flourishing. The official book of praise, the ˆHymnal,® was superseded in 1919 by a hymnbook published jointly by the . Reformed Church, United States, and the Re¬ formed (Dutch) Church in America. Prior to 1870 the 150 psalms were used in the song serv¬ ice. Since that date hymns only are employed. The government of the Church is presbyterial, according to the ˆConstitution,® which contains some 200 articles and is based on the Church Order of Dordrecht. Doctrinally the position of the denomination is broad and tolerant. At¬ tempts to effect union with

the Reformed Church in America and the Presbyterian Church (North) have hitherto borne no fruit.

Henry Beets.

REFORMED CHURCHES IN SOUTH AFRICA. The Union of South Africa con¬ tains six Reformed Churches. The oldest of these is the Dutch Reformed Church of the Cape province, dating from 1652 and num¬ bering about 160 congregations, some of which are located in Rhodesia and Mashonaland. Its theological seminary is in Stellenbosch. Three missionary training schools and several philan¬ thropic institutions are maintained by this Church, which in liturgy, doctrine and polity is in accord with the other reformed churches

of Dutch origin. Both psalms and hymns are sung in public worship. The highest church court, the Synod, meets as a rule every three years. The Dutch Reformed Church in the Orange Free State became independent from the Cape Church in 1853. It numbers 61 congre¬ gations. In the Transvaal province the Dutch Reformed Church, dating from 1866, reports an enrolment of 71 churches, while the Natal denomination of the same name numbers seven congregations. Since 1906 the Dutch Reformed Churches of these four provinces have a com¬ mon bond of union in their <(Federal Council® which secures their cooperation in many ways. The weekly organ of these churches is De Kerkbode, Capetown. A vigorous mission work is carried on by the above-named denomina¬ tions within their own territory as well as north and south of the Zambesi River. Some Boer missionaries labor in the Sudan. De Konings-bode is the missionary monthly. As a result of this missionary activity among the African natives over 100,000 persons belong to their ((mission churches.® They form synods of their own. The Reformed Church in South Africa , a body composed of about 80 congregations, dates from 1858, when its founders seceded from the Dutch Reformed Church. It is found in the Cape province, Free State and Transvaal. Psalms are used in public worship, and not any hymns. The theological school of the denomi¬ nation is located in Potchefstroom. Church organ, Het Kerkblad. This body is very con¬ servative. Mission work is carried on among the natives, although on a small scale. Much stress is laid on the erection and maintenance of free Christian primary schools. The late President Kruger was one of the leading men of this denomination, usually known as the (<Dopper Church.® The Reformed (Hervormde) Church of Transvaal is the smallest Dutch de¬ nomination in the Union of South Africa. Dating from 1853, it has been unable to pass beyond the boundary lines of the Transvaal, and in 1918 reported 32,500 souls. Its semi¬ nary is in Pretoria. The Reformed Church numbers 35,000 souls. The four Dutch Re¬ formed churches total (1918) 525,000 souls — of whom about 150,000 are communicants. African Dutch is fast becoming the official language of all the denominations mentioned above, instead of the Holland language as hitherto.

Henry Beets.

REFORMED EPISCOPAL CHURCH,

a denomination organized by members of the Protestant Episcopal Church, who give substan¬ tially the following statement of the events and circumstances which, as they believe, justify their course: (1) The Protestant Reformation in England had outwardly a political origin (in the act of the king, Henry VIII, renouncing alle¬ giance to the Pope, and proclaiming himself head of the English Church) ; by which the work was biased and cut short. During the brief life of the young king, Edward VI, the regent, or protector, being in favor of the Reformation, great progress in it was made. Under Mary the supremacy of the Pope was again acknowledged. When Elizabeth became queen, wishing to harmonize her divided sub¬ jects, and hoping for reconciliation with Rome, she strove to have the Liturgy framed so as to

satisfy both parties. Consequently it contained contradictory elements. At a later period, when she had found her hope futile, the articles of faith adopted were decidedly Protestant. Thus it came to pass that in the Church of England two parties found support in her Ritual ; the one Protestant, the other having an affinity with Rome. (2) After the American Revolution, when the Church of England in the colonies became the Protestant Episcopal Church of the United States, the Book of Common Prayer, having been adopted without material altera¬ tions, retained its conflicting elements. (3) The Tractarian movement, which began at Ox¬ ford, 1833, was a successful endeavor to revive the principles of antiquity and Catholicity con¬ tained in the Prayer Book, in opposition to its Protestant elements. It discarded Protestant principles and taught the doctrines of apostolic succession, priestly absolution, baptismal regen¬ eration, the real presence and the authority of the Church. (4) These teachings produced a powerful effect in the United States also. A great increase in ritualism, and of the drift toward Rome, was soon manifested; the opposi¬ tion between the <(High® and the ((Low Church® parties was intensified, and practical measures were adopted by each which widened the chasm. (5) Several subsequent public events fanned the flame of discontent, especially the censure of one clergyman for preaching in a Methodist church, and the suspension of another for omitting the word ((regenerate® in the baptismal office. (6) Remonstrances and petitions for relief, which were numerously and urgently pre¬ sented to the General Convention, produced no effect. (7) During the sessions of the Evan¬ gelical Alliance in New York in October 1873, Bishop

Cummins of the diocese of Kentucky, having, by invitation, officiated at a union cele¬ bration of the Lord's Supper, in company with representatives of other denominations, was for this act of Christian fellowship bitterly censured through the press by members of the High Church party. After this, convinced that he could no longer rightfullv continue in a Church whose theory and practice (as interpreted by the majority of its members) denied the brother¬ hood of believers in Christ, Bishop Cummins withdrew from the ministry of the Protestant Episcopal Church. (8) This led to the organi¬ zation in 1873 of the Reformed Episcopal Church, of which Bishop Cummins and the Rev. Dr. Charles E. Cheney were elected bishops. At the same time the following declaration of principles was adopted: I. The Reformed Episcopal Church (<holding the faith once de¬ livered to the saints® declares its belief in the Holy Scriptures of the Old and New Testa¬ ments as the Word of God, and the sole rule of faith and practice; in the creed <(commonly called the Apostles' Creed® ; in the divine in¬ stitution of the sacraments of baptism and the Lord's Supper; and in the doctrines of grace substantially as they are set forth in the Thirty-nine Articles of Religion. II. This Church, recognizes and adheres to Episcopacy, not as of divine right, but as a very ancient and desirable form of Church polity. III. This Church, re¬ taining a liturgy which shall not be imperative or repressive of freedom in prayer, accepts the Book of Common Prayer, as it was revised, pro¬ posed and recommended for use by the General Convention of the Protestant Church, 1785; re-310

serving full liberty to alter, abridge, enlarge and amend the same as may seem most conducive to the edification of the people, (<provided that the substance of the faith be kept entire.® IV. This Church condemns and rejects the follow¬ ing erroneous and strange doctrines as contrary to God's word: (1) That the Church of Christ exists only in one order or form of ecclesiasti¬ cal polity. (2) That Christian ministers are <(priests® in another sense than that in which all believers are <(a royal priesthood.® (3) That the Lord's table is an altar on which the oblation of the body and blood of Christ is offered anew to the Father. (4) That _ the presence of Christ in the Lord's Supper is a presence in the elements of bread and wine. (5) That regeneration is inseparably connected with baptism. To this statement it may be added that in this Church the bishops do not constitute a

separate order, but are presbyters; in council they vote with and as their brother presbyters, and are subject to confirmation or appointment by the general council. Statistics, 1910: Churches, 80; ministers, 94; members, 9,610. The present bishops are Samuel Fallows of Chicago, Robert L. Rudolph of New York, William Brewing of Toronto and Arthur L. Pengelley of Charleston, S. C.

REFORMED PRESBYTERIAN CHURCH. See Cameronians; Presbyterian Church in the United States.

REFORMED SCHOOL OF MEDI¬ CINE. See Medicine, Eclectic.

REFRACTION, a deviation in the course of a ray of light when it passes through the surface of a transparent medium. A familiar result of refraction is seen when one looks very obliquely into a transparent pool of water, of which the bottom is visible. The water seems much shallower in such a case than it really is. Another example is the bent appearance of the oars of a boat when the blades are seen obliquely under water. When ordinary light is refracted, it is also decomposed into light of the various elementary colors. This decomposition is due to the unequal refraction of light of different wave-lengths; and the resulting separation is known as dispersion. It is too small to be noticed in ordinary cases, such as those we have already cited. But, on looking at a source of light through a glass prism, it is very evi¬ dent. See Light; Spectrum.

The general theory of refraction is quite simple, and may be expressed in the following way: The power of a transparent medium to refract a ray of light is expressed bv a certain number called its index of refraction. The phenomenon of dispersion shows that this num¬ ber is different for rays of different colors, or wave-lengths. It is generally greater the denser the medium; but to this rule there are many exceptions. The mathematical principle by which the amount of refraction is determined is as follows: Let AB represent the surface of a transparent medium, LM. Let a ray of light,

. PQ, strike this surface obliquely at Q and enter the medium, and let QR be its course through the medium. Draw through Q the perpendic¬ ular DE. Then the angle PQD which the ray makes with the perpendicular before it enters the medium is called the angle of incidence;

and the angle EQR which it makes after enter¬ ing the medium is

called the angle of refraction.

Fig. 1.

The law of refraction then is:

For one and the same medium, and the same ray of light, the ratio of the sine of the angle of incidence to that of the angle of refraction is a constant quantity for the same medium and the same ray.

This constant ratio is called the index of re¬ fraction. The law may be expressed in alge¬ braic language as follows : Put

I, the angle of incidence;

R, the angle of refraction;

n. the index of refraction.

Then we shall have

sin I

n = -

sin R

sin R —

n

It is a law of the course of light that, if a ray passes in the opposite direction, say from R to Q, it will continue on the line QP after leaving the medium. It follows if the ray PQ emerges from the medium at R it will suffer refraction according to the same law as a ray entering it, but in the reverse direction. Hence if the lower surface of the medium is parallel to the upper surface, the emerging ray RS will be parallel to PQ.

One result of the above law is that a ray entering or leaving a medium in a direction perpendicular to the surface of the latter will undergo no refraction, but will continue in the same straight line. In this case the angles of incidence and refraction are both zero.

From the above equation we find that, if the angle R and the index of refraction are given, we can find the angle of emergence by the equation

$\sin I = w \sin R$.

Now, the angle R may be so large that this expression is greater than 1. Then there will be no possible value of the angle of emergence to fulfil the condition. It is found that, in this case, the ray will not emerge from the medium at all, but will be reflected from its inner surface as if the latter were polished and opaque. This is called total reflection, and is frequently applied in optical instruments. An example will show how this result may be

brought about. Let ABC, Fig. 2, be the sec¬ tion of a glass prism, the angle at C being a right angle. Let a ray enter the prism at the point Q in a direction perpendicular to the sur¬ face BC. It will then pass on and will reach the lower surface of the prism at the point R.

C

R

Fig. 2.

the angle DRQ will then be 45°. The sine of this angle is 0.707 +

Now, a glance at the table which follows will show that in all sorts of glass the index of re¬ fraction is greater than 1.5. It follows that the sine of the angle at which the ray QR should emerge from the prism would be greater than 1.5 X 0.7, and therefore greater than 1. There is then no possible angle to fulfil the conditions. The light is therefore reflected in the direction RS, as though the surface AB were perfectly opaque and highly polished.

Indices of Refraction of Various Sub¬ stances. — Any one definite chemical com¬ pound has, at a given temperature, always the same index of refraction for the same ray. But glass is not such a compound, because its in¬ gredients differ in different specimens of glass. It is impossible to make two pots of glass so exactly alike that they shall have the same index of refraction. It is owing to this fact that the idea frequently entertained, of making a telescope by putting together different pieces of glass, is impracticable. The following table

Table of Indices of Refraction.

Ray C

Ray D (mean)

Ray F

Soft crown glass .

1.511910

1.514580

1.520994

Medium crown glass… .

1.513558

1,516149

1.522343

Hard crown glass .

1.514571

1.517116

1.520994

Light flint glass .

1.537682

1.541022

1.549125

Medium flint glass .

1.575903

1.579880

1.589870

Dense flint glass .

1.645773

1.651242

1 664981

Rock salt .

1.54050

1.54418

1.55324

Iceland spar (ordinary

ray) .

1 . 65435

1.65833

1.66780

Rock crystal (ordinary

ray) .

1.5419

1 . 54424

1.54970

1.4339

1.528

1.53

2.417

1.306

Water .

1.3307

1.3324

1 . 3366

Carbon disulphide .

1 . 6240

1.6333

1 . 6584

Air .

1 . 000290

1 . 000292

1 . 000294

shows the indices for a number of common transparent substances, and for three of the principal rays, C, D, F. It will be seen that glass has a greater refracting power than water;

and that plate glass is more refracting than crown. The diamond is the substance which has the greatest refracting power of all. It has also a great dispersive power; and it is owing to this fact that a diamond with polished faces shows so many brilliant colors when a ray of light falls upon it.

The refractive power of a substance is dif¬ ferent at different temperatures. As a general rule, glass refracts more the colder it is. Con¬ sequently the focal length of a telescope will generally be slightly shorter the colder the weather. The difference is, however, slight and there are exceptions to the rule.

Refraction by the Atmosphere. — It will be seen by the preceding table that air has an ap¬ preciable, though slight, refracting power. It follows that a ray of light coming from a star is gradually bent toward the perpendicular as it approaches the surface of the earth. Only when a star is in the zenith does the ray suffer no refraction. The result is that astronomical observations upon the declination or altitude of a heavenly body require to be corrected for refraction. The latter, depending upon the density of the air, is greater the colder the air and the higher the barometer. Hence the as¬ tronomer has always to record the readings of his thermometer and barometer when he ob¬ serves the altitude of a heavenly bodv. A rough approximation to the amount of the re¬ fraction can be made by the rule that at small

zenith distances it is nearly 1” for each degree of zenith distance; and that, if the altitude is not greater than 45°, it increases nearly as the tangent of the zenith distance. The rate of in¬ crease is somewhat less than that given by this law, but still the refraction increases rapidly as we approach the horizon, where it usually amounts to about 35’. This is greater than the diameter of the sun or moon. It follows that, when we see the lower limb of the sun just touching the horizon at sea, the luminary is actually entirely below the horizon. Moreover, the lower limb is elevated more by refraction than the upper one, with the result that a cer¬ tain ellipticity is produced in the apparent out¬ line of the sun, which is plainly perceptible to the naked eye.

A ray of light always suffers refraction when passing through the air in any other than a vertical direction, and its course is most curved when it is horizontal. In this case the curvature under ordinary conditions of the air is about one-sixth that of the earth. But this re¬ sult depends entirely at the rate of increase or diminution of the temperature as we rise above the ground. If the air is very cold near the ground, and rises rapidly in tetnperature above it, a horizontal ray may be more curved than the earth, and strike the latter at some point. Objects may then be seen at such a distance that they are far below the horizon, as was once noticed by an Arctic navigator who, when separated from one of his ships, saw her image upside down above the horizon and, sailing to¬ ward it, found the ship. In the contrary case, when the air near the ground is much warmer than at a small height above it, the reverse effect is produced. A horizontal ray is then refracted upward so as not to strike the earth at all. It

is through this action that the mirages, so fre¬ quent in the desert and elsewhere, are produced. See Mirage.

Simon Newcomb.

REFRIGERATION AND REFRIGER¬ ATING MACHINERY. Refrigeration is the operation of cooling substances by artificial means. Natural ice forms the greatest source of refrigeration, but there are certain conditions where cold produced through mechanical means possesses advantages over natural ice, which have led to the development of a number of re¬ frigerating machines. The advantages of me¬ chanical refrigeration over that produced by natural ice are that the temperatures of the objects cooled can be more readily regulated, lower temperatures can be obtained and in many cases the desired cooling effect can be secured at a lower cost. The industrial im¬ portance of mechanical refrigeration is of ever-increasing importance in modern life. _ One of its earliest and largest applications is to brewing. Moreover, it has revˆutionized the industry which relates to the distribution and sale of ice. It has given us a product which is not only better than natural ice but. can be sold at a price with which natural ice in many in¬ stances cannot compete. It has further created an enormous new industry in the transport and storage of the perishable necessaries of life in a cold state. Broadly speaking, the methods that are employed for the production of cold may be classified under two heads, the second of which is by far the more important in practice. There is, first, the production of cold directly by the agency of heat, and, second, the production of cold by the expenditure of me¬ chanical work. It is by the expenditure of mechanical work that nearly all modern refrig¬ eration is carried out, namely, by compressing a gas or a vapor and afterward allowing it to expand under conditions which allow it to absorb heat from the thing that is to be cooled. To maintain the low temperature of a cold storage room or refrigerator space one must have a continual extraction of heat going on from a thing which is already colder than its surroundings. The same is true in the case of a brine tank for the production of ice. The brine has to be maintained at a temperature somewhat lower than that at which water freezes, considerably lower if the process of freezing is to go on at a reasonably fast rate. The heat which comes into the brine from the water to be frozen, the heat which the water gives out when it freezes and the heat which leaks in

from all sources has to be continuously extracted from the brine at this comparatively low level of temperature. The heat so ex¬ tracted is not . destroyed but is raised to a higher level of temperature and is discharged by being given up to some substance which acts as a receiver of heat. In all actual cases of re¬ frigeration the substance which absorbs the rejected heat is circulating water, which be¬ comes more or less warmed by the heat which it takes up. The refrigerating machine accord¬ ingly works between two temperatures ; the lower temperature is that at which heat is taken in from the body which is to be kept cold, and the higher temperature is that at which heat is rejected to the circulating water or other substance which absorbs it. In order

that this process may go on an expenditure of mechanical power is necessary.

Classification of Refrigerating Machines. — Refrigerating machines are generally classi¬ fied by reference to the particular working sub¬ stance they employ. A broad distinction may be drawn between machines which use air as their working substance, and those which use a liquid which is alternately vaporized and liquified during the cycle of operations. Gen¬ erally speaking, in this second class of machines the liquid which is used is one whose vapor pressure is higher than the pressure of the atmosphere, under the actual conditions of temperature at which the machine works. If we take, for instance, ammonia or carbonic acid as the liquid which is alternately liquefied and vaporized, we find that under the conditions of temperature usually obtaining, the pressure of the vapor is higher than the atmospheric pres¬ sure. It is, however, quite possible to use a liquid which can only be vaporized by sub¬ mitting it to a lower pressure than that of the atmosphere. Water is an instance in point. When water is the working substance, the whole action is taking place in what is, rela¬ tively speaking, a vacuum. It has to take place in chambers which are maintained at a pressure much below the pressure of the atmosphere, and consequently machines using water as their working substance are frequently spoken of, for this reason, as <(vacuum® machines. Fur¬ ther, when a vaporized liquid is used for work¬ ing substance one may either adopt simply mechanical compression as the means of restor¬ ing the vapor to the liquid state, or one may adopt a chemical action between the vapor and some other substance which has an affinity for it. This alternative gives rise to the grouping of machines under the title of Compression® machines on the one hand or ˆabsorption® ma¬ chines on the other.

The latter are those in which a quasi-chemical action or species of solution goes on as a substitute for the me¬ chanical compression used in other vapor ma¬ chines. In absorption machines there is usually a direct application of heat instead of mechani¬ cal power. Machines of the vapor-compression type are further classified according to the particular vapor which they employ, as am¬ monia, carbonic acid, sulphurous acid or ether machines. Air machines are divided into two groups, in one of which the same volume of air is made to pass again and again through a cycle of operations without leaving the machine. Such machines are called closed cycle machines to distinguish them from those air machines in which air is discharged from and taken back again in the cycle at atmospheric pressure.

Air Machines. — Refrigeration machines which employ air as the working substance filled an important place in the development of mechanical refrigeration, and are still doing useful work; though the more efficient and more compact machines of the vapor-compres¬ sion-type, using ammonia or carbonic acid, have now to a great extent driven them from the field. Dr. Gorrie of New Orleans invented an air machine in 1845. It had a compression cylinder in which the air was compressed, and from which it passed into a chamber which was kept cool by surrounding water. This chamber was maintained at a pressure of about 15 pounds per square inch above the pressure

of the atmosphere. The air was partly cooled during compression by the injection of water, so that what passed into the receiver was really air and water together. The air was further cooled in the chamber by the application of cold

Fig. 1. — Diagram of Open-cycle Air Machine.

C represents space which is to be kept cooled. Air is taken from it by compression cylinder M. It is then com¬ pressed from 1 to 4 atmospheres or so, and is discharged into the vessel A, where it is cooled by a circulation of cold water. The air is heated in compression, but the circu¬ lating water brings it down to a temperature only a little above that of the water itself. The air is next passed into an expansion cylinder N. During expansion it cools rapidly and reaches the cold room C at a very low temperature.

water outside, and then it passed on to another cylinder in which it was allowed to expand down to something like atmospheric pressure. While it was expanding it was mixed with a quantity of brine injected into the expansion cylinder. By expansion the air became much cooled and its low temperature was communi¬ cated by direct contact to the brine in the ex¬ pansion cylinder. The air leaving the expan¬ sion cylinder was allowed to escape to the at¬ mosphere, while the brine cooled to about 20° F. was conveyed into a tank and was usefully applied to ice-making or other refrigerating purposes. Many improvements were made in Gorrie's machine, which was followed in 1862 by Kirk's machine, an air machine of the closed cycle type. These types of machine and their successors are substantially the same. Their essential parts are a compression cylinder and an expansion cylinder. The first takes air from the room which is to be kept at a low temperature, compresses it; the air is then cooled by circulating water while compressed and is then returned to the cooled room by the expansion cylinder. Air machines have played a large part in developing the commer¬ cial applications of cold, although now the first place is taken by other types. Air can be employed as a

medium for cooling itself more efficiently than it can be employed as a medium for cooling anything else. Also, air machines use a working substance that is simple and harmless and that costs nothing. For use on shipboard the air machine still retains the favor of some engineers although the more efficient vapor-compression machines dispute its sway even there.

Absorption Machines. — In machines of this type cold is produced as a direct result of the utilization of high-temperature heat, without the

intermediate step of converting the heat into mechanical work. In anv machine of this type there are two substances used which have an affinity for one another so that one tends strongly to unite with or dissolve in the other when they are in the cold state, but they can be separated by applying heat. In the action of the machine they are alternately allowed to unite and made to separate. By the direct ap¬ plication of heat one of them is driven off in the form of a vapor. It is then condensed, is allowed to re-evaporate, and is absorbed by the other substance as soon as it does so. While re-evaporating it takes up heat from bodies round it, thus becoming effective for refrigera¬ tion. Of practical machines of the absorption type there are two kinds. In one kind the vapor used is water, and it is absorbed by sul¬ phuric acid. In the other kind the vapor is am¬ monia, and it is absorbed by water. When water vapor is used, the pressure at which the vapor is formed must be very low, and hence machines using water and sulphuric acid are often described as vacuum machines. The method was known from about 1810 when Leslie described the process. In 1878 Windhausen made an improved machine of this type for the making of ice.

Ammonia absorption machines employ am¬ monia dissolved in water and are in much wider use than the sulphuric acid or vacuum machine. The action is in general respects the same, but as ammonia has a much higher vapor pressure than water, there is no vacuum, but pressure higher than the atmosphere throughout

Fig. 2. — Diagram of Cycle of Ammonia Absorption Machine.

The generator (top left) contains a solution of ammonia; heat is applied to it by a steam-coil. Ammonia gas passes over to the condenser, which is a coil kept cold by water circulation. Here the ammonia gas is condensed and is next passed through a valve into the evaporator or re¬ frigerator. In evaporating there the ammonia absorbs heat from surrounding bodies, thus performing the work of a refrigerant. It is evaporated at low pressure and tempera¬ ture. After re-evaporation the ammonia gas passes to the absorber where it is absorbed by water. This liquid is then pumped back to the generator where it goes in at the top. thus completing a cycle of operations.

the cycle. The ammonia absorption machine consisted merely of two vessels, in one of which was placed a strong solution of am¬ monia in water ; the other in the first instance was empty, and was surrounded by cold water. The vessel containing the solution of ammonia was heated and the gas passed over under pres¬ sure into the other vessel, where it was con¬ densed, giving up its latent heat to the water outside. Liquid anhydrous ammonia collected in the cold vessel while the solution in the first vessel became more and more dilute. After some time the source of heat was removed, and the vessel containing dilute solution was sur¬ rounded by cold water. The condensed am¬ monia in the other vessel then evaporated and

her or cooler F, where it is evanorated through heat supplied by the coils contained therein through which a calcium chloride brine is circu¬ lated. The cold brine is circulated through the pipes dd to and from coils in the cold storage rooms. The ammonia gas leaves the cooler through the pipe cc and enters near the top of the absorber /, where it meets a spray of weak ammonia liquor, which is conducted to it through the pipe ee. The ammonia gas is taken up by the weak ammonia liquor in the absorber and forms the strong liquor which leaves the absorber through the pipe ff and is forced by the pump K through the pipe ll, the exchanger L and the pipe mm into the top of the generator, thus completing the cycle. Heat is given off by

was reabsorbed by the dilute solution. In re¬ evaporating, the ammonia exerted a refrigerat¬ ing effect. This machine was intermittent in action but a continuous machine was soon de¬ veloped from it by Reece, Stanley, Mart and others adding features which are found in the ammonia absorption machine of the present day. As has already been explained, the essential difference in an absorption machine and a com¬ pression machine consists in the metho'd of in¬ creasing the pressure of the ammonia gas leav¬ ing the refrigerating co;ls. For the compress¬ ing pump and the steam-engine in the compres¬ sion system there is substituted a vessel called an absorber, and a pump for pumping the liquid into a steam still. The condenser, liquid am¬ monia reservoir, expansion cock and cooler are the same

in the two systems. A section of an absorption refrigerating machine is shown in Fig. 3. A is the still or generator in which the aqueous ammonia is heated in order to drive off the gas. The ammonia gas passes off through the pipe aa to the rectifier B, where the gas is cooled to a point where anv water vapor in it will be condensed. The ammonia gas free from water vapor passes to the condenser C, where it is condensed and passes through the pipe bb to the ammonia reservoir D. From the reservoir D the liquid ammonia passes through the valve, or expansion-cock E, into a refrigerating cham-the ammonia on absorption, which is taken up by water circulated through coils contained in the absorber. The exchanger L saves heat which would otherwise be lost, and thus increases the efficiency of the machine. The weak liquor on leaving the generator is at the highest tem¬ perature at which the aqueous ammonia is brought in the system, whereas the strong liquor leaving the absorber is at the lowest tempera¬ ture. It is necessary to cool the weak liquor before it enters the absorber and to heat the strong liquor to the temperature of the gen¬ erator, and this is accomplished, in part, by the exchanger by making the weak liquor heat the strong liquor and the strong liquor cool the weak liquor. The weak liquor at about 270° F. is taken off near the bottom of the generator and passes through the pipe nn to the top of the exchanger L and thence through a coil contained therein. From the bottom of the exchanger it passes through the pipe ee to the absorber / The strong liquor at about 130° F. passes through the exchanger L in the reverse direc¬ tion to that of the weak liquor, and the inter¬ changing of heat is such that the weak liquor leaves the exchanger say 100° F. cooler than it entered and the strong liquor is heated a corre¬ sponding amount. The strong liquor is made to enter the top of the generator and pass through what is called an analyzer M. The

analyzer adds to the efficiency of the generator by causing the strong liquor to meet the outgo¬ ing gas generated at the bottom of the still. An exchange of heat takes place, which causes much of the ammonia contained in the strong liquor to be driven off at a lower temperature than that which exists at the lower part of the still and produces ammonia gas more free from water vapor than could be secured if the strong liquor were introduced into the lower part of the still. The cooling water passes first through the condenser C. entering through the pipe oo and from thence to the absorber J through the pipe pp. It finally leaves the absorber through the pipe qq. Heat is supplied to the generator by means of steam which enters a coil contained

denser through the pipe bb to the liquid am¬ monia reservoir D. From the reservoir D the liquid ammonia passes through the valve E , termed ((the expansion cock,® where it is re¬ duced in pressure from say 140 pounds per square inch above the atmosphere to a pressure of say 15 pounds per square inch above the at¬ mosphere, and thereby is reduced in tempera¬ ture from about 80° F. to about 0° F. The anhydrous ammonia at a temperature of about 0° F. flows in coils of pipe in the brine cooling tank F, and abstracts heat from the brine by being evaported. The gas produced by the evaporation of the ampionia passes from the condenser coils through the pipe cc to the com¬ pressing cylinder A, where it is again com-

Fig. 4.

therein through the pipe rr. The water vapor condensed in the rectifier together with the am¬ monia which it carries with it is returned to the analyzer by means of the pipe ss. The drip water from the generator coil is discharged through the steam trap N.

Comparison of Ammonia Compression and Absorption Systems. — Tests have shown that the economy of a compression system when driven by an engine requiring three pounds of coal per hour per indicated horsepower is about equal to that of the best absorption system when used in connection with a boiler of good efficiency provided the suction pressure of the ammonia gas is about 20 pounds per square inch above the atmosphere — that is when the tem¬ perature of the substance to be refrigerated is about 20° F. For higher temperatures and higher suction pressures the compression ma¬ chine is more economical in fuel, and for lower temperatures the absorption machine is more economical, unless the compression system em¬ ploys a multiple expansion engine so as to reduce the coal consumption below the three pounds on which this comparison is based.

Ammonia Compression Machines with Brine Circulation. — Fig. 4 shows a compres¬ sion system for a cold storage warehouse. A is the compressing cylinder which is driven by the steam engine B. The gas on being com¬ pressed in A passes up through the pipe aa to the condenser C, where it is liquefied. The liquid anhydrous ammonia passes from the con-

pressed and returned to the condenser. The brine which is reduced in temperature in the cooler F is pumped by means of the pump G through the pipes dd, which are connected with coils HH in the cooling rooms II. After the brine has passed through the cooling coils it is returned to the cooler F. In passing through the expansion cock E about 10 per cent of the weight of the anhydrous ammonia will be va¬ porized and it is the heat required to produce this vaporization that causes the liquid to be re¬ duced in temperature from say 80° F. before throttling to 0° F. after throttling. Ninety per cent of the ammonia is, therefore, in the liquid state when it has attained the tempera¬ ture of ebullition corresponding to the pressure existing in the cooler. The brine in the cooler is at a slightly higher temperature than the liquid ammonia contained in the coils and trans¬ mits heat to it so as to boil it and convert it into gas. The brine in parting with its heat is thus cooled to the extent of the heat required to evaporate 90 per cent of the liquid ammonia which passes through the throttling cock. In some types of compression machines all of the ammonia is not allowed to vaporize in the cooler, whereas in other systems care is taken to secure a complete evaporation. This gives rise to two classes of machines, one of which is known as the wet or cold compression and the other as the dry compression system. The brine returns to the

cooling tank after passing through the storage rooms at about 6° higher

temperature than that at which it leaves the cooler and the mean temperature of the brine is about 10° higher than the boiling point of the ammonia corresponding to the suction-pressure. The mean temperature of the brine is 6° less than that of the air in the storage-rooms. For the storage of beer a temperature of about 36° F. is required, and this is secured with a pressure of about 28 pounds per square inch above the atmosphere in the coils of the cooler. Slaughter-houses require about 25° F. in their storage-rooms, which must be obtained by a pressure of about 22 pounds per square inch in the cooler. The storage of fish requires a tem¬ perature of about 0° F., for which a pressure in the brine coils of the cooler of about five pounds per square inch above the atmosphere must be used. Instead of a brine made with ordinary salt one formed from chloride of cal¬ cium is often used as a circulating medium be¬ cause it produces less corrosion in the pipes than salt brine and may be brought to a lower temperature before it freezes or becomes partly congealed. In another system air is blown around the coils of the cooler and is circulated through the storage-rooms, and a chamber freshly filled with material can be more quickly cooled than by the use of cooling coils. The air system appears to be more expensive to operate than the brine system.

Direct Expansion Systems. — In some ma¬ chines instead of expanding the ammonia in coils placed in the cooler and forcing cold brine through the coils in the refrigerating-rooms the anhydrous ammonia is expanded directly in coils placed in the refrigerating-rooms. In this sys¬ tem we eliminate the loss due to the difference in temperature between the brine and the coils in the cooler. The use of brine is, however, re¬ garded by many as a safeguard against damage to the material in the storeroom by the acci¬ dental escape of ammonia from the circulating pipes ; the brine circulation is for this reason much used, notwithstanding the fact that the cost of the piping is less for the direct expan¬ sion system and that there is a saving in the cost of operation. This saving is due to dis¬ pensing with the brine circulating pump and permitting from five to 10 pounds higher pres¬ sure to be used in the coils of the cooler. In the wet system of compression, known also as the Linde system, the presence of liquid am¬ monia in the compression cylinder limits the highest temperature attained by the ammonia during compression to the boiling point of the ammonia liquid corresponding to the highest, pressure, or say to 80° F. _ With the dry system of compression the maximum

temperature in the compression cylinder is about 100° F. higher than this, and if the cylinders were non-con¬ ductors of heat the wet process would be aore economical than the dry. It appears by tests, however, that the influence of the conductivity of the cylinder walls in abstracting heat in one part of the cycle and giving it back in part in another, makes the two systems about equal in economy.

Other Compression Systems. — Water, sul¬ phuric ether, sulphur dioxide, carbonic acid, methylic ether and certain petroleum products may be used in compression systems in the same way as ammonia. In the case of water temper¬ atures colder than 32° F. require a suction pres¬

sure of within .08 pound per square inch or 0.16 of mercury of a perfect vacuum. The dimen¬ sions of a compressor cylinder of such a plant is about 150 times that for ammonia. The use of water as a working fluid is, therefore, impracti¬ cable except for the production of ice as de¬ scribed under section Ice-making. ■ Sulphuric ether was the first substance practically applied to refrigeration by the compression system. The volume of the compressing cylinder is, however, about 17 times that required for ammonia, and its use has, therefore, been abandoned. Sulphur dioxide machines produce a temperature of about 5° F. in the cooler with a suction of about three pounds below, and a condenser-pressure about 35 pounds per square inch above the atmosphere. Their economy is about the same as with ammonia, but the compressing cylinder must be about three times as large as for ammonia. The Pictet system uses sulphur dioxide, and in some cases what is called the Pictet fluid, which is sulphur dioxide mingled with about 3 per cent of carbonic acid. Car¬ bonic acid gives a temperature of 5° F. in the cooler with a suction-pressure of about 330 pounds per square inch above the atmosphere and a condenser pressure of about 900 pounds per square inch. The fuel required is more than with ammonia, but the size of the com¬ pressor cylinder is about one-fourth that re¬ quired for ammonia. Carbonic acid is used only to a limited extent ; but the compactness of the machine employing it, together with the fact that any bursting of a pipe or leakage will not lead to the same disastrous results as with am¬ monia, renders it more suitable for service on ships and also in some other special lines of work. Nothing definite is known of the economy of the few machines which have used methylic ether and petroleum products. From the physical properties of these substances it would appear that they would give about the same economy as ammonia or sulphur dioxide.

Ice-Making. — The production of artificial ice. The heat is usually abstracted from the water to be frozen by evaporating a volatile liquid, such as ammonia, sulohur dioxide or ether, which in evaporation absorbs heat. An¬ hydrous ammonia is most commonly employed. This boils at 27° F. below zero at atmospheric pressure. If the anhydrous liquid ammonia is introduced in a coil of pipe which is placed in a tank of brine it will absorb heat from the brine during the process of boiling equal to the latent heat of evaporation. If a can of water is immersed in the brine it will in turn be cooled and then frozen, and this process consti¬ tutes the elements of the Can System of ice¬ making. If on the other hand, the ammonia in the coil is made to cool a flat plate forming the vertical side of a water reservoir ice will be formed directly on the plate, and this consti¬ tutes the elements of the Plate System of ice-making. The vapor produced when the liquid ammonia evaporates in the coil is, in all cases, again converted to the liquid state so that it may be used over again. In abstracting heat from the refrigerating coil the vapor is at a low pressure, say 15 pounds per square inch above the atmosphere at which the boiling point of the liquid is 0° F. To convert it to a liquid it must be raised in pressure, to say 140 pounds per square inch above the atmosphere, at which

the boiling point of the liquid is 80° F. As the temperature at the boiling point of a vapor is the same as that at the condensing point, the vapor at 140 pounds pressure can be condensed by cooling it to 80° F., and after such conden¬ sation it may be returned to the refrigerating coils and used over again for abstracting heat from the brine. To raise the pressure of the gas from 15 pounds to 140 pounds per square inch we may employ either of two methods — compress it bv means of an engine, or we may absorb the vapor in cold water and then heat the aqueous solution of ammonia in a still, and so drive the gas off at high pressure. These two methods of compression constitute the distinguishing features of what is called the compression and absorption systems of ammo¬ nia refrigerating machines.

In the can system of ice-making, distilled water which has been freed of air is ordinarily used for freezing and this produces a cake of transparent and clear ice with the exception of a thin feather of air bubbles in the centre of the cake and a portion of the top of the cake which is white where the water expands over that first frozen. The distilled water from which ice is made is obtained by con¬ densing the exhaust steam from the engine of the refrigerating machine and by condensing live steam. In an economical plant the steam required to run the engine and for other pur¬ poses is less than the amount of ice produced, and to make up the difference some live steam is admitted directly to the condenser in order to supply the necessary amount of distilled water. In an ice-making plant where the water is distilled by evaporating it in an ordinary boiler, the weight of ice made per pound of coal is, therefore, limited by the evaporation of the boiler and the amount of ice produced is less than the total amount of steam generated by what is lost through the drips from the steam pipes and other causes. It is possible, therefore, to make more ice per pound of coal by the plate system of ice-making where the water is not distilled than it is by a can system as ordinarily operated. In an economical com¬ pression plant where the ice is made by the can system a single cylinder engine working with¬ out a vacuum will require less steam to run it than the weight of ice which is produced, and if distilled water is used for freezing it will not increase the efficiency to employ a more

eco¬ nomical engine. In a plate system, however, a compound engine may be used with a corre¬ sponding gain in the efficiency.

In order to make it possible in a can system to make a greater amount of distilled water ice than the weight of water evaporated by the boiler it has been proposed to use multiple-effect evaporators for distilling the water. This was done in a plant at Newark, N. J., but the system had to be abandoned on account of the evaporator becoming coated with a hard scale which Was deposited from the water to such an extent that the evaporator soon fell off in its capacity and efficiency. Where the steam from the engine operating the refrigerating machine is condensed in order to obtain distilled water for making the ice, the oil which this water contains must be eliminated. This is accom¬ plished by reboiling the water which comes from the condenser in an open tank by means of a jet of live steam; then cooling and run¬

ning it through an oil separator and finally through charcoal filters. Reboiling the dis¬ tilled water removes the air which it may con¬ tain. It is possible to so thoroughly remove the oil that there will be no traces of it in the ice, whereas, if this is done imperfectly, the centre of the cake, when freshly broken open, will have a slight smell resembling that of tar. The presence of a trace of oil can be detected by the odor when it cannot be detected by taste. In the plate system the ice is formed on the flat cooling surface to the depth of about six inches in two days, nine inches in four days and 12 inches in seven days. The plates are usually allowed to build up to about 12 inches thick before harvesting. They are then melted free from the cooling plate by passing hot ammonia gas under pressure into the cooling coil which by condensation supplies the necessary heat. After this the blocks of ice are cut to the size required by sawing or by a parting tool heated by steam. In some plate systems cold brine instead of ammonia is circulated through the cooling coils. In tfle plate system the water in contact with the freezing plates is agitated by means of com¬ pressed air which is admitted from a perforated pipe placed near the bottom of the tank. As the ice freezes from one side only it forces the impurities and the air contained in the water to its surface, and the circulation produced by the air bubbles floating upward through the water assists in removing the impurities and air bubbles from the surface. A clear transparent ice is thus produced.

In the so-called vacuum ice-making machines water is used as a working fluid, and it is cooled to the freezing point by its own

evaporation. In these machines the water is injected into a refrigerating chamber in which a vacuum is maintained and a portion of the water is frozen by the cooling effect produced by the evaporation. In some machines the vacuum is maintained entirely by mechanical means and in others by the combination of an air pump and a reservoir of strong sulphuric acid for absorbing the water vapor. Where acid is used it is heated after it has become weak through the absorption of water vapor and after concentration is returned to the ma¬ chine and used over again as an absorbent. Where a vacuum is maintained entirely by me¬ chanical means a very large cylinder displace¬ ment is required in the air-pump. One machine constructed on this principle had a cylinder 20 feet in diameter and a stroke of 10 feet, and made 20 double strokes or revolutions per minute. The ice produced is white, opaque and hard. It is produced in large cakes and cut by a saw to the size required for commercial use.

Bibliography. — Anderson, J. W., (Refrigeration) (New York 1908) ; Arrowood, M. W., Refrigeration* (Chicago 1913) ; Cooper, M., (Practical Cold Storage} (Chicago 1905) ; Dickerman, C., and Boyer, F. H., (Refrigeration) (Chicago 1909) ; ‘Goosman, J. C., Car¬ bonic Acid Industry *(Chicago 1906) ; Gueth, O., (The Refrigerating Engineer’s Pocket Manual* (New York 1908) ; Hausbrand, E., (Evaporating, Condensing and Cooling Appara¬ tusˆ translated from the German by A. C. Wright (New York 1904) ; Leask, A. Ritchie;

(Refrigerating Machinery* (4th ed., London 1907) ; Ledoux, M., (Ice-Making Machines*

(6th ed., rev., New York 1906) ; Levey, J., Refrigerating Memoranda) (Chicago 1906) ; Lorenz, H., (Modern Refrigerating Machinery > (New York 1905); Paulding, C. P., (Practical Laws and Data on the Condensation of Steam *(New York 1904); Redwood, I. I., ‘Theoretical and Practical Ammonia Refrigerationˆ (New York 1904) ; Schmidt, L. M., Principles and Practice of Artificial Ice-Making and Refrig¬ erating (3d ed., Philadelphia 1907) ; Selfe, N., (Machinery for Refrigeration) (Chicago 1900); Siebel, J. E., ‘Compend of Mechanical Re¬ frigeration (7th ed.,*

Chicago 1906) ; Stephan-sky, P. C. O., 'The Practical Running of an Ice and Refrigerating Plant1 (Boston 1897) ; Voorhees, G. T., indicating the Refrigerating Machine) (Chicago 1899) ; Wallis-Taylor, A. J., Refrigeration, Cold-Storage and Ice-Mak- ing) (New York 1902) ; id., Refrigerating and Ice-Making Machinery1* (ib. 1902) ; id., 'The Pocket Book of Refrigeration and Ice-Making) (5th ed., ib. 1907) ; Wilder, F. W., 'The Mod¬ ern Packing House1* (Chicago 1905) ; Wood, D. V., (Thermodynamics, Heat-Motors and Refrigerating Machines1* (8th ed., New York 1905) ; Williams, H., (Mechanical Refrigera¬ tion (ib. 1903). Consult also Zeitschrift fiir die gesammte Kalte-Industrie, Ice and Cold Storage, an illustrated review ofthe.ice mak¬ ing, cold storage and refrigerating industries (London, Monthly), and the Refrigerating World (New York, monthly).

REFRIGERATOR, a machine or appara¬ tus employed to reduce temperature by chemical or mechanical means. In the restricted sense in which it is most familiarly understood, the term refers to any vessel or chamber in which animal and vegetable substances, solid or liquid, are kept, and are prevented from decaying or fermenting, by the presence of ice, or freezing mixtures, or by the circulation of currents of air or liquid furnished by a refrigerating ma¬ chine. Domestic refrigerators of this character are made in a great variety of forms, ranging

from the common metal-lined wooden ice-box, provided with a tube to drain off the water from the melting ice in the ice chamber, to the large and elaborate ice-rooms used for exten¬ sive storage purposes.

Refrigerator cars employed to transport per¬

ishable merchandise without deterioration over long distances may also fie considered as beˆ longing to this class. They were first operated in 1867, between Chicago and New York City, and succeeded in keeping the meat transported fresh and sweet through an interval of 10 days, during the hottest summer months. Each end of a car is provided with a chamber in which blocks of ice are packed on gratings in such a manner as to permit the circulation of a current of air, furnished by a blower driven by a belt on one of the axles, over the ice and through the storage space in the car. See Refrigeration and Refrigerating Machinery.

REFUGE, Cities of, six Levitical cities di¬ vinely appointed as places of refuge to one who had committed manslaughter, and was pursued by the Revenger® or “Avenger® of Blood. Three (Kedesh Naphtali, Shechem and He¬ bron) were west of the Jordan, and three (Bezer in Reuben, Ramoth Gilead in Gad, and Golan in the half-tribe of Manasseh) were east of that river. If the case was proved to be one of murder, the perpetrator might be taken from the City of Refuge and put to death; if it was only manslaughter, the refugee had to re¬ main in the city to which he had fled till re¬ leased by the death of the high priest (Num. xxx, 6-34; Josh, xx, 1-9).

It was provided that the cities of refuge should be easy of access, and every year, on the 15th of Adar, the magistrates inspected the roads to see that they were in good condition, and that there were no impediments. At every division of the road was a direction post for the guidance of him who was fleeing for secu¬ rity. Those in flight were to be well supplied with water and provisions, and it was necessary that all should understand a trade so as not to become public charges. At the death of the high priest the refugee might quit the city in which he had sought security, but, according to Num. xxxv, 12, he had to stand trial to de¬ termine whether the murder was truly casual and involuntary. If pronounced innocent he was permitted to remain in safety; if otherwise he was put to death according to the law.

REFUGEES, ref’u-jes’, a name commonly applied to political or religious exiles, but origi¬ nally and particularly to the French Protestants who fled from their native country on account of the persecutions to which they were exposed after the repeal in 1685 of the Edict of Nantes, under which the reformed doctrines had enjoyed toleration from the year 1598. About 800,000 Protestants fled from their native country. England, Denmark, Holland, Switzerland, Ger¬ many, in the latter especially Saxony, Branden¬ burg and Hesse, received these fugitives with hospitality. In the Civil War in the United States the term was applied to those negroes of the South who before and after Lincoln’s Emancipation proclamation sought freedom in the Northern States. See Huguenots.

REFUNDERS. See Readjusters.

REGATTA, originally a gondola race held annually with great pomp in Venice on the canals intersecting the city. The term is now popularly employed in the United States and o-ther countries to signify a showy sailing or rowing race, in which a number of yachts or boats contend for prizes.

REGELATION, re-je-la'shon, a phenome¬ non observed by Faraday in 1850, namely, that two pieces of moist ice placed in contact will freeze together, even in a warm atmosphere. It is proved that beside the pressure from the weight of the upper piece of ice there is atmos¬ pheric pressure holding the two pieces together ; this pressure melts the ice at the parts which bear on one another, and thus enough heat is absorbed to produce regelation. A snowball is formed by the regelation of the particles composing it ; so also are the snow bridges spanning chasms on high mountains. The phenomena or regelation are easily seen in the making of snow balls, which is well known to be impossible, by the hands at least, when the snow has been exposed to great cold, and is therefore dry. Professor Thomson's discovery, that the freezing-point is lowered by pressure, explains the motions of glaciers and the ap¬ parent plasticity of ice under pressure.

REGENERATION, the act or the state of being born again in a spiritual sense. The word is a literal version of the term palingenesia, pe¬ culiar to the New Testament, in which it occurs twice only, namely, Mat. xix, 28, where it signi¬ fies the renovation of all things at the second coming of Messiah ; and Titus iii, 5, <(washing of regeneration,® where it signifies a new life, a new spirit in the individual redeemed soul. In many other passages of the New Testament, and specially in John iii, 1-10, the new birth is spoken of without the use of the word regenera¬ tion, but in such terms as plainly to indicate that the soul which is received into the kingdom of Christ is born into a new life. Regarding the relation of the sacrament of baptism to the new birth there are chiefly two divergent views en¬ tertained by divines. One view, which till the Reformation was well nigh universal, and which is still held by the Catholic Church as an article of faith, regards baptism as the agency whereby the Holy Spirit bestows the new life. Accord¬ ing to the other view the washing of water in baptism is but a sensible representation of the spiritual new birth, and regeneration is effected independently of baptism by the direct action of the Holy Spirit. The first view is called that of <(baptismal regeneration.® Article XXVII of the Articles of Religion

of the Church of Eng¬ land teaches that baptism is (<a sign of regenera¬ tion whereby, as by an instrument, they that receive baptism are grafted into the Church®; but in 1849, by a judgment of the Privy Council, it was decided that in the Established Church of England Baptismal Regeneration is not a doctrine taught in her articles and formularies as legally construed. See Man, Christian Anthropology.

REGENERATION, in zoology, signifies the reproduction, or natural restoration, of parts of the body, whether external or internal, lost by injury. This power of renewal belongs in some degree to all living creatures, and is one of the distinguishing features of organic, as distinct from inorganic, nature. A broken crystal may rebuild itself when it is allowed to remain for a suitable time in a saturated solu¬ tion of the mineral of which it consists; but this renewal is accomplished wholly bv exteinal. ac¬ cretion of new material, whereas an animal supplies a lost part wholly by the ordinary proc¬ ess of food-assimilation and growth.

This power is most manifest, as might be predicted, in the animals of the simplest or¬ ganization, and in those most exposed to serious mutilation, and decreases in a varying scale as organisms become more and more complex, until in the higher vertebrates (except lizards) it is limited to the healing of wounds. (The success of what surgeons call grafting, that is, the organic attachment of new flesh to old, as when detached skin is placed over a flayed sur¬ face, might be classified here, but it is an artificial utilization of the regenerative principle).

Among such lowly animals as protozoans, coelenterates, echinoderms and worms, the power of regeneration is very great and of much importance, although it appears with much inequality and with some strange irregu¬ larities; among crustaceans it is strong in some groups and not in others ; and among the verte¬ brates is confined mainly to the amphibians and the lizards.

As long ago as the middle of the 18th cen¬ tury it was learned that if a hydra be slice„d into thin cross-sections from each ring would sprout a fringe of tentacles, and when cut lengthwise into strips each strip would form for itself .a complete hydra. The same thing happens when protozoans, and even some worms, are dissected, (<If,® says Morgan, <(a fresh-water worm (Lumbriculus) is cut into pieces, each piece makes a new head at its anterior end, and a new tail at the

posterior end; in this way as many new worms are pro¬ duced as there are pieces.® Not all worms are so energetic. Thus in the common earthworm the cutting must be done carefully. (<If from one to five of the anterior segments be cut off,® according to Packard, <(the same number comes back; if more are cut off the process of regen¬ eration begins only after a longer interval, and only four or five segments come back as a rule; if the cut be behind the middle …

fewer worms succeed in regenerating at all.® In the case of another annelid (Allolobo - phora) allied to the earthworm, when cut in two in the middle the posterior piece ((regenerates at its anterior cut end not a head but a tail.® This is one of the many curious ex¬ amples of inconsistency or irregularity in this function. In the hydroids the presence or ab¬ sence of light has much to do with the form regeneration will take, and elsewhere other external conditions are influential.

Among the echinoderms regeneration is most conspicuous is the starfishes. Before this ability was generally known the oystermen of Long Island Sound, whose planted oyster-beds were infested with destructive starfishes, used to catch great numbers of them by dragging Hangles® ; piling them on the deck of the boat they would, as an easy means of dispatching them quickly, saw through the heaps by pulling a coarse cord and then throw the severed halves overboard. The result was that each half of the starfish (unless its centre was utterly ruined) put forth new arms, and thus the number of pests was doubled instead of de¬ creased. Now the starfishes caught are taken ashore and turned into fertilizer.

Crabs and other crustaceans will develop new limbs to replace lost ones. (<If,® savs Caiman ((Life of Crustacea,* 1911), (<a lobster be caught by one of its claws or by a leg, it very

readily parts with the limb in its struggles to escape® ; and he explains that the connection at the joint of the second and third segments is slight, and that there is only a small hole through which

blood vessels and nerves pass to the distal segments, and this is quickly plugged by a blood-clot. “Beneath the scar which forms on the stump of a separated limb a sort of bud grows, and gradually assumes the form of the lost segments … and ultimately

provides in normal cases a new member, similar in every detail to that which has been lost.w

Amphibians, especially salamanders and the young frogs, suffer greatly from mutilation, not only by enemies who catch them by the tail or a limb, which may be lost in the effort to escape (in some cases by voluntary slough¬ ing off of tail or gills.), but by the biting of their own fellows, especially when many larvae are associated. Salamanders are particularly subject to loss or mutilation of their long tails. These, and lost hands, are restored in the course of three or four months ; but in place of the bones that formerly existed in the part a similar cartilaginous framework only is sup¬ plied. Fully grown frogs are slower than the young and often the restoration is incomplete.

The same is true of lizards, whose tails are frequently torn or cast off and regenerated. The new structure is, however, as Gadow says, <(a sham tail, since neither new centra nor arches [of the vertebrae] but only a non-seg- mented rod or tube of fibro-cartilage is pro¬ duced.® Gadow ((Amphibia,) 1901) continues: (<The regenerated tail is, however, provided with new muscles, and with skin, but the scales often differ considerably from those of the normal organ. Boulenger has found that the new r aberrant scaling is in some cases a reversion to an ancestral form. This, for instance, is the case in Pseudopus, and in the tejoid genus Gymnophthalmus ; to a certain extent also in geckos and skinks. On the other hand Lacer-tidce, Gherrosanridce and also Anguidce, re¬ produce a caudal scaling true to their type. Injured or broken-off tails are often repro¬ duced double or even trifid; sometimes an ad¬ ditional little tail grows out from an injured spot, anywhere on the side of an injured or mended tail.®

Turtles will mend injured plates of their shell, or in some cases are able to reproduce a plate wholly lost.

The physiological process or method by which regeneration is effected through the cells at the surface of the injury or amputation is still a matter of theory. The latest statement of the power of regeneration manifested by the cells concerned is that by Henry Fairfield Osborne ((Origin of Life and Evolution,) 1917), who believes that, such “regeneration is attributable to the potentiality of the hereditary chromatin which still resides in the cells of the amputated surfaces.®

It has been argued by some of the stricter followers of Darwin that this power of regeneration is an acquire¬ ment through natural selection, but Morgan shows conclusively that this view is untenable. He speaks of the healing of wounds, which oc¬ curs in all animals, and asserts that its higher manifestation in the restoration of lost limbs is adaptive in character. “The immense useful¬ ness of this power,® Morgan reminds us, “is obvious when it is remembered how exposed

most animals are to injuries. By repairing the injury the animal can better carry on its normal functions. Moreover the presence of the wound would give injurious bacteria a ready means of entering the body. In fact, an intact skin is one of the best preventives to the entrance of bacteria.® Consult Morgan, T. H.,

(Regeneration } (New York 1901).

Ernest Ingersoll.

REGENERATION IN PLANTS. See

Plants, Regeneration in.

REGENSBURG, ra’gens-boorg, See Ratisbon.

REGENT, re’jent, in a general sense, is a ruler, the ruler of a state; in a more limited sense, one who exercises the highest power vica¬ riously during the absence or incapacity of the lawful sovereign.

In the United States the term regent has two very special applications, viz.: (1) The Smith¬ sonian Institution in Washington, D. C., is under the direction of a board of regents com¬ prising the President of the United States, Chief Justice of the Supreme Court, three members each of the Senate and House of Representa¬ tives, and six citizens appointed by joint resolu¬ tion of the Congress; (2) the University, of the State of New York, a supervising, not a teaching, institution, is under the direction of a board of regents, elected by the legislature, by whom all charters of academies, colleges, uni¬ versities, libraries and museums in the State are issued.

REGENT-BIRD, a bird of eastern Aus¬ tralia (Sericulus chrysocephalus) , allied to the bower-birds, which derives its name from the golden color of the head. The bower of the Regent bird (which derives its popular name from the fact that it was discovered during the regency of the Prince of Wales, afterward George IV) is

smaller and less dome-shaped than that of the Satin-bird. It is sometimes, but erroneously called the Regent-oriole. The males possess a brilliant plumage of glossy satin-like texture and of black and yellow colors, but the females are dingy in appearance. The regent-birds are of very shy habits, and inhabit the forest depths, making bowers less complicated and striking than those of some other bower-birds (q.v.), but for the same pur¬ pose. The food consists of fruits and seeds principally. One of the honey-eaters is called mock regent-bird on account of its black and yellow plumage.

REGENT DIAMOND. See Diamond.

REGENT'S PARK, London, England, one of the principal metropolitan pleasure-grounds, covering 470 acres, in the western boroughs of Marylebone and Saint Pancras. The Zoological Gardens are in the northern section of the park, and the Royal Botanic Gardens occupy a circu¬ lar area in the southern section. See London.

REGER, ra'ger, Max, German composer : b. Brand, Bavaria, 19 March 1873; d. Jena, 12 March 1916. He removed with his family to Weiden in 1874, and received his early musical training under his father and an organist named Lindner. In 1890-95 he studied under Riemann at Sondershausen and at the Conservatorium at Wiesbaden. He was a teacher at the Conservatorium in 1895-96, performed mili-

tary service in 1896-97, and in 1901 settled in Munich. He went to Leipzig in 1907, becoming director at the university and teacher of compo¬ sition at the Conservatory, and in 1908 he be¬ came professor at the university. In 1911 he was appointed court conductor of the Meiningen Orchestra by the Duke of Meiningen. He oc¬ cupied a foremost place among modern German composers of chamber and church music and by many critics is considered the logical successor of the great German masters, Bach, Beethoven and Brahms. His work was highly individual and his facility in the art of counterpoint re¬ markable ; although the complexities of his ex¬ pression in harmony, rhythm and form are at times difficult to follow, even for experienced

listeners. His power of invention was extraor¬ dinary and the volume of his compositions enormous, his Opus 100 being completed when he was 34. His works for the organ are ranked next to Bach's. Besides chamber music, choral works with orchestra, piano pieces and several hundred songs he made numerous transcrip¬ tions of songs, orchestral and organ works for the piano. Among his organ works are (Fantasie and Fugue in C minor* (Op. 29) ; (Sonata, F sharp minor *(Op. 33) ; (Fantasie and Fugue on Bach) (Op. 46) ; (Variations and Fugue on an Original Theme* (Op. 73) ; (Introduction, Passacaglia and Fugue) (Op. 127) ; his works for the pianoforte include (Improvisation) (Op. 18) ; (Aquarellen* (Op. 25) ; (Sonata for piano and violin* (Op. 72) ; (Sonata for piano and violincello in F* (Op. 78), and among his orchestral works are (Sinfonietta* (Op. 90; his first opus for orchestra) ; (Ouverture zu einem LustspieP (Op. 120) ; (Klavier-konzert) (Op. 114). He explained something of his method in (Beitrage zur Modulation-slehre) (1903).

REGGIO DI CALABRIA, red'jo de ka-la'bre-a, Italy: (1) capital of a province of same name, a seaport town opposite Messina at the extreme southern point of the peninsula. Reggio was founded by Greek colonists in the 8th century becoming later a Roman possession. Ancient Graeco-Roman baths were recently re¬ vealed in excavating. It fell alternately into the hands of Saracens, Spaniards and Turks, and in 1783 and 1908 its ruin was almost com¬ pleted by earthquakes. Its chief industries are the manufacture of essential oils, olive oil, silk and printing. Pop. 43,162. (2) The province is rugged and mountainous, covering an area of 1,219 square miles; pop. 469,071.

REGGIO NELL' EMILIA, nel la-mel'le-a, Italy, (1) capital of the province of the same name, 38 miles northwest of Bologna, on the canal of Tassone. It is well-built and enter¬ prising. Its chief points of interest are its ancient walls and ramparts, cathedral and library. Ariosto and Spallanzane (qq.v.) were born in Reggio. Pop. (1915) 75,349. (2) The

province lies between Parma on the west and Modena on the east. Its southwest portion is covered by the Apennines. The opposite por¬ tion is flat and alluvial, bordering the Po. Area, 885 square miles; pop. 326,487.

REGICIDE, a term applied to persons who bring about the death of a king, by assassina¬ tion or otherwise and specially applied in his¬ tory to the judges of Charles I, and the mem¬ bers of the French Convention who voted for

die death of Louis XVI. Of the judges, 67 in number, who actually sat in trial on Charles I, only 59 signed the death warrant. After the Restoration the regicides were brought to trial on a charge of high treason. Twenty-nine were condemned to death, but only 10 were executed, 19, together with six others who were not tried, being imprisoned, most of them for life. More than 20 who were already dead were tried and condemned, notwithstanding, and Cromwell, Ireton and Bradshaw, three of them, were exhumed and hanged at Tyburn and then reburied at the foot of the scaffold.

In July 1660, there arrived at Cambridge, Mass., Edward Whalley and his son-in-law, William Goffe, two of the judges who had condemned Charles I. For some months they appeared in public and joined in the devotional meetings in Cambridge and Boston, where they were kindly received. Upon the news of the passage by Parliament of the Indemnity Act. marking Whalley and Goffe for vengeance as regicides, they fled to New Haven and were re¬ ceived and concealed by Davenport in the ((Judges' Cave.® They were concealed from pur¬ suit at New Haven and Milford for nearly two years. After this they fled to a cave in New Hampshire, but were there discovered by some Indians and returned to Hadley. Mass., where they were concealed until their death, Whalley dying in 1674, Goffe in 1679. When King Philip attacked Hadley in 1675, Goffe appeared and led the defense. Dixwell, another regicide, also escaped to New England.

In the broad sense of assassinations of rul¬ ers under various titles we have since 1800 the following: Tsar Paul, Russia, 24 March 1801; President Lincoln, (died) 15 April 1865; Prince Michael, Servia, 10 June 1868; Sultan Abdul-Aziz, Turkey, 4 June 1876; Tsar Alexander II, Russia, 13 March 1881 ; President Garfield, (died) 19 Sept. 1881 ; President Sadi Carnot, France, 24 June 1894; President Juan Idiarte, Uruguay, 25 Aug. 1897; President Heureaux, Santo Domingo, 26 July 1899; King Humbert, Italy, 29 July 1900; President McKinley (died) 14 Sept. 1901 ; King Alexander, Servia, 10 June 1903; King Carlos I, Portugal, 1 Feb. 1908; President Madero, Mexico, 23 Feb. 1913; King George, Greece, 18 March 1913 ; President Sam, Plaiti, 1915; Nicholas II, Russia, July 1918.

REGILLUS, re-jfl'us, Lake, a lake of an¬ cient Latium, lying to the southeast of Rome, noted as the scene of a great victory won by the Romans under Albinus Postumius, over the Latins, under Octavius

Mamilius, on behalf of the banished Tarquin the Proud, 496 b.c. No certain identity has been established with any modern lake.

REGIMENT. In modern armies the regi¬ ment is a colonel's command and is the largest permanent association of soldiers. Regiments may be combined into brigades, brigades into divisions and divisions into armies; but these combinations are but temporary, while in the regiment the same officers serve continually and in command of the same body of men. The strength of a regiment may vary greatly even in the same army, as each may comprise any num¬ ber of battalions. In the cavalry, field artillery and infantry arms the regiment is the adminis¬ trative unit. The headquarters of the regi¬ ment a*re at the station of the permanent regi-

mental commander; in his absence the com¬ mand of the regiment devolves upon the senior officer on duty with it wherever he may be stationed. The regiment is composed of two or more battalions which, in turn, are composed of two or more companies. The battalion, in a regiment, is not an administrative unit and has no separate records ; it is purely a tactical unit conveniently organized for instruction or maneuver and particularly for combat, either as an integral part of the regiment to which it belongs or separated from it. It is appro¬ priately commanded by a field officer, normally a major, regularly assigned in orders. In the absence of its regular commander the com¬ mand devolves upon the senior officer of the battalion on duty with it, unless a field officer has been assigned. Whenever incomplete bat¬ talions of the same or different regiments are serving together, the commanding officer desig¬ nates provisional battalions and similarly, in the case of the incomplete regiments, he desig¬ nates provisional regiments. Under the new organization plan of 22 Sept. 1917, an infantry regiment in the United States army contains one headquarters and headquarters company (303), three battalions of four line companies each (3,078), one supply company (140), one machine-gun company (178), one medical de¬ tachment (56), making a total of 3,755 officers and men. For the composition of the com¬ panies,

battalions, *etc.* See Army Organiza¬ tion.

REGINA, Canada, city and capital of the province of Saskatchewan and for many years previous to 1905 the capital of the North West Territories, the commercial, educational, social, political and industrial centre of that prairie country lying between Winnipeg and the Rocky Mountains and the largest city between Win¬ nipeg (356 miles east) and Calgary (840 miles west). The main line of the Canadian Pacific Railway cuts the city from east to west. The Colonsay line of the same railway enters from the north and has its terminus there. The Bul-yea line of the Canadian Pacific Railway also connects Regina with the northern portion of the province east of Last Mountain Lake, and with the Kirkella branch serving the eastern portion of the province north of the Qu'Appelle Valley. The Areola line of the Canadian Pacific Railway has its western terminus in Regina and serves the southeastern portion of the province. The Weyburn cut-off of the Canadian Pacific Railway connects Regina to the south and by connecting up with the new Lethbridge line opens up the whole of the southwestern portion of the province. It also brings Regina into direct connection with the Soo Line and thereby with Saint Paul, Minneapolis and other American cities. The Canadian National Rail¬ ways have a line running east from Regina which connects with their main Transcontinen¬ tal at Winnipeg. They also own the old Qu'¬ Appelle, Long Lake and Saskatchewan Railway from Regina to Prince Albert and continuing on to the Hudson's Bay. Their line to Moose Jaw from Regina is a recent addition serving a rich stretch of country. The Grand Trunk Pacific has a line from Regina to Melville con¬ necting with their main Transcontinental, one to Moose Jaw and another south to the inter¬ national boundary line connecting with the

Great Northern. The chief industry of the Canadian west is agriculture and stockraising, and Regina is the centre of both for Saskatche¬ wan. The land is a rich clay loam, producing excellent crops of small grains and roots. Seed grain from the district is sold throughout the continent at excellent prices. Nearly all the great implement houses have headquarters for Western Canada in Regina and a few years ago the city held the record for implement sales for all the world. Regina may be said, there¬ fore, to be the heart of the implement trade of the West. All the leading wholesale houses have branches in Regina and an immense volume of trade is done. The city has laid out a tract of property a mile long and half a mile deep for a wholesale and manufacturing dis¬ trict. This is served by all lines of railways

operating in the district and is already over half full of permanent and substantial business structures. Among recent additions to this dis¬ trict are branches of the T. Eaton Company and the Robert Simpson Company, both of Toronto and the two largest enterprises of their kind in Canada. The Imperial Oil Company (Stand¬ ard Oil) have a refining plant at Regina de¬ voted to refining crude oil shipped in tank cars from Wyoming. The Canadian Continental Oil Company recently removed its headquarters to Regina.

A large Canadian pork-packing firm re¬ cently established a plant in Regina. Most of the great Canadian and many of the American financial houses have branches located in Regina. There are 15 branches of chartered banks and numerous trust companies. The bank clearings for 1910 were $50,739,159, and for 1918 they were $184,624,632. The city is governed by an elected mayor and 10 aidermen. Municipal ownership is at its best in Regina, the municipality owning and operating its own water plant, light plant and street rail¬ way. The city is well supplied with parks and beauty spots and it is prettily situated on the banks of Wascana Lake. Within easy motor distance are several noted summer resorts on the Qu'Appelle and Last Mountain lakes. Its educational facilities comprise a fine collegiate institute and two colleges (Methodist and Anglican) while Presbyterian and Roman Catholic colleges are projected. All religious denominations are well represented with large congregations and commodious churches. There are also numerous public buildings of magnifi¬ cent proportion and architectural beauty.

The city was founded in 1883 and was origi¬ nally called Pile of Bones, due to the great piles of buffalo bones in the vicinity. It grew slowly until 1905 when it rose by successive strides of healthy growth from 2,249 in 1891 to about 40,000 souls to-day. Headquarters for Canada of the Royal North West Mounted Police are located in Regina, as is also the mili¬ tary headquarters for the province. During the war of 1914-18 the city responded nobly, having sent four battalions into the field as fighting units and raised many men for rein¬ forcements.

REGIOMONTANUS, re"ji-6-mon-ta'nus, German astronomer, whose real name was Johann Muller, but who assumed that of Regiomontanus, in allusion to the place of his birth, Konigsberg (Kings Mountain), Fran-

■■

A

■

■M

1

1 Lome Street, showing Metropolitan Church, Y.W.C.A., Public Library, Knox Church and a part of Victoria Park

2 Scarth Street, looking south from Eleventh Avenue

REGINA, CANADA

1 View from Wascana Park, showing Collegiate Institute, Regina College and Normal School

2 Victoria Park

REGIONAL METAMORPHISM— REGISTRATION OF PROPERTY

323

conia : b. 6 June 1436; d. Rome, 6 July 1476. Having received a classical education at Leip¬ zig, he placed himself under Purbachius (Georg von Purbach), the professor of mathe¬ matics at Vienna, and under him became one of the first astronomers of that age. With Purbachius he accompanied Cardinal Bessarion to Rome in 1461, where Beza gave him further instruction in Greek literature, and he now completed a new abridgment in Latin of the (Almagest) of Ptolemy (1496), correcting many errors in the former translation,

made by George of Trebizond. In 1471 he built an ob¬ servatory at Nuremberg and established a press, but after three years returned to Rome on the invitation of Sixtus IV, who employed him in the reformation of the calendar and rewarded his services by raising him to the bishopric of Ratisbon (1475). He died, according to some, of the plague, according to others by poison administered by the son of George of Trebizond out of revenge for his having exposed the errors of his father. Regiomontanus was the first in Germany to apply himself to the culti¬ vation of the neglected science of algebra. He made great improvements in trigonometry, into which he introduced the use of tangents. His refutation of a supposed discovery of the quad¬ rature of the circle and numerous writings on various subjects of natural philosophy display extensive learning and great acuteness. His astronomical observations from 1475 to 1506 (<Ephemerides)) are very accurate. Among his other works (Kalendarium) (about 1474), (De Reformatione KalendariP (1489) ; (De Cometae Magnitudine Longitudineque) (1531) ; (De Triangulis Omnimodis) (1533) ; (Tabulae Directionum Prejectionumque in Nativitatibus multum utiles-* (1585). Consult Gunther, (Johannes MiilleU (in the (Allgemeine deutsche Biographic,* Vol. XXII, 1855) ; also Ziegler, < Regiomontanus als, geistiger Vorlafer des Columbus) (1874).

REGIONAL METAMORPHISM. See

Metamorphism.

REGISTER, the title of a public officer who has charge of records, his duties varying in different States ; a list of persons entitled to vote ; a perforated plate governing the opening into a duct which admits warm air into a room for heat, or fresh air for ventilation, or which allows foul air to escape; in music, the com¬ pass of a voice or instrument. Also a device for automatically indicating the number of rev¬ olutions made or amount of work done by machinery; or recording steam, air or water pressure, or other data, by means of apparatus deriving motion from the object or objects whose force, distance, velocity, direction, eleva¬ tion or numerical amount it is desired to ascer¬ tain. There are various appliances of this kind, each particularly adapted for the peculiar opera¬ tion which is to be investigated ; many depend¬ ing on the action of clockwork mechanism, which indicates results on dials, but others, as in registering meteorological instruments, hav¬ ing means for recording varying conditions, as with the anemometer, barograph, *etc.* The cash register is a machine for recording money pay¬ ments. It is of very general use in retad establishments throughout the world.

REGISTRATION OF BIRTHS, MAR¬ RIAGES AND DEATHS. France has the

most perfect system of registering births, mar¬ riages and deaths. There it is the duty wholly of the civil authority, and the methods are sp thorough and comprehensive that it is practi¬ cally impossible for a birth, a marriage or death to occur without going on record. In Great Britain no thorough system existed till 1836, when a general registration act was passed, ap¬ plicable, however, only to England and Wales, which has been considerably amended since. In the United States, while there is no national law on the subject, the registration of births, marriages and deaths is universally required bv State laws, but it is only in well-organized municipalities that it is fully enforced, and even there much depends on the willingness of doctor, minister or other civilian upon whom the law imposes the duty of making report to the authorities, to perform that duty. In rural and remote districts births, marriages and deaths often go unrecorded, thus causing doubt and un¬ certainty which may cast a cloud on property titles and the legitimacy of children. Claims to great age are often made more than doubtful by the lack of any authentic evidence as to date of birth. Indeed, owing to the lax methods of registration which prevailed up to the latter part of the 19th century it is almost impossible to establish the pretensions of alleged centena¬ rians. The importance of registration has of late, however, impressed itself deeuly on the public, and everywhere throughout the United States an improvement is being witnessed in this regard.

REGISTRATION OF PROPERTY TITLES. The United States leads the world in its system — which is practically the same everywhere throughout the Union — of record¬ ing property transfers. The possession of a deed of property is not proof of title. The title rests legally in the person in whose name it is recorded in the books of the register or recorder, or by whatsoever name the official hav¬ ing charge of such records is known. The first business, therefore, of a person acquiring prop¬ erty is to have the deed registered. Otherwise the former owner could sell the same property to another, and if the latter had received no notice of a previous transfer, and gave value for the estate, and had his deed recorded first, he could hold the property against the person who had received a previous deed, but had failed to put it on record. The officials in charge of the records are sometimes county and sometimes town and city officers, and the deed is recorded the moment it is received, even although not entered on the books for some time after. Therefore it is carefullv stamped with

the hour, minute and even second of its presentation. The old cumbersome English method of vesting title on a trunkful of deeds is, therefore, unknown in America, where regis¬ tration has been the rule from the time of the earliest settlers, who allotted lands to each freeman, and made a record of the division.

Chattel mortgages are also recorded; other¬ wise the mortgagee is without protection against transfer to a third and innocent party who might purchase the goods, or advance money on them.

England has been slow to follow the ex¬ ample of the United States in this matter, but the convenience of the American system and

the cumbersomeness of the English, which was growing more top-heavy year by year, has led to the adoption of a method of voluntary regis¬ tration which makes it possible to transfer and hold property without having to hand over or keep a mass of old title-deeds. In Scotland an excellent system for the registration of transfers of heritable property has existed since 1617.

REGISTRATION OF VOTERS. Un¬ restricted and general registration of voters is required by law in 40 of the American States, as a check to fraudulent voting; in two there are no registration requirements ; in the others a restricted registration is required, as in cities and towns of specified population, in certain cities, towns and villages that have become in¬ corporated, in cities but not in country pre¬ cincts, *etc.* In some States a voter having once registered is not required to register again while he retains the same qualifications and residence. In the State of New York yearly registration is required in the large cities, while in the country districts it is not necessary. . Previous to registration “repeating” — that is, voting more than once in one election — and other frauds were very common and probablv affected the results of important political contests. The voter is required, as a rule, to give his name, age, residence, place of birth and, if of foreign birth, produce his naturalization papers, should the registering officials demand them. For a short time New York State had a law

requiring the registry board to make a record of the physical defects of voters for identification, but this proved offensive and unpopular and was soon repealed. It is a penal offense to make a false statement in registering. See various arti¬ cles dealing with voting and suffrage.

In Great Britain and on the Continent of Europe voters are required to register, a most exact scrutiny being enforced as to the posses¬ sion of legal qualifications for the suffrage.

In England the registration of electors was first established by the Reform Act of 1832, in terms of which, in England, the overseers of each parish were reqGired to draw up a register of all persons qualified to vote. This still forms the basis of procedure, but the law has been frequently altered, the latest act on the subject being the Registration Act of 1885.

REGISTRY BOARDS, Election of. See Elections ; Electoral Qualifications ; Con¬ gress.

REGISTRY OF VESSELS, legal term applied to the record of United States merchant ships engaged in foreign trade, kept in the customs office of their home port. Ships en¬ gaged in coastwise or home trade are “enrolled,® the terms “register” and “enrolment® being used to distinguish the two classes of vessels. The ship receives a registry certificate giving her home port, date of construction, name of owner, measurements and tonnage, her official number and signal letters. “Registry of ton¬ nage® is the amount of weight a ship will carry as expressed in the official register.

REGIUM DONUM, re’jl-um do’num (“royal gift®), an annual grant of public money formerly received by the Presbvterian and other Non-Conformist ministers in England, Scot¬ land and Ireland. The Irish Regium Donum was withdrawn by the Act of 1869, which came

into force in 1871, disendowing the Irish Epis¬ copal Church. Compensation was made of lite interests, and the ministers were allowed to commute on the same terms as the clergy of the Church. In 1874 it was reported that the commutation money paid had amounted to $2,898,810. The Regium Donum in England was enjoyed by the three denominations, Pres¬ byterians, Independents and Baptists, from 1723 till 1851. The amount required was annually voted by Parliament till 17 July 1857. The Scotch Episcopalians also enjoyed for a time a small share.

REGIUS (re'ji-us) PROFESSORS, the

designation of professors at Oxford and Cam¬ bridge whose chairs were founded by Henry VIII. In the Scotch universities the name is given to professors who receive their appoint¬ ments from the Crown.

REGLA, rag'la, Cuba, town, province of La Habana, on Havana Harbor, opposite the city of Havana. It is connected with Havana by ferry, with Matanzas and other towns to the east by rail, and also has a street railway running to Guanabacao. It contains foundries, shipyards and large sugar warehouses, and has a considerable trade, especially in the exporting of sugar. It contains a large bull ring, for¬ merly the scene of the Havana bull fights. Pop. about 14,000.

REGNARD, re-nar, Jean Frangois, French

comic dramatist: b. Paris, 1 Feb. 1655; d. Griffon, 4 Sept. 1709. He was the son of a rich mer¬ chant, and while on a voyage to Italy was cap¬ tured by pirates and sold as a slave in Algiers. Being redeemed by his family he traveled ex¬ tensively in Holland, Germany, Poland and Lapland. He wrote many comedies for the French stage, his first, (Le Divorce,' was per¬ formed at the Theatre Italien in 1688. What is considered his masterpiece is (Le Joueur' (1696), which holds a place second only to some of Moliere's. Other pieces, produced at the Theatre-Frangaise, were 'La Serenade' (1694) ; 'Le Bourgeois de Falaise' (1696) ; (Le Distrait' (1697) ; (Le Carnaval de Venice' — music by Campra — (1699); 'Democrite' (1700); (Le Retour imprevu' (1700); (Les Folies amoureuses' (1704) ; (Les Menechmes' (1705). The best editions of his works are by Didot (1820) ; Michiels (1854) ; Fournier (1875); Moland (1893).

REGNAULT, re-no, Alexandre Georges Henri, French painter: b. Paris, 30 Oct. 1843; d. Buzenval, 19 Jan. 1871. He was trained in art under Lamothe and Cabanel; in 1866 car¬ ried off the Prize of Rome by his (Thetis Bringing Weapons to Achilles' and for the next two years lived in Italy, where he fur¬ nished illustrations to the (Travels' of Francis Weh. He next visited Spain, where his passion for light and color was satisfied in studying the works of Goya and Velasquez, of whose 'Las Lanzas' he made a copy. In fact, his first work of importance, a colossal equestrian por¬ trait of General Prim (now in the Louvre), was executed at Madrid. He had a natural, tem¬ peramental preference for the features of ori¬ ental life, and he loved to paint incidents and scenes of horror. Of such a character is his 'Salome,' a personification of bloodthirsty pas¬ sion; and 'Decapitation in Granada'; two can-REGNAULT — REGULATORS

vases of marvelous daring in color, but repul¬ sive from their cold brutality. When the war of 1870 broke out he returned to France, en¬ listed and was killed at the battle of Buzenval, near Paris. The circumstances of his death have invested his name with a certain halo of glory in the eyes of his countrymen and have tended to impart an exaggerated importance to his artistic achievements. A monument to him by Chapu is seen in the Lcole des Beaux Arts, Paris, and his (Automedon with the Horses of Achilles,5 in the Boston Museum of Fine Arts. Consult Cazalis, (Henri Regnault, so Vie et son CEuvre* (1872).

REGNAULT, Henri Victor, French chem¬ ist and physicist: b. Aix-la-Chapelle, Germany, 21 July 1810; d. Auteuil, France, 19 Jan. 1878. After study at the ficole Polytechnique of Paris, he became a mining engineer and later a pro¬ fessor at Lyons. His (L' Action du Chlore sur l'Ether Chlorhydrique5 (1840) won for him a professorship at the ficole and admission to the Academy of Sciences. In 1841 he was made professor of physics in the College de France, in 1847 chief mining engineer, and in 1854 di¬ rector of the Sevres porcelain manufactory. Among his writings, besides many scientific papers in (Annales de Chime 5 and other learned journals, are (Cours Elementaire de Chimie) (4 vols., 1849-50; 14th ed, 1871), and (Pre¬ miers Elements de Chimie) (1850; 6th ed. 1874). His great work on steam engines con¬ stitutes Vol. XXI of the (Memoires de l'Academie des Sciences.5

REGNAULT, Jean Baptiste, Baron, French painter: b. Paris, 19 Oct. 1754; d. there, 12 Nov. 1829. He studied under Bardin, won the grand medal with his Alexander and Diogenes5 in 1774, and after capturing the Prix de Rome in 1776, entered the Academy in 1783 and became eventually a professor in the Bcole des Beaux Arts (1795). The influence of David was predominant in his day, and Regnault's paintings are all in the conventionally classic manner of that master. Many of his works are in the Louvre, among them his (Baptism of Christ,5 and his most notable picture, the (Education of Achilles.5 Among his notable works are (Perseus and Andromeda5 (1782), and (Cupid and Psyche5 (1829). He also pro¬ duced the historically interesting works, (The Acceptance of the Constitution by Louis XVI5 ; (Napoleon Proclaimed Consul for Life5 ; bat¬ tle of Marengo,5 and

(The Death of Dessaix.5

REGNIER, ra-ne-a, Henri Frangois Joseph de, French poet: b. Honfleur, 28 Dec. 1864. He was numbered in his earlier days among the Parnassians and later was allied with Mallarme and the symbolists. His admirers are found among the younger literary men rather than among the academic. Critics have found his verse excellent for a delicacy of taste and a kind of antique inspiration, but have blamed him for sacrificing too much of the sentiment or the idea to the last refinement of expression. He has published in verse (Sites5 (1887) ; (Poems anciens, romanesques5 (1890) ; (Tel qu'en songe5 (1892); (Les Jeux rustiques et divins5 (1897) ; (Les Medailles d'Argile5 (1900), etc., and the novels (La Canne de Jaspe5 (1895) ; (Le Trefle blanc5 (1899) ; <La double Maitresse'5 (1900).

REGNIER, Mathurin, French satirist : b. Chartres, 21 Dec. 1573; d. Rouen, 22 Oct. 1613. He was a nephew of the poet Desportes; served as secretary in Rome to the ambassadors Joyeuse and Bethune. Having taken orders as a youth he was granted a canonry at Rouen upon his re¬ turn from Rome, but his dissipated habits shortened his life. He was famous for his satires in imitation of Horace, Juvenal and Martial, especially those in which he attacked Malherbe, the reigning literary authority of his day. He showed knowledge of life and char¬ acter and a power in the expression of manners that in the opinion of Sainte-Beuve ranked him after Montaigne, Ronsard and Rabelais. No good edition of his works appeared in his life¬ time; that published in 1608. and in 1613 was entitled (Satires et autres Poesies de Maturin Regnier.5 Numerous editions of his works have appeared, including those by Brossette (1729, 1736); Viollet-Leduc (1822, 1853);

Barthelemy (1862) ; Lacour (1867), and Cour¬ bet (1869, 1875).

REGOLITH. See Mantle Rock.

REGULAR ARMY. See Army; Army Organizations; United States, Army of.

REGULAR CANONS OF THE IM¬ MACULATE CONCEPTION. See Orders, Religious, Immaculate Conception, Regular Canons of the.

REGULAR CLERKS OF THE FAITH OF JESUS. See Orders, Religious, Bacca-narists.

REGULARITY, Political. See Vote, Voters, Voting.

REGULARS, in the Roman Catholic Church, persons of either sex who are members of any of the religious orders, congregations or institutes approved by the Holy See. Those of their number who are in holy orders constitute the Regular Clergy, that is, clergy under a religious rule (regula), who are bound by the usual three monastic vows, poverty, chastity and obedience: so contradistinguished from the secular clergy — those clergymen who do not belong to such orders or congregations.

REGULATION OF PUBLIC UTILI¬ TIES. See Public Utilities.

REGULATORS, a name adopted in South Carolina, about 10 years before the Revolu¬ tion, by citizens who organized themselves to put down lawlessness and enforce respect for life and property. Their methods were very like those of the vigilance committees of Cali¬ fornia and Nevada, about a century later. The Regulators were pacified by the establishment of courts of law in the disturbed districts.

Some years later in North Carolina an or¬ ganization calling themselves <(Regulators55 was formed to resist the extortion and oppression practised by officers of the colonial government. They drove out the local authorities, and Gov¬ ernor Tryon led a military force against them, defeating them after a sanguinary battle, near the Allemance Creek, 16 May 1771. Tryon hanged six of the Regulators for treason. The survivors generally took the patriot side in the War for Independence, and the ((Regulator55 movement in North Carolina is regarded by some as one of the beginnings of that struggle.

Consult (Messages and Papers of the Presidents) (Vol. XX, 1914).

REGULUS, reg'u-lus, Marcus Atilius, Roman general of the 3d century b. c. He was made consul in 267 b.c., and a second time about 256 b.c. With his colleague, Manlius Vulso, he commanded in the first war against Carthage. With a fleet of 330 ships carrying 40,000 men the consuls defeated a superior Carthaginian fleet in the battle of Ecnomus

and effected a landing in Africa. Here Regulus followed up his victories so successfully that in a short time he presented himself before the capital of the enemy. Carthage sued for peace and Regulus who wished to end the war be¬ fore his successor was appointed demanded un¬ conditional submission. The Carthaginians re¬ fusing the terms ended the negotiations and at this juncture were joined by a small body of Spartan volunteers under Xanthippus, to whom was given the command of the Carthaginian forces. In a battle under the walls of Carthage 30,000 Romans fell and Regulus was made pris¬ oner 255. He remained in Carthage till 250, when the Carthaginians, having been defeated at Panormus, were desirous of peace. An em¬ bassy was, therefore, sent to Rome, accom¬ panied by Regulus, who was obliged to bind himself by an oath to return to Carthage, if Rome should refuse the terms proposed. Regu¬ lus, however, advised the continuance of the war and recommended the Romans not to ex¬ change prisoners. Thereupon he declined to listen to the entreaties of his family or of the Senate and peristed in his intention to return to Carthage. It is related that he was put to death with great cruelty and that Hamilcar and Boscar, two noble Carthaginian prisoners, were given up to the family of Regulus, who took revenge on them in a similar manner. Neither the story of the embassy nor of the revenge is related by Polybius, and Ihne, the German historian, inclines to the modern view that the story was invented to excuse the cruelty of the family of Regulus to their prisoners. Niebuhr declares the story a forgery and be¬ lieves that Regulus died a natural death. Hor¬ ace (Odes) III, 5, repeats eloquently the story as current at the time.

REGULUS, the star Alpha Leonis, the brightest in the constellation of the Lion.

REGUR, a dark superficial soil of India, loam or clayey, occurring chiefly on the table¬ land of the Deccan and in Nagpur, less fre¬ quently in Mysore and reappearing in southern India in continuous sheets from 6 to 20 feet thick. Although generally a surface soil, it dips beneath recent alluvium. It is extremely fer¬ tile, having produced heavy crops, especially of cotton and corn, for many centuries without requiring manure. Its exact age is unde¬ termined. The name is native.

REHAN, re'an, Ada (originally Crehan), American actress: b. Limerick, Ireland, 22 April 1860; d. New York, 8 Jan. 1916. She came to this country as a child and made her first appearance on the stage at 14 in Newark, N. J. She had not at that time, however, taken up acting as a profession, but continued her education in Brooklyn where her parents lived. She appeared for two seasons at Mrs. John Drew's theatre in

Philadelphia, and later in stock companies in Baltimore, Albany and

Louisville. In 1879 she became a member of Augustine Daly's stock company first as lead¬ ing lady and afterward as star, where she continued until Daly's death in 1899. Here she took part in many revivals of old comedy, together with a fewer number of modern plays, principally adaptations from the German made by Daly. Her greatest successes were Katharine in (Taming of the Shrew) and Lady Teazle in (School for Scandal,5 though she played with acceptance Viola, Portia, Rosalind and Beatrice, Peggy Shrift in (The Country GirP and Agatha Posket in Pinero's (The Magistrate. 5 After 1899 she appeared on the stage only at con¬ siderable intervals.

REHN, ren, Frank Knox Martin, Amer¬ ican artist: b. Philadelphia, Pa., 12 April 1848; d. Magnolia, Mass., 7 July 1914. He studied at the Philadelphia Academy of Fine Arts and established a reputation as a painter of marines, landscapes and portraits. He attained his great¬ est successes as a painter of marines. He re¬ frained from studying abroad believing that for¬ eign study tended toward imitation of old masters rather than permitting the development of an individual American school of art. He was awarded honorable mention at the Paris Exposition in 1900 and gold medals at the New York Competitive Prize Fund Exhibition in 1885 and at the Philadelphia Society of Artists in 1907. He was elected a member of the Na¬ tional Academy in 1908. His most important figure piece is (The Turkish Harem,5 and among his marines are (Missing VesseP (De¬ troit Art Museum) ; (Close of a Summer Day5 (Buffalo Fine Arts Academy) ; (The Derelict5 (1892); (A Moonlight Sea — Cape Ann5 (1912); (A Sunny Afternoon in the Gulf Stream5 (1914).

REHOBOAM, re'hd-bo'am, first king of Judah and, for a time after succeeding his father, king of all Israel, son of King Solo¬ mon and the Ammonitish Princess Naamah: b. 1014 b.c. ; d. 956 b.c. He succeeded to the throne 973 b.c., and proceeded to Shechem for his coronation. There he was petitioned by the people for a remission of the heavv burdens imposed under Solomon's masterful reign ; but, disregarding the advice of his elders, he not onlv refused the petitions, but announced his intention of being more severe than his father had been. The result was a revolt under the leadership of Jeroboam, who had returned from exile in Egypt. Rehoboam gathered an army of 180,000 men at Jerusalem with the purpose of reconquering Israel. He appears to have been outnumbered by the opposing forces, and his expedition was, moreover, forbidden by the prophet Shemaiah, who

declared the division of the kingdom to be the will of God. Re¬ hoboam acquiesced, strengthening his borders and becoming the first king of Judah, the divi¬ sion of the kingdom into two parts continuing to the end of both lines of monarchy. The pure worship of God was maintained in Tudah, attracting many settlers from Israel, but Re¬ hoboam did not put down the worship of Ashtoreth, which, according to the chroniclers, was visited with punishment through an Egyp¬ tian invasion under Shishak, or Sheshonk. Jerusalem was taken and Rehoboam secured an ignoble peace by delivering to the victor the treasures of King Solomon's temple and palace.

His reign was thereafter uneventful and he was succeeded by his son Abijah, or Abijam.

REICH, rlkH, Jacques, American artist: b. in Hungary, 10 Aug. 1852. He studied art in Budapest; came to the United States in 1873; continued his art education in New York and Philadelphia, and afterward studied in Paris. He returned to Philadelphia and became skilled in pen-and-ink drawings and in the etching of portraits on copper. In 1885 he removed to New York. He drew the greater number of the pen-portraits for Scribner's (Cyclopsedia of Painters and Paintings, > and also for Appleton's (Cyclopaedia of American Biography. > His other important work includes a series of portraits of American and English authois and other prominent persons, and half life-size plates of Washington (after the Gilbert Stuart unfinished painting), Jefferson (after the paint¬ ing by Rembrandt) and President Roosevelt.

REICHA, rik' Ha, Anton Joseph, Austrian composer: b. Prague, Austria, 27 Feb. 1770; d. Paris, France, 28 May 1836. He made a study of the violin, pianoforte and flute and in 1788 he entered the chapel of Maximilian of Austria as second flute. His ambition, however, was to become a composer and after overcoming many difficulties he succeeded in having his sym¬ phonies and other compositions played by his uncle's orchestra at the court of the Elector of Cologne. Reicha lived in Hamburg 1794—99 and there wrote his

first opera, (Obaldi, ou les Frangais en Egypte,* but failed to obtain its production in Hamburg or Paris, though sev¬ eral of his symphonies were well received. In 1802-08 he lived in Vienna, where he enjoyed the patronage of Maria Theresa and was in¬ timate with Beethoven, Haydn and other great musicians. He removed to Paris in 1808, be¬ came professor at the Conservatoire in 1818, was naturalized in 1829 and elected to the Insti¬ tute in 1835. He was chiefly notable for his chamber music and his theoretical work, though his symphonies and overtures met with consid¬ erable success. His operas were lacking in dramatic effect, though their music is excellent. He was also author of numerous theoretical works, among which may be mentioned (Etudes ou Theories pour le Pianoforte, dirigees d'une Maniere nouvelle) (1800) ; (Traite de Melodie) (1814, 1832) ; (Cours de composition musicale) (1818) ; (Traite de haute Composition musicale) (1824, 1826), edited by Czerny in French and German as (Vollstandiges Lehrbuch) (4 vols., 1834) ; (L'art du Compositeur dramatiqm (1833) ; (Petit traite d'harmonie pratique) (no date), *etc.*

REICHARDT, rik'Hart, Johann Fried¬ rich, German composer and author : b. Konigsberg, 25 Nov. 1752; d. Giebichenstein, 27 June 1814. He studied in the universities of Konigsberg and Leipzig; was appointed Kapellmeister by Frederick the Great in 1775, and during his tenure of office introduced Concerts Spirituels for the performance of novelties with analytical programs (1783). He conducted Italian opera under Friedrich Wilhelm II, but his French sympathies brought about his dismissal in 1794. He was court director at Cassel for a short time during the incumbency of the king of Westphalia. He holds an important place in the history of music from the fact that his Singspiele are factors in the development of

German opera, and his Lieder are among the earliest of their kind. He wrote operas, ora¬ torios and cantatas, besides compositions for orchestra and pianoforte and set to music Burger's translation of Macbeth, Goethe's Faust, Egmont and Tasso, besides many lyrics. He edited musical periodicals and, among other works, published (Ueber die deutsche Kom-ische Oper) (1774) ; (Ueber die Pflichten des Ripienviolinisten) (1776) ; (Schreiben fiber die Berlinische Musik) (1775) ; (Vertraute Briefe aus Paris* (1804-05) ; (Vertraute Briefe ges-chrieben auf einer Reise nach Wien) (2 vols.,

1810).

REICHENBACH, rik'HenbacH, Karl, Baron von, German naturalist : b. Stuttgart, 12 Feb. 1788; d. Leipzig, 19 Jan. 1869. He studied at Tfibingen, where he obtained the degree of doctor of philosophy, and was denounced to the Napoleonic police and imprisoned for hav¬ ing organized an association with the fanciful object of founding a German kingdom in the South Seas. He visited the principal iron works in France and1 Germany and established others of his own at Villingen and the first large German charcoal-burning establishment at Hausach in Baden. In 1821 he founded with Count Hugo zu Salm a number of industrial establishments in Moravia, from which he real¬ ized a considerable fortune. The king of Wfir-temberg raised him to the dignity of baron in 1839. In 1834 he published in Vienna (Mittheilungen aus Mahren,* the first geological monograph in Austria. He is also credited with some chemical discoveries, in particular of paraffin and creosote. In the course of his studies of animal magnetism he believed he had discovered a new force, which he called od and upon which he published several works, as ˆdisch-magnetische Briefe) (1852) ; (Der sensitive Mensch und sein Verhalten zum Ode) (1854). Od, he said, was a peculiar power possessed by certain persons of special sensi¬ tiveness, which enabled them to detect veins of ore, distinguish negative and positive magnetic poles, start a pendulum without touching it and the like. He derived the word from the Latin vado, <(I go quickly.® Part of the scientific world attacked his theory, but the larger por¬ tion laughed it out of court; and after his death it was quite forgotten. Among his other literary productions may be mentioned (Geolo-gische Mittheilungen aus Maleren* (1834) ; (Das Kreosot* (1833) ; (Die Dvnamide des Neognetismus) (1840) ; (Odische Erweiderun-gen) (1856) ; (Kohlerglaube) and (Afterwis-senschaft,* in reply to Karl Vogt (1856) ; (Aphorismen fiber Sensibilitat und Od) (1866) ; (Die odische Lohe) (1867).

REICHENBACH, Saxony, 11 miles south¬ west of and in the circle of Zwickau, 11 miles northeast of Plauen, is a manufacturing town, trading considerably in woolen and cotton goods, and has a notable town hail. This is the home of the distinguished antiquary, Bottiger (q.v.). Pop. (1905) 29,060.

REICHENBERG, rik'Hen-iberg, Czecho¬ slovakia, town in Bohemia, on the Neisee, about 60 miles in direct line north-northeast of Prague (q.v.). It is a well-built town with several mod¬ ern public buildings and a number of historic edi¬ fices dating back to the 13th and 14th centuries. Its principal church contains an altar-piece by

3£8

Diirer. It is one of the leading manufacturing towns of the republic. The chief manufactures are woolen, cotton and linen goods, carpets, leather, shoes, hats, gold and silver ware, musi¬ cal instruments and firearms. The schools rank ’high, especially its industrial school. Pop. (1914)

37,100.

REICHMANN, rikiPman, Theodor, Ger¬ man opera singer : b. Rostock, Mecklenburg, 18 March 1849 ; d. Vienna, Austria, 22 May 1903. He studied at Berlin, Prague and Milan, and became widely known on the German operatic stage as a dramatic baritone. In 1882 he be¬ gan his engagement at the Vienna Opera House and in that year created the part of Amfortas in (ParsifaP at Baireuth. He continued at the Vienna Opera House with great success until 1889, when he came to New York and made his first appearance at the Metropolitan Opera House in (The Flying Dutchman. } He later appeared in (Der Trompeter von Salk-Kengenˆ His reception there was most flattering, and his success was marked throughout his engagements there in 1889-90, 1890-91.’ After his New York activities he filled star engagements in London, Saint Petersburg, Moscow and many German cities, and then returned to his former post at Vienna, where he remained till his death. He possessed a remarkable voice ; and his dramatic impersonation of his various roles made him one of the most famous operatic singers of his day. He was notable in his presentation of the roles William Tell, Telramund, Wolfram, Wotan (in (Siegfried)) , Hans Sachs, Tilos (in (Der Vassal von SzigetlP), Nelusko (in ˆ’Africaine1*), *etc.*

REICHSBANK, Deutsche, the official cen¬ tre of the German banking and monetary sys¬ tem, was inaugurated on 1 Jan. 1876, in accord¬ ance with the German Banking Law of 14 March 1875. While established with private means and forming a corporate bodv, it is under the management and supervision of the empire. Its original capital was 120,000,000 marks, later (7 June 1899) increased to 180,000,000 marks. The purpose of its establishment was the c< regu¬ lation of the money circulation of the whole Empire, the facilitation of payments, and the utilization of available capital.® The manage¬ ment of the institution is vested in the Imperial Chancellor,

and by him delegated to the presi¬ dent of the bank and a board of directors, these latter appointed for life. In. addition, supervision over the bank is maintained by a board of curators — the Imperial Chancellor and four members. The shareholders have a voice, principally in an advisory capacity through a general meeting, and ad interim through a central committee consisting of 15 members and 15 alternates who meet at least once a month. From this central committee three members are selected to supervise the management of the bank and participate, with advisory powers only, in the meetings of the board of directors. In matters of an unusual nature with the empire or with the German federated states the consent of a majority of the central committee is required. Upward of 500 branches of the Reichsbank are distributed throughout the empire, the shareholders of each community having such a branch, forming dis¬ trict committees similar in function to those of central committee, from which district com¬

mittees three deputies are selected to manage the local offices. The Reichsbank is authorized to issue bank notes, in no case more than thrice its cash reserve — coin, bullion, imperial treas¬ ury notes and notes of other note-issuing banks — the excess over the cash reserve to be ren¬ dered secure by discounted bills secured by at least two persons of known solvency, said ex¬ cess being subject .to a tax of 5 per cent. These bank notes the Reichsbank is obligated to re¬ deem in German gold coin at its central or branch offices on presentation ((in so far as the available cash and money requirements permit.® Such issues (Act of June 1909) are legal tender. In view of this obligation the activities of the institution are confined necessarily to banking transactions involving assets of immediate marketability; transactions in precious metals; discounting of secured bills, of three months or less; purchase and sale of imperial government or federated state bonds, and other like short¬ term securities specified by law.; in addition it receives interest-and non-interest-bearing moneys on deposit and ((giro® account; such, if interest-bearing, not to exceed the combined capital and surplus funds of the bank. Finally, it is authorized to receive in custody and man¬ age articles of value. It is the Reichsbank that introduced the system (10 April 1876) of «giro® transactions whereby, in lieu of cash payment between ((giro® customers of the bank, the corresponding debit and credit is entered in the accounts of the respective parties, facili¬ tating the settlement of claim and counterclaim at the same bank or between the bank and its branches or between any of the latter by simple bookkeeping transfer. This, of course, presup¬ poses such prior arrangement with the

depos¬ itors, who are then known as (<giro® customers. At the present time a majority of the imperial and federated state government treasuries maintain ((giro® accounts with the Reichsbank — a facility employed also by most of the great German corporations, particularly since 1 Jan. 1909, by the introduction of a postal and cheque transfer system to which the Reichsbank is a party. The practical operation of the system is that of an immense clearing-house acting through a single institution. Since its incep¬ tion the ((giro® system has met with every de¬ mand of German finance and transactions through it have grown more than twenty-fold.

The condition of the Reichsbank is indicated from the following figures taken from the re¬ port for 23 April 1917 (in round numbers) : Cash reserve, 3,108,220,000 marks, comprising coin and bullion, to the amount of 2,549,000,000 marks, and treasury and loan bank notes to the amount of 550,420,000 marks ; other bank notes, 8,800,000 marks; bills discounted, 8,484,800,000 marks ; advances, 9,280,000 marks ; investments, 105,160,000 marks; other securities, 1,088,000,000 marks; notes in circulation, 8,144,920,000 marks; deposits, 4,014,320,000 marks; other liabilities, 366ˆ240,000 marks ; and reserve fund, 83,460,000 marks. The note issue in circulation on this particular date was 8,144,920,000 marks, or 5,036,700,000 marks in excess of the cash re¬ serve. This excess was secured primarily by discounted bills amounting to 8,484,800,000 marks, in addition to the other bank assets amounting to 1,218,984,000 marks, a total of 9,703,784,000 marks, which, minus liabilities of

4,380,570,000, leaves net a balance of 5,323,214,000 marts. The note circulation based upon bills discounted constitutes what is denominated the ˆelastic® part of the whole note issue, in that it is closely adapted to the varying state of the market, based, as it is, upon the actual evi¬ dences of everyday business. What profit un¬ due inflation would give to the bank and its stockholders is counterbalanced by the 5 per cent tax on same that the government receives — a charge that maintains the excess note issue to the actual

needs of business.

During its first 35 years of existence (1876— 1911) the Reichsbank's net profits amounted in round figures to 691,000,000 marks; during the same period the Imperial Treasury received 325,500,000 marks and the stockholders 336,- 400,000 marks of these net profits, this being for the latter an annual average of 6.92 per cent. Consult Reisser, J., (Die deutsche Gross-banken und ihre Konzentration) (1909) ; Ger¬ many's Economic Forces) (1913) ; (Report on Cooperation in American Export Trade* (Washington 1916).

REICHSRATH, rikHs'rat, the representa¬ tive council of the former empire of Austria. It consisted of an Upper House (Herrenhaus) , formed of the princes of the imperial familv, certain hereditary nobles, archbishops and bish¬ ops of princely title, and life-members nominated by the emperor for distinguished service in art, science, the Church and State ; and a Lower House (Abgeorduetenhaus) , elected on the basis of universal, equal and direct suffrage, under the Electoral Law of 26 Jan. 1907. All Austrian male citizens over 24 years of age who had resided for at least a year in the place of election were entitled to vote for deputies. In 1917 the Upper House contained 237 members and the Lower House 516, the latter elected for six years. For the new chamber, see Austria.

REICHSTADT, rikH'stat, Duke of (Na¬ poleon Francois Charles Joseph Bonaparte), titular emperor of France: b. Paris, 20 March 1811; d. Schonbrunn, Austria, 22 July 1832. He was son of Emperor Napoleon I (q.v.), and from his birth was styled ((king of Rome.® In 1814 Napoleon abdicated in favor of his son, but the Senate took no notice of the youth and called Louis XVIII to the throne, whereupon Maria Louisa and the boy removed to the palace of Schonbrunn, near - Vienna. After Waterloo Napoleon proclaimed his son Napoleon II (22 June 1815). He was brought up at the court of his grandfather, the Emperor Francis, who created him Duke of Reichstadt (1818). His education was careful, and he was early trained to the military profession. At the Tuly Revolu¬ tion in 1830 his name was mentioned as a can¬ didate for the French throne, and Talleyrand is said to have made an unsuccessful effort in his behalf. After passing through subordinate grades he was made a lieutenant-colonel in June 1831, and took command of a battalion in the Gyulai regiment of Hungarian infantry, then garrisoned at Vienna. He was extremely attentive to his military duties, but he had grown very tall and slender and symptoms of consumption had early shown themselves. His physician advised a removal to Schonbrunn, but this proved unavailing. His last words, ad¬ dressed to his mother, were <(Ich gehe unter, meine Mutter,

meine Mutter.® The Duke was

made the hero of (L'Aiglon) ((The Eaglet*)> a drama by Edmond Rostand (q.v.). Upon the accession of Napoleon III (q.v.) he was reck¬ oned among French sovereigns as Napoleon II. Consult YVelschinger, (Le Roi de Rome) (1879) ; Lacroix, (Le Roi de Rome' (1899) ; Wertheimer, (Der Herzog von Rom) (1902).

REICHSTAG, rikHs'tag, the representative legislative body of the German nation as a whole. The Reichesrath is of the separate Ger¬ man states. The president of the Reichstag is elected by the deputies. In 1917 the Reichstag was composed of 397 members, elected by uni¬ versal suffrage and ballot for the term of five years. See Germany.

REICK, rik, William Charles, American journalist and publisher: b. Philadelphia, Pa., 29 Sept. 1864. He was educated at Harvard, and engaged in newspaper work at Philadel¬ phia in 1883. In 1888-89 he edited the London and Paris editions of the New York Herald and in 1889-1903 he was city editor of that publica¬ tion. He was president of the New York Herald Company in 1903-06, and of the Public Ledger Company of Philadelphia in 1907-12. He was one of the principal owners of the New York Times in 1907-12, and chief owner of the New York Sun in 1911-17.

REID, red, Alexander Peter, Canadian physician : b. London, Ontario, 22 Oct. 1836. He was educated at the universities of McGill, Edinburgh and New York. He practised for a time in Ontario, but in 1860 went to the North¬ west Territory; returning in 1864 he engaged in practice in Nova Scotia, chiefly at Halifax. He was instrumental in founding the Halifax Medical College and held several chairs there, also serving as president for several years. He was for 16 years visiting phvsician at the City Hospital, superintendent of the Hospital for In¬ sane for 15 years and later served at the Victoria General Hospital. He was deeply interested in securing legislation governing the study and practice of medicine in Nova Scotia; was secre¬ tary of the Provincial Board of Health in 1893— 1904, and afterward was chief health officer for Nova Scotia. He was subsequently retired on a pension.

REID, Daniel Gray, American financier: b. Richmond, Ind., 1 Aug. 1858. He was edu¬ cated in the public schools, entered the Second National Bank of Richmond as a clerk in 1874 and worked his way up to its vice-presidency in 1895. He became interested in the tin-plate industry at Elwood, Ind., in 1892 ; and in 1895 he was one of the

organizers of the American tin-plate industry, of which he was elected president. He removed to Chicago in 1897 and to New York in 1899. He assisted in the or¬ ganization of the National Steel Company, the American Steel Hoop Company and the Ameri¬ can Sheet Steel Company; and on the organi¬ zation of the United States Steel Corporation in 1901 he became a director and member of the executive committee. He was also inter¬ ested in railroad organizations and many banks and trust companies.

REID, Sir George, Scottish artist: b. Aber¬ deen, Scotland, 31 Oct. 1841 ; d. 9 Feb. 1913. He studied art in Edinburgh, Utrecht, Paris and The Hague, being the pupil in turn of Mol-linger, Israels and Yvon. In 1891 he was

elected president, in succession to Douglas, of the Royal Scottish Academy and knighted. He was widely known for his fine portraits and was also distinguished as a flower and land¬ scape painter and as a book illustrator of high merit.

REID, George Agnew, Canadian painter: b. near Wingham, Ontario, 1860. At Paris he was a pupil of Constant, Lefebvre and Dagnan-Bouveret and became a constant exhibitor at the Salon. The World's Fair Columbian medal was awarded to his (The Foreclosure of the Mortgage) (1893). He excels in figure paint¬ ing and has been successful in panel decoration and the series in the entrance hall of the Munic¬ ipal Buildings, Toronto, contain very good ex¬ amples of his style. In 1898 he was president of the Ontario Society of Artists.

REID, Harry Fielding, American geolo¬ gist : b. Baltimore, Md., 18 May 1859. He was educated at the Pennsylvania Military Academy and at the Johns Hopkins University, later studying in England and Germany in 1884-86. He was connected with the faculty of the Case School of Applied Science, Cleveland, in 1886-94; with the University of Chicago in 1895-96; and in 1896 went to Johns Hopkins, where he has been professor of dynamical geology and geography since 1911. He has been special ex¬ pert in charge of the earthquake section of the United States Geological Survey since 1902 and in 1917 he was one of the National Research Council sent to Europe by the government to study scientific developments in connection with the European War. Author of (Parts VI-VIII, Highways of Maryland) (1899) ; and joint author of (Second Report on Highways of Maryland) (1902); (Report of California State Earthquake Investigation Committee, Vol. IP (1910).

REID (Thomas), Mayne, British author of tales of adventure: b. Ballyroney, County Down, Ireland, 4 April 1818; d. near Ross, Herefordshire, England, 22 Oct. 1883. The son of a Presbyterian minister, he was educated for the ministry, but love of adventure took him to this country, where he engaged in various call¬ ings and traveled widely as hunter and trader. In 1843 he was a journalist in Philadelphia, but joined the United States army as a volunteer in 1846 and fought in the Mexican War, his ex¬ periences in which furnished him with mate¬ rials utilized in several novels. He afterward went to London and became well known as a writer of thrilling stories, many

of them based on his American experiences, such as (The Rifle Rangers5 ; (Scalp Hunters5 ; (The War Trail5 ; (The Headless Horseman,5 *etc.* He re¬ turned to America in 1867 and founded the Onward Magazine, which was unsuccessful, and in 1870 went back to England. Many of his tales were translated into French and German. They were all very readable and healthy in tone, though extravagant in incident. Consult (Memoir5 by his wife (1890).

REID, Ogden Mills, American editor and publisher, son of Whitelaw Reid (q.v.) and grandson of Darius Ogden Mills (q.v.) : b. New York, 16 May 1882. He was educated at the University of Bonn, Germany, and at Yale, and was admitted to the bar of New York State in 1908. He then began work as a re¬ porter on the New York Tribune, occupying dif¬

ferent positions in his progress toward man¬ aging editorship in 1912 and editorship in 1913. He succeeded his father not only as editor but as principal owner of the Tribune and is presi¬ dent of the Tribune Association. His policy in conducting the newspaper has been marked by much vigor and straightforwardness and the gathering of an able staff.

REID, Robert, American painter: b. Stockbridge, Mass., 29 July 1862. His work shows the influence of Impressionalism, but as the pupil of Boulanger and Lefebvre in Paris, where he began his art studies, he maintains an academic correctness and insistence upon detail which render his work singularly ef¬ fective. His great decorative piece in the Paris Exposition of 1900 ((America Unveil¬ ing Her Natural Strength5) was much ad¬ mired and like all his productions in this de¬ partment has extended his reputation. The Li¬ brary of Congress ; Massachusetts State House, Boston; Appellate Court House, New York; Paulist Fathers' Church, New York; and many private buildings contain mural dec¬ orations by him.

REID, Sir Robert Gillespie, a Newfound¬ land railway contractor : b. Coupar-Angus, Scotland, about 1842; d. Montreal, Canada, 3 June 1908. In 1865 he went to Australia, where he took part in gold-mining and public works ; in 1871 came to America and constructed many railways in the United States and Canada. The heaviest section of the Canadian Pacific was built by him ; and he was prominent also in bridge-work, constructing the international railway bridge over the Rio Grande, the inter¬ national bridge across the Niagara and (1886) the Lachine bridge over the Saint Lawrence. In 1893 he made a

contract with the colony of Newfoundland whereby he was to build a rail¬ way from Saint John's to Port-au-Basque to be completed in three years at $15,600 per mile. For the further consideration of a land-grant of 5,000 acres per mile of construction, he was to maintain and operate the railway for 10 years. He contracted with the colonial govern¬ ment in 1898 to operate all the railways of the island for 50 years, maintaining them in a safe and efficient manner, on condition that the rail¬ ways should become his property at the end of that period. He was to obtain also 4,500,000 acres of land concessions additional and the government land telegraph lines. On his part he contracted also to build and operate seven steamers transporting passengers and goods at various points in the island ; to buy and operate the Saint John's dry-dock; to build and operate an electric street railway in Saint John's; to pave a specified portion of Saint John's; and to pay $1,000,000 within one year from the date of the signing of the contract. In fact, he be¬ came the real owner of the island and was popularly known as ((Tsar55 Reid. Sir Robert Bond, the Liberal leader, protested against the contract ; a material revision of the contract was made favorable to the colony and the property transferred to the Reid-Newfoundland Company. He was knighted in 1907.

REID, Samuel Chester, American naval

officer: b. Norwich, Conn., 25 Aug. 1783; d. New York, 28 Jan. 1861. He entered the United States navy as a midshipman when very young, rose rapidly in rank and in the War of

1812 commanded the privateer General Arm¬ strong. He repulsed the British attack in the harbor of Faval, Azore Islands, 26 Sept. 1814, the enemy having three heavily armed vessels with 2,000 men to his single vessel with 90 men and seven guns. During 10 hours' fighting, the British lost 300 killed and wounded and the Americans two killed and seven wounded. The British government subsequently apologized for the attack on an American vessel in a neu¬ tral port, and the engagement is considered im¬ portant in having prevented British ships from attacking New Orleans and so enabling Jackson to reach that city in time to save it. Reid was subsequently harbormaster and warden of the port of New York. He invented a signal telegraph, reorganized the pilot-boat system, es¬ tablished a lightship off Sandy Hook and de¬ signed the present flag of the United States, first used in 1818, suggesting the retention of the original 13 stripes and the addition of a star for each new State.

REID, Thomas, Scottish metaphysician: b. Strachan, Kincardineshire, 26 April 1710; d. Glasgow, 7 Oct. 1796. He was graduated at Marischal College, Aberdeen, in 1726, and in 1736 presented to the neighboring living of New Machar. It was his custom to preach the ser¬ mons of Tillotson and. Evans rather than his own compositions, for he was already chiefly absorbed in the study of metaphysics. In 1748 he published a paper in the London Philosoph¬ ical Transactions, } in which he opposed the in¬ troduction of mathematical formulas into meta¬ physical and moral speculations, and particu¬ larly criticized the statement of Hutcheson that the benevolence or moral merit of an agent is ((proportional to a fraction having the moment of good for the numerator, and the ability of the agent for the denominator.® He was in 1752 elected professor of philosophy in King's College, his department comprehending logic, ethics, mathematics and physics. His Unquiry into the Human Mind on the Principles of Common Sense) (1764) aimed at the refutation of Hume skeptical theory. Affirming the im¬ possibility of proving the existence of an ex¬ ternal world from reason, or experience, or in¬ struction, or habit, or any other principle hith¬ erto known to philosophers, Reid introduced the doctrine of an original instinct or

“common sense® (q.v.) as the ground of the belief. In 1764 he was transferred to the University of Glasgow as successor to Adam Smith in the chair of moral philosophy. His course included metaphysics, moral philosophy, natural law and political right. He was a member of a philo¬ sophical society before which he read several essays, including an Examination of Dr. Priestley’s Opinion Concerning Matter and Mind,* Observations on the Utopia of Sir Thomas More* and (Physiological Reflections on Muscular Motion.) In 1781 he withdrew from public duties to devote himself exclusively to philosophical studies. In 1785 he published Essays on the Intellectual Powers of Man,* consisting of his academical lectures, and in 1788 his Essays on the Active Powers of ’ Man,* his last important work. An edition of his works with notes and dissertations was pre¬ pared by Sir William Hamilton (incomplete, 1846). Consult the Eife) by Dugald Stewart (1804) ; McCosh, Scottish Philosophy from

Hutcheson to Hamilton * (1890) ; Sneath, (The Philosophy of Reid) (1892).

REID, Sir Thomas Wemyss, English jour¬ nalist : b. Newcastle-on-Tyne, 29 March 1842; d. London, 26 Feb. 1905. He contributed fre¬ quently to English reviews and magazines, ed¬ ited the Leeds Mercury (1870-87) and The Speaker from 1890 to 1899, when he resigned. He was knighted in 1904. He was the author of (Cabinet Portraits: Sketches of Leading Statesmen of Both Parties* (1872) ; (Charlotte Bronte: A Monograph) (1877); (The Land of the Bey) (1882) ; (Mauleverer’s Millions) (1885); and Eives) of W. E. Forster (1888), Lord Houghton (1890), Lord Playfair (1899), Gladstone (1899) and William Black (1902). His (Memoirs,* edited by his brother, were published in 1905.

REID, Whitelaw, American diplomat : b. Xenia, Ohio, 27 Oct. 1837 ; d. London, England, 15 Dec. 1912. He was graduated from Miami University in 1856; and began his journalistic career as editor of the Xenia News, in 1858-59. In 1860 he became a reporter for the Cincinnati Gazette, in 1861-62 was war correspondent, and later Washington correspondent for the same paper, the brilliancy and accuracy of his war reports attracting considerable attention among newspaper men. He was aide-de-camp on the staff of General Morris and General Rosecrans in West Virginia. In 1863-66 he was librarian of the House of Representatives and after the war spent some time on a cotton plantation in Concordia Parish, La. In 1868 he joined the editorial staff of the New York Tribune; in 1869 became managing

editor and in 1872 edi¬ tor-in-chief. Under his management the Trib¬ une came to rank among the leading papers of the cit}' in the trustworthiness of its news re¬ ports. He twice declined an appointment as Minister to Germany, was Minister to France in 1889-92 and negotiated important reciprocity treaties, and in 1892 was the unsuccessful Re¬ publican candidate for Vice-President. He was the Special Ambassdor from the United States to Queen Victoria's jubilee in 1897 ; was a mem¬ ber of the American-Spanish Peace Commis¬ sion in Paris in 1898 ; and was Special Ambas¬ sador at the coronation of Edward VII in 1902. In April 1905 he was appointed Ambassador to the Court of Saint James, to succeed Joseph H. Choate, and held that post till his death. He had been a regent of the University of New York since 1878. His notable publications in¬ clude (After the War, a Southern Tour) (1867) ; (Ohio in the War* (1868), an import¬ ant contribution to the local history of the State; (Schools of Journalism* (1870); (The Scholar in Politics *(1873) ; (Newspaper Tendencies) (1874) ; (Town Hall Suggestions* (1881) ; Two Speeches at the Queen's Jubilee) (1897) ; (Some Consequences of the Late Treaty of Paris> (1899) ; (Our New Duties) (1899) ; (A Continental Union* (1900) ; (Our New Interests) (1900) ; and Eroblems of Ex-pansiorP (1900). He wrote the introduction for the centennial edition of Thackeray's (Van¬ ity Fair> in 1908 and was one of the speakers at the English celebration of the centenary of Dickens' birth. In English history, his address on Edmund Burke has been pronounced his most important study.

REID, Sir William, Scottish meteorolo¬ gist and colonial governor : b. Kinglassie, Fifeshire, 1791 ; d. London, 21 Oct. 1858. He was educated at the Royal Academy at Woolwich, and in 1809 entered the army_ as lieutenant of engineers, serving in the Peninsular campaign under Wellington, in America in the War of 1812 and in Belgium in 1815. He was appointed governor of Bermuda in 1839, and by his ex¬ cellent administration of affairs greatly im¬ proved the deplorable agricultural condition of the island. He opened a market for their prod¬ ucts in New York and by these and other effi¬ cient methods

gained the title of (<the good governor.® In 1846 be became governor of the Windward Islands and in 1848 he returned to England and was appointed commanding engi¬ neer at Woolwich. In 1851 he was knighted and appointed governor of Malta, where he re¬ mained until 1858. He was raised to the rank of major-general in 1856. He became interested in meteorology in 1831 while superintending the repair of injuries inflicted by a severe hurri¬ cane at Barbados, and engaged in a corre¬ spondence with William C. Redfield (q.v.) of Yale College. The correspondence has since been presented to Yale. His publications in¬ clude (An Attempt to Develop the Law of Storms by Means of Facts Arranged Accord¬ ing to Place and Time) (1838) and (The Prog¬ ress of the Development of the Law of Storms)

(1849).

REID, William Thomas, American educa¬ tor: b. near Jacksonville, Ill., 8 Nov. 1843. He served in the Union army during the Civil War, was graduated from Harvard in 1868 and was headmaster of the high school, Newport, R. I., 1868-71. He subsequently taught in the Boston Latin School, was superintendent of the Brook¬ line, Mass., schools 1873-75, was principal of the San Francisco Boys' High School 1875—81 and president of the University of California 1881-85. He founded the Belmont School for Boys at Belmont, Cal., the most important col¬ lege preparatory school on the Pacific Coast and was for many years its headmaster. Consult Adams, (Some Famous American Schools)

(1903).

REIDSVILLJE, N. C., city in Rockingham County, 75 miles northeast of Raleigh, on the Southern Railway. It is situated in a tobacco¬ raising district and has tobacco factories and warehouses as well as a cotton-mill. Pop. 5,333.

REIGHARD, ri'gard, Jacob Ellsworth,

American zoologist: b. Laporte, Ind., 2 July 1861. He was graduated in 1882 from the Uni¬ versity of Michigan; studied also at Freiburg-im-Breisgau, was assistant professor of zoology at the University of Michigan in 1887-88 and 1 890—92, and directed the scientific work of the Michigan fish commission in 1890-95. _ In 1898-1901 he was in charge of the biological survey of the Great Lakes for the United States Fish Commission. From 1895 he held the chair of zoology in the

University of Michigan. He wrote (The Anatomy of the Cat> (with H. S. Jennings, 1901) and many papers on fresh¬ water biology and sub-aquatic photography.

REIGN OF TERROR, a period of the French Revolution, conspicuous for its horrors and cruelties. It is generally considered to ex¬ tend from 21 Jan. 1793, the date of the execu¬

tion of Louis XVI, to 28 July 1794, when Robespierre and other sanguinary leaders were guillotined. Every day, during the Reign of Terror, victims were hurried, after a mock trial, to the scaffold, and the prisons were kept replenished by fresh captives from all parts of France. When all the nobility who could be reached had been cut off, the middle and lower classes were drawn upon for victims, and the terrorists even laid traps for each other, in their mad ambition and fear of what the future might bring. At last a successful coup d'etat was secretly organized, which resulted in the extermination of the more rabid revolutionists and the lifting of the awful nightmare which had brooded for months over France. The Reign of Terror had its reaction in the despotism of Napoleon and eventually in the restoration of the Bourbons.

REIKIAVIK, ri'ke-a-vik, or REYKJA¬ VIK, rlk'ya'vik (Dan. Reikevig), Iceland, cap¬ ital of the island, stands on the southwestern coast and is an important northern port from which considerable trade is carried on. It is the seat of a local legislature and, under the constitutional law of J903, of a minister ap¬ pointed by the Danish king. It is also the seat of a bishop. The climate is not very severe as generally supposed. The people are unusually intelligent; the chief institutions include a pub¬ lic library, college, gymnasium, observatory, churches and medical, divinity and nautical schools. A noteworthy attraction is a statue of Thorwaldsen. A great fair is held annually

REIMARUS, ri-ma'roos, Hermann Sam¬ uel, German scholar : b. Hamburg, 22 Dec. 1694; d. there, 1 March 1768. Early in life he devoted himself to the study of languages, and he became distinguished for his knowledge of Latin, Greek and Hebrew. From about 1714 he studied at Jena and afterward lectured at Wittenberg. He became in 1723 rector at Wis-mar and in 1728 was appointed to the professor¬ ship of Hebrew in the Gymnasium of Ham¬ burg, which he subsequently united with the professorship of mathematics. He edited the works and wrote the life of his father-in-law, <De Vita et Scriptis J. Alb. Fabrici Commen-tarius) (1737). The edition of Dio

Cassius, begun by Fabricius and ended by him, shows him as a philologist in a favorable light. Among his further publications are (Die vornehmsten Wahrheiten der natiirlichen Religion) (1754) ; (Betrachtungen fiber die Kunsttriebe der Thiere) (1762), and < Vernunftlehre* (1756). In the (Wolfenbfittelsche Fragmenten eines Ungenannten) (published by Lessing in 1777— 78) he made an application of the rules laid down in the last-mentioned work against the positive doctrines of Christianity. Until pub¬ lished by Lessing it was known only in manu¬ script to a few of his most intimate friends. It precipitated the well-known controversy between Lessing and Pastor Goeze of Hamburg. To¬ ward the end of his life Relmarus applied his , hours of leisure to the study of natural history, of which he acquired an extensive knowledge and led to his Observations, Physical ancl Moral, on the Instinct of Animals) (2 vols.# 1760. See Lessing.

REIMS, remz. See Rheims.

REINACH, ra-nak, Joseph, French publi¬ cist and politician: b. Paris, 30 Sept. 1856; d. Paris, 18 April 1921. He was admitted to the bar in 1877, in 1881 became secretary to Gambetta and continued such until the fall of that minister. Having earlier devoted consider¬ able time to journalism, he returned to that field in 1886, becoming proprietor with Denayrouse of La Republique Frangaise. In 1889 he was elected deputy by the arrondissement of Digne and was reelected in 1893, but owing to his at¬ titude of criticism of the Dreyfus trial and his demand for a revision, he failed of re-election in 1898. He published a number of pamphlets on this celebrated case. He is also the author of (La Servie et la Montenegro5 (1876) ; (Voy¬ age en Orient5 (1879) ; (Le Ministere Gambetta, Histoire et Doctrine5 (1884) ; (Etudes de Literature et d'Histoire5 (1888-89) ; (La Politique Opportuniste5 (1890) ; (Petites Catilinaires5 (1888-89), being his articles against Boulangism published in Republique Frangaise. He edited (Discours et Plaidoyers politiques de Gambetta5 (1881-85) and (Depeches Circulaires Decrets, Proclamations et Discours de Gambetta5 (1870-71).

REINACH, Salomon, French archaeologist, brother of Joseph Reinach (q.v.) : b. Saint-Ger- main-en-Laye, 21 April 1858. He was educated at the Lyce Fontanes and the Lcole Normale Superieure and was appointed to the Ecole Frangaise d'Athenes. He made a series of ex¬ cavations and investigations at Myrina near Smyrna in 1880-82, was secretary of the Archaeological Commission of Tunis in 1882-85 and in 1886 was an attache at the Museum of National Antiquities at Saint-Germain-en-Laye. In 1890-92 he was assistant professor of archae¬ ology at the Ecole du Louvre, was associate curator of the National Museums in 1893, in 1896 was elected to the Academie des Inscrip¬ tions et Belles-Lettres and in 1906 became president of that institution. He has published (Chronique d'Orient5 (1885-91) ; description raisonne dus Musee de Saint-Germain5 (1890) ; (Repertoire de la Statuaire grecque et romaine5 (1897-98) ; (Guide illustre du Musee national de Saint-Germain5 (1899), *etc.* A bibliography of his works, embracing more than 50 volumes and about 2,000 articles, has been printed, last edition 1907. His most popular works are a general history of art and a general history of religion.

REINBOLD, rln'bolt, Adelheid. See

Berthold, Franz.

REINDEER, a very distinct genus Rangifer, of Cervidce, unique in the possession of antlers by both sexes, though those of the fe¬ male are somewhat smaller. The Euro-Asiatic reindeer (Rangifer tarandus) is the only domesticated species of the family. It extends over the boreal regions of the Eastern hemi¬ sphere between about lat. 50° and 81°, and runs into several well-marked varieties. The reindeer formerly had a much wider geographi¬ cal range and is probably the bos cervi figura described by Caesar as inhabiting the Hercynian forests. Its remains are found associated with hippopotami in Pleistocene formations still farther south in Europe. The antlers are not alike on both sides, the great palmated brow tine being, as a rule, developed on one side only. In the winter the fur is long, grayish

brown on the body; neck, hind-quarters and fielly white. In summer the gray hair darkens into a sooty brown and the white parts become gray, owing to the shedding of the long hairs. To the Laplander the reindeer serves as a sub¬ stitute for the horse, the cow, the sheep and the goat. It is extensively employed as a beast of draft and carriage, being broken to draw sledges or to carry men or packages on its back;

the large race of Siberia and Kamchatka being used especially for the latter purpose. A full-grown animal can draw a weight of 300 pounds and travel at the rate of 100 miles a day, its broad deeply cleft hoofs fitting it admirably for traveling over the broken snow. In winter the herds feed in the woods on the lichens which hang from the trees or grow upon the ground, to secure which the shovel-like brow tine and the hoofs are employed to scrape away the snow ; in summer they move to the valleys to feed on the herbage and shoots, and in autumn they seek the sea coast in order to escape the mosquitoes and gad-flies, where they feed largely upon marine algae cast upon the shore. So important are these animals to the Laplanders that they, with their entire house¬ holds, accompany them on these annual migra¬ tions. _ In 1891 16 head of domestic reindeer were introduced into Alaska by Dr. Sheldon Jackson for the benefit of the natives who fre¬ quently suffered for food and for purposes of transportation. The experiment proved so satis¬ factory that importations were continued for 10 years, at the end of which time 1,200 had been brought from Siberia. In 1898 Dr. Jackson, as agent of the United States government, procured a colony of Laplanders to train the natives in the care of the reindeer. On 30 June 1915 there was officially reported a total of 70,243 reindeers in the Territory, distributed among 76 herds. Of the total 46,683 were owned by natives ; 3,408 by the United States govern¬ ment ; 6,890 by the various missions, and 13,262 by Laplanders and other whites. The valuation of the reindeers owned by natives was $1,167,- 075 ; of those owned by all others, $589,000 ; the total income of natives from their holdings, 1895-1915, was $369,407, of all others, $107,361 ; making the total valuation and income $2,232,- 843, and the total government appropriation for the industry in 1893-1915 was $307,000; total gain, $1,925,843.

By European mammalogists the American wild reindeer or caribou, as they are called, are considered to be co-specific with R. tarandus, but American students recognize two native species with some six or seven sub-species. The woodland caribou (R. caribou) inhabits the wooded parts of British America and the United States border from Maine to Minnesota. It is larger than most varieties of the European reindeer, and both the brow and bez tines of the antlers are much palmated; those of the female are much smaller and little palmated. It frequents marshy regions and feeds upon leaves, grass and shoots, but in some localities at least, migrates northward in the winter in search of tree lichens (Usnea , etc.) and rein¬ deer moss (Cladonia rangiferina) . The latter is a valuable lichen, which grows in great abund¬ ance in the north of Europe, particularly in Lapland, as well as on the tundras of Siberia and the barren plains of Arctic America. It

con¬ stitutes almost the sole winter food of the rein-

deer. Linnaeus says it grows so luxuriously in Lapland that it sometimes reaches a foot in height. The reindeers scratch it up from under the snow with their feet and antlers. On this plant their existence, as well as that of the Lap¬ landers, to whom they are indispensable, de¬ pends. Its nutritive properties depend chiefly on the gelatinous and starchy matter of which it is largely composed. Its taste is slightly pungent and acrid. When boiled it forms a jelly pos¬ sessing nutritive and tonic properties.

The Barren Ground caribou (R . arcticus) is a smaller species with larger antlers which oc¬ cupies the more central and northern barren plains of British America. This species lives in herds of enormous size, said to rival even those of the bison of former days and migrates regularly. In the winter it moves southward to the wooded belt where it meets but does not mix with the woodland caribou, and in the spring returns to the shores of the Arctic Ocean. See Caribou.

Much interesting information concerning the habits of reindeer will be found in the narra¬ tives of Nordenskjold and other Arctic trav¬ elers. Besides these consult Caton, ‘Antelope and Deer of North America) (Boston 1881) ; Lydekker, ‘Deer of All Lands5 (London 1898) ; Richardson, ‘Fauna Boreali-Americana5 (Lon¬ don 1829) ; Jackson, (Annual Reports on Rein¬ deer in Alaska5 (Bureau of Education, Wash¬ ington 1892), and annual reports of the Secre¬ tary of the Interior and the governor of Alaska.

REINDEER MOSS. See Reindeer.

REINECKE, ri’nek-e, Karl, German musi¬ cian : b. Altona, Pressia, 23 June 1824; d. — , March 1910. He was educated by his father, a composer, and in 1834 made a successful con¬ cert tour as a pianist, later becoming court pianist to the king of Denmark. He was ap¬ pointed a teacher in the Cologne Conservatory in 1851 and in 1860 was made professor of piano and composition in the Leipzig. Consevatory. He became well known as a director and as a pianist and for his interpretations of Mozart. His compositions number nearly 200, are char¬ acterized by great refinement and have a dis¬ tinctly classical and occasionally a romantic touch. They include (Serenade5

; (Aus der Jugendzeit5 ; (Konig Manfred5 (1867); (Auf hohen Befehl5 (1886); (Der Gouverneur von Tours5 (1891), *etc.*

REINHART, rin'hart, Benjamin Franklin,

American artist: b. Waynesburg, Pa., 29 Aug. 1829; d. Philadelphia, 3 May 1885. At 15 he began to study art, and afterward took a three years' course at the National Academy, New York. In 1850 he went to Europe and studied in Paris and Diisseldorf. Returning to this coun¬ try, he settled in New York in 1868. His most important works are engravings, and include (Cleopatra 5 (1865); 'Washington Receiving the News of Arnold's Treason5 ; 'After the Cruci¬ fixion5 (1875) ; 'Evangeline5 and 'Pocahontas5 (1877) ; 'The Pride of the Village5 ; and 'Cap¬ tain Kidd and the Governor5 and 'Baby Mine5 (1884) ; 'The 'Nymphs of the Wood5 ; 'Katrina Van Tassel5 ; 'Young Franklin and Sir William Keith5; 'The Regatta5; 'Con¬ solation,5 *etc.* To these should be added por¬ traits of the Princess of Wales, Duchess of Newcastle, Carlyle, Tennyson, Charles O'Conor,

fames Buchanan, General Winfield Scott, Stephen A. Douglas and others.

REINHART, Charles Stanley, American artist, nephew of Benjamin Franklin Reinhart: b. Pittsburgh, 16 May 1844; d. Philadelphia, 30 Aug. 1896. He went to Paris in 1868 and studied at the Atelier Suisse; later entered the Royal Academy in Munich; and in 1870 re¬ turned to the United States. Besides note¬ worthy illustrations for magazines in this coun¬ try and in Europe, he produced works in black-and-white, water-color and oil, many of which were exhibited at the National Academy. . In 1881 he again went to Paris where he resided till 1891, and was a regular exhibitor at the Salon. Later he became a member of the So¬ ciety of American Artists, New York, and was identified for several years with the publishing house of Harper and Brothers. Among his works in black-and-white are 'An American Abroad,5 'A Little Swiss Sojourn5 and 'Reichstag Sketches5 ; in water-color, 'Gather¬ ing Wood5 (1877) ; 'At the Ferry5 (1878), and 'The Spanish Barber5 (1884) ; in oil, 'The Old Life-Boat5 (1880); 'Washed Ashore5 (1887); and 'The Rising Tide5 (1888). He also pro¬ duced a series of Civil War scenes, several of which were published in Harper's Weekly in double-page form. Among his earlier paintings should be noted 'Clearing Up} (1875) ; 'Recon-noitering5 (1876), and 'Refeuse5 (1877).

REINHART, Johann Christian, German painter: b. near Hof, 24 Jan. 1761; d. Rome, 8 June 1847. He began his professional education as a divinity student in Leipzig theological school, but soon showed a very decided inclina¬ tion for art and became a pupil of Oeser. He afterward attended the Academy of Dresden. The liberality of his patron, the Margrave of Baireuth, enabled him to visit Rome, where he fixed his residence. His compositions are rich, nobly conceived and full of poetic beauties, but his coloring is wanting in softness and warmth. Of the great masters he most strongly resembles Swanevelt. Among the most excellent paint¬ ings of his later years are those in the Massini Palace at Rome. He was also successful as an etcher. Consult Baisch, 'J. Ch. Reinhart und seine Kreise5 (1882).

REINHOLD, rin'holt, Karl Leonard, Ger¬ man philosopher: b. Vienna, 26 Oct. 1758; d. Kiel, 10 April 1823. His parents destined him for the church, and sent him to study with the Jesuits in Vienna. When the order was abol¬ ished in 1774 he entered the college of the regu¬ lar priests of Saint Paul (generally called Barnabites), where he became, at 22, professor of philosophy. He left Austria in 1787, and the same year was appointed professor at Jena, having written a celebrated vindication of the Reformation against two chapters in Schmidt's 'History of the Germans.5 In 1794 he became professor at Kiel and remained there until his death. Among his other works are 'fiber das Fundament cles philosophischen Wissens5 (1791) ; 'Grundlegung einer Synonymik fur den allgemeinen Sprachgebrauch in den philosophischen Wissenschaften5 (1812). In his philosophy he followed Kant, Fichte, Bar-dili and Jacobi. Consult 'Life5 by his son E. Reinhold (1828); Fischer, Kuno, 'Die neuere Philosophic seit Kant5 ; 'Nouvelle Bio¬ graphic Generale.5

REINICK, ri'nTk, Robert, German artist and poet: b. Dantzic, Prussia, 22 Feb. 1805; d. Dresden, 7 Feb. 1852. He studied painting in Berlin under Begas, and at the Diisseldorf Academy, and in 1844 settled at Dresden. He displayed superior artistic powers in romantic and historical subjects, and especially in such works as show the artistic

union of brush and pen. Among his more important productions in art are (Rachel and Jacob at the WelP ; (WelI Near Olevano,' and numerous etchings contrib¬ uted to various publications. To Rethel's (Dance of Death) he furnished the poetical text and his other writings include (Song-book for Artists) (1833) ; (Song-book of a Painter' (1837-44) ; (Songs and Fables for the Young' (1844) ; Hebei's (Allemanic Poems' (1851), which he translated into High German; (Col¬ lected Songs' (1852) ; and (Book of Poetic Fables and Stories' (1873).

REINICKE, ri'nik-e, Paul Rene, German painter and designer: b. Strenz-Naundorf, near Halle, 1860. Beginning his professional life at Weimar in the studio of A. Struys, he after¬ ward became a pupil of E. von Gebhardt at Dusseldorf. In order to extend still further his art experience he went to Palestine as a pupil and assistant of Piglhein, at that time painting his panorama of the (Crucifixion of Christ,' and executed a considerable portion of that work. While his promise as a painter vfras very evident he abandoned the easel on returning to Munich and became chief illustrator for the (Fliegende Blatter.' The wonderful skill he has shown in this department of art is well known and he has depicted artistocratic life in park and promenade, ballroom and theatre, with a truthfulness and grace, with a suggestive wealth of detail and consummate finish of exe¬ cution which are unrivaled. A collection of his designs, under the title (Spiegelbilder aus dem Leben' (Reflections from Life' has appeared in heliogravure (1890).

REINKENS, rin'kens, Joseph Hubert,

German Old Catholic bishop : b. Burtscheid, near Aix-la-Chapelle, Germany, 1 March 1821 ; d. Bonn, 5 Jan. 1896. He was educated at Bonn and Munich, was ordained to the Roman Catho¬ lic priesthood in 1847, became a preacher in the cathedral, extraordinary professor (1853), or¬ dinary professor of church history (1857), and rector of the University of Breslau (1865). In 1870 he joined Dollinger in the Old Catholic movement, protested against the infallibility dogma, was suspended from his clerical offices and in 1872 was excommunicated. He became one of the leaders of the Old Catholic move¬ ment and in 1873 was consecrated bishop of the Old Catholic Church with his official residence at Bonn, and was recognized as such by the German government. He published (Papst und Papstthum nach der Zeichnung des Heiligen Bernhard von Clairvaux' ; (Hilarius von Poitiers' (1864) ; (Ueber papstliche Unfahlbar-seit' (1870), which his bishop attempted to sup¬ press; (Die papstlichen Decrete vom 18 Juli 1870' (1871) ; devolution und Kirche' (1876) ; (Lessing iiber Toleranz' (1883), *etc.*

REIN.SCH, rlnch, Paul Samuel, American historian, educator and diplomat : b. Milwaukee, Wis., 10 June 1869. He was graduated from the University of Wisconsin in 1892, .from its law

department in 1894, and after studying abroad was assistant professor of political science at the University of Wisconsin in 1899-1901, full professor in 1901-13, and in the latter year was appointed United States Minister to China. He is the author of (The Common Law in the Early American Colonies' (1899) ; (World

Politics at the End of the 19th Century as In¬ fluenced by the Oriental Situation' (1900) ;

(Colonial Government' (1902) ; (Colonial Ad¬ ministration' (1905) ; (American Legislatures and Legislative Methods' (1907) ; Intellectual Currents in the Far East' and (International Unions' (1911), *etc.*

REIS EFFENDI. See Effendi.

REISEBILDER, rl'ze-bil'der. The < Pic¬ tures of Travel' belong to the first period of Heine's literary career and made him famous as a writer of prose. The first volume (1826) and the second (1827) are partly in prose and partly in verse, while the third (1830) and fourth (1831) contain prose only. Heine in¬ corporated the poems which occur in the (Pictures of Travel' (Vol. I, (The Return Home,' (From the Journey to the Harz' and the first section of (The Northsea' ; Vol. II, the second section of (The Northsea') into the (Book of Songs.' The (Letters from Berlin' (prose) which appeared in the first edition of the (Pictures of Travel' (Vol. II) were omitted in subsequent editions. Heine drew directly on his personal experiences for all the (Picturcs of Travel,' and at times his genius lights up his subjects with the brilliance of lightning, at times we feel more as a passing breath of wind the spirit and the atmosphere of times and places. On the other hand, the author's own personality, his political views and various accessory circumstances of his travels stand out altogether too prominently to permit of comprehensive and objective visions of the regions he visited. Heine never con¬ fines himself to his subject, but speaks — as he himself said — <(of everything and a few things besides," mingling with perfect ease the bril¬ liant and the disgusting, the touching and the malicious, the humorous and the sentimental, the grand and the trivial. Irony and love of liberty are two qualities which especially mani¬ fest themselves. Among the features and topics which mark the various parts of the (Pictures of Travel' apart from

the poems are: the charm of the mountains and the simplicity of their inhabitants ((The Journey to the Harz' in Vol. I) ; Norderney as a lonely island given up to tradition and as a modern summer resort ((The Northsea,' section 3 in Vol. II); Heine's boyhood days and his admiration for Napoleon I ((Ideas. The Book Le Grand,' in Vol. II) ; German and Italian cities, ancient Rome and modern Italy ((Journey from Mu¬ nich to Genoa' in Vol. Ill) ; characters drawn in a cynical and satirical vein, polemics against the poet Platen ((The Baths of Lucca', in Vol. Ill) ; celebration of a Catholic holi¬ day in an old Italian city, religious controver¬ sies ((The City of Lucca' in Vol. IV); London, political life in England ((English Fragments' in Vol. IV). Consult Elster, E., (Heinrich Heines Samtliche Werke' (Leipzig 1890, Vol. Ill and Vol. I, pp. 35-89, text and introductions) ; Strodtmann, A., (Heinrich

Heines Leben und Werke) (3 Aufl., Berlin 1884); Bols-che, W.,/ Heinrich Heine, Versuch einer asthetisch-kritischen Analyse seiner Werke> (Leipzig 1888) ; English translation : <The Works of Heinrich Heine,' tr. by C. G. Leland (Vols. II, III) ; selections (in (German Classics,' Vol. VI).

Ewald Eiserhardt.

REISKE, ris'ke, Johann Jakob, German philologist: b. Zorbig, Saxony, 25 Dec. 1716; d. Leipzig, 14 Aug. 1774. He was educated at the University of Leipzig and devoted much attention to the study of the Semitic languages, particularly Arabic. Although abjectly poor he journeyed to Leyden, where he gained access to the library and continued his study of Arabic. In 1758 he was appointed to a rectorship at the Nikolai Gymnasium at Leipzig, a position he occupied until his death, devoting himself to Greek literature in regard to which he became an authority. His works display a wide erudi¬ tion and he succeeded in attracting publicatten-tion to the value of Arabic literature in the world of learning. He edited (Constantips Porphyrogennetus) (1751-54) ; (Ciceronis Tus-culanse Qusestiones' (1759) ; <Theocritus) (1765-66) ; (Maximus Tyrius) and <Oratores

GraecP (1774-75) ; (Dionysius Zalicaruasseuris) (6 vols., 1774-77) ; <Plutarchi Opera Omnia' (12 vols., 1774-82), etc.; translated from the Arabic and Greek classics and made the Latin translation of Abulfeda's <Annales Moslemici' (1754). Most important among his writings are (Miscellanea aliquot Observationes Medicae ex arabum Monimentis' (1746), and (Animadversiones in Graecos Auctores' (6 vols., 1757— 66). Consult (Autobiography, ' edited and com¬ pleted by his wife (1783) : Morus, (Vita Reiskii' (1777); Haupt, (Opuscula' (1875-76).

REISNER, George Andrew, American Egyptologist: b. Indianapolis, Ind., 5 Nov. 1867. He was graduated at Harvard in 1889, after¬ ward pursuing graduate courses in Semitic lan¬ guages there. He was assistant in the depart¬ ment of Egyptology at the Royal Museum, Berlin, in 1895-96, and instructor at Harvard in 1896-97. In 1897-99 he was a member of the international committee on catalogues at the Khedivial Institute, Cairo, and in 1905 became connected with the faculty at Harvard, where he has been professor of Egyptology since 1914. He was appointed curator of the Egyptian de¬ partment of the Boston Museum of Fine Arts in 1910. He served as director of the Egyptian expeditions of Harvard and of the Boston Mu¬ seum of Fine Arts from 1905, and has engaged in explorations and excavations in Nubia, Samaria, Bersheh, Girga-Pyramid, Lower Nubia and Dongola. He was granted leave of absence from Harvard in 1916-17. He has written (The Early Dynastic Cemeteries of Nayu-ed-der' (Part I, 1907) ; (First Annual Report, Nubian Archaeological Survey' (1910) ; #(Models of Ships and Boats' (1913), *etc.*

REITBOKS, or REEDBUCKS, a genus (Cervicapra) of small South African antelopes, which have horns only on the heads of the males and are never found far from water, affecting particularly marshy valleys and the reedy borders of the larger rivers. They are rather more than four feet in length and nearly

three feet high at the shoulder; general color, dull ashy-gray, sometimes tinged with red on upper parts, silvery-gray on under parts. The type is C. arundineunt. Other species are the rio rhebok, nagor and bohor.

REJANE, ra-zhan, Madame, stage-name of Gabrielle (Reju) Porel, French actress: b. Paris, 6 June 1857; d. there, 15 June 1920. She first appeared in 1875 in (Revue des Deux Mondes' at the Vaudeville. She became known for her impersonation in melodramatic parts,

particularly in the title-role of (Madame Sans Gene' (1893), written for her by Sardou. In 1895 she toured in the United States with much success. One of her later appearances was in <La Fasserelle.' In 1905 she founded a theatre in Paris bearing her own name.

REJECTED ADDRESSES, a famous col¬ lection of parodies by the brothers James and Horace Smith, which was issued anonymously in 1812, and met with great success. They were written as a burlesque upon the many prominent and unsuccessful competitors for the reward offered by the management of the Drury Lane for an address to be delivered at the open¬ ing of the new theatre. Among the parodies the following are the work of James Smith: <The Baby's Debut' (Wordsworth) ; (The Hampshire Farmer's Address' (Cobbett) ; (The Rebuilding' (Southey) ; (Play-House Musings' (Coleridge) ; (The Theatre' (Crabbe) ; the first stanza of cCui Bono' (Lord Byron) ; the song entitled (Drury Lane Hustings' ; and (The Theatrical Alarm-Bell,' an imitation of the editor of the Morning Post; also travesties on (Macbeth,' (George Barnwell' and /The Stranger.' The rest are by Horace Smith. The (Rejected Addresses' still hold a high place among the best works of their kind ever written, and their extent and variety exhibit the versatility of the authors. James Smith (1775— 1839) and Horace Smith (1780-1849) were voluminous contributors to the periodical litera¬ ture of the day, largely in humorous imitations and amusing trifles. The elder Charles Mathews said to James: ((You are the only man in London who can write what I want, good nonsense."

REJUVENATION, the revival of stream erosion in a region in which the rivers have cut as low as they can. It is usually brought about by uplift.

RELAPSING FEVER, a disease so called from the fact that during apparent convales¬ cence a relapse of all the symptoms occurs; and this may be repeated more than once. It is also called famine fever, because it has oc¬ curred during seasons of destitution since 1739. Other names for it are five-day fever, seven-day fever, mild yellow fever, heart fever and febris recurrent. Its present name was given to it by Jenner in 1850. It is infectious and contagious. The symptoms do not usually show themselves for three or four days after exposure to the contagion. They generally begin in a shivering sensation, with headache, and with muscular pains all over the body, but especially in the limbs; then the pulse rises and the temperature increases; there is also great thirst, nain over the stomach and retching. Sometimes there is intense hunger and the patient becomes ex-RELATIVITY

tremely prostrated. On the fifth or seventh day the symptoms abate and there is rapid amendment until about the 14th or 15th day from the beginning of the symptoms, when a relapse occurs. Three or four days afterward convalescence again begins and in the majority of cases it goes on to complete restoration of health. Relapsing fever is not often fatal, the death rate being about 2 per cent of those at¬ tacked. The treatment consists in giving gentle laxatives and cooling drinks, a light nutritious diet and in securing to the patient perfect quiet¬ ness. Relapsing fever is now known to be caused by a spirillum (Spiroch&tce obermeieri) , a micro-organism which Obermeier of Berlin showed (1873) to be constantly present in the blood of those having this disease.

RELATIVITY, The Principle of. The

principle of relativity consists essentially in the hypothesis that it is impossible by physical ex¬ periment to measure or detect the absolute mo¬ tion of a body through space. As a conse¬ quence the expressions ((absolute velocity® and <(body at rest® have no significance. Only rela¬ tive motion can be detected or even defined. If this were all the subject would be of interest to the philosopher rather than the physicist. But it can be shown as a consequence that space and time have no absolute significance. They depend on the motion of the observer. As stated by Minkowski, (<From now on, space by itself and time by itself, are mere shadows, and only a kind of blend of the two exists in its own right.®

Absolute Motion. — It has been known for a long time that the dynamical properties of a system in uniform motion are identical with those of the same system at rest. A person shut in a box moving with constant velocity could not determine by mechanical means whether he was moving or not. Certain optical experi¬ ments, however, suggested that optical methods might determine absolute motion. Thus the index of refraction of a piece of glass is the ratio of the velocity of the incident light to that of the refracted light. Arago, in 1818, suggested that this might be used to determine absolute velocity. The experiment did not suc¬ ceed. Fresnel explained this by supposing the light to be partially convected, or dragged, by the moving medium. Fizeau tested this notion by sending a beam of light along the direction of motion through water flowing in a tube and found that the velocity of light in the moving water was slightly

different from that in water at rest. The experiment, however, only indi¬ cated the difference in velocifv of the water in two tubes and not the absolute velocity.

The most famous experiment for detecting absolute motion was devised by A. A. Michelson in 1881, repeated with greater refinement by E. W. Morley in 1887, and again repeated with greater care by E. W. Morley and D. B. Miller in 1905. It is generally called the (<Michelson-Morley Experiment.®

The fundamental idea is as follows: A beam of light from a source S is divided by partial reflection at a plate of glass A into two portions traveling along the paths AM i and AM*. These portions are reflected back by mirrors at Mi, M2, and, on striking the plate again, a part of the beam from Mi is trans-vol. 23 — 22

mitted and a part of that from M2 is reflected, the two being brought to interference at C.

M,

C

Suppose the whole apparatus moving with velocity v in the direction AM 2. Let c be the velocity of light. As the light goes from A to M2 its velocity relative to the apparatus is c — v, while on the return journey it is c\zk The time to pass from A to Ma and back again is then

•> *22*c

- - — — 1 - — _

C + V C2 - V2 ‘

Since the apparatus moves the distance v while light moves the distance c, the beam passing from A to M and back describes a path ABA’ in space. By similar triangles

The time required to describe the path ABA’ is then

AB BA’ 2h

c + c “ (c2 — v2)Y

The retardation in time of the former beam relative to the latter when they are brought together again is

1-iC l\

C 2 - V2 (C 2 - v2)i

(1)

If now the whole apparatus is rotated 90 degrees so that AMi is in the direction of mo¬ tion, h, and U change places and the retardation becomes

2ˆ h _ he \

((c 2 — v 2) 1 c2 — v2 j ’

The change in retardation is

2(/i -f-h)\~i - ‘2 — j-z - r.

This should result in a displacement of the

interference fringes when the apparatus is ro¬ tated. No such displacement was found, though the effect due to a velocity one-tenth that of the earth in its orbit could have been detected in the experiment of Morley and Miller.

Fitzgerald and Lorentz independently sug¬ gested that motion might cause a change of length in the direction of motion. If all lengths in the direction of motion are de¬ creased in the ratio

(1) becomes

h *k* [

(C2 - V2) 5 (c2 - l>2) 5 J

and after rotation through 90 degrees the re¬ tardation has the same value. Hence the null effect in the Michelson-Morley experiment is explained.

If we accept this explanation the difficulty is only moved one step farther. While we could compare lengths of objects moving with known velocities it would be impossible to determine the absolute distance of points in space. For the only way we can measure distances is by means of material scales. If such scales are subject to the Fitzgerald contraction, scales moving with different velocities give different values for the distance between the same points of space. Since no means has been found for determining which scales are moving and which are not, there appears to be no way of deter¬ mining,ˆ and so defining the distance between two points.

Similar difficulties are encountered when we try to determine simultaneous instants of time at different points. The ordinary way of trans¬ ferring time from a point A to a point B is by moving a clock from the one point to the other. If the clock is subject to the Fitzgerald contraction, however, its parts will change length when in motion. This may change the period of vibration, and so the time determined at B will depend on the speed which the clock is moved and the path along which it is moved from A to B. Any other mechanism (velocity of chemical action, for example), may be similarly affected. If we

attempt to transfer time by means of light or electromagnetic signals, . since the absolute distance between points is unknown, we cannot determine the interval required for the signal to pass from A to B and, even if the distance were known, the time of passage would seem to depend on the absolute velocities of A and B.

Einstein's Relativity of Time and Space. — In 1905 A. Einstein took up the question as to what might properly be understood by time and space. He assumed a system of points at rest with respect to each other and with re¬ spect to a system of co-ordinate axes. This means merely that an observer attached to the system and measuring distances with a scale finds no evidence of motion. He further as¬ sumes a system of clocks attached to the points on which time can be measured. It is necessary first to synchronize the clocks, i.e., determine simultaneous instants of time at the different points. To do this a ray of light starts from a point A, goes to a point B, and is there re¬ flected back to A. Let ta, ta' be the times on

the /I-clock when it starts and when it returns, and tb the time on the -clock when it is re¬ flected. If

tb — ta = ta' — tb , (2)

the clocks at A and B are said to be synchron¬ ous. This definition merely expresses that the time required for light to go from A to B equals the time required to return. This is a case of the principle of relativity. For if a means of measuring time existed such that the absolute motion of the system made these inter¬ vals different, it could be used to detect abso¬ lute motion.

In referring to the time of an event it is always understood that the time is measured on the clock at the point where the event occurs.

Let S' be a second set of points at rest with respect to each other but appearing to the inhabitants of S to move with velocity V. The same events may be observed by the inhabitants of S and S', each measuring time with his own clocks and distance with his own meter stick. Einstein's first fundamental problem was to determine the relation between the distances and times thus obtained. To do this he made two assumptions which are generally called the first and second postulates of relativity.

I. The Principle of Relativity. — The laws of physical phenomena are the same whether stated in terms of one system of co-ordinates or

another moving with constant velocity with respect to it.

II. The Principle of Constant Light-Velocity. — The velocity of light is a constant independ¬ ent of its source and of the system with re¬ spect to which it is measured.

The principle of relativity as here stated is equivalent to the impossibility of defining ab¬ solute motion. For, if there were any law that differed at different velocities of the reference system, that law could be used to distinguish such differences of absolute velocity, and, con¬ versely, such differences could only be detected by observing some phenomenon which changed with the velocity.

That the velocity of light is independent of the observer is a special case of the principle of relativity. That it is independent of the source is a physical assumption for which there is considerable independent evidence. For ex¬ ample, if the velocity of light changed with the velocity of the source, the total change in the time of passage of light from some of the fixed stars would be so great that the star would be seen in two different points of its orbit at the same time.

Let OX, OY, OZ be a system of rectangular axes in S, the X-axis pointing in the direction of motion. Let O'X', O'Y', O' Z' be a similar set of axes in S', the two origins coinciding when

$$t = t' — 0$$

Let t be the time and x, y, z, the co-ordinates of a point when the inhabitants of S see an event occur. Let t' be the time and x', y', z the co-or¬ dinates of the point where the inhabitants of S' locate the same event. We shall now determine the equations connecting x, y, z, t and y' , z , t'.

These equations must be linear. For a free particle appears to both observers to move in a straight line with constant velocity. Hence a first degree equation should transform into a first degree equation. Since each particle of

.S’ moves parallel to OX with velocity V, the equations have the form

x’ — (h (x — vt) + a2y + a*z, y’ = bi (x — vt) + b2y + b3z, zf ~ Ci (x — vt) + c2y + Czz, t’ — di x 4* d2y + d3z + d*t.

The first three equations show that the points y = 0 lie in a fixed plane of S’. Similarly, the points £ = 0 lie in a fixed plane of S’. These may be taken as the planes yf — 0 and z = 0, respectively. By symmetry these planes in S’ will be perpendicular, for there is no reason why one of the angles they determine should be greater than the other. In the same way the points x — vt=k, when k is constant, lie in a fixed plane of S’ perpendicular to O’X’. Hence the equations reduce to the form

x’ = p(x — vt), y’ = ly, z’ = mz\ /,\

tr = diX -f-dˆy -j-d3z -{- d\t. J

A particle starting from the origin at t — 0 and moving with respect to 5* with the velocity c of light has co-ordinates satisfying the equa¬ tion

** + y2 d-s2 ■= c2t\ (4)

By Einstein’s second postulate, the same par¬ ticle moves with velocity c with respect to S’. Hence (4) must have as consequence

xft d-y‘2 d-s‘2 = c2x‘2.

By substituting the values from (3) and com¬ paring with (4) we get

P2v = — c2 d\ d\, di = d3 = 0,

p = m2 — B2 — c2dd = -9 [c2d42 — M.

cl

Solving these equations and substituting in (3), we get

x’ = PCx—vt),y’ = ly, z’ = lzyt’ = P (t — , (5) where

Solving for x, y, z, t , we get x = P{x’ d-vt’), y’ = j-y’, z’ = y z’ , (6)

If these are to have the same form as (5), except for the change in the sign of Pv, we must have

/= 1.

Hence, finally,

=» P(x — vt), y’ = y, z’ = z, t’ = p (t .(7)

These are known as the Lorentz transforma¬ tions because Lorentz first obtained similar formulas in his work on electromagnetic theory.

Consequences of Einstein’s Theory. — The

equations

y' ˆy, z' =z,

show that distances in a moving system per¬ pendicular to the direction of motion are the same whether measured by an observer mov¬ ing with the system or one at rest.

Let Xi, X2' be the co-ordinates of two fixed points in S' in a line parallel to the direction of motion. Then

Xi = P(x i — vt), Xi' = P(x 2 — vt).

The distance between these points appears to the observer in .S to be

A body moving with velocity v thus appears to an observer at rest to be reduced in the di¬ rection of motion in the ratio.

A sphere in motion appears to an observer at rest to be an ellipsoid. This is the Fitzgerald contraction used to explain the Michelson-Morley experiment.

From (7) we get

>->(<■+%)■

If ti and U are measured at the same point of

whence

- </ = ±(k - (l)= yj 1 tt(h _ h).

Intervals of time on a moving clock are thus less than the corresponding intervals indicated

by fixed clocks in the ratio

This

is independent of the direction of motion. If then the particle moves around a closed path and returns to its starting point, the time elapsed will be less on the moving clock than on fixed ones. In particular, if the clock moves with the velocity of light, v— c and t‘2— t’ i. In a system moving with the velocity of light, time is thus constant.

Differentiating (7), we get

dx

dx’ _ dxˆ dt _ Sdt V

dt dt dt v ■

1 ~ Pdt

Similarly,

dy =

dt’

dy

~dt

v dx} c 2 dt

dt’

dz

dt

v dx c2 dt

If then the velocity of a particle has com¬ ponents ux, Uy, Uz with respect to .5 and uxl, Uyl, Uzl with respect to S1,

Ux

vux

c2

Uy

Uy

j _ VUx

Uz =

Ui

j _ VUx

• (8)

These formulas give the result of subtracting a velocity with components v, o, o from one with components ux, uy, Uz. The result is not obtained as in ordinary mechanics by merely sub¬ tracting corresponding components.

In relativity mechanics the mass of a par¬ ticle is not constant but depends on its velocity. The mass is determined by assuming that the mutual actions of a system of particles do not change the total momentum with respect to a given system. Suppose m0 is the mass of a ball at rest and m its mass when moving with velocity v. Take two identical balls, one at¬ tached to a system S, considered at rest, the

other attached to a system S’ moving with velocity v. Through a collision of the two balls, let the one in S’ be deflected with velocity u along the y’-axis. Its velocity parallel to the y-axis in .S’ will be

u

P ‘

Also, by the principal of relativity the ball in 5” will have the velocity — u along the y-axis. Since neither ball had any velocity along that axis before collision, the conservation of mo¬ mentum requires

whence

mu

— — muu =

U

0,

m = Pm0

mQ

U-t

\

(9)

The force acting on a particle is defined as the rate of change of momentum

F = ±(mv),

where m is the mass and v the velocity, all quantities being measured by the same observer. The work done by this force in moving the particle a distance ds is

ds

Fds = — d(mv) = vd(mv) . at

Using the above value of m, this reduces to

Fds = c2dm.

The result is the increase in the kinetic energy of the particle. Hence the increase in kinetic energy is equal to the increase in its mass multiplied by the square of the velocity of light. If now the body comes to rest, this in¬ crease in mass will be transmitted to other bodies as energy. It is then reasonable to as¬ sume that mass and energy are merely different aspects of the same entity. In ergs of energy, one gram of mass is equivalent to

c2 = (3 X 10l0)2 = 9 X 1020, approximately.

Similarly, an amount of energy E has the mass

i _ <10)

This means that energy has inertia just like ordinary mass.

Mass and energy cannot be treated sep¬ arately. If we make a division of the total into material mass M and energy E, the laws of conservation of mass and energy in an isolated system are expressed by the equivalent equations

M + ~ E — const., E + c*M = const. c2

Four-Dimensional Geometry of Minkow¬ ski. — ■ An event occurs at a point x, y, z and at a time t. Minkowski considered the four vari¬ ables as the co-ordinates of a point in a space of four dimensions. The motion of a particle is represented by a line in that space. In his first paper Minkowski used as co-ordinate along

the time axis ct\/ — 1. In a later paper of Minkowski and in most of the papers of more recent writers the co-ordinate along that axis is ct. The four co-ordinates are then Xi = x, X2 = y, x3 = z, X4 = ct.

The Lorentz transformations appear as the changes of variable from one set of co-ordinate axes in the four-dimensional space to another. The values of x, y, z, ct obtained by observers moving with different

velocities are merely the co-ordinates of the same point in four dimen¬ sions referred to different axes.

The principle of relativity requires that when stated in this four-dimensional form, physical laws must be independent of the axes used. That is, the laws of physics must be expres¬ sible by equations invariant in the space of Minkowski.

Take two points Xi, yi, Zi, eti, and x-i, y2 z2, ct2 in the four-dimensional space. The quantity

s= V c20> — U)2 — (x2 — *i)2 — (y2 — yO2 — (22 — zi)2

mav be considered as a sort of distance between the points. By applying the Lorentz trans¬ formations it is easily shown to be independent of the reference system. In particular, if the two points represent consecutive positions of a moving particle

ds= V c2dt2 — dx2 — dy 2 — dz2 = cdt 1 —

where u is the ordinary velocity of the particle.

The various positions of a moving particle are represented by a curve in the four-dimen¬ sional space. Any kinematical property of the motion is represented by a geometrical property of the curve. If r is the vector from a fixed origin to any point of the curve,

dr

is a vector of unit length tangent to the curve at that point. If mo is the rest mass of the particle nuw is called its extended momentum. It can be written

mu

m0w — - —

c

+ mk 4,

where u is the vector representing ordinary velocity and k 4 is a unit vector along the time axis. Since mu is the momentum of the particle and m its energy or mass, the laws of conserva¬ tion of momentum and of mass or energy of an isolated system are all expressed by the one equation

2m0 w = const.

In all the interactions of a system of particles, the total extended momentum is thus constant.

To give any adequate conception of the form in which Minkowski represented the equations of electromagnetic theory, it would be necessary to use a considerable amount of four-dimen¬ sional vector-analysis. It is sufficient to say that there exists a four-dimensional two-vector (analogous to a directed section of a plane) M resolvable into a sum of two parts

M = H + E,

where H lies in the three-dimensional space and E passes through the time axis. The magnetic intensity is a vector in the observor's space perpendicular to H and the electric intensity a vector along the line in which E intersects that space. The various values of magnetic and electric intensity as seen by observers mov¬ ing with different velocities are obtained by referring this ■same^ two-vector M to different sets of four-dimensional co-ordinate axes.

To an observer moving with a given velocity,

spatial forms can be represented in three di¬ mensions. To an observer moving with a slightly different velocity, there appears a slightly different space. Since the practicable range of velocity is so small, we can to a high degree of approximation consider these spaces the same. If we could experience all velocities up to that of light, the ensemble of all such spaces would be the four-dimensional space of Minkowski. If the principle of relativity is correct, this four-dimensional universe has as great reality as the three-dimensional one con¬ sciousness presents to us, but as yet our ex¬ periences have been limited to only a thin sec¬ tion of it.

H. B. Phillips,

Professor of Mathematics, Massachusetts Insti¬ tute of Technology, Cambridge, Mass.

RELAY. See Electrical Terms.

RELEASE, in law, is the name given to a common-law conveyance, in which the word ((release® is the operative verb. A release operates in five modes: (1) By passing an estate, as when a joint-tenant or coparcener conveys his estate to his cojoint-tenant or coparcener; (2) by transferring a right, as when a disseizee (a person who has been unlawfully dispossessed) discharges his right to the disseizor; (3) by extinguishment, as the lord releasing his seignorial rights to his tenant; (4) by enlarging a particular estate into an estate commensurate with that of the person releasing; (5) by entry and feoffment, as a disseizee releasing to one of two disseizors, which is equivalent to entry on the property and enfeoffment after putting an end to the disseizin. Blackstone says ((Com¬ mentaries, } book II and chap. 20) : ((Releases are a discharge or conveyance of a man's right in lands or tenements to another that hath some former estate in possession.® In simple language a release is the discharge of a right, by an instrument in writing, by which estates, rights, titles, entries, actions and other things are extinguished and discharged; and, in gen¬ eral, the term signifies a person's surrender of the right or action he has, or claims to have, against another or his lands.

RELIANCE. An American yacht. See Yachts and Yachting.

RELICS, the mortal remains of departed saints; also, objects associated in memory with them, such as articles they used in life — clothes, vestments, the pectoral cross or the pastoral staff of a holy bishop, or the like: similar re¬ minders of the life and death of Jesus Christ are also relics ; and the religious venera¬ tion of all such relics when they

are duly au¬ thenticated is expressly approved by the Catholic Church. The Council of Trent in Sec. xxv of its Acts and Decrees regarding invocation of saints condemns those who hold that Generation and honor is not due to relics of saints® ; but all the Protestant churches teach that veneration of relics, or relic worship, is a sin of the nature of idolatry. In favor of the Catholic doctrine is cited the teaching of the early Fathers, who find both in the Hebrew Scriptures and in the New Testament the high¬ est sanction for the veneration of relics, for ex¬ ample, the incident of the coming to life again of a corpse on contact with the bones of the orophet Eliseus (Elisha: 2 Kings xiii, 21);

and that recounted in Acts xix, 12 (compare v, 15), of sick persons being healed with (<handkerchiefs or aprons® that had touched the living body of Saint Paul : <(there is a power,® says Saint Cyril of Jerusalem (Catecheses xviii) <(latent even in the bodies of the just.® And the practice of the faithful in the first ages of the Church is fully consonant with this belief in the physical and spiritual efficacy of relics. The early Christians were careful to save the remains of martyrs from desecration. In the year 107 the bones of Saint Ignatius, bishop of Antioch, were gathered and wrapped in fine linen, to be guarded thereafter (<as a priceless treasure left to the Holy Church.® In the year 167 the faithful of Smyrna exhumed the re¬ mains of their bishop, Saint Polycarp, who had been burned alive 10 years before under Marcus Aurelius and treasured them as ((more precious than costly stones and more valuable than gold.® When Saint Cyprian, bishop of Carthage, was about to be decapitated (258 A.D.), the Chris¬ tians cast towels and napkins before him that they might be soaked in his blood. After the persecutions were over, the practice of ven¬ eration of sacred relics persisted in the Church, as is testified by the writings of Saint Ambrose, Saint Augustine, Saint Jerome and indeed by all the Fathers of the 4th and 5th centuries. In all ages there have been abuses connected with the practice. A canon of the Fourth Coun¬ cil of Lateran in the year 1215 forbade relics to be sold or to be exposed outside of their cases or shrines and prohibited the veneration of new relics till their authenticity had been approved by the Pope : and these laws are confirmed in decrees of the Council of Trent. The venera¬ tion of relics has attained its maximum in the Roman Church and there, according to Addis and Arnold ((Catholic Dictionary5) , these articles comprise the ((bodies, or fragments of the bodies of departed Saints : articles, or por¬ tions of articles, which they have used; the holy nails, lance, spear, or fragments of the True Cross; and the girdle, veil, etc., of the Blessed Virgin.® In the Roman Breviary there are special offices for the Most Holy Relics (to be said on the fourth or last Sunday in October), for the Crown of Thorns, the Lance and Nails, *etc.*

RELIEF, in old English law, a fine or composition paid by the heir of a tenant, hold¬ ing by knight's service or other tenure, to the lord on the death of the ancestor for the priv¬ ilege of succeeding to the estate, which by strict feudal law had lapsed or fallen to the lord on the death of the tenant.

In physical geography, the undulations or surface elevations of a

country.

In painting, the appearance of projection and solidity in represented objects, so as to cause them to appear precisely as they are found in nature.

In sculpture and architecture, the prominence of a figure from the plane surface to which it is attached; according to the degree of prom¬ inence, it is known as alto-relievo or high relief, mezzo-or demi-relief and bas-or low-relief.

In ordinary language, release from a post or duty by a substitute, who may act either per¬ manently or temporarily; specifically, the re¬ lease of a sentry from his post, which is taken by another soldier, also the person who thus relieves or takes the place, of another.

RELIEF SCULPTURE. See Sculpture.

RELIGIO MEDICI was the first of Sir Thomas Browne's books and has always been the one most generally read. It was first printed in an unauthorized edition in 1642, followed in the next year by an edition under Browne's own supervision. The book was the fruit of much reading and much quiet observation and reflection, but is not Browne's most characteris¬ tic work. Enthusiasts are more likely to turn to his (Pseudodoxia Epidemica or Enquiries into very many received Tenets and commonly pre¬ sumed Truths) (1646) or to his (HydriotaphiaUrneburialP (1658) as giving with fullest body the peculiar flavor of Browne's somewhat whimsical personality and as exemplifying that sombre magnificence of style in rhythm and phrasing, not unworthy to be compared with Milton's at their best, which is the special virtue of Browne's most admirable prose. The preference of the general reader for (Religio Medici > is largely due to its theme and to Browne's highly characteristic attitude toward this theme. The religion of a physician, to translate Browne's title literally, is an arrest¬ ing topic. It is always interesting when a man who has been deeply concerned with the facts of the natural world abandons

himself to speculation on the supernatural possibilities of human existence. Browne's interest in this subject is almost purely speculative. He lived in an age of controversy and at a time when dogmatic opinion flourished, but he acknowl¬ edged himself unsuited to follow the con¬ troversial method1 and unable to condemn categorically opinions which he could not share. If one sought for it, so he thought, one would find some good in everything. His habit of mind was to steer a middle course between credulity and scepticism, with a strong leaning toward the latter. But nobody so charitable to¬ ward strange views as the sceptic turned loose in the field of speculation, and in reading Browne, one is continually being caught up by his defense of such opinions as the belief in witchcraft, by his apparent desire to put faith in the existence of ˆchangelings® (though he will not go so far as to say that a man can be ((despeciated® into a horse), or by his oc¬ casional defense of ecclesiastical practices which in his day the normal Protestant (and Browne asserted that the only thing he disliked about Protestantism was the name) would never have thought of defending. In short, Browne loved to sport in paradox and intellectual hyperbole, habits of mind often annoying to the literal¬ minded reader. Beneath these eccentricities, however, there lay a solid foundation of character and belief, an open-mindedness and readiness to see the best in everything, which make of him a better proponent of his views than an orthodox dogmatist, or a bitter iconoclast could have been.

George Philip Krapp.

RELIGION has been variously defined ac¬ cording to a multitude of epistemological and ethical systems. The pantheist Hegel takes it to be <(the knowledge acquired by the finite spirit of its essence as Absolute Spirit.® Kant makes duty to follow his categoric imperative of the practical reason ; and religion to be <(the recognition of all our duties as divine commands.® Huxley defines religion as ((rev¬

erence and love for the ethical ideal, and the desire to realise that ideal in life.® According to Max Muller, religion is <(the perception of the infinite.® Schleiermacher says, it is (<a de¬ termination of man's feeling of absolute de¬ pendence.® Matthew Arnold, the apostle of sweetness and light, finds that religion is <(morality touched by emotion.® The latest definition is that of Reinach, <Orpheus) (1909) : <(Religion is a collection of scruples that are a stumbling-block to the free exercise of our faculties.®

Waiving these definitions, based upon false philosophical systems, one may begin by con¬ ceiving a man's religion as his Godwardness. Cicero, (De Natura Deorump II, xxviii, derives religio from re-leg ere, to recollect, to recall to mind, to reflect. Lactantius, Hnstitutiones Divinae,* IV, xxviii, throws over this deriva¬ tion, and traces religio back to re-ligare, to bind again. This etymology is commonly ac¬ cepted. Man is bound to God as creature to Creator; by religion he renews this bond, when¬ soever in word or deed he acknowledges a de¬ pendence upon God. Religion, then, in its essence, is generically a practical acknowledg¬ ment of man's dependence upon a Supreme Power that is beyond control. This article will treat: first, revealed religion as it is ac¬ cepted by those who believe in the supernatural revelation of God to man; second, natural re¬ ligion, as it is found among those who admit not that supernatural revelation.

I. Revealed Religion. — They who believe in God's revelation of Himself to the human race as the basis of religion do not deny that man's acknowledgment of dependence upon God is postulated by the very nature of the universe ; to this form of natural religion they superadd the obligation of worship consequent upon rev¬ elation. <(What is known of God is clear® even to the heathen. For, <(ever since the creation of the world, the unseen truths about God, — His everlasting power and divinity, — are to be reasoned out and seen by His works® (Romans i, 19-20). And yet <(God, who of old, at many times and in many places, spoke to our ancestors by the prophets, hath in these latter days spoken to us by a Son® (Hebrews i : 1 —2) . This communication of truth by God to the human race through the prophets and the Son is the basic fact of revealed religion.

1. Possibility of Revelation. — Subjective idealists and Kantians deny the possibility of revelation; for, in their systems of philosophy, knowledge has no objective validity, and there can be no certainty that God speaks to man. The adherents to revealed religion believe in a Personal Deity, Creator of man. Since this Creator has bestowed upon man the faculty of communicating his ideas with fellow-men, He undoubtedly may in like manner communicate with us. The deist errs in assigning to God such transcendence as to preclude the possibil¬ ity of revelation. For the infinity of God in¬ cludes omnipresence; and His omnipotence demands that He may communicate with His creature wherever He is. Such communica¬ tion is not opposed to the divine wisdom. For the authority of God revealing gives to man greater certainty of religious and moral truth than does the authority of reason unaided by revelation. Moreover, fallen human nature, tainted by original sin, has tendencies to evil

that arc consequent upon concupiscence. God, in His wisdom, meets this fallen condition by the manifold graces of revealed religion. Nor has human reason any such Kantian autonomy as to preclude the possibility of God's revela¬ tion to man. For the soul that reasons is created by God. But God is a Person, and every person acts with a purpose. Therefore, God created the reasoning soul with a purpose. But in this divine purpose, God may intend a supernatural end, and may reveal this end to man; and man's reason has no right to reject the revelation. Hence neither the wisdom of God nor the Kantian autonomy of reason pre¬ cludes the possibility of supernatural revela¬ tion to the human race.

2. Knowability of Revelation. — Granted the possibility of revelation, how can man be certain of the fact that God has spoken? Time-honored criteria are given, by which one may be at least morally certain that in revealed religion God has entrusted truths of faith and morals to the human race. These criteria are miracles, prophecies fulfilled, the heavenliness both of the truth communicated and of the ef¬ fects of that communication in the souls of men. No prudent man has any right to deny that a code of faith and morals is revealed religion, if that code does not contradict right reason, instills the practice of virtue even in an heroic degree, effects lives of virtue among men in every clime and down through many centuries, has been given to the world by one who claimed to have received it from God and made good his claim by miracles and by true prophecies, and has been handed down to the world by a never-failing body of teachers instituted by the founder as a part of his revealed religion.

3. Fact of Revelation. — The Old Testa¬ ment is clear witness to the fact of God's com¬ munication with the human race. Such com¬ munication is frankly admitted, and logically defended, by those who accept this collection of sacred books as God's own word. The Old Testament is an history of the human race from its inception, and of God's revelation of Him¬ self to that race. This history is not chronology nor critical work, but fact-narrative in primi¬ tive and popular form. It begins as a primitive tradition, and gradually

approaches nearer and nearer to the form of popular history. Herein are taught the beginnings of revealed religion by God's messages to Adam ; the evolution thereof by the Messianic prophecies to Abraham, Isaac and Jacob; the still further development of true religion by frequent revelations to Moses ; the carrying on of these revelations through the prophets of Israel and Judah. Herein also the miracles of the Exodus, and the theocratic rule of Jahweh over the flock of his pasture are clearly attested. One has to deny the divine authority of these books, if one admit not the fact of revelation in the Old Law.

The New Testament is replete with just such proofs of God's revelation to the human race in His Son.

First, Jesus made claim to a divine ambas¬ sador. According to the witness of John alone, the claim was made 32 times. _ This divine ambassador again and again insisted1; "My teaching is not mine, but His who sent me® (John vii, 16) ; "As the Father hath sent me, so I send you® (John xx, 21).

Secondly, Jesus appealed to His Future res¬ urrection in proof of the truth of His claim, that He was the ambassador of God the Father, and that He had from God the Father a message for the world. Witness the sign of Jonas: "Just as Jonas was in the belly of the sea-monster three days and three nights, so shall the Son of Man be in the earth three days and three nights® (Matthew xii, 39-41). Witness the sign of the Temple: " (Destroy this temple, and in three days I will raise it upj … He was speaking of the temple of His body® (John ii, 18-22). Witness the re¬ peated and detailed prophecy of the oncoming death and resurrection of Jesus: "He shall be delivered to the Gentiles ; and shall be mocked, and scourged, and spat upon. And after they shall have scourged Him, they shall kill Him. And the third day He shall rise again.® This prophecy is given three times by Mark (viii, 31 ; ix, 11-13 and 30; x, 33-34), three times by Matthew (xvi, 21; xvii, 12 and 22-23; xx, 18-19), and twice by Luke (ix, 22; xviii, 31-34). There can be no doubt about the fact. Jesus clearly appealed to His future resurrection in proof of the truth of His claim that He had from the Father a message for the world.

Thirdly, Jesus arose from the dead to ful¬ fil His prophecy in proof of the truth of His claim to the divine ambassadorship, to the message from the Father, to the right to give that message to the world. This clear fact is denied only by those who start by throwing out of court miracles, prophecies and all the super¬ natural elements of religion.

Lastly, Jesus consigned to a teaching body the very same message which He had from God the Father, and conveyed to that teach¬ ing body the right to have and to hold and to hand down that message to the world. 1. Just before His ascension, He appeared to the 11 apostles in Galilee and said to them: “All power hath been given me in heaven and upon earth. Therefore > go ye, make dis¬ ciples of all nations, baptise them in the name of the Father and of the Son and of the Holy Ghost, teach them to observe all things what¬ soever I have commanded you. And, lo, I am with you all days, even to the end of the world® (Matthew xxviii, 18-20). 2. On the

very point of ascending into heaven from Mount Olivet, Jesus once again gave this solemn message to the same body of teachers : “Go ye to all the world, preach the Gospel to all creation. He that believeth and is baptised, shall be saved. He that believeth not, shall be damned® (Mark xvi, 15-16).

Such is a brief outline of the possibility, knowability and fact of revelation, — the all-important elements of revealed religion of the Old Testament and the New.

Bibliography. — Ottiger, (Theologia Funda¬ mentalˆ (1897) ; De Broglie, (Religion et Critique) (1906) ; Hettinger, (Revealed Re¬ ligion, } Eng. trans. (1895) ; Drum, (Divinity of Christ* (1918) ; Schmidt, (La revelation primitive) (1914).

II. Natural Religion. — Under this heading will be treated religion as it is found in the history of peoples who have not accepted the Bible, the inspired Word of God to the human race. These various forms of religious belief are all degenerations from primitive revelation. In some is found the pantheistic tendency of

identifying subject and object; most are theistic in separating the worshipper from the object worshipped. These theistic cults are at times monotheistic, though generally polytheistic. Monotheism is the worship of one Supreme Power. Polytheism is the worship of many gods. In polytheistic religions, the Supreme Power is found to have degenerated into an obscure form, which faintly preserves the unity and supremacy of the All Father of monothe¬ ism. Sometimes the relic of the Supreme Power of primitive revelation may be marked in what Max Muller calls henotheism, the sin¬ gling out of a particular god for a seemingly monotheistic reverence. By such henotheistic praises, Sumerian hymns extol Marduk and Sin with the attributes usually assigned to vari¬ ous other deities. A second obscure form of the Supreme Power is the chief of the gods, the Prytanis or president of the assembly of immortals, as Zeus in Homeric theogony; or, again, the dimmed Power called Fate, which in Greek classic tragedy controls both gods and men. Finally the Supreme Power, in the Upan-ishads of India, has been vaporized into an all-pervading, pantheistic Spirit. Modern pan¬ theism has evolved this all-pervading Spirit into a completely evaporated, ethereal and gen¬ erally impersonal Being, — the Absolute, which is all that is, and apart from which is naught that is.

Rationalistic historians of religion assume that all these various forms of monotheism, henotheism, polytheism, pantheism, are an evo¬ lution of the consciousness or emotion of man that has been due to sociological or other en¬ vironment. They deny that the Personal Deity has revealed Himself to man ; scout the very idea that all forms of pagan cults are mere degenerations from primitive revelation ; and try to explain as purely natural the worship of a Supreme Power which must be admitted to be universal, be it never so obscured and vapor¬ ized.

1. Theories of the Origin of Religion.—

The chief theories, whereby rationalists strive to explain the empirical fact of an universal cult of a Supreme Power, are animism, totemism and magic. These theories all start from a false assumption. It is assumed that the present state of civilization and religion has resulted from evolution. Primitive man was a brutish cave dweller; and from a neolithic state he has been evolved into that of culture. The religion of

cultured man is in like manner an evolution from primitive forms. Hence the lower its civilization the nearer is a race to primitive religion. One must study religion as it is in savage peoples in order to come near to the primitive religion of mankind. All this is groundless assumption and progressive asser¬ tion. Fiction is proposed as fact; emphasis takes the place of logical reasoning.

The Biblical narrative of the creation of man with at least a normal intellectual equipment, and of the descent of the human race from the created pair, is the only authoritative witness we have about primitive man, and stands the test of all argument based upon whatsoever facts the spade has upturned and literature has preserved. There is absolutely no proof that a prehistoric, neolithic man ever existed. The Neanderthal man and other abnormalities of such sort have turned out to be nothing more

than mere degenerations. Profane history takes us back about 7,000 years, and no farther. Bible history takes us back farther, even to the beginning of the race, but not in the form of chronology. Early traditions, as handed down by Genesis, are not chronological history; but only a popular narrative of the story of man and of God's revelation of Him¬ self to man. How long intervened between the creation of man and the beginning of pro¬ fane history we have no idea. Thousands of years may be allowed for the evolution of the linguistic, sociological and ethnological differ¬ ences that separated the races at the time pro¬ fane history begins. The process of this evo¬ lution is enwrapped in mystery. We can only argue from the facts to hand.

Chinese pictographs of the dynasty of Shang, second millenium B.C., show the Mongolian characteristics of to-day, — almond-shaped eyes, almost beardless faces and straight hair ; while contemporaneous Egyptian hieroglyphic writing is evidence of the modern Western facial traits. A horizontal straight line may be drawn through the eyes that serve as ideographic signs in the West; whereas, in the Far East, such a line is broken into an angle. The inscriptions and carvings on Egyptian temples show that, during the reign of Rameses II, before the Exodus, c. b.c. 1250, the negro, the Semite, the Hittite and the Egyptian were types as ethnologically sepa¬ rated from each other as the Iranian, Semitic and African types are distinct to-day. It is only guess-work to conjecture how long it took to evolve these characteristics which distin¬ guished the races ethnologically in the dim past.

Linguistics throws no more light upon the history of primitive man than does ethnology. So far back as language can be traced, no hint appears of the undoubtedly common original tongue spoken by men. In Mesopotamia, as early as b.c. 4500, the Sumerians spoke a lan¬ guage as much removed from that of their Babylonian conquerors as Hungarian diverges from modern Arabic. The word hand in Sumerian was katu, and the same root is found in Hungarian kase as well as in kindred words of the Lapps and the Finns. Compare with this Sumerian katu its contemporaneous Baby¬ lonian equivalent idu; follow this Semitic root for 7,000 years through Assyrian idu and iadu, Hebrew jad, Aramaic jada, Syriac ida, Arabic jad. The history of these two dissimilar roots, both meaning hand , is evidence of the linguistic evolution of peoples, but leaves us in utter dark¬ ness about the language of primitive man. Here is another linguistic fact that the present writer has discovered. The Gros Ventres say itti for woman, and enenya for man. It is strange that the science of language has not yet called attention to the Semitic origin of these forms. Compare the following Semitic words for wo¬ man : Hebrew, ishsha ; Aramaic, itta ; Syriac, attetha ; Assyrian, ishshatu ; and for man : He¬ brew, enosh ; Aramaic, enash ; Syriac, nasha ; Assyrian, nishu. There must have been Semitic influence in the history of the Gros Ventres. When? During the reign of Tai-tsong, a.d. 627-649, when Nestorian missionaries intro¬ duced Christianity into Mongolia from Persia? Or thousandˆ of years before the Christian era? We know not. This much we know, that the science of linguistics, which cannot explain modern facts of diversity and similarity of lan-RELIGION

guage, is helpless to solve the problem of the primitive civilization of the human race.

As comparative ethnology and linguistics fail to reach back to the primitive racial char¬ acteristics and language of man, so comparative history of religions can prove only two facts about man's primitive beliefs: 1, that no people has been found to be without some cult of a Supreme Power, into a relation of dependence upon which the individual members entered ; 2, that the manifold and multiform evolution of natural religion is due to a degeneration from the unity of revelation. It is a false start to assume that the savages of Africa, America and Australia are nearer to primitive religion than are

cultured races. There is no reason to think that, for thousands of years, savages have been linguistically, sociologically and the-istically at a standstill ; and that they bring us back to primitive conditions wherefrom our more civilized races are evolved. Human na¬ ture abhors such a standstill ; it either pro¬ gresses or degenerates, and that most of all in its practice of religious worship. Sometimes this degeneration is in both culture and reli¬ gion ; at other times it is in religion alone. Instances of degeneration in both culture and religion may be found in out of the way places of the United States. The (<Pinies® of the neighborhood of Mount Holly, N. J., are said to belong racially to the same stock as the colonial element of Philadelphia; and yet, because of inbreeding and isolation, they have degenerated to the mentality of children and have lost hold of some of the fundamental principles of morality. Instances of degenera¬ tion from revealed religion alongside of ad¬ vance in culture are provided by Leuba, (The Belief in God and Immortality > (1916). His figures show that, among the <(greater men of science® of the United States, belief in a Per¬ sonal Deity, — that is, worship of a Supreme Personal Power, — is had by only 34 per cent of the physicists, 16 per cent of the biologists, 32 per cent of the historians, 19 per cent of the sociologists and 13 per cent of the psycholo¬ gists. It were just as reasonable to study the religious ideas of these cultured atheists, as to examine into the taboos of savage peoples, in the effort to reach back to the origin of reli¬ gion in the human race.

2. Animism. — What has been said in the preceding section applies in general to the rationalistic theories on the origin of natural religion. The three chief theories of to-day will now be more specifically set forth. Ani¬ mism is the name given by E. B. Tylor, (Primi¬ tive Culture* (1903), to the faith of primitive man. His theory is pretty much the same as the (fGhost Theory® of Herbert Spencer, Prin¬ ciples of Sociology* (1882); it finds the origin of religion in the tendency to endow material objects with living souls, reason, will and the passions. Just as the child whips a door for naughtily jamming its finger, so primitive man took inanimate things as possessed by souls. It is not clear that the child is not taught to vent its hurt feelings thus foolishly; nor does history prove that the prehistoric savage, whom nobody ever saw, had a child's mental equip¬ ment. Still Mr. Tylor is not proving anything. , He is theorizing by the process of progressive assertion. We proceed. Primitive man specu¬ lated on the differences between a living body

and a dead one, a man asleep and awake, the human forms seen in

time of waking and of dreaming. He concluded that man had a ((ghost soul,® which left him in sleep for a tim,e and in death forever; and that this <(ghost soul® appeared to others in their dreams. The in¬ genious, prehistorical psychologist then spec¬ ulated on his shadow. It followed him every¬ where ; was an inseparable companion in hours of consciousness, a very self and yet another self; and thus came to be thought of as an immortal shade. To this ((apparitional soul,® which could take a vacation from the body for a time or forever, physical powers were in due season assigned. At times so great were these powers that the <(ghost souls® of certain dead men became gods ; in this wise ancestor-worship came into being. Later evolutions resulted from this primitive notion of wandering, separate souls. The next step of the clever, neolithic savage was to evolve souls that never existed in human beings. Everything became animated. In child-life, (<chairs, sticks and wooden horses are actuated by the same sort of personal will as nurses and children and kittens. In such matters the savage mind well represents the childish stage® (Tylor, op. cit. I, 285). Since these (<ghost souls® were out of the ordinary and superhuman, the savage felt their power, invoked their aid, feared their wrath, propitiated them with offerings and finally deified them. It is all very simple to those that have the credulity to swallow Mr. Tylor's dose without making a wry face at the gratuitousness of his whole collection of as¬ sumptions. Against the animistic theory is the fact that ancestor-worship is not an important factor in the religion of many savages. More¬ over, among tribes that worship dead heroes, there is at times found a nature-worship with which no trumped-up ((ghost soul® may be as¬ sociated. The pygmies of the Kongo, probably one of the lowest of extant races, worship a Supreme Being and not their dead heroes. And the studies of Andrew Lang, (The Making of Religion) (1909) have led him to hold the (<hypothesis of an early Supreme Being among savages, obscured later by ancestor-worship and ghost-gods, but not often absolutely lost to religious tradition® (p. 289).

3. Totemism. — The existence of totemism is undeniable; it is a relation of dependence that a people enter into with a totem — an ani¬ mate object or the inanimate representation thereof. Traces of totemism are found all the world over. Objects of totemic cult, or totems , were: in ancient Egypt, the bull Apis (sacred to Ptah), the ape (embodiment of Thoth), the cow (sacred to Hathor), the cat (sacred to Bu-bastis) ; in India, the sacred cow; among the Canaanites, the stone phallus (sacred to Baal), and the wooden kteis-pole of Ashera; the Iroquois turtle, the Omaha maize, and so on. Akin to totemism is the worship of a fetish (Portuguese feitiqo, Artificial®) , — a charm

trinket, idol, a child's hand, a claw, a tooth or any such object. It is arbitrary and unscientific to argue from these degenerations to the re¬ ligion of primitive man. The primitive, mono¬ theistic acknowledgment of dependence upon a Supreme Power has in all these cases been de¬ teriorated into the senseless relationship of de¬ pendence that ignorant people have entered into with sticks and stones and animals, just as

happens in West Indian voodooism and in the stupid superstition with which cultured folk of to-day pick up a pin, hang a horseshoe or study the lie of the leaves in a teacup.

One form of totemism or nature-worship which deserves special mention is cult of the heavenly bodies. The chief school in favor of astral cult as the origin of religion is the Pan-Babylonian. According to Friederich Delitzsch, Gunkel and Winckler, of Berlin, together with Jeremias of Leipzig and a host of university scholars in England and America, the origin of Greek, Roman, Old Testament, New Testament and countless other religions of cultured peoples must be sought in Babylo¬ nian solar, lunar and astral mythology, an evolution from the worship of the heavenly orbs. At first an attempt was made to set this theory upon an astronomical fact as a founda¬ tion. Winckler assumed that the Babylonians knew the precession of the equinoxes ; and upon this fiction built up an absurd hypothesis. Father Kugler, the Jesuit astronomer and As-syriologist, then came into the arena and showed that the whole explanation of Babylonian my¬ thological religion was established upon the Pan-Babylonian school's ignorance of Baby¬ lonian astronomy and astrology. Recourse was then had to far-fetched analogies between Bible facts and astral phenomena. Jacob had four wives and 12 sons; and so he becomes the moon-god with four phases and 12 lunar months. With equal assurance, the 12 Apos¬ tles are relegated to the realm of fiction as 12 lunar months of a moon-god.

4. Magic. — Tylor assumes an age of ani¬ mism that preceded religion. Frazer, J. G., (The Golden Bough5 (1911), postulates an age of magic that preceded animism. This pre-ani¬ mism was the conjuration of hidden forces. When such conjuration was found ineffective, petition of superhuman powers took its place. Marett, (The

Threshold of Religion) (1909), starts theorising from a life-force, called mana in Polynesia and Melanesia ; mana, conceived as impersonal, led to magic ; mana, conceived as personal, led to worship.

Bibliography. — The works above referred to, and Toy, introduction to the History of Religions) (1913) ; Schmidt, (L'origine de l'idee de Dieu5 0910) ; De la Saussaye, (Manual of the Science of Religion5 (1891) ; London Cath¬ olic Truth Society, (History of Religions5 (1910-11) ; Rogers, (Religion of Babylonia and Assyria5 (1908) ; Hoffding, 'Philosophy of Religion5 (1906) ; Galloway, (Philosophy of Religion5 (1914); Moore, (History of Reli¬ gions5 (1913) ; Jastrow, 'Study of Religion5 (1901); Hettinger, (Natural Religion5 (Eng. trans., 1890) ; Lang, (Myth, Ritual and Reli¬ gion5 (1899) and 'Magic and Religion5 (1902) ; Smith, W. Robertson, (Lectures on the Reli¬ gion of the Semites5 (1904) ; Goblet d'Alviella, Hibbert Lectures (1891) ; Drum, 'The Mythic Christ5 (American Ecclesiastical Review , May, September-December, 1915).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College,

Maryland.

RELIGION, Established, or STATE RE¬ LIGION, that form of religious belief and worship which is recognized by the government or constitution of a country as national and

which enjoys certain privileges and is supported by the public treasury or by tithes. The idea of complete separation of civil government and religious affairs is peculiar to modern times. In the ages before Christianity the administra¬ tion of religious affairs was. a function of the state and the priesthoods were orders in the state. After the triumph of Christianity the relations between church and state in the Roman Empire were intimate and the civil power freely intervened in the government of the Church, the prelates of the Church also were vested with extraordinary powers by the state. Throughout the Middle Ages the civil power was everywhere in the last resort the Church's armed right hand for the enforcement of uniformity in religion. For a long time after the Reformation the uni¬ formity of religious belief and ceremonial was held to be indispensable: in the present age, though in many countries state churches exist, controlled by public

authority and supported from the public purse, uniformity is no longer enforced by civil penalties and the subject is permitted to reject the state religion, to em¬ brace another religion or to ignore religion; but in some countries dissidents from the reli¬ gion of the state suffer certain civil disabilities. It is urged in favor of the national recognition of a form of religion, that if the majority of a nation are prevented from making this public recognition of it, as a matter of primary im¬ portance to the state's welfare, then they are subject to coercion by the minority; and if an established church uses no sort of coercion, its being supported by the state in the face of a protesting minority is no greater violation of equal rights than would be its disestablish¬ ment at the behest of the same minority.

RELIGION, Influence of the Great War upon. It is generally impossible to estimate the influence of a war until years after the declaration of peace. So many elements of good and of evil are set in motion by the call to arms that the resultant ultimate influence takes time to reveal itself. The process cannot be hurried. This is particularly the case in a world war including diverse nationalities. A struggle of that magnitude is apt to intensify human pas¬ sions and the selfish interests of the contending nations, who are likely to regard justice and humanity as of less consequence than success in battle and a point of advantage at the peace table. In such an atmosphere, however grandil¬ oquent the sentiments, there is obviously no op¬ portunity for religion to display its power — it must retire from the shuffle-board of the na¬ tions and continue a secondary factor in the world's parliament. Yet in the past it has cer¬ tainly been the direct or indirect cause of war — • there has been no century without its au¬ thorized representatives or interpreters inciting the nations to conflict for its greater glory or power. Religions of old failed admittedly to appreciate their opponent's point of view. When argument failed, the invariable recourse was to arms. Each was too full of its own divine right to admit the possibility that a rival creed might have its share of that same authority.

Now it is not to be denied that in the era of • the Crusades and in later ages, religion sought often to heal wounds made in its name and furnished illustrious examples of kindly and upright men and women identified with the

Church as teachers or workers in various fields who have enriched humanity. On the whole, however, when religion dominated the state, the religions in the customary ecclesiastical meaning of the term were too absorbed by worldly ambitions under specious masks of humility and piety to realize the divine possibili¬ ties at the root of their creeds. The countries were still in deep shadows, when Shakespeare — prolific in such anticipations — wrote that it is the heretic who makes the fire, not he who is burned by the fire. It took some centuries before religion began to advance out of the bogs and sandbanks. Not only the historic creeds, but smaller groups of religionists who forgot to exercise toward others the toleration they demanded for themselves, made religion so empty and delusive a phrase that a Madame Roland might well have exclaimed : ((Religion, what crimes are committed in thy name !®

It did not take many months after the Great War began for religion and the religious to show tremendous advance, as they arrayed themselves as partners and no longer as com¬ petitors, in the world-embracing task of solving vital problems and meeting conditions which had to be faced in every land, as well as on the battlefield and in the battle zone. The new alignment was peculiar to no clime or creed — it was observable everywhere, but perhaps seen at its best in the United States, which, always free from religious propaganda and debarred by its constitution from making religious tests of any kind, was to witness the most superb illustration of genuine religion on the part of all the creeds. In England, France, Italy, and possibly none the less truly among the Central Powers, the influence of religion made itself quickly felt in the organization of national and international agencies to relieve suffering, to restore, to rebuild, to uplift, to strengthen. The team-work among Catholic, Protestant and Jew was immediate and farreaching. It did not content itself with the giving of money in vast sums in the aggregate, but developed into the giving of self, into personal service unsur¬ passed in numbers and variety. From the train¬ ing camp to the battlefield, so diverse in their claims, thousands of men and women of differ¬ ent faiths were foremost as workers for hu¬ manity's sake, above creed and race and nation. Rarely, if ever, in the entire history of man¬ kind was so genuine a spirit of religion aroused. It did not call itself by such a name, but it was none the less a translation of religion into deeds that made for human happiness and hopefulness at an era when the greatest tragedy in history was being enacted.

In the United States, the Y. M. C. A., the Y. W. C. A., the Knights of Columbus, the Jewish Welfare Board, the Salvation Army, cooperated as brethren in a common cause. The Red Cross received its financial support and gathered its workers from all. No narrow sectarianism held sway. In the raising of war relief funds all were contributors without dis¬ tinction of creed. No hut or building, no can¬ teen or facility was selfishly kept for one or¬ ganization, but when necessary was placed freely at the disposal of the rest. Thus amid the horrors of war, which used to be intensified so as to aid the Almighty to punish the sinner and the heretic, the oldtime hatreds and disso¬ nances among the creeds were resistlessly swept

aside, the high walls of separation became merely lines and the feeling of comradeship and brotherly love was marvelously strengthened.

Many examples of the new birth of reli¬ gion are told from day to day from sources whose veracity cannot be questioned. In France, an observer, an official in service, writes how Catholic chaplains distributed Jewish prayer books to the Jewish soldiers. At a holy day service not far from the Belgian frontiers, the Y. M. C. A. gave its auditorium at general headquarters for Jewish worship. On a battle¬ field in Flanders, a rabbi, in the absence of a Catholic priest, held a cross before a dying French soldier and a few moments later the Israelite lost his life as a stray shell exploded. A prominent British official notes that when Sunday came it was no unusual thing to find a series of religious services of all creeds within the same hut back of the front. ((At 6:30 will be Communion Service by the Church of Eng¬ land; at 7 o'clock a Roman Catholic Mass; at

8 a Jewish Service, at 8:30 Presbyterian, at

9 the Free Churches, and at 10 the Episcopalian Service again.® As in the United States, in England, too, every British war service agency, bv whatever church, synagogue, chapel or meet¬ ing hall originated, joined hands in the com¬ mon cause. Such instances of cooperation of the creeds could be multiplied in gratifying numbers. As to the influence of war in check¬ ing racial prejudice, what better illustration can be furnished than the United States War Department's naming a camp after a negro soldier, Camp Alexander, at Newport News, Va. No less significant was the action of the Red Cross Canteen Committee of Chattanooga in distributing food and postal cards and writ¬ ing letters home for a regiment of negroes.

Now a critic might say: Are not these ex¬ amples due to transient influences, the sense of common peril, the feeling of esprit du corps as is witnessed at school or college, among bodies of business or professional men, without the slightest connection with religion?

The universal sentiment, the broad unsec¬ tarian and undenominational atmosphere, this magnificent exhibition of team work unex¬ ampled in the entire history of the religions, points to a more significant underlying force than a mere feeling of comradeship, a sense of common danger. Its depth and universality indicate a character more than transient and not due to the circumstances of the hour and scene. A nation that contributes its millions to a war chest in which all elements of the popula¬ tion, rich and poor, Christian and non-Christian, contribute in a spirit of noble emulation, is not likely to forget the lesson, nor will it cherish bigotry in the future in any marked form* The Red Cross, which has raised its millions and hundreds of millions from representatives of every class, creed, sect and color, has enriched the globe in more senses than one and given its cup of refreshment not to the suffering soldier only, but to a world that needed a per¬ manent revival of religion in its genuine form. The fact, too, that these agencies for human re¬ lief were largely organized by representative religious bodies and supported mainly by them indicates the vital character of the movements as expressing the sentiment of the creeds in this 20th century. They could not prevent war — they could mitigate its horrors and furnish an ex-

ample of brotherhood, helpful and hopeful for the future.

Religion has been limited to the religious shrine, to the beauties of ceremonial, to sacred memories and associations, to the fragrance of incense and swelling music. It is held by many to be a rich keepsake of traditional rites and terms of wonderful potency. Others, with as good, if not better, authority, see religion as an active, not passive, force in human life and affairs. It is a power never designed to be a sedative, merely to promote pious contempla¬ tion at stated times, but one whose highest aim is to awaken us to practical goodness, not good thoughts alone. It is an influence that en¬ nobles and sanctifies, an atmosphere in which nothing wrong, hurtful or evil can exist. Thus defined it is showing its reality amid stirring years of strife, as it

spreads its blessings in a thousand ways, in the wondrous compensations of the Creator; and it trains men and women to be creators in His spirit, as they diffuse kindness, and mutual respect, giving to all the open hand and heart. If it takes war to bring about this result, peace will not long witness its negation.

As to the relation of war to the religion of the individual, perhaps the finest aspiration appears in a letter, dated 9 September, from a sergeant on the battle front in Flanders, to his father, a Georgian clergyman: (<War of course may call forth a latent power of self-sacrifice. God grant that some of the heroism and cour¬ age now being so prodigally lavished on the battlefield may persist in the days of peace and used in raising up and building anew a broken-down world.® Abram S. Isaacs.

RELIGION, the Psychology of. . The

psychology of religion, which originated in this country about 20 years ago, is the application of the principles of general psychology to the in¬ terpretation of religious phenomena. It rests upon the fundamental assumption that religious experiences, viewed psychologically, must be of the same essential nature and subject to the same laws as other forms of human conduct.

The first religious phenomenon to be studied was ˆconversion,® as the term is used in the American Protestant churches popularly called ˆevangelical® or ((evangelistic.® These denomi¬ nations insist that the individual must con¬ sciously pass through some inward transforma¬ tion of his personality as an assurance of divine acceptance. Their members in consequence had often learned to watch their mental states and to describe such marks of presumed divine favor as they might have inwardly experienced. The phenomena of “conversion® thus furnished a favorable field for American psychological investigation. Though preceded by monographs and journal articles by other writers of whom G. Stanley Hall and James H. Leuba have re¬ mained the most important contributors in this field, the first comprehensive studies to be pub¬ lished in book form were (The Psychology of Religion) by E. D. Starbuck (1900), (The Spiritual Life) by G. A. Coe (1900) and (The Varieties of Religious Experience) by William James (1902). The methods employed in these three pioneer volumes were respectively the questionnaire, the questionnaire supplemented by interviews and experiments chiefly to determine temperament and degree of suggestibility, and the interpretation of startling religious experi¬

ences recorded in autobiographical literature. Though these imperfect methods led to mis¬ takes, they were successful in establishing broad general conclusions.

The following principles in regard to conver¬ sion may be regarded as now fairly well estab¬ lished. A changed attitude toward religion some time during adolescence is a very common, and in the opinion of most writers a normal, phenomenon. This transition may assume one of at least four types: (1) a state of emotional depression and poignant self-reproach (((sense of sin®; ((sick soul®) followed by a state of elation and joy felt to be an assurance of di¬ vine acceptance; (2) a feeling of incomplete¬ ness and lack of appreciation of religious be¬ liefs and practices followed by a greater ma¬ turity of apprehension and attendant peace and joy and sense of divine presence and favor; (3) a sudden attainment of the last state men¬ tioned without previous depressed feelings of “sin® or ((incompleteness® (“spontaneous awak¬ ening®) ; (4) a ((gradual growth® without con¬ scious transitions, in which a mature apprecia¬ tion of religion insensibly supplants the more limited intellectual outlook and emotional capa¬ bilities of childhood (((healthy-mindedness®). All four of these types would now be regarded as cases of “conversion® by most American denominations insisting upon “conversion® as essential for salvation, and this broader denota¬ tion will be followed in this article. However, many psychologists restrict “conversion® to the first two types, which are thus set in opposition to (<gradual growths® and “spontaneous awaken¬ ings.® The two principal factors that determine which of these four types will be experienced by any particular individual are his own tempera¬ ment and other factors in his personality on the one hand, and on the other, the kind of experi¬ ence suggested to him by the pressure of his religious milieu. Coe has analyzed these fac¬ tors carefully. The first two types are likely to be experienced by adolescents who expect such transformations, in whose temperaments sensibility rather than intellect is predominant, and who have a tendency to automatisms and passive suggestibility. Among factors that Starbuck has shown to be influential in determining the age of conversion are sex, age of puberty, and period of most rapid growth; and all of these combined with the age of conversion it¬ self have an influence upon the character of the experience, e.g., determining how far distinctly intellectual features will be present. Conver¬ sions to religion among adults are rarer, since they involve the reorganization of a mature personality instead of merely the completion of an immature one. When they do occur, they are usually of the first two types.

Phenomena similar to all four types of religious conversion have been noted in experiences of a different nature, such as conversions to ((infidelity,® <(f ail¬ ing in love® and ((falling out of love,® sudden changes from prodigality to miserliness, *etc.* So psychological justification may be found for the popular practice of speaking of a person's ((conversion® to a belief, practice or manner of living, whenever a profound change in emo¬ tional attitudes and ideals has occurred. The phenomena of conversion are explained in terms of the sub-conscious mind by those who accept that doctrine. Undoubtedly they are instances of the coming to dominance in attention of prp-

viously unheeded processes that have been de¬ veloping in the peripheral consciousness and in the nervous system.

The phenomena of religious revivals are all explained in terms of the well-known laws of imitation and suggestion and crowd psychol¬ ogy of Tarde and Le Bon. (See article on Social Psychology). The external sugges¬ tions of the revival in a few instances pre¬ cipitate developments that have been incubating in an individual's memory, force them on his attention and effect in his character a transfor¬ mation that otherwise would have come more slowly or possibly not at all. But the vast majority of revival conversions are "pseudo¬ conversions,® i.e., behavior induced solely by crowd suggestion to which nothing deepseated in the individual's personality responds, and they are consequently transient in their effects. Often the pseudo-convert loses respect for re¬ ligion, and in many cases he is injured mentally and morally by the excitement through which he has passed; so religious psychologists as a rule criticise revivalism severely. (Ames; Cut-ten; Coe; Davenport).

Other religious phenomena that have been investigated by psychologists, though usually with less thoroughness, include mysticism, prayer, saintliness, sanctification, ecstacy, in¬ spiration, faith, visions, mental healing, miracles and witchcraft. None of these involve psychological principles essentially different from those found in conversions and pseudo¬ conversions. All involve developments that have previously gone on in the organism with¬ out having become organized in the personality, so that their more or less abrupt

entrance into the focus of attention appears mysterious and is often in consequence assumed to be super¬ natural. Underhill has found five stages in the experiences of mystics which appear to constitute a repetition of states in some re¬ spects analogous to conversions, each however being more profound and comprehensive than its predecessor. This <(mystic way,® attended by marvelous visions and other automatisms, is possible only for those who have a talent for this sort of thing, and cultivate it by systematic effort. Strong has found prayer to be ((an imaginative social process,® arising in con¬ sciousness between an ego and an Alter, and that types of prayer may be distinguished as “ethical® and “aesthetic® as emphasis is laid on the needs of the ego or the glory of the Alter. Psychological studies of some of the great figures in religious history have occasionally ap¬ peared; among these the elaborate work upon Jesus Christ by G. Stanley Hall is the most im¬ portant.

The developments of religious experience in savage races of the present time (which may be assumed to be more similar to primitive mankind than civilized races) and also in the great historical religions have been interpreted from the psychological standpoint. Here the rich data contained in the reports of anthropol¬ ogists and historians and in sacred literatures have been available for study. Primitive re¬ ligion has been shown to be more or less closely connected with primitive magic, while its connection with primitive morality is less intimate. Whether religion has evolved from magic, or whether both have evolved from an undifferentiated form of behavior, is in dis¬

pute. It is certain that religions always develop within social groups, and that they always at¬ tempt to conserve (and also as some think, to enhance and even to create) values that are recognized by groups to be desirable. King and Ames have attempted to state this charac¬ teristic of religion in terms of functional psychology. It is now very generally agreed that there is no distinctly religious instinct in the sense that there are instincts of fear, pugnacity, sex, *etc.* McDougall and others how¬ ever, believe that certain instinctive emotions, notably fear and wonder, are basic in the evolu¬ tion of religion. Seashore maintains that there is a peculiarly intimate connection between the play impluse and religion. Wright believes that sentiments toward supernatural beings may on occasion develop from any of the principal primary instincts, but that in any case the religious sentiments rest on instinctive foundations.

Since there is no mental element or process or mode of behavior that

is distinctively re¬ ligious, and so would logically serve to dif¬ ferentiate religion, is it possible to arrive at a definition of religion in psychological terms? Ames,. Coe, King and others, looking for a definition of religion in terms of values, regard religion as a process in which values of a distinctively social character are heightened and intensified. Regarding such attempts to de¬ fine religion wholly in terms of values as vague and unsuccessful, another group of writers believe that religion can be more clearly differentiated through the attitude assumed to the agencies by which the values are believed to be achieved. The agencies, whether fetishes, gods, a single God, or the universe conceived as a spiritual order, or what not, are always non-human entities toward which man as¬ sumes the sort of behavior that he ordinarily manifests toward his fellow human beings. (Leuba, Watson, Wright). Similarly, but with more emphasis on beliefs and institutions, Durkheim defines a religion as "a unified sys¬ tem of beliefs and practices relative to sacred things, that is to say. things set apart and for¬ bidden — beliefs and practices which unite into one single moral community called a Church, all those who adhere to them.®

While agreement upon a psychological defini¬ tion thus has not yet been achieved., it is at any rate generally agreed that religion is mainly an affair of social rather than of purely individual experience; that it is primarily affective and volitional rather than cognitive though it in¬ volves all phases of consciousness or behavior to some extent ; that it is a process by which the individual assimilates and realizes within him¬ self the values of the social order and achieves a corresponding development of his personality; and that the influence of religions on individuals and societies is at least more likely to be con¬ servative than otherwise. Myths, dogmas, rituals and ecclesiastical organizations, though perhaps fundamental to religion in its maturer phases, are accordingly to be interpreted as mainly products rather than causes of religious activity.

While the psychology of religion professes to be a purely empirical description and ex¬ planation of religious experience, its writers have not entirely avoided normative and tran¬ scendent problems, though American writers, at

least, have endeavored to exclude them from their premises and data, and to introduce them, if at all, merely as deductions from conclusions reached in a strictly scientific manner. Though not itself a normative discipline, the psychology of religion may properly suggest to teachers methods of religious education, and indicate to social reformers and statesmen the possible service and limitations of religion as a factor in social and moral progress, and it may even assist theologians in determining attainable ideals for religious aspiration.

Both those who believe in religion as a revealer of knowledge and those who reject it as a survival from times of superstition have claimed the support of the psychology of re¬ ligion. Since religious experiences involve an influx into conscious attention from fields out¬ side of personal awareness, much has been made of James' suggestion that this influx may come in part, as it seems to the religious per¬ son to come, from a source entirely external to him in the universe that might be called God. Cutten adopts this suggestion, and at¬ tributes conversion and other forms of re¬ ligious experience to "the action of God upon the sub-consciousness.® On the other hand, since the conceptions of the gods are projec¬ tions of human social experiences and change with changing civilizations, and since all re¬ ligious phenomena are referable on their psy¬ chological sides to individual and social origins which can be analyzed for the purposes of psychology without taking into account the hypothesis of an objective God, it has been argued that atheism — or at least agnosticism — is a necessary deduction from the psychology of religion. It would seem that if the psychol¬ ogy of religion is to maintain its position as a strictly empirical science, its data and con¬ clusions should be kept entirely free from such transcendent questions, as are those of physics and astronomy. Questions concerning the nature and existence of an objective God and other matters of religious faith belong, not to psychology or to any other science, but to metaphysics. They are, to be sure, legitimate metaphysical questions which the philosophy of religion should attack by metaphysical methods, reinterpreting the data of all the sciences, including the psychology of religion, for the purpose. It is even legitimate to com¬ bine discussion of psychological and metaphys¬ ical problems of religion in a single treatise, and each discipline may be helped by the process. In fact, the science of the psychology of religion got much of its first impetus from the psychological portions of such primarily metaphysical treatises as those of Hoffding and Sabatier on the philosophy of religion, and the

psychology of religion in turn has con¬ tributed much to such metaphysical inquiries as Royce's (Problem of Christianity.) But the psychology of religion is an empirical science, and must adhere consistently to scientific methods of analysis and investigation.

Bibliography. — Ames, E. S., Psychology of Religious Experience) (1910) ; Coe, G. A., 'Spiritual Life) (1900); 'Psychology of Re¬ ligion (1916); Cutten, G. B., 'Psychological Phenomena of Christianity 0909); Daven¬ port, F. M., 'Primitive Traits in Religious Re¬ vival (New York 1905); Delacroix, H., 'Etudes d'histoire et de psychologie du mysticisme> (1908); Durkheim, E., 'Les formes elementaires de la vie religieuse) (Eng. trans. 1912); Hall, G. Stanley, 'Adolescence) (1904) ; 'Jesus, the Christ, in the Sight of Psychology) (1917) ; James, William, 'Varieties of Re¬ ligious Experience) (1902) ; King, Irving, 'De¬ velopment of Religion (New York 1910) ; Leuba, J. H.. 'Psychological Origin and Nature of Religion5 (ib. 1910), and Leuba, J. H., 'Psy¬ chological Study of Religion5 (ib. 1912) ; McDougall, William, 'Introduction to Social Psychology) (1908); Marett, R. R., 'Threshold of Religion (1909); Pratt, J. B., 'Psychology of Religious Belief 5 (New York 1907) ; Seashore, C. E., 'The Play Impulse, and Attitude in Re¬ ligion (American Journal of Theology, Vol. XIV, pp. 505-520, 1910) ; Starbuck, E. D., 'The Psychology of Religion) (1900); Stratton, G. M , 'The Psychology of the Religious Life5 (1912); Strong, A. L., 'The Psychology of Prayer5 (1908); Underhill, E., 'Mysticism5 (1911); Watson, A. C., 'The Logic of Re¬ ligion (American Journal of Theology, Vol. XX, pp. 81-101 ; 244-265, 1916) ; Wright, W. K., 'A Psychological Definition of Religion (American Journal of Theology, Vol. XVI, pp. 385-409, 1912) ; 'Instinct and Sentiment in Re¬ ligion J (Philosophical Review, Vol. XXV, pp. 28-44, 1916) ; 'The Relation of the Psychology of Religion to the Philosophy of Religion5 (Philosophical Review, Vol. XXVII, pp. 134-149, 1918) ; Wundt, Wilhelm, 'Volkerpsychol-ogie5 (1900-10) ; 'Elemente der Volkerpsychologie5 (1912, Eng. trans. of latter). The fullest bibliography and best summary of the entire field of the psychology of religion is by Georges Berguer in Archives de psychologie, Vol. XIV, pp. 1-91 (1914). The most recent bibliography in English is given by G. A. Coe, in his 'Psychology of Religion5 (1916). The Journal of Religious Psychology is published by Clark University, Worcester, Mass. Fre¬ quent articles on the psychology of religion ap¬ pear in nearly all American and French psy¬ chological and philosophical journals, and also in the American Journal of Theology, the Harv¬ ard Theological Review and the Hibbert Journal.

William Kelley Wright, Assistant Professor of Philosophy, Dartmouth College.

RELIGIONS, Congress of. See Con¬

gress of Religion.

RELIGIOUS ART. See Christian Archi¬ tecture; Ecclesiastical Art.

RELIGIOUS CORPORATIONS. See

Corporations, Legal.

RELIGIOUS EDUCATION. The

phrase “religious education55 began to take on a definite and technical meaning only in the 20th century. Up to that time there is scarcely any trace of its use ; to-day it has a recognized place in current educational coinage. Its pri¬ mary significance is not so much that of instruc¬ tion in a category of subjects or lessons on religion, but in general it describes that type of education which gives full recognition to the religious nature of the persons being educated, the religious and moral forces opera¬ tive in their development and the religious, or spiritual, aim of all education. It isˆ the dis¬ tinctive phrase of the movement which seeks to complete the aims of general education by the inclusion of the elements commonly called

religious ; these include racial and world heri¬ tages of ideals, concepts, interpretations and values of life in terms of the spiritual, train¬ ing in habits and conduct and the development of motives and purpose in life. It includes and emphasizes instruction in the history and literature of religion as the means of securing the heritage of ideals, but it insists still more on the wider aim of developing the person who will live a life essentially religious, governed by developing spiritual ideals. The concept of religious education has helped to give a deeper meaning to education by calling attention to the spiritual needs of the person. It has given new significance to religious activities by suggesting their educational character and responsibilities. It has made men think of education in terms of the religious ideal and of the religious aim and ideal as realized by educational processes.

The movement for religious education owes its modern inception and its present impetus to the vision of educational idealists such as Herbart, Froebel, Spencer and Dewey who con¬ ceived of education in terms of life and as em¬ bracing all life, to leaders in the spiritual like Gladden, Coe, King and others, who taught us to think of religion in terms that lift it far above its own records, analyses, philosophy and literature, and to practical educators, like W. R. Harper, who could see the problem of securing to each person his full heritage of the world's spiritual idealism and opportunity. The move¬ ment for religious education instead of forcing ecclesiastical formularies upon the schools and colleges has widened the meaning and field of education, and has given it a deep, spiritual meaning. Whether in the agencies of the Church or in those of the State, religion and education are seen as inseparable processes of life development.

The notion of religious education expresses the idealism of the modern revolt against formalized education. General education passed from the restraints of a class privilege to be¬ come little more than a system of mass, mechanical, intellectual discipline, a formal and largely perfunctory initiation to the rights of citizenship. Its technique was that of mental processes. Its aim was the acquisition of bodies of

information arranged in a series of fixed steps which led up and out of schooling. Its tests were almost exclusively intellectual. Its professional interests were largely confined to methods of formal disciplines. But modern psy¬ chology revealed the person as a complex of powers; it insisted both on the breadth of the life as embracing much more than the so-called mental powers and on its unity so that every power of the life entered into the making of the person. Moreover modern social studies indicated that the formal, intellectual disciplines of education were failing to train persons com¬ petent in vision, motive and habits for the strain and opportunities of present-day living. It be¬ came evident that if education would really develop persons it must deal with them as lives and not alone as memories. It must in¬ clude, by some means, the range of motives, ideals, emotions, the habits and the will and all that determines character and conduct. A new conscience for personality arose in education.

Along with the new conscience in education came new concepts in religion. It passed again into the realm of life. Quickening social re¬

sponsibility brought religious thinking close to reality; it became concerned with people. It was seen that if its ideals were to be realized it must be. through persons intelligently governed by those ideals. Seeking to save sbciety the churches are coming to see a program of grow¬ ing an ideal society by developing ideal per¬ sons, an educational program. The child has come to have a new importance because his life is at its determinative, developing period and because he may be trained to become an effective religious person. One can have re¬ ligious persons only as such persons are trained; the time to train them is in the de¬ velopmental periods and the scientific methods of modern education are the truly religious methods of such training.

Further the demand for religious education arose from a quickened public conscience. With a rapidly rising wave of juvenile de¬ linquency it was evident that the young were not being adequately prepared for the elemental duties of living. The general curriculum was much richer than in former times, but it was poorer in that it failed to include the elements that make for strength and ideals in character. The disciplines that failed to include discipline in the art of living were inadequate for the de¬ mands of life. In the realm of conduct some¬ thing is required beyond knowledge ; ideals must be developed, the motives formed, the will trained. The realm of

judgments, motives, ideals of life and will to live is essentially the realm of religion. Training in these respects is religious training. In meeting the problems rising out of the recognition of the need for such training the schools have been compelled to look to the religious agencies for aid.

Religious education in the United States has received stimulus on account of the relations between the agencies of religion and those of education. The people of the United States are entirely committed to the policy of the separa¬ tion of Church and State. This involves the separation of the work of the schools from that of the churches. Instruction in religion is the responsibility and privilege of the churches.

The public agencies of education cannot give formal instruction in the subjects of re¬ ligious history, philosophy and methods as such because (1) Such instruction would be ((sectarian.® It might be Christian in the broadest sense; but nevertheless, this is a land of abso¬ lute religious freedom, a land where, within the limits of the civil law, all faiths have equal rights. Public money cannot be legally nor ethically devoted to teaching Christianity as such. (2) Such instruction, if attempted by the public schools, could never be satisfactory to the religious agencies. It would be sure in some instances to run counter to cherished be¬ liefs. Nor is it possible to agree in the schools on a common creed. Even in the churches all attempts to agree on a common creed have re¬ sulted in such a planing' away of the parts as to leave nothing at all. Even though the creed were reduced to the briefest, barest possible terms, the objection would still hold that such a creed, formulated for the public schools, would be the creed of the schools, and they would be¬ come creedal institutions. (3) The teaching of religion in any such a formal manner and even in any so innocent a form of matter would be an invasion of the peculiar privilege

of the churches. (4) Formal religious teach¬ ing in these schools would not attain the ob¬ ject desired; it would result, as the German system has resulted, in the formalization of reli¬ gion untilrit is destitute of practical, vital mean¬ ing to the child. (5) Sectarian teaching means sectarian interference. Under the paralyzing effect of denominational oversight, of fear of offending on this hand and that, the teacher would be without the freedom of life and the teaching without direct character values. (6) Public school teachers are neither trained nor selected for the work of teaching religion.

With such a situation in every community there has fallen on the religious agencies the burden of the instruction of children in the subjects of religion. That task was, for 10 dec¬ ades, relegated to the Sunday school. But rising educational standards indicated the in¬ adequacy of this school with its brief weekly period, its corps of purely amateur and un¬ trained teachers and its lack of any sort of physical equipment. It lacked professional leaders, educational ideals and standards of work. It was expected to accomplish specific instruction in religion when it lacked educa¬ tional standing and consciousness. In fact it had no plan of instruction in its own field, in religion, as it attempted no more than per¬ functory instruction in certain parts of the Bible. Along with the revival in educational science came a quickening of scientific interest in religion, especially in its literature and its phenomena. The churches had laid upon them a difficult task, to meet the demands of this new interest, to furnish instruction which could meet modern, prevalent, scientific concepts and to meet the need for religious instruction of the young with plan and plant recognized as totally inadequate and inefficient. Leaders in the dif¬ ferent churches began to see the seriousness of the educational need; they began to seek for religious educational leadership. They found it through the work of the Religious Educa¬ tion Association. (See Religious Education Association). Before long there developed leaders who began to interpret the work of re¬ ligion in educational terms.

The development of religious education in the churches has been marked by: (1) The edu¬ cational reorganization of schemes of instruc¬ tion. The Sunday school has become, in many instances, a real school. Courses of study are now provided, in a variety of forms, for as many as 20 different grades, from the youngest to the adults in

a school. The material in¬ cludes religious history, teachings and ideals both in the Bible and outside, ancient and modern problems of present-day living and social organization. At least 250 textbooks are available, nearly all having been prepared since 1903. This elaboration of curricula has taken place in practically every Church communion, including the Roman Catholic, the Hebrew and the Mormon. It brought about the complete reorganization of the International Sunday School Lesson Committee which formerly pre¬ pared one single lesson for all scholars in all Protestant schools; a new committee prepares schemes of graded lessons, a different lesson for each year of the pupibs life. (Consult Cope, H. F., (The Modern Sunday School and its Present Day Task; also Athearn, W. S., (The Church SchooP). (2) The provision of suit¬

able facilities for the work of instruction in religion. A very large number of churches now provide special buildings for their general educational work. There have classrooms with regular equipment, often gymnasiums, and fa¬ cilities for play, recreational and social activi¬ ties. (Consult Evans, H. F., (The Sunday School Building and Its Equipment ; also Cope, H. F., <(The School in The Modern Church"). (3) The development of professional leaders in religious education, especially for the organiza¬ tion and direction of work with the young. Leadership is passing from the amateur to the trained expert. Hundreds of churches are em¬ ploying persons who have been trained in special courses in psychology, pedagogy and educational method as superintendents of church educational work, including Sunday schools and as teachers. The Religious Education As¬ sociation established a professional standard and lists nearly 200 persons as "Directors of Religious Education in Churches." These all have had several years of graduate study of a technical character. A special organization, of directors exists. (Consult Religious Education, April 1914, p. 186; Oct. 1915, p. 444). (4)

The Church communions have provided special¬ ized leadership in religious education by organ¬ izing what are known as commissions on re¬ ligious education. Among the more active and important commissions are those of the follow¬ ing churches: Episcopal, Secretary Wm. E. Gardner, New York; Baptist, Secretary Prof. E. DeWitt Burton, Chicago; Congregational, Secretary Rev. F. M. Sheldon, Boston; Presby¬ terian in Canada, Secretary Rev. J. C. Robert¬ son, Toronto; Disciples, Secretary R. M. Hop¬ kins, Cincinnati; Methodist, Secretary Dr. Edgar Blake, Chicago. The commissions out¬ line advanced plans of religious education in

churches, communities and families. The official denominational organizations are also federated in what is known as the Sunday School Council of Evangelical De¬ nominations for the common supervision of the work of this group of churches in this field. This body has effected a common organization with the International Sunday School Associa¬ tion for the promotion and supervision of work in this field. The Federal Council of Churches also has a commission on religious ˆ education. (5) The special preparation of ministers of churches for religious educational work. In 1903 the Hartford School of Religious Pedagogy was organized. In 1906 a chair of Sunday school pedagogy was established in the Southern Baptist Theological Seminary. In 1912 50 theological seminaries made provision for one or more courses training ministers for educa¬ tional work in the churches, 10 of the seminaries having chairs in religious education. In 1919 all the larger seminaries provided such courses and many colleges were offering work in re¬ ligious education both as preparatory to theo¬ logical seminary courses and for layman.

In Relation to Public Education. — The rec¬ ognized necessity for courses of instruction in religion available to all school children led to the organization of a field in which both the churches and the public schools could operate without official relations under what is known as the plan of correlated Bible study. In 1910 an arrangement was made by which students at the Colorado State Teachers' College, Greeley,

Colo., could receive not to exceed two units of credit for the study of the Bible outside of the college in church classes under academic regulations. Later this plan was extended to apply to students in high schools through the State. In 1912 a somewhat like plan was adopted in North Dakota by the State Teachers' Asso¬ ciation. It provides that high school students may follow an official syllabus of Bible study and upon passing an examination conducted by the State Teachers' Association receive not to exceed one-fourth of a unit of credit per annum. Several plans are now in operation in a number of the States. A further and dif¬ ferent development has taken place, beginning at Gary, Ind., by which children in the public schools may be excused at certain periods in order to attend classes conducted according to schoolroom standards in their churches and this without prejudice to their standing in the public school. None of these plans call for the use of either the property, the funds, the au¬ thority or the professional workers of the schools as such. Care is constantly exercised so that there is no sort of official relation be¬ tween the churches and the State, but the plans have resulted in very much larger numbers of young people receiving regular and systematic instruction in their different churches and Sun¬ day schools, instruction which has been corre¬ lated to their week-day work. Similar plans are followed in Toledo, Ohio, Birmingham, Ala., and in numerous lesser communities in Illinois, Indiana, Oregon, Montana and elsewhere. In New York City an influential interdenomina¬ tional committee promotes the instruction, on week-days, of thousands of children in Hebrew, Catholic and Protestant churches. The Daily Vacation Public School Movement adopted by many church communions provides for week¬ day religious instructions during the summer period. The fact remains, however, that there are probably 70,000,000 of persons of school age in the United States who are receiving no for¬ mal instruction in religion.

In the Family. — The problem of the re¬ ligious instruction of children has been pe¬ culiarly complicated in the United States by the fact that, while the public schools have been necessarily debarred from this work, the breakdown of family customs due to settle¬ ment

in a new country has largely deprived the family of its function in regard to religion. Changing social and economic conditions have effected a similar result so that it is not possible to count on any general custom of instruction in religion in family life nor on any effective degree of religious training in habits and ideals. Doubtless some awakening has been effected. Several organizations have given serious atten¬ tion to the problem of religious education in the home, notably the Religious Education As¬ sociation which held a convention on the sub¬ ject in 1911 and has published much useful material on the problems involved. Other or¬ ganizations touching the matter are The Mother's Congress, Philadelphia ; L'Unione Familiale, Paris ; League for the Populariza¬ tion of Pedagogy for Families, Brussels, pub¬ lishing up to the outbreak of the war Edn-catione Familiale ; the Home Progress Society, Cambridge, Mass.; After School Club, Phila¬ delphia. The impressive Child Welfare Ex¬ hibits also aided in calling attention to this VOL. 23 — 23

need. Consult Hodges, George, (The Training of Children in Religion * ; Cope, Henry F.,

(Religious Education in the Family.)

In Communities. — In 1917 serious attention for the first time was paid to the possibility of organizing a system of religious instruction which, while remaining independent of taxation and upon a voluntary basis, should parallel the system of public instruction. It was realized that the current plan of separate schools in churches, meeting only once a week and for a brief period, was entirely inadequate and highly wasteful. The International Sunday School Association proposed a plan of schools created by community boards of religious education and quite independent of churches. The plan at¬ tracted wide attention ; but it met with much opposition and little practical support, princi¬ pally because of the proposed divorce from church control. However, numerous experi¬ ments were made in the organization of com¬ munities for the training of religious teachers and much serious attention continues to be given to the possibilities of common, united action, for it is relized that the largest possible contribution to a united religious life would be to give to all children a common, unified training in religion. Consult Cope, Henry F., (The School in the Modern Church* ; Win¬ chester, A. S., (Religious Education and Democracy.*

In Relation to Public Schools. — Even with its recognized limitations

the public schools have not been indifferent to the child's needs for religious education. The volun¬ tary organization of public educators, the National Education Association, has declared in formal resolutions <(The building of character is the real aim of the schools® (Resolutions of 1905 and similar statements in conventions of 1910 and 1911). In current literature on general education of children there is clear recognition of the fundamental place of train¬ ing in motives and habits of conduct. The notion of Mealing with persons as behaving organisms® (Bagley in Educational Values*) and ((the aim of social efficiency® (Dewey in (My Educational Creed *) are characteristic of the thinking of leading authorities. The Re¬ ligious Education Association organized several important conferences of public school leaders on different phases of moral training in the schools and in 1916 conducted an important con¬ vention in Chicago on the relations of religious instruction to public education, discussing par¬ ticularly the various schemes of correlation be¬ tween the work of instruction in religion in churches and the work of public schools. In 1915 the National Education Association offered a prize for the best essay on the place of re¬ ligion in education and a scheme-for religious instruction in public schools. On the other hand the Religious Education Association has steadily refused to endorse plans for religious teaching in public agencies and has sought to develop the voluntary agencies to efficiency in this field.

Activities in the Colleges and Universities.

— The problems of teaching religion and im¬ parting religious training in colleges and uni¬ versities have not been neglected in recent years. Numerous colleges have introduced new courses, engaged new and highly trained in¬ structors in the Bible and other aspects of re-

ligion and generally, in almost all colleges, this work has been brought up to a higher academic level. More men and women of thorough train¬ ing are engaged in teaching religion in this field than ever before. They have a special pro¬ fessional organization of their own in the college department of the Religious Education Association. Besides courses in the Bible there began to be introduced in the. American col¬ leges, in about 1908, courses in religious educa¬ tion, courses designed to train young people to usefulness in the organization and teaching in religious agencies. In 1919 there were over 200 standard colleges offering courses in this field, looking forward to the usefulness of the graduates in work in religious education, es¬ pecially training teachers and specialists in this field. In State universities, separated from ecclesiasticism just as public schools are, there is, however, greater freedom in the teaching of religion because here it is lifted into a higher realm of free discussion and of pure scientific thought. Some State universities offer courses in religious literature, nearly all in the history of religions, some in philosophy and psychology of religion and some provide for courses in re¬ ligion given in accredited institutions adjacent to the university. The real problem of all in¬ stitutions of higher learning as it relates to religious education is not, however, so much in the realm of formal courses in religion as in the matter of securing in the institution the prevalence of ideals, the rule of customs and atmosphere that will train the students in habits of religious living, and will inerpret life to them in essentially religious terms. In many universities this is consciously the most serious endeavor, to send out men and women to whom life means a chance to realize high spiritual ideals.

In an increasing degree the phrase religious education is coming to mean to large numbers of persons the interpretation of every activity and aim in life in terms of character results, to see all as judged by the effects on persons, by the product in character and in the perma¬ nent worths of life. It has come to mean a new interpretation of religion as not alone a body of literature or philosophy, and still less a form of organization or custom, but as a force of ideals working in life to develop finer persons, to interpret the world in the light of the values that endure, the values of thought, ideal and hope. Religious education seeks to organize society, through all agencies of instruction, habituation and idealization, so that out of all the process of life there may grow religious persons and there may develop a

society that will make a religious world.

Henry F. Cope,

General Secretary of the Religious Education Association; Author of c Religious Education in the Family R *etc.*

RELIGIOUS EDUCATION ASSOCIA¬ TION, The, was organized in February 1903 at a convention called to consider ((the improve¬ ment of moral and religious education.® The movement began under the inspiration of Wil¬ liam Rainey Harper, then president of the Uni¬ versity of Chicago, who organized a <(Council of Seventy,® first to promote modern, scientific biblical study and, later, to develop the neces¬ sary organization for promoting religious edu¬ cation. Other well-known educators associated

with the beginnings of the organization were Dr. Charles Cuthbert Hall, Dr. Frank Knight Sanders, Dean Shailer Mathews, Pres. William Douglas Mackenzie, Pres. James B. Angell, Prof. John Dewey, Dr. William Hervey and Pres. Henry Churchill King. The organiza¬ tion states its purpose as: (<To inspire the edu¬ cational forces of our country with the re¬ ligious ideal; to inspire the religious forces of our country with the educational ideal ; and to keep before the public mind the ideal of Re¬ ligious Education and the sense of its need and value.®

It brings together in one comprehensive organization the leaders and workers of all ecclesiastical, evangelical, educational, cultural and social organizations who wish for fellow¬ ship, for mutual interchange of thought, infor¬ mation and experience, and for cooperation in achieving the highest ideal of personality and citizenship. By means of this organiza¬ tion of leaders, it promotes the interrelation of all existing agencies of religious and moral education, for mutual service, understanding and sympathy, for economy of effort, for friendly cooperation and for united strength. It also surveys the whole field of religious and moral education, promoting a study of condi¬ tions, reporting the organized and individual forces at work within it, fostering thought, discussion and experiment, determining the principles and the methods of progress.

It enlists in a united membership and fellow¬ ship of service all persons, in all walks of life, who desire to secure the improvement of homes, churches, schools and other agencies in the work of moral and

religious instruction and training.

The Religious Education Association has a membership of 3,000 persons paying the annual fee of $3 ; the money necessary for its extension work and its free services to persons seeking counsel is contributed by other members who elect to pay $5, $10 and upward, and by persons who make generous gifts to this work.

The Association conducts a bureau of in¬ formation to meet the need for a common source of reliable information on modern work in religious education. Through its officers it gathers up the facts on modern methods from all parts of the world. This information is classified in the office and constitutes, with the extensive library, the working basis with which to answer thousand of inquiries annually.

The central office acts as a clearing-house on methods, material, literature and informa¬ tion. All inquiries receive careful attention and are answered by the aid of department officers and specialists and the exhibit library. When¬ ever literature on the subject of inquiry is available it is sent to inquirers. Numerous pamphlets, bibliographies, reprints, etc., are on hand for free distribution. The services of the bureau of information are free to all.

The bureau also aids many inquirers person¬ ally. The offices are open to the public, and at the headquarters of the Association, at 1440 East Fifty-seventh street, Chicago, a permanent exhibit of materials has been installed. This exhibit now consist of: (1) A library of over 6,000 books, consisting of works on methods, principles and materials of religious and moral education. The textbook selection shows the material now available for use in Sunday

schools, colleges, *etc.* (2) Lesson helps, text¬ books, outline material and printed matter used in Sunday schools and similar institutions, in¬ tended to reflect the best material and methods. (3) Pamphlets and illustrative material on moral education.

The Association holds annually an interna¬ tional convention. These conventions, to which the public is invited, but at which members have special privileges, already have an international fame for their splendid array of noted speakers, the importance of the topics discussed and the character of the attendance. Each convention program includes over 100 speakers and 30 different meetings.

The. membership of the Association is di¬ vided into departments which are organized about institutional interests for co-operative study of their problems and the improvement of their methods of religious education, by cor¬ respondence and conference, especially at the conventions, enlisting the services of many leaders and specialists. The Association has published five large volumes, containing author¬ itative, modern scientific treatment of the most important problems of the home, Sunday school, public school, college, university, church, library and other educational agencies, and it also issues the bi-monthly magazine, Religious Edu¬ cation.

RELIGIOUS LIBERTY. See Liberty,

Religious.

RELIGIOUS ORDERS. See Orders, Re¬ ligious.

RELIGIOUS PAINTINGS. See Paint¬ ings of the Great Masters.

RELIGIOUS SECTS. From the earliest days of the world's history man has been more or less a religious creature. Almost in¬ variably he has had a god, or several of them, to whom he looked for protection. At times these gods have been crude fetishes of whittled wood or roughly hewn stone ; at times they have assumed the form of animals or reptiles, or have appeared as cruel monsters eager for the life-blood of those who reverenced them. But, however they may have come, man has worshipped them, because religion, as repre¬ sented in the worship of a supernatural power, is interwoven with the entire fabric of human nature. The religious ˆsect,® however, is of more recent origin, for while primitive man could worship his crude fetishes blindly, it was necessary that he should learn to think before he could attempt to distinguish between the various attributes of the Infinite, that from them he might construct those well-marked divisions of faith, or creed, which are such an inevitable result of the varying phases of human thought. To-day the term ˆsect® is ap¬ plied to those bodies of men who have an¬ nounced their decisions to follow the opinions or doctrines of some philosophical or theologi¬ cal teacher. Of course, to the Roman Cath¬ olic all religious bodies that are not

actually in affiliation with her communion are classed as sectarian, but such a definition is not the general one, the word “sect® being used to differentiate separate organizations rather than to call attention to comparatively inconsequen¬ tial differences of opinion. Thus, for example,

the High and Low Church factions in the Church of England, or, in this country, the Protestant Episcopal Church, are not regarded as separate sects but as parties, or schools, within the same communion ; whereas the vari¬ ous bodies of Baptists in America are denomi¬ nated as ˆsects,® not so much because of their differences in doctrinal matters, which in some instances are slight, but for the reason that they are under separate Church government. While there were sects among the ancient Jews and Greeks the. coming of Christianity, with its wide field for speculation, opened the way for a more general promulgation of individual opin¬ ion and the following list of the most import¬ ant organizations of this and other days indi¬ cates that there has been no lack of teachers and prophets to preach new gospels to those who would hear :

Abecedarians. — A sect of German Anabaptists, led by Nicholas Stork, a weaver, who opposed the simplest forms of education, even the learning of the A B C’s, on the ground that it prevented divine illumination and hindered spiritual sanctification. Extinct.

Abelites. — An African sect which opposed procreation on the ground that it was a perpetuation of sin. Extinct.

Abrahamites. — An obscure Bohemian sect of deists. Its members rejected all distinctively Christian doctrine, with the exception of the Lord’s Prayer, which they used, adopting the tenets of the religion of Abraham as con¬ tained in the Decalogue. Extinct.

Abyssinian Church. — That branch of the Christian Church that has been established in Abyssinia for many centuries. It is in agreement with the Coptic Church con¬ cerning its ritual and practice, but differs from it slightly in its theological position.

Acacians. — An Arian sect which occupied a theological position half way between the Semi-Arian and the extreme Arian, or Anomoean sects. Extinct.

Adamites. — Several attempts have been made to revive the sect *of Adamites, which was first suppressed in the 2d century. Its pretensions

are that its members have attained the primitive purity of Adam and are, therefore, able to dispense with marriage and to go without clothing at their meetings, which are called “ paradises.” Upon each appear* ance it has been proscribed, the last attempt at rejuvenation having been in 1848-49.

Adelphians. — A branch of the Euchite sect. Extinct.

Admonitionists. — The followers of Thomas Cartwright, who, in 1572, advocated the government of churches by presbyters instead of bishops and who urged the right of the Church to hold supremacy over the state. Extinct.

Advent Christian. — The largest branch of Adventists. Absolutely millennial in character, it teaches the final extinc¬ tion of all evil as well as the renewal of the earth that it may become the future abode of the saints. See Adventists.

Aerians. — A reforming sect in the 4th century now sometimes considered to have been a forerunner of modern Presbyterianism. The members declined to permit prayers for the dead, repudiated the Church fasts, and made the authority of the presbyters equal to that of the bishop. Extinct. •

Age-to-Come Adventists. — One of the many sects of Adventists. Its members believe that at the time of the millennium Christ will assume a personal rather than a spiritual rule over the earth which, they hold, will not be destroyed at the Second Coming. See Adventists.

Agnostics. — While unorganized as a sect agnosticism teaches the theory that it is impossible for man to attain to any definite knowledge of the divine power.

Aitkenites. — A party which was founded in the Church of England about the year 1850, by Robert Aitkens, a ritualistic clergyman. It was an attempt to graft a portion of the tenets of Methodism upon the High Church school of ritualistic and sacerdotal theology.

Albaneses. — A mediaeval sect closely allied to the Albigenses. Extinct.

Albigenses. — A name applied to the anti-sacerdotal sects that revolted from the Church of Rome during the 12th century. They were vigorously persecuted and finally exterminated.

Allenites. — The followers of Henry Allen, who preached the peculiar

doctrine that all souls were actually present at the Garden of Eden where they participated in the fall of Adam. Extinct.

Alogians. — A name applied to a heretical sect of the 2d century because of its rejection of the doctrine of the Logos and the Gospel of Saint John.

Amalricianism. — A pantheistic heresy promulgated by Amalric of Bene, professor of logic and exegesis in the Univer¬ sity of Paris. Extinct.

Amyraldists. — A sect of Calvinists who followed Moses Amyraut in his attempt to reconcile the disputes concerning predestination and divine grace.

Anabaptists. — A name most generally applied to those bodies of extreme anti-sacerdotalists which required re¬ baptism from those who had been baptized in infancy and who were often over-zealous in their repudiation of certain doctrines of the 10th century Church. For many years the term was seldom used except as one of opprobrium.

Angel Dancers. — A small sect of vegetarians founded about 1890 by Huntsman T. Mason, who claimed to be the reincarnation of the spirit of Saint John the Baptist.

Angelic Brothers. — A community of Dutch pietists founded by George Gichtel in the 1 6th century. Its members held that, having attained a state of angelic purity, they should give no further thought to marriage. Extinct.

Anglicans. — One definition for the High Church school in the Episcopal Church.

Annihilationists. — The name applied to those sects which teach the absolute destruction of the wicked.

Anomie ans. — The extreme sect of Arians; it taught that the Son was of an essence which was not even similar to that of the Father. It existed during the 4th century.

Ansarians. — A sect whose membership is almost entirely restricted to a small district in Syria. As a religious belief it is a combination of Mohammedanism, paganism and some¬ thing that somewhat resembles Christianity. This strange faith is said to have first been taught by Nusari, a prophet and saint who lived at Nasai, near Koufa, in the latter part of the 9th century, and his gospel included the doctrine of metempsychosis as well as that of divine unity in three personalities, the second and third being created. This sect now receives both the Old and New Testaments,_ the Koran and several apocryphal works as its inspired scriptures.

Anti-Mission Baptists. — A sect which is theologically in accord with

the regular Baptists but that is opposed to missions, Sunday schools and other educational and evange¬ listic enterprises.

Anti-Pˆedabaptists. — A name sometimes applied to sects that are opposed to the doctrine of infant baptism.

Antiburghers. — A name applied to one of the two factions into which the Scottish Secession Church was split in 1747. The controversy was based upon the lawfulness of a clause in the oath required to be taken by burgesses, but, while the point was fiercely contended for several years, the two factions were reunited in 1820.

Aphthartodoceta;. — A sect which became extinct about the 9th century. It held that the body oS Christ was incorruptible even before the resurrection and that his suffering of death was merely a phantasma.

Apollinarians. — A sect condemned during the 4th century for having denied the proper humility of Christ.

Arians. — The followers of Arius, the Alexandrian priest who promulgated a widespread heresy during the 4th century. Denying the divinity of Christ and other fundamental doctrines of the Christian Church, he was condemned and Arianism was suppressed by order of the early councils. Since that time, however, the doctrines taught by Arius have been frequently revived and they still exist under other designations.

Armenians. — Although the separation of the Armenian Church from the main body of Christians, which occurred at the time of the Council of Chalcedon (451 a.d.), was the result of a comparatively inconsequential misunderstanding; it has been maintained to this day, in spite of the several attempts at reconciliation. _

Arminians. — A name sometimes applied to the anti-Calvinistic sects of Protestants which teach the doctrine of universal salvation. … ,

Artotyrites. — A sect existing in the early days or the Church. It admitted women both to the priesthood and the episcopate and taught the use of bread and cheese in the eucharist on the ground that it was right that man s oblations should be of the fruits of the earth and of the flocks.

Atheists. — The term applied to those persons who deny the existence of God.

Baanites. — A Paulician sect of the 8th and 9th cen¬ turies. Extinct.

Babists. — The followers of Mirza Alit Muhammad, of Shiraz, who founded a new religious system in Persia during 1844. Described as a " Pantheistic offshoot from Moham¬ medanism, tinctured with Gnostic, Jewish and Buddhistic ideas," the high form of morality which it teaches has appealed so strongly to the Western mind that its converts in America alone during the past few years undoubtedly number several thousand. Among other doctrines Babism teaches the equality of the sexes.

Bahaists. — The same sect as the Babists (q. v.).

Baptists. — Those sects which oppose infant baptism, administering the rite only to adult persons, and then baptizing them not to make them children of God, but as a sign that they themselves have accepted Him. See Baptists.

Beguni. — A fanatical Russian sect which preaches and, it is feared, sometimes practises the rite of human sacrifice as a means of justification before God.

Bezopoetsciiins. — Many sects of Russian dissenters depend upon an independent ministry, rejecting the office of priest, or " pope." They are designated as Bezopoftschins.

Bible Christians. See Bryanites in this article.

Bohemian Brethren. — A Hussite sect which was quite numerous in Bohemia but which ceased to exist at the end of the 17th century.

Booldo. — The Buddhism of Korea, which differs but slightly from that of China.

Borrelists. — A sect of Mennonites whose worship is devoid of all external ordinances.

Bourignonists. — A sect of Quietists founded by An¬ toinette Bourignon, a pietist who claimed to be the subject of divine inspiration, in the 17th century. Extinct.

Brahmanism, or Hinduism. — This religion, which is the oldest faith that has sprung from the Aryan family, derives its name from that of its chief caste, from which alone, the priests are selected.

Brahmo-Somal — A monotheistic Hindu sect which apparently owes its origin to the contact of Brahmanism with the various anti-sacerdotal forms of Christianity repre¬ sented by the missionaries.

Broad Churchmen. — A designation often applied to a school of thought in the Protestant Episcopal Church, the members of which are inclined to give considerable latitude to individual opinion in the rejection or acceptance of beliefs.

Bryanites.— Otherwise known as " Bible Christians." A sect which is in general theological accord with Methodism, but which permits women to preach.

Buchanites. — The followers of Elspeth Buchan, or Simpson, a religious enthusiast in Scotland who claimed to be the woman of Revelation in whom the light of God was restored to men. Extinct.

Buddhism. — The reform movement which originated in India, some 2,500 years ago._ It was a protest against the religious and social despotism of Brahmanism, and, while atheistic in theory, teaching that release from existence, or absorption into the infinite, is the great good to which man should look forward, it has exercised an elevating effect upon the social and moral conditions of the countries where it has been accepted. It is still the religious faith of about one-third of the human race.

Cainites. — A fanatical Gnostic sect of the 2d century. Its members reverenced such personages as Cain, Esau and Judas Iscariot. Extinct.

Calendar Brethren. — A religious society, which, while once prominent, now exists only in Brunswick. It derives its name from the fact that its meetings are always held on the Kalends, or the first day of the month.

Calvinists. — A designation applied to those Christians, in various sects, who follow John Calvin in his opinions regarding the ministry, the sacraments and divine grace, as exploited in his doctrines of " Election " and " Particular Redemption."

Campbellites. — The followers of Rev. John McLeod Campbell, who taught the universality of the atonement and who held that Christ's death was in no sense a vicarious satisfaction of divine justice. He was condemned as a heretic by the Presbytery of Dumbarton in 1830.

Campbellites, American. — Otherwise known as Disci¬ ples of Chiist, or as Reformed Baptists. A Baptist sect founded by Rev. Thomas

Campbell. Congregational in discipline it insists upon baptism by immersion as the requirement for admission to its membership. See Christ, Disciples of.

Catholic Apostolic Church. See Irvingites.

Christadelphians. — Otherwise known as Christ's Brethren. A sect of modern origin which has assumed its name to distinguish it from other bodies of Christians whom it regards as apostates. Quite similar to Unitarianism in its doctrines it still insists upon baptism by immersion. See Christadelphians.

Christian Catholic Church. See Dowie.

Christian Connection. — A sect which accepts no earthly leaders and which denies the inspiration of all creeds. Its members are permitted to be guided entirely by individual interpretation of the Holy Bible.

Christian Israelites. — A small sect, the members of which are anticipating the immediate second-coming of Christ.

Christian Scientists. — The followers of Mrs. Mary Baker Eddy, who, about 1866, promulgated a system of theosophic and therapeutic doctrine. Mrs. Eddy, in her book, " Science and Health," based her theories upon the Bible, teaching that as man's essential nature is spiritual and the Spirit of God, Love and Good, any moral and physical evil must be contrary to that Spirit, representing the absence of the True Spirit which was in Jesus Christ. See Christian Science.

Christians. — Several small sects have from time to time assumed the title " Christians," to indicate that they alone are possessed of true Christianity.

Christ's Brethren. See Christadelphians.

Christ's Sacrum. — A religious society founded in the 18th century to work for the reunion of all Christian bodies. Practically extinct.

Church of God. — Otherwise known as Winebrenne-rians. A small body of Baptist Christians, which accepts no authority, or creed, except that contained in the doctrines exploited by its founder, John Winebrenner. See Church of God.

Church of God in Jesus Christ. See Adventists,

Church of the New Jerusalem. See Church of the New Jerusalem.

Coglers. — A sect of total abstainers whose chief tenet is that its members are morally incapable of committing any sin.

Collegiants. — A sect which, founded in the 17th cen¬ tury, is still well represented in The Netherlands and in some parts of Germany, deriving its name from the fact that its assemblies are known as colleges. Its theological position is practically that of the Quakers, plus baptism by immersion.

Collegiate Church. — The corporate name of a branch of the Reformed (Dutch) Church which occupies an import¬ ant position among the religious bodies of New York.

Confucianism. — Although one of the popular religions of China, Confucianism is in no sense a religious system, its only worship being what may be defined as a religious veneration of ancestors. Instead of doctrines it presents instructions as to the proper mode of life, the discrimination between virtue and vice; the duty of compliance with the law of following the dictates of the conscience, *etc.*

Congregationalists. — An evangelical sect which de¬ rives its name from its fundamental' principle in discipline, that each particular congregation is an independent body, having the right to elect or depose its pastors, settle all disputes regarding matters of faith; and exercise necessary discipline over its members without the interference of other congregations.

Copts.— The name applied to the Jacobite Church in Egypt, which has

now almost entirely supplanted the Orthodox Church.

Cumberland Presbyterians. — A sect which withdrew from the Presbyterian Church in 1810 because of the refusal of that body to recognize as ministers persons who had been admitted without the usual educational preparation and who refused to subscribe to the Calvinistic doctrine of “ Election.” See Presbyterian Church.

Deists. — Those who believe in the existence of God, but who accept few if any other of the doctrines of the Christian religion.

Devil Worshippers. See Satanists and Yezeedees in this article.

Donatists. — An early Christian sect in Africa. Its members held that they alone constituted the true church and that any offices performed by other clergy were invalid. Extinct.

Dowieites. — Otherwise known as “ The Christian Catholic Church.” A sect primitive in creed, the members of which believe in the healing of disease by prayer. It was founded about 1892 by the late John Alexander Dowie, who professed to be the reincarnation of the Prophet Elijah.

Druses. — A fanatical sect found chiefly in the moun¬ tainous regions of Syria. Their name is derived from that of their first apostle, Ismail Darazi, or Durzi. Little is known concerning their belief, their reputation for fanaticism being based upon the blood feud which they have long maintained against their Maronite neighbors.

Dukhobortzi. — A Russian sect which originated in the early part of the 18th century. It has been subjected to repeated persecutions both because of its religious doctrines and for the refusal of its members to abide by the laws of the country.

Dunkards. — Otherwise known as Brethren. An Ameri¬ can sect of extremely primitive Baptists which was founded by a party of German emigrants in the 18th century. In addition to a dress which is peculiar to themselves, its members maintain such customs as the washing of feet and the anointing of the sick with oil. See German Baptist Brethren.

Ebionites. — A sect of Judaizing Christians which became extinct about the 4th century. They recognized Christ as the Messiah, but denied his divinity and repudiated the writings of the apostles, accepting the Mosaic law.

Elcesaites. — A Jewish Christian sect very similar in doctrine and practice to the Ebionites. Extinct.

Encratites. — The name applied to. those members of Early Church who refrained from marriage as well as the use of wine and flesh meat. Extinct.

Enochites. — A millenarian sect in Russia. It teaches that the Prophet Enoch has already returned to earth and that his personal manifestation will be the signal for the destruction of all matter.

Ensarians. See Ansarians in this article.

Erastians. — The followers of Thomas Erastus, who proposed several restrictions regarding the jurisdiction of the Church. Extinct.

Euchites. — A 4th century sect sometimes known as Euthusiasts. Its members lived a life of prayer and asceticism and repudiated the sacraments and moral law. Extinct.

Eunomians. — A sect of extreme Arians. Extinct.

Eusebians. — The followers of Eusebius of Nicomedia, who effected the restoration of Arius in 334. Extinct.

Eustathians. — The orthodox sect in Antioch during the 4th century. Extinct.

Eutychians. — The members of a sect condemned for heresy in the 5th century. They taught that Christ was possessed only of a divine nature. Extinct.

Evangelical Adventists. — The original sects of Adventism. Its particular belief is in the conscious state of the dead and, necessarily, the conscious suffering of the wicked. Like other Advent sects it is millenarian. See Adventists.

Evangelical Association. — A sect whose belief is like that of the Methodists except that it rejects the doctrine of original sin. See Evangelical Association.

Evangelicals. — A designation sometimes applied to the Low Church party in the Episcopal Church.

Fetishism. — The lowest grade of idolatry, taking the form of a

worship of some material object to which a supernatural power is ascribed.

Fire WoRSHipPiT s. — A designation by which the Parsees are sometimes known.

Flagellants. — The victims of a hysterical mania which spread over almost every portion of Europe during the Middle Ages. Its devotees held that in flagellation was the only means to salvation, but their use of the scourge was finally suppressed by the ecclesiastical powers.

Flemings. — Otherwise known as " Fine," or rigid Mennonites, because they profess to maintain more ancient rites and stricter principles than those followed by ordinary Mennonites. Among these ancient rites is that of feet washing.

Foism. — The official name for the Buddhism of China. Its worship includes that of many gods which are peculiar to itself.

Fratricelli. — A sect which had its origin in a reforma¬ tion of the Franciscan order in the 13th century. Its members devoted themselves to prayer, rejected the sacraments and held that the ideal Christian condition was one of poverty. Extinct.

Free Church of England. — A name which has been assumed at various times by sects which have seceded from the Church of England. They have had no affilia¬ tion, however, either in principles or practice.

Free Kirk of Scotland.— A name assumed by that body of Presbyterians which seceded from the Established Church of Scotland in 1843. The only points in which it differs from the older body are in matters of patronage and the question of the right of the state to interfere in church affairs.

Free Will Baptists. — A sect which withdrew from the Baptist communion in 1780, chiefly because of its rejection of the Calvinistic doctrine of election , but a much closer union between these two sects has since been effected, many churches in various parts of the country having united.

Friends, Society of. See Friends, The Religious Society of.

Friends of Light. — A sect of Rationalistic Lutherans. It taught that complete intellectual freedom in religious belief could not be obtained except when individual judg¬ ment was permitted to be the sole guide

of the conscience.

Galenists. — A Mennonite sect founded in 1664 as the Arminian branch of the Waterlands.

Glassites. See Sandermanians in this article.

Gnostics. — The name applied to the Rationalistic sects which flourished between the 2d and the 6th centuries. They rejected the literal translation of the Scriptures, held that God was unknowable, that Christ was a superior geon who had come to subdue the seon of this world, and insisted “that knowledge instead of faith was necessary to salvation. Extinct.

Greek Orthodox Church. — The name applied to the communion which since its separation from Rome has acknowledged the primacy of the patriarch of Constanti¬ nople.

Gymnosophists. — An ascetical sect of Hindu philos¬ ophers who lived as hermits that they might better devote themselves to silent contemplation. Extinct.

Hanafites. — The oldest of the four orthodox sects of Sunnite Mohammedans.

Harmony Society. — A communistic religious body composed of members of the German Pietist sect, the Separatists, which emigrated to the United States in 1803 and founded a colony in Pennsylvania, the model for which was the primitive church. After removing to Indiana in 1815, they returned to Pennsylvania in 1825, when they founded the township of Economy and the new village of Harmony. Communistic in character, they hold all property in common, discourage matrimony, and look for the early second-coming of Christ. See Harmonists.

Hattemists. — A sect founded in The Netherlands in the 17th century. Its members denied the expiatory sacrifice of Christ and held that sin can exist only in the Imagination. Extinct.

Henri cians.— A sect of religious reformers that originated in Switzerland during the 12th century. Extinct.

Heracleonites. — A Gnostic sect of the 2d century. Extinct.

Hicksites. — Those who followed Elias Hicks in his separation from the main body of the Society of Friends

in 1827. They deny the divinity of Christ and repudiate the doctrines of the Atonement and the Trinity.

High Churchmen. — Otherwise known as Ritualists. A designation applied to those members of the Episcopal Church who exalt the authority of the Church and give prominence to the sacerdotal aspect of the priestly office.

Hinduism. — The name applied to the modern religious beliefs which have developed from Brahmanism.

Holy Ghost and Us, Society of the. — Otherwise known as " The Church of the Living God." A sect wffiich, millennial in character, teaches the cure of disease by faith and professes to follow a literal interpretation of the Scriptures.

Holy Rollers. — A designation applied to a small sect because of the peculiar habits of its members who roll upon the ground during their religious ecstasies.

House of Israel. — An obscure sect of American millenarians.

Huntingdonians. — A sect of Calvinistic Methodists, congregational in policy, which was founded by Selina, Countess of Huntington, after her withdrawal from the Wesleyan communion.

Huntingtonians. — A sect founded by William Huntington, known as the "preaching coal-heaver," who laid great stress upon the doctrines of faith and indefectible grace. Practically extinct.

Hutchinsonians, American. — The followers of Mrs. Anne Hutchinson, who taught the Antinomian doctrines in the Massachusetts colony soon after its foundation. Extinct.

Hutchinsonians, English. — The followers of John Hutchinson, who, accepting the Bible as the source of all science and all philosophy, opposed the system of Newton and all other scientific theories that could not easily be reconciled with their belief. Extinct.

Independent Methodists. — A title assumed by several independent congregations of Calvinistic Methodists.

Inghamites. — A religious denomination founded in England in the 18th century by Benjamin Ingham, who taught a peculiar combination of Methodism and Moravian-ism. Extinct.

Irvingites. — Otherwise known as “ The Catholic and Apostolic Church.” A sect founded in 1831, its doctrines being based upon the teachings of Edward Irving, who held that by a new “outpouring” of God through the Holy Ghost the prophetic and apostolic offices had been re-established. Its ritual is very elaborate. _

Jacobites. — A sect of Christians in Asia, the members of which have remained true to the Monophysite doctrines. Its churches include three patriarchates, those of Antioch, Armenia and Alexandria.

Jains. — A non-conformist Hindu sect, the members of which believe that every object in the world, includ¬ ing plants and minerals, as well as men and animals, possesses souls.

Jansenists. — A school of thought established _ in the Roman Catholic Church by Cornelius Jansen during the 17th century. It has frequently been the subject of the condemnation of the ecclesiastical authorities.

Jerkers. — A name, usually a term of opprobrium, applied to those sects whose members are in the habit of indulging in violent exhibitions of religious fervor on the occasion of revivals or other special meetings.

Joachimites. — A mystical sect which existed until some time in the 13th century. Its members believed that the earth was passing through the third and last period of its existence and that a new gospel would soon appear to supersede the Old and New Testaments.

Julianists. — A sect in the 6th century. It held that the body of Christ was incorruptible. Extinct..

Jumpers. — A name which was first applied to the Methodists of Wales because of their peculiar actions during times of religious frenzy.

Kabbalists. — Those who are devoted to the Kabbala, or the theosophical or mystical philosophy of the Hebrew faith.

Kabirpanthis. — The followers of Kabir, a Hindu reformer, who denounced idol worship and preached that the only religion was devotion to one god, irrespective of the name by which that god might be known.

Karaites. — Otherwise known as “ The Karim,” or “ Scripturists.” A Jewish sect which adheres stricly to the Scriptures, rejecting the authority of the Kabbala as well as the Talmuds.

Kilhamites. — The name often applies to the followers of Alexander Kilham, the founder of the “ New Connection of Wesleyan Methodists.”

Labadists. — A sect of Christian communists which existed until the middle of the 18th century. Its members upheld the doctrines of Jean de Labadie, who taught that as life was a perpetual sabbath, the observance of a par¬ ticular day was unnecessary and that marriage as a holy ordinance was not valid unless both parties to it were believers, in which case the children of such unions were born without the taint of original sin.

Lamaism. — The Buddhism of Tibet, which teaches that the soul of Buddha is always present, reincarnate ■n the body of the Grand Lama.

Latter Day Saints. See Mormons.

Leonists. Same as Waldenses.

Lesghians. — A Mohammedan sect living in the Caucasus… .

Life and Advent Union.— A sect which is similar to regular Adventism except that it holds that the souls of the wicked are exterminated and will not be present with the saints at the day of resurrection. See Adventists.

Lollards. — Otherwise known as “ Bible men.” The followers of Wyclif in England during the 14th century. Extinct.

Low Churchmen. — The designation applied to that branch of the Episcopal Church, the members of which strive to avoid anything savoring of sacerdotalism and whose chief regard for the ministry and the sacraments is based upon their relation to the religious life of mankind.

Lucianists. — The members of a Marcionite sect which existed during the 2d century. They held that while some representation of the soul and body would appear at the resurrection the actual soul and body would not participate in that event. Extinct.

Lutherans. — Although there have been many changes in the various branches of the Lutheran Church since the days of Luther the doctrines wffiich he promulgated in the 16th century are the basis for the beliefs of all the sects which bear his name and which are now represented in almost every part of the Old and New Worlds. The title is also applied to all followers of that 16th century reform movement which cost the Roman Catholic Church so large a part of the Teutonic and Scandinavian con¬ stituency. See Lutheran Church in America.

Macarians. — A monothelitic sect founded by Macarius, patriarch of Antioch,. in the 7th century. Extinct.

Macedonians. — A sect founded by Macedonius bishop of Constantinople, in the 4th century. Its members denied the Godhead or distinct existence of the Holy Spirit, claiming that the supposed third person in the Trinity was no more than a divine energy which God had diffused through the universe. Extinct.

Malakanes. — A millenarian sect in Russia, the members of which reject all sacraments.

Mand/EANS. — An Eastern sect that has never extended beyond Persia and Arabia. Its members are known as " Disciples of Saint John the Baptist," and, from the Christian point of view, their Christology is of a most he¬ retical character.

Marcellians. — Followers of Marcellus, bishop of Ancyra, in the 4th century. They held that the Holy Spirit was merely an impersonal agency of God. Extinct.

Marcellinists. — A Gnostic sect of the 2d century. Extinct.

Marcionites. — An ascetic Gnostic sect of the 2d century. Its members rejected the Old Testament and denied both the incarnation and the resurrection. Extinct.

Maronites. — The ecclesiastical name for a Syrian tribe inhabiting the slopes of Lebanon. In the early days the Maronites followed the monothelite heresy, but, in 1445, they were reunited to the Roman communion, although they have continued to retain their own liturgical customs, just as they elect their own patriarch.

Martinists.— A school of religionists, or kind of pietist freemasonry, instituted by Chevalier Saint Martin. Among other peculiar doctrines the founder taught that man is antecedent to nature, having, existed in spirit, of the same essence as God Himself, prior to his existence in

body.

Massilians. — The members of a Semi-Pelagian school once numerous in France.

Materialists. — Those who hold that matter is the first and only principle and that mind is the derived result.

Melchites. — The name by which the orthodox Egyp¬ tians are distinguished from the Jacobites.

Meletians. — A 4th century sect, followers of Meletius, a schismatic Egyptian bishop. Extinct.

Men, The. — The name applied to a class of lay preachers who frequent the Scottish Highlands. They wear a dis¬ tinctive dress and are in direct opposition to the Kirk in all their ministrations.

Mennonites. — A general designation for those sects which were known as Anabaptists until the time of their reformation by Menno, in the 16th century. See Mennonites.

Methodists. — A general designation for those sects which are more or less the outcome of the institution of John Wesley's confraternity, in 1739. The parent sect was known as Wesleyan Methodists, but many other important branches have been organized since that time, including the Methodist Episcopal Church, Methodist Reformed Church, Methodist Protestant Church, Union American Methodist Episcopal Church, Methodist Episcopal Church South, Congregational Methodist Church, New Congregational Church, Primitive Methodist Church, Free Methodist Church, Independent Methodist Church, Methodist Connection and various African and Zion Methodist branches, which are composed of colored persons. See Methodist Churches of the World.

Michaelhahnites. — A pietist and millenarian sect organized by Michael Hahn after his separation from the Evangelical Lutheran Church of Wurtemberg. Extinct.

TABLE OF PERCENTAGES

CHRIST IANS 34.3%

NON-CHRISTIANS 65.7%

PROTESTANTS

CATHOLICS 23.9%

and

HINDUS

(Brahmanists)

BUDDHISTS

JEWS

TOTAL

Roman

Greek Orthodox

10.4%

16.5%

7.4%

9.9%

1.4%

18.2%

12.8%

8.4%

13.4%

.7%

.9%

100%

Copjright bj Rand MoNallj & Co.

i— n«— — — win ii Tim i i

Millenarians. — A general designation for those Christians who anticipate the early second-coming of Christ. There are many bodies of millenarians, all professing different doctrines, the more extreme asserting that the dead will finally be restored to life, including all its bodily pleasures, on earth.

Mohammedans. — The followers of the Prophet Mo¬ hammed, who began to propagate his faith in Arabia in 611. The name which was given to this religion by its founder was “ Islam,” one meaning of which is “ to submit wholly to God and to acknowledge Him only as Lord.” The entire Mohammedan faith may be briefly explained by reference to its two articles:. (1) “ There is no God but God,” and (2) “ Mohammed is His Prophet,” a proposition the acceptance of which makes every doctrine of divine authority.

Molinists. — There have been two sects which have borne the name of Molinists: (1) Those who agreed with Luis Molina regarding the doctrines of free will and pre¬ destination, and (2) the followers of Miguel Molinos, the Spanish mystic who taught the doctrine of the direct relationship between the soul and God. The latter were also known as Quietists. Both are extinct.

M on ar chians. — A designation applied to those who deny the distinction of persons in the Trinity.

Montanists. — A 2d century sect, the followers of which believed in the divine and prophetic inspiration of Montanus of Phrygia. Extinct.

Moravians. — Otherwise known as Moravian Brethren. A sect which occupies a theological position which is almost identically that of the Evangelical Lutheran Church. Formerly affiliated with the Taborites, it withdrew from the communion during the 15th century.

Morelstschiki. — A fanatical Russian sect whose practices are said to be in keeping with its name, which means “ self-immolators.”

Mormons. — Otherwise known as Latter Day Saints. A religious

system organized by Joseph Smith, who claimed to have found his inspiration in a “ Book of Mormon,” which he had unearthed and translated. The doctrines have been further extended by later revelations, one of which, the “ Celestial Law of Marriage,” which was promulgated in 1852, and which authorized the practice of polygamy, having resulted in a reform movement which brought about the secession of a large body of Mormons who assumed the name of the “ Reorganized Church of Jesus Christ of Latter Day Saints.” See Mormons.

Muggletonians. — An English sect founded in 1651 by Lodowick Muggleton and John Reeve, who claimed to be the two witnesses referred to in Revelations. They insisted that they were divinely inspired and taught many doctrines peculiar to themselves. Extinct.

Mystics. — The general designation applied to those who believe that a rapt soul may enter into union with the divine by means of ecstatic contemplation.

Naumbergers. — An obscure evangelical sect which carries the simplicity of its dress to such extreme as to use hooks and eyes instead of buttons.

Nazarenes. — A 4th century sect of Jewish Christians. While observing the Mosaic ritual they accepted the divinity of Christ and looked for his early second-coming.

Necessitarians. — A general designation applied to those who believe that a fixed and unchangeable law governs everything. .

Nestorians. — The followers of Nestonus, who denied the hypostatic union of the two natures in the one person, Christ. Two sects of Nestorians, the remnants of the once-powerful denomination, still exist, one in Turkey and Persia, and the other in India.

Netovtschins. — A sect of Russian dissenters who believe that antichrist has commenced the ruin of the Church and that all holiness is gradually being extinguished.

New Jerusalem Church. See Church of the? New

J ERUSALEM.

New Lights. — A designation sometimes applied to the Free Will Baptists and Separatists.

Niobites. — A monophysite sect which was finally absorbed into the orthodox communion. Its members held that the human nature of Christ was lost in its union with his divine nature.

Noetians. — The followers of Noetus, a 2d century heretic, who held that Christ was the actual embodiment of the Father and that it was the Father Himself who was bom and had suffered death on the cross.

-

Nonconformists. — A designation sometimes applied to various sects of Protestant dissenters.

Novations. — An austere 3d century sect which was absorbed by the Mother Church before the 6th century, its differences having been chiefly in regard to matters of church discipline.

Oahspe. — A sect of American vegetarians, extremely primitive in character. Its tenets prohibit divorce and second marriage and its members are not permitted to have

recourse to law. . , . ˆ

Old Catholic. — A movement inaugurated m Germany as a protest against certain dogmas of the Roman Catholic

Church. * .. , , y ,

Old Lutherans. — The name applied to those Lutherans

of Prussia who have refused to enter into affiliation with the United Evangelical Church.

Old School Baptists.— The name assumed by a religious sect which still maintains the strict doctrines of Calvinism.

Old Two-Seed-in-the-Spirit Predestinarians. — A strictly Calvinistic sect of American Baptists.

Omish Church. — The name applied to a strict sect of primitive Mennonites.

Ophites. — A Gnostic sect which held that the serpent that tempted Eve was the impersonation of divine wisdom.

Osiandrians. — The followers of Osiander, a 16th cen¬ tury

theologian who taught that the attainment of the essential righteousness of Christ was necessary to justification by faith.

Pantheists. — The members of a philosophical school which teaches that God is in everything and that everything is God.

Parsees, or Parsis. — The followers of Zoroaster, who founded the ancient religion of Media and Persia, about 1000 B.C.

Paulicians. — A sect founded in the 7th century, the members of which held that all matter is evil and that Christ had a purely ethereal body and suffered only in appearances. Extinct..

Peculiar People. — A sect which in almost every respect resembles the Dunkards.

Pelagians. — A sect which held that there was no original sin, but that each soul was created sinless and free. Extinct.

Peremayanoftschins. — A sect of Russian dissenters which requires the reordination of the clergy.

Perfectibilists.— A name applied to those who hold that absolute perfection is attainable during the present life.

Perfectionists. — The name assumed by an American sect established by John Humphrey Noyes, in 1845. In addition to teaching perfect holiness through complete reconciliation with God, its founder maintained the equality of the sexes and the community of goods.

Picards. — A sect suppressed in the 15th century because of alleged immoralities. They held that salvation was obtainable only through the restoration of man's primitive innocence.

Pietists. — A general designation applied to those who claim to be possessed of extreme piety.

Plymouth Brethren. — A sect which holds the two doctrines of Predestinarianism and Millenarianism and which does not maintain a separate ministry.

Pemorane.— A sect of Russian dissenters which has no separate ministry and which requires rebaptism of converts.

Popoftschins. — That branch of Russian dissenters which continues to maintain the office of priest, or " pope."

Positivism. — A modem school of skepticism, founded by Auguste Comte. As a religion, Positivism is nothing less than the worship of humanity; as a philosophy, it teaches that nothing should be accepted as true unless it can be positively demonstrated.

Predestinarians. — • A general designation applied to those who believe that each soul is predestined for heaven or hell from all eternity.

Presbyterians. — The name assumed by a denomina¬ tion which maintains that the ministry of the Church should consist of but one order, that of presbyters, or elders. Its creed, which has been Calvinistic since the establishment of the denomination, is now, in some places, in process of alteration.

Princeites. — A small English sect established in 1840 by Henry James Prince, who professed that his person represented a new dispensation of the Holy Ghost by which the dispensation of Christ was to be superseded. It is now practically extinct.

Protestant Episcopal Church. — The American repre¬ sentative of the Church of England, the denomination which led in the protesting reformation of the Roman Catholic Church in that country. In addition to its creeds it adopts the principles of the Thirty-nine Articles and makes use of the Book of Common Prayer. See Protestant Episcopal Church.

Puseyites. — The name sometimes applied to the High Church school in the Episcopal Church, from that of Dr. Pusey, who was one of the leaders in the “ Tractarian ” or ritualistic movement.

Pyrrhon ists. — The designation applied to that school of extreme skepticism which denied the possibility of attaining with certainty any absolute truth.

Quakers.— Otherwise known as Friends, or as the Society of Friends. A sect founded by George Fox. Its members reject all sacraments, possess a mixed but not settled ministry which depends upon the inspiration of the Holy Spirit for its utterances, and refuse to participate in wars or to take oaths. They also maintain a peculiarity of dress and a simplicity of speech which is quite in keeping with their life of peace and meditation. See Friends, The Religious Society of.

Quietists. — A designation often applied to a school of mysticism, the followers of which profess to resign them-

selves passively to what they regard as divine manifestations. The name is also applied to certain distinctive sects like the Bourignonists and Molinists.

Rappists. See Harmonists.

Rationalists. — Those who maintain that reason is the one test of truth in matters of religious faith and who are guided by this theory in their interpretations of the Bible.

Reformed Dutch Church. — The Reformed Protestant Dutch Church which was instituted in the Netherlands during the 16th century. In 1561 it adopted a confession of faith, known as the Belgic Confession, which was prepared by Guido de Bres, who took for his model the Calvinistic confession of the Church of France. This body was the first Reformed Church instituted in the American colonies.

Reformed Dutch Church, True. — A sect resulting from the secession of a party led by Rev. Sol Froeligh, in 1822. They held that the Reformed Dutch Church had become erroneous in doctrine, lax in discipline and corrupt in practice. During recent years the sect has gradually dwindled away although it is still in existence.

Reformed Episcopal Church. — Founded in 1873 as a church of the reformation, or as a protest against what it termed the errors in the position and practice of the Protestant Episcopal Church.

Reformed German Church. — That portion of the Protestant Church which, being unable to embrace either the teaching of Luther or of Zwingli, endorsed instead the Melanchthonian compromise.

Reformed Presbyterian Church. — Otherwise known as Cameronians. A sect founded in the 17th century as a protest against what its members regarded as the “ unworthy compromise ” of the Established Church.

Relief Synod. — A body of Scotch dissenters whose secession was the result of their opposition to the existing system of patronage.

Remonstrants. — A title applied to the Arminians f<?r the reason that they had called their creed, adopted in 1610, “ The Remonstrance.”

Restorationists. — A small sect the beliefs of which may be designated as Universalism in a modified form.

Ritualists. — ■ Another designation for High Churchmen.

Roman Catholic Church. — That body of Christians who look to the Holy See for direction in spiritual things. See Catholic Church.

Russian Orthodox Church. — The national Church of Russia. It differs in belief but slightly from that of the Roman Catholic Church, from which it separated about 1,000 years ago.

Ruthenians. — The members of the Ruthenian Church are converts and the descendants of converts from the Russian Church who now maintain obedience to the Pope in spite of the fact that they have never altered their ancient rites and discipline and still use the Greek liturgy, which they have translated into Old Slavonic. -

Sabbatarians. — Those who insist upon the strict ob¬ servance of the Sabbath as a tenet binding upon all Christians.

Sabbatians. — A 4th century sect the members of which adopted the Quartodeciman rule. Extinct.

Salvation Army. — A quasi-military organization formed to promote the revival of religion among the masses. It was organized in England, about 1865, by William Booth, a Methodist evangelist. At that time it was known as the Christian Mission, and it retained the title until 1878, when it was changed to that of the Salvation Army. Its theo¬ logical position is thoroughly evangelical.

Samokrischtchins. — A name which signifies “ self-baptizers,” and which as applied to a sect of Russian Christians indicates its theological peculiarity.

Sand emani ans. — A denomination founded in the 17th century by Robert Sandeman, a disciple of John Glas. Its members maintain a community of goods; abstain from blood meats . and from things strangled, and participate in ove feasts and a weekly communion.

Satanists. — The members of a strange sect which worships and prays to Satan not only because of his present power to do evil, but on account of his future power to do good.

Schwen ckfeldi ans. — A sect of German anti-sacramen- talists founded at the time of the Reformation by Casper Schwenckfeld.

Scottish Baptists. — A .sect which differs from other Baptists only by being more congregational in government and having a somewhat stricter form in discipline.

Scottish Kirk. — ■ The Established Presbyterian Church of Scotland, which, founded on the ruins of the ancient Scottish Church, in the 16th century was adopted as the National Establishment by act of Parliament.

Second Adventists. See Adventists; also Millenarians in this article.

Secularists. — The term Secularist is most generally applied to the members of that school of skepticism which holds that man should devote his attention only to the duties and interests of this world.

Seleucians. — Followers of Seleucus, who rejected baptism by water and who taught that there would be no resurrection of the body. Extinct.

Seventh-day Adventists. — The most primitive form

of Adventism, its members practising many of the ancient Christian rites. See Adventists.

Seventh-Day Baptists. — A sect which differs from other Baptists chiefly in the observance of Saturday, or the seventh day of the week, as its day for rest and worship.

Shafiities. — A Mohammedan sect, one of the four branches into which the orthodox sect of Sunnites has been divided.

Shakers. — A sect of American millenarians founded in 1776 by Ann Lee. Although it does not impose celibacy as a necessary rule of life, married couples are not permitted to live together in its communities.

Shaktas. — A Hindu sect, the members of which worship the divine power under its female representation.

Shiaha. — A Mohammedan sect which claims to be the one orthodox branch of the religion because they accept Ali, the first cousin of Mohammed, as the successor to the prophet, rejecting the other caliphs who are accepted by the Sunnites.

Shiites. — One of the two great divisions of Moham¬ medanism. Its

doctrines are directly contrary to those of the orthodox sect, the Sunnites.

Shintoism. — The state religion of Japan. It teaches the existence of both good and evil gods.

Sikhs. — A sect founded in India, about 1500, upon principles of monotheism and human brotherhood. See Sikhs.

Six-Principle Baptists. — The oldest sect of American Baptists. Its doctrines are founded upon the “ six princi¬ ples ” mentioned in the first three verses of the sixth chapter of the Epistle to the Hebrews: (1) Repentance from dead works; (2) faith toward God; (3) baptism; (4) laying on of hands; (5) resurrection of the dead, and (6) eternal judgment.

Skoptzi. — A fanatical sect of Russians. Its members practise severe penances, including, it is said, self-mutilation.

Smartas. — One of the three great divisions of the Hindu religion.

Society of Friends. See Friends, The Religious Society of.

Socinians. — The followers of Socinius, who denied the divinity of Christ and the atonement, who rejected the sacraments and the authority of the Scriptures, and who held that the soul of man was born pure.

South cotti ans. — The followers of Joanna Southcott, who professed to be the inspired woman of Revelation, who was predestined to give birth to the new Messiah. Although she died of dropsy io days after the date on which, as she had predicted, this event was to occur, her disciples maintained their faith in her supernatural gifts, and the sect still exists in small numbers in England.

Spiritualism. — A religious body composed of those who believe that it is possible for man to hold communica¬ tion with the spirits of the departed.

Starovertzi.— A designation applied to those who refused to participate in the ecclesiastical reforms intro¬ duced in the Russian Church in the 17th century. The name signifies the “ men of the ancient faith.”

Sunnites. — The name applied to the orthodox Moham¬ medans who constitute the largest sect of the Moslem world. Its members accept

the books of Sunna, said to be the verbal utterances of Mohammed, as well as the Koran, as the sources of doctrine. See Sunnites.

Swedenborgians. — Otherwise known as the Church of the New Jerusalem. A religious system promulgated by Emmanuel Swedenborg, who taught that the last judg¬ ment had taken place in the year 1757, when the " Old Church," or Christianity had given place to the new dis¬ pensation as represented by the " New Church " of Swedenborg. See Church of the New Jerusalem.

Syrian Church. — A religious body still under obedience to the Pope. Its members continue to maintain the ancient Syriac rites, which are common alike to the Jacobites and themselves.

Taborites. — The members of one of the most extreme parties of Hussites.

Taoism. — The materialistic religion of China.

Theists. — Believers in a personal Creator and Divinity, however conceived as related to man. The term is used as contrasted with Deists; Deism being the belief in a divine principle, not a personality.

Theosophists. — Those mystics who affirm that they are admitted to a knowledge of the mysteries of being, on the side of nature as well as upon that of religion, by means of an internal and supernatural illumination. One of the most modem applications of the word is as a designa¬ tion for the followers of *Mme.* Blavatsky.

Traskites. — An early name for the Sabbatarian Puritans.

Tubingen School. — A name applied to a certain rationalistic school of philosophy, the members of which questioned the credibility, integrity and reliability of the New Testament.

Ultramontanists. — From a Roman Catholic point of view this name is applied to those who believe that the Pope is supreme spiritual ruler over every part of the Christian Church.

Unitarian. — A name applied to those who deny the

distinction of persons in the Trinity and who hold that they in themselves only hold, in its true sense, the Unity of God.

United Brethren. — Otherwise known as United Brethren in Christ. A sect whose present doctrinal position is quite similar to that of the Moravians. Although never officially instituted it grew out of the attempt of William Otterbein to found a church that would unite the various Presbyterian sects as one body of Christians.

United Presbyterians. — A body composed of two sects of Scotch dissenters, the Associated and the Relief synods.

Universalists. — Those who believe in the ultimate salvation of all mankind.

Utilitarian. — A designation applied to those who hold that man's actions derive their character, in a moral sense, from their consequences.

Vamamargis. — The name applied to those persons who, in Hinduism, worship the female side of the dual nature of Vishnu.

Volunteers of America. — An offshoot from the Salvation Army resulting from a misunderstanding between the leaders of the two bodies. As in the Salvation Army both sexes participate in its meetings, and, like the older body, while it has no formulated creed, it is thoroughly evangelical.

Wahhabees. — Followers of Abd-el-Wahhab, a Moham¬ medan reformer of the 18th century. They strenuously oppose all practices not absolutely sanctioned by the Koran.

Waldensians. — A reforming body of Christians, the members of which participated in the Reformation. A Waldensian church now existent in Italy numbers more than 20,000 members.

Waterlanders. — A sect of Mennonites, similar in doctrine but less rigid in discipline than the main body.

Wilburites. — A branch of the Society of Friends who followed John Wilbur in his protests against the actions of the Society in abandoning its original principles.

Wilkinsonians. — A 19th century American sect the members of which accepted the statements of Jemima Wilkinson, who asserted that she was divinely inspired, having been raised from the dead.

Yezeedees. — An ancient sect of unknown origin. Its members form a tribe of individual nationality located in the neighborhood of Mosul. They not only belie ye in God but also in Satan, whom they recognize as the chief of the angelic hosts. Admitting that he is suffering punish¬ ment now, they believe that he will eventually be restored to his originally high station. As the result, like the Satanists, they believe that it is right for man to pray to him.

Zanzalians. — A designation applied to the Jacobites of the East.

Zoarites. — The name applied to a sect of American Lutherans.

Zoharites. — A modern Jewish sect which takes its name from the Kabbalistic book of Zohar, which is held in great veneration.

Zoroastrians. See Parsees.

John R. Meader.

RELIGIOUS SOCIETIES. See Orders,

' Religious.

RELIGIOUS SYMBOLISM. Wolfgang Menzel (1854) wrote (<The picture is holy, same as the Word. The Savior himself spoke pictorially. The picture is as powerful as the word and more penetrating than words. The world was more pious while Christian symbol¬ ism was in vogue ; laymen and priests were bet¬ ter trusted as long as everyone understood the pictures with which Art decorated the Church.

… The world was more pious while it knew which symbol belonged to each season, yes, to each day of the year and that connected with the name of his Patron ; while they yet recog¬ nized the symbolism of natural phenomena every season, and even that of the animals, plants and stones, as the signature of the Holy One in all Creation.® We can call religious symbolism (when inspired) revealed or inter¬ pretative religion, or, as Hugo of Saint Victor (who developed Christian symbolism so greatly) says : <(A symbol is the comparison of the visible forms for the showing forth of the invisible.® Faced by the powers of the ele¬ ments, fire, water, earth, lightning, etc., it soon became the natural instinct that primitive man should revere, fear and

worship these ac¬

tive (live) elements as conscious entities and that nature should take on in the primaeval brain a nomenclature easiest defined in symbol form. Hence the earliest religion and the earliest symbolism may be reasonably con¬ sidered as one and the same thought-develop¬ ment of man. All through the evolution of the religious cults from time immemorial we will find the worship of the sun and light up to the present day in some form, open or occult. To the primitive man the warmth and productive power in nature of the sun's rays has been looked upon as a beneficent agent; and light, which dissipates the hidden dangers of night or darkness, has naturally ever been held in human regard as a friend and defender of humanity against evil. The primary consider¬ ation of light brings flame to recognition, and we learn that the ancient Persians (as well as modern Parsees) reverenced flame as son of Ormuzd; in Rome flame was kept pure by the pure daughters (vestals) of the leading fami¬ lies; in Israel the Jews kept watch over it to dispel darkness and the inherent evil spirits. Fire was the Assyrian as well as the Germanic test of purity of those accused of evil ; fire ap¬ pealed as purifying agent on the sacrificial altar since and probably during prehistoric times. For the candles on our altars are but a con¬ tinuation of those displayed in the seven-branched candlestick in King Solomon's temple. The altar, the Latin altare (from alte, high) was any kind, of an elevation on which to sacrifice, and the hill or mountain summit was preferred on which to erect it. Nearest to heaven, the mountain height has always been a reverenced symbol the world over, whether it be Mount Olympus of the Greeks or Fuji Yama of the Japanese, while the Christian devotee selects Mount Athos and other heights on which to live in prayer, and the sacred char¬ acter of Mount Lebanon comes up promi¬ nently to mind.

The source of origin of religious symbolism can be definitely placed in the Orient, the birth¬ place of all occultism, for the primal elements of occultism are due to the study of the cosmic laws, the world's circumambient physical and spiritual powers and the part man could take in their control. The natural development and progress in such study brought the visible uni¬ verse into its realm, and the planets found their place in the curriculum. Astrology gave the laws of astral motion, their cause and their power over the human race. Closer investigation evolved the science of mathe¬ matics and geometry — always as corollary and indivisible part of cosmic philosophy with symbolism as a large portion of its language. The science of medicine was an outgrowth from the master mind of Aristotle and such fol¬

lowers as Galen, Ibn Sina, Paracelsus, *etc.* Diagnosis included the functional powers of the sun, moon and planets, and idol worship of the untrained mind of the pagan was an act of gross materialism and misunderstanding of the occult purpose of symbolism as divine in¬ terpretation.

Harking back to the first stages of occultism and knowledge we get to Buddhist symbolism with its wheel, bowl, yellow robe, *etc.* Chinese history tells us how early the heavenly bodies received the attention of scholars and how the

knowledge brought into practice hidden powers of man. Then westward came the initiated and taught their disciples the mystic religion. The Chaldeans transmitted the teachings to the Egyptians. Greeks and Romans adapted their religious tenets to the Oriental pantheology and philosophy. Early Occidental masters of symbolism were Thales of Miletus (6th century b.c.) , the founder of the Ionic sect of philosophers ; Anaxagoras, Archelaus, master of Socrates, *etc.* The Jews soon absorbed the study of astrology with its planetary signifi¬ cance and zodiacal mystic rulings, the symbolic value of numbers (Kabala), *etc.* As an Eastern people they were naturally early imbued with a symbolic system, and the Mosaic plan fre¬ quently discloses the fact in the Old Testa¬ ment, but we must remember the Egyptians (under whom the Jews had dwelt for so many years) were, in their cult, symbolists. The cult of Judaism has been said to have been built on a monotheistic and ethical basis ; not like others, on natural religion and on physical and cosmic hypotheses. A learned Jewish rabbi (Samson Hirsch) declares that the purpose of Biblical symbols is not to veil the mind or to lay down secrets that are puzzles to be eluci¬ dated, as is the case with other religions, but, on the contrary, to make plainer the inner meaning in the rendering of which the mean¬ ing is mostly declared in words added to the expression. Of such symbols might be men¬ tioned the rainbow, S}Tnbol of the pact be¬ tween God and man ; innumerable stars, symbol of the promised riches of Israel; stone and ladder of Jacob's dream; prohibition of eating the hip sinew, in everlasting memory of the struggle with God ; the commandment to take off the shoes; the blood of the Paschal lamb; shearing of the Levites' head ; washing and bathing rites, anointment, laying on of hands, *etc.* For in their liturgical ritual, as with those of former and later cults, the sacrifice of burnt offering on the altar has always been symbolic of self-abnegation ; the burning of incense, symbol of devout prayer reaching to heaven, and so on. With their rigorous sect of Essenes we can recognize, in their peculiar ritual of apparent worship of the rising sun, a physical expression of symbolic reverence, for they seem to have considered the Torah as entirely sym¬ bolic in all its text.

In the claim, by some few, that John the Baptist was an Essene, we come to the early Christians and the Gnostics. Pythagoras (6th century b.c.), with a knowledge gained (accord¬ ing to ancient claims) by years of actual resi¬ dence and deep study among the Egyptians,

Phoenicians, Chaldeans, Jews, Arabians, Gallic Druids, Persian Magi and Indian Brahmins, founded at Crotona a religious brotherhood for the reformation of society, besides the study of philosophy. The science of numbers (mathe¬ matics and astronomy) was the basis of theo¬ retical teaching developing into numerical sym¬ bolism and the displaying of dots as units in symmetrical patterns (as on our dice and dominoes), each pattern group becoming a symbolic unit and thereby becoming the es¬ sence of cosmic substance and symbols of such. Later the philosophy of Aristotle (4th century b.c.) with its ethics gave much impulse to the cults, and out of the teachings of these great Greek master minds, with such links in the

propaganda of mystics as Basilides, Marcion, Valentine, Heracleon, Ptolymeus, Apelles, etc., flourished gnosticism. Thus we get such sects as Ophites, Cainites, Sethians, *etc.* Thus we have in the first three centuries or more of the Christian era a symbolic cult supposed to cover the entire knowledge of religious sublime prin¬ ciples. In 325 a.d. the religious usage of symbolism was interdicted, but Byzantine churches followed a symbolic ritual containing much* of the ancient Oriental mystic wisdom. The symbolism of the Moslem doctrines and architecture has been claimed as being taught to Mohammed by his Jewish secretary, who in turn gained initiation from the Aristotelian school. The cult of Sufism, with its deep occult symbolic learning, is found practised by its adherents in the land of the Moslem. The symbols of the pagan and those of the early Christian Church, as Harnack says, (<were never mere signs, but always embodied a mystery.® Hence water may be a symbol of cleansing power but the priestly blessing of the water incor¬ porates the mystic value into the water; the bread and the wine are symbols of the Flesh and Blood, but the ritualistic sanctification pro¬ duced the embodied Eucharist. Great teachers of the Christian symbolism were Hugo'of Saint Victor (12th century), Durandus (13th cen¬ tury), *etc.* Much of the symbolic ritual of the Christian Church in Europe was brought from the Orient by the Crusaders, who imbibed their knowledge from Jew, Moslem and other sects that they encountered. And the persecution of the Knights Templar, early in the 14th century, for idolatry was based on rumors of their Oriental symbolic ritual held in mystic secrecy, no doubt, while the real incentive was jealousy of their power and the desire to grasp their $30,000,000 annual income derived from some 9,000 rich estates. Included in the ritual and architecture of the Roman as well as the Greek Catholic Church are most of the Oriental occult branches of symbolism, often deviating in form or inter¬ pretation. Thus we find a very thorough sys¬ tem of the symbolism of numbers, of colors, . of

flowers, of animal representation of the Evangelists (Luke as lion, John as eagle, etc.). The priestly vestments are given symbolic form, even the instruments of ritual, as the crozier (taken from the pagan bacillus, badge of the cynic philosophers) of episcopal office. But re¬ stricted space forbids discussion of symbols and their interpretation in this article dedicated to the history of religious symbolism. More in¬ formation on several symbols will be found un¬ der titles Symbolism, Dove, Dolphin, Dragon, Eagle, Colors, Lamb, Lion, Dog, Heart, Devil, Rose, Vine, *etc.*

Bibliography.— Allen, J. R., < Early Chris¬ tian Symbolism in Great Britain and Ireland before the 13th Century) (London 1887) ; Auber, C, (Histoire et theorie du symbolisme religieux avant et depuis le Christianisme) (Paris 1870-71); Audsley, W. J. and G. A.

(Handbook of Christian Symbolism* (London 1865) ; Baur, F. C., (Symbolik und Mythologie* (Stuttgart 1824) ; Collins, A. H., (Symbolism of Animals and Birds represented in English Architecture) (London 1913) ; Creuzer, G. F., (Symbolik und Mythologie der alten Volker besonders Griechen> (Leipzig 1836) ; Ditch-field, P. H., (Symbolism of the Saints) (Lon¬ don 1910) ; Durandus, W., (The Symbolism of

Churches and Church Ornament* (Leeds 1843) ; Evans, E. P., (Animal Symbolism in Ecclesias¬ tical Architecture; with a biography* (New York 1896) ; Faye, E. de, (Gnostiques et gnos-ticisme* (Sciences Religieuses, Vol. XXVII, Paris 1913) ; Goldsmith, E. E., (Sacred Sym¬ bols in Art* (New York 1912) ; Howard, M. F., (A Study in Symbolism* (London 1916) ; In¬ man, T., (Ancient Pagan and Modern Chris¬ tian Symbolism* (New York 1875) ; Jenner, K. L., (Christian Symbolism* (London 1910) ; Jones, E., (The Theory of Symbolism* (British Journal of Theology, London 1919) ; Kahn, G., (Les origines du symbolisme* (La Revue Blanche , Vol. XXVI, Paris 1901) ; Landriot, F. A. T., (Le symbolisme* {Paris 1891) ; Men-zel, W., (Christliche Symbolik* (Regensburg 1854) ; Niewbarn, M. C., (Church Symbolism* (translation by Rev. J. Waterreus, London 1910) ; Portal,

P. S. F. de, Baron, (Des couleurs symboliques dans l'antiquite, le moyen age et les temps modernes* (Paris 1857) ; Schles-inger, M., (Geschichte des Symbols* (Berlin 1912) ; Silberer, H., (Probleme der Mystik und ihrer Symbolik* (Vienna 1914) ; id., translation of same by Smith, E. J., (Problems of Mystic¬ ism and Symbolism* (New York 1917) ; Tyr-whitt, R. Saint J., (Christian Art and Symbol¬ ism* (London 1872) ; Twining, L., (Symbols and Emblems of Early and Mediaeval Chris¬ tian Art* (London 1885).

Clement W. Coumbe.

RELIQUARY CROSSES. See Crosses and Crucifixes.

RELIQUES OF ANCIENT ENGLISH POETRY, an anthology of old English bal¬ lads and other verse first published in 1765 by Rev. Thomas Percy (q.v.), vicar of Easton Maudit, Northamptonshire, who later became bishop of Dromore, Ireland. During a visit at the house of his friend Humphrey Pitt at Shifnall, Shropshire, he rescued from the hands of a housemaid, who was about to use it to light a fire, an early 17th century folio manu¬ script, which had been Hying dirty on the floor under a bureau in the parlour.** At the sug¬ gestion of William Shenstone he made it the basis of the collection of English ballads, re¬ vised and edited in the best taste, which be¬ came famous as (Reliques of Ancient English Poetry.* This anthology has been called (<the bible of the Romantic movement.** Breathing the primal emotions of folk-poetry it created an entire change in the poetic spirit of the age and in a rebound from classical to human ele¬ ments gave a more natural and virile tone to English verse which found its best exemplifi¬ cation later, in the ballad literature of Scott, Campbell and Coleridge, its influence also ex¬ tending to German literature. Named in honor of Bishop Percy, the Percy Society (1840-52) was founded for the purpose of publishing old English poetry, by a group of scholars includ¬ ing Alexander Dyce, Halliwell Phillips, John Payne Collier and Thomas Wright. Edited in complete form by Hales, J. W., and Furnivall, F. J., the original Eolio Manuscript* appeared in 1867-68. Besides the early editions of the Eeliques,* including the 4th edition by the bishop's nephew, Thomas Percy (1768-1808), several editions have appeared. Of late date are those of Wheatley, H. B. (London 1891;

New York 1910) ; and the edition of Every¬ man's Library* (New York 1906).

REMAINDER is defined in law as an es¬ tate which commences after the determination of another estate in the same property, which has previously been limited by the same con¬ veyance. A remainder becomes vested when¬ ever the preceding estate is limited so as to de¬ termine on an event which must certainly hap¬ pen. It is the present right of one to the future enjoyment of an estate, which right takes effect on the determination of the preceding estate. Contingent estates usually give rise to con¬ siderable doubt. The intention expressed in the instrument by which the contingent estate is created' governs. Contingent remainders are defined by statute in some States. A simple exposition of the legal character of the term is: If a man in unrestricted possession of lands grants them to A for a specified period, and, after the end of that period, grants them to B and his heirs forever, A is the tenant for the period, with remainder or reversion to B.

REMBANG, rem-bang', Java, a seaport and the capital of a residency of the same name, on the north coast, west of the river Rembang, and 60 miles west-northwest of Samarang. Its well-protected harbor is one of the best in the island. It has a good trade in ship-timber, earthenware, paper, gold and silver work and in shipbuilding and near it are valuable salt¬ pans. The town contains a Protestant church, government school and an institute for girls. Pop. about 15,000.

REMBRANDT, rem'brant or -brant (full name written Rembrandt Harmensz van Rijn or Ryn), Dutch painter and etcher: b. Leyden, 15 July 1607 ; d. Amsterdam, 8 Oct. 1669. He was the son of a miller settled in Leyden; and an early shown disposition toward the life of an artist caused him to be taken from the Latin School, at an early age and put into the studio of a Leyden artist who took pupils. In 1622 he was sent to a studio in Amsterdam. In 1623 he seems to have been working as an artist and there is a signed and dated picture of (Saint Paul in Prison* in the Stuttgart Gallery, which is his earliest piece with an ascertained date. By 1630 he was settled in Amsterdam and in 1634 married Saskia van Ulenburgh, who lived with him only eight years, leaving one son, Titus. Saskia had property; and her death caused confusion in Rembrandt's affairs because of her will leaving all of this property to Titus, with only a life interest to her husband, while in the meantime Rembrandt's affairs had been in a bad condition. In 1656 he was finally sold out as a bankrupt. It is not perfectly known why the very prosperous painter who, in his early manhood, had a great deal of work to do as a portrait painter (always a profitable branch of the art),* and whose etchings sold remark¬ ably well, should have become so straightened in his circumstances. It is known that he bought very freely, surrounding himself with works of

art of all kinds, of which he was a constant and diligent student and by means of which he gave himself that knowledge of the world which he did not obtain from travel, as it appears that he never crossed the frontiers of the United Provinces. It is also asserted that a certain change in popular taste left him at one side while it followed men whom we now deem

greatly his inferiors in artistic power. He had many pupils and many assistants and even the interruptions caused by death and by loss of fortune do not seem to have checked the great production of his work, for between the time of his bankruptcy and the time of his death,

13 years later, he was as busily engaged and his * work was fully as important as at any former time. The mention of a few works of art with their dates in the course of this article illustrates this fact sufficiently well.

At a very early date Rembrandt's style as a painter was fixed. It is extremely original, founded on the work of no other artist of any school, based upon a strong perception of the beauty and value of pure light and shade m nature and in art. In one sense he was a great colorist, namely in that he conceived a painting as strictly the result of a disposition and com¬ bination of the hues and tints, treating all his work with as complete a color-scheme as that used by the great Venetians. There, is this pe¬ culiarity, however, that Rembrandt s coloring is sombre and reaches its highest achie\ ement in combinations of browns and grays with but few passages of primary color or of those hues which approximate to primary color. A blue sash may appear in a portrait and its effect of pure, bright color may be led up to and assisted by the glimmer of steel and the warm yellow¬ ish-brown of a buff coat; but as a general thing these effects are not his happiest achievements as we see the pictures now, and those are the most delightful to us in which he departs the least from his accustomed gravity of tone. There is a certain disappearing of the subject in blackness which is very disagreeable to many lovers of painting; and it is hard to form a con¬ ception of how far this had been the result of time producing changes in the pigments. Mean¬ while the effect of a brilliantly modeled head coming to light from a profoundly gloomy background and helped by the painting .of cos¬ tume similarly relieved by light colors upon darkness, is very pleasing to many students ; and apart from his obviously surpassing ability, Rembrandt is a delightful painter to many ardent lovers of the art of painting. To paint¬ ers by profession Rembrandt must always be one of the men whose work commands the highest respect.

"His power of characterization is not con¬ fined to painting and his small etchings drawn upon copper in a few straggling lines have as

much of it, according to their subject, as the largest pictures. This power of characteriza¬ tion lifts him almost out of the category of the painters of his period. . When he has character to express, either of an individual or of a race of men, he does it with a touch and an evi¬ dence of thought entirely his own. < It may sometimes take a disagreeable, even an ignomin¬ ious appearance and his drawing in a given case may not be dignified or refined or even truthful; while yet the significance of the state¬ ment he wishes to make remains uniformly dis¬ tinct and positive…

Among his most important paintings are the < Saint Paul in Prison,' in the Stuttgart Gallery, signed and dated 1627 ; the portrait of a man at Windsor Castle, signed and dated 1631 ; the portrait of his brother in the Berlin Museum, lhat of himself in Buckingham Palace and that of an old woman in the Hermitage collec¬

tion near Petrograd; (The Supper at Em-maus,' in the Louvre; and 'The Lesson in Anatomy,' at The Hague. There are two magnificent portrait groups, one of his middle life and one of his more advanced age; the Night Watch, ' in the Amsterdam Museum, signed and dated 1642 and 'The Syndics of the Clothmakers' Company,) in the Amsterdam Museum, signed and dated 1661.

Of his etchings the number is so very great and the enthusiasm which they have excited among great classes of collectors and students during the 19th century is so intense, that it is very hard to name even a few characteristic specimens. The prices which they fetch at auc¬ tion or at private sale are enormous (several thousands of dollars in many cases), though price is not always proportionate to merit, as rarity has much to do with this detail. Fhus the famous (Three Trees' (1643), of which a fine copy is worth as much money as a large oil painting by a modern artist and the won¬ derful portrait of the burgomaster Six' are not necessarily as much better than other and less costly prints as their price would indi¬ cate. Their faultless work, however, is the main consideration and the portrait of Six must always be of extreme value when in fine con¬ dition, because the closely worked etching has caused the plate to suffer from use — there can never have been more than 40 or 50 impres¬ sions of great brilliancy. During his life and during the 18th century the so-called Hun¬ dred Guilder print, (Christ Healing the Sick,' was the most famous ; and since that time the etching, slight and but little worked over, (The Death of the Virgin' (1639), is one of the most admired by artists of all Rembrandt's work in black and white; the wonderful portrait of the

<Goldweigher' (1639), that of the preacher Uijtenbogaert (1635), the famous Dr. Faustus, dated 1648, and several of the landscapes, especially the (Cottage with the Great Tree,' and the magnificent (OmvaP dated 1645, are all etchings which are unsurpassable even among Rembrandt's own works.

The most complete book on Rembrandt, that of C. Vosmaer, (Rembrandt, sa vie et ses oeuvres' (1877), has furnished most writers since that time with their facts. A more re¬ cent work of great extent and thoroughness is that by Emile Michel, translated into English as ' Rembrandt, his Life, his Work, his Time' (London 1894). This book is elaborately illus¬ trated. Small biographies by Knackfuss (1899), Malcolm Bell (London 1899), Neumann (1900), some of them well imagined, are contained in the different series of Artists' Lives. The etch¬ ings form a continual study and besides the famous work of Bartsch (1797), which is con¬ tinually referred to, there have been works by ' Charles Blanc (1880) and Dutuit. The best recent works on the etchings are that by Rovin-ski (3 vols., Saint Petersburg 1890) and that by Hameston (London 1904). His complete etched work has been reproduced in admirable photogravure by Armand-Durand. The Eng¬ lish etcher and student of etchings, Sir Francis Seymour Haden, has published a small book on Rembrandt's etchings, (The Etched Work of Rembrandt' (1879-80), in which there is a care¬ ful investigation of the authenticity of some which may be thought to be by students or imi¬ tators. Consult also Bode, Wilhelm, 'CEuvre de

From the original painting by himself

>

.

‘

Rembrandt) (8 vols., Paris 1897), with repro¬ ductions of all paintings ; Blanc, A. A. P. C., (L’CEuvre complet de Rembrandt, decrit et com-inente) (2 vols., Paris 1861); La Farge, John, in (Great Masters) (New York 1903) ; Michel, F. E., (Rembrandt Harmensz van Rijn: A Memorial of his Tercentenary > (New York 1907) ; Hare, T. L., (Three Great Portrait Painters) (ib. 1909) ; Holmes, C. J., (Notes on the Art of Rembrandt* (London 1911); de Groot, C. Hofstede, (Die Urkunden iiber Rem¬ brandt* (The Hague 1906).

REMEDIOS, ra-ma’t’he-os, or SAN JUAN DE LOS REMEDIOS, san hoo-an’ de los ra-ma’t’he-os, Cuba, town, Santa Clara province, 32 miles east of the town of Santa Clara. It is four miles from the north coast, but is con¬ nected with its port, Caibarien, by rail, and also with the important towns of the island to the west. It is in a fertile region and carries on a good trade. Pop. 21,573.

REM E N SNYDER, rem’en-sm”der, Junius Benjamin, American Lutheran clergy¬ man : b. Staunton, Va., 24 Feb. 1843. He was graduated from Pennsylvania College, Gettys¬ burg, in 1861 and from its theological depart¬ ment in 1865. He served in the Union army in 1862-63, was ordained in 1865 and held im¬ portant pastorates at Philadelphia, Savannah and New York, and originated the movement which resulted in the adoption of a common service ritual in all American Lutheran churches, and became president of the General

Synod of Evangelical Lutheran churches in the United States in 1911. He published (Heavenward* (1874); (Doom EternaP (1880); (Work and Personality of Luther *(1884) ; (Six Days of Creation) (1886) ; 'Lutheran ManuaP (1892) ; v The Atonement and Modern Thought* (1905) ; 'Mysticism* (1908) ; (The Post-Apostolic Age and Current Religious Problems) (1910) ; (Eucken and the Problem of Life* (1913) ; 'What the World Owes Luther* (1917).

REMENYI, re'man-ye, Edouard, Hun¬ garian violinist: b. Heves, 1830; d. San Fran¬ cisco, Cal., 15 May 1898. He studied violin at Vienna under Joseph Bohm. For his part in the insurrection against Austria in 1848 he was obliged to flee from Hungary. He came to the United States in 1849, but returned to Europe a few years later and in 1854 was ap¬ pointed solo violinist to Queen Victoria. He returned to Hungary in 1860 under the amnesty, attained great fame and was appointed solo violinist to the emperor of Austria. In 1865 he began a professional tour of Europe; in 1878 returned to the United States, where he spent much time until his death. He made a second concert tour around the world, begun in 1886, and a tour in Canada in 1891-92. He possessed a high technical mastery of his in¬ strument.

REMIGIUS, re-mij'us, Saint, the great apostle of the French nation: b. Laon, Picardy, 438; d. Rheims, 13 Jan. 533. He was appointed bishop of Rheims when only 21 years old. He it was who baptized Clovis, the founder of the French monarchy, who had been converted to Christianity chiefly through the influence of his queen, Clothilde. The ceremony took place amid imposing surroundings on Christmas Day, 496. Through the example of the king and the untiring exertions of Remigius almost the

whole of Gaul was Christianized in the lifetime of the latter. Consult Migne, 'Patrologia Latina, *Vol. LXV (which contains some of the bishop's letters) ; Aubert, (Vie de Saint Remi> (1849). Other letters are preserved in the 'Bibliotheca Patrum,* and two documents, en¬ titled <Testamenta,) the genuineness of which has never been fully established.

REMINGTON, Frederic, American artist and author: b. Canton, N. Y., 4 Oct. 1861; d. Ridgefield, Conn., 26 Dec. 1909. He studied at Yale Art School and the Art Students' League, New York, and later went west where, as cowboy and stockman on a ranch, he gathered the material that made him a success in scenes of frontier life. He contributed to the leading magazines and periodicals scenes of Western military and

Indian life, and also events of the Cuban War of 1897-98. Few illustrators have drawn the horse with so much character and lifelikeness. He produced several sculptures, such as 'The Broncho Buster* and 'The Wounded Bunkie.* As author and illustrator he produced (Pony Tracks *(1895) ; 'Crooked Trails) (1898); (Frontier Sketches*; (John Ermine of the Yellowstone) (1902) ; (The Way of an Indian *(1906). As artist and illustrator he produced (An Impression from the Pony War Dance) ; (The Last Lull in the Fight* ; (The Advancer, or the Military Sacrifice* ; 'The Arrival of the Courier* ; (A Buck Jumper, > *etc.*

REMINGTON, Joseph Price, American pharmacologist : b. Philadelphia, Pa., 26 March 1847; d. 1 Jan. 1918. He was graduated from the Philadelphia College of Pharmacy in 1866, was professor there from 1874, dean from 1893, and in 1877-1915 was director of the laboratory. He became a member of the revision committee of the United States Pharmacopoeia in 1880, and since 1901 has been chairman of the com¬ mittee. He edited the 'United States Dispen¬ satory) (1883-1909) ; (Lippincott's Medical Dic¬ tionary* (1897); 'United States Pharmacopoeia* (1890, 1906, 1913). He wrote 'Practice of Pharmacy) (1886).

REMINGTON, Philo, American inventor : b. Litchfield, N. Y., 31 Oct. 1816; d. Silver Springs, Fla., 5 April 1889. He entered the small-arms factory of his father at Ilion, N. Y., and for 25 years was superintendent of the mechanical department. The perfecting of the Remington breech-loading rifles and of the Remington typewriter was mainly due to him. In 1886 he withdrew into private life and in that year Wyckoff, Seamans and Benedict bought out the Remington interest in the type¬ writer, and an assignment having been made, took charge of the Ilion plant. In 1888 the main plant passed to Hartley and Graham, who oper¬ ated it as the Remington Arms Company.

REMINGTON RIFLE. See Small Arms.

REMITTENT FEVER. See Jungle—

fever; Malaria.

REMONSTRANTS, those members of the Reformed Church in Holland who, in the year 1609, after the death of Jacobus Arminius, con¬ tinued to adhere to his doctrines, and in 1610 presented to the states of Holland a remon¬ strance in which they defend the grounds of their dissent from the official creeds of the Re¬ formed Church ;

thereafter they were styled

Remonstrants, and they are still represented in Holland by a small but scholarly and liberal sect. See Arminianism ; Religious Sects.

REMORA, or SUCKING-FISH, a popular

name for any species of the family Echineididce and order Discocephali. It is about eight inches long and common in the Mediterranean. The top of the head is provided with a peculiar sucking disc, a modification of the spinous dor¬ sal fin, composed of a series of plates arranged transversely, by means of which they attach themselves to moving objects and thus sup¬ plement their powers of locomotion. On the coast of Zanzibar and elsewhere they are used in catching other fishes and turtles, the remora being secured by a line fixed to the tail, and being sent in pursuit of the turtles, etc., to which it attaches itself by means of its sucker. The ancients believed in the remora's power of arresting and detaining ships in full sail through their suctorial powers ; and Antony's galley at the battle of Actium was said to have been fixed by a remora, which defied the efforts of several hundreds of men to free the vessel.

The remoras are a group of oceanic fishes occupying a rather isolated position among the spiny-rayed Teleostomi. Five genera and eight species have been recorded from North Amer¬ ican waters. Some of them appear to confine their attentions to particular species of large fishes, as the spear-fish, dolphins, *etc.* ; others are less particular. The common species on the Atlantic Coast of the United States are the shark-sucker (Echeneis naucrates) , very fre¬ quently found adhering to large sharks as well as to other fishes; Remora brachyptera, the sword-fish remora; and Remora remora, a spe¬ cies widely distributed in warm seas. They are not utilized for food nor for any other purpose in this country.

REMSCHEID, rem'shit, Prussia, a noted manufacturing town, Rhine province, 1,110 feet above sea-level, 18 miles east-southeast of

Diisseldorf. It is a town of much antiquity; orig¬ inally a villa, it had a church as early as 1189, and by 1580 it contained several iron foundries, where pig-iron was worked into bars by hand. It has since maintained its importance as an industrial centre, producing various kinds of iron ware and especially high-grade cutlery and tools. Pop. 7-2,159.

REMSEN, Ira, American chemist and edu¬ cator: b. New York, 10 Feb. 1846. He studied at the College of the City of New York, was graduated in 1867 from the medical department of Columbia, pursued chemical courses at Munich and Gottingen, and in 1870-72 was as¬ sistant to Prof. Rudolph Fittig in the chemical laboratory of the University of Tubingen. In 1872-76 he was professor of chemistry and phys¬ ics in Williams College, and in 1876, upon the organization of the Johns Hopkins University, was made professor of chemistry in the new institution. He formed its chemical department and continued to direct the numerous researches of the Johns Hopkins laboratory, the facilities of which are not excelled in the United States. Despite the large amount of executive work devolving upon him in connection with his chair, he found opportunity for considerable original investigation, including that in connec¬ tion with the oxidation of aromatic substitution products, the sulphides, double halides and the

decomposition of diazo compounds by alcohol. In 1881 he made a study for the city council of a peculiar condition of Boston water, which he found due to a growth of fresh-water sponge in one of the artificial lakes from which the supply was derived. He also conducted for the National Board of Health special researches in various subjects, among them (Organic Mat¬ ter in the Air) and (The Contamination of Air in Rooms Heated by Hot-Air Furnaces or by Cast-Iron Stoves.) He was made vice-presi¬ dent of the university and frequently, in the absence of the president, Dr. Daniel Coit Gil¬ man (q.v.), acted as president. In June 1901 he was chosen president upon the resignation of Dr. Gilman and served as such till 1912, becoming president and professor emeritus in 1913. In 1873 he was elected to the American Association, in 1875 made Fellow, and in 1879 ©resident of the chemical section, and in 1902 president of the association. He became a member of the National Academy of Sciences in 1882, and was at one time president of the American Chemical Society. He founded in 1879 and has since edited the American Chem¬ ical Journal. Among his textbooks are (The Principles of Theoretical Chemistry) (1877) ;

(Introduction to the Study of the Compounds of Carbon, or Organic

Chemistry } (1885) ;

(Introduction to the Study of Chemistry > (1887) ; (The Elements of Chemistry) (1888) ; (A Laboratory Manual* (1889) ; and ‘Chemical Experiments > (1895).

REMUS, re’mus, in the fabulous history of Rome, the twin brother of the founder of the city, Romulus, who in a quarrel slew him. According to the legend Romulus and Remus were the twin sons of Mars and Rhea Silvia, who was a daughter of Numitor, king of Alba. Amulius dethroned Numitor and pronounced death on the twins, but the latter were provi¬ dentially saved, and when they grew up and were informed of the secret of their birth they killed Amulius, restored Numitor and founded the city of Rome. Remus was punished with death for jumping, in derision, over the wall of the new city.

REMUS, Uncle, a well-known negro char¬ acter invented by Joel Chandler Harris (q.v.) and introduced to his readers in (Uncle Remus: His Songs and Sayings) (1880). Uncle Remus, an aged plantation African, is used as the mouth¬ piece of quaint folklore tales current among the blacks of the South and detailing in pictur¬ esque and amusing fashion the adventures of Bre’r Rabbit, Bre’r Fox and other animals. The stories, interlarded with considerable homely philosophy, were gathered with much care by the author and awakened among students an interest in that domain of the beast-fable.

REMUSAT, ra-mii-za, Charles Frangois Marie, Comte de, French politician and man of letters, son of the Comtesse de Remusat (q.v.) : b. Paris, 14 March 1797 ; d. there, 6 June 1875. He was educated at the Lycee Napoleon and entered life as a journalist and lawyer. He was a member of the Chamber of Deputies 1830-48, and in 1848-49 of the constituent and legislative assemblies, in which he voted with the friends of order. From March to October 1840 he was Minister of the Interior, and in 1871-73 Minister of Foreign Affairs. He began

public life as a Liberal, but ended it as a Con¬ servative. During the Second Empire he lived in retirement, devoting himself chiefly to literary pursuits. His works include (De la Procedure par Juges en Matiere Criminelle) (1820) ; (Essais de Philosophy (1842); Abelard) (1845) ; (De la Philosophic Allemande> (1845) ; (L'Angleterre au XVIII Siecle) (1856) ; (Critiques et Etudes Litteraires : Ou, Passe ct Present (1857); <Bacon> (1857); <Politique Liberate: ou, Fragments pour servir a la De¬ fense de la Revolution Frangaise> (1860) ; (De la Theologie Naturelle en France et Angleterre) (1864) ; (Lord Herbert of Cherbury* (1874) ; (Histoire de la Philosophic en Angleterre depuis Bacon jusqu'a Locke) (1875), and numerous contributions to the Revue des Deux Mondes.

REMUSAT, Claire Elizabeth Jeanne Gravier de Vergennes, Comtesse de: b. Paris, 5 Jan. 1780; d. 16 Dec. 1821. She was married to Comte Auguste Laurent de Remusat, Napoleon's chamberlain, and became an intimate friend and lady-in-waiting of Josephine; thus her position made her thoroughly acquainted with the life of Napoleon's court. Her (Essai sur l'Education des Femmes,) published 1824, received an academic couronne, and her (Memoirs, > pub¬ lished in 1879-80, are particularly valuable for the light they throw on the court of the First Empire.

REMUSAT, Jean Pierre Abel, French Orientalist: b. Paris, 5 Sept. 1788; d. there, 5 June 1832. He devoted himself to the study of Oriental languages, particularly Chinese, while pursuing a course in medicine, and in 1811 published (Essai sur la Langue et la Li¬ terature chinoisesP He received his degree as a physician in 1814 and entered one of the mili¬ tary hospitals, but in that year accepted the chair of Chinese which had been established for him by the Abbe Montesquieu at the College de France. He was admitted to the Academy of Inscriptions in 1816; in 1818, after Visconti's death, became editor of the Journal des Savants , and in 1822 he founded the Societe Asiatique in Paris. His works include (Livre des Recompenses et des Peines) (1816) ; H.'invariable Milieu of Tsz'-tse> (1817) ; (Recherches sur les Langues Tartares> (1820) ; (Elements de la Grammaire chinoise) (1822) ; (Memoire sur la Vie et les Opinions de Lao-tse> (1823); (Recherches sur l'Origine et la Formation de l'Ecriture Chinoise) (1827), *etc.* Consult Silvestre de Sacy, (Notice sur la Vie et les Ouvrages de Remusat* (1834).

REMY, ra'mi, Alfred, American philologist: b. Elberfeld, Germany, 16 March 1870. He came to the United States when 12 years of age and was graduated at the College of the City of New York in 1890. He studied the theory of music and piano under B. O. Klein in 1890-96;

was musical critic for Vogue in 1895-97, and musical editor of The Looker-On during the same period. He was lecturer on the history of music at the New York College of Music in 1896-98; professor of modern languages at the Commercial High School, Brooklyn, in 1898-1911, and since 1911 has been instructor in that branch at the Commercial High School, New York. Author of Alar¬ con's Novelas Cortas Escogidas) (1905); (Spanish Prose Composition* (1908) ; joint

author 1 Biographical Dictionary of Musicians' (1916), *etc.*

REMY, Arthur Frank Joseph, American educator: b. Elberfeld, Germany, 26 June 1871. He was educated at Hamburg and Coesfeld, Germany, the College of the City of New York and Columbia University. In 1882 he removed to the United States and from 1891 to 1894 was tutor in Latin and Greek at the College of the City of New York. In 1898 he was Fellow in comparative philology, in 1899-1907 instructor in Germanic philology, and after 1907 professor of Germanic philology at Columbia University. He has lectured in German and English before various organizations and societies ; before the Champlain Assembly at the Catholic Summer School of America and at the Columbia Institute of Arts and Sciences. Professor Remy has published (The Influence of India and Persia on the Poetry of Germany *(1901) and con¬ tributions in Journal of the American Oriental Society, the Journal of English and Germanic Philology, the (Catholic Encyclopedia, etc.*

RENAISSANCE, or RENASCENCE, is

a term given to the period of transition from the Middle Ages to modern times, and to the movement of thought which characterized that period. Etymologically the French Renaissance — Italian Rinascimento — means rebirth. A rebirth of classical forms in literature and art is supposed to have dominated this transition. The metaphor must not be insisted on. There was no rebirth of antiquity in the Renaissance. The change from the mediaeval to the modern mind was gradual. One phase of this change was a more general harking back to classical models. This phase, in its bearing on litera¬ ture, is loosely designated the Revival of Learning. The classical scholars, who re¬ vived the refinement of Greek and Roman literature, litterce humaniores, are called human¬ ists.

I. Italy. — The Renaissance began in Italy. Here the memory of classical antiquity had never fully died out. North of the Alps the sway

of scholastic philosophy was mightier than in the peninsula. Saint Thomas of Aquin (1225-74) taught at Paris; Albert the Great (1206-80) was a German; Alexander of Hales (d. 1245) and Occam (1280-1349) were Britons; Duns Scotus (d. 1308) was a Scotchman or a Briton, who taught at Oxford. In Italy the mediaeval mind of the Florentine Dante (1265-1321), though thoroughly scholastic and Catholic, was at the same time steeped in the culture of ancient Rome. From Dante to Petrarch is a natural transition that cannot be called a rebirth of ancient ideas and ideals.

1. Petrarch (a.d. 1303-74). — The revival of learning in Italy is generally assigned to Petrarch. He is sometimes depicted as an out and out humanist who ignored a future life and made ever onward to a godless expression and gratification of self. Such a picture is false in coloring. Petrarch was ever devoted to the Church and its doctrines, even in the days of wildest enthusiasm for the humanistic culture of Rome and Greece. Witness his letter to Giovanni Colonna : ((The true wisdom of God is Christ. Him must we love and rever¬ ence above all things, so as to learn true philosophy. We should first be Christians; then we may be what we will.® (E pistoles, ed.

Fracasetti, Florence, 1864, ii, 112 ff.) When he was publicly crowned as poet and historian (1341), at Rome, in the Capitol, Petrarch showed his loyalty to the authority of the Church by laying theˆ highly prized laurel crown as a votive offering upon the main altar of the basilica of Saint Peter. The imaginary con¬ versations, held by Saint Augustine and the author, (De Contemptu Mundi,} ring true in tone, and doom pragmatistic sensuality to the condemnatory judgment of personified truth. Monastic life is praised in (De Vita Solitaria) and (De Ocio ReligiosorumP The <Trion,fi,) in terza rima, celebrate allegorically the triumph of chastity over love, and of divinity over all. Bad traits there were in the character of Petrarch. He took minor orders, so as to en¬ joy ecclesiastical preferment, and never became a priest. Sensuality besmirched his life. He vauntingly craved for fame and flauntingly scorned scholastic theology. Apart from his (Canzoniere) and <Trionfi> Petrarch's greatest achievement in the cause of letters was the dis¬ covery of many a precious manuscript of the Latin classics. Lost works of Cicero and miss¬ ing parts of the (Institutiones) of Quintilian, by means of his travels and researches, were again made accessible to the learned.

2. Boccaccio (1313-75). — There were in all Italy only very few men who knew anything at all of Greek when Petrarch and his friend Boccaccio put themselves under the tutelage of Leo Pilatus and undertook to gain an en¬ trance into the literature of the Hellenes. Boccaccio was a thoroughgoing humanist. His (Filocolo) (1338) is wanton. (Ameto) (1340), a novel, tells with utter abandon the story of his mother's free love, and is fetid with the ((reek of the rotten fens.® The 50 cantos in terzine, that make up the (Amorosa Visione) (1342) in praise of love, are befouled with filth. The <Teseide) (1341) gives the tale of Palemon and Arcite in ottava rima; it was annotated by Tasso and used by Chaucer for his (Knight's Taleˆ The (Decameron) (1353) is a collection of an hundred tales, often begrimed with inde¬ cency, which Boccaccio gathered from various literatures and set forth in his own manifold and multiform style. The <Corbaccio) (1354) is a rank lampoon and cynical satire against woman. Boccaccio runs the gamut of the emotions, but plays chiefly and with free fling on lust. His humanism is a riotous revel of the pas¬ sions. Monks and nuns to him are hypocrites whose ethics is that of the pig-sty. And yet Boccaccio remained loyal to the Church ; he died in the faith, bequeathed his library to a friar and set the condition that the legatee

pray for his soul. The humanism of Boccaccio was not directly anti-Catholic. He was three times Ambassador of Florence to Rome, re¬ ceived many favors, from the Popes and was financially aided by Clement VI. While Boc¬ caccio wallowed in the mire of the erotic myths and legends of paganism, the study of an¬ tiquity in a Christian spirit was ever encouraged by the papacy. Superstition and immorality were opposed by the Church, but the intellectual culture of the Greeks and Romans was ac¬ cepted by her as a means of fulfilling her divine purpose. Saint Paul tried to gain the Stoics of Athens through the medium of their poets Aratus and Cleanthes (Acts xvii, 28).

Some of the fathers of the Church were hostile to the use of pagan classics as a means of educa¬ tion. They feared an inroad of paganism. Yet most of the fathers approved of the cultural value of the study of the ancients, so long as the humanism of antiquity was not allowed to tar¬ nish the beauty of Christian faith and moral¬ ity; and the popes at the dawn of the Renais¬ sance followed the example of fathers so illustrious.

3. VaUa (1405-57) — In the course of time some of the Italian humanists became fanatical propagandists of heathenism, but there were ever contemporary scholars who clung to Christian ideals. Lorenzo Valla, (De Volup-tate) (1431), presents an accurate picture of the false and true Renaissance of the times. The characters of his dialogue are historical personages. Lionardo Bruni tries to effect a harmony between Christianity and Stoicism. Niccolo Niccoli is a Christian humanist who defends the agreement of faith and science. Antonio Beccadelli, an Epicurean and the mouthpiece of Valla, teaches the gospel of pleasure, the gratification of every sense. Through him Valla defends the indulgence of all the appetites. Women have no rights. Adultery is the natural thing for man and woman. Continence is a crime. Sensuality is the highest good. Voluptuousness is an act of worship. Besides championing all this pagan¬ ism and immorality, Valla wielded his trenchant pen against monasticism, the clerical state and what was called <(tyrannical priestly domina¬ tion.® His invectives against the papacy were most virulent; and yet this pagan humanist, because of his masterly Latinity, was favored by the popes. Nicholas V made him scriptor in the Vatican Library and later on papal secre¬ tary, and used his genius for the translation of Greek classics. Valla fawned and cringed, like others of his class, with such success as to receive from Callixtus III a canonry in Saint John Lateran. The papacy of the Italian Re¬ naissance rather favored than opposed the pagan humanists in order to use their brilliant

attainments in the cause of learning. Valla's contemporary, Antonio Beccadelli of Palermo, would scarce have been condemned by Eugenius IV had not his ˆermaphroditus5 glorified the lowest degradations of unmentionable lust.

4. The Height of the Italian Renaissance (1453-1527). — The University of Paris had be¬ come a papal foundation in 1211. Twenty-eight universities, in various parts of Christendom, received papal charters between 1400 and 1506. The papacy was the main power that brought the Revival of Learning to the height of its glory. Nicholas V (1447-55) founded the Vatican Library, as a means of making Rome the centre of literary culture to the world. At his death, it contained 824 Latin and 352 Greek manuscripts. Among these latter was the famous Vatican Codex, B, of the Greek Bible. The fall of Constantinople (1458) occasioned a rich harvest of manuscripts for the Vatican Library. By 1484, at the death of Sixtus IV, it had a thousand Greek manuscripts of which 58 were Biblical. The library of Saint Mark's, Venice, which Cardinal Bessarion enriched, and the Laurentian Library of Florence belong to the fruitage of the Italian Renaissance. The art of printing soon reached Italy. With papal

approval, the printed Latin Vulgate edition of the Bible was spread broadcast. Between the years 1450 and 1500, there were 177 complete editions of the Vulgate printed: 134 in the Latin original, 15 in German, 13 in Italian, 11 in French, two in Bohemian, one in Dutch and one in Spanish. It is a sign of the vigor of the Christian Renaissance that no classic of an¬ cient Rome was printed, until some 12 editions of the Latin Bible had been put through the press. In 1475 the Venetian Vulgate was is¬ sued. The Aldine Press of Venice, between 1494 and 1515, printed 33 first editions of Greek classics. Aldus issued the Septuagint in 1518. The Hebrew Bible was printed at Soncino (1477) and Naples (1486). Meantime, in the papal court, the false Renaissance was repre¬ sented by the ribaldry and innuendo of Poggio, Filelfo, ZEneas Sylvius Picolomini (later con¬ verted and raised to the pontificate as Pius II), and Cardinals Bembo and Bibbiena. Vain were the efforts of Giannozzo Manetti, Lionardo Bruni, Ambrogio Traversari, Gregorio Corraro, Maffeo Begio, Vittorino da Feltre, and a host of Christian scholars, to stem the tide of pagan¬ ism. Vain was the thundering of the Francis¬ can and Dominican friars against the obscenity and filth of the false Renaissance. High ecclesiastics and even popes pampered and sup¬ ported the ribald set. In the end, Leo X (151 3— 21) encouraged the abuses which he should have reformed. Had he done his duty, the Church would not have been dealt the severe blow of the Protestant Reformation. He him¬ self was temperate; and yet revelry and carous¬ ing were characteristic of his court. The loose¬ ness of morals at that court are witnessed to by such immoral plays as Bibbiena's (CalendraJ and Ariosto's <Suppositi.) Leo encouraged art and letters ; but was a mere dilettante, and a dupe to profligates of the false Renaissance. Shortly after the death of Leo X, the sacking of Rome by a Lutheran army brought the Italian Renaissance to a close.

5. Fine Arts. — Long before the Revival of Learning, supposed to have been a Renaissance of Latin and Greek forms in letters, the fine arts had reached a high degree of perfection in Italy. Petrarch had not yet made his journeys in quest of manuscripts. Dante (1265-1321), the glory of mediaeval Italian literature, had not written his <(Divina

Comedia.® Yet the cathe¬ drals of Pisa, Lucca and Pistoia were completed. The basilica of Assisi stood in all its splendor, to be beautified by the frescoes of Giotto (1266-1337). Says Taine : (<There is nothing like it. Before seeing it, one has no idea of the art and genius of the Middle Ages.® There is no harking back to antiquity on the part of the Italian painters of the 13th and 14th cen¬ turies. Christianity provides their subjects. The inspiration of Quattro Cento art is that of Catholic devotion. Cimabue (1240-1301) and his contemporary Duccio produced Madonnas that are masterpieces both in conception and execution. The exquisite draperies, filmy veils, aerial lightness and heavenly gi-ace of Botticelli (1447-1510), a penitent of Savonarola, breathe not a pagan emotion. And as one gazes in rapture on the wondrous Annunciation and other frescoes in San Marco, Florence, one realizes the reasonableness of the story that the brush of Fra Angelico (1387-1455) was guided by eyes that saw through tears of love and devo-

tion for the Madonna and her Child. Even the Cinque Cento plastic art of Italy shows by no means a rebirth of classic forms. There is individuality of self-expression in the painting of Raphael, Da Vinci, Titian and Correggio ; and in the sculpture of Donatello and Michelangelo. Only in architecture is an attempt made at a rebirth of antiquity. The result is a hybrid Roman form, which later on becomes still more grotesque by the accretion of barocco vagaries.

II. Outside of Italy . — The influence of the Italian Renaissance reached Germany, France, the Netherlands, England and Spain by various and at times devious ways.

1. Germany. — Greek, Latin and Hebrew were brought into prominence among Teutonic peo¬ ples by traveling professors, and by students who attended Lombard and Tuscan Renaissance schools. The new learning was still wider spread through the establishment of universities and the invention of printing. The religious orders favored the press from the outset. Marienthal (1468), Saint Ulrich at Augsburg (1472), and the Benedictines of Bamberg (1474) did pioneer work in the printing and distribution of literature. The first book printed by Gutenberg, the inventor of the art, was the beautiful (<42 line Bible® (1453-55), an edition of the Vulgate that is still extant. The Latin Vulgate was by far the best seller of the times. Most scholars then understood Latin; it was their common medium of epistolary intercourse. The needs of the few, who read German but knew not Latin, were amply met by the print¬ ing of the Bible in the vernacular.

We still have copies of 18 complete editions of the Bible, printed in German between 1466 and 1521. The publication of Luther's Bible in 1522 was not due, as is too often said, to the lack of a trans¬ lation that the uneducated could understand ; but to Luther's revolt from the teaching and authority of the Church. (Consult Nestle, {Urtext und tlbersetzungen der BibeP 1897, pp. 124 ff.). This revolt had nothing in common with the rebirth of heathen ideas in Italy. The revival of learning in Germany was from the very outset opposed to the pagan humanism of the peninsula; and yet it but led up to the same disregard of authority in religion as character¬ ized Valla, Poggio and <(thc poets,® as they were styled. This spirit of revolt against papal authority did not at first appear. Rudolf Agricola (1443-85) was an eminent classical scholar and a devout Catholic. The Latinist von Langen, and the educationalist Wimphe-lung united Christian principles with a love of antiquity. On the eve of the Reformation Reuchlin was defended by Rome in the use of Hebrew and Septuagint readings for the proper interpretation of Holy Writ. Then came Luther, and in his wake Melanchthon, Zwingli and Calvin. They were learned, but not large minded. Though keen sighted enough to note the degradation of the court of Leo X, they failed to see that the reformation of ecclesias¬ tical discipline had to be brought about by es¬ tablished authority. They broke loose from that authority; and in theory substituted free¬ dom of private interpretation of the Bible in¬ stead of the authoritive teaching of the Church. In reality, Luther attempted not only to topple over the papacy from its power, but to set him¬ self in the stead of the Pope. His was a mas¬ terful personality. In translating Romans iii, 28,

he interpolated the word alone: <(For we ac¬ count a man to be justified by faith alone with¬ out the works of the law.® Catholics found fault with the interpolation. He badgered them, and wrote : <(When your papist gives himself useless trouble about that word alone, just tell him prudently: (Dr. Martin Luther wills it so and says ((Papist and jackass are one and the same.® Sic volo, sic jubeo; sit pro ratione voluntas. We would not be the pupils and dis¬ ciples of the papists, but their masters and lords. We, too, would strut it a bit, and be arrogant with these donkies, and as Paul makes boast against his crazy saints, so I make boast against these my jackasses. Are they doctors? So am I. Are they learned? So am

I. Are they preachers? So am I. Are they theologians? So am I. Are they contro¬ versialists? So am I. Are they philosophers? So am I. Are they dialecticians? So am I. Are they teachers? So am I. Do they write books? So do I. And I will go farther in my boast : I can explain the Psalms and the Prophets. They cannot … Why, if there be only one among them that can understand aright a foreword or a chapter of Aristotle,

I am ready to be tossed in a blanket. I do not exaggerate … Be minded no longer to give to such jackasses other reply to their useless chatter about that word alone, than again and again to say: (Luther will have it so, and says he is a doctor greater than all the doctors of the whole of popery >® (Sendbrief von Dollmet-schen, Luther's works, Weimar edition, 30, 2, p. 635: Erlangen ed. 65, p. 107). No wonder Harnack speaks of ((the curious logic of Luther's arguments, the errors of his exegesis, and the unjustifiableness and barbarity of his polemic® (Dogmengeschichte, Vol. Ill, 4, p. 817).

2. France. — The conquest of Naples by the French king, Charles VII (1494), marks the beginning of the inflow of Renaissance ideas from Italy into France. The house of Valois ever and anon urged its claims to certain Italian provinces. Military expeditions over the Alps as well as the intervening peaceful relations with the Italians brought about in France a shifting of the nobility and the learned to Italian culture and ideals. The spring-tide of the French Revival of Learning was not antago¬ nistic to the teaching and authority of the Church either in the direction of the paganism of Italian ultra-humanism or along the way of Luther's revolt. Aleandro, an Italian lecturer on Latin, Greek

and Hebrew early in the 16th century, became rector of the University of Paris, and wielded a powerful influence against Luther. The Sorbonne was in those days a leader at once in science and in orthodoxy. It condemned the Bibles of Estienne, because they lacked annotations from approved Catholic sources. The first critical editions of the Greek New Testament were those of the devout Cath¬ olics Simon de Colines (1534) and Robert Estienne (1st ed., 1546; 3d ed., 1550; 4th ed., 1551). The latter was the first to publish an apparatus criticus for the restora¬ tion of the New Testament text. French poetry takes on a new form in Marot, Ronsard and their followers. The first French humanists to go the wav of Boccaccio and his set are Rabelais (c. 1490-1553) and Montagne (1533-92). The former was a priest and a

physician ; he is known chiefly for the masterful style of his indecent, satirical, humorous and brilliant Epicureanism. Montaigne, the elegant essayist, sets a pace of hostility to the Church and her institutions that has been kept up in France until this day. The most decided return to classic forms is seen in poets, essayists and preachers of a century later — Fenelon, Racine, Corneille, Bossuet, Massillon, Bourdaloue — all devoted Catholics. Pointed architecture had reached the height of its glory in France dur¬ ing the 13th century; it became florid, perfor¬ ated, embroidered, in the style flamboyant of the 15th century; and the Renaissance intro¬ duced forms that, though deprecated by lovers of Gothic, were the natural evolution conse¬ quent upon the inroad of Italian ideas into the valley of the Loire. In painting, there is not a real French Renaissance school; the work of Claude and the Poussins is of the early modern period.

3. The Netherlands. — In the Low Countries, Renaissance architecture pales by the side of medieval structures. The Van Eycks, Memling, Metsys and others surpassed in their oil coloring; but painting does not reach its glory in the Flemish and Dutch schools until the 17th century. The exquisite sepias of Rembrandt, the gorgeous coloring of the all too sensuous Rubens, the heavenly beauty of Vandyck, the light effects of Ruysdael and Cuyp will ever be the objects of enthusiastic admiration. In let¬ ters the critical work of Lipsius and Grotius is to be grouped with the marvels of the Elzevir and Plantin presses. The greatest humanist of the Netherlands was Erasmus. That he was a loyal Catholic is clear from his opposition to Luther ; an excellent edition of the works of Saint Jerome (1516), the first critical work done in this Patristic field; and an edition of the Greek New Testament (1516). This latter was not critical. Erasmus relied on a few late

manuscripts. For the Apocalypse he had only a single, imperfect codex. So the Dutch scholar went the full length of boldness ; he garbled the text and filled in with his own translation from the Vulgate when the original Greek source could not be deciphered or was deemed to be wrong. Some of these readings of Erasmian coinage found their way into the textus receptus, were borrowed from the Dutch work-basket by Luther and appear in the Greek Testament of the British and Foreign Bible Society as well as the Authorized Version. Erasmus is merciless and sarcastic in attacking the extravagances of the schoolmen and the abuses that existed among the clergy; but he must be interpreted in the spirit of the times. His lasting and close friendship for Blessed Thomas More, after whom the (Praise of Folly) ((Moriae Encomium*) is playfully en¬ titled, suggests a far greater loyalty to the Church than one might conclude from the in¬ vectives and pitiless spirit of that work, the (Adagia* and the (Colloquial

4. England. — Among the English humanists were More, Blessed Cardinal Fisher, Hadley, Linacre, Colet and Fox. Blessed Thomas More, chancellor of the realm, martyred for refusal to take the oath of the supremacy of Henry VIII over the Church in England, was scholarly, witty, learned, an adept in Latin style, and per¬ haps the best example of Renaissance English

extant in our literature. Though later Eliza¬ bethan English became classic, the clearness, strength and elegance of More must be ad¬ mitted. His (Utopia) is entirely free from any humanistic slavishness of imitation and shows a firm grasp on social and religious problems of the day. More is not spa.ring of whatsoever he found to be unbecoming in ecclesiastics, yet his writings breathe a noble, truly Catholic spirit. The revolt of England from the Church cannot be attributed to a freedom of private judgment, which infiltrated from Italy. The germs of this spirit were long developing in England. Witness the conflict between the papacy, represented by Saint Anselm, Primate of England, and the Norman kings, William Rufus and Henry

Beauclerc, during the 11th and 12th centuries. Chaucer (1340-1400) was influenced by Italian models, but long preceded the Renaissance in England. Wyclif (1335-84) and the Lollards of the 14th and 15th centuries anticipated the Lutheran Reformation by more than a century in the substitution of simple Bible reading for the authoritative teaching of the Church. The so-called Wyclif Bible, as¬ signed to 1380, which was used by the Lollards, was a translation from the Latin Vulgate, prob¬ ably of Catholic and not Wyclifite origin (con¬ sult Dom Gasquet, (The Old English Bible, > pp. 102 ff.). Tyndale (1484-1536) showed some influence by the Reformation in Germany; but when his Bible was issued (1525), it by no means marked the beginning of England's movement away from the authority of the Catholic Church.

5. Spain. — During the Renaissance, in Spain, architecture added Arabic features to classic forms ; sculpture showed strength and individu¬ ality; painting developed apace, until the great 17th century masters, Murillo and Velasquez, rivaled the best work of the Italian Renaissance. Cardinal Ximenes published his monumental Polyglot Bible (1514-22). Spanish prose reached its high-water mark in the humorous and refined Cervantes (1547-1616), whose (Don Quixote) (1605-15) is unsurpassed in the world's literature for masterful, withering, witty, yet courteous taunts at the evils of the day. Dramatic poetry culminated in the volu¬ minous Lope de Vega (1562-1635), to whom 1,500 plays are accredited, and the renowned Calderon de la Barca (1600-81). In objectivity, freedom from lyric self-unfolding, breadth of vision, interest of plot and counterplot and power of dramatic expression, only Shakespeare and the Greek dramatists surpass these two Spanish poets. Along with them should be men¬ tioned the (Lusiad) of the Portuguese Camoens, who was the first modern epic poet to use a modern theme for his epos and to cut free from ancient trammels in the treatment of his theme. The Spanish and Portuguese Renais¬ sance also expressed itself in exploration and colonization. Columbus, Vespucci, Diaz, Vasco da Gama, Cortez, Pizarro and many others bear witness to the intrepidity and greatheartedness that characterized these Catholic nations. There was in those days an effective league of nations. By common consent of Catholics throughout Europe, the popes had for centuries been the arbiters in national and international disagree¬ ments. It was by this overlordship that Nich¬ olas V (1454) conceded to Portugal the right

of colonization from Africa to India; and Alexander VI (1494) divided the Indies into East or Portuguese and West or Spanish.

III. Counter Reformation. — The Italian pagan Renaissance ended with the sack of Rome by German Lutherans (1527). Its churches were desecrated and libraries pillaged. The papacy was aroused from the lethargy of Leo X. The Counter Reformation began; it was late but most effective. The Council of Trent, the Roman Index and the Society of Jesus were mighty forces in effecting the needed reform of ecclesiastical discipline. (See Jesuits; Loyola; Index Librorum Prohibitorum ; Trent. At the end of the 16th cen¬ tury, chiefly because of the missionary activities of the great religious orders, the Church had so recovered from the staggering blow of the Reformation that the faithful outnumbered those of pre-Lutheran times, and an age of strict religious observance set in.

Bibliography. — Sadoleto, cEpistolse) (1760) ; Michelet, (Histoire de France* (1855) ; Burckhardt, (Die Cultur der Renaissance) (1860) ; Hettinger, (Kunst in Christenthum) (1867) ; Walter Pater, <Essays,) (The Renaissance) (1873) ; Symonds, (The Renaissance in Italy* (1875) ; Muntz, (Precurseurs de la Renaissance) (1882), (La Renaissance en Italie et en France) (1885), ˆistoire de l'art pendant la Renaissance) (1889-95) ; Hughes, (Loyola and the Educational System of the Jesuits* (1892) ; Pachtler, (Ratio Studiorum et institutiones scholastics Societatis Jesu per Germaniam olim vigentes,* in Monumenta Germania Pcedagogica, ii, v, ix, xvi (1887-94) ; Pastor, (History of the Popes) (Eng. trans., 1895, especially Vol. I) ; Gothein, Hgnatius von Loyola und die Gegen-reform* (1895) ; Rashdall, (The Universities in the Middle Ages) (1895) ; Duhr, (Die Studi-enordnung der Gesellschaft Jesu) (1895) ; Gas¬ quet, {The Eve of the Reformation* (1900) ; Lilly, (Renaissance Types) (1901) ; (Cambridge Modern History) (Vol. I, 1902) ; Janssens, (History of the German People) (Eng. trans., 1902) ; Schwickerath, (Jesuit Education* (1903); Ruskin, (Modern Painters> (Vol. II, 1903).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College,

Maryland.

RENAISSANCE DECORATION. See

Interior Decoration.

RENAISSANCE PAINTING. In central and northern Italy, in the 14th century, the Giottesclii, or scholars and imitators of Giotto, soon lost the inspiration and initiative of his art. His great principle of the

direct study of nature was much neglected ; portraiture, which he had undertaken with imperfect knowledge, became a distinct branch of the art only in the 15th century; and the landscape sentiment was as yet undeveloped. Nevertheless, the seeds of the great awakening of the human intellect, which brought with it a knowledge of antique art and a new intimacy with both Nature and contemporary man, — and a consequent develop¬ ment of all the arts, — were germinating; it appeared almost in the first decade of the 1 5th century in both Italy and the Netherlands. For this Renaissance, the art of painting presented the most favorable means of expression, of rendering the spiritual rather than the merely

corporeal, the intangible as well as the appear¬ ance of reality; and also as an outlet for the individuality which had been so long smothered under formulas and conventions. Rather curi¬ ously, this restoration of a long-lost art began, among the Flemish painters, with a suddenness, a completeness, which it was impossible to main¬ tain, — the first great work which figures in the history of this restoration, the great altar-piece in the church of Saint Bavon in Ghent, painted by the brothers Huybrecht (Hubert) and Jan van Eyck (q.v.), is an example of com¬ pleteness of pictorial representation, spiritual and technical, which the survivor of these paint¬ ers himself was not able to equal in his other works. The mastery seems complete even of the new process of oil painting, which they are generally credited with having first practically employed. (See Oil Painting). Contempo¬ rary with this Flemish school of Bruges and Ghent was another of Brabant, with the centre in Brussels, founded by Rogier van der Wey¬ den (q.v.) similar in tendencies. Holland developed an independent school, at Haarlem, the chief of which was Dierick Bouts (d. 1475), whose works show the influence of Van der Weyden, but are marked by somewhat greater luminousness and richness of color and display a knowledge of aerial perspective in landscape. In the paintings of Hans Memlinc (q.v.) of Bruges many of the archaic qualities of his predecessors disappear and are replaced by a greater suavity and feeling for beauty. The influence of the Van Eycks extended down to the end of the 15th century, and Flanders was the seat of a great artistic production, painters and students passing backward and forward between her borders and those of Italy. In France, in the latter part of the century, there was a northern school and a smaller one in Provence, at the court of Rene d' Anjou ; but the important paintings of this period were nearly all destroyed in the religious wars and the Revolution, and our knowledge of the art is derived chiefly from the miniatures.

The patronage which had been extended to the new art in the Netherlands, by princes, corporations, the Church and private individuals in the 15th century, was continued in the early years of the 16th. Foremost among the im¬ portant representatives of the Northern spirit was Quinten Massys (q.v.), or Massijs, of Ant¬ werp (d. in 1530). Jan Gossart (q.v.), called Mabuse, from his native town of Maubeuge in Hainault, on the contrary, after his journey to Italy, adopted many of the characteristics of the Southern painters, which

found favor in the eyes of his countrymen. The Dutch painters of this period were numerous ; the first to become widely known abroad was Lucas Jakobsz, called Lucas van Leyden. The movement to¬ ward realism and naturalism was slower in the schools of Germany, the chief of which was that of Cologne; the earliest important work now extant is the large altar-piece, a triptych known as the Dombild, painted by Stephen Lochener (d. 1451). The painters of this school substituted for the pictorial or distant back¬ grounds of the Flemings generally a flat, gold one and they differed from them also in the retention of the disc-shaped nimbus behind the heads. The Swabian school, chiefly Alsatian, was distinguished by a remarkable artist, a bold

innovator, Martin Schongauer, the greatest master in Germany of his time, but now best known by his drawings and engravings. The schools of Ulm, Nordlingen and Augsburg were more or less influenced by the Flemish art; two families of painters, the Burckmairs and the Holbeins, combined to raise the fame of Augsburg to the highest degree. In both, an illustrious father was succeeded by a still more illustrious son, — Thoman Burckmair by Hans (q.v.), and Hans Holbein, the elder (q.v.), by his famous son of the same name. The latter, and his brother Ambrosius, are found in Basel in 1515-16. As the most brilliant representative of the German Renaissance, Hans Holbein, the younger (q.v.), rose superior to the limitations of the art of his time and excelled in all branches. His large mural paintings have all been destroyed ; but the votive picture executed for the family of the Burgomaster. Meyer in 1526, his portraits — including those of the period of his sojourn in England at the court of Henry VIII — and his designs and engrav¬ ings, have been preserved. From the Franco¬ nian school, of which Nuremberg was the centre, came the most formidable of his rivals, Al¬ brecht Differ (q.v.), a pupil of Michael Wolge-mut, painter of altar-pieces and of careful por¬ traits and a skilful wood-engraver. The influ¬ ence of Nuremberg was diffused over a wide area, — Schleswig, eastern Germany, Bohemia and Poland.

In the north of Europe, the spirit of the Renaissance lagged somewhat behind as com¬ pared with its development under the sky of Italy. Climatic conditions, the influence of the Gothic in making angular the forms and the draperies and in diminishing the wall spaces for mural painting, a neglect of the close study of the human body, of proportion, of perspective, a general empiricism in the sciences, the scarcity of examples of antique art, a lack of intelli¬ gent and

munificent patronage in Germany, even the Reformation itself, — all have been given as partial explanations of this inferiority. Notwithstanding his genius, his earnest re¬ searches and his journey to Italy, Differ's art remained hampered throughout his life by his mediaeval limitations. The Italians, who fully appreciated his work, his imagination and intel¬ lectual power, declared that he would have been as great as the greatest of their own artists if they had been born in Florence or Rome and had studied the antique. His great influence over his contemporaries was extended by his engravings. Durer's chief rival among his contemporaries was Albrecht Altdorfer, the Ratisbon master. Lucas Cranach, the elder, so called from his natal town in Franconia, estab¬ lished a school in Saxony, which survived for some years after his death, although unable to reproduce his strong individuality. In Upper Alsace, the renown of Martin Schongauer was continued by two painters, not natives of the province, Matthias Griinewald and Hans Bal-dung, the latter, also, betraying strongly the in¬ fluence of Differ. The school of Swabia, the most eminent and the most learned of the Ger¬ man Renaissance, boasted, in addition to the Burckmairs and the Holbeins, of Martin Schaffner, the so-called Master of Ulm and some other painters. In the Spanish peninsula, at the period of the gradual expulsion of the Moors,

the demand for church pictures brought paint¬ ers from both Italy and Flanders, — from the latter, among others, Jan van Eyck and Rogier van der Weyden.

Among the causes that contributed to the development of the full flower of the Renais¬ sance in Italy, — in addition to those already mentioned, — may be cited the humanistic spirit, derived largely from the enthusiasm arising from the study of the antique, a general aspira¬ tion toward the noble and the beautiful, a new ideal of humanity. Contemporary with this was a revival of learning, — more complete than in Germany. The art of painting, however, it ‘was necessary to reinvent ; the study of the human figure, the all important subject in the art of the Renaissance, was undertaken scientifically. Church painting remained for a long time the principal feature and it was greatly favored by the abandonment of the old Gothic Type and the division of the field into panels — which permitted of larger wall spaces, of pictures even longer than they were high. These were exe¬ cuted in fresco, the method perfected in the school of Giotto, — buon fresco, painting on the last or smooth coating of plaster freshly ap¬ plied to the wall and while still wet. That which could not be painted upon in the course of the day was cut out and replaced with fresh lime the next morning. In this manner the color becomes an integral part of the wall. The pigments were water colors, usually earths and minerals. Subsequent retouching was neces¬ sarily done al secco, on the dry wall and this was generally considered regrettable and some¬ what dangerous to the conservation of the painting. Sometimes in the contracts for deco¬ rative works we find this retouching insisted upon. Encaustic paintings seems also to have been known ; tempera and oil painting were usually reserved for altar-screens and easel pic¬ tures, these being generally panels covered with a thin layer of plaster. For their studies and drawings, the artist worked in monochrome or gris aille, called by the Italians painting in chiaro oscuro; their colors were ground by their apprentices under their own eyes and selected with great care. The art of painting, the most eloquent expression of the Renais¬ sance, was destined to outstrip the other mani¬ festations — sciences and letters, if not

architec¬ ture. Florence remained the chief seat of this art in the 15th century as in the time of Giotto, though her authority was much less than in sculpture; the leaders were Masolino and his pupil Masaccio (q.v.), to the latter is attributed the honor of having invented a new style in painting. Very different from his intelligent naturalism and fine sense of distinction was the sincere and naive piety of the work of the Dominican friar Fra Giovanni da Fiesole (q.v.), called Fra Angelico; and still more so the tasteless ((realism® of Paolo di Dono, known as Paolo Uccello (q.v.). Foremost amongst the direct heirs of Masaccio were Fra Filippo Lippi (q.v.), and his son, called Filippino Lippi (q.v.) ; the paintings of the former betraying new qualities of color and of niorbidezza. With him originated a new type of the Ma¬ donna, afterward given its highest expression by Leonardo and Raphael. — a presentation in which only the human idyl of motherly love and infantile innocence is sought. In the reli¬ gious as in the allegorical and mythological sub¬

jects of Sandro Botticelli (q.v.), something of the mediaeval awkwardness of expression re¬ appears, redeemed by the grace and charm of the conception and the color. With him are associated as exponents of a modern, ingenious spirit, Benozzo Gozzoli, a pupil of Fra Angelico and Pinturicchio (q.v.). Andrea Ver¬ rocchio (q.v.) is most popularly known as a sculptor, principally by his equestrian statue of Colleone, the Venetian general; Domenico Ghirlandaio (q.v.), less original than Masaccio but more finished in his expression of realism, was, next to him, the most important painter of the Florentine school of the 15th century and had for a pupil Michelangelo.

Of the Umbrian school, the chief seat was Perugia, though in this province painting was not centralized in the cities; the mystical and serene spirit of Pei;ugino differed from the vivacious and investigating character of his predecessors in the school. The first artist to feel the influence of Florence was Piero degli Franceschi (q.v.), but a more skilful was Luca Signorelli (q.v.), his pupil, whose great paint¬ ing of the (End of the Worlds in the chapel of the cathedral of Orvieto (which had been commenced by Fra Angelico), furnished themes and figures to Michelangelo for his (Last Judg¬ ment. } In the best works of the master of Raphael, Pietro Vanucci (q.v.), called Perugino, may be seen the same art, the same suavity and dignity, which characterize much of the early work of his famous pupil ; he seems to have been the first in central Italy to master com¬ pletely the new process of painting in oil.

In northern Italy, the most important centre of the arts was at Padua, the school there hav¬ ing been founded in the second half of the 15th century by Francesco Squarcione (q.v.), known as the ((Father of Painters,® and the discoverer of the genius of Andrea Mantegna (q.v.), whom he adopted at the age of 10. In this latter artist, one of the most learned, in¬ genious and original of his age, the first to master the complete rules of composition, the study of nature was happily balanced by a corresponding study of the antique. In Venice, enjoying a most unusual order and prosperity under the intelligent despotism of her dukes, the revival of art did not manifest itself strongly until the second half of this century, but its final florescence was one of the most brilliant of any age. Two families of painters appear in this first period, the Vivarini and the Bellini, the latter much the more famous. To them Antonello da Messina seems to have communicated the method of painting in oil, which they so soon mastered, — a love of color and splendor being one of the natural gifts of the Venetians. The head of the family was Jacopo Bellini (q.v.), who went to Florence early in his career; his sons were Gentile (q.v.) and Giovanni (q.v.), the latter praised by Al¬ brecht Differ at the period of his visit to Italy in 1506. In the works of these Venetians ap¬ pears that ˆatmosphere® which is so diligently sought by the modern schools, — the feeling of space and air, of the relative position and value of the figures in the general arrangement; the Gothic angularity and awkwardness have been replaced by a fuller knowledge. The most eminent of the followers of Gentile Bellini was Vittore Carpaccio (Scarpaccia), famous for

his cycle of nine pictures illustrating the legend of Saint Ursula.

The greatest name in the Renaissance proper is that of Leonardo da Vinci (q.v.), b. 1452, distinguished as a scientist, an architect, a sculptor, a musician, an author and a painter, — and qualifying painting, himself, as the noblest of the arts and as at the same time a science. But few of his pictures survive, the most famous and the most wonderful being the portrait known as the (Mona Lisa5 in the Louvre. Of his numerous followers, the most productive and the most successful in expressing some of his qualities was Bernardino Luini (q.v.). Michelangelo (q.v.), on the other hand, vehe¬ mently protested against placing painting on a level with sculpture, and, indeed, remained to the end of his days (< Michelangiolo S cult ore* rather than the painter, even in his great¬ est mural decorations. His first patron was Lorenzo de Medici; and it was in 1508 that the Pope Julius II commissioned him to paint the ceiling of the Sistine Chapel in the Vatican. In 1535 he began the (Last Judgment on the end wall, and it was unveiled for the Christmas festival of 1541. The qualities of his rugged genius were peculiarly those best adapted to create a school of mannerisms and con¬ ventions among his imitators, and we see his influence very strongly developed even in his lifetime, and even in the favorite pupil of Raphael, Giulio Pippi, called Giulio Romano (q.v.). To this pretentions and ignorant school of exaggerated muscular action and violent foreshortening, which flourished during the decadence of the art, was given the name of the Baroque. The art of Raphael Santi da Urbino so different in quality, was eminently qualified by its combinations of academical distinc¬ tion with suavity and grace to secure the largest need of popular favor in his own time and in succeeding ages, and his (Madonna Sistina,5 now in the Dresden Gallery, was accepted for more than three centuries as the greatest painting in the world. Andrea del Sarto (q.v.), the best colorist in the Florentine school, may be said to err only in a certain lack of deep feeling; and the versatile talent of Cor¬ reggio (q.v.) leads up to the splendors of the later Venetian school of Giorgione, Palma, Vecchio and Titian, and, later still, of Paul Veronese, Tintoretto and Tiepolo, the apotheosis of the beauty of oil painting. Giorgio da Castel-franco (so > great a .Giorgio that he was called Giorgione, that is, Big George) was a fellow student with Titian under Giovanni Bel¬ lini. But very few of his authenticated works survive, one of them being in the Louvre. Of Giacomo Palma, the elder (q.v.), called Palma

Vecchio, more is known, over a hundred exist¬ ing paintings being attributed to him, the finest being probably the altar-piece of Santa Maria Formosa, Venice, a single figure of Saint Bar¬ bara. With the majestic figure of Titian, Tiziano Vecelli da Cadore (q.v.) (1477-1576), the golden period of the Renaissance may be said to end, — of all the numerous assistants who worked under him during his long life, including a brother and a son, none inherited his power. His paintings, sacred, allegorical, mythological, and portraits, are preserved in all the great galleries of Europe ; the most beauti¬ ful, and perhaps the most characteristic of this school being the so-called (Earthly and Heavenly

Love* in the Borghese Palace in Rome. For painting after 1550, see Post-Renaissance Painting.

Bibliography. — Crowe and Calvalcaselle, (History of Painting in Italy) (1864; new edi¬ tion begun in 1903) ; (A History of Painting in North Italy) (1871) ; (Titian, his Life and Times5 (1877) ; (Raphael, his Life and Works) (1882); (Early Flemish Painters > (1872) ; Kugler, (Handbuch der Geschichte der Malerei5 (1867), English translations include (German, Flemish and Dutch Schools of Painting) ed. by Crowe (London 1898) ; (Italian Schools of Painting) ed. by Layard (London 1907) ; Muntz, (Histoire de l'Art pendant la Renais¬ sance: Italy) (1895); (Les Precurseurs de la Renaissance5 ; Lubke, (Geschichte der ital-ienischen Malerei vom 4. bis zum 16. Jahrhun-dert5 ; LaCroix et Sarre, (Le Moyen Age et la Renaissance5 ; Burckhardt, Civilization at the Period of the Renaissance in Italy5 (author¬ ized translation by S. G. C. Middlemore) ; Viardot, (Les Merveilles de la Peinture5 ; Va¬ sari, (Vite dei Pittori, Sculturi, Architetti,5 translated into English by Mrs. Jonathan Fos¬ ter as (Lives, of Seventy Painters, Sculptors and Architects,5 edited and annotated in the light of recent discoveries by E. H. and E. W. Blashfield and A. A. Hopkins5 ; Woefflin, H., (The Art of the Italian Renaissance5 (English trans., London 1913).

William Walton,

Painter; Author of "Chefs d,CEuvre,' > Exposi¬ tion Universelle, Paris.

RENAN, re-nan, Ernest, French historian, philosopher, dramatist and essayist: b. Treguier, Cote-du-Nord (Brittany), 27 Feb. 1823; d. Paris, 2 Oct. 1892. The priests who directed the school in Treguier conducted his education up to his 16th year. When he was chosen in 1838 by the Abbe Dupanloup for a place in the seminary of Saint Nicolas du

Chardonnet in Paris. Here he remained until, in 1842, he went to Issy, near Paris, to receive a training in philosophy previous to his entering upon his studies for the priesthood. In 1844 he was ad¬ mitted to the seminary of Saint Sulpice, the chief training school of the French priesthood, where he acquired a knowledge of Hebrew, Arabic and Syriac. The result of these studies in philology was to shake his belief in Catholic orthodoxy, and finding it impossible to enter the priesthood he left the seminary in 1845. While he now maintained himself by teaching in a school at Paris, he continued his historical and philological studies, aided by the counsel and assistance of his sister, Henriette. In 1848 he received the Volney prize for an essay on the Semitic languages. This was amplified and pub¬ lished as (Histoire generate et Systeme compare des Langues semitiques5 (1855). In the follow¬ ing year he was sent on a mission to Italy by the Academie des Inscriptions et Belles-Lettres, and returning was appointed to a post in the manuscripts department of the Bibliotheque Nationale. His (L' Avenir de la science,5 though not published until 1890, was written in 1848—49. He next published (Averroes et aver-roisme5 (1852) and several (Etudes d'histoire religieuse5 (1856). Having become known as an Oriental scholar, he was appointed a member of a commission sent by the government in 1860 to examine the remains of Phoenician civiliza-RENlS — RENlSE OF FRANCE

tion in Syria. It was during this journey in Palestine that he wrote his famous (Vie de Jesus } (1863). He afterward dedicated it to his sister, Henriette, who, having accompanied him, had died at Byblos. During his absence Renan had been appointed professor of Hebrew in the College de France, but some expressions of a Unitarian character in his inaugural ad¬ dress conspired with his well-known hostility to traditional Christianity to deprive him of his chair, in which he was not reinstated until

1871.

The publication of the (Life of Jesus) in 1863 gained for its author a European reputation, and was the first of a series on the (Histoire des Origines du ChristianismeC which he made the chief labor of his life.

This comprehensive work included the following further volumes: (Les Apotres) (1866); (Saint PauP (1869); MAntichrisC (1871) ; (Les Evangiles et la seconde generation Chretienne) (1877) ; (L'eglise Chretienne) (1879) ; (Marc Aurele et la fin du monde antique > (1882) ; (Index

general > (1883). In 1888 he was elected a member of the French Academy. During 1880 he delivered the Hibbert lectures in London on (The Influences of the Institutions, Thought, and Culture of Rome on Christianity,* and also, at the same time, lectured at the Royal Institu¬ tion on Marcus Aurelius. In 1883 he was ap¬ pointed administrator of the College de France, where he continued his labors until his death. It is not yet possible to decide with any degree of certainty the ultimate effect of his work on the religious thought of Europe. Around Renan's writings were waged bitter contro¬ versies <(whose volume is rivaled only by their acrimony.® Truth was to him a diamond of many facets, and he was never ready to define his position, but to his own generation he was a man of unique personality, and a writer of great erudition. Besides the works already enumerated the following should be mentioned : (De l'Origine du Langage> (1857) ; (Le livre de Job) (1859) ; (Essais de morale et de critique) (1859) ; (Le cantique de cantiques) (1860); (Mission de Phenicie* (1865-74); Questions contemporaines) (1868) ; (La re¬ forme intellectuelle et morale) (1872) ; dia¬ logues philosophiques> (1876) ; (Melanges

d'histoire et de voyages) (1878) ; (Corpus in-scriptionum Semiticarum* (1881-89) ; (L'Eccle-siaste) (1882) ; (Souvenirs d'enfance .et de

jeunesse* (1883) ; (Nouvelles etudes d'histoire religieuse* (1884) ; (Discours et conferences* (1887) ; (Histoire du peuple d'Israel* (1887 — 94) ; (Feuilles detachees* (1892) ; and several dramas, such as (Caliban) (1878). (L'eau de Jouvence) (1880), Le pretre de Nemi* (1885) and (L'abbesse de Jouarre* (1886). His dettres intimes) (1896) are a fitting memorial of his devoted attachment to his excellent sister, Henriette. See Life of Jesus; Recollections of Childhood and Youth.

Bibliography. — Babbitt, I., Masters of Modern French Criticism* (New York 1912) ; Barry, W. F., (Ernest Renan) (New York 1905) ; Bourget, Paul, (Essaio de psychologie contemporaine) (Paris 1889) ; Brauer, G. H. A., (Philosophy of Ernest Renan) (Madison, Wis., 1903) ; Despartes, H., (Ernest Renan, sa vie et son ceuvre> (Paris 1893) ; Espinasse, F., (Life of Ernest Renan* (London 1895) ; Duff, Grant, (In Memoriam* (1893); Harris, F., Contem¬

porary Portraits) (New York 1915) ; Myers, F. W. H., (Essays: Modern) (London 1883) ; Monod, (Maitres d'histoire> (Paris 1895) ; Platzhoff, E., (Ernest Renan) (Dresden 1900) ; Renan, E., (Souvenir d'enfance et de Jeunesse) (Paris 1883) ; (Feuilles detachees* (Paris 1882) ; dettres intimes) (Paris 1896) ; Rod, E., des idees Morales du temps present* (Paris 1897) ; Saintesbury, G. E., Miscellaneous Essays* (London 1892) ; Seailles, G., drnest Renan) (Paris 1894) ; Sainte-Beuve, (Nouveaux lundis* (Paris 1863-72) ; Soman, M., da formation philosophique d'Ernest Renan) (Paris 1914).

RENE, re-na, or RENATUS I (re-na'tus) OF ANJOU (called also The Good), titular king of Naples: b. Angers, 16 Jan. 1409; d. Aix,

10 July 1480. He was the second son of Louis II, Duke of Anjou. He inherited Anjou and Provence, besides claims upon Naples, Sicily and Jerusalem from his brother Louis III in 1434, and these rights were confirmed by Joanna

11 before her death in 1435. Rene had in 1420 married the daughter of Charles II, Duke of Lorraine, and had in 1431 become possessed of that dukedom. But in the same year Count An¬ tony of Vaudemont took him prisoner, where¬ upon the Lorraine states appealed to the Em¬ peror Sigismund to decide the quarrel. Rene in 1432 was released from his prison for a year by giving his sons as hostages. At last, in 1434, Sigismund gave a decision in Renes favor. The dethroned Antony proceeded to the Duke of Burgundy, who required Rene again to place himself in custody. Scarcely had this been done when an embassy arrived to tender him possession of Naples and Sicily. Philip refused to set Rene at liberty, and the ambassadors therefore conferred the crown on his wife Isabella, whom her husband named regent of Anjou, Provence, Naples and Sicily. Isabella set sail for Naples, but there found a competitor in Alfonso, king of Aragon, who maintained his position not only against her, but also against Rene himself, after he had obtained his liberty in 1437. Rene, obliged to abdicate, re¬ turned to Provence. The government of Lor¬ raine he gave up to his son John, who, after his mother Isabella's death, entered into full possession under the title of John II. On this Rene retired to Provence to give himself to poetry and the arts. His literary remains were edited by Count de Quatrebarbes (1845-46). Consult also Boisson de la Salle, (Precis Historique* (1820) ; Bargemont, (Histoire de Rene d'Anjou, Roi de Naples, Due de Lorraine, et Comte de Provence) (1825) ; Marche, (Le Roi Rene: sa vie et ses travaux) (1875); Stalev, (King Rene d'Aniou and his seven Queens)

(1912).

RENE II, count of Anjou, grandson of Rene I: d. 1508. He inherited Vaudemont, Joinville, Aumale, Mayenne and Elbceuf in 1470 from his father, Frederick II; and Lorraine from his mother in 1473. In 1480 he acquired the dukedom of Bar. He fought with the Swiss against Charles the Bold of Burgundy in 1477. After his grandfather ceded Lorraine to Louis XI he tried to establish his rights by force of arms.

RENEE OF FRANCE, Duchess de Ferrara, French princess, daughter of Louis XII: b. Blois, France, 1510; d. Montargis,

France, 1575. She was highly educated, pos¬ sessed a keen intellect and took a deep interest in religious controversies. In 1527 she was married to the Duke de Ferrara and in 1535 was converted to Protestantism by Calvin. Her conduct was displeasing to her father who caused her four children to be taken from her and educated in the Catholic faith, and also ordered severe restrictions concerning the princess' freedom of action and compelled her to attend mass. After the death of the duke in 1559 she returned to France and resided in her castle of Montargis, where she was the patron of the French Huguenots and also of various literary celebrities. Consult Vatteau-Calleville, (Vie de Renee de France' (1781) ; (Memorials of Renee of France, Duchess of Ferrara) (1859) ; Fontana, (Renata di Francia, duchessa di Ferrara' (1888-93) ; Rodocanachi, (Renee de France' (1896); Fawcett, (Five Famous French Women' (1905).

RENEGADE, one who renounces his reli¬ gious belief and adopts another; in particular one who gives up Christian belief for Moham¬ medanism : a renegade is also a traitor who, deserting the cause of his country, enters the service of his country's enemies. Among famous renegades in this sense are Hippias, the Athenian, son of Pisistratus, who fought on the side of Sparta against Athens, and afterward joined the Persians; the Roman patrician Coriolanus, who, when exiled from

Rome, took up arms with Volscians against his country; in the Thirty Years' War, Count Mansfeld, who deserted from the Catholic to the Protestant side, and Pappenheim, who deserted from the Protestant side to the Catholic; Archibald Campbell, Duke of Argyll, who in 1619 entered the service of Spain, then at war with Great Britain; the Cossack chief, Mazeppa, who fought against his sovereign at Pultowa with the Swedes ; in the 18th century the Duke de Riperda, who had won distinction in the mili¬ tary service of Spain, but embraced Islam and led the armies of Morocco against Spain ; Omar Pasha, hero of the Crimean War, born a Chris¬ tian, who joined the Turks and embraced Islam; Emin Pasha, a hero of the Equatorial Province of Africa and a German Jew, who became a Mohammedan. At the outbreak of the Civil War in the United States, a considerable num¬ ber of military and naval (officers resigned office and entered the Confederate service.

RENFREW, Canada, town in Renfrew County, Ontario, on the Bonnechere River, eight miles above its confluence with the Ottawa River, 58 miles west of Ottawa, on the Grand Trunk and Canadian Pacific Railways. There is a large waterfall near here and the town has abundant water power. Manufactures include leather, flour, woolens, hosiery, refrigerators, machinery, and there are dairy and lumber in¬ terests. Pop. 3,846.

RENI, Guido, ge'do ra'ne, Italian painter: b. Bologna, Nov. 1575; d. there, 18 Aug. 1642. His first instruction was received in Calvaert's celebrated school at Bologna where he studied the works of Albrecht Diirer. When the school of the Caracci, at Bologna, began to eclipse that of Calvaert, Guido, then 20, joined it. He visited Rome for the first time in 1602, with two of his fellow students, Domenichino and Albano. He made a second visit in 1605 and

Cardinal Borghese employed him to paint a (Crucifixion of Saint Peter' (now in the Vati¬ can) for the church Delle Tre Fontane. The powerful manner of this picture, and several others of the same period, which manner Guido did not, however, long retain, increased his fame; and at the cardinal's request, he com¬ pleted the Aurora' on the ceiling of the Casino in the Rospigliosi Palace. This picture has be¬ come well known and popular from the engrav¬ ings of it by R. Morghen, J. Burger and others. Paul V at that time employed Guido to decorate a chapel on Monte Cavallo, with scenes from the life of the Virgin Mary. Guido accom¬ plished this work to the satisfaction of the Pope, and was next entrusted with the painting of the memorial chapel in Santa

Maria Maggiore. To this period his (Fortuna,' and the portraits of Sixtus V and Cardinal Spada may be assigned. His paintings are very unequal in style and character, but generally are con¬ sidered as belonging to three different manners and periods. The first comprises those pictures which resemble the manner of the Caracci, and particularly that of Caravaggio. Faces and forms, stately and grandiose, deep shadows, narrow and intense lights, high coloring, in short, an effort after great effect, distinguish his works of this first period. The second manner is completely opposed to the first and shows the painter at his best, being sweet, natural and unstrained. Its principal features are tender coloring, little shade, an agreeable, though often too dainty, airy and sentimental, treatment of the subject, constituting a style quite peculiar to Guido. His Aurora' forms the transition from the first to the second style of his paintings. A third period commences at the time when Guido worked with too much haste and had become more avaricious of money than of fame. His coloring has turned to a greenish and altogether unnatural grayness, and the general treatment is careless and weak. During the government of Pope Urban VII Guido quarreled with his treasurer, Cardinal Spinola, respecting the price of a picture, and returned to Bologna. There he had already executed his (Saints Peter and Paul' for the house of Zampiere, and the (Murder of the In¬ nocents' for the Dominican church, and was on the point of embellishing the chapel of the saints with his pictures when he was called back to Rome, loaded with honors, and received by the Pope himself most graciously. But he soon ex¬ perienced new difficulties, and in 1622 accepted an invitation to go to Naples. Believing him¬ self unsafe at this place, on account of the hatred of the Neapolitan artists for foreign painters, he returned once more to his native city, never to quit it again. At Bologna he painted two beautiful pictures for the church Dei Mendicanti, an Assumption' for Genoa, and a number of others for his native city and other places, particularly for Rome. There is also a (Magdalen' by this artist in Chiswick House, belonging to the Duke of Devonshire, of which there is an engraving by Sir Robert Strange. Equally celebrated is a painting of (Lot and his Daughters,' in the Hampton Court collection, also engraved. In the gallery of the Louvre are several, of which the finest is the (Centaur Nessus carrying off Dejanira.' In the Dresden Gallery is his (Christ Wearing the Crown of Thorns.' Consult Bolognini-Amorini,

(Vita del celebre pittore Guido RenP (1839) ; Dohme, (Kunst und Kiinstler Italiens) (Vol. II, 1879) ; (Masters in Art> (Vol. IV, 1903) ; Von Boehm, (Guido Reni) (in Kiinstler-Mono- graphien,> 1910).

RENNELL, ren'el, James, English geog-grapher: b. Chudleigh, Devonshire, 3 Dec. 1742; d. London, 29 March 1830. At 13 he entered the navy as midshipman and was present at the siege of Pondicherry. In 1763 he entered the East India Company's sea service; the next year was appointed surveyor-general of the East India Company's dominions in Bengal and re¬ mained in the service for 13 years. Returning to England in 1777, he published his (Bengal Atlas) (1779), a work of the highest import¬ ance for administrative and strategical purposes. This was followed by the earliest approximately correct map of India, with a memoir (1783). The Royal Society, of which he had been a fellow for 10 years, gave him the Copley medal in 1791. His attention was thereafter directed to comparative geography, and in pursuance of his scheme for a great work on western Asia he published Geographical System of Herod¬ otus Explained) (1800) ; Observations on the Topography of the Plain of Troy> (1814), and (Illustrations of the Retreat of the Ten Thousand) (1816). Finally came (A Treatise on the Comparative Geography of Western Asia) (1831). He contributed much to the field of African geography, constructing a map of northern Africa for the African Association, and determining the routes taken by Hanno and his own day by Mungo Park. Throughout his life he had been interested when not per¬ sonally occupied in marine surveying and had collected an immense mass of data which he began to reduce to a system about 1810. He completed current-charts of the Atlantic which were published after his death ; and the name of (Rennell's CurrenP was given to the current to the southward of the Scilly Islands whose occasional northward set he was the first to explain. He published papers on the ruins of Babylon, the identity of Jerash, the shipwreck of Saint Paul and the landing of Caesar. In 1801 he was made an associate of the Institute of France, and in 1825 received the gold medal of the Royal Society of Literature. He was buried in Westminster Abbey. Consult Mark¬ ham, (Major James Rennell and the Rise of Modern English Geography > (1895).

RENNENKAMPF, ren'en-kampf, Paul Charles von, Russian general : b. Baltic Prov¬ inces, 1854. He was educated in a military academy, became a staff officer and in 1900 saw service in China as a major-

general. He was commander of a division of cavalry in the Russo-Japanese War in 1904-05, and he was criticized for the harshness of his measures in dealing with the revolutionary disturbances in 1905. He took an active part in the early events of the European War, participating in the Russian invasion of East Prussia. He was removed from his command after his failure to prevent the Germans from entering Warsaw and was placed on the retired list. Author of (Der zwanzigtagige Kampf meines Detache-ments in der Schlacht von Mukden > (1909).

RENNERT, Hugo Albert, American phi¬ lologist: b. Philadelphia, Pa., 6 May 1858. He was graduated at the University of Pennsyl¬

vania in 1876 and later studied at the University of Freiburg. He has been professor of ro¬ mance philology at the University of Pennsyl¬ vania since 1892. He has written (Spanish Pastoral Romances) (1892) ; (Comedias of Miguel Sanchez) ; (Poesies Quedites de Gon-gora > ; (Life of Lope de Vega) (1904); (The Spanish State in the Time of Lope de Vega >

(1909).

RENNES, ren, France, capital of the de¬ partment of Ille-et-Vilaine (formerly capital of Brittany), situated at the junction of the rivers Ille and Vilaine. It is divided by the Vilaine, traversing the city from east to west, into the High and Low Town. The High Town is ele¬ gantly built on the right bank of the river; the Low Town is unprepossessing and older (11th-13th century) and suffers from frequent inun¬ dations. The buildings of interest are : The cathedral, of pseudo-ionic style ; the archiepis-copal palace; the old parliament house, and the statutes of many celebrities; the town-house, containing a fine picture gallery, with work by Veronese, Michelangelo, Tintoretto, Van Dyck, Rembrandt and Rubens; splendid scientific and other collections ; important archives and a large library. Rennes has courts of justice of first and second instance. The industries em¬ brace tanneries, wax-bleaching, printing, stained paper, hats, boots and shoes, gloves and agri¬ cultural implements. There is an extensive trade in butter, honey, wax, cotton and linen yarns, lace, earthenware, *etc.* Rennes is very ancient, dating from Condate, the capital of the Gallic Redones. It was the scene of the second court-martial of Captain Dreyfus for high treason (September 1899). Pop. 80,000.

RENNET, the prepared inner surface of the stomach of a young calf. It contains much pepsin and has the property of coagulating the casein of milk and forming curd. It is pre¬ pared by scraping off the outer skin and super¬ fluous fat of the stomach when fresh, keeping it in salt for some hours and then drying out. When used a small piece of the membrane is cut off and soaked in water, which is poured into the milk intended to be curdled.

RENNIE, ren'i, George, English civil engi¬ neer, son of John Rennie (q.v.) : b. London, 3 Sept. 1791 ; d. there, 30 March 1866. He was educated at the University of Edinburgh and in 1811 entered the office of his father. He was inspector of machinery of the mint in 1818-26, and in 1821 engaged with his brother Sir John Rennie (q.v.) in completing several important works begun by their father, among which were the breakwater at Plymouth, various docks, har¬ bors, canals and the London Bridge. He laid out the Liverpool and Manchester Railway in 1826, was chief engineer of the Namur and Liege Railway in 1846, constructed the first screw-propelled ship in the British navy, the Mermaid, in 1840, and was engaged in the con¬ struction of naval works at Sebastopol and other foreign ports besides those in English harbors. After the retirement of his brother, Sir John, in 1845, he conducted the business ol the firm in partnership with his two sons.

RENNIE, John, Scottish civil engineer: b. Phantassie, Haddingtonshire, 7 June 1761 ; d. London, 4 Oct. 1821. At an early age he showed an interest in mechanics and frequented the

shop of the millwright Andrew Mickle, inventor of the threshing machine. Later he spent three years at the Edinburgh University, and in 1784, having already established a business of his own, he visited James Watt at Soho, Stafford¬ shire, and by Boulton and Watt was engaged to take charge of the work of the Albion Flour Mills, Blackfriars, London. Rennie designed all the machinery, using iron instead of wood for the shafting and framing. In London his reputation rapidly increased until he was ranked foremost among the civil

engineers of Great Britain. Among his public works may be men¬ tioned Ramsgate Harbor; Waterloo and South¬ wark Bridges, across the Thames, and the design of London Bridge, the structure being completed after his death ; the breakwater at Plymouth, and several similar structures, where submarine masonry was carried to great per¬ fection. He superintended likewise the execu¬ tion of the Grand Western Canal, from the mouth of the Exe to Taunton ; the Polbrook Canal, Cornwall; the Aberdeen Canal, uniting the Don and the Dee ; that between Arundel and Portsmouth, and, his chief work in connec¬ tion with inland navigation, the Kennet and Avon Canal, between Bath and Newbury, the London Docks, the East and West India Docks, the Prince's Dock at Liverpool, and those of Dublin, Greenock and Leith were also designed by him. In prosecuting his works he made use of the diving-bell which he greatly improved and the steam-dredging machine, apparently without the knowledge that in its invention he had been anticipated by Sir Samuel Bentham.

RENNIE, Sir John, English civil engineer, younger son of John Rennie (q.v.) : b. London, 30 Aug. 1794; d. Bengeo, near Hertford, Hert¬ fordshire, 3 Sept. 1874. At 16 he like his brother began the study of engineering under his father. When his father died in 1821 he continued with his brother George to carry on the extensive business left in their hands. He made hydraulic engineering a special study and through his efforts large tracts of land on the eastern coast of England, including part of the Lincolnshire fens, were reclaimed and made extremely productive. The finest works of the Rennies are their bridges, which may be seen in all parts of England and Scotland, London Bridge being the most massive of them all. On the occasion of the opening of this bridge in 1831 John Rennie was knighted, an honor his brother declined. After the dissolution of the partnership in 1845, Sir John practised as an architect. He introduced the system of rail¬ ways in Sweden, made important surveys of the harbor of Oporto in Portugal and designed, and in great part executed, the harbor of Ponte Delgada in the Azores, one of his latest public works. In 1845 he was elected president of the Institute of Civil Engineers. He was the author of (Theory, Formation and Construction of British and Foreign Harbors) (1851-54), Consult his (Autobiography) (1875).

RENNO RENAPPI, the native name for Delaware Indians (q.v.).

RENO, re'no, Conrad, American lawyer, son of J. L. Reno (q.v.) : b. Alabama, 28 Dec. 1859. He was graduated from the Boston Uni¬ versity Law School in 1883 and afterward practised in Boston. He published (State Regulation of Wages) (1891); <Non-Residents

and Foreign Corporations) (1892) ; Employ¬ ers' Liability Acts) (1896-1903) ; (History of the Judicial System of New England) (1900) ; (The Spirit of Progress,) a dramatic fable

(1908-14).

RENO, Jesse Lee, American military offi¬ cer: b. Wheeling, W. Va., 20 June 1823; d. South Mountain, Md., 14 Sept. 1862. He was graduated from West Point in 1846, served with distinction in the Mexican War, was assistant professor of mathematics at West Point in 1849 and at the outbreak of the Civil War was com¬ missioned brigadierrgeneral of volunteers. He rendered gallant service at Roanoke Island. Newbern and Camden, and was promoted ma¬ jor-general in 1862. He took part in the bat¬ tles at Manassas and Chantilly and after re¬ pulsing the Confederates under General Lee at South Mountain was killed while leading a charge.

RENO, Jesse Wilford, American engineer, son of J. L. Reno (q.v.). b. Fort Leavenworth, Kan., 4 July 1861. He was graduated from Lehigh University in 1883, afterward pursuing a special 'course in mining and engineering. In 1885-90 he was engaged in mining in Colorado and later became an electric railway expert. In 1892 he invented the inclined elevator or mov¬ ing stairway (see Escalator), for which he was awarded the medal of the Franklin Insti¬ tute in 1914 and later became consulting engi¬ neer of the Otis Elevator Company. He was a frequent contributor to technical publications.

RENO, Marcus Albert, American military officer: b. Illinois, about 1835; d. Washington, D. C, 31 March 1889. He was graduated from West Point in 1857 and at the outbreak of the Civil War was made first lieutenant in the United States army. He was promoted captain in the same year, brevetted major for gallantry at Kelly's Ford, Va., in 1863, lieutenant-colonel for services at Cedar Creek and in 1865 was brevetted brigadier-general of volunteers and colonel of regulars for distinguished service

throughout the war. In 1876 he was engaged in the campaign against the Indians under Sit¬ ting Bull, holding command second to General Custer. In the engagement in which Custer and nearly all his regiment were killed, Reno es¬ caped through cowardice and in consequence of his failure to support his associates and other serious charges he was

dismissed from the

service.

RENO, Nev., city, county-seat of Washoe County, on the Truckee River and on the

Western Pacific, the Southern Pacific and the Virginia and Tennessee railroads; in the ex¬ treme western part of the State, about 30 miles north of Carson City. It was settled in 1858 by eastern emigrants who had started for Cali¬ fornia. It was incorporated in 1869 and in

1901 was chartered as a city. It is in a farm¬ ing and stockraising region and is the most important and largest city in the State. The chief industrial establishments are railroad machine shops, which have 2,500 employees ; abattoir and packing houses, electric-power plant, pressed brick works, two flour mills, a cracker factory and a number of smaller factories. The trade is chiefly in farm prod¬ ucts, livestock and manufactures. It is an important distributing point for a vast terri-

RENOIR

tory. The principal public buildings are a gov¬ ernment building, eight churches and the Ne¬ vada State Hospital for Mental Diseases The educational institutions are the State University, opened in 1886, State Agricultural College and Experiment Station, a normal school, Academy of Our Lady, public and parish schools and a Carnegie library. The five banks have a com¬ bined capital of $2,500,000 and the annual amount of business is $64,000,000. The govern¬ ment is vested in a mayor and a city council of five • members, all of whom are elected by the people. Pop. (1920) 12,016.

RENOIR, re-nwar, Auguste, French painter: b. Limoges, 1841. He exhibited at the first Impressionist Salon in 1874 after study¬ ing under the impressionist Monet and others of the same school. While he paints figures principally and possesses singular skill in de¬ picting flesh color and skin texture, as well as facial expression, he has remarkable success in landscape, in fruit and in flowers, which he sets on the canvas with astonishing boldness and vividness of presentation. He is cer¬ tainly one of the most original and independent of the school to which he belongs. His (Jeunes Filles au Piano) is a good example of his qualities; among others (Une DanseuseP (La RoseP (Une tasse de theP and (La Seine a ArgentenieP Among his portraits are those of Claude Monet, his master, and the composer Wagner. Consult Duret, (Les Peintres Impressionistes) (1879) ; also (Exposees en partie a l'Exposition centennale de l'art francais >

(1900).

RENOUF, re-noof, Emile, French painter: b. Paris, 23 June 1845; d. Havre, 6 May 1894. He chose for his subjects the scenery of the sea and incidents in the lives of those who live on the seashore, fishermen, etc., but he also did some good work in landscape and genre. His fine marine (After the StorirP is in the New York Metropolitan Museum and his (Helping Hand* (a child holding to an oar, while a sturdy fisherman rows), is in the Corcoran Gallery, Washington. While in New York (1887-88) he painted (Brooklyn BridgeP which at present

is in the public gallery at Havre. In 1883 he was awarded a first class medal at Munich and in 1889 the Legion of Honor.

RENOUF, Sir Peter Le Page, English Egyptologist : b. Guernsey, 23 Aug. 1822 ; d. Lon¬ don, 14 Oct. 1897. He was educated at Eliza¬ beth College, whence he passed to Pembroke College, Oxford, where he cqme under the in¬ fluence of Newman and the Tractarians and in 1842 entered the Roman Catholic Church. From 1855 to 1864 he was professor in the Cath¬ olic University of Ireland, first of French litera¬ ture and the history of philosophy and subse¬ quently of ancient history and Oriental lan¬ guages. He began his career as an Egypt¬ ologist about 1860 and in 1863 defended the work of Young and Champollion against Sir George C. Lewis. He opposed the dogma of papal infallibility and in connection with this subject wrote on (The Condemnation of Pope Honorius) (1868) and (The Case of Pope Honorius Reconsidered* (1869). From 1866 until 1885 he was an inspector of schools and dur¬ ing 1885-91 he. wras keeper of the Egyptian and

Assyrian antiquities in the British Museum. In 1875 he published (An Elementary Grammar of the Ancient Egyptian Language) (2d ed., 1896), and in 1879 delivered a course of Hibbert lectures on the (Origin and Growth of Re¬ ligion as Illustrated by the Religion of Ancient Egypt* (1880; 2d ed., 1884). He was knighted in 1896. He left unfinished a translation of the (Book of the Dead,* with commentary, which at the time of his death was in course of publi¬ cation (1892 et seq.) in the Proceedings* of the Society of Biblical Archaeology, of which he was president from 1887. The work was com¬ pleted from Renouf's notes by E. Naville. Re-nouf was one of the most careful and trust¬ worthy Egyptologists of his time and was in addition a most versatile linguist. For a sketch of him, with a bibliography of his writ¬ ings, consult the (Proceedings) of the Society of Biblical Archaeology (Vol. XIX, 1897).

RENOUVIER, Charles Bernard, French philosopher: b. Montpellier, 1 Jan. 1818; d., 1 Sept. 1903. After studying at the Bcole Poly¬ technique at Paris, he began to take an interest in politics. He lived a life of retirement de¬ voted to study and writing. His principal works are (Essais de critique generale* (1854-64) ; (Science de la morale) (1869) ; (Uchronie) (1876) ; (Esquisse d'une classification systemati- que des doctrines philosophiques) (1885-86) ;

(Philosophic analytique de l'histoire) (1896-97) ; (Histoire et solution

des problemes metaphysiques) (1901) ; (Victor Hugo: le Poete* (1893) ; (Le Philosophe* (1900) ; (Les Dilemmes de la metaphysique pure) (1901) ; (Le Personnalisme* (1903) ; (Critique de la doctrine de Kant) (1906). His philosophy is idealistic and is based on Kant. However, he differs from Kant in several respects. He trusts only in personal experience as shown by phenomena as the true test of validity and distrusts every doctrine of an unknowable as a basis of ex¬ planation of the universe, whether that unknow¬ able be spiritual, ideal or material force. Realities are of objective as well as subjective aspect. In his theory of volition, he holds that liberty is the real and fundamental character¬ istic of man; and that belief consists also in an act of will. In the field of religion, he is op¬ posed to any doctrine of an infinite God, but believes that the consent of the doctrine of a finite God and immortality is rational and justifiable. Consult Prat, L., (Les Derniers en-tretiens de Charles Renouvier* (1904) ; Darlu, A., (La Morale de Renouvier> (1904) ; Seailles, G., (La Philosophic de Charles Renouvier) (1907).

RENOVO, re-no'vo, Pa., borough in Clinton County, on a division of the Pennsylvania rail¬ road, about 125 miles northeast of Pittsburgh and 25 miles northwest of Lock Haven. . It is in a region of the Alleghany Mountains noted for grand scenery and an abundance of game. Renovo is a summer resort which is growing in favor. It has considerable industrial interests connected with the extensive bituminous coal¬ fields and the fireclay deposits in the vicinity. The chief industrial establishments are the Pennsylvania railroad shops, the coal yards and the brick works. There is a national bank, with (1917) capital $50,000 and resources $986,970. Pop. (1920) 5,877.

RENSSELAER, ren'se-ler, Ind., city, county-seat of Jasper County, on the Iroquois River and on the Chicago, Indianapolis and Louisville Railroad, about 100 miles northwest of Indianapolis. It was settled in 1834 by David Nowles, John Nowles and Joseph Yeo-ma. It was incorporated in 1850 and chartered as a city on 1 May 1896. Rensselaer is in an agricultural region ; and its industries are chiefly

connected with farm products and live¬ stock, of which it makes considerable ship¬ ments. There are five churches, Saint Joseph's College, a high school, public elementary schools, Monnet School for Girls, a Catholic seminary, public library, business schools and a national bank, with (1917) capital $60,000 and resources $574,602. The government is vested in a mayor and a council of six members elected biennially. Pop. 2,393.

RENSSELAER, N. Y., city in Rensselaer County, on the Hudson River and the Boston and Albany, the New York Central and Hudson River railroads, opposite Albany and six miles south of Troy. It is connected with Albany, Troy and other cities by electric lines and by steamboat with many cities and towns on the river. Three large bridges span the Hudson and connect Rensselaer with Albany. The first settlement was made by the Dutch. It was in¬ corporated as a village in 1815 and in 1897 was chartered as a city. It was called Greenbush until it became a city, when it took the name Rensselaer. The village of Bath was annexed in 1902. Rensselaer is a commercial and manu¬ facturing city, noted for its chemical and aniline works, felt factory, tannery and shirt¬ waist factory. According to the United States census for 1914, the city had 32 manufacturing establishments, employing a capital of $2,317,- 925 and yielding products valued at $2,755,418. A large number of persons are employed in connection with the railroads and steamboats and in the offices, stores and factories in Albany and Troy. There are 10 churches, two public schools, one parish school, Saint John's Academy, Saint John's Orphan Asylum, Fran¬ ciscan Father's Home, Genet Barracks and Memorial Park. Fort Cralo, built in 1642, still stands. The government is vested in a mayor and a common council of 10 members, elected biennially. Pop. (1920) 10,823.

RENSSELAER POLYTECHNIC IN¬ STITUTE, located at Troy, N. Y. It was founded by Stephen Van Rensselaer in 1824 as a school of practical science, being the first school of science and the first school of engi¬ neering to be established in any English-speak¬ ing country. It was first opened to students in January 1825 and incorporated in March 1826. It was at first named the Rensselaer School, afterward the Rensselaer Institute and finally the Rensselaer Polytechnic Institute. Lectures on land surveying and engineering were given as early as 1823; and after 1850 the Institute be¬ came more distinctly a school of civil engineer¬ ing; the course at that time was lengthened from one year to three years. It now offers two courses of four years each, one in natural science and one in civil engineering. These courses include instruction in chemical analysis, mineralogy, metallurgy and assaying, as well as in the design and construction of roads, rail¬ roads, bridges, roofs, arches, dams, steam

engines, electric engines, dynamos, turbines, foundations, waterworks, tunnels, sewers and canals. The degrees of B.S. and C.E. are con¬ ferred. The students in 1917 numbered 687 and the faculty 63. Its influence has been wide— spread. Students have come to it from 42 of the States of the Union and 25 foreign coun¬ tries, and its graduates are at present practis¬ ing their profession in 45 of the States and 19 foreign countries. Its standing as a profes¬ sional school is shown by the following extract from the report to the German government by Prof. A. Riedler of the Royal Polytechnicum of Berlin: ((The greatest number of renowned hydraulic and railroad engineers of America are graduates of this school.®

RENT. Rent is commonly defined as the income received for the use of land, whether the owner uses it himself or leases it to some one else. Land, however, must be distinguished from real estate which includes not simply the land itself, but the permanent improvements and the fixtures on the land. Land in the strictly economic sense means simply the origi¬ nal and indestructible properties of the soil. Economic rent would, therefore, include only the income received for the use of these origi¬ nal and indestructible properties. There is still some question as to whether land should be so defined as to include the available supplies of plant food which may be found in the soil. From the standpoint of the original settler on a piece of virgin land, considerable supplies of plant food are found in the soil and may, there¬ fore, be regarded as original properties. In older and more permanent settlements, however, this original supply of plant food has long been exhausted and whatever plant food there is in the soil must be regarded as one of the improve¬ ments which have been placed on the land, along with draining, fencing, wells, buildings and so forth. In short, while a certain amount of plant food may have been one of the original properties of the soil, it is clearly not an in¬ destructible property. It may easily be ex¬ hausted and usually has to be replaced by human endeavor. There is, therefore, a tend¬ ency to define land in stricter terms so as to include only the physical and geometrical prop¬ erties of solidity, extension and location. Rent in this strict and narrow interpretation is that which the owner receives for the use of these physical and geometrical properties. This defi¬ nition is satisfactory for urban land. The only difficulty is in applying it to farm land. The physical and geometrical properties of solidity, extension and location are the only properties that give urban land any appreciable part of its value. These are the only properties needed for building purposes. Farm land, however, derives a large part of its value from soil fertility which is partly chemical. The farm owner who receives rent from his

farm is not likely to dis¬ tinguish that part of his income which is due to the chemical fertility of his soil from that part which is due to the physical and geometrical properties _ of solidity, extension and location.

The principle which determines the amount which a piece of land yields in the way of rent ha«s been variously stated. The most widely ac¬ cepted statement is that formulated first by the Scotch writer, Anderson, and later by the Englishman, Ricardo. Both regard rent as due

to a preferential value. If we assume that there is always free land, that is, land which can be had free of charge, then the utmost which will be paid for the use of a particular piece of land is the equivalent of the superiority of this land over such free land as may be hˆd. Some¬ thing can always be produced on free land. If we can determine how much more can be pro¬ duced with the same amount of labor and ex¬ penditure on a given piece of land than could be produced on free land, the difference between these two products will measure the degree of preference for the piece of land in question; or this difference in product will represent the preferential value of the better piece of land. Stated in formal terms, this law of rent is as follows : The rent of a given piece of land is equal to the difference between what it will yield under the method of treatment suited to its condition and that which the best free land available could be made to yield with the same application of labor and capital under a treat¬ ment suitable to its condition.

The cause of rent is undoubtedly the scar¬ city of land. This does not mean that all land of all qualities is scarce, but that lands of cer¬ tain desirable kinds and qualities are scarce. These are the only lands that yield rent. If we consider a certain desirable piece of land and find that there is not enough of the same grade to supply all the needs of the community, then, in order that the needs of the community may be supplied, inferior grades of land must be brought into use. Rather than make use of these inferior grades, cultivators, builders and so

forth will pay something for the use of the better grades. While the cause of rent is the scarcity of the better grades of land, the amount of rent is limited by the presence and availability of inferior grades of land and their degree of inferiority. If there is an abundance of land only slightly inferior to the piece of land in question, this piece of land will com¬ mand a low rental. If there is a scarcity of inferior land and if it is vastly inferior to the piece of land in question, then the piece of land in question will command a high rental. There is another way of looking at the question of rent, though it leads to much the same con¬ clusion. The rent of a given piece of land may be said to be equal to its social produc¬ tivity. If a given piece of land is brought into cultivation, the labor and capital necessary to its cultivation cannot be used on other land, or if it is thrown out of cultivation, the labor and capital which formerly cultivated it must be now employed on other land. How much dif¬ ference does it make to the community whether this piece of land is cultivated or not? If it is a good piece of land and is thrown out of cultivation, the labor and capital which for¬ merly cultivated it will produce less when em¬ ployed on other land than it formerly produced on the piece of land in question. When we determine how much less, we have a measure of the social value or the social productivity of the piece of land in question. If it is very poor land, and there is plenty of other land equally good on which the labor and capital can be em¬ ployed, it will make no difference whatever to the total productivity of the community whether the piece of land in question is cultivated or not. In that case the piece of land in question is worth nothing and will command no rent. The

more difference it makes to the community whether the piece of land in question is used or not, the higher the rental which it will com¬ mand.

Thomas N. Carver,

Professor of Political Economy, Harvard Uni¬ versity.

RENT, Law of. Rent being the sum, duty or return levied on the occupants, lessee or user of land, buildings, apartments, rooms, machin¬ ery, tools, power, heat, artificial light, etc., for the benefit of the owner it follows that a rela¬ tion is thereby instituted from which many legal complications may arise. The relation estab¬ lished that of landlord and tenant. A sub¬ tenant is one who rents all or part of the prem¬ ises from the original tenant. A lease is a legal instrument by which the relation of landlord and tenant is formally established and

which to a very great extent defines the privileges, duties and obligations of the parties subscrib¬ ing to it. The relation is often less formally established and may arise by implication if the acts of the parties are consistent with it. A tenant Is bound to pay the stipulated rent at the time stated in his lease or contract or otherwise agreed upon. Should he fail to do so, however, his status of tenant is not affected, but the landlord acquires a right to institute a civil action to recover the amount in default and further may levy a distress. A tenant who occupies the premises beyond the term of his lease or contract becomes liable for the rent of the next ensuing period, week, month, etc., as the case may be. He becomes in such a case a tenant at will and his tenancy may be ter¬ minated at the will of the landlord. Statutes in some jurisdictions hold that a tenancy not governed by a lease is a tenancy at will. Such a tenancy may be terminated in various ways, i.e., by the lease of the property to a third person, by the death of either the landlord or tenant, by the sale of the property, or by any act on the part of the landlord amounting to a demand for possession or showing such in¬ tention. A lease once signed, the lessee or tenant is ordinarily liable for the rent agreed upon whether or not he takes possession, ex¬ cept in the case where the premises are de¬ stroyed before the beginning of the term. A lease is terminated by the sale of the property under foreclosure proceedings. Unless con¬ tained in the agreement a landlord is not com¬ pelled to make repairs, nor is he liable for them, and seldom for any injury caused by the condi¬ tion of the premises. A landlord is generally liable to tenants for injuries due to accidental defects, and for any negligence on his part. In modern states increasing liabilities are being placed upon property-owners, property being held in less divine regard than formerly and persons proportionally higher. Thus in modern cities, the landlord is often obliged to keep passageways and approaches lighted, to pre¬ vent any obstruction of a passageway, which would render it dangerous. The duty of re¬ moving ice and snow in many cases devolves upon the tenant. Where heat, light, power, etc., are included in the agreement, failure of the landlord to supply same creates a right of the tenant to damages. The owner is obliged to maintain the premises in a habitable condi¬ tion. Disputes and suits at law over repairs

have been so numerous as to cause very many landlords to insert in their leases a clause that all repairs shall be made by the tenant. Of course this involves a reduced rental. An ac¬ tion at law at any time can be maintained by the landlord, or his assignee, to recover rent, and under ordinary circumstances no prior demand is necessary; in few jurisdictions, however, is the landlord authorized to attach the property of a tenant, but never the household goods, trade tools, *etc.* Courts have held that the right to collect rent was a species of real property that might be delegated, held in fee, or willed to posterity. Every State has its own laws and many municipalities have ordinances that tend to complicate greatly the relations of landlords and tenants. It is impossible, therefore, within the limits of the present article to give details of the statutes obtaining in the several juris¬ dictions. See Fee; Landlord and Tenant; Lease; Property, Laws of. Consult Kent, J., Commentary on American Law) (14th ed., 4 vols., Boston 1896) ; Maine, H. J. S., (Lectures in the Early History of Institutions) (7th ed., London 1897) ; Corpus Juris) (New York 1915 et seq.) ; Tiffany, H. T., (The Law of Landlord and TenanD (New York 1913) ; Williams, T. C., Principles of the Law of Real Property) (19th ed., London 1901).

RENTON, Wash., city in King County, 10 miles southeast of Seattle, on the Columbia and Puget Sound, the Northern Pacific and the Chicago, Milwaukee and Saint Paul railroads. There are clay, coal and lumber interests and manufactories of bricks, briquettes and cars. Pop. (1920) 3,301.

RENUNCIATION, in law, the act of giving up a right, such as the position of an executor or administrator of an estate, or any other office, charge or claim to which the per¬ son renouncing is legally entitled. The term is applied especially to the act of an executor, who, having been nominated in a will, and hav¬ ing the option of acting as such or not, declines to act, and in order to avoid any liability ex¬ pressly renounces the office. There are proper legal forms for such action.

RENWICK, Edward Sabine, American engineer and patent expert: b. New York, 3 Jan. 1823; d. 19 March 1912. He was graduated from Columbia in 1839 as a civil and mechanical engineer and became superintendent of large iron works at Wilkesbarre, Pa. In 1849 he began his career as a patent expert and in 1862, with his brother Henry Renwick, he repaired a break 82 feet long and 10 feet wide in the bilge of the Great Eastern while afloat, a feat deemed an impossibility by experts. He in¬ vented several machines and

mechanical ap¬ pliances and published Practical Invention

(1893).

RENWICK, James, Scottish covenanter: b. Moniaive, Dumfriesshire, Scotland, 15 Feb. 1662; d. Edinburgh, 17 Feb. 1688. He was edu¬ cated for the ministry at the University of Edinburgh, but upon declining to recognize Charles II as the head of the Church was re¬ fused a degree. He finished his education at Groningen, Holland, was ordained in 1683, re¬ turned to Scotland and engaged in preaching at conventicles. He was outlawed in 1684 as a result of publishing with Alexander Shields (An Informatory Vindication of the Covenant¬

ers.) When James II came to the throne (1685), Renwick with 200 men went to San-quahar, and published a declaration rejecting him, and in 1687, as the acknowledged leader of the Cameronians a price was put upon his head, and he was hunted from place to place. He was captured in the following year and executed at Edinburgh.

RENWICK, James, American scientist : b. Liverpool, England, 30 May 1790; d. New York, 12 Jan. 1863. He came with his parents to New York in 1794, was graduated from Columbia and in 1812 acted as instructor in natural philosophy there. In 1814 he became a topographical engineer with rank as major in the United States service and in 1820-53 was professor of chemistry and physics at Columbia. In 1840 he was engaged as one of the commis¬ sioners to survey the boundary line between United States and New Brunswick. His pub¬ lications include ‘Outlines of Natural Philos¬ ophy } (1822-23) ; ‘Treatise on the Steam

Engine) (1830); (Elements of Mechanics* (1832); ‘Outlines of Geology) (1838); Ap¬ plications of the Science of Mechanics to Practical Purposes> (1840); ‘Memoir of De Witt Clinton) (1840) ; (Life of John Jay* and ‘First Principles of Chemistry) (1841) ; (First Principles of Natural Philosophy) (1842) ; lives of cDavid Rittenhouse) (1839); ‘Robert Ful-ton) (1845), and ‘Count Rumford* (1848), in Sparks’s (Library of American Biography) ; lectures on (Chemistry Applied to the Arts,* *etc.*

RENWICK, James, American architect : b. New York, 3 Nov. 1818; d. there,- 23 June 1895. He was son of the preceding, and was graduated at Columbia College in 1836. Among his many works are Grace

Church, New York, completed in 1845; the Smithsonian Institution and the Corcoran Art Gallery, Washington, D. C. ; Vassar College, Poughkeepsie; and Saint Patrick's Cathedral, New York. This list of buildings shows the versatility of this truly learned architect, whose mastery of French-Gothic, both in its details and proportions, en¬ abled him to give New York two of the noblest ecclesiastical exteriors in the city. He gathered a remarkable collection of professional material which he bequeathed to the Metropolitan Museum of Art, New York.

REORGANIZED CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS, The,

organized 6 April 1860, at Amboy, Ill. On 27 June 1844 Joseph Smith, President of the Church of Jesus Christ of Latter Day Saints and his brother Hyrum, the Patriarch, were murdered by a mob at Carthage, Ill. Following this event several aspirants arose claiming the right to the presidency of the Church. The most prominent of these were Sidney Rigdon, Wil¬ liam B. Smith and James J. Strang. Sidney Rigdon, who served as first counselor to the Prophet Joseph Smith 1833-44, was the first to make the claim, stating that the Church should choose him as "Guardian® to stand for the martyred president. By appointment, a con¬ ference of the Church was held 8 Aug. 1844, in Nauvoo, Ill., at which Mr. Rigdon presented his claims at length and was rejected by the as¬ sembled members when the question was put to vote. At this same conference the Twelve Apostles were sustained by unanimous vote as

the presiding quorum of the Church agreeable to the revelation which reads : ((The Twelve traveling counselors are called to be the Twelve Apostles, or special witnesses of the name of Christ in all the world; thus differing from other officers in the Church in the duties of their calling. And they form a quorum equal in authority and power to the three Presidents previously mentioned.® (Doctrine and Cove¬ nants 107; 23-24). After the rejection of his claims, Sidney Rigdon became disaffected and withdrew to Pittsburgh, Pa., with a small fol¬ lowing, over which he presided for a few years, when the organization, for lack of mem¬ bers, ceased to exist. William B. Smith claimed the right to the presidency by virtue of being the only surviving brother of Joseph Smith. His following was always small and soon dis¬ banded. James J. Strang declared that he had been appointed by the Prophet Joseph Smith to be his successor, in a letter writ¬ ten but a few days before the tragedy. He was a man of some ability and gathered about him a few prominent men who refused to remain with the Church under the leadership of Brigham Young and the Twelve Apostles. For a time his organization appeared to flourish, but like the organizations of Sidney Rigdon and William B. Smith, soon fell into decay and was deserted by many members. In the year 1852 Jason W. Briggs, a resident of Beloit, Ill., and Zenas H. Gurley, gathered some of the scattered remnants from these organiza¬ tions and formed branches at Beloit, Waukesha and Yellowstone, in what they called the <(New Organization of the Church.® Jason W. Briggs, it is said, held the office of Elder in the Church of Jesus Christ of Latter Day Saints previous to the death of Joseph Smith. Until 1846, the year of the exodus to the west, he re¬ mained a member of the Church. Later he joined the organization of James J. Strang, then that of William B. Smith in which he re¬ mained until 1851. Zenas H. Gurley, before the death of the Prophet Joseph Smith, held the office of Seventy. He also accepted the leader¬ ship of Brigham Young and the Twelve Apostles until the exodus in 1846, when he withdrew and became a member of the Church under James J. Strang. In this organization he labored diligently until 1851. After Tason W. Briggs and Zenas H. Gurley joined their forces in 1852, they commenced to preach the doctrine of the ˆrejection® of the Church of Jesus Christ of Latter Day Saints or

the ((original church® because they said the saints had failed to build the temple at Nauvoo within a given time, which expired at, or shortlv following, the death of Joseph and Hyrum Smith. Because of * this “rejection® they said it became necessaiy for the church to be newly organized that it might find favor with the Lord. They also promulgated the doctrine of ((lineal priesthoodˆ claiming that it was the right of the oldest son of Joseph Smith to succeed his father in the presidency of the Church. For a number of years they labored to induce Joseph Smith, son of the Prophet Joseph, to take the presidency of the new organization, but without success. Finally, at a conference held at Amboy, Ill., 6 April 1860, he consented and was installed as president of the new organization, which was later incorporated as the Reorganized Church of Jesus Christ of Latter Dav Saints.

The Saints’ Herald, the official publication of the Church, was begun 1 Jan. 1860, at Cincinnati, Ohio. It was removed to Plano, Ill., March 1863. Since 1881 it has been pub¬ lished at Lamoni, Iowa. Joseph Smith was its editor-in-chief from 1865 to 1914. The Church held annual and semi-annual conferences un¬ til and including 1882, when the semi-annual were discontinued. The headquarters were at Plano, Ill., from 1863 to 1881 ; since then at Lamoni, Iowa. The quorums of the reorganiza¬ tion are organized in the same order which ex¬ isted at the death of Joseph Smith. The doc¬ trines are as follows :

A belief in God the Eternal Father, his Son Jesus Christ, and the Holy Ghost.

That men will be punished for their own sins, and not for Adam’s transgression.

That all men may be saved by obedience to the laws and ordinances of the gospel, namely, faith in God and the Lord Jesus Christ; repentance; baptism by immersion for the remission of sins; laying on of hands for the gift of the Holy Ghost; the resurrection of the body; that the dead in Christ will rise first; that men shall be judged, rewarded, or punished, according to the degree of good or evil they shall have done.

That a man must be called of God, and ordained by the laying on of hands of those who are in authority, to entitle him to preach the Gospel, and administer in the ordinances thereof.

In the same kind of organization that existed in the primitive Church.

That in the Bible is contained the word of God, so far as it is translated correctly. That the canon of Scripture is not full,, but that God, by His Spirit, will continue to reveal His word.

In the powers and gifts of the everlasting gospel, namely, the gift of faith, discerning of spirits, prophecy, revelation, healing, visions, tongues, and the interpretation of tongues, wisdom, charity, brotherly love, *etc.*

That marriage is ordained of God; and that the law of God provides for but one companion in wedlock, for either man or woman, except where the contract is broken by death or transgression.

That the doctrines of a plurality and a community of wives are heresies. The Book of Mormon says: " Wherefore, my brethren, hear me, and hearken to the word of the Lord: For there shall not any man among you have save it be one wife, and concubines he shall have none.

That the religion of Jesus Christ, will, if its precepts are accepted and obeyed, make men and women better in the domestic circle, and better citizens, and consequently better fitted for the change that cometh at death.

That men should worship God in "Spirit and in truth;'* and that such worship does not require a violation of the constitutional law of the land.

The Church has been more aggressive in its fight agaiqst polygamy than any other organiza¬ tion. The local work is divided into the follow¬ ing organizations according to latest reports : Two States, Lamoni, Iowa; and Independence, Mo. ; both organized in 1901 ; 74 districts ; 62 in the United States, two in Australia, five in Eng¬ land, two in Wales, two in Canada and one in Nova Scotia. The reorganization supports Graceland College and a home for the aged, both at Lamoni, Iowa. It is prosecuting mis¬ sionary work throughout the United States, the Canadas, Australia, New Zealand, Society Islands, Sandwich Islands, the British Isles, Scandinavia and other countries. The member¬ ship is about 75,000.

REPAIRS. See Law of Landlord and Tenant.

REPARATIVE SURGERY. See Sur¬

gery.

REPEAL, the rescission, annulling, or revo¬ cation of a law. Repeal of a statute may be express or implied. It is express when the re¬ pealing statute states specifically that a prior statute has been abrogated. It is implied when the statute does not refer specifically to a prior

statute but contains provisions wholly or in part repugnant thereto. In case only a part is re¬ pugnant, the other part of the prior statute con¬ tinues in effect.

REPEAL MOVEMENT, the agitation for the repeal of the Union between Great Britain and Ireland. This agitation began almost at the moment of the Union, and has continued to the present time. Robert Emmet sacrificed his life to the cause of repeal in 1803. But the word repeal is most intimately connected with the name and career of Daniel O'Connell, the Irish ((Liberator." O'Connell died in 1847, and the cause of repeal was taken up by the Young Ireland party of 1848; by the Fenians, whose operations came to a head in 1865—67 ; and finally by the Home Rule party organized under the leadership first of Isaac Butt, in 1870, and later under the leadership of Charles S. Parnell. During the celebrated Parnell Commission of 1888-89, however, the Home Rule _ party, through their counsel, disclaimed all desire for repeal, maintaining that their aims were con¬ fined to the obtaining of Home Rule in the strict, or restricted, sense of the word.

REPEATER, in arithmetic, an indeter¬ minate decimal in which the same figures con¬ tinually recur or are repeated. A pure re¬ peater, or circulating decimal, is one in which the repetition goes on from the beginning; as, .3333 … .272727 … A mixed repeater is one in which the repetition does not begin till after the intervention of a figure or figures; as, .128888 . ? ., .0113636 …, *etc.* For the algebraic method of finding the value of a re¬ peating decimal see Progression.

In firearms, an arm which may be caused to fire several successive shots without reloading, whether rifle, pistol or cannon. In horology, a

watch or clock made to strike the time when a spring is pushed in. Some strike the hour and quarter, others the hour, quarter and odd minutes. Nautically, a vessel, usually a frigate, appointed to attend each admiral in a fleet, and to repeat every signal he makes, with which she immediately sails to the ship for which it is intended, or the whole length of the fleet when the signal is general ; called also a repeating ship. In telegraphy, the same as relay.

REPEATING. See Ballot.

REPENTANCE, or CONTRITION, as

understood by divines, both Protestant and Catholic, is defined by the Council of Trent as (<grief of mind and detestation of sin com¬ mitted, with a purpose of sinning no more" ; more specifically it is that sorrow for sin which arises out of consideration of God's goodness which sin has outraged, and which includes a resolution never more to offend God because God so deserves our love. This is the repentance called by Protestant divines <(goodly sorrow." The same Protestant divines recognized a second kind of repentance, which mourns that sin is attended by a penalty rather than hates sin. This differs little from the ((attrition" of Catholic divines, which is an imper¬ fect sorrow for sin arising from such motives as fear of hell, loss of heaven, the turpitude of sin. Consult Psalms li, 4; Acts v, 31, xl, 18; 2 Timothy ii, 25 ; Matthew xxvii, 3-5.

REPLACEMENT. See Metasomatism.

REPLEVIN, re-plev'in (French replevin, from Middle Latin replivire, to pledge), an ac¬ tion for the recovery of unlawfully possessed or detained goods or chattels. The action re¬ quires the issue of a writ for the seizure of the goods. To effect this the plaintiff must file a bond large enough to cover all probable re¬ sulting damage of the action to the defendant ; or the latter may, in some cases, give bond and retain the possession of the contested goods until the case is settled. Should the plaintiff win the action he is entitled to the return of the goods, or, in case this be impossible, the pay¬ ment of their value. In either case he is also entitled to damages for the retention of the goods. But should the plaintiff lose the action the defendant may recover damages and may sue for the same on the plaintiff's bond.

REPLICATION, from the Latin replicatio , an answer, a reply. In law, the reply of the plaintiff to the defendant's plea.

delivered by Daniel Webster of Massachusetts in the United States Senate 26-27 Jan. 1830 (to Senator Robert Y. Hayne, of South Carolina) was the culmination of a debate that arose over an unimportant resolution regarding the sale of the public lands, and grew to include sectional political issues. The oration may be divided into two sections. The first replies in detail to charges of political inconsistency which had been brought against New England and against Webster personally, and closes with a glowing eulogy on Massachusetts. The second and more important section opposes the claim of South Carolina to the right of nullification, and leads up to the famous peroration on the Union, closing <(Union and Liberty, now and forever, -one and inseparable." This last pas¬ sage was for many years the best-known piece of American political oratory with the ex¬ ception of Patrick Henry's ((Give me liberty, or give me death." The two impassioned out¬ bursts, closing the two sections of the address, are, however, each but a paragraph in length. The greater part of the Reply, which occupied four hours in the delivery, is taken up with simple and direct reasoning, and while it gives the sense of great moral earnestness on the part of the speaker it contains no obvious ap¬ peal to the feelings of the hearers. Webster, who according to tradition once said that his whole life had been a preparation for the (Reply to Hayne,) spoke almost extempora¬ neously, and the chief impression which his ad¬ dress produces is that of vast grasp of all the widely different matters on which he touches. There were two sides to the questions under dis- . cussion, as there always are, but to many of his hearers he seemed to have annihilated the argu¬ ments of his opponent. In a private letter Webster once referred somewhat oddly to the Reply as <(No. 1 among my political efforts," and to the Seventh of March Speech as <(probably the most important effort of my life." By an almost unanimous verdict his admirers, many of whom disagreed with the political sentiments of the Seventh of March Speech, have given highest rank to the Reply to Hayne.

William B. Cairns,

Associate Professor American Literature, Uni¬ versity of Wisconsin.

REPORTING. See Journalism ; News¬ papers, American.

REPOUSSE, re-poo'sa'. A term taken from the French, meaning "beaten back.® It is used to designate the formation of raised (re¬ lief) ornament in metal on flat or hollow ware. In its stricter interpretation the term refers to that division of beaten relief work which is performed by hammering or punching on the reverse (negative) side of the metal. This is, therefore, embossing as contradistinguished from chasing, which latter process is the ham¬ mering or driving of the metal into recesses (depressing). Inasmuch as the relief ornament is, almost invariably, followed by a finishing process of chasing, the entire performance (of relief and intaglio work on a single piece) is, by extension, frequently termed repousse work. The great esteem in which repousse work of fine character is held by connoisseurs is en¬ hanced by the knowledge that the quality of the production depends solelv on the skill of the craftsman. The art dates back to very early history, and the ancients did very re¬ fined, delicate work in this process, as is proven by such examples as the Bernay Treasure (see Silverware) and other finds of silver, gold and bronze art metal work (see Bronzes). To the Greeks the process was known as sphyre-laton. Repousse work is about the most dif¬ ficult the craftsman in metal can undertake, re¬ quiring great skill and patience to obtain fine execution, and for this very reason the great gold and silversmiths of all times have loved to display their skill in this medium ; Greeks, Romans, Italians, Dutch. French and Germans have all left us grand examples. The golden altar in Cluny Museum, Paris (see Altar), is a beautiful 11th century example of re¬ pousse work.

Technique. — As above stated, this process consists of hammering or punching embossed work from the reverse side. In efficient work the whole surface, both the relief and the back¬ ground, should remain of equal thickness as near as possible. This involves hammering up the metal sheet (termed blank) to thicken, or reinforce, the parts which are to be in relief, so that, while covering a larger surface than the flat, the thickness of the "walls® may be main¬ tained. Another chief difficulty to overcome is the fact that hammering on the metal tends to harden and cause "temper® or brittleness. A frequent ((annealing® is, therefore, necessary. Annealing is the softening process brought about by bringing the metal to red heat, then <(quenching® in ((pickle® or water. In the case of copper the quenching can be done at

red heat, but with brass or silver the metal should cool down somewhat. The first process in produc¬ ing repousse work is to get a copy of the re¬ quired design on to the metal; for which there are several processes, but the simple methods of pasting the drawing on the metal or tracing it on to the surface with carbon paper and stylus, or a needle point, are commonly used for flat work. For hollow ware surfaces the work has to be done by freehand generally, using “dividers® for tracing the measurements. In the case of fiat work, the blank is placed face downward, the design being on the reverse side, on a board which is faced with a composition which will yield to the blows of the tool yet

maintain the surrounding surface to support the remainder of the metal. Usually a composi¬ tion is used containing pitch (Stockholm or Swedish preferred) mixed with tallow or some other substance to soften it and overcome its tendency to brittleness ; brickdust, plaster of Paris or resin are often used for this purpose. In high relief work the pitch must be kept warm so as to be sufficiently soft to take on deep impressions. But, in order to avoid the inconveniences of working on such a soft, sticky substance, lead, tin or zinc are frequently used to support the metal that is to be ham¬ mered into high relief. For surfaces which are not in the flat a “pitch bowl and ring® are used as support. A hemispherical bowl filled with the pitch is rested on a thick ring of leather, rope or other substance. This contriv¬ ance permits the worker to tilt the surface in any desired direction.

Tools. — At least two hammers are needed, one with flat face, the other a “chasing® hammer with handle ending bulb-shape ; a wooden mal¬ let can take the place of the latter. Punches and several kinds of chasing tools should be numerous if it is desired to avoid monotonous effects ; a “tracer® and a “back grounding® tool are needed, and, to ease operations, at least 50 different punches are required (which are best shaped by the individual worker). Bossing and “cushion® tools vary in form (but the edges must be eliminated) and are used to produce bosses or ridges. “Modelling® and “chasing® tools have a flatter working end; “lining,® “freezing® and “matting® tools are used to produce “texture® on the surface and contain working surfaces in lines, grooves, hatchings, *etc.* “Ring® tools produce a de¬ pressed circular mark; “backgrounding® tools, of course, are for giving background texture. “Snarling irons® are for working in the in¬ terior of hollow ware (such as ewers, vases, etc.) and are made in

elongated Z shape; they are fastened at one end in a vice the other end (which is provided with a knob or button) is inserted in the orifice of the hollow piece, press¬ ing against the surface to be operated on. A blow of the hammer on the tool near the vice sets the free end in vibration whose percussion produces on the inside of the vessel a depres¬ sion, therefore a corresponding embossing effect on the outer (positive) surface. Consult Gaw-thorp, (A Manual of Practical Instruction in the Art of Brass Repousse Work for Amateurs5 (London 1899) ; Horth, A. C., (Repousse Metal¬ work: a Scheme of Sheet Metal Work for Schools and Amateurs5 (London 1905) ; Maryon, H., (Metal Work and Enamelling5 (London 1912).

Clement W. Coumbe, Technical Art Expert.

REPPLIER, rep'ler, Agnes, American essayist : b. Philadelphia, Pa., 1 April 1855. She is of French descent and was educated at the convent of the Sacred Heart, Torresdale. Her essays are characterized by lightness of touch, a keen sense of the humorous side of a theme and not a little irony. She published (Books and Men5 (1888); Points of View5 (1892); (In the Dozy Hours5 (1894) ; (Essays in Idle¬ ness5 (1893); (Essays in Miniature5 (1892); (Varia5 (1897); and Philadelphia: the Place and the People5 (1898) ; (The Fireside Sphinx5

(1901); <Compromises) (1904); (In Our Con¬ vent Days) (1905); (A Happy Half Century) (1908) ; Americans and Others* and (The Cat* (1912), *etc.* She also compiled a (Book of Famous Verse* (1892), and was a contribu¬ tor to the Saturday Evening Post.

REPRESENTATION. See Minority and Proportional Representation.

REPRESENTATION, (1) the authorized acting by one person in behalf of another, as in a legislative assembly; also, the system of choosing such representatives. Representation in a modified form was known in ancient times, and the principle was extended by the Church, in its ecumenical councils. The Germanic na¬ tions, however, were the first to adopt political representation, having employed it in their popular assemblies. Later it spread to Great Britain and still later to the United States, in which latter country it developed into the rep¬ resentative democracy which still endures. Representation to-day is found not only in republics, as the United States, but in monarch¬ ies also, as Great Britain. In republics, how¬ ever, representatives are less restricted in their power than in monarchies, it being usual in the latter to place a check in the form of an ap¬ pointed or hereditary upper house to control legislation. In early times representation was largely by classes, and to-day this principle is still carried out to some extent in England. There is much conflict of opinion as to whether a national representative should follow closely the wishes of his constitu¬ ents solely or whether he should, in case of conflicting interests, prefer to use his powers in a manner that would most benefit the entire country. The latter view appears to dominate, but it is nevertheless a fact that representatives, especially those seeking re-election, are largely influnced by the wishes of their constituency.

Majority, Minority and Proportional Representation. — In the United States the majority generally rules, and no provision is usually made for giving the proportionate rep¬ resentation to the minority that it would seem in all justice to require. It often happens, owing to the system of representation in vogue in the United States, that a party which casts less than 40 per cent of the votes in a Congres¬ sional or other election may have all the repre¬ sentation while the parties casting the remainder of the votes have no representation what¬ ever. In Illinois an attempt was made to remedy this by the constitution of 1870, which provided for what is known as the <(free vote.® This

system, as applied in this State, affects the election of members of the lower house of the legislature only, and by the provisions of the constitution each voter may cast as many votes for each candidate as there are representatives to be elected or he may apportion such votes, or equal parts thereof, among the candidates, if he so desires, and those receiving the largest number of votes shall be elected, three representatives be¬ ing chosen in each district. The chief objec¬ tion to this method is that at best it gives only minority and not proportional representation, gives it solely to a very large minority and ignores third parties entirely. Another objec¬ tion is that the politicians of the two leading

parties have rendered the regulation practically valueless by manipulation in naming the can¬ didates. For instances, in districts largely Democratic, the Democratic party makes but two nominations and the Republicans one, thus ensuring the election of two Democrats and one Republican in a very large preponderance of cases. Another method advocated for the re¬ form of present methods is known as the “limited vote,® which has been used in Eng¬ land, and also in Pennsylvania in choosing Supreme Court judges, county auditors and other officials and in New York for the select¬ ing of members at large to the Constitutional Convention of 1867. By this method each voter has less votes than there are offices to be filled. For example, where there are three offices, the voter has only two votes. This method, in a modified form, is in effect in a number of countries, among them Portugal and Spain. Another method, known as the “transferable vote® or “Hare system,® is complicated but much favored by advocates of the minority system. By this method a voter indicates his choice (1st, 2d, etc.) by number, after voting for as many candidates as he desires. The total num¬ ber of votes cast is divided by the number of offices to be filled, and the quotient gives the “quota,® or number of votes necessary to elect a candidate. At the first count of votes, only the first choices are reckoned and those that re¬ ceive at least a quota are declared elected. After this, if all the offices are not filled, the remain¬ ing votes of the candidates who have been de¬ clared are transferred to the candidate having second choice, and the process is continued until all the offices are filled. Tasmania adopted this method, for all elections in 1907, and it is in use also in Moravia, Denmark and Iceland. Another method, in use in Switzerland and else¬ where in Europe, is known as the “free-list® system. Under it any organized party may nominate as many candidates as it desires, but not to exceed the total number of places to be filled. Any voter may cast as many votes as there are candidates to be elected, but not

more than one for any candidate. The total vote cast is then divided by the number of places to be filled, and this gives the quota of rep¬ resentation. The total vote cast by each party divided by this quota gives the number of rep¬ resentatives to which each party is entitled. For example, if 20 representatives are to be elected, with 1,000,000 voters in the dis¬ trict, the Democrats polling 400,000, the Repub¬ licans 350,000 and the Socialists 250,000, the quota is found by dividing the total votes cast (1,000,000) by the number of representatives to be chosen (20), equalling 50,000. This would give the Democrats eight representatives, the Republicans seven and the Socialists five. Other systems are in use which are modifica¬ tions of those above described.

(2) In law, an oral or written statement of fact, as one made incidentally or collaterally to a contract. Whether express or implied, a material false representation made by one party to a contract, if acted upon and believed by the other party to his injury, will render such con¬ tract void; (3) the principle by which the lineal descendants of a deceased person inherit or take part of the estate which their ancestor would have inherited if he had survived.

REPRESENTATIVE GOVERNMENT.

Representative government in the modern mean¬ ing of the term was unknown to the ancients. Kings, chiefs and administrative officers were often elected by popular vote or acclamation, but neither in ancient Greece nor Rome did a body exist even remotely resembling a Con¬ gress, a Parliament or a Reichstag. States which were not absolute despotisms were gov¬ erned, as a rule, by a council of magistrates and a popular assembly, in which latter all persons with civic rights took part, and which was very much like a New England town meeting; but there is no instance of the popular assembly of ancient times developing into a representative body. The Roman Senate was composed of magistrates and ex-magistrates and resembled the American Senate of to-day only in name. This ancient system, which appears from the standpoint of to-day both unwieldy

and un¬ ruly, was well enough fitted, however, for the so-called republics in which it prevailed, and in which all power was reserved to the central city, whether Athens, Thebes or Rome. The citizens in public assembly stood for the state, and were the state, and did not think it neces¬ sary to delegate their powers to representatives. When civic rule in Rome gave place to imperial¬ ism, the public assembly ceased to exist, while the Senate was retained to register the decrees of the Caesars, and offer honorable retirement to those who had gained imperial favor.

Representative government, as we know it to-day, is not derived, therefore, from any Ro¬ man or Greek institution. It is essentially an outgrowth of that love of liberty inherent alike in Saxon, Norman and Celt, and reached its present development through centuries of struggle and of political and social evolution. The English Parliament, with its combination of mediaeval House of Lords and 20th century House of Commons, has grown gradually from beginnings dating back almost to the Norman Conquest. The barons asserted their rights against tyrannical kings, and the necessities of the kings compelled them to recognize the well-to-do classes outside the nobility, who had the wealth of which the royal exchequer stood badly in need. Taxation gave birth to repre¬ sentation, and at length it became a recognized principle that Englishmen would not stand taxa¬ tion imposed without their own consent through representatives in Parliament assembled. It was not, however, until far into the 19th cen¬ tury that the common people of England were permitted to have a voice in public affairs, and not until 1885 that the suffrage was bestowed on virtually all male subjects of adult age in the United Kingdom. The Parliament of to¬ day, therefore, represents the English people ; less than half a century ago it represented only the privileged classes.

Representative government in the United States inherited its spirit from England, but not its form. The American system is of native origin. It developed from town-meeting to assembly, and when the new States adopted new fundamental laws, the upper house was called a senate, after the ancient Roman Senate, while the right of originating measures of taxation was reserved to the popular branch of the leg¬ islature. In the United States, also, however, the right or privilege of voting was generally restricted to taxpayers and property-owners

for many years after independence, and in one of the States — Rhode Island — a landholding qualification for foreign-born citizens existed

until a few years ago. Excepting some peculiar restriction intended to prevent negroes from voting in certain Southern States, nearly all male citizens of adult age now possess the right to vote. The second decade of the 20th century saw the extension of the suffrage to women in many States of the Union and the passage of the Federal amendment to the Constitution, in 1918, by which all women in the United States are enfranchised ends the long struggle in other States and confers the voting power on mil¬ lions, making for a really representative govern¬ ment. See Suffrage.

In the Hanseatic towns, in Switzerland, the Italian free cities, and other republics of the Middle Ages, representative government had no real existence so far as the common people were concerned, and the parliaments of modern Europe are not derived from the institutions of those states. The American Revolution gave the impulse and inspiration needed to awaken the people of Europe to a sense of their rights and wrongs and the constitutions granted by monarchs on the Continent to their subjects adopted as models a mixture of the English and American systems. Every European country at present has a congress or parliament in which the people are represented by deputies elected according to law. Japan has a similar system, and representative government, which 100 years ago was practically confined to the United States and England, is now coextensive with civilization in every continent. See De¬ mocracy; Government; and consult Beard, Charles A., (American Government and Politics) (New York 1910) ; Commons, John R.,

(Proportional Representation (2d ed., ib. 1907) ; Garner, J. W., ˆIntroduction to Political Science) (1910) ; McLaughlin, A. C., and Hart, A. B., (Cyclopedia of American Government > (3 vols., New York 1914) ; Stubs, W., Con¬ stitutional History of England) (London 1897).

REPRESENTATIVES, Election of. See

Elections; Electoral Qualifications; Con¬ gress.

REPRESENTATIVES, House of. See

House of Representatives; Congress of the United States; Senate, United States; Assembly, Legislative; Legislature.

REPRESENTATIVES, State. See Elec¬ toral Qualifications.

REPRIEVE, in law, a temporary suspen¬ sion of the execution of a sentence after con¬ viction of a crime, as by a governor or a sover¬

eign ; also, the instrument granting such suspen¬ sion. The term to-day is usually applied with reference to sentences of death only. Reprieves are usually granted by the chief executive of a nation or state, among some of the reasons being: newly-discovered evidence affecting favorably the case of the condemned, preg¬ nancy, insanity occurring after sentence of death and to allow time for the determination of facts after a pardon has been requested. Sometimes the court which tried the prisoner may grant a reprieve.

REPRISALS, in international law, (1) forcible seizure and retention of the goods of an enemy in retaliation or as satisfaction.

While it is an act of war, it is usually resorted to for the purpose of avoiding war and is always accompanied by force, as by the seizure of property. Sometimes naval forces are landed on territory of the offending nation and the custom-house and other public buildings are taken and held until satisfaction has been secured. Compensation should first be de¬ manded by a state before resort is had to re¬ prisal. (2) A retaking of one's own property by force.

REPROACHES, or IMPROPERIA (a

Latin word of the same meaning), in the Roman Missal, a part of the divine service which on Good Friday is substituted for the usual daily mass. While the clergy and people are paying veneration to the representation of the Crucified before the high altar, two pairs of choristers chant alternately a series of an¬ tiphons, to which two choruses respond in versi-cles, Greek and Latin alternately, then repeat¬ ing part of the antiphon. There are 12 Im-properia, the first being : <(My people, what have I done to thee? or wherein have I vexed thee? For that I led thee out of the land of Egypt, thou has provided a cross for thy Saviour.® Again: ((I lifted thee up with mighty power; and thou hast hanged me on the gibbet of the cross.® These reproaches were first sung to plain-chant melodies, preserved in the (Grad-uale Romanum/ and still extensively used, but in the Sistine Chapel, since 1560 they have been sung to some exquisite (<faux

bourdons,® to which they were adopted by Palestrina.

REPROBATION, a dogma of the Calvinistic creeds, which teaches the predestination of some of the children of Adam to be eter¬ nally lost. Though the word reprobation is not used in the Westminster Confession of Faith and does not occur in the Authorized Version or Revised Version, the definite repro¬ bation of those who are not predestinated to. everlasting life is unequivocally expressed in this passage of the Confession (iii, 7) : ((The rest of mankind® — that is, all but the elect to everlasting happiness — <(God was pleased, ac¬ cording to the unsearchable counsel of his own will, whereby he extendeth or withholdeth mercy as he pleaseth, for the glory of his sover¬ eign power over his creatures to pass by and to ordain them to dishonour and wrath for their sin, to the praise of his glorious grace.® Among the passages of the New Testament that are cited in support of this doctrine are Rom. ix, 11-22; 1 Thess. v, 9; 1 Pet. ii, 8; Jude 4.

REPRODUCTIVE ORGANS. See Anat¬ omy, Comparative.

REPTILES, or REPTILIA, a class of vertebrate animals. Although no two groups of V ertebrata are more dissimilar in general appearance and habits, and to the popular mind might seem more unrelated than the birds and reptiles, they are, by common consent of modern systematists, combined in a superclass, the Sauropsida, of Huxley, or the Monocondylia, of Haeckel and Cope. The Sauropsida are dis¬ tinguished by the possession of lungs, gills be¬ ing permanently absent. The embryo possesses an amnion and allantois, the former being a sac investing the body, the latter a structure -de¬ veloped from the lower surface of the embryo and serving for respiration. The lower jaw in Sauropsida is compound in that each half or

ramus consists of a number of distinct pieces; while in mammals each half consists of but a single piece. The lower jaw in reptiles and birds further articulates with the skull, not di¬ rectly, but through the intervention of a sepa¬ rate and distinct bone, the os quadratum or quadrate bone. The skull is joined to the spine by one condyle only; two such condyles exist in amphibians and mammals. As compared with the fishes and batrachians the basal axis of the brain-case is bony instead of cartilaginous and the parasphenoid bone is absent. The bodies of the vertebrae are formed chiefly of centra (that is, are gastrocentrous) instead of intercentra (notocentrous) as in the Amphibia. Very rarely and only in extinct forms is the notochord persistent. The anklejoint is placed in Sauropsida, not as in mammals,

between the tibia and the astragalus, but between the proximal and distal parts of the tarsus which in Sauropsida becomes thus divided. The cora¬ coid bone is almost always well developed. The intestine ends in a cloaca. No complete dia¬ phragm is developed to separate the thorax from the abdominal cavity. The corpus cal¬ losum uniting the halves or hemispheres of the cerebrum is rudimentary, no mammary glands exist and the Sauropsida are oviparous or ovo-viviparous. Such are the characters common to birds and reptiles.

Comparison with Birds. — Reptiles differ from birds in the following characters, which may, therefore, be taken as including the defini¬ tion of the class Reptilia. The covering con¬ sists of horny scales or of bony plates (scutes), but never of feathers. The blood is cold and two aortic arches (right and left) exist in liv¬ ing Reptilia. The heart is three chambered in all save the crocodiles, which possess a four-chambered heart. But in all reptiles, without exception, the venous and arterial currents of blood are connected and an impure or mixed blood is thus circulated throughout the body. The lungs do not present the open character of those of birds, but, like those of mammalia, are in modern reptiles almost always closed sacs. The tarsal and metatarsal bones of the hind limbs, which in birds are united to form a single bone, are distinct and separate in the great majority of reptiles. When a sacrum exists it bears sacral ribs, which articulate with the ilia or haunch-bones.

Skeleton. — The body in reptiles is generally elongated, the tortoises and their allies present¬ ing the most notable exceptions to this rule. The limbs may be entirely wanting, as in most snakes and in many lizards ; or only a pair of limbs may be developed, as in some lizards ; while in moˆt other reptiles all four members are present. The bones of reptiles are more compact than those of lower vertebrates. In the reptilian skeleton the five different regions into which the spine is ordinarily divided are to be recognized, except in the serpents and a few others. There are seldom more than two sacral vertebrae, and free cervical ribs are usu¬ ally present. The epiphysial and other sutures of the vertebrae are retained through life. The bones of the shoulder-girdle of each side in¬ clude a simple or divided scapula or shoulder-blade and an often complex coracoid bone, in¬ cluding precoracoid and epicoracoid, the latter bone of each side articulating with the ster¬ num or breast-bone when the latter is present.

In addition a clavicle and interclavicle may be present. The fore-limbs consist each of a humerus, radius and ulna, the carpal bones and normally five digits. The pelvis contains its three typical elements, ilium, ischium and pubis, the first being often of larger size and the last usually forming a symphysis. In ser¬ pents the shoulder-girdle is totally absent and vestiges of the pelvic-girdle appear only in a few instances; and in the turtles both are en¬ closed within the shell, except that the clavicle and interclavicle form part of the plastron. The limbs are usually. adapted for running, but some¬ times for leaping and in the extinct pterodactyls for flight. In the extinct marine pelagic rep¬ tiles, and in the modern sea-turtles, they are paddle-like. The ribs in reptiles are always present, but may differ greatly in form and dispostion, those of the turtles, for example, contributing toward the formation of the upper shell or carapace.

Skull. — The skull of Reptilia possesses but a single occipital condyle, which is sometimes tri¬ partite. The quadrate bone is generally firmly fixed to the skull, joining the squamosal bone, but is freely movable in serpents and only less so in many lizards. Each half or ramus of the lower jaw is composed of dentary, angular, sur-angular, coronoid, splenial and articular bone. Other regions of the skull are modified in the greatest varieties of ways in the several orders, the most important from a systematic stand¬ point being in the bones which form the com¬ plex roof of the temporal fossa. Primitiyely this roof is complete as in the stegocephalian-batrachians, but by the formation of one or two openings (supra-and infra-temporal vacuities) it is divided into one (Synapsida) or two (Diapsida) longitudinal bars behind the orbits. Through variations in the size and position of these openings, to which may be added emar-ginations, this region is modified, and may even practically disappear altogether, as in the snakes.

Digestive Organs. — The teeth are gen¬ erally well developed, but in the Chelonia are wanting, the jaws, like those of birds, being ensheathed in horn. The reptilian teeth, like those of lower Vertebrata generally, are adapted less for mastication than for merely retaining prey while it is being swallowed. Save in the crocodiles and in some

extinct forms the teeth are not implanted in sockets or alveoli, but are attached in various ways and by bony union to the jaw-bones. Teeth may be borne by bones other than the jaws (for example, palate bones) ; and, as seen in the poison-fangs of serpents, may be modified for special purposes. The teeth vary greatly in number and are not per¬ sistent, new teeth being produced in regular order (as in crocodiles) from a growing pulp at the base of the socket, the new tooth dis¬ placing the old.

The tongue may be elongated, distensible and bifid, as in many lizards and serpents ; short, thick and non-protrusible, as in other lizards ; or completely attached and fixed throughout its entire extent, as in Crocodilia. The oesophagus or gullet is usually greatly distensible (as in serpents), and may be cov¬ ered (as in some Chelonia) with retroverted spines. The stomach is mostly pyriform or pear-shaped, and (as in snakes) may, like the gullet, be capable of great distension. In Op India it exhibits an anterior dilated part, with

thin walls for receiving nutriment, and a pos¬ terior hinder portion with non-distensible walls provided with glands and adapted for digesting the food. In the crocodile the stomach re¬ sembles the gizzard of a grain-eating bird in its high muscularity.

Circulation. — The heart in reptiles consists of two auricles (right and left) and a ventricle, except in the Crocodilia, in which two auricles and two ventricles are developed. The aortae or main arterial trunks exist, and are respec¬ tively named right and left aorta. These chief vessels bend around the gullet and unite to form a single and common main-trunk for the sup¬ ply of blood to the system generally. But the chief peculiarity in the circulation of all reptiles consists in the peculiar mixture of arterial with venous blood, which takes place in the aorta in such a manner that the head alone is supplied with arterial blood. The reptiles exhibit slug¬ gish habits, slow respiration and a series of vital actions marked by no active conditions de¬ manding a more perfect circulation or highly-oxygenated blood. The blood is cold (poikilo-thermic) in reptiles, that is, but little higher in temperature than the surrounding medium, with changes in which it varies. The red blood-corpuscles are oval and nucleated.

Respiration in reptiles is carried on solely by means of lungs, the presence of branchiae or gills in early life, and sometimes in the adult life also of batrachians, constituting a marked difference between these latter and reptilian forms. In the Crocodilia, Chelonia and most

lizards, the lungs are equally developed, but in serpents and some lizards only one lung is fully developed, the right lung being usually abortive. The lungs may, as in snakes and other Reptilia, in which the body is elongated, be of proportionally large size, and may extend nearly throughout the whole length of the body-cavity which is not separated by a complete dia¬ phragm into a distinct thorax and abdomen. _ In the crocodiles, lizards and serpents the respira¬ tory action is carried on through movements of the walls of the trunks. But in turtles, in which no movements can take place, air is drawn into the lungs by a process analogous to swallowing. The larynx or organ of voice is simple in structure, no vocal cords being in general de¬ veloped, although these organs appear in croco¬ diles and some others.

Brain and Sense-Organs. — In the higher Reptilia the cerebrum attains a comparatively larger size than in the lower forms, while the cerebellum also attains a relatively higher de¬ velopment as we proceed upward. The cere¬ bellum has no lateral lobes nor pons, while the corpora bigemina and thalami are of large size. The senses are developed in tolerable perfection. The nasal cavities are of large size and open into the mouth through either the anterior or posterior part of the palate. In the Crocodilia the hinder nostrils open very far back in the mouth, enabling these animals to hold their prey under water in .their mouths, and so to drown it, while their own respiration is carried on un¬ impeded through the nostrils. The eyes are usually of small size, and exhibit variations in structure and in the disposition of the protec¬ tive coverings. Thus in snakes the eye-ball in front is covered by a transparent lid, formed by a layer of the skin, which is attached to a circle of surrounding scales, and is shed periodically,

with the outer skin. In snakes the pupil of the eye is round. In the lizards movable and ordi¬ nary eyelids exist, while the turtles possess a nictitating membrane. In lizards and snakes the sclerotic coat of the eye is strengthened by a circle of bony plates, such as also occur in sev¬ eral extinct reptilian forms and in birds. In the chameleons the single eyelid is formed by the united lids, and through an opening in this circular lid the rays of light enter the pupil of the eye within. The tympanum of the ear is imperfectly developed in Ophidia, and no eusta-chian tube exists. In lizards the tympanic ap¬ paratus is better developed, while in chelonians the tympanic cavity is large and complicated, and a rudimentary cochlea exists. The Crocodilia possess a movable valve, by means of which the tympanic canal of each ear can be closed at will ; and most of the structures found in the ear of higher Vertebrata are represented in greater or less structural detail and perfec¬ tion.

Viscera. — The kidneys are generally placed far back and deep within the pelvic cavity. In the serpents, however, the kidneys are situated anteriorly, and are unsymmetrically placed, the right being higher up and in advance of the left kidney; they also are divided into small lobes. No urinary bladder exists, and the urine of the lizards is fluid; that of the ser¬ pents resemble the excrement of birds in being pasty and crystalline. In Crocodilia the testes are elongated, and placed in front of the kid¬ neys. The penis in Crocodilia is single, grooved and contained within a special cloacal fold; in Ophidia two lateral penes exist, and these are hollow and evertible; a double penis exists in lizards, while that of turtles is single.

The eggs are generally of relatively large size, and provided with a thick parchment-like shell and a large yolk. In many instances the eggs may be deposited in sand and hatched by the sun’s heat.

Distribution. — With regard to the distribu¬ tion in space of reptiles, the warm or tropical regions of the earth contain these animals not only in greatest number, but in most typical form and variety. During winter or in the colder seasons of the year, most reptiles hiber¬ nate and many desert species also pass into a summer sleep. Reptiles are varied in their habits, most of them being terrestrial, but many arboreal and some, including the great ma¬ jority of the turtles, are aquatic. While most are strictly carnivorous or insectivorous, some

subsist on a general diet and a few are purely vegetarian. Many of the extinct forms fed exclusively on fishes. Reptiles exhibit many interesting habits, but, owing to a popular prej¬ udice against them and the tax on the patience of the observer resulting from their inactivity and secretiveness, they have been comparatively little studied.

Classification. — Because of certain resem¬ blances in form and manners, all of the early zoologists, to and including Cuvier, classed the ReptUia and Amphibia together, and it was only when embryological data began to play an important part in taxonomy that their dis¬ similarity was perceived. Milne-Edwards and his contemporaries toward the middle of the 19th century were the first to recognize this in a scheme of classification. In 1860-70 when

zoologists were still working under the fresh stimulus of the publication of the (Origin of Species,* Huxley, Haeckel and Cope almost simultaneously perceived much more clearly than had any of their predecessors the close relationship and probable community of descent of birds and reptiles. Reptilian life played a much more important role in past ages of the earth than now, that it is not surprising that we must turn to palaeontologists for nearly all of the recent advances in the classification of the groups. The scheme and nomenclature mainly followed in this work is that elaborated by Gadow in Vol. VIII of the (Cambridge Natural History.*

Class Reptilia.

Subclass Proreptilia.

Subclass Prosauria. Orders : Microsauri, Prosauri (Rhynchocephalia, etc.).

Subclass Theromorpha. Orders: Pareia-sauri, Theriodontia, Placodontia, Anomodontia.

Subclass Chelonia (Turtles). Orders: Ath-eca, Thecophora.

Subclass Dinosauria (Dinosaurs). Orders: Sauropoda, Theropoda, Orthopoda, Ceratopsia.

Subclass Crocodilia (Crocodilians). Or¬ ders : Pseudosuchia, Parasuchia, Eusuchia.

Subclass Plesiosauria. Orders : Nothosauri, Plesiosauri.

Subclass Ichthyosauria. Orders : Ichthyo¬ sauri (Fish-lizards).

Subclass Pterosauria (Flying Reptiles). Or¬ der: Pterosauri (Pterodactyls).

Subclass Pythonomorpha, Orders : Dolicho-sauri, Mosasauri.

Subclass Sanria. Orders: Lacetilia (Liz¬ ards) ; Ophidia (Serpents).

A more elaborate scheme, but one which more correctly expresses the natural relation¬ ships of the orders, has been developed by Cope, Baur and Osborn.

The vast majority of reptilian types have become extinct. Only four orders are repre¬ sented in our modern fauna, and one of these, the Rhynchocephalia, by only a single species, the New Zealand tuatera. The Crocodilia have greatly declined in variety of forms since the close of the Mesozoic Age. The Pythono¬ morpha have become extinct, but lizards and snakes are represented in the saurian orders by a great number of species and are the only dominant reptilian types. Reptiles flourished especially during the Mesozoic Age, to which four of the most remarkable groups were con¬ fined, the great marine reptiles. (Plesiosauria and Ichthyosauria) , the huge and often remark¬ ably modified terrestrial Dinosauria and the equally wonderful flying Pterosauria. This epoch, when the seas were shrinking and dry land increasing in extent, but when the atmos¬ phere was heavy with moisture and carbonic-acid gas, unfitted for the respiration of high types of life, was well suited for the develop¬ ment of the sluggish reptiles ; and they were dominant on land and sea, replacing on the one hand the amphibians and on the other the primi¬ tive types of fishes of earlier ages. With the close of the Age of Reptiles and the advent of the Eocene Period, mammals quickly rose to full dominance on the land and many orders of reptiles, having played their parts in the evolution of life, disappeared forever. Reptiles

sprang from the stegocephalian Amphibia. From some group of the Theromorpha (of the synapsidan series) mammals are supposed to have come ; while birds took their origin from the diapsidan line, probably in common with some primitive dinosaurian.

Consult, besides the numerous articles in this work on special orders and kinds of rep¬ tiles, the following: Cope, (The Crocodilians, Lizards and Snakes of North America, } Re¬ port of United States National Museum (Wash¬ ington 1900) ; Holbrook, (North American Herpetology) (Philadelphia 1842) ; Gadow, (Amphibia and Reptiles) (New York 1901) ; Boulenger, (Catalogue of the Reptiles in the British Museum* (London 1889-96) ; Osborn, (The Reptilian Subclasses Diapsida and Synapsida,* Memoirs American Museum of Natural History (New York 1903) ; Woodward, (Vertebrate Palaeontology * (Cambridge 1898).

J. Percy Moore, University of Pennsylvania.

REPTILES, Eggs of. See Egg.

REPTON, a village of Derbyshire, Eng¬ land, about eight miles southwest of Derby; it was once an Episcopal see, capital of the kingdom of Mercia and had a celebrated nun¬ nery from 660 till its destruction by the North¬ men in 874. From 1172 till the dissolution of the monasteries under Henry VIII it was the seat of a priory of Austin friars; part of the priory buildings is incorporated in the fabric of the Repton free grammar school, founded in 1556, one of the great English public schools. The parish church of Saint Wystan is notable for its curious crypt, consisting of a centre and side isles divided by three arches on either side and supposed to date from the reign of Edgar. Pop. 1,695.

REPUBLIC, a word signifying a state in which the people are the source of power. The degree of popular sovereignty in republics has varied very widely in the past, most of the so-called republics having been ruled by an aris¬ tocracy which jealously guarded its own rights, but treated the multitude as little better than slaves. Real republican government may be said to date from the American Declaration of In¬ dependence, and even in the United States the government was largely one of class until about the second quarter of the 19th century, when suffrage barriers began to break down. The other so-called American republics have been so far mostly military despotisms, in which order or disorder was maintained by force under the command of a

successful general. But the force of true republicanism has been slowly growing in all the ancient Spanish possessions. Argentina, Chile and Brazil are also gradually becoming inspired by the real republican spirit, while Cuba, the youngest of American repub¬ lics except Panama, which has just been ad¬ mitted to the family of nations, is making ah excellent record.

As an instance of the way in which the term “republic® was used or abused in the past, it may be mentioned that Poland was formerly called a republic because the king was elected bv the nobles. In the 18th century it was not uncommon to designate the German Empire by the appellation of the “republic of princes.® The large commercial cities of Italv, Genoa and Venice were called republics because they were

governed by an aristocracy of noble families, who appointed one of their number to be su¬ preme chief of the state, as the dope. The re¬ publican institutions of the greater part of the Greek states, as well as that of Rome, at least in later times, were of a more democratic char¬ acter.

Of the tiny republics of the world San Ma¬ rino is the best known. It is situated in cen¬ tral Italy, and its territory covers about 33 square miles and the population numbers about 8,500 souls. This miniature state was founded in the 4th century by Saint Marinus. who, hav¬ ing embraced Christianity, fled there to escape the persecution under Diocletian. The capital, San Marino, is on the crest of a mountain over 2,000 feet high and has a population of 1,200. It is one of the most picturesque places in the world, being perched on perpendicular cliffs.

The small half French and half Spanish re¬ public of Andorra, which lies in an almost in¬ accessible valley of the eastern Pyrenees, pos¬ sesses a charter of rights dating from Charle¬ magne in 790. See Free Cities ; San Marino ; Andorra; Republics, The History of; Repub¬ lics, Duration of; Democracy; Government; Constitution of the United States.

REPUBLICAN, the river which unites with Smoky Hill River, at Junction City, Kan., to form the Kansas River. The Republican is formed by two streams which unite in east cen¬ tral Colorado. The river flows northeast into Nebraska, then east and southwest, entering Kansas at Superior in Jewell County, con¬ tinuing south, east and southeast to the Kansas River, uniting with that stream in Gary

County, about three miles below Junction City; esti¬ mated length, 550 miles.

REPUBLICAN PARTY, The. The Re¬ publican party was an inevitable outgrowth of the conditions which prevailed about the time of the repeal of the Missouri Compromise in 1854. The Whigs, incapable of grappling with new problems, were rapidly disintegrating; no one of the sporadic parties sprouting in the political confusion of the time was based on broad enough principles to become a truly national organization ; the Republican party, germinating in the Free Soil movement and inheriting Whig and Federalist traditions, hap¬ pily combined the inspiration of a great moral idea with the enduring quality of sane poli¬ cies in Federal administration. Its origin can- • not properly be ascribed to any particular date or place. The first known suggestion of the name was in a letter written by Horace Greeley. The earliest convention of import¬ ance to adopt it was held at Jackson, Mich., 6 July 1854. Virtually coincident with the Michigan convention there were conventions in Maine, Illinois, Massachusetts, Ohio, Indiana, Wisconsin and Iowa; almost spontaneously the Republican party had become a strong national organization. On the roster of the 33d Con¬ gress, the name “Republican® does not appear; in the 34th Congress, which met 3 Dec. 1855, there were in the Senate 15 Republicans, 42 Democrats and 5 Americans; in the House of Representatives there were 108 Republicans, 83 Democrats and 45 Americans. The Whigs had disappeared. Nathaniel P. Banks of Massa¬ chusetts was chosen speaker of the House by a combination of Republicans and Americans.

after a memorable contest. Steps were taken at once to put a ticket in the field for the approaching election of President. The chair¬ men of the State committees of Maine, Ver¬ mont, Massachusetts, New York, Pennsylvania, Ohio, Michigan, Indiana and Wisconsin called an informal convention to meet at Pittsburgh, 22 Feb. 1856. A committee appointed at that meeting called a national convention to meet at Philadelphia, 17 June 1856, to nominate candidates for President and Vice-President. The call was addressed to ((the people of the United States, without regard to past political differences or divisions, who are opposed to the repeal of the Missouri Compromise, to the policy of the present administration, to the extension of slavery into the Territories, in favor of the admission of Kansas as a free State, and of restoring the action of the Fed¬ eral government to the principles of Washing¬ ton and Jefferson.® John C. Fremont, of Cali¬ fornia, was nominated for President, and Wil¬ liam L. Dayton, of New Jersey, for Vice-President, on a platform the most conspicuous plank of which read as follows :

“ Resolved, That the Constitution confers upon Congress sovereign power over the territories of the United States for their government and that in the exercise of this power it is both the right and the imperative duty of Congress to prohibit in the territories those twin relics of barbarism, ploygamy and slavery.”

It was essentially a one-idea convention, although resolutions were adopted favoring national aid for a railway to the Pacific Coast, and liberal appropriations for rivers and har¬ bors; but the party was not long to remain thus limited in its mission. The convention of 1860, which nominated Abraham Lincoln for President, adopted resolutions which com¬ mitted the new party to the doctrine of a pro¬ tective tariff, in the following clause:

“ That, while providing revenue for the support of the general government by duties upon imports, sound policy requires such an adjustment of these imposts as to encourage the development of the industrial interests of the whole country; and we commend that policy of national ex¬ changes which secures to the workingmen liberal wages, to agriculture remunerative prices, to mechanics and manu¬ facturers an adequate reward for their skill, labor, and enterprise and to the nationˆ commercial prosperity and independence. ’ ’

The Republican party is thus seen almost from the beginning to have been committed to the protective policy which remains to-day one of its cardinal principles. The election of 1856 resulted in a Democratic victory. James Buchanan received 174 electoral votes; Fre¬ mont received 114. It is perhaps fortunate that the new party did not then meet with success. Their candidate was a popular hero. No better name could have been selected about which to rally a new party alive with the crusading spirit. Had the party been success¬ ful in 1856, however, the Civil War would doubtless have begun then, and Fremont by temperament and experience was ill-fitted to grapple with such a problem. The inspiration of the campaign which he led carried the Republican party up to the momentous suc¬ cess of 1860. When the clouds broke, Lincoln providentially was at the head of the state, endowed beyond all other men of his time with the peculiar genius required to cope with the storm. The national convention at Chicago, 16-18 May 1860, nominated Abraham Lincoln, of Illinois, for President, and Hannibal Hamlin,

of Maine, for Vice-President. In the elec¬ tion which followed Lincoln and Hamlin re¬ ceived 180 electoral votes ; all others received 123 electoral votes. In April immediately fol¬ lowing Lincoln's inauguration Fort Sumter was fired upon and the Civil War began. ˆ The war occupied the four years of Lincoln's ad¬ ministration. The Republican party was not only charged with the heavy work of ad¬ ministration, but it was responsible for the preservation of the government. When it en¬ tered upon the war, the government was without military preparation. Congress and the Presi¬ dent were compelled to build navies, raise armies, to provide money and to fight the bat¬ tles of the republic. They were hampered by secession sympathizers in the South, and ˆcopperheads® in the North, although the masses of the Democratic party and many of its leaders were thoroughly loyal. Lincoln called into his Cabinet Democrats like Stanton, Blair and Welles, and gave high military com¬ mand to loyal officers with Democratic affilia¬ tions. Logan, McClernand, McClellan and Butler were cases in point. Had it not been for this broad and statesmanlike attitude of Lincoln, who always acted on the theory that he was President of all the people, it may be doubted whether the Union would have been preserved. In the midst of the war, on 1 Jan. 1863, the proclamation of Emancipation went into effect. An election for President was held in November 1864. The Democratic party nominated Gen. George B. McClellan of New Jersey, for President, and George H. Pendle¬ ton, of Ohio, for Vice-President. The prin¬ cipal plank of its platform was a blunt dec¬ laration that the war was a

failure. The Republicans at Baltimore, 7 June 1864, re¬ nominated Lincoln for President, with Andrew Johnson, of Tennessee, for Vice-President. During the early days of the campaign, while military success seemed to be still far away, Lincoln, believing that he was likely to be de¬ feated at the polls, began preparations for a Democratic successor, pledging himself to do everything in his power in the few months remaining to him to carry through the war and save the Union. His fears were not justi¬ fied by the results. Lincoln received the electoral vote of every State not in the re¬ bellion except Kentucky, Delaware and New Jersey — 212 electoral votes; McClellan re¬ ceived 21.

The assassination of Lincoln, 14 April 1865, was a calamity not only to the country but also to the Republican party, upon which was pressing at the moment the problem of recon¬ struction growing out of the Civil War. Lin¬ coln had the qualities needed at that time — firmness, moderation and political sagacity. Andrew Johnson, who succeeded to the Presidency, was ill-fitted either by tempera¬ ment or by training to deal with the delicate questions which then arose. He was hot¬ headed, uninformed and unstable. He was soon at odds with the leaders of his party in Con¬ gress, and by his obstinacy drove them to ex¬ tremes which might have been avoided had the executive been guided by a broader intel¬ ligence. All the measures of reconstruction were forced through in spite of the President's opposition. The difference became so marked

that in February 1868 articles of impeachment were brought against the President by the House of Representatives. In the impeach¬ ment proceedings in the Senate the President was not convicted. The vote was : Guilty, 35 ; not guilty, 19 — one less than the two-thirds majority required by the Constitution for con¬ viction.

Ulysses S. Grant, of Illinois, the victorious commander of the Union armies, was the unanimous choice of the Republican National Convention, which met at Chicago 20-21 May 1868. Schuyler Colfax, /of Indiana, was the candidate for Vice-President. In the election which followed Grant and Colfax received 214 electoral votes. Seymour and Blair, the Democratic candidates, received 80. Through¬ out Grant's first administration, both Senate and House were strongly Republican. The 15th Amendment to the Constitution, having been recommended by Congress and adopted by the States, was proclaimed on 30 March 1870. To Grant fell the task of bringing the Southern States into adjustment with the re¬ constructed Union. The problems of his first administration were largely those which grew out of this new relationship. The former slaves in Southern States exercised for the first time their newly-acquired privileges of voting. The State governments of negroes and ˆcarpet-baggers® which were set up be¬ came a scandal. The outrages committed by Southern Democrats upon all Republicans of whatever color aroused the resentment of the North, and kept the South in a condition of disorder which necessitated constant Federal interference.

The situation in the South, coupled with differences between the administration and cer¬ tain Republican leaders, conspicuous among whom were Charles Sumner, Carl Schurz and Horace Greeley, caused a defection in the Re¬ publican ranks. The discontented Republicans met at Cincinnati in May 1872, and nominated Horace Greeley, of New York, for President, and B. Gratz Brown, of Missouri, for Vice-President. The platform declared that sec¬ tional issues should be buried, that civil serv¬ ice reforms should be inaugurated and that specie payments should be immediately resumed. The Democratic convention at Baltimore, in July, accepted the Liberal Republican

candi¬ dates and platform. The regular Republican convention at Philadelphia, 5-6 June, renomi¬ nated Grant for President by acclamation, and put Henry Wilson, of Massachusetts, on the ticket with him. Grant and Wilson received 286 electoral votes out of 366. The first two years of Grant's second administration wit¬ nessed a strong reaction against the Republi¬ can party. There was a financial panic in 1872 and 1873, and the scandals of the whisky ring in the Treasury Department, and of the post tradership in the War Department, in¬ volving men close to the administration, created a strong feeling of dissatisfaction throughout the country, which resulted in a political overturn in 1874. In the 44th Con¬ gress for the first time since 1860 the House of Representatives contained a Democratic majority.

Notwithstanding these adverse influences, Grant's administration in constructive achieve¬

ment has hardly been equaled by any other. He established our monetary system on a sound basis through his veto of the Inflation Bill in 1874 and through the enactment, in January

1875, of a law providing for the resumption payments by the redemption of greenbacks in coin. With the cooperation of Hamilton Fish, the Secretary of State, he carried through a strong, far-seeing foreign policy. There has never been a period in American history when an American citizen could count more surely on worldwide respect. He secured satisfaction from Spain for the seizure of the Virginias and the execution at Santiago, Cuba, of American citizens among her passengers. Through the Treaty of Washington and the creation of the Geneva Tribunal to pass on the Alabama claims, he was first in history to establish arbitration in the settlement of international disputes. By the appointment of a Civil Service Commission he was the first President to give official recog¬ nition to Civil Service reform — to the prin¬ ciple of fitness in official appointments rather than selection for partisan political activity. He urged the upbuilding of an American mer¬ chant marine through ocean mail subsidies. He enforced the laws, maintained economy in gov¬ ernment expenditures, lowered taxes and re¬ duced the national debt.

By the time the Presidential election of 1876 arrived the Republican party had regained some of the ground it had lost. Rutherford B. Hayes, of Ohio, was nominated for President in the convention at

Cincinnati, 14-16 June

1876. William A. Wheeler, of New York, was nominated for Vice-President. The Demo¬ cratic candidates, nominated at Saint Louis, were Samuel J. Tilden, of New York, and Thomas A. Hendricks, of Indiana. The Demo¬ crats went into the campaign with a cry of <(Turn the rascals out.® In the election which followed Tilden and Hendricks received a ma¬ jority of the popular vote. There was a dis¬ pute in regard to the electoral votes of South Carolina, Florida, Louisiana and Oregon. The disputed votes were finally referred to an electoral commission, composed of five sena¬ tors, five representatives and five justices of the Supreme Court. After a long hearing, dur¬ ing which the country was in great excitement, the commission held that it had no authority to go behind ■ the returns, upon which the choice of electors had been certified. With this de¬ cision all the contested votes were awarded to Hayes and Wheeler, and they were declared elected, receiving 185 electoral votes. Tilden and Hendricks received 184 votes. The ad¬ ministration of President Hayes is notable for two reasons. He withdrew Federal troops from the South, thus leaving the negro voters at the mercy of the white population. The Southern States, which under reconstruction had been Republican up to 1876, now passed under Dem¬ ocratic control, and have remained Democratic with only occasional exceptions, ever since. Under the administration of John Sherman, as Secretary of the Treasury, specie payments, as¬ sured by legislation urged and made law by Grant, were resumed, and the finances of the government were fixed firmly on a substantial foundation. President Hayes had to deal with a Democratic House of Representatives throughout his term.

In the election of 1880, James A. Garfield, of

Ohio, and Chester A. Arthur, of New York, nominated at Chicago, 2-8 June, were chosen President and Vice-President, respectively, re¬ ceiving 214 votes against 155 electoral votes cast for Hancock and English, their Democratic opponents. They also received a plurality of the popular vote. For the first time since 1874 the Republicans controlled the House of Rep¬ resentatives. The Senate was evenly divided. President Garfield was shot on 2 July 1881, and died on 19 September, leaving the administra¬ tion in the hands of President Arthur. During Arthur's administration the Civil Service Com¬ mission was created and effective steps were taken to divorce the great body of subordinate offices in the civil service from the changes in¬ cident to party politics. Under the administra¬ tion of William E. Chandler, as Secretary of the Navy, the building of the new navy was begun. A treaty was negotiated with the gov¬ ernment of Nicaragua, looking to the construc¬ tion of an interoceanic canal. This treaty had not been ratified by the Senate when the ad¬ ministration came to an end, and President Cleveland promptly withdrew it upon entering the White House. The administrations of Garfield and Arthur were marked by factional differences in the Republican party. The elec¬ tions for Congress in 1882 resulted adversely, and in the 48th Congress there was a Demo¬ cratic majority of 73. Grover Cleveland was elected governor of New York by a majority of nearly 200,000 over Secretary Folger, who had been nominated for governor through ad¬ ministration influence? In the election of 1884, Blaine and Logan, the Republican candidates for President and Vice-President — nominated at Chicago, 3-6 June — were defeated by Cleve¬ land and Hendricks, the Democratic candi¬ dates, receiving 182 electoral votes as com¬ pared with 219 for their opponents. The cam¬ paign was fought almost solely on the per¬ sonality of Mr. Blaine, and had never been exceeded in bitterness. The result was de¬ termined by a plurality of 1,149 in a total vote of 1,200,000 in the State of New York. The Democrats controlled the House throughout the Cleveland administration, but the Republicans had a majority in the Senate, a combination which prevented affirmative legislation of any consequence. President Cleveland brought the tariff question sharply to the front in his mes¬ sage of 1887, and the agitation which grew out of that message resulted in a campaign fought on the tariff issue in 1888. The Re¬ publicans in that year, in a convention at Chicago, 19-25 June, nominated Benjamin Har¬ rison, of Indiana, for President, and Levi P. Morton, of New York, for Vice-President. The Democrats

renominated President Cleve¬ land, and placed Allen G. Thurman, of Ohio, second on the ticket. Harrison and Morton received 233 electoral votes ; Cleveland and Thurman received 168. Both Senate and House were strongly Republican. The adminis¬ tration of President Harrison was signalized by the enactment of important legislation and by a strong foreign policy. Thomas B. Reed was speaker of the House of Representatives in the 51st Congress, with a narrow Republican ma¬ jority. The Democratic minority essayed at the beginning of the Congress to prevent all Re¬ publican legislation by appealing to the tech¬ nicalities of antiquated rules. Speaker Reed,

in the face of vehement opposition, secured the adoption of new rules, under which it became possible for the majority to do business. The Reed rules, although angrily assailed by the Democratic minority, were adopted by the Dem¬ ocratic party when it next came into control of the House, and they prevailed for nearly 20 years. Having obtained the power to legislate, the Republican party in the House proceeded to enact a tariff bill in obedience to the com¬ mand of the electorate. The McKinley Act was signed 1 Oct. 1890. A law was passed, known as the Sherman Anti-Trust Law, providing pen¬ alties for creating combinations in restraint of interstate trade. The House of Representatives passed a bill looking to the more efficient con¬ trol of Federal elections. This measure aroused great Democratic opposition. It failed to pass the Senate. During Harrison's ad¬ ministration a revolution in Hawaii resulted in the deposition of Liliuokalani, the native queen. A republic was set up, and a commission was sent to Washington seeking annexation to the United States. President Harrison made a treaty of annexation, which the Senate failed to ratify in the few weeks remaining of the ad¬ ministration. The treaty was withdrawn by President Cleveland and the queen was re¬ stored to the throne, but Hawaii was finally annexed shortly after the return of the Re¬ publican party to power in 1897.

The Congressional elections of 1890 were fought on the issue created by the McKinley bill. In the 52d Congress the House contained 235 Democrats and only 88 Republicans. The election of 1892 resulted in turning all branches of the government ovqr to the Democratic party. Cleveland and Stevenson were elected Presi¬ dent and Vice-President, receiving 277 electoral votes; Harrison and Reid, nominated at Minne¬ apolis, 7-10 June 1892, received 145 votes. Both House and Senate were strongly Demo¬ cratic in the 53d Congress. The administration had come in on a platform which denounced protection as a fraud and declared it to be a fundamental principle of

the Democratic party that the Federal government has no constitu¬ tional power to impose and collect tariff duties except for the purposes of revenue only. The election of a Democratic President on this platform created distrust in business circles and caused a paralysis of industry which re¬ sulted in a financial panic, hitherto unequaled, during the spring of 1893. President Cleve¬ land, believing that the financial depression was due to the operation of the Sherman Act, which provided for the purchase of silver bullion, called a special session of Congress to repeal that act. The Republicans in the House and Senate combined with a small number of Dem¬ ocrats to carry out the President's recommenda¬ tion and finally after weeks of heated discus¬ sion the law was repealed, but the financial situation was not relieved. The money strin¬ gency continued with the dread of tariff legis¬ lation hanging over the country. A tariff bill was enacted after months of debate which did not go to the lengths recommended by the President, and which he accordingly denounced as an act of perfidy and dishonor, although he refrained from vetoing it. The fight over the repeal of the Sherman Act and over the Wilson-Gorman Tariff Act disrupted the Democratic party and at the Congressional elections held in

1894 the Republican party came into control of both branches of Congress.

In 1896 the Republicans at Saint Louis, 16-18 June, nominated William McKinley for President and Garret A. Hobart, of New Jersey, for Vice-President, on a platform de¬ claring for a protective tariff and for the maintenance of the gold standard. The Demo¬ cratic convention at Chicago was carried away by the cry of free silver coinage at the ratio of 16 to 1. William J. Bryan, of Nebraska, and Arthur Sewall, of Maine, were nominated for President and Vice-President, respectively. The campaign was fought chiefly on the finan¬ cial planks of the two platforms. McKinley and Hobart were elected by a decisive ma¬ jority, both in the electoral college and of the popular vote. They received 271 electoral votes. Bryan and Sewall received 176 votes. Both Senate and House were strongly Republican in the 55th Congress. Thomas B. Reed was speaker of the House and Nelson Dingley, of Maine, was chairman of the Committee on Ways and Means. A special session of Congress was called to carry into effect the pledges of the party with regard to the tariff. The Dingley Tariff Act became law 24 July 1897. It marked the beginning of a period of prosperity un¬ equaled in the previous history of the United States.

The disturbed conditions in Cuba growing out of the uprising against Spanish misgovernment were rapidly reaching a point where in¬ tervention by the United States would have be¬ come inevitable, when the destruction of the battleship Maine by a mine in Havana Harbor, on 15 Feb. 1898, roused the resentment of the people and precipitated the war with Spain. The war began on 21 April 1898. The Ameri¬ can forces gained two great victories by sea, one in Manila Bay, on 1 May, the other off Santiago Harbor on 3 July 1898. After a brief and effective campaign by land, Spain sued for peace. The treaty of peace was signed at Paris on 10 Dec. 1898. It provided for the ac¬ quisition by the United States of the island of Porto Rico in the West Indies and of the Philippine Archipelago and the island of Guam in the Pacific. It placed the island of Cuba temporarily under the

guardianship of the United States. The McKinley administration undertook the government of the newly-ac¬ quired territory with all the serious problems involved. It quickly set up a stable American government in Porto Rico. It established order in Cuba under a military administration, pre¬ pared the people of the island for self-govern¬ ment and on 20 May 1901 withdrew the Ameri¬ can military forces, permitting the Cuban people to set up an independent republic of their own. In the Philippines, after four years of armed opposition by guerrilla tribes in Luzon, a civil government was finally estab¬ lished and the people of the island were given a degree of civil freedom such as they had not known in 400 years. Early in the McKinley ad¬ ministration resolutions were enacted provid¬ ing for the voluntary annexation of Hawaii on terms similar to those contemplated by Presi¬ dent Harrison in the treaty of annexation which President Cleveland withdrew. President Mc¬ Kinley was renominated at Philadelphia on 19-21 June 1900. Theodore Roosevelt was nominated by acclamation for Vice-President.

William J. Bryan was again nominated for President at Kansas City on 4 July with Adlai E. Stevenson, of Illinois, for Vice-President. The Democrats reaffirmed the platform of 1896 with its declaration of free silver, but they declared the paramount issue to be the ques¬ tion of imperialism. The Republican candi¬ dates received 292 votes in the electoral col¬ lege ; the Democratic candidates 155 votes. The Republicans retained control of both Senate and House. On 6 Sept. 1901 President Mc¬ Kinley was shot at Buffalo by the anarchist Czolgosz. On 14 September he died. Vice-President Roosevelt succeeded to the Presi¬ dency. He pledged himself to carry out the McKinley policies under which the country had experienced unparalleled prosperity and he re¬ tained all members of President McKinley's Cabinet. Among the cabinet members thus re¬ tained in office was Elihu Root. As Secretary of War, Mr. Root effected a complete reorgani¬ zation of the army on lines which made it capable of quick and effective expansion in time of need. He established the General Staff Corps. John Hay, as Secretary of State,- enhanced the prestige of the United States throughout the world by his masterful handling of our foreign relations, securing the recog¬ nition of the (<Open Doorˆ in China and com¬ manding respect for American diplomacy among the European powers.

The Panama Canal (q.v.), begun under Roosevelt and completed under the succeeding Republican administration, is one of the greatest engineering feats of all time and will have a lasting influence upon the

development of the United States, bringing constantly into closer commercial and political relations the people of the Atlantic and Pacific coasts and simplifying the problems of national defense. It would have been indefinitely delayed had it not been for Roosevelt's firmness and prompt decision in dealing with the neighboring South and Central American states. The early years of his incumbency were marked by the settlement of the great anthracite coal strike, which threatened a coal famine in the winter of 1902. He brought the contending operators and operatives together and named a non-partisan commission composed of men representing labor, capital and the public, which named terms of agreement.

The Republican National Convention held at Chicago in June 1904 unanimously nominated Roosevelt as his own successor and named Charles W. Fairbanks, of Indiana, as the can¬ didate for Vice-President. The Democrats at Saint Louis nominated for President Alton B. Parker, of New York, and for Vice-President Henry G. Davis, of West Virginia. Roosevelt and Fairbanks were elected, receiving a total of 336 electoral votes out of 476. In his second administration Roosevelt entered on a crusade against what he regarded as a danger¬ ous tendency to concentrate power in the hands of capitalists controlling agencies of transpor¬ tation, manufacture and commerce. He se¬ cured the enactment by Congress of legislation enlarging the functions of the Interstate Com¬ merce Commission and investing the Commis¬ sion with authority to fix railroad rates and abolish discriminating practices. The Depart¬ ment of Justice with his approval brought suit under the Sherman Law against large indus-

trial organizations as combinations in re¬ straint of trade.

In the spring of 1904 war broke out between Russia and Japan. After the battle of the Sea of Japan, 27 and 28 May 1904, in which the Russian fleet was almost annihilated, Presi¬ dent Roosevelt (9 June) urged on the Russian and Japanese governments the desirability of putting an end to the war and proferred his good offices toward bringing about peace. Both governments acceded and appointed plenipo¬ tentiaries to discuss terms. Portsmouth, N. H., was selected as the place of meet¬ ing. A deadlock arising between the plenipo¬ tentiaries, the President again appealed to the high contracting parties and finally succeeded in bringing about an agreement. A treaty was signed at Portsmouth, 5 September. For his services in bringing about peace President Roosevelt was later awarded the Nobel Prize.

In November 1906 President Roosevelt made a visit to the Isthmus of Panama. This was the first time a President of the United States had gone outside the territorial limits of the Union, even technically. It was at a time when Con¬ gress was not in session and there were no great and immediately pressing questions which might call for official action by the President.

The first session of the 60th Congress passed an act to regulate the employment of child labor in the District of Columbia, intended to be a model law on the subject. It was the forerunner of more comprehensive legislation which was declared unconstitutional by the Supreme Court in 1918. On 30 May 1908 was passed an act to amend the national banking laws of the United States and creating a Na¬ tional Monetary Commission, which was au¬ thorized to investigate and ascertain what changes may be necessary in the banking and currency laws. This commission made an ex¬ haustive and scientific study of our entire finan¬ cial policy, which it had long been plain was faulty. Our banking system, based on legisla¬ tion adopted early in the Civil War and ap¬ plicable primarily to the Civil War emergency, was quite unequal to the demands of our ex¬ panding commerce. Our currency was inelastic. In times of monetary stringency the resources of the treasury were repeatedly called upon to meet a desperate emergency and even this reser¬ voir of credit occasionally proved inadequate, as was evidenced in the panics of 1873, 1893, 1901 and 1907. The Monetary Commission com¬ posed

of senators and representatives was fortu¬ nate in the high character of its personnel. At the head was Nelson W. Aldrich of Rhode Island, chairman of the Finance Committee of the Senate; while among the representatives on the commission were Edward B. Vreeland of New York, chairman of the House Committee on Banking and Currency, and John W. Weeks of Massachusetts, later a United States senator, a man of constructive ability and financial knowledge. Owing to limitation of time it was impossible to secure the enactment of a com¬ prehensive measure such as Senator Aldrich and his associates had in mind, but a measure calculated to meet immediately urgent neces¬ sities and called the ˆAldrich-Vreeland" Emergency Act was enacted. This act was first called into operation in 1914, after the outbreak of the European War, and by resorting to

the methods of relief which it provided the danger of panic was averted. A striking feature of Roosevelt's administration was his dramatic action in sending around the world a great American fleet consisting of 16 battleships which stopped at many ports, impressing European and Asiatic powers with the potential naval strength of the United States. The fleet left Hampton Roads, Va., 16 Dec. 1907 and arrived at Hampton Roads, on its return, 22 Feb. 1909. The principal places visited were Trinidad, Rio' de Janeiro, Valparaiso, Callao, San Diego, San Francisco, Honolulu, New Zealand, New South Wales, Australia, Manila, Japan, Ceylon, Suez, Naples, Villefranche, Athens, Algiers, Gibraltar and Portugal and everywhere the fleet was received with great demonstrations of goodwill toward the United States. While Roosevelt was President, the United States re¬ mained at peace. No foreign nation had the hardihood to trespass on the rights of Ameri¬ can citizens on land or sea.

The Republican National Convention at Chicago in June 1908 named William H. Taft, of Ohio, for President and James S. Sherman, of New York, for Vice-President. The Demo¬ cratic Convention at Denver, Colo., named Wil¬ liam J. Bryan for President and John W. Kern, of Indiana, for Vice-President. Taft and Sherman were elected, receiving 321 electoral votes out of a total of 483.

President Taft, who had been a Federal judge, governor-general of the Philippines and later Secretary of War, was the personal choice of President Roosevelt for the succession, but he had hardly taken his seat before differences arose between the two. President Taft was lacking in political prescience. He showed a leaning toward the more conservative element of the party, called into his Cabinet men who

were not in sympathy with the policies of his predecessor and asked for the resignation of men in high positions, in whom his predecessor had shown especial interest. A bitter contest grew out of the attitude of the Secretary of the Interior toward the program of the Roose¬ velt administration, which looked to the con¬ servation of mineral and agricultural resources, especially in the West. This resulted in the dis¬ placement of Gifford Pinchot, the head of the Forestry Division, one of Colonel Roosevelt's closest friends. The Republican party in its platform in 1908 had declared for revision of the tariff and President Taft, on his own initiative during the campaign, had interpreted this to mean a <(revision downwardˆ — a declara¬ tion which was made much of later. Sereno E. Payne of New York, as chairman of the House Committee on Ways and Means, brought in a bill which was not regarded favorably by many members of the party, especially those from Western and Middle Western States, and when the Finance Committee of the Senate, under the leadership of Senator Aldrich of Rhode Island, undertook its amendment, reporting a bill to the Senate which Western senators thought drawn too closely in accordance with the neces¬ sities of textile manufacturers of the North¬ east, it aroused bitter opposition and gave rise to one of the most acrimonious political de¬ bates which had taken place in the Senate in many years. The bitterness aroused by the contest had an influence on the future of the

United States which it would be hard to over¬ estimate. It had much to do with the election of a Democratic House in 1910, with the elec¬ tion of a Democratic President in 1912 and with the Republican reverses which resulted in Democratic ascendancy during the years im¬ mediately preceding the war with Germany and the reshaping of the map of the world. The Payne-Aldrich Tariff Act was approved by President Taft 5 Aug. 1909, although he had severely criticized its provisions. Rates of duty were increased where found necessary or desirable, but were reduced in many in¬ stances. All prior commercial and reciprocity treaties were terminated, except the treaty with Cuba, and authority was given the President to create a board of experts to collect informa¬ tion upon cost of production of commodities at home and abroad. In opposition to public sentiment and against the judgment of Republi¬ can leaders, President Taft persisted in ne¬ gotiating a reciprocity treaty with Canada. The agreement which contained provisions seriously affecting the agricultural and in¬ dustrial welfare of the northern tier of Re¬ publican States was signed on 26 Jan. 1911. It passed the House on 14 Feb. 1911 under strong administration pressure but was not brought to a vote in the Senate before the expiration of the 61st Congress on 3 March 1911. A new bill was introduced at the special session of the new Congress which was called to meet on 4 April. Both House and Senate acted favorably on the bill, but Canada had seen new light in the meantime and failed to act. Thus reciprocity was defeated by the in¬ difference of Canada after the administration had exhausted .its influence in forcing it through a reluctant Congress. The proceeding accentu¬ ated the administration's unpopularity and helped to precipitate the split in the party.

The struggle in the House of Representatives between Speaker Cannon and the recognized organization on one side and a combination of Democrats and Republican insurgents on the other also contributed to the party's demoraliza¬ tion. Under the Reed rules the speaker ap¬ pointed all committees and was himself chair¬ man of the Committee on Rules which fixed the order of precedence for legislation, by the in¬ troduction of special rules, limiting debate and fixing the time for

a vote, thus concentrating power in the hands of a small group of leaders. The insurgent Republicans with the aid of the Democrats, after a tumultuous time in the 61st Congress, adopted by a vote of 191 to 156 a resolution' taking out of the speaker's hands the appointment of the Committee on Rules and making the committee elective. The 62d Con¬ gress made all committees elective and reduced the influence of the speakership below the point where Speaker Reed had found it. As the end of the administration approached it became clear that President Taft could not be re¬ elected. He had not only alienated the Progres¬ sives in the party who regarded Colonel Roose¬ velt as their leader, but he had also alienated the substantial business element in the North and East by prosecution of suits under the Sher¬ man Anti-Trust Law. Colonel Roosevelt had spent much time abroad during the early part of the administration, hunting big game in Africa, exploring in Brazil and visiting Euro¬ pean and South American capitals. On his re¬

turn the demand became vociferous in many quarters that he be a candidate against Taft for the nomination. Through delay in an an¬ nouncement of his candidacy, however, many party leaders who might otherwise have favored it committed themselves to the renomination of Taft and when the announcement finally came it was accompanied by radical declarations for the recall of judges and judicial decisions and by other advanced ideas, antagonistic to the political convictions of many who had previously been among Colonel Roosevelt's most cordial supporters. The campaign for nomina¬ tion was vituperative. The contending factions were not sparing in attacks upon each other's motives. The National Convention assembled at Chicago in June 1912 in the heat of passion, with many contested seats. After much wran¬ gling the majority of these contests were de¬ termined in favor of delegates pledged to Taft in accordance with recognized rules and prece¬ dents which had governed previous conven¬ tions. Taft and Sherman were renominated. The followers of Roosevelt, denouncing the ac¬ tion of the convention as illegal and declaring that the nomination had been stolen, withdrew before the ballot was taken, organized a new party and called a convention of their own. This convention of Progressive Republicans met at Chicago in July, nominated Roosevelt for President by acclamation and named Hiram W. Johnson, governor of California, as his run¬ ning mate. The Democratic Convention at Baltimore in June nominated for President Woodrow Wilson, of New Jersey, and for Vice-President, Thomas R. Marshall, of Indiana. In the election Taft carried only two States, Ver¬ mont and Utah, with eight electoral votes. Roose¬ velt received 88

electoral votes and Wilson re¬ ceived 435 electoral votes. The Congress chosen was Democratic in both branches. Vice-Presi¬ dent Sherman died before the meeting of the electoral college and the votes of Vermont and Utah were thrown for Nicholas Murray But¬ ler of New York. With the inauguration of Wilson and Marshall on 4 March 1913 the Re¬ publican party went out of power in all de¬ partments of the government and remained in a minority in all departments until 4 March 1919 when they regained control of the Senate and the House of Representatives — the Senate by a majority of two, the House by a majority of 45.

Although in a minority and excluded from participation in' administration councils, the Republican leaders in Congress and out were able to modify to some extent radical and dangerous tendencies in legislation, to neutralize the errors of the majority and to perfect meas¬ ures which had possibilities of merit. The Federal Reserve Act of 23 Dec. 1913 as enacted carried into effect many of the changes in our banking system recommended by the Monetary Commission, and in its final form it had the benefit of the knowledge and experience of Senator Weeks, who at that time was the recognized Republican authority in the Senate on financial questions. The amendments which he induced the Senate to incorporate in the original bill framed by the administration and forced through the House, were of incalculable value in eliminating provisions which contained the germs of currency inflation and future panics.

The Underwood Tariff Act was an expres¬ sion of classic Democratic theories — a tariff for

revenue, not protection. It brought on indus¬ trial doubt and depression, arrested manufac¬ turing production and led to unemployment and distress all through the industrial North. The outbreak of war in Europe nullified the evils of the act, since the peaceful and exporting industrial energies of Europe were transferred to the industries of war and destruction and gave to neutral America an artificial but highly profitable market for all her products and stopped the western flow of competitive products.

The plainly-announced purposes of the Wil¬ son administration and its intolerance of ad¬ vice and criticism had one wholesome political effect — it made a solid and united party of all Republican factions. The National Con¬ vention of June 1916, at Chicago, nominated for President former Gov. Charles E. Hughes, then on the Supreme Court bench, and for Vice-President, Charles W. Fairbanks. The Demo¬ cratic National Convention at Saint Louis, a week later, renominated Wilson and Marshall. For over three years the American people had been fed on the strange doctrines of pacifism, internationalism and socialism. While Europe was at war, we were at peace, and through the very fact of war abroad were rich and prosperous at home. At the same time we were earning the contempt and ill-will of all the warring nations. American citizens had suf¬ fered much in Mexico, while the government pursued its policy of Svatchful waiting,® and now were slaughtered on the high seas without any vigorous or effective steps being taken to protect American interests. Republican leaders, like Roosevelt, Lodge and Weeks, and military leaders like Gen. Leonard Wood, saw that we might at any time be drag¬ ged into war in order to maintain our national self-respect, and urged insistently that we put ourselves in readiness, but the administration, preaching neutrality and neglecting even ordi¬ nary preparations, went to the country with the boast that Wilson had ((kept us out of war® and carried the election by a narrow margin of the popular vote in States which were affected by this cry. The Wilson administration had undi¬ vided responsibility and unlimited power from the time war was declared — modified only by constructive criticism by the Senate of inefficient and extravagant control of war activities, and when the Congressional elections of 1918 were at hand, the President issued an appeal to the electorate to return a Democratic Senate and House because <(the leaders of the minority in the present Congress have unquestionably been pro-war but they have been anti-admin¬

istration® ; because “unity of government is as necessary now in civil actions as it is upon the field of battle,® and because <(the return of a Republican majority to either House of the Congress would moreover be interpretative on the other side of the water as a repudiation of my leadership.® The response of the coun¬ try was emphatic and unmistakable. The Con¬ gress elected was Republican in both branches, and the President within a month after the election set sail for Europe to appear there in the Peace Conference as the spokesman of American opinion and purpose.

The Republican party from its beginning has been distinctly an American party, a party

of constructive ability and of moral purpose. In power it has been rich in achievement and in a minority it has been unselfishly loyal to the best interests of the United States. The war with Germany is the first war since the United States became a nation in which the party out of power has stood unswervingly for the successful prosecution of the war and by its attitude has forced the party in control to greater efforts than those in power would have preferred. The most compact and force¬ ful summary of its principles to-day was set forth in the Middlesex Resolutions accepted by the Republicans of Massachusetts just before the signing of the armistice which marked the end of the great European War. This is the creed:

To carry on the war unflinchingly to unconditional surrender.

Germany to make full reparation for her crime against the world.

A lasting peace which leaves America the master of her destiny — a nation unbeguiled by international or socialistic dreams.

Revitalize the Hague tribunal. Create machinery to insure observance of its awards.

Political and economical independence for the United States.

The Monroe doctrine to be respected and enforced.

No foreign power to have the right to meddle in American affairs.

No European interference in Cuba, Mexico, the Carib¬ bean or the Philippines.

The Panama canal to be owned, controlled and fortified by the United States.

A navy strong enough to guard our commerce and our coast.

A strong army to repel invasion and resist aggression.

Universal military training that we may always be pre¬ pared for national defense.

Protection of American industry. No agreements with any other nations preventing the enactment of such tariff laws as we see fit.

Internal taxes an incident to revenue and not its chief reliance. No excessive and unequal burdens of taxation upon any section, industry or class.

A great merchant marine.

Congress to begin at once to solve tremendous problems soon to be upon us. We who were criminally unprepared for war must not be unprepared for peace.

When war is done, to lose no time in bringing home the men who have been fighting overseas.

To stop the insidious growth of bureaucratic government and put an end to the petty tyranny of manifold commis¬ sions.

No government ownership except of undisputed govern¬ ment activities.

To restore freedom of speech and of the press.

To reassert the constitutional prerogative of Congress that this may once more be a government of laws and not of men. Having fought to rid the world of Prussianism, let us not Prussianize ourselves.

This platform, promulgated before the armistice with Germany became effective on 11 Nov. 1918 not only anticipated the termina¬ tion of diplomatic negotiations in the settle¬ ment of terms of peace but also defined the party's attitude on foreign and domestic prob¬ lems which speedily pressed for solution. After the conclusion of the armistice with Germany, President Wilson hastened to Europe to con¬ duct in person the negotiations for peace on behalf of the United States. He remained abroad until the end of February 1919 return¬

ing for a few days in order to sign the bills passed by Congress in the closing days of its session; he then returned to France and re¬ mained abroad until July, when he brought back with him the treaty with Germany, which he and the representatives of other powers had signed, including the covenant of a League of Nations, the ostensible object of which was to create an organization through which the permanent peace of the world might be secured. The Senate, deprived of the usual sources of

information with regard to the details of the treaty of peace, undertook to consider that great question with the aid of such inquiries as it could institute on its own initiative. The majority of the Republicans in the Senate be¬ lieved that the treaty as signed, including the covenant of the League of Nations, failed to protect American interests and imperilled rec¬ ognized American doctrines. The division in the Senate and in the country was not strictly on party lines. Some Democratic leaders were equally insistent with the majority of Repub¬ licans in their determination to Americanize the treaty and so amend the covenant of the League of Nations that it should not endanger national interests. As the inquiry in the Senate pro¬ ceeded, the debate became nation-wide and the feeling throughout the country strengthened that in the parleys at Paris, American delegates had entered into engagements to which the Senate could not assent without betraying the United States. There was an insistent demand that the treaty be rejected altogether and that the Congress by resolution declare a state of peace. So strong did this feeling grow that on 4 Sep¬ tember the President began a tour of the country in order to save his work at Paris from defeat.

Bibliography. — Blaine, James G., (Twenty Years of Congress) (1884) ; Bryce, James, <The American Commonwealth5 (New York 1893—95) ; Flower, F. A., (History of the Republi¬ can Party, Embracing Its Origin, Growth and Mission5 (1884) ; Gordy, L. P., (A History of the Political Parties in the United States5 (1900-02) ; Greeley, Horace, (The American Conflict5 (1864) ; Hoar, George F., (Autobiography of

Seventy Years5 (1903) ; Lodge, Henry C., (Party Allegiance5 (in his (Historical and Po¬ litical Essays,5 1892) ; Long, (The Republican Party; Its History, Principles and Policies5 (1900) ; McClure, (Our Presidents and How We Make Them5 (1900) ;• McMaster, John Bach, (History of the United States5 (8 vols., 1883-1913) ; Merriam, G. S., (The Life and Times of Samuel Bowles5 (1885) ; Patton, (Po¬ litical Parties of the United States: Their His¬ tory and Influence5 (1896) ; (Republican Na¬ tional Conventions, Official Proceedings5 (1856— 1916) ; Rhodes, James F., (History of the United States5 (7 vols., 1893-1906) ; Schouler, James, (History of the United States5 (7 vols., 1913) ; Sherman, (Recollections of Forty Years in the House, Senate and Cabinet5 (1895) ; Seilhamer, (History of the Republi¬ can Party5 ; Wiley, E., and Rines, Irving E., <The United States5 (New York 1916) ; Wil¬ son, H., (Rise and Fall of the Slave Power in .America5 (1874); Woodburn, James Albert, (Political Parties and Party Problems in the United States5 (1903); White, (The Life of Lyman Trumbull5 (1913) ; Welles, Gideon, (Diary5 (1911). Consult also McCulloch, Hugh, (Men and Measures of Half a Century5 (1889) ; De Witt, D. Miller, (The Impeachment and Trial of Andrew Johnson5 (1903) ; Curtis, Francis M., (The Republican Party 1854-1904 5 ; Gorham, George C., (Life and Public Services of Edwin M. Stanton5 (1899); Bishop, J., Presidential Nominations and Elections5 (1916) ; Stanwood, Edward, ‘History of Presi¬ dential Elections5 (1888); Schurz, Carl, Reminiscences of Carl Schurz5 (1907) ; Thayer, William Roscoe, (The Life of John Hay5 (1915) ; McPherson, Edward, (History

of the Reconstruction5 .(1875); Garland, Hamlin, ‘Ulysses S. Grant, His Life and Char¬ acter5 (1898) ; Cushing, Caleb, ‘The Treaty of Washington5 (1873) ; Hackett, Frank Warren, ‘William Adams Richardson5 (1898) ; Conkling, Rife and Letters of Roscoe Conkling5 (1889) ; Pierce, Edward L., Rife of Charles Sumner5 (1877-93) ; Hoar, George F., Auto¬ biography of Seventy Years5 (1903) ; Lodge, H. C., ‘War Addresses 1915— 1917 5 (1917) ; Mc¬ Call, Samuel W., ‘The Life of Thomas B. Reed5 (1914) ; Olcott, Charles Sumner, ‘The Life of William McKinley5 (1916) ; Coolidge, Louis Arthur, Rlysses S. Grant5 (1917) ; Coolidge, Louis Arthur, (An Old Fashioned Senator — Orville H. Platt5 (1910).

Louis A. Coolidge,

Formerly Assistant Secretary of the Treasury, Washington, D. C.

REPUBLICAN PARTY, Jeffersonian, the

name of the party of which Thomas Jeffer¬ son was leader. During Washington's first administration the Federalist party showed a tendency to centralize the government and to destroy little by little the rights of the States. The Federalist leader at that time was Alex¬ ander Hamilton, and Thomas Jefferson was the ablest among the opponents of the Federals. The differences between the two led to the resignation of Jefferson from Washing¬ ton's cabinet on 31 Dec. In the election of 1796 Jefferson was the candidate of the Re¬ publicans, but was defeated by John Adams, the Federalist candidate. Under the law as it then existed Jefferson became vice-president. He watched carefully the march of events and when the Federalists, who were almost mon¬ archists at heart, passed the hateful Alien and Sedition Laws, Jefferson and Madison pre¬ pared and secured the passage of the Kentucky and Virginia resolutions. The reaction against the Federalists set in at once. Jefferson was the candidate of the Republicans in 1800 and received an equal number of votes with Aaron Burr and it devolved upon the House of Representatives to make one of the two presi¬ dent. The Federals thought to prevent an election, but calmer counsels prevailed and, Hamilton throwing his weight to Jefferson, the latter became President. His first ad¬ ministration was marked by great simplicity and by a great reduction in expenditure. See Jefferson, Thomas.

REPUBLICS, Duration of. It is not easy to set down in each case precisely the length of years that the various republics have ex¬ isted. Among historians there are differences, in most instances, as to the dates of beginning and ending. Some authorities date from the physical overthrow of a monarchv or other form of government preceding; others from the beginning of the struggle for popular rights; others from the adoption of a constitu¬ tion, and so on. Some accept as the end the accession of king or emperor, or the actual establishment of a new form of authority, while others hold that the republic really became non¬ existent before those events occurred to finally and formally mark its disappearance. Fre¬ quently the birth or the death of a republic has been a gradual development extending over many years, so that it is almost impossible to fix the exact time when it was fully fledged.

or, on the other hand, had passed away com¬ pletely. Some republics, noticeably those of South America and Central America, have had interrupted careers, republican rule in them be¬ ing frequently suspended for a few months or even years, while dictators have held power, although in form, at least, it “has been prac¬ tically continuous. Others have begun as mem¬ bers of a republican federation and later have been established entirely independent. Vene¬ zuela, Colombia and Ecuador were originally united in the one republic of Colombia; Guate¬ mala, Honduras, Nicaragua and San Salvador were first members of a federal union. It is a disputed question whether such republics should be considered as dating from the beginning of the federation or from the beginning of their individual independence. In the appended table the former view is generally taken ; ap¬ proximately, then, the duration of life of the world’s republics is as follows :

Israelitish Commonwealth…

1491-1095 B.C.

396 years.

Grecian republic .

700-146 B.C.

554 years.

Carthage .

850-146 B.C.

704 years.

Rome .

535-29 B.C.

506 years.

Lombard Communes .

1183-1530

347 years.

Genoa .

1000-1802

802 years.

Venice .

600-1796

1196 years.

Amalfi .

900-1135

235 years.

Free Cities of Germany .

1241-1630

389 years.

Hamburg .

1630-

Lubeck .

1630-

Bremen .

1630-

Frankfort .

1630-1810

180 years.

Iceland .

928-1261

333 years.

The Netherlands .

1609-1805

196 years.

French Republic I .

1792-1804

12 years.

French Republic II .

1848-1852

4 years.

French Republic III .

1871-

San Marino .

885-

Andorra .

790-

Switzerland .

1291-

Liberia .

1820-

Orange Free State .

1854-

South African Republic .

1849-1903

54 years.

United States of America…

1776-

Mexico .

1824-

Venezuela .

1819-

Colombia .

1819-

Ecuador .

1819-

Peru .

1821-

Bolivia .

1825-

Paraguay .

1811-

Argentine .

1810-

Uruguay .

1825-

Chile .

1810-

Guatemala .

1823-

Honduras .

1823-

Nicaragua .

1823-

San Salvador .

1823-

Costa Rica .

1821-

Brazil .

1889-

Haiti .

1804-

San Domingo .

1844-

Cuba .

1903-

Hawaii .

1894-

Panama .

1903-

Portugal .

1911-

China .

1911-

Russia .

1917-

Austria .

1918-

Poland .

1918-

Czecho Slovakia .

1918-

Esthonia .

1918-

Latvia .

1918-

Finland . .

. 1918-

Of these 54 republics 33 were in existence in 1912. No dynasties can compare in years of existence with the 12 centuries of Venice, the 11 centuries of Andorra and the 10 centuries of San Marino. Few can show longer life than the republics of Israel, Carthage, Greece, Rome, Genoa, Switzerland and the Hanse cities of Germany. The ancient republics of Greece, Carthage, Rome, Lombardy, Venice and Genoa

were the greatest nations of their times. In

art, literature, law, commerce — all that goes to make up the best of modern civilization, they led the world for more than 1,000 years, and left a heritage of good for all mankind com¬ ing after them, such as can be credited to no monarchy. The death of those that have gone out of existence was not, as is claimed by some, due to defects peculiar to the reoublican form of government. It came about naturally from the condition of things in the civilization of the earlier centuries. Men were warlike in those days, unrestrainedly contentious and regardless of the rights of others; public and private affairs were in the hands of the turbulent; class distinctions were sharply defined. Under such conditions all governments were, for the most part, short lived. Monarchies and oligarchies suffered as well as others. One after another they rose and disappeared, and none of them, until comparatively recent centuries, endured as long as the republics that were contemporary with them or that succeeded. The older re¬ publics deteriorated in public spirit toward the end; they were torn by internal dissensions; they became the prey of extravagance, dissolu¬ tion and idle wealth within their borders, while jealous neighbors constantly sought to plunder and destroy or subjugate them. But these were dominant evils of the day in all lands and it stands to the credit of republican institutions that, despite disintegrating forces constantly at work, they existed long and splendidly. In modern times the story has been much the same. Only Great Britain and two or three smaller monarchies can show results comparable with contemporary republics, and in those countries constitutions have given the people almost as much voice in public affairs as in a republic. Even in South America and Central America, where government is still more or less chaotic and uncertain, the republics are an improvement upon the despotic rule of Spain which they suc¬ ceeded. The first French republic was undis¬ guised anarchy; the second was merely in com¬ parison a temporary flurry, but the third suf¬ fered in no wise in comparison with the most brilliant decades of the French kingdom or empire. The United States of America, under republican form of government, in all that goes to make up a great nation, has advanced to the forefront of world powers. Brazil has been as well governed in the decade and a half of its republican existence as it was even under the last Dom Pedro, most beneficent and most dem¬ ocratic of monarchs. The lesson to be drawn from the history of these republics is that men are able to govern themselves well. The dan¬ gers and evils that may threaten the republic have always been and are now the dangers and the evils inherent to the period, and threatening to

any government, republican or otherwise. The elasticity of republicanism, permitting of easier adaptation to changing conditions and readier conformity to the needs of the people, gives it an advantage over the more rigid mon¬ archy. That the general trend of the 19th cen¬ tury was toward republicanism cannot be ques¬ tioned. Nearly half the republics that history tells of were started then and all of them are now in existence. At the beginning of the 20th century more than one-half of the territory that is included in the civilized world belonged to republics and fully one-third of the population

in all the civilized countries lived under re¬ publican rule. See Republic; Republics, The History of.

Bibliography. — Adams, John, Contribu¬ tions of Government of the United States of America > (Philadelphia 1797) ; Aulard, F. V. A., (Histoire Politique de la revolution fran- ?aise) (Paris 1901) ; Fisher, H. A. L., (The Republican Tradition in Europe1 (New York 1911) ; Jarvis, W. C., (The Republican (Plainfield, Mass., 1820) ; Milton, John, (A Free Com¬ monwealth1 (1820) ; Scott, John, (The Re¬ public as a Form of Government (London 1890) ; Vizetelly, E. A., Republican France) (London 1912) ; Woolsey, K. T., Republics Versus Women1 (London 1903).

REPUBLICS, The History of. The word republic is derived from the Latin res, a thing, and publicus, belonging to the people. The word is frequently applied to any group of in¬ dividuals having a common interest in their pursuits, as the republic of letters. Its general usage, however, is as a political designation for a state or country in which the supreme power of government is vested in rulers elected peri¬ odically by those of its citizens who have ac¬ quired the right to vote. In the narrowest sense a republic is a democracy where political power rests in all the people and is wholly in their unrestricted control. It is the antithesis of a monarchy, where the power rests in one indi¬ vidual or family and is self-perpetuating through dynastic succession. Between these two extremes of monarchic and democratic gov¬ ernment are other forms, of oligarchic or aris¬ tocratic

character, where the right of partici¬ pation in the direction of public affairs is in the hands of classes or of a restricted portion of the community. Strictly speaking, these are not republics, but in history nearly all authori¬ ties agree in so regarding and placing them.

Republics may be divided into two distinct types, the centralized and the non-centralized. A centralized republic is one in which all power is deputed to and is exercised by the general government entirely independent of local au¬ thority in any of the subdivisions of the coun¬ try. France and some of the South American republics are examples of the centralized re¬ public. When the power of the general gov¬ ernment is derived, to a greater or less extent, from the local constituent bodies or states which also have independent rights and powers over which the general government has no con¬ stitutional control, we have the non-centralized republic. The Greek republics, the free cities of Germany and the United States of America are examples of the non-centralized republic.

The Earliest Republics. — In prehistoric times when men first began to feel the necessity for communal control of their affairs and inter¬ relations, government took somewhat the form that has persisted in modern times in the mon¬ archy. At the beginning this was patriarchal, as history shows us at later date among the Hebrews, the Pelasgians and other early races. The head of the family was recognized as supreme in authority, first over his immediate family and then over its branches. As the asso¬ ciated families grew in number and size and expanded into tribes, the strongest family or group of families asserted its pre-eminence by force or peacefully, by common consent, and

became the ruling power; hence the king and the dynasty. It was a reversion from this con¬ dition that led to the earliest republics of which history has anything to tell. Among the Israel¬ ites, the patriarchial or family government con¬ tinued until the time of the Egyptian serfdom. When, under Moses, the people escaped from Egypt and became again free and independent, the Israelitish commonwealth or republic was established; it lasted nearly four centuries, from 1491 b.c. to 1095 b.c. Under Moses and Joshua the government was of the consolidated and centralized type. All the people, young and old, rich and poor, male and female, had a voice in public affairs and the privilege of political preferment. This is the earliest record of choosing rulers by elective franchise. Only the priesthood was a privileged class. Laws were beneficent and wise ; a general system of edu¬ cation

was established ; the military spirit was fostered so that the nation became a strong power. Usury was illegal and interest was re¬ garded with disfavor. An agrarian law as¬ signed to each family a small acreage of land and this was made inalienable; it could not be held under mortgage or sale. Of this early stage of the republic it has been said that <(the descendants of Abraham had reached a higher state of virtue and happiness than any other nation of that period.11 Upon the death of Joshua the seeds of disintegration were sown. The different states seceded, forming independ¬ ent confederacies, although generally all were united for common defense. Dissensions arose, patriotism weakened, officials became dishonest and finally the people, whose will was still the highest law of the land, demanded of Samuel a king. Saul was anointed king in 1095 b.c. and that was the end of the Israelitish republic.

Greece. — In the Heroic Age, Greece was divided into several states or tribes, each ruled by a chief or king. It was about the time of the first Olympiad — 776 b.c-772 b.c. — that the people began to aspire to political independence, and they gradually deposed the kings, setting up chosen rulers in place thereof. At first the new governments were oligarchal, but in the course of time all of them, except that of Sparta, be¬ came democratic. The states were only loosely bound to each other and national unity was altogether lacking. Athens became foremost in the time of Thucydides and exercised a sort of sovereignty over the entire country. But after a while Sparta imposed her oligarchic system upon the other states and then again Thebes had the ascendancy. Greek civilization, Greek laws, Greek art, Greek literature, Greek patriot¬ ism, became forces that have never ceased to dominate the world. But the passion for wealth and display, local political strife and particu¬ larly jealousy between the different states and cities led to dissension and disunion. Greece came under the influence of the Persian monarchs, then was ruled by the Macedonian kings, Philip and Alexander, and finally, when in 146 b.c. the Roman legions conquered Macedonia, the last Grecian league, the Achsean, and then Athens, were completely vanquished. Succes¬ sively under the domination of Roman Empire of the East, the Byzantine Empire and Turkey, Greece, finally reunited, became an independent kingdom, under a constitutional monarchy in

1832.

Carthage. — Carthage had its beginning be¬ fore history had its records. Five centuries before Christ it flourished under rulers who were not hereditary, but who were elected bv the people. The commonwealth of Carthage was a centralized republic, unlike that of Greece and similar to that of Rome. In the Great Council of the State and in the Council of the Elders there was something of aristocracy, but on the whole the people were in control. There was a liberal administration in the interest of all citizens alike, courts of justice, banking in¬ stitutions, public libraries and schools of litera¬ ture and ’art. Carthage acquired great wealth and a high degree of civilization. Her territory was wide, extended and rich, and the city, Carthage, capital of the country, was the most superb of that day, being to the republic what Paris is to France. The prosperity of the com¬ monwealth begat its downfall. Political feuds developed and its citizens became divided into factions. Rome, grown in power, saw the op¬ portunity for revenge for earlier defeats and humiliations. Her legions swept over the coun¬ try. Carthage, the splendid city, was blotted from the face of the earth, never to reappear, and with her went every vestige of the republic of which she was the metropolis.

Rome. — Like Israel and Greece, Rome had its political beginning in peoples who were organized in families, clans and tribes. In the early Roman state a king was the ruler, partly an hereditary chief and partly an elected magis¬ trate. Naturally the kinglv office grew in im¬ portance and power until, in the time of the Tarquins, it was well-nigh supreme. Still even during this regal period the people retained much power. The inhabitants were divided into two classes, patricians and clients, and the franchise and right of office-holding were pos¬ sessed only by the former. A similar condition existed under the Etruscan kings, who ruled from the 7th century before Christ. With the deposition of Tarquin, the Proud, at the close of the 6th century before Christ, the Roman republic began and lasted until 27 b.c., nearly five centuries. Of the early years of the re¬ public little is positively known. Romance and tradition make up a large part of the story. In order to curb the growing power of the execu¬ tive office, administrative authority was vested in two elected consuls, with limited tenure of office; but as had always been, the franchise still remained in the patrician class to the ex¬ clusion of the plebeians. No sooner was the republic fully established than a struggle for power

began between the two classes and lasted for several centuries. The oatricians endeavored to establish an exclusive aristocratic govern¬ ment on the ruins of the monarchy, and the plebeians demanded a large participation in com¬ mon civic privileges. Slowly but surely the plebeians gained. Gradually the social and political barriers between the classes were broken down and by the 3d century before Christ practically all distinctions in regard to the franchise and office holding had disap¬ peared. In 200 years the Romans emancipated themselves, first from kingly and then from oligarchial domination. During these and the ensuing centuries constitutional changes were frequent, but until toward the end, generally to the enlargement of the powers of the people.

Under this republican government Rome arose to a civic distinction unparalleled at that time. The story of the city and state fills the most brilliant pages of ancient history. Her law is to-day largely the basis of law throughout the civilized world. She made herself mistress of the peninsula of Italy and then conquered the world. Her power became colossal and then her conquests proved her undoing. War made her a military nation and agriculture was neglected. The spoils of victory brought to her enormous wealth and created great fortunes for her soldiers. Inordinate extravagances followed and resultantly the condition of the poorer classes became more and more distressing. Reverence for law disappeared, many attempts were made by the aristocracy to control the power of the masses and the state became an arena on which men were merely contending for power, wealth and influence The civil war in which Marius and Sulla were the leaders was the final struggle between the aristocratic and democratic elements. Constitutional gov¬ ernment had been long forgotten and, in the general distress, all classes of citizens felt that a change of government with a strong man at the bead was the only thing that could save the state. So Sulla was proclaimed dictator in 81 b.c. In form the republic endured for 50 years more under the consulships of Pompey, Caesar, Crassus and Cicero, but it was little more than form. The dictatorship of Caesar in 48 b.c. was another step toward the end, and Rome was ready for the empire when Octavius Augustus came to the head of the state and was pro¬ claimed imperator in 33 b.c. Republican insti¬ tutions more and more faded into the back¬ ground during the life of Augustus and in all but name he was an absolute monarch. When Tiberius succeeded to the throne, Rome was an empire in reality.

Mediaeval Republics. — In mediaeval times there were the Lombard

communes, the inde¬ pendent cities of Italy, the free cities of Ger¬ many and Iceland, all of which had republican forms of government. Lombardy, in the north of Italy, . was a separate kingdom, part of the Carolingian Empire, or annexed to the German Empire until near the close of the 10th cen¬ tury. Then arose a number of independent duchies, as Mantua, Susa, Piedmont and others and several independent cities that in the 11th century became republics. Among these were Florence, Milan, Padua, Piacenza, Treviso, Modena, Cremona, Vicenza and Bologna. In them municipal organization grew up independ¬ ent of Church or empire that had heretofore dominated. Consuls were elected bv the citi¬ zens and arts, crafts and guilds had part in the control of affairs. Between these cities there was no firm federal compact, but in times of danger they formed powerful leagues for mutual defense. Although they grew in wealth, power and influence their governments were never stable. They quarreled with each other and were torn by internal dissensions, con¬ stantly shifting between the power of the people and the power of the few. The history of Florence, which remained longest the champion of constitutional liberty, is a storv of centuries of contention between the forces of democracy and oligarchy. One by one these cities finally fell before the assaults of foes, were incorpo-REPUBLICS, HISTORY OF

rated into kingdoms, _ duchies or principalities, becoming, in some instances, possessions of Austria and finally were incorporated into the kingdom of Italy. In the 10th century Genoa established a free constitution. During the next two centuries the republic increased in wealth and power. A worldwide commerce was established and many of the large cities of southern Europe and Asia came under her con¬ trol, as Marseilles, Nice, Venice and Constan¬ tinople. At the outset the constitution of the state leaned toward an aristocracy. A bitter antagonism between conservatism and democ¬ racy developed, changes of government became frequent and in 1339 the citizens elected a doge for life. Three centuries later Genoa yielded to Austria and then to France, bv the Treaty of Vienna became a tributary city of the Sar¬ dinian monarchy and ultimately a part of the Italian kingdom. Venice had an independent government in the middle of the 6th century, her rulers being called military tribunes. From 69 7 to 755 the elected chief magistrate was the doge, whose authority was well-nigh imperial. Universal suffrage existed, but during the sea¬ son

of the republic's greatest prosperity, wealth and aristocracy for the most part administered public affairs. In time the democracy demanded more rights and privileges and in the 11th and 12th centuries the strife between the aristocracy and the commonalty was determined and bitter. In 1172 the government became essentially a patrician oligarchy with constantly increasing power, and in 1298 popular elections were abol¬ ished by the Great Council. Further encroach¬ ments upon the civic rights of the people, ex¬ pensive wars with sister republics and selfish legislation of the oligarchy undermined patriot¬ ism, and for four centuries the classes fought with each other. In 1674 the oligarchy yielded to the commonalty and for another century the republic continued in varying fortune until Napoleon, in 1797, placed it under the domina¬ tion of Austria. Amalfi, on the west coast of southern Italy, was an independent citv of 50,000 inhabitants in the 9th century and the capital of a flourishing republic. Toward the close of the 11th century Amalfi was subjugated by the Normans.

Later Struggles. — The larger towns and communities of northwestern Europe gradually freed themselves from the exactions of feudal lords and became independent. From the be¬ ginning of the 12th century they established a large commercial intercourse between them¬ selves and with the rest of the world. To pro¬ tect themselves against marauders and to de¬ velop their commercial interests they formed the Hanseatic League in the 13th century. Hamburg, Lubeck, Bremen, Frankfort and Cologne were the princioal cities in this league, but city after city joined the union until it em¬ braced 85, and in power matched the strongest governments of Europe. These cities were sov¬ ereign states and, while part of the German confederation or empire, they exercised full authority in their local affairs. In the Hanse confederacy they held the Baltic in dominion and controlled the foreign commerce of north¬ ern Europe. The league lasted until 1630, al¬ though previous to that date it had been shorn of its powers: Most of the cities had been absorbed into the German kingdoms or princi¬ palities and at last only Hamburg. Lubeck,

Bremen and Frankfort remained independent. In 1813 these four became free members of the German Confederacy, but in 1866 Frankfort fell to Prussia. Hamburg, Lubeck and Bremen still retain their freedom in local affairs, being gov¬ erned by chambers of representatives elected by popular vote.

Iceland was settled by exiles from the tyranny of the princes of

Norway, Denmark and Scotland, in the 10th century and a re¬ publican form of government was established in 928. At the head was placed a supreme magis¬ trate, elected by the people and sharing author¬ ity with a general assembly. This form of government lasted for nearly 400 years and Ice¬ land attained to civilization and a measure of prosperity. But internal dissensions sprang up and civil wars devastated the island. In 1621 the National Council, by common consent of the people, invited Haco, king of Norway, to be¬ come Iceland's ruler and in 1380, again by com¬ mon consent and peacefully, the island was transferred to Denmark.

During the 10th, 11th, 12th and 13th centuries Belgium and Bavaria were split up into small dominions. In 1383 the house of Burgundy ob¬ tained control of this territory, which after¬ ward became the 17 provinces of the Nether¬ lands. Following the Burgundian rule came the long struggle with Spain, which ended in 1648 with the Peace of Westphalia, by which the in¬ dependence of the republic of the United Prov¬ inces was acknowledged by the great powers of Europe. The provinces had formally united, with William of Orange as stadtholder, in 1580. The republic continued through many vicissi¬ tudes for two centuries, the people enjoying political freedom and the nation acquiring a high degree of power and prosperity. European politics could not withhold its hand from the Netherlands, and the Dutch provinces were in constant turmoil within and engaged in war without. In 1747, through all these influences, William IV was made captain and admiral-general of the whole union and stadtholder of the seven provinces ; a little later these offices were made hereditary in both male and female lines. At the time of the French Revolution the stadtholder was driven out bv the French and the old republican forms of government re-established ; but in 1814 the people recalled the Prince of Orange from his exile in Eng¬ land and established the monarchy, under Wil¬ liam I, king of the Netherlands.

France. — The first French republic had an inglorious career of 12 years. It began with the overthrow of the monarchy in 1792 and ended with the crowning of Napoleon as em¬ peror of France, in 1804. The 12 years of this republic were 12 years of terror. A state of anarchy existed, not a state of government. It was a despotism of a democratic mob united with the despotism of a democratic dictatorship. When the passion of the hour had burned itself out and Robespierre, Marat, Danton and other leaders had fallen, France turned again to a monarchy for self-preservation. For the second time the people, in 1848, overthrew the mon¬ archy and re-established a republic. The king, Louis Phillippe, abdicated and fled to England and a new constitution was adopted, providing for a President, a council of

state and an as¬ sembly elected by popular vote. Louis Bona¬ parte was elected the first President and in 1852

by an almost unanimous vote he was accepted as hereditary emperor under the name of Napo¬ leon III. The second empire lasted for 18 years and was succeeded by the third republic in 1870, which was in stable and unthreatened existence in 1918. The defeat of France by Germany in 1870 led to the overthrow of Napoleon III and the Napoleonic dynasty. For almost half a century France, the republic, has steadily grown in wealth and power, and is reckoned as one of the strongest nations of Europe. Its govern¬ ment is a pure democracy and authority is vested in a President elected for seven years, by the Congress and a Senate and Chamber of Deputies elected by the people, the latter by popular vote and the former by an electoral body.

Switzerland. — The Swiss republic dates from 1291, when the men of Uri, Schwyz and Unterwalden entered into a defensive league. Other, cantons were added to the league until, in 1798, under the influence of France, the Helvetic Republic was formed with a regular constitution. In 1815 the perpetual neutrality of Switzerland and the inviolability of her ter¬ ritory was guaranteed by the powers of Europe. The republic is non-centralized, each canton having independent local powers. The federal government consists of a state council of mem¬ bers elected by the separate cantons and a national council elected by the people as a whole. The President and the Vice-President are elected for terms of one year by the federal assembly. Universal suffrage prevails and the compulsory referendum and popular initiative are features of legislative procedure.

Andorra. — Andorra, in a valley of the east¬ ern Pyrennees, between France and Spain, is under the joint-suzerainty of these two coun¬ tries. It was declared a free state by Charle¬ magne and has always retained its independence. It is governed by a council of 24, elected by the people, and the chief executive is a mem¬ ber of the council, elected for life by his as¬ sociates. It has a population of less than 10,000.

San Marino. — San Marino, in Italy, is the oldest existing republic in the world. It em¬ braces five villages with a population of about 11,000. The general government is entrusted to a council of 60, the chief officer being termed captain-regent.

The United States. — On the western hemi¬ sphere, with the exception of the Dominion of Canada and the smaller dependencies of Great Britain, France and Holland, every country is under a republican form of government. The United States of America is the oldest of these republics, the most extensive in territory and the largest in population. It stands among the world's greatest powers and in its influence it dominates the Western world. As a nation, the United States originated in the colonies of Great Britain that existed in the eastern, mid¬ dle and southern sections of the New World in the 18th century. The inhabitants of these colonies were mostly of English origin but they rebelled against the rule of the mother country and' united in establishing themselves as a free nation, under the Declaration of Independence in 1776. In form of government, the country is a non-centralized republic, and its constitu¬ tion and form of government have been the pattern upon which all republics have been

modeled since the beginning. The President, who serves for a term of four years, is chosen by an electoral college, the members of which are elected by popular vote in the several States and represent the State-at-large and its Con¬ gressional districts. The Senate consists of two members from each State, elected by popular vote. The House of Representatives con¬ sists of members elected by popular vote in the separate Congressional districts in the several States. There is a Federal judiciary and, in foreign relations, interstate commerce, army and navy affairs, navigation and postal service, the Federal government is supreme. Each State is wholly independent in the control of its own affairs, having a form of government like the Federal, a governor, upper and lower houses of legislation and State judiciary. The nation has had a prosperous existence. It has been en¬ gaged in wars with England, France, Mexico and Spain and passed through, 1861-65, the greatest Civil War the world has ever known. It has expanded until now it covers the north¬ ern part of the hemisphere from the Atlantic to the Pacific and from Canada on the north to Mexico on the south. At a result of the Spanish-American War, the republic entered upon a colonial policy and extended its operations across the Pacific. It acquired the Philippine Islands by the treaty of 1898 and also the islands of Porto Rico and Guam, and all

three have been held as colonial dependencies. Hawaii, whose white citizens had revolted from native monarchial rule and set up an independ¬ ent republic, was annexed to the United States in 1898 as a Territory. For centuries the island of Cuba was under the rule of Spain. Insur¬ rection followed insurrection against the Span¬ ish power, but Cuba was held fast as a Spanish colony until the Spanish-American War, of which it was the cause. In the peace treaty between the United States and Spain, Cuba was relinquished. It was temporarily held by the United States pending the establishment of a stable home government, but in 1901 this was accomplished and in the following year, with Tomas Estrada Palma at its head, free Cuba took its place as the latest republic in the world. Universal suffrage with educational qualifications prevails, and the form of federal government and methods of election follow closely those of the United States of America. In 1917 and 1918 the United States was en¬ gaged in a stupendous war against the central allied powers of Germany, Austria and Turkey. In this she was one of the allies of Eng¬ land, France, Italy, Belgium and other allied nations fighting to sustain the cause of de¬ mocracy. See War, European.

South America. — The South American reˆ publics are 10 in number, Argentine, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. Early in the 16th century Spain invaded and subjugated Peru and achieved a conquest of almost the entire ‘South American continent. For three centuries she was able to master and hold not only that portion of the hemisphere, but also the territories of Mexico and Central America and a great part of what is now the western and southwestern section of the United States. In South America she divided power only with Portugal. In the first quarter of the 19th cen-

tury most of the South American states achieved their independence and established themselves under republican forms of government. The agitation for emancipation broke out almost simultaneously in different parts of the con¬ tinent but was not always quickly or easily

successful. In 1810 the Chileans revolted against the king of Spain and a junta which met at Santiago elected the Marquis de la Plate, a native Chilean, President of the republic, but it was not until 1818 that independence was formally proclaimed. A constitution was voted in 1833. The Argentine provinces freed them¬ selves from the Spanish yoke in 1810, but were immediately embroiled in disputes and con¬ tentions among themselves. The history of the republic until comparatively recently was a record of anarchy, civil contentions and war¬ fare with European nations and sister repub¬ lics. The existing constitution was adopted in 1853. Paraguay gained its independence in 1811 and after a short period of government by two councils, the supreme power was seized in 1815 by Dr. Jose Gaspar Rodriguez Francia, who exercised autocratic sway as dictator un¬ til his death in 1840. A state of anarchy fol¬ lowed and lasted two years, after which a National Congress put two consuls at the head of affairs. The dictatorship of President Lopez followed, and in 1870 a new constitution was voted, making the country a full-fledged re¬ public. Bolivar, the liberator, began his work for freeing South America from the Spanish yoke in 1809. After alternate defeat and suc¬ cess, he finally triumphed, and in 1819 united New Granada and Venezuela as a republic un¬ der the name of Colombia. In 1832 the republic split up into Venezuela, Ecuador and New Granada, and after several changes in constitu¬ tion and in state membership, the country be¬ came, in 1886, the republic of Colombia. In 1820 San Martin, at the head of an invading army from the republic of Chile, entered Peru, drove out the Spanish authorities and pro¬ claimed himself protector. Two years later Simon Bolivar, at the request of San Martin, entered the country and was appointed dictator. Under Bolivar, Peru achieved her full free¬ dom. A succession of civil wars and constitu¬ tional changes followed during a period of over 30 years. A constitution, in the modern spirit, was proclaimed in 1856 and under it the republic has continued since. In 1825 the re¬ public of Bolivar was instituted from the south¬ ern province of Peru by Simon Bolivar and named after its founder. The constitution then formed underwent important modifications in 1828, 1831, 1863 and 1880. For nearly two centuries the territory of Uruguay was the subject of almost constant contention between Brazil and Buenos Aires. In 1828 by the mediation of England, the northern part of the territory was ceded to Brazil and the south¬ ern part was erected into the republic of Uru¬ guay, having declared its independence three years before. The constitution was established in 1830. The republic of Ecuador was estab¬ lished in 1830 as the outcome of a civil war which separated the members of the original republic of Colombia formed by Simon Bolivar upon the ruins of the Spanish kingdom of New Granada. Its constitution was

voted in 1844 and modified in 1887. Venezuela also had its

origin in 1830 in the break-up of the Bolivar republic of Colombia. The Spanish flag was cut down in this province in 1811 and the struggle against Spain was carried on until 1823, when the Spanish troops were completely expelled. The charter of fundamental laws put into force in 1830 has been several times modi¬ fied. Of all the South American countries, Brazil remained longest under a monarchy. It was an appanage of Portugal until 1815. The royal family of Portugal fled to Brazil in 1807 and establishing the throne there ; the colony was declared a kingdom in 1815. When the royal family returned to Portugal in 1821, Brazil declared itself independent with Dom Pedro, son of Dom Joao VI of Portugal, as emperor. The throne came to Dom Pedro II in 1831 and he ruled until 1889, when, by a revolution, he was deposed and, with his family, exiled to Europe. Brazil was declared a republic under the name of the United States of Brazil. In origin, in career and in form of constitutional government, the South American republics show striking similarity. The cry for liberty expressed in the French Revolution and more especially the successful establishment of the republic of the United States of America in¬ spired the patriots of the southern part of the hemisphere to the struggle for freedom. In es¬ tablishing constitutional government, they took pattern from the United States of America. Universal suffrage with age and educational qualifications prevails. The central government in each republic consists of a President and two legislative branches, a Senate and a House of Representatives or House of Deputies. Methods of electing the President and members of the Senate and the House vary somewhat, but di¬ rectly or indirectly adhere to the principle of the rule of the people. The states or prov¬ inces that constitute each republic generally have full freedom in their local affairs, although in several republics federal officers have more or less control. Theoretically, most of the South American governments are non-centralized re¬ publics. Practically the federal government is a strongly centralized power. The population may be broadly divided, as far as government is Goncerned, into two classes, the illiterate, ignorant and indifferent and the educated and enlightened, among whom are to be found lead¬ ers ambitious and turbulent. Consequently the history of these governments has been almost uniformly a story of intrigue, revolution, sanguinary civil war and domestic upheaval. Presidents have held themselves in power by bayonets, usurpers have arisen supported by the army and dictators have ruled under the name of presidents and nominally so elected.

Central America. — The Central American republics are Costa Rica, Guatemala, Honduras, Nicaragua, San Salvador and Panama. Central America, after freeing itself from Spain in 1821, until which time it was known as the kingdom of Guatemala, was attached to the kingdom of Mexico. In 1823 Guatemala, Hon¬ duras, Nicaragua and San Salvador formed an independent federal union, under the name of the United States of Central America. Subse¬ quently the states dissolved this alliance and became independent, Guatemala in 1847, Hon¬ duras in 1839, Nicaragua in 1858, Costa Rica in 1829 and San Salvador in 1853. These repub-

lies are republics in little more than name. Each has a constitutional government and theoretically possesses popular suffrage. In form the federal authority consists of a Presi¬ dent and two legislative houses. In fact, the government is always in the hands of a few strong men who exercise autocratic power. Revolutions are frequent, the factions resort to arms whenever desire or opportunity impels and there is frequently no security of life or property. Panama, which may, perhaps, be con¬ sidered as belonging almost as much to South America as to Central America, was originally part of the republic of Colombia. When the latter country hesitated in coming to an under¬ standing with the United States in regard to the construction of the Panama Canal in 1903, the department of Panama seized the oppor¬ tunity to secede from her associate. There was a bloodless revolution of a few days. Panama declared itself an independent republic and was recognized at once by the United States. She is now practically under the protection of the United States. See Panama.

West Indies. — In the West Indies is an island on which there are two nominal re¬ publics, known as the Black Republics. Hayti, governed first by Spain and then by France, became free in 1793. First the free colored population gained the franchise in 1791 and then all the negroes in 1793 under the leadership of Touissant l'Ouverture acquired freedom. In the last century the island had varying for¬ tunes, sometimes under English, French or Spanish domination, being twice an empire and several times a republic. San Domingo Republic, on the eastern end of the island, was estab¬ lished in 1844. The government is in the hands of an elected President and two legislative houses, but control of affairs is constantly being changed by revolutions and the setting up of dictatorships. The republic of Hayti, on the western end of the island, has a similar his¬ tory, under a like form of government pro¬ claimed in 1867. In both republics the govern¬ ment is in the hands of negroes and mulattoes who constitute almost the entire population.

Mexico. — From the time that Cortes con¬ quered Mexico, 1519-21, that country remained in the hands of Spain for three full centuries. Finally in 1810 rebellion broke out and after 11 years' struggle, Iturbide, the liberator, was proclaimed emperor. Upon the deposition of Iturbide, the army organized a republic. For nearly half a century there was only the merest semblance of government of any kind. The

history of the period is a record of anarchy, intrigue, revolution, military leaderships and dictatorships. In 1857 a constitution was formed, but the existing condition of internal disorder did not terminate. The French made war against Mexico and Maximilian was cre¬ ated emperor by a provisional government in 1862. Upon the execution of Maximilian in 1867 the republic was more firmly established, but it was not until as late as 1878 that under Porfirio Diaz the country became settled. In 1911 a revolution broke out against the Diaz government and a bloody civil war followed for nearly five years, finally terminating in the triumph of the Constitutional party under Carranza who became Constitutional President. (See Mexico — History). Mexico is a federa¬

tive republic, divided into states, each of which manages its own local affairs, while the whole are bound together by fundamental and con¬ stitutional laws. The powers of government are exercised by a President, Senate, House of Representatives and judiciary.

Africa. — On the western coast of Africa is the republic of Liberia which represents an attempt made by American philanthropists to prove the capacity of the negro race for self-government. Founded in 1820 by the American Colonization Society, it was organized as an independent state in 1847 and acknowledged first by England and other nations of Europe and by the United States in 1861. The constitution of the republic is copied from that of the United States and the right of suffrage is inalienable to every male citizen who owns real estate. As no white man can be admitted to citizenship and as none but citizens can hold real estate, the republic is in absolute control of men of the African race. It is a fairly prosperous country but is heavily loaded with debt and has been constantly torn by political disorder. Executive power is vested in a President and legislative power in a Senate and House of Representatives. In the southern part of Africa the Boers of Dutch origin founded two republics. The Orange Free State was established by Boers who in 1836 and following years quitted Cape Colony in order to separate themselves from British rule there. In 1854 the independence of the republic was declared and a constitution proclaimed. The legislative authority is vested in a single popular assembly elected by the suf¬ frage of adult white males having property qualifications. The President is elected by uni¬ versal suffrage. Similar to the history of the establishment of the Orange Free State is that of the South African Republic, known also as the Transvaal. It was formed by Boers who moved from Cape Colony and Natal and in 1852 its independence was acknowledged by Great

Britain. A constitution was adopted in 1858. There was never lasting peace between the Transvaal and its British neighbors to the south. In 1877 the country was annexed to Great Britain, but the Boers gained their free¬ dom again under the treaty of 1881. Great Britain acquired suzerainty over the foreign relations of the republic in 1884. Friction be¬ tween the two countries continued unceasingly and finally culminated in open war in 1899 which resulted in the defeat of the Boers and the addition of the republic to the South African possessions of Great Britain.

George Edwin Rines.

REPUDIATION, a term signifying the refusal of a national or State government to pay pecuniary obligations, especially bonds or other evidences of borrowed money. Nearly all lead¬ ing countries have, at some time in their his¬ tory, repudiated indebtedness. England has never repaid money borrowed for public uses from a Florentine merchant by one of the Ed¬ wards, and prominent London bankers were ruined when Charles II confiscated their funds deposited in the royal exchequer. France re¬ deemed the paper money called assignats at one-thirtieth of its value. The United States failed to redeem the Continental currency. In the disastrous financial period of 1840 and sev¬ eral subsequent years, the States of Illinois,

Indiana, Pennsylvania, Maryland, Mississippi, Michigan and Louisiana suspended payment of interest on their debts incurred in promoting public improvements, but all of them, except Michigan, Mississippi and Louisiana, eventually fulfilled their obligations as to the capital of the debt. Governor McNut of Mississippi advocated ˆrepudiating the sale of certain of the State bonds,® on account of alleged fraud and ille¬ gality in the issue, and this was the origin of the popular use of the term <(repudiation® as ap¬ plied to that course on the part of a State. The legislature of Mississippi refused to accept the governor's suggestion, but while the bonds were not formally repudiated, they were not re¬ deemed. Michigan provided for the repayment of money actually received, repudiating obliga¬ tions shown to have been

issued without a fair equivalent, even although in the hands of in¬ nocent parties. Louisiana paid her creditors in depreciated State bonds. Minnesota refused to honor certain railroad bonds guaranteed by the State, in 1858, claiming that the railroads had failed to comply with the conditions on which the guarantee was given. The question of pay¬ ing this indebtedness was agitated for many years, and finally in 1880 Minnesota com¬ promised by agreeing to pay 50 cents on the dollar.

After the Civil War the Southern States fell largely under the rule of unscrupulous poli¬ ticians known as ((carpet-baggers,® intruders from the North took advantage of the prostrate condition of the Southerners, and inflicted much wrong and injustice. Obligations were issued for which no reasonable equivalent ever reached the State treasuries, and the impoverished com¬ munities, when the native whites obtained supremacy again, found themselves deeply in debt. Georgia, Virginia, North Carolina, South Carolina, Florida, Alabama, Mississippi, Louis¬ iana, Arkansas and Tennessee either scaled their debts to a figure which represented value received, or refused to pay obligations alleged to be tainted with injustice and corrpution. In all, the Southern States scaled down their in¬ debtedness from about $235,000,000 to a little more than $100,000,000. While there was rough justice in these reductions, yet the natural re¬ sult was that foreign investors were shy of State securities for many years. Cities and towns of the United States have sought at times to repudiate a portion of their debts, and in case a city actually is bankrupt, it is not clear how the debt can be collected. Under the 11th Amendment to the national Constitution, States cannot be sued by individuals, and creditors are, therefore, powerless to attempt collection in the courts.

Spanish-American republics, with some hon¬ orable exceptions, have persistently ignored their financial obligations. An attempt by France, England and Spain, to collect debts due by Mexico, was the cause, or more correctly the excuse, for the illfated effort to establish an empire in Mexico, with Maximilian on the throne. Since the growth of Mexico in pros¬ perity and position among the nations, under the beneficent despotism of Diaz, the Mexican government has voluntarily taken steps to meet its financial obligations.

REPULSION, in physics, the force which impels certain bodies or their particles to re¬

cede from each other. Apparent repulsion ex¬ ists when there is a

greater attraction else¬ where. No repulsion exists between bodies at sensible distances, except when they are in cer¬ tain electric or magnetic states, in which case the repulsions between them are in the inverse ratio of the square of the distance. At in¬ sensible distances, some influence keeps the particles of a body from being in absolute con¬ tact, whence results the phenomenon of elas¬ ticity. The motions produced by heat are also a cause of strong molecular repulsion. The molecules of gases are always in a state of mu¬ tual repulsion. Compare Attraction ; Magnet¬ ism.

REPUTED OWNERSHIP, in law, is a phrase used of one who has to all appearances the right and actual possession of property. ((The false credit raised by a person exercising all the rights of ownership over a subject not his own has led to the adoption of the rule that the creditors of the reputed owner may take the subject as if it were his own.® See Bank¬ ruptcy Law.

REQUEfNA, ra-ka'na, Spain, town in the province of Valencia, 40 miles west of Valencia. The remains of the tower of the ancient church of San Salvador ; the castle towering above Las Cabrillas (a prominent summit), and the ruins of walls which formerly surrounded the city, are the chief points of architectural interest. The chief industry consists in the culture of silk, saffron, grain, fruit and wine. Pop. 14,500.

REQUEST, Letters of, (1) in law, a writ¬ ten request by one court asking another court in a different jurisdiction for assistance in per¬ forming a judicial act, as to enforce a monition, execute a judgment or the like. They are used in the United States in admiralty practice. They have been superseded to some extent, both in the United States and England, by commis¬ sions for taking evidence. (2) In ecclesias¬ tical law, a written request to send a cause to another court. Usually letters of request lie only in cases in which an appeal would be proper.

REQUIEM, re'kwi-em, the Roman Catho¬ lic mass for the dead, named from the first word of the Introit ((Requiem ceternam dona eis, Domine .® While the term covers the entire mass it is more distinctively employed to desig¬ nate the musical setting for the mass; and in common usage has come to mean a musical serv¬ ice or hymn for the dead. Among the most famous musical settings for the Requiem mass are those of Palestrina, Vittoria, Mozart, and two by Cherubini and Verdi.

REREDOS, rer'dos, in church architecture, usually the screen back of the altar, which is adorned with sculptured work comprising the

tabernacle, niches, statuary and the like ; in some great cathedrals, for example, in England, the cathedrals of Durham, Winchester and Saint Albans, the reredos is a mass of most elaborate carving which reaches nearly to the graining.

RES JUDICATA, rez joo-di-ka'ta, a law term meaning that the subject matter of an ac¬ tion has been already decided by a court of competent jurisdiction. A matter so decided cannot again be made a ground of action be¬ tween the same parties.

RES AC A, ra-sa-ka, Battle of. While the armies of Generals Thomas and Schofield were threatening an advance from the north on Dal¬ ton, Ga. (q.v.), General Sherman ordered Gen¬ eral McPherson, commanding the Army of the Tennessee, to move southward through Snake Creek Gap and interpose between Dalton and Resaca. McPherson moved from Gordon's Springs, 8 May 1864, his advance bivouacked that night in the Gap and next morning pushed through it, defeated a brigade of Confederate cavalry at the eastern end of it, and approached to within a mile of Resaca, on the Oostanaula, where he found the enemy in position too strong to be attacked ; and being unable to find a good road by which he could quickly reach the railroad, north of Resaca, and fearing an attack upon his own left flank, he prudently withdrew, after some severe skirmishing and took a strong position near the east end of Snake Creek Gap. Sherman now resolved to transfer the greater part of his army to join McPherson. Howard's Fourth corps and a small force of cavalry were to demonstrate on Buzzard Roost Gap and occupy Confederate at¬ tention north of Dalton. On the 10th Hooker's 20th corps moved through Snake Creek Gap and joined McPherson. Palmer's 14th corps and Schofield's 23d corps followed, and on the 12th the whole army ex¬ cept Howard's corps and the cavalry with it, was through the Gap. On the morning of the 13th McPherson, preceded by General Kil¬ patrick's cavalry, led the advance on the direct road to Resaca. Thomas, with the corps of Palmer and Hooker, was to move on McPher¬ son's left, and Schofield on the left of Thomas. The country

was covered by dense forest, and the movement of troops was difficult. Kil-patrich drove the Confederate calvary to within two miles of Resaca, and was wounded, and his cavalry wheeled out of the road, allowing Mc¬ Pherson to pass, who, encountering the Con¬ federate pickets near Resaca, drove them in and occupied a range of bald hills, his right on the Oostanaula, about two miles below the railroad bridge, and his left abreast the town. Thomas came up on McPherson's left and faced Camp Creek. Schofield worked his way through dense forest and came up on the left of Thomas, but it was noon of the 14th when these move¬ ments were completed, at which time Howard's Fourth corps, following Johnston from Dalton, had reached a position about a mile north of Schofield's left. Johnston abandoned Dalton about midnight of the 12th, and during the 13th formed his army covering Resaca, Polk's and Hardee's corps west of the place, facing west and covering the railroad bridge and a trestle bridge. Polk rested his left on the Oostanaula, and Hood's corps on the right of Hardee's ex¬ tended across the railroad to the Connesauga, facing to the northeast. Wheeler's cavalry was on the right, and Jackson's cavalry on the left guarded the Oostanaula from Resaca to Rome. There had been severe skirmishing on the after¬ noon of the 13th between the troops of Mc¬ Pherson and Polk, and it was renewed on the morning of the 14th, and in the afternoon Mc¬ Pherson carried a bridge on Camp Creek, crossed it and secured a commanding position very close to Polk's main line and intrenched. Confederate efforts to retake the position were repulsed. Farther to the left Palmer's 14th

and Schofield's 23d corps' became engaged with Hardee on Camp Creek; parts of Schofield's corps were repulsed with great loss, another part succeeded in making a lodgment beyond the creek. Two divi¬ sions of Howard's corps coming in from the north were sent to Schofield's support, leaving Stanley's division in echelon to the left. Hooker's corps was sent to the left. Johnston had noted the exposed position of Sherman's left and ordered Hood, with the divisions of Stewart and Stevenson to attack and turn it. Late in the afternoon Hood attacked Stanley, outflanked him and was dirving him back, when the advance of Hooker's corps, Williams' divi¬ sion, came up, repulsed Hood and drove him back to his intrenchments. Skirmishing was re¬ sumed along the entire line on the morning of the 15th, and Sherman ordered an advance of Hooker on the left, and the two divisions of the 23d corps were withdrawn from the centre and marched to the extreme left in sup¬ port. It was after noon when Hooker ad¬ vanced, Butterfield's and Geary's divisions on the right and centre, and Williams' on the left. Hood, with the divisions of

Stevenson and Stewart, supported by three brigades from Polk's and Hardee's corps, made a simultaneous advance from his works. Stevenson on his left was struck first by Butterfield and then by Geary, before he had gone far from his works, and after a severe fight was driven back to them, leaving a four-gun battery in advance of his line, which remained between the two lines until night, when it was secured by a detach¬ ment of Geary's division. On Hood's right Stewart's division swung to the left, drove Wil¬ liams' skirmishers from the railroad and, cross¬ ing, assaulted Williams' main line most vigor¬ ously, but was bloodily repulsed and fell back to its intrenchments. A part of Schofield's corps on Hooker's left took part in this en¬ gagement. Hooker's loss was over 1,600. On the 14th Sherman had ordered a pontoon-bridge to be thrown across the Oostanaula at Lay's Ferry, in the direction of Calhoun, and Sweeny's division of the 16th corps was ordered to cross it and threaten Calhoun. Sweeny crossed one brigade, drove some Con¬ federate cavalry from the opposite bank, then hearing that the Confederates were crossing above him, he withdrew the brigade and retired his entire division half a mile to a less exposed position. On the morning of the 15th he moved back to the river and crossed it, laid a pontoon-bridge and constructed works. Here he was fiercely attacked by Walker's Confederate divi¬ sion, which was repulsed. The presence of a part of Sherman's army east of the Oostanaula determined Johnston to retreat, and that night he abandoned Resaca and marched for Calhoun. Sherman occupied Resaca on the morning of the 16th and started in pursuit. The Union loss at Resaca was about 600 killed and 2,147 wounded. The Confederate loss was about 300 killed, 1,500 wounded and 1,000 missing. Con¬ sult (Official Records } (Vol. XXXVIII) ; Cox, (Atlanta) ; Van Horne, (History of the Army of the Cumberland) (Vol. II) ; Sherman, Per¬ sonal Memoirs) (Vol. II) ; The Century Com¬ pany's (Battles and Leaders of the Civil War* (Vol. IV); Johnston, 'Narrative of Military Operations.)

E. A. Carman.

RESACA DE LA PALMA — RESERVATION

RESACA DE LA PALMA, ra-sa/ka da la pal ma, Battle of, in the Mexican War (q.v.). After the battle of Palo Alto (q.v.), 8 May 1846, the Mexican general Mariano Artista fell back on the road to Matamoras and took posi¬ tion in a ravine called Resaca de la Palma (Palm Ravine) in Cameron County, Tex., four miles north of Brownsville. Having been re¬ inforced by 2,000 men, bringing his army up to about 6,000 infantry and 800 cavalry, he deter¬ mined to resist the further advance of Gen. Zachary Taylor (q.v.) and the American army of about 2,200 troops. About noon of 9 May, having sent his wounded back to Point Isabel, Taylor began his advance and came upon the Mexicans, strongly intrenched in the ravine which forms a natural breastworks, defended in front by artillery and well secured in the rear against the possibility of being flanked. On the road along which the Americans must approach the Mexicans had established a three-gun bat¬ tery so as to rain a shower of grape-shot on the advancing enemy. Perceiving that the severest struggle must take place on this road, Taylor, after sending some troops into the chaparral on either side of the road, ordered Capt. Charles A. May with a squadron of dragoons to take the battery. Though the Mexican shot tore his ranks to pieces, May gallantly executed this task, drove the Mexicans from their guns and captured General La Vega, but was gradu¬ ally being driven back by superior numbers when Taylor ordered the 5th and 8th infantry to charge. This decided the battle ; the Mexi¬ cans fled from their positions and were put to total rout, the pursuit being halted only at the river. Taylor might have entered Matamoras at once but took time for his troops to recover from their labors and did not enter the town until the 1 7th, without encountering any resist¬ ance from Arista. Taylor's loss was 39 killed and 83 wounded, while the Mexican loss is variously stated, though it probably was be¬ tween 500 and 600. Taylor then remained prac¬ tically inactive until he had fought the battle of Monterey (q.v.). Consult Executive Doc¬ uments^ 30th Congress, 1st session, Vol. VII, No. 60, pp. 293-296; Montgomery, H., (Life of Taylor, > pp. 141-187; Howard, (Life of Taylor, > pp. 119-130; Bancroft, H. H., Mexico,5 Vol. V, chap. XIV ; Ladd, H. O., (The War with Mex¬ ico, J pp. 59-69; Wiley and Rines, (The United States, > Vol. VII, pp. 197-200.

RESCISSION, re-sish'un, a legal term designating the act of rescinding or abrogating a voidable contract, that is, a contract in force but which owing to some injustice, infirmity or demand of justice or public policy may be an¬ nulled, and refers to the dissolution of the con¬ tract through the will of the parties involved instead of through an action in court, in which case the term "cancellation® is employed. The rescission may take place through the inclusion of a clause

providing for it in the contract; through evidence of fraud practised when the contract was made; inadequacy of considera¬ tion through the employment of fraud; the exercise of undue influence, as resulting from confidence and friendship, the relation of hus¬ band and wife, parent and child, principal and agent, trustee, executor or administrator and heir or legatee; mistake in drafting the con¬ tract, or misunderstanding of the terms em¬

ployed, or want of authority on the part of an agent or officer ; the contractors of minors on the application of the minor, and of people insane or under the influence of intoxicants, or made under duration or stress; failure of one of the contracting parties to perform his part of the contract, either through inability or refusal ; failure of consideration, or non-existence of sub¬ ject matter, but not through depreciation after the consummation of the contract; and, in the case of a selling contract, the discovery before transfer of possession, that the purchaser in¬ tends making illegal use of the purchase. In¬ surance policies cannot be rescinded by either party without the consent of the other unless the right of rescission be included in the policy. The right to rescind belongs only to the party without fault. The act of rescission may be effected by an act of party, notifying the other of intention; or by an act in equity in order that the instrument may not later be used to the annoyance or disinterest of an innocent party. Right to rescind is lost through unreasonable or inexcusable delay, or by an act at law to recover damages ; but an action in court for recovery of damages or property may follow rescission. The party rescinding must place the other in statu quo; he may not rescind and retain the benefits derived from the contract; and no rights received through it remain upon its rescission.

RESCRIPT, the term applied in Roman law to the answers of popes and emperors to ques¬ tions in jurisprudence propounded to them offi¬ cially. The rescripts of the Roman emperors constitute one of the authoritative sources of the civil law. These were usually addressed to the provincial magistrates, to corporations or even to individuals. The rescripts of Justinian admitted into the code have acquired great authority. The rescripts of the popes of Rome are still referred to as fundamental in Catholic theology.

RESCUE, (1) in law , the forcible setting at liberty of a person or thing in legal custody. The punishment varies, depending on the cir¬ cumstances. In the case of persons, the res¬ cuer was formerly held to be guilty of the same degree of crime as the prisoner if the former

knew the prisoner was in lawful custody at the time. (2) In international law, the retaking of a prize by the persons taken with such prize.

RESCUE, or SCHRADER'S BROME GRASS. See Grasses in the United States.

RESECTION, in surgery, the operation of cutting out the diseased bone of a joint. It frequently obviates the necessity of amputating the whole limb, and by the removal of the dead parts leaves the patient a limb which, though shortened, is in the majority of cases better than an artificial one. Resection, which is one of the triumphs of modern surgery, became a recognized form of surgical operation in 1850.

RESERVATION, in law, (1) the with¬ holding of an interest in property granted, or the interest so withheld. (2) Notice that speci¬ fic rights are retained. (3) That part of a deed in which the vendee reserves an interest in the property granted. A reservation must be care¬ fully distinguished from an exception. The latter denotes a specific part of land not con¬ veyed by the grantor, while a reservation de-

notes that the grantor reserves a right in land which he has conveyed. This right cannot be granted to any one but the grantor of the land. A reservation may be of a life estate or even a right of fishing. (4) In the United States the withholding of certain territory, as for public uses, or the territory so held.

RESERVATION, Papal, of Benefices,

the taking of the bestowal of certain Church benefices and dignities out of the hands of the local church rulers and the attribution to the Roman Pontiff of the right to confer the same; or, what amounts to the same thing, the requir¬ ing of bishops, chapters and other persons or ecclesiastical bodies possessing the right of con¬ ferring benefices, that in case of vacancies they should bestow such benefices on persons

nom¬ inated by the Pope. One reason alleged in favor of this practice was that thus the several national churches were linked more closely by personal ties of gratitude and affection to the central see, and through it to each other; an¬ other was that thus the Supreme Pontiff was provided with the means of rewarding those who had labored meritoriously in the cause of the Holy See and the Church Catholic.

RESERVATION OF THE EUCHA¬ RIST, the keeping of the sacramental species against emergent occasions, as the communion of the sick in their homes, for the Mass of the Presanctified on Good Friday, for the rite called Benediction of the Blessed Sacrament and for the perpetual adoration. Mention is made in authors of the times immediately following the Apostolic Age, of the custom of the bishops sending to one another the Eucharist in token of Christian union and fraternity. Saint Am¬ brose (4th century) tells of the Eucharist being carried by lay persons ; in the Middle Ages this custom was still in vogue. Thomas a Becket carried the Eucharist with him when he went to meet Henry II and Saint Louis carried the sacred species with him on his Crusade. The sacred host is now customarily reserved in all Catholic churches whether of Latin or Oriental rite, being kept usually in the tabernacle of the high altar in the Latin Church and in Greek churches in a special receptacle, artophorion, behind the altar ; whenever it is reserved a lamp is kept ever burning before it.

RESERVATIONS, Game. See Game

Preserves.

RESERVATIONS, Indian. When the settlers from Europe came to realize that the Indians had human rights, and ought not to be enslaved or exterminated, the rule was gener¬ ally adopted of confining the tribes to reserva¬ tions, both for their own protection from un¬ principled whites and for the security of the white population. New York, Massachusetts, Connecticut, Rhode Island and other States en¬ forced this policy in the colonial period and after independence, and the United States gov¬ ernment has carried it out from an early date. Southern tribes east of the Mississippi were removed to the Indian Territory, designated by solemn pledge of the national government as a permanent home for their race, and there some of the tribes have achieved a high degree of civilization and gained considerable wealth. They are largely intermarried with whites and to some extent with negroes, whom they for¬ merly held as slaves. Other tribes, chiefly from

the Southwest, have been gathered into the Indian Territory, but large Indian reservations, mainly of Sioux, are still maintained in the Northwest, and altogether the various tribal reservations in the different States and Terri¬ tories number about 185. The reservations are carefully guarded against intrusion by unscru¬ pulous whites, and provision is made for the intellectual and physical welfare of the Indians and for leading them to adopt civilized methods of self-support, instead of depending on the chase which now offers only the most precarious re¬ turns, or on government aid, which, however, is not withdrawn under any circumstances while an Indian is in need of it. The sale of intoxi¬ cating liquor to Indians is severely punished when detected, but the law is frequently evaded.

In 1917 the Indian population, as returned by the leading States having reservations, was as follows: Oklahoma, 119,108; Arizona, 44,617; South Dakota, 26,246; New Mexico, 20,853; California, 15,362; Minnesota, 11,777; Montana, 11,525; Washington, 11,181; Wisconsin, 10,216; North Dakota, 8,903; North Carolina, 8,118; Nevada, 7,944; Oregon, 6,612; New York, 6,272. No other State had as many as 4,000.

RESERVATIONS* Military. The United

States government maintains military reserva¬ tions in all the States and dependencies. Very many of these are used for rifle ranges ; others for barracks, training grounds, cemeteries, forts and arsenals. They were extensively utilized for the war in 1917, and in many cases new lands have been acquired for military training. See Reserve.

RESERVE, in military affairs, has several significations. In battle the reserve consists of those troops not in action, and destined to sup¬ ply fresh forces as they are needed, to support those points which are shaken and to be ready to act at decisive moments. Napoleon’s guards, and his disposition of them, are models. They often decided the victory when the enemy felt sure of success. The reserve of ammunition is the supply of warlike stores placed close to the scene of action to allow of the supply actually in the field being speedily replenished.

The term reserves is also applied to those forces which are liable to be called into the field on great emergencies, for the purposes of national defense; which have received a military training but follow the ordinary occupations of civil life and do not form part of the standing-army. Such reserves now form a part of all national troops organized on a great scale. They are entitled to wear ˆU.S.R.®, on their

uniforms.

In 1917 the United States army began to establish reserve officers' training camps, and by 1 Jan. 1918 had issued more than 60,000 officers' commissions from these camps. A third series of such reserve officers' camps was started January 1918. (See Reservations, Military). The United States naval reserve force was authorized by Congress, 29 Aug. 1916. Only citizens are enlisted; the pay is $12 a month minimum. The fleet naval re¬ serve is composed of retired naval officers and men who receive retainer pay of $50 per an¬ num and upward, being liable to be called upon to serve at their former rank. The naval re¬ serve is composed of ex-merchant marine men who are liable to be called to duty either

RESERVOIR

in the regular navy or on auxiliary vessels. They receive a small retainer pay, varying with their previous earnings. There is also a naval auxiliary reserve, made up of officers and men who have been listed by the Navy Department as desirable for enlistment. The naval coast defense reserve is composed of owners and operators of yachts, motorboats, or men who are familiar with coasting, radio work, handling mines and torpedoes, *etc.* The naval reserve flying corps is operated on similar lines and is open to men who understand something of avia¬ tion. There is also a medical reserve corps connected with the navy.

RESERVOIR, a large and commodious receptacle for storing water for any purpose, but more commonly for supplying cities and towns, feeding canals, driving machinery and the like. A dam differs from a reservoir in that the name applies only to the artificial structure that holds back the water, while the reservoir includes also the entire artificial lake and its appurtenances. The construction of a reservoir is of much importance and requires great engineering skill. In the selection of a site the great object should be to choose a posi¬ tion which will give the means for collecting a large supply of rainfall with as little recourse as possible to artificial construction. An ad¬ vantageous site would be, for instance, in the narrow gorge of a valley through which a stream passes, and at a place where the gorge widens out on the side looking toward the source of the stream. Particular care, however, is necessary to discover whether the position chosen communicates with the courses of under¬ ground waters or springs, as disastrous results have frequently been occasioned by ignoring this. As a general rule the best and safest method is to establish reservoirs in valleys filled in with clays derived from the decomposition of the primary formations, which are very slightly permeable. The embankments or dams may be constructed either of masonry or earthwork, the latter being generally the more economical method. Where the reservoir requires to be constructed on perfectly level ground the exca¬ vation should be calculated so as to equal the embankment. The earthwork of dams should be as much as possible of material — such as a mixture of clay and gravel — which would,

resist the infiltration of the water; but as it is im¬ possible always to obtain such material in suffi¬ cient quantities, engineers have recourse to what is termed a puddle-wall , formed in the middle of the embankment. This wall is constructed of well-worked clay, the foundation of the puddle being a trench dug down to impervious rock or clay, and its breadth should be on an average about one-third the height of the em¬ bankment. The inside slope of the embankment is usually 1 perpendicular to 3 horizontal, some¬ times it is steeper; the outside slope may be 1 perpendicular to 2 horizontal ; and the height above the surface of the water is often 4 to 7 feet. The earthwork ought to be con¬ structed of thin layers, carefully rammed so as to secure their equal settlement; the inner face requires to be protected by stones in order to resist the action of the water. The waste-weir, to admit of the surplus water flowing over, should be from 4 to 6 feet below the surface line of the embankment, built of strong

mason-work and of a width such that with a flow of 2 feet over the crown it should be able to discharge all the water brought down by the severest floods ever known to fall upon the basin supplying the reservoir. Many of the accidents that have occurred were due to defi¬ ciencies in the waste-weirs. In the reservoirs of which the dams are built of masonry there is no necessity for a waste-weir, as then the water may be allowed to overflow the wall, there being no fear of its endangering the work. The outlet at the bottom, by which the water to be used is drawTn off from the reservoir, may consists either of a tunnel, culvert or iron pipes provided with suitable sluices, and these should be so constructed that access may be had to them even when the reservoir is full.

The true principles for the proportioning of masonry dams were not thoroughly investigated until about the middle of the 19th century and subsequently. This was first done by French engineers, and many such dams have since been constructed in France, Algeria, the United States, *etc.* The highest of all such dams is that of the New Croton reservoir, New York, its height being 248 feet ; thickness at bottom, 185 feet; at top, 16. The first great masonry dam built in France on the newer principle was that of Furens (1860-65); height, 184 feet; thickness at bottom, 162; at top 11. San Mateo reservoir dam near San Francisco is 170 feet high; thickness at bottom, 176; at top, 20. The Periyar dam, India (1890-95), has a height of 173 feet; bottom thickness, 139; top, 12. In the famous reservoir of Alicante, Spain, execu¬ ted 1579-94, the wall is 67 feet thick at the top, 112 feet at the bottom, and the height 141 feet. In England the preference is

generally given to earthen dams. Sometimes natural lakes are used as reservoirs, instances of which are Loch Katrine, for the water supply of Glasgow, and Lake Thirlmere, in Cumberland, for the supply of water to Manchester. Distributing reservoirs for towns are generally built of masonry, but sometimes largely of steel. Reinforced con¬ crete is now generally favored. They ought to be placed high enough to command the highest part of the town, and ought to be capacious enough to contain half a day's supply, their chief use being to store the surplus water during the night. Among notable modern storage res¬ ervoirs for towns are those of the Vyrnwy, for supplying Liverpool, containing 11,900 million gallons; Vehar (10,800 million gallons), for Bombay; San Mateo (31,000 million gallons), for San Francisco; and the New Croton (32,000 million gallons), for New York. See Dams; Roosevelt Dam ; Irrigation.

RESHT, resht, Persia, capital of the prov¬ ince of Ghilan, 150 miles northwest of Teheran, near the Caspian Sea, and with a port at En-zeli. On the highway of commerce and travel between Europe and Persia, its geographical position has a special significance. There is an extensive manufacture and trade in silk. Pop. about 40,000.

RESIDENCE, the place which a man re¬ gards as his home, even although he may be absent from it for long periods of time. In the United States the question of residence is of the greatest importance, involving citizenship, the right to vote, to sue at law, marital relations,

questions of taxation and of the disposition of property by will or inheritance. It has, there¬ fore, frequently engaged the attention of the courts, and the decisions have not been uniform. As a rule a man is assumed to reside where his family have their home, provided he is not separated from them by law, and provided they have not refused to accompany him to a fitting residence elsewhere. When a man has a sum¬ mer and a winter home, the question of resi¬ dence is usually determined by his personal declaration, and his payment of personal taxes in the place which he elects to call his resi¬ dence. Courts regard with suspicion and dis¬ favor change of residence for the obvious

pur¬ pose of evading the laws of the State left, or of escaping taxation. Yet the man or woman who travels a great deal has an undoubted right to declare some place as his or her home and residence for all legal purposes. While the privilege may be, and doubtless is, often abused, yet the condition continues that residence is very largely a matter of where the individual declares it, provided he regularly spends a por¬ tion of his time there. See Domicile.

RESIDUE, in law, that which remains of an estate after all debts, legacies, and expenses are paid. If no residuary legatee is mentioned in the will, the residue goes to the next of kin.

RESIN. See Rosin.

RESIN WEED. See Compass Plant.

RESISTANCE, Electrical, that property of electrical conductors in virtue of which the passage of a current of electricity through them is necessarily accompanied by the dissipation of a part of the energy in the form of heat. It is manifested not only in a linear conductor like a wire, but also in solids of large extent in two or three dimensions, as when a current passes from one point to another of a sheet of metal, or of a mass like an ingot or casting. It is chiefly in connection with wires, however, that electrical resistance is of practical import-

ally dissipated in the form of frictional heat, and the energy of the moving current of elec¬ tricity is similarly dissipated on account of the electrical resistance of the conductor through which .it is passing. The unit in terms of which electrical resistance is measured is the ˆohm,ˆ which may be taken as sensibly equal to the resistance of a column of mercury 106.3 centi¬ meters long and one millimeter in cross-section, at the temperature of freezing water. (The Britsh Board of Trade specifies that the mer¬ cury column shall be 106.3 centimeters long and that it shall have a mass of 14.4521 grammes. This is supposed to be identically the same definition, but it is more convenient for practical work, because in reproducing the ohm by means of a mercury column a glass tube would be filled with mercury and the sectional area of the column would be deter¬ mined by weighing). (See also Units). The phenomena of electrical resistance have been studied, both mathematically and experi¬ mentally, by many eminent physicists ; but the most important contributions to our knowl¬ edge are due to George Simon Ohm (for whom the ˆohrn® was named), and to James Prescott Joule. Ohm investigated the

manner in which the flow of electricity through a con¬ ductor depends upon the resistance of the con¬ ductor, while Joule determined the law that governs the dissipation of energy from a con¬ ductor, in the form of heat. In the present article it will be assumed that the currents in the conductors are steady, that the electro¬ motive forces in the circuits are constant and that the conductors are stationary (so that their coefficients of induction remain constant). The laws of Ohm and Joule may still be ap¬ plied, though in a somewhat more generalized form, to conductors in which these three con¬ ditions are not fulfilled; but for the proper understanding of the phenomena in such cases, it is necessary to refer to the more advanced treatises on electricity.

ance, and it is only in this aspect that the subject will be here considered.

The passage of a current of electricity through a wTire or rod has been likened to the flow of a current of water through a pipe, the water corresponding to the electricity, and the friction between the water and the pipe to the electrical resistance of the wire. The anal¬ ogy is not perfect, but it is useful in forming a good conception of electrical resistance. The energy of the moving current of water is gradu-

One of the results of Ohm's investigation was, that in a branched circuit, in which the resistances of the two branches are precisely equal, the current divides in such a manner that exactly one-half of it traverses each branch. By taking advantage of this fact, we can determine the resistance of a proposed conductor in the following manner : Let R, in Fig. 1, be the resistance to be measured, and let this be placed in one of the branches of the circuit. In the other branch of the circuit

is a standard volume of mercury, whose cross-section is one square millimeter, and whose temperature is that of freezing water; the re¬ sistance of such a column being (as noted above) one ohm for (say) each 106 centimeters of its length. The mercury column is ar¬ ranged so that the current enters it at the left end; and the current is led away from the mercury column again by means of the movable wire P, whose point of contact with mercury can be shifted to the right or left, at will. The measurement consists in moving the point P until the two galvanometers A and B, one in each branch of the circuit, show that the cur¬ rents in the two branches are precisely equal. We then know that the resistances in the two branches are also equal. In preparing the en¬ graving it has been assumed that the equality has been observed to subsist when that part of the mercury column which is included in the circuit is 150 centimeters long, and, there¬ fore, has a resistance of 1.5 ohms. If the gal¬ vanometers and connecting wires are identical in both branches, it, therefore, follows that the resistance of the coil R is also 1.5 ohms. The method of measuring resistances here described is presented in order to illustrate the funda¬ mental idea of electrical resistance. In the practical measurement of resistances a more refined method, presently to be described, is employed.

It is found that the electrical resistance of a linear conductor of uniform cross-section is proportional (1) directly to the length of the conductor, (2) inversely to the area of its cross-section and (3) directly to a certain nu¬ merical factor characteristic of each material, and which is called the, ((specific resistance® of the material. The ((specific resistance® (or ((resistivity®) of a substance is the resistance, at the freezing point of water, of a conductor composed of the given substance, and having a length of one centimeter and a cross-section of one square centimeter. The specific resist¬ ance of a given metal varies to a certain extent with the physical condition of the metal, but the values given in the accompanying table will be found useful for many purposes :

Specific Resistance of Metals.

Mercury .

Silver (hard drawn) .

Silver (annealed) .

Copper (hard drawn) ….

Copper (annealed) .

Gold (hard drawn) .

Gold (pure and soft) …. Aluminum (hard drawn) . Aluminum (annealed) …

Zinc (pressed) .

Platinum (pure annealed)

Iron .

Nickel (specially pure) …

Lead (pressed) .

Manganin .

German silver .

0.000 094073 ohm. 0.000 001652 “

0.000 001521 “

0.000 001622 “ 0.000 001590 “

0.000 002118 “ 0.000 001952 “

0.000 003160 “

0.000 002946 “

0.000 005690 “

0.000 008222 “ 0.000 010200 “ 0.000 006935 “

0.000 019850 “

0.000 041000 “

0.000 020500 “

In practice, mercury columns are not used as standards of resistance, because they are not convenient to manipulate. The mercury column is selected in defining the <(ohm® for general purposes, because it is easy to obtain mercury in a satisfactory state of purity, and also because all uncertainties relating to in¬ ternal stress and physical state are eliminated by the use of a fluid standard. An isolated ob¬ server, for example, who wishes to construct a resistance of one ohm for experimental pur¬

poses, can do so readily enough by preparing a column of pure mercury of known length and cross-section. He can then compute the re¬ sistance of this column, at the freezing point of water, and in this way he can obtain a standard of considerable accuracy. In practi¬ cal work, however, it is customary to employ, as standards of resistance, coils of wire that are wound upon spools or bobbins. These are standardized either by comparison with other coils whose resistance are known, or by di¬ rect comparison with a mercury column of known dimensions and assured purity. A bob¬ bin that is wound with wire as an ordinary spool is wound with thread possesses a con¬ siderable coefficient of self-induction if the length of wire is at all great; and this tends to impair its efficiency as a standard, because in the practical measurement of resistance it is desirable to have the self-induction of the standard as small as possible. Standard resist¬ ance coils are, therefore, wound in a special way, with the idea of reducing the self-induc¬ tion as much as possible. One-half of the wire is wound about the central core (or spool) in one direction, and the other half is wound in the opposite direction so that if an iron core were placed in the axis of the spool, and a current were sent through coil, the magnetic effect upon the central iron core would be zero. By winding the wire in this way, the self-in¬ duction of the coil may be rendered negligible.

The resistance of a conductor varies with temperature and, although the magnitude of the variation differs with different metals, and even with the physical state of any one metal, it may be taken, roughly, as increasing by about 0.21 of 1 per cent, for each Fahren¬ heit degree of rise of temperature, for copper and silver and several of the other pure metals. The resistance of liquid mercury increases much more slowly with temperature, the coefficient of mercury being only about one-fifth of that stated above. The resistance of carbon dimin¬ ishes as the temperature rises. In accurate electrical work it is evidently essential,

in view of the variation of resistance with temperature, either to keep the temperature of the standard coils constant, or to ascertain the coefficient of variation of resistance with temperature with considerable care, so that a suitable correction may be applied for any departure of the tem¬ perature of the standard coils from the one temperature at which their resistances are ac¬ curately known. In practice it is usual to de¬ termine the temperature coefficient with as much accuracy as possible, and then to keep the temperature of the coil as near as prac¬ ticable to the temperature at which it has been standardized. Any error in the determination of the temperature coefficient will then have but small effect upon the calculated resistance of the standard. Many attempts have been made to prepare alloys which shall have neg¬ ligible temperature coefficient ; and while no alloy has been found whose electrical resist¬ ance is absolutely independent of the tempera¬ ture, several have been prepared whose tem¬ perature coefficients are quite small. German silver is one of the commonest of these alloys, the composition of that which is used in the preparation of resistance wire being (by weight) four parts of copper, two of nickel and one of zinc. The specific resistance of this alloy is

about 13 times, that, of copper, and its tem¬ perature coefficient is only about 0.022 of 1 per cent, per degree Fahrenheit. ((Platinum-silver,® as used for electrical resistance stand¬ ards, is composed of two parts (by weight) of platinum to one part of silver. It has a specific resistance about 15 times as great as that of copper, and its temperature co¬ efficient per Fahrenheit degree, is only about 0.017 of 1 per cent. ((Manganin® has largely come into favor for electrical resistance stand¬ ards in recent years, the composition recom¬ mended by the Reichsanstalt being (by weight) 84 per cent of copper, 12 per cent of man¬ ganese and 4 per cent of nickel. Its specific resistance is about 20 times that of copper, and its temperature coefficient is only about 0.0013 of 1 per cent per Fahrenheit degree, at ordinary temperatures; the coefficient di¬ minishing as the temperature rises, until, at about 113° F., the coefficient becomes

rigorously zero. At still higher temperatures, the coefficient of manganin becomes negative ; but at all tem¬ peratures it is so small that it can be neglected for all purposes save those in which the highest attainable degree of accuracy is required.

In the preceding paragraph it was tacitly assumed that the temperature was not widely different from that prevailing in rooms in which electrical measurements are usually made. Kamerlingh Onnes has shown, how¬ ever, that the relation between resistance and temperature undergoes a remarkable change in the vicinity of the absolute zero. Experi¬ menting, for example, with a coil consisting of 1,000 turns of fine lead wire, the two ends of which he had fused together, he found that, although the coil had a resistance of 734 ohms at the temperature of the laboratory, its re¬ sistance appeared to totally vanish at 6° C. cn the absolute scale. The coil was surrounded with liquid helium, and thereby cooled to 4.26° C. (absolute), — which is the boiling point of helium under atmospheric pressure, — and an electric current was then produced in it, by in¬ duction. At the temperature of the laboratory this current would die out to practically noth¬ ing within an extremely small fraction of a second after the removal of the exciting cause ; but at the temperature of boiling helium the current persisted for many hours. It fell off, in fact, at the rate of less than 1 per cent per hour. If, however, the coil were lifted out of the helium, the current ceased abruptly as soon as the temperature rose, to 6° C. (abso¬ lute), — this being the ˆvanishing point® of the resistance of lead, above which the energy of the current was quickly dissipated in the form of heat, in the usual way. In another experiment Onnes used a wire of solid mercury, the resistance of which, just be¬ low the freezing point of mercury, was about 50 ohms. As the temperature of this wire was lowered, the resistance diminished regularly until it became reduced to 0J2 ohm at 4.3° C. (absolute). Upon further cooling the resistance fell off abruptly at about 4.19° C. (absolute), to 0.00001 ohm; and at 2.5° C. (absolute) the resistance of the mercury was only one ten-thousand-millionth of the resist¬ ance observed at the freezing point of water. At 1.7° C. (absolute) a mercury wire will con¬ duct a current having a density of 1,000 am¬

peres per square millimeter, without showing any measurable difference of potential, and without developing heat. Ohm’s law no longer holds, and the applied electromotive force may have to be increased a thousand fold, in order to realize a 10 per cent increase in the cur¬ rent. When a metal exhibits these singular properties, by

reason of being cooled to a tem¬ perature lower than that at which its resist¬ ance practically vanishes, it is said to be a ˆsuperconductor.® In the Chemisch Weekblad (Amsterdam), Vol. XVI, p. 640, C. A. Crommelin gives a historical and theoretical discus¬ sion of the work of Kamerlingh Onnes along these lines, and appends a valuable bibliography bringing the subject up to 1919.

In the accurate measurement of electrical resistance, the device known as ˆWheatstone's bridge® is employed. Ohm's law, which is one of the most fundamental principles in the science of electricity, states that in any circuit of con¬ stant form, in which a constant electromotive force is acting and a uniform current is flowing, the current, resistance and electromotive force are connected by simple mathematical relation, which may be expressed in the following man¬ ner: Let any two points in the circuit be

selected, and let R be the resistance included be¬ tween these points, as expressed in ohms. Let E be the electromotive force between these same points, as expressed in volts ; and let C be the current between them, in amperes. Then

E

the relation in question is — , or E = CR.

R

To apply this principle to the measurement of resistances, let A and .B , in Fig. 2, be the two

H

Fig. 2.

points selected, and let the circuit be divided at these points, into the two branches AHB and AKB ; the resistance of AH being P, while that of HB is Q, that of AK is S and that of KB is T. The points H and K are to be connected, later, by means of a conductor, HGK, carrying a galvanometer, G ; but for the moment the conductor HGK is assumed to be non-existent. Let us suppose that the difference in electromotive force between A and B is E, while that between A and H is e. Then Ohm's law, when applied to the branch AHB as a whole, gives E — Ci (P +Q); Ci being the cur¬ rent flowing through the branch AHB. Sim¬ ilarly, when applied to the section extending simply from A to H, Ohm's law gives e — CiP. Eliminating Ci from these two equations, we find that e, the electromotive force between the two points A and H, is equal to EP/(P + Q). In the same way we may show that the differ¬ ence of electromotive force between A and K in the branch AKB is equal to ES/(S ~b T).

RESOLUTION ISLAND — RESOLUTIONS OF '98

415

If the electromotive force between H and K is zero, then these two expressions are equal, and we have P/(P --Q) — S/(S T) , which is equivalent to Q/P = T/S, or to PT = QS. If H and K are connected by a branch con¬ ductor that includes a delicate galvanometer, G, then the galvanometer will indicate a current except when the electromotive force between H and K is zero; that is, it will show a current whenever the relation PT = QS is not fulfilled. This arrangement of branch circuits, with a galvanometer bridging across from one of the branches to the other, constitutes (<Wheatstone's bridge.® Its use for measuring resistances may be illustrated as follows : Let Q and T be two known resistances, and let P be the unknown resistance, whose

value is to be determined. At S’ we introduce a ˆresistance box,® which is merely a box containing an assortment of known resistances, so arranged that any or all of them can be conveniently thrown into the circuit or out of it. The resistance S’ is varied by trial until the galvanometer G ceases to show a deflection; and when this condition is fulfilled, we know that the equation PT = QS holds true. But we knew Q and T to start with, and we have determined S’ by trial ; so that we know three of the four resistances that enter the foregoing equation, and we can, there¬ fore, calculate the fourth. Resistances may be determined, in this manner, with exceeding ac¬ curacy. Consult for full details W. A. Price, (Treatise on the Measurement of Electrical Re¬ sistance.)

Ohm’s law enables us to foresee, very easily, how the cells of a given battery must be ar¬ ranged, in order to obtain the greatest possible current through a given, fixed conductor by which its terminals are to be joined. If the zinc electrode of each cell is joined to the car¬ bon electrode of the next one, so that the cur¬ rent has to pass through all the cells in succes¬ sion, the battery is said to be arranged <(in series.®

The quantity of energy dissipated in the form of heat when a current traverses a con¬ ducting circuit was investigated by Joule, and also by Lenz, Becquerel and others. It is found that the quantity of heat-energy set free in any given conductor in one second is pro¬ portional (1) to the resistance of the conduc¬ tor, and (2) to the square of the current that is flowing. If the resistance of the conductor is R ohms, and the current is C amperes, then the quantity of heat generated in T seconds will be 0.238 C2RT calories ; the (<calorie® being defined as the quantity of heat required to raise the temperature of one gramme of water from 14° C. to 15° C. This is ((Joule’s law.®

Allan D. Risteen, Ph.D.

RESOLUTION ISLAND, the name of several islands, the principal one being in British North America, at the extreme end of Hudson Strait; lat. 61° 39’ N. ; long. 65° W. The island is about 40 miles in length and breadth, and Cape Resolution is on the east side. Resolution Island, in Dangerous Archipelago, Pacific Ocean, is in lat. 17° 22’ S., long. 141° 35’ W. Resolu¬ tion, a lagoon island in Low Archipelago, is in lat. 17° 25’ S., long. 143° 24’ W.

RESOLUTIONERS, a designation of

king, Charles Stuart (Charles II), had been de¬ feated by Cromwell at Dunbar (13 Sept. 1650), the Scotch Parliament repealed an act under which royalists were excluded from the army. The repealing act was approved by a large ma¬ jority of the Scotch Kirk as being wise and politic in the circumstances, but it was repro¬ bated by a small but zealous minority in the kirk as a betrayal of the true interests of religion ; this party was known as that of the Protestors, the other party as that of the Reso-lutioners ; each of the two maintained that it was itself the genuine Scotch Kirk, the only church that remained faithful to the Covenant and to the Church's head, Christ.

RESOLUTIONS OF '98, the designation commonly given to the Kentucky and Virginia resolutions of 1798, defining the relations be¬ tween the State and Federal governments, and protesting against certain acts of Congress as unconstitutional, and as violating the rights re¬ served to the States. The Resolutions offered in the Kentucky legislature, and adopted by that body, were drafted by Thomas Jefferson, who, in common with other leading American states¬ men, and the majority of the people, was alarmed by the enactment of the Alien and Sedition Laws, and other measures regarded as indicating a purpose to create a centralized despotism in place of the Union formed under the Constitution.

The first Resolution declared that the Federal Constitution was a compact between the States, by which a general government was created for special purposes, and that, ((as in other cases of compact between the parties hav¬ ing no common judge, each party has an equal right to judge for itself, as well of infractions as of the mode and measure of redress.® The Alien and Sedition and other laws were pro¬ nounced ((not law, but altogether void and of no force,® and one of the Resolutions postponed to (<a time of greater tranquillity® the ((revisal and correction® of other acts of Congress al¬ leged to be unconstitutional.

The eighth Resolution directed the appoint¬ ment of a committee of correspondence, to communicate the Resolutions to the several States, and to inform them that the State of Kentucky was determined ((to submit to un¬ delegated and consequently unlimited powers in no man or body of men on earth ; that in the case of an abuse of the delegated powers, the members of the general government being chosen by the people, a change by the people would be the constitutional remedy; but when powers are assumed which have not been dele¬ gated, a nullification of the act is the right remedy; and

that every State has a natural right, in cases not within the compact, to nullify of their own authority all assumptions of power by others within their limits.® The Committee of Correspondence was instructed to request the other States (<to concur in declaring those acts void and of no force, and each to take measures of his own for providing that neither these acts, nor any other of the general government, not plainly and intentionally authorized by the Constitution, shall be exercised within their re¬ spective territories.®

The Resolutions passed the Kentucky legis¬ lature, 14 Nov. 1798, with only two or three dis¬ senting votes, and similar Resolutions, drafted

by James Madison, were adopted by the Virginia legislature, 24 Dec. 1798, by a vote of 100 to 63 in the house of delegates, and 14 to 3 in the senate. The fact that both Jefferson and Madi¬ son were afterward elected Presidents of the United States, and that the Democratic party, which they represented, remained in power for many years, has been accepted as indicating that the Kentucky and Virginia Resolutions had the substantial approval of the American people. See United States.

RESONANCE, the reduplication or echo¬ ing of sound, increasing its volume so that it may be regarded as strengthened. When a person speaks in an empty room the walls reflect the vibration. There is an echo from each wall, but it returns so quickly that we do not recognize it as an echo ; and whether or not the listener is equidistant from the different re¬ flecting surfaces, the echoes give the effect of strengthening the sound or increasing its vol¬ ume. This resonance occurs when a sounding-board is used to strengthen the vibration from a string or a tuning-fork. Resonance is also ob¬ served when a sound is made in a large open-mouthed vessel. The form of the bell is de¬ signed to gain the benefit of this resonance. A piece of flat metal, the size of a bell, would not produce nearly the same effect, when struck by a hammer, as does the bell, whose sides reflect the vibrations. The principal of resonance ap¬ plies to all waves, and is observed in electrical phenomena and radiography.

RESORCINOL, RESORCIN, 1:3 dihy¬ droxy benzene, CeHˆOHV, is formed by the fusion of certain resins or gums with caustic alkalis. Aromatic compounds containing two side chains, e.g., benzene chlorsulphonic acids, benzene disulphonic acids and halogen phenols, will also yield resorcin when fused with caustic alkalis. On a commercial scale resorcin is pre¬ pared by gradually heating a mixture of dry meta sodium benzene disulphonate and caustic soda. The mass is stirred during fusion, and the temperature is not allowed to go above 275° C. The product is treated with much water, acidified with hydrochloric acid, ex¬ tracted with ether or benzene and finally puri¬ fied by distillation and recrystallization from benzene.

Resorcin is a colorless, crystalline compound, with a melting point of 118° C., and a boiling point of 276.5° C. It is somewhat volatile with steam and dissolves readily in water, alcohol, ether and glycerine. Its aqueous solution re¬ acts with bromine water to give a precipitate of tribromresorcin. On exposure to light and air it acquires a brown tint, due probably to the presence of moisture and traces of iron.

Resorcin is extensively employed in the manufacture of synthetic dyes. Heated with phthalic anhydride and a dehydrating agent it condenses into fluorescein, and from the latter may be obtained eosine, erythrosine, spirit eosine, eosine S, eosine BN, erythrosine G, spirit cyansosine, rose bengal, oriental yellow, *etc.* With phthalic anhydride, in the presence of benzyl chloride and sulphuric acid, resorcin condenses into chrysoline — the important silk dye. With diazoxylene and diazosulphanilic acid it forms resorcin brown. Resorcin is also employed for the preparation of tropaeoline O, isodiphenyl black, lacmoid, Hessian brown BB,

Kongo brown G, fast green O, Iris blue, Sudan G, *etc.*

On account of its antiseptic properties resorcin in water solution has been recom¬ mended as a wash for diseased stomachs, in the treatment of skin diseases, in hay fever, nasal catarrh, chronic eczema and intestinal catarrh ; but recent experimenters claim that the em¬ ployment of resorcin in large doses will usually develop symptoms similar to those of alcoholic poisoning.

V. S. Babasinian, Lehigh University.

RESPIRATION. The essential process in respiration is the taking in of oxygen and the giving out of carbon dioxide by the living cells of a

plant or animal. In higher animals special organs, the lungs (q.v.), and a special tissue, the blood (q.v.), are the main factors in this exchange; but in the lower animals various types of structures are utilized. Thus in insects there are series of ramifying tubes into which the air circulates; in water animals there are gills, which are the precursors of lungs in land animals. Even those higher animals in which the major part of the oxygen exchange takes place in the lungs (external respiration), there is also an internal respiration constantly taking place in the exchange between the blood, the lymph and other tissues. Respiration in plants is of the same general character as in animals. It is not to be confounded with the much more active process of photosynthesis, by which plants utilize carbon dioxide and give off oxygen, a process which was termed respira¬ tion by the older plant physiologists.

Historical Summary. — The earliest natural¬ ists and philosophers, Aristotle and others, even down to the anatomists of the 15th century, taught that the function of respiration was to draw air into the arteries and heart, and thus to cool the blood. The old Galenic doctrine was that the <(air introduced by breathing served to. regulate, to maintain and at the same time to temper, to refrigerate the innate heat of the heart.® Again the pumping action of the thorax introduced into the blood the air which was necessary to generate the vital spirits in the left side of the heart, and finally the same pumping action got rid of the foul vapors, the product of the innate fire burning in the heart. Harvey was one of the first to show that the same channel probably did not serve to carry these two different currents. But the chemical prob¬ lems involved were too intricate for Harvey, although it was chiefly through the work of a group of Englishmen of the 1 7 th century that the unraveling of the mystery of respiration came about. Von Helmont had taught a theory of fermentations, and he had noted the differ¬ ence in color in’blood passing through the lungs. Borelli approached the mechanical side of the problem and showed the truth regarding the mechanics of the chest, the bellows-like action of which took in by atmospheric pressure and expelled the air by the muscular relaxation and the elasticity of the chest-walls. Malpighi had in the meantime discovered, with the aid of his crude microscopes, the minute structure of the lung, and Borelli, as well as others (Hooke, 1667; Croon and Boyle, 1666), working with the newly-discovered principle of the air-pump and vacuum, had learned that air was absolutely

essential to the life of the animal, and had ad¬ vanced to the point that the particles of the air taken into the lungs enter into and become mixed with the blood. But Borelli was a physi¬ cist, and had no sympathy with the new chemical learning, which was then a very vague subject. Hooks and Lower made the next steps possible, the former by his artificial-respiration experi¬ ments, proving the necessity for air, and the latter by his careful transfusion experiments, demonstrating that the difference between dark venous blood and lighter arterial blood was due to the admixture of air, thus explaining this color change, which had been recorded for thousands of years and referred to thousands of causes. Up to this time it had always been thought that the air • was a simple substance, and not a mixture. John Mayow (1643) first showed that not all of the air was used by the lungs in influencing the blood, but only a certain part; and although he called it by a different name (spiritus nitro-aerius) , it was that part now known as oxygen. Mayow thus developed the first full adequate physico¬ chemical theory of respiration. He saw that respiration was a process analogous to com¬ bustion, and that the movements were to take in the nitro-aerial gas and give out the vapors arising from the blood. But he did not know at all what these vapors were. He had grasped at the meaning of the intake, but had no knowl¬ edge of the exchange products. He said: (<In the first place then, I take it for granted that the air contains certain particles termed by us elsewhere nitro-aerial which are absolutely in¬ dispensable for the production of fire, and that these in the burning of flame are drawn from the air and removed, so that the latter when deprived of these particles ceases to be fit for supporting fire.® <(With respect, then, to the use of respiration, it may be affirmed that an aerial something, whatever it may be, essential to life passes into the mass of the blood. And thus air driven out of the lungs, these vital particles having been drained from it, is no longer fit for breathing again.® This and other wonderful discoveries were made by a young man of 25, and who died at the age of 34. Mayow's work was then forgotten for almost 100 years. As Foster expresses it, ((that which in the first years of the latter half of the 17th century as igneo-aerial particles shone out in a flash and then died away again into darkness, in the last years of the 18th century, as

oxygen, lit a light which has burned, and which has lighted the world with increasing steadiness up to the present day.® The names of Stahl, Hal¬ ler, Boerhaave appear as keeping alive the study of respiration. • Stephen Hales, an active parish priest, and the earliest sanitarian, was an ardent student of chemistry. He first enunciated the principle of free and combined gases, and led the way to the work of Joseph Black, who re¬ discovered Von Helmont's ((fixed air,® which was given off by the lungs, and that animals placed in the ((fixed air® died much as if they were deprived of fresh air. The next step was made by Priestley, who in 1772 rediscovered Mayow's <(igneo-aerial® spirit and isolated oxy¬ gen. Priestley's views, however, were permeated by the century-old phlogiston theory, and it remained for Lavoisier clearly to demonstrate what oxygen really was and to overthrow the

phlogiston theory. Thus the problem of animal respiration was solved. The air, composed mostly of innocuous nitrogen and of small pro¬ portions of active oxygen, passes into fine air vesicles, first seen by Malpighi, the blood there takes up the free oxygen, giving off carbon dioxide, which exchange constitutes the es¬ sential feature of respiration. It should be added that it was not until Gustavus Magnus (1837) proved the presence of the blood-gases in different proportions in the blood that the present theory of respiration assumed a defi¬ nite form. The study of the relation of the iron of the haemoglobin in the blood to this oxygen exchange constitutes the last chapter in the unraveling of this secret of nature.

Mechanics of Respiration. — Breathing con¬ sists in the rhythmical expansion and contrac¬ tion of the walls of the chest, by means of which process air passes into the lungs and thus comes in contact . wdth the blood. The lung structure itself possesses no marked ex¬ pansile power, but it is in a constant state of tension, there being negative pressure in the pleural cavity. The muscles attached to the ribs, including the diaphragm (q.v.), expand the cavity of the chest in all three diameters by raising the ribs and lowering the diaphragm ; the air rushes in and inflates the lungs ; the muscles then relax, the elasticity of the ribs causes the chest-wall to contract, the lungs themselves contract somewhat and the air is forced out through the bronchi and larynx. Thus it is evident that lungs themselves are merely passive agents in inspiration, being filled and emptied of air largely in consequence of the movement of the chest-wall. The control of the muscular movements is partly voluntary and partly involuntary,

and the breathing centre so called is in reality a complex one, or rather a series of centres, all co-ordinated. Thus the motor centres for certain muscles attached to the ribs are located in the spinal cord, and their excitation can bring about restricted move¬ ments of expansic-, while their destruction may result in paralysis of certain of the muscles of respiration. Another breathing centre, the most important one, spoken of as the automatic or true respiratory centre, is found in certain ganglion cells in the floor of the fourth ven¬ tricle of the medulla oblongata (q.v.). This is the vagus respiratory muscles. Their de¬ struction destroys the co-ordination of the muscular movements and brings about death. A third centre is present in some portion of the fore brain, probably in the frontal lobes. It is the centre that enables one to <(hold the breath,® or to make extra deep breaths, *etc.* The distinction between conscious and uncon¬ scious breathing is very distinct and yet very subtle. Voluntary influences constantly modify the rate of breathing. While one is asleep these conscious influences are usually temporarily ex¬ cluded, and then the so-called normal rhythm is seen. This is usually from 18 to 20 to the minute in the adult, the ratio of length of in¬ spiration to that of expiration being about 10 to 12. Numerous individual variations may be present, however, the rate varying from infancy to old age, and in diseased conditions the rate is nearly always modified, usually quickened in consequence of the increased oxidation that often accompanies disease. Occasionally res-418

piration is slowed when there i$ painful breath¬ ing, or some form of poisoning; opium-poison¬ ing is a noted illustration. In this condition the breathing rhythm may sink as low as four to five to the minute. In children of both sexes the movements of breathing are similar, but as adult conditions develop, and changes in dress become pronounced, it happens that women are more apt to breathe more in the chest (costal breathing), while men make more use of the lower ribs and the diaphragm (dia¬ phragmatic or abdominal breathing). The amount of air taken into the lungs varies widely with the size of the individual, the shape of his chest and a number of other factors that make it impossible to give a general average. It is usual to measure that portion of air that passes in and out of the lungs during normal respiration as tidal air; this has been known to be from 150 to 700 cubic centimeters. In forced breathing a certain extra amount of complemental air can be taken into the chest, its average being about 1,500 cubic centimeters. A certain amount of air (residual air) cannot be expelled from the chest even by forced ex¬ piration. This has been found to vary in amount from 400 to 1,500 cubic centimeters. The vital capacity, or the amount of air which can be expelled from the thorax by forced expira¬ tion following a deep inspiration — a spirometer, or the “lung-tester® of the circus, being the instrument for measuring the same — varies very widely according to practice, height, weight and age. For the comparative anatomy of respiration, see Anatomy, Comparative, Respiratory System.

Artificial Respiration. — When death is im¬ minent, owing to a cessation of the natural res¬ piration movements, it may sometimes be averted by an imitation of them carried on regularly for a while. Such a condition may occur in disease (for example, asthma, epi¬ lepsy), though very rarely; it is most common in suffocation, either by drowning, choking or strangulation, and is sometimes met with also in poisoning by noxious vapors (for example, carbonic acid, carbonic oxide, coal-gas, chloro¬ form, etc.). In order that any method may have a chance of being successful it is of course necessary that the entrance of air into the lungs be not impeded, whether by a piece ol food or by water in the windpipe, or by the tongue falling back and closing the upper open¬ ing. A piece of food may sometimes be re¬ moved through the mouth by the finger; if this fails, the windpipe should be opened. In those apparently drowned the body should first be laid on the face, with the head low, and the thorax and abdomen

be pressed on in order to expel fluids which may have been drawn into the trachea and bronchial tubes. The tongue may need to be held forward; this may be done by an assistant, or an elastic band passed round the tongue and the chin will effect the object. No general consensus of opinion has yet been arrived at as to which is the best method of producing artificial respiration. The methods most employed fall into three divisions: (1) insufflation, or blowing of air into the lungs, either by the mouth or by means of bel¬ lows; (2) manual methods, in which external manipulations of the chest-walls are made to effect the entrance and exit of air; (3) elec¬

trical stimulation of the respiratory muscles. In all cases where artificial respiration is re¬ quired every movement is of importance. It is doubtful whether life can ever be restored when the heart has ceased to beat for more than a few seconds ; and when breathing has stopped failure of the heart's action is always imminent. That method is, therefore, best which can be applied with the least possible loss of time, so that under ordinary circumstances the methods which require bellows or electric batteries are out of the question. Direct insufflation, or blow¬ ing of air into the patient's lungs by the mouth applied to his mouth, is now hardly ever used except in the case of very young children, al¬ though within recent years specially devised pumps have been made that are at times very serviceable. Of the manual methods those most in use are Marshall Hall's (1856), Sil¬ vester's (1857) and Howard's (1877). The second is certainly the most easy to learn, but is more fatiguing to carry out for a length of time than either of the others. In Marshall Hall's method the body is laid upon its face and rolled "in what may be termed cradle-fashion® from this position on to one side and a little beyond it (inspiration), and then back on to the face (expiration). In Silvester's method the patient is laid on his back on a plane, inclined a little from the feet upward, and the shoulders are gently raised by a firm cushion placed under them, which also throws the head back. The operator then grasps the patient's arms just above the elbows and raises them till they nearly meet above the head. This action imitates inspiration. The patient's arms are then turned down and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated. In Howard's method the patient is laid on his back with a cushion below the middle. The operator kneels astride his hips, places his hands with fingers spread outward over the lower part of the chest-wall and alternately bends forward, throwing his weight on the chest to imitate expiration, and springs back to allow the elastic recoil of the chest-wall to imitate inspiration.

Whatever method be adopted, the move¬ ments must be gentle, regular and perseveringly carried out, at the rate of from 10 to 15 times in the minute ; and when the faintest natural effort at respiration is observed they must at once be timed so as to reinforce and not to oppose it. In some cases life has been restored under artificial respiration when no respiratory movements have occurred for an hour or even several hours. In all cases, but especially in that of persons apparently drowned, artificial respiration should be conducted in a warm at¬ mosphere, 90° F., or even more if possible, and should be supplemented by warmth applied to the body and by vigorous friction. In those apparently drowned recovery is very rare after complete immersion for as much as five minutes. If stunning or fainting has occurred at the moment of immersion, so that the respiratory movements have been annulled or much dimin¬ ished for the time, less water will have entered the lungs, and the chance of recovery may be greater. In other modes of death by suffoca¬ tion, such as choking or strangulation, the ac¬ tion of the heart may continue longer, and

restoration to life be, therefore, possible after a longer deprivation of air. In recent years a variety of instruments, pulmometers, have been constructed to do the work of artificial res¬ piration. These are widely used in industrial asphyxiation from fires, *etc.* See Anatomy; Asphyxia; Drowning; Hemoglobin; Lungs.

Consult Bert, (Legons sur la Physiologie comp, de la Respiration* (1870) ; Foster, (Lectures on the History of Physiology* (1901) ; Bayliss, (General Physiology* (2d ed.,

1918).

Smith Ely Jelliffe,

Editor (Journal of Nervous and Mental Disease. *

RESPIRATION CALORIMETER. See

Calorimeter, Respiration.

RESPIRATION IN PLANTS. See

Plants, Respiration in.

RESPIRATOR, a contrivance used as a mouth-covering to protect the wearers from noxious vapors, coal-dust, mine-eras, *etc.* They are also frequently employed to secure the in¬ halation of a medicated atmosphere, containing a layer of lint or wool on which a few drops of terebene, eucalyptol or other antiseptic are placed.

RESPONDENT, (1) in equity , one who answers a bill. In this sense it is equivalent to the term defendant as used at common law.

(2) In admiralty, one who answers a libel.

(3) One who opposes an appeal; an appellee.

(4) In English law, one who defends a suit for divorce. (5) In civil law, one who acts as security for another.

REST-CURE, a method of treatment ad¬ vocated by Dr. W. S. Weir Mitchell in 1875 for cases of nervous prostration and various condi¬ tions characterized by poor blood and lack of muscular and nervous tone. It is a systematic treatment extending over several weeks, a com¬ bination of absolute rest of body and mind, regular diet at fixed hours, a separation from relatives and friends, passive exercise by mas¬ sage, the use of electricity and the supervision of a trained nurse. The use of medicines is of secondary importance, but frequently of value. As Dr. Mitchell puts it, the rest-cure is of service to “invalids, unable to attend to the duties of life, and sources alike of discomfort to themselves and anxiety to others.® Many modifications have been introduced in the sys¬ tem to adapt it to sufferers from alcoholism, indigestion, tuberculosis, *etc.* Consult Mitchell, S. Weir, (Fat and Blood) (new ed., Philadel¬ phia 1905); Dercum, F. X., (The Rest Cure? (in (Modern Treatment,* Philadelphia 1910).

RESTIF DE LA BRETONNE, Nicolas Edme, French novelist and reformer: b. Sacy, 1734: d. 1806. Bretonne, though unknown to the general public, holds a remarkable place in French literature. The son of a farmer, he was educated by the Jansenists, and on their ex¬ pulsion from France became a printer, and later went to Paris. He married Agnes Le Buges. Six or seven years after his marriage he

began to write, and until his. death poured out a stream of books, amounting in all to about 200. They were upon almost every kind of subject, and many were written in the wildest vein of license, both of speech and morals. Many of his books he printed himself and to-day the

original editions are very rare. It is impossible to mention his works in detail, because of the fact that they are so numerous and also be¬ cause of the subject matter. Perhaps the best known of his novels is (Le paysan perverti* (1777), a novel that had back of it a moral pur¬ pose, though written in a very immoral manner. Bretonne's (Les Contemporaines* (42 vols., 1780-85) is a great collection of short stories, dealing with marriage, love and intrigue. (La pornographe) (1769) was a plan to regulate prostitution, and the plan was tried in one of the German cities of the time. Perhaps the most important of his works was his remarkable autobiography, (Monsieur Nicolas,* published in 16 volumes. This extraordinary work, which is one of the strangest pieces of literature in the world, presented his life story and his views upon society, morals and also his numerous love episodes. It ranks but little below (Cassa-nova,* to which it is often compared. In 1795 Bretonne received a pension of 2,000 francs from the French government, and just before his death he was given-a place in the Ministry of Police, which he did not live to fill. His other works are all filled with the same frank¬ ness of expression. Among them might be mentioned (Anti Justine) ; (Filles du Palois Royal* ; (Le nouvel Abailard) ; (Le pied de Fanchette.* Though for some time Bretonne was considered simply as a pornographic writer, and was nicknamed the ((Rousseau du ruisseau — Rousseau of the gutter,® to-day his works are considered valuable studies of the life of his time. It should be understood that Bre¬ tonne, though the author of many books, has not been translated in English, and there seems to be no reason for thinking that any of his works ever will be. There are numerous edi¬ tions of his most important novels in French, and (Monsieur Nicolas *has been translated into Italian and German. Consult Duhren, Eugene, (Restif De la Bretonne* (Berlin 1906) ; Monsilet, C., (Restif De la Bretonne) (Paris 1853). The best edition of (Monsieur Nicolas, > Bretonne's leading work, is that published by Liseux (14 vols., Paris 1883-84).

RESTIGOUCHE, res-ti-goosh', a river of Canada, in its lower course separating New Brunswick from the province of Quebec, and flowing northeast into the Bay of Chaleur at Dalhousie. It rises in eastern Quebec, is 225 miles long, is navigable for 16 miles to Camp-bellton

and forms a tidal estuary for 24 miles. It drains 6,000 square miles and its basin sup¬ plies great quantities of timber.

RESTITUTIONISTS, a Christian reli¬ gious sect in New England whose distinguishing tenet is that the restoration of mankind to the condition from which he lapsed through Adam's sin of disobedience is near at hand, and that the reign of perfect love, justice, purity and holi¬ ness is soon to commence. They observe the Sabbath of the Hebrews as a holy day of rest and assemble weekly for worship on the even¬ ing (Friday) before the Sabbath.

RESTORATION, in matters of fine art, the putting of a building, a work of sculpture, a painting or other work of art into what is thought to have been its original perfect con¬ dition. There is, however, a secondary mean¬ ing which is often used in a way to cause con-

fusion: this is the preparation of drawings showing what, in the opinion of the drafts¬ man or his director, would be the appearance of the building or other work of art if restored according to the above definition. The term <(conjectural restoration® is applied to these drawings, though all restoration is more or less conjectural, but the adjective is used in these cases because the drawings often represent much more complete and precise, and much less thoroughly verified statements concerning the original state of the work of art than those which are actually carried out.

To treat first of these suggestions for restoration embodied in drawings : Among the most useful in the way of architecture are some by Sibil, who continued the work of Letarouilly in his folio work on the Vatican in Rome, and those by the well-known author and1 architect, Viollet-le-Duc, especially in the plates to (En-tretiens sur l'Architecture,) and in three or four large lithographs for display on the walls of schools and the like. These are based upon a very exact knowledge of the processes of build¬ ing. There are some of singular interest in the work on the discoveries at Pergamon, by Pontremoli and Collignon (<Pergame,> Paris 1900) ; in the kindred work on ˆpidauros5 by Defrasse and Lechat, Paris 1895 ; also in a three-volume book called (La Restauration d'01ympie) by Laloux and Monceaux. In such drawings a building will be shown complete and in use, with figures near it and passing up and down its flights of steps, or seated on its stone benches. Life is given to the representation by landscapes fitted to the purpose, or by other carefully considered surroundings. In connec¬ tion with these there should be mentioned also the models in plaster, the preparation of which is a serious art in Paris and in other great centres of artistic study. These models, when concerned with a non-existent building, may be a complete rendering of that building, as in the case of the model of the Parthenon and that that of the Hypostyle Hall at Karnak, both at the Metropolitan Museum of Art, New York. (See Architecture; Egyptian Architecture). In these there has been a bold attempt to show, as if definitely known, the en¬ tirely uncertain structure of the roof of the great temple, and also the painting on the same building, according to the theory of the accom¬ plished architect who designed the model, the late Charles Chipiez : but the Egyptian temple has its paintings modified on account of modern notions of propriety. The model of the Pan¬ theon at Rome, in the same collection, can be visited both within -and without, and is

more nearly trustworthy than that of the Parthenon. Of the same nature are the fine Scheck models of the temples of Solomon and of Herod (see Jerusalem). All of this, however, is conjec¬ tural restoration of excellent quality.

Restoration of buildings, when carried out in reality, is extremely open to error of the most mischievous sort, because it is never safe to assume that the last word has been spoken in the matter of demonstration of the building's original condition. As the years advance, for instance in 1920, we could not for a moment accept the archaeological knowledge of our predecessors, say of 1860, and yet in the years following the middle of the 19th century nearly all the most important mediaeval buildings of

Europe were restored, and too often in a rad¬ ical way. In too many cases the original char¬ acter of the building is destroyed altogether, as in the famous instance of the church of Saint Front at Perigueux, and in the case of the Fon-daco dei Turchi at Venice, now the Museo Civico ; but in a vastly greater number of cases the restoration has been conscientious and in a way judicious, but has still destroyed much that would be, had it been spared, the best possible evidence for the original study of the structure. It will be noted that the ambition of the official or committee in charge of a great building, religious or secular, is nearly always to have it as complete and elegant as may be; that this ambition is more than repeated in the architect whose reputation and pecuniary gain are closely connected with the great and costly undertaking; and finally that these ambitions find an echo in the opinions of the general pub¬ lic, who, of course, like to see the famous monu¬ ment of their city put into first-rate order and kept as clean and perfect and bright-colored as the new buildings near. To this is added the actual demand for safetv. Thus, in the case of the Ducal Palace at Venice, of which the restorations were carried on between 1881 and 1884, a conscientious desire to preserve the famous building intact was present in the mind of the controlling intelligence ; but the great capitals of the lowermost arcade upon which the whole weight of wall reposes were in many cases found to be so split that they were un¬ safe. It may well have been thought with per¬ fect honesty that the preservation of the build¬ ing required their removal; they were removed and placed with all care in a hall of the build¬ ing, while newly cut capitals were put in their place. Saint Mark's was more harshly treated, for the exquisite marbles with which the ex¬ terior was sheathed were carried off and re¬ placed by slabs of a vastly inferior quality and color, a certain smoothness and a certain ap¬

pearance of finish being thus obtained at the expense of the chromatic beauty of the original work. Nothing need be said of the mosaics, because they are always in a state of change, repairs and restorations going on all the time : but the change in the great floor of the church by which the singular waves and hollows which had marked it for so many years were all graded and the floor smoothed out into a glossy, modern pavement, excited at the time the great¬ est indignation on the part of many, but can hardly call for criticism, there being so much doubt as to the true cause of the old inequalities.

There is still another difficulty in the restora¬ tion of buildings, namely, the introduction of later, though still early, details. Thus in a Gothic cathedral, especially in England, one whole bay of the north or south aisle will have been built up with 14th century windows, con¬ trasting oddly with the (<early English® fenes¬ tration of the neighboring bays. Shall the restorer respect these changes of an earlier time, or shall he sweep them all away and make the church that which, according to his best lights, it was in (say) 1195? It is evident that there is great room for disagreement as to this, and that no restoration of such building can ever satisfy the student altogether. It is evi¬ dent that every precaution should be taken to save the old work and that the interests of fine

art and archaeology alike demand the preserva¬ tion of every bit and scrap of building as it has reached us from antiquity, repairs being car¬ ried out only in so far as to save the ancient pile with all its details. At the same time ex¬ cuses can readily be found for those who advo¬ cate a sweeping restoration : for, as they would say, the building was meant to be used and was meant to have a certain general aspect : is it not probable that we know enough to put it back to its original character? Unbelieving critics can never persuade these people of their own probable ignorance.

In sculpture the case is more simple. Until within the last 25 years an important antique statue was generally restored, and the most skil¬ fully carried out restoration was perhaps that of the 2Egina sculptures

in the Glyptothek in Munich. These are said to have been directed by the celebrated sculptor Bertel Thorwaldsen, and they have a wonderful appearance of verity, while at the same time no one can say how far the surface of the marbles found in 2Egina have been lowered in places to agree with the restoration. It has always been con¬ sidered a wonderful piece of good fortune at a time too early for such intelligence in archaeo¬ logical matters — the preservation from restora¬ tions of the Venus of Milo in the Louvre, this preservation having been largely the result of disagreement. On the other hand, the finds of the years since 1870 are much more commonly preserved intact : no one will think of restoring the Hermes of Olympia. Even in our own time, however, such slight injuries as the breaking of two or three fingers in the Augustus of Otricoli in the Vatican, or in the Venus of the Capitol, are pretty certain to be repaired, but then it is the custom of all properly managed museums that a label shall hang on the pedestal with a full description of the additions made, and the catalogues of the better organized museums contain also such a mention in full.

In the matter of painting it has long been understood that there is only one safe way and that is to refrain from bringing a brushful of paint anywhere near the canvas. The old pic¬ ture has suffered certain injuries; it must not, therefore, be subjected to the greater injury of falsification. As late as 1885 paintings in several of the museums of Europe were under¬ going repainting of the most radical sort. Any person who was looking into the matter at that time would miss from its place in a church or gallery some great canvas. If he were shrewd and bold he would get sight of that canvas set up against a wall on its side or on its head perhaps, and there undergoing a proc¬ ess of repainting in sky or drapery at the hands of the most unintelligent operative who could use a palette and a painter's pencil. By and by the picture would be in its old place again and then the few who look closely into a picture would feel that their old friend and inspirer was gone. The director of just such a restora¬ tion said to the writer that he was quite aware of the opinion of the foreign visitors that this ought not to be done — that only a patch of neutral color should be put in where an actual blister had existed — where color had left the canvas altogether — that, in short, the picture should be mended, but not repaired and re¬ newed with an attempt to imitate its original surface. He was a good-tempered old gentle¬

man and made no pretense at artistic pride in his work, which indeed was going on at the hands of the most forlorn and careless copyists,

but it was his work, for which his salary was paid. It was suggested long ago that every picture in a public gallery should have hung on its frame an exact account of what had been done to it and when — whether partial repaint¬ ing or repairing of positive injuries, revarnish¬ ing, transferring from wood to canvas or the like. This, however, has not been done as yet, and the student of the most precious paint¬ ings in the world is grievously handicapped by the primary difficulty of discovering what is really the artist's work and what is the ignorant tinkering of irresponsible moderns. Consult Holyoake, M. L., Restoration of Paintings) (in Magazine of Art London 1900) ; Secco-Suardo, Hlrestauratore del depintP (Milan 1894).

Russell Sturgis.

RESTORATION, The, in English history a term applied to the accession of King Charles II, in 1660, after the civil war, to the throne of England, after an interregnum of 11 years and 4 months, from 30 Jan. 1649 (when Charles I was beheaded) to 29 May 1660. In French history, the first restoration begins 3 May 1814, when Louis XVIII made his entry into Paris under the protection of foreign bayonets and ended with the return of Napoleon from Elba, 20 March 1815. The beginning of the second restoration is generally reckoned from the bat¬ tle of Waterloo, 18 June 1815, and terminated on 29 July 1830, with the abdication of Charles X.

RESTORATIONISTS, the followers of Origen in the opinion that after a certain purga¬ tion proportionate to their delinquencies all will be restored to God's favor and to paradise. In the Middle Ages, the Brethren of the Free Spirit held this doctrine; at the time of the Reformation, it was taught by the Anabaptists and in the 18th century by the Rationalists. See also Universalism.

RESTRAINT OF MARRIAGE, that

which unreasonably represses or restricts mar¬ riage, as a clause in a will forbidding under penalty the marriage of an unmarried person. Such a condition, if general, is void. A con¬ dition in restraint of a second marriage is held to be legal. Likewise a condition which re¬ strains marriage with a particular class is legal. It has been held that the limitation of a be¬ quest or an annuity to continue until a woman shall marry is legal both in the United States and in Great Britain. Similarly a condition in restraint of marriage is legal if a condition precedent.

RESTRAINT OF TRADE, that which

tends unreasonably to restrict or prevent trade. By common law a contract which deprives a person of the right freely to engage in lawful business is void as contrary to public policy. However, contracts which are in partial re¬ straint of trade, for a valuable consideration and which are a reasonable protection to a con¬ tracting party are legal. For instance, an agree¬ ment by A with B never to carry on business again or not to carry it on for 100 years at any place would be void, but an agreement by A with B not to carry on a business in the same town with B for 10 years would be reasonable

and, therefore, valid. The tendency of the law in the United States and that of Great Britain are similar, but there are minor differences. Interstate and international commerce in the United States became subject to the provisions of the Sherman Act in 1890. In effect, this statute declares that old contracts, combina¬ tions, etc., in restraint of interstate or inter¬ national commerce are void. It subjects to a penalty all persons found guilty of such acts and provides for forfeiture of goods in trans¬ portation in violation of the act by the govern¬ ment and dissolution of such contracts. For¬ merly it was held by the Supreme Court of the United States that all such restraints of trade, whether reasonable or unreasonable, violated the statute, but in later decisions this rule was modified by the adoption of the so-called ((rule of reason,® which practically follows the old decisions that no restraint is void which is rea¬ sonable. Various States have passed laws pun¬ ishing restraint of trade, notably Kansas, Ohio, Missouri and Texas. It has been suggested, as an aid to Federal enforcement of laws pun¬ ishing restraint of trade, that all industrial concerns doing an interstate business be com¬ pelled to incorporate under Federal laws, but this would probably require a constitutional amendment and is, therefore, impracticable.

RESTREPO, ra-stra/po, Carlos E., Colom¬ bian statesman : b. Medellin, 1868. He received an excellent education and engaged in the prac¬ tice of law, taking an active interest in politics. He served in

the House of Representatives, acting as its presiding officer, and in 1910 was elected President of the republic. At the time of his election to succeed Gen. Gonzalez Valencia there was a strong anti-American feeling at Bogota and an American-owned rail¬ road was obliged to suspend service. In the following year the United States consul, W. B. MacMaster, died under suspicious circumstances. Restrepo, although originally . anti-American, changed his policy an i labored earnestly to bring about a better understanding between the two countries. His administration was notably prosperous.

RESTREPO, Jose Manuel, Colombian his¬ torian and statesman: b. Envigado, 1780; d. 1 April 1864. He early gained a literary repu¬ tation and in 1810 espoused the cause of in¬ dependence. Fie was a member of the Con¬ gress of Cucuta and became Foreign Secretary in the newly-established government. He was afterward intimately associated with Bolivar, serving for a time as his secretary. His his¬ tory of the revolution is highly valuable, much of his information being secured through per¬ sonal observation. It was published (Historia de la revolucion de Colombia (1827).

RESUMPTION, the return to specie pay¬ ment by a government. The Resumption Act of 14 Jan. 1875 fixed 1 Jan. 1879 as the day on which specie payments should be resumed by the United States government. Resumption actually took place on 17 Dec. 1878, when the premium on gold disappeared.

RESURRECTION, generally spoken of as resurrection of the dead, or of the body (resurrectio mortuorum, resurrectio carnis, dvaofaoit; tuv veicptiv) is the doctrine of the

reunion of the soul and body of man after their separation in death. This teaching of re¬ vealed religion should be distinguished from that of the immortality of the soul, and the eternal survival of human personality after death. (See Immortality). Moreover, the miraculous resuscitation of the dead, — by the intercession of the prophets of the Old Law and the apostles of the New, or by the Divine power of Jesus Christ,— does not enter within the scope of the belief in a general resurrec¬ tion. After summing up the traces of the res¬ urrection-belief as they are found in paganism, this article will give the biblical, ecclesiastical and patristic evidence in favor of the revealed truth of a future resurrection ; and will then establish the fundamental fact of Christianity, the resurrection of Christ.

I. Pagan Traces. — In pagan religions, de¬ generated from God's primitive revelation to the human race, there ic a common and definite belief in the survival of human personality after death; but the traces of a hope of a future resurrection are not universal nor distinct. Many savage tribes witness to a crude belief in metempsychosis. Such theories of reincarnation and transmigration of souls may readily be dis¬ tortions of a primitive revelation of the resur¬ rection of the body. The totemistic worship of the bear, the beaver, etc., which is found among the Sioux, Iroquois and other American In¬ dians, follows upon the idea that the souls of the tribal ancestors have been reincarnated in those animals. Among the Egyptians, reincar¬ nation was a purification of the soul and a prepa¬ ration for final and separate existence. Consult Budge, (The Egyptian Heaven and Hell 5 (1905) ; (The Book of the Opening of the Mouth' (1900) ; (The Liturgy of Funerary Of¬ ferings' (1909); (The Book of the Dead' ; Garstang, (Burial Customs of Ancient Egypt' (1907). To the Babylonians the idea of res¬ urrection is familiar. It is supposed in the worship of Tammuz. Consult Hymn to Tam¬ muz (in Rogers, Cuneiform Parallels to the Old Testament,' 1912, p. 179). In the (<Descent of Ishtar," Tammuz and Ishtar return alive from the abode of the dead. (Dhorme, (Choix de textes religieux Assyro-Babyloniens' 1907, p. 326; Lenormant, (Melanges d'archeologie egyp-tienne at assyrienne,' Vol. I, pp. 31-35). Mar-duk and other gods are accredited with the power to raise men from the dead (Jeremias, (Babylonisch-Assyrischen Vorstellungen vom Leben nach dem Tocle,' 1889, p. 100). In the henotheism of Marduk he is invoked as ((he that giveth life to the dead" (Jensen, (Die Kosmologie der Babylonier,' 1890, p. 196; Mar¬ tin, (Textes religieux assyriens et babyloniens,' 1903, p. 217; Lagrange, (Etudes sur les reli¬ gions semitiques' 1905, p. 340). Persian re¬ ligion has its resurrection of the dead ; but the Avesta, containing this doctrine, was not closed until the 3d century of the Christian era. (La¬ grange, (La religion des Perses,' 1904, pp. 33-35). In India the idea of metempsychosis is essential to religious thought. Each Buddhistic Karma, or successive life, depends upon the per¬ fection of the soul's preceding incarnation ; and this cycle of existences leads up to Nirvana, a cessation of conscious existence, or annihilation of personality by absorption in the Buddhistic Absolute. Mohammedanism borrows and de-

teriorates resurrection-ideas of Hebrew and Christian revelation.

II. Old Testament Teaching. — 1. Genesis.

The human race, at its creation, was endowed with the preternatural gift of immortality. At the dawn of human life, the separation of soul from body in death was precluded by God's special providence. The tree of life stood in the midst of Eden (Genesis ii, 9) ; and the eat¬ ing of the fruit of that tree was somehow associated with the immortality of Adam's ani¬ mated body. Jahweh intended to perpetuate this preternatural and deathless union of man's soul with his body, had Adam not sinned. But Adam sinned. He and the human race lost the preternatural gift of immortality. God had threatened : ((Dying thou shalt die,® if thou disobey (Genesis ii, 17 and iii, 3). After the disobedience, that threat was fulfilled: <(Dust thou art, and unto dust shalt thou return® (Genesis iii, 19). (<By one man the sin entered into the world ; and by the sin entered death. And in this wise death passed unto all men, for as much as all sinned® (Romans v, 12). However, the final triumph over death is im¬ plied in the promised victory of the seed of the woman over the seed of the serpent ('Genesis iii, 15).

2. Job - It is not certain how this revelation of the triumph over death was evolved into a clear belief in the resurrection of the body. All at once we come upon that belief in its full evolution about the 10th century b.c. Our wit¬ ness is the dramatic epic called the Book of Job. Without any prospect of human comfort, the patient sufferer looks forward to the un¬ ending joy of an eternal reunion of his soul and body. The Masoretic, Septuagint and Vul¬ gate traditions of the text are slightly vari¬ ant, though substantially the same. To the scepticism of Bildad and the Shuhite, Job makes reply :

I know that my Redeemer liveth:

And on the Last Day from the dust shall I rise.

Yea, again shall I be clothed with my skin;

And in my flesh shall I see God.

Him I shall see for myself,

Yea, mine eyes shall look on, not another's.

Full fraught is this hope in my bosom.

(Job xix: 25-27)

3. Hosea. — During the dreadful times that preceded the Assyrian exile, Hosea, a prophet of the northern kingdom of Israel, about b.c 750, foretold the triumph of the chosen people in terms that clearly refer to the resurrection, especially to that of the Messias :

Come, let us go back to Jahweh.

For He hath bruised, that He may heal us;

He hath smitten, that He may cure us.

After two days He will quicken us;

On the third day He will raise us up,

That we may live before His face. (Hosea vi, 1-2)

The triumph of Israel over death is a resur¬ rection hope, bound up in the promise of national redemption that Jahweh makes through His prophet : _

From the power of She'd shall I free them;

From death shall I redeem them.

Where is thy sting, O death?

Where is thy doom, O She'ol? (Hosea xm, 14)

This prophecy, Saint Paul tells the Cor¬ inthians (1, Cor. xv, 54-55), is to be fulfilled at the resurrection of the flesh.

4. Isaiah. — Shortly before the fall of Sa¬ maria b.c. 722, Isaiah, a prophet of the southern

kingdom of Judah, intermingled thoughts of the resurrection with his

Messianic prophecies. By means of the Messianic triumph Jahweh of hosts “shall cast death down headlong for ever® (xxv, 8). In that day of complete re¬ demption,

Thy dead shall come to life again;

My slain shall rise up again.

Awake and shout for joy,

Ye that dwell in the dust.

For thy dew is a dew of light;

Yea, the earth shall bring forth her dead.

The earth shall unveil her blood;

She shall cover her slain no more. (Is. xxvi, 19-21)

In the prophets of both the Assyrian and the Babylonian period the redemption of Israel from thraldom in Assyria, and of Judah from Babylonian bondage, is a type of the resurrec¬ tion of the world from slavery to sin.- The sacred manumission of the slave to sin, by means of the mediatorship of the Messias, is completed in the glorious resurrection of the body. That is why Isaiah now and then is in¬ spired to shift his thought from the salvation of Israel or of Judah to that of the soul of man by reunion with its body in glory.

5. Ezechiel. — Coming to the Babylonian period of prophecy, we find Ezechiel (b.c. 592-586) foretelling the salvation of Judah in terms that vividly picture the resurrection. The prophet in vision stood in the midst of a vast plain <(full of bones … and, lo, they were very dry.® Then Jahweh prophesied to the bones :

Lo, within you I shall put spirit.

And ye shall live.

I shall grant you sinews,

I shall raise up for you flesh,

I shall set over you skin,

Within you I shall put spirit,

And ye shall live.

(Ezech. xxxvii, 5, 6)

Straightway ((there was a noise … and a rattling; and the bones moved nigh, each bone to its own bone.® Lastly ((came into them the spirit ; and they lived, and they stood upon their feet. They were an army exceeding great® (xxxvii, 10). The belief in the resurrection must have been real and universal in Judah; else Ezechiel would not have received and set forth, in terms of that figure, the revelation of the ultimate triumph of his people.

6. Daniel. — Throughout the Babylonian Ex¬ ile (b.c. 586-536) and thereafter, the prophet Daniel is a clear witness to that part of Jewish eschatology, which has to do with the fact of a future resurrection of the body. ((At that time Michael, the great leader, who stands for the sons of thy folk, will rise up; and there will be a time of anguish, such as never has been since nation was even until then. At that time shall thy folk be saved, — all that are found to be written in the book. And the multitude of those that sleep in the dust of the ground shall awake, — some unto life eternal, others unto reproach and unto shame eternal. Yea, they that teach wisdom shall shine like the reful¬ gence of the firmament; they that bring many to justice shall be like stars forever and be¬ yond® (xii, 1-3).

7. The Psalms. — The Book of Psalms, in its present state, is likely the result of a series of inspired redactions, dating from the time of David (b.c. 1017-977) up to the time of the close of the canon of Esdras (b.c. 444), The

soul's longing for immortality is clear, and the resurrection-hope at least faintly glimmers throughout this long period of liturgical evolu¬ tion of Israelite hymnody. The Davidic Psalm 16 (15) :9, 10 proclaims the immortality of the pious :

Therefore my heart is glad, and my tongue exults;

Surely my flesh now abides in hope.

For thou wilt not give over my soul to She'd;

Nor suffer thy pious one to see corruption.

r *

A later Psalm 49 (48) : 14-15, of the Psalter of the Sons of Korah, consigns the wicked to She'd and redeems the just:

Like sheep to She'd they are driven;

Death shepherds them;

The just shall rule over them in the morning;

Their beauty is for She'd to waste out of its dwelling.

Surely God will save my soul from the power of She'ol;

For He will take me.

Asaph's Psalm 73(72) : 24, 25, yearns for im¬ mortality. David sings that his joy wTill be complete in the beatific vision of God, after his awaking from the sleep of death (Psalm

17: 15).

8. Maccabees. — During the tortures they underwent, at command of Antiochus IV (b.c. 175-164), the Maccabees appealed to the hope of resurrection as their stay (2 Macc. vii, 9). The third of the seven sons put forth his tongue to be torn out, and hands to be lopped off; and said: <(These I despise, for I hope to receive them back again from Him® (2 Macc. vii, 11). The fourth son taunted the king : ((It is better to be put to death by men … so as to be raised up by God. To thee resurrection will not be unto life® (2 Macc. vii, 14). The author of 2 Maccabees narrates that Judas sent a large offering to Jerusalem, so as to have sacrifices offered in expiation for the sins of the slain ; and adds : (<In this he acted quite rightly and religiously, having in mind the resurrection. For had he not deemed that they, who had fallen, would rise again, it would have been useless and silly to pray for the dead® (2 Macc. xn, 43, 44).

9. Apocrypha. — Though not among the in¬

spired and canonical books of the Bible, the apocrypha bear historical witness to the faith of the period that immediately preceded the foundation of Christianity. In 1 Enoch, Sec¬ tion II, The Parables , cc. 37-71, written b.c. 94-79, many details of the resurrection are

enumerated. (<The earth shall give back that which has been laid away in it; She'ol shall give back that which it has received® (li. 1). All mankind shall rise. The angels shall measure the secrets of all. Not one shall escape. (<On the day of the Elect One, not one shall be destroyed before the Lord of Spirits, not one can be destroyed® (lxi, 5). 4 Ezra,

31-44, supposed to have been drawn from an Ezra Apocalypse written about b.c 30, is ample and detailed in regard to the universal resur¬ rection and last judgment. <(The earth shall restore those that sleep in her; and the dust, those that rest therein.® The Testaments of the Twelve Patriarchs, Benjamin, x, 7-10, written b.c. 137-107, teaches that all will rise, ((some unto glory and some unto shame®; God will (<convict Israel through the chosen ones of the Gentiles.®

III. New Testament Teaching.— The time and details of the Parousia are treated else¬ where. (See Eschatology). This article is

limited to the fact and manner of the resur¬ rection. The current Jewish eschatological be¬ lief, at the beginning of the Christian era, is manifested by Martha in regard to her brother Lazarus : <(I know that he will rise again at

the resurrection on the last day® (John xi, 24).

1. Doctrine of Jesus. — Our Lord repeated the Old Testament teaching in this matter. The Sadducees ((said there was no resurrection,® and denied even the immortality of the soul (Josephus, (Antiquitates Judaicae) XVIII, i, 4). They proposed to Jesus the case of a woman, who by the Mosaic law of go'el had married seven brothers, one after the other. ((At the resurrection, to whom of the seven will she be wife?® In reply, our Saviour blamed them because of ignorance of Scripture. <(For at the resurrection there will be no marrying nor being married ; but they will be as angels in heaven.® The glorified body will not be subject to the appetites of the flesh. The Sadducees grossly caricature the glory of the resur¬ rected body. Its joy is of God. <(He is not a God of the dead, but of the living® (Matt, xxii, 23-32; Luke xx, 28-38). Besides, Jesus claimed that, as Son of Man, He would be the Judge of men (John v, 23-27). He added: <(A time is coming and now is, when the dead shall hear the voice of the Son of God ; and they that hear shall live. … A time is com¬ ing when all who are in their graves shall hear His voice. And they shall come forth — they that have done good; unto a resurrection of life; they that have done

evil, unto a resur¬ rection of condemnation® (John v, 28, 29). This resurrection unto life, Jesus promises, He Himself will accomplish in the case of those that believe in Him (John vi, 39, 40) ; follow the impulses of God's grace (John vi, 44) ; eat the flesh and drink the blood of the Son of Man (John vi, 45). He said to Martha {(I am the resurrection and the life. He that believes in me shall live, though he die ; yea, he shall never die, who lives and believes in me® (John xi, 25, 26). The charitable shall receive their <(reward at the resurrection of the good® (Luke xiv, 14). The unjust also will rise from the dead to be punished for their sins (Matt, v, 29, 30; Mark, ix, 43 — 49) ; they will go soul and body to hell (Matt, x, 28). At the Parousia, the risen just will stand at the right, and the risen unjust at the left of the Judge. He will pronounce sentence of damnation of the latter to eternal fire, and of welcome of the former to everlasting bliss (Matt, xxv, 31-46).

2. Doctrine of Saint Paul.— In keeping with his teaching that the Church is the mystic Christ, whereof Jesus is the mystic Head and we are the members, Saint Paul links together two correlative doctrines. The first is that of the mystic resurrection of both Head and mem¬ bers, by the rising of the soul above things of sin. The second is the teaching that the physi¬ cal resurrection of the Head postulates the ris¬ ing of the members: <(Now if it be preached that Christ rose from the dead, how is it_some among you say there is no resurrection of the dead? Why, if there be no resurrection of the dead, not even Christ is risen. And if Christ is not risen, then vain is our preaching — yea, vain is your faith ; and we are proven to have been false witnesses of God; forasmuch as we have testified of God that He raised the Christ, whom He did not raise — if, forsooth, the dead

do not rise® (1 Cor. xv, 12, 15). This denial of the resurrection is due to an infiltration into the Corinthian Church either of Sadducean ideas or of the Hellenism that scouted the doc¬ trine upon the Hill of Ares in Athens (Acts xvii, 32). To show how fundamental is belief in the resurrection, Saint Paul urges the doctrine at Athens (Acts xvii, 18), at Jerusalem (Acts xxiii, 6), before Felix (Acts xxiv, 15), and Agrippa (Acts xxvi, 8). The Pauline let¬ ters again and again present the argument: Jesus, the Head of the mystic Christ is risen; therefore, we, the members of that mystic Christ, the Church, shall also rise from the dead (Romans viii, 11; 1 Cor. vi, 14; 2 Cor. iv, 14; 1 Thess. iv, 14; 2-Tim. ii, 11). Christ, <(the first of those that sleep® the sleep of death, is the second Adam. As body and soul are separated in death because of the sin of the first Adam ; so body and soul come together after death because of the merit of the second Adam (1 Cor. xv, 20-23). <(He will trans¬ form the body of our lowliness, that it may be conformed with His Body of glory, by the same power that enabled Him to subject all things to himself® (Phil, iii, 21). If this be not true, then one may as well follow one's lower appetites, and act according to an Epicurean fundamental principle of life: <(Let us eat and drink; for to-morrow we die® (1 Cor. xv, 32, citing Isaias, xxii, 13).

3. Manner of the Resurrection. — Saint Paul preached ((a resurrection of the just and the unjust alike® (Acts xxiv, 15). True, his letters generally have to do with the rising only of the just, who have died in the mystic union with Christ by grace. Yet He clearly means that both the just and the unjust will rise unto immortality in the same bodies as were ani¬ mated by the soul before death. It would not be resurrection, were the dead to rise in bodies not their own. These identical bodies, in all their entirety, will be so transformed at the resur¬ rection as to be immortal. The transformation of the living, at the Last Day, will be conse¬ quent upon the equivalent of death, a summary death that will be immediately followed by resurrection. The living will not then die the lasting death, which the Apostle calls sleep. <(We shall not all sleep ; but we shall all be transformed in a moment, in the twinkling of an eye, at the last trumpet-call. For the trum¬ pet will sound, and the dead will rise immortal, and we also

shall be transformed® (1 Cor. xv, 51, 52). As the grain of wheat differs from the blade that shoots up therefrom, so the earthly body differs from the transformed (1 Cor. 36, 37). To the just, this immortality of the transformed body will be an everlasting joy; to the unjust, a never ending torture. This torture is vividly described in Matt, v, 29, 30 ; xxv, 41-46 ; Mark, ix, 43-49 ; and Apoc. ix. In the last pericope, it is expressly stated that the tortures of the wicked are ((not allowed to kill them.® The tortured (<will seek death, and will not find it ; they will long to die, but 'death will flee from them® (Apoc. ix,

5, 6).

In what will the transformation of the bodies of the just consist? Saint Paul tells us, after putting himself the questions : «How shall the dead rise? With what sort of body shall they come forth?® (1 Cor. xv, 35-57). Four qualities of spirit will transform the risen

bodies of the just. The first of these qualities is impassibility , by which the glorified body is not subject to pain and is forever freed from those organic changes that end in death. <(For this perishable body must put on an imperishable form : and this dying body must put on a deathless form® (verse 53). The second quality of the glorious risen body is glory, or brightness, by which the bodies of the saints are refulgent and dazzling in beauty, and ((shine like the sun® (Matt, xiii, 43). ((There are heavenly bodies and earthly bodies: but the glory of the heav¬ enly bodies is not the glory of the earthly. The glory of the sun is not the glory of the moon, nor the glory of the stars: for star differs from star in glory. Even in such wise is the resur¬ rection of the dead® (1 Cor. xv, 40, 41). The third quality of the bodies of the risen just is agility \ by which the risen body is freed from the hindrance of gravity and speedily moves through space like as does a spirit. Saint Paul has this agility in mind, when he writes : wWith a summons, with a voice of an archangel, with a trumpet-blast of God, the Lord Himself will come down from heaven. Then the dead in Christ shall rise first; and afterward we, if we be alive, if we be left over, shall with them be caught up into the clouds to meet the Lord in the air. And so we shall ever be with the Lord® (1 Thess. iv, 16-18). The fourth qual¬ ity of the glorified body is subtility, by which it becomes spiritualized or like to a spirit, passes through material objects as did the glori¬ fied body of Christ and is under the absolute

control of the soul. ((Sown mortal, it rises immortal; sown tainted, it rises glorious; sown weak, it rises mighty; sown an animated body, it rises a spiritualized body. As surely as there is an animated body, so is there a spiritualized® (I Cor. xv, 42-44).

IV. Ecclesiastical and Patristic Evidence.

— The creeds of the Church, from the begin¬ nings of Christianity, have contained the be¬ lief in the resurrection of the dead. Such are the Apostles' Creed, as witnessed to by Justin (a.d. 138-165), Tertullian (194-221), Phcebadius (d. c. 392), Rufinus (d. 410) and Epiphanius (d. 374) ; the Fides Damasi (c. 380), the Nicene-Constantinopolitan Creed (381), Libellus in moduni Symboli (referred to by Gennadius c. 490), the Quicunque (fifth cent.) and later creeds. So, too, the Fathers bear overwhelming witness to the doctrine of the' resurrection. We cite only the earliest: Clement of Rome, (1 Cor. 25); Justin, (Contra TryphonemP 80; Athenagoras, (De resurrectione carnisP 3; Tatian, (Adversus GraecosP 6; Tertullian, <Marcion,) v, 9, and (De resurrectione carnisP 1; Irenaeus, (Contra HaeresesP i, 10; Minu-cius Felix, (OctaviusP 34; Origen, in Matt, xxix; Hippolytus, (Adversus Graecos) (in Migne, (Patrologia GraecaP x, 799) ; Cyril of Jerusalem, Ephraim, Epiphanius, Basil and a vast list of later Fathers.

V. Resurrection of Christ. — One of the fundamental facts of Christianity is the resur¬ rection of Christ; without this fact, the whole fabric of our apologetic falls to the ground and there is no hope of any life after death. <(If Christ is not risen, vain is your faith, ye are still in your sins; yea, and they, that have passed to their rest in union with Christ, are lost. Why, if we have hoped in the mystic

union with Christ for this life alone, then are we the most to be pitied' of all mankind" (1 Cor. xv, 16-19). Hence it is of prime import¬ ance to establish the resurrection of Christ as ati historical fact. We do so from the four Gospels and the letters of Saint Paul, taken as historical documents, the substantial his¬ toricity of which no prudent man has any right to deny.

First, Jesus appealed to His future resur¬ rection in proof of the truth of His claim that He was the Ambassador of God the Father and that he had from God the Father a message for the world. This fact is clear to any reader of the historical documents called Matthew, Mark, Luke and John. Witness the sign of Jonas: <(Just as Jonas was in the belly of the sea-monster three days and three nights, so shall the Son of Man be in the earth three days and three nights" (Matt, xii, 39-41). Wit¬ ness the sign of the Temple: <((Destroy this temple, and in three days I will raise it up*

… He was speaking of the temple of His body" (John ii, 18-22). Witness, finally, the repeated and detailed prophecy of the oncom¬ ing death and resurrection of Jesus: <(He shall be delivered to the Gentiles ; and shall be mocked, and scourged, and spat upon. And after they shall have scourged Him, they shall kill Him. And the third day He shall rise again." This prophecy is given, in substantially the same form, three times by Matthew (xvi, 21 ; xvii, 12 and 22, 23 ; xx, 18, 19) ; three times by Mark (viii, 31 ; ix, 11-13 and 30; x, 33, 34), and twice by Luke (ix, 22; xviii, 31-34). There can be absolutely no doubt about this fact. Jesus clearly appealed to His future resurrection in proof of the truth of His claim that He had from the Father a message for the world.

Secondly, Jesus arose from the dead to ful¬ fill His prophecy in proof of the truth of His claim to divine ambassadorship, to the message from the Father and to the right to give that message to the world. This fact is denied only by those who start by throwing out of court miracles, prophecies and all supernatural ele¬ ments of religion. Their theories are summed up under Christology (q.v.). Against these theories are the subjoined, clear facts of our documents. The chronological order of these facts is matter of dispute; of the facts them¬ selves there is no doubt. They bear conclusive witness to the physical resurrection of Jesus. 1. The leaders of the priestly party and

the Pharisees called to the attention of Pilate the prophecy of Jesus: ((After three days I shall rise again." They demanded a guard, lest the disciples might steal the body of the dead Teacher and then say: ((He is risen from the dead." The tomb was closed with a rolling stone; the stone was sealed with the official seal; a guard was set to prevent stealth (Matt, xxvii, 62-66). 2. Saturday evening, after sun¬ set, the holy women visited the tomb, returned, bought spices and ointments (Matt, xxviii, 1 ; Mark xvi, 1; Luke xxiii, 56). 3. Christ arose early Sunday, the earth quaked, the angel rolled back the stone from the entrance to the tomb, the guards were terror stricken and lost con¬ sciousness (Matt, xxviii, 2-4). 4. While it was yet dark, Sunday morning (John xx, 1), the women started for the tomb; they arrived at daybreak (Mark xvi, 2) and found the stone

rolled back (Mark xvi, 3, 4; Luke xxiv, 1, 2) ; straightway Mary Magdalen returned to tell the apostles (John xx, 2). 5. The rest of the

holy women entered the tomb and saw two angels standing (Luke xxiv, 3, 4) and one sitting (Mark xvi, 5) ; they were told that Jesus had risen, and were sent back to inform the apostles (Matt, xxviii, 5-8; Mark xvi, 6, 7; Luke xxiv, 5-11) ; but were so frightened as to say nothing (Mark xvi, 8). 6. After hearing the story of Mary, Peter and John ran to the tomb and found it empty (Luke xxiv, 12; John xx, 3-10). 7. Mary Magdalen returned to the

tomb; Jesus appeared to her (Mark xvi, 9-11; John xx, 11-18). 8. Jesus appeared to the holy women, who had been affrighted by the vision of angels (Matt, xxviii, 9, 10) ; meantime the guards were bribed to say that the body of Jesus had been stolen by the disciples, while the soldiers were asleep (Matt, xxviii, 11-15). 9. Jesus appeared to the two disciples going to Emmaus (Mark xvi, 12, 13; Luke xxiv, 13-33). 10. The fourth appartion of Christ was to Peter (Luke xxiv, 34, 35). 11. Jesus appeared

to 10 apostles at Jerusalem, in the absence of Thomas (Mark xvi, 14; Luke xxiv, 36-49; John xx, 19-25). 12. Eight days after these five apparitions of the first Easter Sunday, Jesus again appeared to the apostles, and this time Thomas was present (John xx, 26-31). 13.

The seventh apparition was by the Sea of Gali¬ lee, to seven apostles ; the Saviour then en¬ trusted Peter with the primacy in shepherding His flock (John xxi). 14. On a mountain in Galilee, at the eighth apparition of the risen Saviour, He gave His Own world-mission to the

apostles (Matt, xxviii, 16-20). 15. On Mount Olivet, Jesus repeated to His apostles the com¬ mand to preach the FathePs message to the world, and He then ascended into heaven (Mark xvi, 15-19; Luke xxiv, 50, 51).

Briefly, then, in nine apparitions recorded by the evangelists; and in three apparitions handed down by Paul alone — to James, to Paul, and <(to more than 500 of the brethren at one time" (1 Corinthians xv, 3-8) — Jesus spoke, ate, walked and acted otherwise as He had acted before death. He proved to His followers that He was risen from the dead. In the court of historical evidence, there can be no prudent doubt of the validity of the testi¬ mony that we have summed up. Matthew, John and Paul were eye-witnesses of what they narrate. Mark and Luke had personal inter¬ course with the eye-witnesses of the risen Christ. Hence, first, our witnesses could read¬ ily have known the facts they handed down to us. Secondly, there is no reason to suppose that they falsified the facts they state. They intended to tell the truth in regard to the risen Jesus. They told the truth, as they deemed it to be truth. They had absolutely nothing to gain by telling the truth — nothing that the world deems worth the while. They had all to lose by telling the truth — all that the world rates high. To gain, they had poverty, -con¬ tumely, failure in name and fame, by the propaganda of the worship of a crucified Man-God ; by the spread of His otherworldiness — love of enemies, forgiveness of injuries, re¬ nunciation of wealth and power; and by death itself. Matthew and Paul were actually put to death for their pains in telling the truth about

Jesus; John endured tortures that naturally should have caused his death; Mark, also, was martyred for his witness to the truth that he wrote.

Bibliography. — The biblical commentators ; Bautz, (Die Lehre vom Auferstehungsleibe) (1877) ; Williams, (Our Lord's Resurrection (1882) ; Faunce, (Resurrection in Nature and in Revelation (1884) ; Milligan, (The Resur¬ rection of Our Lord) (1884) ; Westcott, <The

Gospel of the Resurrection (1884); Shedd, (Doctrine of Endless Punishment 5 (1886) ;

Kullmann, (Die Wacht am Grabe Christi und die Leugner seiner Auferstehung) (1887) ; Atzberger, (Die Christliche Eschatologie5 (1890); Cox, (The Resurrection (1890); Far¬ rar, (The Eternal Hope) (1892); Dahle, (Life after Death and the Future of the Kingdom of God5 (Eng. trans., 1895) ; Giannone, HI Tri-regno) (1895) ; Wilhelm and Scannel, Man¬ ual of Catholic Theology) (Vol. II, 1898) ; Hughes-Games, (On the Nature of the Resur¬ rection of the Body) (1898) ; Charles, (A Crit¬ ical History of the Doctrine of a Future Life in Israel, in Judaism and in Christianity5 (1899) ; Salmond, (The Christian Doctrine of Immortality) (1901) ; Beet, (The Last Things> (1905) ; Dentler, (Die Auferstehung Jesu Christi nach den Berichtungen des N. TP (in Biblische Zeitfragen, 1908) ; Prat, (Theol-ologie de S. PauP (1908) ; Hyslop, Physical Research and the Resurrection5 (1908) ; Schulte, (Das Osterwunder in der neuen Theologie) (1909) ; Volter, (Die Entstehung des Glaubens an die Auferstehung Jesu) (1910) ; Simpson, (The Resurrection and Modern Thought5 (1911) ; Plummer, (I Corinthians5 (in International Critical Commentary , 1911).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College, Maryland.

RESURRECTION, a novel by Leon Tol¬ stoy, published in 1900. It presents in the au¬ thor's strongest manner the theme of the de¬ velopment of a great character, besides offering a picture of Russian society, from the wealthy office-holding circle, to the peasants and com¬ mon soldiers, jailers and criminal classes. Nekhludoff, a noble, in the effort to right the wrong he has done to another, unconsciously rights t'he wrong done in himself by the false social outlook and inadequate education which had made him what he was and constructs for himself a new and broadly human creed of living.

RESURRECTION FERN. See Ferns and Fern-Allies.

RESURRECTION PLANT. See Rose of Jericho.

RESURRECTION SISTERS. See Or¬

ders, Religious.

RESURRECTIONISTS, or BODY-SNATCHERS, a class of miscreants who, in Britain previous to the passing of the Anatomy Act of 1832, made a livelihood by rifling graves, taking out the corpses and selling

them to schools of medicine and surgery as ˆsubjects55 for dissection or demonstration. So long as in Britain the supply of “subjects55 from the gal¬ lows sufficed for the needs of the schools, there

was no call for a resort to illegal means. But when, in the progressive reform of criminal law, capital punishment was less frequently in¬ flicted, while medical and surgical schools were greatly multiplied, the necessity for “subjects55 overrode the laws, and the trade of the resur¬ rectionist flourished. As the schools were mostly in London the graveyards in the vicinity of the metropolis were the main resource of the body-snatchers, with whom the grave-diggers and the caretakers were usually in league. As the business was naturally risky and precarious the price of ((subjects)5 was, for each, $40 to $50. To protect the bodies of the newly in¬ terred their graves would be protected with strong gratings or spring-guns would be set at night, or the friends of the deceased would keep watch, armed, over the graves for several nights till the bodies had become unfit for use in the schools. These precautions made the business of the body-snatchers even more risky, and “subjects55 would be sought in various locali¬ ties throughout the kingdom. As the price paid by the doctors rose and the risk grew greater, it occurred to one Burke at Edinburgh to pro¬ vide subjects for the dissecting table by killing people instead of violating graves. He was hanged at Edinburgh 28 Jan. 1829, convicted of having dispatched 15 victims and sold their bodies to the doctors. The first Anatomy Act of the British Parliament (1832) provides that schools of anatomy and teachers and demon¬ strators of anatomy shall be licensed; such schools and such teachers are empowered to re¬ ceive as subjects for dissection the cadavers of persons dying friendless, in poorhouses, hos¬ pitals and elsewhere; and the trade of the resurrectionist was practically done away in Britain by the passage of the act. In the United States there are not in any of the individual States any statutes regulating the practice of anatomical dissection: the plundering of graves for subjects of dissection is a misdemeanor for which the offender may be indicted at common law. Instances are not very rare of the bodies of persons, not friendless, who die in public or quasi-public hospitals, being, without legal war¬ rant, sold to the schools by subordinate em¬ ployees of such hospitals. Body-snatching, or rifling of graves for the purpose of exacting a ransom from the families of the dead is not in¬ frequent: a notable instance was that of the stealing of the body of A. T. Stewart, well-known New York merchant, in 1878, from the cathedral at Garden City, Long Island. The body-snatchers in this case demanded a ransom of $200,000, which afterward they reduced to half that sum : finally, they received

$20,000 with the assurance that they should not be prosecuted. Since that time extraordinary pre¬ cautions are taken against body-snatching from the graves, especially of very rich persons. Consult Bailey, J. B., ed. (The Diary of a Resurrectionist5 (London 1896).

RESZKE, resh'ke, Edouard de, Polish

opera singer: b. Warsaw, 23 Dec. 1856; d. 30 May 1917. He studied at the College de l'Agriculture of Proskao, and then turned attention to the cultivation of his remarkable bass voice. He appeared in Paris in 1876 at the Theatre Italien, and afterward in the large cities of Europe and America. He created the role of the King in Catalini's (Edda5 and Carlo V, in

Marchetti's (Don Giovanni d'Austria) at Turin. He was especially identified with Mephistopheles in (Faust} ; Frere Laurent in (Romeo et Juliette,* and the Wagnerian roles of Hans Sachs, Wotan and King Mark.

RESZKE, Jean de, Polish opera singer : brother of Edouard de Reszke (q.v.) : b. War¬ saw, 14 Jan. 1853. He completed the law course at the Warsaw University; but having been surrounded by a musical atmosphere in his home, and having sung as a boy in the cathedral, he decided upon singing as a career. He studied with Ciaffei and Cologni in Italy and made his debut in Venice in 1874 as Alfonso in (La Favorita.* In the two following years he appeared in London and Paris. Hitherto he had sung baritone roles, but in 1876 he re¬ tired to cultivate his natural voice whose reg¬ ister was that of a tenor. In 1880 he reap¬ peared, singing at Madrid in (Robert le Diable.* Following this he created the part of Jean in Massenet's <Herodiade) in Paris and was en¬ gaged at the Opera where he sang from 1885 to 1890, appearing in (Le Prophete,* (L'Africaine,* 'Aida,* 'Faust,* 'Romeo et JulietteP (Don JuanP and (Le Cid* which Massenet composed for him. From 1893-99 he appeared continuously at the Metropolitan Opera House, New York, where he added to the foregoing roles several Wagnerian parts, particularly (SiegfredP In

later years he was associated artistically with his brother Edouard. He re¬ tired from the stage in 1902 and subseqently devoted himself to vocal teaching in Paris.

RETAINING WALL, a wall usually of masonry, erected for the purpose of confining a body of water in a reservoir, or for resisting the thrust of the ground behind it. Without such a wall the earth would slide, or lie at a considerable angle off the perpendicular. A bank of rock may hold itself, but gravel, sand or loose earth will slide and wash away and requires a retaining wall to confine it. The amount of resistance or strength in the wall depends partly on the material held back and partly on the angle of repose, that is the angle beyond which the sand, gravel, etc., will slide. The pressure against the wall is produced by the material filling the space between the angle of repose and the face of the wall. As a gen¬ eral rule the thickness of retaining walls is made one-third the height of the bank which they are intended to support. In estimating the requisite thickness of the wall, account must be taken of the different ways in which it may be displaced, as by overturning, slipping along its entire base, or the giving way of the upper parts while the base remains. In reservoir walls of masonry, the thickness should be made practically double that of ordinary earth re¬ taining walls. In the case of loose soil, readily rendered fluid by rains, as at Panama, the greatest engineering difficulties have been en¬ countered. (See Panama Canal). The great irrigation projects of the West and the Ashokan reservoir in New York presented vast problems in building retaining walls. Consult Cain, (Practical Designing of Retaining Walls) (1914); Baker, (Treatise in Masonry Con¬ struction (1900) ; Merriman, <Masonry> (1915). See Dams; Irrigation; Masonry and Building; Reservoir.

RETARDATION OF PUPILS. This

term is popularly used by educators to mean that a pupil is old in years for his grade, on the basis of being in ‘the first grade of the elementary school course at the age of six or seven years. According to this general plan all pupils who were eight years old or more, and were found in the first grade at any time during the school year would be considered as retarded. In the same manner all second grade pupils nine years old and over are retarded. This general standpoint of a leeway of two years in the standard age with its possible ap¬ plication at any time during the school year when the data may be collected from pupils and teachers is, however, far too loose in its ap¬ plication to serve as a very definite measure. The proper standard of age is that

a pupil should begin the elementary school course at the first opportunity presented after he has passed his sixth birthday. In most cities this opportunity comes within six months, and the custom of midyear promotions is quite universal. In order to provide for those cities which pro¬ mote only once a year, the standard should be made six years but less than seven years for beginning the first grade; seven vears but less than eight years for beginning the second grade. This scale of pupils' ages is not based upon the mere fact that a pupil is in a certain grade at some time during the school year, but upon the pupil's commencement of the work of a certain grade involving the actual completion of previous grades. This definite standard has been adopted by the superintendents of New York State. Age is figured as of the nearest birth¬ day. The exact definition of retardation is, however, not covered even by this well-defined plan of figuring age for beginning or com¬ pleting a particular grade, because many chil¬ dren do not start school at the age of six years, but wait until they are seven or eight years old, and once entering their progress is in many cases entirely regular. The correct conception of a retarded pupil is one who has spent a longer time in school than the usual period required to finish a given grade or place him at the beginning of the next advanced grade. In other words, the normally progressing pupil completes one grade in one school year, and a retarded second grade pupil would be one who began that grade with more than one year of previous schooling; a retarded third grade pupil would be one beginning that grade with more than two years of previous schooling, *etc.*

The age basis alone is inaccurate for all pupils who do not happen to enter school be¬ tween their sixth and seventh birthdays. On the basis of time-in-school, however, no pupil is charged with retardation unless he has actually spent more than the allotted time to achieve a given point in his school progress. Owing to the absence of complete progress rec¬ ords in schools at the present time, however, the age basis is the only measure on which in¬ formation is available on a broad scale, and for this reason it is valuable and its compila¬ tion is worth while. Modern practice com¬ bines the tabulation of both age and progress figures. It is evident that a pupil may get an early start and make normal progress. An¬ other may make a late start and progress

normally, and since a given pupil may be young, normal or overage, and may at the same time make rapid, normal or slow progress, we have nine possible categories of pupils with ref¬ erence to these conditions, as follows :

1 Underage and rapid progress

2 Normal age and rapid progress

3 Overage and rapid progress

4 Underage and normal progress

5 Normal both as to age and progress

6 Overage and normal progress

7 Underage and slow progress

8 Normal age and slow progress

9 Overage and slow progress

These are best shown in the following ar¬ rangement of the groups :

Underage and rapid progress

Normal age and rapid progress

Overage and rapid progress

Underage and

Normal both as

Overage and

normal progress

to age and progress

normal progress

Underage and

Normal age and

Overage and slew

slow progress

slow progress

progress

According to this plan the results of the statistical research in the cities undertaking this work during 1916-17 are given.

An analysis of 46,000 pupils on this plan is given in Table 1, Fig. 1.

Table 1.

46,000 Pupils in Twenty-two Cities in New

York State.

Numbers

Percentages

PUPILS

Underage

Normal age

Overage

Total

Underage

Normal age

Overage

Total

Rapid progress. .

1,356

1,195

820

3,371

2.9

2.6

1.8

7.3

Normal

progress. .

2,710

16,220

7,921

26,851

5.9

35.3

17.2

58.4

Slow

progress. .

315

3,148

12,338

15,801

0.7

6.8

26.8

34.3

Total . .

4,381

20,563

21 ,079

46,023

9.5

44.7

45.8

100

Public school pupils commonly move from city to city, and within the

same city they fre¬ quently transfer back and forth between pa¬ rochial and public schools as well as from one public school to another. These changes in the location of pupils' schooling affect their progress to a considerable extent as shown in subdivision A, Table 2, and in Fig. 2.

Rapid

Progress

Normal

Progress

Stow

Progress

Total

Under Age Normal Over Age Total

Fig. 1.

Age and progress of elementary pupils.

This age-progress percentage chart represents the nine groups of pupils shown in the text just preceding table 1. The figures show percentages alone and not the actual number of pupils and correspond to table 1 to which additions were made after the figure had been drawn, which slightly changed the decimals in some of the percentage figures. The total of 100 per cent is the sum of the nine groups, not of the 15 other circles in the figure, 6 of which, 3 at the right and 3 at the bottom, are subtotals.

Table 2.

Age-progress Analysis of 3,665 Elementary Pupils by School Location.

A — All Pupils Enrolled.

PUPILS

Numbers

Percentages

Underage

Normal age

Overage

Total

Underage

Normal age

Overage

Total

Rapid progress. .

120

96

101

317

3.3

2.6

2.8

8.7

Normal progress.

370

641

431

1,442

10.0

17.5

11.8

39.3

Slow progress …

119

353

1 ,434

1,906

3.3

9.6

39.1

50.0

Total .

609

1,090

1,966

3,665

16.6

29.7

53.7

100

B — 2,289 Pupils Schooled Entirely in Local Public Schools.

Rapid progress. .

95

59

35

189

4.2

2.6

1.5

8.3

Normal progress.

323

500

208

1 ,031

14.1

21.8

9. 1

45 .

Slow progress …

100

275

694

1,069

4.4

12.

30.3

46.7

Total .

518

834

937

2,289

22.7

36.4

40.9

100

C — 836 Pupils Schooled Entirely in Two or More Local Public Schools.

Rapid progress . .

11

8

38

2.3

1.3

1.0

4.6

Normal progress.

82

148

101

331

9.8

17.7

12.2

39.6

Slow progress …

60

98

309

467

7.2

11.7

36.9

55.8

Total .

161

257

418

836

19.2

30.7

50.1

100

D — 1453 Pupils Schooled Entirely in One

School.

Rapid progress. .

76

48

27

151

5

3

2

10

Normal progress.

241

352

107

700

17

24

7

48

Slow progress …

40

177

385

602

3

12

27

42

Total .

357

577

519

1,453

25

39

36

100

E — 785 Pupils Schooled Partly in Local Non-Public Schools.

Rapid progress. .

5

14

42

61

0.6

1.8

5.3

7.7

Normal progress.

24

66

133

223

3.1

8.4

16.9

28.4

Slow progress …

9

45

447

501

1.2

5.7

57.

63.9

Total .

38

125

622

785

4.9

15.9

79.2

100

F — 458 Pupils Partly Schooled in Other Cities.

Rapid progress. .

18

21

21

60

3.9

4.6

4.6

13.1

Normal progress.

20

66

66

152

4.4

14.4

14.4

33.2

Slow progress …

10

29

207

246

2.2

6.3

45.2

53.7

Total .

48

116

294

458

10.5

25.3

64.2

100

G — 133 Pupils Partly Schooled in Foreign Countries.

Rapid progress. .

2

2

3

7

2

2

2

6

Normal progress.

3

9

24

36

2

6

18

26

Slow progress …

0

4

86

90

0

3

65

68

Total .

5

15

113

133

4

11

85

100

This table shows that at the very start there are three types of location factors which have to be analyzed quantitatively before the super¬ intendent can even begin to interpret his own age-progress figures: (1) changes within his

system, (2) the combination of public and pa¬ rochial schooling, and (3) the combination of local and out-of-town schooling. The great difference between the number of pupils who are overage, who are slow and who are both old and slow shows the inadequacy of either age or years-in-school alone as a measure of re¬ tardation, and the handicap under which those superintendents are working who have not the aid and support of a complete system of indi¬ vidual permanent record cards, so essential to the demands of modern supervision considered

M-‘&Ce-‘MTAGE’OP’ r > VMLS bom ove-fc-Ace a 5iow-t > &fl&fcfc’SS

T

All f»V»»iLS trnmiE-b

44

l»\/PiLS F-ftOM MOM-PW6UC SCHOOLS

PVAILS SCMOOttrb

6-NTl*»GrLY IM LOCAL PVbUC SCHOOLS

Pv*>»ts PRon

OUT - OP-TOWM

47«/o

PVPILS JCHOOtS-6 IP* TWO Oft MOOS’ LOCAL

oueuc schools

3? •/.

*»VftlLS SCHOOLED S-MTIH6-LY »« ON6r PVfct»C SCHOOL

30«/o

Fig. 2.

This figure should not be misinterpreted as show¬ ing the relative number of pupils who have been schooled entirely in the local system or have come into it from the outside. It represents groups of pupils based on the location of their previous schooling, ranging in size from 133 pupils partly schooled in foreign countries to the grand total of 3,665 found in the public schools at the time of the survey. Each circle represents 1 00 per cent of its own group and the black sector shows the percentage of these that are retarded.

locally and entirely apart from any collective research such as this discussion. Even this sevenfold table does not tell the complete story of local and outside retardation, to determine both of which requires the correlation of each pupil's progress with the proportion of his total schooling received in the local public system and obtained elsewhere, a task which, while somewhat involved, is quickly accomplished by means of the mechanical tabulation of these statistics with electrical machines.

Analysis by Grades. — Tables 1 and 2 pre¬ sent figures for all pupils in a city system be-

longing to the several groups. In order to gain the elementary course. The extent to which

an adequate notion of the retardation in a slow progress varies in the different grades is

school system it is essential to have a separate shown in Table 3, Fig. 3. analysis of each of the eight regular grades of

Table 3.

Progress Percentages of 286,207 Pupils in 41 Cities, 29 Villages and 493 Union Free

School Districts.

GRADE

Rapid

Normal

1 year slow

2 years slow

3 years slow

4 years slow

5 years slow

6 years slow

Total

slow

Total

1 .

38,112

7,501

841

154

19

10

6

8,531

46,643

2 .

2,225

28,026

8,900

2,108

357

83

24

8

11,479

41,730

3 .

2,917

24,796

8,120

2,325

631

180

41

10

11,309

39,018

4 .

3,773

21,599

9,247

2,964

923

296

84

19

13,533

38,905

5 .

4,152

18,815

8,990

3,109

1,053

306

58

14

13,222

36,497

6 .

4,568

16,402

7,963

2,684

801

217

28

12

11,609

32,579

7 .

4,854

13,875

6,126

1,693

416

67

11

1

8,314

27,043

8 .

4,639

12,798

4,709

1,298

274

72

2

6,355

23,792

Total .

27,128

1-74,419

61 ,556

16,925

4,608

1,240

259

70

84,660

286,207

Percentages

1 .

81 .69

16.07

1.80

.330

047

.027

.012

18.3

100

2 .

5.33

67.16

21.31

5.05

.852

. 198

.057

.019

27.51

100

3 .

7.47

63.54

20.81

5.95

1.617

.461

. 105

.025

28.98

100

4 .

9.67

55.51

26.09

7.62

2.372

.760

.215

.049

34.78

100

5 .

11.37

51.55

24.63

8.52

2.885

.838

. 158

.038

37.07

100

6 .

14.02

50.34

24.44

7.94

2.458

.666

.088

.036

35.63

100

7 .

17.94

51.31

22.65

6.26

1.530

-.247

.040

.004

30.74

100

8 .

19.49

53.77

19.79

5.46

1 . 150

.300

08

26.71

100

Total .

9.48

60.94

21.51

5.91

1.608

.433

.091

.025

29.58

100

Rapid, Normal & .Slow Progress Percentages Reported By 5 < c > 3 School Systems In New York .State Representing a Tata I of £ < 56,207 Elementary Pupils

More Than 2 Yrs.Slow progress

Two Years SI o\V

One. Year

5 l w

I

Norm <x l

Pf q/rc*4

Raoid

Progress

Fig. 3.

432

S\ow Progress Percentages In 175

vSy s+em.s With LessThan 100 Elementary Pupils Each /O 2.0 SO 4Q _ s50

Percents Tvt/0 or More Veari 5/oW

£0 30 40-%

Fig.

School Systems of Different Sizes. — In

addition to the analysis by school locations and by grades, it is very* essential not to limit the study of retardation to one school system, but to gather similar data from a number of school systems of comparable size. When this has

4.

been done the figures should be tabulated in the order of the slow progress percentage of each contributing place. Such an arrangement is graphically represented in Fig; 4 above, and shown in Table 4 on the following page.

Table 4.

Slow-progress Percentages Reported by 175 Union Free School Districts with an Ele¬ mentary Enrolment Below 100.

SLOW-PROGRESS PERCENTAGES REPORTED

Number

reporting

Per cent two or more years retarded

Number

reporting

2 .

1

0

2

5 .

1

1

7 .

1

2

1

8 .

1

3-0 1

1

9 .

3

4

1

11 .

3

5

1

12 .

3

6

1

13 .

2

7-Md

1

14 .

4

8

15 .

1

9

11

16 .

5

10

1

18 .

5

11-Q3

19 .

4

12

20 .

3

13

21 .

6

14

22-Qi .

4

15

23 .

2

16

24 .

4

17

25 .

3

18

26 .

2

20

27 .

5

23

28 .

5

25

29 .

3

46

30 .

5

31 .

9

32-Md .

3

33 .

8

34 .

5

35 .

5

36 .

5

37 .

2

38 .

6

39 .

6

40 .

4

41 .

3

42-Q3 .

4

43 .

11

45 .

3

46 .

7

48 .

2

50 .

4

51 .

2

52 .

2

53 .

3

54 .

1

58 .

1

59 .

1

63 .

1

73 .

1

76 .

1

This table means that the retardation in this group of villages ranges from 2 per cent to 76 per cent, the midpoint of the series of

medium being 32 per cent and the two quartile points which include the middle half of the series being 22 per cent and 42 per cent re¬ spectively. Reading across the top line, the table is interpreted as follows :

Two per cent slow progress is reported by one village.

Zero per cent of pupils retarded two years or more is reported by 23 villages.

The second line means that 5 per cent slow progress is reported by one village, and one village reports 1 per cent of pupils retarded two or more years. It should be emphasized that the particular percentage of retardation which _ happens to be the median of such a table is by no means the normal amount of retardation which should be expected, or which would represent satisfactory school conditions. Slow progress percentages reported by cities and villages in New York State, May 1917, are shown in Table 5.

Correlation with Other Factors. — A com¬ plete study of retardation should show condi¬ tions relating not only to the retardation of pupils but should give this information in con¬ nection with the health of the pupil, and with his ability to perform the now thoroughly tried and permanently established standard classroom tests used by modern superintendents as a part of their regular supervisory program. It is in¬ teresting to note in Table 5, that average pupils are by no means confined to those having physical defects, but that in this single illustra¬ tion a large majority of the pupils with physical defects are of normal age and even underage.

School Retardation and Mentality. — The fact that a pupil may have started school at the age of seven or eight instead of six years or that he may have required an extra year to place him in a given grade does not in any way prove or indicate that there is anything the matter with his mind, as either or both of these circumstances may obtain in the case of a pupil of normal intelligence. Retardation in school is by no means synonymous with mental subnormality. Some of the factors contributing to retardation in school are the following:

a The late entrance of pupils into the first grade.

b Varying practice in promoting children into and out of the first grade.

c Different standards of promotion from grade to grade.

d Differences in the health of pupils while at school.

e Varying degrees of regularity of attendance.

Table 5.

Progress Percentages of 286,207 Pupils in 41 Cities, 29 Villages and 493 Union Free

School Districts.

Pupils

Per cent

GROUP

Rapid

Normal

Slow

Total

Rapid

Normal

Slow

Total

T,pss than 100 .

987

6,724

3,732

11,443

8.62

58. 76

32.62

100

100-199 .

1,078

11,090

6,183

18,351

5.82

60.8

33.352

100

200-299 .

864

11,574

6-, 541

18,979

4.56

61.

34.44

100

300-499 .

1,271

13,674

7,104

22,049

5.77

62.

32.23

100

500-599 .

2,217

1 7 , 566

9,965

29,748

7.3

59.3

33.4

100

1000-1999 .

3,123

18,118

9,691

30,932

10.09

58.57

31.33

100

2000-2999 .

2,681

10,937

6,071

19,689

13.61

55.5

30.83

100

3000-4999 .

4,483

18,361

8,389

31 ,233

14.35

58. 79

26.86

100

Over 5000 .

10,424

66,375

26,984

103,783

10.04

63.96

26.

100

TP nfal .

27,128

174,419

84,660

286,207

9.48

60.94

29.58

100

/ Different degrees of familiarity with the English language. g Differences in the mentality of normally intelligent children.

h The presence of mentally subnormal children in regular

classes.

j Physical defects of children. k Differences in the maturity of children.

I Differences in the home environment of children. m Differences in the amount of time which children may devote to the preparation of lessons outside of school.

n Circumstances incident to the moving of families from place to place.

o The transfer of pupils from one school to another and from parochial to public schools within a city.

p Differences in the type of pupil left in the system when others have been removed.

q Differences in the extent to which communities offer inducements for pupils to leave school.

Rochester, N. Y., considerable attention has been given to the preventive and remedial measures used by elementary teachers against retardation. It is significant to note that where teachers have reported in detail their efforts to reduce retardation, they have enumerated meas¬ ures all of which should be employed by every good teacher in her regular work with normally successful pupils as well as with those in danger of non-promotion. There is indeed little doubt that the most effective way to reduce retardation is to improve the teaching itself, and this is already the superintendent's constant problem.

fc-n*oLnfrrvr-f-nnoLMfcriT-

tn*OL*trnT‘

C-nfcOLntnT-

&APIO

PftOCftt is

E > tt > CE-MTAGfr OF &At > IC > . NORMAL AND SLOW
C > t > OCt > tSS EA/MLS

— IM 563 frLE-116-MTACiY SYSTtriS -

• fcn&om hit-

ˆHOIR |

SOOO An&MOMr

0

Z3A

32

35.3

32-6

2.6

26

PRO

SLOW

PKOGAt-SS,

Table 6.

Under, Normal and Overage and Physical

Defects.

GROUP OF PUPILS

Without

physical

defects

With

physical

defects

Total

Pei

With¬

out

defects

rcentag <

With

defects

Total

Underage… .

22

79

101

4.2

15.2

19.4

N ormal age . .

69

258

327

13.3

50.0

63.3

Overage .

21

69

90

4.0

13.3

17.3

Total…

112

406

518

21.5

78.5

100

Variations in pupils' progress through school and variations in the mentality of children are shown in Figs. 5 and 6, from which it is clear that the factors listed above combine to bring about the result that while there appear to be actually more bright children than dull children, there are relatively fewer who make rapid progress through school than the propor¬ tion making slow progress.

Preventive and Remedial Measures. — The query naturally arises, now that we have this information about non-promotion, What is to be done about it? In several places, notably in

Many cities have certain features in their organization, which, entirely apart from the effort to improve the effectiveness of the in¬ struction in the regular classroom, make it easier to grapple with the retardation problem and have been of material assistance in re¬ ducing its effects. These special features in the organization of the school and of the whole local system do not apply to pupils who are making normal or rapid progress but to retarded pupils and those in danger of non¬ promotion, and for this reason they may be called

preventive and remedial measures with more propriety than those which ought to be a feature of the effective and successful teach¬ ing of all pupils. A list of some of these measures is given by way of illustration.

1. Primarily Concerning the Teaching. —

A. Those which allow the pupil repeating the grade to remain with the class which is regu¬ larly taking the grade for the first time. The remedial work is performed by the teacher in the course of her regular instruction and the retarded pupil is supposed to have the chance of finishing the grade with the rest of the class..

B. Those which involve the services of an assistant working in the classroom with the regular teacher.

C. Those which involve a temporary trans¬ fer to a special class and a prospective return to the regular grade in time to complete it with the class at the close of the term.

6T%

Fig. s.

Rapid, normal and slow progress of 286,207 elementary pupils in 563 public school systems in New York State.

This figure shows where the schools have the children located with reference to the normal advancement of one grade a year. Note that relatively a larger number of pupils are found on the slow side of the normal than in the portion of the diagram representing rapid pupils.

D. Those which involve a transfer to a spe¬ cial class with a return to regular work some time after the class from which the transfer was made has completed the work of that grade.

(1) Ungraded classes.

(2) Foreign classes.

(3) Special catch-up classes.

(4) Classes for atypical pupils.

(5) Open-air classes.

E. Those which involve the substitution of a modified, though regularly graded, course of study in place of the regular elementary curriculum.

F. Those which involve a transfer to another sort of school or institution which substitutes a special curriculum for that of the graded school.

2. Primarily Concerning the Administra¬ tion of the School. — Those which relate to the principal's office and to the school district as a unit

rather than to the instruction in the classroom. The keeping and actual use of special individual records of scholarship, health and standard test results; special features of organization within the school and of co-opera¬ tion with the home.

3. Primarily Concerning the Administra¬ tion in the Entire Local School System. —

Those which relate to the department as a whole and to cooperation with other city de¬ partments and organizations. Analysis of re¬ tardation records of schools and use of data in the supervisory program. Employment of clerk or establishment of a bureau of research

and educational measurement. Cooperation with all city departments having to do with children. Study of the methods used in other t cities of comparable size.

Retardation Survey. — In order to make a study of this problem in a school system, it is necessary to obtain for each pupil enrolled the following information :

1. The date of birth.

2. The date of entrance into the first grade (not kindergarten).

3. The number of terms (one-half years) of schooling received and grades or half grades completed in each of the following school locations :

a School where registered.

b Other local public schools.

c Local parochial or private schools.

d Any schools in other cities.

e Schools in foreign countries.

4. Grades or half grades skipped or doubly promoted.

5. Grades repeated or doubly repeated.

6 Note of extraordinary circumstances fa¬ vorable to progress.

7. Note of extraordinary circumstances un¬ favorable to progress.

33**

Definite

Feeblcmmd—

edness

1 .48%

70 50

Bor¬ der¬ line

5.45

10 \10

Dull¬

ness,

14.35

Normal

Intelligence

55.5

Super¬

ior

16.5

Very Superior Intelligence

140

5.92

Neor—

Gen/us

.28

23. ’»

Z0)%

iZ

* f ?.

8 > %

Fig. 6.

Intelligence distribution of 1000 unselected children.

This figure should be examined in connection with figure 5. Note that so far as the children's minds are concerned: (1) the number below normal is considerably less than the proportion of children whose progress through school is below normal as shown in figure 5, and (2) that the number of children who appear in any way to be mentally slow is more than counterbalanced by the number of children of cor¬ responding degrees of mental superiority. This is in marked contrast to the relatively few children who are making rapid progress through school. This figure is a modified form of a diagram in " The Measurement of Intelligence " by Lewis M. Terman, published by the Macmillan Company and re¬ produced here with the permission of the author and the publishers. Together figures 5 and 6 would appear to show that there is considerably more trouble with the children's schooling than there is with their minds, and that whatever is the matter with their schooling is quite out of proportion to anything wrong with their minds.

The most effective manner of assembling retardation data in the tables is to resort to the mechanical tabulation of these statistics by means of electrical sorting and tabulating ma¬ chines, in which process a small card contain¬ ing all the necessary information is punched for each pupil. These cards are then run through the machines any desired number of times in order to make sortings based upon the

different angles from which the situation is to be viewed.

Bibliography. — Ayres, L. P., (Laggards in Our Schools* (Russell Sage Foundation, New York City 1909) ; Averill, W. A., (The Ages of Pupils and Their Progress Through the Elementary Grades* (Bulletin New York State Education Department, 1918) ; Bachman, F. P., ˆProblems in Elementary School Administra¬ tion (1914) ; Keyes, C. H., Progress Through the Grades of City Schools) (Teachers' College, Columbia University, Contributions to Educa¬ tion No. 42, 1911) ; Strayer, G. D., (Age and Grade Census of Schools and Colleges* (United States Bureau of Education Bulletin No. 4,

1907).

W. A. Averill,

New York State Department of Education.

RETENTIVENESS, a quality of memory by which the after-effects of mental process are long held, with capability of reproduction. Re¬ tention is of primary importance in judgment, particularly in the study of processes that are continuous, or in which there is a continuity of interest. Thus when one hears a succession of sounds and judges that the second, for in¬ stance, is louder than the first, the property of retention, by which the after-effect of the hear¬ ing of the first sound is compared with the second, is of great importance. In many this attribute of retentiveness is weak, seriously im¬ pairing their judgment. See Judgment; Mem¬ ory and its Disorders.

RETHEL, ra'tel, Alfred, German painter: b. Aix-la-Chapelle, 15 May 1816; d. Diisseldorf,

1 Dec. 1859. He studied at the Academy of Diisseldorf (under W. Schadow) and after¬ ward at Frankfort (under Philip Veit and Schwind). Here he painted <The Resurrection of Christ* (in the church of Saint Nicholas),

4 Daniel } (in the city museum) and (Justice Pursuing a Fleeing Murderer. *When there was a competitive exhibition held of designs for frescoes in the town-house of Aix-la-Chapelle representing incidents in the life of Charle¬ magne, he was chosen to do the work, and lived to complete four of them ; the other four being executed from his designs after his death. These are considered the finest productions of his brush. He painted in water-color a series of pictures illustrative of Cannibal's Passage of the*

Alps, which were afterward reproduced by wood engraving. In 1848 he executed his < Dance of Death,* and drew a number of de¬ signs on wood. His style was notable for gran¬ deur and energy, and his frescoes are among the finest modern examples of that style in Europe. In 1852 he was seized with a nervous affection for which he sought relief by travel¬ ing, but died insane.

RETIARIUS, re-shi-a'ri-us, a netman, that is, a Roman gladiator who wore a short tunic and carried a trident and net, with which he endeavored to entangle and dispatch his adversary, who was armed with helmet, shield and sword.

RETIF DE LA BRETONNE. See Res-tif de la Bretonne, Nicholas Edme.

RETINA. See Eye.

RETREAT, Spiritual, or RETREAT, in

devotional language, a season of retirement from ordinary secular occupations and of

prayer, of meditation upon the truths of re¬ ligion and the duties of the Christian life, of examination of the conscience, of serious con¬ sideration of one's spiritual state, *etc.* 'Uie retreat is also called the spiritual exercises, t*at being the name given to it by Saint Ignatius de Loyola, whose plan of the exercises (Exercitia spiritualia) has ever since his day been the directory of the spiritual retreat. The exer¬ cises are arranged for a retreat of four weeks, but usually the time is abridged to 10 days or a week. See Spiritual Exercises, The.

In military language, a retrograde move¬ ment, whether forced or strategical, by which troops retire before an enemy: it differs from a flight in being orderly and under control. An army in retreat must be covered by a powerful rearguard, which from time to time must, if the enemy is pursuing, hold the pursuers at bay, while the artillery and the baggage pass defiles, cross streams or overcome any ob¬ stacles.

RETRIBUTION, in anthropology and in law : in anthropology the retribution, theory ex¬ presses the belief in states of happiness or of misery in another world, allotted to men according-to their deserts while living on earth. Tylor ((Primitive Culture,* Chap. 13) does not find this idea existing universally in the religions of the lower range of culture that have not been affected by contact with higher religions. The most primitive view of the life beyond the grave was, he holds,

that it is simply a continuation of the present ; to this succeeds the belief that ex¬ cellence, valor, social rank, etc., modify circum¬ stances and surroundings in the next life; out of this, he believes, was finally developed a doc¬ trine of future rewards and punishments. — In law, the theory of retribution, or retributive theory is, that punishment is inflicted in retri¬ bution for an offense, and ought to be similar to the misdeed : this is the principle of the retri¬ bution prescribed in the Hebrew law — <(an eye for an eye, and a tooth for a tooth.® In modern legislation deterrence displaces retribution : it is held that no more punishment should be in¬ flicted than suffices to deter others from com¬ mitting the offense : even the death penalty is not defended on the principle of ((life shall go for life,® but because with abandoned crim¬ inals capital punishment has a more deterrent effect than has life imprisonment.

RETRIEVER, a dog, trained to find out and bring back any killed or wounded game. The two varieties of British retriever differ only in coat. The larger and more familiar breed of retrievers, the wavy-coated, is formed by crossing the Newfoundland and the setter; the smaller or curly-coated breed is formed by crossing the water-spaniel and the terrier. The typical retriever is 20 or more inches high, with a stoutly-built body, strong limbs, webbed toes and black and curly fur. See Dog.

RETURN OF THE NATIVE, The

(1878), one of the masterpieces of Thomas Hardy and perhaps the best of all his earlier novels, deals with the people in the very centre of his favorite land of ((Wessex.® The scene never leaves Egdon Heath, and on this sombre uniting of various real places in the south of England, somewhat to the west of the Isle of Wight, a very intense tragedy is enacted. It is

conceived on classic lines, and is simple, clear and fateful. It is a story of the interruption of and sinister effect upon the ordinary life of the people caused by acts of will and wilfulness. Eustacia Vye, one of the

most perfectly deline¬ ated women in modern English fiction, wishing relief from the ennui of the restricted life on the heath seeks diversion in the admiration of Wildeve, but seeing a chance for positive escape in the return from Paris of the ˆnative,® Clym Yeobright, marries him, only to find herself, on the threatened loss of his eyesight, the wife, not of a Paris jeweler, but a day laborer on Egdon. Attempting to flee with Wildeve, both are drowned on the edge of the heath. Mean¬ while the course of these events has marred the life of Thomasin, Wildeve's wife, has es¬ tranged Yeobright from his mother, and caused the death of the latter. As in many of Hardy's works the wilfulness of one character like a kind of fate operates to disturb and ultimately to upset the lives of several people, and only when Eustacia finally involves herself in the general ruin does life resume its normal though altered course. The tragedy is an extremely vivid and powerful one, although severely localized. It is very richly set in the back¬ ground of local customs, habits and characters, all of which are given an extraordinary unit}' and impressiveness through the dominance of Egdon Heath.

William T. Brewster.

RETURNING BOARDS. All State gov¬ ernments have provision for the final canvass of votes in State elections by some central authority, known as a returning board, or by some similar designation. The duties of these boards are ministerial, and they have no right to go outside the face of the returns. In the Presidential election of 1876 the returning boards of Florida, South Carolina and Louisi¬ ana, controlled by the <(carpetbag)) and negro element, went behind the returns, and assumed to cast out sufficient votes on the ground of alleged fraud and intimidation to give those States to the Republican electors. A great fer¬ ment resulted, and in order to allay the agita¬ tion and arrive at a correct conclusion, an electoral commission was appointed, which de¬ cided in favor of the Republican candidate, Rutherford B. Hayes. See Elections; Elec¬ toral Qualifications ; Congress.

RETZ, retz, RAIS, raz, or RAYS, raz, Gilles de Laval de, French military officer: b. 1404; d. 26 Oct. 1440. He was a Breton of high rank, and distinguished himself under Charles VII in the struggle with the English, fighting by the side of the Maid of Orleans. Subsequently he received the baton of marshal. He retired to his estates, but was brought to trial by the Bishop of Nantes, charged with sorcery and the practice of cruelty in the cele¬ bration of demoniac rites. He was convicted and burned. Attempts were once made to find in Retz a historical original of Bluebeard, but, of course, in vain.

RETZ, Jean Frangois Paul de Gondi,

Cardinal de, French politician: b. Montmirail, 19 Sept. 1613; d. Paris, 24 Aug. 1679. His in¬ structor was the celebrated Vincent de Paul. In 1643 he received a doctorate at the Sorbonne, and was appointed coadjutor of the archbishop of Paris. Although preferring military service

he found he could gratify his ambitions in the church and his impassioned eloquence won him the favor of the Parisians. Aiming at political influence he incurred the enmity of Richelieu, and, after his death, of Mazarin. The Fronde, or the party opposed to the court and Mazarin, received the coadjutor as a man whose genius and popularity made him a valuable accession, and De Retz embraced their cause with zeal. The various insurrections of the people and the Frondeurs obliged Mazarin to leave France, whereupon De Retz seemed to have it in his power thenceforth to hold the reins of govern¬ ment. But Mazarin soon returned from his banishment, more powerful than ever. The Fronde, which had never been firmly united, and the members of which, with the exception of Conde and De Retz, were weak and wavering, was dissolved ; and soon after the latter, not without the management of his enemy Mazarin, had obtained the cardinal's hat, he was unex¬ pectedly seized and confined in the castle of Vincennes, whence he was subsequently removed to Nantes. Here he found means to escape, and, perpetually pursued by officers of Mazarin, wandered for eight years through Europe. After the death of Mazarin in 1661 he was allowed to return to France, after haying prom¬ ised never to take part again in political com¬ binations. He now resigned his archbishopric, governed the abbey of Saint Denis, lived retired, restricted his wants, paid his immense debts, and distributed pensions to his friends. Recon¬ ciled with all parties he lived the retired and quiet life of a philosopher. His posthumous (Memoires) (1718) give an interesting picture of his character. They were praised by Vol¬ taire and were drawn upon by Dumas for con¬ temporaneous pictures in his (Vingt Ans ApresP The best edition of his works is that in the (Grands Ecrivains de la France) series (1872-90). An abridged edition was published in 1865 in one volume. Consult Chantelauze, (Le Cardinal de Retz, Etude historique) (1878) ; (Le Cardinal de Retz et ses Missions diplomatiques a Rome) (1879).

RETZSCH, retsh, Moritz, German artist: b. Dresden, 9 Dec. 1779; d. Holflossnitz, near Dresden, 11 June 1857. As a painter his sub¬ jects were taken largely from German and Greek mythology and display

beauty in drawing and color. Retzsch's illustrations of the great poets, comprehending the drawings executed by him for editions of Goethe's (Faust, > and the works of Schiller and Burger, have rendered him deservedly famous. He executed a Shake¬ speare Gallery) consisting of 80 plates. In 1824 he was appointed a professor in the Art Academy at Dresden. His illustrations of poetry and legend were done in outline and are distinguished by exquisite delicacy and refine¬ ment of form and expression.

REUCHLIN, roikH'lin, Johann (Hellen—

ized Kapnio), German Hebrew scholar and humanist: b. Pforzheim, Baden, 22 Feb. 1455; d. Liebenzell, 30 June 1522. The excellence of his singing procured him a place in the chapel of the Margrave of Baden, who appointed him traveling companion to his son Frederick, after¬ ward bishop of Utrecht. In 1473 Reuchlin ac¬ companied that prince to Paris, and there studied Greek under Hieronymus of Sparta, be¬ sides applying himself assiduously to Latin

composition and Hebrew. In 1475 he went to Basel, and after some time spent in the study of Greek began to teach that language, with Latin and philosophy. • At this time also he wrote his Latin dictionary (Breviloquus, id est Dictionarium singulas Voces Latinas breviter explicans) (1478), the first published in Ger¬ many. In 1478 he went back to France, and studied law at Orleans, while he taught, at the same time, the ancient languages. In 1481 he returned to Germany, and taught law and the belles-lettres at Tubingen. Eberhard, count of Wiirtemberg, soon after took him, as the best Latinist in Germany, in his train on an embassy to Rome. The Emperor Frederick II created him a noble of the empire in 1492. After Eberhard's death Reuchlin lived several years at the court of Philip, elector of the Palatinate. Here he enriched the Heidelberg library with manuscripts and productions of the new art of printing. He was subsequently appointed president of the court of the confederacy which had been established by the Swabian princes against the encroachments of the house of Bavaria. He was also engaged in translating the penitential psalms,

preparing a Hebrew grammar and dictionary, and correcting the translation of the Bible. A converted Jew, John Pfeffercorn, and Hoogstraten, an inquisi¬ tor, obtained from the Emperor Maximilian, in 1509, an order that all Hebrew works, the Old Testament only excepted, should be burned, on the ground that they were full of blasphe¬ mies against Christ. The emperor, however, consulted Reuchlin, who assured him that these works, instead of injuring Christianity, con¬ tributed, on the contrary, to its honor and glory, since the study of them produced learned and bold champions to fight for the honor of the Christian religion, and that to destroy these books would be to put arms into the hands of its enemies. The order was thereupon recalled, but the war of pens raged for 10 years. Pas¬ sages were extracted from Reuchlin's works and their meaning perverted; on the ground of which a charge of heresy was brought against him. He was summoned in 1513 before the Inquisition at Mainz, presided over by Hoog¬ straten, and by a decree of that tribunal his writings were consigned to the flames. This roused the indignation of the friends of classical literature, and an appeal was made to Pope Leo X, who referred the whole matter to the Bishop of Spires. That prelate declaring Reuchlin in¬ nocent, ordered the monks to pay the expenses of the investigation. A counter appeal was made by Hoogstraten ; but Reuchlin was then acquit¬ ted by a commission of prelates held at Augs¬ burg in 1516; and the pope issued a mandate that all proceedings against Reuchlin should be stopped. In the course of this contest appeared the (Epistolse Obscurorum Virorum,> in which the enemies of Reuchlin were ridiculed. When, in 1517, he received the theses propounded by Luther, he exclaimed, ((Thanks be to God, at last they have found a man who will give them so much to do that they will be compelled to let my old age end in peace.® In 1518 he was appointed professor of Hebrew and Greek at Wittenberg, but sent his nephew Melanchthon instead, and William of Bavaria appointed him professor in the University of Ingolstadt. Al¬ though suspected of a leaning toward Protestanism, he never left the Roman Catholic

Church. Consult Geiger, (Tohann Reuchlin: sein Leben und seine Werke) (1871) ; Geiger, L., (Johann Reuchlins BriefwechseP (1875) ; Horawitz, A., (Zur Biographie und Korrespon-denz J. Reuchlin > (1877) ; Holstein, H., <J. Reuchlins Komodien) (1888) ; Hirsch, L. A.,

((Johann Reuchlin® in (A Book of Essays * (NewˆYork 1904).

REUNION, Isle de la, el de la ra-ii-ne-on, or ISLE OF BOURBON, in the Indian

Ocean, about 400 miles east of Madagascar, a French insular colony, with an area of 970 square miles, its length being 45 miles and breadth 33 miles. It was discovered by Mas-carenhas, a Portuguese, in 1545, who called it by his own name. The French took possession in 1649 and gave it the name of Bourbon. It was captured by the British in 1810 and re¬ stored to France in 1815. The island is of vol¬ canic origin, composed of two enormous vol¬ canic mountains, in one of which the fire is extinct; the other is still in activity. The loftiest summit, Le Piton de Neige or the Snowy Pike, is about 10,000 feet above the level of the sea. The climate is excessively hot from November to April; the evenings, how¬ ever, are refreshed by the sea breezes, and the mornings by the land breezes. The capital is Saint Denis, a pretty town; pop. 23,972. Other urban centres are Saint Pierre (29,481), Saint Paul (18,646) and Saint Louis (13,346). The towns are under French municipal law. The island has a lycee with 25 teachers and 350 pupils. There are 163 elementary schools with 373 teachers and 15,837 pupils. The chief port, Pointedes-Galets, is connected by a coast rail¬ way of 80 miles with Saint Benoit on the one hand and Saint Pierre on the other. In 1888 this railway was taken over by the state. The total value of imports in 1916 was $4,679,413, and of exports, $6,634,901. In the same year 91 vessels of 216,638 tons entered and 92 vessels of 220,054 tons cleared at the ports of the island. The public debt is about $900,000. The principal articles of export are coffee, sugar, vanilla, gums, lichens for dyeing, cotton, hides, *etc.* Sugar is by far the most valuable export ; vanilla comes next. Commerce is impeded by the want of good harbors. The population con¬ sists of 173,822, comprising 159,218 Euopeans, 8,341 British Indians, 1,868 natives of Madagas¬ car, 2,927 Africans, 884 Chinese and 584 Ara¬ bians. Here, as elsewhere, the French have not shown themselves successful colonizers. It would appear that only the British, Americans and Russians possess this faculty to any high degree.

REUS, ra'oos, Spain, in the province of Tarragona, is an important railway station and a progressive town, with a port at Salou on the Mediterranean, four miles distant. It has ex¬ cellent schools and model public institutions. Its importance as a commercial centre has in-crased in ? marked manner during the last quarter of a century. Its export houses repre¬ sent great local industries in the agricultural products of flour, wine and fruit.

REUSCH, roish, Friedrich, German sculp¬ tor: b. Siegen, Prussian Westphalia, 5 Sept. 1843. He received lessons at the Berlin Acad¬ emy, and afterward from Albert Wolff. In 1874 he traveled in Italy for purposes of study, and on his return executed some military statues

for Siegen and Bensberg, and a group in mar¬ ble for the Belle Alliance bridge at Berlin. A lucky inspiration was his (Demon of Steam. y This spirited and highly original work was modeled in 1880, and subsequently cast in bronze and set up in the Scientific High School at Charlottenburg. He became teacher in the Art Academy of Konigsberg (1881), and mean¬ while executed numerous busts and statues for public buildings; the monuments of Vessel, the astronomer, and Jacobson, the oculist; the sepulchral monument of General Bronsart von Schellendorf, and the colossal figure of Em¬ peror Wilhelm I in his coronation robes which stands in front of the palace (1894). Of his imaginative works the most notable are (Psyche Appeasing Cerberus* ; (Cupid Putting on the Helmet of Mars) ; and the (Triumph of Cupid over Hercules.*

REUSS, Germany, formerly two central principalities somewhat intermingled with and lying between Saxony and Bavaria, now a part of the Republic of Thuringia. Total area of both districts, 441 square miles, mostly moun¬ tainous. The former -territory of the older line, Reuss-Greiz, consists of -the districts of Greiz and Burgk, and* has an area of 122 square miles. These districts are separated*, one being tra¬ versed by the White Elster, while -the other lies along both banks of the Saale. The surface is better adapted for pasture than agriculture, rear¬ ing great numbers of horned cattle and sheep, but scarcely raising grain sufficient to meet the consumption. The most important crops are potatoes and flax ; hops also are an important crop. The weaving of -woolen, linen and cotton fab¬ rics is also among the principal occupations of the people. The capital is Greiz, and the only other town is Zeulenroda. The territories of the younger line, the former principality of Reuss-Gera-Schleiz-Lobenstein-Ebersdorf, have to¬ gether an area of 319 square miles. These terri¬ tories are, on the whole, fertile and well wooded, raise sufficient grain to supply the consumption and -possess among their minerals marble, salt and iron. The capital is Gera, and other towns are Schleiz, Saalburg, Hirschfeld and Lobenstein. The division into an older and a younger branch dated from* 1616. From 1668-1918 all the princes of both lines were

called Heinrich (Henry). The great majority of the inhabitants are Protestants. Reuss according to the census of 1919, had a population of 212,007, of which number 97,995 were males and 114,012 were females.

REUSS, Switzerland, a tributary of the Aar, rising on the north face of the Saint Gothard, flowing north past Andermatt and Amsteg, between which places its course is through a wild and narrow gorge, spanned by the Devil's Bridge and other wonders of Swiss roadmaking, and entering the south end of the Lake of Lucerne. This it leaves again at its north end, at the town of Lucerne, and still going nearly due north, reaches the Aar near Windisch (Aargau). Its length is 90 miles.

REUTER, roi'ter, Fritz, German dialect poet and story writer: b. Stavenhagen, Mecklenburg-Schwerin, 7 Nov. 1810; d. Eisenach, 12 July 1874. He studied law at the universities of Rostock and Jena, and in 1833 was con¬ demned to death at Berlin for his share in a students' democratic society. His sentence was,

however, commuted by the king to 30 years' imprisonment. Till 1838 he was a close prisoner in various Prussian fortresses, and after a farther period of confinement in the Mecklen¬ burg fortress of Domitz was set free in 1840. For 10 years he devoted himself to farming but in 1850 became a private teacher in the Pomeranian town of Treptow. In 1853 he was made famous by the publication of humorous poems in the Platt-Deutsch dialect, entitled (Lauschen un Rimels> (new series, 1858). These were followed bv (Polterabendgedichte* (1855) and (Reis' nah bellegen) (1855). His later works comprise (Kein Hiisung) (1858) ; a tragical village story in verse; (Hanne Niite und de lutte PudeP (1859) ; <Schiirr-Murr) (1861), a collection of tales in both Low and High German; and (011e Kamellen* (1860-68), his chief prose work, a series of tales in Platt-Deutsch, including (Ut de Franzosentid* (1860); (Ut mine Festungstid,* an account of his conviction, and imprisonment (1862) ; (LTt mine Strontid,* his masterpiece (1864) ; (Dorch-lauchting* (1866) ; and (De Reis' nah Kon-stantinopeP (1868) ; (Die Drei Langhause* (1878), a satirical play; (Lustspiele und Polterabendgedichte) (1883) ; and <Reuter-Reli-quien* (1885). Reuter's stories are lacking in plot, but are marked by clever episodes, skilful character drawing and a humor, which, despite the difficulty of his medium, was universally appreciated in Germany. An edition of his works appeared in 1863-68, and in 1875 two volumes of (.Nachgelassene SchriftenP with biography, were added by Wilbrandt. Consult Ebert, H., cFritz Reuter, sein Leben und seine

Werke) (Giistrow 1874) ; Gadertz, K. T., cAus Fritz Reuters jungen und alten Tagen* (2d ed., 3 vols., Wismar 1897-1901) ; Glagau, O., (Fritz Reuter und seine Dichtungen) (2d ed., Berlin 1875) ; Romer, A., (Fritz Reuter in seinem Le¬ ben und Schaffen) (Berlin 1895) ; Thurber, C. H., (Fritz Reuter) (Boston 1914).

REUTER, Paul Julius, Baron, German telegraph promoter: b. Cassel, Germany, 21 July 1816; d. Nice, France, 25 Feb. 1899. He settled in Aix-la-Chapelle in 1849, where he first estab¬ lished his system of transmitting news by tele¬ graph to the leading towns on the Continent, and in 3858 removed to London, where he undertook to supply the English newspapers with foreign news. His enterprise, known as ((Reuter's Agency,** occupied a unique field and grew in importance from year to year until it is now in operation in all parts of the world. In 1865 he obtained the permission of the government to lay a cable from England to Cuxhaven, and shortly after to lay one between France and the United States. In 1872 the shah of Persia granted to him the exclusive rights of con¬ structing railways, farming customs and control of the natural resources of the country, but later exchanged these privileges for that of establishing the bank of Persia. He was cre¬ ated baron by the Duke of Saxe-Coburg-Gotha in 1871.

REUTER AGENCY, an English news service opened in London by Julius Reuter in 1858, and now the most important institution of its kind in the British Empire. It has corre¬ spondents in all the great news centres of the world and furnishes telegraph and other news features throughout the eastern hemisphere and,

to some extent, to Latin America, the United States and Canada. See Press Associations; Reuter, Paul Julius.

REUTERDAHL, roi'ter-dal, Henry, American naval artist : b. Malmo, Sweden, 12 Aug. 1871. He received his academic educa¬ tion at Stockholm, Sweden, and-after remaining in this country served as newspaper correspond¬ ent during the Spanish-American War. He has contributed to various prominent periodicals in this country and

England, and illustrated the (History of the New American Navy* (1903) by John D. Long (q.v.).

REUTLINGEN, roit'ling-en, Germany, in Wurtemberg, capital of the circle of the Schwarzwald or Black Forest, on the Echaz, affluent of the Neckar, 20 miles south of Stutt¬ gart. The church of Saint Mary is of great antiquity (13th century), and its tower, 325 feet high, of Gothic type, considered the most beautiful in the kingdom. The environs of the town are most romantic. Its leather and textile industries are important.

REVEILLE, re-val'ye, or rev-e-le', the signal given in camp and garrison at break of day, by beat of drum or sound of bugle, for the soldiers to rise and begin the duties of the day.

REVEL, rev'el, or REVAL, rev'al, capital of the Republic of Esthonia, on a small bay of the same name, 238 miles southwest of Petrograd. The ancient part of the city on a rocky emi¬ nence is surrounded by Gothic walls and con¬ tains the cathedral, castle, governor's residence, high school and aristocratic quarters ; other churches, the town-hall, several fine halls, schools, etc., are located in the lower, or com¬ mercial town. There are two harbors : mer¬ cantile and naval. Commerce is comparatively unimportant. Flax, linseed, grains, skins and potato brandy are exported; salt, wine, fruits and manufactured and colonial goods imported. Pop. about 68,000.

REVELATION, in theology, the communi¬ cation of truth by God to men ; also, the truth so conveyed, and especially in the Scripture. There is a revelation of God's will and his pur¬ poses made through man's reason and the voice of conscience: Nature everywhere reveals God's attributes — his power, his goodness, his wis¬ dom, his providence ; so, too, the history of the tribes of mankind upon the earth affords proofs of divine governance. But the most ex¬ press revelation of God's purposes toward man is made in the written word, in the record of special divine communications made in time past to holy men ((who spake as they were moved by the Holy Spirit® ; and this written word is the key to all the other revelations of the divine nature and the divine will. See Inspiration ; Bible.

REVELATION OF JOHN. The last of the canonical books of the New Testament.

General Character. — The book, as its name implies, purports to be a revelation (aTroKaAv'ifug, an ˆuncovering®) or unveiling of the secrets of the divine purpose in reference to God's King¬ dom on earth

in its conflict with the forces of evil. As such, it is one of a large number of Apocalypses that were published, first in Jew¬ ish circles and later the early Christian Church within the period from about 200 b.c.

to 200 a.d. While most of these works were probably quite popular and circulated widely, only two, the book of Daniel in the Old Testa¬ ment and the Revelation of John in the New, became canonical. The. chief characteristics common to all apocalyptic works are (1) the communication of the inspired information to the seer by means of visions, or dreams, or similar ecstatic experiences by which the seer was brought into immediate contact with trans¬ cendental scenes (heaven, the throne of God, angels, etc.) ; (2) the use of symbolism (num¬ bers, beasts, the sea, mountains, etc., figuratively representing individuals, kingdoms and other realities) ; and (3) the attempt to forecast the course of world-history from the time of the author to the ((end® ; in other words, to work out a program of the future and especially of the last times, which were usually thought to be very near at hand. All of the known Jewish Apocalypses were pseudepigraphic, the revela¬ tions being asserted to have been received by Enoch, or Noah, or other ancient worthies, thereby giving the work the prestige belonging to great antiquity and to a famous name. Even the Daniel Apocalypse, written about 165 b.c., was assigned to a Daniel supposed to have been living, about 400 years earlier. The Chris¬ tian apocalyptists were not all bound by this traditional practice. At least two, John, the author of the New Testament book, and Hermas, the author of (The Shepherd* (c. 150 a.d.) , issued their works under their own names. It is evident, from the facts stated, that Revelation is unlike any other New Testament book and must be viewfed and inter¬ preted, in general, in harmony with the prin¬ ciples of interpretation that hold for all the works of the class to which it belongs.

Special Character of the Book. — Revela¬ tion, though one of many Apocalypses, is the most individual of them all. Its many special characteristics serve to put it in a class by itself. It is addressed by the author, John, to a definite group of seven churches, all in the Roman Province of Asia. No other Apocalypse is so openly and specifically addressed to actual readers. It was expected that it would be read and its message heeded. The circumstances which occasioned the message are, in part at least, also clearly indicated. The churches were in danger. From without, because they were undergoing persecution. Some Christians had already been martyred and a general persecu¬

tion seemed imminent. Within, the sins of apostasy, immorality or corruption of doctrine seemed to be assuming threatening proportions. But it was not simply with such concrete facts that Revelation sought to deal. The seer was given to know what lay behind or was involved in these things. The persecution of the Chris¬ tians was, to him, more than merely the work of the civil authorities, or of the state (the imperial Roman government). It was, in the last analysis, the work of Satan, the arch-enemy of God and of all good, the AntiChrist, the head of legions of evil angels, whose earthly rule was carried on through the institutions, political and religious, of the pagan Roman Empire. Of these institutions, the one that more significantly than anv other gave expres¬ sion to the union between Satan and the empire •was that of the worship of the emperor. To

the seer this was, in principle, the worship of Satan, it was Satan's means of receiving the homage of mankind. But just as in the insti¬ tutions and practices of pagan imperial Rome Satan's earthly kingdom was concretely em¬ bodied, so in the Church — the unity spiritu¬ ally existing in the numerous small Christian communities of Asia and elsewhere — nothing less than the Kingdom of God and of His Christ was concretely embodied, and the issue, as thus perceived by the seer, was in reality the issue between Satan and God, between heaven and hell, good and evil. What was transpiring on earth was therefore of universal, cosmic and eternal significance. This theme, one common to apocalyptic literature, is applied and developed in Revelation with a consistency and clarity, a dignity and sublimity, a force and pathos that places this book far above all others of its class.

The Plan of Revelation. — The book con¬ sists of two unequal parts: (1) The letters to the Seven Churches of Asia (i, 3; iii, 22) ; (2) The Apocalypse proper (iv-xxii). The first three verses serve as a brief explanatory in¬ troduction to the whole book, indicating the source and authority of the contents which are expressly stated to be a "revelation8 and a "word of prophecy8 concerning things which must soon take place.

The letters are nominally from John to the seven churches. In reality they claim to be a message from the eternal God, the "seven spirits before His throne8 and from Jesus Christ, the head of the Church, who is soon about to come again (i, 3-8). John describes his vision of Jesus who commanded him to write (i, 9-20) and then gives in detail the message to each of the seven churches (chs. ii and iii). From these messages, with their particular ref¬ erences to the circumstances of each church, we learn what the conditions were that sug¬ gested the great Apocalyptic drama that fol¬ lows.

The Apocalypse proper (iv-xxii) opens with a vision of God on His throne, with His heavenly court, ineffably glorious, worshipping and adoring Him (ch. iv), holding in His right hand a seven-sealed book (the book of des¬ tiny) which the Lamb (the crucified and glori¬ fied Jesus) alone is able to unseal. To the Lamb the whole heavenly court

ascribe all praise (ch. v). The dramatic action of the Apocalypse begins with the opening of the seven-sealed book of destiny, seal by seal (ch. vi). Between the unsealing of the sixth and seventh seals there is a pause, full of meaning (ch. vii) . The breaking of the seventh seal introduces a second series of signals, seven trumpet-blasts (ch. viii), each blast being f 1-lowed by some event of ominous portent. The fifth and sixth trumpet-blasts also usher in the first and second of three great woes destined to come upon mankind (ch. ix). Then comes another significant pause. A little book (of prophecy?) is given the seer by an angel and the seer devours it (ch. x), after which he measures the Temple, except the outer court, which is to be given over to the Gentiles, and is told of the two witnesses and their fate and the calamities that are to follow it, making up the second woe (xi, 1-14). The blast of the sev¬ enth trumpet brings the great announcement

“the Kingdom of Christ has come to pass,8 at which heaven rings with praise (xi, 15-19). From now on the theme centres about the great judgment-crisis in its various stages. First, however, we are let into the secret of the great issues at stake. Such is the real signifi¬ cance of chs. xii-xiv. It was necessary to ex¬ plain this before describing the great judg¬ ment. The seer sees a woman about to bear a son, which a great dragon is waiting to kill as soon as born. But the child is caught up to God and saved. The dragon pursues the woman but she escapes. War ensues in heaven and the dragon and his hosts are defeated and cast down to earth. The real victory has been won, but the dragon continues the conflict on earth fch. xii). The two beasts of ch. xiii are the dragon’s agents on earth by whom he seeks to keep control of mankind. But he is opposed by the Lamb, head of the armies of heaven, whose impending triumph is forecast in an¬ nouncements of angels (xiv, 1-20). Now come the seven last plagues poured out by seven angels from seven bowls full of the wrath of God and culminating in the great judgment on “Babylon8 (xv-xviii). These are fittingly introduced by a hymn of the victors over the beast (xv, 1-4), then described in detail (xv, 5-xvi, 21), the climax being reached when the great harlot, the earthly representative of the kingdom of Satan, the deadly enemy and per¬ secutor of the Church, is utterly destroyed (xvii-xviii). The final acts of the great drama now take place. Of these, the supremely sig¬ nificant one is “the marriage of the Lamb,8 as is indicated in the announcement in xix, 1-10. But preceding this a final disposition must be made of the beast and the dragon, who are overthrown and at last, after a 1,000-year in¬ terval, subject to eternal punishment (xix, 11-xx, 15). Then appear the new heaven and the

new earth, the marriage of the Lamb takes place and the new type of existence begins (xxi, 1-xxii, 5). The conclusion (xxii, 6-21) repeats in fuller form the urgent appeal and solemn warning of the introductory section of the book.

The Unity of Revelation. — The develop¬ ment of the theme is, on the whole, so con¬ sistent and straightforward that the book must be considered the work of one mastermind. The general uniformity in style throughout the book leads to the same conclusion. But the author was not the creator of the entire mate¬ rial of the book. He drew heavily on the Old Testament, especially on Ezekiel, Zechariah, and, above all, Daniel. He used these as quar¬ ries whence to get stones for his new building. But never is he a mere imitator or slavish copyist. He probably had access to other Apoc¬ alyptic material, symbolism, calculations, etc., which is no longer extant. In using all this variety it is not surprising that he should have found some of it difficult to manage and work up in perfect agreement with his general plan.

The Symbolism of Revelation. — Much of the symbolism used by the author was common to Apocalyptic tradition and some of it may have belonged originally to ancient Babylonian or Persian mythology and superstition without our author being aware of the fact. He took what was at hand and filled it with a new meaning or gave it a new application. The

Christian element in the symbolism of Revela¬ tion is probably for the most part due to the author. The more important symbols of chs. xii, xiii and xvii are to be interpreted as fol¬ lows : the woman of xii, 1, is probably the true Israel and the child the Christian Church, the offspring of God’s own covenant-people, in¬ clusive perhaps of the Messiah Himself (ch. xii, 5). The beast ascending from the sea (xiii, 1) signifies imperial Rome, the seven heads the seven first emperors (beginning with Augus¬ tus), the one apparently wounded to death be¬ ing Nero, the first emperor to persecute the Christians. The (<names of blasphemy® refer to the state-religion which culminated

in the worship of the emperor. The second beast (xiii, llff.) probably represents the organized emperor-cultus, with its priesthoods, to which the Christians were summoned to show alle¬ giance or suffer death. Nero is meant in xiii, 18 by the number 666 (the numerical value of the Hebrew letters spelling Nero Ccesar). In ch, xvii imperial Rome is the great harlot. In verse 10 we again have the seven first emperors (as in xiii, 1-3). The beast of verse 11, which <(was and is not® yet is himself the eighth, is the same as the wounded head of xiii, 3, namely, Nero, whom legend asserted was destined to reappear and regain control of the empire. In these three chapters, xii, xiii and xvii, the author is apparently making use of material that originally referred to the period of the sixth and seventh emperors (Vespasian, 68-79 a.d. and Titus, 79-81 a.d.), making it do serv¬ ice for the time of Domitian (81-96 a.d.), the eighth emperor, who laid great insistence on the emperor-worship and who made Christianity a crime punishable by death. In this emperor the author saw N ero-redivivus, revived as by Sa¬ tanic power and therefore representing in him¬ self and his government the rule of Satan on earth.

The Interpretation of Revelation. — Rev¬ elation was a tract for its times and is to be interpreted as such. Its message, as its ad¬ dress, its local color and reference to contem¬ porary events and issues show conclusively, was for its own age. This was the way in which it was probably understood at first, but it soon (as early as Irenaeus) was taken to be a phophecy in which the whole future course of the history of the world or of the Church was intended to be sketched. The author thought the end was to come quickly. He had no idea of a course of Christian history ex¬ tending over 20 or more centuries. Conse¬ quently all attempts, too many to be enumerated, to find the events of this or any other age, past or future, foretold in Revelation are futile and doomed to failure.

Date and Author. — The earliest Christian tradition (e.g., Irenaeus, V. 30, 3) asserts that John had his vision near the close of Domitian's reign, i.e., not long before 96 a.d. With this the internal evidence of the book agrees. The expectation of Nero's reappearance (xiii, 3; xvii, 8, 11) and the persecution of the Church together point to the latter part of Domitian's reign and to no other time. Sections that im¬ ply an earlier date must be considered as older material used by the author but not entirely transformed. As to the author, criticism has gotten very little beyond the simple statements

of the book itself. A certain John, a man prominent in Christian circles

in Asia, who felt that his words would carry weight, sent forth this book as a message of comfort, exhorta¬ tion and warning, to stay and cheer the Church in its trial, to encourage it to endure even unto death, confident that the ultimate victory of Christ its Lord would soon be manifest. Whether this John wTas an Apostle or was the author of the Fourth Gospel, or the ((Elder® of 2d and 3d John are questions which cannot be discussed in this article but will be found fully treated in the literature listed below.

Bibliography. — • Of modern commentaries, those by Bousset (Meyer series, 6th ed., 1906) ; Swete, H. B. (London 1909) and Moffatt (in Expositor's Greek Testament, > New York 1910), will be found most satisfactory, with full bibliographies. A good brief commentary is that by C. A. Scott ((New Century Bible*). W. M. Ramsey's (The Letters to the Seven *Churches) (London 1904) is full of archaeolog¬ ical information. The (New Testaments Intro¬ ductions,* by Zahn (New York 1909) and Mof¬ fatt (New York 1915) should be consulted.

Edward E. Nourse,

Professor of Biblical Theology, Hartford Theo¬ logical Seminary.

REVELGANJ, or GODNA, India, in

Bengal, near the confluence of the Ganges with the Ghagra, has an active local trade. It is famous as the home of Gautama, the founder of Buddhism, who also taught here. Pop.

14,750.

REVELL, re-vel, Fleming Hewitt, Amer¬ ican publisher: b. Chicago, 11 Dec. 1849. He was educated in the public schools and estab¬ lished himself as a publisher and editor in 1869. He founded the Fleming H. Revell Company, of which he has been president since 1890. He is a trustee of the New York Life Insurance Company, the Northfield, Mass., Seminary and of Wheaton, Ill., College.

REVELS, Master of the, an English court

officer, in former times appointed to superintend the revels or amusements, consisting of danc¬ ing, masking, etc., in the courts of princes, the inns of court, and noblemen's houses, during the 12 Christmas holidays.

REVELSTOKE, rev'el-stok, Canada, city and county-seat in the Kootenay district, British Columbia, 270 miles northeast of Vancouver, on the Canadian Pacific Railway, and near the Selkirk Mountains. It is situated in a mining district and has railwav shops, a lumber in¬ dustry and manufactures beer and cigars. Pop.

3,017.

REVENTLOW, ra'vent-ld, Ernst, Count, German journalist: b. Husum, 1869. He at¬ tained the rank of captain in the German navy and afterward engaged in journalism. He was an ardent supporter of Germany's schemes for world dominion which culminated in the European War, and as an editorial writer on the Deutsche Tageszeitnng advocated extreme ruthlessness, particularly in submarine warfare. He accused United States Ambassador Gerard of being a British spy; but assailed Zimmer¬ man for the plot to form an alliance between Mexico and Japan against the United States. He furiously attacked Germany's leaders for a supposed inclination to yield to the United

States' demands for respect of its rights after the sinking of the Lusitania, and the Tages-zeitung was suspended 25 June 1915. For an attack on Bethmann-Hollweg, accusing him of misleading von Hindenburg, he was sued for slander in 1916. Author of (Russische-Japan- ische Krieg) (3 vols. 1904-06) ; (Deutschland in der Welt voran) (1905) ; (England der feind) (1914) ; (Flotte in diesem grossen Kriege) (1915) ; (Deutschlands auswartige Politik, 1888-1 9 1 4 } (1916) ; (The Vampire [England] of the Continent5 (1916), *etc.*

REVENUE, the income of a nation, de¬ rived from taxation in various forms. In Eng¬ land the principal source of revenue is the in¬ come tax. In the United States the national government derives its revenue chiefly from tariff duties and internal taxes on alcoholic liquors and tobacco. The revenues of the vari¬ ous States and municipalities are

mainly from taxes on land and buildings and personal prop¬ erty. New York and some other States have an inheritance tax which brings in large returns, so that the New York State government is supported almost without direct taxation. So far as the large majority of citizens are con¬ cerned, the forms of taxation in the United States are not directly appreciable. In some countries of Europe, revenue is collected by most vexatious methods. In Vienna a small tax is exacted every time the resident of an apart¬ ment house goes in or out of the building be¬ tween 10 p.m. and 6 a.m., the person in charge of the building being ithe collector, and respon¬ sible to the authorities. Methods hardly less annoying are practised in other European cities. The <(octroi,® a tax on produce of any kind brought into a city from the country districts, is prevalent throughout Europe, and adds to the cost of all kinds of food.

REVENUE CUTTER, a small armed steam vessel, designed for the prevention of smuggling; so called from the fact that origi¬ nally the vessel was of the cutter-yacht type. The United States Revenue Cutter Service is a branch of the Treasury Department and its purpose is, principally, to enforce the customs revenue laws. Its immediate supervision re¬ sides in a bureau of the department known as the Division of Revenue Cutter Service, which is in charge of a chief and a number of assist¬ ants.

REVENUE CUTTER SERVICE, United States. The organization of this service in 1790 was the conception of the first Secretary of the Treasury under the Constitution, Alex¬ ander Hamilton. In emphasizing its importance Hamilton recommended “giving the officers military or naval rank, which will not only in¬ duce fit men to engage, but attach them to their duties with a nicer sense of honor.® The original purpose was to inaugurate a (<preventive service,® as against illicit trade by sea, and in that sense to aid the customs service in the collection of the revenue from duties on im¬ posts. The organic act provided for ten small vessels, armed and equipped, and for each a complement of officers and enlisted men, and these formed the nucleus from which has grown the service of to-day. From the begin¬ ning the service was placed upon _ the same plane as to pay and allowances for its officers

and enlisted men. with the officers and soldiers of the army.

Various acts of Congress (1 Oct. 1790, 2 March 1793, 6 March 1796, 1 July 1797) pro¬ vided for additional and larger vessels, increase of

crews, armaments and equipments. It is interesting to note that this service was the only semblance of a navy possessed by our government from 1790 to 1797, when on 10 July, in the latter year, the first vessel of the then new navy, the 44-gun frigate United States, was launched. In the meantime the duties of the service were such as were required of an armed service, in guarding the coast and com¬ mercial interests, and also against piratical in¬ cursions. But during those years our relations with France were becoming strained, culminate ing finally in active hostilities at sea between vessels of the United States and of France. The difficulties with France may be said to have been the first war of the young republic with a foreign power. During its continuance (1798 to 1801) several engagements were fought and many captures were made by our vessels.

The revenue cutter service took an active and brilliant part in cooperation with the navy. Thus, while this service was organized as a preventive service to be operated in the interest of commerce and for the protection of the rev¬ enue, it had, in these early years, rapidly de¬ veloped into an armed and equipped military or naval service, offensive and defensive, and this character was well and continuously main¬ tained.

At the breaking out of hostilities with France provision for an armed force upon the sea, to convoy merchantmen and to defend the coast, became indispensable. To accomplish these purposes the President was authorized (Act 1 July 1797) to increase the complements of the several revenue cutters, and to employ them in defensive operations on the coast. Under authority of previous enactments the service had been provided with a number of vessels which, for that time, were of consider¬ able size and able seagoing qualities. In 1798 two brigs and six schooners were commis¬ sioned, aggregating 1,140 tons, carrying 96 guns and 416 men.

When it was determined, in 1798, to extend hostile operations against France, to the waters of the West Indies, four fleets, under Commo¬ dores Barry, Truxton, Tingey and Decatur, United States navy, comprising in all some 20 national vessels, were formed to prey upon French commerce and destroy that nation's privateers, the above-named vessels of the revenue cutter service were placed in co-opera¬ tion with the navy and sailed with the fleets, and in the summer and fall of 1799 did fine service. It was during this war that the frigate Constellation, under Commodore Truxton, captured the French frigates Insurgent, 40 guns, and Vengeance, 44 guns. During the naval operations against France 22 vessels, privateer and other, under the French flag, were captured, and of these 16 were made prizes by the

revenue cutters, unaided, while they assisted in the capture of two others.

The Slave Trade. — Under the provisions of law inhibiting the slave trade, between the United States and foreign countries, the revenue cutter service, in common with the navy, took

an active part in its suppression, and in the course of its work captured many slavers and liberated an aggregate of 487 negroes.

The War of 1812. — For the enforcement of the embargo laws of 1807, Congress by the Act of 6 Jan. 1809, and another enactment of the same date, made provision for additions to the fleet of revenue cutters of 42 vessels. Fol¬ lowing the proclamation of the President order¬ ing all British armed vessels to leave the ports of the United States, and laying the first em¬ bargo in December 1807, to the close of the War of 1812, which ensued, the service bore an honorable and conspicuous part. Numerous and varied duties in the enforcement of the embargo laws up to the date of their repeal, and subsequently the non-intercourse act, fell to the revenue cutter service until the declara¬ tion of war, 4 June 1812, when the service en¬ tered upon an active career, to capture, burn, sink and destroy the commerce of the enemy in cooperation with the navy. The first prize in that war was the British trading schooner Patriot, with a valuable cargo, and was cap¬ tured by the revenue cutter Jefferson, Capt. William Ham, 25 June 1812, just 21 days after the declaration of war. Following this the cut¬ ters Madison and Gallatin made valuable prizes. The British privateer Dart, 14 guns, had been for some time cruising and committing depreda¬ tions on our coast near Newport, R. I. On 4 Oct. 1813, the revenue cutter Vigilant, Capt. John Cahoon, having augmented his crew by a draft of some 20 men from the United States frigate President, Commodore John Rogers commanding, sailed from Newport in pursuit. Soon after coming up with the enemy he cap¬ tured the vessel by boarding and conveyed the prize and prisoners to Newport. One of the most notable actions fought upon the water in the War of 1812 took place in York River, near Chesapeake Bay, on the night of 12 June 1813, when the cutter Surveyor, commanded by Capt. William Travis, succumbed after a desperate resistance to superior forces from the British man-of-war Narcissus.

During this war the revenue cutter service captured 10 merchantmen, three barges, three officers and 60 men; one privateer mounting 14 guns. The cutters Eagle, Mercury and Ac¬ tive did duty as scouts and on blockade service. The cutters Commodore Barry, Surveyor and Eagle were captured by the enemy, but only after hard struggles and most gallant defenses.

Neutrality Laws. — The enforcement of the neutrality laws, during the European troubles from 1815 to 1823, engaged much of the atten¬ tion of the service, but this duty has always been a part of the vigilant work of the service, and is no less true of the earlier years than in the operations of later times.

Nullification, 1832. — During the attempt to nullify the laws relating to the collection of rev¬ enue from imposts, by the State of South Caro¬ lina, five vessels of the revenue cutter service were ordered to Charleston Harbor, with in¬ structions (<to take possession of any vessel arriving from a foreign port, and defend her against any attempt to dispossess the customs officers of her custody until all the requirements of the law had been complied with.® The silent influence exerted by the presence of ibis fleet

was a large factor in the solution of the diffi¬ culties which menaced peace.

Piracy. — During the early years of the last century, piracy which prevailed along the Gulf Coast of our possessions acquired from France and Spain, was suppressed, chiefly by the rev¬ enue cutter service. That service waged re¬ lentless war upon the corsairs, pursued them into every bay and bayou, broke up their resorts and rendezvous, attacked and dispersed them whenever found. While engaged in this work the cutters Louisiana and Alabama were at¬ tacked off the south coast of Florida by the pirate Bravo, commanded by lean La Farge, a lieutenant of the notorious Jean Lafitte. The Bravo was signally defeated, and carried by boarding in a hand-to-hand struggle. The ren¬ dezvous of the pirates on Breton's Island, La., was attacked by the cutters Alabama, Cap¬ tain Cartigan, and Louisiana, Captain Loomis, and the resort broken up. This practically put an end to organized piracy on our Gulf Coast, though piratical craft from Mexico, Central America and South America, subsequently made incursions on that coast. The pirate Bolivia with its prizes Antoinette and Isabella were found by the cutter Louisiana, Captain Jackson, at the South West Pass of the Mississippi River. Jackson attacked at once, captured the Bolivia and liberated the prizes, and carried his pris¬ oners to New Orleans. The Bolivia carried three guns and 34 men ; the cutter Louisiana two guns and 16 men.

Seminole War, 1836-42. — During the Flor¬ ida War for the suppression of Indian troubles in that region, the revenue cutters Dallas, Wash¬ ington, Dexter, Jefferson, Jackson, Madison, Campbell

and Van Buren rendered valuable and conspicuous service in Florida waters, co-oper¬ ating principally with the army.

The Mexican War, 1845-47, — The revenue cutter service was represented in this war by the following named cutters : Schooners For¬ ward, Ewing, Van Buren, Wolcott, Woodbury, Morris, and steamers McLane, Legare, Spencer, Bibb and Polk. They took an active part prin¬ cipally in cooperation with the armies under Scott and Taylor. Some of these vessels, not¬ ably the Forward and McLane, served in co¬ operation with the navy, in the fleet commanded by Commodore Conner. In the squadron of Commodore M. C. Perry, at the capture of Frontera and Tabasco, the Forward took a brilliant part.

Paraguay Expedition. — In the naval ex¬ pedition to Paraguay, in 1858, the steam revenue cutter Harriet Lane, seven guns, eight officers and 104 men, served in cooperation with the navy, and rendered valuable services.

Winter Cruising^— The Act of Congress, approved 22 Dec. 1837, now embodied in section 1536, Revised Statutes, requires that a suitable number of public vessels shall cruise upon the coast in the severe portion of the winter weather to afford aid to distressed navigators. The work outlined in the law, now undertaken by the coast guard and always effectively per¬ formed by the revenue cutter service, is ener¬ getically maintained. As a result of the work many hundreds of lives and many million dol¬ lars' worth of property have been saved. Ves¬ sels of commerce are frequently fallen in with at sea, with sails blown away, crews frost-

bitten and unable to respond to duty; they are taken in tow and to a harbor ; others short of provisions and water are supplied, while others again, found stranded, are floated when possible. In short, everything possible is done for the relief and care of the distressed mariner of whatever nationality wherever found, during the hard weather on our storm-driven coast from December to April, and prompt response is always made by the service at the cry of distress at all seasons and all hours.

Life-Saving Service. — This, an outgrowth of the revenue cutter service, formed part of the division of revenue cutter service prior to its organization as a separate service under the act approved 18 June 1878. On 28 Jan. 1915, the two services were again fused.

In the Civil War, 1861-65. — The service was conspicuous and valuable tliˆfeughout this period from the attempted reliet of Sumter in April 1861 to the close of hostilities in 1865. The Harriet Lane cooperated with the navy at the capture of the fortifications at Hatteras Inlet ; the Forward rendered support and as¬ sistance to General Butler at Annapolis, Md. ; the Miami covered the landing of troops at Lynn Haven Bay for the recapture of Norfolk; the cutter Naugatuck took part in the attack on Sewell's Point, led the naval fleet up the James River and participated in the bombardment of Drewry's Bluff, 15 May 1862; the Nemaha ren¬ dered efficient aid to the army and navy on the South Atlantic Coast, received on board General Sherman at Fort McAllister, Savannah, Georgia, at the end of his (<march to the sea,ˆ and con¬ veyed him to the naval fleet below. The For¬ ward, Brown, Agassiz, Toucy and Antietam rendered important service in the waters of North Carolina, while the Jackson, Hercules, Reliance, Tiger and Allen performed excellent service in the Chesapeake, co-operating with the naval forces in the gunboat flotilla in those waters.

In Peace from 1867 to 1898. — The achieve¬ ments of the service were numerous and varied during times of peace, and honorable, often heroic in both peace and war. It blazed the way to and through Alaska, and for many years from the date of the acquisition of that

ter¬ ritory in 1867, except for the occasional visit of a naval vessel, was the only service to exercise authority or to display the national emblem in the waters of that coast from Sitka to Bering Sea, and the Arctic Ocean to Point Barrow. It is on guard in the waters of Alaska from early in May until late in December of every year, rendering aid to shipping, caring for the ship¬ wrecked, and assisting to their homes the un¬ fortunate and the destitute. Its surgeons yearly prescribed for and as far as possible aid the sick, and hardly a year goes by in which more than a thousand cases are not treated or relieved by the medical officers of our cutters in Alaskan waters. In these waters alone the service has rescued and brought home from the Arctic Circle hundreds of shipwrecked whalers, and others, who, but for the timely aid of the serv¬ ice, must have perished.

In the Spanish-American War, 1898. — Hardly had the war commenced when the revenue steamer McCulloch, bound for San Francisco, was overhauled at Singapore, by cable, directing her to report at Hongkong to

Commodore Dewey, commanding the Asiatic fleet. The ship made a quick run to Hong¬ kong, joined Dewey, and accompanied him in his Manila campaign, performed fine service, and brought to a waiting world the first news wired from Hongkong of the victory of Manila Bay. That ship, the McCulloch, re¬ mained with Dewey until November following, and incurred the very highest praise on his part.

At the battle of Cardenas, 11 May, the rev¬ enue cutter Hudson, Lieut. Frank H. New¬ comb, R.C.S., commanding, sustained the fight against the gunboats and shore batteries of the enemy, side by side with the naval torpedo-boat Winslow and when Ensign Bagley and half the crew of the latter-named vessel had been killed and her commander wounded, rescued from certain destruction the vessel and the bal¬ ance of the crew, under the furious fire of the enemy's guns.

President McKinley made the work of the McCulloch and Hudson the subject of a special message to Congress, in terms of high com¬ mendation and praise and as a reward of merit in the case of Hodgsdon of the McCulloch (there being no higher grade in the revenue cutter service to which he could be promoted) that he be retired from active service on the full pay of his grade and in recognition of the heroic gallantry noted in the letter of the Secre¬ tary of the Navy, the bestowal of a gold medal of honor upon Lieutenant Newcomb, of the Hudson, and silver medals of honor to

each of his officers and bronze medals to each of his crew. It will be noted that .the only gold and silver medals bestowed by Congress for services in this war were those for officers of the rev¬ enue cutter service. There were in co-opera¬ tion with the navy during this war, 13 revenue cutters carrying*61 guns, 98 officers and 562 en¬ listed men. Of these eight cutters (43 guns), 58 officers and 339 men were in Rear-Admiral Sampson's fleet and on the Havana blockade. One cutter, 6 guns, 10 officers and 95 men in Dewey's fleet and 4 cutters, 12 guns, 30 officers and 128 men cooperated with the navy on the Pacific Coast. Three other cutters, with 25 officers and 210 men, were ordered into cooperation, but the war closed before they were equipped or could get to the front. There were in active cooperation with the army and navy together in all 20 cutters, carrying 71 guns, 131 officers and 725 men. The services performed by the vessels of the revenue cutter service in cooperation with the navy during this war were officially acknowledged by the commanders of the fleets with which they served.

On 28 Jan. 1915 the revenue cutter and life¬ saving services were merged into the coast guard. See Coast Guard; Life Saving Serv¬ ice, The United States.

REVERBERATORY FURNACE, a

furnace in which the material is heated without coming into contact with the fuel. Between the fireplace and the bed on which the material to be heated lies a low partition wall, called a firebridge, is placed. The flame passes over this bridge and plays down against the bed, being reflected or reverberated (whence the name) by a flat arch which surmounts the whole.

REVERE, re-ver', Joseph Warren, Amer¬ ican military officer: b. Boston, Mass., 17 May 1812; d. Hoboken, N. J., 20 April 1880. He entered the navy as midshipman in 1828, at¬ tained the rank of lieutenant in 1841, served in the Mexican War, and in 1850 resigned from the navy. At the outbreak of the Civil War he was appointed

colonel of volunteers in the army and in 1862 was promoted brigadier-gen¬ eral. He commanded a brigade at Fredericks¬ burg and was engaged at Chancellorsville. For his conduct in the latter battle he was censured by his superior officer, tried by court-martial, and dismissed from the service in 1863. The decision was revoked by President Lincoln and Revere then resigned. He published (Keel and Saddle> (1872).

REVERE (French, Rivoire), Paul, Ameri¬ can patriot: b. Boston, Mass., 1 Jan. 1735; d. there, 10 May 1818. He was trained as a gold-and silversmith and was skilful in the engrav¬ ing of designs for silver plate. In 1756 he participated in the expedition for the capture of Crown Point, upon his return from which he set up as a goldsmith and also practised copper¬ plate engraving. Among his prints were a like¬ ness of Samuel Adams, a portrait of King Philip, a view of Castle William and the Bos¬ ton Massacre. He also engraved the plates for the earliest paper currency of Massachusetts. In 1774 he was one of the grand jurors who refused to serve in consequence of the act of Parliament making Supreme Court justices in¬ dependent of the legislature as regards salary. In the autumn of that year he became one of the <(thirty Northend mechanics,® who patrolled the Boston streets to watch the movements of the British forces. On 14 April 1775 this com¬ mittee of observation noted preparations in bar¬ racks and on board ship on the part of the British. On the evening of the 18th it was seen that troops were marching across the common to the inner bay. Revere forthwith had a pre¬ concerted signal set in a Northend church tower — the honor being claimed for Christ Church and for the church in North Square destroyed by the British — crossed the river, mounted a horse on the Charlestown side and began his famous ((midnight ride.® He was none too early, for at 2.30 A.M., 800 British troops were landed at Lechmere Point and marched on Lexington. Revere became the trusted special messenger of the committee of safety and after the evacuation of Boston was made successively major and lieutenant-colonel of a regiment of artillery. He took part in the Penobscot expedition in 1779. After the Revo¬ lution he resumed as gold-and silversmith, built a bell-and cannon-foundry and in 1801 established large copper-rolling works at Can¬ ton, Mass. It is said that he was the first in America to smelt copper ore and to refine and roll copper into sheets and bolts. He was conspicuously associated with benevolent enter¬ prises. Longfellow's poem, (The Midnight Ride of Paul Revere,* in which, says Winsor, the author has <(paid little attention to exact¬ ness of fact,® is well known.

REVERE, Mass., city in Suffolk County, on the Atlantic Coast and on the Boston and Maine Railroad, northeast of Boston. The place was

settled in 1627 and was first named Rumney Marsh. Until 1738 it was a part of Boston.

In 1739 it was incorporated as Chelsea and in 1846 was set off and reincorporated as North Chelsea. In 1871 the name was changed to Revere, in honor of Paul Revere (q.v.). It received its city charter in 1915. It is a pop¬ ular residential town and summer resort. It has a Massachusetts State Bath House, built and maintained by the State ; Revere City Hall, a memorial to Paul Revere, and a Carnegie library. It has a number of churches and good public schools. It has a city government con¬ trolled by a mayor and nine councilmen. Pop.

(1920) 28,823.

REVEREND, a title of respect given to ministers of religion — in the United States to the clergymen of all religious denominations, including the Jewish Church: the titles very reverend, right reverend and most reverend are given to *6eaiis and vicars-general, bishops and archbishops, respectively. A like usage prevails in England, but strict churchmen of the Establishment long refused to accord the title reverend to the clergymen of the dissenting churches. When the bishop of Lincoln in 1874 refused to allow this title to be inscribed on the tombstone of a Wesleyan minister, his action was approved by judgments of the Arches Court; but that judgment was reversed on ap¬ peal to the Privy Council, when the title was declared to be simply one of courtesy and not confined to clergymen of the Established Church. In Scotland the principals of the uni¬ versities, if they be clergymen and the moderator of the general assembly for the time being, are styled very reverend.

REVERIES OF A BACHELOR, or A BOOK OF THE HEART, a collection of meditative papers by Donald Grant Mitchell, originally issued under the pseudonym, (<Ik Marvel.® The first (Reverie) was published in the Southern Literary •Messenger in 1849, and reprinted the following year in Harper's New Monthly Magazine. These papers, full of sentiment, enjoyed a wide popularity at the time of their appearance and still find favor with readers.

REVERSION, in biology, the reappearance in an animal or plant of characteristics not of its parent, but of more remote ancestors. This frequently occurs in varieties of domesticated animals or of cultivated

plants, which have been produced by artificial breeding and which sud¬ denly develop traits belonging to the wild stock. The more highly bred and artificial the variety of animal or plant, the more liable is it to show this occasional reversion. That the tendency is strong and persistent appears from the fact that if the variety is not kept pure by careful breeding, as when a flower escapes from culti¬ vation or a race of domestic animals runs wild, it soon begins to resume the characteristics of, or <(revert toward,® the wild stock from which it sprang. This reappearance of abnormal characters, as of color, markings, etc., is very likely to occur in the progeny resulting from the crossing of dissimilar races or species, which can be explained only on the supposition that such characters belonged to remote ancestors, perhaps thousands of generations removed. This was illustrated very forcibly by the ex¬ periments undertaken at Penycuik, in Wales, by Ewart, in the crossing of zebras with mares, the offspring of which exhibited many pe-REVERSION — REVIVAL OF RELIGION

culiarities belonging to neither parent. Con¬ sult Darwin, (Variation of Animals and Plants Under Domestication) (London 1888) ; Ewart, (The Penycuik Experiments* (London 1899) ; and the authorities cited under Heredity.

REVERSION, in law, the right to prop¬ erty which remains after ‘some particular estate has ceased which has been granted by the owner. In the United States this is virtually the only meaning of the term in general usage. In England, where the purchase and holding of annuities is common, a reversion means the present right to a payment to be made at some future time, conditional upon certain con¬ tingencies, as in the case of an insurance fail¬ ing to be paid on the attainment of a certain age, or on the death of the assured. The value of a reversion is easily ascertained when the date of its emergence is fixed, and thus a per¬ son who has a right to receive a certain sum of money at a given time is enabled to sell this right for its just value. See Property.

In heredity, reversion is the reappearance in offspring of ancestral feature or type. Atavism is nearly synonymous, but properly more restricted, referring to the return of characters observed in less remote

ancestors, of the human race especially. Reversion is sometimes seen in cultivated plants, exhibiting features of the wild plant. Domestic animals do not always return to the feral form and color, when they run wild, but in many instances or in some degree they do. Pigs have resumed stripes and other characteristics of the wild boar. Black is supposed to be the original color of sheep to which some in almost every flock return, despite most careful exclusion for many generations. The crossing of breeds sometimes reproduces at once the original type, as in the case of pigeons and white and black fowls; the former was followed by offspring like the wild blue rock pigeon; the latter be¬ came red like the original jungle-cock of India. In plants there is often a partial morphological reversion, as when stamens are reconverted into petals, or petals into leaves. See Hybridity ; Mendel's Law, and consult Darwin, C., Varia¬ tion of Animals and Plants under Domestication) (2 vols.. New York 1900), and Ewart, T C, (The Penicuik Experiments) (London,

1899).

REVIEWS. See Periodical Literature.

REVILLE, ra-vel, Albert, French Prot¬ estant theologian: b. Dieppe, France, 4 Nov. 1826; d. 1906. He was educated at Geneva and Strassburg, and was pastor of the Walloon Church at Rotterdam, 1851-72. He then re¬ moved to Dieppe, where he spent his time in philosophical studies till called in 1880 to the chair of the history of religions in the Col¬ lege de France. He was one of the most radi¬ cal French Protestants of his time, and among his numerous books are (Comparative History of Philosophy and Religion) (1859) ; (Redemption) (1860); (Essais de Critique religieuse) (1860); (Theo 'ore Parker, sa Vie et ses CEuvres* (1865) ; (History of the Dogma of the Divinity of Jesus Christ* (1869) ; Untroduction to the History of Religions* (1881); (Histoire des Religions* (1883-89).

REVISED STATUTES OF THE UNITED STATES, a compilation of all the

acts of the Congress of the United States ; it was first approved by Congress 22 June 1874, thus becoming law ; at that time the compilation included all the laws enacted by Congress down to 1 Dec. 1873. The second edition of the Re¬ vised Statutes comprised the first

edition as amended by the 43d and 44th Congresses ; sup¬ plements have since been approved and pub¬ lished containing later acts of Congress. The act approving the Revised Statutes makes that compilation the authentic and authoritative ex¬ pression of the laws, without reference to the original acts, but the originals may be quoted to show the true intent of the lawmakers if there is any ambiguity in the compilation.

REVISED VERSION, a revision of the authorized version (or King James' version) of the Bible. The project of the revision orig¬ inated in the Convocation of Canterbury, 1870, when two companies of biblical scholars of the Established Church, one to revise the Old Testament, the other the New, were appointed, with power ((to invite the cooperation of any eminent for scholarship, to whatever nation or religious body they may belong.** Afterward, under a resolution of the Convocation, two companies of American biblical scholars were formed, to act with the English companies. The work of revision, which was commenced 30 June 1870, was completed 20 June 1884; the New Testament was published in England and the United States in May 1881, and the Old Testament in May 1885. Many readings and renderings proposed by the American revisers were not approved by the English companies either for adoption into the text or the margin, but were ordered to be recorded at the end of the New Testament or the Old, respectively. But an edition of the whole Bible having the renderings preferred by the American com¬ panies and many other renderings since pro¬ posed by American scholars has been published in the United States and is known as the Ameri¬ can Revision. See Bible.

REVIVAL OF LETTERS, a term used to designate the revival of literature after the ap¬ parent death blow which it received when the barbarous nations of the North destroyed the Roman empire. It commenced about the begin¬ ning of the 11th century, and became more potent. in the 14th, 15th and subsequent centuries.

REVIVAL OF RELIGION, a season of religious awakening out of spiritual torpor or indifference ; usually brought about by the fervid exhortations of men deeply impressed with the feeling that the churches, the pastors and the people have been slumbering while Satan has been gaining possession of the kingdom of Christ on earth. The term, revival of religion, is a modern one, but the thing it signifies is as old as Christianity, as old as Iraelitism or as religion itself. The mission of every one of the Hebrew prophets was for the revival of religion ; in the Christian Church, revivals, though not called by that name, oc¬ curred at intervals from apostolic <times ; and every

sincere and enthusiastic reformer — Saint Peter Damiani, Saint Francis of Assisi, Saint Dominic, in the Middle Ages; the Jesuits, the Redemptorists and other missionary orders; these were in their time revivalists in fact,

though not in name. The Reformation is re¬ garded by Protestants as a great awakening of the Christian consciousness and the well-spring of 3.11 the efforts that have since been made for the renovation of the spiritual life in the Protestant churches. In England, at the beginning of the 17th century the religion of the Established Church had degenerated into a cold but decent formalism, but a revival of spiritual interest in the common people was brought about through the instrumentality of the Puritans. After the restoration of the monarchy and of the State church there was a period of spiritual sloth and apathy, infidelity and immorality till in the 18th century Great Britain was aroused by the fervid preaching of the Wesleys, Whitefield, Rowland Hill, Romaine, Venn, Newton, Cecil, Fletcher and others, earnest men who were raised up and qualified by the divine spirit for the work which lay before them. (See Methodist Churches of the World). In the colony of Massachusetts Jonathan Edwards carried on notable revivals at Northampton in 1734. Shortly afterward Gilbert Tennant aroused great religious interest in New Jersey. The impulse spread through the colonies, and has been called the Great Awakening ; it seems to have arisen independently of the movement in the parent country ; but it was greatly quick¬ ened by the missionary labors of John Wesley and George Whitefield during their visits to the colonies. Its influence was very powerful during the 3rears 1740, 1741 and 1742, and its quickening results were felt, long afterward, and inspired the multiplication of churches, seminaries and colleges. About the same time there was a remarkable revival of religion in various parts of Scotland, especially at Cam-buslang and Kilsyth; and out of a similar awakening in Wales arose the Welsh Calvinistic Methodist Church. In 1839 Kilsyth was again the focus of a great revival of religion, which extended to Dundee, Perth, Blairgowrie An-crum, Jedburgh, Kelso, and in the north of Scotland to Ross-shire and Sutherlandshire. In the first half of the 19th century there were many revivals in the United States, notable among which were those under Charles G. Finney (q.v.), who also visited Great Britain and preached to vast crowds in London and other cities; a notable feature of the great re¬ vival commenced in 1830 was the camp meet¬ ings (q.v.), assemblies of great numbers of people, held in the open air and addressed by relays of evangelists from morning till night. In 1858 there was a great revival of religion in the United States, which subsequently extended to the British isles and even to the continent of Europe. Its principal centres at first were New York and Philadelphia,

whence it spread throughout the States, producing for a time a sort of federation of the evangelical churches for the promotion of the work of spiritual con¬ version. In nearly every city in the land meet¬ ings for prayer were held daily, often in busi¬ ness hours, in churches, in counting houses, in theatres and other places of public resort ; in the one State of New York more than 2,000 cities, towns or villages had an active part in this revival; throughout the country the inter¬ est in the movement was universal; daily re¬ ports of the deep religious feeling of the people

were received at the principal centres and pub¬ lished in the newspapers. In New York every evangelical church received large accessions to its membership, and a like report was made con¬ cerning Boston, Baltimore, Washington, Chi¬ cago, Cincinnati, Pittsburgh and other cities.

For nearly two years, the meetings for prayer and the labors of the evangelists continued almost unflagging, and for many years P°on-hour prayer-meetings continued to be held in the business centres of many of the cities. In the summer of 1859 the movement extended to the north of Ireland, where it was not less fruitful of spiritual good than in America; the people flocked to the services in the open-air meetings or assembled in social gatherings for devotional exercises; there was a noticeable diminution of vice and immorality, especially of drunkenness; and judges and magistrates cor¬ dially recognized the reality and power of the spiritual work. From Ireland the revival spread to Scotland, and in Glasgow, Edinburgh, Aberdeen, Perth, Dundee, and the other con¬ siderable towns, the religious denominations joined in active exertions to bring the neglected poor within the range of evangelistic and edu¬ cational agencies. It extended to Wales also, where in one year the increase in the member¬ ship of the Calvinistic Methodist body alone was 33,724 souls; the gain to the independent denomination was 30,000, to the Established Church 20,000 and to the Wesleyan body 10,000.

In more recent times the great revival in Wales of 1904-06 was conspicuous for its great wave of moral regeneration in certain districts. In the West and Southern United States and rural districts of the East the revival often took the form of the camp meeting (q.v.), and these open air gatherings continue to be made an instrument of evangelism and conversion by the Methodist Church. Out of the camp meet¬ ing sprang the Chautauqua Assembly (q.v.), an institution both religious and educational Especially notable was the revival initiated

in Chicago by Dwight Lyman Moody (q.v.) and conducted by him in conjunction with Ira D. Sankey. These two evangelists — a preacher and a singer of the gospel — visited Great Brit¬ ain in 1873, and for two years in the principal cities of England, Scotland and Ireland their meetings were attended by multitudes from all ranks of society, and their labors zealously sec¬ onded by ministers of all the evangelical churches; thousands of persons professed con¬ version, and there was a manifest religious awakening. The two evangelists on their return home engaged in revival work of the same kind in the American cities; and they subsequently made two visits to Great Britain, namely, 1883-84 and 1891-92. The Salvation Army (q.v.) and the Volunteers of America (q.v.) are agencies designed to promote a continuous revival of religion, especially among the poor and neglected classes.

Among modern American revivalists and professional evangelists are <(Gypsy® Smith, J. Wilbur Chapman, <(Sam® Jones, R. A. Torrey, and most prominent of all ((Billy® Sunday, an ex-baseball player who, though lacking in the f elegancies of speech, possesses an energy of statement, a seemingly boundless enthusiasm and an ability for drawing and holding an audience that is phenomenal. He is the most

conspicuously successful revivalist since Moody.

Bibliography. — Bacon, L., (History of Christianity) (New York 1897) ; Beardsley, G. F., (History of American Revivals) (New York 1904); Burns, J., c Revivals: Their Laws and Leaders) (New York 1910) ; Davenport, F. M., Primitive Traits in Religious Revivals) (New York 1905) ; Duncan, “History of Re¬ vivals of Religion in the British Isles) (New York 1840) ; Edwards, J., (Narrative of the Work of God in Northampton (1756) ; Ellis, W., (Billy Sunday, the Man and His Message5 (1914) ; Finney, C. G., (Lectures on Revivals of Religion (Boston 1835; new ed., London 1910) ; James, W., ˆVarieties of Religious Experience) (New York 1902) ; Porter, (Letters on Religious Revivals5 (1850) ; Starbuck, Psychology of Religion5 (1900) ; Stead, W. T., (The Revival in the West5 (London 1905) ; Torrey, R. A., (How to Conduct and Promote a Successful Revival5 (New York 1906) ;

Tracy, J., (The Great Awakening: A History of the Revivals of Religion in the British Isles5 (London 1840) ; Tyler, B., (New England Revivals5 (Boston 1846).

REVOCATION OF THE EDICT OF NANTES. See Edict of Nantes.

REVOLUTION, a term commonly used ,to designate a fundamental change in government, or in the political constitution of a country, effected or sought to be effected by violence and force of arms of a considerable number of individuals, and mainly brought about by in¬ ternal causes; a revolt against the constituted authority more or less successfully and com¬ pletely accomplished. In the United States the term Revolution is applied specifically to the American War for Independence, which began in 1775 with the irregular running fight popu¬ larly known as the battle of Lexington, and practically ended with the surrender of Lord Cornwallis, at Yorktown, Va., to the combined forces of the French and Americans, 19 Oct. 1781. By this war the colonies succeeded in casting off the English authority and in erect¬ ing the government of the United States. The English revolution was that revolution in Eng¬ land by which James II was driven from the throne in 1688. The Central American states and Mexico have been seriously afflicted for years with revolutions. See Mexico; Central America; also Poland; Rebellion; United States — American Revolution.

The French Revolution began in 1789. (See France). Others were: Sweden, 1772; Hol¬ land, 1795; Netherlands, 1830; Spain, 1868 and 1874; Brazil, 1889; Chile, 1891; Cuba, 1891-98; Norway, 1905; Turkey, 1908; Mexico, 1910; China, 1912.

REVOLUTION. (1) In astronomy, the motion of a planet around the sun or of a satel¬ lite around a planet. The point, to which it returns is called annual, anomalistic, nodical, sidereal or tropical, according as it has a relation to the year, the anomaly, the nodes, the stars or the tropics. (2) In geom¬ etry, when one line moves about a straight line' called the axis, in such a manner that every point of the moving line generates a cir¬ cumference of a circle, whose plane is perpen¬ dicular to the axis, that motion is called revo¬ lution, and the surface is called the surface of VOL. 23—29

revolution. Every plane through the axis is called a meridian plane, and the section which this plane cuts from the surface is called a meridian curve. Every surface of revolution can be generated by

revolving one of its merid¬ ian curves about the axis. The revolution of an ellipse round its axis generates an ellipsoid; the revolution of a semi-circle round the diameter generates a sphere ; such solids are called solids of revolution. (3) In mechanics, the motion of a rotating body around a centre, as that of a small gear-wheel traveling around a large gear¬ wheel — distinguished from rotation.

REVOLUTIONARY CALENDAR, a

calendar adopted during the French Reign of Terror. It was decreed on 24 Nov. 1793, to commence from the foundation of the French republic, 22 Sept. 1792. The 12 months were Vendemiaire, Brumaire, Frimaire, Nivose, Plu-viose, Ventose, Germinal, Floreal, Prairial, Messidor, Fervidor or Thermidor, and Fructi-dor. The first three constituted autumn, the second three winter, the third spring and the fourth three summer. Napoleon I restored the old system 31 Dec. 1805.

revolutionary; tribunal, a

court of extraordinary criminal jurisdiction es¬ tablished by the French Convention, 10 March 1793, for the purpose of trying those accused of plotting “against the liberty, equality, unity and indivisibility of the Republic, the internal and external safety of the state, or the sover¬ eignty of the people.55 It received the name Revolutionary Tribunal in October 1793. The court was to consist of a jury and a public prosecutor with two assistants, all named by the Convention, and from its decision there was no appeal. The number of judges rose as high as 80 toward the end of the tribunal’s existence. Intended as a means of combating treason at home, the Revolutionary Tribunal speedily be¬ came an instrument in the hands of the Com¬ mittee of Public Safety, whose will it executed under the guise of judicial form. Without any definite procedure, with no legal defenders allowed to the accused and with its acceptance of the vaguest rumors and charges as evidence, the tribunal offered but a mockery of justice and citation before it almost invariably meant death. The reading of the act of accusations, the trial and the execution of the sentence gen¬ erally occurred on the same day. The tribunal sent 1,220 victims to the guillotine from its in¬ ception till June 1794, when Robespierre (q.v.) caused the infamous law to be enacted acceler¬ ating its procedure; from that date to the fall of Robespierre, a period of about 50 days, it condemned 1,376 persons, Robespierre and his followers being among the lot. The tribunal soon after ceased its functions and was for¬ mally suppressed 31 May 1795. Its sanguinary work must be regarded as justified to a large extent by its success in saving the

country from sedition at home at a time of great national danger. It was but one feature of the organized Terror which saved France from foreign con¬ quest. Consult Wallon, (Histoire du Tribunal Revolutionnaire de Paris5 (1880-82).

REVOLUTIONARY WAR. See United

States — American Revolution.

REWA, ra'wa, India, (1) the capital of a native state of the same name, 131 miles south-

west of Allahabad, and connected by a branch line with Sulna on the East India Railway. It is enclosed by three wall circuits or ramparts, the outer one massive and flanked by round towers. Its chief buildings and institutions are the fortified palace of the maharajah, a high school, hospitals and a model jail. Pop. 24,000. (2) The native state in the Central India Agency and in the subagency of Baghelkhand (q.v.), has an area of 12,676 square miles. It is chiefly an elevated tableland, but also com¬ prises portions of the country on both sides of the Kaimor Hills, watered by the Son, a tribu¬ tary to the Ganges, and flowing northeast. The surface is in part covered with jungle, but on the whole highly cultivated ; the condition of the peasantry is, however, much depressed. The ruins of many temples are scattered over the country. The revenue of the maharajah amounts to about $1,250,000 annually; the armed force consists usually of 4,000 men, though from 10,000 to 12,000 might be mustered. Pop. about

1,700,000.

REWA KANTHA, kan'tu or -ta, India, a political agency under the government of Bom¬ bay, containing 61 small states, of which five are tributary to the British government, and most of the remainder to Baroda. The territory in¬ cluded, covering an area of 4,980 square

miles, with a pop. of about 478,889, lies mainly along the south bank of the lower Nerbudda with patches north of it, and on the western borders of Broach, Baroda and Ahmadabad.

REWARD, in a legal sense, some encour¬ agement which the law holds out for exertions in bringing certain classes of criminals to jus¬ tice. The courts may order the sheriff of the county, in which certain offenses have been committed, to pay to persons who have been active in securing the apprehension of offenders charged with murder or with feloniously shoot¬ ing, cutting, stabbing, wounding or poisoning, or with rape, burglary, housebreaking, robbery, arson or cattle-stealing, or with being accessory before the fact to any of such offenses, or to receiving any stolen property, a reasonable sum to compensate them for expense, exertion and loss of time. By another statute it is a felony, punishable by penal servitude to the extent of seven years, to corruptly take any reward for helping a person to property .stolen or embez¬ zled, unless all due diligence to bring the offenders to trial has been used. States, cities, municipalities, corporations, individuals, etc., may offer rewards for information leading to the detection and punishment of any sort of crime, and thi-s is done not infrequently to in¬ duce some one having knowledge of a crime to disclose it, receiving protection as regards any complicity of his own. In Great Britain an advertisement offering a reward for the return of stolen or lost property, using words purporting that no questions will be asked or inquiry made after the person producing the property, renders the advertiser, printer and publisher liable to forfeit $250; but in the United States such advertisements are common. Some courts have held that a reward may be withdrawal by advertisement; also that it lapses after a reasonable time.

REWBELL, re-bel, Jean Francois, French statesman: b. Colmar, 8 Oct. 1747 ; d. there, 23

Nov. 1807. He was a prominent advocate of Colmar, and was elected to the States-General of 1789, where he advocated the principles of the Revolution. He was a member of the Con¬ stituent Assembly, where his boldness and legal knowledge made him president in 1791. As a member of the Convention, in 1792 he was out¬ spoken in urging the condemnation of Louis XVI ; but his absence on a mission to the army at Mentz saved him from being numbered among the regicides. He helped suppress the Jacobin Club in 1794, figured ls member of the committees of public safety and of general security; and on the adoption of the Constitu¬ tion in 1795 he became one of the five

members of the Directory and took in charge the depart¬ ments of Finance, Justice and Foreign Affairs. In 1796 the Directory elected him its president. He succeeded in defending himself from con¬ viction on charges of peculation, but retired from public life after the coup d'etat of the 18th Brumaire (9 Nov. 1799) and carried with him a large fortune. Consult Sciout, (Le Di-rectoire) (1895-97).

REXFORD, Eben Eugene, American

writer: b. Johnsburg, N. Y., 16 July 1848; d. 18 Oct. 1916. He was educated at Lawrence Uni¬ versity, Appleton, Wis., and began to write for the press at 14. He published (Brother and Lover,) verse (1886) ; (Grandmother's Garden,' verse (1887) ; (John Fielding and His Enemy 5 (1888); (The Swamp Secret) (1897); blow¬ ers: How to Grow Them> (1898); Unto the Light) (1899), etc., and achieved popular fame by his well-known songs, (Silver Threads Among the Gold> and (Only a Pansy Blossom.

REYES, Rafael, Colombian explorer soldier and statesman : b. Santa Rosa de Viterbo, Boyoca, 1852. He served as Minister of the Interior under President Nunez, was Minister to France and Switzerland and dele¬ gate to the second Pan-American Conference in Mexico. In 1904 he was elected President of Colombia. He greatly improved the internal affairs of the republic. He resigned in 1910. Beside the public service rendered by him when he traveled during several years in unknown parts of the Amazon Basin, the facts in his career which deserve special notice are the fol¬ lowing: He was commander-in-chief of the Colombian army; was sent Jo Washington, after Colombia had lost Panama, to <(save whatever he could from the wreck'5 ; and in this patriotic effort he was certainly not altogether unsuccess¬ ful, since he gained courage to advocate on his return to Bogota the policy indicated in the re¬ port which he submitted to his government. He advocated, sensibly, courageously and magnan¬ imously, a frank acknowledgment by his people of their own blundering which had contributed to the disaster; and he continued to show his people how the natural resources of the vast territory still remaining in their possession could be developed by attraoting foreign capital. He succeeded. The very great imperfectly de¬ fined powers of the Presidency were entrusted to him, despite the old ultra Conservatives' hostility to foreign enterprise, and despite the suicidal scheme of the Liberals for permitting Colombia to be absorbed by Venezuela and Ecuador. . His success saved Colombia from a future of isola¬ tion and stagnation, on the one hand, or, on the

other hand, nearly complete loss of identity. President Amador of Panama and President Reyes exchanged congratulatory messages in August, and the American Minister was re¬ ceived at Bogota in December 1904. Dr. Reyes is the author of (Mision del Rafael Reves) (1908) ; (Pro Colombia, Pro Ibero-America' (1912) ; (The Two Americas-' (1914).

REYKJAVIK, rik'ya"vik. See Reikiavik.

REYMONT, Wladyslaw Stanislaw, Polish

novelist and poet: b. 6 May 1863. The son of poor parents, he received but little education and, after trying his hand in various employ¬ ments — on the railway, on a farm, in a store and on the stage, he began his literary career in 1894. Though practically unknown to the English-speaking world, his novels, of which he has written over 20 volumes, have found their way into Russian, French, German, Swed¬ ish and Spanish. His first story of (Death' (1894) ; his first novel (The Comedienne, ' ap¬ peared in 1896. These were followed by (Fermention) (2 vols.) ; (The Promised Land) (2 vols.) ; (The Peasants> (4 vols.) ; (The Vam¬ pire' ; (The Dreamer' and a trilogy portraying the partition of Poland and the insurrection led by Kosciuszko in 1794. W. Reymont visited the United States in 1919.

REYNARD (ra'nerd) THE FOX. The

beast-epic, (Reynard the Fox,' the property of the Frankish race of the Netherlands, northern France and western Germany, is perhaps their most original contribution to mediaeval litera¬ ture. To be sure, there is scarcely a people without its animal fables, which in the case of celebrated stories like some of 2Esop's go back to remote antiquity, but none has developed a consistent epic such as the Middle-Franconian, Reinaert de Vos. A short poem in Latin com¬ posed at the court of Karl the Great in the 8th century by Paulus Diaconus, retells the ˆEsopian fable of the sick lion, who on the ad¬ vice of the fox is cured by being wrapped in a fresh wolf's hide. The same story is found in the (Ecbasis captivi,' or (The Escape of the Calf,' in which a Lorraine monk from Saint Evre at Toul relates the story of his escape

from the cloister, under the cloak of an animal story, about 940. Other elements from vEsop, Phaedrus, the Physiologus and folk-stories were gradually added to the kernel, including human names for the animals, and the Flemish Magister Nivardus of Ghent added 11 other humorous animal stories, including the pilgrim¬ age of Bertiliana, the Goat, with satirical at¬ tacks on the vices of the clergy, in a Latin poem of over 6,000 verses, the Usengrimus,' be¬ tween 1146-48. Bishop Gaudri of Laon had called his enemy Isengrimus as earlv as 1112, on the testimony _ of Petrus Alfonsus in his (Disciplina clericalist

The beasts apparently received their Teu¬ tonic names in Flanders, so Reynard, from a root ragin + hard = strong in counsel ; Isengrim, either iron helm, or iron fury; Tibeert, the cat, from Theudebert, a Frankish king; Bruun = brown, the bear. Others like the Leopard Feirepeel, from varium pellem, spot¬ ted hide, are French. .

French. — From this time on the gleemen or traveling entertainers take up the subject and include the court and all ranks of people in their satire, with the result that poets, good and

bad, develop a never ending Roman de Renart in French, which is artistically arranged by an unknown editor in some 27 "branches" of more than 40,000 lines, including repetitions and variations. Ernest Martin thinks that perhaps nine of these "branches" were collected by 1180, that a few years later, perhaps at the be¬ ginning of the 13th century Pierre de Saint Cloud added "branche" 16 to complete the poem, thus rekindling a waning interest to which was due among others "branche" 20, completed around about 1210 and the founda¬ tion of the Flemish epic. Other "branches" were added in the 13th century by the editors from whose labors resulted two broad classes of manuscripts, numbering 15 in all. A lost compilation of 16 "branches" was adapted about 1180 by the German Heinrich der Glichezare. Later continuations of the 13th and 14th cen¬ turies were (Le couronnement Renart,' (Renart le nouveau' and (Renart le conterfait.' cf. Rothe, M.A., (Les Romans du Renard' (Paris

1845).

Of the personality of the poets we know nothing. We can only judge from their dia¬ lects, from the use of Flemish words, from place

names, and scattered historical allusions that they came from either the Flemish and German border or the Isle de France. The older the composition the greater its merit. The later branches became more and more an¬ thropomorphic, less “beastly,” and degenerated into fastidious allegory, the didactic purpose of which became fatally tiresome, and the poem gradually sank into oblivion.

Originally based on the friendship of wolf and fox, this relation changed to hostility and resulted in a series of duels between fox and wolf or the latter’s retainers and champions, in which the cunning of the fox invariably worsts the heavier ferocity of his adversary. An especial favorite was the judgment of Reynard,’ with which Martin’s edition begins. Hens, titmice, kites, crows, hares, Tibert the cat, Patous the bear, the ram, the heron, all suffer or are killed. Reynard even becomes emperor, vio¬ lates the female wolf and seduces the queen, who is at all times his friend, cures King Nobel, the lion, at the expense of the wolf. Finally he dies, or at least is supposed to die, receives a grand funeral (of which there was formerly a sculpture in the cathedral of Strassburg, repre¬ senting Reynard on a stretcher carried by the other animals), and goes to the animals “para-douse,” “two leagues beyond paradise.” To compliment Boniface VIII, Philip the Fair had the subject matter of this procession played in the streets of Paris about 1303.

Text: Meon, M. D. M. (4 vols. with supple¬ ment. Frontispiece by Desenne. In Newberry Library, Chicago ; Paris 1826) ; Ernest Martin (Strasbourg et Paris 1887). (The best; Branche I — Meon’s Branche XX). Criticism: Sudre, L., (Les sources du Roman de Renart’ (Paris 1892) ; also in Petit de Julleville’s (Histoire de la langue et de la litterature frangaise,’ (II Paris 1896) ; Martin, Ernest, in Zeitschrift fiir germanische und romanische Philologie, 1894; Paris, Gaston, (Le Roman de Renard’ (Journal des Savants, Paris 1895) ; Potvin, (Roman du Renard’ (Paris 1891). Transla¬ tion: Potvin, (Roman du Renard mis en vers’ (Paris-Bruxelles 1861).

Middle High German. — Only a few frag¬ ments of the Reinhart Fuchs of Heinrich der Glichezare (the Satirist) have come down to us, but a 13th century redaction was edited by J. Grimm in 1834. This poem represents Rein¬ hart in the beginning as the dupe of weaker animals, later as victimizing the wolf in various pranks, working up to the illness of the king, to the trial of Reinhart, to his curing of the king at the expense of his opponents and his final poisoning of his benefactor.

The author seems to have been an errant minstrel or gleeman of whom nothing is known. His style is terse, dry and satirical, with proverbs and local allusions, and German names for animals. He seems to have used a French compilation, containing a portion of the extant Renart but with four episodes of which the French originals have not yet been found.

Text: (Reinhart Fuchs) (Reissenberger,

Halle 1886).

Flemish. — Between 1250 and 1270 an un¬ known poet wrote the 3,476 lines called <(van den vos Reinaerde® (of Reynard the Fox). He may have been a <(clerk,® Willem, perhaps from Hulsterlo in East Flanders, or possibly an un¬ known Arnout from Brugge or thereabouts. From the 1st (Martin) branche of the French Roman he derives his poem with logical consist¬ ency and epic purpose. It opens with the court of King Nobel, the lion, to whom com¬ plaints against the thief and murderer Reinhart are preferred, and bear and later cat are sent to summon the culprit, who gets both into ter¬ rible trouble. On the advice of the badger, his “nephew,® he submits, goes to court, defends himself and offers to go on a pilgrimage to Rome. Acquitted by the king he breaks all promises, commits further depredations and is outlawed. It is told naively, humorously and well. Only a portion of the names are Flemish, the rest French.

Nearly a century later another unknown, possibly from Brugge, rewrote ˆWillem’s® work, and added some 3,318 lines with copious borrowings from the Roman de Renart, the Flemish adaptation of Marie de France’s (Isopet, } and various Bestiaries. Its satirical and obviously didactic purpose made it a great favorite for several centuries, as is witnessed by the chap books of Gouda, 1479, Delft, 1485, the Caxton English one of 1481, and the rimed and modernized

Antwerp work of 1487, of which last only fragments are preserved be¬ cause the Duke of Alba and the University of Louvain caused all copies to be destroyed in the year 1570. It was accompanied by didactic glosses and preceded by a preface from the pen of an unknown Hinrek van Alckmer, who was long wrongly considered the author of the Low German (Reinke de Vos,5 which con¬ tains a translation, or more likely an adaptation, of the preface to an Antwerp print of 1564.

Text: (Reinaert) (Ernest Martin, Paderborn 1874) ; (Reinaert5 (F. Buitenrust Hettema en J. W. Muller, Zwolle 1903) ; <Reinaert> (van Helten, Groningen 1891). Edition (MS.) : Hermann Degering (Munster 1910).

Low German. — The first version appeared at Liibeck in 1498 with the so-called Catholic “glosses,® followed by the Rostock edition of 1539 with polemical Protestant <(glosses,® from which resulted 14 Low German, 2 high Ger¬ man, 7 Latin, 3 Danish, 1 Swedish translation,

down to Gottsched’s reprint and prose transla¬ tion of 1752, which is the beginning of modern “Reinhart® scholarship and the main basis of Goethe’s (Reinecke Fuchs.)

Reinke (ke is a diminutive) Vos is the principal literary monument of Middle Low German literature, but it has added little to the Flemish original. It has perhaps improved it by slightly amplifying certain portions, while condensing others, by eliminating some of the sermonizing so that a certain refreshing naivete distinguishes it at least from Reinaert II, and its influence in Germany is deeper and broader than elsewhere. The 16th century engravings of Virgil Solis and Jost Ammann also con¬ tributed to this popularity.

Text: (Reinke de Vos5 (Friedrich Prien, Halle 1887). Criticism: Th. Carlyle, (German Literature of the 14th and 15th Centuries>

(Foreign Quarterly Review, 1831).

High German. — Gottsched’s translation in 1752 of the Liibeck version of 1498, illustrated with Everdingen’s fine engravings, was read in extract by Goethe to Duchess Amalie in 1782, and the acquisition of ((this profane bible® in 1783 “makes him happy as a child,® but it was his disgust at the failure of the campaign to rescue Louis XVI in 1793 that caused him to write : “Bui? I endeavored to rescue myself from this hideous misfortune by declaring the whole

world infamous … it was now (in (Reinke Vos5) really amusing to see court and ruler intrigues mirrored. For even if the human race appeared quite natural in its un¬ disguised bestiality, things went off amusingly, if not perfectly.® Goethe's work adds prac¬ tically nothing to the original except his own political confession in the eighth canto. He divided the poem into 12 cantos and adopted the dactylic hexameter in place of the rime verses of four accents of the Weinke.5 Goethe's version gave rise to Wm. Kaulbach's inimitable drawings, the delight of older gen¬ erations.

Text: Gottsched, J. C., (Reineke Fuchs5 (1752, and Halle 1886) ; Goethe's <Werke5 (1794, Vol. II); (Reineke Fuchs5 (Munich 1847; with Kaulbach's woodcuts ; tr. into English by T. J. Arnold) ; Simroclc, K. J., (Reineke Fuchs5 (Frankfurt 1845, original metre) ; Sol-tau, (Reineke Fuchs5 (Berlin 1803, original metre).

English. — (Vox and the Wolf5 (13th cen¬ tury), Chaucer's (Nonne Preestes Tale,5 and Caxton's translation (1481) of the Gouda re¬ print of 1479, popularized the tale in England. In 1844 W. J. Thoms edited the last for the Percy Society. In 1895 appeared Joseph Jacobs' (The Most Delectable History of Reynard the Fox,5 with a valuable introduction. In 1852, E. W. Holloway published in Leipzig (Reynard the Fox,5 translated from the German of Sim-rock mainly, illustrated by the fine woodcuts of H. Leutermann. T. J. Arnold translated from Goethe with illustrations by J. Wolf (1855) ; same with illustrations by W. von Kaulbach

(1860).

Carl E. Eggert,

Sometime Assistant Professor of German, Uni¬ versity of Michigan.

REYNOLDS, ren'oldz, Edwin, American engineer: b. Mansfield, Conn., 23 March 1831; d. 1909. He was apprenticed to a machinist in

1847 and in 1857-61 he was superintendent for Stedman and Company at Aurora, Ind. He was superintendent of the Corliss Steam Engine Company, Providence, R. I., in 1871-77, and was afterward connected with the Edward P. Allis Company, Milwaukee, Wis. He invented the Reynolds-Corliss engine, introduced the first triple expansion pumping engine, and the cross compound hoisting engines for mining work.

REYNOLDS, James Emerson, Irish chemist : b. Booterstown, County Dublin, 1844. He took the degrees M.D. and Sc.D. at the Uni¬ versity of Dublin, and in 1867 was appointed keeper of minerals at the National Museum at Dublin. He was professor of analytical chemis¬ try at the Royal Dublin Society in 1870, and in 1873 became professor of chemistry at the Royal College of Surgeons, Ireland. In 1873—1903 he was professor of chemistry and chemi¬ cal philosophy at Dublin University. He was president of the Society of British Chemical Industry in 1891 ; of the Chemical Society, Lon¬ don, in 1902-03, and vice-president of the Royal Society in 1902. He discovered many chemical substances, including thiocarbamide and its allies ; a new class of colloids, and several groups of the element silicon, which he de¬ scribed in reports in the <Transactions> of the Chemical Society and the Royal Society. Au¬ thor of (Lectures on Experimental Chemistry) (1874) ; (General Experimental Chemistry >

(1880).

REYNOLDS, Joseph Jones, American military officer: b. Flemingsburg, Ky., 4 Jan. 1822; d. Washington, D. C., 25 Feb. 1899. He was graduated from West Point in 1843 and after service at Fort Monroe and in Texas was, in 1846, assigned to the Third artillery and was on frontier duty at Fort Washita, I. T., in 1855-56. He then resigned to become professor of mechanics and engineering at Washington University, Saint Louis. At the beginning of the Civil War he entered the Federal army as colonel of the 10th Indiana Volunteers, soon becoming major-general of volunteers. He was engaged in the battles

of Chickamauga and Chattanooga ; later was in command of the defenses of New Orleans from 6 January to 16 June 1864; and of the Mississippi River from its mouth to Memphis, Tenn., from October to December 1864. In 1866 he was mustered out of the volunteer service and promoted colonel in the regular army.- He was brevetted briga¬ dier-general in 1867, retiring from active service in June 1877.

REYNOLDS, Sir Joshua, English portrait painter: b. Plymouth, Devonshire, 16 July 1723; d. London, 23 Feb. 1792. He was the son of Rev. Samuel Reynolds, master of the gram¬ mar school at Plympton Saint Mary, Plymouth, who intended him for the medical profession; but Reynolds declared himself for art and went to London in 1741 and studied under Thomas Hudson. This painter was at the head of his profession at a time when there were no very shining lights and from him Reynolds acquired a correctness of drawing and a certain reflec¬ tion of the style of Van Dyck that gave way subsequently, in great measure, to other influ¬ ences. He returned to Devonshire after two years and painted portraits for small prices; went again to London in 1745 and established himself as a painter, but the death of his father

the following year recalled him to Plymouth. In 1749 he accompanied young Commodore Kep-pel, then sent on a mission to the Barbary states, to the Mediterranean and spent more than three years in Italy, mainly at Rome with visits to Florence, Bologna, Parma, Venice and a short stay at Paris on his return to London. In Italy, he studied the Italian masters, espe¬ cially in respect to their handling of light and shade. He learned from the Venetians much of their mastery of color, so that when he settled again in London in 1753 his work showed the influence of Correggio primarily with reminis¬ cences of Tintoretto, Veronese and Titian. In that year he painted a portrait of Commodore Keppel that lifted him at once into fame. This picture, now in the Grosvenor Gallery, is al¬ most a monochrome in gray, with a few faint suggestions of color; but is remarkable for its effects of light and for individuality of por¬ traiture. So popular did the young painter be¬ come that in 1755 120 persons sat to him for their portraits. His work, which is of such considerable extent, does not display a uniform excellence, since to produce it all he had to call in the assistance of journeymen. Jn 1768 he was made president of the Royal Academy upon its establishment ; and the next year he de¬ livered his first discourse to the students. His social success was commensurate with his fame as an artist; George III knighted him and ap¬ pointed him court painter in succession to Allan Ramsay. He lived on terms of intimacy with Dr. Johnson, Goldsmith, Burke, Gibbon, Gar¬ rick and

was the founder of the Literary Club in 1764 where these distinguished men assem¬ bled. His body lay in state in the Royal Acad¬ emy and he was buried in Saint Paul's Cathe¬ dral.

The mention of his portraits would include all the names famous in the upper world of society and the arts in his day, and there is no higher source for learning of the beauty of English women, the character of English men and the fashions of taste of the later 18th cen¬ tury. He was graceful in arrangement of fig¬ ures and accessories, was able in his portraits of men and women to differentiate a masculine vigor and a feminine charm, and in his mastery of color achieved a position, according to Rus-kin, as ((one of the seven great colorists® of the world. Posterity cannot fully appreciate his power in the latter direction, as he often used impermanent mediums and resorted to a thick impasto, which has cracked with time. His work is amply represented in the National Gallery and the National Portrait Gallery of London and the numerous great collections belonging to noble families. In America his pictures are to be found in fewer numbers in the larger mu¬ seums and in the possession of private collect¬ ors. He published discourses Before the Royal Academy) (1778), and Commentary on Du Fresnoy's Art of Painting.*

Bibliography. — Armstrong, Sir Walter, (Sir Joshua Reynolds) (New York 1905) ; Bolton, S. K., (Famous Artists) (ib. 1902) ; Cotton, William, (Sir Joshua Reynolds and his Works* (London 1856) ; Farrington, Joseph, (Memoirs of the Life of Sir Joshua Reynolds) (ib. 1819) ; Gower, R. S., (Sir Joshua Reynolds) (New York 1902) ; Graves and Cronin, (History of the Works of Sir Joshua Reynolds* (4 vols., London 1899-1901) ; Leslie and Taylor, (Life

and Times of Sir Joshua Reynolds) (2 vols., ib. 1865) ; Malone, (The Works of Sir Joshua Reynolds, Knight) (3 vols., London 1798) ; Molloy, J. F., <Sir Joshua and his Circle) (2 vols., New York 1906) ; Northcote, James, <Life of Sir Joshua Reynolds) (2d ed., 2 vols., London 1818) ; Osborn, Max, (Joshua Reynolds) (in Kunstler-

Monographien, Bielefeld

1908).

REYNOLDS, William, American naval officer: b. Lancaster, Pa., 18 Dec. 1815; d. Wash¬ ington, D. C., 5 Nov. 1879. He entered the navy as midshipman in 1831, was commissioned lieutenant in 1841 and in 1851 was retired in consequence of failing health. He was subse¬ quently assigned to duty in Hawaii where he negotiated a reciprocity treaty, and at the out¬ break of the Civil War was again assigned to active duty. In 1862 he received command of the Asiatic station, was promoted captain in 1866, commodore in 1870 and rear-admiral in 1873. He was chief of bureau and acting Sec¬ retary of the Navy in 1873 and again in 1874; and in 1877 was again retired on account of continued ill health.

REYNOLDSVILLE, ren'oldz-vil, Pa., bor¬ ough in Jefferson County, 75 miles direct and 120 miles by rail northeast of Pittsburgh on the Pennsylvania, the Reynoldsville and Falls Creek and the Michigan Southern railroads. It has bituminous coal mines and an extensive lumber industry, and has flour, silk and woolen mills, a tannery and manufactures macaroni and asbestos. The borough was increased consider¬ ably in size by the annexation of several neigh¬ boring areas in 1913, including West Reynolds¬ ville with its population of 993. Pop. (1920)

4,116.

REZONVILLE, re-zon-vel, Battle of. See

Gravelotte; Franco-German War.

RHABDOCCELIDA, rab-do-se'lT-da, an order of Turbellaria which is characterized by the simple, unbranched and rod-shaped alimen¬ tary canal. Some forms are very minute and often mistaken for Infusoria. Transverse fis¬ sion is common in certain forms, and the power of regenerating lost parts is very great. A few genera have acquired a strictly parasitic habit, and a few also are marine and land forms, but most are inhabitants of fresh water. In many species two sorts of eggs are produced : summer eggs which are thin-shelled and are retained in "the uterus until hatched, and winter eggs, which possess heavy brown shells, and, though produced in the fall, do not hatch out until

spring. All Rhabdocoelida undergo a simple di¬ rect development.

RHABDOMANCY. See Divination; Divining Rod.

RHADAMANTHUS, rad-a-man'thus, ac¬ cording to Greek legend, a son of Zeus and Europa, and brother of Minos, king of Crete. According to another tradition, Rhadamanthus laid the foundation of the Cretan code of laws, which his brother Minos completed. From fear of his brother he is said to have fled to Ocaleia in Boeotia, where he married Alcmene. In the belief of the Greeks a spirit in the lower world continued the business of life, hence Rhada¬ manthus, after his death, was made a judge in the kingdom of Pluto, or the Islands of Blessed, on account of the justice of his life, and had

for his associates ZEacus and Minos. The name suggests an Egyptian origin of the myth.

RHZETIA, re'shi-a, a Roman province comprising the regions of Rhaetia proper and Vindelicia and extending from the land of the Helvetii in Gaul to Noricum on the west, and from Gallia Cisalpina to the Danube. It in¬ cluded within its bounds what are now the Grisons and the Tyrol, the southern districts of Bavaria and Wiirttemberg and the region of the Italian Alps, and contained the sources of the Rhine (Rhenus), the Inn (Alnus) and the Adige (Athesis), with many other rivers of northern Italy. The principal towns were Tridentum (Trent) in Rhgetia proper and Au¬ gusta Vindelicorum (Augsburg) in Vindelicia. The original inhabitants of the country were considered by most ancient writers to be Etrus¬ cans who had been driven out of Italy by the invasion of the Gauls and who under their leader Rhaetus took possession of the moun¬ tainous country. Modern research has tended to confirm the view of the ancients. The Rhae-tians were a brave and warlike people and their frequent inroads into northern Italy led to re¬ taliation on the part of the Romans. After a bitter struggle they were subdued in 15 b.c. by Drusus and Tiberius, stepsons of Augustus Cae¬ sar. With Vindelicia, which was conquered at this time, the southern region was united to form the province of Rhaetia. Diocletian di¬ vided the province into two, giving to the southern part the name of Rhaetia Prima, while Vindelicia was known as Rhaetia Secunda. After passing into the power of the Ostrogoths in the 5th century the region was overrun by the Boiarii who settled in the eastern part, the Alemanni who occupied the west and the Lon-gobards who established themselves in the south.

RHAMNACEZE, ram-na' se-e, an order of trees and shrubs. The species, of which about 500 have been described and classified in about 40 genera, are mostly natives of temperate and tropical countries, in which they are widely distributed, especially in the northern hemi¬ sphere. They are frequently spiny, have usually simple leaves and inconspicuous, small, greenish blossoms which are followed either by dry fruits which break at maturity into three parts, or by fleshy ones which do not split open when ripe. In several species the fruit is edible as in the jujube (Zizyphus jujuba). The red fleshy pear-flavored peduncles of Hovenia dulcis are eaten in Japan and China, where the plant is native. Some are important ornamental plants ; for instance buckthorn (Rhamnus) , and New Jersey tea (Ceanothus) . Various species of the former genus are valued for the yellow and green dyes they yield and R. frangula for its charcoal which is used in making gunpowder.

RHAMPSINITUS, ramp-si-ni'tus, a Grae-cised form of the Egyptian name Rameses, Rameses III, the first king of the 20th dynasty and the builder of the pavilion of Medinet Habu at Thebes. Brugsch makes Rhampsinitos a Greek form of Ramessu pa muter ((<Rameses the God®) ; Maspero, Ramsis-si-nit ((<Rameses, son of Neith®) ; by Diodorus he was called Remphis (Rempsis), from which comes the name Rame¬ ses by which Pliny called the monarch. Of him Herodotus (II, 121 et seq.) relates a story sub-

stantially the same as one of the most wide¬ spread folktales of the Aryan world. The king acquired an enormous treasure, and to secure it built a treasury of stone. The architect left one stone loose, so nicely adjusted as to be un¬ noticed, yet capable of being taken out and replaced without difficulty. Before death he entrusts the secret to his two sons, who from time to time plunder the king's treasure at their will, until at length the elder is caught in a snare set by the king. According to his desire, the younger brother cuts off and carries away his head, so that he may remain unknown. The king now orders the headless body to be ex¬ posed unburied, protected by a guard of

soldiers, but the younger brother lades an ass with skins of wine, allows some of it to run out and is relieved in his distress by the soldiers, to whom in gratitude he gives his wines so freely that they all sink into a drunken sleep. Thereupon he shaves the right half of all their beards, and carries his brother's body to his mother. The king next sends his daughter to find out the clever thief. She promises her love to those who reveal to her the most extraordinary things that have ever happened to them, and when the young man in his turn relates the strange pas¬ sages of his life she seizes him; but he cun¬ ningly slips his brother's dead hand into hers, and so escapes. The king is so much struck with wonder and admiration that he promises the clever thief his daughter in marriage, since he surpassed all mankind in knowledge ; for, while the Egyptians surpassed all the world, he surpassed the Egyptians.

The wealth of Rameses III is said to have been equal to 400,000 talents, or $387,500,000, an incredible sum for those ages. It is repre¬ sented on the walls of the palace treasury in the Medinet Habu as consisting of the precious metals and of wonderful jewels.

Herodotus gives the generally accepted story of the supposed thefts from, the treasury, but his chronology and historical facts have been proven to be too inaccurate to be relied upon.

RHAPSODISTS, wandering minstrels among the ancient Greeks, who sang the poems of Homer and sometimes their own composi¬ tions. They were for a long time held in high esteem, until the poems were committed to writing, and through the medium of manuscript copies became pretty generally known, when the rhapsodists soon lost their importance. Each ballad or recitation was termed a rhapsody, and thence it was applied to the separate books of the <Iliad) and < Odyssey. > Consult Browne, H., (Homeric Study* (London 1905).

RHATANY. See Rattany.

RHAZES, ra'zes (Abu Bekr Mahammed Ibn Zakhariya Ar-Razi), Arabic physician: b. Rai or Raz (ancient Rhagae), near Teheran, probably 923 a.d. He acquired great philolog¬ ical and philosophical knowledge, but studied chiefly music. Eventually he became expert in the medical science of his day and was made director of the Bagdad Hospital. There is a story that, when aged, he became blind and re¬ fused to have an operation performed upon his eyes, because the surgeon about to undertake it could not tell how many membranes the eye contained. When it was urged that the opera¬ tion might nevertheless succeed, he still re¬ fused, saying that he had seen so much of the

world he was weary of it. The best known of the books that pass under his name is (A1-Havi,* but its authenticity is questioned. His treatise on the smallpox and measles is the oldest account in existence of those two dis¬ eases. It has been translated several times into Greek and Latin and into English from the Arabic text by Greenhill (1847). His (Ketab Al-Mansuri* is a complete system of medicine drawn from Arabic and Greek sources.

RHE, tie de, el de ra. See Re, Ile de.

RHEA, re'a, an ancient Cretan earth-god¬ dess, daughter of Uranus and Gaea, wife of her brother, the Titan Cronus, and by him mother of the Olympian deities Zeus, Hades, Poseidon, Hera, Hestia, Demeter. She was early identi¬ fied with the Asiatic nature-goddess, Cybele, the Great Mother, who was worshipped on mountains in Mysia, Lydia and Phrygia. Her Cretan Curetes corresponded to the Phrygian Corybantes, many of whom mutilated them¬ selves like Attis in the frenzy of their orgies. Rhea was supposed at first to make her home in the towering hills of Asia Minor. It was her delight to tame the ferocious beasts found in these wildernesses, as well as to protect the fair towns lying in their valleys. Thus she became known as Mater Turrita and was repre¬ sented as wearing a crown, turreted like a wall. Rhea's supposed love for the Phrygian shep¬ herd, Attis, gave much color to her worship. In Pessinus, in Phrygia, there was a cave under Mount Dindymon, where was a large stone supposed to be the heavensent image of the goddess, as well as the tomb of Attis. This was the centre of her worship and here the first temple to Rhea is said to have been erected by King Midas. From this centre the worship spread to the neighboring towns and provinces, finally reaching Athens. The worship of Rhea continued long after the decadence of Phrygian civilization. Its introduction into Rome, during the Second Punic War, was the result of a prophecy of the Sibylline Fates which told that her image brought to Rome would expel a common foe. The stone in the cave at Pessinus was, therefore, placed in the temple of Victory in the capital city, a holiday being proclaimed to celebrate the event.

RHEA, the generic and usual book-name of the South American ostriches or nandus, which, although true ratite birds and occupying the place of ostriches in the American avifauna, yet differ so greatly from the African species that ornithologists universally rank them as a distinct family (Rheidce) or even order (Rhea). Conforming to the general type of the ostriches, the rheas differ in having three toes with large claws, the head and neck fully feathered, the flowing plumes

absent from the wings and especially the tail, the ischiatic in¬ stead of the pubic bones forming the pelvic symphysis and the palatal structure peculiar in several respects. Three species of Rhea have been described ; R. americana, found throughout the greater part of South America ; R. mac-rorhyncha, which is confined to northeast Brazil and is distinguished by its darker color and longer bill ; and R. darwini, of southern Argen¬ tina, which is smaller and has tarsi covered with small scales instead of scutes as have the others. The newly-hatched young of the latter are said to have the legs feathered to the toes.

Rheas are known to the natives as nandus or emas (the latter a corruption of emu intro¬ duced by the Portuguese) and live in small parties on the pampas and dry plains, where they associate with wild horses, deer and guanacos. In general habits they closely re¬ semble the ostriches (q.v.), but usually run with the wings lowered instead of elevated. They are said to be able to swim across wide rivers. Because of the well-developed syrinx, which is absent in the ostriches, the male rheas have a loud, resonant call, especially heard dur¬ ing the mating season, when they also fight viciously. They are polygamous and the male incubates the score or more of eggs deposited by several females in one nest. They are omniv¬ orous. Although lacking the precious plumes of the ostrich the feathers of the rhea have a commercial value in the manufacture of feather dusters. Many thousands are killed by shoot¬ ing or with the bolos, or are run down with hounds or horses and clubbed to death. . In many places they are threatened with extinction ; but, although they breed readily in confinement, no efforts to raise rheas on a commercial scale appear to have been made. Consult Darwin,

(Voyage of the Beagle) (New York 1889) ; Mosenthal and Harting, ‘Ostriches and Ostrich Farming) (London 1877).

RHEA, or CHINA GRASS. See Ramie.

RHEA LETTER, The, in American his¬ tory, a famous political episode of the time of the Monroe administration. On 6 Jan. 1818, Andrew

Jackson, then army department com¬ mander in the Southwest, wrote to President Monroe regarding the Seminole troubles in Florida and advising the prompt seizure of East Florida, which he declared could be done “without implicating the government.® He offered to accomplish the seizure himself with¬ in 60 days, if it should be indicated to him that it were desirable. John Rhea, a congressman from Tennessee, was the secret channel through which he hoped Monroe’s assent might be signi¬ fied. It was not. In 1831, during Jackson’s administration, in the height of his quarrel with Calhoun, which turned in part upon the Semi¬ nole affair, Rhea wrote to Monroe, hoping to elicit from him something that would implicate him as approving Jackson’s plan. Monroe, on his death-bed in New York, denounced Rhea’s insinuations as utterly false.

RHEES, res, (Benjamin) Rush, American

Baptist clergyman and educator : b. Chicago, Ill., 8 Feb. 1860. He was graduated from Am¬ herst College in 1883 and from the Hartford Theological Seminary in 1889. He was pastor of the Middle Street Baptist Church, Ports¬ mouth, N. H., 1889-92, and professor of bibli¬ cal New Testament interpretation (1892-1900) in the Newton Theological Institution, Newton Centre, Mass. He was elected president of the University of Rochester, Rochester, in July 1900, where he is also Burbank professor of Biblical literature. He has published (The Life of Jesus of Nazareth: a Study) (1900); < Saint Paul’s Experience as a Factor in His Theology) (1896), also articles in journals and periodicals.

RHEIMS, remz, Fr. rans (Reims), France, in the department of Marne, on the Vesle, 100 miles northeast of Paris. Its industries are

considerable, embracing, besides champagne, the manufacture of textiles, dyeworks, breweries, distilleries, *etc.* It is also an important market for raw wool, and its woolen goods, mixed fabrics in silk and wool, merinos, etc., are known in commerce as articles de Reims. The old ramparts have been transformed into boulevards, but a few ancient gateways remain, the most noteworthy of which is the Porte de Paris. Rheims was a well-built town and pic¬ turesque from the material employed in building and from the prevalence of the older style of architecture. The abbey of Saint Remy was one of the town’s principal features ; it had become a hospital before the late war. Rheims is a very ancient city. It occupies the site of Durocortorum, mentioned by Julius Caesar as capital of the Remi, from which peo¬

ple it subsequently took its present name. There are extensive Gallo-Roman remains on the Montagne de Rheims to the south. Christianity may have found entrance into Rheims at an earlier period, but not till the middle of the 4th century did Rheims become a bishop's see. It became a place of importance under Frank rule and was early imbued with a religious char¬ acter as the scene of the baptism of Clovis and his officers in 496 and to the many solemn and historical rites celebrated in its great cathedral. It became an archbishopric in the 8th century and after 1179, the year of the coronation there of Philip Augustus, it became the place for the coronation of the kings of France, Charles X being the last monarch solemnly crowned there. The only sovereigns, in the long series, not crowned at Rheims were Henry IV, Napoleon I and Louis XVIII. During the frenzy of the Revolution, the cathedral was attacked by the populace, and the sacred oil ampoule was destroyed, in detestation of royalty; and in 1830 the ceremony of the coronation at Rheims was abolished. The most remarkable building is the great cathedral, one of the noblest specimens of Gothic art in all the world. It was built in the first half of the 13th century; is 466 feet long by 99 feet in breadth, with a transept of 160 feet, and a height of 144 feet. Its grandest features were the west fagade, which was unrivaled, and the Angel tower, which rose 59 feet above the lofty roof. The baptismal fonts were exquisite and the organ was one of the finest in France. A wealth of tapestry, sculpture and paintings beautified this magnificent structure and in¬ numerable statues of artistic grace adorned the exterior. It is now necessary to write of its glory in the past tense for the Germans by aerial attack and long range artillery fire dam¬ aged this glorious edifice beyond repair dur¬ ing the four years in which they were in sight of its towers yet never able after the first fierce onslaught to come within the city. The cathedral is now nothing but a magnificent ruin. The city of Rheims was also laid in ruins by shot and shell. In normal times Rheims had a population of 118,000. See War in Europe; and consult Gossett, Alphonse, 'La cathedrale de Reims) (Paris 1895) ; Justinus, J., (Reims, la ville des sacres} (Paris 1860) ; Marlot, Guillaume, (Histoire de la ville, cite, et universite de Reims) (3 vols., Rheims 1 843— 45) ; (Reims and its Cathedral* fin Contem¬ porary Review, Vol. CVI, New York 1914).

RHEINGOLD, Das. See Nibelungen Ring, The.

RHENISH (ren'ish) ARCHITECTURE.

See German, Architecture.

RHENISH CONFEDERATION. See

Confederation of the Rhine.

RHENISH PRUSSIA. See Rhine, Prov¬ ince OF THE.

RHEOSTAT, in electricity, an instrument invented by Wheatstone for measuring electri¬ cal resistances. Two rollers, one non-conduct¬ ing, and the other of brass, are geared to¬ gether, so that when either is turned by means of a handle a fine copper wire will be uncoiled from one roller as it is wound upon the other. Two binding-screws, one of them in contact with the brass cylinder and the other with the end of the wire on the non-conducting cylinder, connect the apparatus with the wires of the battery. To use the rheostat, the resistance to be measured is put in circuit with a constant battery and a galvanometer, and the indication of the galvanometer is noted; the resistance is then removed from the circuit, and the rheostat is put in its place, and the handle turned till the galvanometer gives the same reading as be¬ fore; the resistance of the rheostat is now the same as the resistance which was to be measured, and it is measured by the number of coils of copper wire on the insulating roller. At present instruments working on the same principle, and known by the same name, are used to adjust the resistance of electrical cir¬ cuits.

RHEOTROPISM, that tendency in plants which leads their roots, when immersed in run¬ ning water, to curve in accordance with the current. Positive rheotropism causes the roots to curve up stream ; and negative rheotropism produces the opposite curvature.

RHESUS, or BENGAL MONKEY, a

common Indian macaque (Macacus rhesus). It is a strong species with powerful limbs, but without the ruff or beard found in some allied species. The body attains a length of about two feet, and the tail is of medium length. Brown is the prevailing color, but the bare face and the callosities are flesh-colored or red. The rhesus monkey is very intelligent and mischiev¬ ous, and the young ones can be easily tamed. In several parts of India the Hindus protect this species, for which they have a great venera¬ tion.

RHETORIC (Gr. pr/rapiKT/rˆxˆV , the art of the orator), the skilful use of language for the persuasion or influence of others. Out of this primary meaning of the term have grown other secondary senses. These embrace the artistic use of language, skill in discourse, the power of persuasion, the influence exercised by this power, ostentatious display of language, gaudy and tawdry use of speech, the prostitution of one's honesty and honor by the use of persua¬ sive language employed to gain ignoble ends, artificial oratory as opposed to natural and un¬ affected speech. Rhetoric thus includes, in the widest use of the term, the art of orator whether written or spoken. It, therefore, in¬ cludes public speaking, delivery of a discourse, speech, etc., composition, written or spoken, recitation, elocution, with special reference to the scientific rules governing all of these. The

ancient Greeks use the term rhetoric largely in the sense of the art of persuasion; and this is the more general sense in which the word is used to-day. Modern writers on the subject of rhetoric have analyzed and dissected the term and followed into all sorts of ramifica¬ tions, and broadened its scope so as not only to include everything relating to the art of composition but also the investigation of the psychological problems related thereto, the effect of rhetorical speech upon hearers or readers and its reactive effect upon society. While this philosophical aspect of the question is in line with the spirit of scientific investiga tion of cause and effect, of the age in which we live, it cannot be considered more than an in¬ teresting and illuminating commentary upon the subject of rhetoric itself, which in no way concerns itself with moral purpose, its one great object being to persuade an audience by means of the written or spoken word. This was the one primary aim of the American In¬ dian, who gave very great attention to the strict rhetorical form and force of his public speeches.

The Graphic Word . — • Rhetoric which has been skilfully and artfully employed by savage, barbaric, semi-barbaric and civilized races alike, to the one great end, persuasion, formed the guiding force of the spoken word long before there were writers to define its provinces and uses and to lay down laws for its proper em¬ ployment and rules for its acquirement. In early times the great orator was looked upon as a person inspired by the gods just as much as were the prophet and the poet. The effective rhetorical use of words to the more primitive mind had something strangely mysterious and divine about it. This is embodied graphically in the Biblical statement : ((In the beginning was the Word, and the Word was with God, and the Word was God.® (John i, 1). The idea con¬ veyed in the graphic introduction of John is that of the orator, divine orator creating the world by the power of his word just as the earthy orator moves the imagination and the hearts of men by the beauty and strength of his oratorical presentation of his thoughts. The public utterances of the kings of Egypt were held to be the divinely-inspired words of the highest of their gods, Ra, whose representa¬ tives the sovereigns were held to be upon earth ; and they were likened to the strong and shining beauty of the great sun himself. In most of the Asiatic countries the power of oratory was accredited to a like divine origin. This idea was carried to its logical conclusion among the Semitic races, and more especially among the Jews, the fiery utterances of whose great priests were held to be the revelations of the divine prophets of the God of gods and the Lord of hosts. Thus throughout the long ages stretching from barbarism to the present, the one great object of oratory and rhetoric has been persuasion, the moving of the minds of men. Among the Jews the rhetorical speeches and writings of their prophets and the lofty religious compositions of their poets, historians and chroniclers were early collected and guarded as the sacred possession of the race.

Profane Rhetoric and Rhetors. — At this early period in the history of rhetoric, there could be no rules for its acquirement and use, since that which is held to be a divinely in¬ spired gift cannot be affected by earthly means.

But the practical Greeks and Romans, and be¬ fore them, to some extent at least, the Baby¬ lonian and other cultured races of Asia Minor, had developed orators quite apart from the per¬ son of the sovereign and the service of re¬ ligion. These rhetors, as they were called in Greek, were intimately connected with the civic life of the Greek community. Already in the case of these men, the old idea of the divine in¬ spiration of the spoken word had pretty well disappeared or was accepted only in the general sense that ancient tradition is accepted. The rhetors who appeared before the Greek public as public orators, lawyers, prosecutors and de¬ fenders, in the legal sense, soon found the great necessity of becoming masters of the principles of rhetoric with their most effective application. This called into being teachers of rhetoric and oratory who gradually organized rhetorical expression into a science farreaching and all-embracing within its own special prov¬ ince. Aristotle is credited with haying made Empedocles the inventor of rhetoric. He prob¬ ably was one of numerous early Greek teachers each of whom contributed his part to the grad¬ ual development of the science of the spoken word ; but the real organizer of the art of rhet¬ oric seems to have been Corax of Syracuse who put forth his method about 446 b.c. It was not until some 30 years later that the new method of Corax, as further perfected by one of his pupils, became known in Athens. There it at once be¬ came immensely popular with the Athenian orators; and teachers of the Syracuse method of rhetoric sprang up everywhere. Isocrates, himself one of the greatest orators of his age, founded a noted school of rhetoric, whose in¬ fluence lasted throughout his life and was main¬ tained afterward by his pupils. This influence extended from 390 b.c. to the middle of the lat¬ ter half of the century. Aristotle (q.v.) who published his rhetoric in 322 b.c. has done per¬ haps more than any one other man to give a clear perception of the province, object and rules governing rhetoric. Corax, who had pro¬ duced his system of rhetoric for the democratic lawyers and professional pleaders who had sprung up after the fall of the tyrant Thrasy-deus (472 b.c.) and the establishment of a democracy, divided his subject into five parts corresponding to the development of the public speech ; poem, narrative, arguments, additional remarks and peroration ; and he showed, by illustration, how to develop and use each. His <(art)} became the basis of the procedure of the subsequently great orators of Greece. Aristotle presented clearly principles given in a very gen¬ eral, concrete manner by Corax.

Aristotle's work, which is divided into three books, dis¬ cusses at length and with wonderful power of analysis the nature and object of rhetoric, the means of persuasion and the manner of hand¬ ling these means in order to secure the best effects. He divides the province of rhetoric into deliberative, forensic and epidictic. In the lat¬ ter part of the work he deals at length with ex¬ pression, the art of delivery and skill in ar¬ rangement. The whole book proceeds on the assumption that rhetoric is an art and the province of the teacher is to show to his pupils the true principles of this art the chief aim of which should be to prove one's point or to ap¬ pear to do so. At length Aristotle discusses in

a very scientific manner all the problems of rhetoric and its teachings, as he sees them. So well did he handle his subject that not only did his work take the place of that of Corax, but most writers on rhetoric since his day have followed him more or less closelv. For more than 300 years the scientific method of Aristotle formed the basis of rhetoric study and pro¬ cedure for those orators and schools who fol¬ lowed the purer traditions of Greece ; but it was opposed by an increasingly large body of orators and teachers of rhetoric who followed the florid Asiatic style of oratory, depending upon practice for perfection, and decrying scientific rules. These two systems were used by Hermagoras of Temnos (in ˆEolis) as the bases of a new system of rhetoric which at¬ tempted to reconcile the two schools by applying the practice of the one to the scientific exposi¬ tion of the other (110 b.c.). This became the ruling system of rhetoric in Italy and did much for the training of the foremost Roman speakers, orators and jurists, Cicero, Quin¬ tilian ((De Institutione Oratoria,5 90 a.d.), Longinus ((Art of Rhetoric. > 260 a.d.) and Aphthonius ((Exercise, > in 4th century). All contributed important marks on the subject of rhetoric. In the 16th and 17th centuries many Modern Rhetoric European universities paid considerable attention to the teaching of rhet¬ oric and their textbooks were for the most part the old Greek and Roman writers already mentioned. After this the teaching of rhetoric in schools and universities gradually became less and less effective, to meet however with a very imperfect revival in the 19th century. Among the well-known works of rhetoric be¬ longing to the Renaissance are (The Art or Craft of Rhetoryke,* by Leonard Cox (1540); (Art of Rhetorique> by Thomas Wilson (1553) ; several treatises (in French) by Tonquelin (1555) and Courcelles (1557). To the modern age of rhetoric belong such popular books as Blair's (Rhetoric, J Campbell's (Philosophy of Rhetoric, } Whately's (Elements of Rhetoric> and a large number of textbooks for schools. In the

United States there arose, in the latter half of the 19th century, various schools of oratory, rhetoric and dramatic art, which aimed to teach their pupils the principles of rhetoric so as to fit them for the stage, the pulpit and the forum. Teachers in these schools have pub¬ lished works on rhetoric, oratory and dramatic art; but these publications, where really valu¬ able, have been almost altogether based on the principles expounded in the works already men¬ tioned. German and French schools have also paid considerable attention to the teaching of rhetoric from the point of view of the spoken word. All modern universities have depart¬ ments of rhetoric, though too often the teach¬ ing of the rhetoric department is confined to the exposition of the principles of correct and ef¬ fective composition in prose and verse, without any attempt to apply these principles to practical public speaking. The result of this neglect to combine theory and practice is shown in the very defective oratory and rhetorical presenta¬ tion by the public speakers of the day.

Figures of Rhetoric. — Writers on rhetoric from very early times have distinguished numerous forms of language, which are de¬ partures from the straightforward speech of the

masses of the people. Such figures are natural to every tongue; and they belong to the uncul¬ tured speech of the savage as trulv as they do to the most highly cultured language of modern civilization. The human mind constantly works in the same way under given conditions. It thus produces the same kind of figures of speech, which are due to imagery, arrangement of words as a sentence or phrase or to apparent contradiction. It is possible for one figure of speech to contain these three subdivisions. The figures of imagery are metaphor, allegory, synecdoche and metonymy ; while those of ar¬ rangement consist of climax and antithesis. The figures of contradiction embrace irony, epigram and hyperbole. In addition to these there are numerous minor figures of speech which often belong to two of the above classifi¬ cations or are merely peculiar sentence struc¬ tures caused by the form in which the thought is presented. These include

asvndeton, apos¬ trophe, apophasis, epanorthosis, negative, in¬ terrogation, epistrophe, epiploce, epiplexis, euphemism, antiphrasis and onomatopoeia.

Scientific Investigations. — Modern students of rhetoric, including dramatic art, have given considerable study to the investigation of the relation of the orator to his audience and to the effect of rhetoric and oratorical display not only upon the actual audience of the speaker or writer but upon society, through the medium of his hearers or the subsequently printed dis¬ course. Some writers have also considered minutely and at great length of mental proc¬ esses involved in the production of oratorical effects and the kind of faculties involved. They have also given careful attention to the “speech habit® and the best way of acquiring it; and, in connection therewith, they have dis¬ cussed, from almost every point of view, the character and probable causes of the display in the individual of those superior talents univer¬ sally recognized as genius. The investigation has been carried into the field of social prob¬ lems, where experiments have been conducted to show to what extent language is a social bond. See Elocution ; Oratory ; Speech, Figures of.

Bibliography. — Baker and Thorndike* (Everyday English) (2 vols., New York 1912— 13) ; Baldwin, C. S., (College Manual of Rhetoric > (1909) ; Bascom, J., Philosophy of Rhetoric* (New York 1885) ; Brewster, W. T., (English Composition and Style) (New York 1912) ; Carpenter, G. R., (Elements of Rhetoric and English Composition* (1906) ; Chaignet, A. E., (La rhetorique et son histoire) (Paris 1888) ; Erskine, John, (Written English) (New York 1913) ; Herrick, R., (Methods of Teach¬ ing Rhetoric* (Chicago 1913) ; Tebb. R. C., Aristotle’s Rhetoric) (trans. 1909) ; id., (Attic Orators) (1876); Lanson, M., (Conseils sur l’art d’ecrire* (Paris 1909) ; Navarre, (Essai sur la rhetorique grecque avant Aristote* (Paris 1900) ; Saintsbury, G. E. B., (History of English Prose Rhythm* (London 1912) ; Spen-gel, (Atrium Scriptores) (1828); Thorndike, A. H., Elements of Rhetoric and Composition (1911); Volkmann-Gleditsch, (Rhetorik und Metrik der Griechen und Romer* (Munich

1901).

John Hubert Cornyn, Birmingham Southern College.

RHETT, ret, Robert Barnwell, American politician: b. Beaufort, S. C., 24 Dec. 1800; d. Saint James' Parish, La., 14 Sept. 1876. He was the son of James Smith, but in 1837 adopted the name of Rhett, a prominent colonial ances¬ tor. He studied law, was elected to the legis¬ lature in 1826, and in 1832 was elected attorney-general of the State. He was one of the lead¬ ers of the Nullification movement and a more strenuous advocate of States' rights than even Calhoun. In 1837-49 he sat in Congress and in 1850 was elected to succeed Calhoun in the Senate. He stoutly upheld slavery, opposed all compromises and in 1851—52 he urged the seces¬ sion of South Carolina, whether accompanied by other States or not. After the elections of 1852 Rhett resigned from the Senate and re¬ tired to his plantation. He later edited the Charleston Mercury in which he advocated his extreme views, and in 1860 he again came into prominence as a member of the South Caro¬ lina Convention and was one of the committee which wrote the address giving reasons for se¬ cession. He was a delegate to the provisional congress at Montgomery, Ala., in 1861 and later an active member of the Confederate Congress. He removed to Louisiana after the war.

RHETT, Thomas Grimke, American mili¬ tary officer : b. South Carolina, about 1825 ; d. Baltimore, Md., 28 July 1878. He was gradu¬ ated from West Point in 1845, served in the Mexican War, was brevetted captain for con¬ duct at Puebla in 1847 and in 1858 received rank as major. In 1861 he resigned his com¬ mission in the United States army and was commissioned major-general by the governor of South Carolina. He was chief of staff to General Johnston until 1862 and was then as¬ signed to the trans-Mississippi department. He served as colonel of ordnance in the Egyptian army in 1870-73 and then resigned.

RHEUMATISM, a constitutional disease marked by inflammation of the connective-tis¬ sue structures of the body, especially of the muscles and joints and attended by pain in them. It is frequently recurrent. In a popular sense it covers nearly all forms of painful arthritic and muscular disease. Four forms are recog¬ nized in medicine: (1) Acute rheumatism (acute articular rheumatism or acute rheuma¬ tic arthritis, acute inflammatory rheumatism, rheumatic fever) ; (2) chronic rheumatism ;

(3) rheumatoid arthritis (arthritis deformans, osteoarthritis — chronic articular rheumatism ;

(4) muscular rheumatism or myalgia. Acute rheumatism, also a mild'er form known as sub¬ acute and chronic rheumatism — may

insensibly follow one another — alternating it may be and even the different varieties may co-exist at the same time.

Acute rheumatism is attended with high fever, sour sweat, scanty high-colored urine containing a large amount of urea and swelling of the joints from exudation into their cavities and infiltration around them. The joints are tender and hot. The local symptoms may re¬currently pass from one joint to another. There is a tendency to inflammation of the endocardium (endocarditis) and of the pericar¬dium (pericarditis). Predisposing causes of the disease may be heredity, sudden checking of the perspiration in a cold and damp at¬mosphere, conditions which lower vitality such

as chronic alcoholism, nervous debility, worry with exposure, insufficient food, injuries to joints, and excessive muscular work especially in a poisonous atmosphere.

More males than females have acute rheu¬ matism, probably because of more hardship and exposure. It is quite common among farmers, longshoremen, coachmen, stokers, motormen, sailors, scrub-women, *etc.* It most frequently occurs between the ages of 15 and 30, is rare before the 10th year and after the 50th. The disease is rare in the tropics, common in the temperate zones; in the United States it is most frequent in the early spring and late fall; and it is often endemic and sometimes epidemic. The specific cause in at least the first three forms of rheumatism mentioned above is now generally believed to be a micro-organism, known as a strepto-diplococcus, the ((micrococcus rheumaticus,® yet by some writers the various forms of rheumatism are believed to be due to non-neutralized acid poisons of pro¬ tein metabolism — auto-infection.

The theory of an arthritic diathesis as a cause, and the theory that rheumatic joint le¬ sions are due to disturbances of the nervous system seemed to have passed away. Tonsilar disease has come to be associated with rheuma¬ tism and is believed by some to be due to rheumatism, for the most common habitat of the specific germ is in the tonsil crypts, where it may remain quiescent for months or years, until lowered vitality and a sore throat af¬ fords a suitable chance for it to do its specific work, in the joints, heart, kidneys, nerves, brain and the various fascia of the body. It is believed that any focal point of suppuration within the body may afford a starting point for infection — if the specific organism is present — as in pyorrhea — middle ear and post nasal dis¬ charge, gonorrhea, abscesses, fissures — chronic appendicitis, *etc.*

The morbid anatomy of rheumatic joints show synovial membrane swollen and hyperse-mic ; serous infiltration of ligaments and other tissues; joint fluid turbid with albumen, fibrin and leucocytes (pus and blood rarely present) ; sometimes ecchymoses on cutaneous and serous surfaces. In the blood the red corpuscles are reduced more than one-half ; the haemogloblin is much less than normal, but fibrin and leuco¬ cytes are largely increased. There are various complications of acute rheumatism, chorea, con¬ junctivitis, nephritis, pleurisy, etc.,

but the most serious are endocarditis and pericarditis. The heart is affected in very many cases, most frequently the left side (rheumatism of the heart), the edges of contact of the mitral valves being swollen and covered with fibrinous masses ; less f requently, the aortic valve ; rarely, the pulmonary or tricuspid. Contraction and distortion of the affected valves may result. Ulceration is rare. Simple fibrinous or sero¬ fibrinous pericarditis is common ; myocarditis seldom occurs. The attack may begin with headache, indigestion, aching, chilliness, slight tonsilitis or pharyngitis, but usually comes with a chill, followed soon by high fever (may be 103° or 104° F.), swelling, tenderness, heat and shiny appearance of one or more joints (knees most often, then wrists and fingers, ankles, etc.), a coated tongue, foul breath, a soft pulse of 100° to 110°, thirst, constipation and by profuse sour sweat. There is always a tendency to re¬

currence, complications and migration from one joint to another. The mind is clear, except when the fever is very high. Coma, which is rare, is due either to high fever or nephritis.

So-called cerebral rheumatism is due to a toxic congestion. Sometimes urticaria and spots of ecchymosis appear upon the skin and in children small nodules, firm but movable, are attached to tendons and fasciae, and are found over the spine, scapula and inflamed joints. Acute rheumatism is to be distinguished from arthritis following scarlet fever and found in the course of other diseases — due also to spe¬ cific germs — and from acute osteomyelitis, scurvy (in children), gout and gonorrheal rheu¬ matism.

There is a sub-acute rheumatism, very com¬ mon, with mild symptoms and slow recovery. It may follow an acute attack or be sub-acute from the outset and may pass into the chronic form. Temperature is seldom above 102° F. The so-called acute rheumatism of children is usually sub-acute; the joint-symptoms may be so slight as to be readily overlooked, but there is more liability to cardiac inflammation than in adults! Children perspire less, but are liable to have chorea, tonsilitis and cutaneous manifes¬ tations. If not treated acute rheumatism lasts from two to three weeks or more.

Severe cases may recover under treatment within a week ; and mild casee last several weeks, so obstinate sometimes is the disease. The joints are not left with fibrinous adhesions unless chronic rheumatism supervenes. Death is rare, and when it occurs it results from high fever, pneumonia, pleurisy or myocarditis. Re¬ lapses are quite

common. Treatment requires many details. Among preventive measures are care against exposure to cold and damp, especially when overheated; freedom from mus¬ cular strain ; the wearing of woolen undercloth¬ ing in winter, and of linen-mesh in summer ; abstinence from sweets and malt liquors; very moderate eating of animal food ; sponging with cool water, followed by friction ; outdoor exer¬ cise ; and the keeping of the bowels open with Carlsbad water or Rochelle salt. During the attack place the patient between blankets on a comfortable mattress; have him use a bed-pan; carefully dispose the inflamed part in a com¬ fortable position. While the disease is severe give light food, no meat, sweets or malt liquors ; allay fever with cool spongings and tincture of aconite ; quiet the patient with Dover's powder or codeine ; locally apply methyl salicylate, oil of wintergreen, or equal parts of guiacol and glycerin ; and keep the part warm with cotton batting, oil-silk, *etc.* Medic¬ inally, salicin, salol, or salicylate of soda and bicarbonate of potassa or soda, or the citrate of potassa seem to be of most avail.

Chronic rheumatism is a form of chronic joint-inflammation, attended by moderate pain, and by changes in the joints resulting in their deformity. It begins insidiously, or follows at¬ tacks of acute or sub-acute rheumatism, and is rare before the 40th year. The predisposing causes are poor hygienic conditions, debility, malnutrition, cold and damp, and occupations which involve the repeated and long-continued use of certain joints, as in the cases of seam¬ stresses and tailors. A moderate thickening and some distortion appear in affected joints (fingers and knees especially) which may be bilateral.

The changes are mainly in the fibrous tissues, though sometimes there is synovial injection and effusion. Erosion of cartilages is seen only in prolonged cases. Endocarditis, pericarditis and pleurisy are rare.

The symptoms slowly develope ; general health may be good; pain occurs when joints are red and swollen, and may be severe at night. Joints swell from time to time, and some per¬ sons readily predict an attack. The muscles about the joints after a time atrophy and the

affected joints are deformed by deflection due to adhesions. Slight fever may accompany at¬ tacks. The diagnosis excludes gout and ar¬ thritis deformans (qq.v.).

In treatment medicine is of uncertain value. Iron, Vichy water, iodide of potassium and Carlsbad salts or phosphate of soda may be used. More relief is to be obtained from douch¬ ing and sweating of the joints, massage, protec¬ tion against cold and damp and injuries to the joints, an ample diet (no sweets, and no alco¬ holic stimulant except whisky), a dry equable climate and residence at one of the spas. Bee stings have proved valuable.

Rheumatoid arthritis, a better term than arthritis deformans, may follow acute or chronic rheumatism or apparently may start de novo. It frequently is associated with neu¬ ritis. It usually does not come to persons under 50 and is an obstinate disease, seldom fully recovered from. It is marked by varying at¬ tacks of severe localized or shooting (neuritic) pains, by tenderness and soreness of joints, by contraction and sometimes severe jerks of muscles about the joints and leading to them, by atrophy of muscles, bony nodes about joints and fibrous bands within joints, numbness of heels, constriction about chest and neck, some¬ times marked deformity of one or more of the limbs rendering person unable to move the affected limbs. Yet with it all, the afflicted per¬ son may live for years, and at times have spells of good general health. Treatment usually unsatisfactory — static electricity, bacterius, local heat, soothing applications, internal medi¬ cines (for the physician to advise) — proper food, keeping the bowels clean and living as much as possible in outdoor air.

Muscular rheumatism or myalgia is a pain¬ ful affection of various voluntary muscles and of the fasciae and periosteum to which they are attached. It is most common in youth and young adults and among those exposed to cold and damp when overheated and those who over¬ use certain muscles. Heredity, goutiness and lithaemia are predisposing causes. The disease is never fatal, whether it is neuralgic in char¬ acter or is an inflammation of muscular tissue (myositis) is not determined. The symptoms include local pain and tenderness, increased by contraction or movement of the affected mus¬ cle ; usually the pain is an intense dull ache. There is seldom any heat, swelling or redness. Occasionally the muscle cramps and is most comfortable if semi-flexed. Sometimes there is fever. In torticollis or stiff-neck (unilateral) some of the muscles of the neck are involved. The patient dreads to move the head, and moves the body instead. In pleurodynia one side is affected (generally the intercostal muscles, but sometimes in the serratus and pectoralis), usually the left. Pain is

increased by move¬ ments, coughing or sneezing.

Lumbago, a muscular rheumatism affecting the muscles of the lumbar region and their tendinous attachments, is bilateral, quite fre¬ quent, and is often caused by strain of the muscles of the loins. An attack often begins suddenly with an excruciating pain when the sufferer is attempting to rise from a sitting posture, or to change his position in bed. If the loin-muscles are kept rigid the patient may be able to move about. Treatment calls for rest of affected muscles (best in bed), the ap¬ plication of heat and anodyne liniments, ironing the loins with a hot flatiron over a few thick¬ nesses of flannel or thick wrapping paper, or galvanism.

Muscular rheumatism is distinguished from neuralgia by localized pain, increased by volun¬ tary movements, and by the absence of tender spots. Recovery usually occurs in a few days, except in debilitated persons, those with rheu¬ matic tendencies or subjects of chronic al¬ coholism.

Preventive treatment requires freedom from damp and cold, and from muscular strain, sponging and friction, vegetable diet and warm underclothes. Massage and a Turkish bath may prevent an attack. For local treatment rest, heat, turpentine stupes and anodyne liniment are of use. Medicine is of little value. In pleurodynia, strapping the chest, or the use of a wide flannel binder, is often of much service.

RHEUMATISM-ROOT. See Twin-leaf

RHEYDT, rlt, Germany, a town of Prussia, in the government of Diisseldorf, 16 miles west of Diisseldorf, important on account of its in¬ dustries, which embrace silk and satin goods cottons, and mixed fabrics, foundries and ma¬ chine-shops, printing and dyeing works, brew¬ eries, distilleries, *etc.*

RHIGAS, ri'gas, Constantine, Greek pa¬ triot: b. Velestino (the ancient Phera) about 1753; d. Belgrade, Serbia, 1798. He wrote not only in Greek but also in French, and was a poet and proficient in music. He formed the bold plan of freeing Greece from the Ottoman Porte by means of the secret association of the Hetasrsea, and succeeded even in bringing powerful Turks into his conspiracy. From Vienna he kept up a secret correspondence with the most important confederates in Greece and in other parts of Europe. At the same time he composed in his native language a number of patriotic songs, calculated to inflame

the imagination of the Greek youth and embitter them against the Mussulmans. Having been arrested in Trieste he was with several other prisoners conducted to Vienna. Rhigas and three others of those arrested were sent back in chains to Belgrade in May 1798, and put to death by the Turkish authorities. During the Greek War of independence, which ultimately led to the emancipation of their country from the Turkish yoke, his songs were in the mouth of everyone. The most celebrated of them are his translation and adaptation of the (Mar¬ seillaise. } Consult Edmonds, (Rhigas Pheraios, the Protomartyr of Greek Independence >

(1890).

RHINE, rin, a river of Germany. It is one of the most picturesque rivers in the world, and its natural beauty is heightened by the his¬ toric and legendary traditions with which its name is associated. Its direct course is 460

miles long and its indirect course about 800 miles ; the area of its basin is about 86,600 square miles. It is formed in the Swiss canton Grisons by three main streams called the Vorder, Mittel and Hinter Rhein, or the Upper, Middle and Lower Rhine. The Vorder Rhein rises in the small Toma Lake (7,690 feet high) lying to the northeast of the Saint Gothard, and is augmented by two streams which unite with it near Chiamut (5,380 feet). The Mittel Rhein issues from a small lake west of the Lukmanierberg, traverses the Medelserthal, and joins the Vorder Rhein at Disentis, from which point the united stream is called Vorder Rhein. It takes an easterly direction, and at Reichenau unites with the Hinter Rhein, which issues from the Rheinwald Glacier, in the Adula group, and has a course of about 70 miles through the Rheinwaldthal before reaching Reichenau. Here the stream takes the name of Rhine, has a width of 130 to 140 feet, and admits of floating. The Rhine first becomes properly navigable at Coire after receiving the Plessur. It now turns north, and shortly after being augmented by the Landquart quits the Grisons, forms the boundary between the can¬ ton of Saint Gall on the left and Leichtenstein and Voralberg on the right, receiving the Ill from the latter, and enters the Bodensee or Lake of Constance, continued by the Untersee. On issuing from the Untersee it flows west, separating Switzerland from the State of Baden, and continues its course to Schatf-hausen and Basel, receiving, as it proceeds, on the left of the Goldach, Thur, Thoss, Glatt and Aar, and on the right the Wutach and Alb, mountain streams of the Black h orest. At Schaff hausen the river forms perhaps the grandest waterfalls in Europe. At Basel it again begins to flow north, when it separates the French territory of Alsace from Baden, forms the boundary between the latter and the Bavarian palatinate, flows thereafter through the grand-duchy of Hesse, forms the boundary first between it and Nassau, and then between Nassau and the Prussian Rhenish province, till it wholly enters the latter at Coblentz. Below Emmerich it enters the Dutch province of Gelderland, and shortly after divides into two branches, a south and a north. The south, called the Waal (anciently Va'halis), carries off two-thirds of its water, and joins the Maas oi Meuse at Woudrichem. The north branch, after making several windings in its course to Arnhem, but still retaining the name of Rhine (Rijn), divides at Westervoort, before reach¬ ing Arnheim, into two branches. Of these the right proceeds as the New Yssel, in the bed of the canal which Drusus dug to connect the Rhine with the Old Yssel, till it reaches Does-burg, where the New and Old Yssel unite to pour'

their accumulated waters into the Zuyder Zee. The left arm proceeds, under the name of Rhine, in a course nearly parallel to the Waal, passing Wageningen and Rhenen to Wijk-by-Durstede, where it again bifurcates, sending a very feeble branch, under the name of the Crooked Rhine, to Utrecht, where, by the canal of Vaart, it communicates with the much larger branch, called the Leek, and flow¬ ing past Vianen and Schoonhofen unites with the Maas above Grimpen-op-de-Lek. The Crooked Rhine becomes little better than a

ditch; on leaving Utrecht it proceeds toward Leyden, and at the beginning of the 19th cen¬ tury was lost in the sand beyond the Katwijk-aan-den-Rijn. At an earlier period it had here found an outlet into the ocean ; and in more recent times, after surmounting many diffi¬ culties, the lost water of the Rhine has bden collected in a canal, and by the aid of .three sluices the outlet has again been established. The breadth of the Rhine and the character of its channel differ much at different parts of its long course. Its breadth at Basel is 750 feet; between Strassburg and Spires from 1,000 to 1,200 feet; at Mainz 1,500 to 1,700 feet, and at Schenkenschanz, where it enters the Nether¬ lands, 2,150 feet. Its depth varies from 5 to 28 feet, and at Diisseldorf amounts even to. 50 feet. The Rhine abounds with fish, including salmon and salmon-trout, but more especially sturgeon, lampreys and carp. Wild fowl also abound on its banks and countless islands. Some gold is contained among the . sands brought down into it from the mountains of Switzerland and of the Black Forest.

The navigation of the Rhine is very im¬ portant, particularly for west Germany. The navigation is rendered dangerous by waterfalls, more especially those of Schaffhausen, of Zur-zach (near the mouth of the Wutach), of Lau-fenburg and of Rheinfelden; it is also rendered dangerous by the Bingerloch, near Bingen, where the stream becomes suddenly narrowed and confined between lofty precipices, and by similar causes, thougE in a less degree, at Bacharach, Saint Goar and at Unkel.

The Rhine is distinguished alike by the beauty of its scenery and the rich fields and vineyards which clothe its banks. Hence no river in Germany, more especially since the introduction of steam-vessels, attracts so many tourists. From Basel to Mainz it flows through a wide valley, bounded on the left by the Vosges, and on the right by the Black Forest and the mountains along the Bergstrasse. From Mainz the mountain ridges approach the stream at first only on the right bank, where they form the Rheingau ; but at Bingen they begin to hem in

the left bank also, and continue from thence to Konigswinter to present a suc¬ cession of lofty mountain summits, bold preci¬ pices and wild romantic views. Pleasant towns and villages lie nestled at the foot of lofty hills; above them on all sides rise rocky steeps and slopes clothed with vines, and every now and then the castles and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. At times the chain of ridges on either side opens out and allows the eye to wander into romantic valleys, along which tribu¬ taries of less or greater magnitude keep dashing down or gradually winding to the parent stream. On the river itself much additional variety and beauty are given to the scenery by the constant recurrence of picturesque and verdant islands.

Scarcely a river in the world is of impor¬ tance to more people than the Rhine. Since long before Caesar's day this great stream has been the scene of stirring events in the world's drama. Vercingetorix, Charlemagne, Tilly, Wallenstein, Frederick the Great, Napoleon Bonaparte, Bismarck, Moltke, Foch and Persh¬ ing, these are some of the illustrious names in the long roll of warriors who strove along its

banks for command of this great highway. Famous in song and story, lined with great cities and ruined castles of robber barons, it is the Mecca of tourists at all seasons of the year. Up one side and down the other, or by river from Cologne to Mainz, every mile has its beauties and its legends. Between Darm¬ stadt and Heidelberg the Taunus Mountains shut in its basin on one side, the Odenwald, scene of the Siegfried saga of Wagner's Nibelungen operas, on the other. An ideal region for the man fond of walking tours, for the vil¬ lages are so close together that no spot along its banks is more than an hour's walk from a village. Cyclists and automobilists find good roads, generally military highways, all the way from Holland to Basel and the Lake of Con¬ stance. For the international control of the Rhine as formulated at the Paris Conference in 1919 see War, European. Consult Clapp, E. J., (The Navigable Rhine *(New York 1911) ; Hugo, Victor, (The Rhine* (Boston 1874); Hunt, (The Rhine: Its Scenery and Historical Legendary

Associations) (London 1845) ; Mackinder, H. J., (The Rhine* (New York 1908) ; Mansfield, F. M., (Cathedrals and Churches of the Rhine* (Boston 1906) ; Mehlis, (Der Rhein* (Berlin 1876-79) ; Stieler, Karl, et alii, (The Rhine from Its Source to the Sea* (2 vols., London 1888).

RHINE, Confederation of. See Confed¬ eration of the Rhine.

RHINE, Province of the, or RHENISH PRUSSIA (Ger. Rheinland) , the westernmost province of Prussia, touching west and north, Luxemburg, Belgium and Holland; greatest length from north to south about 200 miles, greatest breadth about 90; area, 10,423 square miles. It is divided into five governments or districts, Coblenz, Treves, Cologne, Aachen (Aix-la-Chapelle), and Diisseldorf. The city of Coblenz is the official capital of the province, but Cologne is the town of most importance. The southern portion of the province is hilly, being traversed by the ranges of the Eiffel, Hochwald, *etc.* It is watered by the Rhine, the Moselle and some affluents of the Meuse. A large proportion of the surface is in forest. Besides the usual cereal crops, tobacco, hops, flax, rape, hemp and beet-root are raised; fruit culture and the vine culture are also carefully attended to. Cattle are extensively reared. It is the most important mineral district in Ger¬ many, abounding in coal, iron, lead, zinc, *etc.* The Ruhr and Saar coal districts have aided in the industrial development of the province. It is likewise an active manufacturing district, there being numerous iron works and machine-shops, textile factories, glass works, tanneries, chemical works, sugar refineries, breweries, dis¬ tilleries, *etc.* Its textile industries are among the best in the world. There are over 2,900 miles of railway. A large portion of the province came within the neutral zone reserved by the conquering Allies, according to the terms of the armistice of 11 Nov. 1918. (See War, European). Pop. about 7,121,140, of whom 70 per cent are Roman Catholics. Con¬ sult Tollman, O., (Die Eifel* (Bielsfeld 1912) ; Kerp, (Am Rhein> (ib. 1901); Rollback, Karl, (Rheinisches Wanderbuch* (2d ed., Bonn 1897) ; Mehlis, (Studien zur altesten Geschichte der Rheinlande* (Leipzig 1875-79) ; Schwann,

(Die Rheinlande von Mainz bis Koblenz* (ib. 1900) ; Tille, (Uebersicht fiber den Inhalt der kleineren Archiv der Rheinprovinz* (Bonn

1899-1902).

RHINE WINES. See Wine and Wine Making.

RHINELANDER, rin'lan'der, Wis., city, county-seat of Oneida County on the Wis¬ consin River and on the Minneapolis, Saint Paul and Sault Sainte Marie, and the Chicago and Northwestern railroads, about 100 miles northwest of Green Bay. The Pelican Rapids in the Wisconsin at this place furnish extensive waterpower. It is in a lumbering region, and its chief manufacturing establishments are lumber mills, paper mills, refrigerator works, boat building works, iron works and minor in¬ dustries. There are several churches, Saint Mary's Hospital, public schools, one parish school and a Carnegie public library. The banks have a combined capital of over $100,000. The government is vested in a mayor and 12 aldermen. Pop. (1920) 6,654.

RHINITIS. See Nose and Throat, Dis¬ eases of.

RHINOCEROS, a massive hoofed mammal of the family Rhino cerotidce, characterized prominently by its nasal horns, the species of which are now confined to South Africa and southeastern Asia, although in past ages of worldwide distribution. These animals are all of large size and ungainly form, and the very thick skin is usually thrown into folds of more or less definite kind, and as a rule is very sparsely haired. The limbs are stout and com¬ paratively short, and terminate in round feet with three toes on each foot, each toe encased in a hoof. The skull is of pyramidal form, with a confluent orbit and temporal fossa, and the nasal bones are very prominently developed, and support one or more ((horns,** which grow one behind the other. The muzzle is extended by a more or less elongated pointed and pre¬ hensile upper lip; the incisors and canines are diminished but functional in the African species, and entirely wanting in adults of the Asiatic species. The cheek-teeth are massive and their crowns exhibit complexly folded ridges, varying much with the species. The horn of the Rhinoceros is of epidermic origin based upon thickened ((bosses** of the underly¬ ing bone, but really formed of fibres of horn practically bristles, agglutinated as they grow.

Indian Rhinoceros (Rh. indicus).

When two horns are developed, the hinder one is borne by the frontal bones, and is situated in the middle line behind the front horn. The front horn is generally much larger than the hinder one, the latter,

when larger, possessing a different shape from the front structure.

They serve many useful purposes in savage economy, but are of little service in civilized arts, although formerly the horn was consid¬ ered to have medicinal and even magical virtues, especially in the detection of poisoned wine.

Although subdivided by some zoologists, the rhinoceroses may properly be regarded as form¬ ing only a single genus, Rhinoceros, with five existing species, and some extinct species, to which must be added several genera known only by fossil remains.

The most familiar species is the typical one¬ horned or Indian rhinoceros (Rh . indie us) , which, like all the Asiatic species, has the skin thrown into very definite folds, corresponding to the regions of the body. The horn of this spe¬ cies is black, very thick, from one to (rarely) two feet long and rises from the tip of the nose. The upper lip is very large and over¬ hangs the lower; it is furnished with strong muscles and is employed by the animal some¬ what as the elephant uses his trunk. The skin is naked, rough, extremely thick and of a pur¬ plish brown hue. About the neck it is gathered into large folds; a fold also extends between the shoulders and fore-legs and another from the hinder part of the back to the thigh. It is naturally soft and easily penetrated by a rifle-ball or hunting knife, but when suitably dried is exceedingly hard and polishable. The tail is slender, flat at the end and furnished at the sides with very stiff black hairs. The animal was well known to the ancients when it ranged over most of the peninsula of India and was introduced into the games of the circus by Pom-pey. From the time of the fall of the Roman Empire, however, it was lost sight of so com¬ pletely, that prior to the 16th century, natural¬ ists were of opinion that it had never existed, or, if so, that it was extinct. When the Portu¬ guese, however, opened the way to India, these animals again became known, and many were introduced into Europe, a historic one, sent by an Indian potentate to the king of Portugal in 1513, stood as model for a well-known drawing by A. Diirer. This species is now much re¬ stricted in range and not to be found outside of the plain of Assam, where it confines itself to the marshy grass-j ungles, where, like its rela¬ tive, the tapir, it is fond of wallowing in the mud. Though possessed of great strength and a match for either the tiger or the elephant, it is quiet and inoffensive unless provoked. _ The

African Rhinoceros (Rh. bicornis).

female produces one at a birth. The growth of the young is very gradual, as, at the age of two years, it scarcely attains half the height of the adult, which is usually about five feet at the shoulder; such a specimen will measure about nine and one-half feet from the snout to the root of the tail. The sight of this rhinoceros • is by no means acute, but, on the contrary, its senses of smelling and hearing are very keen.

Its chief food is canes and shrubs. The flesh somewhat resembles pork in taste, though oi a stronger flavor and coarser grain. It can be successfully hunted only by the aid of elephants, and is now protected by law against extermina¬ tion. It lives well in captivity and specimens may be seen in many zoological gardens, but it does not breed in captivity. <

The Javanese or Sondaic rhinoceros (Rh. sondaicus) is distinguished from the Indian spe¬ cies by smaller size, shorter horn and differ¬ ences in the disposition and tesselated appear¬ ance of the skin-folds, which is also somewhat more hairy. It occurs in the Sunderbunds of India, in Bengal and in the Malayan Islands. The Sumatran rhinoceros (Rh. sumatrensis) is well distinguished by having two horns, the rear one like a big knob, and in being clothed with a comparatively thick coat of hairs. Its range is similar to the Sondaic species, but it also extends to Borneo. A variety living in the Assamese swamps has been called the hairy-eared rhinoceros (Rh. lasiotis). The upper lip of this species forms a short proboscis and it gets its food mainly by browsing shrubs.

The African rhinoceroses are two, both dif¬ fering from the Asiatic group in dentition, and in the absence of the armor-like plates and folds in the hide, which is hairless and lead-colored. Considerable variation exists, so that half a dozen or more distinct forms have been named, but all seem referable to two species, — the ordinary widespread African rhinoceros (Rh. bicornis), and the square-mouthed (Rh. simus). The former is to be found, except where killed off by civilization, throughout all southern and eastern Africa outside of the equatorial forests, and it does not show the fondness for swamps which characterizes the Asiatic congeners. Its front horn is broad and

raised as on a base, sharp-pointed and curved slightly backward, while the hinder horn is usually shorter and more conical. The head is rounded. This animal appears to be of ferocious disposition, and is quick and active and greatly feared by the natives. The food consists largely of roots, which it digs out of the earth by aid of its horn. The side of the horn is thus fre¬ quently rubbed by contact with the earth. This long horn may attain a length of three to three and one-half feet, and straight ramrods are made from it. The lip is somewhat pointed and prehensile and the animal browses much of the time. It is justly regarded by hunters as one of the most dangerous animals in the world to meet and it often charges from ambush or dashes frantically through a camp, so that many persons have lost their lives by it outside of chosen encounters.

The square-mouthed, white or Burchell's rhinoceros is a northerly and now almost ex¬ tinct species (Rh. simus) which dwelt in east Africa and was distinguished by its huge size, a male standing six and one-half feet high at the shoulder, with the front horn 50 or more inches in length. Its muzzle is short and square, the upper lip being short and its food consisting altogether of. grass. Its general habits otherwise are similar to those of the other species.

Fossil Rhinoceroses. — These animals begin to be recognizable toward the end of the Eocene Period, both in Europe and North America; but the first form of which much

definite knowledge is possessed is Hyracodon of the Lower Miocene (White River beds) of the eastern slope of the Rocky Mountains. This was a comparatively small, slightly built ani¬ mal with a longer neck and limbs than later rhinoceroses show and no trace of a horn is perceptible. Like other early forms it was tridactyl, but in some a rudimentary fourth toe (the fifth) remains on the fore foot. The holarctic Amynadants were of a habit of life not unlike that of the hippopotamus, as is shown by the height of the eyes and nostrils and the tusk-like teeth. They had no horns. (<In North America,® says Woodward, ((a normal horn does not appear ever to have been acquired, and the race disappeared before the close of the Pliocene. … In the Old World, however, the gradual development of the horn can

be clearly traced.® The earliest definite European remains are of a hornless rhinoceros (Aceratherium) , which seems to have ranged over all Europe and Asia, and very similar species lived simultaneously in western North America. One of the latter (Diceratherium) , of small size, had two callosities on its nose side by side' and four digits in the front foot. Typical horned rhinoceroses are to be traced as far back as the middle of the Miocene, and they had all the essential features of the mod¬ ern ones and no one-horned fossils have been found outside of the Indo-Malayan region. The upper Pliocene species bore horns so large that the septum between the nostrils was ossi¬ fied for their support. This feature is notice¬ able in the species (Rh. leptorhinus) common in England in the time immediately subsequent to the Ice Age, and reaches its maximum in the great woolly rhinoceros (Rh. tichorhinus) , whose bones are found in the cave deposits and river gravels from Great Britain to China and whose mummified remains have been taken, like those of the mammoth, from the ice-cliffs of arctic Siberia. It had immense horns and was covered with dense woolly hair. Another huge, but aberrant rhinoceros (named (Elasmother-ium) roamed over Russia and northern Asia at the same Pleistocene period, which was sometimes 15 feet long, and bore an immense horn rising from-between the eyes.

Bibliography. — Consult authorities on zool¬ ogy and sport in India and in Africa, especially Roosevelt, T., (Life Histories of African Game Animals) (New York 1914) ; Blandford, W. T., (Fauna of British India) (London 1888-91). For the palaeontology of rhinoceroses, consult Osborn, H. F., (The Extinct Rhinoceroses) (Memoirs of the American Museum of Natural History, Vol. I, Part III, New York 1898) ; id., (Phylogeny of the Rhinoceroses of Europe* (Bulletin of the American Museum of Natural History, Vol. XIII, ib. 1900).

RHINOCERpS-BIRD, some bird, espe¬ cially a small white egret, which perches upon the rhinoceros when at rest, searching his hide for ticks and other insects and warns him by its cries of the approach of any intruder. See Buffalo-bird.

RHINOSCOPY. See Nose and Throat, Diseases of.

RHIO, re'o, or RIOUW, re-ow', a sea¬ port belonging to the Dutch, in the Indian Archipelago, on the islet of Tandjong Pinang, in a bay on the south side of the island of Bin—

tang, 50 miles southeast of Singapore. It is the capital of a Dutch residency, comprising the Rhio Archipelago, the Linga group and the Tambelan, Anambas and Naturna islands, as well as the districts of Kampar, Siak and In-dragiri, on the east coast of Sumatra. The pop¬ ulation of the residency is estimated at 108,000.

RHIZOME, or ROOTSTOCK, in botany, a sort of stem found in herbaceous perennials, running along the surface of the ground, or partially or wholly subterranean, sending forth shoots at its upper end and decaying at the other. It occurs in the ferns, iris, etc.; and in the ferns it may be wholly covered with the soil. In the mints, the sand-sedge, couch-grass and other plants the rhizome is long and slender, but in Solomon's Seal, iris, birthroot, etc., it is stouter. Unlike roots, rhizomes bear scaly leaves at the nodes, and they also send down fibrous roots. The stouter rhizomes may act as storehouses of food.

RHODE ISLAND AND PROVIDENCE PLANTATIONS, one of the New England States, situated between lat. 41° 18' and 42° 3' N., and between long. 71° 8' and 71° 53' W. ; bounded on the north and east by Massachu¬ setts, on the south by the Atlantic Ocean and on the west by Connecticut. The extreme length of the State from north to south is 48 miles, and the extreme width from cast to west is 36 miles. The area is 1,248 square miles, of which 1,067 square miles, including the island, are land surface. The larger part of the State is hilly, but the general elevation is not great; the highest point, Durfee Hill, in the north¬ west of Providence County, having an altitude of 805 feet. The large inlet known as Narragansett Bay, ranging in width from 12 to 3 miles, and with lesser bays and inlets branching from it, extends 28 miles inland in a northerly direction. It includes a number of islands, Rhode Island, Conanicut and Prudence Island being the largest. Rhode Island is 15 miles long and about three miles wide, and on it is situated the city of Newport. Block Island lies nine miles from the coast. It is a hilly ex¬ panse of verdure-clad sand rising boldly from the Atlantic Ocean. The Great Salt Pond which was formerly enclosed within the island is now an open harbor, and other important improve¬ ments have been effected, making the island much more accessible and secure for steam and sailing vessels. The rivers of Rhode Island are small, but they supply much of the nower used by great industrial establishments. The Blackstone, Pawtuxet, Wanasquatucket, Moshassuck and West River all in the northern part of the State flow into the Providence River, which in turn empties into Narragansett Bay. It is navigable for trans-Atlantic steamers to Provi¬ dence. All the streams are rapid for the greater part of their course, and on some of them large dams have been built as reservoirs for the mills. These and the natural ponds add greatly to the picturesque

effect of the scenery.

Climate. — The climate is mild, as compared with that of the greater part of New England. The mean temperature for January is 36° and for July 76°, and the humidity aver¬ ages between 80 and 95 per cent throughout the year. The rainfall ranges from 40 inches in the northern part of the State to neariy 50 inches on the coast.

4Q6

Geology and Minerals. — In the western part of the State the surface is chiefly com¬ posed of Archaean rocks, which in some places, as at Rocky Point, jut prominently into the bay. The bed of the bay itself, with its islands and a large part of both shores, is composed of deposits from the Carboniferous oeriod, but in the great terrestrial disturbances which ‘followed that period, the coal strata in the vicinity of Narragansett Bay underwent changes which greatly affected their value for use as fuel. Coal was discovered at Philipsdale, East Provi¬ dence, some years ago. It is claimed that the mine contains good hard coal and can be worked profitably. A coal mine is also located in Cranston, near Providence, which has been worked at intervals for many years, but never far from the surface. Excellent granite quarries are worked in different parts of the State, especially at Westerly, whence granite has been supplied for many notable monuments and buildings throughout the United States. Considerable deposits of magnetic iron ore are known to exist along the western edge of the Carboniferous strata, and limestone is abundant in some parts of the State. In 1915 the total value of the mineral output (graphite, lime, building stone, etc.) was $855,007, as compared with $777,716 in 1914.

Agriculture. — Extensive farming is not carried on in Rhode Island. Much of the land has been taken for factory sites, villages and small settlements; while the growth of the cities and large towns has absorbed much suburban property, which was formerly under cultivation. As in other States many farms are occupied by persons who do not cultivate them to any great extent ; farmers who do get a living from their land generally keep cows and from these derive much, if not all, of their income; and this accounts for the fact that hay and forage form a most important crop. The acreage de¬ voted to this is about 60,000 acres. Corn and potatoes together occupy about one-quarter of this acreage. In Cranston are found some of the largest market garden farms in the United States. Poultry raising is carried on along the most approved scientific lines and yields hand¬ some returns. The State has in all about 5,300 farms, with an area of 443,308 acres, of which 178,344 acres are improved. In 1913 the value of all farm property was $32,990,739. Farm land per acre averaged $63.01. In 1917 the acreage planted to corn was 13,000, from which were produced 546,000 bushels valued at $1,289,- 000; in the same year 2,000 acres were planted to oats, yielding 62,000

bushels valued at $46,- 000; 5,000 acres to potatoes yielding 675,000 bushels valued at $1,181,000; 60,000 acres to hay, yielding 90,000 tons, valued at $1,827,000; a total of 80,000 acres in corn, oats, potatoes and hay, yielding an aggregate product valued at $4,343,000. Vegetables other than potatoes are raised to the value of $700,000 annually. Nursery products, flowers and other ornamental plants are grown in considerable quantities, the annual value being approximately $650,000. The small fruits — strawberries, raspberries, etc — average about 470,000 quarts with a value of $44,000. The apple crop is valued at about $150,000 annually; while other orchard fruits are placed at $50,000. In a good season the grape crop brings about $10,000. According to present official returns Rhode Island farms have

10,000 horses worth $1,455,000; 23,000 dairy cows worth $1,663,000; 11,000 other cattle worth $295,000; 7,000 sheep worth $36,000; 15,000 swine worth $202,000; dairy products sold in 1915 were valued at $2,600,000.

Manufactures. — The leading industries are the manufacture of cotton and woolen goods, fine tools, machinery, silverware and jewelry. Rhode Island is the parent State of cotton- , spinning in America. English laws forbade anyone making a model or drawing of English cotton machinery and sending it out of the country. Samuel Slater, an apprentice to cot¬ tonspinning under Strutt, partner of Arkwright, the great inventor of spinning machinery, mas¬ tered the improvements on which he was em¬ ployed, and came to the United States. Moses Brown invited him to Rhode Island. Slater went, and with the aid of Moses Brown's wealth, he succeeded in producing by the close of 1790, at Pawtucket, R. I., cotton-yarn equal to the best made in England. Cotton-spinning became a great Rhode Island industry, and continued to be the leading industry until the attention of manufacturers was turned largely to woolens and worsteds. The dyeing and fin¬ ishing of textiles, the silk and silk goods in¬ dustry and the manufacture of rubber boots and shoes and of electrical apparatus are also among the important and growing industries of the State. In the manufacture of the cheaper quality of jewelry Rhode Island stands first in the United States. In solid silverware the State has no superior. The iron industries are flour¬ ishing and include locomotives, engines, screws — the gimlet-pointed screw being a Rhode Island invention — and all varieties of metal tools. According to the Federal census returns of manufacturing establishments in the State in 1914, the capital invested in manufacturing industries

amounted to $308,444,563 in 2,190 establishments; there were 1,883 proprietors or firm members, 8,801 clerks or so-called salaried employees, and 113,425 wage-earners. The raw materials were valued at $162,425,219, and the output at $279,545,873. The dyeing and finishing of textiles with an average of 7,928 wage-earners and an output valued at $16,300,- 783 in 1914, ranks fourth compared with other industries in the State. Rhode Island ranks fifth among the States in the production of cot¬ ton goods, third in woolen and worsted goods, sixth in silk and silk goods and fifteenth in hosiery and knit goods. The cotton mills of the State had in 1914, 2,574,942 spindles, con¬ suming 122,403,247 pounds of cotton valued at

$17,813,655.

Banks. — The Providence National Bank, founded in 1791, is the oldest Rhode Island banks. The Providence Insitution for Savings dates from 1819. In the year ending 30 June 1917 there were 17 national banks in the State, three State banks, 15 savings banks, 13 trust companies and 13 branches. The savings banks had 161,470 depositors with $92,769,759 to their credit, being $574.53 to each depositor.

Fisheries. — Oysters, lobsters, scup, men¬ haden and squinteague are the most important products of the fisheries, which employ about 1,500 persons and approach in value about $1,- 600,000 annually. About $1,500,000 is invested in the industry. In former years the flats along the bayside produced the clam in abundance which, when baked in the proper way, or the

RHODE ISLAND.

Estimated population, 614,315

COUNTIES

Pop. 1915 Pop. 1915

20,525 Bristol . K 19 405,937 Providence . E8

38,866 Kent . K 10 26,793 Washington . Q9

43,865 Newport . O 20

Incorporated Cities, Towns, *Etc.*

2,000 Anthony . K 10

3,100 Arctic . J 12

2,107 Ashton . C15

1,400 Block Island . Z 12

9,609 Bristol . K19

1,270 Centerville . K 12

25,636 Central Falls … .E 16

901 Charlestown . F 8

1,309 Chepachet . D7

5,669 Coventry . K 9

25,987 Cranston . H 14

3,604 East Greenwich . .L13 18,113 East Providence . G 16

904 Exeter . N 12

1,076 Foster . F 4

1,531 Harris ville . C7

1,311 Hope Valley P6

2,496 Hopkinton . R 5

1.518 Jamestown Q 17

1,382 Little Compton .P21 4,500 Lonsdale . D 16

5,000 Manville . C 14

1,708 Middletown . O 18

(P.O. Newport)

2,325 Natick . J 13

30,108 Newport . Q 19

2,010 Pascoag . C 6

59,411 Pawtucket . F 16

2,194 Phenix . J 11

2,678 Portsmouth . M 20

254,960 Providence . G 15

2,000 River Point . J 11

1,271 Riverside . H 17

3,284 Smithfield . D 12

4,409 Tiverton . M 22

3,318 Valley Falls . D 17

2,170 Wakefield . … R 13

7,241 Warren . J 18

29,969 Warwick . K 17

9,422 Westerly . . T 2

44,360 Woonsocket A 12

Longitude Wwrt from Greenwisl

Ironstone 1

3£i so oket_Jc. _

N SOCKET

[anilet ft O

Grants V -Mills

Reservoir ˆ

Round Top

1 ranite (?

Karri/

IT. Attleboro

/?lear Rivet

s of W00NSQ4KET

\ [VI /

Woon socket JH[i) U vN -0 R T H QunfLcrbtx

S M r T H F I E Jjjh D tr

*2ˆ7 \

,H*riuirose\ ˆ

2. Norton P. O, or Norton Sta.

<B U R R\|

ˆI’ilion Res. V

\J {

f> Rascoag

f ˆ Reservoir

olds Mi:

P/a imiˆe

Tarkiln

omption

Raynbam Sta.

Gazzaville

lilams—

teV

Rock Y.\v

Smlthfield

Berkeley’

Spring Orove \

‘Wt ittenti

BowdisV,

ResY& ˆ 0 West Qlocci

ter Chepachet Burlingame Res.

\ L I N OX) L N \

Vezl’Ss’fiCill v. °° <

j D\(ˆmtta Pd > \d

, V\Y {FanAitXcF** f

stuiXx / clTyMm

Putnam

/*’ V)

East Junction

] Stillwater V

V Riservoir \

, T E R I SMIT

t; and Town Asylum \

s $e9z Hlu*mony ° Spmguevillejb

VˆV, \ Mountain Ddfe

AN, IFalrm “y

’bV <v<KS«V»»‘”Trn” S /_

- — — \ - 1 — vob 7o .

Reservoir ˆ ,{

? ° HarriMale

E. 1 utnam

JCceckˆ 1 Rond

Ronegansrttf JlfservqrryJ

I; Print Works ‘•ixhamville

Vighton

North

’ Kilhngly Pond’

“Foster0 7

Elmdaif.

Berkley

‘ Rehfiboth

-Pull ˆ/ˆNortli .Scituate

)§. Saunders vill

Mauton

%Noˆ

pi OIneyville V Arlington 1 oTVorntoiT

A hny Ret e r v ot r **

\ Hughosdaie £ ‘ V ~$[organ Mills

SimmoWsˆˆ ° i JkssK?°tr»ˆ ‘ i Us

Dighton

►anielsoi

PonagiVnsettj

2^^|Spitn(

i villa

＞BTART1

Foster Centerˆ)

Cransto’

Rocky ? irneyviiie

I Somerset

s Applerhouse Hill

K*^M\ tfei

Town A6ylurnYo

m jm. Wi\

Howard Hill

Pt*”’ X)

*/ ˆocasactˆ 4W)ckan’>‘i»ty-

“Howard/ˆ Stain J A h Truo///?

ZMtsJu n<« Oak 1 iawi

f •yO’ Lakewlitdˆ1 ˆNorwood

I

Boxsie

Warwick Rond ˆir’ Jr Jills Oroveˆ %g

Shawomet Q

ˆGreenwood ˆ0n®rneac/oll,

e«ervoir

Misery

Sterling]

Moos up]

tisea

Valley °

ernon

‘tiki nil*

Vntioc Sta.

lutiac.

‘Central Village

/ Rice City _

ˆ/Carbuncle Hill Rl < *t (Bowens Hi

Bowen

Rotterville

‘N a tick restcott

Sterling

[BFistorV

‘Hijjhlnm

i rot ic

Apponaugi

BlRlSTOL V V.Bristol

TVabLlnj

dvyARWiCK ■hie Rcecrvoii

Cow’esettV

Cb 1 p 1 tvanox et j \mP juep.

ˆIˆHarkney/lill

foQuid)iic7c Res,

Plainfield

South

.Tlvertoi

; r Wotuiq/a

)and,l’t

Greenwlcb’

)[ishnock Pond-Eaat

Pond

WeaversJHil

P’ Fisher Hill

S T Carr Fond

Jtkorik

i StaJ’or’dtP’l’ohd { 1 , VTi O | ˆ

,,lrJ/u

o W. Qreetiwich\pj If j Center

\ Raccoon Hillˆ

*Jq r e e n

I French to w:i

opkins Hill

Bliss Corners

I Sandy Rond

frortsui

lavTsvlIle G<

Nbose Neck Hill(\ 1

- istin.

Tippecc ncett Rond |

Jit pic i ns Bond\ *.Boon Pond 0

Central ‘ Village

l (lˆckford Pc

{Casey Hill 7Jˆe/er,

Tiverton\ Jonguit To

sWickfoi

oDeep Pond

Glasgo

\ jR/lviU e T <

Tetfis Hill P/ZZjtrn’jj \ Zillerty tf/ ‘ - —

Arcadiaˆ \Bafbc ruiUc\

KINGSTOWN

iLcum*, Saunderstown | W Coco.ouHill

liddletown l

Portsmouth, \ / Slate Hill

/ BlackFt.

pmmony HilLY

ˆDDLETOWN’i

<nt Asylum ft

Simmorts

Hili “%;• \ossy Rond

Moscow

Pendleton Hill t Yau

.Yawcoo Rond I \

oAVyomitw

/r I CJ M (

vLocustvill(j Us i

Quitksand \ ‘ Pond

eoog Rond

Hafimond Hill

HopeXalley

Me.pomptm

?paug°X Barbers

. Eastons I\>nd

‘ 1

Ca«knonchet Sta.

” ’ ‘j-‘ 3

Tv’ooaviif,

«

HnpTcinton

©►- Moretjield

:.OAda’

artenZ:

m •// a ˆ in a

ˆriOESH-ALLS I

lmi?r

Gould

O “FeaceDali ‘ordens Pond <c-

Graves,!,

|rej/to.n8/

Alfroj}

ˆ Plainvillefr V

a-Ashav>ay

O ddurdickville , Toiler JTiH °/

I -

;entorii

ˆS/T >v ot u ni’ci ut. ˆ •

7ˆ* .Pq sy «/ ij#c/ PondM /

•V’ SHunun Kan ug Hill > r,,,,,.,A,Sand Hill**

CITY OF PROVIDENCE

Tuckers Pbnd \

“Woodli

iteRoa

“Wester! f

CE.llETEIt\<

WESTERLY

mm

ill Reef

Olneyvi’

RHODE

C/jaaMrAl’P-’Wˆ”

(UU/lm s

BLOClvff 5

3$w% 1

ISLAMEF

rTO NEWrOllTˆl-XTY) ˆ

ettle

Point

1 Inch,

V Field’ Fort ® J pendenceˆ

ˆland

z/ewater

feNally’a N*w II 1 14 M*p of RKcfe blwuL Copyright b, BMd McNally * Co.

Dickens

)House

Rhode Island way, is the most delicious of sea foods. The ((Rhode Island Clam Bake® is a State institution known the world over. While clams are not as plenty now as formerly, the supply is sufficient for many years yet to come. The fishe lies of Narragansett Bay were men¬ aced for a number of years by the lack of a proper method of sewage disposal, but the city of Providence at a very great expense has pro¬ vided a system of clarifying the sewage and this evil has been entirely removed. The total annual product of the lobster fisheries, accord¬ ing to the latest available data, was 1,425,000 pounds, valued at $152,000. This branch of the fisheries has been the especial study of the Commission on Inland Fisheries which, after many experiments, has devised a method of rearing young lobsters until they become able to take care of themselves, thus making it pos¬ sible to increase greatly the number of lob¬ sters inhabiting the waters of the State.

Railways. — The New York, New Haven and Hartford Railroad Company controls railroad operations in the State. The railroads within the State comprise 202 miles of single track and a total mileage of all tracks operated of 446.40 miles and 359.96 miles single track of electric railway. The total length of single track, operated steam and electric, is 562 miles ; the net income, steam and electric, amounted to $6,101,381.60 in 1915. After a long period of controversy over location and terms for the dis¬ posal of the so-called ((Cove Lands,® in the centre of the city of Providence, and over which the tide formerly ebbed and flowed, a union station was erected where all railroads now enter.

Commerce. — The export commerce from Rhode Island ports is insignificant. Receipts from foreign imports at the port of Providence for the year ending 30 June 1915, amounted to $320,563.49, which included the custom dis¬ tricts of Providence and Newport. Congress has made liberal appropriations for the im¬ provement of harbor facilities at Block Island. The wharves at Providence and other ports, which once gave room to Indiamen, whalers and privateers, now accommodate steamers and other vessels used in the coastwise trade and summer travel. The boat-building industry of Bristol is known the

world over on account of the Herreshoffs, who have constructed several successful defenders of the America's Cup. Narragansett Bay has become a pleasure resort from Providence River to Newport in the east and Point Judith in the west, and in this way a large amount of money is brought into the State while wealthy men from New York and elsewhere, with summer homes in Rhode Island, have selected the State as their legal residence and pay personal taxes there.

Finance. — Since the State recovered from the final disorder occasioned by the War for Independence its credit has always been of the highest, and its obligations promptly met. The construction of the new State House at Provi¬ dence and other improvements due to the grow¬ ing needs of the commonwealth have led to extraordinary expenditures within recent years and at the close of the year 1917 the net in¬ debtedness was $6,437,226. On 1 Jan. 1917 the balance in the State treasury amounted to $32,- 839; the revenues during 1917 amounted to $4,- 507,000, making a total of $4,539,839. The ex¬

penditures for the same year aggregated $4,046,- 292, leaving cash on hand 1 Jan. 1918 at $493,- 547. The assessed value of the property within the State in 1917 was real property, $495,006,- 727 ; personal property, $273,083,498, making a total of $768,090,225.

Population. — Rhode Island was the most densely inhabited State in the Union by the census of 1920, which gave 604,397 as the total population or 566.4 inhabitants to the square mile. It is the only State east of the Mississippi River where a majority of the population are not natives of the State. In 1915 the population by sex and birth was :

White

Negro

Asiatic

Indian

Total

n

Male .

291,556

5,751

545

297,852

Female .

292,809

5,129

196

298,134

Total.. .

584,365

10,880

741

595,986

The foreign-born whites numbered 135,894, of whom Canada contributed 23.5 per cent; Ire¬ land 16.7 per cent; England 15.6 per cent and Italy 15.3 per cent. The chief city is Providence (q.v.) which

(1920) ’had a population of 237,595 ; other cities are Paw.tucket, 64,248; Woonsocket, 43,496; Newport, 30,255; Warwick, 13,481 ; West Warwick, 15,461 ; Central Falls, 24,174; Cranston, 29,407; East Providence, 21,- 793. The urban population is 97.5 per cent of the whole. In 1916 there were 14,622 births in the State, 5,727 marriages and 9,512 deaths. The death rate in cities was 16.2 and in rural dis¬ tricts 14.3 per 1,000 of the population.

Education. — Rhode Island has excellent public schools, supported by local taxation and administered by local authority, and under the general supervision of a commissioner of schools. Education is compulsory, and while there is much illiteracy among certain classes of foreigners, parents, almost without excep¬ tion, show eagerness to have their children edu¬ cated. In 1916 the school population of the State was 127,479, of whom 76,359 were en¬ rolled in schools. The State Normal School at Providence is a handsome building, and the State also maintains a College of Agriculture and the Mechanical Arts. The leading educa¬ tional institution of the State, and one of the best in the United States, is Brown University. The Rhode Island School of Design furnishes educational advantages in the arts of the highest order. Since 1914 the minimum school term is 36 weeks. High schools are provided by every town.

Religion. — The First Baptist Church of Providence, said to be the first in America, dates back to 16 March 1639. Roger Williams was one of the organizers. The Quakers were among the early settlers, seeking refuge from persecution in Massachusetts, and the Friends’ School at Providence is one of Rhode Island’s best-known educational institutions. The Congregationalists did not venture into Rhode Island until 1721, and while their proposal to come there was received with some bitterness by the descendants of those whom their ances¬ tors had driven into the wilderness, they have become one of the leading denominations in

the State. While Roman Catholics were as free to worship in Rhode Island as members of any other creed, it was not until 1813 or 1814 that mass was publicly celebrated in the city of Providence; the church of Saints Peter and Paul was completed in 1838. The present hand¬ some cathedral stands partly on the site of the old church, and the Roman Catholic faith now includes about 275,000, or 46.1 per cent of the entire population of the State. ((Official Catho¬ lic Directory) for 1921). The Baptists have almost one-third of the total Protestant church membership, and the Episcopalians, who cele¬ brated in 1872 the 150th anniversary of the old Saint John's Church at Providence, have about one-fifth. The Methodists date back in Rhode Island to 1787, and have a large membership and prosperous churches. The Universalists settled in Providence in 1772, and have since had a prominent share in the religious life of the State, besides having been instrumental in fostering many important public charities. The Presbyterians are increasing in numbers and have flourishing places of worship. Rhode Island contains its proportion of other sects and creeds, including the Jews, who were among the early settlers of Newport, where some of them achieved eminence.

Government. — There are 33 towns and six cities within the State. The governor, lieu¬ tenant-governor, secretary of state and other State officers are elected for two years. The governor may exercise the power of veto and can pardon criminals, with the advice and con¬ sent of the senate. The members of the legis¬ lature, known officially as the general assembly, are elected for two years. In the upper house, called the senate, there is one senator for each city and town. The lieutenant-governor pre¬ sides over this body. The lower house, or house of representatives, shall never exceed 100 members and no town or city shall have more than one-fourth of the whole number of mem¬ bers. Members of the general assembly are paid for actual attendance, with a maximum limit of 60 days. The house alone has the power to impeach, and the senate tries cases of impeachment.

The judicial power is vested in the Supreme Court and in such inferior courts as the general assembly may from time to time establish. Pre¬ liminary examination of persons charged with serious crimes and trials for minor offenses are held in the District Courts, the justices of which are chosen by the general assembly. The jus¬ tices of the Supreme Court are elected by the general assembly in grand

committee and con¬ tinue in office until their positions are declared vacant by a resolution of the general assembly. In practice this has meant election for life, or until retirement by voluntary resignation. The presidential suffrage was extended to women in April 1917.

History. — The colony originally consisted, as the name indicates, of more than one com¬ munity of independent origin, but to Roger Williams, the founder of Providence Planta¬ tions, history accords the distinction of having established the commonwealth. Providence Plantations was founded in 1636 by Roger Wil¬ liams, who fled with several companions from Puritan persecution. He was of Welsh origin, and of respectable family, and his arrival in

Massachusetts, 5 Feb. 1631, is recorded as <(the coming of a godly minister.® Williams soon showed that he had no sympathy with the Massachusetts principle of controlling through the civil government the consciences of men, and he frankly avowed his views in this regard. He thus incurred the censure of the Puritan magistrates and it was at first resolved to expel him from the colonial bounds, and when it was learned that he proposed to found another colony, it was determined to send him back to England. Williams received timely warning of this intention and he fled into the wilderness with several companions, and at the opening of spring in 1636 he began to plant on the east side of the Seekonk River. He had five com¬ panions, William Harris, John Smith, Francis Wickes, Thomas Angell and Joshua Verin. Here he was allowed to rest, being notified by Plymouth Colony that the place was within their jurisdiction. Some time between the end of April and the latter part of June 1636 he proceeded around what is now Fox Point and up Providence River, landing at the site of the future town, and here he selected a dwelling-place for himself and his associates. His ob¬ ject, as set forth by himself, was (<the settling of the plantation, and especially for the receiv¬ ing of suefi as were troubled elsewhere about the worship of God.®

The settlement of Rhode Island was at first a separate colony, but it also owed its origin to the example and advice of Roger Williams. John Clark and others of Boston went to Provi¬ dence in 1638 in search of an asylum where they might enjoy liberty of conscience. Roger Williams advised them to purchase from the Indians the large island on the east side of Narragansett Bay called by the Dutch (<Roode Eylandt.® This was done, and the adventurers,

18 in number, incorporated themselves as a body politic and elected William Coddington their chief magistrate. A third settlement was formed at Warwick in 1643 by a party of whom John Greene and Samuel Gorton were leaders.

Roger Williams perceived that the union of the weak settlements and the protection of the home government were necessary for their pro¬ tection from the hostile and comparatively pow¬ erful Puritans, and in 1643 he went to England and brought back in the following year a char¬ ter which united the settlements of Providence and Rhode Island under one administration, the name of the colony being Rhode Island and Providence Plantations. The new government went into operation in 1647, when the freemen of the several plantations met at Portsmouth,

19 May, and adopted laws for carrying on the civil government. This charter was confirmed by Cromwell in 1655, and in 1663 Charles II granted the celebrated charter which remained for 180 years the supreme law of Rhode Island, both as colony and State, and gave place to a State constitution in 1843 only after the civil convulsion known as the Dorr Rebellion gave notice that the people were determined upon a change.

The colony suffered greatly in the war with King Philip. Providence was burned, and the outer settlements were laid waste and settlers murdered. The Great Swamp Fight, on Rhode Island soil, broke the power of the hostile Indian confederacy, and when King Philip was

RHODE ISLAND

1 The State House, Providence

2 The Old Stone Mill, Newport

slain by treachery in the fastnesses of Mount Hope, the red men ceased to be a menace to the security of the settlements.

When Sir Edmund Andros was made gov¬ ernor of New England by James II he sought to take away the colonial charters, and in 1687 attempted to seize that of Rhode Island, but in some mysterious manner it disappeared and was not found until the accession of William and Mary in 1689. Roger Williams had died in 1683. Notwithstanding the harsh treatment he had received from the authorities of Massa¬ chusetts he was ever ready to use his influence with the Indians in behalf of the colonies, and he was instrumental in disarming Indian hos¬ tility at times when the colonists were ill-pre¬ pared for defense. Although a strong con¬ troversialist and bold and unsparing in his denunciation of those with whom he did not agree, he had a remarkable faculty of com¬ manding the affection and esteem of men, as was signally shown in his ability to obtain for his colony the protection alike of Cromwell and of Charles II. He was exemplary in his pri¬ vate life and altogether worthy of the rever¬ ence which posterity, without regard to creed, attaches to the memory of him whom Whit¬ tier has truly called ((soul-freedom's brave con¬ fessor.® He imprinted on Rhode Island a character which it has never lost, and which has been handed down through all the varying changes of population, of liberality and toler¬ ance, of the Sermon on the Mount interpreted in the ordinary everyday actions of men.

The colony grew with a steady and whole¬ some growth and religion flourished, although unsupported by the compulsory contributions of worshippers. The people were engaged in agri¬ culture and commerce, and, in times of war, in privateering. During the struggle between Great Britain and France for empire in North America, Rhode Island took an active share in supplying troops and seamen, and the colony had 50 privateer vessels, manned by 1,500 sailors, at sea in 1756. The passion for privateering, with its excitement, its tests of courage and endurance and prospects of rich reward, be¬ came so strong that when Esek Hopkins was commander-in-chief of the Continental navy, with his vessels at Providence, he found it

impossible to man them, owing to the fact that privateering offered better inducements. The coast of the colony was infested with pirates in the early part of the 18th century, and some 30 of these ocean highwaymen were hanged at one time at Newport.

It was difficult in earlier years to obtain men to fill the minor public places, and laws were passed which remained on the statute-books for many years, providing penalties for refusal to accept office. This modesty on the part of the forefathers is easier to understand in view of the fact that the expenses of the town of Providence at the outbreak of the Revolution did not exceed $1,000 a year.

The people of Rhode Island were among the foremost in defending American rights against the aggressions of George III and his ministers. In June 1772 a band of volunteers commanded by Abraham Whipple, who had distinguished himself as captain of a privateer in the wars against the French, burned the British revenue schooner Gas pee in Narragansett Bay. During the greater part of the War of Independence

Newport was occupied by the British, and on 29 Aug. 1778 a severe engagement was fought between the Americans, under Sullivan, and the British at Butt's Hill, R. I., in which the British suffered the greater loss. During the war the State furnished nearly* 12,000 enlisted men.

Rhode Island was the last of the States to ratify the Federal Constitution, its assent not having been given until 29 May 1790, more than a year after the national government had gone into operation. As a small State, Rhode Island was peculiarly jealous of its rights, and was slow to assent to its adoption. As the Con¬ stitution was first formulated and adopted by some of the original States there was room for a well-grounded fear that the smaller States might be destroyed and absorbed through com¬ binations of their more powerful neighbors. It was this fear mainly that caused Rhode Island to stand aloof from the combination, and it was not until that fear had been allayed by amendment to the original instrument that its adoption by the State was effected.

For some years after the Revolution the shipping of the State, being free from British restriction, became known in all parts of the globe then visited by vessels, and the founda¬ tions were laid of large fortunes afterward in¬ vested in manufacturing, when the shipping business declined. This change took place early in the 19th century,

when New England's for¬ eign commerce was practically ruined by the embargo, and when, on the other hand, the War of 1812 gave an impulse to domestic manufac¬ tures. Factories were established on every stream that afforded waterpower, and Rhode Island grew in prosperity with her expanding industries.

The charter of Charles II, which continued to be the fundamental law of the State, re¬ stricted the right of suffrage to freeholders having an estate worth $134, or renting for $7 a year, and to their eldest sons. This was the cause of many wrongs, and of wide¬ spread popular protest. It was not uncommon for persons holding mortgages to threaten to foreclose them in order to influence votes, and the system gave rise to much intimidation and corruption. The conservative element strongly opposed a change, and when attempts to obtain reform through the regular course of legisla¬ tion failed, representatives of the suffrage reform party met in convention and framed a constitution. They claimed that this constitu¬ tion had been adopted by a majority of the adult male citizens of the State, and it was also alleged that a majority of those entitled to vote under the King Charles charter had voted in favor of the constitution. State officers-and a legislature were chosen under this constitution, and organized with Thomas W. Dorr as gov¬ ernor. The charter officials, under Gov. Samuel W. King, ignored the Dorr legislature and its enactments, and Governor King, at the head of a military force, dispersed the so-called insurgents. Dorr was convicted of treason and sentenced to imprisonment for life, but he was released some years later, and his sentence or¬ dered expunged from the records of the State. A new constitution was adopted in regular form, and went into effect in May 1843. It retained the real estate qualification for foreign-born citi¬ zens, and this was not abolished until 1888.

Another important change adopted later was that permitting election by a plurality vote. This came into effect in 1893. When a ma¬ jority was required the election was often thrown into the general assembly, which sometimes chose a minority candidate. Until 1900 the State had two seats of government, the organization of the State government and one session of the legislature being held at Newport in May. Now all sessions are held in Providence, in the splendid new State Capitol.

As a manufacturing State, Rhode Island has been largely influenced by tariff in¬ terests in its attitude on national elections, and since 1856, with one exception, the year 1912, it has always given its electoral vote to the Republican candidates. The Democrats have been successful several times within the past two decades, however, in electing their candi¬ dates for governor. Rhode Island has adopted the so-called Australian ballot system of secret voting.

Political power is unequally divided. Each city and town, no matter how large or small, has but one representative in the senate, or upper branch of the general assembly, and the representation is also disproportionate in the lower branch. The city of Providence,, with nearly one-half the population of the State, and contributing nearly one-half of the State taxes on general property, elects only about one-eighth of the State legislature. In this respect Rhode Island is a miniature of the national government. It is also a singular fact that in Rhode Island's civil conflict, the Dorr ((war® the northern part of the State chiefly supported one side, the Dorrites and the southern part stood by the charter.

In the Civil War, Rhode Island supplied 24,102 men for both the army and navy, Gen. Ambrose E. Burnside, for a time in command of the army of the Potomac, and whose equestrian statue is a conspicuous feature of the city of Providence, joined the service from this State, of which, however, he was not a native, and later was honored by its people by being elected governor and United States Senator. Rhode Island spared no expense in sending troops to the front, and since that great con¬ flict has been generous in caring for her dis¬ abled and dependent defenders, and maintains a well-regulated Soldiers' Home at Bristol. The Soldiers' Monument opposite the City Hall in Providence, one of the finest in the United States, bears the names of the gallant dead who fell in defense of their country. In the Spanish-

American War, the conflict in the Philippines and in the Mexican crisis and the late great World War Rhode Island has been well rep¬ resented. See Boundaries or the United States.

Governors of Rhode Island.

The State originally consisted of four towns, Providence, settled in 1636; Portsmouth, in 1638; Newport, in 1639, and Warwick, in 1642. The executive heads of Portsmouth and Newport were entitled judges, until 1640, when these two towns were united, and the chief officer was thereafter called governor. Providence and Warwick had no executive head until 1647.

PORTSMOUTH

William Coddington, judge. . 7 March 1638-30 April 1639

William Hutchinson, judge. . 30 April 1639-12 March 1640

NEWPORT

William Coddington, judge.. 28 April 1639-12 March 1640

PORTSMOUTH AND NEWPORT

William Coddington, governor, 12 March 1640-19 May 1647 In 1647 the four towns were united under a charter or patent granted in 1643 by Parliament.

PRESIDENTS UNDER THE PATENT

John Coggeshall . May 1647-May 1648

Jeremy Clarke 1 . May 1648-May 1649

John Smith . May 1649-May 1650

Nicholas Easton . May 1650-Aug. 1651

In 1651 a separation occurred between the towns of Provi¬ dence and Warwick on the one side, and Portsmouth and Newport on the other.

i William Coddington, of Newport, was elected, but the General Court would not engage him, for failing to clear him¬ self of certain accusations.

PROVIDENCE AND WARWICK

Samuel Gorton . President. October 1651-May 1652

John Smith . “ Maˆ 1652— May 1655

Gregory Dexter . “ May 1653— May 1654

PORTSMOUTH AND NEWPORT

John Sanford, of Ports¬ mouth . President. May 1653-May 1654

In 1654 the union of the four towns was re-established. Nicholas Easton. President. May 1654-12 Sept. 1654

Roger Williams. . “ Sept. 1654-May 1657

Benedict Arnold . “ May 1657-May 1660

William Brenton. “ May 1660-May 1662

Benedict Arnold. “ May 1662-25 Nov. 1663

Benedict Arnold .

William Brenton .

Benedict Arnold .

Nicholas Easton .

William Coddington…

Walter Clarke .

Benedict Arnold 2 .

William Coddington 2. .

John Cranston 2 .

Peleg Sanford .

William Coddington, Jr

Henry Bull .

Walter Clarke 3 . .

Henry Bull .

John Easton . .

Nov. 1663-May 1666 May 1666-May 1669 May 1669-May 1672 May 1672-May 1674 May 1674-May 1676 May 1676-May 1677 May 1677-20 June 1678 28 Aug. 1678-1 Nov. 1678 8 Nov. 1678-12 March 1680 16 March 1680-May 1683 May 1683-May 1685 May 1685-May 1686 May 1686—29 June 1686 27 Feb. 1687-May 1690 May 1690-May 1695

2 Died in office.

3 The charter was suspended by Sir Edmund Andros till 1689. The deputy governor, John Coggeshall, acted as governor on the resumption of the charter, Governor Clarke refusing to serve.

Caleb Carr 4 5 .

Walter Clarke .

Samuel Cranston 4 .

Joseph Jencks .

William Wanton 4 .

John Wanton 4 .

Richard Ward .

William Greene .

Gideon Wanton .

William Greene .

Gideon Wanton .

William Greene .

Stephen Hopkins .

William Greene 4 .

Stephen Hopkins .

Samuel Ward .

Stephen Hopkins .

Samuel Ward .

Stephen Hopkins .

Josias Lyndon .

Joseph Wanton .

Nicholas Cooke .

William Greene .

John Collins .

Arthur Fenner, Federal-Re¬ publican .

James Fenner, Federal-Re¬ publican . .

William Jones, Federal-Re¬ publican .

Nehemiah R. Knight,6 Fed¬ eral-Republican .

May 1695-17 Dec. 1695 Jan. 1696-March 1698 March 1698-26 April 1727 May 1727-May 1732 May 1732-Dec. 1733 May 1734-5 July 1740 15 July 1740-May f743 May 1743-May 1745 May 1745-May 1746 May 1746-May 1747 May 1747-May 1748 May 1748-May 1755 May 1755-May 1757 May 1757-22 Feb. 1758 14 March 1758-May 1762 May 1762-May 1763 May 1763-May 1765 May 1765-May 1767 May 1767-May 1768 May 1768-May 1769 1769-7 Nov. 1775. Deposed Nov. 1775-May 1778 May 1778-1786 May 1786-1790

May 1790-15 Oct. 1805 *

May 1807-1811

May 1811-1817

May 1817-9 Jan. 1821

4 Died in office.

5 Paul Mumford, governor, died in office. Henry Smith, first senator, officiated as governor. In 1806 no election of governor, Isaac Wilbour, lieutenant-governor, officiated.

6 Elected United States senator, 9 Jan. 1821, for unex¬ pired term of James Burrill, Jr., deceased.

William C. Gibbs, Federal-Republican .

iames Fenner . Whig…

-emuel H. Arnold 7 “

John Brown Francis “

William Sprague 8. . “

Samuel Ward King. “

May 1821-1824

May 1824-1831

1831-1833

1833-1838

1838-1839

1840-1843

7 In 1832, no election of governor, lieutenant-governor, or senators. Elections were successively ordered for 16 May, 18 July, 28 Aug. and 21 Nov. 1832, resulting without choice. At the January session, 1833, the officers who had not been reelected in 1832 were continued in office until the next session.

8 In 1839, no election of governor or lieutenant-governor. Samuel Ward King was first senator and acting governor.

UNDER THE CONSTITUTION (ADOPTED IN 1842)

James Fenner . Whig . 1843-1845

Charles Jackson .. . “ . 1845-1846

Byron Diman . “ . 1846-1847

Elisha Harris . “ . 1847-1849

Henry B. Anthony. “ . 1849-1851

Philip Allen,9 Democratic-Free

Soil … . 1851-1853

Francis M. Dimond (acting) … 20 July 1853-1854 William Warner Hoppin, American, 1854-1857

Elisha Dyer . Republican . 1857-1859

Thomas G. Turner. “ 1859-1860

William Sprague… “ 1860-3 Mar. 1863. Resig’d

William C. Co zzens 10 “ 3 March 1863-May 1863

James Y. Smith.… “ 1863-1866

Ambrose E. Burnside “ 1866-1869

> Seth Padelford . “ 1869-1873

Henry Howard … . “ 1873-1875

Henry Lippitt . “ 1875-1877

Charles C. Van Zandt “ 1877-1880

Alfred H. Littlefield “ 1880-1883

Augustus O. Bourn. “ 1883-1885

George Peabody

Wetmore . “ 1885-1887

John W. Davis… . Democrat.. . 1887-1888

Royal C. Taft . Republican. 1888-1889

Herbert W. Ladd. . “ 1889-1890

John W. Davis… . Democrat… 1890-1891 Herbert W. Ladd . . Republican. 1891-1892 D. Russell Brown. . “ 1892-1895

Charles Wairen Lip¬ pitt . * 1895-1897

Elisha Dyer . “ 1897-1900

William Gregory » . “ 1900-16 Dec. 1901

Chas. Dean Kimball “ 16 Dec. 1901-1903

Lucius F. C. Garvin, Democrat.. 1903-1905 George H. Utter… Republican. 1905-1907 James H. Higgins. . Democrat.. . 1907-1909 Aram J. Pothier… Republican. 1909-1915

R. Livingsten Beeck—

man . “ 1915-1921

E. J. San Souci. … “ 1921—

9 Resigned 20 July 1853, having been elected United States senator, May 1853. Francis M. Dimond, lieutenant-governor, officiated.

10 Governor Sprague resigned 3 March 1863, to accept the office of United States senator; and Lieutenant-Governor Arnold having been previously elected to the Senate of the United States to fill the vacancy caused by the resignation of James F. Simmons, Mr. Cozzens became governor by virtue of his office as president of the State senate.

11 William Gregory was reelected governor 5 Nov._ 1901, but died 16 Dec. 1901, and Lieutenant-Governor Kimball became governor.

Bibliography. — (The Rhode Island Manual* (Providence, annually) ; Reports of the various departments of State government; Arnold, S. A., (History of the State of Rhode Island and Providence Plantations, 1636— 1 790 J (New York 1874) ; Bartlett, J. R. (ed.), < Records of th'e Colony of Rhode Island) (Providence 1856— 65) ; Bonsteed and Carr, (Soil Survey of Rhode Island* (Washington 1905) ; Bates, F. G., (Rhode Island and the Formation of the Union * (New York 1898) ; Field, Edward (ed.), (State of Rhode Island and Prov¬ idence Plantations at the End of the Century) (3 vols., Boston 1902) ; Greene, W. A. A., (Providence Plantations for 250 Years) (Providence 1886) ; Kimball, G. S. (ed.), Correspondence of the Colonial Governors ot Rhode Island) (2 vols., Boston 1902-03) ;

Hasse, A. R., Hndex of Economic Material in Document of the States of the United States : Rhode Island, 1789-1904) (Washington 1909) ; Richman, Irving B., (Rhode Island: Its Mak¬ ing and its Meaning* (2 vols., New York 1902) ; id., (Rhode Island; A Study in Separa¬ tism *(ib. 1905) ; Steffens, J. L., (A Struggle for Self-Government* (ib. 1906) ; Rhode Is¬ land Historical Society (Collections* (10 vols., 1827-1902), and <Proceedings) (Providence

1872-1919).

Edward Field,

Author of (The State of Rhode Island 3

RHODE ISLAND, an island belonging to the State of Rhode Island, at the entrance to Narragansett Bay. It is separated from the mainland on the west by the estuary, Sakonnet River, and is the largest island in the bay. The State was named after this island. It is about 15 miles from north to south and three and one-half miles wide. It is divided into three townships: Newport, Portsmouth and Middletown. It is a famous summer resort. New¬ port (q.v.), the city, is on the southwest coast.

RHODE ISLAND, Battle of, an engage¬ ment which occurred '29 Aug. 1778. The British had seized Newport and garrisoned it with 6,000 men under Pigott. An attack was con¬ certed by Sullivan and Lafayette on land and Count d'Estaing on sea. Sullivan seized Butts' Hill on the island of Rhode Island. Estaing was obliged to meet Howe and the English fleet, but battle was prevented by a fierce storm, and

Estaing withdrew to Boston to refit. Pigott at¬ tempted (29 August) to carry Butts' Hill, and a bloody repulse of the British resulted; but on the arrival of Clinton with 5,000 reinforce¬ ments the Americans were compelled to evac¬ uate the position.

RHODES, rodz, Cecil John, South African financier and statesman : b. Bishop's Stortford, Hertfordshire, England, 5 July 1853; d. Cape Town, 26 March 1902. He was educated at the grammar school of his native town, but before he could pass on to the university a serious affection of the lungs necessitated his departure for Natal, where an elder brother of his was engaged in cotton-raising. Rhodes landed in South Africa in 1870 and after a brief experi¬ ence in farming made his way to the diamond fields of Kimberley, where he met with speedy and astonishing success. At 19 he was a millionaire and, with his health well recovered in the salubrious air of the veldt, he planned to return to England to resume his interrupted education. Before leaving South Africa he traveled for eight months, by ox-cart and on foot, through the region north of the Orange and the Vaal, and his imagination, which even at that early age worked in vast spaces, saw in the fertile, thinly populated country virgin soil for the building up of an imperial Britain in the Dark Continent. He matriculated at Baliol College, Oxford, in 1873, but his ailments re¬ turned and he was compelled to leave England in the same year. Three years in South Africa made him robust again and from 1876 on he kept his terms at the university, spending the long vacations in South Africa, and taking his B.A. and M.A. in 1881. In the same year Rhodes entered the Cape Parliament as member for Barkly West. By this time his plans for

the future had assumed a definite character. Convinced, at all times, of the supreme fitness of the English race for the task of governing the world, Rhodes made it his object in life to further the realization of that end in his own especial sphere of South Africa. To aid him in his schemes he looked to money, in whose power he had a tremendous faith, and it is because of the close connection in him of the selfish money¬ getting instinct and the broad ambition of the statesman that Rhodes remained for many years an enigma to the world. In the Cape Parlia¬ ment Rhodes devoted himself to the task of establishing harmonious relations between the English inhabitants and the Dutch, for with true insight he recognized that if British in¬ fluence was to dominate South Africa it must be conditioned by the goodwill of the people of Dutch blood. The first step in his scheme of imperial expansion was the acquisition of Bechuanaland as a British protectorate in 1884. For this he labored against the indifference of the home government, which he finally stirred to action by his insistence upon the necessity of securing Bechuanaland as an outlet for the British trade to the north, already threatened by the encroachments of ‘the Transvaal from the east and Germany from the west.

The annexation of Bechuanaland was a victory for Rhodes over Kruger, the astute President of the Transvaal, but the struggle be¬ tween the two did not end there. When Boer commanders began to cross the Limpopo River, the northern boundary of the Transvaal, about 1887, Rhodes, to cut off their advance in that direction, obtained from Lobengula, king of the Matabele who were masters of the country be¬ tween the Limpopo and the Zambesi, the ex¬ clusive right to search for minerals within his territories, and in 1889 the British South Africa Company was incorporated with almost abso¬ lute political and territorial powers over a vast, indefinite tract north of the Limpopo. In 1890 settlers were brought into the country and founded Fort Salisbury in Mashonaland, and at the same time the construction of a railway was begun which, running entirely through British territory, was to connect the new settlements with the Cape. Reading his title to Rhodesia, as the country was soon called, in liberal terms Rhodes (after 1893) extended the operations of the company north of the Zambesi as far as to the southern end of Lake Tanganyika, and though his dreams of an <(all red® map of Africa had been dissipated by the convention of 1889 with Germany, which allowed

that country to stretch a barrier across the continent to the Kongo State, he did not abandon his scheme of a transcontinental telegraph line from north to south and a railway <(from Cape to Cairo.® Upon his political projects Rhodes spent vast amounts of money, partly his own, partly the funds of the De Beers Consolidated Mines, a corporation formed by him in 1888 and control¬ ling the entire diamond output of the famous Kimberley mines. Of this company he was man¬ aging director.

In 1890 Rhodes became Premier of Cape Colony. During his six years of office he gave special attention to his old policy of amalga¬ mation between Dutch and British; he succeeded in winning the confidence of the former by his strong advocacy of full local government for

Cape Colony, which he considered quite con¬ sistent with, and indeed, essential for, the scheme of imperial federation. It is this belief in a federal union of locally autonomous com¬ monwealths that explains his gift of £10,000 to the funds of the Irish Home Rule party in 1888. In his treatment of the native races of Cape Colony, Rhodes maintained the impossibility of granting them equal rights with the white pop¬ ulation, but at the same time held it necessary to protect them by law against the temptations of civilization and exploitation by the whites. In Rhodesia a formidable outbreak of the Mata¬ bele in 1893 ended, after a bitter conflict, in their utter defeat and the absorption of their territory by the Chartered Company. Success¬ ful everywhere, however, Rhodes was destined to fall before his old opponent, Kruger, of the Transvaal. The Jameson raid in 1895 destroyed Rhodes' personal power, although subsequent events fully vindicated his policy. Though the full truth of the Jameson affair may not perhaps be known, it is established that Rhodes, who was a large holder of mines in the Rand, plotted with other leaders of the Uitlanders in Johan¬ nesburg for the subversion of the Transvaal government; that a revolution was prepared in Johannesburg, and that Rhodes stationed Cap¬ tain Jameson with several hundred men of the Rhodesian mounted police on the western bor¬ der of the Transvaal to co-operate when neces¬ sary with the leaders in the mining town ; and though it is also established that Jameson in¬ vaded the Transvaal without Rhodes' orders, the results of that unhappy affair were not altogether unjustly reckoned up against the Premier of Cape Colony who abused the powers of his office to plot the downfall of a nation, when conservative methods interfered with his dominating ideas for imperial advancement (see Jameson, Leander Starr). A committee of the House of Commons acquitted Rhodes of

responsibility for the raid, but censured his con¬ duct as Minister and director of the Chartered Company. Rhodes resigned the premiership on the last day of 1895 and thenceforth devoted himself to the interests of Rhodesia. A second war with the Matabele in 1896 was terminated by Rhodes' intrepid courage; the building of the transcontinental railway was rapidly pushed forward, and in connection with this undertak¬ ing Rhodes visited Europe in 1898-1900, carry¬ ing on negotiations with Mr. Chamberlain, the Colonial Secretary, and with the German em¬ peror. During the Boer War, in its outcome the triumph and realization of his policy, Rhodes was besieged in Kimberley and took part in its defense. His health, however, gave way, and in spite of a trip to Egypt, his old disease finally conquered. In his lifetime Rhodes was the subject of infinite execration, as well as un¬ limited applause. Looked upon by different men as a statesman or a land grabber, a builder of empires or an unscrupulous speculator, he was all of these and more; and the anomaly of his character may, perhaps, be best explained if he be regarded as a man of great aims who let nothing stand in the way of their achievement. He bequeathed the bulk of his great fortune for the endowment of a large number of scholarships at Oxford University, with the in¬ tention to bring about the complete union of the English speaking races for the peace, enlight-RHODES

enment and uplift of humankind (see Rhodes Scholarships, The). Consult Fuller, G. E., (Cecil John Rhodes5 (New York 1910) ; Hensman, H., (Cecil Rhodes: A Study of a Career5 (Edinburgh 1901); Jourdan, P., (Cecil Rhodes: His Private Life) (New York 1911) ; Le Sueur, H., (Life of Cecil Rhodes) (New York 1913) ; Michell, L., (The Life and Times of the Right Honourable Cecil John Rhodes5 (2 vols., New York 1910) ; Radziwill, Princess Catherine, (Cecil Rhodes: Man and Empire Maker5 (New York 1918) ; Stead, W. T., (Cecil Rhodes5 (in Review of Reviews, London, May 1902) ; <(Vindex,55 (Cecil Rhodes: His Political Life and Speeches5 (London 1900).

RHODES, James Ford, American histor¬ ian : b. Cleveland, Ohio, 1 May 1848. He studied at the University of the City of New York and also at Chicago University, his courses being principally confined to history, literature, rhetoric and metaphysics. In 1867 he went to Paris and attended lectures at the Col¬ lege de France following which he

pursued a course in metallurgy at the School of Mines in Berlin, and made a tour of inspection through the iron and steel works of Germany and Great Britain. He was Paris correspondent of the Chicago Times. In 1870 he entered his father's iron business in Cleveland and became a mem¬ ber of the firm in 1874. Having acquired sufficient wealth to enable him to adopt a liter¬ ary career, he retired from business in 1885, and began the preparation of his (History of the United States from the Compromise of 1850. 5 In 1891 he took up his residence at Cambridge, Mass., and the next year the first two volumes of his work were published. It was completed in 1906 with the publication of the seventh volume. It is the most authoritative work on the period with which it deals ; is im¬ partial ; fair to all ; but lacks literary grace. The Loubat prize was awarded him by the Berlin Academy of Sciences in 1901. Mr. Rhodes is also the author of (Historical Essays5 (1909) ; (Lectures on the American Civil War,5 delivered at Oxford University (1913) and 'History of the Civil War5 (1917). He was awarded the gold medal of the National Insti¬ tute of Arts and Letters in 1910 and is an ex¬ president of the American Historical Associa¬ tion.

RHODES, an island of Italy, in the TEgean Sea, near the southwest coast of Asia Minor, from which it is distant about 11 miles. It lies between lat. 35° 52' and 36° 28' N., and long. 27° 40' and 28° 15' E., is about 45 miles long and 25 miles broad, and has an area of about 424 square miles. The island is crossed from north to south by a high mountain range which attains its extreme elevation in the peak of Atairo, the ancient Atabyron, with an altitude of 4,070 feet. Hills of a lower level traverse the island in all directions and are covered with coniferous trees, the considerable remnants of once splendid forests. Along the many moun¬ tain streams tropic plants grow in abundance, chief among them myrtles, oleanders and cactus. The soil is fertile and on the hillsides and in the valleys and plains, vines and olives, figs, pomegranates and oranges are grown. Wheat of an excellent quality is also raised, but not in sufficient quantities to form a commodity of export. Rhodes has been famous since ancient

times for the mildness of its climate and its salubrious air. The winds show little variation. The value of the foreign commerce is about $1,000,000, the chief articles of export being sponges, oil and fruit, and the chief imports cotton goods and textiles. There is regular communication by English, French and Austrian steamship lines. The island formed a sanjak or district of the Turkish province of the Isles of the White Sea, and its capital, Rhodes (q.v.), was the seat of a

pasha. The population is placed at 30,000, of whom two-thirds are Greeks, about 7,000 Mohammedans and 2,500 Jews.

The original inhabitants of Rhodes are un¬ known, but at the dawn of history the island was inhabited by a mixture of races from Asia Minor, and Phoenicians, the latter of whom seem to have come from Crete. In the earliest period of Hellenic migrations Rhodes was over¬ run by the Dorians who founded the cities of Lindus, Ialysus and Kamyrus, the sites of which may still be identified. These cities with the three Dorian cities on the mainland, Cos, Cnidus and Halicarnassus, constituted the so-called Dorian Hexapolis whose common shrine was the temple of Apollo Triopis on the Carian coast. The sun-god was at all times the favorite deity of the island and from one of his most common emblems, the rose, its name (rhodos in Greek, ((rose55) is said to be derived. The Rhodians were among the most enterprising traders in the Mediterranean and their colonies were found in Spain, in southern Italy and Sicily, and on the southern coast of Asia Minor. In 408 b.c. the inhabitants of the three ancient towns abandoned their homes and joined to form the new city of Rhodes (q.v.) which from now on was the capital of the island. The foundation of Rhodes exercised a tremendous influence on the development of the trade of the island. In the Peloponnesian War, Rhodes sided with Athens until 412 b.c., when it went over to Sparta. In 394 b.c., however, it returned to the Athenian allegiance. Occupied by the Macedonians during Alexander the Great's life¬ time, it revolted after his death and defended its independence with splendid success against Demetrius Poliorcetes in 304 b.c. The island was now at the very height of its power; its commerce attained an unprecedented develop¬ ment and by means of its strong navy it made itself master of a strip of territory on the Asiatic mainland. The Athenian orator ,2Esch-ines (q.v.) established a noted school of oratory in the city of Rhodes, which also became a great centre for the arts, especially sculpture, and one of the leading university towns of the Roman world. Early in the 2d century b.c. Rhodes became an ally of Rome and enjoyed its favors. In 42 b.c. it was plundered by Cassius because it sided with Julius Caesar, and in 44 a.d. it was united to the province of Asia. In 661 the island was taken by the Arabs, but was recovered by the Byzantines who in 1310 gave it over to the Knights of Saint John. The latter held it against the Turks until 1522, when it was taken by Solyman II, and has since re¬ mained under Turkish domination. The island is subject to earthquakes, in modern times those of 1851 and 1856 being especially disastrous.

RHODES, or KASTRO, a town and the capital of the island of the same name, situated at its northeastern extremity. The modern

town is of much smaller extent than the an¬ cient city, but is still of imposing appearance. It is built in the form of an amphitheatre and is surrounded by walls and a ditch dating from the time of its occupation by the Knights of Saint John, the memorials of whom constitute the most interesting features of the town. Among these are the hospital, the palace of the grandmaster and the cathedral of Saint John, the latter two in a ruinous condition. The streets are tortuous, the most picturesque being the Knights' street, which has preserved its mediaeval appearance. The town has three ports, the one to the north, the central and the southeast port; of these the central port is the only one practicable, but is in part choked up with sand. Near the harbor in ancient times stood the famous Colossus (q.v.). The popu¬ lation is about 11,500, mostly Turks and Jews.

RHODES, Colossus of. See Colossus.

RHODES, Law of, a code of maritime laws adopted by the people of Rhodes (q.v.) about 900 b.c., after their naval victories and their practical sovereignty of the sea. A later collec¬ tion, known as ((Rhodian Sea-Law,® is generally believed not to have been the original maritime code of Rhodes and to have been put together some 1500 to 1700 years later, or from 600 to 800 a.d., by some private individual. The mari¬ time law of Rhodes is of very considerable im¬ portance because of the fact that the Romans borrowed much from it in the compilation of their own maritime laws and in their observ¬ ances of the rules governing the sea. It has, therefore, indirectly influenced modern mari¬ time law. See Maritime Law.

RHODES-GRASS, a newly-introduced species, is a native of central and southern Africa, where it is regarded as one of the best species for pastures on dry soils. It is a per¬ ennial, growing from three to four feet high, with a large number of very long, narrow and tender leaves and with rather few branching stems.

When grown from seeds its growth is com¬ monly erect the first season, but when grown from roots, or the second season when grown from seed, it makes runnerlike branches two to four feet long, which root at the joints and so cover the ground quite rapidly.

It is propagated by both seed and roots. When seed is used it should be sown at corn¬ planting time at the rate of about 10 pounds per

acre on a soil having a fine mellow sur¬ face and then given a light harrowing. As the seed is produced only in small quantities and as it continues to be developed and matured through the entire season, little of it can be gathered at any one time; consequently the grass is more commonly propagated by roots. The roots may be planted in well-prepared land at any time from February to July, putting them two to four feet apart and protecting them from grazing until they become well established. This grass has been introduced so recently that seed is still scarce on the market.

While the principal value of the grass is for grazing it is also used for hay, giving two or three cuttings of about one ton each per acre. The hay is of excellent quality. It bears severe drought and moderate frost without in¬ jury, but is easily killed by plowing late in the season. It is not recommended for cultivation

except in the southern part of the Gulf States. Rhodes-grass is especially promising for the semi-arid regions of the extreme Southwest, where the temperature does not fall below 20° F.

RHODES SCHOLARSHIPS, The. The

system of scholarships founded by the will of Cecil John Rhodes (q.v.), which provided, in perpetuity for the support at Oxford University, for a term of three years each, of about 176 selected scholars from the British colonies, the United States and Germany. The scholarships were apportioned as follows : Rhodesia, 9 ; Cape Colony, 12; Natal, 3; Australia, 18; New Zealand, 3; Canada, 6; Newfoundland, 3; Ber¬ muda, 3; United States, 2 for each State and Territory; total, 104; Germany, 15. The scholarships have an annual value of £300 ($1,500) and are intended to bring about com¬ plete unity of the English-speaking race. The German scholarships of £250 ($1,250) were added as ex-Kaiser Wilhelm II had ((made instruction in English, compulsory in German schools.® Owing to Germany's action in the European War, an act was passed in 1916 canceling the German scholarships and allotting them to Alberta, Saskatchewan, the Trans¬ vaal, the Orange Free State and to the towns of Kimberley and Port Elizabeth, alternately. Appointments to Rhodes scholarships were post¬ poned during the war and were resumed in

1919.

As already stated the Rhodes will provides for two scholarships constantly at Oxford from eadh State in the Union. Each scholar stays three years and receives a stipend of $1,500 a year, out of which he pays his tuition, fees and expenses, exactly as any other student. There are no restrictions as to the subjects which he should study; Rhodes scholars may take any of the various Oxford Honor Schools or, if pre¬ pared, may work for the Oxford research de¬ gree of B.Litt., B.Sc., B.C.L. or Ph.D. Candi¬ dates must be unmarried, between the ages of 19 and 25 and must have completed at least their second year in college. Candidates may try for the appointment either from the State in which they reside or from that in which they have received the major part of their education. The qualifying examination which was re¬ quired of all candidates for Rhodes scholar¬ ships in the past has been abandoned and it is only necessary for candidates to make formal application, endorsed by the authorities of their college or university. The selections are made on the basis iof a man's record in school and college, according to the four points outlined in the Rhodes will : (1) Scholarship, (2) character, (3) interest in outdoor sports and (4) interest in one's fellows and instincts for leaderships.

The selections are made by committees in eadh State constituted for that purpose.

RHODESIA, ro-de'zi-a, South Africa, a British possession colonized in the last quarter of the 19th century by the British South Afri¬ can Company, founded by Cecil John Rhodes (q.v.), after whom it is named. It is bounded on the north and northwest by the Kongo Free State, on the west by Portuguese territory and Bechuanaland, on the south by Bechuanaland and the Transvaal, on the east by Portuguese territory and the British Central Africa Pro¬ tectorate and on the northeast by German East

Africa. Total area, about 750,000 square miles. The river Zambesi, which traverses it from west to east, divides it into the two portions called Southern and Northern Rhodesia. South¬ ern Rhodesia (area, 174,728 square miles) con¬ sists of the two former districts of Mashonaland, capital, Salisbury, and Matabeleland, capi¬ tal, Buluwayo. Northern Rhodesia is divided into two parts under separate administrators, namely, Northeastern Rhodesia, headquarters, Fort Jameson, and Northwestern Rhodesia, headquarters, Lialui.

The river Limpopo forms the southern boundary and the Matoppo Hills and their northeastern continuations from the watershed between the basins of the Zambesi and the Limpopo. Of the tributaries flowing north to the Zambesi, the most important are the Shang-hani, Umfuli and Panyame; and of those flow¬ ing south to the Limpopo the Bubye, Tuli, Shashi and Macloutsie. The whole country is a plateau varying in elevation from 3,500 to 5,000 feet above sea-level, and in Southern Rhodesia there are numerous mountain ranges, of which the chief is that of the Matoppo Hills already mentioned, Rhodes' burial-place. Of the individual peaks Mount Hampden near Salis¬ bury, Hartley Hill, Mount Wedza near New Umtali and Mount Inyanga are the best known. There appear to be no lakes of any importance apart from the great lakes on the frontiers of Northern Rhodesia (Tanganyika, Moero, etc.). The prevailing rock-formations are granite and metamorphic rocks, and rounded, projecting knobs of granite, often of fantastic appearance, form a striking feature in the scenery of many districts. The climate in the higher parts of the country is generally suitable for Europeans, but in the lower swampy parts and some of the river valleys malaria is prevalent, and the tsetse fly commits great ravages among cat¬ tle' and horses. The area above 3,000 feet in Southern Rhodesia, most of which is adapted for the residence of Europeans, is stated at 100,000 square miles, and above 4,000 feet, where European children can be reared, there are 26,000 square miles. The summer season, from December to April, is characterized by great heat during the day and heavy rains, but dur¬ ing the rest of the year the weather is gen¬ erally dry and much colder, especially in June and July. At Salisbury tlhe mean July

temperature is 57.5° F., the mean January tem¬ perature 70.5° F., and the extremes for the year are about 34° and 93°. The annual rainfall is about 33.8 inches and falls on some 75 days. The soil in many parts is fertile, and the or¬ dinary cereals, vegetables and fruit-trees of Europe can be grown, in addition to the native crops of rice, tobacco, india-rubber and cotton. Extensive tracts of land furnish excellent pas¬ ture. Gold has been worked in Southern Rhodesia from ancient times, and there are striking remains at Zimbabye (near Victoria) and elsewhere, of the works erected by the early miners. At the present time little, if any, alluvial gold is found, but quartz-reefs are being worked with more or less success in various parts of the country, especially around Gwanda, Buluwayo, Gwelo, Sebakwe, Victoria, Umtali, Mazoe, Salisbury, Hartley Hill, Lo Magonda, Abercorn and Selukwe. The total output of gold for the year 1900-01 was 106,783

ounces, valued at $1,919,900. Coal, iron, copper, silver, tin, plumbago and kieselguhr have also been reported, and some of them are being worked. Southern Rhodesia is being rapidly opened up by means of railways, telegraphs and roads. Buluwayo is in direct railway communi¬ cation with Cape Town, 1,360 miles, and in 1899 the line from Salisbury to the Portuguese coast at Beira was opened for traffic. A line to connect Salisbury with Buluwayo is rapidly approaching completion and other subordinate lines have been projected or begun.

The whole of Rhodesia, together with the treeless plain of Barotseland on the northwest, acquired in 1899, is under the administration of the British South Africa Company, which was incorporated by royal charter in 1889. Southern Rhodesia, however, is more directly under the control of the imperial government. The ad¬ ministration is carried on in accordance with the company's charter as amended by order in council of 1894 and 1898. The senior adminis¬ trator, with headquarters at Salisbury, has an administrative council of six members and a legislative council of 10 members, the latter including two elected representatives of each of the two great divisions of the province. The enactments of these councils are subject to the approval of the high commissioner for South Africa, who acts through a resident commis¬ sioner. Jury trial was introduced in 1899. There are resident magistrates and judges, from whom an appeal lies to the Supreme Court of Cape Colony and thence to the Judicial Com¬ mittee of the Privy Council. Salisbury and Buluwayo have a regular municipal govern¬ ment, and doubtless this will be extended in time to the rising towns of Umtali, Gwelo, Tuli, Tati, Victoria, Wankie, Melsetter, Enkeldoorn, Charter, Gwanda, *etc.* The revenue in 1901-02

was $2,176,200 and the expenditure $3,552,800. The total native population of Southern Rhodesia is estimated at 510,000. The white population of Southern Rhodesia was about 11,300; of Northeastern Rhodesia, 164.

The chief tribe of original native inhabitants is that of the Mashonas, a peaceful and indus¬ trious race. In 1836 a Zulu people, known as Matabele, invaded the country under a chief called Mosilikatse, and easily conquered the in¬ digenous inhabitants. For more than 50 years this warlike race held undisputed sway in South¬ ern Rhodesia, and appear to have grievously oppressed the subject peoples, but in 1890 an expeditionary force equipped by the British South Africa Company occupied Mashonaland without opposition and founded the town of Salisbury. The Matabeles were for a time left undisturbed, but in 1893 their raids into Ma¬ shonaland gave the company an opportunity of extending its authority. Three columns, one of them assisted by subjects of Khama, chief of the Bamangwato, advanced from the northeast, the east and the southwest, respectively, upon Buluwayo, the capital of Lobengula, who had succeeded his father, Mosilikatse, as chief of the tribe. The Matabeles were easily overcome by means of the Maxim machine-guns, and fled to the hills. Toward the end of 1893. Loben¬ gula sent overtures for peace, together with a sum of money, but the fatal cupidity of some men of the Bechuanaland police prevented these from reaching the company's officials. Accord-476

ingly the Matabeles who remained around the person of their chief, enraged by the supposed rejection of their overtures, surrounded a small party of Englishmen under Major Wilson, who, unable to escape, fought desperately till all were killed. Lobengula died early in 1894 and all resistance was at an end. Matabeleland has since formed a part of the company's dominion, but a serious native revolt, partly due to the ravages of rinderpest and locusts, broke out in 1896. Mashonaland also revolted about the same time, but both rebellions were peaceably settled by Cecil Rhodes' personal influence over the natives. Consult Bent, J. T., (The Ruined Cities of Mashonaland) (London 1893) ; Darter, A., (The Pioneers of Mashonaland) ('London 1914) ; Fyfe, H. H., (South Africa To-Day, with an Account of Modern Rhodesia* (London 1911) ; Hall, R. N., and Neal, W. G., (The Ancient Ruins of Rhodesia* (London 1902); Heatley, J. T. P., development of Rhodesia and its Railway System in Relation to Oceanic Highways) (Washington 1907) ; Hensmann, H., <History of Rhodesia* . (London 1900) ; Hone, P. F., (Southern Rhodesia> (Lon¬ don 1909) ; Johnson, T. P., (The Mineral In¬ dustry of Rhodesia) (London 1911) ; Knight,

(Rhodesia of To-Day* (1901) ; Laing, D. T., <The Matabele Rebellion, 1896* (London 1897) ; Leonard, (How we made Rhodesia) (1896) ; Maclver, D. R., < Medieval Rhodesia* (London 1906) ; Rrolin, H., (Les loiset l'administration de la Rhodesie* (Brussels and Paris 1913) ; Selous, F. C., (Sunshine and Storm in Rhodesia) (London 1896) ; Thomson, H. C., (Rhodesia and its Government) (London 1898) ; Toit, S. J. du,

(Rhodesia, Past and Present (London 1897).

RHODIAN LAW, an early system of marine law, said to have been compiled by the Rhodians after they had obtained the sov¬ ereignty of the sea. The only rule that we know now, though the entire code was adopted by the Romans under Antonius Pius, is the prin¬ ciple of general average: <(If a cargo be jettisoned to lighten the ship, all contribute to make good the loss incurred for the benefit of all.® The mediaeval naval law of the Rhodians was not of Rhodian origin.. It consisted of four distinct parts, of very different dates, but mostly of practical value.

RHODIUM, a metal belonging to the plati¬ num group, discovered by

Wollaston in 1804. It occurs in small quantities in various platinum ores; is a grayish-white metal; is very hard and infusible, scarcely softening in the flame of the oxyhydrogen blowpipe; and is unaltered in the air at ordinary temperatures, but oxidizes at a red heat. Insoluble in acids, it is readily oxidized by fusion with nitre. The specific grav¬ ity of fused rhodium is 12.1 ; its atomic weight is 103. The compounds of this metal have not been much studied.

RHODOCHROSITE, or DIALOGITE,

native manganese carbonate. It is usually either cleavable-massive or in rhombohedral crystals of rose-pink or brownish-red color. Its lustre is vitreous to pearly; hardness, 3.5 to 4.5; rhombohedral, cleavage highly perfect. Its most important localities are in Hungary, Germany and Colorado, in which State many magnificent specimens have been found.

RHODODENDRON, a genus of shrubs and trees of the family Ericaceae. About 200 species have been recognized, natives mainly of the cooler parts of the northern hemisphere. They are most numerous in eastern Asia ; seven are indigenous to America. They are usually evergreen, have smooth simple leaves and termi¬ nal umbel-like racemes of generally very showy flowers for which the plants are widely popular as ornamentals. A few species yield wood which is used in turning and cabinet work, but more largely as fuel ; the flowers of others are used in jelly-making, and the leaves of a few have been used medicinally. They are sometimes made to include azalea (q.v.) by some botanists, but are usually considered distinct, the azaleas being generally deciduous. Some species are only a few inches tall, others exceed 50 feet in height, with trunks 18 inches in diameter.

Rhododendrons are readily, propagated by seeds, cuttings or layers usually under glass; but choice varieties are most frequently grafted upon seedling stocks. The. seeds are very small and are generally sown in seed-pans during early spring in peaty, sandy soil. The seedlings are pricked off as soon as possible; the green¬ house kinds under glass, the hardy ones in cold frames until the following year, when they may be grown in nursery rows. When planted in the garden they should always be protected from heavy wind and the full glare of the sun. The deep shade afforded by walls and hedges is, however, not generally desirable. They do not succeed well as a rule upon limestone, limy or clayey soils, but thrive best upon well-drained,

though moist loamy soils underlaid by porous subsoil. Since the roots lie close to the surface no cultivation can be given, but mulching may take its place. Pine needles and marsh or salt hay are specially desirable since they are free from weed seeds. Annual or biennial dressings of well-rotted stable manure should be given. The seed vessels should be cut off when the flowers have fallen, to divert the plant food into new flower buds and to prevent the scattering of seed. The greenhouse kinds require very porous peaty soil, free watering during the summer, careful watering in winter, cold but not frigid quarters for the Himalayan species, and not less than 50° for the Javanese kinds which bloom and grow continuously and require more water also. These last also being epiphytes require still more open soil. They are exceptionally attractive when properly grown.

Among the American species the great laurel (R . maximum) is the largest, attaining a height of 30 feet or more. It is indigenous from Nova Scotia to Michigan and southward in the moun¬ tains to Georgia. In early summer when its rose or lilac flowers appear in profusion it is an imposing subject and is justly popular as a park specimen. If taken when small from loose soil in the woods it usually transplants well, but nursery-grown plants should be given pref¬ erence. Though called maximum, several of the Asiatic species discovered since this was named are far larger. R. catawbiense, a species with lilac-purple flowers often one and one-half inches in diameter, is one of the most beautiful of ornamental shrubs. It rarely ex¬ ceeds 15 feet. In the mountains from Virginia to Georgia it is very common but in cultiva¬ tion is well known as hardy in New England.

It is one of the parents of a host of hybrid varieties of remarkable beauty.

R. ponticum, a native of western Asia and the Iberian Peninsula, resembles R. maximum but rarely exceeds 10 feet in height. It is con¬ sidered less hardy than the preceding species, but is widely cultivated, especially in Europe. Several remarkably striking species were dis¬ covered by Hooker and other botanists in southern Asia, those of the

Khasia Hills being especially noted. Only a few of these, however, have been introduced into cultivation and still fewer have been brought to America. Some have flowers four inches in diameter, others per¬ fumed blossoms and some are epiphytic in their habits. Consult Bailey, (Standard Cyclopedia of Horticulture.)

RHODOLITE, a beautiful light red variety of garnet, found only in North Carolina, highly prized as a gem, for which it has been extensively worked and sold within a few years past. The name is from the Greek rhodon, a rose, the color resembling some roses and rhododendrons, and, unlike most garnets, becoming extremely brilliant by artificial light. Analysis shows that rhodolite is composed of two molecules of pyrope garnet with one of almandite garnet. It occurs intimately associ¬ ated with the Cowee rubies (see Ruby) of Macon County, the crystals of the latter some¬ times even enclosing the rhodolite. It is one of the most important gem-stones of North Caro¬ lina.

RHODONITE, a rose-pink or brownish-red .triclinic mineral, essentially a manganese meta-silicate, MnSiCh. It usually contains some calcium and iron, while zinc is present in the variety fowlerite, which occurs at Franklin Furnace and Ogdensburg, N. Y., in groups of magnificent crystals several inches in length. Sweden yields attractive specimens and masses of much beauty associated with braunite are found at Cummington, Mass. Its most im¬ portant occurrence is near Ekaterinburg, in the Ural Mountains, from which locality the Russians have for many years mined consider¬ able quantities as an ornamental and semi¬ precious stone, for which purposes it is highly esteemed, being cut into pillars, mantels, table tops, jewel caskets, *etc.* Its hardness varies from 5.5 to 6.5. Crystallized specimens show an eminent cleavage; the massive forms are exceedingly tough, like jade.

RHODOPE, rod‘6-pe, ancient name of a mountain chain (7,474 feet) extending along the borders of Macedonia and Thrace. The Turks call it Dospad Yailasi, the Bulgarians Despoto Dagh, both titles having reference to the numerous (Greek) monasteries that stud its sides. Of these the most famous is the vast fortress-monastery of Rilo, in the northwest of the range, standing on its south side in the midst of magnificent pine forests. Rilo has for generations been the focus of the national Bul¬ garian Church and the mainstay of Bulgarian nationality.

RHONDDA, rond’da, David Alfred Thomas, Viscount, British coal magnate and food controller: b. Aberdare, Wales, 26 March 1856; d. Llanwern Park, Wales, 3 July 1918. He was educated at Caius College,

Cambridge, and was a scholar of Jesus and Caius colleges.

He entered the colliery firm in which his father held a large interest, and at the time of his death was senior member of the firm of Thomas and Davey. In 1916 he effected a great combination of the coal-mining interests known as the Cambrian mines, in which he was a controlling director. His reputation was that of a hard, resourceful fighter, whose sym¬ pathies were with the people. He served as president of the Cardiff Chamber of Commerce in 1895 and from 1893 to 1897 was president of the South Wales Liberal Federation. From 1888 to 1910 he represented Merthyr Burghs in the House of Commons, and in 1910 repre¬ sented Cardiff. In 1916-17 he was president of the local government board. His most con¬ spicuous service to his country was as food controller, to which position he was appointed in 1917. The appointment became effective in June of that year. At once, under the power given him by the Defense of the Realm Act, he took over the wheat, potato, barley, oats and rye crops. He announced that the solution of Great Britain's food supply was in America, and he set out to obtain the cooperation of the United States. In the winter of 1917, when the expected American supplies of wheat and meat did not arrive, it was Lord Rhondda's careful handling of the food distribution that saved England from extreme hardship. He put an effectual stop to profiteering and specula¬ tion in food. In January 1918 the rationing system was put into effect. Customers were required in every community to register, to buy only at one store and to buy at no store where they could not be accommodated quickly. Drastic restrictions were put on the use of wheat and grains. Lord Rhondda's greatest source of satisfaction in his work was the fact that the German government had directed its newspapers to be silent about the food sup¬ ply in England. His resignation from the post of food controller was first made in February 1918 when his health failed. He continued in absentia at the Premier's request and was offi¬ cially in office when he died. In 1916 he was created first baron of Llanwern and on 3 June 1918 was made viscount in recognition of his delivery of England from a food crisis.

RHONDDA, a river and town of South Wales, in Glamorganshire. Its valley is the seat of a large population engaged in coal-min¬ ing and metallurgical industries. The inhab¬ itants are employed mainly in collieries, iron¬ works, *etc.*

RHONE, ron, a river of Europe which rises in Switzerland, near the east frontiers of the canton of Valais. Its precise origin is com¬ monly

said to be in the Rhone glacier, between Mount Furca on the east, the Gallenstock on the north and the Grimsel on the west, 5,581 feet above the level of the sea; but the natives give the name of Rhodan or Rotten to three springs situated in a single basin at the foot of the Mayenwand, at an elevation of 5,282 feet, the water of which flows with an equal temperature in Summer and winter (61° to 63° F.), and these they consider to form the true source of the Rhone. The waters from these springs join the stream from the glacier at a very short dis¬ tance from their origin. The young river dashes down with great rapidity into the valley beneath, leaping from cascade to cascade; tra-

verses the centre of Valais in a westerly direc¬ tion, and near Villeneuve enters the Lake of Geneva at its eastern extremity. On entering the lake its waters are surcharged with mud; but on issuing from it, at its southwest ex¬ tremity, at the town of Geneva, it is of a pure deep blue color, soon after changed into a muddy brown by the accession of the glacier-born Arve, which joins it one and one-half miles below Geneva. Proceeding southwest to the frontiers of the department of Ain in France, it turns almost due south, forming the boundary between that department and Savoy; then turning suddenly northwest, traces the boundary between the same department and that of Isere and reaches Lyons. Here, having at least doubled its volume by the accession of the Saone, it proceeds almost due south, sepa¬ rating the departments of Rhone, Loire, Ardeche and Gard on the west, from the department of Isere, Drome and Vaucluse on the east. On approaching Avignan it takes a more circuitous but still southerly course, separates the depart¬ ment of Gard from that of Bouches-du-Rhone, traverses part of latter department and finally falls into the Gulf of Lyons in the Mediter¬ ranean. At Arles it divides into two branches, the lesser of which, under the name of

old Rhone, flows southwest, forming the west side of the large delta, known by

the name of the lie de Camargue. The main branch, under the name of Grand

Rhone, continues its southerly course, but again divides into two branches and enters the sea by two mouths. Its whole course is about 580 miles, of which 200 miles are in Switzerland and 380 miles in France. It is navigable for 360 miles. By means of a series of magnificent canals, the navigation of the

Rhone has been continued, without interruption, to the Rhine (through the Saone), Seine, Loire and Garonne.

RHOPALACERiE, butterflies (q.v.) ; see also Lepidoptera.

RHUBARB, WINE PLANT, or PIE PLANT, several species of perennial herbs of the genus Rheum, family Polygonacece. They are natives of Asia and eastern Europe and have generally very large radical leaves with thick fleshy petioles and small greenish or whitish flowers in racemes or paniculate fas¬ cicles which are borne on stout stalks well above the foliage. Several of the species are valued for bold effects in ornamental garden ing, and some have been used in medicine, but the most important species is the common rhu¬ barb (R . rhaponticum) which has long been cultivated in gardens for its tender, acid, escu¬ lent leaf-stalks, which are largely used for mak¬ ing pies, sauce and preserves in spring, and to a less extent for home-made wine from the juice. The plants are usually propagated by means of divided roots, though seed is also used. They thrive best in rich, light, friable loamy soils, well drained but moist, and given liberal applications of manure of all kinds. The plants should be set not less than three ..feet apart each way, given clean cultivation until the foliage shades the ground and mulched with stable manure during the winter. When two years old the stalks may be used freely. They are most easily gathered by bending them down while being pulled. The earliest stalks are ob¬

tained by inverting a barrel over the plants and heaping manure around it ; but for forcing the roots are dug in autumn, allowed to freeze, covered with earth or sand in cellars, under greenhouse benches, etc., and watered. After producing a crop the roots are thrown away. Large quantities are cultivated in the Southern truck gardens, but the forced stalks are con¬ sidered superior and generally command higher prices.

Turkey rhubarb, formerly popularly used in medicine is supposed to be derived from R. palmatum, but the exact species seems to be still undetermined. Chinese Tartary and parts of China were the principal shipping countries, but Asia Minor was also a producer.

RHUMB-LINE, a line described on the earth's surface by a ship sailing steadily in the direction of any one point of the compass, ex¬ cept one of the four cardinal points. A rhumb¬ line laid down on a map drawn on the prin¬ ciple of Mercator's projection is a straight line cutting the meridians at a constant angle ; but if a rhumb-line be drawn on a globe, so that it will cut the meridians all at the same angle, it will be found to be a spiral curve such that however far it may be produced it will always approach the pole, but never reach it.

RHUS, a genus of the cashew-nut family (Anacardiaceee) . It is found all around the world, and the species are generally shrubs, with simple or compound leaves, and small five-merous flowers in panicles. The fruit is a dry, one-seeded drupe, often in conspicuous masses. Some, like the American staghorn sumac (Rhus typhina), with its tropical appear¬ ance and the smoke-tree (R. cotinus) are planted for ornament; and the R. coriaria is cultivated along the Mediterranean for its leaves, a valuable material for tanning leather, when a fine white color is desired, as in light morocco. The foliage of some other species is also gathered for the same purpose. The Amer¬ ican aborigines used Rhus berries for red and the juice for black dyes and the bark of R. glabra is employed as a mordant for red colors. Oriental lacquer is made from juice exuding from incisions in the bark of R. vernicifera. Many species, including the R. toxicodendroni, which, like R. vernix, is poisonous to the touch (see Plants, Poisonous), are used in medicine, and the acid fruits of certain species are made into cooling drinks or sharpened vinegar. Chinese galls are produced by R. semialata, and candlewax is expressed from the berries of the wax-tree (R . succedanea) and from R. verni¬ cifera, often planted in Japan, for that purpose. One or two species furnish a useful wood.

RHYACOLITE, a variety of orthoclase,

occurring in glassy crystals in the lavas of Vesuvius, Italy.

RHYME, accentual verse, characterized by agreement of terminal sounds. Rhyme was used, in a sense which has now become obso¬ lete, to mark similarity of syllabification in other portions of the line than at the end. Thus the old writers speak of rhyming words when they mean words beginning with the same con¬ sonant, that is, in alliteration; also, in Spanish and Portuguese what we now call assonance — a coincidence of vowels in corresponding sylla¬ bles, without regard to the consonants — was

also called rhyme. Rhymes of to-day demand agreement in final syllables of the sound of the vowels and the succeeding or interposed con¬ sonants, if there are any, with a dissimilarity of preceding consonants, if there are any. Rhymes of such a character are of three kinds in Eng¬ lish : single, or of one syllable, as flap and slap; double, or of two syllables, as greeting and fleet¬ ing; triple, or of three syllables, as merrily and cheerily. The single rhymes are often called masculine and the double feminine rhymes. The triple rhyme is used, in English, principally in verse of a conversational or comic or facetious nature. Rhymes of more than three syllables are practically unknown in all except the Per¬ sian language and its branches. In the perfect rhymes of to-day the preceding consonants, it has been stated, must not be the same; thus, partake and lake make perfect rhymes, but not partake and take, which makes an inelegance to the ear. The final syllables, moreover, of the perfect rhymes must both be accented; thus but¬ terfly will not rhyme with terribly, although the final syllables are suited in other respects for rhyming. There are, however, rhymes which occupy middle ground — permitted by the exi¬ gencies of the occasion in which they are used (known as poetic license) — which are not to be tolerated in ordinary occasions or if frequently used. Such rhymes are those that nearly coin¬ cide in sound and which do not offend the ear by failing entirely to do so. Thus gone may be rhymed with alone under poetic license. There is no rule by which a permissible imperfect rhyme may be determined and the only criterion is to be found in good usage as established by the better class of authors. Some languages in¬ cline more to the masculine rhyme, as the Eng¬ lish, on account of its superabundance of mono¬ syllables ; others, as the Spanish and Italian, more to the feminine; the German and French possess an almost equal store of both. The feminine rhymes in French all contain an e mute in the last syllable; and from the begin¬ ning of the 16th century it has been the almost uniform practice among French poets in dra¬ matic, heroic, elegiac, satirical and other forms of poetry to make couplets of masculine rhymes alternately with others of feminine rhymes. In the ode combinations of rhymes are used, but always regular. When two successive lines rhyme they form a rhymed couplet, the measure used by Pope in his famous (

Essay on Man.* Three successive rhyming lines form a triplet ; four a quatrain, but there may be two pairs of rhymes in a quatrain. Rhymes are used throughout poetry in accordance with the author's own taste and inclinations. In some poetry every line is rhymed with some other. And this may be an adjacent line or one sepa¬ rated from its partner by one or more lines which do not end with the same rhyme, but with some other. The position of the rhyming pairs in the stanzas must be the same in each verse of the composition, and, moreover, within the stanzas the rhymes must occur regularly, ac¬ cording to some fixed scheme. In long poems, indeed, it is not infrequently the case that dif¬ ferent portions of the poem employ stanzas in which the rhyme schemes differ. This is per¬ missible because, on account of the length of the composition, the effect is the same as if it were composed of several shorter poems. _

It is not necessary that every line in the

poem should rhyme, and some of the pleas¬ antest effects have been produced by the use of a mixture of rhyming and not-rhyming lines. When rhyme is totally absent poetry is spoken of as blank verse. The rhyme does not always occur only at the end of lines. It sometimes occurs at two places within the line, at the mid¬ dle and at the end. But this is only a supple¬ mentary or secondary rhyme; it is not to be used except in conjunction with lines which have proper or terminal rhymes.

The rhyme scheme employed, in conjunction with the kind of measure used, determines the structural character of poetry (q.v.). The most complex forms now used in English are found in the sonnet (see Poetry) and in the Spenserian stanza, so-called because adopted by Spenser and used in his (Faerie QueeneP There are a number of artificial forms of verse known as the French forms, because invented and brought to perfection by the poets of that nation, in which the positions of the rhymed lines vary greatly not only in the stanzas, but in the poem as a whole. The most commonly employed of these forms are the triolet, rondel, rondeau, vilanelle and ballade.

The modern use of rhyme was not known to the ancient Greeks and Romans. We meet, indeed, with some rhymed verses in Ovid, in which the rhyme was evidently intentional ; but these examples are rare. It has been used, on the other hand, from time immemorial among the Chinese, Hindus, Arabs and other Oriental nations. Rhyme began to be developed among Western nations in the Latin poetry of the Christian

Church. It is found used as early as the 4th century, and in subsequent centuries grew to common use in the writings of Church officers and ecclesiastical students. The use of rhyme in the vulgar dialects of Latin was even more general than in ecclesiastical poems, as is shown by the poetic monuments of the Ro¬ mance nations belonging to the 9th and 10th centuries. In the Latin poems of the Fathers of the Church of the 4th century rhymes are more frequently used. The most ancient relics of Teutonic and Scandinavian poetry are not in rhyme, but are distinguished by alliteration. The earliest use of rhyme in a Teutonic dialect is in Otfried's ˆvangely,* written in Frankish, in the latter part of the 9th century. The oldest forms of rhymed verse are the couplet and the continuation of one and the same rhyme through a whole piece. The oldest poems of the Chinese, Indians, Arabians and of other ancient peoples are rhymed ; so are those of the Irish and the Welsh. In the fragments of the earliest Latin poetry yet found, where the metre is accentual, not quantitative, there is a marked tendency toward rhymed endings. This tend¬ ency was lost for a time under the influence of Greek poetry in which the measures are quantitative. Still the partiality for rhymes was not lost, as is proven by the verses of Ovid, and upon the decline of classicism, they became common. An attempt at sustained rhymed verses can be found as far back as the 4th cen¬ tury, as evidenced in the verses of Hilary. By the end of the Middle Ages rhymed Latin verse had reached its perfection. For a general dis¬ cussion of rhyme schemes and verse-forms con¬ sult Raymond, G. L., (Rhythm and Harmony in Poetry and Music) (1895) ; Guest, (History of English Rhythms* (1838) ; Parson, 'English

Versification ; Trench, R. C., (Sacred Latin Poetry. >

RHYMER, Thomas, the familiar name of an early Scottish poet, whose real name is sup¬ posed to have been Thomas Learmount. He flourished in the latter part of the 13th cen¬ tury at Ercildoune (modern Earlston), Ber¬ wick. To this day the name of Thomas the Rhymer is popularly known in Scotland as that of a prophet, who derived his powers from resi¬ dence in Fairyland ; and it is only

through the discovery of the manuscript of a metrical ro¬ mance called (Sir TristranP (supposed by Scott to be his work, though this is still a matter of dispute) that he has acquired a better claim to remembrance. A good edition of the (Tristram) is that of M'Neill (Scottish Text So¬ ciety, 1886). Consult also Murray's edition of the (Romance and Prophecies of Thomas of Ercildoune) (Early English Text Society, 1875) ; Scott's (Minstrelsy of the Scottish Border) (1806); and Child's (Popular Ballads* (Part II, 1884).

RHYNCHOCEPHALA, rin-ko-sefyia,

an order of very ancient prosaurian reptiles, fossil chiefly in the Old World Triassic, having much superficial resemblance to lizards. They are characterized by a fixed quadrate bone, an inferior temporal arcade, a closed palate and separate premaxillse. They were unarmored, terrestrial, lizard-like creatures, varying in length from a few inches to six or eight feet. Important genera are Rhynchosaurus, Hypero-dapedon, Homceosaurus, found in Europe and India. The most remarkable genus, however, is Sphenodon (or Hatteria) , one species of which is still living in New Zealand. See Tuatera.

RHYOLITE, a silicious porphyritic rock resembling granite in chemical composition. The name was first given by Richthofen to igneous rocks in Hungary distinguished from trachyte mainly by a more varied texture and the presence of quartz. The western Cordil¬ leras of America, as well as like regions else¬ where, contain rhyolite in vast areas. Rocks of the same or similar structural character are now known also under the names of liparite and nevadite. The rocks which petrographers formerly classed among felsites are now mainly described under the name of rhyolite, which in¬ cludes a much greater number of varieties.

RHYTHM, rlt'hm, (a) in metrics, the measure of time or movement by means of a numerical proportion or harmony. (b) In prose literature, it follows no regular law, but consists in an arrangement of words in an ex¬ pressive succession. This arrangement may at times approach the regularity observed in rhythm in verse ; and the term prose-poetry has been applied to the prose in which such regu¬ larity is strongly marked. In poetry, rhythm is reduced to law and consists in a regular suc¬ cession of arses and theses (long and short; accented and unaccented syllables). This re¬ sults in a precise cadence or variety of cadences; modified, of course, by the pauses necessary to rhetoric. (See Phrase; Rhyme), (c) In music, the swing and sweep of a composition, emphasized by the accents ringing out in their proper places and attaining a series of climaxes in the special stress given to

each metrical di¬

vision of the work, accent being the life of rhythm. (See Music; Musical Elements and Terms), (d) In psychology, the move¬ ment or intervals expressive of emotion and feeling set up by changes of relative duration and of quality between recurrent brain-stimuli, (e) In physiology, the proportion as to time between the action of an organ, of an inter¬ mittent or remittent disease, etc., at successive periods, as in respiratory rhythm establishing first the number of inspirations per minute in normal breathing, then showing the greater or less frequency in certain states of health.

RHYS, res, Ernest, Welsh author and critic: b. London, 17 July 1859. He was edu¬ cated at Bishops Stortford and Newcastle-on- Tyne and in 1877 became a mining engineer. In 1885, however, he turned his entire atten¬ tion to literature and in 1887 made a lecturing tour in the United States. He was editor of the Camelot series of reprints and translations (65 vols., 1886-91), of (The Lyric Poets* (12 vols., 1894-99) and other publications and has written (The Great Cockney Tragedy* (1891) ;

(Welsh Ballads and other Poems) (1898) ; ˆFrederick Lord Leighton) (1898) ; (The Whistling Maid* (1900) ; (Celtic Lore) (1901) ;

(Ogam-inscribed Stones Preserved in Dublin *(1902) ; introductions to several volumes of (Everyman's Library,* of which he is general editor. Other works are (The Fiddler of Carne* (1896) ; (The South Wales Coast* (1911); (Lyric Poetry) (1913); (Romance* (1913) ; (Rabindranath Tagore* (1915).

RHYS, Sir John, Welsh Celtic scholar: b. Ponterwyd, Cardiganshire, 21 June 1840; d. 1915. He was educated at Bangor Normal Col¬ lege for the teaching profession; kept a school in Anglesey till 1865 and in 1869 was gradu¬ ated from Oxford. Continuing his studies at the Sorbonne and College de France in Paris, Heidelberg, Leipzig and Gottingen, in 1871 he was appointed inspector of schools for Flint and Denbigh, and in 1877 professor of Celtic in Oxford University, becoming in the same year an honorary Fellow of Jesus College, of which he served as principal after 1895. He was already known as a Celtic scholar before the publication, in 1877, of his (Lectures on Welsh Philology) gave him a high reputation in this department of scholarship. Later works are (Celtic Britain) (1882) ; (Origin and Growth of Religion as Illustrated by Celtic Heathendom* (1887) ; (

Studies in the Arthur¬ ian Legend* (1891) ; (The Early Ethnology of the British Isles) (1891) ; ‘Inscriptions and Languages of the Northern Piets* (1892) ; (Celts and Pre-Celts; The Welsh People* (1900) in collaboration with J. B. Jones; and (Celtic Folklore) (1901). He also edited vari¬ ous Welsh texts in conjunction with J. G. Evans.

RHYTINA. See Sea-cow.

RIALL, ri’al, Sir Phineas, British military officer: b. County Tipperary, Ireland, 15 Dec. 1775; d. Paris, France, 10 Nov. 1850. He en¬ tered the British army as ensign in 1794 and became major in the same year. In 1804 he was attached to the 15th Foot and in 1808-10 commanded a brigade in the West Indies. He was promoted major-general in 1813 and ordered to Canada to participate in the war

against the United States. He served on the Niagara frontier and was chief in command in the campaign against Gen. Jacob Broun in the following summer. He was defeated at Chippewa and at Lundy’s Lane, being severely wounded and taken prisoner in the latter en¬ gagement. He was appointed governor of Grenada in 1816, was knighted in 1833 and in 1841 received full rank as general. Consult Morgan, (Sketches of Celebrated Canadians and Persons Connected with Canadian History*

(1862).

RIALTO, re-al’to, (1) the principal bridge of Venice (q.v.), the only one spanning the Grand Canal. It consists of a single arch 90 feet in span and 24 feet high, and was built of marble at a cost of over $500,000, in 1590. Two ranges of shops divide the bridge road into three narrow parallel streets. Shakespeare mentions the bridge and contiguous promenades as a rendezvous in (The Merchant of Venice,* and the term has become synonymous with the meeting places of the theatrical profession in most populous centres. (2) The Rialto in New

York was first applied to the section on 14th street, between Broadway and Fourth avenue; but has now extended to the portion of Broad¬ way, between 40th and 50th streets.

RIAZAN, or RYAZAN, Russia, (1) city, capital of the government of Riazan, on the Trubesh, a branch of the Oka. It is in an agri¬ cultural region, in which the chief product ex¬ ported is rye. The chief manufactures of the city are woolen and linen goods, leather and needles. Nearby is the village of Grishina, in which are large cutlery works. Pop. about 48,000. (2) The government of Riazan has an

area of 16,254 square miles. It is drained by the Oka and its tributaries. The chief manu¬ factures are cotton, linen and woolen goods and leather. Rye is the principal grain exported. Pop. about 1,900,000.

RIB. The ribs are a series of flattened, narrow bones which together with the sternum in front and the vertebral column behind form the bony cage which encloses the thoracic organs and supports the muscular structures surrounding the chest cavity. In man there are 12 pairs of ribs, of which the first seven articu¬ late directly with the sternum by means of their costal cartilages and are called the true ribs. The cartilages of the eighth, ninth and 10th ribs join the cartilage of the seventh rib and are, therefore, termed false ribs, while the 11th and 12th ribs are free at their anterior extremities and are spoken of as the floating ribs. The seventh rib is the longest of the series, the others decreasing progressively in size to the first and to the 12th. The seventh is considered the most representative rib, and is described as having an anterior or sternal extremity, a shaft and a posterior or vertebral extremity. The sternal end is hollowed slightly to receive the cartilaginous prolongation by which it is connected with the sternum. The shaft is flat¬ tened and has an external and an internal sur¬ face. Its lower edge is slightly grooved to shelter the intercostal vessels and nerve which run parallel to and close to it. The head presents two facets which articulate with the bodies of two adjoining dorsal vertebrae, and the neck is the short portion between the head and the beginning of the shaft. At the junc-

tion of the neck with the shaft there is a small swelling called the tubercle which has an articular facet for contact with the transverse process of the lower of the two vertebrae with which the head articulates, and a roughened area for the attachment of a ligament. The rib presents two curvatures, one around a ver¬ tical axis and the

other about a horizontal axis, the effect of which is that the bone cannot be laid on a plane surface in such a way that both ends and the shaft between shall be in contact with it. The point at which the curvature is most acute is called the angle of the rib. Most of the ribs are so placed in the body that their sternal extremities are much lower than their points of attachment to the vertebral column, and through this arrangement as well as their peculiar curvature, when they are raised in in¬ spiration the capacity of the thorax is increased both in its anteroposterior and lateral diameters. In some diseases, notably rickets (q.v.) and emphysema (q.v.), which are characterized by changes in the shape of the chest, the ribs undergo alteration in curvature. In children having rickets the anterior portion of the ribs sinks in so that the sternum becomes more prominent and the ends of the ribs may be enlarged and beaded, forming what is called the <(rachitic rosary.® If, in addition to rachitis there is present some respiratory obstruction from such causes as adenoids, nasal catarrh, etc., the ((pigeon® or ((keeP* breast may result. In this the lateral compression is carried to a more extreme degree and the cross-Section of the chest approaches the triangular shape with the apex forward. A funnel-shaped depression over the lower point of the sternum is some¬ times caused by rickets, but may be congenital or due to the habitual pressure of a work bench or tools, as in cobblers, for example. In the emphysematous chest the ribs are thick and run more nearly horizontal so that an increase in the anteroposterior direction and outward bulg¬ ing of the middle portion are caused, giving rise to the so-called barrel-shaped chest. The flat chest is the opposite of this, as its name implies, and has a short anteroposterior diam¬ eter. It is often associated with a tendency to pulmonary tuberculosis. Very rarely the ribs are more or less numerous than normal, but a not unusual deformitv is the non-attachment of the anterior end of the 10th rib, so that it, too, is a floating rib. This abnormality is by some authorities considered as an indication of a tendency to neurasthenia. Fractures of the ribs are not infrequent injuries. Owing to the more sheltered position of the upper and the greater mobility of the lower members of the series it is most often the fourth to the eighth ribs that are fractured. Unless there is some complica¬ tion, such as internal injury, the outlook is usu¬ ally good. The treatment consists chiefly in immobilizing the side of the chest affected by adhesive plaster strapping. In treating collec¬ tions of purulent fluid in the pleural cavity, it if often necessary for the surgeon to resect portions of one or more ribs in order to secure free drainage. See Anatomy; Osteology; Thorax.

RIBALTA, (1) Francisco de, Spanish painter: b. in Castellon de la

Plana. Valencia, about 1550; d. Madrid, 12 Jan. 1628. Of the Spanish school of painting, he studied first in

Valencia and afterward in Italy, where he came tinder the influence of Raphael, Piombo and the Carracci. Returning to Spain he was received with honor and engaged to paint pictures for many churches and convents in Valencia. His work is remarkable for grandeur of concep¬ tion, good taste in composition, freedom of drawing and correct anatomical design, but like other Spanish painters he was an extremist, depicting alternatelv agony and ecstacy. Among his best pupils were his son Juan (q.v.), Ribera known as Lo Spagnoletto, and Gregorio Castenada. Of his paintings perhaps the best are (Dead Christ and Angels,* (Saint Francis,)

(Blessed SouP and (Lost Soul,* in the Madrid Museum; (Saint Francis Embracing Christ,) (Saint Peter, > Conception* and (Saint John Baptist, *in the Valencia Museum; (Virgin and Saint John Returning from the Sepulchre,* at Munich; and (Saint Joachim and Saint Anne,*

(Christ on the Cross) and (Magdalen at Sepulchre, *at Saint Petersburg. He also painted portraits of many prominent Valencians. (2) Juan de, his son, flourished about 1 597— 1628. He painted so nearly in his father's style that their works are often confounded. When 18 he painted the admirable Crucifixion* in the Valencia Museum. Among his works are (Saints John and Matthew, *(Saints Mark and Luke) and (A Singer) in the Madrid Museum; Cope Gregory the Great Celebrating Mass,* in the Dresden Museum; (Jephtha's Sacrifice) and the (Martyrdom of Saint Catherine.*

RIBAULT, re-bo, or RIBAUT, Jean, French soldier and colonist in the New World: b. Dieppe, about 1520; d. Florida, 1565. A Huguenot, he was sent by Admiral Coligny to establish a colony of French Protestants in North America. He went out in 1656 with an advance party, with which he built a fortress at Port Royal in the present South Carolina. A garrison of 30, left by him in charge, finally mutinied and, having slain their leader, set out in a crazy vessel for France. Half

famished, they were carried by an English cruiser to Lon¬ don. Ribault was made governor of a pro¬ posed colony in Florida in 1564 and sent out Rene de Laudonniere, who built Fort Caroline near the mouth of the Saint John's. In May 1565 Ribault himself with seven vessels and a force of 300 set sail for the colony, where he arrived 28 August. A Spanish expedition under Pedro Menendez de Aviles had, shortly after Ribault's arrival, begun work on intrenchments on the site of Saint Augustine, and Ribault de¬ termined on an attack before the fortifications had been completed. His ships, however, were wrecked in a hurricane, and Menendez, march¬ ing overland, captured Fort Caroline and butchered almost all whom he found there. Ribault, with most of his force, was saved, endeavored to return but was intercepted by Menendez, and with a portion of his followers were murdered. This ended the Huguenot colony in Florida. Consult Gaffard, (La Floride frangaise* (1875) ; Parkman, (Pioneers of France in the New World) (1885).

RIBBECK, Johann Karl Otto, German philologist: b. at Erfurt, 23 July 1827; d. 1898. In early life he went to Berlin, where he studied under Lachmann, Bopp and Bockh, and from there to Bonn where he was a close student of the methods of Welcker and Ritschl. Having

received his degree in Berlin and traveled for a year through Italy, in 1853, he returned to Berlin, where he entered Bockh's school. He then became a teacher, being called successively to Elberfeld, Bern, Kiel, Heidelberg, and finally, in 1877, to Leipzig, there becoming the successor of his former master, Ritschl. Ribbeck's works are mostly confined to criticisms of Latin poetry and to classical character sketches and display a profound knowledge of the classics combined with a brilliant style of essay. Among them are (Vergelii Opera,* with prolegomena and critical notes (5 vols., 1859-69) ; (Tragicorum Latinorum reliquiae* (1862); Cornicorum Latinorum reliquiae> (1855) ; (Der echte und unechte Juvenal* (1865) ; (Horace's Epistles* (1869) ; (Zur Lehre von den Latein Partiketn* (I860) ; (Die romische Tragodie im Zeitalter der Republick* (1875) ; Plautus's (Miles Gloriosus) (1881); the biography of Friedrich Ritschl (2 vols., 1879-81) ; Ceschichte der romischen Dichtung) (3 vols., 1889-92; 2d ed., 1897-1900) ; and the classical character sketches (which appeared in the Rheinische Museum, of which he became editor in 1876) <Alazon) (1882), (Kolax* (1885) and (Agrockos*

(1885).

RIBBED VAULTING. See Gothic

Architecture; Vault.

RIBBON, a narrow web, generally of silk, used for tying and ornamental purposes. Rib¬ bon-weaving is a special branch of the textile industries. In modern looms as many as 40 ribbons are simultaneously woven in one ma¬ chine. Mixed fabrics of silk and cotton are now largely employed. See Silk and Silk In¬ dustry.

RIBBON-FISH. See Deepsea Life.

RIBBON-SNAKE, a garter snake (q.v.) of slender form and conspicuous stripes.

RIBBONISM, in Irish history, the name given a group of secret associations among the lower classes in Ireland throughout the half century extending from 1820-70, at its greatest height from about 1835 to 1855. Its origin and organization are alike wrapped in obscurity, but it appears in the beginning at least to have been political in its aims, and it seems probable that it grew out of the northern Defenders who banded themselves to oppose the Orange organization. Earlier associations with some¬ what similar aims were the Whiteboys and the Threshers, and in particular corners of the island, the Carders, Shanavests and Caravats. Though everywhere condemned by the Roman Catholic clergy, Ribbonism included none but Roman Catholics within its numbers, and it maintained its influence by a system of oaths and secret signs and passwords. One striking feature of Ribbonism, as distinguished from most Irish patriotic associations, was the fact that its adherents belonged exclusively to the very lowest and most ignorant classes, the hum¬ bler peasantry, farm servants, laborers and petty shopkeepers, hardly even the smallest farmers or their sons apparently belonging to it in any part of Ireland. So far as there was any unity in its aims, it aimed at making itself a public conscience on all agrarian questions ; but, the Ribbonism of one period and of one district was not the Ribbonism of another. In Ulster it professed to be a defensive or retaliatory

league against Orangeism. In Munster it was at first a combination against tithe-proctors. In Connaught it was an organization against rack-renting and evictions. In Leinster it often was mere trade unionism. The name originated in a badge worn by the members.

RIBEIRO, re-ba'roo, Bernardim, Portu¬ guese poet: b. Torrao, Alemtejo, about 1486; d. about 1550. He appears to have been a gen¬ tleman of the chamber at the Portuguese court and to have-been involved in an unhappy love affair with Donna Joana de Vilhena, a relative of the king. He was one of the first to intro¬ duce in Portuguese literature the Italian pas¬ toral style which has since prevailed in Portu¬ gal. Of his writings there are still extant five idylls and several lyrics beside his best-known work, the pastorial romance (Menina e Moga5 (1554). Editions of the (Obras de Bernardim Ribeiro5 were published in 1645, 1785 and 1852, and in 1891 an excellent edition of (Menina e Moga5 with a <Prefacio) was edited by Dom Jose Pessanha.

RIBEIRO -FERREIRA, far-ra'e-ra, Thomaz Antonio, Portuguese poet : b. Parada dc Gonta, Portugal, 1 July 1831; d. 1901. He was educated for the bar at Coimbra and in 1870 was appointed Secretary-General of the Portuguese colonies. In 1878 was appointed Colonial Secretary, in 1881, Minister of the In¬ terior, and in 1885 and 1890 was Minister of Public Works. He was Minister to Brazil in 1895-96. As a poet he attained high rank, his work exhibiting much grace and a fervid pa¬ triotism. His works include (Sons que passam5 (1854) ; vVesperas5 (1858) ; (Don Jaime5 (1861) ; (Delfino do MaP (1868) ; (Dis-sonancias5 (1890), *etc.*

RIBERA, re-ba'ra, Jose or Jusepe de

(known as (CLo Spagnoletto55), Spanish painter: b. Jativa, kingdom of Valencia, 12 Jan. 1588; d. Naples, 1656. Although early entered at the University of Valencia, he preferred the studio of Francisco de Ribalta (q.v.) to the schools of book-learning. He eventually left Valencia for Naples, and thence took up his residence at Rome, where he was given the name of Lo Spagnoletto, ((the Little Spaniard.55 Here he studied the works of Raphael and the Caracci. He also visited Parma and Modena and copied the paintings of Correggio. It is, however, very evident that while he was at Naples Cavaraggio exercised a preponderating influence over his style, and though a Spaniard, he

must be ranked as one of the most pronounced representatives of the Naturalistic School of Naples. Pedro de Madrazo calls him (<a most excellent painter, who finds his place among the greatest Italian masters.55 Both in coloring, chiaroscuro and anatomical knowledge he excels many of the Neapolitan school; but he generally chose gloomy, austere or revolting subjects for his powerful brush, and these he treated with a wild and extravagant fancy which deepened the horror each incident inspired, such are his (Prometheus Chained to the Rock5 ; (The Tor¬ ment of Sisyphus5 ; (The Flaying of Saint Bartholomew5; (Saint Sebastian Transfixed with Arrows5 (all in the Prado Museum, Madrid) ; (The Martyrdom of Saint Lawrence5 (Dresden Gallery). His etchings, of which he left 26, are mostly figure pictures of great spirit and power. He had a great number of

pupils and imitators, among whom were Sal¬ vator Rosa and Lucio Giordano. Consult (Diccionario historico de las bellas artes5 (1800) and (Diccionario Enciclopedico Hispano-Amer- icano) (1895).

RIBOT, re'bo', Alexandre Felix Joseph,

French statesman: b. 1842. Shortly after his admission to the Paris bar, he was appointed deputy procurator-general before the Tribunal in 1870, and became secretary-general of the Ministry of Justice in 1878. In that year he was also elected deputy for Saint-Omer, and later senator. He was Foreign Minister in the Freycinet Cabinet formed in 1890, and during his tenure of that office the alliance with Russia was concluded. In 1893 he became Premier during the Panama upheaval, and again after the resignation of Casimir-Perier in 1895. In December 1912 he accepted candidature for the French Presidency, but on 17 Jan. 1913 M. Raymond Poincare (q.v.) was elected, with M. Briand as Premier. The latter fell on 18 March and was succeeded by M. Barthou, who in his turn was defeated in December. M. Ribot, then Finance Minister, was invited to form a cabinet, but he was unable to gain the neces¬ sary support of the Republican party to his policy of conciliation. M. Dupuy met with a similar failure. The next attempt, that of M. Doumergue, succeeded, and Caillaux became Finance Minister. On 26 March 1914 the wife of Caillaux shot Gaston Calmette, editor of the Figaro, at his desk, and Caillaux was driven from office. M. Ribot succeeded him at the Ministry of Finance and held that post till March 1917 when he became Premier. In September a change of government brought M. Painleve to the helm and M. Ribot took the Foreign Office. Four weeks later he resigned, and on 23 Oct 1917 withdrew from public life. Madame Ribot was Miss Mary Burch

of Chicago.

RIBOT, Augustin Theodule, French painter: b. Breteuil (Eure), 8 Aug. 1823; d. Colombes, 11 Sept. 1891. His only schooling in art was obtained by copying pictures in the Louvre. His early works were household and kitchen scenes; (Cooks 5 ; (The Dinner Hour5; Hnterior of the Kitchen5; (The Merry Cook5 and (Poultry. 5 After 1865 he painted religious subjects; but chose to interpret them by select¬ ing scenes of modern life which he gave with a startling realism. ‘Jesus in the Temple5 ; ‘Saint Sebastian5 and ‘The Good Samaritan,5 now in the Luxembourg Gallery, are examples in this vein. In his early days he was forced to practise his art during the night hours, and this no doubt confirmed his predilection for concentrated light and strong shadows. In this he is allied to masters of the Dutch school, while in the frank realism of his methods he is classed with Velas¬ quez and Ribera. In later life he painted his¬ torical and genre subjects in addition to his earlier field of subjects.

RIBOT, Theodule A., French psychologist: b. Guingamp, 18 Dec. 1839 ; d. 9 Dec. 1916. He received his education at the Lcole Normale, Paris, taking his doctor’s degree in 1875. For several years he taught at various high schools in France, and then becoming interested in experimental psychology spent several years at Paris developing this science by practical studies. He was the founder of Revue Philo-

sophique, and its first editor. In 1885 he was in charge of the course of psychological experi¬ mentation at the Sorbonne and in 1888 occu¬ pied the same position at the College de France. His published works, many of which have been translated into English, include (La psychologie anglaise contemporaine5 (1870) ; (L’Heredite psychologique) (1873); (Philosophie de Scho¬ penhauer J (1875) ; (Psychologie allemande contemporaine) (1879); (Les maladies de la me-moire) (1881); (Les maladies de la volonte5 (1883) ; (Les maladies de la personality (1885) ; (La psychologie de l’attention> (1889) ; Psychol¬ ogie des sentiments) (1896) ; (L’Evolution desidees generates5 (1897) ; (Essai sur l’imagination creatrice5 (1900); (Essai

sur les pas¬ sions > (1906) ; (Problemes de psychologie affective) (1910) ; (La vie inconsciente et les mouvements) (1913).

RICARDO, ri-kar'do, David, English po¬ litical economist: b. London, 19 April 1772; d. Gatcombe Park, Gloucestershire. 11 Sept. 1823. His father was a prosperous Jew, born in Hol¬ land, but settled in England in his youth; and was 'a member of the Stock Exchange. The son was educated in England and later in Holland, but had no university training and entered his father's business at 14. He married early and conformed to the Christian religion, whereupon an alienation with his father necessitated his taking up business on his own account. In this he was immediately successful and made a fortune on the Stock Exchange, at the same time preserving an honorable reputation. In 1799 he became interested in Adam Smith's (Wealth of Nations5 and turned his attention to the scien¬ tific treatment of questions connected with bank¬ ing and finance. His first contributions to the subject appeared as letters in the Morning Chronicle in 1809 and later appeared in a pamphlet entitled <The High Price of Bullion a Proof of the Depreciation of Bank-notes.5 The report of the bullion committee in. 1810 coincided with the principles of Ricardo in its attributing the depreciation of the currency to excessive issues of the Bank of England and in recommending a resumption of cash pay¬ ments. In 1816 Ricardo proposed a scheme for making bank-notes exchangeable for standard bars of gold bullion instead of coined gold. The scheme was adopted in 1819, but had to be aban¬ doned on account of the temptation to forgery. In 1817 appeared his principal work, (On the Principles of Political Economy and Taxation.5 This work instead of being a historical or philosophical treatment of the general theme is rather a specialized examination of such factors as value, rent, wages, etc., and his contributions to these subjects, while not absolutely original, yet were for the first time stated with fullness and authority. His writings have had a pro¬ found influence upon modern doctrines, though his views are not now fully accepted. James Mill and J. R. McCullock were his disciples. He retired from business in 1814 and in 1819 entered Parliament for the Irish borough of Portarlington. He held the seat until his death and contributed to important discussions of financial questions. Consult (Life5 by McCul¬ lock (1846). See Political Economy.

RICASOLI, re-ka'so-le, Baron Bettino, Italian statesman : b. Florence, 9 March 1809 ; d. near Siena, 23 Oct. 1880. He first entered public

life in 1847 when he submitted to the Grand Duke Leopold of Tuscany

plans of governmen¬ tal reform which the latter saw himself forced to adopt. Ricasoli became mayor of Florence in 1847 and in the following year was elected to the Tuscan Parliament, and helped to bring about the recall of the grand duke. After the battle of Novara (1849) and the restoration of Austrian influence he retired to private life and devoted himself mainly to the scientific study and practice of agriculture. When the revolutionary movement of 1859 compelled the grand duke to flee, Ricasoli became Minister of the Interior, and in August of the same year dictator. He resolutely opposed all attempts at a restoration of the grand-ducal government and labored for the annexation of Tuscany to Sardinia, which was accomplished in March 1860. He was made, thereupon, governor of Tuscany, and was a member of the first Italian Parliament which assembled in 1861. In June he succeeded Cavour as head of the ministry and sought to carry out his predecessor's policy, but he could make no head against the opposi¬ tion, and in March 1862 made way for the ministry of Rattazzi (q.v.). He assumed office once more in the early part of 1866, conducted public affairs with ability during the war against Austria, but met with no success in his internal policy of decentralization and financial reform because of his inability to rally a Parliamentary majority to his support. He resigned in April 1867, to be followed by Rattazzi, but remained a member of the Chamber of Deputies till his death, though taking no very active part in affairs. His 'Letters and Papers5 were pub¬ lished by Tabarrini and Gotti at Florence in 10 volumes (1886-94).

RICCIARDELLI, ret-char-del'le, Daniele.

See Volterra, Daniele da.

RICCIO, or RIZZO, Antonio, Italian

sculptor and architect: b. Verona, about the middle of the 15th century; d. about 1500. It appears that he was in early life under the Mantegazzas at Certosa, but about 1465 he re¬ moved to Venice. During the war with the Turks he was chief engineer of the Venetian republic, and at its close became the chief architect of Venice, in which capacity he re¬ built a portion of the Palace of the Doges. We lack accurate knowledge of the extent and quality of his work. It is certain, however, that he was one of the early apostles of the Renaissance. Two figures in the nude, (Adam5 and (Eve,5 are in the court of the Palace of the Doges, and are executed in the realistic manner of the Florentine school of that day. The tombs of Doge Francisco Foscari and of Niccolo Tron, both in the Frari, Venice, are ascribed to Riccio, but their style differs much from that employed in

the nude figures, being more after the Paduan school.

RICCIO, or RIZZIO, David, Italian

secretary to Mary Queen of Scots: b. Pancalieri about 1533 ; d. Edinburgh, Scot¬ land, 9 March 1566. He was educated as a musician, and in 1561 went to Scotland in the train of the Marquis of Moretto, Ambassador of the Duke of Savoy. At first a singer in Queen Mary's private chapel, in 1564 succeeded Raulet as the queen's secretary. The causes of his elevation have been variously explained. Coincident with the event was Mary's deter-

mination to act in matters of state independently of the Scottish nobles or even of her uncle of Lorraine, and the supposition is natural that in Riccio Mary found a safer confidant than in her former French secretary. After the queen's marriage to Darnley in July 1565, Riccio rose even higher in the favor of Mary, and it was Mary's avowed intention to make him her Prime Minister. His intimacy with the queen aroused the jealousy of Darnley and his haughty be¬ havior made enemies of the nobles. The con¬ spiracy formed to remove the objectionable sec¬ retary was precipitated into action by Mary's refusal to pardon Moray and other exiles in England. Its leaders were the relatives of Darnley, Lord Maitland who had fallen from power, and leading Protestants, including prob¬ ably John Knox; with the English government standing as a neutral abettor. Riccio was dragged from the queen's supper-chamber in Holyrood Palace and despatched with at least 56 wounds.

RICE, Alice Hegan, American humorous writer: b. Shelbyville, Ky., 11 Jan. 1870. She was educated at Hampton College, Louisville, Ky., and was married to C. Y. Rice of Louis¬ ville, in 1902. Her first book, (Mrs. Wiggs of the Cabbage Patch5 (1901), attained ex¬ traordinary popularity, and was followed by (Lovey Mary5 (1903) ; (Sandy5 (1904).

RICE, Allen Thorndike, American editor: b. Boston, Mass., 18 June 1853; d. New York, 16 May 1889. He was graduated at Oxford in 1875 and in 1876 purchased the North Ameri¬ can Review, of which he became editor. He was one of the promoters of the Charnay ex¬ pedition which in 1879 investigated the ruins of primitive civilization in Central America and Mexico. He was actively interested in politics, an earnest advocate of a. more efficient copy¬ right law and was chiefly instrumental in securing the introduction of the Australian bal¬ lot system into the United States. In 1889 he was appointed Minister to Russia, but died be¬ fore the date set for sailing. He edited Rem¬ iniscences of Abraham Lincoln) (1886), and contributed to (Ancient Cities of the New World > (1887).

RICE, Cale Young, American poet and playwright : b. Dixon, Ky., 7

Dec. 1872. He was graduated at Cumberland University in 1893 and at Harvard in 1895. After holding the chair of English literature at Cumberland University in 1896-97 he resigned to devote his time to literature and travel. He was married to Alice Caldwell Hegan (Rice) (q.v.) in 1902, and has traveled extensively in Europe, Asia, Asia Minor and Africa. Author of (poems) (From Dusk to Dusk) (1898) ; (Song Surf5 (1900) ; (Mirvana Days) (1908) ; (Far Quests5 (1912) ; (Collected Plays and Poems5 (1915) ; <Earth and New Earth) (1915) ; (dramas)

(Charles di Tosca5 (1903) ; <David) (1904) ; (A Night in Avignon> (1907) ; (The Immortal Lure5 (1911) ; (Porzia5 (1913), *etc.*

RICE, Daniel, circus clown: b. New York, 1822; d. Long Branch, N. J., 22 Feb. 1900. His real name was Daniel McLaren, but he was nicknamed as a child for the old Irish clown, Dan Rice, and on entering the show business adopted that name. He became an acrobat and began his career as a clown with the Seth B. Howe Circus in 1845, attaining an immediate

success. He was later connected with Spauld¬ ing's Circus, in which he became a partner. His familiarity with the works of Shakespeare won for him the name of ((the Shakespeare Clown.55 After a season of misfortune, during the Civil War, he was engaged by Adam Fore-paugh at a salary of $35,000 a year, and later received $1,000 a week with O'Brien's Circus. He retired in 1882. He was lavish with his money, gave much to charity and on one oc¬ casion gave $32,000 to President Lincoln for the benefit of wounded soldiers and their depend¬ ents. His popularity as a clown was widespread and lasting, his appearance in the circus ring always exciting wild enthusiasm.

RICE, Edmund, American military officer: b. Cambridge, Mass., 1842; d. Wakefield, Mass., 20 July 1906. He entered the Union army in 1861, received rank as captain, was voted a medal of honor by Congress for bravery at Gettysburg and was mustered out with rank as colonel in 1865. He entered the regular army in 1866, was promoted colonel and in 1877 served for a time on the. staff of General Sko-beleff in the Turko-Russian War. He was ap¬ pointed inspector-general in 1898, and in 1902-03 was colonel of the 19th infantry. He was retired in 1903. The trowel bayonet, stacking swivel and knife-intrenching bayonet now in use in the United States army were his in¬ ventions.

RICE, Edwin Wilbur, Jr., American engi¬ neer; b. La Crosse, Wis., 6 May 1862. He was educated at the Central High School, Phila¬ delphia, and engaged in practice as an electrical engineer in 1880. He became superintendent of the Thompson-Houston Electric Company in 1883 and was also technical director in 1884-94. He was vice-president of the General Electric Company in 1894-1913, and has since been president of that organization. He is a Cheva¬ lier of the Legion of Honor, and in 1917 was president of the American Institute of Elec¬ trical Engineering.

RICE, Isaac Leopold, American lawyer: b. Wachenheim, Bavaria, 22 Feb. 1850; d. New York, 2 Nov. 1915. Coming to Philadelphia with his parents in 1856, he was educated at the Boys' Central High School of that city, and showing a genius for music was sent to Paris to complete his musical training. In 1868 he visited England where he taught music and the languages for a year when he settled in New York, teaching music for a time and then en¬ tering Columbia Law School, from which he graduated in 1880, taking prizes in constitu¬ tional and international law. He founded the School of Political Science and was lecturer (1882-83), and subsequently instructor in the Columbia Law School (1884-86). He was a specialist in railroad law and was counsel and director in the lines now constituting the South¬ ern Railroad and for a time foreign repre¬ sentative of the Philadelphia and Reading Railway. He took an active part in the appli¬ cation of electricity to transportation and was prominently identified with many financial in¬ terests. He founded The Forum in 1885; and as a leader in international chess invented the Rice Gambit.55 He published (What is Music ? 5 (1875) ; produced many songs, orchestral and piano compositions and notable articles in lead-486

ing reviews. Consult (Rice Memorial Supple¬ ment in American Chess Bulletin, Vol. XII, p. 269 (New York 1916).

RICE, James, English novelist: b. North¬ ampton, 26 Sept. 1843; d. Redhill, Surrey, 26 April 1882. He studied at Queen's College, Cambridge, without taking a degree, and in 1868 became editor and proprietor of Once a Week. He was called to the bar in 1871 and while waiting for clients he became London correspondent for the

Toronto Globe. His first literary success was with the novel (Ready Money Mortiboy > (1872), written conjointly with Walter Besant. The novel was drama¬ tized and produced at the Court Theatre in March 1874. Other novels written in partner¬ ship with Besant were (With Harp and Crown) (1874) ; <The Son of Vulcan) (1875) ; (The Golden Butterfly) (1876) ; (The Monks of Thelema) (1877) ; (By Celia's Arbour) (1878); (The Chaplain of the Fleet) (1879); (The Seamy Side) (1881). Rice also wrote a (History of the British Turf) (1879).

RICE, Luther, American Baptist clergy¬ man: b. Northboro, Mass., 25 March 1783; d. Edgefield District, N. J., 25 Sept. 1836.ˆ He was educated at Williams College, became interested in foreign missionary work and with Adoniram Judson and several others initiated a move¬ ment which led to the establishment of the American Board of Commissioners for Foreign Missions. He was ordained in the Congrega¬ tional ministry, 6 Feb. 1812, and later in the month went to India to engage in missionary work. Soon after his arrival he united with the Baptists and in 1813 he returned to America to adjust his relations with the board. He then began his labors among the Baptist churches, awakening their interest in foreign missions and raising money to support the work. He was also deeply interested in ministerial educa¬ tion and was instrumental in founding Colum¬ bian College, Washington, D. C. He was treas¬ urer of the college and worked energetically in raising funds for it; and he was also engaged as a missionary agent. He was noted for his sermons and was highly influential in the Bap¬ tist denomination.

RICE, Thomas D., American comedian : b. New York, 20 May 1808; d. there, 19 Sept. 1860. He was apprenticed to a woodcarver in early youth, but ran away to become an actor. In 1832 he appeared in Pittsburgh as a negro min¬ strel and became widely popular. He made his London debut in 1836 and afterward en¬ joyed repeated successes in other British cities. He elevated negro minstrelsy to a position of respectability, was almost as famous in England as at home, and for an extended period enjoyed great prosperity. He was extravagant and ec¬ centric, however, and his career ending through a stroke of paralysis he died in poverty. His entertainments included the farces (Jumbo Jum) and <The Virginia Mammy) ; the bur¬ lesques (Bone Squash Diavolo) and (Othello) ; and his songs included (Jim Crow' ; (Lucy Long); <Gich a Gittin' Upstairs); and (Clare de Kitchen,' all of which won great popularity.

RICE, William Marsh, American capital¬ ist and philanthropist: b. Massachusetts, 1816; d. 1900. He gained a fortune of about $10,-

000,000 in the cotton business in Texas and be¬ queathed it as a foundation for Rice Institute (q.v.) at Houston, Tex. He came to his death through chloroform administered by his valet, who had plotted with Albert J. Patrick (q.v.) and the case developed into a sensational mur¬ der trial.

RICE, Wild or Indian. See Grasses in the United States.

RICE-BIRD, in the United States the bobo¬ link (q.v.), so called in the south Atlantic, where it is a serious pest in the late autumn to the rice crop ; in the East Indies, a familiar and handsome finch-like weaver-bird (Munia oryzivora) , also known as the Java sparrow and paddy bird. It possesses a large pinkish bill ; the head and tail are black, the belly rosy, the cheeks of the male white and the legs flesh-colored. It is dreaded in southern Asia on account of the ravages it commits in the rice fields, but is frequently brought to Europe and America as a cage-bird.

RICE INDUSTRY, American, The. The

rice industry had its inception in America about the middle of the 17th century, when Sir William Berkeley made an attempt to raise rice in Virginia in 1647. As this experiment, which was continued for several years, was an utter failure, owing probably to the high latitude in which the seed was planted, it was generally be¬ lieved that such a crop could not be grown in this country. The fact that this was an error was discovered accidentally, in 1694, when a vessel bound for Liverpool from Madagascar was blown so far out of her course that, hav¬ ing been somewhat injured by the storm, it was decided to put into Charleston for repairs. Among those who boarded the vessel was Land¬ grave Thomas Smith, and, at his request, the captain gave him a small package of rough rice to be used as seed. Although little faith was expressed in the success of the experiment Smith planted it in proper soil in lower Carolina and his enterprise was rewarded by the growth of a crop that was almost sufficient to meet the needs of the entire colony.

From that day the success of the rice indus¬ try was assured. By 1707, the cultivation of rice had extended so widely that no less than 17 ships sailed from Carolina with cargoes of this grain, and, during the 10 years between 1730 and 1739, inclusive, the shipments to Great Britain and other ports amounted to more than 223,787,000 pounds. In 1754, the exports to England alone aggregated over 100,000 barrels

of unhusked rice, which was equivalent to 30,- 000,000 pounds of the cleaned product, arid yet the supply that was left was ample for home consumption. From that time until 1784, the yield remained practically the same, but, in that year, the system of water culture was intro¬ duced, an innovation which has since resulted in constantly increasing crops.

The following statistical table gives a clear idea of the condition of the industry from the beginning of the 19th century up to 1900, to¬ gether with necessary information regarding the prevailing tariffs. For the sake of brevity these figures have been grouped in periods of five years, with annual averages. The table is as follows :

Production of Rice in the United States for 120 Years, 1795 to 1915, with Tariff Rates Prevailing from 1789 to 1857.

Five years ending 30 June

Production

for

five years (pounds)

Average per year

Tariff on rice

Year

enacted

Rate

ad valorem

1800… .

320,631,803

64,124,361

1789

5 per cent

1805 ….

240,044,600

48,008,920

1792

n

1810… .

274,477,000

54.895,400

1794

10

1815… .

274,867,800

54,973,560

1800

\2\

1820… .

282,397,800

56,479,560

1804

15

1825… .

333,447,000

66,689,400

1812

30

1830… .

417,333,600

83,460,720

1818

15

1835… .

457,282,200

91,456,440

1832

Free

1840… .

429,585,600

85,917,120

1836

15 per cent

1845 ….

481,669,200

96,333,840

1841

20

1850… .

543,494,400

108,698,880

1857

15

1855… .

483,279,600

96,655,920

1860… .

545,592,600

109,118,520

1865… .

115,738,680

23,147,736

1870… .

160,837,790

32,167,558

1875… .

276,704,430

55,340,886

1880… .

415,332,000

83 , 066 , 400

1885… .

534,720,400

106,944,080

1890… .

675,950,400

135,190,080

1895… .

762,698,460

152,539,692

1900… .

822,596,280

164,519,256

1905 ....

2,232,051,133

446,410,226

1910... .

2,982,233,223

596,446,645

1915... .

4,000,000,000

750, 000 j 000

Although the superiority of American rice was a well-established fact long before the Civil War the success that planters have attained since 1865 has been indicated in a better quality of rice. In the old days, before the war, when Ward's famous <(long grain Carolina® rice was the standard of perfection, Georgia and the Carolinas were the only States in which rice was grown to any great extent. In nearly all the other southern States its cultivation was merely for home consumption. Since the war, however, there has been a change in these condi¬ tions : Georgia and the Carolinas have retained their rice fields, but other southern States have evinced an increased interest in the cultivation of this product, Louisiana and Texas being par¬ ticularly notable examples of the gigantic strides which this industry has taken.

The southern rice fields upon which the best commercial crops are grown are the reclaimed cypress swamps and the tide-water lands along the coast. Of course, many of the finest plan¬ tations are among the marshes higher up the rivers, or even in the interior upon level tracts that are so situated that they may be irrigated with ease. In nearly all of these plantations the system of water cultivation is followed. In the case of the tide-water lands, they lie along the rivers, above the meeting of fresh and salt water, in such a position that they may be flooded with water when the tide is high and drained at low tide. Thoroughly protected by dikes, the salt water, which is so fatal to

the rice, cannot reach them from below, nor can freshets sweep them from above.

The serious check which this industry re¬ ceived during the Civil War was not forgot¬ ten upon the declaration of peace. Lands there were in plenty, but there was no money to operate them, and it was not until incidental protection was derived from the tariff that any vigorous attempt was made to rehabilitate the old plantations. Since that time the greatest

advancement has been made in Louisiana, and, during more recent years, in Texas.

The history of rice culture in Louisiana dates back to 1718, but, during all the years prior to the war, this industry was confined chiefly to the parish of Plaquemine. Experience had shown, however, that, in Louisiana, rice was a sure crop, upon which a fair price could be realized quickly without the outlay of a great amount of money, and so, in the uncertain days that followed 1864, it was to rice that the plant¬ ers turned, with the result that a crop which had never been able to do more than supply a local demand, suddenly sprang into a position of national importance. So great and lasting was this impetus that, by 1875, the State of Louisiana was furnishing fully 30 per cent of the total yield of the United States, while in each of the five years following 1880, it aver¬ aged 40 per cent ; 1885, 60 per cent ; 1890, 65 per cent; and 1895, 75 per cent. As the industry grew, in other States this percentage fell off, and in 1916 Louisiana produced about 50 per cent, Texas 25 per cent and Arkansas 16 per cent. The year 1916 saw the largest acreage ever planted in the United States, 866,000, and the crop was 41,325,000 bushels, or 47 bushels per acre, far the best American average re¬ corded. The best 10-year average is 34.7 bushels per acre. Before the World War the United States exported considerable rice to British In¬ dia and French Indo-China, and also imported small quantities from the Dutch East Indies, Germany, Japan, China, *etc.* The Philippine Islands production is nearly double that of the entire United States.

India's production of rice is about 56,000,- 000,000 pounds annually; China's is probably as great; Japan grows 20 bushels to an acre, and the Siam crop is seven to eight times the Amer¬ ican. The world's production is estimated at about 150,000,000,000 pounds annually.

The American storage facilities for rice are mainly in the southern

States where it is grown. The mills, elevators and warehouses there have a total storage capacity of about 40,000,000 bushels, of which one-half is in Louisiana and more than a fourth in Texas. This capacity is the equivalent of a year's crop.

RICE INSTITUTE, a coeducational insti¬ tution for higher education, established in 1912 at Houston, Tex., by means of a fund of about $10,000,000 bequeathed for the purpose by Wil¬ liam Marsh Rice (q.v.). It was incorporated in 1891 as the William Marsh Rice Institute for the Advancement of Literature, Science and Art, and at this time Mr. Rice gave the institute $200,000 to enable the board of trustees to work out the plan under which it should be operated, actual establishment of the organi¬ zation to take place after his death. The realiza¬ tion of the project was delayed by the years of litigation which followed the murder of Mr. Rice, in 1900; but in 1912 the institute was opened, with Dr. Edgar Odell Lovett as presi¬ dent. The institute has a campus of 300 acres, situated about three miles from the heart of the city; the buildings and grounds are valued at about $1,500,000, and the annual income is about $500,000. The courses of instruction are those usually afforded by colleges of the first class, with additional courses in chemical, elec¬ trical and mechanical engineering and archi-

tecture. The institute gives the usual degrees of a college of the first class. Tuition and matriculation are free. In 1919 the institute had 50 instructors, 651 students in attendance and 325 in the United States service. Dr. Lovett has been its president from its initial establish¬ ment.

RICE LAKE, Wis., city in Barron C<?unty, on the Red Cedar River and on the Chicago, Milwaukee and Saint Paul and Northwestern railroads, about 45 miles north by west of Eau Claire. Noted as a summer resort. It is in a lumber region and the chief industries are con¬ nected with farm and lumber products. It has public and parish schools, a public library, teachers' training school and private business schools. The city has adopted the commission form of government and has a fine sewerage system. Pop. (1920) 4,457.

RICE PAPER, also called PITH PAPER, and more properly, as the

substance is not de¬ rived from rice. The product of a small tree, 10 to 15 feet high, known botanically as Aralia (Fatsia) papyrifera, which grows in many por¬ tions of Formosa. Japanese name, Tsuso; Chinese name, Tung Tsao. The pith is ex¬ tracted by breaking the bark and outer woody portion and forcing out the cylindrical core. Consul Jas. W. Davidson states that the paper is produced by skilfully paring these cylinders of pith with a sharp knife as they are rolled upon the surface of a tile or other hard sub¬ stance that will serve as a bed plate, the thick¬ ness of the sheet of pith paper being regulated by the angle at which the knife is held. The sheets are put under heavy pressure for a time, and are finally cut into squares of three and one-half inches and packed 90 in a package. There are three grades of the paper, which is chiefly used for the manufacture of artificial flowers and also for the painting of small fancy pictures, and to some extent for sun hats. Tamsui is the port of shipment, and as high as 28,000 pounds have been exported in a single year, worth over 15,300 yen. See also Paper.

RICH, Edmund. See Edmund, Saint.

RICH HILL, Mo., city in Bates County, on the Osage River; and on the Kansas City, Fort Scot and Memphis and the Missouri Pa¬ cific railroads, about 83 miles south of Kansas City. It is in an agricultural and coal region; in the vicinity of the largest coal fields in Mis¬ souri. Its chief industries are connected with the mining and shipping of coal. It has vitrified brick and tile works, canning factories, a foun¬ dry, distillery, machine shops and zinc smelters. It has an extensive trade in coal, farm prod¬ ucts, canned goods and brick. The principal public buildings are the churches and schools. Pop. 2,755.

RICH MOUNTAIN, Battle of. After the reverse of Colonel Porterfield at Philippi (see Philippi, Engagement at) General Lee ordered Gen. H. A. Wise to the Kanawha Valley and Gen. R. S. Garnett to the Cheat Mountain re¬ gion. Garnett was to relieve Porterfield, re¬ cover lost ground and secure control of the Baltimore and Ohio Railroad. With one regi¬ ment he arrived at Huttonsville on 14 June, where he found Porterfield with about 1,400 men. Leaving Porterfield at Huttonsville with three companies to guard his line of communi¬

cation with Staunton, Garnett marched on the night of the 15th to Beverly, from which point a regiment, a company of cavalry and two guns were sent by the Parkersburg road to the west foot of Rich Mountain, seven miles west of Beverly; Garnett, with the other regiment, two guns and a company of cavalry pushing on to Laurel

Hill, the northern extension of Rich Mountain, 17 miles northwest of Beverly. These positions were regarded as the gates to northwestern Virginia, and both were strongly fortified. By 1 July Garnett had nearly 4,000 men, including his reserve at Beverly and Hut¬ tonsville.

General McClellan arrived at Grafton 23 June and prepared to expel the Confederates from their positions and to enter the Shenan¬ doah Valley. He had 20,000 men; 5,000 along the line of the Baltimore and Ohio Railroad ; a brigade of over 3,000 and a battery, under Gen. T. A. Morris, were stationed at Philippi, and by 2 July the main column, under his own im¬ mediate command, was concentrated at Buck-hannon, 24 miles west of Beverly. This column of over 10,000 men, with 12 guns, was organ¬ ized into three brigades, under Gen. W. S. Rosecrans, Gen. N. Schleich and Col. R. L. McCook. On 2 July Gen. J. D. Cox was ordered to cross the Ohio with a brigade and co-op¬ erate with McClellan by moving up the Kana¬ wha Valley against General Wise. On 6 July Morris was ordered to march his brigade from Philippi to within a mile and a half of Garnett's position at Laurel Hill, and on the 9th Mc¬ Clellan had the three brigades of his own column at Roaring Creek, two miles from the west foot of Rich Mountain, where Lieut.-Col. John Pegram was intrenched, with 1,300 men and four guns. Preparations were made to assault Pegram in front with Rosecrans' brigade, on the morning of the 11th, but on the evening of the 10th Rosecrans learned that Pegram's rear could be reached by a difficult route around his left and proposed to do it with his brigade. To this McClellan assented. It was arranged that Rosecrans should march at daybreak of the 11th, with about 1,900 men, gain the road in Pegram's rear, march down it and attack, and that at the sound of the en¬ gagement in the rear McClellan would attack in front. Rosecrans, after a very hard march, made the turning movement, and coming to the road about 3 p.m. unexpectedly came under fire of musketry and artillery and was checked. Pegram had been warned of danger to his rear, and during the morning had sent two detach¬ ments to Hart's farm, at the summit of the mountain, with Maj. J. A. De Lagnel in com¬ mand, who took with him a gun of his battery, and threw up breastworks for his 310 men. Rosecrans attacked, was at first repulsed, and it was not until after a sharp engagement of nearly two hours that he succeeded in driving the Confederates from position, just as Pegram was approaching with reinforcements and an¬ other gun. A part of the reinforcements be¬ came involved in the defeat, and Rosecrans captured the two guns. Nothing had been heard from McClellan, and knowing that a consider¬ able body of Confederates was still near him, Rosecrans directed his men to lie on their arms until morning. Rosecrans lost 12 killed and 49 wounded. The

lant fight, with a loss of 40 to 45 killed and about 25 wounded. The noise of the engage¬ ment had been heard in McClellan's ranks and he prepared for an attack in front, but the long continuance of the artillery-fire on the moun¬ tain and some cheering in Pegram's camp im¬ pressed him that it had gone badly with Rosecrans and the attack was not made, and near night he withdrew his troops beyond Roaring Creek. At daybreak of the 12th Rosecrans found that the Confederates had disappeared, and marching down the mountain he entered Pegram's abandoned camp, taking two more guns, with some sick and wounded, and as nothing was seen of McClellan, he sent him word of what he had been doing and where he was.

The forces engaged with Rosecrans on the mountain top succeeded in passing around his right during the night to Beverly, where they were joined by the 44th Virginia and the re¬ treat was continued through Huttonsville and across Cheat Mountain to Greenbrier River, and then to Monterey. Pegram abandoned his works, intending to follow his detachment to Beverly, but in the darkness his column was broken up, part reaching that place. Pegram led the remainder to join Garnett, marching all day of the 12th and halting at night in the valley six miles north of Beverly. There, hear¬ ing that Garnett had retreated northward, and that McClellan was at Beverly, and seeing no chance of escape, he sent to McClellan an offer of surrender. This was accepted and next morning Pegram surrendered 30 officers and nearly 500 men. Garnett, at Laurel Hill, in¬ formed of the disaster that had befallen Pegram on the 11th, abandoned his works after dark, and retreated toward Beverly. When within five miles of the place, at daybreak of the 12th, he received erroneous information that McClel¬ lan had already occupied it, whereupon he re¬ traced his steps and retreated north toward Saint George and West Union, hoping to escape by the Northwestern Turnpike, but was over¬ taken by Morris at the fords of Cheat River, at noon of the 13th and killed in a rearguard fight at Corrick's Ford. His army continued the retreat through Red House, Greenland and Petersburg to Monterey. McClellan occupied Beverly on the 12th and Huttonsville on the 14th, and pushed his advance to the summit of Cheat Mountain. Leaving a force on Cheat Mountain and at Huttonsville he returned to Beverly on the

16th. A few days later Mc¬ Clellan was called to Washington and assigned to the command of the troops for the defense of the city. On 1 November he became com¬ mander of the army of the United States. His short and successful campaign, with that of General Cox up the Kanawha Valley, settled the fate of West Virginia, stimulated the Union men in their effort to form a new government and finally resulted in the dismemberment of Virginia and the formation of the new State of West Virginia. Consult (Official Records) (Vol. II) ; The Century Company's (Battles and Leaders of the Civil War) (Vol. I).

E. A. Carman.

RICHARD I, king of England : b. Oxford, 8 Sept. 1157; d. Chaluz, France, 6 April 1199. He was the 3d son of Henry II of England and Eleanor of Aquitaine, and while an infant

was betrothed to Alice, a daughter of Louis VII of France. Made duke of Aquitaine in boyhood, he took part in the rebellion of his brothers against his father, who at different times attempted to deprive Richard of his pos¬ sessions, and even planned to exclude him from the succession to the Crown in favor of the younger son John. In 1189, in conjunction with Philip Augustus of France, he waged war on his father and compelled Henry II to acknowl¬ edge his right to the throne. Two days after the conclusion of peace Henry II died at Chinon (6 July 1189). In September he was crowned king at Westminster and immediately began preparations for a crusade to the Holy Land, in fulfilment of a vow made two years before. To raise money for the expedition he sold fiefs and offices, surrendered to William the Lion of Scotland the suzerainty over that country, and increased the burden of taxation. Pro¬ ceeding through France he joined the army of the French king at Messina, where he be¬ came involved in a conflict with Tancred, King of Sicily, in the course of which the English king made himself master of Messina. The intrigues of Philip Augustus brought on enmity between the two sovereigns and Richard repu¬ diating his betrothed, Alice, sister of the French king, secured the hand of Berengaria of Navarre, who joined him at Cyprus, where they were married. After he had conquered the island and seized its treasures he joined the crusading army before Acre (8 June 1190). Between the English and the French bitter feelings now prevailed and at one time hostili¬ ties were threatened. Acre, nevertheless, was taken by the crusaders, and in August Philip sailed for Europe. War with Saladin (q.v.) was renewed on account of Richard's atrocious massacre of 2,700 Mohammedan prisoners. At

Arsuf, 7 September, Richard won a decisive victory and in spite of prolonged negotiations moved on Jerusalem, arriving in December 1191 within a very short distance of the city. He fell back to Ascalon, where the contest between Guy of Lusignan and Conrad of Monferrat for the kingdom of Jerusalem was productive of dissensions among the crusaders. A second advance on Jerusalem met with ill success and in August 1192 Richard concluded a three years' truce with Saladin and left the Holy Land, having made no conquest beyond that of Acre. Shipwrecked in the Adriatic, he at¬ tempted to make his way disguised through Germany, but was taken prisoner near Vienna by his enemy, the Duke of Austria, who handed him over to the emperor. Brought before the imperial diet, Richard pledged himself to a ran¬ som of 150,000 marks and received his English kingdom as a fief from the emperor. The in¬ fluence of the French king and Richard's own brother was effectual in prolonging the English king's imprisonment. Liberated in March 1194 he landed in England in the same month and was crowned a second time. John was forced to submit and Richard, collecting all the money he could for a war with Philip of France, sailed for Normandy in May. The contest which dragged on for five years presents little that is noteworthy, and in January 1199 peace was made. While besieging the castle of Chaluz, held by a vassal with whom Richard disputed the possession of a newly found treasure, the

king was wounded by an arrow and died in his tent. Richard I owes his fame to the glamor with which legend has surrounded his name as the typical warrior of the Middle Ages. As a king he did nothing for England; his great passion was war, and the only re¬ deeming features in a character of violence and ferocity are a certain naive magnanimity and the splendid courage which gained him even in his lifetime the title of Coeur de Lion, ((Lion-hearted.55 The legend which recounts how Richard immured in an Austrian prison was discovered by his favorite minstrel, Blondel, who had wandered throughout Europe singing his songs outside of castle walls, dates from the second half of the 13th century. Richard figures prominently in Scott's (Ivanhoe5 (1820) ; and (The Talisman5 (1825), and in Maurice Hew¬

lett's (Richard Yea and Nay.5 Consult Stubbs,

(Early Plantagenets) (5th ed., 1886); Norgate, (History of the Angevin Kings) (1887) ; Archer, (Crusade of Richard I5 (1889) ; Round, (Feudal England) (1895) ; Stubbs, Constitu¬ tional History of England,5 Vol. 1 (6th ed.,

1897).

RICHARD II, king of England: b. Bor¬ deaux, 6 Jan. 1367; d. Pontefract, Yorkshire, February 1400. He was a younger son of the Black Prince and a grandson of Edward III, and succeeded to the throne on the death of his grandfather in June 1377, at a time when Eng¬ land was suffering from the effects of the black death, the demoralizing results of the war with France, and the misgovernment by faction_that marked the latter part of the reign of Edward III. The young king was placed under the control of a council in which his uncle, John of Gaunt, Duke of Lancaster, exercised a pre¬ dominant and, on the whole, pernicious in¬ fluence. Popular disaffection, fed by the ill suc¬ cess of the government in repelling attacks on the part of the French and the Scots, was in¬ tensified by the increasing burden of taxation. The imposition of a new capital tax in 1380 led to the outbreak of the celebrated Peasants' Revolt in 1381. (See Tyler Insurrection). Richard displayed great presence of mind in dealing with the insurgent forces near London, and to his bearing was largely due the speedy suppression of the revolt, which was directed largely against John of Gaunt. In 1382 he married Anne of Bohemia and about the same time sought to free himself from the control of Parliament by building up a partv of his own with Robert de Vere, Earl of Oxford, and Michael de la Pole, Earl of Suffolk, as a nu¬ cleus. Richard thereby came into conflict with John of Gaunt who in 1386 departed for France. The leadership of the opposition fell to the un¬ scrupulous Duke of Gloucester, the youngest of the king's uncles. In 1387 Parliament, con¬ trolled by Gloucester, demanded the dismissal of the chancellor de la Pole, and of Oxford, who had been made Marquis of Dublin with sovereign rights in Ireland, and though the king refused to yield, he was compelled to ac¬ cept a committee of 11 appointed by Parlia¬ ment with extensive power of government Rr a period of one year. Suffolk was dismissed. When Richard set himself to overthrow the committee, the Duke of Gloucester and the earls of Arundel, Derby, Nottingham and Warwick took up arms, marched on London, demanded

the trial of five of the king's principal advisers on the charge of treason and brought about their condemnation by Parliament. Forced to submit for a time, Richard succeeded in throw¬ ing off his uncles authority in 1389 and for the ensuing eight years ruled with moderation and in peace. He had not abandoned, how¬ ever, his views on the absolute authority of kings and had not forgiven the party of Glou¬ cester for their persecution of his former sup¬ porters. In 1387 Gloucester, Arundel and War¬ wick were seized, and a packed and intimidated Parliament condemned the three to death. Arundel was executed, and Warwick im¬ prisoned. Before sentence could be carried out on Gloucester, news of his death came; that death was probably a violent one. The earls of Derby and Nottingham were spared and raised to the dignities of Duke of Hereford and of Norfolk. Extensive Dowers were sur¬ rendered by Parliament to the king and his triumph was complete. A quarrel between Here¬ ford and Norfolk led to their banishment from England in 1388 and on the death of Here¬ ford's father, John of Gaunt, Richard seized the Lancastrian estates. In May he went to Ireland for the settlement of the affairs of that country and Hereford seized the opportu¬ nity of invading England, ostensibly for the purpose of recovering his estates. When Richard landed in England in August, he found himself abandoned by his followers and Henry of Lancaster in possession of power. On 19 August he gave himself up to Henry at Flint in Wales. He was brought to London and on 29 September resigned the crown in favor of Henry, who, on the following day, took the royal title with the consent of Parliament. Richard was sentenced to strict imprisonment and was removed to Henry's castle of Ponte¬ fract. There he died, probablv by violence, though his body was publicly exposed to refute the charge. Richard was a patron of Chaucer and Gower and was favorably inclined to the teachings of Wyclif. Consult Wallon, (Richard II,5 (1864) ; Stubbs, Constitutional History of England,5 Vol. II (4th ed. 1896).

RICHARD III, king of England: b. Foth-ering Castle in Northamptonshire, 2 Oct. 1452; d. Bosworth, Leicestershire, 22 Aug. 1485. He was the youngest son of Richard, Duke of York, and upon the accession of his brother to the throne as Edward IV, he was created Duke of Gloucester and received the grant of exten¬ sive lands with the office of admiral. With Edward he fled to Holland in 1470, and with him returned in the following year, command¬ ing the Yorkist vanguard against the Lancastrian forces at Barnet and Tewkesbury, where he distinguished himself by his courage and skill. There, too, he gave signs of his innate ferocity, by his execution of the

Lancastrian commander Somerset and others. The murders of Edward, Prince of Wales, after Tewkesbury, and that of Henry VI, in the Tower, are also ascribed to him. Richard became grand-chamberlain of England, and, marrying Anne, the younger daughter of Warwick, fell into violent disputes with his brother Clarence who was the husband of an elder daughter. The death of Clarence in 1478, for which Gloucester cannot be made directly responsible, greatly enriched the latter. In 1480 he became lieutenant-general of the

north and in 1482 carried on a victorious cam¬ paign in Scotland. Edward IV died in April 1483 leaving Richard as guardian of his 13-year-old son Edward and protector of the king¬ dom. Richard's first move after securing posses¬ sion of the king was to seize the queen-mother's relatives, who were soon after sent to execu¬ tion. Lord Hastings, who at first sided with Richard but showed signs of disaffection at his ambitious schemes, was likewise put out of the way. With the aid of the Duke of Buckingham Richard began openly to work for the crown. Doubts were cast on the legitimacy of Edward IV's children and in June a subservient Parlia¬ ment asked Richard to assume the crown. This he did 26 June, though the coronation did not take place till 6 July. Soon after the young sons of Edward IV were done to death in prison. Buckingham now began to plot against Richard and in October stirred up an insur¬ rection in Wales and the southern counties, but the movement collapsed and Buckingham was sent to the scaffold (2 Nov. 1483). More than a year of peace followed during which Richard acquired much popularity by his wise legislative measures and energetic administration. Early in August 1485, Henry, Earl of Richmond, Lan¬ castrian claimant for the throne, landed in England, and Richard going to meet him was defeated and slain at Bosworth Field, after a display of heroic valor. The popular conception of him as a dwarf and hunchback rests on no good authority. Undeniably he was a man of fine powers and bid fair to become one of England's ablest rulers ; undeniable, too, how¬ ever, are his ruthless ferocity and total lack of moral consciousness. Consult (Letters and Papers of the Reigns of Richard III and Henry VI, > edited by

Gairdner (Rolls Series 1861-63) ; Fabyan, (The New Chronicles of England and France* (1811); Walpole, ˆHis¬ toric Doubts on the Life and Reign of Richard III, J (1768) ; Legge, (The Unpopular King; Life of Richard IIP (1835) ; Jesse, (Memoirs of Richard IIP (1862) ; English Historical Review, Vol. V (1891); Gairdner, <Life and Reign of Richard IIP (1898).

RICHARD DE BURY. See Aunger—

ville, Richard.

RICHARD CARVEL, a historical novel by Winston Churchill, published in 1900. It is a story of the Revolutionary period and the hero, Richard Carvel, spends his early life in Mary¬ land, where he is brought up by his grand¬ father, an ardertt supporter of King George. The climax of the story is reached in a brilliant description of the victory of the Bon Homme Richard over the Serapis, in which battle Car¬ vel is severely wounded.

RICHARD OF CIRENCESTER, sis'e-ter, English chronicler of the 14th century. All that is known of his life is that he entered the Benedictine monastery of Saint Peter's, West¬ minster, and was there in 1350; that in 1391 he obtained permission from his abbot to make a visit to Jerusalem; and that he died in his monastery in 1400 or 1401. He is the author of (Speculum Historiale de Gestis Regum Anglise,* a compilation from other chronicles, giving an account of the kings of England from 447 to 1066. His name is best known, however, in connection with a forgery of the 18th century. In 1747 Charles Bertram, an English teacher in

Copenhagen, wrote to the well-known English antiquary, Stukeley, that a friend of his had a manuscript work on Roman Britain, by a monk named Richard of Westminster, and a transcript of the manuscript was subsequently forwarded, with a few lines in facsimile. The author was soon identified with Richard of Cirencester, who henceforth passed for the writer of a valuable Latin treatise, (De Situ Britanniae.* The work was published in Copen¬ hagen in 1757 and passed as authentic until B. B. Woodward, librarian of Windsor Castle, exposed the forgery in 1866.

RICHARD PLANTAGENET, plan-taj'e-net, Earl of Cornwall, titular emperor of Ger¬ many, younger son of King John of England: b. Winchester, Hampshire, 5 Jan. 1209; d. Kirkham, Lancashire, 2 April

1272. He fought against France, in the army of his brother Henry III, went on a crusade to Palestine, and on his return to England in 1242 again assisted his brother in a war against France, but was soon after deprived of his French domain Guienne. In 1256 he was chosen emperor of Germany by a faction while the opposing party declared Alfonso X emperor. He was crowned king of the Romans in 1257, but was unable to obtain general recognition though he exercised all the rights of a sovereign. In 1264 he re¬ turned to England to assist his brother and was taken prisoner at the battle of Lewes, 13 May 1264. He returned to Germany in 1268, held a diet at Worms in 1269, after which he re¬ turned to England. He was one of the ablest and wealthiest princes of his day. Consult Lorenz, (Deutsche im 13. und 14. Jahrhundert* (1863-67) ; Schirrmacher, (Die letzten Hohen-stauffen) (1871) ; Koch, (Richard von Corn¬ wall 1209-57* (1888).

RICHARD ROE. See Doe, John.

RICHARDS, rich'ardz, Charles Brincker-hoff, American engineer: b. Brooklyn, N. Y., 23 Dec. 1833 ; d. 20 April 1919. He was edu¬ cated privately, and for many vears was super¬ intendent of the Colt's Arms Company at Hart¬ ford. He occupied a similar post with the Southwark Foundry and Machine Company at Philadelphia in 1880-84, was consulting engineer for numerous public buildings and after 1884 filled the chair of mechanical engineering at Yale. He invented in 1861 the indicator for steam-engines, which bears his name; was one of the United States expert commissioners at the Paris Exposition in 1889, and prepared a large share of their official report ; and was a member of various American and European scientific societies. He was editor of engineering and technical terms in Webster's (International Dictionary.*

RICHARDS, Ellen Henrietta Swallow,

American chemist and educator : b. Dunstable, Mass., 3 Dec. 1842. She was graduated from Vassar in 1870, from the Massachusetts Insti¬ tute of Technology in 1873, and in 1875 was married to Robert Hallowed Richards. She has been an instructor at the Massachusetts Insti¬ tute of Technology since 1876, is chemist of the Manufacturers' Mutual Fire Insurance Com¬ pany, and is also a specialist in water analysis. She has published (Chemistry of Cooking and Cleaning) (1882) ; (The Cost of Living) (1899) ; (Air, Water and Food) (1900), *etc.*

RICHARDS, Herbert Maule, American

botanist, brother of Theodore William Rich¬ ards (q.v.) : b. Germantown, Pa., 6 Oct. 1871. He was educated at Harvard and Leipzig, and later traveled in Java, Japan, China, Straits Settlements and the Malay Archipelago. After occupying different positions at Harvard, Radcliffe, Columbia and Barnard he became pro¬ fessor of botany at Barnard in 1906. He has specialized in plant physiology.

RICHARDS, John Morgan, American author: b. Aurora, N. Y., 16 Feb. 1841; d. 11 Aug. 1918. He was educated in the public schools and early entered business life. He was connected with different commercial interests in the United States until 1867, when he took up his residence in England. He Was chairman of the firm John Morgan Richards and Sons, London; and in 1888-1905 was owner of The Academy. Author of 'With John Bull and Jonathan, Sixty Years of an American's Life in England and the United States5 (1905) ; (The Life and Letters of Mrs. Craigie (John Oliver Hobbes)5 (1911); 'Almost Fairyland >

(1914).

RICHARDS, Joseph William, American

metallurgist: b. Oldbury. England, 28 July 1864; d. Bethlehem, Pa., 12 Oct. 1921. Educated at the Central High School, Philadelphia; Lehigh University, and at Heidelberg and Freiberg. He was connected with the facultv of Lehigh University from 1887, and after 1903 was pro¬ fessor of metallurgy there. He was professor of electro-chemistry at Franklin Institute, Phila¬ delphia, in 1907—10 ; and from 1915-18 was a member of the United States Navv Consulting Board. Author of 'Aluminium5 (1887; 3d ed., 1895); 'Metallurgical Calculations: Part I, General Metallurgy; Part II. Iron and Steel; Part III, Non-ferrous Metals5 (1907-08), *etc.*

RICHARDS, Laura Elizabeth Howe.

American writer of juvenile fiction: b. Boston, 1850. She is a daughter of Mrs. Julia Ward Howe (q.v.), and was married in 187 1 to Henry

Richards of Gardiner, Me., where she has since resided. Among her numerous popular works are ‘The Joyous Story of Toto5 (1885) ; ‘Queen Hildegarde5 (1889); ‘Captain January5 (1890) ; ‘Melody5 (1893) ; ‘When I Was Your Age5 (1893) ; ‘Three Margarets5 (1897) ; ‘Snow White5 (1900); ‘The Green Satin Gown5 (1903); ‘The Merryweathers5 (1904); ‘Letters and Journals of Samuel Gridley Howe5 (2 vols., 1906-09) ; ‘The Wooing of Calvin Parks5 (1908) ; ‘Florence Nightingale5 (1909) ; ‘Aboard the Mary Sands5 (1911) ; ‘Two Noble Lives5 autobiographical of her father and mother (1911); ‘The Little Master5 (1913); ‘Three Minute Stories5 (1914) ; and with her sister Maude Howe Elliott, ‘Julia Ward Howe5

(1915).

RICHARDS, Robert Hallowell, Amer¬ ican mining engineer : b. Gardiner, Me., 26 Aug. 1844. He was graduated at the Massachusetts Institute of Technology in 1868, and was con¬ nected with the faculty of that institution from 1868, becoming professor of mineralogy and assaying in 1871 ; professor of mining engineer¬ ing in 1873; and emeritus professor in 1914. He invented a jet aspirator for chemical and physical laboratories in 1873 ; a prism for stadia surveying in 1890; and several ore separators

for copper and iron ores. Author of ‘Ore Dressing5 (4 vols., 1903-09) ; ‘Ore Dressing,5 textbook (1909).

RICHARDS, Theodore William, Amer¬ ican chemist: b. Germantown, Pa., 31 Jan. 1868. He was educated at Haverford College, Har¬ vard, Gottingen, Leipzig and Dresden. He was a member of the faculty at Harvard from 1894, becoming professor of chemistry in 1901, and director of Gibbs Memorial Laboratory in 1912. He was exchange professor from Harvard to Berlin in 1907, and adviser of the Carnegie In¬ stitute Research Association from 1902. He has specialized in atomic weights and in physi¬ cal and inorganic chemistry. He was Nobel laureate in chemistry in 1914.

RICHARDS, Thomas Addison, author

and artist: b. London, 3 Dec. 1820; d. Annapolis, 29 June 1900. He came to the United States in 1831 and settled in Georgia. He studied art at *the National Academy in New York with Daniel Huntington, and at an early age began writing and illustrating for publication. He

organized the Woman's School of Design at Cooper Union in 1859 and was its first director. In 1868 he became professor of art in the Uni¬ versity of the City of New York and after 25 years' service was made professor emeritus. He was a constant exhibitor at the National Acad¬ emy of Design, became an associate in 1848, an academician in 1851, and was member of the council and corresponding secretary 1852-92. In the early 50's he was a frequent contributor of pictures and text to Harper's Magazine , de¬ scribing in his articles scenes in the United States and the homes of American authors. His landscape paintings produced in many parts of the United States and Europe are illustrative rather than creative. He was the author and illustrator of 'The American Artist5 (1848) ; 'Georgia Illustrated5 (1851) ; 'Romance of American Landscape5 ; 'Summer Stories of the South5 ; 'Pictures and Painters.5

RICHARDS, William, American mission¬ ary and Hawaiian diplomat: b. Plainfield, Mass., 22 Aug. 1792; d. Honolulu, 7 Dec. 1847. He was graduated at Williams College in 1819 and at Andover Theological Seminary in 1822. He was then ordained and in November 1822 started on his journey to the Hawaiian Islands where he became a missionary. His work was highly successful, but in 1838 he resigned his missionary duties in order to become councilor, chaplain and interpreter to the Hawaiian king. He was special Ambassador to England on a mission to secure recognition of the independ¬ ence of the islands by foreign powers, and after the successful conclusion of his errand he re¬ turned to Honolulu and from 1845 until his death he was Minister of Public Instruction.

RICHARDS, Sir William Buell, Canadian jurist: b. Brockville, Ontario, 2 May 1815; d. Ottawa, 26 Jan. 1889. He was admitted to the bar in 1837 and practised law at Brockville. In 1848 he was elected to the Canadian Parlia¬ ment, and in 1851 was appointed a member of the Executive Council. He was appointed queen's counsel in 1850, and in 1853 became puisne judge of the Court of Common Pleas, Ontario, receiving the office of chief justice of that court in 1863, and that of chief justice of Ontario in 1868. He was chief justice of the

Supreme Court of Canada in 1875-79, and then retired. He was knighted in 1878.

RICHARDS, William Trost, American ar¬ tist : b. Philadelphia, 14 Nov. 1833; d. New¬ port, R. I., 8 Nov. 1905. He first studied under Paul Weber and in 1855 went abroad for ob¬ servation and study in Italy and Paris, estab¬ lishing a studio in Philadelphia in 1856. In his landscapes he adopted the minute method of drawing characteristic of the English Pre-Raphaelites, though he resembled them in no other respect, his subjects being transcripts rather than composed pieces. His greatest suc¬ cess was in his marines where he carefully studied the motion of waves in storm and calm. He painted numerous subjects along the Atlan¬ tic Coast, especially near Newport, where he later lived. He exhibited at the Royal Acad¬ emy, London, at the Paris Salon and the various American expositions. He was a member of the National Academy of Design. A series of his water-color marines hangs in the Metro¬ politan Museum, New York.

RICHARDSON, Sir Benjamin Ward,

English physician : b. Somerby, Leicestershire, 31 Oct. 1828; d. London, 21 Nov. 1896. He was educated at Anderson College, Glasgow and Saint Andrews University, and in 1855 removed to London and for three years was lecturer on medical jurisprudence at the School of Medi¬ cine in Grosvenor Place, and until 1865 lecturer on physiology. Sanitary reform and methods of producing anaesthesia were the two fields in which he was especially interested. Of the 14 anaesthetics that he brought into use methylene bichloride is most widely known. He intro¬ duced the ether spray for local anaesthesia, and the lethal chamber for the humane extinction of the life of animals. He also discovered the properties of amyl nitrite and introduced a number of bromides and other substances into use by the medical profession. He was a strong advocate of total abstinence from the use of alcohol, on the ground that its power as a drug required the greatest caution in its use. Aside from his scientific writing he produced biogra¬ phies, plays and poems. The Nsclepiad,* a series of original researches in the science, art and literature of medicine, was written entirely by himself and appeared quarterly from 1884 to 1895. Besides works already mentioned he wrote (Diseases of Modern Life* (1876) ; Na¬ tional Health* (1890), *etc.*

RICHARDSON, Charles Francis, Amer¬ ican educator: b. Hallowed, Me., 29 May 1851. He was graduated at Dartmouth in 1871, was

editor of the New York Independent in 1872-78, of the Philadelphia Sunday School Times in 1878-80, and of Good Literature, New York, in 1880-82. Since 1882 he has occu¬ pied the chair of English at Dartmouth. He has published (A Primer of American Liter¬ ature* (1878) ; (The Cross,* poems (1879) ; (The Choice of Books* (1881); (American Literature 1607-1885* (1886-88); <The End of the Beginning) (1896), *etc.*

RICHARDSON, Clifford, American chemical engineer: b. Worcester, Mass., 6 March 1856. He was graduated at Harvard in 1877, and was a member of the United States Geological Survey in 1878. In 1878— 87 he was assistant chemist in the United States Depart¬ ment of Agriculture. He was superintendent

of tests for the Barber Asphalt Paving Com¬ pany in 1896-1900, and owner of the New York Testing Laboratory in 1900-10. He is an ex¬ pert in asphalt, bitumen and Portland cement. Author of (On American Cereals) (1883, 1884, 1886) ; (On the Nature and Origin of Asphalt* (1898) ; (The Modern Asphalt Pavement* (1905; 2d ed, 1908), *etc.*

RICHARDSON, Ernest Cushing, Amer¬ ican librarian: b. Woburn, Mass., 9 Feb. 1860. He was graduated at Amherst in 1880 and at Hartford Theological Seminary. In 1883— 90 he was professor and librarian at the latter institution and since 1890 has been librarian at Princeton. He was American editor of Berner's (Jahresberichte d. Geschichtswissenschaft* ; crit¬ ical editor of (Hieronymus w. Gennadius de Viris Illustribus* (1896) ; and wrote bio¬ graphical Synopsis of the Ante-Nicene Fathers) (1887); Classifications, Theoretical and Prac-ticaP (1901).

RICHARDSON, Henry Hobson, Amer¬ ican architect: b. Parish of Saint James, La., 29 Sept. 1838; d. Boston, 27 April 1886. He was graduated at Harvard in 1859 and in the following year went to Paris and entered the Ecole des Beaux Arts. Throughout his student life in Paris he worked under the instruction of L. J. Andre, and when his private fortune was swept away by the Civil War he secured through Andre's friendship an appointment in a government office in Paris. In 1865 he re¬ turned to the United States and located his business in New York. His first commission, received in October 1866, was for building the Church of the Unity in Springfield, Mass. The design of this church is the only instance of his following Gothic models ; and this, which may in general terms be typical of the English Rural Gothic, yet presents

certain independent features that show the practical bent of his mind. Shortly afterward he built the Boston and Al¬ bany Railroad office in the same city and Grace Church in West Medford. In October 1867 he formed a partnership with Charles Gambrill which lasted until October 1878. The works of this period, which include several of his more important ones, and especially Trinity Church in Boston, were projected under the firm name, though with few exceptions were the conceptions of Richardson. In 1870 the commission was received to build the Brattle Street Church in Boston and the design he produced, Romanesque in general character, may be regarded, however, as rather transi¬ tional to that style that he worked in so consist¬ ently in the latter part of his life, and which received its first confirmation in the North Church of Springfield, built by him in 1872. The Brattle Street Church, now known as the First Baptist Church, has a fine tower orna¬ mented below the upper arcade by a bold sculp¬ tured frieze. The church itself is ineffective in respect to the relations of its general masses with this superb tower, and, its acoustic proper¬ ties being imperfect, the work is judged a partial failure.

Trinity Church in Boston was begun in 1872 and finished in 1877. This church shows the perfection of his individual style evolved from his study of the Romanesque churches of southern France. It is cruciform in plan, but its distance from apse-wall to faqade is

only about 39 feet in excess of the distance be¬ tween the two walls of the transepts. This in¬ novation in church architecture has had a powerful effect upon subsequent designs. After Trinity he produced only two other, and these comparatively unimportant churches, though he entered the competition for the Cathedral Church at Albany. His subsequent work was in the designing of municipal or commercial structures, and of these the one by which he wished to be judged was the Allegheny County buildings — courthouse and jail, of Pittsburgh, Pa. These structures, however, he did not live to see completed. Other buildings designed by him are Sever Hall, and the Law School of Harvard University; the city hall at Albany; parts of the New York State capitol at Albany, in which he was associated with Leopold Eidlitz and Frederick Law Olmsted, his individual work being the senate chamber, the governor's room, the Court of Appeals chamber and the western staircase; the chamber of commerce at Cincinnati and the Field building at Chicago. Other buildings such as stores, railway stations, public libraries and private dwellings were de¬ signed by him. Consult Van Rensselaer,

(Henry Hobson Richardson and His Works }

(1888).

RICHARDSON, Sir John, Scottish nat¬ uralist and Arctic explorer: b. Dumfries, Scot¬ land, 5 Nov. 1787; d. Lancrigg, near Grasmere, Scotland, 5 June 1865. He was educated at the University of Edinburgh and in 1807 entered the navy as assistant surgeon. In 1819 he was appointed surgeon and naturalist to Sir John Franklin's expedition to Hudson Bay and the Coppermine River. He was appointed surgeon of the Royal Marines at Chatham in 1824, but accompanied Franklin on his second Arctic ex¬ pedition in 1825, resuming his duties at Chatham in 1827. He was knighted in 1846 and in 1848 set out with Rae in search of Franklin. The search was fruitless so far as finding trace of Franklin, but Richardson gained valuable in¬ formation concerning the physical conditions of North America. In 1855 he resigned his posi¬ tion as surgeon to the Hasler Hospital at Gos¬ port, which he had held since 1838. He was author of the articles ((Ichthyology® and ((Franklin® for the Encyclopedia

Britannica) ; Vols. I and III of (Fauna Boreali-Americana* ; and also published (A Voyage Through Rupert's Land and the Arctic Sea) (1851) ; (The Polar Region) (1861), *etc.*

RICHARDSON, John, Canadian author : b. near Niagara Falls, Ontario, 1797 ; d. United States, about 1863. He served in the Canadian militia in the War of 1812, and later entered the British army, taking part in actions in Spain and attaining the rank of major. He returned to Canada in 1838 and founded The New Era at Brockville, Ontario, in 1840. He removed to Kingston in 1843 and established The Native Canadian there, continuing its publication until 1845. He also served for a time as special correspondent for the London Times. He removed to the United States after 1845 and was there engaged in journalism un¬ til his death. Author of <Wacusta) (1832) ; Eight Years in Canada* (1847) ; (The Guards in Canada* (1848) ; (The Monk Knight of Saint John) (1850) ; (Wau-nan-gee> (1852), *etc.*

RICHARDSON, Maurice Howe, Amer¬ ican surgeon : b. Athol, Mass., 31 Dec. 1851 ; d. 31 July 1912. He was graduated at Harvard in 1873 and took his M.D. there in 1877. He was engaged in the practice of surgery at Boston from 1876 until his death, and attained a foremost place among American surgeons. He was a member of the medical faculty at Harvard from 1879, and was visiting surgeon to the Massachusetts Hospital from 1886. He contributed to Parks' (Surgery by American Authors* ; and to Dennis' (System of Surgery.*

RICHARDSON, Owen Williams, Amer¬ ican physicist: b. Dewsbury, England, 26 April 1879. He was educated at the universities of Cambridge and London, and was a fellow of Trinity College, Cambridge, in 1902-08. In 1906-13 he was professor of physics at Prince¬ ton University, and since 1913 has occupied that chair at King's College, London. Author of Electron Theory of Matter* (1914) ; Emis¬ sion of Electricity from Hot Bodies) (1916).

RICHARDSON, Rufus Byam, American archaeologist: b. Westford, Mass., 18 April 1845. He was graduated at Yale in 1869, studied divinity at Yale 1869-72, and at Berlin 1872-74. He was professor of Greek at the University of Indiana 1880-82, and at Dartmouth 1882-93, and since 1893 has been director of the Ameri¬ can School of Classical Studies at Athens, Greece. He edited Eschines' (Oration Against Ctesiphon) (1889) ; and contributed frequently to the (American Journal of Archaeology* (1892-1902). He wrote (Vacation Days in Greece* (1903).

RICHARDSON, Samuel, English novel¬ ist: b. Derbyshire, 1689; d. Parson's Green, near London, 4 July 1761. Up to the age of 50 the life of Richardson was not only un¬ eventful, but undistinguished. The son of a joiner of the better class, who had moved from London owing to circumstances vaguely con¬ nected with Monmouth's rebellion, there is no clear evidence that he ever had more than what he calls "common school learning.® His father's means did not permit him to take orders, but as a concession to an early taste for reading, he was, when the family returned to the metropolis, apprenticed to John Wilde, an Aldersgate street printer. Here he exhibited the usual traits of the exemplary apprentice ; proceeded, in due course, compositor, corrector, overseer, and master; and, as in duty bound, eventually married his employer's daughter. From Fleet street, where he first began business, he moved to Salisbury Court (now square) ; set up newspapers and books ; worked on the publications of the Society for the Encourage¬ ment of Learning; and advanced generally in an industrious career. His first wife dying in 1731, he married again, his second wife being the sister of James Leake, a Bath bookseller. Children were born to him by both his wives ; but he was well past middle life before he had acquired any literary reputation, although he had long been known to his friends as what Goldsmith calls <(a dab at an index.® a clever compiler of opportune prefaces and <(honest dedications,® and, above all, a copious and in¬ defatigable letter-writer.

This, from his childhood, had been his hobby. As a boy he was the chartered secre-

iary of all the love-sick girls in the neighbor¬ hood; as a printer's apprentice he had cor¬ responded voluminously with a gentleman who was a (,master of the epistolary style® ; and it is characteristic of the qualities he afterward developed as a novelist, that his communica¬ tions were always of the moral or improving order. Out of these things arose his first liter¬ ary effort. Two bookseller friends, Rivington and Osborn, suggested to him the preparation of a model letter-writer. Richardson at once went farther by proposing that the letters should teach those concerned to think as well as write. Such was the origin of the little-known volume of (Familiar Letters* issued in January 1741. Before it was finished, one of the model epis¬ tles, coupled with the recollection -of some¬ thing he had heard some 20 years before, led him to the composition of a story, also in letters, dealing with the triumphs of chastity in humble life. The idea rapidly grew into the famous 'Pamela; or, Virtue Rewarded) (1740), which not only obtained an immediate and un¬ exampled success, but by superaddine to the patient realism of Defoe a power of minute mental analysis which Defoe did not possess, set a new fashion in fiction. It is this latter quality, together with the transfer of the fable from the impossible land of heroic romance to the very probable region of ordinary life, which gives the Salisbury Court printer his claim to have invented the novel of sentimental analysis as opposed to the novel of manners. Despite the moral professions of <Pamela) many of its scenes are needlessly indelicate; and the final union of the heroine to the man who has re¬ peatedly attempted her ruin is unpleasant, — to say nothing of the fact that there is a sordid air of calculation about the virtue she so vig¬ ilantly preserves. But dealing, as the story did, with real people in a real way, in what was, moreover, a dead season of letters, the book's success is not surprising. Fine ladies raved about it in public places. Clergymen praised it from the pulpit. Pope, sincerely or insincerely, declared it ((would do more good than many volumes of sermons,® and the voices of the con¬ tinuer and parodist were speedily heard in the land.

Of the inevitable sequel, 'Pamela's Conduct in High Life,) by John Kelly of the Universal Spectator, nothing need be said, save that it

forced Richardson upon a continuation of his own, now deservedly neglected. But among the numerous publications prompted by ‘Pame¬ la’s* more assailable side, two in particular re¬ quire to be mentioned. One was ‘An Apology for the Life of Mrs. Shamela Andrews, *a clever but very gross attack upon the inner morality of the heroine. Richardson himself attributed this to Fielding, as did other of his contemporaries; but Fielding is never known to have acknowledged it. Ten months later Fielding issued ‘Joseph Andrews,* which at all events set out with the open intention of burlesquing Richardson, although its writer promptly abandoned this inadequate motive with the development of more important char¬ acters than Pamela Booby, a name which, both in ‘Shamela* and ‘Joseph Andrews,* is cruelly filled in from Richardson’s hero, “Mr. B.® Either of these performances was sufficient to be a thorn in the side of ‘Pamela’s* sensitive au¬ thor. But probably the worst thorn of all was

the success of Fielding’s ‘Tom Jones,* which appeared not long after Richardson’s next novel ‘Clarissa.*

‘Clarissa; or the History of a Young Lady,) usually misnamed ‘Clarissa Harlowe,* was pub¬ lished in 1747-48, in seven volumes and three instalments. The story, which deals with the “Distresses that may attend the Misconduct both of Parents and Children in Relation to Marriage,® is an intensely tragic one. The heroine, a very pure and beautiful woman, is deliberately hunted down by a relentless se¬ ducer, whose eventual death at the hand of her guardian only faintly satisfies poetical justice. But in this book Richardson rises to the height of his powers. Encumbered by a story to be told in letters, and trammeled with his own prolixity, he nevertheless contrives to hold his readers fascinated, not only with the fortunes of his heroine but with the individuality of her despicable but dazzling pursuer, who is drawn with surpassing dexterity. The inter¬ mittent mode of publication added flame to the public interest in the issue; and the writer was bombarded with appeals for a “happy ending.® As to this, he showed more artistic fortitude than might have been expected. Imperfect as his education had been, he had learned from the Spectator that to “make virtue and in¬ nocence happy and successful® was to defeat one of the great ends of tragedy, “the raising of commiseration and terror in the minds of the audience.® So Clarissa Harlowe dies elabo¬ rately of a broken heart; and her history re¬ mains a masterpiece.

By this time Richardson was nearing 60, and might reasonably have

held his hand. But the welcome accorded to Fielding's 'Tom Jones,* coupled with the importunities of his coterie of lady friends, soon engaged him in a third effort, the object of which was to delineate a model good man and fine gentle¬ man combined. This was the 'History of Sir Charles Grandison) (1753-54), a book which still has its admirers, though it does not by any means attain the tragic level of 'Clar¬ issa.* That the hero of such a work should be something of a prig is inevitable : but he has many estimable qualities which are not ridicu¬ lous; and he is surrounded by a bevy of fe¬ male worshippers who are drawn with un¬ questionable skill. Neither Clementina nor Harriet Byron could have been conceived by an inferior artist. It is easy to make fun of the little printer's superexcellent central figure ; but there must, in spite of his long-windedness, have been something in the personage who could attract the admiration of both Ruskin and the Master of Balliol.

Beyond a very popular paper in Johnson's Rambler, Richardson wrote nothing more of importance. He continued to prosper in his business, made money, became Master of the Stationers' Company, and eventually Law Printer to the king. He was a nervous, in¬ offensive, sensitive valetudinarian, delighting in the stimulus of feminine adulation rather than in the robust criticism of his own sex. His style is hopelessly pedestrian and diffuse; but it has an extraordinary cumulative power which attracts, and by degrees detains, the persever¬ ing reader. His faculty of minute imagination is wonderful ; and he gradually acquired an exi traordinary insight into the workings of the

female heart. The English fiction which fol¬ lowed developed itself on somewhat different lines ; but it is impossible to deny to him the credit of inaugurating the novel of sentimental analysis, which for a time became the fashion, even more in France and Germanv than in England. See Clarissa Harlowe.

Bibliography. — Richardson's life has been written by Mrs. A. L. Barbauld, (Memoir > pre¬ fixed to Correspondence* (6 vols., 1804) ;

by Miss C. L. Thomson (1900), and by Austin Dobson, (English Men of Letters) (1902). Consult also Scott's (Lives of the Novelists) (1825) ; Mrs. Oliphant, Blackwood's Maga¬ zine (March 1869) ; H. D. Traill, Contem¬ porary Review (October 1883), and Texte's (Jean Jacques Rousseau,* *etc.* (1895). There are editions of his novels by Rev. E. Mangin (1811) ; Sir Leslie Stephen (1883) ; Mrs. Mc¬ Kenna (1901), and Prof. W. L. Phelps of Yale. There are several portraits of Richard¬ son by the painter Joseph Highmore.

Austin Dobson,

Author of (Life of Richardson, * *etc.*

RICHARDSON, Tobias Gibson, Amer¬ ican surgeon : b. Louisville, Ky., 1827 ; d. 1892. He took his M.D. at the University of Louisiana in 1848 and later occupied the chairs of anatomy and surgery there. He practised for a time in Philadelphia, where he was a member of the College of Physicians and of the American Surgical Association. In 1851, be¬ fore the use of anaesthetics and antiseptics, he successfully extirpated the thyroid gland, the first successful case recorded. He occupied the chair of surgery at Tulane University, New Orleans, in 1858-92 ; and in 1878 was president of the American Medical Association. He wrote many articles and reports for scientific journals and for the (Transactions) of the American Medical Association and the American Surgical Association, and was author of (The Elements of Human Anatomy* (1854).

RICHARDSON, William Adams, Amer¬ ican jurist: b. Tyngsboro, Mass., 2 Nov. 1821; d. Washington, D. C., 19 Oct. 1896. He was graduated at Harvard in 1843, later studied law there and in 1846 was admitted to the bar. He was appointed judge-advocate and governor's aide in Massachusetts; and in 1855 revised the statutes of the State, afterward editing the annual supplements of the general statutes until 1877. He was named judge of probate in 1856, and also judge of insolvency in 1858-72. He became Assistant Secretary of the United States Treasury in 1869 and Secretary in 1873. He resigned in 1874 to accept an appointment as justice of the United States Court of Claims, of which he was chief justice in 1885-96. He was lecturer and professor in the Georgetown Law School, District of Columbia. Author of (The Banking Laws of Massachusetts) (1855) ;

(Practical Information Concerning the Debt of the United States* (1872) ; < History of the Court of Claims> (1882-85), *etc.*

RICHELIEU, Armand Jean du Plessis de,

ar-man zhon dii ples-se resh-le-e, Eng. resh'loo, Cardinal, Due de, French prelate and states¬ man: b. Paris, according to Jal, who cites a register of baptism, 9, not as usually stated, 5 Sept. 1585; d. Paris, 4 Dec. 1642. Armand was the third son ; his father lost his life at the

siege of Paris, 10 July 1590, and the mother was left with five children and an estate heavily encumbered with debt. By practising careful economies she liquidated the debt and brought up the children as befitted their rank. In 1594 the future cardinal entered the College de Navarre, Paris, where he made a brilliant course in grammar and philosophy. He next entered a (<finishing school® in preparation for the life of a courtier and where his training was directed toward a military career. This career was cut short when Alphonse, his elder brother, refused the bishopric of Lugon, prefer¬ ment to which had been vested in the Richelieu family by Henry III. Armand was thereupon induced to enter the Church. At 21, in 1606, Henry IV nominated him bishop of Lugon. He obtained from the Pope a

dispensation allowing him to accept the office though under age, and on 16 April 1607 was consecrated by the Cardinal de Givry in presence of the Pope himself (Paul V). For several years he devoted himself to the duties of his see, reforming abuses and laboring for the conversion of Protestants. But his ambi¬ tion always made him turn his eyes toward the court, and having come to Paris in 1614 as deputy of the clergy of Poitou to the States-General he managed to insinuate himself into the favor of the queen-mother, who obtained for him the post of grand-almoner, and in 1616 that of Secretary of State for War and Foreign Affairs. On the disgrace of the queen-mother (1617) Richelieu fell with her, and was ban¬ ished first to Blois and then to Avignon. In 1620 he managed to effect a reconciliation be¬ tween Mary of Medici and her son, Louis XIII. On 5 Sept. 1622 he obtained through her influence the cardinal's hat, and on 19 April 1624 was admitted into the Council of State. No sooner was Richelieu secure in his high post than he began systematically to extend the power of the Crown by crushing the Hugue¬ nots and overthrowing the privileges of the great vassals, and to increase the influence of the French monarchy by undermining that of the Hapsburgs, both beyond the Pyrenees and in Germany. Louis XIII, sensible of the energy of his Minister, favored his plans, though he always showed a dislike for the man, whom he would gladly have destroyed had he been able to govern without him. The Huguenots had for a long time resisted the royal power; and bloody insurrections, in several preceding reigns, had arisen from their struggles in their attempts to gain political and

religious power. The wis¬ dom and mildness of Henry IV had, indeed, assuaged the excitement of the contending parties, but his reign was too short to extin¬ guish the fires. Richelieu resolved to crush the weaker by the aid of the stronger party, and thus to deprive those who should be disposed to resist his schemes of their main prop. The rallying-point of the Huguenots was Rochelle ; and Richelieu neglected no means to make himself master of that city. In the celebrated siege of Rochelle he commanded the army in person.

Rochelle, supported by England, from which it continually received supplies, held out for a long time against all the efforts of the cardinal; and the hope of reducing it was already nearly abandoned, when Richelieu, by the erection of an immense mole, cut off the communication

by sea, and finally compelled it to surrender by famine (1628). It would be a mistake to see in this war that Richelieu waged against the Huguenots an example of religious intoler¬ ance, for although this would have been quite in keeping with the spirit of his time, Richelieu was, with respect to this matter, in advance of his age. He destroyed the political conse¬ quence of the Huguenots as a separate body within the state, but by the Peace of Alais or Edict of Grace, which concluded the war (June 1629), he left them liberty of worship and equality of civil rights, and throughout his ministry employed them, with other citizens, in the army, the magistracy and offices con¬ nected with the revenue. During the continu¬ ance of this war Richelieu had taken various steps in pursuance of the other main end of his internal policy, the overthrow, of the power of the great nobles. In 1626 he ordered the demolition of all those feudal fortresses which could not be used for the defense of the fron¬ tiers, and which were a perpetual menace to the Crown. The next step was the removal' from court of the queen-mother who had be¬ come hostile and endeavored to obtain Riche¬ lieu's downfall. Saint Simon represented to the king the services of Richelieu and the im¬ possibility of dispensing with his aid. Louis, therefore, ordered him to Versailles, and assigned him

apartments in the palace directly below his own. This day (10 Nov. 1630), on which the hopes of the queen and of the cardi¬ nal's enemies were disappointed, was called the ((Day of the Dupes® (<(la Journee des Dupes®). The queen-mother was banished to Compiegne, her friends removed from place and some of them thrown into the Bastile. This step, and the almost total annihilation of the privileges of the parliaments and the clergy, excited all classes against the despotic admin¬ istration of the cardinal, and the discontent broke out in numerous risings and conspiracies, which, however, were not only suppressed by the prudence and vigor of his measures, but also contributed to the furtherance of his plans, and gradually rendered the royal power entirely absolute. In 1632 the royal arms, directed by Richelieu (in the previous year raised to the rank of duke), suppressed the rising in favor of the Duke of Orleans, the king's brother, to which the Duke of Montmorency had been induced to lend his support. Even those whom the king privately favored were obliged to yield to the all-powerful Minister, and paid with their lives for their rashness in venturing to oppose him, as in the instance of Cinq-Mars, who in 1642 had entered into a conspiracy against him, which the king was, not without reason, believed to have favored. While the Minister was thus extending the power of the Crown at home he did not neglect the aggrandizement of the mon¬ archy abroad. The Thirty Years' War gave him an opportunity of effecting this object. The same man who pursued, with the great¬ est severity, the Protestants in France, employed all the arts of negotiation, and eyen force of arms, to protect the same sect in Germany, for the purpose of humbling the house of Austria. In the early stages of the war he subsidized Count Mansfield. Subsequently Gustavus Adolphus, king of Sweden, the great bulwark of religious liberty in Germany, re-

ceived aid of every kind from Richelieu as long as he was not in danger of becoming formidable to France ; but when the brilliant victories of Gustavus gave the cardinal reason to consider his power as more dangerous than that of Austria he abandoned that prince in the midst of his successes. The war which he undertook against Spain, and which continued till 1659, put France in possession of Catalonia and Roussillon, and the separation of Portugal from Spain was effected by his assistance (1640).

Richelieu must be allowed to have deserved the character of a great statesman ; he cannot be denied the glory of having raised the power of the sovereign in France to its highest pitch; but he was proud, arrogant and vindictive. He was a patron of letters and art, and

founder of the French Academy and the Jardin des Plantes. Louis XIII died a few months after him; but in the long reign of Louis XIV the effects of Richelieu's policy were yet visible.

Richelieu was a voluminous writer; his most important works may be consulted in (Memoires sur la regne de Louis XIIP (in Col¬ lection Petitot, Paris 1823 et seq.) ; (Memoire d'Armand du Plessis de Richelieu, eveque de Lugon, ecrit de sa main, l'annee 1607 ou 1610, > edited by Baschet, A. (Paris 1880) ; (Lettres, instructions, diplomatiques, etc.,* edited by Avenal, G. d' (8 vols., Paris 1853-77) ; Testa¬ ment politique d'Armand du Plessis, Cardinal de Richelieu* (Amsterdam 1687). For extended biography consult Avenal, G. d', (Richelieu et la monarchic absolue) (2d ed., 4 vols., Paris 1895) ; Barriere, J. F., (Memoirs of the Duke de Richelieu* (New York 1904) ; Caillet, J., (L'Administration en France sous le ministere . du cardinal de Richelieu) (new ed., 2 vols., Paris 1863) ; Fagniez, G., (Le pere Joseph et Richelieu) (2 vols., Paris 1894) ; Hanoteaux, G., (Histoire du cardinal de Richelieu) (Paris 1893) ; Lodge, R., <Richelieu) (London 1896) ; Martineau, A., (Le cardinal de Richelieu) (Paris 1865) ; Perkins, J. B., (Richelieu and the Growth of the French Power> (New York 1900) ; Topin, M. J. F., (Louis XII et Richelieu) (Paris 1885).

RICHELIEU, (also called CHAMBLY, SOREL and SAINT JOHN), river of Que¬ bec, Canada, leaving Lake Champlain at its northern extremity and flowing in a direct northerly course to Saint Lawrence River, which it enters at the southern end of the widening of the river known as Lake Saint Peter. Near the centre of its course the Riche¬ lieu River widens into the basin of Chambly and it is canalized above there in order to avoid the rapids and maintain navigation from the Hudson to the Saint Lawrence. The town of Sorrel lies on its east bank as it enters Lake Saint Peter.

RICHEPIN, resh-pan, Jean, French poet novelist and dramatist : b. Medeah, Algeria, 4 Feb. 1849. He began the study of medicine with his father, a physician, but gave it up and entered the ficole Normale in the department of literature. After 1870 he engaged in jour¬ nalism, editing L'Est, and contributing to Mot d'Ordre, the Corsair e and Verite, in which lat¬ ter he published (Les etapes d'un refractaire.* Shortly afterward he published (Chanson des Gueux,* for which he was fined and obliged to spend a month in prison, during which time he

wrote (Morts bizarresP Works of this char¬ acter have placed him among the most ad¬ vanced of the naturalistic school ; the boldness of his expression and the license of his subject have brought to him both applause and con¬ demnation. In reply to criticism he admitted in 1881, in defense of his works, that his coarse¬ ness was perhaps unnecessary and repugnant, but not immoral. His works include verses under titles such as <Caresses) (1877) ; blas¬ phemes* (1884) ; La mer) (1886) ; (Mes paradis* (1894) ; of romances (Madame Andre* (1874); (Sophie Monnier> (1884); (Cesarine> (1888) ; (Bravesgens) (1888), besides many others; and of dramas (Nina Sahib) (1882); (Monsieur Scapin> (1886) ; (Le Filibustier) (1888) ; bar le glaive> (1892) ; <Vers la joie) (1894); <Chemineau> (1897). He published also a work entitled (Theatre Chimerique* (1896) ; in 27 acts in prose and verse.

RICHER, re'sha', Edmond, French Roman Catholic priest: b. Chaource, Sube, 1560; d. Paris, 1631. He was educated for the Church and was a parish priest in 1590-94, when he became director of the College of Cardinal Lemoine. Soon afterward he became also syn¬ dic of the Theological Faculty of Paris. While in these positions he opposed the doctrine of the infallibility of the Pope, defending his posi¬ tion in *De Ecclesiastica et Politica Potestate' (1611; published, 2 vols., 1629). This work brought a furious attack upon him and he was deposed from his offices. The intercession of the university saved him from imprisonment and in 1627, under pressure, he made a retrac¬ tion of his arguments. He had made further explanation of his position in (Historia Concili-orum Generalium* and (Histoire du syndicat de Richer, * published posthumously in 1683 and 1753, respectively. He was also author of (Apologia pro J. Gersonio) (1674), *etc.*

RICHER, Paul, French neurologist: b. Chartres, 17 Jan. 1849. He was educated at Paris, taking his M.D. in 1879. From its foundation in 1882 until he resigned in 1895 he was director of the laboratory of the Sal-petriere clinic of nervous diseases. He was elected to the Academy of Medicine in 1898, and was appointed professor of anatomy at the Lcole des Beaux Arts in 1903. He is also well known for his artistic capabilities, is a draughts¬ man of ability and has written successfully on art topics as well as on medicine. His medical works include (Etudes cliniques sur la grande hysterie ou hystero-epilepsie* (1885) ;

(Paralysies et contractures hysteriques* (1892). He collaborated with his instructor in art in writing (Les demoniaques dans l'art* (1886) ; (Les difformes et les malades dans l'art* (1889), and was sole author of <Anatomie artistique) (1890) ; (Physiologie artistique de rhomme en mouvement* (1895) ; (Nouvelle anatomie artistique du corps humain) (1906).

RICHET, re'sha', Charles Robert, French

physiologist: b. Paris, 16 Aug. 1850. He was educated at Paris, taking his degree in medicine in 1877 and in science in 1878. He was con¬ nected with the Faculty of Medicine at Paris from 1878, and in 1887 succeeded De Bedard as professor of physiology. He was elected to the Academy of Medicine in 1899. He achieved a considerable literary reputation not only as a writer on scientific subjects but on international

peace and other subjects, and he also published a volume of verse (1875) under the pseudonym Charles Epheyre. He is famous for his re¬ search into the phenomenon which he named "anaphylaxis® (q.v.), which he explained with Portier in 1902. He received the Nobel Prize in Medicine in 1913. Author of <Les poisons de l'intelligence* (1877) ; Structure des cir-convolutions cerebrales) (1878); (Essai de psychologie generate* (1887) ; (Dictionnaire de physiologie) (4 vols., 1895-1906) ; L'Anaphy-laxie> (1911); (Les Guerres et la Paix,* *etc.*

RICHFIELD, Minn., village in Hennepin County, near Fort Snelling, and forming a suburb of Minneapolis, on the Dan Patch Elec¬ tric Railroad. It has extensive greenhouses and market gardening interests. Pop. 2,673.

RICHFIELD, village in Utah, county-seat of Sevier County, on Denver and Rio Grande Western Railroad, 135 miles south of Salt Lake City. It was incorporated in 1878. It is the centre of an agricultural and stockraising region. The public school system includes a high school founded in 1896; there is also an association library. Pop. (1920) 3,362.

RICHFIELD SPRINGS, N. Y., village in Otsego County, on the Delaware, Lackawanna and Western Railroad, about one mile from Schuyler Lake, 25 miles south by east of Utica and 13 miles north by west of Cooperstown. It is in a productive agricultural region ; but the village is a well-known health resort on account of its large number of

mineral springs. It is also a famous summer resort. Nearby are many places of attraction, as Otsego Lake and vicinity. It has several small manufacturing establishments which more than supply local needs. The place was settled about the middle of the 18th century, but a permanent settlement was not made until after the Revolution. It was one of the favorite localities of the Indian tribes of eastern New York. Pop. about 1,650.

RICHFORD, Vt, town in Franklin County, on the Missisquoi River, and on the Central Vermont and Canadian Pacific railroads, 45 miles northeast of Burlington. It was first settled in 1795 and incorporated as a village in 1878. The town is built on both sides of the river which affords good water power; the lumber interests exceed all others in import¬ ance, and there are several lumber, saw and planing mills, furniture factories, butter and dairy products, sugar evaporators, clothing manufactories, *etc.* It is also in a maple-sugar and agricultural region, and has a good trade, being a port of entry from Canada. The town's real estate is valued at $1,076,940 and the per¬ sonal property valuation is $431,625. There are one graded and six rural schools. The govern¬ ment building contains the post office and custom-house ; there is also the town-hall, con¬ taining library, clerk's office, public hall, lockup, *etc.* The customs receipts are about $100,000 annually, the expenses $12,000; the post office receipts $8,000. Pop. (1920) 1,995.

RICHLAND CENTER, Wis., city, county-seat of Richland County, on Pine River, and on the Chicago, Milwaukee and Saint Paul Railroad, 55 miles northwest of Madison. It was settled in 1849 and was made the county-seat in 1852. It is the centre of an agricultural, stockraising and dairying region, and has a

large export trade in flour, cheese, *etc.* The river furnishes water power for manufacturing, and the city contains flour and saw mills, a tannery and brick kiln. There is a public high school. Pop. (1920) 3,409.

RICHMAN, Irving Berdine, American lawyer and diplomat : b. Muscatine, Iowa, 27 Oct. 1861. He was graduated from the State University of Iowa in 1883 and admitted to the bar in 1885. He was elected to the lower house of the State legislature in 1889 and 1891, and was United States consul-general in Swit¬ zerland, with residence at Saint Gall, 1893-98. He has published (J°hn Brown Among the Quakers and Other Sketches5 (1894) ; 'Ap-penzell; Pure Democracy and Pastoral Life in Inner Rhoden) (1895); 'Rhode Island: Its Making and Meaning, 5 a historical work of much importance (1902) ; 'Rhode Island, a Study in Separatism5 (American Common¬ wealths Series, 1905) ; 'California Under Spain and Mexico) (1911). Mr. Richman (Litt.D., Brown, 1904) is a member of the Iowa His¬ torical Society, an honorary member of the Rhode Island Historical Society and a corre¬ sponding member of the Hispanic Society of America.

RICHMOND, Charles Alexander, Amer¬ ican educator and Presbyterian clergyman: b. New York, 7 Jan. 1862. He was graduated at Princeton in 1883 and at the theological semi¬ nary there in 1888, being ordained in the Presbyterian ministry in 1888. He held a pas¬ torate at East Aurora, N. Y., in 1888-94, and at Albany, N. Y., in 1894-1909. Since 1909 he has been president of Union College and chan¬ cellor of Union University. Author of 'The Four Winds) (1902) ; 'Safeguards of American Democracy > (1913).

RICHMOND, Charles Lennox, 3d Duke

of, English diplomat and statesman : b. Lon¬ don, 22 Feb. 1735; d. Goodwood, Sussex, 29 Dec. 1806.' He succeeded to the peerage on the death of his father in 1750, was appointed Ambassador Extraordinary to Paris in 1765 and in 1766 became Secretary of State under the Rockingham administration. He was strongly opposed to the policies which resulted in the American War for Independence, and in 1778 he opened the debate which demanded the withdrawal of troops from America, his opinion being that the position of the colonists was "neither treason nor rebellion, but is per¬ fectly justifiable in every political and moral sense.® He also pursued a sympathetic course in regard to Irish affairs, advocating "an union, but not of legislature, but an union of hearts, hands, of affections and interests.® He served in Rockingham's second cabinet, and in 1784 joined Pitt's ministry. His views on Parlia¬ mentary reform were far in advance of his period, but after his affiliation with Pitt he be¬ came a Tory. He was created a Knight of the Garter in 1782.

RICHMOND, Countess of. See Beau¬ fort, Margaret.

RICHMOND, Dean, American capitalist: b. Barnard, Vt., 31 March 1804; d. New York, 27 Aug. 1866. He engaged successfully in the refining and selling of salt at 15, was a director in a Syracuse bank before he was of age and afterward engaged as a shipping and produce

merchant at Buffalo. He was a leader in the movement which consolidated seven separate corporations into the New York Central Rail¬ road Company in 1853, was its vice-president in 1853-64 and president in 1864-66. He was a recognized political leader but declined public office.

RICHMOND, Legh, English clergyman : b. Liverpool, 29 Jan. 1772; d. Turvey, Bedford¬ shire, 8 May 1827. He was graduated from Cambridge in 1794, took orders in the Church of England in 1797 and in 1798 became curate of Brading in the Isle of Wight. In 1805 he was appointed chaplain in the Lock Hospital, London, and later in the same year became rector at Turvey, where he remained until his death. He was well known as a leader in the evangelical party and wrote several tracts which were widely circulated, among them 'The Dairyman's Daughter, 5 of which more than 4,000,000 copies in 19 different languages were circulated; 'The Negro Servant, 5 *etc.* He also published 'The Fathers of the English Church, or a Selection from the Writings of the Re¬ formers and Early Protestant Divines of the Church of England) (8 vols., 1807-12). Con¬ sult ' Memoirs, 5 by Grimshawe (1826; edited by Bedell, 1846).

RICHMOND, Sir William Blake, English painter: b. London, 29 Nov. 1843. He studied in the schools of the Royal Academy, where he received two silver medals in 1857 and had his portrait of his two brothers hung at the exhibi¬ tion in 1861. He has traveled extensively in Italy, Greece and Egypt, studying the remains of ancient art, whence he has derived many sub¬ jects for his work. From 1878 to 1883 he was Slade professor at Oxford. In 1895 he be¬ came a Royal Academician, and has been pro¬ fessor of painting at the Royal Academy. His works include 'The Procession of Bacchus) (1865-68) ; 'The Life of Women) (1870), a series of frescoes for J. S. Hodgson of Hasle-mere; 'Electro at the Tomb of Agamemnon5 (1877) ; 'Behold the Bridegroom Cometh5 (1881) ; 'Release of Prometheus5 (1882); 'Audi¬ ence at Athens during the Representation of Agamemnon5 (1885), now in the Birmingham Gallery. He has painted portraits of Darwin, Gladstone, Browning, William Morris, Holman Hunt and Lord Lyttelton. Most notable of his works are the interior decorations and

the glass mosaics of Saint Paul's Cathedral. This work was executed by a staff trained under his per¬ sonal supervision. He is an earnest advocate of the development of mosaic work in England, believing that this art should be applied only in the country and under the conditions of light in which the finished product is to remain. Con¬ sult his article on Mosaics in Vol. XXXI of the New Volumes of the 'Encyclopaedia Britannica.5

RICHMOND, Cal., city in Costa County, 10 miles northwest of Oakland and six miles by water northeast of San Francisco, on the west side of San Francisco Bay and on the Atchison, Topeka and Santa Fe and the Southern Pacific railroads. It has a fine natural deep-water frontage six miles long. It is the terminus of the Standard Oil pipe lines and the home port of the company's fleet of vessels, and there is a large oil refinery. Other

industries of the town include porcelain bath¬ room fittings, brick, pipe and steel works, car¬ bon products, chemicals, furniture and wine. There are also railroad machine shops and yards, and Pullman car shops. The city has grown rapidly. Pop. (1910) 6,802; (1920 Fed¬ eral census) 16,843.

RICHMOND, Canada, the capital of Rich¬ mond County, Quebec, 72 miles east of Montreal, on the Saint Francis River, an affluent of the Saint Lawrence, and on the Grand Trunk Railroad. Its chief institution is Saint Francis College, affiliated to McGill Uni¬ versity. The town has railway works, machine shops, shoe last factory, sash and door factory and other industrial establishments. There are three banks. The value of all taxable prop¬ erty is estimated at $1,000,000. The educational establishments include a high school, a Brothers' school and convent. The principal buildings are the town-hall, post office, convent, high school, Roman Catholic church, Methodist church, *etc.* The government is vested in a mayor and councillors. Pop. about 2,300.

RICHMOND, England, an ancient town in the county and 50 miles northeast of York (North Riding), on the left bank of the Swale. In and around the town are numerous interest¬ ing remains of antiquity, the most remarkable of which is the castle, comprising an area of nearly six acres, and one of the most majestic ruins in England; its great tower, about 100 feet high, is a fine and very perfect specimen of the Norman keep. Pop. about 4,000.

RICHMOND, Ind., city, county-seat of Wayne county, on the Whitewater River, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Grand Rapids and Indiana railroads, 68 miles east of Indianapolis and 70 miles north¬ west of Cincinnati. The Richmond Interurban and the Dayton and Western traction lines con¬ nect the city with all nearby places. Richmond was settled and laid out in 1816 by Friends from North Carolina. It was incorporated as a bor¬ ough in 1834 and chartered as a city in 1840. The city has about 300 manufacturing establishments, employing about 3,500 persons. The chief manufactures are threshers, drills, plows, en¬ gines, boilers, carriages, milling machinery, clothing, flour and dairy products. It is the commercial and industrial centre of a large portion of the county. It has a number of fine public buildings, chief of which are the

churches and schools. There are 26 churches, 10 public school buildings, two Roman Catholic parish schools and one Lutheran parish school. Other educational institutions are Earlham Col¬ lege (Friends), Saint Mary's Academy (Roman Catholic), one business college and the Morrison-Reeves Free Public Library. The East¬ ern Indiana Insane Hospital, a State institution, is located here; also other charitable institu¬ tions. The government is vested in a mayor and a council of 14 members elected biennially by the people. The metropolitan police board is appointed by the governor. Pop. (1920)

26,728.

RICHMOND, Ky., city, county-seat of Madison County, on the Louisville and Nash¬ ville Railroad, about 25 miles south-southeast of Lexington and 135 miles east-southeast of Louisville. It is in an agricultural region; in

the vicinity is found an excellent building stone. The chief manufactures are tobacco and dairy products, and the trade is chiefly in farm and tobacco products, cattle and horses. Its educa¬ tional institutions are Madison Institute, under the auspices of the Church of the Disciples, Walter's Collegiate Institute, a Presbyterian' institution, and public elementary schools. One of the most desperate battles of the Civil War was fought at Richmond. The Confederate forces under E. Kirby Smith defeated a much larger Federal force under Manson and Nelson. Pop. (1920) 5,622.

RICHMOND, Me., town in Sagadahoc County, on the Kennebec River and on the Maine Central Railroad, 37 miles north-north¬ east of Portland. It was first settled in 1700; in 1719-20 a fort was erected here for the de¬ fense of the settlers against the Indians; this fort twice resisted attack, and was finally dis¬ mantled in 1754. The town was incorporated in 1823. The chief industries of the town include a cotton mill and shoe factory, ice cutting and agriculture ; there are also saw and planing mills and some trade in lumber. The town has a pub¬ lic high school, with which the Richmond Academy (incorporated 1861) was united, and also a public library. Pop. about 2,000.

RICHMOND, Mo., city, county-seat of Ray County, on the Atchison, Topeka and Santa Fe Railroad, 58 miles southeast of Saint Joseph. The

county-seat was removed to Richmond from Bluffton in 1827. It is the centre of a fertile agricultural and stockraising region; and there are coal mines in the vicinity which yield excellent quality of bituminous coal. It also has wagon and plow factories, flour mills' and a foundry. It contains the county court¬ house and has electric lights and modern water¬ works. It is well provided with educational facilities, having two public high schools, of which one, the Lincoln High, is for colored pupils; and is also the seat of Woodson Insti¬ tute, a coeducational secondary school under the auspices of the Methodist Episcopal Church, South. Pop. (1920) 4,409.

RICHMOND, Va., city, port of entry, capi¬ tal of the State, county-seat of Henrico County, on the James River, the Richmond-Washington Railroad Line, the Atlantic Coast Line, the Chesapeake and Ohio, the Seaboard Air Line and the Southern railroads, about 115 miles almost due south' of Washington, D. C., and 90 miles from the mouth of the river at Chesapeake Bay. Area, including the suburbs, 26 square miles. The surface is hilly, rising from the river and the valley of Shockoe Creek in a series of Fills, almost terrace-like in forma¬ tion, until it reaches altitudes of from 170 to 250 feet above sea-level, at which altitudes there are plateaus constituting the principal resi¬ dential sections. It was originally built on seven hills and was often called the "Modern Rome.* In 1842, when Charles Dickens visited the city, it had extended its limits to another hill, and he wrote of it as ˆdelightfully situ¬ ated on eight hills overhanging James River.* Regular lines of steamers, the Virginia Navigation Company and Old Dominion, con¬ nect the city with Atlantic and Chesapeake ports and furnish a cheap outlet for shipping products to other parts of the United States

RICHMOND, VA

1 Washington Monument, near State Capitcl

2 Capitol Square, showing the City Hall Building

RICHMOND, VA

1 The Capitol at Richmond, designed by Thomas Jefferson

2 St. John’s Church, Richmond, where Patrick Henry made his famous speech

and to foreign ports. James River (q.v.) fur¬ nishes water power which is used extensively for manufacturing and for electrical develop¬ ment which propels the entire street-car system and supplies the electric lights of the city. Several bridges (five railroad and two for vehicles, street cars and foot passengers) cross James river and connect the two sections of the city lying on its opposite banks and afford ready access to its suburbs — Forest Hill Park, Bon Air, Granite, Spring Hill and other places on the south side of the river. The streets are all fairly wide, Main, the chief financial thoroughfare, is a broad, well-built street; Broad, the shopping district, is the widest street in the city; Grace and West Frank¬ lin, as well as some of the avenues and suburbs, are residential sections. The water supply, which is excellent for domestic and all other purposes, is obtained from the James River at two points above the city. The water is pumped into two reservoirs from which it is piped for distribution through¬ out the city. The plant comprises an extensive settling basin and system for insuring its clari¬ fication at all times. The natural drainage makes the city healthful, and warm winters and temperate summers attract many home seekers who desire a mild climate.

Industries. — The chief industries of the city are connected with the preparation of tobacco for local use and for shipment to out¬ side markets. Recent statistics give the annual value of ˆ cigars, cigarettes, smoking, chewing and reprising tobacco manufactured at $30,- 806,680; foundry, machine-shop products and agricultural implements amounted to $18,850,- 390 ; fertilizers, chemicals, cement, etc., to $10,987,560; flour milling, cornmeal, etc., to $8,695,750; paper and paper products to $5,958,- 150; printing, publishing, etc., to $5,985,570; boots and shoes to $5,013,355 ; other manufac¬ turing establishments produce wagons and car¬ riages, locomotives, ammunition, lumber, sad¬ dlery, harness, hides, leather, drugs, medicines, perfumery, *etc.* The manufacturing concerns number 2,226, employing 32,905 hands. The capital employed is $37,342,940; the total annual sales amount to $135,239,212.

Commerce. — The location and the facilities for transportation make

Richmond the com¬ mercial centre of a large extent of southeastern Virginia, and an important point of distribu¬ tion for the Carolinas and adjoining Southern States. Richmond has about $17,150,000 in¬ vested in the jobbing trade, with annual sales of $120,934,665. Post-office receipts amount to more than $1,000,000 annually (for 1918 they were $1,290,707) ; internal revenue receipts to $20,000,000, and the Custom House collects duty annually of over $1,000,000 (in 1918, $10,029,948), although the city's imports and exports are principally cleared through the cus¬ tom-houses of New York and other northern ports. The amount of trade with the United States Atlantic Coast cities and the cities and towns of the interior of the State is very large.

Banking and Finances. — The city has over 30 banking institutions, including seven national banks. There are also State banks, savings banks, trust companies, private bankers and brokers and loan and deposit companies. Rich¬ mond is a national reserve city and the seat

of the Federal Reserve Bank for the Fifth Dis¬ trict. The combined resources of the banks ex¬ ceed $160,000,000; they have a combined capital and surplus of $21,302,599; deposits amount to $102,095,240, and bank clearings for 1918 to $2,404,367,314. The property valuation of Rich¬ mond is $230,299,969 ; public assets amount to $23,613,85 2. The public debt is $14,252,095. Building operations have averaged nearly $5,000,000 during a recent period of five years, and annual real estate sales amount to $20,712,- 516. The tax rate is reasonable.

Government. — Richmond is governed by a mayor, council and four directors of depart¬ ments acting under the mayor ; has highly effi¬ cient police and fire departments, the latter with partially motorized apparatus and equipment. The municipal assets include waterworks, gas plant, city hall, parks, market houses, school buildings, *etc.*

Public Buildings, Parks and Monuments. —

Richmond is historic ground and her noted pub¬ lic buildings are valued not only on account of their association but also for the architectural merits which they possess. Capitol square, on Shockoe Hill, has an area of 12 acres. It takes its name from the State capitol, which is on the square. The capitol was built after a model procured by Thomas Jefferson when he was in France, and which was patterned after the Maison Carree of Nunes, an ancient Roman temple, the columns being changed, however, from the Corinthian to the Ionic.

The corner¬ stone was laid in 1785, and on 19 Oct. 1789, the eighth anniversary of the surrender of Lord Cornwallis at Yorktown, the Virginia State legislature convened in the new capitol. The model for the capitol is still in the building. In the rotunda is the most valuable piece of marble in America, Houdon's statue of Wash¬ ington, modeled from life. The general assembly of Virginia (1903-04) appropriated $250,000 for the purpose of adding wings to the east and west sides of this building, for steps to the imposing portico at the southern end and for some interior improvements. These addi¬ tions are in harmony with the architectural style of the original building and preserve its most characteristic features while they furnish additional room, much needed by the general assembly and the various State departments.

On the same square is the library building, which contains the parole signed by Lord Corn¬ wallis at Yorktown, the original Virginia Bill of Rights, and the Virginia ordinance of seces¬ sion. The executive mansion is on this square, on land which was once a part of Nathaniel Bacon's plantation. The old building known as the Bell House has many interesting associa¬ tions. The old bell, purchased in 1790, was for years a ((voice to the people.®

Among the famous pieces of statuary on the grounds is the equestrian statue of Wash¬ ington, by Thomas Crawford (q.v.). Of the statues at the base Crawford completed only Thomas Jefferson and Patrick Henry, the other pieces, George Mason, John Marshall, Thomas Nelson and Andrew Lewis, were made by Ran¬ dolph Rogers. Nearby stands a fine marble statue of Henry Clay, by Joel T. Hart; also several other marble statues and a bronze statue of <(Stonewall® Jackson, by Foley. Three fountains add to the beauty of the square.

The William Byrd Park, the largest of the city, has an area of 300 acres. It has two lakes, a fine boulevard and the chief city reservoir. The Joseph Bryan Park — a gift to the city from the family of the late Joseph Bryan — con¬ tains 262 acres. Monroe Park has many fine trees and some good pieces of statuary. Libby Park is on Libby Hill. It is terraced from Main street to the summit, and a monument in honor of the Confederate soldiers and sailors stands on the highest point. Chimborazo Hill Park has an area of 36 acres. A government road leads from the park to the National Cemetery, where are buried 6,547 Federal soldiers who fell in the attempts to capture the city during the Civil War. Jefferson Park is between Pleasant and Marshall streets; Gamble's Hill Park is on a relic of the James River and Kanawha Canal, still used as a race to a number of important waterpower plants. It also overlooks the famous Tredegar works, where cannon were made, and the no less famous Belle Isle, the site of the Old Dominion Iron and Nail Works, where a number of Federal prisoners were con¬ fined during the war between the States. Lee Circle, in the western part of the city, has a bronze equestrian statue of Robert E. Lee (q.v.), by Mercie, a French sculptor. It rep¬ resents the general on ˆTraveller,® his well-known war horse. In Howitzer Park is a monument in memory of the Richmond-Howit- zer battalion. A favorite drive is the one to Hol¬ lywood, where sleep 12,000 Confederate soldiers. A monument of granite, pyramidal in form, 90 feet high and softened by a covering of Vir¬ ginia creeper and ivy, has been erected to the memory of the dead Confederate soldiers. Many of Virginia's famous men are buried here. Tyler and Monroe, Presidents of the United States; John R. Thompson, the poet; Matthew F. Maury, ((Pathfinder of the Seas®; John Ran¬ dolph; Jefferson Davis, President of the Con¬ federacy, and a number of Confederate gen¬ erals. The most noted parks and squares have a combined area of 358 acres; but the little squares and circles, not mentioned as noted, ornament the city and give it an artistic appearance.

Other historic and prominent landmarks are the residence occupied by General Lee and his family, now the home of the Virginia Histori¬ cal Society; the house occupied by Jefferson Davis while he was President of the Con¬ federate States; and the famous Monumental Church on Broad street, formerly called Academy" square. At one time a large wooden building, built for an academy of fine arts, oc¬ cupied the present site of the church. In 1788 the old building saw a brilliant

gathering of (<history makers,® who met to discuss the docu¬ ment proposed as the Constitution of the United States of America. Madison, Mason, Marshall, Pendleton, Randolph, Lee, Wythe and others were there, and finally the Constitution as framed at Philadelphia was ratified by Virginia. Only 23 years afterward occurred in the same building at a theatre the terrible disaster which resulted in the death of 72 persons, among whom was the governor of the State. The present church is their monument; the portico extends over their tombs and the charred re¬ mains. The house, once the home of Chief Jus¬ tice Marshall, stands on the street named in his

honor. Saint John's Episcopal Church, built in 1740, is in an excellent state of preservation and is still used for religious services. Richard Randolph, who superintended the building of the church, was a descendant of Pocahontas. In the quaint old churchyard surrounding it is the grave of George Wythe, one of the signers of the Declaration of Independence. In this church, on 20 March 1775, was held the famous Virginia Convention which met to hear a re¬ port of the first Continental Congress, and to discuss the political situation of the country. The convention feared to hold a session in Williamsburg, the capital, on account of the hostility of Lord Dunmore. The church was the only place in Richmond large enough for the assembly. It was at this convention that Patrick Henry made his famous speech, ending with the words: <(Is life so dear, or peace so sweet, as to be purchased at the price of chains and slavery? Forbid it. Almighty God! I know not what course others may take, but as for me, give me liberty or give me death.® The place where the patriotic orator stood is pointed out to strangers. Another interesting event oc¬ curred on 6 Jan. 1781, when Benedict Arnold, at the head of a British force of 900, entered the city, and a number of the soldiers were quartered in this old church. The oldest house in Richmond, a stone building on Main street, was built in 1737 by Jacob Ege. It is now used as a historical museum. The Valentine Museum contains over 100,000 archaeological specimens, also many fine pictures and statues. This valu¬ able museum was given to the city by Mann S. Valentine. His brother, Edward V. Valentine, the sculptor, has given to the museum several valuable pieces of statuary. The most costly and the most ornate building in the city of Rich¬ mond is the citv hall, completed in 1893 at an outlay of over $1,400,000. It is built of Rich¬ mond granite, dressed and quarry-faced, is com¬ pletely fireproof, and commodious in all its appointments.

Education. — The city has an excellent school system ; there are

public and parish elementary schools for white and similar ones for colored pupils, a high school, normal school for whites and one for colored, Virginia Mechanics' In¬ stitute which has evening classes, kindergartens and a number of private schools. The second¬ ary schools and colleges are the Richmond Female Institute (Baptist), founded in 1854; Richmond Female Seminary (Protestant Epis¬ copal) ; Hartshorn Memorial College for Colored Girls (Baptist), opened in 1883; Visita¬ tion Academy (Roman Catholic), founded in 1860; Saint Peter's Academy (Roman Catholic) ; Saint Joseph's Academy (Roman Catholic) ; Saint Patrick's Academy (Roman Catholic) : Sacred Heart Academy (Roman Catholic) ; Saint Mary's Benedictine Institute (Roman Catholic) ; Training School for Kindergarteners; Art School of Art Club, and Saint Andrew's School, the Medical College of Virginia (1837) ; Richmond Theological Seminary (Baptist), opened in 1807 ; Richmond College, opened in 1832; and beyond the city limits, Hartshorn and two others. There are five public libraries with an aggregate of over 60,000 volumes.

Churches. — The city has 130 religious or¬ ganizations and 90 church edifices; 65 for white people and the others for colored. The dif-

ferent denominations rank according to church edifices and organizations as follows : Baptists, Protestant Episcopalians, Methodists, Presby¬ terians, Roman Catholics, Lutherans, Tews, Christians.. Friends. The Roman Catholic Cathedral, built with means supplied through the munificence of Mr. and Mrs. Thomas F. Ryan of New York, is the finest church edifice in the city.

Charitable Institutions and Hospitals. —

There are here Saint Sophia's Home for the Aged, the Sheltering Arms, the Home for In¬ curables, Foundling Asylum, Retreat for the sick, city orphan asylum, Lee Camp Soldiers' Home and Saint Joseph's Orphan Asylum. There are a number of public and church aid societies and various charitable organizations. Saint Luke's Hospital is one of the best equipped institutions in the city.

History. — In May 1607, John Smith, Cap¬ tain Newport and others ascended the James River as far as the place where Richmond now stands. In September 1609, Smith, who was the president at Jamestown, again ascended the river to find a better location for the colony than Jamestown. He purchased from the In¬ dians some land near the present site of Rich¬ mond, and so pleased was he with the place that he called it (<None Such.® ((Forte Charles® was built below the falls, in 1645. In 1675 and in 1687 a further grant of 950 acres was made, which tracts included the land upon which Richmond now stands, but the city was not founded until some years later by Col. William Evelyn Byrd. He seems to have been versed in methods of founding cities which are now called modern. He established two cities ((on paper,® one at Sohocco's to be called Rich¬ mond, and at the «Point of Appamattuck River,® to be called Petersburgh. He engaged Major Mayo to lay out the squares, streets, *etc.* Then he proceeded to advertise his cities, inserting a notice in the Virginia Gazette, April 1737, «that on the north side of James River, near the uppermost landing and a little below the falls, is lately built by Major Mayo a town called Richmond, with streets 60 feet wide, in a pleasant and healthy situation, and well supplied with springs of good water.® Byrd was a learned man as well as a good advertiser. He brought to the New World a large and well selected library, a catalogue of which is in the Franklin Library in Philadelphia. He pro¬ ceeded to build a mill, a warehouse, and such other buildings as were necessary. In its early days the place was called Byrd's Warehouse. In 1742 the assembly of Virginia established the town, and the wide streets and squares were at last laid out. In 1779 the capital of the com¬ monwealth was changed from Williamsburg to Richmond. Then the place was only a number of disconnected houses in small groups, with rough ground and rocks intervening. Benedict Arnold entered the city in 1781 and burned a portion of it, as already mentioned. In 1782 Richmond was incorporated as a city, and in 1785 the foundation of the capitol was begun. This capitol, from its opening in 1789 down to the present, has been the scene of many stirring historical events. In 1798-99 took place the famous debates which ended in the adoption of the resolutions, drafted by James Madison, re¬ garding the interpretation of the Federal com¬ pact. What powerful conventions were held

here when such men as Monroe, Madison, John Randolph and Marshall were members. The convention of 1851 extended the privilege of suffrage, and here in 1861 the Act of Secession was adopted; and in June of the same year, Richmond was made the

capital of the Con¬ federate States. In July 1862, the Congress of the Confederacy convened here and remained in session until April 1865. During the Civil War the city was the great objective point of the chief operations of the Union army in the East. Again and again the Union forces marched to the battle cry ((On to Richmond,® and again and again were they repulsed. For three years, from May 1862 to April 1865, the city was al¬ most in a constant state of siege ; the records tell of 15 pitched battles and 25 skirmishes and sharp engagements which were fought in efforts to capture the city. When its defenders yielded and left the city they set fire to the arsenals and large tobacco warehouses, and burned the bridges directly after crossing them, which caused a most extensive conflagration in the principal business sections. On 27 April 1870, at a contest over the mayoralty before the Su¬ preme Court of Appeals, over 60 persons were killed by the giving away of the floor of the court room. A large number of people were in the building.

The suburbs of Richmond contribute to the charms of the city and to its history pages. The broad, shady avenues of stately, beautiful trees lead out to battle grounds now covered with the houses and business establishments of busy, peaceful people.

The population in 1890 was 81,388 and in 1900, 85,050 but these figures by no means in¬ dicated .the growth and prosperity of the city. With the exception of the annexation of Lee District, which was just beginning to be built up, the corporate limits had not been extended since 1867, and in many quarters the suburbs were thickly settled and were indistinguishable from the adjacent districts of the city. The population was increased by some 30,000, when the much-needed expansion of the city limits went into effect. This placed it where it properly belonged, in the ranks of cities of over 100,000 inhabitants. Pop. (1910) 127,628;

(1920) 171,667.

Consult Henry, W. W., <(Richmond on the James® in (Historic Towns of the Southern States> (New York 1900) ; Mordecai, S., < Richmond in By-Gone Days) (Richmond 1856; 2d ed., 1860) ; “Richmond since the War® in Scribner’s Monthly (New York 1877) ; Wood, <The Industries of Richmond) (Richmond

1886).

F. D. Dunlop,

Secretary and Treasurer Richmond Chamber of Commerce.

RICHMOND (Ky.), Battle of, the most decisive Confederate victory of the Civil War. On 14 Aug. 1862, Gen. E. Kirby Smith left Knoxville, Tenn., to unite with General Bragg in northern Kentucky, He passed through Big Creek Gap of the Cumberland Mountains and, leaving General Stevenson's division to observe the Union forces at Cumberland Gap, penetrated Kentucky with about 6,000 men. Preceded by Col. J. S. Scott's cavalry force of 900 men, he moved in the direction of Frankfort, threaten¬ ing both Louisville and Cincinnati. Gen. Lew

Wallace, with a regiment, hastened from Louis¬ ville to Lexington, and there found other forces, over which he was placed in command; new regiments came from north of the Ohio; but as Wallace was about to move forward and op¬ pose Smith he was superseded by General Nel¬ son, who had been ordered by General Buell to take charge of affairs in Kentucky. Upon his arrival Nelson organized the troops at Lexing¬ ton into a division of three brigades, under Gens. M. D. Manson, Charles Cruft and J. S. Jackson; and hearing that the Confederates were approaching, he sent forward some Ken¬ tucky cavalry to oppose them. There were sev¬ eral sharp cavalry affairs, in which the Union cavalry showed such aggression that Kirby Smith determined to make an immediate attack upon the Union forces at Richmond, although his troops were jaded by long and laborious marches, and General Heth's division of 4,000 men was still far to the rear. He had for the attack Cleburne's and Churchill's divisions of 6,000 men and Scott's cavalry brigade of about 850, and the advance was ordered for the morning of 30 August. Scott's cavalry en¬ countered Manson's brigade about half a mile south of Rogersville, and Cleburne, coming up with two brigades, attacked Manson, who, rein¬ forced by a regiment of Cruft's brigade and a battery, endeavored to turn Cleburne's right, but was repulsed. Meanwhile

Churchill's divi¬ sion 'had come to Cleburne's support ; a brigade flanked Manson's right and drove it back in dis¬ order; and as the rout became general, another of Cruft's regiments came up, but was quickly repulsed with heavy loss. Another posi¬ tion was taken farther to the rear, where the troops were under partial, cover, with artillery on the flanks. This the Confederates soon at¬ tacked; Churchill's division struck Cruft's brigade, which was on the right, and drove .it back in disorder; and Cleburne advancing in front, Manson's entire line went back, the Confederates in close pursuit. Manson had but partially formed another line in front of Rich¬ mond, when General Nelson came on the field and selected a new line near the town and ceme¬ tery; and the troops, barely 2,200 in number, had scarcely taken position when the Con¬ federates were upon them in flank and front, fired about three volleys, and the Union troops gave way in utter rout. Early in the day Scott's cavalry had gained the road in rear of Richmond, and the knowledge of the fact in¬ creased the demoralization. Nelson, wounded, narrowly escaped to Lexington and thence to Louisville. Manson was wounded and taken prisoner, with over 4,000 of his men, while nine guns, over 6,000 muskets and the entire wagon-train were lost. The fragments of the army made their way to Louisville. The Union troops engaged numbered 6,500 raw men; the Confederates about 6,800 veteran troops. The Union loss was 206 killed, 844 wounded and 4,303 captured or missing, an aggregate of 5,353. The Confederate loss was 78 killed, 372 wounded, and one missing, an aggregate of 461. General Heth, with his division of 4,000 men, joined Smith after the battle, and marched to Lexington, where he arrived 2 September, and the legislature, then in session at Frankfort, fled to Louisville. Heth marched northward to Cynthiana, and to within a few miles of Cov¬ ington, to threaten Cincinnati, which he found

too well defended to attack, and being in turn threatened, he withdrew to join Smith, who waited at Lexington to join forces with General Bragg, then operating against General Buell. (See Perryville, Battle of). Consult (Official Records > (Vol. XVI) ; Van Horne, (History of the Army of the Cumberland) (Vol. I) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. III).

E. A. Carman.

RICHMOND, Borough of. See New

York City.

RICHMOND (Va.), Kilpatrick's Expedi¬ tion to. In February 1864 a cavalry expedition organized to make a dash on Richmond, dis¬ tribute President Lincoln's amnesty-proclama¬ tion, and liberate the Union prisoners in the city and on Belle Isle. The expedition was put under command of General Kilpatrick, who, with 4,000 men and a battery of artillery, marched from Stevensburg, crossed the Rapidan at Ely's Ford, early on the night of 28 February, and moved swiftly to Spottsylvania Court House. Here Col. Ulric Dahlgren, with 500 men, was de¬ tached from the column, on the morning of the 29th, to cross James River and enter Richmond from the south. Kilpatrick continued his course to the Virginia Central Railroad at Beaver Dam Station, thence to Ground Squirrel Bridge over the South Anna, and to a point five miles from Richmond, which was reached on the morning of 1 March. Believing that his approach was unknown, and that a small force of infantry only occupied the intrenchments, he moved on the Brook road toward the interior line of defensive works, driving in a few pickets, and found in¬ fantry and artillery in the works — 500 men and six guns. He opened with artillery, and was about to attack, when he thought he saw rein¬ forcements of infantry filing into the Confed¬ erate works, and, feeling certain that Dahlgren had failed, and that his own attack would be a bloody failure, he withdrew to Atlee Station, north of the Chickahominy, and went into camp. Here he was attacked during the night by Wade Hampton's and Bradley T. John¬ son's cavalry, the latter having followed him from Beaver Dam Station. The camp of one of his brigades was captured, and Kilpatrick, retreating, was followed down the Peninsula, being joined near Tunstall's Station next day by nearly 300 of Dahlgren's men. He reached Williamsburg on the night of the 2d.

Colonel Dahlgren moved from Spottsylvania Court House across the Virginia Central Rail¬ road, near Frederickshall, to James River, near Goochland Court House, where he expected to cross the river, release the prisoners on Belle Isle, and enter Richmond from the south, to unite with Kilpatrick at 10 a.m. of 1 March But he could find no ford, so marched bv the north bank of the river, approaching Richmond late in the afternoon, and coming upon cavalry and infantry, with which he skirmished sharply until night. Hearing nothing from Kilpatrick, except his guns, heard early in the afternoon, and rightly believing that he had failed, Dahlgren withdrew, designating Captain Mitchell, 2d New York cavalry, to command the rear guard. In the darkness the column became broken, Dahl¬ gren, with less than 100 men going in one direc¬ tion, and Mitchell in another. Mitchell suc¬ ceeded in joining Kilpatrick at Tunstall's with

about 260 men. Dahlgren crossed the Pamunkey at ˆHanover Town, and the Mattapony at Ay-lett's Ford, and about midnight 2 March fell into an ambuscade and was killed. Others were killed and wounded, nearly all were captured. Captain Mitchell reports that of the 500 men of Dahlgren's command 61 were killed and wounded, and 138 captured. The total loss of Kilpatrick's command, including Dahlgren's, was about 350. Consult < Official Records* (Vol. XXXIII) ; Humphreys, (From Gettys¬ burg to the Rapidan* ; The Century Company's (Battles and Leaders of the Civil War) (Vol. IV).

E. A. Carman.

RICHMOND (Va.), Sheridan's Raid on the Communications with, a movement which included the battle of Yellow Tavern. At day¬ break 9 May 1864, General Sheridan, with 10,000 cavalry and six batteries, started from near Todd's-Tavern to cut the railroads entering Richmond from the north and northwest. He moved on the Telegraph road; Merritt's division crossed the North Anna at Anderson's Ford at dark and encamped; the rest of the column, har¬ assed by a brigade of Stuart's cavalry, halted for the night on the north side of the river. The march was resumed early on the 10th, several miles of the Virginia Central Railroad de¬ stroyed, with rolling-stock and supplies, and at night Sheridan crossed the South Anna, halting at daylight of the 11th on the south bank. Early in the day Davies' brigade encountered Mun-ford's cavalry at Ashland, on the Fredericks¬ burg Railroad, drove it from the place, de¬ stroyed the depot and several miles of railroad, and joined Sheridan's main body at Allen's Station. Meanwhile General Fitzhugh Lee's cavalry division had been rapidly marching by a circuitous route to interpose between Sheri¬ dan and Richmond, and had reached Yellow Tavern, on the Brook road, six miles from Richmond. Lee had barely 4,500 men. Sheri¬ dan's whole force advanced, Merritt's division leading, followed by Wilson's and Gregg's. Merritt attacked ana gained the Brook road at Yellow Tavern, but General Stuart, in com¬ mand of the Confederates, seized a position on his flank and enfiladed his line with artillery. Then Custer's brigade, supported by Wilson's division, charged the flanking force, breaking it and capturing two guns. In this encounter Stuart was

mortally wounded. Stuart's de¬ tached brigade, under Gen. James B. Gordon, fell upon Sheridan's rear, but Gregg drove it back toward Ashland. Fitzhugh Lee's divi¬ sion retreated toward Richmond. The losses on both sides were severe. Sheridan followed Lee's division and entered the most advanced line of works covering Richmond. Sheridan had in¬ tended to keep south of the Chickahominy and march by way of Fair Oaks, to make a demon¬ stration on Richmond. Marching during the night, at daylight of the 12th he massed his force at Meadow Bridge, overlooking the line of the Virginia Central Railroad and the Mechanicsville pike. After demonstrating on the Confederate works, which were found too strong to be attacked, he determined to recross the Chickahominy at Meadow Bridge. The bridge, which had been partially destroyed, was held by some of Gordon's cavalry and a battery on the north side. Merritt's division crossed

after a severe engagement, in which Gen. James B. Gordon, commanding the Confederate cavalry, was killed. Meanwhile, Wilson's divi¬ sion could not pass the second line of the Rich¬ mond defenses, on the Mechanicsville road, and was attacked by Barton's and Gracie's infantry brigades and some dismounted cavalry, who, ad¬ vancing from the works, attacked both Wilson and Gregg, at first with success, driving Wilson in some disorder. After a severe contest the Confederates were driven back to their works, and between 3 and 4 p.m. Wilson and Gregg crossed the Chickahominy above Mechanicsville bridge, and Sheridan encamped his corps near Gaines' Mill. Next day he crossed to the south side of the Chickahominy by Bottom's bridge, marched through White Oak Swamp and, on the 14th, encamped in the vicinity of Haxall's Landing, on James River. He made several demonstrations on the New Market road, in the direction of Richmond, and having drawn sup¬ plies from General Butler's army, started on the 17th to rejoin the Army of the Potomac, march¬ ing by way of White House, on the Pamunkey. Detachments were sent to destroy the railroad bridges over the South Anna and to demon¬ strate on Richmond, and 24 May Sheridan re¬ joined Grant's army near Chesterfield bridge on the North Anna. The Union loss in the move¬ ment from 9 May was 64 killed, 337 wounded, and 224 missing. There are no reports of Con¬ federate losses. Consult (Official Records *(Vol. XXXVI) ; Humphreys, (The Virginia Campaign of 1864-65* ; Sheridan, (Personal Memoirs> (Vol. II) ; McClellan, <Life and Campaigns of General Stuart* ; The Century Company's (Battles and Leaders of the Civil War> (Vol. IV).

E. A. Carman.

RICHMOND (Va.), Union Campaigns Against. As the capital and political centre of the Southern Confederacy, defended by its best army, Richmond became and continued to be the objective point of the Union armies. The first campaign against it was that of General McDowell, which ended in Union defeat at Bull Run, 21 July 1861. (See Bull Run, First Bat¬ tle of). The next campaign had its base at Fort Monroe, from which, 4 April 1862, General McClellan advanced with the Army of the Po¬ tomac up the York Peninsula. After the siege and capture of Yorktown and the battle of Wil¬ liamsburg (qq.v.), McClellan crossed the Chick¬ ahominy, and 30 May his outposts were within five miles of Richmond. Meanwhile, after the destruction, by her commander, of the Con¬ federate ram Merrimac, Capt. John Rodgers, with three Union gunboats, ascended James River until he reached Fort Darling (q.v.), on Drewry's Bluff, eight miles below Richmond, where, 15 May, he was stopped by the fire of heavy guns. Commodore Goldsborough, com¬ manding the navy in those waters, now pro¬ posed to McClellan to co-operate with him in a joint naval and land attack on Fort Darling, but McClellan declined, preferring to wait until after he should have crossed the Chickahominy. The Confederate authorities were so much im¬ pressed with the gravity of the situation, when they heard that the fleet was ascending the river, that the government archives were shipped to Columbia, S. C., and the public funds were kept on cars ready for transportation.

The Confederate defense at Fort Darling was looked upon as the salvation of the Con¬ federate capital. Strong works were now con¬ structed by the Confederates on Drewry's Bluff and on the opposite side of the river, and to the end of the war they barred advance on Richmond by water. Elaborate works were constructed to defend the city from the land side. On 31 May Gen. J. E. Johnston, com¬ manding the Confederate army, advanced from his works around Richmond and attacked Mc¬ Clellan. The battle continued two days, at the end of which the relative positions of the two armies were unchanged. (See Fair Oaks, Battle of). On 25 June McClellan, in view of a general advance, threw for¬ ward a part of his force toward

Rich¬ mond, gaining some ground, but Gen. R. E. Lee, commanding the Army of Northern Vir¬ ginia, assumed the offensive on the 26th by crossing the Chickahominy and attacking Mc¬ Clellan's right, forcing McClellan to retreat to Harrison's Landing, on James River, after a series of hard-fought, bloody battles. (See Peninsula Campaign of 1862; Seven Days' Battles). Richmond now had some respite. Lee invaded Maryland, and upon his return de¬ fended Richmond on the line of the Rappahan¬ nock, from which Burnside in December 1862 and Hooker in April 1863 unsuccessfully en¬ deavored to force him. Lee again assumed the offensive and marched northward for an in¬ vasion of Maryland and Pennsylvania, leaving but a small force at Richmond, and Hooker, 10 June, proposed to march immediately upon the city, capture it and then send the disposable part of his force to any threatened point north of the Potomac, but the proposition was nega¬ tived by General Halleck, and Hooker was in¬ formed by President Lincoln that Lee's army and not Richmond was his true objective. On 14 June Halleck ordered General Dix, com¬ manding at Fort Monroe, to send an expedition to threaten Richmond and destroy the railroad bridges over the South and North Anna rivers. Dix drew troops from Suffolk and Norfolk, and on the 24th Colonel Spear, with about 1,200 men of the 11th Pennsylvania, 2d Massachusetts and 12th Illinois cavalry, was sent by water up York River, landed at White House on the 25th, marched through Hanover Court House and on the 26th attacked and captured about 100 men of the 44th North Carolina at the bridge of the Virginia Central Railroad over the South Anna, burned the bridge and returned to White House on the morning of the 27th. Upon Spear's return Dix organized an expedition of 10,000 men, under General Getty, to destroy the bridge of the Fredericksburg and Richmond Railroad over the South Anna, and an expedi¬ tion of 6,000 men and 14 guns, under General Keyes, to threaten Richmond by seizing Bot¬ tom's Bridge over the Chickahominy. Both ex¬ peditions moved from White House on 1 July. Keyes failed to accomplish anything, being held in check by a small force under Gen. D. H. Hill. Getty, preceded by Spear's cavalry, marched from White House to Hanover Court House, which he occupied on the 4th, his ad¬ vance reaching the bridge over the South Anna late in the day and making an attack, which was repulsed by Gen. John R. Cooke, who had about 4,000 men. General Foster, who was in com¬

mand of Getty's advance, destroyed some of the railroad track, and during the night was recalled to Hanover Court House. The depot and track at Ashland Station was destroyed, and on the 5th Getty took up the return march to White House, which was reached on the 7th, his

loss being 16 killed, wounded and missing. Dix re¬ turned to Fort Monroe and sent part of his command to the Army of the Potomac.

After the Gettysburg campaign (see Get¬ tysburg, Campaign and Battle of), General Lee fell back beyond the upper Rappahannock and General Meade followed. Meade was forced back to Centreville, and, renewing the offensive, pushed Lee beyond the Rappahannock and then beyond the Rapidan. Meade now essayed an advance on Richmond by passing Lee's right, but was checked at Mine Run (q.v.), 28-29 Nov. 1863.

On the morning of 6 Feb. 1864 Gen. I. I. Wistar, with 2,200 cavalry and 4,000 infantry, left Williamsburg to make a dash on Richmond and release the Union prisoners there. The cavalry advance arrived at Bottom's Bridge, on the Chickahominy, about 13 miles from Rich¬ mond, before daylight of the 7th, and found the Confederates in force under Gen. Eppa Hunton, and reinforcements coming up by railroad from Richmond. A deserter from the Union army had given information of the proposed move¬ ment, troops had been sent from Richmond, Bottom's Bridge taken up and the fords ob¬ structed. The cavalry charged one of the fords and was repulsed by canister fire with some loss, and Wistar desisted from further effort and re¬ turned to Williamsburg. To cover this move¬ ment and divert Lee's attention from it, the cav¬ alry and two corps of the Army of the Potomac made a demonstration on the 6th upon Lee's army at Morton's Ford, the demonstration con¬ tinuing on the 7th with considerable loss. Later in the month General Kilpatrick made a move¬ ment on Richmond which resulted in a lamen¬ table failure. See Richmond, Kilpatrick's Expedition to.

The next and final campaign against Rich¬ mond was conducted by General Grant, begin¬ ning in May 1864. With the Army of the Potomac he advanced from the north, while General Butler, with the Army of the James, crossed to the south side of James River and marched up its right bank. Butler was defeated at Drewry's Bluff (q.v.), 16 May and confined to his intrenchments at Bermuda Hundred (q.v.). The Army of the Potomac began the campaign by the battle of the Wilderness (q.v.), 5-7 May, and on the 9th General Sheridan set out on his raid, elsewhere described. (See Richmond, Sheridan's Raid on, and the Bat¬ tle of Yellow Tavern). Grant continued his campaign in a series of sanguinary battles, and after the bloody repulse of Cold Harbor (q.v.) he abandoned the campaign north of the James, crossed to the south side of the river 14-16 June and invested Petersburg and Richmond from that side. (See Petersburg, Military Operations Against). The siege began on 19 June 1864 and continued until 2

April 1865, when Petersburg was assaulted and taken, and that night Richmond was evacuated, the Union troops under General Weitzel occupying it 3 April.

E. A. Carman.

RICHMOND COLLEGE, located at Rich¬ mond, Va. It was founded in 1832 by the Baptists under the name of the Virginia Bap¬ tist Seminary; the name was changed to Rich¬ mond College in 1840. The college was closed during the Civil War; the buildings were used as a hospital by the Confederates and as bar¬ racks by the Federals after their occupation of Richmond. The equipment was largely de¬ stroyed and much of the endowment rendered worthless, but the college was reopened in 1866, a new endowment was obtained, and it has since then been prosperous and has taken a leading part in Southern educational life. Courses are elected in accordance with the group system, there being three groups. The degrees of A.B. and B.S. are conferred; and A.M. for graduate work. There is also a School of Law, which confers the degree of B.L. Women were ad¬ mitted to the college in 1898. In 1914 West-hampton College, an institution for women, was opened. The two colleges have the same president, the same board of trustees and the same male faculty. They are, however, simply co-ordinate institutions and cannot be called coeducational. The total annual attendance of students of both colleges is over 400; the fac¬ ulty numbers 43. The value of the buildings and grounds is about $1,250,000 and the income about $110,000.

RICHTER, rih'ter, Adrian Ludwig, Ger¬ man painter and designer: b. Dresden, 28 Sept. 1803; d. near there, 19 June 1884. His father, Karl August Richter, the well-known copper¬ plate engraver, was his first teacher, as he was his father's collaborateur in the production of landscapes in black and white. In 1820 he ac¬ companied Prince Narischkin in a journey through France as draughtsman to illustrate that nobleman's travels ; subsequently he spent three years, ending 1826, in Italy. He next ap¬ plied himself to study the masters of the North Holland School, and chose J. Schnorr as his especial model and

standard of excellence. Re¬ turning to Germany he was appointed in 1828 to a position in the School of Design at Meis¬ sen, which he held for 10 years, meanwhile acquiring a popular reputation as illustrator of (The Vicar of Wakefield* and (Popular Books of Germany. *He inaugurated an epoch in German illustrative art by his sympathetic in¬ terpretation of common life in Germany, his tender humor and refined fancy. While he drew on wood for book illustration, he also executed numerous etchings, mostly of Italian landscapes. The most important of his landscapes in oil, which, however, are marred by a certain cold¬ ness of treatment, are ‘ Storm on Mount Gerone* (1830, in the Museum, Frankfort-on- Main) ; (Harvest Time on the Roman Campagna) (1833, Leipzig Museum); ‘Schrecken-stein near Aussig) ; landscape in the Riesen Mountains, > *etc.* After working for some years as professor of landscape painting in the Dres¬ den Academy, he retired in 1876 on a pension provided ‘by the German emperor. Consult his autobiography, (Lebenserinnerung eines deutschen Malers> (1855); Hoff, ‘Adrian Lud¬ wig Richter, Maler und Radierer) (1877).

RICHTER, Gustav, German painter : b. Berlin, 31 Aug. 1823; d. there, 3 April 1884. He studied under Eduard Holbein in Berlin and Cogniet at Paris, and also at Rome. He

was professor of the Berlin Academy and hon¬ orary member of the academies of Munich and Vienna. His first work to attract attention was the ‘Raising of Jairus’ Daughter> (1856). In 1864 he received the Grand Medal at Berlin ; other medals have been conferred on him at Paris, Brussels, Vienna and Philadelphia. His works are reproduced in vivid colored chromos. He painted many European celebrities, and of Americans a notable portrait of George Ban¬ croft, the historian.

RICHTER, Hans, Austrian musical con¬ ductor : b. Raab, Hungary, 7 Aug. 1843. He was the son of the capellmeister of the cathe¬ dral and entered the conservatorium at Vienna in 1860. He studied the horn under Kleinecke, the violin under Heissler and theory under Sechter. He was conductor of the Hofund Na¬ tional Theatre, Munich, in 1868-69, after which he visited Paris and Brussels. He became chief conductor of the National Theatre, Pesth, in 1871 ; and in 1875 succeeded Dessoff as con¬ ductor of the Court opera at Vienna, holding at the same time the conductorship of the Phil¬ harmonic Concerts. He became Court capell¬ meister in 1878; and in 1879 he inaugurated in London the Orchestral Festival Concerts, later known as the Richter Concerts and continued successfully for many years. He became con¬ ductor of the Manchester orchestra in 1897 ; and from

1885 until his return to Vienna in 1911 he conducted the Birmingham Festival. He is regarded as one of the greatest living conductors.

RICHTER, Henry Joseph, American Ro¬ man Catholic bishop: b. Neunkirchen, Olden¬ burg, Germany, 9 April 1838; d. 26 Dec. 1916. He came to the United States in 1854, studied at Saint Xavier's College, New York, at Mount Saint Mary's Seminary, Cincinnati and in 1860 entered the American College at Rome, where he was graduated in 1865. He was ordained in that year, was vice-president and professor of dogma, philosophy and literature at Mount Saint Mary's Seminary, Cincinnati, in 1865-70 and in 1870-83 was rector at Saint Lawrence and chaplain of Mount Saint Vincent Academy. In 1883 he was consecrated first bishop of Grand Rapids.

RICHTER, Johann Paul Friedrich, gen¬ erally known as Jean Paul, German author: b. Wunsiedel, near Baireuth, Bavaria, 21 March 1763; d. Baireuth, 14 Nov. 1825. He was edu¬ cated at Leipzig and became a tutor and school¬ master. In 1794 he turned from teaching to a general literary activity. The prince-primate Dalberg gave him in 1809 an annual pension of 1,000 florins, continued by the king of Ba¬ varia. The fantastic quality of his genius was at first disconcerting but gradually, says Car¬ lyle, he became considered "not a strange crack-brained mixture of enthusiast and buffoon, but a man of infinite humor, sensibility, force and penetration.® His style is perhaps one of the most barbarous and his books are quite without structure. His humor, however, is genuine, though frequently clumsy. He affected boldly to despise all literary proportion and technique and is recompensed by having the bulk of his work pronounced difficult or unreadable. Yet scattered through his writings are the best of aphorisms and some of the most finely imagined passages in German literature. These may

serve to account for the interest Carlyle and De Quincy took in him. Outside of Germany he has not been greatly read, though there are various English renderings of his volumes, such as (Walt and Vult) by Lee (1846) ; (Titan> by Brooks (1863) ; (Flower, Fruit and Thorn

Pieces } by Ewing (1877) ; and <Levana> by Wood (1887). His first novel, <Die unsicht-bare Loge) ((The Invisible LodgeQ appeared in 1793. It was followed by (Hesperus) (1794); (Biographische Belustigungen unter der Gehirnschale einer Riesin) ((Biographical Recreations under the Skull of a Giantess,* 1796); (Leben des Quintus Fixlein) (1796); (Blumen, Frucht und Dornenstiicke* ((Flower, Fruit and Thorn Pieces,* 1796) ; (Der Jubel-senior) ((Parson in Jubilee, *1797) ; (Das Kam-paner Thal> (1797) ; <Titan* (1800) ; <Flegel-jahre) (translated by Carlyle, (Wild Oats,* 1804). The two last are regarded as among his best productions. (Das heimliche Klaglied der jetzigen Manner* appeared in 1801; (Dr. Katzenberger's Badereise) (1809) ; (Des Feld-predigers Schmelzle Reise nach Flatz* (1809) ; (Leben Fibels) (1812) ; (Der Komet, oder Nico¬ laus Markgraf* (1820-22) ; (Die Vorschule der Aesthetik,* his first important philosophical work, appeared in 1804, followed by (Levana, oder Erziehungslehre> (1807), a work on educa¬ tion. Further titles are (Friedenspredigt* (1808) ; (Dammerungen fur Deutschland* (1809) ; (Mars und Phobus' Thronwechsel im Jahr 1814) (1814) ; (Politische Fastenpredigten* (1817. A collection of his works, (Sammt-liche Werke,* edited by him before his death, was published in 65 volumes (1826-38). (Der Papierdrache,* his last work, was published in 1845. Consult Spazier, R. O., <Jean Paul Fried¬ rich Richter, ein biographisches Commentar zu dessen Werken) (1833) ; Carlyle's two essays on Richter; Forster, (Denkwiirdigkeiten aus dem Leben Richters* (1863) ; and Nerrlich, P.,

< Jean Paul und seine Zeitgenossen) (1889).

RICHTHOFEN, rm'ho-f-en, Ferdinand,

Baron von, German geologist : b. Karlsruhe, 5 May 1833 ; d. Berlin, 7 Oct. 1905. He was edu¬ cated at the universities of Breslau and Berlin ; and went to Austria in 1856 to study the geology of Tyrol, Siebenbiirgen and northern Hungary. In 1860 he joined a Prussian expedition to the East and spent 12 years in China, Japan, Siam, Java, the Philippine Islands, Formosa, Califor¬ nia and Nevada. Returning to Europe in 1872, he accepted professorships at Bonn, Leipzig and Berlin, successively. He published (China, Er-gebnisse eigner Reisen und darauf gegriindeter Studied (1877-83), and the following have ap¬ peared in English: (The Comstock Lode) (1865) ; Principles of the Natural System of Volcanic Rocks) (1867) ; (Letters to the Shang¬ hai Chamber of Commerce* (1869-72).

RICHWOOD, Ohio, village in Union County, on the Erie Railroad, 34 miles north¬ west of Columbus. It was settled in 1832 and its growth

during the first 30 years was slow; since 1870 it has become the second town of the county in size and importance. It is the centre of an agricultural region; contains flour and planing mills, tile mills, poultry packing houses and several large grain elevators and has a considerable trade. It has a public high-school with a school library and grade schools, a nor¬ mal school, city building, *etc.* The three banks

have combined resources of $1,300,000. The value of taxable property is estimated at $2,000,- 000. The yearly receipts average $23,500. There are four miles of paved streets. Pop. 1,850.

RICHWOOD, W. Va., town in Nicholas County, on the Cherry River, 60 miles south¬ east of Charleston, on the Baltimore and Ohio Railroad. It is situated in a coal and timber region and has paper mills and a tannery. Pop.

(1920) 4,331.

RICIMER, ris'i-mer, Roman general of the 5th century a.d. ; d. 472. He was a barbarian, but his youth was passed at the Court of Valentinian III, and he received his training under Aetius. For a long time he was ˆkingmaker® in the West. He deposed Avitus, and elevated successively Flavius Anitus (454—56), Major-ianus (457-61), Libius Severus (461). After Libius' death, he himself ruled for a time as Patricius, until in 467 the danger of a Vandal invasion compelled an alliance of East and West, and the elevation of Procopius An¬ themius. Ricimer later grew openly hostile to the monarch, whom he murdered 11 July 472 during a sack of Rome. He then made Olybrius emperor, and died soon afterward.

RICKARDITE. A purple copper telluride CmTes found in Good Hope mine, Gunnison County, Colo.

RICKARDS, rik'ardz, Marcus Samuel Cam, English poet and naturalist : b. Exeter, 28 April 1840. He was educated at Oxford, admitted a solicitor in 1862, and practised for many years in Bristol. In 1876 he took priest's orders in the English Church, was curate of Holy Trinity at Clifton, near Bristol, till 1889, and was then vicar of Twigworth, Gloucester¬ shire, till 1913. Among his many published works, mainly in verse, are (Creation's Hope5 (1890); (Poems of Life and Death) (1895); (Poems of a Naturalist* (1896) ; (Musings and Melodies)

(1902) ; (Poems, Old and New* (1905) ; (Echoes of the Infinite) (1909) ; (A Soul's Symphony) (1913) ; (Echoes from the Epistles) (1915), *etc.*

RICKETS, a disease of children in which there is an affection of the general nutrition of the whole body, dependent chiefly upon im¬ proper feeding and want of fresh air and exer¬ cise. The disease commonly appears after the age of nine months and before that of two years, producing its most obvious effects on the growth of the bones. It is characterized by enlargement of the head, prominent forehead, projecting breast-bone, flattened ribs, big belly and emaciated limbs, with great debility. The bones and spine of the back are variously dis¬ torted. Nature frequently restores the general health, and leaves the limbs in a state of dis¬ tortion. In the treatment of rickets tonic medi¬ cines, the cold bath, etc., are beneficial. The child should be kept clean and dry, regularly exercised, and allowed to enjoy a pure bracing air, that of the seaskle being specially bene¬ ficial. The food should be nutritious and easily digestible.

RICKETTS, rik'ets, James Brewerton,

American military officer: b. New York, 21 June 1817; d. Washington, D. C., 22 Sept. 1887. He was graduated from West Point in 1839, served in the Mexican War, where he was en¬ gaged at Monterey and at Buena Vista, was

promoted captain in 1853, and fought in the Seminole War in Florida. He afterward served on the Texas frontier until the outbreak of the Civil War, when he assisted in the defense of Washington and the capture of Alexandria. He participated in the first battle of Bull Run where he was made prisoner but on his release in 1862, he was brevetted brigadier-general of volunteers. He commanded a division at Chan¬ tilly, South Mountain and Antietam, in 1863 received promotion as major of artillery in the regular army, was in command of a divi¬ sion in the Richmond campaign, and fought in the engagements from the battles of the Wilder¬ ness to the investment of

Petersburg. In 1864 he served under Sheridan in the pursuit of Early's army. He was brevetted major-general in the regular army in 1865, and in 1865-66 was in command of a district in Virginia. He was mustered out of the volunteer service in 1866, and in 1867 retired from active duty.

RICKETTS, Palmer Chamberlaine, Amer¬ ican engineer and educator : b. Elkton, Md., 17 Jan. 1856. He was graduated at the Rensselaer Polytechnic Institute in 1875 and was appointed to the teaching staff there, becoming professor of technical mathematics in 1884, and president and director in 1901. He is known as a con¬ sulting engineer for railroads and corporations ; and is vice-president of the American Society of Civil Engineers. Author of (History of Rensselaer Polytechnic Institute> (1895), and of papers for technical journals.

RICKMAN, nk'man, Thomas, English architect: b. Maidenhead, Berkshire, 1776; d. March 1841. He developed a taste for archi¬ tectural drawing, and having sent in a design for a church that proved successful in a gov¬ ernment competition, he settled at Birmingham as an architect. He built a number of Gothic churches and chapels in Birmingham, Hamp¬ ton, Lucy, Bristol, Preston, Carlisle, etc., many country houses, and the new buildings of Saint John's College, Cambridge. He is the author of (Attempt to Discriminate the Styles of Architecture in England from the Conquest to the Reformation5 (1817).

RICO, re'ko, Martin, Spanish painter: b. Madrid, about 1850 ; d. 1908. He studied under Frederico de Madrazo, and later in Paris and Rome. He was elected a member of the Legion of Honor in 1878. His works are well known in America where he is represented in many collections, both public and private, and present architectural subjects chiefly. Among his works are (Doge's Palace in Venice5 (Samuel Hawk Collection, New York) ; Utalian Garden5 (Metropolitan Museum) ; (Court Interior-Granada) and (On the Seine) (Morris K. Jessup Collection, New York) ; (Canal Near Poissy) (A. J. Drexel, Philadelphia); En¬ trance to Canale Grande, Venice5 ; (Bridge of Toledo5 ; (Gathering Oranges, Toledo5 (Wal¬ ters' Gallery, Baltimore) ; (Banks of the Adige5 (Corcoran Gallery, Washington), *etc.*

RICO, Colo., town and county-seat of Dolores County, on the Rio Grande Southern Railroad, 140 miles southwest of Leadville and on Dolores River. The first settlement was made in 1867 and a new settlement in 1877, both by mining prospectors; the town was incorpo¬ rated in 1879, and became the county-seat on the

organization of the county in 1881. It is in a region rich in gold, silver, copper and iron, and the chief industry is the mining and milling of these ores. The town contains a bank, a hose-house and the county courthouse. It has a graded public school. The government is vested in a mayor, elected annually, and a council of six members, three elected each year. Pop. 500.

RICORD, rik'ord, or RICARD, John,

American lawyer : prominent in Hawaiian af¬ fairs in 1843-47. He is stated by some au¬ thorities to have gone to Hawaii from Oregon while others speak of him as a young lawyer who arrived from New York. He reached Hawaii in October 1843, was appointed at¬ torney-general in 1844, and in 1845, by request of the legislature, he prepared three bills which were practically amendments to the constitution, providing for the establishment and defining of the duties of an executive department of the government and also for a judiciary independ¬ ent of the executive branch of the government. Regular cabinet departments were established, the Premier being Minister of the Interior, while other departments were foreign affairs, finance, public instruction and attorney-general. As far as was practicable Ricord sought to es¬ tablish the common law of England in the islands, and the statute laws drafted by him and passed by the legislature remain in a large measure still in force. He left the islands in

1847.

RICORD, re-kor, Philippe, French physi¬ cian: b. Baltimore, Md., 10 Dec. 1800; d. Paris, France, 22 Oct. 1889. He went to Paris in 1820, where he was granted his medical degree in 1826, practised in the provinces for two years, and on his return to Paris passed the Concours examination, and was appointed a surgeon at the Pitie Hospital. In 1831 his lectures in sur¬ gery secured his appointment as surgeon-in¬ chief at Hopital des Veneriens du Midi, an office he continued to fill until 1860, when he resigned and engaged in private practice. In 1862 he was appointed physician in ordinary to Prince Napoleon, and in 1869 consulting surgeon to Napoleon III. He was made commander of the Legion of Honor in 1860, and for his serv¬ ices in the ambulance corps during the siege of Paris was made grand-officer of the Legion in 1871. He was the author of various valuable

surgical treatises and invented several surgical instruments.

RIDDLE, Albert Gallatin, American law¬ yer and author: b. Monson, Mass., 18 May 1816; d. Washington, D. C., 15 May 1902. He re¬ moved with his father, to Geauga County, Iowa, in 1817, studied law, and was admitted to the bar in 1840. He was' elected to the legislature in 1848 and in that year called the first Free-Soil Convention in Ohio. He removed to Cleveland in 1850, was elected prosecuting at¬ torney in 1856 and in 1859 he defended the Oberlin slave rescuers. He served in Congress in 1861-63 and was then appointed United States consul at Matanzas. From 1864 he was engaged in law practice at Washington, D. C. He was one of the lawyers retained by the government for the prosecution of John H. Surratt for the murder of President Lincoln. He served as law-officer of the District of

Columbia from 1877 ; and for several years after its establishment he was in charge of the law department at Howard University. Author of (Students and Lawyers) (1873) ; (Alice

Brand: A Tale of the Capital > (1875) ; (Life of James A. Garfield) (1880) ; (The Sugar Maple of the West Woods) (1885) ; (Life of Benja¬ min Wade* (1886); (Recollections of War Times, 1860-65. *

RIDDLE, rid'l, Matthew Brown, American theologian: b. Pittsburgh, Pa., 17 Oct. 1836; d.

1 Sept. 1916. He was graduated from Jefferson College, Pennsylvania, in 1852, and from the New Brunswick Theological Seminary in 1859. He was adjunct professor of Greek at Jeffer¬ son College in 1857-58, was pastor of the Dutch Reformed Church, Hoboken, N. J., 1861-65, and of the Second Reformed Church, Newark, N. J., 1865-69. In 1871-ˆ87 he occupied the chair of New Testament exigesis at Hart¬ ford Theological Seminary, Conn., and from 1887 filled that chair at the Western Theological Seminary, Allegheny, Pa., until he retired in 1913. He was a member of the American Com¬ mittee for New Testament revision, an editor of the Standard edition of the Revised

Version, and was a revising editor on the Standard American Revised Version of the New Testa¬ ment (1901). He was one of the editors of Lange's (Commentary* ; (International Com¬ mentary } ; (International Revision Commen¬

tary) and Myer's "Commentary* ; edited Rob¬ inson's (Greek Harmony of the Gospels* (1885) ; Vols. VII, VIII, (Ante-Nicene Fathers* and Vols. VI, X, (Nicene and Post-Nicene Fathers) (1886).

RIDDLE, any sentence or composition with an intentionally double or veiled meaning, which is propounded for another to discover the meaning. A riddle may either have an ap¬ parent sense which serves as a disguise to the real one, or it may be in the form of a ques¬ tion, the terms of which do not directly indicate the nature of the answer required. Riddles naturally divide themse'ves into two classes : plays upon words, which are otherwise called conundrums; and allegorical or fanciful descriptions of or allusions to the subject on which the riddle is founded. The latter is called an enigma. It is the more ancient and serious form of the riddle. Enigmas, or dark sayings, were frequently used by the ancients to disguise important truths, which it was not deemed safe or advisable that everyone should know. Kings sent enigmas to each other, am¬ bassadors delivered their messages in this form, and the oracles of the gods were frequently conveyed in the form of an enigma. In modern times serious enigmas have been elaborated in prose and verse, particularly the latter, in all civilized languages. They are in general mere elaborate trifling, and are commonly as dull as they deserve to be.

Among the most celebrated examples of an¬ cient riddles is that propounded by the Sphinx, and answered by QEdipus, What animal is that which goes on four feet in the morning, on two at midday, and on three in the evening? The answer is Man, because he goes on all fours as a child, on two feet as a young man, and with a staff in old age. The punning variety of rid¬ dle, though sometimes indulged in by the Greeks and Romans, is of comparatively modern

growth. It is a great favorite in festive gatherings of juveniles. Sometimes strings of puns are linked together with considerable in¬ genuity in the more complex riddles of this description, as in the following instance. What wind does a hungry sailor like best? One that blows fowl and chops, and then comes in little puffs. The earliest collection of riddles known to have been published is entitled (Demands Joyous,* printed in 1511. The first French col¬ lection was

published in Paris by Gille Beys in

1582.

RIDEAU-OTTAWA CANAL SYSTEM.

See Canadian Canals.

RIDEING, rid'mg, William Henry, Amer¬ ican editor: b. Liverpool, England, 17 Feb. 1853; d. 23 Aug. 1919. He came to the United States and lived in Chicago until 1870, after which he was engaged in journalism in various American cities. After 1882 he was associate editor of the Youth's Companion, and in 1887-99 was associate and managing editor of the North American Review. He published (Scenery of Pacific Railways* (1878) ; (Thackeray's London) (1885) ; (In the Land of Lorna Doone) (1895) ; (At Hawarden with Mr. Gladstone) (1896) ; (How Tyson Came Home) (1904), and cMany Celebrities,* a book of reminiscences of a very varied life, 1912.

RIDERS, in national or state legislation, the additional provisions of a bill under the con¬ sideration of a legislative assembly, having little connection with the subject matter of the bill. Sometimes riders are attached to important and particularly to appropriation bills, in order to ob¬ tain their passage, as by themselves they would be likely to incur an executive veto, while as a part or proviso of an important bill they are absorbed in the main subject, and so avoid the "veto® and the "table.® It has been proposed frequently that the Constitution of the United States be so amended that the President could veto single objectionable items without affecting the main purpose of bills.

RIDERS TO THE SEA, by John Milling¬ ton Synge, is the most nearly perfect tragedy in one act in modern literature. The very sim¬ ple plot is based not on the traditional conflict of human wills but on the hopeless struggle of man against the impersonal but relentless cruelty of the sea. It has taken from Maurya four of her six sons, their father, and their father's father. The fifth son is missing and her daughters get proof that he too has been drowned while Maurya is entreating Bartley, the last of them all, not to ride his horses down to the boat for the Connemara fair. "If it was a hundred horses, or a thousand horses you had itself, what is the price of a thousand horses against a son, where there is one son only?® But Bartley will not listen, and when the sea swallows him too, the tragedy of the mother's previous revolt pales before the utter tragedy of her resignation. "They're all gone

now and there isn't anything more the sea can do to me. … I won't care what way the sea is when the other women are keening.® In all of Synge's plays except (Deirdre of the Sorrows,* one can trace his inspiration to his stay in the Aran Islands, — usually to a story he has heard on the road or by the turf fire — but in (Riders to the Sea) we have the most direct transcript of his own sympathetic knowledge of the peo-RIDGAWAY — RIDGEWAY

pie and conditions of those wind-swept, sea-swept isles where life seems only the sweeter for being purchased by daily struggle with barren soil and warring elements. In this struggle it is inevitably the mothers who lose out. ((The maternal feeling is so strong in these islands,® Synge writes, ((that it gives a life of torment to the women.® The contrast between (Riders to the Sea) and (The Playboy of the Western World) indicates the gamut of Synge's genius. The former is as remarkable for the exquisite consistency of its theme, treat¬ ment and atmosphere as the latter is for its variety and its piquant contradictions ; the one almost defies criticism, the other challenges it.

(Riders to the Sea) was first produced by the Irish National Theatre Society at Molesworth Hall in Dublin on 25 Feb. 1904. It was in the repertory of the Irish Players on tour in the United States in 1912-13. Consult Synge, J. M., (The Aran Islands) ; id., prefaces to (The Playboy of the Western World* and (The Tinker's Wedding) ; Bickley, Francis, (John Millington Synge> ; Boyd, Ernest, Contem¬ porary Drama in Ireland) ; Howe, P. P., (John Millington Synge) ; Weygandt, Cornelius, Hrish Plays and Playwrights.*

RIDGAWAY, rij'a-wa, Henry Bascom,

American Methodist Episcopal clergyman and educator: b. Talbot County, Md., 7 Sept. 1830; d. Evanston, Ill., 3 March 1895. He was edu¬ cated at Dickinson College, engaged for several years as a pastor, and in 1882 was appointed professor of historical theology at Garrett Biblical Institute. In 1884 he became professor of practical theology there, a position he held until his death, serving also as president of the institute. Author of (Life of Alfred Cook-man* (1871); (The Lord's Land; Travels in Sinai and Palestine in 1873-74* (1876) ; (Life of

Bishop Edward S. Janes* (1882) ; (Bishop Matthew Simpson* (1885), *etc.*

RIDGE, ridj, John, Cherokee Indian leader: b. northern Georgia, about 1801; d. 22 June 1839. His early education was begun in the schools conducted among the Cherokee people by the Moravian missionaries. In 1818, at the instance of the American Board of Commis¬ sioners for Foreign Missions, he was selected with two other Cherokee youths to attend school at Cornwall, Conn. While there, he be¬ came acquainted with Miss Sarah B. Northrop, a member of a prominent local family, whom he afterward married. With his father (Major Ridge) and his cousin (Elias Boudinot) he took an active part in the agitation for the removal of the Cherokee people to the West and was one of the signers of the treaty of New Echota, under which it was finally accomplished. In revenge for this radical action, his death was plotted with that of other members of the Treaty party, by some of the ultra conserva¬ tive full-blood members of the faction which was opposed to removal. He was a talented man, of strong personality and winning address. So pronounced was his persuasive eloquence that those who plotted his death especially charged his assassins to permit no words of parley with him lest he dissuade them from their fell purpose. He was stabbed to death at his home.

RIDGE, Major, Cherokee chief : b. High-wassee, present State of Georgia, about 1771 ; d.

Cherokee reservation, 22 June 1839. He be¬ came a councilor and one of the leaders of the Cherokee nation. He favored the deportation of the Cherokees from the Georgia reservation to one westward of the Mississippi, and was murdered, presumably, by some of the opposing party.

RIDGE, William Pett, English novelist: b. 1860, Chatham, Kent. He was educated at the Birbeck Institute in London. He began to write in 1890, and among his published works are (The Second Opportunity of Mr. Staple-hurst* (1896) ; (A Breaker of Laws* (1900) ; (Outside the Radius* (1900) ; (Lost Property* (1902); (Mrs. Galer's Business* (1905); Splendid Brother* (1909); (The Happy Re¬ cruit* (1914); (The Kennedy People* (1915). He is best known for stories of a humorous character.

RIDGEFIELD, ridj'feld, Conn., town in Fairfield County, on the New York, New Haven and Hartford Railroad, about 60 miles northwest of

New York, and 13 miles north by west of Norwalk. It is in an agricultural re¬ gion, and is a favorite summer resort for resi¬ dents of New York. The chief industries which contribute to the prosperity of the town are farming, dairying, the grinding of feldspar, and the manufacturing of ice-cutting tools. The most prominent public building is the pub¬ lic library, presented to the town by James Mor¬ ris of New York, in memory of his wife, Elizabeth W. Morris. There are four churches, good public schools, and one private school. The government is administrated by a board consisting of a warden and burgesses, six mem¬ bers, elected annually in May. Pop. (1920) 2,707.

RIDGETOWN, Canada, town in the County of Elgin, province of Ontario, on the Michigan Central Railroad, about eight miles from Lake Erie and 65 miles east of Windsor. It is in an agricultural region, and has some manufacturing interests.

RIDGEVILLE, ndj'vil, Ind., town in Ran¬ dolph County, on the Mississinewa River, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis and the Grand Rapids and Indiana railroads, about 60 miles south of Fort Wayne and 90 miles northeast of Indianapolis. It is in a fertile agricultural region and is the trade centre for the northern part of the county. It has several industries connected chiefly , with farm products and stock raising. It has good public schools, several private schools and a public library. Pop. about 1,300.

RIDGEWAY, William, British archaeolo¬ gist: b. King's County, Ireland, 1853. He was educated at Trinity College, Dublin, and at Cambridge University. He was appointed pro¬ fessor of Greek at Queen's College, Cork, in 1883; and from 1892 was professor of archae¬ ology at Cambridge. He was Gifford lecturer in natural religion at Aberdeen in 1909-11; Stokes lecturer on Irish archaeology at Dublin in 1909; Hermione lecturer in art at Dublin, 1911; and president of the Royal Anthropo¬ logical Institute in 1908-10. He has also been Brereton Reader in classics at Cambridge since 1907 and is a Fellow of Caius College. Author of (Origin of Metallic Currency and Weight Standards* (1892) ; (Homeric Land System* (1907); (The Origin of Tragedy* (1910);

(Minos the Destroyer* (1910); (The Dramas and Dramatic Dances of non-European Races)

(1915).

RIDGEWOOD, N. J., village in Bergen County, on the Erie Railroad, about 21 miles north of New York. The railroad divides the village into eastern and western sections. The village is in a residential locality; the western side is built up with fine residences, most of them the homes of men doing business in New York City. The eastern section of the village spreads out into the Paramus Valley, through which flows the Saddle River. In this part are substantial dwellings with extensive grounds. There are no' manufactories. The business blocks and fraternal society buildings are mostly of limestone and pressed brick. There are sev¬ eral churches, public schools and one private school for boys. In 1918 the village erected one of the finest high schools in the State ; and the new railway station and plaza, fi¬ nanced conjointly by the village and the Erie Railroad, is a most artistic and attractive re¬ cent improvement. There are lodges of nearly all the chief fraternal societies and a large number of social and charitable organizations. Located here is the House of Divine Provi¬ dence for Incurable Patients, in charge of the Sisters of Charity. The water supply is fur¬ nished by the Bergen County Aqueduct Com¬ pany. The roads in the vicinity are excellent, and the scenery in general, together with the numerous groves and small streams, make it a most charming locality. In the vicinity are many points of historic interest, their his¬ tories dating back to pre-Revolutionary days. The value of all taxable village property is $8,500,000. The government is on the commis¬ sion plan. The receipts and expenses average yearly about $245,000. Pop. (1920) 7,540.

RIDGWAY, rldj'wa, Robert, American naturalist : b. Mount Carmel, Ill., 2 July 1850. He was zoologist to the United States geologi¬ cal exploration of the 40th parallel under Clarence King in 1867-69, and since 1880 has been curator of the division of birds in the National Museum at Washington. He was one of the founders in 1883 of the American Orni¬ thologists' Union, of which he later became president. He was appointed a member of the committee at the first International Ornitho¬ logical Congress at Vienna in 1885, and of that at Budapest in 1891, and the advisory council of World's Congresses at the World's Colum¬ bian Exposition. He is author of (A Nomen¬ clature of Colors

for Naturalists* (1886) ;

(Manual of North American Birds) (1887) ; (Birds of North and Middle America > (1901-16, of which 7 vols. have been issued) ; (Color Standards and Color Nomenclature) (1912) ; joint author with Prof. Spencer F. Baird and Dr. T. M. Brewer of (A History of North American Birds) (3 vols., 1874) and 'Water Birds of North America) (2 vols., 1884); Orni¬ thology of Illinois) (2 vols., 1889) ; '^Nomen¬ clature of North American Birds) (1881) ; and several hundred separate papers on ornitho¬ logical subjects. He is a member of the Amer¬ ican Forestry Association, Biological Society of Washington, Boston Society of Natural His¬ tory, National Geographic Society, National Institute of Social Sciences, Philosophical So¬ ciety of Washington and Washington Academy

of Sciences; corresponding member of the Academy of Natural Sciences of Philadelphia, Boston Society of Natural History, Boston Zoological Society, Chicago Academy of Sci¬ ences, Davenport Academy of Sciences, Man¬ chester (England), Literary and Philosophical Society, Michigan Ornithological Club, New York Academy of Science and Zoological So¬ ciety of London ; honorary member of the British Ornithologists' Union, German Orni¬ thological Society, Nuttall Ornithological Club and Royal Australian Ornithological Society.

He has traveled extensively in North Amer¬ ica while engaged in ornithological exploration ; two years' field work in California, Nevada and Utah (1867-69) ; a summer along the coast of Alaska as guest of the Harriman Alaska Ex¬ pedition in 1899; two trips to Costa Rica (six months in 1905, three months in 1907) as guest of Senor Don Jose C. Zeledon, of San Jose; several trips to Florida, *etc.*

RIDGWAY, Pa., borough, capital of Elk County, on the Clarion River, and on the Buffalo, Rochester and Pittsburgh and the Pennsylvania railroads, about 150 miles north¬ east of Pittsburgh and 115 miles southeast of Erie. It is in a region devoted mainly to lum¬ bering and agriculture. The chief industrial establishments are lumber mills, sash, door and blind factories, flour and grist mills, machine shops, engine and boiler works and dry kilns. There are other manufactories producing min¬ ing materials, proprietary medicines and to¬ bacco products. The educational institutions are public and parish elementary schools, a pub¬ lic library and a private business school. Pop.

0920) 6,037.

RIDING AND DRIVING. See Horses,

Riding and Driving.

RIDLEY, rid'li, Nicholas, English ecclesi¬ astic and martyr: b. about 1500; d. Oxford, 16 Oct. 1555. He was graduated from Cambridge in 1521-22, later studied at the Sorbonne, Paris, and at the University of Louvain. Returning to Cambridge he was made proctor to the uni¬ versity, and as such advocated the claims of King Henry VIII to the supreme ecclesiastical jurisdiction in the realm. Through the patron¬ age of Archbishop Cranmer he became one of the king's chaplains; in 1540 he was appointed master of Pembroke Hall, in 1541 canon of Canterbury, and in 1545 an additional canonry of Westminster was conferred upon him. In 1547 he was elevated to the see of Rochester. In 1550, on the deposition of Bonner, Ridley was made bishop of London, and distinguished himself by his tempered zeal in favor of Prot¬ estantism, and especially by his liberality and kindness toward the family of his predecessor. In 1553 in a sermon before Edward VI he made an appeal for the destitute London poor, and as a result of subsequent conferences the king and corporation of London determined to build Christ's Hospital, Saint Thomas' Hospital and Bethlehem Hospital. On the death of Edward he was induced to listen to those who attempted to secure the Protestant ascendency by placing the Lady Jane Gray upon the throne. The defeat of this scheme, the active part he had taken in the establishment of the new discipline and the construction of the liturgy, together with his connection with Cranmer, marked Rid-RIDPATH — RIEGO Y NUNEZ

ley out as one of the most prominent opponents of Queen Mary. He was arrested and sent to the Tower 20 July 1553. In the spring of 1554 he was removed to Oxford, and being brought before the royal commissioners and refusing to recant he was excommunicated. His further trial progressed slowly. The next year Parlia¬ ment passed penal laws against heretics and under these he was summoned to trial. His condemnation followed upon his admitting the truth of the principal charges against him, and he was burnt at the stake in

company with Hugh Latimer.

RIDPATH, John Clark, American educa¬ tor and historian: b. Putnam County, Ind., 26 April 1840; d. New York, 1 Aug. 1900. He was graduated from Asbury University, Indi¬ ana, in 1863, and in 1864 was appointed principal of the academy at Thornton, Ind. In 1866 he was superintendent of public instruction for Lawrenceburg, Ind., and in 1867-69 professor of languages at Baker University, Baldwin City, Kan. In 1869 he was appointed to the chair of English at Asbury, and in 1879 became vice-president of the university. The endowment of $2,000,000 bestowed upon the university by Mr. De Pauw was secured largely through Rid-path's efforts, and under his management it received its new name of De Pauw. After his resignation from the university he devoted himself to literature. He was one of the edi¬ tors of the (People's Cyclopaedia* (1881) and ublished Academic History of the United tates) (1874-75) ; 'Popular History of the United States* (1877) ; (Life of James A. Garfield) (1882) ; Cyclopaedia of Universal His¬ tory * (1880-84) ; 'Great Races of Mankind) (1893) ; (Life and Times of Gladstone> (1898) ; (History of the United States) (1900), *etc.*

RIEDESEL, re'de-zel, Frederica Charlotte Louisa (Von Massow) : b. Brandenburg 1746; d. Berlin, 29 March 1808. She was the wife of Baron Riedesel (q.v.) and accompanied her husband to America. After Burgoyne's sur¬ render she resided for a year at Cambridge, Mass., where a street has since been named in her honor; and later at Charlottesville, Va. She wrote graphic descriptions of the campaign and subsequent events, published after her death by her son-in-law, Count von Reuss, and trans¬ lated inadequately into English in 1827 ((Letters and Memoirs Relating to the War of American Independence, and the Capture of the British Troops at Saratoga*), and worthily by W. L'. Stone in 1867 ('Letters and Journals Relating to the War of the American Revolution*).

RIEDESEL, Friedrich Adolph, Freiherr zu Eisenbach, German soldier: b. Lauterbach, Hesse, 3 June 1738; d. Brunswick, 6 Jan. 1800. He studied at the Marburg law school, but before the completion of his course enlisted in a regiment of Hessian infantry .as vice-ensign, and soon afterward went to England with his regiment, which had been made part of the British army, and was billeted on a town near London. There he became fairly proficient in English. On the outbreak of the Seven Years' War in 1756, the regiment was sent to Ger¬ many and Riedesel served on the immediate staff of Duke Ferdinand of Brunswick. Shortly after the outbreak of the American Revolution, England negotiated with several of the petty sovereigns of Germany

for some 20,000 troops.

Of these about 4,000 were from Brunswick. Riedesel was promoted major-general and placed in command of the Brunswick contin¬ gent, and on 1 June 1776 he reached Quebec. A thorough disciplinarian, he practised his troops in the American mode of fighting, par¬ ticularly in rapidity of firing, in which the Con¬ tinentals were much more efficient. He accom¬ panied Burgoyne (q.v.) on the illfated expedi¬ tion of 1777, distinguished himself at Ticonderoga, and at Hubbardton brought up rein¬ forcements and dispersed the Americans. At Freeman's Farm, 19 Sept. 1777, he saved the British from rout by arriving with his Bruns-wickers ; and, after the action on 7 October, had his counsels prevailed, Burgoyne would prob¬ ably have made a successful retreat to Canada. He was taken prisoner at Saratoga 17 October, exchanged in 1779, and in that year appointed to a command on Long Island. In 1783 he re¬ turned to Germany, in 1787 was promoted lieu¬ tenant-general, and in 1788 commanded the Brunswick portion of the army sent from Ger¬ many to Holland to assist the Stadtholder. From 1794 until his death he was commandant of the town of Brunswick. The 'Leben und Wirken des General-Lieutenants F. A. Riedesel, nebst vielen Original-Correspondenzen und his-torischen Aktenstiicken,> by von Eelking, ap¬ peared in 1856. An abridged translation into English by W. L. Stone was published in 1868. It affords a most complete and accurate account of Burgoyne's expedition, as well as a clear view of contemporary affairs in Canada.

RIEGER, re'ger, Franz Ladislaus, Baron von, Bohemian statesman : b. Semil, 10 Dec. 1818; d. Prague, 3 March 1903. He studied law at Prague, received a government service ap¬ pointment and in 1848 he was elected to the Austrian Reichsrat. After a period of activ¬ ity as one of the leaders of the Slavic party he remained in the background until 1861, when with Palacky he led a movement demanding the restoration of the Bohemian monarchy, including Moravia and Silesia, and that Bohe¬ mia should occupy in the empire a place similar to that of Hungary. Reiger's power was grad¬ ually encroached upon by the Young Czechs, he remaining the head of the Old Czechs, and in 1891, after 30 years of leadership, he was defeated by the young party. He was ennobled in 1897 and took his seat in the Austrian House of Peers.

RIEGO Y NUNEZ, re-a'gd e noo'nyath, Rafael del, Spanish

revolutionist : b. Santa Maria de Tuna, 24 Oct. 1785; executed, Madrid, 7 Nov. 1823. He studied law at Oviedo, en¬ tered the army in 1807 and was in command of a battalion at the time of the French inva¬ sion of 1808. He was taken prisoner at the battle of Espinosa de los Monteros in Novem¬ ber 1808 and was held a prisoner in France until 1814, when he escaped. He visited Switz¬ erland, Germany and England and then re¬ turned to Spain through the aid of the Eng¬ lish. He remained in the army and in 1820 became the leader of the revolutionary move¬ ment which secured the restoration of the Cor¬ tes constitution of 1812. He was placed in command of the forces in Aragon as field mar¬ shal and captain general, but was discontented with the appointment, feeling that his services deserved high place in the new government.

He was elected to the Cortes in 1822 and chosen its president, 17 Feb. 1823. He met the French invasion with considerable determina¬ tion but was taken prisoner after several un¬ successful actions, then fell into the hands of royalist volunteers, by whom he was taken to the capital and executed. His revolution failed to benefit Spain as he was unable to keep the forces he had released under control and the country suffered severely between the intrigues of royalty and the uncontrolled conduct of Riego's followers. Spain's popular revolution¬ ary song, the (Hymn of Riego) was named for him. Consult Riego, < Memoirs of Riego and His Family) (1824); Baumgarten, H., (Geschichte Spaniens> (1865-71).

RIEL, re-el', Louis, Canadian insurgent: b. Saint Boniface, Manitoba, 23 Oct. 1844; d. Regina, Northwest Territory, 16 Nov. 1885. He belonged to the Metis race of Franco-In- dians and as protege of Archbishop Tache, was educated at the Jesuit College at Montreal. In 1869 he took part in the protest raised by the native tribes against the establishment of Canadian authority in the territories lately ac¬ quired from the Hudson Bay Company and was elected president of a provisional government established at Fort Garry. The rebellion was suppressed the next year by a force under Sir Garnet Wolseley and

Riel fled from the terri¬ tory. In 1873 he was elected to the Dominion parliament for Provencher, but was not per¬ mitted to take his seat and after two subsequent re-elections a warrant of outlawry was issued against him and he was sentenced in 1875 to five years' banishment with forfeiture of politi¬ cal rights. In 1884-85 he headed a party of half-breeds in another insurrection, which was soon suppressed. Riel was taken prisoner, con¬ victed of treason and executed. See Riel's Re¬ bellion.

RIEL'S REBELLION, or the Northwest

Rebellion, was an outbreak of the half-breeds and Indians of the valley of the Saskatchewan, in the spring of 1885, promptly suppressed by the Canadian militia. For some time past dis¬ content had been rife among the half-breeds, or Metis, of that district, who feared that the surveying of the country by the Dominion gov¬ ernment and the government sales of land to incoming settlers would dispossess them of their homesteads. In June 1884 Louis Riel, the half-breed leader of the abortive outbreak of 1869-70, returned by invitation from Montana and put himself at the head of the movement. At a gathering at Saint Laurent, on the Sas¬ katchewan, September 1884, a ((Bill of Rights" was adopted asking that the half-breeds should receive the same grant of 240 acres per capita that had already been given (1870) to their kinsmen in the province of Manitoba. With this demand were coupled more extravagant pretensions to further reservations of land and grants of money. Various petitions had already been sent to the Dominion government in be¬ half of the half-breed claims. A commission had been appointed to consider them, but the whole matter aroused so little public attention in Canada that the news of the actual revolt in March 1885 came with alarming suddenness. On the 17th of that month the Metis formed a provisional government, with Louis Riel (q.v.) as president, Gabriel Dumont as adjutant-general, and a numerous council. All obtain¬ able stores were seized, supplies on the way to Prince Albert intercepted and the telegraph wires cut. At the same time every effort was made to arouse the Indians of the Saskatchewan district, detachments of whom, under Beardy and One-Arrow, at once joined the rebels. The only forces immediately available to cope with the outbreak were about 500 mounted police, scattered in small detachments over the Northwest Territory, of whom some 200 men of all ranks were distributed between Prince Albert, Fort Carlton, Battleford and Fort Pitt. The rebels demanded the surrender of Fort Carlton, a mounted police post on the North Saskatchewan, 40 miles above Prince Al¬ bert, held by Major Crozier with a handful of men. Crozier refused, and succeeded in com¬ municating with Prince Albert and obtaining a reinforcement

of 40 volunteers. With the help of these he attempted (26 March) to secure the stores from Duck Lake, a post a few miles distant. Here occurred the first bloodshed of the rising. The rebels attacked Crozier near Duck Lake, and forced him to retire to Carl¬ ton with a loss of 12 killed and 12 wounded. The mounted police burned the fort at Carlton and retired to Prince Albert. The news of the fight at Duck Lake occasioned intense excite¬ ment throughout Canada. Immediate steps were taken to despatch an adequate force of militia to the northwest. General Sir Fred¬ erick Middleton, the commander-in-chief, was already on his way. On the 28th of March there was a general call to arms of the militia forces, picked troops from the different regi¬ ments being at once forwarded to the front. Various corps of scouts, rangers, cavalry, etc., were specially organized. Eighteen hundred troops started from Ontario and Quebec within six days of the call to arms, and within a month 3,000 men had been transported to the northwest and 1,500 raised in Manitoba and the territories. The area of operations was the valley of the Saskatchewan River, whose north branch runs from west to east through the province of the same name and now in the territories of the Canadian Northern and Grand Trunk Pacific railways. On this river were the posts of Prince Albert, Battleford, situated about 160 miles farther up the river, and Fort Pitt, also on the river, 120 miles northwest of Battleford. The main body of rebels had established them¬ selves at Batoche, on the South Saskatchewan, a river flowing from the southwest to meet its confluent on a long V-shaped angle. Muster¬ ing His forces at Qu'Appelle and Swift Cur¬ rent, Middleton resolved to strike into the rebel territory in two columns. The main column, under Middleton, was to move northward on Clark's Crossing, a ferry station on the Sas¬ katchewan about 40 miles by trail from Batoche. A second, under Lieutenant-Colonel Otter, was to march from Swift Current (140 miles west of Qu'Appelle) to the relief of Battleford. A third force, gathered at Calgary, was to descend the route of the North Sas¬ katchewan from Edmonton, thus reaching Fort Pitt. Meantime the position of affairs appeared extremely critical. Some 500 Indians in the neighborhood of Battleford had risen under Poundmaker, a Cree chief, laid siege to the stockade fort in which the whites had taken

refuge, and plundered the stores of the town. Near Fort Pitt the Indians had also risen under Big Bear, and at Frog Lake, a post about 30 miles distant, on Good Friday (3 April) they plundered the stores and shot down nine per¬ sons in cold blood. The news of the massacre spread terror throughout the unprotected val¬ ley of the upper river, the settlers fleeing toward Edmonton. Many of the deserted houses were looted and burned. The advance was carried out with admirable success. The main column, the Royal Grenadiers, A Battery and other troops, traversing in forced marches 177 miles of prairie, struck the South Sas¬ katchewan at Clark's Crossing. Advancing north¬ wards down the river, they came upon the rebels strongly posted in a wooded ravine called Fish Creek, in which they had constructed rifle pits. A sanguinary contest ensued (23 April). The rebels, led by Gabriel Dumont, defended them¬ selves stubbornly, but were ultimately dislodged. The loss of the militia was 10 killed and 40 wounded. The second column, under Otter, consisting chiefly of Queen's Own men, left Swift Current 13 April, and after a march of 202 miles successfuly relieved the beleaguered fort at Battleford. From there Colonel Otter determined to strike at Poundmaker's reserve, against which he moved on 1 May, with a force of 325 men and three guns. They came upon the Indians in force at Cut Knife Hill, and after a severe engagement were compelled to re¬ tire on Battleford, with a loss of 8 killed and 14 wounded. At the same time General Strange, with the third division, marched from Calgary to Edmonton (2 May), and thence directed his forces against Big Bear. Mean¬ while General Middleton decided to move for¬ ward against the main body of the half-breeds at Batoche. The advanced season rendered possible the navigation of the South Saskatche¬ wan, down which the steamer Northcote, with supplies and munitions, was despatched to join Middleton's column. Batoche was invested by the militia on 9 May, and a four days' fight ensued. The rebels were entrenched in rifle pits along the banks of the river. During the first three days the fighting was desultory, Mid¬ dleton using his artillery and throwing up earthworks in order to exhaust the ammunition of the half-breeds without unduly exposing his men. The Northcote, that was to have aided in the attack, steamed down the river under a hot fire on the

9th, but its steering gear being disabled, it drifted past Batoche. On the fourth day a general charge of the militia resulted in a complete victory. The rifle pits and the vil¬ lage of Batoche were taken by storm and Riel and many of his council captured. Dumont escaped to the United States. The loss of the Canadian forces in the four days was 8 killed and 46 wounded; that of the rebels, 51 killed and 173 wounded. With the storming of Batoche the rebellion was virtually at an end. Poundmaker capitulated, and Big Bear fleeing to the north, though offering fight at French¬ man's Butte and Loon Lake, was ultimately cap¬ tured (2 July). Riel was taken to Regina, where he was tried for treason-felony (July 1885). His counsel attempted to defend him on the ground of insanity, but the plea was un¬ availing, and he was sentenced to be hanged. Numerous petitions were sent from French

Canada in favor of commutation of his sen¬ tence, with equally urgent petitions to the con¬ trary from various parts of the Dominion. He was hanged at Regina 16 Nov. 1885, meeting his death with great fortitude. Eight Indians were shortly after hanged at Battleford for complicity in the murders at Frog Lake, Fort Pitt and other places. Poundmaker, sentenced to three years' imprisonment, died in the Mani¬ toba penitentiary. For further information con¬ sult the Official Report on the Suppression of the Rebellion, ˆOttawa* (1886); (Dominion Annual Regis/ter) (1885); (Reminiscences

Lieut. -Col. Bolton) (1886), and (Canada and Its Provinces) (Vol. VII, 1914).

Stephen Leacock, McGill University.

RIEMANN, re'man, Georg Friedrich Bernhard, German mathematician: b. Brese-lenz near Dannenberg, Hanover, 17 Sept. 1826; d. Selasca, near Iutra, Lago Maggiore, Italy, 20 July 1866. He was educated at the universities of Gottingen and Berlin, taking his doctor's degree with the thesis (Grundlagen fur ein allgemeine Theorie der Functionen einer veranderlichen complexen Grossed and establish¬ ing therewith a reputation for high mathematical ability. He also made valuable researches in natural philosophy. He became privat docent at Gottingen and in 1857 was appointed adjunct professor of mathematics there, becoming pro¬ fessor after the death of Dirichlet in 1859. His achievements in mathematics included new and highly valuable theories concerning the study of surfaces and functions, and a non-Euclidean system of geometry. His work represents a

considerable advance in the science notwith¬ standing his short life and the fact that in his last years much of his time was absorbed in combating pulmonary tuberculosis, which caused his early death. Author of (Ueber de hypothesen, welche der Geometrie zu Grunde liegen) (1867) ; (Vorlesungen uber Schwere, Elektrizitat und Magnetismus) (1876) ; his col¬ lected works were edited by Weber, H., and Dedekind, R., and include a biographical sketch, (Gesammelte mathematische Werke und wis-senschaftlicher Nachlass) (1876; French trans.

1898).

RIEMANN, Hugo, German author and music teacher : b. Grossmehlra, near Saunder-shausen, 18 July 1849. He served in the Franco-Prussian War and later studied at the Con¬ servatory at Leipzig, where in 1878 he became university lecturer on music. In 1880 he re¬ moved to Bromberg and in 1881-90 he was teacher of theory and piano at the Conservatory there. He taught at the Conservatory at Wiesbaden in 1890-95. Returning to Leipzig as lecturer in 1895, he became professor of music there in 1901 and director in 1908. He has written much and authoritatively on the teaching and theory of music, and his musical compositions are designed to aid the teaching of music. He has also edited many works of older composers. His most important work is his <Musik-lexicon) (1882; 8th ed., 1916) which attained worldwide recognition. He is also author of (Handbuch der Harmonielehre) (1887); <Jahrhundert) (1898); (Handbuch der Musikgeschichte) (4 vols., 1901—14) ; (Gross Kompositionlehre* (3 vols., 1902-03).

RIEMENSCHNEIDER, re'men-shni'der, Tilman (Meister Dill, or Till), German sculptor: b. Osterode, Harz Mountains, about 1468; d. Wiirzberg, 8 July 1531. He became a resident of Wiirzberg, was chosen a member of council in 1509 and burgomaster in 1520. He was prominently connected with the Peasants War and after 1525 he was

not permitted to re¬ tain his office. He lived thenceforth in retire¬ ment. He left numerous works of sculpture, the majority of which are in or near Wiirzberg. One of his finest works is the monu¬ ment to Emperor Heinrich II and his consort Kunigunde, in the Bamberg Cathedral, finished in 1513. The figures of the emperor and his wife are somewhat more than life size and are regarded as excellent portraits besides furnish¬ ing an authoritative representation of the 15th century costume. The church at Rimpar, near Wiirzberg has some 20 statues by Riemen-schneider. A group, (Lamentation over the Dead Christ,* is in the church at Heidingsfeld, and there is a high relief of the same subject in the church at Maidbrunn. The latter was executed in sandstone (1525) and is believed to be his last work. He achieved a considerable reputation in foreign countries through his wood carvings and his designs for them. Among them are several beautiful altars. Con¬ sult Streit, ˆiemenschneider* (Berlin 1888), a monograph with reproductions of all his works.

RIENZI, re-en'ze, Cola di, Roman popular leader: b. about 1313; d. 8 Oct. 1354. The son of an innkeeper, he became imbued with a pas¬ sionate desire to re-establish the glory of an¬ cient Rome on the ruins of the oligarchy under whose rule the people suffered. In 1343 he went to the pope at Avignon, as the representative of the Roman people, and entreated him to return to Rome and end the misrule of the nobles. The pope made Rienzi apostolic notary, and the lat¬ ter returned to Rome, where he began the organ¬ ization of a widespread movement for the over¬ throw of the aristocracy. On 20 May 1347, Rienzi summoned an assembly of the people at the capitol, and there proposed a new constitu¬ tion for the state, providing for the arming of the people and the garrisoning of the walls by them, the reform of justice and the equitable dis¬ tributing of taxes. He became head of the new republic with the title of tribune of the people, and by means of the popular levies forced the nobles to leave the city. Rienzi's plans in¬ cluded not merely the restoration of the mu¬ nicipal liberties of Rome, but the re-establish¬ ment of the ancient Roman state, and to that end he invited the Italian cities to send repre¬ sentatives to Rome for the consideration of the welfare of Italy. Though few cities responded, Rienzi, carried away by power and his own elo¬ quence, caused himself to be crowned tribune 15 August, and bestowed the Roman citizenship on all inhabitants of Italy. The pope's hostility, however, was aroused by Rienzi's vainglorious attempt to act as arbitrator in the dispute for the Imperial throne that was then in progress, and he stirred up the Roman nobles against him. The nobles were defeated, but, Rienzi, dazzled by success, . began to play the tyrant, and a second insurrection compelled him to flee the city (15

December). Later he went to Bohemia to secure the aid of Emperor Charles IV for the execution of his plans. The emperor

handed Rienzi oyer to Pope Innocent VI, who, however, recognized how useful the tribune might be to him in crushing the Roman nobility and therefore sent him to Rome with Cardinal Albornoz in 1354. Rienzi's popularity was still great and he easily regained power; once more, however, he fell a victim to excess, oerpetrated acts of outrage and oppression, and aroused the hatred of the people. An insurrection, stirred up by the nobles of the house of Colonna and Sarelli, broke out on 8 Oct. 1354. The mob stormed the capitol, and Rienzi, seized as he was escaping in disguise, was murdered, and his body dragged through the streets. The career of Rienzi is the subject of one of Bulwer-Lytton's novels, <Rienzi) (1835) and of Wagner's opera, (Rienzi,* first produced at Dresden, 20 Oct. 1842. Consult Pappencordt, (Cola di Rienzi und seine Zeit* (1841) ; Auriac,

(Etude historique sur Nicole Rienzi* (1888) ; Rodocanachi, (Cola di Rienzi* (1888).

RIENZI, The Last of the Roman Tri¬ bunes, a historical romance by Sir Edward Bul-wer-Lytton, published in 1835. It is founded on the career of Cola di Rienzi (q.v.). Bulwer was so impressed with the heroism and force of character of his hero, that at first he meditated writing his biography, instead of a romance founded on his life. The story adheres very closely to the historical facts. Many of the situ¬ ations and scenes are very strong. The treat¬ ment is epic rather than dramatic ; and the splendid yet comfortless civilization of the Middle Ages, so picturesque and so squalid, so ecstatic and so base, is vividly delineated. Rienzi is also the subject of a once popular tragedy by Mary Russell Mitford, first pub¬ lished in 1828.

RIES, res, Heinrich, American economic geologist: b. Brooklyn, N. Y., 30 April 1871. He was educated at Columbia University. He served on the New York State Geological Sur¬ vey in 1891-92 and in 1895, and was assistant in mineralogy at Columbia in 1896-97. He be¬ came associated with the faculty at Cornell in 1892, was appointed professor of economic ge¬ ology in 1905, and since 1914 has been head of that department. Author of (Economic Ge¬ ology of United States) (1905) ; (Building Stone and Clay Products) (1912) ; and joint author of (Clay, Occurrence, Properties and Uses, History of the Clay Working Industry of United States) (1906) ; and Engineering Geology.) (1914).

RIESENGEBIRGE, re'zen-ge-ber"ge (the Giants' Mountains), part of the Sudetic chain, separating Silesia from Bohemia and Moravia, till it joins the Carpathians. It contains the loftiest mountains of the north or central parts of Germany. Some of the principal summits are Schneekoppe, 5,257 feet high; the Boren-berg and the Grand Rad, each 5,156 feet high.

RIET-BOK, ret'bok, the Dutch name of a South African species of antelope. Antilope (or Tragelaphus) arundinaceus. It is nearly five feet in length and about three feet high at the shoulder ; the horns, about a foot long, are boldly annulated at the base. In color it is of a dull ashy gray, sometimes tinged with red on the upper parts and silvery-gray beneath. As its name (riet-bok , reed-buck) implies, it is found mostly among reeds or coarse long grass.

RIETSCHEL, rech'el, Ernst Friedrich August, German sculptor: b. Pulsnitz, Saxony, 15 Dec. 1804; d. Dresden, 21 Feb. 1861. He studied art at Dresden, was a pupil of Rauch in Berlin and later studied in Italy. He gained recognition as a sculptor of extraordinary abil¬ ity through his colossal statue of Frederick Augustus, king of Saxony, at Dresden. He was elected to the Academy of Dresden and from 1832 until his death he was professor of sculpture at Dresden. He possessed a broad scope and excelled in many branches of his art. He was especially famous for his portrait figures, among which are those of Goethe-* and 'Schiller5 (Weimer) ; 'Lessing5 (Bruns¬ wick) ; and (Luther) (Worms). His religious pieces include the ' Christ-Angel 5 and the statue of 'Pieta5 ; and among his bas-reliefs are (Night and Morning5 ; (Noon and Twi¬ light.5 Consult his Autobiography (edited by Oppermann, 1873).

RIFF, a name given to the coast districts of northern Morocco extending from Ceuta to the western frontier of Algiers and forming a line of steep cliffs with few harbors. Its Ber¬ ber inhabitants were formerly much addicted to piracy and are still noted for smuggling.

RIFLE. See Small Arms.

RIFLE CLUBS. There are more than 1,000 rifle clubs in the United States, affiliated with the National Rifle Association of America, which is managed by the War Department at Washington. The object is to promote good marksmanship. A club must have at least 10 • members and a range where they can use .22 calibre rifles. Such ranges measure 50 or 75 feet from rifle to target. Civilian clubs usually shoot at 75 feet ; but college, military academy and high school clubs usually shoot at 50 feet. If outdoor ranges of 200 yards or more are available, the War Department furnishes mili¬ tary rifles and ammunition. Navy ranges are usually available and these furnish not only rifles and ammunition, but excellent coaching. The regular army and navy courses are used and those who qualify as marksman, sharp¬ shooter, or expert, receive appropriate decora¬ tions. With scientific coaching in the indoor range, men with no previous knowledge of the rifle soon learn to shoot well, and seldom fail to make good with the military rifle at longer ranges. Ample information as to organizing clubs, installing ranges, securing guns, ammuni¬ tion, etc., may be secured by addressing The National Rifle Association of America, 1108 Woodward Building, Washington, D. C.

RIFLEMAN, or RIFLE BIRD, an Aus¬ tralian forest-bird (Ptilorrhis pciradiseea) , close¬ ly related to the birds of paradise and so called because its colors and ornaments re¬ minded the colonists of the old uniform of the British Rifle Brigade. The male is regarded as more splendid in plumage than any other Australian bird. The upper parts are velvety black, tinged with purple; the under parts vel¬ vety black, diversified with olive-green. The crown of the head and the throat are covered with innumerable little specks of emerald green of most brilliant lustre. The tail is black, the two central feathers rich metallic green. The female, as is often the case, is much duller colored than her mate. They obtain their in¬ sect food largely from beneath the loose bark

of trees, about which they scramble like wood¬ peckers. Consult Newton, dictionary of Birds5 (1893-96).

RIG VEDA, rig va'da, the oldest of the four Vedas, and the oldest literary monument of the Indo-European races. The term Veda is the ancient Hindu Sanskrit word for knowl¬ edge, and the Vedas compose the great body of sacred scripture of the older Hindus, written in an ancient form of Sanskrit. The precise time of composition of the Vedas cannot be determined, but it is probable that the Rig Veda was in course of composition as early as 1200 b.c., and some authorities

contend that some of the verses must have been composed as early as 1500 b.c., the latest date of compo¬ sition given for any of the verses being 600 B.c. It is known that the Rig Veda was composed by many different generations, and Max Muller believed that for a long period after its com¬ position it was transmitted orally from one to another, and was not set down in writing until a much later date, since it contains no allusion to writing or writing materials. Of the four Vedas the Rig Veda is by far the most important, not only on account of its greater antiquity but also because of the information which it contains. The most authoritative writ¬ ers state that the sacred hymns of the Rig Veda are repeated in a modified form in the Sama Veda, or chants, and in another form in the Yajur Veda, or ritual, while the fourth and latest of the Vedas, the inferior Atharva Veda, shows great modifications from the hymns of the Rig Veda, due to the introduction of superstitions, magic chants and vulgar charms. The hymns of the Rig Veda, in com¬ mon with those of the three succeeding ones, are of four classes; the first and most import¬ ant are the mantras, or sacred utterances, usually in metrical form ; the next are the brahmanas, or explanatory inspired utterances, being the oldest Indo-European bodies of prose; last come the Sutras, divided into three classes, of which two are found in the Rig Veda; the Kalpa-Sutras, comprising largely rules of sacrifice, and the Grhya-Sutras, dealing with home life. The Rig Veda consists of 1,017 hymns or short lyric poems, with 10,580 verses. It is written in 10 books, of which six books ii-vii contain each the record of a single family or clan; book i, 15 collections, each attributed to a different poet-sage; book ix glorifies the sacred drink ''Soma,8 and book x contains hymns supposed to have been composed by many different authors. The religion was nature worship, the chief objects of adoration being Agni, the god of fire, and Indra or Jupiter Pluvius, the cloud-compeller. The Hindu Triad had not yet arisen. The Rig Veda does not recognize the institution of caste. Beef was eaten. Women held a high position, and some of the hymns were composed by them. The rite of suttee was unknown; the conquest of Indra had only begun, and the Ganges, inci¬ dentally mentioned, had not become a sacred stream. <(The home of the Rig Veda,55 says Professor Hopkins, of Yale University, (<has been located in almost as many places as Para¬ dise. Now it is by the Caspian Sea, now it is in Kandahar, but the Punjab is the favorite place, and quite naturally; for the poets are familiar with the Punjab, sing of it, talk of crossing its rivers, and in many ways show that

they occupied, in part at least, the country stretching from Peshawar to Delhi.® (See Sanskrit Literature; Veda). Consult (India Old and New: The Rig Veda,5 by E. W. Hop¬ kins (New York 1901); (The Religions of India,5 by the same author (Boston 1895), and the translation by Arrowsmith (Boston 1886) of A. Kaegi's (Rigveda.5

RIGA, re'ga, Latvia, capital of Republic on the Dwina, seven miles from the Gulf of Riga, an inlet of the Baltic, is one of the principal seaports of the Baltic. It had a population at the last census of 569,100. Of the four parts into which it is divided, the old town alone preserves the Hanseatic features. It is characterized by high storehouses and spacious granaries ; market place ; other squares, and busy, winding streets. The Saint Petersburg di¬ vision of the town is the aristocratic quarter. The <(Domkirche® (1204) contains one of the largest organs in the world. Saint Peter's Church has a tower over 400 feet high. The Castle (1494-1515), built by Walter von Plettenberg, is a spacious building now occupied by the military authorities. Other places of more recent construction are: The Polytechnic, Ex¬ change, municipal picture gallery, . schools, gymnasiums and scientific and professional col¬ leges, bonded warehouses and manufactories. At least half of the population is German, the German element predominating in the life of the city. There is an ever-increasing intellectual and commercial development. Riga is a great mart for timber from the vast. White Forest, and the principal port of Latvia for exports, the chief of which are corn, hemp, oats, tallow, leather, tobacco, rugs and feathers. Much of the interior trade is carried on by both rail and water communications.

RIGA, Gulf of, an inlet on the east side of the Baltic Sea, 105 miles in length from north to south and about 60 in breadth. The islands of Osel, Dago, Mohn and Worms lie across the entrance. The chief river which falls into the gulf is the Dima; seven miles above its mouth is the important commercial seaport of Riga (q.v.), after which the gulf is named.

RIGAUD, re-gd, Hyacinthe, French painter: b. Perpignan, 20 July 1659; d. Paris, 27 Dec. 1743. He arrived at Paris in 1681 and, acting under the advice of Lebrun, began to study portrait painting, taking Van Dyck for his model. In 1700 he became a member of the

Academy, of which he was elected professor in 1710 and rector in 1733. His portraits are all extraordinarily successful as likenesses, his heads are full of character, and the figures have all the studied nobleness in attitude character¬ istic of the times ; while he paints the gay cos¬ tumes of the court with remarkable truthfulness and brilliancy. Among his most notable works in the Louvre are the large portraits of Louis XIV and Bossuet, of which latter a replica or copy is in the episcopal palace at Meaux.

RIGDON, Sidney, Mormon leader: b. Allegheny County, Pa., 19 Feb. 1793; d. Friend¬ ship, N. Y., 14 July 1876. He was employed in a printing office in Pittsburgh in 1812 when a manuscript entitled (The Manuscript Found, or the Book of Mormon5 was offered for publi¬ cation by Samuel Spaulding. The work

impressed Rigdon so much that he made a copy of the manuscript before it was returned to the author who died soon after. In 1819 Rigdon became a Baptist preacher and in 1829 made the acquaintance of Joseph Smith, with whom (ac¬ cording to a story denied by the Mormons) he published (The Book of Mormon,5 transform¬ ing it by the addition of various pious phrases from an innocent historical romance into a new bible intended as the foundation of a new sect. He accompanied Smith to the West, assisted in founding the Mormon Church and became one of its presidents. He was one of the originators of the (<new revelation® author¬ izing polygamy, and in 1844 on the death of Smith aspired to the leadership. He refused to acknowledge the authority of Brigham Young, was excommunicated, and returned to the East where he lived quietly until his death.

RIGG, James Harrison, English Wes¬ leyan clergyman and educator : b. Newcastle-on- Tyne, 16 Jan. 1821 ; d. Brixton, 17 April 1909. He was educated at Kingswood School and in 1845 entered the Wesleyan ministry. He was a member of the London school board 1870-76; principal of the Westminster Training College 1868-1903 ; and a member of the Royal Com¬ mission on Education 1886-88. He edited the Quarterly Review for 15 years and wrote Principles of Wesleyan Methodism5 (1850-51) ; (The Churchmanship of John Wesley5 (1868-78-86); (Dr. Pusey: His Character and Life-work5 (1883); (Scenes and Studies in the Ministry of Our Lord5 (1902), *etc.*

RIGGS, rigz, Elias, American missionary and linguist: b. New Providence, N. J., 10 Nov. 1810; d. Scutari, Turkey, 17 Jan. 1901. He was graduated from Amherst in 1829, from Andover Theological

Seminary in 1832, was ordained to the ministry and sailed for Greece as a mis¬ sionary in the same year. He continued his work in Greece from 1832-38, in Smyrna from 1838-53, and from that time was engaged in Turkey. He returned to the United States once, in 1856, for the purpose of publishing his Armenian Bible, and while waiting for the completion of the work taught Hebrew in Union Theological Seminary in 1857-58. The remainder of his life was spent in Turkey. He translated the Bible into Bulgarian, Armenian and Turkish, and published (Manual of the Chaldee Language5 (1832) ; (Grammar of the Modern Armenian Language5 (1847) ; gram¬ mar of the Turkish Language as Written in the Armenian Character5 (1856) ; <Notes on Difficult Passages in the New Testament5 (1889), *etc.*

RIGGS, John Davis Seaton, American edu¬ cator: b. Washington, Pa., 29 Jan. 1851. He was graduated -from the University of Chicago in 1878, after engaging in business in Rockford, Ill., in 1869-75. He was principal of the com¬ mercial department in Salt Lake Academy, Utah, in 1878-79, of the preparatory department in the old University of Chicago in 1879-86, and joint principal of University Academy, Chi¬ cago, 1886-87. In 1887 he organized the Gran¬ ville (now Doane) Academy of Denison Uni¬ versity, Ohio, and was its principal until 1896, when he became president of Ottawa Uni¬ versity, Kansas. In 1905-10 he was president of Shurtleff College; traveled in 1910-11; in 1911-13 was district manager of the United

Mercantile Agency of Denver. Since 1913 he has been principal of Wolcott School, Denver. Mr. Riggs is a member of the Kansas State Historical Society, of the National Geographical Society and of the National Institute of Social Sciences. He has published (In Latinum) (Caeesar) (1890) ; lIn Latinum' (Cicero) (1892), *etc.*

RIGGS, Kate Douglas (Smith) (Wiggin),

American author : b. Philadelphia, 28 Sept. 1859. She was graduated at Abbott Academy (An¬ dover, Mass.) in 1878; was the first to organize free kindergartens for the poor of the Pacific Coast. In 1880 she was married to S. B. Wig-gin, who died in 1889, and she became the wife of G. C. Riggs in 1895, but continues to use the name of ((Kate Douglas Wiggin® as a literary signature. Her reputation as a humor¬ ist was made by the sketch (The Birds' Christ¬ mas Carol ' (1888), and has been well sustained by the cleverness in description and dialogue of her succeeding volumes, among them <The Story of Patsy' (1889); (Timothy's Quest) (1890) ; <Polly Oliver's Problem' (1893) ; (Marm Liza) (1896); <Penelope's Progress) (1898) ; (Penelope's Experiences in Ireland) (1901), and (The Diary of a Goose Girl' (1902). She also edited the anthology (Golden Numbers' (with N. A. Smith, 1902), and various books for children.

RIGGS, Stephen Return, American mis¬ sionary: b. Steubenville, Ohio, 23 March 1812; d. Beloit, Wis., 24 Aug. 1883. He was gradu¬ ated at Jefferson College, Pa., in 1834, studied at the Western Theological Seminary, Alle¬ gheny, Pa., for a year, and was licensed to preach. He was sent as a missionary to the Indians in 1837, first being stationed at Fort Snelling. He set about mastering the Dakota language, and subsequently wrote nearly 50 books concerning the language, customs and history of the tribe. He was later connected with the mission at Lac-qui-parle, established one at Traverse des Sioux in 1843, and in 1854 built a boarding school for Dakota children at Hazelwood. He was chaplain to the govern¬ ment expedition which suppressed the Little Crow insurrection in 1862, and thenceforth divided his time between visits to the missions and his translation of the Bible into the Dakota language, which work was published before his death. Author

of (A Grammar and Dictionary of the Dakota Language) (Smithsonian Institu¬ tion 1852; revised ed., 1883); (Forty Years Among the Sioux' (1880), *etc.*

RIGGS, William Henry, American col¬ lector of arms and armor: b. New York, about 1838. He was the son of Elisha Riggs, the banker, of New York, and from his childhood was an ardent collector. At 15 he began the collection of Indian arms and costumes, and in 1853 he shipped from the Rockies to New York one of the earliest ethnological collec¬ tions made in that region. This, unfortunately, was destroyed in a warehouse fire. At a school in France he was a fellow student with J. P. Morgan, Sr. (q.v.), and the friendship then formed became lifelong. Possessed of ample means, his association with Morgan crystallized his ambitions as a collector, and he definitely planned to make his collection of arms and armor a national one. He traveled inde-

fatigably in quest of rare and historic objects, and in 1857 settled upon Paris as the head¬ quarters for his collection. His home there became a gathering place for a brilliant coterie of lovers of armor, of whom the emperor was one. His later years were devoted to the ar¬ ranging and putting into perfect order the great collection which in 1913 he presented to the Metropolitan Museum of Art, and which is now housed there as the Riggs Collection of Arms and Armor (q.v.).

RIGGS COLLECTION OF ARMS AND ARMOR, the collection of William Henry Riggs (q.v.), presented to the Metropolitan Museum of Art in 1913 and placed on exhibition there in 1914. The collection was gathered from practically every sale of such objects, private or public, in a period beginning in the early 50's and includes intact some of the rpost famous collections in Europe. It is par¬ ticularly rich in articles of historic as well as artistic interest, and the total number of pieces in the collection is about 2,500. These represent the cream of Mr. Riggs' collection, he having possessed at one time some 8,000 objects; but these were sorted, weeded out, many pieces of the commoner sort being exchanged for single objects of greater merit, or sold at public auc¬ tion. As a private collection it was considered unrivaled. Consult (Bulletin of the Metro¬ politan Museum of Art' (Vol. IX, No. 3, New York 1914).

RIGG'S DISEASE. See Pyorrhcea Al—

VEOLARIS.

RIGHI, re'ge, Augusto, Italian physicist : b. Bologna, 1850. He was educated at the University of Bologna and was afterward pro¬ fessor at the universities of Palermo and Padua, becoming professor of experimental physics at Bologna in 1889. He has made im¬ portant researches in connection with electrical conductivity, resistivity and waves, the polariza¬ tion of light and the Leeman effect. He was the first to observe the double refraction of electric waves; made a series of experiments to prove the analogy of electric and light waves, and discovered the influence of magnetism over bismuth in connection with resistivity. He car¬ ried forward the investigation of electromag¬ netic waves, his work in this connection greatly facilitating Marconi's achievements in wireless telegraphy. He was elected a fellow of the Academia dei Lincei at Rome, and a senator of the Kingdom. < He has written many scien¬ tific articles and is author of (Die optik elek-trischen Schwingungen' (1898) ; (Die Tele¬ graphic ohne Draht' (1903) ; (Modern Theory of Physical Phenomena, Radioactivity, Ions and Electrons' (trans. by A. Trowbridge, 1904) ; (Strahlende Materie und Magnetische Strahlen' (1909) ; (Kometen und Elektronen' (1911), *etc.*

RIGHI. See Rigi.

RIGHT is a claim or a title to anything whatever that can be enforced, or a claim to act, possess or enjoy anything, or the use thereof, or it may exist in the nature of a privilege or power. Right has also been legally defined (<as that which one has a legal claim to do; legal power; authority, immunity granted by authority." A legal right is one which is protected by law, and the means of protection

is the remedy. The existence of a legal right implies the existence of legal remedy, for one does not exist without the other.

RIGHT-HANDEDNESS, the property or condition of being right-handed. The cause is not known. Some contend that it is racial habit, growing out of the left hand being used for un¬ clean purposes and, therefore, not fit for eating, salutation, *etc.* This has not been proven.

Others, like Charles Reade, contend that man should be ambidextrous, and that it is a duty in athletics to preserve the balance between the hands. The propensity in man to use the right hand in preference to the left is by some at¬ tributed to the lack of perfect symmetry in the body. If the body could be folded over from a medial line so that each organ of the one side should lie exactly on a corresponding organ of the other, the bodily structure would be highly fitted, in a mechanical sense, for the equal use of either limb, and ambidextral individuals would be the rule. The centre of gravity in the body of the average person is a little to the right of such a medial line. This makes the right side the heavier. From a series of ex¬ periments the greater weight has been estimated at about 15 ounces. On this fact is founded the mechanical theory of right-handedness, the pre¬ dominance of the right hand over the left; or, more generally, of the limbs of the right side over those of the left. The extra 15 ounces, however, may be a result not a cause to right-handedness. The three-lobed right lung is more capacious and receives more air during an inspiration than the two-lobed left lung. The liver during inspiration swings toward the right side, shifting the centre of gravity farther to that side. In violent muscular exertion there is more air proportionally inhaled by the lung of the side which sustains the exertion. Under exertion of the right side the larger lung is better filled than the smaller, and the centre of gravity is removed till it is found in a line passing through the right foot ; so that the right leg and foot afford a steadier basis of support than the left would do under similar circumstances. Through the greater use of the right lower limb the right upper limb comes to be preferred. In the case of a light weight, slung on the arm, the equilibrium of the body is better maintained by carrying it on the left side. If the weight be a heavy one, borne on the left shoulder, the burden is really being sup¬ ported very much by the right limb, owing to the natural curve of the body toward the right side, while sustaining the pressure.

In a very few cases left-handedness has been found to accompany transposition of the viscera. But cases of genuine left-handedness far exceed in number such instances of trans¬ position. Ferrier's researches have proved that when we see with the right eye we see with the left side of the brain. Hereditary left-handed¬ ness, if there be such a thing, may 'be due to the greater development of the right side of the brain. (<It is practically certain,® savs Bastian, (<that the great preponderance of right-handed movements in ordinary individuals must tend to produce a more complex organization of the left than the right hemisphere.® Some think that in the evolution of man right-handedness has probably been a late acquisition. The old¬

est discovered records of the human race, how¬

ever, suggest man to have been right-handed. Prehistoric weapons are those of right-handed individuals; many tools, etc., now in use are made for the right hand.

Right-handedness in man appears to be more persistent than the corresponding quality in lower animals. Naturalists, who observe that adult monkeys catch nuts more with the right hand, that the African elephant digs more with the right tusk, or that the Carolina parrot has a preferential claw for grasping, tell us that these habits are subject to exceptions more numerous than those of left-handedness in human beings. Another view of the whole sub¬ ject is taken by some psychologists, who main¬ tain the probability that the tendency to right-handedness is due to unrecognized spiritual causes, which underlie all phenomena of life. Since we do not know what life is, nor even how and why we are sentient creatures, the problem is wholly beyond our reach, and the ingenious theories only demonstrate man's fond¬ ness for speculation.

RIGHT OF SEARCH. In international law the right of search is the right of the lawfully commissioned cruisers and war ships of a belligerent power to stop and ex¬ amine on the high seas the merchant vessels of neutral powers in order to determine whether they are carrying contraband goods, engaging in unneutral service, attempting to run a block¬ ade and the like. It is ancillary to* the right of capture, for the liability of ship or goods to capture often can be determined only after an inspection of its papers and an examination of its cargo. This right has long been recog¬ nized as one which belligerents are lawfully entitled to exercise. ((The right of visiting and searching merchant ships upon the high seas,® said the great English admiralty judge, Sir William Scott, in the case of the Maria in 1799, (<whatever be the ships, whatever be the car¬ goes, whatever be the destinations, is an incon¬ testable right of the lawfully commissioned cruisers of a belligerent nation — this right is so clear in principle, that no man can deny it who admits the legality of maritime capture, because if you are not at liberty to ascertain by sufficient inquiry whether there is prop¬ erty that can legally be captured, it is impos¬ sible to capture.® The right, however, is one which belongs only to belligerents ; it cannot be exercised by insurgents whose belligerency has not been recognized. Likewise, it is limited to merchant vessels and cannot be exercised against public vessels of neutral powers and of course it can be exercised only on the

high seas. Neutral vessels under convoy are exempt from search. Nor may it be exercised in time of peace except where the right has been granted by treaty, as it has been done to a limited extent for the purpose of putting an end to the slave trade. The assertion and ex¬ ercise of such a claim by Great Britain dur¬ ing the early part of the 19th century was vigorously contested by the United States apd in 1858 it was definitely abandoned by the British government. There are certain well-recognized rules governing the exercise of the right. The pursuing cruiser may, if it wishes, chase under false colors but before beginning the search the true flag must be hoisted. Re¬ sistance to the exercise of the right of search

renders the vessel and its cargo liable to capture and condemnation. It is customary to summon the vessel to stop by firing a blank cartridge, as a signal to heave to. This is called the semonce or affirming gun. A searching party then goes aboard, examines the ship's papers with a view to verifying its nationality, investigates the nature of the cargo and inquires into the ports of departure and destination. There are well-settled rules regarding the number of men who may constitute the searching party, the number and kind of arms they may take aboard, the manner in which the search shall be conducted, *etc.* Nearly all prize regulations stipulate that the crew shall be treated courteously and that the vessel shall be subjected to as little delay and inconvenience as possible. If the search reveals the presence of contraband, evidence of an intention to violate a blockade and the like, the vessel may be seized, taken into a home port and placed in the custody of a prize court in order that the validity of the capture may be judicially determined. Otherwise it should be released and allowed to proceed on its voyage. During the Great European War of 1914-17 the American sawernment protested against the action of British cruisers for taking American vessels into distant ports ((on suspicion not amounting to evidence® and for detaining them for long periods of time for the purpose of dis¬ covering evidence of hostile destination. The American government contended that the right of search could only be exercised on the high seas at the time and place

of capture and if the examination did not show the presence of contraband or intent to violate a blockade the vessel should be released. To this protest the British government replied that effective searches at sea under modern conditions was impossible. Modern ships are so large and their cargoes so huge that if the right of search is to be effective it is necessary that the ships be taken into port and the cargoes removed in order that each parcel may be examined or weighed. The evidence in many cases showed that contraband articles like rubber and copper had been packed in bales of cotton and the pres¬ ence of such articles could be determined only by a more thorough examination than was pos¬ sible at sea. To take a ship into port, it was argued, was not the assertion of a new bellig¬ erent right but rather the adaptation of an existing right to modern conditions of com¬ merce. It has been suggested that the neces-sitv of detention in such cases and with it the ruinous delays to which shippers are exposed might be removed by the adoption of a system of official certification whereby neutral vessels could carry, if they chose, satisfactory assur¬ ances that their cargoes consisted only of the goods described in their manifests. In some in¬ stances during the war such certificates were in fact issued by the United States customs officials and in other cases by British consuls under whose supervision the cargoes were laden on board, but the British government declined to recognize them as conclusive, on the ground that the certificates afforded no assurance against subsequent augmentation of the cargo at sea. In some cases, it may be remarked, treaties have been concluded between the United States and certain foreign powers providing that certificates of this kind shall be accepted by the contracting parties, if one should be

belligerent and the other neutral, as conclusive that the cargo is not contraband.

Bibliography. — Aside from the general treatises on international law see Atherley-Jones, Commerce in War, > Chapter V, and Garner, Contraband, Right of Search and Continous Voyage) (American Journal of Inter¬ national Law, April 1915, pp. 372 ff).

James W. Garner.

RIGHT OF WAY, the right to pass over a certain route or track in going from one place to another. Such a right is a public right of way if enjoyed by everybody; private if en¬ joyed by a certain person or description of persons (as the residents of a particular farm). Wherever

there is a public right of way there is technically a highway, though the phrase is not used in connection with regularly-kept-up public roads, but generally with mere paths, tracts or by-roads. The origin of a public right of way is generally said to be by dedica¬ tion of it to the public by the owner of the soil.

RIGHT WHALE, the most important ‘of the baleen whales. See Whale.

RIGHTS, Civil. One of the clearest defin¬ itions of an authoritative character declares : Civil rights are those which appertain to citi¬ zenship and which may be enforced or redressed by a civil action. Also a term applied to certain rights secured to all citizens of the United States by the Thirteenth and Fourteenth Amendments of the Federal Constitution, and by congressional action thereunder, and by State legislation.® Bouvier says “these consist of acquiring property, of exercising the paternal and marital powers, and the like.® Civil rights in full are extended in this country to aliens as well as to citizens. All residents alike enjoy such powers which can only be denied under a sentence of civil death. Civil rights have been divided into absolute and relative rights. Absolute rights are those generally considered as inherent to humanity. Of such is the right of personal security permitting of the individual’s enjoyment, legally and uninterruptedly, of the use of his limbs, his body, his health and his reputa¬ tion ; the right of his personal liberty, consisting of the power of locomotion, of changing situation, or betaking one’s person to other places accord¬ ing to inclination and under no outside direction or restraint, except by due process of law. Under the division absolute rights is placed the right of property, allowing the free use, enjoy¬ ment, and disposal, all his legally acquired ac¬ quisitions, uncontrolled and undiminished, sub¬ ject alone to the laws of the country. Relative civil rights include those which subsist between the people and the government, such as the peoples’ right to protection at the hands of the government; the right of allegiance which is due to the government at the hands of the people; the rights of husband and wife, parent and child, guardian and ward, master and serv¬ ant, reciprocally. Belonging to such relative civil rights would appear to be those which Blackstone defines as follows : “The rights of persons that are commanded to be observed by the municipal law are of two sorts: first, such as are due from every citizen which are usually called civil duties, and, secondly, such as be¬ long to him, which is the more popular accepta¬ tion of rights or jura?

As to precedence of civil rights Bouvier says: ((The idea of rights is co-existent with that of authority (or government) ; both are inherent in man ; but if we understand by government a coherent system of laws by which a State is ruled and if we understand by State a sovereign society with distinct authority to make and execute laws, then rights precede gov¬ ernment, or the establishment of States. .. .. .

An accepted judicial decision says, in distin¬ guishing civil from natural rights: ((By civil rights, I understand those rights which the municipal law will enforce, at the instance of private individuals, for the purpose of securing to them the enjoyment of their means of happi¬ ness. They are distinguished from natural rights, which would exist if there were no municipal law, some of which are abrogated by municipal law, while others lie outside of its scope and still others are enforcible under it as civil law.® Johnson, distinguishing civil from political rights gives the following definition: t(A right accorded to every member of a dis¬ tinct community or nation,® whereas a political right is a ((right exercisable in the administra¬ tion of government,® such as rights of voting on elections. ((Civil rights … have no rela¬ tion to the establishment, support, or manage¬ ment of the government,® Bouvier says.. Cer¬ tain apparently inherent rights of the citizens may not be actual rights so far as the laws of the country are concerned. Thus some rights, termed often rights of privacy, such as (<one s right to one's face,® the prohibition of holding of a private citizen's character up to ridicule, etc., found no place in court. The former case seems to make legal conditions clear. Until quite recent legislation no redress was avail¬ able in repeated attempts to hinder the use of portraits of living persons for use in adver¬ tising, etc., without that person's consent. But under present legislation the usage of a living person's lineaments without obtained permis¬ sion of the "owner® is illegal and the civil right of the citizen to his own likeness now prevails, whereas the ((holding up to ridicule® of the private person's character (except upon proof of malicious intent, libel, etc.), fails still to find a <(remedy® in the courts.

RIGHTS, Declaration and Bill of. See

Bill.

RIGHTS, Legal. Bouvier says legal rights <(are those where the party has the legal title to a thing; and in that case his remedy for an infringement of it is by an action in a court of law. Although the person holding the legal title may have no actual interest, but hold only as trustee, the suit may be in his name, and not, in general, in that of the cestui que trust* Legal rights are those which permit a capacity to reside in one. man to control ((with the assistance of the State, the action of others.® They are the rights which can be enforced in a civil action. A universally accepted judicial decision says : ((The very idea of legal right is, that it is one which is enforced and protected by the law, and as this can only be done by the remedy, the coercive means, whatever they may be, which the law affords for that purpose, it is plain that no one can have a legal right in that which another may take and apply to his use, and for doing so the law will find no redress.® The term (<remedy,® in its comprehensive mean¬

ing, is the <(means employed to enforce a right or redress an injury, including not only applica¬ tion to court, but any other lawful mode of obtaining satisfaction.® A legal proverb runs <(no wrong without a remedy.® This assertion has been long held by jurists as nonimpugnable, and the claim remains that ((where the law recognizes a right it gives a remedy to enforce it or redress its violation.® By extension the courts hold that (<right and remedy are re¬ ciprocal.® And whether by common law or by statute such a right obtains it makes no dif¬ ference. A distinguished authority says : ((When there is an invasion of primary rights, then and not till then, the adjective or. remedial law becomes operative and under it arise rights of action.® The legal right to an action at law does not exist until there has been a wrong, a violation of a legal right.

RIGHTS OF MAN, Declaration of the,

a famous statement of the constitution and principles of civil society and government adopted by the French National Assembly in August 1789. It suggested the title for Paine's defense of the French Revolution against Burke (1791-92) ; which was followed 'by Mary Woll-stonecraft Godwin's (Vindication of the Rights of Women) (1798). In 1832 the Society of the Rights of Man was founded in Paris. Consult Abbot, L., (Rights of Man) (Boston 190.1) ; and for the text of the French declaration, Robinson, J. H., (Readings in European His¬ tory) (2 vols., New York 1903).

RIGI, re'gi, or RIGHI, Switzerland, in the canton of Schwyz, an

isolated mountain rising precipitously between Lakes Zug and Lucerne to a height of 5,905 feet. It may be ascended by two railways of special type and affords fine views on which account it is much visited by travelers who visit Rigi in large numbers.

RIGOR MORTIS, the rigidity of the body which comes on after death. It varies in the time of its appearance and also of its dura¬ tion, sometimes setting in within a few minutes, at other times not for many hours and lasting in some cases but a very brief period, in others for several days. It is believed to be due to the coagulation of fluid substance in the muscular system which occurs after the withdrawal of nutrition from the tissues. Decomposition be¬ gins when relaxation of the body follows the passing of the rigor.

RIIS, res, Jacob Augustus, American jour¬ nalist, author and social reformer: b. Ribe, Denmark, 3 May 1849; d. 26 May 1914. He came to the United States in 1869 and worked at different trades, until he became a reporter on the New York Sun. In this work he gained a thor¬ ough knowledge of the conditions in the slums of the city, and by his lectures and writings aroused interest in reforms in the tenement-house dis¬ trict and became a leader in the reform move¬ ment. When Theodore Roosevelt was police commissioner, Riis' thorough knowledge of the city was of the greatest aid to him and the commissioner was usually accompanied on his all-night tours of investigation by Riis. Under the leadership of the latter, police station lodg¬ ing-houses were abolished, small parks in crowded districts opened, playgrounds equipped and many tenement-house evils done away with.

He, howeyer, held but one official position in connection with this reform work, that of secretary of the New York Small Parks Com¬ mission in 1897. His first book was (How the Other Half Lives, } published in 1890; other writings are (The Children of the Poor) (1892) ; (Nibsy's Christmas) (1893) ; (Out of Mulberry Street) (1898) ; (A Ten Years' War* (1900) ; (The Making of an American,* an autobiography (1901) ; (Battle with the Slums) (1902) ; (Peril and

Preservation of the Home' (1903) ; (Theodore Roosevelt, the Citizen) (1904) ; (The Old Town) (1909) ; (Hero Tales of the Far North* (1910); (Neighbors: Life Stories of the Other' Half* (1914).

RIKER, ri'ker, Andrew L., American auto¬ mobile engineer and designer: b. New York, 22 Oct. 1868. He was graduated at the Colum¬ bia Law School, but early turned his attention to automobile construction. He built one of the first electrically propelled vehicles in the United States ; produced the first toothed armature ; and has designed numerous auto¬ mobile parts, as well as dynamos, motors, trans¬ formers and electric systems. He was also a pioneer in building electric trucks. He was awarded a medal from the French government for an automobile design in 1900; and in 1912 he became vice-president of the Locomobile Company of America. One of the first presi¬ dents of the American Society of Automobile Engineers, he was in 1915 appointed to the Naval Advisory Board as a representative of that society.

RIKKI TIKKI TAC. In spite of solid qualities, the popularity of (Rikki Tikki Tac,* like that of many of the stories of Henri Con¬ science, is due in part to adventitious elements; for considered purely as a work of art it must stand on a lower plane than many another brief romance of its type. In construction of plot and the handling of incident its author here fails to show that deftness and sureness of touch which characterize the work of other masters, like Merimee or Turgenieff or Steven¬ son. Its appeal, as so often in the case of Conscience's work, is to sentiment. A life of hardship and suffering patiently borne and a love which triumphs through adversity provide a characteristic theme of life in Flanders in the days of Napoleon and after, and through it all, like sad, remembered music, runs the long, inexplicable, haunting refrain of the black¬ smith's song. This with the description of the acrid smell of fires of sod, the shrilling of the cricket, the monotonous wide stretch of plain about Antwerp and the sense of tenderness, homesickness and loneliness, testify to the patriotic interest and homely, simple faith of its author.

Christian Gauss.

RILEY, rl'lT, Charles Valentine, American entomologist : b. London, England, 18 Sept. 1843; d. Washington, D. C., 14 Sept. 1895. He was educated at Dieppe and at Bonn, and in 1860 came to the United States where he spent three years in studying practical agriculture. He then engaged in newspaper work and in 1864 went to the front in the Union army. In 1868 he was appointed State entomologist of Missouri and in that year assisted in founding the American Entomologist. He

was presi¬ dent of the Academy of Science at Saint Louis

in 1876-77, chief of the United States entomo¬ logical expedition to investigate the locust plague in 1877, and in 1878 became United States entomologist in the Department of Agriculture, an office which he occupied until 1894 with the exception of 1879-80 when conducting the cot¬ ton-worm investigation. In 1884 he was ap¬ pointed curator of the National Museum and also became general secretary of the American Association for the Advancement of Science. He invented the (<cyclone** or eddy chamber in nozzles for spraying purposes and made nu¬ merous discoveries of methods to control in¬ sect pests. His publications include (Annual Reports on the Insects of Missouri (9 vols., 1868-77) ; (Annual Reports as Entomologist of the Department of Agriculture) ; Potato Pests* (1876) ; (Locust Plague in the United States) (1877) ; (The San Jose Scale) (1895), *etc.*

RILEY, (Isaac) Woodbridge, American scholar: b. New York, 20 May 1869. He was graduated at Yale in 1892, and took the degrees of A.M. and Ph.D. there in 1898 and 1902 re¬ spectively. He was Johnston research scholar at Johns Hopkins University in 1904—07, and in 1908 became professor of philosophy at Vassar College. Since 1903 he has been asso¬ ciate editor of the Psychological Bulletin. Author of (The Founder of Mormonism* (1892); (American Philosophy) (1907);

American Thought* (1915).

RILEY, James Whitcomb, American poet : b. Greenfield, Ind., 7 Oct. 1853; d. Indianapolis, Ind., 22 July 1916. Being one of those who never grow old, Mr. Riley was particularly sensitive on matters pertaining to his age, and the year of his birth is uncertain, some sup¬ posing that he was born as early as 1848. He was the son of Reuben A. Riley, a lawyer and politician, of Greenfield, Ind., and was educated to follow in his father's footsteps. The young man, however, didn't fancy law, and after a little elementary schooling he left home and be¬ came an itinerant sign painter. For 10 years he roamed the Ohio Valley, painting commercial signs on fences and farm outhouses. His clever sketches attracted wide attention and won praise from his employers. He led this free and easy existence, as happy and carefree as one could imagine, until the late seventies, when he obtained employment on a newspaper at Anderson, Ind. He then began to write verses, but received little encouragement. Then, in 1877, for the purpose of proving that his verses under a famous name would receive recog¬ nition, he perpetrated the famous ((Poe Hoax.® By arrangement with

J. Oscar Henderson, pub¬ lisher of the Dispatch of Kokomo, Ind., Mr. Riley wrote and Mr. Henderson printed a poem in the style of Edgar Allan Poe, to which he gave the characteristic title of ˆeonanie,* and it was offered to the public as a hitherto un¬ published product of the genius of Poe. This poem, it was stated, had been found written on the fly-leaf of a copy of Ainsworth's (Dic¬ tionary. * A traveler had discovered the treas¬ ure in the sitting-room of an old inn near Rich¬ mond, Va., and had taken it away with him. The publication of the poem and the accom¬ panying story excited interest throughout the country, and Mr. Henderson was called upon to produce the book in which it was written.

In some quarters the poem was accepted as genuine ; in others it was denounced as a fraud and its alleged discoverers as imposters. To Riley's delight it proved that he was a real poet; but the storm of protest that the ultimate disclosure aroused made him think he had ruined his future with the public. He shouldered the burden and returned to sign¬ painting. For a time he traveled as a sort of minstrel with a patent-medicine vendor and played the violin to attract crowds to be solicited to buy nostrums. In the midst of these dismal days came a letter from the Indianapolis Journal inviting Riley to contribute and prom¬ ising him real money for his verse. In the early eighties, therefore, he settled in Indian¬ apolis and began writing verses in the ((Hoosier55 dialect for the Journal; publishing (The Old Swimmin'-Hole) and (When the Frost is on the Punkin,5 and other poems under the pseudonyn of Benj. F. Johnson of Boone, which justly won him a great reputation in the West. He sent some of his poems to Henry Wads¬ worth Longfellow and received warm praise. In 1887 he participated in the Copyright Read¬ ings in New York City where he received the distinction of being invited, after his first appearance, to reappear on the second pro¬ gram, on which occasion James Russell Lowell gave him a high tribute. After this all the magazines clamored for his verse, and he be¬ gan to sell his poems by volumes. Publication of books of poems year after year brought Mr. Riley wealth and wide recognition of his liter¬ ary genius, and not

alone in the genre form. Many of his poems are of imaginative fantasy or are gently philosophic. In 1902 he received the degree of master of arts from Yale Uni¬ versity and in 1904 the University of Pennsyl¬ vania conferred upon him the degree of doctor of letters. In July 1911 the poet presented to the city of Indianapolis property valued at $75,000 for a site for a public library and school administration building. Mr. Riley had collected (The Old Swimmin'-Hole and 'Leven More Poems5 into a little paper-backed book sold over the newspaper counter in 1883. In 1885 he published an unpretentious volume called <The Boss Girl and Other Sketches) (now called (Sketches in Prose5). In 1887 he brought out (Afterwhiles,5 followed by (Pipes O'Pan at Zekesbury5 (1888) ; (Nye and Riley's Railway Guide) (1888) ; 'Old-Fashioned Roses) (1888); (Rhymes of Childhood) (1890); (The Flying Islands of the Night5 (1891); (Green Fields and Running Brooks5 (1892); (Pomes Here at Home5 (1893); (Armazindv5 (1894); <A Child World5 (1896); (Rubaiyat of Doc. Sifers5 (1897); (Riley Child-Rhymes5 (1898);

(Riley Love-Lyrics5 (1899); Tome Folks5 (1900); 'Riley Farm-Rhymes5 (1901); (The Book of Joyous Children5 (1902) ; 'An Old Sweetheart of Mine5 (1902) ; (His Pa's Ro¬ mance5 (1903); (A Defective Santa Claus5 (1904) ; (Out to Old Aunt Mary's5 (1904) ; 'Riley Songs o' Cheer5 (1905) ; 'While the Heart Beats Young5 (1906); (The Boys of the Old Glee Club5 (1907) ; (Morning5 (1907) ; Tome Again With Me5 (1908) ; ' Old School Day Romances5 (1909); (The Girl I Loved5 (1910); (The Lockerbie Book5 (1911); (01d Times5 (1915). In 1902 'That Old Sweet¬ heart of Mine5 was published individually in a volume illustrated by Christy. Since that

date many special editions of Riley's works have been printed until the total numbers 70. The biographical Edition5 of his complete works was published in 1913. In 1910 Riley ex¬ perienced an illness that brought him very near death. In the next year his birthday was cele¬ brated in the schools of Indiana and of New York City. In 1912 the celebration became more widespread, and Greenfield, his birth¬ place, gave him a <(Riley Day.55 In 1913 the school children of Indianapolis paraded past his home on Lockerbie street, and ((Riley< Days55 were held at Anderson, Indiana University and Cincinnati, Ohio, which places he visited. In 1914 the celebration was continued, and in 1915 Governor Ralston of Indiana issued a proclamation making Riley's birthday a day of celebration throughout Indiana. On the after¬ noon of his birthday a musical festival was given to him at which his poems were sung and danced and acted out in pantomime,

and in the evening a banquet was given in his honor, which was attended by representatives from all sections of the country. James Whitcomb Riley is known as “The Hoosier Poet55 and is often referred to as “The Burns of America.55 A poet of the people — his own people — was Whitcomb Riley. Born among them when the Middle West was a big pasture, he lived and died among them when it had grown to be an industrial empire. Dreaming their dreams, singing their songs, sharing their joys, sorrows and fancies, he touched these things with the wand of his great genius and enshrined them in the heart of the nation. Mr. Riley was to American poetry what Mark Twain was to American prose. One measure of his success — and by no means the greatest — may be gauged by the fact that he was one of the few Ameri¬ cans who, having devoted their lives to poetry, was able to gain a fortune from it. Not only in America, but in all the world have children claimed James Whitcomb Riley as their own. All the sorrows, the happiness, the joy of ex¬ istence have been expressed in his pages, and countless thousands have laughed and cried over them. He is the most widely read and best beloved of the singers of America. His verse occupies an unique niche in American literature. Mr. Riley never married, but he was a lover of children, whose spirit he divined so inti¬ mately, and of family life.

RILEY, John, English painter: b. Bishops-gate, London, 1646; d. there, 1691. He did not rise into notice until the death of Sir Peter Lely, but remained unsurpassed until the ap¬ pearance .of Sir Joshua Reynolds. He was an imitator of Van Dyck, and in both drawing arid coloring must be reckoned one of the best por¬ trait painters of his time. He painted the por¬ trait of Charles II, who rather disconcerted the artist by exclaiming: <(Is this like me? Then, odd’s fish, I am an ugly fellow.55 He also painted James II and his queen, William and Mary, Bishop Burnet, Dr. Busby of Westmin¬ ster and Lord Keeper North.

RILL MARKS, little channels cut by run¬ ning water on mud surfaces. They may become buried and be preserved on rock layers. They would be found only in terrestrial sediments.

RIMBAUD, ran’bo, Jean Arthur, French poet and author: b. Charleville, in the Ardennes, 20 Oct. 1854; d. Marseilles, 10 Nov. 1891. He

early displayed unusual intellectual gifts and an erratic temperament. Some of his verses written at the age of 15 are included in the collections of his works, and before he was 17 he had run away from home three times, once being returned as a vagabond and twice because of want. At 17 he sent the poem (Le Bateau Vivre> to Verlaine at Paris and was warmly invited to visit that poet, who hailed him as a genius — recognition that is still vouchsafed him as the pioneer of the (<decadent** movement in France. He remained in Paris until 1872, dividing his time as the guest of Verlaine and of Theodore De Ban-ville, served in the army of the Commune, and afterward left Paris with Verlaine. They traveled in England and Belgium for 13 months and then separated after violent quar¬ rels in which Verlaine twice attempted to kill the younger man. Rimbaud's (Une Saison en Enfer* (1873) detailed this extraordinary friendship. It was written in prose and was the only work he ever published. He then abandoned writing verse, although but 19, wandered through Germany and Italy and in 1875 disappeared. He eventually settled at Harrar, Abyssinia, and became a trader in coffee, perfumes, gold and ivory. He amassed a great fortune, became a sort of chieftain among the natives and was engaged in intrigues with Menelek and the French government against Italy. He was forced to go to Europe in 1891 for a surgical operation upon his knee and he died in a hospital at Marseilles. Mean¬ time, his friends supposing him dead, Verlaine had published his poems (Les Illuminations> (1886), including the famous sonnet attributing colors to the vowels, and these have had a great influence over younger French poets. A collection of his works, with a biography, was published 'by his brother-in-law, Paterne Bevrichoy, in 1879-98. Consult also (Lettres de Jean Arthur Rimbaud, Egypte, Arabie, Lthiopie* (1899) ; Moore, G., (Impressions and Opinions) (1891).

RIMINI, re'me-ne (ancient Ariminum), Italy, city on the Adriatic, in the province of Forli, celebrated for its mineral springs, the sea-bathing of the adjacent Porta Marina and for the massive and elegant architecture of its chief buildings. Its fisheries are extensive. It was the seat of the celebrated Malatesta family. Pop. 50,000.

RIMMER, William, American artist: b. Liverpool, England, 20 Feb. 1816; d. South Mil¬ ford, Mass., 20 Aug. 1879. He was taken to Nova Scotia by his parents in 1818 and in 1826 they removed to Boston. He studied medicine, paying his way by painting, and was a practising

physician for 16 years. While he had given some attention to painting and sculp¬ ture it was not until 1860 that he achieved a really important work, the colossal head of (Saint Stephen* carved from granite (Boston Athenaeum). In 1861 he finished his (Falling Gladiator5 (Boston Museum of Fine Arts), a work which established his reputation for vigorous, powerful work and showed an ac¬ curate knowledge of the human figure. He then opened an art school in Boston and lec¬ tured at Lowell Institute and Harvard on art anatomy. He also lectured at Cooper Institute and the National Academy, New

York. It was as a teacher that he attained his greatest success. Much of his work was ex¬ ecuted in clay by chiseling instead of modeling, and was impermanent. The permanent works he left are regarded as anatomically almost perfect and possessed of much of the vigor and simplicity of the early Greek sculptors. Be¬ sides the two already mentioned his remaining works are (The Fighting Lions5 (Boston Art Club) ; (A Dying Centaur5 (Boston Museum of Fine Arts), and a statue of Alexander Hamilton (Boston). He was author of Ele¬ ments of Design) (1872) ; (Art Anatomy*

(1877).

RIMMON. See Rammon.

RIMOUSKI, re-moos-ke', Canada, town ii. the county of Rimouski in the province of Quebec, on the right bank of the Saint Law¬ rence River, and on the Intercolonial Railroad, 185 miles northeast of the city of Quebec. The principal occupations are lumbering and fishing ; trout and salmon are abundant. It is a favorite summer resort on account of its cool climate and the opportunities for hunting and fishing. Communications by water are cut off about half the year, when the river is frozen. Pop. about

3,100.

RIMSKI-KORSAKOV, rim'ske-kor'sa'kof, Nicholas Andreyevltch, Russian composer : b. Vihkvin, Novgorod, 18 March 1844; d. Petrograd, 20 June 1908. He was graduated at the Naval Academy at Petrograd in 1862, served as a midshipman in the Russian navy and made a cruise around the world, and by 1865 had pro¬ duced a

symphony in E minor which was the first written by a Russian composer and was performed under the direction of Balakirev. He was retired from active service in the navy in 1873 and was appointed a professor at the Petrograd Conservatoire. He became associ¬ ated with a group of younger Russian com¬ posers, Borodin, Cui and Moussorsky, disciples of Balakirev, and devoted to the cause of in¬ dividual national music. He was most famous outside of Russia for his symphonies, but he also wrote 13 operas, several orchestral suites and overtures and many songs and pianoforte pieces. He succeeded Balakirev as the leading conductor in Petrograd. His work was indi¬ vidual and placed him among the foremost Russian masters. He often introduced Russian folk-melody themes into his compositions, work¬ ing out the combinations with extraordinary smoothness and richness and avoiding violent methods. Besides the miscellaneous work and symphony already mentioned he wrote two other symphonies (Op. 9 and Op. 32) ; and the operas (Pskovitianka* (1873) ; (The. Snow Maiden* (1880) ; <Mlada> (1892) ; (Mozart and Salieri* (1898) ; (Servilia* (1902) ; (Kites*

(1905), *etc.*

RIMU, or RED PINE, a New Zealand tree (Dacrydium cupressinum) of the yew family. It grows to a height of 40 to 80 feet, and from two to six feet in diameter. The branches are pendulous and feathery, and the leaves slender and needle-like. Its brown wood is valued for general building purposes. The young branches make good spruce beer.

RINDERPEST, a general term covering various malignant diseases of neat cattle. Rin¬ derpest proper is an acute infectious disease of

cattle and sometimes of other ruminants, char¬ acterized by high fever, rapid pulse and cessa¬ tion of milk-production during the first few days of the attack, followed by congestion and subsequently ulceration of the visible mucous membranes. The mortality is often as high as 90 per cent. This disease has been on record since the 4th century. It was first known in eastern Russia and central Asia, whence it has periodically emerged, causing havoc among cat¬ tle and heavy losses to the various European nations. From Europe it spread to Egypt. It appeared in Somaliland in 1889 and spread southward, reaching the Zambesi in 1896. It caused great loss to South African farmers and led to troubles with the natives whose cattle were affected. Inoculation with a prepared virus has given encouraging results as a means of securing immunity. The stamping out proc¬ ess is the only way to combat the disease.

Pleuro-Pneumonia. — This ((lung-fever® is a contagious malignant disease of cattle attended by inflammation of and exudation on the pleura and in the lungs. A disease, somewhat similar, has recently attacked goats. This disease has been recognized since the close of the 18th cen¬ tury. At present it occurs in Europe, Asia, Africa and Australia, but is under control in Great Britain. It was introduced into the United States in 1843, and outbreaks were re¬ ported at intervals. By 1883 the disease was distributed throughout the Eastern States and as far west as Chicago and constituted a serious menace to the livestock interests of the country. No temporary measure can be used in dealing with this scourge. The only ones practicable are quarantine, restriction of movement of cat¬ tle, slaughter of affected animals and disinfec¬ tion. The wisdom of such measures is vouched for by the results. Less than five years and the expenditure of only $1,500,000 by the Bureau of Animal Industry of the Department of Agricul¬ ture at Washington sufficed to place this disease under control. No case has been reported in the United States since 1892.

Anthrax, a specific infectious disease of mammals including man, also known as splenic fever, charbon, woolsorters' disease, etc., due to the presence in the blood of the micro¬ organism Bacillus anthracis. The diseased animal may suddenly fall to the ground as in apoplexy and die, or it may live 10 to 24 hours or more in a sub-acute case. The symptoms are high temperature, muscular trembling and labored breathing with prostration. The pres¬ ence of the germ in the blood is

proof of the disease. All carcases should be burned, as if buried the germs may remain in the soil or be carried-in the soil water. Cattle may be im¬ munized by inoculating with attenuated virus, with toxins or antitoxin serums. Anthrax vac¬ cine is on sale.

Blackleg, or quarter-ill, etc., called also symptomatic anthrax, usually attacks young cattle. It is due to a bacillus. Immunity to this disease is conferred by vaccination with blackleg vaccine.

Texas, Southern, or Spanish Fever, is a

contagious disease of cattle caused by a para¬ sitic protozoan (Pyrosoma bigeminum) , and is carried from Southern cattle to Northern cattle by the Southern cattle-tick (Boophilus bovis). Adult ticks fall from the cattle, lay eggs and

thus infest the soil with young ticks that carry the germs. Northern cattle passing over the ground get the ticks and subsequently the fever. When the ticks become attached to the skin they inoculate the cattle with the parasites, which in unimmune animals rapidly multiply, destroy the red corpuscles of the blood, causing high fever and a temperature of 106° F. or more, general weakness and finally death. In the later stages the urine is highly colored, showing the great loss of red blood cells, hence the name “red-water® for the disease. These symptoms and the presence of the ticks enable the disease to be recognized. Post-mortem examination re¬ veals an enlarged spleen, containing a dark tarry substance instead of normal pulp. The ticks can be destroyed by dipping the cattle in a light lubricating oil containing dissolved sul¬ phur. In the South cattle may be kept free from the fever by keeping them free from ticks in an uninfected enclosure. Young calves may be rendered immune by keeping ticks on them, and a considerable degree of immunity can be conferred on animals by inoculating them with the blood of Southern cattle, thus producing the fever. This disease has been widely dis¬ seminated throughout the southern parts of the United States. Thanks to the Federal quaran¬ tine from Virginia to California, established in 1899, however, so as to control the movement of Southern cattle into Northern States, the dis¬ ease is steadily being restricted to smaller and smaller areas and bids fair to be exterminated.

Foot and Mouth Disease or Aphthous Fever, a contagious eruptive fever attacking cloven-footed animals and communicable to many others, including man. Eruptions occur as blisters in the mouth, on the

udder, teats and feet, with an elevation of temperature of from 2 to 6 degrees. Although in mild attacks only 2 to 3 per cent of the animals attacked suc¬ cumb, it depreciates the value of the survivors from 20 to 50 per cent. When present in a malignant form, 5 to 50 per cent of the adults die and 50 to 80 per cent of the calves. It is more to be feared than pleuro-pneumonia. The milk from diseased cows may transmit the dis¬ ease to those partaking of it, and the disease produced in this manner is, especially when it attacks children, serious and sometimes fatal. The disease was first seen and recognized in England in 1839 where it continued with more or less prevalence until 1886, since when it has appeared less frequently. In 1870 it was intro¬ duced into the United States from Canada. The introduction of the disease into New Eng¬ land in 1902 drew attention to the dangers of the malady. Since then sporadic attacks have occurred in several States. Isolation and quar¬ antining of diseased animals is futile ; slaughtei of diseased animals and prohibition of move¬ ment of stock in the infected areas have proved the most efficacious methods of eradicating the disease.

Tuberculosis is one of the most insidious diseases infecting cattle and other animals. Like human tuberculosis, it is due to a germ, the tubercle bacillus which may affect any part of the body where it can secure a lodgment. Recent investigations show that the same ba¬ cillus may cause human and bovine tuberculosis, hence there is need to guard against human in¬ fection with bovine tuberculosis, and particu-

larly to guard children from tuberculous milk. Plenty of good food, fresh air and sunlight, rigid cleanliness, the use of disinfectants and the determination and isolation of affected ani¬ mals are now viewed as the best means of checking the disease. The tuberculin test is a ready means of determining whether or not cat¬ tle are tuberculous. Tuberculin is made by growing the bacterium for two or three weeks in bouillon to which glycerine is added. The germs are then killed by heating and their re¬ mains removed by filtration. Carbolic acid is

added to prevent decomposition and the fluid is packed in sealed sterilized bottles. Inoculation with this fluid causes a rise in temperature in the case of diseased animals. See Cattle, Dis¬ eases of.

Bibliography. — Consult various Reports of Bureau of Animal Industry, Washington, D. C. ; also of the State departments of agriculture in many States ; and bulletins of the State agricul¬ tural experiment stations.

RINEHART, rin'hart, Mary Roberts,

American novelist: b. Pittsburgh, Pa., 1876. She was educated at the Pittsburgh High School and the Pittsburgh Training School for Nurses, and in 1896 was married to Stanley Marshall Rinehart, M.D., of Pittsburgh. She attained her first literary success through her clever mystery stories and she later became well known as a novelist and playwright. She made a tour of the western battle front under the protection of the allied governments in 1915, and after the entry of the United States into the European War volunteered as a nurse. Author of (The Circular Staircase) (1908) ;

(Window at the White Cat5 (1910) ; (Amazing Adventures of Letitia Carberry5 (1911) ; (Street of Seven Stars5 (1914) ; (Kings, Queens and Pawns5 (1915) ; (Altar of Free¬ dom5 (1917) ; (The Amazing Interlude5 (1918) ;

(Dangerous Days5 (1919), *etc.*

RINEHART, William Henry, American sculptor: b. Carroll County, Md., 13 Sept. 1825; d. Rome, Italy, 28 Oct. 1874. He apprenticed himself at 21 to a marble-worker of Baltimore, and 10 years later went to Italy where he re¬ mained two years. On his return to Baltimore he executed several busts and a fountain for the United States general post office. He did not stay long in the United States, though his success as a sculptor met with much apprecia¬ tion here, but established himself in Rome in 1858. Among his best-known works are the reliefs Eight5 and (Morning5 ; his highly poetic and well-wrought (Clytie5 and (Love Reconciles with Death5 ; (Latona and her Chil¬ dren5 ; (Antigone5 ; (Atlanta5 and (Endymion.5 He finished the bronze doors for the national Capitol, a work bequeathed to him by Craw¬ ford.

RINES, George Edwin, American editor: b. Maitland, Hants County, Nova Scotia, Can¬ ada, 28 Dec. 1860. Coming to the United States when 11 years old, his early education was obtained in the public

schools of Brooklyn, N. Y. For several years after graduation from the high school there he was engaged in mer¬ cantile life, but in 1887 resumed his studies at Colgate University, Hamilton, N. Y. In 1890 he entered the full Hebrew and Greek course in theology and was graduated from the Hamilton Theological Seminary in 1893. He was for two

years pastor at Binghamton, N. Y., afterward accepting a call to the pastorate of the First Baptist Church of Ridgewood, N. J., where he remained for three years. He resigned from the ministry in 1899 to devote himself to literary work, and has been a frequent contributor to religious and other periodicals. In 1903 he was appointed managing editor of the Encyclopedia Americana,5 to which he contributed many articles. Subsequently Mr. Rines was managing editor of the (United Editors' Encyclopedia,5 and in 1910-11 was general editor of (The Foundation Library for Young People.5 In 1913-15 Mr. Rines was managing editor of (The German Classics,5 and after 1916 was editor-in-chief of the Encyclopedia Americana5 (2d ed.). This second edition he planned with con¬ summate care, adding many features hitherto foreign to works of reference. His particular care was to have an adequate treatment of every phase of American life and American govern¬ ment and informative articles describing the motives and actions of America in the Great War and the mighty forces loosed by her par¬ ticipation in that conflict.

RING. See Rings.

RING-BONE, a bony excrescence on the pastern of a horse. It is a morbid growth, callus or exostosis, commonly due to inflamma¬ tion, and in some cases extending to toe-joints with disabling effect. It is one of the more frequent ailments of horses and, although ordi¬ narily affecting animals of inferior condition or injured by overwork, it sometimes appears in very young colts. While not always visibly impairing the serviceableness of a horse, ring¬ bone usually depreciates the market value of animals affected with it, and as cure is practi¬ cally impossible it is a defect which calls for particular preventive methods in the care and breeding of horses and for cautious scrutiny in the purchase of them.

RING AND THE BOOK, The. This is indisputably one of the most remarkable poems of the 19th century. In 21,000 lines of blank verse — such poems as the Uliad5 and Earadise Lost5 with their breadth of theme fall far short of this total — Browning unfolds a story cen¬

tring in a murder actually committed at Rome in 1698. A Tuscan nobleman, nearly 50 years old, slew his young and low-born wife, whom he had wedded for her fortune. The material Browning derived from a miscellaneous collec¬ tion of documents, legal and other, relating to the trial, partly in print, partly manuscript, bound together in a volume — the so-called < Yellow Book5 — which fell into his hands, prob¬ ably in 1860. The details, thoroughly assimi¬ lated by the poet's imagination, are used in the poem with marvelous fidelity and fullness. The poem already begun in 1862, was published in 1868, and was the first work of its author to receive adequate recognition in the reviews.

The plan is unprecedented and seemingly cumbrous. Owing to Browning's employment of his favorite monologue form, the story is told 11 times. In the monologues we become acquainted with events and actors as trans¬ mitted through the personality of each speaker and colored by his prejudices. The interest is maintained, in these repetitions, by extraordi¬ nary subtlety, psychological insight and imagi¬ native grasp. The central figure, a triumph of

creative imagination, is the girl-wife, Pompiha. The central interest is her relations with the noble young churchman, Caponsacchi, who rescues her from the tyranny of her husband. Here we have a spiritual romance — love in that purely altruistic form in which it so often appears in Browning's pages as the motive force of the highest life.

In Book I the poet, speaking in person, tells of the finding of the (Yellow Book) ; out¬ lines the story — thus eliminating the element of plot interest; and explains the circumstances in which each of the following monologues is spoken. In Books II-IV, we see the case as it appears to the general public. Two ordinary citizens in gossiping fashion narrate the story, — the first with a bias toward the husband, the second toward the wife. In Book IV, an habitue of the higher circles complacently un¬ folds, for a politer audience, a more subtle and cynical view. The reader, familiarized with the facts through these partially informed and conflicting statements, is next introduced into the very heart of the action. In Book V Count Guido, the husband, unable to deny the deed, and in peril of his life, sets forth before the judges a cunning and plausible justifica¬ tion ; in Book VI, Canon Caponsacchi gives an impassioned narrative of his relations with Pompilia; in Book VII Pompilia, on her death¬ bed, with infinite pathos, tells her story. The next three monologues — uttered by officials — are on a lower plane. Books VIII, IX contain the pleas of the lawyers, indifferent to the truth, and intent only on displaying their skill in legal quibbling: these books are humorous and satirical, and Browning's penchant for special pleading finds full scope. Book X con¬ sists of the meditations of the Pope as in the privacy of his chamber he writes his confirma¬ tion of the sentence and orders the execution. The figure of the Pope is a noble and impres¬ sive one, and in his discursive meditations he utters much of Browning's favorite pnilosophy. In Book XI Guido <(the same man, another voice, speaks and despairs this last night of his life.® Finally the poet himself, in Book XII, by means of extracts from imaginary let¬ ters, ties up the loose threads of his tale and concludes with reflections on art.

The style offers tew of the difficulties which are supposed to confront the reader of Brown¬ ing, and the books may be enjoyed separately. As is natural in the case of a work so recent and novel, critical estimates vary. It was a favorite poem with George Meredith, while Carlyle threw off the remark that ((it was among the absurdest books

ever written by a gifted man.® Arthur Symons writes that «it takes rank easily among the greatest poems.® William Sharp considers it, regarded <is an artistic whole, <(the most magnificent failure in literature.® The faults alleged are in the direction of excess. ((No one has said that it is too short,® remarks Dowden, ((many that it is too long.® Professor Hereford speaks of its (<immense, even riotous vitality,® of its being «even mercilessly voluble, but with the volubil¬ ity of a consummate master of expression, in whose hands the difficult medium of blank verse becomes an instrument of Shakespearean flexibility and compass, easily answering to all the shifts and windings of a prodigal inven¬

tion.® It is doubtful if any competent critic would now deny that the book is the product of imaginative and intellectual power almost unparalleled — the latter at times unlortunately predominating. Most competent readers will probably assent to Symon's dictum <(It has a wealth of spiritual insight, human science, dramatic and intellectual and moral force, a strength and grip, a subtlety, a range aud variety of genius and knowledge without parallel save in the pages of Shakespeare.*

References — Mrs. Orr's Handbook; John Morley in Fortnightly Review , 1869; James Thomson in Gentleman's Magazine, _ 1881; the (Yellow Book* is published in facsimile, with English translation and notes by C. W. Hodell, Carnegie Institution, Washington; the transla¬ tion is republished in Everyman' s Library.

William J. Alexander, Professor of English, University College,

T oronto.

RING-DOVE, or CUSHAT. See Dove;

Pigeon.

RING-MONEY, in numismatics, an an¬ cient metallic currency in the form of rings. This seems to have originated with the Egyp¬ tians, with whom rings were freely used as ornaments, and the same rings appear to have answered both purposes. The use of ring-money in Africa subsists to this day. A foim of ring-money was also anciently used in Ceylon.

RING-OUZEL, oo'zl, a European thrush (T urdus torquatus), rather larger than a black bird and of shy habits, preferring mountain slopes,

heaths and wild land to cultivated dis¬ tricts, but it often makes raids on fruit gardens, and in vine countries feeds largely on grapes. In some parts of Scotland it is known as the moor blackbird. The song consists of a few loud, clear and plaintive notes, and is some¬ what monotonous. It is dark-brown with gray¬ ish wings and has a broad crescentic white gorget, whence the name. See Ouzel.

RING PLOVER, or RINGNECK, a com¬ mon plover or dotterel (q.v.) of the whole northern hemisphere (FEgialitis hiaticula) , dis¬ tinguished by its black collar and its brilliant, gold-colored eyes. This bird was formerly cele¬ brated in European folk-medicine. To be cured of the jaundice it was held to be only neces¬ sary to look fixedly at the bird's eyes with a firm faith in the success of the experiment. See Plover.

. RING SNAKE, the name of various ser¬ pents with a band encircling the body, espe¬ cially at the neck, In the United States the name belongs especially to a small harmless serpent of the warmer States (Diadophis punctatus) , which is found <(coiled up under stones, logs or the bark of fallen trees, chiefly in forests.® It is bluish black above, yellowish orange be¬ neath and has a whitish collar. In Great Britain the common grass-snake (q.v.) is often so called ; in South America, the many-banded coral-snakes and in South Africa a large black and yellowish venomous hooded snake (Sepedon hcemachates) known to the Dutch as (<ringhals,® and differing from the cobras only in anatomical peculiarities. Consult Gadow, (Amphibia and Reptiles) (1901).

RING-TAILED LEMUR. See Lemur.

RINGGOLD GAP, Battle of. After the

expulsion of the Confederates from Mis¬ sionary Ridge 25 Nov. 1863 they retreated on Dalton (see Chattanooga, Battle of). To intercept the retreat, General Thomas, on the morning of the 26th, ordered General Hooker to push on Graysville, from near Rossville, and directed General Palmer, commanding 14th corps, to report to Hooker and join

in the movement. On reaching Pea Vine Creek Pal¬ mer was ordered to move directly on Grays¬ ville, while Hooker, with his three divisions — Osterhaus', Geary's and Cruft's — moved on Ringgold to strike the Confederate line of re¬ treat six miles farther south. At 9 p.m. Palmer struck the Confederate rearguard, capturing three guns and some prisoners. Pushing on to Graysville, which was reached at 11 p.m., he captured more prisoners and another gun, and bivouacked for the night. Hooker ad¬ vanced to within six miles of Ringgold, and late in the night bivouacked a short distance to the right of Palmer. At daybreak of the 27th Hooker renewed the pursuit, Osterhaus' division, in the advance, capturing many pris¬ oners, and pursuing the Confederates into Ringgold. At 3 a.m. of the 27th General Cleburne, whose division was acting as rearguard to Hardie's corps, received an order from General Bragg to hold Ringgold Gap, in Taylor's Ridge, near the town, until the trains and rear of the retreating troops could get well advanced. Cleburne disposed his four brigades of about 4,200 men on the ridge, on each side of the gap, and as a support two guns in it, and in less than half an hour Hooker came up and Wood's brigade of Osterhaus' division was ordered to attack. Cleburne's skirmishers were soon driven in ; but Cleburne, assuming the offensive, attacked Wood's main line and was repulsed, Wood's men following to the gap. Meanwhile Williamson's brigade had made a lodgment on a spur of Taylor's Ridge, half a mile to the left of the gap, but found the Con¬ federates so strongly posted that it could make no headway, and Creighton's brigade of Geary's division was ordered to ascend the ridge still further to the left. Cleburne had anticipated the movement by still farther extending his right. Colonel Creighton, making a gallant as¬ sault, was badly repulsed, and in falling back he carried part of Williamson's brigade with him. While Creighton was preparing for another assault he was killed, and operations on that part of the field were suspended. Meanwhile sharp work was going on in the gap and on the line on either side of it, without any material advantage to Hooker. Between 12 and 1 o'clock Hooker's artillery came up and opened a furious fire upon Cleburne's position, but Cleburne had gone, leaving only a few skirmishers in the gap. These were closely followed by some of Geary's men to the bridges beyond the gap. General Grant arrived on the field early in the afternoon, and orderd pursuit discontin¬ ued; later in the day Grose's brigade went forward, but encountering cavalry, supported by infantry, it returned to Ringgold. The Union loss at Ringgold Gap was 65 killed and 377 wounded. The Confederate loss, as reported by Cleburne, was 20 killed. 190 wounded and 11 missing. Consult (Official Records, } Vol. vol. 23 — 34

XXXII (Washington 1889-1901), and Van Horne, (History of the Army of the Cumber¬ land, > Vol. I (Cincinnati 1875).

E. A. Carman.

RINGS. Among primitive races ring adorn- • ment of the human members is universal and dates back to prehistoric times. Lip rings (labrets), neck rings (torques , etc.), nose rings, anklets, bracelets, ear rings were worn by the ((savagesM of the different countries. The Orientals, from time immemorial, have worn rings on their toes ; married women wearing them on the big toe of the left foot, men wear¬ ing them on the big, second and third toes. The finger ring, strange to say, does not figure-among the aboriginal adornments of the wild or savage tribes (America, Africa, etc.). The finger ring appears to have originated with the early Egyptians, and was evolved from the seal or signet (about 16 centuries before our era). The intaglio seal affording security and authenticity of ownership was probably car¬ ried strung on a cord until the invention of fastening it in a stirrup-shaped loop. A hole was bored longitudinally and wire passing through this entered holes in the extremities of the loop (see Figs. 1, 2) to be fastened by winding round the latter. Fine specimens of goldsmiths' work in this form are in the Louvre and London museums. The seal being sign of power or authority, it was natural that the wearer of the portable seal (a signet ring) as¬ sumed dignity. In this sense Pharaoh (Gen. xli, 42) invested Joseph with his ring; a ring in the Ashburnham collection, it is claimed, may be this very one (see Fig. 3) as it was found in a mummy case (in the Necropolis of Sakkarah, near Memphis) having hieroglyphics indicating that it contained the body of Joseph. The step from the ring being insignia of au¬ thority to its becoming an article of adornment is a short one, and we find the Egyptian ladies wore finger rings, even several on a single finger; a number of elegant specimens are extant (see Fig. 4). Herodotus (5th century b.c.) tells the story of the ring of Polycrates, tyrant of Samos. Warned that the great wealth and marvelous successes would bring dire visi¬ tations from his enemies in later life if he did not make some great sacrifice to the gods to forefend disaster, he threw his most valued possession, a talismanic ring, into the sea. His cook found it in the belly of a fish and returned it to him. The Greeks, Etruscans and Romans produced lovely finger-rings (see Figs. 5-7). One quite peculiar form of Roman ring has a key attached to it, some specimens have nu¬ merous wards and even the hollow barrel (see Fig. 8) of modern keys. Roman rings are in many decorative forms (see Fig. 9), the be¬ trothal ring (anulus pronubus)

being com¬ posed of two rings having oval plates contain¬ ing the engraved names of the betrothed couple (see Fig. 10). Like the rings of the Spartans, the betrothal ring was made of iron, till Pliny's time. But we have Roman rings made in double, triple, even quintuple form ; such were termed polysep-hi. Mythology records a ring dating back far beyond those above mentioned, for it informs us that, when Jupiter released Prometheus from his agonies on the Caucasian rock, be had to wear on his finger one of the links of his iron chain with a piece of the rock

set in it as reminder of his terrible experience. The first Roman senators wore rings of iron, but when acting as ambassadors a gold one was given them ; later they could all wear gold rings. Next the privilege of wearing a gold ring became so common even the menials wore them and only slaves wore iron rings. When Hannibal's soldiers took the gold rings from the Roman dead after the battle of Cannae (216 b.c.) they filled, some writers say, three bushel baskets. During the Roman Empire it was a custom to give birthday (anniversary) rings, termed anuli natalitii. The imperial sig¬ net of Constantius (306 a.d.) is in the Rinu-cinnit cabinet at Florence with its 53-carat sapphire engraved with the scene of the em¬ peror spearing a wild boar, *etc.* Of Anglo-Saxon rings the British Museum (London) con¬ tains that of King Ethelwulf (see Fig. 11) and that of Ethelswith, his daughter, queen of Mercia, of the 9th century. Other extant rings of historic interest are: The "Shakespeare ring" (see Fig. 12) supposed to have been given by Anne Hathaway to the poet, which was found in a field at Stratford-on-Avon; the ring said to have been given to Henry Darnley (her spouse) by Mary Queen of Scots (see Fig. 13) ; the wedding ring Martin Luther gave to Catherine Bora when he made her his wife (see Fig. 14), it is what is known as a "Pas¬ sion" ring, carrying the symbols of the Passion. The wedding ring of the Romans was a signet ring and conveyed the meaning that it was the wife's right to seal up the property of the household; it, sometimes, had a small key at¬ tached. It was placed on the fourth finger in early Roman days ; the index finger was re¬ garded by the Jews as the hallowed finger and bore the marriage ring; in the days of ((Queen Bess" of England the ring, after betrothal, was worn on the thumb. The betrothal ring in Britain became the wedding ring about the time of the Reformation.

Ecclesiastical Rings. — Closely allied to the wedding ring is the ecclesiastical ring, cere¬ monially wedding the wearer to the Church, as well as signifying the dignity of the office. Most important of these insignia jewels is the papal ring, called the "Fisherman's Ring" (or anulus piscatoris), with its gem stone contain¬ ing an engraving (used by the Pope for his seal) of Saint Peter in a bark pulling up a fishing net and the Pope's name above. A new one is conferred by the cardinal-chamberlain, to be broken on the death of the Pontiff. Episcopal rings conferred on bishops and ab¬ bots are of gold embellished by a stone ; the latter must not be cut (as is the papal

ring) but left in its natural form (see Fig. 15), though polished. The stone was formerly green (emerald favored), later blue (sapphire), but Dr. Kunz says: “Besides rubies and emeralds, balas-rubies, turquoises, chalcedonies and even opals were used, pearls and garnets also ap¬ pear occasionally.” The episcopal ceremonial ring is worn by the bishop outside his glove, and is, therefore, quite a large ring. An amethyst, emblematic of sincerity, innocence and earthly suffering is worn in the rings of cardinals and bishops as a sign of submission to the Church as well as of spiritual power. Decade rings came into being in the 14th cen¬ tury and are so termed from the fact that they have 10 projections on their circumference.

They answer the purpose of a rosary (see Fig. 16) and each knob represents an Ave, while the head or bezel (often with I.H.S. and the three nails) represents the Pater Noster. Peculiar to England and Scotland are the so-called iconographic rings, with their Virgin Mary and Child, or saints’ images, in gold or silver. They were made from 1390 to 1520. The Jewish ceremonial wedding ring is fre¬ quently a very large and cumbersome device with its bezel towering into the architecture of houses (see Fig. 17) and with raised filigree ornamental circlet. A very noted ceremonial ring is the English “Coronation” ring; it is of pure gold and large, being worn over the glove, generally on the index finger of the right hand formerly, except on celebrating Mass, when it is changed to the annular finger. Usually it has a large violet-hued table-cut ruby, and a Saint George’s cross is engraved on the flat surface ; 26 diamonds surround the ruby.

Memorial Rings. — In olden times it was the custom to bequeath memorial rings to one’s friends, as is shown in many wills. Richard II (1400) left a gold ring to each of his nine executors. Shakespeare (1616) bequeathed rings to a number of friends. Samuel Pepys willed 123 memorial rings to surviving friends. Followers of Charles I, after his execution, wore memorial rings, some with his effigy or name on them, and it established a custom that lasted for many years. Black enamel or niello was favored for memorial rings, but in the 18th century young maidens’ deaths were memorial¬ ized with rings in white enamel. Hair from the head of deceased, in the end of the 18th century, was used in forming a device in the bezel. Later very plain rings came into vogue with just a motto, as: “To the Memory

of . ” Other mottos seen are: “Not lost

but gone before,” “Memento Mori,” *etc.* But the “Memento Mori” rings

so-called are those bearing a death's head. Extant are rings with the letters BDLK, they stand in memory of executed lords Balmerino, Derwentwater, Lovat and Kilmarnock.

Occult Rings. — The fact that, in mediaeval days, certain peculiar-shaped pieces of stone, metal, ore, etc., were considered to have occult powers of great value led to the setting such talismans in finger-rings to obtain security and portability. Cabalistic words or sentences also served for occult influences and we find them on rings (see Figs. 18-20) ; astrological signs of significance are frequently found on such talismanic rings. Great curative power was supposed to be possessed by certain mystic rings carried by physicians of olden times, they are known as medicinal rings; Galen (about 200 a.d.) was renowned as a doctor and tells of a green jasper amulet of King Nechepsus, of Egypt, that had a design cut in it representing a dragon surrounded by rays. He said it was a most potent remedial agent for the digestive organs. To be numbered among the medicinal rings are the "royal cramp rings." Edward the Confessor, king of England (1042-66) instituted the practice, according to the legend, from the fact that, he being without money, one day when an aged pilgrim ac¬ costed him, the royal personage handed over a ring as alms. The pilgrim turned out to be no other than the Apostle Saint John in disguise, who sent the ring

RINGS

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 6

Fig. 8

Fig. 7

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

SALVSKl

— ««y

.STJT VTf\j

Fig. 15

Fig. 16

Fig. 17

Fig. 19

Fig. 20

Fig. 21

Fig. 22

Figs. 1,2 — Finger Rings Fig. 3 — Joseph's Ring Fig. 4 — Egyptian Lady's Ring Fig. 5 — Etruscan Ring Fig. 6 — Greek Rings Fig. 7 — Roman Ring Fig. 8 — Roman Key Rings Fig. 9 — Other Roman Rings

Fig. 10 — Roman Betrothal Rings Fig. 11 — Ring of Ethelwolf Fig. 12 — Shakespeare's Ring Fig. 13 —

Ring of Mary Stuart to Darnley Fig. 14 — Passion Ring of Martin Luther Fig. 15 — Ecclesiastical Ring in

the Cluny Museum. (Note the Uncut Stone) Fig. 16 — 16th Century

Ring Fig. 17 — Jewish Wedding Ring

Fig. 18 — Physician’s Medicinal Ring Fig. 19 — Cabalistic Ring in the Londes-Borough Collection Fig. 20 —

Astrological Ring Fig. 21 — Gimmel Rings Fig. 22 — Triple Ring, Arms of Cosimo Di Medici

back to the king with the information that he had blessed the ring and it now had great curative power. Since which time, up to the reign of Queen Mary, the English kings and queens had blessed and distributed a number of rings on Good Friday which were said to be a sure cure for ((falling sickness® (epilepsy) and were termed <(cramp rings.® The antithesis of medicinal were poison rings. The Borgias are said to have used rings containing poison, which, by pressing the victim’s hand, pricked and poisoned with deadly effect. Such rings dating from that period are in existence; the poison (liquid) was hidden in a small cavity in the bezel. In ancient times it appears to have been a frequent custom to wear a ring contain¬ ing a deadly poison with which to escape from torture if taken prisoner. Hannibal took a fatal dose of poison from his ring when he was to be given over to his enemies, the Ro¬ mans. ((Posey rings® were a mediaeval inven¬ tion and contained inscribed love mottoes. The word is frequently spelled posie and poesie; originally they were called <(chanisons® or <(reasons.® The earlier specimens have the couplets engraved on the outside, but later (by the 16th century) they were hidden in the inside where only the wearers could see them. On them we find such expressions as : ((Many are the starres I see, Yet in my eye no starre like thee,® ((No love so hard as love debarred,® (tMy life is done when thou art gone.®

La Semaine rings of France came into vogue in the 19th century, and carried seven stones, the name of each commencing with the same letter as the day of the week.

Gimmel rings (spelled also gimmal, gem - mel, gemmow, etc.) were

old style matrimonial rings composed of twin loops (see Fig. 21) that linked into each other. While generally double we find them made in triplets, or even further complicated. Herrick writes : <(Thou sent'st to me a true-love knot, but I return a ring of jimmels, to imply thy love had one knot, make mine a triple tie.® The device of the noted Cosimo di Medici consisted of three diamond rings entwined (see Fig. 22) ; they recall the fact that at an early date diamonds were set in rings, before the method of cutting them was discovered, with the natural conical point of the crystal extending from the bezel. These points were used by the ladies and gentry to cut love couplets and other inscriptions on glass -windows, *etc.*

Hololith rings, Dr. Kunz tells us, are those made entirely of a single piece of stone. Per¬ haps the most costly of these is that emanating from the Mogul Empire (16th century) and made for Jehangir Shah. It is cut out of a single emerald <(of exceptional purity and beauty of color.® More frequent are rings made solely of amber, rock-crystal, chalcedony, carnelian, jade, coral, steatite, ivory, *etc.*

Bibliography. — Dalton, O. M., (Finger Rings; Early Christian, Byzantine, Teutonic, Mediaeval, and Later) (London 1912) ; Franks, Sir A. W., (Catalogue of the Franks' Bequest of Finger Rings, Early Christian, Byzantine, Mediaeval and Later, to the British Museum* (London 1912) ; Jones, W., (Finger-Ring Lore> (London, 1877); Kunz, G. F., (Rings> (New York 1917) ; Waterton, E., (On Episcopal Rings) (in Archceological Journal, London 1863) ; id., (On the Anulus Piscatoris, or

Fisherman's Ring) (in Archceologia, London 1866) ; Neville, R. C., (The Romance of the Ring) (Saffron Walden 1856).

Clement W. Coumbe, Technical Art Expert.

RINGWORM, a disease occurring in three varieties, in one of which it attacks the scalp, in another the beard and in the third some part of the body. In all cases it is due to the pres¬ ence of a vegetable parasite, consisting of minute round bodies, and of thread-like struc¬ tures formed of rows of rod-shaped bodies of a beaded appearance. This is the growing fungus (Trichophyton tonsurans) and its spores, and wherever ringworm occurs this is present between the layers of cells of the scarf-skin, in hairs and hair-sheaths. Ringworm of the body (Tinea circinata) is the name given to the dis¬ ease when it occurs on non-hairy parts of the body. It is most common on the face, neck and

trunk, but it also occurs on the hands, arms and wrists. It consists of small circular patches, rose-colored and slightly raised, covered with small branny scales. Usually round the margin is a ring of very small blisters. The spot is the seat of a tingling and itching sensation. It spreads around the margins, and as it spreads the centre heals up, so that a large red ring with a pale centre is formed. Ringworm of the scalp (Tinea tonsurans) , identical with favus (Tinea favosa), begins with small red patches like those described above and spreads at the margins. It involves the hairs, which become penetrated by the fungus, and are dry, dull and twisted. They are easily pulled out and become very brittle. The affected patch becomes covered with a grayish-white powder. Inflammation may be produced and crusts formed. This variety of ringworm is commonest in children. Ring¬ worm of the beard (Tinea sycosis) is similar to the scalp variety. A lotion of bichloride of mercury is often sufficient to kill the fungus, but if it prove ineffectual glacial acetic acid may be painted all round the spreading margins of the ring. In ringworm of the head and beard the hair of the diseased patches and for a little distance beyond should be cut short, and crusts should be removed by poulticing, washing with water and soft soap, *etc.* The general health should be maintained by the use of tonics and otherwise. Ringworm is very contagious.

RINK, Hinrich Johannes, Danish Arctic explorer : b. Copenhagen, 26 Aug. 1819 ; d. Christiania, Norway, 15 Dec. 1893. He took his Ph.D. at Kiel in 1844, and in 1845 — 47 was mineralogist to the Galatea expedition around the world. In 1848-51 he was engaged in ex¬ plorations of northern Greenland, and his sub¬ sequent life was devoted to the affairs of that country. He was inspector of southern Green¬ land in 1857-71 ; and in 1871-82 he was director of Greenland's trade in Copenhagen. He after¬ ward lived in Christiania. Author of (Die Nikobarischen Inseln* (1847) ; (Grouland geo-graphisk og statistish beskrevet) (2 vols., 1852-57; Eng. trans., (Danish Greenland,* 1877) ; (Eskimoiske Eventyr og Sagn* (1866; Eng. trans., 1879) ; (The Eskimo Tribes* (1887) ; (Groulandere og Danshe i Groland) (1887), *etc.*

RIO BRANCO, re'o brang'ko, a large river of Brazil, entirely in the state of Amazonas. It rises on the eastern slopes of the Serra Parima, near the sources of the Orinoco, flows

eastward parallel to the Serra de Pacaraimo, turns southward before reaching British^Guiana, and joins the Rio Negro about lat. 1° 25' S., long.' 61° 10' W. It has a length of about 830 miles and receives numerous affluents.

RIO CUARTO, koo-ar'to, Argentina, a town of Cordoba province, near the source of the Cuarto River, on the Trans-Andean Rail¬ road midway between Belleville and Villa Mercedes, 119 miles south of Cordoba. It is the distributing centre of a large agricultural region. Pop. about 25,000.

RIO GRANDE, re'o grand-a, or RIO GRANDE DEL NORTE, a river which rises in the southwestern part of Colorado, flows south and southeast into New Mexico, when its general course, about halfway across the State, is south by west, then south by east to El Paso (q.v.), whence it forms the ir¬ regular boundary between Texas and Mexico. It enters the Gulf of Mexico after a course of nearly 1,900 miles. It is navigable for small boats only to Kingsbury Rapids, near Presidio, about 460 miles from its mouth. In the upper course the banks are generally high, and the irregular rocky beds form rapids and water¬ falls. In the lower part of its course the stream is shallow, and it is subject to periodical inundations. The largest tributary is the Pecos River, which enters the Rio Grande from Texas. A number of United States forts are on this river. The most important places on the Rio Grande are Brownsville, Eagle Pass, Laredo and El Paso in Texas; and Matamoros and Nuevo Laredo in Mexico. A few villages and towns of importance are on the banks of the river in New Mexico.

RIO GRANDE DE CAGAYAN, re'o gran'da da ka-ga-yan', the largest river of the island of Luzon, Philippines. It rises on the northeastern slope of Carabellos Sur, and flows north in a winding course to the China Sea. It drains a large territory, and has numerous tributaries, the chief of which are the Magat and the Chico de Cagayan. Its valley is very fertile, the land being used mainly for the culti¬ vation of tobacco. The river is navigable for vessels drawing 12 feet as far as Lallo, 13 miles from its mouth ; and for light draft vessels for 200 miles in the wet season. Freshets occur at times with a rise of several feet in a few hours.

RIO GRANDE COLLEGE, located at Rio Grande, Ohio; founded in 1876 under the auspices of the Free Baptists. It offers a clas¬ sical and a

scientific course, and confers the degrees of bachelor of arts and bachelor of science. There is also a preparatory depart¬ ment. The college is coeducational, and women constitute fully one-half of the student body. The grounds and buildings in 1910 were valued at $40,000 ; the library contained 3,500 volumes ; the productive funds amounted to $76,000; and the annual income to $6,000. The students in collegiate department, the preparatory, normal, music, elocution departments and the summer school numbered about 400 in 1916.

RIO GRANDE DE MINDANAO, re'o gran'da da men-da-now'. See Mindanao, Grande de.

RIO GRANDE DO NORTE, re'o gran'da do nor'ta, an important maritime state in the northeast of Brazil; area, 22,196 square miles.

The surface is mountainous in the south and southwest, where it is covered by several moun¬ tain ranges. The principal rivers have all either a north or an east direction. The proximity to the equator makes the climate intensely hot.

It is, however, not unhealthful. The soil is generally good, but not remarkable for its fertility. For a long time sugar cane was the principal cultivated crop, but considerable tracts formerly devoted to it are now occupied by cot¬ ton, which may be regarded as the staple product of the province. The other leading crops are mandioca (cassava), millet and hari¬ cots (kidney beans). Many of the plains are grazed by large herds of horses and cattle. The minerals include gold, silver, iron, salt, amethysts and rock-crystals, limestone, sandstone and granite. The forests are not very extensive. Pop. 430,000.

~ RIO GRANDE DE LA PAMPANGA,

re'o gran da da la pam-pan'ga. See Pampanga. Rio Grande de la.

RIO GRANDE DO SUL, re'o gran'da do sool, a southern maritime state and the best known of all the states of Brazil; area, 91,336 square miles. Along the cost for more than half the extent of the coast-line of this state stretches the great Lago dos Patos, which communicates with Lake Mirim, and which receives the rivers of the southeastern part of the territory. Those to the southwest belong to the basins of the Parana and Uruguay, and flow west. The mountain chain called Serra Geral divides the state into two unequal parts. The seacoast is flat and sandy, and is lined by a series of reefs, which make navigation dangerous. The inte¬ rior, partly occupied by arid serras, is mostly

fertile. The climate is temperate, and the pro¬ ductions are more like those of Europe than of the rest of Brazil. Maize, rice, potatoes, mandioca, black beans and flax, particularly the first, are largely cultivated. The finer European fruits, especially figs and peaches, find a genial soil. The minerals of the state include gold, iron, sulphur and porcelain clay of the finest quality. There is a large foreign population in Rio Grande do Sul composed principally of Italians, Germans, Portuguese, Spanish and Spanish-Americans, with a few English, Ameri¬ cans and Belgians. The Germans number over 200,000 and the Italians even more. The chief occupation of the inhabitants is the rearing of cattle, horses and mules, and the preparation of dried beef. A number of German colonists and many Italians have settled in the state. There are several railways. Porto Alegre, about 100,- 000, is the capital. Pop. of the state 897,455. See Brazil.

RIO DE JANEIRO, re-o da zha-iia'rd, Brazil, one of the maritime states on the south¬ east coast of the republic; area, according to official returns, 26,634 square miles. The cen¬ tral part of this territory is mountainous, being traversed generally from east to west by a series of ranges, of which the loftiest and most con¬ spicuous is the Serra dos Orgaos or Organ Mountains (q.v.). They are almost entirely composed of granite. The mountains slope down on the north and south — in the former direction toward the basin of the Parahyba, to which all the surface of the province on that side belongs ; and in the latter to the coast, which

receives the drainage from a great number of comparatively small streams, each carrying its waters directly to the ocean. The shore toward the northeast is lined by numerous lakes and lagoons. The soil does not seem to possess much natural fertility. A great part of it con¬ sists of a retentive clay, ill-adapted for agricul¬ tural operations ; but the warmth and moisture of the climate are so favorable to vegetation that magnificent forests and valuable crops exist, and there are many tracts of the richest land which are turned to the best account. The crop which attracts the largest share of attention is coffee. The other

leading crops are sugar, rice, millet, mandioca and cotton. The forests are rich in timber, both for ordinary and orna¬ mental purposes, in dyewoods, gums, balsams and valuable medicines. The domestic animals, originally imported from Europe, have in¬ creased considerably, and immense herds of cattle are reared. This province is not rich in precious metals. Iron, however, abounds, though it is not much worked ; and the decom¬ position of granite has formed extensive beds of the finest kaolin. The state assembly used to meet at Nictheroy, but Petropolis is the present capital. Under separate jurisdiction from the state is the federal district of Rio de Janeiro, embracing the city of the same name (q.v.) and its surroundings. The population of the state exclusive of the federal district is

1,250,000.

RIO DE JANEIRO, capital of the United States of Brazil; socially and commercially the most important city of South America, excepting Buenos Aires. It is situated in the federal district which comprises 538 square miles. The name is supposed to perpetuate an error of the discoverers (1 Jan. 1502), who, seeing the great length of the bay, assumed that it was the mouth of a river (no). It is, in fact, a capacious and excellent natural harbor, one of the largest in the world, with an area 68 square miles greater than the combined areas of the lower and upper bays of New York. It is 17 miles long, 15 miles wide and has 45 miles of coast line. But the bottom silted up so much in recent years that the water near the shores became too shallow for large vessels. Accordingly, some of the old mooring places were abandoned. Merchant vessels unable to reach the docks cast anchor on the north side of the city, and their cargoes were transported in lighters. The entrance to the bay is less than a mile wide and is sheltered by high moun¬ tainous elevations. Modern facilities for hand¬ ling freights were provided for in 1904; and the plans for the improvement were drawn by a commission of Brazilian engineers. A wide quay of solid masonry extends along the north¬ ern front to a deep artificial channel. The outer wall of this quay for about two miles is accessible to the largest shipping, and railway trains run to the same point. The new quays are very extensive and are equipped with cranes, warehouses, railway track and all the facilities of a modern harbor. The harbor has been drained to such a depth that ocean-going ves¬ sels can load and unload without the aid of lighters, which not long ago formed such an important feature of the harbor. The city proper is very compactly built on flat land ad¬ joining the bay, but its suburbs stretch out along

the shores for miles. Above the crowded cen¬ tral portion rises Sugar Loaf Peak (Pao d'Assucar), and on the same side of the harbor is the fortress called Sao Joa — opposite which, on the eastern promontory, is Santa Cruz for¬ tress. A small island, lying in the entrance be¬ tween Sao Joao and Santa Cruz, is also for¬ tified; and other defensive works are located in the bay on an island, which takes its name from the French adventurer Villegaignon, who tried to establish a colony of Huguenots there (1 555— 60). The main body of the city is divided into regular squares by narrow streets, along which pass lines of electric cars. The National Museum, formerly the Imperial Palace of Boa Vista, is in the district of Sao Christovao. Some of the finest buildings, the Senate, City Hall, Mint, Normal School and Quartel-general, surround the old park, Praga 15 de Novembro, now called Campo de Sant' Anna. The Department of Foreign Relations occupies the old palace of Itamaraty. The present gov-enment palace was formerly the luxurious resi¬ dence of Conde de Sao Clemente. The Cham¬ ber of Deputies, Department of Telegraphs and Historical Institute are installed in the old Pogo Palace. A fine modern building is devoted to the Department of Industry. An especially in¬ teresting feature of the city is the Botanical Garden, in which rare exotics from all countries of the globe are cultivated, side by side with specimens of the flora of the various parts of South America. The cathedral and church of Santa Cruz stand near the water front, in a large square from which starts the main business street, Primeiro de Margo. Rio de Janeiro is the chief industrial and commercial centre of Brazil. The very large wholesale and foreign trade of the city is largely in the hands of Portuguese, Brazilian, English, German and French merchants. In the list of exports, coffee is the principal item. Imports consist chiefly of food products and manufactured arti¬ cles. There are at Rio cotton mills, furniture manufactories, flour mills, textile factories other than cotton, shirt, shoe, collar and stocking factories, hydrogen gas plant, railway car works, lumber mills, breweries, distilleries, canned food factories of various kinds, chemical works and a long list of other industries, over 600, covering most human activities, foundries, dry docks and a naval arsenal. A system of railways, of which the capital is the centre, covers the state and the southern part of Minas Geraes. The ((Brazil Central® system, the most important in the republic, connects Rio with Sao Paulo, and has a large number of branch lines, controlling the terminal facilities of the port and the sub¬ urban traffic. Rio de Janeiro is the principal market for the coast trade in fish ; and it re¬ ceives from 35 to 40 per cent of the country's imports, while one-fifth of all Brazilian coffee passed

through its port. Population of the city about 1,000,000.

RIO NEGRO, re'o na'gro (((black river®), the name of numerous streams, of which two are important: (1) A river of South America and principal tributary of the Amazon. It rises in Colombia and joins the Amazon, after a course of about 1,000 miles, at Manaos, Brazil. The Rio Negro together with the Naupes is be¬ tween 1,400 and 1,500 miles in length. Through

its affluent, the Cassiquiari. there is direct com¬ munication between the Amazon and Orinoco. Ocean steamers ascend the river to Manaos, the chief shipping point for the rubber col¬ lected in the interior far up the river. (2) A river of South America forming the boundary between the Argentine Republic and Patagonia. It rises in the Andes in Chile and is over 700 miles long. Its current is very rapid and its bed obstructed with shoals and sand banks. It is navigable, under some difficulties, for nearly 600 miles.

RIO DE LA PLATA, re'o da la pla'ta.

See Plata, Rio de la.

RIO T&ODORE, or THEODORO, for¬ merly known as Rio Duvida (River of Doubt), a river of Brazil, rising in the Corde hei'ra dos Parecis, in the western portion of Matto Grosso, flowing in a northerly direction from about the 13° to the 5° of lat. S., and between the 59° and 60° of long. W., and emptying into the Maderia, an affluent of the Amazon. It is the largest affluent of the Maderia, about equal in size to the Hudson, with many rapids and falls. Its length is nearly 1,000 miles. The lower course of the river had long been known, to the rubbermen, but the upper course, traversing an unexplored portion of western Matto Grosso, was entirely unknown, and no part of the river was recorded on the maps. When the Roosevelt-Rondon expedition was starting on its exploring trip through southern and western Brazil in 1914 Colonel Roosevelt was ap¬ proached by the Brazilian Minister of Foreign Affairs, Mr. Lauro Muller. Mr. Muller was intensely

interested in the development of the interior of Brazil, and asked Colonel Roosevelt to undertake the exploration of the Rio Duvida, of whose source or course nothing was known beyond its lower waters. The announcement of the exploration of a hitherto untraversed and unmapped river caused considerable comment and even doubt upon Colonel Roosevelt's re¬ turn in the autumn of 1914, but he established the course and identity of the new river with¬ out difficulty. It was at first christened Rio Roosevelt, but later was formally designated as Rio Teodore by the Brazilian government. Con¬ sult Roosevelt, T., 'Through the Brazilian Wilderness) (1914).

RIOBAMBA, re-6-bam'ba, or BOLIVAR,

Ecuador, a town on the Pastasa River, a branch of the Amazon, about 100 miles from Quito. A former town of the same name, at the foot of Chimborazo Mountain, about nine miles from the present town, was destroyed by an earthquake in 1797. Riobamba, which is the capital of the province of Chimborazo, has a population of about 25,000, most of them In¬ dians.

RIOJA, Francisco de, fran-thes'ko da re-6'ha, Spanish lyric poet: b. Seville, about 1583; d. Madrid, 8 Aug. 1659. He studied first law and then theology, in his native city. The minister Olivarez obtained for him a prebend in the cathedral of Seville, and he became royal historiographer, inquisitor at. Seville and, lastly, inquisitor of the supreme tribunal of the holy office. The downfall of his patron involved his own. He was imprisoned and obtained his liberty only after he had undergone a formal trial and completely established his innocence.

Philip IV, whose favor he had regained, made him director of the royal library and councillor in the Supreme Court of the Inquisition. As a poet he formed himself on the classic and Ital¬ ian models, particularly Horace and Seneca; kept himself, in style and language, free from the tasteless eccentricities of his contempo¬ raries, and thus preserved the true spirit of the lyric. His (Silvas> exhibit rich pictures of rural life, remarkable for their truth to nature. His works were published with a biography by D. Cayetano de la Barrera, 'Poesias5 (1868) ; and 'Adiciones a las poesias de D. Francisco de Rioja) (1872). Consult Longfellow, 'Poets and Poetry of Europe5 (1843).

RIOJA, La, Argentina, a western province north of San Juan and south of Catamarca, with an area of 69,502 square miles, divided into 18

departments. While in the east and south there are salt and sand deserts, it is well watered on the west, and agriculture and cattle rearing are important industries. Excellent wheat, fruits and wine are produced. The climate is dry and healthful. Near Chilecito and Famatina are valuable gold, silver and cop¬ per mines, and the province contains gypsum, salt, graphite and coal. Pop. about 110,000. The capital of the province is La Rioja, a town of 10,000 inhabitants at the foot of Mount Belasco, 118 miles southwest of Catamarca, with which it is connected by railway and public highway. It contains a state college and a normal school.

RION, re-on', or RIONI, re-6'ne, the an¬ cient PHASIS, a river of Colchis (Transcau¬ casia), anciently regarded as the boundary be¬ tween Europe and Asia. It was afterward held as the boundary line between Colchis and Asia Minor. It rises in a spur of the Caucasus (Moschici), and after receiving the rivers an¬ ciently called the Rhion, the Glaucus and the Hippus, it falls into the Euxine near the ancient town of Phasis. In the early part of its course it was called the Boas. Other rivers were some¬ times confounded by ancient writers under the same name with this. The Phasis of Xenophon was the Araxes.

RIORDAN, Patrick William, American Roman Catholic archbishop : b. New Bruns¬ wick, 27 Aug. 1841 ; d. 27 Dec. 1914. He was educated at Notre Dame, Ind., and was graduated from Louvain, Belgium, in 1864. He then returned to Chicago, accepted the chair of theology at the Seminary of Saint Mary's of the Lake, and in 1868-71 was pastor of Saint Mary's Church at Joliet, Ill. From 1871-83 he was in charge of Saint James' Church, Chicago, and in the latter year was consecrated titular arch¬ bishop of Cabesa and was made coadjutor. He succeeded to the see of San Francisco in 1884.

RIORDAN, Roger, American artist and author: b. Ireland, 1848; d. 1904. He studied art at the Art Students' League in New York, contributed as illustrator and writer on art subjects to various magazines and served on the international jury of awards at the Paris Ex¬ position, 1900. He published 'Sunrise Stories, a Glance at the Literature of Japan5 ; 'French Etchers5 and collaborated on the catalogue of the Marquand collection.

RIOT (O. F. riot, ryote), a disturbance of the public peace, attended with circumstances of tumult and commotion, as where an assem-

bly destroys, or in any manner damages, seizes or invades private or public property, or does any injury whatever by actual or threatened violence to the persons of individuals. By the common law a riot is an unlawful assembly of three or more persons which has actually be¬ gun to execute the common purpose for which it assembled by a breach of the peace, and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful pur¬ pose to the terror of the people, though they had not that purpose when they assembled. In England every person convicted of riot is liable to be sentenced to hard labor. In Scotch law rioting is termed mobbing. A person may be guilty of mobbing who directs or excites a mob, though he is not actually present in it. Mere presence without participation may con¬ stitute mobbing. A majority of the States of the American Union have riot acts somewhat similar to those of England, and the common law governs where no statutes have been en¬ acted. A riot against the government with the purpose of overthrowing it is treason. How¬ ever, an uprising of this kind is not generally called a riot.

RIOUW-LINGGA, re'ow lin'ga, or RIOU, <or RIO LINGA, an archipelago southeast of the Malay Peninsula, belonging partially to the Netherlands. It is formed of two groups of islands ; the northern group is that of Riouw, and the southern, Lingga. There are about 30 islands in the Riouw group ; the largest, Bin-tang, has an arqa of 400 square miles. Lingga, of the Lingga group, has an area of 320 square miles; Singkep, 204 square miles. The soil of the greater part of the archipelago is fertile and the whole is well wooded. The principal export is gambir; other exports are pepper, sago and rice. Tin has been mined and ex¬ ported for many years. The original inhabit¬ ants have nearly all disappeared. The capital of the Dutch residency is Rio (Riouw). The population now is made up of Chinese, Japa¬ nese, Javanese and Kings. Pop. about 80,000.

RIP VAN WINKLE, rip van wing'kl, a character in one of Washington Irving's legends of the Hudson Valley. While hunting among the mountains he falls in with the reputed fol¬ lowers of Hendrik Hudson and by drinking the liquor they offer him is cast into a sleep of 20 years. When he awakes and returns to the village of Laughing Water, he finds all things changed, but is chiefly relieved to discover that his

wife, the irritating obstacle to his easy¬ going life, is no longer alive. The story was dramatized by Joseph Jefferson (q.v.) and formed one of the important roles in his reper¬ tory. This version of the play was first per¬ formed in London in 1865.

RIPARIAN RIGHTS are those of one who owns the land bounding upon a water¬ course; such owner is the proprietor of that portion of the bed of a river which adjoins his land ; such rights upon navigable waters depend largely upon statute and customs of the differ¬ ent jurisdictions. A riparian owner has the right of access to navigable water, and for that purpose to erect a wharf or pier, provided it does not encroach upon the navigable waters sufficiently to interfere therewith. A riparian owner has also a right to the accretions of the

soil and to fish in the adjacent waters; he has also the right to have the stream flow naturally without changing it in quantity or otherwise. Such owner is not entitled to the water, but merely to its use, and is without the right to divert, obstruct or corrupt the stream, except to build such lawful obstructions as may be neces¬ sary for bridges, wharves and dams. Riparian rights of propertv are established property, of which the owner cannot be deprived except by due process of law. See Rivers.

RIPLEY, rip'll, Eleazar Wheelock, Amer¬ ican soldier: b. Hanover, N. H., 15 April 1782; d. West Feliciana, La., 2 March 1839. He was graduated from Dartmouth College in 1800, en¬ gaged in law practice and in 1811 settled at Portland, Me. In 1810-11 he was a member of the Massachusetts legislature, served as speaker in the latter year and in 1812 was elected State senator. At the outbreak of the War of 1812 he entered the army, became brigadier-general in 1814, and for services at Niagara, Chippewa and Erie was voted a gold medal by Congress. He remained in the army until 1820 when he removed to Louisiana and resumed the prac¬ tice of law. He afterward served in the State senate and was a member of Congress from 1835 until his death.

RIPLEY, George, American author : b. Greenfield, Mass., 3 Oct. 1802; d. New York, 4 July 1880. _ He was graduated at Harvard in 1823, studied theology at Cambridge and in 1826 was ordained a Unitarian minister in Bos¬ ton. He became interested in the principles of Fourier, Comte and St. Simon and made trans¬ lations of the writings of modern German and French philosophers and endeavored to in¬ troduce their ideas in America. He collabo¬ rated with Dr. Hodge on a

large work in 14 volumes, Specimens of Foreign Standard Literature) (1838-42). His discourses on the Philosophy of Religion* (1839) eave rise to a long and bitter controversy with Prof. Andrews Norton of Cambridge. He was a leader in the Transcendental Movement originating in 1836 in association with Emerson and others, and v/ rote frequently for The Dial, the organ of that movement. In 1841 he definitely retired from the ministry and became prime mover in the communistic enterprise of Brook Farm (q.v.), and in 1844 invested all his small fortune in that settlement in West Roxbury. After the burning of the phalanstery in 1846 and the consequent dispersion of the colony, he went to New York as literary editor of the Tribune; contributed also to the literary department of Harper's Monthly. With Bayard Taylor he edited a (Handbook of Literature and Fine Arts* (1852), and in 1858, with Charles A. Dana (q.v.), began the editing of (Appleton's New American Cyclopedia.* Consult Frothingham, (George Ripley> (1882) ; Swift, (Brook Farm* (1900).

RIPLEY, James Wolfe, American soldier: b. Windham. Conn., 10 Dec. 1794; d. Hartford, Conn., 16 March 1870. He was graduated at West Point in 1814, served in the second war with Great Britain, his first engagement being in the defense of Sackett's Harbor. In 1818 he was promoted lieutenant, fought in the Seminole War and was appointed commissioner to estab¬ lish the boundary line of the Florida reserva¬ tion in 1823-24. He was captain in command

of Charleston Harbor at the time of the nullifi¬ cation troubles in 1832-33, and in 1841-54 was superintendent of the Springfield armory. He was brevetted lieutenant-colonel in 1848 for services in the Mexican War, receiving full rank in 1854. He was promoted brigadier-general in 1861, and after 1863 was inspector of fortifica¬ tions on the coast of New England. He was brevetted major-general in 1865.

RIPLEY, William Zebina, economist: b. at Medford, Mass., 13 Oct. 1867. He graduated at the Massachusetts Institute of Technology in 1890; A.M., 1892, and Ph.D. 1893 at Columbia University; and was

professor of economics, Massachusetts Institute of Technology 1895-1901 ; lecturer on sociology, Columbia Uni¬ versity 1893-1901 ; and from 1901, professor of economics at Harvard. In 1900-01 he was ex¬ pert agent on transportation, United States In¬ dustrial Commission ; Huxley Memorial lect¬ urer, Royal Anthropological Institute, London, England, 1908; and lecturer at Columbia Uni¬ versity 1915-16. He is author of financial History of Virginia) (1890) ; The Races of Europe) (Lowell Institute lectures, 1900) ; Trusts, Pools and Corporations* (1905) ;

< Railway Problems* (1907); (Railroads: Rates and Regulation* (1912); 'Railroads: Finance and Organization (1914). Editor of selections and documents in economics (8 vols.) : also many articles in periodicals.

RIPLEY, Ohio, village in Brown County, on the Ohio River, and on the Chesapeake and Ohio Railroad, 45 miles southeast of Cincin¬ nati. It was founded about the time of the War of 1812, and was first called Staunton; later its name was changed in honor of General Ripley, an officer in the war. For a time the County Courts were held here, but the county-seat was finally moved to Georgetown. The first station on the "underground railway® f<?r runaway slaves was located in Ripley. It is in a noted tobacco region and has a number of tobacco packing-houses and factories; its other industrial establishments include a piano fac¬ tory and shoe factories and it carries on a con¬ siderable river trade. Pop. 1,840.

RIPON, rip'on, England, a cathedral city in the county of York (West Riding), on the Ure. 22 miles bv rail northwest of York. The cathedral of Saints Peter and Wilfrid, dating as far back as the 12th century and restored 1862-76, is one of the finest churches in Eng: land; length, east to west, 266 feet; width of transept, 132 feet; the three towers 120 feet high were crowned by spires prior to 1660. The abbey of Ripon was founded in the 7th century, and the Saxon crypt of the cathedral was probably built by Wilfrid in 674-678. The see of Ripon was established in 1836. The city has also other fine ecclesiastical, municipal and benevolent institutions. The principal manufactures are machinery, saddle-trees, leather and varnish. An obelisk 90 feet high is situated in the centre of the market place. Pop. about 8,250.

RIPON, Wis., city in Fond du Lac County, on Silver Creek, an inlet of Green Bav. and on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railoads, about. 85 miles northwest of Milwaukee and 18 miles west by north of Fond du Lac.

Ripon was settled in 1844 by the “Wisconsin Phalanx,® an organization of 19 members, founded at Southport, Wis., based upon Fourier’s principles. The city was named Ripon by John Homer, whose ancestors had lived in Ripon, England. The “Phalanx® pros¬ pered and held together as an organization for six years. The reports of gold in California was one of the causes of unrest which led to the voluntarv and peaceable disbanding of the organization in 1850. The city was incorporated in 1849 and chartered in 1858. Ripon claims to be the birthplace of the Republican party, and one of the historic buildings is pointed out as the place where the first meetings were held and where the party received its name. The chief industrial wealth of the city is connected with the products of the rich farms of the valley. Grain, fruit and vegetables are abun¬ dant, and the dairy products are of consider¬ able value. The chief manufacturing establish¬ ments are knitting works,. glove factory, grain elevators, washing-machine works, veneer works, carriage works, machine shops, and pickling works, creameries, box and crate fac¬ tories and flour and feed mills. There are. sev¬ eral churches and a number of fine business blocks. The educational institutions are Ripon College, organized in 1851 ; a high school, graded elementary schools, a parochial school and a free public library. The three banks have a combined capital of over $2,000,000. The gov¬ ernment is vested in a mayor and a council of eight members, who hold office two years, four of whom are elected each year. Ripon is a favorite summer resort on account of its climate, beautiful scenery and the attractive drives to nearby points of interest. Pop. 4,090.

RIPON COLLEGE, located at Ripon, Wis., organized in 1850. It was founded under the name of Brockway College and received its present name in 1863. Though the Congregationalists have contributed largely to its sup¬ port and prosperity, it is not under denomina¬ tional control. Its organization includes a col¬ legiate department, a preparatory department and departments of music and of art; normal courses are also given. In 1901 the group sys¬ tem of elective studies was adopted and a new professorship in history and economics estab¬ lished; the collegiate courses are arranged in three general groups, classical, literary and sci¬ entific, but only the one degree of A.B. is con¬ ferred. Women are admitted to all depart¬ ments. The campus includes 10 acres ; the li¬ brary contains 20,843 volumes The students for the year 1917-18 numbered 234, and the faculty 20.

RIPPLE MARKS. See section on Struc¬ ture in the article on Geology.

RISE OF THE DUTCH REPUBLIC, The, a historical work by John Lothrop Motley, first published in 1856. It proved an immediate popular success, and was followed by a French translation (supervised with an introduction by Guizot) in 1859, and soon after by Dutch, German and Russian translations.

RISE OF SILAS LAPHAM, The. The

Rise of Silas Lapham,* by William Dean How¬ ells, on its f?rst publication in 1884 won a popular and critical approval which speedily assigned it to a place among the classics of

realistic fiction, perhaps the chief American novel in that type. Compared with other books by the same author, it is hardly as great in range or as broad in canvass as (A Hazard of New Fortunesˆ hardly as disconcerting by its pungent accuracy as (A Modern Instance, > hardly as winged with laughter as (Indian Summer,) but it goes beyond any of them in its combination of qualities. Its theme is the universal one, particularly dear in a re¬ public, of the rising fortunes of a man who has had no aid but virtue and capacity. Silas Lap-ham appears when he has already achieved wealth, and finds himself drawn, involuntarily enough, into the more difficult adventure of adjusting himself and his family to the man¬ ners of fastidious Boston. A writer primarily satirical might have been contented to make game of the situation. Howells, neatly as he hits off the conflict of standards, gives it the depth of meaning which comes only from a profound understanding and a mellow pity. The conflict, however, while constantly perva¬ sive in the book, does not usurp the action, and the Lapham family has serious concerns that might have come up anywhere. Most intense and dramatic of these is the fact that the suitor of one daughter is believed by the whole family to be in love with the other until the very moment of his declaration. The distress into which they are thrown and the methods by which they free themselves from the predica¬ ment are presented with a degree of subtle comprehension rare in any novel, and here matched with an equally triumphant common-sense. Indeed, a certain rightness of

feeling, equally removed from satire and sentimentalism, may perhaps be called the book's essential merit. As the story proceeds, as Lapham falls into heavy financial vicissitudes, finally to com¬ parative poverty again, and yet through all this actually rises in spiritual worth, the book steadily grows in the dignity which is founded on truth. Without a touch of heroics in style or events, trusting confidently that to be vera¬ cious will suffice, it abounds in memorable reve¬ lations of human character and wisdom.

Carl Van Doren.

RISHI, ri'shi or r'shl, sages of the Hindu mythology, sprung from the mind of Brahma, and attendants in alternate months on the.sun. Seven of them are enumerated. The rishi are connected with the star worship ; and the seven rishi form the constellation of Ursa Major in the Hindu astronomy. The rishi were also inspired sages, of whom the Vishnu Purana enumerates three kinds — royal rishi, or princes, who have adopted a life of devotion; divine rishi, who are both sages and demigods, and Brahman rishi, or sons of Brahma. "Rishi® afterward came to be applied to all personages distinguished for piety and wisdom. Consult Macdonell, A. A., < History of Sanskrit Literature) (London 1913).

RISORGIMENTO, The. The Italian word, "risorgimento® means literally "rising again.® In some of its verb forms the word is seen to be cognate with our "resurrect.® In Italian history the meaning of the word is the rebirth or remaking of the Italian nation. It thus covers the period of revolt from Austrian domination and establishment of the present kingdom — the risorgimento was the founda¬

tion of united Italy. It began in 1831, when Mazzini founded "young Italy.® The influential paper which Cavour edited in the stirring midcentury was called II Risorgimento.

RISTORI, res-to're, Adelaide, Italian ac¬ tress: b. Cividale, Italy, 29 Jan. 1822; d. Rome, 9 Oct. 1906. She appeared on the stage as a child, and her early parts were in Soldoni's comedies. After her marriage in 1846 to the Marchese Giuliano del Grillo she retired from the stage for a time, but after her return she devoted herself thenceforth to tragic roles. In 1855 she appeared in Paris in Silvio Pellico's tragedy of (Francesca da Rimini) and achieved a great success. Her engagement there was fol¬ lowed by a tour of Europe; and from that time she was frequently seen in the large cities of the Continent and Great Britain.

She made her first appearance in America at the Lyric Thea¬ tre, New York, 20 Sept. 1866, and her tour of the United States lasted for eight months. In 1869 she played in South American cities and in 1874 made a journey round the world. She made her fourth and last visit to the United States in 1884-85, and during that tour, which ended in May of the following year, she ap¬ peared as Lady Macbeth in company with Ed¬ win Booth. After 1885 she did not appear on the stage. Her greatest parts were Mary Stuart, in Schiller's drama <Myrrha,) Medea, Phaedra, Lady Macbeth and Queen Elizabeth. Consult Mantillini, G., (Memories and Artistic Studies of Adelaide RistorP (a translation of her own autobiography; Garden City, N. Y., 1907).

RITCHEY, George Willis, American as¬ tronomer: b. Tuppers Plains, Ohio, 31 Dec. 1864. He was educated at the University of Cincinnati. He was superintendent of instru¬ ment construction at Yerkes Observatory in 1899-1904; was connected with the faculty in astron¬ omy at the University of Chicago in 1901-05 ; and in 1905-09 he was astronomer and super¬ intendent in charge of instrument construction at the Solar Observatory, Carnegie Institute. In 1909 he became astronomer and engineer in charge of the designing and construction of a 100-inch reflecting telescope.

RXTCPIIE, rich'i, Alexander Hay, Amer¬ ican artist: b. Glasgow, Scotland, 14 Jan. 1822; d. New Haven, Conn., 19 Sept. 1895. He studied under Sir William Allan at the Royal Institute, Edinburgh, went to Canada in 1841 and later settled in New York. He engaged in business as an engraver and established a con¬ siderable reputation for his work, which was chiefly of the mezzotint variety. He was also known as a painter. He was elected an associ¬ ate of the National Academy in 1863 and aca¬ demician in 1871. Among his paintings are (Mercy Knocking at the Gate* (1860) ; (Baby, Who's That?) (1871), *etc.* His engravings in¬ clude (Mercy's Dream* (1850) ; (George Wash¬ ington } (1852) ; (On the March to the Sea> (1868), *etc.*

RITCHIE, Anna Cora Ogden (Mowatt),

American actress and author : b. Bordeaux, 1819; d. Henley-on-Thames, near London, Eng¬ land, 28 July 1870. She was successful as a playwright and dramatic reader, and in 1845-54 appeared with much favor on the stage in both the United States and England, where she was seen with E. L. Davenport (q.v.). In Lon¬ don and Manchester she was leading lady to

Davenport. In 1854 she married W. F. Ritchie, editor of the Richmond Examiner, her first husband having died the preceding year. From this time on she retired from the stage and devoted her time to literature and play writing. Some of her books were published under the pseudonyms of ((Isabel)5 and ((Helen Berkley.® They include (The Fortune-Hunted (1842); <The Mute Singer,5 (Fashion,5 a comedy (1847), which was very popular; (Evelyn 5 (1845) ; (The Autobiography of an Actress) (1854), the best-known and most popular of her productions; (Mimic Life) (1855); (Fairy Fingers) (1865) ; (The Clergyman's Wife) (1867). Consult (Autobiography of an Ac¬ tressˆ by herself (Boston 1854).

RITCHIE, Lady Anne Isabella Thacke¬ ray, English author : b. London, 1837 ; d. 1919. She was the eldest daughter of William Make¬ peace Thackeray (q.v.). She was educated at Paris and Kensington and in 1877 was married to Richmond Ritchie. Her first literary work was published in the Cornhill Magazine while her father edited that periodical. In 1863 she published (The Story of Elizabeth, 5 which met with success. From that time she published fiction, biography and literary reminiscences, among which are (The Village on the Cliff > (1865) ; (To Esther and Other Sketches5 (1869) ; (01d Kensington) (1873) ; (Toilers and Spinners) (1873) ; 'Bluebeard's Keys5 (1874) ; 'Miss AngeP (1875) ; (Anne Evans) (1880) ; 'Madame de Sevigne5 (1881) ; 'A Book of Sibyls5 (1883); (Mrs. Dymond) (1885);

' Records of Tennyson, Ruskin and Browning5 (1892). The biographical edition of Thack¬ eray's works was edited by her, and her pref¬ aces and notes contain a partial substitute for an authoritative biography against which Thack¬ eray left a prohibition. Her < Chapters from Some Unwritten Memoirs5 (1895) is a work of autobiographical character.

RITCHIE, Thomas, American journalist: b. Essex County, Va., 5 Nov. 1778; d. Rich¬ mond, Va., 12 July 1854. He studied medicine and later engaged in teaching, but in 1804 be¬ came owner of the Richmond Examiner. He changed the name of that paper to the En¬

quirer and acted as its editor for 40 years, making it an organ of unusual influence. In 1845 he acceded to the request of President Polk and, resigning the Enquirer to his two sons, he went to Washington and took charge of the Union, the administration paper. He retired in 1849. He was a strong advocate of State-rights and a picturesque and dominating figure in the political world.

RITCHIE, Sir William Johnstone, Cana¬ dian jurist: b. Annapolis, Nova Scotia, 28 Oct. 1813; d. Ottawa, 25 Sept. 1892. He was ad¬ mitted to the bar of New Brunswick in 1838, was appointed queen's counsel in 1854 and served in the executive council of the province from 1854 until he was appointed puisne judge of the Supreme Court of New Brunswick in 1855. He became chief justice of New Bruns¬ wick in 1865; puisne judge of the Supreme Court of the Dominion in 1875, and was chief justice of Canada in 1879-92. He was knighted in 1881. He was deputy-governor of Canada in place of Lord Lome for six months in 1881 and three months in 1882; and in 1884 was

appointed deputy-governor under Lord Lands-downe.

RITE AND RITUAL (Latin, ritus, cus¬ tom, connected with Sanskrit ri, and it is, therefore, from the same root as river, the thing that flows) ; in modern religious use any external sign or action employed as an expres¬ sion of reverence or devotion, or as a means of exciting religious sentiments. The ancient re¬ ligion of Judaism abounded in rites and cere¬ monies, and the sect or school of the Pharisees appears to have laid more stress on compliance with those observances than on the weighty injunctions of the law. Jesus Christ repeatedly expressed contempt for the scruples of the Pharisees, and many of those who aim to walk strictly in his footprints repudiate everything like ceremonialism in divine worship. But the vast numerical majority of Christians demand a more or less stately and impressive ceremo¬ nial. Rite is used also to express the sum of the ceremonial employed in the administration of the sacraments, as, the ((rite55 of baptism, the <(rite55 of confirmation, <(the last rites.55 The entire liturgical ceremonial of a particular branch of the Church is spoken of as a "rite,55 for example, Latin rite, Greek rite and Syrian rite. All these, however, are but modern man¬ ifestations of very primitive communal cere¬ monies which, in the beginning, were very little, if at all, religious in point of view, in senti¬ ment or in ceremonial execution. Rites repre¬ sent the organization of religious procedure, generally throughout long ages. They may, therefore, be said to be the outw.ard manifesta¬ tion of religion, the dress which distinguishes

one religion or one faith from another. They are when they appear to be individual, for the nature of the ceremonial rites performed in his own home by the individual is exactly similar in form and intent to that of the rites per¬ formed by all the members of the same tribe or primitive racial organization, under the same conditions and for the same ends. The indi¬ vidual rite is, therefore, nothing more or less than the resolution of the congregational rite into its component parts. On the other hand, the congregational rites represent the common interests of the members of the community. Both pertain to the common life in its general and yet most intimate functions and vital in¬ terests. In primitively organized society the rites were largely, if not altogether, intended to control or favorably influence those powers which, by common consent, were recognized as being greater than those possessed by man him¬ self. . But certain rites seem to have been intended to encourage certain beneficent beings, among them the gods of growth and fruition, to become even more favorable to man. Of such a nature were the great spring, summer and autumn festivals common to many races. To this category, too, belonged the ancient rites performed at birth, baptism, puberty, mar¬ riage and death and other interrelated cere¬ monies with their attendant, invariable rites.

Ritual and Myth march hand in hand down the long ages of time, extending mutual help to one another all along the way. Sometimes an elaborate myth apparently grows out of a tribal ceremony; and sometimes elaborate and complicated rites are built up about a racial myth, These act and react upon one another

and arc subject to extraneous influences which tend to modify the form and the spirit of all ceremonies and their attendant rites. Ritual is a generally recognized form of performing cer¬ tain ceremonies growing out of the past experi¬ ences of a people of which they are commem¬ orative. For this reason the origin of most rites must be sought in the long past, and the more primitive of them can be intelligently studied only in connection with their corresponding myths. The primitive belief in the animate nature of things animate and inanimate and in the magic power possessed by certain beings gave rise to the use of magic formulae, spells and charms. He who possessed the most powerful of these was believed to be able to conquer adverse powers through them. These assumed certain ritualistic definite forms which it was not permitted to vary. With these forms went stories or myths explaining their origin and sometimes their efficacy and mystic signification. Certain ceremonies com¬ memorative of the popularly believed origin of the myth commemorated the myth itself, and the ritual laid down the exact form in which the commemorative ceremonies were to be ob¬ served. These early ceremonies and rituals seem to have been all magical in form and intent. The efficacy of the magic or charm consisted in the performance of the ceremony in the exact manner and words prescribed by the ritual, by tradition and by custom. Hence the medicine men, myth guardians, instructors or by whatever name they were known in the various more or less primitive societies, spent years in becoming familiar not only with the ritual itself but with its attendant ceremony and its accompanying myth or myths. As society grew more complex and human interests more confederated, rituals became more complicated and their myths more involved. Thus the former became more difficult of performance and the latter required greater skill for their elucidation. The medicine men and myth guardians and elucidators were gradually forced to give all their time to this work. Thus a formal priesthood came into existence. The priests were the natural guardians of the tra¬ ditions of the tribe or nation. As they were the magic workers they were looked upon with special reverence by the rest of the people, and they were feared on account of their supposed possession of powerful magic, charms and

other mystic knowledge, all of which formed a com¬ plicated and extensive tribal ritual. As the powerful beings feared by primitive man de¬ veloped into gods the medicine men became the sacred depositories of celestial knowledge and their ancient ceremonies and rituals were at¬ tributed to the revelation of the gods. In this connection they assumed an additional sacred¬ ness which tended still more to stereotype them.

Ritual and Writing. — Naturally all primi¬ tive religions have shown a fondness for caba¬ listic signs, and some of the more developed of modern religions still exhibit strong traces of this primitive influence. As religious rites and ceremonies became more complicated and com¬ plex, signs known only to the medicine men or priests were made use of as an aid to the mem¬ ory in the memorizing of the ritual and attend¬ ant myths. Often signs of this kind were painted on the wigwams, altars or temples ; and on account of this connection they assumed a

sacred character. These signs naturally became more numerous and complicated with the ex¬ tension of the primitive ceremonies and rites. When these first hieroglyphic signs grew into formal hieroglyphic writing they still remained the property of the priesthood, and as such retained their sacred character. The knowledge of writing was looked upon by the masses of the people as nothing less than very powerful magic, or in other words, a series of cabalistic charms or ritual. Hence the great culture gods of the races throughout all the ages of barba¬ rism are represented as revealing to the human race the magic of the written word in which great power was believed to reside. Thus the Biblical expression : ((In the beginning was the Word; and the Word was with God; and the Word was God,® is literally the attitude of the people of an earlier age toward the supposed miraculous attributes of the written word, rep¬ resentative of the divine rituals, incantations, charms, hymns and songs, all of which were, in themselves, but so many different forms of primitive rituals. Thoth, the great culture god of the Egyptians, was the revealer of writing to the human race. The books of Thoth, which seem to have consisted of religious rituals and a compilation of the scientific knowledge of the age, were looked upon as not only extremely sacred but as miraculously powerful; and strangely modern Egyptian romances recount the adventures of those who either tried to secure possession of Thoth's secret book or actually did obtain it and the terrible mishaps that befell them. In these stories the belief in the divine nature of writing is strongly in evi¬ dence.

Ritual, Charms and Incantations are es¬ sentially the same in origin. The efficacy of the charm or incantation depended upon its being recited in a certain prescribed form. The greater part of the worship of primitive races has always consisted of charms and incantations accompanied by offerings and sacrifices, which are but another form of offerings. The charms and incantations were made use of with a view to opposing powerful known magic to the great magic of the superior being addressed, while the offerings were made with a view to pleasing or propitiating him. In the course of time the ritual connected with these charms, incantations and their accompanying ceremonies became ex¬ tensive and more or less obligatory in form. Gradually the dramatic picturesque ceremony superseded the charm element in the imagina¬ tion of the participants in the ceremonies ; and the ceremonial rites assumed a form of worship in which the being addressed continued, as time went on, to play a larger and more important role. But the idea of magic and charm was eliminated very slowly from the minds of the masses of the people. The formal ritual of the blessing of the water was believed to give it miraculous power; the rite of baptism was a more or less sure protection from the evil one. Marriage, from being one of the loosest and most irregular and non-formative unions, be¬ came, as the rite connected therewith assumed a complex and mystical form, one of the most sacred of religious and divine institutions en¬ joined bv heaven and revealed by the deity. By the rite of anointment and inauguration the sovereign became a semi-divine character, the anointed of the Lord, the representative of

heaven upon earth. Out of the rites, ceremo¬ nies and traditions rose the doctrine of the divine right of kings, which seems to have been at one time more or less universally subscribed to among civilized and semi-civilized forms of government. Baptism, as a rite, became, among Christians, of such importance that it was be¬ lieved that without it no one could enter the kingdom of heaven. Auricular confession, too, assumed the form of a rite of the Church, though perhaps not originally specifically classed 3.S such.

What has taken place in the Christian Church had already taken place in the great pagan religions of Greece, Rome, Carthage, Egypt, Babylonia, Assyria and India; and the same tendency was noticeable in the Jewish faith.

Everywhere a sacredness was ascribed to the religious ritual to which was also attributed a mysterious virtue of power strongly similar to the ancient charms and incantations about which most of the ritual was built. Every ceremony of a religious nature, among these races, had its accompanying ritual, rigid, unchangeable, obligatory in form and generally believed to be of wonderful efficacy. Some of these cere¬ monies with their accompanying rites were of such a complex nature and so extensive that the performance of them occupied a week or more each year and called forth the unrestrained energies of a people. Every important event in life has its corresponding cere¬ mony and rite. This seems to have been an almost universal tendency of man in a cer¬ tain stage of racial development. Among most of the races of North and Central America and the west and north of South America there were ceremonies and rites connected with birth, puberty, marriage, death, war, peace, spring¬ time, harvest, the undertaking of a journey or the beginning of some important enterprise. The people of these regions possessed elaborate rites according to which the germination, ripen¬ ing and gathering of the crops were celebrated. Every trade, guild or occupation had its patron deity, its holy day and a special ceremony and ritual connected therewith. With such a multi¬ plicity of deities, naturally there was consider¬ able similarity among the hundreds of. rituals ; and yet there were also some striking and spectacular differences.

Secret Rites. — In ancient religious and semi-religious societies the secret rites were frequently more elaborate and of far greater

importance than the public rites. This is ex¬ plained by the fact that the former were pro¬ prietary and, as such, naturally inspired greater personal interest and called for more detailed attention and elaboration. Where the secret rites existed, and they existed extensively in more primitive society, they were the really sig¬ nificant rites of the celebration, pregnant with meaning and associations for those privileged to take part in them, while the public rites were in general the drama or play, of a commemora¬ tive and informative nature presented for the general use and interest of the people. Many of the ancient Egyptian, European and Asiatic secret rites were widely spread and exercised profound influence upon the national life. Some of them, as the Eleusinian mysteries, possessed fine temples, elaborate rituals and thousands of devotees who performed all their important

rites behind closed doors ; and took into partner¬ ship with them in the performance of these rites certain of the deities. The secret part of these rites was looked upon as very sacred. The public rite soon became little more than a dra- • matic performance for the edification and en¬ tertainment of uninitiated masses; and as such it continued to degenerate.

Secret rites were a notable feature of the great religious ceremonies of the North Ameri¬ can Indians in general. Almost always these secret rites were performed in a medicine lodge or great tepee erected for the occasion and dedicated to this use alone. Into this chamber none but the initiated may enter and it is marked by cabalistic signs which distinguish it from all other dwellings and give it at once a semi-sacred, semi-mysterious nature. Proces¬ sions, dances, offerings, purification ceremonies, songs, incantations, prayers, all performed in a manner rigidly enjoined by the ritual, generally form part of the secret ceremonies of most of such societies. There too the priests and other participants rehearse the mythical story or legend of the origin of the society and its pe¬ culiar rites and ceremonies. Among most In¬ dian secret societies one of the ever-present rites is that of smoking to the six directions of the universe, east, west, north, south, upward and downward. Often, too, an elaborate cere¬ monial feast forms part of the obligatory rite. This may be private or public or both, and is frequently preceded or followed by the sacrificial food offering. Not infrequently a public altar is erected by the masses of the people, under the direction of the priests, on a certain day or days set apart between the secret and public rites. This in itself may be said to form an integral part of the rites since it is of deep mystical symbolization,

symbolizing some god, culture hero, the earth, the heavens, the universe according to the ritualistic tradition of the tribe. The rites of this altar and its symbolism frequently represent the four wind gods, the great and sovereign rulers of the four quarters of the earth, the thunder gods and the spirit of the rainbow, the long bridge spanning the earth-land and the sky-land. The public performance also follows an elaborate, rigidly-defined ritual, the prominent features of which generally are smoking, sacrifices, specific dances, dramatic presentations of legend and tradition, oratorical exhortations, prayers, processions and traditional songs generally sung by choruses. Masks are frequently worn and mythological characters are impersonated according to a plan rigidly de¬ fined and exacted in the tribal rite of the cere¬ mony.

The tendency everywhere and at all time has been for ceremonial rites to become rigidly stereotyped, a fact due to the ever-present be¬ lief in the magic efficacy of the spoken word, of incantations and mystic signs presented in certain forms approved by antiquity and tradi¬ tion. In ancient and modern ceremonial rites everything is ruled by precedent. From Rome to Egypt, from Persia to Hindustan and China, from Greenland to Yucatan, from Central America to Peru, even the decorations and symbols of the ceremonies and of the tepees and temples were fixed and practically un¬ changeable in the pre-Columbian days.

Changing of Rites. — This very unchange¬ ableness of customs and ritual and the tend-

ency to relegate the most important and solemn of the rites to societies and lodges to associa¬ tions of priests and nobles, and to reserve the spectacular and the dramatic for the great pub¬ lic performances had two tendencies which be¬ came invariably destructive of the ceremonies they were interested in preserving. A strong priesthood and a powerful privileged class elaborated these ceremonies and rites and read into them symbolical meanings they did not originally have, and overloaded the ritual, bind¬ ing it soul and body to the secret societies and the ruling class. The symbols, in the course of time, became conventionalized and the original signification of the religious rites forgotten or obscured. Gradually for the masses, the cele¬ bration of the great ritualistic feasts became the occasion of a public holiday, often accompanied by licentiousness and debauchery. The mean¬ ing of the sacred or mystical symbols obscured or forgotten or a new signification read into them, they insensibly and gradually changed form or assumed stereotyped shapes to which semi-mystical, semi-magical powers were still attributed. Thus it was that the original temple decorations, once pregnant with meaning, be¬ came transformed into conventional decora¬ tions. In this latter shape they might still con¬ tinue to attach themselves to the ritual of which they had originally formed an integral part. In the later Greek and Roman Classical periods the ritualistic decorations had become almost altogether conventionalized and their meaning obscured or lost. The Aztecs and Mayas, at the time of the Conquest, had arrived at the transition period when the ritualistic symbols were beginning to become stereotyped while still retaining most of their mystic signification. Among many of the northern Indian races mysticism and symbolism were still linked with the ritual and never used apart from it. These different grades of civilization illustrate well the insensible changes of ritual and its attitude toward its origin in the course of ages of social and religious evolution. Thus ritual, while ap¬ parently often stationary, is continually chang¬ ing with the never-ceasing changes of the ages. This is due to the part that personal religion tends to be informal which state or tribal re¬ ligions tend to wrap themselves about with ceremonies borrowed from court ceremonies and surroundings, vocabulary and relationship. Just as

state ceremony tends to become top-heavy under autocratic governments and finally to fall by its own weight, so the ceremonies of state and tribal religions are born down by the weight of their own ritual, generally after centuries of slow growth and very gradual change leading to more and more ornate, in¬ volved and obscure symbolism. The whole course of ritual evolution is affected by the constant borrowings of races and creeds from one another, and the ever-present tendency to develop new forms from old.

The individualism of strong men has also, from age to age, had a very decided influence upon the upbuilding and new interpretation of ritual, or upon its simplification or total or par¬ tial destruction. This is well exemplified in Biblical history, in the growth of ritualism in the state religions of Egypt and those of Assyria, Babylonia and India; and more recently in the development of Christianity, first as an icono¬ clastic force directed against ritualism, and

later as one of the greatest ritual-building agencies. This ritual-building was arrested and strongly affected by the individualism of such men as Zwingli, Erasmus, Calvin, Melanchthon and Luther, the most active leaders of the Reformation. Since their day the more indi¬ vidualistic leaders of Protestantism have made repeated attacks upon ritualism until now little or nothing of the original ritual remains in the more ultra Protestant churches, and with the ritual have disappeared much of the dogma of the Roman Church and many of the customs, traditions and practices inherited by it from the earlier ages of Christianity or from pre-Chris¬ tian times. Much the same tendency is notice¬ able in the Mohammedan faith which has de¬ veloped from a distinctly iconoclastic force, in its earlier days, into a strong fortress of ritualism.

Contra-Currents.— Where the tide is strong and constant in one direction there are apt to be contra-currents. This is true of the ever-constant tide of ritualistic change. Within the Protestant bodies there has ever existed a contra-current in favor of the preservation of the essentials of the rituals of the earlier Christian Church. Luther himself, though pro¬ claiming doctrines destined ultimately to shake the throne of ritualism throughout the Christian world, was himself at heart a ritualist. The Anglican Church, though the most determined of opponents of Rome in the days of its early struggle, has clung tenaciously to much of the Roman ritual ; while a certain section of the Anglicans still stand for elaborate ritualism and symbolism in formulas and service of the church. The Hindu religion has had the

same experience, in a more pronounced manner, for numerous sects within the ecclesiastical body stand to-day for the maintenance or extension of ancient ritual. In Egypt, when the symbol¬ ism of the state church had become complex, extensive and elaborate, there were constant undercurrents, which on two, if not more, occasions succeeded, for a time, in getting the upper hand. In Mexico, under the Aztecs, in the later days of the Montezumas, there was a strong double reaction in favor of a return to the earlier ritual of the tribal nature worship. The headquarters of this reaction was in Tex-coco, the old Chichimeca capital. So strong was this reaction, in the days preceding the Conquest, that it seemed in a fair way ulti¬ mately to overthrow the state religion of the Aztec Empire, which had already been so strongly affected by the efforts of the followers of the ancient Toltec faith that the statue of the chief Toltec divinity, Quetzalcoatl, god of the winds, had been set up in the great temple of Tenochtitlan (Mexico City) by the side of the chief of the national and state deities, and in many other temples throughout the Aztec Empire. In the history of the evolution or dis¬ appearance of ritual these contra-currents are constantly in evidence, working a change of direction, often in the main stream.

Bibliography. — Caland, W., and Henry, V., <L'Agnistoma) (1906) ; Cushing, F. H., <Zuni Fetiches* (in second Report of the Bureau of American Ethnology) ; Farnell, L. R., <The Cults of the Greek States* (1896-1907); Fewkes, J. W., (Fusayan Katchinas) (15th Report of Bureau of American Ethnology) ; Fletcher, A. C, (The Kako: A Pawnee Ceremony* (in 22d

Report of Bureau of American Ethnology) ; Frazer, J. G., 'The Golden Bough) (1900) ; Hillebrant, A., 'Ritual Litteratur> (1896); Hubert, H., and Mauss, M., 'Essai sur la nature et sur la fonction du sacrifice' (in L'Annee sociologique II'); Lang, A., (Myth, Ritual and Religion' (1899) ; Levi, S., (La Doctrine du sacrifice dans les Brahmanas' (1899); De Marchi, A., 'II Culto privato di Roma antica' (1902) ; Moret, A., (Le Rituel du culte divin journalier in Egypte' (1902) ; Oldenberg, H.,

<Die Religion des Veda' (1894) ; Robertson-Smith, W., 'Lectures on the Religion of the Semites' (1899) ; Spencer, B., and Gillen, F. J., <The Native Tribes of Central Australia' (1899); 'The Northern Tribes of Central Australia' (1904) ; Stevenson, M. C., 'The Zuni Indians' (in the 23d Report of the Bureau of American Ethnology) ; Tylor, E. B., (Primitive Culture' (1903).

John Hubert Cornyn, Editorial Staff of The Americana.

RITES, Congregation of, a commission or standing committee of cardinals of the Roman Catholic Church, instituted in the 16th century by Sixtus V. Its function is to exercise super¬ vision throughout the entire Church over all ecclesiastical rites and ceremonies, in particular those belonging to the mass, with a view to preventing the introduction of novelties without express approval, and to maintain unaltered the usages sanctioned by the tradition of the Fathers and the prescriptions of the rubrics. It is the Congregation of Rites that takes cognizance of all matters concerned with beatification and canonization.

RITROVAMENTO. See Invention of the Cross.

RIT.SCHEL, rich'el, Wilhelm, American artist: b. Nuremberg, Bavaria, 11 July 1864. He studied at the Royal Academy, Munich, and in 1895 came to the United States. He has special¬ ized in marines, and his paintings have been shown at important exhibitions in America and Europe. He was elected to the National Acad¬ emy in 1914. Among his paintings are Raid¬ ing up the Boats' (1908) ; ' Midsummer Night, Maine' (1912) ; (Glory of the Morning, Pacific Coast' (1913), *etc.*

RITSCHL, rich'l, Albrecht, German theo¬ logian : b. Berlin, 25 March 1822; d. Gottingen, •20 March 1889. He studied at the universities of Bonn, Halle, Heidelberg and Tubingen, qualified at Bonn as a lecturer in 1846, became extraordinary professor of theology there in 1852 and ordinary professor in 1859. In J864 he accepted a call to the corresponding chair at Gottingen. From 1874 he was a consistorial councillor. In his early thesis, 'Das Evangelium Marcions und das kanonische Evangelium des Lukas' (1846), he adopted the position of his master, F. C. Baur, but in the first edition (1850) of his (Entstehung der altkatholischen Kirche' ((Origin of the Early Catholic Church') he showed signs of divergence, and the publication of the second edition of the lat¬ ter work in 1857 marked his complete severance from the Tubingen school. His chief subse¬ quent works are 'De Ira Dei' (1859) ; 'Die christliche Lehre von der Rechtfertigung und der Versohnung' ('The Christian Doctrine of Justification and the

Atonement,' 3 vols., 1870-74), his chief work; 'Schleiermacher's Redcn fiber die Religion und ihre Nachwirkungen auf die evangelische Kirche Deutschlands' (1874); <Die christliche Volkommenheit' ('Christian Perfection,' 1874) ; 'Unterricht in der christlichen Religion' (1875; 5th ed., 1895) ; 'Geschichte des Pietismus' (1880-86) ; 'Theologie und Metaphysik' (1881); (Drei akademische Reden' (1887) ; 'Fides Implicita' (1890) ; and 'Gesammelte Aufsatze' ('Collected Essays,' 1893 and 1896). Ritschl founded a school of theology still of much importance both in Germany and in other countries. Starting from a subjective theory of cognition, based upon the philos¬ ophy of Kant as developed in Lotze, he sought to eliminate the whole metaphysical element from religion. He was thus led to reject such doctrines as original sin, the Trinity, the incarnation, whether historic or mystical, and the whole of natural theology, as of no religious value, and he denied the pre-existence and miraculous birth of Jesus. He laid stress upon the historical character of Christianity, but held free views of inspiration and admitted the most advanced criticism. His view of the atone¬ ment was essentially the same as the "moral in¬ fluence" theory of liberal theologians.

Bibliography. — Brown, A. W., 'The Es¬ sence of Christianity' (1902) ; Denney, J., 'Studies in Theology' (1894) ; Ecke, G., 'Die Theologische Schule Ritschls, A.' (1897-1904) ; Edghill, E. A., 'Faith and Fact' (1910) ; Garvie, A. E., 'The Ritschlian Theology' (1902); Mielke, G., 'Das System Albrecht Ritschl' (1894); Mozley, J. R., 'Ritschlianism' (1909) ; Orr, J., 'The Ritschlian Theology and the Evangelical Faith' (1899); Pfleiderer, 'The Development of Theology in Germany since Kant' (1890; German ed., enlarged, 1891); 'Die Ritschlsche Theologie kritisch beleuchtet' (1891) ; Ritsch, O., 'Life of Ritschl' (1892-96) ; Schoen, 'Les origines historiques de la theologie de Ritschl' (1893) ; Swing, A. T., 'The Theology of Albrecht Ritschl' (1901).

RITSCHL, Friedrich Wilhelm, German

classical scholar : b. Grossvargula in Thuringia, 6 April 1806; d. Leipzig, 9 Nov. 1876. He was educated at Leipzig and Halle, where he de¬ voted himself to classical studies, and in 1832 was appointed extraordinary professor at Halle. He subsequently held professorships at Breslau and Bonn, and in 1865 accepted a call to Leip¬ zig, where he remained until his death. He was a very popular and successful teacher. His chief work is a critical edition of Plautus' 'Comedies' (1848-54, incomplete; entirely re¬ modeled edition, 1881-94). His other works include 'Parerga Plautina et Terentiana' (1845) ; 'Priscae Latinitatis Monumenta Epi-graphica' (1864) ; 'Opuscula Philologica' (his miscellaneous papers in 5 vols.). Consult Mfil-ler, L., 'Life of F. W.

Ritschl' (Berlin 1877) ; Ribbeck, O., 'Life of Ritschl,' published in Leipzig in 1881; Sandys, J. E., 'A History of Classical Scholarship' (Cambridge 1908).

RITSON, Joseph, English antiquarian: b. Stockton-on-Tees, England, 2 Oct. 1752; d. Lon¬ don, 23 Sept. 1803. He studied law, became con¬ veyancer in London and deputy high bailiff to the duchy of Lancaster. For many years he de¬ voted his time to antiquarian researches and the editing of rare books, and he assisted Sir

Walter Scott in preparing his work on the (Border Minstrelsy.5 His works include (Ob¬ servations on Warton's History of English Poetry5 (1782) ; (Ancient Songs from the Time of King Henry II to the Revolution5 (1790) ; (Cursory Criticisms5 (1792) ; (Bibliographica Poetica5 (1802) ; (Ancient English Metrical

Romances5 (1802). Consult Hastewood, (Some Account of the Life and Publications of the Late Joseph Ritson5 (London 1824) ; Nicholas, Sir Harris, (Letters of Joseph Ritson5 (Lon¬ don 1833).

RITTENHOUSE, David, American as¬ tronomer and mathematician : b. Germantown, Pa., 2 April 1732; d. Philadelphia, 26 June 1796. His great-grandfather, Willem Rittinghuysen, a Mennonite from Holland, in 1688 set up, on Wissahickon Creek, the first paper mill in America. From an uncle the boy inherited some books on calculation and geometry, and henceforth his life was determined. Mathe¬ matics and computation became his absorbing passion. He had great facility in mechanical invention and execution. In his 'teens he began to make clocks of wood and metal, and his father set him up in the business of maker of mathematical instruments and clocks. He is said to have independently discovered the method of fluxions or the calculus when but 19, and to have foreseen its vast utility, before he heard of the claims of Leibnitz and New¬ ton.

In 1763 he laid out the 12-mile radius around Newcastle, which forms the boundary between Pennsylvania and Delaware, accurately with

instruments of his own construction, and Mason and Dixon accepted his results as final. In 1769 he located the point where the 41st parallel of latitude, the boundary between Pennsylvania and New York, strikes the Delaware River. The same year the Pennsylvania legislature ap¬ propriated £200 toward the observations of the transit of Venus. Rittenhouse built an observa¬ tory near his home in Norriton, and in com¬ pany with a committee appointed by the Ameri¬ can Philosophical Society made preparations for the occasion. His results were the best ob¬ tained and the computed parallax of the sun the most accurate then known.

Rittenhouse invented the plan of placing spider lines in the focus of the telescope, an arrangement that has done more to make ac¬ curate measurements possible than almost any¬ thing else. In 1770 he completed his famous orrery based on computations of his own. This showed the movements of the planets and moons in elliptic orbits around their primaries, the phenomena of eclipses and the relative places of the members of the solar system over a time of 5,000 years preceding or following. For this he received £300 from Princeton Uni¬ versity, and a like sum from the legislature of Pennsylvania for a second orrery for the Uni¬ versity of Pennsylvania. The first was injured by the British troops in the Revolutionary War.

Then followed computations of the orbits of comets, surveys of the land between the Delaware and Susquehanna for canal purposes, calculations for almanacs and surveys for a series of dams to make the Schuylkill River navigable. He was engineer and finally presi¬ dent of the committee of safety of his State during the Revolutionary War, and plunged into

military problems with all his energy. In 1776 he was made a member of the assembly of Pennsylvania, the earliest under the reorgan¬ ized Revolutionary movement, and was active in the creation of the new constitution, the first for the State of Pennsylvania. In 1777 and for 12 successive years he was elected State treasurer. He was also trustee of the Loan Office.

He determined the boundaries of Pennsyl¬ vania and the line between New York and Massachusetts. From 1779 to 1782 he was pro¬ fessor of astronomy in the University of Penn¬ sylvania and afterward trustee and vice-provost. In 1792 he was made director of the United States mint by President Washington. After three years he resigned and returned to scien¬ tific work. He succeeded Franklin as president

of the American Philosophical Society in 1790.

His publications (about 20) appeared in the Transactions of the American Philosophical Society. The most popular was an (Oration on Astronomy.5 An interesting (Eulogium5 was delivered after his death by Dr. Benjamin Rush. His life was written by his nephew, William Barton,* in 1813, and by James Renwick in Sparks' (American Biography.5 An account of him, by S. W. Pennypacker, was issued in 1882.

RITTER, rit'ter, Frederic Louis, Amer¬ ican musician and composer : b. Strassburg, Al¬ sace, 22 June 1834; d. Antwerp, Belgium, 6 July 1891. He studied music at Paris with Georges Kastner, taught at the seminary at Fenestrange, Lorraine, and in 1856 came to America and settled at Cincinnati. There he organized the Cecilia (choral) and Philhar¬ monic (orchestral) societies. Removing to New York in 1861 he became the conductor of the Sacred Harmonic and the Arion Choral societies. The first musical festival of note held in New York was given under his direc¬ tion in 1867. That year he assumed the duties of the professorship of music at Vassar Col¬ lege, which position he held until his death. He was a prolific composer of vocal solos and choruses, among which were musical settings for several Psalms, (0 Salutaris,5 an (Ave Maria,5 a group of Persian songs and more than 100 German lieder. He also wrote works for orchestra and pianoforte and was the au¬ thor of (A History of Music in the Form of Lectures5 (1870-74) ; (Music in England5 (1883) ; (Music in America5 (1883) ; (Manual of Musical History5 (1886) ; and (Musical Dictation5 (1888).

RITTER, Heinrich, German philosopher: b. Zerbst in Anhalt, 21 Nov. 1791 ; d. Gottingen, 3 Feb. 1869. He studied at Halle, Gottingen and Berlin from 1811 to 1815, and in the last-named year the calling out of the volunteers led him to France. On his return he devoted himself exclusively to philosophy, especially in the department of history, in which he adopted the method and critical views of Schleiermacher. He qualified himself at Berlin as a university teacher, and from 1824 held an extraordinary professorship in that city until he accepted a call to Kiel in 1833. In 1837 he removed to Gottingen, where he continued to occupy the university chair of philosophy till his death. Ritter's best works belong to the history of philosophy, his first in this department being an investigation into the doctrines of Em-

pedocles in Wolf's (Literarische Analekten> (1820). His (History of Ionian Philosophy> (1821) ; (History of the Pythagorean Philos¬ ophyˆ (1826), and (Notes on the Philosophy of the Megarean School* in the Rheinisches Museum, are models of historical investigation on the principles of Schleiermacher. His his¬ torical masterpiece is the (History of Philosophy> (1829-53), which deals with general his¬ tory up to the time of Kant. It was supple¬ mented by a (Review of the History of Ger¬ man Philosophy from the Time of Kant*

(1853).

RITTER, Henry, Canadian artist : b. Mont¬ real, 1816; d. Dusseldorf, Germany, 21 Dec. 1853. He studied in Hamburg and Dusseldorf, and spent most of his life abroad. He special¬ ized in subjects of a nautical character and was noted for his excellent coloring and care¬ ful finish as well as for originality. At his early death he left unfinished a .numberˆ of paintings as well as a series of illustrations for Washington Irving's works. Among his works are < Offer of Marriage in Normandy * (Leipzig Museum 1842) ; (The Poacher (1847) ; (Indians Flying Before a Burning

Prairie> (Kunsthall, Bremen 1851) ; (Middy's Sermon) (Cologne Museum 1853), *etc.*

RITTER, Karl, German geographer: b. Quedlinburg, Prussia, 7 Aug. 1779; d. Berlin 29 Sept. 1859. He was educated at Halle and resided for a considerable time at Gottingen in order to avail himself of its library. In 1819 he succeeded Schlosser as professor of history at the Frankfort Gymnasium, and in 1820 be¬ came professor extraordinary of geography at the University of Berlin, an office which he held with distinguished reputation for nearly 40 years. With Ritter may be said to have commenced a new epoch in geographical science; and a new department, that of com¬ parative geography, claims him as its founder. His great work is (Die Erdkunde im Ver-haltnisse zur Natur und Geschichte des Menschen* ((Geography in its Relations to Man's Nature and History1*), the first two volumes of which appeared at Berlin in 1817-18. Although it was afterward continued on a more extended plan, yet it was left incomplete, covering only Africa and

Asia. It constitutes so far as it extends, 19 volumes (1822-59), a vast repertory of valuable information relative to physical and general geography. Among other productions of Ritter may be mentioned ˆEuropa, ein geographisch-historisch-statistiches Gem'alde* ((Europe Delineated Geographically, Historically and Statistically,* 1807), and <Die Stupas, oder die architektonischen Denkmaler an der indobaktrischen Konigstrasse und die Kolosse von Bamyan* (<The Stupas, or Archi¬ tectural Monument on the Indo-Bactnan Highwav and the Colossi of Bamyan, ˆ 1838). Con¬ sult Gage, W. L., (Life of Carl Ritter> (New York 1867); Kramer, G., (Carl Ritter: ein LebensbiP (Halle 1875).

RITTER, William Emerson, American zoologist: b. Hampden, Wis., 19 Nov. 1856. He was educated at the universities of Cali¬ fornia, Harvard and Berlin and at the Stazione Zoologica, Naples, Italy. He has been associ¬ ated with the faculty of the University of Cali¬ fornia since 1891, becoming professor of zoology there in 1902. He is director of the

Scripps Institution for Biological Research, formerly the San Diego Marine Biological Sta¬ tion, and editor of the zoological publications of the University of California. Author of (War, Science and Civilization (1915).

RITUAL (Latin, ritualis, pertaining to rites), in ecclesiastical usage a manual con¬ taining the forms to be used by the priest in administering the sacraments, namely, the com¬ munion (when given outside of the Mass), baptism, absolution, marriage and extreme unction ; also in such rites as the churching of women, burial of the dead, blessing articles for religious uses, as water, candles, *etc.* The Ro¬ man Ritual now in universal use in the Latin Church was drawn up by order of Paul V, who (1614) "counseled" all prelates to conform to its prescriptions exactly. But though the Pope only counseled (hortamur is the word he em¬ ploys in the bull Apostoliccs Scdi), a decree of the Congregation of Rites (1850) declares that the forms of the Rituale Romanian "affect the universal church." Before the issuance of the bull of Paul V there were various ritual manuals authoritative in different countries or different episcopal jurisdictions. In the East¬ ern churches generally, as in the Greek Schismatical Church, the Ritual forms part of the general service book, the Euchologion, which corresponds to the Missal, the Pontifical and the Ritual of the Latin Church. The ritual of the Anglican Church is contained in the Prayer Book under the heads "Ministration of Bap¬

tism," "Order of Confirmation," *etc.* In gen¬ eral Ritual is a term applied to any form used in continually repeated ceremonials. There have been rituals in the religions of most peo¬ ples ; and these exist in many forms to-day among highly civilized and primitive races alike. Most of the Indian tribes of the North American continent had very rigid and com¬ plicated religious rituals. The term ritual is also used in many secret societies for the cere¬ monial forms used in receiving candidates into the various degrees of the order.

RITUAL LAW, that portion of the law of Moses which prescribes the ceremonies of pub¬ lic religious worship, the manner of making trespass offerings, the procedure for the dis¬ covery of leprosy, for the purification of women after childbirth, the discrimination of things clean and unclean, *etc.* The ritual laws of the Hebrews are contained mostly in the books (Exodus,* Leviticus,1* <Numbers> and (Deuteronomy. 5

RITUAL IN MYTHOLOGY. See My¬

thology.

RITUALISM, a term designating the prac¬ tices of a narty in the Church of England and the Episcopalian Church in the United States and elsewhere, in surrounding the nublje wor¬ ship with a variety of rites and ceremonies, and in resuscitating certain features and usages of the Catholic Church in pre-Reformation times, such as the use of ornate eucharistic vest¬ ments, use of the sign of the cross, belief in the "Real Presence," prayers for the dead, treating the communion service as a real sacri¬ fice, auricular confession and many other be¬ liefs and practices usually esteemed by Prot¬ estants as the insignia of "Romanism." By many, Ritualism is held to be only another name

for Puseyism and Tractarianism ; but Dr. Pusey, the reputed father of Puseyism, never adopted any of the practices of Ritualism. The Ritual¬ ists defend their position against the charge that it is nothing but a revival of “Romanism” in the Protestant Church and that it is flag¬ rantly inconsistent with the simplicity of Chris¬ tian worship as portrayed in the books of the New Testament, by saying that not all authorita¬ tive regulation of ritual is laid down in the New Testament, and that what is obligatory in ritual is to be learned from apostolic tradition. They allege, in explanation of the simplicity of primitive Christian worship, the secrecy and restraint to which the church was subjected through the ages of the persecution. All through that time the apostolic tradition was preserved by the church. On the accession of Constantine the ritual of the church assumed its natural beauty and proportions. They cite the Anglican Book of Common Prayer in its original form as promulgated in the second year of Edward VI (1549) as authorizing most of the practices now condemned by Protestants as ritualistic and “Romanish.” They contend that the Episcopalian Church of England, with its daughter churches, is historically committed to the practices for which the Ritualists are censured. The following are some of the rites and usages which distinguish the Ritualists from the mass of Protestants whether in the Episcopalian or other churches. The Ritualists hold that the “altar” is a necessary part of Christian worship. The Book of Common Prayer, in the <(order for the administration of the Lord’s Supper,® carefully avoids the word ˆltar® and says always “table.® The Ritualists revived the practice of auricular confession and set up in their churches confession-boxes as in Roman Catholic churches. They brought back into use the eucharistic vestments — dalmatic, chasuble, cope, *etc.* The Puritans held the cross an abomination; the Ritualists set it on top of their churches and in the centre of the altar — and not only the cross, but the crucifix. The Ritualists insist on the eucharistic vestments; the position to the east of the celebrant at the altar; the use of unleavened bread, the mixed chalice, altar lights and incense, and they pay formal adoration to the “Real Presence® of Christ’s body and blood, believed to underlie the species of bread and wine.

‘ The growth of Ritualism assumed such pro¬ portions in England that a commission was ap¬ pointed by the government in 1867 for the pur¬ pose of inquiring “into the rubrics, orders and directions for the regulation of the conduct of public worship.® Seven years later the “Pub¬ lic Worship Regulation Act® was passed for the express purpose of putting down Ritualism; and a judge was appointed to try cases of vio¬ lation of the ritual. Numerous cases were tried, among the defendants being high digni¬ taries of the Established Church. Punishments, including imprisonment, followed. But perse¬ cution only caused the ritualistic movement to flourish. The Ritualists had the sympathy of many members of the church who were not themselves in favor of Ritualism, for it was very generally felt that it was not wise for the secular court to interfere in things spiritual and to compel priests, clergymen and congrega¬ tions to refrain from practices which they held to be essential. Practically all the objections

against ritualistic practices were sustained by the judges before whom the cases were brought; but this not only failed to drive Ritualism out of the Established Church of England, but it also failed to stop or even re¬ tard its growth. The practices have been prac¬ tically permitted by the legal authorities ; so that Ritualism lives to-day strongly entrenched in the Episcopal Church, without fear of suc¬ cessful opposition from anv quarter whatever.

The historv of Ritualism in the Anglican Church in America is much the same as that of England, except that, on this side of the water, the secular government could take no part in the quarrel, the church on the Western continents being in no way connected with or dependent upon the government. A canon law passed in 1874 at the General Convention in¬ structed the bishops to proceed against any minister “accused of introducing unauthorized ceremonies and practices.® But though the power to discipline the Ritualists rests in the hands of the bishops, it has never been used; and Ritualism to-day attracts little or no at¬ tention or comment.

Bibliography. — Frere, W. H., ‘The Princi¬ ples of Religious Ceremonial) (London 1906) ; Gallwey, ‘Twelve Lectures on Ritualism’ (London 1879) ; Gladstone, ‘The Church of England and Ritualism’ (London 1876) ; Hen¬ son, H. H., ‘Church Problems) (London 1900) ; Lane, W. C., ‘Catalogue of a Collection of Works on Ritualism and Doctrinal Theol¬ ogy ‘ (in Bibliographical Contributions, Har¬ vard University, 1889) ; MacColl, M., ‘The Reformation Settlement

Examined in the Light of History and Law' (London 1900) ; Morti¬ mer, A. G., 'Development of Worship in the Rights and Ceremonies of the Church) (Phila¬ delphia 1912) ; Pyle, J. C., 'The Present Crisis) (London 1892) ; 'Romanism and Ritualism in Great Britain and Ireland) (Edinburgh 1895) ; Roscoe, E. S., 'The Bishop of Lincoln's Case) (London 1891) ; Thureau-Dangin, 'English Catholic Revival in the 19th Century) (London 1914) ; Vox Clamantis, 'History of Ritualism? (London 1907) ; Warren, J., 'Ritualism? (Lon¬ don 1906) ; Walker, C., 'The Ritual Reason Why' (London 1908) ; Wordsworth, C., 'The Present Disquietude in the Church) (London

1881). *

RITUALIST, one who is zealous for strict observance of ritual ; in particular, one who ad¬ vocates the use of the rites of Catholic worship in the Established Church of England or in the Episcopal churches which derive from the Church of England. See Ritualism.

RIVALS, The. Not long after his mar¬ riage Sheridan was asked by the manager of Covent Garden Theatre to write a play for that theatre. He seC to work with alacrity and finished 'The Rivals' in six weeks. For this undertaking he was by no means ill-adapted; his father had been an actor and his mother a playwright ; and he himself had already on hand notes and sketches for scenes at least if not plays. 'The Rivals' was produced on 17 Jan. 1775. The play failed, partly because it needed cutting, and partly because of the character of Sir Lucius O'Trigger as it was acted at the initial performance ; partly because of its threatened desertion of the sentimental comedy then the fashion. The piece was withdrawn,

shortened and Sir Lucius O'Trigger recast. The revival met with a remarkable success, which has lasted to our own day. Many charges of plagiarism were brought against (The Rivals > ; but the amount of actual literary theft is negligible. The comedy, however, de¬ scends

from a long line of dramatic ancestors, and can be thoroughly studied from a technical standpoint only in the light of Plautus and Terence and the Greek remains, and of Moliere and Congreve, Farquhar, Wycherly and some of the contemporary novels. It is a comedy of manners verging on the exaggera¬ tion of farce. The scenes made up of Julia's and Faulkland's high-flown and sentimental love affair have no relation to this authentic comedy and were thrown in by Sheridan as a sop to the prevailing taste of the day; and it is worth noting that when he came to write (The School for ScandaP he made no such concession. Not only the great Joseph Jeffer¬ son and every high-school and dramatic society and stock company, but also the frequent quota¬ tion of many of the lines, have helped to keep (The Rivals> alive. Every part in the play is actable, the invention of the humorous situa¬ tions inexhaustible, and the wit and portraiture and motivation cast so happily within the theatrical tradition as to pass unfailingly over any footlights.

Stark Young.

RIVAROL, Antoine, an-twan re-va-rol, French satirical and political writer : b. Bag-nols, 26 June 1753; d. Berlin, 11 April 1801. He was one of the celebrated wits of the 18th cen¬ tury, possessing distinction, elegance and an astonishing facility in the expression of his thoughts that early gave him a position in the salons and at the court of Paris. His first work, which obtained a prize at the Academy of Berlin, was (Discours sur l'Universalite de la Langue Frangaise* (1784). The same year he published a translation of Dante's (Inferno.) Later appeared (Lettres a M. Necker) and in collaboration with Champcenetz, (Petit Al-manach des grands Hommes) (1788), a satire on the authors of his day. Becoming an emigre in 1792, he lived at Brussels, London, Hamburg and finally at Berlin, his works at this period being (Lettres au Due de Brunswick* ; (Lettre a la Noblesse Frangaise* (1792) ; (Vie politique et privee du General La Fayette* (1792) ; also a preliminary discourse to a French dictionary (1797). In 1828 was published under his name a dictionary of the French language, which was not written by him. His collected works were edited by Chenedolle and Fayolle in 1808.

RIVAS, re'vas, Angel Perez de Saavedra,

3d Duke of, Spanish statesman and poet: b. Cordova, 19 March 1791 ; d. Madrid, 22 June 1865. He fought in the Spanish War for Inde¬ pendence, retired from the army in 1815 and in 1820-23 was prominent in the advanced Lib¬ eral party. He was secretary of the Cortes in 1821, but at the time of the French invasion of 1823 he was

under sentence of death and es¬ caped to England. He later went to Malta, and also lived in Italy and France, engaged in literary pursuits until the amnesty of 1834 per¬ mitted his return to Spain. He then succeeded to his brother's ducal title and in 1835 he be¬ came Minister of the Interior under Isturiz Political troubles in 1837 forced him into a

second exile, and upon his return in 1843 he allied himself with the Moderate party. He af¬ terward became Prime Minister and served as Ambassador to Paris and Naples. He had early established a reputation as a poet and dramatist and his long sojourns abroad had considerable influence upon his work, both poetry and drama. He was one of the first of the Romantic school of poets in Spain and showed much skill in adapting modern tendencies to the characteris¬ tics of Spanish genius. Author of (Ensayos poeticas* (1813) ; (E1 moro exposito* (1834) ; the dramas <Slatar) (1814); <Lanuza> (1822);

(Alvaro 6 La Fuerza del sino) (1835), *etc.* His collected works were published (Madrid 1894— 1904). Consult Pineyro, E., (E1 Romanticismo en Espana* (1904).

RIVAS, re'vas, Nicaragua, a town between Lake Nicaragua and the Pacific Ocean, slightly northwest of the surveyed route of the Nicara¬ gua Canal, and on the high road to Granada., It occupies the site of a Nicaraos Indian vil¬ lage. Pop. 6,000.

RIVE-KING, re-va'king, Julie, American concert pianist : b. Cincinnati, Ohio, 31 Oct. 1859. She is the daughter of Leon and Caroline Rive, the latter a musician and her first teacher, and was married in 1878 to F. H. King. She appeared first in concerts at the age of six. Later she was a pupil of Liszt. She has ap¬ peared in over 200 concerts with Theodore Thomas and 80 with Seidl, besides in many independent recitals. She ranks among the foremost solo-pianists in America.

RIVER BOUNDARIES. See Bounda¬

ries of the United States.

RIVER BRETHREN, a Christian reli¬ gious denomination consisting of three com¬ munities: (1) <(The Brethren in Christ® ; (2) <(The Old Order® or ((Yorker Brethren®; (3) (<The United Zion's Children.® The denomina¬ tion is of Mennonite origin and was founded in Pennsylvania in 1770 by Jacob Engle. He, with his brother John, and 30 Mennonite families, came from Switzerland because of religious

persecution and settled in Lancaster County, Pa. After a revival held by the Mennonites, Baptists and Lutherans in 1770, in which various differ¬ ences in doctrine arose, the Engles and their followers withdrew and formed a body of their own, the name coming either from the fact pf its members dwelling near the river or from their performing the act of baptism in the Sus¬ quehanna River. They believe in true immer¬ sion as the proper form of baptism, observe the ceremony of footwashing in connection with the eucharist, are strict Sabbatarians and hold non-resistance a cardinal virtue. The original order is known as ((Brethren in Christ®; (<The Yorker Brethren® withdrew in 1843 ; and (<The United Zion's Children® in 1852. The difference in the three bodies is slight. Owing to their members being drafted in the Civil War they sought legal status in 1862 in order to maintain their scruples against resistance. The order has spread from Pennsylvania into Ohio, Indiana, Kansas, New York and Canada. Its members in all bodies number about 5,000.

RIVER DOLPHINS. See Porpoise.

FIVER C? DOUBT. See Rio Teo-

■X xv£.

RIVER ENGINEERING. Introduction.

— River engineering is man's effort to create artificial form and behavior in streams for the betterment of his environment. Its purposes relate to transportation, power supply, agricul¬ ture, sanitation and security of life and prop¬ erty. River improvement is of present import¬ ance to any community according to its sus¬ ceptibility to devastation by flood or bank cut¬ ting, the comparative economy of other means of transportation and power development and its natural agricultural and sanitary advan¬ tages. That the utmost in river improvement will eventually become an imperative necessity to continued prosperity and progress of indus¬ trial civilization, indeed to the possible perpe¬ tuity of such civilization, is attested by every argument for the conservation of natural re¬ sources.

Faults of Natural Streams. — While most streams are more or less useful to man in their natural states, they generally have character¬ istics or form or behavior that restrict their usefulness or constitute a menace. Natural low water discharge may fall short of the need for irrigation, power development or sani¬ tary uses and high water discharge may exceed the drainage capacity of natural channels and spread over populated alluvial lands as a de¬ structive flood. Bars and shallow crossings may limit navigation on streams that are otherwise well suited to this use. Alluvial streams habitu¬ ally undermine and cut away their banks and menace or destroy valuable riparian properties. Streams build up their bottom lands unevenly and the lowest areas may be imperfectly drained and untillable. The regularity of grade that is characteristic of alluvial streams generally de¬ nies natural power sites to the regions best suited to human habitation and industrial con¬ centration.

Origin of Faults of Natural Streams. —

Low Water. The mantle of soil and loose rock detritus that generally forms the land surface acts as a reservoir in which part of the rainrall is stored as ground water. During periods of drought this reservoir is gradually drained ; the plane below which the ground pores are full of

water sinks deeper beneath the surface toward the levels of adjacent streams, the gravitative stress that forces seep¬ age is diminished and consequently the rate of discharge falls off. The most marked falling off in discharge during drought occurs where the soil mantle is thin; the surface is compact; the topography is steep or gullied and precipita¬ tion is concentrated as to time.

Floods. — Floods vary as to cause and char¬ acter between two extreme types, — the sporadic type that results purely from excessive local precipitation and the recurrent type that is due to the adjustment of processes of sedimentation to variable discharge.

The type example of the sporadic flood is the sheet flow that forms from cloudbursts. Such floods are virtually built in situ and with small regard for the topography of the affected area. Flow leads to their dissipation rather than to their concentration. Being due to local vaga¬ ries of weather, they can be neither forecast nor prevented. The more localized a flood is the more it partakes of the characteristics of the sporadic type.

Recurrent floods are typically developed in large delta-building streams that have variable discharge. Delta growth adds to the length of the channel and tends thereby to reduce the slope and erosional capacity of its lower reaches. The part of the load delivered from upstream that cannot be carried through the lower reaches is deposited. Deposition in the channel reduces its drainage capacity and when that becomes less than maximum discharge overflow is possible. When overflow occurs a part of the load escapes from the channel with the flood waters and accumulates alongside the stream, the coarse materials to form natural levees and the finer to form the more wide¬ spread flood plains. A nice adjustment is finally achieved among the delta, channel and flood plain forms that maintains a constant relation¬ ship among their different rates of growth. This adjustment keeps the drainage capacity of the lower reaches of the channel less than the higher phases of discharge and so renders the periodic overflow of its flood plains a normal feature of the stream's behavior.

Shallow Crossings. — The typical alluvial stream meanders, that is, its course consists of a series of alternating right and left bends. Where the direction of curve changes from one bend to another the channel shallows fre¬ quently to an extent that limits the navigability of the stream. Such shallows are called cross¬ ings.

The superior depths of the channel on bends is due to centrifugal force incident to the changing direction of the flow. This force affects all moving particles of the stream at right angles with their direction of flow, vary¬ ing in magnitude with the third power of their velocities. The faster currents of the upper part of the stream are affected more strongly than the slower bottom currents and they are con¬ stantly directed toward the outer bank. This movement is compensated by undertow in the opposite direction so that the stream has a torsional or boring motion, as well as down¬ stream flow, on bends. This torsional motion involves a downward migration of faster cur¬ rents near the outer bank which brings cur¬ rents capable of scour to greater depths on bends than that at which they are maintained on straight reaches or between bends where no centrifugal force is developed and flow: is essentially parallel.

If discharge and load remain constant long enough, the channel depths become adjusted at all points to the relative intensities of centrif¬ ugal force and, correlatively, with the curva¬ tures of bends, to give uniform erosional capacity throughout like reaches. When dis¬ charge increases, the erosional capacity of a bend increases more rapidly than that of ad¬ jacent crossings, and consequently scour occurs on all bends and filling on all crossings during a rise in stage, tending the re-establishment of uniform erosional capacity. When discharge decreases, the erosional capacity of a bend falls off more rapidly than that of the crossings and erosional readjustment involves filling on bends and scour on crossings. Crossing bars are thus built up during flood and are most troublesome to navigation after a sudden drop from a high stage.

Bank Cutting. — Bank cutting is also due to

centrifugal force incident to changing direction of flow. Currents capable of scour are con¬ stantly shifting to the outer banks of bends. The undertow in the opposite direction shifts the bottom load toward the inner bank. Thus the channel tends to shift outward on a bend by taking on load from the outer bank and depositing load along the inner bank.

Imperfect Drainage. — Flood plains of an aggrading stream slope downward away from the channel. Their elevation near the channel approximates high water level and in more re¬ mote areas may be at or even below the low water level of the adjacent channel. The drain¬ age of the lowest areas, consisting of their own rainfall and the seepage and periodic overflow from the stream, finds its course down the valley parallel with the main stream, to join at some lower point as a distinct tributary. As the main stream is elevated in adjustment to delta growth, the drainage of flood plain areas that are not built up commensurately becomes more and more sluggish and may even become imperfect, to form permanent swamps that are char¬ acteristic features of the flood plain of broadly aggrading rivers.

Regularity of Grades. — Any unusual de¬ clivity in the stream's course makes the channel at that point subject to special erosional attack. This generally causes the elimination of all irregularities of grade early in the geologic life history or cycle of erosion of the stream. In terms of human experience, irregularities of grade suitable to power development are prac¬ tically permanent, so that the natural processes working toward their elimination are negligible in relation to river engineering.

Present Methods of River Improvement. — Low water discharge is increased by storage reservoirs that accumulate water during freshets and discharge it during the natural low water season, supplementing natural ground storage. Floods are prevented from spreading by levees built between the stream and the threatened areas, or from concentrating in trunk channels by detention reservoirs that store temporarily a part of excessive run-off. Shallow crossings are improved by dredging or the stream is forced to deepen itself across them by works that reduce its width. Banks are protected from scour by lining them with resistant material. Imperfect drainage is im¬ proved by ditching, diking and pumping. Water¬ power sites are

developed by dams which afford artificial irregularities of grade.

Limitations of Present Methods of River Improvement. — Any of these works, if ade¬ quately contrived, will eliminate the specific fault to which it is applicable, but a work that does not affect the primary cause of a fault may give but temporary benefit. Works that disturb the natural equilibrium of erosional processes may excite vicious readjustments that end in detriment instead of improvement.

To dredge a navigable channel through a crossing bar is patently a temporary expedient, as it does not eliminate the play of centrifugal force in adjustment to which all crossings build up during flood. Contraction works for in¬ creasing crossing depths give a more persistent .effect, but their use on all or many crossings impedes flow and causes deposition, adding to the height of levees required to restrain floods.

Levees built to sufficient height accomplish their immediate purpose of preventing the spread of water over the flood plains when discharge exceeds the drainage capacity of the channel. But they also restrain the sediment that would naturally escape from the channel with the flood waters. The retention of flood waters between the levees increases channel discharge above the natural and also erosional capacity. The retention of sediment increases load.

In natural streams crevasse waters commonly return to the channel after depositing their load. Levees, therefore, increase channel dis¬ charge locally only by the amount of natural crevasse water in that section of the valley, while load is increased at any point by the amount of sediment that, without levees, would have been vented through all upstream cre¬ vasses. The increase in erosional capacity of the channel due to levees varies from place to place but never exceeds a small fraction of the natural. The increase in load due to levees is cumulative down stream and in the lower reaches of a leveed stream it may equal or even be a multiple of the natural load. The readjustments of grade to increased load in the lower reaches involve deposition in and eleva¬ tion of the channel. Also delta growth and elevation of the channel in adjustment to it are stimulated.

Bank protection by revetment or rip-rap suspends lateral scour. Concomitantly the re¬ assortment of floodplain materials, which gives a progressively finer grained load and contrib¬ utes to the gradual decrease in channel slope downstream, is eliminated. Therefore, an

ab¬ normal coarse-grained load must be carried through the lower reaches of a stream whose banks are generally protected. The readjust¬ ment of slope to this duty involves channel elevation and aggravation of flood heights.

The present methods of channel improve¬ ment, flood prevention and bank protection are of limited practicability. The persistence of benefit to navigation from dredging varies in¬ versely with the erosional activity of the stream, and its profitable use is generally limited to lightly loaded streams and waterways where benefit to commerce outweighs a considerable annual expense. Contraction works to im¬ prove crossings can be logically used only where it is possible to offset their effects by adding to levee heights. Levees can give permanent protection from floods only where the height required to confine floods after grades become readjusted to all improvement works is within the limit of practical construction. General fixation of banks is permissible only when other factors affecting required levee heights leave a sufficient margin of practical construc¬ tion for the grade readjustment which they entail.

The Future of River Improvement. —

To gauge the future of river improvement one must look not to the past history of the art, but to the histories of other arts of early civilization that have assumed the stature of applied sciences. Chemistry, medicine, mining, metallurgy, agriculture — all practical sciences had their early foundations in primitive arts that had developed under pressure of economic need, representing man's physical adaptation to

external nature. With the advent of the modern scientific age the spirit of research swept beyond immediate physical need in a wide mental adaptation to external nature ; per¬ sistent inquiry and experimentation built up pure sciences that became the soil in which the ancient arts grew to fruition in technical prac¬ tices that are the foundation of modern living.

River engineering dates its inception far back in unwritten antiquity to irrigation and levee projects that are counted among the signs of earliest civilization. Down through all the succeeding ages there was little change in prin¬ ciple or practice for the simple and obvious works first invented were sufficient for the needs of small or isolated projects. When the needs of river improvement were multiplied in the course of industrial development it was natural for the same practices to be extended to larger and more general application without premonition of the more subtle and remote con¬ sequences. The first great expansion of river improvement works occurred in Europe in the last half of the 19th century. As it progressed and unexpected results developed it became apparent that the art was still in an experi¬ mental stage and that the problems involved not only the study of mobile hydraulic quanti¬ ties and channel space but also the study of the intricate interrelations of erosional processes and physiographic forms.

This demonstration stimulated research and throughout Europe in the early years of the 20th century hydraulic laboratories were in operation. However, their efforts were mainly directed to local, practical difficulties rather than to general physiographic problems, so their results fell short of the ultimate need — the formulation of methods of unified treat¬ ment of entire river systems for complete de¬ velopment of water resources. The work of the European laboratories marks the farthest advance in the direct adaptation of means to necessity in river improvement, for American practice is modeled after the European. It remains to be seen how much this work has been curtailed and set back by the World War.

Entirely distinct from the physical adapta¬ tion to external nature represented in European progress in river improvement there has been developed in the last few decades, chiefly bv Americans, the .science of physiography which treats of topographic forms and the agencies that create them. Its subject matter includes the laws that underlie the agency of running water in the transportation and deposition of solid matter. When these principles are fully invoked to assist in the practical matters of river . improvements a new day will have dawned upon the enterprise, a day like that enjoyed by the other arts that have intergrown with science until their basic problems are lifted above the field of speculation and controversy. When river improvement becomes the applica¬ tion of physiographic science, sure progress will be made toward complete and permanent utilization of water resources.

Henry M. Eakin.

RIVER FALLS, Wis., city in Pierce County, on the Kinnickinnick River and the Chicago and Northwestern Railroad, about 60 miles west of Eau Claire and about six miles from the Mississippi River. It was settled in 1850 by a colony from New York, incorpo¬

rated in 1856 and chartered as a city in 1885. It is in a productive agricultural region, in which wheat is the principal crop. The chief manu¬ facturing establishments are flour mills, wagon works and a starch factory. The trade is mostly in grain, flour and vegetables. The principal public buildings are the six churches and the schools. River Falls is the seat of a State normal school and a high school and has two graded schools. The bank has a capital of $25,000. The government is vested in a mayor, elected biennially, and a council of six members elected annually. The city owns and operates the waterworks and the electric-light plant Pop. (1920) 2,273.

RIVER-HOG, one of the African wild swine of the genus Potaniochoorus, separated from the typical pigs (Sus) by the existence of a horny outgrowth from a bony protuberance above the canine in the male. This has been compared by Beddard to the osseous horn-cores of the extinct Dinocerata. Five species are rec¬ ognized, one in Madagascar and the others in South and West Africa. The best known are the gray boschbark or bush-pig (P . africanus) of Cape Colony and the red river-hog (P . por¬ ous) of the West Coast, remarkable for its vivid rufous coloring and long penciled ears. These pigs lead a half-aquatic life along the marshy borders of sluggish streams and in dense for¬ ests, but do great damage to the native planta¬ tions in some parts of the country, whence they are constantly killed off. Consult Pro¬ ceedingsˆ Zoological Society, London 1894, p. 92.

RIVER REGULATION. See Hydraulic

Engineering.

RIVER ROUGE, roozh, Mich., village in Wayne County, on the Detroit River, five miles south of Detroit, on the Michigan Central and the Detroit and Toledo Shore railroads. Steel works and a shipping yard are located here. Pop. (1920) 9,822.

RIVER-TERRACE. See Terrace.

RIVERA, Jose Fructuoso, hd-sa’ frook—

too-6’so re-va’ra, Uruguayan soldier and poli¬ tician: b. Paysandu, Uruguay, 1790; d. Mon¬ tevideo, Uruguay, 13 Jan. 1854. He fought in the numerous civil wars, rose to leadership and when Uruguay ‘established her independence be¬ came in 1830 first President of the republic. In 1835 he was succeeded by Oribe, and in 1836 headed a revolt against the President, which resulted in a civil war of two years’ duration. Oribe was forced to resign, and in 1838-42 Rivera again served as President. In the latter year Oribe, aided by the Buenos Aires dictator, Rosas, invaded Uruguay and in 1843 began the famous nine years’ siege of Montevideo. Rivera moved to meet him in the field, but in 1845 was defeated at India Muerta by Urquiza, an ally of Oribe. In 1853 Rivera aided Flores in de¬ posing the recently elected President, Giro, and later became a member of the executive tri¬ umvirate.

RIVERHEAD, N. Y., village, county-seat of Suffolk County, on the Peconic River, at the head of navigation, and on the Long Island Railroad, 67 miles east of New York. The vil¬ lage was first settled in 1690, and its growth during the first century was slow; in 1729 it was made the county-seat. During the War of

1812 a skirmish between men from some British vessels and the American militia took place near the village and within the limits of the town¬ ship. It has a variety of industrial establish¬ ments, including grist mills, a woolen mill, planing and molding mills, carriage works, soap factories and an organ manufactory. It con¬ tains the county courthouse, the agricultural fair buildings and grounds, and has a high school with a school library. Pop. (1920) 5,753.

RIVERS (Fr., riviere; Span., ribera; It., riviera; Lat., riparius, from ripa, bank, of or belonging to a bank), bodies of water of con¬ siderable size flowing with perceptible currents in definite channels, and usually without cessa¬ tion during the year. Some watercourses are designated as rivers, although their beds are dry a part of the year. Rivers, obeying the laws of gravity, seek the lowest level and eventually reach the ocean. The regions having rivers which do not flow into the ocean either di¬ rectly or indirectly are parts of the earth's sur¬ face where the evaporation is so great that no overflow of water results from precipitation. Usually the overflow of a river discharges into another river, and perhaps a second or even a third discharge is made before the waters reach the sea. The Republican River of Nebraska and Kansas flows into the Kansas River in the State of Kansas, and the Kansas River flows into the Missouri, the Missouri into the Mis¬ sissippi and the Mississippi into the Gulf of Mexico, which last discharges its waters into the Atlantic Ocean through Florida Strait and Yucatan Channel.

Origin. — Rivers are usually formed by springs or the gradual melting of the ice and snow which perpetually cover the summits of all the most elevated ranges of mountains upon the globe. Springs and ice are themselves due to the precipitation of water from the 'at¬ mosphere in the form of snow, rain, mist or dew. These fill the springs, lakes or other reservoirs from which rivers flow by the natural gravitation of water to a low level. The union of various springs, or of these meltings, forms rivulets; these last follow the declivity of the ground and commonly fall at different stages into one great channel called a river, which at last discharges its waters into the sea or some great inland lake. A new-made river at first usually flows over the surface until it has worn itself a channel; or it may follow some depression or deformity in a mountainous re¬ gion. Rivers are swollen during their course by the rain which falls on the surface. In temperate climates

the source of suoply tends to greater equality in the volume of the river than in torrid regions, where the evaporation is great. In the former the rains are not only more equally distributed in point of time, but also from a more protracted source of supply; part of the rainfall sinks into the ground and forms springs, part forms rills which flow di¬ rectly into the river and part feeds those rills with the drainage of the saturated ground long after the rain has ceased. As mountainous re¬ gions abound in springs, most rivers begin from a chain of mountains; each side of a chain also has its springs, and the rivers which orig¬ inate on one side flow in the opposite direction to those which rise on the other. As it is the property of water to follow the most precipitous descent that comes in its way the courses of

streams point out the various declivities of the earth's surface, and the line from which large rivers flow in contrary directions generally marks the highest parts of the earth. This line need not, however, be of any great height; in European Russia, for instance, where the rivers are very extensive, the line which sepa¬ rates their sources is very little above the level of the Baltic or of the Black. Sea.

Changes in Form and Size. — As soon as the stream begins to flow, its channeling and the deepening of its trough commences. If no ob¬ structions prevented, the water would go on enlarging the channel, by widening and deepen¬ ing. The nature of the soil, the softness or hardness of the rocks along its course, the amount of sediment it carries in its waters and where this sediment is deposited all contribute to change of form and size. The erosive action of rivers on their beds is continually exercised, especially in the early part of their course; where the channel broadens as they approach the sea it may almost cease. Remarkable in¬ stances of erosive action are almost everywhere to be observed ; but in no case is such action more striking than in the canons or river-gorges in the Colorado region of the United States. There the rivers have hollowed out for themselves channels that present almost perpen¬ dicular rock walls on either side rising to the height of 6,000 feet for hundreds of miles. Such action is also seen where there is a water¬ fall, in which case the water gradually wears away the rock at the place where the fall occurs and thus causes the latter to recede, as Niagara Falls. In perhaps every case a river has had much to do with the formation of the valley in which it flows. Rivers are very permanent features in the earth's history, and in some cases have hollowed out a channel through a mountain range gradually elevated across their source.

The size of a river depends upon two main circumstances, — the extent and character of its drainage area, and the degree of humidity pos¬ sessed by the climate of the region from which it draws its supplies, — the latter being often dependent upon prevalent winds blowing from the ocean. The peculiar position of the Andes Mountains with respect to the rest of South America, the fact that by very far the largest proportion of its running waters are drained off in one general direction, toward the At¬ lantic, and the humidity of the climate, all con¬ tribute to the immense size of the rivers. The Andes being placed so near the coast of the Pacific, the rivers which flow into the Pacific Ocean are small, while those which flow on the other side, having such an immense space to traverse, are increased into a vast volume be¬ fore they reach the Atlantic. The physical con¬ formations of some continents are unfavorable to the accumulation of such vast bodies of water as the rivers of South America. Europe is not of sufficient extent; Africa has a climate which causes rapid evaporation and abounds in sandy deserts. A large part of Asia has not the humiditv of the Amazon region, and its vast interior lakes serve as receivers for some of the large streams. The arrangements of its mountains conduce to long and somewhat nar¬ row drainage areas. As the river goes on from year to year, in most cases it cuts a trench be¬ low the original constructional channel, and in

time forms what is called a consequent valley. By means of the new constructional troughs many of the constructional lakes and the rivers become continuous streams, that increase the length as well as the depth of the channel. Where the waters pass from a hard to a soft rock, or from a resistant to a weak part of the material through which it is channeling, a greater slope is formed making rapids (q.v.) or falls, or cascades (q.v.). The angle of the slope depends upon the difference in the de¬ gree of resistance of the hard rock in the old channel as compared with the soft rock in the formation channel. Gradually the channel is cut down close to the sea-level or base-level, and its course is over" a gentle, gradual slope. The depth of the channel depends upon the dryness of the climate, softness of the rock, height of the land and the volume of the stream. The dry climate really lessens the volume of the stream, and consequentlv it can¬ not force its way with the rapidity of a stream with greater volume even if the widths of the channels are equal. The river flowing through a region of hard rock will cut a deeper valley in a given time than the river of the same size and volume flowing through a region of soft rock; the latter will have a mass of detritus, an accumulation of waste from the weak rock, and it will need a vast volume of water or a steep grade to do the same amount of channeling as the first-mentioned river. Rivers flowing over comparatively low land, with drainage areas not much above the base-level, have shallow chan¬ nels, as in the southeastern part of the United States, especially in Florida. A river with a large volume of water has more power to carry off sediment, and even where the slope is gentle its momentum is greater than in that of the stream with a small volume of water. There are two causes for the shallow channels of the long rivers of the plains east of the Rocky Mountains — the dryness of the climate and the soft rock material through which they pass.

After a river has cut its channel to the base¬ line, then its grading reallv begins, the inequali¬ ties gradually disappear, or would disappear if there were no obstructions to the regular work. The constructional lakes and the waterfalls gradually disappear. The constructional lakes may disappear, but if the amount of detritus is

large the channels lower down a stream, with a slight grade, may be filled, and thus the water will flow over a bed elevated above what was once its channel. Such channels exist in Ohio and in the plains of Lombardy. Any change in the depression or uplift of the land, whether from volcanic or other causes, will produce some change in the river. In various parts of Europe and the eastern part of North America rivers have changed because of increase of evapora¬ tion caused by the continued deforestation of their basins. New tributary rivers appear in the drainage area of a well-defined river. The valleys formed by such streams are called sub¬ sequent valleys and the streams themselves are called subsequent streams.

The main stream with all the lateral streams and all tributaries, whether lakes or rivers, is called a river system. The land drained by a river system is called its basin. The system is usually known by the name of the main stream or trunk.

The rate of fall of many of the large rivers

is not great. The Amazon has a descent of only 10ˆ2 feet in 600 miles of its course — that is, one twenty-seventh part of an inch for every 1,000 feet of that distance. The Loire, in France, between Pouilly and Briare, falls one foot in 7,500 feet, but between Briare and Orleans only one foot in 13,596 feet. Even the rapid Rhine has a descent of no more than four feet in one mile between Schaffhausen and Strassburg, and of two feet between the latter place and the borders of Holland. The glaciers in France show a change in volume and a con¬ sequent change in the size and rate of fall of the glacier-fed rivers. See Niagara Falls; Waterfalls.

Watersheds or Divides. — The line which separates the waters which flow into different rivers or different systems is called the water¬ shed or the divide. The continental divide in the United States is the line which parts or separates the streams which flow into the Pacific from those which flow into the Gulf of Mexico through the Mississippi. Divides change from various causes. The subsequent rivers some¬ times take the water from one system to an¬ other. The gradual removal of a constructional lake may change the divide, as in New York State between the Mohawk River and Lake Ontario; in the Northwest, between the Red River of the North and the Mississippi. The divides in many places are very low, as between the Amazon and Orinoco and the Amazon and the Paraguay. The Orinoco at some distant period reached the basin of the Amazon, and has been

subsequently connected with it through what is now an important branch, the Cassi-auiare, which after a course of 120 miles from the main river discharges itself into the Rio Negro, a branch of the Amazon; and as the navigable waters of the Amazon approach within three miles to those of the Paraguay there is with only this interruption a continuous communication by navigable rivers from the mouth of the Orinoco, in lat. 9° N.t to the mouth of the Paraguay, in lat. 35° S.

FloodPlains. — For various reasons many rivers overflow their banks at annual periods, others at irregular intervals. Such rivers usu¬ ally carry a large amount of silt which at the time of an overflow is deposited on the land, thus enriching it. Great damage sometimes results from this overflow (see Levee; Missis1-sippi), and various means have been devised to protect the lands adjacent to such rivers from inundation. The floodplains of the Nile are noted for their fertility; the . Mississippi, Ama¬ zon, Ganges and many others have extensive floodplains. The large rivers of Siberia have vast floodplains caused by the thaws at the sources of the rivers when the lower portions are closed by ice. The descending waters sweep over the frozen surface carrying with them vast quantities of soil, detritus and even forests. The Mackenzie in North America has floodplains from the same sources as the Si¬ berian rivers.

Mouths of Rivers. — The river which en¬ ters the ocean may have its channel submerged and the mouth becomes an estuary or a fiord. In either case there is a constant battle for supremacy between the fresh water from the land-mass and the salt waters of the sea. Some of the sediment of the rivers is brought to the sea and either carried out into the ocean or

deposited at the mouth of the river, where it forms deltas. In some cases, as the Mississippi, the delta grows rapidly, extends out into the sea and becomes a part of the land-mass. The sediment annually brought down the Mississippi has been estimated as equal to a deposit of a foot in thickness over 12 square miles. The waters of the Ganges and Brahmaputra come more highly charged with sediment on account of their more rapid descent and the more vio¬ lent rains that fall about their sources, and their deposits exceed many times those of the Missis¬ sippi. The sediments are spread out to a dis¬ tance of 100 miles or more from the land, the waters of the Bay of Bengal being discolored by them even at this great distance. The quan¬ tity annually discharged from the mouth of the river has been computed equal to a layer one foot thick over a tract of 225 square miles. The Nile has a vast delta. The Mississippi, Nile, Ganges, Po and many other rivers enter the sea by several channels. The Amazon enters by only one large channel, divided by an island, but the river broadens out into a bay 180 miles wide. The delta-lands are very fertile, and where the river channels have assumed stability, deltas have become valuable additions to the land-mass.

Economic Relation of Rivers. — The effect rivers have in supplying moisture to the adjacent lands, either by natural or artificial (irrigation) means, is recognized by all nations. Their uses as contributing to the healthfulness of the climate and to modifications of tem¬ perature are well known. In the early history of all the nations on the globe, the waterways were the great thoroughfares which furnished means of intercommunication, and the rivers were largely instrumental in determining the location of the important commercial and indus¬ trial centres of the world. The great rivers of Europe and Asia, such as the Rhine, Danube, Volga, Indus, Ganges, Brahmaputra, Yangtse and Ob afford enormous populations access to the sea. The Amazon, with its plain track extending for nearly 3,000 miles, is in many ways less like a river than a fresh inland sea; but the Mississippi and Saint Lawrence, though less extensive, are of greater value for carrying sea traffic to inland places. In their upper valley tracts, rivers are of use chiefly for transport¬ ing timber and driving machinery. It is in¬ teresting to note that in Switzerland, Norway and Sweden, where there is no coal, there exist exceptional facilities for the use of water power on account of numerous mountain torrents.

Law of Rivers.

General. — In law a body of water having a uniform current is generally termed a river. It consists of the bed, the water and the banks or shores according as the stream is non-tidal or tidal. The law applicable to rivers and their use depends upon the country having jurisdic¬ tion over them. In the United States the use of navigable rivers is regulated by the laws of the United States and by the legislatures of the States through which they flow. No general statement that is applicable to all streams, and which governs the use of all streams, can be made, and navigable and unnavigable rivers are not always subject to the same rules. In the United States, in the most

approved and important sense of the term, navigable waters include all those having a channel which is useful for commerce. Such waters are public highways by common right. It has been said in construing the common law and in some of the earlier decisions of the courts that by navigable waters are meant all those in which there is a flow or reflow of the tide. This definition may have been proper in England where there is no river of any con¬ siderable importance which has not a flow of the tide, but it would be unreasonable, in fact it cannot ‘be applied, in the United States where there are large rivers like the Mississippi, the Ohio, the Allegheny, the Delaware, the Hud¬ son, the Schuylkill, the Missouri, the Columbia and others that are very important for the purposes of navigation, and over which large business interests are transacted. To be navi¬ gable rivers, in the legal sense, commerce must be carried on over them which is of a valuable character. It is not necessary, however, that this commerce be carried on by means of boats ; waters over which valuable commerce can be carried on are public highways for the purpose, even if they are used only for floating logs and rafts. Most of the authorities in America limit the term navigable waters to waters having an inherent capacity for navigation. Whether a river is navigable or not is generally a con¬ clusion of fact and can be established by proof ; but the courts in some States take judicial no¬ tice of the fact that some streams are navigable. In common law a distinction was made between waters navigable in law and those navigable in fact; those navigable in law being tide waters. The term is still used in this sense in England. By the civil law, waters that are in fact navi¬ gable are such in law, and a navigable river is defined as a statio itinere navigio (a place or way for navigation). In the development of American law the tendency of the courts has been toward the adoption of the civil-law doc¬ trines. Among navigable waters are two classes, termed Public and Semi-

Public. The basis of classification is ownership. In public waters the soil beneath them is common prop¬ erty. The public have the right of navigation and all rights incident to ownership. Among them are fishing, gathering ice, sea-weed, sand, gravel, *etc.* All tide waters, including the sea and its arms and tidal rivers, belong to this class, and in many of the States all fresh-water rivers and lakes which have a capacity for valuable floatage are public. The non-tidal w-aters and the soil under them are private property, although the interest of the owner is qualified by being subject to the right of the public to pass over them.

Jurisdiction. — The right of navigation is subject to the control of the government, and the government has the right to improve rivers and harbors. In England this power was vested in Parliament. In the United States the au¬ thority of Congress under the commercial clause of the Constitution is paramount. In the ab¬ sence of Congressional action, the power of the State legislatures is supreme ; they may direct the improvements of navigable rivers, and may authorize improvements by individuals and by private corporations, and may levy tolls. Waters which lie within the borders of dif¬ ferent States are generally subject to the con-

current jurisdiction of the States. The terri¬ tory of States and nations when bounded by rivers extends, unless otherwise agreed upon, to the centre of the streams.

Public Easement of Passage. — The public have the right of passage over all streams which have a capacity for that purpose, and this includes the right of navigation in boats and vessels, and of floatage as in the case of rafts and logs, and of travel over the ice. In com¬ mon law the right to navigate waters above the tide was acquired by using the same. Now it may be granted by express act of legislature, but it is generally regarded as an inherent pub¬ lic right needing no legislative sanction. The legislatures of the States having jurisdiction and Congress may make rivers and streams public highways for particular purposes when they are not public highways or navigable for other ‘ purposes. For instance, the legislature may make a river a public highway for the purpose of floating logs, although it cannot be navigated by boats or vessels.

Use of Banks and Shores. — By the civil law the public have the right to use banks and shores of navigable rivers as appurtenant to the right ot passage, and this is true of the States where that system prevails; but under the common law the right to use the shores and banks by navigators was limited to high water mark and the right to pass over the waters does not include the use of banks for general purposes. But the public have the right of anchoring and of mooring on the banks against all except the owners of the banks. There is no public right at common law of towing on the banks. The owners of stranded property may go upon the banks for the purpose of taking it. In the use of rivers for navigation, the boats going down stream have a right to the centre of the stream or the centre of the current, and those going up stream must keep to the sides in passing. A descending boat may keep to the shore, but if she meets an ascending boat hugging the same shore and signaling her in¬ tention of keeping the shore, the boat going down stream must keep to the middle of the river. The rule is for the protection of vessels navigating up and down rivers crowded with boats to hold to the centre as nearly as possible. The rule both of

statute and the general laws of navigation, which requires steamboats ap¬ proaching one another to turn to the right, ap¬ plies to steamboats crossing a river, and ferry¬ boats crossing rivers making frequent trips are obliged to use great care to avoid other sailing craft. Steamboats must keep out of the way of barges and flat boats floating down the river guided only by oars.

Rivers not Navigable — Rights of owners.

— When a river that is not navigable forms the boundary of property, one-half usually be¬ longs to one proprietor and the other half to the other, the centre of the stream being the line between the owners of the lands on each side, and when the land on both sides belongs to one owner he is then the owner of the whole bed of the stream. This rule of law refers to the land under the water, and it is the property of the riparian owner as much as the banks of • the river. The owner of the land has not an absolute ownership of the water, but he can use it for necessary purposes, as for the use of

his family and house and to water his stock. If he takes more than the usual quantity and for such purposes as are not necessary, he is liable for damages to riparian owners farther down the stream in case they suffer damages. One owner of the land cannot change the bed of the stream to the injury of other owners; but if the line be changed slowly by accretion at one side, the line of ownership will still follow the centre of the stream. The rule might be different if, for any unforeseen and uncon¬ trollable cause, the stream should burst its banks and make a new channel in a different place.

Accretions. — The owner of the land along the side of and under a river has the right to all deposits of alluvium along and upon his land. If an island is formed by accretions in an unnavigable stream, the ownership will be determined by the filum aquae, or centre of the stream, and it will belong to the persons owning the land on the side of the line on which it is formed. If the island is on the line, each will own his proportionate share.

Bridges. — Congress has power to authorize the erection of bridges over navigable rivers; the power may be exercised and authority given even when the bridges obstruct to a certain extent the free navigation of the rivers. States also have power to authorize the building of bridges over navigable waters within their boundaries, although they may . to a certain ex¬ tent interfere with navigation. This power in

the States, however, is subject to the exercise of the power of Congress to regulate naviga¬ tion. The proposition has come to be recog¬ nized as not disputable that, but for the power granted by the Constitution to Congress, the State legislatures would have as full and en¬ tire control of the waters of their several States as they have over the land. The States reserve all power not granted to Congress. The sovereignty over the waters of the States vests in Congress and in the several State legisla¬ tures. Congress and the State legislatures can provide for the erection and maintenance of draw-bridges over navigable rivers, and provide for the safe passage of vessels in the draws.

Boundaries. — When land along the bank of a river is described as being bounded on the bank or shore, instead of the centre of the stream, then low-water mark on the shore will usually be the boundary line. Where land is bounded by a common law navigable stream, that is, one in which the tide ebbs and flows, the boundary is the high-water mark on the shore, and in some States in which there are large rivers that are navigable, although the tide does not ebb and flow, the boundary line is held to be low-water mark. The proprietor has a right, subject to government supervision, to erect wharves and piers extending to low-water mark or into the channel of the stream. In deciding what is low-water mark, the or¬ dinary rise and fall of the water is taken into account. There is not a unanimity of legal opinion in all the States upon the subject of the ownership of the beds of streams.

Dams. — The owner of land on both sides of a stream not navigable may erect a dam and swell the water of the stream or form a pond up to the line of the land of the next owner up the stream. An owner of but one bank can-

not, without permission, erect a dam beyond the thread of the river. The erection of dams has been encouraged by the legislatures in many of the States on the ground of public policy. The right to erect dams has been given to riparian owners even when they flow the lands above them, and in some cases permission has been given to riparian owners to erect dams across the stream, although they owned land only upon one side. In these cases the statutes authorizing the erection of such dams have pro¬ vided the method of assessing and collecting damages. Riparian owners on navigable streams, whether navigable by nature, or de¬ clared to be public highways by the legislatures of the States through which they flow, cannot erect dams across such streams without per¬ mission of the legislature having jurisdiction, or Congress. This permission is granted in some States by general law, and in others, as in New York, by special laws. The legislatures in granting permission to erect dams always pro¬ vide for ordinary navigation and for the mainte¬ nance of fishways. The right given by legis¬ latures and by Congress to erect dams is not a protection against injuries to private owners. Such owners have a right to collect damages.

Ferries. — A ferry franchise is a right to transport passengers and property across a stream and to land at a particular place on its bank. In the United States this right is estab¬ lished by legislative authority. It is the crea¬ ture of a sovereign power and no one can exercise it without the consent of the State. It is within the control of the government. In England the right was granted by the Crown, or founded upon prescription. A ferry fran¬ chise is real estate and can be sold like any other real estate.

Fishing. — Ordinarily any person may take fish out of navigable streams if he can do so without trespassing upon the lands of private owners. In most of the States of the United States as at common law, the exclusive right to fish is in the owners of the banks of rivers that are not navigable unless otherwise appropriated by statute. This right, however, is subject to legislative control. The preservation of fish in the waters of a State is of such public concern as to fall within the domain of legislative power. No owners of land have the right to obstruct the free passage of fish up and down the streams. The legislatures have the right to regulate the taking of fish from private rivers, which are unquestionably private property.

Floods. — Riparian owners who collect water on their land must keep such water under control at their peril, and dams erected for the purpose of confining water or creating ponds must be constructed with such care and skill as to make them capable of resisting usual and ordinary floods.

Ice. — Water congealed is ice. Ice formed upon private waters, and that includes rivers owned by individuals, is real estate and is the property of the owner of the soil over which it is formed. In some of the States, however, as in Michigan, it is held as personal property and can be sold as personal property. After it is cut and removed it is always personal property. The owners of land bordering upon navigable streams in States where they are held to be public property, have no title to the ice which forms on such streams; such ice

belongs to the first person who appropriates it, but generally ice forming upon private fresh¬ water streams belongs exclusively to the riparian proprietors and they may prevent others from removing it and maintain trespass against those who cut it without permission.

Irrigation. — The right to take water from streams passing over land owned by individuals is regulated by law, and differs in different States. The right, however, is generally recog¬ nized that there may be a reasonable appropria¬ tion, but no total diversion of the water.

When the State or the government intervenes and takes control of rivers for the purposes of irrigation, then the streams are to be used ac- <dbrding to the laws enacted for the purpose. This is so as to the use of all rivers that can be used for the general good of the public. The courts have jurisdiction over questions arising out of the use of rivers. The United States admiralty courts have jurisdiction over causes of action arising in the large rivers as they do in the Great Lakes and the sea and coast waters.

Bibliography. — Lawson, (Geography of River Systems) ; Napier, Makes and Rivers* ; Ruffner, (Non-Tidal Rivers of the United States) ; Russel, (Rivers of North America) ; Wheeler, (Tidal Rivers) ; Morrill, (Floods of the Mississippi River) ; Edward, thousand Miles up the Nile) ; Keller, (Amazon and Madeira Rivers.*

RIVERSIDE, Cal., city and county-seat of Riverside County, on the Santa Fe, Southern Pacific, Salt Lake and Pacific Electric railroads, about 60 miles east of Los Angeles. It was founded in 1870 by settlers

largely from the New England States and New York, and was incorporated as a city in 1886.

Riverside is famous as one of the largest citrus producing and shipping points in the world, the annual output of the citrus fruits in Riverside County being over 6,000 cars, of which something over 1,000 cars are lemons, the balance being oranges. There are over 20 packing-houses in the city where oranges and lemons are shipped, employing over 1,000 per¬ sons at the height of the season. Alfalfa and deciduous fruits are also successfully grown, and there is a large grain-producing area in the county. There are three large fruit canneries in the city. Cotton is extensively grown in the Palo Verde Valley in Riverside County and the only place in the United States where dates are grown in a commercial way is in the Coachella Valley in Riverside County.

Riverside has one of the most extensive and complete irrigation systems in southern Cali¬ fornia. The climate is remarkably healthful and the place is famous as a health resort. The architecture of the public buildings has been largely developed along Mission lines, and among the famous buildings of this character are the Glenwood Mission Inn, the Carnegie library and the Girls' High School building. The courthouse is a single-story structure built along classic lines, and cost $250,000. Riverside is the seat of Sherman Institute, a United States Indian School, which has over 600 pupils, and of March field, an army aviation post.

There are four banks with deposits of over $7,000,000. The government of the city is vested in a mayor and city council of six members. Pop. 20,000.

RIVES , revz, Alfred Landon, American

engineer, son of William Cabell Rives (q.v.) and father of Amelie Rives: b. Paris, France, 25 March 1830; d. 1903. He was educated at the University of Virginia and at the Lcole des Ponts et Chaussees, Paris, where he was grad¬ uated in 1854. He was assistant engineer in completing the capitol at Washington, was en¬ gaged on the aqueduct there, and later was in charge of the United States survey for im¬ proving the Potomac River. He was colonel of engineers in the Confederate army during the Civil War, and was afterward manager of vari¬ ous railways and engineering enterprises.

RIVES, Amelie. See Troubetzkoy, A. R.

RIVES, George Lockhart, American law¬ yer and historian: b. New York, 1 May 1849; d. 18 Aug. 1917. He was educated at Columbia University and Trinity College, Cambridge, England; and was admitted to the bar of New York in 1874. He engaged in practice in New York, and in 1887-89 was Assistant Secre¬ tary of State in the Cleveland administration. He was president of the commission to revise the Greater New York Charter in 1900; was a trustee of Columbia University from 1882 and a trustee of the New York Public Library after 1895, serving as president of the board from 1914. ‘Author of (The United States and Mexico, 1821-48) (2 vols. 1913).

RIVES-WHEELER, Hallie Erminie,

American novelist : b. Christian County, Ky., 2 May 1876. She has published (Smoking Flax) (1896); (Asˆthe Hart Panteth) (1896); (A Furnace of Earth5 (1900) ; (Hearts Courage¬ ous5 (1902) ; (The Castaway5 (1904) ; (Satan Sanderson5 (1907) ; (The Kingdom of Slender Swords5 (1909) ; (The Valiants of Virginia5 (1912) ; (The Long Lane’s Turning5 (1916).

RIVES, William Cabell, American legisla¬ tor and diplomat: b. Nelson County, Va., 4 May 1793; d. near Charlottesville, Va., 26 April 1868. He was educated at Hampden-Sidney and William and Mary colleges,

studied law, and in 1816 was a member of the Virginia constitu¬ tional convention. In 1817-19 and in 1822 he served in the State legislature, and in 1823-29 was a member of Congress. He was Minister to France in 1829-32, and in that capacity negotiated the treaty indemnity in 1831. He served in the United States Senate in 1832-34, 1835-45, and in 1849-53 was again Minister to France. He was a member of the peace con¬ ference at Washington in 1861, and after the secession of the South sat in the Provisional Congress at Montgomery, Ala. He published (Life and Times of James Madison5 (1859-69) ; <The Life and Character of John Hampden5 (1845); (Ethics of Christianity5 (1855).

RIVETING MACHINES. See Metal

Working Machinery.

RIVIERA, re-ve-a'ra, a district bordering the Mediterranean Coast, partly in France, partly in Italy, with Genoa as its central point. It extends to Spezzia on the east and Nice on the west, and is a favorite winter resort of invalids and others. The whole coast is tra¬ versed by a road and by a railway.

RIVIERE, re-ve-ar', Briton, English artist: b. London, 14 Aug. 1840; d. there, 20 A pril 1920. He studied art under his father, a drawing master, worked at illustrating for many

English and American publications and ex¬ hibited at the Royal Academy for the first time in 1858. He was elected A. R. A. in 1878 and R. A. in 1881. Among his most notable pic¬ tures, many of which have been engraved, are (Strayed from the Flock5 ; (The Lost Sheep5 ; 'Legend of Saint Patrick5 ; {An Anxious Mo¬ ment5 ; (Circe5 ; 'Giants at Play5 ; 'Actaeon5 ; 'Vse Victis5 ; (Rizpah5 ; "'A Fool and His Folly5; (Daniel5 (1872); Sympathy5 (1878), and 'Miracle of the Gadarene Swine5 (1883), which are found in the Tate Gallery; 'Perse-polis5 (1878), considered his masterpiece; 'In Manus Tuas Domine5 (1879) ; 'A Mighty Hunter before the Lord5 (1891) ; 'Beyond Man's Footsteps5 (1894, also in the Tate Gallery) ; (Hark, Hark, the Lark5 (1909). He is also known as a sculptor by his 'Anatomical Lion5 (1888) ; 'A Dying King5 (a lion, 1894), and 'The Last Arrow5 (a lion¬ hunting scene, 1896).

RIVIERE DU LOUP, re-ve-ar du loo. See Louiseville.

RIVINGTON, James, American printer: b. London, about 1724; d. New

York, 4 July 1802. Early in life he was a bookseller in London, but in 1760 came to America and opened a shop in Philadelphia, then in 1761 established himself in New York, and on 22 April 1773 began the publication of a newspaper entitled the New York Gazetteer, or the Connecticut, New Jer¬ sey, Hudson River and Quebec Advertiser. It was Royalist in sympathies and circulated among the Tories and gave to its publisher a position of some prominence. His affairs seem to have been under investigation by both the Provincial and Continental Congresses, and he himself was placed in temporary confinement. In November 1775, in consequence of his constant assaults upon the patriots, and especially Cap¬ tain Sears, that officer came from Connecticut with a company of horsemen, proceeded to Rivington's printing office, destroyed the press and converted the types into bullets. Rivington then went to England, and being appointed king's printer in New York, returned with a new press after the city had fallen into the hands of the British, and in October 1777 resumed the publication of his paper under the old title, soon changed to Riving ton's New York Loyal Gazette, and on 13 December to the Royal Ga¬ zette. About 1781, when the success of the British was becoming very doubtful, he played the part of a spy, furnishing Washington with important information. When, therefore, New York was evacuated Rivington remained in the city and changed the title of his paper to Rivington' s New York Gazette and Universal Advertiser. The paper finally suspended pub¬ lication in 1783, and he passed the remainder of his life in comparative poverty.

RIVOIRE, re'vwar', Andre, French poet and playwright : b. Vienne, Isere, 1872. He was educated at the Lycee Henri IV, became a col¬ laborator on La Revue de Paris and was elected a Chevalier of the Legion of Honor. He occupies a foremost place among the younger French poets and has been equally successful as a dramatist. Author of (Les vierges5 (1895) ; 'Le songe d'amour5 (1900) ; 'Le chcmin de l'oubli5 (1904) ; and the dramas 'La peur de souffrir5 (1899) ; (I1 etait une bergere5 (1905) ; (Le bon roi DagoberC

(1908); (Mon ami Teddy0 (1910); (The Little Shepherdess5 (1915) ; ^'humble offrande5 (1916), *etc.*

RIX, Julian, American painter : b. Peacham, Vt., 1850; d. New York, 24 Nov. 1903. He used to say that he was <(a pupil of nature,® and ap¬ pears to have had no regular academic training. He came to New York in 1888, and his work immediately attracted attention by its marked personal qualities. His California landscapes have been familiar ever since to all visitors to the exhibitions. His best paintings, among which are scenes in the Maine woods, were pro¬ duced during the last five years of his life. Among those found in private collections in New York, Rochester and Baltimore, are Sun¬ set, California Coast-' ; (High Tide, Coast of Maine5 ; <The Woodland Spring, Mike Marr's Camp, Moosehead, Maine5 ; (Breezy After¬

noon5 ; (Solitude5 ; (01d Oaks5; (Twin Oaks5; (Noon-day5; (A Breezy Day5; (St. John Harbor.5

RIX DOLLAR, the English way of writ¬ ing the names of different silver coins used in various European countries, as the rigsdaler of Denmark =53 cents; the Swedish riksdaler = 27 cents.

RIZAL, Jose, hd-sa' re-thal', Filipino pa¬ triot and author: b. Calamba, province of La Laguna, Luzon; d. Manila, 30 Dec. 1896. He studied medicine at Manila, and was graduated from the University of Madrid as doctor in medicine and philosophy; studied further in Paris, Heidelberg, Leipzig a.nd Berlin; made researches in philology and ethnology; and was elected a member of the Berlin Anthropological Society. Having returned to the Philippines, he was soon compelled to emigrate, owing to the hatred visited upon him by the old Spanish party on account of his story, (Noli Me Tan-gere,5 descriptive of political conditions in the Philippines. He then resided in Japan, North America and London, where he prepared an edition of Morga's (Sucesos de las Islas Fili-pinas,5 originally printed in Mexico in 1609. On the continent he wrote another political novel, (E1 Filibusterismo.5 Subsequently he practised medicine at Hongkong and went to North Borneo, where he purposed to establish an agricultural colony of Filipinos. Though he had obtained permission to visit the Philippines, he was arrested on arrival there, and banished to Dopitan. On the outbreak of the native in¬ surrection against Spain, he was accused of being its instigator; and on a third trial was condemned and shot. The proceedings against him have been described as farcical. He was undoubtedly the most talented Filipino of recent times.

RIZAL, Philippines, a province of the island of Luzon, formed by the

consolida¬ tion of the former province of Manila (except¬ ing the city of Manila) and the district of Morong, bounded on the east by the province of Infanta and the Bay Lagoon, and on the west by the Bay of Manila; area, 1,026 square miles. The surface, except that part of the former province of Manila which lies south of the Pasig River (q.v.), is mountainous, traversed by a number of short irregular ranges. There are many plains which, though fertile, are often inundated by the Bay Lagoon to the destruction

of crops. In the western part of the province, the betel is grown extensively, especially in the vicinity of the town of Pasay ; other products of the province are rice, sugar, corn and to¬ bacco ; there are also extensive forests. A fine variety of building stone is quarried on the island of Talim, in the Bay Lagoon. The indus¬ tries other than agriculture include lumbering, fishing and the manufacture of lime, mats and clothing for native wear. The trade of the province naturally concentrates at the city of Manila, and the railroad from Manila to Dagu-pan, numerous roads and the waters of the Bay Lagoon and the Pasig River provide means of communication between the different parts of Rizal and Manila. The province was created and civil government instituted in June 1901. Pop. 246,940.

RIZZIO, David. See Riccio, David.

RIZZO, Antonio. See Riccio, Antonio.

ROACH, roch, John, American shipbuilder: b. Mitchelstown, Ireland, 1815; d. New York, 10 Jan. 1887. He came to this country in 1829, ob¬ tained employment in various iron works and foundries, became a machinist and finally erected a foundry of his own. Later he established the ˆFtna Iron Works, where he constructed the first compound engines built in the United States, and also built the largest engines which had been made in the country at that time. In 1871 he purchased the Rainer shipyards at Ches¬ ter, Pa., enlarged the establishment until its value was estimated at $2,000,000, and under the name of the Delaware River Irop Shipbuilding and Engine Works, of which he was entire owner, built a large number of merchantmen and also constructed the first ships for the new United States navy, among them the cruisers Atlanta, Boston and Chicago, and the despatch-boat Dolphin.

ROACH, a small European fresh-water fish (Leuciscus rutila), of the family Cyprinda, related to the dace, chub, etc., and a favorite of

anglers, because so much skill is needed in hooking it. It rarely weighs more than a pound, and is grayish or bluish green on the upper parts, lightening into lustrous white on the abdomen.

ROACH, an insect. See Cockroach.

ROAD-RUNNER, one of the English

names of a species of ground-cuckoo (Geococ¬ cyx calif ornianus) , so called from the chaparral or somb, which it inhabits. A remarkable bird which Coues aptly describes as a ((cuckoo com¬ pounded of a chicken and a magpie,55 having a length of about two feet, of which a half is tail, very short wings, powerful legs, and feet of the cuckoo type, a rather long bill and crested head. The colors are changing and varied bronzes, dark steel blue on the head; every¬ where except on the rump streaked with white and tawny; underparts soiled whitish, streaked with black on the throat, breast and sides. The chaparral-cock inhabits northern Mexico and southwestern United States, while a second re¬ lated species is confined to Mexico. When pur¬ sued it seldom flies, but runs with great speed with upraised wings. Like other American cuck¬ oos it builds a flimsy nest of twigs, in which six or more white eggs are laid at intervals. In feeding both animal and vegetable matter are partaken of. They are sometimes domesti-

cated and trained to catch mice and other house pests. Other names applied to this bird are road-runner, ground-cuckoo, paisano and snake-killer, each of which suggests one of the pecu¬ liarities of the bird. See Cuckoo.

ROADS AND HIGHWAYS. Historical Review. — Road building requires community action of a fairly high order. Savage man built no roads nor had he any conscious need for them. His wants were few and of an in¬ dividual character. Gradually, however, as he mounted the ladder of civilization his wants increased both individually and collectively.

• The game trail and natural path became in¬ adequate for travel, commerce and the move¬ ment and supply of armed forces.

When and where man first began to build roads we do not know. That it was long be¬ fore the beginning of authentic history is cer¬ tain. Dense populations and large cities are

The Building of the Roman Roads (allegorical engraving from an old print) .

impossible without roads. Furthermore the con¬ struction of such works as the pyramids of Egypt and the ((great walls and hanging gar¬ dens® of Babylon could not have been accom¬ plished without the existence of roads for the transportation of materials and supplies.

Herodotus tells us that in Egypt a ((Great King® built a magnificent road across the sands for the transportation of the materials for the <(Great Pyramid,® employing for this purpose 100,000 men for a period of 10 years. This road, 10 feet thick in places, was built of massive stone blocks and lined on both sides with mausoleums, temples and statues. Traces of what may be a part of this road are found near the “Great Pyramid,® probably the oldest authentic remains of a road surfaced with stone. Early historians speak of wonderful roads radiating from Babylon on or before

2000 b.c. These roads extended to Susa, Ecbatana, Sardis and Nineveh. Strabo even speaks of the road between Babylon and Nine¬ veh as being paved with brick laid in a mortar of asphaltum.

The ancient Persians, Assyrians, Carthagin¬ ians, Chinese and Peruvians were all great road builders. Their works, however, have all passed into decay and the records of their achievements lost or largely forgotten.

The Romans are the first systematic road builders of which we have definite knowledge.

« , Cross Sect/or) Roman Read (App Jan

‘

Cross Section French Road (Romon Method),

previous to H7S. ‘ •

‘ CrossSecfion Teifora ‘Road ’ /Si

Cross Section Macadam Road, /S/6.

Cross Section of Modern Macadam (Mast, . V .shaped foundation.

Crass Section of Modern Macadam Rood.

Evolution of Road Construction.

The first of the great Roman roads, generally known as the ((Appian Way® or “Queen of Roads,® was begun by Claudius Appius about 312 b.c., and led from Rome to Capua, a dis¬ tance of 142 Italian miles. This road was later extended to Brundisium (Brindisi), a total distance of 360 miles, and was probably finally completed by Julius Caesar. The ((Flaminian Way,® the second of the great Roman roads, was begun about 220 b.c. This road crossed the river Nar about 60 miles from Rome by means of a great stone-arch bridge with a

central span of 150 feet and a rise of 100 feet. After the completion of the <(Flaminian Way® road building progressed very rapidly so that when Rome reached the height of her glory no less than 29 great roads radiated from her gates. Every conquered province was soon traversed with connecting roads and the entire Roman road system of main or military roads is estimated to have amounted to 50,000 miles.

The construction of the main Roman roads was extremely massive, consisting of four courses having a total thickness of about three feet and generally a width of from 16 to 32 feet or more. The foundation course of statumen was composed of large flat stones bedded in mortar. On this foundation was placed the nidus, a layer of hand rock laid in a form of lime or cement mortar. The nucleus consisted of small stones, gravel or pieces of brick and broken tile, laid in mortar. On top of this was placed the summa crusta, or wearing surface, of large, flat, closely-joined stones, making the total depth of the road about three feet.

The highway legislation of the Romans forms the basis for many of our present road laws. By the Roman law the right of the use of the roads was inherent in the public. The roads could be the property of no one, while the emperors or other chief magistrates were their conservators. The majority of the great highways were built by contract at the public expense. A few, however, were built, at least in part, from the spoils of war, the private munificence of emperors or great personages ambitious for public approval and acclaim. Their maintenance was in part by the labor of soldiers and slaves, or by enforced labor, which sometimes took the form of taxation. But, in whatever form the maintenance was made, it was at the expense of the district through which the road passed. The local or vicinal roads were committed to the charge of the local magistrate and as a rule maintained by compulsory labor or the contributions of the whole neighborhood.

In England, following the old Roman law, the ((King's Highway® early came to represent a perpetual legal and customary right of pas¬ sage, residing in the sovereign, for himself and his subjects over another's land. The mainte¬ nance of the road at first devolved on the Lord of the Manor, then for many centuries on the parish and now on the district and county councils. In the United States the public road

has come to represent a definite strip or area of land owned and maintained by the public for public passage and such additional uses as may be determined by statute.

With the fall of the Roman Empire its magnificent system of roads began to decay and as a result of the following thousand years of neglect ceased to exist. Not until about the close of the Middle Ages did road building begin to revive and then not in Italy but in England and France. In 1597 Sully was ap¬ pointed ((Grand Voyer® of France and slow but definite improvement of the roads was begun. Broken stone began to be used ex¬ tensively for surfacing during his Ministry.

In 1661 when Colbert became Comptroller of Finance he extended the feudal system of compulsory labor called the (<corvce® so as to compel every able-bodied rural peasant, to¬

gether with his work animals, to labor on the road or in the production of road materials as many days as the king, at the request of his Comptroller, might decree. By this means 15,000 miles of main roads were surfaced with broken stone. This work, however, imposed a fearful hardship on the peasants and was accompanied by the gravest abuses and caused the greatest discontent. Nevertheless the system of the “corvee® was continued with the greatest rigor until 1774 and was not entirely abolished until

1787.

About 1775 Tresaguet introduced in the de¬ partment of Limoges a system of road build¬ ing and maintenance which soon became gen¬ eral in France. This system, by making scien¬ tific provision for proper drainage, greatly re¬ duced the amount of material required and sub¬ stituted for the old periodical, haphazard road mending by the inefficient compulsory labor of the “corvee® continuous, systematic maintenance by permanently employed laborers employed by the state or departments and under the super¬ vision of skilled engineers. This system, with but slight modifications is still in force. The state department of roads and bridges (Corps des Ponts et Chaussees) which has full con¬ trol of all state highways is and has been for nearly a century and a half the chief controlling force in all road matters in France.

In England, until near the close of the 13th century, the duty of

maintaining the King's Highway devolved entirely on the Lord of the Manor. From 1285 until 1555, however, we find a gradually increasing trend toward plac¬ ing this burden on the parish. In 1555 the duty of road maintenance was by statute definitely placed on the parish and for the next 300 years Parliament was often obliged to devise new ways and means to enforce this obligation.

As travel and trade increased, the demand for improved roads became more and more insistent, and finally the argument that, ."Every person ought to contribute to the roads in pro¬ portion to the use he makes or the benefit he derives from them,® found favor with Parlia¬ ment and the toll-road era began. The toll-road or turnpike consisted of a grant or fran¬ chise by Parliament to a company to improve and maintain a certain length of road and establish toll gates and collect certain fixed tolls for each passage over the road. These charters were usually granted by Parliament for a term of 21 to 31 years, and, during the early period of toll-road existence, were usually renewed without question. The first turnpike act by Parliament was passed in 1663 and dur¬ ing the later part of the 18th century the toll roads multiplied very rapidly. Not less than 1,100 such trusts or companies, involving about 20,000 miles, existed in 1838 when the railroad began to make itself felt in diverting the large coach¬ ing traffic. The toll road, however, never be¬ came popular with the public. The inherent fault was the impossibility of fixing a rate of toll which would be accepted as fair by all. Many of the turnpike trusts, also, proved financially unprofitable, due largely to the high cost of collecting the tolls. In 1878 England provided that no further charters should be granted and that as the existing charters ex¬ pired the toll roads should be taken over by

ROADS AND HIGHWAYS

1 Rural road before improvement at Meridian, Miss.

2 Same road after improvement, Meridian, Miss.

3 Tractor train. Modern methods in road construction, Atlanta, Ga.

4 Type of traffic rapidly developing on American country roads

1 Avenue of the Sphinxes, Karnak, Egypt 2 The Appian Way as it is today

3 A good type of the National Roads of France

ROADS AND HIGHWAYS

1 A street, Pompeii, Italy

2 The Axenstrasse, Switzerland

-

.

‘

the highway districts or counties. However, the last turnpike in England and Wales, the Anglesey portion of the Shrewsbury and Holyhead road, did not go out of existence until 1 Nov. 1895.

In 1835 quite comprehensive legislation was enacted, relieving the parish of some of the burden of road maintenance by entirely abolish¬ ing statute labor and providing a money rate in its place. In 1878 a general act provided for taking over the turnpikes as their charters ex¬ pired and in connection with the Act of 1888 provided for the care of these roads by the county and of all others by the district.

The greatest benefits to the turnpike roads, as well as to all the roads in general, how¬ ever, came, not through acts of Parliament, but from the work of two individuals, Thomas Telford ‘ (1757-1834) and John Loudon MacAdam (1756-1836). Their work consisted mainly in devising more scientific methods of con¬ struction and maintenance. From 1800 to 1830, the methods advocated by these men, especially those of MacAdam, were largely adopted, not only in Great Britain but also in many parts of continental Europe and America. The types of construction developed by these engineers are still known throughout all English-speaking countries as macadam and telford.

In 1909 a further step in centralizing the road work of England was taken by Parlia¬ ment in the establishment of a road board and providing national aid to the various county councils on roads carrying extraordinary traffic. In 1914 plans had been practically completed for further classification of the roads and for direct national aid and control on the more im¬ portant roads of the kingdom. The war, how¬ ever, caused all these plans to be postponed.

The early settlers of the United States brought with them the institutions of the mother country. The history of the development of road building in the United States, therefore, bears a marked resemblance to that of England, especially in the movement from extreme lo¬ calization toward centralized control. Thus, the first road legislation in the United States, adopted by the House of Burgesses in Vir¬ ginia in 1632, provided for the most extreme local control in the

construction and mainte¬ nance of the public roads. Moreover, in much of the road legislation passed by the several colonies provisions for means and methods of local self-control form a striking feature.

Near the close of the 18th century the toll-road movement, then at its height in England, made its appearance in the United States. Charters were first granted to toll-road com¬ panies in Virginia in 1772, and what is said to have been the first toll road in the United States was established in this State between Alexan¬ dria and Sniggin's Gap in 1785. The Philadelphia-Lancaster turnpike which was begun in 1792 was the first toll road in the United States surfaced with broken stone.

The growth of the toll-road movement in the United States was at first extremely rapid and large amounts were invested. Almost in¬ variably, however, the rate of tolls levied soon became a fertile source of complaint and dis¬ satisfaction to the users of the road. In many cases the undertakings also proved unprofitable to the investors. Some States, especially Ken¬ tucky and Virginia, assisted in the construction

of toll roads, either by direct appropriations or indirectly through the purchase of stock in the companies. In general, however, direct State participation in toll-road construction proved both unprofitable and unpopular and was consequently discontinued.

In 1806 the ever-growing demand for better means of communication with the West found expression in the adoption of an act by Con¬ gress providing for the construction of a National Road from the head waters of the Potomac to the Ohio River, which should be free from tolls. This act was later extended so as to provide for the construction of this road to the Mississippi River at Saint Louis. Actual progress, however, was slow. The first section from Cumberland, Md., to Wheel¬ ing, W. Va., was not completed and opened for traffic until August 1818. Gradu¬ ally the construction was extended across Ohio and practically completed to Indianapolis. By this time, however, the rapid and successful development of railroad transportation had impressed Congress with the belief that the railroads were certain to supersede the wagon roads for all but the most extremely local traffic. Consequently, ap¬ propriations for the construction of the National Road became less and less and finally ceased in 1848 after the expenditure of nearly $7,000,000 of Federal funds. The road was only partially completed west of Indianapolis, and even the grading ceased entirely at a point near Vandalia, Ill.

With the coming of the railroads Federal as well as direct State participation in road con¬ struction or improvement ceased for nearly half a century. The appearance of the bicycle, however, in the latter part of the 19th century brought the need of better roads sharply to the public attention. A movement for more cen¬ tralized direction found immediate favor as it was clearly impossible to secure any extensive, co-ordinated improvements so long as the various local bodies had unlimited control. The first definite result was the adoption of State aid in road improvement by New Jersey in 1891, which was followed by Massachusetts in 1892. Then came the motor vehicle with the attend¬ ant and ever-growing demand for better roads. The force of this demand can be readily under¬ stood from the fact that on 1 lan. 1921, there were over 9,000,000 automobiles and motor trucks in use in the United States.

The movement for better roads, however, has steadily followed along the line of State aid and more centralized control in the manage¬ ment of the public roads. A still wider recog¬ nition of this movement was secured in 1916 with the passage of the Federal Aid Road Act, approved 11 July. This act authorizes the Sec¬ retary of Agriculture to co-operate with the States, through their respective State highway departments, in the construction of rural post roads. The particular roads to be improved are selected by the State highway department of each State and approved by the Secretary of Agriculture. For carrying out the provisions of this act, Congress appropriated $75,000,000, of which $5,000,000 was made available for the fiscal year 1917, and a sum increasing annually by $5,000,000 for each of the following years until 1921, when $25,000,000 will be available. An amendment to this act on 28 Feb. 1919

appropriated an additional $200,000,000 avail¬ able for the fiscal years 1919, 1920 and 1921 and also $9,000,000 additional for forest roads available during the same period. Three per cent of the appropriation is available for administration and overhead expenses, and the remainder is apportioned to the several States on the basis of population, area and mileage of rural-delivery routes and star routes, each having a weight of one-third. The State must pay at least one-half of the cost of all the roads improved from Federal aid, and in addition, it, or its civil subdivisions, according to its laws, must maintain these roads after they are constructed. Under the same act $1,000,000 a year for 10 years was appropriated for the construction and maintenance of roads

Table I — Cash Road and Bridge Expenditure

and trails in or partly within the national forests, in cooperation with the State, territory or county, upon a basis equitable to both par¬ ties. This Federal participation already has resulted in a marked activity on the part of the States, until at the present time every State in the Union has succeeded in establishing some form of State highway department and is pro¬ viding for some form of State aid or assistance to the local communities.

Current Highway Data. — Cash expendi¬ tures on the rural roads and bridges in the United States in 1918 amounted to $286,598,000. To this should be added the value of the statute and convict labor, which cannot be fixed with any great degree of accuracy, but probably amounted to not less than $14,000,000, thus

t

5 for the Calendar Years 1914 and 1916 and for 1916.

STATE

Year

in

which

first

State—

aid

law

passed

State funds expended by or under State highway department

Total cash expenditure from all sources

Total

all

State

and

State—

aid

roads

built

to

Jan. 1,

1917

Mileage of rural public roads

1914

1916

1914

1916

Total all sur¬ faced roads in State (approx¬ imate)

Total all ‘ public rural roads in State

Per¬ centage of sur¬ faced roads in State •

Miles

Miles

M iles

Alabama .

1911

$170,232

$102,422

$3,949,019

$4,186,384

659

6,000

55,446

10.8

1909

441,202

982,721

1,988,221

372

375

12,075

3. 1

Arkansas .

1913

115,000

55 , 483

1,522,696

3,443,887

534

1,500

50,743

3.0

1895

4,285,964

19,171,985

20,392,434

1 ,907

12,300

51,039

20.2

Colorado .

1909

301,274

607,628

1,937,546

2,313,208

*7,305

1,800

39,780

4.6

Connecticut .

1895

1,307,381

1,865, 948

3,640,963

3,200,948

1,627

3,100

14,061

22.0

Delaware .

1903

31,000

31,000

511,628

512,000

160

275

3,674

8.0

1915

10,484

2,280,255

4,010,484

3,500

17,995

19.4

1908

3, 688,172

3,750,000

13,000

80,669

15.3

Trlaho .

1905

49,812

100,057

1,371,469

1,948,118

413

800

24,396

3.3

Illinois .

1905

387,989

1,119,202

8,734,713

10,356,669

767

12,400

95,647

13.0

1917

14,233,986

13,500,000

31 .000

73,347

42 . 5

1904

74 , 000

90,821

10,187,507

14,427,877

1,000

104,074

1.0

1911

9,080

10,000

5,544,048

5,610,000

1,400

111,052

1.3

Kentucky .

1912

18,000

708,346

2,474,621

4,448,533

1,611

13,400

57,916

23.2

Txmisiana .

1910

161,186

184,533

1,177,572

3,458,643

752

2,400

24,563

9.8

Maine .

1901

467,149

1,055,250

2,642,007

3,167,215

1,798

3,250

23,537

13.8

Maryland .

1898

356,845

2,280,000

6,000,652

5,560,000

1,321

2 ,900

16,459

17.6

Massachusetts …

1892

242,560

2,701,236

6,091,875

6,499,141

1,998

8,900

18,681

47 . 6

Michigan .

1905

657,264

982,939

9,261,998

10,082,939

3,940

9,600

74,190

13.0

Minnesota .

1905

1,309,956

1,390,525

6,458,940

8,742,278

10,011

6,500

93,517

7.0

1915

6,500

3,960,377

3,256,500

2,600

45,779

5.7

Missouri . .

1907

277,253

482 , 860

5,513,049

7,982,860

t

7,250

96,041

7.6

Montana .

1913

13,516

26,150

2,888,400

3,475,569

30

8C0

39,204

2.0

1911

110,000

1,796,278

4,500,000

1,350

80,272

1.7

1911

245,014

275,000

320

12,182

2.6

New Hampshire. .

1903

491,520

414,669

1,590,464

2,045,410

1,280

1,900

14,020

13.5

New Jersey .

1891

1,306,596

1,167,843

7,208,287

5,784,354

2,054

6,000

14,817

40.5

New Mexico .

1909

115,732

385,684

556,399

828,952

846

550

11,873

4.6

New York .

1898

8,544,126

9,409,655

23,231,964

19,901,391

6,765

18,000

79,398

22.7

North Carolina…

1901

5,000

10,000

5,215,491

5,510,000

6,750

50,758

13.3

1909

2,402,384

2,711,295

1,100

68,796

1 . 6

IN UI L 11 J _ f cX A U LU • t •

Ohio .

1904

1,855,338

2,885,071

14,334,246

12,992,625

1,299

31,500

86,354

36.5

1911

300,000

2,112,681

3,625, 000

1,900

300

107,916

.3

Oregon .

1913

10,697

165,662

5,310,467

5,955,662

413

4,875

36,819

13.2

Pennsylvania ….

1903

1,976,768

3,663,352

10,424,580

10,985,392

1,988

10,500

91,556

11.4

Rhode Island ….

1902

543,152

446,496

943,152

325

750

2,170

34.5

1917

1,024,480

1,250,000

3,700

42,226

8.8

1911

1,217,809

2,708, 000

750

96,306

.8

OU U Lit L/ct AU tel • • * •

1915

200,000

2ˆ370,560

4,600,000

150

8,750

46,050

18.9

1917

9,920,079

10,500,000

12,000

128,960

9.3

Utah .

1909

157,732

179,400

803,071

1,855,160

3,440

1,500

8,810

17.1

Vermont .

1898

458,456

632 , 800

1,023,941

1,607, 800

2,011

2,100

14,249

14.9

Virginia .

1906

523,578

542 , 524

3,224,529

3,691,249

4,463

5,500

53,388

10.3

Washington .

1905

1,343.431

859,672

7,944,717

7,518,343

1,977

5,900

42,428

13.9

1909

10,967

2,483,747

5,510,967

1 , 532

32 , 024

4.7

VV Cdlf V llgilliCl ….

Wisconsin .

1911

1,482,379

950,000

9,880,240

10,570,764

5,070

14,850

75,707

19.6

Wyoming .

1911

669,661

450,000

520

14,797

3.5

Total …

.

24,220,850

40,969,001

240,263,784

272,634,424

69,186

287,047

2,455,761

11.6

* Includes about 6,300 miles of earth roads. t No data.

(Adapted from U. S. Department of Agriculture, Office of the Secretary — Circular No. 74.)

making the grand total expenditure for the year $300,000,000. This total is made up of the actual expenditure for such items as labor, materials, supervision, management and ad¬ ministration directly connected with the con¬ struction, improvement and upkeep of our public roads and bridges. During 1917 the grand total expenditure amounted to approximately $280,-

000,000.

This, however, does not represent the total outlay by the States and communities because of their rural public roads. At present there are outstanding more than $400,000,000 of road and bridge bonds and long-term warrants, maturing at the rate of about $20,000,000 per year and requiring about an equal amount for the payment of interest charges. These out¬ lays are not included in the totals.

From 1904 to 1915, inclusive, the annual in¬ crease in the expenditures on rural roads and bridges amounted to approximately 12 per cent over each preceding year. The increase of 1916 over that of 1915, however, was only 2 per cent, and that of 1917 over 1916 about 1 per cent. This was due largely to the scarcity of labor and materials which caused an unusually large amount of road work to be deferred.

The public rural roads of the United States at present have a total length of 2,4 78,332 miles, of which about 299,000 miles, or 12.0 per cent, are improved with some form of surfacing. The mileage of hard-surfaced roads is in¬ creasing at the rate of about 12,000 miles per annum. During 1918 the State highway de¬ partments surfaced about 4,000 miles under State supervision and also improved an ad¬ ditional 7,000 miles by grading or otherwise. The several State highway departments also supervised the maintenance of 200,000 miles of main and trunk-line highways.

In regard to our citv and village streets no such exact data are

available. Their total length is estimated at 250,000 miles and the total annual expenditure for construction, im¬ provement and maintenance at more than $300,- 000,000. In general, their control in regard to construction and maintenance is vested entirely in the respective local authorities without any State assistance or supervision.

The expenditures in 1916 by or under the various State highway departments and also the expenditure of State and local funds for the years 1904, 1914, and 1916, as well as the total rural road mileage and that improved, are shown in Table I on preceding page.

Austria-Hungary.1 — Before the Revolu¬ tion the central government had general super¬ vision of all roads. The state roads were con¬ structed and maintained at the expense of the im¬ perial government, while the cost of the lesser roads were borne by the various political subdi¬ visions according to their importance with or without government grants. In 1914 there were in Austria 10,008 miles of state, 2,288 miles provincial, 39,212 district and 22,7a6 mdes of town roads, or a total of 74,265 miles of all classes of roads. In Hungary there were 5,600 miles of state, 17,400 miles of county, 8,100 miles of district and 700 miles of parish roads, or a grand total of 31,800 miles. In Austria the average annual cost of maintaining the

i Statistics rclatinf? to continental ii.uropean countries refer to 1914 or the pre-war period, voi.. 2.3 — 36

state roads was $311 per mile and $282 per mile in Hungary, exclusive of bridges.

Canada. — Canada has no central road or¬ ganization, but the control of the public roads is vested in the respective provinces through their local subdivisions. However, in line with the road movement in the United States the several provinces have established provisions for more or less provincial aid and control, the form of which is not exactly alike in any two provinces. The total mileage in the Dominion amounts to about 250,000 miles of graded roads. Surfaced roads are confined largely to Ontario, Quebec and British Columbia. The annual road and bridge expenditures amount to about $22, ~ 000,000, or about $88 per mile. On 4 July 1919 the Federal Parliament passed an act providing for $20,000,000 in Federal aid to the province during a period of four years. Each province through its highway department is to receive $80,000 annually plus 40 per cent of the cost of such road

work as is approved by the Federal Road Department within the limits of the total allotment to each province.

Great Britain. — The only national highway authority is the road board established in 1910, which has the power to make contributions toward approved schemes of improvement and until 1916 was provided with revenues from the motor vehicle registration fees and the li¬ cense tax on motor spirits, amounting to about $8,000,000 annually. Otherwise, the roads and streets of England and Wales are maintained by 1,891 local authorities, those of Scotland by 337 and those of Ireland by about 370 local au¬ thorities. England and Wales have a total of 152,085 miles of roads, of which 33,624 miles were in urban areas or practically city streets. The average annual expenditure is about $52,- 000,000, or $730 per mile on the city streets, and $28,000,000 or $230 per mile on the rural roads. Of the roads in rural areas, however, 23,833 miles, or 20 per cent, are classed as main roads and require an annual expenditure of about $600 per mile. Scotland has 24,908 miles of reads of which 2,244 might be classed as streets. The average annual expenditure on the streets amounts to about $2,500,000, or about $1,000 per mde, and $4,000,000, or $175 per mile, for the rural roads. Ireland has a total of 58,334 miles of road which cost annually about $5, 000, 000, or $86 per mile.

France. — The roads are divided into three general classes — national roads, 23,756 miles, built and maintained entirely by the national government; departmental roads, 8,161 miles, maintained at the (xpense of the departments and 331,855 miles of vicinal roads, built and maintained by the communes with occasional subsidies by the national government. In addi¬ tion there are about 155,000 miles of rural lanes of entirely local importance. The national roads as well as most of the departmental roads are under the care of the corps of bridges and roads of the ministry of public works consist¬ ing of a complete, non-political organization from the highly trained engineers and adminis¬ trative officials down to the road men or cantonniers. Each cantonnier has immediate charge of about 2.8 miles of road. The average annual cost of maintaining the national roads is about $335 per mile, the departmental roads $190 per mile, and the vicinal roads about $110 per mile.

Germany. — The construction and mainte¬ nance of the public roads is in the hands of the several states without any control from the central authority. Classification and methods of management and control differ among the several states. In general, however, the roads are divided into state or provincial roads, under the control of the state or province, county or district roads under the district, and parish or local roads which are usually a local burden. There are approximately 36,000 miles of im¬ proved state roads distributed as follows : Prussia, 20,489 miles; Bavaria, 4,200 miles; Sax¬ ony, 2,267 miles; Baden, 1,890 miles; Wiirtemberg, 1,710 miles; and the other small states 444 miles. Of county roads Prussia has 38,400 miles, 14,598 miles of parish roads and 1,100 miles of private roads, all of which are improved with a hard surface. The total annual road expenditure in Prussia is about $35,000,- 000, of which the provinces pay 28 per cent, the districts 33 per cent, and the parishes 39 per cent.

Italy. — The roads of Italy aggregate a total of 92,000 miles divided as follows; National, 5,200 miles, built and maintained by the national government at an annual average cost of $275 per mile ; provincial roads, 27,800 miles, built and maintained by the provinces at an average cost of $185 per mile, and 59,200 miles of local roads provided for by the communes.

Norway. — The roads of Norway have a to¬ tal length of 17,550 miles, of which 6,570 are main roads for the construction of which the national government has contributed from two-thirds to three-fourths of the cost. The cost of maintenance is almost entirely a local bur¬ den, though under the supervision of a national director of roads.

Russia. — There are about 12,000 miles of post roads in Russia either under the control of the ministry of ways and communication or the department of war. The average annual maintenance cost of these roads is about $200 per mile. The cost of other roads is borne by the local communities.

Spain. — There are about 34,000 miles di¬ vided into state and provincial roads. The state roads are constructed and maintained by the general government through the department of public works at an annual average cost of about $240 per mile.

Sweden. — There are 36,000 miles of road in Sweden made up of

12,000 miles of main and 24,000 miles of district roads. On the main roads which are under the supervision of the royal board of road building and waterworks the government pays two-thirds of the cost of construction and 15 per cent of the maintenance. The total annual expenditure is about $70 per mile for all classes.

Switzerland. — Switzerland has no central road authority. The roads are left to the can¬ tons and their municipalities, though the federal government grants aid to certain more impor¬ tant roads, which have a total length of about 350 miles. The cantonal roads have a length of 875 miles and local roads 6,250 miles.

Andrew P. Anderson,

Highway Engineer, Office of Public Roads and

Rural Engineering, United States Department

of Agriculture.

ROAN ANTELOPE, a large and hand¬ some South African antelooe (Hippotragus equinus), related to the exterminated blaaubok and the beautiful sable antelope, which is of a reddish hue, with strong black and white mark¬ ings on the face. It is becoming very rare.

ROANNE, ro-an, France, town in the de¬ partment of the Loire and an important rail¬ way junction, 59 miles by rail northwest of Lyons. Extensive engineering workshops are located here, besides iron and copper foundiies, many dyeworks, pottery and tile works. Pop. about 36,000.

ROANOKE, Va., city in Roanoke County, on the Roanoke River and on the Norfolk and Western Railroad, 53 miles west of Lynchburg. Roanoke was formerly a leading tobacco market, but in later years has become the centre of a large section rich in iron mining and farm¬ ing interests. Roanoke has extensive iron manufacturing interests, rolling mills, tobacco factories, bottling works, box factories, loco¬ motive and car shops, canning factories, wheel and spoke factories, machine shops, saw mills, planing mills, woodenware factories, knitting and silk works, iron furnaces, bridge works, foundries, rolling mill, cotton mill, carriage and wagon factories and many smaller in¬ dustries. The Virginia College for young ladies and the National Business College for both sexes are located here, and the famous Hollins Institute for young ladies is located within seven miles of Roanoke. There is also a very

fine high school, and grammar and other schools, courthouse, city-hall. Academy of Mu¬ sic, and numerous fine business blocks. The city is governed by a mavor and city council elected by the people. There is an excellent paid fire department and electric street rail¬ ways and electric lights. The city has an im¬ proved sewer system and two waterworks plants. There are several national and State banks, excellent hotels, daily and weekly news¬ papers and monthly periodicals. Roanoke, prior to 1880 known as Big Lick, was incorporated in 1884, and has grown steadily in population, wealth and solid industry. Its present popula¬ tion is 50,842.

ROANOKE, a river in Virginia and North Carolina, formed by the confluence of the Dan and Staunton rivers at Clarksville, Va. It flows south and southeast for nearly 300 miles, enter¬ ing the Atlantic Ocean through Albemarle Sound. It is a tidal stream fully 80 miles from its mouth and is navigable to its source. The Dan and Staunton are navigable for small ves¬ sels for some distance from the Roanoke. At Halifax, N. C., there are rapids and falls which furnish considerable water power. A canal has been built around this obstruction to navigation.

ROANOKE COLLEGE, located at Salem. Va. It was established in 1853 under the auspices of the Evangelical Lutheran Church, and is governed by a self-perpetuating board of trustees. It offers a classical course, leading to the degree of A.B., and a business course, and has also a preparatory department. It is coeducational, but few women have enrolled. The college possesses a numismatic collection of considerable value, a library with about 25,000 volumes, and grounds and buildings valued at over $144,000. The endowment funds

amount to over $215,000 and the annual income to about $32,000. The annual enrolment of students is over 200; the faculty numbers 19.

ROANOKE COLONY, The, in American colonial history the name applied to a famous land grant of the Crown. In 1584 Sir Walter Raleigh, having obtained a large grant of land from Queen Elizabeth,

sent out 9 April, seven vessels and 108 settlers under the command of Sir Richard Grenville. After skirting the West Indies and Hispaniola, they landed at Roanoke, in North Carolina, 20 June. Ralph Lane was left in charge of the settlement and Grenville returned to England. During the following winter Lane made numerous exploring expedi¬ tions and suffered greatly from Indian attacks. In the spring he received some aid in men and supplies from Sir Francis Drake, but finally the settlers persuaded Drake to take them home. Soon after Grenville arrived with new settlers. These had been destroyed by the Indians when, in 1587, a new colony of Raleigh's, under White, came out. White himself returned to England. When he came back (1590) he found the colony vanished. It seems to have been destroved by the savages, though there is a theory that de¬ scendants of the colonists are still to be found among North Carolina half-breeds.

ROANOKE ISLAND, Battle of. After the capture by Union troops of fort Hatteras and Clark, at Hatteras Inlet (q.v.), 29 Aug. 1861, the Confederates began to erect works on Roanoke Island, to command the narrow chan¬ nel connecting Albemarle and Pamlico sounds, considered as the key to one-third of North Carolina, the possession of which by the Union forces would enable them to reach the railroad connecting Richmond with New Orleans. The Union authorities decided to seize the position, and 7 Jan. 1862 General Burnside, who had a division of 12,000 men, was ordered to seize and hold Roanoke Island, capture Newbern and Fort Macon, open the harbor of Beaufort and, if practicable, to advance from Newbern and seize the railroad to Goldsboro. On 7 January vessels carrying the troops set sail from Annapolis, and by night of the 10th more than 80 vessels of all kinds had rendezvoused at Fort Monroe, 20 being war vessels, carrying over 60 guns, under command of Flag-Officer L. M. Goldsborough. The fleet was divided into two columns under commanders S._ F. Hazard and S. C. Rowan. The expedition sailed from Fort Monroe on the night of the 11th, and after many mishaps, in which some vessels were lost, by 4 February had passed into Pamlico Sound, and orders were given for the advance on Roanoke Island. On the morning of the 5th the start was made, with 65 vessels in all, naval vessels and transports. On the 7th the armed vessels engaged the Confederate batteries on the west side of Roanoke Island, and also small gunboats, which were soon driven off. The forts were silenced and on the morning of the 8th, Burnside had over 8,000 troops and a battery ashore at Ashbv's Harbor. Confronted by Confederate works, manned by nearly 6,000 men, he had formed his division into three brigades, corrtmanded by Gens. J. G. Foster, Jesse L. Reno, and John G. Parke. The advance was ordered early in the morning, Foster leading, in the centre, Parke on

the right and Reno on the left. While Foster

pressed the front and engaged with his artillery, Reno marching at times waist-deep in the mud of the swamps, gained the right of the Con¬ federate position, Parke in the same manner gaining the left, and, after a more than three hours' fight, a simultaneous charge was made and the entire position carried. This cleared the road. Burnside marched to the head of the island, where the forts on the shore and their entire garrisons were captured. The Union loss was 37 killed 214 wounded and 13 missing. The Confederate loss was 23 killed, 58 wounded, 62 missing and about 2,650 cap¬ tured, including 159 officers. The Confederate gunboats went up Albemarle Sound to Eliza¬ beth City, pursued next morning by Com¬ mander Rowan, with 14 vessels. Rowan promptly attacked, and after a short but severe engagement, Lynch, the Confederate com¬ mander, ordered the abandonment of his boats, ran them aground and set them on fire. Rowan had two killed and six wounded. Having gained entire possession of Roanoke Island and the control of the inland waters of North Carolina, Burnside's next step was the capture of New¬ bern (q.v.). Consult (Official Records, } Vol. IX; the Century Company's (Battles and Leaders of the Civil WarP Vol. I. See New¬ bern, Operations at, in the Civil War.

E. A. Carman.

ROARING, a disease of horses whereby the air-passages are partially obstructed, giving rise, when the horse is briskly exercised, to a pecu¬ liar noise in breathing. The disease is due to inflammation of the larynx or of the windpipe, with wasting or paralysis of some of the laryn¬ geal muscles, whereby the glottis becomes con¬ tracted. The fluid discharged from the affected parts, changing into a tough, viscid substance, adheres to the larynx and upper part of the windpipe and further obstructs them. But the specific causes of roaring are various. It some¬ times follows strangles. Carriage-horses are more subject to it than saddle-horses, because of the injury done to the larynx by tight rein¬ ing. There are also various kinds of roaring, distinguished by the sounds, as whistling, wheezing, high-blowing and piping. The dis¬ order does not appear to be amenable to treat¬ ment, though in early stages, as when it pro¬ ceeds from catarrh or influenza, it may be re¬ lieved by blisters or setons. The disease renders a horse unsound, as it unfits him for the ordi¬ nary strain of work.

ROARING BUCKIE, common Scottish name for the red whelk (

Chrysodomous anti-quns) so-called because of the sound heard when held to the ear and believed by the unin¬ formed to be the murmur of the sea from which the shell came.

ROARING FORTIES, a sailor's term for a region of the great Southern Ocean lying south of lat. 40° to 45° S., where strong and often stormy west-northwest winds prevail. Owing to these winds the outward voyage to Australia by sailing vessels is made via the Cape of Good Hope and the homeward voyage via Cape Horn. The same name is sometimes given by analogy to a belt of the North Atlantic about 40° to 50° N.

ROASTING. See Cookery.

ROB ROY, a romance of the Scottish border, written by Sir Walter Scott and pub¬ lished anonymously in 1818, takes its name from the famous Highland brigand, Rob Roy Mac¬ Gregor Campbell, who is at the time of the story engaged in the lacobite plots which led to the uprising of 1715. The narrative is put into the mouth of Francis Osbaldison, son of a London merchant. Exiled to the home of his uncle, near the border, he falls in love with the highly unconventional Diana Vernon and incurs the hostility of Rashleigh Osbaldison, a dark villian, who is at first an adherent of and later a traitor to the Jacobite cause. In en¬ deavoring to recover certain papers stolen by Rashleigh, the loss of which will ruin the house of Osbaldison, Francis makes an expedi¬ tion to the Highlands and witnesses the excit¬ ing conflict between Rob Roy's outlaws and the forces which the government has sent to cap¬ ture him. He is befriended by the brigand, and after the suppression of the revolt suc¬ ceeds in winning the hand of Diana.

For bibliography, consult Ivanhoe.

James H. Hanford.

ROBALLO, family of American fishes (Centropomidce) comprising one genus and about 15 species. The family is characterized by an

elongated body, a pike-like head, ctenoid scales, a projecting lower jaw, dorsal fins well separated and villiform teeth. They are nearly all game fishes and of some food-value. Their habitat is salt or brackish water and their hab¬ its closely resemble the bass. The Pacific ro-balo (Centropomus viridis) is found from Baja, Cal., south to Panama. It reaches a length of two to four feet and is of value as a food-fish. The common robalo or snook (C . Un-decimalis) is the best known species and is also the largest and most abundant. It is very com¬ mon in West Indian and Florida waters. It reaches a length of three and one-half to four feet. It is valued as a food-fish in Porto Rico. Southward from Cuba to Pernam¬ buco is found the species Parallelus, which enters rivers and is sometimes found far from salt water. It attains one foot in length and is valued' as a food-fish. The roballo is said to take the hook readily and even to rise to the fly. Consult Jordan, D. S., and Evermann, B. W., (American Food and Game Fishes) (New York 1902).

ROBBER COUNCIL. See Eutyches.

ROBBER-FLY, bee-killer, many species of mostly large, slender and long-bodied (some¬ times stout) strong and active flies of the family Asilidcr, which prey upon many kinds of insects, by darting upon them in mid air and stabbing them with their dagger-like beaks.

ROBBER, PALM or COCOANUT CRAB, a large and powerful land-crab (Birgus latro) of the East Indies, related to the her¬ mit-crabs, which lives in a hole in the earth under trees, lining its burrow with the fibrous cocoanut husks, has an almost lung-like modifi¬ cation of the gill-cavity for breathing air di¬ rectly, yet visits the sea annually in droves to spawn. It goes abroad only at night and feeds on cocoanuts, though it does not climb for them, and is itself eaten in Amboyna and elsewhere. Darwin has graphically described how it tears

the husk from the cocoanuts and hammers on the round depressions at one end until entrance is effected. Consult Forbes, (A Naturalist's Wanderings5 (1885).

ROBBERY, is the wrongful taking, without a claim of right, of a thing of value from one's person against his will, or by force, or through placing him in fear. In the United States the offense is regulated by the statutes of the vari¬ ous jurisdictions, in some of which the degree of guilt depends on the nature of the act. Actual force need not be employed to induce fear, and fear may extend to a threatened

destruction of one's property or injurv to reputation. The law does not "hold that the property must be in the actual physical possession of one, or in contact with his person, but merely that it must be in his presence, or in his immediate control ; the property need not belong to the person from whom it is taken. Two or more persons may be equally liable for robbery if participating in any of the acts by which it is carried out. Pun¬ ishment for robbery is fixed by statute.

ROBBIA, rob'be-a, Luca della, Italian sculptor : b. Florence, 1400 ; d. 1482. In the Early Renaissance he appeared as the foremost artist of all his contemporaries, and created a new school of sculpture by his marble friezes for the organ-loft of the Duomo at Florence. These are still to be seen in the Bargello Palace of the same city. The work was completed in 1445 and represents in 10 panels, angels and boys singing and playing on various instruments, to the rhythmic movement of the dance. For re¬ fined and chastened fancy, skilful grouping and animated expression this masterpiece showed a vast advance on the hieratic sculptures of me¬ dievalism. The enthusiasm with which it was greeted was redoubled, when in conjunction with Michelozzo and Maso di Bartolommeo, he exe¬ cuted the bronze doors for the Old Sacristy of the Duomo (1446-64). His name is, however, especially associated with works in clay reduced to pottery in the kiln, and colored and glazed like faience. This faience sculpture was un¬ known before his time and in it he improved the common process of glazing by a new method all his own. Numberless were the reliefs, me¬ dallions, tympanum groups, altars and other decorations which he and his pupils produced in this style. He began by plain white reliefs on a flat blue ground; the flawless beautv of his profiles in many sculptures of this kind have been the inspiration of succeeding artists. But he gradually enriched the coloring by the addi¬ tion of other tints, some critics think, with a loss to classic purity and simplicity; yet the harmonious composition of his designs, the charm of expression which appears in every¬ thing he did, added to the boldness with which he ventured into a new field of plastic art have won for him a sort of unique glory among the artists of the Renaissance. His works and those of his pupils are met with in every part of Tus¬ cany, and some examples may also be seen in the museums of Europe. Among his most emi¬ nent pupils were his nephew, Andrea della Robbia (1437-1528) ; and the sons of this latter, Giovanni (1469-1529) and Girolamo (1488-1566). Consult Barbet de Jouy, (Les Della Robbia5 (1855) ; Cavalucci et Mohnier, (Les Della Robbia5 0884) ; Leander Scott, (Luca Della Robbia5 (1883).

ROBBIN -

ROBBIN, rob'm, Albert Farthing, Eng¬ lish writer: b. Launceston, Cornwall, 1 Aug. 1856. He entered journalism in 1871 and has long been London correspondent of the Bir¬ mingham Post. In addition to several comedies and other dramas he has published (Practical Politics or the Liberalism of To-day } (1888) ; (The Early Public Life of William Ewart Glad¬ stone } (1894), *etc.*

ROBBINS, rob'mz, Wilford Lash, Ameri¬ can Protestant Episcopal clergyman : b. Boston, Mass., 7 Aug. 1859. He was graduated from Amherst in 1881, studied at Cambridge Theo¬ logical Seminary, was ordained deacon in 1884 and held his first charge at Lexington, Mass., in 1885-87, where he was advanced to the priest¬ hood in the following year. He was appointed dean of the Cathedral of All Saints at Albany 1887-1903 and in the year last named became dean of the General Theological Seminary, in which relation he remained until 1916. He has published (An Essay Toward Faith > (1900) ; <A Christian's Apolegetic) (1902), *etc.*

ROBERT I, king of Scotland. See Bruce, Robert (3).

ROBERT II, king of Scotland, son of Wal¬ ter III, steward of Scotland, and Marjory, daughter of Robert Bruce ; b. Scotland, 2 March 1316; d. Dundonald Castle, Ayrshire, 13 May 1390. He was recognized as heir to the Scottish throne by Parliament in 1318, but superseded by a son afterward born to King Robert, who suc¬ ceeded him in 1329 under the title of David II. In 1333, Robert, then steward of Scotland, was a leader at Halidon Hill and in 1334 was ap¬ pointed joint regent with Moray. In 1338 — 41 he was sole regent and after the battle of Nev¬ ille's Cross in 1346, where King David was taken prisoner, was again made regent. After the death of David in 1371 Robert was declared king and was crowned shortly afterward, the first of the Stuart dynasty. He ratified a treaty with France in the first year of his reign, and continued a nominal truce with England until the succession of the English king, Richard II, with whom he waged two wars. In the latter of these Richard II and the Duke of Lancaster made successful forays into Scotland. In 1388 these were avenged by an invasion of England by two armies and the famous battle of Otter-burn (Chevy Chase) was then fought. The long-continued border wars and the disorders caused by the turbulent barons caused the king, whose

increasing age disinclined him to the arduous duties of reigning, to entrust the man¬ agement of the kingdom to his second son, the Duke of Albany, in 1389, and he then retired from public life.

ROBERT III, king of Scotland, eldest son of Robert II: b. Scotland, about 1340; d. Rothe¬ say, Bute, 4 April 1406. He was originally known as John Stuart, Earl of Carrick, but assumed the name of Robert on his coronation in 1390. He possessed little strength of mind and incapacitated for military service by his lameness, delegated, therefore, the guidance of military affairs to his brother, the Duke of Al¬ bany. The friends of the king's eldest son, the •Duke of Rothesay, forced the abdication of Albany in 1398 and war was renewed with Eng¬ land. Scotland was invaded for the last time by an English king in 1400, and in 1402 the Scottish troops met with disastrous defeat at

Homildon Hill. Albany then regained the re¬ gency, imprisoned Rothesay at Falkland Castle, where he starved him to death, and caused Robert III, in his terror of him, to send his second son James to France for safety. James was captured and imprisoned by the English and his father on learning of the event went into melancholy and died soon after. Scott's (Fair Maid of Perth> is based upon various incidents related above.

ROBERT, Christopher Rhinelander,

American philanthropist : b. Brookhaven, N. Y., 23 March 1802; d. Paris, France, 28 Oct. 1878. He was a merchant's clerk in Newr York for five years before engaging in business for him¬ self at New Orleans; and in 1830 he returned to New York, became head of the firm Robert and Williams and also president of a large coal and iron company. He amassed a fortune and in 1862 retired from business. He was a gener¬ ous benefactor of Hamilton College and of the Auburn Theological Seminary, but was chiefly interested in the American College at Constanti¬ nople, which was later named Robert College in his honor. His gifts to it during his life¬ time and by bequest totalled $461,000.

ROBERT, Henry Martyn, American mili¬ tary engineer and parliamentarian : b. Robert-ville, S. C., 2 May 1837. He was graduated from West Point in 1857, was assistant pro¬ fessor of natural philosophy, and later of mili¬ tary engineering there in 1857-58 and served on frontier duty 1858-61. He was on duty as an engineer officer through the Civil War, was promoted captain in 1863, and major in 1867, and served as professor of practical military engineering at West Point in 1865-67. In 1867— 90 and 1891-95 he was on duty in connection with river and harbor improvements, light¬ houses and fortifications. In 1890-91 he was engineer commissioner of the District of Co¬ lumbia. He was made president of the board of engineers for fortifications and of the New York and Philadelphia Harbor Line Boards, and division engineer of the southwestern divi¬ sion including river and harbor improvements from Pittsburgh to Galveston. He was pro¬ moted brigadier-general chief of engineers in 1901, and was retired shortly after. Since his retirement he has acted as president of the board which designed the Galveston seawall and grade raising, and was consulting engineer to design the causeway-bridge connecting Galves¬ ton Island with the mainland. In 1911 he planned the improvement of the port of Frontera, Tabasco, Mexico. He

is the author of (Rules of Order) (1876), and (Rules of Order Revised) (1915) ; (Index to Report of Chief of Engineers of the United States Army on River and Harbor Improvements from 1866 to 1887 5 (Vol. I, 1881; Vol. II, 1889).

ROBERT, Louis Leopold, French painter: b. Les Eplatures, near Chaux-de-Fonds, Switz¬ erland; d. Venice, 20 March 1835. His teach¬ ers were the copperplate engraver Girardet in Paris, and the painter David. In 1818 he visited Rome and the study of life among the common people there furnished material for some of his smaller genre pictures. He was especially happy in his representation of robber life in Italy, and his (Sleeping Brigand* in the National Gallery at Berlin is much admired. But it was at Naples that he found material for his first mas-

terpiece (The Improvisator 5 (1823). This was succeeded by (The Return from the Festival of the Madonna5 (1827), now in the Louvre; (The Arrival of the Reapers in the Pontine Marshes) (1830) in the Louvre; of which latter a replica with variations is in the Berlin Na¬ tional Gallery. In 1832 he visited Venice and completed (The Departure of the Fishermen of the Adriatic.5 An unrequited attachment for the Princess Charlotte Bonaparte preyed upon his mind and he committed suicide in Venice. In his pictures the life of the Italian common people is delicately idealized, and among his contemporaries his works were greeted as they appeared with the greatest enthusiasm.

ROBERT, Duke of Normandy, surnamed The Devil: d. Nicsea, Asia Minor, 22 July 1035. He was the younger son of Duke Richard II and ascended the throne in 1028 in succession to his brother, Richard III, whom he was said to have poisoned. The earlier years of his reign were passed in the subjugation of his vassals. Then ‘he interfered in various princely quarrels, restoring Baldwin IV of Flanders to his estates, and aiding Henry I of France against the plots of the latter’s mother. In 1034 he undertook an expedition against England, in support of his nephews, whom Canute had excluded from the

succession, but his fleet was wrecked off Jersey, and the attempt failed. He now set out on a pilgrimage to Jerusalem; and while re¬ turning died suddenly in Nicaea, poisoned, per¬ haps, by his servants. His heroic deeds and penance have given rise to numerous stories. (La Vie du terrible Robert le Diable, lequel fut apres l'homme de Dieu) appeared in 1496, and was much imitated. On it was based the grand opera (Robert le Diable,5 text by Scribe and Delavigne, music by Meyerbeer. William the Conqueror was his son. Consult Tardel, (Die Sage von Richard dem Teufel5 (1900).

ROBERT, Duke of Normandy, eldest son of William the Conqueror: b. about 1054; d. Cardiff, Wales, 10 Feb. 1134. In 1087 he suc¬ ceeded his father as Duke of Normandy, but not as king of England, and he made no serious effort to take the throne from his younger brother, William II, although he re¬ ceived offers of assistance in the project. His rule in Normandy proved irresolute, he lost the county of Maine, and was continually en¬ gaged in quarrels with his brothers. In 1096, however, Robert and William II reached an understanding, and Robert, pledging his duchy to William for five years in order to raise 10,000 marks, set out on the first crusade. He greatly distinguished himself during the opera¬ tions leading to the capture of Jerusalem and is said to have refused to become king of the new Latin Kingdom. He returned to Nor¬ mandy in 1100, to find William II dead and his younger brother, Henry, on the throne. He journeyed to England in 1101 to claim the succession but was persuaded to withdraw. In 1106, however, Henrv invaded Normandy, took Robert prisoner at the battle of Tinchebrai, 28 Sept. 1106, and kept him in prison the remain¬ ing 28 years of his life. While deprived of his liberty and detained successively in the Tower of London, and the castles of Devizes and Cardiff. Robert is said to have been other¬ wise well-treated. Consult Freeman. E. A., 'History of the Norman Conquest5 (1870-76); and (The Reign of Rufus5 (1882).

ROBERT OF BRUNNE. See Brunne, Robert of.

ROBERT COLLEGE, Constantinople, Turkey, so called after Christopher R. Robert of New York, its chief benefactor, was organ¬ ized by James H. and William B. Dwight, sons of the Rev. Harrison G. O. Dwight, an Ameri¬ can missionary to Turkey. It was opened in 1863, its financial support being guaranteed bv the philanthropy of Mr. Robert who died in 1878, and whose total contributions to the insti¬ tution amounted to $450,000. In 1864 the col¬ lege was affiliated with the University of New York. Its first president was the

Rev. Cyrus Hamlin, D.D., who at his resignation in 1877 was succeeded by the Rev. George Washburn, D.D. The curriculum is similar to that of the average American college ; while English is the principal language in use, instruction is also given in 13 other languages. The first home of the college was in a private house ; the two college buildings built in 1871 and 1891 re¬ spectively occupy a fine site on the Bosporus.

ROBERT ELSMERE, a novel by Mrs. Humphry Ward, published in 1885. It is a brilliant example of the embodiment in a work of fiction of intellectual problems of contem¬ porary interest and recounts the struggles of an Anglican clergyman who cannot accept all the miracles and dogmas of Christianity, while in deep sympathy with its spirit. The work had a phenomenal success, partly owing to the nature of its subject, and partly to its genuine literary merit. Aside from its intrinsic value, the sen¬ sation it produced entitles it to rank as one of the most remarkable books of its genera¬ tion.

ROBERT-FLEURY, ro-bar, fle-ri, Joseph Nicolas, French painter: b. Cologne, 8 Aug. 1797 ; d. Paris, 5 May 1890. In early life he studied under Gros at Paris, and after visiting the galleries and studios of Italy finally settled in the French capital. His works are dis¬ tinguished for impressive characterization and profound sentiment; and among them may be mentioned (Night of Saint Bartholomew's5 (1833) ; (Religious Conference at Poissy in 1561 5 (1840) ; (Jane Shore after her Condem¬ nation Insulted by the People5 (1850) ; (Sack of a Jew's House at Venice in the Middle Ages5 (1855) ; the last three are in the Luxembourg Museum. He also decorated with paintings the hall of the Chamber of Commerce at Paris.

ROBERT-FLEURY, Tony, French painter : b. Paris, 1 Sept. 1837. He was a pupil of Delaroche and Cogniet and is known for his historical and genre pictures, as well as for portraits. Among his best works are (Warsaw on 6 April 1861 5 ; (Scene During the Polish In¬ surrection5 ; (The Old Women of the Piazzo Ravona, Rome5 (1867, in the Luxembourg) ; <The Daughters of Danaus5 (1873) ; Char¬ lotte Corday at Caen in 17935 (1874) ; (The Sack of Corinth5 (1870, in the Luxembourg) ; and a ceiling picture in the Luxembourg (The Apotheosis of French Sculpture.5

ROBERT OF GLOUCESTER, English historian. He was a monk in the abbey of Gloucester in the latter half of the 13th century, but of his life there is nothing known. His history of England extends from the fabulous Brutus to about 1300 a.d. The work is written

in Anglo-Saxon, showing the transition stage of. the language previous to Chaucer, and its chief value is linguistic. It is in verse, and contains upward of 10,000 lines and is filled with the most absurd fables. Numerous manu¬ scripts prove its popularity. These are found in the Bodleian, Cottonian, Herald's College, and other libraries. Thomas Hearne printed it at Oxford in 1724, but the best edition is that of Aldis Wright in the Rolls series (two vols. 1887). It is partly based on earlier works, is wholly destitute of originalitv and some have thought it a translation from the French.

ROBERT GUISCARD, ges'kar, The Re¬ sourceful, Norman-Italian soldier and noble, b. near Contances, Normandy, c. 1015: d. Cephalonia, Greece, 15 July 1085. His father was Tancred of Hauteville. His brothers William of the Iron Arm, Dgo and Hemphrey having gained distinction in Italy, Robert who had developed into a strikingly handsome man, tall and blonde, with a dominating voice, as de¬ scribed by Anna Comnena, in 1046, in his 30th year followed them, but was not warmly wel¬ comed. He, however, soon became a leader of men during the tumultuous period of recon¬ struction then being attempted in Italy. In 1057 he succeeded his brother Humphrey as Count of Apulia, and while their brother Richard conquered Capua, Robert with his youngest brother Roger completed the conquest of Apulia and Calabria. Previously looked on with disfavor by the papal authorities, in 1059 Pope Nicholas II concluded a treaty with Robert creating him Duke of Apulia and Cala¬ bria and Lord of Sicily provisionally, on the conquest of the island. This, however, was not accomplished until 1090, five vears after the death of Robert. He incurred excommunica¬ tion in 1074 for attacking Benevento, a uapal possession, but in 1080 was reconciled to Pope Gregory VII. who needed his assistance against Henry IV. Having become master of southern territorial Italy, in 1081 he embarked on a victorious campaign in the Balkan Peninsula against the Greek Byzantine Empire, champion¬ ing the cause of Michael VII, who had been deposed by Alexius Comnenus, and whose son was his prospective son-in-law. In 1083 he was recalled to the aid of Pope Gregory VII,

besieged by Henry IV in the castle of Sant' Angelo, Rome. He raised the siege, quelled a revolt of the citizens by a three days' sack of the city in May 1084, and re-established the Papacy. Returning to the Greek campaign he died of fever in the following year at Cephalonia and was buried at Venosa. Consult Amatus, <Ystoire de li NormanP (ed. by Delarc, Rouen 1892) ; Chalandon, F.. <Histoire de la domination normande en Italie et en Sidle* (Paris 1907) ; Comnena, A., (Corpus scriptores historicse Byzant* (Bonn 1839) ; Heinneman, L. v., (Geschichte der Normannen in Unteritalien und Sizilien) (Leipzig 1894).

ROBERT OF MOLESME, mo-lam, Saint, founder of the Cistercians : b. Champagne. 1018; d. Molesme, _ 1110. At 15 he became a Benedictine monk in the abbey of Montier-la- Celle, where on account of his high and re¬ ligious character he was elected prior while still the youngest member of the community. He was afterward appointed abbot of Saint Michael de Tonnerre. He was induced to leave this

abbey through the recalcitrancy of the monks. In Colan, however, a desert place near the abbey, there lived certain anchorites, and at their request he became their superior; they thence removed to the forest of Molesme, where they built themselves cells and an oratory dedi¬ cated to the Holy Trinity (1075). Here the community became relaxed in discipline through the bounteous contributions proved by the bishop of Troyes and others. Robert, therefore, left them and eventually settled with some de¬ vout members of the abandoned community at a place called Cistertium, or Citeaux, five leagues from Dijon in the diocese of Chalons. They chose a spot in the uninhabited forest with the consent of Walter, bishop of Chalons, and Renand, viscount of Beaune, lords of the territory. The day of their establishment was Saint Bennet's Day, 21 March 1098, from which must be dated the foundation of the Cistercian Order. The rule established by Saint Robert allotted four hours for sleep, four for singing the offices, four for manual labor and four for study. Thus was the great, practical and highly useful Cistercian Order founded ; and it was presided over by Abbot Robert until his death.

ROBERTS, Benjamin Stone, American soldier: b. Manchester, Vt., 1811; d. Washing¬ ton, D. C., 29 Jan. 1875. He was graduated from West Point in 1835, and in 1839 became chief engineer in the construction of the Cham¬ plain and Ogdensburg Railroad. He was as¬ sistant geologist of New York State in 1841, and in 1843 wras admitted to the bar and en¬ gaged in law practice. At the outbreak of

the Mexican War he re-entered the army with rank as lieutenant. He served at Vera Cruz, Cerro Gordo, Contreras, Churubusco. Matamoras and the Galajara pass, was promoted captain, re¬ ceived brevet rank of lieutenant-colonel, and at the close of the war was voted a sword of honor by the Iowa legislature. In 1861 he was commissioned brigadier-general of volunteers and served under General Pope as chief of cavalry in the Army of Virginia. He was present at Cedar Mountain and the second bat¬ tle of Bull Run and at the close of the war was brevetted brigadier-general in the regular army. In 1866 he became lieutenant-colonel of cavalry and in 1868 accepted the chair of militarv science at Yale which he occupied until his retirement in 1870. He was the inventor of the Roberts breech-loading rifle.

ROBERTS, Benjamin Titus, American Methodist clergyman : b. Leon, Cattaraugus County, N. Y,, 1823; d. Chili, N. Y.. 27 Feb. 1893. He was graduated at Wesleyan Univer¬ sity in 1848, joined the Genesee Conference of the Methodist Episcopal Church, but in 1860 was one of the seceders from that body who founded the Free Methodist sect, of which he became the first general superintendent. In the same year he began a monthly magazine called The Earnest Christian, and in 1865 founded the Cheeseborough Academy at North Chili. N. Y., serving as its president from 1869 until his death. He wrote (Fishers of Men) ; (Whv Another Sect> ; (First Lesson in Money) ; Or¬ daining Women.)

ROBERTS, Brigham Henry, American journalist and politician: b. Warrington, Lan¬ cashire, England, 13 March 1857. In the sum¬ mer of 1866 he emigrated with his parents to

Davis County, Utah. In 1878 he was graduated from the University of Utah, and soon after¬ ward was called by the Mormon Church to its missionary service. After laboring for some years as a missionary he was elected to a high office in the church. He also engaged in jour¬ nalism and was editor-in-chief of the Salt Lake Herald. In 1895 he was a member of the State constitutional convention. At the first State election he was the Democratic nominee for Representative to Congress, but was de¬ feated. In 1898, however, he was elected by a large majority. His election created wide¬ spread agitation throughout the country, and on 25 Jan. 1900 the House of Representatives by an overwhelming majority voted to exclude him as constitutionally ineligible, as a polygamist, to a seat in that body. He is the author of (The Gospel' (1888) ; (Life of John Taylor' (1892) ;

(Outlines of Ecclesiastical History) (1893) ; Succession in the Presidency of the Church' (1893); (A New Witness for God> (1895); (Missouri Persecutions) (1900) ; (The Rise and Fall of Nauvoo) (1900) ; (Mormon Doctrine of Deity) (1903) ; (Defense of the Faith and the Saints) (2 vols. 1905). He also edited numer¬ ous volumes of Mormon Church history.

ROBERTS, Charles George Douglas,

Canadian author: b. Douglas, near Fred¬ ericton, New Brunswick, 10 Jan. 1860. He was educated at the University of New Brunswick, in 1883-84 was editor of the Toronto Week; in 1885-87 was professor of English and French literature in King's College (Windsor, N. S.) ; and was professor of economics and interna¬ tional law from 1887 until his resignation in 1895, since when he has lived in New York. His reputation was first made as a poet with a gift of melody, a clear and grave manner, and a particular felicity, noticeable in the Canadian school, in pictures of nature. Later, he be¬ came equally known for his prose work in (The Heart of the Ancient Wood) (1900), and (The Kindred of the Wild) (1902), the latter one of the most successful of imaginative treat¬ ments of wilderness life. The collection of short stories, (Earth's Enigmas ' (1896), also is marked by an interesting individual quality. Among Roberts' other volumes are (In Divers Tones) (1887) ; (Ave: An Ode for the Shelley Centenary) (1892) ; (Songs of the Common Day-* (1893) : (The Raid from Beausejour' (1894) ; (A History of Canada' (1897) ; (The Book of the Native'

(1897) ; (The Forge in the Forest' (1897) ; (By the Marshes of Minas' (1900); (The Book of the Rose' (1903).

ROBERTS, David, English painter: b. Edinburgh, 24 Oct. 1796; d. London, 25 Nov. 1864. In 1818 from being a house painter he advanced to the profession of scene painter, and in 1821 painted scenery for the stage of Drury Lane, London. All this while he was studying drawing and oil painting, and in 1826 and 1827 he attracted attention by his pictures of Rouen and Amiens cathedrals. Later on he traveled in Spain, Morocco, Egypt, Palestine, Italy, Bel¬ gium, making drawings of great buildings and landscapes with picturesque edifices, and work¬ ing them up into pictures. Among his works ihe following are the most noteworthy: the drawings from Spain for the landscape An¬ nual' (1835-38), and illustrations for the volume entitled (The Holy Land, Syria, Idumea,

Arabia, Egypt, and Nubia' (1842). His other pictures represent numerous interiors of churches; as Saint Miguel at Xeres, Holy Nativity at Bethlehem, Saint Jean at Caen, Saint Paul at Antwerp, Saint Peter's at Rome, the cathedrals of Milan and Seville. Among his re¬ ligious historic pictures are (Departure of the Israelites from Egypt' (1829) ; (Ruins of the Great Temple at Karnac' (1845) ; destruction of Jerusalem' (1849), which were followed by (Rome' (1855), and (Grand Canal at Venice' 0856). Roberts' style was essentially spectacu¬ lar; he produced grand, broad effects, with magnificent architectural arrangements, to which the details are of course generally sacrificed.

ROBERTS, Edmund Quincy, American diplomat: b. Portsmouth, N. H., 29 June 1784; d. Macao, China, 12 June 1836. He engaged in a mercantile career at 13, lived in Buenos Aires and afterward in London and' had gained con¬ siderable shipping interests when he returned to the United States at the age of 24. He arranged preliminary negotiations with the sultan of Zan¬ zibar in 1827, resulting in friendly relations and a satisfactory treaty with the United States, and in 1832 was sent to Muscat, Siam and Cochin-China as a special diplomatic agent to secure commercial treaties. He returned in 1834 and in 1835 was sent on a similar mission to Japan, but died en route. Author of (Embassy to the Eastern Courts' (1837). Consult Ruschen-berger, W. S. W., (A Voyage Around the World, Including an Embassy to Muscat and Siam' (1838).

ROBERTS, Edwin Ewing, American poli¬ tician : b. Pleasant Grove,

Cal., 12 Dec. 1870. In 1890 he was graduated at the California School of Elocution and Oratory, San Jose, and in 1891 at the State Normal School of San Jose. In 1891-99 he taught school, was ad¬ mitted to the bar in 1899 and has since been practising at Carson City, Nev. He served five terms as district attorney of Ormsby County, Nev., in 1900-08, and in 1911-19 w'as member of the 62d to the 65th congresses. In 1918 Mr. Roberts was Republican choice for United States Senator from Nevada.

ROBERTS, Ellis Henry, American finan¬ cier: b. Utica, N. Y., 30 Sept. 1827; d. 8 Jan. 1918. He was graduated from Yale in 1850 and in 1851 became editor and proprietor of the LTtica Morning Herald. He sat in the State legislature in 1867, was a member of Congress 1871-75, afterward continuing his editorial work until 1SS9, when he was appointed assistant treasurer of the United States. In 1893-97 he was president of the Franklin National Bank in New York, and after 1897 was United States treasurer. Lie published Government Reve¬ nues' (1884) ; (The Planting and Growth of the Empire State' (1887).

ROBERTS, George Evan, American au¬ thority on finance and director of the United States mint: b. Delaware County, Iowa, 19 Aug. 1857. He was educated in the public schools and in 1878-1909 was proprietor of the Fort Dodge Messenger. He was State printer of Iowa in 1882-89, and was director of the United States mint in 1898-1907 and 1910-14. He has since been assistant to the president of the National City Bank of New York. Author

of (Coin at School in Finance5 (1895) ; (Iowa and the Silver Question 5 (1896) ; ‘Money,

Wages and Prices) (1897) ; (Business After the War5 (1916), *etc.*

ROBERTS, Howard, American sculptor: b. Philadelphia, 1843 ; d. Paris, 19 April 1900. He studied at the Pennsylvania Academy of Fine Arts and in 1866 went to Paris and studied under Dumont and Gumery at the ficole des Beaux Arts. In 1875 he established a studio in Philadelphia and at the Centennial Exhibition exhibited a statue, ‘La Premiere Pose,5 that created a sensation on account of its superior technical qualities. He received one of the three medals awarded to American sculptors. Other works are <Eleanor) ; (Hester Prynne5 ; <Hypatia) ; ‘Lot’s Wife,5 nearly all being at the Pennsylvania Academy.

ROBERTS, Isaac Phillips, American agriculturist and educator : b. Seneca County, N. Y., 24 July 1833. After several years’ con¬ nection with the agricultural department of the State College of Iowa he became connected with Cornell University. He was professor of agriculture and dean of the faculty of agricul-true there in 1873-94; director of the agri¬ cultural experiment station in 1888-1903, and professor emeritus and lecturer on agriculture from 1903. He was for many years assistant editor of The Country Gentleman; wrote about 1,200 articles for agricultural papers, and was also author of (The Fertility of Land) (1898) ; (The Farmstead) (1900) ; (The Farmers’ Busi¬ ness Handbook (1903) ; (The Horse) (1905) ; (The Autobiography of a Farm Boy) (1916).

ROBERTS, John Bingham, American sur¬ geon and author: b. Philadelphia, Pa., 29 Feb. 1852. He was graduated at the University of Pennsylvania in 1871, received the degree of A.M. in 1874, and that of M.D. at Jefferson Medical College in 1874. He was formerly attending physician and lecturer on clinical medicine at Jefferson Medical College Hospital ; was president of the Philadelphia County Medi¬ cal Society, also of the Medical Society of the State of Pennsylvania, Philadelphia Academy of Surgery, Philadelphia

Polyclinic and College for Graduates in Medicine, American Academy of Medicine, and section on anatomy of the first pan-American Medical Congress; and for¬ mer vice-president of the Pathological Society of Philadelphia and of the American Surgical Association. Dr. Roberts is treasurer of the College of Physicians of Philadelphia; Fellow of the American Association for Advancement of Science, the American Medical Asso¬ ciation and membre original de la Societe internationale de chirurgie. He was for¬ merly lecturer on anatomy and surgery in the Philadelphia School of Anatomy; lecturer on anatom}'-, University of Pennsylvania ; professor of surgery in the Woman's Medical College of Pennsylvania; Muetter lecturer on pathology of the College of Physicians of Philadelphia, and surgeon to various hospitals in Phila¬ delphia. He is professor of surgery in the Philadelphia Polyclinic and College for Gradu¬ ates in Medicine. Dr. Roberts has published (Paracentesis of Pericardium5 (1880); (Compend of Anatomy > (1881) ; < Surgical Delusions a-nd Follies5 (1884) ; 'Treatise on Modern Sur- (1890); 'Modern Medicine and Homce- > (1895); 'Fracture pf Radius5 (1897) ;

gery5

‘Surgery of Human Brain5 (1897) ; ‘Notes on; Modern Treatment of Fractures5 (1898) ; ‘De¬ formities of Face5 (1900) ; ‘The Doctor’s Duty to the State5 (1908) ; ‘Surgery of the Face5 (1912) ; ‘Treatise on Fractures,5 with James A. Kelly (1916). He has contributed articles to systems and encyclopaedias «of medi¬ cine and surgery (Bryant, Holmes, Ashhurst, Dennis, Pepper, Keen) and Transactions of the American Surgical Association and other periodicals.

ROBERTS, Morley, English novelist and journalist: b. London, 29 Dec. 1857. After study at Owens College, Manchester, he went, in 1874, to Australia, and there worked on railways in Victoria and as a sheep and cattle rancher in the New South Wales bush. Then he was be¬ fore the mast in merchant ships, and after some experience in the quartermaster-general’s de¬ partment of the British war office and in the India office, set out again traveling, visiting in 1884-86 many of the western United States, Canada, British Columbia and Manitoba, and later the South Seas. His hardships and adven¬ tures have lent a certain element of vigor to his stories, which are better known in England than in the United States and include ‘King Billy of Ballarat5 (1891) ; ‘The Reputation of George Saxon 5 (1892) ; ‘Red Earth5 (1894) ; ‘The Degradation of Geoffrey Alwith5 (1895) ; ‘The Great Jester5 (1896) ; ‘The Circassian5 (1896; with Max Montesole), an interesting book of Eastern life; ‘The Keeper of the Waters5 (1898) ; ‘The Colossus5 (1899), which, as giving a portrait of Cecil Rhodes (q.v.), was perhaps most talked of among Roberts’ works; ‘Immortal Youth5 (1902); ‘The Way of a Man> (1902) ; ‘The Promotion of the Admiral5 (1903) ; ‘Bianca’s Caprice5 (1904) ; ‘Lady Penelope5 (1905) ; ‘Captain Baalaam5 (1905) ; ‘The Idlers5 (1905) ; ‘The Prey of the Strongest5 (1906) ; ‘The Blue Peter5 (1907) ; ‘The Flying Cloud5 (1907) ; ‘Lady Anne5 (1907) ; ‘Captain Spink5 (1908) ; ‘David Bran5 (1908) ; ‘Midsummer Madness5 (1909) ; ‘Sea Dogs5 (1910) ; ‘The Wonderful Bishop5 (1910) ; ‘Thorpe’s Way5 ; ‘Four Plays5 (1911) ; ‘The Man who Stroked Cats5 ; ‘The Private Life of Henry Maitland5 (1912) ; ‘Gloomy Fanny5 (1913) ; ‘Time and Thomas Waring5 ; ‘Sweet Herbs and Bitter5 (1914).

ROBERTS, Oran Milo, American jurist and governor of Texas : b. Laurens District, S. C., 9 July 1815; d. Austin, Tex., 19 May 1898. He was graduated at the University of Alabama in 1836, was admitted to the bar in 1837 and engaged in practice. He served in the State

legislature in 1839-40, and in 1841 re¬ moved to Texas. He became district attorney in 1844, and after Texas' admission to the United States was district judge in 1846-51. He was associate justice of the Supreme Court of Texas in 1857-61. He served in the Con¬ federate army in 1862-64, and was then ap¬ pointed chief justice of the Supreme Court of Texas. He was elected to the United States Senate in 1866, but was not permitted to take his seat. He was again chief justice of the Texas Supreme Court in 1874-79; was gov¬ ernor of Texas in 1879-83, and was subse¬ quently professor of law at the University of Texas. Author of 'Governor Roberts1 Texas5

(1881).

ROBERTS, Robert Richford, American Methodist bishop: b. Frederick County, Md., 2 Aug. 1778; d. Lawrence County, Ind., 26 March 1843. He removed with his family in 1785 to Ligonier Valley, western Pennsylvania, and was brought up on the frontier. He obtained Methodist books, studied for the ministry, in 1802 was licensed to preach, served as an itiner¬ ant preacher for several years, and later was in charge of important pastorates in Baltimpre and other cities. In 1816 he was elected bishop and soon after removed to Indiana. He did much for Indian missions, and among the In¬ dians he was known as <(the grandfather of all the missionaries. M Consult .Charles Eliot, (Life of Bishop Roberts > (1853).

ROBERTS, William Henry, American Presbyterian clergyman: b. Holyhead, Wales, 31 Jan. 1844. He was graduated at the College of the City of New York in 1863; at Princeton Theological Seminary in 1873; and was ordained in 1873. He was statistician of the Treasury Department at Washington, D. C., in 1863-65, and assistant librarian of Congress in 1866-71. He was pastor at Cranford, N. J., in 1873-77; librarian at the Princeton Theological Semi¬ nary in 1878-86; and professor of practical theology at Lane Theological Seminary, Cin¬ cinnati, Ohio, in 1886-93. In 1895-1900 he was acting pastor at Fourth Church, Trenton, N. J. He occupied many important church organiza¬ tion offices, was moderator of the general as¬ sembly in

1907, and as its secretary edited its minutes in 1884—1914. Author of (History of the Presbyterian Church) (1888) ; (Laws Re¬ lating to Religious Corporations) (1896); Man¬ ual for Ruling Elders) (1897), *etc.*

ROBERTS, William Milnor, American civil engineer: b. Philadelphia, 12 Feb. 1810; d. Brazil, South America, 14 July 1881. As early as 1831 he was senior principal assistant engineer on the Allegheny Portage Railroad, and in 1835 he planned and built across the Susquehanna River at Harrisburg the first com¬ bined railroad and highway bridge in the United States. During the next 20 years he was engi¬ neer or contractor on many American railroads and canals. In 1857 he went to Brazil and undertook the construction of the Dom Pedro II Railroad. During 1866-68 he was United States civil engineer in charge of improvements of the Ohio River ; from 1868-70 associate con¬ tractor with James B. Eads in building the bridge across the Missouri at Saint Louis. In 1870 he became chief engineer of the Northern Pacific Railroad, and in 1874 visited Europe on an observation tour of jetties as member of the commission of civil and military engineers to report on plans for the improvement of the mouth of the Mississippi River. In 1879 the emperor of Brazil appointed him on a commmis-sion of hydraulic engineers to report on harbors and rivers of Brazil, and in prosecution of these labors he died of a fever. He was president of the American Society of Civil Engineers in 1879.

ROBERTS OF KANDAHAR, PRE¬ TORIA AND WATERFORD, Frederick Sleigh, 1st Earl, British soldier: b. Cawnpore, India, 30 Sept. 1832; d. Saint Omer, France, 14 Nov. 1914. Son of General Sir Abraham Roberts ; he was educated at Eton, Sandhurst and Addiscombe ; and was commissioned sec¬ ond lieutenant, Bengal artillery in 1851. At

the outbreak of the Indian mutiny he was dep¬ uty assistant quartermaster-general, and fought at the siege and capture of Delhi and at the second relief of Lucknow. He won the Vic¬ toria Cross at the action of Kali Nadi by re¬ covering, single-handed, a standard with which some sepoys were making off. In 1863 he was employed in the Umbeyla campaign, and four years later accompanied the Bengal brigade to Abyssinia under Gen. Donald Stewart. For his services he was made brevet lieutenant-colonel, and in 1871 became a C.B., after serv¬ ing with the Lushai expeditionary force. When in 1878 the war with Afghanistan broke out, he was placed in command of the Kurram field force. At the close of the first phase of the war Roberts was

awarded the thanks of both houses of Parliament and made a K.C.B. Then came the Kabul massacre. The Indian government was unprepared; the force under Roberts was the only one in a position to strike for Kabul. He successfully fought his way through and spent several months of continual fighting around Sherpur. Eventually matters quieted down and the war was considered over when in July 1880 Ayub Khan defeated General Burrows' brigade at Maiwand and be¬ sieged General Primrose in Kandahar. Help¬ lessness seized the British government, but Rob¬ erts saved the situation. He set out with fewer than 10,000 men on the 313 miles' journey from Kabul to Kandahar. It was a daring and highly risky undertaking to lead such a small force through a wild and hostile country without a base of operations or communications of any kind, and toward a point presumably already in the hands of the enemy. For four weeks the world heard nothing of Roberts and his column. They reached Kandahar, raised the siege and completely defeated Ayub Khan with a loss of 2,000 men, whilst the British losses amounted to only 248 killed and wounded. Again he re¬ ceived the thanks of Parliament and was cre¬ ated a baronet. His next post was that of commander-in-chief in Madras. The Majuba Hill disaster occurred 27 Feb. 1881 and Britain once more turned to General Roberts to re¬ trieve its fortunes. He was sent to South Africa, but only remained there 24 hours, peace having been concluded in the meantime. In 1885 he was appointed commander-in-chief in India, and shortly after took charge of the final operations in the Burma War. The next seven years, though years of peace, brought no rest to the strenuous soldier. He built for¬ tifications, strengthened and safeguarded the frontiers, prepared defense schemes, established regimental institutes, introduced skilled nursing in the military hospitals, improved the shooting of British as well as native troops, and devised many other benefits which have permanently written his name over the Indian Empire. In 1893 he completed 41 years' service in India. After a spell of rest Lord Roberts took com¬ mand of the forces in Ireland, and it seemed that his fighting days were over. Perhaps he himself wished it, for 44 years of toil and hard¬ ship under foreign skies had left their mark upon him. He had behind him a career and a reputation that the most ambitious might envy, but fate demanded that his life's work should be crowned by yet another effort — perhaps his greatest. To the old soldier it was a crown

more of sorrow than glory. His only son fell fighting at Colenso, 16 days after winning the Victoria Cross. In his 68th year Lord Roberts responded once more to his country's call ; the eyes of the British Empire turned instinctively to the one man who, in their estimation, was the man to redeem the melancholy blunders and disasters of the South African War. Nor were their hopes disappointed. He returned to Eng¬ land in 1900, after the capture of Pretoria and Bloemfontein, leaving Lord Kitchener to con¬ tinue and wind up the guerrilla fighting. Roberts was then appointed commander-in-chief of the British army, made an Earl and a K.G., and was formally thanked for his services by King Edward VII. Parliament also voted him a grant of $500,000. He served in his new com¬ mand until its abolition in 1904, when he retired The last 10 years of his life were devoted to exhorting his countrymen to place their great heritage in such a condition of strength and preparedness that they might be able to regard the unknown future with that confidence born of timely sacrifice and prudent foresight. He was fully aware of Germany's designs and preparations for a war of world domination, but to a large extent his voice fell on deaf ears. In November 1914 he died while on a visit to the British line, resisting the German invasion of France. He was given a public funeral in Saint Paul's Cathedral. The earldom de¬ scended, by special remainder, to his daughters and their issue. Lord Roberts published (The Rise of Wellington (1895) ; (Forty-one Years in India) (1897; new ed., 1915). Consult Cob¬ ban, J. M., (The Life and Deeds of Earl Rob¬ erts5 (4 vols., London 1901) ; Forrest, Sir George, (The Life of Lord Roberts) (New York 1914) ; Menpes, M., (Lord Roberts) (New York 1915) ; Vickers, Roy, (Lord Roberts: The Story of His Life5 (London 1914).

ROBERTSON, Archibald Thomas, Amer¬ ican Baptist theologian : b. near Chatham, Va., 6 Nov. 1863. He was educated at the Southern Baptist Theological Seminary; became asso¬ ciated with its teaching staff in 1888, and since 1895 has been professor of theological inter¬ pretation there. Author of (Syllabus of New Testament Syntax5 (1900) ; (Short Grammar of the New Testament5 (1908) ; (The Glory of the Ministry5 (1911); Practical and Social Aspects of Christianity5 (1915)

; Studies in the New Testament5 (1915).

ROBERTSON, Frederick William, Eng¬ lish clergyman: b. London, 3 Feb. 1816; d. Brighton, ‘ 15 Aug. 1853. He was ordained in 1840, and was graduated from Brasenose College, Oxford, in 1841 ; in that year he was made curate of Christ Church, Cheltenham ; and from 1847 until his death was pastor of Trinity Chapel, Brighton. His eloquence was remarkable, and soon extended his renown far beyond local limits. He was an eclectic in theology, and de¬ clared for no party in a time when the clergy were generally partisans. His frequent dissent from various positions of the schools of thought brought upon him numerous attacks, whose im¬ portance he was wont to overestimate. His views were colored by study of the Germans, and de¬ veloped considerably during the progress of his ministry. His mind was positive, original and without fear; and his constant labor greatly affected his health. He was deeply interested

in the workingmen’s institute, which he founded at Brighton, and whose work he made very effective. His Sermons5 (1855-90), though de¬ rived from inadequate shorthand notes or from recollections prepared by himself, have been very widely read. His other important work has been collected in his ‘Literary Remains.5 Consult the (Life and Letters5 by S. A. Brooke

(1865).

ROBERTSON, James, English royal gov¬ ernor of New York: b. Fifeshire, Scotland, about 1720; d. London, England, 4 March 1788. He entered the army and after various services sailed for America in 1756, was appointed major-general of the royal troops raised in America and barrack-master at New York. He commanded a brigade at the battle of Long Island in 1776 and after Andre’s capture made an earnest effort to secure his release. In 1779 he was appointed royal governor of New York, and in 1782 received rank as lieutenant-general. He returned to England in the following year. His reputation was that of an avaricious and supercilious officer and in his position as gov¬ ernor he was charged with arbitrary measures.

ROBERTSON, James, American pioneer : b. Brunswick County, Va., 28 June 1742; d. Chickasaw region, Tenn., 1 Sept. 1814. In 1769 he accompanied Daniel Boone (q.v.) on the latter’s third exploration, and

stopping at Watauga (now Elizabethton, Tenn.), planted corn. In 1770 he returned thither with a band of North Carolinian settlers. The settlement soon numbered some 200. Both North Caro¬ lina and Virginia asserted jurisdiction over it, but neither colony offered protection; and it was left an independent outpost of civilization. With John Sevier, Robertson became the head of the communities which gathered about the Holston and Watauga. In 1777 he was com¬ missioned agent of North Carolina among the Cherokees, and during his residence of more than a year thwarted the British agent and kept at peace the great body of Cherokees and Creeks. With a party of settlers he set out in 1779 for the French Lick of the Cumber¬ land, and on 25 December made the beginnings of a town on the site of Nashville, then 15 days' journey from the westernmost white con¬ fines. A fort built, a military organization was made, with Robertson as colonel. Troubles in¬ creased. Provisions were low, and the Indians hostile. He detached the Chickasaws and Choc¬ taws from their English alliance and concluded a treaty with the Cherokees. He also defended the settlement against the Creeks, who were abetted by the Spanish authorities of Louisiana; and refused to organize a separate state in alliance with Spain. In 1790 Robertson was commissioned United States brigadier-general, and latterly he was government Indian agent. He was well fitted for his frontier career, and especially successful in his dealings with the savages. His favorite saying, (<Man proposes, but God disposes,55 he always insisted was somewhere in the Book of Job. Consult the <Life5 by Putnam (1859) ; Gilmore, (The Rear Guard of the Revolution5 (1886), and Harper's Magazine, February 1888, pp. 420-426.

ROBERTSON, James, Canadian Presbvterian clergyman : b. Dull, Scotland, 24 April 1839; d. Toronto, Canada, 4 Jan. 1902. He re¬ moved to Canada with his family in 1855, and

was educated at the University of Toronto, the Princeton Theological Seminary and the Union Theological Seminary, New York. He was pastor at Norwich, Windham and East Oxford, Ontario, in 1869-74, and of Knox Church, Win¬ nipeg, in 1874-81 ; and was lecturer at Manitoba College, Winnipeg, from 1877. In 1881 he was appointed superintendent of Presbyterian mis¬ sions for Manitoba and the North West Terri¬ tory, and achieved a high reputation as an organizer of ability and courage in dealing with the problems of his missions in the wilderness. He was the <(sky pilot55 of Ralph Connor's (q.v.) tales. He was moderator of the general assembly in 1895.

ROBERTSON, James Burton, English historian: b. London, 15 Nov. 1800; d. Dublin, 14 Feb. 1877. He was educated at the Roman Catholic College of Saint Edmund, near Ware, and was called to the bar in 1825. Later he studied literature, philosophy and dogmatic theology in France. His first important publica¬ tion was a translation of Frederick Schlegel's (Philosophy of History) (1835). He lived in Germany in 1851-54, and here produced a trans¬ lation of Mohler's (Symbolism or Exposition of Doctrinal Differences Between Catholics and Protestants5 (1843), a work which made z. .deep impression on the Tractarians. In 1855 J. H. Newman, then rector of the Catholic University at Dublin, called him to the chair of geography and modern history and later the department of English literature was assigned him. His original works comprise lectures (On Subjects of Ancient and Modern History5 (1859); (On Subjects of Modern History and Biography5 (1864) ; on the (Writings of Cha¬ teaubriand, and on the Illuminati, Jacobins and Socialists5 ; (On the Life, Writings and Times of Edmund Burke5 (1869), together with poetry and translations.

ROBERTSON, James Craigie, Scottish clergyman : b. Aberdeen, Scotland, 1813 ; d. Canterbury, England, 9 July 1882. He was graduated from Cambridge in 1834, and took orders in the Anglican Church in 1836. He was made canon of Canterbury in 1859, and from 1867-74 was professor of ecclesiastical history at King's College, London. He published (How Shall We Conform to the Liturgy5 (1843) ; (Church History5 (1852-73); (Plain Lectures on the Growth of Papal Power5 (1876) ; edited Heylyn's (History of the Reformation5 (1849) ; (Materials for the History of Archbishop Thomas Becket5 (1875-82), *etc.*

ROBERTSON, James Wilson, Canadian agriculturist and educator : b. Dunlop, Ayrshire, Scotland, 2 Nov. 1857. He removed with his parents to Canada in 1875, was engaged in farm¬ ing and cheese manufacture, and was professor of agriculture at the Ontario Agricultural Col¬ lege in 1886-90. He was appointed as the first dairy commissioner for the Dominion in 1890, and was the first commissioner of agriculture and dairying in 1895-1904. He was principal of the Macdonald College at Saint Anne de Belle¬ vue, Quebec, in 1905-09; and from 1910 was chairman of the Royal Commission on Indus¬ trial Training and Technical Education, and of the committee on lands of the Canadian com¬ mission of conservation. Author of Conserva¬ tion of Life in Rural Districts) (1911).

ROBERTSON, John Mackinnon, British author, lecturer and legislator: b. Brodick, Isle of Arran, 14 Nov. 1856. He received an ele¬ mentary education at Stirling, Scotland, but left school at the age of 13 years. In 1878 he joined the staff of The Edinburgh Evening News, as a leader writer, went to London in 1884 to join the staff of Bradlaugh's National Re¬ former, and was the editor of that publication from the time of Mr. Bradlaugh's death in 1891 until it went out of existence in 1893. Mr. Robertson then started The Free Review and was editor of that periodical until 1895. In that year he was the Independent Radical candidate for Parliament for Northampton, but was not elected. He made a lecturing tour in the United States during 1897—98, and in June 1900 he went to South Africa to investigate the condi¬ tion of affairs in Cape Colony and Natal. His letters from South Africa to The Morning Leader, signed (<Scrutator,55 attracted a great deal of attention at the time. ■ He has been member of Parliament for the Tyneside Divi¬ sion of Northumberland since 1906, and was named a Privy Councilor in 1915. He was Parliamentary Secretary to the Board of Trade from 1911 to 1915. He has written a number of books and essays on religious and literary subjects, among which are (The Dynamics of Religion5 ; (Modern Humanists5 ; (Buckle and Plis Critics5 ; (History of Free Thought5 ; Christianity and Mythology5 ; (Montaigne and Shakespeare5 ; (The Baconian Heresy5 and (The Eight Hours Question.5

ROBERTSON, John Ross, Canadian

journalist: b. Toronto, 28 Dec. 1844. He was educated at Upper Canada College, where in 1859 he founded the Upper Canada College Times. He afterward engaged in journalism, published (Robertson's

Railway Guide,5 the first of its kind issued in Canada, and in 1864 he became city editor of the Toronto Globe. He founded the Evening Telegraph in 1866 and made it a leading Conservative organ. In 1872-75 he was London agent of the Toronto Daily Globe, then returned to Canada, and was managing editor of the Nation. He founded the Toronto Daily Telegram in 1876, acting as its editor and publisher as well as owner, and made it one of the leading Canadian publica¬ tions of its type. He was one of the founders of the Lakeside Home for Little _ Children in 1883, as well as the Hospital for Sick Children. He was elected to the Canadian Parliament in 1896. Author of (History of Craft and Capit¬ ular Masonry in Canada5 (1888) ; (History of Cryptic, Templar and A. and A. S. Rite Masonry in Canada5 (1888) ; (Robertson's

Landmarks of Toronto5 (5 vols., 1905), and editor of (Diary of Mrs. John Graves Simcoe5

(1911).

ROBERTSON, Morgan, sailor, watch¬ maker, diamond setter, inventor and sea-story writer : b. in Oswego, N. Y., 30 Sept. 1861 ; d. 4 March 1915. Young Robertson ran away to sea at the age of 16 before he finished his public school education. In 1886 he left the sea and took up the watch-maker's trade. About 1894 he began to write. His best-known books are (Spun Yarn5 (Harper's 1898) ; <Where Angels Fear to Tread,5 (1899) ; Mas¬ ters of Men5 (1901) ; (Shipmates 5 (1901) ;

<Down to the Sea5 (1905) ; (Land Ho5 (1905) ;

(Sinful Peck) (1903). He invented a periscope for submarines, which was the outgrowth of a fiction story. He died suddenly 4 March 1915. A uniform edition of his stories was brought out in 1915.

ROBERTSON, Thomas William, English

actor and dramatist: b. Newark-on-Trent, 9 Jan. 1829; d. London, 3 Feb. 1871. He came of a theatrical family and played his first part at the age of four. He had a varied career as actor, newspaper writer, adapter of plays, as well as dramatist, in none being more than suc¬ cessful enough to gain a bare subsistence until he wrote (David Garrick,* produced by E. A. Sothern in 1864. This piece has taken a per¬ manent place on the English stage. Following this a play called (Society* had a long and suc¬ cessful run, making the fortunes of the Prince of Wales Theatre and the author. At the same house were produced his most successful series of plays, including <Ours,) <Caste,) (Play,*

(School,* and (M. P.* Some of these, espe¬ cially (Caste,* his masterpiece, are revived from time to time. His comedy was artificial, with a strong sentimental interest ; but he was a good observer of manners and drew his char¬ acters from life. He established a distinct school, and has had several followers, though in the best exponents of the later English dramas he has been replaced by writers whose methods are less artificial and hence more logi¬ cal. His Principal Dramatic Works) were published with a memoir by his son in 1889. Consult also Pemberton, (Life and Writings of T. W. Robertson* (1893) ; Cook, (Nights at the Play) (1883) ; Clement Scott, (The Drama of Yesterday and To-day1* (1899).

ROBERTSON, William, Scottish histor-rian : b. Borthwick, Midlothian, 19 Sept. 1721; d. near Edinburgh, 11 June 1793. After the completion of his course in Edinburgh Uni¬ versity, Robertson obtained a license to preach in 1741, and in 1743 was presented to the living of Gladsmuir, in East Lothian. His (History of Scotland During the Reigns of Queen Mary and King James VP appeared in 1759, and was received with general applause, though modern research has deprived

it of most of its historical value. This work, which reached a 14th edition before the author's death, led to his nomination to the chaplaincy of Stirling Castle in 1759, as one of the king's chaplains in 1761, and as principal of the University of Edin¬ burgh in 1762. The year after he was made historiographer-royal of Scotland, with a salary of £200 per annum. His (History of the Reign of Charles V* appeared in 1769, and his his¬ tory of America1* in 1777. His latest work ap¬ peared in 1791, under the title of a (HistoricaI Disquisition Concerning the Knowledge which the Ancients Had of India, and the Progress of Trade with that Country Prior to the Dis¬ covery of the Cape of Good Hope.) Consult (An Account of the Life and Writings of Wil¬ liam Roberston* (1801-02) ; Gleig, (Life and Writings of William Robertson) (1812) ; Gra¬ ham, ˆScottish Men of Letters in the 18th Cen¬ tury1* (1901).

ROBERTSON, William H., American jurist and politician: b. Bedford, N. Y., 10 Oct. 1823; d. Katonah, N. Y., 6 Dec. 1898. He was admitted to the bar in 1847 and engaged in prac¬ tice in his native town. He served three terms

in the State assembly and eight terms in the State senate between the years 1848-91.; and was county judge of Westchester County in 1854 —66. He was a member of the 40th Con¬ gress, 1867-69. In March, 1881 he was ap¬ pointed collector of customs for the port of New York by President Garfield, an appoint¬ ment which met with the determined opposition of Senators Conkling and Platt, of New York, who considered the nomination their political prerogative. The President refused to with¬ draw the name of Judge Roberston and the two Senators resigned and appealed to the legisla¬ ture of New York to reelect them as a rebuke to the President ; but the legislature refused to support them and elected other members in their places. The controversy assumed a bitter aspect and resulted in a party split. Robert¬ son's appointment was confirmed by the Senate and he remained in office until the close of President Arthur's term in 1885.

ROBERTSON, Sir William Robert, Eng¬ lish general : b. 1860. He began his military career as a lieutenant in the 3d Dragoon Guards in 1888 and served as railway transport officer in the Miranzai and Black mountains expedi¬ tions in 1891. He was staff captain and deputy-assistant-quartermaster-general in the Intelli¬ gence Branch at Simla (India) 1892-96, and 'intelligence officer with the Chitral Relief Force in 1895, when he was treacherously attacked and left for dead by his native escort. After serving at the War Office he went to South Africa

in 1900 and later became Assistant Direc¬ tor of Military Operations at the War Office until 1907. From 1907 to 1910 he was brigadier-general of the General Staff at Aldershot and commandant of the Staff College 1910-13. At the outbreak of the European War he accom¬ panied the Expeditionary Force as quarter¬ master-general and was specially commended for his services during the retreat from *Mons.* In 1916 he became chief of the Imperial Gen¬ eral Staff and a member of the Army Council. He resigned from the former in February 1918 and was appointed to the chief command of the forces in Great Britain in June 1918.

ROBERTSON, William Schenck, edu¬ cator and mission superintendent : b. Huntington, L. I., 11 Jan. 1820; d. 26 June 1881. He was fitted for college at several different acade¬ mies and graduated from Union College, Schenectady, in 1843. He started] to study medicine but, after partially completing his course, decided to devote himself to* teaching as a profession. In 1849 he offered himself as a mission teacher to the Presbyterian Board of Foreign Missions and was accepted for service in their work among the Creek, or Muskogee Indians, and was sent out as the principal of Tullahassee Manual Labor Boarding School. The following year (16 April 1850) he married Miss Ann Eliza Worcester, daughter of Rev. Dr. Samuel A. Worcester, superintendent of the Park Hill Mission, in the Cherokee Nation. The work of the Tullahassee Mission was in¬ terrupted by the outbreak of the Civil War, in the spring of 1861, Mr. Robertson and his family having to leave the Indian Territory as refugees. During the ensuing five years they were located at Highland, Kan., where he en¬ gaged in teaching in a mission school which was operated for the benefit of the children of the

Iowa and Kickapoo Indian tribes. Just before his return to the Indian Territory, in 1866, he was ordained to the ministry of the Presby¬ terian Church. The Tullahassee Mission was rehabilitated and the work of educating Creek children was resumed, his duties as a teacher occupying his time to such an extent that the work of translating was

left to others. He published a paper in the Creek language called Our Monthly for some years. In 1876 he was in charge of the Indian educational exhibit at the Centennial Exposition for a time. A man of brilliant attainments, he lived only in his work and the impress of his life and labors remains among the people to whose betterment his self-sacrificing service was given. The prop¬ erty of the Tullahassee Mission was destroyed by fire, 19 Dec. 1880. The work incidental to the plans for rebuilding the mission and the disappointments and discouragements that were encountered are believed to have hastened his death.

ROBERTSON, William Spence, educator and historian : b. Glasgow, Scotland, 7 Oct. 1872. He came to America with his parents in 1878. He graduated B.Litt. in 1899 and M.Litt. in 1900 at the University of Wisconsin. _ He re¬ ceived his Ph.D. at Yale University in 1903. From 1903-06 he was instructor and from 1906-09 assistant professor of history at the College for Women of the Western Reserve University. In 1907 he was awarded the Her¬ bert Baxter Adams prize in European history by the American Historical Association. After special sessions at Indiana University, from Sep¬ tember 1909 he was assistant professor of history in the University of Illinois. Part of the years 1916-17 he spent in travel and study in South America. He is author of magazine articles on the Monroe Doctrine, the diplomatic rela¬ tions between the United States and Latin America ; is a member of learned societies and was decorated with the Order of the Liberator of Venezuela. His published works include Francisco de Miranda and the Revolutionizing of Spanish-America5 (1909) ; (The Rise of the Spanish American Republics, as Told in the Lives of their Liberators5 (1918).

ROBESPIERRE, ro-bes-pe-ar or ro’bes-per, Maximilien Frangois Marie Isidore, French revolutionist: b. Arras, 6 May 1758; d. Paris, 28 July 1794. He was the son of an avocat and having been left an orphan at 11 was sent by his grandfather to the college of his native town, from which he passed in 1770 to the College Louis-le-Grand at Paris on a scholarship given him by the bishop of Artois. After pursuing the study of law with great distinction, he returned, in 1781, to Arras, where he adopted the profession of advocate. Solid, rather than brilliant, he quickly became known as a skilful lawyer and a man of un¬ impeachable integrity. With growing success he gave much of his time to the dilettante pur¬ suit of literature, wrote essays in competition for prizes offered by the provincial academies and was a prominent member of the Rosati, a society devoted to the cultivation of wit and letters. He was an ardent student of Rousseau and a fanatical believer in the teachings of the Genevan philosopher ; indeed

Robespierre's un¬ wavering convictions in the possibility of realiz¬ ing Rousseau's ideal society explains his course

in the days when he stood forth as the greatest figure in France and gives the secret of his tem¬ porary success. In the events leading up to the election of the States-General Robespierre appeared prominently as the champion of the liberal views then so widespread among the French bourgeoisie. He was elected fifth dep¬ uty to the States-General from Artois and allied himself with the radical faction in that body. In the constituent assembly he spoke frequently and always in the spirit of that equality which he believed was now at length to be established in France. Of small stature and by no means robust health, weak-voiced and pale-eyed, he did not impress himself on the mass of the as¬ sembly, but those who came into personal con¬ tact with him were gained over by his tremen¬ dous sincerity and Mirabeau said of him : <(That young man believes what he says ; he will go far.55 Robespierre's great strength, however, was in the club of the Jacobins, where his polished, classical declamations gained him the ardent support of those members who had been recruited from among the working classes and the small bourgeoisie of Paris. His power in the club became absolute when the more con¬ servative members seceded in 1791, after the more radical faction, under the inspiration of Robespierre, had prepared the petition for the deposition of Louis XVI which led to the mas¬ sacres in the Champ de Mars in 17 July. His popularity was demonstrated on the day of the dissolution of the National Assembly, 30 Sept. 1791, when Robespierre and Petion were drawn in triumph through the streets of Paris and crowned as ˆincorruptible patriots55 by the people. In accordance with his own motion, adopted in May 1791, prohibiting members of the constitutent assembly from sitting in the succeeding legislature, Robespierre took no direct part in the sessions of that body, but he continued to wield great influence over its de¬ liberations through his power in the Jacobine. In February 1792 he became public prosecutor at Paris, but resigned the office in April on account of the virulent attacks of the Giron¬ dists, who regarded him with special hatred because of his opposition to their favorite policy of war against Austria. Robespierre's opposi¬ tion to the war was based on humanitarian grounds; he was, besides, a man of theories and not of action and this would explain the little share he took in the uprisings of 20 June and 10 August, which, under the guidance of Dan-ton, effected what Robespierre was quite pleased to see consummated, the overthrow of the Bourbon monarchy. Shortly after the storming of the Tuileries, Robespierre became a member of the Paris Commune; his

personal popularity lent strength to that body, but his inability to prevent the prison massacres of September showed that his power was by no means absolute in the ranks of the radical party.

In the Convention to which he was elected as the first deputy from Paris, Robespierre be¬ came the leader of the Mountain. The Giron¬ dists turned the full force of their eloquence against him and accused him of aiming at the dictatorship. In the crisis which attended the trial of Louis XVI, Robespierre for once as¬ sumed a firm and definite line of action. He pleaded for the death of the king and bv so doing gained over to his side the party of Dan-

ton, Carnot and Bellaud-Varenne, who were disgusted by the temporizing policy of the Gi¬ rondists at a time when France was in immi¬ nent danger of foreign invasion and needed a strong government to make headway against her enemies. The condemnation of Louis XVI was a triumph for Robespierre, who, however, did not cease from his attacks on the Giron¬ dists. The struggle became one of life and death. In April, Robespierre denounced them in the body of the Convention and on the fate¬ ful days of 31 May and 2 June the destruction of the party was accomplished with the aid of the Parisian mob. See Girondists.

In July 1793, Robespierre was made a mem¬ ber of the Committee of Public Safety, which for a year was to be the virtual ruler of France. To curb dissension at home, so as to present a united front to the foreign foes of the coun¬ try, the committee organized the Terror with which the name of Robespierre has become, through legend, synonymous. To the world at large Robespierre appeared as the master of the committee and the ruler of France. As a matter of fact, his power was in no way abso¬ lute. Of the 12 members of the committee, the majority were quite opposed to his Rous-seauan ideals and only two of the 12, Couthon and Saint Just, were professed followers of Robespierre. The rest of the committee were practical men of affairs, like Carnot, Bellaud-Varenne, or Collot d'Herbois, upon whose shoulders fell the real task of government. Robespierre's services to the committee were such as his immense popularity and spotless reputation could render it. He was the apol¬ ogist for the committee in the Convention and before the people, but he differed from his as¬ sociates entirely so far as the motives of his action are concerned. While the Terror to them was but a thorough, though possibly radi¬ cal, means for establishing peace within the country, Robespierre saw in the Terror an ef¬ fective instrument for bringing about the erec¬ tion of Rousseau's ideal state, by wiping out all opposed to his favorite theories. He first turned against Hebert (q.v.) and his followers in the Paris Commune, who had aroused his enmity by their uncompromising democracy, in their display of which they were guilty of the most ridiculous excesses and their professed

atheism, which attained its climax in the estab¬ lishment of the worship of Reason by Chaum-eUe. The Hebertists were brought to the scaf¬ fold on 24 March 1794, and they were followed by Danton, Camille Desmoulins and their fol¬ lowers on 5 April. On 13 April came the turn of Chaumette. Danton fell because he had begun to advocate a moderation of the Ter¬ ror and thereby had incurred the enmity both of the men of action on the Committee of Safety and of Robespierre, to whom alike the continu¬ ance of the Terror seemed essential. To hasten the work Robespierre caused the infamous law of the 22 Prairial (10 June) to be proposed by Couthon, whereby the revolutionary tribunal was freed from all restrictions of legal proced¬ ure and thus improved sent nearly 1,300 per¬ sons to the scaffold between 12 June and 28

On 8 June Robespierre attained the zenith of his career, when, as president of the Con¬ vention, he celebrated with great pomp the Feast of the Supreme Being, whose existence

had been formally admitted by the Convention in the preceding month. His fall followed speedily. The men on the Committee of Safety who had suffered his official leadership as long as he was content to remain largely a figure¬ head, turned upon him when he began seri¬ ously to assert mastery over the committee. Besides, it became apparent that the excesses of the Terror could not go on and that repara¬ tion would be demanded and Robespierre was chosen as the scapegoat of the committee. The attack on Robespierre began 17 June, when Vadier, a member of the committee of general security, satirized him before the Convention. Instead of joining battle, as he was urged to do, Robespierre went into retirement for more than a month to prepare his defense. On 26 July he appeared in the Convention and de¬ clared that the Terror should cease and that the committees of public safety and general secu¬ rity should be reorganized. Ominous threats appeared in his oration, which for a time held the Convention terror-stricken and caused it to vote his proposition. Quickly, however, he was assailed by various orators, the Convention re¬ considered its action and in the session of the following day, the 27 July, the fateful 9th Thermidor, the secret intrigues of his associates on the committee, the fear of his intended victims and the resentment of the Dantonists, who had not forgotten the death of their leader, fell upon Robespierre. His arrest was ordered and with him that of Saint Just, Couthon, Lebas and his younger brother, Augustin Robespierre. Rescued by the national guards under Henriot and brought to the Hotel de Ville, the great Terrorist showed

no capacity for action. The Convention placed him outside of the law and despatched a portion of the national guard un¬ der Barras against him. In the assault Robes¬ pierre was shot in the jaw by a gendarme and taken in a pitiful condition to prison. On the following day he was brought before the revolu¬ tionary tribunal and with Couthon and Saint Just and others of his followers was sent to the guillotine. Consult Aulard, A., (La Societe des Jacobins) (1891) ; Hamel, L. E., (Vie de Robespierre) (Paris 1865-67), the principal authority; Belloc, Hilaire, <Robespierre) (1902) ; Morse-Stephens, Principal Speeches of the Orators and Statesmen of the French Revo¬ lution (Oxford 1892) ; Brunnemann, Karl., (Maximilien Robespierre) (Leipzig 1885) ; Car¬ lyle, (French Revolution ; Morley, John, Criti¬ cal Miscellany) (Vol. I. London 1898) ; Les-cure, M. de, (La societe frangaise pendant la Terreur* (Paris 1882) ; Lewes, G. H., (Life of Maximilian Robespierre, with Extracts fiom his Unpublished Correspondence* (3d ed., Lon¬ don 1899) ; Sardou, Victorien, <La maison de Robespierre: reponse a M. Hamel* (Paris 1895) ; Strada, Jose de, Robespierre et la revo¬ lution de l'humanite* (Paris 1899) ; Warwick, G. F., (Robespierre and the French Revolu¬ tion* (London 1909).

ROBERVAL, rd'ber-val, Giles Personne, or Personier, de, French mathematician : b. Roberval, near Beauvais, 8 Aug. 1602; d. Paris, 27 Oct. 1675. His family name was Personne, the name of his birthplace being added to it. He studied at Paris in 1627-31, and was then appointed professor of philosophy at Gervais College. In 1633 he was called to the chair

of mathematics at the Royal College of France, which he occupied until his death. He was the first to discover the method of indivisibles but kept it for his personal use, while Cavalieri published a similar method of his own inven¬ tion, thus raising a question as to priority of discovery in which much animosity developed. He discovered the famous <(Robervallian Lines® ; a method of determining tangents somewhat similar to that of Descartes, again raising a question as to priority of discovery, and a method of determining the area of a

cycloid. Outside the field of pure mathematics he devoted considerable study to the system of the universe, and he invented the Robervallian balance. He was one of the original members of the French Academy of Science. During his lifetime he published nothing, but his works were published after his death by Abbe Galois in the <Recueil> of the (Memoires de 1' Acad¬ emic des Sciences) (1693).

ROBERVAL, Jean Frangois de la Roque,

Sieur de, French Canadian colonizer: b. Picardy, France, about 1500; d. probably at sea, 1547. He was an officer in the French army and upon the return of Jacques Cartier from Canada in 1536 he was commissioned by the king to attempt the exploration and coloniza¬ tion of New France in Canada. He sailed in 1542 a year after the departure of Cartier's second expedition, wintered at Stadacona (now Quebec), losing many of his men, and after¬ ward led an unsuccessful expedition into the in¬ terior. Hunger and cold and failure of promised supplies seriously depleted the num¬ ber of his followers, and, while accounts of his exploits are conflicting, Francis I appears to have summoned Roberv'il home to aid in the war in Picardy instead of sending relief for his expedition. He is stated by some author¬ ities to have been killed in France, while others relate that he perished at sea on a second voyage to Canada.

ROBIDOUX, ro-be'doo, Joseph Emory,

Canadian jurist: b. Saint Philippe-de-Laprairie, Quebec, 18 March 1844. He was graduated at McGill University in 1866, was called to the bar in that year and engaged in practice at Montreal. He was later appointed queen's consul and in 1877 he became professor of civil law at McGill University. He served in the Quebec legislature in 1884-92 and in 1897— 1900; was provincial secretary and later attorney-general in the Mercier administration; provincial secretary in the Marchand admin¬ istration, and since 8 Oct. 1900 has been puisne judge of the Supreme Court of Quebec. He became a member of the French Legion of Honor in 1908.

ROBIN, a name originally applied in Eng¬ land to the redbreast (q.v.), a bird so familiar and so dear to the English heart that loyal colonists in many parts of the world have felt impelled to transfer the name to native species, which often resemble the original in little but the ruddy breast. The American robin is a true thrush (Merida Magratori) of the fam¬ ily Turdia, and is found in summer through¬ out North America from Alaska to Virginia. Robins retire from higher latitudes only as their food begins to fail, or when driven south by very heavy

snows. During the winter months they are numerous in the Southern States, but

even as far north as Boston robins are some¬ times seen assembling round the open springs wherever berries may be found in the depth of winter. In the New England and the Middle States the robin is perhaps the most abundant breeding bird. Their nests of mud and grass are often seen on the horizontal branch of an apple tree, or in a shade tree, especially ever¬ greens. The eggs, about four, are of a pale bluish-green, and without spots. They raise several broods in a season.

Robins feed upon insects, ripe cherries and other small fruit, but are especially fond of earthworms, which they extract from their bur¬ rows in the early morning and late afternoon with the greatest skill and industry, and of which they devour vast quantities. In spite of the fact that fruit growers consider them harm¬ ful, the cheery whistle and vivacious manners of the robin are rapidly gaining for it a place in popular esteem analogous to its English name¬ sake. Unfortunately there are still parts of the country, and particularly of the South, where a sordid interest leads to the slaughter of great numbers of robins for the pot. In North Caro¬ lina they are killed at night in their roosting places. On the Pacific Coast the robin varies to the sub-species propinqua, and in lower Cali¬ fornia a distinct species (M. confirms) occurs. Hesperocichla ncevia is sometimes called the Oregon robin.

ROBIN ADAIR, a-dar, or EILEEN AROON, a familiar air, which, with the origi¬ nal words, was written, tradition says, by one Carroll O'Daly, an Irishman, of Elizabeth's time. However that may be, it was first popu¬ larized in England in the latter 18th century by Tenducci, an original singer in Dr. Arne's (ArtaxerxesP Tenducci probably learned it in Ireland; at least it is known that he sang (Eileen Aroon) with Irish words which had been phonetically arranged for him. The ˆ Robin Adair) form obtained currency through its rendering by Brahm at his benefit in London in 1811. Brahm's version was introduced by Boildieu into the latter's opera of (La Dame Blanche.) Beethoven made a trio arrangement of it, with accompaniment by pianoforte, violin and 'cello.

ROBIN GOODFELLOW. See Puck. ROBIN HOOD. See Hood, Robin.

ROBIN HOOD BALLADS, The. Ballads and tales of the outlaw have been steady favorites of the people of England. Soon after the

Conquest, rebels of high rank, like Hereward and Fulke Fitz-Warine, and many a humbler hero who ((concealed his life,® were said and sung by the popular muse. Their bal¬ lads, however, are lost ; and the single outlaw who survives as hero of an actual ballad-cycle, and of an epic made directly from the ballad stuff, is (Robin HoodP There is obvious temptation to put Robin into the Fulke Fitz-Warine class, and to regard him as a disguised nobleman like the hero of that charming but sophisticated poem, (The Nut-Brown MaidP A passage in (Piers Plowman) (14th century) which certainly attests Robin's early and wide vogue, where Sloth, the alehouse idler, is said to know <(rymes of Robin Hood and Randolf of Chester® better than his prayers, serves as an argument for the rank of the first-named

outlaw. He has been made earl of Huntington. Yet another theory of origins interprets <(Hood® as (< Woden® and regards Robin as a divinity in disguise. Neither of these supposi¬ tions is probable. It is true that legend often borrows from myth; but the supposed mythical attributes are very far fetched in the outlaw's case, and seem impertinent. ® Robin® is prob¬ ably the word for <(bandit,® and <(Hood® may mean ((of the wood.®

Professor Child concludes a very careful in¬ vestigation of all the evidence and all the theories by declaring that Robin Hood is neither a nobleman of record nor yet a god; he is simply the ideal and typical outlaw, and is ((absolutely a creation of the ballad muse.® Of course, some actual ((banished man® who went to the greenwood as a victim and became a vic¬ tor over the cruel forest-laws, may have been the nucleus of this tradition. But the story is localized in more than one place, and the hero is typical, not historical, in person, habit and surroundings. He has aristocratic traits ; the (<milk-white side® is no yeoman's, and his lavish but capricious generosity is part of the peasant's notion of a lord. His conventional foes are the sheriff and the irionk, objects of popular satire. Like the Klepht, or bandit, hero of modern Greek ballads, Robin is the humble man's friend; he takes from the rich to give to the poor, is pious, handsome, miraculously

strong and brave. This is the hero of the best and oldest ballads ; like other favorites, Char¬ lemagne, for instance, in early French epic and in stories of the 12th century, (Robin Hood' has two distinct phases and is at last the victim of his own tvpical excellence. In the best bal¬ lads he fights and kills the doughtiest of foes, like Guy of Gisborne, or else displays prodigious valor against overwhelming odds ; but in the inferior verse of broadsides and garlands, Robin fares ill at the hands of wayside bullies, — tinkers, potters, what not, — who. are thus glori¬ fied by victory over the champion and typical hero. Like these inferior ballads, as significant of a second literary growth, must also be reckoned the Robin Hood plays. They intro¬ duce with Maid Marian — however ancient their own proper rites — a sentimental note which is alien to the greenwood tradition. Such subjection to base uses, and such changes of character, were the penalty paid by Robin's . venerable and universal fame. Pleasanter proof of this popularity is found in proverbial phrases like (< going round Robin Hood's barn® and in the many place-names which he has fathered.

The Robin Hood ballads have a double ap¬ peal,— to the student of poetry for their signifi¬ cance, and to the lover of poetry for their worth. Thirty-six ballads are preserved, which deal with individual adventures of the hero ; a few of these are trash; some are spirited and readable, though low in the poetic scale ; and perhaps half-a-dozen belong with the best nar¬ rative verse. With these last must be counted the Gest (gesta , deeds), a little ep-ic of 458 stanzas, or about 2,000 lines, which was made from ballads of the type of <Robin Hood and the Monk,* and was printed about 1500, al¬ though the date of composition must be put earlier. Comparison of one of the older bal¬ lads, like (Robin Hood's Death,) with the same story in the (Gest) is very suggestive for the epic problem.

At their best, these ballads are a model of popular chronicle verse. They differ widely from the romantic ballads, lacking for the most part, repetition, refrain, and all choral sug¬ gestions. They were sung, or chanted, for the story alone. Nowhere, however, is a story bet¬ ter told than the adventures of the Knight, Robin and the abbey folk in the <Gest,) and the complication of Robin and Little John and the Sheriff ; while the opening stanzas of (The Monk) are famous for their descriptive beauty. The literature of the subject is given by Child, (Ballads,) III Introduction to the Gest. Some books and articles of later date are noted in the bibliography of the chapter on the Popular

Ballad in the second volume of the Cambridge History of English Literature.*

Francis B. Gummere.

ROBIN SNIPE, the redbreasted sand¬ piper or knot (Tringa canutus) in its summer plumage. This is among the largest of the sand¬ pipers, and is distinguishable by the long, per¬ fectly straight beak combined with the absence of webbing from between the toes, the middle one of which is much shorter than the tarsus. It is upward of 10 inches long and stoutly built, with rather short stout legs. In breeding plumage the entire under parts are reddish brown, and the autumn young, which are abun¬ dant during the gunning season, have the breast and belly whitish tinged with red, and the back very characteristically marked with white and black semi-circles. Such seasonal changes in coloration are unusual among the Scolopacidce. The knot is nearly cosmopolitan, breeding in high northern latitudes and wintering in the southern hemisphere. It passes through the United States in April and May, and again more leisurely in August to October, frequent¬ ing the seashore in small flocks, and, less com¬ monly, the large rivers and lakes of the in¬ terior. Its habits are similar to those of the other sandpipers (q.v.), with which it associates. Because of its large size it is a favorite with gunners, among whom it is known in the autumn plumages as the gray-back.

ROBINS, rob'mzz, Benjamin, English mathematician: b. Bath, 1707 ; d. Fort Saint David, Coromandel coast, India, 29 July 1751. He early became known as a mathematician of unusual ability, and in 1728 published a confuta¬ tion of the veteran Johann Bernouilli (q.v.), who had attempted a defense of the Leibnitz theory as to the laws of motion relative to bodies impinging on one another. After some time spent as a private instructor in mathemat¬ ics and physical science, he turned engineer, and made particular study of fortifications and gunnery. He published in 1742 his (New Principles of Gunnery, *which he had under¬ taken by way of furthering his unsuccessful candidacy for the professorship of fortifica¬ tion at Woolwich. It was translated into Ger¬ man and French, and has been regarded as the starting point of the modern scientific study of the matter. Much of it was derived from per¬ sonal experiment with gunpowder. In 1749 he was made engineer-general to repair the forts of the East India Company. He wrote several political pamphlets, which brought him into some notice. In 1761 Mathematical Tracts,* containing the Principles of Gunnery,* ap¬ peared under the editorship of James Wilson.

There were subsequent editions. Consult the memoir by Wilson in this collection.

ROBINS, Edward, American author: b. Pau, France, 2 March 1862. He was educated at a military academy in Philadelphia, and in 1883 engaged in newspaper work. He was on the editorial staff of the Philadelphia Public Ledger in 1884-88, 1895-97, and has since de¬ voted himself to authorship and as Secretary of the Corporation of the University of Pennsyl¬ vania. He has published, besides several juve¬ nile works, (Echoes of the Play House) (1895) ; (Twelve Great Actors) (1900) ; (Romances of Early America > (1902); biographies of Ben¬ jamin Franklin and Gen. William T. Sherman, *etc.* He is one of the Councilors of the His¬ torical Society of Pennsylvania and a Director of the Drama League of Philadelphia.

ROBINS, Elizabeth. See Parkes, Eliza¬ beth Robins.

ROBINS, Margaret Dreier, American social economist : b. Brooklyn, N. Y., 19th cen¬ tury. She was privately educated and was married to Raymond Robins (q.v.), 21 June 1905. She was a founder of the Women's Municipal League, New York; was president of the New York Women's Trade Union League in 1905, of the Chicago Women's Trade Union League in 1907-14, and has been president of the national organization since 1907. She has served on the executive board of the Chicago Federation of Labor since 1908, and in 1915 was appointed to the unemployment commission by the governor of Illinois.

ROBINS, Raymond, American social econ¬ omist : b. Staten Island, N. Y., 17 Sept. 1873. He was graduated at Columbian (now George Washington) University in 1896, and was en¬ gaged in settlement work in Chicago in 1902-OS. He was a member of the Chicago board of education in 1906-09, and was social service expert for the Men and Religion Forward Movement in 1911-12, making a world tour in its interests in 1913. He was the Progressive candidate for United States senator from Illinois in 1914, and was leader of the National Christian Social Evangelistic campaign in 1915. He commanded the American Red Cross mis¬ sion to Russia in 1917-18 and on his return made a report of conditions there.

ROBINS, Thomas, American inventor and manufacturer: b. West Point, N. Y., 1 Sept. 1868. He was educated at Princeton University and in 1892 began a series of inventions which led to the perfection of his ((belt conveyor® used for carrying coal, ores and other products. The invention received the grand prize at the Paris Exposition in 1900, and first prizes at the Buffalo and Saint Louis Expositions. He is president of the Robins Conveying Belt Company and of the Robins New Conveyor Company. In 1915 he was appointed to the United States Naval Advisory Board.

ROBINSON, rob'in-son, Agnes Mary Frances. See Darmesteter, Agnes Mary Frances Robinson.

ROBINSON, Albert Gardner, American newspaper correspondent and author : b. Win¬ chester, Mass., 21 Feb. 1855. He received a public school education at Winchester and was engaged in commercial pursuits from 1871 to 1898. In the latter year he became special war

correspondent for the New York Evening Post in Cuba and Porto Rico. He was in the Philip¬ pines on a similar errand in 1899-1900 and also in South Africa. From 1903 to 1912 Mr. Rob¬ inson was a member of the editorial staff of the New York Sun. He has written numerous pamphlets, magazine and newspaper articles. His published works include (The Porto Rico of To-day* (1899) ; (The Philippines: The War and the People) (1901) ; (Cuba and the In¬ tervention (1905); (Cuba: Old and New*

(1915).

ROBINSON, Benjamin Lincoln, American botanist: b. Bloomington, Ill., 8 Nov. 1864. He was graduated at Harvard University in 1887 and took his Ph.D. at Strassburg in 1889. He has been curator at Gray's Herbarium since 1902, and Asa Gray, professor of systematic botany at Harvard since 1899. He has been editor of Rhodora, the journal of the New England Botany Club, since 1899, and also has edited (Synoptical Flora of North America* (1892-97) ; (Gray's New Manual of Botany * (7th ed.).

ROBINSON, Beverley, American Loyalist soldier: b. Virginia, 1723; d Thornbury, Eng¬ land, 1792. He was a major under Wolfe at the taking of Quebec in 1759, and at the com¬ mencement of the Revolution was a large landed proprietor on the Hudson. He was op¬

posed to the measures of the British ministry respecting the colonies, and abandoned the use of imported merchandise. Nevertheless, he re¬ mained loyal, and reluctantly entered the mili¬ tary service of the Crown. The Loyal American regiment was recruited largely by him, and he was made its colonel. He was connected with the negotiations preliminary to Benedict Arnold's treason ; and at the time Arnold was occupying as headquarters Robinson's country-seat. At the conclusion of the war he went to New Brunswick, where his name appears as a member of the first council, though he never took his seat; and thence to England. He lost his property by confiscation, and by way of compensation received £17,000 from the Eng¬ lish government. Consult Ryerson, (The Loyalists of America and Their Times* (1880).

ROBINSON, Charles, first governor ol Kansas: b. Hardwick, Mass., 18 July 1818; d. Lawrence, Kan., 17 Aug. 1894. He was edu¬ cated at Amherst and at the Berkshire Medical School, taking his M.D. in 1843. He was en¬ gaged in the practice of medicine at Belcher-town, Springfield and Pittsfield, Mass., until 1849, when he went overland to California. He es¬ tablished the Settlers' and Miners' Tribune at Sacramento in 1850, was a supporter of squat¬ ter sovereignty, and worked earnestly against the movement to establish slavery in California. He was wounded in the riots of 1850, and was indicted for conspiracy and murder; but upon his election to the legislature the case was dis¬ missed without trial. He returned to Massa¬ chusetts in 1852 and for two years edited the Fitchburg Weekly News. In 1854 he was ap¬ pointed agent for the New England Emi¬ grants' Aid Association and was sent to Kansas where he became the leader of the Free State party and chairman of its executive committee as well as commander-in-chief of the Kansas volunteers. He was a member of the Topeka convention which framed and adopted a Free

State constitution in 1855 and was elected gov¬ ernor under it in 1856. Ignoring the bogus pro-slavery legislature, but endeavoring to avoid conflict with the Federal authorities he was, upon attempting to perform his duties as gov¬ ernor, indicted for treason and conspiracy on a charge by the Pro-Slavery party. He was ac¬ quitted by the Federal grand jury and served out his term. He was reelected governor by the Free State party in 1858, and was elected for a third time in 1859 under the Wyandotte constitution, taking office after the admission of Kansas to the Union as a State and serving in 1861-63. He organized most of the Kansas regiments for the Civil War during his term. He later served in both bodies of the State legis¬ lature and from 1887 he was superintendent of Haskell Institute at Lawrence. The State Uni¬ versity of Kansas was erected on land given by him and it received the greater share of his estate. He was author of (The Kansas Con¬ flict (1892). Consult Blackmar, F. W.f 'Charles Robinson > (1902; 2d ed., 1907).

ROBINSON, Charles Mulford, American author and city planner; b. Ramapo, N. Y., 30 April 1869; d. 30 Dec. 1917. He was graduated from the University of Rochester in 1891, and received from it the honorary degree of master of arts in 1905. He was editor of the Rochester Post Express from 1891 to 1902, became an offi¬ cer or honorary member of many civic societies, local, State, national and foreign, and a con¬ tributor to magazines. After 1902 he was re¬ tained to make city planning studies in munic¬ ipalities in all parts of the country. He is the author of 'The Improvement of Towns and Cities) (1901; 12th ed., 1916); (Modern Civic Art> (4th ed., 1917) ; (The Call of the City) (1908) ; (The Width and Arrangement of Streets) (1911) ; (City Planning) (1916). Since 1913 he has been professor of civic de¬ sign (the first in the United States), at the University of Illinois. From 1907 to 1912 he was contributing editor to The Survey.

ROBINSON, Charles Seymour, American Presbyterian clergyman and hymnologist : b. Bennington, Vt., 31 March 1829; d. New York, 1 Feb. 1899. He was graduated from Williams College in 1849, studied at Union Theological Seminary and at Princeton and was ordained in the

ministry in 1855. He held a pastorate in Troy 1855-60, and thereafter was pastor of va¬ rious churches in New York with the exception of 1868-70, when he had charge of the Amer¬ ican Chapel, Paris, France. He published sev¬ eral volumes of sermons and other works, and is widely known as a collector of hymns. His publications include (Songs of the Church) (1862); 'Church Work) (1873); (The Phar¬ aohs of the Bondage and the Exodus) (1887) ; (New Laudes Domini* (1892); Annotations on Popular Hymns) (1893); 'Simon Peter: Later Life and Labors) (1894), *etc.*

ROBINSON, Christopher, Canadian law¬ yer: b. Toronto, 21 Jan. 1828; d. 1903. He was a son of Sir John Beverley Robinson (q.v.), and was educated at Upper Canada College, King's College and Trinity University, Tor¬ onto. He was called to the bar in 1850 and engaged in practice at Toronto in 1852. He was reporter to the Queen's Bench in 1856-72 ; became editor of Law Reports in 1872, and re¬ signed in 1885 upon becoming a bencher of the

Law Society of Canada. He consistently de¬ clined public office, and became the acknowl¬ edged leader of the Canadian bar. He served as counsel in numerous important cases, among them being the trial of Louis Riel for high treason in 1885 ; the libel suit of the queen against Wilkinson ; the case for the arbitration of the Manitoba boundaries,' and the Bering Sea arbitration with the United States.

ROBINSON, Clifford William, Canadian

statesman: b. Moncton, New Brunswick, 1 Sept. 1866. He was educated at the University of Mount Allison College, Sackville, New Bruns¬ wick, and became attorney-at-law in 1892, en¬ gaging in practice at Moncton He was elected to the provincial Parliament in 1897, became speaker in 1903, provincial secretary in 1907 and Premier later in that year. In 1908 he be¬ came leader of the Liberal opposition. He was a member of the government without portfolio after his return to the New Brunswick Parlia¬ ment in 1917.

ROBINSON, Sir Clifton, English engi¬ neer: b. Birkenhead, 1 Jan. 1848; d. 6 Nov. 1910. He joined the staff of George Francis Trainer and in 1860 assisted in the construction at Birkenhead of the first tramway in Europe. He was later engaged in similar work in Amer¬ ica and Continental Europe as well as in Eng¬ land, building the pioneer system of cable and electric railways at Los Angeles, Cal. He was a pioneer of electric traction in London, de¬ signed and

constructed the London United • Electric Tramway system, and built the first electric tramway at Bristol in 1895. He was manager, director and engineer of the Imperial Tramway Company, and in 1902 was connected with the promotion of the great tube railway system in London. In 1906 he devised and successfully put into operation a system of through booking between the electric tramways and the underground railway systems of Lon¬ don. He was knighted in 1905. He was author of many articles and treatises on tramway con¬ struction.

ROBINSON, Doane (Jonah Leroy Robin¬ son), American editor and historian: b. Sparta, Wis., 19 Oct. 1856. He was educated at the University of Wisconsin and was admitted to the bar in 1882. In 1884 he was editor of the Courier at Watertown, S. D., in the following year was secretary to the Territorial Railroad Commission of Dakota, and of the first Rail¬ road Commission of South Dakota in 1890-91. Mr. Robinson edited The Interstate of Gary, S. D., in 1894 and the Daily and Weekly Gazette of Yankton, S. D., in 1896 and in 1898 organized the South Dakotan Monthly at Sioux Falls. He subsequently became State librarian, secretary and superintendent of the State His¬ torical Society at Pierre, S. D. He published (Coteaus of Dakota *(1899) ; (History of South Dakota) (1900); (History of Leavenworth's Expedition and Conquest of Ree Indians' (1902); 'History of Dakota> (2 vols., 1903); (History of Sioux Indians* (1904) ; 'Brief His¬ tory of South Dakota* (1906) and contributions to encyclopedias and periodicals.

ROBINSON, Edward, American Biblical scholar : b. Southington, Conn., 10 April 1794 ; d. New York, 27 Jan. 1863. He was graduated at Hamilton College in 1816 and went in 1821 to Andover to publish his edition of books i-ix,

xviii and xix of the (Iliad>. There he aided Moses Stuart (q.v.) in the preparation of the second edition (1823) of the latter's (Hebrew Grammar,' and rendered into English (1825) Wahl's Clavis Philologica Novi TestamentiP After European study, largely in Halle and Berlin (1826-30), he was professor extraordi¬ nary of sacred literature in the Andover Theo¬ logical Seminary in 1830-33, and professor of Biblical literature in Union Theological Semi¬ nary from 1837 until his death. In 1838 and 1852 he visited Palestine with the scholarly missionary, Eli Smith, and there made care¬ ful surveys and investigations. His chief work, (Biblical Researches) (1841; 3 vols. compressed into 2, with a 3d 1856), which obtained for him the Royal Geographical So¬ ciety's gold medal, was based on these studies. He was a leading member of the American eth¬ nological, geographical and Oriental societies, and edited in 1831-34 the (Biblical Repository,) in 1843 the (Bibliotheca Sacra, } with which the 'Repository' was incorporated, and for which he continued to write until 1855. Among his other publications are (A Dictionary of the Bible' (1883) ; editions of Buttmann's (Greek Grammar' (1833; 3d ed., 1851) and Gensenius' (Hebrew Lexicon' (1836; 5th ed. 1854), and Greek (1845; 2d ed., 1851) and English (18-16) 'Harmonies of the Gospels.' Consult Hitch¬ cock, (Life, Writings and Character of Edward Robinson' (1863).

. ROBINSON, Edward, American archie-ologist : b. Boston, Mass., 1 Nov. 1858. He was graduated at Harvard University in 1879, later spending five years in study in Europe, includ¬ ing 15 months in Greece and three semesters at Berlin. He was curator o± classical an¬ tiquities at the Boston Museum of Fine Arts in 1885-1902 and director in 1902-05. He be¬ came assistant director at the Metropolitan Museum of Art, New York, in 1906, and in 1910 succeeded Sir Caspar Purdon Clarke as director. He lectured on archaeology at Har¬ vard in 1893-94 and in 1898-1902, and was sec¬ retary of the art commission of Boston in 1890-98. He has contributed many articles to periodicals as well as to the Bulletin of the Metropolitan Museum of Art.

ROBINSON, Edward Van Dyke, Amer¬ ican economist : b. Bloomington, Ill., 20 Dec. 1867; d. 10 Dec. 1915. He was graduated at the University of Michigan in 1891 and took his Ph.D. at Leipzig in 1895. He was engaged in teaching and lecturing on commercial geog¬ raphy, physiography, economics and political science in 1895-1907 ; was appointed professor of economics at the University of Minnesota

in 1907, and in 1915 accepted that chair at Columbia University. He was a contributor to scientific periodicals and was author of (Nature of the Federal State' (1893) ; (War and Economics > (1900) ; (Text Book on Commercial Geography' (1909) ; 'Cost of Government, National, State and LocaP (1912) ; (Economic Conditions and the Development of Agricul¬ ture in Minnesota' (1915), *etc.*

ROBINSON, Edwin Arlington, American poet : b. Head Tide, Me., 22 Dec. 1869. He was educated at Gardiner, Me.,- and at Harvard University in 1891-93. His poetic work has been very well received by discriminating critics who have pronounced it thoroughly American

in tone and free of the meaningless twaddle all too common among our poets. His works are (The Torrent and the Night Before' (1896); (The Children of the Night' (1897); (Captain Craig' (1902) ; (The Town Down the River' (1910); Wan Zorn,' a play (1914); (The Porcupine, > a play (1915); 'The Man Against the Sky,' poems (1916) ; (Merlin,' a poem (1917). See Merlin; Van Zorn.

ROBINSON, Ezekiel Gilman, American

Baptist clergyman and educator: b. Attle¬ borough, Mass., 23 Marcn 1815 ; d. Boston, Mass., 13 June 1894. He was graduated at Brown University in 1838 and at Newton Theo¬ logical Seminary in 1842. He held pastorates at Norfolk, Va., and Cambridge, Mass., in 1842—46 ; was professor of Biblical interpreta¬ tion at the Western Theological Seminary, Cov¬ ington, Ky., in 1846-50, and pastor at Cincinnati, Ohio, in 1850-53. He became professor of theology at the Rochester Theological Seminary in 1853 and president in 1860. In 1872-89 he was president of Brown University, and from 1893 until his death was professor of ethics and apologetics at the University of Chicago. He edited the Christian Review in 1859-64, and was author of Wale Lectures on Preaching' (1883) ; (Christian Theology' (1894) ; Auto¬ biography' (ed. Johnson, E. H., 1896), *etc.*

ROBINSON, Frederick Cayley, English

artist : b. Brentford, Middlesex, 18 Aug. 1862. He studied at the Royal Academy Schools and in Paris and Italy. His work is characterized by much care in finish and has a certain tend¬ ency toward mediaeval effects. He illustrated Genesis for the Medici Society and painted the mural decorations for the Middlesex Hos¬ pital in 1910-14. Among his earlier works are 'Outward Bound) : (The Ferry'; (Drifting' ; 'Souvenir

of a Past Age' (Adelaide Perma¬ nent Collection) ; 'The Foundling.' After studying in Italy he painted in a different style, his works including (Fata Morgana) ; 'Winter Twilight,' etc., and study in Paris influenced his later works, among which are 'The Deep' ; 'Midnight* ; 'Dawn'; 'Youth' (Cape Town Collection) ; (The Fisherman' (Italian National Collection) ; (Death of Abel' (Luxembourg, Paris), *etc.*

ROBINSON, Sir Frederick Philipse, Eng¬ lish soldier: b. near New York. September 1763; d Brighton, England, 1 Jan. 1852. He became ensign in 1777 in a Royalist American regiment, raised by his father, and fought in the battles of Horseneck, Stony Point and New London. He returned to England in 1784; entered the West India service in 1794 and was present at the capture of Martinique, Saint Lucia and Guadeloupe. He became colonel in 1812 and commanded a brigade in the Peninsula cam¬ paign of 1913, where he fought gallantly; was promoted major-general in 1814 and rewarded with a medal. He took part in the engagement before Plattsburg in 1814 during the war with the United States, and in 1816 left Canada for the West Indies, where he was put in command of the troops in the Windward and Leeward islands and for a time was governor of Tobago. In 1841 he became general. At the time of his death he was the soldier of longest service in the .British army.

ROBINSON, Frederick William, English novelist : b. London, 23 Dec. 1830 ; d. there, 6 Dec. 1901. He was educated at Clarendon House, Kensington, and in. 1851 began his career as a novelist, though he frequently con¬ tributed special articles to periodicals and for five years wrote dramatic criticisms for the Daily News. He founded and edited Home Chimes, which ran as a weekly two years and then became a monthly. He was a prolific writer and over 50 titles of novels stand to his credit. Some of them are as follows: 'The House of Elmore) (1855) ; (One and Twenty) (1858) ; 'No Church) (1861) ; 'Female Life in Prison* (1862) ; 'A Woman's Ransom) (1864) ; (Beyond the Church) (1866) ; 'Stern Necessity> (1870) ; (Her Face Was Her Fortune) (1873); 'Second Cousin Sarah) (1847); 'The Romance of a Back Street) (1878) ; 'Lazarus in London) (1885) ; 'The Keeper of the Keys* (1890); 'The Secretary) (1895); 'Sweet Nine¬ teen (1896). His skilfully constructed and fluently told fictions were as popular in this country as in his own.

ROBINSON, Geoffrey, English journalist: b. 1874. He was educated at Oxford, was a Fellow of All Souls' College in 1898, and in 1901-05 he was private secretary to Lord Milner in South Africa. He edited the Johannesburg Star in 1905-10; was afterward South African correspondent for the London Times , and from 1912 was editor and director of the Times.

ROBINSON, Henry Crabb, English bar¬ rister and diarist: b. Bury Saint Edmunds, 3 May 1775; d. London, 5 Feb. 1867. In 1796 he en¬ tered a solicitor's office in London, and in 1800 went to Germany, where he spent five years in studying at Jena and elsewhere, and in making the acquaintance of Goethe, Schiller, Wieland, Herder, Kotzebue and other noted Germans. In 1807 he went to Altona as Times correspond¬ ent, and in 1808-09 was war correspondent in Spain for the same newspaper. He was called to the bar in 1813, and practised until 1828. He was associated with the foundation of the University of London in 1828. His fame as a conversationalist approached that of Rogers, but he never made any serious attempt to gain distinction as a writer. His intimate acquaint¬ ance with many of the greatest men

and women of his time, both in his own country and on the Continent, such as Wordsworth, Lamb, Coleridge, Southey, Flaxman and Clark¬ son, gives peculiar interest and value to the selections from his 'Diary, Reminiscences, and Correspondence,* edited by Sadler in 1869. He was one of the founders of the Athenaeum Club and of University College, London. Consult Vincent, L. H., 'Dandies and Men of Letters" (Boston 1913).

ROBINSON, Sir Hercules George Robert,

1st Baron Rosmead, British colonial governor: b. 19 Dec. 1824; d. London, 28 Oct. 1897. He was educated at Sandhurst and was commis¬ sioned in the 87th regiment (Irish Royal Fusiliers) in 1843. He retired from the army in 1846 and became commissioner of public works for Ireland, rendering admirable service during the Irish famine of 1848. In 1854 he was appointed president of Montserrat in the West Indies, and in 1855 he became lieutenant-governor of the neighboring island of Saint Christopher, where he introduced coolie labor

from India with excellent results. In 1859 he was promoted governor of Hongkong and was in office during the war with China in 1860-61. He was governor of Ceylon in 1865-68 and reorganized its public works de¬ partment so that it became a model in British colonial administration. He was governor of New South Wales in 1872-79, negotiating the cession of the Fiji Islands, and in 1879 he be¬ came governor of New Zealand. He was ap¬ pointed governor of Cape Colony and high commissioner of South Africa in 1880, arriving in January 1881, and was called upon to estab¬ lish the peace following the first Boer War. His administration was exceedingly able under circumstances of marked difficulty. He labored earnestly to establish a responsible colonial government and to institute cordial relations between the British and Dutch settlers, besides improving internal communication and opening new territory. He was continued in office two years beyond the usual term of a governor and received a baronetcy in 1891. In 1895, at the urgent request of Lord Rosebery's government, he returned to South Africa and resumed his former position. The Jameson raid, car¬ ried out without his knowledge, brought his negotiations with the South African Republic to an end. He secured the release of the raiders but could do little to remedy the troubles which resulted in the War of 1899, although at the time of his departure in May 1896 he had established comparative calm. He was created Baron Rosmead in 1896.

historian and educator : b. Bloomington, Ill., 29 June 1863. He was graduated at Harvard in 1887 and took his Ph.D. at Freiberg in 1890. In 1891 he was lecturer on European history at the University of Pennsylvania; and in 1892-95 he was assistant professor of history at Columbia University, where he has held the chair of history since 1895, acting also as dean of Barnard College in 1900-01. He is favor¬ ably known for his original methods and broad scope as a teacher of history. He edited the Annals of the American Academy of Political and Social Science in 1891-95; and since 1911 has been associate editor of the American His¬ torical Review. He was joint editor of 'Trans¬ lations and Reprints from the Original Sources of European History *; and joint author of 'Petrarch, the First Modern Scholar and Man of Letters) (1899) ; 'Development of Modern Europe* (2 vols., 1907) ; and 'Readings in Modern European History) (2 vols., 1908-09). Author of 'The German Bundesrath* (1891) ; 'Introduction to the History of Modern Eur-ope) (1903) ; 'Readings in European History* (2 vols., 1904-05) ; 'The New History) (1911), *etc.*

ROBINSON, John, English Independent clergyman: b. Lincolnshire, about 1576; d. Ley¬ den, Holland, 1 March 1625. It has been widely assumed that he was educated at Corpus Christi College, Cambridge. He was, say certain later writers, suspended from a benefice in Norfolk. He himself mentions a residence in Norwich, where he was religious director of a band of worshippers, and where certain persons were excommunicated for their interest in his in¬ struction. In 1608 he emigrated to Amsterdam, with several of the congregation of the church

at Scrooby Manor, Nottinghamshire, and thence in 1609 to Leyden, where he was ordained pas¬ tor, with William Brewster (q.v.) as ruling elder. In 1611 a building was purchased for 8,000 guilders for use as a meeting-house. Mather in his (Magnalia) says that ((those famous divines, Polyander and Festus Hom-mius, employed this our learned Robinson to dispute publicly in the University of Leyden against Episcopius, and the other champions of that grand choke-weed of true Christianity® (Arminian doctrine). There may be some foundation for the story of such a disputation ; but it was probably not at Polyander's request, nor at the university, where Episcopius was in power. Robinson was admitted to the univer¬ sity in 1615 and attended Episcopius' lectures. He took a very active interest in the project for emigration to America; and had a majority of his church volunteered would have accom¬ panied them hither. Previous to the sailing of the Speedwell he preached on 21 July 1620, observed as a day of prayer and humiliation. His celebrated address is given in Winslow's (Hypocrisie Unmasked) (1646), the author re¬ marking that Robinson ((used these expressions, or to the same purpose,® and some allowance must be made for such improvements and em¬ bellishments as Winslow may have made to suit his controversial purpose. Robinson cor¬ responded with the "church of God at Plym¬ outh, New England.® Mather calls him "a most wise, grave, good man,® and Robert Baillie, "the most learned, polished, and modest spirit® among the Separatists. A tablet marks the house in which he lived in Leyden, and Peter's Church, where he is buried, also contains a bronze memorial. His <Works,) with memoir and notes of Robert Ashton, appeared in 1851. The most important of his works which were published were (A Justification of Separation from the Church of England) (1610) ; (Of Religious Communion) (1614) ; 'Essays or Ob¬ servations Divine and MoraP (1625). Consult Bradford, 'History of Plymouth Plantation (Coll, of the Mass. Hist. Soc., 4th ser., Vol. Ill, 1856); Mather, (Magnolia) (1702); Neal, 'History of New England) (1720) ; Brook, 'Lives of the Puritans) (1813) ; Dexter, 'Con¬ gregationalism of 300 Years) (1880) ; 'Life) by Davis (1903) ; Burrage, Champlin, 'New Facts Concerning John Robinson (Oxford 1910).

ROBINSON, Sir John Beverley, Canadian jurist and statesman: b. Berthier, Quebec, 26 July 1791 ; d. Toronto, 31 Jan. 1863. He was educated under Dr. John Strachan at Kingston and was admitted to the bar in 1814. He served as clerk of the assembly of Upper Canada

in that year, and in 1815 read law at Lincoln's Inn, London. Returning to Canada he became Solicitor-General, and he was leader of the Conservatives in Upper Canada in 1818-29. He was speaker of the Legislative Council in 1828-40; and from 1829 until shortly before his death he was chief justice of Upper Canada. His reputation as a justice was high, not one of his decisions ever being reversed on an appeal. He was opposed to the union of the two Canadas, but upon its accomplishment he rendered in¬ valuable assistance in adjusting financial ar¬ rangements, receiving the thanks of the Upper Canadian assembly. He was a Tory of pro¬ nounced opinions and was by many considered

a reactionary, but admittedly possessed the high¬ est principles and sound patriotism. He wrote several pamphlets, the most notable being his argument against the Canadian union, 'Canada and the Canada Bill5 (1839). He was created a baronet in 1854. Consult Robinson, C. W., 'Life) (1904) and Dent, J. C., 'Canadian Por¬ trait Gallery5 (Vol. IV, 1881).

ROBINSON, John Cleveland, American soldier: b. Binghamton, N. Y., 10 April 1817; d. there, 18 Feb. 1897. He entered West Point in 1835, but withdrew in 1838 to study law, ac¬ cepting, however, a commission as 2d lieutenant in 1839. He was engaged in the Mexican and Seminole wars, was promoted captain in 1850 and at the outbreak of the Civil War was com¬ missioned colonel of volunteers. He was in command of Fort McHenry at the opening of the war; successfully defended it, and was later engaged in organizing volunteer troops. He commanded a brigade in the Army of the Po¬ tomac in the Seven Days' battle before Rich¬ mond; was present at the battles of Fredericks¬ burg, Chancellorsville, Gettysburg, Wilderness and Spottsylvania, and in the last lost a leg and was prevented from further active service. He was voted a medal of honor by Congress ; was brevetted major-general of volunteers in 1864 and of regulars in 1865. In 1866 he was mus¬ tered out of the volunteer service and accorded rank as colonel in the regular army. He was in command of the Department of the South in 1867, of the Lakes in 1868-69, and in the latter year was retired with rank of major-general. He was elected lieutenant-governor of New York in 1872, was commander-in-chief of the G. A. R. in 1877-78, and president of the So¬ ciety of the Army of the Potomac in 1887-88.

ROBINSON, Joseph Armitage, English

clergyman : b. — . He was educated at Cam¬ bridge, took priest's orders in the Established Church in 1882 and was vicar of All Saints, Cambridge, 1888-92. From 1893 to 1899 he was Norrisian professor of divinity at Cambridge, and was prebendary of Wells' Cathedral 1894 — 99. He was rector of Saint Margaret's, West¬ minster, 1899-1900, canon of Westminster 1899-1902, and in the year last named succeeded Dean Bradley as dean of Westminster Abbey. He has published 'A collection of the Athos Codes of the Shepherd of Hermas) (1888) ; 'Appendix to the Apology of Aristides5 (1891) ; 'The Passion of Saint Perpetua5 (1891) ; 'The Philocalia of Origen5 (1893) ; 'Euthaliana5 (1895) ; 'Unity in Christ5 (1901) ; 'The Study of the Gospels5 (1902) ; 'Some Thoughts on the Incarnation5 (1903) ; 'Commentary on the Epistle to the Ephesians5 (1903; 2d ed., 1904); 'On the Athanasian Creed5 (1905) ; 'The Vision of Unity5 (1908) ; 'The Advent Hope in Saint Paul's Epistles5 (1911); 'Holy Ground5 (1914).

ROBINSON, Sir Joseph Benjamin, South

African capitalist: b. Cradock, Cape Colony, 3 Aug. 1840. He engaged in wool-buying and farming until 1867, increasing his holdings to 20,000 acres at Vaal River after the discovery of diamonds. He was the discoverer of the Langlaagte gold mine and became owner of the Radfontein gold fields. He was mayor of Kim¬ berly in 1880, and was for four years a member of the Cape Parliament, in which time he se¬ cured the passage of the Diamond Trade Act.

He fought for the Free State in the Basuto War. He was created a baronet in 1908.

ROBINSON, Joseph Taylor, American

senator: b. Lonoke, Ark., 26 Aug. 1872. He was educated at the University of Arkansas, was admitted to the bar in 1895 and engaged in practice at Lonoke. He was elected to the general assembly in 1895, and in 1903-13 was a member of Congress. He resigned from Congress in 1913 after his election as governor of Arkansas, but a few days after taking office he resigned that post also in order to accept an appointment to the United States Senate, succeeding Jefferson Davis for the term ending in 1919. He was reelected for the term ending in 1925.

ROBINSON, Robert, English preacher and hymn writer: b. Swaffham, Norfolk, 27 Sept. 1735; d. Birmingham, 9 June 1790. Lack of funds prevented his studying for the Anglican ministry, but he came under the influence of Whitefield in 1752, and in 1758 became a preacher. A year later he joined the Baptist faith, preaching at the Stone Yard Baptist Chapel, Cambridge, for two years before he was ordained pastor. He became popular as a preacher, built a new church in 1764 and with¬ out neglecting his clerical duties supported him¬ self by farming and a corn and coal business. He later became practically a Unitarian, and after 1783 left the Baptist Church, engaging in preaching at Chesterton and Birmingham. Of his hymns two are still in use, Tome Thou Fount of Every Blessing5 and (Mighty God While Angels Bless Thee.5

ROBINSON, Stuart, American Presby¬ terian clergyman : b. Strabane, near London¬ derry, Ireland, 26 Nov. 1814; d. Louisville, Ky., 5 Oct. 1881. He was graduated at Amherst College in 1836, studied theology at Union Seminary, Prince Edward, Va., and was or¬ dained in 1841. He was pastor at Kanawha Salines, W. Va., 1841-47, in 1856—58 professor of ecclesiology in the Presbyterian Seminary at Danville, Va., and then became pastor at Louis¬ ville. He edited the True Presbyterian, which was suppressed by the government in 1862 for

disloyalty, and he then removed to Toronto. In 1865 he published (Slavery as Recognized by the Mosaic Civil Law, and Allowed in the Abrahamic, Mosaic and Christian Church,5 and in 1866 resumed his Louisville pastorate and reissued his paper as The True Christian Commonwealth. His persistence in expressing his former views led to his expulsion from the Presbyterian General Assembly, and by his in¬ fluence the Kentucky svnod joined the Southern General Assembly in 1869, which body made him its moderator. He was a delegate to the Pan-Presbyterian council at Edinburgh in 1877. He wrote (The Church of God an Essential Ele¬ ment of the Gospel5 (1858), and published (Discourses of Redemption5 (1866).

ROBINSON, Theodore, American artist: b. Irasburg, Vt., 1852; d. New York, 2 April 1896. He studied under Carolus-Duran and Gerome in Paris and under Claude Monet at Giverney. He opened a studio in New York, devoted himself chiefly to landscape and figure painting and became a leader of the Impres¬ sionist school. He was awarded the Webb prize for his (Winter Landscape5 (1890), and the Shaw prize for his study of a peasant girl

(In the Sun5 (1892). Among his works are (A Bridge5; (In the Sunlight5; (On the Tow Path5; <West River Valley — Vermont5; (Giverney5 and (Girl with Cow5 (Metropolitan Museum) ; (Correspondence,5 *etc.*

ROBINSON, Theresa Albertine Louise von Jakob, German-American author: b. Halle, Prussia, 26 Jan. 1797 ; d. Hamburg, 13 April 1870. She was the second wife of Edward Rob¬ inson (q.v.), and was known in Germany as an author under the name of <(Talvj5) (formed from her initials). While residing at Kharkoff she began to study Slavonian, and wrote her first poems. In 1824 she published a few tales in a volume bearing the title (Psyche.5 She also published, in 1825-26, translations of a number of Serbian popular songs entitled (Volkslieder des Serben.5 In America she be¬ gan the study of aboriginal languages and translated into German Pickering's work on the Indian tongues. In 1834 she wrote a (His¬ torical Review of the Slavic Languages5 for the (Biblical Repository,5 republished in en¬ larged form in 1850. During her husband's visit to Palestine she resided in Germany, where she published, in 1840, (Charakteristik der Volkslieder germanischer Nationen mit einer Uebersicht der Lieder aussereuropaischer Volker-schaften.5 (Die Colonisation von Neu-Eng- land5 was published at Leipzig in 1847 ; a de¬ fective translation by W. Hazlitt, Jr., appeared in London in 1851. She also wrote numerous tales, and contributed to

magazines, both Ger¬ man and English. tHeloise,5 (Life's Disci¬ pline5 and (The Exiles5 were German tales translated into English by her daughter (1850-53). (Fifteen Years: A Picture of the Last Century5 appeared in 1870, and (Gesammelte Novellen5 in 1874.

ROBINSON, William Erigena, Ameri¬ can journalist and legislator: b. Unagh, County Tyrone, Ireland, 1814; d. Brooklyn, N. Y., 23 Jan. 1892. He emigrated to the United States in 1836, took out his first naturalization papers in 1837 and in 1841 was graduated at Yale University. He later engaged in journalism; was on the staff of the New York Tribune in 1844-48, writing under the pseudonym ((Richelieu,55 a name he used for occasional writings until his death. He engaged in law practice in New York in 1854; was assessor of internal revenue for Brooklyn in 1862-67, and served in Congress in 1867-69 and in 1881-84. He secured the passage of a bill to protect the rights abroad of naturalized as well as native-born citizens, and was an advocate of penny postage and of Cuban independence. In 1847-48 he organized the movement for the relief of the famine in Ireland.

ROBINSON, William S., American land¬ scape painter: b. East Gloucester, Mass., 1861. He studied in Boston, France and Holland. He was instructor in art at Maryland Institute, Baltimore, in 1885-89; at Drexel Institute in 1891-93 ; at the Pennsylvania Academy of Fine Arts in 1892-99, and at Columbia University in 1894-1904. He took honors at the Paris, Buffalo, Saint Louis and Panama Expositions, and in 1900 was elected to the National Academy. Among his works are (The Golden Bough5 (Carnegie Institute, 1908) ; (White Birches5 (1913) ; (Whiteface Chasm, Monhegan5 (1913) ; September5 (1 91 5) v *etc.*

ROBINSON, Ill., city, county-seat of Craw¬ ford County, on the Wabash River, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Illinois Central railroads, 45 miles southwest of Terre Haute, Ind. It was settled in 1842, when it became the county-seat; was incorporated as a village in 1866 and as a city in 1886. It is the trade centre of a fruit and grain-growing and sheep-raising region, and

contains a few small mills, an oil refinery and oil-well supply works, hospital and sanitarium.. It has four banks. It contains a township high school founded in 1885, with a school li¬ brary of over 600 volumes and a Carnegie library, an Elk's home, Federal building and courthouse. The city is governed by a mayor and a council of 12 ; the members of the coun¬ cil are elected for two years, six being chosen each year. Pop. (1920) 3,368.

ROBINSON CRUSOE, the best-known

work of Daniel Defoe and one of the most widely read of all modern books, was pub¬ lished at London, on or about 25 April 1719, by William Taylor at the Sign of the Ship in Pater Noster Row, in an octavo volume some¬ what exceeding 350 pages, with a frontispiece representing the hero in his goatskin clothes, and under the following show-case or display title : <(The Life and Strange Surprizing Ad¬ ventures of Robinson Crusoe, of York, Mariner: Who lived Eight and Twenty Years, all alone in an uninhabited Island on the Coast of America, near the Mouth of the Great River of Oroonoque; Having been cast on Shore by Shipwreck, wherein all the Men perished but himself. With An Account how he was at last as strangely deliver'd by Pyrates. Written by Himself.® It was a rather expensive, not ill-looking book, marred, however, by a consider¬ able number of typographical blunders.

Defoe at the time of its publication was apparently in his 60th, possibly in his 61st year. He was very widely but not favorably known as a bankrupt merchant who more than 20 years before had turned pamphleteer and poli¬ tician. His satire (The True-Born English¬ man (1701) had brought him fame, but shortly afterward he was ruined through his exposure in the pillory and his imprisonment for writ¬ ing his ironical tract {The Shortest Way with the Dissenters, J and he became in consequence a political journalist, a secret government agent and a miscellaneous writer whose pen was supposed to be as venal as it was prolific. Since the accession of the Hanoverians in 1715 he had been much attacked for his relations with Jacobite newspapers, the fact that he was in reality employed by the government to watch them not being generally known. Of his thousands upon thousands of pages in peri¬ odicals, pamphlets and books nearly all had been anonymous, and, while his style often be¬ trayed him, he had been detected in writing nothing that on the surface markedly resembled (Robinson Crusoe.) Yet it was not long before his hand was recognized in that, a fact which led to some rather stupid criticism of the book; and in our own day certain preliminary essays of his in more or less fictitious writing have been discovered, which make his success in the

new vein, which he soon began to practise assiduously, somewhat less surprising than it would have been had he suddenly changed to an

unwonted field of composition and produced a masterpiece. That something novel and im¬ portant had been added to English fiction was speedily shown by the unparalleled popularity of (Robinson Crusoe, } in its full form, in cheap abridgments, in translations and in frank imita¬ tions. We do not know the size of the editions, but we do know that before the end of 1719 there were probably six authorized impressions, a Dublin reprinting and several piratical issues, not counting serial publication in a newspaper. No previous English story had been so circu¬ lated, and by August 1719 the canny author had presented the public with a second instalment of his hero's history, likewise published by Taylor, (The Farther Adventures of Robinson Crusoe; Being the Second and Last Part of his Life, And of the Strange Surprizing Ac¬ counts of his Travels Round three Parts of the Globe. > This, while fairly popular and a creditable piece of travel-fiction, was not, as Defoe fondly thought, contrary to the usage of second parts <(every Way as entertaining as the First,® a verdict which applies with still greater force to the so-called third part pub¬ lished by Taylor a year later (1720), really not fiction at all but a volume of essays entitled (Serious Reflections during the Life and Sur¬ prising Adventures of Robinson Crusoe : With his Vision of the Angelick World. } Both of these parts, like the first, bore the legend ((Writ¬ ten by Himself,® for those were days when serious people denounced fiction as Hies,® and Defoe indulged in some curious exegesis in his prefaces in order to justify to his Non-Con¬ formist's conscience his lucrative story-writing.

To follow the fortunes of (Robinson Crusoe* after 1719 would require a large volume. Here only a few salient facts can be given. At least three additional authorized reprintings were needed before Defoe died in 1731, quaint il¬ lustrations were introduced, several abridg¬ ments appeared, one of which, apparently made by Defoe himself and covering all three parts, went through numerous editions during the next hundred years, the three parts were trans¬ lated into Dutch, French and German, and a large number of imitations made unsuccessful attempts to rival the popularity of the original, although in some cases attaining themselves considerable vogue. The story took root more strongly perhaps in Germany than in any other foreign country, but it was and remained very popular in France, and before many years had elapsed Italians also could read it in their native tongue. It has since been translated into all sorts of languages and

dialects, it has fas¬ cinated wandering Arabs, it is taught to school children in our island possessions and it is accessible in Esperanto. One of the largest collections of ((Crusoes ,® that of Mr. William S. Lloyd of Philadelphia, contains some 400 volumes, but unrecorded issues in English and in other tongues are continually coming to light. Some of the modern editions are true works of art, very distinguished artists, especially in France, having striven to illustrate adequately so famous a book.

It has naturally attracted also both scholars and literary critics and gossips, with the usual darkening of counsel. It may fairly be said that scarcely one of the numerous stories and speculations about Defoe and his chief book

will bear investigation. He cannot be shown to have made misuse of Selkirk's papers, it is highly unlikely, to say the least, that Robert Harley, Earl of Oxford, had anything to do with writing the first part, it is far from cer¬ tain that Defoe had any difficulty in getting that part published, it could not possibly have been written at most of the places assigned for its composition, and was probably thrown off hastily at Defoe's house at Stoke Newing¬ ton not long before it was issued, and, finally, all attempts to see in the book a serviceable allegory of Defoe's life, however much sup¬ port they may receive from his sophisticated prefaces, are likely to prove valueless and not a little absurd. The truth is that scarcely any¬ thing definite is known about the origin of the great story except that it is clearly Defoe's, since it was assigned to him by fellow-journal¬ ists of the time, and since in all three parts, from first page to last, the minute student finds the stylistic evidence of his authorship over¬ whelming, and that doubtless the occasion for Defoe's attempting to describe the life of a shipwrecked sailor upon a far-off deserted island was the publication of accounts by Capt. Woodes Rogers, Capt. Edward Cooke, Sir Richard Steele and others of the strange adventures of the Scotch sailor Alexander Sel¬ kirk or Selcraig, during a more than four years' solitary sojourn on the island of Juan Fer¬ nandez off the coast of Chile. That this is not Crusoe's island the very title-page of the book plainly shows — many persons, inquisitive in small matters, seem to be unduly positive that Tobago should have that honor — but it is about as clear as such things can ever be that poor Selkirk's story influenced Defoe. He may have taken hints from the experiences of other castaways and from other narratives of travel, also — indirectly if at all — from Grimmels-hausen's (Der labenteuerliche Simplicissimus and from a Dutch story, Hendrick Smeeks' Reschrijvinge van het magtig Koningrijk Krinkle Kesmes) ; but in the main most of the ˆsources® for the masterpiece discovered by indefatigable scholars are imaginary or at best barely possible, and (Robinson Crusoe,5 like (Paradise Lost) and many of Shakespeare's plays, may truly be said to derive its great¬ ness from the appeal of its subject matter and from its author's own genius. It is doing Defoe no injustice to say tnat, on the whole, it is the exceptional interest

attaching to the central part, the island portion, of the first volume of (Robinson Crusoe) that has contributed most to giving the story its extraordinary currency. The third volume, the (Serious Reflections,5 while not without merit, has been but seldom reprinted and is little known. The second volume, (The Farther Adventures, 5 possesses more merit and has been many times reprinted to accomplish the first, but it is seldom specially in mind when the book is mentioned. Even the extra-island portions of the first volume — the experiences in Africa and Brazil and the con¬ cluding journey through Spain — good of their kind though they are — do little to make the book impressive. What profoundly impresses us is the frightful loneliness, the struggle of the ordinary sailor-hero against what seem to be overwhelming odds, his final success, although his endowments, except perhaps in physical resistance, are no higher than we may well

suppose our own to be. Our sympathy and our curiosity — two mighty elements in the success of a book if the author can but arouse them thoroughly — are brought into play from the shipwreck to the departure, although some may experience a slight flagging of interest after the life with Friday has been described. (< Would I have thought of doing that?® is the question, however egotistical, that continually presents itself, and in reflecting upon it we can legiti¬ mately bring Defoe in for a high share in the praise we bestow on his book. c Robinson Crusoe) through the universality of its appeal has much of the carrying power of the world's greatest poems, but Defoe, although possessed of more imagination than is often given credit for, was not a great poet. He was, how¬ ever, as a journalist and much experienced, ver¬ satile and wideawake man, endowed with quali¬ ties that stood him in good stead when he be¬ gan his book at a remarkably late period in life for the inception of new literary enter¬ prises. His English, if careless, was easy and unaffected, his methods of narration were straightforward, and he had not only a very large knowledge of character and of the de¬ tails of life but an exceptional power of lend¬ ing vividness and reality to whatever he de¬ scribed. This last he attained chiefly through a skilful use of minute features and circum¬ stances, which beguile the reader into belief of all he is told. It may be at bottom a jour¬ nalistic faculty, but, as Defoe seems to be the only professional journalist who has a Robin¬ son Crusoe,5 a (Moll Flanders/ and a 'Jour¬ nal of the Plague Year5 to his credit, it would seem either that he was a good deal more than a journalist, or else that critics need to revise their notions as to what the term Journalistic® should connote.

We have already seen that Defoe had made some mild attempts at semi-fictitious writing before the second edition (1718) of Woodes Rogers' (Cruising Voyage5 brought, in all prob¬ ability, the story of Selkirk, much in evidence six years before, once more to his attention. An omnivorous reader, he undoubtedly knew the work of preceding picaresque writers, like the author of (The English Rogue,5 as well as that of Mrs. Aphra Behn, but in the main his contribution to English fiction was orig¬ inal. He had learned early as a pamphleteer to narrate and to describe in a lifelike fashion — - vide his (True Relation of the Apparition of one Mrs. Veal5 (1706) — and he had also learned to manage dialogue and to tell anecdotes ef¬ fectively. Later he had learned how to con¬ struct books of some length and to make them less and less sprawling; he had even begun to create characters and to move in imagina¬ tion in foreign countries and in the past — vide, his (History of the Wars5 of Charles XII of Sweden (1715) and his Continuation5 of the famous ('Letters5 supposed to be written by a <(Turkish Spy® (1718). Shorter pieces more specifically fictitious might be added to these, but the main point is that he had gradually, probably without knowledge of it or conscious purpose of any sort, been assembling the quali¬ ties and materials necessary to the writing of fiction. The story of Selkirk supplied the oc¬ casion, the spark, and Defoe was doubtless influenced also by the facts that he now lived

at home, being no longer sent by the govern¬ ment on tiresome journeys, and that, writing as he did with great ease, the more books he could produce, the more money he could lay by to furnish dowries for several daughters, to whose attractiveness one of his future sons-in-law, the naturalist. Henry Baker, has borne testimony. In some such uninvolved and human way, we may imagine, one of the most unin¬ volved and human books ever written came into existence, and it was in giving this book, not merely to his countrymen, but to the world, and in showing other writers what it was to be uninvolved and human in their stories that Daniel Defoe proved himself to be a benefactor to the race. To the student he is in his mixed character and in his perplexing career one of the most interesting of men; to the masses of

mankind he is and will always remain <(the Author of Robinson Crusoe, w a name and little else. The thing created has swallowed its cre¬ ator, which is not far from being the highest tribute that can be paid to any achievement.

Convenient editions of (Robinson Crusoe J may be! found in thd Globe, Golden Treasury and other well-known series, and in the late George A. Aitken's edition of Defoe's (Romances and Narratives. > The text of most editions, how¬ ever, leaves much to be desired. The writer has endeavored to supply an accurate text of the first part in a school edition published in 1916 by Ginn and Company, and he has an edition of the same part with full apparatus in the press of the same firm.

W. P. Trent.

ROBLIN, rob'lm, Sir Rodmond Palen,

Canadian statesman : b. Sophiasburgh, Ontario, 15 Feb. 1853. He was educated at Albert Col¬ lege, Belleville; settled in Manitoba in 1880; and engaged in farming on an extensive scale, also becoming a grain merchant. He was elected to the Manitoba legislature in 1888, and in 1900-13 was Premier, Minister of Agricul¬ ture and Railway Commissioner for that province. He was an opponent of the projected Reciprocity Agreement with the United States in 1911. In 1912 he was knighted.

ROBSON, Eleanor Elsie (Mrs. August Belmont), American actress: b. Wigan, Lan¬ cashire, England, 1879. She was graduated at Saint Peter's Academy, Staten Island, N. Y., in 1897 and made her stage debut at San Francisco in that year. She achieved a success in New York as Bonita in ˆArizona,* and later played leading parts in many successful productions. She played Juliet to Kyrle Bellew's Romeo in 1903 and headed an all-star cast in (She Stoops to Conquer y in 1905. She starred in (Merely Mary Ann* in 1903-05, winning high praise in both London and New York; and won her greatest success in (The Dawn of a To-mor- row) in 1908-10. She retired from the stage upon her marriage in 1910.

ROBURITE, an explosive patented by Ur. Roth in 1887. It consists of dinitrochlor-ben- zene mixed with ammonium nitrate, and must be used dry. The detonation of the mixture is to be effected by means of fulminate of mer¬ cury. Roburite burns quietly, and is not sensi¬ tive to shock. Its most successful use has been in the mining of coal, where it is valuable not only because it causes littleˆ dust, but also be¬

cause it allows of blasting the coal in large blocks.

ROBUSTI, ro-boos'te, Jacopo. See Tinto¬ retto.

ROC, rok, a mythical bird of enormous size, supposed to have been able to perform won¬ derful feats of strength and ferocity. The most popular accounts of the roc are given in 'The Arabian Nights' Entertainments/ where the bird plays an important part in the fortunes of Sinbad the Sailor. Sinbad describes the roc as white, with a claw as large as the trunk of a large tree and with a beak of prodigious size and sharpness. Its egg he declares to be 50 paces in circumference, about 150 feet. Another writer computes that the egg of the roc is equal to 150 hens' eggs. The bird is described as a bird of prey, ((able to bear an elephant away in its talons, w and (<killing the moa, which it bore to its nest and destroyed to provide food for its young/ Consult The Arabian Nights' Enter¬ tainments > for the accounts of the second voy¬ age, and the third Calendar's Story. Attempts have been made to identify the roc with the so-called elephant-birds of Madagascar and New Zealand, but it is asserted by naturalists that neither this huge bird (which is not a bird of prey) nor the Harpagornis, the largest known rapacious bird, could have performed the feats commonly attributed to the roc. There were described to the Parisian Academy of Sciences the fossils of an enormous bird called the JEpyornis and two of its eggs, fossil remains of which had been discovered. (See reports for first quarter, 1851). This little-known colossal form has been accepted as the nearest ap¬ proach to the fabulous roc. Consult Lane, E. W., (Arabian Nights' Tales and Anecdotes } (London 1845), and Yule, Sir Henry, in (Book of Marco Polo> (ib. 1871).

ROCA, ro'ka, Julio Argentino, Argentine

statesman : b. Tucuman, Argentina, 1 July 1843 ; d. 1914. He was trained in the Parana Military School, entered the army and in 1874 became general. In 1878-80 he was War Minister, and as such headed in person the expedition which subdued the Patagonian Indians. From 12 Oct. 1880 to 12 Oct. 1886 he was President of the republic. It was during his administration that the serious Argentine financial crisis occurred. In 1890-92 Roca was Minister of the Interior in the Pelligrini administration. He was elected President for a second term in 1898, and during the ensuing six years promoted a sound finan¬ cial policy, furthered public improvements and averted a crisis with Chile. He was sent as Ambassador to Brazil in 1904 and later held a

similar post at Paris.

ROCAFUERTE, ro-ka-foo-ar'ta, Vincente, South American statesman : b. Guayaquil, Ecua¬ dor, 3 May 1783; d. Lima, Peru, 16 May 1847. He was educated in France and England, and in 1812 was elected to the Spanish Cortes by Guayaquil, but his opposition to the policies of Ferdinand VII was resented and he was obliged to escape to France. He went to Lima, and to the United States in 1819. and in 1824 to Mexico, where he became secretary to General Michelena. He accompanied him to England, and after the recognition of Mexico's inde¬ pendence and Michelena's return he remained in England as charged'affaires. In 1830 he re-

signed and returned to Mexico, where he edited the Fenix de la Libcrtad. He went to Guaya¬ quil in 1833, and was soon after elected deputy to Congress for the province of Pichincha, but was exiled because of his opposition to the ad¬ ministration. The province of Guayaquil then revolted against General Flores and proclaimed Rocafuerte as supreme chief. He was defeated and captured by Flores, but an amicable ar¬ rangement was soon afterward made, co-opera¬ tion in the reorganization of the republic was agreed upon and Rocafuerte served as Presi¬ dent in 1835-39. His administration was one of ability. He introduced many reforms and placed the financial affairs of the country on a sound basis. His after life was spent in various diplomatic missions, in which he sustained his high reputation as a statesman. He wrote (Ideas necessarias a todo pueblo independiente, que quiere ser libre (1820) ; (Ensayo sobre tolerancia relegiosa bajo el aspecto politico y como medio de colonizacion y de progreso) (1831), *etc.*

ROCAILLE, ro-kal-e'. See Rococo.

ROCAMBOLE, a perennial species of onion (Allium scorodophrasum) whose bulbs resemble those of the garlic ; but the cloves are smaller. It is cultivated for the same purposes, and is considered more delicate flavored. Its chief use in America is among the French-Canadians.

ROCHA PITTA, Sebastiano, sa-bas-te-a'- noo rdsh'a pet'ta, Brazilian author : b. Bahia, Brazil, 3 May 1660; d. near there, 3 Nov. 1738. He was a leisurely student, and the author of some commonplace verse and fiction. He made very elaborate preparations for his (Historia da America Portugueza desde o seu Descobrimento ate o Anno 1724 } (1730), which won for him deserved success and numerous honors. The book was the first history of Brazil in any true sense, and the material it contained has proved of much value to subsequent workers in that field.

ROCHAMBEAU, ro-shan-bo, Jean Bap¬ tiste Donatien de Vimeur, Comte de, French marshal: b. Vendome, 1 July 1725; d. Thore, 10 May 1807. He was the son of the governor of his native town and was brought up for the Church, but at 17 entered the army. He fought with distinction in the war of the Austrian Suc¬ cession, attained the rank of colonel and in 1749 succeeded his father as governor of Ven¬ dome. During the Seven Years' War he did excellent service in Minorca (1756) and later in Germany, winning the rank of brigadier-gen¬ eral. He was made lieutenant-governor in 1780 and in the same year was dispatched at the head of an army of 6,000 men to co-operate with the American forces in the War of Indepen¬ dence. In July he landed in Rhode Island and, intrenching himself at Newport, held his posi¬ tion until June of the following year, when, in pursuance of a plan of campaign arranged be¬ tween Rochambeau and Washington, the French troops, reinforced by some 3,000 men, marched across Connecticut and joined the American army on the Hudson near Dobbs Ferry, whence was begun the southward march for Yorktown. The city was invested on 29 September and after two brilliant assaults by the French troops and the defeat of the English fleet by the

French under De Grasse in Chesapeake Bay, Cornwallis surrendered. Rochambeau's serv¬ ices to the American cause were enhanced by the utter absence of jealousy or self-assertion on his part; he placed himself implicitly under Washington's orders and within his own army maintained the sternest discipline. Congress voted its thanks to the French commander for his valuable services and presented him with two guns taken at Yorktown. Returning to France in 1783, he took part in the earlier events of the French Revolution and after being raised to the rank of field-marshal was given in 1791 command of the Army of the North. Re¬ garding with disfavor the progress of the Rev¬ olutionary policy, he resigned in June 1792 and soon after was imprisoned at Paris, regaining his liberty at the end of the Reign of

Terror in 1794. In 1804 Napoleon made him an officer of the Legion of Honor. A statue of Rocham¬ beau was erected at Vendome in 1899 and a replica of it, a gift of the French republic to the United States, in Lafayette square, Wash¬ ington, was unveiled with much ceremony in 1902 by President Roosevelt. He left behind him (Memoires du Marechal de RochahbeaiP (1890), translated, in part, into English by M. W. E. Wright (1838) under the title (Memoirs of the Marshal Count de Rochambeau Rela¬ tive to the War of Independence of the United States. > For his correspondence during his term in America consult Daniel, (Histoire de la participation de la France a l'etablissement des Etats Unis d'Amerique) (Vol. V, Paris 1892). Consult also Gachot, (Rochambeau) (in Nouvelle Revue, Paris 1902) ; Jusserand, J. A. A. J., (Rochambeau in America> (Washington 1912) ; Lodge, Henry C., (A Fighting Frigate and Other Essays) (New York 1902) ; (Ro-chambeau5 (published by the Joint Commission on Library of the United States Congress, Washington 1907) ; Soule, Frangoise, (Histoire des troubles de l'Amerique anglaise) (Paris 1787) ; and the anonymous work, (Journal des operations du corps frangais sous le commande-ment du comte de Rochambeau, > sometimes attributed to Rochambeau.

ROCHDALE, roch'dal, a market-town and Parliament borough, England, in Lancashire, 10 miles north-northeast of Manchester. The parish church of Saint Chad, finely situated on a lofty height and approached from the lower part of the town by a flight of 122 steps, is a spacious and venerable structure of the 12th century (restored in 1837), partly in the late Norman and partly in the Perpendicular style, with a square embattled tower, several windows of rich tracery and some very ancient monu¬ ments. Rochdale is a place of considerable an¬ tiquity, and had a Roman station in its vicinity. Its woolen manufacture appears to have been introduced by the Flemings in the reign of Ed¬ ward III, and having continued to flourish is mentioned as famous in the reign of Elizabeth. The Rochdale Co-operative Store, which has several branches in the town, was the first so¬ ciety of its kind, and has served as a model for other co-operative societies. There is a monu¬ ment to John Bright, a native of Rochdale. Pop. 91,428. Consult (Victoria History of the County of Lancaster (8 vols., London 1906-14).

ROCHDALE PIONEERS, or ROCH¬ DALE SOCIETY OF EQUITABLE PIONEERS. See Cooperation.

ROCHE, roch, Alexander, Scottish artist: b. Glasgow, 17 Aug. 1861 ; d. Edinburgh, 10 March 1921. He began life as an architect, but turning to painting, studied at Paris under Boulanger and Lefebre. He painted in land¬ scapes and genre, and among his pictures are (Tete-a-Tete,5 which carried off a gold medal at Munich in 1889; (Fishers) (1891), bought by the Berlin Gallery; 'Landscape,5 awarded a gold medal at Dresden (1897); (Prue) (1902), bought by the Munich Gallery; (The Window Seat) (in Carnegie Institute, Pittsburgh) ; (Spring) ; (Low Tide) ; (01d Song) (in Stutt¬ gart Public Museum) ; 'Margaret5 (in Scottish National Gallery, Edinburgh) ; (Building of the Ship5 (1905, in Dublin Gallery) ; (01d Harbor > (1907) ; portraits of Mrs. Andrew Carnegie and daughter (1903) and Miss Flora Stevenson (in Edinburgh Gallery) ; (The Prison Gate, Magadar5 (1916). Roche was elected to the Royal Scotch Academy in 1900. He also painted the frescoes in the Banqueting Hall, Glasgow Municipal Building, 1900. He published (Finish in Art5 (<Transactions) of the National As¬ sociation for the Advancement cf Art, 1889) and several essays and lectures on art subjects.

ROCHE, James Jeffrey, American author and editor : b. Mountmellick, Queen's County, Ireland, 31 May 1847 ; d. Berne, Switzerland, 3 April 1908. He was educated at Saint Dunstan's College, Charlottetown, Prince Edward Island. In 1883-90 he was assistant editor of the Boston Pilot and editor-in-chief 1890-1905. He was United States consul at Genoa, Italy, 1904-07 and at Berne 1907-08. He published (Songs and Satires5 (1886) ; (The Story of the Filibusterˆ (1891); 'Her Majesty the King) (1898); By-ways of War5 ; 'Sorrows of Sap'ed5 (1904), *etc.*

ROCHE, Regina Maria (Dalton), Irish novelist: b. south of Ireland about 1764; d. Waterford, 17 May 1845. She attained sudden fame in 1798 by the publication of her four-volume story, (Children of the Abbey, > much in the fashion of the (Mysteries of Udolpho,5 which it rivaled in popularity. She then set to work on a long series of similar books — 'The Nocturnal Visit5 (1800) ; 'The Tradition of the Castle5 (1824) ; 'The Nun's Picture5 (1834), and a dozen others.

ROCHE, rosh, Troilus de Mesgouat, Mar¬ quis de la, French colonizer in America: b. France, 16th century; d. Brittany, after 1600. In 1598

he received from Henry IV letters patent creating him lieutenant-general of Canada and adjacent islands, with power to establish col¬ onies anywhere in North America. With a crew drawn largely from French prisoners, he set sail with one Chefdhotel of Normandy as pilot. After landing 40 of his force on Sable Island, he explored Acadia. Head winds pre¬ vented a landing at the island, on his return, and he sailed on for France, where he was im¬ pressed for a year. Chefdhotel was ordered to go in search of the 40 followers, who had fortu¬ nately made their escape by means of wrecked vessels found on the coast. Consult Cham¬ plain, Samuel, (Voyages5 (in Publications of (he Prince Society, Vols. XI-XITI, Boston 1878-82) and Parkman, Francis, 'France and Eng¬ land in North America5 (Boston 1898).

ROCHE-SUR-YON, La, formerly Napoleon-Vendee and Bourbon-Vendee, a town in France, the capital of the department of Vendee, 40 miles south of Nantes, situated on a hill on the right bank of the Yon. The streets nearly all end in a spacious square, bordered with ranges of fine trees and surrounded by public monuments and elegant mansions. The parish church, with a peristyle of six Doric columns and the maire, or mansion-house, an elegant Italian building, are both in the square. There is an active trade in woolen cloth and hardware. Yon was founded by Napoleon I on the site of the ancient castle of Roche-sur-Yon, destroyed at the Revolution, and received the name of Napoleon-Vendee, which was changed to Bourbon-Vendee at the Restoration and to its present name on the dissolution of the Second Empire in 1870. It contains an eques¬ trian statue of Napoleon I and a museum. Pop. 14,885.

ROCHEFORT, Henri, on-re rosh-for

(Victor Henri, Marquis de Rochefort-Lu- qay), French journalist and politician: b. Paris, 30 Jan. 1830; d. 1 July 1913. He became known as the author of successful vaudevilles and farces and as a contributor to Charivari , Figaro and other Parisian periodicals, wherein his political reviews were marked by a brilliancy of wit and audacity of attack that brought upon him the resentment of the government. His assaults on Napoleon III led the emperor to demand his expulsion from the staff of Figaro. Rochefort thereupon (1868) founded a weekly of his own, la Lanterne, in which he continued his assaults on the government with unrivaled weapons of sarcasm and ridicule, be¬ neath which the emperor and his ministers were helpless. The Lanterne attained an enormous circulation and when the editor was forced by repeated sentences of the courts to take refuge in Belgium, he continued its publication in a spirit all the more acrimonious. In 1869 he was elected to the Corps Legislatif and established the Marseillaise with

the professed object of combating the Second Empire. In January 1870 he was imprisoned for inciting to insurrec¬ tion. After the fall of the empire he became a member of the government of national de¬ fense, but was out of sympathy with the con¬ servative tendencies of that body and strongly inclined to the radical element that afterward brought forth the Commune. In May 1871 Rochefort fled from Paris, but was captured and sentenced by a court-martial to deporta¬ tion. In 1873 he was transported to New Cale¬ donia, but escaped, in the following year, lived in Belgium and Switzerland and renewed the publication of the Lanterne. In 1880 he returned to Paris and founded the Intransigeant, a peri¬ odical of virulent protest. He was deputy in 1885-86, became an ardent supporter of Boul¬ anger and in 1889 was sentenced to imprison¬ ment, but escaped to England. He returned under amnesty in 1895 and attracted public at¬ tention as one of the most violent opponents of Captain Dreyfus (q.v.) in that celebrated affair. He published (Les franqais de la deca¬ dence5 (1866) ; (La grande Boheme5 (1867) ; (Les petites mysteres de l'Hotel des Ventes5 (1852); (Lcs uaufragcurs5 (1876); 'L'Evade5

(1880) ; (Les depraves* (1882) ; Napoleon dernier* (1884) ; (Les Aventures de ma Vie) (Paris 1896). Consult Macdonald, J. F., Per¬ sonal Recollections of Rochefort> (in Con¬ temporary Review, Vol. CIV, London 1913).

ROCHEFORT, or ROCHEFORT-SUR- MER, France, chief city of an arrondissement of the department of Charente-Inferieure. It is notable for its naval and army institutions and its well-built public works. It has two harbors — military and commercial. Napoleon purposed embarking for America from this point, but his plans were frustrated. The manufactures include tiles, beer, candles, artifical flowers, naval clothing. There are also various metal foundries, *etc.* Shipbuilding is also important. The wharves, magazines, dock¬ yards, munition works, etc., are well planned and are now almost entirely modernized.

ROCHEFOUCAULD, rosh-foo-ko, Fran¬ cois, Due de la. See La Rochefoucauld.

ROCHEGROSE, Georges, zhorzh rosh-gros, French painter: b. Versailles, 1859. He studied at Paris and developed under Lefebvre and Boulanger a powerful naturalistic style with an almost startling brilliancy of technique. His tendency to the brutal side of tragedy in his choice of subjects is, however, frequently revolting and his pictures too frequently swim in blood. Among the best known and most characteristic are cThe Death of Geta, Em¬ peror of Rome,* and (The Fall of Babylon. *Others of like nature are (Vitellius* ; (An-dromache) ; (La Jacquerie,* and (Barbarian Ambassadors before Justinian.* Of another kind are his mural decorations of the Sorbonne, (The Red Delight* ; (Knight among the Flowers) ; illustrations for PalammboP and (Herodias.* In 1892 he became an officer of the Legion of Honor.

ROCHEJACQUELEIN, rosh-zhak-lan, Henri de la. See La Rochejacquelein.

ROCHELLE, ro-shel', Ill., city in Ogle County, on branches of the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern rail¬ roads, about 70 miles west of Chicago and 150 miles north of Springfield. It is the commercial and trade centre of a fertile agricultural region, in which stockraising is an important industry. The manufacturing interests are connected with farm products. It has a high school, public elementary schools and a public library. Pop.

(1920) 3,310.

ROCHELLE, La, la rd-shel, France, chief town of the department of Charente-Inferieure, a fine port and strongly fortified, 120 miles from Bordeaux. Rochelle played an important role in the Reformation period, resisting many assaults, but was finally forced by famine to succumb (1628). It has a fine town hall begun in 1486, an 18th century cathedral, exchange, courthouse and the ((House of Henry II,® a lycee, old episcopal palace now used as a library and picture gallery, teachers' train¬ ing school, academy of fine arts, botanical gar¬ dens and a museum. Its manufactures in¬ clude porcelain, textiles, sugar and glass. Pop.

36,371.

ROCHELLE SALT, sodium potassium tartrate, a white crystalline substance, dis¬ covered by Seignette, an apothecary of Rochelle,

France, in 1672. It has a mildly saline and slightly bitter taste, and is much used as a laxa¬ tive, especially in seidlitz powders. Its formula is KNaCJLOe + 4H20.

ROCHESTER, roch'es-ter, John Wilmot,

2d Earl of, English poet and courtier: b. Ditch-ley, Oxfordshire, 10 April 1647 ; d. Woodstock Park, Oxfordshire, 26 July 1680. On his father's death in 1658 he succeeded to his titles and estates, the latter of which he soon dis¬ sipated. Having studied at Oxford, he served with credit in the fleet under Lord Sandwich at the attack on Dutch ships in the harbor of Bergen, but subsequently gave himself up to dissipation and became the personal friend and favorite of Charles II, who is said to have en¬ couraged and shared many of his exploits. He frequently fell into disgrace at court, though his pardon was not long in forthcoming. His constitution at length gave way, and at 30 he was visited with all the debility of old age. He lingered for some time in this condition and died after sending for Bishop Burnet and pro¬ fessing great penitence for his misspent life. The volume of obscure verse purporting to be his contains much that is spurious. He was no better and rather worse than the lax writers of his day; but the edition of his poems brought out by his friends in 1691 contains such ex¬ quisite lyrics as entitle him to rank as the best song writer between Carew and Burns. He wrote the famous epigram on Charles II, as¬ serting he <(never said a foolish thing and never did a wise one.® Consult Burnet, (Some Pas¬ sages in the Life and Death of John Wilmot, Earl of Rochester (1680), and Longueville, Thomas, Rochester and Other Literary Rakes of the Court of Charles IP (New York 1903).

ROCHESTER, Nathaniel, American pio¬ neer: b. Cope Parish, Westmoreland County, Va., 21 Feb. 1752; d. Rochester, N. Y., 17 May 1831. Having gone in 1763 to Granville County, N. C., he was made a member of the committee of safety for Orange County in 1775, in 1776 was a member of the first provincial convention in North Carolina and was appointed by the convention a deputy commissary-general of mili¬ tary and other stores. He soon afterward re¬ signed and was elected to the North Carolina legislature. In 1783 he established various man¬ ufacturing enterprises at Hagerstown, Md., and in Maryland became a member of the assembly, judge of the County Court and a Presidential elector. Independently and in association with others, he purchased tracts of land in western New York, including (1802) one of 100 acres in Falls Town, now in the heart of Rochester. He removed (1810) to Livingston County, near

Dansville, and (1815) to Bloomfield, Ontario County. In April 1818 he went to Falls Town, which had been named Roch¬ ester in his honor; and in 1821-22 was the first representative of Monroe County in the State legislature. Consult Rochester, Nathaniel, (Early History of the Rochester Family in America) (Buffalo 1882).

ROCHESTER, England, in the county of Kent, a river port on the Medway, 26 miles southeast of London. Its ancient castle (11th century) on an eminence overlooking the river commands the view of a vast expanse of the surrounding country. The great tower of this ruined castle is one of the finest specimens of

Norman architecture extant. It was restored in 1900. The castle and grounds are the prop¬ erty of the municipality, and the latter have been made into a public garden. The cathedral, founded by Saint Augustine in 604, presents a mixed style, as it was destroyed by the Danes, and parts were added and remodeled subse¬ quently at various epochs. There are many monuments of great antiquity. Of secular buildings, the town-hall, exchange, municipal buildings and almshouses, schools and Work¬ ing Men's Institute are the most important. There is a large shipping trade, a steam-engine plant and other industrial establishments, and lucrative oyster fishing. The town was founded by Ethelbert. The castle was built by Henry III. Henry VIII visited Rochester, accom¬ panied by Charles V, and Elizabeth spent five days there in 1573. Dickens introduces Roch¬ ester into (Pickwickˆ (Edwin Drood) and others of his novels. The city is on the site of the ancient Durobrivae. Pop. 31,384.

ROCHESTER, Ind., city and county-seat of Fulton County, on an outlet of Lake Mani-tou, 98 miles north of Indianapolis, on the Erie and the Lake Erie and Western railroads. The city was chartered in 1832 and is situated in a productive agricultural district. Industries include bridge works, canneries and manufac¬ tures of machinery. Pop. 3,720.

ROCHESTER, Minn., city and county-seat of Olmstead County, on the Zumbro River, and on the Chicago and Northwestern and the Chicago Great Western railroads, about 90 miles southeast of Saint Paul and 49 miles west of Winona. It was settled in 1854 by James Bucklin and Mr. Proudfoot, and incor¬ porated as a city in 1858. Rochester was visited by a cyclone in 1883, which caused the death of 27 persons and the loss of a large amount of property. It is in a productive agricultural region, corn, barley, clover being among the principal crops. Considerable attention is given to stockraising. The chief manufacturing es¬ tablishments are flour and grist mills, a foundry, the Sears-Roebuck camera factory and machine shops. There are large grain elevators and stock yards. The principal buildings are the courthouse, municipal building, Masonic Temple, Odd Fellows' building, Metropolitan Theatre, Mayo Clinic, Colonial, Worrell and Stanley hos¬ pitals, Kahler Sanitarium, the Rochester State Hospital for the Insane, Saint Mary's Hospital, Zumbro Hotel, a number of churches and the ■ convent of the Sisters of Saint Francis. The educational institutions are the high school, public and parish

elementary schools, private commercial schools, Notre Dame de Lourdes Academy (R.C.), founded in 1877, and four libraries. The city is the home of the famous surgeons, Charles and William Mayo (q.v.), who founded the Mayo Clinic. The five banks have a combined capital of $1,000,000; and the annual business amounts to nearly $6,000,000. The city has constructed a million-dollar hydro¬ electric plant on the Zumbro River 14 miles north of the city. Seventy thousand persons annually visit Rochester for health. The gov¬ ernment is vested in a mayor, alderman-at- large and a council of six members, three of whom are chosen by popular vote each year. Pop. 15,000.

ROCHESTER, N. H., city in Strafford County; on the Cocheco and Salmon Falls rivers, and on the Boston and Maine Railroad ; about 30 miles east by north of Concord, and 35 miles northeast of Manchester. It was set¬ tled in 1722 by emigrants from England; in¬ corporated as a town in 1722 and chartered as a city in 1891. It is the commercial and in¬ dustrial centre of a large part of Strafford County; the chief manufacturing establishments are shoe factories, woolen mills, brick yards, box factories and other industries. The trade is chiefly in its own manufactures and in farm products. The principal public buildings are the Gaffney Home for the Aged, several churches and the schools. The educational institutions are a high school, public and parish schools, private commercial schools, and a public library. The government is vested in a mayor and a council of 18 members who hold office for three years, six being elected each year. Pop. (1920) 13,722. Consult Mc-Duffee, history of the Town of Rochester' (Manchester, N. H., 1892).

ROCHESTER, N. Y., city and county-seat of Monroe County, is situated on Lake Ontario, the Genesee River and the Barge Canal. It is reached by the following railroads: New York Central and Hudson River, West Shore, Lehigh Valley, Erie, Buffalo, Rochester and Pittsburgh and the Pennsylvania. It has two car ferries to Coburg, Ontario, making round trips daily throughout the year; is an important coal ship¬ ping port and a point of call for passenger steamers in the Toronto, Kingston, Thousand Islands, Montreal and Quebec trade. It is 228 miles west of Albany. The city lies on a plateau 263 feet above Lake Ontario, is built on both sides of the river, and almost in the centre of the city are the Upper Falls of the Genesee. There are two falls within the city limits. Midway through Rochester runs the Genesee, which is spanned by 10 bridges within the city limits, the middle one of which, built of stone, is enclosed by stores on both sides, but the others, of iron construction on stone piers, are open, affording beautiful and diversified views of

the river, particularly from Driving Park Avenue bridge, whence can be seen a winding gorge nearly 200 feet deep. The sides of this show several distinct geological strata revealing the gradual formation of the earth, the red Me¬ dina sandstone being plainly visible as it rises from the water's edge for more than half the height of the precipice, when it gives place to successive layers of green shale, limestone, hem¬ atite iron ore, green and purple shale, and finally a topmost crust of limestone, all belonging to the Upper Silurian Age. At the point referred to are the Lower Falls, about 80 feet high, a curtain of water most beautiful, though less im¬ posing, than the principal cataract, two miles further back, in the centre of the city, from which, with its sheer descent of 96 feet, Sam Patch (q.v.) jumped to his death in 1829.

Barge Canal. — < Crossing the city from east to west is the new Barge Canal which succeeds the Erie Canal constructed in 1825, and which for many years after its construction was the great highway of commerce through the State. The old canal crossed the river by means of an aqueduct of fine proportions, built of Lockport limestones at a cost of $600,000. The canal at

ROCHESTER, N. Y

1 The Falls of the Genesee, Upper Falls

2 The Falls of the Genesee, Lower Falls

• '

this point is 506 feet above sea-level tide-water. The Barge Canal passes through the city about three miles to the south of the old canal and has a commodious harbor in conjunction with the Genesee River. The river is dammed for this purpose a little south of the Court Street Bridge.

Parks. — The Rochester park commission was created in 1888, since when work has been done so judiciously by the aid of the best land¬ scape architects and nurserymen, taking ad¬ vantage of the rolling lands that were ob¬ tainable, that few cities present so attractive an appearance in this regard. The total area of park territory is 1,649 acres, and the five largest parks, in their order, are Durand-East- man, Genesee Valley, Seneca, Maplewood and Highland. Highland Park contains one of the finest arboretums in the country, and Durand-Eastman Park is located on Lake Ontario, and has the advantages of forest, field and stream.

Public Buildings. — There are four well-equipped hospitals, the General, Saint Mary's, Homoeopathic and Hahnemann ; a Municipal Hospital for contagious diseases, Iola Sani¬ tarium for tubercular patients, Infants' Summer Hospital at Lake Ontario, the insane asylum or State Hospital, the County Hospital for free patients and a splendidly equipped dental dis¬ pensary, the gift of some of Rochester's public-spirited citizens. There are numerous hotels, many of them new and modern, of which the largest are the Powers, Rochester, Seneca, Whitcomb and the Osburn. Of late years, apartment houses have become popular and many have been built or are in process of con¬ struction. There are several theatres and mo¬ tion picture houses, most prominent of which are the Lyceum, Temple, Family, Fay, Gayety, Piccadilly, Regent, Gordon and Rialto.

Newspapers. — There are several daily newspapers, the chief of which are Democrat and Chronicle, Herald, Times-Union and the Post-Express, and a large number appearing less frequently.

Clubs. — Of the social clubs the principal are the Genesee Valley, Rochester, Masonic, Whist, Elks, Physicians and University. There are

three well-equipped country clubs, the Oak Hill, the Country and the Irondequoit; the first located near Genesee Valley Park, the second about two miles east of the city and the third still farther east. There is also a flourishing women's club, the Century. The Genesee Golf Club is located in Genesee Valley Park and has a large well-equipped clubhouse. The leading literary clubs are the Alembic, Pundit, Fortnightly and the Wednes¬ day Morning.

Manufactures. — Rochester was built up by the milling industry. The quality and amount of wheat grown in the valley during the early days made a demand for flouring mills, which was strengthened by the presence' of the high falls, so that those structures sprang up rapidly on both banks of the river and became - so numerous that the place was long known as <(the Flour City® and its pre-eminence in this respect was recognized throughout the country. The development of the enormous wheat-fields of the West caused a decline in this business, so that its relative position was taken by the nursery industry; this was started here in 1838,

after which it increased so that in 1904 there were more than 30 firms engaged in the busi¬ ness ; besides the nurseries there are several large seedhouses, Rochester being the foremost city in the world in this regard. It is now called <(the Flower City.® The first trees sent to California went from here in 1849. Rochester is the home of the camera and is often called ((the Kodak City.® It leads the world in the manufacture of photographic goods and sup¬ plies, soda fountain fruits and syrups, enameled steel tanks, filing devices and office systems, thermometers, optical goods and check pro¬ tectors. Because of the wide range of articles manufactured, it is known as <(the City of Varied Industries® and has adopted as a slogan, <(Rochester Made Means Quality,® as practically all of the goods manufactured are of the high¬ est grade. Sixty per cent of the carbon paper and typewriter ribbon made in the United States are manufactured in Rochester and the city leads the United States in the manufacture of high class ivory buttons. It is estimated that more than 350 separate commodities are manu¬ factured in Rochester by 1,760 manufacturing establishments. Rochester is one of the largest shoe centres in the United States with 58 fac¬ tories and an annual output valued at $55,- 075,000. In the production of clothing, the out¬ put in 1918 was valued at $24,000,000 in its 30 clothing factories. Canning of fruit and other foodstuffs is one of the large industries in the city. Although Rochester ranks twenty-fourth in the United States in point of population, it ranks first in the production of many manufac¬ tured articles. It is

placed third in the pro¬ duction of clothing and has the same rating in the production of boots and shoes. Its total manufactures are valued at $250,000,000. Re¬ ceipts at the post office in 1918 were $1,730,-115.90. The capital invested in manufactures is estimated at $150,000,000 and the total em¬ ployees in factories is estimated at 125,000. The salaries and wages paid annually approxi¬ mate $50,000,000. The assessed valuation of property in the city in 1919 was $286,455,240. The tax levy for 1919 is $6,886,165, making a tax rate of $24,065 per thousand.

Banking and Commerce. — A most import¬ ant factor in the commercial and civic life is the Chamber of Commerce, organized in 1888, which now has a membership of 3,300. It is magnificently housed in its own building con¬ structed especially for its use and all of which it occupies. There are 16 banks, including four savings banks, the capital and surplus of which, 1 Jan. 1918, was $21,000,000 and the deposits $208,000,000. The clearings for the last six months of 1918 were $188,449,976.

Education. — The Rochester Athenaeum and Mechanics Institute — generally known by the latter part of its title — was founded in 1885 as a free drawing school and has so expanded that it now gives instruction in practical arts and sciences to about 1,850 pupils and ranks fourth among the technical trade schools of the country. The University of Rochester, founded in 1850 and located in beautiful grounds in the eastern part of the city, has a faculty of 46 instructors, with 535 students, and a library of 76,800 vol¬ umes. There are also the Rochester Theological Seminary, of the Baptist denomination, founded in the same year, with a present faculty of 17, over 100 students and 42,900 books; Saint Ber-

nard's Theological Seminary, occupying capa¬ cious grounds north of the city, started in 1893, having now 13 professors, 225 students and over 15,000 volumes. The public school system, under the control of a board of education of seven members, is among the best in the coun¬ try. It maintains 47 buildings with as many principals and during 1918 there were 1,250 teachers with 39,750 registered pupils. The ex¬ penditures of the board for 1918 were $2,301,- 867.44. There are four high schools, East High, West High, Washington Junior High and Charlotte High. There are also 32 parochial schools and many private ones, including four academies, two of them for girls and two for boys, and one large institution for the instruc¬ tion of deaf-mutes. The 'Rochester Public Library operates six branches comprising 75,000 volumes in all ; also the Reynolds Public Library with 55,800 volumes, mainly books for reference and consultation.

Churches and Charities. — There are 155 churches in Rochester. The first congregation ('Presbyterian) was formed in 1815; the Roman Catholic diocese of Rochester was created in 1868. Of the seven cemeteries the oldest is Mount Hope, opened in 1838, remarkable for its natural beauty, owing to the undulations of the ground in every direction. There are five orphan asylums, three of which are under Catholic control, one under Jewish. In 1822 the Female Charitable Society was organized, from which has risen the kindred institutions of to-day, including, besides the hospitals and asylums, the Industrial School, the Home for the Friendless, the Humane Society, the Chil¬ dren's Aid Society, the Society for the Organi¬ zation of Charity and a host of other associa¬ tions for relieving distress, the most of which are connected, more or less directly, with the various churches.

Public Service. — * In 1873 the Holly system of waterworks was introduced for fire protec¬ tion. In the same year pipes were laid to Hem¬ lock Lake, 28 miles away, by which water that is unsurpassed, possibly unequaled in its purity by any other city in the United States, is ob¬ tained for drinking and other purposes; 39,- 500,000 gallons are delivered daily through con¬ duits ; there are within the city limits 452.5 miles of distributing majns, and 5,711 hydrants; the total cost of the works was $12,926,907.19. The street cleaning is done by many water-carts, instead of by the unsanitary means of dust-raising brooms. It is probably owing, partly, to the agencies just described that Roch¬ ester is one of the healthiest cities of the Union, the annual

death rate during five years averag¬ ing 14 to the 1,000. The police force consists of 407 uniformed men; the fire department has 402 men with 17 steamers, 23 hose carts, 10 truck companies and two water towers, and one protective volunteer company. The meteorologi¬ cal records of the 33 years show that the mean annual temperature was 47.3°, and the mean maximum 55.4° ; the mean minimum 39.2°, the absolute maximum 99° ; the absolute minimum 14° below zero ; the mean annual precipitation 34.5 inches, the average number of clear days annually 83, partly cloudy 126, cloudy 156.

Rochester has always been free from over¬ whelming calamities. The worst two disasters, financially, in its history, in neither of which was a single life lost, were the great flood of 17

March 1865, when much of the city was under water for two days, doing a million dollars worth of damage; and the fire of 26 Feb. 1904, which devastated a large portion of the drygoods district and inflicted a loss of $3,000,000. Roch¬ ester has a well-supplied electric street car sys¬ tem with 144 miles of track, besides interurban lines that run in every direction. There are two telephone systems in the city, one a home enterprise.

History. — In 1789 a sawmill and grist¬ mill were built on the west bank of the river by Ebenezer Allan — commonly called <(Indian Allan® from his lifelong association with the savages — who received, as compensation for the work, from Phelps and Gorham, the owners of the land, 100 acres surrounding those pioneer structures. Though no settlement was made at the time, that tract became the nucleus of the future city. In 1803 it was bought by Col. Na¬ thaniel Rochester, Col. William Fitzhugh and Maj. Charles Carroll, all of Maryland, for $17.50 per acre. Some scattered dwellings were built in the vicinity within the next few years, but no house was erected in what was then called Rochester, after the first-named proprietor, un¬ til 1812, when a log cabin was built on the spot that has ever since been known as the Four Corners. Other residences soon went up, in one of which the first white child was born 2 Dec. 1814. Settlers from the New England States came pouring in and when the first census was taken in December 1815, the popula¬ tion was shown to be 331. In 1817 it was in¬ corporated as a village, under the name of Rochesterville, but in 1822 the title was changed to Rochester. In 1823 the size of the village was augmented by taking in a part of the town of Brighton, on the east side of the river, and subsequent additions have so increased the area that it now embraces over 20,900 acres, with 401 miles of

open streets, 290 miles of which are improved, with 380.2 miles of sewers. It was incorporated as a city in 1834, the first mayor being Jonathan Child. Rochester was the birth¬ place of modern Spiritualism, the famous Fox sisters having given here, in 1849, the first manifestations of mysterious rappings, which speedily became known as the ((Rochester knockings.® During slavery times, Rochester was one of the centres of the abolition move¬ ment and one of the principal stations of the “underground railroad.® It was the home of Frederick Douglass (q.v.), the celebrated negro orator, and was the place in which William H. Seward (q.v.) in 1858 uttered in a public ad¬ dress his memorable phrase in speaking of the struggle between freedom and slavery as an “irrepressible conflict between opposing and en¬ during forces.®

The government is vested in a mayor and common council, elected for two years, under a charter of 1908. A comptroller, police justice, assessors, aldermen, school commissioners, etc., are chosen by the people. The city budget is about $6,200,000 yearly.

Population. — In 1910 Rochester ranked 23 in the list of cities in the United States. The population in 1820 was 1,502; (1825) 5,273;

(1834) 12,252; (1880) 89,363; (1890) 162,608;

(1910) 218,149; (1920) 295,750. This shows an increase between 1890 and 1900 of 21 per cent, ana between 1900 and 1910 of 34 per cent, and between 1910 and 1920 of 74 per cent.

Bibliography. — Anstice, (Centennial Annals of St. Luke’s Church, Rochester, N. Y., 1817-1917) (1917) ; Bragdon, (Notable Men of Roch¬ ester and Vicinity) (1902) ; (Biographical Record of Rochester and Monroe County, N. Y.5 (1902) ; Bureau of Municipal Re¬ search, New York City, Government of the City of Rochester, N. Y.5 (1915) ; Com¬ mon Good of Civic and Social Rochester5 (1910-14) ; Devoy, (A History of Rochester … With a Record of the Post-Express 5

(1895) ; (Early History of Rochester> (I860) ; Fitch, (Sketches of the City of Rochester5 in Larned's (History of Buffalo5 (1911) ; Mat¬ thews, (Fire Service of Rochester 5 (1888) ;

O'Reilly, (Sketches of Rochester> (1838) ; Foreman, Edward R., (Municipal Code of the City of Rochester5 (2 vols., 1904-07) ; Hop¬ kins, C. M., (City Atlas of Rochester, N. Y.5 (1910) ; Kelsey, John, (Lives and Reminiscences of the Pioneers of Rochester and Western New York5 (1854); Parker, Rochester: A Story Historical 5 (1884) ; Parsons, (History of

Rochester Presbytery 5 (1871); Peck, (History of Rochester and Monroe County, N. Y.5 (1908) ; id., (History of the Police Department of Rochester (1903) ; id., (Landmarks of Monroe County) (1895) ; id., (Semi-centennial History of the City of Rochester 5 (1884) ;

(Art Work of Rochester5 (1896) ; Robinson, (First Church Chronicles, 1815-19155 (1915) ; Rochester Park Commissioners, (Public Parks of the City of Rochester, 1888-1904) (1904) ; Strong, (Reminiscences of Early Rochester5 (1916); Ward, (Churches of Rochester5 (1871) ; (Union and Advertiser Year Book5 (1888-1916) ; (Annual Reports Rochester Cham¬ ber of Commerce5 (1888-1918).

Howard Strong,

Secretary, Rochester Chamber of Commerce.

ROCHESTER, Pa., borough in Beaver County, at the junction of the Ohio and Beaver rivers, and on the branches of the Pennsyl¬ vania Railroad, about 25 miles northwest of Pittsburgh. It is connected by electric lines with Beaver, Beaver Falls, New Brighton and other nearby places. A bridge across Beaver River connects the borough with Bridgewater, and one across the Ohio connects the town with Monaca. It is in the coal and oil region, and in the vicinity are deposits of fireclay and building-stone quarries. The chief manufactures are flour, lumber, brick, glassware, foundry prod¬ ucts, mining tools, structural iron and oil-well supplies. The principal public buildings are the churches, schools and Masonic Temple. Pop.

(1920) 6,957.

ROCHESTER, University of. See Uni¬

versity of Rochester.

ROCHESTER PLAN OF EDUCATION.

See Retardation of Pupils.

ROCHESTER THEOLOGICAL SEM¬ INARY, founded at Rochester in 1850 by the New York Baptist Union for Ministerial Edu¬ cation. As early as 1847 an attempt was made to remove Madison (now Colgate) University from Hamilton to Rochester, but this was op¬ posed by the Baptists of Hamilton and legal obstacles were found, so that the plan was abandoned. The University of Rochester (q.v.) was established at the same time by the Bap¬ tists, and for a time the two institutions occu¬ pied' the same buildings, but there has never

been any organic connection between the uni¬ versity and the seminary, the latter being essen¬ tially a professional school. The regular course is three years ; instruction is given in the de¬ partments of Hebrew language and literature (Old Testament), theology, church history, New Testament, homiletics and pastoral theol¬ ogy, elocution, English Bible and Christian ethics. Graduation from college or preparation in Greek sufficient for the study of the Greek Testament is required for admission; formerly there was an English course for those who had no classical training; this was abandoned in 1889-90. In 1852 a German department was organized ; the course is literary as well as theological and covers six years. The seminary was at first without endowment, and at the end of 10 years had only $75,000; in 1917 the pro¬ ductive funds amounted to $1,814,000. The li¬ brary is one of value, including the whole col¬ lection of Neander, the German church his¬ torian, and numbering 45,000 volumes. The total number of students was 152 in 1917.

ROCHET, a lawn or linen lace garment, somewhat like the surplice in shape, but with close-fitting sleeves or sleeveless, worn by bishops, abbots, prelates and other ecclesiastical dignitaries. Also a ceremonial robe formerly worn by British peers.

ROCHETTE, Desire Raoul, da-ze-ra ra-ool ro-shet, French archaeologist: b. Saint-Ar- mand, France, 9 March 1790; d. Paris, France,

3 July 1854. He was educated at Bourges, re¬ moved to Paris in 1811. in 1815 became assist¬ ant professor to Guizot, whom he afterward succeeded in the chair of history at the Sorbonne. In 1826 he became professor of archaeol¬ ogy at Paris, and in 1838 was elected perma¬

nent secretary of the Academy of Fine Arts.

He gained a wide reputation for learning, was popular as a lecturer and enjoyed high favor * after the Restoration. Besides his unfinished history of ancient art he wrote (Antiquites du Bosphore Cimmerien5 (1822) ; (Tableau des Catacombs du Rome5 (1837) ; (Lettres archeologiques sur la Peinture des Grecs5 (1840) ; (Memoire sur l'Acrooole d'Athenes5 (1845) ; (Memoires d'Archeologie comparee Asiatiquc, Grecque, et Etrusque5 (incomplete, 1848), *etc.*

ROCKBASS. See Bass.

ROCK-BRAKE. See Ferns and Fern-allies.

ROCK BREAKING. See Gold Mining.

ROCK CLEAVAGE, a tendency that many rocks have to part more easilv along certain parallel directions than in other directions. If this tendency was imparted to the rock at the time of formation it is called primary or orig¬ inal cleavage. Bedding is the usual type of primary cleavage. If the tendency is im¬ parted after the rock has been formed it is called secondary or induced cleavage. Such cleavage is produced by pressure and is usually not parallel to the original bedding planes. If the tendency to part results from many closely spaced fractures it is called fracture cleavage. Frequently, however, there is no actual fracture, but the weakness comes from the arrangement of the mineral particles in parallel directions. This can often be plainly seen in schists which split parallel to the numerous mica plates. This latter type is called flow cleavage. It is well

exhibited in schists; gneisses and slates. It is believed to be caused by actual rock-flowage, under intense pressure. See Rock-flow age ; Mf.tamorphism ; Rocks, Schist Structural Geology, *etc.*

ROCK CRYSTAL. See Quartz.

ROCK DOVE, or ROCK PIGEON. See

Pigeon.

ROCK DRILLS AND ROCK DRILL¬ ING. The steam or rock drill is known to-day as an American invention and its inception dates back to the excavation of the Hoosac Tunnel in Massachusetts. This enterprise was fathered during its period of construction by the State of Massachusetts and was beset with enormous difficulties. To begin the exca¬ vation of a tunnel five miles long through hard rock and to do the drilling by hand was an audacious proposition. Many methods of ex¬ cavation were proposed and tried. Machines were built, tested and condemned. Among the inventors, the man who schemed the machine which in general features embodied the require¬ ments of a perforator for making holes for blasting was Mr. Fowle of Boston. He con¬ structed the first machine in which the drill used was made the extension of the piston rod of a reciprocating steam engine, which was moved forward toward the rock as the drilling advanced. The drill had a slow rotary as well as a reciprocating motion to ensure the boring of a round hole. With this beginning machines were improved in details, but operated without notable economy. The drills were heavy and couid be used practically only when mounted on heavy carriages running on wheels on a track They were much too heavy for mine or ouarry work, although a few were used for such purposes.

Later came a demand for a lighter machine, and the Little Giant and Eclipse machines, both built by the Ingersoll-Rand Company of New York, were found useful. The Little Giant was operated by a positive motion valve and the Eclipse by a piston valve. With the introduc¬ tion of light drills came various improvements which were found to be invaluable as the scope for the use of the rock drill enlarged. In fact, almost a new drill was made when the machines were applied on a large scale in New York City for outside excavation at a tunnel under 42d street and under Hell Gate, and also in the hard ore mines of Lake Superior.

As soon as the rock drill attained a reason¬ able state of perfection its improvement was immediately manifested to the world at large. It has often been called the advance agent of civilization, and it undoubtedly has a better claim to that title than any other mechanical invention of recent date. All modern engineer¬ ing is dependent on its use, and problems which would be impracticable without this machine are rendered easy. Its influence on mining, quarry¬ ing, railroading and navigation has been felt all over the world. The rock drill has developed the mines and tunnels of the world. The work done by the

rock drill may be said to be from 60 to 150 lineal feet of hole drilled per day of 10 hours in ordinary stone, including shifting and setting up of the drill, cleaning holes, *etc.* In tests and special cases the figures have been largely exceeded, sometimes as much as 400 lineal feet being made. Records of 24 inches

per minute are not uncommon, all, of course, for down holes in favorable rock, but 70 feet per day of 10 hours in granite, including moving and setting up. averages a fair working basis. The cost of drilling in this way mav be stated to vary from 2*4 to 13 cents per lineal foot, according to local conditions. From four to six cents per foot of hole drilled may be taken as the wording figure for general calculations, and this includes all expenses. There are two distinct methods of machine drilling, one the auger drill, which bores the rock, and the other the percussion drill, such as the Little Giant or Eclipse, working by direct impact, that is, by striking repeatedly in the same spot and by simply bruising or chipping awav the rock. Ex¬ perience has proved that a reciprocating drill operates with the greatest economy and effi¬ ciency. The following are improvements made in the rock as used to-day:

Beginning with the cylinder of the drill, the method of using long bolts to hold the top and bottom heads in place with an elastic or spring buffer, whereby the blow (struck acci¬ dentally upon either head by the piston) is absorbed, may be placed first. The method of gripping the steel and the chuck by means of the <(U)} bolt and chuck key stands second. The device of flanged and rotating bar dropped through the ratchet box marked a great ad¬ vance in the art. The use of the taper throttle was also a very neat device for preventing leakage and providing a graduated admission of the working fluid. In passing from the cylinder to its mounting the most important achievement was in the very simple device of mounting the drill on the horizontal arm at¬ tached to a vertical column, which in turn was mounted to a block and jacked in place by two screws, one on either end of the block. A kindred invention was the universal joint ap¬ plied to the legs of a tripod.

Surface and Underground Work. — Sur¬ face work includes that class of excavation which occurs in open air, and underground operations include such borings as are under¬ ground. Surface drilling may be aoplied for opening up canals, for quarrying purposes, for opening up ways for railroads and similar undertakings. Such work may necessitate the use of tripod, column and shaft-bar, quarrying

machines, channelers, gadders and the like. (See Quarrying). Underground work neces¬ sitates the use of rock drills and compressed air machinery for purposes of sinking shafts, open¬ ing mines, *etc.* In shaft sinking and tunnel work, as in driving headings and enlarging, it has been found that the column is the best means of mounting rock drills. These columns are simply round, extra heavy, wrought steel tubes with a suitable claw-foot or rosette on one end and either one or two clamping or jack screws on the other. Stoping bars and tripods are also extensively used for special features.

Submarine Work. — Submarine or subaque¬ ous rock excavation is essential for converting shallow rivers and harbors into navigable waterways. The conditions under which sub¬ marine rock excavation must be done are diffi¬ cult to the last degree, calling for special appa¬ ratus of unusual strength and endurance. This character of work is nearly alwavs carried on where tides, currents, winds and storms are present in a varying degree, and these elements

are practical obstacles to rapid and economical work. Add to these troubles deep water, ir¬ regular bottom covered over with mud, sand and other shifting material, which fills in al¬ most as fast as removed, and the undertaking is seen to be extremely difficult. In the early days the usual method was to lower explosives to the surface of the rock and attempt frac¬ turing by surface blasting. Later a form of drop bore was introduced. This system has been abandoned for the more progressive method of drilling a hole and inserting the charge of explosive as is done in rock excava¬ tion on land.

The removal of submarine rock is becoming a more important feature owing to the increas¬ ing depth of ocean and lake-going vessels de¬ manding deeper channels for harbors and rivers. A barge, scow or float fitted with a suitable frame to support the drill guides, drill, boilers and other auxiliary apparatus, is usually em¬ ployed in submarine excavation. The barge is towed into place and anchored by means of cables, anchor chains or spuds, or a combina¬ tion of these methods, depending upon the rise and fall of the tide, or the currents

to be en¬ countered. The form of framework depends largely upon the system used to feed the drills down, as the hole is cut into the rock. The height of the frame and the length of feed de¬ pend on the rise of tide and the depth of water over the rock and the depth to which the hole is to be drilled.

Various styles of mountings are employed in submarine excavation work. The drills used for such operations are generally of the heaviest tvpe, as the work to be done is always severe and difficult. See Drill.

Edward F. Schaefer, M.M.E., Ingersoll-Rand Company, New York.

ROCK-EXCAVATING MACHINERY.

In quarrying the most important machines are the channeler, the gadder, rock drill, air com¬ pressor, *etc.* To meet the varying requirements of different classes of work four styles of track channelers are manufactured.

Upright Channeler. — This consists of a truck mounted on four flanged wheels running on a track. Upon this track is carried a boiler (in the steam driven machine) or a reheater (in the air driven channeler) together with a pow¬ erful chopping engine mounted at one side on a frame of great strength. At the end of the piston rod of this engine are connected cutting steels which are driven against the rock by steam or air power in the engine cylinder.

Swing-Back Track Channeler. — In ma¬ chines of this type, the frame carrying the cut¬ ting engine swings on a hinge joint, giving an angular adjustment up to 45 degrees from the vertical in the bare machine, or 15 degrees in the outfit carrying the boiler or reheater. In addition to this movement the cutting engine swings in the plane of the frame, with an angu¬ lar range up to 45 degrees either side of the vertical.

Undercutting Channelers. — These consist of a heavy frame of cast iron mounted on four wheels, carried on steel axles running in bab¬ bitted boxes. At either end of the frame is a special guide shell provided with a swinging adjustment in both horizontal and vertical planes, by means of which all angular condi¬

tions may be met and cuts carried clear into the corners. The shells are hung verv low, thus giving the least possible offset in cutting. The use of the two shells permits the channeler to work close to the wall and

adapts the machine to deposits of any angle or dip.

The bar channeler consists of a carriage sup¬ porting the cutting engine mounted on two parallel bars along which it is moved auto¬ matically by means of an engine actuating a traveling feet nut. The engine is automatically reversed at each end of the travel ; or the stops may be set at any intermediate point.

The quarry bar consists essentially of the single bar mounted on four tripod legs, two on either end. On the bar is mounted a carriage which supports the drill and which may be moved along the bar by means of ratchet and pinion and operated by a hand wheel.

The gadder consists of a heavy solid cast-iron body mounted on four wheels forming a truck running close to the floor of the quarry. To one end of the truck is hinged a standard or arm which can be swung from nearly hori¬ zontal to vertical and firmly locked in any de¬ sired position. On the swinging arm or stand¬ ard is a sliding carriage on which may be mounted, by means of a cone pivot and bolt, any one of several sizes of rock drills, accord¬ ing to the work to be done. To raise or lower the drill and move it along the slide a chain is attached to the saddle and run up and over a shaft at the end of the swinging arm and down to a small drum on which it is wound by turning a crank conveniently placed for the operator. A special taper gib or wedge clamp is fitted on the saddle, wherewith the saddle is firmly locked to the swinging arm by simply throwing down a small lever when the drill has been raised or lowered to the proper posi¬ tion. At each corner of the truck frame is a large pointed steel pin or pointer, slipping freely in a guide socket, and when the machine is properly arranged a blow from a sledge on each of these pins anchors the trucks in place. See Air Compressor; Rock Drills; Pumps, Compressed Air; Pneumatic Tools; Mining and Milling Machinery; Coal Mining Ma¬ chinery; Crushing and Grinding Machinery ; Quarrying ; Rock Drills ; Tools, *etc.*

ROCK FALLS, Ill., city in Whiteside .County, on Rock River and on the Hennepin Canal, the Chicago, Burlington and Quincy Railroad, across the river from Sterling, where connection is made with the Chicago and Northwestern Railroad, about 110 miles west of Chicago. It was settled in 1867 by Augus¬ tus P. Smith. It is the commercial and in¬ dustrial centre of the eastern part of the county south of Rock River. The water power is good; the chief manufactures are wire fencing, rivets, bolts and nuts, box boards, agricultural imple¬ ments, butter tubs, flour, furniture, woodenware, wagons, carriages, buggies, washing-machines, garden tools, display racks and dairy products.

There are several churches, a high school, elementary schools and a public library. The banking resources amount to $390,000; the value of taxable property to $2,000,000, the an¬ nual tax levy to $12,000, while receipts from the municipal electric-light plant amount to $10,000. The government is on the commission plan. Pop. 3,000.

ROCK FEVER. See Malta Fever.

ROCKFISH, the name of several fishes usually found about reefs and on rocky bottom. In the United States the most prominent one is the striped or rock bass (see Bass) ; another is a grouper (Epinephelus adcensionis) of the West Indies, called by English-speaking fisher¬ men “rock-hind.® The name applies on the Pacific Coast to the whole family Scorpcenidce, represented in the Atlantic by the dory or rosefish (Sebastes marinus), which looks somewhat like a perch in form, reaches a length of two feet, has a rosy hue and is excellent for the table ; it may be known by its nearly uniform orange-red color and its spiny head. The genus Sebastodes contains more than 50 species of Pacific Coast rockfish and several are con¬ stantly brought to market. Says Jordan: “ Sebastodes panel spinns ,® the boccaccio, large and swift, is abundant in California. Sebastodes flavidus, the yellow-tail rockfish, reaching a length of two feet, is one of the most valuable species. It is abundant from San Francisco to San Diego. 5”. mystinus , the black rockfish, is the most abundant species in rather shallow water about San Francisco. Another abundant species is the orange rockfish, S. pinniger , found from Puget Sound to San Diego. It reaches two feet in length and is a common market fish. The rasher (S. miniateus) is another important species, reaching a length of twp feet and abundant from San Francisco to San Diego. The red rockfish (S. ruberrimus) is the largest species of all, reaching a length of two and one-half feet; it is abundant from San Diego to Puget Sound and is a valued food fish. An¬ other important species is the yellow-backed rockfish (S. maliger), which is found from Monterey to Sitka. It is especially abundant northward and reaches nearly two feet in length. The Spanish flag, Sebastodes rubrovinctus, banded red and white, is perhaps the hand¬ somest sea fish in our waters.® Consult Jordan and Evermann, (American Food and Game Fishes* (1902).

ROCK-FLOWAGE. It has been demon¬ strated that under sufficiently intense pressure, hard rocks can be made to flow. This has been accomplished in the laboratory. Cylinders of marble have been enclosed in hollow brass cylinders and subjected to intense compression slowly applied through a very long time. The brass cylinders were much distorted until they were only about half as long as before and much wider. The brass was then sawed away and the marble was found to have also taken the new shape, but to be as solid

and unbroken as it was before. Marble not enclosed in the brass cylinders when subjected to the same pressure broke into little fragments. In the first case the rock flowed, in the second it frac¬ tured. Other rocks can be made to behave in the same manner. The pressure necessary to make the marble flow can easily be measured. It can then be figured how deeply rocks would have to be buried to undergo natural flowage due to pressure in the earth's crust. It has been variously estimated that at depths of from 5 to 12 miles the hardest rocks would flow. If so, that is the limit of depth of open cavities and of faults and veins. Below this depth is the zone of flowage ; above it, where rocks fracture rather than flow, is the zone of frac¬

ture. Flowage is in part due to the solution and recrystallization of minerals. New minerals are often formed with their longer dimensions at right angles to the force, producing flow cleav¬ age. See Rock Cleavage, Metamorphism and Sectional Structure in article on Geology.

ROCK HILL, S. C., city in York County, in the northern part of the State, 80 miles north of Columbia, on the Southern Railroad. It is a live commercial and manufacturing centre and contains railroad shops, large hydroelectric plants, public library, Fennell Infirmary, the Winthrop Normal and Industrial College of South Carolina. The region is adapted to a large variety of farm and vegetable produce, specially to cattle-raising, hogs, sheep, poultry, *etc.* The city's industrial establishments include cotton mills, a bagging factory, knitting mills, automobile factory, fertilizer and oil mills, lum¬ ber and planing mills, flour and grist mills, foundries, ice and printing plants, *etc.* The city owns excellent water, light and sewerage plants. The commission manager form of government with three commissioners and a city manager is in operation. The three banks have combined capital and surplus of $850,000 and deposits of over $3,700,000, including two trust companies. There are five modern school buildings, includ¬ ing a well-equipped high school. There are 19 miles of paved sidewalks and asphalt streets. Pop. (1920) 8,809.

ROCK HIND. See Rockfish.

ROCK-HOPPER, a rock wallaby or kan¬ garoo (q.v.).

ROCK ISLAND, Ill., city, county-seat of Rock Island County, on the Mississippi River and on the Chicago, Rock Island and Pacific, the

Chicago, Burlington and Quincy, Rock Island Southern and the Chicago, Milwaukee and Saint Paul railroads, 180 miles west by south of Chicago, opposite Davenport, Iowa, a few miles below Moline and 125 miles, in direct line, north by west of Springfield, the State cap¬ ital. The city is named after the is'and in the river between the cities of Rock Island and Davenport. The United States government and the Chicago, Rock Island and Pacific Railroad built a combined railroad and highway bridge from Rock Island city to the island and thence to Davenport. The original cost of this bridge was $1,000,000. Another bridge connects Moline with the island, thus making the three cities ("The Triplets®) one in many matters com¬ mercial and industrial. Rock Island has steamer connections with all the Mississippi ports. The island is three miles long, composed largely of limestone. A government arsenal and armory are located here and represent an investment of about $30,000,000. The grounds cover 1,000 acres. That portion of the river between the island and Davenport is navigable, but on the west side of the island the river has been dammed by the United States government, thus furnishing Rock Island, Moline, the island and Milan (a few miles below the city) with extensive water power, which has contributed to the development of a large and important manufacturing centre. Rock Island has excel¬ lent transportation facilities which make it of importance as a commercial city.

The 'chief industrial establishments are the arsenal in which there are normally 4,500 em¬ ployees, plow and tractor factory, lumber mills.

petroleum wax-plant, paint factory, oilcloth fac¬ tory; brick, gas engine, lumber, stove works; soap, electrical appliance, storage battery and plumbing fixture works ; sash and door and building materials factories, *etc.* The prominent public buildings are the government arsenal, the courthouse which cost $175,000; the high school, $125,000; the library, $75,000; Saint An¬ thony's Hospital ; the 20 churches and a num¬ ber of fine business blocks. The Davenport mansion, on the island, is of historic interest. The

educational institutions are Augustana Col¬ lege (Lutheran), opened in 1860; Vila de Chantal (Sisters of the Visitation), public and parish schools, several private schools, one city library and three school libraries. The five banks have a combined capital approaching $1,000,000. The government is conducted on the commission plan.

Rock Island was settled in 1826 by Col. George Davenport. It was platted in 1835 and called Stephenson. In 1841 it was united with Farnhamesburgh under its present name, and in 1849 was chartered as a city. When Colonel Davenport built his home on the island in 1833 the neighboring places were a fort and an In¬ dian trading post. Prior to his settling in this locality, in 1826, he had been there in 1816 with the government troops, when Fort Armstrong was established. Black Hawk, the Indian chief, often visited him here, and many of the people who are now regarded as ((history makers® often visited Davenport in his island home. During the Civil War the prison here was the place of detention of many Confederate pris¬ oners. When the Mississippi Valley began to change from a raw producing region to a sec¬ tion sending to the world the finished and pol¬ ished product of the best in manufacturing methods, Rock Island was among the leading cities which were quick to welcome the railroad and the manufactory, and the first to use the improved means presented to extend the com¬ merce to the city. Pop. (1920) 35,177.

ROCK KANGAROO or WALLABY.

See Kangaroo.

ROCK-MELON. See Melons.

ROCK PTARMIGAN. See Ptarmigan.

ROCK-RABBIT. See Hyrax.

ROCK RAPIDS, Iowa, city, county-seat of Lyon County, on the Rock River, and on the Illinois Central, the Chicago, Rock Island and Pacific and the Chicago. Saint Paul, Minneap¬ olis and Omaha railroads about 70 miles north of Sioux City and 33 miles southeast of Sioux Falls, S. D. It is in an agricultural and stockraising region. It has considerable manu¬ facturing interests connected chiefly with farm and dairy products. It owns and operates the electric light, water and heating plants valued at $150,000. It is the commercial centre for a large part of the county. Pop. 2,200.

ROCK RIVER rises in the State of Wis¬ consin, 50 miles west of Lake Michigan; it flows south-southwest, receives several tribu¬ taries,

enters Illinois, and crossing the State in a southwesterly direction flows into the Missis¬ sippi a little below Rock Island. Its whole length is estimated at 330 miles, about 225 of which have been ascended by small steamers, though with some difficulty, owing to the various rapids. The region which it drains is one of

great fertility. It is connected with the Illinois River by the Mississippi Mineral Canal.

ROCK-ROSES. See Cistus.

ROCK SALT. See Salt.

ROCK-SNAKE, an African python. See Python.

ROCK-SOAP, a hydrated silicate of aluminum, containing peroxide of iron and water. It is a variety of halloysite, is found only massive, is earthy, easily broken, black or nearly so, very soft, somewhat greasy to the touch and adheres strongly to the tongue. Rock-soap is used for crayons, and is also useful, by reason of its saponaceous properties, in the washing of cloths, *etc.*

ROCK SPRINGS, Wyo., in Sweetwater County, on Bitter Creek, and on the Union Pa¬ cific Railroad, about 250 miles west of Laramie, and 170 miles east of Great Salt Lake. It is on a plateau, in a mountainous region in which there are extensive coal fields. The principal industries are connected with the min¬ ing and shipping of coal. There are banks and newspapers. The educational institutions are a public high school, public and parish elementary schools and a high school library. Pop. (1920)

6,456.

ROCK TEMPLES. In many parts of western India, as at Ellora, Elephanta, Karli and Salsette Island, natural rocks have been cut into temples ; as also into caves and forts. Out of India well-known instances of the same kind occur at Petra, in the Arabian Desert, at Abu-Simbed, in Egypt, and in China and Siam. Con¬ sult Ferguson, (Rockcut Temples of India' (1889). See Cave-dwellers.

ROCK-TROUT, a valuable fish (Hexa - grammus decagrammus) of the coast of Cali¬ fornia and northward. It is one of the green-lings (q.v.),

and is known northward as boregat and bodieron. It reaches a length of 18 inches, and is regarded as an excellent food-fish.

ROCK-WORK. See Masonry.

ROCK-WREN, a grayish-brown migatory wren (Salpinctes obsoletus) of the Rocky Mountain region which haunts the mountain gulches and makes a big rough nest in some rift of rock, or on a ledge. It has a charming song, and is likely to come familiarly about the mountaineer's cabin.

ROCKALL ISLET, in the North Atlantic Ocean, 160 miles west of Saint Kilda, 260 miles north of Ireland and 290 miles west of the mainland of Scotland, is an isolated conical rock of stratified granite, 100 yards in circum¬ ference, rising 70 feet above the sea, from a sandbank about 50 miles long and 25 miles broad. The vicinity is a cod-fishing ground for Scotch and English fishermen. The first known landing was made in 1810, and the islet was the object of a scientific expedition in 1896.

ROCKEFELLER, John Davison, Amer¬ ican capitalist: b. Richford* Tioga County, N. Y., 8 July 1839. After an education in the public schools of Cleveland, he there entered a mercantile establishment as clerk, and subse¬ quently was made cashier and bookkeeper. In 1858 he became a member of the firm of Clark and Rockefeller, and in 1860 the concern en¬ tered the oil business as Andrews, Clark and Company. The firm, its style having been

changed to William Rockefeller and Company, built the Standard Oil Works at Cleveland in 1865, and in 1867 the various interests with which John and his brother William were con¬ nected were consolidated into one corporation. In 1870 the Standard Oil Company was incor¬ porated, with John D. Rockefeller as president; and a capitalization of $1,000,000. Thus at 31 he had already attained a commanding position in business, with ample resources. Then began that development and absorption which have been the wonder of the

age and the subject of rare discussion, criticism and admiration. Grad¬ ually rivals in business were either taken into the Standard or driven out of the field. Within two years the Standard Oil Company's capital was $2,500,000, and in 1874 was $3,500,000. From that date the wealth of the company and of John D. Rockefeller grew by leaps and bounds and cannot be adequately figured. By 1881 it became necessary to better consolidate the enormous enterprises and the Standard Oil Company was made a trust under the guidance of the shrewdest lawyers of the country. It continued to make money so fast and to be so unpopular a monopoly that it was dissolved by the courts in 1892. By this time Mr. Rocke¬ feller's wealth was variantly estimated as be¬ tween $500,000,000 and $1,000,000,000. He was the world's only billionaire. About 1900. Mr. Rockefeller began to turn his great business over more and more to his partners, and. to take an interest in establishing and supporting charitable and useful works. His chief gifts have been to the University of Chicago, which has received from him about $23,000,000; the General Education Board, $50,000,000; the Rockefeller Foundation, $100,325,000 ; Rocke¬ feller Institute of Medical Research, $4,000,000. He has given to a vast number of educational institutions, and the total is estimated, 1918, as about $300,000,000. He presented also to Cleve¬ land real estate and cash to the value of $600,- 000; to Vassar College a $100,000 building and 3,000 volumes on Greek art and literature; to Tarrytown, N. Y., $50,000 for a high-service water tower; to the American Baptist Mission¬ ary Union, $400,000; and to Barnard College,

$1,375,000.

ROCKEFELLER, John Davison, Jr.,

American capitalist, son of J. D. Rockefeller: b. Cleveland, Ohio, 29 Jan. 1874. In 1897 he was graduated at Brown University with the degree of A.B. Soon afterward he became associated with his father in business enter¬ prises; was made a director of the Colorado Fuel and Iron Company, the Manhattan Rail¬ way Company, the Merchants Fire Assurance Corporation, *etc.* He is active in Sunday-school and philanthropic work; is chairman of the board of the Rockefeller Foundation ; trustee of the Rockefeller Institute for Medical Re¬ search ; director of the General Education Board, Bureau of Social Hygiene. Consult <Report) of the Federal Industrial Relations Commission (Washington, D. C., 1915).

ROCKEFELLER, William, capitalist : b. Richford, N. Y., 31 May 1841. After schooling at Owego, N. Y., and Cleveland, Ohio, he be¬ came a bookkeeper and afterward a partner in a produce commission business. He became as¬ sociated with his brother, John D. Rockefeller, when the latter became established in the oil

business and in 1865 William Rockefeller took the management and was at the head of the busi¬ ness in New York and was president of the Standard Oil Company of New Jersey and also of New York, until the trust was dissolved in 1911. He has been an official of a great num¬ ber of corporations, among them the New York, New Haven and Hartford Railroad Company, being one of the 21 directors indicted in 1914, in which case the jury disagreed.

ROCKEFELLER, William Goodsell,

capitalist, son of William Rockefeller ; b. 1870. After graduation from Yale, in 1892, he was made treasurer of the Standard Oil Company of New York, and has been elected director in the Brooklyn Union Gas Company, the Lincoln National Bank, the Columbia Bank and other financial institutions.

ROCKEFELLER FOUNDATION. In

March 1910 Mr. John D. Rockefeller set on foot a scheme to distribute a large amount of his wealth, for the avowed purpose of uplifting humanity all over the world, by organizing his philanthropic work through the United States government. At his request Senator Gallinger introduced a bill in the Senate creating the ((Rockefeller Foundation,® which, in the lan¬ guage of the bill, was (<to promote the well¬ being and advance the civilization of the peo¬ ples of the United States and its territories and possessions, and of foreign lands, in the acquisi¬ tion and dissemination of knowledge, in the pre¬ vention of suffering and in the promotion of any and all the elements of human progress.® The bill failed to pass the United States Sen¬ ate, and the State of New York granted a charter to the Rockefeller Foundation in 1913. Its endowment is $101,324,576.78. The incorpo¬ rators are John D. Rockefeller, John D. Rocke¬ feller, Jr., Frederick T. Gates, Harry Pratt Judson, Simon Flexner, Starr J. Murphy, Jerome D. Greene, Wickliffe Rose and Charles O. Heydt. The officers are Chairman of the board of trustees, John D. Rockefeller, Jr.; president, George E. Vincent ; secretary, Edwin R. Embree; treasurer, L. G. Myers; comptroller, Robert H. Kirk; assistant treasurer, L. M. Dashiell;

members, Wallace Buttrick, Simon Flexner, Harry E. Fosdick, Frederick T. Gates, A. Burton Hepburn, Charles E. Hughes, Harry Pratt Judson, Starr J. Murphy, John D. Rocke¬ feller, John D. Rockefeller, Jr., Wickliffe Rose, Julius Rosenwald, Martin A. Ryerson, Fred¬ erick Strauss, George E. Vincent. During the war the flood of gold poured out to relieve the suffering and the necessities of humanity covered pretty much the whole world. To the United War Work Fund went more than $5,000,000, after large appropriations had been made to the seven individual agencies com¬ posing the united service; an equal amount having gone to those previously. Large sums went for medical research, the war work of the Rockefeller Institute, for war research, in¬ cluding the work of Dr. Alexis Carrel, for hygiene and for demonstrations. Great sums were appropriated for relief in the small coun¬ tries devastated — Belgium, $1,498,000; Armenia and Syria, $610,000; Serbia, $163,895. The American Red Cross received the immense con¬ tribution of $8,083,772. The Foundation spent $22,444,815 on war work from 1914 to 1919. Adverse criticism has been expressed at various

times in regard to the educational activities of the Foundation, it being alleged that its aim is to further entrench capitalism and to pro¬ mote class education in the United States. Its religious activities have also been under sus¬ picion.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH. This institution was incorporated 14 June 1901, with Dr. Wil¬ liam H. Welch, of Baltimore, president; Dr. T. Mitchell Prudden, of New York; Dr. Christian A. Hester (since died in 1910) ; Dr. Theobold Smith, of Boston; Dr. Hermann M. Briggs, of New York; Dr. Simon Flexner and Dr. L. Emmet Holt, of New York (secretary and treasurer), for a board of scientific directors. Mr. Rockefeller pledged $200,000 to the board to be drawn upon at their discretion during a period of 10 years, for preliminary work, his letter of gift expressing his desire ((to accom¬ plish the most . for humanity and science. w Scholarships and fellowships were created and distributed to the existing laboratories through¬ out the country, to enlist the cooperation of various investigators, to aid some promising lines of research which could not previously be continued for lack of funds, and to discover who and

where were the persons who desired to undertake research work and what were their qualifications. At the end of the first year it was decided to centralize the most important lines of work in the Institute's own laboratory under a competent head and with special equip¬ ment. Mr. Rockefeller gave $1,000,000 at the second annual meeting of the board in June 1902 for this object. The Schermerhorn prop¬ erty, fronting East River at East 66th and 67th streets, New York, was chosen for the site, and a plot comprising 26*4 city lots, upon which the present building stands, was deeded to the Institute. Dr. Simon Flexner resigned his position as professor of pathologv in the University of Pennsylvania to become director of the Institute and began his work 1 July 1903. The cornerstone of the building was laid 3 Dec. 1904, a building at the corner of Lexing¬ ton avenue and 50th street being used tempo¬ rarily.

The present organization provides for the following departments : Pathology, bacteriology, physiological and pathological chemistry, phys¬ iology, comparative zoology, pharmacology and experimental therapeutics.

The purpose of the Institute is research, not instruction ; yet it exerts a considerable influence on medical education. Upon the basic sciences above mentioned the future discoveries on medical science must largely rest. The In¬ stitute endeavors to apply the latest discov¬ eries in science to problems connected with the prevention and cure of disease.

The Institute has cooperated with the Health Department of New York in the study of conditions surrounding the production and distribution of the milk supply of the city, and the effects of milk upon the health of children in the tenements; also with the commission appointed by the city in 1904 to study the prevalence of the acute respiratory diseases, and with that appointed in 1905 to investigate cerebro-spinal meningitis. It has united with Harvard University in sending men to Manila to study certain phases of smallpox; and it has

made grants each year to assist important in¬ vestigations which were being carried on in various places.

The work done by the Institute is published in various scientific journals and collected in volumes of (Reprints. * In February 1905 the Institute took charge of the publication of The Journal of Experimental Medicine.

Mr. Rockefeller gave an additional $3,820,- 000 when the hospital of the Institute was opened on 7 Oct. 1910. This made the income bearing endowment $6,420,000, and the total endowment, including grounds and buildings, $8,240,000. In the hospital the closest scientific study is given to obscure pathological condi¬ tions such as heart disease, pneumonia and in¬ fantile paralysis. The board of trustees of the Institute consists of John D. Rockefeller, Tr., Frederick T. Gates, William H. Welch, Starr J. Murphy and Simon Flexner.

ROCKEFELLER PLAN. See Indus¬ trial Peace, Experiments in.

ROCKET, the name of several plants. Rocket-salad, or properly Roquette, is a low-growing hardy annual (Eruca sativa) native to southern Europe. The young leaves are used by French and Italian cooks as a salad and pot¬ herb. They resemble radish in appearance, but horse-radish in flavor. Yellow rocket, upland or common winter cress (Barbarga vulgaris), also hails from southern Europe. It is a hardy biennial herb with yellow flowers for which it is grown in flower gardens. Its leaves are used for salads and pot-herbs. Sweet rocket, damask or dames violet (Hes peris matronalis), a tall, hardy perennial, is native to northern Asia and Europe. It has long been popular in old-fash¬ ioned flower gardens for its white or purplish flowers, which continue from June to August and are fragrant especially at night. The double forms are the best to grow.

ROCKETS. See Projectiles.

ROCKFORD, rok'ford, Ill., city, county-seat of Winnebago County, on the Rock River, and on the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, Chicago, Burlington and Quincy and the Illinois Central railroads, 81 miles northwest of Chicago. It was settled in 1834, being the first settlement in the county, and was incorporated as a city in 1853. In 1890 it obtained a considerable increase of territory by annexation, and now has an area of ten and one-half square miles. It is built on both sides of the river, which is here crossed by three railroad and four highway bridges. A dam 800 feet long across the river secures excellent water power for manufacturing, and the city is one of the most important industrial centres of northern Illinois. The chief manu¬ factures are agricultural implements and furni¬ ture; others are pumps, watches, silver-plated ware, leather goods, sewing machines, clothing, knitting wool, paper, flour and grape sugar. There are about 600 manufacturing establish¬ ments, with over 20,000 employees and an an¬ nual production of $25,000,000. The assessed valuation, which is one-third of the actual, was $25,102,470 in 1918; while the city debt was $477,100. The tax

rate of $6.52 is equivalent to $2.17 on the actual valuation. There are numerous banks, trust companies and news¬ papers. Rockford is surrounded by a fertile agricultural region, and with its railroad facilL

ties is an important shipping point for the products of this district. The citv is well built with wide regular streets ; among its notable public buildings are the Memorial Hall for Soldiers, the city hall, the courthouse, muni¬ cipal tuberculosis sanitarium, three hospitals and the public library; the library contains over 80,000 volumes. The public school sys¬ tem is of the best, and includes a high school, organized in 1857 ; there is also a Roman Cath¬ olic parish school ; and the city is the seat of Rockford College (for women) and of Brown's Rockford Business College. The government is vested in a mayor and council, elected bi¬ ennially; the council has the power of appoint¬ ing the city officers. There is an excellent water supply from five artesian wells, and the waterworks are owned and operated bv the municipality. Pop. 65,657. Consult Church, C. A., (History of Rockford and Winnebago County, Illinois) (1900).

ROCKFORD COLLEGE, a college for women, located at Rockford, Ill. It was founded in 1849 as a seminary and received its college charter in 1892. It has a collegiate de¬ partment, department of music and preparatory department; the collegiate work is in two courses, classical and general scientific, for the completion of which the degrees of A.B. and B.S. are conferred. In 1917 the ground and buildings were valued at $200,000; the produc¬ tive funds amounted to $242,152 and the annual income to $101,305. In 1917 the students num¬ bered 237 and the instructors 32.

ROCKHAMPTON, rok-hamp'ton, Austra¬ lia, capital of the County of Livingstone, Queensland, on the Fitzroy River, about 325 miles northwest of Brisbane, almost on the Tropic of Capricorn. It is enclosed by hills and is-the gateway to rich pasture lands and the adjacent Mount Morgan mineral fields. There are many fine buildings and a bridge 1,160 feet in length. It has considerable river traffic with the ports of Alma and Broadmount at the mouth of the river, 35 miles

distant. The Queensland Central Railway has its terminus here. Pop. 20,915. North Rockhampton is a suburb and separate municipality with a popu¬ lation exceeding 3,000.

ROCKHILL, William Woodville, Amer¬ ican diplomatist: b. Philadelphia, 1 April 1854; d. 1915. He was educated at the Lycee Bonaparte and the College de France, Paris, and was grad¬ uated from the military school of Saint Cyr in 1871. He served with a French regiment in Algeria but returned to the United States in 1876. In 1881 he returned to France and re¬ sumed his Oriental studies begun during his college course, and in 1884 entered the diplo¬ matic service as second secretary of legation at Peking, China. He was charge d'affaires at Seoul; Korea, 1887-88; visited China, Mongolia and Tibet during 1888-92 on exploring tours; was appointed chief clerk of the State Depart¬ ment in 1893 ; was made third Assistant Secre¬ tary of State a year later, and first assistant in 1896. He was Minister to Greece, Rumania and Servia, 1897-99, and the following year went as United States commissioner to China, where in 1901, under appointment as special ambassador, he signed the final peace negotia¬ tions. In October 1901 he resumed his duties as dii'cctoi of the Bureau of American Repub¬

lics, to which he was appointed in 1890. He was Minister to China in 1905, Ambassador to Russia in 1909 and Ambassador to Turkey from 1911 to 1913. In 1915 he was sent on a mission to China, but died on the way at Honolulu. He has published (Udanavarga, the Northern Buddhist) (1883) ; (A Life of Buddha and the Early History of His Church* (1884) ; (Land of the Lamas* (1891) ; (Diary of a Journey in Mongolia and Thibet* (1893) ; ˆTreaties and Conventions with China and Korea) (1904).

ROCKING STONES, boulders that are very insecurely balanced on their foundation. They are also known as perched or balanced bowlders. Sometimes they result from the weathering away of the surrounding rock, leav¬ ing the bowlder as a residual. More often they are carried in glacial ice and left in unstable positions as the ice melts.

ROCKINGHAM, rok'mg-am, Charles Watson-Wentworth, Marquis of, English statesman: b. 13 May 1730; d. *1 July 1782. He was educated at Westminster School and Saint John's College, Cambridge, and in 1750 was created an Irish peer under the titles of Baron and Earl of Malton, later in the same year be¬ coming also an English peer and Marquis of Rockingham by succession. He took his seat in the House

of Lords in the following year and continued in practice with his Whig sympa¬ thies which he had inherited from his father. He took little part in politics, being a hesitat¬ ing speaker and of mediocre talent, until 1765 when on the refusal of Pitt to take office, he became Prime Minister. His large wealth and powerful family position contributed to his ele¬ vation, and he had the invaluable assistance of his brilliant secretary, Edmund Burke. He took a friendly attitude toward the American colonies and favored the repeal of the Stamp Act, though he affirmed the right of Parliament to tax the colonies. He gave offense to the king for his support of the repeal principle and for refusal of allowances of the king's brothers and was superseded by Pitt, who returned to form a new ministry. His tenure lasted barely a year and his Parliamentary career was incon¬ spicuous until March 1782 when, upon the fall of North's administration, he was called upon to form a coalition ministry in which he held the treasury. The chief events of his second term were the concession of legislative independence to Ireland and the forcing the king to treat for peace with the United States on the basis of their independence. In accomplishing these ends credit is not given to Rockingham for excep¬ tional force and brilliancy, but rather for quiet tact and the adoption of a policy of oppor¬ tunism. Consult Albemarle, (Memoirs of Rockingham > (1852-53) ; Walpole, (Memoirs of George IIP (1894).

ROCKINGHAM, Vt., village and town¬ ship in Windham County. The village is on the Rutland Railroad, 75 miles south of Mont¬ pelier. The township contains in addition to the village of the same name the villages of Bellows Falls, Saxton's River, Cambridgeport, and Bartonsville. The district is chiefly agri¬ cultural, but there are paper mills and machine shops. The village is the seat of an academy. Pop. township 6,207.

ROCKLAND, Me., city and county-seat of Knox County; set off from Thomaston in 1848

and incorporated a city in 1854. On a harbor which is an easterly extension of Penobscot Bay at its mouth ; is very commodious and

easily accessible ; is protected by a breakwater costing $500,000 and two lighthouses. Rockland is connected with Maine Central Railroad sys¬ tem; 86 miles by rail from Portland; has steam¬ boat connection with Boston, Bangor, Portland, *etc.* It has a complete electric railway system with 21 miles of track extending northward to Rockport and Camden, and westward to Thomaston and Warren and other electric railways. The region thus connected accommodates many summer tourists. Shipbuilding is an important industry. The Red Jacket, a clipper ship built at Rockland in 1853, is said to have made the passage across the Atlantic Ocean in a shorter time than it was ever made by any other sail¬ ing vessel. There are considerable deposits of lime and large lime and cement works have been established. The granite business is important. Two of the largest granite companies of the country have quarries in the vicinity, on the islands and on the mainland. These companies have handled some of the largest stone that have ever been wrought. The United States custom house in Saint Louis, the post offices in New York and Cincinnati, and many of the largest and handsomest buildings in the coun¬ try have been built of Rockland granite. Steam and gasoline engines and blacksmiths' and gran¬ ite workers' tools are manufactured. Fishing is carried on to some extent. Clams and sar¬ dines are canned, and more than 2,000,000 pounds of lobsters are shipped annually by rail. The public buildings are the United States cus¬ tom house and post-office building, which is a handsome granite structure and cost about $150,000, and the county courthouse and jail, costing over $100,000. There is a fine soldiers' monument, a public library, banking facilities and newspapers. There are many handsome residences with fine grounds. Pop. 8,174.

ROCKLAND, Mass., town in Plymouth County, on the New York, New Haven and Hartford Railway, about 17 miles south by east of Boston. Until its incorporation as a separate town in 1874 it was a part of the town of Abington of the old Plymouth Colony. The town is pleasantly situated and its proximity to Boston and the convenience of transporta¬ tion give it an excellent trade and have made it a popular suburb of that city. . Rockland is a manufacturing place, with about 100 factories, distributing about $750,000 annually in wages. The industry first in importance was the man¬ ufacture of boots and shoes. Tacks are also extensively manufactured, and other factories produce heels and shoe-findings, box board, shoe-boxes and soaps. Rockland has well-built factory and public buildings, churches, schools and attractive homes. It has two banks, a pub¬ lic library and weekly newspapers. Pop. (1920)

7,544.

ROCKLAND LAKE, N. Y., a village of Rockland County, on the West Shore Railway and on the Hudson River, four miles north of Nyack and 30 miles north of New York. It has only a small permanent population but is a popular summer resort. Near here is Rockland Lake, a large sheet of clear, fresh water, from which 300,000 tons of ice are taken annually for use in New York.

ROCKLING, a European fish of the cod family and of the genus Motella, also classified as the gaidropsauras, three species of which are regarded as valuable in British markets. They are of small size, with small scales, long body and one anal and two dorsal fins. Called also gade, whistlefish, sea-loach and eelpout.

ROCKPORT, rok'port, Ind., city, county-seat of Spencer County, on the Ohio River on a branch of the Southern Railway about 32 miles east of Evansville. It has steamer con¬ nections with all the river ports. It is on a bluff about 100 feet above high water. It is in an agricultural region in which grain and tobacco are the chief productions. The principal indus¬ trial establishments are flour and grist mills, foundry, machine shops, tobacco stemmeries, brick works, silo works, basket factories, cream¬ ery, wagon and carriage works and furniture factories. It has a library founded in 1855. Pop. (1920) 2,581.

ROCKPORT, Mass., town in Essex County, on the Atlantic Ocean and on the Bos¬ ton and Maine Railroad, about 30 miles north¬ east of Boston. It is on an island, the same on which Gloucester (q.v.) is located, and includes Cape Ann, the most easterly point in Massa¬ chusetts. The town embraces several villages. Electric lines connect Rockport and Gloucester and many points on the island. It was settled in 1690 by Richard Tarr and was known at first by the name <(Sandy Bay.® It is a famous sum¬ mer resort; near Pigeon Cove, one of the vil¬ lages, are a number of summer cottages. Part of the land is fertile and is used mainly for market gardening. Some of the places of in¬ terest in the vicinity are Dogtown Commons, where in the last of the 18th century a hundred families exiled themselves and lived in loneli¬ ness and poverty on those bowlder strewn hills. Their numerous dogs gave the place its name. Other places of interest are Doctor's Run, The Headlands and the Straitsmouth Life Saving Station at Gap Cove. In the northeastern part of the town are extensive granite quarries. The chief manufacturing establishment is an isin¬ glass factory which employs about 1,000 persons. There are one national and one savings

bank. There are 12 churches, and the educational in¬ stitutions are a high school, grammar and pri¬ mary schools and a public library, opened in 1871. Pop. about 4,400, of whom 3,878 are in the village.

ROCKPORT, Tex., town, county-seat of Aransas County, on the Aransas Bay, an inlet of the Gulf of Mexico, and on the San Antonio and Aransas Pass Railroad, about 180 miles southwest of Galveston and 150 miles south by east of San Antonio. It was settled in 1865 by Doughty and Mathis ; was incorporated in 1865 and chartered as a city in 1871. It has steamer connections with all of the Gulf ports. It is on the peninsula, Live Oak Point and is a popular summer resort. It has fishing interests, espe¬ cially oysters, and small game is plentiful in the vicinity. Shipments are made of livestock and fruit. There are five churches, a high school, elementary schools and one national bank. The government is vested in a mayor and a board of aldermen, eight in number, who are elected biennially. Pop. (1920) 1,545.

ROCKS. Regarded as a whole, the earth, so far as we can examine it first hand and thus

know it intimately, consists of three envelopes: (1) an outer gaseous envelope called the at¬ mosphere; (2) a middle aqueous envelope called the hydrosphere; (3) an inner solid envelope called the lithosphere. These en¬ velopes, considered together, including the lithosphere to a depth of some 10 miles below the sea-level, have been shown to consist quanti¬ tatively of the following elementary substances:

Oxygen… Silicon …. Aluminum

Iron .

Calcium . .

47.07 Potassium . 2.45

28.06 Sodium . 2.43

7 . 90 Magnesium . 2.40

4.43 _

3.44 Total . 98.18

All the remaining elements together make up less than 2 per cent of the earth.

The above-named elements rarely occur in the uncombined state in the lithosphere, but are usually united chemically in different pro¬ portions to form those more or less definite chemical compounds

called minerals (for ex¬ ample, quartz, Si02; calcite, CaO.C02; olivine (MgFeˆSiCh; and minerals in turn are ag¬ gregated in various ways to form rocks. A rock may be defined as any accumulation or aggregation of one or more mineral species or substances, which constitutes a considerable component of the lithosphere; for example, granite, sandstone, limestone, clay, gravel, salt-beds. Although the crust of the earth or lithosphere has been shown to contain many ˆ13ln(ireds species of minerals, nevertheless the great bulk of it is composed of compara¬ tively few species, and these have been termed the rock-forming minerals, in contradistinction to the great multitude of mineral species found more particularly in veins, and which, though of great importance, economically, and of pri¬ mary interest, scientifically, are insignificant in amount when compared with the great mass of the more common minerals which go to make up a large portion of the earth. Thus gold, silver, platinum, the sulphide ores and the minerals containing such rare substances as thorium, uranium or radium, are negligible in quantity when compared with the “mass of minerals composing the lithosphere.

The science of rocks, in its broadest scope, which considers them in all their relations, is called petrology or lithology, while the system¬ atic and descriptive science of rocks, leading more particularly to their nomenclature, is called petrography. This distinction is implied in the etymology of the words. The latter term is used commonly in connection with the micro¬ scopic study of the igneous rocks.

Those minerals which are of especial impor¬ tance as rock-formers can be grouped as fol¬ lows :

Group I.

Quartz.— This group, for present purposes, may be limited to a single species, quartz, which is one of the most abundant of minerals, and is remarkable otherwise for its rather superior hardness and lack of cleavage. It is the most indestructible of all the common rock-making minerals. It has strong crystallizing powers and, where allowed to grow intact, forms those beautiful hexagonal crystals with which all are iamiliar. Chemically it is *an oxide of silicon,

Slt?\ that most a1?undant all acid radicals,’ which, when .combined with the bases alumina, lime, iron, magnesia and the alkalies, soda and

potash, in different ways, forms that most im¬ portant of all classes of mineral substances, the silicates.

Group II.

Feldspars. — These are the most abundant of all rock-formers. They comprise a rather complex group of silicates, where alumina, the alkalies, potash and soda, and the alkaline, earth, lime, are the bases. On a chemical and crystallographic basis they fall naturally into two series, the orthoclase and the plagioclase. Orthoclase is the type-species of the series. It is a silicate of potash and alumina having the chemical composition KAlSiaOs, and is other¬ wise known as potash feldspar. It belongs to the monoclinic system of crystallization. A part of the potash of orthoclase may be re¬ placed by soda. In fact most of the analyses of the mineral show only 1 per cent or more of the substance. This replacement of potash by soda can take place until these two constituents are present in nearly equal proportions without altering the monoclinic character of the species. Such an orthoclase is called soda-orthoclase.

Microcline, like soda-orthoclase, contains both potash and soda (K,Na) AlSiaOs. It is, however, trichnic, but only slightly so. As it possesses a notable amount of potash, it may be classified with soda-orthoclase as represent¬ ing the transition varieties of feldspar, lying between the monoclinic, potash, orthoclase series and the triclinic, soda-lime, plagioclase series.

The more typical plagioclases are repre¬ sented by albite, oligoclase, andesine, Iabradorite, bytownite and anorthite. which together con¬ stitute the albite-anorthite series. The theory of their constitution was propounded by Tscher-mark in 1864. He showed that the series can best be explained as a mixture of two extreme molecules, the one a pure soda-alumina silicate molecule, and the other a lime-alumina sili¬ cate molecule, found in anorthite. The inter¬ mediate varieties can be considered as varying mixtures of these two molecules.

The feldspars are not only of primary im¬ portance as rock-formers, but the classification ot rocks as at present accepted (more particu¬ larly the igneous varieties) depends largely upon the kmd of feldspar which they contain.

I he feldspars can be grouped in tabular form thus :

(a) Monoclinic Orthoclase (sanidine) Soda-orthoclase

(b) Triclinic Microcline Soda-microcline Albite Oligoclase

Labradorite \ Mixture of Bytownite Anorthite

KAlSiaOs

(Na,K)AlSi308

(K,Na)AlSi308

(Na,K)AlSi308

NaAlSi308

albite and anrothite CaAl2Si308

Group III.

Feldspathoids. — The minerals of this group are called feldspathoids or feldspar-like minerals, more particularly because , of their chemical resemblance to the feldspars. There are but two species which need be considered here : leucite, which has a chemical composi¬ tion expressed by the formula KAl(Si03)2;

having the composition lv2J\ a« AlgbieUjM, Chemically leucite resembles

ROCKS

p

L .J

K^ii

aMBP ‘.yPrP*»

V rfr

jfe, aJjf fjMtfELzJjV

mi

- WBiˆP～aPi-W&&*T 1

wt

7~ nifc mr

\j Wjf’W

J -r ‘ ■ 2 : ‘^BfB** ^jgl

5| *T 5

JP, -2;

W”’- ■” i

RlS^v ^

orthoclase feldspar. In addition to being chem¬ ically like orthoclase, leucite, like its counter¬ part, alters to kaolin. But more interesting still is the fact that on decomposition it has been known to furnish orthoclase or orthoclase and muscovite.

Nephelite, as its chemical composition indi¬ cates, is analogous to the plagioclase feldspars. It is hexagonal in character. The decomposi¬ tion of nephelite, like that of the plagioclases, usually results in the formation of some one ot the zeolites, or more rarely it forms kaolin.

The feldsparthoids are lower in silica than their corresponding feldspars, and it is be¬ lieved that, where they are present, true feld¬ spars would have formed, except for this de¬ ficiency in silica. They hold an important place in the classification of rocks.

One other important rock-former must be mentioned as belonging to this group — olivine, so called on account of its usual olive-green color. It has the chemical composition (Mg,Fe)2Si04, is orthorhombic in crystalliza¬ tion, and readily decomposes to serpentine.

Group VI.

Ores. — Minerals of this group that consti¬ tutes important rock-formers usually have iron as their principal constituent, and frequently constitute ores of that substance. Included here are :

Magnetite FeFe2C > 4

Pyrite FeS2

Hematite Fe203

Ilmentite FeTiCh

Chromite FeCrCh

Group IV.

Mica. — Two species here are of widespread occurrence ; one is muscovite, the white, silvery, potash variety, having a chemical composition corresponding to HJvAhfSiChˆ. Chemically it is closely allied to orthoclase, and frequently results as an alteration product of that mineral. The second species, biotite, is dark-colored, owing to comparatively high percentages of iron. It also contains varying amounts of magnesia, and might thus be properly classed with the following group of minerals. It has the chemical composition (HK)2(MgFe)2 (AlFeMSiChU

Group V.

The Ferromagnesian Minerals. — The min¬ erals of this group take their name from the fact that they contain iron and magnesia as two of their prominent constituents. In addition they may contain lime and alumina in consider¬ able amounts, also some alkali. The more im¬ portant members of the group are included un¬ der the amphiboles and the pyroxenes, two species having numerous varieties. They form two parallel series which are both chemically and crystallographically analogous. Their re¬ lationship can best be shown by the following table :

Amphibole

(a) Orthorhombic Anthophyllite

(b) Monoclinic Tremolite

• Actinolite

Hornblende

Glaucophane

(c) Triclinic .dinigmatite

‘ Pyroxene

(a) Orthorhombic Enstatite Hypersthene

(b) Monoclinic

• Diopside

Augite

Acmite

(c) Triclinic Rhodonite

The really important rock-forming am-phibolcs and pyroxenes are to be found among the orthorhombic and monoclinic varieties. And it is necessary to distinguish here between those which are aluminous and those which are non-aluminous, for the special reason that the former on alteration produce chlorite, while the latter produce serpentine.

MgSiCh

CaMg3(SiC > 3)4 Ca(MgFe)3(SiOs)4 / Ca(MgFe)3(SiC > 3)4 \
CaMg2Al2(Si04)3 NaAl(Si03)2,MgSi0a

Na4Fe9AlFe(Si,Ti)i2038

MgSiCh

(Mg,Fe)Si03

MgCa(SiC > 3)2

CaMg(Si03)2

MgAbSiOs

NaFe(SiC>3)2

MnSiCb

Thus far the mineral species enumerated are mostly found as the essential constituents ■of that class of rocks hereafter to be described as igneous.

Group VII.

Accessory Minerals. — Those minerals which are usually of subordinate importance, and which are, therefore, more in the nature of accessory than notable rock-constituents, are included here:

Cassiterite Rutile Titanite Apatite Monazite Corundum Spinel

Garnet] “ite

Staurolite Chiastolite Kyanite Fibrolite Cordierite Tourmaline Topaz Fluorite Zircon Allanite Zoisite

Sn02

Ti02

CaTiSiOs

Ca4(CaF) (P04)3

(Ce.La.Di) PO4

Al203

MgAl2C > 4

Fe3Al2(SiC > 4)3

Ca3Al2(Si04)3

Fe(A10)4(A10H) (SiCbJs

Al(AlO) SiCb

(A10)2Si03

AbSiOs

(Mg, FebAUSisOis

(Na6Mg3Al2)3(AlFe)6(B0H)4Sis038

(AlF)2Si04

CaF2

ZrSiCb

(CaFe)2(AlCaFe)2A10H(Si04)3

Ca2Al2(A10H)(SiC > 4)3

Some of the above minerals occasionally come to be of considerable importance, or may even constitute the bulk of the rock-mass. As a rule, however, they are of minor considera¬ tion and frequently even negligible.

Group VIII.

Secondary Minerals. — Minerals of this class have originated as the result of the decom¬ position or alteration of some previously exist¬ ing primary or original mineral. The most noteworthy are :

Kaolin

Serpentine

Talc

Chlorite

H4Al2Si2C > 9 H4Mg3Si209 H2Mg3(SiOs)4 HstMgs.FelsAbShOis
Ca2Al2(A!OH) (Si04)3 Ca2Fe2(FeOH) (SiChb

Kaolin results from the decomposition of orthoclase and other feldspars by the loss of some of the silica and alkalies, and by the ad¬ dition of water (hydration). Serpentine results from the alteration of olivine and the non-aluminous hornblendes and pyroxenes by the loss of some of the magnesia and by an addi¬ tion of water. Talc is formed by the hydration and partial decomposition of several of the lime-magnesia or non-aluminous ferromagne-

sian minerals, namely, tremolite, pyroxene (chiefly enstatite), phlogopite mica. Chlorite re¬ sults most frequently from the alteration of the aluminous hornblendes and pyroxenes. Epidote also results from the alteration of the aluminous varieties of hornblende and pyroxene, especially those having some lime in their com¬ position.

Group IX.

Precipitations from Aqueous Solutions. —

The following minerals occasionally form im¬ portant bodies of rock. They are usually de¬ posited from solution in water:

Salt NaCl

Gypsum CaSo4,2H20

Aragonite or Calcite CaC03

Hydrous Silica SiCh.nHsO

(Geyserite or Silicious Sinter)

Origin of Rocks. — Two alternative hy¬ potheses are at present recognized as possible explanations of the origin of the earth: (1) the. old so-called nebular hypothesis, propounded by Kant and Swedenborg and later elaborated by Laplace and others ; (2) the newly proposed accretion theory or planetesimal hypothesis propounded by Prof. Thomas C. Chamberlin of the University of Chicago. The first of these supposes that the earth was originally in a gaseous condition, from which, under its own gravity and by a radiation of its heat, it passed into a fluid state and thence to a solid form. The (<original crusU of the earth (lithosphere) formed at the surface as the result of a cooling of the molten materials of the globe. Further¬ more, the earth may have solidified from the centre outward as the result of pressure. Others ‘suppose that the original crust was not only added to from below by the crystalliza¬ tion of molten material, but also increased in thickness from above by chemical precipitations from the intensely heated hydrosphere. The accretion theory, on the other hand, supposes that the earth as a whole never was in a gase¬ ous or even fluid condition, but was built up by the infalling of cold, solid particles of matter called planetesimals ; that the present internal heat is the result of pressure due to gravity. Adherents of both these hypotheses agree, how¬ ever, that the oldest known rocks, the original or primitive rocks from which all others have been derived, are of igneous origin, that is, were once in a molten condition, from which they cooled to the solid state, and in so doing formed more or less thoroughly crystalline ag¬ gregates of different kinds of minerals.

In discussing the origin and descent of rocks we must, therefore, start with the more com¬ mon igneous varieties, and show how they have furnished materials for the others.

Rocks may be classified as (1) igneous, (2) sedimentary and (3) metamorphic.

Igneous Rocks.

(Definitions depending upon external form and mode of occurrence.) Igneous rocks com¬ prise all those portions of the lithosphere which are or were in an intensely heated and more or less fluid condition and which have subse¬ quently solidified by cooling into massive, more or less crystalline bodies of varying sizes and shapes. They occur as intrusions into or re¬ placements of some previously existing rocks of the lithosphere, either sedimentary, meta¬

morphic or igneous. Where a huge mass of molten material slowly melts its way from some-deep-seated portion of the earth up into the overlying rocks 'by dissolving them and incor¬ porating them in its own mass, and subsequently cools there, slowly, without ever reaching the surface, forming a great irregular body of coarsely crystalline matter frequently scores of miles in extent, we have what is termed a batholith. In its molten condition it would be termed a magma and the reservoir in which it was contained would be called a magma basin. It might have extending from it (usually up¬ ward) irregular, more or less elongated, arm¬ like processes called apophyses. Should cracks or fissures form, they would be instantly filled by the inrush of fluid substance, which would solidify with comparative rapidity to form dikes. In stratified rocks dikes usually cut at some angle across the strata. Where the molten material intrudes itself between the strata paral¬ lel to the bedding planes in broad sheets, it is called an intrusion-sheet or sill. Where the overlying strata become lifted and arched up¬ ward into a huge dome without breaking above and letting the fluid rock escape, the solidified lenticular mass constitutes a laccolith or laccolite. Where the molten rock actually escapes to the surface by means of a fissure or other conduit, and flows out over it in a broad sheet, it is termed a flow, lava-flow, or extrusion-sheer. The interval of time elapsing between the out¬ break of the magma from its reservoir and its subsequent cooling to the solid state is termed the effusive period. If the conduit is rudely cylindrical the lava accumulates about the vent, forming a lava or volcanic cone. Subsequent erosion may entirely remove the cone and ex¬ pose the cold lava in the conduit, to which the term volcanic neck is applied. In fact it is only through the exposure of these deepseated masses of cooled igneous material by erosion that we are enabled to study them. Over the more ancient land areas many miles of rock, vertically measured, have been removed, laying barQ the underlying rocks to a corresponding depth.

The Modern Conception of Rock Mag¬ mas. — The popularly accepted idea of lava is that it is rock which has been fused by great

heat. In fact the older conception of scientific men was that magmas consisted of fused rock-masses. Recent opinion, however, based on the revelations of the microscope and experiments in the synthesis of minerals and rocks, tends to regard them as solutions of one mineral sub¬ stance in another or of several mineral sub¬ stances mutually in each other. One of the chief reasons for thinking them such can be stated as follows: If magmas are fusions then the individual mineral constituents potentially present in them should crystallize out according to their fusibilities, beginning with the least fusible, but they do not. On the other hand, as the magma slowly cools, the first individual mineral species makes its appearance when the point of saturation for that particular species is reached, and the others follow in the order of their solubilities. For example, in granite (which consists of quartz, feldspar and mica or hornblende, with some accessory constituent, such as apatite or zircon, and, it may be, also a small amount of one or more of the ores),

the order of crystallization is: (1) the ores with apatite and zircon; (2) mica or horn¬ blende; (3) feldspar; (4) quartz. Quartz is the least fusi'ble, and should appear first under the fusion theory. As a matter of fact it ap¬ pears last. In short, all of the materials ap¬ pear in the reverse order of what we would expect if they are true fusions. But they do appear in the order of their solubilities. Pres¬ sure, however, exerts an important influence upon the solvency of a substance, and as this is variable the order of appearance is not ab¬ solutely fixed. Moreover, heat, the most im¬ portant factor involved, is very variable, and still farther modifies the problem.

The Splitting or Cleavage of Magmas (Spaltung, Magmatic Segregation, Mag¬ matic Differentiation). — When a magma cools, the first minerals to appear are the ores (with apatite, titanite, zircon, etc.) ; following these, the basic ferromagnesian constituents ; then the more basic plagioclase feldspars, followed or overlapped by the orthoclase varieties ; and last of all, quartz, if more than enough exists for the formation of the silicates. Obeying the principle of diffusion, the first minerals to form — the more basic ones — tend to accumulate on the cooling walls, that is, at the periphery of the magma-basin; and the other minerals ar¬ range themselves rudely in concentric zones, each zone toward centre being successively more acid, until at the centre the magma becomes comparatively acid and may, after solidification, consist largely of such minerals as orthoclase and quartz. This arrangement of the minerals by diffusion before crystallization results in the rude separation of an originally uniform magma into several magmas of different chemical com¬ positions, which, on cooling, furnish rocks of different mineralogical compositions. The proc¬ ess is termed the cleavage of magmas.

Definitions depending upon internal char¬ acteristics will next be considered.

Texture. — • The fluid magmas of igneous rocks may be compared to molten glass. If the cooling period be long the individual minerals form comparatively large crystals. If it be short the crystals are correspondingly small. If it chills so suddenly that the molecules of the

different mineral compounds do not have time to unite to form crystals, but are caught just as they existed originally in the fluid magma, the result is a volcanic glass. Rocks in which the crystals are five millimeters or more in diameter may be called coarse-grained ; rocks in which the crystals range in size from one to five milli-Tneters, medium-grained; and those in which they are one millimeter or less in diameter, fine¬ grained. Rocks in which all of the original magma has individualized or crystallized, to form minerals of some sort, and in which there is no unindividualized material remaining be¬ hind in the form of glass, are called holocrystalline. All rocks in which the crystals are large enough to be seen with the unaided eye are termed phanerocrystalline, or phaneric. Those rocks in which the crystals are too small to be distinguished megascopically are called aphanitic. Many aphanitic rocks, however, un¬ der the microscope are seen to be holocrystalline and to consist of small crystals of minerals which can be specifically identified with the aid of that instrument. For these rocks the

term microcrystalline has been proposed. But the crystals, though recognizable, may be too small to be specifically identified even with the microscope. Such rocks are called microcrypto¬ crystalline. Volcanic glasses show only em¬ bryonic crystals imbedded in textureless glass. Such rocks are said to be vitreous or glassy.

If during the entire period of solidification the conditions of cooling remained the same and the entire process of cooling of a deepseated magma was slowly and quietly accom¬ plished in the magma-basin, unattended by any effusive period, the rock would be coarse (to fine), evenly-granular. In rocks cooling under these circumstances the growing crystals have usually interfered with each other in such a way as mutually to destroy their crystal bound¬ aries, forming irregular interlocking grains, with no one diameter much greater than the ethers. In other words, the grains are irregu¬ larly rounded. A texture of this sort is char¬ acteristic of the granites, and is called the gran¬ itic or granitoid texture. The term allotrimor-phic, referring to the fact that the crystals do not possess their own boundaries, is applied to the same texture, and a still newer term, xeno-morphic, has recently been proposed. Where the majority of the crystals do retain their crystal boundaries, the resulting texture is called idiomorphic or automorphic. If the crystal boundaries are only faintly or imper¬ fectly discernible, the structure is said to be hypidiomorphic.

The period of solidification within the earth may be interrupted by an

effusive period; in which case those crystals which had begun to form, and may have reached considerable size are carried by the eruption into other sur¬ roundings, where the cooling process may be much accelerated. A second generation of smaller crystals would then form about the large well-formed ones, imbedding them in a fine¬ grained ground-mass, producing what is termed porphyritic texture. Two or more generations of crystals may thus be recognized. The well-defined crystals of the first generation are called phenocrysts. The term.felsite is applied to the fine-grained ground-mass of the acid rocks.

The crystals of some one mineral species in a rock may have one diameter much larger than the others. The crystals then appear distinctly lath-shaped in thin section under the micro¬ scope. This form of crystallization is espe¬ cially common with the plagioclase feldspars. These laths of plagioclase are enclosed by crystals of another species. This texture is com¬ mon, and in the scheme of classification of igneous rocks at present accepted is called into rather prominent requisition. It is known as the ophitic texture.

Flow-structure is exhibited by the parallel arrangement or orientation of minerals in lines which indicate the direction in which the fluid rock had been moving before solidification took place, or while it was in a viscous state.

Classification of Igneous Rocks. — The classification of igneous rocks as at present widely accepted is based upon three things' (1) chemical composition; (2) mineralogical composition; (3) texture. (The proposed Quantitative Classification of Igneous Rocks, > published jointly by Cross, Iddings, Pirsson and

Washington, Chicago 1903, is the most elaborate* attempt at a thoroughly scientific classification of the igneous rocks yet proposed. It has not, however, as yet received general acceptance).

Chemical Composition. — The chemical com¬ position of igneous rocks is primarily ex¬ pressed in terms of silica percentage. Rocks which contain from 60 to 80 per cent of silica are called acid. Most of these rocks contain free quartz ; those which range from 40 to 60 per cent in silica are called basic and rarely possess free quartz in any considerable amount; while those which fall below 40 per cent are termed very basic, and practically never contain original free quartz. Generally speaking, as the silica percentage declines the percentage of the bases (lime, iron, magnesia) increases. This change in chemical composition from acid to very basic is indicated by change in color, the acid rocks being light ashy gray, while the very basic are dark.

Mineralogical Composition. — Quartz is more or less abundant in rocks of the acid di¬ vision, but soon disappears in passing toward the basic end of the series. Orthoclase is the dominant feldspar among the acid rocks, but even here the plagioclases are more or less common. Among the basic rocks the plagio¬ clases prevail, and in a general way change from the albite to the anorthite variety as the more basic rocks are approached, but fail en¬ tirely in most rocks of the very basic division.

The ferromagnesian minerals are subor¬ dinate, almost negligible, in the very acid rocks. They become dominant in the basic and con¬ stitute the bulk of the very basic rocks.

The ores, chiefly magnetite, chromite and ilmenite, are found more or less sparselv dis¬ seminated through all three divisions, but they become notable constituents among the basic and very basic rocks and may even segregate to form important bodies of ore.

Texture. — As already explained, magmas which solidify deep within the lithosphere usually form coarse (to fine) evenly-granular rock-masses, having the granitoid texture, al¬ though they may be more or less porphyritic or idiomorphic in character. These deepseated rocks are called plutonic. Where eruption takes place those rocks which solidify somewhere be¬ tween the magma-basin and the surface (as intrusion-sheets, dikes, laccolites, etc.) are called intrusive, while

those which cool subaerially (or it may be beneath bodies of water) are called effusive or extrusive. While neither the plutonic, intrusive nor extrusive members are limited to any one kind of texture, it is true that the plutonic rocks are more frequently granitoid, and the intrusive and extrusive mem¬ bers even-fine-grained, felsitic, asphanitic or porphyritic in texture, while the textureless vol¬ canic glasses are nearly always extrusive.

Rock-families: I. Acid Division; Granites. — The granites are plutonic rocks occurring fre¬ quently as huge irregular masses which have slowly melted their way up from some deepseated region into the more ancient and then deeply-buried portions of the lithosphere ; or they may occur as apophyses or dikes given off from some parent mass. Mineralogically they consist of quartz, dominant feldspar of the orthoclase variety (with subordinate amounts of soda-orthoclase, microcline or oligoclase), and muscovite or biotite mica, or both. Typical

granite has muscovite. Where biotite alone is present it is called granitite. Where horn¬ blende or tourmaline replaces the mica, the rick is called hornblende-or tourmaline-granite. Where feldspar fails and only quartz and mica remain, the rock is called greisen. As access¬ ory constituents might be mentioned, zircon, allanite, cassiterite, rutile, titanite, magnetite. By a gradual decrease of quartz the granites pass inperceptibly into the syenites (to be de¬ scribed later), and by similar changes into the diorites.

There is a form of granite called pegmatite, which is found in veins or dikes. It is very coarsely granular. The crystals of feldspar sometimes measure a foot or more in diameter, while the quartz and muscovite crystals corre¬ spond in size. Pegmatite is the source of nearly all of the white mica of commerce. It is also remarkable as being the home of a variety of extremely rare minerals — com¬ pounds of thorium, lanthanum, yttrium, *etc.* — among which may be mentioned uraninite or pitchblende, the present source of radium. Pegmatite is characterized by the interesting parallel intergrowth of feldspar and quartz called graphic granite. Pegmatite is particu¬ larly noteworthy, however, as having been de¬ posited from an intensely heated aqueous solu¬ tion, perhaps from vapor of water (mingled with other gases, such as carbonic acid, hydro¬ fluoric acid, boracic acid, etc.), which was un¬ der such great pressure that it bordered on the fluid condition. The minerals of pegmatite, more particularly the quartz crystals, are fre¬ quently filled with fluid inclusions of water or

carbonic acid. A great variety of minerals and a few rocks are considered to have been formed in this manner, and are said to be of pneumatolytic origin (Greek, xvevfiaTou , to turn into air), and such processes are termed pneumatolytic processes. Furthermore, since these processes usually succeed some great vol¬ canic outbreak, they are termed post-volcanic processes.

The granites as a family have a range in silica which varies between 65 and 80 per cent.

Where a magma of the chemical composition of granite erupts it may form dikes, sheets or flows. The rocks may have a variety of colors, but they are prevailingly light ashy gray. Where crystalline, they possess the same min¬ eral constituents as granite, except that the feldspar is apt to be the glassy variety of or¬ thoclase called sanidine. The porphyritic text¬ ure prevails among the intrusive and extrusive forms alike.

The geologically older intrusives of this family are called quartz or orthoclase por¬ phyry according to whether the phenocrysts im¬ bedded in the felsitic ground-mass are quartz or orthoclase. The strictly extrusive forms of granitic composition are known as rhyolites (from the Greek word which means to flow), so called because of the flow-structure which is commonly developed in them. The rhyolites are rarely holocrystalline, containing nearly al¬ ways more or less glass and occasionally con¬ sisting wholly of it. These entirely glassy forms of rhyolite are called obsidian. Perlite and pitchstone are varieties of obsidian. Occa¬ sionally the rhyolites are frothy in character, due to the rapid escape of steam resulting from the relief from great pressure. This form is

known as pumice. Rhyolite is also called liparite because extruded abundantly from the volcanoes of the Lipari Islands.

Syenite. — The hornblende granites, as al¬ ready explained, are those in which the mica has been replaced by hornblende. An occur¬ rence of such a rock at Syene (now Assuan) on the Nile, was called syenite from its local¬ ity. Of late the term has been restricted to quartzless rocks consisting primarily of orthoclase and hornblende. Rocks of the syenite family usually carry varying amounts of plagioclase and may contain subordinate quartz. Apatite, zircon, titanite and magnetite are uni¬ formly present as accessory constituents. In texture they are granitoid and, by an increase of quartz, grade over completely into the gran¬ ites, or by an increase of the plagioclase pass over into the diorites (described below). Where augite replaces the hornblende the rock is called augite-syenite ; where mica replaces it, minnette. Nepheline and orthoclase constitute nepheline-syenite.

The range in silica percentage for the typical syenites is between 55 and 65 per cent.

When a magma having the chemical com¬ position of a typical syenite erupts it forms dikes, sheets and flows, closely resembling the eruptive forms of granite, but without quartz. The loosely applied mining term porphyrv is used indiscriminately for the eruptive members of both the granite and syenite families. True eruptive syenite, however, is called trachyte, from the Greek word which means rough. The most typical occurrences are light-colored, ashy-gray rocks, either aphanitic or oorphyritic in texture, with usually some glass in the ground-mass. When porphyritic the phenocrysts are of the glassy variety of orthoclase called sanidine. In fact, the entire felspathic constituent is chiefly of this variety.

The eruptive rock having the composition of nepheline-syenite is called phonolite because of the ringing sound which thin plates make when struck with a hammer.

Rock-Families: II. Basic Division; Dior¬ ites. — These diorites are

plutonic rocks having a silica percentage running from 50 to 65 per cent. They are of medium acidity and the magmas from which they are formed may be considered as approaching closely the hypothet¬ ical parent magma from which, by the process of cleavage, the other rock-families, acid, basic and very basic, may be thought of as having originated. Mineralogically they consist of hornblende and plagioclase feldspar. Those in which mica replaces a part of the hornblende are called mica-diorites, while the same con¬ stituents plus quartz go by the name of quartz-diorites or granite-diorites. These rocks mark the transition to the granites. Augite-diorites are rocks of the diorite type, in which horn¬ blende is replaced in part by augite. They grade over into the gabbros.

Extrusive rocks having the chemical and mineralogical composition of the diorites are called andesites. Typical andesites are aphan¬ itic, felsitic or porphyritic in texture and closely resemble the trachytes, the main distinction be¬ ing that they contain plagioclase (andesine or oligoclase) instead of orthoclase. The ferromagnesian constituent is usuallv hornblende, but may be either biotite or augite. The rocks are

named because of their common occurrence in the Andes Mountains.

Acid andesites containing free quartz are known as dacites, a name derived from the old Roman province of Dacia, now a part of Hun¬ gary.

The Gabbros. — The gabbros are coarse-to fine-granular, granitoid rocks of plutonic origin, having a silica percentage ranging from 45 to 55 per cent. As originally defined they consisted of plagioclose (labradorite) plus a pyroxene, of the variety known as diallage ; but more re¬ cently the name has been applied to a great variety of rocks consisting of a plagioclase (at least as basic as labradorite) plus any kind of pyroxene, either monoclinic or orthorhombic. If olivine be present it is known as olivine gabbro.

The name norite is applied to that member of the gabbro family which consists of plagio¬ clase and enstatite. If olivine be present it is called olivine-norite. The ferromagnesian con¬ stituent may fail and the rock thus consist of labradorite feldspar alone, in which case it is known as anorthosite (from the French word for triclinic feldspar).

The accessory mineral constituents are apa¬ tite, titanite, ilmenite, magnetite. The first and last mentioned are usuallv abundant, and the

latter may segregate to form ore deposits.

Diabases. — These may properly be discussed in connection with the gabbros, for they have the same mineralogical composition. Their chief distinguishing feature perhaps is their texture, which under the microscope, if not in the hand-specimen, is seen to be ophitic. This, in short, is the essential distinction between the gabbros and the diabases as ordinarily considered. In granularity they -range from coarse to aphanitic. They are sometimes strikingly porphyritic, with perfect automorphic phenocrysts of augite im¬ bedded in an aphanitic, ground-mass of augite and plagioclase (labradorite or anorthite). The basalts or traps are the dense black aphanitic extrusive equivalent of diabase, but they grade over into the diabases by imperceptible stages. The basalts constitute great surface flows of un¬ paralleled extent, covering thousands of square miles. On cooling they frequentlv break, by shrinking, into hexagonal prisms, which have their long diameters normal to the cooling sur¬ faces. This is known as the columnar struc¬ ture of basalt, so famously exhibited at the Giant's Causeway, on the northeast coast of Ireland.

Olivine is a more or less constant mineral in the basalts, which have been divided into the olivine-free and olivine-bearing varieties.

Very Basic Division: Peridotites, Pyroxenites, Hornblendites and Dunites. — Rocks of this division, as already explained, include those from which not only free quartz has disap¬ peared, but also the feldspars, at least as notable constituents. They consist essentially of a mix¬ ture of ferromagnesian constituents plus one or more of the ores. Olivine and pyroxene (usually augite) together constitute peridotite (from the French word for olivine). If horn¬ blende be substituted for augite the rock is known as hornblende-peridotite. If the rock consists essentially of pyroxene it is called pyroxenite; or of hornblende alone, hornblend-ite, or of olivine alone, dunite. Thev have as accessory constituents magnetite, chromite, il-

ROCKS

menite and apatite. Chromite rarely occurs in such abundance in the peridotites as to be of economic value.

A certain rare basaltic rock of the mineralogical composition of peridotite. consisting of augite and olivine in a glassy ground-mass, occurs at Limburg in Kaiserstuhl, Baden. It is called limburgite. Dense porphyritic rocks con¬ sisting of augite and magnetite in a glassy ground-mass represent the effusive member of the pyroxenites and are called augitites.

Pyroclastics. — Igneous rocks belonging to any of the above families may, by violent erup¬ tions, be blown into fine particles known as ash, or if coarser as lapilli or bombs. These may accumulate and ultimately consolidate, the fine¬ grained material constituting tuff, the coarser material being known as volcanic breccia or agglomerate. See Pyroclastic.

Sedimentary Rocks.

Rock Disintegration. — Granite is one of

the most abundant and widespread of igneous rocks, and is a most important species among the numerous other primitive rocks of the lithosphere. The changes which take place in it in the process of its decay can be taken as illustrative of those which take place in the dis¬ integration of all other primitive rocks. Gran¬ ite consists of quartz, orthoclase feldspar (with some soda-orthoclase microcline or plagioclase), and light or dark mica, or both, or perhaps hornblende in place of the micas.

On decomposition under the influence of at¬ mospheric agencies it falls to a more or less rusty, clayey mass of sandy or gravelly mate¬ rial, the sandy or gravelly part consisting of angular fragments of the original quartz (which is practically unaffected by atmospheric agen¬ cies), and fragments of still undecomposed feldspar. The clayey portion of the alteration products results from the decomposition of the feldspar and consists largely of kaolin, which in a pure condition is a white powdery or plastic material, according to whether it is dry or wet. It is usually stained rusty brown by iron oxide, which results from the decomposi¬ tion of any ferromagnesian constituent con¬ tained in the rock or from small particles of some one of the ores

which are quite certain to have been present in small amounts. Cer¬ tain constituents of the original minerals are carried off in solution; the alkalies and a part of the silica of the feldspars; also a portion of the iron of the ferromagnesian minerals, to¬ gether with some of the magnesia and much of the lime that may have been present as a minor constituent.

This mass of loose, more or less rusty, in¬ coherent material remaining behind is termed residual granite. Rocks of whatever nature are in like manner subject to decomposition by at¬ mospheric agencies, and their residual materials everywhere cover the greater portion of the surface of the underlying rocks, and constitute what is termed mantle-rock or detritus. A part of this, mantle-rock consists not of residual ma¬ terial in the strict sense, but is made up of angular fragments of various sizes, which have been broken from the rock-masses by the action of frost. At the foot of nearly every steep cliff is to be found an accumulation of angular rock-fragments called talus, rock-slide or breccia.

Removal of Rock-waste and Its Deposi¬ tion in the Form of Sediments. — Most of the various materials of the mantle-rock, whether residual or fragmental, find their way sooner or later, chiefly by the action of rain or frost, to the neighboring streams, and are borne by them to the rivers, which in turn transport them, after numerous halting-periods, to the sea or to smaller bodies of salt or fresh water. In this process of transportation the angular rock-fragments are reduced by attrition to rounded pebbles. The angular grains of quartz also be¬ come rounded and water-worn, while much of the material becomes reduced to an impalpable mud. These more or less finely comminuted and abraded materials are distributed along the shores of lake or sea. Gradually the finer, more easily suspended and transportable ma¬ terials are carried out into deep water, the finest and most impalpable muds being trans¬ ported farthest from the shore; so that, broadly speaking, the washings from the land surface become distributed over sea and lake bottom in order of fineness, beginning with the coarsest gravelly materials at the shore-line, and grow¬ ing successively finer toward the deep water, where finally only the impalpable silts and muds are deposited.

Stratification. — In addition to this more or less gradual horizontal change from coarse to fine material brought about by the transporting power of water, there is always to be observed a much more sudden and abrupt change vertically, by which materials of various sorts and

degrees' of fineness are arranged by the sorting power of the same medium (water) into horizontal beds of varying thickness, which are separated from each other by sharply defined planes of demar¬ cation called sedimentation or bedding planes. Beds which consist of the same material mineralogically are called strata. But a stratum may be made up of thinner beds, owing to a difference in the fineness of the material which composes it. These subdivisions of a stratum are called layers, and layers in their turn may be composed of extremely thin beds, only the very small fraction of an inch in thickness, called laminae. Strata vary in thickness from a few inches to several feet. All materials de¬ posited in water are called sediments; and all sediments were originally deposited in nearly horizontal position. These nearly horizontal strata slope or dip slightly toward deep water, and this slight inclination is known as initial dip. All materials deposited in water are stratified, and this is the chief characteristic of all rocks so formed. Rocks of this character are called sedimentary.

Consolidation of Sediments into Coherent Rock-masses. — • Sediments have accumulated to a very great thickness during geologic time. Those sediments which have been deeply buried and have been subjected to great pressure have been made to cohere either as a direct result of this pressure or by cementing together of the particles by mineral substances in solution; namely, silica, carbonate of lime, or some com¬ pound of iron. These rocks of sedimentary origin may be further classified as aqueous, eolian, or glacial, depending on whether they are formed by water, wind, or glaciers.

Rocks of Aqueous Origin. — Rocks depos¬ ited in water are usually stratified. In this respect they are distinguished from typical

igneous rocks, which are unstratificd and mass¬ ive. Aqueous rocks can be classified as fol¬ lows: (1) Mechanical sediments of terrigenous origin; (2) sediments of organic origin; (3) chemical precipitates.

Mechanical Sediments of Terrigenous Origin . — Included here are all those sub¬ stances which have been washed from land sur¬ faces and deposited in the seas or other bodies of water, as above explained. The principal varieties are: (1) Conglomerates, otherwise known as pudding-stones. These are solidified gravels, in which coherence is due to some cementing principle (lime, iron, or silica), to pressure, or to both. Where the fragments of rock are angular, as though freshly broken, the rock is called breccia. Breccias are not all of water origin. They are occasionally terrestrial. In either case they have not been transported far from the parent ledge, as their sharp cor¬ ners indicate. (2) Sandstones, consolidated sand-beds. Where the cement is calcareous they form calcareous sandstones. They are also called silicious or ferrugenous, according to the character of the cement. Argillaceous sand¬ stones contain an admixture of clay. Coarse sandstones containing grains of undecomposed feldspar are called arkose. (3) Shales, solidi¬ fied clays or muds. They may contain some sand, and are then said to be arenaceous ; or they may contain lime in the form of shell-fragments or impalpable limy material, and are lacustrine ; and those made by rivers are alluvial or fluvial.

Mechanical sediments of the character above described accumulate alike in seas, in lakes, and on river flood plains. Those deposits made in the sea are called marine ; those made in lakes, lacustrine; and those made by rivers are alluvial or fluvial.

Sediments of Organic Origin. — These may be the result of the accumulation of either ani¬ mal or plant remains. The accumulation of hard parts of animals, such as the shells of mollusks and other mollusk-like forms, the framework of coral polyps and echinoderms, and the microscopic skeletons of some of the protozoans, form the bulk of limestone and other chemically similar deposits. Coquina, the Florida limestone, is composed of a mass of mollusk-shells ; crinoidal limestones of the frag¬ mentary skeletons of those marine forms so

abundant during Paleozoic time. Coral lime¬ stones are formed by the building up of coral reefs and by the accumulation of fragmentary coral materials and finely divided coral muds, which may be distributed widely over the floor of the ocean by currents, forming compact cal¬ careous rocks. Calcareous accumulation of this particular sort are considered to have been changed to dolomites by the action of the salts of magnesium in the sea-water, on carbonate of lime, replacing part of the calcium by magne¬ sium and forming (Ca,Mg) COs out of CaCOs. This imperfectly understood process, by which limestones are changed to dolomites, is called dolomitization. Dolomites and limestones grade into each other and together are among the most common and important rocks of the lithosphere.

Chalk is an accumulation of minute calcare¬ ous shells secreted by the lowest forms of ani¬ mal life, the protozoans, certain forms of which abound in the surface waters of the oceans.

When they die their shells rain down through the water and accumulate on the floor of the high seas, forming oozes. The chalks are con¬ sidered to have originated in a similar manner during past geologic time.

Chief among the accumulations of plant re¬ mains is peat, an accumulation of vegetable ma¬ terials in swamps or moist places. It is a dark brown or blackish residuum left by the partial decomposition of mosses and other vegetable accumulations, not always made strictly in the water, but always in moist places, and usually in the waters of swamps. Similar vegetable accu¬ mulations on a most extensive scale have been formed during past geologic time, and now con¬ stitute beds of lignite and bituminous and an¬ thracite coal. Diatomaceous or infusorial earth is a silt-like deposit consisting mostly of the microscopic silicious shells of that low order of plants called the Diatomacecu.

Chemical Precipitates. — Briefly enumer¬ ated, these are salt and gypsum, found in alter¬ nating beds, and considered to have formed by the evaporation of salt lakes, or by the isolation and evaporation of bodies of sea-water. Cal¬ careous sinter or tufa consists of carbonate of lime, which has been brought up in solution in the waters of hot springs and deposited as por¬ ous or cellular material about their vents. It is also deposited from solution in the waters of rivers and

lakes, and occasionally forms de¬ posits of considerable extent. Travertine is a more compact form of the same material, as is also Mexican onyx.

Eolian Rocks. — In regions unprotected by vegetation, as long sea-beaches, the shores of lakes, or in the region of deserts, the finer sands are picked up by winds and drifted like snow into oval or rounded hillocks called dunes. Often these drifting sands are a menace to agri¬ culture, since they gradually encroach upon and bury under them, the arable land. Sands thus deposited by winds are only rudely strati¬ fied. In the same manner fine impalpable dust is transported long distances, and gradually ac¬ cumulates to form loess. The loess deposits of China are locally over 1,000 feet thick. Similar accumulations occur in the United States, Europe, and in Argentina. The Mississippi Valley loesses are believed by some to have been laid down in water under unusual conditions. True loesses are unstratified, and have a char¬ acteristic verticle cleavage.

Glacial Deposits. — The great continental glaciers that, geologically speaking, existed only yesterday over a large portion of the continents of the northern hemisphere, left behind them vast amounts of characteristic material, which was in part deposited by the glaciers directly and in part by the waters resulting from the melting of the ice. These latter deposits are, therefore, partly of aqueous origin, and are called fluvio-glacial. Glacial drift is the gen¬ eral term applied to all the materials resulting from glacial action direct or indirect. Glacial till is the dense bluish clay, with numerous im¬ bedded bowlders, characteristically striated, formed underneath the glaciers (sub-glacial material). This till-sheet (or ground-moraine) is found over a large portion of the area cov¬ ered originally by the glaciers, and varies in thickness from zero to hundreds of feet. Other sub-glacial accumulations are called drumlins,

till-billows, till-tumuli, crag-and-tail, *etc.* Ma¬ terials dumped down at the margins of the glaciers in confused heaps are termed moraines (terminal, lateral, or medial). Streams flowing within or underneath the glaciers deposited along their courses material (sand, gravel, clay), which remained behind after the melting of the glaciers in elongated ridges called eskers or osars. Where these streams issued at the margin of the ice-sheets they left irregular mounds called kames. Streams flowing on the surface of the ice would likewise accu¬ mulate materials of the same sort, which would remain after the melting of the ice as long serpentine ridges known as super-glacial kames or eskers. These floods of water escaping from the glaciers carried the gravels, sands and silts far beyond the margins of the glaciers, and de¬ posited them as deltas, fans, overwash aprons, and valley trains.

Metamorphic Rocks.

The Metamorphism of Sediments. — Those

most ancient of all sediments which were de¬ rived from the disintegration of the original or primal rocks of the lithosphere, and which were first deposited in the primordial seas, have been so deeply buried in the crust of the earth as to have been affected by the uprising heat of the earth's interior. This heat, united with the tre¬ mendous pressure exerted by the superincum¬ bent mass of sediments and the dissolving effect of the intensity (super-) heated mositure pres¬ ent have changed these old rocks into thor¬ oughly crystalline masses, consisting of distinct mineral aggregates more or less resembling the crystalline rocks of the igneous type, but dif¬ ferent from the latter chiefly in this, that the original stratification (bedding) planes are still visible. Such rocks are utterly changed in every¬ thing except their chemical composition from their original condition and appearance and are said to be metamorphosed. As a class they compose the metamorphic rocks. It is not alone these ancient sediments which have suffered transformation. Sediments of every geologic age have been found in some quarter of the globe in the metamorphosed condition.

There are two kinds of metamorphism : con¬ tact and regional. Contact mefeamorphism is produced by the heat of intruded masses of igneous material upon the surrounding rocks. The contact zone or area

about the intrusion affected by its heat is usually narrow, but it may extend for rods or even miles from the in¬ truded mass. The changes resulting from con¬ tact metamorphism are not so important in the production of altered rock-masses as they are in the formation of new minerals, so that they are of more especial importance to the min¬ eralogist.

Regional metamorphism, on the other hand, as the name implies, has been exerted over wide areas, and has produced the most profound and farreaching effects. By it the rocks over many thousands of square miles have been completely altered from their original condition. As a result of pressure the older deeper-seated rocks (as well as some of the more recent ones) have been intensely folded, plicated and sheared, which folding and shearing alone would be suffi¬ cient to alter them completely. Metamorphic rocks have other structures developed in them,

such as crushing; jointing (series of more or less parallel cracks intersecting each other at nearly right angles and breaking the rock-masses into blocks with rudely parallel sides) ; faults (produced by the slipping of the walls of rock on either side of a fissure over each other) ; slaty cleavage (produced by great pres¬ sure exerted at right angles to the cleavage sur¬ faces) ; fissility (the visible separation of rocks into thin plates, also due to pressure, and at¬ tended by slight movement of the plates on each other) ; schistosity or foliation (the property of splitting into plates with rough undulating sur¬ faces, due to the parallel orientation of the mineral crystals). This may be cleavage, fissility, or both.

The same processes of metamorphism, so potent in the transformation of true sediments, are just as efficacious in producing changes in the igneous rocks themselves, by virtue of which processes the igneous rocks frequently become so profoundly altered as to be utterly unrecognizable.

The metamorphic rocks as a class are com¬ pletely crystalline, and in this respect resemble the igneous rocks of plutonic origin. Their chief varieties will now be considered.

Gneisses. — Disintegrated or residual gran¬ ite consists of disaggregated particles of quartz and more or less thoroughly kaolinized feld¬ spar, with considerable true clayey residue re¬ sulting from the complete decomposition of some of the feldspar, all

somewhat tinged by the oxide of iron. It is easy to see how a similar assemblage of materials could be brought together upon a sea-beach. By a subsidence of the area and a continued deposition of other sedimentary ma¬ terials above them, that first assemblage of sand and clay might become so deeply buried as to come within the sphere of metamorphic action. If subjected to heat and pressure, the elements present would recrystallize as quartz, feldspar and mica. In being so altered it would not necessarily have its original bedding-planes obliterated, and the rock would have the mineralogical composition of granite, but obviously would be of sedimentry origin. A metamor¬ phic rock of such a character would be called gneiss. In the same manner a variety of mix¬ tures might be altered with the same result. Conglomerates are known thus to pass by im¬ perceptible gradations over into gneisses. An arkose might alter to gneiss. If the material originally contained much iron, then horn¬ blende, or some other ferromagnesian mineral, such as biotite or augite, would result and the rock would accordingly be called hornblende-, biotite-or augite-gneiss. Garnets might result from the metamorphism and the gneiss would then be called garnetiferous.

Igneous rocks such as granites, syenites or gabbros, by process of metamorphism, may be altered into gneissic rocks. The chief meta¬ morphic factor in the changing of igneous rocks to gneisses is, however, intense pressure, as a result of which even these most resistent of all rock-masses are made to flow like some viscous substance. This flowing, which is accompanied by more or less shearing, results in producing schistosity or foliation, which is accompanied by a distinct banding closely simulating original bedding, so that the rocks lose their original

massive form and come to resemble altered sed¬ iments. A granite in which this secondary banding or foliation had been produced would be called a granite-gneiss ; a gabbro similarly altered would be termed a gabbro-gneiss, *etc.* In general we can say that a gneiss is any holocrystalline, foliated, metamorphic rock, of either sedimentary or

igneous origin, which has the mineralogical composition of some one of the plutonic igneous rocks. It is frequently im¬ possible to determine whether certain rocks are true sediments or altered igneous rocks.

Schists. — The term schist is applied to any metamorphic rock which, on account of the parallel arrangement of its crystal particles, tends to split more or less perfectly in parallel planes (schistosity or foliation). Clay upon metamorphosis yields mica. If little iron be present it furnishes muscovite (or sericite, its hydrated form), but if much iron be present it produces biotite. From this it follows that clay-beds on metamorphosis furnish mica of some sort or other, and as the rocks are always distinctly foliated, owing to the invariable par¬ allel orientation of the mica-scales, they are called muscovite (or sericite) or biotite schists or, in more general terms, mica schist. Some quartz and feldspar may be present, but if subordinate they are still reckoned among the schists. Rocks of this character mark the tran¬ sition of the schists into the gneisses. Mica-schists range in granularity from coarse- to fine-crystalline, the fine-crystalline varieties be¬ ing called slates.

Quartz-schists are essentially quartz-rocks which contained originally some disseminated clay that altered to mica, as a result of the presence of which the rock has a schistosity. Many basic igneous rocks of the diabase order on metamorphosis change to hornblende-rocks. Where they are foliated they are called horn¬ blende-schists. If more or less massive they are termed amphibolites. The diabases are very apt, however, to alter to chlorite schists, especially if the original augite was of the aluminous variety, and they may alter to biotite schists.

Other Metamorphic Varieties. — Pure quartz-sand metamorphoses to a holocrystalline rock called quartzite. Limestone metamorphoses to a more or less coarsely crystalline rock con¬ sisting of grains of calcite. If fine, even-gran¬ ular, it is known as marble. If coarse-granular, it is called crystalline limestone or simply lime¬ stone. But the term marble is used to embrace all crystalline calcite rocks that are susceptible of a polish. Serpentine results from the meta¬ morphosis of basic igneous rocks consisting largely of the non-aluminous varieties of horn¬ blende or pyroxene and olivine. The peridotites are especially susceptible to this change. Anthracite coal results from the metamorphosis of bituminous coal, which in turn is derived from peat or lignite. In certain extreme cases of metamorphism anthracite becomes altered to a graphitic material.

Frederick B. Peck,

Professor of Geology and Mineralogy in Lafay¬ ette College, Easton, Pa.

ROCKVILLE, rok'vil, Conn., city in Tol¬ land County and on the New York, New Haven and Hartford Railroad, about 16 miles east-northeast of Hartford. Electric lines extend to Hartford, Ellington and other places. Shenip-

sit Lake, nearby, is more than two miles long and drains into the Hockanum River, which has here a series of falls, making in all a de¬ scent of 280 feet and furnishing Rockville with exceptional water power. The city was settled in 1716 by a colony from East Windsor and was a part of the town of Vernon until 1889 when it was chartered as a city. There are about 20 manufacturing establishments of im¬ portance, chief of which are envelope factories, silk and woolen mills, gingham and satinet fac¬ tories. The principal public buildings are the schools, churches and the library. The latter cost over $100,000. There are eight churches, a high school, public and parish schools, two pri¬ vate schools and a public library. The govern¬ ment is administered by a board of aldermen, four members, and a council of eight members. Pop. about 8,000.

ROCKVILLE CENTRE, N. Y., village in Nassau County, Long Island, five miles east of the New York City line and 10 miles southeast of Jamaica. It is situated in an agricultural district and is largely residential. There are oyster and fishing interests and an increasing population. Pop. (1920) 6,262.

ROCKWELL, Alphonso David, Ameri¬ can physician: b. New Canaan, Conn., 18 May 1840. He was graduated at Kenyon College in 1868 and at the College of Physicians and Sur¬ geons in New York. He is a specialist in electro¬ therapeutics and neurology, having held a pro¬ fessorship in the former subject in the Post-Graduate School of Medicine and also in the New York State Women's Hospital. He was one of the three commissioners appointed to give advice on the establishment of the new method of execution by electricity adopted by the State of New York. He is the author of (Relation of Electricity to Medicine and Surgery) ; (Nervous Exhaustion (1901) ; and, with G. M. Beard, (Treatise on the Medical and Surgical Uses of Electricity) and of many con¬ tributions to the medical press on neurology and physical methods of treatment. During the Civil War he was surgeon of the 6th Ohio cavalry in Sheridan's corps. He is neurologist-emeritus to the Flushing Hospital.

ROCKWOOD, Tenn., city in Roane County, on the Cincinnati, New Orleans and Texas Pacific and the Tennessee Central rail¬ roads, about 60 miles west-southwest of Knox¬ ville and 88 miles north by east of Chattanooga. It is in a coal region in which there are exten¬ sive deposits of iron ore. The chief industrial-establishments are blast furnaces, foundries, machine shops, coal yards, hosiery mills and lumber yards. The trade is chiefly in coal and in iron products. The value of taxable prop¬ erty is $800,000. There are a high school and grammar school. The government is vested in a mayor and a board of five aldermen. The municipal receipts approximate $25,000 yearly. Pop. 5,000.

ROCKY FORD, Colo., city in Otero County, on the Arkansas River, 53 miles south of Puebla, on the Atchison, Topeka and Santa Fe Railroad. It is situated in a rich irrigated farming district, is famous for the cantaloupes bearing its name and is largely devoted to the sugar-beet industry. There are canneries, creameries and beet-sugar factories. Pop. 3,746.

ROCKY GAP, Engagement at. On 5

Aug. 1863 Gen. W. W. Averell, with a brigade of cavalry and mounted infantry and a six-gun battery, left Winchetser, Va., for a raid into West Virginia, which was to be continued to Lewisburg and the Virginia and Tennessee Railroad. He moved by way of Wardensville to Moorefield and to the upper valley of the south branch of the Potomac, and then to Hunters¬ ville, driving back Col. W. L. Jackson's cavalry. As he approached White Sulphur Springs, on the morning of the 26th, he encountered Col. Geo. S. Patton, who, with four small organiza¬ tions of infantry, two battalions of cavalry and a battery, in all about 1,900 men and four guns, had been ordered to intercept him, and had taken position at Rocky Gap, the junction of the Huntersville road with the Lewisburg and Kanawha turnpike. Patton was strongly posted and Averell opened upon him with artillery and disabled two of his guns ; but successive charges by Averell's dismounted force, with efforts to flank him, continued during the entire day, failed to

dislodge him, and at night, after nine hours' fighting, the contending forces occupied the same positions as in the morning. Averell intended to renew the fight next morning, but, learning that Patton had received reinforce¬ ments from Lewisburg, made arrangements to withdraw. At 10 a.m. Patton attacked his left and half an hour later Averell ordered a re¬ treat, which was conducted in good order on the road to Warm Springs, and thence by way of Huntersville to Beverly, which was reached on 31 August. The Union loss was 25 killed, 125 wounded and 67 missing, a total of 217; the Confederate loss was 20 killed, 129 wounded and 13 missing, a total of 162.

ROCKY MOUNT, N. C., city in Edge-comb and Nash counties, one mile from Tar River, 120 miles northwest of Wilmington, on the Atlantic Coast Line. It has a university school, a large trade in cotton and tobacco, and manufactures machinery, fertilizers, lumber, yarns, hosiery and cottonseed oil. The city is growing rapidly. Pop. (1920) 12,742.

ROCKY MOUNTAIN GOAT, a goat-an¬ telope (Oreamnos montanus), related to the chamois and serow, which inhabit the heights of the Rocky Mountains and Cascade Ranges be¬ tween the forests and the snow line, from the 44th to the 65th degree of latitude. It is about the size of a common goat, but is stouter, hand¬ somer and has stronger legs. It is completely covered with long, thick, white hair, which forms an erect mane along the middle of the back from between the horns to the root of the tail; the shoulders are rather humped and the head is habitually carried low. Both sexes have slender, smooth, black horns, curving backward, about eight inches long and sharp-pointed. Its pure white coat is a capital protection against observation in the midst of the mountain snow, and is unique, as no other white ruminant is known. Dwelling in such solitudes they have little to fear from natural enemies and fall an easy prey to the human hunter who has the hardihood to pursue them upon the rough mountain peaks and skill enough to get near to them unobserved. <(Their food,® says Wister. (<seems to be chiefly the short almost lichen-like moss that grows on the faces and at the base of the rocks, and between them in the crevices.

… I am inclined to believe that the goat

keeps consistently to the hills, whatever the sea¬ son may be, and in this differs from the moun¬ tain sheep, as he differs in appearance, tempera¬ ment and in all characteristics, except the pre¬ dilection for

the inclined plane; and in this habit he is more vertical than the sheep.® A variety from the Copper River region, in Alaska, is marked by a greater divergence of horns and some other structural characteristics and has been called O. kennedyi. The flesh of the mountain goat is not highly esteemed, but its hair was utilized in weaving by the Indians of British Columbia and the coast northward ; and its tanned hide has a value in market as a rug. Consult Stone and Crane, (American Animals) (new ed., 1914), and authorities on travel and sport in the Northwest.

ROCKY MOUNTAIN NATIONAL

PARK, created by an act of Congress ap¬ proved 26 Jan. 1915, is located in the northern part of Colorado and has an area of 358ˆ4 square miles. It includes the principal part of the Rocky Mountain Range, the highest point being Longs Peak, which is 14,271 feet, and 14 mountain peaks that are over 13,000 feet above sea-level. The park is accessible to tourists and travelers at numerous points on the east¬ ern and western boundaries, where trails have been in existence for a number of years. The most central point from which the public can enter the park to different points therein is Estes Park, a small village located about three miles-from the nearest point to the park bound¬ ary and approximately 7l/2 miles from the main entrance where the Fall River road enters the park. The nearest railroad stations to Estes Park are Lyons, Colo., 22 miles; Loveland, 33 miles; Fort Collins, 46 miles; and Boulder, 40 miles. Automobile stage lines during the tour¬ ist season make regular trips at special rates between these points and Estes Park. Consult Trowbridge, C. R., (Rocky Mountain National Park> (Department of the Interior, Washing¬ ton 1915 et seq.).

ROCKY MOUNTAIN SHEEP. See

Bighorn ; Sheep, Mountain.

ROCKY MOUNTAIN SUBREGION, a

rather indefinite zoogeographical region em¬ bracing the elevated area occupied by the Rocky Mountains, which zoologically presents certain peculiarities very noticeable to a traveler from either the eastern lowlands or the Pacific Coast. The resemblance in the fauna is, indeed, rather to the East than to the West, as the Rockies do not form a zoological ((divide® to anything like the extent which the Sierra Nevada does, nor even as completely as does the line of deserts which occupy the great depression of Nevada and Idaho between the Wahsatch Range and the Sierra Nevada.

A large number of species of animals and plants extend from the Mississippi Valley to and throughout the Rocky Mountains, in forms which are identical from one side of their wide range to the other, or which shade indistinguishably from one varietal extreme in the East to another in the West. On the other hand the plants and animals common to both California and Colorado are comparatively few. The dry and foodless deserts of the Utah basin form a more potent barrier than the snows and altitude of either Sierras or Rockies. Thus the

buffalo

formerly wandered throughout the whole net¬ work of interior valleys, and there is a special variety which seem never to have left the park-pastures and scantily timbered defiles ; yet Bear River, Utah, on the border of the alkali basin, is the farthest west they ever got south of northern Idaho. The elk, grizzly and bighorn, the mountain goat, white ptarmigan and certain other examples of animals, are common to both the Sierra Nevada and the Rocky Mountain systems ; but in all these cases they are species whose range extends far north where both lines of elevation converge in British Columbia. Yet the true ftblacktail,)> or Columbian deer, is never shot east of the Cascades, nor does the Vir¬ ginian, or willow deer, common enough in the Rockies, wander over to the Cascades or Sier¬ ras of Oregon and California.

To a more limited extent the Great Plains on the east serve as a barrier between the com¬ mingling of plants and animals indigenous to the mountains on the one hand and the Mis¬ sissippi Valley on the other. And that this, as far as it goes, is a real barrier, is shown by the fact that many common weeds and trees, which flourish well in Colorado now, had never reached there until carried, either intentionally or accidentally by man ; that is, the place was suitable enough to them, but they had never been able to reach it.

The Rockies, then, form a zoogeographical district, which embraces practically the whole system of complicated chains from New Mexico to the borders of Alaska, and there is a curious homogeneity throughout, a long list of insects, mollusks and animals of the lower classes, as well as of trees and herbs, occurring from the Rio Grande to the headwaters of the Saskatche¬ wan, disregarding the difference in latitude, which in flat regions is the most powerful factor governing the distribution of animal and plant life.

This is not exceptionally the case in the Rocky Mountains alone, though here it is con¬ spicuous and well-marked. It is true of the Ural-Carpathian system, of the Scandinavian ranges, of the Andes, of the great East-Afri- can system, of which Mounts Kilimanjaro, Kenia and Gordon-Bennett are peaks ; nor is it difficult of explanation. A great

mountain-province is really a series of sub-provinces con¬ centrically arranged, or, to put it in another way, heaped on top of one another, for the larg¬ est bound, embracing the whole extent of the mountains and their foothills, contains several more or less restricted areas, determined by alti¬ tude, just as a vast lowland province, such as the whole eastern half of the continent, con¬ tains several well-defined subdivisions according to zones of climate, succeeding one another from north to south. The cause of the natural division of these sub-provinces is precisely the same in both cases, for, whereas in the Missis¬ sippi Valley the cooler or warmer average tem¬ perature required by each animal or plant for its best development is obtained by moving to the north or to the south, so in a mountainous region too much cold or too much heat can be avoided by moving upward or downward, and climate varies with altitude instead of latitude.

Hence, naturalists who have studied the mountains are able to mark out successive sub¬ provinces, according to altitude, within the up¬ per and lower borders of which certain forms of

life are restricted, appearing neither below, or above, a limited number of thousand feet, ex¬ cept as occasional wanderers. Botanists have long recognized this.

Of course the number of varieties steadily decreases as one ascends just as on approach¬ ing the poles, because the means of supporting life diminish in proportion as a moderate cli¬ mate and abundant vegetation are left behind. The hardy grizzly can stray to the utmost heights, as he is fond of doing, for his strength, power of locomotion and fasting abilities make it possible ; but even he cannot remain there long, since food is very scarce beyond the tim¬ ber. The eagle and greater hawks may soar above the naked icy crest of the loftiest sum¬ mits, or perch upon the pinnacles, but they seek their prey and build their nests for the most part at far lower levels. A few small birds, like certain semi-arctic warblers and sparrows (especially the gay Leucosticte finches) and one large one (the well-known ptarmigan), the little-chief hare or ˆcony,® which stores in its rocky tunnels a winter larder of roots and stems gathered at the edge of the snow during the brief summer, and a small variety of beetles and other insects more or less subterranean in hab¬ its, alone brave the storms and famine involved in continuous residence upon the higher sum¬ mits.

Next below lies the zone of hardy plants and of a longer list of

animals, such as the Canada jay, dusky grouse, several hawks and owls, the kinglets, water-ouzel, snow-birds and Zono-trichia finches, the bighorn sheep and a large variety of insects and snails. Below that, down among the pines and abundant shrubbery of the lower slopes and the foothills, one finds in sum¬ mer the full measure of Rocky Mountain life.

An examination of these facts discloses that all the inhabitants of the lofty plateaus and the rocky peaks are arctic animals and some of them, like the ptarmigan, turn white in winter in true arctic fashion. These creatures, finding the same conditions at those great heights to which they are accustomed at lower levels in¬ side the polar circle, can live and flourish on an arctic island, as it were, in the midst of the temperate zone ; the long narrow snow peaks of the great range forming a tongue of polar cli¬ mate stretching half way to the equator. It has thus been possible for the beautiful white goat, whose proper home is in British Columbia, to stray south along the crest of the Sierra Nevada and Rockies as far as these high moun¬ tains run, but he must keep upon the very crest, whereas in Alaska he comes down to the shore. The insects and minute life of the peaks of Col¬ orado belong to the same class with (are often identically the same species as) those collected by polar exploring expeditions. The same is true of plants. (<Red snow® and arctic lichens may be gathered on Pike's Peak.

It is natural, then, that two different migra¬ tory movements should be observable in the Rocky Mountains ; one the regular seasonal movement southward in the fall and back in the spring, affecting chiefly those birds that live at the base of the range, or near it; and another movement, which is regularly made by many animals, upward to the cooler and fresher pas¬ tures in the summer, and back to the less snowy and more sheltered dells near the base of the mountains as winter approaches. This

vertical migration is very well understood in the case of the game, and the paths which the ani¬ mals follow are often distinct.

The foregoing facts lead to an interesting generalization. While the southern peaks might be colonized by such stragglers from the north as the goat and the ptarmigan, whose legs or wings enable them to travel back and forth, there is a much longer list of small and prac¬ tically stationary animals never found in the intervening valleys and totally unable to cross from one peak to another. Hence we must con¬ clude that each lofty mountain top is a habitat by itself, entirely cut off from neighboring peaks where duplicates of its fauna and flora may be collected. On the tops of Mount Washington, in the White Mountains and Mount Marcy, in the Adirondacks, are insects and cryptogamous plants which do not occur anywhere between these isolated fragments of polar climate and the arctic circle, where the same butterflies, spiders and lichens are widespread and indigenous.

How shall this isolation of strictly circum¬ scribed faunas upon mountain peaks be ex¬ plained? Clearly it dates back to a time when communication between them existed. The ice¬ cap which, during the last Glacial Epoch, grad¬ ually overspread a large part of the north temperate zone and in the Rocky Mountain region covered the whole extent of their high¬ lands with a thick mantle of snow and filled every canyon with local glaciers, of course crowded southward all the surviving life which had been wont, during the warm Tertiary time, preceding this cold period, to dwell far toward the north.

But when the epoch was on the wane, and the ice-f ront began to retreat, the relieved earth was again clothed with vegetation and re- ten- anted by cold-loving animal life, which ad¬ vanced northward closely in the rear of the re¬ treating glacier. At a greater distance followed the more delicate animals and plants, gradually spreading northward as the moderating climate permitted, until they had established themselves in isothermal zones as we now find them. But as a subsiding flood will leave, stranded upon the top of the first points to appear above the surface, the driftwood and wreck of the del¬ uge, so, as the warmth of southerly regions at a low elevation has increased, certain colonies of the advance guard of the army of animals and plants have round themselves stranded upon frigid mountain tops — islands of arctic climate — isolated from their fellows by warm valleys and plains in which their kindred speedily dis¬ appeared, overcome in the battle of life by the greater increase of lowland species to whom the circumstances were more favorable; but here on the high cold peaks they have been able to keep a stronghold, each in its own in a limited area, though surrounded by utterly fatal condi¬ tions.

Consult authorities cited under Zoogeogra¬ phy, especially the

writings of C. Hart Merriam.

ROCKY MOUNTAIN TROUT. See

Dolly Varden Trout.

ROCKY MOUNTAINS, or CORDIL-LERAN SYSTEM, the system of mountains which constitute the major axis of elevated lands of North America, in the western part, extending from the Arctic Ocean on the north to South America on the south, and parallel

with the Pacific Coast. This great system of mountains is continued along the Pacific Coast in South America under the name Andes Moun¬ tains (q.v.). Between the Rocky Mountains and the Andes is a pass in Panama not many feet above sea-level. The width of the system varies; the greatest breadth is in the United States between lat. 38° and 42° N., where it is about 1,000 miles. The width diminishes north and south, increasing again in Mexico and diminishing only with the width of the continent. The highest point of the system is in Alaska, but the highest land mass is in the United States between 35° and 42° and on the eastern side of the system.

Ranges. — The ranges on the western boundary, and near the Pacific Coast are the Cascade and Sierra Nevada in the United States, the Sierra Madre in Mexico and Central America. West of the Sierra Nevada, in Cali¬ fornia, is the Coast Range. The Coast Ranges, Cascades and Sierra Nevadas are really separate mountain systems, folded at different times, and not genetically connected with the Rocky Moun¬ tains at all, although popularly spoken of as belonging to the Rocky Mountain System. The eastern chains in the United States, called the Rocky Mountain Range, extend north and northwest in the United States, approach nearer the Pacific in Canada, continuing into Alaska to the Arctic Ocean. On the east of the Rocky Mountain Range is the great central plain of the United States and Canada. Rising abruptly from this plain are many isolated cone-shaped peaks which gradually merge into ranges, form¬ ing an almost continuous eastern barrier, com¬ posed of short ranges, chief of which are Sangre de Cristo, Colorado or Front Range, Medicine Bow, Big Horn and Laramie. Farther east, in South Dakota and Wyoming, are the Black Hills, a mountain mass detached from the main ranges. In Wyoming the ranges divide, some extending southeast, others southwest and several short ranges having an almost east and west trend. Some of the well-known interior ranges are Wasatch, extending

through Utah, and forming the eastern wall of the Great Basin, Wind River, Salmon River, San Miguel and Beaver River. Bitter Root Mountains form the divide between the headwaters of the Colo¬ rado and the Missouri rivers. In Nevada the short ranges are generally north and south; in the central and eastern part there are a large number of short, almost parallel chains. Other noted ranges are the Coeur d'Alene, the Lap-wai and the Blue. The ranges south of the divide in Wyoming have a greater altitude than those north; but some of the southern ranges after leaving Colorado on the south and east end abruptly, and others slope gradually to the low desert plains. The greatest development is in Colorado.

Peaks. — In Colorado there are about 40 peaks which are over 14,000 feet in height. Among them are Grays Peak, 14,341 feet in height; Longs Peak, 14,271 feet; Pikes Peak, 14,134 feet. In the Sawatch Range, in Colorado, are Mount Harvard, 14,375 feet, and Mount of the Holy Cross, 14,176 feet. In the mesa re¬ gion in western Colorado is Uncompahgre Peak, 14,408 feet; and in Sangre de Cristo Range is Blanca Peak, 14.463 feet. Other famous peaks, outside of Colorado, are, in Wyoming, Fre-

mont's Peak, 13,700 feet, in the Wind River Mountains ; Mount Hayden, 13,691 feet, in the Sawatch Range. In the Colorado, or Front Range, there are four peaks over 14,000 feet ; in Sawatch Range, 10 peaks; in the Sangre de C risto, three; in the San Juan, four; in the Sierra Nevada, four. In Park Range (not group) and in the Pikes Peak Group, there is one in each. The highest peaks belong to the Cascade Range. Mount McKinley in Alaska is over 20,000 feet above sea-level ; Mount Logan is 19,500 feet; Mount Saint Elias, 18,101 ; Mount Rainier, 14,444. Many of the peaks of this vast system, especially in the Cascade Range, are extinct volcanoes. In Mexico and Central America there are a number of active volcanoes. Orizaba, 18,300 feet in height ; Popo¬ catepetl, 17,887 and Ixtaccihuatl 17,343, are among the highest active volcanoes.

Plateaus. — The great plateau region in¬ cluded in the Rocky Mountain system is in southern Wyoming, eastern Utah, eastern Ari¬ zona, western New Mexico and western Colo¬ rado. The lands in Colorado and New Mexico east of the mountain ranges belong to the Great Plain. The Plateau region is bounded on the north by Sweetwater and Wind River Moun¬ tains. The general elevation of the whole plateau is about 7,000 feet above sea-level, but in Colorado it has an elevation of 10,000 feet. The Continental divide crosses this plateau ; and within its limits are the waters of the three great river systems of the United States, the Mississippi, the Colorado and the Columbia. The southern part of the plateau has in places an abrupt ending, a steep, almost perpendicular escarpment. The ranges crossing, divide the plateau region into sections to which have been given the names Kaibab, Kaiparowits, Aqua¬ rius, Colorado, Markagunt, Paunsagunt, Paria, Shiwits, Tavaputs, Uinkaret, and others not so well defined as those named. On these broad plateaus are groups of mountains, buttes and isolated ranges and peaks. There are seven peaks over 13,000 feet above sea-level ; five over 12,000 feet and less than 13,000 feet; and 20 over 10,000 feet and less than 12,000 feet.

Parks. — The parks of Colorado are high mountain valleys, known as

North, Middle, South and San Luis, with an elevation of from 6,000 to 10,000 feet, surrounded by ranges of mountains from 3,000 to 4,000 feet higher. The west border of the San Luis Park is formed by San Juan Range, with its high peaks, more than 100 of them over 13,000 feet, border¬ ing it like giant watch towers. The Uinta Range is west of North Park. The Parks, or enclosed mountain valleys in Idaho and Wyoming, are not so high as the Parks of Colorado. The most famous park in the whole Rocky Mountain System is Yellowstone Park (q.v.) in Wyoming, now a government reser¬ vation. The ranges on the boundaries of the Parks and rising from the Park Valleys, are grouped together as the Park Ranges or Park System. The mountains so designated are bounded on the north by the Laramie Plains, and on the east by the Great Plains. The southern and western boundaries are indefinite. Other noted parks are Monumental Park and the Garden of the Gods, near Colorado Springs. The 500 acres are covered with an extraordinary rock formation, like giant spires and pillars, and

some like vast cathedrals. The Yosemite Valley (q.v.) is often classed with the Parks.

Desert Region. — Within the area called by this name are vast arid regions, bare bleak mountains, and localities of almost barren lands, some of which might be made fertile by irriga¬ tion, and some fertile valleys. It includes the southern parts of Idaho and Oregon, the west¬ ern parts of Utah and Nevada, the southeastern part of California, the southwestern part of New Mexico, the southern part of Arizona and the north central part of Mexico. The Sierra Nevada and Cascade ranges are on the western boundary; and the plateau drained by the Colo¬ rado River is on the eastern boundary. The greater part of this region is known as the Great Basin (q.v.) which has no apparent out¬ lets to the ocean. The ranges, as in Nevada, are simple and narrow and separated by broad, level desert valleys. Geologically this basin is probably not strictly within the Rocky Moun¬ tain system.

Passes. — • Several depressions in the ranges are called Passes, and some have been used for routes for railroads. A famous pass is the Lewis and Clark's, in lat. 47°. Through this pass the Northern Pacific Railroad has been built, and at Mullan's Pass it goes through a tunnel 3,850 feet long. The Truckee Pass, 6,000 feet above sea-level; the South Pass of the Wind River Range, Evan's Pass in the Front Range, which is crossed by the Union Pacific Railroad, are well known. In Canada the pass between Mount Hooker and Mount Brown, Athabasca Portage, is 7,300 feet above the sea. In the California mountains there

are a number of passes. Where the rivers have cut their channels through the mountains, passes have been formed.

Lakes, Rivers and Glaciers. — The great¬ est rainfall is on the western slope, where the moisture brought by the winds from the Pacific Ocean falls. In the valleys and on the plateaus, especially where the waters fall down the es¬ carpments, the rivers run through deep canons, the most perpendicular sides of which are thou¬ sands of feet above the river beds. The rivers of the plateaus have their sources in the Park and Wind River Mountains, and in the Wahsatch Range. They have carved out deep gorges, which divide the region into a series of distinct plateaus. Some of the famous canyons of this region are the Grand of the Colorado, the Kanab and the Marble. The principal riv¬ ers within this region are the Green, Colorado, Sevier, Paria, Uinta and White. The rivers whose head waters are in the Sierra Nevada Range, flow to the Pacific, except a few, which flow east and are lost in the sands. The Sacramento and the San Joaquin are in the valley between the Sierra Nevada and the Coast Range. The one river comes from the north, the other from the south, almost parallel with the ranges until they unite, when they burst through the mountains and discharge their united waters into the Pacific Ocean. The Columbia is one of the great rivers of this re¬ gion. Rising on the east side of the Cascade Mountains it flows south for some distance un¬ til finally it plunges through the mountains in a series of magnificent cascades, whence the name of the range. The Front Range in north¬ ern Montana bears upon its crest for many miles the continental divide which separates the

headwaters of the Missouri and the Columbia rivers. The Bitter Root Range separates the Missouri from the Salmon. The greatest water systems of North America have headwaters in the Rocky Mountains. The Colorado toward the south, the Yukon on the north, and the Columbia are the largest streams that flow toward the Pacific; the Mississippi, the Great Lakes and the Saint Lawrence, and the streams that flow into the Hudson Bay all reach the Atlantic Ocean ; and the Mackenzie and its tributaries flow into the Arctic. The Rocky Mountains have many small lakes, formed by springs, and depressions which serve as basins. In the Great Basin are several bodies of salt water, the largest of which is Salt Lake (q.v.). The only crater lake in the United Stated is Crater Lake in the National Park. The glaciers of the Rocky Mountains are numerous. In Alaska are the largest and greatest numbers among which are Muir and Malaspina. Mount Rainier (q.v.) has over 30 glaciers, extending over a space of 100 square miles, and some of the ice walls reach a depth of 1,000 feet. The Puyallup and Mowich rivers drain five of the largest glacier rivers of Mount Rainier. A notable feature of these rivers is what is known as glacial tides, which are quite marked in summer time. Between midday and a few hours before sunset, there is an increase in the flow of water at the head of each river; about two feet in the narrowest part of the rivers. The vastness of Mount Rainier may be con¬ ceived when it is known that the surface, in¬ cluding the hill country at its base, has an area of 3,000 square miles. In other parts of the Rocky Mountains are found vast glaciers, and many of the peaks are ever whitecapped with snow.

Geology. — Throughout the Paleozoic era, the region of the Rocky Mountains was low and featureless, and under the sea a great part of the time but with several local emergencies. Toward the close of the era, in the Permian epoch, it was probably a desert, and at this time were laid down the red sandstones and gyp¬ sum beds that form so striking a feature of the eastern ranges. Land conditions obtained through Triassic and most of Jurassic time, but the region was not mountainous. Again in the Cretaceous most of the region sank beneath the sea for a short time. During all its history thus far the most important fact was the ac¬ cumulation over all the region of the great series of sedimentary rocks that make the bulk of the mountains. During the late Cretaceous the region again became land, low and swampy, with the accumulation of coal beds. At the close of the

Cretaceous there began a period of folding, which compressed and crumpled the rocks and arched them up into a great series of folds that constituted the first appearance of the Rocky Mountains. In the northern Rockies the compression was so great that the rocks broke and passed into enormous overthrust faults (q.v.) along which the beds slipped many miles. Following the uplift erosion set in and has been continuously carving the region ever since. During Tertiary times the area was the site of very extensive volcanic activity that poured out the great lava flows of the Yellow¬ stone Park and other localities. There have been one or two later periods of slight uplift

and faulting, but no great folding since the close of the Cretaceous. The general trend of the folds and hence of the mountain ranges is nearly north and south, though a few lie nearly east and west. Erosion has planed off many of the folds, so as to expose cores of older granite, from which sedimentary beds dip out¬ ward in all directions. In the southwestern part of the system, faults are much more important than at the north, and great fault scarps are common.

Minerals and Mining. — The Rocky Moun¬ tain section is the great treasure region of North America. Almost all the precious and useful minerals are found here in abundance. Gold had been discovered and used by the abo¬ rigines, and deserted mines have been found where mining had been carried on in a crude way as early as 1680. Gold exists in nearly all the ranges of the system. Gravel containing coarse gold is found from 20 to 60 and even 100 feet below the surface. Abandoned gold fields were worked over with great profit during the last decade of the 19th century, by using improved methods. There are rich deposits of silver, copper, iron, salt, coal, lead and in the southwestern part of the United States, petro¬ leum and gas. The placer gold regions in Alaska, and the gold fields of the same territory, have been found thus far of great extent and value. The value of the fine building stone, the fireclay, gypsum, all kinds of cement ma¬ terial, are rarely taken into consideration be¬ cause overshadowed by the value of the gold, silver and copper. The gypsum beds in the northwestern part of Texas and along the foot¬ hills of the ranges in southern Colorado are of great extent and value. For further details on minerals and mining see articles on the sepa¬ rate States of the United States in the Rocky Mountain region, also Canada and Mexico.

Climate. — The west slope of the Rocky Mountains, or all that portion which faces the Pacific Ocean, has a milder climate than .the central or eastern part of North America in the same latitude. The warm

winds from the Pacific Ocean bring heat and moisture. The rainfall is copious on the western side of the mountains. Like the mountain regions on all parts of the globe, the temperature lowers with increase of altitude, and the winds which here blow over the cold mountain tops and across the plateau region to the eastern slope carry with them neither heat nor moisture. In the southeastern part of this vast region where the mountains become low ranges or foothills, in the United States, west of the ranges that parallel the coast, the climate is hot in summer and mild in winter; in the Great Basin region and on the eastern slope of the mountains extending out on the Great Plains, the climate is marked -by aridity. See United States.

Flora.— The great aridity of the region east of the western or coast barrier prevents the growth of vegetation. The surface is exposed to erosive action which is especially rapid at such great elevations, and the denudation be¬ comes more complete as the sand and small dis¬ integrated fragments are swept away by the winds, thus giving no opportunity for the accu¬ mulation of soil. A large portion of the cen¬ tral and eastern mountain region and the west¬ ern part of the Great Plains require irrigation in order to have vegetation; this is so even in

the parts where there is abundant fertile soil. The arid portion of the United States, exclu¬ sive of Alaska, is about two-fifths of the whole area. The redemption of the arid lands is one of the nation's problems. Less than 10 per cent of the mountain region is forest-clad; but a larger proportion is covered with verdure, in¬ cluding the portions covered with dwarfed herb¬ age, sage brush and stunted cedars and pines, most of which is useful for fuel but not tor building purposes. Crops that mature in a short season and pasturage grasses are found on the foothills and valleys, especially along the streams. In some places where a little moisture is carried over the passes, below the snow line, the mountains are covered with the dark ever¬ green growth of hemlock, spruce, balsam, fir and tall pines, and still further down are inter¬ spersed among them the birch, beech, cherry and various other trees, while along the streams are found groves of cottonwood and willow. Over large districts, however, the forest growth is often exceedingly sparse, and even the grass that covers the plains, and upon which travelers depend for the sustenance for their animals, is parched and disappears in the long droughts to which these regions so remote from the sea are subject. In the sandy regions along the North Fork of the Platte River above Laramie River an extraordinary growth of artemisias and other odoriferous plants is found. They abound in the river bottoms and on the hills, growing to the height of two and three feet in tough, twisted, wiry clumps. A multitude of flowering plants abound in this region, among which prevail several of helianthus sun¬ flower), and in the month of September, when they are mostly in bloom, the whole country resembles a vast garden. On the western slope may be found some of the largest trees in the world, many of them over 2,000 years old. The vast forests of the Northwest yield enormous quantities of timber. Not only is there a great variety and amount of plant life, but the vege¬ tation attains a remarkable size. The shrub of the Atlantic region becomes a tall tree on the Pacific Slope. Like the mountains themselves, the vegetation which covers the western slope is large, massive, dense and in every way seems patterned on a gigantic scale.

Fauna. — For several generations the Rocky Mountains have been the

world's "sportmen's paradise,® vying with India and central Africa. The hunters of big game found great attractions in its grizzlies, buffalo (bison), moose, caribou, not to mention its bighorns and Rocky Moun¬ tain goats. Its buffaloes and its beavers have become extinct through excessive depredations and, as early as 1905, James Outram wrote: ((The Canadian Rocky Mountains are not re¬ markable for a great profusion of animal life, though big game in abundance will reward the skillful hunter, provided he is accompanied by a guide who is acquainted with the habitats of the noble denizens of these grand mountain haunts. . But unless hunting or research into their ways is the specific object … few

animals are likely to be seen. They are too shy and wary … to allow human beings to get very close.® He tells us that mule-deer caribou are found in the valleys and on the slopes, and fur animals are fairly plentiful; bear (<in considerable quantities.®

One of the most interesting and unique of the fauna of this great mountain range is the Rocky Mountain goat, or white goat (Or earn - nus montanus) , of the family Bovidae. Its white color (tinged with yellow) is its distinc¬ tion, being like no other ruminant (except Alaskan wild sheep), remaining entirely white the year round. Its hair is long and pendent in winter, becoming comparatively short in sum¬ mer; muzzle is hairy, tail short. Its rather short black horns are ringed in basal portion and they taper sharply. A strange huge hump is on the withers where it attains a height of three feet. While at a height of from 2,000 to 5,000 feet above sea-level the region is very arid and affords chiefly desert and alpine forms and the different zones otherwise have their characteristic species. These ranges of habitat are not sufficiently defined to permit their special allocations here.

Mammalia. — • Greatest and most formidable of the ferocious beasts of the Rockies is the grizzly bear (Ursus horribilis), but indigenous also are the "silvertip,® the black bear (Ursns americanus), the brown and the cinnamon. Here are the pronghorned antelope (Antilo - capra), the mountain goat (Aplocerus) , the Rocky Mountain sheep or "bighorns® (Ovis rnontana) with their great spiral horns ; they are the only American wild sheep. To the mammalia belong the lynx, coyote, wolverine, muskrat and marten, the porcupine, red-squirrel with bushy tail and bright striped coat, the gopher. The "whistling® marmot (Arctomys) and the prairie-dog (Cynomys) , a rodent, make themselves audible here and the pikas or "calling® hares (Lagomys princeps). Other rodents are the lemming mouse (Synap - tomys

cooperi) and the jumping mouse (Zapus kudsonius). Better known to the public are the raccoon (Procyon) , .flying squirrel (Sciurop - terus), ground squirrel {Tamms). The pouched marmot (S permophilus) and the glut¬ ton (Gulo) are found here.

Birds. — There are many migratory birds, but of those resident there are a dipper (Sinclus) ; Salpinctus, one of the wrens; Poospisa, Cala-mospiza, genera of finches, including the gros¬ beak; Rocky Mountain thrush, Hylociclila gut¬ tata audoboni; Piccicorvus and Gymnokitta, genera of the crow family; Centrocercus and Pedioccetes, genera of the grouse (the grouse are locally termed ((fool-hens®) ; blue-bird Sialis-arctica; creeper, Certhia Montana, downy woodchuck, Dryobates pubesectis ; garrot, Clan-gula islantica; hairy woodpecker, Dryobates monticola; jay, Cyanocitta canadensis, locally termed “whiskey John® or “whiskey Jack® from the Indian word ouis-cachon ; pine grosbeak or pine bullfinch, Pina enucleator Montana; the screech-owl, Megascops americana maxwellice. Of winter immigrants from the north are Leucosticte and Plectrophanes, genera of finches ; Perisoreus, genus of crow family ; Picoides, arctic woodpecker; Lagopus leucurus, or white-tailed ptarmigan. Summer migrants are Oreoscoptes, genus of thrushes; Campy-lorhynchus and Catherpes, wrens; Paroides, one of the tits; Phcenopepla, allied to the wax¬ wing; Embernagra and Spermophila, genera of finches ; Pyrocephalus, one of the tyrant shrikes ; Callipepla and Cyrtonyx, American partridges ; also Harporhynchus, Lophophanes, Carpodacus,

Spizella. Two kinds of humming birds occur: the Atthis and Selasphorus.

Reptiles, Amphibia and Fishes. — A number of snakes and lizards. Of lizards there are Igua-nidce. Geckotidce, Svincidce and Zonuridce. Of snakes there are C alamariidce , Calubridce and Crotalidce. Among amphibia are Sire don (sal¬ amander) ; one of the Proteidce is peculiar. Abundance of fish is found in the glacial streams and lakes, largely rainbow trout (Salrno purpnratus) weighing as high as six pounds and fine eating.

History. — The natural history of a region is told by the geology and physical geography. This region is not as old as the Appalachian. The form of the peaks and the irregular sur-tace of the slopes differ. The missionary ex¬ plorers visited the mountainous sections of Mexico and the southwestern part of the United States in the 17th century, but the ‘Relations of the Franciscans } have as yet (1904) been only partially translated. A large part of our knowledge of this section came first from the reports of the government explorations made by Lewis and Clark in 1804. Other explorations were made by Harmann, Long, Schoolcraft, Bonneville, Nicollet, and Fremont (cpv.). Since 1844 more than 20 expeditions have been en¬ gaged in exploring these wild regions, nearly all of them for the United States government. Since the bill and appropriations of March 1853 the object of most of them has been the determination of the most practicable route for a railroad from the valley of the Mississippi to the Pacific. The history of the railroads across these mountains is largely a history of this region. The story of the strange, weird people called Cliff Dwellers (q.v.) is a most interest¬ ing chapter in the history of the efforts of man to use this region for a home. At present the population of this whole section is small. A large portion has less than two inhabitants to the square mile. About one-tenth of the whole Rocky Mountain area in the United States has from two to six inhabitants to the square mile; in some places in California, Oregon and Wash¬ ington there are from six to eight; near the cities from 18 to 45, and in the San Francisco section from 45 to 90.

Bibliography.— Reports by the United States Geological Survey ; Bulletin No. 213 by the United States Geological Survey on ‘Placer Gold Mining in Alaska in 1902) ; (Mineral De¬ posits of Bitter Root Range and Clearwater Mountains of Montana) ; (Ore Deposits of Butte, Montana) ; ‘ Wonderland, an annual

issued by the Northern Pacific Railroad; De Nadailla, (Prehistoric Americans, } for Cliff Dwellers; Lumholtz, ‘Unknown Mexico) (1903) ; Day, ‘Mineral Resources of the United States* ; Dana, ‘ Geology) ; Thwaites, ‘A Brief History of Rocky Mountain Exploration (New York 1904) ; Burpee, L. J., ‘Among the Canadian Alps> (New York 1914) ; Harsh-berger, ‘Phytogeographic Survey of North America* (ib. 1911) ; Grant, M., ‘The Rocky Mountain Goat* (in Ninth Annual Report New York Zoological Society, New York, 1905) ; Hornaday, W. T., ‘Camp-Fires in the Canadian Rockies) (ib. 1906) ; Outram, Tames, ‘In the Heart of the Canadian Rockies) (New York 1905) ; Shaler, N. S., ‘Nature and Man in America) (ib. 1892) ; United States Geo¬

graphical and Geological Survey of the Rocky Mountains (Washington 1868 et seq.).

ROCOCO, ro-ko'ko, or ROCAILLE, ro-kal-e', in architecture a name given to the de¬ based style of decoration which succeeded the first revival of Italian architecture. The orna¬ mentation consists of panels with their mold¬ ings broken or curved at the angles and filled with rock-work, leafage, shell-work, musical instruments, marks, *etc.* This style prevailed in Germany and Belgium during the 18th cen¬ tury and in France from the time of Henry IV to the Revolution. In departing from simplicity the true principles of decoration were violated, hence the bizarre character of this decoration soon failed to please.

ROD, rod, Edouard, Swiss author: b. Nyon. Canton Vaud, 31 March 1857; d. 29 Jan. 1910. He studied at Lausanne and Berlin, became editor of the Revue Contemporaine at Paris, succeeded Monnier in the chair of comparative literature at Geneva, but subsequently returned to Paris and became a collaborator on the Cor¬ respondent , the Revue des Deux Mondes and other periodicals. Among his works are 'La course a la morte> (1886) ; 'Les trois cceurs) (1890) ; 'Le silence) (1894) ; 'Scenes de la vie suisse) (1896) ; 'Au milieu du chemin) (1900); ' Dante > (1891); 'Stendhal* (1892), and 'Essais sur Goethe) (1898). Rod has vis¬ ited the United States as lecturer before the Cercle Frangais de l'Harvard. Consult Ste¬ phens, W., 'French Novelists of To-day*

(1914)!'

ROD, called also a pole, or perch, a meas¬ ure of length, equivalent to five and one-half yards or 16ˆ2 feet. See Perch ; Weights anh Measures.

RODBERTUS, Johann Karl, yo'han karl rod-ber'toos, German political economist: b. Griefswald, 12 Aug. 1805; d. Jagetzow, 6 Dec. 1875. In 1829-32 he was in the Prussian civil service. In 1848 he entered his brief political career as a member of the Prussian National Assembly. Then he was for a fortnight Minister of Education, and in January 1849 entered the second chamber from Berlin. Rodbertus was the real founder of scientific socialism in Ger¬ many. In contradistinction to Marx (q.v.), above whom he is placed by many modern econ¬ omists, he was not international nor material in his views, but a nationalist and idealist, and ex¬ pected social questions to be solved by legal

methods. Professor Wagner has called him <(the most distinguished theorist of the purely economic side of scientific socialism.® He wrote several works in connection with his propaganda. Consult the lives by Dietzel (1886-87) and Jentsch (1899).

RODD, Sir Rennell, English diplomat, au¬ thor and poet : b. 1858. As consul-general at Zanzibar in 1897 during the insurrection he took an active part in the fighting. In 1897, as Lord Cromer's lieutenant, he headed a mission to the Emperor Menelik of Abyssinia and later was appointed Minister to Sweden. In 1908 he was sent as British Ambassador to Rome. He ac¬ companied Lord Milner's mission to Egypt in 1920. Among his writings are a 'Life) of Sir Walter Raleigh and a book upon the ancient crusading princes of Achaia in Greece

RODDICK, Sir Thomas George, Canadian physician: b. 31 July 1846. He was educated at McGill University, engaged in practice at Montreal and became surgeon at the General Hospital there in 1874. He was consulting surgeon to the Royal Victoria Hospital and a governor of McGill University, where he was connected with the faculty from 1872, and filled the chair of surgery in 1890ˆ-1907. He was dean of the faculty in 1901-08. He served in the Fenian Raid in 1870 and in the North West Rebellion of 1885 he organized and was in charge of the medical field forces. He was a member of the Canadian Parliament in 1896-1904, and was knighted in 1914.

RODENBERG, ro'denberg, Julius, Ger¬ man poet: b. Rodenberg, Hesse-Nassau, 26 June 1831; d. 1914. Of a Jewish family of the name of Levy, he adopted the name of his birthplace for his own. He was educated at the universities of Heidelberg, Gottingen and Berlin, afterward devoting himself to litera¬ ture and traveling, and for many years after 1874 was editor of the Deutsche Rundschau. His publications include (J ournalistic Life in London5 (1859); (Pictures of Berlin Life) (1885-88) ; fiction, (The New Deluge) (1865) ; (The Grandidier5 (1878), *etc.*

RODENBOUGH, ro'den-bow, Theophilus Francis, American army

officer: b. Easton, Pa., 5 Nov. 1838; d. 19 Dec. 1912. He was educated at Lafayette College, and in 1861 was appointed second lieutenant in the United States army. In the Peninsular campaign of 1862 he was cap¬ tured at Manassas, but was soon exchanged, and at the battle of Gettysburg was in com¬ mand of a regiment. He was engaged at Win¬ chester, losing an arm in that battle, and was brevetted maior for his bravery. In 1865 he was brevetted brigadier-general of volunteers, mustered out of the volunteer service and was appointed major in the regular army. In 1870 he was retired with full rank as colonel. He was secretary of the Military Service Institu¬ tion in 1879, its vice-president in 1890-91, assist¬ ant inspector-general of New York in 1880-83, and in 1890-1901 chief of the bureau of elec¬ tions in New York. He has written (From Everglade to Canon with the Second Dragoons> (1875); Afghanistan and the Anglo-Russian Dispute5 (1886); (Uncle Sam's Medal of Honor5 (1887) ; (Sabre and Bayonet5 (1897). He was editor of (The Army of the United States5 (1896) ; (Journal of the Military Serv¬ ice Institution5 (1899).

RODENTIA, or GLIRES, an extensive order of Mammalia, represented by such forms as mice, beavers, porcupines, squirrels, rabbits, lemmings, *etc.* Of the characteristics tooth structures are the most important. The canines are always absent and the incisors large and chisel-like and, with the exception of the Leporidce, which have four in the upper jaw, never more than a single pair in each jaw. These teeth consist each of a front layer of hard enamel and a posterior part of softer dentine, which ensures a persistent sharp edge, since the more rapid wearing of the softer dentine leaves the harder enamel of the front surface as a chisel-like edge. These teeth continue to grow from persistent pulps throughout life. The incisors are long and curved and each forms a segment of a circle. Between the in¬

cisors and the molar teeth a wide interval ex¬ ists. The molars are few and their crowns may exhibit a variously laminated or tuberculate pattern. This structure of the molars has rela¬ tion to the motion of the jaws in gnawing, the jaws being so articulated by narrow condvles fitting in longitudinal grooves that they slide backward and forward instead of moving ver¬ tically, as in most other animals. The trans¬ verse ridges of the molar teeth act, therefore, in opposition to this sliding motion of the jaws. The molars in some cases (as in the beavers) also grow from persistent pulps and possess un¬ divided fangs. There is always a succession of milk and permanent dentitions. The chief chewing muscle is the masseter, which is greatly developed, while the temporal muscle is small. The usual number of toes is five

on both feet, but the pollex may be rudimentary or absent, and in the hind feet the number may be reduced to four, as in the hares, or to three, as in the agouti, jerboa, *etc.* Generally they are all clawed, but sometimes, as in the capybara, have hoof-like terminations. The scapula is narrow and remarkable for the long acromion process, and the clavicles are generally well developed, but may be imperfect or absent, as in the hares and guinea-pig. The femur generally possesses a third trochanter, and the tibia and fibula are distinct or, as in the rats and hares, united. The beaver has the hind feet webbed, to adapt it for its semi-aquatic life. Some rodents have the hind legs of extreme length, as the jerboas. Usually a more or less complete hairy screen extends across the mouth at the narrow region of the palate behind the incisor teeth, thus pre¬ venting the entrance into the hinder portion of the mouth of the chips or dust that result from gnawing operations. Many rodents are pro¬ vided with cheek-pouches for carrying food; usually these open within the mouth, but in the Geomyidce they open externally.

The stomach, generally a simple structure, may in some forms, as the Jemmings, become quite complex, and its anterior portion, as in beavers, may be provided with glandular ap¬ pendages. This same portion in the dormouse is glandular and dilated so as to resemble the proventriculus or digestive stomach of birds. A large sacculated caecum generally exists, and the intestine is usually very long. A gall-bladder is sometimes wanting. The surfaces of the cerebral hemispheres are smooth or destitute of convolutions and, when viewed from above, the cerebellum is seen to be in great part uncovered by the cerebrum. The corpus callosum is well developed. The penis is usually retractile and contains a bone, and the testes normally remain in the abdomen, but descend periodically into the groin at the breeding seasons. The uterus is frequently completely divided into two cor¬ nua or horns, each of which opens separately into the vagina. In others the two cornua unite to form a single uterus or womb. The placenta is of the deciduate type and of discoid form. Rodents are extremely prolific. Most species of rodents have characteristic and penetrating odors which arise from scent glands variously located in the vicinity of the anus. The skin, generally covered with hair, is spiny in the porcupines (q.v.), some genera of which group possess prehensile tails. Many of these ani¬ mals furnish furs of value in commerce.

Extent and Classification. — This is by far

the largest order of mammals, comprising more than 2,000 species. Rodents are found in all parts of the world, but are poorly represented in the Australian region and on Madagascar and are altogether absent from certain oceanic islands. In South America they reach their maximum development. With a very few ex¬ ceptions, such as the house-rats and the musk¬ rat, they are exclusively herbivorous, and dif¬ ferent species subsist upon grains, nuts, barks, roots, herbage, *etc.* Notwithstanding their great structural similarity the rodents have fitted themselves to the most varied environmental conditions and present many remarkable adap¬ tations and interesting habits. Most of them are terrestrial ; many, like the mole-rats, rabbits and prairie marmots, are burrowers : some, as the beaver and muskrat, are aquatic; many squirrels and others are arboreal. They run, leap, climb or, like the flying squirrel and Ano-malurus, sail through the air on skinny para¬ chutes. Some, as the woodchuck, are solitary; many are gregarious, like the rats and mice, colonial like the rabbit and prairie marmot, or even, like the beaver, form co-operative so¬ cieties and exhibit wonderful building instincts. Migratory movements of large parties of rodents are not infrequent, the most remarkable of which are the well-known migrations of the lemmings. Although generally of small size, the rodents have gained a dominance both of species and individuals through their great fecundity and their ability to gnaw out a living beyond the reach of most animals. Their wari¬ ness and secretiveness have aided no little toward their preservation, though they form the chief subsistence of a host of snakes, birds of prey and small carnivorous mammals. Human interests are affected by these animals in a va¬ riety of ways. Some of them furnish food, furs or sport, others are interesting pets, but the great majority are injurious to agricultural in¬ terests. Nt> less than 400 species and many additional sub-species have been described as occurring within the limits of North America, the great majority being mice.

The following is a modern classification of the order, through some mammalogists recog¬ nize a larger number of families:

Group Simplicidentata. — There is a single pair of upper incisors with the enamel layer confined to the anterior surface ; the fibula does not articulate with the calcaneum. Three sub¬ orders :

I. Hystricomorpha, or porcupine-like rodents: tibia and fibula distinct,

alveolus of * lower in¬ cisor ending on the medial side of the ramus of the lower jaw, only one premolar in each jaw: Families: Octodontidce, containing the coypu and many others chiefly of South America, but a few in Africa; Hystricida , the porcupines; Chinchillidce, chinchillas of South America; Dasyproctidce, agoutis, etc., of South America ; Dinomyidcu, containing a single gen¬ eralized rodent of Peru; Caviidce, the cavies or guinea-pigs and capybara of South America.

II . Sciuromorplia, or squirrel-like rodents: tibia and fibula distinct from each other, the alveolus of the lower incisor penetrating the ramus of the lower jaw and the premolars one or two on each side above and one on each side below. Families: Sciuridce, the squirrels and marmots, found throughout the world except Australia; Anomaluridce, peculiar squirrel-like

animals with extensive parachutes along the side found in tropical Africa; Haplodontida, the sewellel or mountain-beaver of the moun¬ tains of the north Pacific coast ; Castoridce, the beavers of the northern hemisphere.

III. Myomorphia, or rat-like rodents: tibia and fibula coalesced, lower incisors as in the squirrels, premolar o to J. Families : Dipodidce, jumping mice, jerboas, *etc.* North America, Europe, Asia and Africa; Muridce, the rats and mice, a very extensive and cosmopolitan group, variously subdivided ; Myoxidce, the dormice of Europe and other Old World forms ; Geomyidce, pouched gophers and pouched mice of America ; Lophiomyidoz, a remarkable arboreal African form; Spalacidaz, the mole rats and their allies of the Old World.

Group Duplicidentata. — Besides the large incisors, the enamel covering of which extends all around, there is a second pair in the upper jaw; the fibula articulates, with the calcaneum and the ankle and elbow joints are tongued and grooved; tibia and fibula co-ossified. One sub¬ order: Lagomorpha, hare-like rodents, with two families : Leporida, hares and rabbits, cosmo¬ politan ; Lagomyidce, picas or whistling hares, North America and Europe.

Fossil Rodentia. — Rodent remains first oc¬ cur in a fossil state in the Eocene Period, in which remains of forms allied to the dormice, porcupine and squirrels exist. In Pliocene and post-Pliocene formations they become tolerably plentiful. Of the post-Tertiary forms, Trogon-therium, or the great beaver, found in European deposits, is a familiar species, and the cave beaver (Castor spelceus) is also a

notable form. Trogontheriimi may possibly have survived the human period. The hares and rabbits first occur as fossils in Lower Miocene of North America and Pliocene of Europe, and the rats and mice are found in Eocene, Miocene and Pliocene formations. The guinea-pigs are chiefly Pleisto¬ cene, their remains occurring in the Brazilian bone caves of that age. Some of the extinct rodents were as large as an ox. Very little light has been thrown on the origin of the order by a study of the fossil forms, though Professor Cope believed the Tillodonta to be their ances¬ tors.

Bibliography — Consult the articles in this work on the various animals included in the order, and the following: Coues and Allen,

(Monographs of North American Rodentia, } United States Geological Survey of Territories (Washington 1877) ; Elliot, (Synopsis of the Mammals of North America,* Field Columbian Museum (Chicago 1901); Beddard, ‘Mammals* (London 1902) ; Alton, (On the Classification of the Order Glires,* Proc. Zoological Society (London 1876) ; Osborn, (Age of Mammals) (New York 1910) ; and numerous papers by Merriam, Miller, Palmer and others in the ‘Bulletins* of the Biological Survey of the United States Department of Agriculture.

RODERICK, rod’er-ik (Spanish, Rodrigo), last king of the West Goths in Spain. In 710 he was chosen king. Shortly after the Moors, under Muza, invaded Spain. Roderick met the invaders on the banks of the Guadelete in 711, but was defeated, and perished in the battle. Some accounts declare that he maintained re¬ sistance for two years longer. He is the hero of Scott’s ‘Vision of Don Roderick* (1811)

and Southey’s (Roderick the Goth > (1814).

Consult Toilhan, (Chronique Rimee des Derniers Rois de Tolede) (1885) ; Dozy, (Geschichte der Mauren in Spanien) (1874) ; Saavedra, (Estudio sobre la invasion de los Arabes)

(1895).

RODES, Robert Emmett, American Con¬ federate soldier: b. Lynchburg, Va., 29 March 1829; d. 19 Sept. 1864, in the battle of Opequon (q.v.). He studied at the Virginia Military Institute, where he graduated in 1848 and remained as professor till 1861, when he was commissioned as captain of the Mobile Cadets. In the early stage of the Civil War, he commanded the 5th Alabama Infantry, Ewell's 2d brigade, Army of the Potomac, in the first battle of Bull Run (q.v.). He was severely wounded at Seven Pines and later distinguished himself at Gaines' Mill and South Mountain in 1862. His brigade was in the van at Cban-cellorsville and for his services he was pro¬ moted to major-general on the field. He took part in numerous battles — notably that of the Wilderness (q.v.) — and was one of the most successful of the Southern military leaders.

RODGERS, roj'erz, Christopher Ray¬ mond Perry, American naval officer : b. Brook¬ lyn, N. Y., 14 Nov. 1819; d. Washington, D. C., 8 Jan. 1892. He entered the United States navy as a midshipman in 1833, commanded the schooner Phoenix in the Seminole War in 1840-41, was engaged in blockading service in the Mexican War and served in the trenches at Vera Cruz and at the capture of Tobasco and Tuspan. He was commissioned commander in 1861, was fleet-captain at the battle of Port Royal and also in the attack on the defenses of Charleston in 1863. He was then appointed to command the steam sloop Iroquois and was engaged in special service until the close of the war. He became commodore in 1870 and in 1874 received rank as rear-admiral. He was superintendent of the Naval Academy in 1874-77, in command of the naval forces in the Pacifis in 1878-80, and from then until his retirement in 1881 was again superintendent at the academy. He presided over the conven¬ tion held in Washington in 1885 for fixing a prime meridian and universal day.

RODGERS, Frederick, American admiral: b. Havre de Grace, Md., 3 Oct. 1842; d. 3 Nov. 1917. He was graduated at the United States Naval Academy in 1861. He participated in the actions at Donaldsonville, Port Hudson and Col¬ lege Point; and served on the Grand Gulf, At¬ lantic and West Gulf blockading squadrons in 1863-65. He was promoted lieutenant-commander in 1866 and commander in 1875. He was light¬ house inspector in 1876-77, 1881-83 and 1887— 90, and was promoted captain in 1890. lie was supervisor of New York Harbor in 1892-93 ; commander of the United States ship Massachusetts in 1896-97; commanded United States ship Puritan during the war with Spain, and became commodore in December 1898. He was president of the Board of Instruction and

Survey in 1898-1901, being promoted rear-admiral in 1899. In 1901 he was senior squadron commander of the Asiatic fleet, and in 1902 he was commander-in-chief. He was commander of the navy yard, New York, in

1903-04; and was retired 3 Oct. 1904. He served on special board duty in 1904-07.

RODGERS, John, American naval officer : b. Harford County, Md., 11 July 1771 ; d. Phila¬ delphia, 1 Aug. 1838. He entered the naval service in 1789, and in 1798, as lieutenant and executive officer of the frigate Constellation, captured a French vessel, for which service he was promoted captain in 1799. In 1802 he was appointed to the Mediterranean squadron then engaged in the war with Tripoli, in the success of which he was largely instrumental. He suc¬ ceeded Commodore Barron in the command of the squadron in 1805, and in this office rendered a valuable diplomatic service in securing treaties from Tripoli and Tunis which established the friendly relations since existing between those countries and the United States. In 1812 Com¬ modore Rodgers, in command of the Atlantic squadron, was the first to fire upon the British, and during the campaign captured some 23 English vessels. He was president of the Board of Naval Commissioners 1815-37, except during the three years 1824—27, when he was again in command of the Mediterranean squadron.

RODGERS, John, American naval officer, son of the preceding: b. Harford County, Md., 8 Aug. 1812 ; d. Washington, D. C., 5 May 1882. He was commissioned lieutenant in 1840 and was engaged in the hostilities with the Seminoles from 1840 to 1843. Subsequently he per¬ formed a valuable service in surveying the Florida coast. His explorations from 1852 to 1861 in the north Pacific and China seas and in the Arctic Ocean were also of much scientific and commercial importance. As commander of the monitors IVeehawken, Dictator and Monad-nock he took a prominent part in the Civil War. He was made commodore in 1863, and in 1869 commissioned rear-admiral in command of the Asiatic fleet. In this office he rendered valuable service as a diplomat by establishing the safety of American commerce in Korea. At his death he was superintendent of the naval observa¬ tory at Washington.

RODIN, ro-dan, (Frangois) Auguste,

eminent French sculptor: b. Paris, Novem¬ ber 1840; d. 17 Nov. 1917.

After working in a subordinate position in several studios he exhibited for the first time in the Salon in 1875, and since then became well known as a sculptor utterly beyond the control of classical convention, and reveling in the first expression of emotion and action, yet showing a power of execution worthy of the best Renaissance art. One of his first productions was (The Broken Nose,* which invited much discussion. In 1870, during the siege of Paris, he served in the national guard. He has done some re¬ markable work, as for instance (The Brazen Age,* exhibited as a cast, and after much dis¬ cussion executed in bronze for the Luxem¬ bourg Gardens. Among other rugged and fan¬ tastic creations are (Burghers of Calais* ; (The Kiss.* He has made busts of Bastien-Lepage, Victor Hugo, Henri Rochefort and Jules Daloux, the sculptor. (The Hand of God,* (The Bather,* a bust of (Saint John,* and 18 minor works, are in the Metropolitan Museum of New York. Originals or copies of his works are to be found in all the great sculpture col¬ lections of the globe. Rodin was distinctly an impressionist, seeking to convey a psychologi-622

cal meaning to the beholder. He was not satis¬ fied to reproduce a figure; he felt it necessary to present an idea with every piece of carving. He not only conquered the prejudice of con¬ vention, which demanded only the beautiful and graceful, according to accepted types, but he set a new standard of modern expression, em¬ phasizing the strength and character even of ugliness, and showing the possibility of em¬ phasizing an idea in stone by exaggeration, as is done by the most expert cartoonist. It was not humor, however, that he strove to dis¬ play, but rather the grand human emotions. The breadth of Rodin's character is illustrated by his indifference to hostile criticism. No other sculptor of modern times has received so much criticism, nor succeeded in overcom¬ ing all criticism. His plaster sketch of Balzac, in a voluminous dressing gown, was declared absurd by the committee of the Society of Men of Letters, and they refused to accept it, giving the order to Falguiere. In the salon where his successful opponent exhibited his Balzac, Rodin entered a bronze bust of Fal¬ guiere, showing that he was above all petty jealousy. Time has shown that he could afford to be, and many devotees of art now declare that he never had a peer. This is doubtless over-enthusiasm. Rodin was a great inspired sculptor, ranking with three or four of the world's best, and he has given birth to a new school. He has been

showered with honors, college degrees, official positions in art socie¬ ties, and was chosen president of the Inter¬ national Society of Sculptors, Painters and En¬ gravers, succeeding Whistler in 1904. At the 1900 Exposition in Paris an entire building was given up to the display of Rodin's works. In addition to his marble and bronze figures were many water-color drawings and etchings. Further illustrating the versatility of his genius are a number of writings on various subjects, of which the most notable is (Les cathedrales de France > (1914). Consult Marx, (Auguste Rodin, Ceramiste) (Paris 1907) ; Lawton, F., (Life and Work of Auguste Rodin > (New York 1907) ; Dirks, R., (Auguste Rodin) (Paris 1913) ; Bulletin, Metropolitan Museum of Art, Supplement (New York, May 1912) ; Harris, F., Contemporary Portraits) (New York 1915).

RODMAN, Hugh, American naval officer: b. Frankfort, Ky., 6 Jan. 1859. In 1880 he was graduated at the Naval Academy of the United States and at the Naval War College in 1907. In 1883 he was promoted ensign, junior grade; became ensign in the following year and was made lieutenant, junior grade, in 1893. In 1903 he was commissioned lieutenant-commander; commander in 1907; captain in 1911, and rear-admiral on 23 May 1917. In the Spanish-American War he served on the Raleigh; was executive officer of the New Or¬ leans in 1904; on the Cincinnati in 1904-05; the Wisconsin _ 1905, *etc.* In 1907-08 Rodman was inspector in charge of the sixth lighthouse dis¬ trict; commanded the Cleveland in 1909-10; served as inspection officer at the Mare Island navy yard 1910—1 1 ; commander of the Con¬ necticut in 1912; the Delaware in 1912-13, and in 1914-15 was superintendent of transporta¬ tion of the Panama Canal. In 1915-16 he com¬ manded the New York and the following year

served as member of the General Board of the Navy Department. In 1917 Rodman was made commander of Division Three of the Atlantic Fleet and later in the same year became com¬ mander of squadron I of the Battleship Force of the Atlantic Fleet; subsequently he com¬ manded Division Three of Battleship Force One of the same fleet and in November 1917 was made commander of Division Nine of the Bat¬ tleship Force for duty with the British Grand Fleet. In April 1918 Rear-admiral Rodman was made commander of the battleship divisions of the navy. He was awarded medals for his part in the battle of Manila Bay, 1 May 1898, and also for his efficiency in other actions dur¬ ing the Spanish-American War.

RODMAN, Isaac Peace, American soldier: b. South Kingston, R. I., 18

Aug. 1822; d. Sharpsburg, Md., 30 Sept. 1862. He engaged in business as a woolen manufacturer, served several terms in the Rhode Island legislature and in 1861 resigned his seat in the State senate, organized a company, of which he was com¬ missioned captain, and went to the front. He was promoted lieutenant-colonel for gallantry at the first battle of Bull Run, fought at Roanoke Island and at New Berne, N. C., and in 1862 was commissioned brigadier-general of volunteers. He commanded a division at Antietam in 1862 and while leading a charge was mortally wounded.

RODMAN, Thomas Jefferson, American military officer: b. Salem, Ind., 30 July 1815; d. 7 June 1871. He was graduated from the ordnance department of West Point in 1841 and was appointed to service at various arsenals, where his experiments in the manufacture of guns soon brought him into prominece. His method of casting guns on a hollow core, the metal being cooled by a stream of water running through the inside, was adopted in 1847. This method he later applied to shells and cannon. In 1860 he completed his experiments upon a 15-inch gun for the uses of mammoth powder, the cannon which bears his name. The Rodman gun and mammoth powder were adopted by the United States government in the following year, and soon after by Russia, England and Prussia. In 1865 he was brevetted brigadier-general, and four years before his death promoted to the rank of lieutenant-colonel.

RODMAN, William Lewis, American sur¬ geon: b. Frankfort, Ky., 7 Sept. 1858; d. 8 March 1918. He was graduated at the Ken¬ tucky Military Institute in 1875 and took his M.D. at Jefferson Medical College, Philadel¬ phia, in 1879. He was a surgeon in the United States army in 1880-82; then engaged in prac¬ tice at Louisville, Ky., where he was demon¬ strator of surgery in the medical department of the University of Louisville in 1885-93. He was professor . of surgery at the Kentucky School of Medicine in 1893-98; and thereafter held the chair of surgery at the Medico-Chirurgi- cal College of Pennsylvania, and was also pro¬ fessor of surgery and clinical surgeon of the Women's Medical College of Pennsylvania from 1900. He wrote (Diseases of the Breast*

RODMAN GUN. See Guns, History and Development.

RODNEY, rod' n!, Caesar, American pa¬ triot: b. Dover, Del., 7 Oct. 1728; d. there, 29 Tune 1784. He was the grandson of William Rodney, a large landholder under the Duke of 'j ork, in the grant to William Penn, and mem¬ ber of Perm's council. As high sheriff of Kent County and judge of all the lower courts of the province of Delaware, Caesar Rodney came into prominence as a statesman. He was a delegate to the Stamp Act Congress held in New York in 1765, and as speaker of that body was largely instrumental in bringing about the first Continental Congress, of which he was also a member. In this capacity he was one of the signers of the Declaration of Independ¬ ence. In 1775, after the second session of the Congress at Philadelphia, he journeyed through his native province sowing the seed of inde¬ pendence, and was appointed brigadier-general in the army under Washington at the beginning of the Revolution. As commander of the Dela¬ ware militia he rendered valuable service, for which he was made a major-general in 1777. In this year also he was made president of the State of Delaware, from which office he retired in 1782.

RODNEY, Caesar Augustus, American

statesman, son of Csesar Rodney (q.v.) : b. Dover, Del., 4 Jan. 1772; d. Buenos Aires, Ar¬ gentina, 10 June 1824. He was graduated from the University of Pennsylvania in 1789 and after his admission to the bar in 1793 practised law in Wilmington, Del. On account of his election to Congress as an anti-Federalist in 1805 he has been called the first Democrat in that body. In 1807 he was appointed Attorney-General of the United States by President Jef¬ ferson, but resigned this office in 1811, and in the War of 1812 took active part on the Ca¬ nadian frontier as captain of artillery. In 1821 he again represented Delaware in Congress, and in the following year took his seat in the United States Senate. In 1823 he was ap¬ pointed Minister Plenipotentiary to the Ar¬ gentine provinces.

RODNEY, George Brydges, 1st Baron Rodney, English naval commander: b. Walton-upon-Thames, and baptized 13 Feb. 1718; d.

London, 23 May 1792. He became a lieutenant in 1739, first obtained a ship in 1742 and in 1748 went to Newfoundland as governor. On his return in 1751 he was elected member of Parliament. In 1759 he was promoted rear-admiral, and in 1761 sailed to the West Indies, reduced Martinique and took possession of Saint Lucia, Grenada and Saint Vincent. In 1762 he became vice-admiral and in 1764 was made a baronet. The next year he became gov¬ ernor of Greenwich Hospital. In 1779, having already been promoted to the rank of admiral, he was put in command of a fleet bound for the West Indies with instructions to relieve Gib¬ raltar on his way. This latter was accomplished on 16 Jan. 1780 by capturing or destroying seven ships of the fleet of the Spanish admiral, Don Juan de Langara. Continuing on to the West Indies he encountered the French fleet under Guichen near Martinique, with indecisive results, though with considerable loss on both sides. In April 1782, he again met a French fleet in the West Indies, this time commanded by Count de Grasse; and after a three days' fight over¬ came the French, captured de Grasse and his

flagship, the Ville de Paris , but forewent the larger part of his spoil by not giving chase. Before the news of the victory reached Eng¬ land, Admiral Hugh Pigot had been sent to supersede Rodney, and though he retired from active service, he was rewarded with a pension and a barony. Consult Mundy, (Life and Cor¬ respondence of Lord Rodney > (1830) ; Hannay, <Rodney) ((English Men of Action*).

RODRIGUEZ, Jose Ignacio, Cuban-Amer- ican lawyer and author: b. Havana, Cuba, 11 Nov. 1831 ; d. Washington, D. C., 1 Feb. 1907. He was educated at the University of Havana and studied American law under Caleb Cush¬ ing. In 1855 he was admitted to the bar at Havana and in the same year was appointed supernumerary professor of philosophy at the university there. In 1856 he became professor of natural philosophy and chemistry at the Pre¬ paratory Technical School of Havana; in 1863 professor of natural philosophy and chemistry, Havana Institute; in 1864 judge of the Belen district, and in 1866 inspector-general and mem¬ ber of the superior board of public instruction. In 1869 he removed to the United States and in 1890 was secretary to the International Amer¬ ican Conference and in 1891 secretary to the International American Monetary Commission. At Paris in 1898 Dr. Rodriguez acted as private adviser in matters of Spanish law to the Amer¬ ican Peace Commission. In 1902-03 he was sec¬ retary to the United States delegation to the Pan-American Conference at Mexico City. He was at one time chief translator and head of the Spanish department of the International Bureau of

American Republics and at the time of his death was chief translator and librarian of the Columbus Memorial Library. He pub¬ lished (Vida de Don Jose de la Luz y Caballero) (1874) ; (Vida del Presbitero Don Felix Varela) (1878) ; (Estudio historico sobre el origen, desenvolvimiento y manifestaciones practicas de la idea de la anexion de Cuba a los Estados Unidos de America) (1901), and contributions to the (Catholic Encyclopedia,* The Forum, American Catholic Quarterly Review, *etc.*

RODRIGUEZ, rod-re'ges, a volcanic island in the Indian Ocean, 19° 41' S. and 63° 23' E., about 345 miles east by north of Mauritius (q.v.), of which it is, a dependency, and con¬ nected by cable telegraph. It is 13 miles long by six miles wide, and the altitude is about 1,750 feet. It is surrounded by a coral reef. Its isolation has prevented change in its flora and fauna, and for this reason the island has been of interest to the botanist and the zoolo¬ gist. It is very fertile and tropical fruits flour¬ ish, also sugar-cane, cotton, coffee and tobacco. The only indigenous animal is a fruit-eating cat, but deer and fowl were* once abundant. Until near the end of the 17th century the dodo-like solitaire, now an extinct bird, was found on this island. The population is about 4,000, mostly negroid. The government main¬ tains a hospital and school and retains a priest. The island was discovered by the Portuguese in 1645 and since 1810 it has been a British colonly. Consult (Reports) of the Transit of Venus Expedition in Philosophical Transactions) (London 1879).

RODRIGUEZ Y FERNANDEZ, Teodoro, Spanish educator and author : b. Santi¬ ago Millas, Leon, 8 Nev. 1864. He was edu-

cated at Astorga Seminary, the Augustinian scholasticate, Valladolid, College of La Vid, Bur¬ gos, Escorial University, Ximenes Institute and Central University, Madrid. In 1879 he entered the Augustinian order and was ordained to the priesthood in 1887. He was successively vice¬ rector, professor and rector of Escorial Uni¬ versity and president of the Catholic Social Bureau of the Escorial. At present he is pro¬ vincial of the Sacred Heart province of his order and moral

instructor to Don Alfonso de Bourbon. In 1911 Dr. Rodriguez took an active part in the assembly which presented resolu¬ tions on the laws of education to the minister of public instruction. He founded the chari¬ table Social Bureau of the Escorial, which maintains a night school for workmen, savings banks, loan offices, a department of domestic economy and fund for providing dowries. He has published ‘Elementos de fisica y quimica) ; ‘Elementos de quimica) ; ‘La ensenanza en Espana> ; ‘Estudios sociales* (2 vols.) ; ‘Lec-turas sociales) ; ‘Problemas cientifico-religi- osos) ; (La paz del alma> ; ‘Ricos y pobres) ; (Mision social de las classes cultas y acomo-dadas> ; (E1 deber social* ; (Sindicalismo y Cristianismo> ; ‘La civilizacion moderna> ; *etc.*

RODRIGUEZ DE FONSECA, Juan.

See Fonseca, Juan Rodriguez.

rodri’guez galvAn, rdd-re’gas galvan’, Ignacio, Mexican poet and dramatist : b. 1816; d. 1842. Although he died at the early age of 26 he had already proved himself one of the greatest dramatic and poetic geniuses of Mexico and one of the masters of the Spanish tongue. Early in the beginning of the last cen¬ tury Mariano Galvan had a noted bookstore in Mexico City and he published the Galvan Callender, which is still issued. His young nephew Ignacio came to work for him. The boy had very little education; but he set to work to educate himself through the books in his uncle’s store and with the help of kindly priests and other visitors to the old book shop. In this way he mastered several languages, while yet in his ’teens. But above all he studied poetry and more especially the works of the romantic poets who had already begun to make a stir in the world of literature. Young Rodri¬ guez Galvan early began to write in imitation of his favorite authors, poetry and drama. In 1838 when he was but 22 years of age, his first drama was produced in Mexico City with great success. This drama, “Munoz, Visitador de Mexico, > which was based on events in Mexican history of the colonial period, was the first real national drama in Mexico; and it set the fashion for others, many of them of notable worth. It is a tragedy in which all the prin¬ cipal characters s’uffer in the usual way of the romantic school. But it has many strong quali¬ ties which has ever made it a favorite in Mexico and in Spain, where it has been fre¬ quently produced. Rodriguez Galvan’s bent of mind was tragic and his odes and poems, though forceful and poetic, are all tinged with this tragic hue. The young poet also set the fashion of going into the preConquest history of Mexico for subjects, in the ‘Vision de Moctezuma.* This legend was written about a tra¬ dition of the unfortunate emperor of Mexico who

occupied the throne of the Aztecs at the time of the Conquest. The poet also went

back into the same period for the incidents in (La Profecia de Guatemoc,* the last emperor of the Aztecs. In this poem he again sounds a very strongly national note, when he presents the dead emperor, in a vision, showing his burnt feet, as a token of the cruelty of the, Spaniards who had tortured him in an effort to force him to reveal the hiding place of a royal treasure which he was supposed to have hidden. This latter poem was followed by a second drama dealing with an incident of the colonial period of Mexican history and en¬ titled (E1 Privado del Virrey,* which was still more popular than his first effort in this field; and awakened the people of the capital to the fact that in this young man had arisen a national drama and poetry. His literary repu¬ tation secured for Rodriguez Gavan an ap¬ pointment in the Mexican diplomatic service in South America. At that time yellow fever was raging in Vera Cruz; Galvan succumbed and died at Havana, on the threshold of what promised to be a much greater fame than he had as yet achieved. Young though he was at the time of his death his youthful accomplish¬ ments have won for him the title of father of the Mexican national drama and of Mexican romantic poetry of the purely national type. In reality he is the first of the romantic poets of Latin America and his work has had con¬ siderable influence upon that of other Latin-American ooets in Central and South America.

ROE, Charles Francis, American soldier: b. New York, 1 May 1848. He was graduated at West Point in 1868 and entered the 1st cavalry, being assigned to frontier duty. In 1870 he was transferred to the 2d cavalry; be¬ came second lieutenant in 1871 and first lieu¬ tenant in 1880. In his early days in the West he rode 22ˆ2 hours from Camp Harney, Ore., to Fort Bidwell, Cal., to carry orders to prevent an Indian outbreak. In 1888 he resigned from the army and engaged in real estate business in New York. He became major of Troop A, New York Volunteer Cavalry, in 1895, and later was appointed major-general. President McKinley appointed him brigadier-general of United States volunteers in June 1898; he retired on account of his advanced age on 1 May 1912.

ROE, Edward Payson, American Presby¬ terian clergyman and novelist: b. Moodna, New Windsor, Orange County, N. Y., 7 March 1838; d. Cornwall, N. Y., 19 July 1888. He studied at Williams College and at Auburn and Union Theological seminaries ; was ordained to the

Presbyterian ministry; in 1862-65 was a chap¬ lain in the volunteer service; and from 1865 until his resignation in 1874 held a Presby¬ terian pastorate at Highland Falls, N. Y. There his addresses on topics of the Civil War gained for him some notice as a speaker. In 1874 he removed to Cornwall-On-Hudson, N. Y., where he cultivated small fruits and turned out a series of novels which sold largely (759,000 copies, it was estimated, at his death) and met with widespread interest but lacked distinction or literary quality. Among the titles are < Bar¬ riers Burned Away> (1872) ; 'Opening a Chest¬ nut Burr> (1874) ; (A Knight of the 19th Cen¬ tury* (1877) ; 'A Face Illumined) (1878) ; 'Driven Back to Eden) (1885) ; and 'The Earth Trembled) (1887). He published also three books on horticulture. Consult 'E. P.

Roe: (Reminiscences of his Life,5 by his sister. May Roe (1899).

ROE, Francis Asbury, American naval of¬ ficer: b. Elmira, N. Y., 4 Oct. 1823; d. Wash¬ ington, D. C., 28 Dec. 1901. He entered the naval service in 1841 as acting midshipman on the John Adams and received his later training at the Naval Academy at Annapolis and in serv¬ ice in various parts of the world. He was executive officer of the flagship Vincennes dur¬ ing the Arctic exploring expedition of 1855, and was made a lieutenant in that year. At the outbreak of the Civil War he was appointed executive officer of the Pensacola, which was in the van of Farragut's fleet, and was especially commended for bravery during the famous pas¬ sage of Fort Jackson and Fort Saint Philip. In 1862 he was ordered to the gunboat Katah-din and upon the first day of his command fought the battle of Baton Rouge. For this service he was promoted to the rank of lieu¬ tenant-commander. On 5 May 1864, in com¬ mand of the Sassacns, he defeated the Confed¬ erate ram Albemarle and the gunboat Bomb¬ shell near Plymouth, N, C. As commander of the Gulf Division of Rear-Admiral Palmer's squadron at Vera Cruz he rendered noteworthy service as negotiator between the forces of Gen¬ eral Juarez and the governor of Vera Cruz, and received the surrender of that city in 1867. From 1869 to 1871 he was with the Asiatic fleet and was commissioned captain in 1872. In 1884

he was promoted rear-admiral and was retired the following year.

ROE, John Orlando, American laryngolo¬ gist: b. Patchogue, L. I., 3 Feb. 1849; d. 24 Dec. 1915. He was graduated M.D. at the Univer¬ sity of Michigan in 1870 and later studied at the College of Physicians and Surgeons, New York. He engaged in practice at Rochester, N. Y., and specialized in laryngology, rhinology and otology, in which fields he made extensive researches and originated several valuable operations. He wrote (Recurrent Papilloma of the Pharynx) in (Illustrated Medicine and Surgery 5 (1884) ; (Foreign Bodies in the Lar¬ ynx and Trachea5 and (Foreign Bodies in the Pharynx and (Esophagus5 in (System of Dis¬ eases of the Ear, Nose and Throat5 (1893) ; Unjuries and Deformities of the Nose and Throat5 and operations in the Upper Air Pas¬ sages5 in (American Textbook of Diseases of the Eye, Ear and Throat5 (1899), etc..

ROE, Richard. See Doe, John.

ROE-DEER, a small European deer (Ca-preolus caprcea) , the adult measuring about two feet at the shoulders and about two and one-half feet at the hind quarters. The buck's ant¬ lers are small, and provided with three short branches only. The general body-color is a brown. The tail has a white patch at its root and the chin, belly and inner aspects of the limbs are grayish-white. These animals inhabit mountainous districts, and are monogamous, each male remaining faithful throughout life to one female. The habits of the roe are some¬ what like those of the goat, or even of the chamois. It keeps its footing on rocks with great security, bounds very actively, and takes great leaps. Its usual pace, when not very hard pressed, is, however, a kind of canter. It is not gregarious, not more than a buck and doe

with one or two fawns being usually seen to¬ gether. The voice of the roe-deer resembles that of a sheep, but is shorter and more barking. The roe browses on the tender shoots of trees and bushes as well as on herbage, and is thus very injurious to young woods. It is never very thoroughly tamed, and when kept in parks is apt to become mischievous, and the male dan¬ gerous. The venison is superior to that of the stag, but not equal to that of the fallow deer. The horns are used for handles of carving knives and similar articles.

ROEBLING, reb'ling, John Augustus,

famous American bridge-builder: b. Miihlhau-sen, Prussia, 12 June 1806; d. Brooklyn, 22 July 1869. He was graduated at the Royal Poly¬ technic School in Berlin in 1826, his thesis be¬ ing on suspension bridges. He came to Amer¬ ica in 1831 and settled in Pittsburgh, Pa. Later he was engaged in surveying the lines of the Pennsylvania Railroad across the Allegheny Mountains from Harrisburg to Pittsburgh. Having spent some years thereafter in the man¬ ufacture of iron and steel wire he utilized his new product in 1844-45 in building an aqueduct across the Allegheny River at Pittsburgh, con¬ sisting of a wooden trunk supported by wire cables. The bridge comprised seven spans each 162 feet long. In 1846 he built a suspension bridge over the Monongahela River at Pitts¬ burgh, and after building several other bridges removed his business to Trenton, N. J., and in 1851 began the construction of the suspension bridge across Niagara River, connecting the New York Central and the Canadian Railway systems. He next built the bridge over the Allegheny River at Pittsburgh and during 1856— 67 the bridge connecting Cincinnati and Coving¬ ton. In 1868 he was chosen chief engineer for the construction of the Brooklyn Bridge; but he died the following year from the effects of an injury to one of his feet. The completion of the structure was carried out by his son. He was the author of (Long and Short Span Railway Bridges5 (1869).

ROEBLING, Washington Augustus,

American civil engineer : b. Saxonburg, Pa., 26 May 1837. He was graduated at the Rens¬ selaer Polytechnic Institute, Troy N. Y., in 1857, and joined his father, John A. Roebling (q.v.), in the construction of the suspension bridge across the Allegheny River at Pittsburgh. He served in the Union army, 1861-65 ; was brevetted lieutenant-colonel in December 1864 for gallant service before Richmond and col¬ onel of volunteers in March 1865 for meritori¬ ous service during the war. He joined his father in building the Cincinnati-Covington suspension bridge and became assistant en¬ gineer in constructing the Brooklyn bridge. After his father's death in 1869 the entire direc¬ tion of the work was left in his hands. He found it best to strengthen the design, increas¬ ing the anchorages. This was far the largest suspension bridge ever attempted at that date, and he felt the responsibility so strongly and worked so exhaustively that his health broke down, though he continued the supervision from his bedroom, until the bridge was completed in 1883. Since that date he has been engaged as vice-president of the iron and steel wire and wire rope manufacturing concern of John A. Roebling and Sons Company of Trenton, N. J.

ROEBLINGITE, a white, massive mineral, recently found at Franklin Furnace, N. J., hav¬ ing the remarkable composition HioCa7Pb2Sis SaOw, which is interpreted by Penfield as being a combination of five molecules of the silicate HzCaSiCh with two molecules of the basic sul¬ phite, CaPbSCh. This is the only known occur¬ rence of a sulphite in nature. Named after W. A. Roebling.

ROEBUCK, ro'buk, John Arthur, English politician: b. Madras, India, 29 Dec. 1802; d. London, England, 30 Nov. 1879. He was called to the bar in 1831. In 1832-37 and in 1841 — 47 sat in Parliament for Bath and for Sheffield in 1849-68, and again from 1874 until his death. He charged the Aberdeen ministry with mis¬ management of the Crimean War, and was in¬ strumental in overthrowing it; he favored the Confederacy in the United States, and supported Beaconsfield in his Eastern policy in 1877-78. In 1879 he became a member of the Privy Council. He wrote (Colonies of England) (1849) ; (History of the Whig Ministry of 1830> (1852), *etc.*

ROEDIGER, re'dig-er, Emil, German

Orientalist : b. Sangerhausen, Thuringia, 13 Oct. 1801 ; d. Berlin, 15 June 1874. He studied at Halle, where in 1830 he became extraordinary and in 1835 ordinary professor of Oriental languages. He removed to a similar post in Berlin in 1860 and remained there until his death. He contiued the work of Gesenius' (Novus Thesaurus Philologicus Criticus Linguae Hebraicae et Chaldae Veteris Testamenti, Editio ii) with indexes, additions and corrections (1858). He edited Gesenius' (Hebrew Gram¬ mar,) and wrote (De Origine et Indole Ara¬ bics Librorum V. T. Historicorum Interpreta-tionis Libri Duo> (1829).

ROELAS, ro-a'las, Juan de las (El Cler-igo Roelas), Spanish painter: b. Seville, about 1558; d. Olivares, 26 April 1625. He received a university education, and studied painting in Venice, where his work was influenced ma¬ terially by Titian and by Tintoretto, more particulary by the latter. He was especially strong as a draughtsman and

his work is marked by great vigor and power and by splendid color effects. He was appointed prebendary of the chapel at Olivarez in 1603, but lived and worked in Madrid and Seville until 1624, when he re¬ moved to Olivarez. His works are listed by Cean Bermudez. Among them are (Death of Saint Isidore) (Church of San Isidore, Seville) ; (Martyrdom of Saint Andrew) (Seville Museum) ; (Santiago at Battle of Clavigo) (Cathedral of Seville) ; (Moses Striking the Rock > (Madrid Museum) ; (Conception) (Dres¬ den Gallery) ; (Communion of Saint Theresa) (Hermitage, Petrograd).

ROELOFS, re'lofs, Willem, Dutch painter and naturalist: b. Amsterdam, 10 March 1822; d. 1897. He early made his home in Utrecht, where he learned to appreciate the beauty of the Netherlands landscape. In 1845 he began his art career in The Hague, and three years later went to Brussels, thus completing his studies of the Dutch masters. From Belgium he passed to France and received the great artistic impulse of his life from the French landscape painters, who represent the aspects of nature as inter¬ pretative of spiritual moods. Thus he learned

to depict what we may style the transitions of color and light in scenery with a certain dra¬ matic intensity, and preferred the portrayal of dazzling light effects and violent contrasts in color; as when the sunlight pours like a torrent through gaps of leafage into the dark forest depths. He traveled through the whole of Holland and gathered subjects and motifs for his pictures from many obscure and unfamiliar spots, painting with equal facility in oil and water color. He was also a skilful etcher. As a naturalist he was well known among students of entomology.

ROENTGEN, rent'gen, Wilhelm Konrad,

German physicist : b. Lennep, Prussia, 27 March 1845. He took his Ph.D. at Zurich in 1869, and later became assistant to Kuntz at Wiirsburg. He was professor at Hohenheim, Strassburg and Giessen, and in 1885 became professor of physics and director of the physical laboratory at Wurzburg. In 1895 he discovered the rays known by his name (see X-Ray), and which made him famous. He was awarded the Rumford Medal of the Royal Society, London, in 1896; the Barnard Medal of Columbia Univer¬ sity in 1900; and the Nobel Prize in physics in 1901. From 1899 he was professor of experi¬ mental physics at Munich. He is the author of (Annalen der Physik und Chemie,* em¬ bodying the results of numerous experimental labors.

ROGATION DAYS, the Monday, Tues¬ day and Wednesday next before Ascension Day: so-called because they are observed as days of solemn supplication, with processions and chant¬ ing of the Litanies (Greek litaneia , supplica¬ tion; equivalent to Latin rogatio). The custom ot processions on these days had its rise in the city of Vienne in Gaul about the middle of the 5th century, when, the city having been visited with earthquakes, fires and other grave calami¬ ties, the bishop, Saint Mamertus, ordered a solemn fast and public supplication of three days to appease the divine indignation : and thereafter the three days' supplication was practised annually, the custom spreading throughout Gaul and beyond the Alps. Every¬ where these processions were suppressed in England after the triumph of the Reformation, yet in some localities the perambulation of the boundaries of parishes on the "gang-days® is still kept up.

ROGER I, count of Sicily: b. Normandy, about 1031; d. Mileto, Calabria, 1101. Roger's brothers, Drago, Humphrey, William and Robert Guiscard, had acquired fame in Italy, and obtained possession of the county of Aversa, when he was summoned thither by his brother Robert, and landed in Apulia in 1057. The two brothers, Robert, the eldest, and Roger, the youngest, founded the kingdom of the Two Sicilies. Roger in 1063 defeated the Saracens at Ceramium, and was thereupon confirmed by the pope in all his conquests in Sicily. He took the title of Count of Sicily, and in spite of certain disputes between the brothers, the complete subjugation of Sicily was the result of their joint efforts. After the death of Robert Guiscard in 1085 the Norman power in Italy came into Roger's hands. The general support given to him by the pope freed him from many dangers. In 1098 Urban II gave him a free

brief (the genuineness of which has, however, been questioned), that he would send no' legate to Sicily without Roger's consent and left it to him to decide what bishops should attend the general assemblies of the Church and whom he should detain for the service of the king¬ dom. With this extension of his spiritual rights Rogers introduced

many important im¬ provements. Consult Schack, (Geschichte der Normanen in Sicilien) (1889) ; Caspar, E. L. E., c Roger IP (Innsbruck 1904).

ROGER II, king of Sicily: b. about 1095; d. February 1154, second son of Roger I. His elder brother, Simon, died in 1102, and during his minority the government was administered first by his mother, Adelheid, a daughter of the Margrave Boniface of Montserrat, and then by Prince Robert of Burgundy. The free barons of the land, however, leagued with Pope Honorius II to break the Norman ascendency. They had no success, and the pope voluntarily confirmed Roger in the possession of Apulia and Calabria. Pope Anacletus extended the confirmation to Capua and Naples; and in 1130 Roger received the title of king. He now pressed so hard upon the barons that Rainulf of Avellino, Robert of Capua, Servius of Naples and others revolted, receiving support from the German and Greek emperors, Lothar and Em¬ manuel, and the influence of the anti-pope, Innocent, who excommuniacted the Sicilian monarch, Roger in 1132 was defeated by them in an engagement ; but having promptly as¬ sembled a new army suddenly recovered all he had lost, and although the revolt lasted till 1136 it terminated to Roger's advantage. He took Malta and the adjacent islands, and after¬ ward made himself master of Tripoli. With a second fleet he sailed to Madia, and took it in 1148. At the same time he led an expedition against the kingdom of Greece, in which he took Corfu and Thebes,, and plundered Corinth, Athens, Cephalonia and Negropont. In 1152 he extended his dominion from Tripoli to Tunis, and from the desert of Mohrab to Kair-wan. The peace which followed he turned to good account, reforming the law, introducing order into the administration and patronizing science. Consult (Geschichte der Normanen in Sicilien> (1889) ; Caspar, E. L. E., (Roger IP (Innsbruck 1904) ; Curtis, E., (Roger of Sicily J (New York 1912).

ROGER OF HOVEDEN, or HOWDEN,

English historian : lived in the last half of the 12th century; d. Hoveden, now Howden, East Riding of Yorkshire. He was a lawyer, in holy orders, and lived at the court of Henry II whom he served in many diplomatic and professional capacities. His latter days were spent as a prebend of the collegiate church at Howden, to which he had retired on the death of his royal master. The history or chronicle which he wrote during his half monastic re¬ tirement was based upon (Historia Saxonum vel Anglorum post Obitum Bedae) (1101). The main additions made by Roger de Hoveden to this work include the miracles of Edward the Confessor; an abstract of the charter by which

Hominburgh and Brackenholm were ceded by William the Conqueror to Durham; a list of French knights at the siege of Nice. Naturally the most valuable part of the Chron¬ icle is that which relates to the time in which

Roger lived (1169-92). Edward I in 1291 caused diligent efforts to be made to secure a copy of it, that he might collect therefrom evidence bearing on the vexed question as to the homage due the king of England from the Scottish Crown. The Chronicle was first printed in 1696. Consult Morley, Henry, (English Writers) (Vol. Ill, London 1864-67).

R<?GER OF WENDOVER, English chronicler: d. 1237. He was a monk in Saint Alban's Abbey, and lived to be prior of Belvoir. His chronicle extends down to 1235, and bears the title (Flores Historiarum) in the (Historia Majors His account up to 1189 is supposedly based on the compilation of John de Celia, the 21st abbot of Saint Albans. The work was continued by Matthew of Paris. The best edition is by Coxe (4 vols., London 1841—42) . The work of Roger is not entirely accurate and trustworthy.

ROGERS, Fairman, American civil engi¬ neer: b. Philadelphia, 15 Nov. 1833; d. Vienna. Austria, 23 Aug. 1900. He was graduated from the University of Pennsylvania in 1853, was lecturer on mechanics at Franklin Institute, Philadelphia, in 1853-65, and professor of civil engineering at the University of Pennsylvania 1855-70. He was a volunteer in the Union army in 1861 and completed the survey of the Potomac River northward from Blakiston Island in 1862. He was a trustee of the Uni¬ versity of Pennsylvania in 1871-86, presented to the university a valuable library of works on engineering in 1878, and finally resigned his trusteeship because of continued residence abroad. Besides various valuable scientific papers he wrote (Terrestrial Magnetism and the Magnetism of Iron Ships> (1883) ; and (Manual of Coaching* (1900)).

ROGERS, Henry Darwin, American geolo¬ gist : b. Philadelphia, 1 Aue. 1808 ; d. near Glas¬ gow, Scotland, 29 May 1866. He was appointed professor of physical sciences at Dickinson Col¬ lege, Carlisle, Pa., in 1830, studied in London in 1831, was lecturer on geology at Franklin Institute in 1833-34, and in 1835-46 was pro¬ fessor of geology and mineralogy at the Uni¬ versity of Pennsylvania. In 1835 he made a geological survey of the State of New Jersey, and was appointed geologist in charge of the survey of Pennsylvania in

1836. The survey was interrupted in 1841-51 by lack of appro¬ priations, and Rogers was engaged as an ex¬ pert for various coal companies, until he re¬ sumed the survey which was then concluded in 1854. The final report of the survey was en¬ trusted to him, and he completed the work in Edinburgh. From 1857 until his death he was professor of geology and natural history at the University of Glasgow. He published ˆDescription of the Geology of the State of New Jersey* (1840) ; (The Geology of Penn¬ sylvania, a Government Survey* (1858) ; numerous geological reports.

ROGERS, Henry Huttlestone, American capitalist: b. Fairhaven, Mass., 1840; d. 19 May 1909. He was educated in the schools of his native town, and afterward was connected with the Standard Oil Companv, of which he eventually became a large stockholder and a vice-president. He was also president of the

Amalgamated Copper Company (1901) ; di¬ rector of the United States Steel Corporation, the National Transit Company and numerous other great corporations. Of the great wealth acquired through his business enterprises he devoted large sums to public and benevolent uses, especially for the benefit of Fairhaven. Among his gifts to the town are two schools, a town hall, the Millicent Library (a memorial to his deceased daughter), a Masonic building, and memorial church buildings, comprising a group said to be excellent examples of Tudor architecture, the church itself being perhaps the finest of its size ever built in America. These buildings were erected in memory of the giver's mother. He also built at Fairhaven, and pre¬ sented to the Millicent Library, a system of waterworks from which it derives an income; and as superintendent of streets he made, pre¬ sumably in great part at his own expense, vast improvements in the public highways.

ROGERS, Henry J., American inventor : b. Baltimore, Md., 1811; d. there, 20 Aug. 1879. He is known as the inventor of a code of flag signals, adopted by the United States in 1846, and was also the originator of a code of sig¬ nals in which colored lights are used. As an associate of Samuel F. B. Morse (q.v.) he was instrumental in constructing the first telegraph line, and was the inventor of several important telegraphic instruments, and was one of the organizers of the first telegraph companies in the United States, the Magnetic Telegraph Company, established in 1845. He served in the Civil War as acting master of the volunteer navy. Subsequently he was prominently iden¬ tified with the American, the Bankers' and Brokers', the Southern and Atlantic, and the Western Union Telegraph companies. His writings include (The Telegraphic Dictionary and Seamen's Signal Books* (1845); (The American Code of Marine Signals* (1854) ; and, in collaboration with W. F. Larkins,

(Rogers' Commercial Code of Signals for All Nations* (1859).

ROGERS, Henry Wade, American lawyer : b. Holland Patent, N. Y., 10 Oct. 1853. He was graduated at the University of Michigan in 1874 and was admitted to the bar in 1877. In 1883 he became professor in the law school of the University of Michigan and was its dean from 1885 to 1890. From 1890 to 1901 he was president of Northwestern University, and in the latter year became connected with the Yale Law

School, where he was dean until 1913. In 1913 he became United States circuit judge. Rogers has been actively engaged in the work of the Methodist Church and has sought in the advancement of legal education, prison re¬ form and the furtherance of peace. He has written Ullinois Citations) (1881) ; < Expert

Testimony1* (1883), and (Introduction to Con¬ stitutional History as seen in American Law*

(1889).

ROGERS, Howard Jason, American edu¬ cator: b. Stephentown, N. Y., 16 Nov. 1861. His early education was obtained in public schools and at the Pittsfield. Mass., High School; after graduation in 1880 he entered Williams College, from which he was graduated A.B. in 1884. He was admitted to the New York State Bar in 1887. From 1884-92 he was

teacher of history and literature in the Albany Boys • Academy; superintendent of the New York State Educational Exhibit at the World's Columbian Exposition, Chicago, 1892—94 ; act¬ ing-secretary of the New York commission there, and editor of the official report of the commission, 1894-95 ; deputy-superintendent of public instruction, New York State, 1895-1901 ; director of education and social economy for the United States commission at the Paris Ex¬ position of 1900. At the Saint Louis Exposi¬ tion, 1904, he was chief of the departments of education and of social economy, and also director of congresses and editor of the Pro¬ ceeding* of the International Congress of Arts and Sciences. In April, 1904, he became first assistant commissioner of education of the State of New York, having charge of higher education. He was decorated, in 1901, by the French Republic with the Order of the Legion of Honor of France, and promoted to the rank of officer in 1904; in 1904, by King Victor Eman¬ uel III of Italy, with the Order of Chevalier of Saint Maurice and Lazare; by King Oscar II of Sweden, with the Order of the North Star; and in 1905 by Emperor William II of Ger¬ many, with the Order of the Red Eagle, rank of officer, and by King Leopold II of Belgium with the Royal Order of Leopold.

ROGERS, Jacob S., American manufac¬ turer: b. Paterson, N. J., 1823; d. New York, 2 July. 1901. In 1856 he became head of the Rogers

Locomotive and Machine Works of Paterson. He retired from active business in 1897, and upon the completion of outstanding contracts closed the works 1 Dec. 1900. He bequeathed the bulk of his estate to the Metropolitan Museum of Art, New York. Litigation was begun by other legatees, but a settlement was effected by the payment to these of $250,000. The residuary estate, about $5,000,000, went to the museum.

ROGERS, Janies Edwin Thorold, English economist: b. West Meon, Hampshire, 1823; d. Oxford, 12 Oct. 1890. He was educated at King's College, London, and at Oxford, took orders in the Established Church, and was ap¬ pointed curate of Saint Paul's, Oxford. After 1860 he lost sympathy with the Tractarian movement and in 1870 was the first to take advantage of the new Clerical Disabilities Relief Act to resign his orders. He received the Tooke professorship of statistics and econo¬ mic science at King's College, London, in 1859. In 1862 he was elected for five years Drum¬ mond professor of political economy at Oxford, but failed of re-election at the end of that term on account of his advanced religious views. He was again elected to the chair in 1888, however, after the death of Bonamy Price, who had held the post in the interval. In 1880 he en¬ tered Parliament for Southwark and in 1885 was elected for Bermondsey; but his adoption of Gladstone's home rule policy in 1886 lost him his seat in the general election of that year. His great work is his (History of Agriculture and Prices in England* (1866-93), covering the period from 1259 to 1793. Based upon this was his <Six Centuries of Work and Wages* (1884).

ROGERS, John, English Reformed clergy¬ man, first martyr in the persecution under Queen Mary: b. Deritend, Aston parish, near

Birmingham, about 1500; d. London, 4 Feb. 1555. He obtained his education at Cambridge in 1532-34, was rector of Trinity and Less, Lon¬ don, and then went to Antwerp as chaplain to the English merchants. There, it is said, he was led by William Tindall, then busy on the translation of the Old Testament into English, to change his religious views. He then took charge of a Protestant congregation at Witten¬ berg, and prepared for the press an English rendering of the Bible, including Tindall's New Testament, and Old Testament as far as the end of 2 Chronicles. His part in the transla¬ tion was slight, but his marginal notes formed the earliest English commentary on the Scrip¬ tures. The whole constituted the second com¬ plete version in English, Coverdale's having ap¬ peared in 1535, while this appeared, with the pseudonym <(Thomas Matthew® on the title-page, in 1537. In 1548 Rogers returned to Eng¬ land, in 1550 was simultaneously made rector of Saint Margaret Moyses, London, and vicar of Saint Sepulchre there. In 1551 he received the prebend of Saint Pancras in Saint Paul's Cathedral. In 1553 he preached twice at PauFs Cross, the second time against Catholicism (6 August), three days after Queen Mary's arrival in London. He was shortly deprived of the emoluments of his benefices, on 27 Jan. 1554, im¬ prisoned at Newgate at the instance of Bonner, new bishop of London, and after two examina¬ tions (22, 29 January), was burned at the stake at Smithfield ; showing, says Fox, (<most con¬ stant patience, … exhorting the people

constantly to remain in that faith and true doc¬ trine which he before had taught.® Consult Fox, (Book of Martyrs) ; and the biography by Chester (1861).

ROGERS, John, American sculptor : b. Salem, Mass., 30 Oct. 1829; d. New Canaan, Conn., July 1904. In early life he developed a talent in clay modeling; and in 1858 went to Europe where he studied under the best masters in Paris and Rome. He returned to the United States in 1859, and modeled a large number of statuettes, of which his first group, (The Checker Players,5 attracted popular attention. Many of these <(Rogers Groups® pertained to the Civil War and elicited

general popular ap¬ proval rather than the unstinted admiration of the art critic. He also executed the equestrian statue of General Reynolds, now at the city hall in Philadelphia.

ROGERS, Randolph, American sculptor: b. Waterloo, N. Y., 6 July 1825; d. 15 Jan. 1892. He studied art in Europe from 1848 to 1850 when he returned to the United States, where he executed a statue of BulwerV blind heroine (Nydia) and a figure of President John Adams. He for five years had a studio in New York, but established himself in Rome in 1855. In 1858 he began the bronze doors for the capitol at Washington and subsequently executed several ’portrait statues and memorial monuments in Providence, Richmond, Detroit and other cities. His colossal figures of Generals Lewis and Nel¬ son, for the Washington monument, which Crawford had begun to raise near Richmond, are good specimens of his work. Among his other statues is that of Seward in Madison Square Park, New York. Perhaps one of his best works is the figure of the ‘Resurrection

Angel5 for the tomb of Colonel Colt in Hart¬ ford, Conn.

ROGERS, Robert, American author and soldier: b. Dunbarton, N. H., 1727; d. London, England, 18 May 1795. He raised a company of soldiers known as “Rogers’ Rangers® and commanded them efficiently during the French and Indian War of 1755-63. He visited Eng¬ land in 1765 and was appointed governor of Mackinaw, Mich., but while holding this office was charged with designs for delivering his own fort to the French and was sent to Mon¬ treal in irons. At the outbreak of the American Revolution he declined a commission in the Colonial army, though professing a sincere in¬ terest in the cause of the colonies, and later aroused the suspicions of Washington. He was secured but was released on parole, which he broke, accepted a commission in the British army and organized the ((Queen’s Rangers,® re¬ cruits to which he promised their “proportion of rebel lands.® Shortly after 1776 he went to England. He was proscribed and banished by the provincial government of New Hamp¬ shire in 1778. He wrote (A Concise Account of North America) (1765) ; (Ponteach, or the Savages of America,5 a tragedy in verse, now very rare (1766) ; and (A Diary of the Siege of Detroit in the War with Pontiac,5 first pub¬ lished in 1860.

ROGERS, Robert Cameron, American

poet: b. Buffalo, N. Y., 7 Jan. 1862. He was graduated from Yale in

1883, and has since pub¬ lished (Wind in the Clearing and Other Poems> ; ‘For the King and Other Poems) ; and in prose,

(Will o’ the Wisp,5 a sea tale; and (01d Dorset: Chronicles of a New York Country Side.5

ROGERS, Robert William, American

Orientalist: b. Philadelphia, Pa., 1864. He was graduated at the University of Pennsylvania in 1886, and later studied at Johns Hopkins, Haverford and Leipzig. He was professor of the English Bible and Semitic history at Dick¬ inson College in 1890-92 ; and since 1893 he has been professor of Hebrew and Old Testa¬ ment Exegesis at Drew Theological Seminary. He has also been an extension professor of Columbia since 1917. Author of (Two Texts of Esarhaddon> (1889) ; ‘Inscriptions of Sen¬ nacherib (1893) ; (History of Babylonia and Assyria) (2 vols., 1900) ; Cuneiform Parallels to the Old Testament (1912) ; (The Recovery of the Ancient Orient5 (1912), *etc.*

ROGERS, Samuel, English poet: b. Stoke-Newington, London, 30 July 1763; d. London, 18 Dec. 1855. After attendance at private school he entered the Rogers banking estab¬ lishment as a clerk, but his favorite pursuits were poetry and general literature. In 1786 he printed anonymously ‘An Ode to Superstition, with Some Other Poems.5 His (Pleasures of Memory,5 with’ which his name is principally identified, appeared in 1792. It is a carefully finished, graceful production, but somewhat deficient in force and vigor, and though every¬ one is familiar with the name, the Pleasures of Memory5 is a poem that at the present day is comparatively little read. It was received with unbounded applause, while the reputation of the author was still further confirmed by the publi¬ cation in 1798 of ‘An Epistle to a Friend and other Poems.5 He now built the celebrated

house in Saint James' street, Westminster, long made the centre of intellectual society, which he had in part decorated by Stothard and Flaxman and which was filled with antiques, books and art-works, all selected in admirable taste. It ought also to be recorded that, though of great brusqueness and bitter of tongue, no man was more generous in relieving distress or assisting struggling genius; and Sheridan, Moore, Campbell and others were all indebted at different times to his generosity. He pub¬ lished in 1810 his poem (Columbus, *which was severely handled by the Quarterly Revieiv and met with little success. (Jacqueline, a Tale,* appeared in 1814, in the same volume with Lord Byron's (Lara.* The same year he visited Paris, extending his tour to Italy and remain¬ ing abroad for several years. On his return in 1819 he published the poem (Human Life,* and in 1822 appeared the first part of his < Italy, J a series of poems descriptive of the scenery and antiquities of that country, and perhaps the finest of all his works. Continuations of it followed at successive intervals and a complete edition in 1830, beautifully illustrated by Prout, Stothard and Turner, which, with an illustrated edition of his other poems, composes two octavo volumes, was issued at a large expense to the author. It proved, however, a remunerative speculation. In 1850 Rogers was offered the laureateship vacated by the death of Words¬ worth, but declined the appointment, which was bestowed on Tennyson. His unique collection of works of art was disposed of by auction after his death. Rogers' long life saw many literary changes, from the times of Goldsmith and Johnson to those of Thackeray and Dick¬ ens. He was a kind of English ((autocrat of the breakfast table,** famous for his anecdotes and bon-mots, and his discussions of politics and art. He was certainly a representative, though among the less prominent, of a brilliant period of English poetry, with him care and taste serving for genius. A volume of his (Table Palk) was published by Alexander Dyce (1860). Consult Clayden, (Early Life of Sam¬ uel Rogers) (1887) and (Rogers and His Con¬ temporaries } (1889). The correspondence,

journals and memoirs of the earlier 19th cen¬ tury abound in references to him.

ROGERS, William, English clergyman and educational reformer: b. London, 24 Nov. 1819; d. there, 19 Jan. 1896. He was educated at Baliol College, Oxford, and at Durham Uni¬ versity and was ordained in the Anglican Church in 1843. He was appointed perpetual curate at

Saint Thomas Charterhouse in 1845 and labored in that district for 18 years, es¬ tablishing schools for the poor and greatly ameliorating the condition of the poor gen¬ erally. He was a member of the commission to inquire into popular education in 1858 and in 1870 became a member of the London school board. He was appointed chaplain in ordinary to the queen in 1857 and rector of Saint Botolph s, Bishopgate, in 1863. He continued a zealous worker for the establishment of schools and his determined stand for their sec¬ ular standing earned for him the sobriquet of (<Hang-theology Rogers** through his impatience at the objection made to ((godless education.** He secured the erection of the Cowper street schools and the completion of Bishopgate In¬

stitute crowned his lifework. Consult his (Rem¬ iniscences* (London 1888).

ROGERS, William Augustus, American astronomer: b. Waterford, Conn., 13 Nov. 1832; d. Waterville, Me., 1 March 1898. He was graduated from Brown University in 1857, en¬ gaged in teaching at Alfred University and in 1858 accepted its chair of mathematics and astronomy. In 1864-65 he served in the United States navy and in 1866-67 studied at Yale, but resumed his duties at Alfred after each inter¬ ruption and under his direction the observatory there was built and equipped. He was ap¬ pointed assistant at the Harvard Observatory in 1870 and became assistant professor of astron¬ omy in 1877. He accepted the chair of as¬ tronomy and physics at Colby University in 1886 and remained there until his death. His work at Harvard Observatory consisted of ob¬ serving and mapping all the stars down to the ninth magnitude, in a narrow belt a trifle north of our zenith, a task which consumed 11 years in observations and 15 years for their reduc¬ tions. He overcame the difficulty of finding micrometer spiderwebs suitable for his work by etching glass plates with hydrofluoric acid, an expedient which proved so successful that he furnished the government with the plates used by the expedition to observe the transit of Venus. He was an acknowledged authority in the micrometrical field and established stand¬ ards of measurement for practical mechanical work. He was an active member of various scientific societies and published nearly 70. papers concerning his specialties. He also pub¬ lished, in the (Annals of Harvard Observatory,*

(Observations Made with Meridian Circle, 1871-72* ; (Catalogue of 8,627 Stars between 49° 5(F and 50° 10’ of North Declination, 1875* ;

jour¬ nal of Zone Observations During the Years 1875-1833,* *etc.*

ROGERS, William Barton, American ge¬ ologist and physicist: b. Philadelphia, 7 Dec. 1804; d. Boston, 30 May 1882. He was edu¬ cated at William and Mary College, gave scien¬ tific lectures before the Maryland Institute in 1827 and in 1828 became professor of natural philosophy and chemistry in his alma mater. From 1835 until his resignation in 1853 he was professor of natural philosophy in the Univer¬ sity of Virginia. He added to the course min¬ eralogy and geology; and organized and di¬ rected the Virginia geological survey until its discontinuance in 1842. During his occupancy of. this chair he devoted much of his time to original researches in geology, chemistry and physics. . He was also a leading member of the Association of American Geologists and Nat¬ uralists (organized 1840), and to its Transac¬ tions contributed important memoirs, including observations on the temperature of coal mines in eastern Virginia. In 1853 he removed to Boston, where he continued his researches and voluminous contributions to scientific journals of the United States and Europe, and in 1862' lectured beftire the Lowell Institute on «The Application of Science to the Arts.** At the re¬ quest of several citizens of Boston, he drew up m 1859 a scheme entitled <(Object and Plan of an Institute of Technology,** to include a so¬ ciety of arts, a museum of arts and a school of industrial science. He then memorialized the State legislature and at length obtained from

the State a charter (1862), and the grant of a tfaet in the Back Bay district upon which to place the buildings of the institution, Chosen the hist president of the Massachusetts Institute r.eehnoiogyj he was made also prof CssOf of physics Stid geology and iri.1864 Visited Europe for the purcnase of sCierltmb iri§tHimerit9 and appliances. He organized the system Of t£3€h~ ing which still in general obtains in the Insti¬ tute and whose leading feature was laboratory instruction not only in chemistry, but in physics, mechanics and mining. He resigned his post as president in 1870, but resumed his duties i rom 1878 to 1881, when he was succeeded bv Etaneis A: Walker (q.v;); In

1847 he presided at the meeting by which the Association of American Geologists arid N§ttifftlist8 Was en¬ larged into the American Association for the Advancement of Science; was made president of the latter in 1875 ; was a corporate member of the National Academy of Sciences; became its president in 1878; and was a founder and the first president of the American Social Science Association. He has been characterized as one who had in a .high degree “the faculty of pre¬ senting the claims of science on popular interest &rid respect with force and lucidity, ˆ His gifts Of expression as speaker and writer wefe excel¬ lent. . Many of his researches added materially to scientific knowledge. Among his books were (The Strength of Materials5’ (1858) } ‘The Ele¬ ments of Mechanical Philosophy* (1852); and (Papers, on the Geology of Virginia5’ (1884), Comprising his yearly reports in 1836-40, Con¬ sult the ‘Life and Letters, * published in ‘1897.

ROGERS, Ark., town of Benton County, 90 miles north of Fort Smith, on the Kansas City and Memphis and the Saint Louis and San Francisco railroads. The town has flOUf mills, lime works, vinegar and pickling plant and a hub and spoke factory. Pop. (1920) 3,318,

ROGERSVILLE, roj’erz-vil, Tenn., vil¬ lage, county-seat of Hawkins County, on the Southern Railroad, about 45 miles east-north¬ east of Knoxville. It is in a fertile valley, bordered by mountainous regions rich in varie¬ gated marble and building stone and consider¬ able coal. The chief manufacturing establish¬ ments are flour mills, furniture factories and machine shops. A number of the villagers have employment in the marble quarries. The edu¬ cational institutions are the McMinn Military Academy and the Swift Memorial Institute. The latter was founded in 1848 by the Presby¬ terian Church. There are good public schools and two school libraries. The national bank has a capital of $75,000. Pop. 1,582.

ROGERSVILLE, Engagements at. On 5

Nov. 1863 Col. Israel Garrard, with the 7th Ohio Cavalry, 2d Tennessee mounted infantry, and a battery of four guns, occupied Rogersville, Tenn., camping near the town. During the day Gen. W. E. Jones, with about 2,500 Confederate cavalry, crossed the Holston River near Kingsport, made a night march by roads badly guarded and at daybreak of the 6th sur¬ prised and captured Garrard’s outposts, and ad¬ vanced toward his camp, attacking and routing the 7th Ohio, Garrard and a few of his men escaping to Morristown. Jones then attacked the Tennessee regiment, which made a good resistance, but was soon surrounded and obliged to surrender. The Union loss was

killed and wounded, with 650 men, four guns, two colors, 1,000 horses and mutes and 40; wagons and ambulances captured. T he Confed¬ erate loss, as reported, was 10 killed3 and wounded. News of the disaster caused a fiftst-y retl'tat of the Union forces from Jonesboro and Greetteville to Bull's Gap, where it was learned that Jofles had not advanced beyond Rogers-Vllig the retreat ended. At the same time Jones re tf Called In an opposite direction to the Virginia line.

On 21 Aug. 1864 KogefSVflle was held by a small force of Confederate cavalry, under Colonel Watkins, which was attacked at daybreak by a detachment of the 13th Tennessee cavalry, under Lieutenant-Colonel Ingerton.- Several Confederates were killed and wounded and Watkins, with 25 of his men, captured, the: refffalttctef escaping to Kingsport. On 8 Oct. 1864 Geri. John G. Vaughn, having driven a Union force frorrl Kingsport, followed it to Rogersville and attacked with his brigade, kill¬ ing 10 and wounding several Union troops and driving the remainder to Bull's Gap. On 10 December Gen. A. C. Gillem, with a Union brigade, marched from Knoxville, on the 12th drove in the pickets of General Duke's brigade, and followed to Big Creek, four miles from Rogersville, where the Confederates had taken a strong position. With a part of his command Gillem made a flank movement, charged with the other part and drove the Confederates from position and through Rogersville, in the direc¬ tion of Kingsport, where they were overtaken next day and routed, with some loss. Consult 'Official Records, > Vols. XXXI, XXXIX and XLV. E. A. Carman.

ROGET, ro-zha/, Peter Mark, English physician: b. London, 18 Jan. 1779; d. Malvern, Worcestershire, 12 Sept. 1869. He was edu¬ cated at the University of Edinburgh and was appointed physician to the Manchester Infirmary in 1804. In 1808 he removed to London, where he became physician to the Northern Dispen¬ sary. He was elected a fellow of the Royal Society in 1815 and for 20 years served as its secretary. He was professor of physiology at the Royal Institute in 1833-36 and in 1837 was active in the establishment of the University of London, in the senate of which he continued a member until his death. He retired from prac¬ tice in 1840 and devoted himself to literature and to mechanics, for which he had decided talent. He wrote 'Animal and Vegetable Phys¬ iology Considered with Reference to Natural Theology * (1834) ; 'Physiology and Phrenol-ogy) (1838);

and the famous ‘Thesaurus of English Words and Phrases) (1852).

ROGGEVELD (rog’ge-veld) MOUN¬ TAINS, in Africa, in the southwestern divi¬ sion of Cape Colony, running northwest to southeast with an average height of 5,000 feet. They form a western continuation of the Nieuwveld Mountains.

ROGIER, ro-zhe-a, Charles Latour, Bel¬ gian statesman : b. Saint Quentin, 17 Aug. 1800; d. Brussels, 27 May 1885; He was edu¬ cated at the University of Liege and at the outbreak of the Belgian revolution in Septem¬ ber 1830 became a revolutionary leader in Brus¬ sels. On 24 September he was made president of the administrative commission and later went as a delegate of the provisional govern-

ment to Antwerp. After an armistice had been arranged with Holland, he exercised absolute power in the reorganization of the administra¬ tion of the city. He represented Liege in the National Congress, voted to establish a heredi¬ tary monarchy, and proposed the adoption of the elective second chamber. He became gov¬ ernor of the province of Antwerp in 1831 and the next year Minister of the Interior. He re¬ tired in 1834 after having carried a law pro¬ viding for the establishment in Belgium of the first railway in Europe. From 1834 to 1840 he was again governor of Antwerp; and leader of the Liberal party in opposition 1841-47. He became Prime Minister and Minister of the Interior in 1847 and by his energy and fore¬ sight Belgium escaped the revolutionary crisis that involved Europe in 1848. In 1850 he or¬ ganized secondary education under control of the state; but retired from office in 1852. Again becoming Prime Minister in 1857 one of the first acts of his ministry was the fortification of Antwerp. In 1861 he became Minister of For¬ eign Affairs and succeeded in freeing the navi¬ gation of the Scheldt, which fact contributed to make Antwerp one of the important ports of Europe. He retired from ministerial office in 1868, though he sat for Tournai until his death.

ROGUE MONEY, the popular name for an

assessment formerly levied on every county in Scotland <(for defraying the charges of appre¬ hending criminals or subsisting them when apprehended and of carrying on prosecutions against them.® This tax was first imposed by a statute of George I, on the assertion that criminals were in the habit of escaping punish¬ ment for lack of the funds necessary to bring them to justice. The freeholders in each shire were directed to fix the assessment at any of the head courts yearly and to appoint collectors. By an act of Victoria rogue money in the shires was abolished and in lieu thereof power was conferred on the commissioners of supply to levy by date a ((county general assessment.®

ROGUE (rog) RIVER INDIANS, the

name applied to a number of Indian tribes on Rogue River, southwestern Oregon, most of which belonged to the Athapascan stock, but the members of the Takilman stock were also in¬ cluded. They were not friendly to the early settlers, and in 1853, with neighboring tribes, they resented the continued encroachments on their lands by conducting a succession of massa¬ cres and outrages which continued until 1856, when they were compelled to submit to Ameri¬ can troops and sent to Grande Ronde Reserva¬ tion. Here they remained until the spring of 1857 when they were finally established on Siletz Reservation. Here, with five other tribes, they now number 453.

ROHAN, Henri de, on-re de ro-an, Duke of, French general : b. Castle of Blain, Brittany, 21 Aug. 1579; d. Konigsfeld, 13 April 1638. In his 16th year he joined the court of Henry IV, whose childless marriage led him to entertain the hope that, as a very near relative, he might one day succeed him in Navarre, but in 1610 the assassination of the king dashed all his hopes. The opposing parties again flew to arms and Rohan placed himself at the head of the Cal¬ vinists. But Louis XIII and Richelieu, the all-powerful minister, annihilated the political ex¬

istence of the Huguenots. Rohan then with¬ drew from his native land, and in exile wrote (Memoires sur les choses advenues en France depuis la mort de Henri IV) (1630). In the wars of Venice against Austria he commanded the troops of the republic till the Peace of Cherasco in 1631. Later he went to Geneva, where he composed his (Memoires et lettres sur la guerre de la Valteline> (1638). In Germany the Roman Catholic league had made war against the Protestants, and Rohan in 1638 joined Bernard of Weimar, then

commanding the Protestant army on the Rhine. He was wounded at the battle of Rheinfelden, 28 Feb. 1638, and his death followed shortly afterward. Besides the works mentioned above he wrote (De l'interet des princes et etats de la Chre-tiente) (1638).

ROHILKHAND, ro-hil-kund' or -kand', or ROHILCUND, India, a division of the United Provinces of Agra and Oudh, bounded north by the Himalayas, separating it from Kumaon, west and southwest by the Ganges, and east and southeast by Oudh ; area, 10,885 square miles. The surface is a plain, with a gradual slope south, in which direction its principal streams, Ramganga, Deoha and others flow. Its north frontier is occupied by an extensive forest; elsewhere palms, the sugar-cane, cotton and the finer fruits of the temperate zone flourish. It takes its name from the Rohillas, an Afghan tribe, who gained possession early in the 18th century. The division is subdivided into the districts Bijnur, Muradabad, Budaon, Bareli, Terai and Shahjahanpur. It encloses the na- ˆvepnnapality of Rampur. Pop. of division,

5,343,674.

ROHLFS, rolfs, Anna Katharine Green.

See Green, Anna Katharine.

KUrlLrS, Friedrich Gerhard, German African traveler: b. Vegesack, Germany, 14 April 1831; d. Goderburg, Prussia, 3 June 1896. He was educated at Heidelberg and Gottingen and m 1855-60 served as a surgeon in the French army at Algiers. He traveled through Mo¬ rocco in 1860 and in 1862 explored the Tafilet Oasis. He traveled in North Africa in 1863 and in 1865, joined the English expedition to Abyssinia in 1867 and in 1868 traveled in Cyre-naica. He conducted an expedition through the Libyan Desert in 1873-74, traveled in North America in 18/5— /6 and in 1878 again visited Africa, penetrating to the Kufra Oasis. He traveled in Abyssinia in 1880 and in 1884-85 acted as German consul at Zanzibar. He wrote 'Journey through Morocco' 0869); 'Across Afnca' (1874-75); <My Mission to Abyssinia' (1883) ; (What News from Africa* (1887), *etc.*

ROJAS, Fernando de, Spaniard, the re¬ puted author of the

(Tragicomedia de Calisto y Melibea,* . known also as the ‘Celestina.* He flourished during the latter part of the. 15th and the first part of the 16th cen¬ turies. According to his own confession he wrote the continuation of this very famous work and his addition appeared in 1499. There has been much discussion as to whether he really was the author of the work that he claims as his own. Ticknor and other notable writers on the Spanish literature of the period ap¬ pear to be willing to take him at his word, while still other critics, like R. Foulche-Delbose,

have striven to show that he was an impostor. The <Celestina) is the most dramatic and char¬ acteristically Spanish of all works up to the date of its publication. It ran through numer¬ ous editions (between 30 and 40)*and was im¬ mensely popular in its day, not only in Spain, but in France and Italy. Translations of it ap¬ peared in French, Latin, Italian, English, Ger¬ man and Dutch. While the work is sparkling with wit and humor and is racy with Spanish idiomatic expressions, customs and descriptions, its grossness is very offensive to modern taste. Yet it was universally read and imitated, not only at the time of its appearance, but for long afterward. It thus came to exercise a very strong and lasting influence upon both the Span¬ ish drama and the Spanish novel. So popular was this work that the name <Celestina) was on everyone’s tongue and it passed into a proverb. Hundreds of the sayings from {Celestina) passed into current use and are still to be found among the rich and poor, illiterate and educated, alike, throughout Spain. Naturally scores of imitations of it were written, none of them however in any way equal to the original <Celestina.)

ROJAS Y ZORRILLA, ro’has e thor-rel’ya Francisco de, Spanish dramatist: b. Toledo, Spain, 4 Oct. 1607 ; d. about 1648. Information concerning his life is of a fragmentary charac¬ ter and he is frequently confused with several other persons of the same name. He seems to have studied at the universities of Toledo and Salamanca and his work had become famous by 1632, as Montalvan mentions him in high

terms in his (Para Todos) of that year. In 1644 he was honored with the mantle of the Order of Santiago, an evidence of favor at court. He was author of numerous plays and sacred pieces, but took no pains to preserve his works and many of them have been lost, though he did publish two (Parts* of his dramas (1640-45) and announced a third which never appeared. Among the best of his remaining works are <Del rey aba jo ninguno) ; (Entre bobos anda el juego) ; (Lo que son mujeres* ; (Casarse por vengarseP No complete edition of his remain¬ ing works has been published, but an excellent selection is given in Rivadeneyra's (Biblioteca de autores espanoles* (Vol. LIV, 1866).

ROKITANSKY, ro-ke-tan'ske, Karl, Baron von, Bohemian anatomist : b. Koniggratz, 19 Feb. 1804; d. Vienna, 23 July 1878. He studied at Prague and Vienna; became professor of pathological anatomy at the University of Vi¬ enna in 1834, and continued there until 1875. His great work, (Handbuch der pathologischen Anatomie* (1842-46), stands as the foundation of the science of pathological anatomy. It was translated by order of the Sydenham Society in 1849-52. In 1869 Rokitansky became president of the Austrian Academy of Sciences.

ROLAND DE LA PLATIERE, Jean

Marie, zhon ma-re ro-lan de la pla-te-ar, French patriot: b. Thizy (Beaujolais), 18 Feb. 1734; d Rouen, 15 Nov. 1793. From a humble position in the mercantile world, he rose to eminence m the city of Amiens, in which he held the office of inspector of manufactures. His interests, however, were not in trade, and his views upon political economy and the great problems of government brought him into the ranks of the philosophers of his day. In 1780 he married

Manon Jeanne Philipon, whose share in the Revolution was even greater than his own. At the outbreak of the Revolution he joined the Moderate Republican party, during whose brief rule he was made Minister of the Interior. This position he held from March until June 1792, when the Girondists were forced to retire. After the conflict in Paris 10 August, Roland was recalled, but the Jacobin spirit was too strong, and he was forced to flee. Upon hearing of the death of his wife he took his own life. Consult Lamartine, lHistoire des Girondins> (1847; Eng. trans. by Ryde).

ROLAND DE LA PLATIERE, Manon Jeanne Philipon, wife of Jean Marie Roland (q.v.) : b. Paris, 17 March 1754; d. there, 9 Nov. 1793. With a mind bent upon inter¬ ests far beyond her years from earliest

child¬ hood, Mademoiselle Philipon, the daughter of a Paris engraver, developed at 19 remark¬ able talents, and at 24 into a woman of great brilliancy of intellect, a disciple of Rousseau, the emancipation of the common people her creed, and their deliverers, the phi¬ losophers and patriots of France, her friends and counsellors. In 1779 she was married to M. Roland, with whose political fortunes her life was thenceforth bound. Her faith in the out¬ come of the Revolution was that of a devotee, her enthusiasm the inspiration of a great party. At first the friends and confidants of Robes¬ pierre and those who were afterward leaders of the Jacobin element, the Rolands became the defenders of the more moderate republican idea, and were among the greatest martyrs to this cause. On the fall of the Girondists in the summer of 1793, Madame Roland was arrested, and on the 9th of November was guillotined. During her imprisonment she wrote her famous (MemoiresP which were afterward published, together with her correspondence with the other leaders of the French Revolution. Consult Lamartine, (Histoire des Girondins,* English translation by Ryde (1849); (Correspondence de Madame Roland,* edited by C. Perroud (1901) ; Tarbell, (Life of Madame Roland)

(1896).

ROLAND, ro'land (Italian Orlando), hero of romance and one of the paladins of Charlemagne, whose nephew he was reputed to be. His character is that of a brave, unsus¬ picious and loyal warrior, but somewhat sim¬ ple in his disposition. The poems of Pulci, (Morgante Maggiore' ; of Boiardo, <Orlando Innamorato) ; and Ariosto, (Orlando Furioso,* relate to Roland and his exploits. (See Chanson de Roland; Morgante Maggiore; Orlando Furioso; Orlando Innamorato; Ro¬ land Song, The; Rolandslied). Consult Einhard, (Vita Caroli MagnP ; Turpin, (De Vita Caroli Magni et RolandP ; Schmidt, (Ueber die italienschen Heldengeschichten aus dem Sagen-kreis Karls des Grossen) (1820).

ROLAND SONG, The (< La Chanson de Roland*) is the chief French chivalrous epic and almost the oldest to survive. Written be¬ fore 1080, the creation of a single minstrel who was a true poet, it bears internal evidence of a legendary ancestry stretching back almost to the days of Charlemagne. In 778 that still youthful king made an incursion into Spain and was checked at Saragossa. On his return across the Pyrenees his rear guard was attacked

by Basque mountaineers at Roncesvalles and exterminated. Among the dead was Hrodland, Count of Brittany. Breton minstrels were quick to exploit the tragic theme, Roland's fame spread quickly over all France and be-yond In the 11th century his tomb Was shown at Blare, his horn, cracked, at Bordeaux A minstrel sang of him to the Normans at Hast-inst's in 1066. Forms of the legend earlier than *be Chanson > can he discerned in a prose chronicle attributed to (<Archbishop Turpin® and in the Latin (Carmen de proditione Guenonis> (<Songof the Treason of Ganelon*

1 he minstrel of the (Chanson *introduced many new elements and infused the whole with a nattonahzing fervor of patriotic inspiration, the Chanson* is preserved Only in manu-flCˆPt written a century after its composition H>y scribes who were unfamiliar with its lan¬ guage and did some violence to its versifica-tmn. In the oldest of them it counts 4,002 vdses. This was discovered at Oxford by r-and edited by him in 1837 and since

cdten most elaborately by Leon Gautier in more than 20 editions. Its French shows strong marks of Breton influence and occasionally suggests an effort to combine, without fusing, differing versions of the original. In this form of the legend the Basque mountaineers have become Vr FLCen Aarons,® who worship images of Mahomet and Apollo, are able to muster for an ambush 400,000 men in three days and to summon almost equal reinforcements from Babylon and its Ethiopian vassals who seek in vain to cope with the remnant of Roland's -0,000 rear guard. Roland's iealous step¬ father, Ganelon, betrays the French to the «papns.» King Charles, then 35, is for the poet 200 years old, «conqueror of England, Germany, Bavaria, Lorraine, Burgundy, Italy, ly'/ˆany and other regions and cities innumer¬ able. His 12 paladins match the knights of Arthur's Round Table. Roland, the king's nephew leads them in valor, Oliver in counsel. Archbishop Turpin is their guide in religion promising paradise to those who die killing baracens, and bidding them ((for penance hit hard® (line 1138). Prodigies of valor 'and ˆ a ugh ter pall by iteration but there are many scenes to stir generous blood still, notably where Roland, counselled by Oliver, scorns in proud self-

confidence to summon the king to his aid and, when he blows the horn in the last desperate strait, dies, still unscathed, his veins burst by the strain of the supreme caff. Very striking, too, is the death of Aude Rolands betrothed, and the trial of Ganelon. At the end Charles, divinely summoned to new conquests exclaims, as he plucks his mighty beard, ((My God, how toilsome is my life® (line 4001). J

The (Chanson* is framed in Hasses, strophes of about 15 lines, with assonant endings The style is vivid, concise, direct. There is but one simile in the whole poem. Its grandeur is in its ideal of devotion, fidelity courage and honor, its impassioned patriotism and its ex¬ pression. of a spirit of national unitv till then unknown to Europe's Middle Age. Its vogue was immediate and wide. It was soon put into hrench rhymes and adapted to most varied foreign taste in English, Dutch, Danish, Ger¬ man, Norwegian, Spanish, Portuguese and Italian versions. It has been translated into

raottewi French by Petit dc lulleville (Pari.-? 1878) £fid others; into English prose by I. Bfftler (Boston 1904) and, partially, into verse by Way and Spencer (London 1895). Con¬ sult Paris, G., (Histoire poetique de Gharle* magne) (Paris 1905) and (Legendes dti moVeH age >' (Paris 1903): also Gatiticr. L>, jBijilidg-raphie des chansons de geste* (Phijs 1$)7).

W. Wells.

ROLANBˆLJeB, the (Song of Roland,* the m Several mediaeval German versions

of the French (Chanson de Roland) (q.v.). The first was probably made by Pfaffe Konrad in 1131-33, in the service of Henry the Proud; it was called (Ruolandes liet, J and served as a basis for at least two later versions by other German poets. One was written by a Lower Rhenish poet toward the end df the 12th century, the other bV an Austrian ooet, called Der Strieker, ih the first half of the 13th century'; he probably supplemented the older version by using later French poems for addi¬ tional data. None of the versions produced in any country attain the popular importance, how¬ ever, of the later Italian Roland poems ; Pulci's 'Morgante Maggiore,* Boiardo's (Orlando Innamorato,* Ariosto's (Orlando FuriosoP A German poet, Immermann (q.v.) used the epi¬ sode of Roland's death as the subject for a tragedy, <Das Tal von Ronceval* (Hamm 1822). Consult Ammann, (Das Verhaltnis von Strickers Karl zum Roland des Pfaffen

Konrad, mit Berucksichtigung des Chanson de Roland' (Vienna 1902); Bartsch, <t)bef Karlmeinet* (Nurnberg 1861).

ROLFE, John, English coiohist in Ameri¬ ca: b. England, about 1585; d. Virginia, 1623, He settled in Virginia in 1610, his wife dying soon after his arrival. He became one of the leading settlers in the colony, and introduced the regular cultivation of tobacco. He was married to Pocahontas (q.v.) in 1613 and took her to England in 1616. After the death of Pocahontas in 1617 he returned to Virginia, was married to an Englishwoman and left several children. He . had one son by his marriage with Pocahontas.

, juim Ldrew, American educator:

b. Lawrence, Mass., 15 Oct. 1859. He was graduated at Harvard in 1881, and later studied at Cornell and at the American School, Athens He was instructor in Latin at Cornell in 1882—

icon^nn 1?T ^,atan an<^ Greek at Harvard in 1889-90 He became associated with the staff ot the University of Michigan in 1890, and was of Latin there in 1894-1902. Since 1902 he has been professor of Latin language

?ndione7rnlUr,e at the Uni,versity Pennsylvania. In 1307-08 he was professor at the American

School of Classical Studies at Rome. He edited many textbooks.

KUL PE, William James, American Shake¬ spearean scholar : b. Newburyport, Mass., 10 Dec 1827; d. 7 July 1910. He was educated at Amherst, and after teaching in Wrentham Mass., became master of the high school, Dor¬ chester, Mass., in 1852. In 1857 he occupied a similar post in the high school at Lawrence,

iMaiS&Q,n ^ .^alem* Mass., and from 1866 to 1868 at Cambridge, Mass., resigning in 1868 to devote himself to literary pursuits. His Shakespearean labors began in 1867 with his editorship (with J. H. Hanson) of Craik's

‘English of Shakespeare.5 In 1870 he issued an annotated edition of (The Merchant of Venice5 and followed this with other annotated plays till in 1883 a complete edition of Shakespeare had appeared in 40 volumes. This is sometimes styled (The Friendly Edition,5 a name first suggested by Mary Cowden-Clarke (q.v.). He has also edited (Select Poems of Goldsmith5 (1875) ; Gray (1876) ; Browning (1887) ; and Wordsworth (1889) ; a complete edition of Scott (1887) ; and of Tennyson (1895-98), and other works, and in the author of (Satchel Guide to Europe,5 revised yearly (1872-1903) ;

(Shakespeare the Boy5 (1896) ; (Life of Shake¬ speare5 (1901). He lectured much upon Shakespeare and literature in general and in his editions of Shakespeare and other poets he ndmirably preserved the balance between textual and literary criticism.

ROLL, Alfred Philippe, French painter: b. Paris, 10 March 1846. From being a designer of patterns and decorations of various sorts he passed to the Ecole des Beaux Arts at Paris, where he was much attracted to the work of Jerome and Bonnat. The influence of both these teachers is traceable in his pictures, es¬ pecially that of Bonnat in the duskiness of coloring in his (Scenes from the Flood at Toulouse in June 1877, 5 a picture which gained a medal of the first class and is now in the Havre Museum. In succeeding pictures he developed a passion for naturalism of the most uncompromising character, and in his (Feast of Silenus5 (1878) in the museum of Ghent, and still more in the (Strike of the Colliers5 (1880), now in the gallery of Valenciennes, and (Labor5 (a representation of masons, bricklayers, and carpenters at work on a build¬ ing), this tendency is conspicuous. These are all blazing sunlight pictures, as if executed en plein air; his subsequent works, whether por¬ traits, genre-groups, landscapes or marines, are in like style. They are solidly painted with a matter-of-fact air of reality which is very striking. Among his later works is a canvas crowded with figures, (The Centennial Jubilee of the Revolution of 17895 (1893).

ROLLA, Alessandro, Italian violinist and composer: b. Pavia, 22 April 1757 ; d. Milan, 15 Sept. 1841. He was active for many years as musical director at La Scala Theatre and teadier in the conservatory in Milan. He published several quartet and solo pieces both for the violin

and the bass viol, which for essential purity of composition and perfection of form stand pre-eminently superior to similar works of his day.

ROLLA, rol'a, Mo., city, county-seat of Phelps County, on the Saint Louis and Santa Fe Railroad, about 48 miles south-southeast of Jefferson City and 110 miles southwest of Saint Louis. It is in an agricultural and iron mining region. Its chief industrial establishments are smelting furnaces, foundries, machine shops, flour and grist mills. It is the seat of the Missouri School of Mines and Metallurgy, a department of the Missouri State University (q.v.), organized in 1871. Pop. (1920) 2,077.

ROLLAND, rol'lan, Romaine, French au¬ thor: b. Clamecy, 29 Tan. 1866. He studied at the Ecole Normale Superieure, Paris, and in 1889-91 was a member of the Ecole Frangaise

de Rome. He was for a time professor of the history of art at the Ecole Normale Superieure, and was later called to the chair of history and music at the Sorbonne. He was awarded one-fourth of the Nobel Prize for literature in 1915 for the completion of his (Jean Christophe,5 a species of rambling novel, written in 10 volumes and carrying much philosophic discussion of life, the sub-titles being (L'Aube5 ; (Le Matin5 ; (L'Adolescent5 ; (La Revolte5 ; (La Toire sur la place5 ; Antoinette5 ; (Dans la Maison5 ; (Les amies5 ; (Le Buisson Ardente5 ; and (Le Nouvelle Journee.5 It was translated into Eng¬ lish by Cannan, G. (1911-13). His other works include (Les origines du theatre lyrique mod-erne5 ; (LesLoups,5 drama; (Le Temps,5 drama; (Vie de Michel Auge5 ; (Vie de Beethoven5 ; (Haendel5 ; (Vie de Tolstoi5, *etc.* Consult Stephens, W., (French Novelists of To-day, Second Series5 (1915).

ROLLE DE HAMPOLE, rol de ham'pol, Richard, English author and recluse : b. Thorn¬ ton, near Pickering, Yorkshire, about 1290; d. Hampole, near Doncaster, 25 Sept. 1349. He studied at Oxford and at 19 decided to lead a hermit's life. For many years he was a wan¬ derer, leading a holy life devoted to contem¬ plation rather than to making converts, al¬ though he occasionally preached. In his later years he became an inmate of the Cistercian nunnery of Saint Mary, near Doncaster, where he died. His life of unquestionable piety, his adherence to the spiritual side of religion and his exalted love of Christ gave him a wide in¬ fluence over his generation and that succeeding him. He wrote extensively both in English and in Latin,

and many of his manuscripts are preserved. (The Pricks of Conscience5 is a religious poem of 9,624 lines in rhyming coup¬ lets and was widely popular; this and his Commentary on the Psalter5 constitute his most important works. Of his Latin treatises (De Emendatione Vitse5 and (De Incendio Amoris5 were translated by Richard Misyn (1434—35) and edited by R. Harvey for the Early English Text Society (1896). (De in¬ cendio amoris5 is most interesting because of its autobiographical nature. There is no com¬ plete edition of his works but an excellent collection is that of Horstmann, C., Yorkshire Writers: Richard Rolle of Hampole5 (2 vols.,

1895-96).

ROLLER, a tropical bird of the genus Corasias, forming the type of the family Cora-ciidce. These birds are generally of small size, frequently exhibit brilliant colors in their plum¬ age and are confined to the eastern hemis¬ phere. Their food consists partly of insects and partly of nuts and fruits. The common roller (Coracias garrula) is found in Africa, whence it migrates in summer into Europe. In size the roller equals the common jay. The back is of a light brown color. The head is bluish-green, as also are the neck and lower surfaces. The lesser coverts of the wings are bright blue; the tail feathers blue, with a green¬ ish lustre. The voice is noisy and harsh. In habits these birds are shy, and frequent forest depths and secluded spots. The four pure white eggs are frequently deposited in the holes of trees or in holes in river banks. The genus Eurystomus is nearly similar to Coracias , but

occupies tropical Africa. Both genera include several distinct species. Consult Evans, <Birds)

(1900).

ROLLER BEARING, a bearing in a ma¬ chine that utilizes hardened steel rollers to re¬ duce friction, as the Hyatt. See Bearings, Anti-friction.

ROLLER SKATE, a skate patented in France as early as 1819. Since that time scarcely a year has passed without the record¬ ing of some improvement in wheel skates. Plimpton's improvement consisted in so gearing two pairs of wheels that they would *cramp® when the footplate was canted to either side, and thus cause the skate to move on a curved line. Several years elapsed before the value of the invention was generally recognized; but in the meantime the inventor was busy making improvements and taking out other patents and in 1874 had brought the skate pratically to its present condition. This device of "cramping® the wheels secured the initial success of roller skating. The earlier inventions were crude affairs compared with the modern ; the present roller skate . combines strength, lightness and ease of action in a marked degree. About 1864 the mania for roller skating appeared in Austria ; and in 1866 the linking® fever broke out in Australia and spread thence to England and the United States. Since that time the craze has appeared at intervals onlv to die out again. The most recent form of the roller skate has only two wheels, set one behind the other, resembling the ice skate in its form and action.

ROLLESTON, Thomas William Hazen,

Irish author and journalist: b. Glasshouse Shinrone, King's County, 1857. He was edu¬ cated at Trinitv College, Dublin, and lived in Germany in 1879-83. He edited the Dublin University Review in 1885-86; was Taylorian lecturer at Oxford University in 1892 ; and was managing director and secretary of the Irish Industries Association in 1894-97. In 1898-1900 he was leader writer for the Dublin Daily Express, as well as Dublin correspondent of the London Daily Chronicle. He organized lectures and other educational work under the Department of Agricultural and Technical In¬ struction for Ireland in 1900-05; and was actively interested in the Irish Literary Revival. Author of (The Encheiridion of Epictetus) (trans. with introduction and notes, 1881) : (Life of Lessing) (1889) ; (Treasury of Irish Poetry, > coeditor (1900); Umagination and Art in Gaelic Literature) (1900) ; Sea Spray, > poems (1909) ; (Myths and Legends of the Celtic Race) (1911) ; (Sacred and Profane Love; a Triology after Richard Wagner J (1914); Ureland and Poland; a Comparison (1917). *etc.*

ROLLIN, ro-lan, Ambrose Lucien, West Indian historian : b. Trois Rivieres, Guadeloupe, 1692; d. Point a Pitre, Guadeloupe, 1749. He

was appointed deputy-lieutenant of the colony in 1725, an office which he occupied until ‘his death, devoting himself in his leisure to re¬ searches upon the Caribes and other Indian tribes. His works show remarkable care and ability and are still accepted as authoritative. They include (Histoire des Indiens> (1739) ; (Histoire et description des Cara’ibes, leur con¬

dition avant la conquete) (1734) ; <Les Incas du Perou et la conquete Espagnole) (1748), *etc.*

ROLLIN, Charles, French historian: b. Paris, 30 Jan. 1661; d. there, 14 Sept. 1741. He studied theology at the Sorbonne, but did not take orders. In 1688 he obtained the chair of eloquence in the College de France, of which he became rector in 1694, and he there revived the study of the Greek lan¬ guage. In 1696 he was chosen coadjutor or head of the College de Beauvais. Displaced in consequence of his connection with the Jansenists, he was reinstated in 1720. His productions are (Traite des etudes* (1726-31); <Histoire ancienne) (1730 and 1738), his best-known work; and (Histoire romaine* (1738-48) down to the war against the Cimbri (completed by Crevier and others). Rollin’s writings are dis¬ tinguished for purity and elegance of style, but are diffuse and prolix, and his historical works are deficient in critical sagacity. There is an edition of his works in 30 volumes (1827), with notes on the historical parts by Guizot. His (Ancient History* has been often reprinted in English, but is now quite out of date.

ROLLIN, Ledru. See Ledru-Rollin.

ROLLING MILLS are machines employed to convert masses of metal into bars, plates and commercial shapes. They consist of rolls in pairs, driven in opposite directions at nearly the same surface speed, and variously grooved and molded, between which the metal is passed while hot. In successive rollings by passing through a series of openings between the rolls known as “passes,® the metal suffers gradual reduction in thickness and a consequent in¬ crease in length or breadth, or both, as the case may be. For example, a 15-inch square ingot is reduced to eight inches square by from 12 to 15 passes through the rolls. In very power¬ ful mills such a reduction is sometimes achieved in six or seven passes. See Fig. 1.

The rolls, which are the vital part of the roll¬ ing mill, are made of cast steel or a tough cast iron, depending upon the product the mill

turns out. For plates and sheets cast iron is used in many mills, the surface of the rolls being “chilled,® rendering them very dense and hard, and capable of a high polish which is im¬ parted to the sheets. If the rolls are unusually long, for making large sheets, they are of forged steel. Steel rolls have an advantage in that their deflection under a given load is only about half as much as with cast iron; they are practically unbreakable ; and they hold their corners better against crumbling under the pressure. On the other hand, steel rolls cannot be chilled ; their temper is soon removed by the heat of the material passing through them; and they are apt to develop a roughness of the surface, and their corners soon lose their sharpness. In proportioning a roll for heavy work it is the rule to make the length not more than twice the smallest diameter at the deepest groove. It is not uncommon to find rolls for light work up to four times the smallest diam¬ eter. The roll is formed so as to have a journal at each end, and this is regularly half the diameter of the body of the roll. The outer extremities of the iournal are formed into cross-shaped “wobblers® by which they are driven. As used in the various mills rolls are arranged according to one of two general

plans: as ((balanced rolls® where the axis of one pair is movable, so as to allow of its being brought closer to the other or vice-versa; and the fixed rolls, whose axes are set in place permanently. In the former type the reduction of an ingot is accomplished by changing the distance between the rolls each time the metal passes ; in the second the gradual reduction is made by running the ingot through a series of passes, each smaller than the preceding. The rolls are held in position by housings or frames of great strength, and of such construction that a broken roll may be quickly removed and a new one put in place.

Rolling mills are of four principal designs : (1) the (<two-high pull-over® mill, in which there are two rolls set one above the other, the bar being rolled in the passes between the rolls as it goes forward, and is then passed back to its first position over the top roll, to receive its second reduction as it again goes forward — work being done on the bar only on the for¬ ward trip; (2) the <(two-high reversing® mill, two rolls high, but the motion reversible, so that after the bar has gone through on its forward trip the motion of the rolls is reversed, and the bar returns to the former position through another pass — work being done on the bar in both its directions of travel; (3) the (<three-high® mill, in which there are three rolls, one above another, the bar going forward between the bottom and middle rolls, and returning be¬ tween the middle and top rolls ; (4) the <(rock-ing mill,® consisting of two pairs of rolls set in a housing shaped in the sector of a circle in such fashion that the housing may be rocked to and fro, bringing alternately one pair of rolls

Fig. 2. — Rocking Bar Mill.

Fig. 1. — Two-High Cogging Mill; showing the reducing passes in shading.

and then the other into position. The bar is run through one pair as it goes forward, the mill is rocked back and the bar returns through the other pair, the power working continuously in one direction. See Fig. 2.

The Universal Mill is a type of rolling mill with two horizontal rolls and two vertical rolls designed to turn out a finished product with one rolling. The Grey form of this mill is shown in Fig. 3. The passes are made of such shape

as produce almost any dimensions of a given form. Two stands of rolls are used, one di¬ rectly behind the other. The first gives the preliminary shaping and the second stand finishes.

The rolling mill establishments consist of a series or <(train® of several mills. They are ar¬ ranged according to the class of product turned out. In the ((continuous® mill the sets of rolls are set one beyond another, and the metal being

worked passes continuously in one direction, coming out at the further end of the works in a finished condition. The mills which make small rods and wire usually have their stacks of rolls set side by side in a rank. The bar coming from one pair of rolls is caught by the tongs of a workman and curved into a loop, passing back through the adjacent pair of rolls. Another workman catches it and directs it through the next mill in the rank, and thus the one rod may be passing through three or four pairs of rolls at the same time. This is called a ˆlooping® mill. . It is adapted only for work of small di¬ mensions. The general purpose mill or “mer¬ chant8 mill, as it is called, intended to do roll¬ ing or order, is generally a combination of the continuous mill and the loop mill.

Rolling mills are popularly classified by their ultimate product: as the blooming mill (making only the blooms for other mills), billet mill,

hoop mill, wire mill, sheet mill, tube mill, *etc.* The products of rolling mills are of two descriptions, semi-finished and finished. To the first group belong blooms, slabs, billets and bars. To the second class belong rods, bands and hoops, structural shapes and rails, plates, sheets, skelp, nail plates, wheels, axles, tires, *etc.*

The rolls are driven by powerful steam engines, or by electric motors — the latter form of drive coming more and more into favor ex¬ cept for the heaviest work. In mills which run continuously in one direction the fly-wheel is universally in use to store energy when metal is not actually passing through the rolls. In the reversing type of mill the fly-wheel cannot be used, as the engine must be brought to a full stop and reversed with each pass. For this reason the engines to run reversing mills must be extremely powerful. The advantages of electric drive are: (1) economy due to the rapidity of action and high efficiency of all electric machinery at all loads from the lowest to the maximum; (2) reduced floor space; (3) ease of control; (4) uniform drive with a uni¬ form current; (5) smaller initial cost. The motors are coupled direct to the mill, and the speed can be varied from 190 to 270 revolutions per minute. However, in sheet mills, where the speed is cut down to 30-35 revolutions per minute, direct coupling has been proved entirely satisfactory.

In the manufacture of rails, the ingot of cast metal is placed in the soaking pit and heated to a white heat. It is then taken to the bloom¬ ing mill and passed through the blooming rolls seven times and reduced to a bar of a section nine inches square and 15 feet long which is subsequently sheared into two or three pieces, according to the length of the desired rail. These pieces called “blooms® are then heated in the bloom furnaces from which they are taken to the rail mill, which consists of a series of grooved rollers arranged in three sets — the roughing rolls, the intermediate rolls and the finishing rolls. These rolls are placed one beyond the other and extend over an interval of about 900 feet. The hot blooms are passed through them successively. Through the rough¬ ing mill the bloom is passed five times and reduced approximately to the section of the de¬ sired rail. It is then passed through the inter¬ mediate rolls five times and brought still closer

to the desired section. It is now placed upon a cooling table for a period of time ranging from 45 to 90 seconds, depending upon the weight per pound of the rail, and then passed through the finishing rolls and brought to the exact sec¬ tion required. After leaving the

finishing rolls the rails are cut into lengths of 30 to 60 feet, as required, then passed through the cambering rolls where they receive sufficient camber to en¬ sure of their remaining true and straight when cooled. Rail rolling mills have a capacity of turning out from 7,000 to 8,000 rails per day, requiring about 3,000 tons of metal. See Rails, Manufacture of.

The largest rolling mill in the world is that recently completed for the Lukens Iron and Steel Company of Coatesville, Pa. It is 204 inches in width, capable of rolling plates up to 192 inches (16 feet) in width. In pattern it is a four-high mill, the two middle rolls being the working rolls and the top and bottom rolis be¬ ing merely backing-rolls, running in contact with the working rolls to stiffen them against bending. The working rolls are of a chilled iron 34 inches in diameter and the backing rolls are of cast steel 50 inches in diameter. The mill is of the reversing type and the rolls of the “balanced® order, the screw-down rig being operated by two 150-horse-oower motors. The rolls are driven by a 46-inch by 70-inch by 60-inch twin tandem compound condensing steam engine.

I he normal production of rolled steel in the United States is best assessed from the output of the year 1914, many of the mills since then having been given over to the making of muni¬ tions. In that year the product was 3,500,000 tons of rails; 3,000,000 tons of plates; 3,000,000 tons of sheets ; 2,500,000 tons of wire rods ; 2,500,000 tons of structural shapes; 1,000,000 Ions of skelp; 1,000,000 tons of miscellaneous; 8,000,000 tons of merchant mill products — a grand total of 24,500,000 tons. (See Pipe, Manufacture of, and Wire, Manufacture of) Consult Charnock, G. F., (Mechanical Technology> (London 1915) ; Harbord, F. W., and Hall, J. W., (The Metallurgy of SteeP (2 vols

£i-,YTY(?rk 1916> ; Kindi, F. H„ <The Rolling Mill Industry) (Cleveland, Ohio, 1913) ; Asso¬ ciation of Iron and Steel Electrical Engineers 1 Proceedings 11th Annual Convention) (Phila¬ delphia 1917).

COLLINS, rol’inz, Frank West, Ameri¬ can politician : b. Concord, N. H., 24 Feb. 1860 ; d. 27 Oct. 1915. He was graduated from the Massachusetts Institute of Technology in 188 and later attended the Harvard Law Schoc After a brief practice of the law he became banker in Boston. In 1894 he was elected to the New Hampshire senate and in 1898 was elected governor of that State. In this capacity he served

two years. The idea of “Old Home Week,® established in New Hampshire during his administration, and adopted by many of the other States, originated with Governor Rollins. He published <The Ring in the Cliff) (1877) • c Break o’ Day Tales) (1895); <The Lady of the Violets) (1898); <01d Home Week

Speeches) (1900), *etc.*

ROLLINS COLLEGE, located at Winter Park, Fla. ; established in 1885. It is not under direct denominational control, but is closely affiliated with the Congregationalists. It has a

collegiate and preparatory department, the former conferring the degree of bachelor of arts. It is coeducational and the number of women in attendance usually nearly equals the number of men. The grounds and buildings in 1910 were valued at about $90,000; the library contained 8,000 volumes ; the annual income was over $60,000. The students numbered 200 in both departments and the faculty 20.

ROLLO, rol’d, Norwegian conqueror of Normandy: d. 930. According to tradition he was named <(Walking RolP* (Ganger Rolf), be¬ cause no steed could carry him. He fought for several years in France and finally made peace in 912, receiving from Charles the Simple for himself and his freebooting followers a tract along the Seine between the Eure and Epte. He became a Christian, was baptised at Rouen and took the title Duke Robert. See Normans.

ROLPH, John, Canadian politician and physician : b. Thornbury, England, 4 March 1793; d. Toronto, 10 Oct. 1870. He studied law and medicine, emigrated to Canada in 1820 and in 1821 was called to the bar. He engaged in law practice and later also practised medicine. He was elected to the assembly of Upper Canada in 1825 ; and for a time in 1836 was a member of the executive council. With W. L. Mackenzie he planned the insurrection of 1837 and upon its failure sought safety first in the United States and then in Russia. After the amnesty of 1843

he returned to Can¬ ada and in 1845 he was elected to the Canadian Parliament. He retired from politics in 1857. He afterward devoted himself to the practice of medicine and founded the Peoples' School of Medicine, which later became a faculty of the University of Toronto. Consult Dent, J. C., (Canadian Portrait Gallery) (1880) ; Lindsey's (Life and Times of W. L. Mackenzie. b

ROMAGNOSI, ro-man-yo'se, Giovanni Domenico, Italian jurist and philosopher: b. Salso Maggiore, Italy, 13 Dec. 1761 ; d. Corfu, 8 June 1835. He was educated at Pavia and established himself as an advocate at Trent. He was appointed professor of law at Parma in 1803 and in 1806 went to Milan to assist in pre-naring a code of penal procedure which was later adopted. A chair of law was established expressly for him at Milan, but after the down¬ fall of Napoleon he lost his position. He con¬ tinued to lecture until 1817 and in 1818 was tried for treason but acquitted. He subsequently supported himself by giving private lessons and continued in abject poverty until his death. Among his works are (La genesi del diretto penate) (1791); Untroduzione alio studio del diretto pubblico universale> (2 vols., 1805), *etc.* Complete editions of his works were published in 19 volumes (1832-35) and in 15 volumes

(1836-45).

ROMAIC LITERATURE. Already some centuries before ancient Greek declined and be¬ came extinct there existed a dialect among the common people which gradually replaced the majestic tongue of Hellas. Until about the middle of the 18th century this dialect, out of which grew the Romaic or Neo-Hellenic, de¬ generated in form and became split up into various other dialects. During the Turkish dominion Greek pride of race was kept alive by dwelling on past glories. With the dawn of

independence efforts were made to revive those glories. Ancient authors were studied, ancient names were given to their children, and literary men endeavored to graft the ancient language on to the modern. In the first newspapers which appeared there began an artificial process of grammatical reconstruction that led to curi¬ ous and confusing results. Ancient Greek acci¬ dence and words were intertwined with modern French syntax, and a ˆliterary® dialect arose, a language of books that grew quite distinct from the language

of the people. Unfortu¬ nately no Greek Chaucer or Dante appeared to crystalize the incongruities and dialects into a fixed language for both the written and the spoken word. But for centuries there had been in continuous use among exiled Greeks a literary language lineally descended from the Byzantines, and which could be read and under¬ stood by all educated Greeks. At first limited to a small circle, this literary language gradu¬ ally made its way during the 19th century as a spoken speech among the people — a speech commonly called Romaic, but a form of By¬ zantine Greek. Educated Greeks speak in the general dialect except with those to whom some ceremony must be used. For many years the Greeks have been purging their language of Turkish and Italian words, so that newspapers are now written almost in the style of classical writers.

Ptochoprodromos or Prodromos, who flour¬ ished about 1150 a.d., is the first Romaic author of whom there is definite record. He left ’two long Romaic poems addressed to the Emperor Manuel Comnenus. To the early 14th century belongs a metrical (Chronicle of the Conquest of the MoreaP Folksongs especially composed the most widely cultivated form of literature in the heroic ˆKlephU songs, though their literary quality is not very high (see Klephts). Among the mass of Romaic literature that emanated from Greece, Constantinople and the islands of the eastern Mediterranean after 1453, there were but few works of importance, notwith¬ standing the wide range of historical and theological prose, allegorical and erotic poetry, mystery plays and spiritual hymns. The most celebrated compositions before 1800 are Abra¬ ham’s Sacrifice,) a 16th century mystery play; the chivalric romance, Arotocritus,* by Vicen-tius Cornaro who has been styled the modern Homer;’ and the gruesome drama (ErophileP by Chortakis, adapted from the Italian. A re¬ vival of enthusiasm for education and literature occurred in the 18th century; Bucharest and Jassy became centres of Hellenic culture, which later found a seat at the University of Corfu, founded by Lord Guildford in 1808. Rhigas of Velestinos (d. 1798), inspired by the French Revolution, aroused the patriotic ardor of his compatriots for liberty. He wrote the war song, (On, Sons of the Hellenes P — which has been called the Greek Marseillaise. } Joannes Velaras of Epirus (d. 1823) was a doctor by profession and a writer of satirical fables. With the emancipation of Greece in 1821 several men of genius were connected, notably the brothers Panagiotis and Alexandro Svotsos, and Alexandro Rangabe. The first two heartened the people in the struggle for independence with lofty ideals and in • eloquent language. Rangabe (Rangavis), though chiefly remembered as a poet, covered a wider field of literature.

His works comprise songs, hymns, ballads, narrative poems, comedies and tragedies. Adamantios Korais (1748-1833) deserves a high place in Romaic literature ; he was one of the early reformers in the long-drawn-out contro¬ versy over the ancient and the “vulgar® Greek. Dyonisius Solomos (1798-1857) wrote the Greek national anthem, the (Hymn to Freedom,* and a number of powerful dramatic poems, in¬ cluding one on the death of Byron. Of the later writers Valaoritis of Corcyra (1824-79) is the most notable, both as poet and an artist in his craft. His thoughts are expressed in the language of the peasantry, refined and uplifted. Other celebrated poets are Julius Typaldos (1814—83) and Markoras of Corfu; Demetrios Bikelos, who translated some of Shakespeare’s plays ; the Anacreontic Christopulos ; Georgios Soures, a witty and versatile journalist and poet. Among the best colloquial story writers are Palamas, Karkavitsa and Eftaliotis. These have preserved the pure dialect of the people and valuable pictures of modern peasant life. Axiotes and the Cretan Damverges are racy in dialogue when their characters converse, but in their own persons they use a rather stilted and conventional style. Between 1892 and 1900, M. Pallis issued a translation into modern Greek of the first half of the (Iliad. } Although the form of the modern sentence differs widedly from the ancient, yet owing to the simplicity of Homer’s style, Pallis keeps surprisingˆ close to his model. Quite a number of Greek authors compose their works in French, German or English, thus reaching a wider circle of readers.

The struggle between ancient and modern Greek assumed an alarming shape on 21 Nov. 1901 when a meeting of 10,000 people held in the temple of Jupiter at Athens protested against the proposed issue of a translation of the Gospel into the popular language, Romaic. The meeting was broken up by troops and some 20 persons were killed or injured. The translation had been made by the queen’s order, but the students of the university objected to it on the ground that the original text was sacred and should not be tampered with, and that if the Gospels were promulgated in the kingdom in the dialect spoken there the feeling of Pan-Hellenism might be weakened, as a dif¬ ferent dialect was spoken by the Greeks in Turkey.

Bibliography.— Abbott, G. F., (Songs of Modern Greece* (New York 1900) ; Dieterich, K., (Geschichte der byzantinischen und neugriechischen Literatur) (Leipzig 1902) ; Fauriel, C. C., (Chants populaires de la Grece moderne> (Paris 1825); Garnett, Lucy, (Greek Folksongs from the Turkish Provinces of Greece) (London 1885) ; Geldart, E. M., (Folklore of Modern Greece). (ib. 1884) ; Krumbacher, K., (Geschichte der byzantinischen Literatur) (Munich 1897) ; Legrand, E., (Bibliotheque grecque vul-gaire) (8 vols., Paris 1880-96) and (Bibliographie hellenique* (15th and 16th centuries; 4 vols., ib. 1885-1906) ; Menardos, S. T., (The Value of Byzantine and Modern Greek in Hellenic Studies* (Oxford 1909) ; Nicolai, R., (Geschichte der neugriechischen Literatur) (Leipzig 1876) ; Rangabe, A. R., cPrecis d'une histoire de la litterature neo-hellenique* (Paris 1877); Rangabe and Sanders, (Geschichte der neugriechischen Literatur von ihren Anfange bis auf die neueste Zeit) (Leipzig 1885) ; Stuart-Glennie, (Grcek Folk Poetry) (Guildford, Eng¬ land, 1896).

ROMAIKA (ro-ma'i-ka) DANCE. See Pyrrhic Dance.

ROMAINE, ro-man', William, English An¬ glican divine: b. Hartlepool, England, 25 Sept. 1714; d. London, 26 July 1795. He was educated at Oxford, held several small curacies prior to 1748, when he went to London to hold a lecture¬ ship at the united parishes of Saint George's, Botolph lane, and Saint Botolph's, Billingsgate. In 1749 he became attached to Saint Dunstan's-in-the-West and the next year became morning preacher at Saint George's, Hanover square. He was a follower of Whitefield, an ardent evan¬ gelical and suffered much persecution in and out of the Church for his views and on account of the congregations of the poor that he as¬ sembled. As a consequence he lost his appoint¬ ments and held others but for a brief period until 1764, when he was inducted into Saint Ann's, Blackfriars, and was elected by the parishioners to Saint Andrew of the Wardrobe. This election, though disputed, was confirmed by the Court of Chancery and he held the pulpit until his death. He published (The Life of Faith> (1763); <The Walk of Faith> (1771) ; (The Triumph of Faith* (1794).

ROMAN, Andre Bienvenu, American gov¬ ernor: b. Opelousas, La., 5 March 1795; d. New Orleans, La., 26 Jan. 1866. He came of French slock, was graduated at Saint Mary's College, Maryland, in 1815, and became a sugar planter in Saint James' Parish. He was for many years a member of the State legislature, serving as speaker of the lower house for four terms, and in 1826-28 he was also judge of Saint James Parish. He was governor of Louisi¬ ana in 1831-35 and in 1839ˆ41 ; and aided the foundation of Jefferson College and the drain¬ age of

the swamps around New Orleans. He was a Whig in politics and opposed disunion, but in the Secession Convention of 1861 voted for secession when the crisis was reached. He was one of a Confederate commission of three to approach the government at Washington to seek a peaceable separation from the Union.

ROMAN DE LA VIOLETTE (Fr. Ro¬ mance of the Violet*), a French poem written by Gerbert Montreuil about 1225-30. It con¬ tains about 6,700 rhymed lines and exists in four known manuscript copies of different periods, of which two are in the Bibliotheque Nationale, Paris; one in the Imperial Library, Petrograd; and one in the private collection of J. E.. Kerr, New York. Its heroine is the vic¬ tim of a wager concerning her virtue, but triumphs over slander and proves her inno¬ cence. The story is used in Toman du Comte de Poitiers) ; (Floire et Jeanne* ; in the De¬ cameron } ; Shakespeare's (Cymbeline* ; Weber's <Euryanthe,) *etc.* It was published by Fran-cisque Mihel in 1834. Consult Buffum, D. L., (Le Roman de la Violette) (1904).

ROMAN ARCHAEOLOGY. See Cata¬ combs, Roman; Christian Archeology; Italy — Archeology; Rome.

ROMAN ARCHITECTURE. See Archi¬ tecture.

ROMAN ART. See Italy — Art in An¬ cient Italy.

ROMAN CANDLE. See Proj ECTILES.

ROMAN CATACOMBS. See Cata¬ combs.

ROMAN CATHOLIC CHURCH. See

Catholic Church.

ROMAN CATHOLIC EDUCATION.

See Education, Roman Catholic.

ROMAN CATHOLIC EMANCIPA¬ TION, the abolition of those civil and ecclesias¬ tical restraints to which the Roman Catholics of Great Britain, and particularly of Ireland, were once subjected. By the statutes of Wil¬ liam III, Roman Catholics were forbidden to hold property in land and their spiritual in¬ structors were open to the penalties of felony; and although latterly these restrictions had not been enforced, they remained unrepealed in England until 1778. See Emancipation, Cath¬ olic.

ROMAN EMPIRE. See Rome.

ROMAN EMPIRE, Holy. See Holy Ro¬ man Empire.

ROMAN FORUM. See Forum; Rome.

ROMAN LAW. See Civil Law; Jus¬ tinian ; Pandects.

ROMAN LITERATURE. See Latin

Language; Latin Literature.

ROMAN NOSE, a Cheyenne Indian who operated along the Kansas border from 1864 to 1868. He was a brave and daring leader of a resourceful nature and much feared on that account. In 1866 the whites began to push into the country of the Cheyenne and a railway was being extended through it. The Cheyenne protested. A meeting or council to hear the protest was held at Fort Ellsworth, Kansas, in which General Palmer and the leaders of the Indians took part. At this council Roman Nose presented the claims of the Cheyenne in a concise and forceful manner. The Cheyenne not only protested against the invasion of their territory but they were determined to defend it. Almost immediately the Indians were upon the warpath under Roman Nose and Black Kettle ; and they became a terror to western Kansas all along the line of the Kansas Pacific Railroad. Everywhere the isolated homes of settlers were attacked and the inhabitants mas¬ sacred. General Sheridan, military commander of the district, organized from among the more daring settlers a band of 52 so-called scouts and placed them under the command of Major Forsyth. On 10 Sept. 1868 they came upon the trail of a large band of Indians whom they later encountered on the 17th at Beecher's Island in the Arikaree Fork of the Republican River. There the whites, finding themselves surrounded and outnumbered 20 to 1, re¬ treated to the island where they defended them¬ selves for eight days without food and without horses, the latter having been killed. Roman Nose planned the attack of the island from one side by 500 warriors while he prepared for a

cavalry attack with 500 from the opposite side. This latter he led personally in a wild charge which forded the river, reached the island and rode up to the breastworks of the whites who defended themselves steadily and systematically. At the breastworks Roman Nose fell and the Indians broke and fled. But they reorganized and made two more desperate attacks upon the vol. 23 — 41

island only to be repulsed with still greater slaughter. Finally the siege was broken by the arrival of a part of the 10th cavalry from Fort Wallace, Kansas. Consult Hodge, hand¬ book of American Indians) (Washington 1910) ; Johnston, H. L., ‘Famous Indian Chiefs> (Boston 1909).

ROMAN RELIGION. From the time that the Roman religion appears within the pale of traditional and recorded history it seems to have been constantly and progressively sub¬ jected to varying influences, both internal and external, and to have passed through many changes. For this reason different writers have had very different views as to what it really was, according as each took his vantage position at this or that point of its evolution. The religious system of the Roman Empire was distinctly different from that of the Romans when they first appeared in Italy. The long and eventful intervening period of time had as effectively changed the composition of the Roman religion as it had that of the Roman people and Roman society. Therefore, any ac¬ count of the religious life of Rome should ex¬ plain these constant changes, reveal their causes and show the effects they had upon Roman society and upon that of all the peoples who came closely and intimately into contact with the Imperial City. Fundamentally the primitive religious ideas of all the Indo-European peoples were quite similar. Even the Roman religion, in the days when Rome was governed by kings and had already begun to evolve complicated rituals and complex myths, still retained a suggestive similarity to that of India. Yet striking though this similarity is the difference between the two religions is just as striking. This is due to the fact that, though the religious beliefs of the two peoples had the same origin, they Jiad continued for centuries to develop independent of one another, after the separation in prehistorical times of the two great branches of the family. In the days of her struggles and later, of her achieved greatness, Rome strongly influenced the people with whom she came in contact, and was, in her turn, influenced by them. These influences extended from the Roman colonies in Spain and Gaul in the West to the Far East. Of these influences the strongest were those of Greece, Egypt and Asia Minor. Out of this constantly acting and re¬ acting

religious thought grew an all-pervading mysticism and love of philosophical speculation.

Early Period. — Originally the Roman reli¬ gion was almost altogether nature worship vivi¬ fied by a primitive belief in an all-pervading and prevailing animism. Survivals of this faith in the religion of Rome at a later period in her history point indisputably to the fact that the Romans were at one time nomadic and given largely, if not altogether, to hunting and fish¬ ing, and that their deities and familiar spirits partook of the nature of these occupations. In their nomadic and hunting days the Roman people built no temples and apparently erected no religious monuments. They worshipped the gods of the chase and other beneficent or feared spirits in the haunts of nature, the sacred groves in the forest, by the sides of flow¬ ing streams and on the tops of hills and moun¬ tains. The early Roman gods were the per¬ sonification of the elements of nature. The old

Roman deities and supernatural beings of their nomadic life, the patrons of the chase and the guardian spirits of the mountains, the rivers, the earth, the sky and the upper heavens gradually assumed more definite attributes and became, at the same time, confined to a more restricted atmosphere as the Romans settled down to a sedentary life and became agricul¬ tural and later on commercial. But being the first on the scene these earlier gods, for the most part, continued to develop and to assume these new attributes in conformity with the natural growth of the city and the civic progress of its people, developing finally into the chief deities of a highly organized community. This evolution was in the full process of accomplish¬ ment when Rome became subject to strong and steadily increasing influences. This develop¬ ment of the primitive Roman deities and the influence of outside religious forces were recog¬ nized by the Romans at a later period, when they classified their deities as di indigentes and di novensides or novensiles , that is, the native gods and the foreign or new gods, the latter of whom were introduced from the other tribes of Italy, and at a later period from Greece and other countries with whom Rome had come into intimate political contact. Each of these gods, old and new, had his distinct ritual, place and relationship in national life.

Rome, founded, according to tradition, as a free community, threw her gates open to the oppressed and discontented of the surround¬ ing country. This liberality of thought and at¬ titude on the threshold of her career dis¬ tinguished her ever afterward and enabled her to assimilate, first, all of Italy, and afterward vast domains outside the Italic Peninsula. The deities and religious customs and practices of all the tribes of Italy of Indo-European origin, which were quite similar, gradually became domesticated in Rome. Naturally as the Roman Empire broadened and became more cosmo¬ politan, its religious system also became broader and more all-embracing. Having ab¬ sorbed the deities of the Italic Peninsula, the habit of absorption became, with Rome, all-impelling, and the pantheon of the Imperial City, reaching out its octopus arms in every direction throughout the already wide confines of the rapidly extending Roman domain, and even beyond it, brought new creeds, new deities and new religious philosophies into Rome. Under such conditions as these little or no religious dogma could exist ; nor did it. On the contrary, religious Rome was like a vast, all-absorbing sponge drawing into itself all that

came within its sphere of action, religious creeds, ideas, customs, philosphies, elaborate theories and mystical speculations, with their corresponding practices, rituals, ceremonies and public celebrations. Thus ecclesiastical Rome became as cosmopolitan and eclectic as the Roman Empire itself. This is but another way of saying, however, that the religious life of the Roman community was constantly shifting as the process of broadening continued.

Evolution of the Gods. — In the early Ro¬ man gods, which, as we have already seen, consisted for the most part of guardian deities of hunting, fishing, fighting and all the prac¬ tical needs of daily life, were the seed germs from which sprang the national state religion

under the early kings and the mighty gods of later imperial Rome, with their magnificent temples, shrines and extensive and highly or¬ ganized priesthood and other ecclesiastical dig¬ nitaries, their close connection with the state and their inseparable partnership with the im¬ perial family. The first temples built in Greece and Rome were suggestive of their origin. They consisted of rows of pillars of wood so erected as to imitate or represent the sacred groves of the forest. Diana, the moon god¬ dess, under one name or another and with somewhat varying attributes, the favorite deity of so many nomadic peoples given to the chase, and in all probability the chief deity of the nomadic Romans, gave place to the earth mother, the producer, the characteristic deity of an agricultural people. The agricultural Ro¬ mans created a new relationship between the heavens which sent the refreshing and in¬ vigorating rains and mist upon the earth and the great earth mother who received them ; and they made the sky and the great earth, on account of this relationship, husband and wife, father and mother. But the moon god¬ dess did not thereby lose all her ancient power and glory. She still remained what she had al¬ ways been, distinctively the patroness of the hunters and of all persons taking long journeys. Connected from early times with the primitive priests she continued to be intimately connected with the diviners and soothsayers, and later on, with the alchemists and astrologers, their first cousins.

In the meantime Jupiter, the god of the sky, of the upper regions and of thunder, usurped the foremost place primitively held by Diana, the moon mother, becoming the titular deity of the Romans and the supreme god of the Latin races united under the imperial sway of Rome. Originally, as his powers, functions, titles and attributes indicate, he was the chief active, divine spirit of the heavens, a being

to be feared and propitiated by a nomadic people, but one of no other very great interest to them. But though Jupiter grew to be the greatest of the Roman gods and was affectionately desig¬ nated the All-father, yet he preserved to the last all the primitive earmarks of his nature origin. He was generally represented with the thunderbolts in his hand (the sign of his do¬ minion over the elements), and the eagle (the thunder bird) by his throne. As the god of the dawn he was <(the white oneˆ ; and in general everything connected with his worship was white. Even the consuls dressed in white when they sacrificed to him in their official capacity, and his priests wore white caps symbolical of the color sacred to him as representing the light of day, or more properly of the dawn or com¬ ing day. For the same reason white animals were offered to him in sacrifice.

Jupiter not only attracted to himself the attributes and qualities of other deities with many of their functions, but he also showed a signal power of extending all these acquired functions and, in a sense, organizing them into a component part of the system of state re¬ ligion. One of the strangest of these develop¬ ments is that of Juno, the female counterpart of the supreme deity himself, and the definition of the supposed female qualities of the sky. In other words she is but a subdivision of

Jupiter himself, whose sister and wife she is represented, in Roman mythology, to be. She bore the same relation to women that Jupiter did to men. She was the special protectress of women throughout life and she presided at birth, marriage and death, being ever the tutelar female genius, and by extension the guardian of national finances, as the Roman wife was of the household finances.

Next to Jupiter and Juno, his regal consort, the greatest of the Roman state gods was Mars-, who, beginning as a deity of agriculture, as the Romans emerged from barbarism grew more and more the patron of war, as Jupiter's war¬ like functions and attributes became obscured in his assumption of the throne of the Roman pantheon. Yet as Jupiter never altogether out¬ grew his warlike associations so Mars never got completely away from his earlier agricul¬ tural connection. Jupiter, with Mars and Quirinus, formed the great triad of gods of the earlier state religion of Rome. The latter, who was the Colline deity of war, became the patron of soldiers and other armed people in times of peace; while Mars, who was especially honored in March and October, was the patron of the opening and closing of the war campaigns and of the sports connected therewith. Thus, in the readjustment of religious ideas, customs and practices, after Rome had extended her sway over all of Italy, the functions and attributes of the tribal deities became more and more specialized, each god, however, in the shifting of the scenes, retaining his most characteristic part and attributes. Thus Janus, the door¬ keeper, who is usually associated with Vesta, the keeper of the hearth, came, through a natural process of evolution, to preside over the beginnings of all undertakings. He was represented as having two faces, that he might see the more readily the beginning and the end of all things. He carried a staff (sym¬ bolical of traveling) and a key (the sign of his functions as doorkeeper).

Probably none of the greater of the Roman gods exemplifies better than Vesta the ever-changing character of the Roman deities. Originally the Roman virgin goddess of the blazing hearth, she was worshipped along with the Penates, at every meal when the family assembled round the hearth, which was situ¬ ated in the centre of the

room. Under the or¬ ganized Roman state religion Vesta became symbolically the king's hearth, that is, the hearth of the nation, and as such she had a sumptuous temple near the king's palace. The vestal maidens belonging to this temple were known as the king's daughters, a title that was later on extended to the vestal maidens of all of Vesta's temples. According to the religious legend, HYieas was credited with having brought with him from Troy to Rome the sacred fire of the vestal temple on the Forum, where it was guarded with the most solicitous religious care by four (later six) virgins of the purest char¬ acter, called vestals, who were dedicated to the service of Vesta from an early age (6 to 10 years) for 30 years, after which they were, by law, permitted to marry. Few, however, took advantage of this permission, even though it was considered a great honor to* marry a vestal, upon whom rested the special favor of the goddess of the hearth. This was because

the office of vestal was considered one of special ecclesiastical dignity and honor and car¬ ried with it a certain influence.

Naming the Deities. — In general the Ro¬ man gods were named from their qualities, functions or actions. Often the primitive sense of the name is exemplified in the future actions of the deity. One of the best examples of this is Ceres (Greek Demeter from Gemeter, ge, the earth, and meter, mother), the goddess of the earth, the bringer forth of fruit and the special patroness of growing grain and other plants. Though a Roman deity, she was said to have been the daughter of the Greek deity Kronos and his sister-wife, Rhea. The Romans early identified Kronos with their own agri¬ cultural deity Saturn, an ancient Italian god of the culture hero type whom tradition represents as having made his appearance in the reign of Janus and to have taught the Roman people the arts of civilization and especially agriculture and gardening. He is said to have become coruler with Janus, and later poets sang of their rule as the ((golden age.® His temple was in the state treasury, because he was represented to be the special patron of wealth. A female derivative of himself and his functions and attributes was his wife, Ops, the female di¬ vinity of fertility and plenty and the protec¬ tress of agriculture. Thus it will be seen that her functions largely overlapped those of Ceres. The latter, whose distinguishing symbols were full and flowing robes, poppies and ears of corn and who wore a corn measure for a headdress, was the mother of Proserpine, the queen of the under-earth regions, and of Bac¬ chus, the god of the vine and of wine, its char¬ acteristic product. The origin of most of the other gods is as distinctly pictured in their

names. The Lares, the spirits of deceased an¬ cestors, were literally (<the shining ones® ; Ops denoted the plentiful harvest; Pomona fruit; Saturn the sowing of the seed ; Vesta the glow¬ ing hearth ; Ge the earth. Kronos, the oldest of the great gods, has come to signify time, if he did not originally do so; while the Penates, the gods of the interior of the houses, mean literally those within (penitus , within).

Ceremonies. — The Roman religion was dis¬ tinctly ceremonial, and in this it betrays its nature worship origin. It possessed ceremonies for every event in life, and for almost every conscious movement of existence. Birth, in¬ fancy, puberty, marriage and death were all celebrated with elaborate and significant cere¬ monials. Each stage of the year, the days of the week, the progress of agricultural develop¬ ment, the special occupations of the individual, the successive seasons of the year, the family meal, all had their individual and appropriate ceremonies at certain fixed times. These cere¬ monies, taken as a whole, represent the sum total of man's interests, faculties and powers, the whole inventory of which they covered, by anticipation, in the act of accomplishment or in fulfilment. The calendar year which began in March, for instance, was divided religiously into three seasons, spring, harvest and winter, to each of which was apportioned its ap¬ propriate and individual ceremonies. In spring anticipatory prayers were offered for the suc¬ cessful growth of the seed already planted ; in the harvest season ceremonies were held in

connection with the gathering and storing of the harvest; while the winter ceremonies were directly related to the preparation of the ground for planting and the sowing of the seed. The elaborate ceremonies connected with these three seasons of the year grew into great national religious events famous in the life of the Roman people, both in the Imperial City and through¬ out the towns of the empire. So strongly had they become a part of the lives of the people after the debacle of time had swept away the Roman faith, and after it the Roman Empire, that they remained standing forth from amidst the ruins, to influence largely the Christian festivals and calendar. There were scores of other characteristic Roman religious ceremonies covering the deference, devotion and offerings made to the great deities of the state religion and also those presented to the minor deities and personal and household guardian spirits. Most of these may be found described in any work on the subject under the name of each of the deities and spirits.

The medicine-man, conjurer, enchanter and worker . of great magic inseparable from the religious ceremonies of primitive races had already developed into the formal priest when the Romans first appeared upon the stage of history in Italy. At this early period Rome seems to have also possessed her own religious rituals and sacred priestly knowledge. The priests soon became the first depositaries of writing and the organizers of the calendar and the religious tribal and state religious cere¬ monies in general. At this early period in the life of the Roman people, the superior priest¬ hood seem to have been almost inseparably connected with the nobility and the kingly rulers, the latter of whom had already begun to lay claim to descent from the gods. The seeds of ancestor worship had also already been planted, a custom which was later on to deify kings and emperors, as the legal and de facto repre¬ sentatives of the gods upon earth. As early as 304 b.c. the first known religious ceremonial Roman calendar presents a list of 45 days in the year sacred to the gods and subject to prescribed ceremonial. No work was permitted on these days. Following this first ceremonial regulation and the Julian calendars, (46 b.c.) there were some 30 other calendars, all issued with the same end in view, the recording and regulating of religious practices and ceremonies long in vogue. For this reason, though most of these calendars are fragmentary, they are of very great interest and value in the study of the religious and social life of the Roman people. They show plainly

the organizing hand of a priesthood growing steadily ever more and more powerful, better organized and more closely connected with the state. According to the calendars, 30 or more gods were signally honored in the provision of special festivals, ceremonies, shrines and priests ; and of all these definite and well-defined deities and ceremonies statements are presented which are invaluable for the proper understanding of the religious references so profusely scattered throughout Latin literature.

Evolution of Religious Thought. — Rome had about all the various and varying religious experiences sustained by later nations and peoples. In the early stages of her career she

had a strong and abiding faith in her gods and in their efficacy. The establishment of the state control of religion was followed by a decrease of interest in religious matters by the more in¬ telligent classes. From the end of the Regal Period to the Second Punic War Rome became gradually more cosmopolitan, assimilating the thought of the other parts of Italy in her almost continuously waged campaigns of war and com¬ merce; and from the close of this latter period to the end of the republic, while working out her destiny as Imperial Rome, she came into contact with Greece and other highly-civilized nations ; and her literature, thought and phi¬ losophy expanded and became truly national, assuming, at the same time, a worldwide out¬ look. This brought with it a radical revolution in religious thought leading directly to general scepticism. It looked very much as if the old religion were about to go by the board when the establishment of the empire saved it for the time being. The emperors, claiming to rule by divine right and direct descent from the gods, it was. very much to their interest to uphold a state religion ; which they did on a magnificent scale, bringing into the national church all the officers, employees and dependents of the gov¬ ernment. The state church, at this latter stage, was an immense fraternity, all the members of which were bound, by virtue of their office, to support it. This revival of the ancient Roman religion was, therefore, less religious than po¬ litical, though the royal family and especially the emperors took the matter serious enough, an attitude due to their careful education, which taught them to believe in their own divine birth and destiny. But on the whole this revival of the old faith was effected under conditions which could produce only a general scepticism ; and this became the prevailing tone of the re¬ ligious thought of the empire, which showed itself in the wide attention given to the most recondite philosophies, mysticisms and foreign cults of all kinds. Babylonian,

Greek, Assyrian, Egyptian and Eastern religious ideas found welcome in Rome. The Great Earth Mother of Asia Minor and Isis, the mother goddess of Egypt, were not only introduced into Rome but their worship, which was accompanied with elaborate ritual and ceremonial, became almost universal throughout the Roman Empire; and such a firm root did it take among the masses of the Roman people and the Eastern nations under the domination of Rome that the early Christian missionaries found great difficulty in eradicating it.

One of the strongest of the Greek influences was exercised through the Sibylline Books, which introduced Greek gods, rituals, organiza¬ tions, ceremonies and practices into Rome. Connected with these books was a very famous oracle who boldly recommended the introduc¬ tion into Italy of foreign gods, especially those of Greek origin. As this cult became fashion¬ able with the educated class, it spread rapidly throughout the cities of the Roman Empire. Greek gods were set up by the side of Roman, the new by the old ; and the splendor and pomp of the ceremonies connected with the worship of both increased. Greek art and the wholesale manufacture of artistic statues of the deities followed. One of the recommendations of great moment of the Sibylline Books was that of the

introduction of the Magna Mater (the Great Mother), which helped to largely strengthen the worship of the Earth Mother, already men¬ tioned. This was followed, on the same recom¬ mendation, by the introduction of the Earth Mother, Ma, of Phrygia. All these had very emotional rites and attractive ceremonies sim¬ ilar, in many respects, to those accorded Isis of Egypt. Hence they appealed strongly to a people already tired of the dead formality of the old state religion which had become so ritualized and fossilized that it had lost all its former vitality and attractiveness. This craze for for¬ eign deities went to unheard-of extremes, going so far afield as Persia, from which was intro¬ duced the great sun god, Mithras, with his elab¬ orate mystical worship, which became very popular in the Imperial City itself. From thence it spread over all the Roman Empire, where Mithras was

worshipped as the source of all life and the redeemer of souls. His mystical rites, which were held in dark caves or gloomy buildings under ground, were attractive owing to their contrast to the gorgeous ceremonies of the state religion, in which it was said that no one stil believed except the emperor and the poets ; a hyperbole which conveyed the thought that it had become an integral part of the government machinery and of the imagery and machinery of Latin literature, which was overlarded with allusions to the state deities and given to fulsome praise of them, partly be¬ cause this was pleasing to the state authorities. Thus Rome, bathed in philosophy, scepticism, mysticism, emotionalism and stoicism, with noth¬ ing solid to which to anchor, drifted upon the rocks of national religious shipwreck. In this condition she was found by the young and vigorous Christianity, which, throwing her weight strongly in the balance, won the day for the development of the Catholic faith.

Bibliography. — Aust, ‘Die Religion der Romer) (Paris 1889) ; Boissier, ‘La religion romaine d’ Auguste aux Antoines1 (2 vols., Paris 1874) ; Carter, J. B., ‘The Religion of Numa) (London 1905) ; (The Religious Life of Ancient Rome) (Boston 1911) ; Cornyn, J. H., ‘El modo de pensar del hombre primitivo) (Mexico City 1912) ; (Corpus Inscriptionum Latinarum1 ; Cumont, ‘The Oriental Religions in Roman Paganism) (Chicago 1911) ; Fowler, F. W., (The Roman Festivals) (London 1911) ; Glover, T. R., (The Conflicts of Religions in the Early Roman Empire) (London 1909) ; Marchi, (I1 culto privato di Roma Antica) ; Marquardt, (Romische Staatsverwaltung1 ; Mommsen, his¬ tory of Rome) ; Peller, (Romische Mythologie1 (Berlin 1881-83) ; Roscher, ‘Lexicon der griechischen und romischen Mythologie1 (Leipzig 1884-1915) ; Wissowa, (Religion und Kultus der Romer) (Munich 1912) ; De Feriis, ‘Anni Romanorum VetustissimP (Marburg 1891) ; (01d and New Gods) (1892).

John Hubert Cornyn, Birmingham Southern College.

ROMAN REPUBLIC. See Republics; Rome.

ROMAN DE LA ROSE, Le ((The Ro¬ mance of the Rose*), a poem of nearly 23,000 verses, is the most notable and was for 300 years the most quoted and discussed French writing of the 13th century. More than 200 manuscripts of it have been classified; 18 edi¬

tions were printed between 1481 and 1538; large parts were translated into English and Dutch in the 14th century; Chaucer used it

freely in (The Canterbury Tales.1 The <Roman) .was begun by Guillaume de Lorris, in the style then fashionable of courtly, scholastic allegory, as an Art of Love and, incidentally, of polite be¬ havior, for the use and pleasure of courtiers and their ladies. Under the form of a dream the Lover, aided by Courtesy, Sweet-Looks, Riches, Fair-Welcome and others, seeks posses¬ sion of a Rose-bud, guarded by Danger, Shame, Evil-Tongue, Jealously and so on. Guillaume drew the spirit and substance of his allegory largely from Ovid's 'Ars amatoria,1 Chapelain's (De arte honeste amandi1 and the writings of Chretien de Troyes. His work was apparently almost ended at his death, sometime between 1225 and 1240. With a brief conclusion by an unknown hand it counted 4,669 verses. Some 40 years later Jean de Meun took up the narra¬ tive in quite different spirit and in 18,000 verses, introducing many new characters, chief among them Reason and Nature, embodied the results of very wide if superficial reading and of dar¬ ing speculations, political, economic, social and moral, anticipating much in Rabelais, Mon¬ taigne and Voltaire. Guillaume was no mean scholar or poet. His allegorical characters show keen analysis. He has faint premonitions of the Renaissance. But Jean's work gave the (Roman) its abiding interest for it pressed social questions even yet not fully answered. He was a Parisian bourgeois. The site of his house has been identified at 218 Faubourg Saint Jacques. Many other writings, didactic and philosophic, are attributed to him. His pur¬ pose in the (Roman) was, he says, "wholly for instruction.® In digressions of 1,000 verses and more he seeks to apply Nature and Reason, that is, normal instinct and common-sense, in a thoroughly rationalistic spirit to the claims of royalty and nobility, to the origin of society and the ideas of the state, of justice, taxation and property, to the inequalities in the distri¬ bution of wealth and, with special and often quite misunderstood insistence, to the social position of women, their claim to equality as <(free-born,® and the evil effect on their char¬ acters of marriage as it had been developed under mediaeval institutions. This gives occa¬ sion for much dramatically lively and often bitter satire. He condemns celibacy. The mendicant orders, typified in False-Semblance, embodiment of slothful hypocrisy, are his peculiar abomination. Speeches put in the mouths of the Duenna, prototype of Chaucer's Wife of Bath, of False-Semblance, the Friend, Reason and Nature, principally in the later half of the 'Roman,1 best reveal Jean's radicalism. He finds place, too, for scientific speculations on the illusions of the senses and even on dis¬ sociations of personality. Through all this the allegory winds a slender thread leading to a philosophy of living more emancipated from theology than possibly the author realized. A symbolic celebration of Love as the self-per¬

petuating force of Nature ends with the Rose¬ bud in full bloom. Some two-thirds of Jean's verses hark back to older writers, chiefly Boethius, Alain de Lille and Ovid. He uses also Abelard and Roger Bacon and cites with complacent pedantry a host of others. He thought himself loyal to the Church, but his

temperament was practical, positive. Nature and her priest Genius, to whom more than a fifth of the whole poem falls, are the touch¬ stones of his ethics and social philosophy, the real objects of his devotion.

The first scholarly edition of the (Roman, 5 by E. Langlois (Paris 1914 —) is in course of publication. Meon's edition (4 vols., Paris 1814) was good for its time. Michel's (2 vols., Paris 1864) is convenient, Marteau's (5 vols., Orleans 1878-1900) better. Consult Langlois, E., (Origines et sources du Roman de la Rose) (Paris 1891) ; id., (Les Manuscrits du Roman de la Rose5 (2 vols., Lille 1910), also Bourdil-lon, F. W., (The Early Editions of the Roman de la Rose5 (London 1906) ; Ward, C. W., <The Epistles on the Roman de la Rose5 (Chicago 1911); Guillon, F., (Jean Clopinel5 (Paris 1903) ;_Besant, W., (French Humorists5 (Lon¬ don 1873). There is a good, not quite complete, translation by F. S. Ellis (3 vols., London

1900).

Benjamin W. Wells.

ROMAN WALLS, four great walls built by the Romans in Great Britain. The first of these stretched from the Firth of Forth to the Firth of Clyde. It was built by Agricola in 80 A.p. In 83 he strengthened it by another wall, and in 139 Lollius Urbicus again built over the same ground, the wall being known as the wall of Antonius. These walls were built to keep back the northern barbarians, who in the form of Piets and Scots continuously menaced Ro¬ man rule in Britain. Hadrian, concluding that the walls of Agricola were insufficient for

this purpose, built in the early part of the 2d century the famous wall that stretched between New¬ castle on the Tyne and Solway. This wall, fin¬ ished in 120 a.d., was 68 miles in length, and marked the northernmost limits of Roman ter¬ ritory in Britain after that date. It is known as the wall of Severus, since that ruler strength¬ ened it in 209 by building a parallel wall a few yards above it. Few remains exist of any of these save the last which may still be easily traced. Consult Bruce, (Roman Walls5 (1855) ; (An Account of the Roman Antiquities Pre¬ served in the Museum at Chesters, Northumber¬ land5 (London 1903) ; Westscott, J. H., (The Roman Wall in Britain5 (in The Classical Weekly, Vols. XVIII-XX, New York 1911).

ROMANCE, a fictitious narrative in prose or verse, the interest of which turns upon inci¬ dents either marvelous or uncommon. The name is derived from the class of languages in which such narratives in modern times were first widely known and circulated; these were the French, Italian and Spanish, called the Romance Languages (q.v.). The treatment here given must omit any extended mention of cer¬ tain isolated romances in the later Greek. A well-known example of such is (Apollonius of Tyre,5 at one time widely read in the west of Europe; transmitted to England, first probably in a Latin version, it was soon translated, and was employed by Shakespeare for the plot of (Pericles, Prince of Tyre.5 Nor can the limits of the subject admit of discussion of some few Latin works sometimes classed as romances, such as the (Golden Ass5 of Apuleius, of which use was made in (Don Quixote5 and c Gil Bias.5 For such, see articles on individual titles and authors, and the general articles on the Greek

and Latin literatures. For general consideration the subject may be restricted to the Middle Ages. The finest of these romances still extant are of the 12th and 13th centuries. They may be divided into two classes — the popular epics (chansons de geste) chanted by the jongleurs and other strolling minstrels ; and the more elaborate and artificial poems composed by trou-veres and recited before aristocratic audiences.

The materials of both classes were more an¬ cient lays of celebrated heroes, mingled fre¬ quently, especially in the German romances, with pagan myths, together with long connecting pas¬ sages composed by the minstrels themselves. Hence originated a series of epics grouped around some renowned hero, and forming a cycle of romance. To the first class belong the German heroic poems and the Carlovingian chansons; to the second the Arthurian legends.

Of the collection of the ancient German lays made by Charlemagne, nothing remains except perhaps the fragment of the alliterative Lay of Hildebrand, now in the Cassel Library. It is supposed to have been written in the 9th cen¬ tury or even earlier. All the other manuscripts of German heroic poems are of much later date; none of them are earlier than the 13th and most of them belong to the 14th or 15th centuries. Of the (Nibelungenlied5 (q. v.) there are three copies belonging to the 13th century. In this epic Dietrich plays an important part; but the poems devoted to the simple Dietrich legend are only found in late transcripts or early printed editions, probably little later than the date of their actual composition. They repre¬ sent, however, older lays, and these again still older, of equal or even greater antiquity by two centuries or more than the Cassel fragment. The language changed considerably in the course of these centuries, and the poems must have been entirely recast, rhyme being substi¬ tuted for alliteration; but the change in the legend itself is immaterial. It can be traced in the Latin chronicles of the 10th and 11th centuries, and also by means of the Wilkina Saga,5 an Icelandic prose work of the 13th century. These poems, as well as others on similar subjects, range from a few hundred to several thousand lines in length. Some of them were modernized by Caspar von der Rohn, and inserted in his ˆHeldenbuch.5 The completest collection is that in Heinrich von der Hagen's <Altdeutsche Heldenlieder5 (1855). Another poem closely connected with the Nibelungenlied is the Latin epic of Walter of Aquitaine, attrib¬ uted to Ekkehard I, abbot of Saint Gall, who died in 973, and is said to have written it as an exercise in his youth. It is obviously a transla¬ tion from a German poem, and is found in several manuscripts, none of them perhaps older than the 12th century. The (Klage5 (la¬ ment5), said by W. Grimm and others to be a poem of the 12th century, forms a sort of conclusion to the great German epic; and an¬ other poem, (Biterolf,5 is ascribed to the same unknown author. It extends to 13,000 lines, and contains a great number of daring adventures m the course of which Dietrich encounters and vanquishes Siegfried. (Gudrun5 is a fine epic of nearly 7,000 lines, and is of not much later date than the (Nibelungenlied. 5

We can only mention the names of the poems which make up what has been called the Lom¬ bard sub-cycle, namely, <K6nig Ruther,5 (Wolf-

dietrich* (including (Hugdietrich*) , and (Ot-niV which latter furnishes the materials for the French poem (Huon de Bordeaux.* Frederick Barbarossa was a great admirer of Charle¬ magne, and collected all the accredited records of that monarch. He patronized the minne¬ singers as the German representatives of the troubadours. At his great Mainz tournament were assembled not only the knights of Ger¬ many and France, but the poets also. Among those present was Heinrich von Veldeke, who imitated the (Roman d'Eneas* in his (Eneit,* an example quickly followed by the chief lead¬ ing epic poets of Germany. Heinrich completed his poem at the Wartburg, the residence of Her¬ mann, Landgrave of Thuringia; and many other translations, among others that of the (Roman de Troie,* were executed there shortly after¬ ward. Another guest of the landgrave's was Wolfram von Eschenbach, author of (ParzivalP The chansons de geste form an interesting body of literature. The oldest of them are of great length, consisting generally of 20,000, 30,000, or even as many as 56,000 lines, grouped in sets (tirades) of from 20 to 200 lines, all ending with the same assonantal rhyme. Up till the middle of the 12th century the lines were of 10 syllables, but lines of 12 syllables, ending in consonantal rhymes, were gradually substi¬ tuted. The romances were sung to the sound of a kind of violin (vielle), played with a regu¬ lar bow. Many of the minstrels (jongleurs) were poor, wandering on foot from village to village, singing in the alehouses, or at the public fairs and games ; some were soldiers, such as Taillefer, who struck his first blow at Hastings. Later they became mere mounte¬ banks. A number of them wrote their own chansons, while others bought them from their original authors, and adapted them to the taste of their audience. When a jongleur had thus procured a copy he took care to C9nceal it from his rivals. A few of such copies, little weather-beaten volumes, are still preserved, a noted example being the Oxford manuscript of the (Chanson de Roland. > It was to the poets of northern and central France rather than to the troubadours of Provence that these poems were due. The chansons de geste are divided into three cycles — that relating to Charlemagne and his peers, the Arthurian and the classical. The more antique the Charlemagne romances are the more they are devoted to the emperor,

who is represented more as a majestic king and valiant knight than as the statesman we recog¬ nize him in history to be; at times he is de¬ picted as being easily duped, avaricious and capricious. Among such works are (Girard de Viane) ; (Ferabras) or (Fierabras) ; and the (Chanson de Roland. *The centre of the entire structure is the (Arthurian Cycle.* In the lays of the Welsh bards, supposed to be as old as the 6th and 7th centuries, although no manu¬ script extant is of earlier date than the 12th century, Arthur and his companions are cele¬ brated, but temperately, the element of the miraculous being absent. It is in the (Historia Britonum* of Abbot Nennius (apparently written in Welsh in the 8th century, and trans¬ lated into Latin afterward) that the legendary additions begin to develop. Of three or four centuries later date are the so-called (Armoric Collections) of Walter, archdeacon of Oxford, from whom Geoffrey of Monmouth professes

to translate, and in which the supernatural and marvelous elements largely prevail. The (History) of Geoffrey was versified in French (1155-58) by Wace, a son of one of the Con¬ queror's followers. The <Brut,) as this met¬ rical setting is called, contains about 15,300 eight-syllable lines, and adds a few details to the story of Arthur which do not seem, how¬ ever, to have been Wace's own invention. The work was translated into English, and further amplified, by Layamon, about 1204. The (Brut* of Layamon is composed of nearly 32,250 allit¬ erative lines, or rather half lines. One of the most prolific of the Arthurian poets is Chretien de Troyes (born about 1140).

One of the finest of the early French Arthur¬ ian romances, <Tristan) or <Tristram,) was adapted by Gottfried of Strassburg, who left his (Tristan und Isolt) slightly incomplete, about 1210. Other poems belonging to the cycle are the (Morte d'Arthur,* a fine alliterative work of the 14th century; a Latin (Life) of Merlin, in 1,529 hexameters, written about 1217 ; (Li Biaus Desconneus,* a narrative of the ad¬ ventures of Giglain, son of Gawain, written by Renauld de Beaujeu about 1200, and imitated by Wirnt von Gravenberg in his <Wigolais) (about 1212). From France the Arthurian ro¬ mance spread also into Provence, Spain, Italy and the Netherlands, and was again transplanted into England.

The last of the cycles are the classical, in which the subjects are Alexander the Great and the Trojan heroes. The materials for the Alex¬ andrine poems were found in an old Greek ro¬ mance, written in Alexandria between 100 and 300 a.d., and known as the (Pseudo-Callisthe- nes,* which was long read as authentic history, and of

which there is still extant two Latin abridgments belonging to the 9th and 10th cen¬ turies. The most important romance on this subject is (Le Romans d'AlizandreP written by Lambert li Tors and Alixandre de Bernay in the 12th century; it contains upward of 20,800 12-syllable lines. This was the chanson that established the whole sub-cycle, and first brought the Alexandrine fine into vogue and gave it its name. It concludes with the testa¬ ment of Alexander and the lamentations of his 12 peers. Many French poets continued the su'bj ect. (See separate articles on the personages and the works mentioned; also Fiction; and Provencal Literature.) Consult Billings, A. H., (Guide to the Middle English Metrical Romances) (New York 1901) ; Courthope, W. J., (The Connexion between Ancient and Modern Romance) (Oxford 1911) ; Hurd, R., (Lectures on Chivalry and Romance) (Oxford 1911) ; Ker, W. P., (Epic and Romance1* (London 1897) ; id., (Dark Ages) (London 1904) ; Mason, E., (French Romances and Legends of the Twelfth Century* (New York 1911) ; Mor-ley, H., and Thomas, W. J., eds. (Early Prose Romances* (London 1906) ; Paris, G., {La litterature frangaise,, au moven-age* (Paris 1890) ; Rennert, A. H., (Spanish Pastoral Ro¬ mances* (Philadelphia 1912) ; Saintsbury, G. E. B., (The Flourishing of Romance* (London 1897) ; Spence, L., ed., dictionary of Mediaeval Romance and Romance Writers* (New York 1913) ; Wagner, W., (Romances and Epics of our Northern Ancestors* (London 1906).

ROMANCE LANGUAGES, the languages derived from the Latin tongue. These lan¬ guages are very largely Latin in vocabulary and grammatical structure. The Romance languages had their being in the territory included within the Roman Empire. But not all of this territory produced Latin tongues for the sim¬ ple reason that not all of it had become so Latinized that the Roman language had become that of the masses of the-people. Through the colonizing efforts of Spain, Portugal and b ranee, the Romance languages have spread beyond their original habitat, especially to Cen¬ tral and South America, where they have be¬ come the official speech of over 80,000,000 peo¬ ple. Romance languages are also spoken in many of the West Indies and part of Canada.

Italy, in the days of the Roman Empire, was subject to strong dialect influences against which the literary tongue had constantly to struggle. Little by little these influences gained the upper hand and literary Latin began to lose its complex grammatical forms and to become more analytical in construction. The northern end of the Italian Peninsula was considerably influenced by the so-called barbarian invaders and the south was overrun by Greeks, Cartha¬ ginians, Phoenicians and other races. The downfall of Greece had brought to Rome thou¬ sands of Greek scholars and teachers, all of whom were forced to use the Latin tongue, in which many of them learned to write fluently. These Greek scholars had a very considerable influence upon the development of the Latin language. In the later days of the Roman Empne, German and other mercenaries were extensively employed in Italy and throughout the Latin domains and prominent and influential men from the provinces in France, Spain, Britain and other parts either paid long visits R* R°mc> or lived there with their families. Ihe number of these foreigners resident in Rome alone was very great, so that the cosmo¬ politan centre, where three languages, Latin, Greek and Italian, seem to have been recognized by the authorities as early as the first half of the 1st century of the Christian era, for we are told that one of the Caesars returning from a protracted and successful military campaign gave the customary popular festivities belong¬ ing to such an occasion, which, in this case, lasted a month. One part of these festivities consisted of dramatic entertainments open to the public and given in Latin, Italian and Greek. Ihe suggestive part of this act is that the Greek colony in Rome, at this early date, was s° strong and so influential as to demand

official recognition at the hands of a returning conqueror seeking public favor. Quite as sug¬ gestive is the fact that the dialeotic influence at work within the Imperial City had already be¬ come so strong as to demand recognition at the hands of the authorities. The popular speech must have already become very considerably differentiated from the literary tongue, since it was thought good politics to give public plays in the former. Out of the service of people from all over Italy, in the Roman army for many years, sprang a sort of common tongue that was very considerably different from Classical Latin. This bastard Latin was carried by the army to every country over which the arms of Rome triumphed. Thousands of Roman soldiers and other Italian colonists

settled in the provinces and many of them in¬ termarried with the natives. As the way to preferment everywhere throughout the Roman Empire could only be found through the ac¬ quirement of the Latin tongue, the study of Latin seems to have soon become popular in the provinces, where the speech of the Roman soldier was naturally much more prevalent than the Classical Latin of the literary men and the higher government officials. In this way the so-called Low Latin became domesticated in the provinces, where it seems to have been ac¬ cepted everywhere as the most convenient medium of business transactions not only with the natives but also with the Roman colonists from the interior and south of Italy. This curious lingua franca, if it may be so called, seems to have continued its disintegrating in¬ fluence upon the Classical Latin tongue, which rapidly lost most of its grammatical inflections and became analytical in form. This change must undoubtedly have assumed definite shape in the tongue of the masses some considerable time before we have any existing record of it in the shape of surviving documents written in the popular speech. It began early to influence literary or written Latin, and its iconoclastic hand is seen strongly in the Vulgate which has made many concessions to the popular speech j and in other Latin writings of the same and somewhat earlier and later periods.

While the Classical Latin tongue continued to disintegrate and to reshape itself as an analytical language on the Italian Peninsula, it was subject to still greater disintegrating in¬ fluences in the provinces, where each native race impressed its racial and linguistic char¬ acteristics upon it. In fact these racial char¬ acteristics are noticeable in a striking degree in Italy itself where the tongue of the north is different from that of Rome and the west generally and both are radically different from that Of the south and southwest and the ad¬

jacent coastal islands. In the provinces the new Latin tongues that grew out of the decaying Latin shaped themselves in accordance with the tribal influences brought to bear upon them Italian naturally keeps closer to the Classical Latin than most of the other Romance tongues Yet the various dialects of southern Italy shows a wide divergency from the Classical tongue. In Spain and Portugal, where the Latin occupation had most influenced the native population, the Latin vocabulary suffers ess contraction than in France. Yet in Cata-oma and the east coast of Spain, and in the Provengal distnets of France, the tendency toward the suppression of unaccented vowels and word terminations is very noticeable. All this indicates that strong tribal influences were

Sihaplinr the]ˆatln tongue in conformity with the local lingual tendencies. Out of these

various native lingual influences grew the c*! Romance languages, Italian, French, ˆpanish, Rumanian, Romamsh, Portuguese Sardinian, Dalmatian (now extinct), Provengal’

Franc°-Pr°vengal. The formation 1 these Romance tongues was possible onlv through the spread of Roman rule and the ore

a TTCeT °r Lai-mi °ver Etruscan> Umbrian

and 0r ilL tan dlaleCtS’ ?n£ also over ˆerian and Gallic. The power of Rome in the prov¬ inces was shown m the imposition of the Latin tongue on the inhabitants of France and Spain.

throughout practically all of which territory and the rest of the vast Roman possessions it was, by the time of Augustus, spoken, with unim¬ portant dialectic variations.

Notwithstanding the fact that the Romance languages are essentiallv Latin in vocabulary, yet many changes took place in the Roman tongue before it finally became one of the Romance languages ; and these changes were not always the same. Even in France itself there were two distinct forms of the Romance tongue, and various dialects. In Spain the Castilian and the Catalan developed differently; and there also grew up different dialects which still mark off very distinctly different localities of the Iberian Peninsula. Similar conditions prevailed in Italy. The Italian spoken in the Po and Liguria districts very much resembles the northwest Romanic speech ; but it has evi¬ dently been also influenced by the dialects of other parts of the country, which forced upon it the loss of the ˆs® so common in the Iberian tongues. In the centre of Italy the Italian dialect was considerably influenced by the north¬ ern speech ; but in the south, a combination of native dialectic speech and Greek and other influences worked together to produce a very considerable variation from the speech of northern Italv in vocabulary, accent and idioma¬ tic turns of expression. In Portugal, too local conditions produced a Romance tongue con¬ siderably different from Spanish, French and Italian.

The breaking up of the Roman Empire, re¬ moved the one great tendency which held to¬ gether the various different ethnic elements that composed the Roman domains. Political disin¬ tegration followed and brought with it the isolation of various districts. This isolation was helped bv the invasion of the Latin country by various Germanic tribes. The Goths, Lom¬ bards and Franks have left their traces on Italy; in Gaul, the Franks took possession of the north, the Burgundians of the east and the Visigoths of the south, during the last half of the 5th century. The Visigoths also overran most of Spain. Under these new conditions new groupings of people succeeded, and out of them sprang new and vigorous nations each of which spoke the Latin tongue in its own way. Soon the people speaking the new

tongues could not understand Latin, a proof that the conditions that produced them must have been working silently for a very considerable period of time. Rapid changes in the form of the vocabulary and grammar of these new tongues followed. The primitive peoples who had fal¬ len heir to the Latin language found it too com¬ plicated for their simple uses. So they promptly discarded the future and the passive forms of the verb and, in most cases, made the plural form end in «s.» Later on, when they found the need of the future and passive, they formed the former by means of an auxiliary verb and substituted for the latter a reflexive form. The Latin genitive, too, gradually dis¬ appeared, and the accusative became the com¬ mon form of the substantive after prepositions, and finally the only form. The future had early been replaced by the present; and this old use of the oresent and also its employment to replace the perfect is still common in dialect speech and the language of the illiterate in the Romance tongues. The profuse use of diminu¬

tives in -ullus and -ellus, noticeable auite early in the Romance tongues, was carried to excess in Italian and Spanish; and the Latin Ameri¬ cans have so abused this effective feature of the Romance tongues as to injure the beauty of Spanish. Articles were also manufactured out of the pronouns ille and ipse, which assumed distinct forms in the different Romance lan¬ guages. The genitive, when it went bv the board, was replaced by de with the accusative. The frequent use of the accusative in this con¬ nection led to the suppression of the nominative and the employment of the accusative in its place, thus aiding that simplicity which always appeals to rude undeveloped intelligences.

The causes that led to the formation of the Romance tongues had their origin, for the most part, in phonetics. Since the vocabulary of these languages is still essentially Latin, Spanish has radically simplified and developed the full sound of the vowels at the expense of the consonants. The Latin accented e becomes, in Spanish, ae, and the o becomes ue, while there is a strong tendency to weaken the initial consonant. Thus the Latin porta becomes puerta in Spanish, tempus becomes tiempo and bonus, bueno. Portuguese, on the contrary, is verv careless in the articulation of both vowels and consonants ; it avoids the diphthongs that Spanish likes, and as if going to the opposite extreme, the initial sounds are strongly pronounced. Portuguese, like French, has a strong nasal tendency, which is entirely absent from Spanish and Italian. It has also, a strong tendency to contract unac¬ centuated vowels. The Latin caelum, for in¬ stance,

which became cielo in Spanish, has be¬ come ceo in Portuguese.

French differs from Spanish in its suppres¬ sion of the Latin final vowels, a excepted, or their transmission into e. This tendency is noticeable in Provengal and Catalan, but it is stronger in the north of France than anywhere else. This tendency to contraction has left the French tongue practically without accent, while the opposite tendency in Spanish has made the latter tongue one of the most, if not the most, sonorous of the Romanic group.

Germanic Influence. — The Germanic tribes probably helped toward the disintegration of the Latin tongue in Italy. But this disin¬ tegration wras long protracted and slowly evolved as should be the natural growth of a language. This prevented the various foreign influences becoming great at any particular time. The German mercenaries, who were largely used in the Latin armies, naturally brought into the country numerous German words relating to their life and occupation, which belonged to the camp. The names of grains, animals and persons in use among the Germans, but unfamiliar to the Romans, bore their native designations on their introduction into Italy. These words naturally assumed Latin forms, and they so identified themselves with Latin speech that it is difficult, at times, to recognize their foreign origin. The Goths, Lom¬ bards and Franks influenced the northern and central parts of the Italian Peninsula much more than they did the south, where Greek and Carthaginian played a very considerable part in the local appearance assumed by southern Italian. This influence is still noticeable in the strong quantitative accent placed upon the

accented vowel throughout the south and south¬ west of Italy.

As the natives, after the Roman conquest of Gaul, continued to be the mechanics, artisans and laborers, they naturally contributed to the store of Latin words, designating such occupa¬ tions by names given them in their own Gallic tongue. As Gaul remained largely agricultural, during the Roman occupation, and as, in the beginning, the Roman task masters and em¬ ployers of labor found it easier to learn the native names for the implements of labor, grains and processes than to teach the natives the Latin designation therefor, many agricul¬ tural terms of Gallic origin became current in the Latin spoken in Gaul. The same thing hap¬ pened to the native tongues in Spain and Portugal. In the south of Italy and the ad¬ jacent islands, for practically the same reason, agricultural terms and especially names of farm and garden products have generally quite dif¬ ferent names from those they bear in other parts of the peninsula. Yet notwithstanding these natural differences and those occasioned by accent and intonation which distinguish the speech of one locality from another and the great language groups to-day throughout all the territory that once constituted the western empire of Rome, the Romance tongues are surprisingly Latin in the composition of their vocabularies, the changes that differentiate them from one another and that mark the dialects of each language group being very largely phonetical; for however great the changes may be that have taken place in the Latin vocabularies in their transmission into the Romance tongues, they have not materially interfered with the roots or the accents of the Latin words. This fact has rendered the task of the Latin philol¬ ogists much easier than it could have been had the accentuated vowel not persisted, subject to certain regular known modifications.

Inter-influence — Naturally, being so closely related and having a common origin within his¬ torical times, the Romance tongues have acted and reacted upon one another. Moreover they have been acted upon by the German language, since their riseito the dignity of national tongues. Of all the Latin tongues French has had the greatest, deepest and most farreaching in¬ fluence not only upon the Latin and German languages, but upon other languages of Europe ; and the Norman French gave to English two-fifths of its vocabulary. This French influence, begun in the time of Charlemagne, has extended to

our own day, and is still being unconsciously exercised, though now in a somewhat more re¬ stricted degree. As the diplomatic language of Europe, as the voice of the leaders of fashion, as the tongue of the profoundest and wittiest literary critics of Europe and the leaders of science and of Romance philology it has long continued to furnish thinking Europe with con¬ cise names and expressions as they have sud¬ denly found the need of them. In the age of chivalry, in the Renaissance, and the centuries that witnessed the growth of diplomacy, the French tongue continued performing its good offices for the other languages of Europe. Even Germany and the other countries in which the Germanic languages were spoken felt this French influence strongly in the court, art, literary and military circles.

While the Spanish, Italian and Portuguese languages influenced one another and other European tongues, their influence was sporadic and very much less than that of French. Span¬ ish and Portuguese were, to some considerable extent, influenced by the aboriginal American tongues; and many of the words from this source were passed on to the other languages of Europe. Many Spanish words came into Eng¬ lish and some into French through the contact with Spain in the American colonies. Very many, words derived from the indigenous American tongues are in use in the different Latin-American countries. The names of plants and animals, agricultural terms and the designa¬ tions of places have contributed very largely to this Indian element in the Spanish tongue. However, the use of most of these foreign words is confined to localities in America and but a comparatively small number of these native designations have become domesticated in Spain. Yet, as they enter into the very lives of the Latin-American nations, they seem to have come to stay. They, therefore, help to make the Spanish tongue, as spoken in America, different from that of Spain. Thus the litera¬ tures of the different Latin-American republics have each its own peculiar individuality, marked by local vocabulary and terms of expression.

Spanish was also influenced by Arabic dur¬ ing the Moorish occupation of the country, and these Moorish words and idiomatic expressions have, many of them, been carried to America. In the same way, the Greek and Carthaginian words that found their way into Catalan, have found lodgment in the Spanish spoken in cer¬ tain section of Latin America. See Phonet-tics ; Language, Science of, and each of the Romance languages.

Bibliography.— Alexander, L. H., Par¬ ticipial Substantives of the — ata Type in the Romance Languages) (New York 1912) ; Bartoli, G. M., Pas Dolmatische; Altroman-lschen Sprachreste von Veglia bis Ragusa) (Vienna 1906) ; Bourciez, E., (Elements de linguistique romane) (Paris 1910) ; Dauzat, A., (Essai de metodologie linguistique dans le domaine des langues et des patois romans > (Paris 1906) ; Diez, F. C., (Gammatik der romanischen Sprachen> (Bonn 1882) ; (Etymol-ogisches Worterbuch der romanischen Sprachen) (Bonn 1887) ; Ebeling, G., Probleme der romanischen Syntax) (Halle

1905) ; Grandgent, C. H., (Introduction to Vul¬ gar Latin J (Boston 1907) ; Grober, G, (Grundriss der romanischen Philologie) (Strassburg 1904) ; Jud, J., (Probleme der altro-manischen Wortgeographie) (Halle 1914) ; Korting, G., (Handbuch der romanischen Philologie> (Leipzig 1896) ; (Lateinisch-ro- mamsches Worterbuch > (Paderborn 1907) • Meyer-Lubke, W, <Einfuhrung in das Studium der romanischen SprachwissenschafG (Heidel¬ berg 1909) ; Prinzipienfragen der romanischen SprachwissenschafC (Halle 1910) ; Monaci, E„ Pacsimili de documenti per la storia delle lingue e . delle litterature romanze> (Rome 1913) ; Niedermann and Herman, (Historische Lautlehre des LateinischeiP (Heidelberg 1911) ; Paris, Gaston, (Melanges linguistiques) (Paris

1906) ; Richert, G., (Die Anfange der roman¬ ischen Philologie und die deutsche Romantik) (Halle 1914) ; Richter, E., (Zur Entwicklung

der romanischen Wortstellung aus der latein-ischen) (Halle 1903) ; Schneegans, H., (Romanische Philologie> (Berlin 1914) ; Tobter, H„ (Altfranzosisches Worterbuch) (Berlin 1915) ; Zauner, A., (Romanische SprachwissenschafD (Berlin 1914) ; Zimmer, (Die romanischen Literaturen und Sprachen) (Berlin 1910). Among the magazines devoted to the Romance Languages are Zcitschrift fur romanische Philologie, Zeitschrift fiir newfranzohsische Spraclie und Literatur, Romanische Forschun-gen, Arcliiv fiir das Studium der neueren Sprachen, Romania, Archivio glottologico italiano.

John Hubert Cornyn, Birmingham Southern College.

ROMANCE OF THE ROSE. See Ro¬ man de la Rose.

ROMANCERO DEL CID, a collection of romances or ballads which sing of the mighty deeds of Ruy Diaz de Bivar, the Cid Campea-dor, the national hero of Spain. Curiously enough there exists no single romancero in which are included all the Cid ballads. This is due to the fact that new ballads are being constantly found which had not been put into print. The first (Romancero del Cid of Juan de Escobar } dated 1612 contains only 102 bal¬ lads, the most complete modern collection, that of Carolina Michaelis de Vasconcellos of 1871, contains 205. It was during the 16th and 17th centuries that the ballads reached the height of their popularity and passed from the oral to the written stage. Most of the ballads we have preserved to-day are not ancient. The tales they tell are those of the old ballads but the language is that of the classic period, and some of them have unknown authors. The early ballads were the most oft-repeated and favorite parts of longer poems. They represent a more demo¬ cratic form of literature than such long works as the (Poema del Cid) and the (Cronica RimadaP poems of an aristocratic and chival¬ rous age. Often the ballad is the result of a popular embellishment of an event found in the longer songs. In the 18th century the Cid ballads decayed somewhat in popularity but during the Romantic period they flourished as never be¬ fore. John G. Lockhart's (Ancient Spanish Bal¬ lads' though containing only eight Cid ballads is important because it has been accepted as a classic by several generations of English-speak¬ ing peoples. A more scholarly but still poetic translation is James Y. Gibson's (Eighty-three Cid Ballads.* The Cid ballads are dramatic, realistic and virile; they rarely lapse into the puerilities of some other types of. folklore poetry. In them the Cid may be idealized from a historical point of view, but to the Spaniard he is the noblest type of warrior carried to the height of perfection. For a fuller account of the (Romancero del Cid,* consult Fitz-Maurice-Kelly, James, (Chapters on Spanish Literature) (I and IV) ; and Morley, Span¬ ish Ballads) containing nine Cid ballads with vocabulary, notes, and excellent bibliography.

Samuel M. Waxman.

ROMANES, ro-man'ez, George John, Eng¬ lish scientist : b. Kingston, Canada, 20 May 1848; d. Oxford, 23 May 1894. He was gradu¬ ated in 1870 from Caius College, Cambridge, studied in France, Germany and Italy and in 1874-76 worked under Burdon Sanderson in

the laboratory of University College, London, and carried out important researches in nervous excitability. In 1879 he was elected Fellow of the Royal Society and in 1878 published, under the pseudonym (<Physicus,** a work entitled (<A Candid Examination of TheismP in which he took up a somewhat defiant atheistic position. Subsequently his views underwent considerable change; he revised the (Candid ExaminationP and toward the close of his life was engaged on <A Candid Examination of ReligionP in which he returned to theistic beliefs. His notes for this work were published after his death, under the title (Thoughts on ReligionP edited by Canon Gore. Romanes was an ardent sup¬ porter of Darwin and the evolutionists and in various works sought to extend evolutionary principles to mind, both in the lower animals and in man. He wrote very extensively on modern biological theories. His chief remain¬ ing works are (Animal Intelligence) (1881) ; Scientific Evidences of Organic Evolution) (Nature Series, 1882) ; (Mental Evolution in Animals* (1883) ; (Jelly-fish, Starfish and Sea Urchins* (1885) ; (Mental Evolution in Man* (1888) ; (Darwin and after Darwin (1892-95) ; Examination of Weismannism* (1893) ; (Mind and Motion, an Essay of Monism) (1895). In 1896 appeared a volume of (EssaysP a selec¬ tion from his (PoemsP and his (Life and Let-tersP edited by his wife. Consult Carus, P., (Dawn of New Religious Era* (Chicago 1899).

ROMANESQUE ARCHITECTURE. The

somewhat misleading name Romanesque is ap¬ plied to the non-Byzantine architecture of Chris¬ tian Europe generally, from the fall of Rome (476) to the rise of Gothic architecture in the 12th century. Its greatest development be¬ gan with the 11th century and continued well into the 12th. While in certain regions the influ¬ ence of Roman remains was considerable and while in Italy traditions of Roman design per¬ sisted long, the outstanding characteristic of the Romanesque architecture generally is its independent development along predominantly structural lines as the parent of the splendid Gothic styles of the 13th to 15th centuries. It has, indeed, been called by some writers the <(round-arched Gothic® style. It was through¬ out an architecture of religion, because the Christian Church was the chief civilizing agency of the early Middle Ages. Outside of Italy, and to a great extent there also, it was an architecture of monasteries, especially of the great Benedictine order. It is, however, really not one style but several. In Italy it developed the Basilican or Latin style in and around Rome, the Lombardy style in Lombardy and the north, the

Tuscan Romanesque in Florence, Pisa and their neighborhood. The Byzantine style was influential in eastern Italy and in Sicily the Arabic and Byzantine influence mingled with the basilican tradition. Another phase was later developed along the Rhine Valley.' It was in France that it took on the greatest independ¬ ence and vitality, though there, also, are many marked provincial variations; and from Nor¬ mandy it spread to England, taking on a new character called the Norman, or more properly the Anglo-Norman.

General Character. — All the Romanesque styles show steady progress from the crude and simple efforts at architectural expression of

communities slowly emerging from the chaos of the centuries following the fall of Rome, toward a highly organized, structurally elabo¬ rate type of church edifice and of monastic buildings. The church plan, at first simply basilican (see Basilica), became increasingly varied and complex to meet the growth and changes of liturgy and ritual. The transept and crossing became more important ; a lantern, tower or dome was often erected over the cross¬ ing ; the eastern arm of the church was length¬ ened and chapels for the worship of various saints opened out from the transepts and apse. Bell-towers were added, detached in Italy, at¬ tached in France, England and Germany. Structurally two great changes from the early basilican types were evolved; (a) masonry piers, square, round or clustered, took the place of columns between nave and aisles; and (b) vaulting gradually replaced the wooden ceilings, first in the side-aisles, later in the high central aisle or nave. In Italy the supply of antique marble columns led to a longer continuance of the use of columns, the tradition lasting even after Roman shafts were no longer to be had, and many Lombard, Tuscan and Sicilian churches have columnar interiors. Elsewhere piers of stone had to be used from the first. The use of vaulting was primarily the result of scarcity of timber and of the destruction by fire of many of the wooden-roofed churches. These two changes compelled a far more mas¬ sive construction than that of the non-vaulted wooden-roofed, columnar basilicas. The ma¬ sonry was at first crude and heavy, especially in France and England. Walls were thick; round arches were universally used and built of stepped section with splayed or stepped jambs and jamb-shafts, especially in the doorways. Carving was at first scanty and rude, but advanced steadily in richness and refine¬ ment and in the 12th century sculpture was rapidly developed, especially in France. Vault¬ ing became more scientific; groined vaults everywhere displaced the heavy barrel-vault over the nave as well as the side-aisles and in the 12th century the use of vault-ribs became general in their construction. The problems of support and abutment created by these changes compelled new experiments in the construction of walls, piers and buttresses, in which the masonry was more and more concentrated at the points of chief strain. (See Buttress; Vault). In all this structural develop¬ ment wholly new forms of architecture were created, both in the masses and details. In addition the monasteries developed the cloister with its arcaded court and various types of chapels, refectories and other dependencies. In general > the

exteriors of buildings were severely plain, except the richly carved portals ; the interiors of churches were increasingly spacipus and lofty as the style developed. Domical baptisteries and round chapels were frequent in the earlier centuries, especially in Italy and the Rhine Valley.

The Subordinate Styles.— The Lombard churches adhered in many cases to the basilican plan with wooden roof-ceiling; but vaulting was also early used, as in San Ambrogio, Milan, and the vaulted churches varied greatly in plan. The round window, the splayed and shafted portal with a porch and the arcaded cornice are

characteristic. The Tuscan employed banding and paneling in white and black marble ex¬ ternally and in and around Pisa richly arcaded facades were common. The great domical bap¬ tisteries of Florence and Pisa also belong to this style. The French Romanesque churches were frequently vaulted, sometimes with bar¬ rel-vaults (Autun, Clermont-Ferrand, Issoire) ; more often with groined vaults as at Caen. The exteriors became increasingly varied and struc¬ turally expressive, with twin towers at the west end and figure sculpture attained high merit (Saint Trophime and Saint Gilles at Arles; Chartres). In parts of central France (Perigueux, Angouleme) domical vaulting betrays Byzantine influence via Cyprus and Venice. The Anglo-Norman churches, often of vast size (e.g., Saint Alban's, over 500 feet long) were almost always roofed with wood over the high central nave, with vaulted side-aisles. Square central lantern-towers, round nave-piers and the carved zigzag are frequent. The Rhen¬ ish abbey churches are noted for their pic¬ turesque masses and many towers: they often have an apse at each end (Worms, Mayence, etc.). In the 12th century many wooden-roofed churches in France, England and Germany re¬ ceived vaulting.

Bibliography.— Consult any of the general histories of architecture (Choisy, Fergusson, Fletcher, Hamlin, Kimball, Edgell, Simpson, Sturgis-Frothingham). Also Hasak, 'Die romamsche und die gotische Baukunst5 (Stutt¬ gart 1899) ; Jackson, T. G., 'Byzantine and Ro¬ manesque Architecture5 (London 1912). For the Anglo-Norman : Bond, F., introduction to English Church Architecture5 (London 1913) ; Scott, G., 'English Church Architecture5 (Lon¬ don 1882). For the French Styles: Baum, Ro¬ manesque Architecture in France5 (London 1912) ; Enlart, ' Manuel d'archeologie fran-Qaise5 (Paris 1902) ; Revoil, H., Architecture romane du Midi de la France5 (Paris 1867) ; Viollet-le-Duc, E., (Dictionnaire raisonnee, etc., s. v. Architecture

monastique. For the Lom¬ bard: De Dartein, (Etude sur l'architecture lombarde5 (Paris 1822) ; Porter, A. K., 'Lom¬ bard Architecture5 (New Haven 1916) ; 'Me¬ diaeval Vaulting5 (New Haven 1910). For Ger¬ many: Hasak (as above) ; Otte, V., 'Geschichte der . romamschen Baukunst in Deutschland5 (Leipzig 1874) ; Kutschmann, T., 'Romanesque Architecture and Ornament in Germany5 (New York 1906). For Spain: Lamperez y Roma, 'Historia de la arguitectura cristiana Espa-nola etc.5 (Madrid 1909).

A. D. F. Hamlin,

rrofessor of the History of Architecture , Columbia University.

je-ro-la'mo ro- -no, Italian painter: b. Brescia, about 1485; d. there, 1565. He was a pupil of Fera-mola in Brescia and between 1509 and 1513 lived at Padua and Venice, where he studied the rich golden coloring of Giorgione and learned the art of reproducing it in his own works. After completing (1519-20) four fres¬ coes in the cathedral at Cremona, he returned to Brescia. All his pictures are remarkable for their skilful composition and splendid coloring, but in his later works his tones become silvery, clear andˆ cold and lose the warm lustre of Giorgione s sunset tints. He painted many

altar-pieces, of which the most remarkable are (Madonna and Child5 and (The Madonna with the Dead Christ* (in Berlin Museum) ; Adora¬ tion of the Infant Christ> (in the London Na¬ tional Gallery, a good example of this painter's manner) ; (Nativity (in the Church of San Giuseppe at Brescia) ; and an Assumption (in the Church of Sant' Alessandro, Bergamo). He also painted some frescoes in the castle of Malpaga near Brescia, the home of the fa¬ mous Colleoni, the commander of the Venetian armies. There are some fine portraits by Ro-manino to be seen at Brescia.

ROMANOFF, ro-manof, the name of the late reigning family in Russia, founded by Michael Feodorovich Romanoff: b. 1598; d. 1645. He was descended through his grand¬ mother from the family of Ruric, the

founder of the Russian empire and came to the throne in 1613 by election of the boyars and the higher clergy. The early part of his reign was troubled by the Poles and by turbulent nobles. Western civilization gained an entrance into the country and many foreigners, particularly Scotchmen, became naturalized. France tried to disturb the commercial monopoly of Eng¬ land in Russia. Michael was succeeded by his son Alexis and the male succession of the Ro¬ manoff family continued until the death of Peter II in 1730, when the crown devolved upon Anne, Duchess of Courland and continued in the succession of the female Romanoffs until the death of Elizabeth in 1762. The latter was succeeded by her nephew, the son of the Duke of Holstein-Gottorp, who ascended the throne as Peter III and established the dynasty of Romanoff-Oldenburg, which ended with the de¬ position of Tsar Nicholas II (q.v.) in March 1917. Consult Bain, R. N., (The First Ro¬ manovs } (New York 1905) and Edwards, H. S., (The Romanoffs: Tsars of Moscow and Emperors of Russia) (London 1890).

ROMANS, Epistle to the. Authorship.—

That the Apostle Paul wrote the Epistle to the Romans is practically undisputed, for the very few critics who have ever denied it (scarcely more than the little ((Dutch School® of the lat¬ ter part of the last century) have found no recognition for either their arguments or their conclusions. The claim of Pauline authorship in the opening address (i, 1) is confirmed not only by unanimous tradition but also by the whole tone and contents of the letter, so that sane historical criticism unanimously asserts it with the utmost positiveness.

Destination.— It is as little to be d<?ubted that the letter was addressed to the Christians in the city of Rome. The name of the city stands both in the opening address and a little later in the same chapter (i, 7, 15), and this is confirmed alike by unanimous tradition and by many things in the letter itself, as, for example, that Paul writes in i, 10-13 and xv, 23, 24, 28, in a fashion which would fit with no other city we can name, especially as we know from Acts xix, 21, that he did have the fixed purpose of visiting that city. While the omission of the name Rome in a few authorities, none of which is of any special value, raises a somewhat per¬ plexing problem for textual criticism, the re¬ sult is such as in no way to shake the confi¬ dence of scholars in the Roman address of the Epistle.

The Roman Church. — The origin of the Christian Church at Rome cannot now be traced. It is probable that many influences and

elements combined to make it. Some Jews from Rome were in Jerusalem on the Day of Pentecost (Acts ii, 10) and they may in some cases have returned to Rome, carrying their newfound faith; when persecution scattered the Jerusalem Christians (Acts viii, 1), some may have wandered as far as Rome; as the facilities for communication throughout the empire were better than they were again anywhere in the world till during the last century, and as the capital of the empire was a great magnet which drew from all over the world, men and women who had elsewhere been converted to Chris¬ tianity may have drifted to Rome in consid¬ erable numbers during the quarter of a cen¬ tury which intervened between the resurrection of Jesus and the writings of Romans. Thus even if one deny the traditions of an Apo¬ stolic origin for that Church, it is easy to see that from the very nature of the case there must have been many Christians in the city when Paul wrote. Many would naturally be of Jewish descent, so that there is nothing improbable in the interpretation which many give to the words of Suetonius narrating the expulsion of the Jews by Claudius, to the effect that the disturbances were not due to the gen¬ eral Messianic hope, but to conflicts based on a difference of opinion as to whether Jesus was the expected Messiah. It is also known that there were many proselytes and others, who were associated with the Jews, being attracted by the lofty spiritual worship of their monothe¬ istic faith and the strict purity of its moral precepts. It has been held by some that the church at Rome was mainly made up of Jewish Christians at that time but the prevalent opin¬ ion seems to be fully justified, especially by what we find in the letter itself as well as by the probabilities of the case, that the dominant element in the church was Gentile, as was doubtless already true almost everywhere out¬ side of Palestine.

Date and Place. — From the epistle itself (xv, 25) we learn that it was written just be¬ fore Paul's visit to Jerusalem to carry up the great collection which he had gathered from all the churches which he had founded. From Acts xx, 3, we learn that Paul spent in Corinth the three months before setting out on this journey, and everything fits with the view that this Epistle was written during the period of comparative leisure and calm which this visit may well have afforded him. There are also greetings at the close of the letter (xvi, 23), which are best understood as from Corinthian Christians, and Cenchrese, from which place Phoebe, the bearer of the letter, was to set out, was close by Corinth. While most of Paul's letters can be dated with satisfactory certainty so far as the relations to other events in his life work are concerned, there still remains much uncertainty as to the calendar years to which these events should be assigned. The date

usually given to the stay in Corinth and the writing of Romans is the winter of 57-58, but some chronologists date the events accom¬ panying its composition several years earlier.

Integrity. — There has been much discus¬ sion as to whether we now have the Epistle to the Romans in the form in which it was sent

to them by the Apostle, or whether it now con¬ tains material which has been added to its orig¬ inal form. This question relates mainly to the last two chapters. It is known that Marcion in the 2d century rejected these chapters, and there seems to be some evidence that such a shorter edition was in circulation in other cir¬ cles of Christians. The doxology which in the Greek Textus Receptus, the Vulgate and the English translations stands at the end of the present Epistle (xvi, 25-27), is found in a con¬ siderable number of manuscripts, some ver¬ sions and the works of several Fathers at the end of chapter xiv, while in a very few au¬ thorities it stands in both places. Also a sys¬ tem of notation for reading in church seems to have ignored all which comes after the end of the fourteenth chapter except the doxology. These facts may, however, be explained on either of two hypotheses, either that the section from xv, 1, to xvi, 24, was passed over in select¬ ing Scripture readings for public use, and that this influenced copyists to drop it out, or that a shortened form of the Epistle was circulated for a time, possibly with Paul's own authority, as a sort of treatise or circular letter. The latter hypothesis would also furnish an expla¬ nation of the omission in two manuscripts of the words ((in Rome® (i, 7, 15). A strong argument in addition to the overwhelming ex¬ ternal evidence in favor of the text as it stands is the unity of the section xv, 1-13 with chapter xi v, which seems to show decisively that this was part of the original letter, and conse¬ quently that it could not have ended with xiv, 23. It is also held by some critics that the many salutations of xvi, 1—16, could not have been intended for the Christians in a city which Paul had never visited, and, therefore, that a letter of recommendation for Phoebe addressed to some other church, most probably Ephesus, has in

transmission become combined with the letter to the Romans. There is, how¬ ever, no real impossibility in the view that those whom Paul saluted may have been resid-mg in Rome at the time. Some are known to have had a connection with Rome, as Prisca and Aquila, who may well be presumed to have returned from Ephesus to their old home as soon as practicable; many of the names fit quite as well in Rome as in Ephesus, especially the melition of the households of Narcissus and Aristobulus ; and it has also been noted that the salutations are always more numerous in letters to churches where Paul had not worked than where he had, and he might well have desired to strengthen his hold in Rome by every pos¬ sible appeal. Finally, it has been doubted that the closing doxololgy (xvi, 25-27), could have been penned by the Apostle, but against its gen¬ uineness can be urged only subjective impres¬ sions, the weight of which is fully neutralized by the equally trustworthy feeling of a much greater number of critics who find the doxology to be alike in sentiment and in expression clearly Pauline. On the whole, the conserva¬ tive position,, that we have the letter in the form in which Paul wrote it, has been by no means overthrown and is held by the majority of scholars with as much confidence as ever.

Occasion and Purpose. — It has sometimes been said that this Epistle is really a treatise rather than a letter, that Paul deliberately set about giving a systematic exposition of his the¬

ology. But it is to be noted that the exposition is far from being a complete statement of Paul's doctrinal views, while on the other hand there is much in the book which is truly episto¬ lary in character, so that this view cannot sat¬ isfy. Others have held that it was purely a controversial and polemic document, an en¬ deavor to counteract the work of Judaizers at Rome as he had met them elsewhere. But while the arguments used are doubtless those which Paul had often used in controversy with his antagonists, yet the controversial note is much subdued, as will be seen if Romans is compared with Galatians, and there are no tokens that the Judaizers had already begun work at Rome, at least so far as Paul knew, though it may be that the vigor and sternness of the warning in xvi, 17—20, is due to news that the danger was less remote than he had hoped. The real purpose of the letter is best seen in connection with its occasion. Paul, who since leaving Antioch had worked only among churches of his own founding and had made them in turn in some sense a basis for his further work, now hopes to go to Rome where there are already numerous Christians, and after working there for a time to go on to Spain in

further missionary endeavor. It is important, in order that his work among them may be successful, that they should have a clear idea of the way in which he presented his (Gospel. > Accordingly he makes a some¬ what full and systematic statement of the truths which he chiefly presented in his preach¬ ing, man's sin and God's grace of salvation through Christ. Necessarily reviewing to a great extent the various arguments used in con¬ troversy with the Judaizers, he makes a clear and well-reasoned statement in a form as con¬ ciliatory as possible, in order that so far as it could 'be secured in this way he might find a welcome and help in his work when he reached Rome.

Contents. — The epistle naturally falls into four main divisions, the first two of which are doctrinal, the third relates to the problem of the unbelief of Paul's own nation, and the fourth is ethical. After an epistolary address expanded beyond parallel (i, 1-7), and some pleasant words about his desire to visit the Roman Christians (i, 8-15), he states in i, 16,

17 the theme with which he is to deal, viz., that the Gospel is the divine power to save. The truths, in regard to this salvation lie develops first in relation to forgiveness of sin (i, 18— v, 21), and then in relation to the spiritual consequences of this salvation as shown in the life of faith and goodness (vi, 1-vm, 39). It. may be remarked that the signifi¬ cance and importance of the truths brought .section have been too much ignored both by friends and opponents of Paul's doc¬ trine and that men have too much failed to see that to him salvation was not a mere matter of release from the penalties of sin, but was also an inward and spiritual fact, that the right character and life by the power of the indwelling Holy Spirit is an essential part of the salvation which he preached. In chapters 1X—X1 trie author deals with the problem how it was that the Jews as a nation did not accept Christianity. The concluding section

Axll» .AY1' 1S devoted to injunctions to live rightly in all the relations in which the

Christian finds himself. The whole book is dominated by an unparalleled note of catho¬ licity and universality. All men are sinners and need a Saviour : salvation through Christ is for all men: even the unbelief of the Jews was in order that God might have mercy on all.

Value. — The epistle to the Romans has proved itself one of the greatest ((books of power® which the world has ever seen. It is a masterful, though of course unconscious, revelation of what the great Apostle himself was. As Jiilicher says: (tIn chaps, i-iv we have the Rabbinical schoolman, in viii and xi the inspired poet, in xiii and xiv the sober, careful director of conduct and in ix the bold thinker who follows out to its logical conclusion the argument which makes all things begin and end in God. The Romans would not be able to disregard such a man or to lock their hearts against him, unless they had previously deter¬ mined to make no terms with him whatever.® The influence of the thought it contains has been immeasurably vast and farreaching. While it was somewhat overlooked for centuries, . its influence on the spiritual life of Protestantism due to its rediscovery by Luther has been in¬ calculable and this influence in varying meas-sure continues to this day among the most pro¬ found Christian thinkers. Luther styled it <(the chief book of the New Testament and the purest Gospel.® Godet said : ((M. de Pres-sense has called the great dogmatic works of the Middle Ages (the cathedrals of thought.5 The Epistle to the Romans is the cathedral of the Christian faith,® and the philosopher Cole¬ ridge called it <(the profoundest book in exist¬ ence.®

Bibliography. — Denney, Jas., Commen¬ tary on Romans5 (Expositor's Greek Testa¬ ment, 1897) ; Lake, K., (The Earlier Epistles of Paul5 (1911) ; Moffatt, James, introduction to the Literature of the New Testament5 (1911) ; Sanday, Wm, and Headlam, A. C., Commen¬ tary on the Epistle to the Romans5 (Inter¬ national Critical Commentary, 1895) ; Zahn, Theodor, introduction to the New Testament5 (Eng. trans., Vol. I, 1909).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

ROMANTICISM. The word <(Romantic» is derived from the old Romanic or Romance languages, which were formed by a fusion of Latin as spoken by the common people of Italy with the native tongue of the northern bar¬ barians who invaded that country. This Ro¬ mance speech naturally assumed a variety of forms, but it reached its highest development in Provence, in southern France, where it be¬ came an important instrument of popular liter¬ ary expression, especially during the 11th and 12th centuries. The compositions which ap¬ peared in this vernacular tongue were generally tales and ballads in which the adventures of knights in pursuit of honor, or in devotion to the Christian religion, or the enthusiastic deeds of chivalry, and the spirit of loyalty and rever¬ ence for women were portrayed. Another mark of this literature is its evident fondness for events that are strange, mysterious and supernatural. The name ((romance® then, first applied to the language in which those com¬ positions were written, came afterward to refer

to the prevailing characteristics which they dis¬ played, as contrasted with the works written in Latin, which were termed <(classical.® Dur¬ ing the 18th century, which delighted to term itself the ((Augustan Age,® and prided itself upon its purity and refinement of taste, the classical models and modes of expression were regarded as furnishing the only correct stand¬ ards, while the literature and aft of the Mediae¬ val Period was regarded as barbarous, and its whole mode of thought and life to be char¬ acteristic ot Dark Ages that were unworthy of the attention of a cultivated man. At the close of this century, however, and during the early decades of the 19th, a marked change mani¬ fested itself in the whole tone and tendency of the intellectual life of the time. This mental revolution, which is known as the Romantic Movement, affected all departments of thought, and all artistic and literary standards and modes of expression. From the first this movement showed a consciousness of its opposition to the generally received intellectual conceptions and prevailing artistic and literary standards of the time, though this contrast was less violently emphasized in England than in Germany and France. Goethe noted and commented upon the difference between the old tendency and the new, describing it as equivalent to that between the (<diseased® and the <(healthy® ; while Schiller contrasted them as the ((naive® and the <(sentimental.® It was Friedrich Schlegel who first employed the terms ˆclassic® and “romantic® to characterize this opposition. Since that time many writers have undertaken to define and explain the

fundamental distinctions between these tendencies, especially as they express themselves in art and literature. The following points appear to be most significant: (1) The main marks of classicism are simplicity, direct¬ ness and nobility, and perfection in achievement. In a classic work of art there are no evidences of a lack of harmony between the ideas and the medium, no suggestion of something remaining that cannot be expressed. As a consequence, the personality of the artist is not expressed, the artist is lost in his work, which stands imper¬ sonal and objective. He does not show us his own attitude toward the subject matter, his emo¬ tional struggles and the play of his life. The Romanticist, on the other hand, puts himself into his work; it is no disembodied idea of beauty that he seeks to express, but his own personality, the longings, hopes and ideals of a spirit that has a tendency toward the infinite, and which, therefore, can never express itself in any finite and objective medium. Classicism is thus always definite, objective and complete, while Romanticism is always touched with sub¬ jectivity, and thus with a suggestion of incom¬ pleteness, which is due to the fact that it seeks to convey the mystery of spirit for which no objective mode of expression is adequate, and which, therefore, can only be symbolized and vaguely suggested. (2) As Romanticism en¬ deavors to express what is strange and mysteri¬ ous in the life of spirit, it naturally seeks its material in the past and feels itself especially in sympathy with the Middle Ages, when the aspi¬ rations of the spirit, its love of adventure and sense of the mysterious expressed themselves in quests for the Holy Grail, in crusades and gallant deeds of chivalry and knight-errantry.

Thus a sympathy with the past, a new interest in humanity as such, marks Romanticism. (3) Just because classicism sought to express the idea of beauty in definite and objective form, it was possible to lay down fixed canons of pro¬ cedure and so to render the result formal, pre¬ cise and almost mechanical. Romanticism, how¬ ever, aims to represent what is inner and sub¬ jective, and, therefore, necessarily protests against making art stilted and formal by the application of external rules and mechanical standards. Art, the Romanticists declare, must spring from the untrammeled expression of the free spirit of the man of genuis. ((The will or caprice of the poet,® as Schlegel says, <(admits no law above itself.®

The Romantic Movement. — The romantic movement may best be understood if we regard it as a part of the general intellectual revolu¬ tion of the 19th century, and as one in spirit with the historical and scientific spirit of mod¬ ern times. The entire spiritual attitude of mod¬ ern life, as contrasted with that of the 18th century, may be characterized as a new con¬ sciousness of infinite possibilities and boundless aspirations. The spirit knows itself as infinite and is also conscious of the infinite task set for the individual through its own demand for ex¬ pression and realization. The new tendency turns away in disdain from the mechanical con¬ ceptions and formal syllogisms in which the 18th century had self-complacently summed up the universe, it laughs to scorn the unintelli¬ gent and formal imitation of classical models that bases itself on ancient canons ; it denounces the ethical principle of prudence; it declares that the infinitely mysterious law of life cannot be comprehended by the principle of self-love; it refuses to believe in a transcendent God. The new movement is thus romantic through and through, filled with a sense of mystery and wonder, with the love of adventure and dis¬ covery, and with the buoyant spirit of aspira¬ tion. As Wordsworth says: ((In that dawning age ’twas bliss to be alive, but to be young was very heaven.® This tendency to advance to new achievements manifested itself in many and various directions. In philosophy it led to a new and fruitful attempt to comprehend in more adequate terms God, nature and the place and significance of man’s life in the universe. The result of this is seen in the systems of Kant and the German idealists. On another side the new interest in man and the affairs of man’s life has given rise to the modern his¬ torical movement which has made its influence felt in every department of

thought and cul¬ ture. It is this historical interest, united with the Romantic spirit of adventure and discovery, which is just the assertion of the confidence of Reason in itself, that has called into being the evolutionary sciences of nature. The concept of evolution has transformed the older view of nature, just as it did our view of man when it was earlier applied to illumine his social, ethical and religious life. For evolution is just an attempt to explain the world by showing the relations between things as parts of a single living process. It, therefore, always emphasizes organic relationships and views things as parts or stages in a dynamic process, instead of taking each thing as something static, an ele¬ ment existing in isolation as something in itself

independent and having only external relations to other things. The Romantic movement in art and literature must also be regarded as an exˆ- pression in different fields of essentially the same attitude of self-assertion and consciousness of the creative movement of life that is mani¬ fested in philosophy and the new sciences of history and biology.

Romanticism in England. — In England a new spirit was perceptible in literature soon after the middle of the 18th century. This new movement, however, was not so intense or so fundamental in scope as its counterpart in Ger¬ many, which began a little later. For the intro¬ duction of a natural literature into England, expressing a sympathy with nature and an interest in the past, while disregarding the rigid canons of the Augustan Age, was in a way but the restoration of the healthy natural traditions that had expressed themselves in Chaucer and Spenser, in Shakespeare and Mil-ton, and in the folk-songs and ballads, which were collected and edited by Thomas Percy in his (Reliques of Ancient English Poetry,* in 1765. It was thus not marked by the keen sense of opposition to the prevailing system that characterized the tendency in Germany, and at a later time, also in France. Moreover, perhaps for this very reason, it did not penetrate so deeply into the spiritual life of the people, or show its effects markedly in all departments of intellectual life, as in Germany. It appears mainly as a literary movement, with which is connected some new tendencies in painting, and also as a revival of interest in Gothic architecture, which Horace Walpole did much to promote. But the movement did not involve a fundamental transformation of philosophical and scientific conceptions. This transformation came about at a later period during the 19th century, and was largely the result of the in¬ fluence of German thought as represented by

Coleridge and Carlyle, aided by Darwin's dis¬ covery and applications of the doctrine of evolu¬ tion. The names of Gray, Cowper, Scott and Burns are usually placed among the English Romanticists, as well as those of Wordsworth, Coleridge, Southey, Byron, Shelley and Keats. A little later we have the revival of interest in Dante, which culminates in the pre-Rap'haelite movement.

The Romantic School in Germany. — Less¬ ing stands as the first to challenge the canons of the classic art and literature. Herder is at once the pioneer of the modern historical method and one of the first to appreciate the value of what is natural and spontaneous in literature. Influenced no doubt by the publica¬ tion of Percy's ˆeliques,* he made a collection of the folk-songs of Germany. In Goethe's lWerther> and Rousseau's <Confessions) we have two books of nearly the same date that show many of the marks of extreme Romanti¬ cism. The name ((Romantic school,® however, is usually applied to a group of men whose main centre of activity was first at Weimar and Jena and afterward to some extent at Berlin, and whose work extends from about 1775 or '80 to 1806. The main names of this school are the brothers Friedrich and A. W. Schlegel, the philosopher Schelling, Novalis (whose real name was Friedrich von Hardenberg), Ludwig Deck and the theologian Schleiermacher. The

main result of this movement was philosophical and aesthetic, though it led to some important results in the way of historical investigations. Heine, lmmermann, Freytag and von Scheffel all exhibit the characteristic Romanticist fond¬ ness for the picturesque and the mediaeval. Another group of men — Uhland, the brothers Grimm, von Arnim, J. Gorres and Brentano, who represent a more distinctly literary move¬ ment with strong national characteristics — are often called the younger Romanticists, whose centre of activity was at Heidelberg, where their organ, the Zeitung fur Einsiedler, was published.

Romanticism in France. — We have seen that Rousseau may in a sense be called one of the earliest Romanticists. As a result of the Revolution

and the prolonged Napoleonic wars, literature received little attention in France dur¬ ing the years that were most fruitful in Ger¬ many and England. Chateaubriand and *Mme.* de Stael are sometimes said to be the fore¬ runners of Romanticism in France. But the tradition of classicism was strongly intrenched, and even Victor Hugo at first adhered to this standard. But in 1826 in the (Odes and Bal¬ lads, } and in the following year in the preface to the play entitled (Cromwell, > he declared his allegiance to Romanticism, and at once became the leader in a new cause into which he threw himself with all the fervor of his enthusiastic nature. Besides Hugo, the principal French Romanticists are Alf. de Musset, Ch. Nodier, George Sand, Th. Gautier and Balzac.

Bibliography. — Royce, (The Spirit of Mod¬ ern Philosophy } (New York 1892), Lecture 6; Brandes, George, (The Romantic School in Germany > (1902) ; (Die romantische Schule in FrankreidP (1897) ; Gautier, Th., (Histoire du romantisme) (Paris 1872) ; Hegel, (Aesthetik,) (see Sections on Classical Art and Romantic Art ; English translations by W. M. Bryant, and in abridged form by B. Bosanquet, London 1886) ; Hedge, F. H., (Classic and Romantic) (in volume entitled (Martin Luther and Other Essays,) 1888) ; Heine, H., (Die romantische Schuleˆ (1833; Eng. trans. 1882); Boyesen, H. H., (Essays on German Literature) (1892) ; Beers, H. A., (A History of English Romanti¬ cism in the 18th Century) (New York 1899) ; (A History of English Romanticism in the 19th Century) (New York 1901).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

ROMANUS I, ro-ma'nus, Lecapenus, By¬ zantine emperor : d. Island of Protea, 948. He served in the imperial navy, and was in com¬ mand of the Byzantine fleet on the Danube in 917, when hearing of the defeat of the army at Achelous, he at once set sail for Constantinople. His designs on the throne were furthered by his popularity with his sailors and the people, and after the marriage of his daughter, Helena, to Constantine VII he rose steadily in power, and in 919 was crowned colleague with his son-in-law. He exercised so much influence over the latter as to make him the real ruler until 944, when Constantine, aided by the sons of Romanus, caused him to be carried off to the island of Protea, where he was forced to become a monk, while Constantine was pro¬ claimed sole emperor. vol. 23 — 42

ROMBERG, Moritz Heinrich, German pa¬ thologist and neurologist: b. Meiningen, 11 Nov. 1795; d. Berlin, 17 Jan. 1873. He was educated at Berlin and at Bonn. He became priva docent at Berlin in 1828, lecturer there in 1830, and from 1840 until his death he was professor of pathology and therapy. He made important contributions to knowledge of the nervous system, several of his discoveries being named for him. In methods of diagnosis of nervous diseases he made notable progress, which is detailed in his (Lehrbuch der Nerven-krankheiten) (1840-46; Eng. trans., Sievekind, E. H., (A Manual of the Nervous Diseases of ManP 1853).

ROMBLON, rom-blon', Philippines. (1) A province consisting of a group of islands in the Visayan Sea, lying east of Mindoro and south of Luzon; they are near the centre of the archipelago, and the most northern islands of the Visayan group; area, 515 square miles. The northern islands of the group form with the islands of Mindoro and Marindique clear, deep channels, much frequented by Philippine boats ; the islands are also indented with well-sheltered inlets and bays. The majority of the inhabitants of the province are Visayans ; some Negritos are found on the island of Tablas, and Manguianes in Tablas and Romblon. Civil government was established in 1901. Pop. 55,339. The islands constituting the province are as follows: (a) Banton, the most northerly island of the group ; the surface is rugged ex¬ cept in the southeast ; the soil is sterile and few crops are raised; the chief industry is the min¬ ing of gypsum, an excellent quality of which is found; area, 11 square miles; (b) Carabao, the most southern island of the province; its chief physical characteristic is a central cone-shaped summit, from which the land slopes regularly to the sea; it is heavily wooded, but not in¬ habited; area, 19 square miles; (c) Dos Her-manas, two islets of rock, separated by a chan¬ nel two miles in width'; area, one square mile; (d) Maestre de Campo, the most western island of the province; it is circular in shape and mountainous with steep shores ; it contains one small village on the east shore; area, three square miles ; (e) Romblon, the third island in size, giving its name to the group on account of central location and mineral wealth; (/) Sibuyan, the second largest and most eastern island of the group (see Sibuyan), and (g) Tablas, the largest island (see Tablas).

(2) An island of the province of Romblon, lying midway between Sibuyan and Tablas, on the route of steamers passing through San Ber¬ nardino Strait and Verde Passage; area, 50 square miles. A central mountain range tra¬ verses the island from north to south, with spurs extending toward east and west. The chief occupation of the people is cattle raising; valuable deposits of quartz, marble and slate are found and quarried; the marble is exported in large

quantities. This island is the seat of gov¬ ernment for the province.

(3) Pueblo, capital of the province of Rom¬ blon, situated on the northwestern coast of the island of Romblon, the largest town of the province; it has an excellent harbor, one of the best of the Visayan group, and-is the com¬ mercial center of the island. It has some old

fortifications originally built to defend it from pirates. Pop. 6,764.

ROME, Ga., city and county-seat of Floyd County, picturesquely situated at the junction of the Oostanaula and Etowah rivers, which at this point form the Coosa River. It is situ¬ ated 72 miles northwest of Atlanta, 195 miles northeast of Selma, Ala., and 73 miles south¬ west of Chattanooga. Rome is on the Central Railroad of Georgia, the Southern Railway, the Western and Atlantic, and the Rome and Northern, the Nashville, Chattanooga and Saint Louis railroads. Both the Coosa and Oostanaula rivers are navigable. Rome has many modern business blocks, handsome churches and public buildings. Shorter University for Women is here located. It also has a United States post office and courthouse, opera-house, fine school buildings, municipal and library buildings, and national and State banks. There is a large and increasing trade here in cotton manufacturing and general merchandise. In the city and contiguous thereto are numerous cotton mills, planing mills, furniture factories, iron foundries, plow and scale works, ice mill, cottonseed oil mill, sash and door factories, tanneries, twine works, brickyards, sewer pipe works, tents, awnings, boxes and crates, mat¬ tresses and other smaller industries. The as¬ sessed property valuation of Rome is over $6,000,000. Rome was incorporated as a city in 1847 and is governed on the commission plan since 1915. It has an electric light plant and

09ˆ0ˆ*13ˆ252 n<ˆ a S*reeˆ railway system. Pop.

ROME, the capital of the Roman republic and empire, the Holy See, and of the kingdom of Italy since 1871, is in 41° 53′ 54″ N. latitude (more than a degree further north than New \ork City) and 12° 28′ 50″ E. longitude from Greenwich. Pop. about 539,000. Its nearness to the Mediterranean on the south and the Apennines on the east strongly influence its cHmateˆ The average temperature in winter is 49ˆ2 F . and in summer 74-1/2° F. Snow, ice aftd frost are infrequent. Foreigners regard the summer as rather oppressive, but as there is both a mountain and a sea breeze the nights are reasonably comfortable except in July. The Tramontana wind from the Alps is bracing but menacing to those not warmly clad. The sirocco from the African desert is enervating and productive of nervous disorders — a fact recognized by the old law in Rome and held an attending circumstance” in cases of crimes of blood. The city is efficiently

drained by means of some of the ancient cloaca and by modern culverts ; intramural burial is no longer practised; the streets are well cleaned; the plumbing is of the best type ; slaughter-houses have been abolished and the abattoir substi¬ tuted; meat, fruit and vegetables are rigidly inspected, and in all respects the sanitation has been so careful that the death rate has been reduced from 30 to 19 in the thousand. The Acqua Marcia (built 140 b.c. ; restored 1869) brings water from the Sabine Mountains, a dis¬ tance of 56 miles. Although strongly impreg¬ nated with lime, the water is pure and excellent.

The city is situated on both sides of the liber about 16 miles from its contact with the sea, surrounded by the Campagna, the vast prairie stretching from the Mediterranean to

the Alban Mountains and the Sabine Hills, the granary of Rome and the grazing country from which are drawn, in large part, its supplies of moat, milk and butter. Measured by its extent, but a small part of the city is on the right bank of the river. This Transtiberine part — in two sections, the Borogo and the Trastevere — extends over the low ground beneath the \atican Hill, north of the ancient Janiculum. This eminence is crowned by the Vatican, the residence of the popes, the largest palace in the world, containing more than a thousand rooms, halls and chapels, and covering more than 13 acres. The Vatican, the Lateran and the. Castello Gandolfo are outside of civic jurisdiction.

kjuuui ui uie vaucan is saint deter s, on the site of Caligula's circus, the scene of the torture of Christians by Nero. This chief shrine of Roman Catholicism (described hereafter) is the largest church in the world and occupies nearly four acres. It had its beginning as a basilica erected by Constantine. In the course of its development it came under the creative genius of Michelangelo and received from him its most striking feature, the great dome. Saint Feters tomb is under the high altar.

The Rome on the right bank of the Tiber is of modern development and is the home of the working class, by speech and appearance some¬ what differentiated from the people of the Rome of the left bank. The Tiber enters the aty from the north and issues from it at the southwestern base of the Aventine eminence. In its course of three or four miles it is spanned by 11 bridges.

Modern Rome on the left bank occupies the plain anciently known as the Campus Martius north of the seven hills of the regal and re¬ publican city. The Piazzo del Popolo is to Rome, in a measure, what the Place de l'Etoile !?. to Pans. From it radiate great arteries of ˆjdjbution of the city's outdoor throng and traffic 1 he chief of these is the Corso Um¬ berto I, called simply the Corso, leading, along tne western base of the Pincio, to the Capitoline and to a panoramic view of ancient Rome be-yond the hill. It is the successor of the ancient

I-ata and is. continued north of the city by the Via Flaminia. The Via Fernandlno di bavoia runs due west from the piazza, crosses the liber at the Ponta Margherita (the north-ermost bridge, within the city) and is continued

Jjy A-a dl Rlenzi to the Vatican. The Via di Ripetta, passing southward from the Piazza del Popolo, parallels the river and unites with e \ la della Scrofa where the Senate sits in the Palazzo Madama. The Via del Babuino leaves the Piazza del Popolo on the left or east side of the Corso and ends at the Piazza di ˆpagna and the English quarter, into which the §cala * Spagna descends (137 steps) from the SS. Innita de Monti. From this Piazza the via del Babuino continues to the Quirinal and thence, through a tunnel, to the Esquiline.

The Piazza di Venezia, in which the Corso terminates, is the tramway centre of the city On the southern side of this square is the im¬ posing monument to Victor Emmanuel II a ter designs by the late Count Sacconi, rising in the centre of a colonnaded platform to a height of more than 200 feet. The platform is approached by massive flights of steps. The

monument was a quarter of a century building and cost about 25,000,000 francs. From the Piazza di Venezia the broad Via Nazionale runs a general course northeast between the Quirinal and the Viminal Hills to the Church of Santa Maria degli Angeli, a minute's walk from the railway station (Stazione di Termini), opposite the Baths of Diocletian. In the reverse direc¬ tion this great street is continued — under the names of the Via del Plebiscito and the Corso Vittorio Emanuele — westward to the Tiber op¬ posite the Villa Barberini. In a fairly accurate way it is the boundary between the area of ancient Rome and that of the modern city on the left bank of the river. Important streets south of this line are the Via Cavour and the Via Alessandrina, which pass the site of the Forum of Vespasian; the Via S. Teodoro (the Vicus Tuscus), traversing the ancient Velabrum ; the Via dei Cerchi between the Pala¬ tine and Aventine, running through the site of the Circus Maximus, and the Via di Porta S. Sebastiano, touching the tomb of the Scipios and the arch of Drusus, and ending at the ancient gate to the Appian Way. Other im¬ portant squares and streets : the Piazza Bar¬ berini adjacent to the Palace; the Piazza Colonna in the centre of the city, with a column of Marcus Aurelius, and nearby the Piazza di Monti Citoria, on which stand the Chamber of Deputies and other government offices; the Piazza San Pietro with its artistic colonnade, in front of Saint Peter's, and the Vatican; the Piazza di Navona with a fountain and two churches ; the Piazza del Campidoglio in front of the Capitol, having the perfect equestrian statue of Marcus Aurelius, celebrated as win¬ ning Michelangelo's special regard ; the Piazza di S. Agnese, a martyred saint; the Piazza di Navonna, .containing the famous statue, a noble Greek work of Pasquino (hence the term "Pasquinades®) where for a long time satires of the day, directed against the Pope or nobility and prevalent follies, were posted; the Piazza di Montanari, where from time im¬ memorial peasants contracted with landowners for the season's farm-work; and in the new quarter, embracing the Esquiline, Viminale and a portion of the Pincian Hill, besides the Inde-pendenza, are the Piazza di Dante, Vittorio Emanuele, Esquilino, Guglielmo Pepe, *etc.*

Before the railroad was built most travelers entered Rome by the Porta del Popolo, at the northern extremity of the city and but a short distance from the piazza of that name. Those bound for Tuscany depart thence along the Via Flaminia. Just outside is the Villa Borghese, officially styled Villa Umberto Primo since its purchase and transfer to the city as a public park.

The Porta Pinciana is less than a mile east of this gate, and the Porta Pia is a half mile still further on, along the Corso d'ltalia. The Via Venti Settembre begins at the Porta Pia, near which the Italian troops entered Rome Sept. 20, 1870, and runs to the heart of the city near the Quirinal. From this gate the Via Nomentana leads across the Anio to Mons Sacer, where the plebeians took refuge during the secession movement which ended in the recognition of popular rights. A mile south is Porta San Lorenzo, the ancient Tiburtina, from which excursions leave Rome for Tivoli.

Along a lane inside the wall, going south across the railroad, one reaches the Porta Maggiore, which was originally an archway in the Acqua Claudia (a.d. 52), which brought water from Subiaco, 42 miles from Rome. Palestrina is reached from the gate over the ancient Praenestina. The Porta S. Giovanni is the gate of departure from Naples, and the Porta S. Sebastiano, the southernmost gate of the city, is the port of departure for the tombs and other places of interest along the historic Appian W ay.

Government. — The government of Rome is administered by a communal council, a munici¬ pal council and a syndic. The municipal council is a modified board of public works and the syndic is the administrative chief; both are elected by the communal council from the mem¬ bership of that body. The syndic is a member of the government. The executive power of the state belongs exclusively to the sovereign and is applied by ministers, of whom there are 13, one without portfolio: The Interior, Foreign Affairs, the Colonies, Justice and Ecclesiastical Affairs, the Treasury, Finance, War, Marine, Public Instruction, Public Works, Agriculture, Industry and Commerce, and Posts and Telegraphs. The legislative authority is the joint concern of king and Parliament. Parliament consists of the Senate and the Chamber of Deputies, the former composed of the princes of the royal house, who are over 21 (they may not vote until they are 25 years of age), and of an unlimited number of members over 40 who are nominated for life by the king. The total membership usually exceeds 400. The House of Deputies has a larger mem¬ bership, now

somewhat more than 500. The number is determined by the population — one deputy to every thousand. The Parliament sits in the Camera de' Deputati, in the Piazza Colonna. The Quirinal Palace is the residence of the royal family and the chief government bureaus are on the Quirinal Hill or near by.

Religion, Churches, *etc.* — The Roman Catholic Church is in name the ruling religion, but church and clergy are subordinate to the civil government, which guarantees freedom of worship. The law of 1873 abolished the legal status of religious corporations, and they cannot hold property. The revenue from lands des¬ tined for charity or schools is now administered by the city, and by each commune; the income from monastic parish church property in Rome belongs to the parish churches, and that from property of foreign religious orders in Rome ' — about $80,000 — goes to the Holy See. Saint Peter's and its precincts, the Vatican Palace and Saint John Lateran belong to the jurisdic¬ tion of the popes. More than 95 per cent of the population of Italy is Catholic. Rome is a city of churches. Any good guide book records more than a hundred as worthy of a visit. Among those of most ancient foundation still in use are Santa Pudenziana, traditionally the oldest, dating from Saint Peter's establishment of a place of worship in the house of Pudens; S. Maria, in Transtevere, founded in the be¬ ginning of the 3d century ; San Paolo, Fuori le Mura, on the spot where the body of Saint Paul is entombed, S. Agnese, and S. Lorenzo Fuore, all credited to Constantine. Saint Peter's, of course, ranks first among Roman churches. It

was founded by Constantine on the site of the Circus of Caligula, where Saint Peter suffered martyrdom, and is gorgeously decorated with gold mosaics and marble. Bramante, Raphael, and Michelangelo were the chief architects. Bernini filled it with the sculptures of his con¬ temporaries and many monuments line the pil¬ lars and fill niches. The Pieta is one of the notable sculptures of Saint Peter's. The great dome is a marvel of architectural skill. The faqade is 357 feet long and 144 feet high, and over the central entrance is the loggia, where the Pope is crowned and whence he gives his Easter benediction. Over the main entrance of the vestibule is the celebrated ˆMosaic of the Novicella (1298), by Giotto and Cavallini. The magnificent central door of bronze is a remnant of the old Basilica (1431-39). The enormous size of statues and ornaments in Saint Peter's are deceptive as relates to the vast proportions of its interior, which is only realized by ob¬ serving the moving, living figures of people. Around the shrine under the dome, 86 gold lamps burn continually. Wonderful mosaic pictures are among the countless gems which enrich this noble temple. Its interior has the form of a Latin cross with chapels on the sides. Many princes of the church lie buried in the crypt. The Vatican, the present residence of the popes, is a vast collection of palaces, com¬ prising the old and new palaces of the popes, the Sistine Chapel, the Loggie and Stanze, the picture gallery, museums and library. Raphael's wall frescoes rank above all his other work, and in the (ScJiool of Athens) and <Disputa,) the ˆTransfiguration,* 'Driving Heliodorus from the Temple,* and other frescoes of the Stanze and Loggie, he evinces astonishing theological wisdom and philosophical erudition. Each stanza attests to his deep reflection and rich imagination ; detail and general effect are equally studied, resulting in a perfect harmoni¬ ous whole. In the Sistine Chapel, the (Last Judgment* is Michelangelo's chef d'ceuvre.

S. Giovanni in Laterano, on a lonely site near the south wall, was built by Constantine, but has since been rebuilt, altered and extended by Giotto and others under various popes, and the high church councils are held there. Other churches are S. Maria Maggiore, in whose construction antique bronzes, gold and marble from pagan temples were largely used, also beautiful mosaics of the 6th century. S. Croce, erected by Saint Helena, the nave of which was borne by eight antique columns; Saint Clem¬ ente, the most perfect specimen of old basilica, contains frescoes by Masaccio; II Gesu, the principal church of the

Jesuits, with the fagade and cupola by Giacomo della Porta, and whose interior is rich in marbles ; S. Maria degli Angeli, originally a part of Diocletian's Baths, transformed into a church by Michelangelo, an imposing church, contains an altar-piece by Muziano, and a fine fresco by Domenichino, and the tomb of Salvator Rosa; S. Maria in Ara Cceli, remarkable for its architecture and very old; S. Maria in Cosmedin at the north base of the Aventine, remarkable for its Alex¬ andrine pavement and its lofty and beautiful campanile of the 8th century; S. Maria sopra Minerva, notable as the only Gothic church in Rome; S. Maria in Dominica or della Navicella on the Caelian, with 18 fine columns of granite and two of porphyry, and whose frieze of the

nave was painted in Camiean by Giulio Romano and Perino del Vago ; S. Maria della Pace, in¬ teresting for its paintings, particularly the four sybils, considered among the most perfect works of Raphael, and S. Maria del Popolo, notable for its sculptures and paintings ((Jonah* by Ra¬ phael, ceiling frescoes by Pinturicchio, and mo¬ saics from Raphael's cartoons by Aloisio della Pace). In S. Pietro in Vincoli is the celebrated 'Moses* of Michelangelo, by some critics re¬ garded his best work of sculpture.

The Catacombs are subterranean passages, ex¬ tending many miles by winding passages under¬ ground, used as sepultures and meeting places by the early Christians ; niches in the walls of tufa were used to bury their dead. The pas¬ sages are narrow, except occasionally when they open into wider spaces used for chapels of worship, and often frescoed. The decoration is characteristic and significant, usually repre¬ senting Christian hope and doctrine. Pictures are frequently symbolic. A large collection of sarcophagi, pictures and inscriptions from the catacombs, are preserved in the Lateran Mu¬ seum. The catacombs extend around the city in a wide circle; the most important are the Cata¬ combs of Calixtus on the Via Appia; those of Domitilla or Saints Nereus and Achilleus; Saint Praetextatus, Via Appia; Saint Pris¬ cilla, beyond the Porta Salara; Saint Agnese, Via Nomentana; Saint Sebastiano, beneath the church of that name; Saint Alessandro; and the Jewish Catacombs and those of Mithras of the Via Appia. Among the finest sepulchral monuments, the chief were the Mausoleum of Augustus in Campus Martius, and that of Hadrian on the west bank of the Tiber, now the fortress of modern Rome, known as the Castle of San Angelo.

Schools, Libraries, etc.— The state con¬ trols public instruction. There are four grades : Elementary ; secondary, classical ; secondary,

technical and higher education. Elementary instruction is provided with religious tuition, R the parent request it ; otherwise, without. Great Britain, America, Germany and Austria maintain schools of history, art and archaeology. France's Academy of Art is in the Villa Medici The University of Rome or Collegio della Sapienza is an ancient institution; canon law and civil law, medicine and philosophy and philology are included in its curriculum. It possesses extensive laboratories, botanical gar¬ dens and an astronomical observatory. It is attended by nearly 1,000 students. The Collegio de Propaganda Fide is situated in the Piazza di Spagna ; the Collegio Romano, adjacent to Saint Ignazio, is a lyceum, and now contains the Archaeological Museum and the recently established library, Biblioteca Vittorio Emanuele. The Accademia de' San Luca, for the pro¬ motion of the fine arts, is composed of painters sculptors and architects, and was founded in 1595. Connected with it are a picture gallery and schools of fine arts. There are numerous other institutions connected with art, music, science or learning, one of which the Accader™a de' Lincei, founded in 1603 by Galileo and his contemporaries, is the earliest scientific society of Italy. The American College, founded about half a century ago, is a school lor priests and is composed of students who desire a post-graduate course in divinity, phi¬ losophy, rhetoric, metaphysics, *etc.* The students

ROME, ITALY

1 Facade of Saint Peter's

2 Interior of Basilica of Saint Peter's

ROME, ITALY

• umiiutiuiut

I .IS

§■

UfB;

1 Interior of Saint Peter’s

2 Interior of Saint Paul’s

ROME, ITALY

Piazza Navona, or Circus Agonalis

Piazza Del Popolo, Saint Peter’s in the distance

ROME, ITALY

Copyright, Underwood & Underwood, N. Y.

2 The Coliseum — Present Condition

1 The Coliseum — Restored

enjoy special privileges in the Vatican Library and museums and at all great church functions. There is also an American school of classical studies, under the auspices of the Institute of Archaeology, whose work consists of archaeo¬ logical research and study, and whose investi¬ gations often lead the students as far as Greece or Egypt, accompanied by the faculty. The Irish College is the oldest in Rome.

The Vatican Library — Biblioteca Apos-tolica Vaticana — possesses more than 250,000 volumes and 34,000 manuscripts. Its priceless treasure is the Codex V aticanus , containing all of the Bible as far as Hebrews ix, 14. Scholars regard it as probably the oldest .vellum manu¬ script in existence. The Codex was entered in the first catalogue of the library, dated 1475. The most recent significant acquisition was the Biblioteca Barberiniana, at a cost of $100,000. This library is nominally in the charge of a cardinal, but the actual administration is by an under librarian and a prefect. The largest collection — more than 350,000 books and 6,200 manuscripts — is the Biblioteca Vittorio Emanuele, in the Collegio Romano. It was formed in 1871 of the libraries of the Jesuits and sup¬ pressed convents, to which large additions are made annually. The Biblioteca Alessandrina, in the Universita della Sapienza, possesses 160,000 volumes, the Biblioteca Casanatense, in the monastery adjoining S. Maria sopra Minerva, 112,000, and the Biblioteca Angelica, in Sant Agostina, 80,000. A half dozen private libraries are open to the public.

Palaces. — It is probably true, as claimed, that Roman palaces are unequaled elsewhere in the world for spaciousness and splendor. Their lofty portals, broad marble stairways, and great halls are matters of wonder. The descrip¬ tion by Gibbon applies to-day: (<The most costly monuments of elegance and servitude, the per¬ fect arts of architecture, painting and sculpture have been prostituted in their services, and their galleries and gardens decorated with the most precious works of antiquity which taste and vanity have prompted them to collect.® The Palazzo Barberini, on the Quirinal, was built by Urban VIII, almost wholly from materials taken from ancient buildings. In its small but excellent collection is the (Beatrice CencP

by Guido Reni — also valuable manuscript and some literary curiosities ; the Palazzo Colonna near the centre of the city; the Palazzo Corsini in the Trastevere, once the residence of Queen Chris¬ tina of Sweden, and containing precious manu¬ scripts ; the Palazzo Farnese, near the Tiber, was inherited by the kings of Naples, but now belongs to the French government, and is occu¬ pied by the ambassador. The Spada Palace is one of the finest examples of the late Renais¬ sance; the Palace Rospigliosi, near the Palace of the Quirinal, contains valuable art treasures. On the ceiling of a casino in its gardens is the beautiful fresco of the <Aurora) of Guido — this is now the residence of the French Am¬ bassador to the Pope; the Palazzo di Venezia is adjacent to the principal Jesuit church, II Gesu. In the Corso Vittorio Emanuele is the splendid Palazzo della Cancelleria, the single palace in the city which the Pope is permitted to own. On a part of the site of the theatre of Pompey is the Palazzo Pio, and southwest of it the fine 16th century Palazzo Farnese.

Ancient Rome. — Counseled by the gods, the Greeks conquered Troy. 2Eneas, carrying his father on his shoulders and leading his son Ascanius, fled, and, guided by his mother Venus, reached Latium. In time Ascanium built a city on a hill, which he called Alba Longa, and his descendants reigned there as kings for 300 years, with all the Latin towns as vassals. But one of his descendants — Pro-cas, king of Alba — dying, left two sons who quarreled over the throne. Amulius, the younger, seized the power, and made his brother Numitor's daughter, Rhea Silvia, a Vestal to avoid the birth of a claimant to the throne. The gods decreed otherwise. She was loved of Mars and bore twins, which Amulius the king ordered to be thrown into the Tiber. They were saved, and suckled by a wolf until they came under the care of Acca Laurentia, wife of the shepherd Faustulus, who reared them. In time they slew the usurping king, placed their grandfather Numitor on the throne, and went away from Alba to build a new city on one of the seven hills by the Tiber. Being twins, neither had the right of primogeniture, and a quarrel ensued over the naming and the govern¬ ing of the city to be. They left the decision to the sacred birds, and awaited a sign, Romulus (q.v.) on the Palatine Hill and Remus on the Aventine. Remus saw the vultures first — six of them ; but Romulus saw 12. Accordingly Romulus built the city, named it Rome for himself, drew a furrow around it with the sacred plow, and beside the furrow built a wall and dug a trench. Remus ridiculed his defenses, and leaped over the wall and the trench to show that the town might easily be taken. Romulus slew him, saying: ((So be it with anyone who dares to cross these walls.® And so Rome was founded 753 years

before the birth of Christ.

These stories of the founding of the Eternal City, once given a certain value as history, Niebuhr, Mommsen and their successors have dismissed to the limbo of myths that have no claim on the credulity of seekers after truth. Even Dionysius (i, 29) reported the skepticism of authorities before his day who claimed that there existed on the Palatine Hill, previous to the time of Romulus, a Siculian, Pelasgian or Tyrrhenian town whose name was probably Roma. And Microbius (Saturn iii. 9) avers that it was the belief of the Romans themselves that Rome, the city's name, was not Latin and that its Latin name was kept a sacred secret.

Whenever and however Rome had its begin¬ ning, its inception was on the Palatine Hill, the centre of a group of eminences of slight eleva¬ tion on the left bank of the Tiber. The Pala¬ tine was not* a large stage for so vast a drama of world history as developed there, its circum¬ ference being less than a mile and its elevation above the Tiber but little more than a hundred feet. The area of the hill is less than a 20th of that of Central Park, N. Y. It was the home of the Ramnes, who were regarded as the original Romans ; a tribe of uncertain origin, but probably of the Opican stock. The form of the so-called city of Romulus — that of a trapezium — forced upon it by the contour of the hill, procured for it the name Roma Quad-rata. This early city was enclosed by the wall credited to Romulus, which began on the west¬ ern edge of the Palatine opposite the S. Giorgio in Velabro, ran thence southward in such wise

as to enclose the site of the church of S. Anas¬ tasia and the declivity of the valley of the Cerche under the southern slope of the Pala¬ tine, along the eastern edge of the Palatine op¬ posite the Caelian Hill, then along the Sacra Via close to the Arch of Titus to the Forum Romanum near S. Marie Liberatrice, and thence to the beginning. Within this enclosure were the temples of the gods and the homes of the patricians ; the commons lived beyond the walls with only incidental protection from the fortress within. There was little room for growth. Imperial expansion began with Augustus, who lived m the house of Hortensius until it was burned. Then the Romans, building him a palace worthy of his state — it covered the sites 01 1ˆ1 houses of Cicero, Hortensius, Catiline and Clodius — really began the (<Palace of the Caesars,® which spread over the entire hill, and, before the day of its decline, extended beyond the Romulan wall to two other hills, the Caelian and the Esquiline. Tiberius extended the palace toward the edge of the hill above Velabrum (the riverside marsh), Caligula toward the borum Romanum, connecting it with the capi¬ tal by a bridge, and converted the temple of Castor and Pollux into a vestibule for it. Nero built it toward the Colosseum and filled the valley between the Caelian and the Palatine with the overgrown structure.

The Caelian Hill, southeast of the Palatine, was inhabited by the Luceres, a tribe of sup¬ posed Greek origin. It was the site of the Campus Martialis, the playground of Rome whenever the Campus Martius was flooded bv the liber. It is more than three times the size of the Palatine, and, because it was covered with oaks-a part of which made the sacred wood of the Camenae — it was known as Mons Querquetulanus. The Caelian figures, in the history of Rome, less than the other hills. Originally the home of a dense population, it was later long given up to the monks of the Camaldolese, Passionist and Redemptorist orders and the Augustinian nuns of the In-coronati. New streets have now been opened and settled.

The Esquiline, ˆ ET ill of the Beech,® a tree sacred to Jove, is directly north of the Caelian across the ancient Subura. It has two eleva¬ tions or summits rising from a common plain — one summit, known as the Oppius, now occu¬ pied by the churches S. Pietro in Vincoli and S. Martino al Monte, and the other as the Cipius now the site of S. Mary Major's. It is the largest of the Roman hills. Temples dedicated to Fever (near S. Maria Maggiore), Juno Mephitis (near a malarial pool),

and to Venus Libitina for the registration of deaths, bear testimony to the insalubrity of the Esquiline. On the slope behind the Forum was the fashion¬ able quarter called the Carinae, on the site of the present Via del Colosseo. Neˆr here the Senate sat occasionally in the Temple of Tul¬ lius. Pompey's home was here; and near this patrician quarter of the hill was the already mentioned Subura — in the v.alley formed by the convergence of the Esquiline, the Quirinal and the Viminal — the plebeian quarter, to this day the scene of a crowded population. Virgil lived on the Esquiline, Maecenas, patron of Augustan poets, had his home where the baths 0/ Thus stood later. To-day only the northern side of the hill is inhabited; the southern is

covered with vineyards and gardens and ruins.

The Capitoline, the smallest of the seven hills, is less than five minutes from the Pala¬ tine, in a northwesterly direction. It had but one building devoted to secular affairs, the 1 ecord office (Tabularium), but many pagan temples. It was the home of Saturn, the pre¬ decessor of Jupiter in the city's legendary story, and was called successively Saturnium, Mons Tarpeius and Capitolium, or Mons C.apitolinus, the Hill of the Skull. There were two summits; one the citadel or Arx, the other the site of the earliest temple mentioned by any classic author

— that of Jupiter Capitolinus, built under Tarquinius Superbus, 535 b.c., with money taken from the Volscians in war. This sumptuous fane had peculiar claims on the veneration of Roman citizens— -it was citadel and shrine combined. The Sybilline books were preserved there. There both Titus and Vespasian cele¬ brated their triumph over the fall of Jerusalem. It was later robbed of its treasures during invasions of the Vandals. Near it stood the temple of bides and the twin temples of Mars and Venus Erycina. The temple of Jupiter Tonans was built by Augustus; the temple of Honor and Virtue by Marius in 103 b.c., with spoils taken in the-Cimbric wars. There were still other notable temples, and the Altar of Jupiter Pistor, commemorating the stratagem of the Romans, who threw down loaves into the camp of the besieging Gauls to deceive them as to the state of their supplies. On this hill Petrarch received his laurel crown, and the tribune Rienzi promulgated new laws. Michelangelo designed the present museum and palace of the conservatories. The Museo Capitolino contains one of the finest collections of statuary and painting and the famous mosaic, Pliny's Doves, found in JjLe, ruEis of Hadrian's Villa near Tivoli. In 'I he Reserved Cabinet® stands the exquisite Greek statue Venus of the Capitol, found immured in a wall

upon the Quirinal. In the Hall of the Emperors is the imposing seated statue of Agrippina (granddaughter of Augus¬ tus) and 83 busts of Roman emperors em-piesses and their families, a character study. Ihe Hall of Illustrious Men is interesting as is also the Hall of the Faun, from the Faun found at Hadrian s Villa. The statue of the Faun is highly graceful and artistic. The three gems of the collection are found in the Hall of the Dying Gladiator — the Dying Gladiator, the Antinous of the Capitol and the Faun of Praxiteles. The ralace of the Conservatories contains busts of artists, by Canova, the restoration of a column of Michelangelo, many fine frescoes and re¬ liefs by Bernini and other masters ; the Apollo Belvedere and the famous Bronze Wolf of the Capitol, of unknown antiquity. Near the wolf is the well-known and beautiful figure of the boy extracting a thorn from his foot. The Picture Gallery of the Capitol contains few good works: a beautiful Saint Sebastian by Cuido and several others by Guercino.

The Capitoline was the seat of administration

- the Capitol. State acts, deeds, documents, *etc.* were advertised there by hanging or ((posting® copies, engraved on bronze, on a statue or shrine.

the Quirinal, the northernmost of the seven summits, is a long narrow eminence beginning at the Forum of Trajan, at the base “of the Capitoline and stretches northeastward toward

the Porta Pia. It was the site of the Temple Janus Quirinus (a Sabine god) surrounded by a sacred grove. Here Martial, the epigram¬ matist, lived in a third floor apartment in a narrow street and greater folk had their pal¬ aces — the Flavii and the Cornelii — at some number in the Vicus Corneliorum. In Tra¬ jan's time the Quirinal was joined to the Capitoline by a steep, high ridge which sloped to the Forum Romanum on the southeastern side and to the Campus Martius in the opposite direction. Trajan cut it away. The building of chief importance on this hill is the Quirinal Palace erected to be a summer residence of the popes. It is now the palace of the king.

The Viminal, like the Esquiline, was out¬ side the Servian wall, adjacent to the Quirinal and in appearance a part of it, except when viewed from near S. Maria Maggiore. It ex¬ tends to the Esquiline and gets its name from the water willows (vimina) once abundant there. The line of separation between the bases of the Quirinal and the Viminal was marked by the massive Tower of Nero (the Torre Mili-zie) and the walls of the Forum of Augustus. The most striking remains on the Viminal are the ruins of the Baths of Diocletian near the railway station. The great baths of Thermae were peculiar features of the city and were used not only for bathing purposes, but for games and athletic sports and contained assem¬ bly rooms, libraries, promenades, *etc.* The thermae of Caracalla, Titus and Diocletian were the most magnificent and largest.

The Aventine Hill takes its rise from where the old Sublician bridge spanned the Tiber and extends to the Circus Maximus, which sepa¬ rated it from the Palatine. The name was de¬ rived from King Aventinus Silvius, according to the most credited but still disputed etymol¬ ogy. It is the highest and most picturesque of the hills. The Roman home of Saint Paul's friend Aquila was on the Aventine and over¬ looked the Circus Maximus. Here, tradition says, Peter and Paul taught the Christian faith in an oratory discovered in 1776 near the pres¬ ent church of S. Prisca. Aquila and Priscilla were buried in the cemetery of Priscilla, which was also the burial place of Pudens, whose house was on the southern slope of the Viminal, where its

remains were discovered in 1870. The Liber Pontificalis confirms the tradition that pieces of furniture used by Saint Peter were long preserved in the house and church of Pudens.

There were other hills of profound interest to students of the history of the imperial city. The Janiculum was the chief of these, rising abruptly on the right bank of the Tiber and declining gently into the Campagna in the direction of Civita Vecchia, the ancient Centum Vellae. Ancus Marcius, fourth of the Roman kings, connected it with the rest of the city by means of the Pons Sublicius, the first bridge over the Tiber and the scene of the de¬ fense of Rome by Horatius Codes, who kept the bridge against Tarquinius Superbus and his Etrurian ally, Lars Porsena.

The Ramnes settled the Palatine, the Luceres the Caelian and the Sabines all the other eminences. These tribes were the three chief racial ingredients of the Roman people. The Servian wall enclosed all these hills except the

Esquiline, the Viminal and the Janiculum. The Aurelian was built to extend still further the defenses of Rome, then threatened by the northern tribes. The menace of the Goth was responsible for the purpose to enclose not only the city proper, but a part of the suburbs be¬ yond the Tiber, as a military necessity. The suburbs were at the mercy of the barbarians who had already overspread whole provinces and devastated as far as Rome, which had now descended its hills to the unenclosed Campus Martius. Aurelian, with the support of the senate, commenced the wall which bears his name in 271. The Einsiedeln Manuscripts (9th century) enumerate 383 towers, some of which remained until near the end of the last century, notably near the site of the Ludovisi Gardens. It also records the names of the 14 gates in this wall, of which six are in use now : Porta Flaminia, now Porta del Popolo ; Porta S. Lorenzo (the ancient P. Tiburtina), Porta Maggiore (P. Praenestina) , Porta S. Sebastiano (P. Appia), Porta G. Paolo (P. Ostiensis) ; on the Janicu¬ lum, Porta Aurelia. These gates, which dis¬ close the course of the wall, date generally from the time of Honorius (379-395).

The population of ancient Rome has been estimated in several ways — by the extent of the area within the city wall, by the amount of corn consumed in a year, by the number of habitations, *etc.* What the area was is uncer¬ tain, the extent of the walls being a matter of controversy. In the Augustan period, at the beginning of our era, the

consumption of corn — 60,000,000 bushels in a year — indicated a population of 1,950,000. To have housed this number — allowing 40 persons to the house — would have required 48,750 habitations; but of the actual number of domiciles at this time there is no record. Four hundred years later, in the reign of Theodosius (395-425), we have the first record of the kind, 48,382 houses. Ju¬ venal advised the poor to emigrate from the miserable, dark lodgings, the smoke and other hardships of the city to better homes at the same price in the Italian villages. Houses were built to dangerous heights in order to accommodate the body of the Roman people and the estimate of 40 persons to each habita¬ tion may not be too large. The fact that there were no more houses in Rome at the end of the 4th century than there were at the begin¬ ning of the first should be pondered in the light of the sharp fluctuations of population which, for one reason and another, took place in the early centuries of the Christian era. Merivale's guess at the population was 300,000, Dureau Lamalle's 500,000, Gibbon's 1,200,000 and Donovan's 1,950,000. For an interesting discussion of Roman population, consult Story, (Roba di RomaJ ch. xxi.

Public edifices rather than private, life in public in preference to domestic pursuits in the home, were bents characteristic of the Roman genius which developed a political system of collectivism — centralization, state initiative and domination. The Athenian emphasis on the in¬ dividual was reversed in Rome. There the unit counted for nothing; the utilities were for the populace. Under this system a wonderful city came into being, the greatest instrument of popular service that was created before the Christian era. At the beginning of the 4th

century there were in Rome, 18 public fora, 30 parks and gardens and 8 campi or commons principally used for athletics. To these are to be added the covered ways which sheltered the people from sun and rain, the colonnades and temples which served them in many ways and the public baths for their refreshment — 11 ones and 926 small, capable of receiving 60,000 bathers at one time. Noteworthy among these were the baths of Agrippa, with the cele¬ brated Pantheon (q.v.), the «temple to all the gods,® adjacent. Through all these utilities and many others the currents of Roman life ran from century to century of development — a well-balanced life, expanding constructively and making Rome indeed eternal, and, Jerusalem excepted, the most interesting spot on the globe.

In the fora — the kind called venalia — they trafficked in cattle, corn, fish ; in the fora judi-cialia brokers and money-lenders pursued their calling in offices in the porticoes and buildings \hich enclosed them. The great forum — not the largest, but called the Forum Romanum Magnum was built between the Palatine and the Capitoline hills. Before its founding this valley was a small lake, with a ferry; later, a morass with its wet and dry seasons — in the latter the scene of occasional battles between denizens of the surrounding hills — and finally ideally prepared for its future use by drainage accomplished through the great sewer, Cloaca Maxima, discovered in 1872. The Forum first became useful in the 6th century b.c., as the community assembling place, serving more am¬ ply than the area Capitolina which had previ¬ ously been used. In view of its august history one learns with surprise how small its area was. «We say to ourselves, is it possible the Roman world, even of Csesar's time, could have transacted its business in such restricted limits?® Its greatest length at any time, anti¬ quarians agree, did not exceed 671 feet its greatest width (under the Capitol) 202 and its least 117, at its eastern end. Under the em¬ pire it was but 375 feet long and 150 feet wide at the Capitoline end. It was habitually so encroached upon by the statues and monuments that the senate from time to time required it to be cleared. Lucius TEmilius Paulus, with a part of the spoils of the Gallic War, purchased adjacent property and enlarged the forum on the northern side. Caesar, drawing on the same tund, bought more space, removed houses north and west of the Curia and gave Rome the Forum Julium. Augustus extended the area northward and Vespasian, Domitian and Nerva, each as he came upon the scene, enlarged east¬

ward until the Forum Transitorium and the rorum Pads were created. Trajan cut away a spur of the Quirinal on the northwest side of the Forum of Augustus and completed the development projected by Paulus and Caesar with the vast Trajan or Ulpian Forum. <(Could we from some vantage point look down and sur¬ vey all these imperial fora, together with their original parent, the one forum alone now com¬ pletely exposed for us, that surprise above ad¬ verted to would not partake of the nature of a disappointment. … We should survey a space covering many thousands of square yards, amazingly rich with temples, basilicas and columns, white with dazzling marbles and white-robed people, golden with gilt bronze statues,

and here and there beautifully green with favored and sacred trees and flowers.® (Baddeley).

On the east side of the Forum, Tullius Hostilius enclosed a space called the Curia, in which the senators, representing patrician Rome, held their meetings; in front of it, in another enclosure, the Comitium, the plebeian vote was polled. From the senate house a flight of steps led to that part of the Comitium where the Rostra stood, from a near-by plat¬ form of which foreign ambassadors (Greek) listened to orators in the Rostra and speakers in the Comitium. The Rostra was a simple platform, under an arcade, to which the bronze beaks (rostra) taken from captured vessels were attached.

xne rorum was connected with the bumma Sacra Via (the ridge .between the Colosseum and the Forum) by a short lane which was the original Sacra Via, whose name was then ex¬ tended to the entire length of the road from the Capitol to the Esquiline Hill. Baddedey con¬ jectures that it originated in a path leading to the sacred Capanne, or primitive temples and the cemetery above the marsh wherein the pusci Latini,® * Sabini,® and their forbears in¬ terred their kindred. Varro says the Sacra Via, at its eastern end, originated in the Sacellum Streniae whose site is now unknown ; event¬ ually it was extended to the Clivus Capitolinus.

brom this long track duly developed the rich Republican street lined with temples and houses, descending from the Velia [the north point of the Palatine] so as to skirt the northern flank of the Regia and then lose itself beside the open Forum. … Its conditions, like those of the historic buildings on it, kept on improving until the time of Nero; and

from having been a simple path to the place of the ancestral dead, it survived to celebrate for centuries the proud¬ est triumphs of the living.® Then Nero appro¬ priated the V elian Ridge and built across it, from the Palatine to the Esquiline, his House of Gold. By this time (a.d. 121) the trade centre of Rome had moved from the imperial fora to the Forum Pads and the Forum I ransitorium, relieving the Sacra Via of the noisy throng going to and from the Colosseum; and the Triumphs — outdoor displays of great magnificence thereafter passed more con¬ veniently through the Forum Pacis and thence into the lower Forum Romanum.

,r other streets — Vicus Jugarius and

Vicus iuscus — were important features of the environs of the great forum. Both originated in the unknown street which lay along the south side of the Forum ; the Jugarius at the western end of the Basilica Julia, and running close under the Capitoline to the Porta Carmentalis, near the 1 heatre of Marcellus. • At its entrance into the Forum was the fountain Lacus Servilus where were exposed the heads o senators assassinated during the proscrip¬ tions of Sulla. The Vicus Tuscus ran along the eastern end of the Bascilica Julia, through the Velabrum to the Circus Maximus. It was a busy shopping street where almost every¬ thing was sold from the finest silks, frank¬ incense and perfumes to fruits, vegetables and hsti. b estal pageants moved along it from the borum to the circus. On one side of the Forum stood the Tabernae Argentariae, silversmiths'

shops, and in front of S. Adriano, beyond the Tabernae Novae, Virginia was stabbed by her father. The front of S. Adriano is a fragment of the Basilica of Hvmilius Paulus. This Basilica occupied the site of the famous Curia of Tullus Hostilius. The three gigantic arches are all that remain of the Basilica of Constantine. Little remains of the once superb temple of Venus and Rome, except a cella, countless fragments of columns, and a mass of Corinthian cornice facing the Colosseum. This was the last pagan temple which remained in use in Rome. Near the church of Saint Fran¬ cesca the Sacra Via passes under the Arch of Titus, the most beautiful monument of its kind remaining in Rome, erected by the senate to commemorate the taking of Jerusalem. Of the orginal erection of 81 a.d. only the central part of the arch remains ; the sides were restored as late as 1823. The triumphal procession of Titus occupies two reliefs on the inner sides of the jambs of the arch. The chariot bearing the conqueror is drawn by horses led by the goddess Roma. Victory holds a crown above his head, and Lictors surround him, while the procession passes under the triumphal arch. On the opposite jamb a relief displays the spoils of the Temple of Solomon — the table for the shew-bread, the seven-branched candlestick and the golden trumpets. The apotheosis of Titus — the emperor ascending, borne by an eagle — is represented on the soffit of the arch, while the friezes carry sacrificial scenes. The doings that made the fame of Titus won for him the abhorrence of the Jews, and to this day hatred of him is a part of the creed of that race, which will never forget that captives from Jerusalem marched in chains in the procession of their conquerors, slaved (12,000 of them) in the building of the Colosseum and were forced to lay the stones in the foundation of this very arch, beneath which, it is said, no Jew who respects his religion and racial tra¬ ditions has ever passed willingly. Vespasian exacted from the Jews the same tribute which they had given to the Temple, and Domitian, who erected the arch, drove them out of Rome, from which they remained exiled until Alex¬ ander Severus extended amnesty and permitted them to return to the Ghetto.

The best preserved triumphal arch remain¬ ing in the Eternal City is the Constantine, by the Colosseum, which has been accepted as

finished in 315, when Roman art was at low tide. The beauty of its lines and the wealth of its decorations have been accounted for by refusing to credit the conception and achieve¬ ment to that time and claiming that the reliefs and other decorations were taken from an arch erected by Trajan as an entrance to his Forum two centuries before. Recently the fact that it was built by Constantine has been challenged, and the claim set up that it was one of the arches by Domitian rehabilitated after its despoilment by the senate's degree of Memories damnatio pronouced against the murdered emperor.

The Romans imitated the Greeks in many things but not in their abandonment of human sacrifice, which was a part of the festivities at the funerals of the great. From simpler arenas these events were transferred to the market places, the first to the Forum Boarium, 264 b.c. For a long time the Forum Romanum was one

of the most popular stages for these bloody shows. The Colosseum succeeded it. The Co¬ losseum was the conception and the achieve¬ ment of the Flavian emperors : Vespasian be¬ gan it, Titus advanced it and Domitian com¬ pleted it. Vespasian came from the people; looked to them for popularity and support and built this, the first considerable edifice for the public since the time of Augustus, for the use of the classes. It was in the heart of Rome,, a short distance from the Capitol, adjacent to the palaces of the Caesars. About it surged the high tide of Roman life. It was massive, architecturally purely Latin, of perfect arrange¬ ment for popular uses and altogether typically Roman. The three lower stories of the four were built with 80 arches supported by piers, faced with half columns. The fourth was a solid wall faced with pilasters. The first story is Doric, the second Ionic, the third Corinthian and the fourth composite. There was a statue for each of the arches of the second and third floors. The capacity of the building was 50,000 persons ; a tier of seats for each external story. Hard by the arena was a marble platform with marble thrones for the Vestals, senators and other dignitaries. Above this platform was the emperor's throne, under a canopy. The em¬ peror entered from the Caelian or the Esquiline, from each of which there was an approach to the throne. There were marble steps above the platform, every second one forming a row of numbered seats, admission to them being by ticket, whose issue was governed by special laws as to the classes eligible to receive them. Above these seats a wall separated them from those still further up. To the topmost seats the women and the lower classes were admitted to see the homicides that made their holiday. The human slaughtering went on throughout the day. Such was pagan

Rome a century after the dawn of Christianity. Such indeed it continued, though slowly diminishing in thirst for blood, until Justinian, in the sixth century, put an end to its preying on human victims.

Romulus in his feasts in honor of Neptune — so runs the legend — introduced the most an¬ cient of all Roman spectacles, the circus. Cred¬ iting this popular form of amusement to the mythical founder of Rome means that its origin antedates authentic history. No building dedi¬ cated to the sport of chariot and other horse races, and called a circus, is known to have existed before the time of the elder Tarquin — about 616 b.c. The Romulan Circus, afterward known as the Circus Maximus, was in the val¬ ley between the Palatine and the Aventine, and was the only one in Rome for nearly 400 years. The Flaminian, constructed in 212 b.c., was the second, and the Flora came next, the gift of a noted courtesan. The wealthy and powerful then began to attach circuses to their estab¬ lishments — Sallust, between the Quirinal and the Pincian, Caligula in the Vatican gardens, Heliogabalus in the Varian gardens, and Alex¬ ander Severus in his grounds. It was a subject of satirical comment that Rome possessed nine circuses and only three theatres and three amphitheatres. The most celebrated theatres were those of Pompey, Cornelius Balbus and Marcellus. Pompey's was adorned with beauti¬ ful statuary. It held 40,000 persons.

The games in the circus, and indeed all games,

the Romans regarded as religious manifesta¬ tions, and they were accordingly preceded by so-called religious ceremonies. When the Cir¬ cus Maximus was the scene, the Pompa Cir-censis commenced at the Capitol and proceeded by the Forum. It was opened by boys afoot and on horseback, followed by charioteers, horsemen and almost naked athletes, and by three classes of dancers — boys, beardless youths and young men, who moved through the Pyrrhic dance to the sound of the lute and the lyre. Others bore altars and burned per¬ fumes upon them, and still others carried images ot gods and demigods and sacred vases and utensils. Entering the circus by the central gate of the Carceres, the Porta ‘ad Pompam, the pomp moved around the circus, and, after offering sacrifices at the first goals and ’at the altar of the Consus, each person who had had a part in the sacrifice took his place in the games.

The Roman theatre was of early origin. The dramatic representations, like the games in the circus and the amphitheatre, were religious. As early as 114 b.c. the Censors Massala and Cas¬ sius desired to erect a permanent theatre, but were not permitted to do so for fear that the morals of the people would suffer. The first plays were given al fresco, and then in wooden structures without seats, the senate having de¬ creed against seats in order that «the manly habit of standing, combined with mental re¬ laxation, might be the peculiar mark of the Roman peopled A century after Massala and Cassius were refused a permit, a permanent theatre was erected by Pompey. As a peace-offering to the many who still regarded perman¬ ent theatres as immoral agencies he erected on

a temple to Venus Vincitrix, thus, as Tertullian conceived,
(<screening a censurable project under the veil of religion.”

The Roman religion was a vast symbolism of things seen and of qualities apprehended.

1 he gods representing conceptions of physical phenomena were characteristically Latin. The oldest document which has come down from Roman antiquity — the Calendar of the Roman Community — is filled with the festivals of the gods and goddesses of germination, of seed sowing, harvest, the granary, protection of vines and vats, the shepherds, the fecundation of flocks, *etc.* Ihe Roman desired the part¬

nership of his gods in his everyday employ¬ ments, to promote increase of substance by whatever means he resorted to,, whether in the keeping of flocks, seafaring or commerce.

ˆ here were innumerable deities for the field the forest and the stream, and 12 great gods — Mars, Jupiter, Juno, Vesta, Minerva, Mercury Ceres, Venus, Neptune, Vulcan, Apollo and jnar J,C.e neatest of these was Mars, the god of killing, the divine hurler of the spear and the protector of Roman life and substance.

It was a religion devoid of morality and morai purposes, and rose no higher than the sphere of business and, eventually, under Greek in¬ fluence, of physical and intellectual pleasure. As the Romans saw gods everywhere ; as all nature — sky, earth and water — was to them full of divinities who watched over human beings with benevolent or jealous eyes, there was no act of life which did not require a prayer or an offering, a sacrifice or a purifica¬ tion, according to the rights prescribed by the

ministers of religion. This piety, being the offspring of fear, was all the more attentive in observing signs considered favorable or the reverse; so that everything depended on re¬ ligion — private life, from the cradle to the tomb; public life from the comitia to the field of battle; even business and pleasure. Games and races were celebrated in honor of the gods; the people's songs were hymns; their dances a prayer; their music uncouth but sacred har¬ monies ; and, as in the Middle Ages, the earliest dramas were pious mysteries. By the continual intervention of the pontiffs, who knew the necessary rites and sacred formulae, by that of augurs, aruspices and all the interpreters of omens, this religion, devoid of dogmas and of clergy, of ideal and of love, was yet a great torce of cohesion for the state and a powerful discipline for the citizen." (Duruy).

While there was no clergy there were priest¬ hoods, the most ancient bearing relation to Mars. But those who desired anything of the gods made their prayer to them and not to the priests. This was not. always a simple matter, and the habit of consulting men of skill — not mere altar menials — resulted in two so-called colleges or corporations: the augurs and the pontifices. The former — six in number — in¬ terpreted the language of the gods from the flight of birds; the latter, five engineers, de¬ rived their name (pontifices, bridge-builders) £0nu tˆleˆr profession, managed the calendar of the state and saw that every religious and judicial function was performed on the right day.

Temples, unknown in the earliest Roman worship, came to hold a large place in the life of the city, and were probably the first public buildings in time and importance. There were eight types; the cedes, a sacred edifice with prescribed parts ; the templum, an open space or edifice consecrated by the augurs; the fanum a Plot of ground consecrated by the pontiff ; the dulubrum, an edifice consecrated to several divinities ; the tesca, for the deities of a desert place , the aedicula, a little temple apart ; the sacellum, a roofed or unroofed cella containing the statue of its divinity, and the lucus, a sacred grove.

o- —— - cv-ccviiig ilo v*umcu icnipieb ana

lanes and the Christian religion was entering. Rodolfo Lanciani, after 25 years of active ex¬ ploration of ancient Rome, by excavation and otherwise, declared that every pagan building that was capable of giving shelter to a congre¬ gation was transformed, at one time or another into a church or a chapel, and that patient in¬ vestigation of the ruins of such edifices always disclosed traces of the work of the Christians a* 15J I-*16 f^irit delineation of the Saviour and Uie four saints in the temple of the Svbil at Iivoli and the diminutive figure of Christ on the Cross in one of the flutings of a column in the temple of Neptune. There were discernible remains of religious painting in the apse of the Basilica of Constantine disclosed by the excavations in 1828. The same excellent au-thonty bears testimony to the great number of churches, there seeming to be, at one period, more of them than of habitations. Saint Paul could have said in the Eternal City that the Romans were in all things religious, whether they were of the pagan ages or the succeeding

ROME, ITALY

Copyright by Underwood & Underwood, N. Y. Copyright by Underwood & Underwood,

The Forum of Pompeii and Vesuvius ‘ ‘ ‘ ’ Forum, Capitol and Pavement of Sacred Way

Interior of the Pantheon

ROME, ITALY

Christian era. It requires centuries for the spiritual development that gave Rome its re¬ ligious supremacy through the powerful agency of the Roman Catholic Church.

Recent excavations have thrown consider¬ able light on the subterranean galleries con¬ nected with the games held in the time of Caesar in the Forum. It is clear that 12 ele¬ vators were used to deposit quickly the various parties of combatants. Equestrian statues were later placed above them. The square basement of Janus Medius, wells containing fragments of pottery, graves containing chalices, have also been discovered. Under the substructure, nar¬ row prison cells have come to light. At the foot of the Palatine were revealed the re¬ mains of an imperial palace, later trans¬ formed into a Christian sepulchre ; also some prehistoric tombs. The ancient graffiti — that is the rough sketch or misspelled word scratched upon walls or columns by early Chris¬ tians and thoughtless idlers — have solved many topographical problems of the ancient monu¬ ments of the “Eternal City.®

History. — The entire period from the date of the foundation of the city, 753 b.c., to the establishment of the republic, 509 b.c., is in its detailed history unknown to us, and from the mass of myth and legend it is possible to derive the very broadest conceptions only of the be¬ ginnings of the Roman state. This is due to the fact that the authentic records of Rome date only from 390 b.c., the year of the destruction of the city by the Gauls. Tradition, then, speaks of seven kings who, including Romulus, ruled over the city for 243 years and assigns to each definite services rendered to the state. Romulus was the founder and conqueror; his successor, Numa Pompilius, was a religious teacher; Servius Tullius, a political reformer and law-giver, *etc.* The last three kings, Tarquinius Priscus, Servius Tullius and Lucius Tarquinius Superbus, were of Etruscan origin, whereas the earlier rulers had come from Latin stock. With the overthrow of Tarquinius Superbus in 510 the Roman kingship comes to an end. A critical study, of this legendary period makes all these names and the events connected with them doubtful, but preserves the general outline of

development. Rome, in the modern view, is regarded as having had its origin in the union of three tribes, the so-called Ramnes, Tides and Luceres, of whom the first were of Latin blood, the second of Sabine stock and the third of doubtful affinity. The situation of Rome on the hills near the mouth of the Tiber was favor¬ able for its development, and in the course of time the city extended its authority over the neighboring country until with the destruction of Alba Longa, the ancient religious centre of ihe Latin peoples, it came to assume a pre¬ dominant position in Latium. The Etruscan character ascribed to the last three kings points lo an Etruscan conquest, and indeed throughout the early period of Rome the influence of the Etruscans to the north is marked, especially in religious customs and in architecture. From the very earliest period the inhabitants of Rome appear to have been divided into two classes, the patricians and the plebeians or plebs, with whom probably may be ranked the class of clients. It was the patricians alone that con¬ stituted the state; the plebs had no political rights whatsoever. In fact early Rome should

be regarded as consisting of two isolated com¬ munities, one comprising the original settlers or, possibly, the conquerors of the city, the other the conquered population and later immigrants, such as those attracted to Rome by the excellent opportunities for trade it offered. Not only was the political power in the hands of the patricians, but even the early Roman religion was largely in the nature of a narrow national creed to which the plebs could not be admitted. Intermarriage between members of the populns and plebeians was forbidden. The patricians alone had the right to bear arms. Within the populns or state, the headship was vested in the rex or king, who combined in himself the functions of war leader, judge and priest, and was assisted by a council of elders or senate. The Roman “people® were divided into wards, class or gens, and households. When’ assembled for the exercise of its sovereign powers it was known as the comitia curiata. A change in the relations between patricians and plebs was effected by a reform which legend ascribes to Servius Tullius. By this innovation the right of bearing arms was conferred on the plebs, and the entire freeholding Roman community was divided into five classes, on the basis of wealth. These classes were subdivided into centuries or “hundreds,® and the entire military assembly of the inhabitants bore the name of comitia centuriata, which, instituted undoubtedly for purposes of national defense, soon came to exercise important political powers.

The expulsion of Tarquin was followed by long wars with the

Etruscans and the Latin tribes, in the course of which Rome for a time had to contend for its existence. A great vic¬ tory over the Latins in 496 led to the formation of a Latin Confederacy under the leadership of Rome. Thus strengthened the Romans fought successfully against the yEqui, the Volsci and the Sabines, and in 396 captured the Etruscan stronghold of Veii, which was followed by the subjugation of southern Etrura.

The place of the kings was taken after 509 by two consuls, elected by the comitia centuriata from the ranks of the patricians. The institu¬ tion of the senate was retained and plebeians were admitted to membership, but all magisterial offices were closed to members of that order.. The period that follows, therefore, is marked by a bitter struggle on the part of the plebeians for political and, to a degree, social equality. Wealth, too, became concentrated in the hands of the patricians and the distribution of the public lands was carried on entirely in the in¬ terests of the ruling class. Discontent was also fostered by the severity of the laws against debtors. In 494 the plebeian army, just re¬ turned from a victorious campaign, seceded to the Sacred Mount, near Rome, and threatened to found a city for themselves unless conces¬ sions were made. The patricians yielded and the office of tribune of the plebs was created for the defense of the interests of the lower order against the ruling class. These tribunes, originally two in number, later increased to 10, were given the right of veto on the decisions of the consuls and the senate. In the course of the struggle for an equitable division of the pub¬ lic land, Spurus Cassius, a patrician who es¬ poused the cause of the plebs, fell a victim to the vengeance of his caste (486 b.c.). The de¬ mand for a codification of the laws led to the

appointment in 451 of 10 decemvirs who after two years' work brought forth the Twelve Tables in which the entire system of public and private law was embodied. The act of violence attempted by Appius Claudius, head of the decemvirs, on the plebeian maiden Virginia led to the overthrow of the decemvirs in 449 b.c. Protected now against the arbitrary misuse of the law on the part of the patricians, the plebeians pursued with renewed strength the struggle for political and social equality. In 445 intermarriage between patricians and plebe¬ ians was made legally valid. The consuls were supplanted by military tribunes with consular power wrho might be chosen from among the plebeians. After this the plebeian conquest of offices proceeded steadily. The qusestorship was gained in 421 b.c., the dictatorship in 356 b.c., the censorship in 351, the praetorship in 337. After a 10 years' struggle it was provided by the so-called Licinian Rogations (367 b.c.) that no citizen should own more than 500 jugera of the public domain that the remainder should be distributed among the plebs in small allot¬ ments. The consulship was also restored and it was made obligatory for one consul to be chosen from the plebs. By the year 300 com¬ plete equality between the orders had been established. The termination of the contest be¬ tween the two orders may be assigned to the year 286 b.c., when the Hortensian Law made any decree of the Comitia Tributa, wherein the plebs were predominant, law for the whole peo¬ ple, the so-called plebsicite.

The course of political progress during this period was sharply interrupted by the invasion of the Gauls who in 390 overwhelmed a Roman army on the Allia, burned the city and besieged • the garrison in the Capitol. Legend ascribes the defeat of the Gauls to Camillus (q.v.), but in reality it was a large ransom in gold which induced the conquerors to retreat. The devoted patriotism of its citizens, however, restored the fortunes of the city; its houses were rebuilt, the attacks of the neighboring peoples, the Volsci, the 2Equi and part of the Latini were repulsed, and within a short time Rome had more than regained its former power. With the establishment of internal peace, its career of rapid conquest begins. The Samnites, the most formidable rivals of the Romans, were de¬ feated in three great wars (343-341, 326-304, 298-290) in the course of which Rome con¬ tended successfully against the united forces of the peoples of central Italy, aided in the last of the wars by the Gauls. A rebellion of the Latins was crushed in

338, the long struggle terminated in the complete subjection of the allies, and the inhabitants of Samnium, Picenum, Umbria, Apulia, Lucania and Etruria became the allies of Rome. In 280 war broke out with Tarentum, the most powerful of the Greek cities in southern Italy. Tarentum called Pyrrhus (q.v.), king of Epirus, to its aid. Sub¬ jected at first to defeat, the Romans ultimately drove Pyrrhus from Italy and took Tarentum (2 72). Rome was now mistress of central and southern Italy and had fought with success against the Gauls in the north. To make con¬ quest permanent military colonies were planted in the subjugated territories and a great system of public highways was developed to facilitate communications. The incessant wars had made Rome a nation of soldiers, and now that there

was no one to resist it in Italy, it turned its arms against a foreign power, and in the strug¬ gle with carthage made the first beginning of its imperial career.

The early relations between Rome and Carthage were friendly and commercial treaties between the two nations had been concluded at various times. The contest .between the two broke out in Sicily, of which the Carthaginians were masters in greater part. The first Punic War (264-241 b.c.) began with the invasion of Sicily by a Roman army. The strength of Carthage, however, was on the sea, and to cope with it, the Romans built a fleet with which in 260 they gained a great victory at Mycalae. The fortunes of the war wavered for a long time until a second victory off the .TEgatian Islands in 241 brought Carthage to terms. Sicily was surrendered to the Romans who erected it into their first province, and Carthage pledged itself not to wage war on the allies of Rome. In 238 the Romans seized Sardinia and in the follow¬ ing year extended their sway over the Illyrian coastlands and upper Italy. Cathage, robbed of its island possessions in the Mediterranean, more than made up its losses in Spain, and in 218 b.c. the celebrated Hannibal (q.v.),- son of Hamilcar Barca, the conqueror of the peninsula, renewed the contest with Rome (the second Punic War) by his attack on Saguntum, a city ally of Rome. Hannibal invaded Italy (218 b.c.), defeated the Romans at Trebbia on Lake Trasi-menus the following year, and in 216 b.c. at Cannae thoroughly completed the rout of the Romans. Rome, however, remained steadfast with Hannibal at its very gates, husbanded its resources and by carrying the war into Africa forced Hannibal to depart from Italy. In 202 the Carthaginian general was defeated by P. Cornelius Scipio at Zama, and Carthage signed peace giving up Spain to the Romans, dis¬ mantling its navy and paying an indemnity of 10,000 talents. The

hatred of Rome, however, was not appeased, and when Carthage, after 50 years, showed signs of renewed strength, it was attacked and destroyed (146), after a siege of three years (the third Punic War). The Roman arms in the meantime had also conquered the East. Antiochus III of Syria was defeated in 190 at Sipylus and deprived of his possessions in Asia Minor. Macedonia, after repeated wars, was made a Roman province in 146, and Greece, which had enjoyed the shadow of freedom for 50 years, was reduced to the same condition, in the same year, under the name of Achaia, after Corinth, its most prosperous city, had been stormed and robbed of its art treasures. In 133 Rome fell heir to the dominions of Attalus, king of Pergamus, and the Province of Asia was formed out of the territories thus acquired. The Roman rule in the Spanish peninsula was firmly established after two formidable insur¬ rections, one led by Viriathus (148-140) and the other known as the Numantine War (143-133), had been suppressed.

Republican Rome was now at the height of its power, but the wars which had been crowned with such success abroad brought on evils within the state which were destined to destroy it. The task of governing a world empire and carrying on the great game of diplomacy by which that empire had in large measure been built up, naturally called for a more centralized and rapid exercise of authority than was possible

with the cumbrous methods of the popular comitice. The power of the state gradually passed into the hands of the senate. There grew up at the same time a nobility of the robe, consisting of those who had enriched themselves as rulers of the newly conquered provinces which Rome for a long time regarded as sub¬ ject territories merely and as fruitful sources of revenue. So wealthy had the state become, indeed, that in the second half of the 2d century b.c. the citizens of Rome were freed from all burdens of taxation, a measure which attracted to Rome a large population of idlers, which de¬ rived its chief sustenance from the largesses of the nobles who found it necessary to court the favor of the mob. Throughout Italy the rich Roman office holders established vast landed estates, -which were fast coming to be worked by slaves, and the poor farmers, ruined by this formidable competition, came in great numbers to Rome to swell the ranks of the propertyless. Between this great mass of poor proletarians and the small class of officials, senators and landlords, strife was in the nature of things bound to come, and it was this strife between the Optimates or the aristocratic party and the Populares or proletarians that, skilfully used by ambitious politicians, brought about the fall of the republic. Nobles of the popular cham¬ pions were the brothers Tiberius and Caius Gracchus (qq.v.) who wrested from the sena¬ torial party an agrarian law favorable to the homeless masses and regained some of the ancient powers of the popular assemblies, but fell victims both to the hatred of their enemies (133 and 121). The war against Jugurtha (q.v.), which revealed the shameless corruption to which the ruling party had sunk, brought forth another popular leader in Marius (q.v.) whose reputation was increased by the splendid victories over the Cimbri and the Teutones in the years 102-101. Moderate at first in his views, Marius was driven, by the agitations of demagogues, to violence. In 90 b.c. the Italians rose in insurrection to enforce their demand for the rights of Roman citizenship, and though the allies were defeated it was deemed expedient to grant them their demands. The termination of this struggle, known as the Social War, in 88 b.c., was followed by a conflict between Marius and Sulla (q.v.), an adherent of the senatorial party, for control in the state, in the course of which both factions were guilty of dreadful excesses. In the year 81

the Marian party was finally overthrown and Sulla, pro¬ claimed dictator, enthroned himself in power by a bloody proscription of his enemies, and pro¬ ceeded to revolutionize the constitution of the state so as to place the sole power in the hands of the senate and the aristocratic party. But neither senate nor people was thenceforth to govern in Rome. The example of aristocratic rule based on military force had been set by Sulla and the struggle between parties now passed into a struggle between individuals for control. Gnseus Pompeius by his vic¬ tories over Sertorius in Spain and the suppres¬ sion of the servile insurrection under Sparta-cus attained immense popularity and this was increased by his readiness to make concessions to popular demands. After his triumphant campaigns against the Mediterranean pirates and Mithridates (q.v.) he was for a time master

of Rome. The senate, however, stirred to an assertion of its rights by its successful course in the conspiracy of Catiline (q.v.) now set itself to oppose his will and Pompey, desirous of redeeming the promises made his veterans of allotments of land in Italy, joined with Gaius Julius Caesar (q.v.) and Licinius Crassus (q.v.) to form the first Triumvirate which for a time was absolute in Rome (60 b.c.) Caesar was a leader of the popular party and he aimed at becoming the sole power in the state. Crassus died in 53, and in 49 war broke out between Caesar and Pompey. The former had under his command a splendid army trained by years of campaigning in Gaul and Britain and in the bat¬ tle of Pharsalia (48) Caesar was victorious. Pompey fled to Egypt and there perished and the remnants of his party were wiped out at Thapsus in 46 and Munda in the following year. Caesar was now undisputed master of the empire, but fell, after a short rule, beneath the daggers of Brutus and his associates, and his death was followed by the renewal of civil war. Gaius Octavius, Caesar's nephew and adopted son, and Marcus Antonius, Caesar's lieutenant, both aspired to be his successor, but joined in 43 with Aurelius Lepidus in a second Trium¬ virate to overthrow the party of Brutus and Cassius. This was accomplished at Philippi in 42, and Octavius and Marcus Antonius, setting aside the weak Lepidus, divided between them the Roman world. But while Octavius governed his western realm with energy, Marcus Anto¬ nius gave himself up to the pleasures of Cleo¬ patra's court. War broke out between the two and in the naval battle of Actium (31) the forces of Marcus Antonius were utterly routed. Antonius fell by his own hand and Octavius was left without a rival. With Actium begins the Roman Empire.

Octavius made no change in the established forms of government. In 27 b.c. the senate conferred on him for life the government of all those provinces whose defense called for the employment of the military forces of the em¬ pire, together with the supreme command of the army and the title of Augustus. Successively Augustus united in himself the great offices of the state, the consulate, the tribunate, the head¬ ship of the sacred colleges. The senate was left with the splendid shadow of power, in reality the mere instrument of the emperor's will. The empire, and especially the provinces, found peace after a half century of civil strife and acquiesced in the rule of an autocrat whose sway was far more kindly than the selfish rule of an aristocratic oligarchy. Under Augustus the economic development of the empire made rapid progress ; its parts were brought more closely together by increased means of commu¬ nication; with peace came also rapid intellec¬ tual growth, and Latin literature had its golden age in the reign of Augustus. The boundaries of the empire were extended to the north by the campaigns of the emperor's stepsons Ti¬ berius and Drusus, who carried their victorious arms to the Danube and beyond the Rhine. The last years of Augustus' reign were darkened bv domestic unhappiness and the great disaster of the Teutoburg Forest where Varro's legions were annihilated by the Cheruscan chief Arminius. Augustus was succeeded in the principate by his stepson Tiberius (14-37 a.d.) who ruled

ably in the beginning but hardened with time into a gloomy despot whose suspicions fell heavily on all those members of the nobility who might in any way become rivals for power. Living in retirement on the island of Caprae he left the government to powerful ministers, of whom Sej anus (q.v.) is the most celebrated. Cams Caligula (37-41), a madman and a tyrant, was murdered by his guards and was followed by Claudius (41—54) , a good-natured dotard, who was completely under the control of his in¬ famous wives, Messalina and, after her, Agrip¬ pina. By the latter he was poisoned and Agrip¬ pina s son, Nero (54-68), succeeded to the throne. After giving the fairest promise for some years, the young emperor, in spite of such advisers as Seneca and Burrus, entered upon a course of infamous excesses and mad escapades which disgusted alike the senate and the army and brought about a revolt before which Nero fled. Unable to escape, he killed-himself, the last of the Julian house of emperors.

Galba, Otho and Vitellius, military rulers ah proclaimed by their respective armies, fell within the space of two years and were suc¬ ceeded by Flavius Vespasianus (69-79), com¬ mander of the legions in the east. Vespasian introduced economy into the government brought to an end the Jewish War by the' storming of Jerusalem (70) and began the con¬ quest of Britain. The brief reign of his son iitus (79-81) was marked by the eruption of Vesuvius which overwhelmed the cities of Her¬ culaneum and Pompeii (24 Aug. 79). The Domitian (81-96), a younger brother of thus, was a period of oppression and in¬ tellectual stagnation. Cruel, despotic, half-mad Domitian resembled the last rulers of the Julian house rather than the great emperors whom he succeeded and by whom he was followed. Nerva (96-98) was succeeded by M. Ulpius T raj anus (98— 117), under whom the empire attained its greatest extent. His campaigns north of the Danube resulted in the erection of the province of Dacia; Armenia and Mespo-tamia were acquired and the Parthians were ™ven back from the Euphrates. Hadrian (117 138) had none of the warlike instincts of his predecessor, but he devoted himself to the task of organizing the affairs of the empire and better to acquaint himself with the condi¬ tion of the various provinces he made long and repeated journeys embracing every part of the Roman dominions. Hadrian was succeeded by the philosopher— emperor5 Antonius Pius (138-161) and Marcus Aurelius Antoninus (161-180) in whom were exhibited the highest and fullest development of the pagan character, and

though the reign of the latter was disturbed by wars against the Parthians and the peoples of the Danube, it was of this age of the Antonines that an eminent historian speaks as the happiest era in the entire course of European history if the welfare of the great mass of the population be considered.

With the death of Marcus Aurelius the de¬ cline of the empire begins. On the north the Germanic peoples were threatening the Roman iontier and on the east the new Persian king¬ dom arose as a formidable adversary. Corn-modus (180-192) neglected the affairs of the empire to win the laurels of a gladiator and was murdered by some of his followers. The Prae¬

torian guard now appears as the maker of emperors. It deposed Pertinax, who had been chosen by the senate and sold the throne at auction to the Senator Didius Julianus. The armies of the provinces arose and three claim¬ ants for the throne appeared. The successful candidate Septimius Severus (193-211), success¬ ful by force of arms, ruled well and sought to repress the power of the Praetorions. The reign of his son Caracalla (211-217), one of the most vicious tyrants in Roman imperial history, is noteworthy for the extension of the rights of Roman citizenship to all free inhabitants of the empire. Caracalla was assassinated by the Praetorian prefect Macrinus, who was speedily succeeded by Heliogabolus (218— 222), a priest of the sun of Emesa. Heliogabalus brought with him to Rome the orgiastic rites of thp Orient and became the object of national hatred and contempt. He fell at the hands of the Prae¬ torians, who chose as his successor Alexander beverus (222—235) who ruled with fair ability but perished in a mutiny of the German legions. iher,e f,?llowed a period of confusion in which the decline of the empire was rapidly acceler-atecb Maximinus (235-238), a Thracian by birth and a soldier of fortune, crushed his rivals, the two Gordiani, but fell in battle against the forces of the senate. Balbinus and Maximus, chosen by the senate, were slain by * £?!?an?V and Gordianus III ruled from

a followed by Philip the

A/.ab (244-249), Deems (249-251), Gallus (251-254), Valerianus (254-260). and his colleague Gallienus (254-268). Valerian was defeated by the Persians and taken prisoner and on the en¬ suing anarchy usurpers arose in every province known collectively as the Thirty Tyrants. The border lands of the empire suffered from the invasions of the Germanic peoples and the Per¬ sians, and a pestilence which raged for 15 years (251-265) carried off one-half of the in¬ habitants of the empire. The fortunes of Rome rose somewhat under the following emperors : Claudius (268-270), Aurelian (270-275) who drove the Goths beyond the Danube and over- ‘myran kingd˚m of Zenobia, Taci-P (275-276), and Probus (276-282) who held f-pRˆSsm aga.m.st,tl!e Germanic tribes. Carus bi˚i283) Pe/lshed ln a camPaign against the

f|s, 284ˆ anb Ta ?uccue<ied, by Numerianus (483 284) who died in the following year. The

army thereupon proclaimed as emperor Vale—

CaUrin ˚10(283 2f«SV h””10 aftef the death of carpus (283-285) became sole master of the

empire.

Diocletian abandoned the ancient forms of government and transformed the empire into an absolute monarchy. He separated the civil and

offie V ad™’;Istrah˚ns created a new order of officials and brought the finances into order. r he supreme power he vested in the hands of two Augusti assisted by two Caesars who in turn were to succeed to the office of Augustus hus a more efficient administration would be ensured by the practical division of the empire into four parts. Diocletian, however, did not count on personal ambitions which were destined to wreck his plan. In 305 Diocletian resigned his office and compelled his fellow August

cˆeded bvThVr d˚ HkˆWise-Thev were GalerhJ Vbi? C ˆr’ C˚nStant,us Chlorus and aierius, while new Caesars were created. Con-

fusion and civil war followed and at one time there were six Augusti in the field. The strug¬ gle finally narrowed down to a contest between Licinius and Constantine, a son of Constantius, and after two wars Licinius was overthrown and Constantine became sole ruler of the em¬ pire. Constantine the Great (324-337) con¬ tinued the administrative policy of Diocletian. He built Constantinople as a new capital for the empire and made Christianity the state religion. Of his three sons to whom he left power, Constantinus, Constantius and Constans, the first died in 340 and the last in 350. Constantius ruled with undisputed power from 353 to his death in 361. He was followed by Julian, known as the Apostate (361-363), who fell against the Persians and Jovian (363-364). Valentinian I ruled from 364 to 375. H,e left the government of the East to his brother Valens and made his son Gratian coemperor. Gratian ruled till 383 with Valentinian II as coemperor. The Goths had now broken into the empire and in 378 thev inflicted a terrible defeat upon Valens at Adrianople. In this extreme Gratian conferred the government of the east upon Theodosius (379-395), who by war and diplomacy effected a settlement with the Goths. In 392 Valentin¬ ian II died and Theodosius became sole ruler of the empire. His own death followed in 395, after he had divided the empire between his sons, Honorius, to whom was assigned the West under the guardianship of Stilicho and Arcadius, who became emperor of the East with Rufinus as his adviser. The influx of Ger¬ manic tribes into Italy increased in volume. The tide of invasion was checked for a moment by the generalship of Stilicho (q.v.), but in 410 Rome was sacked by the Goths under Alaric, who, passing into southern Gaul, estab¬ lished a kingdom there. Other Germanic hordes wrested Spain from the Roman arms. Honorius died in 423 and was succeeded after a brief interval by Valentinian III who ruled till 455. The defeat of the Huns under Attila on the Catalaunian Fields in Gaul (451) by Aetius was the last effective assertion of the Roman power. Valentinian III was murdered in 455 and in the strife for the throne that followed, Valentinian's widow summoned to her aid the Vandals from Africa, who plundered the city of its treasures. For 20 years there came a succession of shadow kings, made and unmade by the all powerful commanders of

the German mercenaries, Ricimer, and after him Orestes, who in 475 placed his young son Romulus on the throne. The troops under Odoacer (q.v.) revolted, Orestes was overthrown, the child em¬ peror was retired to private life and in 476 Odoacer assumed for himself the title of king of Italy, thus marking the end of the Roman Empire in the West. For the history of the East Roman Empire see Byzantine Empire.

History of the City of Rome subsequent to 476 A.D. — After the overthrow of the West¬ ern Empire and the defeat and surrender of Odoacer, Rome came under the rule of the Ostrogoths. The city suffered severely in the wars between the Goths and Byzantines, in the course of which it was taken six times. The depredations of the Byzantine emperors as well as of the Christian authorities, who made use of the materials and ornaments of the ancient edifices in the erection of their churches, were the cause of the destruction of

many ornaments of the imperial city; but more destructive still were the feuds that afterward (especially in the 10th century and later) raged in Rome between the leading families. In 1084 a part of the Campus Martius and most of the city in the south were devastated by the army of Normans, Greeks and Saracens which Robert Guiscard led to the relief of Gregory VII, then besieged by Henry IV of Germany in the Castle of Sant' Angelo. In the 14th century the work of destruction and depopulation was hastened bv the struggles which resulted from the at¬ tempt of Rienzi (q.v.) to found a republic, and was continued during the period of confusion that ensued after the commencement of the great schism in 1378. A terrible pestilence which raged in the city in 1348 is said to have reduced the number of inhabitants to less than 20,000. A temporary check was given to the confusion that prevailed in Rome toward the end of the 14th century by Boniface IX, but order was not permanently re-established till Martin V took up his residence in the city after the schism had been virtually terminated by the Council of Constance. Martin's successor, Eugenius IV (1431-47), is usually named as the Pope under whom the work of restoration in Rome began. In this he was followed by Nicholas V (1447-55), who began the building of the Vatican, Pius II (yEneas Sylvius, 14584-64), Paul II (1464-71), who, however, auarried in the Colosseum for the erection of the Palazzo di Venezia, as did also Paul III (1534—50), when building the Palazzo Farnese. But the most important period in the architectural his¬ tory of Modern Rome was the end of the 15th and beginning of the 16th centuries, when the labors of Bramante, the two Sangalli, Peruzzi and Michelangelo were pursued under the patronage of Sixtus IV, Alexander VI, Julius II and Leo X, and when

the works of the great architects were adorned in the interior by artists as great or greater, such as Raphael and Michelangelo himself. In 1527 the city was sacked by an imperial army under the Con¬ stable of Bourbon. From this date onward the city began to extend more and more over all parts of the Campus Martius. Much was done in the 16th century, especially by Paul III, Pius IV, Gregory XIII and Sixtus V, for the embellishment and enlargement of the town, the improvement of the streets and the restora¬ tion of the fortifications. Many remains of antiquity were then rescued from destruction, although many more were sacrificed, particu¬ larly under Sixtus, for the sake of modern structures. In the 18th century Benedict XIV, Clement XIV (founder of the Museo Pio-Clementino) and Pius VI deserve special men¬ tion for their efforts to nreserve and beautify Rome. In 1798 Rome was occupied by the French and deprived of many of its art treas¬ ures. At the same time a republic was erected in Rome, but this only lasted for a short time, and after a series of disturbances and changes the Pope was again reinstated in his dominions in 1799. (See Italy). From 1809 to 1814 Rome was once more under French rule, the States of the Church having in the former year been annexed to the Napoleonic Empire. The short¬ lived Roman republic of 1848-49 was followed by the restoration of the papal rule in 1850. On 20 Sept. 1870 the Italian troops, after effect¬ ing a breach in the Porta Pia, in the north-

east of the city, marched in along the Via di Porta Pia (henceforth called Via Venti Settembre). Since then Rome has been in the pos¬ session of Italy, and since the 1st of July of the following year the capital of the kingdom.

Bibliography.— Abbott, F. F., < Society and Politics in Ancient Rome) (New York 1909) ; id., (History and Description of Roman Polit¬ ical Institutions) (3d ed., Boston 1911) ; id., Che Common People of Ancient Rome5 (New York 1911) ; Ampere, J. J., C'Histoire romaine a Rome* (3d ed., 4 vols., Paris 1866-72) ; Arnold, Thomas, (History of Rome) (new ed., 3 vols., London 1871): Bailey, Cyril, (Religion of Ancient Rome) (Chicago 1907): Baddeley, Saint Clair, Tome and Its Story5 (New York 1904) ; id., (Recent Discoveries in the Forum, 1898-1 904 } (ib. 1904) ; Bury, J. B., < History of the Later Roman Empire5 (2 vols., New York 1889) ; id., (History of the Eastern Ro¬ man Empire5 (London 1912) ; id., Constitu¬ tion of the Later Roman Republic5 (Cambridge 1910) ; Baumeister, August, (Denkmaler des klassischen Altertums5 (Vol. Ill, Munich 1889) ; (Bulletino della Commissione Archeo-logica Comunale di Roma5 (Rome 1872 et seq.) ; Notizie degli Scavi (Rome 1876 et seq.) ; Bryce, (Studies in History and Jurisprudence5 (New York 1901) ; Botsford, G. W., (Roman As¬ semblies5 (ib. 1909) ; Carter, J. B., (Religious Life of Ancient Rome5 (Boston 1911) ; Craw¬ ford, Francis M., (Ave Roma Immortalis5 (New York 1905) ; Davis, W. S., (Influence of Wealth in Imperial Rome5 (ib. 1913) ; Dill, S., Toman Society5 (2 vols., ib. 1904; 1906); Duruy, Vic¬ tor, (History of Rome and of the Roman Peo¬ ple5 (English trans. by Ripley and Clarke, 8 vols., Boston 1883-86) ; de Cesare Raffaele, Cast Days of Papal Rome 1850— 18705 (Lon¬ don 1909) ; de Coulanges, N. D., Fastel, Che Ancient City : A Study on the Religion, Laws and Institutions of Greece and Rome5 (English trans. by Willard Small, 8th ed., Boston 1894) ; Friedlander, Ludwig, (Roman Life and Man¬ ners under the Early Empire5 (English trans. by L. A. Magnus, 4 vols., New York 1908-14) ; Ferrero, Guglielmo, Creatness and Decline of Rome5 (English trans. by Zimmern and Chay-ton, 5 vols., ib. 1907-11) ; id., Characters and Events of Roman History from Caesar to Nero5 (New York 1909) ; Fowler, W. W., Tome5 (ib. 1912) ; id., City State of the Greeks and Romans5 (New York 1895) ; id., Toman Fes¬ tivals of the Period of the Republic5 (ib. 1899) ; id., (Religious Experience of the Roman Peo¬ ple from the Earliest Time to the Age of Augustus5 (ib. 1911) ; id., Toman Ideas of

Deity in the Last Century Before the Christian Era5 (London 1914) ; id., (Social Life in Rome in the Age of Cicero5 (new ed., ib 1915) ; Tenney, Frank, (Roman Imperialism5 (New York 1914) ; Gibbon, Edward, (History of the Decline and Fall of the Roman Empire5 (Bury ed., 3 vols., ib. 1912) ; Greenidge, A. H. J.,

(Roman Public Life5 (ib. 1901) ; Greenidge and Clay, (Sources for Roman History5 (Oxford 1903) ; Gregorovius, Ferdinand, (History of the City of Rome in the Middle Ages5 (English trans. by Annie Hamilton, 9 vols., London 1894-1912) ; Glover, T. R., Conflict of Religions in the Early Roman Empire5 (4th ed., ib. 1910); Gsell-Fels, T. J., Tom und die Campagna5 (5th ed., Leipzig 1901) ; Hare. A. 1. C., (Walks in Rome5 (ed. by St. Clair Baddeley, 20th ed.,

London 1913) • Hayes, C. H., (Introduction to the Sources Relating to the Germanic Invasions5 (New York 1909) ; Hertzberg. J. F., Republi¬ can Rome5 (English trans., Philadelphia 1902) ; id., Hmperial Rome5 (ib. 1905) ; Heitland, W. E., Che Roman Republic5 (3 vols., Cambridge 1909) ; Howells, W. D., Roman Holidays5 (New York 1908) ; Ihne, Wilhelm, (History of Rome5 (English trans., 5 vols., London 1871—82) ; Jd., (Early Rome from the Foundation of the City to Its Destruction by the Gauls5 (New York 1902) ; Johnston, H. W., Rrivate Life of the Romans5 (Chicago 1907) ; Kieppert-Hulsen, Rormae Urbis Romae Antiquae5 (2d ed., Berlin 1912) ; Lanciani, R. A., (Ancient Rome in tfie Light of Recent Discoveries5 (6th ed., New York 1890) ; id., destruction of Ancient Rome5 (2d ed., ib. 1901) ; id., (New Tales of Old Rome5 (ib. 1901) ; Launspach, C. W. L.,

(State and Family in Early Rome5 (London 1908) ; Liddell, H. G., (History of Rome from the Earliest Times to the Establishment of the Empire5 (2 vols., London 1885) ; Liibker, Fried¬ rich, Reallexi kon des klassischen Altertums5 (8th ed., Leipzig 1914) ; McVeagh, Che Foun¬ tains of Papal Rome5 (New York 1915) ; Marquardt, Joachim, (Manuel des antiquites ro-maines5 (18 vols., Paris 1887-1907) ; Merivale, Charles, Che Roman Triumvirates5 (London 1876) ; id., (History of the Romans under the Empire5 (new ed., 8 vols., New York 1890) ; Munro, D. C., (Source Book of Roman His¬ tory* (Boston 1904) ; Mommson, Theodor, Rrovinces of the Roman Empire5 (2 vols., New York 1887) ; id., (History of Rome5 (new ed., 5 vols., ib. 1903-05) ; Morey, C. R., Cost Mosaics and Frescoes of Rome5 (Princeton 1915) ; Niebuhr, B. G., (History of Rome5 (new ed., 3 vols., London 1855-60) ;'Niese, Crundriss der romischen Geschichte nebste Quellenkunde5 (2d ed., Munich 1897) ; Oman, C. W. C., (Seven

Roman Statesmen of the Later Repub¬ lic5 (New York 1902) ; Orbaan, J. A. F., (Six-tine Rome5 (ib. 1911); Pais, Ettove, <Storia critica di Roma durante i primi cinque secoli5 (Vols. I and II, Rome 1913—15) ; id., (Ancient Legends of Roman History5 (English trans, New York 1905) ; id., (Ancient Italy5 (English trans., Chicago 1908) ; Pelham, H. F., Cutlines of Roman History5 (New York 1907) ; Platner, Copography of Ancient Rome5 (New York 1912) ; Reid, J. S., Che Municipalities of the Roman Empire5 (Cambridge 1913) ; Richter, O., Reitrage zur romischen Topographie5 (Berlin 1903-10) ; Sanders, H. A., Roman His¬ torical Sources and Institutions5 (New York 1904) ; Seignobos. Charles, (History of the Ro¬ man People5 (ib. 1902) ; Sheppard, J. G., Che Fall of Rome and the Rise of New Nationali¬ ties5 (ib. 1892) ; Seeck, Otto, < Geschichte des Untergangs der antiken Welt5 (5 vols., Berlin 1897-1913) ; Tomassetti, Giuseppe, (La cam¬ pagna romana antica, medioevale. e moderna5 (Vols. I and III, Rome 1909-13) ; Taylor, T. M., Constitutional and Political History of Rome5 (London 1899) ; Villari. Pasquale, (Barbarian Invasions of Italy5 (2 vols., New York 1902) • Willoughby, W. W„ Rolitical Theories of the Ancient World5 (New York 1903) ; Wissowa, Georg, Religion und Kultus der Romer5 (2d ed., Munich 1912) ; Young, Norwood, (Story of Rome5 (New York 1910).

John S. Patton, Librarian, University of Virginia.

ROME, N. Y., city in Oneida County, on the Mohawk River and at the junction of the Barge, Erie and Black River canals, and on the New York Central and New York, Ontario and Western railroads. The city is about 110 miles west by north of Albany and 15 miles northwest of Utica. It is at the head of the Mohawk Valley, on a plateau about 450 feet above sea-level. The first settlement was made in 1760 by John Roof. The central part of the city is the site of Fort Stanwix, erected here in 1/58 at a cost of over $200,000. It was then a place of great importance as it was the de¬ fensive point in the ((carrying place,)} or port¬ age, that part of the route between the Atlantic and the Great Lakes, where the journey had to be made by land. Fort Stanwix was a

storm centre in the French War and also in the Revolutionary War. At Rome the Stars and Stripes were first unfurled in battle; for here in July and August, 1777, there were many sharp engagements, and finally the Tryon County Militia under Herkimer defeated the British under St. Leger in the battle at Oris-kany. A government arsenal was established here in 1814, but in 1873 was sold for a factory. In 1819 Rome became a village and in 1870 was chartered as a city.

The greater part of the water supply is taken from Fish Creek, about 13 miles from the city. The surrounding country is devoted to' farming and dairying; but Rome is a manu¬ facturing city. The chief industrial establish¬ ments are brass and copper mills, locomotive works, knitting mills, brick yards, canneries, metal bedstead factories, wire works, automo¬ bile and radiator factories, and creameries. The facilities for transportation give Rome con¬ siderable commercial advantages. The prom¬ inent public buildings are the Rome State Cus¬ todial Asylum for incurable insane, the Oneida County Home, the municipal buildings and some of the business blocks. There are several churches and missions. The educational insti¬ tutions are the Central New York Institution for Deaf-Mutes, Academy of the Holy Names (Roman Catholic), opened in 1865, several graded public and parish schools, public kinder¬ gartens, private schools and libraries. The li¬ braries are the high school, the Jervis Public and the Y. M. C. A. There are national banks with a combined capital of over $200,000 and savings banks. The city debt is $915,614.55, largely due to the amounts paid for city sewer¬ age, waterworks and new schools. The as¬ sessed valuation is about $10,955,875 yearly. The government is vested in a mayor and a council of 15 members, who hold office three years. Pop. 23,868.

ROME, CEcumenical Councils of, are six

in number, namely, five Lateran Councils, so called as having been held in the Lateran Palace, and the Vatican Council, held in the palace of the Vatican. 1. The ninth general Council of the Church, the first Lateran Coun¬ cil, was held in the reign of Calixtus II in 1123; it confirmed the concordat of Worms regarding Investiture (q.v.). 2. The second

Lateran (10th general) Council, held in 1139 under Innocent II, condemned the Manichsean errors of Arnold of Brescia (q.v.). 3. The third Lateran (11th general) Council, under Alexander III in 1179, condemned the heresies

and impieties of the Waldenses and Albigenses. 4. The 12th general Council (4th Lateran) held in 1215 in the pontificate of Innocent III, con¬ firmed the doctrine of transubstantiation and promulgated decrees for the reformation of abuses in the Church and the extirpation of heresies. 5. The 19th general Council (5th Lateran) under Julius II, assembled in 1511, was in session till 1517 when Leo X was Pope; it enacted some laws for the reformation of clerical discipline and procured from the king of France, Francis I, the revocation of the Pragmatic Sanction (q.v.) which the French clergy had ever regarded as the bulwark of the Gallican Liberties. 6. The Council of the Vatican (20th oecumenical council), which was opened 8 Dec. 1869 and closed 20 Oct. 1870, under Pius IX, affirmed as the teaching of the Catholic Church the doctrine that the Pope when teaching ex cathedra and defining matters of faith or morals is always divinely aided and is infallible.

ROME STATE CUSTODIAL ASYLUM,

an institution for the custody, maintenance and treatment of the custodial class of feeble¬ minded, located at Rome, N. Y. It was for¬ merly the Oneida County Insane Asylum and Almshouse, but by the acts of the legislature in 1893 and 1894, the building and grounds were purchased by the State. Among other things, calisthenics, dancing, drilling, kindergarten, sloyd and articulation are taught. Agricultural colonies for the brighter male inmates have also been established. Feeble-minded are com¬ mitted to this asylum from all counties in the State, according to the quota assigned each county, which is based on the population of the respective counties, as compared with the capacity of the institution. For their care there are over 20 large buildings, beside several small sheds, *etc.* The average number of inmates is about 750.

ROMEO AND JULIET. This, the first tragedy that Shakespeare wrote, was first printed in 1597 as ((a garbled and imperfect rendering, made up partly from copies of por¬ tions of the original, partly from recollection and from notes taken during the performance.ˆ The second quarto, a revised edition, ((newly corrected, augmented and amended, w was pub¬ lished in 1599, a third quarto in 1609, and a fourth version in the first folio (1623). Al¬ though there is no evidence that the play was acted before 1596, it is probable that it was written as early as 1594, although later revised. The immaturity of the play is indicated in the large number of conceits, puns and other forms of quibbling, such as we have in (Love’s Labors Lost) and (MidSummer Night’s DreanP ; in the preponderance of rhymed verse and in the decidedly lyrical character of many of the passages. On the

other hand the excellence of the plot, the supreme beauty of the best scenes, the assured mastery of blank verse dis¬ played in parts, indicate an excellence not found in the earlier plays and suggest, therefore, care¬ ful revision of an earlier version. The story had long been a popular one in Italy and France when it was translated in a long narra¬ tive poem entitled (The Tragical History of Romeo and Juliet > by Arthur Brooke (1562) and in a shorter prose version by William Painter in his 'Palace of Pleasure) (1567).

There is no better evidence that Shakespeare conceived his task in handling sources as one of adapting and not originating plots than a detailed comparison of Brooke's poem and the play. Not only are the chief char¬ acters and practically all the minor ones found in the poem, but entire scenes and many bits of psychological insight attributed to Shakes¬ peare. The change of time from four or five months to as many days, the dramatic contrasts of characters and scenes and the heightened poetical language — all indicate Shakespeare's power of dramatization. What stirred the interest of Shakespeare in reading the old story was the dramatic situation pre¬ sented by the lovers in conflict with their en¬ vironment. Tragedy has not become with him, as in his later plays, so much the inner conflict between the complex elements of a hero's soul. Romeo and Juliet are a pair of <(star-crossed loversˆ who move somewhat inevi¬ tably toward their fate. Theirs is a love that knows no impediment; they bear it out even to the edge of doom. It is the great and typical love tragedy of English literature. The love that unites Romeo and Juliet springs from no worldly consideration; it is natural, spontane¬ ous, all-absorbing. There is no moral error involved in their tragedy — at the best a tragic error. One of the best effects of the play is found in the contrast between these highly emotional lovers and Paris and Lady Capulet, to whom love is a mere conventional relationship; the Nurse, to whom it is a matter of pleasur¬ able instinct and even vulgar comment; Friar Laurence, with his somewhat worldly counsels against the excess of it; and Mercutio, trans¬ fixing it with the shafts of his reckless and cynical wit. In the blending of comedy and tragedy,

which is more marked in this tragedy than in any of his others except perhaps (Ham-let, } Shakespeare was following the demand of life in its more complex aspects rather than the laws of classic art. While the defects of the play already suggested tend to mar the complete unity, the final impression is that of the great scenes: The Balcony Scene with the beauty of the Italian sky at night and the softest music of lovers' tongues; the Dawn Scene, when the earth is a-quiver between night and day and the lovers breathe out in each other's arms the saddest of farewells; and the Grave Scene, where the old Friar unites above the graves of the lovers the two families from whose loins they sprang. Then we know that we are reading the greatest of love poems, if not the greatest of Shakespeare's tragedies.

Edwin Mims.

ROMER, re'mer, Ole, Danish astronomer; bˆ Aarhus, 25 Sept. 1644; d. Copenhagen, 19 Sept. 1710. After study at the University of Copen¬ hagen he was in 1671-81 at Paris, where he made observations in the royal observatory and was elected to the Academy. In 1681 he was made professor of mathematics and director of the observatory at Copenhagen, and subse¬ quently became a councilor of state. He is known chiefly as the discoverer of the velocity of light, which he determined by observation of the eclipses of the satellites of Jupiter. He found that when Jupiter and the earth were on opposite sides of the sun, the eclipse seemed to occur too late; when on the same side, too early. The extreme deviation from mean time

he computed at 11 minutes; it is now known to be approximately 8 minutes 20 seconds, that is, light crosses the space between the earth and the sun (a little less than 93,000,000 miles) in about 8 minutes. (See Light). Romer in¬ vented the transit instrument (1689) and meridian circle (transit and vertical circle com¬ bined; 1690). Consult Grant, (History of Physi¬ cal Astronomy > (1852) ; Horrebow, Peter, < Ad¬ versary (1910).

ROMERO, ro-ma'ro, Don Matias, Mexican diplomat: b. Oaxaca, Mexico, 24 Feb. 1837; d. Washington, D. C., 30 Feb. 1898. He was graduated at the Academy of Theoretical and Practical Law, Mexico City, in 1855, and ad¬ mitted to the bar in 1857. In the revolution of that year he supported the government and served as secretary to Melchor Ocampo. In 1859 he was appointed secretary to the Mexi¬

can legation at Washington and in 1860-63 was charge d'affaires. He then returned to Mexico where he was commissioned colonel in the army, became chief of staff to General Diaz and later in the same year resumed his diplomatic career as Minister to the United States. He held the portfolio of the treasurer in Juarez's cabinet in 1868-73, was a member of the Senate in 1876 and on the election of Diaz to the Presidency he resumed his position in the treasury. He was Postmaster-General in 1879-80 and in 1882 he was again sent as Minister to the United States, where he arranged the boundary ques¬ tion and concluded a reciprocity treaty. He was reappointed in 1884 and continued in the position until his death. He published more than 50 volumes, chiefly of technical reports, among which are 'Coffee-culture on the South¬ ern Coast of Chiapas } (1875); Correspond¬ ence of the Mexican Legation at Washington during the French Intervention) (1870-85); (The State of Oaxaca* ; 'Mexico and the United States.)

ROMEYN, ro'min, John Brodhead, Amer¬ ican Presbyterian clergyman: b. Marbletown, N. Y., 8 Nov. 1777; d. New York, 22 Feb. 1825. He was graduated at Columbia in 1795 and was licensed to preach in 1798. He held charges at Rhinebeck, Schenectady, Albany and New Tork successively, attained a high reputation as a theologian and was popular as a preacher. He was one of the founders of Princeton Theo¬ logical Seminary, president of Transylvania University, a trustee of Princeton College and a moderator in the Presbyterian General As¬ sembly. His sermons were collected and pub¬ lished in 1816.

ROMILLY, rom'I-11, Sir Samuel, English statesman and jurist: b. 1 March 1757; d. London, 2 Nov. 1818. He entered Gray's Inn to study for the bar, to which he was called in 1783, and gradually rose to distinction in the Court of Chancery, in which he ultimately took the lead. During the short administration of Fox and Lord Grenville (1806) he was ap¬ pointed solicitor-general (being member for Queensborough), and knighted. When the Whigs went out of office he remained in Parlia¬ ment, where he pleaded the necessity of a re¬ vision of the criminal code, with a view to the limitation of capital punishment, and a more appropriate regulation of the scale of penalties. To his exertions may be traced the final de-

termination of the executive to the reform and condensation of the various acts in regard to crime, effected under the superintendence of Sir Robert Peel. After a lifetime spent in securing mitigation of the criminal laws, he died by his own hand. Consult (Memoirs, y written by himself (1840) ; also (The Creevy Papers) (1904).

ROMNEY, rom'ni, George, English painter : b. Beckside, near Dalton-in-Furness, Lanca¬ shire, 15 Dec. 1734; d. Kendal, 15 Nov. 1802. His father was a cabinet-maker, and the boy learned this trade, but he also taught himself drawing and woodcarving and at 19 was ap¬ prenticed to a portrait painter at Kendal named Steele. In 1757 he entered a career as portrait painter, and after local success went to Lon¬ don (1762), leaving his wife (whom he mar¬ ried in 1756) and his two children in Kendal. The following year he won a prize offered by the Society of Art for a historical painting, by his (Death of General Wolfe,) and rose steadily in popularity until he held a position beside Reynolds and Gainsborough as a por¬ trait painter. He visited France twice; once in 1764 and again in 1790, and resided in Italy during the years 1773-75. While in Italy he gave much attention to the works of Correggio, and this, along with his study of the nude, greatly influenced his after-work. In 1783 Romney made the acquaintance of Emma Hart, who afterward married Sir William Hamilton, and she became the model from which he painted such well-known pictures as (Saint Cecilia,) (Joan of Arc,) (A Magdalen,) (A Bacchante> and (Sensibility.) His (Lady Ham¬ ilton as Circe) sold in 1890 for $20,210; his (Lady Hamilton as Sensibility) in the same year for $15,025. In the Metropolitan Museum in New York are his (Lady Hamilton as Daphne,) (Mrs. FitzherberC and (Mrs. Scot-Jacksen.) Gradually he began to withdraw from portrait painting and gave more time to his¬ torical and imaginative work. In 1786 Aider-man Boydell founded his famous Shakespeare gallery, to which Romney contributed a scene from the <Tempest) and the (Infant Shake¬ speare attended by the Passions } ; while about this time he painted (Milton and his Daughters) and (Newton making Experiments with the Prism.) In order to find room for these great imaginative pictures he erected a large studio at Hampstead, which he occupied in 1797. But his health at this time began to fail, and in the summer of 1799 he returned to

Kendal utterly weakened in body and mind. He had only seen his wife twice since he left her 35 years before, yet she received and nursed him faithfully through his premature senility and dotage until his death.

The art of Romney displays a certain fitful¬ ness of achievement due partly to the instabil¬ ity of his character, and partly to his defective early training. His defects of technique are most apparent in his historical and imaginative subjects; it is only when we examine his por¬ traits, and especially his female portraits, that we find that beauty of form and subtle charm of color which place him among the greatest portrait painters of the 18th century. Consult Hagley, (Life of George Romney) (1809) ; Gamlin, (George Romney and His ArC ; Gower, (Romney and Sir Thomas Laurence) ; J. Rom¬

ney, (Memoirs of the Life and Writings of George Romney) (1830).

ROMNEY, W. Va., city and county-seat of Hampshire County, situated in the valley of the South Branch of the Potomac River and on the Baltimore and Ohio Railroad, about 100 miles west of Washington, D. C. The city's industries include a barrel factory, planing mill and a flouring mill. There are two banks — one State and one National. The value of the city's taxable property is $899,342. The annual re¬ ceipts average about $5,850. The chief public buildings are the county courthouse, Literary Hall, the State institution for the deaf and blind and the high school. There is also a school for negroes. The city is well laid out with wide streets running at right angles, good water-supply system, electric lights and sewage system. It is the shipping centre for a fruit¬ growing section. The form of government is that of the ordinary municipal corporation chartered by the State. Pop. (1920) 1,028.

ROMNEY (W. Va.), Engagements at.

This place was important as an outpost of the Union troops guarding the Baltimore and Ohio Railroad and also as a base for operations up the valley of the south branch of the Potomac. It was held early in June 1861 by Col. Angus McDonald, with about 500 Virginia troops and two guns. On the night of 12 June Col. Lew Wallace, with 800 men of the 11th Indiana regiment, went by rail from Cumberland to New Creek Station and marching across the mountains attacked and routed McDonald on the 13th, and on the same day started on his return by the route he had come. Informa¬ tion of Wallace's

movement reached Gen. J. E. Johnston, commanding the Confederate forces at Harper's Ferry, on the morning of the 14th, and supposing it to be the advance of General McClellan's column from West Virginia to co¬ operate with General Patterson, who was threat¬ ening to cross the Potomac at Williamsport, Johnston ordered Col. A. P. Hill, with three regiments, to march on Romney and check the movement (see New Creek). He burned all the bridges on the Potomac from Harper's Ferry to Williamsport, abandoned Harper's Ferry, and fell back to Winchester. On 23 September Lieutenant-Colonel Cantwell, with detachments of the 4th and 8th Ohio, a company of cavalry and one gun, marched from New Creek, drove McDonald's forces from Romney on the 24th and with a loss of three killed and 30 wounded, returned to New Creek, closely followed by McDonald's cavalry. On 25 October Gen. B. F. Kelley, with detachments of Ohio and West Virginia troops and two companies of cavalry, in all about 2,500 men and two guns, started from New Creek for the permanent occupation of Romney. He captured it on the 26th, after a sharp engagement with McDonald's forces, driv¬ ing them beyond the town on the Winchester road, and capturing all their trains, two guns, 300 stands of arms and much camp equipage. A supporting column of the 2d Maryland, Colo¬ nel Johns, marching from the mouth of Patter¬ son's Creek, through Frankfort and Springfield, was met by the 114th Virginia militia, under Col. A. Monroe, at the bridge over the South Branch, seven miles from Romney, checked, and fell back to Patterson's Creek, with a loss of six or eight in killed and wounded. On 28

October Gen. <(Stonewall® Jackson was assigned to the command of the Valley District, with headquarters at Winchester, and immediately prepared to clear the valley of Union troops. He called out the militia, and being reinforced by General Loring's division from West Vir¬ ginia, set out late in December to destroy the Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad, and to recover Romney. To withdraw his attention from the railroad, Colo¬ nel Dunning, in command at Romney, made a demonstration toward Winchester with 2,000 in¬ fantry and cavalry and six guns. He marched on the night of

6 Jan. 1862, and next morning at Blue's Gap, 16 miles from Romney, fell upon 700 Virginia militia, under Colonel Mon¬ roe, scattered them and captured two guns, sev¬ eral prisoners and some baggage, without the loss of a man, and returned to Romney. On the same day Jackson left the vicinity of Han¬ cock and marched for Romney. Hearing of his approach, the Union troops retreated from Romney on the 10th toward New Creek. Jackson occupied the town on the 14th and placed Loring's division there in winter quarters. Lor-ing and his officers complained to the Richmond authorities, and the Confederate Secretary of War ordered Jackson to move the division back to Winchester, which was done 31 January, and on 7 February the town was again occupied by Union troops under Gen. F. W. Lander. Be¬ tween this time and the close of the war the town changed hands several times, but, for the greater part of the time was in Union posses¬ sion. Consult ˆOfficial Records) (Vols. II and V).

ROMOLA, George Eliot's sole experiment in historical fiction, was originally published as a serial in The Cornhill Magazine from July 1862 to August 1863. Hitherto George Eliot had taken the substance of her novels from memories of English life in the midland coun¬ ties where she had grown up and passed her youth. Into her new field she was led primarily by an interest in Savonarola, the great Floren¬ tine preacher and reformer of the Renaissance. Twice she visited Florence, where she made exhaustive studies in the politics of the period in order that her details might have the exact¬ ness of an historian. Her 'novel opens with the death of Lorenzo, the Magnificent, in 1492, and closes with the execution of Savonarola in 1498. The portrait of Savonarola, with which she took great pains, has been subjected to much criticism. As she paints the prophet and preacher, he has a sort of dual personality. In her words : <(The passionate sensibility which, impatient of definite thought, floods every idea with emotion and tends toward contemplative ecstasy, alternated in him with a keen percep¬ tion of outward facts and a vigorous practical judgment of men and things.® So without his being quite aware of it, Savonarola comes perilously near duplicity in his dealings with the people. He invokes the <(trial by fire,® but hesitates and fears when the day of the ordeal arrives; he watches the clouds, and delays until the rains come to quench the fires prepared for him ; then he can say that the hand of God is visible in the heavens to protect him. Still, in the end George Eliot says : ((Power rose against him not because of his sins, but be¬ cause of his greatness — not because he sought

to deceive the world, but because he sought to make it noble.®

On this historical background is projected the story of Tito Melema, a young Greek, beautiful and clever, who in a few short years betrays all who put their trust in him — Romola, Tessa, Savonarola and Badassarre his foster-father, at .whose hands he finally meets his fate. By many Tito is regarded as George Eliot's finest character study; but with this opin¬ ion I do not agree. No one can deny the re¬ lentless logic with which George Eliot pursues the downward career of this pleasure-loving young man ; but the study would be more im¬ pressive were not Tito so weak when the reader first meets him. We can understand his ingrati¬ tude toward Baldassarre and that Tessa should be deceived by him ; but we cannot understand the ease with which he imposes upon Romola and Savonarola. The plot, too, develops into a loose revenge-tragedy of the Elizabethan type, wherein Baldassarre, an impossible character outside of fiction, appears and disappears when¬ ever the occasion demands his presence or his absence. Great as is the novel, it will not stand comparison with those novels in which George Eliot depicts the life she knew. Romola is really a new and weaker version of Maggie 1 ulliver in (The Mill on the Floss, > without the flesh and blood of the Margaret in Charles Reade's (Cloister and the Hearth, > who was Romola's contemporary; and for George Eliot's most powerful study in the deterioration of character, we must turn from Tito Melema to Dr. Lydgate in (Middlemarch,> who began his career with noble ideals and afterwards lost them.

Wilbur L. Cross.

ROMULUS, rom'u-lus, mythical founder and first king of Rome. He is said to have been the son of Sylvia, generally, but incor¬ rectly called Rhea Silvia, daughter of Numitor, king of Alba, and one of the priestesses of Vesta. By the god Mars she became the mother of male twins, whom Amulius, who had usurped the throne of Numitor, ordered to be thrown into the Anio, but the basket contain¬ ing the two boys, Romulus and Remus, was stranded at the foot of the Palatine Hill. Here a she-wolf, going down to the river to drink, was attracted by their cries, carried them to her cave, and suckled them. Some time afterward chance brought thither Faustulus, the king's herdsman, who took them home and educated them. With him Romulus and Remus spent their youth. When they had grown up Amulius was deprived of his usurped throne by Romulus who reinstated his grandfather Numitor in his dominions. After this the brothers resolved to build a city. Romulus wished to place it on the Palatine, Remus on the Aventine, or on another hill three or four miles down the Tiber. Determining to reach a decision by consulting the augurs, each took his station on his favorite hill; the night passed

away, and at the first streak of dawn Remus saw six vultures; but at sunrise, when this news was brought to Romulus, 12 vultures flew by him. Each claimed the augury in his favor; but as their companions decided for Rom¬ ulus his brother was forced to yield. Romulus, to outline the boundary of the city, yoked a bul¬ lock and a heifer to a plow, marked a deep

furrow around tne base of the Palatine, and guided by this line began to raise the wall. Remus leaped over the rude rampart in scorn, whereupon the enraged Romulus slew him. Ac¬ cording to another tradition Remus fled from the anger of his brother beyond the Alps, and founded Rheims. Romulus was immediately struck with remorse, and could obtain no rest till he appeased his brother's shade by institut¬ ing the festival of the Lemuria for the souls of the departed. Thus is Rome said to have been founded in the year 753 (or according to others 752 or 751) b.c. The small number of friends who had followed Romulus were insuffi¬ cient to people his city. Men enough were gained by making the city a refuge for exiles; but the Roman citizens soon wanted women. Romulus thereupon instituted a religious festi¬ val, to which he invited the Sabines with their wives and daughters. In the midst of the festi¬ val the unarmed strangers were suddenly at¬ tacked, and the Sabine women borne away as captives. The two states thus became engaged in war; but the entreaties of the ravished fe¬ males, who threw themselves between the con¬ tending parties, at length effected a peace, and Rome gained by her union with the Sabines an important addition. According to tradition Romulus ascended to heaven into the company of the gods, after he had completed the work of founding the eternal city; and, until the introduction of Christianity, Rome worshipped its founder in temples expressly dedicated to him.

RONALDSHAY, run'ald-sha, North and South, two of the Orkney Islands (q.v.), Scot¬ land.

RONAYNE, ro-nan', Maurice, American Roman Catholic clergyman and author : b. Castlemartyr, Ireland, 3 April 1828; d. Fordham, N. Y.,

3 March 1903. He received his education for the priesthood in Ireland and France, and entered the Jesuit Order in 1853. He came to the United States in 1855, was ordained to the priesthood in 1856, taught in Saint John's College, Fordham, N. Y., and was for many years professor of history in the col¬ lege of Saint Francis Xavier, New York. In 1898 *he returned to the college at Fordham, where he spent the remaining years of his life as spiritual director. His writings upon the labor question may be found in various Roman Catholic periodicals. His most important books are (Religion and Science) (1879), and (God Knowable and Known.5

RONCADOR, one of several Californian drumfishes of the family Scicenidce, especially the red Scicena saturna, and Roncador stearnsi, both food-fishes of some importance.

RONCESVALLES, ron-thes-val'yes (Fr. Roncevaux, rons-vo) , Spain a valley in Navarre, between Pamplona and Saint Jean de Port, where, according to tradition, the rear of Charlemagne's army was defeated by the Arabs in 778, and the brave Roland killed. The battle forms an essential part in the fabulous cyclus of Charles the Great or Charlemagne. (See Roland and Romance). Roncesvalles, the chief place of the valley, 25 miles northeast of Pamplona, is traversed by the so-called Gates of Roland, leading over the Pyrenees to France; in the church fabulous antiquities bearing the

name of Roland are shown. The French under Moncey defeated the Spaniards here in 1794, and here Soult took up a strong position in 1813, from which he was dislodged by Welling¬ ton.

RONCO, a West Indian name for various drumfish of the genus Hcemulon, popular among fishermen and in the market, especially H. bonariense (ronco prieto) and H. parra (ronco bianco) or salior's choice.

RONDEAU, ron'do, or RONDO, origi¬ nally a short lyric of 13 lines divided into three unequal strophes ; the two or three first words form the burden, and are repeated after the 8th and 13th line. The term is now chiefly applied to a musical composition, vocal or instrumental, generally consisting of three strains, the first of which closes in the original key, while each of the others is so constructed in point of modula¬ tion as to reconduct the ear in an easy and nat¬ ural manner to the first strain. The rondeau takes its name from the circumstance of the melody going round after both the second and third strain to

the first strain, with which it is finally closed. While it frequently forms the last movement of a sonata or a symphony, it is quite as common as a separate composition.

RONGE, Johannes, yo-han'nes rong'e, Ger¬ man Anti-Catholic religious leader : b. Bisch-ofswalde, Silesia, 16 Oct. 1813; d. Vienna, 26 Oct. 1887. He studied theology at the Uni¬ versity of Breslau 1837-39, was ordained to the priesthood in 1840, and in 1841 became chaplain at Grottkau. Having manifested an opposition to the discipline of the Church, he was sus¬ pended in 1843. On 1 Oct. 1844 he published a letter against the exhibition of the <(holy coat® at Treves, which was soon followed by the organization of the so-called German Catholic congregations. (See German Catholics). He published in succession a number of pamphlets, in which he called on the Roman Catholic laity and the lower clergy to leave the communion of that Church. These were generally under¬ stood to be written from the standpoint of deism ; and in subsequent years Ronge pro¬ nounced himself more and more unreservedly in favor of deistic doctrines. He took part with the radicals in 1848 and was obliged to flee to London, where he signed in 1851, with Ruge, Struve, Kinkel, and others, a democratic mani¬ festo to the German people, and where he be¬ came the leader of a free congregation. In consequence of the amnesty granted by the Prussian government, he in 1861 again made his appearance in Breslau. He founded a reform association at Frankfort-on-the-Main in 1863, and from 1873 resided at Darmstadt. Consult the article (Deutschkatholiken) in Wetzer und Welte's ˆirchenlexikonP

RONSARD, Pierre de, pe-ar de ron-sar,

French poet : b. Chateau de la Poissonniere, Vendomois, 11 Sept. 1524; d. Saint Cosme near Tours, 27 Dec. 1585. He entered as page the service of the dauphin, and then of the Due d'Orleans, second son of the king. In 1538 he accompanied James V of Scotland and his bride Marie de Lorraine back to their kingdom and remained at the Scottish court three years. He also spent six months at the English court and was then employed in a diplomatic capacity in

Germany, Piedmont, Flanders and Scotland. On his return to France he devoted himself with great eagerness to the study of literature. With a group of followers, self-styled the ((Pleiade,)) he cast away the literary traditions and ideals of mediaeval France and sought inspiration from the Latin and Greek classics. The result was transformatory, and Ronsard's influence on the progress of French letters was thus very great. In the Floral Games at Toulouse he triumphed over his competitors and received a silver statue of Minerva which he presented to Henry II. He was greatly esteemed by that prince and by his successors, Francis II and Charles IX; ob¬ tained the abbey of Bellozane and was also prior of Saint Cosme. His writings, consisting of sonnets, madrigals, eclogues, lyric pieces, elegies and satires and a fragment of an epic poem, (La FranciadeP were read with almost incredible admiration by his contemporaries and brought him valuable presents from Queen Elizabeth of England and the imprisoned Queen of Scots. Many of his sonnets and odes possess considerable merit, but his style is marred by affectation and his pages are filled with freshly imported words from the classic languages. There are editions by Blanchemain (1856-4)7) and Marty-Laveaux (1887). Consult Perdrizet, P., (Ronsard et la Reforme* (1902).

rGntgen rays. See Roentgen, Wil¬ helm Konrad; X-Ray.

ROOD, Ogden Nicholas, American physi¬ cist: b. Danbury, Conn., 3 Feb. 1831; d. New York, 12 Nov. 1902. He was graduated at Princeton in 1852 and afterward studied at Yale and at the universities of Munich and Berlin. He was appointed to the chair of physics and chemistry at the University of Troy in 1858, and in 1863 accepted the chair of physics at Columbia where he remained until his death. In his re¬ searches . and experimental work he showed great originality and skill, his specialties being in the fields of mechanics, optics, acoustics and electricity. His original experiments included the application of stereoscopic photography to the microscope, the quantitative analysis in color contrast, and the measurement of the duration of flashes of lightning. He was the first to de¬ scribe a photometric method that is independent of color. He was a leading member of the prominent scientific societies, author of nearly 100 monographs and also wrote (Modern Chromatics) (1881) ; (The Voice and the Ear,* *etc.* Consult files of the American Journal of Science.

ROOD, a cross. The term is more particu¬ larly applied to the large cross erected in Roman Catholic churches over the entrance of the

chapel or choir; this is often of a very large size, says the (Glossary of Architecture,* and when complete is like other crucifixes, accom-pained by the figures of Saint John and the Blessed Virgin, placed one on each side of the foot of the cross, but these are more often omitted. The rood-loft was the gallery in which the cross was set to view, and the rood-arch was the arch between the nave and the chancel, that is, the arch over the rood-loft. Rood-lofts be¬ came common in England in the 14th century, were ordered taken down by the government in the 15th and 16th centuries and temporarily were restored under Queen Mary. Consult Urish Constitution of 1635,) p. 110,

ROOD. See Weights and Measures.

ROOD-SCREEN, a screen of wood, stone, or wrought iron, separating the western end of the ritual choir from the nave in many churches and forming a support for the rood, a cross or crucifix, placed in the centre of the rood-beam. Sometimes the rood-screen was double, with vaulting between and a rood-loft over it, as at Southwell Cathedral. It was frequently orna¬ mented with niches in which were placed statues as at York Minster and Rochester Cathedral.

ROOF, the covering of a building by which the interior secures protection. In ordinary ac¬ ceptation the term includes the covering and the supporting framework, though in carpentry the term is applied only to the framework. Roofs are broadly distinguished as flat or sloping. The former were used almost exclusively among ancient peoples and are at present employed largely in Eastern countries where the roof is

devoted to some extent to domestic purposes. The sloping roof, being to a great extent an ornamental consideration, has given way to the flat roof in modern business buildings, where economy of construction prevails. Flat roofs are usually covered with tar, metal, asphalt or gravel. The framework of the roof has been, until the modern application of iron to this use, almost exclusively of timber; and the end de¬ sired has been to arrange the timbers in such relations as to secure the greatest strength and stiffness consistent with the minimum of weight; also to avoid lateral strain or thrust upon the walls. The form chosen has been that of two or more inclined planes for the slopes of the roof over the enclosed space. Two in¬ clined planes are formed by a series of sloping rafters having the lower ends tied

together to

prevent spreading, the upper ends forming the angle of the roof and connected by the ridge-piece. The method of tying the rafters is by a horizontal beam laid across the span, receiving at each end the foot of one of the rafters, the two being securely mortised. This is called a tie-beam. When the roof is of wide span it becomes necessary to secure the tie-beam against settling in the middle, and this is done by joining the centre of the tie-beam and the ridge angle of the rafters by a king-post (A in Fig. 1).

Sometimes two vertical beams are sus¬ pended from the rafters to the tie-beam, and these are called queen-posts (BB in Fig. 2).

Braces or struts (c) may be carried from the foot of the suspended posts to the rafters to afford additional stiffness to the frame. Further support is given to the rafters in roofs of long span by one or a series of transverse longitudinal beams called purlins. Early Chris¬ tian basilicas, of which San Miniato in Florence is typical, had roofs of the character just de¬ scribed. When the period of Gothic architec¬ ture was reached the king-post and tie-beam were carved and molded, in cases where wooden roofs were used instead of stone vaulting. Open timber roofs were used in England more than on the Continent for churches and halls. The finest example is that of Westminster Hall (Fig. 3) completed in 1399 and having a span of 68 feet.

Fig. 3.

In this example the central part of the tie-beam is cut away, and the great rigidity of the framework prevents any inordinate thrust upon

the walls.

The inclination or pitch of the roof seems to be regulated by taste, after the general law is observed that countries of moist climate re¬ quire a sloping roof to carry off the rain and snow. The slope of a Greek pediment, marking that of the roof, varied from 15 to 16ˆ2 de¬ grees; Roman roofs, the roofs of Romanesque buildings, and also those of the. Renaissance era, generally carried an inclination increased one-quarter to that of Greek buildings. The Gothic pitch sometimes reached to 50 or 60 degrees ; but since the period of the prevalence of one particular style, great latitude has been observed, — Germany and the Netherlands favor¬ ing a steep roof, and France retaining a mod¬ erately steep inclination even in her Renais¬ sance structures; but England has tended toward the lowering of the pitch.

The commonest form is the gable roof where each end terminates in a gable. Modifications of this are the curb-roof in which the slope is broken, further distinguished as the gambrel roof where only two opposite sides are sloping; the French roof where the slope beneath the curb approaches almost to verticality and that above is nearly flat or with a slightly visible slope; the Mansard roof, named after its de¬

signer, Mansard, where the slope beneath the curb is pierced by dormer windows. The hipped roof is one having a double pitch and no gables, and the ridge shorter than the parallel wall plates. The pyramidal roof is one where the ridge is so short as to approach a point. Various modifications of these general forms are known by a variety of names.

The recent use of iron for roof-frames has become very general, especially where wide spans are required as in the case of railway train sheds. The general principles of construc¬ tion employed in wooden frames are utilized in iron ridge roofs; but for oval or conical roofs, the iron trusses require a consideration of the principles governing those of bridge trusses. See Bridges.

The covering of sloping roofs is of various material, such as thin slabs of stone, thatch, tiles, slate, metal, shingles and cement. Metal shingles and asbestos shingles are increasing in use. Of the 120 factories in the United States making roofing materials, one-fourth make metal shingles and ceilings. There are employed in these factories over 4,000 people and the gross annual product is valued at about $28,000,000. There is also a production of over $5,000,000 worth in factories

mainly devoted to other industries.

ROOFING TILES. See Tiles.

ROOK, Edward Francis, American artist: b. New York, 1870. He studied under Jean Paul Laurens and Benjamin Constant in Paris. He received the Temple gold medal at the Phila¬ delphia Academy of Fine Arts in 1898; and was awarded medals at the Buffalo, Saint Louis, Buenos Aires and Panama Expositions. Among his works are (Deserted Street, Moonlight y (Pennsylvania Academy, -Philadelphia), and (Pearl Clouds, Moonlight* (Cincinnati Art Museum).

ROOK, a European crow (Corvus frugile-gus), having the base of the bill, forehead and upper part of the throat naked. The rook pos¬ sesses a voice much less harsh than that of the crow. Rooks are gregarious in habits, and nest in great communities or rookeries, thus differ¬ ing from other species of the family. The nests, which are placed in tree tops, are built or repaired early in March, and the young are hatched in April. The food consists chiefly of grubs, although grain appears to form part of the dietary. In Great Britain the rook is a permanent resident or partial migrant, but in other parts of Europe these birds appear to be more or less strictly migratory. The same species is found in Asia, where related species having the facial feathers only partially decidu¬ ous also occur.

ROOKE, ruk, Sir George, English admiral: b. 1650; d. 24 Jan. 1709. At an early age he entered the royal navy, and in 1689 commanded a squadron at the siege of Londonderry, was knighted for his burning of six French ships at Barfleur in 1692 and in 1694 became one of the lords commissioners of the Admiralty and admiral. He distinguished himself in the fight against the French and Spanish fleets in Vigo Bay (1702), and at the capture of Gibraltar in July 1704. On 9 Aug. 1704 he fell in with a French fleet of much superior force, under the Comte de Toulouse, off Malaga, and an engage-

merit which lasted nearly the whole day en¬ sued. Victory remained

with the English, though none of the French ships were captured. The news of the Malaga victory reached Eng¬ land during the celebration over Blenheim, and Rooke's name was put forward for honors along with Marlborough's; but being a Tory he suf¬ fered from the jealousies of the Whigs, the dominant power. His command was taken away from him and he retired in disgust to his family seat in Kent.

ROOKWOOD POTTERY. See Pottery.

ROON, ron, Albrecht Theodor Emil von,

Prussian soldier: b. Pleushagen, 30 April 1803; d. Berlin, 23 Feb. 1879. He entered the army in 1821 ; was attached to the Topographical Bureau in Berlin, 1833-35; became captain in 1836, and major in 1842; in 1848 became chief of staff of the 8th Army corps at Coblentz, took part in the campaign at Baden of that year ; and was promoted lieutenant-general in 1859. In the latter year he was appointed a member of a commission on the reorganization of the army. He had given special attention to this subject for many years, but his proposals which were in effect an extension with modifications of Scharnhorst's system, embracing a universal three years' service and a reserve, were carried only after long opposition. The Austrian War of 1866 demonstrated that value of his sys¬ tem. He attended the German emperor through¬ out the Franco-Prussian War, and was created a count in 1871. The Ministry of War which he had held since 1859 he resigned in 1871 to¬ gether with the Ministry of Marine, held since 1861. In 1872 he succeeded Bismarck as presi¬ dent of the Prussian Cabinet and was made field-marshal shortly after; but soon resigned. He was author of several works on geography published between 1832 and 1839.

RCOS, Johann Heinrich, German painter: b. Otterberg, in the Palatinate, 27 Oct. 1631 ; d. Frankfort-on-Main, 3 Oct. 1685. He went to Amsterdam and applied himself to landscape and animal painting. After a visit to Italy he settled finally at Frankfort. Most of his w'orks are animal landscapes, executed in the conven¬ tional Italian style.

ROOSEVELT, ro'ze-velt, Nicholas J.,

American inventor: b. New York, 27 Dec. 1767; d. Skaneateles, N. Y., 30 July 1854. He engaged in manufacturing and inventing in New York and was connected with Robert R. Living¬ ston and John Stevens in experimental boat¬ building. In 1798 he conceived the idea of a vertical wheel, a suggestion which made steam navigation a success. The first experiment was made in a boat launched in 1802 and pro¬

pelled by the vertical wheels. In 1809 he was associated with Fulton in the introduction of steamboats into Western waters and in 1811 built, and launched the New Orleans, with which he made a pioneer trip down the Ohio and Mississippi rivers in 14 days. He obtained letters patent from the United States govern¬ ment in 1814 protecting his invention, but was denied protection by the New Jersey legislature. Fulton never claimed the invention as his own, and Roosevelt's title to it has never been legally proved.

ROOSEVELT, Robert Barnwell, Amer¬ ican author and politician; b. New York, 7 Aug.

1829; d. Sayville, L. I., 14 June 1906. He was admitted to the bar and practised law in New York until 1871, when he was elected to Con¬ gress. In 1888 he was appointed Minister to the Netherlands and served two years. He was active in opposing the Tweed ring, and wrote several works of natural history. His most important public service, however, was in the establishment of the United States Fish Com¬ mission, of which measure he was the originator and promoter while in Congress.

ROOSEVELT, Theodore, American au¬ thor, naturalist, explorer, statesman and sol¬ dier, and 26th President of the United States: b. New York City, 27 Oct. 1858; d. Sagamore Hill, N. Y., 6 Jan. 1919. He was born at No. 28 East 20th street, New York City. His father (of the same name) was a prominent merchant and a man noted for patriotism, public spirit and enlightened interest in many movements for social betterment. His mother's maiden name was Martha Bullock; she was a native of Georgia and had two brothers who served in the Confederate navy during the Civil War. The Roosevelt family is descended from Klaes Martensen Roosevelt, who came from Holland to what was then <(New Amsterdam® in 1644; for seven generations thereafter all of Theo¬ dore's paternal ancestors bearing the family name were born on the island of Manhattan, and were well known there as leading citizens. Young Theodore was a sickly child, greatly troubled with asthma and extremely near¬ sighted; the condition of his health somewhat retarded his education, but he developed, when he was still very young, a passion for serious reading and an intelligent interest in natural history. In 1876 he entered Harvard College and received his degree of bachelor of arts in 1880. Before going to college and while there, as well as afterward, he gave much time to ath¬ letic exercises of various kinds and, although seriously handicapped by physical deficiencies, became, by sheer force of will

and indomitable perseverance, a good boxer, a good rider and a good marksman, while, by frequently living in the open air and persistence in strenuous exer¬ cise, he not only threw off the maladies of his childhood, but became a tireless walker and rider and developed a magnificent physique, able to respond for many years to the exhaust¬ ing calls he made upon it. While in college he began a History of the Naval War of 1812, which he completed after graduation ; this is a work of much greater literary merit than he himself afterward ascribed* to its opening chapters, but the most interesting and signifi¬ cant incident connected with its preparation is the generally admitted fact that he undertook it because he found all the American narratives of that conflict, then current, untrustworthy, prejudiced and unfair to the public enemy; then, as ever throughout his life, his love of truth and fair play was, perhaps, his most striking characteristic ; hypocrisy, humbug and obtaining praise through false pretenses were always, for him, the very abomination of desolation.

At the age of 23 he was elected to the New York assembly. Through family tradition and personal conviction he was a Republican, and

* “Those chapters were so dry they would have made a dictionary seem light reading in comparison.” ‘Autobio¬ graphy,’ p. 27,

THEODORE ROOSEVELT

The Twenty-sixth President of the United States

his district was normally Republican also ; but, two years before, the local bossling, to please the. supreme party boss, had caused the nomi¬ nation and election of a candidate whose rec¬ ord at Albany of unscrupulous subserviency to the boss in question had so disgusted decent people among his constituents as to make the choice of a Democrat reasonably certain, were he renominated by the Republicans. Neverthe¬ less, the boss insisted on his tool's renomina¬ tion, and the bossling proceeded to obey orders; young Roosevelt reluctantly consented to be a candidate in the primaries, at the urgent en¬ treaty of a local politician named Joe Murray, who pointed out to him how his party was about to suffer defeat merely to promote the discred¬ itable personal ends of its unscrupulous leaders; and, to the great astonishment of these leaders, the supposed stripling was nominated, despite their hostility, and easily elected. In the as¬ sembly his independence, courage, devotion to duty, outspoken enmity to corruption in every form and enlightened and fearless efforts to promote practical reforms and truly progressive legislation, in the face of bitter hostility on the part of wealthy ˆinterests® and politicians owned by them, soon made him a figure of national prominence. The sudden deaths of his mother and his first wife within a few hours of each other in February 1884, and the discouraging political outlook after the nomination by the Republicans of James G. Blaine for the Presi¬ dency, a nomination which Roosevelt, as a delegate to the National Convention, had sought vainly to prevent, caused his temporary retire¬ ment from public life and led him to become for some two years a ranchman in the wild country then given over to cowboys and their herds.

Two years later he returned to New York to accept the Republican nomination for mayor, tendered him principally because the more wealthy and conservative element of his party was alarmed by the candidacy of Henry George, representing an ephemeral (<United Labor® or¬ ganization; Roosevelt was defeated on this oc¬ casion, mainly by reason of defections among the same class of his supporters who deemed Abram S. Hewitt, the Tammany nominee, a ((safer® mayor for their purposes. In February 1889 he attended a National

Conference of Civil Service Reformers in Baltimore and there ex¬ pressed such outspoken and unqualified devo¬ tion to the principles of the merit system that President Harrison appointed him a member of the Civil Service Commission. In this post he made the Civil Service Law a living force for good government and pure politics and himself a source of real terror to politicians who had previously believed, with good reason, and acted on the belief that this statute and the commis¬ sion it created could be safely ignored and de¬ fied by officials having <(pull .® He remained in office for more than three years after Presi¬ dent Cleveland had succeeded President Harri¬ son, resigning to become one of the police com¬ missioners of New York City, appointed by Mayor Strong after the Reform victory of 1894. Here again he showed himself the fearless and inflexible enemy of the many abuses which had become chronic in the New York police, and thereby incurred the rancorous hostility of all those who profited, in one way or another, by these abuses, including many citizens outwardly

reputable and ready to favor reforms so long as these led only to talk, but shocked by Roose¬ velt's thoroughgoing and practical discharge of his sworn duty. After two years of what he called a ((grimy struggle® he was given a new field of useful activity by his appointment as Assistant Secretary of the Navy.

For Roosevelt it was a labor of love to pro¬ mote the efficiency of the American navy, and to his energy, eminent talents for administration and fervent patriotism the brilliant success of our fleets in the war with Spain must be fairly ascribed in very large measure. He took part in the war, however, in another capacity; as soon as its outbreak became certain he tendered his services as a soldier, was offered the com¬ mand of a regiment of volunteer cavalry, de¬ clined this in view of the superior experience of his old friend, afterward Maj. Gen. Leon¬ ard Wood, then a surgeon with a notable record as an Indian-fighter, but accepted a commission as lieutenant-colonel in the same organization, soon to be known as the famous Rough Riders, and served with distinction at the engagement of Las Guasimas and the battle of San Juan Hill. He became colonel of the regiment when Colo¬ nel Wood was promoted, was nominated brevet brigadier-general ((for gallantry in battle® and was warmly commended by Generals Wheeler, Young, Sumner and Wood and several other officers of rank who were eye-witnesses of his conduct. When his regiment was disbanded he became at once the Republican candidate for governor of New York.

He owed his nomination to the extremity of the bosses and bosslings then in control of the party, who at that time hated Roosevelt, but hated yet more their own exclusion from power and its profits, and recognized that he was the cnly man they could then put up with any hope of victory. The result justified both their fore¬ cast and their antipathy, for Roosevelt was elected by a good majority and also proved him¬ self as unsatisfactory a governor, for their pur¬ poses, as he had been an assemblyman 17 years before. Especially did he render himself ob¬ noxious to wealthy corporations and to the prominent politicians (both Republicans and Democrats) employed by such corporations by insisting on their paying reasonable taxes on their franchises. As the only means to prevent his obtaining a second term as governor, the leading Republican politicians tried to force and finally succeeded in forcing upon him the nomination for the Vice-Presidency at the Na¬ tional Convention of 1900 in Philadelphia.

It had been the hope of these politicians that, when thus (<kicked upstairs,® he would be re¬ duced to ornamental impotency; but these calcu¬ lations were falsified by the murder of Presi¬ dent McKinley, and, on 14 Sept. 1901, Theo¬ dore Roosevelt took the oath of office as Presi¬ dent at the house of Mr. Ansley Wilcox in Buffalo. On 8 Nov. 1904 he was elected to the same office against Judge Alton B. Parker, the Democratic candidate, by 330 electoral votes to 136 and a popular majority of some two mil¬ lions and a half.

To relate, even in the barest outline, the events of Roosevelt's Presidency would be quite impossible within the limits of this article. His virtually enforced adjustment of the great coal strike, his long struggle, in Congress and the courts, with <(trusts® and combinations in re-

straint of trade and actual or threatened mo¬ nopolies, his successful mediation between Rus¬ sia and Japan, his restoration of order in Cuba, his vindication of the Monroe Doctrine in the case of Venezuela, his rescue of the Isthmus from Colombia and construction of the Pan¬ ama Canal, his steadfast and untiring efforts to preserve the public lands from misappropriation and trespass on the part of land thieves, to de¬ velop the country's natural resources for the benefit of the people and to detect, root out and punish corruption and breach of trust in all branches of the public service — each of these subjects could be fairly and adequately treated only if it had an article to itself as long as the present. The history of his Presidency was, in short, the history of the United States during seven and a half years of great moment. On the evening of election day 1904 he said pub¬ licly that he would not accept a nomination for another term. To this determination he ad¬ hered inflexibly in 1908, resisting a tremendous pressure from almost every part of the country, based upon the universal conviction that his nomination and election were absolutely certain if his consent could be obtained, and a large measure of doubt as to whether he could transfer to any other candidate enough of his own immense popularity to assure the latter's choice. He succeeded, however, in bringing about the nomination and election, as his suc¬ cessor, of William Howard Taft, whom he had selected, after very serious consideration and some hesitancy, as on the whole the most suit¬ able among the public men connected with his administration to continue the practical appli¬ cation of his theories and principles in the con¬ duct of the government. A few weeks after Mr. Taft's inauguration Roosevelt started on a hunting trip to East Africa.

On his return he found the Republican party threatened with defeat and the adminis¬ tration gravely discredited by Mr. Taft's com¬ plete failure to justify the hopes of those who had secured his nomination and most signally of all, of Roosevelt himself; he found also a general conviction, which every day strength¬ ened, that only his own acceptance of the Re¬ publican nomination for the Presidency in 1912 could prevent a Democratic victory. Against both his own inclination and his own judg¬ ment he finally yielded to the overwhelming pressure brought upon him, and consented, in his own words, to <(cast his hat into the ring.® The party primaries gave him an undoubted majority in the convention held at Chicago in June 1912, but the wealthy ˆinterests® which controlled the National Committee,

and, through it, the preliminary organization of the conven¬ tion, and the unscrupulous politicians who did their bidding deliberately preferred defeat at the polls to four years more of Roosevelt, and unseated enough of his delegates to ensure the formal renomination of Mr. Taft. An impro¬ vised ˆProgressive® party, created largely as a protest against the injustice and dishonesty of this nomination, put Roosevelt in the field, and a bitter, three-cornered contest followed; dur¬ ing this a partially demented man, maddened by the violent abuse of Roosevelt's enemies, at¬ tempted to kill him at Milwaukee, inflicting a wound which obliged him to remain two weeks in a hospital. At the election Mr. Taft met prob¬ ably the most humiliating defeat ever experi¬

enced by a candidate for the Presidency, carry¬ ing only two small States and receiving only eight electoral votes ; Roosevelt obtained 80, and a popular vote of over 4,000,000, but the division of the Republicans made inevitable the election of the Democratic candidate, Woodrow Wilson.

In October 1913, Roosevelt sailed for South America to explore a virtually unknown portion of the Brazilian wilderness. This expedition was attended by great dangers and hardships ; his party was for months entirely cut off from civilization and suffered terribly from the tropi¬ cal fevers always lurking in those regions. He was himself so very ill and the whole party so utterly exhausted that he urged them to leave him to die ; but his companions, includ¬ ing his son Kermit, refused to do this, and finally succeeded in reaching a frontier settle¬ ment. Roosevelt returned to his home in May 1914, and thereafter was outwardly as earnest, as active and as interested in public affairs as he had ever been ; but the poison of the South American fever remained in his system, under¬ mined his strength and undoubtedly shortened his life.

Roosevelt's return to the United States was very soon followed by the outbreak of the European War. He had entirely disapproved of President Wilson's policy of (<watchful wait¬ ing® and inconclusive intermeddling in Mexi¬ can affairs, and now found himself yet more radically out of sympathy with the latter's ad¬ vocacy of (<neutrality in thought® respecting Belgium and the settlement underlying his (<too proud to fight® speech : moreover Roosevelt had naturally and strongly felt as an unseemly re¬ flection on his own official course that a succes¬ sor in the Presidency should negotiate a treaty with Colombia apologizing for the action of the United States at Panama.

He became more and more critical of the administration as he re¬ alized more and more clearly the imminent danger to the United States involved in a possi¬ ble German victory, and the unwillingness of President Wilson and of the political party then dominant to adopt any adequate measures of preparation for war, or even to resent with dignity and spirit repeated and insolent out¬ rages on our citizens. To bring about Mr. Wil¬ son's defeat in 1916, he refused to run as the Progressive candidate for the Presidency (thereby virtually destroying the short-lived Progressive party), when the same interests and, in the main, the same men responsible for Mr. Taft's candidacy four years before again showed that they preferred their party's defeat to Roosevelt's election, by giving the Republican nomination to Justice Charles E. Hughes. Roosevelt earnestly and whole-heartedly sup¬ ported Hughes in the ensuing campaign, but his innumerable friends were less forgiving than himself, and their profound dissatisfac¬ tion, joined to some clumsy and arrogant blunders on the part of the Republican man¬ agers, gave Woodrow Wilson four years more in the White House.

The President's final break with Germany was to Roosevelt a very agreeable surprise. He threw himself with all possible* ardor into the advocacy of an energetic participation iw the war on our part, and offered to raise a division of volunteers, in which he should him-

self serve as one of the brigadier-generals. He was instantly overwhelmed with applica¬ tions to serve in the force from all parts of the Union ; it is said1 that more than 250,000 men asked to join it. Congress authorized its or¬ ganization, notwithstanding strenuous oppo¬ sition from the President; but the latter re¬ fused to avail himself of the authority thus conferred ; Roosevelt could not be allowed to return home with a military record.

Roosevelt was bitterly disappointed by this refusal; prevented by the President from serv¬ ing his country in the field, he did everything in his power to arouse an imperative demand by public opinion for a prosecution of the war with unflinching vigor up to a decisive vic¬ tory, without regard to the cost and sacrifices involved, and protested with all possible energy against any thought of negotiation or parley with the public enemy; for, with many others, he entertained something more than a suspicion that peace without victory was the secret aim of President Wilson. All four of his sons promptly entered the army and served with distinction; one of the four was killed; two were wounded. When on 25 Oct. 1918, the President appealed to the voters of the Nation to elect a Democratic Congress, as a mark of confidence in himself and approval of his policy, Roosevelt vigorously denounced the President's course, and united with ex-Presi- dent Taft in urging that the voters should choose ((a Congress which will not register the will of one man, but, fresh from the people, will enact the will of the people.® The ex¬ tremely significant result of the election, which, instead of giving the President the vote of confidence he had asked, changed Democratic majorities of 10 in the Senate and five in the House into Republican majorities of 2 in the Senate and 45 in the House was the last of Roosevelt's many political triumphs ; and it proved a solace to the last two months of his life. His health, fatally weakened by the re¬ sults of his South American explorations, had gradually failed during the four busy and ex¬ citing years succeeding his return. About mid¬ night on 5 Jan. 1919, he dictated from his sick¬ bed a communication to the chairman of the Republican National Committee; some four hours afterward, he died quietly in his sleep.

Roosevelt's political and public services were but a part of his many activities. He was a very prolific writer; beside innumerable ad¬ dresses, magazine articles and occasional pub¬ lications he wrote (The Winning of the West> a history of the pioneer settlement of our states beyond the Alleghanies ; Lives of Thomas Hart Benson, Gouverneur Morris and Oliver Cromwell; a (History of New York1* ; an Autobiography'; African Game Trails'; (Through the Brazilian Wilderness) ; and a multitude of other books, some setting forth his theories or narrating his experiences as a naturalist and hunter, some expounding his views on moral, social or economic problems, many devoted to the political issues of the times or defending his opinions (always very pronounced and definite) as to disputed ques¬ tions of ethics or public policy. He was like¬ wise an indefatigable traveler, and always ready to give the brief holidays allowed him by his literary labors and his public duties to

journeys in wild regions and life in the open. He was twice married, in 1880, to Alice Lee, and, in 1886, to Edith Kermit Carow. By his first marriage, he left one daughter, Alice, the wife of Nicholas Longworth of Ohio*; by his second, he left three sons, Theodore, Kermit and Archibald, and one daughter, Ethel, the wife of Dr. Richard Derby of New York; his youngest son, Quentin, had been killed in the war.

Theodore Roosevelt was a man of extraor¬ dinary powers and, to those who knew him well and understood him, a man of most at¬ tractive character and qualities. Doubtless he was sometimes gravely misunderstood; his men¬ tal processes were so abnormally rapid that he often seemed to act with little or no reflec¬ tion, when he had, in fact, considered the ques¬ tion at issue most thoroughly and conscien¬ tiously, although, perhaps, in one-tenth of the time which would have been needed for the purpose by an ordinary man. Moreover the strength of his convictions and the vivacity of his speech and manner confused and fright¬ ened timid men or those who knew him but slightly, and led them to think of and describe him as arbitrary and overbearing; he was, in truth, somewhat exceptionally anxious for information, assistance and advice from those for whom he felt respect and in whom he had confidence; but only one who wasn't afraid of him could fairly judge or really like him. He had the stern sense of duty, the lofty pur¬ pose and the strict morals of puritanism, with¬ out any of its prudishness or pharisaism or intolerance, and, most emphatically, without any of its too common hypocrisy or affectation of virtue. He detested falsehood in every form and shams of every kind, and, throughout his long and stormy career

as a public servant and a political leader, always fought fairly and in the open, and was restrained by the instincts of a gentleman and the scruples of a man of honor. It were needless to speak of his pa¬ triotism or his courage, — the events of his life sufficiently attest these, — but it is the firm belief of the writer that his profound wisdom, the unselfishness of his devotion to duty and his immense usefulness to his country will be more clearly recognized and more highly es¬ teemed by each successive generation of Amer¬ icans in our national future.

Bibliography. — Autobiography' (New

York 1913) ; Bennett, J. W., (Roosevelt and the Republic,' bitterly 'hostile (New York 1908) ; Burroughs, John, (Camping and Tramp¬ ing with Roosevelt } (Boston 1907) ; Douglas, G. W., (Life of Theodore Roosevelt' (New York 1907) ; Greene, F. V. (in Roosevelt's American Ideals'); Halstead, Murat, (Life of Roosevelt' (Akron 1902) ; Leupp, F. E., (Biography of Theodore Roosevelt' (New York 1904) ; Lodge, Henry Cabot, (Frontier Town and Other Essays) (New York 1906) ; Morgan, James, (Theodore Roosevelt, the Boy and the Man' (ib. 1907) ; Riis, Jacob A., (Theodore Roosevelt the Citizen' (ib. 1904) ; Shaw, Albert, (Cartoon History of Roose¬ velt's Career' (ib. 1910) ; Thayer, William Roscoe, (Theodore Roosevelt ' (New York 1919) ; Washburn, C. G., (Theodore Roosevelt' (Boston 1916). Charles J. Bonaparte,

Attorney-General in the Cabinet of President Roosevelt.

ROOSEVELT AND THE PROGRES¬ SIVE PARTY. The Progressive movement in the Republican party, like its counterpart in the Democratic party, laid emphasis on the need of freeing government, both State and Federal, from the domination of special interests and the prostitution of government to serve the needs of a small moneyed minority. The fight more especially developed into a struggle against cor¬ porations. This struggle has had three principal phases : first, the attempt to control and regulate corporate activities; second, to resist the efforts made by vested corporate interests to exploit the natural' resources of the country in their own interest and, third, the revolt against the tariff revision of 1909 which was made in the interests of the same predatory classes. The Sherman Law was the effort made to accomplish the first end; it was not very successful and had a dis¬ astrous effect on business. When Roosevelt became President in 1901 he regarded this law as of doubtful efficacy. His chief objection to it was that it failed to discriminate between good corporations and bad corporations, assuming that all combinations were trusts and, therefore, dangerous and to be suppressed. Roosevelt in 1903 prevailed on Congress to establish a Bureau of Corporations in the Department of Commerce and Labor, through which ((power and author¬ ity, w were granted, ((to make … diligent

investigation into the organization, conduct and management of the business of any corporation, joint-stock company or corporate combination engaged in commerce among the several states and with foreign nations.®

Roosevelt, however, before the bureau made its reports of the activities of <(big business® determined to try out the Sherman Law in the cases of the Standard Oil Company and the American Tobacco Company. While nominally successful the punishment of the delinquent cor¬ porations was more apparent than real. The financial panic of 1907 further stayed the Presi¬ dent's hand but it was clearly his intention and desire that Taft, his successor, should carry on the work of government control of corporations.

The conservation movement to protect the natural resources of the nation in the in¬ terest of all the people and from exploitation by private individuals and interests was the second great objective of the progressive forces during Mr. Roosevelt's incumbency of the White

House. The President in March 1907 appointed the Interstate Waterways Commission to in¬ vestigate conservation as far as the waterways of the country were concerned. A preliminary investigation by the commission caused it to recommend to the President the calling of a conference to discuss conservation from all angles. The result was the memorable confer¬ ence at the White House on 13 May 1908 and the subsequent appointment of Gifford Pinchot as head of the National Conservation Commis¬ sion. In the fight to conserve the natural re¬ sources of the country Mr. Roosevelt received no aid from the majority of the Congress. Everything possible wTas done to hamper him and the special private interests were sufficiently powerful to prevent him in his effort to put the conservation movement on a secure basis. The lasting benefit of his struggle was the awakening of public interest in the question which in later years put the movement beyond the power of the special interests and their subservient tools among the politicians.

In endorsing Taft as his successor, Mr. Roosevelt firmly believed that his favorite meas¬ ures, (‘his policies,® would be carried out faith¬ fully. Roosevelt’s disappointment was keen, therefore, when the Payne-Aldrich tariff raised certain schedules upward instead of downward as had been promised by Taft and his political sponsors during the pre-election campaign. Taft’s support of Ballinger, his advocacy of a sham reciprocity treaty with Canada and his yielding to the old conservative standpatters and reactionaries made it impossible for the progressive members of his party to support him for re-election in 1912. The tariff discus¬ sion of 1909 was the most potent factor in widening the breach between the Progressives and the reactionaries among the Republicans and helped define the progressive movement for the country. An open break with the Taft adminis¬ tration followed and the National Progressive Republican League was formed by the Pro¬ gressive senators and members of the House of Representatives, pledged to these specific re¬ forms: (1) election of United States senators by popular vote; (2) direct primaries; (3) direct election of delegates to national con¬ ventions ; (4) initiative, referendum and recall clauses in all State constitutions; and’ (5) a corrupt practices law with adequate provision for its enforcement. The league grew rapidly and was sufficiently powerful to cause progress and reform legislation to be passed in the last year of the Taft administration. Its growth proved that the Republican party as then con¬ stituted had no room for real progressives and either a new party must be created or the old effectively regenerated.

Already in April 1911 the Progressive wing of the Republicans made preparation to en¬ sure the nomination of one of their members in 1912. For a time it appeared that Senator La Follette would be the Progressive leader against reaction in the Republican National Convention of 1912. Certain interests, how¬ ever, were able to cause his candidacy to be dropped and his followers at once transferred their allegiance to Roosevelt. The latter was less uncompromising than La Follette, having yielded to the special interests whenever he could make an advance by so doing. Good government had no more doughty champion than he and popular rights no advocate more sincere. The contest for the Republican nomi¬ nation by the spring of 1912 dwindled to a struggle between the followers of Taft and Roosevelt. The contest was one of the most bitter in our political history because of the former close relations existing between the two candidates. The issues, however, were sharply defined. Taft stood forth the champion of privilege while Roosevelt as throughout his career espoused the cause of democracy, or government by the people.

The crisis came at the Chicago Convention of the Republican party, 18-22 June 1912. The delegates to that convention were of three classes according to mode of selection : Those elected by State conventions, those chosen di¬ rectly by the people and those chosen di¬ rectly under pledge to vote for designated candidates. The reactionaries under Taft con¬ trolled the first or ((machine® group ; the two other groups were largely controlled by Roose¬ velt. It was soon observed that the contest

would be close and the fight was soon centred on those delegates whose seats were contested, neither candidate having a clear majority of uncontested seats. The reactionary National Committee, appointed four years before, now proceeded to award the contested seats and adjusted matters so that Taft was ensured a majority. The Progressives claimed that these decisions were made in bad faith, that the nomination was stolen, and they withdrew from the convention. They held a rump con¬ vention to discuss future plans. Roosevelt told the

delegates to return to their homes, sound the popular sentiment and return to Chicago on 5 August, when if the popular demand should be sufficiently strong, a third party would be established. On 5 August the Pro¬ gressive delegates met again in Chicago and reported an overwhelming popular demand for a new party opposed to boss rule and machine politics. On 6 August Mr. Roose¬ velt in what he called his (<Confession of Faith® outlined the purposes of the new party, stating that : (<the old parties are husks, witfi no real soul within either, divided on artificial lines, boss-ridden and privilege-controlled, each a jumble of incongruous elements, and neither daring to speak out wisely and fearlessly what should be said on the vital issues of the day.® The new Progressive movement he character¬ ized as <(a movement of truth, sincerity and wisdom, a movement which proposes to put at the service of all our people the collective power of the people, through their governmen¬ tal agencies, alike in the Nation and in the several States… . We propose to raise

aloft a standard to which all honest men can repair, and under which all can fight, no mat¬ ter what their political differences, if they are content to face the future and no longer to dwell among the dead issues of the past.® Roosevelt was nominated for the Presidency and Hiram Johnson of California for Vice-President. The platform of the new party promised the five reforms outlined above as the demands of the National Progressive League and also outlined a program of social and industrial justice, to correct or mitigate the injurious effects incident to our modern in¬ dustry. Within the three months following the convention the Progressive party organized it¬ self from the national committee down to the local election district and at the November election polled more than 4,000,000 votes — a feat unparalleled in all political history. When the Presidential campaign of 1916 arrived and Mr. Hughes became the Republican candidate, old animosities were laid aside and Mr. Roose¬ velt and nearly all of his Progressive follow¬ ers supported the old party, believing rightly that a division would again make for a Demo¬ cratic victory and four more years of Wilson and Democratic administration. Tactless blun¬ ders by a few campaign managers nullified Mr. Roosevelt's efforts and Wilson secured a second term. In October 1919 an intimate friend of Mr. Roosevelt disclosed the fact that the latter was preparing to secure the nomination for the Presidency in 1920, when he prophesied that the standpatters would have to take him and ((with a larger dose® of reform than in 1904. His untimely death removed America's most progressive and most earnest leader; perhaps,

the only man who was able to place a strong government in Washington instead of a cabal of theorists and impractical idealists. Consult La Follette, R. M., (Autobiography (1918) ; Roosevelt, Theodore, (Thou Shalt Not SteaP (in the Outlook of 12 July 1913) ; id. (Progressive Principles,* edited by Elmer H. Young-man (New York 1913) ; De Witt, B. P., (The Progressive Movement (ib. 1915) ; Walling, W. E., (Progressivism — and After* (ib. 1914) ; New York Times of 17 Oct. 1919; Literary Di¬ gest of 18 Oct. 1919.

ROOSEVELT, N. J., borough in Middle¬ sex County, on Rahway River and Staten Island Sound, 16 miles from New York, on the Cen¬ tral of New Jersey Railroad. It gained its present name and status in 1906 when the dis¬ tricts Carteret, Chrome and East Rahway were united in one borough. It has deep sea water frontage and is chiefly a manufacturing city. Its industries include steel works and the manu¬ facture of metal goods, fertilizers, chemicals, cigars, *etc.* Pop. (1920) 11,047.

ROOSEVELT DAM, the greatest engi¬ neering work in connection with the Salt River irrigation project in Arizona, which ranks first among the works of the United States reclama¬ tion service, was completed in 1910. This won¬ derful structure of sandstone and cement, cost¬ ing nearly $9,000,000, rises 284 feet above Salt River, about 75 miles northeast of Phoenix. It is 1,080 feet long on top and 170 feet thick at the base. Placed by the side of a 20-story building, it would rise' 10 feet above it, while its length on top would be equal to four blocks on Broadway, New York City. Across its top is a roadway 20 feet wide. The structure is set in a mountain gorge, being in the form of a huge W, closed at the top and bottom, and curved with a bulge upstream so as to present an arched resistance to the great body of water it has to withhold. Very large stone is used in the dam wall, technically ((cyclopean,® and this is securely bonded together and filled in with Portland cement, thus solidifying it into a great monolith. The discharge is through a 500-foot tunnel to six great service gates, each of which will discharge 1,670 cubic feet of water per second. Spillways carry the surplus water around the dam, and serve to relieve it in time of flood. The reservoir created by the Roosevelt dam is the largest artificial body of water in the world. Its capacity is 61,000,000,000 cubic feet, and if its water were spread over the State of Delaware it would cover the en¬ tire surface of the State a foot in depth. The lake formed by the dam is 25 miles long, and at its greatest two miles wide. It was formally opened by Theodore Roosevelt 18 March 1911.

ROOSEVELT MILITARY HIGHWAY,

Oregon. On 3 June 1919 the Oregon legisla¬ ture passed a measure for the issuance of $2,500,000, provided the Federal government ap¬ propriated a similar amount, in order to con¬ struct a great highway running along the entire coast of Oregon from the mouth of the Colum¬ bia River to the boundary of California, which State has expressed the intention of continuing the road along its coast. The entire highway through both of the States is named in honor of the late Colonel Roosevelt. An association has been formed in the State of Washington to further the scheme, so that, if carried through,

the highway will spread along the entire Pacific seaboard of the United States. It is pointed out that the coast of Oregon presents rare at¬ tractions to the tourist in its rugged grandeur of scenery, flora and wild fauna.

ROOT, root or rut, Elihu, American law¬ yer and statesman: b. Clinton, N. Y., 15 Feb. 1845. He was graduated at Hamilton College in 1864, and at the New York University Law School in 1867. In the latter year he was admitted to the bar and entered upon the prac¬ tice of his profession in New York. In 1883 he was appointed United States District Attor¬ ney for the southern district of New York; in 1894 was a delegate-at-large to the New York State Constitutional Convention, and was chair¬ man of the judiciary committee. He was ap¬ pointed Secretary of War by President Mc¬ Kinley in 1899 and reappointed in 1901. He found the work of his department in disorder, with constant rivalry among its various bureaus, but by strict discipline, adherence to civil service rules, and establishing a system of promotion for merit, he soon brought order into the admin¬ istrative departments, and turned his attention to the organization of the army. In this field he brought about a number of improvements, chief among which are the assimilation of the militia with the regular army and the creation of the General Staff. He also had charge of the military administration of Cuba and the Philippines ; and while he was severely criticised for not trying to prevent cruelties in the con¬ quest of the Philippines} he must be given credit for the policy of the army in enforcing sanitary measures and preparing for independ¬ ent government in Cuba ; and for the restora¬ tion of order and preparation for civil govern¬ ment and the work of the Philippine Commis¬ sion in the Philippines. In January 1914 he re¬ tired from the secretaryship to resume the prac¬ tice of law. On 19 July 1905 he was appointed Secretary of State. In 1909 he was elected United States senator from New York, but in 1913 declined to serve further. In 1912 he was permanent chairman of the Republican National Convention at Chicago. He was honored with the 1912 Nobel Peace Prize. In 1915 he pre¬ sided at the sessions of the New York State Constitutional Convention and in 1916 received 103 votes for the Republican nomination for President of the United States. In 1917 he headed a commission sent by the United States to advise with the Russian government. He has served as president of the Union League Club of New York, the American Bar Associa¬ tion, the American Society of International Law, the board of

trustees of the Carnegie Institution at Washington and numerous other distinguished bodies. He has received many eminent degrees from American and foreign universities and societies.

ROOT, George Frederick, American mu¬ sician and composer : b. Sheffield, Mass., 30 Aug. 1820; d. Bailey's Island, Me., 6 Aug. 1896. He was self-taught in his earlier years, but later studied under George J. Webb in Boston. He was instructor in music in the schools of Bos¬ ton in 1839-44, and director of two churches there. He taught music in New York in 1844-45; studied at Paris in 1850, and afterward was chiefly engaged in composition. From 1859 he was senior member of the Chicago music pub¬

lishing firm, Root and Cady. Among his many successes are the songs (Rosalie, the Prairie Flower) ; (The Battle Cry of Freedom* ; (Tramp, Tramp, Tramp, the Boys are March¬ ing* ; *Just Before the Battle, Mother* ; the quartet, (There's Music in the Air,* and the cantatas (The Fower Queen) (1852) and (The Haymakers) (1857).

ROOT, that plant part which normally penetrates the soil, absorbs water and chemicals in solution, for nutritive purposes, forces it through the plant and also acts as an anchor and support. Roots, however, in modified forms, may draw nutriment from other vegeta¬ tion or from the air, and may even serve as support and aid to climbing-plants. Low forms of vegetation and certain submerged aquatics able to absorb water through most of their tissues have no roots, or only enough to act as anchors.

The primary form of root is that which secures the germinating seed to the ground and strikes downward into the soil, sending off branches which rebranch until the ground oc¬ cupied by the fibrous reticulation is thoroughly exhausted of food. In many cases, however, this single central tap-root, so-called, is miss¬ ing, and numerous horizontal and lateral roots take its place. The growth of the root-system is commensurate with that of the plant above ground. In epiphytes the roots either adhere to the site of the plant, to hold it in place, or depend freely in the air, drawing nourishment therefrom.

Plants are called annuals, biennials or per¬ ennials, according to the length of time the root lives, but the differences are not always ab¬ solute, and are often changed by cultivation. Perennials, such as quack grass and peony, often have thickened, tuber-like roots, in which nour¬ ishment is stored during the growing periods, to be drawn upon

when the plant flowers. Bi¬ ennials such as beets and carrots show similar development.

Each root is a naked organ, incapable of bearing leaves, which has a blunt aoex shielded by a root-((cap** more or less distinct, of old and firm cells. The growing cells of the root lie directly behind this cap, and still farther back is a zone of delicate tubular, one-celled root-hairs, which are devoted to the absorption of liquid foods from the soil and are constantb; dying off and being renewed on the side next the root-cap. The growing tip with cap and root-hairs continually advances through the soil, while the older portions become inactive so far as absorption is concerned, thicken, envelop themselves in cork and increase their means of conducting water from the region of the root-hairs to the rest of the plant.

Roots may be produced from stem parts (easiest at the nodes) or even leaves as in Bryophyllum and Begonia. They are then called adventitious. Familiar examples of adven¬ titious roots are the aerial roots of banvan and mangrove, which start from the branches and eventually penetrate the ground. These roots not only assist in feeding the trees, but also help to support their gigantic heads. Vines, such as the poison-ivy, have masses of aerial rootlets which spring from and fasten the stem firmly to its support.

The haustoria of certain parasitic plants,

such as dodder (Cuscuta) , are forms of re¬ duced roots. They are special organs of ab¬ sorption which develop from the tissues of the parasite and penetrate the body of the host plant either by means of solvent ferments or the pressure resulting from their own growth or both combined. Once there, they draw sus¬ tenance from their host and often dispense with assimilative organs of their own.

Other parasites have disc-like haustoria upon their root-systems, which fasten upon the roots of other plants. Although appearing above ground like self-supporting herbs with green foliage, vigorously

assimilative, these plants do not reach full development without this clandes¬ tine connection. The young roots of sapro¬ phytes, or plants living upon the decaying re¬ mains of vegetation, seem to require the co¬ operation of fungi in obtaining food.

The symbiotic connection of bacteria and leguminous plants is well known The bacteria penetrate through the root-hairs of the Lequminosce into the cortex of the root and there raise tubercular growths. They draw upon the carbohydrates developed by the host, but being capable of fixing free nitrogen, they exchange this element in elaborated form to the host plant. By plowing the legumes under the ground they decay, returning the nitrogen to the soil in a form available for the next crop. This process, called green manuring, is a good treatment, especially for exhausted, non-nitroge- nous soils.

ROOT, in philology. See Science of Lan¬ guage.

ROOT-WORM. See Grape Insect-pests.

ROPE. See Cordage.

ROPES, Arthur Reed (((Adrian Ross®), English dramatist and poet : b. Lewisham, Kent, 23 Dec. 1859. He was educated at Cambridge. Among his numerous dramatic productions are (Faddimer) (1889); (In Town) (1892); <Ga'iety: a Greek Slave5 (1898); (San Toy) (1899) ; (The Messenger Boy) (1900) ; (Gaiety: a Country Girl5 (1902). He also published (Poems) (1884) : (Short History of Europe> (1889) ; (On Peter's Island,5 with Mary E. Ropes (1901), *etc.*

ROPES, John Codman, American mili¬ tary historian : b. Saint Petersburg, Russia, 28 April 1836; d. Boston, Mass., 28 Oct. 1899. He was graduated at Harvard in 1857, and from his admission to the bar in 1861 until 1870 prac¬ tised law in Boston, but devoted the remainder of his life to historical writing. As the founder of the Military Historical Society of Massa¬ chusetts he started the movement for the col¬ lection of historical data relating to the Civil War by the United States government. He spent much time also in the collection of ma¬ terial bearing upon the life of Napoleon. His published books are (The Army Under Pope5 (1881) ; <The First Napoleon1* (1885) ; (The Campaign of Waterloo) (1893-94), and (The Story of the Civil War5 (1894—99).

ROPS, rops, Fˆlicien, Belgian artist: b. Namur, 1833; d. 1898. His illustrations for the Crocodile, a journal published at Brussels, ap¬ peared for the first time in 1855 and established his reputation as an

artist of original genius. But his main employment from that date was book illustration, and many novels of the day

have been published with his brilliant pictures, which reflect the cynical spirit of some modern literature with great imaginative power. Many of his drawings are, however, too sheerly naked and unreserved to be pleasing. But his etchings are almost unique in power of execution, espe¬ cially the series known as (Sataniques5 which while they belong to decadent art are master¬ pieces of technique. He founded the Interna¬ tional Society of Etchers at Brussels and has had a great influence on modern schools of art in Europe. Consult Ramiro, (Catalogue de l'CEuvre Grave de Felicien Rops5 (1887), and Mascha, Catalogue5 (Munich 1910).

ROQUE, rok. Croquet and roque are two varieties of the same game. Croquet is played upon a grass lawn on which the boundaries of a rectangular court are indicated by a chalk line or by a slight ridge. Roque, however, is a much more scientific variety of the game. The court is 72 feet long and 32 feet wide, rectangular, with each corner, for eight feet, cut off diagonally. The surface is well-rolled dirt sprinkled with sand. It is surrounded with rubber cushions so that caroms can be made off the balls the same as they are in billiards. All the arches, of which there are eight, are three and a half inches in diameter. In the centre of the court is a tunnel or cage the arch of which is three and one-eighth inches, and it is 18 inches in length. The balls are of hard rubber and are three and a quarter inches in diameter. The mallets' heads are seven and a half inches long by two and a quarter to two and a half inches in diameter, with a handle from 8 to 15 inches long. Only two players play against each other, each playing two balls. A national championship is held annually in the United States. See Cro¬ quet.

ROQUEFORT, rok-for, France, a village in the department of Aveyron in the vicinity of which large quantities of the well-known variety of cheese of the same name are made from ewe milk. Pop. 1,150.

ROQUEPLAN, Joseph Etienne Camille,

zho-zef a-te-en ka-mel rok-plan, French painter: b. Mallemort, Bouches-du-Rhone, France, 1802; d. 1855. He studied at Paris under Gros and Pujol. His two pictures exhibited at the Salon of 1827 and illustrative of Sir Walter Scott's writings won him a place among the leaders of modern French painting. His most remarkable works

include (The Amateur Antiquary,5 and (The Well Near the Tall Fig-Tree.5 He was equally successful in genre and landscape, and his faithful transcripts of Pyrenean scenery are among the most delightful of modern French pictures.

ROQUETTE, ro-ket', Otto, German au¬ thor, critic and poet : b. Krotoschin, Posen, 19 April 1824; d. Darmstadt. 18 March 1896. Edu¬ cated at Heidelberg. Berlin and Halle, he taught at Dresden until his 39th year, at Berlin in 1862-69, and then in the Darmstadt Technische Hochschule, where he was professor of Ger¬ man language, literature and history. He wrote an excellent history of German litera¬ ture (1872; 4th ed., 1882) ; the novels, (Im Haus der Vater,5 (Das Buchstabirbuch der Leiden-schaft5 and (Die Prophetenschule5 ; two vol¬ umes of dramatic poems (1867-76). His alle-

goric tales in verse, (Waldmeisters BrautfahrD (77th ed., 1905), was his greatest and most pop¬ ular work. It was followed by other lyrics and tales. Consult his autobiography, (Siebzig Jahre) (Darmstadt 1893).

RORAIMA, ro-ra'e-ma, a mountain of South America, in lat. 5° N., on the boundary of British Guiana and Venezuela, part of the Pacaraima range. It is 8,740 feet high, the top forming a rugged rocky plateau, and the steep rocky sides render the summit almost inac¬ cessible. It was ascended in 1884 by Im Thurn. The flora and fauna of the summit are scanty.

RORER, Sarah Tyson, American teacher of domestic science : b. Richboro, Pa., 18 Oct. 1849. She was graduated from the academy at East Aurora, N. Y., and was married in 1871 to W. A. Rorer. She was for many years principal of the Philadelphia School of Domes¬ tic Science, and she lectured widely. She was editor and part owner of Table Talk in 1886-92, edited Household Nezvs in 1893—97 and was later on the editorial staff of the Ladies' Home Journal. She was a director of the Pennsyl¬ vania Chautauqua School of Domestic Science. Her publications include (Mrs. Rorer's New Cook Book) ;

(How to Use a Chafing Dish) ; (Colonial Cookery) ; (A Book on Diet and Cookery, > *etc.*

RORIC FIGURES (Fr. fiaures roriques, from Lat. ros, dew), a name applied to certain curious images rendered manifest upon breath¬ ing on polished solid surfaces, when these have been previously exposed to contact or close proximity of the objects thus represented, and at the same time have been acted upon by light, heat or electricity. The singularity of these phenomena is, that they consist usually in the production at the first of a sort of latent or in¬ visible image, but this may afterward be de¬ veloped or brought out, somewhat in the man¬ ner of photography. Consult Chwolson, O. D., (Lehrbuch der Physik) (1902).

RORKES (rorks) DRIFT, Africa, a post station on the Tugela River, in Natal, memora¬ ble for the heroic defense of a British force of 80 men under Lieutenants Bromhead and Chard. They were guarding the hospital and the commissariat, when they were attacked by a Zulu force of 4,000, the night of 22 Jan. 1879. The British used biscuit boxes and rice bags for a barricade and kept the enemy at bay until relieved the morning of the 23d. Six times in succession the little force drove out Zulu war¬ riors who had got within the barricade. .

RORQUAL, ror'qwal, a name of Scandi¬ navian origin, signifying a whale having longi¬ tudinal furrows on the belly. As generally em¬ ployed it comprises the finback, sulphurbottom and humpback whales, or the subfamily Balcenopteridcc, exclusive of the genus Rhacliia-nectes. The furrows extend to the throat, where they are closely laid. All these whales have small heads and small flippers. In the north Atlantic there are three species of fin¬ backs, one species of sulphurbottom and one species of humpback. The finbacks are the common finback (Balcenoptera physalus) , the pollack whale (B. borealis) and the little piked whale (B . acuto-ro strata) . The whale which is most frequently seen on the east coast of the United States and of which stranded individ¬

uals are found every year at different points is the common finback, B. physahis. It is from 60 to 70 feet long when full-grown, and is* readily distinguishable by its gray and white striped whalebone, gray upper surfaces and white belly and under surfaces of pectoral fins and flukes. The dorsal fin, which is rather more than a foot high, is situated a little in advance of the last fourth of the length of the body. Though numerous species of finbacks and humpbacks have been described

from dif¬ ferent parts of the world, the five forms above mentioned are everywhere recognizable. If others exist they at least resemble these very closely. The sulphurbottom feeds on small crustaceans and the finbacks and humpbacks on various fishes, such as the cod, pollack, herring, capelin, *etc.* They all engage in seasonal migra¬ tions. During the summer months great num¬ bers congregate about Newfoundland, Iceland and the north of Norway. For gray whale, or hardhead, and further information relating to finbacks and humpbacks, see Whale.

RORY O'MORE, ror'i o-mor', a novel by Samuel Lover, published in 1836. In spite of its stilted style and improbable incidents, this story is valuable in its delineation of Irish character and in its picture of the Irish up¬ risings at the close of the 18th century.

ROSA, Edward Bennett, American physi¬ cist : b. Rogersville, N. Y., 4 Oct. 1861 ; d. Washington, D. C., 17 May 1921. He was graduated at Weslevan Universitv in 1886; Ph.D. at Johns Hopkins in 1891. He was pro¬ fessor of physics at Wesleyan University in 1891-1902; physicist of the National Bureau of Standards in 1901-10, and thereafter was its chief physicist. He contributed to journals of physics, and was author of the paoers of the National Bureau of Standards, in which he in¬ stituted a special department of theoretical and applied electricity and electrical measurements. In 1915 he was appointed a member of the LTnited States Coast Defense Board. He wrote fThe Specific Inductive Capacity of Electrolytes* (1892) ; descriptions of a New Respiratory Calorimetre* (1899), *etc.*

ROSA, Francisco de Paula Martinez de la, Spanish poet, novelist, dramatist and states¬ man : b. Granada, 10 March 1788'; d. Madrid, 7 Feb. 1862. Graduating in law from the Uni¬ versity of Granada he became lecturer on ethics at his alma mater, while still in his 'teens. He was popular as a lecturer on account of his originality in the handling of his subjects, his enthusiasm and his wide knowledge of litera¬ ture. He had scarcely entered upon his duties at the university when he began the publica¬ tion of a series of epigrams on well-known local personages, under the title of (E1 cementerio de momo.) This gained him considerable reputa¬ tion as a writer. But his university and other duties were interrupted by the arrival of the French in Spain. De la Rosa became very ac¬ tive in the national movement against the in¬ vaders. Deep in the councils of the Junta of Granada, he undertook for that body to secure arms from the English who were busy fighting Napoleon. In complying with this self-imposed task, he went first to Gibraltar and then to England. He was possessed of notable oratori¬ cal gifts and this enabled him to exercise a cer¬

tain amount of influence in political juntas,

which his otherwise retiring character would not have permitted him to do. This in turn brought for him political offices and a leadership in literature which he was not in reality able to maintain in his later years. Yet this com¬ bination of circumstances had two directly op¬ posite effects. It gained for him during his lifetime the reputation of being in his day Spain's greatest and most representative literary man and gave him the literary leadership of his country. This latter position he maintained not so much through his gifts of originality in thought, literary form and subject matter, as by his successful imitation of his favorite au¬ thors not in Spanish alone, but also in foreign languages, more especially French and Eng¬ lish. The second effect has been that since his death and in consequence of the public and political glamor that surrounded his name in his lifetime his works have become largely neglected; and they have found more critics to pick flaws in them than to recognize their many good qualities. For his political activi¬ ties and especially for his advocacy of the constitution of 1812, Martinez de la Rosa was tried and sentenced to imprisonment for 10 years, on the political reaction of 1814. He served six years of this sentence which was cut short by the insurrection of 1820. He came forth from his prison to become head of the new ministry; but he proved himself far too weak a character for the stormy part to which fate had assigned him, and his temporizing at¬ titude made him very unpopular and distrusted by both political parties and by the masses .as a whole. Resigning office, he went to Paris, where he remained until 1830. Four years later he became head of the liberal ministry. In this capacity he showed his reactionary tendencies by becoming author of a royal statute creating a constitutional government and doing away with the ancient privileges of the provinces. Active though he was in promoting the inter¬ ests of Spain, he succeeded in making himself fully as unpopular as he had during his first term as head of the government ; and he was again forced to resign his office, this time be¬ fore the end of his first year of service. He, however, continued to be a supporter of the queen, Maria Christina, and on the fall of her government in 1840 he retreated to Paris. He returned to Madrid four years later, as the result of political changes, entered the cabinet cf Narvaez (1844), and three

years later be¬ came Ambassador to Paris (1847-51). His long residence in the French capital made him a champion of the Romantic movement in litera¬ ture, which he was instrumental in introducing into Spain. Martinez de la Rosa was very sen¬ sitive to the influence of his favorite authors, and he reflects them in turn, as one after an¬ other obtained ascendency over him. For this reason he was well fitted for the task of intro¬ ducing his countrymen to the literary move¬ ment that had taken possession of the French capital and through, it of all France. Experi¬ menting, as he constantly was, with the works of others, his literary efforts increased in ex¬ cellence toward the close of his life. Among his published works most worthy of attention are (Dona Isabel de Solis) (an imitation of Scott) ; (La viuda de Padilla > ; Cos celos in-f undados' ; Ca conjuracion de Venecia' ;

4 Aben-Humeya' ; (Lo que puede un empleo,' VOL. 23 — 44

and (Espiritu del siglo.' Consult Godard, Mar¬ tinez de la Rosa' (Paris 1862).

ROSA, ro'sa, Salvatore or Salvator, Ital¬ ian painter: b. Renella, near Naples, 20 June 1615; d. Rome, 15 March 1673. His eldest sister having married Francesco Fracanzano, a painter, Salvator from him acquired a taste for art. He then became a pupil of Falcone and Ribera (q.v.) ; but his taste was formed by the study of nature among the wilds of the Apennines rather than by other artists. During one of his rambles in the Abruzzi he was seized by brigands with whom he is said to have asso¬ ciated for some time, but left them at last and went to Naples, where he worked in such want that he was often obliged to sell his pictures to the meanest hucksters and for a pittance. At last one of his pictures was observed by the painter Lanfranco who recommended Salvator to notice, and procured him patronage. He re¬ moved to Rome, where he established his repu¬ tation. In 1647, when the revolt under Ma-saniello occurred, he joined La Compagnia della Morte, which Falcone commanded, and on the defeat of the cause he returned to Rome, where he was not, however, permitted to remain. He went to Florence, where he was patronized and employed by the grand duke and other members of the family of Medici. At length, returning to Rome on the death of his enemies, he painted many pictures for the churches in that city. His great ambition was to be a famous historical painter, but he is actually best known as a painter of landscapes and battles. His land¬ scapes present wild and desolate scenery, with rocks rising like towers ; broken, splintered tree trunks waving their leafless arms; storm and lightning convulsing the

heavens. The figures introduced are those of bandits, soldiers or witches. Among his extant works are (Pro¬ metheus,) Celisarius,' (Saint Roche Wounded,' some landscapes and battle-scenes, in Rome ;

(Jesus Disputing with the Doctors,' (Daniel in the Lion's Den,' (Jesus Walking on the Water,' in Naples; (Souls in Purgatory,' in Milan; Conspiracy of Catiline,' and his own portrait, in Florence; Che Soldiers of Gideon,'

(Bandits in Council,' (Saint Jerome in the Desert,' and some landscapes, in Munich; Mercury and the Woodman,' landscape with Figures,' in the National Gallery; Moses at the Rock,' Malt of the Soldiers,' at Hampton Court; Crometheus,' (Sisyphus,' at The Plague; (Regulus,' (Cadmus,' at Copenhagen; Che Prodigal Son,' in Petrograd ; Che Angel Raphael,' Che Young Tobias,' Che Shade of Samuel Appearing to Saul,' in the Louvre; (Jesus in the Garden of Olives,' (Resurrection of Christ,' in Toulouse. He was also distin¬ guished as a poet and musician, and his satires and other poems have been often printed.

ROSA, Monte, mon'te ro'sa (ancient Mons Sylvius), a mountain of the Alps (q.v.), on the boundary between Italy and Switzerland, near the Matterhorn, and about 40 miles east of Mont Blanc (q.v.). It is formed by the union of several mountain ridges. Where the ridges meet four chief angles are formed, the one on the northeast, which is most precipitous, enclosing the glacier of Macugnaga, another on the northwest originating the great Corner glacier or glacier of Zermatt, a third on the southwest containing the glacier of Lys, and

the fourth on the southeast occupied by sev¬ eral large but less prominent glaciers. The loftiest peak, Dufourspitze, 15,217 feet in height, was first ascended in 1855. There are three other peaks, respectively, 15,132, 15,005 and 14,965 feet high.

ROSA AMERICANA, in numismatics, the name applied to a coinage issued in 1722 by Great Britain for America of a mixed metal resembling brass, and called Rosa Americana or Wood's money, after its manufacturer, William Wood. The royal letters patent described this money as two-pence, pence and half-pence. See Numismatics.

ROSACEiE, ro-za’se-e, the Rose family, perhaps the most important natural order of fruit-bearing plants, since it includes apple, pear, quince, peach, plum, apricot, cherry, nectarine, raspberry, dewberry, loganberry, blackberry, strawberry, loquat, medlar and countless orna¬ mental trees and shrubs. The family is com¬ posed of about 90 genera and 1,500 species widely distributed throughout the world, though most abundant in the north temperate zone. It is divided into six subfamilies, which by some authors are considered as distinct families. The basis of subdivision is the formation of the fruit as follows: Fruit follicular, as in Spircea; ovary compound, inferior, fruit fleshy as in Pyrus; fruit of achenes as in Rubus; carpels connate and adnate to the hollow dry re¬ ceptacle, as in Geum; carpel solitary, superior, fruit a drupe, style terminal, as in Primus ; car¬ pel solitary, superior, fruit a drupe but style basal and flowers usually irregular, as in Chrysobalanus. The species agree in having alternate, simple or compound leaves, accom¬ panied by two persistent stipules, a calyx of one sepal, with four or five divisions, and the corolla with as many petals as the calyx has divisions, but sometimes wanting. The stamens are generally very numerous and distinct, and are inserted with the petals round the ovary. The pistil presents various modifications. Some¬ times it is formed of a single carpel or sev¬ eral entirely free and distinct carpels, placed in a tubular calyx. Sometimes these carpels adhere by their outer side to the calyx; some¬ times they are united, not only to the calyx but to each other, and sometimes they are col¬ lected into a kind of capitulum or head. The fruits, consequently, are highly varied, and their modifications afford the chief distinguish¬ ing marks of the suborders.

ROSACEA, ACNE ROSACEA, or GUTTA ROSEA. See Acne.

ROSALES, ro-sa’les, Philippines, pueblo, province of Neuva Lcija, Luzon, on a tribu¬ tary of the Agno River, two miles from its junction with the Agno, 38 miles north of San Isidro. It is connected by highway with Manila and with towns to the north. Pop. 11,519.

ROSAMOND, roz’a-mond, English mis¬ tress of Henry II, commonly called (<fair Rosa¬ mond. ˆ She was the daughter of Walter, Lord Clifford, became the mistress of Henry II and died probably about 1176. The king is said to have set apart for her residence a building sur¬ rounded by a labyrinth at Woodstock. The in¬ trigue was finally discovered by the jealous Queen Eleanor, who forced her to drink poison. These details, however, have no historic basis.

She was buried in the chapter-house of God-stowe nunnery, where her tomb was long to be seen.

ROSANILINE, a derivative of aniline (q.v.), the base of magenta, fuchsine (qq.v.), *etc.* It is a colorless substance, having the formula C20H21N30. Many of its crystalline salts are of very brilliant colors.

ROSANOFF, Martin Andre, American chemist : b. Nikolaieff, Russia, 28 Dec. 1874. He was educated at the Imperial Classical Gymnasium, Nikolaieff, and at the universities of New York, Berlin and Paris. He was re¬ search assistant to Thomas A. Edison in 1903-04; instructor, and later head, of the depart¬ ment of chemistry, at New York University in 1904-07, and was head of the department of chemistry and the chemical laboratories at Clark University in 1907-14. He was called to the chair of chemical research at the University of Pittsburgh in 1914, and since 1915 has also been head of the department of research in pure chemistry there.

ROSARIO, ro-sa’re-o, Argentina, in the province of Santa Fe, on the right bank of the Parana, lies about 230 miles by river north¬ west of Buenos Aires. It is the second city of the republic in commercial importance and the centre of the entire trade for the 11 prov¬ inces lying between Parana and the Andes. It is the largest river port in the Argentine. Six railways meet here, and river navigation is well developed. Grain elevators and large ware¬ houses accommodate the wheat, hides and prod¬ uce from the interior. The city is well laid out, on level ground, and has sewers, water¬ works, electricity, gas and all modern improve¬ ments. There are 18 banks and private bankers, and good newspapers. Many handsome build¬ ings are of recent construction, such as the new courts, theatre, banks and hotels. The residence sections are attractive and finely kept. There are sugar refineries, grist mills and breweries. A large amount of money has been expended in conveniences for transfer of freight from water to rail, and the port trade has responded with a rapid development. The foreign trade ap¬ proximates $100,000,000 annually. The most im¬ portant items of import are lumber, oil, ma¬ chinery and canned goods. Pop. about 200,000.

ROSARIO, Philippines, pueblo, province of Batangas, on the southeastern coast at the mouth of the Rosario River, 13 miles north¬ east of Batangas, the provincial capital. It is an important road centre. During the last in¬ surrection the town was destroyed by the in¬ surgents. Pop. 12,450.

Also the name of two smaller pueblos in Luzon: (1) in the province of

Cavite, on the Manila coast road, eight miles southwest of the town of Cavite, pop. 6,390; (2) in the province of Union, situated in a mountainous district, 30 miles southeast of San Fernando, connected with coast highway; pop. 2,250.

ROSARY OF THE BLESSED VIRGIN MARY, a form of devotion in the Catholic Church, which consists in the recital of 15 decades of Aves (see Ave Maria) each decade preceded by a Paternoster and followed by a Gloria (see Doxology). As the prayers are said they are counted off on a string of beads. Five decades form a chaplet and in each chaplet

are contemplated events or ((mysteries" con¬ nected with the life of Christ: the mysteries of the first chaplet are the Annunciation, Visita¬ tion, Birth of Christ, his Presentation in the Temple and his Finding there: these are the Joyful Mysteries. In the other chaplets are contemplated the Five Sorrowful Mysteries — the Agony in the Garden, Scourging, *etc.* ; and finally the Five Glorious Mysteries — Resur¬ rection, Ascension, *etc.* The Rosary of 15 dec¬ ades was introduced by Saint Dominic in the 13th century.

ROSARY SUNDAY, the first Sunday in October; a feast instituted by Gregory XIII for the Confraternity of the Rosary and made of universal observance after the victory of the Emperor Charles VI over the Turks at Lepanto in 1571 in gratitude to the Blessed Virgin. This victory is supposed to be in answer to the prayers of the Fraternity of the Rosary, a Ro¬ man Catholic order established in the 15th cen¬ tury for the purpose of averting public calamity by the means of prayers. An impetus was also given to the devotion of the rosary by Leo XIII, who enjoined its daily use in public during October. Roses are blessed and dis¬ tributed as souvenirs and the rosary is recited continually during the day.

ROSAS, Juan Manuel de, hoo-an' ma-noo- el da ro'sas, Argentine dictator : b. Buenos Aires, 30 March 1793; d. near Southampton, England, 14 March 1877. He was descended from a noble family of

Spain and first came into pub¬ lic notice as leader of the Republicans against the Aristocratic party of the Unitarios. He was commander of the police of Buenos Aires in 1826, but the revolution headed by Lavalle forced him to retire. He succeeded a little later in overcoming Lavalle and becoming gov¬ ernor, 1829-32. Though forced out of office, he held control of the army and in 1835 became dictator for five years. His appointment was twice renewed and until 1852 no meetings were held of the National Congress or the Constituent Assembly. Rosas exercised a despotic rule and attempted to annex the neighboring states by force under the pretext of their formerly be¬ longing to the vice-royalty of Buenos Aires. He took advantage of the rivalry of Oribe and Rivera to intervene in the affairs of Uruguay, made an unsuccessful invasion in 1839 after the fall of Oribe's government and repeated the attack in 1843. A long siege followed with the closing of the Parana to navigation and the violation of the treaties of 1828 and 1840 finally led to combined interference on the part of England and France. Buenos Aires was block¬ aded, but little was effected save the opening of the Parana, as the river provinces could not be induced to rise against Rosas. England withdrew in July 1848 and France six months later. The opposition party against Rosas was growing more powerful, however, and the treaty of 1849 which denied to the neighboring provinces navigation privileges of the Plate, the Uruguay and the Parana finally brought to his opponents the support of Brazil, and Rosas was defeated at Monte Caseros, 3 Feb. 1852. He made his escape to England, where he lived the remainder of his life. The Argentine Congress passed sentence of death upon him in 1861 as <(a professional murderer and robber." Consult

Mejia, Ramos, (Rosas y su tiempo) (2 vols., Buenos Aires 1907).

ROSCELIN, ros-el-an, ROUSSELIN, or RUCELIN, Jean, French theologian of the 11th century: b. probably in the diocese of Soissons. He was educated at Rheims, and came into public notice while canon of Compiegne by citing Anselm as supporting his view of the Trinity, which in effect conceived God as ex¬ isting as an individual and consequently the Trinity as three Gods. The synod of Soissons in 1092 compelled Roscelin to recant, after re¬ ceiving from Anselm a refutation and denial of Roscelin's position and claims. Continuing to teach his peculiar views, he was deposed. He went to England to attack Anselm, then archbishop of Canterbury, at the opportune moment of his difference with the king, but failing in his purpose returned to France. Later he settled at Tours and entered into a controversy with Abelard, his former pupil, on the grounds taken by

the latter in maintaining the unity of the Trinity. After this controversy Roscelin disappears from history. Of his writ¬ ings only a letter to Abelard is extant. In the history of philosophy he is classified as a nom¬ inalist and in theology as a tritheist.

ROSCHER, rosh'er, Wilhelm, German

political economist: b. Hanover, 21 Oct. 1817; d. Leipzig, 4 June 1894. Following Savigny, who introduced into Germany the historical treatment of jurisprudence, Roscher broke with the theoretical economists and entered on the study of the history of economics, treating political economy less as an abstract science and more as a branch of history, and making eco¬ nomic fact and past development rank as mere economic ideas and theories. From 1848 he was professor at Leipzig. His two great works are (System der VolkswirtschafD (5 vols., 1854-81) and (Geschichte der Nationalokonomik in Deutschland) (1874). Other volumes on forestry, commerce, charities, etc., were (Zur Geschichte der englischen Volkswirtschaftslehre) (1852) ; (Ueber Kornhandel und Teuerungspolitik) (3d ed., 1852) ; (Kolonien Kolonial-polidk, und Auswanderung) (3d ed., 1885) ; (Ansichten der Volkswirtschaft aus dem geschichtlichen StandpunkC (1861; 3d ed., 1878); (Politik) (1892) ; (Geistliche Gedanken eines National-okonomen) (1894).

ROSCIUS, rosh'i-us, Roman actor: b. Coionium, near Lanuvium, 134 b.c. ; d. about 61 b.c. He was born a slave and early adopted the histrionic profession for his master's profit, His success on the stage was phenomenal. It is said that at one time he earned 1,000 denarii (about $175) daily, and Pliny estimates his annual profits at 50,000,000 sesterces (about $2,000,000). This may be exaggerated, but he was a favorite actor at. a period when the Ro¬ man passion for the stage was at its height. He was easily enabled to purchase his freedom from his peculium, or perquisites as a slave, took the name of Quintus Roscius Gallus and wore the emblem of equestrian rank, a gold ring, given him by Sulla. The Roman populace and nobles he moved with equal facility to tears or laughter by his irresistible histrionic power, for while he was a tragedian unparalleled in the history of the ancient Roman stage, he was also a comedian of fresh and natural humor. Cicero

did not disdain to receive instructions from the great actor, whom the first orator of Rome always spoke of in terms of affection and admiration.

ROSCOE, ros'ko, Sir Henry Enfield, English chemist: b. London, 7 Jan. 1833; d. 18 Dec. 1915. He was educated at University Col¬ lege, London, and at Heidelberg, making a special study of chemistry. He occupied the chair of chemistry at Owens College, Manches¬ ter, in 1857-87. He was knighted in 1884, sat in Parliament for South Manchester in 1885— 95, and in 1896-1902 was vice-chancellor of the University of London. He received high honors from the universities and learned societies of England and published (Investigations on the Chemical Action of Light* ; (Lessons in Ele¬ mentary Chemistry) (1871) ; (A T reatise on Chemistry* (1878-89); (The Hydrocarbons and Their Derivatives,* with Schorlemmer (1881 — 92), *etc.* His (Life and Experiences) were published in 1906.

ROSCOE, William, English biographer: b. near Liverpool, 8 March 1753; d. Toxteth Park, Liverpool, 30 June 1831. At 16 he was articled to an attorney in Liverpool, and this obliging him to study Latin, he read and made himself master of the Latin classics. He next studied the Italian and French languages, and in the former became uncommonly proficient. Having finished his clerkship, he was taken into partnership by an attorney of considerable practice and carried on the whole of his busi¬ ness. In 1777 he published a collection of some of his earlier poems and when the question of the slave-trade came uppermost Roscoe took a warm part in favor of its abolition and joined Clarkson in his endeavors to that end. His < Scriptural Refutation of a Pamphlet on the Licitness of the Slave-Trade* and his < Wrongs of Africa1* appeared in 1788; and in 1796 he brought out the work which gained him celeb¬ rity, the (Life of Lorenzo de' Medici, called the ' Magnificent* (1795), since translated into Italian, French and German. He published the <Life and Pontificate of Leo X* in 1805, and in 1806-07 represented Liverpool in Parliament. He had previously entered into business at Liverpool as a banker, a move which eventually landed him in great pecuniary difficulties. He was the author of several political pamphlets and the mover and supporter of several public works in Liverpool. To the botanic garden and to the Athenaeum he lent much effective assist¬ ance. Consult his (Life and Correspondence* (1833) by his son, Henry Roscoe.

ROSCOELITE, a vanadium-bearing mica (muscovite) in which part of the ALOs is re¬ placed by V2O3, the latter reaching 28.85 per cent in some specimens. It occurs in thin layers with gold near Coloma, Cal., and at various localities in central and western Colorado.

ROSE, roz, Chauncey, American philan¬ thropist: b. Wethersfield, Conn., 24 Dec. 1794; d. Terre Flaute, Ind., 13 Aug. 1877. In 1825 he settled in Terre Haute as a merchant, where by his investments in land he became wealthy. He was an active promoter of railroad interests and was especially interested in the Terre Haute and Indianapolis Railroad. Though legally en¬ titled to the fortune of his brother John, he disposed of almost the entire amount of

$1,600,000 in benevolent enterprises which he knew his brother to have favored, and later founded from his own fortune the Rose Poly¬ technic Institute to which he left the greater share of his estate.

ROSE, George (((Arthur Sketchley**), English dramatist and novelist : b. London, Eng¬ land, 19 May 1817; d. there, 11 Nov. 1882. He was graduated at Oxford in 1845, took or¬ ders in the Church of England in 1848 and after holding several curacies became in 1855 a Ro¬ man Catholic. He then engaged in tutoring and later devoted himself to a literary career in which he achieved a considerable success. His (Mrs. Brown *monologues were published in 32 volumes (1866-70) and enjoyed wide popularity. Plis other works include novels,. (A Match in the Dark* (1878) ; and (A Marriage of Con¬ science* (1879) ; plays, (The Dark Cloud* (1863); (How Will They Get Out of It?* (1864); (Money Makes the Man* (1870); and also several works of travel, (The Great Coun¬ try, or Impressions of America* (1868); (Out for a Holiday* (1870), *etc.* Consult Winter's (01d Friends* (1909).

ROS E, ro'ze, Gustav, German mineralogist, brother of Heinrich Rose (q.v.) : b. Berlin, 28 March 1798; d. there, 15 July 1873. He studied under Berzelius at Stockholm, in 1822 became keeper of the mineralogical collection in the University of Berlin, and in 1826 was made ex¬ traordinary and in 1839 ordinary professor of mineralogy in that institution. Beside several essays in Poggendorff's (Annalen,* he wrote (Elemente der Krystallographie* (1833) ; (Ueber das Krystallisationsystem des Quarzes* (1846) ; (Das Krystallochemische Mineralsvs-tem* (1852). With Humboldt and Ehrenberg he made in 1829 a journey to northern Asia, an account of which he gave in a work entitled (Reise nach dem Ural dem Altai und dem Kapische Meere* (1837-42).

ROSE, He'nrich, German chemist: b. Ber¬ lin. 6 Aug. 1795; d. there, 27 Jan. 1864. He first devoted himself to pharmacy, studied in Berlin, in Stockholm in 1819 under Berzelius, and from there went to Kiel, where he took his degree In 1823 he became extraordinary and in 1835 ordinary professor of chemistry at Berlin. As a practical analyst in the department of inor¬ ganic chemistry he held a high rank, and the result of his labors can be found in his memoirs inserted in the (Annalen* of Poggendorff. H;s (Manual of Analytical Chemistry* (1829) was translated into French, English and Swedish. In 1844 he discovered a new metal in the tan-talites of Bavaria which he called niobium.

ROSE, Hugh Henry, Lord Baron Strath - NAIRN, English soldier and diplomatist: b. Ber¬ lin, 6 April 1801 ; d. Paris, 16 Oct. 1885. He en¬ tered the British army in 1820, was military at¬ tache to the Turkish army in 1840, was consul-general for Syria 1841-48, as secretary to Lord Stratford de Radcliffe was charged'affaires at Constantinople in 1852-54 and was commissioner at the French headquarters during the Crimean War and served at the Alma and Inkerman. Pie was sent to India in 1857 to command the Cen¬ tral Indian army and virtually reconquered Central India. Though his campaign was over¬ shadowed by that of Sir Colin Campbell, it is generally admitted that his operations were

more skilful and brilliant than his chief's, on whose death he became commander-in-chief in India. He held the same post in Ireland 1865-70, was raised to the peerage in 1866 and made field-marshal in 1877. Consult Burne, Sir O. T., (Clyde and Strathnairn) (1891).

ROSE, Hugh James, English theologian : b. Little Horsted, Sussex, 1795; d. Florence, 22 Dec. 1838. He was graduated at Trinity Col¬ lege, Cambridge, in 1817 ; was professor of divin¬ ity at the University of Durham in 1833 ; and in 1836 principal of King's College, London. He was one of the leaders of the Oxford move¬ ment, and it was at his rectory, Hadleigh, Suf¬ folk, in July 1833, that a resolution was made to publish 'Tracts for the Time.* ((He was,®

says Dean Church, ((the most accomplished di¬ vine and teacher in the English Church. He was really a learned man. He had the intellect and energy and literary skill to use his learning. He was a man of singularly elevated and reli¬ gious character ; he had something of the eye and temper of a statesman, and he was pro¬ foundly loyal to the Church.® It is not too much to say that by his early death the Tractarian movement lost its balance wheel. (See Oxford Movement). Consult Church, 'The Oxford Movement) (1891) ; Mozley, Reminis¬ cences^

ROSE, Sir John, Canadian financier : b. Turriff, Aberdeenshire, 2 Aug. 1820; d. Caith-ness-shire, 24 Aug. 1888. He was educated at King's College, Aberdeen, and in 1836 removed with his parents to Canada. He served as a volunteer during the rebellion of 1837. In 1842 he was admitted to the bar and soon established a large practice at Montreal. He entered Par¬ liament as member for Montreal in 1857, and after the Union until his retirement in 1869 rep¬ resented Huntingdon. He was solicitor-general for Lower Canada in 1857, minister of public works in 1859 and in 1864 was appointed com¬ missioner for the settlement of claims under the Oregon treaty with the United States. In 1867— 69 he was minister of finance, then retired from office, went to England and engaged in banking. He represented the English govern¬ ment on a confidential mission to the United States which led to the Treaty of Washington in 1870, and until his death was regarded as the unofficial representative of Canadian interests in England. He was created a baronet in 1872 and in 1886 was made an imperial privy-coun¬ cillor.

ROSE, John Holland, English historian: b. Bedford, 1855. He was graduated at Cam¬ bridge University, received a fellowship at Christ's College and since 1911 has been reader in modern history at Cambridge. Besides much editorial work and contributions to the ^Cam¬ bridge Modern History* he is author of 'The Revolutionary and Napoleonic Era} (1897) ; 'Life of Napoleon) (1902) ; 'William Pitt and the Great War* (1915); 'Nationality a Factor in Modern History* (1916) ; 'Why We Carry On> (1918), *etc.*

ROSE, Joseph Nelson, American botanist: b. near Liberty, Ind., 11 Jan. 1862. He was edu¬ cated at Wabash College and was assistant in botany there in 1888-89. He was first assist¬ ant in the division of botany of the United States Department of Agriculture in 1888-94;

assistant and later associate curator of the United States National

Museum in 1894-1912, and since then associate in botany there. He is also research associate of Carnegie Institute, Washington-. He has made an exhaustive study of cacti. He was joint editor of ‘Revision of the Umbelliferae of the United States* (1888) ; and of ‘Revision of North American Crassu-laceae* (1905). Besides numerous articles in technical journals on Umbelliferse, Cacticese and Mexican plants, he is author of ‘Useful Plants of Mexico) (1899); ‘Monograph of North American Umbelliferae* (1901).

ROSE. See Rosacea; Roses.

ROSE, Attar of. See Attar of Roses.

ROSE IN ART AND SYMBOLISM, The. The Bible but twice mentions the rose, and modern criticism tends to prove that in both cases it is a mistranslation and refers to some other growth. In the Song of Solomon the “rose of Sharon® is mentioned. In histori¬ cal reference we find the rose mentioned as of religious significance already in the ancient Zendavesta, and it was held in reverence by an¬ cient Indians, Syrians and Egyptians. But the rose does not appear as a motif in Egyptian art, though the Babylonians had their staves orna¬ mented with silver roses as tokens of festivity. In the heathen mythology the rose was dedi¬ cated to Aphrodite and was claimed either to have been created from the blood of Adonis or to have been caused by the sea-foam dropping from the newly-created Aphrodite bursting into bloom. In mythological evolution the rose became a symbol of Eros, later of the Muses and of the Graces. Dionysus (Bacchus) also had a rose as attribute, hence this flower deco¬ rated the guests at banquets. In this context it may be mentioned that the rose has always been the queen of wreath-flowers and orna¬ mental expression of beauty. In antithesis the rose was a symbol of decay; hence an emblem of death. Originating in the Orient the rose be¬ came a popular growth with the Greeks, who in turn carried its cultivation into their colonies in Italy and elsewhere. The ephebes in their youthful capacity as servers of wine to the guests wore roses on their heads as did also the female dancers. In the orgies following the banquet roses were used in great abundance, smothering the tables, and the Latin term sub rosa is said to have originated from the rule that all acts after the arrival of the flowered decoration were considered secret with the con-vivialists. Nero is said to have squandered $150,000 in roses at a single feast; the sybarites are said to have reposed on a bed of roses. In Christian iconography we find the rose and blood of Christ brought into close symbolic cor¬ relation and in the Catacombs the rose and wreath of roses are pictured as symbols of martyrdom. In ecclesiastical art we early find the Holy Virgin symbolized by the rose (rosa mystica) and

one of her titles became in Italy Santa Maria della Rosa. The flower is often found in her hand in early paintings. An¬ other one of the Virgin's titles is Rosa Cocli, the Rose of Heaven. Ever since the Middle Ages the Pope has, on Laetare Sunday, blessed a golden rose which he bestows to some bene¬ ficiary. Some Italian writers have declared that the term sub rosa is derived from the fact of

the Pope presenting (since 1526) consecrated roses which were placed over the confessionals at Rome to denote secrecy, the rose being a symbol of silence. In legend, Saint Dorothea, who suffered martyrdom under Fabricius, made a convert of Theophilus by sending him some roses from Paradise. The rose is an attribute of the saints : Casilda, Elizabeth of Portugal, Rose of Lima, Rose of Viterbo, Rosalia and others.

In heraldry the rose is blazon of the dif¬ ference or brisure of the seventh son. The heraldic rose is depicted witnout leaves or stem and has five petals but the rose double dis¬ plays five other petals within the outer ones ; it is pictured full blown. The badge of the House of York is a white rose, while that of the House of Lancaster, its former rival, was a red rose, and their numerous feudal combats are known in history as the ((Wars of the Roses.® The (<Tudor® rose is the white rose of York and red rose of Lancaster combined. In old England roses were the popular presents for birthdays, but in classic art a rose figured on a tomb denotes a short life. And with the Romans the graves were strewn with roses, emblematic of death.

Clement W. Coumbe.

ROSE, Order of the. See Orders, Royal.

ROSE-BREASTED GROSBEAK. See

Grosbeak.

ROSE-CHAFER. See Grape Insect-pests.

ROSE FESTIVAL, a peculiar kind of fes¬ tival which is celebrated annually on 8 June in some French villages. A similar gala-day is celebrated in Los Angeles, Cal., annually in June.

ROSE OF JERICHO, or RESURREC¬ TION PLANT, a small, annual, cruciferous plant (Anastatica hierochuntica) which grows in the desert regions about the Red Sea. It bears minute white flowers succeeded by tiny pods, containing a few seeds. When the seeds are ripe the leaves fall off, the branches curl inward and interlace, enclosing the pods still holding their seeds, and become dry and rigid, causing the plant to assume the form of a ball, ready to be blown hither and thither by the winds of the dry season. When the plant is deposited in a damp place, it exercises its re¬ markable hygroscopic powers, rapidly uncoils and lets the seed escape in soil suitable for germination. This habit of curling up when dry, and rapid absorption of water, forcing the apparently dead limbs to spread open, as if alive again, has caused the plant to be collected and sold as a curiosity.

ROSE OF LIMA, Saint, a religious woman of Spanish America : b. Lima, Peru, 20 April 1586; d. there, 30 Aug. 1617. Her baptismal name was Isabel, but from her fine complexion she was given the name of Rose. She early showed herself resolute in avoiding the self-indulgence of society and the world. As a sym¬ bol of the life she had chosen she planted her garden only with bitter herbs and interspersed them with figures of the cross. In her religious exercises she took the great mystic, Catharine of Siena, as her model. When her parents fell into poverty she was taken into the family of the treasurer Gonsalvo, by the devout wife

of that gentleman, and by her labor day and night supplied the necessities of her parents. When she was importuned by her friends to marry, she refused, and as her duty to her parents forbade her taking the veil, she em¬ phasized her refusal by joining the Third Order of Saint Dominick, and the religious strictness and exalted piety of her life was an ex¬ ample which won the admiration, sometimes the imitation, of the worldly and profane. On her death the chapter of the cathedral, the senate and all the most honorable companies of the city took turns in carrying her body to ˆ the grave. She was canonized by Clement X in 1671, and 30 August was appointed for her festival.

ROSE OF LIPPE, The. See Orders,

bfoY AL.

ROSE-MALLOW. See Hibiscus.

ROSE-NOBLE, an English gold coin cur¬ rent in the 15th and 16th centuries, and of vary¬ ing value. It was so called because it was of the same value as the noble, a money of ac¬ count, and was stamped on one side with the figure of a rose. It ceased to be coined in the reign of Henry V.

ROSE POLYTECHNIC INSTITUTE,

an institution of collegiate grade at Terre Haute, Ind. Its organization was begun as early as 1874, but it was not opened to students until 1883. It is governed by a board of nine mem¬ bers, of whom one is an alumnus elected by the alumni. The institute offers four courses, each of four years' duration. They are in mechani¬ cal engineering, electrical engineering, civil en¬ gineering and architecture, and chemistry. From the first the practical work in the institute shops has been an important feature of the cur¬ riculum. The degree of bachelor of science is conferred for the completion of any of these courses; that of master of science, two years after graduation if one year is spent in gradu¬ ate study; the degrees of mechanical engineer, electrical engineer or civil engineer are con¬ ferred upon those who have the master's de¬ gree after two years' successful professional work. The grounds and buildings of the in¬ stitute are valued at $145,000; the library con¬ tains 16,000 volumes. The original endowment from the founder, Chauncey Rose, was over $500,000, and additions to this fund have since been made. The students number about 240, and the faculty 20.

ROSE OF SHARON, a name given to an ornamental malvaceous shrub, the Hibiscus syriacus. The rose of Sharon of the Bible was doubtless a bulbous plant, probably a kind of narcissus. See Hibiscus.

ROSE WINDOW, a circuar window, es¬ pecially one divided into compartments by rriul-lions and tracery radiating from the centre, also called Catharine wheel and marigold win¬ dow according to modifications of the design. It forms a fine feature in the church architec¬ ture of the 13th and 14th centuries, and is mostly employed in the triangular spaces of gables. In France it is much used, and, not¬ withstanding difficulties of construction, at¬ tained great size. Notable examples are found in the windows in the cathedrals of Amiens, Chartres, Paris, and in that of Rheims Cathe-

dral which was over 40 feet in diameter. See Ecclesiastical Art.

ROSE-WOOD, the commercial name for chestnut-colored, dark-veined woods, brought chiefly from Brazil, of varying origin, but mainly the product of Dalbergia nigra, one of the Luguminosw or Fabacere. It is imported not in logs or planks, since the large heart-wood rots easily, but in segments, and is sold by weight, being valued according to its rich¬ ness of color. When cut it gives out a faint rose-odor, and is fine and hard, takes a high polish and is much in demand for cabinet making and pianos, being used solidly and in veneer, although somewhat difficult to work on account of its resinous veinings.

ROSEATE SPOONBILL. See Spoon¬

bill.

ROSEATE TERN. See Tern.

ROSEBERY, roz'ber-i, Archibald Philip Primrose, 5th Earl of, English statesman and author: b. London, 7 May 1847. He was edu¬ cated at Eton and Oxford: became Earl of Rosebery in 1868; as a member of the House of Lords entered his political career without the advantage of a training in the Commons, but soon proved himself a brilliant debater; in 1872 was a commissioner on Scottish endowments, and was successively rector of the great Scot¬ tish universities of Aberdeen (1878—81) and Edinburgh (1882-83). In 1878 he married Han¬ nah, only daughter of Baron Meyer de Roths¬ child. From August 1881 to Tune 1883 he was Under-Secretary of State for the Home Depart¬ ment, in 1884 became First Commissioner of Works and in 1886 was appointed Secretary of State for Foreign Affairs in Gladstone's Home Rule government. He was generally approved for his skilful treatment of the difficult ques¬ tions connected with the war between Bulgaria and Serbia and the coercion by the European concert of Greece, then threatening war with Turkey. With the defeat of the Home Rule bill and of the government at the general elec¬ tion he passed from office. He soon, however, entered upon a new activity and one with which up to his time peers had been supp < psed to have nothing to do, namely, the municipal govern¬ ment of London. Upon the

organization of the London County Council, a representative body chosen by popular suffrage and responsible to the public, he at once enlisted himself in the service of the improved system of government promised thereby, on 17 Jan. 1888 became a member of the council and on 12 February was made its chairman. In June 1890 he resigned. Following his example many others of rank and prominence entered the council, whose work was raised to an important position in English public life. For some months, in 1892 he was again president of the council. Upon Glad¬ stone's accession to power in that year he once more became Secretary for Foreign Affairs. He maintained continuity in foreign policy; strongly advocated some kind of imperial fed¬ eration ; made in September 1894 a notable and characteristic speech before the Lords on the Home Rule bill, which, though passed by the Commons, was thrown out. by the Upper House after a four-days' discussion ; and brought to a satisfactory end the serious coal strike, of 1893. When Gladstone retired from political

life in 1894 Rosebery was summoned to form an administration, notwithstanding that there were other Liberals whose length of service was thought by many to give them precedence. Many influential Liberals objected, too, it was said, to a Prime Minister without the House of Commons. No remarkable events attended his administration. The Liberal majority was not large; and before long there were evidences of an increasing division within the party, due in large measure to opposition to his imperial¬ istic views. His government was once or twice discomfited, and finally on 21 Jan. 1895 was de¬ feated in the committee on army estimates. He resigned on 22 January and became the leader of the Liberal opposition. In October 1896 he resigned this position, and since that time has continued, to use his own phrase, to "plough his lonely furrow.® In May 1898 he spoke on Gladstone before the House of Lords; in 1899 was elected lord rector and in 1908 chan¬ cellor of Glasgow University. In his later years he advocated the elimination of Home Rule from the Liberal program, and opposed Cham¬ berlain's tariff reform scheme. He is distin¬ guished for his many and varied attainments, and as a ceremonial and commemorative orator is unequaled in England. Marked character¬ istics of his speeches are their literary quality, derived from a very extensive reading, and that skilful irony whose presence he has so admir¬ ingly indicated in the writings of Stevenson. As an author he is known for his (Life of William Pitt) (1891), already becoming a sort of classic; a (Life of Sir Robert PeeP (1899), and (Napoleon: The Last Phased (1900), a most careful and interesting narrative of the captivity at Saint Helena, with

a severe arraign¬ ment of English blunders in the treatment of the emperor; (Lord Randolph ChurchilP (1906), and ‘Chatham: His Early Life and Connections* (1910). Consult the ‘Life and Speeches* (1900) by Coates, a eulogy through¬ out; also the collection, Appreciations and Addresses) (1899). See Great Britain — His¬ tory of the 19th Century.

ROSEBRUGH ,. roz’bru, Abner Mulhol-land, Canadian physician and inventor: b. near Galt, Ontario, 8 Nov. 1835; d. 1914. He was educated at Victoria College, Toronto, and later studied in New York and London. He engaged in practice at Toronto, revived the Free Dis¬ pensary there in 1863, and in 1867 organized the Toronto Eye and Ear Infirmary. He specialized in medical electricity and in opthalmology. In 1864 he invented a new demonstrating opthal-moscope, and in 1865 he succeeded in photo¬ graphing the inverted retinal image of an object placed in front of the eye. He perfected in 1883 a practical method of duplex transmission of telegraphic and telephonic communication, and improved the method in 1890. Author of (An Introduction to the Study of the Optical Defects of the Eye) (1866) ; ‘Chloroform and a New Way of Administering It) (1869) ; ‘Handbook of Medical Electricity) (1885), *etc.*

ROSEBURG, roz’berg, Ore., city, county-seat of Douglas County, on the Umpqua River, and on the Southern Pacific Railroad, about 200 miles south of Portland. It is the com¬ mercial and trade centre for the fertile valley of the Umpqua, in which farming, fruit-grow¬ ing, stockraising and mining are carried pn,

The chief manufactures are flour, dairy products, canned fruits, wagons and carriages. It has the Oregon State Sodiers’ Home. Pop. 4,738.

ROSECRANS, ro’ze-kranz, William Starke, American soldier: b. Kingston, Ohio, 6 Sept. 1819; d. near Redondo, Cal., 11 March 1898. He was graduated at West Point, enter¬ ing the army as 2d lieutenant of engineers in 1842, but in 1844 returned to West Point as assistant

professor of engineering. From 1847 to 1854 he superintended the repair of various harbors on the eastern coast, but resigned his commission in the last-named year and retired to private life in Cincinnati, where he became a consulting engineer and architect. He en¬ tered upon his career in the Civil War in the volunteer army, his first service being the organ¬ ization of the Ohio troops. From colonel of the 23d Ohio Volunteers he was promoted briga¬ dier-general, United States Volunteers, in May

1861, and 23 June was placed in command of three brigades under McClellan in the campaign of western Virginia, where he was victor in the battles of Rich Mountain and Carnifax Ferry. He served in the Department of West¬ ern Virginia until he succeeded General Pope in command of the Army of the Mississippi. After successfully defending Corinth in western Ten¬ nessee during the siege of 11 June 1862, he was put in command of that district by General Grant, with headquarters at Jackson, Tenn. His memorable career as commander of the Army of . the Cumberland began in October

1862, and in June 1863 he moved upon the Con¬ federate army under General Bragg, whose forces he had been holding in intrenchment dur¬ ing the Northern victory at Vicksburg, causing Bragg's retreat over the Cumberland Moun¬ tains to Chattanooga. In the battle of Chickamauga, 19-20 Sept. 1863. Rosecrans was badly defeated. He was soon after transferred to the Department of the Missouri, and in 1864 re¬ lieved of his command. He retired to Cincin¬ nati, where he remained until 1868, • when he was appointed Minister to Mexico. In 1865 he was brevetted maior-general in the United States army. In 1881-85 he represented Cali¬ fornia in Congress. From 1885 to 1893 he was Register of the United States Treasury and his beautiful signature is to be seen on the treasury notes of that period. He was restored to the rank of brigadier-general and placed on the re¬ tired list of army officers in 1898. -Consult Bickhork, (Rosecrans' Campaign with 14th Army Corps> (1863) ; Cast, (The Army of the Cumberland) (1875) ; Fiske, (The Mississippi Val¬ ley in the Civil War) (1900).

ROSEDALE, Kan., city in Wyandotte County, near Kansas River, adjoining Kansas City, Kan., on the north and Kansas City, Mo., on the east, and on the Saint Louis and San Francisco Railroad. The city virtually forms a part of Kansas City. There are iron and wire works. Pop. (1920) 7,674.

ROSEFISH, a large red fish (Sebastes marinus) of the rockfish family (Scorpoenida) , taken numerously on far northern coasts, where it frequents .shallow shore-waters, while south¬ ward it remains at

considerable depths. It bites readily to hand or trawl lines, its flesh is good, and it is profitable for market as it reaches a length of two feet. Its color is orange-red.

Many local names belong to it, as red perch, snapper, Norway haddock, hemdurgan, *etc.* The rosefish feeds upon crustaceans, small fish and mollusks ; and the young at least are among the most important food-resources of cod and hali¬ but.

ROSJLGGER, Peter, Austrian novelist and short-story writer: b. Alpl, Styria, 31 July 1843; d. 28 June 1918. The son of a poor peasant, he was obliged to obtain an education by his own efforts, chiefly out of school, until he gained the literary protection of Albert Swo-boda, editor of the Graz Tagespost, to which Rosegger became a contributor. He obtained a traveling stipend, with the aid of which he visited Germany, Holland, Switzerland and Italy, and in 1876 founded, at Graz, the Heimgarten, a pe¬ riodical with which he continued to be connected until his death. His stories deal with the life of the mountain peasantry of Styria and possess a great deal of rude energy and simple pathos and humor, not always without senti¬ mentality. The most famous is (Die Schriften des WaldschulmeistersP purporting to be the autobiographical record of a recluse country schoolmaster, Andreas Erdmann, who chooses this profession after an adventurous youth, but, after having practised it for 50 years, again feels a longing for the more exciting life of great multitudes. Other important works are (Das Buch der Novellen) (1872-86) ; (Wald-heimat) (autobiographical, 1873, 1877 ; 35th ed., 1912) ; (Der Gottsucher) (1883) ; (Jakob der Letzte) ˆ(1888) ; (Peter Mayr> (1893). Two good editions of his works are (Ausgewahlte Schriften) (30 vols., Vienna 1894) and (Volk-sausgabe> or People's edition (40 vols., Vienna and Leipzig 1895-1900). There are biographies by Vulliod (in French) and by Feierfeil (in German).

ROSELLE, N. J., borough in Union County, three miles southwest of Elizabeth, on the Central of New Jersey and the Lehigh Val¬ ley railroads. It has iron works and manufac-ories. of hydraulic machinery. Pop. 5,737. It is adjoined on the west by Roselle Park, a sepa¬ rate borough of residential character. Pop. 5,348. . r

ROSELLINI, roz'el-le'ne, Ippolito, Italian Egyptologist: b. Pisa, 13 Aug. 1800; d. 4 June 1843. He was educated at Bologna under Mezzofanti, and in 1824 was called to the chair of Oriental languages at the University of Pisa. He shortly afterward became interested in

Egyptology, and was associated with J. F. Campollion in study as well as in explorations in Egypt in 1828-29. The death of Campollion left to Rosellini the task of publishing the re¬ sults of their explorations (Monumenti dell egitto e della Nubia* (10 vols., Florence 1832— 40). He was also author of (Elementa Linguae vEgyptiacae* (1837).

ROSEMARY, a shrubbery, strongly aro¬ matic plant (Rosmarinus officinalis), growing wild in the southern parts of Europe and also cultivated. It belongs to the Mint family (Men - thacecc) and has axillary, pale blue flowers with two stamens. The stem is three or four feet high, bearing opposite, linear sessile leaves with revolute margins, which are dark-green, smooth, and shining above, white and cottony beneath. Rosemary is tonic and slightly stimulant, and

formerly enjoyed considerable repute as a med¬ icine. It yields, by distillation, a light pale essential oil of great fragrance, which is used in hair pomades. The herb is also used for seasoning in Italy. Rosemary is often referred to in folklore : it was supposed to restore youth when eaten ; it was woven into brides' wreaths, and otherwise employed at weddings, and was carried to funerals and thrown on the graves, because, as it did not soon fade, it was a symbol of remembrance. (<There's rosemary, that's for remembrance.®

ROSEN, Charles, American artist: b. West¬ moreland County, Pa., 28 April 1878. He studied at the National Academy of Design and at the New York School of Art, and has specialized in landscape painting. He received the Hallgarten Prize for his (Rocky Ledge> (1912) ; was awarded the silver medal at the San Francisco Exposition in 1915 ; and the Inness gold medal and Altman first prize in 1916. He became an associate of the National Academy in 1913, and member in 1917. His work is represented in the permanent collection of Delgado Museum, New Orleans; and by (Washed out Bottom Lands) (Minneapolis So¬ ciety of Fine Arts) ; Pate Sunlight5 (Duluth Art Association) .

ROSEN, Friedrich August, German San¬ skrit scholar : b. Hanover, 2

Sept. 1805 ; d. Lon¬ don, England, 12 Sept. 1837. He studied at Gottingen and Leipzig, and under Bopp at Ber¬ lin, and Silvestre de Sacy at Paris. He oc¬ cupied the chair of Oriental languages at the University of London in 1828-30, then resign¬ ing in order to devote himself to the study of Sanskrit, although he returned to the Univer¬ sity as professor of Sanskrit shortly before his death. Overstudy and overwork in earning a subsistence shortened his life. He was author of (Corporis radicum Sanscritarum prolusio5 (1826); (Radices Sanscritae5 (1827); (Rig-Vedae Specimen5 (1830) ; (Algebra of Moham¬ med ben Musa5 (1831). He edited Haughton's < Bengali and Sanskrit Dictionary5 ; Cole-brooke, H. T., ˆMiscellaneous Essays,5 *etc.* He was engaged in preparing a text and Latin translation of (Rigveda) at the time of his death. The first volume was published pos¬ thumously as (Rigveda Sanhita, Liber-Primus. Sanscrite et Latine) (Oriental Translation Fund, 1838).

ROSEN, Roman Romanovitch, Baron, Russian diplomat : b. 1849. He was educated at the University of Dorpat, and at the Im¬ perial Academy of Law at Saint Petersburg, received an appointment in the Department of Justice and was soon transferred to the De¬ partment of Foreign Affairs. He was vice-consul at Yokohoma, and later secretary of the Legation at Tokio ; and became Russian consul-general at San Francisco. He was charge d'affaires at Washington during the period in 1886-89 when there was no Russian Ambassador at Washington. Subsequently he was Minister to Mexico, Serbia, Bavaria and Greece; and at the outbreak of the Russo-Japanese War he was Minister to Japan. He was one of the Russian plenipotentiaries at Portsmouth during the Peace Conference; and in 1905-11 he was Ambassador to the United States. He revisited the United States in 1919.

ROSENAU, rd'ze-now, Milton Joseph,

American physician and sanitarian : b. Phila¬ delphia, Pa., 1 Jan. 1869. He was graduated M.D. at the University of Pennsylvania in 1889, and later studied at Berlin, Vienna and Paris. He was surgeon of the United States Public Health and Marine Hospital Service in 1890-1909. Since 1909 he has been professor of preventive medicine and hygiene at the Har¬ vard Medical School; and also director of the School for Health Officers of Harvard Uni¬ versity and the Massachusetts Institute of Technology since 1913, and director of the Antitoxin and Vaccine Laboratory since 1914. He was appointed surgeon with rank of lieu¬ tenant commander in the United States

Naval Reserve Force in 1917. He was awarded the Georgetown University gold medal of American medicine for service to humanity in 1913-14. Author of (Viability of the Bacillus Pests> (1901) ; (Course in Pathology and Bacteriology5 (1902); (The Immunity Unit for Diphtheria Anti-toxin5 (1905) ; (The Standardization of Tetanus Anti-toxin5 (1908) ; Preventive Medi¬ cine and Hygiene5 (1913; 3d ed., 1917), *etc.*

ROSENAU, William, American rabbi and educator: b. Wollstein, Germany. After com¬ ing to America he studied in the public schools of Philadelphia and Cincinnati and was gradu¬ ated from the Hebrew Union College in Cin¬ cinnati in 1889. He was rabbi in Omaha, Neb., 1889-92, and has been rabbi in Baltimore since 1892. He has been instructor and is now associate in rabbinica at Johns Hopkins Uni¬ versity, and among his publications are Sem¬ itic Studies in American Colleges5 ; (Hebraism in the Authorized Version of the Bible5 ; (Jewish Ceremonial Institutions and Customs.5

ROSENDALE, ro'zen-dal, N. Y., village in Ulster County, on the Rondout River, the Delaware and Hudson Canal, and the Walkill Valley Railroad, about eight miles south by west of Kingston (q.v.). It is noted for its manufacture of hydraulic cement (q.v.). Most of the cement derived from the natural cement rock in the United States comes from Rosen-dale. Pop. 1,125.

ROSENTHAL, ro'zen-tal, Max, American artist : b. Turck, then in Russian Poland, 23 Nov. 1833; d. August 1918. . At 14 he studied art in Paris, and coming to Phila¬ delphia in 1849, he entered the Academy of Fine Arts, chromo-lithography being his specialty. In 1861 he followed the Army of the Potomac and executed drawings of every camp until Gettysburg. Some of his best work is seen in illustrated plates of the report of the United States Military Commission to the Crimea (1860) and in Dickinson's Numis¬ matics of the United States.5 In 1880 he started etching and made all of the Continental Con¬ gress, officers that fought in the American Rev¬ olution, the British officers, Attorneys-General and in 1891 illustrated the (History of the Su¬ preme Court of the United States,5 by Hampton L. Carson, also began Mezzotinting in 1891. In 1906 he painted a large picture of (Jesus at Prayer5 and at the same time made quite a few miniatures. More than 500 of his historic por¬ traits are in the Smithsonian Institution.

ROSENTHAL, Toby Edward, American painter: b. New Haven, Conn., 15 March 1848;

reported deceased c. 28 Dec. 1917. He studied at Munich in the studio of K. Raupp (q.v.) and in 1868 came under the instruction of Piloty. After producing many genre pictures he attracted attention by his Sebastian Bach and his Family at their Morning Devotions> (1870), which was purchased by the Leipzig Museum. After a visit to his home in the United States he returned to Munich and painted (Elaine the Fair) (1874) from Tenny¬ son's idyll of (Elaine. J He also produced some humorous pictures, such as (He Laughs Best Who Laughs Last) (two panels) and (The Girls' Boarding School in Alarm* (1877). His name will be perhaps best remembered for his (Trial of the Escaped Nun, Constance de Beverley> (from Sir Walter Scott's <Marmion))» and (A Dancing Lesson of Our Grandmoth¬ ers.) Two other paintings of this artist have become universally popular; these are (The Portrait of the Cardinal* and the dramatic painting (The Vacant Chair) (both in private galleries in America). Among the more prom¬ inent works of his later period are <The Christ. Carver) and (His Madonna.* Mr. Rosenthal wTas honored by a number of medals of first and second class and received the cross of the Knights of Saint Michael.

ROSENWALD, Julius, American mer¬ chant and philanthropist : b. Springfield, Ill., 12 Aug. 1862. He was of Jewish descent and early engaged in the mercantile business. He was vice-president and treasurer of the Chicago mail-order house, Sears, Roebuck and Com¬ pany, in 1895-1910, and has since been president of the company. He was appointed to the advisory committee of the Council of National Defense and chairman of the Commission on Supplies in 1916. He is a generous benefactor of educational institutions, particularly the Young Men's Christian Association for colored people, rural schools and the Chicago Univer-stiy. He wras also a foremost organizer of the Jewish War Relief.

ROSEOLA, any rose-colored rash occur¬ ring usually in a symptomatic character, with some febrile disorder, as measles, scarlet fever, etc., or with gastric disturbances. The term is often applied, though inexactly, to German measles and to mild forms of other diseases attended with

a rash of similar appearance to that seen in roseola.

ROSES, flowers of the type-genus Rosa, of the order Rosacece. The species are exceed¬ ingly variable; probably no other genus calling iorth so wide a range of botanical opinion. Most botanists recognize about 100 species; Bentham and Hooker estimate the number at less than 40, but Gandoger describes more than 4,000 as indigenous to Europe and western Asia. The number of horticultural varieties, crosses and hybrids is probably several times larger than in any other genus ; more than 3,000 varieties are listed in French catalogues, and since new ones are added annually the list con¬ sists of active members. The roses are widely distributed in the temperate and cold parts of the northern hemisphere extending in the re¬ spective continents southward to India, Abys¬ sinia and northern Mexico. They are erect, climbing or trailing shrubs, generally prickly-stemmed; bear alternate, odd-pinnate, though sometimes simple, leaves and generally large,

showy, pink, white, yellow or purple flowers born either singly or in terminal corymbs, fol¬ lowed by generally showy berry-like fruits (hips) which contain several bony akenes. Prob¬ ably no flower has played so important a role in the garden and in literature. It was prized in the cradle days of the Aryan race and is frequently mentioned in the writings prior to our era. China and Japan, however, seem to have been less attracted to it than more western races. In very early times the flowers exhibited their characteristic tendency to double ; indeed, it is probably the first flower cultivated in this state, and is now more often thought of in this form perhaps than in-its natural single form. The single roses are, however, useful and popu¬ lar in park planting.

Except for ornamental purposes roses are of small importance ; the only uses made of them are the preserving of the fruits of a few species for food and the manufacture of perfumes, especially attar or otto of roses and rose water from the flowers of some other kinds, princi¬ pally R. alba and R. damascena, which are ex¬ tensively grown in southeastern Europe, particu¬ larly Bulgaria and adjacent Asia and in south¬ ern France, in which last country the leading rose is the Provence, a hybrid variety of R. cen-tifolia. The flowers are either put in stills or are macerated. In the distilling process the essen¬ tial oil is extracted by steam and condensed. In each process there is considerable perfume in the water used and in the maceration process, which is most popular in France, this <(rose water® is the

product sought rather than the attar which is regarded as a by-product. These perfumes are among the most important of the world, and it is said that the importations of the attar alone into the United States is greater than the importations of any citrus perfume such as lemon oil, oil of bergamot, *etc.*

Unquestionably the roses are the most im¬ portant flowers cultivated. They are prized by everyone who cares for flowers at all, and throughout the civilized world are probably grown in more gardens than any other flowers. (How important they are commercially ap¬ pears by the statistics quoted in the article Floriculture). In the United States alone the number of blossoms annually grown for sale has been estimated at 100,000,000, valued at about $6,000,000. Yet the development of this industry, which now demands the greatest skill of specialists, has sprung from insignificance in 1870; and in 1850 it did not exist.

From the , botanist's standpoint the classi- • fication of Crepin in his (Primitise Monographiae Rosarum,* seems to be one of the most satis¬ factory and is followed by botanists perhaps more frequently than any other; from the gardener's standpoint Barron in the Cyclo¬ pedia of American Horticulture,* divides the roses into 19 groups with more or less sub¬ division. Among these the following are prob¬ ably the most important. Provence , perhaps most familiar in America in one of its types, the fragrant globular flowered moss roses; Damask and French, fragrant-flowered, robust growing, hardy prolific roses; Ayrshire, very hardy climbing roses with solitary fragrant white to deep crimson flowers; Briers, small perishable-flowered garden roses more useful in shrubberies than for cut flowers; Multiflora, with large corymbs of rather short-lived flow-A LA FRANCE ROSE

ers, and popularly known as ramblers, used' largely in wild gardens, though the crimson rambler and its sub-varieties which belong to the polyantha subdivision are used for porch decoration for which they are admirably adapted ; Evergreen, the foliage continuing very late in autumn ; for example, R. Wichuraiana, a very popular hardy trailer which grows any¬ where ; Hybrid perpetual, upright growing, though sometimes pendulous, shrubs which bear flowers of all types and colors and embrace the largest number of varieties of any group but so greatly mixed as to preclude separation and defi¬ nition ; Hybrid teas, a group of the preceding, the members being the result of crosses with the Chinese tea-scented rose, especially rich in forcing varieties; China or monthly rose, a per¬ petual-blooming rose chiefly interesting because of its effect upon other roses by hybridizing through its variety the tea rose ; Musk, very fragrant light-colored rather tender roses best known in their derivatives, and noisettes, which blossom later, are hardier than the type, and will grow in any soil but are little used prob¬ ably because the blending with the teas seems to have impaired their hardiness ; Polyantha, perpetual-flowering multiflora climbing varie¬ ties bearing small flowers in clusters and espe¬ cially promising as the parents of a nebulous group of varieties adapted to American require¬ ments ; Perpetual briers, best known in Amer¬ ica by one of its component species R. rugosa, a hardy Japanese rose much used in exposed situations for hedges, screens, etc., and useful for hybridizing with many other species.

Rose species are propagated by seeds which are either sown as soon as the hips are ripe or are stratified in sand until spring. If allowed to become dry they may require two years to germinate, but if treated as above they generally sprout the first spring. Many species may be propagated by means of cuttings of nearly ma¬ ture wood taken during summer and rooted under glass. Others will grow from mature wood cuttings taken in autumn and rooted in the spring like currants and gooseberries. Lay¬ ering is generally practised with such species as do not root readily from cuttings; for example, R. hemisphcerica and R. eglanteria. Some species such as the cinnamon rose (R. cinnamomea), the Carolina rose (R. Carolina) and the Damask rose

(R. damascena), may be propagated by suckers, division or by cuttings of the roots which in the last case should be dug in autumn, stored in sand or sphagnum in a frost-proof cellar until spring when they are planted in nursery rows. Grafting and budding are also practised, but are frequently unsatisfactory where regular intelligent attention cannot be given to the removal of the suckers that gen¬ erally spring from the stock. For greenhouses and for forcing, cuttings of semi-mature wood are nearly universally used. They may be taken at any time, rooted with bottom heat in sand, and kept in pots until large enough to be trans¬ planted upon the branches.

In general, roses thrive best upon loamy soils, rich in plant food and humus, well drained but moist, in situations sheltered from the wind but where they will receive the sunlight at least half the day. They do not generally succeed upon very loose or sandy soils, but often do upon heavy clays. They are seldom difficult to transplant with ordinary care, are easy to culti¬

vate and generally simple to prune. The re¬ moval of weak and old wood is the most im¬ portant pruning detail. But care must be taken especially with climbing varieties to preserve the long sturdy shoots, since they are most prolific of blossoms. Indoor roses cultivated for cut flowers are generally pruned so as to have the flowers borne singly at the ends of long stems sometimes, as in the case of American Beauty, exceeding four feet in length. But this is a special florist's practice and is depend¬ ent not only upon the method of pruning but upon the management of the plants otherwise. In the garden the plants may usually be set about 30 inches apart in beds about four feet wide, the plants of one row being preferably opposite the intervals of the other so as to obtain full light and air. Beds of this width need not be tramped on when the flowers are being gathered. Cultivation consists in keeping the surface loose and open at all times by raking, a rather shal¬ low forking being given each spring. In the autumn a liberal mulch of stable manure should be spread upon the beds and the coarser parts removed in the spring before the annual fork¬ ing. The removal of all dead, failing or puny shoots should precede the cultural operations. Many gardeners give applications of liquid ma¬ nure just as the flower buds appear and pref¬ erably preceding a shower. When well man¬ aged a rose bed should be satisfactory for 10 or more years.

A large number of insects feed upon the rose both out of doors and in the greenhouse. Of those which sometimes prove troublesome in the

garden the rose beetle or chafer is perhaps the most annoying, since it feeds upon the petals of the opening flowers, thus ruining them. The only remedy which has been satisfactorily applied is hand picking. Plant lice (see Aphis) and scale insects (q.v.) are often found upon roses, but in the garden are not usually very troublesome. Slugs occasionally skeletonize the leaves by working upon the undersides, and several caterpillars, beetles, etc., also live upon the foliage, usually, however, in insufficient num¬ bers to do damage. In the greenhouse some of the above species may appear, but they are usually debarred by correct methods of manage¬ ment, especially as to ventilation, temperature and humidity. The red spider, not an insect but a mite, is sometimes troublesome where the air is allowed to become too dry. Management will also prevent the so-called plant diseases occasionally found in poorly ventilated houses ; indeed, attention to the details mentioned is in many leading houses found more expedient and satisfactory than recourse to the so-called reme¬ dies for either insects or maladies.

Bibliography. — Buist, (The Rose Manual* (Philadelphia 1844, etc.) ; Prince, (Manual of Roses* (New York 1846) ; Parkman, (Book of Roses) (Boston 1866) ; Shaw, (The Rose* (Saint Louis 1882) ; Ellwanger, (The Rose> (New York 1882 ; 2d ed., 1892, New York); Hatton, (Secrets of Rose Culture* (Huntington, N. Y., 1891) ; Hole, (A Book About Roses* (1894) ; Bailey, L. H., (Cyclopedia of American Horticulture> (1904) ; Mellias, (Book of the Rose) (1905) ; Pemberton, J.H., (Roses: Their History, Development and Cultivation* (1908) ; Thomas, H. H., (The Rose Book) (New York 1914) ; Thomas, C. C, Jr., (Practical Book of Outdoor Rosegrowing) (Philadelphia 1914) ; Sanders,

T. W., (Roses and Their Cultivation } (London 1914) ; Joret, C., (La Rose) (Paris 1892).

M. G. Kains, Crop Expert.

ROSES, Wars of the, the name given to the protracted struggle

between the houses of Lancaster and York for possession of the Eng¬ lish throne, in the second half of the 15th cen¬ tury. The appellation was derived from the badges adopted by the contending parties, a white rose by York and a red rose by Lancaster. The outbreak of the war was brought about by the growing discontent of the people with the evil fortunes of the war against France and the oppressive taxes necessitated by the heavy mil¬ itary expenditures. The imbecile Henry VI (q.v.) had shown himself quite incapable of the tasks of government and this served to enhance the power of Richard, Duke of York, the repre¬ sentative of the claims of the house which had been driven from the throne in 1399 in the per¬ son of Richard II, Henry IV assuming the crown by parliamentary sanction, and being succeeded by Henry V. The Duke of York's strongest opponent was Margaret, wife of Henry VI, a woman of great strength of char¬ acter and much ability. The first battle of the war was fought in 1455 at Saint Albans and re¬ sulted in a victory for the Yorkists, whose head became, for the second time, protector of the realm. War broke out again in 1459 and began auspiciously for the Lancastrians. The Duke of York and the Earl of Warwick and Salisbury were compelled to flee the country. In June 1460 they returned, however, and defeated the Lancastrian forces at Northampton and took Henry VI prisoner. A compromise was effected by which Henry VI was to retain the crown until his death, when -it was to pass to the Duke of York. Queen Margaret, however, would not consent to this wrong to her son, and continued the struggle. At Wakefield, 30 Dec. 1460, the Yorkists were defeated and the Duke of York was killed, and soon after the Lancastrians gained a second victory at Saint Albans (17 Feb. 1461). Edward, Earl of March, the Duke of York's eldest son, joining forces with War¬ wick, succeeded in getting possession of Lon¬ don, which was a fervent supporter of the Yorkist cause, and was elected king, setting out immediately to meet the enemy, on whom he inflicted a bloody defeat at Towton (29 March 1461). Henry VI fled to Scotland and the remnants of Lancastrian resistance were crushed out at Hedgley Moor and Hexham in 1464. A quarrel between Edward IV and the Earl of Warwick led the latter to embrace the Lancastrian cause. Returning from France with a large force in 1470, he compelled Edward to seek refuge in Holland. Henry VI was re¬ leased from captivity and replaced upon the throne. Edward IV, however, returned to Eng¬ land in the early part of 1471, and on 14 April decisively defeated Warwick at Barnet, the ˆkingmaker® himself falling in the fight. On 4 May a Lancastrian force under Queen Mar¬ garet was overthrown at Tewkesbury and the young Prince Edward met his death there, most probably by assassination after the battle. Henry VI died in the Tower a few days later, and Edward IV was securely established on the

throne. The last battle in the long conflict was fought in 1485 when Henry of Richmond, repre¬

sentative of the Lancastrian claims, overthrew Richard III (q.v.) at Bosworth Field and as¬ cended the throne as Henry VII. By his mar¬ riage to Elizabeth, the daughter of Edward IV, he united in himself the claims of the rival houses. (See England, Civil History). Consult Gairdner, Lancaster and York) (1886) ; Onan, (History of England from Richard II to the Death of Henry IV> (1906).

ROSETTA, ro-zet'ta (Ar. Reshid), Egypt, a city near the mouth of the Rosetta Canal — a branch of the Nile — formerly the medium of communication between Cairo and Alexandria, which gave to Rosetta a commercial importance which it has lost by the opening up of other channels of traffic. Between 1798 and 1807 Rosetta was captured in turn by the French, English and Turks. Pop. 17,000.

ROSETTA STONE, a slab of black basalt of ancient Egypt, now in the British Museum, chiefly noted as having furnished the key for the decipherment of the Egyptian hieroglyphics. The stone was discovered in 1799, during the excavation of Fort Saint Julien, near Rosetta, Egypt, by M. Boussard, an officer of engineers in the French army of occupation. Three years later the stone was brought to England and deposited in the Museum. The stone was greeted in 195 b.c. by the priests of Egypt in honor of Ptolemy Epiphanes and in commemo¬ ration of his remission of the dues of the sacerdotal body. It bears an inscription duplicated in three languages, in Greek, in hieroglyphics, or sacred, in demotic or common characters, and this fact enabled Dr. Thomas Young in 1818 and later, M. Champollion, in 1822, to decipher it in the three languages and thus furnish a key for the reading of the hieroglyphics (q.v.). The Rosetta Stone is three and one-half feet long, two and one-half feet wide and nearly a foot thick. See Arche¬ ology; Hieroglyphics.

ROSETTA WOOD, an East Indian wood, of unknown origin, reddish orange in color, with darker veinings. The wood is close, hard and very beautiful when first cut, but soon becomes darker by exposure. It is used in fine cabinet work, and is imported in logs.

ROSEVILLE, Cal., city in Placer County, 18 miles northeast of Sacramento, on the South¬ ern Pacific* Railroad. It is a growing city with machine, shops and yards of the Southern Pa¬ cific Railroad, an ice-plant and fruit-packing industry. Pop. (1920) 4,477.

ROSEWATER, Andrew, American civil and sanitary engineer: b. Bohemia, 31 Oct. 1848. After a course of study in the common and high schools of Cleveland, Ohio, he became flagman in the engineer corps of the Union Pacific Railroad, engaging in explorations and surveys in 1864 and later in other engineering positions on the same road. He was assistant city engineer of Omaha, Neb., 1868-70 and city engineer, 1870-75. He was in charge of the construction of the Omaha and Northwestern Railroad 1878-80; was resident engineer of the Omaha Water Works Company 1880—81, and from 1881-87 was city engineer. Between 1887 and ’91 he was consulting and designing engi¬ neer of sewerage for 25 cities. Since 1897 he has been city engineer of Omaha and president of its board of public works.

ROSEWATER, Edward, American jour¬ nalist : b. Bukovan, Bohemia, 1841 ; d. Omaha, Neb., 31 Aug. 1906. Coming to America in 1854, he became a telegraph operator and for two years (1861-63) was in the United States military telegraph corps. In 1863 he went to Omaha, Neb., as manager of the Pacific Tele¬ graph. In 1871 he was elected to the Nebraska legislature. In 1871 he founded the Omaha Bee and edited it till his death. He was vice-president of the Universal Postal Congress at Washington, 1897, and -the original founder of the Omaha Trans-Mississippi Exposition (1898).

ROSEWATER, Victor, American journal¬ ist: b. Omaha, Neb., 13 Feb. 1871. He was graduated at Columbia University in 1891 and in 1893 engaged in newspaper work on the Omaha Bee, of which he became editor in 1906, and editor and publisher in 1917. He lectured on municipal finance at the University of Ne¬ braska in 1894 and at the University of Wis¬ consin in 1904. He has been active politically and in 1917 was appointed a member of the com¬ mittee on labor of the Advisory Commission of the Council of National Defense. Author of (Special Assessments — A Study in Munic¬ ipal Finance* (1898).

ROSICRUCIANS, ro-zi-kroo’shi-anz, a real or imaginary secret society, the alleged existence of which became known unexpectedly at the beginning of the 17th century. Early in that century appeared several

books concern¬ ing the societv, which are now generally ascribed to Johann Valentin Andrea, a Lutheran clergy¬ man, and among which is the Tama Fraterni-tatis R.C.* (1614). This work is the story of a certain holy and reverned Brother Christian Rosenkreuz, a German noble of the 14th cen¬ tury, who, inspired with the lofty ambition of reforming the world, spent a large portion of his days among the Brahmans, and in Jerusalem, Damascus, Egypt, Morocco, Fez, etc., in the pursuit of wisdom. Returning to Germany, he founded an order, consisting of but few mem¬ bers. They met in a house erected by himself, and called Sancti Spiritus Dominus, where he died at the age of 106. His burial-place was to be kept a secret by all the adepts, but he ordered the words <(Post CXX annos patebo** to be inscribed upon one of the doors of the house of the order. To this work was added another, (Confession of the Society and Brotherhood of the Rosy Cross.* addressed to the learned of Europe. This tract declared that the order had no intention of inter¬ fering with the religious or political action of states, but only desired the improvement of man¬ kind by the discovery of the true philosophy. Whether such a society ever existed is still an open question. Many will have us believe that the above treatises were meant by Andrea to satirize in serio-comic style the philosophical follies of the age, having no expectation that they would be regarded otherwise than as fic¬ tion. The fraternity had fallen out of public attention for a long time, when in the latter •half of the 18th century the interest in their organization was revived, especially by the noted imposter Cagliostro, who gave out that he was a Rosicrucian. Consult Sender, (History of the Rosierucians) (1768) ; Waite, (Real His¬ tory of the Rosicrucians) (1887).

ROSIN, or RESIN, the name given to the rosin of coniferous trees employed in a solid state for ordinary purposes. It is obtained from turpentine by distillation. In the process the oil of the turpentine comes over and the rosin remains behind. There are several varieties of rosin, varying in color from the palest amber to nearly black, and from translucent to opaque. It differs somewhat according to the turpentine from which it is derived, this being obtained from numerous species of pine and fir. It is used in the manufacture of sealing-wax, var¬ nish, cement, soap, for soldering, *etc.* Colo¬ phony is a name for the common varieties. See Naval Stores.

ROSLER, rezTer, Augustin, German clergyman and historian : b. Guhrau, Silesia, 6 March 1851. He was educated at Glogan Gym¬ nasium and the universities of Breslau and Freiburg-im-Breisgan, and at Rome. In 1875 he was ordained to the priesthood, in 1876-77

edited Schlesisches Kirchenblatt at Breslau, and in the latter year entered the Redemptorist Order. In 1880-82 he was professor of dogmatic theology and church history, and after 1882 of Scripture and Hebrew at the Redemptorist scholasticate, Mantern, Styria. His published works are numerous, including <Der katholische Dichter Aurelius Prudentius Clemens) (1886) ; (Der Fahneneid des christlichen Mannes) (1888); (Der Stall von Bethlehem* (1890); (Der Katholizismush seine Aufgabe und seine Aussichten nach Prof. Dr. Albert Ehrhard* (1892); (Cardinal Johannes Dominici, O.P.* (1893) ; (Die Frauenfrage vom Standpunkte der Natur, der Geschichte und der Offen-barung) (1893;. 2d ed., 1907); (Cardinal Johannes Dominicis Erziehungslehre und die iibrigen padagogischen Leistungen Italiens im 15 Jahrhunder.* Der Kartauser Nicolaus Kempf und seine Schrift: (Ueber das rechte Ziel und die rechte Ordnung des Unterrichts,* Vol. VII of (Bibliothek der katholischen Padagogik* (1894) ; (Der Reichtum der katho¬ lischen Kirche* (1896) ; (Gewissenserforschung fiber die Anklagen des Professor Dr. Ehrhard) (1902) ; (Die Uebung der Caritas durch die Frauen und an den Frauen) (1901; 2d ed., 1903); (Ffirs Priesterherz* (1907; 2d ed., 1908); (Liebfrauenschule* (1910; 4th ed., 1912). Dr Rosier was a collaborator in Herder's (Kirchenlexikon> (2d ed.) and (Lexikon der Padagogik* ; Buchberger's (Kirchliches Hand-lexikon, and contributor to Literarische Rund¬ schau, Historisch-politische Blatter, the (Catho¬ lic Encyclopedia, * *etc.*

EOSLIN, ROSLYN, or ROSSLYN,

Scotland, village in Edinburghshire, seven miles south of Edinburgh, in the valley of the North Esk. Roslin Chapel, famous for its beauty and containing the tombs of the earls of Orkney and Roslyn, is located here ; it was built in the 15th century. Pop. 1,129.

ROSLYN, N. Y., village in Nassau County, Long Island, on an inlet of Long Island Sound, 18 miles northeast of Brooklyn, and on the Long Island Railroad. It was the home of William Cullen Bryant (q.v.), who, with* his wife, is buried there. The village is chiefly residential in character. Pop. (1920) 2,500.

ROSLYN, Wash., city in Kittitas County, 70 miles east of Tacoma, on the Northern

Pacific Railroad. It has important commercial interests as the centre of the coal-mining dis¬ trict of the State. Pop. (1920) 2,673.

ROSMINI, ros-me'ne, Antonio Rosmini-Serbati, Italian philosopher: b. Roveredo in the Italian Tyrol, 25 March 1797 ; d. Stresa, 1 July 1855. He began the course of studies for the priesthood at Padua in 1817, and was ordained in 1821. He became deeply versed in philosophy, ancient and modern, and revolved in his mind a comprehensive system to serve as a basis for the truths of revelation, while on the practical side he planned an institution for the training of teachers and priests. From 1826 to 1828 he lived mostly in Milan, thought out the rule of his new order, visited Rome, gained the approval of Pius VIII both for special studies and for the institution of his order, and pub¬ lished his 'New Essay on the Origin of Ideas >

(1830).

After a few years of labor at Trent he set¬ tled in 1837 at Stresa on the west shore of Lago Maggiore and, surrounded by loving and devoted friends, sent volume after volume to the press. His dream in politics, as expressed in his Constitution according to Social Justice > (1848), was a confederation of the states of Italy under the Pope as perpetual president. For a brief period he basked in the papal favor, and was promised by Pius X a cardinal's hat; and on the Pope's flight to Gaeta he followed, but now found the pontiff's mind turned against him and never afterward regained his confi¬ dence. His Constitution and 'The Five Wounds of Holy ChurcfP were next prohibited by an irregular meeting of the Congregation of the Index called at Naples. But in 1854 the Congregation of the Index, the Pope presiding, declared Rosmini's writings entirely free from censure and enjoined perpetual silence on all his accusers. The <(Institute of the Brethren of Charity® survived its founder, and among the Rosminian Fathers, who are mostly Italians or Englishmen, are to be found at the present day some of the ablest and most devoted sons of the Roman Church. In England it has foundations at Ratcliffe, Loughborough, Cardiff, Wadhurst, Rugby, and established in 1876 its central house at Saint Ethelreda's, Holborn, once the domestic chapel of the palace of the bishops of Ely.

The foundation of Rosmini's philosophy is being considered as the form of the intelligence — an elemental intuition of which is implanted by Nature herself. Intuition gives us ideas, of which we may affirm (1) that they are not nothing; (2) that they are not ourselves; (3) that they have a mode of existence of their own, entirely different from that of real or sub¬ sisted things, and independent of the bodily sense. Their two essential characteristics are universality and necessity; for real objects and sensations are always particular, instead of be¬ ing universal and generic, and every object which involves no contradiction is necessarily possible. These two characteristics involve two others, infinity and eternity; the origin of the ideas comes from God, for man does not re¬ ceive them from the things themselves. The one indeterminate and wholly universal idea is that of being or existence ; we cannot determine the subsistence of an object until we first have the idea of it, therefore perception involves the idea which is further isolated from all the other

elements of the perception by the process of uni¬ versalization through whicl it may be realized an indefinite number of times. When the ideas are all fully or perfectly determined, they are called concrete ; when they remain to a certain extent indeterminate, they are abstract. Being is incorporeal, independent of space, spiritual, and therefore incorruptible and immortal. It is independent of time ; as being in its essence is always being, and as it would be a contradiction in terms for being to cease to be being, it is eternal. But since it was united to the soul in time, it must have existed before it and be independent of it. And thus we reach an Intel¬ ligence anterior to human intelligence — an Eternal Mind. This eternal mind is God's, and therefore God exists, and his existence and the immortality of the soul remain the true founda¬ tion of morals. Consult Tommaseo, (Antonio RosminP (1855) ; Lockhart, (Life of Antonio Rosmini) (1866) ; Werner, 'Rosmini und seine Schule) (1884) ; and above all, Davidson, Thomas, 'Philosophical System of RosminP

(1882).

ROSNY, Joseph Henry, pseudonym of the French novelists, Joseph Henri Honore BOEX: b. Brussels, 1856; and his brother, Seraphin Justin Frangois BOEX: b. Brussels, 1859. Henry worked alone as a novelist until 1891, and the brothers then collaborated until 1912, since when they have written independ¬ ently. Their work is of a

strong sociological trend, the theme sometimes taking an anar¬ chistic level, and there is an extensive inter¬ weaving of scientific information. The char¬ acters are drawn with a striking realism and present individual portraits rather than repre¬ sentative types. Henry was influenced by Zola in his earlier work but the brothers in 1887 were among the writers who formally protested against Zola's 'La Terre. } Henry was sole author of 'Nell Horn, membre de l'armee du salut> (1886); 'Le BilateraP (1886); 'L'lm-molation) (1887); 'Le Termite* (1890); 'Ery-mah> (1895), *etc.* Together the brothers wrote 'Daniel Valgraive) (1891) ; 'L'lmperieuse Bonte) (1894); 'Le Serment* (1896; drama¬ tized 1897); 'Les Ames Perdues* (1899) • 'Therese Degaudy> (1902); 'Sous le fardeau* (1906); 'Le Testament vole* (1909); 'La Mort de la terre* (1912), *etc.* Later Henry was author of 'La guerre du feu) (1913) ; 'La force Mysterieuse* (1914); 'Perdus?) (1916); 'L'enigme de Givreuse> (1917), *etc.* Justin was author of 'Sepulchres blanchis) (1913)' 'La Caraface) (1914), *etc.*

ROSNY, Leon Louis Lucien Prunol de

(pseudonyms Jose Perez and Leone d'Albano), French Orientalist, ethnographer and transla- *°ri-k' Ldos, 5 Aug. 1837. He was educated at the Eleve d'Adrien Jessieu and because pro¬ fessor of Japanese at the Bibliotheque Imperiale. He was appointed professor at the Lcole des Langues Orientales in 1868; and became direc¬ tor of the ficole des Hautes-Etudes at the Sorbonne in 1886. He became an authority on the Chinese, Japanese and Korean languages and on the antiquities of Central America and Yuca¬ tan-e(hted the Revue Orientale et Americaine in 1859—65 and in 1876-79. Author of a Chinese, Japanese and French Dictionary (1864); 'Grammaire Japonaise) (1865);' 'Ar¬ chives Paleographiques> (1869); 'Anthologie

Japonaise) (1871) ; Grammar of the Chinese Language5 (1874) ; ˆ”interpretation des anciens textes Mayas) (1875) ; (Les Coreens, Apercu ethnographique et historique) (1886) ;

(First Elements of Chinese Grammar) (1887) ; cL’atlantide historique5 (1902) ; (L’Amerique pre-Colombienne) (1904), *etc.*

ROSS, ros, Alexander, British soldier: b. Scotland, 1742 ; d. London, 29 Nov. 1827. He entered the British army in 1760, and was made captain in 1775. He served as aide-de-camp to Lord Cornwallis in the war of the American Revolution, and served as his commissioner in arranging for his surrender at Yorktown. He afterward served with Cornwallis in India, and in 1812 attained the rank of general.

ROSS, Alexander, Canadian fur trader and author: b. Mairnshire, Scotland, 9 May 1783; d. Manitoba, 23 Oct. 1856. He emigrated to Upper Canada in 1805 where he was for some years a teacher. In 1810 he joined the fur¬ trading expedition of John Jacob Astor; was one of the founders of Astoria, and established trading posts in the most isolated regions. He wrote the earliest and most graphic accounts of the Columbia and Oregon country, with the opening up of which he was for years identi¬ fied. In 1814 he joined the Northwest Com¬ pany and joined in its merger with the Hud¬ son’s Bay Company in 1821. He was later prom¬ inent in the Red River Colony, and was sheriff of Assiniboia. Among his works are Ad¬ ventures of the First Settlers on the Oregon and Columbia Rivers5 (1849) ; (Fur Hunters of the Far West) (1855), and (Red River Settle¬ ment : Its Rise, Progress and Present State5

(1856).

ROSS, Alexander Milton, Canadian natu¬ ralist: b. Belleville, Ontario, 13 Dec. 1832; d. Detroit, Mich., 27 Oct. 1897. At 13 he came to New York, where he became a compositor on the Evening Post and a protege of William Cullen Bryant. In 1851 he began to study medi¬

cine, and during the Civil War was a surgeon in the Union army, but rendered his greatest service to the cause as confidential correspond¬ ent to Lincoln in Canada. His subsequent life was chiefly devoted to the study of natural history, in the pursuit of which he has added valuable information concerning the fauna and flora of Canada. He published (Birds of Can¬ ada5 (1872); (Butterflies and Moths of Canada5 (1873) ; (Forest Trees of Canada5 (1874) ; (Ferns and Wild Flowers of Canada> (1877); < Mammals, Reptiles and Fresh Water Fishes of Canada5 (1878).

ROSS, Edward Alsworth, American soci¬ ologist : b. Virden, Ill., 12 Dec. 1866. He was graduated at Coe College, Iowa, in 1886 and later studied at Berlin and at Johns Hopkins. He was professor of sociology at Leland Stan¬ ford Jr. University in 1893-1900; at the Uni¬ versity of Nebraska in 1901-06; and at the University of Wisconsin from 1906. He was lecturer at Harvard in 1902, and at the Uni¬ versity of Chicago in 1896 and in 1905. He has been advisory editor of the American Jour¬ nal of Sociology since 1895. In 1914-15 he was president of the American Sociological Society. Author of (Honest Dollars5 (1896); (SociaI Control5 H901) ; foundations of Sociology5 (1908) ; (The Changing Chinese5 (1915) ; (The

Old World in the New5 (1914) ; (South of Panama5 (1915) ; (Russia in Upheaval5 (1918), *etc.*

ROSS, George, American patriot: b. New¬ castle, Del., 1730; d. Lancaster, Pa., July 1779. On his admission to the bar in 1751 he settled in Lancaster, Pa. As a member of the Penn¬ sylvania assembly 1768-70, he drew up the declaration of rights which was presented by the assembly to the proprietary government. He was a member of the Continental Congress from 1774-77, and as such was one of the sign¬ ers of ttie Declaration of Independence. In 1779, three months before his death, he was made judge of the Admiralty Court of Penn¬ sylvania.

ROSS, George, Canadian physician: b. Montreal, 11 March 1842; d. November 1892. He was graduated at the McGill University in 1866, and in that year was appointed apothecary to the Montreal General Hospital. He was pro¬ fessor of hygiene at McGill University in 1871-73; held the chair of clinical medicine in 1872-89, and in 1889-91 was vice-dean and professor of medicine there. He was president of the Medico-Chirurgical Society of Montreal and of the Canadian Medical Association, and gov¬ ernor of the College of

Physicians and Sur¬ geons of Quebec. He was coeditor of the Medical and Surgical Journal and the Medical Journal, both published in Montreal, and wrote extensively on aneurism.

ROSS, Sir George William, Canadian statesman: b. near Nairn, Ontario, 18 Sept. 1841 ; d. 1914. He was educated at the To¬ ronto Normal School and the Law School of Albert University and after several years of educational work was called to the bar in 1887. He served in the Canadian House of Com¬ mons in 1872-83 ; was Minister of Education for Ontario in 1883-99, and Premier and Treas¬ urer in 1899-1905. From 1907 he was a mem¬ ber of the Canadian senate. He was noted as a public speaker and as a worker for temper¬ ance, besides doing much to improve the edu¬ cational system of Ontario. Author of (The Uni¬ versities of Canada' (1896); (The School Sys¬ tem of Ontario5 (1896) ; (The Senate of Canada5 (1914).

ROSS, Sir Hew Dalrymple, British field-marshal: b. Galloway County, Scotland, 5 July 1779 ; d. London, 10 Dec. 1868. He was edu¬ cated at the Royal Military Academy, Wool¬ wich, and was commissioned in the artillery in 1795. He served in the Irish Rebellion of 1798, and commanded the famous <(Chestnut Troop55 of the Royal Horse Artillery in the Peninsular War of 1809-14 and at Waterloo. He was appointed deputy adjutant-general of artillery at headquarters in 1840, and until his retirement in 1858 practically directed the Brit¬ ish field artillery, and sent it to the Crimean War in the best condition of any part of the army. He was responsible for the establishment of the School of Gunnery at Shoeburyness and the Royal Artillery Institute at Woolwich. He reached the rank of field marshal in 1868, receiving also the G. C. B.

ROSS, Sir James Clark, English explorer: b. London, 15 April 1800; d. Aylesbury, Buck¬ inghamshire, 3 April 1862. He was a nephew of Sir John Ross (q.v.) whom he accompanied

on the voyage in search of a northwest passage in 1818. Between 1819 and 1827 he accompanied Captain Parry upon his four Arctic explora¬ tions, and was a member of the expedition of his uncle in 1829-33. His discovery of the north magnetic pole in 1831 raised him to the rank of post-captain ; but it was in his memorable voy¬ age to the Antarctic Ocean in 1839-43 that he rendered his most valuable contribution to science. He succeeded in reaching lat. 78° 10', and discovered a great ice-bordered continent which he named Victoria Land, and an active volcano which was called Mount Erebus after the discoverer's ship. For these services he was knighted in 1844. In 1848 he was a mem¬ ber of the party which made an unsuccessful attempt to discover the fate of Sir John Frank¬ lin. He became rear-admiral in 1851. An ac¬ count of his Antarctic expedition was published by him in 1847, entitled (A Voyage of Discovery and Research in the Southern and Antarctic Regions.' Consult O'Byrne's Naval Biograph¬ ical Dictionary; Markham, Fifty Years' Work of the Royal Geographical Society. '

ROSS, Janet Anne Gordon, English au¬ thor : b. London, 24 Feb. 1842. A daughter of Sir Alexander Duff Gordon, she was mar* ried to H. J. Ross, a banker of Alexandria, Egypt, in 1860, was for three years Egyptian correspondent of the London Times, and since 1867 has lived in Italy. She has published (Italian Sketches' (1887) ; ˆhree Generations of Women' (1888) ; (Leaves from our Tuscan Kitchen' (1899); Florentine Villas' (1901); (01d Florence and Modern Tuscany' (1904) ; Florentine Palaces' (1905) ; Fives of the Early Medici' (1910) ; (The Fourth Genera¬ tion: Reminiscences' (1912). She was on terms of close friendship with George Mere¬ dith, and is the original of Rose Jocelyn in Fvan Harrington.'

ROSS, John, American patriot: b. Ross-shire, Scotland, 29 Jan. 1726; d. Philadelphia, Pa., March 1800. After a mercantile experi¬ ence of 20 years in Perth, he emigrated to America at the beginning of the rebellion of its colonies and became at once a staunch de¬ fender of the cause of independence. In June 1774, as chairman of the meeting of Philadel¬ phia merchants in protest against British im¬ portations, he signed the agreement presented to the authorities and otherwise resisted un¬ just taxation.

ROSS, Sir John, English Arctic explorer: b. Balsarroch, Scotland, 24

June 1777; d. Lon¬ don, 30 Aug. 1856. He entered the navy at 9 and was promoted lieutenant in 1805. His first Arctic expedition was made in 1818, when, with Lieutenant Parry, he made a voyage in search of a northwest passage to the north pole. His second Arctic voyage was made in 1829 in a small vessel equipped at the expense of Sir Felix Booth, high sheriff of London, which proved inadequate for the purpose. The exploring party was frozen up in the ice for four winters, and was rescued in 1833 by Ross's old ship, the Isabella, in Lancaster Sound. He was knighted for his services in 1834, and made rear-admiral in 1851. In 1839 he was appointed consul at Stockholm, and served until 1846. He made an expedition in search of Franklin in 1850. He was the author of (A Voyage of Discovery' (1819) ; and (Narrative of a Second

Voyage in Search of a Northwest Passage'

(1835).

ROSS, John, or KOOWESKOOWE, In¬ dian chief: b. Georgia, 30 Oct. 1790; d. Wash¬ ington, D. C., 1 Aug. 1866. He was a Cherokee half-breed who became chief of his tribe in 1828. In 1817-19 Georgia attempted to remove the Cherokees from its borders through a bribe offered to Ross, who had received an, English education and was a man of importance in his tribe. He exposed the attempt and con¬ tinued to repulse the concerted effort of the people of the State to effect their removal. In 1829 Ross, as chieftain, successfully appealed to the Supreme Court of the United States against the action of the Georgia legislature in expelling his people ; nevertheless the Cherokees were banished in 1838.

ROSS, Jonathan, American jurist and statesman: b. Waterford, Vt., 1826; d. Saint Johnsbury, Vt., 22 Feb. 1905. He entered Dart¬ mouth College in 1847 and was graduated in 1851. He earned his early education by work¬ ing on his father's farm during the summer, and by teaching school during the winter. After graduating, he taught in Craftsbury and was principal of the academy at Chelsea, Vt. Meanwhile he studied law and was admitted to the Orange County bar in 1856, practising until he was elected in 1870 as assistant judge of the Supreme Court. He was elected chief judge in 1890. Judge Ross was State attorney for Caledonia County 1862—66, represented Saint Johnsbury in the legislature 1865-66, and in 1869 was a member of

the last council of censors held in the State. In 1870 he repre¬ sented Calendonia County in the State senate was for several years a member of the State board of education, and early in 1899 was ap¬ pointed by Governor Smith to succeed Justin S. Morrill in the United States Senate.

ROSS, Robert, British soldier: b. 1766; d. Baltimore, Md., 12 Sept. 1814. He was grad¬ uated at Trinity College, Dublin, in 1784, and was commissioned an ensign in the British army in 1786. He served in Holland in 1799, in Egypt in 1801, and later at Naples and in Spain. He was in command of a brigade sent to America in 1812; won a victory at Bladens-burg, 24 Aug. 1814, and pushing on to Wash¬ ington that evening took the city and burned the public buildings. He then moved upon Baltimore, but was mortally wounded and died before he could be returned aboard ship.

ROSS, Sir Ronald, British physician: b. 13 May 1857. He was educated in medicine at Saint Bartholomew's Hospital, London, and entered the Indian Medical Service in 1881. He began a special study of malaria in 1892, and won the Parker gold medal in 1895. He en¬ gaged . in experimental verification of the mosquito theory of malaria in 1895 ; discovered the life history of malaria parasites in mosqui¬ toes in 1897-98; and in 1899 headed the ex¬ pedition which found the malaria-bearing mosquitoes in West Africa. He received the Nobel Prize in medicine in 1902 in recognition of his services in regard to malaria. He re¬ tired from the Indian Medical Service with the rank of major in 1899. He was appointed pro¬ fessor of tropical sanitation at the University of Liverpool and the Liverpool School of

Tropical Medicine; became physician for tropical diseases at King's College Hospital in 1913 ; and in 1914 was appointed consulting physician for Indian troops engaged in the European War. He was knighted in 1911. He was an editor of Science Progress and of Annals of Tropical Medicine. Author of many scientific papers, several novels and Philoso¬ phies and Other Poems) ; (Mosquito Brigades and How to Organize Them) (1901) ; Ma¬ larial Fever) (9th ed. 1902) ;

Prevention of Malaria) (1910).

ROSS, Sir William Charles, English mini¬ ature painter: b. London, 3 June 1794; d. there, 20 Jan. 1860. He began exhibiting at the Royal Academy at 15. In 1821 his judgment of Brutus5 gained the gold medal of the Society of Arts. His most ambitious religious picture,

(Christ Casting out the Devils from the Maniacs in the Tombs, 5 exhibited at the Royal Academy (1825), was the last large canvas that he executed. Henceforth he devoted himself to miniature. He was knighted in 1842 and elected R.A. in 1843 and became the most fashionable painter of his time in his chosen department. He painted Queen Victoria, Prince Albert and their children, the King and Queen of the Belgians, the King and Queen of Portu¬ gal, Prince Louis Napoleon (afterward Napoleon III) and many English celebrities. The total number of these exquisite works, as calculated from his own memoranda, was 2,200. He wisely attempted to give to the miniature that breadth of treatment which distinguished Reynolds, whom he evidently took for his model. His drawing was invariably correct, and marked by a nameless elegance enhanced by the truth¬ fulness and clearness of his flesh tints and his clever handling of textures. His miniatures are still considered the models of their class in England. He was an enthusiast in his profes¬ sion and on his death-bed almost his last words were expressions of regret that photography would destroy the art of painting in miniature. Consult Williamson, (History of Portrait Miniatures) (1904).

ROSS, William Potter, Cherokee Indian leader : b. at the foot of Lookout Mountain, Tenn., 28 Aug. 1820 d. Fort Gibson, 20 July 1891. His father was a native of Scotland and his mother was a sister of John Ross, who was principal chief of the Cherokee Nation from 1828 to 1866. His early education was obtained in the Presbyterian mission school at Will's Valley, Ala., and at the Greenville (Tenn.) Academy. He finished his preparation for col¬ lege at the Hamil School, Lawrenceville, N. J., and then entered Princeton College, where he pursued the full classical course and whence he was graduated with honor, in 1842. The fol¬ lowing year he entered public life as the clerk of the Cherokee senate. In 1844, he was selected as the first editor of the Cherokee Advocate. He subsequently filled other public positions in the Cherokee Nation. In the lat¬ ter part of 1861, the Cherokee Nation entered into a treaty of alliance with the Confederate States and agreed to furnish a regiment . of troops for the Confederate military service. This action was taken against the better judg¬ ment of William P. Ross but he felt himself bound by it. He was commissioned lieutenant-colonel of the Cherokee regiment which was

raised in compliance with the terms of the treaty. The regiment became demoralized and practically ceased to exist soon after the battle of Pea Ridge, Ark., in 1862. He accepted a parole as a Confederate officer and took no further part in the war. He was an active participant in the Indian peace council which was convened at Fort Smith, Ark., in Septem¬ ber, 1865. After the death of Principal Chief John Ross, in August, 1866, William P. Ross was elected as his successor for the unexpired term. In 1867, he was one of the commis¬ sioners deputed by the Cherokee Nation to negotiate the agreement with the people of the Delaware tribe whereby the latter were incor¬ porated into the citizenship of the former. He was a prominent and active participant in the annual inter-tribal councils which convened at Okmulgee between 1870 and 1878. At the first of these councils, which held sessions in September and December 1870, he was named as chairman of the committee which framed <(the Okmulgee Constitution,55 proposed and sub¬ mitted as an organic union of the several tribes in the Indian Territory. In 1873, upon the death of Principal Chief Lewis Downing, he was again elected to fill an unexpired term. After retiring from public life, in 1875, he as¬ sumed the editorship of the Indian Journal at Muskogee, and subsequently he filled similar positions on the Indian Chieftain, at Vimta, and the Indian Arrow, at Fort Gibson and Tahlequah. He was a man of remarkably versatile attainments, interested in agriculture and horticulture and in the cause of education, a talented writer, an orator of power and eminent as a lawyer.

ROSS, The Man of (real name John Kyrle), English philanthropist: b. Dymock, Gloucestershire, 22 May 1637; d. Ross, Hert¬ fordshire, 7 Nov. 1734. He was educated at Balliol College, Oxford, and lived thereafter on his estates at Ross. Possessed of large means he lived in the simplest manner and de¬ voted his time and income to the general good of the countryside. He was made famous as (The Man of Ross) by Pope, who wrote of him in (Moral Essays5 (Vol. III).

ROSS FAMILY, The, prominent in the creation of the United States flag. The 3rd Continental Congress, 14 June 1777 adopted the report of Gen. George Washington, Robert Morris and George Ross, and declared that the national flag of the United States shall be, of stars and stripes, red, white and blue. George Ross a member of the flag committee, also a signer of the Declaration of Independence, suggested that the widow of his nephew Col. John Ross, be chosen to

make the new cloth flag. George Ross was three times chosen a delegate to the Continental Congress. He was a judge; he died in 1779, age 49.

When the Revolution broke out the family of the Rev. George Ross went with the colonists, except one son, who as a learned and influential attorney remained true to the king, and managed to make untold trouble for the family of Ross as well as all the other “Rebels55 as he earnestly termed them. The other son of the Reverend Ross was a man of more cour¬ age and daring; he asserted himself and be¬ came one of the eloquent men who assisted in arousing the people of Philadelphia to resist

the demands of the king, and if needs be, to greet the newly arrived soldiers with the out¬ stretched sword. His independent nature so impressed itself upon the community that he was sent with Bemjamin Franklin and others as delegates to the Continental Congress which in 1776 framed and signed the Declaration of Independence. Wonderful as was his record in this convention of giants, he will be ever re¬ membered as having been the man who was eager to have a flag for the continental army which would be emblematic of all the colonies, and when the committee was appointed to de¬ sign a national banner, George Ross was placed with General Washington and Robert Mor¬ ris, as a committee to prepare such a symbol. It was probably he, rather than Washington who suggested Mrs. Betsy Ross as the proper person to make that flag, although she was known to Washington, as she had for many years made some of the fancy vests of George, and her laces were in evidence on a few of General Washington’s coat sleeves. But it was most likely that George Ross suggested that they call on his nephew’s widow, Mrs. Elizabeth Ross, as she was not only the handiest, most dexterous needle worker in the Quaker City, but since her husband had recently been buried, death resulting from his heroic service in the continental army, and since she was continuing the dead soldier’s business, that of upholstering, she was not only deserving this compliment but needed the money. Robert Morris, too,

knew her well, and he like the other distinguished men of Philadelphia were embroidered and be-laced by her dainty threads of silk and satin. While it is uncertain which of the committee suggested her, though the evidence seems to point to, George Ross (his sister was the wife of a signer of Declaration of Independence, George Read), the facts are she did make the flag, and made it according to a design agreed upon by the committee.

Her husband, John, was a volunteer and he was the son of the third son of Rev. George Ross who came from Scotland; his name was Amos and he was the rector of Trinity Church, Philadelphia, and his fame as an orator lives to this day in the records of the church. John was in the service of the continentals and while guarding the powder at a wharf, the explosion which took place killed him and destroyed valuable property. This accident took place in January 1777. See United States Flag.

But our colonial dame did not remain a widow long, in fact while she was stitching the new flag, on 13 June, her mind was not only on the wedding of the colonies into one great nation, but was also more deeply interested in her second wedding which was held over until the flag was approved or adopted — for on 14 June 1777 the Continental Congress accepted the emblem and on the next day, Sunday, 15 June, she was married to Joseph Ashburn a sea captain.

She continued to make flags for the govern¬ ment while her newly wed half kept up his sea service. His boat was sailing in the inter¬ ests of the continentals and he was captured by the British and taken to English land where he was confined in a prison near Portsmouth. Here he died in March 1782. John Claypoole, a young Philadelphian, also a prisoner, was later

released and upon his return to Philadelphia visited Mrs. Betsy Ashburn some time in May. While the colonial dame was busy making the flag, Claypoole was busy making love and Betsy finished her task on 13 June while Claypoole completed his task 15 June and on that day Betsy Griscom-Ross-Ashburn-Clavpoole, began a new life of romance. To this marriage was born four daughters. The ((Widow Ross® who made our first flag and her daughters for many years after were employed to make the govern¬ ment flags. On 30 Jan. 1835, she died at Philadelphia at the age of 84. Her maiden name was Griscom, she was the daughter of Samuel Griscom, a builder. She was a wor¬ shipper at Christ Church, Philadelphia, where her pew is now marked

with a brass tablet; she was buried at the south Fifth street God's acre, but in 1857 her remains were transferred to a lot in Mount Moriah Cemetery where a well-marked grave is kept in floralized form, by the Daughters of the Revolution. On a tall hickory flag pole daily from sunrise to sunset, floats the <(Star Spangled Banner® over the remains of the woman, who first formed it into a thing of beauty and a joy forever. (See Flag Day). The Ross who planted the family in America came from Scotland where he was born 1676, just 100 years before the Declaration of Inde¬ pendence. He was a Presbyterian minister but later left that church and joined the Episco¬ palian creed. Immediately after this religious change he came to America, and landed at Delaware, where he rapidly grew in the favor of the entire New World and he was known as one of the most learned and nopular in the colonies at that period. He was chaplain to a number of proprietory governors.

Lieut. B. J. Cigrand, U. S. Navy, Author of (Real History vf U. S. Flag?

ROSSA, O'Donovan (real name Jeremiah O'Donovan), Irish political agitator: b. Rossa-Carbery, near Skibereen, County Cork, 1831 ; d. New Brighton, Staten Island, N. Y., 25 June 1915. He joined the Phoenix Society in 1856, and in the course of its transformation from a literary to a revolutionary society became one of its leaders. He was an advocate of the most extreme and violent measures and was nicknamed <(Dynamite Rossa.® With other members of the Phoenix Society he was arrested for political activities in 1858 and was im¬ prisoned for six months, but was released on a plea of guilty. He emigrated to America in 1862 and continued actively to promote the Fenian cause. Returning to Ireland in 1863 he became connected with the Fenian organ, The Irish People. The paper was seized in 1865, and O'Donovan was held on a charge of treason-felony. He was sentenced to imprisonment for life, but was released under an amnesty act of 1871 and banished for life. He returned to the United Stares, became a naturalized citizen, and continued his work against the British government, publishing the United Irishman in New York. Upon the expiration of the 20 years of his banishment necessary to be served he was permitted to visit Ireland, and remained there in 1891-1900. He spent the remaining years of his life in the United States.

ROSSBACH, ros'bacH, Germany, village in Prussian Saxony, 8 miles southwest of Merse¬ burg. It is famous as the scene of the victory

won 5 Nov. 1757, by Frederick the Great over the allied French and Imperial Armies under Charles de Rohan, Prince de Soubise; Joseph Frederick William, Duke of Saxe-Hildburg- hausen ; and General Tildzeugmeister of the empire. The Prussians were heavily outnum¬ bered, but won an important victory, the entire action consuming only one and one-half hours.

ROSSE, ros, William Parsons, 3d Earl of, British astronomer: b. York, 17 June 1800; d. Monkstown, Ireland, 31 Oct. 1867. He was educated at Dublin University and at Magdalen College, Oxford, where he was graduated in 1822. He was member of Parliament for King's County from 1823 to 1834, and succeeded his father in the earldom in 1841. In 1845 he was elected a representative peer of Ireland, but took little interest in politics. During the stormy dis¬ cussions on the first reform bill he was occupied with the construction of his first famous reflect¬ ing telescope, the speculum of which had a diam¬ eter of three feet, and was soon superseded bv one of double the size. The two great de¬ fects which had hitherto baffled opticians in constructing large reflecting mirrors were spher¬ ical aberration and absorption of light by spec¬ ula, and in the casting of those of large size there arose the apparent impossibility of pre¬ venting cracking and warping of the surface on cooling. Even the proper admixture of the metals for the reflector had to be ascertained by numerous and costly experiments. At last, however, a gigantic speculum, weighing three tons, was turned out without warp or flaw and was then polished and mounted on a telescope 52 feet in length in Lord Rosse's park at Par-sonstown, at a cost of $150,000. The sphere of celestial observation was immensely widened bv an instrument so powerful ; nebulae which had defied Herschel's telescope were resolved into stars and new nebulous mist was revealed to the observation. The construction of the tele¬ scope, effected under the earl's direction and superintendence, is fully described in the Phil¬ osophical Transactions of the Ro}ral Society, of which body he was president, 1849-54.

ROSSELLI, ros-sel'le, Cosimo, Italian painter: b. Florence, 1439; d. there, 1507. He was a pupil of Neri di Bicci, the representative of the early Florentine school and this school furnished the guiding principles of his artistic life, which was especially influenced also by the work of Benozzo Gozzoli. The altar-pieces and frescoes which he

produced were filled with figures dressed in the costumes of his day, and the realistic minuteness of his faces seems to suggest that they were portraits of his contem¬ poraries. He was in short a genuine Pre-Raphaelite of the Florentine school. His finest work is a fresco in the chapel of Saint Ambrogio at Florence: (The Exhibition of a Mir¬ acle-working Chalice, > — a fashionable religious function of old Florence, displaying the silks, laces and jewelry of the time in all their splen¬ dor. Among other good works of his may be mentioned (The Coronation of the Virgin > and an Assumption,* both at Florence. He was called to Rome in 1480 by Sixtus IV, and con¬ tributed to the decoration of the Sistine Chapel, with the approval of the Pope, who ad¬ mired his lavish use of gold and ultramarine. Among « his pupils the most celebrated were Pietro di Cosimo and Fra Bartolommeo (q.v.).

He produced few easel pictures, but one of these, (The Annunciation * (1486), was sold in 1847 for $1,627 in England.

ROSSELLINI, ros'sel-le'ne, The, a sur¬ name applied to the hve sons of the Florentine, Mattio di Domenico Gambarelli ; all of whom attained distinction in the fine arts and of whom the oldest and the youngest, Bernardo and An¬ tonio Rossellino (qq.v.) became famous sculp¬ tors, while Domenico, Maso and Giovanni also did excellent work. Consult. Bode, W., <Die Italienische Plastik) (1882).

ROSSELLINO, Antonio (real name Gam¬ barelli), youngest of the Rossellini (q.v.), Florentine sculptor : b. about 1427 ; d. about 1479. Little is known of his life except that he was a pupil of his elder brother, Bernardo (q.v.) and that his work was influenced by Donatello and Alberti. Llis work is character¬ ized by great beauty and delicacy. He is best known for his tomb of the young cardinal prince Portogallo in San Miniato, Florence, which he executed in 1461. He copied it with some slight changes for the tomb of Mary of Aragon, wife of the Duke of Amalfi, in the church of Mount Oiivcto, Naples.

ROSSELLINO, Bernardo (real name Gambarelli), Florentine sculptor and architect, eldest of the Rossellini (q.v.) : b. Settignano, 1409 ; d. Florence, about 1464. He studied un¬ der Alberti and also gained something of his mastery through study of the work of Dona¬ tello. Under popes Nicholas V and Pius II he made restorations of the famous buildings of ancient Rome and restored Saint Peter's and the Vatican, but this work is largely lost through alterations made in the 1

7th and 18th centuries. He built the palaces at Oliveto and Spolcto and the baths at Viterbo ; as well as a palace, a cathedral and city hall at Pienza, the native town of Pope Pius II, previously known as Cosignano. The monument to Leonardi Bruni in Santo Croce was executed by him in 1444; and busts of Saint John and Battista Sforza are among his other works.

ROSSER, Thomas Lafayette, American

soldier and civil engineer : b. Campbell County, Va, 15 Oct. 1836; d. 29 March 1910. He en¬ tered West Point from Texas in 1861, but when President Lincoln ordered that class into the field after the attack upon Fort Sumter, Rosser resigned and entered the Confederate army, in which he was appointed 1st lieutenant of artil¬ lery and later captain. In 1862 he was made lieutenant-colonel and shortly afterward colonel of the 5th Virginia regiment under J. E. B. Stuart. In 1864 he became major-general in the army of Northern Virginia. He refused to surrender at Appomattox; escaped through the Federal lines, and while trying to reorganize scattered troops was captured and made a pris¬ oner of war. After the war he studied law, but did not practice. In 1868 he became assistant en¬ gineer in the construction of the Pittsburgh and Connellsville Railroad; engaged on the North¬ ern Pacific in 1870, becoming the next year chief engineer of its construction through Minnesota, Dakota and Montana; in 1881 became chief engineer of the Canadian Pacific Railway. In 1886 he returned to Virginia to reside, and in the war with Spain in 1898 commanded a vol¬ unteer brigade.

ROSSETTI, ros-set’te, Christina Georgina,

English poet, daughter of Gabriele Rossetti (q.v.) : b. London, 5 Dec. 1830; d. there, 29 Dec. 1894. She was educated at home. Her first verses were written in 1842 and printed in the private press of her grandfather, Gaetano Polidori. She was probably her brother Dante’s first model, and many portraits of her exist both as portraits and as figures in his paintings. A volume of her verse came from the Polidori press in 1847 and, later after the establishment of (The Germ) in 1850 she contributed to it under the name of ftEllen Alleyne.** Of a deeply religious temperament, she was a devoted High Churchwoman and her writing, aside from devotional manuals and strictly religious works, was mainly poetry of a devotional char¬ acter. (Goblin Market,* however, published in 1862, is not of this type; and for original and purely imaginative qualities was never after¬ ward approached by her. She also wrote (The Prince’s Progress) (1866) ; (A Pageant* (1881) ; stories and nursery rhymes under the titles, Commonplace* (1870), and (Sing Song* (1872); (Verses* (1873), and such religious works as (Annus Domini* (1874) ; Called to be Saints: the Minor Festivals* (1881) ; (Time Flies: a Reading Diary* (1885); (The Face of the Deep* (1892). From 1871 to her death she was for most of the time an invalid. Con¬ sult Mackenzie Bell, Christina Rossetti: a biographical and critical study* (1898).

ROSSETTI, Dante Gabriel, English poet and painter : b. London, 12 May 1828 ; d. Berch-ington, 10 April 1882. His full name was Ga¬ briel Charles Dante, but for literary purposes he rearranged it in the form by which he is now remembered. He was one of four children, all of whom, especially himself, his sister Christina and his brother William Michael, achieved fame in literature. His father, Gabriele Rossetti, pro¬ fessor of Italian in King’s College, was an Italian exile, an enthusiastic patriot, himself a poet and author of several critical works on Dante. He had married Frances Mary Lavina Polidori, of English and Italian blood.

Dante Gabriel was educated at home, in an atmosphere of culture and fine enthusiasms ; from his ninth to his 14th year he attended King’s College. During that time he received some instruction in drawing, and upon leaving college he gave himself to the study of art, entering the Royal Academy in 1848. At the same time he began his

translations from Dante and other Italian poets, showing from the first more genius in poetry than in painting. His great poem, perhaps his most remarkable, (The Blessed Damozel,* was written about 1847. In 1848 he entered the studio of Ford Madox Brown, where he met Woolner, Holman Hunt and Millais — the group that with himself and Madox Brown constituted the so-called pre-Raphaelite brotherhood. In 1850 William Michael Rossetti edited The Germ , a short-lived but famous magazine devoted to pre-Raphaelite ideals; in its page appeared (The Blessed Damozel* and other work of Dante Gabriel Ros¬ setti's. Tust what were the ideals of the pre-Raphaelites is hard to define ; they stood in gen¬ eral for the devotional sincerity in art of those painters who preceded Raphael, and for free¬ dom from modern academic canons ; yet Ros¬ setti himself was not strictly a pre-Raphaelite ;

his drawing was quite in his own style, little affected by the manner of the old painters.

For some time Rossetti had to face the pro¬ verbial artist's struggle; his pictures were not bought, and the peculiarities of his drawing were severely criticized. Ruskin's kindly de¬ fense of the pre-Raphaelites, however, encour¬ aged the whole group. Shortly afterward Ruskin made Rossetti a standing offer to buy, up to a certain sum, all of Rossetti's painting that pleased him. The arrangement lasted for some time, to Rossetti's great benefit. Through Ruskin he met Sir Edward Burne-Jones, who introduced him to Morris and Swinburne. Rus¬ kin also generously assumed the cost of Ros¬ setti's first volume, the (Early Italian Poets,* a collection of translations which appeared in 1861. Rossetti afterward paid back the loan, and the book was reprinted in 1874 under the title of (Dante and His Circle.*

In most of Rossetti's early pictures, his Beatrices and ideal ladies were copied after his wife, Elizabeth Eleanor Siddal, herself a

S>et and artist, whom he had married in 1860.

rs. Rossetti was an invalid ; the poet had no delusions as to the sadness shortly in store for him. But when, in 1862, his wife accidentally hastened her fate by an overdose of laudanum, Rossetti gave way impetuously to his grief, and in his impulsive despair buried in his wife's coffin the manuscript of his poems, for the most part inspired by her.

In the course of the next seven years — dur¬ ing which time he continued his painting with success, and also began the use of chloral — his friends persuaded him to recover his manu¬ scripts, which he did in 1869. The following year appeared his (Collected Poems,* contain¬ ing the (House of Life* sonnet sequence in its original complete form. In October 1871, Rob¬ ert Buchanan, under the pen-name of ˆThomas Maitland,** wrote an essay entitled (The Fleshly School of Poetry,* in the Contemporary Re¬ view. The purpose of this article was to show that Rossetti's poetry, in thought and expres¬ sion, was indecent; and to make his point the writer did not shrink from misquoting Rossetti and perverting his meaning. Rossetti made an adequate reply in an article called (The stealthy School of Criticism,* and in later editions some¬ what unnecessarily withdrew the verses that had most offended Buchanan. But the injustice of the attack preyed upon him until his mind was deranged ; at one time only the loving care of his friends prevented him from committing suicide.

He partly recovered his mental poise, and for a time entirely recovered his poetic and artistic faculties, which seemed at first not to be affected by his use of chloral. Several of his best pictures belong to this time; the bal¬ lads and Sonnets* were published in 1881. These last years, however, were years of pitful suf¬ fering and gradual collapse. His friends shel¬ tered him from his worst moods and cared for him to the end.

In both painting and poetry Rossetti's per¬ sonality expressed itself with unusual evenness throughout his career, and in (The Blessed P)amozel,* one of his earliest poems, almost all his qualities can be traced. Like so much of his other writing, it was illustrated, set to painting, as it were, by himself ; but without such aid the pictorial genius is strong in the

veˆse-The ideas are typically concrete ; not only the Damozel, leaning on the bar of Heaven, is seen, with the lilies in her hand, and on earth the fall of autumn leaves, and in the sky the ((curled moon® ; but from all points of view the appeal is to the eyes, as in that imag¬ inativeˆ glimpse of the world spinning far below the bridge of Heaven; and in the picture of souls ascending to God like thin flames — such as William Blake could have drawn; and in that ((strong level flight® of the angels. The three lilies in the Damozel's hand and the seven stars in her hair, and the five handmaidens of the Virgin are definitely numbered for the effect of concreteness; Rossetti habitually employs the device, as Keats employed it in the (Belle Dame Sans Merci,5 after the manner of the old English ballads — a manner that strongly influenced Rossetti. Partly from the ballads (The Blessed DamozeP derived some of its mediaeval flavor ; but the quality was really per¬ sonal with the poet. Here as in his other poems Rossetti manages to reproduce the romance of the archaic, without any great reproduction of the archaic itself. The furnishing of Heaven in the poem is quaint and remote, in effect like the lovely names of the five handmaidens; but the thought or attitude of no particular past time is revived. Perhaps some of this pseudo-archaic flavor comes from the strange verse-music, which Rossetti introduced into English. The secret of much of its charm is veiled in the poet's genius, but its most striking trait, its melancholy evenness, can be explained by Ros¬ setti's training in Italian prosody. In writing English poetry he departs radically from the genius of English metre ; instead of fitting the words, with their natural accents undisturbed, into the regular beat of the verse — so placing them that the natural reading of the line would determine the rhythm, — Rossetti allows a pre¬ conceived rhythm to determine the accent of the words, as in the line <(With her five hand¬ maidens, whose names,® *etc.*

These characteristics of (The Blessed Damo¬ zel,) and others besides, reappear more marked in other poems — the subtlety of thought, in (Love's Nocturne5 ; the mediaeval mood of de¬ votion, altogether or almost religious, in (Ave,5 and in (The Portrait,5 with its splendid dosing image; the ballad element, together with the unusual skill in

reproducing physical sensation, in (Eden Bower,5 (Troy Town,5 and the longer ballads; and the same sad, even music in them all. Among his other verse the elaborate ballads — (Rose Mary,5 (The White Ship,5 (The King's Tragedy,5 show Rossetti's debt to ballad lit¬ erature, and at the same time mark the wide gulf between the clear simplicity of the old nar¬ ratives and the wrought loveliness of his work. In his shorter ballads, however, such as Strat¬ ton Water,5 he is much simpler. What hold he had on real life is powerfully concentrated in (Jenny,5 probably his most thoughtful poem.

Rossetti's sonnet sequence, (The House of Life,5 undoubtedly places him among the mas¬ ters of the sonnet form, though none of the son¬ nets, perhaps, are so well known as (The Blessed Damozel.5 Technically, they have more of the rise and fall of the best Italian models than is usual in English poetry, and at times, as in the first sonnet, or the 24th or the 25th, their cadence is superb. But in many of them the mystical subject matter is baffling, and Rossetti's

characteristic evenness of manner, here also an evenness of mood, makes the sequence monot¬ onous at last. Perhaps Rossetti's best sonnets were written singly for pictures — as the beau¬ tiful (Lilith,5 and the (Venus Verticordia,5 with the three wonderful lines at the end.

The most widely known of Rossetti's trans¬ lations are the three from Villon, especially the (Ballad of Dead Ladies,5 and Dante's (Vita Nuova.5 In all of his translated verse, how¬ ever, the same traits are found as in his origi¬ nal work — the same exquisite, rather than great mood, the same concrete, yet remote, aspects of beauty, and the same un-English music of the verse. He has many imitators in both his arts. See House of Life.

Bibliography. — The best edition is by W. M. Rossetti. For biography and criticism, con¬ sult Introduction to the above; (Dante Gabriel Rossetti; His Family Letters,5 with memoir by Rossetti, W. M. ; Caine, Hall, (Recollections of Dante Gabriel Rossetti5; Pater, . Walter, in appreciation5 ; the same essay in Ward's (English Poets.5 Recent studies are by Ben¬ son, A. C. (1906); Marellier (1901); Singer (1908), and Symons, Arthur (1909).

John Erskine,

Adjunct Professor of English in Columbia Uni¬ versity.

ROSSETTI, Gabriele, Italian poet : b. Vasto Abruzzo Citeriore, 28 Feb. 1783; d. London, England, 26 April 1854. He was educated at the University of Naples and in 1814 was ap¬ pointed curator in the Museum there. He joined the Liberals and in 1815 became a mem¬ ber of the secret society of the Carbonari. He was a supporter of the constitution which King Ferdinand was forced to grant as the re¬ sult of a military uprising, and when in 1821 the constitution was abrogated and its adher¬ ents proscribed, Rossetti was compelled to fly the country. He went first to Malta and in 1824 to London, where he was engaged as a teacher of languages and was elected professor of Italian at King's College, London, in 1831. In his political opinions he continued an ar¬ dent Liberal, but was in favor rather of a constitutional monarchy than a republic. In religion, though never wholly abjuring the Ro¬ man Catholic creed, he was for many years practically a free thinker, though in later years he accepted an undogmatic form of Christian¬ ity. In 1845 blindness compelled his resignation from the college. His works include (Dante, Commedia-' (1826) ; (Lo Spirito antipapale che produsse la Riforma5 (1832) ; (Poems5 (1833); (La Beatrice Dante) (1842); -HI veg-gente in solitudine5 (1846); (L'arpa evangelica5 (1852), *etc.*

ROSSETTI, William Michael, English

poet and art critic, son of Gabrielle Rossetti (q.v.) ; b. London 25 Sept. 1829. He was edu¬ cated at King's College, London, and entered the excise office in 1845. From 1869-94 he was assistant secretary to the board of inland rev¬ enue. He has published blank verse transla¬ tions of Dante's comedy (The Hell> (1865) ; Wives of Famous Poets5 (1878) ; (Life of Keats5 (1887) ; (Memoir of Dante G. Rossetti5 (1895) ; (Gabriele Rossetti5 (translated auto¬ biography 1901), etc., besides much editorial work, including the works of many poets and

ROSSI

the (Rossetti Papers) (1862-70-1903), and (Some Reminiscences> (1906).

ROSSI, Francesco de, ros'se, known as 1l Cecco ft Sat.viati, Italian painter : b. Florence, about 1510; d. Rome, 1563. He was a pupil of Michelangelo and Parmigiano and a painter of history and mythological subjects. Little is known of his life, excepting that he went to France, made enemies by his ec¬ centric conduct and reckless wit, and found little patronage there. He is said by Vasari to have decorated many Italian palaces, and there are examples of his work in several of the great European collections, including his (Chari ty) in the English National Gallery, and his (Holy Family) in the Prado Gallery, which show him to be somewhat mannered in execu¬ tion, but none the less a painter of the Florence school at its best.

ROSSI, Giovanni Battista de', jo-van'ne bat-tes'ta da, Italian archaeologist : b. Rome, 23 Feb. 1822 ; d. there, 20 Sept. 1894. He was distinguished for his studies of the inscriptions of the early centuries of the Church, and made important discoveries in the catacombs. He was made-a member of the Berlin Academy of Sciences and corresponding member of. the French Institute. He published (Inscriptionˆ Christianas Urbis Romae septimo Saeculo Anti-quiores) (1861) ; (Roma Sotteranea Christiana)

(1864-77).

ROSSI, Pellegrino Luigi Edoardo, Count, Italian statesman, jurist and economist: b. Carrara, 13 July 1787; assassinated Rome, 15 Nov. 1848. He was educated at the uni¬ versities of Pavia and Bologna and was ap¬ pointed to the chair of law at Bologna in 1812. He espoused the cause of Joachim Murat and after his fall in 1815 he escaped to Geneva. There he became professor of criminal law at the academy, was honored by naturalization as a citizen and in 1820 became a deputy in the Cantonal Council. In 1832, as a member of the Extraordinary Diet, he was commissioned to draw up a revised constitution, known as the <(Pacte Rossi,® but which was rejected by the Diet, an outcome which caused him to accept an invitation to France. In 1833 he succeeded Say as professor of political economy at the College de France, and in 1834 he became a French citizen and

was appointed professor of constitutional law. He was sent to Rome as French Ambassador in 1845, but in 1848, after the fall of Louis Philippe, he resumed his status as an Italian subject. He was named Minister of the Interior by Pius IX, but although a statesman of pronounced ability his conserva¬ tism in opposing the formation of an Italian confederation made him unpopular and his assassination followed. His greatest fame rests upon his work as an economist. Author of (Traite de droit penaP (1829) ; (Cours d'economie politique } (1838-54) ; Cours de droit con-stitutionneP (1866-67) ; (Melanges d'economie politique, d'histoire et de philosophicˆ published posthumously (2 vols., 1857), *etc.*

ROSSINI, Gioachimo Antonio, jo-a-ke'-

mo an-to'ne-o rds-se'ne, Italian composer : b. Pesaro, 29 Feb. 1792; d. Passy, near Paris, 13 Nov. 1868. He was born of poor parents, and when only 10 was able to support his mother by singing solos in church. He also

took the part of Adolfo in Paer's <Camillo) at the theatre of the Commune — his only ap¬ pearance as a dramatic singer. He began his musical studies with his parents, but later he studied composition and counterpoint under Tesei and Mattei, both of Bologna. His first opera, (Demetrio e PolibioP was composed be¬ fore his studies under the latter, and even at that stage of his career he had mastered the art of imbuing his music with feeling. His first public appearance as a dramatic composer was at Vienna in 1810, when his opera (La Cambriale di Matrimonio) was performed. Successful though it was, it did not contain any definite evidence of power to assert a new school or create a radical change in style. It had been preceded in 1808 by (I1 Pianto d'Ar-monia per la Morte d'OrfeoP a cantata, which gained the prize at the Liceo and was performed in public on 8 August of that year. His next composition was (Didone abbandonataP a can¬ tata, followed by an opera buffa, (L'Equivoco stravaganteP which brought him fresh triumphs. Early in 1812 he produced two comic operas, (LTnganno felice) and (L'occasione fa il Ladro, ossia il Gambia della valigiaP each of which contained several songs full of force and origi¬ nal melody. He attempted one oratorio, (Ciro in BabiloniaP which unhappily proved a failure. In the autumn of 1812 he wrote a musical two-act comedy, (La Pietra del Paragoned produced at the Scala with immense success. In the finale occurs the first instance of his emplojunent of the crescendo, for which he became famous later, and which Mosca declared had been bor¬ rowed from his own

(Pretendenti delusiP In 1813 Rossini composed (TancrediP an opera based on Voltaire's drama, full of good situa¬ tions and patriotic sentiment. Its choruses are rich in martial passages. (Di tanti palpiti) be¬ came popular everywhere and made Rossini the most famous composer living. During that year he also wrote (L'Italiana in Algerip containing the charming trio (Papataci) and the patriotic air (Pensa alia PatriaP During the next two years Rossini wrote eight operas, including the well-known (Barbiere di Siviglia) and cOtelloP while in 1817 he produced his celebrated operas (La CenerentolaP (La Gazza ladra) and (ArmidaP but critics still regarded him as a <(mere musical figure-maker and a diluter of melody into mere ornament.® (ErmioneP his next opera, has been styled a ((system of word-painting.® His next notable compositions were 'Adelaide di Borgogna) (or (Ottone Re d'ltaliaP as it is sometimes called), and an¬ other oratio, (Mose in EgittoP The former was produced during the Carnival of 1818 and was warmly received, and the latter at the San Carlo in Naples. During the summer of 1818 he wrote 'Adina, o il Califfo di Bagdad) for the San Carlo Theatre in Lisbon, and 'Ricciardo e Zoraide) for the San Carlo in Naples, an opera full of ornament. His (La Donna del Lago) seemed to show that Scott's works were becom¬ ing popular even in Italy. In this opera and others that followed, such as 'MaomettoP (Zel-miraP (SemiramideP etc., it was plain that Ros¬ sini was half a century ahead of his day. His style was changing; his gaiety had disappeared; he was becoming serious. He now visited England, on the invitation of the manager of the King's Theatre in London, to write an opera for that house, to be called 'La Figlia

dell' Aria,* for which he was to receive about $1,200. He arrived in London in December 1823, with his wife, Isabella Colbran, a singer, to whom he had been married about two years, and while there was much lionized. He acted as accompanist at numerous soirees, gave several concerts, singing the solos on two occasions in a cantata which he had composed for the occa¬ sion under the title (Homage to Lord Byron,* and in five months had acquired nearly $35,000. He then undertook the musical direction of the Theatre Italien in Paris for 18 months at a salary of about $4,000 a year. He here repro¬ duced some of his operas, for example, (La Donna del Lago,* (Semiramide,* <Zelmira,* etc., and also brought out a new one — (I1 Viaggio a Reims, ossia l'Albergo del Giglio d'Oro) — composed for the coronation fetes of Charles X. The sinecure positions of ((Premier compositeur du roi® and (<Inspecteur General du Chant en France,® were now given him, with an annual income of 20,000 francs, or about $4,000. He then revised the music of (Maometto,) brought out under the title (La Siege de Corinthe,* and also reproduced <Mose,) with many improve¬ ments and additions, some of the interpolated airs being taken from (Armida* and (Ciro in Babilonia.* He next resolved to try his skill at lyric opera and adapted to the (Le Comte Ory) some of his favorite music in the (I1 Viaggio a Reims,* but it is said that the best part of the drinking chorus was borrowed from Beetho¬ ven's Eighth Symphony. His next opera, com¬ monly regarded as his masterpiece, was Guil¬ laume Tell,* which was produced at the Acad¬ emic on 3 Aug. 1829.

With its completion the prolific career of the composer may be said to have ended, for though he lived nearly 40 years longer, a few songs, his (Stabat Mater) and the (Petite Messe Solennelle) are about all he wrote. These 40 years were spent at Bologna and at Passy, where he died.

Determining to revisit Bologna, where his mother had died in 1827 and where his father was still living, he resigned his post, but made an agreement with the government to compose operas for the French stage for the next 10 years, and to produce one every two years, re¬

ceiving 15,000 francs for each. Should this plan not be carried out, he was to receive a pension of 6,000 francs. On account of the abdication of the king of France and the Revolution of 1830, he returned in November 1830 to Paris. The new government, however, was not willing to recognize the agreement above mentioned, and for several years he fought his case in the courts, it being eventually decided in his favor. During this time he wrote his (Stabat Mater. *In 1836 he again left Paris for Bologna, where his father died in 1839. He now wrote a num¬ ber of songs and choruses, among which may be cited (Inno populare,* for the accession of Pius IX. His wife died in October 1845 and two years later he married Otympe Pelissier, whom he had met in Paris. In 1855 he again returned to Paris. His (Petite Messe Solennelle) was produced on 14 March 1864 and he afterward scored it for a full orchestra, in which form it was given at the Theatre Italien on 28 Feb. 1869, three months after his death. ((Next to the Emperor,® writes one of his biographers, ((he became the first man in this city of arts and artists.®

Rossini's position among the world's greatest composers has been much discussed. His joyous disposition and light-heartedness have been used as arguments against classing him with such profound composers as Mozart and Beethoven, the latter of whom is recorded as having char¬ acterized Rossini's work as ˆdegrading the art in general wantonness with a negligence bordering on frivolity.® It has been often said that Ros¬ sini's melodies are conspicuous for great sweet¬ ness and wonderful sensuous attraction, as for instance in the first finale of Generentola,* or as evidenced by the jolly roguery of the Garber of Seville. * This is unquestionably true and these are the fruits of his special form of genius. They are his natural endowment and probably if he had at that time tried ever so hard to write in a different vein he would have failed. His melodies were intended to please the public, for whom he wrote, and they ful¬ filled their mission to perfection. That he ac¬ complished much for music cannot be gainsaid, and especially for operatic music in Italy.

Notwithstanding the immense popularity of Rossini's compositions, there have been pointed out certain peculiar features repeated over and over again which have caused some of his critics to temper their praise. Nor were these peculiarities entirely of Rossini's own creation, some of them having been borrowed from the works of Generali, Velluti and others. Prom¬ inent among them is the use of the crescendo, ((which,® says one, <(appears as regularly and invariably in his overtures and finales as horse¬ radish with a joint of roast

beef.® The constant use of triplets is another mannerism which has provoked adverse criticism, while the undue prominence of appogiaturas (leaning notes), in many cases of longer duration than the har¬ monic notes to which they are attached, has also been condemned, as well as his practice of closing his periods by modulating them from the major tonic to the minor mood of the lesser third below, or of the great third above the major tonic. A more serious charge made against him was that of plagiarism, it being stated that besides resorting to the national airs of Italy, he availed himself to a great ex¬ tent of the ideas of Generali, Cimarosa and other Italian composers, as well as of several German composers, such as Haydn, Mozart, Krommer, *etc.* Thus, while no competent critic has denied that Rossini possessed genius of an extraordinary character, many are inclined to believe that his inventive faculties were con¬ fined within quite measured limits.

In spite of all this, there can be no doubt that his compositions form a memorable epoch in the history of musical art. It was he, more¬ over, who substituted singing for the endless recitatives which had been in vogue and he also gave the bass voice a leading part, insist¬ ing too that a singer should sing the notes of the composer without any additions of his own. He also made the chorus an important feature and fortified the orchestra by adding wind instruments to the strings, which alone had hitherto been used.

It cannot be questioned that wherever his operas appeared, they became firmly established and in many instances almost banished the classic works of the great masters who had preceded him. Thus, in Italy, they nearly sup¬ planted the works of Paesiello, Mayer and

others, including even Cimarosa. In Germany the national predilection was for graver music, but even there Rossini was, as one of his bi-opraphers put it <(lord of the ascendants.® While he rarely, if ever, reached the tragic grandeurs of Gluck, or the intense feeling of Mozart and Weber, his music is never dolorous and heavy, as is the case with some of the best compositions of the German school Forceful and precise rhythm is another of his principal characteristics, while his scores are notable for their simplicity of outline and primary concep¬ tion, although his manner of decorating the framework was at times intensely florid. Con¬ sult biographies by Beyle-Stendhal (1823; new ed., 1892) ; Azvedo (1865) ; Edwards (Boston

1881) ; Zanolini (1875) ; Bevan, W. A., Ros¬ sini > (New York 1905) ; Dauriac, L., (Rossini > (Paris 1905) ; Corradi, E., <Gioachino Rossini* (Rome 1909) ; Sittard, J., <Rossini) (Leipzig

1882) .

ROSSITER, ros'i-ter, Thomas Pritchard,

American artist: b. New Haven, Conn., 29 Sept. 1817; d. Cold Spring, N. Y., 17 May 1871. He early developed a talent for art and secured Jocelyn of New Haven as his instructor. He studied in Rome 1840-46, and on his return opened a studio in New York, where he was elected a National Academician in J849. He painted historical and . religious subjects, and was an admirable colorist.

ROSSLAND, ros'land, Canada, an incorpo¬ rated city since 1897, in the West Kootenay District, British Columbia, on the Canadian Pacific and Canadian Northern railways, near the international boundary line at an altitude of 3,461 feet. It is the receiving and distributing centre for one of the richest gold mining dis¬ tricts of British Columbia. Silver and copper are also found, and great smelters and reducing works have been erected here and at Trail, about 10 miles distant. Pop. 3,000.

ROSTAND, ro'stan, Edmond, French poet and playwright: b.

Marseilles, 1 April 1868; d. 2 Dec. 1918. He obtained his education at the Marseilles Lycee and the College Stanislas of Paris, and in 1891 was admitted to the practice of law. He first came into prominence as an author in 1888, when his (Le gant rouged a vaudeville sketch, was produced in Paris. About that time a small volume of poems, en¬ titled (Les MusardisesP appeared, but attracted scant notice ; nor was (Pour la Grece) (1897), a poem which he recited for the benefit of wounded Greeks and Cretans in the Graeco-Turkish War, much more successful. As a playwright, however, he at once met favor. His <Les romanesques* (1894), (,La Princesse loin-taine} (1895) and (La Samaritaine) (1897), all in verse, were applauded by public and press. But they were quite outdone by his (Cyrano de Bergerac* (1897), a five-act drama in verse, which proved to be one of the most conspicuous successes of the modern stage, being presented in Paris 500 times consecutively, with Coquelin in the title-role. It was given also in the United States in English by Richard Mansfield and in French by Coquelin. It employs the his¬ toric figure of de Bergerac, duelist and author. (L'Aiglon> (1900), based on the story of the king of Rome, was given in the United States by Sarah Bernhardt, who created the part in

Paris, and in English by Maude Adams. M. Rostand was at the height of his popularity when <Chantecler) was produced in Paris in 1910. Seats sold for $50 and the American rights for its presentation cost a fortune. <Chantecler) originally had been written for the French actor, M. Coquelin, who died before rehearsals and the title-role was then given to Guitry. The play was not a conspicuous suc¬ cess and its presentation in English with Maude Adams in the title-role was even less successful.

M. Rostand had been made a member of the French Academy, 30 May 1901, the youngest ˆImmortal* ever admitted ; he was raised to the rank of Commander of the Legion of Honor, received a grand diploma for writing (Chantecler) and was lionized at many brilliant assem¬ blages. Other poems and plays by M. Rostand were (Le pois sacre* ; (Don Juan* ; La Cantique de l,aile) (1911) ; Le printemps de l'aile> (1912) ; (La Belgique,* and (The Song of the Stars.* Rostand's versification is finished and brilliant, his wit keen and polished and, added to these, his work displays a certain enthusiasm and spontaneity. He contributed, with Stephen Phillips (q.v.), to the much-talked-of renais¬ sance of the poetic drama.

Early after the outbreak of the War of the Nations in 1914 M. Rostand

volunteered to fight as a French soldier, but his services were declined. He proceeded to hearten the Entente Allies, however, by writing patriotic verse, and one poem, in which he praised America's atti¬ tude, was dedicated to Sarah Bernhardt. When the Lusitania was sunk, M. Rostand wrote a long poem excoriating Count von Bernstorff, German Ambassador to the United States, and accusing him of perfidy.

Rostand married early in life Rosamond Gerard, granddaughter of Count Etienne Gerard, a Marshal of France during the Napoleonic wars. They had one son, Maurice, who has collaborated with his mother in writing the plays (Un bon petit diable,* produced in New York in 1913 as (A Good Little DeviP and (La petite vendeuse d'allumettes) (1914). Among English translations are (Cyrano* by Thomas and Guillenard (1898) and Hall (1898); <L'Aiglon> by Parker (1900); <Les romanesques> by Fleming (1900), and Hendee (1899), and (Chantecler* (1910). See Chantecler; Cyrano de Bergerac, and L'Aiglon.

Bibliography. — Filon, <De Dumas a Ros¬ tand* (Paris 1898) ; Chesterton, G. K., (Varied Types* (New York 1903) ; Hale, E. E., Jr., (Dramatists of To-Day * (6th ed., ib. 1911) ; Lewisohn, Ludwig, (The Modern Drama> (ib. 1915) ; Edinburgh Review (October 1900) and L' Illustration (1898, 1910).

ROSTOCK, ros'tok, Germany, in the state of Mecklenburg-Schwerin, on the left bank of the Warnow, 80 miles northeast of Lubeck, is one of the most important cities on the Baltic. It consists of three parts : The Old, the New and the Middle Town. The east or Old Town bears the impress of an old Hanse town; the Middle Town is the most modern and best built. The most noteworthy points of in¬ terest are the palace of the grand duke; the town-house, with its seven towers ; the church of Saint Mary (1400) and church of Saint Peter, with a steeple 414 feet high; the university (1419), attended by about 500 students; the

house in which BKicher was born and the one in which Grotius died ;

schools, hospitals, *etc.* The fine promenades surrounding the city were formed on the site of the old fortifications. There is an extensive trade in agricultural products and salt, and important fisheries. Pop.

65,400.

ROSTOPCHIN, ros-top'chm, or RAS-TOPCHIN, Feodor Vassilievich, Count, Rus¬ sian general : b. province of Orel, 23 March 1763; d. Moscow, 12 Feb. 1826. He entered the Imperial Guards as lieutenant, was highly pro¬ moted under Paul I, but afterward dismissed in disgrace. Under Alexander he became gov¬ ernor of Moscow and exercised an important influence over the campaign of 1812, even if the assertion of the French that the burning of the city was his work should be untrue. He himself denied this charge in his (Verite sur l'incendie de Moscow > (1824). It is certain, however, that he caused his villa near Moscow to be burned and took measures for the destruc¬ tion of the magazines in that city. In 1814 he accompanied the Emperor Alexander to the Congress of Vienna. He afterward traveled and spent several years in literary pursuits in Paris. His works include a number of his¬ torical memoirs, comedies, etc., written in French and Russian and published in 1853. Consult Schnitzler, (Rostopchine et Koutou-soff > ; Segur, (Vie de Comte RostopchineP

ROSTOV, ros'tof, or ROSTOFF, Russia, in the government of Ekaterinoslav, pic¬ turesquely situated on a prominent summit above the Don, 20 miles from its mouth in the Sea of Azov. It is the oldest town of eastern Russia, a centre of considerable traffic and some domestic industries, and its annual fair establishes the prices of cotton goods prelimi¬ nary to the great fair of Nijni-Novgorod. The chief objects of trade are grain (the principal article of export), flour, tobacco, drugs, herbs, saddlery, linen manufactures and enameled sacred pictures. It has ever counted as an im¬ portant point, from the period when it was first contended for by Slavs and Finns. After the Mongolian invasion it declined and was suc¬ cessively plundered by Tartars, Lithuanians and Poles. Electric lighting, street railroads and telephones are among its modern features. The ancient cathedral (1216) contains precious sacred relics of Christian missionaries and princes. Pop. 121,300.

ROSTRA, a name given the platform or stage in the forum in Rome, whence the orators used to harange the people, so called from the beaks (rostra) of the ships taken, in 338 B.C., from the Antiates, with which it was adorned. It was a circular structure raised on arches,

with a stand on the top, bordered by a parapet, the access to it being by two flights of steps.

ROSWELL, roz'wel, N. Mex., city and county-seat of Charles County, on the Rio Hondo, a tributary of the Pecos River, 150 miles southeast of Albuquerque, on the Atchi¬ son, Topeka and Santa Fe Railroad. The New Mexico Military Institute is located here; there are flour mills, and the city is the centre of rich cattle, sheep and farming country. It was incorporated as a city in 1904 and is grow¬ ing steadily. Pop. (1910) 6,172; (1920) 7,062.

ROSWITHA,ˆ ros've-ta, or HROTS-WITHA, hrots've-ta, German poet : b. about 932; d. about 1002. She was of Saxon birth and a nun in the Benedictine convent of Gandersheim, Brunswick; the first German poet and the first dramatist since the Roman period. She wrote sacred legends, a poetical chronicle of the reign of Otto I and six Latin comedies for performance before the sisterhood. The latter were imitations of Terence, and without attempting a development of character they dis¬ played rapidity of action and good theatric effect. Her works were first published at Nuremberg in 1501 ; translations were made by Benedixen in 1850-53. The best edition was published by Barack in 1858. Consult Kopke, (Hrotsuit von Gandersheim > (1869).

ROSY FINCH, one of the large finches of the genus Leucosticte, native to the northern parts of Asia and northwest America. Several species inhabit the higher parts of the Rocky Mountains and the colder parts of northwestern America, coming southward in winter. Their plumage is suffused with rosered, brightest in the males, and in the spring they have a loud and pleasant song. The best-known species is L. tephrocotis, common in Colorado and Utah in winter. Consult Coues, (Birds of the North¬ west (1874).

ROT, a disease in sheep and other gram¬ inivorous animals, produced by the hydatids Fasciola hepatica and Distoma lanceolatum, often living in great numbers in the gall-ducts and bladder of the animal. (See Sheep). Also the popular name for many fungoid dis¬ eases of plants. See Diseases of Plants; Fungi.

ROTA ROMANA, rd'ta ro-ma'na, or RUOTA ROMANA, signifies an ecclesiastical tribune of the Roman Catholic Church situated at the papal court; from this situation probably comes the name of the tribunal, since the old papal courts were decorated with mosaics in

the shape of wheels or rotce. The Rota Romana was at one time a body of vast judicial power, having jurisdiction not only over all cases of appeal and all disputes of beneficiary and patri¬ monial nature, but as well over the more im¬ portant class of all cases concerning ecclesias¬ tical benefices. These last are no longer within the jurisdiction of the court, its power being diminished of necessity by the political position of the papacy of to-day. But over the first two classes named the court has full jurisdiction, its decree being final, inasmuch as the only ap¬ peal permitted is one directly to the Pope.

The Rota Romana was, and still is, a col¬ legiate body, although its constitution has under¬ gone radical changes in recent years. Origi¬ nally it was composed of 12 prelates, mostly Italians, but representing also the other papal states of Catholic Christendom. The meetings which took place in the palace of the Pope twice a week were of supreme importance in the administration of the Roman Catholic Church law throughout the world. The Tri¬ buna is now divided into two colleges or senates.

ROTARY STEAM ENGINE, a type of engines in which the pistons rotate within the cylinder, or the cylinder upon the pistons, thus giving a continuous rotary motion and eliminat-

ing the loss of power consequent to the neces¬ sary change in the direction of motion of a piston working horizontally in a cylinder, as in the case of an engine operating with a re¬ ciprocating action.

The varieties of rotary engines are numer¬ ous, consisting of machines equipped with one, two, three and four pistons on single axes, or of pistons working in pairs on several axes, operated by steam injected against them, or working by the reactive action of steam emitted tangentially. The basic principle was suggested by the inventors of the last century, among whom Watt, Cartwright and Galloway may be included; while among the notable engines of this class may be mentioned the Scheutz (Swedish), the Thompson (Scotch), the Behrens (American) and the Pillens and Hill (English), in all of which the pistons revolve within the cylinder and differ from each other only in the details of the mechanical arrange¬ ments employed to utilize the pressure «of the steam.

In another form perfected by Harris, por¬ tions of the engine are attached to two hubs and run in different directions. The hollow trun¬ nions of one axis carries the two radial arms which emit steam at their ends tangentially against vanes carried on the other axis with a direct driving action. By gearing the two mo¬ tions are utilized upon a single shaft. The latest development, and perhaps the most effi¬ cient-, is that perfected by William M. Hoffman, or the type in which the cylinder revolves around the pistons upon an elliptical steam-chest supported by a hollow shaft through which the steam is admitted and exhausted.

Fig. 1. Standard for holding stationary shaft and core.

Fig. 1 shows a side view of the Hoffman engine in which the shaft and core, or steam chest, are stationary and the cylinder revolves. Live steam is admitted at the left end of the hollow shaft and is utilized by the action of an automatic cut-off arrangement which allows it to enter the expansion chamber from the sta¬ tionary core, where it expands and pressing against a piston moves it forward over the el¬ liptical surface of the core and in so doing causes the cylinder to revolve. As the piston approaches the greater dimension of the ellipse, it is forced into its housing, where it forms an abutment against the

escape of steam ; while a piston in its housing on the opposite side of the cylinder arrives opposite the port of ex¬ haust exhausts the steam, and, relieved of the pressure of the greater dimension of the ellipse, emerges from its housing, and forms the free side of a new chamber, into which the live steam is again admitted by the automatic cut¬ off to expand and continue the action while steam is admitted to the shaft. The expansion

chamber is so arranged that it has but three sides — the inner surface of the cylinder and the outer surface of the ellipse, both of which are rigid, and the convex surface of the pis¬ tons, which are free to move in and out of housings in the cylinder casing.

Fig. 2. Common efficient type of Rotary Engine.

The chief defects of this type of rotary en¬ gine are the excessive loss of power by friction of the pistons against the core and the compli¬ cated system of valves, steam ports, connecting arms, etc., which are difficult to keep in proper order. Many forms of rotary engine are en¬ tirely free from valves and steam ports. The type illustrated in Fig. 2 uses the expansion of the steam in one long curve, for almost a com¬ plete revolution of the rotor R. The pistons P slide in grooves in the rotor R and are pushed against the cylinder by helical springs. When steam is admitted it pushes the first piston ahead and with it the rotor until the next fol¬ lowing piston is exposed to its action. Near the exhaust port the piston is pressed into its groove and as it passes the port the steam is exhausted.

Rotary engines are designed to obtain the greatest possible efficiency with the least amount of fuel consumption and a great reduction in engine-room floor space. Engines capable of developing 300 horse power at 2,000 revolutions per minute have been successfully and economic¬ ally operated. W. Morey, Jr., C.E.,

Consulting Engineer.

ROTATION, (a) in astronomy, the turn¬ ing round of a planet on its imaginary axis, like that of a wheel on its axle. The rotation of the earth is performed with a uniform mo¬ tion from west to east and occupies the inter¬ val in time which would elapse between the departure of a star from a certain point in the sky and its return to the same point. The only motions which interfere with its regularity are

the precession of the equinoxes and nutation. The time taken for the rotation of the earth measures the length of its day. So with the other planets. The sun also rotates as is shown by the movement of spots across its disc (see Sun). The earth's rotation slightly increases the force of gravity in moving from the equator to the poles. Sir William Thomson,

reasoning from some small anomalies in the moon's motion, inferred that 10,000,000 years ago the earth rotated one-seventh faster than it does now, and that the centrifugal force then was to that now as 64 to 49; (b) in botany, the movement of the protoplasm observed in the cells of cell-walls of certain plants. Little or nothing is definitely known as to the causes that bring it about, but it is probably related to the similar motion in amoeba and other low orders of animal life; (c) in mechanics. See Mechanics.

ROTATION OF CROPS, the order in which crops are grown during a series of years on the same land. The advantages of this prac¬ tice are: (1) All plants tend to exhaust the soil, but in different degrees, hence a rotation tends to maintain a balance. Thus at the Rothamsted Experiment Station, England, where wheat has been grown on the same land for 62 successive years without manure or fer¬ tilizers, the average yield is about 13 bushels per acre, or nearly the same as the average yield in the United States, while where grown in a four-course rotation of rutabagas, barley, beans or clover, wheat, the average yield during a period of 52 years is nearly 27 bushels per acre, with¬ out manuring or fertilizing. (2) All plants do not take up the same ingredients in the same proportion ; thus, crops rich in carbonaceous matter take up relatively small amounts of food from the soil but large quantities from the air, the latter costing nothing. (3) Some crops give better opportunity for cleaning land, as corn, potatoes. Others cannot be tilled and favor the growth of weeds, as whe.at, oats. (4) When several crops are grown on a farm the labor is distributed over a greater -portion of the year and it is more economical. The social evils consequent on temporary emplovment at high wages for a short period of the year, and idleness the rest of the time, cannot be over¬ looked. (5) Plants vary in their ability to assimilate the plant food in the soil ; thus buck¬ wheat and rye are able to flourish where wheat and cabbages could hardly live. (6) The legumes enrich the soil in nitrogen. (7) A variety of crops is essential where cattle and other livestock are kept. (8) In a rotation the* increase of destructive insects and diseases is hindered, owing to their not having the neces¬ sary crop to prey upon. (9) Some crops per¬ mit the sowing of others

among them, thus saving time; clover and grass seeds being sown among barley and wheat, wheat sown among corn. (10) Some crops permit the aggrega¬ tion of the soil particles when they become ex¬ cessively reduced by tillage, hence land is laid down to grass, alfalfa. (11) Certain crops aid in accumulating humus, as grass, hence such should follow twro or three vears of exhaustion by tillage. Admitting air to the soil tends to destroy humus and to reduce the water-holding capacity. The loss of humus has converted garden-spots in New York and other Eastern States, northern Africa, Asia Minor and Spain into wastes, and Sicily, the granary of Italy in the time of the Romans, is now comparatively sterile.

Rotations are described according to the number of years required to complete a circuit, as three-course, four-course, *etc.* In the latter the tillable land is divided into four parts and

each crop is grown on part of the farm each year. The folly of growing the same crop on the same land for several successive years was noted by the Romans and others, as also the benefits derived from growing a leguminous crop, as alfalfa or clover, previous to a grain crop, as wheat. These observations remained unutilized until a comparatively recent date. Rotations have gradually grown into their present forms according to circumstances, and have been and are modified as required and as our knowledge increases. Attention was first drawn to their value in 1777, in a treatise by Dickson of Edinburgh, Scotland.

One of the earliest recorded systems was the ˆoutfield® and “infield,® in which part of the land was used for growing grain until its crop-producing power was so reduced that it became unprofitable, when it was allowed to lie idle for a number of years. Increase of population caused a modification, the land being rested or “fallowed® a. year at intervals; thus, among the Jews, this was repeated every seventh year. A system of continuous single cropping has been pursued in the Western States with distinct loss to the nation. Where land is weedy and in dry districts, as parts of California, the east of England, etc., bare fallowing or the cultivation of the soil without growing a crop is still con¬ sidered good practice, sufficient moisture being conserved to ensure a profitable crop the suc¬ ceeding year. A development from this system consisted of the introduction of green crops, either intertillage crops, as corn, turnips, pota¬ toes, cabbages, etc., if the land was weedy and needed cleaning, or of legumes, as clover. The advantages of a crop-fallow are that the land is turned to profitable use; it is cleaned and the available nitrogen present as nitrates is not

so liable to be lost by percolation, being taken up by the crops ; that humus is produced from the root-residue ; and that if a leguminous crop is grown it enriches the soil in nitrogen by means of the bacteria on its roots.

In 1788 Marshall of England stated that a common rotation was: 1st year, wheat, bar¬ ley or bigg; 2d year, oats, beans and pulse; 3d year, bare fallow. A distinct advance was made with the realization of the value of the Norfolk four-course, which was practised on light land and originally consisted of roots, bar¬ ley, clover, wheat. The principles involved are (1), that a deep-rooted crop shall succeed a shallow-rooted one, barley being shallow-rooted and clover deep-rooted; (2) that crops of the same natural order and somewhat like tendencies, as wheat and barley, both being straw-crops and more or less subject to similar enemies, shall not succeed each other; (3) that a weedy crop shall be followed by a cleaning one, as the roots after the wheat; and (4) that a leguminous crop shall have a place in each rotation. The advantages of this system were: (1) The wheat was grown after a nitrogen-gathering crop ; the clover stubble was readily prepared for wheat in the fall, or if stock feed was scarce it could be pastured late and spring wheat or oats grown instead. The wheat was harvested in time to permit the land being fall-plowed and cleaned for the succeeding root crop. (2) The fallow crop, roots, received manure and intertillage, and gave an oppor¬ tunity to clean the land and stir it deeply. It furnished work for the horses in summer in

cultivating, and a bulky crop of succulent feed for stock, which with the hay furnished con¬ siderable manure. (3) A grain-crop follows well after a root crop, and generally little or no plowing is needed. Barley is a good crop to seed with, as it occupies the land but a short time and is not so exacting on the soil moisture as oats. (4) The clover requires a firm seed¬ bed, and if the roots were consumed on the land and shallow tillage given in fitting the land for the barley, such was secured. The barley permitted a good growth of clover which enabled it to withstand the winter. This crop supplied the hay. The disadvantages of this system are that it is too short, the land being liable to become both clover and turnip sick, and the turnips affected with (<club-root.):) Under these circumstances clover and turnips could be taken every eighth year, substituting beans, peas or cowpeas for the former, and pota¬ toes, etc., for the latter. Such close cropping renders the rotation expensive, the labor bill be¬ ing high, but the cost may be reduced by leav¬ ing the grass and clover seeding down for two or three years, thus making a five or six years' rotation, or it may be used as the basis for a seven or eight course. This rotation is capable of adaptations as follows: (1) Grain — wheat, oats, barley, rye, corn, buckwheat; (2) cleaning or fallow crop — corn, potatoes, sugar beets, mangels, tobacco, cabbages, turnips, ruta¬ bagas, rape, cowpeas, soy beans, sorghum, *etc.* ;

(3) Grain — barley, oats, rye, wheat, corn;

(4) Legume — clover, grass and clover, cow¬ peas, soy beans; (5) Legume — grass and clover, mown once and pastured, or pastured all the year.

In the United States the rotations of crops vary considerably in different sections. In-many places the succession of crops is dictated rather by accident or convenience than by any well-considered principles. Corn and wheat or oats formed a common two-course rotation with the early settlers, until the land failed to produce a crop of wheat when corn was grown every second year, the land going to weeds in the in¬ terval. The <(Eastern Shore rotation,® which is a two-course, consists of corn followed by oats, with a secondary crop of Magothy Bay beans. The growth of this leguminous crop, while cur¬ tailing the yield of oats, furnishes considerable green manure for plowing in. The first system on the best cultivated farms in Virginia

was a three-course, beginning with corn, and suc¬ ceeded by wheat in which the grass and weeds were allowed to grow and be grazed the third year. One well-known farmer in Virginia grew clover in place of the weeds the third year to furnish green manure. A later rotation was: (1) corn or oats; (2) wheat and clover sown; (3) clover grown and plowed under in August, and the land seeded to wheat for the fourth year.

An old and successful rotation recorded for New England is corn, oats and timothy and clover, the latter remaining down for three years; thus two plowings are required in five years, one for corn, and a light plowing for oats, the grass and clover seed being sown among the oats. A modern three-course ro¬ tation for the Eastern States is potatoes, winter rye, clover. This is a modification of a well-known Middle Western rotation, pota¬

toes, winter wheat, clover. It embraces a root crop, a cereal and a leguminous crop. It is well suited to light and medium soils and is economical in labor, but one deep plowing being required in three years, that for the potatoes, the land being prepared for the rye by discing. The potatoes are a cash crop, the rye furnishes bedding and feed for stock, and the clover fur¬ nishes hay, and is not left down long enough to be seriously injured by -the clover-root worm. The rotation is too short for many places, and probably the land would become clover-sick. It may be converted into a four-course by growing a crop of corn after the clover, and into a five-course by sowing grass with the clover and leaving them down for two years, thus corn, potatoes, rye, grass (timothy, redtop, *etc.* clover), mown, grass mown and grazed. In this way two-fifths of the tilled land is plowed each year, that for corn and ootatoes ; the land for potatoes may be plowed in fall after the rye is sown in September, thus reducing the spring work. If milch cows are kept, the corn furnishes grain, and stover or mav be cut for silage, the rye may be cut green for fodder or allowed to mature, and the area in potatoes might be reduced and cowpeas, soy beans, peas and barley, or some other fodder or silage crop substituted.

For a dairy farm having half the land in permanent pasture, a satisfactory four-course is (1) corn (cut for silage) ; (2) oats, the land being fall-plowed, the crop furnishing grain and bedding; (3) wheat (sown in fall, the grain being sold or consumed, the straw used for bedding) ; (4) clover (sown in spring in the wheat). This rotation permits of carrying the maximum amount of livestock and having a

large supply of manure, thus enabling the crop-producing power of the soil to be maintained or increased. The livestock furnish constant employment and enable the farmer to make two profits, that of the grower and the manufac¬ turer.

A common rotation in the Middle West is corn, wheat and clover. The wheat is sown in the corn with a one-horse drill before the latter is mature, the clover being sown in the wheat. Labor is a serious problem, and this system ‘ economizes it, but one plowing being required. Consult Wheeler, (A Rotation of Crops, > Bull. 74, 75, 76, Agr. Exp. Sta., Rhode Island (1900) ; Gilbert, (Memoranda of the Rothamsted Experiments) (1901) ; Parker, E. C., (Field

Management and Crop Rotation) (Saint Paul 1915). Consult also works referred to in article Agriculture in the United States, all of which emphasize the imperative necessity of rotation if our lands are to be saved from ex¬ haustion.

ROTCH, roch, Abbott Laurence, Amer¬ ican meteorologist: b. Boston, Mass., 6 Jan. 1861 ; d. 5 April 1912. He was graduated from the Massachusetts Institute of Technology in 1884, and in the following year established and afterward maintained at his own expense a meteorological observatory at Milton, Mass. On 14 Dec. 1906 he was appointed professor of meteorology at Harvard University. He was the first meteorologist in the United States to measure the height and velocity of clouds, and to use kites with a self-recording instrument for this purpose. He also made experiments

in wireless telegraphy. He was the author of (Sounding of the Ocean of Air* (1900) ; (The Conquest of the Air* (1909).

ROTH, rot, Frederick George Richard,

American sculptor: b. Brooklyn, N. Y., 28 April 1872. He received his early education in Germany and studied art at the Vienna and Berlin Academies of Fine Arts. He returned to the United States and from

1890 was profes¬ sionally engaged as a sculptor, attaining a repu¬ tation for the excellence of his small animal groups. He has exhibited in New Yrok, Phila¬ delphia, Saint Louis, Chicago, Portland and Diisseldorf ; and was awarded silver medals at the Saint Louis and Buenos Aires expositions, and a gold medal at Panama. He was elected to the National Academy in 1906. Five of his small bronzes are in the Metropolitan Museum of Art.

ROTHERHAM, rot'h'er-am, England, county borough in the West Riding of York¬ shire, at the confluence of the Rother and the Don, five miles northeast of Sheffield. The most notable buildings are the 14th century cruciform church, market hall, post office, court¬ house, corporation buildings, mechanics' insti¬ tute and free library.. The town possesses ex¬ tensive metal and railway carriage works, pot¬ teries, glass works and rope yards. It is of Roman origin and was of some importance in the Anglo Saxon period. Pop. 62,500.

ROTHERMEL, roth'er-mel, Peter Fred¬ erick, American painter : b. Luzerne County, Pa., 18 July 1817; d. near Pottstown, Pa., 15 Aug. 1895. He was educated as a land sur¬ veyor, but at 22 studied painting, and about 1840 opened a studio as a portrait painter at Philadelphia, and eventually turned his atten¬ tion to historical subjects. Among his earlier works are (Christabel* and (Katherine and Petruchio.* He has also painted many Ameri¬ can subjects, among them (De Soto Discover¬ ing the Mississippi,) (Columbus Before Isa¬ bella the Catholic,* the (Noche Triste* from Prescott's (Conquest of Mexico) ; (Patrick Henry Before the Virginia House of Burgesses) ; and (The Battle of Gettysburg.* His pictures reveal a fine sense of color and a power of dramatic composition which are not com¬ mon ; but he has a tendency to exaggeration and his overtrained action is very often less genuinely effective than sensational.

ROTHROCK, Joseph Trimble, American botanist: b. McVeyton, Pa. 9 April 1839. He was graduated at Harvard in 1864, and took his M.D. at the University of Pennsylvania in 1867. He served in the Civil War and was wounded at Fredericksburg. He was profes¬ sor of botany at the University of Pennsvlvania in 1877-93; commissioner of forestry for Pennsylvania in 1893-1905; and in 1905-08 he was superintendent of the State Sanatorium for Consumptives, South Mountain Camp. Author of (Flora of Alaska) (1867) ; (Botanv of the Wheeler Expedition (1878); (Vacation

Cruisings* (1884) ; Pennsylvania Forest Re¬ ports J (1895-97), *etc.*

ROTHSCHILD, roths'child (Ger. rot'- shllt). The famous European

financial house known as Rothschild was founded by Mayer Anselm Rothschild: b. Frankfort-on-the-Main 1743; d. 19 Sept. 1812. He was of Jewish

parentage, and was destined for the priesthood, but found commercial pursuits more to his lik¬ ing, and engaged in trading, afterward entered a banking house in Hanover. His industry, frugality and sound business methods made him in* a few years the master of a small capi¬ tal, and he returned to Frankfort, where he es¬ tablished the banking house still in existence. The firm originally consisted of his five sons, who established branches of the house in dif¬ ferent European cities: Anselm, b. 12 June 1773; d. 6 Dec. 1855; resided in Frankfort; Solomon, b. 9 Sept. 1774; d. 27 July 1855; lived in Vienna; Nathan, b. 16 Sept. 1777; d. 18 July 1836; located at London; Karl (baron), b. 24 April 1788; d. 10 March 1855; resided in Naples; and Jacob (baron), b. 15 May 1792; d. 15 Nov. 1868; resided in Paris. The political events of 1813 raised the house of Rothschild to the important position it has since occupied in the commercial and financial world. In 12 years the Rothschilds raised by wav of loan or subsidy an amount exceeding £100,000,000 ster¬ ling which was distributed by them in nearly the following proportions: England, £40,000,000; Austria, £10,000,000; Prussia, £8,000,000 ; France, £16,000,000; Naples, £10,000,000; Russia, £5,000,- 000; several German courts, £1,000,000; Brazil, £2,000,000 ; exclusive of various other large sums. The remarkable degree of success at¬ tained by the house, setting aside the favorable circumstances of which they have taken advan¬ tage, may be largely attributed to their strict adherence to two fundamental maxims laid down by the founder of the house. The first of these is their conducting all operations in com¬ mon. Every proposition of magnitude is laid before each member of the firm, fully dis¬ cussed and then executed by their united ef¬ forts. The second principle is to set definite limits to each operation and never to aim at exorbitant profits. Their wealth has increased in an unexampled degree, and their reputation and credit have been steadily fortified by fair dealing, reasonable terms and sagacious and systematic operations which are clearly planned and judiciously executed. The Rothschilds are extremely punctual in meeting their contracts, and before the introduction of the telegraph their couriers were frequently in advance of the government. The advantages of their system and their strength were clearly shown when in 1848 they met conjointly a loss of several mil¬ lions, which would have crushed any other house, but which the enormous scope of their resources enabled them to meet without diffi¬ culty. The members of each

succeeding genera¬ tion are admitted into the firm and much inter¬ marriage among cousins indicates that the family is destined long to retain its control of Euro¬ pean finance. Lionel Nathan, b. 22 Nov. 1808; d. 3 June 1879, was the first Jew admitted to the English Parliament, and his son Nathaniel Mayer, b. 8 Nov. 1840; d. 13 Tune 1905, was created a baron in 1883, who was succeeded by his son, Lionel Maitland, b. 8 Feb. 1868, as second baron Rothschild. Consult Reeves, (The Rothschilds (1887) ; (Das Haus Rothschild) (1857) ; Von Scherb, (Geschichte des Hauses Rothschild* (1893); Michaud et Villeneuve, *Histoire de Saint-Simonisme et de la famille de Rothschild* (1847).

ROTHSCHILD, Alfred Charles de, Eng¬ lish financier: b. 1842; d. February 1918. He was educated at King's College School, London, and Trinity College, Cambridge. He was a partner in the firm of N. M. Rothschild and Sons, and from 1868 to 1890 a director of the Bank of England. The last of the three brothers who had presided many .years over the London branch of . the family, he was the second son of the late Baron and Baroness Lionel de Rothschild, and a brother of the late Lord Rothschild. All the brothers died during the war.

ROTIFERA, a group of small, usually microscopic animals, are familiarly known as wheel animalcules, because of the presence at the anterior end of a crown of cilia which in their vibration suggest the rotation of a wheel. The opposite (posterior) and of the body is pro¬ longed into a stalk (foot), which is the organ of attachment in sessile forms or is used in walking by such as are free. It is often seg¬ mented and may be terminated by one or two pointed toes, while a cement gland in the foot aids in fixation. The anatomy is simple and usually easily studied in the living animal. In general it recalls that of the embryonic anne¬ lid with which the rotifers are often genetically connected (see Trochelminthes). A vas¬ cular system is wanting and the excretory sys¬ tem consists of <(flame-cells .® The sexes are separate, but the males are rare, degenerate and needed only for the production of the fertilized winter eggs. Summer eggs develop

parthenogenetically. The rotifers are abundant and widely distributed, but confined almost en¬ tirely to fresh water. They were among the very first of microscopic organisms to receive attention, and have always been favorite ob¬ jects of study. A few forms are parasitic in habit and almost all are capable of desiccation and subsequent revival.

ROTOGRAVURE, a process used in re¬ producing photographic illustrations by means of engraved cylinders, the machine printing both sides of the sheet, illustrations and print¬ ing, at the same time. The paper is fed from rolls and the machine delivers it printed, dried and cut into sheets. The process is invaluable because of the rapidity and low cost with which perfect work may be produced, and makes possible the elaborate illustrated supplements of newspapers and magazines. The repro¬ ductions are exact and the costly ˆmake-ready® work required with flat plates is eliminated. The principle of the machinery is the same as in that used for wall-paper printing and silk printing.

ROTTECK, rot'tek, Karl Wenceslaus Ro-decker von, German historian and publicist : b. Freiburg in Baden, 18 July 1775; d. there, 26 Nov. 1840. He was educated at the Uni¬ versity of Freiburg, early turned to the study of history and in 1798 was appointed professor of that department in Freiburg University, a chair exchanged in 1818 for that of natural and international law. In 1819 he was chosen by his university as their representative in the first chamber of the states of Baden, and there proved an ardent champion of political reform. He was one of the founders of Der Freisin-nige, a journal with strong democratic lean¬ ings, and brought upon himself the displeasure

of the Conservative party, who compelled him to resign his professorship and discontinue the editing of all public prints for five years. An ineffectual attempt was made to exclude him from the second chamber of the states, to which he had been elected representative in 1830 ; but he continued to hold this seat till his death. His chief work is (Allgemeine Weltgeschichte> (1813-27). Numerous translations of the original work, or an abridgment published by Rotteck, entitled (Auszug aus der Weltgeschichte,* have appeared in most European languages. It is a critical narrative of promi¬ nent events written from a liberal point of view. Other works are (Lehrbuch des Vernunftrechts und der Staatswissenschaften) (1829-30) ; (Lehrbuch der okonomischen Politik) (1835) ; (Kleinere Schriften) (1829-30) ; and, with Welcker, a (Staatslexikon) (1834-44).

ROTTENSTONE, a decomposed mineral substance, consisting chiefly of alumina with about one-ninth of carbon and half as much of silica. It is supposed to be formed almost wholly by decomposition of shale, and is chiefly found in Derbyshire, England, in South Wales, and near Albany, N. Y. It is either grayish, blackish or reddish-browm in color, is soft and easily scraped to powder and is much used for cleaning and polishing metallic surfaces, glass, *etc.* The term rottenstone is now used to in¬ clude the tripoli of commerce (first imported from Tripoli, Africa), and also any kind of silicious material suitable for the same pur¬ poses.

ROTTERDAM, rot'er-dam (Dutch, rot¬ ter-dam'), Netherlands, one of the chief cities and busiest ports of the country, 36 miles by rail southwest of Amsterdam. Important water¬ ways connect the town with the sea and with the interior. Thus vessels of deep draft may approach quite near, and the amount of tonnage entering Rotterdam (including that which is connected with the inland traffic) is only sur¬ passed by London among European ports. The Hoog Straat, built on the protecting dike, di¬ vides the city into Binnenstad and Bintenstad. The intersecting canals cut the Bintenstad into islands. The canals or <(havens® are Rotter¬ dam's streets, generally speaking, and the princi¬ pal buildings line the main <(havens.® In the Groote Markt is a statue to Erasmus, who was a native of Rotterdam. Saint Lawrence Church, founded in 1414, contains an excellent organ and some fine marble monuments to celebrities. There is an academy of fine arts, various mu¬ seums and schools of navigation, music and tech¬ nology. There are also zoological gardens and a public park. The modern public buildings form a remarkable contrast to the quaint oldtime wooden gabled houses. Rotterdam carries on an active foreign and domestic trade with her colonies, Europe and America. The im¬ ports include native produce from her eastern and western colonies, and grain, coal, oil, seeds, *etc.* The exports are linen, flax, dairy products, gin and manufactures. Rotterdam boasts many flourishing mills, shipbuilding yards, ironworks and distilleries. Pop. 417,800.

ROTTI, rot'te, ROTTEE, or ROTTO, an

island belonging to the Netherlands, in the Indian Ocean, northwest of Australia and south¬ west of Timor Island. It is of volcanic origin; its greatest length is 36 miles, and greatest

width 11 miles; area, 655 square miles. The surface is nowhere above 800 feet high. It has a bold, rocky coast ; the surface of the in¬ terior is undulating and the soil is very fertile. The lontar, or palmyra palm, furnishes a juice which is one of the principal articles of food. Maize, rice, millet, cotton and tropical fruits are plentiful, and cabinet woods are exported. Horses, goats, sheep, pigs and buffaloes abound. Edible birds' nests and wax are also exported. The natives, supposed to have come originally from Java, are a fine-looking race. Pop. SO, 000.

ROTTMANN, rot'man, Carl, German painter: b. Handschuchsheim, near Heindelberg, 11 Jan. 1792; d. Munich, 6 July 1850. He early established himself at Munich, but finding little congeniality in the studies of the academy, interested himself in the natural scenery of the country, which formed the environs of the city, and by his independent studies he actually in¬ stituted a new school of German landscape. His masterly pictures attracted the attention of King Louis, who engaged him to paint a series of Italian landscapes; and his frescoes, executed between 1829 and 1833 in the arcades of the palace gardens, are remarkable for color and masterly power in line. Among his oil paint¬ ings may be mentioned (The Acropolis of Sicyon) and his (View of Corfu, > now at Mu¬ nich in the new picture gallery; (The Fountain of CallirrhoeP at Munich; (Perugia) in the National Gallery at Berlin. While he was a powerful and imaginative painter in oil, his chief claims to recognition in modern art his¬ tory are his mastery of water colors and his skill in genuine naturalism.

ROUBAIX, roo-ba, France, in the depart¬ ment of Nord, six miles northeast of Lille, is a prosperous manufacturing town, containing many mills and factories, dye works and tan¬ neries. Its public buildings are unimportant. Its woolen and linen manufactures and its carpets are celebrated. Pop. 122,700.

ROUBILLAC, roo-be-yak, Louis Frangois,

French sculptor: b. Lyons, about 1695; d. Lon¬ don, 11 Jan. 1762. He settled in England about 1720, and a monument designed by him for the Duke of Argyle in Westminster Abbey brought him into great repute. Among his monumental works are statues of Bishop Hough in

Wor¬ cester Cathedral; of Sir Peter Warren; of Handel in Westminster Abbey; of Shakespeare in the British Museum, and of Sir Isaac New¬ ton at Cambridge.

ROUCOUYENNE, roo'koo yen', or ROU-COUENNES, a South American Indian tribe of Cariban stock, living in French Guiana around the upper waters of Maroni River. They take their name from roucou, the French name for a vegetable with the juices of which they paint their skins. They are thought to be remnants of the true Caribs, or Galibis, who have taken refuge in the interior in order to lead their lives according to their own cus¬ toms. They are said to permit the marriage of father and daughter and brother and sister. Consult Brinton, D. G., (The American Race >

(1891).

ROUEN, roo-on, France, chief town of the department of Seine-Inferieure, situated on the right bank of the Seine, 87 miles southwest of Paris, ranks next to Lyons as a manufacturing

city, and is one of the most attractive provin¬ cial towns of the republic. Rouen possesses much interest in its public buildings, many of which are almost perfect specimens of Gothic architecture. They include the venerable cathe¬ dral of Notre Dame, the product of centuries of construction; begun in 1220 under Philippe Au¬ guste, it has seen many vicissitudes, but its im¬ posing fagade surmounted by lofty towers, its richly decorated walls, its exquisite wood carv¬ ings, fine sculpture and beautiful rose-windows render Notre Dame one of the most remarkable and artistic of Christian temples. Among others are the abbey and church of Saint Ouen, also in the Gothic style, whose aerial tower terminates in a crown of fleurs-de-lis ; the church of Saint Maclou, a fine specimen of florid Gothic; the Tour de la Grosse-Horloge ; the Palais de Justice, of the 15th century, re¬ markable for the delicacy and boldness of its construction ; the Hotel de Bourgtheroulde (15th century), with fine reliefs; the archiepis-copal palace ; the musee or picture gallery, con¬ taining a fine collection of paintings bv French masters, and the ancient Halles o-r market build¬ ings. There is a large library and several museums of scientific collections. In the Place de la Pucelle Joan d'Arc was burnt. Rouen is the birthplace of Corneille, Fonternelle, Boiel-dieu and Flaubert. It is the see of an arch¬ bishop and seat of law courts, and

possesses a chamber of commerce, an exchange, mint and schools of science, art and the higher profes¬ sions. The staple manufacture is cottons, in every form, one class of which is so specialized as to be known as rouenneries. Besides woolen goods, machinery, chemicals, etc., there are nu¬ merous industrial works for weaving, refining and smelting. The location of the city favors trade. The main articles are corn, flour, wool, cotton, coal, petroleum, wine, brandy, colonial produce and manufactured goods. Rouen was built before the conquest of Gaul by the Ro¬ mans. It was captured and pillaged by the Normans in the 9th century. Afterward it was long held by the English until 1449. Pop.

125,000.

ROUGE, roo'zha, Oliver Charles Camille Emmanuel, Vicomte de, French Egyptologist: b. Paris, 11 April 1811; d. Bois-Dauphin, Sarthe, 27 Dec. 1872. He was educated at the College de Saint-Acheul and afterward devoted himself to the study of Egyptology, early gain¬ ing a reputation as an authority. He became conservator of the Egyptian Museum at the Louvre in 1849, and professor of Egyptian areheceology at the College de France in 1860. He made important advances in the translation of Egyptian hieroglyphics, discovering the pro¬ totypes of the Semitic alphabet in the early Egyptian hieratic; and made other valuable con¬ tributions to the knowledge of early Egyptian history and religion, as well as formulating an improved system for the study of Egyptian grammar. Author of (Examen de l'ouvrage du chevalier de Bunsen : Le place de l'Egypte dans l'histoire du monde) (1846-47); (Memoire sur I'inscription du tombeau d'Ahmes) (1851) ; (Rituel Funeraire des anciens Egyptiens) (1861-63) ; (Memoire sur l'origine Egyptienne de la alphabet Phenicien) (1874) ; (Chrestomathie Egyptienne } (4 vols., 1867-76) ; (In-ROUGE — ROUGH-WINGED SWALLOW

scriptiones hieroglvphiques copiees en Egypte5 (1877-79), *etc.*

ROUGE, roozh, a cosmetic prepared and used to impart artificial bloom to the cheeks or lips. It is applied by means of a camel's hair pencil, puff-powder or a hare's foot. When rouge is properly prepared,

i’t is said that its application does not injure the skin. Jeweler’s rouge is an impalpable preparation of oxide of iron obtained by heating the yellow oxalate of iron till it decomposes, carbonic acid escaping, and only a red powder being left. It is used for polishing silver and for this purpose should be of the finest quality.

ROUGE ET NOIR, roozh a nwor, or TRENTE ET QUARANTE, tront a ka-rant, a modern game of chance played with the cards belonging to six complete packs. The punters or players stake upon any of the four chances: rouge , noir, couleur and inverse. The banker then deals a row of cards for noir, until the ex¬ posed pips number between 30 and 40 (court-cards count 10, aces 1), and a similar row for rouge. That row wins which most nearly ap¬ proaches the number 31, and players staking on the winning color receive their stake doubled. Couleur wins if the first card turned up in the deal is of the winning color; in the contrary case inverse wins. When the number of pips in both rows are equal it is a refait, and a fresh deal is made ; but if both happen to count ex¬ actly 31 it is a refait de trente-et-un, and the banker claims one-half of all stakes. This last condition places the banker at an advantage cal¬ culated to be equal to about lp* per cent on all sums staked.

ROUGET, Georges, zhorzh roo-zha, French painter: b. Paris, 2 May 1784; d. there, 9 April 1869. He studied at the ficole des Beaux Arts and later under David, who em¬ ployed him to finish many of his pictures. He became in consequence an imitator of that mas¬ ter. He painted a large number of portraits, those of Louis XVIII and of Charles X being noteworthy and historical subjects. Of the lat¬ ter are (French Princes Paying Homage at the Cradle of the King of Rome5 (1812) ; (Death of Saint Louis5 (1817), at Versailles; (CEdipus and Antigone5 (1819), at Rouen; (Francis I Pardoning Rebels of La Rochelle5 (1822) ;

(Marriage of Napoleon and Marie Louise5 (1837) ; (Napoleon Receiving the Decree of the Senate Proclaiming Him Emperor5 (1838) ; (Death of Napoleon5 (1846). Several of the churches of Paris contain religious subjects painted by him, but the major part of his work may be seen at the Versailles Museum.

ROUGET DE LISLE, roo-zha de lei, Claude Joseph, French song-writer: b. Lons-le-Saulnier, France, 10 May 1760; d. Choisy-le- Roi, 27 June 1836. He published (Fifty French Songs, Words of Various Authors, Set to Music by Rouget de Lisle5 (1826), etc., but is chiefly remembered as the author of both the words and music of (the Marseillaise5 (q.v.).

ROUGH-LEG, a buzzzard-hawk of the genus Archibuteo, especially A. lag opus, so called because feathered down to the toes. It is known throughout the northern regions of both continents, and is typically whitish, streaked with rustred, but the American form best known is a melanotic variety (A. lagopus

sancti-johannis) , which frequents the maritime districts of the Atlantic Coast and is less often seen in the interior, except northerly. The western United States and Pacific Coast have a second species (A. ferrugineus) , called in Cali¬ fornia squirrel-hawk, which is rusty brown, marked with gray, white and black, or some¬ times plain dark chocolate brown. These hawks are large (23 to 24 inches in length) and of fierce and noble appearance, but 'they have none of the dash and spirit of the falcons and in¬ deed seem inferior to the buteos in this respect. Their quarry, though diversified, is always humble; they prey upon various field-mice and other very smair quadrupeds, lizards and frogs and even insects, rarely attacking birds of any kind, and then only the most defenseless. Open fields, especially in the vicinity of water, are their favorite resorts. They appear heavy and indisposed to active exertion ; flying slowly and heavily and often remaining long motionless on their perch. They show some analogy to the owls in points of structure, as well as in their partially nocturnal habits. Wilson observes that it habitually courses over the meadows long after the sun has set, and Audubon calls it the most nocturnal of our species. The nest is ordi¬ narily built of sticks, etc., in a high tree; some¬ times, however, on cliffs. The eggs, three or four in number, measure about two and one-third by one and three-quarter inches, largely blotched with different shades of brown, some¬ times mixed with purplish slate markings.

ROUGH AND READY, a popular nick¬ name applied to President Zachary Taylor dur¬ ing the Mexican War.

ROUGH RIDERS, a name borne by the First Regiment of United States cavalry and also by the Second United States volunteer cavalry in the Spanish-American War. The original Rough Riders were the men who car¬ ried messages through the Western States be¬ fore the organization of the pony express in 1859, and the name was used by William F. Cody in his <(Wild West55 show, which con¬ tained a ((Congress of the Rough Riders of the World.55 The army regiments were thus named because of the great number of Western ranch¬ men in their ranks, and they played a prominent part in the Spanish-American War. The first regiment was organized by Leonard Wood,

who was commissioned colonel, and Theodore Roosevelt became lieutenant-colonel. Before the disbanding of the regiment in 1898 a Rough Riders' Association was formed, to which all members of the regiment are eligible, the right of membership to descend to the eldest son. See Roosevelt, Theodore; and Wood, Leonard.

ROUGH-WINGED SWALLOW;, a small blackish migratory swallow (Stelgidopteryx serripennis) of the United States generally, where it nests in summer in holes in banks, in crevices of rocks, etc., and has the general habits of the bank swallow (q.v.). The genus, of which several other species are known in Central and South America, is peculiar in having the outer web of 'the first wing-quill converted into a series of stiff recurved hooks, which may be supposed useful in creeping into their holes and in clinging to vertical or overhanging surfaces. Considering the general likeness of the bird otherwise to the bank swallow, the fact that this species often makes its nest and lays

its pure white eggs in some cranny about' a bridge or building is noteworthy. Consult Coues, (Birds of the Colorado Valley) (1878).

ROUGON-MACQUART, roo-gon ma-kar, Les, a series of 20 novels by fimile Zola, relat¬ ing the history of a family under the Second Empire and published in 1871-93. The novels were intended to form a scientific study of heredity as well as a photograph of French social life. The series begins with (La for¬ tune des Rougons> (1871), and this was fol¬ lowed by (La curee) (Rush for the Spoil: 1872) ; a studv of the financial world of Paris at the time Haussmann laid out the boulevards) ; (La conquete de Plassans) (1874) ; (La ventre de Paris) (The Markets of Paris; or Fat and Thin: 1875); (La faute de-l'Abbe MoureC (1875) ; (Son excellence Eugene Rougon> (1876), a story of political life; <L'assomoir) (Drink: 1877), a story of life among the work¬ men of Paris; (Une page d,amour> (1878), a physical and psychological study of the various phases of a woman's passion; <Nana) (1880), a study of the life of a courtesan and actress; <Pot-Bouille) (1882), a study of the life of the bourgeoisie; (Au bonheur des dames) (The Ladies' Paradise: 1883), a study of the mam¬ moth

department stores; cLa ioie de vivre) (1884); (GerminaP (Master and Man: 1885), a study of life in the mines; <L'oeuvre) (1886), a study of artist life; (La terre) (1888), a study of peasant life and the greed for land; (Le reve) (1888) ; (Le bete humaine) (1890), a study of railway life; (L'argent) (1891), a study of stock speculation; (La debacle' (The Downfall: 1892), a study of the Franco-Prus- sian War and the Siege of Paris; (Le Docteur Pascal' (a pitiful story of incest: 1892). In this last story Pascal Rougon collects all the data relating to his family and sums up their history.

ROUHER, Eugene, e-zhan roo-ar, French statesman: b. Riom, 30 Nov. 1814; d. Paris, 3 Feb. 1884. He studied law and practised his profession in Riom until his election to the Legislative Assembly in 1849. He became a confidant of Napoleon III and was appointed Minister of justice. In 1863 he was made Minister of State and in 1870 became presi¬ dent of the Senate and chief of the Napoleonic Cabinet. In 1860 the famous treaty with Eng¬ land was effected largely through his instru¬ mentality in which the free trade policy of Napoleon was inaugurated. His activity in state affairs continued until the fall of the em¬ pire, when he fled from France. In 1872 he re¬ turned as the Corsican representative in the Assembly, and remained in office until 1875. He was to the last'the leader of -the Bonapartists.

ROUINS, The Forty-seven, a popular Japanese historic-romantic drama, based on the custom of katakiuchi (q.v.).

ROULERS, roo-la (Flem. Rousselaere) , Belgium, on the Mandel, 17 miles south of Bruges. Up to the outbreak of the Great War it carried on an active industry in the manufac¬ ture of textiles and a trade in linen, chicory, *etc.* Pop. 25,000.

ROULETTE, roo-let', in geometry, the path of any point in a moving plane when a given curve in the latter plane rolls without sliding on a given curve in the former. See Cycloid; Trochoid; Hypocycloid.

ROULETTE, roo-let, a French game of chance, in which a small ivorv ball is thrown off by a revolving disc into one of 37 or 38 compartments surrounding it, and numbered from 1 to 36, with one or two zeros. Players who have staked upon the number of the com¬ partment into which the ball falls receive 36 times their stake ; less if they have staked upon more than one number. There are also other

chances on which stakes may be placed.

ROUMANIA, a variant spelling of Ru¬ mania (q.v.).

ROUMANILLE, roo-ma-nel-e, Joseph, modern Provenqal poet: b. Saint-Remy, near Avignon 1818 ; d. 1891. He was the first French poet to conceive the idea of reviving, as a liter¬ ary tongue, the local dialects of southeastern France. Accordingly he gathered round him an enthusiastic band of friends, and with their as¬ sistance collected materials for a grammar and lexicon and also founded a consistent system of orthography. It was in his program to produce, and favor the production of, genuine poetry, such as would speak to the hearts of the peasantry to whom the dialect was vernacular. In 1852 he edited a collection of Provengal poems by several authors under the title (Li Provengalo.' It was mainly under his inspira¬ tion that the society of the (<Felibres" was formed, and he was the second president of its consistory. His (Letters,' edited by Ritter, were published 1894-95, and biographies have been written by De Bouchard (1896) and Ferris (1894).

ROUND, William Marshall Fitts, Amer¬ ican journalist and reformer: b. Pawtucket, R. I., 26 March 1845 ; d. Acushnet, Mass., 2 Jan. 1906. He was educated at Harvard, became a journalist, and engaged actively in prison re¬ form. He had served as United States delegate to various European prison congresses, was director and corresponding secretary of the National Prison Association, which he reorgan¬ ized, and he also organized the Burnham Indus¬ trial Farm at Canaan, N. Y. He was the originator of the ftMill" system of awards, since adopted in many institutions both at home and abroad, and was editor of (Lend-a-Hand Rec¬ ords He wrote <Achsah) (1877) ; (Child Mar¬ ian Abroad' (1880); (Rosecroft' (1884); (Torn and Mended' (1885).

ROUND, a short simple musical composi¬ tion, written generally for three or more voices on the same clef. Each voice takes up the melody after the first has sung the first phrase or so, the third following the second, as it followed the first, and so on, until after a cer¬ tain number repetitions the signal is given to stop. It is evident that the melody must be so constructed that each phrase must harmonize with the other, so that, when all the voices are singing, a three-or four-part harmony is heard.

ROUND ROBIN, a written protest or remonstrance, signed in a circular form by sev¬ eral persons, so that no name shall be obliged to head the list. This method of bringing griev¬ ances to the notice of superiors was first used by French officers, whence its derivation from

rond rnban, ((round ribbon.”

ROUND TABLE, The. See Arthurian Legends.

ROUND TOWERS. See Tower, Round.

ROUNDABOUT PAPERS, The, the title

of a work by William Makepeace Thackeray. He became editor of the Cornhill Magazine in 1859 and (The Roundabout Papers* were sketches for this periodical. They appeared simultaneously, between 1859 and 1863, with cLovel the Widower* and (The Adventures of Philip, } and exemplify the author’s best quali¬ ties as an essayist.

ROUNDELAY. (1) A song of any sort

in which a line, refrain or idea is constantly repeated. (2) The tune of such a song. (3) A dance in a circle. (4) Specifically, a fixed verse-form, originating in France, and better known as the rondeau (q.v.).

ROUNDERS, a game played with a bat and a ball by two parties or sides, on a piece of ground marked off into a square or circle or pentagon, with a batter’s station, and three (or more) goals or bases at equal distances. On the ball being thrown toward him the batter tries to drive it away as far as he can and run completely round the goals, or over any one of the four parts, before the ball can be thrown back to the batting station. The batter is de¬ clared out if he fails to secure a run after having had three balls, if a fielder returns the ball so as to strike him while running, or if the ball from his bat is caught in the air by one of the fielders. See Baseball.

ROUNDFISH. See Whitefishes.

ROUNDWORMS, a common or semi-scientific designation for certain slender cylindri¬ cal or spindle-shaped worms mostly parasitic. The term is sometimes applied to the phylum N emathelmifithes (q.v.) and again restricted to the class Nematoda (q.v.), also called the true

roundworms. Some of the species included in these subdivisions are very slender and to such the term threadworms is applied though this designation is regarded by some as equivalent to roundworms. In medical usage the term roundworm is employed to designate especially a few well-known human parasites that fall within the general group of Nematoda. The most famous is the stomach worm or common roundworm, Ascaris lumbricoides, which as the name suggests has a certain external likeness to the earthworm. It has been known since the days of Egyptian and Greek medicine as a fre¬ quent guest in the human intestine, especially in children. The parasite is 15 to 40 centimeters long by three to five millimeters thick, the male being much smaller than the female and show¬ ing two projecting spicules near the posterior end. It is distributed over the entire world, though more abundantly in the warmer regions and in the country than in colder latitudes and in the cities.

The eggs are covered with a very heavy triple shell, the outer layer being rough and mammillated. Within this the embryo may live safely for several years if no chance is offered for further development. The latter begins when the egg is taken into the stomach of the host and its introduction is due to the use of contaminated vegetables or fruits or of impure drinking water. It has been shown recently that the embryos which hatch out in the stomach penetrate to the lung of the host and after a period there return to the intestine where

they become sexually mature and the life cycle is complete. While the presence of such parasites may not be fatal, they exert a toxic influence on the host, and give rise to reflex nervous symptoms of a serious char¬ acter so that prompt measures should be taken under the advice of a physician for their removal. Similar species are found in the pig, sheep, cat, dog and horse, and some of them rarely occur in man. The pinworm, Oxyurias vermicnlaris, is less frequently spoken of in medicine as a roundworm though it is a closely related member of the group of Nematoda. It inhabits the rectum and like Ascaris is most common in children. It is a much smaller worm, measuring only 3 to 12 millimeters in length. It has been known from remotest antiquity' as a cosmopolitan parasite of man and is more abundant in the cities than in the country. An intense itching is induced by its presence and if large numbers are pres¬ ent this results in a serious inflammation which may lead to onanism or other similar disturb¬ ances. For a description of the group see Nemathelminthes, Nematoda, Gordiacea, Acan-thocephala. Particular species are discussed un¬ der Filariasis, Guinea—worm, Parasitism, Tri¬ china. For fuller data on these worms

consult special works on animal parasites and parasitic diseases.

ROUP, roop, an infectious disease of the respiratory passages of poultry, resembling diphtheria in man, but of different origin. It progresses rapidly and is frequently fatal. It has a catarrhal character at its first appearance, accompanied by a cough and with a discharge from the nostrils which quickly becomes fetid. The eyes become closed and the head often swells, while cankers of a diptheritic appearance affect the throat and mouth and may cause death by choking. The most rigid precautions in isolating diseased members of a flock should be observed and disinfection of the premises should follow. An injection of a solution of copper sulphate, one-half ounce to a quart of water, is sometimes effective as a remedy, but at times it becomes necessary to destroy a flock and start with fresh stock on thoroughly dis¬ infected premises. Consult Salmon, Umport-ant Poultry Diseases) (United States Depart¬ ment of Agriculture, Farmers' Bulletin No. 530, 1914) ; Kaupp, B. F., (Poultry Diseases and Their Treatment (1914) ; Pearl, Surface and Curtis' (Diseases of Poultry) (1915).

ROUQUETTE, roo-ket', Adrien Emman¬ uel, American Roman Catholic priest and author: b. New Orleans, La., 13 Feb. 1813; d. there, 15 July 1887. He was educated in France, where he studied law, and was graduated from the University of Rennes in 1833. Returning to America he abandoned law for the priest¬ hood and his cherished career as a missionary to the Choctaw Indians, among whom he had spent some years in his boyhood. In 1859 he established a mission in the Indian village at Bayou Lacombe, and thenceforth devoted his life to the Choctaw people, by whom he was greatly beloved. His writings include (Les Savanes, Poesies americaines* (1841) ; (Poemes patriotiques) (1860) ; Catherine Tegehkwitha)

(1873).

ROUS, or ROUSE, roos, Francis, English Puritan: b. Dittisham, Devonshire, 1579; d.

Acton, 7 Jan. 1658-59. He was educated at Oxford and at Leyden ; and lived for a num¬ ber of years in Cornwall, engaged in writing and theological study. He was a member of Parliament from 1625, and in 1657 was made a lord of Parliament. He was a supporter of Cromwell ; and, originally a Presbyterian, be¬ came an Independent in religion. Of his ex¬ tensive religious writings (Mystical Marriage Between a Soule and Her Saviour > (1635), gives perhaps the clearest exposition of his religious beliefs. He is remembered for his (Psalms of David in English Metre> (1643), which were authorized by Parliament for gen¬ eral use and are still, in a revised form, sung in Scottish Presbyterian churches.

ROUSE, William Henry Denham, British educator: b. Calcutta, India, 30 May 1863. He was educated at Doveton College, Calcutta, and at Christ College, Cambridge. He was a Fellow at Cambridge in 1888-94; master of Rugby School in 1896-1901 ; and since 1901 has been headmaster of Perse Grammar School, Cambridge. Since 1903 he has also been uni¬ versity teacher of Sanskrit. He was acting professor of Latin at the Columbia Summer School, Teacher's College, New York, in 1912. He has made frequent use of translations in his writings. Author of (The Jataha* (under editorship of Professor Cowell, Vols. II, IV, VI, 1895, 1901, 1907) ; (The Giant Crab and other Tales of Old India* (1897); (Tales from the Isles of Greece) (1897) ; (Atlas of Classical Portraits * (1898) ; (A History of Rugby

SchooP (1898); <The Talking Thrush' (1899); (Greek Votive Offerings) (1902) ; Jinacaritam, or Life of Buddha) (1905).

ROUSES (rows'iz) POINT, N. Y., vil¬ lage, port of entry in Clinton County; on Lake Champlain, and on the Delaware and Hudson, the Rutland and the Grand Trunk railroads; on the boundary between the United States and Canada, about 160 miles north by east of Al¬ bany and 21 miles north by east of Plattsburg. A railroad bridge about one mile in length spans the portion of the lake between the State of New York and Grand Isle, in Vermont. The village has steamer connections with the Lake Champlain ports, and by way of the lake and the Richelieu River with many places in Canada. Rouses Point receives a large part of the cus¬ tom receipts of the Champlain district. Indus¬ trial activities include a large printing-house, railroad repair shops, lumber mills and machine shops. The Charbonneau Institute, a high school, public and parish schools and two pub¬ lic libraries are its chief buildings. Rouses Point was a noted locality in the discovery days, and at the time of the Revolution and the War of 1812. Just on

the frontier, on an island, is Fort Montgomery. Pop. 1,650.

ROUSSEAU, roo-so, Jean Baptiste,

French poet: b. Paris, 6 April 1670; d. Brussels, 17 March 1741. In 1701 he was admitted into the Academy of Inscriptions and Belles-lettres, and his lyric compositions procured him high reputation among the French literati; but his turn for satire and his quarrelsome temper later involved him in disgrace. He was found guilty of having written libelously agains La Motte and Saurin, and was exiled from France «in 1712. The latter part of his life was spent in the Netherlands, where he obtained a pen¬

s'on from the Duke of Aremberg, which he re¬ signed on having forfeited the favor of that nobleman. An edition of his works was pub¬ lished under his own inspection, by Tonson 1723, and since his death they have been often printed in various forms. One of the best edi¬ tions is that of Latour, with a commentary and life of the author (Paris 1869). His <CEuvres Poetiques* appeared with a commentary (1824), and (Contes inedits* ed. by Luzache (Paris

1881).

ROUSSEAU, Jean-Jacques, in point of in¬ fluence the most striking figure in modern French philosophy and literature: b. Geneva, 28 June 1712; d. Ermenonville, 2 July 1778. His mother died at his birth, so that in his own characteristic phrase his birth was the first of his misfortunes. His father was of unstable disposition and in his attitude toward his son wavered between over-fondness and neglect. He taught the lad his letters out of Plutarch and the French 17th century romances in his shop, where the two remained reading at times all night until they saw the swallows flying low under the eaves. Such indulgence hardly contributed to stabilize a temperament essentially unbalanced and to the end Rousseau was to worship the heroic and the romantic. He received very little regular training and ideas of rigorous discipline remained foreign to his life and thought, and we need not expect to find them in his later treatise on education. His father came into conflict with the author¬ ities, and later married a second time, and there followed a period when the lad seems to have been left to shift pretty much for him¬ self. For a little while he, with a cousin, was sent to a school in the country, kept by a re¬ tired

pastor, and later apprenticed to an en¬ graver where he was left largely to his mas¬ ter and his fate and where he learned the petty tricks and villainies of maltreated apprentices generally. On this whole period of his early life it is unwise to accept the Confessions,* our largest single source of information. Most of the facts there recounted are substantially correct and it is dangerous to assume, as has been done by Faguet and others, that he fre¬ quently misrepresented. It must be remembered that this eloquent autobiography was written half a century later when the author's mind had been unsettled by real or imaginary persecutions and when he believed himself in disgrace with fortune and men's eyes. For this reason, though he recounts and excuses the sordid events of his early youth, he looked back upon his childhood as a refuge, the first asylum of his innocence, and idealized his relations to his city, his father and his relatives, and theirs to him. That his boyhood in Geneva was spent in rela¬ tive isolation and unhappiness will be plain to the student who ponders the significance of that event which is usually emphasized as the turn¬ ing point of his life.

When 16 years old, he hurried back one Sunday from his walk in the country to see the city gates closed in his face. Up to this point there had been nothing in his story to indicate the rover or vagabond, nor any desire to ((see the world,® nor any unusual chafing under the restraints of his apprenticeship. That, however, there could not have been any bonds of affection to hold him to anything or anyone

within the gates of his native city is plain from his course. An untrained apprentice, absolutely without means, and as yet with no ulterior purpose or desire, he decides forthwith that he will not enter the home of his youth again, and he wanders about aimlessly in the environs. The parting caused no serious heart burnings, either to himself or to his father and relatives, and for the next quarter century he merely “stopped off® at Geneva once or twice in a most casual way. The varied life of vagabond¬ ing, study, desultory occupations and adventures of the next 20 years it is impossible to describe in brief or general terms. His two most ini-portant relationships were those formed with *Mme.* de Warens and with Diderot, toward the beginning and the end respectively of this long period in the maturing of his genius. The for¬ mer, an over-generous woman of purse and per¬ son, received him at her home where in the course of years he was in turn guest, protege, lover and intendant. From her he received perhaps his first lessons in gentility and while at her house developed an interest in music of which he was to become one of the great 18th century masters. There, too, especially at her country home, Les Charmettes, near Chambery in Savoy, he began his first serious reading and study. In the intervals between his sojourns with *Mme.* de Warens and after his departure from her home he made many long trips, usually afoot, tried many desultory means of support, had many adventures and naturally saw much of the under side of 18th century society, which seems never to have seriously attracted him and against which he later sincerely if ostentatiously revolted. In 1743 he accompanied the French Ambassador to Venice and first came into close contact with political life and institutions. After his return to Paris (1744), he became more intimate with Diderot, who probably quickened his interest in philo¬ sophical and social problems, though Rousseau at this time was still primarily a composer, poet and musician. He lived with a dull and un¬ attractive servant, Therese Le Vasseur, by whom he had five children whom he consigned to a foundling’s asylum. One day in 1749. on his way to visit Diderot, who was at the time confined at Vincennes because of his (Letter on the Blind, > he had that strange experience which was to inaugurate his amazing career as man of letters and reformer and beget his first epoch-making work. This contains in germ the ideas which he later softened and amplified and provides the best starting point for the study of his philosophy.

Before considering it in detail certain gen¬ eral considerations must be

borne in mind. The greatness of Rousseau is due to the fact that his work marks the end of one era and the beginning of another. We may admit, as re¬ cent studies have shown, that the isolated ele¬ ments, the disjecta membra of his philosophy, are to be found in predecessors and contem¬ poraries. It is none the less true that he marks the end of classicism in literature and of medi¬ aeval theories of the rights of empire and church in politics and religion. He tended to break the hold of all external sanctions in state, church, literature and society. His atti¬ tude toward the past is in general that of the modern radical. He starts on the other hand that immense enthusiasm for individual lib¬

erty and emotional participation in life which is to be the most characteristic feature of ro¬ manticism. He will exalt freedom as against any externally constituted authority ; natural impulse as against discipline, and the indi¬ vidual's feeling (which he was often to identify with conscience) as against any convention of society. Phases of this spirit were to exert extraordinary influence in Germany on Herder, Schiller and Kant, and in England on men like Godwin and Wordsworth, while in France its first powerful expression is to be found in the destructive enthusiasm of the Revolution. Such an attitude was essentially dynamic in an age that clamored for new principles, though it was weak on the constructive side, for it lacked elements of cohesion, and it was fraught with danger wherever, as only too often, it made the individual and not mankind the point of reference in all human relationships and actions. For all its dangers, however, it is hardly too much to say that this attitude was the most powerful regenerative force of the late 18th and 19th centuries. It is as contribu¬ tory to this general body of doctrine that each of Rousseau's works should be judged if we are properly to gauge its historical importance. We have seen that by temperament and ex¬ perience he was already peculiarly fitted to become its champion. He was essentially the novus homo, the man without attachments, who was as strange to the highly socialized life of 18th century Paris as a man from Mars. By temperament he was averse to discipline and control. The circumstances of his life had not as yet, indeed were never, to force either upon him. He had from a boy been at home in nature and was ever to feel awkward and con¬ strained in society. His posture was, there¬ fore, one of attack and he had been endowed with an extraordinary and as yet untried gift of eloquence.

Upon his way to Vincennes his eye fell upon an announcement that the Academy of Dijon was offering a prize for the best discourse on

the subject whether the arts and sciences have contributed to improve morals. Putting the question thus sharply before him seems to have released all of his pent-up social antagonisms and as he tells the story he fell in a trance and began to write feverishly at his first famous essay. Naturally he answered the question with a ringing negative. The development of the arts and sciences, he said, not only did not improve man in habits and morals, but he im¬ plied that with their progress man deteriorated. Society corrupted man's native goodness. The discourse is naturally full of inconsistencies and it is less well written than its successors. Its importance, however, lies in its purport. It is this that makes it the harbinger of a new dispensation, for it presents society and exist¬ ing institutions as the perverters of mankind. In other words it throws them upon the de¬ fensive and inaugurates the age of experiment and reform. His next discourse on (The Ori¬ gin of Inequality (1753) is a much better if less striking performance and in it he dis¬ tinguishes between natural and unnatural or social inequality. Its upshot very briefly is that the former, — inequalities of talent, natural en¬ dowment, etc., — are good and should be fos¬ tered, while the latter, — inequalities of social position, rank, inherited wealth, etc., — are evil,

back to the institution of private property and should be abolished. For some time be¬ fore 1750 Rousseau had been living in a position of relative comfort and had been received in the houses of the great. Possibly as the re¬ sult of illness and from a desire for notoriety as well as from a constitutional inability to accept restraint, he decided to ˆreform® and live the simple life. He made no attempt to recover his wardrobe, which had been stolen, gave away his watch and sword and dressed in simple garb. In 1756 he retired to a cottage near the forest of Montmorency. Here he broke with most of his old friends, including Diderot and his patroness, *Mme.* d'Epinay. In this, quiet neighborhood he pondered and wrote during the next six years his three great mas¬ terpieces, (The New Heloise,> <Emile> and (The Social Contract,* which were published in 1761 and 1762. His misfortunes now increased with his fame and the remainder of his life is a tragedy clouded certainly by fixed delusions, possibly by periods of insanity. The <Emile) was condemned in Paris and a decree pro¬ nounced against Rousseau which forced him to leave France for Switzerland. Geneva was no more tolerant and he suffered from real or im¬ aginary persecutions or both, and moves from place to place in a mood that approaches dis¬ traction. He is consumed by the desire to jus¬ tify himself and confute his enemies and his later works, (The Letters to M. de Males-herbes,* (The Confessions,* (Rousseau Judge of Jean-Jacques) and the <Reveries) are de¬ voted to this end. David Hume, who respected his genius, invited him to England, but here his delusions followed him and he accused his benefactor of conspiring with his enemies. He returned to France, where he lived for a time in disguise, and finally with Therese, whom he had now married, he comes back to live in Paris (1770) until his death at Ermenonville

(1778).

We have spoken in passing of the general spirit of his work and of its importance. Its general principles may roughly be stated as fol¬ lows : God is good, nature is good, man is good. The great governing forces of the world make for righteousness and virtue. Evil, therefore, is not

natural or fundamental, it is the result of perversion. Rousseau found its sources in the human institutions which have produced society and have begotten am¬ bition. His problem was, therefore, not so much to master or counter its possible effects as it was to eliminate evil altogether and pre¬ vent its irruption into a world of whose com¬ plex it is not an essential element. It is here that he links up with the Utopians of whatever age or clime. This being the case, Rousseau's insistence is not upon discipline and control. On every side, individual, social, educational, political, he believes in expression rather than repression. His ideal government is that which least checks the impulse and desire of the indi¬ vidual and gives him the maximum of direct control in all State affairs. His ideal system of education is that one which least hampers the development of the pupil's native bent. His ideal social life is that which ignores conven¬ tion and allows all characters, even of contra¬ dictory interests, to live in one hive of har¬ monious virtues. For this reason his novel, (The New Heloise,* instead of being the tragic

story Ox two men who love the same woman, is a wonderful but impossible idyll. Unre¬ strained self-revelation is exemplified in the (Confessions, * one of the most wonderful autobiographies in literature, and all told, prob¬ ably his most valuable permanent contribu¬ tions to pure literature. It remains not only a masterpiece of proud apologetics for a sorry and unhappy life, but the one indispensable document for him who would understand this strange sick genius who held so firmly and preached so eloquently his belief in the good¬ ness of God, of nature and himself. It was this subjectivity of his, this individualism, this willingness to indulge in lyric expressions of his own griefs and joys that furnished a glow¬ ing precedent for that ((pageantry of the bleed¬ ing heart® which was one of his greatest legacies to the later romanticists. His title as father of romanticism is further justified by his magnificent descriptions and glorifications of nature. Indeed in this respect the famous lines of Wordsworth,

" One impulse from a vernal wood

May teach you more of man

Of moral evil and of good

Than all the sages can."

are merely a later poetic restatement of the doctrine of this Genevan philosopher and man of letters. See Confessions, Les ; Emile; La Nouvelle Heloise; Social Contract.

The best complete edition of Rousseau's works in French is still that of Musset-Pathay (1823-26). John Morley's (Rousseau* remains in spite of its inadequacy, especially on the bi¬ ographical side, the most important study of the man in English. Frederika McDonald's (J. J. Rousseau* (2 vols.) is a well-intentioned but occasionally uncritical attempt to justify Rousseau against his enemies and gives irre¬ futable evidence of the plot of misrepresenta¬ tion. The important results of the recent at¬ tacks on Rousseau have been incorporated in Irving Babbitt's (Rousseau and Romanticism> (1919), an able indictment rather than an open-minded criticism. Many of the important recent studies themselves and the results of all appear in the volumes annually published by the Rousseau Society of Geneva, (Annales J. J. Rousseau,* which contains com¬ plete bibliographies. Of the longer recent works consult Ducros, (J. J. Rousseau, de Geneve a l'Hermitage* (1908) ; Vallette, (J. J. Rousseau, Genevois* (1911) ; Faguet, (Vie de Rousseau) (1911) ; Lemaitre, (J-J- Rousseau) (1907) ; Mornet, (Le sentiment de la Nature en France de J. J. Rousseau a Bernardin de St. Pierre) (1907). On Rousseau's philosophy consult Revue de Metaphysique et de Morale (Vol. NX).

Christian Gauss,

Professor of Modern Languages, Princeton University.

ROUSSEAU, Lovell Harrison, American

soldier and legislator: b. Stanford, Ky., 4 Aug. 1818; d. New Orleans, 7 Jan. 1869. He was admitted to the bar in 1841, engaged in practice at Bloomfield, Ind., and was a member of the Indiana legislature 1844-45. He served in the Mexican War and in 1849 opened a law office in Kentucky, and became famous as a criminal lawyer. In 1860 he entered the Kentucky sen¬ ate, but resigned to join the Union army. He was commissioned brigadier-general of volun¬ teers in 1861, promoted major-general in 1862,

and fought at Stone River, Chickamauga and Chattanooga. From 1863-65 he was as in com¬ mand of the district of Tennessee and success¬ fully defended Fort Rosecrans during the siege of Nashville. He took his seat in Congress in 1865, but in the following year resigned it in consequence of being reprimanded by that body for a public assault upon Representative Grin¬ ned of Iowa. He was, however, soon reelected and served another year. In 1867 he was ap¬ pointed brigadier-general in the regular army and assigned officially to receive Alaska from Russia and assume control of the territory. He was summoned from this post to testify in the trial for impeachment of President Johnson and was afterward until his death in command of the Department of the Gulf with headquarters at New Orleans.

ROUSSEAU, Philippe, French artist: b. Paris, 1816; d. Acquigny, 4 Dec. 1887. He studied under Gros, Berlin and Hippolyte Gar-neray, and first exhibited at the Salon in 1831. His early work was confined principally to landscapes; but he later painted animals, ex¬ celling in his pictures of monkeys, and also painted interiors, fruits and flowers with ex¬ cellent color and light effects and rare taste for beauty. Among his works are (The City Rat and the Field RaL (Medal, Salon, 1845) ; Hnterior of a Farmhouse) (1850) ; (Storks Taking a Siesta > (Luxembourg Museum) ; (Breakfast) (Valenciennes Museum) ; (Spring) (1869) ; (The Wolf and the Lamb* (1875), *etc.*

ROUSSEAU, Pierre Etienne Theodore,

French painter: b. Paris, 15 April 1812; d. Barbizon, near Fontainebleau, 22 Dec. 1867. He was a pupil of Remond (1826) and of Lethiere, but quickly parted company with all current theories of art, and showed himself an original interpreter of nature, while he fought the battle of the new landscape — ((paysage intime® — through the 13 years during which his pictures were excluded from the Salon by the Academ¬ ical Jury, which happily has since then been abolished. He traveled through the Auvergne and Normandy and painted the scenery with the main object of breathing human feeling into the colors and forms of external nature. He is the central figure of the Barbizon school and must be looked upon as the founder of the modern school of French landscape paint¬ ing, as opposed to the Romanticism of Claude Lorraine, Poussin and their followers. It has been well said of him: ((He occupied the high¬ est place because he was the most perfect master. The grand aspect of landscape and its tenderness are equally familiar to him. He ren¬ ders with the same mastery the smile of crea¬ tion and its terrors ; the broad open plain

and the mysterious forest ; the limpid, sun-bright sky or the heaping of the clouds put to flight by' storms; the terrible aspects of landscapes or those replete. with grace. He has under¬ stood all, rendered all, with equal genius. The greatest contemporary painters have each a particular stamp, Corot painting the grace; Millet, the hidden voice; Jules Dupre, the ma¬ jestic strength. Theodore Rousseau has been by turns as much a poet as Corot, as melan¬ choly as Millet, as awful as Dupre; he is the most complete, for he embraces landscape art

absolutely.® .

In 1848 he took up his residence on the

edge of the forest of Fontainebleau and deriyed most of his inspiration from the surrounding scenery. How he drew the motif of his work from this environment is seen in the fine pic¬ ture in the Metropolitan Museum, New York, (Edge of the Woods.) Among other char¬ acteristic works may be mentioned (View of the Valley of Paris and the Banks of the Seine) ; (The Forest Height of Compiegne* (1833); (Avenue of Isle-Adam* ; <Entrance to the Forest of Fontainebleau* (1862) ; and (Marsh in the Landes) (1854) ; the last two being in the Louvre. His early style was sketchy with some carelessness of touch, although absolutely sincere and impressional-istic. Later he indulged in excessive detail, and never seemed to know when his pictures were finished, yet all his landscapes were tinged with the deepest poetic spirit. He never really won recognition during his lifetime, however, and after an unsuccessful auction-sale of his works in 1861 thought seriously of seeking a home in some foreign capital. It is said that a sense of this depreciation wore away his health. Yet in the last year of his life he took the medal of honor and since his death the genuine merit of his pictures has been acknowl¬ edged and as early as 1873 his (Scene near Fontainebleau* was sold for $2,360. Consult Sensier, (Souvenir sur Theodore Rousseau* (Paris 1872).

ROUSSEAU'S CONFESSIONS. Jean-Jacques Rousseau. For us, who lived among scientific ideas familiarly apnlied, the name of Rousseau has lost its power to shock. Most of us have forgotten that to the eyes of the 18th century mankind appeared in the image of his makerj without body, parts or passions, and that to Rousseau belonged the discovery of man as he really is, with his structure as an animal, with his power as an idealist, with his limi¬ tations as a machine. The (Confessions* must, therefore, be read, first of all in order that we may appreciate the effect of this discovery upon a society whose view7 of

its own members had tended, until Rousseau appeared, to be dis¬ torted and sentimental. Secondly, it should be read because this presentation of a human being who felt himself to be different from other men became the starting-point for our own understanding of such human beings, and our belief in educating each according to his individual need. Lastly, it must be read because every school child in America owes much of the intelligent care of his training to the works of that unhappy, morbidly hypersensitive, little thief and coward of a Jean-Jacques. The serv¬ ice of truth is the service of God, and thus the impression which these often ugly (Confessions) made on thoughtful people was almost a religious impression. George Eliot, for ex¬ ample, speaks of their effect on herself as crucial. Anyone who looks into the depths of his own nature, as Rousseau did, may see the same scurry of ill-formed wishes seeking cover in darkness, and tremble to think how close he is to the brute. But this book is not only a record of morbid feelings : it is also an ac¬ count of a man's struggle with social injustice, told with emotional power, with a feeling for beauty and for nature, which heightened his style above the great accents of his time. This struggle continues ; it has changed and is yet

changing the face of the world. Rousseau has taught us all to feel sympathy for the individual who needs special training. The facts he gave about himself have become the classic material of modern educators. He describes an early life spent in miserable servitude to unworthy masters, lacking in health, self-confidence, equal friendships or steadfast purpose. The son of a Swiss watch-maker, he drifted about from situation to situation, never isecure in his patron's favor, and sick with rage at owing each advance in life to some base caprice or to his own servile weakness. His intense ego¬ tism became his only refuge, while faith in his own powers ultimately raised him above his vices. None of his critics has been more severe than he; and he knew that there was nothing in his circumstances to help him over¬ come his nervous tension, his irritable sensitive¬ ness. All these things he set down with close detail and unexampled beauty of language, de¬ scribing the play of life upon his nerves and imagination, his conflicts,

his errors, his rise to literary power. Although no translation of the <Confessions) exists which does it full justice, yet no book has had more influence on English literature, and its value deepens with the advance of psychology. Surely, it was his own individual struggle which lent such poig¬ nant emotion to that famous sentence of the Social Contract — ((Man is born free, yet every¬ where he is in chains.® It was his personal experience of that civilization which he felt was wrongly leading men away from nature, which caused his books to become the inspira¬ tion and his voice the trumpet call of modern democracy. We of to-day must, therefore, feel that Rousseau's delight in the beauty and dignity of Nature, his faith in the essential beauty and dignity of human life, draw him closer to us and serve to outweigh the dark and morbid moments of his narrative. Much of the smiling and liberal aspect which life to-day wears for any am¬ bitious youth has been gained for him by the work of this unhappy man, who never relin¬ quished or denied an ideal because he often fell so pitifully short of it. With a lacquey's vices and from a lacquey's condition, he yet man¬ aged to raise himself to a throne in the king¬ dom of ideas. Because he lived, the life of the young is happier than it was, and this fact should give pause to those who are shocked by his candor. Lord Morley is one of these, and Mr. Birrell thinks the ('Confessions* ought never to have been written, <(but written they were,® he adds, ((and read they always will be.® To say that a book will always be read seems to us a high form of praise; but surely the < Confessions5 need no justification. When we turn to the history of our own country, we hear the voice of Rousseau urging on the founders of the Republic: and it has even been said that Rousseau, by inspiring Jefferson, is the real author of the Declaration of Independence. The life, by himself, of one. whose ideas yet live in that Declaration and in the schools of the world, is full of interest, an interest height¬ ened because we now believe, with Jean-Jacques, that each of us is ˆdifferent,® and that those of us who are healthy, vigorous, living in the light, may be benefited by knowledge of the others, who — generally through no fault of

their own — are frail, abnormal, living under the shadow of mental or moral infirmity.

Anna Robeson Burr.

ROUSSEL, roo'sel, Gerard, French bishop and reformer: b. Vaquerie, near Amiens, about 1480; d. Mauleon, 1550. He studied at Paris, became a friend of Lefevre d'Etaples, and shared his exile when his

theories of Reforma¬ tion were the cause of his being driven to seek safety at Meaux in 1521. Later Roussel was himself compelled to flee to Strassburg to avoid imprisonment on a charge of heresy; but in 1526 he was recalled by Francis I and became court preacher to Margaret of Orleans. After her marriage to the king of Navarre in 1527 he became her confessor, and in 1536 he was ap¬ pointed bishop of Oleron. While a believer in reformation he held it not incompatible with continued connection with the Roman Church and under the protection of his patroness he occupied a sort of intermediary position be¬ tween the Reformation and Rome, although his writings and preaching were twice condemned by the Sorbonne. While preaching a sermon advocating a reduction in the number of church festivals he was attacked by fanatics and re¬ ceived injuries from which he died. Author of (Expositions* ; and a number of tracts and translations. Consult Schmidt, C., (Gerard RousseP (1845).

ROUSSELOT, roo-se-lo, Abbe Jean Pierre, French phonetician: b. Saint-Cloud, Charente, 1846. He was early engaged in teach¬ ing and as a curate and vicar, but studied at the University of Paris and took his degree in letters in 1892. He was appointed assistant professor of French philology at the Catholic Institute, Paris, in 1887 ; and established there the first course in experimental phonetics. He planned the laboratory of experimental pho¬ netics at the College de France and became its director in 1897. He invented a number of valu¬ able phonetic instruments and methods to aid the deaf and to correct impediments in speech. He edited Revue des patois Gallo-Romans in 1887-93. Author of (Principes de phonetique experimental (1897) ; (Precis de prononcia-tion franˆaise* (1902), *etc.*

ROUTH, Edward John, British mathema¬ tician: b. Quebec, Canada, 28 Jan. 1831; d. Cambridge, England, 7 June 1907. He went to England at the age of 11, was educated at Uni¬ versity College, London, and at Cambridge, and was elected a Fellow at Peterhouse, Cambridge, in 1857. He .was a famous mathematical tutor, 500 out of his 700 pupils becoming wranglers ; while for 22 consecutive years, 1861-82, the senior wrangler was trained by him. He was an examiner at both University College, London, and at Cambridge. With Lord Broughton he wrote (An Analytical View of Newton's Principia* (1855). He was also author of (Essay on the Stability of a Given State of Motion) (Adam's Prize, 1877) ; (Treatise on Rigid Dy¬ namics* (2 vols., 1860 ; 7th ed., 1905); treat¬ ise on Analytical Statics) (2 vols., 1891 ; 2d ed., 1896-1902) ; (Dynamics of a Particle)

(1898), *etc.*

ROUTHIER, roo'tya,' Sir Adolphe Basile,

Canadian jurist and author: b. Saint Placide, Quebec, 8 May 1839. He was educated at Laval University and was called to the bar in 1861,

He became queen's counsel in 1872 ; was ap¬ pointed judge of the Superior Court for Que¬ bec in 1873 and was named chief justice in 1904. He was also judge of the Vice-Admiralty Court of Quebec from 1897 until his retirement from the bench in 1906. He was knighted in 1911. He was known as a writer of essays, verse and travels. Author of the Canadian na¬ tional spng cO Canada* ; (A Travers l'Eu-rope* ; (A Travers l'Espagne* ; (Les Echoes* verse; (Le Centurion,* novel; (De l'Homme Dieu,* apology for Christianism, *etc.*

ROUTLEDGE, rout'lej, George, English publisher : b. Brampton, Cumberland, 23 Sept. 1812; d. London, 13 Dec. 1888. He established himself as a bookseller in London in 1836 and as a publisher in 1843. His house became fa¬ mous for its pioneer work in the publication of good books in cheap editions ; his <(Railway Library® selling at a shilling and presenting the works of Washington Irving, Fenimore Cooper, Bulwer Lytton and Benjamin Disraeli. Har¬ riet Beecher Stowe's (Uncle Tom's Cabin> was included in this series and sold more than 500,- 000 copies. Routledge's <(Universal Library,® edited by Henry Morley, also sold at a shilling a volume. The firm name, originally Routledge, Warne and Routledge, later became George Routledge and Sons. Its New York branch was established in 1854.

ROUVIER, roo'vya, Maurice, French statesman: b. Aix, 17 April 1842; d. 7 June 1911. He was educated for the law but en¬ gaged in business at Marseilles and in 1870 founded the anti-imperialist paper L'Egalite. He was elected to the Chamber of Deputies in 1871 and became a recognized authority on finance. He was Minister of Commerce and the Colonies in the Gambetta Cabinet in 1881— 82, and filled that post in the Ferry Cabinet in 1883-85. He was Premier and Minister of Finance in 1887, but his Cabinet fell through its attempt to shield President Grevy in the scandal connected with the

barter in the decora¬ tions of the Legion of Honor. He was Min¬ ister of Finance in the Tirard, Freycinet, Loubet and Ribot cabinets. The Panama scandals in 1892 involved his office and he was compelled to retire, but he was rein¬ stated in the Combes Cabinet in 1902. In 1905 he became Premier for the second time, and during the Moroccan crisis with Germany he took over the portfolio of Foreign Affairs. The Separation Law was enacted in his adminis¬ tration, putting into effect Rouvier's long fought-for separation of church and state, but his ministry did not long survive it, and in 1906 he was succeeded by the Sarrien Cabinet.

ROUX, roo, Pierre Paul Emil, French physician and bacteriologist: b. Confolens, Charente, 17 Dec. 1853. He was educated at the School of Medicine at Clermont-Ferraud and at the University of Paris. Since 1878 he has been connected with the Pasteur Institute, and has been director there since 1904. He as¬ sisted Pasteur in researches connected with the aetiology of carbon and the treatment of hydro¬ phobia ; is widely known for his work with diphtheria and the anti-diphtheria serum ; was engaged with Nocard in researches resulting in the discovery of the pneumonia microbe ; and likewise made researches into the nature and possibility pf prevention and cure of tetanus,

syphilis and other infectious diseases. He was elected to the Academy of Medicine in 1895, the Academy of Science in 1899 and in 1903 re¬ ceived the Osiris Prize of $20,000 from the In¬ stitute.

ROVE-BEETLES, or COCKTAILS,

names applied to a tribe of beetles, the Staphy-linidee, characterized by elytra only about one-fourth of the length of the abdomen. A com¬ mon species is the <(Devil's Coach-horse® (Goerius olens), a fanciful name given to it from its diabolical aspect when it curls up the abdomen and opens its jaws. These beetles are carnivorous in habits, and are apt to bite if in¬ cautiously handled. The habit of cocking the tail has been alleged to have for its object the function of pushing the hinder wings under the short elytra, which are formed by the front wings and which protect the hinder or func¬ tional wings. These beetles fly about chiefly in the dusk and at night. The tarsi generally possess five joints.

ROVUMA, ro-voo'ma, a river of Africa, which rises east of and near Lake Nyassa, and flows east into the Indian Ocean. It forms the

boundary between German East Africa and Portuguese East Africa. It is about 500 miles long. For about 80 miles from the mouth there are high lands along the banks and about 160 miles from the ocean are a number of beautiful cascades and waterfalls. The river is navigable for some distance. It was first explored by Livingstone in 1861.

ROWAN, row'an, Andrew Summers,

American army officer: b. Gap Mills, Va., 23 April 1857. He was graduated from West Point in 1881, served on the frontier till 1890, when he was detailed on surveying duty in Cen¬ tral America as a member of Party No. 1 (Macomb's) , and after the opening of the Spanish-American War in 1898 was sent to communicate with General Garcia. He made a landing from an open boat near Turquino Peak, Cuba, on 24 April 1898, and with much diffi¬ culty succeeded in reaching Garcia, obtained full information of the insurgent army, and made the return trip successfully, was the first American army officer to enter Cuba after the declaration of war. He was promoted lieuten¬ ant-colonel, LTnited States army, for this service, and in 1899-1902 was on duty in the Viscayas Group, Philippine Islands. He was professor of military science and tactics at the Kansas State Agricultural College, 1902-03. He retired in 1909. He has written (The Island of Cuba> (1898). Was the subject of Elbert Hubbard's 'A Message to Garcia) He has been engaged in literary work since quitting the active list, and is now at work on a history of Mexico.

ROWAN, .Stephen Clegg, American naval officer: b. near Dublin, Ireland, 25 Dec. 1808; d. Washington, D. C., 31 March 1890. He came to the United States when very young and in 1826 was appointed a midshipman in the navy, receiving promotion to lieutenant in 1837. He saw active service in the Mexican War and in 1855 he was appointed commander. At the out¬ break of the Civil War he was in charge of the Pawnee, and on 25 May he engaged in the attack on the Confederate batteries at Acquia Creek, the first naval engagement of the war. He assisted in the capture of Fort Hatteras,

and was promoted captain and commodore for his services* He was engaged at Roanoke Island and Albemarle Sound, and later captured Fort Mason, thereby restoring National authority in North Carolina. He was in Command of the New Ironsides at forts Wagner, Gregg and Moultrie, received the thanks of Congress, and in 1866 was promoted rear-admiral. He became vice-admiral in 1870, and from 1883 until his retirement in 1889 was chariman of the light¬ house board.

ROWBOTHAM, ro'bot-am, John Freder¬ ick, English Anglican clergyman, poet and his¬ torian: b. Bradford, Yorkshire, 18 April 1859. He was educated at Oxford, traveled extensively on the Continent, and took orders in the Church of England in 1891. He was vicar of Ratley in 1892, rector of Huntley in 1895, British chap¬ lain of Budapest and Hungary in 1896, and vicar of Abbotsley 1897-1900. He has published 'The History of Music* (3 vols., 1887); 'Po¬ etical Works* (1889-90); 'The History of the Troubadours and the Courts of Love* (1895) ; 'The God Horus, a Novel of Ancient Egypt* (1898) ; 'The Human Epic* (1902), *etc.*

ROWE, ro, George Fawcett, English—

American actor: b. Exeter, about 1829; d. New York, 29 Aug. 1889. He made his first ap¬ pearance on the stage in Australia in 1854; toured through India, China and Peru, and ap¬ peared in New York in 1866 under Mrs. John Wood's management at the Olympic. His most famous part was Wilkins Micawber in Halli-day's dramatization of 'David Copperfield.* He also played Silas Wegg in 'Our Mutual Friend,* and many other comic and farcical parts, some in pieces of his own composition, such as 'Brass* ; 'The Geneva Cross* ; 'Found Drowned* ; and 'The Sleigh Bells.* His last appearance was at the Colosseum Theatre, Lon¬ don, as Rufus Potts in 'Forward to the Front,* 27 April 1889.

ROWE, Leo Stanton, American economist: b. McGregor, Iowa, 17 Sept. 1871. He was graduated at the University of Pennsylvania in 1890, and took his Ph.D. at Halle in 1892. He was admitted to the bar, and in 1895 became a member of the faculty at the University of Pennsylvania, where since 1904 he has been head professor of political science. He was in

1900-01 a member of the Commission to Revise and Compile the Laws of Porto Rico ; and in

1901-02 was chairman of the Insular Code Commission. He was secretary-general of the Panama-American Financial Conference and

of the International High Commission at Wash¬ ington, D. C., in 1915 ; and in 1917 was ap¬ pointed Assistant Secretary of the Treasury. He was joint author of 'Report of the United States Commission to Revise the Laws of Porto Rico* (2 vols., 1901); 'Report of the Insular Code Commission* (8 vols., 1902) ; and author of 'The United States and Porto Rico* (1904) ; 'Problems of City Government* (1908), *etc.*

ROWE, Nicholas, English dramatic poet: b Little Barford, Bedfordshire, 1674; d. 6 Dec. 1718 He studied at Westminster, entered as a student at the Middle Temple, but turned his chief attention to literature. At 24 he pro¬ duced his tragedy of the 'Ambitious Step¬ mother* ; 'Tamerlane* followed in 1702. His next .dramatic performance was the 'Fair Peni¬

tent,* remodeled from the 'Fatal Dowry* of Massinger. In 1704 he wrote 'The Biter,* a comedy, which being a failure, he thereafter kept to his own line, and from that time to 1715 produced his 'Ulysses,* 'Royal Convert,* 'Jane Shore* and 'Lady Jane Grey.* On the ac¬ cession of George I in 1715 he was made poet-laureate. He wrote a few tender and pathetic ballads, translated Lucan's 'Pharsalia,* and edited the plays of Shakespeare (1709). The memoir prefixed to the plays contains much tra¬ ditional matter judiciously presented.

ROWELL, row'el, Newton Wesley, Cana¬ dian lawyer and statesman : b. Middlesex County, Ontario, 1 Nov. 1867. He was educated in the public schools and at the Ontario Law Society; was called to the bar in 1891, and in 1902 became king's counsel. He attained a reputation as a leader of the Ontario bar; and in 1911 was elected to the Ontario legislature, where he became the leader of the Liberal Op¬ position. He is an earnest worker for legisla¬ tion to improve social conditions, particularly factory laws, workmen's compensation, shorter hours of work for women and children, and to problems of housing, taxation and temperance reform. He was president of the Privy Council of Canada in 1917; and a member of the Im¬ perial War Council in 1918.

ROWING, the propelling of floating rafts, boats or barges by means of oars, is the most ancient of all methods of traveling by water. As evidenced by some of the oldest Egyptian carvings rowing was a well-established prac¬ tice before history began to be written and re¬ mained the chief mode of propelling even of war craft of considerable size long after the art of sailing was invented. Three hundred years before Columbus discovered America the water¬ men of the Thames

were linking the art of rowing inseparably with the sterner history of England in transporting the barons to Runnymede in 1215 to witness the signing of Magna Charta in boats and barges propelled by oars.

Just when rowing began to commend itself to the attention of gentlemen of leisure as a new outdoor sport is not a matter of record. However, it appears that in 1715 an English actor, Thomas Doggett by name, instituted a boat race among the watermen of the Thames, offering as a prize a waterman's coat with a conspicuous silver badge upon the arm. The occasion was so great a success that he estab¬ lished a fund to provide in perpetuity the prize for the annual celebration of such a contest, which is known to this day as the "Doggett's Coat and Badge Race,** from the reward of the successful boatman. Following the initiative of Doggett the practice became general of organ¬ izing boat races between the Thames watermen, and there was no lack of sportsmen to con¬ tribute prizes as incentives to vigorous con¬ tests.

The introduction of the Venetian Regatta, first conducted on the Thames in 1775, added enormously to the popular interest in water sports, and by the opening years of the 19th century rowing had become one of the standard athletic diversions of the people. Several boat clubs were in existence, and special racing boats for six-oared and eight-ored crews had been built. The names of the first four clubs, "Star,**

<(Arrow,® (< Shark® and <(Siren,® have been pre¬ served in the annals of the time. The records show that in 1811 Eton had three 8-oared boats and one 10-oared boat ; and that in .1813 Westminster School had a six-oared boat. In 1818 a challenge to race was sent by the Eton crew to the Westminster crew, but the authori¬ ties prevented the race. In 1829, however, the crews of these two schools rowed the first of a series of matches which spread irregularly over the period up to 1847. For 15 years these con¬ tests were abandoned, to be renewed for a brief period in 1862, the Westminster school then giving up their boating.

The first amateur races were between two rival picnic boats on the Thames in 1826. This became a favorite sport, and it became a com¬ mon practice to enliven picnic parties on the river by improvising such boat races.

The first intercollegiate race was rowed at Henley in 1829, the Oxford crew winning from Cambridge. Oxford had begun rowing races among its own classes in 1815, and Cambridge took up the sport a year or two later. The sec¬ ond meet of these two colleges was not until seven years afterward, and from that time for¬ ward these races were held at irregular inter¬ vals until 1856, since which year the Oxford-Cambridge race has been an annual occasion, up to the outbreak of the War of 1914.

The Henley Royal Regatta was established by the town of Henley in 1839. The series of contests was open to all amateur crews in eight-oared boats and to any four-oared crews of the town. The first regatta comprised five races. This regatta is now held annually and is the greatest rowing event of the world. The course is one mile — 550 yards. The races are rowed against the stream, and the time is close to seven minutes.

In America. — The first college races in the United States were between boats owned by Yale students, in Boston Harbor in 1844, the contestants being an eight-oared gig and a dug-out canoe. The first intercollegiate race was rowed in eight-oared barges by Yale and Har¬ vard crews in 1852, over a two-mile course on Lake Winnepesaukee. In 1855 the two colleges raced again over a three-mile course at Springfield, Mass. For nine years thereafter they rowed at Lake

Quinsigamond and in 1869 at Lake Saltonstall. For the seven years following no Yale-LIarvard races were contested, but in 1876 they were resumed on a four-mile course at Springfield. In 1877 they rowed again on this course, and since then the races have been rowed on the Thames River at New London, Conn., annually up to 1916. No races were made during 1917 and 1918 on account of the war. The fastest time ever made on this course was 20.02 minutes by Harvard, on 23 June 1916. In this race Yale's time was 20.17 .minutes — beating the previous record of 20.20, made by the Yale crew 26 June 1902.

In 1859 the first intercollegiate regatta was held at Springfield, Mass., and from that time onward this meet was an annual event until 1875, when 13 colleges were represented. The racing boats of that period were six-oared shells. The adoption of the eisrht-oared boat and the four-mile course bv Yale and Harvard, and their consequent with¬ drawal from the intercollegiate races put an end

for the time being to these contests. They were revived, however, in 1900, when the new Intercollegiate Association formed in 1895 by Columbia, Cornell and Pennsylvania, selected the four-mile course at Poughkeepsie, N. Y. In this first of the new series of regattas crews of Pennsylvania, Wisconsin, Cornell, Columbia and Georgetown contested. Pennsylvania won in 19 minutes 44 3/5 seconds, the others finish¬ ing in the order named. In 1901 a crew from Syracuse University joined the other five, and Cornell won the race in 18 minutes 53 1/5 sec¬ onds, the fastest time ever made over this course. In 1907 Annapolis participated, and in 1912 Leland Stanford, Jr., University sent a crew.

The best time for four-oared crews made over two miles of the Poughkeepsie course was recorded for a Cornell crew in 1915 — 10 minutes 0 1/5 second.

No races were held by this association in 1917 and 1918 on account of the war. Yale and Pennsylvania raced with two crews each at Philadelphia and the regular regatta of the New England Amateur Rowing Association was held on the Charles River on the Fourth of July of that year, but a general suspension of' the sport on account of the war marked the season of 1918. The sport was resumed in 1919. See Sports.

ROWING, Technics of. Rowing is the method of propelling a boat by

the use of oars. It consists of two parts — the stroke and the recovery, which are executed by a series of complex motions designed to apply a maximum of available motive energy in urging the boat through the water, and at the same time ensure the least amount of deviation from a straight course.

In preparing to row the oarsman sits on the thwart, facing the stern and exactly opposite the handle of his oar, the shaft of which rests in the rowlock with the button on the inner side. To obtain the maximum effect from the power exerted he should sit about two inches from the after edge of the thwart, the body being held square and upright, the back straight and rigid, the feet pressed firmly against the opposite stretcher or foot board with the heels

Fig. 1. — Position beginning of stroke.

close together and the toes apart, so as to keep the knees separate. The handle of the oar should be held firmly by both hands which should be about three inches apart with the out¬ side one close to the end of the handle, the

fingers being above and the thumb underneath. The grasp should be a flexible hold with the fingers and not a clutch with the whole hand. The forearms, should be kept below the level of the handle, with the elbows down, close to the sides of the body. The wrists should be relaxed and dropped, so that the blades of the oars will lie flat upon the surface of the water.

Fig. 2. — Position halfway through stroke.

The stroke is characterized by four distinct phases — the catch, the drive, the pulling through and the finish. The recovery which includes the shoot, the feather and the full reach. In taking the stroke, the body is in¬ clined forward, the backbone being kept straight and rigid, the shoulders thrown forward and held up as high as possible, while the abdo¬ men is kept well out and down between the legs. The arms should reach out perfectly straight from the shoulders to the wrists and the action of the shoulder joints and the hips should be perfectly free and easy. In reaching forward the oar handle is grasped firmly by the fingers, and the hands are shot out quickly straight from the body, and as soon as the oar

Fig. 3. — Position finishing of stroke.

has been passed over the knees, the wrists are raised so as to bring the blade at right angles to the surface of the water and preoaratory to dipping it, at the beginning of the stroke when the arms reach the extreme limit of their for¬ ward movement directly over the stretcher. At this instant, the hands are raised and the blade is dropped firmly into the water and buried un¬

til it is covered up to the shoulder. The pull begins with the drive of the legs, a steady thrust of the feet strongly against the stretcher, the power being transmitted to the oars through the arms by the tense muscles of the rigid back. This leg action is the greatest power utilized in rowing, and the most should be made of it. The pull with the arms suuplements the leg drive as the body sways backward. The finish of the stroke is achieved by the arms alone, and as the boat is at .the moment at its greatest speed the movement is the quickest de¬ manded in the stroke; the wrists are raised and the oar turned so that the blade slips in¬ stantly out of the water and into the position of feathering. During the entire stroke the arms should preserve, as nearly as may be, a right angle with the line of the oar, that posi¬ tion giving the largest leverage. The recovery begins immediately after the blade of the oar slips out of the water at the finish of the stroke. The object is to get the oar back into its first position in readiness for another catch. This position is termed the full reach. Durˆ ing the recovery several things have to be taken care of. For one thing the boat must be preserved upon an even keel ; partly by the feathering of the oar along the surface of the water, but mainly and preferably by the grasp

Fig. 4. — The “Recovery.” (Position of the hands and wrists in the act of feathering).

of the feet upon the toe-straps on the stretcher board. The movement is complicated in the case of the sliding seat. Assuming this to be in use, the leg-drive has thrust the seat back at the beginning of the stroke, before the arms begin to do their particular share. In the re¬ covery the seat must be brought back to its first position. But, as the arms made the last movement in finishing the stroke, so in the recovery they make the first move in the shoot. This motion is very quick. The body neces¬ sarily moves much slower, and it must swing over from the bend backward to the bend forward. During this swing of the body the sliding seat must be returned to its first posi¬ tion. It is necessary that these two latter movements be made gently in order that the inertia of the moving boat be not checked by a jerking force in the contrary direction. By gently is not meant slowly: in fact the move¬ ments must be made as swiftly as possible. When skilfully done the sensation to the rower is that he has simply permitted the boat to

glide forward under him. The very last part of the recovery is the full reach, accom-732

plished by thrusting both shoulders, forward like the wings of a hinge, with the rigid back¬ bone as the centre. The instant the full reach is attained the oar should go into the water for the next catch. It is a serious fault to .“hang® momentarily at the reach before taking the catch.

Fig. 5. — A common but very bad position. (Beginning of stroke).

The motion of the body should be as con¬ stant, smooth and steady as that of a pendulum, while the action of the hands and the wrists, producing the dipping and the feathering, should be entirely free from jerks. When the boat contains a number of oarsmen, each one keeps his eyes on the back of the oarsman in front of him, and times his swing from him; or in other words <(keeps eyes in the boat.®

A boat is “held® or has its headway stopped, by laying the blade flat and then sinking its forward edge slightly into the water. The blade is thus buried at an acute angle and checks the way of the boat gradually until it has been sufficiently reduced to allow of the blade being reversed square, to “back water.® If the boat is under much headway, any at¬ tempt to back water before it has been held would be attended with disastrous results, as the resistance would prove greater than the strength of the oars and cause a fracture.

In sculling, a scull or oar is held in each hand, instead of one oar handle being held in both hands, as in rowing. The grip on the scull is governed by the rules applicable to the grip on the oar handle in rowing, but with the ex¬ ception that the. thumb should cap the butt of the scull handle with the top joint and not clasp around it. The action of the body, legs, arms, wrists and hands are also the same as in rowing, but in sculling some advantage may be gained by allowing the body to swing far¬ ther back at the finish of each stroke. Both hands should work together, and both blades should enter and leave, the water at the. same time. Up to 1856 racing boats were clinker-built; the smooth skin boat was then introduced, and in 1857 was generally

adopted as somewhat faster. The sliding seat invented in America by Walter Brown, in 1869, was used by the Yale crew in its race with Harvard in 1870, and Yale won. It was used at Henlev for the first in 1872, and in 1873 was instrumental in cutting the time on the 4 54 mile course by half a minute. The changes since then have been few. It was at one time believed that shortening the boat would make it speedier, and the dimen¬ sions of the 8-oared boat were changed from 63 feet in length and .lb inches in width, to 58 feet in length and 20 inches in width. No appreciable gain was secured; although the

shorter boat was faster with some crews, toe longer was faster with others. For the single sculler, however, the short boat proved un¬ questionably faster. As now in use the oars are 12 feet 1 inch to 12 feet 6 inches in length, and the blades vary from 5 54 to 7j4 inches in width ; the short oars having the wider blades. In America, as a rule, the long oar with the narrower blade is preferred. The slide of the seat varies from 12 to 17 inches, although up to 20 inches is allowed, depending upon the individuality of the oarsman. It has been defi¬ nitely proved that if the body bends too far backward it is impossible to recover quickly, and that the muscles of the back quickly show fatigue. With the longer slide the back need not incline so far. While formerly the sway¬ ing of the bodies of the men in the crew was carefully synchronized, it is now recognized that this is of little importance so long as the action of the oars in the water is symmetrical and exact; and far more freedom is permitted to the individual in body movement so long as his work at the blade of the oar is accurately timed. Consult Stevens, A. W„ ‘Practical Row¬ ing* (Boston 1906) ; Warre, E., ‘On the Gram¬ mar of Rowing> (Oxford 1909).

ROWLAND, rd’land, Henry Augustus, American scientist: b. Honesdale, Pa., 27 Nov. 1848; d. Baltimore, Md., 16 April 1901. He was graduated from the Rensselaer Polytechnic In¬ stitute in 1870, and taught for a year in Wooster College, Ohio, but in 1872 returned to the Institute, where he was instructor in physics, becoming assistant professor in 1874. He studied for a time in Germany, and in 1876 accepted the chair of physics at Johns Hopkins University, which he occupied until his death. He was a member of the Electrical Commission in Paris in 1881, and was elected to the National Academy of Science in that year. He was the inventor of a greatly improved process of ruling large diffraction gratings directly on con¬ cave mirrors, constituting what is known as the dividing engine (q.v.), with which he succeeded in making photographs far superior to any

which had then been made. He made numerous valuable investigations and experiments, par¬ ticularly in electricity, among them an extremely accurate determination of the ohm, a work which he afterward extended under the govern¬ ment. He was author of more than 100 scientific papers and monographs, among which are ‘Mag¬ netic Permeability* (1873) ; ‘Magnetic Effect of Electric Connection (1876) ; ‘Research on the Absolute Unit of Electrical Resistance* (1878); ‘On the Mechanical Equivalent of Heap (1880); ‘Photographs of the Normal Solar Spectrum* (seven plates, 1886), *etc.*

ROWLANDITE. A rare yttrium mineral 2Yt203.3Si02 occurring in small quantities at Baringer Hill, Llano County, Tex.

ROWLANDS, Samuel, English satirist and poet: b. about 1570; d. about 1630. He wrote numerous pamphlets in both prose and verse, many of them of a religious order and others keenly satirizing the social conditions of his day. His first pamphlet, ‘The Betraying of Christ* (1598), was a religious poem and he wrote many others, but his work is re¬ membered for his satires which are interesting to posterity chiefly through their historical im¬ portance as a source of information concerning

the social life of his time. His first satires, (The Letting of the Humours Blood in the Head¬ line5 (1600) and (A Mery Meetinge, or Tis Mery when Knaves Mete) (1600), were directed against several prominent persons whose names were thinly disguised in Latin. These were burned by the authorities, but were later republished under different titles. After¬ ward his satires chiefly concerned the middle and lower classes ot society, some of them dealing with highwaymen of note and offering a highly interesting vocabulary of thieves’ slang of the day. Several of his known works are lost. Besides works already mentioned he was author of the satires (’Tis Merrie When Gos¬ sips Mete) (1602) ; (Humor’s Looking-Glasse5 (1608) ; (Martin Mark-all, Beadle of Bridewell5 (1610) ; (Good Newes and Bad Newes5 (1622), *etc.* His last work was a religious volume (Heaven’s Glory, Seeke it; Eart’s Vanitie, Flye it; Hells Horror, Fere it) (1628).

ROWLANDSON, rd'landson, Mary White, American captive among the Indians. She was carried away by the Indians after an attack on Lancaster, Mass., 10 Feb. 1675, dur¬ ing King Philip's War. For a time she was kept in an Indian village near the site of Petersham, Worcester County, and later was taken by her captors across the Connecticut, and after about three months was ransomed. Her (True His¬ tory5 of her captivity and restoration was printed at Cambridge, Mass., and in London, in 1682. A fifth edition was prepared by Joseph Willard (1828), and is reproduced in Narra¬ tives of the Indian Wars5 (New York 1913). The work, though not always clear as to de¬ tail, is interesting, and throws a graphic side¬ light on Indian existence with its cruelty and squalor.

ROWLANDSON, Thomas, English artist: b. London, July 1756; d. there, 22 April 1827. He was sent at 15 to Paris and there studied art and gained a taste for the pleasures of the town. The £7,000 left him by a French aunt he gambled away, yet he hated debt, and main¬ tained his uprightness of character. He trav¬ eled over England and Wales, and enjoyed life to the full in his tavern and the company of friends like Morland, Gilray and Bunbury. Rowlandson possessed rare dexterity of touch and fertility of imagination; and, though not seldom vulgar, he was never feeble. He was a relentless hater of Napoleon, belittling his greatness by countless travesties. Some of his best-known works are his (Imitations of Mod¬ ern Drawings5 (1784-88), and his illustrations for Syntax's Three Tours,5 the <Dance of Deaths (Sterne's Sentimental Journey, 5 (Peter Pindar,5 the Nath Guide, 5 Munchausen,5 *etc.*

ROWLEE, rou'le, Willard Winfield,

American botanist: b. Fulton, N. Y. ; d. 15 Dec. 1861. He was graduated at Cornell University in 1888, became connected with the faculty there in that year and since 1905 has been pro¬ fessor of botany. He is a contributor to botani¬ cal journals and is author of (Lieut. Herman Rowlee (1746-1818) and His Descendents)

(1907).

ROWNTREE, roun'tre, B. Seebohm, Eng¬ lish manufacturer and sociological worker, son of Joseph Rowntree (q.v.) : b. York, 1871. He was educated at the Friend's School, York,

and at Owens College, and became a director in his father's business. He is active in social and political work. Author of (Poverty, a Study of Town Life) (1910) ; (Land and Labour) (1910) ; Now the Labourer Lives5 (1913) ; (The Way to Industrial Peace) (1914) ; (Human Needs of Labour5 (1918), *etc.*

ROWNTREE, Joseph, English manufac¬ turer and social worker: b. 1836. He came of a Quaker family, was educated at the Friends' School, York, and later engaged in business. He established the firm Rowntree and Com¬ pany, cocoa manufacturers, of which he is chair¬ man. He is active in work for social improve¬ ment. Joint author of (The Temperance Prob¬ lem and Social Reform5 (7th ed., 1900) ; (Brit¬ ish Gothenburg Experiments) ; (Public Control of the Liquor Traffic (1903) ; (The Taxation of the Liquor Trade5 (1909), *etc.*

ROWSON, ro'son, Susanna Haswell,

American actress and author : b. Portsmouth, England, 1762; d. Boston, 2 March 1824. Her first work, the novel, (Victoria,5 appeared in England in 1786, and in 1792 she made her stage debut at Edinburgh. In 1793-96 she acted in the United States, closing at Boston with a comedy by herself, (Americans in England.5 From 1797 until her retirement in 1822 she con¬ ducted with much success a seminary for young ladies, first at Boston, and from 1800 at Med¬ ford. Her most popular *work was ˆCharlotte Temple, or a Tale of Truth5 (1790), which had in its time wide sale, but is called by Wendell a <(comically extravagant example® of a literary manner then much in favor. Further she wrote, among several volumes, (The Inquisitor5 (1788) ; (The Volunteers5 (1793) ; Miscel¬ laneous Poems5 (1804). There is a memoir by Nason (1870). •

ROWTON, row'ton, Montagu William Lowry-Corry, 1st Baron of, English lawyer and philanthropist: b. 8 Oct. 1838; d. London, 9 Nov. 1903. He was educated at Trinity Col¬ lege, Cambridge, became a barrister in 1863, and entered upon a successful career as a law¬ yer. He was secretary to the Earl of Beaconsfield in 1866-68 and in 1874-80, and was secre¬ tary of the special embassy sent to the Berlin Congress in 1878. He was created a baron in 1880. He established the Rowton lodging-houses in London some three years before the Mills Hotels were instituted in New York. They were built with the idea of furnishing decent and comfortable lodgings for workingmen and fur¬ nishing them also with well-cooked and sub¬ stantial food at very moderate rates, yet at the same time with the intention of keeping the enterprise on a paying basis. He was chairman of the Rowton Houses and of the Guinness Trust until his death.

ROWTON HEATH, England, a place near Chester, which was the scene of a battle 24 Sept. 1645, in which the Parliamentary forces defeated the Royalists. After the crushing dis¬ aster of Naseby, King Charles I had fled to Wales, and then formed the desperate project of marching north to Montrose. Chester was then being besieged by Sir William Brereton, but the king at the head of 5,000 troops suc¬ ceeded in finding an entrance, and entrusted Sir Marmaduke Langdale with raising the siege. The 'Parliamentarians had just been re-

inforced by Poyntz's Yorkshire horse when Sir Marmaduke attacked them. He was utterly defeated, with a loss of 300 killed and 1,000 prisoners, and . the disaster, added to Philip-haugh, deprived the unhappy king of his last hope.

ROXBURGHE CLUB, an English book club founded in London in 1812, during the auction sale of the Duke of Roxburghe's famous library. The title of founder was claimed by Rev. Thomas Fognall Dibdin, the club being formed at a dinner given to celebrate the pur¬ chase by the Duke of Marlborough of the Valdarfer <Boccaccio) (Venice 1471) for the sum of £2,260. The club had 24 members, and its object was to pledge its personnel to the re¬ printing of rare volumes. It was the first club of this order and is still in existence, the Dilet¬ tanti Society being on the same order, and with it forming the forerunners of the modern pub¬ lishing societies.

ROXBURY, roks'bur-i, Mass., now a part of the city of Boston, annexed in 1867. It has a diversified surface, a remarkable alternation of hill and hollows, which afford picturesque building sites, and which have made a great por¬ tion of Roxbury a residential section. There are a number of manufactories, among which are cotton and woolen mills, machine shops, cordage and carpet factories and organ works. A free Latin school *was established in Rox¬ bury in 1645. The place was for many years the scene of the labors of John Eliot (q.v.), the <(Apostle of the Indians,® and his remains are in the ((ministers' tomb® in the old burial ground. It is also the birthplace of Joseph Warren (q.v.) of Revolutionary fame. The township of West Roxbury, which contained

the villages of West Roxbury and Jamaica Plain, was set off from Roxbury in 1852. When Rox¬ bury was annexed to Boston it had a population of about 40,000.

ROY, roi, Joseph Edward, Canadian au¬ thor: b. Levis, Quebec, 7 Dec. 1858; d. 1913. He was educated at Laval University and en¬ tered the Dominion Public Service in 1880. From 1908 he was attached to the Bureau of Archives, Ottawa ; and with his brother he founded the Bullentin des Reclierches Historiques, to which he contributed extensively. Author of (Le Premier Colon de Levis* ; (L'Ordre de Malte en Amerique* ; (Jean Bourdon et la Baie Hud-son) ; (L'Ancien Barreau au Canada* ; (Histoire de la Signeurie de Lauzon) (5 vols.) ; < Rapport sur les Archives de France) ; (Essai sur Charlevoix, * *etc.*

ROYAL, roi'al, Joseph, Canadian journal¬ ist and editor : b. Repentigny, Quebec, 1837 ; d. Montreal, 23 Aug. 1902. He was educated at the Jesuit College of Saint Mary's, Montreal, and engaged in journalism. He founded Le Nouveau Monde in 1857, and L'Ordre in 1859; and in 1864 was one of the founders of the Revue Canadienne. He was admitted to the bar in 1864, and 1870 settled in Manitoba, where he founded Le Metis, and also engaged in law practice. He served in the Manitoba legislature in 1870-79 and was successively speaker privincial secretary, attorney-general and minister of public works. He secured the abolition of the legislative council and the es¬ tablishment of the University of Montreal. He

was elected to the Canadian Parliament in 1888, and in 1889-93 was lieutenant-governor of the northwest Territories. From 1893 he edited La Minerva at Quebec. Author of (Histoire du Canada, 1841 a 1867* (1909).

ROYAL ACADEMY OF ARTS, The, a British institution for the encouragement of painting, sculpture and designing; founded in 1768 by George III, with Sir Joshua Reynolds as president. It is composed of a president (P.R.A.), 40 academicians (R.A.) and 20 as¬ sociates (A.R.A.), which include professors of painting, architecture, anatomy and perspec¬ tive. It holds an annual exhibition open to all artists, at Burlington House, London, of paint¬ ings, sculpture and designs which reach a cer¬ tain standard of merit.

ROYAL ACADEMY OF MUSIC, Lon¬ don, England, an institution established in 1823, mainly through the exertions of Lord Burghersh (afterward Earl of Westmoreland), and incorpo¬ rated by royal charter

in 1830. The purpose for which it was founded was to afford a first-class musical education in the various branches of music. It receives a grant from the govern¬ ment, and from this and other sources is able to award to successful competitors a large num¬ ber of scholarships and prizes. Instruction is given in musical composition, singing and in¬ strumental playing. Concerts are given at inter¬ vals by the pupils. Connected with the R.A.M. are associates, fellows and licentiates, besides honorary members. Among its principals have been Sir George Mcfarren and Sir A. C. Mac¬ kenzie.

ROYAL ACADEMY OF SCIENCE, The,

a Danish institution in Copenhagen, established by the king of Denmark in 1743. It has pub¬ lished transactions QSkrifter*) since its foundation, and memoirs ((Afhandlinger*) since 1823.

ROYAL ACADEMY OF SCIENCES, The, a German institution in Berlin, founded by Frederick I in 1700; had Leibnitz as its first director, and held its first meetings in 1711. It is divided into four sections, devoted to mathe¬ matics, physics, philosophy and history. It pub¬ lishes memoirs and monthly reports.

ROYAL ACADEMY OF SCIENCES, The, a Swedish institution, known also as the Royal Sweedish Academy, founded in Stockholm as a private society in 1739; incorporated under its second name in 1741 ; issues annual volumes of transactions,* which were at first published quarterly.

ROYAL AIR FORCE, the official name of the aviation service of the British army and navy, promulgated in March 1918, in accord¬ ance with the Air Force (Constitution) Act, 1917, providing that <(it shall be lawful …

to raise and maintain a Force, to be called the Air Force, consisting of such numbers of offi¬ cers, warrant officers, non-commissioned officers and men, as may from time to time be pro¬ vided by Parliament.® An Order in Council dated 7 March 1918 decreed that the Air Force be established under the style and title of ((The Royal Air Force.® The name hitherto in use was the Royal Flying Corps. The measure involves the creation of an air council presided over by a new secretary of state, and endowed with powers similar to those of the Admiralty and

the army council. In regard to discipline, the annual Army Act, subject to certain modifica¬ tions, will also apply to the Air Force.

ROYAL ARCANUM, The, a fraternal

and beneficial society organized, 23 June 1877 at Boston, Mass., by Dr. Darius Wilson and John Andrew Cummings. The original council in Boston had but nine members. Other coun¬ cils were soon established in the same city and the order spread rapidly throughout the New England States. It increased at a rapid rate and now there are councils in every State and in almost every city and town in the Union. The business of the order is conducted in Bos¬ ton, where the society owns a substantial build¬ ing, in which the supreme council meets. The society is governed through councils which are dominated by the supreme council or governing body. The membership qualifications are good health and character ; and the age limit is be¬ tween 21 and 55. Benefit certificates are issued for $1,500 and $3,000, payable at the death of a member. Should a member desire to increase his insurance over the limit fixed by the society he can do so by making application for the increase in the Loyal Additional Benefit As¬ sociation, formed in 1889, practically within the Royal Arcanum and incorporated in 1890 under the State laws of New Jersey.

The officers of the supreme council or gov¬ erning body of the society consist of supreme regent, supreme vice-regent, supreme orator, sitting past supreme regent, supreme secretary, supreme treasurer, supreme auditor, supreme chaplain, supreme warden, supreme sentry and legal adviser. The grand councils and subordi¬ nate councils have a similar roster of officers.

From 1898 to 1903, its greatest period of growth, the membership according to official data, attained the following figures:

Grand Subordinate

Membership councils councils

1898 . 193,573 22 1,762

1902 . 249,644 27 2,004

1903 . 258,746 28 2,045

For the same period the total number of deaths and the total amount of benefits paid were as follows :

Number of deaths

Amounts

paid

1898 . 16,479

1902 . 25,714

1903 . 27,480

Emergency fund 31 Oct. 1902 Emergency fund 28 Feb. 1903

$47,886,199

73,817,678

76,190,352

1,813,141

1,885,786

Rates of assessment being too low to cover all expenses and ensure permanency the society at times has had to readjust its financial policy with the result that a firm foundation has been established which actuaries and insurance ex¬ perts confirm as safe and sound. According to recent figures the status of membership, deaths and benefits paid, was:

Member-Grand

year ship councils Councils Deaths Amounts paid

1918 _ 143,042 32 1,619 3,437 $6,600,337 27

Emergency fund 30 April, 1918 . 4,341,675 44

The emblem of the association is a royal crown in a circle, on the circumference of

which are 10 small Maltese crosses with the motto, ((Virtue, Mercy and Charity.®

ROYAL ARCH MASONS. See Masonic Fraternity.

ROYAL BLACK ENCAMPMENT OF ISRAEL. See Orangemen.

ROYAL COLLEGE OF MUSIC, London, England, an institution established in 1883 in South Kensington under the presidency of the Prince of Wales, afterward Edward VII. It was endowed at its commencement by gifts to the amount of $630,000. Pupils of either sex are ad¬ mitted either as fee-paying students or as schol¬ ars or exhibitioners. There are 52 open free scholarships and 11 close free scholarships, be¬ sides the council exhibitions, the Savage Club exhibition, the exhibitions of the associated board of the Royal Academy of Music (q.v.) and the Royal College of Music, *etc.* Prizes and medals are also awarded to the students in accordance with the results of examinations. The associateship may be obtained by outsiders as well as pupils on passing a qualifying ex¬ amination, and entitles the holder to use the initals A.R.C.M. The professorial staff in¬ cludes several eminent names.

ROYAL CROWN OF HAWAII, Order

of. See Orders, Royal.

ROYAL ECONOMIC SOCIETY, incor¬ porated 1902, was formerly known as the British Economic Association, a society estab¬ lished in London in 1890 with the design of advancing economic investigations through the medium of a quarterly styled The Economic Journal. This periodical is the most valuable one of its class and is open to the expression of very diverse views upon economic questions. Viscount Goschen was the president of the association from its founding until his death in 1907. He was succeeded by Lord Haldane. It gives an annual dinner in London, but holds no regular scientific meetings.

ROYAL FAMILY, The, in its widest sense, as referring to Great Britain, embraces all the British descendants of the royal house; in its narrower sense it includes only the queen-consort and queen-dowager,

with all the lineal descendants of the sovereign. The husband of a queen-regnant is not as such a member of the royal family. The members of the royal family have precedence over all peers and offi¬ cers of state; but an heir-presumptive has no rank or precedence as such, as his position may be altered by the birth of an heir-apparent.

ROYAL FERN. See Osmunda.

ROYAL FLYING CORPS (R. F. C.), the aeronautical branch of the British armed forces. The title originated in March 1912.

ROYAL GEOGRAPHICAL SOCIETY.

See Geographical Society, Royal.

ROYAL GEORGE, English man-of-war, sunk in Portsmouth Harbor, England, 29 Aug. 1782. While undergoing repairs at the keel the vessel suddenly careened and filled^ with water, going down with all on board. * The ship, the principal vessel of Lord Howe's fleet, was commanded by Admiral Kempenfeldt, and carried about 1,100 persons, including nearly 300 women and children. The disaster was commemorated in an elegy by Cowper, (The Loss of the Royal George.) The first attempt to raise the vessel was made in 1817 ; but it

was not until 1839 that portions of the ship and its cargo were brought to the surface, when the sunken mass was exploded by means of great quantities of gunpowder.

ROYAL HISTORICAL SOCIETY, an

English society founded in 1868 for the pur¬ pose of promoting and fostering the study of history ((by assisting in the publication of rare and valuable documents, and by the publication from time to time of volumes of Transactions and Publications.® The Society was incorpo¬ rated 31 July 1889 and has since enjoyed the patronage Of the sovereign. The Camden Society was amalgamated with it 2 May 1897 and the Camden Series of publications was transferred to it. The Society consists of president, ordinary fellows, honorary fellows and

corresponding members, and is open to international membership ; the honorary fellow¬ ships are limited to 75, of which only 25 may be British subjects. The membership is about 700, and in 1917 it had published 195 books and manuscripts besides the 57 published by the Camden Society in its separate existence,

1838-97.

ROYAL INSTITUTION OF GREAT BRITAIN, an institution founded in 1799 by Count Rumford, Sir Joseph Banks and other men of science, and incorporated in 1800. It was reconstituted on a wider basis in 1810, and has for objects the promotion of scientific and literary research, the teaching of the prin¬ ciples of experimental science, the exhibition of the applications of these principles to the arts, and the affording of opportunities for study. Many distinguished chemists and physi¬ cists have conducted their researches in the laboratories. The library contains some 60,000 volumes.

ROYAL LION, Order of. See Orders, Royal.

ROYAL LOUIS ORDER, The. See Or¬

ders, Royal.

ROYAL NAVAL COLLEGE OF CAN¬ ADA, an institution for training cadets for the navy. Entrance examinations are held in May at the appointed centres of the Civil Service Commission. The Civil Service Commission, Ottawa, furnishes on application blank forms for admission and information of requirements and dates and places of examination. The ex¬ amination fee is $4. The age of admission is from 14 to 16 years and each candidate under¬ goes a medical examination for physical sound¬ ness and fitness, besides the educational exami¬ nation in arithmetic, algebra, geometry, geog¬ raphy, history, writing and dictation and either French or German. Additional marks may be obtained on two of four optional subjects — Latin, elementary science, drawing or a second modern language. The college course extend¬ ing over three years comprises : mathematics, navigation, mechanics, physics, chemistry, engi¬ neering, seamanship, pilotage, English, French or Gprman, geography and history (including naval history). Each cadet pays annually — in advance — a fee of $100 and in addition a fee of $350 for the first year and $225 for each succeeding year. These fees cover tuition and living expenses, including furniture, bedding, mess equipment and . table board. There

are vacations of six weeks at Christmas and six weeks in summer. By arrangement, graduates

of the college are admitted to the second year of the course of applied science in McGill Uni¬ versity, or the University of Toronto, entrance for which is obtained through competitive ex¬ aminations. Candidates must be British sub¬ jects and they or their parents must have re¬ sided in Canada for two years immediately pre¬ ceding the examination. Absence abroad for schooling during a short period may be con¬ sidered as residence in Canada. The Dominion Department of the naval service does not re¬ quire cadets to adopt a naval career and does not commit itself to issue commissions to grad¬ uates of the Naval College. The British Ad¬ miralty accepts each year eight cadets who have completed their course at the college, if these cadets have attained the required stand¬ ard of efficiency, and they are entered in the Royal Navy as cadets of the same standing as graduates of the Dartmouth Naval College. The college was opened at Halifax, Nova Scotia, in January 1911. Owing to the partial destruc¬ tion of the college buildings at Halifax in the disastrous explosion of 6 Dec. 1917, temporary quarters were located in the Royal Canadian Naval Dockyard at Esquimalt, British Columbia, pending a decision for the definite location of permanent college buildings.

ROYAL OBSERVATORY, Greenwich, England, the famous observatory established by order of Charles II, who appointed John Flamsteed astronomical observer 4 March 1675 at a salary of £100 ($500), for which he was also to instruct two boys from Christ's Hos¬ pital. The first observation was made 19 Sept. 1675. The observatory was established to meet the requirements of navigation and not only has amply fulfilled its object, but under the distinguished successors to Flamsteed has con¬ tributed to the higher branches of science, some of the most important of the astronomical and physical discoveries of modern history. Among the directors of the observatory have been Ed¬ mund Halley (1720-42) ; James Bradley (1742-62); Nathaniel Bliss (1762-65); Nevil Maskelyne (1765-1811); John Pond (1811-36); Sir George Airy (1836-81); Sir William Chrystie (1881-1910) ; Dr. Frank Watson Dyson (1910). The director of the observatory is styled the astronomer royal, and is under the official control of the Admiralty, but receives his ap¬ pointment directly from the Prime Minister, and holds office by warrant under the royal sign manual. The largest instrument is a 28-inch refractor, with spectroscope attached. An¬ other fine instrument is the astrographic equa¬ torial designed for work in connection with the ˆPhotographic Chart of the

Heavens.® It con¬ sists of two telescope tubes rigidly connected and parallel, one carrying a 10-inch telescope lens, the other a 13-inch photographic lens by which the star images are imprinted on the photographic plate. The Greenwich section of this important work was completed at the end of 1909. The Thompson equatorial, presented to the observatory by the late Sir Henry Thompson, has on one side of the declination axis a telescope with a lens corrected for photo¬ graphic rays of 26 inches aperture, and on the other side a telescope with a mirror of 30 inches diameter. A photographic spectroscope is mounted on the reflector. The refractor is being used to determine the distances of stars. Photographs of the sun are taken on every

available day, and after being measured are carefully stored for reference, giving a daily record of sunspots for the last 35 years. The chronometers used in the navy are purchased after ((trial® at the observatory. The average number being tested daily is about 600. Every hour during the day time-signals are sent out from the standard ((motor clock® of the obser¬ vatory-through the postal telegraph service, giv¬ ing Greenwich time to all parts of the United Kingdom. The true basis of accurate astron¬ omy was laid by James Bradley's observations of 3,222 stars at Greenwich; the observatory has the 24-inch reflector by which the satellites of Uranus and Neptune were discovered by Lassell ; and at Greenwich in 1908 the eighth satellite of Jupiter was photographically dis¬ covered by Melotte. Astronomical Observa¬ tions founded 1750 and published annually since 1838 contains a continuous record of the moon's position since 1750. At Greenwich in 1767 Nevil Maskelyne founded the Nautical Magazine. The observatory staff consists of the director, two chief assistants, six assistants and a staff of computers. See Observatory.

ROYAL ORDER OF VICTORIA. See

Orders, Royal.

ROYAL ORDERS. See Orders (Royal) and Decorations of Honor.

ROYAL AND PROTESTANT ORDER OF SAINT JOHN. See Orders, Royal.

ROYAL SOCIETY OF EDINBURGH,

a society which was incorporated in 1783, hav¬ ing been developed from the Philosophical Society of Edinburgh, commenced in 1739. Among its early members were Hume, Reid, Edmund Burke, Hutton, Dugald Stewart and James Watt; and among its presidents have been Sir Walter Scott, Sir David Brewster, the Duke of Argyll, Lord Moncrieff and Sir William Thomson.

ROYAL SOCIETY, London, an organiza¬ tion which owes its origin to a club of learned men who were in the habit of holding weekly meetings in London as early as 1645, although the year 1660 is generally given as the year of its foundation. Charles II took much inter¬ est in the proceedings of the Society, and in 1682 granted a charter to the (<President, Coun¬ cil and Fellows of the Royal Society of London for Improving Natural Knowledge.® Lord Brouncker was first president of this incor¬ porated Royal Society. Meetings are held weekly from November to June for the pur¬ pose of reading and discussing scientific papers; and the more important of these are published in the annual Philosophical Transactions,5 first issued in 1665, and now forming a most valuable series. Accounts of the ordinary meetings, with abstracts of papers, etc., appear also in the periodical (Proceedings, } begun in 1800. Scientific research has at all times been both initiated and encouraged by the Royal Society, and many of the most important scien¬ tific achievements and discoveries have been due to its enlightened methods. It deservedly enjoys an influential and semi-official position as the scientific adviser of the British govern¬ ment, and not only administers the $20,000 annually voted by Parliament for scientific pur¬ poses, but has given suggestions and advice which have borne valuable fruit, from the voy¬ age of Captain Cook in the Endeavor in 1768

down to the Challenger expedition, more than a century later. The society has an independent income.

ROYAL SPANISH ACADEMY, The,

an institution established at Madrid in 1714 for the same purposes as the French Academy. The number of members is limited to 24.

ROYAL UNIVERSITY OF IRELAND.

See National University of Ireland.

ROYALL, roi'al, Isaac, American soldier : b. Massachusetts, about 1720; d. England, Octo¬ ber 1781. He was a wealthy citizen of Med¬ ford, was its representative for many years in the General Court, and for 21 years was a member of the executive council. He served in the French War, and in 1761 was appointed brigadier-general, the first resident of New England to attain that rank. At the outbreak of the American Revolution he remained loyal to the Crown, and in 1775 left the country. His estates were confiscated and he was proscribed in 1778, but seems to have borne no enmity to his native land, as he bequeathed 2,000 acres of land in Worcester County to found a law professorship at Harvard, and made various other patriotic bequests. The town of Royal-ston, of which he was one of the original pro¬ prietors, was named in his honor, and the chair of law was established in his name at Harvard in 1815.

ROYCE, rois, Charles C., American naval officer and historian : b. Defiance, Ohio, 22 Dec. 1845. During the Civil War he was an officer in the United > States navy; from 1866 to 1876 was an official of the United States Indian Bureau and of the Bureau of Ethnology of the Smithsonian Institution from 1876 to 1885. During the 47th Congress he was secre¬ tary to the speaker of the House of Represen¬ tatives. In 1908 Mr. Royce was elected junior vice-commander-in-chief of the Grand Army of the Republic by the National Encampment. He has published (A History of the Cherokee Nation of Indians1* ; History of Indian Land Cessions to the United States5 ; (The Indian Title: the Method and Chronology of its Ex¬ tinguishment5 — all published by the Bureau of Ethnology. He also wrote (An Inquiry into the History and Identity of the Shawnee Indians5 ; and (Biography of General John Bidwell, one of the Earliest of the California Pioneers.5

ROYCE, Josiah, American philosopher and educator: b. Grass Valley, Nevada County, Cal., 20 Nov. 1855; d. Cambridge, Mass., 14 Sept. 1916. Graduated (1875) at the University of California, he studied also at Leipzig and Gottingen (1876) and the Johns Hopkins Uni¬ versity (1877-78), and in 1878-82 was instructor in English in the University of California. From 1882 to 1885 he was instructor in philos¬ ophy at Harvard, in 1885 was appointed assist¬ ant professor, and in 1892 was elected to the professorship of the history of philosophy, which he still retains. His views are very sim¬ ilar to those of T. H. Green (q.v.), the great English representative of the Neo-Kantian or Neo-Hegelian movement, and his position may be

studied in the historico-critical work, (The Spirit of Modern Philosophy5 (1892). His clear, distinguished style as writer and lecturer has served to enhance his reputation in the United States, among whose leaders in philo-738

sophic inquiry he is highly ranked. Besides (California from the Conquest to the Vigilance Committee of 1856) (1886), and (The Feud of Oakfield Creek) (1887), a work of fiction, he has written (A Primer of Logical Analysis) (1881) ; (The Religious Aspect of Philosophy } (1885); (The Conception of God) (1897); 'Studies of Good and EviP (1898) ; 'The Con¬ ception of Immortality) (1900; Ingersoll lec¬ ture on immortality, 1899) ; 'The World and the IndividuaP (1900-01; Gifford lectures, 1899— 1900) ; 'Outlines of Psychology) (1903) ; Her¬ bert Spencer) (1904) ; (Philosophy of Loyalty) (1908) ; (William James and other Essays on the Philosophy of Life) (1911) ; Sources of Religious Might* (1912) ; 'The Problem of Christianity) (2 vols., 1913) ; 'War and Insurance) (1914) ; 'The Hope of the Great Community) (1917).

ROYCROFTERS, roi'krof-terz, The, the name applied to a colony of artisans and artists living at East Aurora, Erie County, N. Y. The founder of the Roycroft colony was Elbert Hubbard (q.v.), who in 1893 established here a printing establishment and a monthly period called The Philistine. Hubbard, imbued with a socialistic doctrine similar to that of William Morris (q.v.) of England, gradually gathered about him numerous kindred spirits, and since 1900 the Roycrofters have been producing hand¬ made books, furniture and wrought-iron work, and have established schools of music, painting and sculpture. There are numerous workshops, a library, church and other buildings at East Aurora, occupied by the Roycrofters, who have increased until the colony numbers several hun¬ dred.

ROYER-COLLARD, rwa-ya-ko-lar, Pierre-Paul, French statesman and philosopher: b. Sompuis, Marne, 21 June 1763; d. Chateau-vieux, 4 Sept. 1845. He was educated at the colleges of Chaumont and Saint Omer and later became an advocate in Paris. He was an active participant in the Pre-Revolutionary movement and was elected one of the representatives of the commune of Paris. During the ascendency of the Jacobins he retired to his native prov¬ ince, where he succeeded

in avoiding their sus¬ picions. In 1797 the department of Marne sent him to Paris as a member of the Council of the Five Hundred and there he endeavored to serve the republic. But his sympathies were not with the Napoleonic regime. His corre¬ spondence with Louis XVIII begun at this period, which was also marked by his tem¬ porary retirement from political life. In 1809 he was appointed to the chair of philosophy in the University of France and later became known as the head of the “doctrinaire® school. At the Bourbon restoration in 1814 he was made Councillor of State and Chief of Public In¬ struction. In 1827 he was admitted to the French Academy and in 1828 became president of the Chamber of Deputies. In 1842 he retired from public life. He left few published works, but these reveal him as at all times on the side of freedom and enlightenment. In the support of the house of Bourbon he sought the over¬ throw of an empire which seemed to him to have usurped greater privileges than those of the monarchy it supplanted. His biography has been written by Barante (1878), Spuller (1895)

and Vinglain (1858). For an outline of his phi¬ losophy consult Jouffroy’s translation of Reid.

ROYERSFORD, roi’erz-ferd, Pa., bor¬ ough of Montgomery County, on the Schuyl¬ kill River, 30 miles northwest of Philadelphia, on the Pennsylvania and the Philadelphia and Reading railroads. There are stove foundries, machine shops, bottle works and silk factories. Pop. (1910) 3,073; (1920) 3,278.

ROZE, roz, Marie, French opera singer: b. Paris, 2 March 1850. She was a favorite opera singer of Paris for many years. Her first ap¬ pearance in London was in 1872. There she was received with favor also and sang in Italian opera during the next four years. She was married to Mr. Mapleson, her manager, in 1897 and sang for two years in America, when she returned to the London operatic stage.

RUATAN, roo-a-tan’, or ROATAN, ro-a- tan’, an island of Central America, in the Bay of Honduras, is 30 miles long by 10 miles wide. Its coast has dangerous reefs, except at the south, where there are a few good roadsteads, and at the east, where there is one, called Port Royal, wThich is ample and deep, though diffi¬ cult of access. The soil is fertile and the cocoa-palm, figs and vines grow without cultivation, while vegetable growth is abundant. Ruatan has three dependencies, Bonaca, Utila and Barbareta, comprising the colony of the Bay Islands. These islands were ceded to Honduras in 1856 by Great Britain. Pop.

from 2;000 to

4,000.

RUBAIYAT (roo-bi-yat') OF OMAR KHAYYAM. The collection of quatrains known as the "Ruba'iyat of Omar Khayyam,® owes its fame less to its author, the astronomer-poet of Persia, than to its translator or adapter, Edward FitzGerald, whose version has become one of the monuments of English literature, and the inspiration of innumerable imitations and parodies.

The original author, Ghias 'uddin Abul-Fath Omar ibn Ibrahim-al-Khayyam, was born in Naishapur, Persia, early in the 11th century a.d. — some hold as early as 1020 — and died at a ripe old age about 1123. He was a man of profound learning, by profession a mathema¬ tician and astronomer, one of eight scientists chosen by the Sultan Malik-Shah to reform the Mohammedan calendar. No less was he a philosopher, poet and humorist, a man of bold and independent thought and many-col¬ ored fancy; and in his leisure moments he embodied his varied reflections in stray quat¬ rains that have come down to us as the 'Ruba'iyat of Omar Khayyam.* The word "ruba'i-yat® simply means (<quatrains,® being the plural of "ruba'iy.® The ruba'iy is a complete poem of four lines, the first, second and fourth lines rhyming, complicated triple, quadruple and even quintuple rhymes being employed. The third line is usually, but not always, left un¬ rhymed. There exist in various Persian manu¬ scripts about 1,200 ruba'iyat attributed to Omar, not more than 500 of which are considered authentic by even the most generous critics. These ruba'iyat, each presenting a distinct thought and unrelated to any other ruba'iy, ap¬ pear in the Persian manuscripts arranged alpha¬ betically according to the terminal letters of the rhymed lines. Edward FitzGerald, in ere-RUBBER

ating his remarkable English version first pub¬ lished in 1859, not only selected, combined and remolded such ruba'iyat as appealed to his genius, but also arranged them so as to pro¬ duce an effect of continuity of thought wholly lacking in the original. He thus evolved a meditative poem or elegy of marvelous melody and power,

emphasizing, however, one phase of Omar's thought to such a degree that a con¬ temporary wrote, <(The Ruba'iyat will come in time to be recognized as the highest expressions of agnosticism.®

The philosophy of the Ruba'iyat as presented by FitzGerald is in effect: ((We know the loveli¬ ness of this world, we know nothing of the Hereafter; but God, who created us as we are, will not punish us for being as He made us; let us then enjoy the only life of which we are sure, before we inevitably pass into darkness.® Without denying that this may be considered the old Persian's dominating thought, it must •be added that Omar, being at least nominally a Mohammedan, had his moments of piety, and never wrote anything as daring as Stanza LXXXI of FitzGerald's version. Some have even maintained that Omar was a devout mem¬ ber of the Sufi sect, and insist on allegorical and religious interpretations of his praises of wine and beauty. But we are safest in con¬ sidering the quatrains as expressions of the conflicting moods of an essentially human per¬ sonality.

FitzGerald's version in the author's fourth and final edition contains 101 quatrains. There are numerous other more extensive and more literal, though far less delightful translations in French, German, English, Hungarian and Nor¬ wegian. Several of these translations may be found, presented with FitzGerald's work, in the Ruba'iyat of Omar Khayyam > (Multi-Variorum ed., edited by Nathan Haskell Dole, Boston).

Arthur Guiterman.

RUBBER, an elastic, resilient substance de¬ rived from numerous trees and vines found scattered widely over the tropics. Its proper name is Caoutchouc and it is classified in the hydrocarbon family; the chemically pure product being described by the symbols C10 H16. Commercially pure rubber, however, contains several other things such as moisture, albumin, resin, sugar, mineral matter and oil. The dis¬ covery of rubber is attributed to Columbus who, as the story goes, found the natives of Hayti playing a game of ball with a resilient, bounc¬ ing material. Later voyagers from France on a mission involving certain geographic surveys made a closer analysis of this substance includ¬ ing in their reports a rather detailed descrip¬ tion. One main fact brought to light by these men was that Caoutchouc was derived from a lacteal fluid and not from the sap of the trees as is, even now, commonly supposed. See India Rubber; India Rubber Tree.

Caoutchouc is the term used to describe this substance in all but the

English-speaking coun¬ tries. The term “rubber® is the result of a dis¬ covery by Priestly, an Englishman, who in 1770, by experiment, found that small pieces of this coagulated latex were useful as pencil mark erasers. He immediately called them “rubbers® and for the want of a more descrip¬ tive one, this name rubber remained; until now

it is accepted by all English-speaking people as descriptive of the crude material, which forms the basis of so many manufactured articles now classified as rubber goods.

Although Latin countries first interested themselves in rubber, particularly France, Portugal and Spain, and many items of native manufacture were exported from Brazil and other South American colonies to these coun¬ tries ; these, however, were looked upon simply as interesting curiosities and it fell to the English to really begin manufacture of. rubber goods on a scientific basis, following extensive research work. The first patent covering rub¬ ber for practical use was issued in 1771 to Samuel Peal of London. His invention pro¬ vided for the waterproofing of cloth by spread¬ ing it with a thin layer of melted rubber. This process was, however, attended by so many difficulties that Peal did not make progress and although the experiment doubtless served as a stimulant for further research and develop¬ ment, in itself resulted in nothing.

FI ext came Nadier, also an Englishman, who in 1820 patented the idea of manufacturing elastic thread by cutting thin strips from long slabs of rubber. These he intended should be woven into cloth. But his invention, likewise, proved impractical as it was then found im¬ possible to design weaving machinery which would accommodate elastic thread. Three years after the failure of the elastic thread project of Nadier, Charles McIntosh of Glas¬ gow, Scotland, obtained a patent for water¬ proofing fabrics. His process was accom¬ plished by spreading a solution of coal-tar naphtha and rubber on a marble slab, allowing the solvent to evaporate. This resulted in a thin sheet of pure rubber which later was placed between two fabrics and fastened by means of needle and thread. In 1825 McIntosh established a factory for the manufacture of garments by this method. McIntosh’s venture is regarded by many as the beginning of our modern rubber industry. The name still sticks — all garments of the double fabric texture variety, with rubber between, are still known universally as McIntosh’s.

Three years prior to McIntosh’s discovery, Thomas Hancock had also

interested himself in the possibility of commercially developing rub¬ ber. Having spent his early days in mechanical pursuits, Hancock attacked the problem from an entirely different angle. That is, he worked out methods of preparing rubber through the application of machinery and by this means founded what is the real beginning of rubber manufacturing. His first patent granted in 1820, provided for improvements in the application of articles of dress such as wrist bands, waist and coat bands, garters, etc., by the introduction of rubber, that these might be rendered elastic and better fitting. To accomplish his purpose he worked out and designed the first rubber milling machinery. The compounding of rub¬ ber with other ingredients was also success¬ fully inaugurated by Hancock. In fact, as early as 1825 he was mixing with rubber, coal-tar, Fuller's earth and coloring pigments for the purpose of strengthening, beautifying and mak¬ ing his products less sticky. He had con¬ siderable success in the manufacture of a varied line of rubber goods which, even now, would

be considered fairly complete. His output in¬ cluded hose, belting, packing, shoes, inflated goods and also molded articles such as bumpers. Thus, it can be said that the manufacture of rubber goods really had its inception in Eng¬ land.

Although, in 1813 a patent was granted to Jacob Hummel, of Philadelphia, for a gum-elastic varnish, there seems to be no further mention of his product so evidently it was never put into use. Crude rubber and native rubber articles, such as shoes, water bottles, etc., were, however, brought to the seaports of New England in large quantities as early as 1823 and formed the inspiration for exper¬ imentation by a great many Americans who also had ideas for manufacturing rubber into various items of commerce. About 1831, McIntosh and Hancock, in England, began to manufacture a varnish by dissolving rubber and lamp black in spirits of turpentine. This was supposed to provide a waterproofing material suitable for use in the manufacture of footwear and coats. The Roxbury India Rubber Company, of Connecticut, was chartered in 1833 for the manufacture of footwear and clothing under this patent. Following this, small rubber factories sprung up all over New England but none attained success because they failed to take into consideration the nature of the material with which they were working, viz., its tendency to soften and stick in warm temperatures and become hard and brittle under the influence of cold. Among the prominent factories which had failed about 1838 was one in Woburn, Mass., which shut its doors early in the summer of this year leaving Nathaniel Hayward as caretaker. Hayward, having little to do and being of an investigating turn of mind, used the materials at hand for exper¬ imentation. During his experiments he hap¬ pened upon the idea of mixing a small amount of sulphur with rubber and treating the mixture with acid gas fumes, the latter idea having previously been worked out by Charles Good¬ year. Hayward patented this process, acknowl¬ edging in his application the use of the Good¬ year acid gas treatment. Charles Goodyear was a native of Connecticut and son of an importer and manufacturer of buttons, hardware and farm implements. At the time Goodyear's in¬ terests were aroused in rubber, he was engaged at Philadelphia in operating the first retail hardware store in the United States and had amassed from this business a considerable fortune. Hearing of Hayward's invention, he promptly purchased from him the patent rights. Thus began the trials of the man whose devotion to an idea has

made the great rubber industry possible.

The sulphur and acid gas treatment did not work well as he supposed it would and it was not until the winter of this same year that Goodyear made the final discovery of the proc¬ ess of vulcanization. Although an educated man, he was not versed in analytical chemistry and his discovery was made by exploration into the field of the unknown rather than by experiment. He had mixed sulphur with rub¬ ber and while discoursing on the subject so dear to his heart one cold night, so the story goes, a piece which he had in his hand ac¬ cidentally touched the red hot door of the kitch¬

en stove. To the astonishment of Goodyear, an ounce or two which stuck on the stove hardened without melting. He rushed to the other side of the room, seized a knife and scraped the residue from the stove while his relatives and neighbors looked on with the conviction that he had finally gone insane. Scraping the residue from the stove and washing it he found ftvulcanized rubber. w Thus, by chance, Good¬ year discovered the vital link which now makes possible the use of automobiles and thousands of other machines.

Goodyear was entirely out of funds through bad credits extended by the hardware business and his devotion to rubber experimenting. It was not until 1844 that he finallv applied for and was granted a patent on his discovery. Even then he had great difficulty in convincing others that this was not a myth, the same as they had found his acid gas process to be.

Laverett Candee is said to have been the first to take practical advantage of Goodyear's dis* covery. He, at least, bought a license from Goodyear to manufacture footwear the same year the patent was granted. From the start rub¬ ber shoes were found to be well adapted for hard service and sales made a slow but substan¬ tial growth. The success of Candee caused many others to enter the business of rubber manufacture and within a comparatively few years there were several concerns turning out a variety of products. Among the first were, Ford and Company of New Brunswick, N. T.

The path of the American rubber manu¬ facturer, in spite of the assured success of rub¬ ber goods through the discovery of vulcaniza¬ tion, was not, however, one of ease and affluence. Many difficulties attended the estab¬ lishment of rubber factories that were not of a mechanical nature. Tariff reforms were needed badly. Our monetary

system was in a state of flux; other industry as a consequence was at a low ebb. Accordingly, the demand for rubber goods did not exist. In fact it was not until after the close of the Civil War that rubber manufacture, through the improved in¬ dustrial condition of the United States and the development of railroads, began to come into its own.

Goodyear died financially discredited, leav¬ ing no legacy to his heirs in the way of partic¬ ipation in the fruits of his efforts, although credited with having made a great fortune from his discovery. He spent money lavishly in advertising; in fact, during the year 1851 he made an impressive exhibit of American made rubber goods at the Crystal Palace (London) exhibition where he contracted more debts than he could conveniently meet and was thrown into prison. Many infringements were made and he was called upon repeatedly to sus¬ tain his patent claims in court. This took a great deal of money.

The Civil War had furnished the impulse to¬ ward a general industrial expansion in the United States and development of transporta¬ tion carried manufacturing further West.

Rubber manufacture was established west of the Allegheny Mountains and thus we have what is known as the beginning of the Rubber Era. As Hancock had shed light upon the possibilities of rubber as an everyday com¬ modity; as Goodyear had discovered the means

for making these ideas realities; so Dr. Benja¬ min Franklin Goodrich developed the channels through which dreams and discoveries of his predecessors were able to be enjoved by men in all walks of life. It was he who blazed the trail of practical manufacture and first demon¬ strated the real scope of rubber manufacture in the central west, which resulted in opening up one of the leading industrial cities in the United States. Dr. Benjamin Franklin Goodrich be¬ came involved through a real estate transaction in the Hudson River Rubber Company of Hast¬ ings, N. Y., a concern which had made a failure. Like Goodyear he became in¬ tensely interested in the future of rubber; so much, in fact, that he gave up his real estate interests to make rubber manufacturing his life profession. He came west seeking capital and landing in Akron sold himself and his defunct New Yoik Rubber Company to the prominent members of the Akron Chamber of Commerce. In 1870 the machinery was moved to Akron, the original company being incorporated 31 December. The building occupied was a two-story brick structure, 50 by 100 feet and 20 people constituted the entire payroll. The first products . consisting of hose, billiard cushions and belting were placed upon the market in May 1871. Thus, from a 20-man beginning, Akron, Ohio, has developed into the rubber manufacturing centre of the world. In normal times something like 65,000 workmen are em¬ ployed in turning out about $300,000,000 worth of rubber goods — over one-third of the pro¬ duction of the whole United States.

No hard-and-fast rule can be laid down by which to classify rubber products. There are, however, to-day 12 general divisions of manu¬ facture and sales which are quite generally recognized both from the standpoint of manu¬ facturing and marketing. While several lines are often sold through the same factors the problems of selling the different lines are some¬ what diversified, and hence the necessity for continuing the classification into the sales end of the business. These lines are, viz., footwear, mechanical rubber goods, rubber sundries, . in¬ sulated wire, hard rubber items, solid tires, pneumatic tires, auto accessories, tire repair materials, rubberized fabric products, dipped goods and lathe cut items.

The rubber business in America can be said with truth to have begun with the rubber shoe in 1823. A few pairs were at that time brought to Boston by a sea captain, plying be¬ tween the ports of South America and New England in the rum trade. During 1825, 500 pairs of crude native-made rubber shoes were brought to Boston and found a ready market. Although thick and clumsy, being made from the raw unvulcanized gums, these readily sold for from $3 to $5 per pair. Although having many drawbacks as an item of wearing apparel, they were, nevertheless, waterproof ; and, being a curiosity, found a ready market among the rich. The following 15 years probably saw 1,000,000 pairs of these crude rubber shoes brought into the United States and all found ready sale. When, however, the mechanical process of rubberizing fabric with a varnish of spirits of turpentine, lamp black and rubber made possible the construction of rubber shoes on a factory basis the popularity of rubber

shoes died out. The shortcomings of unvul¬ canized rubber then became more generally recognized, i.e., its tendency to viscousness in warm and its brittleness in cold weather and The Roxbury India Rubber Company, estab¬ lished in 1833, for the manufacture of shoes after this plan, met with ignominious failure in less than three years.

Immediately after Goodyear's discovery of vulcanization, L. Candee, who purchased the first license to manufacture rubber goods under this patent, repopularized the rubber shoe and put it on the market to stay and this company has continued to the present time as one of the important factors in the American rubber foot¬ wear industry. One very important event in the history of the rubber boot and shoe busi¬ ness in the United States occurred in the fall of 1892 when the United States Rubber Com¬ pany purchased nearly all the larger rubber footwear interests of this country. This cen¬ tralization resulted in conspicuous economies for while the industrial units of this combina¬ tion have remained under their former manage¬ ment, they have shared their individual profits in common. The patents and secret processes of one factory became the property of all and in this way all important methods and formulae which each factory enjoyed before were equally shared by the whole organization. There was also a great saving in the matter of crude rubber purchases, the large single purchase be¬ ing made at great advantage over a number of small scattered purchases. Other advantages also accrued by eliminating the necessity of carrying large stocks and in diminishing the duplication of a large Hast® equipment.

The next great step in rubber footwear development came as a result of experiments made by the B. F. Goodrich Company. This company entered the footwear business in 1905, making a line of light-weight wear under a contract for one of the large jobbers. In 1913 the Goodrich Company introduced their Hi-press line of heavy boots and shoes made by an altogether new process resulting in a qual¬ ity far beyond what had been previously pos¬ sible. In 1916 the Goodrich Company reorgan¬ ized its footwear manufacturing and sales de¬ partments coming out, at that time, with a complete line which they began to market direct to the retailer. In 1917 the Firestone Tire and Rubber Company of Akron also launched a rubber footwear department.

Although for many years the footwear busi¬ ness monopolized the bulk of the crude rubber imports, other lines have now developed to the point where but 8 per cent is utilized by this division. The growth of the rubber shoe business, has, however, been very phenomenal. From an annual output in 1860, valued at $795,- 000, the increase has been in leaps and bounds. To show its growth in chronological order, in 1870 the value reached $8,000,000; in 1880, $16,- 000,000; in 1890, $24,000,000; in 1900, $40,000,000; in 1914, $60,000,000 and during 1918 the produc¬ tion reached the grand total of 65,750,000 pairs, worth, approximately, $125,000,000. Sales dur¬ ing these two years were, however, largely aug¬ mented through the necessities of the warring nations for large quantities of waterproof shoes. For 1919 the output will not exceed in value

$100,000,000.

The manufacture of mechanical goods began

RUBBER

with hose and belting; but development in this field has probably been more prolific in inven¬ tion than in other lines of rubber manufac¬ ture. To-day the full mechanical line not only embraces belting and hose but about 30,000 molded items such as bumpers, valve discs, *etc.* Packing of several kinds for steam engines, etc., is also an important item. Rubber insu¬ lated wire of all kinds, floor covering such as matting and tiling, while decklestraps, billiard cushions, etc., are also embraced within this class. To give an idea of the volume of busi¬ ness which is done in rubber mechanical goods the last item (billiard cushions) uses one-fourth million dollars' worth of crude rubber each year and this by no means is the largest single item.

Rubber sundries had their inception many centuries before the discovery of America in the form of native bottles, canteens, *etc.* Man¬ ufacture began, however, with Hancock in England, about 1825. He designed and patented several articles such as water bottles, air cushions, *etc.* In America the Union Rubber Company of New York can be said to be the first to manufacture sundries under the Good¬ year patents. They started in business in 1857 and to-day this branch of rubber manufactur¬ ing occupies a most prominent place — the vol¬ ume in sales running up to approximately 10 or 12 million dollars.

Rubber sundries embrace a large number of items. These are usually sub-classified into five divisions such as drug sundries which include hot water bottles, *etc.* ; surgeons' sundries in¬ cluding drainage tubes, operating cushions, *etc.* ; dental sundries including plaster bowls, *etc.* ; stationers' supplies including bands, erasers, *etc.* ; athletic sundries including tennis balls, baseball body protectors and golf balls. Many special items such as respirators are also in¬ cluded in the production of this division.

Insulated wire, although using a compara¬ tively small proportion of crude rubber, is one of the most important divisions of the rubber business. Without rubber insulated wire, civil¬ ization could not exist as it does to-day. Build¬ ing cables, automobile cables, mining cables, telephone wire and cables all depend upon the insulating qualities of rubber for their success. In other words, were it not for this rubber in¬ sulation, the '"juice® would leak away long be¬ fore it reached its destination. Several millions dollars' worth of this product alone are pro¬ duced yearly in the United States — the output being confined to

relatively few factories.

Charles Goodyear began the manufacture of hard rubber about 10 years after his patent was granted. In 1851 when he made his famous exhibit in London, hard rubber items played an important part in the display. The first article made to any extent was the comb. Goodyear's biographer, a personal friend, re¬ lates that the original combs cost 20 times as much as the ivory ones then in use, but only 20 years after this, the India Rubber Comb Company practically enjoyed a monopoly in the business. In 1898 the American Hard Rub¬ ber Company, a combination of several small companies, with a capital of $2,500,000 was or¬ ganized and captured the bulk of the business. Other independent companies have since en¬ tered the field and to-day enjoy a large portion of the business.

Hard rubber differs from the soft product mainly in that there is more sulphur in the com¬ pound — the value sometimes reaching 30 per cent — and the cure is longer. Battery jars con¬ stitute, perhaps, the largest single item in hard rubber manufacture although the complete list embraces some 15,000 to 18,000 items. These are represented by tubing, steering wheel rims, pipe stems, buttons, fountain pen barrels and a mul¬ titude of articles necessary to the success of all sorts of electrical devices. For example, there are on every desk telephone set a dozen or more hard rubber pieces. As may be im¬ agined the value in sales . of hard rubber alone is considerable.

In so far as the motor truck is concerned the highway is, in truth, paved with rubber and had it not been for the solid rubber tire, the motor truck would have remained an experi¬ ment and the World War might not have been one for democracy. Even before the discovery of vulcanization, ideas were entertained for the reducing of vibration in vehicles by the use of rubber. As early as 1846, the firm of Charles McIntosh and Company of Manchester, Eng¬ land, perfected and manufactured a solid rub¬ ber carriage tire for Her Majesty's brougham. The Shrewsbury and Talbot Noiseless Tire and Cab Company, Ltd., of England and Brews¬ ter and Company of New York were the first to popularize this solid rubber vehicle tire. This tire was the Carmont, patented in 1881. Fol¬ lowing this came the ˆCushion,® a solid tire with a hollow or sponge rubber centre patented in 1884. The Internal Wire type patented by Grant in 1896 was, however, by far the most popular solid rubber carriage tire made. In 1891, J. A. Swinehart patented what is known as the side wire tire and this is the one which was introduced and first adopted for motor

vehicle use. The side wire tire failed in motor vehicle service and the <(steel base® type took its place and is the one in use to-day. This type is the outgrowth of experiments made by the B. F. Goodrich Company in 1909 to overcome the difficulties in motor vehicle service attend¬ ing the use of other types.

The solid rubber carriage tire has largely died out due to clearly evident causes. The volume of ‘business done in solid rubber motor truck tires is, however, astounding. Two and one-half million of tires were produced dur¬ ing 1918 representing in value something like

$25,000,000.

The pneumatic tire was invented by Robert W. Thompson in 1845 for carriage uses but his patent was forgotten and in 1883 Charles Dunlop revived the idea in the form of a bicycle tire. The growth of the bicycle busi¬ ness is well known, but in its palmiest days there were never as many in use as to-day. Approximately 3,500,000 bicycle tires are in service, wearing out yearly one tire each and the average yearly production of bicycles is one-half million.

The pneumatic automobile tire is the out¬ growth of the bicycle tire. In fact, the first automobiles were equipped with Tandem weight bicycle tires. The first tire designed exclusively for automobile usage was made in 1896 by the B. F. Goodrich Company for the Winton Com¬ pany of Cleveland, Ohio. Two sizes were furnished, 34x4 and 36x4 — the former for the front and the latter for the rear wheels of

the machine. The carcass consisted of 19-plies of fabric and the (<huge tires® were the source of much amusement for the crowds who witnessed the trial trips of Mr. Winton's (<big® machine. To-day the pneumatic auto¬ mobile tire is, by far, the most important single item of rubber goods manufacture. It is estimated that in 1919 37,500,000 tires were made, valued at $1,125,000,000. Prac¬ tically all of this development has taken place since 1900; a wonderful record. There are two general types of pneumatic tires in use to-day. One is made with a carcass of specially woven long fibre cotton duck and the other is made with a carcass of rubberized cord. This latter type constitutes the acme in resilience and mileage and is much pre¬ ferred by* discriminating motorists.

Automobile accessories comprise such items as water buckets, blow-out patches, inner tube patches (self vulcanizing) and rubber mallets. While the volume in sales of these items is relatively small, yet, many such items are indispensible to the motorist.

The World War taxed the manufacturing capacity of the rubber companies to the limit. This together with the curtailment of crude rubber importation and curtailment in produc¬ tion of tires forced a more economical use of tires and with this a greater tire repair busi¬ ness. During this period, tire repairing re¬ ceived a greater impetus than in all the pre¬ ceding years of automobile development. This led to an unprecedented demand for repair materials and there is every indication that tire repair materials as furnished by rubber companies will be an important division for all time to come.

Rubberized fabrics are used by the millions of yards in the manufacture of rubber sur¬ face waterproof coats such as worn by fire¬ men, policemen and teamsters and also in the production of numerous special items such as typewriter, adding machine coverings, *etc.* The balloon business developed almost over night during the war,

called for thousands of yards of rubberized fabric and this necessi¬ tated the installation of a great deal of special machinery. This machinery will be turned to other uses and it is predicted that the sale of coated fabric will extend to many new fields. As an indication of this, many automobiles are now using in place of leather, a leather substitute consisting of a fabric coated with a compound held by a binder of rubber. This material is really more durable and can be made in n texture and colors surpassing in beauty and design those of leather.

Dipped rubber goods embrace such things as gloves, toy balloons, *etc.* The volume in sales in this line is not large and but few manufacturers have departments for the pro¬ duction of this class of rubber products. They are made by dissolving rubber in benzine and dipping mandrels in the solution. It is a par¬ ticularly dangerous process on account of the fumes arising from the solvent and on this account not attractive to the big manufacturer of rubber goods.

Lathe cut goods embrace a great many items such as fruit jar rings, paper mill rolls, feed rolls and certain types of gaskets. These items, especially rubber rolls, both hard and soft, have been in use almost from the be¬

ginning of the rubber industry and while the field for usage in this division is some¬ what limited, the volume is nevertheless at¬ tractive. Several hundred thousand pounds of rubber are used yearly in the making of jar rings alone.

Rubber thread, as worked out from the original idea of Nadier, is usually classified under sundries, although the quantities made generally call for a special department, for its manufacture. Millions of yards are used alone in the production of golf balls. And, in the manufacture of rubber thread for the elastic fabric industry, several hundred people are kept busy in one of Akron's factories.

The total world production of crude rubber has increased more than five fold in the last 20 years. While the production of native or wild rubber has declined considerably, that of plantation has increased since 1900 from a few tons to more than 300,000 tons per year. The bulk of all the crude rubber used now comes from the far eastern area, this embraces the Malay Peninsula, Strait Settlements, Cey¬ lon and other islands. Out of the 290,000 tons used in 1918, 83 per cent came from this dis¬ trict and other plantation areas. Of the 256,879 tons

used in the world in 1917, 177,088 tons were consumed by the United States' — more than 69 per cent. Out of the 177,000 tons used in the United States, over one-third of this, or 60,000 tons came to Akron, justifying the claim that Akron is the rubber manufactur¬ ing centre of the world.

Less than 2,000,000 acres of the plantation areas are, at present, producing. More than 3,000,000 acres are now under cultivation and it is estimated that within four or five years the production of crude rubber on plantations alone will reach the astounding figure of 500,000 tons. Even with this enormous produc¬ tion of crude rubber, the factories would not have been able to keep going, were it not for the fact that three pounds of reclaim to one pound of new rubber are used. In other words, were it not possible to obtain great quantities of high-grade reclaimed rubber to use in places where it will serve the same purpose, the pro¬ duction in rubber goods would be far below what it is at present.

A. R. Chilson,

Of The B. F. Goodrich Rubber Company, Akron, Ohio.

RUBBER INDUSTRY IN THE UNITED STATES. The special census of manufactures for the year 1914 reported the number of es¬ tablishments in the United States engaged in the rubber industry as 342. Of these, seven were making rubber belting; 11 making hose; 23 making boots and shoes, and 301 in other lines — tires, packing, clothing, mats, matting, soles and heels, mechanical rubber, rings for jars, rubber thread, rubberized fabrics and hard rubber articles. In none of these lines was the product of less than $1,000,000 in value for the year.

The industry occupied 88,821 persons, of whom 74,022 were wage-earners. The total capital employed was $267,671,422. The value of the raw materials consumed was $163,034,713, and the value of the year's production was $300,993,796. Of the 301 establishments en¬ gaged in the general manufacture of rubber articles, 54 are in Ohio; 53 in New Jersey; 45 in

New York and 42 in Massachusetts ; the remain¬ ing 107 being quite widely scattered throughout the country.

The values of the output in the larger branches of the rubber industry for 1914 are as follows :

Automobile tires (casings) .	$105,678,951
Shoes and rubbers .	37,858,222
Inner tubes for tires .	20,101,084
Solid tires .	13,735,681
Hose .	16,853,692
Rubber boots …	
Belting .	
Druggists’ and stationery sundries	
Bicycle and aeroplane tires .	
Clothing, ponchos, etc .	
Packing .	
All other .	

12,647,934

7,989,405

7,511,755

6,905,853

6,799,515

3,507,651

40,133,250

The chief division of the rubber industry is the manufacture of tires, the value of its out¬ put amounting to 48.6 per cent of the aggregate production of the whole. In 1914 there were 95 establishments devoted to this manufacture, 27 of these being in Ohio and 19 in New Jersey. The solid tire industry is centred in Ohio, where 86.6 per cent of the country's output is produced. The production of automobile tires for the year 1914 numbered 8,021,371 casings and 7,907,351 inner tubes; motorcycle, bicycle and aeroplane tires numbered 3,728,138, and solid tires to the value of $13,735,681 brought the total value of the tire output for the year up to $146,421,579.

The rubber industry experienced an enor¬ mous expansion during the war. Detailed figures covering this increase are not available, but some comparative idea may be gained from the amounts of crude rubber imported in 1918 as against the importations for 1914. In the calendar year 1914 the amount imported and consumed in the United States was 142,507,294 pounds, valued at $70,275,840. In the fiscal year ended 30 June 1918 the amount was 390,- 338,533 pounds, valued at $203,122,748. Ex¬ ports in 1914 amounted to a value of $14,- 767,513; of which total tires of all descriptions accounted for $4,963,270 ; boots and shoes, $2,780,325, and belting, hose and packing, $1,- 807,848. In 1918 the value of the exports was $31*649,292 ; of which $14,650,621 represented automobile tires; $5,762,079 other tires, and $4,525,243, belting, hose and packing. These ex¬ port figures comprise only the rubber manu¬ factures sold in regular trade, and do not in¬ clude the vast volume of rubber articles sent abroad as a part of the army and navy equip¬ ment of the Expeditionary forces of the United States in the war.

RUBBER TIRES. The earliest mention of rubber tires in literature is

contained in a work by Thomas Hancock published in 1856, in which he suggests the use of rubber tires on vehicles for the purpose of avoiding vibra¬ tion. Prior to this, however, a patent for an elastic tire had been granted to Robert William Thompson in 1845, and it has been frequently suggested that this patent anticipated the pneu¬ matic Dunlop tire. As a matter of fact, it appears to have been satisfactorily proved that Dunlop's invention was developed quite inde¬ pendently of any knowledge of Thompson's work. Thompson's tire consisted of an elas¬ tic belt made of a number of folds of canvas saturated and covered on both sides with rub¬ ber or gutta-percha in a state of solution. The inner tube so obtained was to be protected by

a cover built up around the tire, made by rivet¬ ing together circular segments of leather and bolting these to the tire. There was also provision by means of a pipe passing <(through the tire® for inflating with air. As far as can be ascertained, very little practical use was made of Thompson's invention. In 1856 a solid tire composed of cloth or other fibrous material and rubber sheet in alternate layers was made by W. Coles Fuller. This tire was made up on a cylinder fastened to the wheels by means of flanges. The introduction of the bicycle about 1869 gave the necessary impetus for the further development of the solid tire and sub¬ sequently of the pneumatic type. In 1888 the pneumatic tire as we know it was invented by Dunlop and at once came into universal use on the bicycle. In England and on the Con¬ tinent, an outer casing containing an inner inflated tube was attached to the wheel-rim, while in America a single tube cemented to the rim was more generally used and to this day holds its place on the bicycle. With the advent of the automobile a new field opened for the pneumatic rubber tire. The simplest form of automobile tire is a solid band of rubber, next come the several forms of cushion tires in which the band of rubber is perforated with a number of small holes or provided with a series of openings with the object of obtaining greater resiliency and of making the tire more yielding than the solid rubber type. Solid tires are to-day practically confined to commercial and industrial vehicles, such as delivery trucks, wagons, *etc.* The great weight and speed of passenger automobiles and their delicate con¬ struction require additional protection from vibration to that furnished by springs alone. The pneumatic tire is now in general use on such vehicles, for with these tires the car is suspended in air, which is the most elastic of substances. The most common form of tire is composed of a hollow rubber tube of circu¬ lar section filled with air and protected from wear by means of an outer shoe or casing. The inner member or tube

is made of a very pure rubber, about one-eighth inch thick for cars of average weight. While this tube is very elastic and is airtight, it would not be strong enough or have adequate resistance to be run directly in contact with the road surface, there¬ fore, it is necessary to protect it by a shoe composed of layers of fabric and rubber com¬ position. The shoe member is provided with beads on its inner periphery designed to inter¬ lock with the rim channel. A steel rim is placed around the felloes of the wheel and shaped to fit the shoe or casing, its exact shape depending on the design of the tire. The part of the shoe which comes in contract with the road surface is called the tread. The main part of the shoe or casing is made up of five or more layers of a Sea Island cotton fabric «frictioned® with high-grade rubber composi¬ tion. This is forced into the mesh of the cloth by machinery so the fabric will be prac¬ tically waterproof and will join intimately with the other plies by a process of vulcanization when the shoe is cured. Outside of the fabric body a layer of very resilient rubber, approxi¬ mately of crescent form, known as the padding, is provided to give elasticity to the shoe. Between this member and the tread a number of piece' of heavy fabric called (<breaker strips® a

interposed to offer a certain degree of resist¬ ance to any sharp object that might penetrate the tread and go through the padding and into the fabric body. The tread is the tire part subjected to the greatest stress, as it must resist the abrading influence of the road, and, in the case, of the rear tires, the wearing effect of the friction of the tractive effort. The tread, accordingly, is of very tough rubber com¬ position and does not possess a very great de¬ gree of elasticity, which is here sacrified for strength and resistance to wear. Air is pumped into the tire through a form of automatic valve, firmly attached to the inner tube and projecting through the steel rim and felloe. The valve is held in its seat by a tension spring, and opens only when the pressure of the incoming air is greater than the pressure within the tube. Tires are sometimes classified according as they have a smooth tread or a non-skid tread. The non-skid type has a roughened surface, either small cups, knobs, steel rivets, etc., de¬ signed to prevent skidding on

slippery high¬ ways. Chains are also used for the same pur¬ pose, being so made that they are quickly at¬ tached or detached, as the necessity arises. Their form is too well known to require description. The casing or shoe of automo¬ bile tires ‘differs also in the manner of their seating or attachment to the rim. The clincher type was long the most popular and simplest in that the shoe was held against the rim when the tube is inflated. Another form is known as the straight-side. All these varieties are de¬ signed to facilitate a more ready removal from the wheel or to make for a more secure attach¬ ment. The quick detachable rim is the more modern and popular type. It is permanently fastened to the felloe of the wheel, but the outer clinch of the rim is removable, permitting the casing to be easily pulled off. American tire manufacturers have adopted the following pro¬ portions between axle loads and tire sizes :

2 i -inch tires, all diameters

3 inch tires, all diameters .

3j x 28 . I .

3j x 30 .

3j x 32 .

3j x 34 .

3j x 36 .

4 x 32 .

4 x 34 .

4 x 36 .

4£ x 34 .

4j x 36 .

225 pounds per wheel 350 “

400 “ “ “

450 “ “ “

555 “

600 “ “ “

600 “ “

650 “ “ “

700 “ “ “

750 “ “

800

900 “ “ “

The air pressures for inflating pneumatic tires recommended by the same authorities are as follows:

Diameter of tire.

Maximum weight

Air pressure in

inches

on wheel, lbs.

tire, lbs. pr. sq. in,

2\ .

225

50

350

60

3j .

600

70

750

80

4* .

1,000

90

1,000

90

In recent years cord tires have come into favor because of their lasting qualities. They have a carcass of rubberized cord instead of the well-known fabric laps. Consult Goodrich Rubber Company's 'Wonder Book

of Rubberˆ (Akron, Ohio, 1917) and Dykes, ‘Automobile Encyclo¬ pedia* (Saint Louis, annually).

RUBBER-TREES, the sources of caout¬ chouc (q.v.) or India-rubber (q.v.) are botan¬

ically various and widely distributed in the warmer parts of the world. They belong to the four allied groups Moracece , Enpliorbiacece , Artocarpacece , and Apocynacece, but not all the members of these families yield caoutchouc, while a similar juice may be obtained from cer¬ tain outside plants. This substance (latex) is one of those, like the “milk® of the milkweeds and many others, which are elaborated in the green surface cells and conducted through the plant, for its nourishment by the lactiferous canals. In the rubber plants they run just be¬ neath the bark and often carry the sticky juice in excess, so that “in the gigantic trunks of tropical fig-trees,® as Kerner says, “the latex often wells up in large quantities from rifts in the bark which have arisen spontaneously and thickens into long strings and ropes of In¬ dia-rubber hanging down like a mantle.® A rough test of whether a tree-juice has the true properties of caoutchouc is to rub some of it between the fingers until it exhibits the recog¬ nized elastic threads; inferior juices of other trees are sometimes mingled with it by native gatherers as adulterants and these may in some cases nearly ruin the whole package, by de¬ veloping other qualities in coagulation, as for instance those of gutta-percha (q.v.).

The caoutchouc-yielding trees occur in all tropical regions, but are different botanically in each region. The principal commercial supply and the best is obtained from the valley of the Amazon and is known to the trade as Para rub¬ ber; but all other ports of northern South America ship it in large quantities. That which comes from the valleys of the Amazon and Orinoco (Brazil, Guiana and Venezuela) is chiefly the product of the euphorbiaceous genus Hcvea and especially of H. brasiliensis, a tree often 60 feet in height, branching from the base, which, with two or three similar species, grows abundantly in the hot steaming lowlands along the river courses; the juice is obtained by tap¬ ping the trees by means of incisions in the bark in the evening and collecting the deposition next morning. Each tree will yield about six ounces in three days and then must be allowed to rest. The main resources in Guiana are the species H. guayensis and paucifolia, the former of which is called by the natives “caoutchouc.® That exported from Maranhao is similar. The Ceara rubber is derived from a smaller euphor¬ biaceous tree (Manihat glaziovii) , which grows over a large

area in that part of Brazil and is tapped when about two years old. The Per¬ nambuco or Mangabeira rubber is the product of a small, drooping tree (Hancornia speciosa) of the family Apocyonacece, which grows on the hills and yields the edible fruit “mangaba,® for the sake of which it is frequently cultivated in orchards. This is a comparatively poor sort of rubber. Nearly all the crude rubber above mentioned is exported to Europe. The United States derives its supply mainly from Colombia, Ecuador, Central America and Mexico. This is mainly the product of a tree (Castilloa elastica) of the family Artocarpacece related to the breadfruit. It is a lofty tree, with a trunk sometimes three feet or more in diameter and large, hairy, oblong leaves, which grows in the rich soil of wet, lowlying, heavily forested valleys. With some allied species it flourishes from Mexico and Cuba to the mountains of

Venezuela and the Andes, which separate it from the heveas of Brazil. It reaches its larg¬ est size and best condition in Panama and Nicaragua. Honduras rubber is good, but some of that from Guatemala is inferior.

The Asiatic supply comes from various ports in Assam (via Calcutta), and eastward to Bor¬ neo and is chiefly produced by the rubber-fig (Ficus elastica). A large variety of other plants and trees in the Malayan and Papuan region yield rubber, some of which is excellent and of growing importance commercially, and everywhere the early rough and wasteful methods of obtaining the product are being corrected. It is also obtained in northern Aus¬ tralia, in Fiji and in various neighboring islands. More than 100 different trees are known to give rubber-making juices in com¬ mercial quantities, while in a great many others, as lettuce, poppy, milkweed and others, it is present in small quantities. The juice of the Brazilian Hevea trees is said to yield about 30 per cent of pure rubber; but a product of less than 15 per cent is not regarded as com¬ mercially profitable.

Africa is now the principal source of the wild rubber supply of the world next to Central and South America. The bulk of that from the

west coast and equatorial region is obtained from various climbing shrubs belonging to or allied to the apocyonaceous genus Vahea, few of which are well known to botanists. In Li¬ beria and somewhat elsewhere are rubber-bear¬ ing figs ; and a large part of the extensive product of Madagascar and the Mozambique coast is derived from a Walbergia, species of which also give much of the caoutchouc re¬ ceived from the Malayan Islands.

Cultivation of Rubber Trees. — Attempts have been made in most countries, where suit¬ able conditions prevail, to propagate the rubber trees in plantations of prescribed dimensions, and capable of rational supervision by experts, rendering the planter independent of native de¬ linquencies and assuring annual crops of first quality for an indefinite number of years. It has been demonstrated that the rubber tree can produce, under proper management, a regular and increasing crop, for each year of its natural life, without being injured. Many thousands of acres of rubber are rapidly being developed in Mexican plantations in the tropical coast lands from the country round the Isthmus of Tehuantepec southward into Guatemala. Prog¬ ress has been retarded on account of lack of previous knowledge or precedent in the business, yet the difficulties seem to have been sur¬ mounted, and it is now demonstrated that the rubber tree can be artificially cultivated when conditions under which its growth is stimulated are understood. In Chiapas, the numerous river bottoms afford the character of soil re¬ quired, favorable atmospheric conditions and abundance of rainfall. The rubber lands of this region are covered with thick tropical forest growth, which it is necessary to clear. The rubber tree shoots, raised from seed in neighboring nurseries and about a foot high, are planted in the clearings generally to the number of. 200 trees to the acre. At six years of age the tree is tapped, yielding a small first crop. Hundreds of thousands of every age are growing in strength and luxuriance, with a

prospect of affording an ever-increasing supply of the crude product annually. The Central American rubber tree will not flourish _ in swamps, though moisture is a prime requisite. Hence the saying: ((A rubber tree must have its feet dry and its head damp.® Extensive ex¬ periments have been made with various kinds of rubber plants ; but the Castilloa has been found to be the best adapted to soil and other condi¬ tions obtaining in Mexico and Guatemala. Rubber can be grown in commercial quantities in practically all the states of southern Mexico, where it is sometimes cultivated near the ex¬ treme limit of 3,000 feet above sea-level. How¬ ever the best rubber trees grow

there at from 300 to 1,000 feet altitude. The altitude it affects varies in different lands, preferably but little above sea-level, but in some localities 1,000, 1,500, or even 3,000 feet above tide water. The rubber plant so commonly grown as an orna¬ mental house plant is the East Indian fig (Ficus elastica) .

In the extensive plantations of Ceylon, where the growing of rubber for several years has been a commercial success, ef¬ forts have been directed to the cultivation of the Para variety, which has proven almost as successful there as in its native place. In the Malaya Peninsula excellent cultivated rubber is now being marketed yearly in continually grow¬ ing quantities. But notwithstanding these suc¬ cessful efforts at the cultivation of rubber trees, fully half the rubber used comes from the forests of South and Central America and guayule plains of Mexico in 1914, and the market was still ruled by the price of the best Brazilian rubber. Cultivated rubber has rapidly come to have a very important part in supplying the market. In 1890 there were practically no rubber plantations in existence. In 1900 the rubber plantations were just beginning to pro- . duce enough rubber for experimental purposes ; and three years later Ceylon exported 41,684 pounds, which had grown to almost 25,000 tons in 1916. British Malaya has also become a great rubber-producing country with over 800,- 000 acres planted to rubber trees. The report of the importations into the United States show the wonderful growth of cultivated rubber. The imports had increased from about 30,000 tons in 1904 to over 86,000 tons in 1915. Of the latter more thaii 50 per cent came from rub¬ ber plantations in the Orient and Mexico. Ow¬ ing to the fact that scientific methods are now being used in the tapping of plantation trees and the care of the rubber obtained therefrom, cultivated rubber now brings, in the open market, from 25 to 50 per cent higher prices than the best Para wild rubber. In 1916 the total world crop of rubber was about 200,000 tons or over 50,000 more than that of the pre¬ ceding year ; and this increase was due to the constantly increasing output of the rubber plantations. From 1914 to 1916 the rubber supply from Ceylon and India increased from 15,000 to 25,000 tons; that of the Malaya Peninsula and adjoining lands from about' 50,000 to over 105,000; while that of South America remained stationary. During the same period the output of the Kongo, French Kongo and Sudan rose from 3,900 to over 5,000 tons; while that of the rest of Africa decreased from 4,600 to about 2,000 tons. The import figures

show that, over 65 per cent of all the rubber marketed in 1916 came from cultivated rubber plantations. This is very suggestive. But the facts are even more in favor of the cultivated rubber which reaches the market almost pure while the wild variety contains from 20 to 25‘ per cent impurities, which considerably increases the percentage of cultivated rubber marketed. At the beginning of 1917 the following was the number of acres planted to rubber trees in the Orient: Ceylon, 230,000; Malaya (Malaca, etc.), 600,000; Borneo, 30,000; Dutch East Indies, Java, Sumatra, etc., 500,000; India and Burma, 40,000; German colonies, Samoa and West Africa, 12,000. In addition to these there are probably 50,000 acres planted in Mexico and Central America, if not more. Owing to the revolutionary condition of the country and the difficulty of obtaining labor the rubber plantations of Mexico produced little rubber for export simply because the rubber was not taken from the trees. But there are in southern Mexico some plantations containing from 5,000 to 20,000 acres, on some of which are trees from 10 to 20 years of age. Consult Akers, C. E., (The Rubber Industry in Brazil and the Orient) (London 1914) : Brown, H., (Rubber, its Sources, Cultivation and Preparation) (London 1914) ; Locke, R. H., ‘Rubber and Rubber Planting> (New York 1914).

RUBBLE WORK. See Masonry.

RUBEFACIENTS, substances or agents which, when applied for some time to the skin, occasion a redness and increase of heat. When the irritant effect of any agent amounts to blis¬ tering, or causes discharge of pus or matter, the action is said to be vesicant or suppurative. All these agencies are included under the one term counter-irritants, the rubefacient action being the mildest of ithe three, and dependent generally upon the form and duration of the application ; as, for instance, mustard or am¬ monia may be used so as to produce onlv the most transient redness, or may be made to cause blistering or suppuration. Among the most commonlv used rubefacients are hot water, ammonia, mustard, oil of turpentine, powdered ginger, spirit of wine, camphor and chloroform vapor.

RUBELLITE, the red or deep pink variety of tourmaline (q.v.) ; when transparent, valued as a gem.

RUBENS, roo'benz, Peter Paul, Flemish painter: b. Siegen, Westphalia, 29 June 1577 ; d. Antwerp, 30 May 1640. He was (or, accord¬ ing to some, at Cologne) of good citizen family who had gone from Antwerp to Cologne on ac¬ count of religious oppression, and who, while there, had become the steward of Anne, wife of William of Orange-Nassau, the famous liberator of the United Provinces. He was compelled to remove to Siegen, a small town, because of of¬ fenses committed, and it was not until his death in 1588 that the widow was able to return to Antwerp. There the boy studied in the Jesuit College and was page to a lady of rank. He studied art first with Tobias van der Haegt, and afterward with Adam van Noort, but his chief master was Otto van Veen (called Otto Vaenieus). With this artist, who was court painter to the Regent of the Netherlands under Spain, the Tnfanta Isabella Clara Eugenia,

Rubens remained from 1596 to 1600; and at the end of that period of time went to Italy. It is evident that he had the best introductions ; and yet the young man's courteous manners and liberal training, as well as his great ability as a painter of portraits, must have made him welcome at once.

At Venice he met the famous and magnificent Duke of Mantua, Vincenzo Gonzaga, who at once employed him, sending him first to Rome, placing him near his own person at his own pal¬ ace in Mantua, and sending him to Spain in 1603. While in Mantua he painted the famous triple altar-piece for the Prince's chapel: a work of which the greater part of the middle composition is in the church of Saint Trinita in Mantua, one wing at Nancy in the Provincial Museum, and one at Antwerp. It was not until 1608 that he returned to the North, finding his mother dead on his arrival ; and settled in Antwerp, his home from that time. It was then that he painted the first of the two wonder¬ ful pictures which are in the cathedral of Antwerp, the (Raising of the Cross) ; and two years later, for the company of the Arquebu-siers, its companion, the famous (Descent from the Cross, } which is in itself a perfect embodi¬ ment of Rubens' art. He married, and now having property, both from his own inheritance and labor, and in right of his wife, bought land and built himself a house, of which drawings remain and in which he lived for 30 years in the fashion of a very wealthy burgher ; though having, through the practice of his art, un¬ usually close relations with the Infanta's court and tne nobility, both Spanish and Flemish. It was in this capacity that he went to Spain on a mission for his patroness, the regent of the Netherlands, and her husband, the Archduke Albert of Austria, and

was sent from Spain to England by the famous Minister, Olivares. It is not to be forgotten that he was looked upon as a subject of the Spanish monarchy, and that in his capacity as a good Catholic he would have felt no objection to this view of the case, though he never took sides strongly against the Protestant rising of many of his country¬ men. In England he was knighted by King Charles I. Finally in 1630, being then in his 54th year, he returned to Antwerp and married a second time. From this time onward his art employed him almost incessantly, in spite of a short intervention due to religious divi¬ sions between the northern and southern prov¬ inces ; and his fame and popularity increased until his death in 1640 in Antwerp. His Por¬ trait of Marquis Ambrose de Spinola) is owned bv Henry C. Frick of New York.

Few artists have had so varied a career, with so many other subj.ects of high interest to interfere with the peaceful pursuit of their art; and yet few artists have approached Rubens in the amount of artistic work done. This is to be accounted for in part by his extraordi¬ nary skill and success in assimilating the work of his many assistants (their names are those of men afterward famous in their art, chief among them Jordaens and Van Dyck) ; but partly also by the almost unexampled facility of work which he gained and which remains unique in the records of the art of painting. In his earlier days he copied great numbers of paintings by Italian masters, as was the cus-

tom then, and there can be no doubt that his facility and range were greatly increased by this practice. His work done after the age of 30 is uniformly wonderful for his power over all his materials, and all the different processes which enter into painting on a large scale. The fresh and rosy scheme of color which he adopted must have been natural to his instincts ; original with him and not derived: moreover, his strong and intelligent drawing, though gained by practice in many schools, was still his own creation. His tendency to excess of action and to the appearance of violence, as in the famous (Fall of the Rebel Angels,) in Munich, and many similar works, does not seem to imply a

headlong or self-forgetful mood ; he seems to have been always master of himself, and his paintings were always popular (that is, in sympathy with his times), in style and management. He became in this wav the typical artist of his epoch and the most admired master, the man chosen for great state under¬ takings in art as well as in diplomacy. It was in this capacity that he was employed by the Queen Dowager of France, widow of Henry IV, to decorate her palace of the Luxembourg in Paris, and the great paintings which are now in the new Hall of Rubens in the Louvre were prepared for that purpose. Studies for them are at Munich.

All the treatises on Flemish painting deal with Rubens, and the dictionaries of artists give him much space. The most important books devoted to him are those by Max Rooses (Life of Peter Paul Rubens) (Antwerp 1903; Eng. trans., 2 vols., Philadelphia 1904), and by Emile Michel, translated into English as (Rubens, his Life, his Work, and his Time) (2 vols., New York 1899). This book is very richly illustrated. The collections of artists' biographies do not always contain Rubens' biography; but an excellent life of him bv Charles W. Kett is included in the series called Hllustrated Biographies of Great Artists) (1878-79). There are many books published in Belgium, either in French or in Flemish, which deal with the different stages in his remarkable career, and some of these are readily accessible. The essay on Rubens in (Great Masters) by John La Farge (New York 1904) is of great critical value. The Gazette des Beaux-Arts has several important papers with elaborate illustrations. Consult also his correspondence published as (Codex Diplomaticus Rubenianus) (Antwerp 1887-1909) ; Calvert, G. H., <Life of Rubens) (Boston 1876) ; Gachard, L P., (Histoire de P. P. Rubens) (Paris 1877) ; Hortica, L., c Rubens: the Story of His Life and Work) (New York 1916) ; Knackfuss. H., (Rubens) (New York 1904) ; Rose, G. B., Renaissance Masters5 (3d ed., ib. 1908) ; Stevenson, R. A. M., (Peter Paul Rubens) (New York 1909) ; Dillon, E., (Rubens) (1910).

RUBIACE.7E, a well-marked family of plants, almost exclusively found within the tropics. The leaves are simple, entire, oppo¬ site, with interpetiolar stipules. The flowers are usually arranged in panicles or corymbs. The calyx is adherent, with a definite number of divisions or none. The corolla is superior usually tubular and regular, with a definite number of divisions. The stamens arise from the corolla, all on the same line, and alternate

with its segments. The ovary is inferior, sur¬ mounted by a disc,

usually two-celled, occa¬ sionally with several cells ; the style is single, sometimes partly divided ; the stigma usually simple, sometimes divided into a number of parts. The fruit is inferior, dividing into halves, or not dividing, and dry or succulent ; sometimes it is many-celled. Many of the species of this family are of considerable im¬ portance, being largely used in medicine, act¬ ing as tonics, febrifuges, emetics and purga¬ tives. The species of Cinchona yield Peruvian bark. An extract, with some sweetness and a more astringent taste than terra japonica, and called by the Malays gambier, is obtained from Uncaria ganibir. Ipecacuanha is the root of Ccphaclis ipecacuanha, a little, creeping-rooted, semi-herbaceous plant, found in the damp forests of tropical America. Coffee is the seeds of a plant of this family, Coffea arabica. A few species ‘bear an edible fruit, such as the genipap of South America, the nahil peach of Sierra Leone and the voa-vanga, a good dessert fruit in Madagascar. Among dyeing plants there is Oldenlandia umbellata, whose roots are the chay-root (q.v.) of commerce.

RUBICON, roo’bi-kon, the ancient name of a river in Italy of some celebrity in Roman history. Caesar by crossing this stream, at that time regarded as the northern boundary of Italy, finally committed himself to the Civil War. Hence the phrase, <(to pass the Rubi¬ con,)) means to take the decisive step by which one commits himself to a hazardous enterprise. It is very doubtful under what name the Rubicon now exists, the honor being claimed by two streams — the Fiumicino and the Luso.

RUBIDIUM, a rare metal discovered by Bunsen and Kirchhoff in 1860, by means of spectral analysis, in the residue obtained by evaporating a large quantity of the mineral water of Diirkheim, Germany. The metal and its salts exhibit two dark red lines in the blue part of the spectrum — hence the name, from the Latin rubidus, <(dark red.® Rubidium has the atomic weight 85.4, and the symbol Rb. It is a white, shining metal, having a specific gravity of 1.52; at ordinary temperatures — even so low, indeed, as — 10° C. — it is soft as wax; it is easily oxidized; when thrown on water it decomposes that liquid with evolution of hydrogen, which takes fire because of the heat produced in the reaction. Rubidium forms one of the metals of the alkalies, being analo¬ gous in its properties with potassium and sodium ; its compounds also closely resemble those of these metals ; thus it forms a char¬ acteristic hydrate (RbHO), which is a white, solid substance, feeling unctuous to the touch, deliquescing in the air, and dissolving in water to form a strongly alkaline liquid. Rubidium forms one chloride (RbCl), bromide (RbBr), and iodide (Rbl), and in all its compounds comports itself in a manner precisely analogous with

potassium and sodium.

RUBINOW, Isaac Max, American econo¬ mist and statistician : b. Grodno, Russia, 19 April 1871. He came to the United States in 1893, was graduated at Columbia University in 1895, and took his M.D. at New York Uni¬ versity in 1898. He engaged in the practice of medicine in 1898-1903, afterward adopting economics as a profession. In 1904-11 he was

economical and statistical expert in the United States Department of Agriculture and the De-partrnent of Commerce, and later became statis¬ tical expert for an insurance company until 1915 when he became director of the social statistics department of the board of public charities of New York. He is well known as a writer on Russian economics, social insurance and Socialism. Author of (Russia's Wheat Surplus* (1906) ; (Economic Condition of the Jews in Russia* (1908"); (Russia, Spain* (1911); ˆSocial Insurance) (1913); (Was Marx Wrong ? i (1914) ; (Standard Accident Table) (1915); Standards of Health Insur¬ ance* (1916), *etc.*

RUBINSTEIN, roo'bin-stln, Anton Gregor, Russian composer and pianist : b. Wechwotynez, 28 Nov. 1829; d. 20 Nov. 1894. His parents were Jewish and soon after his birth removed to Moscow. His mother, being a good musician, was his first teacher; he next studied with Villoing, a Frenchman, and at nine played in a concert at Moscow. He ac¬ companied his teacher to Paris, where in 1840 he played before the most distinguished mu¬ sicians. He was advised by Liszt to study in Germany and after a concert tour in England, Holland and elsewhere, he settled in Berlin to study theory under Dehn. He returned to Russia in 1848, settling in Sa-int Petersburg. In 1855 he was enabled to visit Germany again for study; here also he succeeded in finding publishers for his compositions, and made concert tours that extended to London and Paris. In 1858 he was again in Saint Peters¬ burg, where he was appointed court pianist; in 1859 he became director of the Russian Music Society and in 1862 founded the Saint Peters¬ burg Conservatory, and was director until 1867. He made concert tours in Europe in the follow¬ ing years and appeared in America in 1872-73. As a piano player he occupied the front rank; in perfection of technique he had few peers and was excelled by none. As a composer he was prolific, brilliant; but showed a lack of self-discipline which prevented his compositions from attaining the highest merit. He wrote songs ; his best-known works are the Ocean

operas, pianoforte pieces, orchestral scores and Symphony and the pianoforte concertos in G major and D minor and the trio in B-flat. His operas, such as (The Maccabees) (1875);

(Paradise Lost* (1875); (Sulamith* (1883), had but a partial success.

RUBLE, roo'bl, or ROUBLE, a silver coin, the standard of money in Russia, containing 278 grains of fine silver, and equal to about 76 cents in American money. In actual circulation there is little but paper money, valued at from 10 to 20 per cent below its nominal value. A ruble is divided into 100 kopecks. Half and quarter rubles, and 5th, 10th and 20th parts of a ruble, are coined in silver; gold coins of the nominal value of three rubles (the Im¬ perial ducat) and five rubles (the demi-Im- perial) are also coined.

RUBNER, rup'ner, Cornelius, Danish mu¬ sician and educator: b. Copenhagen, 26 Oct. 1855. He studied under Gade Hartmann at Copenhagen, Reinecke and David at Leipzig, and afterward under Hans von Billow and Rubinstein. He was for many years a pro¬ fessor of music, court pianist and conductor

of operas and concerts in Germany. Since September 1904 he has been head of the music department at Columbia University, New York. Author of (Prinz Adzor) ; a symphonic poem (Friede, Kampf und Sieg > and many piano pieces, songs, *etc.*

RUBRIC (Lat. ruber, red), was the name applied to those portions of old manuscripts and books which, for typographical embellish¬ ment or on account of their importance in the text, were printed in red ink. Often, as in the old monastic manuscripts, only initial letters in the paragraph were so treated. With the de¬ velopment of the copyist's art, however, rubi¬ fied manuscripts became ornate ; the initial letter of every noun, perhaps, was rubricated, chapter headings, thumb-nail indexes, marginal comments, and in cases whole passages of the text were highly ornamented rubrics.

The use of the red letter text became com¬ mon in the case of religious treatises, and so certain rules and directions in prayer books, explanations and responses are printed in red ink. This is the case with the Roman missal, where the matins, lauds, beatifications, etc., are always in red, and in the liturgy, where the directions for the performance of the service are also in red. In the old Bibles the chapter heads were so treated. Modern typography dis¬ cards such

profuse use of colored ink and usu¬ ally substitutes in its place type of a different face from the rest of the text, but the por¬ tions thus emphasized are still called rubrics.

Spanish custom has given another signifi¬ cance to the word, and in Spanish denotes the flourish so common after Spanish signatures. This likewise results from the fact that the rubrics were the most conspicuous features of a page.

RUBRUQUIS, ru'bru'kes, or DE RUYS-BROEK, RUBROUCK, RYSBRUCK, Friar William of, mediaeval traveler and author : b. Rubrouck, French Flanders, about 1215; d. about 1270. He was a contemporary and brother Franciscan of Roger Bacon, but little is known of him except what can be culled from his own writings and from Roger Bacon's mention of him in his (Opus Majus) ; he is mentioned also in the records of the Fran¬ ciscan order, and it is now clear that he was born in France instead of in Brabant as was formerly supposed. In 1253 Louis IX (Saint Louis) sent him with two other friars on a special but informal mission to Tartary to spread Christianity and to treat with the Tartar prince, Sartah, son of Batu ; the king having heard that the prince had embraced Christianity. He set out by way of Constantinople, landed on the Crimean coast and proceeded by means of horses and carts to the courts of Sartah and Batu, crossing the river Don and reaching the Volga. He was then sent by Batu to the Great Khan in Mongolia, a journey of great hazard, and returned through Persia and Asia Minor. He reached home in the late summer of 1255, having traveled nearly 11,000 miles. His report of the journey, written for Louis IX, is considered one of the finest travel narratives in existence. While the Lajin in which it is written is not scholarly it sets forth in vivid style the geography, ethnography, manners, cus¬ toms, religion and language of the region tra¬ versed, and shows irrefutable evidence of a

keen, accurate, honest and highly intelligent observer whom time has failed to discredit. Five manuscript copies of the narrative are known to be in existence, the most important being the one at Cambridge and

two at Leyden. Portions of the narrative were published by Hakluyt (1598-99), but it was not until 1839 that a full edition of the text was published by the Paris Geographical Society in (Recueil de Voyages > (Vol. IV). There is no adequate com¬ mentary on the subject matter. There are, however, two useful editions published by the Hakluyt Society, (William of Rubrouck … John of Pean de Carpine,} translated and edited by W. H. Rockhill (London 1900), and (Texts and Versions of Carpini and RubruquisF edited by C. Raymond Beazley (London 1903). Con¬ sult also Schmidt, F. M., (Uber Rubruk's Reise) (Berlin 1885) ; D'Ohsson, (Histoire des Mongols) (1852) ; Bretschneider, (Mediaeval Re¬ searches from Eastern Asiatic Sources'* (1888) ; Beazley, (Dawn of Modern Geography > (1906).

RUBUS, a genus of plants of the family Rosacece, of which more than 1,500 species have been described. They are mostly natives of the northern hemisphere and are especially abun¬ dant in Europe. About 100 are indigenous to North America. They are mostly shrubs whose stems (canes) are biennial or annual, prickly, erect, curving, climbing or trailing. They have simple or compound alternate leaves, white or pink flowers usually in corymbs or racemes, followed generally by compound fruits consisting of many drupelets. In the black¬ berry the drupelets are united to the receptacle; in the raspberry they are not. Besides the rasp¬ berry, blackberry and dewberry (qq.v.), many species are useful for food or ornament. Among the best known are the European bramble (R . fruticosus) , wineberry (R. phceni-colasius) , flowering raspberry (R. odoratus) , and the cloudberry, yellowberry, bake-apple berry (R. chamcemorus) . The Rocky Mountain flowering raspberry (R. deliciosus) , the brier rose, bridal rose or strawberry-raspberry (R. rosecufolius) , and R. cratcegifolius are well-known ornamental species in shrubberies, *etc.* See Blackberry; Raspberry, *etc.*

RUBY, the rich red, transparent variety of corundum, having a hardness of nine and a specific gravity of four. The name is some¬ times used for other red gems (see Ruby Spinel), and improperly for richly colored gar¬ nets, of the variety pyrope. The stones called Cape rubies and Arizona rubies are only fine pyropes, coming respectively from the South Afri¬ can diamond mines and from Arizona and New Mexico. (See Pyrope). Siberian ruby is a term sometimes applied to gems of rubellite or red tourmaline (q.v.), and Brazilian ruby to the deeper shades of pink topaz, altered to that color by heat. The true rubies recently mined in the Cowee Valley, in North Carolina, have attracted much interest, being in some cases as fine as those from Burma; but they are mostly small, and it is not certain whether they will prove of real importance. They occur in a greatly decomposed igneous rock, in the same manner as the very similar crystals of

sapphire from Yogo Gulch, Montana. The rubies of Burma, formerly spoken of as Pegu, are derived from a crystalline limestone. In

these cases, and indeed generally, the gems are largely found in gravels and surface deposits formed from the decomposition of the parent rocks. True rubies of large size are very scarce, so that one of three carats weight, flaw¬ less and of good color, is worth much more than a diamond of the same size. Like all the deeply-colored corundum gems, rubies are strongly dichroic, their color varying with the direction in which light traverses the crystal, whether transverse or parallel to the axis of the prism. The presence of microscopic cav¬ ities or of included crystals of extreme minute¬ ness, disposed in a certain parallelism to the crystalline axes, produces the optical effect known as asterism, which is exhibited by the highly prized gems called star rubies (and star sapphires). In less amount or when irregu¬ larly distributed, the same causes produce de¬ fects known as <(silk,® and cloudiness. Many efforts have been made to produce the ruby by chemical means, and a dozen or more processes have been devised with greater or less success within the past 50 years, but with little practical result. Crystals have been obtained, of fine color, but mostly small, or in flat hexag¬ onal plates too thin to furnish gems. Some years ago larger pieces appeared in the market that caused some concern from their close re¬ semblance to natural rubies. The process was not made known, but was judged to be that discovered by Fremy and Feil, by fusing an aluminate of lead with silica. They were de¬ tectable by the microscope, which showed that they contained minute cavities that were rounded and bubble-like, while those in real rubies are angular and crystalline. The French <(Syndicate of Diamonds and Precious Stones® decided that all such rubies must be sold as ˆartificial,® under penalty of fraud.

RUBY MATRIX, is a name recently given to a beautiful combination of red or pink corundum with a bright green variety of horn¬ blende (amphibilite) found at the Cullakenee corundum mine in Clay County, North Caro¬ lina; it has been proposed to use it as an ornamental stone, though the ruby-corundum is not transparent enough to cut gems.

RUBY SPINEL, this mineral is an alumi¬ nate of magnesia. It crystallizes in octa¬ hedrons, with a hardness of 8 and a specific gravity of 3.5 to 3.7, usually of some shade of red, sometimes very rich, and transparent to translucent. Fine specimens make beauti¬ ful gems, known as spinel rubies, not readily distinguishable from true

(corundum) rubies, though less hard, less dense and less valuable. The historic ((Black Prince® ruby, in the crown jewels of England, is believed to be a spinel. True rubies may also be distinguished from spinels by the dichroism which belongs to all the deeply colored corundum gems. Red spinel has several other varieties, with special names ; it is called Balas ruby when the color is rich pink, rubicelle when it inclines' toward an orange red, almandine ruby when it tends toward a purplish. Spinel is a frequent associate of the true ruby in Burma, Siam, Ceylon, *etc.* It usually occurs in crystalline limestones, though it is occasionally found in other metamorphic, and even in volcanic rocks.

RUBY-THROAT, See Humming-bird.

RUCKER, ruk'er, Sir Arthur William,

English scientist and educator: b. 23 Oct. 1848; d. 1 Nov. 1915. He was educated at Brasenose College, Oxford, and was a Fellow there in 1871-76. He was professor of physics at the Royal College of Science, London, in 1886-1901 ; and was principal of the University of London in 1901-08. He was secretary of the Royal Society in 1896-1901 ; received the Royal Society's Royal Medal in 1902, and was knighted in that year. He was connected with various important official commissions for the advance¬ ment of university education. He was joint author of (On the Expansion of Sea Water by Heat) (1876) ; (Properties of Liquid Films) (ISSCMU) ; (Magnetic Surveys of the British Isles for the Epochs 1886, 1891 5 (2 vols.,

1890-96).

RUCKERT, Friedrich, fred'rm riik'ert, German poet and Orientalist : b. Schweinfurt, Bavaria, 16 May 1788; d. Neuses, near Coburg, 31 Jan. 1866. He was educated at Heidelberg and at Wurzburg. He first began to write under the pseudonym of ((Freimund Raimar,® and (Deutsche Gedichte) appeared with that signature. From 1826 to 1841 he occupied the chair of Oriental languages in the University of Erlangen, and while there was called to Berlin as privy councillor to Frederick IV. Here he also pursued his work as a philologist and poet. He retired to private life in 1848, becoming one of the most prolific writers of his day. He had a remarkable command of language and wrote almost every known form of verse. His original poems relating to the East are (Morgen-landische Sagen und Geschichten) (1837) ; (Rostem und Suhrab : eine Heldengeschichte) (1838) ; and (Die Weisheit des BrahmaneiP (1836-39). His adaptations include (Die Ver-wandlungen des Abu Seid5 of Hariri (1826) ; (Nal und DamajantP from the <Mahabahrata) (1828) ; <Amrilkais) (1843) ; and <Hamasa) (1846). Among his other works are (Saul und David) (1843) ;

<Liebesfriihling) (1844) ; and (Lieder und Spriiche) (1866). Consult biog¬ raphies by Beyer (1868— 77) ; Konrad Fischer (1889); and Reuter, F., <Riickert in Erlangen und Joseph Kopp) (1891).

RUCKSTUHL, ruk'stool, Fred Welling¬ ton, American sculptor: b. Breitenbach, Alsace, 22 May 1853. At two he was brought to America by his parents who settled in Saint Louis, Mo. His art studies were begun in 1883 in Paris. His first exhibit, a life size nude figure called 'Evening,* won honorable mention in the Salon and a Grand medal at Chicago World's Fair, and has since been in the Metro¬ politan Museum, New York; bronze group, (Mercury' Amusing Himself, > Portland place, Saint Louis; bronze statue, Solon,* in the Con¬ gressional Library, Washington, D. C., and for the fagade of the same library, heads of Frank¬ lin, Goethe and Macaulay; bronze, 'Victory,* on the Soldiers and Sailors' Monument, Jamaica, L. I.; equestrian statue of: (Gen. John F. Hart ran ft,* Harrisburg, Pa.; 'Wisdom* and 'Force,* colossal marble statues at entrance of Appellate Court House, New York; (Gloria Victis,* a bronze group on Confederate monu¬ ment, Baltimore; (Defense of the Flag,* a bronze Confederate monument at Little Rock, Ark.; 'Phoenecia,* marble colossal statue, at the Customs House, New York City;

(Color Bearer,* Petersburg Battlefield, Va. ; equestrian statue, (Gen. Wade Hampton, *Columbia, S. C.; marble statue, 'John C. Calhoun,* in the Hall of Fame, Wash¬ ington, D. C. ; bronze group, 'Woman's Monument,* at Columbia, D. C. ; a bronze statue, 'Dr. Charles D. Mclver,* Raleigh, N. C. ; monument to the 'Three Partisan Generals, Sumter, Moultrie and Pickens,* at Columbia, S. C. ; marble statue, ((U. M. Rose,® in the Hall of Fame, Washington, D. C., *etc.* Mr. Ruck-stuhl is member of the National Institute of Arts and Letters, the National Sculpture Society, the Architectural League, *etc.*

RUDAGI, roo'da-ge, or RUDAKI, Farid-eddin Mohammed, Abdallah, Persian poet : b. Rudag, Transoxiana, about 870-900; d. 954. Pie was the earliest of the great modern Persian poets and for many years lived at the court of Nasr II, ruler of Khorasan and Transoxiana, in affluence and with high honors. He is said to have been blind from birth, but his writings show an accurate knowledge of colors. His work survives only in fragments but these are models of form, and of exquisite taste and feel¬ ing. He is known as <(the Father of Persian Literature® and succeeded in emphasizing clearly the different forms of epic, lyric and didactic poetry. He is credited with originating the diwon, the arrangement of a poet's work in nearly alphabetical order

which still maintains among Mohammedan writers. Of his epics only stray lines remain, although there are 52 of his kasidas, ghazals and ruba'is. His translation or an Arabic version of the old Indian fables 'Kalilah and Dinmah) into Persian also is lost. After the death of his royal patron in 942 he fell into poverty and obscurity. A complete edition of his remaining works, in the Persian text and with a German translation, was pre¬ pared by Ethe, H., (RudagI der Samaniden-dichter* in (Gottinger Nachricten) (pp. 663-742, 1873). Consult Pickering, C. J., 'A Persian Chaucer * (1890) ; Brown, E. G., (Literary His¬ tory of Persia) (1902).

RUDD, Steele (pen name), Australian lit¬ erary man (see Davis, Arthur Hoey).

RUDD, William Platt, American lawyer: b. Albany, N. Y., 9 June 1851. He studied law at Union University, was admitted to the bar in 1875 and became a member of the law firm of Harris and Rudd. He was counsel for im¬ portant corporations and in 1910 was elected justice of the Supreme Court of New York for the term ending 1924.

RUDDER, an instrument by which a ship is steered, being that part of the helm which consists of a piece of timber which enters the water and is attached to the sternpost by hinges, on which it turns. The action of the rudder may be thus explained : while it remains in line with the keel, the force of the water gliding past the deadwood, or narrow portion of the stern, is equal on both sides of the rud¬ der and equilibrium is maintained ; if however the rudder be forced to one side the pressure is taken off on the opposite side, while the water exercises an increased pressure on the side to which the rudder is turned. The effect is to force the stern round on the centre of gravity as a pivot, the ship's head, of course, turning to the same side as the rudder. When the head

has sufficiently deviated from its former line the rudder is permitted to resume its straight position. In sailing on a wind, the rudder is kept permanently on one side to counteract the tendency to make leeway.

RUDDER FISH, so named from being per¬ ceived usually in the wake of ships, following the rudder, and doubtless attracted by the refuse thrown overboard, is a small fish of the genus Palinnrus allied to the mackerel family, very common in the Pacific and Atlantic oceans. The Palinurus perciformis , the rudder perch, or black pilot fish of the fishermen of Martha's Vineyard, attains a length of from 9 to 12 inches and is caught on the coasts of Massachusetts and New York, specimens hav¬ ing been obtained in Boston Harbor hovering around the sterns of vessels or keeping near such floating bodies as casks, planks, logs and other flotsam. The back and top of the head is brownish with black blotches, the sides bluish-white with minute black dots and the under parts lighter; the color of the young is a bright bronzed black, variegated with yellow circular spots, obscure reddish hues and streaks of white and yellow lining the sides; there is a depres¬ sion between the eyes which are protected by an overhanging bony ridge and in front of the fleshy rays of the dorsal are eight short spines. The rudder fish belongs to the division of the scomberoids in which the first dorsal is com¬ posed of isolated spines connected by a low membrane, but unlike the scomberoids there are one or more spines in front of the anal fin. The name rudder fish is also less specifically applied to any fish habitually following in the wake of vessels.

RUDDER GRANGE, one of the best known and most humerous of the novels of Frank R. Stockton. It appeared in Scribner's Monthly in 1874; and was followed by the (Girl at Rudder Grange5 in 1875 and the 'New Rudder Grange,5 (Camping out at Rudder Grange5 and (Pomona Takes the Helm at Rud¬ der Grange5 in 1878; and (Pomona's Bridal Trip5 in 1879; in which latter year the story first appeared in book form. Previous to this Stockton had made a reputation as a writer of stories for children, but 'Rudder Grange5 was his first book for adult readers. In the Stockton household was "a middle-sized orphan55 from an orphans' home, a very pecu¬ liar, sentimental, strong-willed girl of 14, in whom Stockton took a very decided and pecu¬ liar interest; for she appealed strongly to his sense of humor and upon whom he bestowed the name of Pomona. The result of his study of her was a paper in Scribner's Monthly, en¬ titled 'Rudder Grange,5 which attracted wide attention and Stockton was induced to continue the idea, the history of the little girl being carried into womanhood. (Rudder Grange5 brought Stockton seriously before the public as a humorous writer of stories other than chil¬ dren's tales. So popular was this series that Stockton was induced to follow it up with (Rudder Grangers Abroad5 and (Pomona's Travels.5 'Rudder Grange5 is a book without a plot ; and it gets along well without. It

deals with eccentric and humorous doings and sayings, for the most part of Pomona, from the time she enters the Grange until she finally marries and has a home and a family of her

own. The 20 papers of which the book is made up develop her character by taking her through a series of adventures and ridiculous situations in which the humor is ever on the surface. But an outline of the story would be the story itself.

RUDDIMAN, rud'i-man, Thomas, Scottish scholar: b. Raggel, Banffshire, October 1674; d. Edinburgh, 19 Jan. 1757. He was graduated at Aberdeen in 1694, revised and edited several works by Scottish authors and to the famous poetical translation of Virgil's 'Hmeid,5 by Bishop Douglas, added a glossary, which brought him fame as a Latin scholar. In 1714 he published his (Rudiments of the Latin Tongue,5 a work which supplanted all previous Latin grammars in use in Scotland and which he lived to see pass through 15 editions. In 1715 he became a publisher and in this capacity edited and brought out many famous books and in 1725 the first volume of his own 'Gram¬ matics Latins institutiones,5 and an abridg¬ ment of the three volumes in 1740. Consult Chalmers, 'Life of Ruddiman5 (1794) ; Cham¬ bers, (Eminent Scotsmen.5

RUDDY DUCK, a rather small, quick¬ diving handsome duck (Erismatura rubida) , found throughout North and Central America, and breeding in all suitable localities. It is related to several foreign sea-ducks, the Aus¬ tralian musk-duck, etc., but is itself confined to this continent. This duck is about 17 inches long and chiefly tawny brown, the drake be¬ coming glossy chestnut in full breeding plum¬ age ; considerably waved and dotted and the lower parts mottled silver-white.

RUDE, Francois, fran-swa riid, French sculptor: b. Dijon, 4 Jan. 1784; d. Paris, 3 Nov. 1855. He was originally a blacksmith, but en¬ tered the fLcole des Beaux Arts in 1807 and was under the instruction of Cartellier. From 1815 to 1827 he worked at Brussels decorating the royal palace and subsequently settled at Paris, where his real artistic life began. His chief works, which show a combination of antique simplicity with modern naturalism, are his (Mercury5 (1827), now in the Louvre; his Neapolitan Fisher Boy,5 also in the Louvre; his 'Louis XIII,5 as a boy 1842; 'Sepulchral Monument of Cavaignac,5 in the cemetery of Montmartre (1847) ; a 'Crucifixion5 and the 'Maid of Orleans5 (1852), both in the Louvre; 'Hebe5 and 'Love as the

Conqueror of the World,5 in the museum of Dijon.

RUDEL, Jaufre, zho'fra roo'del, a famous troubadour poet: b. Blaye (Gironde) in the 12th century; d. Tripoli. A soldier and a wan¬ derer, he became celebrated for his love af¬ fairs, which he idealized in his poems. He was of noble birth and Lord of Blaye; and in his youth he joined the court of William of Agoult, Lord of Sault. He afterward lived at the Court Geoffroi, Count Bretagne, son of Henry II of England, where he was a favorite and honored as one of the greatest of trouba¬ dours. While with this prince, he fell in love with a certain Countess of Tripoli, by report of her brought to the court by pilgrims from Antioch. So impressed was he with the story of her charms and graces that he refused to sing of any other lady. In spite of the opposi¬ tion of the count, he disguised himself as a pil-

grim and set out to visit the Countess of Trip¬ oli. On the way he became very ill and in this condition he arrived at Tripoli. Word was sent to the Countess and she had the poet brought to her palace, where he had scarcely arrived when he died in the presence of her ladyship, who had him buried in the royal tomb of Tripoli; and she had his poems written in a book with letters of gold. These poems of Rudel are among the most tender in the Provencal literature (q.v.). Rudel's tale has been dramatized by Edmond Rostand in the (Princess LointaineP

RUDERAL PLANTS (Lat. rudus, rub¬ bish), plants growing in waste places, amid rubbish and by the wayside. There is usually rapid change in such areas, the profusely-seeded and rapid-growing annuals first securing a foot¬ hold and covering the waste space; but these are soon crowded out by the hardy perennials, among which grass is largely predominant Naturalized plants often gain a temporarily strong foothold in such places because of less severe competition and the absence of natural enemy species, but gradually are reduced in numbers to the natural struggle between native plants.

RUDINI, roo-de'ne, Antonio Starabba di,

Marquis, Italian statesman : b. Palermo, Sicily, 6 April 1839; d. 7 Aug 1908. In 1866 he be¬ came mayor of Palermo and in 1867 a member of the Chamber of Deputies. He was ap¬ pointed Minister of the Interior in the follow¬ ing year. After the fall of the Menabra Cab¬ inet he held no prominent office until 1891, when, having become the head of the Constitu¬ tional party, he succeeded Signor Crispi in the Ministry of Foreign Affairs apd was made Pre¬ mier. In 1892 the premiership passed again to Crispi, but in 18% Rudini returned to power as a result of Signor Crispi's disastrous Abyssin¬ ian policy. He continued in the premiership until 1898, when he resigned his office. His re¬ newal of the Triple Alliance and conclusion of peace with Abyssinia were the most important of his executive acts, while his continued yield¬ ing to the pressure of the Radical party and failure to weld the Conservative elements of the Italian Parliament are quoted against his ad¬ ministration.

RUDOLF OF EM.S, mediaeval German poet or minnesinger: b. Switzerland; d. Italy, about 1251-54. He began to write about 1225. He wrote many legendary, historic and dra¬ matic poems ; and also a version of the Old Testament down to the time of Solomon,

(Weltchronikp which was dedicated to his patron Conrad IV, and which was widely read as it was for long the only available popular presentation of early Biblical events. He was besides author of the poems (Der Gute Gerhard) ; <Barlaam und JosaphaH ; <Wilhelm von Orleans) ; < Alexander.* *etc.*

RUDOLF LAKE (known also as Basso Norok and Gallop), a large lake of eastern equatorial Africa, at the south of the Abyssin¬ ian highlands and occupying a portion of the great equatorial plain. It is 225 miles north¬ east of Victoria Nyanza; and is about 185 miles in length and 37 at its greatest width, its area being about 3,500 square miles. It is deep at the southern end, but shallow at the

northern, where it is fed by the Omo or Ni-anani River. Having no outlet its water is brackish but not harmful for drinking pur¬ poses. The surrounding region is sterile, with high cliffs at the south and lava fields or sandy wastes at the northern end. It was discovered by Teleki and Von Hohnel in 1888. In 1907 an agreement was reached between Great Britain and Abyssinia, whereby the. northern end was ceded to Abyssinia, the remainder falling to Great Britain.

RUDOLF I, roo'dolf, emperor of Germany, founder of the Imperial house of Austria: b. 1 May 1218; d. Germersheim, 15 July 1291. He was the eldest son of Albert IV, Count of Hapsburg and Landgrave of Alsace, was brought up in the court and camp of the Emperor Fred¬ erick II and on the death of his father suc¬ ceeded to lands of very moderate extent, which, in the spirit of the times, he sought to augment by military enterprises. He gained some terri¬ tory by his marriage in 1245 and more by his frequent military aggressions. In 1273, while encamped before the walls of Basel, he re¬ ceived the unexpected intelligence that he was elected king and Holy Roman emperor, in preference to Alphonso, king of Castile, and Ottokar, king of Bohemia. His confirmation was not attained without some difficulty, how¬ ever. Pope Gregory X induced the king of Castile to withraw his pretensions, but the king of Bohemia, at that time one of the powerful princes in Europe, persisted in his opposition, and a war ensued, in which the latter was de¬ feated, compelled to sue for peace and to agree to pay homage. He broke the treaty in 1277, but the following year was defeated a second time and slain. The Diet of Augsburg in 1282 formally conferred Austria, Styria, Carinthia and Carinola on Rudolf's two sons, Albrecht and Rudolf, as a joint inheritance. He re¬ stored peace and order to Germany, and wisely put down the private fortresses, which served as a retreat for banditti and ferocious nobles. For these and other eminent services in the same spirit he obtained the title of <(a living law,® and was regarded as a second founder of the German Empire. He asked the Diet at Frankfort to secure the imperial throne to his son Albrecht, but the electors were jealous of the powerful family and their refusal caused such mortification to the aged emperor that he did not long survive. Consult Kopp, (Kdnig Rudolf und seine Zeit* (1845-49, continued by Busson 1871) ; Hein, (Rudolf von Habsburg) (1874); Schulte, (Geschichte der Habsburger> (1887); Zisterer, (Gregory X und Rudolf von Habsburg* (1891).

RUDOLF II, Holy Roman emperor: b. Vienna, 18 July 1552; d. Prague, 20 Jan. 1612. He was educated in Spain, and before the death of his father, Maximilian II, was crowned king of Hungary in 1572, king of Bohemia in 1575, the same year being also crowned at Ratisbon as Roman emperor. He succeeded to the Austrian throne, 12 Oct. 1576. His disposition was mild and his tastes inclined toward litera¬ ture rather than toward government. Early in his reign he began to impose restrictions upon the holding of public offices by Protestants and in some districts civil war resulted. The west¬ ern parts of the empire were enabled to over¬ come the designs of the king, and by 1603 the

Protestants formed an offensive and defensive alliance at Heidelberg to maintain their civil and religious liberties. In Austria, Bohemia and Hungary, however, the Protestant religion was for a time practically suppressed. The Turks made constant inroads in the east and in 1596 Mahomet invaded Hungary, captured Erlau and defeated the Austrians under Arch¬ duke Maximilian, though he ceased his incur¬ sions at this point. In 1608 Rudolf's brother Matthias, who had made a treaty with the Turks and pacified the disaffected Hungarians, compelled Rudolf to acknowledge him king of Hungary and governor of Austria and Moravia. With this confirmation of Matthias' power the states of Austria regained the religious privi¬ leges they had enjoyed under Maximilian. In 1611 Rudolf was formally deposed and Mat¬ thias succeeded him. Rudolf was the patron of Kepler and Tycho Brahe and the astronomical calculations produced by these two are known as the ((Rudolphine Tables.® Consult Gendely, cRudolph II und seine-Zeit5 (1863-65).

RUDOLPH, Franz Karl Joseph, Archduke and Crown Prince of Austria, son of Francis Joseph I: b. 21 Aug. 1858; committed suicide, Mayerling, near Vienna, 30 Jan. 1889. He entered the army in 1877 and saw some active service. He was a gifted linguist; traveled considerably and was a writer of ability. He collaborated on (Die Osterreichisch-Ungarische Monarchic in Wort und BilcP (1886), and was author of (Funfzehn Tage auf der Donau) (1881) ; (Eine Orientreise) (1884).

RUE, a perennial plant (Ruta graveolens) , wild in the Mediterranean region, but also cul¬ tivated. Its stems are about two feet high, bearing alternate decompound bluish green leaves, pellucid-dotted, with an acrid juice and bitter taste; and corymbs of yellowish green, small, four-parted flowers, with crimped petals. Rue has been employed medicinally on account of its antispasmodic and stimulant properties, and was also used in folk medicine as a disin¬ fectant, probably because of its strong and dis¬ agreeable odor and taste, which, however, did not prevent its use as salad. Rue also entered largely into magic rites and witch-lore. Early missionaries in England were said to have sprinkled water from brushes made of rue, whence

the name referred to by Ophelia: ((There's rue for you … We may call it, herb of grace o' Sundays,® and Perdita speaks of it, with rosemary, as one of the flowers for remembrance.

RUEDA, roo-a'da, Lope de, Spanish actor and dramatist: b. Seville, in the early part of the 16th century; d. before 1567. He was a gold-beater by trade; but became one of the most successful actors of his day. He is credited with being the first to write popular Spanish drama and to have been, therefore, the leader in the movement that was destined shortly after his day to produce Lope de Vega, Calderon and the other great dramatists of the golden age of Spanish drama. He became the head of a strolling company of players who seem to have wandered over a considerable part of Spain and to have acted plays written by Rueda with a view to suiting the public taste. Therefore, Rueda is credited with having made of the theatre and the profane drama a popular institution. He was also credited in .his day with being an excellent dramatist and

a good poet; among his admirers being Lope de Vega and Cervantes. It was not until after his death that his works appeared in print They were collected and published by his friend Juan de Timoneda from time to time between 1567 and 1588. This collection consists of 10 pasos, or dramatic interludes based upon some simple episode; two dialogues (in verse); four comedias and two pastoral colliques, all, with the exception noticed, in prose ; and all bearing the earmarks of having been written for presentation upon the stage, evidently by his own company. The comedias are divided into scenes, but not into acts. These are en¬ titled (Los Enganos5 ; (Medora) ; <Eufemia) and <Armelina,) the last of which is decidedly the best from both the dramatic and the liter¬ ary points of view, but it employs mythological characters in a weird and startling manner, which nevertheless display the author's origi¬ nality and boldness. His manner in the comedias, as in all his work, is light and quite natural even when he deals with supernatural characters. His comic parts are also well pre¬ sented and in fact the comedy is the only really good part of his two pastoral colloquies, the better of which is (Timbria. } The two dia¬ logues (Prendas de Amor' and (Dialago sobre la invencion de las calzas,5 together with some songs, constitute practically all of Rueda's poetry that has come down to us. In all his dramas and other works Rueda shows an ap¬ preciation of the chief factors in the entertain¬ ment of the theatre-going public. In fact the audience seems to be ever in his mind. This is undoubtedly why both Cervantes and Lope de Vega credited him with being the father of

popular national drama in Spain. His greatest move in the right direction for the creation of a national drama was his selection of his personages, subjects and scenes from the com¬ mon life around him. This permitted him to be at once natural and familiar without danger of losing the interest or respect of his audience. In other words, he realized the dra¬ matic element in life and its compelling interest as no Spanish dramatist previous to his day had done; and he set the fashion for repre¬ senting life in a more or less realistic manner for the great national dramatists who followed him and, to a certain extent, imitated him. Among the editions of his works are two of note, in addition to that by Timoneda, that by the Marquis de la Fuensanta del Valle (Madrid 1895-96), and that by Emil Cotarelo y Mori (Madrid 1908). Consult Cotarelo v Mori, E., (Estudios dc. historia literaria de Espana5 (Vol. I, Madrid 1901) ; Fitzmaurice-Kelly, (A History of Spanish Literature5 (New York 1908) ; Salazar, S., (Lope de Rueda y su teatro) (Santiago de Cuba 1911), and Ticknor, (History of Spanish Literature5 (New York

1854).

RUEF, roof, Abraham, American political boss: b. San Francisco, Cal. He was graduated at the University of California in 1884 and was admitted to the bar in 1886. He made himself a political power in San Francisco, and was said to control the city administration through Mayor Eugene F. Schmitz, elected in 1901. There were graft scandals implicating Ruef, as an attorney, together with the mayor and board of supervisors in the division of the spoils. Ruef was brought to trial through the efforts

of San Francisco citizens, headed by Rudolph Spreckels. The services of Francis J. Heney, who had acted for the United States in the Oregon land scandals, and William J. Burns of the United States secret service, were secured and Ruef was in 1911 convicted of bribery and sentenced to nine years, imprisonment. He was paroled in 1915 on a

pledge to remain out of politics.

RUELLIA (Neo Lat. named for Jean Ruel, a French botanist of the 16th century), a genus of herbs and shrubs of the family Scanthacece. The genus is characterized by op¬ posite leaves, and bears flowers of large size in shades of violet, white and red, and occasionally yellow or orange. There are about 200 species, chiefly native to tropical America, while oc¬ casional varieties are found in Asia, Africa and Australia ; and some eight varieties are found in the United States. About 20 varieties are un¬ der cultivation, some of them being especially desirable for greenhouse use. R. tuberosa is the “manyroot,® also called “spirit-leaf® and “snapdragon® ; R. paniculata is a trailing va¬ riety found in Mexico and Jamaica and has inch-long blue corollas ; R. ciliosa is a charm¬ ing hardy species of southern United States; R. indigotica furnishes by maceration an indigo¬ like dye and is native to India, Burma and China.

RUFF, a sandpiper (Machetes pugnax) of the northern parts of the Old World, the fe¬ male of which is called “reeve.® It is about 10 inches long and the bill above it is

varied with black, rufous and gray, arranged in oblique bands on the scapulars and tertiaries and whitish below; primaries dark brown, with green reflections above and with inner webs finely mottled toward the base ; the tail trans¬ versely barred ; sides of rump white, bill brown and legs yellow. The males in spring have the feathers of the neck developed into a kind of ruff, whence the common name, and the face is covered with reddish papillae. They fight during the breeding season, unlike most wading birds; they are also polygamous and larger than the females, in these respects seeming to form one of the links between wading and gal¬ linaceous birds. The colors of the ruff vary exceedingly and no two are precisely similar. They are natives of northern Europe and Asia, migrating southward during winter, and they are found chiefly in flocks, in marshy districts; they feed at night on worms, insects and larvae; the nest is made of coarse grass and is placed in a hollow of the ground; the eggs are four or five, pointed, green, with brown specks. Their flesh is highly esteemed for the table; they are taken alive in nets and are fattened for market on bread and milk and boiled wheat, in a dark place to prevent their fighting; great num¬ bers are sent from Holland to London.

RUFFED GROUSE. See Grouse.

RUFFED LEMUR. See Lemurs.

RUFFIN, Edmund, American agriculturist; b Prince George County, Va., 5 Jan. 1794; d. near Danville, Va., 15 June 1865. He was edu¬ cated at William and Mary College, served in the Virginia legislature, was for many years president of the Virginia Agricultural Society, and in 1833A2 editor of the Farmer's Regis¬

ter. He was an ardent State's rights man and as member of the Palmetto Guard of South Carolina fired the first shot on Fort Sumter in 1861. He committed suicide because of his un¬ willingness to give allegiance to the United States government. He published (Essay on Agricultural Education (1833) ; Anticipations of the Future to Serve as Lessons for the Pres¬ ent Time) (1860) ; edited William Byrd's (Westover Manuscripts) (1841), *etc.*

RUFFO, roof'fo, Fabrizio, Italian cardinal: b. San Lucido, Calabria, 16 Sept. 1744; d. 13 Dec. 1827. He came of a ducal family and was educated as a priest, but never took orders. He gained the favor of Pius VI, who had him appointed treasurer-general and made him a cardinal in 1791. He headed the royalist move¬ ment in Calabria, his family connection greatly aiding him, and in 1799 he became vicar-gen¬ eral. With Fra Diavolo, the brigand chief, he raised an army and succeeded in overturning the Republican government and expelling the French, restoring Ferdinand I to the throne. He took no part in public affairs during the second French invasion, but after the restora¬ tion of the Bourbons was in favor at court and for a short period in 1822 was a royal minister. Consult Sacchinelli, D., (Memorie Storiche Sulla vita del Cardinale Fabrizio Ruffo) (1836) ; Von Helfert, (Fabrizio Ruffo : Revolution und Gegan — Revolution von NeapeP (1882).

RUFINUS, roo-fi'nus, Tyrannius, Latin

ecclesiastical writer and presbyter : b. Aqui-leia, Venetia, about 345; d. Sicily, 410. He was converted to Christianity about 370, became a close friend of Jerome and in 379 after extended study and wandering founded a monastery at the Mount of Olives, Palestine. He was made presbyter by Bishop John of Jerusalem about 394; and took the bishop's side in the controversy with Epiphanius of Salamis over the doctrines of Origen, which action ended Rufinus' friendship with Jerome. He returned to Rome in 397 and there en¬ joyed the protection of Bishop Siricius, but was summoned by Anastasius, the succeeding bishop, to defend his orthodoxy and was for¬ mally condemned. He was on his way to Pales¬ tine when he died. Through his writings and translations he exerted a profound influence over the

Western Church, as he not only made available the writings of the Greeks, but by his translation preserved several valuable works which otherwise would be lost. He made a rather free translation of the (Church History } of Eusebius and brought the history down to the reign of Theodosius the Great. He also translated several exegetical works of Origen ; the <Peri Archon) ; the Apology of Pamphi-lus) ; the (Homilies) of BasiP ; (Canon Pascha-lis of Anatolius Alexandrinus) ; and many other works. He was author of Apologia pro fide sua} ; (De adulteratione Liborum Origenis) ; (Historia Eremitica5 ; (Expositio SymboliP *etc.*

RUGBY, England, a market town of War¬ wickshire, 81 miles by rail northwest of London. It is picturesquely situated on an eminence south of the Avon and is celebrated for its public school. (See Rugby School). The parish church recently restored, the modern municipal offices and the free public library are other noteworthy features.

RUGBY, Tenn., the place in Morgan County, about 140 miles north of Chattanooga, where Thomas Hughes (q.v.) and others from England established a colony in 1880. They purchased a large tract of land, laid out a town, divided the remaining portion into farms ana parks and established several industries. It is in a rich mining and agricultural region on the Cumberland plateau. The settlement proved a failure; but the place is now a health resort.

RUGBY SCHOOL, a famous English pub¬ lic school founded in 1567 by Lawrence Sheriff, who bequeathed for its support property in Man¬ chester square, London. Until the second quarter of the 19th century its importance was local in character, however, but under the head-mastership of Arnold (q.v.) 1828-42, it became one of the greatest schools of England, — to be ranked with Westminster, Eton and Harrow. Among famous headmasters who followed Ar¬ nold are Archbishop Tait, the late Dean Bradley of Westminster, the late Archbishop Temple and John Percival, bishop of Hereford. The roll of distinguished Rugby scholars is a long one ; among them may be mentioned Matthew Arnold, Dean Stanley, Landor, Clough, Thomas

Hughes, author of (Tom Brown's School Days,* Dean Vaughan and Lord Derby. Under the mastership of Dr. Temple (1857-69) the chapel was rebuilt, a gymnasium erected and other new buildings added, while under Dr. Jex-Blake (1874-87) still more building was carried on and Rugby is to-day particularly modern in the character of its edifices, which are Eliza¬ bethan in style and in appointments generally. Consult Goulburn, <The Book of Rugby SchooP (1856) ; Hughes, (Tom Brown's School Days> (1857); (Life of Thomas ArnokP (1860); Bloxam and Payne-Smith, <Rugby: its School and Neighborhood (1889) ; Rouse, (History of Rugby SchooP (1898).

RUGE, roo'ge, Arnold, German Socialist: b. Bergen, Prussia, 13 Sept. 1802; d. Brighton, England, 31 Dec. 1880. He was educated at Heidelberg, Jena and the University of Halle, where in 1830 he became a professor. His first literary production was a translation of Sopho¬ cles' (CEdipus in Kolonos) (1830). He was later identified with the founding of the (Hal-lesche JahrbiicheU and became known as an advocate of radical doctrines. In 1843 he went to Paris where he was associated with Karl Marx and there published his (Zwei Jahre in Paris.* In 1847 he started a journal, Die Re¬ form, in Berlin. Accused of complicity in the Revolution of 1848, he fled to England. He was there identified with Mazzini and Ledru-Rollin in their efforts to organize a democratic league for the establishment of political equality throughout the world. The movement to unite the provinces of Germany in 1866-70 was strengthened by his sympathy and his services in this cause were recognized by the German Empire. He published Political Pictures) (1848); (Our SystenP (1850); <In Former Times) (1862-67) ; and a Manifesto of the German People) (1866).

RUGEN, rii'gen, an island belonging to Germany, in the Baltic Sea, area, 377 square miles. The coast has many indentations; on the northeast the island terminates in a chalk cliff, nearly perpendicular and about 400 feet ' above the water, Peculiarly shaped boulders

are found on different parts of the island. Ac¬ cording to Tacitus, the ancient Germanic god¬ dess Hertha (Earth) was worshipped here at Hertha Lake. The soil is fertile; agriculture, stockraising and fishing are the chief occupa¬ tions. The coast villages are popular sea-bath¬ ing resorts. Bergen is the capital. Pop.

46,800.

RUGENDAS, roo'gen-das, Georg Philipp,

German painter: b. Augsburg, 1666; d-there, 1742. His right hand becoming disabled he painted and engraved with his left. He exposed himself to the fire and carnage at Augsburg that he might delineate the scene.

RUGER, roo'ger, Thomas Howard, Amer¬ ican army officer: b. Lima, N. Y., 2 April 1833; d. Stamford, Conn., 3 June 1907. He was grad¬ uated from West Point in 1854, studied law and in 1855—61 was engaged in practice. At the outbreak of the Civil War he was appointed lieutenant-colonel and was prominent in nu¬ merous engagements. He suppressed the draft riots in New York in 1863, was in command of a division at Gettysburg, served under Gen¬ eral Sherman and in 1864 was brevetted major-general of volunteers. He was mustered out of the volunteer service in 1866, and in that year was appointed colonel in the regular army. In 1868 he was military governor of Georgia, su¬ perintendent at West Point in 1871-76 and in 1876-78 was in command of the Department oi the South. He was promoted major-general in 1895 and in 1897 was retired.

RUGGLES, rug'lz, Samuel Bulkley, Amer¬ ican lawyer: b. New Milford, Conn., 11 April 1800; d. Fire Island, N. Y., 28 Aug. 1881. He was graduated at Yale in 1814 and was admitted to the bar of New York in 1821. He was elected to the State legislature in 1838 and secured the enlargement of the Erie Canal through borrowed funds instead of waiting for the money to be collected by tolls. He was president of the board of commissioners for the canal in 1840-42 and in 1858, and was United States delegate to the International Monetary Conference held at Paris in 1867. He laid out Gramercy Park, New York, in 1831 and presented it. to the surrounding prop¬ erty-owners to be maintained as a private park, and was also connected with the planning of Union square. He. was author of many papers concerning the Erie Canal, and on legal and financial topics.

RUGGLES, Timothy, American lawyer, politician and loyalist: b. Rochester, Mass., 20 Oct. 1711; d. Wilmot, Nova Scotia, 4 Aug. 1795. He was graduated from Harvard in 1732, represented Rochester in the General Court in 1736, opened a law office at Sandwich, Barnstable County, and was connected with many cases of local importance in Plymouth, Bristol and Barnstable counties. Subsequently he removed to Hardwick. In 1755 he was second in command to Sir William Johnson at the battle of Lake George, in 1756. was made judge of the Court of Common Pleas of Wor¬ cester County, and represented Hardwick in the General Court. In 1762-63 he was speaker of the

house, and from 1762 until the Revolution chief justice of the Court of Common Pleas in Worcester County. He served with distinc¬ tion in 1759-60 in the expeditions against Quebec

and Montreal, and in recognition received the sinecure post of surveyor-general of the king's forests. He was a delegate in 1765 to the Stamp Act congress at New York and was elected its president. Upon his refusal to for¬ ward to Great Britain the addresses and peti¬ tions passed by the congress, he was repri¬ manded by the General Court. From that time he was identified with the royalist cause. In 1774 he was made mandamus councillor, and in consequence was forced for safety to flee from Hardwick to Boston, then garrisoned by the British. He made some efforts to recruit a loyalist corps, and in 1779, on the departure of the British troops, went with them to Nova Scotia, where he became a proprietor of the town of Digby. He was a scholar and wit and an excellent, though aggressive, pleader. Con¬ sult Washburn, Emory, (Sketches of the Judicial History of Massachusetts from 1630 to the Revolution in 1775) (Boston 1840).

RUGS, Oriental. History. — The origin of the floor coverings, popularly known as Oriental rugs, is a matter of tradition and, therefore, purely suppositional, for the fragmentary record of the ancients, on this subject, is casual and exceedingly incomplete.

Undoubtedly, however, along with the slow evolution of human progress, rugs, in some form, filled their proper places in the scant household furniture of primitive man.

An old Hebraic tradition ascribes distinction of skilful spinning of wool and weaving of cloth to Naamah, daughter of Lamech, who was a near descendant of Adam, thus placing the handicraft of weaving close to the Biblical account of the beginning of the human race.

It is not at all improbable that Egypt, the successful producer of many useful industries of the ancients, improved the crude handiwork of her predecessors, for we possess records of rugs on her rock-cut tombs, carvings and monuments, some of which date as early as 27 centuries b.c.

Other wall paintings, stone carvings and monuments in the Euphrates Valley indicate clearly that the dwellers of these regions, such as

Chaldeans, Assyrians, Armenians and Per¬ sians were the first to use the rug for floor coverings, wall hangings, tomb coverings, awn¬ ings and for devotional purposes, and that afterward the conquerors of these peoples, the Greeks, Romans, Turks, Turkomans and Sara¬ cens took up the industry and spread its popu¬ larity throughout their dominions.

Ancient Authorities. — Besides Biblical writers, among the ancients who mention rugs and carpets are included Diodorus, Ebers, Homer, Plautus,' Horace, Pliny, Josephus, Arrian and almost all writers of note; but as stated above, not one of these famous men imparts definite information concerning the industry.

Introduced into Europe. — While very little is known concerning tne rugs of the ancients, our knowledge takes definite shape and grows in volume along with the triumphant march of the religion of Mohammed the great prophet of Arabia, whose enthusiastic followers went from victory to victory till they threatened the very existence of mediaeval Europe.

Rug making was introduced to Europe by l lie Moors, whose palaces and mosques in Cor¬

dova, Granada and Castile were adorned with magnificent carpets, and later, when the Cru¬ saders returned from their wars against the followers of the Crescent, they brought back with them not only a powerful desire for Oriental luxuries, but a knowledge of Oriental handicrafts, most important among which were rug and carpet making.

Thus, in about the latter part of the 13th century a.d. rugs were introduced in Europe as objects of wonderful ingenuity and of great value.

From that time interest in rugs from the Orient has constantly increased among all civilized peoples till to-day they rule supreme as* the most desirable and most artistic floor coverings in the world.

Process of Making. — The general process of rug making of to-day is - as old as when it was described first by ancient writers. To-day rugs are made by the descendants of the first rug makers in the same crude and primitive fashion. Nothing has been changed — nothing could be changed — for the process is so ab¬ surdly rudimentary that it precludes improve¬ ment. In the use of material, dyes and imple¬

ments there has been no alteration made since before the period when Cleopatra was pre¬ sented to Caesar wrapped in a magnificent carpet.

(a) The Loom, more properly the frame, on which a rug is to be made, consists of two perpendicular poles (not infrequently two trees) driven in the ground at a desired distance from each other; to these are fastened two horizontal bars, one on top, the other at the bottom of the poles.

(b) Tools. — It is an absurdity to dignify by the name of Hools® a crude wooden or iron comb and a pair of common shears, which about conclude the description of the ((machin-eryw of rug making; no other implement is re¬ quired for the production of the finest Oriental rug.

(c) The Warp. — The warp of a rug con¬ sists of a desired thickness of thread or twine of wool, cotton, linen, hemp, goats' or camels' hair, and in some cases silk, which is stretched, back and front, upon the horizontal bars of the frame, at even spaces, to form the founda¬ tion of the rug.

(d) The Weft. — Before actual tying of the colored yarn to the warp, the maker weaves the salvage of a diaper, beginning at the bottom of the warp. To do this he introduces a shoot of hemp or wool or cotton by means of a treadle and crossing the warp, which is re¬ peated until a desired width is woven ; then he beats this down with his comb. This cross warp, introduced after each row of the knotted yarn, is called the weft of the rug, which very often determines the fineness and the strength of the finished article.

(e) The Knotting. — All Oriental rugs are actually tied to the warp — tuft by tuft Sepa¬ rately — these are tied by hand; so, properly speaking, rugs are not woven, but built, tied, knotted. This part of the process requires great skill, accuracy and more than Job-like patience.

Two ways of knotting are employed through¬ out the Orient in rug making: (1) The Persian (Sehna) knotting; (2) the Turkish (Ghiordez)

knotting. The Persian knotting consists in winding the two ends of the yarn around two separate threads of the warp, and bringing the two ends of the yarn to the surface from between each space of the warp. The Turk¬ ish knotting consists in winding the two ends of the yarn around two separate threads of the warp alternately and bringing ttie two ends to the surface between every two threads.

The Yarn. — Almost every wooly animal and hairy beast contributes its quota to the floor covering of the Orient, and cotton, hemp and linen, in some cases silk, and even gold and silver threads are used to bind together the (<flowing lines of beauty® of the rug.

In the inaccessible fastness of Kirman, the vast mountain chains of Kurdistan and in the enchanting valleys of Shiraz and Kashmere and Euphrates, countless flocks of sheep yield the finest wool, not to mention the soft and downy wool raised in the shadow of Ararat in Armenia, and under the shelter of Demavend in Persia; and the camel of Arabia and the goat of Angora and of Bokhara vie with each other in their contribution of marvelous hair, which is transformed into bits of scintillating gems in the hands of the skilful artist of the Orient.

The wool, after being sheared, is washed thoroughly and sorted and carded upon crude wooden or iron rakes and afterward spun very much after Mr. James Bryce's descrip¬ tion: <(Each, (spinner) like the fates of Ca¬ tullus, bore a distaff in her hand, with a lump of wool upon her wrist, and this they plied as they drove their flocks before them.® And, when thus the wool is spun, it is made into skeins ready for the dyer's vat.

The Dyes. — To dye the yarn is a separate industry in the Orient, and the skilful dyer holds equal rank with the ((dervish" and the conjurer — for, to extract beautiful dyes from animals, insects, trees, plants, roots, herbs, seeds, barks, flowers, berries, fruit and from every imaginable thing yielding color is no less wonderful than the feats of a howling "dervish® or the mysterious exorcism of the magician's wand.

From the old Tyrian purple, which adorned the royal vestments of the ancients, and which is a lost dye to-day, to the ordinary red madder of Asia Minor the extracting of dyes and color¬ ing the yarn is a long-drawn process in an exceedingly primitive manner.

The usual method is to boil in water the ingredients of a given color, with their mor¬ dant of vinegar or some other acid, in an earthen pot, till the desired consistency is reached, every little while the dyer smelling and testing the liquid. Afterward the yarn in skeins is dipped in this preparation until the required shade is obtained, then withdrawn and dried in the sun. Often the dyed yarn is ex¬ posed to the influence of the elements for weeks and weeks, till in the laboratory of nature the dye becomes a permanent portion of the wool, and remains thus as long as the material exists.

There are some dyes which require no such treatment, others which must be produced in an entirely different manner, but in each case the skilled dyer knows just how to obtain best results, and left to his own resources, given his own time, he usually accomplishes the desired end.

Ornamentation.— Taking a wide survey, from the Sea of Marmora at the west to the Yellow Sea at the east, Oriental rugs may be divided into two general classes, according to ornamentation: (a) geometrical; (b) floral.

The development of geometrical ornamentation is attributed to the Turanian races occupying the northeastern portions of Asia, most of whose rugs bear the stamp of a more primitive type, which lead us to believe that the> are more closely related to the rugs of prehistoric times. The design, popularly known as the Swastika or filfot cross, is believed to constitute the basic pattern of all geometrical ornamenta¬ tion in rugs — indeed, some authorities go further in the assertion that the Swastika was the first design used for ornamentation by the human race.

The floral ornamentation, a later and more intricate method, was adopted by the Aryan races, and carried to its highest development by people inhabiting the country lying between the Caspian Sea and the Persian Gulf.

The typical design of floral ornamentation is the ((flower and knob,® a conventionalized re¬ semblance to the Egyptian lotus or the tree of life of the ancients.

An endless variety of patterns of both classes appear on rugs ; they are mixed and intermingled so hopelessly that a rigid classi¬ fication according to ornamentation is almost impossible.

Purely floral patterns, such as representa¬ tions of leaves, trees, blossoms, rosettes, palmettes, are strewn over or under squares, circles, stars, octagons, medallions and various forms of the Swastika in a manner so blended, that a classification of rugs accord¬ ing to ornamentation resolves itself into an unsolvable riddle.

Symbolism. — It is stated by enthusiastic writers on Oriental rugs that a fascinating array of symbolism lies beyond those charming patterns.

The rug itself typifies the universe, and its various designs the ever-changing phenom¬ ena of life. The principal coloring of the field of the rug, if red, signifies life, victory; if blue, royalty; if white, purity; if green, devotion; if black, evil; if yellow, nobility; and so on to the end.

In patterns, the Swastika signifies auspi¬ ciousness, good luck; the flower and knob, for¬ tune, life everlasting; the circle, immortality; the star, the Star of Bethlehem; the triangle, the charm of Solomon; the square, ((the square deal®; the comb, cleanliness, *etc.*

Among vegetation, the rose typifies love; the lily, purity; the scarlet .tulip of Babylon, passion; the blossom, innocence; the fruit, fe¬ cundity; the tree, abundance, *etc.*

And the star of six points represents Allah !

It is reasonable to ask, however, that this endless chain of designs having come to us from the mythological past where the light of knowledge fades in the mist of tradition, who can say positively that a certain design typifies a certain idea — and is not <(one man's guess as good as another® ?

The greatest charm of Oriental rugs lies in the simplicity of construction, in the impress of individuality of effort and in the incom¬ prehensible mystery of design. The manner of their making is primitive; the materials used

RUGS

Indian Rug Caucasian Rug

Persian Rug (Shiraz)

RUGS

arc all home made, and the ornamentations in odd lines, angles, squares or in grotesque like¬ nesses of afish, flesh and fowl,® the original meanings of which are forever buried in the first ages of mankind — these, and the wonder of their marvelous colorings, the secret of many being still hidden and many another being en¬ tirely lost, add to the teasing witchery of the Oriental rugs.

Names. — To the uninitiated, of the many unsatisfactory peculiarities concerning the sub¬ ject, the naming of Oriental rugs is the most perplexing. There is no fixed rule that would classify clearly the enormously diversified out¬ put of rugs within the vast area of about three-quarters of the continent of Asia. There are, however, six recognized geographical di¬ visions, which include about all Oriental rugs of our day, namely: (1) Persian rugs; (2) Turkish rugs; (3) Caucasian rugs; (4) Tur¬ koman rugs; (5) Indian rugs; (6) Chinese rugs.

Persian Rugs. — Persia, the home of floral ornamentation, and the most marvelous ex¬ ponent of textile production of the Orient, stands on the pinnacle of fame by unanimous consent. She attained this enviable position especially during the benign reign of Shah Abbas, in the 16th and 17th centuries, under whose wise encouragement she reached the golden age of the rug industry.

The Ispahan rugs made under Shah Abbas, with their gorgeous field of ((Ispahan red,® decorated in tulip, rose, lotus, iris floriations, fastened together in chiseled tracery of re¬ fined meandering lines and angles at once puz¬ zling and fascinating established a new epoch of the rug industry, never equalled since.

A somewhat similar pattern of the Ispahan having been evolved, the glossary of Per¬ sian rugs was enriched by another famous type of pattern which they called the ((Shah Ab¬ bas,® after that most honored monarch of Persia. The Ispahan rug, as a class, stands alone, and its species is almost extinct, the very few per¬ fect specimens and even fragments being jeal¬ ously preserved in museums or in private col¬ lections.

Persians, who ought to know best, divide their rugs into the following groups according to ornamentation mostly, which is different from the accepted division in common use abroad :

(a) Kirman ; (b) Herati ; (c) Iran; (d) Harna-dan ; (e) Kurdistan.

(a) The Kirman group is subdivided into

the following celebrated specimens : (1)

Kashan ; (2) Kirman or Kirmanshah; (3)

Saruk; (4) Tabriz. The chief characteristics of this group lie in their extreme fineness of texture, brilliance of coloring and purely floral ornamentation, which is carried to its highest perfection.

Mostly of modern construction, but copies of some old forms, with floriated medallions or panels or scrolls, replete with vases of flowers, and representations of birds or beasts, these rugs show the scintillating splendor of jewels in textile art; and they command high prices on the American market.

(b) The Herati group includes: (1) Meshed; (2) Khorassan ; (3) Shah Abbas; (4) Feraghan; (5) Joshaghan; (6) Youraghan.

To the heart of a true son of old Iran, this

group of rugs is the most precious of all, for here are preserved the glorious traditions of his forefathers; here, the holiest shrine of his faith; here, the revered name of his most illus¬ trious shah and, here, the true splendor of his matchless artistry. The chief excellence of this group is in the development of the leaf pattern ; be it the palm leaf, the rose leaf, ‘the lotus leaf or the so-called river-loop design; it fills a very prominent part of ornamentation either in a curled position as in the Feraghan, or spread out on borders, corners and medallions as in the Meshed and Khorassan, or in groups and clusters of splendid tracery as in the Shah Abbas.

(c) The Iran group contains the following popular specimens: (1) Teheran; (2) Mihr; (3) Saraband; (4) Shiraz.

Most worthy of mention and very much admired by all Orientals are the Saraband and Shiraz rugs, besides the Mihr, which really is the finest grade of Saraband.

The characteristic peculiarity of these, es¬ pecially of the Mihr and Saraband, is the palm leaf pattern, row upon row, on a field of red or blue but seldom ivory, each row of palm leaves facing in an opposite direction.

In the Shiraz rugs the palm leaf design, if employed at all, is used without regard to regularity or size. The Shiraz rugs show an utter disregard to conventional patterns, there¬ fore they are among the most interesting rugs of the Orient. Often medallions run through the centre which are decorated with flowers, leaf patterns, birds and animals much after the style of Kirmans. But the distinguishing • points are : the salvages overcast in two or more colors with tassels here and there and the two ends finished with pretty needlework patterns.

In the Teheran the patterns may or may not show the palm, but they are kindred rugs in all other respects.

(d) The Heriz group contains: (1) Ardebil; (2) Hamadan ; (3) Bakhshaish; (4) Gorovan ; (5) Serapi.

In these rugs, the medallion with its vari¬ ous modifications is carried out in a most pro¬ nounced fashion ; especially in the Gorovan and Serapi, where the medallion stands out in bar¬ baric outline upon a field of red, white, blue, green or brown hues of great brilliancy.

In the Heriz and Hamadan, the undyed hair of the camel plays a prominent part, often cover¬ ing the whole rug, decorated with rosettes, medallions, pendants and heavy traceries, all interwoven in bold contrasts. In the Ardebil and Bakhshaish and the Heriz proper, these striking contrasts are entirely eliminated, in¬ deed, these show such superb mellowness of coloring, graceful lineations and superior floriations, that they bespeak of times of long ago.

(e) In the Kurdistan group are included the following specimens: (1) Selina; (2) Bijar; (3) Lulle.

It would seem that the Sehna rug should not fall under this heading, for there is no similarity of style or texture to the Kurdistan; but the people of Persia class this rug as a Kurdistan.

The Sehna, so far as fineness of texture is concerned, belongs to the Kirman group,

and not infrequently surpasses even the best Kashan texture of the Kirman group. Hun¬ dreds of knots are crowded in a space of one square inch with shortest cut yarn until it be¬ comes almost beyond belief that human fingers are capable of producing such a fabric.

The Sehna rug shows no reckless disregard for design or color; whether rosettes or palm patterns or medallions, every line is clear-cut, every curve masterfully rounded and every color faithfully reproduced.' The Sehna is the thin- * nest rug made in the Orient.

In strongest contrast to the Sehna are the Bijar and Lulle of the Kurdistan; they recog¬ nize no established pattern ; accept no school of coloring and follow no rule of texture.

Generally thick and heavy in texture, em¬ ploying all the standard Persian designs with¬ out regard to fitness or uniformity of position on lustrous fields of rich and deep coloring ; whether coarse or fine, heavy or light, these rugs compel admiration by reason of their ex¬ traordinary solidity.

Turkish Rugs.— In the Turkish Empire live many races, peoples and religions, which are not at all affiliated with one another — remnant nations of Syria, Babylonia, Armenia — Chaldea, Greeceˆ Palestine, etc.— consequently, the textile productions of this region are some¬ what mixed and rather difficult to classify. It appears, however, that the Turkish detached mode of ornamentation repeated on some parts of rugs, and the generous use of both floral and geometrical designs usually seen in all Tur¬ kish products, would give them a certain dis¬ tinction ; add to this the very popular pattern found in the prayer rugs, and the Turkish rugs become an individual class in the family of Oriental rugs.

Moreover, most Turkish rugs are coarser than Persians, their pile being longer, looser, thicker and softer.

The people of Turkey divide their rugs into . the following principal specimens: (a)

Ghiordez (Yordez) ; (b) Koulah; (3) Ladik ; (d) Melez; (e) Berghama ; (f) Koniah ; (g) Kir-Shehir; (h) Kutahia; (i) Mousul ; (j) Kurd; (k) Yuruk; (1) Anatolian.

(a) In conception of design, execution of workmanship and combination of coloring, the Ghiordez stands first in all Turkish rugs, and is most highly praised by Turk, Greek, Ar¬ menian, European and American alike.

Usually made of prayer-rug designs, the field has a solid coloring of ivory, blue, red, sometimes green, with the niche or dome rest¬ ing on two ornamented columns; but at limes the columns being absent, the dome is supported by highly conventionalized patterns of the tree of life.

A wide border, generally of the same color¬ ing as of the field, is decorated with flowers and configurations so clustered as to form a superb square, which is repeated on the four sides of the rug, and frequently on the panels, over and under the enclosure of the praying niche pattern.

Two or several narrow borders in detached patterns surround the principal border; and on the two upper corners filling the trigonal spaces of the praying dome, are distributed figures bearing a resemblance to the main border. Often a bejeweled lamp hangs down from the centre of the dome.

The colorings of the Ghiordez of old are impossible to describe appropriately, and d might be added with truth, equally impossible to reproduce in color.

(b), (c), (d) Koulah, Ladik, Melez, these three are kindred rugs to the Ghiordez, but they are not equal to the latter. < .

In Koulahs, the praying dome is often in¬ dented or otherwise misshapen, and the field, instead of a solid color, is decorated with pat¬ terns. It is marked also with several narrow stripes, for border, with startling contrast of

colors. ,

The Ladik may be called a better rug than the Koulah, for it often possesses beautifully subdued greens, deep reds, blues, all blended attractively.

The Melez might be named as twin sister to the Ladik, for it has all her characteristics, and only the trained eye can properly dis¬ tinguished between them.

(e), (f) Berghama and Koniah rugs gen¬ erally show medallion designs and a field well covered with geometrical patterns ; they have also wide attractive borders covered with floral decorations. In form these rugs are made nearer square than other Turkish productions, with a heavy, silky pile and very attractive colorings.

(g) The Kir-Shehir products, prayer-rug design or other, generally small rugs possess much resemblance to Ladik and Melez, they are, however, coarser rugs with brighter color¬ ings and with unpleasant contrasts.

(h) Kutahia, or Kutais, is a longer rug than the foregoing specimens with no special char¬ acteristic in design or coloring. A satisfactory rug usually, with silky surface, pleasing design and fine coloring.

(i) , (j), (k) Mousul, Kurd, Yuruk. Strictly these three grades do not belong to the Turkish family of rugs, yet neither could they be classi¬ fied under the Persian group, and since the provinces in which they are made fall under Turkish rule it is proper to call them Turkish.

In design, in texture, in workmanship, these are the <(heavy-weights)) in rugs. There is coarseness, boldness and a wild strength in these rugs, which indicate the mountain, the desert and the ravine; usually made of good wool and of good coloring (often exceptionally good), they lack the refinement of a Herati or the exquisiteness of a Ghiordez.

The Kurd and the Yuruk, especially, show an utter disregard for regularity of design or texture ; sometimes long and shaggy like the matted wool of a sheep, they defy any ac¬ cepted school of rug making.

(1) Anatolian. — There are several other grades made in Turkey, especially small mats, which are covered by this name. The Ana¬ tolian rug is usually of heavy quality and not very fine, but in coloring surpasses many others. The wool is exceedingly soft, and the colors frequently of primary dyes, and when mellowed by age, it develops a sheen which rivals silk productions.

Caucasian Rugs. — In Caucasian rugs, the geometrical ornamentation is carried to its per¬ fection. All conceivable designs in line are employed with great profusion and bewildering effect. Generally there is one principal colour to which all other colors are subjected in dear-

(lit designs, sometimes without shading, giving tne effect of inlaid stonework.

In texture Caucasian rugs are medium, al¬ though there are some exceedingly fine speci¬ mens made, but these are exceptional.

In size these rugs are not very large, some¬ times they are made long and narrow, but mostly of medium size.

In designing they show star shapes, circles, fretwork, insect shapes, diamonds, triangles, various forms of the Swastika, squares, medal¬ lions, dragons designs, *etc.*

These, are the following principal well-known kinds of rugs made in Caucasia: (a) Daghestan; (b) Kabistan (Kuba) ; (c) Shirvan; (d) Darbent; (e) Karabagh ; (f) Kazak; (g) Chichi; (h) Circassian; (i) Kashmir (Soumak).

The Daghestan, the Kabistan and the Shirvan are rugs made on similar lines. Their colors, designs and texture are not different from each other, except the Kabistan, which is usually of finer construction. The geometrical elongated star and the Swastika and other lineal decorations are common to all, with beautifully vivid colors attractively arranged.

The Darbent rug shows a strong, barbaric nature like that of the Kurd and Yuruk, only in the Darbent there is more uniformity of design, and the texture is not so coarse.

The Karabagh rug shows more of the Per¬ sian mode of designing than any other Caucas¬ ian rug. Upon its black or brown field are strewn, at regular distances, magnificent delineations of leaf and flower patterns in various shades of tan and old magenta colors — but this is the Karabagh of olden times. The modern product is a mixture of homely designs, crude dyes and coarse weaving, showing a careless haste in workmanship.

The Kazak rugs are the heaviest of all Cau¬ casians and different in floriation. It appears that the makers of these rugs have endeavored to develop the gruesome in design, for on their products are shown various grotesque shapes of the dragon and other creeping creatures with startling effect. One distinguishing point of Kazaks is in their size which is nearer square than any other Caucasian product; another is in the peculiar quality of the twisted yarn, which, when untwisted after years of usage, is divided into hundreds of fine ends making the surface of the rug like a smooth velvety lawn.

Chichi rugs are made fine usually, and differ from other Caucasians in ornamentation. On a dark or light colored field are distributed reg¬ ular patterns in cut squares or rectangular forms, giving the appearance of a latticed panel.

Circassian rugs depart entirely from Cau¬ casian mode: of ornamentation. These are among the choicest, if not the choicest products of this region. A favorite design consists in a pattern of superb flowers in full bloom, or foliage artistically clustered and connected one with the other by graceful long lines.

Kashmir (Sumak or Shamakha) rugs are d ovoid of nap; they are made in what is com¬ monly known as the flat stitch style like the old Kashmir shawls of India from which they derive the name. In design they are typical Caucasians, and by reason of the absence of the nap they show their designs in bold relief, clear cut and prominent. The long ends of the yarn,

left on the back, give weight and softness of texture.

Turkoman Rugs. — There are two divisions of the Turkoman rugs: Western and Eastern. In the Western Turkoman rugs the chief color, universally employed, is red with all its shades and kindred colorings, and the principal design, the octagonal or Bokhara ; embracing the fol¬ lowing well-known specimens: (1) Bokhara;

(2) Afghan, or Khiva; - (3) Yomud; (4) Bushir; (5) Beluchistan.

Of these, Bokhara rugs are the finest and most valuable. It is impossible to mistake the Bokhara after once seen. The octagonal device, in shades of blues, ivory and reds, is stamped on every Bokhara upon a field of some shade of red. The octagonal pattern is divided into four, with the diagonal sections resembling each other. They are the finest of all Turkomans in texture and sometimes so fine

that they rival the best productions of Persia.

The prayer-rug of this class preserves the general characteristic color of red. It, how¬ ever, shows no octagonal device ; there is the usual dome pattern in a more pointed shape near the top ; and the whole rug, usually about four feet by five, is divided into four sections,, decorated with highly conventionalized devices of the Swastika.

Afghan or Khiva rugs, made of coarser text¬ ure and of larger size, adhere to the Turkoman red and octagonal pattern most faithfully — in the large regularly arranged octagon is often seen clover leaf and sometimes a portion of dragon designs. Rich in coloring, heavy in pile, these rugs frequently mellow into lustrous and velvety fabrics.

The Yomud rugs are of darker shades of the maroon ; and the detached regular octagon is transformed into an elongated diamond de¬ sign fringed with dragon claws or Swastika devices. The Yomud usually is of very fine texture and is made in large size.

Bushir rugs classed herein are Turkoman only in coloring and texture. They show no octagonal pattern; often being decorated with palm devices; sometime with Herati designs, and with ornamentations generally found in Caucasians. Made in rather longish sizes, loose texture, strong, silky and desirable.

Beluchistan rugs are another class of the Turkomans which bear no resemblance to the Bokhara. Generally small in size, they de¬ viate from the red shades often, and show sub¬ dued shades of maroon, blue, ivory, camels' hair and, rarely, green. In design they employ the floral as well as geometrical forms. The general effect of Beluchistans is dark.

Eastern Turkoman rugs' may be subdivided into: (1) Ganji or Genghis; (2) Samarkand;

(3) Kashghar; (4) Yarkhand.

The Ganji rugs are made by Turkoman nomads, of goats' hair or wool with long silky texture, the principal color being white or yellow, on which are spread at regular distances rather crude geometrical devices.

Samarkand rugs reveal Chinese character¬ istics in coloring and design — usually of yel¬ low, tan or red and blue, they have several round figures intersected with strange floral designs and geometrical patterns.

The fret decoration is pronounced on their borders. Heavy and rather coarse in construe-

tion these rugs are attractive by reason of their simplicity of designing and uniqueness of coloring.

Kashghar rugs, coarse in texture, are stolid in design and simple in coloring. Often only three different colors appear — a solid color for the field, another solid color for the simple geometrical design and a third to separate the lines and to mark the borders. These and the Yarkhand rugs similar to these rarely leave their native places, the easternmost part of Turkestan.

Indian Rugs. — • Strictly speaking India sends out only large carpets, the manufacture of which is in the hands of European and Ameri¬ can firms, who have established great centres of production in the Punjab, Kashmir and Mad¬ ras districts, commonly known as Agra, Lahor, Amritzar, Mirzapur, Kandahar, Ardahan, *etc.* Arbitrary names these last, given by the manu¬ facturers themselves without regard to location.

These American and European houses not only control the output of rugs but also their ornamentation and coloring; they make rugs to order, according to the colors selected and patterns required by their customers. Thus individuality and character is altogether want¬ ing in these productions, albeit they are made to endure, being heavy, closely woven and of attractive colorings.

Mr. Ruskin sums up the deteriorating effect of European control on the Indian rugs in the following manner : (<Modern commercialism has laid its poisonous trade upon this useful in¬ dustry since the days when I was a young man and to-day it is almost ruined as an art.®

It may be added that to-day (<this useful industry … as an art® is altogether ruined with no hope of its revival.

Chinese Rugs. — It is a matter for the his¬ torian to decide whether or not the Chinese are the original rug makers of the world; it is evident, however, that rugs were made in China a very long time ago and some of them of surpassing beauty; thus the white silk rug taken to Mecca as a covering for the holy shrine of Kaaba antedated by hundreds of years the appearance of the great prophet of Arabia.

Chinese rugs form a distinct type, their de¬ signs consist of all kinds of

odd geometrical devices, all imaginable curves and angles and many quaint configurations of the Swastika or the lotus flower which are distributed with unique formations on fields of yellow, blue, red, fawn, gold and tan in all their exquisite shades marvelously blended.

The Chinese mode of ornamentation may be called the kaleidoscope of texture. Generally of long, soft wool or silk or camel's hair these rugs while not made as fine as some Persian rugs, still reveal masterly skill in texture with irridescent sunset colors and magnificent sheen. They are among the most valuable of all Oriental rugs and among the rarest on the European or American market; and they com¬ mand the highest prices.

Kilims. — Kilims, while products of the Orient, are not rugs, for they possess no pile and their mode of construction is different.

Kilims resemble the Kashmir or Shemakha rugs and are made in the same manner, that is on the flat stitch plan, with this difference, however, that while the loose ends of the yarn

are left on the back of Kashmir rugs, in Kilims they are wound around the woof, and in chang¬ ing the yarn to change the color also a sepa¬ rate warp thread is taken up, thus leaving a small oblong open space between the two stitches. Kilims thus made present the open work effect in texture.

Kilims are of lighter weight, often both sides being alike and are not appropriate for floor coverings. They are the tapestries of the Orient, and in whatever district made they follow the usual rug pattern of that district. The finest Kilims are made in Sehna, where the finest rugs are made, in Persia; and also in Bokhara. Small Kilims made in Turkey are often called Kiz-Kilim ; woven by the hands of Turkish maidens for purposes of dowry or devotion, or for presents to their marriageable friends and relations, they are, therefore, highly decorative and often with unusually beautiful designs. Kilims are made also in Caucasia and Kurdistan known as Shirvan and Kurd Kilims respectively.

In the Orient their use is manifold — as rugs, hanging both for doors and walls, and for tents, as mantles by day time and cover¬ ing by night for travelers ; made for bags and covering for bags, and also for covering of the person ; they serve for other conveniences entirely unknown in civilized communities. See Prayer Rug.

Bibliography. — Bode, Dr. W., (Vorderasia-tische Knfipfteppiche aus

alterer ZeiC (Leipzig 1901); Clifford, C. R., (Rugs of the Orient) (New York 1911) ; Ellwanger, W. De L., (The Oriental Rug; a monograph on Eastern Rugs and Carpets* (New York 1903) ; Frehse, E., xWas muss man von Orient-Teppichen wissen?* (Berlin 1907) ; Frohlich, W., (Orientalische Teppiche* (Berlin 1896) ; Hawley, W. A., (Oriental Rugs, antique and modern* (New York 1913); Hendley, T. H., (Asian Carpets; 16th and 17th Century Designs from the Jaipur Palaces* (London 1905) ; Humphries, S., Ori¬ ental Carpets, Runners and Rugs* (London 1910) ; Kulczycki, W., (Beitrage zur Kenntnis der orientalischen Gebetteppiche* (Lemberg 1914) ; Langton, M. B., (How to Know Oriental Rugs* (New York 1904) ; Lessing, J., (Oriental Carpet Patterns, after Pictures and Originals of the 15th and 17th Centuries* (London 1879) ; Lewis, G. G., (The Practical Book of Oriental Rugs* (Philadelphia 1911); Martin, F. R., (A History of Oriental Carperts before 1800* (Lon¬ don 1906) ; Mumford, J. K., (Oriental Rugs* (New York 1915) ; Neugebauer, R. and Brandi, J., (Handbuch der orientalischen Teppichkunde* (Leipzig 1909) ; Oettingen, R., von, (Meister-stiicke orientalischer Knfipfkunst* (Berlin 1914) ; Ropers, H., (Auskunftsbuch fiber Mor-genlandische Teppiche* (Hamburg 1913) ; Stoll, C., (Anciens Tapis, Etoffes et Broderies* (Ber¬ lin 1907) ; Winters, L., (Rugs and Carpets from the Orient* (New York 1899).

B. Peshmalyan.

RUGS, Weaving of. The commerce in Oriental rugs in the United States, especialfy those from Persia, Russia and Turkey, is very considerable. A few came from India and China, and some are woven in Afghanistan and Beluchistan. While there is a large production of rugs of various kinds in America, the im¬ ported rugs continue to hold high favor among American buyers. Many of the costly Eastern

rugs are as simply woven as a Navajo blanket, an Indian product, or even as a rag carpet. The process is in many cases, almost identical, the variation being only in closeness or fineness of warp and arrangement of color. The manu¬ facture of rugs in the United States

is an in¬ dustry of considerable importance. A great variety of weaves is produced — woolen, cotton and grass rugs, in some_ cases after European models and methods and in others after original designs and methods of construction, both as to the machinery used, the dyeing of the fabrics and the designs. Grass rugs for the country house have recently won prominence in our domestic commerce. Some of these are made of tough fibres and others of less durable ma¬ terial. Some have their colors woven into the mesh and some have stencilled designs in fast colors.

Another phase of the weaving of rugs in the United States is their manufacture in the home. Rag carpets have been made and used in farmhouses for many generations, but of late there has been a general demand, especially in country houses, for home-made piazza rugs, bedroom rugs and rugs for general use. An authority on the home weaving of rugs is Mrs. Candace Wheeler, whose recent work on (How to Make Rugs) is a practical handbook. In it the Onteora, the Lois, the Isle La Motte, the Lucy and other home-made designs are de¬ scribed. The pattern, the dyeing and braiding the fringe of the border all are featured in detail. This writer states that ((the cumbrous old woolen loom is still doing a certain amount of work in every country neighborhood, and is capable of a greatly enlarged and much more profitable practice. I find very little, if any difference in the rugs woven upon these and the modern steel loom. It is true that the work is lighter and weaving goes faster upon the latter, and where a person or family makes an occu¬ pation of weaving, it is probably better to have the latest improvements, but it is possible to begin and to make a success of rag-rug weav¬ ing upon an old fashioned loom.® In the matter of pattern and coloring it is stated that the Onteora rug is made by using a proportion of half a pound of blue rags to the two and a half white required to make up the three pounds of cotton needed in a six-foot rug. The side border in the Lois rug is made upon the same blue warp, is separately woven and afterward added to the plain white rug with blue ends. Many of the rugs described by Mrs. Wheeler are washable. Her work also has been the building up of neighborhood industries in do¬ mestic rug making, a labor which has taught both economy and art.

The larger subject of the domestic manu¬ facture and commerce in rugs made in the United States may be broadly considered under the general subject of carpets (q.v.). lhe principal varieties of carpets now in use are the Turkey, the Axminster, the Brussels, the Wil¬ ton the Venetian, the Dutch, the Kidderminster or Scotch, the Whytock's tapestry and velvet pile, and the printed felt carpet. Generally speaking, rugs, whether made in England or the United States, have

somewhat similar designa¬ tions and are similar in appearance though made on the most modern looms. A very beautiful fabric has also been introduced, called the Patent Wool Mosaic.

RUHMKORFF, room'korf, Heinrich Daniel, German inventor: b. Hanover, 1803; d. Paris, 21 Dec. 1877. He removed to Paris in 1839, where he continued to reside. In 1851 he invented the induction coil which bears his name.

RUISDAEL, rois'dal, or RUYSDAEL, Jacob van, Dutch painter : b. Haarlem, 1626 ; d. there, 1682. He was the son of a painter and probably studied art under his father and an uncle, who was also a painter. In 1648 he entered the guild of his native city and some nine years later settled in Amsterdam, where he received citizen rights in 1659. He appears to have traveled throughout his native country and in parts of Germany and Switzerland. Ruisdael was not much appreciated during his lifetime, but is now ranked among the greatest of the Dutch landscape painters. His pictures, comprising well-chosen forests, waterfall, shore, mountain and similar scenes, are often of a melancholy, but always of a deeply poetical character. The figures in them were painted by Berchem, Van de Velde, Van Ostade, Wouwer-man, Lingelbach and others. All the chief European galleries contain examples of his work, the number in the National Gallery being 12. Consult Michel, (Jacob Van Ruisdael et les Paysagistes de l'Ecole de Haarlem ; (1890).

RUIZ, roo-eth, Juan, Spanish poet : b. about 1283; d. 1350. He is frequently called the arch¬ priest of Hita. Very little is known of his life; and the time and place of his birth are uncer¬ tain, Guadalajara and Alcola (de Henares) both claiming to be the latter; for honor it certainly is since he is easily the greatest of the early Castilian writers. It is known that he was cast into prison by order of Cardinal Don Gil, archbishop of Toledo, and he probably died there. At any rate he seems to have remained in prison some 13 years and to have composed most of his works there. His poems are stamped with the immorality of the age, but they are simple, imaginative, varied in form and very wide in range of subject. Through¬ out them are freely scattered fables, sayings, precepts and proverbs that have become an in¬ tegral part of the Spanish language, if indeed most of them had not already attained to that distinction before Ruiz wove them into his poems. His (Libro de buen amorP which seems to have been written while he was in prison, shows a considerable variety of talent, power of expression, breadth of imagination and ability to seize upon the

interesting, picturesque and graphic. Ruiz possesses strong satirical humor and boldly attacks the vices of his day even in the body of the Church, while at the same time showing himself as devoid of any moral standard as those he holds up to ridicule. He is at times reflective and devotional ; but this is far from his customary mood ; it is rather one of licentious immorality which in¬ stead of attempting to hide or gloss over, he rather glories in. The fact that a priest could openly express himself as Ruiz does, offers an excellent commentary upon the customs and the morals of the age. Ruiz is a skilful versifier and his genius is more universal than any of his contemporary countrymen. In fact he has frequently been compared to Chaucer. But while he has much of the vivacity of Chaucer and his ability for narration, he has not his

power of character painting. He strikes the personal note in a way never attained by Chau¬ cer, and which reminds us in some respects of Byron. Ruiz is even bolder and more cynical in his burlesques of the priests and the Church. The whole paraphernalia of the Church, includ¬ ing (< clerks and laymen, monks, nuns, duennas and gleemen,** he sends forth to meet and wel¬ come love at Toledo. In his bold humor he fears nothing and dares everything. Everywhere he strikes the personal note; and his verse and his thoughts flow with freedom heretofore un¬ known in Spanish literature. Consult Cejador y Frauca, J., (Juan Ruiz' Libro de buen amor) (annotated ed., Madrid 1913) ; Ducamin, J., (Libro de buen amor de Juan Ruiz) (Toulouse 1901); Fitzmaurice-Kelly, Chapters on Span¬ ish Literature) (London 1908) ; Ticknor, G.. (A History of Spanish Literature> (New York

1854).

RULE, William Harris, English Wesleyan Methodist clergyman and historian: b. Penryn, Cornwall, 15 Nov. 1802; d. Addiscombe, 25 Sept. 1890. He was practically self-educated and was ordained in 1826. In the succeeding year he was resident missionary at Malta and in 1827

—31 he was missionary at Saint Vincent, West Indies. He was pastor at Gibraltar in 1832-42, and held pastorates in England in 1842-68, serving as chaplain at Aldershot Camp in 1857-65. He was supernumerary pastor at Croyden after 1868. In 1851-57 he was joint editor of the Wesleyan publications. He was a man of high linguistic attainments and is said to have mastered 10 languages. Author of (Memoir of a Mission to Gibraltar and Spain) (1844); (Martyrs of the Reformation* (1851) ; (Celebrated Jesuits* (2 vols., 1852-53) ; <The Religious Aspect of the Civil War in China* (1853) ; (History of the Inquisition from the Twelfth Century* (1868 ; 2d ed., 2 vols., 1874) ; (Councils, Ancient and Modern* (1870) ; (Recollections of Life and Work at Home and Abroad* (1886), *etc.*

RULE BRITANNIA, one of the national songs of Great Britain, the joint production of Tames Thomson and David Mallet, first per¬ formed before Frederick, Prince of Wales, at Cliefden House, 1740. It runs as follows:

When Britain first at Heaven's command Arose from out the azure main,

This was the charter of her land,

And guardian angels sung the strain:

Rule, Britannia! Britannia rules the waves!

Britons never shall be slaves.

The nations not so blest as thee

Must in their turn to tyrants fall.

While thou shalt flourish great and free,

The dread and envy of them all.

Still more majestic shalt thou rise.

More dreadful from each foreign stroke;

As the loud blast that tears the skies Serves but to root thy native oak.

Thee haughty tyrants ne'er shall tame;

All their attempts to bend thee down

Will but arouse thy generous flame,

And work their woe and thy renown.

To thee belongs the rural reign ;

Thy cities shall with commerce shme;

All thine shall be the subject main.

And every shore it circles thine!

The Muses, still with Freedom found,

Shall to thy happy coast repair;

Blest Isle, with matchless beauty crowned And manly hearts to guard the fair: —

Rule, Britannia! Britannia rules the waves!

Britons never shall be slaves!

RULE OF FAITH, the regula fidei of polemical theology is the term applied to what is considered the code from which the Christian faith is to be derived and has been in use since the 2d century. The items of the creed differ in the various sects. The Reformers held that the Scriptures alone could be safely accepted as the rule of faith. Roman Catholics hold that the testimony of the Church is the true rule of faith, regarding the Church as the vital and in¬ fallible organ of the teachings of Jesus Christ under the guidance of the Holv Spirit, while they look upon the Bible as the divinely inspired word of God to be interpreted by the Church. Protestants acknowledge the authority of Christ, his apostles and all inspired writers, but deny that any doctrine not contained in the Scriptures has any binding authority. Certain members of the English Church admit what they call the consent of the Fathers as authori¬ tative in the interpretation of the Scriptures.

RULE NISI, ni’si, or RULE TO SHOW CAUSE, in English and United States law, an order granted by the court on an interlocutory application (formerly always ex parte), direct¬ ing the party opposed to the applicant to do or abstain from some act unless (nisi) he can show cause why the order should not be obeyed. If cause is shown, the order is <(discharged,** otherwise it is made ((absolute.**

RULE OF THREE. See Proportion ; Arithmetic; Arithmetic, History of.

RULING MACHINES, in blank-book manufacture and bookbinding, are instruments used for ruling paper, metal, *etc.* The first ma¬ chine of this kind was invented by a Dutch¬ man, resident in London, in 1782, and was sub¬ sequently greatly improved by Woodmason, Payne, Brown and others. F. A. Nobert de¬ vised a ruling machine in 1845 for the produc¬ tion of microscopical test plates, diffraction gratings and micrometers, etc., and more re¬ cently Benjamin Day, a New York artist, pat¬ ented one for use by artists.

RULLUS, Publius Servilius, Roman tri¬ bune of the people in 64 b.c. He is famous for his proposal of a law which provided for the purchase and distribution by the state of land for the poorer classes, thereby abolishing pauperism. The law was to be administered bv a commission of 10, elected for five-year terms, and the money required was to be raised through the sale of propertv of the state and of lands and provinces acquired by the state since 88 b.c. The proposed law granted wide powers to the commission and was considered open to a suspicion of ulterior political purposes. It failed to become a law. One of its chief op¬ ponents was Cicero, who delivered four speeches against it. Three of these still exist, (De lege agraria.*

RUM, a distilled liquor obtained from the fermented juice of the sugar-cane or molasses. Rum owes its flavor to a volatile oil and butyric acid, a fact which has been utilized to prepare a butyric compound called essence of rum to enable the spirit-dealer to manufacture a fic¬ titious rum from malt or molasses spirit. The color is usually imparted after distillation by adding burnt sugar or caramel.

RUM, ROMANISM AND REBELLION,

a phrase celebrated in American political his-

tory. At a meeting of clergy, in which all denominations were supposed to be represented, held in the Fifth Avenue Hotel, New York, during the Presidential campaign of 1884, in the interest of the Republicans, Rev. R. B. Burchard described the Democrats as the party of ((Rum, Romanism and Rebellion." This re¬ mark was unfortunate for the Republicans and helped in a great measure to win the election for the Democrats.

RUMANIA, roo-man'm-a, or ROUMANIA, a kingdom of southeastern Europe, bounded by Hungary, Ukraine, the Black Sea, Bulgaria and Jugo-Slavia. Area, 122,282 square miles. It comprised the provinces of Moldavia and Wallachia, prior to 23 Dec. 1861, Danubian principalities. The principal towns are Buchar¬ est, the capital, Jassy, Galatz, Braila, Botosai, Ploesti, Craiova, Berlad, Foscani.

Topography. — The surface consists mainly of undulating and well-watered plains of great fertility; from the Carpathian Mountains on the north and west borders, where the summits range from 2,600 feet to 8,800 feet, they grad¬ ually slope downward to the river Danube which for 595 miles flows through Rumanian territory, and with Bulgaria forms the major portion of the southern boundary. The entire kingdom is in the basin of the Danube, the chief Rumanian tributaries of which are the Alt or Aluta, the Arjish, Jalomnitza, Buzeo, Sereth, Berlad and Pruth. The Danube forms a num¬ ber of marshy lakes as it approaches the alluvial region of the Dobrudja, which is mostly a land of steppes and marshes, unhealthful and unculti¬ vated, through which the Danube discharges itself into the Black Sea by the Saint George, Sulina and Kilia channels.

Geology, Natural Resources, *etc.* — In the region of the Carpathians the geology is of the Tertiary period practically completed at the end of the Miocene period and almost entirely com¬ posed of primitive rocks. The kingdom pos¬ sesses considerable mineral wealth ; rock-salt abounds in the vicinity of the Carpathian Moun¬ tains, and the salt mines of Wallachia are ap¬ parently inexhaustible. Petroleum and asphalt are abundant ; a great quantity of saltpetre is produced, chiefly in the northern part of the country; sulphur is found in more

limited quan¬ tities. The only metal of importance is copper, which has been worked to some extent ; gold is washed from the sands of several streams, how¬ ever. About one-sixth of the surface is covered with forests of oak, fir, beach and other valu¬ able timber trees.

The fauna includes stags, bears, wolves, foxes, wild goats, wild boars, hares and mar¬ tens; while fish abound in the rivers. The climate is subject to greater extremes than at the same latitude in other parts of Europe. The summer is hot and rainless; the winter, sudden and severe, the Danube and its tribu¬ taries being regularly frozen for about six weeks; there is almost no spring, but the autumn is long and pleasant. Rumania is an essentially agricultural and pastoral state, fully 70 per cent of the inhabitants being directly en¬ gaged in husbandry. The chief cereal crops are maize, wheat, barley, rye and oats, tobacco, hemp and flax are also grown, and wine is pro¬ duced on the hills at the foot of the Car¬ pathians. Cattle, sheep and horses are reared in large numbers.

Manufactures, Commerce, *etc.* — Since the passing of the law in 1887 for promoting na¬ tional industries some progress has been made in manufactures, chiefly along the line of domes¬ tic commodities. Trade is fairly active, but is almost entirely in the hands of foreigners ; the internal trade is chiefly carried on by Jews, who are subject to certain disabilities. The chief exports are grain (especially maize), cattle, timber and fruit; the chief imports, manufac¬ tured goods, coal, *etc.* Germany, Great Britain and Austria-Hungary appropriate by far the greatest share of the foreign trade, the bulk of which passes through the Black Sea ports. In 1913-14 the exports were valued at $134,141,060, the imports at $118,002,520. In 1914 there were 2,299 miles of state railway, 5,618 miles of telegraph lines and a rapidly extending tele¬ phone system. The government monopolizes also salt and tobacco. The French decimal coinage has been introduced, the franc '"being called leu (pi. lei), the centime bari. The metric system of weights and measures has also been officially recognized, but a diversity of local standards is still common.

Government. — Since 1881 the ruler of Ru¬ mania has had the title of king, in accordance with the decision of the Rumanian Parliament. Previously the title was prince, or in Rumanian ˆDomnu" (Lat. do minus , lord). The father of the present ruler was elected by the peo¬ ple, but the dignity is hereditary. There are two legislative houses, a Senate of 120 members elected for eight years, and a Chamber of Deputies of 183 members elected for four years. The members of both

chambers are chosen by indirect election, the first voters choosing electors, and these in their turn the deputies. A deputy must either belong to a learned profession, to a military or civil service or have an annual income of about $2,000, and must be 25 years of age. All citi¬ zens of full age and paying taxes are electors. The sovereign has a suspensive veto over all laws passed by the two chambers. The execu¬ tive is in the hands of the sovereign assisted by a council of eight members, the heads of the departments of the Interior, of Finance, of War, of Foreign Affairs, of Justice, of Agriculture, Commerce and Public Works and of Public In¬ struction and Worship. For purposes of local government Wallachia is divided into 17, Mol¬ davia into 13 and Dobruja into two depart¬ ments, each administered by a prefect, a re¬ ceiver of taxes and a civil tribunal. Judges are removable at the pleasure of the superior au¬ thorities. The legal codes are founded on the civil law and customs of the two provinces ; but though several reforms have been effected in the system of jurisprudence much yet remains to be done, especially in the administration of the law, which is said to be very unsatisfactory and corrupt. The budget estimates for 1916-17 were each $129,143,860 for revenue and ex¬ penditure. The public debt in 1915 amounted to

$368,077,000.

Army and Navy. — The military forces of Rumania are divided into five classes: (1) the permanent army, with its reserve; (2) the ter¬ ritorial army, with its reserve; (3) the militia; (4) the civic guard; and (5) levies en masse. Every male inhabitant, from the age of 21 to 46, must serve three years in the permanent army in active service and five years in its reserve,

or five years in the territorial infantry and three years in its reserve. The active service in the cavalry of the territorial army lasts four years, and is followed by four years in its reserve. Whether a young man enters the permanent or the territorial army is determined by lot. Those who for some sufficient reason have not been subjected to the conscription form part of the militia, and those who have finished their term in the permanent or the territorial army also enter the militia till the age of 36. After this age, in the country they enter the levies en masse; in the towns, the civic guard. The peace establishment of the Rumanian army in 1914 was 5,749 officers, 124,389 men, 28,585 horses, 808 guns and 570 machine guns. The force mobilized in connection with the war 1914-1918 amounted to a total of 600,000. The effective force of the civic guard and the levy en masse is not definitely fixed ; but altogether Rumania can put into the field about 290,000 men. The navy is insignificant, there being only one armored cruiser of any consequence.

Ethnology and Population. — The Ruman¬ ians claim to be the descendants of a colony of Romans located here by the Emperor Tra¬ jan, and call themselves Armani or Romeni ; hence Rumania, which is now universally adopted by the natives as the name of the united principalities. This view, however, has been seriously questioned by ethnologists of repute and may be reasonably doubted on his¬ torical and linguistic grounds. By them the evident Latinity of the language is considered of later origin. The race is certainly a mixed one, being modified by Greek, Gothic, Slavic and Turkish elements. This mixture makes itself apparent in their language; among words in common use are apa (Lat. aqua), water; pane (Lat. panis), bread; alby (Lat. albus), white; negru (Lat. niger), black; and so on. The conjugations also of the verbs, which are four in number, correspond exactly to the four conjugations in Latin. For a long time Greek was the language spoken by the court and the upper classes; but latterly this language has been largely superseded by French. The popu¬ lation of Rumania, according to the latest cen¬ sus, numbered 7,500,000. The Rumanians are in general strong and stoutly built, with black hair, brilliant eyes and a complexion similar to that of the Italians. Besides the Rumanians proper there are about 400,000 Jews, 300,000 Gypsies, 95,000 Slavs, besides Germans, Mag¬ yars, Greeks, *etc.* There are also large numbers of Rumanians inhabiting Hungary, Transyl¬ vania, Bessarabia, *etc.*

Sociology. — Since the introduction of rail¬ ways great changes have taken place in the con¬ dition of the people. The peasants were never, properly speaking, serfs, but being compelled to work gratis for the proprietor a certain number of days every year they became fixed to that part of the country in which they were born. They are now, however, not only perfectly free, but each head of a family received during the late Prince Couza's reign a small portion of land, of which he became absolute proprietor, the landlord having been compensated by bonds bearing 10 per cent interest. Their dwellings are generally of a wretched description. Many of the towns are merely agglomerations of large houses, the residences of the boyards, sur¬ rounded by the huts of their dependents. The

streets are illy paved, or, most generally, not paved at all, and are usually filthy ; the roads, of which there are too few, are in most cases in a wretched state. Agricultural labor, the chief employment of the inhabitants, is cheap, as most of the laborers are so poor that they engage for work to be done three years after¬ ward, in order to obtain advances of money. More than three-fourths of the population are peasants. Handcraftsmen are comparatively few, as the peasant usually builds his own house and makes his own furniture and uten¬ sils. In Moldavia there are about 3,000 boy¬ ards, besides an extensive lower nobility; in Wallachia they are still more numerous, every twenty-eighth man being a nobleman. There is no native middle class, and the higher ranks of society have only the law open to them as a profession. The commerce of the country is in the hands of the Jews and foreigners. The staple food of the inhabitants is maize ; the common beverage is wine, which is produced in great quantities though mostly of inferior quality. This, however, is owing altogether to the manner in which it is made, and, as already stated, some good wine is also produced. The common people are good-humored, sober and cleanly, and murder and robbery are almost unknown.

Religion and Education. — The established religion is that of the Greek Church, to which about 97 per cent of the population belongs. At the head of the clergy are the metropolitan archbishops of Moldavia and Wallachia, the latter of whom is primate of Rumania. Each bishop is assisted by a council of clergy and has a seminary for priests. In 1863 the national finances were so low that the government was compelled to appropriate the estates of the monasteries, whose revenues amounted to about a third of that of the state, allowing in return a sum of about £700,000 for the support of the religious communities. It was determined that the balance should be devoted to

the support of schools, hospitals, the relief of the poor, *etc.* Rumania possesses 5,000 elementary schools, 57 high schools, 8 normal schools and 2 univer¬ sities, besides other special schools. Education is compulsory, but is still very backward.

History. — Rumania formed an important part of the Dacian territory which was con¬ quered by Trajan and formed into a Roman province in 106 a.d. It became the battlefield of the Goths, Huns, Bulgarians, Magyars and Poles, who in succession held possession of the country for a more or less lengthy period. All these races left some traces among the Romanized Dacian inhabitants, thus helping to form that mixed people who in the 11th cen¬ tury were converted to the Christianity of the Greek Church. About that epoch the Kumans, a Turkish tribe, established in Moldavia an in¬ dependent kingdom. Two centuries later it fell into the hands of the Nogai Tatars, who so desolated the country that only in the moun¬ tains and forests wras left any trace of the native population. Toward the end of the 13th century Radu Negru of Fogarash, a petty Tran¬ sylvanian chief, took possession of part of Wallachia, divided it among his boyards, founded a Senate of 12 members and an elective monarchy, and in the course of time conquered the whole province. About the middle of the following century Bogdan, a Hungarian chief,

made a successful attempt to repeople Mol¬ davia. Struggles for the ruling power, civil and foreign wars occurred. In 1418 Wallachia was conquered by Mahomet I, son of Bajazet. Likewise in 1529 Bogdan, son of Prince Etienne, submitted Moldavia to the Porte. After the conquest of Central Hungary by the Turks, Transylvania became a principality under native Magyar princes, owning the al¬ legiance of the Hungarian Crown, but paying tribute to the sultan as their suzerain. Thus the Rumanians in the beginning of the 16th cen¬ tury were induced to place themselves under the protection of the Sublime Porte, and the boyards were gradually deprived of their power to elect their own ruler, whose office was bought and sold at Constantinople. Voyvodes or dukes of various nationalities were now successively appointed, but their rule proved inefficient in establishing peace and subjection to the sultan, as the boyards never lost an op¬ portunity of making known their dissatisfac¬ tion. One of the most distinguished foreigners was Basil Lupulo, a Greek of Epirus, who pro¬ moted civilization and learning, but was de¬ posed in the middle of the 17th century. For a brief period at the close of the 16th century the Wallach, or Ruman, nationality was brought under the sway of a single monarch, Michael the Brave of Wallachia, who brought Mol¬ davia and Transylvania under his sceptre. From 1732 to 1822 the country was again gov¬ erned, or rather misgoverned, by Fanariot (the name comes from the section of Constan¬ tinople occupied by Greeks) princes, who merely farmed out the revenues, enriching themselves and impoverishing the land. A considerable number of the boyards, through intermarriage with the Fanariots, were more than half Greek by descent ; the court language was Greek, and the religious and political sympathies of the country lay in the same direction. In 1802 Russia succeeded in establishing a sort of pro¬ tectorate over the principalities, and in 1821 a desperate struggle to throw off entirely the Turkish authority almost desolated the land. In 1822 the sultan was compelled by Russia to select the princes of the provinces from natives, and seven years later to allow them to retain their office for life. In 1853 Russia took mili¬ tary possession of the provinces, but was com¬ pelled in a short time to retire, Turkey having received the assistance of France and England. Meanwhile, in

1848, the Hungarian Diet dis¬ posed of Transylvania by voting its formal an¬ nexation to Hungary. In the Treaty of Paris at the-close of the Crimean War in 1856 it was agreed, among other things, that the principali¬ ties of Moldavia and Wallachia should continue to enjoy, under the suzerainty of the Porte and under the guarantee of the contracting, powers, the privileges and immunities of which they were in possession; and that no exclusive pio-tection should be exercised over them by any of the guaranteeing powers. _ The Porte en¬ gaged to preserve to the principalities an inde¬ pendent and national administration. In 1858 the principalities were united under one ruler, Colonel Couza, who took the title of Prince Alexander John I. In 1861 Moldavia and Wal¬ lachia were formally brought .under one admin¬ istration. A revolution which broke out. at Bucharest in February 1866 forced Prince Alexander to abdicate, after which the repre¬

sentatives of the people elected as ruler Charles, son of the late Prince Charles of Hohenzollern-Sigmaringen. In the Russo-Turkish War of 1877-78 the principality sided wth Russia, but in spite of the important services which it rendered in that war, it was compelled at the close to retrocede the portion of Bessarabia which it had acquired at the conclusion of the Crimean War, and to receive in exchange the Dobrudja. Early in the war the principality proclaimed its independence of Turkey, and its independence was recognized in the Treaty of Berlin, July 1878. As already stated, it became a kingdom in 1881, Prince Charles becoming king as Charles I. His wife was well known as a writer under the pseudonym Carmen Sylva. His nephew and heir, Prince Ferdinand, was married in 1893 to Princess Marie, daughter of the late Duke of Saxe-Coburg-Gotha.

The policy of modern Rumania was dom¬ inated by the German plan of expansion toward the East. King Charles, being a Hohenzollern, retained feelings of closest intimacy with the Austrian emperor, Franz Joseph. But as early as 1907 forces within Rumania had begun to turn her away from Austria and set her toward France. In that year a very serious outbreak had taken place among the peasants which re¬ sulted in much needed agrarian reforms. Moreover, disatisfaction had been growing with the governments at Vienna and Budapest. The Magyars had been more than ever annoy¬ ing the Rumanians of Transylvania, and Aus¬ tria was discriminating against Rumanian com¬ merce. At the beginning of the Balkan War (19f2) Rumania was an interested onlooker of the struggle which the other Balkan states were waging against Turkey, but she joined Serbia and Greece in the second Balkan War against Bulgaria. As a result Rumania got the Dobrudja region

north and east of a line drawn from Turtukai to Baltchik. Fear of Bulgarian revenge caused Rumania, Serbia and Greece to draw more closely together, and Rumania was now recognized as the leading Balkan power according to the Treaty of Bu¬ charest (10 Aug. 1913), On 10 Oct. 1914 King Charles died and was succeeded by the Crown Prince, Ferdinand. In the first year of the Great War Rumania had announced a policy of strict neutrality. Although she maintained her neutral attitude during the Teutonic drive into the Balkans (1915), she was drawn into the conflict the following year, only to collapse in ‘ the fall of 1916, upholding the claims of the Rumanians of Transylvania. After the out¬ break of the Russian Revolution (15 March 1917) and the subsequent Brest-Litovsk Treaty (3 March 1918), Rumania was forced to come to terms with Germany. The only alternative left to the country if the conditions were re¬ fused was to submit to seizure by the Central Powers. Under the peace treaty (6 May 1918) Rumania was compelled to give back to Bul¬ garia that part of Dubruja which had passed to Rumania by the Treaty of Bucharest of 1913. The northern section of Dobrudja, which in¬ cludes the mouth of the Danube and Rumania’s only outlet to the Black Sea, was ceded to the Central Powers, to administer through a mixed commission. In addition wheat, salt and petro¬ leum concessions were made to Germany; and Austria-Hungary profited by the ((rectifilca-tion}) of the Transylvanian frontier, to the ex-768

tent of gaining important mountain passes and valuable mineral lands. As for Bessarabia, Austria had declared, during negotiations, that Rumania would be compensated for loss of the Transylvanian boundary territory by taking the southern part of Bessarabia. This latter coun¬ try, one of the richest farm lands of what was formerly Russia had been so badly ravaged by Bolshevik troops that the Rumanians had been called upon for help by the Bessarabians. As a result the whole of Bessarabia voted (9 April 1918) almost unanimously for union with Rumania. When the Great War was won by the Entente powers the position of Rumania was reversed. From a territory of 53,489 square miles she was extended to 122,282, by the addi¬ tion of Bessarabia, Bukowina, Transylvania, the Banat, Crisana and Maramuresch as a result of the peace treaties of 1919.

Bibliography. — Iorga, (Acte si fragmente cu privire la istoria Romanilor5 (1895—97) ; Leeper, (The Justice of Rumania's Cause) (New York 1917) ; Mavrodin, (La Roumaine contemporaine) (Paris 1915) ; Melon, (La Roumanie5 (Nouvelle Revue, ser. 4 Vol. XXX, Paris 1917) ; Mil¬ ler, (The Balkans> (London 1896) ; Mitrany, (Roumania, Her History and Politics5 (New York 1915) ; Negulescu, <Histoire du droit et des institutions de la Roumanie5 (Paris 1898) ; Samuelson, (Roumania, Past and Present5 (London 1882) ; Sturdza, <La terre et les races roumaines5 (Bucharest' 1895-97) ; ˆXenopol, Hstoria Romanilor5 (Jassy 1889) ; ib., (Les troubles agraires en Roumanie5 (Movement economique, Vol. V, pp. 257-263, Bucharest 1907) ; Johnson, <The Conquest of Rumania5 (Geographical Review, Vol. Ill, pp. 438—456, New York 1917) ; Radonitch, (Le droit historique des Roumains et des Serbes sur le ˆBanat5 (Revue des etudes historiques, Vol. LXXXII, pp. 472-498, Paris 1916) ; Seton-Watson, <Roumania and the Great War5 (London 1915).

Milivoy S. Stanoyevich, Lecturer in Jugo-Slav Literature, Columbia

University.

RUMANIAN LANGUAGE. The origin

of the Rumanian language dates from the 2d century, when the Roman colonies settled them¬ selves "on the left bank of the lower Danube, By its grammar and vocabulary this language belongs to the group of the Romance languages, and it is spoken to-day by the vast

majority of Rumans over the whole of Rumania, in Transylvania, Bessarabia, Bukovina and the ■ Dobrudja.

Antonio Bonfinius (1427-1502), the learned Latin historian of the Renaissance, was the first to introduce scientific research of the origin of the Rumanians as a people. He enunciated the theory of their Roman descent, regarding them as descendants of the Dacian colonists of Trajan, who spoke a particular Latin dialect, lingua rustica. Bonfinius' con¬ tention was passed on from historian to his¬ torian until by the 19th century it had been credited in very wide circles. In the year 1812 a history of the Rumanians written by a Tran¬ sylvanian priest, Peter Major, appeared and aided in establishing the belief in the direct Roman paternity. According to Major, Ru¬ manian is the tongue of Rome transplanted from Italy to Transylvania. It was held that the nationality and language of the Eternal

City continued to survive on Transylvanian soil even after the disappearance of Dacia as a colony. Other Rumanian writers, Cogalniceanu, Laurianu, Xenopol and Maniu, confirmed the theory of unbroken continuity (continuitate neintrerupta) between the Legions of Trajan and the present-day Rumanian peasantry. These historians grouped into a homogeneous mass the Dacian colonists and other tribes, and con¬ sidered them as one until the invasion of the Hungarians annihilated their institutions and laws. Not only did the Rumanian historians maintain this view, but even European scholars such as Gibbon, Thierry* Mommsen and Ranke, also exploited these ideas. Over against this array of scientists there is another group of philologists who stood for a different concep¬ tion of the origin and development of the Ru¬ manian language. They assail the assertion of the unbroken continuity of the Rumanian lan¬ guage as exaggerated. The men who. form this group are : Sulzer, Kopitar, Miklosich, Goos, Roesler, Paul Hunfalvy and Tomaschek. These skeptics base their position upon the evidence offered by the structure of the language and consider old Illyricum (the western part of the Balkan peninsula) as the cradle of the Rumanian language. They assume that Ru¬ manian spread from the Adriatic to the north¬ east about the time of the Middle Ages, and that through reaching Slavic culture it became enriched and strengthened. It seems reasonable to suppose that the language which was founded by the early colonists was in form and content Roman and that on account of modifi¬ cation by the tongues of the early inhabitants of the colonized region, it gradually became the true Rumanian language. The Latiniza-tion of the Albanian tongue is due to the Roman occupation. And both of these, the Rumanian and

the Albanian, possess no greater num¬ ber of words from the Age of Augustus than do the Latin languages of the West, but they manifest the Roman elements in a somewhat more ancient form than do Italian and French. The guttural sounds are never, at least in the root, rendered into palatals or sibilants, while the sibilant s has often retained in Rumanian, as in Spanish, its original tone even when placed between two vowels : Rumanian, cesar, Latin, ccesar ; Rumanian, rosei from rod; Latin, redo, rosi. It is noteworthy that where Latin words have survived they are sometimes purer than in the Romance languages of the West; for instance, Latin domina is better represented by Rumanian doamnd (lady), than by Italian donna, Spanish-Portuguese, dona and French, dame. Some words such as laudare, to praise, duccre, to lead, credere, to believe, retain some forms unaltered under which they were used by Virgil and Cicero.

The Rumanian dialects have an article, just as Italian, il uomo, i uomi, but while in Italian it precedes the word, in Rumanian it is ap¬ pended to the word, omu-l, oameni-i, a char¬ acteristic which Albanian shares. The article is the same but it is adapted to the spirit of the Rumanian and Albanian. Such is the case with certain numerical words. The numbers, 11, 12, etc., are expressed in Italian undid, dodici … , while the Rumanians employ an assisting word spre (supra) ; un-spre-zece, doi-spre-zece, *etc.* The same construction is found

in the Albanian, spre corresponding to mbe in the latter (nie-mbe-diete , dhi-mbe-di etc) . Making ordinals with the help of articles is similar in Rumanian and Albanian ; and the comparison of the adjective runs parallel in the two languages. Rumanian has no special infinitive, but it has to be constructed by a de¬ scriptive form (to see, will thus be expressed by the combination of that I see) ; the same holds true of Albanian. The lack of infinitives is sometimes to be noted in Serbo-Croatian: Ja cu jos jednn godinu da te sluzim (V. Karadzic, Pripov. 51). But both forms are to be found in Rumanian as well as Serbian. The influence of Serbian and other South Slavic tongues upon Rumanian became more pro¬ nounced as Latin-Italian waned. When the Roman source evaporated, the impress of Slavic culture became marked. During the course of the 9th and 10th centuries Old Slavic was the church language of the Rumans. This explains how three-fifths of the words are Slavic, while only two-fifths are of Latin and other origin. The first archives, which mention the Rumans, date from 1210-30. Rumanian words are to be found in Slavic documents since 1436, the first being translations of pseudo-evangels (1550) and psalms (1577). During the 1 5th century the Rumans had welded themselves into a com¬ pact nation, according to the opinion of Bonfinius. The Church continued Slavic for a longer time, but after 1643 the Rumanian lan¬ guage was employed instead of Slavic for the use of the Orthodox Church. The written word in Rumanian appeared first in Tran¬ sylvania, as the Latin alphabet came gradually to replace the Cyrillic. Rumanian orthography remained in a transitional state throughout the 19th century, retaining until to-day the Latin alphabet with some special diacritical signs to represent sounds borrowed mostly from the Slavic.

Bibliography. — Cihac, (Dictionnaire d’ety-mologie dacoroumaine) (2 vols., Frankfort 1870-79) ; Dame, (Dictionnaire roumain-frangais) (Paris 1896) ; Densusianu, (Notes de lexicol-ogie roumaine) (Romainia, Vol. 23, pp. 71-86, Paris 1904) ; Diculescu, (Originile limbii Tomane) (Academia Romana, ser. 2, vol. 29, pp. 513-675) ; Gartner, (Darstellung der rumanischen Sprache) (Halle 1904) ; Gaster, (Chrestomathie roumaine) (2 vols., Leipzig 1891); Hasdeu,

(Etymologicum magnum Ro-maniae) (Bucharest 1887) ; Miklosich, (Die Slavischen Elements im Rumunischen) (Kais. Akad. d. Wissenschaf t, Denksch. Bd. 12, pp. 1-70, Wien 1862) ; ibid., (Beitrageˆ zur Lautlehre der rumunischen Dialekte) (Kais, Akad. d. Wiss., Bd. 99, pp. 5-74; Bd. 100, pp. 229-304; Bd. 102, pp. 3174, Wien 1881-83) ; Mircesco, (Grammaire de la langue roumaine* (Paris 1863) ; Roesler, <Die Griechischen und Tiirk-ischen Bestandtheile im Rumanischen) (Wien 1865) ; Sainenu, (Les elements orientaux en roumain) (Romania, vol. 30, pp. 539-566, Paris 1901; id., ibid, vol. 31, pp. 82-99, pp. 557-589; Paris 1902); Safank, (Slovanske StarozitnostP (1837) ; Sulzer, /Geschichte des Transalpinischen Daciens) (Wien 1781); Tor-ceanu, (A Simplified Grammar of the Rou¬ manian Language* (London 1883).

Mtlivoy S. Stanoyevich, Former Assistant Professor of Slavic Litera¬ ture at Zajecar College, Serbia.

RUMANIAN LITERATURE. To get a

clear idea of Rumanian (or properly Daco-Rumanian) literature, it will be convenient to divide it into oral and written. The first of these sections includes the interesting dome (lyric songs), balade (epic songs), hore (dance songs), colinde (carols), basme (fairy tales), snoave (anecdotes), vorbe (proverbs) and ghicitoare (riddles). This literature belongs generally to the cycle of the Balkan nations as a whole, for in everyone of these countries exact parallels are to be found. There was no direct borrowing by one nation from the other, but all of them seem to have stood for a long time under identical psychological influences and to have developed on similar lines. Their folklore shows much family likeness. The heroes are often the same. The Serbs, Bulgars and Rumans sing the chivalrous deeds of their hajduks (braves), Starina (Baba) Novak and Kralyevich Marko ; or they recite the legend of the Monastery of Argesh or the ballad of Iorgovan, found also in the Russian byliny. The Rumanian folk-songs are mostly heard amongst gatherings of peasants, men and w.omen, who transmit them by oral tradition. They are in general unrhymed, rhythmical improvisions, sung to a monotonous chant, ac¬ companied often with a cobza (guitar) or with finer (flute), beginning and ending with a re¬ frain. Most of the poems have the wild melan¬ choly and the fierce simplicity of all true popu¬ lar songs. The epic poetry is not so rich as that of the Serbian, but compares favorably witji the

Bulgarian. The noted and far-famed doine have an undertone of ghastly mystery that reminds one of the Highland ((second-sight** and Irish fairy tales. They belong to a world of banshees and wraiths; there are bits and refrains that recall the Pliarmaceutria of Theocritus. One striking fact in these poems is the absence of any suggestion of Christianity as a religion, of church, of creed, or ritual of any kind. If there are any religious ideas at all, they are Pantheistic, but with the Panthe¬ ism of oceanic islanders. This absence of Christian ideas suggests that the basis of the doine may belong to pre-Christian ages ; and possibly, may have been colored and influenced by tsigani (gypsies) and Idutari, a kind of wandering minstrels, by whom they are chanted and recited.

For a long time the collection of Rumanian oral literature was neglected, and it began only in the middle of the 19th century. One of the first to collect these treasures of national litera¬ ture was Vasile Alecsandri in 1852-66. Bring¬ ing together the fragments of the Rumanian Iliade, Alecsandri was not so strict as modern study of folklore demands ; however, he re¬ tained their poetical beauty unerringly. In 1859 A. M. Marienescu collected the songs of Transylvania, S. F. Marian, those of the Bukovina (1873) and T. T. Burada, those of the Dobrudja (1880). But the most complete col¬ lections are those of S. F. Marian, Poesii populare romane, I. Balade, II. Doine si Hore (1873) and G. D. Teodorescu, Poesii populare ro¬ mane (1885). The collection of fairy tales started later than that of the ballads. The most important, considered as classical, are the successive publications of P. Ispirescu. The collected tales of the Moldavian Ion Creanga (1837-89) appeared in his Opere complecte

(1908). Good collections are those of D. Stan-cescu. Basme (1885-93) and Frdncu si Candrea (1888). In the second half of the 19th century Rumanian folklore was published in the reviews of Convorbiri literare, and Contemporanul. In recent times the only review devoted to the study of folklore is the Shazatoarea founded

in 1892.

Leaving the popular and oral literature, we come to what has been committed to writing. The earliest specimen of Daco-Rumanian monu¬ ments do not go back of the 16th century. All conserved documents prior to this period were written in old Slavonic, which was used by high officials and in church also. Unity of lan¬ guage did not exist at that time. In Moldavia they employed the Russo-Ruthenian dialect and in Wallachia Serbo:Bulgarian. The first and most prominent writer was the Metropolitan Grigorie Tamblacu (Slavic, Grigoriy Tsamblak) who wrote 26 works in three different dialects : Serbian, Bulgarian and Russian. In 1407 he was hegumen of the Serbian monastery Visoki Dechani, and in 1409 went to Russia. A few years later came to Moldavia where he settled and played a prominent role, introducing the Cyrillic alphabet and the Slavonic language in the service books of the Moldavian Church. From the 16th century began to appear books and manuscripts in the Cyrillic alphabet and in both vernaculars, Slavonic and Rumanian. The literature of this period consists mainly of translations from the Bible, homilies and chronicles. There is a gospel composed by Radu Gramaticu, 1574 (now in the British Museum) ; a printed book by a clergyman, Coresi Diaconul (1560-82) ; a collection of religious writings of the Priest Grigore din Mahaciu, from Transylvania ; Codex Sturdzanus and Codex Vc-ronetean (C odicele V eronetean') . All. these documents have more historical and philologi¬ cal than literary value. They are clumsy trans¬ lations from Slavic and Greek works.

In the 17th and 18th centuries Rumanian literature has more national features, but judg¬ ing by its content it is the spontaneous con¬ tinuation of the church literature of the 16th century. In this epoch were published prayer-books, psalms and sermons. Among the church authors of that time was the Wallachian metropolitan, Varlaam, who <(hated idleness and loved work.® He founded in Bucharest a printing press and invited there men of ex¬ perience who understood

their business. The first book published in this printing-house was (<The Key of Understanding® (Cheaia intele-sului, Bucurest ani dom 1678) written by the rector of the Theological Academy of Kiev, and prefaced by Varlaam himself. Later on were published several books of the Metropolitan Dositheiu, of which the most significant is the Viettile Sfintilor (<(Lives of the Saints,® 2 vols., Jassy 1683) To this kind of literature belongs the Mdntuirea pacdtosilor, or “Salvation of Sin¬ ners ® translated from the Greek by a certain Cozma in 1682, which may be regarded as a storehouse of mediaeval exempla ; and the Mir¬ ror of Kings,® ascribed to Prince Neagoe Bas-saraba, written originally in Slavonic and trans¬ lated into Rumanian about 1650. Toan of Vin£i compiled Sicriu de our. (((The Golden Treasury,® Sasz-Shebesh 1688), from some Hungarian Calvinistic collections of obituary sermons. The brothers Radu and ˆerban

Greceanu translated Margantare (The Pearls®) an anthology made from the Greek homilies of Saint Chrysostom, Epiphamus,

Anastasius and Sinaita. .

Of greater interest in Rumanian literature are historical productions. They are shoi t an¬ nals, written originally in Slavonic by monks in the monasteries of Moldavia and Wallacnia. Some of these annals were written in the 16tn century, but most of them have not been pre¬ served. The annalists of the later period were usually the sons of the boyars from Moldavia, educated in Polish and Russian universities,

such as Gregorie Ureche (1590-1646), who wrote (Dominii tarii Moldovei §i viata lor, ana his contemporary Miron Costin whose writings rank as classical. Costin’s best works are (Cartea pentru descalecatul de’entnu a. tarn Moldovii/ and <Letopisetul tarii Moldovei/ in¬ cluding the events from 1594 to 1662. The son of the latter, Nicolae Costin (1660-1712), con¬ tinued the work of his father, and Jon

Neculce (1672-1743) wrote the history of

Moldavia from 1662 to 1743, a history in .which he was participant himself as an eye-witness.

In Wallachia the earlier history was written by Radu Logofatul Greceanul (17th century) and Pitarul Hristache, who wrote, about the end of the 18th century, a chronicle in verses: Istoria fartelor lui Mavroghene Voda/ A Russian his¬ torian, Nikolai Statariya, called in

Rumania Nicolae Milescu, or the Rumanian Marco Polo, wrote interesting historical sketches describing his travelings in China, where he was Am¬ bassador of Russia, and where he died in 1714. The Transylvanian author, George ˆmcai (1753-1816) founder of the Latinist school in Rumanian literature, spent several years in Rome and published a monumental work Cronica Rominilor gi ait or neamuri invecinate (Jassy 1853). Magyar censors burned and for¬ bade this work in Transylvania because of its patriotic tendency. Another Transylvanian, Petru Maior (1755-1821) wrote books on his¬ torical, ecclesiastical and linguistic subjects. Two of his most important works are Istoria Insericei Rominilor, and especially Istoria pentru inceputul Rominilor.

The beginning of the 19th century was an era of preparation. Two foreign influences manifested themselves, Trench and Greek, or rather Greek-Phanariote. The national lan¬ guage was ignored and Greek was regarded as classical. Into it were translated the lyric and dramatic poems. Among the higher aristocratic classes Greek and French were exclusively used, especially in the boyar families. Every writer of better standing was supposed to be familiar with these languages and their literatures. A third influence came to be added toward 1816— 20, that of Transylvania, which brought an ex¬ alted and intolerant patriotism, born of contact with Hungary, and animated by the Rumanian cult and the hatred of Hellenism. The role of the Transylvanian agents consisted in founding schools and newspapers, while the practical sciences, philosophic conceptions and foreign literatures were subjected to vulgarization. . The first men in Rumania who proved that scienti¬ fic works could be written not only in Slavonic and Greek but in Rumanian as well, were George Lazar (died, 1823) and his disciple loan Eliade Radulescu (1802-72). They were fol¬ lowed by Budai-Deleanu, author of many his-RUMANIAN LITERATURE

torical and poetical works who wrote the famous comic epic, (Tsiganiada P Andrei Muresianu was celebrated for some of his patriotic poems and especially the (Desteapta-te, Romine) (<(Arise, Rumans®), which became the national anthem of Rumania. Among the writers of this time was also D. Bolintineanu (1819 — 72) who made his mark with (The Dying Virgin, } his (Legendele nationale)

and Florile BosforuluF ((Flowers of the Bos¬ phorusˆ, which latter work described the beauties of Constantinople in very melodious language. He wrote tales which were excel¬ lently styled, but later on his art began to de¬ teriorate, till the Reveriile signaled the decline of his inspiration. Grigorie Alecsandrescu (1812-85), another author of the time, wrote with less facility than Bolintineanu, but with more sincerity. His erotic lyrics are now out of fashion, as are all the lyrics of that day. But his patriotic odes have a grandeur that is remarkable, and his satires a great variety of attractions.

In the period 1860-80 was formed the in¬ fluential literary society Junimea (Youth). Prior to the establishment of this society the art of writing had been carried on in rather an inconsequential manner, i.e., without restraint. Authors had had the liberty to write as they saw fit. There is no doubt that therein pro¬ truded a grave danger. It had the effect of organizing factional or separatistic schools, as the Transylvanian, the Wallachian and the Moldavian. At the head of the conflicting forces stood Titu Maiorescu (1839-1917) as the spiritus rector of the Junimea (Jassy, Moldavia), and B. P. Hasdeu (Bucharest, Wallachia). B. J. Hasdeu (1838-1907), a poet, philosopher, historian and critic, was the editor of Columna lui Traian. He was aided by V. Urechia, a prolific writer and able historian, who was editor of Revista Contemporana.

In the field of pure literature during the second half of the 19th century were distin¬ guished Al. Macedonski, poet and editor of Literatorul ; Matilde Cugler Poni (b. 1853) ; Veronica Micle (1853—89) ; T. Serbanescu (b. 1839) ; A. Sihleanu (1834—57) and especially Mihail Eminescu (1849-89). The latter had a determining effect upon Rumanian literature, and knew how to express the most profound thoughts in a form which gave new life to the Rumanian language. The period in which Eminescu wrote and lived was characterized by the multiplicity of the sources of inspiration and the diversity of the kinds and groups of writers. Personal independence and perfection of form were features of the time, in which strove the conflicting forces of romanticism and popular literature on one side, and modern European literature on the other. C. Dobro-geanu Gherea (b. 1853) showed himself to be a man of great talent who understood the various literary tendencies and foreign influences in his country. He is the critic who gave in theory the correct formula for the reconciliation of the form and the matter, and, in practice, the in¬ dependence of the personal inspiration of the artist from the milieu. The ideas of Gherea were best represented and explained by J. Nadejde and V. G. Morzum, directors of the Contemporanul in Jassy.

However, the most notable name of this era

was that of George Co§buc (b. 1866), a poet endowed with deep human feeling, with energy and a great love of nature. He spread respect for national tradition which he fused with the most audacious innovations, profoundly Ruma¬ nian. He was without equal, a man of enormous activity and facility in composition and sup¬ pleness of style. There could also be men¬ tioned between Eminescu and Cosbuc, Nicolae Volenti, Nicolae Beldiceanu (1844-96), and Alecsander Vlahuˆa (b. 1858). The latter aided in establishing Eminescu's reputation, but the Transylvanian, Cosbuc, almost outshone Emi¬ nescu with his poems which were more thor¬ oughly based upon the national ballads of the country. At present the two Transylvanians, Stefan Josif (d. 1913) and Octavian Goga, founder of the review Luceafdrul I (((The Morn¬ ing Star®) and, in Rumania proper, Alecsander Stavoi and H. Lecca, wrote in Co§buc's way. Josif shows resemblances to Verlaine, and this new style has made that writer the bright young star in the firmament of Rumanian poesy. Helene Vacaresco and the Countess Mathieu de Noailles, as well as other members of the Rumanian nobility, write in French.

In fiction appear the names of Joan Ereanga (1837-89), Jacov Negruzzi (b. 1842), whose father Constantin Negruzzi (1806-66) was the well-known translator of Pushkin and Victor Hugo, and Joan Slavici (b. 1848), the lyrical story-writer. Other recognized authors of fiction are Duiliu Zamfirescu (b. 1857) with his romance ((Country Life,® Al. Vlahuta with his social novels which treat of modern Russia, Nicolae Ganea (b. 1840) who translated Dante, and Barbu Stefanescu (b. 1859) whose works, inspired by modern French literature, were published under the pseudonym of Delvrancea. A. Odobescu created the Rumanian historical novel by his (Mihnea Voda) (1858) and (Doemna Kiajna} (1860). The modern short story was cultivated in Transylvania by Slavici, Jon Russu-§irianul, Constantin Sandu and Mihail Sadoveanu. Occasionally Sadoveanu and Joan Ciocarlan revived the setting of old Rumania in their stories of the past. In gen¬ eral the writing of romances, just as among the South Slavs and Neo-Greeks, was given little attention. Authors as well .as a public were equally absent. The pathological romance of Constantin Mille entitled (Dinu Milian) (1880) was a result of the socialist wave; Vlahuja wrote a romance concerning the woes of an idealist entitled (Dan> ; and Sofia Nadejde and George Adam tried the experiment of divorce stories.

The drama received but meagre treatment. The light pieces on contemporary life written by Alecsandri and Joan Luca Carageale (1853-1902), the Gogol of Rumanian literature, found their opposites in the heavier and more earnest plays of H. Lucca and R. Rosetti, which par¬ took of French themes. Historical dramatic writings, which in the 70's and 80's appeared in great number, again entirely disappeared in the decades following. The modern Rumanian stage was supplied principally from France, just as that country also monopolized the theatre of the other Balkan nations.

Bibliography. — Gaster, (Literatura popu-lara romana) (1883) ; Murray, (Do!ne, or the National Songs and. Legends of Rumania>

(1854) ; Vacaresco, (Rumanian Folksongs-* (1891) ; Pompilin, (Antologie romana) (1887) ; Adamescu, (Notiuni de istoria limbii §i literaturei rominesti) (1896) ; Densusianu, (Istoria limbei si literaturei romine) (1894) ; Odobescu, (Literare §i istorice) (1887) ; Nadejde, Ustoria limbei §i literaturei romine) (1887) ; Rudow, (Geschichte des rumanischen Schrift-tums bis zur Gegenwart) (1892) ; Alexici, (Geschichte der rumanischen Litteraturi (1906); Eftimiu, (Litterature Neo-Roumaine) in the <Revue) (Paris 1917) ; Vaschchide, (Le mouvement litteraire en Roumanie) in the (Revue des Revues) (Paris 1899) ; Gaster, (Chrestomatie roumaine) (1891).

Milivoy S. Stanoyevich, Former Assistant Professor of Slavic Litera¬ ture in Zajecar College, Serbia.

RUMBOLD, rum'bold, Sir Horace, 8th Baronet, English diplomat: b. 2 July 1829; d. 3 Nov. 1913. He entered the diplomatic serv¬ ice in 1849 and was attache at Turin, Paris, Stuttgart, Vienna and Ragusa successively. He was secretary of the legation in China in 1859, and was transferred to Athens in 1862. In 1868-71 he was secretary of the embassy at Petrograd, and in 1871-72 he was at Constanti¬ nople in that capacity. He was appointed Min¬ ister to Chili in 1872; was Envoy Extraordinary to Argentina in 1879-81, to Sweden and Nor¬ way in 1881-84, to Greece in 1884-88, and to the Netherlands in

1888-96. In 1896-1900 he was Ambassador to Austria. Author of (The Great Silver River* ; (Recollections of a Dip¬ lomatist *(1902) ; (Further Recollections) (1903) ; (Final Recollections* (1905), *etc.*

RUMELI HISSAR, the “Citadel of Eu¬ rope,® a village six and one-half miles north¬ east by north of Constantinople, of which it forms a suburb. The Castle was built in 1452 by Muhammad II out of materials from Chris¬ tian churches and other buildings demolished for that purpose, and by the forced labor of Greeks, 2,000 of whom were employed as masons and lime-burners alone. The sultan himself supervised the building of the walls. The Greek emperor sent ambassadors to pro¬ test against the fortress as an infringement of treaties, to which the sultan replied that the next envoy sent him on a similar errand would be flayed alive. The citadel enabled him to command the straits and to exact toll from all passing vessels. A particular feature of the fortress is that the plan of its walls represents four gigantic Arabic letters — those which form the name Muhammad, MHMD.

The Castle served as a prison for Christian captives after the capture of Constantinople ; among the first incarcerated were Knights of Malta. Nearby is the spot where Darius and his army crossed to Europe over the pontoon bridge constructed by the Samian Mandrocles. Here also the Goths and crusaders crossed into Asia.

RUMELIA, roo-me’li-a, Eastern Bulgaria, a province established, with administrative autonomy, by the treaty of Berlin, 1878, known also as southern Bulgaria. It was formerly part of Turkey in Europe. It is bounded on the north by the Balkan Mountains, on the east by the Black Sea, on the south by a line beginning at Cape Seityn about lat. 42° 20’ N., and pro¬

ceeding west-southwest to the Rhodope Moun¬ tains, and on the west by the watershed between the Maritza and the Karasu. Origin¬ ally it was arranged that the province was to be under the direct political and military authority of the sultan, but to be administered by a Christian governor-general appointed for five years by the Porte, subject to the approval of the European powers. This arrangement con¬ tinued for a few years, but in 1885 the govern¬ ment was overturned by a popular movement and a union with Bulgaria effected, in which the Porte acquiesced. The capital is Philippop-olis. The area is 13,700 square miles. Pop. about 1,200,000. See Bulgaria.

RUMFORD, Benjamin Thompson, Count. See Thompson, Benjamin, Count Rumford.

RUMFORD, Me., town of Oxford County, on the Androscoggin river and on the Maine Central Railroad, 57 miles north of Lewiston. Rumford Falls, (<New England's Niagara,® has been utilized for one of the greatest power plants in the East, including a hydroelectric station completed 1918, developing a capacity of 30,000 horse power. At the headwaters of the Androscoggin River seasonal storage is af¬ forded by a system of six lakes, the Rangeley chain, for which it forms the outjet. Each of these has been improved by regulating dams, raising the natural level four feet in one case, 12 feet in another, 20 feet in three of them and 45 feet in one, creating an available storage ca¬ pacity of 30,000,000,000 cubic feet, with a surface area of 125 square miles. At Rumford a series of three rapids cover a distance of one mile with a total drop of 180 feet. The fall over the first group is 100 feet and is that developed in the hydroelectric plant. It is obtained with the aid of a dam 40 feet high at the head of the rapids, a solid concrete structure 250 feet long. The fall of the second group of rapids is 50 feet. The remaining 35-foot drop is developed mechanically in the mill of a paper company, which, in addition, buys electrical energy from the Rumford Falls Power Company. The smaller rapids are developed by a system of canals, one flowing into the other. In conjunc¬ tion with the dam at the first group of rapids there is a canal 100 feet wide and 15 feet deep, blasted out of the solid ledge, which car¬ ries the water to a gatehouse, thence through tunnels, bored 16 feet in diameter through solid rock and lined with concrete, to the water wheels in the power station on the bank of the river.

The chief industries are paper, paper bags and supplemental chemical works. Since 1900 a notable undertaking has been the building of commodious houses that could be rented at reasonable rates to workers in the several industries ; a mechanics' institute and a Car¬ negie library are the prominent municipal in¬ stitutions. Pollucite, a geological rarity, occurs with beryl in pegmatite veins in the rocks at Rumford. Pop. (1920) 7,016.

RUMINANTS, herbivorous split-hoofed animals, characterized especially by chewing the cud ; they include the camels and llamas, giraffes, deer, pronghorns, antelopes, sheep, goats and ox-tribe and thus nearly all the mammals most economically important to man. All these, except the camels and giraffes, are

represented on the continent of North America, and two — the pronghorns and musk ox — are peculiar to it. In most, no incisor or canine teeth exist in the upper jaw, the place of these being supplied by a hardened or callous pad of gum, against which the lower incisors bite. Six incisors exist in the lower jaw. Canines are always present there, and are usually inclined forward and toward the incisiors, which they nearly resemble in form. The general number of lower canine teeth is two. The molar and premolar teeth number six on each side of each jaw and are selenodont, that i-s possess flat¬ tened crowns topped by two double folds of enamel of an irregular crescentic shape. The stomach is divided into four compartments. (See Digestion). In feeding, the herbage is rapidly cropped off by the lower incisors press¬ ing against the hardened gum of the upper jaw. The food mixed with saliva is swallowed into the paunch, where it is simply moistened and then passes into the reticulum or second com¬ partment. The aperture of the gullet now closes, and the mass of food contained therein is propelled upward into the mouth by a mus¬ cular action similar to that of vomiting. Mas¬ tication of the food is then effected by a kind of rotary motion, the lower jaw thus giving a first stroke, for example, from left to right, and the rotary motion continuing persistently afterward from right to left, or in the opposite direction to the first movement of the jaws. This is “chewing the cud.® In the camels the motion of the jaws is said to be simply one from side to side. After it has been thus thoroughly masticated and remixed with saliva, the food is again swallowed, and passes on at once into the third stomach and is assimilated.

Two distinct divisions of the ruminants may be recognized according to the nature of the horns, and are known respectively as the “solid¬ horned® and the ((hollow-horned.®

The first section includes the giraffe (al¬ though no external antlers arise), the deer and pronghorns ; and the other the antelopes and the sheep, goat and ox tribes. The antlers of deer consist of nearly homogeneous bony tissue, lighter and more porous in structure than ordi¬ nary bone ; they are generally much branched or forked, and

are shed and renewed every year. (See Antlers; Deer).

The horns of the hollow-horned ruminants are entirely different from the antlers of deer, in structure as well as in manner of growth. They are usually common to both sexes, as in our domestic cattle, are simple and not branched and grow continuously throughout the life of the animal, though very slowly after it has reached maturity, and are never shed. They consist of a bony core — an elongated process from the frontal bone — covered with a sheath of horn. (See Horn).

Technically speaking, the ruminant game animals of North America consist of three dis¬ tinct families, two of which are represented by several genera, and some of the genera by nu¬ merous species. These families are the prong¬ horns (Antilocaprida) ; the deer (CervidcB) ; and the sheep, goat and ox tribes (Bovidcu). They are all ((game animals,® and some of them are rapidly approaching extermination. The pronghorn, though usually called the American antelope, is not a true antelope, but is of a dis¬ tinct family type, found only in North Amer¬ ica,! and peculiar in the fact that its horns are

branched, and shed annually. (See Prong¬ horn). The deer tribe in America consists of five genera, namely, the wapiti (Cervus) ; the small deer of the United States and Mexico (Dama , or Odocoileus) ; a Central American brocket (Manama) ; the moose (Alces), and the caribou (Rangifer) . These are separately de¬ scribed under their names. Altogether between 25 and 30 species of deer exist in North Amer¬ ica, including Mexico. Of the ox and sheep tribes or horned ruminants, the most prominent native member is the almost extinct bison (q.v.). The mountain sheep (see Bighorn) number five species, and the Rocky Mountain goat (q.v.) number two species; but of most of these species so few examples are known and their range is so limited that it may well be doubted whether they will ultimately be re¬ garded as distinct. The goats and sheep are mountain dwellers, their favorite haunts are the more inaccessible parts of the higher ranges and they are exceedingly watchful and saga¬ cious. They have been exterminated in the more accessible parts of their ranges and sur¬ vive in comparatively small numbers and greatly restricted areas. The musk-oxen, or musk-sheep, are a very distinct type, entitled to a distinctive name free from the implication of such alliance; but the term musk-ox (q.v.) is not likely soon to be displaced. There are two species, the barren-ground and the Greenland.

The ancestors of the higher ruminants are mainly of Old World origin,

and are compara¬ tively scarce and late in appearance in the fossil beds of our own continent. The oldest forms definitely known were those of the family An-thracotheriidce, pig-like animals, with teeth ap¬ proaching the selenodont shape and a complete dentition ; all the bones of the five-toed feet were free. The type-genus Anthracotherium (q.v.) begins in the Oligocene and continues down to the Pliocene, and is known from all parts of the world. Another early group was more sheep¬ like in its characteristics and forms, the family Cconotheriida? , represented by Ccenotlierium, which flourished in the Eocene and Miocene eras. They were small-sized, more delicate than modern sheep, the dentition was complete and four toes reached the ground. Another large group was the family Oreodontidoe, which was limited to North America, and whose re¬ mains have been found plentifully and usually in excellent condition in the Tertiary rocks of the eastern Rockv Mountain region. The oreo-donts were ancestors of deer and antelopes and some were horned, while all had five functional toes in front and four behind. Prominent genera are Oredon, of the size of a small pig; Mesoreodon, larger and stouter; Casoryx, Agri-ochcerns and most primitive of all Protoreodon. Another primitive family wholly European was Anoplotheriidcz, represented by the long-known Anqplotherium.

RUMP PARLIAMENT, in English his¬ tory a name by which the remnant of the Long Parliament was known after the expulsion of the majority of its members by the army of Cromwell, 6 Dec. 1648, until the latter's recon¬ vention after Cromwell's death. It having been decided by a majority of the House of Com¬ mons that the concessions made to Charles I in the Treaty of Newport were a ground of set¬ tlement, Oliver Cromwell, who wished for the condemnation of the king, despatched two regi-

ments under the command of Colonel Pride to coerce the House. In discharge of the resolu¬ tion of the army that <(none might be permitted to pass into the House but such as continued faithful to the public interests, J) Colonel Pride, whose regiment was stationed so as

to block all the entrances to the House of Commons, furnished himself with a list of the names of the members against whom the sentence of exclusion was passed, and as each approached prohibited him from entering. Forty-one mem¬ bers were placed under temporary restraint and 160 ordered to their homes. Only 60 were ad¬ mitted, all violent Independents, and these con¬ stituted the <(rump):> after the clearance wrought by <(Pride's Purge, » as it is called. This as¬ sembly, in conjunction with the army, brought about the arraignment, trial and condemnation of Charles I. It was forcibly dissolved by Cromwell, 20 April 1653, for presuming to make a stand against certain demands of the army. Twice after this it was reinstated, but both times only for a brief period. In the latter instance, 21 Feb. 1660, the expelled members were restored, it was again known as the Long Parliament and on 16 March 1660, solemnly de¬ creed its own dissolution.

RUMSEY, rum'si, James, American in¬ ventor : b. Bohemia Manor, Cecil County, Md., 1743; d. London, England, 23 Dec. 1792. He was a mechanical engineer, and while en¬ gaged as the superintendent of a mill in Shep-herdstown, Va., conceived plans for the applica¬ tion of steam to marine propulsion. In 1786, 21 years before Fulton constructed the Cler¬ mont , he exhibited a boat upon the Potomac which was propelled by means of a steam pump which forced a stream of water irom the stern. The Rumsey Society, in which Benjamin Franklin was greatly interested, was established in Philadelphia in 1788, and later an organiza¬ tion of the same name in England, to further his invention, but he died while his experiments were incomplete. He wrote (A Short Treatise on the Application of Steam } (1788).

RUMSEY, William, American jurist: b. Bath, Steuben County, N. Y., 18 Oct. 1841 ; d. New York, 16 Jan. 1903. He was educated at Williams College, volunteered for the Union army in April 1861 and was granted his diploma from the college in June. He served through the war, attaining the rank of captain of vol¬ unteers in 1863, major in 1864 and brevet lieutenant-colonel in 1865, in which year he was mustered out of service. He was secretary of the United States legation in Japan in 1865-66, and in 1880-J901 served as judge in the seventh judicial district of the Supreme Court. He then resigned and engaged in law practice until his death.

RUNCIMAN, run'si-man, Alexander,

Scottish painter: b. Edinburgh, 1736; d. there, 21 Oct. 1785. He was placed at 14 with some housepainters, who used to adorn the mantel¬

pieces of the houses which they painted with landscapes, of which many a specimen is still preserved in the houses of the Old Town of Edinburgh. He devoted himself entirely to this art, and acquired considerable local fame for his landscapes. In 1766 he visited Italy, where he met Fuseli, whose enthusiastic character matched aptly with his own. He spent five years in Rome, assiduously studying and copying the Italian masters, and in 1771 returned with

powers increased and taste improved. Just at that time he obtained the mastership of the Trustees' Academy, and his subsistence thus secured, he applied his leisure to historical painting. Among his best-known productions may be mentioned (Macbeth and Banquo,* in a landscape; a <Friar,) in a landscape; (Job in Distress) : (Samson Strangling the Lion* ; (Figure of Hope*; (Saint Margaret Landing in Scotland* ; (Christ and the Woman of Samana *; (Agrippina Landing with the Ashes of Germanicus,* and the paintings in Ossian's Hall at Penicuik. The work last mentioned was his chef-d'cenvre. He was remarkable for candor and simplicity of manners and possessed a talent for conversation. Among his associates were Robertson, Hume, Lord Karnes and Lord Monboddo.

RUNCIMAN, Walter, English politician:

b. South Shields, 19 Nov. 1870. He was edu¬ cated at Trinity College, Cambridge, and for a time was connected with shipping interests. He was elected to Parliament in 1899; was Parliamentary secretary to the local govern¬ ment board in 1905-07 ; financial secretary to the treasury in 1907—08 ; served as presi¬ dent of the board of education in 1908-11, and of the board of agriculture in 1911-14. In 1912— 14 he was commissioner of the King's Woods, Forests and Land Revenues, and he was presi¬ dent of the board of trade in 1914-16. He became a privy councilor in 1908.

RUNEBERG, Johan Ludvig, yo'han lood'- vig roo'ne-bcrg, Swedish poet: b. Jacobstad, Finland, 5 Feb. 1804; d. Borga, 6 May 1877. He wase educated at Wasa and at the Univer¬ sity of Abo. His first volume (1830) contained a number of lyrics and a long poem, (Nights of Jealousy.* In 1832 appeared an epic written in hexameters <Elgskyttarne) (the Elk Hunt¬ ers) ; in 1833 a second volume of lyrics, and in 1836 the idyl (Itanna.* In 1837 he taught Latin literature at the university, became lector at the gymnasium of Borga, where he remained until his death, being advanced to professor in 1844 and rector in 1847. His other works were the idyl (Julqvallen*

(Christmas Eve) and the epic (Na donchda* (1841); <Lyrics) (1843); a ro¬ mantic cycle, (Kung Fjalar) (King Fjalar, 1844) ; narrative poems, (Fanrik St&ls Sagner* (Ensign Stabs Tales, 1848-60) ; a rhymed com¬ edy (Kan ej* (Can't 1862); (Kungarne pa Salamis) (The King at Salamis 1863). His col¬ lected works were published in 1876 and posthu¬ mous works in 1878-79. See Ensign StAl's Tales.

RUNES, the characters used in writing by the Teutonic tribes of northwestern Europe in early times. Three classes of runes are recog¬ nized, Anglo-Saxon, German and Scandinavian, but the differences of form which distinguished them are no wider than the differences between the alphabets employed in very ancient times by various Greek peoples — between the Old Athenian alphabet, for example, and the Old Corinthian, or between the earliest Phoenician and the earliest Hebrew. The name Rune is significant of the use to which this manner of writing was first applied. In Anglo-Saxon run means secret, and runa magician ; and the knowledge of runes was confined to a small class — priests or sorcerers. For this reason, upon the introduction of the Christian religion

the use of the runes was condemned as con¬ nected with heathenish superstitions. A poet of the 6th century, Venantius Fortunatus, tells of runes being written on tablets or slabs of ash (froxineis tabellis), but there are extant numerous runes inscribed on memorial stones, personal ornaments, rings, coins, etc., which have been found in Denmark, Norway, Sweden, Ger¬ many and Iceland, and in Britain within the limits of the ancient kingdoms of Northumbria, Mercia and East Anglia. Some examples of runes have been found in Ireland, France and Rumania. The best British examples are found on a cross in Ruthwell, Dumfriesshire, Scot¬ land, on a pillar in Bancastle in Cumberland, and on the Frank's casket in the British Mu¬ seum. The system of characters called runes gets the name Futhorc from the first six let¬ ters, just as the Greek system is called Alpha¬ bet from the names of the first two letters, alpha and beta, A and B, or as we call our alphabet the ABC. The following examples show the agreements

and differences between British and Norse runes:

r h l> Y It AsUX X F

f n th o r k g (paint) w

Hi I (<H4(M(Y)H T & M

hnljcbpeoatbe

fUHHX Y h for

to I ng o d g (gntt) a (0 7 t»

Anglo-Saxon Runes.

r h > t» n m

t, V 1,0 lb,db #(o) r k,g b 0

I + M T fc > T A

i, • t , <1 p,b 1 ib. fftnaL

Norse Runes.

The origin of the runes is still a matter of uncertainty. While they are obviously an off¬ shoot of the Helleno-Italic family of alphabets, it is not easy to ascertain at what point they branched out from their ancestral stock. While they have usually been regarded as of a purely Latin origin, the alternative theories have been propounded that they were invented upon a Galatian base, by the the Goths soon after their expedition to Asia Minor in 267, and that they are of Eubcean origin, through the contact' of the Goths with Greek colonies in the Crimea. All these theories depend on a dating of the runes which is itself dependent on that of the Gothic bible of Ulfilas, in which an alphabet is used containing at least two runic characters. The authenticity of the 4th century date usually assigned to Ulfilas and his bible has been called into question by the in¬ vestigations of Prof. Leo Wiener of Harvard University, and accordingly he is able to use for the derivation of the runes Greek alphabets much later than those which were formerly accessible for this purpose. He finds the proto¬ type of the runes in the Greek cursive. He has also explained the order of the runes through their relation to the so-called ogams (q.v.) or tree-runes.

Except in Scandinavia, the runes were al¬ ways a purely inscriptional alphabet. Scandi¬ navian runic manuscripts exist, but are not

older than the 13th century. The Latin alpha¬ bet gradually supplanted the runes, though they lingered on in popular use and in calendars until modern times. In England runes are found between the middle of the 6th and the midddle of the 10th centuries. Some Celtic runic inscriptions also exist. Consult Olsen, (Runerne i den

oldislandske LiteratuU (Chris¬ tiania 1891) ; Stephens, G., (The Old-Northern Runic Monuments of Scandinavia and Eng-landJ Copenhagen 1879) ; Taylor, T., (Greeks and Goths: a Study on the Runes> (London 1879) ; Wimmer, F. A., (Die RunenschrifP (Berlin 1887).

RUNIC CHARACTERS. See Runes.

RUNJEET SINGH, run-jet' singh. See

Ranjit Singh.

RUNKLE, Bertha Brooks (Mrs. Louis H. Bash), American novelist: b. Berkeley Heights, N. J. She was educated privately and was married to Colonel Bash, United States Army, 26 Oct. 1904. Author of (The Helmet of Navarre) (1901) ; (The Truth about Tolna) (1906) ; (The Scarlet Rider> (1913) ; (Straight Down the Crooked Lane) (1915) » *etc.*

RUNKLE, run'kl, John Daniel, American mathematician: b. Root, N. Y., 11 Oct. 1822; d. Southwest Harbor, Me., 8 July 1902. He was graduated from the Lawrence Scientific School at Harvard in 1851, and having been appointed to the staff of the American Ephemeris and Nautical Almanac in 1849, continued with it until 1884. He was one of the promoters of the Massachusetts Institute of Technology and held the chair of mathematics there from the time of its foundation until his retirement shortly before his death, with the exception of 1870-78 when he was president. He established the Mathematical Monthly in 1859 and edited it until 1861, and published (New Tables for De¬ termining the Values of the Coefficients in the Perturbative Function of Planetary Motion) (1856) ; (Elements of Plane and Solid Geometry) (1888), *etc.*

RUNNING RECORDS. See Sports.

RUNNYMEDE, run'i-med, England. Five miles east of Windsor, in Surrey, lying along the right bank of the Thames, is the celebrated meadow where the conference was held, 15 June 1215, between John and the English barons, in which the former was compelled to sign Magna Charta and the Charta de Foresta. (See John). Runnymede is now divided into several enclo¬ sures.

RUNYON, Theodore, American diplomat: b. Somerville, N. J., 25 Oct. 1822; d. Berlin, Germany, 27 Jan. 1896. He was graduated from Yale in 1842, admitted to the bar in 1846, and established a law practice at Newark, N. J. He became city attorney of Newark in 1853, city

counselor in 1856 and at the outbreak of the Civil War went to the front as brigadier-gen¬ eral in command of the 1st brigade of New Jersey Volunteers. He arrived at Washington on 6 May, when the threatened invasion by the Confederates had thrown the city into great alarm, and promptly took efficient measures for its defense. After the defeat of the Union army at the first battle of Bull Run when the city was in danger of invasion, he closed all ap¬ proaches, stationed cannon to avert the expected attack and thereby saved the National capital,

a service for which he received the personal thanks of President Lincoln and his Cabinet. He was honorably mustered out of service in July 1861 and resumed his law practice. In 1863 he was elected mayor of Newark, served as chancellor of New Jersey in 1873-87, and in 1893 was appointed Minister to Germany. He was raised to the rank of Ambassador in that year and remained in office until his death.

RUPEE, roo-pe', in India, the name given a small silver coin. The value of this coin is nominally 50 cents, but owing to the deprecia¬ tion of silver It has of late years varied be¬ tween 30 and 40 cents. A rupee equals 16 annas ; one-half, one-fourth and one-eighth rupee are also coined in silver. A lac of rupees is 100,000, and a crore 10,000,000 rupees.

RUPERT, or ROBERT, of Bavaria,

Prince: b. Prague, 18 Dec. 1619; d. London, 29 Nov. 1682. He was the son of Frederick V, elector palatine and titular king of Bohemia, by the Princess Elizabeth of England, daughter of James I; was educated at Leyden and early engaged in military service in the Thirty Years' War. During the Civil War in England he had the command of a corps of cavalry, at the head of which he distinguished himself at the battle of Edgehill in 1642, at Chalgrove Field in 1643, and also at Marston Moor and at Naseby; but his impetuosity and imprudence contributed to the disastrous result of these latter engagements. In 1648 he was

made com¬ mander of that part of the fleet which still adhered to Charles. Prince Rupert for some time carried on a predatory warfare against the English ; but in an engagement with Blake, off the Spanish coast, he was worsted, and his whole squadron destroyed, with the exception of four or five ships, with which he escaped to the West Indies, where he supported himself by capturing English and Spanish merchantmen. Later he joined Charles II at the court of Ver¬ sailles, where his time was chiefly devoted to scientific studies till, the Restoration, when he returned to England. In 1664 he was appointed with Monk, to the command of a fleet against the Dutch, and in the next war with Holland, in 1673 was made admiral of the fleet. Many useful inventions resulted from his studies, among which are the invention of prince's metal, and although the discovery of the method of engraving in mezzotinto is not due to him, as was erroneously supposed, he introduced the art into England. He also introduced the curious glass drops that have been named after him, Prince Rupert's drops. He was likewise one of the founders and the first governor of the Hudson's Bay Company, incorporated in 1670, and a founder of the Royal Society. Rupert's Land (q.v.) was named after him.

RUPERT (Rupprecht Maria Luitpold Ferdinand), Crown Prince of Bavaria, son of Louis III : b. Munich, 1869. He was educated at the University of Munich and at the Kriegs-akademie. He entered the army, attained rank as lieutenant-general in 1903, and in 1913-14 he was inspector-general of the army. In the European War he commanded the Bavarian Army on the western front. His heir, Prince Leopold, was born in 1901.

RUPERT'S LAND, the former name of an extensive territory in Canada, conferred by

Charles I on Prince Rupert, transferred to the Hudson's Bay Company in 1670, and since 1870 included with the other parts of the Hudson Bay Territories in the Northwest Territories. The title is still retained to distinguish an Epis¬ copalian diocese; the see of the bishop of Rupert's Land is at Winnipeg. See North¬ west Territories.

RUPIA, a skin disease, characterized by an eruption of small flattened and distinct bullae surrounded by inflamed areolae, containing a serous, purulent, sanious or dark bloody fluid, and followed by thick, dark-colored scabs over unhealthy ulcers. Three varieties of this disease are described, Rupia simplex, Rupia prominens, and Rupia escharotica. Rupia simplex com¬ monly appears on the legs,

sometimes on the loins or thighs, and seldom on other parts. The bullae are not preceded by any inflammatory symptoms, vary from one-half inch to one inch in diameter, and contain at first a transparent serous fluid, which soon becomes turbid and purulent, and dries into scabs. The scabs are easily removed, displaying an ulcerated surface underneath, and several series of these scabs may follow before healing sets in. In Rupia prominens the bullae are larger, the scabs thicker and the ulceration deeper. The scab adheres firmly, and generally requires emollient applications to facilitate its removal. Rupia escharotica occurs chiefly in cachectic children and infants. It is commonly confined to the lower extremities, and begins by one or two red and livid spots, over which the cuticle is soon raised by the effusion underneath it of a serous fluid. The bullae thus formed increase ; the serum they contain becomes turbid, and of a blackish hue. A bloody and offensive sanies marks the surface of the sore, the edges of which are livid, but not very painful. Rupia is chronic, not dangerous, not contagious, but often very obstinate. It generally attacks persons debilitated by age, intemperance, bad living or previous diseases, especially smallpox, scarlet-fever and syphilis. The general treatment con¬ sists mainly in the administration of tonic de¬ coctions, more especially those of cinchona, cascarilla, gentian, etc., with alkalies, a generous and nutritious diet and warm salt water and alkaline baths. The local treatment consists chiefly of puncturing the bullae early, and allow¬ ing the morbid secretion to escape; of poultic¬ ing in order to remove the scabs, and of apply¬ ing lotions containing nitrate of silver or nitric acid, or any other slightly stimulating applica¬ tion.

RUPP, rup, Julius Augustus Leopold,

German Protestant theologian: b. Konigsberg, 13 Aug. 1809; d. there, 11 July 1884. He was educated at Konigsberg and was connected with the faculty there from 1830 until 1851, when his religious teachings cost the loss of his position. He was at one time a preacher at the Royal Chapel but was deprived of his benefice because of his broad religious views. Upon his failing to receive royal confirmation after his election as pastor of the German Reformed Church at Konigsberg, he in 1846 founded a (<free con¬ gregation® at Konigsberg and was one of the leaders in that movement. Author of (Der Symbolzwang und die protestantische Gewis-sensund LehrfreiheiD (1843) ; (Literarischen Nachlass) (1891-1902), *etc.*

RUPTURE, hernia (q.v.), especially ab¬ dominal hernia, to which the .term rupture is most frequently applied in popular usage.

RURAL CREDITS. See Land Credit; Federal Farm Loan Act; also Banks and Banking.

RURAL DEPOPULATION. See Farm and Farm Problems.

RURAL LIBRARIES of the present are largely an outgrowth of the general library movement in the United States for the past 40 years. Nevertheless, many of these libraries are due to earlier educational movements. The desire for self-education which has characterized the United States ever since the colonial period stimulated the growth of societies devoted, like Franklin's Junta, to the improvement of their members. These spread to the small towns throughout the original colonies. The isolation of these small communities, due to wretched transportation facilities, made these societies play a large part in the community life. Li¬ braries were a recognized part of the activities of many of these societies. Even when the so¬ ciety dissolved, the library often persisted to become either the predecessor or the direct ancestor of a modern public library. Many of the libraries of New England, New York and the Atlantic seaboard originated in this way. The lyceum movement, which was influential throughout the North and West from about 1830 till after the Civil War, through its lec¬ ture courses and public discussions caused the formation of many society libraries. Even the villages, too small to maintain lecture courses, had their local literary® or (<debating societies.® Many of these maintained small libraries for their members. School libraries became fairly common. Many of these like the ((school dis¬ trict libraries® of New York State (authorized by law in 1834) served as rural community libraries also. Sunday-schools became very common everywhere. A small library was con¬ sidered an essential part of nearly all of these, whether urban, village or in isolated church or schoolhouse. These libraries served an excel¬ lent purpose in familiarizing the rural sections with the library idea even though their books were usually confined to the mediocre or evan¬ gelistic types.

Massachusetts in 1890 established a library commission which took for its purpose the founding of a free public library in every town in

the State. Other library commissions were founded. In every case the founding and maintenance of rural libraries was one of their chief duties. Through the traveling libraries maintained by these commissions the num¬ ber of rural libraries was greatly increased and the number and quality of their books and periodicals materially improved. The com¬ missions have also done excellent work in at¬ tempting to put the small rural libraries in touch with larger libraries and other library activities of their respective States.

Coincident with the rise of library commis¬ sions, the University Extension movement, which was imported from England in 1887 and flourished in the United States for more than a decade afterward, promoted the formation of ((extension centres® and study clubs. The need of library facilities for the use of these groups soon became apparent and, in many cases, led

to the formation of rural libraries free for the use of the entire community. Later educational reading circles and other extension movements of universities or State departments of educa¬ tion, have done much to show the need of rural libraries. Rural community centres also usu¬ ally have a small library as part of their equip¬ ment.

Rural libraries, like rural schools, are prob¬ ably only at the beginning of their adequate development. In many cases they will, in all probability, be merged with the rural school library. In the larger villages the rural li¬ brary will probably be independent of the school1 library, though co-operating with it in every practicable way. Virtually all the State library commissions, many of the State departments of education and the Federal Bureau of Education are increasing their efforts to obtain good li¬ brary facilities for all residents of the State, whether in the city, the town, the remote ham¬ let or the isolated farmhouse. The rural school has been made possible only through State supervision and State support. It seems prob¬ able that the rural library as well is destined to receive a greater share of State support than it now gets. Closer organization of rural li¬ brary interests has been begun in some places through district libraries which act as reference and distributing centres for the small libraries of their districts. In many States the county has been adopted as the district unit. The first of these county libraries was the Brumback Library of Van Wert, Ohio, which became the library centre for Van Wert County in 1894. The best-known State system of county libra¬ ries is that of California.

Many rural libraries depend almost entirely on voluntary (<library associations® or educa¬ tional and social clubs for their support. In an increasing number of cases the library is aided by the tax funds obtained from State and local sources. The rural libraries entirely supported by funds raised by public taxation are as yet in the minority. This, however, is the only logical means by which library facilities can be supplied adequately to rural districts and State support of libraries must increase with a growing interest in rural edu¬ cation. Trolley lines, better roads and the automobile have made it easier for the smaller towns and villages to act as library centres for the surrounding rural population. Book-wagons with definitely planned routes have been used to supplement the work of the local library (e.g., at Hagerstown, Md., and by the library commissions of Connecticut and Delaware).

‘ Rural libraries are of great educational sig¬ nificance because of their direct contact with the people they serve. The material they cir¬ culate becomes a force in the community to an even greater extent than it does in larger places. Numerically, the rural library exceeds any other type. No library movement which does not take into account the rural library can have more than partial success.

The great needs of rural libraries are more money for more and better books and for the payment of salaries which will attract and hold librarians who are not only socially-minded but who have education and book sense enough to get the books most needed for the specific communities the libraries serve.

The State library commissions are aiding the small libraries to get better books, through bul¬ letins, book lists and other publications whose purpose is to advise the library in the selection of suitable books. The Wisconsin Free Library Commission regularly includes in its monthly ˆBulletin® a <(Selected list of current books.® The New York State Library issues an annual (Best Books for a Small Library.* The Book¬ list of the American Library Association serves a similar purpose for larger libraries. In the matter of salaries, the chief force at

present is a growing realization, on the part of rural library boards, of the need of competent li¬ brarians. This is aided by a tendency, clearly apparent at present, toward the requirement of definite minimum educational and professional qualifications for all librarians engaged in pub¬ lic libraries of all types.

Bibliography. — The literature of rural li¬ braries is relatively scanty. Valuable material is listed in. Cannons, H. G. T., (Bibliography of Library Economy) (London 1910) and in (Library Work* (cumulated, Minneapolis 1912). The Library Journal and Public Libraries con¬ tain much material on the subject of rural and other small libraries. The most direct source of information is often the bulletins of the different library commissions, since these are chiefly devoted to the interests of small libraries.

Frank K. Walter,

Vice-Director, New York State Library School.

RURAL SCHOOLS. See Education' Elementary.

RURAL AND FOLK THEATRES.

(<The Little Country Theatre® of North Da¬ kota not only illustrates the wide popularity of theatricals to-day, but also points to the deep¬ ening influence of the dramatic arts, almost re¬ ligious in its intensity. The population of North Dakota is mainly foreign and made up of some 25 different nationalities, thinly scat¬ tered. There are 140 towns, each containing less than 500 people; and intellectual compan¬ ionship and culture were not easily obtainable. Exodus to the big cities was the natural con¬ sequence. The solution of the problem of stem¬ ming this tide was found in the amateur com¬ munity theatre for the rural districts. Estab¬ lished with this end in view by Alfred G. Ar-vold of North Dakota Agricultural College, in 1914 in Fargo, the Little Country Theatre has already succeeded far beyond expectations and spread into every corner of the State. It will serve as a model for many similar experiments already in the bud all over the land. The old dingy chapel on the second floor of the admin¬ istration building of the Agricultural College was refurnished at slight cost into a theatre. Simplicity on every hand was the guiding prin¬ ciple. The young people did most of the writ¬ ing, acting, costuming, scene-painting and scene-shifting for themselves. A moving-pic¬ ture machine was installed. About 2,000 people participated in these home-talent plays; 1,600 pieces of play-matter were loaned in the course of a few months. The audiences were enthusi¬ astic and

sometimes aroused into good-humored excitement. North Dakota had solved her ag¬ ricultural and social problem. One of the most-considered of all rural theatres is that founded and maintained by Maurice Pottecher, poet, dramatist and actor-manager, among the peo¬

ple of Bussang, a mountain district of the Vosges in France. In all times, from the far East to the far West, some form of rustic the¬ atre (mainly itinerant) has existed. For the romantic particulars of the old strolling play¬ ers, consult Mantzius, K., (History of Theatri¬ cal Art in All Ages.* For the recent people's theatre revival in Europe, a movement that has shown most energy in Germany and in Russia, consult Pottecher, Maurice, (Le Theatre du peuple de Bussang (Vosges) : son origine, son developpement et son but exposes par son fon-dateur) (Paris 1913) ; Rolland, Romain, (Le Theatre du Peuple : Essai d'esthetique d'un theatre nouveau *(Paris 1904) ; Kahn, A., (Le Theatre social en France* (Paris 1907) ; Morel, Eugene, (Projet de theatres populaires) (in Revue d' art Dramatique, Vol. XV, pp. 1 1 15 — 1188, Paris 1900) ; Le Braz, Anatole, (La Resurrection du theatre populaire en Bretagne) (in La Grande Revue, Vol. VII, p. 140, Paris 1898) ; Van Dooren, J., (Le Theatre du peuple) (in the Revue de Belgique, Series 2, Vol. XXVII, p. 31, Brussels 1899) ; Sellers, Edith, (The People's Theatre in Berlin) (in the Con¬ temporary Review, Vol. LXXVII, p. 870, Lon¬ don 1900) ; Mehring, F., (Die Freie Volks-biihne> (in the Neue Zeit, Vol. II, p. 530, Stuttgart 1900) ; Prod'homme, J. G., (Le Thea¬ tre populaire en Baviere* (in the Revue des Revues, Series 3, Vol. XXXIII, p. 524, Paris 1900) ; Moderwell, H. K., (The Theatre of To¬ day* (Boston 1914) ; Calvi, E., (I1 Teatro popo-lare romanesco dal Medio Evo ai tempi nostri* (in the Nuovo Antologia, Series 5, Vol. CXXXIV, p. 689, Rome 1908) ; Long, R. E. C., People's Theatre in Russia1* (in the Nine¬ teenth Century and After, Vol. LII, p. 775, London 1902).

Bibliography— Arnold, A. G., <The Soul and the SoiP (in The Search-Light, Fargo, N. D., Jan. 13, 1917) ; Chambers, E. K., (The Medieval Stage) (2 vols., Oxford 1903) ; Gregory, Lady, (Our Irish Theatre) (New York 1913) ; Matthews, Brander, importance of the Folk Theatre) (in (Aspects of Fiction,* 3d ed., New York 1902) ; Maxwell, Gerald, < Revival of the Folk Drama* (in the Nineteenth Century and After, Vol. LX 1 1, p. 925, Lon¬ don) ; Merington, Marguerite, (Village Play¬ ers : and every community producing its own plays) (in World's Work, Vol. XVII, p. 254, London 1911); Ordish, T. F., (Folk Drama* (in Folk Lore, Vol. II, p. 314, and Vol. IV, p. 149, London 1891 and

1893) ; Ward, A. W., (History of English Dramatic Literature to the death of Queen Anne) (2d ed., London 1899).

RURIK, roo'rik, founder of the Russian monarchy: d. 879. Most writers consider him to have been a Varangian, of Scandinavian origin, though Kostomorof has endeavored to prove that he was a Lithuanian. It is recorded that he came to Russia about 862, accompanied by his brothers Sinaf and Truvor, in compli¬ ance with the request of Gostomisl, a leading personage of Novgorod. One of the brothers established himself at Belozersk, the other at Izborsk, while Rurik began by fortifying him¬ self in the ancient town of Ladoga, at the pres¬ ent day a miserable village on the Volkhof. The Novgorodians soon repenting, rose in rebellion against Rurik, and at their head was one of their fellow citizens named Vadim, whose valor

is celebrated in the ancient chronicles and in Russian song. Rurik succeeded in establishing a dictatorship in Novgorod in 865 and is said to have killed Vadim with his own hand. His possessions were soon afterward greatly en¬ larged by the death of his brothers, whose principalities, since they died without issue, Rurik united to Novgorod. In o»der to secure himself and his descendants in their newly ac¬ quired territory, he invited various colonies of Varangians, on whose devotion he could count, to settle in the country. Rurik died after a reign of 17 years. The family of Rurik reigned in Russia until the death in 1598 of Feodor, son of Ivan the Terrible, when it was succeeded by the closely allied house of Romanoff.

RUSBY, Henry Hurd, American botanist and educator: b. Franklin, N. J., 26 April 1855. He was educated at the Westfield (Mass.) State Normal School, the Centenary Collegiate Institute, Hackettstown, N. J., the College of Physicians and Surgeons, New York, and the medical department of New York University; was botanical explorer for the Smithsonian In¬ stitution in the southwestern United States 1880-83, and privately in. South America 1885— 87 and in 1896, and in Mexico at various times since 1900; has been professor of botany and materia medica in the New York College of Pharmacy since 1888 and

for many years dean of its faculty; professor of materia medica at Bellevue Medical College and New York Uni¬ versity 1897-1902 and of the principles of stock¬ feeding in the American Veterinary College for many years. He is a member of many learned societies, chairman of the Scientific Directors of the New York Botanical Garden and hon¬ orary curator of the Economic Museum ; since 1890, member of the committee for revising the United States Pharmacopoeia. His greatest pub¬ lic services have been as a leader in reforming and standardizing pharmaceutical education in the United States and, as pharmacognosist of the United States Department of Agriculture (1912-17), for examining drugs offered for im¬ port at New York, since 1907, in purifying our foreign drug supplies, in which work he has been the chief agent. For this service he was elected to membership in the National Insti¬ tute of Social Sciences. He was - instrumental in securing the vindication of Dr. Wiley and his associates from charges in 1911 and in eliminat¬ ing his detractors from the Department of Ag¬ riculture. His publications include (Essentials of Pharmacognosy) (1895) ; (History of the New York College of Pharmacy* (1895) ; (Morphology and Histology of Plants> (1899) ; (Manual of Botany *(1911) ; many pamphlets on the flora of South America, including the contribution of hundreds of new species and genera, and one family; botany, materia med¬ ica and physiology of the National Pharmaceu¬ tical Syllabus; botany and materia medica of the (National Standard Dispensatory* and of Buck's Reference Handbook of the Medical Sciences,* *etc.*

RUSCHENBERGER, rush'en-berg'er, William Samuel Waithman, American naval surgeon : b. Cumberland County, N. J., 1807 ; d. Philadelphia, 24 March 1895. He became surgeon's mate in the United States navy in 1826, took his M.D. at the University of Penn¬ sylvania in 1830 and in 1831 re-entered the

navy as surgeon. He was connected with the Naval Hospital at Brooklyn in 1843-47 and while there reorganized the laboratory to se¬ cure pure drugs for use in the service. He served with the East Indian, Pacific and Medi¬ terranean squadrons, with intervals of land duty and at his retirement in 1869 he was senior officer of the Medical Corps. He was commissioned medical director on the retired list in 1871. Author of (Three Years in the Pacific (1834) ; (A Voyage Around the World, 1835-37* (1838) ; (Notes During Voy¬ ages to Brazil and China) (1848) ; (Elements of Natural History) (1850), *etc.*

RUSH, Benjamin, American physician : b. Byberry, near Philadelphia,

Pa., 24 Dec. 1745; d. Philadelphia, 19 April 1813. He was grad¬ uated from Princeton in 1760, from the Univer¬ sity of Edinburgh in 1768, and became professor of chemistry at the College of Philadelphia in 1769. He was active in the pre-Revolutionary movements and as member of the provincial conference of 1776 moved the resolution declar¬ ing the expediency of a declaration of inde¬ pendence, of which he was a signer in the fol¬ lowing month. He was surgeon to the Penn¬ sylvania navy in 1775-76 and in 1777 was ap¬ pointed surgeon-general and later physician-general of the hospitals of the middle section. In 1778 he resigned and resumed his practice and his professorship at Philadelphia. He was a member of the convention which formed the constitution of 1780, established the first dis¬ pensary in the United States in 1785 and in 1787 was a member of the convention which ratified the Federal Constitution. He became professor of the theory and practice of medi¬ cine in 1789 and after the Medical College was merged in the University of Pennsylvania was appointed professor of the institutes and prac¬ tice of medicine and of clinical practice. In the yellow fever epidemic of 1793 Rush insti¬ tuted a new method of treatment for the dis¬ ease which he used with great success, visiting from 100 to 120 patients daily. He was one of the founders of Dickinson College, an advocate of the abolition of slavery, was connected with various religious and scientific societies and was treasurer of the United States Mint from 1799 until his death. He wrote (Medical In¬ quiries and Observations) (5 vols., 1789-98) ; (Essays, Literary, Moral and PhilosophicaP (1798), *etc.*

RUSH, Richard, American diplomat: b. Philadelphia, 29 Aug. 1780; d. there, 3 July 1859. He was graduated from Princeton in 1797, was admitted to the bar in 1800 and en¬ gaged in practice at Philadelphia. In 1811 he was appointed attorney-general of Pennsylvania and in 1814-17 was attorney-general of the United States. He was temporary Secretary of state under President Monroe in 1817 and was then appointed Minister to England, a post he occupied until 1825 when he was recalled to become Secretary of the Treasury under Presi¬ dent Adams. He was a candidate for the vice¬ presidency on the ticket with Adams in 1828 and in 1836 was appointed by President Jackson commissioner to obtain the legacy for the founding of the Smithsonian Institution which was then pending in the English Chancery Court, returning in 1838 with the entire amount. He was appointed Minister to France in 1847

and remained such until 1851 when he was re¬ called at his own request and spent the remain¬ der of his life in retirement. He published Modification of the Laws of the United States) (5 vols., 1815) ; (Narrative of a Residence at the Court of London from 1817 to 1825 > (1833) ; (Washington in Domestic Life) (1857) ; Oc¬ casional Productions, Political, Diplomatic and Miscellaneous, Including a Glance at the Court and Government of Louis Philippe and the French Revolution of 1848) (published by his sons, 1860).

RUSH, William, American sculptor: b. Philadelphia, 4 July 1756; d. there, 17 Jan. 1833. He was apprenticed to a carver and soon became known as a maker of figure-heads which won admiration in many ports in the world He never worked in marble, confining himself to wood and clay, but gained a high reputation for his statues, busts and ideal figures executed in these materials. He served in the American Revolution and was a member of the city coun¬ cils of Philadelphia for more than a quarter of a century. Among the most admired of his ship carvings were (Genius of the United States1* ; Mature1* ; Undian Trader) ; (William Penn1* ; (River GodP He also executed (Ex¬ hortation ; <Praise) ; busts of Linnaeus, Wil¬ liam Barton and Lafayette; statues of (Winter, > (Washington (1814), *etc.*

RUSH. Many plants growing in moist land having cylindrical stems are called rushes, al¬ though generally with a qualifying adjective; as the bulrush (Typha), flowering rush (Buto - mus), or scouring rush (Equisetum) , and some sedges (Cyperacece) . The true rushes, how¬ ever, are members of the grass-like family Juncacece, containing about 250 species in the several genera, and distributed throughout the temperate zones. Some are destitute of leaves but have barren flower stems resembling leaves ; some have leafy stems, the leaves rounded or somewhat compressed and usually jointed in¬ ternally; the foliage of others is very narrow, springing from the root. The round stems of the leafless species, sometimes bearing flowers, are popularly called rushes. The presence of this family in a pasture denotes bad drainage, and they are troublesome to farmers, since cattle will touch them only as a last resort. The com¬ mon bog or soft rush (Juncus effusus) is found in wet places throughout the temperate world. It is a typical species, with glabrous tufts at¬ taining perhaps four feet, springing from a stout rootstock and bearing an inflorescence

composed of many small greenish grass-like flowers. This species is cultivated in Japan for making mats and with others is employed for the bottoms of chairs, baskets, coarse ropes for binding, *etc.* The stems of /. conglomerates were formerly gathered by English farmers and stripped of their green rind, leaving exposed a large pith with one even lengthwise rib of rind leU to support it. This porous pith was then bleached and dried and di-pped in scalding grease, thus becoming the wick of a rude candle, or “rushlight,® which gave a good, clear light, and, if two feet long, would burn nearly an hour. These dried rush-piths were also used in place of cotton for wicks in open lamps.

Rushes, with a few sweet herbs, were scat¬ tered before processions and were strewn on stages in Shakespeare’s time and on the floors

of houses before the advent of carpets. The strewing of rushes in the churches grew into a religious festival conducted with much pomp. There rushes on the floor generally became so filthy from overlong use that to order fresh rushes was a sincere mark of honor to a guest.

Scouring rushes are the hollow, jointed stems of the horsetail (Equisetum hiemale) the edipermis of which is impregnated with silica, and was formerly used for scouring metals. See Dutch Rush.

Bulruches (Typha), or cat-tails, were some¬ what employed in the place of true rushes, for mats and chair bottoms, and are also placed be¬ tween barrel-staves.

RUSH, Scouring. See Equisetales, under Ferns and Fern Allies; Dutch Rush.

RUSH MEDICAL COLLEGE, located at Chicago, affiliated with the University of Chi¬ cago. It is one of the oldest educational insti¬ tutions in the Northwest, having received its charter in 1837. The first lectures were deliv¬ ered in 1843 and the first building erected in 1844; a larger building was erected on the same site in 1867. This was burned in the Chicago fire of 1871 ; ‘and the present clinical building was erected in 1875. In 1887 the col¬ lege became the Medical Department of Lake Forest University, retaining its autonomy. This relation, however, was dissolved in April 1898, and in the same month the college was affiliated with the University of Chicago (q.v.). The government of the college is vested in the “perpetual board of trustees® incorporated in 1837, of which the governor of the State,

the lieutenant-governor and the speaker of the house of representatives are members ex officio. The board has control of the financial affairs of the college, appoints the faculty and dele¬ gates to the faculty the control of the educa¬ tional work subject to the rules of the university and the approval of the trustees. By the terms of affiliation the board of trustees is composed of members not belonging to the teaching force of the college. In 1899-1900 the Uni¬ versity offered courses corresponding to the work of the freshman year of the Medical Col¬ lege and since 1901 has offered instruction in all of the courses of the first two years of the medical curriculum : in anatomy, neurology, embryology, physiology, physiological chemis¬ try, chemistry, chemistry of medical drugs, toxi¬ cology, pathology, bacteriology and pharma¬ cology. All the work of the first two years is given at the university only and the work at the college is clinical, that is, the work of the last two years of the medical course. Students who take the first-year courses matriculate and register both as students of Rush Medical Col¬ lege and as students of the university. Many of the courses of the freshman and sophomore years are required while the courses of the junior and senior years are all elective, a cer¬ tain amount of work in each department, how¬ ever, being required for the degree of M.D. The university provides three fellowships for graduates of the college and offers the degree of B.S. to students who comply with the uni¬ versity requirements for that degree. The buildings of the college, distinct from those of the university, are the clinical building, Senn Hall and the laboratory building. The Presby¬ terian Hospital, adjoining the college, and the

Cook County Hospital, opposite the college, afford material for the clinics. The library contains over 21,000 volumes; the students number over 300. The college is open to women as well as men.

RUSHFORTH, William Henry, Amer¬ ican inventor: b. Leeds, England, 11 July 1844; d. Rutherford, N. J., 21 Aug. 1892. He entered a railroad repair shop at 12 and at 19 had be¬ come a railroad engineer. He was chief engi¬ neer in charge of 13 stationary engines in 1874

and in 1878 came to the United States, where he became engineer in a silk factory at Camden, N. J. He was the author of numerous useful inventions, among them a fire-escape ladder, a series of automatic safety signals and a feed-water heater for utilizing the heat wasted in the smoke boxes of locomotives, the latter re¬ ceiving a silver medal and a diploma at the Paris Exposition of 1887.

RUSHVILLE, Ill., city, county-seat of Schuyler County, on the Chicago, Burlington and Quincy Railroad, about 53 miles northwest of Springfield and 48 miles east-northeast of Quincy. It was settled 20 Feb. 1826 by Ben¬ jamin ,Chadsey, Levi Green and Thomas Barr, members of a commission that selected a town site. It was incorporated as a village 10 May 1831 and chartered as a city in April 1898. It is in an agricultural and coal mining region; the chief manufactories are a flour mill, ma¬ chine shop, wagon works, harness shops, bot¬ tling works and file factory. It has considerable trade in farm products. The principal public buildings are the county courthouse and the jail. There are six churches, three public graded schools and the Rushville Normal and Business College. The government is vested in a mayor and a council of six members, who hold office for a term of two years. Pop. about

2,500.

RUSHVILLE, Ind., city, county-seat of Rush County, on Flat Rock Creek, and on the Cleveland, Chicago, Cincinnati and Saint Louis; the Cincinnati, Hamilton and Dayton ; the Pitts¬ burgh, Chicago, Cincinnati and Saint Louis and the Fort Wayne, Cincinnati and Louisville railroads, about 40 miles east-southeast of In¬ dianapolis and 85 miles northwest of Cincinnati. It was settled in 1822, incorporated the same year and chartered as a city in 1882. It is in a fertile agricultural region and has considerable manufacturing interests. The chief manufac¬ tures are flour, furniture, machinery, agricul¬ tural implements, lumber, bent wood, drain pipe, clothing, clay-working machinery and washing machines. There, are nine churches, a high school, public and parish schools, two private schools and a public library. The govern¬ ment is vested in a mayor and council of six members, elected every two years. The city owns and operates the electric-light plant and the waterworks. Pop. (1920) 5,498.

RUSK, Jeremiah McLain, American agri¬ culturist: b. Morgan County, Ohio, 17 June 1830; d. Viroqua, Wis., 21 Nov. 1893. He re¬ moved to

Wisconsin in 1853, engaged in farm¬ ing, became sheriff and in 1861 was elected to the legislature. In 1862 he entered the Union army, was commissioned major and promoted lieutenant-colonel in 1863. He commanded a regiment in Sherman's Meridian campaign and for services in the Atlanta campaign was

brevetted colonel and brigadier-general in 1865. He was mustered out of service in that year and in 1866-70 served as bank comptroller of Wisconsin. Elected to Congress in 1871 he re¬ mained there until 1877 and in 1882-89 was gov¬ ernor of Wisconsin. He was first Secretary of the newly-created Department of Agriculture under President Harrison in 1889-93.

RUSK, Thomas Jefferson, American poli¬ tician : b. Camden, S. C., 8 Aug. 1802 ; d. Nacogdoches, Tex., 29 July 1856. He studied law, practised in Georgia, and in 1835 removed to Texas, where he took a prominent part in political affairs. He was a member of the con¬ vention which declared the independence of Texas in 1836, was its first Secretary of War, and after the disablement of General Houston took command of the army at San Jacinto. He was chief justice of Texas and in 1845 president of the convention which concluded annexation with the United States. He sat in the United States Senate in 1846-56.

RUSKIN, John, English critic and author: b. London, 8 Feb. 1819; d. Coniston, Lancashire, 20 Jan. 1900. He attended lectures at King's College, London, was trained in drawing and in 1836 went to Oxford, where he became a gentleman-commoner at Christ Church. In 1839, after two failures, he won the Newdigate prize for a poem on (Salsette and ElephantaJ His first published works were essays in Lou¬ don's Magazine of Natural History on geo¬ logical and allied subjects (1834 and 1836), and in 1837-38 he wrote for Loudon's Archi¬ tectural Magazine on (The Poetry of Architecture) (separately published, 1893). An at¬ tack upon some of Turner's pictures in Black¬ wood's Magazine in 1836 led him to formulate the plan of his (Modern Painters, J the first volume of which appeared in 1843 as by (A Graduate of Oxford. } The second volume was published in 1846, the third and fourth in 1856 and the fifth in 1860 (complete edition, im¬ perial 8vo, with all the original and three new plates, six volumes, 1888; 8vo edition, with re¬ duced plates, six volumes 1897). At first in¬ tended as a defense of Turner, the work soon assumed a wider scope and became a compre¬ hensive treatise on the principles of art. He sought to show the immense superiority of the best modern

landscape painters, especially Turner, to all the ancients, and supported the spiritual against the sensuous theory of art with an eloquence and a breadth of knowledge which have indeed wrought, as Sydnev Smith pre¬ dicted, <(a complete revolution in the world of taste.® The descriptions of natural scenery in the book are justly regarded as priceless gems of word-painting, and the sense of the indissolu¬ ble association of art with all other branches of human activity, so characteristic of Ruskin, became increasingly marked as the work pro¬ gressed. His name was not put on the title-page till 1851.

After the publication of the first volume of (Modern Painters) he continued his studies and his travels, and during a visit to Venice he definitely decided upon literature as his main work. In 1848 he married Euphemia Chalmers Gray, the 19-year-old daughter of a Scottish lawyer, for whom he had written in 1841 his fairy tale, (The King of the Golden River' (published 1851). His married life was not

very fortunate, and in 1854 the marriage was annulled and the lady married the artist Mil¬ lais in 1855. (The Seven Lamps of Archi¬ tecture } (1849) sought to do for architecture what Ruskin had already done for painting. The title and arrangement of the book are characteristic of his whole artistic criticism. All work in architecture, and in all else, should be illumined by the lamps of sacrifice, truth, power, beauty, life, memory and obedience. In 1851 he defended Millais and Holman Hunt, two of the pre-Raphaelite leaders, in letters to the Times, and in the same year followed up this advocacy by a work on pre-Raphaelitism.. (The Stones of Venice5 (1851—53) , the fruit of much close study and arduous toil, is a worthy companion of (Modern Painters,5 and in it, as in the earlier work, we meet the moralist as artist. The chapter <On the Nature of Gothic Architecture,5 in which his economic teaching is distinctly foreshadowed, was reprinted bv William Morris at the Kelmscott Press in 1892. In 1854 Ruskin came to know D. G. Rossetti, to whom he was a considerate and generous patron ; and he was closely associated with F. D. Maurice, Furnivall and other Christian Socialists in the work of the Working Men's College, where he taught drawing regularly for some seven years. His career as a social re¬ former may be dated from 1857, when he pub¬ lished a series of lectures on <The Political Economy of Art5 (enlarged edition, entitled (A Joy for Ever and its Price in the Market,5 1880). His chief works of this kind are (Unto this Last5. (1862; popular edition. 1900), origi¬ nally written for the Cornhill Magazine ; (Munera Pulveris5 (1862), partly reprinted from Fraser's Magazine; (Time and Tide by Weare and Tyne5 (1867), and (Fors Clavigera5 1871-84), consisting of letters to the working men and laborers of Great Britain. In these the tendency to exaggeration is clearly mani¬ fest, and for a time it stood in the way of the serious consideration of his views. He laid especial stress upon the economic value of healthy, happy, honorable, self-sacrificing life; he directed attention to the vital importance of the problem of distribution and the necessity of economic cooperation ; the need for a genuine national system of education, old-age pensions and a radical solution of the housing problem were eloquently set forth by him. In this work Ruskin always professed himself a follower of Carlyle, one of his warmest friends and ad¬ mirers. Some of his books published after 1855 were collections of lectures. Such are (The Two Paths5 (1859) ; (Sesame and Lilies5 (1865) ; (The Crown of Wild Olive5 (1866) ; (Work, Traffic, War and The Future of Eng¬ land5 (last not in

first edition), and (The Ethics of the Dust5 (1866). In 1867 he de¬ livered the Rede lecture at Cambridge on (The Relation of National Ethics to National Art.5 and was awarded the honorary degree of LL.D. by that university, and in 1893 Oxford con¬ ferred upon him its D.C.L. degree. In 1871 he was elected lord rector of Saint Andrews University.

The period from 1870 until his retirement from active work was full of new schemes of social usefulness, some of them more generous in conception than practicable, but all bearing eloquent testimony to the absolute sincerity of his preaching of the gospel of social righteous¬

ness and service. In 1871 he founded the Guild of Saint George, and himself paid $35,000, a tenth of his possessions at that time, into a trust for carrying on its work. The basic prin¬ ciples of the guild were ((that food can only be got out of the ground and happiness out of honesty,55 and in connection with it he started agricultural settlements, some industrial enter¬ prises and the Saint George's (now Ruskin) Museum at Sheffield.

In 1871 he gave up his house at Denmark Hill and purchased his well-known residence at Brantwood, on the shore of Coniston Lake. In 1870 he was appointed first Slade professor of fine arts at Oxford, and held this post until 1879, when he resigned owing to illness, and again from 1883 until 1884, when he again resigned. His lectures at Oxford give the best connected account of his maturer conceptions of art and form the material of the works: (Lectures on Art5 (1870); (Aratra Rentelici : Six Lectures on the Elements of Sculpture5 (1872) ; (The Eagle's Nest: Ten Lectures on the Relation of Natural Science to Art5 (1872) ; (Ariadne Flor¬ entine : Six Lectures on Wood and Metal En¬ graving5 (1873-76) ; (Val d'Arno : Ten Lectures on the Tuscan Art Directly Antecedent to the Florentine Year of Victories5 (1874) ; (The Art of England5 (1884); <The Pleasures of England5 (1884), and (Lectures on Landscape Delivered in Lent Term, 1871 5 (1897). He founded a drawing school at Oxford, and dur¬ ing his professional period he tried the famous and exceedingly characteristic road-digging ex¬ periment, in which he set his pupils to work on the roads in order to improve the country. In 1878 he experienced the first of several attacks of brain fever, and from this time his excessive work at an unnaturally hip-h pressure caused his health to break down seriously; 1878 was also the year of Whistler's libel action against him, in which the jury awarded one farthing dam¬ ages. The most notable work of his period of final retirement, broken only bv short journeys in search

of health, is (Praeterita: Outlines of Scenes and Thoughts Perhaps Worthy of Mem¬ ory in My Past Life5 (1885-89), the last volume containing Pilecta,5 or selections from his correspondence. This fragment of autobiog¬ raphy bears little trace of mental decay, but is notable for brilliant description, vivid recollec¬ tion and excellent portraiture of men whom he had known. Of works not above mentioned the following are the most noteworthy: Poems5 (1850; privately printed; 2 vols., 1891); (Ex¬ amples of the Architecture of Venice5 (1851) ; (Lectures on Architecture and Painting5 (1853) ; (Notes on Some of the Principal Pic¬ tures Exhibited at the Royal Academy5 (1855— 59 and 1875); (The Harbors of England5 (1856), with engravings from drawings by Turner; Catalogue of the Drawings and Sketches of Turner at present Exhibited in the National Gallery5 (1881); (The Elements of Drawing5 (1857), lectures delivered at the Working Men's College; 'Inaugural Address at the Cambridge School of Art5 (1858) ; 'The Oxford Museum5 (1859), with H. W. Acland; (The Elements of Perspective5 (1859), lectures delivered at the Working Men's College; 'The Queen of the Air5 (1869), lectures on the Greek myths of cloud and storm; (Mornings in Florence5 (1875-77; collected, 1889); Proser¬ pina: Studies of Wayside Flowers5 (1875-86);

(Deucalion: Collected Studies of the Lapse of Waves and Life of Stones) (1875-83) ; (Saint Mark's Rest: the History of Venice) {1877-84; collected, 1884) ; (The Laws of Fiesole: A Familiar Treatise on. the Elementary Principles and Practice of Drawing and Painting) (1877— 78) ; (Notes on the Drawings bv Turner Ex¬ hibited at the Fine Art Society's Galleries) (1878; new ed., 1900) ; (Arrows of the Chace) (1880), a collection of newspaper letters; (The Bible of Amiens > (1880-85) ; (On the Old Road5 (1885), a collection of miscellaneous writings. In 1871 a collective edition of his works was begun, but extended to only 11 vol¬ umes. E. T. Cook was supervising a new com¬ plete edition of his works begun in 1903 and to be finished in 30 volumes. This ˆlibrary edition55 is now one of the greatest tributes to Ruskin's memory.

There is a complete bibliography by T. J. Wise and J. P. Smart (1893). Ruskin prepared the plates, or at least the drawings, for many of his own works, and also painted some land¬ scapes, chiefly in water color. A loan exhibi¬ tion of his drawings was held in the Royal Water Color Society's rooms in 1901.

To what has already been said of the work and message of Ruskin little need be added. He was essentially a prophet, on fire with the enthusiasm of humanity, almost fierce in his opposition to every kind of insincerity and in¬ justice. His early religious views were narrow, but in middle life he advanced to a broadly liberal position of no distinctively Christian character, though in later years he added to his religious liberalism a more definitely Chris¬ tian element. What he said of (Modern Painters5 may be applied to all his work: (<It declares the perfectness and eternal beauty of the work of God; and tests all work of man by concurrence with, or subjection to that.55 His teaching has been spread by many Ruskin societies, a Ruskin Hall for working men has been established at Oxford, and at Ruskin. Tenn., a co-operative colony was unsuccessfully attempted. (See Modern Painters; Seven Lamps of Architecture; Stones of Venice). Consult Collingwood, (Life and Work of John Ruskin5 (1893), and (Life of John Ruskin5 (1900) ; Ritchie, (Records of Tennyson, Ruskin and

Browning5 (1892) ; Spielmann, (John Ruskin5 (1900); Harrison, (Tennyson, Ruskin, Mill and Others5 (1899) ; Rossetti. (Ruskin, Rossetti and Pre-Raphaelitism5 (1899) ; Cook, (Studies in Ruskin5 (2d ed., 1891) ; Hobson, (John Ruskin, Social Reformer5 (1898) ; Mallock, (New Republic5 (1881 — Herbert repre¬ sents Ruskin) ; Sizeranne, (Ruskin et la religion de la Beaute5 (1897; Eng. trans., 1899) ; Smart, (A Disciple of Plato5 (1883) ; Waldstein, (The Work of John Ruskin5 (1894) ; Mather, (Life and Teaching of John Ruskin5 (5th ed., 1898) ; Harrison, (John Ruskin5 (1902; (English Men of Letters,5 new series); Mackail's essay in Chambers' Cyclopaedia of English Literature5 (Vol. Ill, 1904); Kitchin, <Ruskin at Oxford and Other Essays5 (1904).

RUSLING, James Fowler, American sol¬ dier: b. Washington, N. J., 14 April 1834. He was graduated from Dickinson College in 1854 and was professor of natural science at Dick¬ inson Seminary, Williamsport, Pa., in 1854-57, when he engaged in law practice. At the out¬

break of the Civil War he entered the Union army with rank as lieutenant. He served in the Army of the Potomac in 1861-63, in the Department of the Cumberland in 1863-65, and in the War Department in 1865-67. He attained rank as colonel of volunteers in 1865, was brevetted brigadier-general in 1866, and mus¬ tered out of service in 1867. He was United States pension agent for New Jersey in 186S— 77 and has published (Across America, or the Great West and Pacific Coast5 (1874) ; his¬ tory of Pennington Seminary5 (1890) ; (Men and Things I saw in Civil War Days5 (1899) ; European Days and Ways5 (1902) ; (History of the Rusling Family5 (1908), *etc.*

RUSS, John Denison, American physician and philanthropist: b. Chebacco (Essex), Mass., 1 Sept. 1801 ; d. Pompton, N. J., 1 March 1881. He .was graduated from Yale in 1823, studied medicine in the United States, in London, and on the Continent, in 1826 began practice in New York, in 1827-30 was in Greece aiding the patriots, and upon his return began the first instruction of the blind attempted in the United States. He was invited to organize the Institu¬ tion for the Blind in Boston, but preferred to continue his independent work. In 1832 he became superintendent of the New York institu¬ tion, a post which he resigned in 1858. His inventions and improvements for the assistance of the blind were widely used. Latterly he was active in endeavors to improve prison discipline and further the welfare of discharged prisoners.

RUSSELL, Benjamin, American journal¬ ist: b. Boston, Mass., 13 Sept. 1761; d. there, 4 Jan. 1845. He was apprenticed to Isaiah Thomas, publisher of the Worcester, Mass., Spy, but entered the Revolutionary army before completing his apprenticeship, and there col¬ lected war news for that paper. In 1784 he established the Columbian Sentinel , which he made the most powerful organ of the Federal party in New England, and which he edited until 1828. He also established and conducted in 1795-1830 the Gazette, likewise a Federalist organ. He printed the laws and State docu¬ ments during the first sessions of Congress and refused to receive pay for his work until it was pressed upon him by Washington ; repre¬ sented Boston in the general court for 24 years ; served several terms in the Massachusetts sen¬ ate; was a member of the executive council, and of the constitutional convention in 1820.

RUSSELL, Bertrand (Arthur William), English philosopher: b. Trelleck, Monmouth, 18 May 1872; d. Pekin, 28 March 1921. He was a grandson of Lord John Russell, and the heir presumptive ot the second Earl, his brother. He received his education at Trinity College, Cambridge, where he later became Fellow and lecturer. He also spent some terms at Oxford and in the spring of 1914 lectured at Harvard University. In 1915 he received the Butler gold medal from Columbia University for the most distinguished work in philosophy or education during the preceding five years. After the be¬ ginning of the European War, he was vigorous in his attempts to obtain peace by understand¬ ing. On 14 July 1916 he was deprived of his lectureship at Trinity on account of his pacifistic activities, which had caused him to incur a fine under the Defense of the Realm Act, and was

later prevented from coming to Harvard for a second period of lecturing on account of the refusal of the British government to let him leave the country. In 1917 he was sentenced to six months' imprisonment on account of re¬ peated violations of the Defense of the Realm Act. Russell was the protagonist of the new mathematical logic, and at the same time per¬ haps the most skilled dialectician among the adherents of the New Realism. His pacifism was intimately connected with an attitude to¬ ward the contemplative life which almost took the form of a worship. He published (German Social Democracy5 (1896) ; (Essay on the Foundations of Geometry5 (1897) ; (The Philos¬ ophy of Lerbris5 (1900) ; <The Principles of Alathematics5 (1903) ; Philosophical Essays5 (1910) ; (Principia Mathematica5 (1910) ; with A. N. Whitehead, (Problems of Philosophy5 (1911); (The Philosophy of Bergson5 (1914), with H. W. Carr; (Our Knowledge of the Ex¬ ternal World as a Field for. Scientific Method in Philosophy5 (1914) ; Scientific Method in Philosophy5 (1915) ; (Mysticism and Logic5 (1918) ; (Why Men Fight5 (1916) ; Principles of Social Reconstruction5 (1917); Political Ideals5 (1918).

RUSSELL, Sir Charles Arthur, Baron of Killowen, English jurist: b. Newry, Ireland, 10 Nov. 1832; d. London, 10 Aug. 1900. He began his career as solicitor in 1854, later matriculated at Trinity College, Dublin, but did not gradu¬ ate ; and in 1856 removed to London, entered Lincoln's Inn and was admitted to the English bar in 1859. In 1872 he was made queen's counsel, and entered Parliament for Dundalk in 1880, but his part in debate was largely con¬ fined to questions concerning Ireland. In 1885 he was returned for South Hackney and be¬ came attorney-general in Gladstone's Cabinet in 1886. His speeches in behalf of home rule were his most notable parliamentary achieve¬ ments. He was leading counsel for Parnell in the investigations brought about by the Parnell Commission Act of 1888, and his six days' speech concluding the trial on 12 April 1889 is accounted his greatest forensic effort. He defended the prisoner in the Maybrick murder trial ; in 1893 represented Great Britain in the Bering Sea arbitration; in 1894 was made lord of appeal ; was raised to a life-peerage as baron of Killowen, and later succeeded Lord Cole¬ ridge as lord chief justice. In 1896 he delivered an address before the American Bar Associa' tion at Saratoga, on Arbitration: its Origin, History and Progress.5 In 1899 he succeeded Lord Herschell as one of the arbitrators to de¬ termine the boundaries between British Guiana

and Venezuela. His publications aside from his address on arbitration were mainly contribu¬ tions to current discussions.

RUSSELL, Charles Edward, journalist and author : b. Davenport, la., 25 Sept. 1860. He was graduated at Saint Johnsbury Academy, Vermont, 1881 ; had a varied experience on sev¬ eral newspapers; was publisher of the Chicago American until 1 Jan. 1902, and later editorial writer on the New York American. From 1904 he contributed to periodical literature and lectured on sociological and literary topics. In 1910 and in 1912 he was the candidate of the Socialist party for the governorship of New \ork. In 1917 he was a member of the special

diplomatic mission sent to Russia by the United States government. He is author of (Such Stuff as Dreams5 (1902) ; (The Twin Im¬ mortalities5 (1904) ; (The Greatest Trust in the World5 (1905); (The Uprising of the Many5 (1907); <Lawless Wealth5 (1908); (Thomas Chatterton, the Marvelous Boy5 (1908) ; (Songs of Democracy5 (1909) ; (Why I am a Socialist5 (1910) ; 'Business, the Heart of the Nation5 (1911) ; (Stories of the Great Rail¬ road5 (1912); 'These Shifting Scenes5 (1914); (The Story of Wendell Phillips5 (1915); En¬ chained Russia5 (1918).

RUSSELL, Charles Taze (((Pastor Rus¬ sell55), American independent clergyman: b. Pittsburgh, Pa., 16 Feb. 1852; d. 31 Oct. 1916. He was privately educated and was in early life a Congregationalist. He began his career as an independent minister at Pittsburgh in 1878, later serving at the Brooklyn Tabernacle and the New York City Temple. He disclaimed being a founder of a new sect, but had about 50,000 followers of his teachings, writings and methods of Bible study. He interpreted the punishment of the Bible as eternal death, and believed in imminent millenium. He edited a semi-monthly journal Zion's Watch Tower and Herald of Christ's Presence, and was author of (Food for Thinking Christians — Why Evil Was Permitted5 (1881) ; (Tabernacle Shadows of Better Sacrifices5 (1881) ; and of a series originally published as Millennial Dawn5 (1886-1904) and later revised and reissued as (Studies of the Scriptures.5 Of these volumes about 3,000,000 copies were sold.

RUSSELL, Charles William, Irish Roman Catholic theologian and educator : b. Killough, County Down, 14 May 1812; d. Dublin, 26 Feb. 1880. He was educated at Maynooth College, where he became connected with the faculty in 1835, taking the chair of ecclesiastical history in 1845, and becoming president in 1857. He was a noted

antiquarian scholar and was promi¬ nently connected with the Tractarian move¬ ment, Cardinal Newman acknowledging his con¬ version to Roman Catholicism to be largely due to Russell. He was appointed to the His¬ torical Manuscripts Commission in 1869, and was joint author of (A Report on the Carte MSS. in the Bodleian Library5 (8 vols., 1871) ; he was joint translator of Schmid's (Catholic Tales5 (3 vols., 1846), and of Leibnitz' (System of Theology5 (1850). Author of (Life of Cardinal Mezzofanti5 (1858). He also com¬ piled 'Calendar of Irish State Papers during the Reign of James I5 (4 vols., 1872-77).

RUSSELL, David Allen, American sol¬ dier: b. Salem, N. Y., 10 Dec. 1820; d. near Winchester, Va., 19 Sept. 1864. He was gradu¬ ated from West Point in 1845, served in the Mexican War and in 1847 was brevetted 1st lieutenant for gallant conduct. He subsequently served on the Pacific Coast, was brevetted cap¬ tain in 1854, later took part in the Mexican War, and at the outbreak of the Civil War was assigned to aid in the defense of Washington. In 1862 he was appointed colonel and served in the Peninsular campaign under McClellan. He commanded a brigade in the Rappahannock campaign, was brevetted colonel in the regular army, assisted in the capture of the Rappahan¬ nock station and commanded a division at the battles of the Wilderness, Spottsylvania and

North Anna. He was engaged in the defense of Washington in August and September 1864, and was killed while leading his column at Opequan, Va., 19 Sept. 1864. He was brevetted major-general of the regular army the same day.

RUSSELL, George W. (<(A. E”), an Irish poet: b. 1867. He studied art in Dublin, and his paintings received favorable comment from George Moore. He became a great student of Eastern philosophy and transcendent¬ alism, which developed his own tendency to¬ ward mysticism. He is also a man of practical sense in political questions and his advice has often been accepted by Sir Horace Plunkett and the Irish radicals. His poems are charming in quality, and rank with the best verse produced by the Irish Literary Revival. Among his poetical works are (Homeward: Songs by the Way* (1894) ; (The Earth Breath and Other Poems* (1897) ; a selection of his poems called (Nuts of Knowledge) (1903) ; (The Divine Vision and Other Poems) (1904) ; (The Spirit of England* (1915) ; (Collected > Poems)

(1915) ; and a three act drama in prose, (Deirdre,* which was performed several times by the the Irish National Theatre society. His political works are (Cooperation and Nationality) (1913) ; (The National Being: Some Thoughts on Irish Polity) (New York 1916); Nationality and Imperialism* (in (Ideals in Ireland* by Lady Gregory, 1901 ; pp. 13-22); (The Irish Home-Rule Convention (three essays, the other two by Sir Horace Plunkett and John Quinn, New York 1917) ; Russell’s essay (Thoughts for a Convention,* attempts to analyze the mood and demands of the various factions in his country.

RUSSELL, George William Erskine,

English statesman and author : b. London, 3 Feb. 1853; d. 17 March 1919. He was educated at University College, Oxford. He served in Parliament in 1880-85 and was returned in 1892. He was Parliamentary Secretary of the Local Government Board in 1883-85 ; Under Secretary of State for India in 1892-94 ; and of the Home Department in 1894-95. He was alderman of the city council of London in 1889-95, and became a Privy Councilor in 1907. His social

and political connections added to the interest felt in his writings. He wrote Col¬ lections and Recollections) (2 series, 1898-1903) ; (Edward King, 60th Bishop of Lincoln* (1912); (The Spirit of England) (1915); ˆPortraits of the Seventies) (1916) ; (Politics and Personalities* (1917) ; (Basil Wilberforce, a Memoir* (1918) ; Cady Victoria Baxton) (1919), etc., bright and entertaining pictures of contemporary life which will be of service to future social historians.

RUSSELL, Harry Luman, American bac¬ teriologist and educator : b. Poynette, Wis., 12 March 1866. He was graduated at the Univer¬ sity of Wisconsin in 1888, and later studied at Berlin, the Pasteur Institute,. Paris, the Zoological Station, Naples, and in 1892 took his Ph.D. at Johns Hopkins. From 1893 he was a member of the faculty at the University of Wisconsin, where he has been Dean of the Agricultural College and Director of the Ex¬ periment Station since 1907. He was also Director of the State Hygienic Laboratory in 1903-08. Author of (Outlines of Dairy Bac—

teriology) (1894-1905); and of the ‘Reports* and (Bulletins *of the Wisconsin Experiment Station since 1893. He is joint author of ‘Public Water Supplies* (1910); Agricultural Bacteriology* (1915), *etc.*

RUSSELL, Henry, English singer and song writer : b. Sheerness, Kent, 24 Dec. 1812 ; d. Maida Vale, 8 Dec. 1900. He made his first appearance on the stage at the age of three, and later studied at Bologna and at Naples. He toured Canada and the United States in 1833-41, giving recitals of his own songs with great success, which was afterward duplicated in London and the Provinces. He also pro¬ duced an entertainment ‘The Far West,* which not only was successful but greatly stimulated immigration to western America. He com¬ posed the music for about 800 songs, among which were Cheer, Boys, Cheer *; there’s a Good Time Coming) ; ‘A Life on the Ocean Wave, etc.* His reminiscences were published under the title of his greatest song success, Cheer, Boys, Cheer) (1895).

RUSSELL, Henry Benajah, American journalist: b. Russell, Mass., 9 March 1859. He was graduated from Amherst in 1881, was at¬ tached to the New York Sun 1884-88, was on the editorial staff of the Providence Journal 1888-90, and of the Hartford Post 1890-97. Editor of Springfield Homestead 1902-13, edi¬ torial writer Hartford Times 1913. He has published ‘Life of William McKinley* (1896) ;

(International Monetary Conferences) (1898) ; Cur War with Spain) (1899).

RUSSELL, Howard Hyde, American Con¬ gregational clergyman : b. Stillwater, Minn., 21 Oct. 1855. He took his degree in law at Indianola College, Iowa, and later was gradu¬ ated at the Oberlin Theological Seminary. He practised law at Corning in 1878-83, and was ordained in the Congregational ministry in 1885. He held various pastorates until 1893, when he founded the Anti-Saloon League in Ohio. He acted as its superintendent until 1897, when he became superintendent of the National Anti-Saloon League of America; he filled that position with the New York Anti-Saloon League in 1901-09, since when he has been asso¬ ciate general superintendent of the National Anti-Saloon League of America. Author of (A Lawyer's Examination of the Bible) (1893).

RUSSELL, Irwin, American poet: b. Port Gibson, Miss., 3 June 1853; d. en route to Cali¬ fornia, 23 Dec. 1879. He was graduated at the University of Saint Louis in 1869, studied law and was admitted to the bar at 19 years of age, the age limit of 21 being overruled by the legislature because of his brilliant examination. He abandoned law for literature in 1876, es¬ tablished himself in New York and there speedily gained a reputation for his verse, which was characterized by unusual grace and strength. He also made a reputation for his verses delineating negro character, many _ of which were published in the Century Magazine. His works were published with an appreciative introduction by Joel Chandler Harris (1888).

RUSSELL, Israel Cook, American geolo¬ gist : b. near Garrattsville, N. Y., 10 Dec. 1852 ; d. Ann Arbor, Mich., 1 May 1906. He was edu¬ cated at the College of the City of New York and Columbia School of Mines, and accom-

panied the United States expedition to New Zealand to observe the transit of Venus. In 1875 he became assistant professor of geology at Columbia, and from 1880 was attached to the United States geological survey, for which he made surveys in the Rocky Mountains, Southern Appalachian regions and in Alaska. In 1879 he ascended the Yukon and made his way to Lynn Canal, and in 1890-91 led expeditions to Mount Saint Elias. In 1892 he became professor of geology at the University of Michigan. His contributions to geography and geology em¬ brace (Geological Reconnaissance in Central Oregon) (1883) ; (Geological History of Lake Lahontan* (1885) ; Quaternary History of Mono Valley, California) (1887) ; 'Existing Glaciers of the United States) (1889) ; (Sub¬ aerial Decay of Rocks> (1889) ; 'A Second Ex¬ pedition to Mount Saint Elias* (1892) ; 'A Geological Reconnaissance in Central Washing¬ ton (1893) ; (Lakes of North America) (1895) ; (Present and Extinct Lakes of Nevada* (1895) ; (Glaciers of North America) (1897) ; 'Volcanoes of North America) (1897) ; 'Rivers of North America) (1898).

RUSSELL, John, 1st Earl Russell, Eng¬ lish statesman, third son of John, 6th duke of Bedford: b. London, 18 Aug. 1792; d. Rich¬ mond Park. Surrey, 28 May 1878. He was educated at Edinburgh University, where he trained himself to debate at the meetings of the Speculative Society. In July 1813 he en¬ tered Parliament and soon gained prominence among the politicians of the day. He early took up the subject of parliamentary reform and supported the repeal of the Test and Cor¬ poration Acts and Roman Catholic emancipa¬ tion. In 1828 he had the satisfaction of seeing the Test and Corporation Acts repealed by the Wellington ministry, and in April 1829 the Catholic Relief Bill became law. When the Grey Cabinet was formed in 1830 Lord John Russell, then paymaster-general of the forces, was elected one of the committee of five to formulate a Reform Bill. This was brought before the House of Commons, 1 March 1831, by him, and though he defended it clause by clause with extraordinary vigor, it was ulti¬ mately rejected. Upon this the Whig ministry resigned and an appeal made to the country. The elections resulted in a majority favorable to the bill, which received the royal sanction 7 June 1832. In Lord Melbourne's second Cab¬ inet (1835ˆ11) he was at first Home Secretary and then Colonial Secretary, and on the out¬ break of the Canadian rebellion, by recognizing the right of the colonies tp self-government, reconciled them to the mother country. From 1841 (in

which year he became member for the city of London) to 1845, during the Peel ad¬ ministration, Lord John Russell led the opposi¬ tion, but lent his influence in favor of the repeal of the corn-laws. He was Premier 1846-52, and was able to pass his Ecclesiastical Titles Bill of 1851, prohibiting the assumption of the ter¬ ritorial titles by Roman Catholic bishops. Lord Derby, who followed him, soon resigned and under the succeeding administration of Lord Aberdeen, Russell was Foreign Secretary for a short time. He also filled the post of lord-president of the council from June 1854 to Feb¬ ruary 1855. He was Colonial Secretary under Lord Palmerston in 1855, and represented Great Britain in the Vienna conferences; but his con¬

duct of the negotiations brought him so much unpopularity that he resigned in July of that year. When Palmerston returned to power in 1859 Lord John again became Foreign Secre¬ tary, with a seat in the Cabinet. He took a lead¬ ing part in regard to such political questions as the oppression of the Poles by Russia, the ag¬ gressive policy of German powers toward Den¬ mark and the disputes between England and the United States as to the neutrality observed during the continuance of the Civil War. He retained his seat for the city of London from June 1841 until July 1861, when he was raised to the peerage as Earl Russell. After the death of Lord Palmersttpn. 18 Oct. 1865, Earl Russell became Prime Minister for the second time, Gladstone taking the lead in the House of Commons. During the session of 1866, in con¬ junction with Gladstone, he introduced a new Reform Bill, which, failing to pass, the min¬ istry resigned and was succeeded by that of Lord Derby. Thenceforth Earl Russell held no office in any ministry, though he always took an active part in promoting Liberal measures.

He published among other works ‘History of the British Constitution (1821) ; (Essay on the History of the English Government* (1823) ; (Memoirs of the Affairs of Europe* (1824-29) ; ‘Essay on the Causes of the French Revolution (1832) ; ‘Memoirs and Correspondence of Thomas Moore* (1852-56) ; ‘The Life and Times of Charles Fox) (1859— 66) ; Selections from Speeches of Earl Rus¬ sell, 1859 to 1865) ; (Recollections and Sugges¬ tions, 1813— 73 J (1875). Consult Walpole, (Life of Lord John RusselP (1889) ; Reid, (Lord John RusselP (1895) ; Russell, R., (Early Cor¬ respondence of Lord John RusselP (2 vols., London 1913).

RUSSELL, John Scott, Scottish engineer and naval architect: b. Glasgow, 8 May 1808; d. Ventnor, Isle of Wight, 8 June 1882. He was

educated at the universities of Edinburgh, Saint Andrews and Glasgow, graduating from the latter at 16. In 1832 he was professor of natural philosophy in Edinburgh University. During his researches into the nature of waves he discovered the existence of the wave trans¬ lation, on which he founded the wave-line sys¬ tem of construction of ships introduced into practice in 1835. In 1844 he removed to Lon¬ don and was for many years a well-known shipbuilder on the Thames. He became joint¬ secretary of the Royal Commissions for carry¬ ing out the Great Exhibition of 1851 and took a leading part in organizing it. He built the Great Eastern ; was joint-designer of the first English seagoing armored frigate, the Warrior , and constructed the vast dome of the Vienna Exhibition of 1873. He published 'The Modern System of Naval Architecture for Commerce and War* (1864-65) ; Systematic Technical Training for the English People* (1869); and (The Wave of Translation in the Ocean of Water, Air and Ether) (new ed., 1885).

RUSSELL, Lillian (Helen Louise Leon¬ ard), American comic opera singer: b. Clinton, Iowa, December 1861. She sang in 'Pinafore* under E. E. Rice in 1879, and later appeared in New York at Tony Pastor's Theatre. She soon became the star in the McCall Opera Company and played leading parts in Snake Charmer,* 'Olivette,* 'Patience* and (The SorcererP She sang in London in 1883 and returned to New

York in 1885, from which date until 1891 she sang at the Casino in various roles, and later at Weber and Fields' Music Hall. She long retained her hold as a popular favorite and finally retired from the stage, but still kept in prominence by journalistic contributions and advice on topics of general feminine interest.

RUSSELL, William, Lord, English states¬ man: b. 29 Sept. 1639; d. London, 21 July 1683. He was educated at Cambridge, was elected to Parliament for Tavistock in 1661 and became one of the leaders of <(the country party® in 1673, coming forward in opposition to the at¬ tempts of the king and his partisans to destroy English freedom through the aid of France. In 1678 he became Lord Russell and heir ap¬ parent to the earldom of Bedford. On 14 March 1678 he seconded the motion to declare war against France and spoke in support of it. In November 1678 he was chosen to move in the House of Commons that the Duke of York should be removed from the king's pres¬ ence and councils. When the new council pro¬ posed by Sir William Temple was formed Lord Russell was appointed one of the 30 mem¬ bers. He was not at first in favor of exclud¬ ing the Duke of York from the succession, but finally supported the measure. He left the council at the beginning of 1680. On 26 Octo¬ ber he spoke in favor of measures against ((popery and to prevent a popish successor® to the Crown ; and a week later seconded Colonel Titus' motion to disable the Duke of York from becoming King of England. When the reac¬ tion against the Whigs took place, the govern¬ ment of Charles II resolved to destroy their leaders, proceeding to do so according to the forms of law. He was arrested on the charge of having been concerned in the Rye House plot, said to have been formed by Rumboldt and others, for an attack on the king and the Duke of York, and after his examination was committed to the Tower. His trial took place at the Old Bailey, 13 July 1683. The charge against him was <(for conspiring the death of the king and consulting and agreeing to stir up insurrection ; and to that end to seize the guards (appointed) for the preservation of the king's person.® No counsel was then al¬ lowed to the accused, except on points of law; his condemnation quickly followed and he was beheaded in Lincoln's Inn Fields. Consult (Life of

William, Lord Russell,5 by Lord John Russell (1819).

RUSSELL, William Clark, English novel¬ ist: b. New York, 24 Feb. 1844; d. 1911. Edu¬ cated at Winchester and Boulogne, he was a midshipman in the merchant service 1857-65. His first sea-story, (John Holdsworth, Chief Mate,* appeared in 1874 and was very success¬ ful; but he won still greater success with (The Wreck of the Grosvenor) in the following year. Among his numerous novels are <An Ocean Free Lance5 (1878) ; (My Shipmate, Louise> (1882); (A Sea Queen5 (1883); (An Ocean Tragedy > (1881) ; (Alone on a Wide, Wide Sea> (1892); <The Emigrant Ship> (1894); (The Convict Ship) (1895); (What Cheer!5 (1895); (List, Ye Landsmen !5 (1897); (The Two Captains> (1897) ; (Romance of a Mid¬ shipman 5 (1898) ; (A Voyage at Anchor 5

(1899); (The Pretty Polly5 (1900); (The Ship's Adventure) (1899) ; (His Island Princess) (1905) ; several collections of short

stories, and lives of Nelson (1890) and Collingwood (1891). He was for some time connected 'with the Newcastle Daily Chronicle, but for several years, ending in 1887, was on the staif of the London Daily Telegraph.

RUSSELL, William Eustis, American lawyer and political leader : b. Cambridge, Mass., 6 Jan. 1857; d. Little Palos, Quebec, Canada, 16 July 1896. He was graduated from Harvard in 1877, and from the Boston Univer¬ sity Law School in 1879, winning the Lawrence prize for the best legal essay. He was ad¬ mitted to the Massachusetts bar in 1880 and began the practice of law with his father's firm. He also became an active member of the Democratic party; was elected to the common council of Cambridge in 1881, to the board of aldermen in 1883 and 1884; and was mayor of the city 1885-87. His efficient administra¬ tion as mayor, and his effective campaign speeches during the Presidential campaign of 1884, had made him a prominent figure in State politics, and in 1888 he was the Democratic nominee for governor. He was defeated in that year and again in 1889, but in 1890 was elected and twice reelected in 1891 and 1892. He took an active part in all his gubernatorial campaigns, making numerous speeches in all parts of the State. * His election as governor for three suc¬ cessive years was a remarkable testimony to his personal integrity and popularity, as the ma¬ jority of the legislature and the State officials were Republicans. Several laws were passed on his recommendation, including a measure to reg¬ ulate the lobby, and a

law abolishing the prop¬ erty qualification for governor and the poll tax. At the close of his term he resumed the prac¬ tice of law, and in 1894 was appointed a mem¬ ber of the board of Indian commissioners. In 1896 he was one of the most active opponents of the adoption of the free silver platform at the Democratic National Convention, and dis¬ tinguished himself by a remarkable speech pleading for a return to the original principles of the Democracy; he was prominently men¬ tioned as a candidate for the presidency by those who favored the gold standard. His death occurred suddenly, shortly after the con¬ vention, and was thought to be due largely to the strain he had undergone at that time.

RUSSELL, Sir William Howard, English journalist: b. near Dublin, Ireland, 28 March 1820; d. London, England, 10 Feb. 1907. He was educated at Trinity College, Dublin, and was called to the bar in 1852. His journalistic career began in 1843 on the staff of the London Times. He was its special correspondent dur¬ ing the Danish war of 1848-50, during the Crimean war, in 1854-56, reported the Indian mutiny in 1857-58, the Italian campaign 1859, the Civil War in the United States in 1861-62, the Danish war of 1864, the Prusso-Austrian war 1866, and the Franco-Prussian war of 1870. He accompanied the Prince of Wales to Egypt in 1868 and was his honorary private secretary on his visit to India in 1875. In 1879-80 he was again engaged as war correspondent in South Africa, and in 1883-84 was on that duty in Egypt. He was knighted in 1895 and was editor of the Army and Navy Gazette. His publica¬ tions include (British Expedition to Crimea> ; (Diary in India5 ; (My Diary — North and South) (1863) ; (The Prince of Wales Tour5 (1877) ; (Hesperothen5 (1882) ; (The Great War

with Russia* (1895) ; (Todleben's Sebastopol*, *etc.*

RUSSELL SAGE FOUNDATION, an

institution established in April 1907, by Mrs. Russell Sage, with an endowment of $10,000,000, for the improvement of social and living con¬ ditions in the United States of America. It does not attempt to relieve individual or family needs, but by study and investigation to eradi¬ cate the causes of distress. The work is dis¬ tributed among several departments, including the Charity Organization Department, Depart¬ ment of Child Helping, Division of Remedial Loans, Department of Surveys and Exhibits, Division of Recreation and

Division of Edu¬ cation. Publications are issued by each de¬ partment. The Division of Education has made contributions to the subject of medical inspec¬ tion of the schools, and to the question of re¬ tardation and elimination of pupils. The Divi¬ sion of Recreation has done much to develop the community centre idea; and the Division of Remedial Loans has thrown much light on the methods of loan sharks and promoted co-operative loan societies. The Foundation has also supervised the development of the model suburban community at Forest Hills, Long Island. The Department of Surveys and Exhibits has, by its constant efforts, kept the community informed of its problems and there¬ by has served to educate public opinion. Con¬ sult Ayres, L. P., (Seven Great Foundations* (New York 1911).

RUSSELL'S VIPER, one of the largest

and most venomous serpents (Daboia russeili) of the East Indian region; justly dreaded throughout southern and eastern India, Ceylon, Burma and Siam. It may reach a length of five feet, and is yellowish-brown with three longitudinal series of black, light-edged rings, which sometimes encircle reddish spots. It is known also as chain-viper, tic-palonga (Ceylon), etc., and is regarded by experts as the most deadly in India. Fortunately, however, it is neither as numerous nor as easily provoked as the cobra. According to Fayrer it is nocturnal in its habits, sluggish and does not readily strike unless irritated, when it bites with great fury; moreover its loud hissing when disturbed is likely to give one sufficient warning to enable him to jump out of reach. It is said to kill many grazing, cattle. The action of its poison resembles that of the rattlesnake, but gives rise to haemorrhagic extravasations from the kidneys and various other organs. Consult Fayrer, (Thanatophidia of India* (1874); Gadow, (Amphibia and Reptiles* (1901).

RUSSELLVILLE, Ark., town, county-seat of Pope County, on the Saint Louis, Iron Mountain and Southern and the Darda-nelle and Russellville railroads, about 80 miles northwest of Little Rock. It is in an agri¬ cultural region in which the chief product is cotton. The lumber interests are quite impor¬ tant. The principal manufactures are cotton, dairy and lumber products, flour and agri¬ cultural implements. The two banks, one Na-

RUSSELLVILLE, ENGAGEMENTS AT

tional and one State, have a combined capital of $80,000. Pop. (1920) 4,505.

RUSSELLVILLE, Ky., city, county-seat of Logan County, on the Louisville and Nash¬ ville Railroad, about 25 miles west-southwest of Bowling Green and 52 miles north by west of Nashville. It is in an agricultural region in which tobacco is one of the chief products. The principal manufacturing establishments are flour mills, tobacco factories, wagon and carriage works and furniture factories. It contains the Logan Female College (M. E. S.), established in 1867, the Bethel College (Baptist), founded in 1854, public schools and a public library. The three State banks have a combined paid-up capital of $75,000. Pop. (1920) 3,124.

RUSSELLVILLE, Engagements at. After the defeat of Gen. W. E. Jones at Mor¬ ristown, Tenn. (q.v.), 10 Dec. 1863, he was fol¬ lowed by a Union force under Colonel Graham, and when near Russellville, Graham ran into General Morgan's cavalry division, which was foraging. Graham was attacked and driven back, leaving some dead, wounded and pris¬ oners in the hands of the Confederates. Late in October 1864 Col. J. B. Palmer, 58th North Carolina, with about 800 men and three guns, moved from North Carolina into East Tennes¬ see to co-operate with the Confederate troops under General Vaughn, and 28 October he was ordered by Vaughn to take position in the rear of Russellville, on the Bull's Gap road. He had scarcely taken position when Vaughn's brigade, defeated at Morristown, swept past him in great disorder. He formed line, threw out skirmishers, and opened fire with his three guns upon Gillem's pursuing troops, checking them and enabling Vaughn to rally about 200 of his men. General Gillem, who with a brigade, was at Henderson's Depot on 8 Nov. 1864, hearing that General Breckinridge was advancing to re¬ conquer East Tennessee, fell back to Greene-ville on the 9th and to Bull's Gap on the 10th, where he was attacked on the morning of the 11th by General Duke's cavalry brigade, but held his own during the day. The attack was renewed by Breckinridge on the 12th with ar¬ tillery; he next assaulted in front and in rear with cavalry, both being repulsed. Breckin¬ ridge again renewed the attack on the 13th, and kept it up all day. Gillem being now almost out of ammunition, and without food for his men and forage for his horses, abandoned his posi¬ tion during the night and fell back toward Rus-selville. He took position on the road, at its intersection with the Knoxville and Greene-ville road, intending to hold that point until his trains had passed it. Nearly all his trains had passed, and were going through Russell¬ ville, when, on the 14th, his rear was attacked by Breckinridge with the brigades of Duke and Vaughn. His men were thrown into disorder, became panic-stricken, could not be rallied and retreated through Russellville to Strawberry Plains. He had 41 killed and wounded, and lost six guns,

132 wagons and ambulances, and 300 horses. About 200 of his men were captured. Consult (Official Records* (Vols. XXXI and XXXIX).

■

.

,

.

.

ftsaps ?OTKt’ *.K: tm

-

,

‘

»

.

.

.

.

Vol. 24, RUSSIA TO SILUS

Americana

.

.

,

/

✓ – . –

/

c:

i i

p

$

i

l

4

1

i

%

d

THE

ENCYCLOPEDIA

AMERICANA

jf

IjBˆr Vmjveˆsal

MfOWLEDGEt

In Thirty Volumes

i

i

1

\

X

X

%

X

I

1

I

I

^ - - -

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK CHICAGO

|

I

I

I

I

I

i

I

b

Copyright, 1919

i ’

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 i322

©‘3.A654317

“V-V, I

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXIV

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Leland Stanford Junior University

SHAKESPEARE’S SONNETS

ANGELL, JAMES ROWLAND, A.M., Litt.D.

President of Yale University.

SENSATION SENSATION, ORGANIC

BABASINIAN, V. S., Ph.D.

Professor of Chemistry, Lehigh University

SACCHARIN . SALOL

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

RUTH, BOOK OF SEMITIC LANGUAGES SEMITIC NATIONS

BLOOMFIELD, MAURICE, M.A., Ph.D.

Professor of Sanskrit and Comparative Philology, Johns Hopkins University

SANSKRIT

BOHME, TRAUGOTT

New York City

SCHELL1NG, FRIEDRICH WILHELM JOSEPH

SCHLEGEL, AUGUST WILHELM VON SCHLEGEL, KARL WILHELM F. SCHLEIERMACHER, FRIEDRICH ERNST DANIEL

BOLLING, GEORGE MELVILLE

Professor of Greek, Ohio State University, Colum¬ bus, Ohio

SANSKRIT LITERATURE

BOTHNE, GISLE, A.B.

Professor of Scandinavian Languages and Litera¬ ture, University of Minnesota

SIGURD SLEMBE

BOYNTON, H. V.

Late General, U. S. Army

SHILOH, BATTLE OF

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

SENTIMENTAL JOURNEY, A

BRUBACHER, A. R., Ph.D.

President, State College for Teachers, Albany, N. Y.

: . ‘* f f

SECRETARIAL EDUCATION

BUCKLEY, EDMUND

Editor of “ University Lessons on Art ”

SCULPTURE

SHINTO

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Uni¬ versity of Wisconsin

.SCARLET LETTER

i

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West . Virginia University

RUSSIA — DIPLOMATIC RELATIONS OF THE UNITED STATES WITH

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

salammbO

SATIRE MfiNIPPEE

CARMAN, E. A.*

Brigadier-General, United States Army

SAVAGE STATION, BATTLE OF SECESSIONVILLE, BATTLE OF SHENANDOAH VALLEY, MILITARY OPERATIONS IN

SHEPHERDSTOWN, ENGAGEMENTS AT AND NEAR

SHEPHERDSTOWN FORD, ENGAGE¬ MENT AT

CLARK, GEORGE ARCHIBALD

Secretary of the Fur Seal Commission 1896-97, Late Academic Secretary of Leland Stanford Jr. University

SEALS AND SEALING

COCHRANE, CHARLES. H.

Author of “ Modern Industrial Progress ”

SCREW

SELF-CONSCIOUSNESS

COUMBE, CLEMENT W.

Technical Art Expert

SHELL CAMEOS SHIELDS

SHIP IN ART AND SYMBOLISM

CREIGHTON, J. E., Ph.D., LL.D.

Professor of Philosophy, Cornell University

SCHOPENHAUER, ARTHUR

CURRIER, ANDREW F., M.D.

New York City

SALVARSAN AND NEOSALVARSAN

DEWEY, GODFREY

Honorary Member of the National Shorthand Reporters Association

SHORTHAND

SHORTHAND, SCIENCE OF

DICKINSON, THOMAS H., Ph.D.

Associate Professor of English, University of Wis¬ consin

SCHOOL FOR SCANDAL, THE SHE STOOPS TO CONQUER

- Deceased.

Contributors to Volume XXIV — Continued

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

SEA-GULL, THE

DONOVAN, EDWARD F.

Formerly Editor “ Unabridged Standard Diction¬ ary,” “ Standard Bible Dictionary,” etc.

SALES

SCOTCH LAW

DOOLITTLE, ERIC, C.E.

Director Flower Astronomical Observatory, Uni- • versity of Pennsylvania

SHOOTING STARS

DRISCOLL, REV. JAMES F., D.D.

New Rochelle, N. Y.

SACRAMENTS

DUNN, JOSEPH, Ph.D.

Professor of Celtic Languages and Literature, The Catholic University of America

SAGA

DUNN, WALDO H., M.A., Litt.D.

Professor of English, College of Wooster, Wooster, Ohio

SCOTT: LOCKHART’S LIFE OF EGGERT, CARL E., Ph.D.

Assistant Professor of German, University of Michigan

SAINT, THE

ENNIS, H. D.

Secretary of the Commerce Club of Saint Joseph

SAINT JOSEPH, MISSOURI

ESTES, DAVID FOSTER

Professor of New Testament Interpretation, Col¬ gate University

SAINT JOHN

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

SELECTIVE SERVICE LAW AND DRAFT SIEGE

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

SHIPPING OF THE WORLD

FLEMING, WALTER L., Ph.D.

Professor of History, Vanderbilt University

SHERIDAN, PHILIP HENRY

FOWLER, HENRY THATCHER

Professor of Biblical Literature and History, Brown University

SAMUEL, BOOKS OF

GANNON, FRED A.

Boston, Mass.

SHOE INDUSTRY IN THE UNITED STATES

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

SEAS, FREEDOM OF

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

SCENES OF BOHEMIAN LIFE, THE

GEDDES, JAMES, Jr., Ph.D.

Professor of Romance Languages, Boston Uni¬ versity

SAUL

GEHRING, ALBERT, A.M.

Author of “ The Appreciation of Music,” etc.

SCHOOLS OF DRAMA, MODERN

GUITERMAN, ARTHUR, B.A.

Author and Critic

SEVEN SEAS, THE

HAMLIN, A. D. F., A.M., L.H.D.

Professor of Architecture, Columbia University

RUSSIA — RUSSIAN ARCHITECTURE

HAMMOND, WM. A., Ph.D.

Professor of Ancient and Mediaeval Philosophy, Cornell University

SCHOLASTICISM

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

SAMSON AGONISTES SILAS MARNER

HARTMANN, JACOB WITTMER, Ph.D.

The College of the City of New York

SCHNITZLER, ARTHUR

HERING, RUDOLPH, C.E.

Hydraulic Engineer and Sanitary Expert

\SANITARY ENGINEERING

HODGE, FREDERICK W.

Museum of The American Indian, Heye Founda¬ tion, New York

SANTA FE SHAWNEE INDIANS

HORNER, HARLAN H.

Dean, State College for Teachers, Albany. N. Y.

SCHOOL EXAMINATIONS

HOURWICH, ISAAC A., Ph.D., LL.M.

Statistician; Author of “ Economics of the Russian Village”; ” Immigration and Labor,” etc.; and

RIVASHA, GEORGE J., M.E.

RUSSIA — RUSSIAN INDUSTRY

HOWELL, CHESTER M.

Assistant Secretary, Saginaw Board of Commerce

SAGINAW, MICHIGAN

Contributors to Volume XXIV — Continued

HUTCHINSON, JOHN I., Ph.D.

Professor of Mathematics, Cornell University

SERIES

INGERSOLL, ERNEST

Zoologist, Editor and Author

SERPENTS

INGERSOLL, HELEN

Naturalist

SAFFRON

SAGE

SASSAFRAS

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages, New York Uni” versity

SACRIFICES

SHEKINAH

ISAACS, EDITH J. R.

Critic and Essayist

SAPPHO

JELLIFFE, SMITH ELY, M.D., Ph.D.

Editor, “ Journal of Nervous and Mental Disease

SERUM THERAPY SICK, FOODS FOR THE

KILPATRICK, VAN EVRIE

Director of School Gardens, New York City

SCHOOL GARDENS

KLEIN, HENRI F.

Editorial Staff of The Americana

RUSSIA AND THE WORLD WAR RUSSO-TURKISH WARS SIAM SIBERIA

LARSON, J. DAVID

Secretary of Commercial Club of Salt Lake City

SALT LAKE CITY, UTAH

MATTISON, R. H.

Secretary of Chamber of Commerce

SEATTLE, WASHINGTON

McCREA, NELSON G., Ph.D.

Professor of Latin, Columbia University

SENECA, LUCIUS ANNˆUS

McDonnell, john b., b.a.

Editorial Staff of The Americana

RUSSIA — GEOGRAPHY, TOPOGRAPHY POLITICAL DIVISIONS, ETC.

MacMECHAN, ARCHIBALD, Ph.D.

Professor of English Language and Literature, Dal- housie College, Halifax

SARTOR RESARTUS

MEADER, CLARENCE L., A.B.

Professor of Latin, Sanskrit and General Lin¬ guistics, University of Michigan

RUSSIAN DRAMA

MODELL, DAVID A., A.M.

Specialist in Russian Subjects

RUSSIA — RUSSIAN MUSIC RUSSIA — EDUCATION RUSSIA — GOVERNMENT RUSSIA — POLITICAL PARTIES RUSSIA — BANKING AND FINANCE RUSSIA — RAILWAYS, HIGHWAYS AND WATERWAYS

RUSSIA — ARMY AND NAVY

MORRISON, J. H.

Author of “ History of American Steam Naviga¬ tion ”

SAILING VESSELS

MOSES, MONTROSE J., B.S.

Dramatic Critic

SCARECROW, THE

MUNSTERBERG, HUGO

Late Professor of Psychology, Harvard University

SCIENCES, CLASSIFICATION OF SCIENCES, NORMATIVE

NASCHER, I. L., M.D.

Author of “ Diseases of Old Age and Their Treat¬ ment ”

SENILITY

NEILSON, WILLIAM A., Ph.D.

Professor of English, Harvard University

SCOTLAND, LANGUAGE AND LITER¬ ATURE OF

NEWCOMB, SIMON,* Ph.D., LL.D., D.Sc. ERIE DOOLITTLE, C.E.

Professor of Astronomy and Director Astronomical Observatory

SATURN

SCINTILLATION

SEXTANT

NOURSE, EDWARD E., D.D.

Professor Biblical Theology, Hartford Theological Seminary

SADDUCEES SAINT PAUL SAINT PETER

PALMIERI, A.

Washington, D. C.

RUSSIA — RUSSIAN RELIGION

PARSONS, E. DUDLEY, A.B.

Author of “ History of Minnesota ”

SAINT PAUL, MINNESOTA

PERSON, HARLOW S., Ph.D., Ph.B.

Managing Director, Taylor Society, New York City

SCIENTIFIC MANAGEMENT

PETROVITCH, WOISLAV M., Ph.D.

Chief of Slavonic Division, New York Public Library

RUSSIA — RUSSIAN HISTORY RUSSIA — RUSSIAN ART SERBIA

SERBIAN NATIONAL POETRY

- Deceased.

Contributors to Volume XXIV — Concluded

PURSE, THOMAS

Secretary of Savannah Board of Trade

SAVANNAH, GEORGIA

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

SATURATION

ROLFE, WILLIAM J., Litt.D.*

Author of “ Life of Shakespeare ”

SHAKESPEARE, WILLIAM

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ Russia: Her Strength and Her Weak¬ ness,” etc.

RUSSIA — RUSSIAN COSSACKS

SAKUNTALA

SHAH NAMEH

SCOTT, WALTER DILL, Ph.D.

Director, Bureau of Salesmanship Research, Carnegie Institute of Technology, Pittsburgh

SALESMANSHIP, THE PSYCHOLOGY OF

SEDGWICK, WILLIAM T., Ph.B., Ph.D.*

Professor of Biology and Public Health, Massa¬ chusetts Institute of Technology

SANITARY SCIENCE

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois

SCHOLAR-GIPSY, THE, AND THYRSIS

SINGLETON, ESTHER

New York City

SHEFFIELD PLATE

STEVENS, WALTER B., A.M., LL.D.

Author, “ History of Saint Louis,” etc.

SAINT LOUIS, MISSOURI

TAFT, LORADO, M.L., L.H.D.

Author of “ The History of American Sculpture ”

SCULPTURE OF THE 19TH CENTURY

THOMAS, CALVIN, LL.D.

Professor of Germanic Languages and Literatures, Columbia University

SCHILLER, JOHANN CHRISTOPH FRIEDRICH

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni¬ versity

SCOTT, SIR WALTER SHELLEY, PERCY BYSSHE

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

SAUL

UNDERHILL, JOHN GARRETT, Ph.D.

Author of “ Spanish Literature in the England of the Tudors ”

SENORA AMA

WALSH, JAMES J., Ph.D.; M.D., LL.D., Litt.D., Sc.D.

Author of “ The Thirteenth Greatest of Centuries ”

SECOND CENTURY SEVENTEENTH CENTURY SEVENTH CENTURY

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

SARCODINA

WAXMAN, SAMUEL M.

College of Liberal Arts, Boston University

SAB, OR ESPATOLINO

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” etc.

RUY BLAS SAPHO

WHEELOCK, CHARLES F.

Assistant Commissioner for Secondary Education, The University of the State of New York

SCHOOLS, BIBLE IN THE SCHOOLS, CONTINUATION SCHOOLS, INSTRUCTION IN SEX HY¬ GIENE IN

WIENER, LEO

I Professor of Slavic Languages and Literature, Har- vard University

RUSSIA — RUSSIAN LANGUAGE RUSSIA — RUSSIAN LITERATURE

WILCOX, MARRION, A.B., LL.B.

Coeditor of ” Encyclopedia of Latin America ”

SALVADOR SAO PAULO

WILSON, LEWIS A.

Director, Division of Agricultural and Industrial Education, The State Department of Education

SCHOOL, THE CORPORATION

WRIGHT, CHARLES H. C., B.A., M.A.

Professor of French Language and Literature, Harvard University

SAND, GEORGE

YOUNG, STARK, B.A., M.A.

Professor of English, Amherst College

SHEPHEARD’S CALENDAR

- Deceased

fro

KEY TO PRONUNCIATION

a

a

a or a

a

a

A

a

ch

e

e or e

e

?

e

ff

g

gw

h

/i or H

hw

I

i or !

j

kw

n

far, father

n

Span, ft, as in canon pin on (pen’yon)

(can’yon),

fate, hate

ng

mingle, singing

at, fat

nk

bank, ink

air, care

ado, sofa

6

no, open

all, fall

o or 6

not, on

choose, church

A

o

corn, nor

eel, we

6

atom, symbol

bed, end

o

book, look

her, over : also Fr. e, as in de ; eu, as in neuf; and oeu, as in

oi

oil, soil ; also Ger. eu,

as in beutel

boeuf, coeur; Ger. d (or oe),

6 or oo

fool, rule

as in okonomie.

befall, elope

ou or ow

allow, bowsprit

agent, trident

s

satisfy, sauce

off, trough

sh

show, sure

gas, get

th

thick, thin

anguish, guava

ih

father, thither

hat, hot

u

mute, use

Ger. ch, as in nicht, wacht

u or u

but, us

what

u

pull, put

file, ice

u

between u and e, as

in Fr. sur,

Ger. Miiller

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

y

(consonantal) yes, young

gem, genius

z

pleasant, rose

quaint, quite

zh

azure, pleasure

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents,

to indicate

point, Jean, temps

syllabic stress

• , • ;

.14 >!T/ .10 ‘r’JVLOiW OF ■ ” ‘

w’l

I – i J-

ire* j ,oa. 6

rtr> .HJ»

no

ion

o

rfjl d /< • > • i –

Jo.’ .J 9

: .if, A ! i ’ ■’.£ ,«* /I!

■ 1 u, ; bo- .. lO

>Iui O OO 70 u i ... o

ttlij ..Mil , •

. .. . • :

ViV 1 ” • ‘ – ; –

lit ; , r) IT • «■

10 > 0 . »f) . ,v. v

MVOSSO fli .?ij ‘ >q > ,1 ’ . J

. • -.1 . ;

a

rfa i-.vm l>

Hi log ,as® S

ˆiUO-T lo

,v. ni tr. {.,(/ :: rr > w/ ni

rf5 £V£ii> .fl’ i: w

‘

■ . ; / :•! •

VA Mr. ‘ A I ‘ J -A . .1 • i ”

u

u

: s;il jy

®oi ,»lii

VT‘J>V ,‘i O Y

,<-'3 ., Ii I*-; i -no:)) x

»ao7 s

■ »! ; d

. : < I . ■ .f i " b » " ,‘j ■ A)'

r -ni Dtilfif’

.

nib oijibr W

-wovjjiVi ni £ ,u ,o ;

l<ˆMVi

‘

RUSSIA (ROSSIYA), the general name of those portions of Europe and Asia which until 1917 formed the dominion of the <(Tsar of All the Russias,® and which are now broken up into several separate state formations. While the name Russia is applied to the whole area of the former empire it is frequently employed in a limited sense to Russia in Europe. The widest use of the term became current after the great expansion of the empire in the 19th century. The following articles, dealing with the area, topography, etc., consider Russia as it was at the beginning of 1917, before the fall of the empire. The history, government and political parties, language, education, etc., are considered as follows :

1. Geography, Topography,

Political Divisions.

2. History.

3. Language.

4. Literature.

5. Drama.

6. Art.

7. Architecture.

8. Music.

9. Education.

10. Religion.

1 1 . Government and Political

Parties.

1. GEOGRAPHY, x ~x –

POLITICAL DIVISIONS, ETC. Russia is a federated republic comprising the whole of eastern Europe from about 23° East, and stretching continuously for about 170 degrees over the whole continent of Asia to Bering Strait, or nearly half of the circuit of the world. The boundaries are the Arctic Ocean on the north, Bering Strait and Bering Sea on the east, the Pacific Ocean, Chinese Republic, Afghanistan, Persia, Asiatic Turkey and the Black Sea on the south, and on the west

Esthonia, Latvia, Poland, Lithuania and Fin¬ land. The length east to west is estimated at about 6,500 miles; the average breadth north to south is about 1,500 miles. The whole area is officially given at 8,417,118 square miles, ap¬ proximately twice the area of Europe, and one-seventh of the land surface of the globe. The republic consists of several well-defined parts ; European Russia, the latter although less than a fourth of the whole, including nearly three-fourths of the entire population ; in Asia — northern Caucasia, Transcaucasia, the Steppes, Turkestan, the Caspian and Trans¬ caspian, and Sibera. The appended table gives the official divisions of Russia as it was on 12 March 1917, the date of the coup d'etat

which resulted in the fall of the Empire and the birth of the republic, their area, population and the density per square mile of land ; the

areas occupied by water are included total, but the densities of the population culated on the land area.

in the are cal-

GOVERNMENT OR

Area,

Population,

Density

PROVINCE

square

miles

1 Jan. 1915

per

sq. mile

European Russia —

Arkhangelsk .

326,063

505 , 700

1.6

Astrakhan .

91,042

1,427,500

16

Bessarabia .

17,143

2,686,600

157

Chemigor .

20,232

3,148,900

156

Courland .

10,435

812,300

78

Don, Province of .

63,532

4,013,400

63

Esthonia .

7,605

512,500

65

Grodno .

14,896

2,094,300

141

Kaluga .

11,942

1,497,200

125

Kazan .

24,587

2,900,400

118

Kharkor .

21,041

3,452,000

164

Kherson .

27,337

3,806,900

139

Kholm .

5,213

1,087,800

209

Kiev .

19,676

4,988,000

254

Kostroma .

32,432

1,855,900

57

Kovno .

15,518

1,871,400

120

Kursk .

17,937

3,276,200

183

Livonia .

17,574

1,778,500

101

Minsk .

35,220

3,070,900

87

Moghiler .

18,514

2,551,400

138

Moscow .

12,847

3,662,900

285

Nizhnii-Novgorod. . . .

19,789

2,081,200

105

Novgorod .

45,770

1,729,300

38

Olonets .

49,355

476,200

10

Orel .

18,042

2,816,200

156

Orenburg .

73 , 254

2,272,000

31

Penza .

14,997

1,940,500

130

Perm .

127,502

4,083,200

32

Petrograd .

17,226

3,197,800

186

Podolia .

16,224

4,127,600

254

Poltava .

19,265

3,906,200

203

Pskov .

16,678

1 ,447,100

87

Ryazan .

16,190

2,795,000

173

Samara .

58,320

3 , 899 , 800

67

Saratov .

32,624

3,432,100

105

Simbirsk .

19,110

2,124,500

111

Smolensk .

21,624

2,210,200

102

Tambov .

25,710

3,555,000

138

Taurida .

23,312

2,133,300

91

Tula .

11,954

2,016,000

169

Tver . .*....

24,975

2,402,900

96

Ufa .

47,109

3,139,100

67

Vilna .

16,181

2,083,200

129

Vitebsk .

16,983

1,984,800

117

Vladimir .

18,821

2,225,900

118

Volhynia .

27,699

4,241,800

153

Vologda .

155,265

1,772,200

11

Voronezh .

25,443

3,687,000

145

Vyatka .

59,329

4,062,000

69

Yaroslavl .

17,723

1 ,416,700

103

Yekaterinoslav .

24,477

3,537,300

144

Poland —

Kalisc .

4,377

1,342,400

307

Kielce .

3,897

1,029,800

264

Lomza .

4,588

819,700

179

Lublin .

6,297

1,481,000

235

12. Industry and Manu¬

factures.

13. Banking and Finance.

14. Railways and Communi¬

cation.

15. Army and Navy.

16. Russia and the World

War.

17. Russia, Diplomatic Rela¬

tions of the United States with.

2

RUSSIA — GEOGRAPHY, POLITICAL DIVISIONS, ETC. (1)

GOVERNMENT OR PROVINCE

Area,

square

miles

Population,

1 Jan. 1915

Density

per

sq. mile

Poland —

•

Piotrkow .

4,730

2,097,900

442

Plock .

3,641

786,000

216

Radom .

4,769

1,180,200

247

Suwalki .

4,756

718,000

151

Warsaw .

6,749

2,792, 600

414

Ciscaucasia —

Kuban, Province of. .

36,645

3,051,200

83

Staoropol .

20,970

1,353,500

65

Terek, Province of. . .

28,153

1,314,900

47

Total, Russia in Europe .

1,997,310

149,764,000

75

Transcaucasia —

Baku .

15,061

1,119,600

75

Batum, Province of. . .

2,693

186,000

69

Black Sea .

3,220

201,800

63

Daghestan, Province

of .

11,471

732,600

64

Yelizavetpol .

16,991

1,117,200

66

Erivan .

10,725

1,034,800

96

Kars .

7,239

403,000

56

Kutais .

8,145

1,070,300

130

Sukhum, District of. .

2,545

147,600

58

Tiflis .

15,776

1,394,800

88

Zakataly, District of. .

1,539

101, 80C

66

Siberia —

Amur, Province of . . . .

154,795

261,500

1.6

Irkutsk .

280,429

821,800

2.5

Kamchatka, Province

of .

502,424

41,400

0.1

Primorskaya, Province

of .

266,486

631,600

3.0

Sakhalin, Province of .

14,668

34,000

0.5

Tobolsk .

535,739

2,085,700

3.9

Tomsk .

327,173

4,053,700

12

Transbaikalia,

Province of .

238,308

971,700

4

Yakutsk, Province of .

1,530,253

332 , 600

0.2

Yeniseisk .

981,607

1,143,900

1.1

Steppes — (Provinces)

Akmolinsk .

225,074

1,546,500

6.8

Semipalatinsk .

178,320

874,900

5

Turgai .

169,832

706 , 200

4. 1

Uralsk .

137,679

889,600

6.4

Turkestan —

Ferghana .

55,483

2,169,600

39

Samarcand .

26,627

1,207,400

45

Syr- Daria .

194,147

2,026,100

11

Semiryechensk .

144,550

1,281,300

9

Trans-Caspian Prov-

ince .

235,120

552,500

2.2

Total, Russia in Asia

6,294,119

29,141,500

4.4

Finland .

125,689

3,277,100

21.6

Internal waters .

347,468

Total without Finland

8,291,429

178,905,600

4.6

Grand total* .

8,764,586

182,182,600

20.8

- Finland, Poland, Ukrainia and other provinces have become separate states since the fall of the empire.

The ethnical composition of the population is as follows:

Aryans .

Slavs .

Lithuanians .

Latins .

Germans .

Iranians .

Armenians .

Other Aryans .

Jews .

Uralo- Allay ans .

Finns .

Samoyeds .

Turks-Tatars .

Tunguz .

Mongols .

Georgians .

Other Caucasians .

Chinese, Japanese and Koreans –

Hyperboreans .

Yukaghirs .

Koriaks .

Chukchis .

Eskimo .

100,331,516 comprising

92,089,733 3,094,469 1,143,000 1 ,813,717 784,746 1,173,096

•232,755

5,070,205

1 7 , 669 , 067 comprising

3,502,147 15,877 13,601,251 69,664 480,128 1,352,535 1,091,782 86,113

33 , 602 comprising

948 6,058 11,795 1,099

Hyperboreans

Ghilaks . 6,194 comprising

Kamchadals . 3,978

Ainus . 1 , 446

Others . 2 , 084

All others . 5,201

Total . 125,640,021

Expansion in Asia was a marked feature of Russian policy from the

18th century. The first settlements on the Pacific slope were established on the Sea of Okhotsk, and by 1859 the boundaries were pushed as far south as the Amur River. In North America, Russia had extended its sovereignty over the Alaskan Peninsula, which, however, it sold in 1867 to the United States for $7,200,000. (See Alaska and Alaskan Boundary Commission). In 1872 it compelled Khiva (q.v.) to acknowledge the suzerainty of the Tsar, and in the follow¬ ing year Bokhara (q.v.), on which pressure had been brought to bear since 1850, and which had been invaded in 1866, became practically a Russian dependency. In 1875, the island of Sakhalin in the Sea of Okhotsk, north of Japan, was ceded to Russia by the Japanese. In 1898, after Japan's successful war with China, Russia obtained from Japan a lease of the Liao-tung peninsula, with the important ports of Dalny and Port Arthur (qq.v.), and after the Boxer uprising of 1901, occupied Manchuria (q.v.). Meanwhile Armenia had been partly absorbed ; Russian influence had been strongly established in the Mongolian steppes, and the military out¬ posts in Turkestan had been extended south¬ ward in the Pamirs

The continuity of the empire might appear to demand a detailed description in a single article ; but its immense magnitude, and the dis¬ tinct names commonly used to designate the different portions, make it more convenient to consider them separately under the heads of European Russia, and Siberia and Asiatic Rus¬ sia. See article Siberia and Asiatic'Russia.

European Russia.

Various classifications, partly historical and partly geographical, of the numerous divisions of European Russia, include Great Russia, Little Russia, South Russia, West Russia, the Baltic Provinces and Caucasus (qq.v.).

The boundaries of European Russia on the north and west are the same as those given above for the republic. Its southern bounda¬ ries also are the same as far east as the east¬ ern shores of the Caspian Sea. The eastern boundary is not so well defined. In its northern part the Ural Mountains form such a definite natural barrier that their title to fix the fron¬ tiers of Europe and Asia, so far at least as the governments Archangel and Vologda extend, has been almost universally recognized. To the south of this the boundary may be said to be almost arbitrary, but is generally conceded to follow the Ural chain southward until it reaches the sources of the river Ural, and then follows the course of this river to its mouth in the Caspian. Parts of the governments of Perm and Orenburg, however, extend across the

Ural Mountains, and are therefore in Asia. European Russia, as thus defined, is bounded northeast by the Ural Mountains, east by the government of Tobolsk, the steppes of the Kirghiz, and the Caspian Sea.

Longitude

Greenwich

East from

jfo'tocWri" Shav,

Finland, republic recognized

E8. Ukrainia, /republic; recognized by Allied and Associated ' ˆ Powere.

30 GeofgJ/" lˆcas,ian(Statepndepˆenceˆoci'ˆ

fahmtoLf Apnl f 19ir

5ˆ > siw»«iiiyj)artof'i Independence prod limed August, U18.

Estbonia,

Latvia

Lithuania,

Bjblic; recognizeif by Great Britain. leclar'W'Jhem s/lves IndependgM. replies, In 191IL7\ˆ An J

■•DAcurylpˆ

Ma tor I Bay

//arb°r

({Kola J

KOLGUEV,

Aleatandi

C. Kanin

G. Svyatoi,

c. «Jr >

» ES .pM’ku”1

r rM

YCheahtkaya) \

“‘J Bay \ \

AucticT

ˆKsC.‘Gorodsikl

.puftol®**’

Tetrlna

//, latnna . \U’OTE s&a

ISOLOVETKKUE {

ACls.f-. t.

Soroka 1*?’ A. S’! %

‘Archangel

\aransk„

‘Sbynkurek

/ 1 I T. .

Cw) A }

7 (\ rf * X ˆ

ˆLodeinovˆPol CˆLai

tath«riP *\ \ che*4®

C’a’»ay \ >1 7ˆ

e Ustyug rerkhova2h«

IVoaAe

odoaaln°2

■Otero

ce Kubenekoye-^^oiml^

KifAoJ

“s^CberXmvete • J

Kadnlko,

ikolsk

obodskoL

S&Ptta 1

‘C-

f^n;^KoU,Brl«\

sABai

oGalich

IskK O S T J*”

■JP Kostroma /vMaki

i gjitelniob of P\

? -> \ L

rfS etlug* f

’armiviy^Wnsk HvN

^ Urxbum vS,

I \o KoinJode®ly»n«k Xt

‘EkSKi&s* 1

i^T^yCyadrmsk

folk

-glib**’

ˆvPosbel

■•‘Vesiegtdek*

r/ˆ&fedai

cb®*” Yaroslavl _ Kashln.C. b Uglicb

R AfO /

KalyaiPh* VxRpsto

fstˆshkr

torshok/

|AlaltoJlbgarapu\ E\abug*_ˆC

.f

jdainady*b

fva ntf> o – Vdzn ese nal

ˆKlinXj

*u£os

>k«umarr

lAenxe1‘1]

iˆlovo / serg

NOVIJOR1

,urom’

Arfpoo / SjUlSri

rat mar

iTetj’M

kCgoiftna

W- Bulnsk ?A°j

%WsK A

id’sk P3bitnblr9jS3g j. /> — / Karsavin n

ˆ3«o«Ual

han

ˆorogobuzh_

‘ eAywx?f-r:

is 1 mow ojpemnljcov \

Sy2_y 1 /hadom ? DKra?noII Sarinsk|

IzaN (-sP“ˆ°iv PENZjj

ˆK > U4aKnT8t ˆlJ

-4J – i’emazf

,nYAM30V <'Chembar-y7' ov/Xrarabov"V1/>-J7>‘r

rihetsk try

«ipe»K \ Petrovs

Syzran

y Etremov-j/ˆ

Euznet-vk Koloyar °

rachev”

~Vy olik ˆ?Kbv»lyn,r ,

V AntoUjyw’w

.JˆXkate rlnvpstadt V

Lokrovˆbay \ ‘

forgo rod >jerer»|/

4\J Atkarskll^ ^ Saratov

■onott

4o°rSf

gkayr- L/RAL*^^

fll? ■CvMcossACXsVi.aiw?t0,

TERˆlˆ°RY

0 B.bau3kay* ® I N. -/»’ m

Starba A ‘ M ˆ

ˆ;ot I vjlR

MkuBcbak y JOR0E ui:

Valuiki

&£/ ˆ’loan*’ˆl£retuo nrinfˆSV

, Xˆ> terl n os|’ˆ

i J AnM,ev\« j]

reprorikˆ :/ Baki/mi Pavlograd |

rirskaya’J

ˆOrylkho*

Tknot*lo«L‘

Aslraki

‘•■UofoS ˆ

, AZOV.

o- IkfkWk,

Stavropol,

Simpheroi

‘^ebastopol4

BaUklara1

Ekate

oss^isk

■inodar

Pyatigo/sk,

-etrovfit

Vladik* trl

Kutais1

r’Hora

UrasOO’

ibetbpolS^7

sbizond

RUSSIA

c—‘b ? U”kor!t“

Scales.

Statute Miles, 220 — 1 Inch.

Meniieres

Urutni a \Lake

Kilometres, 354

Adalia

Rand McNally 4 Co. ’a New ll x 14 Map of Russia. Copyright by Rand, McNally 4 Co.

r v

.

!9 ■

. •

-

.

.

— i •>

• r

RUSSIA — GEOGRAPHY, POLITICAL DIVISIONS, ETC. (1)

3

Topography. — The surface, in the most general view that can be taken of it, is two immense plains, the boundary between which is marked, though not very definitely, by a broad central ridge which stretches across it in an irregular waving line, mainly in a north¬ east direction, beginning on the frontiers of Poland, and terminating on the west side of the Ural Mountains, near lat. 62° N. This ridge forms the eastern continuation of the great watershed which divides the whole con-, tinent of Europe into a north and a south basin ; but, unlike the west part, which is com¬ posed of lofty mountain chains or elevated plateaus, is only of moderate height, never ex¬ ceeding 1,000 feet above sea-level. Even this height is attained only in the Valdai Hills, the far greater part of which, and of the remainder of the ridge, has an average height of not more than 500 feet. The only regions where the sur- * face assumes a mountainous appearance are in the east, where the Ural chain, though nowhere, much exceeding 5,000 feet, looks more elevated, at least in its northern part, from its high latitude and consequent covering of perpetual snow ; and in the south, where the Mountains of the Yaila chain, lining the southern shores of the Crimea, have a height of about 4,000 feet. With these exceptions the only other parts of European Russia which, according to the limits above assigned to it, do not belong to its two immense plains, are those districts of Perm and Orenburg which are situated on the east side of the Urals, and slope toward the almost boundless steppes of Asia. The coast¬ line of European Russia was confined to the Arctic Ocean until the end of the 17th century, and it was only by conquest that Russia ob¬ tained a seaboard on the Baltic and the Black Sea. The Arctic Ocean, affording excellent fishing grounds in the western portion, makes, with the White Sea, a deep indentation on the north

coast, but its gulfs, Kandalaksha, Onega and Dvina, are ice-bound for nine months every year. Archangel, the chief port, is compara¬ tively unimportant. Farther east, Cheskaya and Pechora bays are surrounded by frozen deserts. The Kara Sea, between the crescent¬ shaped island of Nova Zembla and the coast of Siberia, is navigable for a few weeks only every year. The islands of Kolgueff, Vaigatch, Nova Zembla, and the islands of Siberia are unin¬ habited. The Baltic Sea, with the Gulfs of Bothnia, Finland, and Riga, is the chief sea of Russia; but it nowhere touches purely Rus¬ sian territory, its coasts being peopled by Finns, Letts, Esthonians and Germans. Nevertheless, three out of the five chief ports of Russia — Reval, Libau and Riga — are situated on the Baltic Sea. Two of them are frozen during four to five months every year ; and Libau is the only one which has its roadsteads open nearly all the year round.

The Black Sea acquires more and more im¬ portance every year. The fertile steppes of its littoral are being rapidly settled, and the centre of gravity of Russia's population is gradually shifting south. The Black Sea suffers, how¬ ever, from a lack of good ports. Its great gulf, the Sea of Azov (ports Taganvrog and Rostoff), is very shallow; the fine ports of the Crimea are too remote from the mainland; and the sea¬ board of Northern Caucasus is separated from the interior by a high chain of mountains.

Odessa is the chief port of this sea ; and it has no rival in Russia except Petrograd. Nikolaiev is the principal naval arsenal ; and Sebastopol remains a naval station. Batum, the chief port of Transcaucasia, is of great importance for the export of petroleum. The Caspian Sea, which receives the chief river of European Russia — the Volga' — is a valuable medium of communication between the central Asian do¬ minions and the Caucasus, as also for trade with Persia ; but it has no outlet to the ocean, nor is there any probability of connecting it advantageously by canal with the Black Sea, its level being 70 feet below sea-level.

Hydrography. — The rivers are remarkable for their number and magnitude. The broad central ridge already referred to forms the great water-shed of the country, sending the waters on its north side either to the Arctic Ocean or Baltic Sea, and those on the south side to the Black Sea or the Caspian, thus forming four distinct basins. The Arctic Ocean receives directly the Pechora, which drains chiefly the western slopes of the Ural Moun¬ tains by a number of important affluents, ac¬ cumulates them into one great flood, which then flows almost due north, and empties itself into a wide estuary remarkable for the number of islands which the alluvial deposits of the river have formed

within it. Through the White Sea, the Arctic Ocean receives the waters of the Mezen, Northern Dvina and Onega. The most important of the three is the Dvina, which receiving its supplies in nearly equal quantities from the east by the Vitchegda, and from the west by the Suchona, proceeds northwest in a circuitous course, continually augmented by large affluents, and falls into the Gulf of Arch¬ angel, a little below the well-known port of that name. The surface drained by the rivers of this basin is almost entirely confined to the two extensive governments of Archangel and Vo¬ logda. The basin next in order is that of the Baltic. Its principal rivers are the Kemi and Tornea (the latter common to both Russia and Sweden), which fall into the Gulf of Bothnia; the Kymmene, Neva, and Narva or Narowa, which fall into the Gulf of Finland; the Aa and Dima or Western Dvina, which fall into the Gulf of Riga; the Niemen or Memel, which enters East Prussia before terminating its course; and the West Bug, an affluent of the Vistula. To the basin of the Black Sea belong the Dniester, South Bug and Dnieper, which have all their mouths at a short distance from each other in the neighborhood of the rising seaport of Odessa ; the Don, which falls into the northeast extremity of the Sea of Azov; and the Kuban, which derives its chief supplies from Circassia. The last basin, that of the Caspian, is in some respects the most remark¬ able of all, since, though Europe sends it only two large rivers, the Ural and the Volga, both supplied in part from Asiatic sources, the latter not only surpasses all other Russian rivers, but is one of the greatest of Europe. The lakes of Russia are on a scale of magnificence com¬ mensurate with that of the rivers. To say noth¬ ing of the Caspian, which, being wholly sur¬ rounded by land, and even incapable from the lowness of its level, of discharging itself into any other sea, is truly a lake — Russia has others of vast extent. To the basin of the Baltic belong Ladoga, the largest lake in

Europe; Onega, Peipus and Ilmen. Almost all the other lakes of any size belong to the basin of the Volga; chief of these are the Bielo-Ozero, in the government of Novgorod, and the Koubinskoe, in the government of Vologda. In the south are several large salt lakes, among them the Elton and the Khaki Salt Marsh, in the Government of Astrakhan.

Geology. — A vast tract of gneiss and other crystalline schists, penetrated by granite, ex¬ tends east from the Gulf of Bothnia, and north from the Gulf of Finland over the whole prin¬ cipality of the

latter name, the western part of the government of Olonets, and the extensive part of the government of Archangel which is isolated from its main body by the White Sea. The only other region where a similar develop¬ ment occurs is in the south, where a large gran¬ itic steppe stretches in a southeast direction. It begins near Ovrutch, in the northeast of the government of Volhynia, covers the far greater part of the government of Kiev, as much of the government of Podolsk as lies north of the Bug, the northern half of the gov¬ ernment of Kherson, the west and south of Ekaterinoslav, and a part of Taurida, and terminates in Ukraine just before reaching the shores of the Sea of Azov, from which it is excluded by a narrow belt of Tertiary marls and limestone. In the east, however, and along the whole crest of the Ural Mountains, from their commencement on the shores of the Arctic Ocean, and almost continuously southward to their last ramifications, granite of more recent origin than that already mentioned occurs, in connection with other eruptive rocks of green¬ stone, porphyry, syenite, serpentine, etc. These rocks are overlain on both sides of the chain by metamorphic schists, forming long and nar¬ row belts nearly parallel with its principal axis. Immediately to the west appears a similar belt of Silurian strata, which, where lowest in the series, is in the state iof chloritic and talcose schists. The only other locality where the Silurian system receives a marked development is on the southern shores of the Gulf of Fin¬ land, where it stretches from its western ex¬ tremity east along the governments of Esthonia and Petrograd, and is then continued across the isthmus between the eastern extremity of the gulf and Lake Ladoga, and along the south¬ ern and southeastern shores of that lake. In immediate contact with this Silurian formation on the south, but on a much more magnificent scale of development, appears the Devonian sys¬ tem, or Old Red Sandstone. The main body of this formation begins near the southeastern shores of the Baltic, and gradually widens out with its norlheastern and southeastern sides, so as to assume the shape of a wedge. It then forms a wide fork, sending one of its branches northeast across Lake Onega, and along Arch¬ angel Bay to the northwestern extremity of Mezen Bay, and the other southeast to the north¬ western frontiers of Voronezh. It thus covers continuously the whole of the governments of Kurland, Livonia, Vitebsk and Pskof, and parts of Vilna, Minsk, Mohilef and Smolensk, on the one side, and of Petrograd and Novgorod on the other; while its northeast branch traverses Olonets, and penetrates into Archangel; and its southeast branch stretches over considerable parts of Kaluga, Orel and Tula. The only other localities in which the sapie formation occurs

is as a belt stretching south-southeast from the eastern coast of the

Gulf of Tcheskaia in the Arctic Ocean, and in a longer but narrower belt on the western side of the Ural chain, where it immediately overlies the Silurian for¬ mation already mentioned. The formation next in order is the Carboniferous. The main body of it lies within the above fork of the Old Red Sandstone, and in immediate contact with it, and then keeping parallel with the northeast branch of the fork, is continued in the same direction to its termination in Mezen Bay. It occupies the whole of the government of Tver, the capital of which is situated near its centre; and large parts of Smolensk, Kaluga, Tula and Riazan on the one side, and of Novgorod and Olonets on the other. The government of Moscow is situated in the very heart of it, and that of Vladimir on its eastern side. It is evi¬ dently continued beneath these governments and covers part of their surface, the other and far greater part being covered by oolite or Jura limestone. The Carboniferous system occurs in two other distant and isolated localities; the one in the south, a little north of the Sea of Azov, where it occupies the eastern part of the government of Ekaterinoslav, and the western extremity of that of Don Cossacks, and where, too, the coal forming the characteristic mineral of the system is partially worked by pits ; the other locality is on the western side of the Ural chain, where, in the ascending series, it succeeds the Silurian and Devonian systems, and has a larger development than either of them. This development of the Carboniferous system on the side of the Ural chain, and the still larger development above described as existing in the governments of Smolensk, Kaluga, etc., forms the opposite boundaries of a system which in European Russia is highly developed; and to which from the large space which it covers in Perm and the contiguous governments, the name of the Permian system has been given. Its rocks belong to the upper part of the coal measures and consist chiefly of magnesian lime¬ stone and new red sandstone. The latter name is still often applied to the whole system. The Permian system extends over the governments of Kostroma, Viatka and Kazan, and large parts of Archangel, Vologda, Yaroslav, Nijni- Novgorod, Simbirsk, Orenburg and Perm. In the north of the governments of Kostroma and Viatka, and more especially in the part of Vol¬ ogda between the towns of Nikolsk and Ust- Sisolsk, it disappears for a time beneath strata belonging to the Jurassic or oolitic system. This system is developed partially in several other localities, and very largely in the north¬ east of the government of Archangel. Immedi¬ ately above it in the geological series is the Cretaceous system, of which the principal lo¬ calities are Chernigov, Orel, Kursk, Kharkov, and Voronezh, near the centre; Volhynia and a small part of Poland in the west ; and a long tract along the northern base of the Caucasus. The rocks next in succession belong to the Tertiary formation, which in

both its Eocene and Miocene periods is very largely developed. Strata of the Eocene period, beginning in the east in the government of Simbirsk, stretch west over the greater part of the governments of Penza and Tambov, then, after a consider¬ able interruption, reappear on the frontiers of Kursk and Kharkov, cover the far greater part

ot the governments of Chernigov and Poltava, and are thence continued without interruption into the governments of Mohilev, Minsk and Grodno. The Miocene period has its chief de¬ velopments in Volhynia, Podolsk and Bessara¬ bia. Beds of still more recent formation may be traced in the limestones, marls and clays on the northwestern shores of the Black Sea, on the far greater part of the Peninsula of the Crimea, on the eastern and northern shores of the Sea of Azov, on the low flats along the western and northern shores of the Caspian, and the low, sandy steppes of Astrakhan. Mere alluvial deposits, of comparatively recent date, are to be found in a greater or less degree at the mouths of all the rivers, and are par¬ ticularly discernible in the great estuary of the Pechora. Vast numbers of erratic blocks and similar drift are spread over the greater part of northern Russia, evidently transported from Finland, Lapland and Sweden.

Climate. — As the country extends over 35 degrees of latitude, from the warmer regions of the temperate far into the regions of the frozen zone, it exhibits several marked diversi¬ ties of climate, usually considered in four di¬ visions — a polar region, including all the coun¬ try north of lat. 67° ; a cold region, extending from lat. 67° to 57° N. ; a temperate region, from lat. 57° to 50° N. ; and a warm region, from lat. 50° to 37° N. The characteristic features of the climate in general are a greater coldness and variableness than is common under the same latitudes in the more westerly parts of Europe. The mean annual temperature of the upper part of the Norwegian Coast to its ex¬ tremity at the North Cape is above the freez¬ ing point, whereas a considerable portion of Russia within the same, and even in a lower lati¬ tude, is below it. This is true of the whole of Russian Lapland as far south as 66° ; and to the east of the White Sea the thermal line, indicat¬ ing a mean annual temperature of freezing, de¬ scends so rapidly that on reaching the Ural Mountains it is found to be as low as 60°. The region to which the name of cold has been given has a mean annual temperature varying between 32° and 40°, but very unequally di¬ vided throughout the year, the cold in winter often sinking the thermometer to 30° below zero, or 62° below

freezing, while the summer heat often raises it above 80°. At Petrograd considerably below the centre of this region, the mean annual temperature is rather above 40° ; on the other hand, that of Kazan, situated at the very south extremity of the region, but much farther inland, is rather below 36°. The temperate region, situated between lat. 57° and 50° N., has a mean annual temperature varying from 40° to 50°, and includes within it the far finest part of the Russian territory, though even there the thermometer has a very wide range, the summer heat, which suffices to grow melons and similar fruits in the open field, being often succeeded by very rigorous winters. The warm region, extending from 50° southward, well merits the name from its extreme summer heats, the thermometer in June and July standing commonly about 100°, and often considerably higher. It is not, however, free from the re¬ markable contrasts which a Russian summer and a Russian winter exhibit; for the Sea of Azov, situated almost in the heart of this re¬ gion, usually freezes about the beginning of

November and is seldom open again before the beginning of April. In all the countries border¬ ing on the shores of the Baltic Sea and the Arc¬ tic Ocean, and bounded on the west and north by the basin of the Volga, the air is charged with a superabundance of moisture, which de¬ scends in mists and frequent falls of rain or snow. Toward the centre, and still farther east, the superabundance of moisture disap¬ pears, though enough still remains to keep vege¬ tation in full vigor even at the hottest season. Still farther south the want of rain is often felt and long-continued droughts do frequent mischief. In general, however, the climates of all the regions are not unfavorable to health.

Forestry and Flora. — Forests are found chiefly in the more northern districts, particu¬ larly Archangel, Vologda and Perm, and cover about 39 per cent of the total area of European Russia. In many of the central and southern governments a deficiency of timber is seriously felt and many extraordinary expedients are re¬ sorted to in order to obtain adequate supplies of fuel. The districts most imperfectly pro¬ vided with wood are Esthonia, Bessarabia, Kherson, Ekaterinoslav and Astrakhan. The prevailing trees of the northern forests are fir, larch, alder and birch. The oak is seldom found beyond lat. 61°. A considerable proportion of the surface still continues almost in a state of nature; and, where it is well wooded, it is a question whether any other mode of occupation would be equally productive. Russia possesses about 3,400 species of phanerogamous plants, but the examination which botanists have made is incomplete and it is probable that many remain to be discovered.

The forest area of European Russia covers a territory of 474,000,000 acres. In the Ural Mountain region forests cover 70 per cent of the total area. In 1917 the revenues derived from the state forests amounted to 111,206,000 roubles (about $55,603,000) ; the expenses amounted to 41,592,000 roubles ($20,796,000), leaving a net profit of 69,614,000 roubles ($34,-

807,000).

Fauna. — Animals, both domestic and wild, are numerous in Russia. Among the latter are the bear, the wolf, wild hog, the desman, the mole-rat, the saiga, the bobak or Russian mar¬ mot, the elk, the bison, the lynx and various animals which are hunted for their furs. Wild fowl abound, particularly near the mouths of rivers ; among them the pelican frequents the shores of the Black Sea. Both on the coasts and in the rivers a great number of productive fisheries are carried on. In the Arctic Ocean whales are killed and vast numbers of seals are taken. The rivers of the Caspian, particularly the Ural and Volga, and the Sea of Azov, are celebrated for their sturgeon. In the same quar¬ ters are also important salmon fisheries. Rep¬ tiles are few and mostly innocuous.

Land Tenure. — Under the empire the po¬ litical divisions of the Russian people comprised numerous grades of nobility, which were partly hereditary and partly acquired by military and civil service, especially the former, military rank being most highly prized. The clergy, both regular and secular, formed a separate privileged order. The higher clergy were for¬ merly possessed of great wealth, but much of their property was confiscated by Catherine II, who compensated them by state pensions. Pre-

vious to the year 1861 the mass of the people were serfs subject to the proprietors of the soil. The emperors Alexander I and Nicholas I took the same initial steps toward the emanci¬ pation of this class ; but a bold and complete scheme of emancipation was begun and carried out by Alexander II. The decree of emanci¬ pation was dated 3 March 1861 and began to come into execution within two years. There were about 22,000,000 of serfs belonging to pri¬ vate proprietors and rather more than that num¬ ber on the crown lands. By an imperial decree of 8 July 1863, lands were granted to the peas¬ ants on all the estates of the Crown on a 49 years' rental equal to the former poll-tax

and as a freehold estate at the expiration of this period. A similar arrangement was made on behalf of the peasants on the lands of private proprietors. The redemption money of the serfs with their land was estimated at 16ˆ3 years' purchase of their annual produce. Twenty per cent of this had to be paid by the serfs on procuring their emancipation, the re¬ maining 80 per cent was guaranteed by the gov¬ ernment, which levied it from the peasantry in a tax extending over 49 years. The emancipa¬ tion of all the serfs on these terms was ar¬ ranged for by July 1865, and from that date this form of servitude ceased to exist in Rus¬ sia. From this change until 1917 the cultivable land in Russia was mainly distributed among three classes. The Crown held nearly 35 per cent, the emancipated peasants about 20, while the remainder, with the exception of mines and town lands, remained in the hands of the nobil¬ ity and other landed proprietors. Soon after their advent to power in November 1917 the Bolsheviki undertook the solution of the land question. All private ownership was declared to be henceforth null ; the land was nationalized and given to the people who cultivated it. The large estates of the nobility, all the lands be¬ longing to the state and to the Church were left to the disposition of local committees pend¬ ing a decision of the Constituent Assembly. Mines, forests and great waterways became the property of the state; while lesser forests and waterways were turned over to local communes.

Bibliography. General: Aleksinskii, Gri¬ gori!, (Modern Russia) (translated by Bernard Miall, London 1913) ; Baring, Maurice, (The Mainsprings of Russia) (London and New York 1914) ; Bond, Sir Edward A. (ed.), Rus¬ sia at the Close of the Sixteenth Century* (London 1856) ; Child, Richard Washburn, Potential Russia) (New York 1916) ; Drage, Geoffrey, (Russian Affairs1* (London 1904) ; Duff, James (ed.), (Russian Realities and Problems* (by Paul Milyoukov, Peter Struve, A. Lappo-Danilevsky, Roman Dmowski, and Harold Williams, Cambridge, England 1917) ; Fanning, Clara Elizabeth, (Selected Articles on Russia* (New York 1918) ; Graham, Stephen, (Russia and the World* (ib., 1915) ; Hume, George, (Thirty-Five Years in Russia* (Lon¬ don 1914) ; Leroy-Beaulieu, Anafole (Henry Jean Baptiste Anatole), (The Empire of the Tsars and the Russians* (translated from the 3d French edition with annotations by Z. A. Ragozin, New York 1902-05) ; Lethbridge, Mrs. Marjorie Colt (Byrne), (The Soul of the Rus¬ sian* (New York 1916) ; Miliukov, Pavel Nikolaevich, (Russia and its Crisis* (Chicago 1906) ; Souiny-Seydlitz, Leonie Ida Philipovna,

(Russia of Yesterday and To-morrow* (New York 1917); Stephens, Winifred (ed.), (The Soul of Russia* (London 1916).

Asiatic Relations: Beveridge, Albert Jere¬ miah, (The Russian Advance* (New York 1903) ; Meakin, Annette M., (In Russian Turk¬ estan* (London 1903) ; Popowski, Jozef, (The Rival Powers in Central Asia* (Westminster 1893) ; Simpson, Bertram Lenox,

Realities* (London 1915); Reeves, * Francis Brewster, (Russia Then and Now, 1892-1917* (New York 1917) ; Reynolds, Rothay, (My Slav Friends* (London 1916) ; Sears, Robert, (An Illustrated Description of the Russian Em¬ pire; Embracing its Geographical Features, Po¬ litical Divisions, Principal Cities and Towns, Manners and Customs, Historic Summary, etc.* (New York 1855); Beazley, Charles Raymond, (Russia from the Varangians to the Bolshe¬ viks* (Oxford 1918) ; Cazalet, Lucy, (Short History of Russia* (Oxford 1915) ; Krausse, Alexis Sidney, (Russia in Asia; a Record and a Study, 1558-1899* (New York 1900) ; Munro, H. H., (The Rise of the Russian Empire* (London 1900) ; Poole, Ernest, (The Dark People: Russia's Crisis* (New York 1918); Russell, Charles Edward, (Unchained Russia* (ib. 1918) ; (The Russian Year-Book.*

John B. McDonnell, Editorial Staff of The Americana.

2. RUSSIAN HISTpRY. The Russian Slavs were one of the Asiatic tribes designated by the Greeks, <(Scythians,** who in unknown times immigrated into the vast plains of east¬ ern Europe. They had settled near lakes and rivers in the primitive forests of the region ex¬ tending east and west from lakes Ilmer and Chud to the lower banks of the Dnieper and the Dniester. There were other East-Slavonic tribes: the Lithuanians, west, and the Finns north of them, while the Turks and Tartars lived in the southeast. The Russian Slavs lived

in small communistic and patriarchic groups governed by the Vieche (a council of family elders) until the Variagi, or Northmen, helped them to form an independent state. No exact data is available concerning its origin. It is unknown whether the Slavs submitted to the Northmen of their own accord or whether they were forced into submission by conquest. Ac¬ cording to the chronicle, the state originated in 862 when the three Varangian brothers, Rurik, Sineus and Truvor, became rulers of the Sla¬ vonic Stenm clan, the country began to be called Russia, and Novgorod became the cen¬ tre of the principality. Simultaneously another centre, Kiev, sprang up in the south where two Varangian brothers, Askold and Dir, had formed

another principality. Upon the death of Rurik's brothers, their territory also passed to him and he assumed the title Grand Prince. The successor of Rurik was his relative Oleg (879) whose wisdom and steady success gave him the surname ˆVieschi,® which means ˆsoothsayer.® He extended his rule over all the Slavonic clans except the Viatichi and im¬ posed upon them a heavy tax. He took posses¬ sion of Kiev and made it the capital of his principality, naming it (

When her son Sviatoslav became ruler, he displayed all his cunning and ambition in the nu¬ merous expeditions for the purpose of con¬ quest. He defeated the Turkish tribe Khazarui and subjugated the Viatichi, the only Slavonic tribe still under tribute to them. At the sug¬ gestion of the emperor of Byzantium Nikifor Fok, he turned his weapons against the Bulgars along the Danube, but with no consequences. Returning home he was killed near Kiev by the Petchenegs who in his absence had attacked the city (972). Sviatoslav had divided his domin¬ ion among his sons, but it was reunited by the youngest son Vladimir; he killed his oldest brother Yaropolk who had already assassinated another brother Oleg and subdued several re¬ volting clans. He also made several successful attacks on the Poles, the Yatvags and the Bul¬ gars along the Kama. The most significant event of Vladimir's rule was the conversion of the Russians to Christianity (988) after Vladi¬ mir's conquest of the Greek city Khersan. Until then they had been pagans and worshiped all natural phenomena which they represented by different idols. Vladimir, at first cruel, vo¬ luptuous and an assassin, is known to history as the ((Beautiful Son of Kiev,® due to a change said to have been worked in him by the Chris¬ tian faith. Following the custom of the time

Vladimir before his death in 1015 again divided the country among his sons, Garoslav, Yaropolk and Sviatopolk, but Garoslav reunited it at the time of the mutual fight of the brothers in which Yaropolk died and Sviatapolk fled. Garoslav I like his father divided in 1054 the Russian principality among his sons, the oldest receiving the principality of Kiev with the title of Grand Prince. This division of the country into a group of states was known as the system of Appanages. Each state had a ruling prince and subordinate or appanaged princes. The grand prince had authority over all of them and lived in the capital. He had a guard, called the druzhina, consisting of volunteer warriors who were his friends and counselors at all times and were well rewarded for their serv¬ ices. The drushiniks (members of the dru¬ zhina) of the highest rank called Boyare, acted by the appointment of the king as viceroys in cities, as judges, called tiunui, and collectors of tributes and fines. The king himself was chief justice. The main administrative was the Viechi, a popular as'sembly

convened by the princes. Its head was the possadnik elected by the people, who next to the prince was the highest authority. The possadnik, just as well as the tiuiniu guarded social order r.nd con¬ ducted trials. Self-government had reached its highest development in Novgorod which had become almost an independent state. Novgorod was also the commercial centre in the North, just as Vladimir in the South, both having busi¬ ness connections with the Hanseac Union formed of the German cities on the coast of the Baltic and the German Sea. While the system of the Appanages on the one hand favored the distribution of population and the develop¬ ment of commerce, on the other hand it led to internal wars of the appanaged princes. After Yaroslav the right of succession to the throne was transferred from the oldest son to the old¬ est in the family and Yaroslav's sons and grandsons ruled one after another. Their rule was greatly disturbed by internal wars of the appanged princes, complicated by the question of seniority in such a large family as that of Yaroslav. During these struggles Kiev was subject to attacks and pillage which finally caused its fall. In the second half of the 12th century it was replaced by another capital, Vlad¬ imir upon the Kliazma. At that time Russia began to suffer from the destructive invasions of the Palovtzui, a tribe kindred to the Peche- negs. For better protection against the external enemy, the cousins and nephews decided to make peace and by the treaty in Linbetz (1097) resolved that everybody inherit his own paternal estate. In spite of it the internal wars con¬ tinued until Vladimir Monomakh, the son of Vsevolod and grandson of Yaroslav I, became ruler. He was the first to realize the ideal of a peaceful principality with the grand prince as the supreme power. He exercised his author¬ ity to stop the wars of the appanaged princes and, instead, have them join him in his expe¬ ditions against the savages to check their in¬ vasions.

The internal wars, however, had considerably weakened the country, and it could not resist the wild hordes of the savage Mongols and Tartars. Their invasion resulted in Russia's subjugation to Mongol oppression (1237) and the formation of a Tartar kingdom, the Zolo-

taya Orda, along the lower Volga, with Sarai as its capital. In these days two prominent fig¬ ures stand out. Aleksander Yaroslavitch Nev¬ sky, prince of Novgorod, and Daniel Romano- vitch Galitzki in the South. The first attained fame through his victory over Birger in the war against Sweden, and the second, by checking the invasions of the

Lithuanians, who at that time had united with Poland and became a powerful principality to balance the power of the German orders on the Baltic Coast

The first attempt at freeing Russia from Mongolian oppression was made by Dimitri Danskoi (1363-89). He defeated the Tartars in the famous battle of Kulikov 8 Sept. 1380 and after renewed attacks under Ivan III they were driven from Russia and the Zolotaya Orda was destroyed. The Lithuanian conquest pressing in from the west, and the Tartar inva¬ sion from the south, greatly impeded the growth of the Moscovite empire into which the north¬ western territories had begun to form, with Moscow, founded according to the chronicle by Yuri Dolgoruki (in 1147) on the Moscow River, as the dominating city and later, under Joann Kalita the capital and ecclesiastical cen¬ tre. The first steps toward building the Mos¬ covite empire was the annexation of the princi¬ pality of Novgorod by Vasili I (1389-1425) and the abolition of self-government by the dissolu¬ tion of the Vieche (1478) under Joann III (1462-1505), the son of Vasili II (1425-62) and the grandson of Vasili I. The two remaining territories, Pskov and Riasan, were annexed by the son and successor of Ivan III (1505-08).

The first prince to be crowned (1547) Tsar of Moscow was Ivan IV, son of Vasili III and Helen, the daughter of a Lithuanian magnate. This was a time of great oppression and re¬ volt. The former friendly relations of grand princes and druzhina had long ceased. The peasants were in serfdom, having been tied by the Moscovite princes to the land which they cultivated. The members of the Boyarskaya Duma, the ruling power during Ivan's minority, contested for individual power at the expense of the people's freedom and the little Tsar's education. As a result he developed into a hard¬ hearted and cruel man, hence his surname ftGrozni® (Terrible). Oppressing the people, Ivan was suspicious of disloyalties and was liberal with punishments by death. His lack of success in the war against the Polish King Stefan Batore he ascribed to treason. His bodyguard were the ˆoprichniki® (a band of young noblemen) of whom he required a com¬ plete renunciation of their parents, and absolute submission to him. These sad days were brightened by the conquest of Siberia, an achievement of the Cossacks of the Don and their leader Ermak. The hard and exciting times of Ivan the Terrible were followed by the peaceful rule of his son Feodor (1584-98), a pious and mild prince who left the ruling to the Boyarskaya Duma, headed by Boris Gudu- nov, his wife's brother. As he was childless and his brother Dimitri dead, the line of Ruriks came to an end with his death. The people and the Zemskaya Duma (an assembly of mer¬ chants and landlords which convened only in important cases) elected the cunning Boris Gudunov to the

throne despite the opposition of many boyars. With this Tsar begins the

period of incessant troubles in Russia. Boris, suspicious of the hatred of the boyars, spared no punishments and, as a crowning piece of misfortune, the country was stricken by famine and epidemics. At his death he left the throne to his son but Lzhedimitri (False Dimitri), pretending to be Feodor's dead brother, by the help of the Polish King Sigismund, who dreamed of spreading Catholicism in Russia, seized the throne and ruled 11 months, when he was assassinated by a conspiration headed by Vasili Shniski, who succeeded to the throne. During his rule another pretender, Lzhedimitri II, unsuccessfully besieged Moscow for two years. Here begins the period of interregnum and anarchy. The Moscovite Crown was threat¬ ened by the Polish King Sigismund and was saved only by the bravery of a meat merchant Kozma and Prince Pozharski; the former by his fiery patriotic speeches stirred the people of Novgorod, who, joined by other cities, elected Pozharski as their leader and forced the Poles to surrender. The Zemskaya Duma convened in 1613 and elected to the throne Michael Fedor¬ ovich of the dynasty Romanov. When the dy¬ nasty of Romanov came to the throne the Mos- kovite Empire extended from the Arctic Ocean to the mouth of the Don and Caspian Sea, and from the White Sea to the Ural Mountains and throughout Siberia. Its main cities were the capital, Moscow, fortified by the famous Kraul, and the two commercial cities Novgorod and Arkhangelsk engaged since Ivan III in negotia¬ tions with Holland, Germany and England. The territories in the immediate vicinity of Mos¬ cow were called the territories of the Grand Prince. They were inhabited by a mixture of Finns and Slavs. In the south lived the Cos¬ sacks, in the Don region, while Turkish and Mongolian tribes inhabited the steppes of Azov and the Black Sea. Southwestern Russia was occupied by the Polish-Lithuanian Kingdom, of which the main divisions were Little Russia, White Russia and Galicia. Though the Rus¬ sians in these regions were the Greek Orthodox, the union of Liublin (1569) made them recog¬ nize the Pope as the ecclesiastical head. This aroused the discontent of the people and finally led to the uprisings of the Cossacks which re¬ sulted in the separation of Little Russia from Poland and its annexation to Russia under Alexei Mikhailovitch. Later (1667), however, the western region went back to Poland. With Michail (1613-45), anarchy came to an end and peace and order were re-established. The rule of his son and successor, Alexei (1645-76) is marked by a revolt of the people against op¬ pression and heavy taxation as in the time of Ivan III. This pointed to the necessity of a new code of laws and the Sobornoye Polozhe- niye

was composed. Ivan's oldest son, Feodor Alexsieyevich (1676-82), succeeded him and six years later was followed by Peter the Great, the youngest son of Aleksei Michailovich and Natalia Naruishkina, as his older brother Joann, son of Maria Miloslavskaya, was in ill- health. Owing to the ambition of their sister Sophia Miloslavskaya two parties formed and contested for the throne. The result was that both princes were crowned in 1682 and Sophia made regent till Peter's majority.

Peter the Great spent his childhood in the suburban Moscovite village surrounded by for-

eign friends and instructors. He often visited the German settlement called the Koki and made the acquaintance of German officers who assisted him in building a little army while playing at soldiers with his boy companions. German officers had been called to Russia by Peter's father and grandfather to teach the Russian soldiers military arts. There were at that time in Moscow many other foreigners of different professions, such as merchants, physi¬ cians, druggists, architects, who had begun set¬ tling there during the rule of Joann III, when relations with Europe, broken during the Mon¬ golian oppression, had been resumed through his marriage with Sophia, the daughter of the emperor of Byzantium, who came to Russia together with many Greeks and Italians. At the age of 17 Peter I placed in a monastery his sister Sophia, who still had pretensions to the throne, and by means of intrigues tried to attain her ends and finally succeeded in sharing the reign with her brother. Tsar Peter's in¬ terest in the army and navy, which was shown in his early childhood, still continued. He went twice to Arkhangelsk to view foreign vessels and conceived the idea of gaining a foothold on the Azov Sea for the purpose of trading with Southern Europe. After an unsuccessful at¬ tack he triumphantly took possession of Azov in the next year (1696). He then set out trav¬ eling in western Europe to study fortresses and to learn the arts of Western civilization. He joined his own embassy to Europe and, disguised as a Dutch carpenter, settled in Sardam to study the art of shipbuilding. There he boarded with a blacksmith, but, upon identifi¬ cation he changed his abode for Amsterdam, where he continued his studies. He was im¬ pressed by foreign customs and manners and began reforming Russia according to foreign models. He tried even to change the appear¬ ance of the Russians by replacing the feriaza, a long coat with very long sleeves, by the long¬ tailed coat and the kaftan, and by prohibiting a beard to all except the clergy and the peasants, unless a

tax wrere paid for the privilege of wearing one. He turned also his attention to the condition of women, against whose seclu¬ sion he strongly protested, and made the Mos- covite princes introduce their daughters in society, costumed according to Western fashions. He organized gatherings for social intercourse which he called ˆassemblies.® Mar¬ riage agreements were to be made only by the consent of the two concerned and not by their parents, as had been the custom up to this time. With the change of the Russian ways and habits Peter also started a reconstruction of the empire. In the place of the former prikazni he established collegii, the different branches of which were to take charge of commerce, revenue, army and navy, etc. The Boyarskaya Duma was replaced by the Senate and different German official ranks were substituted for Rus¬ sian. Ecclesiastical affairs were entrusted to the Synod, an assembly of archbishops, which was to take the place of the former patriarchate. He was aware of the lack of education and es¬ tablished schools for children of the nobility, who were not allowed to carry before they could read and write. The army as well as the people, particularly the clergy and the staroviertzi (i.e., old believers), were dissatis¬

fied with the foreign innovations. Protesting against the strict foreign discipline the army revolted during Peter's absence abroad, but the revolt was quelled and the rioters severely punished upon his return. Dissatisfaction with the reforms was persecuted and tried by a special secret court (Tainoe Sudilishte) before which one could be brought by any one who cared to denounce his personal enemies by simply pronouncing the words ((slovo i dielo® (i.e., (XII was lured again to Russia by his hopes to secure the Little Russia, whose hetman (or chief) Mazeppa turned traitor to Peter and promised to assist the Swedes with a great army of Cossacks. Charles XII met, however, with a crushing defeat in the battle of Poltava, 27 June 1709, and together with Mazeppa fled to Turkey. Here he instigated the Turkish sultan to declare war against Russia. With an army of 40,000 Peter set out for Turkey to face a considerably greater army of Turks and Tartars on the shores of the river Pruth. He was repelled, however, and by the Treaty of Pruth was forced to give up Azov and with it the outlet to the Southern seas and the mouth of the Don (1711). He suc¬ ceeded, however, in establishing himself firmly on the coast of the Baltic Sea where, as a result of a warfare of 10 years, by the Treaty of Nieshtat (1721) Sweden ceded to Russia Livland, Esthonia and Ingria (the present dis¬ trict of Petrograd). In that same, year he crowned himself, assuming the new title of (

Alekseiyevich died before he reached his ma¬ jority, and the Duchess of Courland, Anna Joannovna (1730-40), the daughter of Joann V, ascended the throne. Biron, a native of Courland, was at the head of the government. He was a cunning and hard-hearted man who for his selfish purposes imposed a heavy tax on the peasants and exacted it with unusual cruelties. At that time Munnich, who was in charge of the military affairs, introduced strict discipline in the army. He was the founder of the corps of cadets for the training of military officers. He became Prime Minister under Anna Leopoldovna, a niece of Anna Joannovna and the mother of little Joann VI (1740—41), whom Anna Joannovna appointed her suc¬ cessor to the throne. The dissatisfaction of the people with a foreign court grew greater and greater, and as a result little Joann, with his mother, Anna Leopoldovna, spent the rest of his days in the Schluesselburg fortress where Biron was also imprisoned. The domination of Germans at the Russian court came to an end with Elizabeth (1741-61), second daughter of Peter I. Munnich and Ostermann were exiled to Siberia and the Germans were re¬ placed by Russian statesmen, Razumovski and Shuvalov. In those days it became the custom to use the French language at the Russian court. The nobility and the bureaucracy, fol¬ lowing the tone of the court, engaged foreign educators for their children. Elizabeth's rule was marked by valuable internal improvements. During her reign the first Russian university (1755) and the first Russian theatre were founded in Moscow, the Academy of Science having been established in Petrograd by Peter I. External affairs also proved to the world that Russia since Peter the Great was occupy¬ ing a prominent position among European pow¬ ers. It participated with great success in the Seven Years' War as an ally of Maria Theresa, empress of Austria, against the Prussian king, Frederick 11.

The rule of Elizabeth's successor, Peter III, the son of her sister Anna, was of a very short duration. However, he succeeded in half a year in earning the gratitude of the people by abolishing the secret courts with its much- hated (

sia suffered a great deal from the insurrection stirred by the Cossack, Pugachev, who pre¬ tended to be the dead Peter III, and, with a band of Cossacks, Tartars and fugitives of malcontent peasants and laborers of the Ural- works, attacked and took possession of one fortress after another along the Ural boundary, putting to death their commanders. The in¬ surrection was finally subdued and its leader executed in Moscow in 1775. Catherine II carried out and promoted some of the

im¬ portant reforms started by Peter I. He had divided Russia into 12 districts; she extended the division to 150 governments (districts) with subdivisions into counties in 1775. Each dis¬ trict had its administrative and judicial depart¬ ments. Two hundred villages were turned into townships with a local administration. The city charters of 1785 divided the urban popu¬ lation into three classes : the merchants, the citizens and the craftsmen. The centre of the city administration was the city council (Gorodskaya Duma) and its head was the mayor elected by the people. The nobility was granted a charter defining its rights and privileges. These were a voluntary military body exempt from taxation and corporal pun¬ ishment. Peter the Great had placed church property under state supervision. Catherine II made the land and the serfs belonging to the Church property of the Crown in 1764. She attempted also a reform of the Russian judicial courts by abolishing tortures at trials and con¬ templated a code of new laws. She had com¬ posed her own legal maxims and appointed a committee to help her draw up a new code of laws, but these attempts were stopped by the outbreak of the Turkish wars. She showed great concern in the spread of education by establishing several city schools and a few other educational institutions ; as also in the moral rectitude of the people by increasing salaries of officials in order to stop bribery. She also took an active part in educational reform by writing fairy tales and comedies in which she ridiculed vice for the purpose of correction. Her reforms were continued by her son and successor, Paul I (1796-1801). Of these the most valuable was the improvement of the con¬ dition of the peasant serfs limiting the service to their masters to three days in the week. He further reconstructed the army following the Prussian style which was then considered the model by all Europe. He introduced even the Prussian decorative court uniform of locks and pigtails. When the French Revolution broke out, Paul I formed an alliance with Eng¬ land, Austria and Prussia to fight the French revolutionists, but dissatisfied with his allies he soon withdrew his troops after some successful military operations in Italy. His successor, Alexander I (1800-25), is represented in his¬ tory as a good-natured man of a friendly atti¬ tude who won the favorable disposition of the people by the changes which he at once in¬ stituted. Some of his edicts greatly improved the condition of the peasantry and gradually led to its emancipation. His main administra¬ tive reforms were : the removal of the system of collegii established by Peter I and their replacement by a group of ministers, such as the Ministry of the Interior, the Ministry of Education, Ministry of War and others. He

also established the Imperial Council which acted as a Senate or Upper House. His activi¬ ties on the educational field are also significant, for he promoted the general learning of the masses, established many higher schools, as Gymnasia, Progymnasia, theological seminaries and universities. Under the protectorate of Alexander I, Karamskin compiled the first (History of the Russian Empire,* and the Metropolitan of Moscow, Platon Sershin, wrote in 1812 a (History of the Russian Church. * Alexander I appreciated to a high degree the works of Pushkin and Krylov, the two great poets of his time. His further plans for in¬ ternal improvements and reform were impeded by the great wars which swept over Europe with the appearance of Napoleon I. Russia participated in the anti-Napoleonic campaigns, first as an ally of Austria and was defeated at Austerlitz, and then as an ally of Prussia, both being defeated at Friedland. Peace concluded in Tilsit (1807) was soon disturbed again by the reappearance of Napoleon in 1812. He invaded Russia with a great army and despite the desperate fight of the Russians under the com¬ mander Barklai-de-Tolli, they were defeated in the famous battle of Borodino. Napoleon then proceeded to Moscow which he entered only to find it in flames and ruin. Famine and the severe cold of the Russian winter forced the French to withdraw with enormous losses. Napoleon hurried to France intending to re¬ turn with a reinforced army, but Alexander I, by an offensive attack transferred the scene of military operations first to Germany and then to France herself. Allied with other Euro¬ pean powers, he finally succeeded in defeating Napoleon and, by the Treaty of Vienna (1815), which gave Europe a general peace, Russia annexed the Polish territory along the Vistula. There were yet further territorial expansions of Russia under Alexander I through his wars against Sweden, Turkey and Persia. Upon the conclusion of peace with Sweden, Russia ob¬ tained all Finland, and the war against the Turks ended with the annexation of Bessarabia (1812), through the splendid victories . of Kamenski and Kutuzov. About the same time Russia came into possession of the kingdom of Georgia. By a treaty of 1813 its king, George XII, agreed to have it become a de¬ pendence of Russia whose protection he sought against Turkish invasions. Alexander I was childless and his brother Konstantin Pavlo¬ vich, at that time Viceroy of Poland and re¬ siding in Varsow, was proclaimed emperor of Russia. He abdicated, however, in favor of his younger brother Nicholas. The dissatis¬ fied people used this occasion for a rebellion. The leaders who were members of noble fam¬ ilies and army officers persuaded the troops under their command that Nicholas was the author of a plot against his brother. The mutiny was quelled on 14

Dec. 1825, and a great number of revolutionists called <(De-cembrists® were executed or exiled. This incident of 1825 made Nicholas see the in¬ adequacy of Russian laws for his times and he commissioned Strauski to draw up a new code of laws which appeared in 1833, known as ((Svod Zakonov.® The most important events of his rule were the abolition of the <(Uniya® and the Polish insurrection which ended unsuccessfully. Nicholas I led two wars

against Turkey, the first for the liberation of the oppressed Greece, which came to a vic¬ torious end in 1829 and sealed by the Treaty of Adrianople, and in the second, called the Crimean War, Russia suffered heavy defeats at the hands of Turkey and her allies, Eng¬ land and France. After a vain resistance of 11 months, the strong fortress Sevastople, was destroyed in 1855. The Crimean War ended during the reign of Nicholas' successor Alexander II (1855-81). By the Treaty of 1856 Russia lost her control over the Black Sea. Alexander II continued his father's for¬ eign policy of expansion. The southern boun¬ dary was pressed further down by the an¬ nexation of Eastern Caucasia (1859) after a continuous war of 60 years. Five years later the western part was also annexed. The Si¬ berian frontier was moved southward at the expense of Central Asia where Russia made conquests in the wars against Bokhara and Kokand (1868). In 1877 Russia declared war against Turkey in support of the oppressed provinces of Serbia, Herzegovina and Monte¬ negro. In the spring of that year the Russian army crossed the frontier, captured Nikropolis, and after successful battles of Shipka Pass and Plevna, stormed Kars to free its way to Constantinople. The Ottoman Empire was forced into submission and Alexander dictated the peace terms at San Stefano (1878) exacting for Russia a large war indemnity. The ad¬ vantages gained by Russia were, however, lost again, due to England's and Germany's inter¬ vention. By the peace treaty in Berlin, Turkey's stability and independence were restored, Montenegro and Serbia were recognized as independent, and Bosnia and Herzegovina were given temporarily to Austrian administration. Russia, however, regained Bessarabia which she had lost in the Crimean War. It seemed for a time that Alexandei II was stirring Rus¬ sia toward greater liberty. On 19 Feb. 1861 he signed the famous manifesto emancipating the serfs and the charter, granted them in 1862 on the anniversary of Novgorod's milennium, made them almost self-governing. He recalled from Siberia the exiles of the conspiracy of 1825 and the Polish exiles of 1821. All this made the people hold out hopes for greater freedom. Bitter disappointment followed, for Alexander continued an autocratic strict policy with the oppression of non-Russian nationali¬ ties. Renewed Polish attempt for a separation

was mercilessly crushed. Their oppression grew worse; the Polish language was banished from their schools, Polish landowners were made to sell their land and Poles were pro¬ hibited from buying. The Ukrainophile move, ment which had originated in Little Russia in Nicholas' time also grew stronger under Alexander's renewed oppression of the Ukrain¬ ians. Alexander's improvements in railways, telegraphs and postal service promoted financial development. This, however, affected but lit¬ tle the general prosperity of the people. The embitterment culminated in the assassination of Alexander II. The effect of this assassina¬ tion was the austere policy of his son Alex¬ ander III who was crowned at Moscow in 1883. Every act of his expressed his opposi¬ tion to reforms. It was a gloomy period of great restriction and oppression of non-Rus¬ sian nationalities, the peasantry became more

impoverished. His foreign policy was that of expansion and he continued the conquest of Central Asia until the Siberian frontiers closely approached Afghanistan. The policy of Rus¬ sian tsars was not in the least changed under the last Romanov Nicholas II (1894-1917). His autocratic attempts for territorial expan¬ sion involved the country in the Russo-Japan¬ ese War which led to the surrender of Port Arthur and crushing defeats at Mugden. The despotic regime grew more intense. Pobiedonos- tev, called the <(evil spirit of Russia,® practi¬ cally ruling Russia from 1881, now became omnipotent. The Zemstvos, rural provincial organizations created by Alexander II for the self-government of peasants after their libera¬ tion, were increasingly repressed in their activi¬ ties. Poles' Jews, Armenians, Georgians and various sects of Orthodox malcontents were oppressed and persecuted. The anathematizing of Leo Tolstoy by the Holy Synod characterizes the country's attitude toward the freedom of speech and conscience. Despite the fact that Nicholas appealed in 1898 to the Great Euro¬ pean powers to form a peace conference at The Hague for the discussion of terms for a last¬ ing international peace, he had no sympathy with progressive reforms. These were achieved by the Revolution.

The Uprising of the Decembrists was the culmination of a long growing dissatisfaction which was still more stirred by the democratic ideas which the Russian officers brought back from their anti-Napoleonic invasion of France. Upon their return to Russia they formed secret societies for dissemination of these ideas. The

organizers of these societies hoped to reach a democracy in Russia by influencing Alexander I, who in the beginning of his rule was very progressive and instituted many reforms. At first Alexander I seemed to bend toward the progressive element. He planned to grant a constitution and a large measure of self-govern¬ ment, but ultimately yielded to his reactionary advisers. He not only was on watch against the revolutionary movements at home, but also helped to suppress such in Germany, Spain and Italy, having obliged himself to do so by sign¬ ing the protocol. The execution and exile which followed the suppression of the mutiny in 1825 still more embittered the people. The secret societies for the purpose of overthrowing the autocracy began to grow. Their branches scat¬ tered all over Russia. With the growth of popular discontent and unrest, the rule of Nicholas I, called the ((Iron Tsar,® became more austere and more oppressive. He tried to crush all progressive movements by establishing a strict censorship and a secret service police which became the terror of the fighters for liberty. The leaders of the societies called <(circles,® men like Petrashevski, Hezen and Bakunin, became more active. The discontent was followed by outbreaks on the part of the peasants. The defeats suffered by Russia in the Crimean War lessened in a high degree the con¬ fidence of the people in the government and the cry for reforms grew louder. When Alex¬ ander II ascended the throne he could not but obey the national will and he introduced a series of reforms, chief amongst which were the emancipation of the serfs, 1861. This, however, appeased the peasants only for a short time.

For though released the peasants continued to live in bondage. The soil allotted to them was to be paid for and the period for payment was 50 years. Autocratic ruthlessness continued. Its natural consequence was increased activity on the part of the revolutionaries. New secret societies came into existence. <(Land and Free¬ dom,® organized in 1876, instigated agrarian up¬ risings. Their suppression was followed by terroristic acts. High officials were assassinated and finally Alexander II himself paid with his life, 13 March 1881.

The immediate successors of Alexander II, Alexander III and Nicholas II, were still more reactionary. Instead of carrying out reforms promulgated by Alexander II, they met de¬ mands for reforms with a greater restriction of the press, wholesale arrests and exiles to Siberia. These measures could hardly moderate the discontent. The oppression of the people took more definite form. The revolutionary element organized into parties which were mostly of a socialistic nature. The best known of these are the Social-Democratic and the Social-Revolutionary parties and the ((Bund.® The methods of fighting the government were also changed. Terroristic measures were re¬ placed

by a systematic development of revolu¬ tionary literature and its rapid spread. The failure in the Russo-Japanese War, in the same way as the defeat in the Crimean War of the time of Nicholas I, discredited the government in the eyes of the people. Along with their legal movement for freedom grew out another which endeavored to bring about reforms by legitimate means. On 21 Jan. 1905, the people decided peacefully to approach' the Winter Palace and to ask for freedom. The response of the government was firing upon the crowds in which there were many women and innocent children. This incident, called the "Bloody Sun¬ day,® enraged the people and a series of revolu¬ tionary outbreaks followed. This marked the be¬ ginning of the Revolution of 1905. Aware of the general popular unrest the government saw no other expedient but to grant a constitution in October 1905. The liberties which it prom¬ ised, however, were withdrawn before they were ever realized. The general strike which followed the withdrawal was successfully broken and the revolters were savagely pun¬ ished. Massacres of Jews crowned the triumph of the government. Of all granted reforms only one remained in force. This was the es¬ tablishment of a Duma, i.e., a parliament, how¬ ever, only of a consultative nature. The first Duma with a majority of Constitutional Demo¬ crats convened in April 1906, but was dissolved for its demands of a limited monarchy. The second Duma met with the same fate. The third Duma which was composed mainly of reactionaries was in session five years without accomplishing anything of importance. Exile to Siberia remained still a prominent and effec¬ tive measure of the government. Only the fourth Duma elected in 1912 succeeded in bringing about a change of great significance. The unrest in the world of labor and strikes had ended by an apparent triumph of the gov¬ ernment. When the War of 1914 broke out the Duma was still a pillar of reactionism. The Duma and the people were two hostile camps, but the war brought them together. Almost

all political factors found it advisable to join the Russian government in its struggle against German autocracy which oppressed Russia economically. Moreover, all Russians united in the common work of war relief for which purpose the Zemstvos became one of the main factors of the Revolution and formed an <(A11 Russian Zemstvo Union® with a general com¬ mittee and Prince Lvov as its president. The towns and different industries also formed into unions, while the people, both revolutionaries and conservatives, were drawn nearer to

each other by common interests. At the same time, they began to lose their confidence in the gov¬ ernment on account of its repeated defeats in the field. This lack of confidence was especially manifest when Russia's defeat and heavy losses inflicted by Hindenburg in the autumn of 1914 was followed by the execution of a member of the Russian General Staff, Colonel Myasoyedov, for treason ; and, when after the occupation of Poland, Lithuania and parts of Loluinia and Courland by the Germans, the Minister of War, Sukhomlinov, was found guilty of ac¬ cepting bribes. The persecution of Jews and their removal from homes near places of mili¬ tary operations (1914-15), in order to veil the treacherous acts of the government, did not produce the desired effect on the people; on the contrary, it only increased bitterness.

The reactionary element of the people also became hostile to the government and when the Duma met in 1915, the Octobrists (the Conservative wing, so named after the mani¬ festo of October 1905), joined their former political opponents and formed the so-called "Progressive Bloc® in August 1915. The main point of the program was the demand of a coalition government composed of men who would enjoy the confidence of the people, a true parliamentary form of government and various progressive reforms. This was the first move of the Duma for liberty and reform. Upon this, the reactionary Goremnikin, who was then at the head of the government, ob¬ tained the tsar's signature for the suppression of the Duma. The members of the Cabinet who favored concessions to the Duma were re¬ called and reactionaries appointed in their places. Furthermore, the government dis¬ graced itself in the eyes of the people by its submission to the so-called "dark forces,® i.e., a clique behind the government prompting and helping it to serve its private ends. The centre of those "dark forces® was a monk, by the name of Rasputin, who, playing upon the ignorance, superstition and prejudices of the Imperial Court, gained an easy access to it in 1905 and used its influence to obtain appoint¬ ments and promotions to high official positions of the various charlatans who had won his friend¬ ships, as also the ruin of those toward whom he was not favorably disposed. His influence was so great that he once succeeded in forcing the very Synod to nullify its own decision. Among the associates of Rasputin there were such personages as the metropolitan of Petrograd, Pitrim, and Manasevich-Mamilov, who acted for the Russian government as secret agents. This influence of the "dark forces® on the govern¬ ment brought about the split in the conservative circles and a strange opposition of the few who endeavored to conclude a secret treaty of peace

with Germany. The people became especially suspicious when Boris

Sturmer, the grandson of an Austrian Teuton, succeeded Goremnikin as Prime Minister with the portfolio of the Minister for Foreign Affairs, which he took from Sasonov, when the latter retired in de¬ monstrative opposition to a separate peace with the Central Powers. In order to prevent any further anti-peace discussions the press of the country was severely censored. The heaviest blow, however, which caused great irritation, was the order of the cabinet in the spring of 1916, prohibiting all national conventions or conferences of the social organizations for re¬ lief work. But the protestation and unrest of the people were of no effective consequence as long as the armies were with the government. The revolutionary element, however, com¬ menced gaining ground with the military circles. This was to a certain extent accom¬ plished by the fact that most of the social workers at the front were revolutionary college students who spared no efforts to enlighten the soldiers by establishing schools in which they conveyed to them the idea of democracy. When the Duma met on 14 Nov. 1916, its speakers, one after another, attacked the government, and its president, Rodzianko, a rich landowner, who enjoyed the fullest respect of the conservatives of the country, came out openly against the Prime Minister, Sturmer. In the speech de¬ livered by the leader of the Constitutional Dem¬ ocrats, Sturmer was also severely attacked. Even the reactionary Pirreshkevitz assaulted the Minister of the Interior who was guided by the policy of Sturmer and worked for a separate peace. For the first time in Russia's history, the greater majority of the Imperial Council sided with the Duma and severely criticized the government and the "dark forces® behind it. The congress of the nobility, which met in December, joined the rest unani¬ mously denouncing the "dark forces.® The War and Marine Ministers at once declared them¬ selves on the side of the Duma and Prime Minister Sturmer saw no other way out of the difficulty but dissolving the Duma, and set out for the general headquarters to urge the em¬ peror to approve of his step; but before he reached his destination he was informed of his dismissal by the imperial order. A. Trepov succeeded him. Before adjourning for Christmas the Duma adopted a resolution pro¬ testing against the. forces undermining the nation's effort to win the war and endorsing the activities of the social organizations. The embitterment in high circles against the evil influences of the "dark forces® resulted in the assassination of Rasputin, 30 Dec. 1916. The murder was followed by the removal of several ministers whose seats were filled by strongest reactionaries. On 1 Jan. 1917, the tsar gave a blow to the liberal forces of the Imperial Coun¬ cil by issuing an edict recalling a large number of progressive members and replacing them with reactionaries. The bureaucrat Scheglo- vitov was made president of the council. The

cabinet was also to be reorganized, replacing its members with strongest reactionaries before the next meeting of the Duma. On 27 February the Duma convened. On that day 30,000 laborers went on strike in Petrograd. The trouble in the Duma began with the refusal

of Scheglovitov to permit the leaders of the left group (revolutionaries) to make a dec¬ laration. In response to that measure the revolutionaries, together with a number of members of the centre, left the hall. The invitations sent by the leaders of the Progres¬ sive Bloc to the members of the cabinet for the discussion of measures for reform were ignored. Meanwhile hunger stirred the dis¬ content of the people and soldiers, especially in view of the fact that food-supplies were found stored away by the police. In March riots began in Petrograd. The government re¬ sponded by calling out troops to patrol the streets and proclaiming martial law. The dem¬ onstrations of all classes of people were becom¬ ing numerous when almost all the newspapers stopped their work and the organized laborers of Petrograd elected a council for the direction of general strikes and the great revolutionary movement that was pending. The Progessive Bloc, then still in session, framed a resolution to break with the government. The tsar issued an edict ordering its dissolution on 11 March. The Duma ignored the order. The government tried to restore its authority by ordering the police to use their weapons freely against the people. Disguised as soldiers of the Voluinski regiment they fired, killing and wounding about 200 of the crowd. In the afternoon the Voluinski regiment joined the revolutionaries. Other regiments, one after another, followed their example. The president of the Duma, Michail Rodzianko, sent to the tsar warnings at repeated intervals. The tsar, however, ignored the warnings of the Duma as well as those of his generals. Aided by the army the revolutionists made gigantic steps. The main arsenal fell into their hands ; police stations were demolished. The famous prisons, the Peter and Paul fortress and Schluesselburg, were at¬ tacked in a rapid succession. Joined by re¬ leased prisoners, some of whom were leaders of the Petrograd uprising of 1905, the rebels proceeded to the secret service department and set on fire its archives. In the afternoon of the same day, 12 March, Taurida Palace, the meeting place of the Duma, was surrounded by the revolutionary forces. The telephone and telegraphic apparatus were captured. Kerensky, leader of the Social-Democrats, and Miliukov, leader of the Constitutional-Democrats, ad¬ dressed the regiments and their speeches were cheered by the revolutionists. Thus

the peo¬ ple and the Duma joined hands to finish the work of the Revolution, while some of the re¬ actionary officials either resigned, as did Premier Galitznin, or disappeared altogether. The members of the Duma appointed a council of 12 members representing all parties. This council, called the Duma Committee of Safety, represented the Duma and the Labor party and, after a night's session, issued a proclamation calling the people to order and effecting a com¬ plete overthrow of the old regime. On 13 March, various military organizations, headed by their officers, appeared before the Duma committee to express their submission, and on that same day the regiments de¬ fending the Admiralty surrendered. On 14 March the emperor's body guard joined the revolutionists and the Winter Palace was oc¬ cupied by the rebels. By a mutual consent of

the two representative bodies (Duma Com¬ mittee of Safety and the Council of Workers and Military Deputies) a provisional govern¬ ment was formed which decided to ask the emperor to abdicate and proclaim Grand Duke Michael regent. The Committee of Safety in Petrograd then informed all other cities that the old government had been deposed and a new and temporary government formed by the Duma. The provisional government was at once recognized by all the cities of the empire. Moscow and Charkov were the first to do so. Also foreign governments, through their diplo¬ matic representatives, recognized the new order of things and announced their readiness to enter upon negotiations with the provisional government. Meanwhile the ex-Premier, Stur- mer, General Kurlov, General Komissarev and many other high officials were arrested. The chief of the Black Hundreds (i.e., the origin¬ ators of massacres), Dr. Dubrovin and the metropolitan Pitrim, member of the Mark forces,® met with the same fate. The Duma committee appointed a special commission to take charge of the railroads, telegraphs and telephones and of various other governmental departments. Encounters between the revolu¬ tionists and the police still continued and hun¬ dreds of the police officials were arrested. The revolutionists had the unanimous support of the commanders-in-chief and of the Petrograd clergymen and officers, who issued appeals to the people and armies, respectively, to continue their revolutionary work. On 15 March the tsar abdicated in favor of his brother, Grand Duke Michael, who, in his turn, abdicated the next day, thus ending the rule of the Romanov dynasty. As the people objected to the deposed tsar's liberty, he was placed, together with his family, under arrest in the Tzarskoe Selo where the guards had also revolted. The im¬ perial family had to part with a great number of their servants and were deprived of all tele¬ phone and telegraphic connections with Petro¬ grad. The colossal income of the tsar's estates

now went to the State Treasury. The first step of the provisional government was the attempt to restore order and Professor Yurevich was ap¬ pointed chief of police. Investigations in the former activities of the bureaucrats were started energetically as a preliminary step in their trials. Many chiefs of the fallen regime were arrested. Among these there were Baron Frederick, General Vozeykov and General Zroz- ovski of Moscow. The provisional government marked the beginning of its administration by ordering full amnesty to all political prisoners and offenders, the complete emancipation of the Jews, the abrogation of the Pale of Settle¬ ment, the abolition of death penalty, the aboli¬ tion of the police and the formation of a militia. Soldiers were granted freedom of speech and uncensored communication with their homes. Immediately after the Revolution laboii councils were formed after the model of the Petrograd council. The cdup d ' etat of the Maximalists (Bolsheviki) in November 1917 resulted in the setting ur of a Communist state and great economic demoralization. In 1921 certain modifications were made in the system and trade relations were resumed with several nations including England. See War, Euro¬ pean ; Russia and the War.

Bibliography. — Arnaud, C. A. de, (The

New Era in Russia) (Washington 1900) ; Bad- deley, J. F., (The Russian Conquest of the Caucasus* (New York 1908) ; Bain, R. N., (The Pupils of Peter the Great from 1697 to 1740* (London 1897), 'Slavonic Europe: a Po¬ litical History of Poland and Russia from 1447 to 1796> (Cambridge, England, 1908), (The Daughter of Peter the Great) (London 1899) and (The First Romanoffs* (New York 1905) ; Banks, J., 'A New History of the Life and Reign of the Czar Peter the Great) (Windsor, Vt., 1811) ; Baring, M., 'The Russian People) (London 1911) and (The Mainsprings of Rus- sia) (New York 1914) ; Beazley, Forbes and Birkett, 'From the Varangians to the Bolshe- viks) (Oxford 1918) ; Bechhofer, C. E., (Russia at the Cross-Roads * (London 1916) ; Berard, V., (The Russian Empire and Czarism* (Lon¬ don 1905) ; Beveridge, A. J., 'The Russian Ad¬ vance^ (New York 1903) ; Bond, Sir E. A., 'Russia at the Close of the 16th Century) (Lon¬ don 1856) ; Bubnoff, I. B., (The Co-operative Movement in Russia, Its History, etc.* (New York 1917) ; Buel, J. W., 'A Nemesis of Gov¬ ernment* (Philadelphia 1899) ; Child, R. W., Potential Russia) (New York 1916) ; Curtin, J., (The Mongols in Russia) (New York 1908) ; Curzon, G. N. (Earl), 'The Russians in Central Asia in 1889 and the

Anglo-Russian Question) (London 1889) and Problems of the Far East) (ib.) ; Dobson, G., (ib. 1914) ; Howe, Mrs. Sonia, (A Thousand Years of Russian History) (London and New York 1916) ; Joyneville, C., (Life and Times of Alexander P (London 1875) ; Kleinschmidt, A., 'Drei Jahrhunderte russischer Geschichte, 1598-1898* (Leipzig 1898) ; Kluchevsky, V. O., 'A History of Russia) (3 vols., New York 1911-13) ; Kornilov, A., 'Modern Russian His¬ tory . . . from the Age of Catherine the Great to the PresenP (2 vols., ib. 1916—17) ; Kovalevsky, M., 'Modern Customs and Ancient Laws of Russia> (London 1891) and (Institu¬ tions Politiques de la Russie* (Paris 1903); Kovalewsky, W. de, 'La Russie a la Fin du XIX* Siecle* (ib. 1900); Krausse, A. S., Rus¬ sia in Asia 1 558 — 1899 > (New York 1900) ; La- visse, E., Rambaud, A., and others, on Russia in (Histoire Generale* (Vols. X, XI, Paris 1898- 99); Leroy-Beaulieu, 'L'Empire des Tsars et les Russes* (3 vols., Paris 1882; English trans., New York 1902-05) ; id., 'La Renovation de l'Asie) (Paris 1900) ; Lethbridge, A., 'The New Russia) (New York 1915) ; Lowe, C., 'Alex¬ ander III of Russia) (London 1895) ; Mahan, A. T., (The Problem of Asia* (New York 1900) ; Martens, F. de, 'Recueil des traites conclus par la Russie avec les puissances etrangeres* (Petrograd 1878 —); Mayor, Prof. J., 'An Economic History of Russia-' (New York 1914) ; Milyukov, P., (Etude sur l'histoire

de la Civilisation russe) (Paris 1901) ; Molloy, J. F., 'The Russian Court in the 18th Century) (London 1905); Morgan, E. D. (ed.), 'Early Voyages and Travels to Russia and Persia by Anthony Jenkinson and other Englishmen (London 1886) ; Munro, H. H., 'The Rise of the Russian Empire* (London 1900) ; Noble, E., 'Russia and the Russians* (New York 1900) ; Norman, H., 'All the Russians) (ib. 1902) ; Notovitch, N., 'La Russie et l'Alliance Anglaise: Etude historique et politique) (Paris 1906) ; Pobyedonostsev, K. P., 'Reflections of a Russian Statesman (London 1898) ; Popow- ski, J., 'The Rival Powers in Central Asia, or, The Struggle between England and Russia in the EasP (ib. 1893) ; Ralston, W. R. S., 'Early Russian History* (ib. 1874) ; Rambaud, A., 'History of Russia from the Earliest Time to 1881 > (2 vols., Boston 1882) ; Sarolea, C.,

'Europe's Debt to Russia> (London 1915) and 'Great Russia: Her Achievements and Prom- ise) (New York 1916) ; Skrine, F. H., 'The Expansion of Russia 1815— 1900) (London 1915) ; Stepniak, E., 'King Log and King Stork, a Study of Modern Russia> (2 vols., London 1896) and 'At the Dawn of a New Reign: Modern Russia* (ib. 1906) ; Thompson, H. M., 'Russian Politics* (London 1896) ; Times (London), 'The Book of Russia) (1916) ; ib., 'A Russian Parliament under Catherine IP (14 May 1906) ; Urusov, S. D., 'Memoirs of a Russian

Governor* (New York 1908) ; Vino- gradoff, Sir P., ‘Self-Government in Russia* (London 1916) ; Waliszewski, K., ‘Ivan the Terrible* (Philadelphia 1904) ; id., ‘Paul the First of Russia, the Son of Catherine the GreaP (London 1913) and ‘Peter the GreaP (ib. 1897) ; Wallace, Sir D. M., ‘Russia) (2 vols., new ed., London 1912) ; Weale, B. L. P. (Simpson, B. L.), ‘The Coming Struggle in Eastern Asia) (ib. 1908) ; Wiener, Leo, ‘An In¬ terpretation of the Russian People> (New York 1915) ; Winter, N., ‘The Russian Empire of To-day and Yesterday) (London 1914) ; Wol- konsky, Prince S., ‘Pictures of Russian His¬ tory and Russian Literature> (New York

1898).

Revolution of 1905. — Durland, K., ‘The Red Reign) (New York 1907) ; Linden, A., ‘Die Juden Pogromen) (2 vols., Berlin 1910) ; Milyukoff, P., ‘Russia and its Crisis) (Chicago 1906) ; Perris, G. H., ‘Russia in Revolution (London 1905) ; Semenoff, E., ‘Une Page de la Contre-Revolution russe : Les Pogroms) (Paris 1906) ; Van Bergen, R., ‘The Story of Russia* (New York 1905) ; Villari, L., ‘Russia under the Great Shadow) (New York 1905) ; Zilliacus, K., ‘The Russian Revolutionary MovemenP (London 1905).

Revolution of 1917. — Anet, C., ‘Through the Russian Revolution (London 1918) ; Beatty, Bessie, ‘The Red Heart of Russia> (New York 1918) ; Brown, A. J., ‘Russia in Transformation (ib. 1917) ; Bryan, Louise, ‘Six Red Months in Russia) (ib. 1918) ; Buis- son, F„ ‘Les Bolcheviki, 1917-19> (Paris 1919) ; Dillon, E. J., ‘The Eclipse of Russia) (New York 1918) ; Dorr, Mrs. Rheta, ‘Inside the Rus¬ sian Revolution (ib. 1917) ; Houghteling, J. L., ‘Diary of the Russian Revolution (ib.

1918) ; Keeling, H. V., ‘Bolshevism) (London

1919) ; Kerensky, A. F., ‘The Prelude to Bol¬ shevism: The Kornilov Rebellion-* (ib. 1918); ‘Lenine and Trotzky German Agents* (Cur-

rent History, New York,. November 1918) ; Levine, I. Don, (The Russian Revolution (ib.

1917) ; Lonˆ. R. C., (Russian Revolution As- pects) (ib. 1919) ; McCabe, J., (Romance of the Romanoffs5 (ib. 1917) ; Marcosson, I. F., (The Rebirth of Russia5 (New York 1917) ; Olgin, M. J., (The Soul of

the Russian Revolution5 (ib. 1917) ; Petrunkevitch, Harper and Golder,

1918) ; Ross, E. A., ‘Russia in Upheaval5 (ib. 1918) ; Russell, C. E., ‘Unchained Russia5 (ib. 1918) ; Sack, A. J., (The Birth of the Russian Democracy5 (ib. 1918) ; Spargo, J., Bolshe¬ vism5 (ib. 1919) ; Trotzky, Leon, ‘The Bol- sheviki and World Peace5 (New York World, 13 Jan. 1918) ; id., (History of the Russian Revolution to Brest-Litovsk5 (London 1917) ; id., (Our Revolution, etc.5 (New York 1918) ; Victoroff-Toporoff, V. (ed.), (La Premiere Annee de la Revolution Russe5 (Bern 1918) ; Walpole, H., ‘Petrograd on the Eve of Revolu¬ tion5 (London 1919) ; Weiss, J., (Les Bolche- viks au Purvoir5 (Lausanne 1918) ; Wilton, R., ‘Russia’s Agony5 (New York 1918) ; ‘The Thing Called Bolshevism5 (World’s Work, New York, January 1919). See Maximalists.

W 01 SLAV M. Petrovitch, Chief of Slavonic Division, New York Public Library.

3. RUSSIAN LANGUAGE. In historical times the Slavic languages appear already sub¬ divided into three groups, the southern, the western and the eastern. The southern com¬ prises the Serbo-Croatians and Slovenians, known as Jugo-Slavs, and the Bulgarians; the western consists of the Czechs, Slovaks, Serbo- Lusatians and Poles; the eastern embodies all the Russian dialects. It is doubtful whether the present subdivision of the Russian dialects into Little, White and Great Russian goes back be¬ yond the 11th century, but since then these have formed distinct groups, and the present growth of nationalism in the Ukraine bids fair to bring about a strong literary development of Little Russian, while White Russian may politically and socially disappear in the newly-created Lithuanian, Polish and Little Russian nation¬ alities. Kiev was originally Great Russian, but early in the Middle Ages Little Russians kept moving up from Galicia until now they can claim linguistically the territory north as far as the government of Syedlets and parts of Grodno and Minsk. They hold the governments of Pol¬ tava, Kharkov, Voronezh and extend into Chernigov, Kiev, Volhynia, that isJ they are found in the territorv provisionally denom¬ inated as the Ukraine. The White Russian, an intermediary between Great Russian and Polish, is found in the governments of Grodno, Vilno, Vitebsk, Pskov, Mogilev, Minsk. Although used in historical documents in the Middle Ages it never developed a literature of its own.

The Great Russian, which we shall now call Russian, is divided into two large groups, by a line running from Lake Peipus to Nizhni-Nov-

gorod and thence directly east. The chief char¬ acteristic of the southern group is the pro¬

nunciation of unaccented o as a, which is not the case in the north. The chief representative of the southern group is the local Moscow speech, which is the basis for the official lan¬ guage, and, both on account of its political im¬ portance and the softness of its consonantal enunciation, bears the same relation to the Rus¬ sian dialects that the Sienese or Florentine bears to the Italian dialects. But the Muscovite pronunciation is not rigorously followed outside the southern group. In the north the unac¬ cented o remains o, and throughout the vast territory which belongs to Russia, without being Great Russian, the school pronunciation is nor¬ malized and more regular than in the soft utterance of Moscow, thus bearing the same re¬ lation to the Muscovite that the English of American schools bears to the Bostonian or New England pronunciation.

The language of literature and the Church up to the 18th century was not Russian, but Church Slavic, which is of southern Bulgarian origin, due to the dissemination of Christianity from Bulgaria. But from the very beginning the local Russian speech of Kiev intruded into the vocabulary and pronunciation of the Church and modified it, while the Bulgarian of the Church language similarly affected the spoken language. Thus the Church Slavic of Russia in time assumed a special aspect in the Church books of the Russian redaction, later to re¬ enter Serbia and Bulgaria and reintroduce a considerable Russian element into the southern languages.

The Bulgarian introduced a very large num¬ ber of phonetic and morphological peculiarities into the spoken language, especially in words connected with the intellectual and religious life. The chronicles and judicial documents em¬ ployed from the start a language which was essentially Great Russian, but with an admix¬ ture of Church Slavic words. Though origi¬ nally an Indo-European language, Russian has a considerable non-Indo-European vocabulary. The Finnish tribes of the north and the Tatar nations ‘of the south, even before the Tatar invasion, have enriched the vocabulary, and there are still other unaccounted-for elements in the language, which of late have been ascribed to a prehistoric residence in the Cau¬ casus. Beginning with the 14th century Mos¬ cow takes the place of Kiev as an intellectual centre, and here the local speech, which arose from a union of southern and northern dialects, penetrates into the written language, and the local literary varieties of Novgorod, Tver and Ryazan soon pale before the administrative lan¬ guage of Moscow. Since then the Russian has received new linguistic additions. The most

re¬ fined literary Polish furnished a considerable number of words, dealing with manners, and the introduction of the technical arts from the West opened the door to Dutch and German words, which entered in alarming quantity with Peter the Great. Later, the adoption of West¬ ern culture has given an enormous number of words from the German, the Romance lan¬ guages and the Latin for scientific purposes. If one considers that possibly one-third of the Church Slavic represented Greek borrowings and that these were also bequeathed to tht Russian, one can see that the Russian, lik< most literary languages, is very composite in it

nature. From the 16th century on the spoken language is more and more used as a means of written expression, but up to the 18th century the Church Slavic maintained itself successfully in the Church. With the growth of culture, the spoken Muscovite and the Church Slavic blend into one, and in the second half of the 18th century the literary norm is established, to be perfected by Karamzin and Pushkin into a harmonious tongue, capable of all uses to which a literary language is put.

The Russian language is, in spite of the pre¬ vailing opinion, not a difficult language, al¬ though very rich in grammatical forms and for¬ bidding to the beginner on account of its strange alphabet. The alphabet is identical with the Church Slavic, except that Peter the Great in 1708 simplified its letters by bringing them in harmony with the simpler Latin letters of the West. This current form of the alpha¬ bet is known as the civil alphabet, as opposed to the Church Slavic Kirilitsa. The alphabet consists of 37 letters, but two of them are rarely used, and the Bolshevik Minister of Edu¬ cation has ordered the abandonment of the useless hard sign and the superfluous ye, which is phonetically identical with e and of y, which is identical with i. This reform has long been mooted and, should it become universal, Rus¬ sian would be the best phonetic language of Europe. The additional letters to the Latin alphabet are not a hindrance, but an advantage, because in Polish and Czech, where the Latin alphabet is used, the diacritical marks used to represent additional sounds are not conducive to easy and rapid writing. The accent is vari¬ able in Russian and extremely difficult if studied in itself. Therefore, all the better grammars and readers, even those for the Rus¬ sian schools, where non-Russians may happen to be, are accented throughout. It can be ac¬ quired only by long practice, when analogy, which guides

the native in his speech, auto¬ matically and with fair safety furnishes a clue to the accent of any new form one may meet. The pronunciation of Russian is not difficult, but the chief difficulty to the Westerner lies in his tendency to harden soft combinations. Before e and i and the vowels beginning with y, such as y a, ye , yo, all the consonants, but more especially the dentals, become distinctly palatalized, that is, these are pronounced not with the tip of the tongue pressing against the roof of the teeth, but by touching the palate with the tongue higher up. An.other difficulty is the hard l before a, o and u, which is not pronounced, as in English, between the tip of the tongue and the root of the teeth, but, while the tip of the tongue rests against the teeth, by vibrating once the uvula and producing a gut¬ tural l, akin to a gutteral r. The other sounds offer no especial difficulty. The phonetic changes within the conjugation of the verb or in derivations, which appear so puzzling to one beginning the study of Russian, is in reality produced by an attempt to remain phonetic, for in English or French practically the same phe¬ nomenon may be observed, only while the Rus¬ sian writes noshu for nosiu, the English writes mission and pronounces mishon. A clear un¬ derstanding of the law of phonetic change re¬ moves this difficulty far more thoroughly than the difficulty of the English pronunciation can be overcome by a foreigner. vol. 24 — 2

The Russian noun has three genders and two numbers, like the Latin, and seven cases. Each gender is declined differently, but their plurals practically are identical, except for the genitive case, which causes some difficulty. The neuter singular does not materially differ from the masculine, but the feminine has totally dif¬ ferent forms. What complicates the declension is the fact that words with a soft or palatalized ending have to be declined soft throughout, and there are very many variations in the geni¬ tive and prepositional cases, due chiefly to a confusion of the historic o and u declensions. Such forms can be acquired only through long practice. The dual of the Church Slavic has almost entirely disappeared, leaving but feeble traces in words naturally dual, such as that for ((eye, ear.® The most curious reminiscence of it is found after the numerals <(two, three, four,® when the noun stands in the genitive singular, because that form frequently corre¬ sponded to the nominative dual. From ((five® on the genitive plural is used by analogy. The adjectival declension is interesting from the fact that by the side of an apocopated form of it, which almost entirely coincides with that of the noun and which is used only in the pred¬ icate, there is a fuller declension, formed orig¬ inally from the nominal endings plus the corre¬ sponding endings of the personal pronoun of the third person, which was used as an

article. Thus we have the curious phenomenon of a post-positive article, which is still in full use in Bulgarian, in existence in all the unrelated languages of the East, in the Scandinavian of Germanic origin, in all the Slavic languages, in Rumanian of Latin origin and in Albanian. The Russian is not fond of an attributive geni¬ tive and generally turns such into a correspond¬ ing adjective, hence it is far richer in adjec¬ tival forms than the languages of the West. The vast majority of family names ending in ov, in, ovich, ski, etc., are just such adjectives, hence the absence of titular von or de, or any¬ thing that corresponds to it, from the Russian vocabulary. The adjectives practically lack the superlative, which is supplied by the compara¬ tive or various intensive adjectives or parti¬ cles. The chief difficulty in the formation of the comparative is the doubling of forms caused by drawing the apocopated comparative chiefly from the native Russian, and the full attribu¬ tive comparative chiefly from the correspond¬ ing Church Slavic formation. The numerals are bothersome because every one of them is declined, and in a combination such as ((one thousand two hundred and forty five men® six different declensional forms will occur. While the nominal declension is complex, the syn¬ tactical application of it is rather simple, be¬ cause the abundance of cases, each one with a distinct function, obviates the difficulty which is ever present in a language without gram¬ matical endings, such as French, where only the closest of attention makes one expert in the use of de and a. Thus Russian, though full of perplexing difficulties, has the unusual compensation of a language with a minimum of syntactical rules.

In the verb the relation between svntax and grammatical forms is reversed. Of the whole intricate structure of the Church Slavic, with its aorist and multiplicity of past tenses, very little is left. Only one, unconjugated past is

left. The future is a compound of I shall and the infinitive, but in a large class of verbs the present does duty for the future. Thus there is only one tense, the present, that really can cause difficulty, on account of a number of con¬ sonant changes that are liable to happen. There are only two conjugations, and a simple rule accounts for the great majority of the so- called second conjugation, leaving everything else to the first. There is a wealth of simple participial forms, which are also found apoco¬ pated and are called gerunds. These make it possible to express a large number of ad¬ verbial phrases in a very

simple and precise way. But, to atone for the absence of a com¬ plicated conjugational system, there is the mat¬ ter of aspects which to the beginner is likely to prove a stumbling block, but which supplies the language with a mass of delicate shades of expression which the Western languages can seldom render correctly. A verb expresses either the action, when it is of the imperfective aspect, or the result of an action, when it is of the perfective aspect. Most verbs have the two, and many are capable of even more delicate distinctions. An imperfective aspect may refer to an indefinite action or to an action with a definite aim; a perfective aspect may not only refer to the result of the action, but also to its suddenness, when it becomes self-active. In addition, there are iterative verbs, which repre¬ sent frequently repeated action. Many verbs have all or nearly all of these forms, which differ from each other by suffixes and prefixes, added in a definite way. The perfective has only two tenses, the past and the future ; the iterative only one, the past, and the imper- fectives, all three. Only long training makes one perfect in the use of these, but in reading the matter is not of such pressing importance.

The Russian avoids the passive voice and has an exceedingly simple way of expressing the subjunctive, which is made up from the unconjugated past tense by the addition of a particle, but makes up these deficiencies not only by the very comprehensive aspects, but also by the use of a reflexive which does not differ from the rest of the verbs, except for the addition of the unchanged reflexive ending. Besides, a particular shade of involuntary ac¬ tion, such as to express the idea I want to eat, as the result of hunger, and not as a wilful act, is expressed by an impersonal construction, so that the ambiguity of the English is always avoided.

The sentence structure of Russian is sim¬ plicity itself. Though originally the Russian, through the Church Slavic, based its sentence on the periodic Greek speech, Karamzin, who had studied in England, popularized the simple co-ordinate arrangement of clauses, as against the intricate and clumsy German subordinate periodic structure, and this simple style has re¬ mained the norm. The language is simple and direct. Add to this the facts that the order of words is quite immaterial, since it is guided exclusively by emphasis, that the indirect dis¬ course is practically unknown and that a small basic number of words furnishes an inexhaust¬ ible number of derivatives of every imaginable shade of meaning, and it will become clear that the Russian language cannot possibly be so difficult as it is generally represented to be. The trouble is that all the troublesome points

are met with at the very start, but, while the difficulties of German, for example, keep in¬ creasing, the difficulties of Russian stop very soon. Thus in a given period, after the rudi¬ ments have been mastered, considerably faster progress can be made in Russian than in German.

As the Russian vowels are all open, except in specially favored positions, and the con¬ sonants are not harsh, the Russian language is particularly adapted to singing, even beyond Italian For- literary purposes it is especially good, since the most difficult ideas of any lit¬ erary language can be rendered with remark¬ able fidelity; hence Russian literature abounds in fine translations, whether of Homer, Shake¬ speare, Goethe, Beranger or of any other for¬ eign poet. The innate beauty of Russian has struck not only foreigners, but has long been known to the Russians, for already Lomonosov said of it, (

Bibliography. — General: Jarintzov, N., (The Russians and Their Language; with an introduction discussing the problems of pro¬ nunciation and transliteration and preface by Nevill Forbes) (New York 1916) ; Leger, L., and Bardonnant, G., (Les racines de la langue russe) (Paris 1894) ; Mazon, A.,

Grammars: Berneker, E., (Russische Grammatik) (Leipzig 1897) ; Boltz, A., (Lehr- gang der russischen Sprache} (Berlin 1880- 84) ; Bondar, D., Simplified Russian Method, Conversational and CommerciaP (London 1917) ; Dmitriewicz, N., (Russishe Gram- matik; enthalt nebst ausfiihrlichen, iiber- sichtlich dargestellten Sprachregeln, einschliess- lich der Akzentlehre, zahlreiche tlbungsaufgaben und Lesestiicke* (Lemberg 1891) ; Forbes, N., (First Russian Bookp Second Russian BookP (Russian Grammar) (Oxford 1917) ; Magnus, L. A., (Concise Grammar of the Russian Lan- guage) (New York 1916) ; Manasevitch, B., (Die Kunst die russische Sprache durch Selbst- unterricht schnell zu erlernen) (Vienna 1897) ; Sieff, M., (Volper's Russian Accidence in Tables) (New York 1917). Accents: Boyer, P., (De l'accentuation du verbe russe) (in (Ecole des langues orientales vivantes) (1895) ; Perot, G., (L'accent tonique dans la langue russe) (Lille 1900) ; Sharlovski, I., (Russian Accent, > in Russian (Vornezh 1883-89) ; id., (Russian Prosody, } in Russian (Odessa 1890). Readers and Texts: Forbes, N., (Russian Read¬ ers* (3 vols., New York 1917) ; Bondar, D., (Russian Readers) (London 1915) ; Seiff , M., (Manual of Russian Commercial Correspond- ence) (New York 1917) ; Solomonoff, J., Rus¬ sian Composition (New York 1917) ; (The First Russian Reader) (New York 1916) ; Tolstoy's ˆevastapoP (New York 1916) ; Chamaelon, A. P.,

translation and explanatory notes (London 1916) ; (accented) Berneker, E., (Russisches LesebuclP (Leipzig 1897). Dictionaries: (All Russian). (Dictionary of the Russian Lan¬ guage > (Imperial Academy of Sciences, Petro- grad 1891 ; only two volumes have so far ap¬ peared of this new edition) ; (all Russian) Dal, V. I., dictionary of the Living Great Russian Language) (3d ed., 4 vols., Petrograd 1903-09) ; (with English) Aleksandrov, A., (Complete Anglo-Russian Dictionary) (Petro¬ grad 1879) ; (Complete Russian-English Dic¬ tionary) (ib. 1904) ; (with English) Freese, J. H., (New Pocket Dictionary of the English and Russian Languages) (New York 1916) ; (with English) Luboff, S.]., (Handy Rus¬ sian-English and English-Russian Dictionary and Self-Instruction) (Philadelphia 1916) ; (with German) Pavlovski, I. Y., Russisch- deutsches Worterbuch) (2d ed., Riga 1879).

Leo Wiener,

Professor of Slavic Languages and Literature, Harvard University.

4. RUSSIAN LITERATURE. Nothing whatsoever is known of any literary activity in Russia previous to the introduction of Chris¬ tianity in the 10th century, and even for a long period afterward it found its expression, not in Russian, but in the language of the Church, that of the proto-apostles Cyril and Methodius, which in all likelihood was the Bulgarian, as spoken in the neighborhood of Saloniki. This Old Church Slavic was so close to the Russian dialects that it could be understood with little exertion by the clergy and those rare intellectuals who found any need to give expression to their thoughts. Up to the 12th century there is only a slim collection of sermons and exhortations, but at the end of this period we have the noteworthy instruction of Vladimir Monomakh to his Children,* which compares favorably with similar spiritual tes¬ taments of the period, such as that of Saint Stephen of Hungary. A little later we get the admirable account of the Holy Land by Abbot Daniel the Palmer, which even now elicits praise for its realistic account of the time of the first crusades. To the same period belongs Nestor's (Chronicle of Kiev,* that set the pace for a considerable number of local chronicles, from which in modern times the history of ancient Russia has been reconstructed. There must have existed, at that time, a considerable secular literature, but the Church ruthlessly persecuted any such manifestation, and only folk epics, for the first time collected in the

19th century, give us any poetical reminiscences of Kiev in the days of its greatest glory. Only one literary production of exceptional beauty has escaped the persecution of the Church,

Greek and Latin apocryphal literature and sim¬ ilar productions in the West. As an example of these may serve (The Holy Virgin's Descent into Hell,* which contains elements akin to those worked up by Dante in his (Divine Com¬ edy.* No appreciable addition to literary style is to be observed before the 16th century, when. Polish scholastic learning at Kiev began to penetrate into Russia at the same time that Western ideas found their way to Moscow through the protection given to foreigners by Ivan the Terrible. It is then that we get the feeble beginnings of Russian history by the exiled Andrey Kurbski and the (Book of Man¬ agement, } the 'Domostroy,* by Ivan's adviser, Sylvester. This is apparently an attempt to create for Russia a manual of manners, such as at that time appeared in Italy and else¬ where. Its unusual harshness has made the 'Domostroy* a by-word for the Asiatic rude¬ ness of the pre-Petrine civilization. Only at the end of the 17th century does a weak light enter from the West in the writings of Simeon Polotski, who came entirely under the influence of the Kiev scholasticism. He thus precedes the period of Peter the Great, with whom a new era dawns upon Russia.

Peter the Great abolished the old Church script, and introduced in its place the modern alphabet, which leaned to some extent on the Latin script. With this, Peter the Great broke with the ecclesiastic tradition, and by degrees the vernacular Russian, at first strongly im¬ pregnated with the Church Slavic, makes its entrance into the written language. The time of Peter was productive only of utilitarian works on mathematics and the applied sciences, but we have even then the remarkable economic work (The Book on Poverty and Wealth,* by Ivan Pososhkov, the peasant manufacturer, who was called the Russian Adam Smith. (The History of Russia) by Tatishchev did not see its light until the end of the century, as there was no interest as yet in such literary produc¬ tion in the time of Peter, but the Spiritual Reglement* of Prokopovich, who advocated Peter's liberal reforms, was one of the first Russian books to be translated into English. Kantemir's satires, based on those of Boileau and Horace, appeared in the time of Queen Anna, and about the same time talentless Tredyakovski established the prosody for the Russian poetry, and a little later the many- sided Lomonosov, in his poetical productions and scentific labors, laid the foundation for the literary norm, which half a century later was to be perfected in its present form by Karamzin. The second half of the 18th cen¬ tury is especially rich in the drama, where, however, nothing notable was produced, except in the comedy.

Here we have the classical (Odd People,* by Knyazhnin, (The Minor, * by von Visin, and ‘The Pettifogger,* by Kap- nist. Among the writers of historical dramas are Sumarokov, the creator of the Russian theatre ; Knyazhnin, whose republican senti¬ ments in (Vadim of Novgorod) created quite a stir, and Ozerov, whose (Dmitri Donskoy) ap¬ peared opportunely on the eve of the Napole¬ onic War. Catherine herself tried her hand at the drama of manners, and by her example en¬ couraged the creation of the satirical journals, in which Novikov was most prominent.

The first half of the 18th century did not

rise above an imitation of the French pseudo¬ classic school, but toward the end of the cen¬ tury the English influence, especially that of Addison, becomes more prominent. In 1790 there appeared Radishchev’s (Journey from Saint Petersburg to Moscow,5 whose very title indicates its obligation to Sterne’s (Sentimental Journey,5 and with it a spirit of liberalism, coupled with the sentimentality which held sway in the West, entered Russia. Of the poets of the time, who were also falling under Italian and Latin influence, the most prom¬ inent is Derzhavin, who bridges over from the 18th to the 19th century, and who, by his violent attack on the turgid ode of the preceding period, put an end to the slavish imitation of foreign models, and himself produced note¬ worthy poems. His (Ode to the Deity) was translated into several languages and breathes an advanced Deism. Karamzin, who had lived in England, introduced the simpler English style into literature, and in his voluminous (History of Russia,5 in his sentimental novels, such as the famous (Poor Liza,5 and in his many sentimental poems, made the Russian language a perfect vehicle of thought. The romantic movement, then prevalent in Germany, had little effect upon Russia. Kamenev’s ro¬ mantic poems and Zhukovski’s excellent trans¬ lations from the German did not create a school in Russia.

The end of the 18th and the beginning of the 19th centuries are rich in talents who made the West accessible to Russia in all literary en¬ deavors. The influence of the French fabulists, especially LaFontaine, is seen in Sumorokov, the dramatist, in the poet Maykov, in Izmaylov, but reaches its apogee in the genius Krylov, who entered the literary field with some medio¬ cre comedies, but gained universal recogni¬ tion by his a little more than 100 fables, less than two for each year of

his life, because he was the first to place the foreign models in a distinctive Russian setting. The senti¬ mentalism, which was introduced by Radish- chev, found its continuators in a number of poets, among whom Kozlov (1779-1840) is probably the most talented. In Vyazemski (1792-1878) sentimentalism, which came other¬ wise to an end in the 40's, survived until the end of the 70's. These poets sang not only of solitude, but also of the gentle home associa¬ tions and the awesome sentiment of religion in places sanctified by age, and thus they intro¬ duced the worship of antiquity, which found its expression in the laudation of Moscow and Kiev, and the holy places, and led to a series of poets, not distinctly sentimental, who may be denominated as the patriotic and religious poets. Thus Glinka (1788-1880) published a series, Spiritual Songs, 5 and Rylyeev (1796— 1826), by his historical ballads, in which there breathes a spirit of liberty, incurred the sus¬ picion of the government, and was one of the literary lights to fall a victim of the December Revolution. The Italian influence, especially that of Tasso, is discernible in Batyushkov (1787-1855), whose (The Dying Tasso) is a poem of unusual merit, but who unfortunately was lost to literature for the last 35 years of his life, having become hopelessly insane.

In the drama Griboyedov (1795-1829) con¬ tinued the tradition begun by Fonvizin and Kap- nist, and his Untelligence Comes to Grief,5

in which he mercilessly flayed the old order of things, the servility, militarism and superficial¬ ity which harked back to the days of Catherine, remained for a long time a classic on the stage. The romantic movement of the English type, which reveled in the past and in adventure under exotic conditions, appealed to the younger generation in the beginning of the 19th cen¬ tury, and some notable results were achieved. Bestuzhev (1797-1837), who himself led a Byronic existence, wrote some good novels of martial adventure, such as (Ammalat Bek,5 and the historical novels of Lazhechnikov (1794-1869), (The Heretic, > (The Ice Housed have lately been resuscitated from oblivion and are read with pleasure. But the poets of this school, Pushkin (1799-1837) and Lermontov (1814-41) have gained the greatest reputation. Pushkin began his career with some extravagant romantic poems, but during his banishment to the Crimea and the Caucasus he found the proper setting for the Byronism which was then taking possession of the nation, and to this he gave utterance in (The Bakhchisaray Fountain,5 (The Gypsies,5 (The Prisoner of the Caucasus,5 etc. His masterpiece is (Evgeni Onyegin,5 a novel in verse, which is considered as the prototype of a long series of Russian novels, in which the Russian hero is discussed. He tried himself in the

historical drama and produced (Boris Godunov,5 a splendid poem, which is hardly fit for the stage. Having devoted himself to historical studies, he wrote (A History of the Pugachev Rebellion,5 and on his investigation based a series of stories, of which (The Cap¬ tain's Daughter is probably the best. Lermon¬ tov even surpassed Pushkin in the facility of his verse, but his career was cut short at the age of 27, when he had already produced sev¬ eral volumes. Besides a number of tunable songs, he wrote a number of romantic poems, of which (The Demon5 is the most notable. Of his prose tales the most important is (The Hero of Our Time,5 which, as the title indi¬ cates, is a continuation of the question created by Pushkin in his (Evgeni Onyegin,5 and the hero of this new novel is the same blase type as created by the Byronic attitude of the time.

The first half of the 19th century was par¬ ticularly rich in poets, and among them must especially be mentioned Koltsev (1808-42), be¬ cause he followed out the suggestion made some time before by Delvig that the popular element should find a place in the artificial poetry, and created a series of scenes from the homely life of the peasant and laborer, which at once made the poetry accessible to the masses, who still read him. At the same time Gogol (1809-52) struck out in a similar direction, by depicting the life of his native Ukraine, and the sordid existence of the small officials. His short stories, (The Mantle,5 (The Nose,5 etc., were the forerunners of his own longer tales and of the whole mass of realis¬ tic stories with which Russian literature has enriched the world. His (Dead Souls5 shows his obligation to Cervantes, but the story, in which we get a series of pensketches of coun¬ try people, is unique and true to life. His (The Revizor,5 the best-constructed comedy to be found anywhere, in which he depicted the ras¬ cality of town officials, has remained a classic

until the present, and his romantic stories, such as (Taras Bulba, * are still enjoyed in Russia and abroad. Gogol is the last of the men of the new period of Russian literature, and his appearance is the more significant, since it is correlated with that of the critic Byelinski, the first of a series of writers who viewed the Russian world of letters as an organic whole and who attached themselves more especially to some prominent author of his time. It was Byelinski (1811-48) who created the name of (

With Byelinski begins the newest period of Russian literature, which during his activity is characterized by an attempt to find itself. The years 1848-55, that is, up to the Crimean War, a*re the period of the ((Censorship Terror," when the new authors, Shchedrin, Turgenev, Nekrasov and others were crushed and litera¬ ture has no conquests to record. The next six years have been denominated (

(1817-75).

The first half of the 60's is an epoch of reaction and Nihilism. It was then that Pisarev (1841-68) developed his destructive criticism which led to the abandonment of art for art's sake and the enthronement of the <(poetry of the people" by Nikitin (1824-61), which was developed in its fullest form by the people's idol Nekrasov (1818-77). The period of Nihil¬ ism brought forward a considerable number of writers from the middle and lower classes of society, who devoted all their energy to the peasants and the submerged. The most talented among these were Pomyalovski (1835-63), Nicholas Uspenski (1842-89), Levitov (1842-

77), Ryeshetnikov (1841-71). To the same period belong the authoresses Marko-Vovchok (1830-1907) and Kokhanovskaya (1825-84), though they did not belong to the worshippers of (

The 70's are denominated ((the epoch of the highest development of altruism." In this period Saltykov-Shchedrin (1826-89) produced his masterly Pamily Golovlev* and Poshek- hon Antiquity,* Dostoevski (1821-81), has (Memoirs from the Deal House* and Prime and Punishment.* Although Dostoevski had been met with indifference in the 60's, he now was acclaimed, on account of his later writings, as a moral teacher (

The eighties have been denominated <(the epoch of despair," which was ushered in by the Pobyedonostsev reaction. Pobyedonostsev

(1827-1907) despised all progress and crushed all free thought, hence the ensuing pessimism and weakness of will, as it appears chiefly in Chekhov's (1860-1904) short stories and dramas, and even Leo Tolstoi's mysticism and desire for self-perfection is ascribed to the disheartening condition of the political life in the last two decades of the 19th century. Among the large number of feuilleton writers of this period there stands out Amfiteatrov (1864 —) as a champion of freedom, while others, like Menshikov (1859 —) turned sordid opportunists, and Tikhomirov (1850 —) became a violent reactionary. Another result of the suppression of free thought was the resurrec¬ tion of ((art for art's sake,® and here we find the poet Fofanov (1862 —), Andreevski (1847 —), Apukhtin (1841-93), Golenishchev- Kutuzov (1848 —). Far more genuine was Frug (1860 —), who sang of his Jewish compatriots, under the oppressive

sensations of the pogroms. The period was rich in women who made a place for themselves in literature, such as Shapir (1850 —), Krestovskaya-Kartavtsevaya (1862 —), Dmitrieva (1859 —), who depicted scenes from peasant life.

The 90's are a period of regeneration, as the previous decade had been more properly a period of decadence. It is particularly marked by the growth of Marxian socialism, which finds its expression in a large number of scientific and popular treatises on political economy by Plekhanov (1857—), Tugan-Baranovski (1865- —), Bulgakov (1871 —), and especially Lenin, the leader of social democracy. In the belles- lettres this socialistic tendency was represented by Chirikov (1864 —), Veresaev (1867 —) and Pyeshkov (1869 —), who writes under the pseudonym of Maxim Gorky. Chirikov later busied himself with psychological studies, while Veresaev gained his reputation by his merci¬ less analysis of a physician's activity in his (Memoirs of a Physician.) Gorki, who has risen from the slum to be the famous author of the slums, revels in bright colors and ((through beauty arrives at truth.® He is the most pronounced follower of Marxism, and, in the spirit of his master, despises alike the bourgeoisie and the peasant, saving all his sympathy for the submerged <(who dare.®

In 1897 Andreev, who was discovered by Gorki, began to write his gloomy stories, in which appear decadents, half-insane, neurotic characters. Since 1904 he has fallen prey to symbolism, although he still deals with realis¬ tic scenes. At the same time modernists made their appearance, who, like the poet Balmont and the novelist Merezhkovski, have taken for their subject beauty and not morality. In his trilogy, (Julian the Apostate, Leonardo da Vinci5 and (Peter and Alexis,5 Merezhkovski dealt with the conflict of Christianity with the Antichrist, taking his part with the latter. Hence he, in his critical essays on Tolstoi, condemned the author for his Christian meek¬ ness. Similarly Balmont has taken to poetry, in order to treat art for art's sake, thus reverting to the older school. The most talented poet of this new movement is Bryusov, who in a dispassionate way describes the passions and dissolving death. He has also written a number of fantastic stories, such as (The Fiery Angela a story of mediaeval witchcraft. Other

modernists are the poet Ivanov, Blok and pessimistic Solugub. The latter has also dis¬ tinguished himself in a number of novels, among which (The Imp> is the best. A very prolific story-writer is Remizov, who portrays chiefly provincial scenes. It has not been pos¬ sible to follow the literary activity in Russia since the beginning of the war, and nothing can be said of the outlook for the future.

Bibliography. — In the Russian language there are numerous aids to the study of its literature. One should consult the works of Aikhenvald, Arabazhin, Chukovski, Gornfeld, Milyukov, Morozov, Ovsyaniko-Kulikovski, Pypin, Skabichevski, Tikhonavov, Vengerov, A. N. Veselovski. Russian literature as a whole has been treated in English in the fol¬ lowing works: Baring, M., (Landmarks in Russian Literature) (New York 1910) ; (An Outline of Russian Literature5 (London and New York 1914) ; Brandes, G., (Impressions of Russia5 (New York 1889) ; Hapgood, I. F., (A Survey of Russian Literature, with selec¬ tions5 (New York 1902) ; Kropotkin, P. A., (Russian Literature5 (New York 1905) ; Waliszewski, K., (A History of Russian Litera¬ ture5 (New York 1900). There are the follow¬ ing collections in English : Bechhofer, C. E., (A Russian Anthology in English5 (London and New York 1917) ; Tollemache, B. L.,

(Russian Sketches, Chiefly of Peasant Life5 (London 1913) ; Wiener, L., (Anthology of Rus¬ sian Literature from the Earliest Period to the Present Time5 (New York 1902-03) ; New- march, R., (Poetry and Progress in Russia5 (London 1907) ; Bianchi, M. G. D., (Russian Lyrics, Songs of Cossack, Lover, Patriot and Peasant5 (New York 1910) ; Bowing, Sir J., specimens of the Russian Poets5″ (Boston 1822) ; Pollen, J., (Russian Songs and Lyrics5 (London 1916) ; Selver, P., (Modern Russian Poetry5 (London 1917). ‘A number of poets and novelists are dealt with in The Russian Review (London 1912 —).

Leo Wiener,

Professor of Slavic Languages and Literature, Harvard University.

5. RUSSIAN DRAMA. In Russia, as in Greece, the drama arose from the com¬ mingling of the religious and secular elements. Mystery plays were imported through Poland and Kiev from western Europe and introduced into Moscow by Semyon Polotski in the time of Tsar Alexis (1645-76). Johann G. Gregori, a German Lutheran pastor, translated German mystery plays, and Dmitri Rostovski produced some akin to the moralities, in which Biblical characters were supplemented by allegorical personifications. The introduction of these crude beginnings was to some extent facilitated by the previous existence in Russia of religious ceremonies (deistva) having a slightly dramatic character. Gradually moral reflections and local touches were introduced into the religious dramas, Western plays of non-religious content were produced, French comedies (Moliere), ti anslated, and finally plays on Russian themes were staged. Four theatres are mentioned in Petrograd in Peter’s time (1702-24).

Thus was paved the way for Sumarokov (1/17-77), the first Russian literateur by pro¬ fession, who in some 20 plays, imitations of Racine and Voltaire, popularized in Russia the

pseudo-classical drama with its rigid <(unities,® and artificiality. The theatre now became firmly grounded and the profession of actor (Volkov, Dmitrevski) was established. This type of play remained extremely popular until the mid¬ dle of the 19th century and still finds some favor. But the great wave of democracy which has been rolling over Europe since 1775, and which brought the French and American revolutions, the insurrections of 1848, the libera¬ tion of the American slaves and the Russian serfs, and which has at last culminated in the Russian Revolution and the plans for a League of Nations — this wave swept away the old drama and brought on its crest the modern national , Russian Realistic Drama.

. Even as early as 1769 the Empress Cath¬ erine's favorite, D. 1. von Visin, to a consider¬ able extent abandoned the artificial ways of his predecessors. He represented, contemporary life in a fairly faithful manner and gave his plays a direct social purpose — the satirizing of the effete nobility. He was followed by Krylov (the wonderful fable writer) with similar but inferior plays. During the entire first half of the 19th century (during which period the romantic school — represented by Lermontov's (Demon,} — exercised a consider¬ able temporary influence in Russia) only three important dramas approaching the newer type appeared: Griboedov's comedy (Woe from Wit,* Gogol's comedy (The Inspector) and Pushkin's tragedy (Boris Godunov.* Although the first drew much from Moliere's (Mis-anthrope) and although the last bears con¬ siderable resemblance to Shakespeare's his¬ torical dramas, yet all are undoubtedly long steps in advance toward the realistic drama. This is particularly true of (The Inspector. * In 1850 appeared the first of the 48 plays of Ostrovski, who is rightly regarded as the father of the national drama, since he not only developed its distinctive characteristics to a high degree but also won for it a permanent place on the Russian stage.

Ostrovski, in keeping with the democratic trend of contemporary thought, turns away from the nobility and the official classes, which up to his time had been the chief subjects of drama, and devotes himself to the large middle and lower classes of the Russian cities, partic¬ ularly to the merchants of Moscow. He raised his voice against

everything among them that stood as a bar to human liberty. In method and style he is frank, direct and simple. Simplicity is revealed in the plot, which offers a striking contrast to the relatively complex plots of most Western plays. Often there is scarcely any trace of a traditional plot. His plays are more like a series of pictures of daily life quietly unfolding, than like a series of unusual events combined with a view to revealing their complex interrelations and collisions of in¬ terests. There are comparatively few char¬ acters, sometimes astonishingly few (four, five or six), which precludes the massing of char¬ acters for striking effects upon the stage. Sim¬ plicity is revealed also in the language, which is the language of the people and not the stilted artificial language of the classic stage. The simplicity of Ostrovski's art also appears in the small amount of action on the stage and the relatively calm emotional tone that pervades his

plays. Many Russians think that this is char¬ acteristic of modern life in general as con¬ trasted with, for example, mediaeval life; they believe that thought (reasoning) are coming to decide men's fortunes more than violence. In most Russian dramas at any rate, the actors appear and disappear without great bustle or excitement. They talk about the most ordinary events of life, the weather, the town gossip; yet little by little it becomes clear that these ap¬ parently trifling matters are really the most important of all, and that these people are passing their most critical days and deciding, though half unconsciously, questions that will determine, not only their own fortunes, but the future of society as well. ((The comedy® (and tragedy) ((of Ostrovski is not the comedy of intrigue or of character, but something quite new, which could be called the drama of life, if the term were not too wide and indefinite. I mean that throughout his plays he puts into the foreground the general conditions of life which are not dependent upon any of the characters of the play. He does not punish either the miscreant or the victim. They both arouse our pity, sometimes our mirth. But it is not upon them that our emotion centres. We see that their environment controls their actions, and that they have not the energy to oppose it. So the conflict demanded by the theory of the drama is not comprised in the dialogue, but in the conditions which control the characters. Often the characters have no appreciation of their own position or of this conflict. But the conflict goes on in the listener, who is incensed by the conditions of life that beget it.® — Dobroliubov.

All these qualities of Ostrovski's art may be summed up in the word realism. But Russian realism is of a peculiar type, because the Rus¬ sian writers are not simply realists; they are also intense idealists. Yet they understand that man cannot attain Utopia by mounting above the

clouds on the golden wings of fancy. Though guided by his ideals, he must erect a staircase slowly and with toil out of acts of his daily life. Russian realism is a fusion of realism and idealism. Through its pictures of the realities of life shimmers life's religious, moral and social significance.

Contemporary with Ostrovski were Tur¬ genev and Potekhin. The plays of the former, though inferior to his other writings, are of a high merit. Potekhin's plays, being outspokenly democratic, met serious opposition from the censor. Pisemski's, (A Bitter Lot,* is the most effective peasant drama before Leo Tolstoi's (The Power of Darkness.*

The chief writers of drama since Ostrovski are Chekhov, Gorki and Andreev. Chekhov, who was primarily a short story writer, wrote five regular plays and several short dramatic pieces. A few years ago statistics of the public libraries showed that he was the most widely read of Russian authors. In his plays he treats the middle and upper classes of the reactionary period of the age of reconstruction following the emancipation of the serfs. Only one of them, however, (Ivanov,) was written in the earlier, more pessimistic period of his career. He is particularly remembered for the mar¬ velous success of his (Sea GulP when it was staged by the Moscow Art Theatre of Stanis-

lavski, and for his contributions to the success of this theatre, which has had such an enormous influence over the western European stage. His realism was of so distinct a type that it struck even the Russians, who called him the ((poet of actuality ,®

Gorki said of himself, ((I have come from below, from the nethermost ground of life, where is nought but smudge and murk. . . .

I am the truthful voice of life, the harsh cry of those who still abide down there and who have let me come up to bear witness to their suffering.® This statement is not true to so great an extent of his dramas as of his stories, since there are in them many characters of the middle class, as for instance, in (The Smug Citizen,5 (The Barbarians,5 and even

Some of Andreev's plays, as (Ekaterina Ivanovna,5 (Professor Storitsyn,) (To the Stars,5 (Savva5 and (Days of our Life5 fol¬ low the traditional type we have just been dis¬ cussing, but he has also produced a number of symbolic dramas which is an entirely new type.

One of these, (The Life of Man,5 has met with remarkable success on the stage, but others present enormous technical difficulties in presentation ((The Ocean5 and (The Black Maskers5), or were prohibited by the censor ((King Hunger5). Andreev represents, par ex¬ cellence, the <(tragedy of thought® mentioned above. Indeed, he has written one drama en¬ titled

The last three decades have brought forth many other meritorious writers of the drama in Russia. Yushkevich in his (King Hunger5 and (Dina Glank) (also called (The City5) has drawn faithful pictures of the life of the Jews in Russia. Artsybashev produced a drama (Jealously, 5 which for months was the sensation of the Russian intellectuals. Other writers of the drama are Chirikov, Nadson, Garin and Chulkov. Evreinov is less distinctly Russian.

The historical drama cannot be said to be a great success in Russia. Only a few patriotic dramas like Pushkin's (Boris Godunov5 and Alexis Tolstoi's trilogy (Death of John the Terrible,5 (Czar Fedor Ioannovich, 5 (Czar Boris,5 dealing with the establishment of the house of the Romanovs, have occupied a prominent place on the stage. The reason is that in Russia, literature has served during the past century primarily as. a guide to a philosophy of life and to the solution of life's practical problems. Hence it has dealt almost exclusively with contemporary life and has left the dead past to bury its dead.

Translations of Russian dramas into Eng¬ lish (the names of the translators are in parentheses) :

Andreev. — (To the Stars) (Goudis; in Poet Lore, 1907) ;

Women5 (Seltzer) ;

Chekhov (or Tchekoff). — (The Sea Gull5 (Eiseman; in Poet Lore, 1913); (The Sea Gull5 and (The Cherry Orchard5 (Calderon) ; (The Sea Gull,5 (Ivanov,5 (Uncle Vania5 and (The Swan Song5 (Fell) ; (The Three Sisters,5 (The Cherry Orchard5 and other plays (West) ; (The Cherry Orchard5 (Mandell) ; (A Mar¬ riage Proposal5 (Chambers, also by House) ; (The Wedding and The Jubilee5 (edited by Bechhofer).

Evreinov. —

Gogol. — (The Revisor5 (also called (The Inspector-General,5 Sykes) ; same (Mandell) ;

camp (Sp1t7PT ^

Gorki.—

Griboedov. — (Gore ot uma5 (Woe from Wit5 (Benardaky) ; also same under the title, (The Misfortune of being Clever.5

Kossatch (pseudonym: Lesya Ukrainka). — (The Babylonian Captivity5 (from the Little Russian language by Volska).

Ostrovski. — (The Storm5 (Garnett) ; (A Protege of the Mistress,5 (Poverty is No Crime,5 (Sin and Sorrow Are Common to All,5 and (It's a Family Affair5 (edited by Noyes).

Pushkin. — (The Statue Guest,5

Tolstoi, Leo. — (The Fruits of Culture5 (L. and A. Maude; also by Wiener; by Schumm; by Dillon) ; (The Power of Darkness5 (L. and A. Maude; also by Wiener); (The Living Corpse5 (Wright) ; (The Light That Shines in the Darkness5 (Wright) ; (The Cause of it All5 (Wright) ; (The First Distiller5 (L. and A. Maude).

von Visin. — (The Choice of a Tutor5 (edited by Bechhofer).

Bibliography. — Kropotkin, (Ideals and Realities of Russian Literature5 ; Brueckner, (A Literary History of Russia5 ; Waliszewski, 'Russian Literature.5 Consult also introduc¬ tions to the various translations.

Clarence L. Meader,

Professor of Latin, Sanskrit and General Linguistics, University of Michigan.

6. RUSSIAN ART. In studying Russian art we have to consider two distinct periods — the ancient and the modern. The ancient, which extends from the earliest origin to Peter I, is characterized by an imitation of Byzantine art imported into Russia from the South and oartly from the West, and by the blending of the Byzantine and the Russian ele¬ ments into an original type of art. The modern period, which begins with Peter I, is marked at first by a strong West-European influence, and later by a strict realism and the develop¬ ment of a typical Russian art.

The beginning of Russian art dates from the

remotest times when the Slavs, who formed the Russian Empire, expressed their artistic in¬ stinct in their animal-like shaped instruments, in the reproduction of their gods, in their works of wood, stone, metal and pottery and in their decorations of household objects and clothes. The history of art properly begins, however, only with the time of Saint Vladimir. Immediately after the introduction of Christian¬ ity, Byzantine builders, painters, decorators and engravers were called to Russia to build churches and decorate them. The first stone churches in Kiev, the Vasilyevskaya and the Desyatinnaya, were built on the Byzantine model of the 10th century. This was an ob¬ long rectangle with three apses on the eastern end of the building. The churches which were soon afterward built in the district of Kiev and in the two other church districts, Novgorod and Pskov, and Vladimir-Susdal, are all on the same style with only slight modifications. Both the churches in the district of Kiev and in the district of Vladimir-Susdal had the plan of a rectangle, which was almost square, and the form of a cube with two or three apses on the eastern end and a (

of different styles. The second group are churches whose main body is a long parallelo- piped, ending in two or three tent towers. The churches of the third group are cubes orna¬ mented with domes varying in number from two to five.

At the end of the 17th century Russian architecture begins to come under the influence of West-European styles. The churches of that time have the old-established form with the decorations of the baroque style then prevalent in western Europe. The innovations of Peter I reflected in architecture just as well as in any¬ thing else a German taste, which, however, with the accession of the patriotic Empress Elizabeth was abolished in favor of the French. It was not until the middle of the 19th century that attempts were made to rescue native archi¬ tecture from its peril. The first Russian archi¬ tects who came into prominence only during the reign of Catherine II were A. Kokorinov, a pupil of Count Rastrelli, then in Russia; V. Bajenov and I. Sfarov. There was, however, yet no attempt made to restore distinctlv na¬ tional features in architecture. All of them had studied the pseudo-classical style and applied it to their productions. At the time of the con¬ struction of the Kazanski Sobar (cathedral of Kazan), which took place under Alexander I, the so-called imperial style was in vogue in Russia. This was the style which had de¬ veloped in France under Napoleon I, who tried to compete in splendor with the emperors of ancient Rome. A great number of Roman porticos, frontals, facades, supported by colon¬ nades, vast vaults in

imitation of ancient rotundas and temples appeared all over _ in Petrograd and Moscow. The best illustration of the imperial style is the Stock Exchange in Petrograd, which is the production of the Frenchman, T. De-Tomon. Vas. Stassov, who had reached great prominence during the years 1820-30, devised a plan in which the Latin form of the cross and the decoration of the imperial style, five cupolas, were combined. This com¬ bination made the structures resemble the an¬ cient Russian churches. Architectural activi¬ ties were greatly spurred under Nicholas 1, who was a great lover of art. However, the freedom of the artist was greatly hampered as architecture assumed an official character. The greater number of state and public buildings were constructed at the order of Nicholas I who entrusted with this work mainly Ton and Brullov. Russian architecture is indebted to Ton for the revival of its national element and his first attempt to restore it by turning the attention of the Russian architects to old Russian art. The tendency to return to the Byzantine and ancient Russian styles became more pronounced under Alexander II when the new spirit of reform allowed greater free¬ dom in art.

The embellishments of the churches were mosaic works, frescoes and ikons which repre¬ sented saints and prophets, complete episodes of the life of Christ and the feasts of the Byzantine emperors.

Iconography was for a long time strictly Byzantine in character. The first sacred pictures were imported into Russia from Byzantium. The earliest ikons at Novgorod and Kiev were productions of Greek painters.

RUSSIA — RUSSIAN ART (6)

There practically was no school of native painters until the 12th century. The teachers in the schools were Greek masters and the Russians who studied with them only copied the Greek style. Soon, however, as early as the 13th century, Novgorod, one of the centres of inconography, began to produce painters who showed ability and originality. The Russians, however, never reached any great distinction in this art, being hindered in their development by the restrictions imposed by the Orthodox church. Despite the efforts of the ecclesiastical authorities to keep this art with¬ in the limits of tradition, the schools of Mos¬ cow and Taroslav began from the 17th century onward to be influenced by Western tendencies. The school of Pskov showed Italian influence already in the 16th century.

Iconography lost much of its national character. The style of the Novgorodian school, the leading style un¬ til far into the 15th century, which was re¬ markable for its vividness and touch of natural¬ ism, and that of the Pskov school, which dif¬ fered only in peculiarities of coloring, lost many of their good qualities with the ascend¬ ency of Moscow. The art of iconography be¬ came poor and remained undeveloped.

The decorative art on the whole dates from very early ages. At first it was only an imitation of the Byzantine but later in the 16th and 17th centuries, under foreign influence, it formed a peculiar style of its own, marked by an astounding originality, diversity _ and beauty. It combined West-European, Asiatic, Byzantine and national elements. The most characteristic Russian designs are geometrical patterns and fanciful representations of birds, animals and floral motifs. A verv common style is that of climbing plants, such as vine, or ribbon-like strips interlacing in fanciful ways, forming different angles and ending with griffons and other fantastical animals and even human faces. Usually more than one color is used.

In the beginning of the 18th century due to the reforms of Peter I, Russian art as¬ sumed distinctly foreign character. Peter I, believing in the usefulness of art, sent a good many men for training abroad and also invited to Russia foreign masters, such as Trezzini, Brandt and K. V. Rastrelli, Sr. Though Elizabeth was patriotic and preferred everything Russian, she was compelled to invite foreign artists, such as De Rotarri, for there w'ere yet no prominent Russian artists, due to inadequate means for good training. Later in 1757, at the suggestion of Shuvalov, an academy of art for the training of native artists was estab¬ lished. However, Russian art continued to be imitative in character, for the teachers at the academy were foreign artists. Moreover, the most gifted nupils of the academy were sent abroad for six years to complete their studies there.

The history of modern Russian painting dates from the establishment of the Russian school of painting which practically begins with A. Losenko. He received his training in France, and as professor and, later, di¬ rector of the academy, he is greatly responsible for the foreign direction which Russian art took and preserved for a long time. The close imitation of ancient forms and Italian art of

the times of the eclectics, conventionality in colors and observation of prescribed rules made Russian work of art of those days be¬ tray poor fancy and routine. The artistic pro¬ ductions of Losenko's followers lack orig¬ inality and national character. They treat themes from holy

history, ancient history, mythology . or allegory, represented on the French or Italian style. Rarely were themes taken from Russian history. G. Ugriumov and A. Ivanov, the teacher of Brullov, rank as the first prominent Russian historical painters.

The first to part with the traditions of the academy was Brullov, whose picture East Days of Pompeii > appeared while the pupils of Ugriumov still strictly adhered to academic classicism. Though the (Last Days of Pom- peiJ combined classicism and romanticism, then prevalent in western Europe, it threw off the shackles of academic routine and first opened the way to free creation. Next to Brullov the path of freedom in artistic production was entered upon by P. Basin and Th. Bruni. Rus¬ sian art became more successful with the ar¬ tists' disposal of ancient gods and heroes for the sake of episodes from ancient Russian his¬ tory, which they treated in a simple and natu¬ ral way. This change marks the beginning of the ((National Historical Genre.® The orig¬ inators of genre were graduates of the acad¬ emy during the years following 1860. The most famous of these were P. Chistyakov, G. Myasoyedov, N. Shustov, K. Flavitzki, H. Litovchenko, K. Makovski, V. Shvartz, N. Ge, V. Jacobi, V. Perov, U. Rilpin. The first to attempt genre was A. Venetianov. The sub¬ ject matter of the genre style were pictures from everyday life, such as Evening-Meet¬ ingsˆ (A Hunter with his Flock,) (Travelers Caught in a Storm, } (Scenes of Provincial

Life.-* In the 18th century portrait painting became very prominent and there was almost no painter of genre who did not paint portraits also. At a time of growth of wealth, followed by vanity on one hand and servility on the other, there was a great demand for portraits. And such artists as Kozlov, Ugriumov and A. Rimov responded. After Brullov's death Zarianko and Nakarov ranked as first portrait painters. Though after Venetianov the realis¬ tic painters began to produce portraits de¬ picting Italian and Eastern life, nationalistic ideas had penetrated the public and they de¬ manded the representation of the real life of their native country. The realization of this ideal in art was made possible by the reforms achieved by Alexander II. The first to re¬ spond to this public demand was P. Fedatov, a fine observer and witty satirist, who very suc¬ cessfully represented both the funny and the sad sides of contemporary Russian life. The realism of genre assumed a journalistic char¬ acter. Its purpose was to attack and correct social defects. Art of the genre style, just as well as literature and politics of that time, was to play a part in bringing about reforms. The interest of the public backed this tendency. Fa¬ mous artists of this group formed in 1872 a ˆSociety of Movable Artistic Expositions® to bring to the attention of the public the exist¬ ing social and

political evils.

Genre was followed by landscape painting. At the head of a great number of landscape

painters stands Schedrue whose influence on this phase of painting would have been still greater, if he had not spent a great part of his short life abroad painting Italian sceneries of the Neapolitan coast. A famous contem¬ porary of his was M. Ivanov. The most prom¬ inent landscape painter, however, was Th. Aleksyexev whose specialty was perspective views of large cities. Russian landscape paint¬ ing was at first, in the • 18th century, only an imitation of foreign models. Following the foreign artist, the Russian painters did not depict nature as it actually is, but represented it perfectly lifeless, depriving it of all its con¬ tingencies and defects and giving it an arti¬ ficial coloring. The Russian landscape paint¬ ing, however, gradually lost its conventional traits, and during the reign of Alexander II assumed a national character. I. Shishkin re¬ produced the native forests ; V. Onlovski painted Russian fields, seas and groves ; M. K. Klodt depicted his native villages. However, Russian landscape painters did not escape the influence of decadence and impressionism of western Europe, which of late made itself felt in the Russian landscape.

Engraving sprang up together with the in¬ troduction of printing in the middle of the 16th century. At first wood engraving was not a separate art, wood cuts being used merely for the illustration of prayer books and other re¬ ligious books, but later, in the 17th and 18th centuries, it developed into xylography. Though this art was practised in Russia for 150 years, no great artistic work was produced, and it later degenerated into plain factory work.

Metal engraving began in Russia as early as the 12th century, when it was first used for the decoration of evangelic books, cases of ikons and of different articles for church and home use. Copper plates, however, were first used in Moscow only in 1647, the engraving being made after the drawing by Gregory Blagou- . shin. The art of engraving was studied in Orouzhenaya Palata (school of the Orouzhe- naya Palace), and the graduates of the school, artists like A. Gerkov, G. Kachalov, E. Vino¬ gradov, were masters of their profession who in the excellence of their work could easily compete with the best foreign engravers. The most famous Russian engraver was E. Chemessov, a pupil of

Schmidt. The art of engraving was already declining when Peter I, who liked to see his heroic deeds and accom¬ plishments perpetuated, called to Russia foreign masters to train Russian engravers, and in the 18th century a great many engravings were produced, which were pictures of court life or portraits of high personages. In the begin¬ ning of the 20th century the themes of. the Russian engravers were also historical subiects and landscaoes. With the invention of photog¬ raphy and the revival of wood cuts in 1840, metal engraving went out of existence. Only eaux-fortes was continued in which Russian artists had become interested in the 19th cen¬ tury when water-coloring was much appreciated in western Europe.

Sculpture practically did not exist until the time of Peter I. for statues of religious per¬ sonages with the exception of that of Saint Nicholas were forbidden by the Orthodox Church. In modern times it has been only an imitation of Greek sculpture deprived of all

national characteristics. Within the last cen¬ tury there has been a tendency to rid it of the classical traditions, but with little success. Even in the works of prominent sculptors like Antokolski who reproduced mainly Russian historical persons and episodes of Russian history, the classical element is quite prominent.

With the exception of sculpture all phases of art have been developing in Russia along nationalistic lines since Alexander II. In re¬ cent years a regeneration of Russian art took place, the religious aspect becoming in it very prominent. Art became permeated with ideals such as expressed by Tolstoi in his (

Consult Benois, A., (The Russian School of Painting) (New York 1916) ; Due, E. V. le, (L'art russe, ses origines, etcP (Paris 1877) ; Holme, C. (ed.), (Peasant Art in Russia)

(International Studio, special autumn number, 1912) ; id., (Some Notes on Modern Russian ArP (R. Newmarch, December 1903) ; id., (Modern Russian Art: Some leading Painters of Moscow) (May 1904) ; ib., (Russian Art and American) (W. G. Peckham, June 1914) ; ib., (Three Russian Painters — Somoff, Grabar and Maliavine> (V. Pica, December 1913) ; Martin- off, (Anciens monuments des environs de Mos- cou) (Moscow 1889) ; Newmarch, Mrs. Rosa, (The Russian Arts* (New York 1916) ; Ramesanov, (Materialen Zur Geschichte der Kunst in Russland* (Moscow 1863) ; Rikliter,

(Monuments of Ancient Russian Architecture) (1850) ; Snow, F. H., (Ten Centuries of Russian ArP (Art World, November, Decem¬ ber

1916) ; Sobko, N. P., (Lexikon russischer Kunstler des llten bis 19ten JahrhunderP ‘ (Petrograd 1873).

Woislav M. Petrovitch,

Chief of Slavonic Division, New York Public

Library.

7. RUSSIAN ARCHITECTURE. The

most cursory survey of the history of Russia, as summarized in the article Russia (q.v.), should suffice to explain why Russian architec¬ ture is not comparable in extent and importance with that of western Europe, on the one hand, or of the great Moslem and Indian empires on the other. Not until the 9th century does Russia appear as a recognizable entity, and until the 16th the chaos of peoples and political institutions, the conquest by the Mongol Khans in the 13th, the incessant struggles of rival prin¬ ces, kings or tsars against the Khans and against each other, the complete absence of any racial or national unity, the lack of roads and the dense ignorance of the masses, made impossible the development of any real civilization out of which alone a great architecture could spring. The first civilizing influence was the conver¬ sion to Christianity in 988 of Saint Vladimir

the Great, who made Kiev the seat of a metro¬ politan of the Greek faith, and brought the empire under the Byzantine influence. At the end of the 14th century, however, Moscow emerged as the political and religious capital of Russia, was enriched with churches and palaces of great splendor, especially in the cita¬ del called the Kremlin, and remained the capi¬ tal under the early Romanoffs until in 1703 Peter the Great built his new capital Saint Petersburg (now Petrograd) upon the Neva and began the imposition upon his empire of Western ideas and Western architecture.

We may accordingly divide Russian archi¬ tecture into two main periods; the first from about 1389 to 1703, occupied chiefly with the erection of ecclesiastical buildings in a style derived from the Byzantine; and from 1703 to the present time, during which period the churches with some exceptions have continued to be built in the Russo-Byzantine style, while palaces and civic buildings generally have fol¬ lowed the modern neo-classic tendencies. Mos¬ cow is the

important centre for examples of the first period, Petrograd for those of the second; but cities like Kiev, Nijni-Novgorod and Yaro¬ slav also possess interesting examples of both.

In all Russian architecture there is an ele¬ ment of semi-barbaric Asiatic taste, which im¬ parts a distinct character alike to the older and the newer monuments. This is especially con¬ spicuous in the Kremlin or citadel at Moscow, within whose nearly triangular enclosure is an extraordinary group of churches, cathedrals (for in Russia there may be any number of cathedrals in one city, dedicated to different names or saints), towers, convents, palaces, museums and an arsenal ; the earliest buildings dating from the late 15th century, the latest from the middle of the 19th century. The fantastic turrets, lanterns, bulbous domes, gilded and brilliantly colored roofs, and singular decorations suggest a mixture of Tartar, By¬ zantine and Italian Baroque influences, while in some churches the multiplied repetition of certain details suggests even the Brahman monuments of India.

The religious monuments of the First Period are best studied at Kiev and Moscow. The earliest churches, built of wood, are no longer standing; the first church of stone and brick, that of the Tithes at Kiev, built in 989, has also disappeared. While parts of some existing churches may date as far back as 1020-37, as in the cathedral of Saint Sophia at Kiev which has 15 domes and whose interior retains very ancient mosaics of Byzantine style, nearly all have been so often rebuilt entirely or greatly altered in much later years that little is to be seen that is older than the late 15th century. The churches are all built on a small scale of parts, often with four interior piers forming nine bays, each covered by a domical vault or a very lofty lantern or drum carrying a bulbous dome, or a spire tipped with a huge bulbous final. These lanterns are the extreme develop¬ ment of the late Byzantine dome on a drum seen in the churches of Salonika and Athens, and reach the extreme of fantastic extravagance of splendor in the cathedral of Saint Basil (Vasili Blajenoy) just outside the Spasskaia Gate of the Kremlin at Moscow, built 1554 by Ivan the Terrible, with eight lanterns and a huge central spire. The Uspensky Cathedral

at Moscow (cathedral of the Assumption) re¬ built in 1473 by Fioraventi of Bologna has five simpler domes; the church of the Devitchy con¬ vent in the Kremlin has five bulbous domes. Of secular buildings of this period the most striking at Moscow are the Ivan Veliki tower of Ivan the Great, finished in 1600 by Boris Godunov, the tower over the Spasskaia Gate, and the Granovitaia or lesser palace, 1473-90, by Italian architects in the Renaissance style, but restored in

1882, and now serving as a ban¬ quet hall.

Of the Second Period the chief examples are at Petrograd. The civic buildings com¬ prise the Admiralty (1727-35), the famous Winter Palace by Rastrelle (1732), the Stro- ganov Palace by the same, the Tauride Palace by Starov (1783), the Imperial Library by Sokolov (1794-1830), the National Museum by Rossi (1819-25) and the Alexandra Theatre (Rossi, 1832) ; nearly all these in a Russian¬ ized version of the Italian Baroque, in many parts displaying, especially in the interior deco¬ rations, the mixed Russian inheritance of By¬ zantine and Asiatic taste for showy effects. The Hermitage, by von Klenze, is in the neo- Greek style, more restrained in composition and detail. But the two most striking monuments are the two cathedrals : that of the Virgin of Kazan by Woronikine (1801-11) in classic style with a bronze dome and semi-circular colonnade, and the impressive cruciform cathe¬ dral of Saint Isaac by de Montferrand (1819— 58) with a vast iron dome, and internally splen¬ did in its finish of marble and malachite ; it is in a strictly classical style, and is reputed to have cost $15,000,000. The cathedral of Saint Vladimir at Kiev is a more recent work in the Russo-Byzantine style, by Beretti and Bern¬ hardt. Consult < Monuments de l'architecture russe) (Saint Petersburg 1895-1900) ; Viollet- le-Duc, E., (L'Art russe) (Paris 1877).

A. D. F. Hamlin,

Professor of Architecture, Columbia University.

8. RUSSIAN MUSIC. The music pro¬ duced by the Russian people, whether in the form of the primitive and spontaneous folk¬ songs or in the various art forms developed by individual composers. It includes, in other words, all the music possessing sufficient Rus¬ sian characteristics that has sprung up on Russian soil or that has been composed by Rus¬ sian composers, whether in the strictly na¬ tionalist spirit of Glinka and Dargomyzhsky or in the more Western vein of Rubinstein and Tchaikovsky.

The historical development of Russian music reflects, in a large measure, the vicissi¬ tudes of Russia's general and cultural evolu¬ tion. In her musical evolution, as in her gen¬ eral history, Russia has had her centuries of semi-Asiatic seclusion, her sporadic waves of Western influence, her periods of vigorous na¬ tionalism, and her days of cosmopolitanism or eclecticism. While it is manifestly impossible to draw exact parallels, it will greatly help the reader to grasp the general outlines of Rus¬ sian musical history to bear this analogy in mind as he reads this article.

There are various ways of dividing and sub¬ dividing the periods composing Russia's musi¬ cal history. Four general divisions are per¬ haps as logical as any. These may be desig-

The Cathedral of Saint Basil, Moscow

nated as (1) The Primitive Period, (2) The Byzantine Period, (3) The Period of Transi¬ tion, and (4) The Modern Period. The first embraces Russia's musical history from earliest times to the introduction of Christianity; the second, the seven centuries following that sig¬ nificant event; the third, the 18th century; and the fourth, the great period from Glinka to the present day.

The Primitive Period. — Although the lim¬ its of the earliest period of Russian music can¬ not be determined with any definiteness, it is known to have been a long and important one. There is abundant circumstantial evidence to show that music figured considerably in the life of the Wends (Slavic tribes of the Western group) as early as the 6th century. That it was known to and practised by other Slavonic tribes much earlier seems quite probable. Early chronicles, and especially the numerous epic songs of Russia (the <(byliny®), prove con¬ clusively that, in peace and war, music never failed to thrill the primitive Slavs, whose great¬ est pleasure it was at home and on their wanderings.

The period of ancient Russia music, like the earliest beginnings of music generally, com¬ prised chiefly songs — folksongs — whose pro¬ fessional promoters were the "Skomorokhi, }) those wandering minstrels (((Merry Andrews, » the Russians fondly called them) who were both the composers and the preservers of Russia's precious old songs and epics. This early band of minstrels, which included the great Bayan, seems to have branched out later into several divisions, each performing a some¬ what different musical function and all having their modern — naturally much modernized — representatives in Russia to this day. Orig¬ inally, however, there were only two classes of these wandering musicians : straight musicians, who sang or played on the primitive Russian harp, "gusslia,® and those who did other than musical stunts (like juggling) for the diversion of the people. As the latter were called by the name "Skomorokhiˆ (a word of dubious

origin and etymology), there came in the course of time to be many kinds of Skomorokhi, corre¬ sponding to their diverse ways of entertaining. Without enumerating all these, it may be well to add, before dismissing this part of the subject, that these wandering minstrels either sang the legendary or heroic songs of ancient Russia, played for dancing, or acted as buffoons or en¬ tertainers. That they were much more than a transitory factor in the life of ancient Russia is shown by the fact that, despite centuries of persecution by the Byzantine Church, none of the general types of Skomorokhi ever became quite extinct. The bards ultimately became poets or poetasters; the musical performers de¬ veloped into orchestral musicians; while the crude entertainers eventually became regular actors.

So much for Russian primitive music and the musicians who performed, preserved and developed it. The third factor to be considered in this part of our survey is the subject of prim¬ itive Russian musical instruments. There were many of these “folk-instruments,)} whose origin is as obscure as that of the Russian folksongs themselves. Owing to Russia’s long isolation from cultural (Western) influences, as well as

to the ban put upon tolksongs and secular in¬ strumental music by the Protestant Russian Church, Russian musical instruments were not developed and perfected as were those of west¬ ern Europe. The most important of them were : (1) String Instruments — the gussli (several varieties of horizontal harps, having from 7 to 13 strings), the dombra (a guitar-like instru¬ ment), the bandura (a large instrument having 8 to 20 strings, which has supplanted the more primitive kobza), and the balalaika (a triangular, long-necked instrument having originally two but now usually three strings) ; (2) Woodwind

Instruments — the zhalaika (a reed pipe with six sound stops), the svirel (a very simple piped instrument), the snrna (a shrill pipe of Oriental origin), the rozhok (a simple horn¬ shaped instrument with six stops), and the dadka (a form of bagpipe) ; (3) Percussion Instruments — the buben (tambourine), the lozhki (wooden cymbals) and the nakry (kettle¬ drums). Most of these primitive instruments are still used in provincial Russia, and many of them have been so far perfected as to be¬ come orchestral instruments. The most notable instance of such use in very recent times is V. V. Andreyev’s, in his famous Balalaika Orchestra (composed of some 30 pieces of the kind just described, without any bowed instru¬ ments), which has toured both Europe and America, rendering mostly Russian folksongs or music of a similarly light and simple character.

The Byzantine Period. — The highest de¬ velopment of the primitive national period of Russian music — the great folksong period — was reached toward the close of the 10th cen¬ tury, in the reign of Vladimir I (980-1015), the first Christian prince of Russia. With the introduction of Christianity into Russia, a long period of decadence set in for Russian folk¬ song, as for all other kinds of national popular diversion and entertainment. The priests of the new faith, in a spirit of truly mediaeval asceticism, waged relentless warfare against the un-Christian spirit of the Slavonic songs and legends they found in the land of the erstwhile pagans. Watching zealously over the social and domestic life of the newly converted na¬ tion, the Byzantine Church proscribed all folk¬ singing and persecuted its proteges, the Sko¬ morokhi. But so dear were these folk-melodies to the hearts of the Russian people that even such constant persecution, much as it hindered their national development, could not entirely arrest their growth. It was those very Skomo¬ rokhi, or gleemen, whom we have just men¬ tioned, that kept alive the spirit of folksong in Russia during centuries of Christian perse¬ cution. Taking refuge in the woods and re¬ mote villages, these wandering minstrels enter¬ tained and diverted their eager audiences pretty much as of old. The rich Russian nobles, moreover, persisted in maintaining, openly or secretly, their customary retinues of minstrels, despite clerical bans and displeasure. But, in the course of time, a new kind of song de¬ veloped, a kind of song in which the earlier pagan sentiments were tempered with Christian. Being less spontaneous than the earlier folk¬ songs, this curious conglomeration — and it seems to have been no more than that — was neither as pure nor as musical. With this de-

terioration of song came, naturally, a deterio¬ ration of the minstrels who sang it. The “spiritual® songs which the Russian gleemen seem to have invented at this time were neither a thing of beauty nor a joy forever. They were frankly and patently a substitute — and a very poor one at that — for the primitive but delightful folktunes, which were to remain sub¬ merged for centuries.

But the influence of the Church of this period on Russian music was not only negative. The Byzantine priests brought with them from the East a number of old church songs. In the 11th century, too, Greek singers introduced the Greek musical system into Russia. Soon music schools sprang up in various parts of Russia — at Smolensk, at Novgorod, and elsewhere — in which this system was studied and

popularized. Gradually interest in church music spread, and the laity also learned to know and care for it. In the 12th century, if not earlier, efforts were made at chanting, which in the early days con¬ stituted the whole of the liturgic music. This was modeled more and more upon the famous Gregorian chant, while parallel texts ac¬ companied the music notes — one in Greek and another in Slavonic (church Slavonic, to be sure). The Greek and Slavonic systems of notation, too, were long rivals, the former pre¬ vailing well into the middle of the 13th century. The greatest promoters of church music in Russia have been its tsars, who have maintained regular church choirs ever since the 15th cen¬ tury. It was out of these church choirs, con¬ stantly improved and augmented, that finally developed the now world-renowned Choir of the Imperial Chapel.

Among those who had done most to develop and perfect Russian church music were M. S. Beriozovsky (1745-77), perhaps the greatest Russian composer of sacred music; D. S. Bor- tiansky (1751-1825), a most gifted composer, who has done more than anyone else to per¬ fect the above-mentioned Imperial Chapel Choir and whom the Russians have aptly named “the Russian Palestrina®; A. Lvov (1799-1836), composer of much meritorious music, but especially famous as the author of the Russian national anthem, and Degtiarev (1766-1813), composer of much interesting church music as well as of the secular oratorio, (The Deliverance of Russia in 1612.) Excellent collected editions of liturgical music of the Russian Church, variously harmonized, have been published at Petrograd under the auspices of the Imperial Chapel. Two ancient musical grammars, pub¬ lished in facsimile, are also available. There are any number of works on the subject of Russian church music.

The Period of Transition. — The salutary influences of church music just referred to came long after the Byzantine period. They were mentioned under the preceding section merely for completeness. As a matter of fact, the dominance of Byzantine music in Russia ended soon after Western influences began to reach it, first through Kiev in the 17th cen¬ tury and next through Saint Petersburg in the 18th century. It was in the reign of Tsar Alexey Mikhailovitch (1645-76), Peter the Great’s father, that the influx of foreign culture into Russia first began. Naturally, music was among the arts affected. Following European

fashion, court choirs and orchestras came into vogue. The wandering minstrels of old (the oft-mentioned Skomorokhi), hitherto banished and persecuted by the overzealous Church, now became regular musicians and actors. The nobility, imitating the court, also now began to maintain their private little bands of musicians. Later these

would give public per¬ formances, and thus musical interest was being stimulated by various agencies. When, finally, toward the end of Alexey Mikhailovitch's reign, the old ban on folksongs and secular music generally .was lifted, the glory of Russian folk¬ song — much dimmed, it is true, by centuries of disuse and somewhat denatured by the long- prevalent Byzantine music — once more re¬ turned to the land.

But conditions generally did not yet favor Russia's spiritual awakening, which followed the era of Westernization ushered in by Peter the Great (1689-1725). Nor did the change come all at once even then. It was impossible for Peter's numerous reforms to make them¬ selves felt so quickly in any field. Certainly music was one of the last things to have throbbed with the new life that then began to stir sluggish Russia. It would seem that, with the multitude of political and social reforms claiming constant attention in the reign of this sovereign, the arts suffered proportionately greater neglect. At any rate, during Peter's reign music remained but a diversion of the court — an aid to the lustre of social functions, etc. — for Peter himself is said to have found as little pleasure in opera and comedy as in the chase. His tastes were only for church music. According to a reliable musical historian (Korb), as late as 1698 music was still only an accom¬ paniment to various occasional feasts and cele¬ brations in the homes of nobles, wealthy mer¬ chants, and German officers residing in Russia. Native Russian musicians were still too scarce in 1702 to make up the small orchestra of the Mos¬ cow Theatre without importing men from Ham¬ burg. And the orchestras of that day were very small. Even court orchestras did not exceed 20 instruments, chiefly brass. Nor did their musical efforts have any artistic merit. Even military music of a very crude character did not find its way into Russia before 1704, after which it came to be used at funerals. As to folksongs, the court and society generally evinced no particular fondness for them, de¬ spite the new lease of life given to them in 1 722 by Peter's ukase permitting popular musi¬ cal diversions on certain Church holidays.

But greater musical progress was made in Russia under Peter's successors, Anna Ivan¬ ovna and Elizabetha Petrovna. It was under the former that Italian opera first appeared in Rus¬ sia (1735). The event and date have great his¬ torical significance because they mark the be¬ ginning of a long period of foreign (chiefly Italian) operatic influence, from which Russia did not fully emerge for over a century. Ac¬ cording to Vladimir Stassov, a famous Russian musical critic and historian, the first Italian opera produced in Russia was Francesco Araja's ˆlbiazar,* conducted by its Italian composer, who was court

kapellmeister under both Empress Anna and Elizabeth. Other foreign operas, mostly the work of the same composer, followed in rapid succession. But

none of them had anything Russian to recom¬ mend them, although several composers tried persistently to give to their non-Russian works some Russian flavor. Thus the above-men¬ tioned Araja produced an opera in 1755 ((Cephalus and Procius)) which was written to a Russianized libretto and which was the first opera sung in Russia in the vernacular.

During Elizabeth's reign music in Russia became a fad, if not a veritable craze, every wealthy merchant aping the court fashion by organizing private musical bands and choirs. It was then, chiefly through the influence of Count Razumovsky (immortalized by Beethoven) that Russian folktunes came into vogue again. Araja and others started to introduce them into their operas. Thus appeared for the first time instrumental music which used and artis¬ tically developed Russian folksong themes. Under such favorable circumstances, native Russian singers and even composers developed. Besides the famous composers of church music mentioned in the preceding section, there were F. G. Volkov (1729-63), the eminent Russian actor, whose opera (produced in 1772) comes much closer even than Volkov's work to having been one of the precursors of genuine Russian opera. The historical importance of such compositions becomes more obvious if we bear in mind the fact that most of the foreign <(operas)) of those days were really only series of more or less successful musical vaudeville acts.

Still greater musical progress was made in Russia under Catherine the Great, who was the first Russian ruler to give serious attention to general musical education. In her reign the study of music was introduced into girls' schools, while a student orchestra was organ¬ ized at the Moscow University. Musicales be¬ came frequent and musical clubs multiplied, both factors exerting incalculable influence upon Russia's musical development. Temporarily halted in the reign of Catherine's successor, who entangled Russia in a war with France, this de¬ velopment received a new stimulus from the spirit of nationalism which followed the great Napoleonic defeat of 1812. Russia was deter¬ mined to shake herself free, as it were, from foreign fashions and influences, which had long hindered her independent national

development, in music as in other things.

Naturally, such a task could not be accom¬ plished all at once. Persistent and numerous attempts in this direction were made with varying degrees of success by such composers as Titov (1800-76), Aliabiev (1802-52), Var¬ lamov (1801-51), Gurilev (1802-56), Vielgorsky (1788-1856), Verstovsky (1799-1862) and, espe¬ cially, the very prolific Venetian composer re¬ siding in Russia, Catterino Cavos (1776-1840), who rendered particularly great service to the Russian music-drama. Though the musical edu¬ cation of most of these composers had been too German-Italian to enable them to write music that should be truly and fully Russian, the work of this group of “pre-nationalists® or “pseudo-nationalists,® as it has been variously called, certainly paved the way for the great

Glinka, the first truly national Russian com¬ poser, with whom modern Russian music really began.

The Modern Period. — Hardly any period of Russian music illustrates better than the modern the principle, referred to at the begin¬ ning of this survey, that Russia’s cultural and artistic development practically reflects the general course of her eventful history. The new and vigorous impulse given to Russian life and thought by the pregnant events of 1812 — an impulse making for thoroughgoing nation¬ alism — found its expression in the field of music, no less than in science, art and literature. Not only did the first quarter of the 19th century witness a still greater development of opera in Russia, but orchestral music first received seri¬ ous attention and systematic study there. The great classical composers, from Bach to Bee¬ thoven, were introduced to Russian audiences between 1802-19 by the assiduous efforts of the Russian Philharmonic Society, the oldest Rus¬ sian organization of its kind, founded in 1802. Besides, orchestral concerts given by various educational institutions (with the participation of their students) supplied more popular musical diversion. That the musical public grew rapidly in those days, Glinka himself tells us. The general elation caused by the sudden victory of 1812 spurred on even Russian composers to new efforts ; and we have, as a result, the first Russian oratorios and songs (best done, per¬ haps, by the above-mentioned pre-nationalist, Titov) and the so-called cantatas of Verstovsky, another of Glinka’s contemporaries, who, to¬ gether with the energetic Cavos, may be said to have tilled the soil of Russian opera into which Glinka was to plant the sturdy seeds of nationalism a little later.

Although the development of Russian music in the 19th and 20th

centuries has been con¬ tinuous, it cannot be said to have been homo¬ geneous. At least three distinct general tend¬ encies are discernible in this period: (1) the nationalist, (2) the Western and what may be called (3) the cosmopolitan or eclectic. We shall consider each separately and in the order given, concluding with a summary view of (4) recent tendencies.

The Nationalist School. — The father of this great school of Russian music was Mikhail Ivanovitch Glinka (1804-57), who did for Rus¬ sian music what Pushkin (q.v.) did for Russian literature, or Ivanov for Russian art. Although Glinka began composing in the Ger- man-Italian vein, he soon set his heart reso¬ lutely against foreign models and, by dint of genius, created music as characteristically Rus¬ sian as has ever been done since. His two songs composed abroad in 1832 already disclosed Glinka's groping for a new musical style, and his epoch-making opera, (A Life for the Tsar* (1836), gave further intimations of the birth of an independent national school of music in Russia. This opera, while still markedly Italian, has sufficient Russian color — it uses Russian folktunes and is based on a Russian plot — to win for it considerable distinction as the fore¬ runner of real national Russian opera, which began most auspiciously with Glinka's (Ruslan and Ludmila) (1842), his masterpiece, which at once raised the status of Russian music as the equal of any in the world. This great national

opera attested to Russia's emancipation from foreign musical domination. An impressionable musical genius, Glinka reflected not only the influence of Russian folksongs, but also that of Oriental and Spanish folktunes. In both latter fields he has wrought his chef-d'oeuvre, introducing new elements everywhere and breathing new life into everything he utilized. Sympathetic comprehension of the spirit of Oriental music, which is so characteristic of many Russian composers, found in Glinka the first and greatest embodiment.

But Glinka was chiefly an instrumental com¬ poser. Much as he did jn this field — and he actually created the modern Russian orchestra and introduced entirely new methods of orches¬ tration — Glinka did not do much for vocal music. With this phase of musical development Alexander Dargomyzhsky (1813-69), Glinka's illustrious contemporary, concerned himself. Although Dargomyzhsky, too, began by imita¬ ting foreign musical models, he soon surpassed all these, and even Glinka himself, in the oper¬ atic field. Even his early

opera,

So inspiring were the great works of Glinka and Dargomyzhsky, that a whole school of Russian composers soon grew up which strove consciously to imitate and interpret them. By continued and close study of Glinka's and Dargomyzhsky's masterpieces, this group of composers — variously known as <(the Balakirev Circle,® <(the Mighty Set,® (

of Russian composers. The leading represen¬ tatives and guiding spirits of this great school were Balakirev (1837-1910), Borodin (1843-87), Musorgsky (1839-81), Rimsky-Korsakov (1844- 1908) and Cesar Cui (1835-1918). Space forbids any consideration of the musical principles which guided the work of this illustrious circle of Nationalists. As their chief mission was the radical reform of opera along the lines marked out by Glinka and Dargomyzhsky (in the field of symphonic music they accepted the work of its great Western masters), one cardinal prin¬ ciple may be stated to indicate their general trend. In the words of Cui himself, this was the principle that <(operatic music should always have sufficient intrinsic value as absolute music, apart from the text to which it is written.® ((Truth and Nationalism® was their persistent battle-cry.

Of the principles and methods of this school, Balakirev was the most influential teacher, Cui the most aggressive exponent, and Mu¬ sorgsky the best illustrator. The first two wrote little music, thus making the other three mem¬ bers of the group the most prominent com¬ posers of their school. But even though Balakirev and Cui do not rank high as com¬ posers — and the compositions of the first, es¬ pecially the wonderful symphonic poem 'Tamara,5 are by no means negligible — they occupy a very important place in the history of Russian music — the former as the initiator and leading spirit of the great musical school we are here considering, and the latter as the most vigorous and devoted literary champion of the principles for which it stood. Of the three others, Musorgsky was chiefly a vocal com¬ poser, Borodin an instrumentalist, while Rimsky- Korsakov worked prolifically in both fields. As they have all won universal renown, a word characterizing the work of each will not be amiss.

Musorgsky was the direct musical descend¬ ant of Dargomyzhsky, whose theories and prin¬ ciples he followed so faithfully that he soon excelled the work of his great master. Accept¬ ing Dargomyzhsky's musical creed concerning the realistic representation of life, Musorgsky embraced also the principle that art is a means to an end, and not an end in itself. The end, in the case of music, as in the case of

the other arts, is the communication of thought. This was Musorgsky's guiding principle, which he successfully embodied in both song and opera, neither of which have ever been surpassed. His operas (especially (Khovanstchina5 and (Boris Godunov,5 both historical music-dramas) are as truly Russian in every respect as art could make them. By all means the most gifted and origi¬ nal composer of the nationalist school, Musorg¬ sky has extended the bounds of musical art quite as much as did Berlioz or Wagner. Cer¬ tainly no Russian composer, before or since, has done so much for musical realism. His works are not only realistic and intensely national in plot, inspiration and melodic texture, but are also veritable studies in folk-psychology, thus giving the spirit of the times as faultlessly as any historical novel. Hence Musorgsky's operas and songs, in both of which he displays truly Shakespearean insight into human nature, are human documents in the broadest and best sense of the word. Add to all this a pervading sense of musical humor — a very uncommon

quality among Russian composers — and great dramatic gifts, and Musorgsky's greatness and historical importance become obvious even to the casual student of musical history.

A far lesser genius was Borodin. Just as Musorgsky continued the line of musical evo¬ lution begun by Dargomyzhsky, the vocalist, so Borodin worked along the lines laid down by Glinka, the instrumentalist. Borodin, unlike Musorgsky and Dargomyzhsky, devoted much time to absolute music, and sedulously culti¬ vated the older musical forms discarded by the latter. In his only opera, Prince Igor,> Borodin is more lyrical than Glinka and more romantic than Musorgsky. In other words, he stands somewhere between national lyricism and dramatic realism. < Prince Igor,> however, has great melodic inventiveness, national pictur¬ esqueness, and epical charm. If Borodin's music is the most national after Glinka's, his use of Oriental melodies surpasses even his great mas¬ ter's. But Borodin was essentially an orchestral composer, and it is as a symphonist that he has influenced the course of Russian musical de¬ velopment. Yet, though a great melodist and Orientalist in color (especially in such a masterly musical picture as (In Central Asia,* one of the mainstays of the modern concert repertoire), Borodin can hardly be ranked among the foremost Russian composers.

The orchestral development begun by Glinka and furthered by

Borodin, among others, at¬ tained seeming perfection in Rimsky-Korsa- kov, at once the most brilliant and the most prolific composer of the Balakirev Circle. An apostle of musical beauty and a perfect master of form, this many-sided Russian composer stands supreme in the history of modern Rus¬ sian music, since not even the great Tchaikov¬ sky (to be considered in another section), equals his powers of orchestration and his epical melodic charm. Rimsky-Korsakov is, first of all, an optimist (a composer in the major key) and an objectivist. Like all the lineal musical descendants of Glinka, he uses folk-melodies of several countries, setting them off in such gorgeous color and orchestrating them with such luxuriance that one almost for¬ gets that the resulting kaleidoscopic beauty is a work of art. Nor is it possible to say in which department, orchestral or vocal, Rimsky-Korsa¬ kov really excels. He has produced first- class symphonic music (including the univer¬ sally admired suite, (Scheherazade*) and many splendid operas (including such gems as (Sniegurotcha*) , besides volumes of songs, duets, choruses and cantatas. Besides being the most versatile Russian composer and the great¬ est wizard of orchestration, producing endless varieties of rich orchestral color, Rimsky-Kor¬ sakov enjoys the additional distinction of be¬ ing the greatest Russian musical fabulist — a great <(musical archeologist,® he has been aptly called — for the way he draws upon folklore and legends for his enchanting opera librettos.

Manifestly, such splendid musical develop¬ ment as was attained by this brilliant group of Russian composers could not continue in¬ definitely. A period of decadence, which al¬ most always sets in after a particularly rich flowering out of any art, naturally followed the unprecedented musical progress made by the foremost composers of the Balakirev Cir-

cle. The numerous and inevitable followers were, for the most part, uninspired imitators. Devoid of original ideas, they became a cult of mere formalists — musical rhetoricians, as it were. Thus, the representatives of the second generation of nationalist Russian com¬ posers, Glazunov (1865—) and Liadov (1855— 1914), both distinguished pupils of Rimsky- Korsakov, were very skilful technicians whose musical inspiration hardly ever keeps up with their mastery of form. Of the two, Glazunov is the greater technician ; Liadov, the greater melodist. Both have their followers and imita¬ tors in Russian music. Mention might be made of Shtcherbatchev, Sokolov, Ladyzhsky, the two Blumenfelds, Alferaky and others, who should be classed in the school best represented by Liadov. Among the followers

of Glazunov, most prominent are Vitol, Liapunov, Gretch- aninov, Kapylov, Antinov and Yestafyev. But, of course, none of these groups of younger nationalists suggest even remotely the great older generation of Russian composers in whom the great nationalist school of Russian music reached its culmination. Whether the vein of nationalism has finally run dry, or whether other tendencies have ultimately replaced it, cannot be discussed in the present article. Cer¬ tain it is that the glorious illumination we have been considering in this section has not yet found its like in Russian musical history.

The Western School. — Even while the na¬ tionalist illumination was at its height, the ((New-Russian School® did not have the field all to itself. Not only then, but from its very inception, this school or tendency had a for¬ midable rival in the Western school, repre¬ sented by the two Rubinsteins, Serov and others. Indeed, the Western tendency ante¬ dated the nationalist, being the more natural heir of the 18th century foreign-opera period. The struggle between the two great schools constitutes a most interesting chapter in the history of Russian music. The traditions es¬ tablished by the leaders of each musical camp have not entirely died out yet, though natur¬ ally the bitterness of earlier days has dis¬ appeared. There are many Russian contempo¬ rary composers who, consciously or uncon¬ sciously, represent one or the other of these tendencies; and there are some, as we shall see presently, whose eclecticism embraces both. It is impossible to enter here into the details and merits of this historic musical controversy, which raged all through the second half of the 19th century. Having already referred to the leading representatives of the nationalists, the (

Anton Rubinstein (1829-94), who was con¬ servative as a composer, rendered his greatest service to Russia's musical development as an educator. In a country where systematic musical education had been hitherto entirely unknown and where musical art was cultivated but by the few, Rubenstein's persistent and indefatigable educational efforts were sorely needed, if not always appreciated. It was to him that Russia owed the establishment of its first symphony concerts, the first Russian con-

servatory of music, the Imperial Conservatory of Saint Petersburg, founded in 1862, and the oldest Russian musical society, the Imperial Russian Musical Society, organized in 1859, per¬ haps the greatest

musical organization in the world. In the teeth of much adverse criticism Rubinstein introduced into his conservatory the principle of sound musical scholarship and broad Western musical education. His insistence on this principle alone would have embittered the members of the new national school, most of whom were neither academic musicians nor professional composers. But, of course, Rubin¬ stein's musical tastes and predilections gave them equal offense.

Just as he looked to the West for educa¬ tional guidance, so Rubinstein turned thither for musical models and inspiration. Being a classicist both by temperament and by educa¬ tion, he followed almost religiously the musical traditions of the school of Beethoven and Mendelssohn, eschewing and detesting all musical innovations, Wagner's no less than those of the new Russian school. Lacking in originality, however, Rubinstein remained a mere imitator as a composer; and he may not improperly be classed with one or other of the German schools of the 19th century. A truly Russian composer Rubinstein never became, though he at times used national themes and set to music several Russian texts — missing, in both instances, the essential spirit of the national elements he employed. Moreover, he was a very careless composer, and most of his works lack finish and depth. He was a very prolific composer, however, and produced many works in every musical form. Though passages of exquisite beauty and even grandeur may be found everywhere, Rubinstein's longer com¬ positions suffer for want of sustained inspira¬ tion, artistic finish and proper proportion, pro¬ fuseness being one of his besetting sins. Much as he did for Russia's musical development as an educator — and Rubinstein not only taught in his conservatory, but also toured Russia as musical conductor and piano virtuoso, giving concerts and recitals of inestimable educational value — Rubinstein did very little for Russian music as a composer. Mistaking mere eth¬ nography for nationalism, he could never be¬ come a truly national composer.

Among the composers whom Anton Rubin¬ stein may be said to have influenced, the most prominent were his brother, Nikolai Rubin¬ stein (1835-81), also a great musical educator and pianist; Edward Napravnik (1839-1916), a great operatic conductor, and Karl Davidov (1839—89) , perhaps the greatest violoncellist Russia has ever produced.

More important also as a musical educator than as a composer was the other prominent opponent of the Balakirev Circle, Alexander Serov (1820-71), the first well-educated pro¬ fessional music critic in Russia. Beginning with a series of essays and lectures interpret¬ ing

the meaning of Western composers — Mozart, Beethoven, Donizetti, Rossini, Meyer¬ beer, etc. — and ending with his whole-hearted praise of the works of Richard Wagner, Serov did very much to spread musical knowledge in Russia. His influence on the reading public of his day was inestimable. By raising musical appreciation in Russia he did for Russian music

pretty much what the great Belinsky (q.v.) did for Russian literature. For having lifted Russian musical criticism to its professional level, a level well sustained by at least two other musical critics (Laroche and Ivanov), Serov's name deserves always to be remem¬ bered in the history of Russian music. But, being a subjective critic and by no means a very consistent one, his four collected volumes of musical criticism abound in misleading and contradictory statements, many of them made in the heat of journalistic debate, for Serov was a born and bitter controversialist.

The Cosmopolitan or Eclectic School. — Neither the strictly nationalist nor the purely Western tendency in Russian music proved self-sufficient. Rubinstein has had no note¬ worthy followers, while the nationalist illumini- nation owed most of its brilliancy to such rare geniuses as Musorgsky and Rimsky- Korsakov. Whatever truth there was in the two diverse views, neither of them contained the whole truth. The golden mean in this case was found by the great Tchaikovsky, the greatest Russian composer and the foremost representative of ˆoccidentalism® or <(eclectic- ism® in Russian music.

Peter Ilyitch Tchaikovsky (1840-93), a pupil of Rubinstein, did not actually belong to the Balakirev Circle; though some of his works embody principles formulated by the famous ((Five.® He cannot properly be classed with the new Russian school, since he persistently deviates from the straight and narrow path of pure nationalism. Though Tchaikovsky un¬ doubtedly had much in common with the Rus¬ sian nationalists, his artistic tastes and leanings were too Western to be confined within the narrow bounds prescribed by nationalism. Thus it came about that in Tchaikovsky these two musical tendencies were happily combined.

Like his great contemporary, Rimsky-Kor- sakov, Tchaikovsky was a very prolific com¬ poser, having created numerous works in every field of musical composition — orchestral, op¬ eratic, song, chamber music, concertos, etc. It is as an orchestral composer, however, that Tchaikovsky's genius shows to greatest ad¬ vantage ; and it is as a symphonist that he ranks among the greatest composers of the world.

Tchaikovsky's characteristic vein is subjective — introspective. All his symphonies but one are written in a minor key, while the three greatest are pervaded by a tone of intense struggle and revolt. If Rimsky-Korsakov may be described as a musical optimist and an objectivist, Borodin as an epical composer, and Musorgsky as a delightful realist, then Tchai¬ kovsky may be characterized as a musical pessimist and subjectivist. The lyrical vein of Glinka, whose musical heritage he, naturally, shared, finds its highest expression in Tchai¬ kovsky. The spirit of folksong, which per¬ vades the best melodies of Rimsky-Korsakov, yields in Tchaikovsky's typical music to sombre themes steeped in introspection. Technically and temperamentally he is an uneven com¬ poser, resembling in this respect the less gifted Rubinstein. While Tchaikovsky's rhythms are often capricious, his melodious vein seldom runs dry, and his rare elegaic charm remains forever fresh, while as a master of orchestra¬ tion he is second only to Rimsky-Korsakov.

Just as the nationalist school of modern Russian composers reached its highest develop¬ ment in Rimsky-Korsakov, its most brilliant representative, so the cosmopolitan or eclectic school attained its greatest glory in Tchaikov¬ sky, its most illustrous composer. In neither case have followers or disciples sustained the splendid attainments of their great masters. The followers of Tchaikovsky are quite numer¬ ous. They include Arensky (1861-1906), a fairly interesting melodist and a skilful har- monizer ; Kalinnikov (1866-1900), a very promising symphonist who died all too soon ; Ippolitov-Ivanov (1859 –), a great connois¬

seur of Caucasian and Semitic melodies; Taniev (1856 —)., a composer best known for his chamber music, and Rakhmaninov (1873 —), the greatest and most promising follower of Tchaikovsky, if not the foremost living Rus¬ sian pianist and composer.

Recent Tendencies. — Many and varied are the new tendencies that have appeared in Rus¬ sian music since the days of Tchaikovsky and Rimsky-Korsakov. As these practically coin¬ cide with the beginning of the present century, they are all too new to have reached any very definite development. It is, therefore, as im¬ possible to label such tendencies as it is to classify the contemporary Russian composers into ˆschools.® The necessary historical per¬ spective is altogether wanting for such a task. All that can safely be attempted in this article

is a very general outline of such few tendencies as seem most pronounced and unmistakable at this writing.

It seems to have been inevitable that the world-wide radical tendencies — (

Skriabin, whose earlier compositions are de¬ lightfully Chopinesque, passed through a period of Liszt-Wagnerism before becoming the musical extremist for which he is known the world over. Thus it is in his last period that Skriabin showed his unmistakable impression¬ ism. Becoming more and more independent as a composer, he introduced more and more revolutionary ideas into his works. For in¬ stance, in his symphonic poem, (Prometheus, } the composer tries to prove the fancied rela¬ tionship between sound and color by introduc¬ ing what is known as ((the color-keyboard. w This experimental fusion of auditory and other sense-impression was to be carried still further in a symphonic poem which would utilize per¬ fume as well as color, but Skriabin's premature death prevented its completion. There is no telling what course this original composer would have taken next, had he lived longer.

Less, of a musical theorist and more of an impressionist than Skriabin is Stravinsky, whose great originality asserted itself from the very first ((Scherzo Symphonique)). More than any other Russian composer, Stravinsky re¬ sembles Debussy and Schonberg. Proceeding to assert himself in subsequent compositions, he soon came to be generally regarded as the fore¬ most ˆFuturist,® which meant that Stravinsky had gone somewhat beyond legitimate impres¬ sionism.

Harder to classify than either Skriabin or Stravinsky is Prokofiev, the youngest of the three and seemingly the most immature. De¬ cidedly under the influence of Schumann and Brahms, he yet shows unmistakable traces of Reger. Though having little in common with Stravinsky's general musical manner, he yet reveals internal traits strongly suggestive of his futurism. Prokofiev, evidently, has not yet found himself.

The only one of these composers whose fol¬ lowers can be said to have formed a new school is Skriabin. In both Petrograd and Moscow there are innumerable budding composers who try to ape Skriabin's compositions, a task far beyond mediocrity. Of these imitators — and to some extent of all the impressionists and futurists — it may be said that their principal shortcomings are the lack of thematic inven¬ tion and solid musical scholarship. Disregard¬ ing fundamentals and seizing upon accidentals, these ultra-moderns worship musical form

above spirit and substance, seeking dissonance instead of consonance. The great advance made in modern orchestral technique enables these composers to hide a woeful paucity of musical ideas under much belabored orchestration. The result, in most cases, is much ado about nothing.

Bibliography. — Considering the very im¬ portant place Russian music now occupies in the concert halls and opera-houses of at least two continents, it is more than surprising that there should be such a scarcity of literature on the subject in West European languages. In English this dearth is particularly disconcerting. Apart from periodical literature, which cannot be listed here, five more or less comprehensive works (two by the same author and two in translation) are practically all that is available in English at this writing on the subject of Rus¬ sian music generally: Cui, Cesar, (A Histori¬ cal Sketch of Music in Russia* (in Century Library of Music, Vol. VII, New York 1901) ; Montagu-Nathan M., (A History of Russian Music) and Contemporary Russian Composers) (both London 1914 and 1917, respectively) ; Newmarch, R., (The Russian Opera) (New York 1914) ; and Pougin, A., (A Short History of Russian Music> (ib. 1915). In French the list of such works is just as short. Besides Pougin's history, already mentioned in its Eng¬ lish translation, the reader of French will find the following variously interesting: Bruneau, A., (Musiques de Russie et Musiciens de France* (Paris 1903) ; Marliave, J., (Musiciens Russes) (In (Etudes Musicales,* ib. 1917) ; and Sou- bies, A., (Histoire de la Musique en Russie) and (Precis de l'Histoire de la Musique Russe) (both Paris 1898 and 1893, respectively).

The most critical and comprehensive Russian work on the subject is Berizovsky's (Saint Petersburg 1898). There are, besides, a very admirable series of essays by Engel (Moscow

1911), a good historical sketch by Kashkin (ib. 1908), and that most authoritative if not unbiased sketch by Cesar Cui mentioned above, which is available in French as well as in English.

Of course, there is no end of literature treat¬ ing of various phases of the subject. But limi¬ tations of space preclude all special and classi¬ fied bibliographies, which may be found else¬ where in this and other reference works.

David A. Modell, Specialist in Russian Subjects.

9. EDUCATION IN RUSSIA. Education¬ ally, as in other respects, Russia has long lagged behind the more progressive countries of both Europe and America. Neither in their extensity nor in their diversity can the schools of Russia compare favorably with those of Germany, England or the United States.

History. — Russia had no schools worth mentioning before the end of the 14th century, when the southwestern part of the country came into contact with Western civilization. Then, for the first time, well-organized schools ap¬ peared in Russia. But these were in no sense national schools — and were not intended for the general public. It was not before Peter the Great, three centuries later, that Russian schools assumed Western characteristics. Up to his time all schools and schooling had borne a decidedly ecclesiastical character and de¬ pended wholly upon the clergy ; but during this monarch's reign Russian education was secular¬ ized, extended and rendered more practical. Under subsequent monarchs there were various periods of bitter struggle between educational autonomy and state autocracy, induced by the shifting political aspects of the times, until the Great War and the proclamation of the Russian Federated Republic inaugurated a new educa¬ tional era.

The Minister of Education appointed by the provisional Kerensky government, Ignatiev, was a progressive educator, who planned many edu¬ cational reforms for Russian schools — includ¬ ing the elective system, the professional training of teachers, etc. But these and other important educational projects were halted by the Civil War into which Russia was plunged by the Bolshevist coup d'etat of 1917, and naturally await the settled conditions of peace for de¬ velopment.

Organization, Etc. — For educational pur¬ poses monarchial Russia was divided into 15 districts, with the Ministry of Public Instruc¬ tion as the supreme central authority. The Holy Synod exercised considerable control over primary schools, while the ministries of War, Marine and Finance maintained their own edu¬ cational departments for the management of military schools, naval academies and com¬ mercial institutes. Save in the Lutheran parishes of the Baltic provinces, education in Russia was neither universal nor compulsory. Although under the Primary School Law of 1864 children of every rank, race and creed were to be admitted to primary schools controlled by the state, not more than one-sixth of the children of school age coula be accommodated in Russia for lack of school facilities. Hence the low average literacy — about 21 per cent through

the former empire. The course of study was extended in 1872 to three years for ordinary

and six years for urban primary schools, the latter including history, geography, geometry, the elements of physics, science and singing, be¬ sides the inevitable three R's and such special subjects as were approved by the Minister of Education. The actual support of primary schools devolved upon the central government, local authorities and private societies, as the case might be. Certain Sunday schools, sup¬ ported by private funds, also carried on regu¬ lar primary work with the approval of the Minister of Education. There were besides, many denominational schools engaged in secu¬ lar teaching throughout the country which were similarly authorized. Before the World War there were, all told, about 126,000 primary schools in Russia, with a total enrolment ex¬ ceeding 8,264,000 pupils.

The principal schools of secondary grade in Russia before the Revolution were Gymnasia (classical high schools), Realschools (modern high schools), Progymnasia (junior high schools) and commercial schools. The first were intended to lead directly into the uni¬ versities, while the second prepared pupils for the various technical schools. As many gym¬ nasia students never entered the university, a new kind of secondary school — something be¬ tween the classical and the modern high school — was under consideration when the war broke out. Besides these types of secondary schools there were many others — teachers' institutes, teachers' seminaries, girls' high schools (((female gymnasia®), etc. A special kind of girls' sec¬ ondary school, a sort of boarding school similar to Roman Catholic convent schools, was established by Empress Maria, wife of Alex¬ ander II, which ultimately necessitated a sepa¬ rate educational department assuming almost ministerial rank. This particular institution is believed to have been the forerunner of numer¬ ous girls' high schools in Russia and thus promoted the education of women to no incon¬ siderable extent. The regular high-school course runs from seven to eight years, and in the case of girls includes no classical languages. As in the case of primary schools, many high schools are maintained by private organizations, but all are controlled or supervised by the government. The total number of secondary schools in Russia increased from 760 in 1909 to 2,050 in 1914 and the number of enrolments from 171,687 to about 685,601.

Russian universities resemble those of other countries in many respects. In imperial times they had the usual faculties of law, philology, science, medicine, chemistry, etc., but foreigners were denied admission to all but musical con¬ servatories. Private

universities were the ex¬ ception rather than the rule. The social spirit characteristic of the best European and Ameri¬ can universities has in the past been wanting in Russian universities, being replaced by intense political activity — hence the government's re¬ pressive measures referred to earlier in this article. The number of applicants for admis¬ sion always greatly exceeding all possible en¬ rolments, a stiff competitive examination pre¬ cedes matriculation in Russian universities. As many university graduates land in the civil service, there was always a close connection between the proverbial incompetence of .govern¬ ment officials and the unfortunate educational situation just referred to, which often makes

the choice of one's profession largely a matter of chance. The leading Russian universities be¬ fore the Revolution were those of Moscow, Petrograd, Kiev, Kharkov, Kazan, Warsaw, Odessa. Yaroslav, Tomsk and Saratov. These had a total of 39,027 students in 1914. During the Great War a women's university was founded at Petrograd and a new university was decreed at Perm.

David A. Modell, Specialist in Russian Subjects.

10. RUSSIAN RELIGION. Pagan Pe¬ riod. — The Russian national chroniclers have left us scanty details as to the primitive reli¬ gious beliefs of the Russian tribes. Russian paganism, despite the multiplicity of its idols, rests on a monotheistic conception of the divin¬ ity. Svagor (in Sanskrit, the God coming from Heaven) is the Jhwah, the Jehovah, Jove or Jupiter of the Russian Olympus, the god of the lightning. All the other gods were born from him. The most powerful of them are the Sun and the Fire. An important divinity is Peroun, adored as the giver of rain. Stribog represents the classic AEolus. Other divinities are Siwra, the god of peace and concord among men; Tur, the god of war; Rod and the Roz- hantzy, the domestic lares ; Mara, the goddess of pestilence; and the Rousalki, the Russian lake and marsh nymphs.

Russia gave her divinities human form; and the national chroniclers mention the statues of Peroun, Dazhbog, Stribog, Simargl and Ko- mosh. Temples do not appear to have been built. Their places of worship were the sum¬ mits of hills, woods, the springs and occasion¬ ally rustic cabins and barns. They offered their idols sacrifices of slaughtered and burnt ani¬ mals, and of bread and fruits. On supreme

occasions, human sacrifices were offered to ap¬ pease the wrath of the gods. The sacrifices were made not by priests, but by the princes, the chiefs of the tribes, the seniors and even by the chiefs of the families. The Pagan Rus¬ sians believed to some extent in the immortality of the soul, and a life hereafter. According to their belief, souls after death were gathered in the island of Buyan, in the middle of the ocean; coming from time to time to visit their native country. The early Russians practised cremation, burning the dead in small canoes. A year after death, the souls were commemo¬ rated with funeral banquets, and other cere¬ monies. It seems also that the faith of Rus¬ sian paganism in the immortality of the soul had an element of metempsychosis.

The religious calendar was based upon the change of seasons. The beginning of the new year was celebrated with special ceremonies in honor of Peroun and the Sun. They were called Koliady, a name derived from Latin Kalendce or according to Solovev, from kolo (circle, the symbol of the sun), and Lada, the goddess of spring. It was replaced later by Christmas. The same divinities were honored in great celebrations at the beginnings of spring and summer. The last one was transformed in Christian Russia into the feast of Saint John the Baptist. The festival in honor of Volos, (Skandinavian Valas), the patron god of cattle, became the day of Saint George.

Russian paganism did not vanish when the Christian gospel began to be preached. It sur¬ vived in the popular language, sayings, tradi¬

tions, domestic life and even religious beliefs. As late as the 18th century, serpents were adored in some remote villages. Eugenius Golubinsky, the greatest historian of the Russian Church, declares that Russia was baptized in the 9th century, but not christianized.

Russian Christianity. — The history of Rus¬ sian Christianity may be divided into four dis¬ tinct periods: (1) The period of the metropoli¬ tans; (2) the Patriarchal period; (3) the Syno¬ dal period; (4) the Revolutionary period.

1. Russian Metropolitans. — The official his¬ tory of Russian Christianity begins with the baptism of Vladimir Sviatoslavich in 987. This does not mean that Christian faith was ignored in Russia before that time. The national chron¬ icles attribute the earliest propagation of the Gospel in Russia to the Apostle Saint Andrew, who after having established an episcopal see at Byzantium went to Korsun, in the province of Tauris, reached Kiev and Novgorod, preached to the Vareghs and lastly set out to Rome. The thesis, however, of the

apostolicity of the Russian Church is of later origin, ac¬ cording to Golubinsky, and cannot be demon¬ strated as historically true.

The frequent relations with Byzantium and the existence of a Slavic colony in Constanti¬ nople explain, however, why a nucleus of bap¬ tized Russians is remembered as observing Christianity in the city of Kiev, at a time when Paganism dominated all Russia.

Photius, patriarch of Constantinople, affirms in his encyclical letter to the Eastern hierarchy that he sent a bishop to the Russians to convert them to Christ. At the time of Igor Riuriko- vich (913-945) a Christian church existed in Kiev, and after the death of this prince, his wife, Olga, according to Konstantin Porphyro- genetus, went to Constantinople, and received baptism there, probably in 954. She was, says Nestor, the first Russian woman who entered the kingdom of Heaven.

In 986, the Russian chroniclers tell us, Vladi¬ mir received the visits of the representatives of various religions; including the Mohamme¬ dans, Jews, Catholics and Orthodox Greeks. The Greek form of Christianity was his choice for a religion. He was baptized in the Greek town of Korsun, and here also he married the sister of Basil, emperor of Byzantium, Prin¬ cess Anna. He became the apostle of his own people. He went back to Kiev with some Greek priests and ordered all the inhabitants to be baptized. The idol of Peroun was thrown into the Dniepr. Violence at times was employed in order to conquer Russians for Christianity. The pagans of Novgorod refused to receive baptism and had to be compelled to do so. During his whole reign Vladimir strove ear¬ nestly to spread Christianity, to build churches and to organize his kingdom on a Christian groundwork. His efforts, however, did not suc¬ ceed in grafting Christianity on the Russian soul. For lack of religious instruction, the Russians persevered in the practice of pagan¬ ism. The responsibility for this state of things rests upon the Byzantine hierarchy whose leaders were called to rule the new Russian Church.

The earliest period of the history of the Russian Church is a mere episode in the his¬ tory of the Byzantine hierarchy. Russia was considered as a metropolitan church in the

ecclesiastical system of Byzantium. Its first metropolitan, Leon, was

sent to Vladimir in 991 by the Greek Patriarch Nikolaos Chrysoberghes (983-996). During two centuries and a half (991-1237) the Russian Church had 24 metro¬ politans elected and consecrated by the patri¬ archs of Constantinople. Most of them were Greek. They naturally considered everything from the Greek point of view, wrote polemical works against the Latins and sought to keep Russian Christianity far from the influence of the Roman Church. They thwarted any at¬ tempt to expand the influence of Latin Chris¬ tianity within the Russian frontiers. The 11th century marks a period of strong vitality in the bosom of the Russian Church. It is the earliest transplantation of Greek monasticism in Russia. Kiev became the cradle of Russian monks, who with Antonius and Theodosius Pe¬ chersky (who died in 1073 and 1074, respec¬ tively) and the monk Nestor, began to give a markedly national character to the Russian Church. Russian bishops strove to loosen their bond with the Greek patriarchate. Together with these attempts to establish in Russia an autonomous church, the foundation and organi¬ zation of Russian eparchies went on especially in the 13th century. Their number under Vladimir was eight; after his death, and down to the Mongol invasion, they increased to 16.

The development of Russian Christianity was hampered and almost stopped by the Mon¬ gol domination, which destroyed Kiev in 1240. For two centuries, Russia was entirely cut off from any contact with Western Christianity. The Mongol Khans did not systematically per¬ secute the Christians. They even granted large privileges to churches and monasteries. The Russian metropolitans were held in great honor at their court and were able to use their influ¬ ence to ameliorate the hard lot of their flocks. But in consequence of the Mongol yoke, the moral and religious conditions of the Russian people sank very low.

In 1303 there took place the first attempt to divide the hierarchical unity of the Russian Church. An independent metropolis of Galicia was established. In 1316 Lithuania claimed its religious autonomy. These new fragments suc¬ ceeded in severing themselves from the metro¬ politans of Moscow whose authority over the Russian Church was otherwise steadily growing, as a logical consequence of the growth of the political power of the grand princes of Mos¬ cow. The Russian Church participated in the Council of Florence in 1438. The metropolitan of Moscow, Isidor (1436-41), signed the decree of union of the Russian Church with the Ro¬ man Church, and his admission was marked by the red hat. But the spirit of Byzantine Christianity was deeply rooted in both the Rus¬ sian hierarchy and people ; Isidor was obliged to leave Moscow, and his successors rejected the union with Rome.

In Little Russia, on the contrary, where the Western influence was stronger, the movement toward union gained ground. In 1458 Kiev became the seat of a united metropolitan, Gregorius, who, however, went back to the Or¬ thodox Church in 1472. The tendency toward an understanding with Rome was kept alive, like a smoldering fire, and under the political and religious influence of Poland, in 1596, gave birth to the United Ruthenian Church,

2. Russian Patriarchate. — The second period of the Russian Christianity embraces the short¬ lived patriarchate of Moscow. It puts an end to the dependence of the Russian Church on the Greek hierarchy. The idea of the establish¬ ment of a Russian patriarchate was a natural consequence of the downfall of the Byzantine Empire and of the growth of Muscovite Russia. Moscow was hailed as the third Rome. In 1588 Ieremia, patriarch of Constantinople, went to Moscow. Tsar Teodor Ivanovich and Boris Godounov received him with great honors and asked him to grant full autonomy to the Rus¬ sian Church, and the establishment of a patriar¬ chate at Moscow. After some hesitation, Iere¬ mia allowed himself to be won by the promises of the tsar. Iov, archbishop of Novgorod, was elected patriarch by a council of Russian and Greek bishops, held at the cathedral of the Assumption on 23 Jan. 1589. Another council held at Constantinople in May 1590, ratified, al¬ though reluctantly, the concession made by patriarch Ieremia. The new patriarchate em¬ braced four metropolitan jurisdictions, eight archbishoprics and eight eparchies. It lasted a little more than one century, and during this period 11 patriarchs ruled the Russian Church, namely, Iov (1589-1605) ; Ignatius (1605-06) ; Hermogen (1606-12) ; Filaret (1619-34) ; Ioa- saph I (1634-41); Iosif (1642-52); Nikon (1652-67); Ioasaph II (1667-72); Pitirim (1672-73); Ioakim (1674-90); Adrian (1691-

1700).

The patriarchs exerted considerable influ¬ ence, both religious and political. They were looked upon as grand princes. They had their court, their dignitaries and an immense income. Filaret, the chief of the dynasty of the Roma¬ novs, was, during his patriarchate, the real tsar of Russia. Patriarch Nikon struggles with Tsar Aleksiei Mikhailovich, seeking the suprem¬ acy of the ecclesiastical upon the civil power. The issue of the struggle was fatal to him. A council held at Moscow in 1667 condemned him as a rebel to the legitimate authority of the tsars, to whom a large power was recognized in ecclesiastical matters. Peter the Great, in order to carry on his vast plan of reform in every branch of Russian life, abolished the

patriarchate, entrusting the government of the Russian Church to a patriarchal vicar, Stefan Iavorsky, and charged Theofan Prokopovich, a Malorossian, a theologian of great renown and a warm admirer of German Protestantism, to draw up a schedule of reforms to be effected in the Russian Church. Theofan, who was later named metropolitan of Pskov, fulfilled the task assigned to him, and wrote the Spirit¬ ual Regulation,* which became for two cen¬ turies the official constitution of the Russian Church.

3. The Synodal Period. — The Spiritual Regu¬ lation was written in 1720. On 25 Jan. 1721 the ukase establishing an ecclesiastical board to be endowed with supreme authority over the Church was promulgated. The board under the name of the Holy Governing Synod held its first meeting in Petrograd on the 14th of Feb¬ ruary. The Holy Synod was composed of several archbishops, priests and a lay dignitary, the high procurator, who, according to the Spiritual Regulation, was to be chosen prefer¬ ably from among the most energetic officers of the army,

W

3

w

3

U

n’

a

M

>

3

•5

c«

>

a;

3

cr

w

o

s

■*-*

c

c

3

C/5

TJ

3

w-

bfl

O

cu

c/2

•e

u

c

o

a

C/2

«

0)

•a

H-i

o

3

u.

T3

*c

■*-»

3

CJ

RUSSIA

—*»r

‘ a..

i

mi

O , i

1 The Cathedral of the Annunication, Moscow

2 The Kremlin, Moscow

RUSSIA

The Petrowski Palace, Moscow

SIjIr’w

>»Wfti|iliMi;M.imn|B!l

J’*

iMjlgw*

The Great Bell, Moscow

With the foundation of the Holy Synod the Russian Church became a department of the civil bureaucracy of the Russian Empire, and its history is thenceforth a portion of the lives and policies of the Procurators. A vigorous censorship was established for all the theologi¬ cal writings. The foundation of new eparchies, the nomination of the bishops, the monastic life, the missions either inside or outside of Rus¬ sia were topics all necessarily subject to the supervision and approval of the government. The influence of the Russian Church in the social and religious field was unceas¬ ingly checked by its bureaucratic yoke. Russian Christianity could not exert the beneficent influence rightfully its own due to it. Control of the Church was gained by the Slavophil party which tried closely to associate autocracy and orthodoxy as the joint pillars of the Russian state. This was notably true in the recent ecclesiastical dictatorship of the Procurator Konstantin Pobiedonostzev. The result of this policy was that the Church lost the intellectual classes, the so called intelligentsia, and became a mere tool in the hands of the Russian bureaucracy for the support of tsarism.

4. The Revolutionary Period. — This period begins in 1905, as the outcome of a new spirit pervading Russia and exerting its influence over the clergy. A group of liberal priests of Petro- grad issued a proclamation of freedom for the Church. This movement was frowned upon by the high clergy, but met with an uncon¬ ditional support from the lower clergy. In order to answer the demand, the Holy Synod proposed the convocation of a General Synod of the Russian Church. The bishops were in¬ vited to outline their plans of reform. A spe¬ cial commission was charged with a pre¬ liminary discussion of the radical changes to be introduced into the constitution and inner life of the Russian Church. At the .end of 1907, however, the forces of

reaction had re¬ gained the ascendency and the project of the general council sank into oblivion.

The downfall of the autocratic regime in Russia left the Russian Church the power of determining her own affairs. With a few ex¬ ceptions in the ranks of the hierarchy, the clergy accepted joyfully the establishment of democracy. Some even advocated the complete democratization of the Church and the abolition of the hierarchy. But the extremists were un¬ able to awaken in Russia the spirit of a radical reform like that of Luther in Western Chris¬ tianity. The best elements of the Church met in the General Council of Moscow, held in September-October 1917. Bishops, priests, monks and laymen discussed the conditions of Russian Christianity and came to the conclusion that after the disappearance of Russian autoc¬ racy the Russian Church needed a visible re¬ ligious head, the centre of the religious forces of the crumbling empire. The restoration of Russian patriarchate was approved by an over¬ whelming majority of votes. Tychon, metro¬ politan of Moscow, a liberal bishop who lived many years in the United States, was elected patriarch. He assumed at once an energetic attitude against the spreading wave of bolshe¬ vism and became the embodiment of the con¬ servative forces in Russia and of sound Rus¬ sian nationalism. The Russian Church is re¬

covering her prestige and fitting herself for the social and political changes brought about by the democratization of Russia.

Statistics. — Before the European War Rus¬ sian Christianity, or according to the official expression, the Russian Orthodox Church, num¬ bered 87,000,000 of the faithful and there were over 70,000 churches and chapels. From an administrative point of view, autocratic Rus¬ sia was divided into metropolitan districts, eparchies (dioceses), vicariats, deaneries and parishes. The Russian clergy, charged with the spiritual care of the orthodox population, formed two entirely distinct castes : the <(white clergy® (secular priests) and the <(black clergy® (monasticism). All the higher clergy (metro¬ politans, bishops and vicar-bishops) in accord¬ ance with an old tradition, have been chosen from monastic ranks.

The Russian hierarchy enhanced their au¬ thority and organization under the synodal regime. At the time of Peter the Great, the Russian Church numbered only 18 eparchies and two vicariats. At the dawn of the 19th century there were 36; in 1890, 62. In 1905 the Russian hierarchy consisted of three metropoli¬ tans (Petrograd, Moscow and Kiev), 16 arch¬ bishops and 108 bishops (including 44 vicar bishops or coadjutors). Most of them have completed their studies in the

Russian theologi¬ cal academies. A half, approximately, had been married priests, who, after the death of their wives, embraced monastic life. Under the old regime the metropolitans received a salary of 50,000 to 75,000 roubles. The salaries of the bishops varied between 1,500 and 20,000 roubles.

In spite of the repeated confiscation of their properties, the Russian monasteries grew in wealth and numbers during the synodal period. In old Russia, monasticism lived an exuberant life. Kiev possessed 17 monasteries and Nizhni'Novgorod 20. Peter the Great issued several ukases with a view to limit the num¬ ber of monasteries and hinder entrance into them of postulants. At the beginning of the 18th century, Russian monasteries held 14,534 monks and 10,673 nuns. As a consequence of the restrictive laws of Peter the Great and Anna Ivanovna, their number was respectively reduced to 7,829 and 6,543. In 1764 many monasteries were suppressed and their prop¬ erties were confiscated. From 954 at that time, they decreased to 452 in 1810. The protection of Tsars Paul I, Alexander I and Nicholas I restored their prosperity. The monks gath¬ ered immense riches. New monasteries were built everywhere in Russia. At the beginning of the 20th century there were over 500 monas¬ teries of monks and 300 monasteries of women, the former with 15,000 monks and novices, and the latter with 38,000 nuns and novices. Among the Russian monasteries four of the most fa¬ mous are decorated with the epithet of lavra : those of Saint Alexander Newski in Petro¬ grad; of Saint Theodosios Pechersky in Kiev; of the Most Blessed Trinity at Serghievo, near Moscow ; and of the Assumption at Pochaev. Seven other monasteries are called stavropi giaki. In the canon law of the Eastern churches, these attributes mean that the monasteries are subject to the immediate jurisdiction of the patriarch.

The white clergy is charged with the ad-

ministration of the parish churches. They number 2,340 archpriests, 44,487 priests, 14,960 deacons, 43,552 psalm readers. According to the most recent statistics, there are 37,465 par¬ ishes and 59,703 churches ; the cathedral- churches existing to about the number of 700.

Social Conditions of Russian Christianity. — A recognized fact in the history of Russian Christianity is the slight influence exerted by the

Russian clergy upon their flock. At the outset of her Christian life Russia depended for the foundation of her churches upon the generosity of the princes, or of the mir (com¬ mune). The choice of the priests for the serv¬ ices of the churches belonged to the members of the parish. The candidates who offered their services for smaller salaries were given the preference. Thus ignorant or loose priests came into possession of ecclesiastical benefices and consequently the Russian priesthood lost its moral prestige. The nobility contributed to its decay as their serfs were ordained in order to increase their revenues. Russian councils, especially that of the (

The ecclesiastical reforms of Peter the Great aimed first of all at reducing the num¬ ber of the clergy and putting an end to the autonomy of the parishes. In 1722 he fixed one priest as the maximum for a village of 150 families. The sons of the clergy and even psalm-readers and deacons were enrolled in the army. His policy was continued by his successors and in 1841, when the statutes of Russian consistories were promulgated, the last traces of parish autonomy disappeared.

Under the synodal regime the Russian clergy transformed themselves gradually into civil employees. They became clerks, preparing numerous documents and statistics to be used by the civil and military bureaucracy. Not in¬ frequently were their services turned to ac¬ count by the police authorities. Under a ukase of 1716, the clergy had each year to submit a list of all the members of their respective parishes who had not received holy communion. This ignoble subjection to the civil bureaucracy lost the clergy their prestige and could not but result in their enslavement to the autocratic regime. It was not unnatural, therefore, that they should share with the bureaucracy the bitter hatred of the revolutionary leaders. Famous painters like Perov, Riepin, Makovsky, Korzuklin and great novelists like Solovev, Chirigov, Glukhovtzovoi, Vasilich, and espe¬ cially Leonidas Andreev, depicted in the dark¬ est colors the degradation of the clergy. A reaction followed in 1905. The better minds in the white clergy became the leaders of a movement for the independence of the Church and her separation from the State. A schedule of liberal reforms was drawn up by 32 priests of Petrograd and inserted into the Ecclesiastical Messenger. For several years the struggle be¬ tween the partisans of the old regime and those of the democratization of the Church went on violently. At last, with the downfall of the Tsarism, the liberal element gained the as¬ cendency and the Russian clergy, freed from

their servile submission to the State, will doubtless exert a great

influence upon the spiritual rebirth of Russia.

Economic Conditions. — Extreme poverty has been the lot of the clergy from the begin¬ ning of Russian Christianity. Priests, Golubinsky tells us, were considered as working¬ men, intended to perform liturgical ceremonies. They did not claim the role of leaders and teachers of their people. The laws either forbade or restricted the bequeathal of prop¬ erty to the parish churches; frequently the clergy has had its land confiscated. Before the war the revenues of the clergy were de¬ rived especially from the land allotments of the dioceses and the parish churches. The white clergy in the villages had the social rank of the peasants among whom they labored. They themselves were farmers and aimed to keep for their sons the fields which they culti¬ vated. Other sources of income may be noted: the sale of candles and religious articles ; tithes; state allowances (not in all parishes, however) ; and offerings made upon the ad¬ ministration of the sacraments. These offer¬ ings are usually pitifully small : 35 cents for marriage, 15 cents for baptism, 3 cents for funeral prayers. Quite frequently, a priest's net income from professional or conventional fees and offerings amounts to no more than $50 a year. They have been unable, conse¬ quently, properly to support their families. Their poverty is one of the common themes of the Russian novelists. It contributed to their estrangement from the upper strata of society, but it associated their lives with the sufferings and aspirations of the poor. The white clergy sympathized with the revolution¬ ary movement, hopeful of an improvement of their economic lot. As yet their hopes have not been realized ; but when normal conditions have been restored in Russia it may be ex¬ pected that the Church will quickly recover its material prosperity.

Bibliography. — For Pagan Period consult Kastorsky, M., (Sketch of Slavic Mythology* in Russian (Saint Petersburg 1841); Kosto¬ marov, N. I., (Sla ic Mythology) (Kiev 1847) ; Nikiforovsky, M., (Russian Paganism,* in

Russian (Saint Petersburg 1875). For a gen¬ eral survey of Russian Religion consult Adeney, (Greek and Eastern Churches) (New York 1908) ; Barsov, T., (The Patriarch of Con¬ stantinople and His Jurisdiction Over the Rus¬ sian Church) (Saint Petersburg 1878) ; Biggs, Ch. R. D., (The Russian Church) (London 1910) ; Blagovieshenskii, A., (History of the Earliest Ecclesiastical Academy of Kazan* (Kazan 1876) ; Curtis, (History of Creeds and Confessions) (Edinburgh 1911) ; Dampier, Organization of the Orthodox Eastern Churches) (Milwaukee 1913) ; Fortescue, (The Orthodox Eastern Church) (London 1907) ; Frere, W. H., (Some Links in the Chain of the

Russian Church) (London 1918) ; Gagarin, (The Russian Clergy* (London 1872) ; Golub- insky, E., (Historv of the Russian Church* (3 vols., Moscow 1900, 1901, 1904) ; id., (History of the Canonization of Saints in the Russian Church (ib. 1903) ; Gorchakov, M. F., (The Canon Law of the Russian Church* (Saint Petersburg 1909) ; Hamilton, (Greek Saints and Their Festival (London 1910) ; Hefele,

cilien-Geschichte) (Freiburg 1851-73) ; Hergen- rother, 'Monumenta Graeca ad Photium per- tinentia* (Regensburg 1869) ; id., (Photius, Patriarch von Constantinopel, sein Leben und seine Schriften> (3 vols., ib. 1867-69) ; Hor¬ ton, (Students' History of the Greek Church * (New York 1902) ; Howard, (The Schism Be¬ tween the Oriental and Western Churches> (London 1892) ; Malitzkii, P., (Handbook of the History of the • Russian Church* (Petro- grad 1898, 1902) ; Neale, (History of the Holy Eastern Church* (5 vols., London 1850-73) ; Pierling's Works on the Relations Between the Tsar and the Popes; Palmieri, A., cLa chiesa russa) (Florence 1908) ; Rohan, (L'Eglise orthodoxe greco-russe* (Brussels 1897) ; Schaff, (Creeds of Christendom) (4th ed., New York 1905) ; Silbernagel, (Verfassung und gegenwartiger Bestand sammtlicher Kirchen des Orients) (Landshut 1865) ; Dean Stanley, his¬ tory of the Eastern Church* (London 1861) ; Tozer, (The Church and the Eastern Empire) (London 1888). A pALMIERI,

Washington, D. C.

11. GOVERNMENT AND POLITICAL PARTIES. Many and varied are the defini¬ tions given of Russia's form of government. The difficulty of properly defining or charac¬ terizing it is due, in large measure, to its changing and changeable nature — not only since the Great Revolution, but even before that event. If one were to treat the subject his¬ torically and adequately, at least five separate stages should be noted in the evolution of the Russian administrative machine. There was, first, the pre-Mongolian free tribal government, which was decidedly democratic; then came the long period of Eastern despotism introduced by Russia's Mongolian conquerors, which destroyed every element of self-government already at¬ tained ; next followed another long period, ushered in by Peter the Great, during which Oriental absolutism was considerably tempered by Occidental democracy; then, again, the revolutionary demonstrations of 1905-06 brought a short period of quasi-constitutional govern¬ ment in which much real

progress toward democratic institutions was made; and, finally, the two revolutions of 1917, the short-lived one of March and its more vigorous successor of October inaugurated many startling experiments in class government, with seemingly disastrous results upon the Russian body politic.

Limitations of space preclude any such ex¬ tended treatment of this interesting subject. For present purposes, therefore, we shall adopt a simpler, if less scientific, scheme. Generally speaking, Russia was an absolute monarchy up to 1905, a limited monarchv from 1905 to 1917, a provisional democracy for some eight months thereafter and a proletarian dictatorship since the Bolshevik coup d'etat. Considering the last two forms of government as but different phases of the transitional period, we may con¬ tinue this brief study of Russia's government under three heads: (1) As it was under abso¬ lutism prior to the so-called revolution of 1905— 06; (2) as it became during the quasi-constitu¬ tional period of 1905-17; and (3) as it has been in the present period of transition.

Under Absolutism (to 1905). — The govern¬ ment machine of imperial Russia was cumber¬ some, complex and very inefficient — cumber¬

some because too centralized, complex because insufficiently specialized, and inefficient because irresponsible. Not only did the regular admin¬ istrative functions (legislative, executive, judiciary) overlap, as we shall see presently, but no consistent demarcation existed between national, state, and local government. For these and other reasons Russia's political in¬ stitutions lagged centuries behind the times and were long the laughing stock of the civilized world. In imperial days, however, absolutism, with all its concomitants, was considered neces¬ sary for holding in line the numerous and diverse racial, social, and religious elements that composed the colossal Russian Empire.

The supreme authority in autocratic Russia was the tsar (from the Latin ((Csesar**), an absolute hereditary monarch, part of whose title was (

The oldest of these was the Senate, created by Peter the Great in 1711 and reorganized by Alexander I in 1802. Its members were all ap¬ pointed by the tsar and held the rank of Privy Councillors. Being the highest judicial institu¬ tion of the empire, the Senate (a) heard ap¬ peals in civil and criminal cases, (b) passed on the legality of new legislation and (c) held disciplinary court for officials from the various

branches of government. For purposes of ex¬ pedition, this large body of state was divided into six separate departments, two of them acting as courts of appeal, two exercising ad¬ ministrative jurisdiction, and the rest supervis¬ ing the collection of taxes, the appointment of government officers, the preservation of the archives, etc.

Another important body concerned with im¬ perial administration was the Imperial Council, which exercised only advisory legislative au¬ thority in pre-constitutional times and consisted of 196 members, half the number (including the president and the vice-president) appointed by the tsar and half elected for nine years. As its function was greatly modified bv law in 1905, we shall refer to this legislative branch later.

The Council of Ministers, composed of the 12 ministers of state, appointed and removable by the tsar, was a third great organ of imperial administration. Representing all the various ministries — the ministries of Foreign Affairs, Finance, War, Navy, Justice, Education, Com¬ merce and Industry, Ways of Communication, Internal Affairs, Agriculture, Imperial Court and Government Control — the Council of Ministers, or the Cabinet Council, was by far the most important executive institution in monarchial Russia.

For administrative purposes Russia was di¬ vided into governments (guberni) , provinces (oblasti) and territories (okrugi). If there were such a thing as state rights in imperial Russia, the governments might be said to correspond to the American States. The re¬ semblance is closer, however, in the case of the territorial divisions. Before the World War,

if not at the time the last tsar was deposed, Russia had 98 governments, 21 provinces and two territories. The governments, varying in size and population, were themselves divided into districts (uyezdi), which, in turn, were subdivided into still smaller administrative units called counties (utchastki). All these di¬ visions and subdivisions run into the thousands, and were not sufficiently graded or standardized. The governments were the more central and more populated sections of the empire, most of them lying within European Russia ; while the provinces, all but one of which lay in the re¬ moter parts of the country (Siberia, Caucasia and central Asia), were inhabited by the less civilized and more nomadic elements.

Every government or province had a governor (• Quberndtor) as chief administrative officer, who, in the case of the provinces, was generally also the chief military commander. The duties and powers of the Russian governor under the monarchial regime included regulations for safeguarding public order, control over all the administrative offices, supervision of all gov¬ ernment officials and general oversight over all local government institutions, such as the Zemstvos, etc. In the exercise of these various functions the governor would have the assist¬ ance of a board of administration, over which he presided.

Such semblance of self-government as monarchial Russia enjoyed was represented by the Zemstvo (q.v.), a territorial assembly which received its official status in 1864, but which has had its powers and functions modified several times since. This elective body has had — and to some extent still has — charge of the pro¬ vincial administration, which began with the village council (Mir), the lowest and earliest form of communal self-government in Russia and not unlike the New England town meeting; gathered authority in the canton (Volost), representing a number of villages, sometimes as many as 30; and culminated in the provincial Zemstvo, a combined organization of all the district Zemstvos. Both assemblies elected a standing executive ’committee (Zemskaya Uprava) consisting of four or five paid officials, which carried on the work of provincial gov¬ ernment — from the construction of public roads, the prevention of cattle disease and the maintenance of primary schools, to the adminis¬ tration of charity, the development of trade and agriculture, the improvement of sanitary con¬ ditions and the promotion of mutual insurance and other co-operative enterprises. District Zemstvos consisted of from 60 to 65 members and met annually — oftener if necessary and the governor permitted. The latter, too, exercised the power of veto over such Zemstvos resolu¬ tions as incurred his (or his superiors’) dis¬ pleasure.

The Municipal Dumas were town councils presided over by a mayor (qolova) and con¬ stituted of a few elected officials, who exercised general supervision of municipal affairs. Since 1870 these dumas copied the administrative organization and methods of the Zemstvos, but their powers were considerably reduced in 1894.

Under the Quasi-constitution (1905-17). — The tsar’s manifesto of 1905 and the famous ˆFundamental Laws® which followed it sud¬ denly changed Russia’s form of government theoretically and practically. The autocratic

authority of the tsar became more limited through the introduction of

a new representa¬ tive assembly (The Imperial Duma) and the extension of the powers of an old one (The Im¬ perial Council). The emperor still retained his former executive powers, but in the field of legislation he was henceforth to reckon with the two assemblies just mentioned, which be¬ came Russia's legislative institutions. The new principle of government thus introduced trans¬ formed Russia from an unlimited to a limited monarchy and fairly started her on her way toward representative, constitutional govern¬ ment.

The two legislative assemblies created in 1905-06 suggested, but did not quite resemble, the bicameral parliamentary institutions of Western countries. The Imperial Council, changed by law from an advisory to a legisla¬ tive body, was the Upper House ; the Duma (q.v.), the Lower. Both houses could initiate legislation, vote on the government budget and make certain recommendations and interpella¬ tions; but the Duma was debarred from exercis¬ ing its authority in matters pertaining to the imperial family and the war and naval depart¬ ments (including their respective courts). More¬ over, the Upper House could throw out any bills or legislation passed by the Duma, while all legislation must receive the sanction of the Senate, the juridical institution retained from absolutist days, and be approved by the tsar before becoming law. Finally, while no legisla¬ tion could be enacted without the Duma and the Imperial Council, yet the tsar retained — and frequently exercised — the right of issuing certain proclamations (ukazy) and of authoriz¬ ing sundry emergency expenditures, especially in case of war, and more especially when the Duma, which he could dissolve at will, was not in session.

Apart from the legislative control left to the tsar by the so-called Constitution, he re¬ tained supreme authority in nearly all executive and judicial matters. He still had the sole power to appoint and dismiss all his ministers, to direct foreign affairs, proclaim martial law, command the military and naval forces, and to do many other things too numerous to mention. In addition to his old powers, the ((Funda- mental Laws® gave the tsar the right to con¬ vene, adjourn, and prorogue both houses of the newly established ((Parliament,® to dismiss the members elect of the Upper House, to veto any legislation passed by both houses, and to confirm or set aside verdicts of the criminal courts.

With all that, the government of imperial Russia under the charter loosely called (

In the Period of Transition (1917-). —

The Great Revolution of 1917, the revolution which dethroned the last tsar and ended mon¬ archial rule in Russia, left the administrative government temporarily in the hands of a revolutionary committee appointed by the last Duma and presided over by its president, Rodzianko. Soon this committee, which was the sole

constitutional authority at the time, organized a coalition cabinet. The new government, which modestly called itself ˆprovisional,® was fairly representative of the leading parties com¬ posing the last Duma and the elements that has¬ tened the Revolution. It was headed by Prince Lvov, a liberal Octobrist, elected to the premiership conjointly by the Duma and the labor elements (subsequently succeeded by the famous Kerensky), and included such other popular leaders as Paul Milyukov, Constitu¬ tional Democrat; Tereshtchenko, a many-sided liberal of truest color; and the above-men¬ tioned Kerensky, a revolutionary Socialist repre¬ senting the workmen and soldiers, who soon dominated the whole Provisional Government. Under stress of factional criticism, the coali¬ tion ministry was repeatedly reformed, becom¬ ing every time more and more representative. Five new departments were created to cope with the exigencies of war and peace — departments of Labor, Public Relief, Food Supplies, Posts and Telegraphs, and a department for the Af¬ fairs of the Constituent Assembly.

The new government at once declared itself in favor of immediate and numerous radical re¬ forms along every line (including such matters as social, religious and racial equality, and universal suffrage). But the execution of its ambitious program, difficult enough in itself, was rendered well-nigh impossible by the ever- increasing interference with the affairs of government on the part of an emergency organi¬ zation called into being during the Revolution and known as ((the Council of Workmen's and Soldiers' Deputies.® Such were the power and popularity of this council that its wishes — and they commonlv took the form of man¬ dates — could not well be ignored. From the very first, the provisional government had to reckon with this new influential factor in Rus¬ sian politics, and such constant reckoning in¬ evitably clogged the wheels of government ma¬ chinery. Hence the Kerensky government spent most of its short career in finding its bearings and in trying to reconcile the various discord¬ ant factions, which lacked both the temper and the tradition of democratic citizenship.

But, little as the first revolutionary govern¬ ment actually accomplished, it gave Russia her first taste of real Democracy, which she is never likely to forget. The spirit, the ma¬ chinery of administration and the reforms proposed were thoroughly democratic. Seem¬ ingly, time and administrative experience were all that was needed for the completion of the colossal task of Russian democratization, but these were denied by the Bolshevik coup d'etat that soon followed.

Ostensibly, the Bolshevik government was placed in the hands of the Council of Work¬ men's, Soldiers' and Peasants' Deputies, the popular organization already alluded to but somewhat enlarged to appease the peasant ele¬ ment. This mixed organization, called in Rus¬ sian simply the Soviet , has numerous branches and acts through innumerable agents styled <(People's Kommissars® (a term borrowed from the French revolutionists), backed by the force of well-armed soldiers called Red Guards. All these executive officers are supposedly carry¬ ing out the will of The Central Executive Com¬ mittee of the Federal Soviets , which is a longer name for the Bolshevik government.

The central figures and guiding spirits of the <(Soviet Republic,® as the Bolshevik rulers themselves style their form of government, have been and still are Nikolai Lenine, Pre¬ mier, and Leon Trotzky, Minister of War and formerly Minister of Foreign Affairs. The rest of the cabinet has been changed frequently, but probably still includes Tchitcherin as (

The rule of a single class, the proleta¬ riat, is the ideal of this ultra-revolutionary government, which has been aptly characterized as a ˆProletarian Dictatorship.® If the first transitional government may be said to have been a (

Political Parties. — Russia had no political parties in the Western sense before the con¬ stitutional era, which is quite natural in view of the notorious want of free political discus¬ sion in that country in strictly monarchial times. Such organizations as existed in absolutist Rus¬ sia were secret debating societies advocating and frequently indulging in terrorism, with revolution as their battle-cry. With the con¬ vocation of the first Duma, however — or, rather, with the promulgation of <(The Funda¬ mental Laws of 1905® granting the right of free political discussion — regular political par¬ ties became for the first time possible in Rus¬ sia, and the vital factor of political struggle commenced to stir that country's otherwise sluggish life.

Historically the first political party to come into prominence in Russia was that of the ((Octobrists,® a conservative organization which received its name from the unbounded en¬ thusiasm with which it hailed the famous Manifesto of 30 Oct. 1905. It was this party organized by Milyutin and Shipov, that domi¬ nated the Third Duma (1907-12).

A more liberal and more important political party was that of The Constitutional Demo¬ crats, formed, also under the influence of the manifesto above mentioned, by radical and in¬ dependent elements and led by Paul Milyukov, a statesman of international fame. Its mem¬ bership has included many of the most promi¬ nent leaders of Russian thought, and it was the first to frame a definite political program. This party, nicknamed from its initials (K. D.) the (

The most radical and aggressive political parties in Russia — and the only ones except the party of Constitutional Democrats to have survived the first Revolution — are, naturally, the various Socialist organizations. There was The Group of Toil, a Socialist labor party represented in the Duma by Alexander Ke¬ rensky himself ; the* Party of Democratic Re¬ form, which was mildly socialistic; the Party of Peaceful Revolution, which believed in Parliamentary reform; the Peasants' Union which stood for the nationalization of land ; and numerous other more or less radical parties.

The principal parties advocating revolu-

tionary socialism do not properly concern us here, since they are not political parties in the accepted sense of the term. Owing to the cur¬ rent prominence, however, of some of these, mention might be made of the Social Revolu¬ tionists, a Marxist organization led by Cher¬ nov ; the Social Democratic party, which in 1903 branched out into the Bolshevik (Maxi¬ malist) and the Menshevik (Minimalist) wings. The bitter struggle between these two factions cannot be entered into here (see Russia — History), except to say that the former, the extremist wing represented by the present ruling regime in the greater part of Rus¬ sia, aspires to eliminate entirely every class but the proletariat, while the latter, the more moderate wing, seeks only to place the laborer on a political and economic level with all other classes of society. There are of course other essential differences in both principles and policies, but this single instance will serve as an

illustration.

David A. Modell, Specialist in Russian Subjects.

12. RUSSIAN INDUSTRY. Introduc¬ tory. — The total national wealth of the Russian Empire, including Poland and Finland, in 1914, v/as estimated at about $60,000,000,000, and the total population may be estimated at about 160,- 000,000, the average wealth thus being about $375 per capita whereas in the United States the per capita wealth is about $2,200. The national income was estimated at $7,500,000,000 of which agriculture furnished about $4,900,- 000,000. These figures are a striking illustra¬ tion of the low stage of Russia's economic de¬ velopment. Though occupying nearly one-sixth of the total land area of the earth, Russia, ow¬ ing to her geographical situation, as well as to unfavorable historical conditions, has been very backward, economically and industrially.

The transportation system of a country may be taken as the best index of its industrial de¬ velopment. The total length of all the inland waters of Russia reaches about 200,000 miles, yet the length of all Russian canals and im¬ proved rivers totals only 1,100 miles, of which the canals represent about 550 miles. The total length of Russian railroads is 46,600 miles, i.e., 0.28 mile per 1,000 inhabitants. In the United States the respective figures are 261,000, and 2.66 miles. Tsarism had a very unfavorable in¬ fluence upon the development of civilization in Russia, generally, and particularly upon its economic development. Innumerable legal re¬ strictions prevented the development of initia¬ tive and enterprise. In Russia in 1913 the total number of joint-stock companies was less than 2,000 and their total capital stock amounted to less than $2,000,000,000. The total number of wage-earners employed in factories and mines was about 3,500,000. The total amount of horse power used in manufacturing industries of Russia in 1914 was 2.500,000, as against 22,- 500,000 in the United States. The total foreign capital invested in Russia before the war amounted to about $4,300,000,000. The largest investors were the French. French capital was invested in government and municipal bonds, and in coal and metallurgical enterprises in South Russia (the Donetz Basin). Next to the French came Belgian capital, invested in street railways, electric plants, coal mines and metal¬

lurgical mills. British capital was invested mostly in oil and gold mining, and played a less important role in the development of Russian industry than French and Belgian capital.

It must be noted, in this connection, that the government itself was

the largest industrial oe- tablishment. It owned metallurgical mills, the greatest part of the railroad mileage, the great¬ est land area and was the largest purchaser of the products of the Russian mining and metal¬ lurgical industry. The imperialistic policy of the government determined the direction of Russian railway construction, and of the whole Russian industry.

Russia's share in the world's trade amounted in 1911-13 to 3.6 per cent. Her exports for 1909-13 averaged 1,501,400,000 roubles annually. Her imports for the same years averaged 1,136,900,000 roubles. During the last decade preceding the World War the total of Russian foreign trade was gradually increasing, but the imports were increasing faster than the ex¬ ports. This was due to the fact that during the years preceding the war Russia was going through a period of intensive industrial de¬ velopment which caused a substantial increase in the imports of machinery.

I. Agriculture and Forestry. 1. Agriculture. — The part played by agriculture in Russia's economics appears from the following figures: in 1910 the total value of the agricultural prod¬ ucts of Russia was about 9,500,000,000 roubles in gold (1 rouble in gold^Sl^ cents); the total value of manufactured products, 4,900,000,- 000 roubles. Thus, in 1910, agriculture fur¬ nished two-thirds of Russia's total national in¬ come. According to the census of 1897, 70 per cent of the population of the Russian Empire were supported wholly or partly by agriculture.

Only about one-twentieth of Russia's terri¬ tory is under cultivation. This proportion varies considerably throughout the vast area of the empire, viz. : Russia in Europe, 17.5 per cent; the Caucasus, 20.3 per cent; western Siberia, 1 per cent; eastern Siberia, 0.1 per cent; the Steppe region (of central Asia), 1.3 per cent; Turkestan, 1.9 per cent. The total area of the principal crops in 1910-12 is shown in the following table:

Dessiatines

(I dessiatine =

CROPS 2 . 705 acres)

Wheat, rye, and barley . 67,518, 000

Oats, buckwheat, peas, potatoes and lentils 28 , 342 , 000

Corn . 18,742,000

Flax and hemp . 20,312,000

Cotton . 4,409,000

The average yield is very low, owing to lack of fertilizers. Artificial fertilizers are al¬ most unknown in Russia. The annual yield of wheat averaged in Russia in 1907-13 10.0

bushels per acre, whereas in the United States it averaged 14.4 bushels, in Canada 19.2 bushels. Modern improved agricultural machinery is scarcely used, yet despite these handicaps Rus¬ sia contributed a large share to the world's production of grains. During the years 1907- 12 Russia produced 48.1 per cent of the world's supply of rye; 31.6 per cent of the total supply of barley; 24.3 per cent of the supply of oats; and 19.0 per cent of the supply of wheat. The export of grains played the most important

part in Russia's foreign trade. The average annual exports for 1910-13 amounted to 11,791,800 short tons, valued at 639,900,000 roubles ($329,300,000).

2. Forestry. — The Russian forests cover about 3,150,000,000 acres, or nearly thrice as great an area as the combined forests of the United States and Canada. Most of these for¬ ests are in Siberia. In European Russia there are about 383,000,000 acres, of which 40.7 per cent are in the province of Archangel, 27.1 per cent in the province of Vologda, 8.5 per cent in the province of Perm and 6.2 per cent in the province of Olonetz, in all 82.5 per cent in northern Russia. Of the Siberian forests 30.9 per cent are situated in the province of Tobolsk, 17 per cent in the Maritime province, 16.9 per cent in the province of Tomsk, 16 per cent in the Amur region and 8.8 per cent in the Trans-Baikal region. The forests cover an area of about 54,000,000 acres in central Asia and about 13,500,000 acres in the Caucasus. Rus¬ sian forests furnish excellent timber and rep¬ resent one of Russia's greatest resources. Nevertheless the lumber industry in Russia is still in its infancy. A very large part of Rus¬ sia's forests, especially in Siberia, has not been surveyed at all. Under the old regime no seri¬ ous attention was paid to conservation of the forests. In some places, as in the Ural Moun¬ tains, forests were being destroyed. The in¬ come from them was extremely low. Before the World War the net income of the govern¬ ment from the state-owned forests did not ex¬

ceed 12 cents per acre, and in Asiatic Russia it was as low as one mill per acre. The total value of exports of lumber and timber from Russia for the calendar year 1913 was $84,- 850,000. It may be safely anticipated, however, that the lumber industry has a splendid future and will play a very important part in the na¬ tional economy of the country.

II. Cattle, and Meat Industry. — Russia possesses vast prairies, suitable for extensive cattle breeding. Nevertheless the number of cattle per capita of population in Russia is one- fourteenth that of Argentina and less than one-half of the per capita of the United States. Taking eight sheep or three hogs as equivalent to one head of cattle we find in Russia 390 heads of cattle to every 1,000 of population, whereas the respective figure for Argentina is 5,320, and that for the United States 860. It must further be borne in mind that the livestock of Russia's peasantry is of an inferior quality compared to that of Argentina and the United States.

The number of heads of animals by geo¬ graphical divisions in 1912 is shown in the fol¬ lowing table :

(000 omitted)

geographical division Sheep and

European Russia and

Horses

Cattle

goats

Hogs

Poland .

22,337

32,842

37,531

11,132

Caucasus .

1,892

5,627

10,781

1,174

Siberia .

4,506

5,306

5,141

1,092

Central Asia .

4,435

5,122

20,613

111

Total for the empire.

33,170

48,796

74,066

13,509

The meat industry in Russia is still predom¬ inantly a small scale industry. Centralization is practically unknown. Prior to the Revolu¬ tion there were no packing concerns like those in the United States. Refrigerating installa¬

tions and cold storage plants first made their appearance shortly before the World War.

III. Mineral Resources and Mining. — The mineral resources of Russia have scarcely been explored, yet from the available sources of

information it can be stated as a fact that Rus¬ sia is very rich in all kinds of minerals. As far as iron ore is concerned, Russia doubtless holds the first place in the world, although not all iron ore deposits have been explored or sur¬ veyed. The iron ore deposits of the Ural Mountains occupy the first place, not only in Russia, but in the whole world. The mountain Blagodat alone contains over 100,000,000 tons of iron ore; the mountain Magnitnaya over 100,000,000 tons. The surveyed deposits iof the Ural Mountains contain more than 500,000,000 tons of iron ore. The Ural iron ore is of a very high quality, containing no less than 65 per cent of pure iron and a very small quantity of sulphur. In the Donetz Basin, in southern Russia, there a*e two deposits of iron ore of high quality; in Krivoi Rog and the Kerch Peninsula the total surveyed deposits exceed 1,000,000,000 tons. There are also several de¬ posits of iron ore in central Russia, but these are of a lower grade and the ore itself is of a lower quality. The iron ore deposits of Sibe¬ ria have not been explored at all, but several deposits are known in the Minusinsk district, in the Trans-Baikal province in the Amur dis¬ trict, in the Ussuri province, in the Bay of Saint Olga, near Vladivostok, etc.

The coal deposits are not as plentiful. The greatest coal deposits in European Russia are situated in the Donetz Basin. Large deposits of bituminous coal exist in the western and central parts of the basin and anthracite in the eastern part. The bituminous coal is of very high quality, and good coke for metallurgical purposes is produced, but the geological condi¬ tions are not as favorable as in England or in the United States. The anthracite of the east¬ ern part of the Donetz Basin (Grushevskaya Moolda) ranks as the best in the world. The second place in the Russian Empire was held by the Dombrowo Basin, in Poland, which has now been detached from Russia. The coal de¬ posits of central Russia are of a low grade (brown coal and lignite). The Ural Mountains contain no deposits of good coal suitable for coking. The deposits of coal in the northern and central parts of the Ural Mountains con¬ tain only brown coal and lignite. In the

southern part of the Ural Mountains (the

Orenburg region), deposits of anthracite are found. In the Caucasus there are some de¬ posits of coal containing a large supply of high grade coal. In Siberia there are very

rich coal beds. The best coal deposit is that of Kuznetsk (in the Tomsk province), whose geo¬ logical conditions are much more favorable

than those of the Donetz Basin. Coal beds are found all along the

Siberian Railroad at short distances from one another, also in the Mari¬ time and Yakutsk provinces, and in the Fergan province in central Asia. Good beds are worked in the Augersky (Tomsk province) and Cheremkhovsky (Irkutsk province) mines. There are very rich deposits of excellent coal on the island of Sakhalien, in the northern part, belonging to Russia. Although the coal de¬ posits of Siberia have not been explored and surveyed, yet from all indications it may be

safely assumed that the reserves of coal there are very large.

The oil fields of Russia are likewise unex¬ plored. The best-known fields are found in the Caucasus. The fields of Balakhani, Sou- rakhani, Sviatoy and Grozny furnish about 85 per cent of Russia's total oil production. Oil is also found on the Taman Peninsula, in the region of the Pechora River (Oukhta in north¬ ern Russia), in the Transcaucasian region, be¬ tween the Caspian Sea and the Ural Mountains, in the province of Fergan (central Asia) and on Sakhalien Island.

Copper ore deposits are situated mainly in Asia, viz., in the Ural Mountains, in Siberia, Minusinsk, Akmolinsk, Semipalatinsk, in Tur¬ kestan, in Fergana and in the Caucasus, but also in the provinces of northern Russia. The richest manganese ore deposits are situated in the Caucasus (Chiaturi) and next in southern Russia. There are known, also, manganese ore deposits in the Ural Mountains. The richest gold ore and placer deposits are located in Siberia, the Lena deposits in the province of Yakutsk, along the river Vitim, in the Ner¬ chinsk and Barguzin districts, in the Amur region, in the Maritime region and in the Altai Mountains. Next follow the Ural Mountains. Gold is also known to exist in Kamchatka, Sakhalien and in the Caucasus. Platinum de¬ posits, the richest in the world, are located in the Ural Mountains. Silver and lead ore de¬ posits are located in Siberia — in the Altai Mountains, in the Ural Mountains and in the Caucasus.

There are large deposits of phosphates, pyrites, asbestos, graphite, marble, very exten¬ sive peat fields, deposits of mica, mercury and nickel. There are also deposits of precious and semi-precious stones, of rare metals, such as tungsten, osmium, vanadium, molybdenum, iridium, etc.

The development of the Russian mining in¬ dustry is at a very low

stage, especially if con¬ trasted with the country's rich mineral re¬ sources. The leading part in Russian mining is played by the Donetz Basin in South Russia, which appears from the following comparative figures of production of the principal minerals in the Russian Empire and the Donetz Basin :

Average Annual Production 1912 and 1913.

In the Donetz Basin

Total for «■ – * – -

the empire. Per cent

mineral Metric tons Metric tons of total

Coal . 34,000,000 23,000,000 68

Coke . 4,200,000 4,200,000 100

Iron ore . 8,900,000 6,300,000 71

Pig iron . 4 , 400 , 000 3 , 000 , 000 68

Cast iron and steel . 3,900,000 2,200,000 56

Salt . 610,000 190,000 31

Manganese ore . 1,000,000 270,000 27

The Donetz Basin is also important as a producer of heavy oils, coal tar and other chemical by-products of the coke industry.

The second place in the mining industry belongs to the Caucasus. In 1913 it supplied 85 per cent of the total of oil, 70 per cent of the total, of manganese ore, 56 per cent of the total of silver and lead ore, 96 per cent of the total output of lead, 30 per cent of that of copper and 24 per cent of the total of silver.

Coal. — The growth of the coal mining in¬

dustry in Russia is shown by the following figures :

years Long tons years Long tons

1870 . 700,000 1910 . 24,600,000

1880 . 3,200,000 1911 . 28,100,000

1890 . 5,900,000 1912 . 30,700,000

1900 . 15,900,000

The principal sources of the output of coal previous to the war were the Donetz Basin, which produced 68.6 per cent of the total for the empire in 1912, and the Dombrowo Basin, in Poland, which produced 20.7 per cent of the total. All other regions produced only 10.7 per cent of the domestic supply. The geographi¬ cal distribution of the production of coal in the empire, exclusive of Poland, in the year 1912, is shown in the following table :

Per cent of total

geographical division for the empire

Donetz Basin . 86.4

Eastern Siberia . 5 3

Ural . 3.8

Western Siberia . 2.9

Central Russia . 0.9

Turkestan . 0.4

Caucasus . 0.3

Total . 100.0

In addition to her domestic production of coal, Russia, previous to the war, depended for over one-fifth of her supply upon imports, mostly from Great Britain, and partly from Germany.

Iron. — The development of the iron in¬ dustry of the Russian Empire and its geographi¬ cal distribution appear from the following

figures :

, Iron ore Pig iron

GEOGRAPHICAL ✓ – — – — * – v – * – N

division Long tons Per cent Long tons Per cent

South Russia . 5,700,000 70.3 2,800,000 67.7

Ural Mountains _ 1,800,000 22.5 800,000 19.8

Central Russia . 300 , 000 3.6 100, 000 3 . 2

Poland . 300,000 3.6 400,000 9.3

Total . 8,100,000 100.0 4,100,000 100.0

The relatively small production of pig iron in the Ural Mountain region is due to the fact that it has no coking coal and uses charcoal for producing pig iron. Therefore the Ural region produces the finest kind of sheet iron, its only competitor being Sweden, which also uses charcoal for smelting iron ore.

Oil. — ‘The production of crude oil (naph¬ tha) in 1913 amounted to 9,000,000 long tons, of which 97 per cent was produced in the Cau¬ casus and the rest mostly in central Asia.

Gold. — The production of gold in the Rus¬ sian Empire in 1910-12 averaged 1,350,000 ounces Troy, of which 80 per cent was pro¬ duced in Siberia and 20 per cent in the Ural Mountains.

Platinum. — Russia is the chief source of the world’s supply of platinum. The world’s production in 1912-14 averaged 280,000 ounces Troy, of which the Ural Mountains contributed 263,700 ounces, i.e., 94.1 per cent, British Co¬ lumbia, 4,800 ounces, i.e., 5.3 per cent and other countries 0.6 per cent.

Copper. — The production of copper has rapidly grown since the beginning ,of the present century, as appears from the ‘following table:

year Pounds

1900 . 17,700, OOP

1910 . 50,000.000

1911 . 57,500,000

1912 . 73,900,000

1913 . 75,600,000

About one-half of the output of copper comes from the Ural Mountains. In 1913 the geographical distribution of the production of

copper was as follows : Ural Mountans, 50 per cent; the Caucasus, 29 per cent; Siberia, 16 per cent; all other sections, 5 per cent. The domestic production of copper in Russia was insufficient to supply its demand. About 20 per cent of Russia's consumption of copper in 1908-12 was supplied by imports from foreign countries.

Manganese. — The production of man¬ ganese ore in 1913 reached 1,130,000 long tons, of which 77 per cent was produced in the Cau¬ casus and 21 per cent in southern Russia. Previous to the war the Russian Empire held the foremost place in the world's market of manganese ore. The annual exports from Russia in 1911-13 averaged 924,000 long tons, as against 706,000 long tons from British India and 168,000 tons from Brazil. Notwithstanding her rich deposits of high grade manganese ore, Russia produced no high grade ferro-manganese and imported it from abroad.

Salt, etc. — Among other mineral products of Russia must be mentioned salt, of which 1,900,000 long tons were produced in 1912; also silver and lead, zinc, pyrites and asbestos.

Wage- Earners in the Industries. — The number of wage-earners employed in the prin¬ cipal mining industries in 1908 is given in the

following table:

industry	Number of wage-earners
Coal	148,555
Gold and platinum	81 , 235
Oil wells and refineries	33,400
Iron ore	29 , 705
Copper mines and smelters	21 ,369
Salt	11,514
Silver, lead and zinc mines and smelters	3,428
Manganese ore	2,855
Total	332,061

IV. Manufactures. — An index of the devel¬ opment of manufactures in Russia is furnished by the statistics of establishments subject to factory inspection, which comprise all manu¬ facturing establishments with mechanical power, employing not less than 16 wage-earners. The principal results of the census of such factories, taken in 1908, are presented in the following table :

INDUSTRY

Num¬ ber of estab¬ lish¬ ments

Number of wage- earners

Value of products

Horse

power

Textile .

2,959

823,300

Roubles

1,384,600,000

549,700

Metallurgical.

2,330

551,900

761,900,000

590,200

Food products

7,948

386,400

1,576,500,000

387,100

All others. . . .

6,773

492,400

929,300,000

549,400

Total . . .

20,010

2,254,500

4,652,700,000

2,076,200

The first place among Russian manufactures was held by the textile industries, of which the cotton factories were the most important. The number of spindles in the cotton factories of the Russian Empire and Finland in 1913 was 9,213,000, which represented 6.4 per cent of the total for the world.

Next in importance after the textile indus¬ tries were the metallurgical mills, including metal working and machine factories. In gen¬ eral this industry was far behind its rivals in the more advanced industrial countries, both in equipment and efficiency. Still there were a few large plants with modern machinery. The largest factories were owned by the govern¬ ment and produced chiefly munitions of war. These establishments were mostly centred in and around the seat of the Imperial govern¬ ment, which accounts for the industrial growth of Saint Petersburg.

Of the privately owned enterprises, those located near the sources of coal and iron were largely controlled by French capital, which also controlled metallurgical works and coal mines in that section.

The domestic production of machinery in Russia was considerably short of the demand for it and the imports of machinery from abroad were the most important items of Rus¬ sia's import trade.

The chemical industry was among the rapidly growing industries of

Russia. Accord¬ ing to the census of manufactures of 1908 there were 466 factories with 64,645 wage-earners, and an annual production of 177,279,400 roubles. The value of products had increased since 1900 by 91 per cent.

Among the most favored industries was the beet sugar industry, which enjoyed an export premium from the government. In truth the exports of sugar from Russia were made pos¬ sible only by the poverty of the mass of the peasantry which regarded sugar as a luxury. The total number of sugar factories in 1911 was 299, with 142,630 wage-earners and with a total production of 1,853,000 long tons of sugar. The area of sugar beet plantations con¬ nected with sugar mills and refineries was 1,350,000 acres.

V. Effects of the War and of the Revolu¬ tion. — The preceding statistical figures have at present only a historical value. The abnormal conditions brought about in Russia by the World War, the Revolution and the civil war have resulted in a complete breakdown of Russian industries. Industry in Russia had be¬ come totally disabled even prior to the over¬ throw of the Tsar. The official publication of the National Manufacturers' Association of Rus¬ sia, Promishlennost i Torgovlya (Industry and Commerce), discussing this problem in its issue of 28 Nov. 1917, notes the fact that the (

The principal cause of the shutdown of the

largest establishments which had given employ¬ ment to one-half of all the workers thrown out of work was lack of fuel. Lack of materials was next in importance. Lack of cotton was responsible for the closing of eight establish¬ ments which had given employment to 28,800 workers. On the other hand, lack of orders and financial losses were reported only from 12 per cent of all establishments employing less than 10 per cent of the total number of workers.

The industrial situation in the month of October 1917 is characterized by the shipments of coal from the Donetz Basin which, as has been seen, is the chief coal-producing centre of Russia. During the month of October the shipments of coal amounted only to 1,440,000 short tons, of which nearly two-thirds were consumed by the railroads. This left only 504,- 000 short tons for the supply of all industrial establishments, which was about one-third of their regular demand for

fuel.

The cessation of the war was followed by the closing of munition factories and other war industries. The secession of Ukrainia and the Caucasus deprived Russia for a time of her principal sources of fuel. The blockade was directly responsible for the lack of cotton which forced the closing of cotton factories.

The breakdown of the transportation sys¬ tem was, perhaps, the most potent cause of the crisis of Russian industry. It is a well-known fact that the war totally destroyed the efficiency of the Russian railways. On 1 Oct. 1917, the number of disabled locomotives .reached 5,551, while work in the repair shops was practically discontinued for lack of metal and fuel. On 31 Dec. 1917, 22,000 loaded cars accumulated at the Moscow railway depot for lack of locomo¬ tives to haul them. The Soviet government at¬ tempted to relieve the industrial breakdown by a broad scheme of nationalization of industry.

Isaac A. Hourwich, Ph.D.

George J. Kwasha, M. E.

13. BANKING AND FINANCE. Russia's extremely agricultural character makes her banks and banking far less important than her enormous size and population would warrant us to expect. Neither in number nor in magni¬ tude can Russian banks compare favorably with those of west European countries, let alone the United States. Indeed, banks are a compara¬ tively recent institution in Russia. There were no commercial banks at all in that country be¬ fore 1865, when the first of them (with a capi¬ tal of 4,000,000 rubles) was established. Nor was their subsequent growth very rapid. The close of the last century still found only 39 such institutions in the whole empire, though their total capitalization approximated 350,000,- 000 rubles. By 1910 their number had decreased through consolidation to 31, though the number of branch-banks had more than doubled during the decade in question (increasing from 242 to 492) and the capitalization reached the half¬ billion-ruble mark. Within the next five years, years of unusual industrial and commercial de¬ velopment in Russia, the number and import¬ ance of Russia's business banks grew amazingly. In 1915 there were 53 main and 743 branch banks, with a total capital exceeding 1,200,000,- 000 rubles. The World War, naturally, inter¬ rupted this rapid general development of Rus¬

sian banking though in its first years it seemed to stimulate even a more rapid growth in cer¬ tain directions. According to the last state¬

ment of the Russian State Bank, published on 6 Nov. 1917 — and no more recent reliable data are available at this writing — Russia then had in circulation no less than 19,000,000,000 rubles, with one and a third billions of gold reserve. The total paper currency had grown from 3,- 260,000,000 rubles in 1915 to about 25,000,000,- 000 rubles (est.) in 1918, with a greatly de¬ pleted gold reserve. Despite the prevailing panic caused by revolutionary conditions, the People's Bank of Moscow was so swamped with deposits that it was opening new branches all over the country to handle their amazing amounts — amounts which during four months of 1917 increased from 353,000,000 to 781,- 000,000 rubles. But just at the close of that year the Bolshevik government seized all the banks, which shared the sad fate of most other institutions under that regime.

In imperial times the Bank of Russia acted in the double capacity of State bank and com- merical bank. The State Bank, the govern¬ ment bank of issue and directly under the con¬ trol of the Minister of Finance, was the central unifying banking institution that gave the Russian banking system its soundness and stability. Before the World War it was the largest bank in the world so far as actual de¬ posits were concerned. Protected and con¬ trolled by the State Bank were numerous State savings banks, established to promote thrift among the people. The government guaranteed all their deposits and fixed their rates of in¬ terest. None of their capital could be used for state expenditures, and only profits in excess of 10 per cent went to the government. Losses were met by a reserve fund built up from profits under the 10 per cent maximum per¬ mitted by the State Bank. The growth of these popular savings banks, which were represented by at least 10,000 branches all over the country, has been phenomenal. According to the official report made by the Russian Minister of Finance in 1916, the deposits in these savings banks in¬ creased by over 3,500,000,000 rubles in the first two years ˆof the Great War. The growth of deposits in the State Bank amounted to 854,- 000,000 rubles during the first 18 months of that war. Besides these general banks, Russia before the Revolution had special banks, such as mortgage banks, land banks, etc. The functions of these different kinds of loan banks are in¬ dicated by their names. It should be noted, however, that the land banks were specially designated as the Nobles' Land Bank and the Peasants' Land Bank, each doing an enormous business before the Great War — over 3,200,- 000,000 and 5,000,000,000 rubles, respectively, in 1913.. There were 36 municipal credit so¬ cieties in Russia on 1 Jan. 1915, having a total capital exceeding 150,000,000 rubles; while the 53 joint-stock banks for commercial credit had a total capital of about .837,000,000 rubles on

1 July 1915, with deposits approximating 2,900,000,000 rubles the previous year. The prin¬ cipal banks of the latter kind before the World War were the Petrograd International Bank of Commerce (capital 90,000,000 rubles), the Russian Bank for Foreign Trade (capital 80,- 000,000 rubles), the Azov-Don Bank of Com¬ merce (capital 75,000,000 rubles), the Russian-

Asiatic Bank (capital 65,000,000 rubles), the United Bank of Commerce (capital 46,000,000 rubles), the Russian Commercial and Industrial Bank (capital 45,000,000 rubles), the Volga- Kama Bank of Commerce (capital 31,000,000 rubles), and the Siberian Trade Bank (capi¬ tal 31,000,000 rubles). All these banks had numerous branches — some as many as a hundred — in various parts of Russia, with headquarters invariably at Petrograd.

The government revenues and expenditures of Imperial Russia were classed under the two general heads of ordinary and extraordinary, with numerous and confusing sub-classifica¬ tions. The principal sources and gross amounts of Russia's ((ordinary)) revenues, as enumerated and officially estimated in rubles for 1915, were as follows: (1) State domains — government railroads, banks, mills, factories, timber sales, etc. — 1,700,000,000; (2) Indirect taxes — cus¬ toms receipts and revenue from sales of tobacco, alcohol, sugar, matches, petroleum, etc. — 699,- 000,000; (3) Duties — revenue stamp receipts, passport charges, taxes on freight and passen¬ ger railroad transportation, etc. — 514,000,000; (4) Direct taxes — taxes on land, real estate, capital, trade licenses, etc. — 375,000,000; (5) State monopolies — mining industries, coinage, liquor traffic, post office, telephone, telegraph, etc. — 326,000,000; (6) Reimbursement of treas¬ ury expenditures, 124,000,000; (7) Land re¬ demption — payments on land purchased by ex¬ serfs and other peasants — 1,900,000; (8) Sale of state domains — forests, lands and other nat¬ ural resources — 1,850,000; and (9) Miscel¬ laneous revenues — military tribute, municipal contributions, payments on railroad and Crown debts, etc. — 15,200,000. If we add to these ˆordinary® revenues the 155,000,000 rubles esti¬ mated as ˆextraordinary® revenues for the same year, the bulk of which was to come from state loans, we find Russia's estimated revenues for the first year of the World War mounting up to nearly 3,912,000,000 rubles. Counting the population of the empire as 180,000,000 in 1915 (a conservative estimate), these vast revenues came to about 21% rubles per capita.

At least 20 items made up the ˆordinary® and ˆextraordinary® expenditures of the Rus¬ sian government in its imperial days. The former included all the fixed or regular ex¬ penses connected with the various ministries; the latter, naturally, most of the irregular or variable disbursements of the government. The cost of running Russia's 11 ministries, which constituted the bulk of her ordinary expend¬ itures, was estimated for 1915 as follows (in rubles and round numbers) : Ministry of Ways of Communication, 752,000,000; Ministry of War, 590,000,000 ; Ministry of Finance, 357,000,- C00; Ministry of the Interior, 203,000.000; Min¬ istry of Marine, 199,000,000; Ministry of Edu¬ cation, 159,000,000; Ministry of Agriculture, 143,000,000; Ministry of Justice, 101,000,000; Ministry of Commerce and Industry, 57,430,- 000; Ministry of the Imperial Court, 16,300,- 000; and Ministry of Foreign Affairs, 7,700,- 000. The (Other ((ordinary® expenditures for that year included 440,000.000 rubles in pay¬ ment of state debts, 52,500,000 rubles to the Holy Synod, 8,830,000 rubles for the higher government institutions (Imperial Council, the Duma, etc.), and 27,000,000 rubles in miscel¬ laneous expenses.

The (

Of course these figures do not include Rus¬ sia's enormous war expenditures, which the Russian Minister of Finance placed at 10,000,- 000,000 rubles for 1915 alone. That the cost of the World War to Russia, as to the other belligerent nations, increased as the struggle continued, goes without saying. Specific es¬ timates by years vary greatly, but Russian au¬ thorities place the whole cost of the World War to Russia at 56,599,275,699 rubles.

The rapid growth of Russia's national debt during the war is another means of gauging its cost. This increased from 8,811,380,000 ru¬ bles on 1 Jan. 1914, to 32,300,000,000 rubles on 1 Sept. 1917, when Russia no longer figured in the war. To cover this and subsequent def¬ icits, Russia made several internal war loans, some of which were taken up abroad, and at least two foreign loans, amounting to $100,000,- 000, placed in the United States, which alone is believed to have extended financial aid to Russia approximating $325,000,000. Just what the financial situation in that country is at the present moment, with the Bolshevik gov¬ ernment still in power, cannot even be con¬ jectured. With all her pre-Bolskevik govern¬ ment loans repudiated by this reckless regime in 1918, and with her unprecedented issues of unsecured paper money, Russia's financial

credit at home and abroad has already reached the lowest ebb in her whole precarious history.

David A. Modell, Authority on Russian Subjects.

14. RAILWAYS, HIGHWAYS AND WATERWAYS. Russia's enormous size makes her means of transportation and com¬ munication even more essential than these vital factors generally are in smaller countries. Yet, neither her railroads nor her waterways have been developed or utilized to anything like their maximum efficiency, both lagging behind Rus¬ sia's industrial and commercial progress.

This is especially true of the Russian rail¬ road system, which, while it is the second largest in the world in point of trackage, falls far be¬ hind those of England, Germany and the United States in actual efficiency. The growth and development of Russia's railroads has been very rapid, however. Beginning in the sixties of the last century, when but 264 miles of tracks were constructed annually, and passing through a period of tremendous development between 1895-99, when the annual increase of lines averaged 1,915 miles, the development of Russian railroads reached its highest point just when the Great War broke out — and, natu¬ rally, interrupted it. Conflicting figures are given for the total mileage' of Russian rail¬ roads immediately before the World War.

In 1917, according to the American Railway Commission in Russia, the total mileage of all railroads in European and Asiatic Russia (exclusive of Finland) approximated 43,300. Only about 25 per cent of these railroads were then double-tracked. Before the Russian Revo¬ lution (q.v.) about two-thirds of Russia's vast railroads belonged to the government, the rest being owned by private companies. Despite their poor equipment and inefficient operation, Russian railroads carry enormous numbers of passengers and mountains of freight. No very recent statistics are available here, but in 1914 a total of about 250,000,000 passengers and 235,000,000 tons of freight were transported by Russian railways. What the figures were dur¬ ing the war, with its unprecedented movements of men and supplies, can only be conjectured at present.

The principal Russian railroad lines connect the outlying provinces of central, southern and western Russia one with another and with the chief Baltic, White Sea and Black Sea ports. Moscow, the centre of Russia's greatest industrial region, is naturally the most import¬ ant

Russian railroad centre. Next comes Petrograd, the actual commercial centre of Russia, which is linked with the older Rus¬ sian capital by the Nicholas Railroad. Nijni- Novgorod, the leading commercial city on the Volga, ranks third as a railroad centre. Con¬ nected with Moscow by the Nizhni-Novgorod Railroad, it is a great distributing point for much of the grain that comes from such agri¬ cultural trading centres as Kazan, Riazan, Samara and Saratov. Another railroad, the Moscow-Kursk, connects Moscow with the densely populated governments of central and southern Russia; and still another, the Moscow- Briansk, connects it with the city of Kiev, the fourth largest city of Russia. The Riga-Orlov Railroad runs directly to the port of Riga, on the Baltic, and connects that important city with those of four or five adjacent governments, finally making a junction near Dvinsk with the Warsaw Railroad. The Yelets and the Griaze-Tsaritsin lines help to connect the fertile black- soil region of southern Russia with the western part of the country. The Petrograd-Warsaw and the Moscow-Brest lines connect Petrograd and Moscow with Poland and the Austrio- Prussian frontier. Then there is, of course, the great Trans-Siberian Railroad (q.v.), the long¬ est continuous railway in the world, which connects such remote cities as Petrograd and Vladivostok, 5,435 miles apart by rail, which is one and three-fourths times the distance from New York to San Francisco by the shortest route. This enormous railroad, costing over $172,525,000 in initial outlay and taking nearly 12 years to build — it is being extended by branch lines and made more efficient by double¬ tracking all the time — is double-tracked from Omsk to Vladivostok, a distance of 3,566 miles, which exceeds the distance across the whole American continent. The Trans-Siberian Rail¬ road has given a great impetus to commerce and agriculture in both European and Asiatic Russia and has greatly promoted Siberian immi¬ gration. In the Great War, when it was natu¬ rally taxed to the utmost, its services were in¬ estimable. The much-needed lesson taught Russia by the exigencies of that unprecedented war is being improved by the above-mentioned

railway commission, which has already increased the efficiency of Russian railroads to a very considerable extent.

Russia's internal waterways, covering so large a part of two continents, are naturally the longest in the world. The country is inter¬ sected by numerous rivers, lakes and canals which afford direct water communication be¬ tween the Caspian Sea and the Arctic Ocean, between the former and the Baltic and between the Baltic and the Black Sea. Exclusive of Finland, European and Asiatic Russia has about 250,000 miles of waterways. But, owing to the lowlands through which they pass, Russian rivers are generally not very deep.

Hence only about half their mileage — not more than 132,- 000 miles, at any rate — represents really navi¬ gable waters, the rest being navigable by rafts and small sailing vessels. Moreover, most of Russia's internal waterways are practically ice¬ bound in winter and some are greatly affected by drought in summer, especially in their southern reaches. Yet, despite these handicaps, about one-third of Russia's immense freight is transported by water, which still affords by far the cheapest means of communication. And the proportion of waterway to railway transporta¬ tion in Russia is bound to increase rather than diminish as time goes on, judging from the vast and numerous waterway improvements projected by the Executive Committee on Water Transportation during the Great War.

There are six large river systems in the former Russian Empire — two in Europe and four in Asia — and these, with their numerous connecting canals, make up a network of water¬ ways unsurpassed anywhere else in the world. Of the two European systems, that of the Volga River is by far the larger. It lies in the East and includes the waters of the Neva Basin as well as those of the northern Dvina, which empties into the White Sea. The other European Russian river system is that of the Dnieper, which flows south into the Black Sea. This is the Western system and includes, besides the Dnieper Basin itself, the basins of the Western Dvina, the Nieman and the Vistula, which link together the Black Sea with the Baltic. The two systems, together, afford a continuous water route between points so dis¬ tant as the city of Astrakhan, on the Caspian Sea, and Petrograd, on the Gulf of Finland, 2,540 miles apart.

The principal river systems in Asiatic Rus¬ sia are those of the Ob River, the Yenesey, the Lena and the Amur. The first is the largest and most important, comprising all the rivers of the West Siberian plain north of the Rus¬ sian Atai and northern Mongolia, with at least 7,000 miles of navigable waters. The Yenesey system, second in size, drains about 870,000 square miles of Siberian territory and has a total of 4,500 miles of navigable waters. The Lena River system comprises over 5,000 miles of navigable waters and drains the northern Irkutsk region as well as the greater part of northeastern Siberia, an area exceeding 1,000,- 000 square miles. Finally, the Amur system, which drains the Russian Far East, affords another 5,000 miles of navigable water routes. Together, all these vast waterways, connecting here and there with the Trans-Siberian Rail¬ road, have been one of the greatest promoters of Siberian colonization and expansion. The

maintenance and control of Siberia's river sys¬ tems, as well as of the large and deep Lake Baikal (a fresh water lake of unlimited possi¬ bilities), is vested in the Russian Department of Ways of Communication, which recommends and makes necessary improvements. The future of Siberia undoubtedly depends quite as much upon her vast waterways as upon any other single factor, the great Trans-Siberian Railroad not excepted.

A country so predominantly agricultural as Russia must of necessity depend a great deal on wagon roads and highways for means of transportation and communication. While Rus¬ sia's ordinary wagon roads are apt to be im¬ passable in spring and fall, they afford very cheap transportation facilities the rest of the year, especially in winter, when sledging is almost universal. It is then that Russia's agri¬ cultural and other products can be transported most conveniently from the villages to the towns and railroad stations by millions of peasants whose time is all their own. There are about 75,000 miles of ordinary (unpaved) roads and over 15,000 miles of post (macadam¬ ized) highways in European Russia alone. The latter connect all the principal cities, thus link¬ ing together such important centres as Moscow, Petrograd, Warsaw, Kiev and Kharkov. The post highways, over which millions of pas¬ sengers travel in winter and summer, were budt by the tsars, but are kept in repairs by local authorities and the rural communities through which they pass.

There are at least six kinds of roads and highways in Asiatic Russia: (1) Main high¬ ways, (2) caravan roads, (3) local roads, (4) colonization roads, (5) by-roads and (6) com¬ mercial highways. Space does not permit a description of the character and function of each, except to add that the principal road in the first class (the famous Sibirskv-Tract) alone exceeds 4,000 miles in length, that the local roads (some 61 in number) have a total mileage of 16,000, and that there were about 6,600 miles of colonization roads in 1913. Most of these Siberian roads are of a rather primi¬ tive character, though examples of more modern highways are not unknown even in this unde¬ veloped part of Russia.

David A. Modell,

Special Authority on Russian Subjects.

15. ARMY AND NAVY. At least three vital factors have combined in the past to make a large standing army essential to Russia's political

integrity and imperial well-being: (1) Her vast territorial extent, which made three practically separate armies necessary; (2) her diverse and very numerous ethnic elements, which made racial revolts an ever-present danger; and (3) her peculiar geographical posi¬ tion, which necessitated a very considerable army to guard her extensive frontiers. For¬ tunately, Russia's enormous population, a popu¬ lation which has always enabled her to put more men under arms than any other nation in Europe or America, makes it comparatively easy to supply any number of soldiers needed in peace or war. Thus, while her standing army before the Great War probably did not exceed 1,700,000 trained men, Russia could al¬ ways mobilize twice that number. In the World War she had no less than 12,000,000

men under arms, with perhaps as many millions more under training.

Like most other European countries, im¬ perial Russia had universal and compulsory military service, which she first established by law in 1874. Theoretically, every able-bodied male between the ages of 21 and 44 was liable to conscription ; but exceptions and exemptions were quite numerous. Finally, many of the non-Slavic races found in the Russian Empire — such as the aborigines of Siberia, the in¬ habitants of Turkestan, the Caucasians, and the subjects of the grand duchy of Finland — be¬ ing deemed undependable, were permanently ex¬ empted from military service. Such exemption, however, involved considerable exemption taxes in the case of the Finns and Turkestanians, at least. These and other ways, honest and dis¬ honest, of evading military service in Russia made conscription there much less onerous than it is elsewhere in Europe.

The number of conscripts to be called an¬ nually was usually determined by the Imperial Senate in accordance with recommendations made by the Minister of War. Thus the quota of new recruits would vary from year to year. Immediately before the Great War about half a million men were drafted out of the 1,300,000 liable for military service; and on this basis had not the war intervened the number of re¬ cruits would have increased by about 150,000 annually for the ensuing year or two. The gen¬ eral demoralization following the Russian Revo¬ lution naturally wrought havoc with the Russian army, greatly depleting its ranks through wholesale desertions and undermining its morale through premature relaxation of discipline. With the conditions existing under the Bolshevik regime, several rival armies have long been operating in various parts of Russia. The largest and strongest of these would seem to be that of the Bolshevik govern¬ ment, called <(the Red Guards,® and composed largely of mercenary troops and German officers.

The Russian army in pre-revolutionary times had the usual four branches — infantry, cavalry, artillery and engineers — to which the Great War has added an indispensable fifth, the avia¬ tion branch. The infantry consisted of regulars, Cossacks, militia and what corresponded to the German Landsturm. Only the first of these di¬ visions maintained its full strength in time of peace, while the Cossacks' ranks were normally kept at one-third their war strength. The con¬ ditions and length of service varied slightly before the World War, but were generally as follows : For the infantry and the artillery, three years in the active army and 15 years with the first reserves ; for the cavalry and other branches, four years in the active army and 14 years with the first reserves; and for all of them five years with the second reserves. This makes a total liability to military service of 23 years for these particular branches, while the Cossacks' liability is practically lifelong. The latter, after two years' training at home, en¬ tered the active district regiment of the first order at 21. After four years of active service there came four years' leave of absence, which meant service in regiments of the second order, with a month's military training every year. Then followed another four years of active service in regiments of the third order and five

years with the reserves, after which the Cos¬ sack, splendidly trained and well disciplined, belonged to the Landsturm division.

The term of military service would be re¬ duced by five years for university graduates, who served but two years in the line and 16 with the reserves, and graduates of secondary schools, who served three years in the line and 15 with the reserves.

For military purposes imperial Russia was divided into 14 districts, each in charge of a district commander. In 1914 the Russian army had 37 army corps, each of which generally con¬ sisted of two infantry divisions, an engineer battalion and sometimes a division of cavalry. On a war footing an army corps had between 36,000 and 40,000 men. Two of the three sepa¬ rate armies maintained by Russia before the Great War were stationed in Europe. There were some 40,000 or 50,000 frontier guards per¬ manently on the Austrian, German, Rumanian and other frontiers. Behind these guards, in the various military districts, were the regular army corps. The principal militarv headquarters in European Russia in time of peace were located at Saint Petersburg, Moscow, Kiev, Kovno, Grodno, Vilna, Minsk, Odessa,

Riga, Revel, Warsaw, Lodz, Kharkov, Smolensk, Vitebsk, Simferopol, Dorpat and Brest-Litovsk. The Caucasian army, consisting of at least four cavalry divisions, had its headquarters at Tiflis and Alexandropol. There were, besides, con¬ siderable forces (some 150,000 troops) stationed in central Asia, while those normally in the Far East were by no means negligible. Mili¬ tary schools and academies were quite numer¬ ous in Russia before the Revolution and, natu¬ rally, were located near military headquarters.

Russia's navy has not attained such high rank among the navies of the world as her un¬ limited resources would seem to have made possible. But the Russians, it should be re¬ membered, are not naturally a seafaring people, and shipbuilding is with them a comparatively recent art. It was Peter the Great (q.v.) who first organized the Russian navy as one of his pet ideas, but it never amounted to much until comparatively recent times. Its growth was so slow at first that only in the early part of the last century did it attain third rank among the world's navies. Even this rank was lost after the Crimean War, and such relatively small navies as the Turkish, Italian and German were in the middle of the 19th century easily sur¬ passed Russia's naval strength. But late in that century (in 1884) a new naval program was begun in Russia which by 1895 again raised her navy to third rank. Such naval progress was not long sustained, however. In the Russian-Japanese War Japan's more modern fleet easily and decisivelv defeated Russia's squadron near Tsushima. Since that disastrous defeat Russian naval reform and expansion have gone on apace, though effective reorganization began only in 1911. The full naval program as then projected involved the construction of 24 new battleships, 12 battle cruisers, 24 lighter cruisers, 108 destroyers and torpedo boats and some 36 submarines. The entire program was to be carried out by 1930, when the Russian navy would indeed have become very formidable. The Great War interrupted this huge naval pro¬ gram which, from present indications, will never be completed.

Before the war with Japan Russia main¬ tained four separate naval squadrons — one each in the Pacific Ocean, the Baltic, the Cas¬ pian and the Black seas. Before the World War the entire Russian navy consisted of some 200 vessels of various types, with a total displace¬ ment of approximately 408,000 tons. These war¬ ships included seven battleships (five of the dreadnought type), seven battle cruisers, five armored cruisers, seven fast and other cruisers, 118 destroyers, 40 submarines and 15 torpedo boats. But these figures give no adequate idea of the nature and size of the Russian navy in the Great War, in the first years of which many important additions must have been made as vessel after vessel then building was completed. The actual

increase from this source has never been tabulated. It could hardly have offset Rus¬ sia's considerable naval losses during the war, which were greatly augmented by revolutionary conditions, especially under the Bolshevik regime. What the Germans did not sink or capture of Russia's navy — and the Black Sea fleet nearly all fell into their hands — Bolshevik maladministration ruined or rendered impotent.

Before the revolution Russia had three prin¬ cipal navy yards at Petrograd — the Baltic works, the New Admiralty Yard and the Galerny Island Yard — one each at Kronstadt, Sevastopol, Vladivostok, Reval, Libau, and Helsingfors.

David A. Modell,

Special Authority on Russian Subjects.

16. RUSSIA AND THE WORLD WAR.

The immediate cause which brought Russia into the conflict was a declaration of war by Ger¬ many on 1 Aug. 1914, following an ultimatum requiring that Russia should demobilize within 12 hours. On being asked by the Russian For¬ eign Minister (M. Sazonov) whether the in¬ evitable refusal of Russia to this curt summons meant war, the German Ambassador replied that Germany would be forced to mobilize if Russia refused. Up to this stage there were but two belligerents — Austria-Hungary and Serbia, and they had opened hostilities only two and a half days before. In reply to a mes¬ sage from President Wilson to the effect that the United States stood ready at any time to mediate between the warring powers, the Ger¬ man emperor on 10 Aug. 1914 handed Ambas¬ sador Gerard a personal letter to the President. This document was first made public on 5 Aug. 1917. In it the emperor stated that a general order of mobilization issued by the tsar on 31 July 1914 had rendered war inevitable. This theory was upheld on the German side for a considerable period of the war, for in his maiden speech to the Reichstag on 19 July 1917 the new German Imperial Chancellor, Dr. Michaelis, stated that Germany was forced into the war (

having been attacked, replied to Russia's mobil¬ ization by sending an ultimatum to Saint Peters¬ burg, and on 31 July we declared war on the Russians, although the tsar had pledged his word that so long as negotiations continued not a man should march — so that we

deliberately destroyed the possibility of a peaceful settle¬ ment ... it is not surprising that the whole civilized world outside Germany at¬ tributes to us the sole guilt for the World War.® The oft-repeated question of ((mobiliza- tion responsibility® — as to which state was the first to mobilize — has been much canvassed. At noon on 31 July 1914 there was proclaimed throughout Germany a <(state of danger of war® (Kriegsgefahrzustand), the preliminary step to mobilization. At 4 p.m., four hours later, the kaiser telegraphed to King George, ((. . .1

have just heard from the Chancellor that intelli¬ gence has just reached him that Nicholas, this evening, has ordered the mobilization of his entire army and fleet.® It will be observed that there is a discrepancy of one day between the account of the kaiser and that of his Ambas¬ sador. An acute analysis of this subject may be found in 'Current History) (Vol. XIII, p. 496) from the pen of Dr. David Jayne Hill, former United States Ambassador to Germany. (See also ib., Vol. XII, pp. 473-475). Russian foreign relations with certain powers are treated under separate heads. See Alliances ; Aus¬ tria-Hungary and the War; Balkan League; Balkan Wars ; Berlin Congress ; Eastern Question; Persia; Russo-Japanese War; Russo-Turkish Wars; Triple Alliance; Triple Entente ; War, European : Historical Introduction and Diplomatic History.

Throughout the period preceding the Crim¬ ean War the relations between Russia and Great Britain had been of a friendly nature; such controversies as arose from time to time were always amicably settled. That friendship dated back to the middle of the 16tli century, when Ivan the Terrible concluded a commercial treaty with Queen Elizabeth and even aspired to win her hand. In 1806 Alexander I instructed his ambassador setting out for London that (

is the enemy of the human race,® wrote Prof. Spenser Wilkinson over 20 years ago ; (78, England and Russia nearly came to blows again over Constantinople, but once more was the Turkish Empire saved from de¬ struction. From 1863 dates the steady advance of Russia in central Asia; Afghanistan and Persia became zones of friction with England; in the Balkans, Russian aims clashed with those of Austria, while in the Far East, Japan looked askance at the Russian approach through Man¬ churia to the Sea of Japan. From 1872 to J895 there were periodical wranglings between Rus¬ sia and England over the boundaries of Afghan¬ istan ; the arrival of a Russian army at Merv in 1884 produced in England what the 8th Duke of Argyle facetiously described as "a violent attack of Mervousness.® More than perhaps any other' great European power, Russia fol¬ lowed a consistent

foreign policy; with plod¬ ding perseverance she aimed at securing an ice free outlet to the sea, in the Far East and on the Persian Gulf. Her conquests in central Asia brought peace, order and security to that region ; she abolished slave-raiding, constructed railways and introduced modern industrialism. While material progress was fostered, how¬ ever, education was not attempted.

In 1888 France lent Russia 500,000,000 francs ($100,000,000), thus paving the way to the Dual Alliance. Democratic France allied herself with autocratic Russia chiefly because she feared a German attack. Year by year the indebtedness of Russia increased, until at length economists began to ask whether Russia was not paying the interest on her old loans with the principal of her new borrowings. Russia began to enjoy the security of the reck¬ less debtor : she could always ask for more, because if more were refused France might lose all that she had embarked. After the accession of Tsar Nicholas II in 1894, the German em¬ peror so successfully played upon the young tsar and the French Foreign Minister, M. Hanotaux, that Germany became a quasi-silent partner in the Dual Alliance. French diplomacy

multiplied difficulties with England in Africa and Asia. The Franco-German-Russian com¬ bination directed its energies to isolate England. At the close of the China-Japanese War in 1895 the terms of the Treaty of Shimonoseki were dictated by the European triumvirate to the detriment of Japan, who was compelled to evac¬ uate Port Arthur, taken from the Chinese. This proceeding drove Japan into the arms of England and to prepare for her revenge. The year 1898 stands out in bold relief as a momen¬ tous epoch in world history. The Spanish- American War was in progress; a European coalition against the United States loomed on the horizon; France was in the throes of a semi-civil war over the Dreyfus case ; with England she stood on the verge of war over Fashoda; the Franco-Russian alliance was neu¬ tralized, even paralyzed; Italy and France were at daggers drawn ; the United States annexed Hawaii ; Russia took Port Arthur and Talien-wan; England took Weihaiwei, and France ob¬ tained a 99 years' lease of the Bay of Kuang- Chau-Wan. But perhaps the climax of that eventful year was the issue, in August, of the tsar's famous (

For the time being Russia stood as dictator of the world's affairs, backed by France and Germany. The territorial scramble in China seemed to presage the break-up of the Celestial Empire. England stood

isolated, helpless to intervene on behalf of the Armenians or to pre¬ vent the Greco-Turkish War. With the out¬ break of the South African War in October 1899 the tripartite coalition — or at least Ger¬ many — made strenuous efforts to bring about active intervention, but both Russia and France drew back. At the time of the Boxer Rebellion in 1900 Russia occupied Manchuria, promising to hand the territory back to China on 8 Oct. 1903. In 1902 came the Anglo-Japanese Alli¬ ance. Russia failed to evacuate Manchuria on the stipulated time, and on 9 Feb. 1904 Japan commenced hostilities without a declaration of war. On the battlefields of Mukden, Japan wiped out her score of Shimonoseki with Rus¬ sia; by the Treaty of Portsmouth, Russia re¬ linquished Manchuria to China and made her leasehold rights on the Liao-tung Peninsula (which included Port Arthur), over to Japan. The Russian disaster changed the political situ¬ ation and profoundly disturbed the balance of power, for one partner of the Dual Alliance was temporarily eliminated. Relations between Russia and England had been severely strained during the war over the North Sea incident, when the Baltic fleet had fired on British trawlers, believing them to be Japanese torpedo boats.

From 1898 onward a new under-current had been working under the troubled diplomatic waters. In that year M. Hanotaux had been replaced at the Quai d'Orsay by M. Theophile

Delcasse, to whom fell the task of settling the Fashoda incident with Great Britain. It was he who realized the peril of a conflict between those two countries and resolutely set himself to remove it. While Russia was being battered by the Japanese, M. Delcasse concluded (8 April 1904) the Anglo-French Agreement and established the Entente Cordiale. That move stunned Germany, for the incredible had hap¬ pened. After the Japanese War, Russia seemed to have reached the limit of her borrowing facilities. The French banks with the govern¬ ment behind them refused to assume the sole responsibility for floating another Russian loan. When Lord Lansdowne left the Foreign Office in December 1905 he had already begun the negotiations which were to- end in the Anglo- Russian Agreement of 1907. Sir Edward Grey pursued them and by the spring of 1906 the alliance was virtually concluded, though the convention was not signed till 31 Aug. 1907. In March 1906 a great Russian loan was floated in London and Paris — the first one in London since 1854. From this period, Russia drew lib¬ erally on British capital up to the European War. Thus were three quondam enemies brought into the same political orbit by an ˆunderstanding® against the Triple Alliance, though there was not, as in the case of the latter, any specific stipulations for mutual de¬ fense. Between Russia and England, Persia still remained the apple of

discord. With Aus¬ tria, Russia had once been on good terms. In the Revolution of 1848 it was Russian troops that had saved the throne and empire of Fran¬ cis Joseph. Austria repaid this obligation by mobilizing on the Russian frontier during the Crimean War, thus contributing to Russia's defeat. For over a century the Dual Monarchy had opposed Russian ambitions on the Bos¬ phorus and had directed covetous eyes toward Salonika. Russia, to her credit be it remem¬ bered, had been the chief instrument in liberat¬ ing the Balkan States from Turkish rule. She had also constituted herself the protector of the Slavic Balkan nationalities. But Austria had greater interests in the peninsula. The popula¬ tions were her next-door neighbors and she had millions of Slavs under her rule. Pan-Slavism constituted a real danger to the state. Russia was further away; only Rumania, neither a Slav nor strictly a Balkan state, touched her borders. Slav and Teuton seem born enemies; the evolution of the former is one of natural growth as opposed to that of forced develop¬ ment ; he has never bartered his individuality for any preconceived higher cult, and it was just this Slav element within her gates that contributed most effectively to the collapse of Austria in 1918. Her traditional policy of sup¬ pressing rising nationalities necessitated the procedure of keeping the Balkan Slavs weak and divided among themselves and against themselves by promoting strife between them. This policy of mischief-making was prompted by self-preservation and directed against Rus¬ sia. The latter power was by no means guilt¬ less of intrigue. She worked for the elimina¬ tion of the Turk from Europe and the strength¬ ening of Serbia. Austria and Germany were interested in holding together the Turkish Em¬ pire, upon the assistance of which they reckoned in a war with Russia. Austria had repeatedly

threatened Serbia and Montenegro with war, in the full knowledge that Russia would immedi¬ ately intervene by force. As the Russian For¬ eign Minister informed the British Ambassador on 25 July 1914, Austria's bellicose attitude toward Serbia ((wa*5 in reality directed against Russia. She aims at overthrowing the present status quo in the Balkans and establishing her hegemony there.®

Russian relations with Germany had been more intimate than with any other country, physically, if not spiritually. Since the days of the early Muscovite tsars Russia had been overrun with German officials, originally in¬ vited to introduce Western methods. They sup¬ planted

the natives in administrative positions and were hated by the people over whom they ruled. The large number of German names borne by Russians to-day bear witness to this. Frequent intermarriage between the nobility of the two countries brought it about that Rus¬ sian society, from the court downward to the bureaucracy, was permeated with German ideas and influence. But while the Germans regarded Russia with contempt as an inferior race, they feared her on account of her strength in man-power. Frederick the Great had suggested the partition of Poland between Russia, Prus¬ sia and Austria ; when that was accomplished, all three were equally interested in preserving their Polish territory, thus forming a tacit union between them. From that period every revolt in western Europe was represented to Russia as a menace to all sovereigns, ever since the first French Revolution. The same policy was energetically pursued by Bismarck. Rus¬ sia had been largely instrumental in delivering Prussia from Napoleon I, and had again come to the aid of Prussia in 1870 by threatening Austria with immediate war if she came to the aid of France. But for this, the Franco-Ger¬ man War might have been avoided. At the Berlin Congress in 1878 Bismarck stood against Russia, and when he had formed the alliance with Austria against Russia and France, he concluded another pact — the ((re-insurance treaty® — with Russia against Austria. Bis¬ marck is credited with having pushed Russia into war with Turkey in 1877, and William II induced her to waste her strength against Japan in 1904.

The agreement with England in 1907 com¬ pleted the Triple Entente, the bond that held solidly together despite outside efforts to shake it. Russia remained firmly with her allies through a succession of shocks — the Bosnia- Herzegovina crisis of 1908, Agadir, the Balkan wars and, finally, into the Great War. With her inexhaustible man-power and her vast natural resources, Russia was indeed an in¬ valuable ally, but the weak points in her armor were soon to be disclosed. She had entered the war heavily handicapped. Her factories and transport services were deficient, and could neither furnish nor distribute the supplies re¬ quired by the army and the civil population ; it was only by a reckless sacrifice of life that she won her early victories. Soon, owing to the shortage of shells, rifles and munitions, the army was left almost defenseless before the enemy, and many of the troops had to fight with sticks and stones. As disaster suc¬ ceeded disaster in the field, the undoubted

enthusiasm with which the nation had re¬ sponded to the call to arms gradually cooled ; enemy agents sowing dissension completed the breakdown of Russia.

So-called wWilly-Nicky® telegrams which had passed between the German emperor and the tsar in 1904—07 (published in the New York Herald Aug.Sept. 1917), showed that the kaiser had persuaded the tsar in 1905 to par¬ ticipate in a coalition against England. These negotiations, however, antedate the Anglo Russian Agreement. The secret treaty between the two monarchs was shortly after torn up by Count Witte. The Allied diplomats who were personally acquainted with the tsar have never doubted his loyalty. Russia's tremendous mili¬ tary efforts during the first two years of the war literally saved the Allied cause.

Henri Klein,

Editorial Staff of The Americana.

17. RUSSIA, DIPLOMATIC RELA¬ TIONS OF THE UNITED STATES WITH. The United States and Russia, with their many striking examples of similarities and contrasts, have had between them some curious and interesting sympathies but no important political relations. Their relations, although not intimate, have usually been friendly — and were especially so from 1861 to 1867.

In the period of the Revolution, the ruling empress, Catherine II, with all her professions of neutrality, showed no acts of sympathy for the revolting English colonists, although several Russian Poles allied themselves with the Amer¬ ican cause.

The traditional friendship between them originated in various acts of Alexander I who succeeded to the Russian throne in March 1801. President Jefferson, who since 1786 had been interested in Pacific trade, in 1803 (in connec¬ tion with the Lewis and Clark expedition) suggested plans for commercial communication between the United States and Asia via the Northwest Coast. In November 1803, although no treaty had been arranged with Russia, he sent a consul to Saint Petersburg. The Russian Foreign Minister in May 1808 requested the negotiation of a treaty regulating trade with Alaska which American vessels had visited for trading purposes since the beginning of Ameri¬ can nationality. He complained of American clandestine trade in arms and ammunition with the Indians, and soon thereafter he suggested a southern boundary limit which the United States rejected because it was far south of 55 degrees which the emperor had designated as the southern boundary in 1799. In June 1808, Russia appointed Daschkoff as consul-general at Philadelphia and also charge-d'affaires at Washington where he presented his credentials on 11 July 1809. At the same time Jefferson secretly sent William Short on a special mis¬

sion to request Russia to protect American commerce against aggression of the European belligerents, but after reaching Paris he waited for additional instructions and finally returned without going to Russia, his appointment having been rejected by the Senate just at the close of Jefferson's administration.

John Quincy Adams who was commissioned Minister Plenipotentiary to Russia on 27 June 1809 remained in Saint Petersburg until April

1814, when he took his leave. Although there had been difficulty in getting admission to Rus¬ sian ports and in determining the limits of the Russian settlements, he found a willingness to adjust all causes of friction. The emperor took a lively interest in American affairs — showing an <(obstinate attachment® of which there were frequent evidences in the decade that followed. In the War of 1812, doubtless inspired chiefly by desire to strengthen Great Britain in contest against Napoleon rather than by friendship for the United States, he offered mediation to secure termination of hostilities in a war which was for the United States inglorious. Later he was selected to arbitrate one of the difficulties re¬ sulting from the war and the Treaty of Ghent, and in 1822 decided that Americans were en¬ titled to an indemnity, the amount of which was fixed at $1,204,960 by a mixed commission.

By 1817 the importance of establishing a defined southern limit to Russian settlement in America was considered. In 1816 Russian traders from Alaska established a fort at Bodega Bay in what is now California, north of San Francisco, and another at Atooi in the Sandwich Islands. In 1821 the tsar by ukase gave- to a Russian company exclusive right to territory as far south as 51 degrees and threat¬ ened to make the northern Pacific a mare clausum by excluding foreigners from the seas within 100 miles from the coast.

Against this Russian policy the United States co-operated with Great British in remon¬ strance, and President Monroe incorporated a manifesto in his famous declaratory announce¬ ment of 2 Dec. 1823. Finally, Russia, refusing the bribe of California which Mexico had offered for a recognition of Mexican independ¬ ence, yielded to the combined protest of the United States and Great Britain, and on 17 April 1824 concluded her treaty with the United States fixing the parallel of 54° 40′ as the south¬ ern boundary of Russia and also providing for freedom of trade for 10 years and granting the right to

fish along the coasts of Russian America, except in the rivers and harbors ; but, after 10 years, believing that the privilege had been abused, she refused to renew the agreement for allowing either fishing or trading.

In the meantime Russia continued to main¬ tain a spirit of apparent goodwill toward the United States, co-operating with her in regard to Spanish American affairs, taking an in¬ terest in a proposed arbitration between the United States and England, and assisting the Uni l ed States in arranging contemplated nego¬ tiations with Turkey.

In 1832 the United States negotiated with Russia a treaty providing for reciprocal liberty of commerce and navigation and also reciprocal liberty of sojourn and residence in order to attend to their affairs and with the same se¬ curity and protection as the natives.

After 1835, although the Van Buren ad¬ ministration in 1839 complained of the Rus¬ sian pretension to exclusive dominion on the northwest coast and a year later exhibited some anxiety in regard to a lease of the Rus¬ sian American dominions by the Hudson's Bay Company, the continuation of good feeling was shown by the continued expression by the Russian government of a friendly interest in American relations with Great Britain just be¬

fore the negotiation of the Webster- Ashburton Treaty.

Although connection between the United States and Russia was slight they continued to remain on good terms and on several occa¬ sions before 1861 acted in harmony in the Far East where both secured advantages from English and French victories which opened China to intercourse with the commercial powers. American relations with Russia at once became more important following the ex¬ tension of the American boundaries to the Pacific in which consequent increase of Amer¬ ican interests invited changes and enlargements of policy. Realizing this, Secretary Clayton in 1850 invited Russia to accede to the Clay- ton-Bulwer Treaty and Secretary Webster in 1851 declared to Russia the policy which the United States was disposed to pursueˆ in re¬ gard to the Sandwich Islands. In 1854, and throughout the Crimean War, certain influen¬ tial American newspapers openly expressed sympathy for Russia. On 22 July 1854, Secre¬ tary Marcy negotiated with Russia a convention on rights of neutrals. At the same time, Russia was extending to the United States facilities in negotiating a commercial treaty with Persia.

The diplomatic correspondence indicates a good American

understanding with Russia from the close of the Crimean War to the opening of the Civil War. The Russian gov¬ ernment agreed to Marcy's doctrine as to the Declaration of Paris and was ready to take the initiative in the effort to extend the principles over Europe. There was a desire for increase of intercourse between the two countries. Early in 1858 Stoeckl, the Russian charge-d'affaires at Washington, was raised to the rank of minister plenipotentiary, and in 1858-60 there was conference and friendly co-operation as to joint interests in China and the opening of the Amoor to free trade. It was seen that the friendly relations between the two countries would favor the United States much in the de¬ velopment of the Pacific and Eastern trade, which would increase with the growth of the Frazer River settlement and extension of a railway to the Pacific. In December 1859, Russia was sounded on negotiations for the cession of Alaska for $5,000,000 which the Russian government regarded as inadequate but as meriting deliberation.

The continuous growth of Russo-Amerian cordiality after the opening of the War of Secession was significant. In 1861 the two gov¬ ernments agreed to co-operate in establishing cable connections between Saint Petersburg and San Francisco by way of Bering Sea and Siberia. Throughout the war wffiich threatened the in¬ tegrity and strength of the American Union, Russia remained friendly to the government at Washington. In 1862 she refused to join in Louis Napoleon's proposal of mediation or in¬ tervention in the American War; and, in 1863, when a revolt in Poland caused apprehension of an Anglo-French diplomatic intervention there as well as in America, she demonstrated her goodwill toward the American government by sending a fleet on a friendly visit to Amer¬ ican waters causing various rumors and sug¬ gestions of a possible Russo- American alliance. In 1866 the American Congress recognized the friendship of this international amenity by send¬ ing Gustavis V. Fox, Assistant Secretary of the

Navy, with a formidable vessel of the navy on a special mission to Saint Petersburg to con¬ gratulate Emperor Alexander II on his escape trom an attempted assassination. In return for this mission which was received with im¬ posing ceremonies, Russia (a year later) planned to send the Grand Duke Alexis on a visit to America.

A fitting climax to this strange paradoxical friendship appeared in the

negotiations result¬ ing in a treaty of 1867 for the transfer of Alaska which, although it had been suggested as early as 1845 and contemplated again in 1854 and in 1859, surprised the diplomats of the Old World.

Although the absence of conflicting interests after the transfer of Alaska seemed a guarantee against serious dispute new sources of con¬ troversy arose, first, in connection with Anglo- American negotiations for adjustment of serious questions, and later, from reactionary Russian policy after the death of the liberal Emperor Alexander II in 1881.

Near the close of 1870 when a series of events contributed to hasten the American negotiations with Great Britain for the adjust¬ ment of the Alabama claims, Constantin Cata- cazy, the Russian Minister who since his arrival in 1869 had interfered in questions not appro¬ priately connected with his legation, suggested to Fish that the condition of European affairs indicated that it was an opportune time to press for an immediate settlement which he expected to result in the American annexation of Canada, but Secretary Fish proposed to the British Minister Thornton a basis of settlement which omitted any mention of Canada and resulted in the famous Treaty of 1871 for the peaceful settlement of Anglo-American difficulties — doubtless much to the surprise of Russia. Cata- cazy continued to use methods at variance with diplomatic practice to defer or to prevent a peaceful adjustment with England. He did not hesitate to use the newspapers to influence the public on questions pending before the gov¬ ernment. His continued methods of interfer¬ ence to prevent the successful execution of the provisions of the treaty whose negotiation he had unsuccessfully attempted to prejudice and defeat made him intolerable and finally in¬ duced the American government (in July 1871) to suggest his recall and later impatiently to urge it, notwithstanding the <(intimate ties of amity® between the two governments. Sec¬ retary Fish acceded to a postponement of the recall only because Russia found his removal inconvenient and impracticable until after a prearranged visit of the Grand Duke Alexis.

Although after the close of the period of the ˆentente cordiale® there appeared evidence of continued friendship — such as resolutions unanimously adopted by the United States Sen¬ ate in March 1881 denouncing the assassination of Emperor Alexander II and extending condol¬ ence, and the promotion of popular sympathy by American shipments of food to relieve the famine sufferers of Russia in 1892 — the chief subjects of correspondence in the last quarter of the 19th century were sources of friction and irritation.

An extradition treaty signed on 28 March 1887 met strong opposition in the United States from those who urged various objections against treating Russia with the same considera¬

tion as countries such as Great Britain or Switzerland, but after six years of delay its ratification was advised by the Senate (Febru¬ ary 1893) and it was proclaimed by the Presi¬ dent in June 1893. In 1894 an agreement for a modus vivendi in relation to seal fisheries was concluded. In September 1900, by exchange of notes, a claims protocol submitted to arbitration certain differences relating to American claims.

After 1890 earlier friendly relations gradu¬ ally changed and after 1898 became increasingly unsatisfactory by the aggressiveness of Russian diplomacy and by repressive measures of Rus¬ sian internal administration. Americans con¬ demned the harshness of the Siberian exile system, published to the world by articles of George Kennan in 1888-89, and the increasingly reactionary spirit of government authorities shown in severe treatment of Poles and Jews — many of whom emigrated to the United States in increasing numbers, destitute and with their tales of woe to spread a hatred of the land from which they had fled. In 1903, fol¬ lowing the horrible massacre of Kishinev which was believed to have been instigated by government authorities, the Washington gov¬ ernment brought the subject into publicity by an unusual and unsuccessful inquiry whether the Russian government would receive a peti¬ tion from American Jews. In 1904 President Roosevelt expressed the American nation's con¬ demnation of the outrage at Kishinev.

Russian aggressiveness in diplomacy became a larger source of danger. Germany and Rus¬ sia, who in 1895 were foremost in intervening to deny to Japan the legitimate fruits of her victory over China against the latter's exclu¬ sive policy, in 1897 seized strategic positions in China which, together with demands for vast concessions, threatened the complete ex¬ clusion of the United States. In the Spanish- American War, Russia favored Spain and par¬ ticipated in a movement to make a European question of Cuba.

Thus in connection with the revolution in international relations after 1898 a wider di¬ vergence of Russo-American interests resulted from events in the Far East. The threatened disintegration of China induced the American government to propose (6 Sept. 1899) a policy of <(open door,® largely directed against the ex¬ clusive trade policies of Russia in Manchuria where the recently constructed trans-Siberian Railway gave her special advantages. Later (1900) the American

government presented a courteous reminder of Russia's promise to evacuate Manchuria whose occupation appeared to menace American trade and manufacturing interests. A continuation of the controversy was a sequel of the peace-making in China fol¬ lowing the Boxer troubles.

In the Russo-Japanese War, American pub¬ lic opinion favored Japan to a high point of enthusiasm, causing considerable astonishment and anger to many conservative Russians, but at the close of the war bitter feelings were softened by President Roosevelt's successful initiation in facilitating peaceful negotiations resulting in the Treaty of Portsmouth and by later American sympathy for reforms in Russia.

Although Russia showed gratitude for the peace, her subsequent acts in violating the open door principle in Manchuria resulted in a di-

vergence of policy in the Far East, again caus¬ ing friction, chiefly illustrated in the American propositions to internationalize the railroad system of Manchuria under Chinese manage¬ ment and with foreign capital in order to elimi¬ nate the political purposes of Russia and Japan. It was further illustrated in the new facilities offered to Russian encroachment in Manchuria and Mongolia following the Chinese revolu¬ tion of 1911 resulting in the American note of 3 Feb. 1912. In Persia also in 1911, the American government viewed with some con¬ cern the Russian action in forcing Commis¬ sioner Shuster to leave the country.

In 1912 Secretary Knox secured the right of the United States to participate in a loan needed by the new Chinese government, re¬ sulting in an arrangement (of June 1912) for a loan shared by bankers of six powers. After the rise of new difficulties resulting from hesitation of China and the imposition of new conditions which China in her extremity was compelled to accept, President Wilson, 18 March 1913, reversed this policy in recogniz¬ ing the new Chinese republic, and. withdrew government support from the combination of the six-power loan.

Meantime, on 7 July 1911, the United States and Russia together with Great Britain and Japan concluded at Washington a treaty for joint protection of fur-seals and sea otters in the north Pacific above 30° latitude for a period of 15 years.

The serious dispute in regard to non-ad¬ mission (even for short visit) of American Jews into Russia, whose government had never officially abandoned the theory of perpetual allegiance, finally led to an American agitation for abrogation of the Russo-American com¬ mercial treaty of 1832.

As early as 1873 Secretary Fish protested against Russian treatment of American citizens of Jewish birth as a violation of the treaty of 1832, to which Russia replied that the treaty must be interpreted in accord with require¬ ments of Russian domestic law. The impor¬ tance of the subject increased by increase of intercourse and in 1880 Secretary Evarts and in 1881 Secretary Blaine vigorously protested to no avail — as did Frelinghuysen in 1884-85 and Bayard in 1886. The subject was investi¬ gated by Secretary Olney in 1895 and in 1902 Secretary Hay at the request of Congress made a detailed report showing that Russia was clearly violating provisions of the treaty of 1832. The United States had been inactive from a desire not to offend Russia, but a large Jewish immigration, and consequent political and busi¬ ness influence, finally led to offensive action in the House of Representatives in 1911 through the passage of an intemperate resolution order¬ ing the abrogation oi the treaty. The Senate proposed a more diplomatic substitute resolu¬ tion which was unanimously adopted. Mean¬ while President Taft properly informed Russia of the intention to abrogate by a year's notice as provided in the treaty.

Thus after seeking ineffectually for over 30 years by deliberate processes of diplomacy to persuade Russia to observe the treaty, the United States resorted to the remedy provided by the express words of the treatv, and on 1 Jan. 1913 the treaty was abrogated. The ac¬

tion met a strong protest from reactionary Pan- Russian leaders. Unsuccessful steps were at once taken to negotiate a new treaty on a basis satisfactory to the United States. The issue was not one easily settled by compromise or by arbitration. As each party showed no disposition to recede from its position no prog¬ ress was made in negotiations.

After 1914, with the disappearance of many causes of alienation and with the probability of a satisfactory understanding in regard to China and Japan, American opinion was again disposed to be friendly to Russia — and es¬ pecially to sympathize with the struggle for liberal reforms in government.

A general arbitration treaty signed in Octo¬ ber 1914 was proclaimed

25 March 1915. A protocol of agreement concerning exportation of embargoed goods from Russia to the United States was signed at Washington 23 Sept. 1915.

During the earlier phases of the Russian revolution, the American government with a view to encouragement and aid sent a mission headed by Elihu Root, whose achievements were soon canceled by the development of the revolution, near the close of 1917, under con¬ trol of unscrupulous Bolshevik-German agents acting solely in the interests of Germany.

Many look forward to the re-establishment of genuine good feeling after Russia has again recovered her international influence through a satisfactory solution of her internal crisis whose end it is still difficult to foresee and futile to forecast.

Bibliography. — Callahan, J. M., (Alaska

and Americo-Canadian Relations) (1908), and (Russo-American Relations during the Ameri¬ can Civil War> (1908) ; Coolidge, A. C., (United States as a World Power } (1908) ; Foster, J. W., diplomatic Memoirs) (1909) ; Hildt, J. C., (Early Diplomatic Negotiations of the United States and Russia) (1906) ; Johnson, W. F.,

(America's Foreign Relations) (1916) ; Moore, J. B., digest of International Law) (1906) ; Thayer, W. R., dife and Letters of John Hay) (1915) ; American Historical Reviezv xviii, 309- 345; 537-562; Cong. Record, 62d Cong., 2d Sess., 493; Internat. Year Book; North American Re¬ viezv (October 1874) ; United States Foreign Relations.

James M. Callahan,

Professor of History and Political Science, West Virginia University.

RUSSIAN COSSACKS. The name of Cossack is derived from the Russian Kazak, which in turn came from a Tatar word, mean¬ ing adventurer, rover, freebooter. The Cos¬ sacks of the former Russian Empire enjoyed certain special privileges in return for which they were obligated to render a very extensive military service, nominally from 18 to 50, prac¬ tically from 18 to 38, of which 12 years in active service. The Cossack, under these agree¬ ments, was bound to furnish his own uniform, equipment and horse, the government providing merely his weapons, guns, etc. The officers were trained in special military schools, and this tuition was really better than that for the officers of the regular army in the rest of Rus¬ sia. The general administration was kept sep¬ arately for each voisko and differed in

each case. The central administration culminated in

the Ministry of War in Petrograd, and there also, with the aid and advice of delegates from each voisko, new legislation for the Cossacks was discussed, deliberated upon and passed. In time of war the 11 Cossack voiskos supplied 890 mounted sotnias, or squadrons, each of 125 men; 108 sotnias of infantry, of equal strength ; and 236 guns, representing 4,267 offi¬ cers and 177,000 men, with 170,695 horses. But altogether they furnished 328,705 men for mili¬ tary service. The Cossack population of the whole of Russia numbered, according to the census of 1893, 2,648,049, and in 1905, 3,252,6 37, of which 1,573,898 were women. Altogether they owned 146,500,000 acres of land, 105,000,- 000 of which was arable and most of the remainder in forest. This land (leaving out of consideration the small space occupied by towns) was divided into stanitsas, or villages, the average rate of holdings per soul being 81 acres, with special grants to the officers, in lieu of pension, from esaul upward, leaving altogether about one-third of the whole land for future use. Altogether there were 11 Cossack voiskos, or tribes, settlements ; namely, those of the Don, the Kuban, Terek, Dnieper, Astrakhan, Ural, Orenburg, Siberian, Semi- rvechensk, Amur and Ussuri. Their location, of course, was always along border lands, past or present, of more or less military or political importance. There are very few towns of any size within the Cossack holdings, and the stanitsa, or Cossack village community, was and remains the unit. The stanitsas hold their land in common, on the principle of the Rus¬ sian mir, but with wider attributes, such as village assembly, assessing taxes for local pur¬ poses or for the whole of their voisko, dividing the tillable land at regular stated intervals, pro¬ viding schooling for the children, village grain stores and electing its ataman, or communal elder, its judges, etc. All this, of course, ap¬ plies to conditions before the World War. . Since the Bolshevist regime has been set up in the heart of the former empire, the Cossack com¬ munities everywhere have resisted the intro¬ duction of this economic and political system within their areas, mostly by force, and at this writing successfully.

As a rule popular education is more ad¬ vanced among the Cossacks than among the remainder of the Russian populations, attend¬ ance being both larger in percentage and more regular. In addition to agriculture, which sup¬ plies more than their needs, leaving a consider¬ able proportion for export, the Cossack popu¬ lation devote

themselves largely to the breeding of horses and cattle, to viticulture in the Cau¬ casus, to fishing on the Don, the Caspian and the Ural, to hunting and agriculture, etc. The fructification of the mining lands within their territories is almost altogether left to non-Cossack strangers, the privileges being chartered out, or subject to an annual rent, to a percentage of the gross output or some other similar method of farming it, while trading and manufacturing are mostly permitted on pay¬ ment of a license. From of old the typical Cossack despises trade, banking, manufactur¬ ing and similar occupations. Ethnologically considered the Cossacks are of mixed origin. They are conglomerate descendants of Russian, Lithuanian and Polish ancestors, fugitives

mostly who had fled from serfdom and joined the free settlements of the Cossacks in the 16th and 17th centuries, and who mingled racially with the aborigines, Tatars and other tribes of Mongolian race, such as the Polovtsi. Physically the Cossacks are more hardy than the Russian proper, though they bear a re¬ semblance to the latter, and share with him certain characteristics, but are physically more slender and supple, of bold, handsome features and dark, expressive eyes, and of vastly more energy and daring. The Cossacks are nearly all adherents of the Greek Orthodox faith, very devout in observing its tenets and ritual, intolerant of other creeds and violently anti- Jewish, hence the frequency of pogroms on territory settled by Cossacks. At different periods the Cossack hetmans, or military chiefs, have exercised greater or lesser power over their tribes or confederations, according to the times and circumstances. Some of them, by their innate genius, achieved supreme and autocratic prerogatives, with scarcely any inter¬ ference by the kings of Poland or the tsars of Russia, as did Chmielnicki. But as early as Ivan the Terrible's reign the tsar was begin¬ ning to be acknowledged, first among the east¬ ern branch of the Cossacks, as their . overlord or suzerain, and at last the chief hetman of all the Cossacks became the tsarevitch, or eldest son of the Russian tsar, who assumed his power with certain ancient ceremonies, such as the investment with the bulawa and bufichu k

History. — The Ukraine (i.e., ˆborderland®), extending from Kiev to the Black Sea, was the first home of the Cossacks, who under the nominal suzerainty of Poland, then by far the largest and most powerful country in the East, here grew and developed into a race of their own. A slow process it was. After the long Tatar and Mongolian invasion had at last subsided, before which the nomadic and roaming tribes had fled or been annihilated, the first small Cossack settlements were founded. These were constantly added to by hosts of fugitive serfs from the feudal estates of Po¬ land, Lithuania, Muscovy, who

joined the bands of rude and plundering freebooters along the eastern limits of the steppe. This went on steadily for three centuries, about 1400-1700, during which time the Don and Dnieper Cos¬ sacks founded warlike fraternities, with fast¬ nesses along the river shores or on inaccessible islands. As early as 1514 the Kasaki were formed into companies and placed respectively under the command of the Polish frontier starostas, or governors, those of Kaniev, Kamenets, Cherkask, etc., but a shifting policy was pursued by Poland all along. It was al¬ together within the nominal domains of the Poland of that time that Cossack territories were located, and hence the earliest traces of Cossack history form a part of Polish history, although from the very start the Cossacks claimed a large measure of independence and autonomy, and in most instances succeeded in maintaining it. Nevertheless, undoubtedly Po¬ land made use of the Cossack settlements and of the Cossack fighting spirit to protect her eastern and southern boundaries. But under various Polish rulers there were also erected by Poland strongholds, like Bar and Krzemi-

eniec, by which that commonwealth meant to defend herself both against the frequent mur¬ derous irruptions of the Tatars .of the Crimea- and Azov, and against the marauding or rebel¬ lious Cossacks. But a settled policy Poland had not. The dzikie pola, the <(savage steppe,® remained <(savage® for three centuries. Up to 1500 in fact the large steppe, extending from the Dnieper to the Ural, had no settled popu¬ lation. Hunters and fishermen frequented its innumerable rivers. Shoals of runaway serfs from Poland, Lithuania and Muscovy, settled beneath the shelter of the stockades and armored blockhouses or watch towers built, from time to time, to guard the southern fron¬ tiers of Poland and Muscovy. The Tatars and Turks, being the declared foe of all Christians, the Cossacks exterminated them for centuries, wherever feasible, and went on frequent ex¬ peditions undertaken as a rule for the sake of booty. The latter in turn they sold to Poles or Muscovites, and this, as a matter of fact, for a long period was their largest item of revenue. The same motive impelled them in making their frequent raids along the shores and to the harbor cities of the Moslem Black Sea. These raids off and on became veritable naval battles, in which the Cossack light and easily managed long boats would prove superior to the clumsy Moslem galleys. One king of Poland, Vladislas IV, was so greatly hampered in his national policy by this guerilla naval warfare that he had to conclude a special agreement with the Cossacks regarding it.

Like the Vikings of old, the Cossacks would undertake raids in their flotillas of light sail boats along the whole coast of the Crimea, then and for many years after under the power of the Khan, and to the opposite shores of the Black Sea, to Batoum, to Trebizonde, Samsoun, etc., burning, slaying, devastating all, and causing annually millions of damage, bringing home immense booty. They would now and then even, under the leadership of some specially bold adventurer, penetrate as far as the Sea of Marmora, to the very haunts of the sultan of Turkey, and this irrespective of whether the latter was at peace with Poland or not, thus often wilfully entangling the web of international statecraft.

The Cossacks had been little meddled with by their Polish suzerains, so long as they kept on defending the frontiers against the Tatars and Turks who made frequent inroads. The Don Cossacks, as early as about 1600, had definitely cut loose from their brethren, the Cossacks of the Dnieper, the so-called Zaporo- zhians, and from the time of Ivan the Terrible had at least nominally placed themselves under the authority of Muscovy, the determining rea¬ son with them for this step being that the Rus¬ sians, like themselves, were of the Greek Ortho¬ dox faith. The Don Cossacks, however, were by no means steadfast in their allegiance. They kept wavering, sometimes neutral, at other times taking sides with one party or the other, as their ungoverned spirit inclined them. For the Cossacks of the Dnieper, though, who still remained under Polish suzerainty, there had been, throughout the whole of the 16th and the first half of the 17th century, a slowly ac¬ cumulating list of grievances against their Polish overlords. The Poles, above all, living under a strictly feudal social and political sys¬

tem, had all along laid claim to territorial feudal rights over the whole Ukraine, including even the very Cossack belt of land on the Dnieper, a claim which the Cossacks had never admitted, they calling themselves the <(Cos- sack Republic® or <(The Free Brotherhood of the Dnieper.® Now, from some time before 1600, and corresponding with the anti-Reforma- tion set up by the Jesuits in Poland proper, another element of strife and dissatisfaction had been infused into the relations subsisting between Poland and her nominal vassals, the Zaporozhians ; namely, the religious one. A persistent attempt was made, under Jesuit guidance, to turn the Cossacks and all the people of the Ukraine from adherents of the Greek Orthodox creed into Roman Catholics. Unwise harshness was shown in this long drawn-out proselyting campaign, and the whole Ukraine, but more particularly the actual Cos¬ sack portion of it, conceived a deep hatred for their oppressors. To facilitate the conversion of the Greek Orthodox

inhabitants of the LTkraine the Poles had hit upon the expedient of founding, with the assent of the Vatican, a new branch of the Roman Church under the caption of the Uniate denomination, leaving in¬ tact the dogmas and ritual of the Greek Ortho¬ dox Church, with some slight modifications, but bringing it under the governance of the Roman pontiff. The Cossacks, therefore, and with them the Ukrainians as a whole, began to hate their Polish lords not alone as their feudal oppressors, but also as their spiritual ones, as heretics. The whole Ukraine was in a ferment during the 17th century. The Cossacks, with the assistance of the Ukrainian settlers, rose in rebellion, in 1635-36, and this rising was put down by Poland with the utmost difficulty. Retribution of the severest type was meted out by the Polish Diet. But the great rebellion that broke out in 1648, and which shook Poland to its very foundations, was the one at the head of which was Bogdan Chmielnicki, hetman of the Zaporozhians, or Cossacks of the Dnieper, one of the most singular and able men in his¬ tory. By allying himself with the Tatars of Crimea, their foes of centuries, he in the spring of 1648 marched suddenly with all his available forces against the flower of Polish knighthood, and simultaneously there was a general upris¬ ing, terrible and bloody, by the settlements of the Ukraine — most of them also Greek Ortho¬ dox and descendants ot Cossack forefathers. While Chmielnicki, with the help of the Ta¬ tars, defeated and destroyed one Polish army after the other, the serfs and settlers of the Ukraine wiped out nearly the entire race of Polish lords that had ruled them for so lone. Every manor house was reduced to ashes ; every lord destroved with bestial cruelty- — impaled, sawn asunder, flayed alive; every Catholic priest was hanged before his own altar, usually be¬ tween a Jew and a slaughtered hog. On 23 Sept. 1648, at Pildawa the main Polish army of 40,000 was utterly destroyed. During the fol¬ lowing three years Chmielnicki with his hosts made himself complete master of the whole Ukraine, and conducted himself like an inde¬ pendent sovereign, even receiving ambassadors from several great powers. But at last, on 1 July 1651, Bogdan Chmielnicki was defeated at Berestecko. But the fruits of this victory were

not gathered by Poland, now hurrying to her destruction, but by Muscovy-Russia, while another result of this great feat of arms was that it did away forever with all dreams of Cossack independence. The Cossacks, little by little, transferred their allegiance from Poland to Russia.

There were, however, repeated attempts by a number o'f Cossack heroes or leaders to estab¬ lish political autonomy. One of these was made by Stenka (Stephen) Razin, originally a hetman of the Don Cossacks, who was sent off on a diplomatic mission to the Kalmuck Tatars, and then made himself head of a piratical brother¬ hood. But in 1670 he openly rebelled against the government at Moscow. He captured Cherkask, Tsaritsyn and took Astrakhan, con¬ verting the latter into a Cossack republic. He spread rebellious doctrine as far as Nizhni- Novgorod, Penza, Tambov, etc., even Moscow. Razin proclaimed his object to be to root out the boyars and tchinovniks (officials), and to establish absolute equality, such as practised by the Cossacks within their commonwealths. A number of pitched battles were fought by Razin's adherents and the tzar's armies, but finally, one year later, Razin was captured at Kagalnik, and taken to Moscow, where after unspeakable tortures, he was quartered alive.

Mazeppa, whose full name is Ivan Stepano- vitch, another Cossack hetman and man of ability, was born in the Ukraine, near Kiev, about 1640, and died on 22 Sept. 1709, in Ben¬ der, a fellow-captive of state with his ally, King Charles XII of Sweden. Byron's poem has made Mazeppa's name and romantic life history familiar to readers. In his youth, be¬ ing then a page at the royal Polish court, a jealous husband had him strapped to the bare back (of a vicious steed, and thus driven into the wilderness steppe. Being rescued by roaming Cossacks, he next became secretary to the Cos¬ sack hetman Ivan Samoilovitch, and himself hetman in 1687. He aided materiallv Peter the Great in his wars against the Turks and Ta¬ tars in Crimea and Azov. But later he turned against the tsar, and made the last attempt on a large scale of obtaining political independ¬ ence for the Cossacks by allying himself with the Swedish monarch, sharing at last his defeat at Poltava, and his flight to Turkish territory where he breathed his last, having attained a ripe old age. Pugatcheff, also hetman of the Don Cossacks for a time, in 1773, during the reign of the Empress Catherine II, raised once more the standard of revolt among the Cos¬ sacks. He did so by pretending to be Peter III, the murdered husband of the empress, and his scene of action was the Volga region. For more than a twelve-month he kept the armies of the sovereign at bay, but was finally crush- ingly defeated, 2,000 of his supporters being killed and 6,000 taken prisoners, including him¬ self. He was beheaded in Moscow. Pugatcheff's name and exploits still live in popular legends and ballads throughout Russia. During the World War now come to a close, the Russian Cossacks, as long as Russia remained in the field, have sustained their great warlike reputa¬ tion, and at this writing it is one of their lead¬ ers, General Denikin, although fighting against

tremendous odds, that successfully is opposing the Bolshevist fighting masses, just as it was

another such leader, General KorniLoff, who just before the accession of Lenine, would have saved Russia from Bolshevism if properly sup¬ ported. What the ultimate fate of all the 11 Cossack settlements within the former empire is going to be is matter of conjecture merely. But if they are allowed their way they will en¬ joy autonomy.

Bibliography. — Bain, R. N., (The First Romanovs> (London 1905) ; Cresson, W. P., (The Cossacks: Their Country and History' ; Grass, C. K., 'Russische Sekten' (Saint Peters¬ burg 1907) ; Kostamaroff, N. J., (The Rebel¬ lion of Stenka Razin' (2d ed., Saint Peters¬ burg 1859) ; Leroy-Beaulieu, A., (L'Empife des Tsars' (3d vol., Paris 1889) ; Martynoff, S., 'Das Petschoragebiet' (Saint Petersburg 1905) ; Morfill, W. R., 'Russia' ('Story of the Nations Series,' New York 1891) ; Munro, H. H., 'Rise of the Russian Empire' (Boston 1900) ; Raim- baud, A. N., 'Histoire de la Russie' (new ed., Paris 1900); Schierbrand, Wolf von, 'Russia: Her Strength and Her Weakness' (New York 1904) ; Solpvieff, S. M., 'History of Russia' (Vol. II, Saint Petersburg 1895) ; Umanez, J. R., 'The Hetman Mazeppa' (Moscow 1897).

Wolf von Schierbrand, Author of ' Russia: Her Strength and Her Weakness ,' etc.

RUSSIAN PEOPLE, LEAGUE OR UNION OF, or UNION OF TRUE RUS¬ SIANS (the "Black Band" or "Black Hun¬ dred"), a reactionary political group of Russia organized in 1905 to combat the rising revolu¬ tionary tendencies of the period, and powerful for about five years. Its members supported the traditional Russian regime, including au¬ tocracy, and sought to counteract revolutionary activities by employing terrorist methods against them. It was contended that the government secretly connived at their efforts. Their ranks were recruited from the nobles, and they main¬ tained that Russian political troubles in gen¬ eral should be ascribed to the non-Slavic ele¬ ment of the population. They were particularly charged with organizing pogroms against the Jews. In the first sessions of the Duma the party was not strong, but by a manipulation of the suffrage laws they gained ascendency in the third Duma, one of their members, Prince Volkonsky, becoming its vice-president. The party was for a time the recipient of favor in high circles, but gradually lost its power through the disaffection of some of its mem¬ bers who disapproved of its extreme measures, as well as by internal quarrels, and a growing public sympathy for the measures and tendencies it was formed to suppress.

RUSSIAN THISTLE, a naturalized an¬ nual (Salsola tragus, one of the Chenopo- diacece)', becoming a dreaded pest in the north¬ ern and western United States. It is closely related to, and resembles, the prickly salt wort of the sea-beaches and in no way, except spini¬ ness, can be confounded with the true thistles. It is a glabrous, succulent, spreading bushy herb, with slender branches and small linear leaves, topped by a prickle, and usually bright red at maturity. Its small flowers are single in the axils, and are succeeded by hard little fruits surrounded by broad, the five-parted hori¬ zontal wing of the calyx, which is conspic¬ uously veined. Like many desert plants, at

maturity, and in the dry season, its branches contract into a ball, enclosing its capsules full of ripe seeds, and it becomes a tumble-weed, blown across the country by the wind, and scattering its seeds, to take root in favorable soils. Careful cultivation is the best way to exterminate the Russian thistle.

RUSSNIAKS. See Ruthenians.

RUSSO-JAPANESE WAR. See Japan.

RUSSO-TURKISH WARS. Ever since the conquest of Constantinople by Mohammed II in 1453, the Turks had been regarded as a perpetual menace to the Christian countries of Europe. The remarkable military achievements of the Osmanli ; their enormous encroachments upon European territory, and, above all, their utter incapacity for equitable administration, plus the insuperable difference in race, creed and language, made them most undesirable neighbors to the Slav, Greek, Magyar, Latin and Teutonic peoples of southern and south¬ eastern Europe. In 1547 the Turks acquired Serbia; Trebizond and Sinope in 1461; Wal- lachia in 1462 ; Bosnia in 1463 ; the Crimea in 1475; Albania in 1479; Otranto in 1480. Bayazid II (1481-1512) took Venice and parts of the Morea; Selim I (1512-20) made his fleet the terror of the Mediterranean, while his suc¬ cessor Suleyman the Magnificent captured Bel¬ grade, Rhodes and Lower Hungary; his tri¬ umphant progress was arrested only at the walls of Vienna in 1529. By the first peace treaty between Austria and Turkey (22 June 1533) the sultan received the right to sanction any arrangement about Hungary. In 1534 Suley¬ man attacked Charles V in the Mediterranean and made the Turks supreme in both the east¬ ern and western basins of that sea. The Turkish fleet attacked Italy in 1537, and Venice was

compelled to make a truce with the Porte in 1539. Hungary was invaded for the fourth time in 1541 and a Turkish government was established at Buda; further places were seized in Hungary, Croatia and Slavonia in 1544; Szegedin fell in 1552, and Chios in 1566. In 1571 Pius V organized the Holy League against the Turks, who captured Cyprus from Venice. But the turn of the tide was at hand. The battle of Lepanto (October 1571) shattered the reputation of invincibility which the Turkish fleet had attained, and in 1573 a new and formidable adversary appeared in the lists against Turkey — the power of Russia. The first proper Russo-Turkish War came in 1678; it ended in 1682 and secured the Ukraine and the Cossack territory to Russia. Other wars followed : in 1686 Russia began operations ; two years later Transylvania renounced Turkish suzerainty and became a province of the king of Hungary, and in 1689 Russia joined forces with the Imperialists to fight the Turks on the Danube. In 1710, at the instigation of Charles XII, the Sultan Achmet III declared war on Russia. By the treaty of the Pruth (21 July 1711) Peter the Great gave back Azov to the Turks, destroyed all Russian fortresses on Turkish territory and made a definitive treaty of peace with Turkey in 1713. In 1715 the Turks conquered the Morea and the Venetian fortresses in Crete; in 1716 the Austrian Im¬ perialists defeated the Turks at the battle of Peterwardein, and Temesvar, the last of the Turkish possessions in Hungary, fell 13 August.

In 1726 Russia and Austria formed an offensive alliance for 30 years against Turkey, though the projected war did not break out until 10 years later, in 1736, and lasted three years, during which time the Turks recovered Nissa from the Austrians, captured Orsova, won the battle of Crocyka, and compelled peace. By the Treaty of Belgrade (18-23 Sept. 1739) Austria ceded Orsova, Belgrade and all territories gained by the Treaty of Passarowitz (1718), viz., a strip of Serbia and the Banat of Temesvar, while Russia ceded all her conquests except Azov, which was to be dismantled. A treaty of neutrality was concluded between Turkey and Russia in 1748, but in 1767 Russian agents began to stir up the Greeks, Montenegrins and Bosnians against the Turks, who declared war against Russia in October 1768. The struggle raged for nearly six years ; the Russians de¬ feated the Turks and occupied Moldavia and Bucharest, but their initial successes were checked by a Turkish victory and a revolt among the Don Cossacks, so that the tsar solicited the mediation of Austria in 1773. By the peace of Kutchuk Kainardji (July 1774) the Tartars were brought under Russian in¬ fluence ; Russia gained an embassy at Con¬ stantinople and secured privileges for the Christians ; she exacted promises of better gov¬ ernment for the principalities, the right of free

commercial navigation in Turkish waters, and gained a firm footing on the northern shores of the Black Sea. Austria obtained Bukovina from Turkey — after forcible occupation — in 1775. Yielding to Russian demands, Turkey ceded the Crimea and Kuban to Russia in 1784, and on 10 Aug. 1787 Turkey once more de¬ clared war on Russia, which was followed by Austria declaring war on Turkey 9 Feb. 1788. The Russian troops gained several successes, but the campaign proved unfavorable to the Austrians. Their united forces defeated the Turks at the battle of Fokshani (31 July 1789), and at Rimnicu (22 Sept. 1789) ; the Turks lost Belgrade, Bucharest, Bender and Aker- man. Austria made peace 4 Aug. 1791 and took Orsova; Russia continued until 9 Jan. 1792, when she also made peace in order to devote her strength to the war with Poland. While Europe was ablaze with the Napoleonic wars, Russia and Turkey again came to grips in November 1806. England joined Russia and a British fleet forced the passage of the Dar¬ danelles. In 1808 Russia submitted peace terms to the Porte; they were rejected, and another war began in April 1809. The Russians seized Tultcha and Ismail on the Danube and drove the Turks from Rustchuk, which the Russians set on fire in 1811. A Turkish army in Wal- lachia surrendered. Russia made peace on 28 May 1812 on terms favorable to her enemy in order to repel the threatened invasion of her own dominions by Napoleon. Turkey lost part of Bessarabia and Moldavia, and acknowledged the principality of Serbia.

After the fall of Napoleon the Greek strug¬ gle for independence from Turkey claimed the attention of the European powers. On 20 Oct. 1827 the combined fleets of England, France and Russia inflicting a crushing defeat on the Turkish navy in the Bay of Navarino and made Greece a free country. On 26 April 1828 Russia again declared war on Turkey, crossed the

Danube, captured Varna and Silistria, and forced peace by the Treaty of Adrianople (14 Sept. 1829), by which the independence of Greece was recognized by Turkey and Russia gained some islands and a strip of territory in Asia Minor, besides securing free navigation of the Black Sea for commerce. Wallachia and Moldavia (now Rumania) received separate administrations, Serbia was recognized as a vassal state, and Turkey was mulcted in an indemnity of 10,000,000 ducats. Russia be¬ came possessed of the whole eastern coast of the Black Sea, with the free navigation of the straits, and obtained complete

command of the chief mouths of the Danube. She also secured the protectorship of the Greek Church through¬ out the whole of Turkey. The Anglo-French- Russian coalition against the Ottoman Empire produced unfortunate results. While from the European point of view it was good and proper that the grip of the Turk should be relaxed from Christian territories in Europe, the re¬ peated interventions of the powers in Turkish internal affairs had bred suspicions and rivalries among those powers themselves. Russian de¬ signs on Constantinople aroused the smolder¬ ing hostility of her allies of Navarino and pro¬ duced the Crimean War (q.v.), which was strictly a Russo-Turkish War. The gradual dismemberment of the Turkish Empire in Europe proceeded over a period of 350 years and reached its climax in the Balkan Wars (q.v.) of 1912-13. Before 1875 Turkey had lost Transylvania, Azov, Moldavia, Wallachia, Serbia, Greece, Bessarabia, Bukovina and the Crimea, besides Asiatic territories and active control of Egypt, retaining in some cases a shadowy suzerainty.

The Russo-Turkish War of 1877-78 directly originated from a revolt that broke out in Herzegovina during July 1875 against Turkish oppression, though in reality it was but a con¬ tinuation of the age-long quarrel between the two countries — their 10th war. It was the most determined attempt hitherto made by Russia to force a solution of the Eastern Ques¬ tion — <(the nightmare of Europe.® The in¬ surrection was secretly supported by Serbia and Montenegro and encouraged by Russian agents. Severe conflicts between Christians and Mo¬ hammedans also broke out in Bosnia, and thou¬ sands of refugees fled to the Austrian frontier. The rapacity of Turkish tax collectors was mainly responsible for the outbreak. To Aus¬ tria, any disturbance on her borders threatening the status quo was always a serious embarrass¬ ment. On behalf of Russia, Germany and Aus¬ tria, Count Andassy (q.v.) drew up a scheme of reforms to be submitted to the Porte, in¬ sisting upon the abolition of tax-farming; the application of the direct revenue of Bosnia and Herzegovina for the benefit of those prov¬ inces; the establishment of religious liberty; the creation of a commission composed equally of Mohammedans and Christians to supervise the reforms, and the amelioration of agrarian conditions by the sale of land on easy terms to the peasants. Though accepted by the Porte, the Andrassy note failed of its purpose be¬ cause it did not provide for supervision by the three emperors over the execution of the re¬ forms. The insurgents refused to lay down their arms; England and Austria attempted

pacification, but the disaffection only spread. Diplomatic conferences were held with a view to avoid intervention when the crisis suddenly became aggravated by the murder of the Ger¬ man and French

consuls in Salonica by a Turk¬ ish mob (6 May 1876). The Berlin Memoran¬ dum of 13 May insisted on the reforms and a two months' armistice; Italy and France ac¬ cepted the memorandum, but England withheld consent and despatched a fleet to Besika Bay. The other powers also sent warships and com¬ pelled Turkey to punish the murderers of the consuls, but compensation could not be en¬ forced owing to the chaotic condition of the Turkish finances. Midhat Pasha deposed the Sultan Abdul Aziz and placed Murad on the throne. Constitutional reforms were promised and a peaceful settlement seemed within reach. Meanwhile, an insurrection had broken out in Bulgaria and was suppressed by the Turks with unspeakable barbarity. The ruthless massacre of some 12,000 Bulgarians aroused a thrill of horror in Europe and inflamed popular pas¬ sion. On 30 June Serbia declared war on Turkey; Montenegro followed suit on 2 July. Supported by Germany, Austria and Russia drew up plans for the partition of Turkey. The Serbians were defeated when Russia intervened with an ultimatum demanding effective pro¬ tection for the Christians and a two months' armistice. Abdul Hamid II, who had mean¬ while succeeded Murad V (deposed and exiled), accepted the Russian terms, but at the same time energetically prepared for the com¬ ing struggle. To allay British anxiety, the Tsar Alexander II disclaimed all desire for territo- ial aggrandizement, but stated clearly that he would act alone if the reforms were not carried out. Lord Derby proposed a conference of the Powers at Constantinople. Warlike prep¬ arations were hurried on all sides; England threatened to occupy Gallipoli and Constanti¬ nople if Russia occupied Bulgaria. A con¬ ference of the Powers assembled at Constanti¬ nople 12 Dec. 1876, with the twofold object of preserving the integrity of Turkey and of press¬ ing the desired reforms. The demands for a foreign commission and a European control over the appointment of governors were en¬ tirely rejected, and the conference broke up in failure.

On 31 Jan. 1877 Russia asked the Powers what they now intended to do. England sug¬ gested a year's probation, and by her advice the sultan made peace with Serbia, 28 Feb. 1877. At the instance of Russia the London Protocol was signed 31 March and presented to the Porte, once more demanding the reforms and also peace with Montenegro, which still continued the war. The Protocol was rejected by Turkey, and on 24 April Russia declared war, England declared strict neutrality so long as the Suez Canal was not interfered with, Constanti¬ nople not occupied, and the Bosphorus and Dardanelles left untouched. The Russian army consisted of 164,000 men in the Caucasus, 56,000 on the coasts of the Black Sea, and 136,000 in

Bessarabia. The army intended for the Danubian territories rose by 15 June to 216,000 men. The navy was composed of 13 ironclads, three frigates and a dozen monitors. The Turkish army of the Danube, under Abdul Kerim Pasha, was composed of about 160,000

men ; Osman Pasha had 35,000 at Widin, and some 100,000 were spread among the fortresses of Shumla, Rustchuk, Silistria and Varna. Some weak divisions lay in the Dobrudja and the rest at Tirnova and Shipka. Reserves were being concentrated at Sofia and Constanti¬ nople; 15,000 stood on the Serbian frontier and in Bosnia-Herzegovina ; 25,000 facing Montene¬ gro ; and other troops in Albania and Mace¬ donia. The Danube flotilla consisted of four armored corvettes, nine monitors, five armored gunboats and five other gunboats. The Rus¬ sians under the Grand Duke Nicholas crossed the Pruth in April, and the Danube in June, and soon put the Turkish flotilla out of action. A convention signed 16 April 1877 between Russia and Rumania (the latter a vassal of Turkey) gave the Russians free passage and use of Rumanian railways and telegraphs. The first fighting occurred in Asia, where the Rus¬ sians under Loris Melikov advanced on Batum, Kars and Bayazid, meeting with fierce resistance and several defeats. In Bulgaria they were more successful, where Gourko seized the Shipka Pass, crossed the Balkans, and threat¬ ened Adrianople; other armies marched on Rustchuk and one took Nicopolis. Russian suc¬ cesses now caused anxiety in England; a squadron was sent to Besika Bay and Malta was reinforced. Osman Pasha took Plevna (q.v.) and strongly fortified it. Here, with a force of about 50,000 men he repulsed all attacks of the Russians and Rumanians for three months, when he was compelled to surrender, 10 Dec. 1877. The whole country, from the Balkans to the Danube, gradually fell into Russian hands. In Armenia the Russians had retrieved their early failures and taken Kars. The Montene¬ grins captured Dulcigno, Antivari and Nik- sitch ; Crete rose in rebellion and demanded union with Greece ; the insurrection in Bosnia-Herzegovina continued, Thessaly and Epirus were in revolt, and the Serbians again rose in arms. The sultan's efforts to enlist European mediation met with no response; he then ap¬ pealed to Queen Victoria, who obtained an as¬ surance from the tsar that he would listen to a direct appeal from Turkey. Accordingly, Russo- Turkish plenipotentiaries met at Kasanlik on 19 Jan. 1878. An armistice was

granted on 31 January and peace preliminaries signed. Eng¬ land's attitude had meanwhile verged on the fringe of war with Russia; it was known that she would forcibly oppose a Russian occupation of Constantinople. A British fleet passed through the Dardanelles and anchored a few miles below Seraglio Point. The Treaty of San Stefano between Russia and Turkey was signed 3 March 1878. By its provisions Montenegro, Serbia and Rumania were made independent; Russia took Bessarabia and gave Rumania the lower Dobrudja (Turkish), as compensation; Bulgaria received an accretion of territory and was created an autonomous principality tribu¬ tary to Turkey; the reform program of 1876 was to be carried out with regard to Bosnia-Herzegovina ; Crete and the remaining Chris¬ tian provinces were to have improved ad¬ ministrations, and the Armenians were to be protected against the Kurds. Also the Dar¬ danelles and the Bosphorus were to be open to the merchant ships of all nations in peace and war times. So far, the terms of the treaty were

acceptable both to England and Austria, but those two powers firmly opposed the other conditions laid upon the Porte, namely, an indemnity 1,400,000,000 rubles ($740,147,450) , coupled with the stipulation that Ardahan, Kars, Batum, Bayazid and the territory between the Russian frontier and the Soghanly Mountains be ceded to Russia in consideration of 1,100,- 000,000 rubles ($581,544,425) being remitted from the indemnity, owing to Turkey's weak finanical position. England demanded that every article of the treaty should be laid before a congress to be held in Berlin. Russia's refusal made war imminent. Lord Beaconsfield ordered the mobilization of the British army and navy and summoned troops from India; Austria voted a war fund and prepared to occupy Bosnia. After some diplomatic conversations Russia decided to accept the British and Austrian demands, and the Berlin Congress (q.v.) met on 13 June 1878. Nine days earlier Lord Beaconsfield had concluded a convention with Turkey engaging to aid against future aggressions by Russia, if the sultan would carry out the necessary reforms. Great Britain received Cyprus to be held by her until Russia restored her Armenian conquests. The Con¬ gress tore up the treaty of San Stefano, sub¬ stituting for it the famous treaty of Berlin signed 13 July 1878. Montenegro, Serbia and Rumania were confirmed in their independ¬ ence; the first-named received the ports of Dulcigno and Antivari ; Serbia and Rumania received accessions of territory and Bulgaria north of the Balkans was made autonomous. Bosnia and Herzegovina were handed over to Austria to be administered until such time as Turkey would be able to assume that task on more enlightened principles. Russia retained Batum and Kars in Asia, but restored

Bayazid; she also acquired Bessarabia and a part of Armenia. England secured Cyprus, and France a lien on Tunis. Pecuniary indemnities were excluded altogether. The results of the con¬ gress and the treaty were not calculated to in¬ crease friendly relations between the powers. Each of the contracting parties, as well as the beneficiaries, was left with a national or territorial grievance. Turkey had been de¬ spoiled by friends and enemies alike; Russia had been checked, Greece ignored and the aspirations of the Balkan principalities un¬ realized. The elaborate stipulations for the protection of Christian subjects of Turkey were never observed. See Balkan League; Balkan Wars; Bosnia; Bulgaria; Rumania; Russia; Serbia; Turkey; War, European: Russo-Turkish Campaign; Austria and the War.

Bibliography. — Anderson, J. H., (Russo- Turkish War 1877-78 in Europe* (London 1910) ; Baker, V., (War in Bulgaria) (Lon¬ don 1894) : Bamberg, F., (Geschichte der orientalischen Angelegenheit* (Berlin 1892) ; Cahuet, A., (La Question d'Orient 1821— 1905, > . (Paris 1905) ; Driault, E., (La Question d'Orient depuis ses origines jusqu'a nos jours) (Paris 1905) ; Duggan, S. P. H., (The Berlin Congress*; Dyer and Hassall, (Modern Eu- rope) (Vol. VI, London 1908) ; Gay, J. D., (Plevna, the Sultan, and the Porte> (London

1878) ; Greene, F. V., (The Russian Army in its Campaigns in Turkey in 1877— 78) (London

1879) ; Hozier, H. M., (The Russo-Turkish

War> (London 1878); Huyshe, W„

Henri F. Klein, Editorial Staff of The Americana.

RUST, ferric oxide, formed by the gradual oxidation of iron when exposed to the air. Carbon dioxide is, if not a necessary factor, a powerful accelerant of the action. To remove rust the usual mode is to rub the object with a piece of oiled rag or emery paper. More rapid and more satisfactory results are secured by using very pure petroleum, and wiping with a hempen or woolen rag. To prevent rust, dip iron or steel articles in a mixture of equal parts of carbolic acid and olive-oil, rubbing the sur¬ face with a rag. Others rub the metal with a mercurial ointment, leaving a thin layer of mercury over the entire surface. If iron be dipped in a solution of carbonate, chromate or bichromate of potash or soda in water the sur¬ face will be

protected by a tenacious film of oxide against rust for a long time, and objects can be protected for any period by burying in quicklime. Rubbing the surface with plumbago has a similar effect.

RUSTCHUK, roos'chook, Bulgaria, a town on the right bank of the Danube, at the confluence of the Lorn, opposite Giurgevo, 42 miles southwest of Bucharest. It has some woolen, silk and other manufactures and con¬ siderable trade. It was of strategic importance owing to its position on the old Turkish fron¬ tier, and was almost destroyed by the Russian bombardment in the War of 1877-78.

RUSTON, La., city and parish-seat of Lin¬ coln Parish, 165 miles northwest of Baton Rouge, on the Chicago, Rock Island and Pacific, and the Vicksburg, Shreveport and Pacific rail¬ roads. There are cotton and lumber interests, and the Louisiana Industrial Institute is located here. It is also the home of the Louisiana Chatauqua, and has a high school, orphanage and a fine post office. Pop. 3,389.

RUSTS. See Fungi.

RUTABAGA. See Turnip.

RUTACE2E, roo-ta'se-e, a widely dis¬ persed family of polypetalous plants with about 950 species, most frequent in warm regions, and

especially so in South Africa and Australia. They are generally shrubs or trees, bearing leaves in various forms, without stipules, dotted with glands and often heavy-scented. The four- or five-parted flowers are often in axillary cymes and the fruits are various, being most conspicuous in the genus Citrus, which produces the orange and lemon. Two American genera are Ptelea (hop-tree), and Zanthoxylum, or prickly ash. The latter is represented by small trees, prickly, with a powerfully stimulative and tonic bark. The common rue is a member of the typical genus Ruta.

RUTGERS, Henry, American philan¬ thropist: b. New York, 7 Oct. 1745; d. there, 17 Feb. 1830. He was graduated from Columbia in 1766; served as captain in the Revolutionary War and later as colonel of New York militia, and entered the legislature in 1784 to which he was frequently re-elected. He was a member of the board of regents of the New York Univer¬ sity from 1802 to 1826. His gifts to public purposes were many, the chief being $5,000 to Queen's College of New Jersey, which there¬ upon took the name of Rutgers.

RUTGERS COLLEGE, located at New Brunswick, N. J. It was chartered

in 1766 under the name of Queen's College ; the charter was slightly altered in 1770. In 1771 the college was located at New Brunswick. During the Revolutionary War, when the British army oc¬ cupied New Brunswick, the college exercises were continued at Millstone and at North Branch. The present site of the college was secured in 1808, and in 1825 a generous dona¬ tion was received from Col. Henry Rutgers, and the name changed to Rutgers College in his honor. A theological school was at first affili¬ ated with the college, but has since become an independent institution. There is a preparatory school, established at the same time with the college. The organization of the collegiate department now includes two schools, the classi¬ cal school and the Rutgers Scientific School. In 1864, the legislature designated (

vision of a State board of visitors appointed bv the governor. The college farm contains 100 acres and is well equipped with modern apparatus. The buildings on the campus in¬ clude Queen's College, Fine Arts Building, Van Nest Hall, Geological Hall, Kirkpatrick Chapel and Library, State Laboratory, Ceramics Build¬ ing, Winants' Hall (dormitory) and the Bal- lantine Gymnasium. The library in 1915 con¬ tained some 80,000 volumes ; the students in the collegiate department numbered 475 and the faculty 55, besides special teachers. The col¬ lege also conducts a summer school and ex¬ tension lectures and during the past 20 years has more than doubled its enrolment.

RUTGERS SCIENTIFIC SCHOOL, a

department of Rutgers College, New Bruns¬ wick, N. J., designated by law as the New Jersey State College of Agriculture and Me¬ chanic Arts. See Rutgers College.

RUTH, Book of. The Book of Ruth is one of (

Two features are specially prominent in the treatment of the book: the descent of David from a Moabitess, and the inculcation of the duty of the nearest of kin .to marry the widow of a man who died without a male child. The purpose doubtless included both elements. The second has no specific indication of time. The custom here described is broader than that of Deuteronomy xxv, 5-10, where the duty is limited to a brother of the deceased. The first feature, however, affords a more definite sug¬ gestion of time. Deuteronomy xxiii, 3 forbids unto

the tenth generation the entrance of the descendant of a Moabitess into the assembly of Ya'hweh. The activities of Ezra and Nehemiah were directed especially against marriage with foreign wives, Ezra ix-x, Nehemiah xiii, 23-29. It must be remembered that the book makes frequent mention of the fact that Ruth is a Moabitess, and in ii, 10 she calls herself a foreigner. The attitude of the book is thus in direct opposition to the regulations which found their fullest expression in the time of Ezra and Nehemiah, the middle of the 5th century. The most probable time for the book, therefore, is not long after the period of Ezra and Nehemiah, the book, at least partly, being designed as a protest against the attitude which they represented. This book is, therefore, one of the evidences that along with the narrow¬ ness of the dominant postexilic view there per¬ sisted a broader conception of Judaism, which,

in some of its other phases, appears also in the books of Jonah and Proverbs, and else¬ where.

The treatment of the author has an idealiz¬ ing element. His presentation of the peaceful village life of the time of the Judges is in marked contrast with the turbulence of the period as reflected in the Book of Judges. The probability of a historical basis for the story, however, is indicated by the connection of David with Moab suggested in 1 Samuel xxii, 3ˆ1. The tradition on which the book is based was doubtless preserved in the family of David.

Of suggested later additions the only one that seems probable is iv, 18-22. The decisive reason here is not the abundance of marks of lateness in the language of these verses, but rather the fact that here Obed is treated as the son of Boaz; in the book itself (iv, 5, 10), he is regarded as legally the son of Mahlon, ac¬ cording to the ancient custom. The addition of these verses was evidently prompted by a genealogical interest.

Bibliography.— Creelman, H., (An Intro¬ duction to the Old Testament* (pp. 249-251, New York 1917) ; Driver, S. R., (An Intro¬ duction to the Literature of the Old Testament* (pp. 453-456, revised ed., New York 1916) ; Gray, G. B., (A Critical Introduction to the Old Testament (pp. 108-110, New York 1913) ; McFadyen, J. E., (An Introduction to the Old Testament (pp. 290-293, New York 1906) ; Nowack, W.,

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages,

Colgate University.

RUTHENES, RUTHENIANS, RUSS- NIAKS, or LITTLE RUSSIANS, are Sla¬ vonic tribes inhabiting Eastern Galicia, Buko- wina and the neighboring districts of Hungary. They are part of the ((Little Russians® who dwell in the Ukraine. The number of Aus¬ trian Ruthenes amounts to about 3,500,000; ac¬ cording to some authorities there are over 4,000,000, of whom 500,000 are settled in the northeast provinces of Hungary, 300,000 in the northwest of Bukowina, and the remainder in Galicia. The name ((Ruthene® is merely the German and Austro-Hungarian title for (

The Carpathian Ruthenes are divided into Boiki, Lemki, Gutsuli and Ugorski Ruthenes. Of these the Boiki inhabit the central portion of the northeastern slope of the Carpathians. They wear long hair and are sometimes clean¬ shaven — in marked contrast to the Slavs of Russia proper. Their chief occupation is cattle- breeding. The Lemki live between the northern frontier of the Boiki as far as the river Poprad. They are much under the influence of the Slovaks and their dress differs considerably from that of the other Ruthene tribes. Their hair is cropped short and their faces are al¬ ways clean-shaven. The Gutsuli inhabit the southwestern region of East Galicia, West Bukowina, and southeastern Ugorsakya Rus, forming in reality a single people divided into three by political boundaries. Dwelling in re¬ mote mountain districts they alone among the Austro-Hungarian Ruthenes escaped serfdom and developed among themselves a compara¬ tively high degree of well-being. Their manner of life has fostered among them the love of arms and a fondness for finery in dress. To a greater degree the Gutsuli have preserved their ancient heritage in dress and habits than other Ruthene tribes. The Ruthenes of the Galician plain reproduce in their dress and buildings the more typical features of life in the neighboring Volhynia and Podolia provinces of Russia, whereas in Bukowina the obtrusion of Rumanian influence is marked. The Ruthe- nian peasants of Eastern Galicia live in wretched circumstances; they are mere farm¬ hands tied to the soil by a miserable pittance from the Polish gentry, who own much of the land and hold practically all administrative posts. The bulk of the Ruthenes belong to the Uniate Church, which means that they ac¬ knowledge the Pope, but retain the outward forms of the Greek Church and have married priests. Despite the published official statistics, it is the Ruthenes and not the Poles who are in the majority within Galicia.

Under the new franchise law of 1907 the Poles obtained 78 seats in the new Parliament, while the Ruthenes were given 28 seats. By a compromise effected in February 1914 the Ruthenes were guaranteed a representation of 27 per cent in the legisla¬ ture. Yet the Ruthenes were in many respects better off under Austrian than Russian rule. They were permitted their own schools (about 2,500), social and political clubs and their own language and literature. Owing to this fact much of the Ukrainian propaganda in Russia had been directed from Lemberg during recent years. The University of Lemberg, established by the Emperor Joseph II for the Ruthenians alone, was appropriated by the Poles. Pro¬ tests led to wholesale imprisonment, though latterly the number of Ruthenian professors had been increased. According to statements by the Ruthenian National Union (New York) the Ruthenes ((felt in recent years that there was hope for their cause within the Austrian monarchy.® The policy of both Russia and Austria-Hungary had long been directed to¬ ward keeping the closely-related Ruthenians and Ukrainians apart. The collapse of those empires in the course of the war brought about the formation of a new nation, the Ukraine, which included the Ruthenian section of Galicia. See Ukrainians.

RUTHENIUM, a metal of the platinum group. It has the atomic weight 101.7, and the symbol Ru. Some specimens of platinum ore contain from 3 to 6 per cent of ruthenium. It is a whitish-gray metal, having a specific gravity of 11 to 11.4 and after fusion of 12.063; is very fusible, more so than any other metal except osmium ; is scarcely attacked by nitro- muriatic acid, but is more easily oxidized by fusion with nitre, chlorate of potassium, etc. than platinum. Ruthenium forms a series of salts which are analogous to those of platinum.

RUTHERFORD, ruth'er-ferd, N. J., bor¬ ough in Bergen County, on the Erie Railroad, about nine miles from New York and seven miles southeast of Paterson. It is a residential place, occupied chiefly by business men from New York. Several electric lines connect the borough with many of the cities and boroughs in the vicinity. Its principal public buildings are churches, schools and a public library. Pop. (1920) 9,497.

RUTHERFORD, Sir Ernest, Canadian physicist: b. Nelson, New Zealand, in 1871. He was educated at Nelson College and the University of New Zealand, and at Trinity College, Cambridge, England. He was awarded the 1851 Exhibition Science Scholarship in 1895 and from that time until 1898 worked at research in the Cavendish Laboratory, Cam¬ bridge, in the latter year being appointed pro¬ fessor of physics in McGill University, Mon¬ treal. In

1903 he was elected a Fellow of the Royal Society ; in 1904 delivered the Bakerian lecture before the Royal Society and was awarded the Rumford Medal; in 1905 delivered the Silliman lectures at Yale University. Since 1907 he has been Langworthy professor and director of the physical laboratories of Man¬ chester University, England. In 1908 he was awarded the Nobel prize for chemistry and in 1914 he was knighted. He has published

RUTHERFORD, Lewis Morris, Amer¬ ican astronomer: b. Morrisania, N. Y., 25 Nov. 1816; d. Tranquility, N. J., 30 May 1892. He was graduated from Williams College in 1834, admitted to the bar in 1837, and practised law in New York until 1849. He then devoted himself to the study of science, making valuable investigations in the departments of astronomi¬ cal photography and spectral analysis. He made several instruments for use in his laboratory, among which were an abject glass, a microm¬ eter for measuring astronomical photographs and a dividing engine (q.v.) of great value. He was a trustee of Columbia University from 1858-84, when he resigned and presented his astronomical instruments to that institution where they are now mounted, and was also one of the original members of the Academy of Science.

RUTHVEN, ruth'ven (Scotch riven), Raid of. See Gowrie Conspiracy.

RUTILE, titanium oxide TiCh in tetragonal form, the chief source of titanium; also used as a gem and for coloring matter for porcelain, artificial teeth, etc. Mined in Virginia.

RUTLAND, Mass., village and township in Worcester County, 75 miles w_est of Boston,

on the Boston and Maine Railroad. It was settled in 1716, and became a town in 1722. After the surrender at Saratoga, part of Bur- goyne's troops were quartered here in 1777-78; and the town was the home of Rufus Putnam in 1781-87. The State hospital for tubercular patients is located here, as are the prison camp and hospital. There are several private sana¬ toria. Pop. 1,743.

RUTLAND, Vt., city, county-seat of Rut¬ land County; on the Otter and East creeks, and on the Rutland and Burlington and the Delaware

and Hudson railroads ; about 56 miles south-southwest of Montpelier, the State capital, and about 62 miles south by east of Burlington. It was settled in 1770 by persons from the East having been incorporated in 1761, by New Hampshire. It was chartered as a city in 1892. Rutland was in the battle region of the War of the Revolution. Two forts were erected here, as it was situated on the Great Northern Military Road. In 1781 it was made the capital of the county, and from 1784 to 1804 it was one of the State capitals. The old boundaries in¬ cluded an area of 26,000 acres with the Green Mountains on the east and the Taconic Range on the west. In 1886 the towns of Proctor and West Rutland were set off from Rutland. The new towns have independent governments, but all are united commercially. Rutland is in an agricultural region, but is well known for its extensive marble quarries and industries con¬ nected with the shipment of marble. Iron ore, fire-clay and slate are found in the vicinity. The marble works have been of considerable importance since 1830. The quarries are now in the new towns, but the industries continue as formerly. The chief industrial establish¬ ments of Rutland are manufactories, in which are made machinery for quarrying, and channel¬ ing marble, machine shops, engine and boiler works, Howe's scale factory, sash, door and blind factories, butter and cheese factory ma¬ chinery, lumber and brick yards, sugar evapo¬ rator works, creameries and flour and grist mills. The principal buildings are Mem¬ orial Hall, built in honor of the sol¬ diers of Rutland who fell in the Civil War, Baxter Memorial Hall, the government build¬ ing, the county courthouse, city-hall, house of correction, opera house, bank buildings, churches and schools. The material for the construc¬ tion of Memorial Hall was donated by the marble quarry companies and the cost addi¬ tional was $60,000. The educational institutions are a high school, Saint Joseph's Academy, pub¬ lic and parish graded schools, the Rutland Free Library and Baxter Memorial Library. The city is well equipped with banks, newspapers, and wholesale and retail business establish¬ ments. Pop. (1920) 14,954. Consult Heming¬ way, (Gazetteer of Vermont > ; Moore, (Churches of Rutland, Vermont.*

RUTLEDGE, rut'lej, Edward, American soldier and legislator : b. Charleston, S. C., 23 Nov. 1749; d. there, 23 Jan. 1800. He was ad¬ mitted to the bar in 1773, established a prac¬ tice in Charleston and in 1774 was elected to the Continental Congress. He was a signer of the Declaration of Independence in 1776 and a member of the first board of war. In this ca¬ pacity he was delegated with John Adams and Benjamin Franklin to confer with Lord Howe

on the subject of a reconciliation, but declined to treat with him excepting on the basis of American independence. As lieutenant-

colonel of the Charleston artillery he assisted in ex¬ pelling the British from Port Royal in 1779 and in 1780 was captured. After his release a year later he resided in Philadelphia, was a member of the Jacksonborough legislature in 1782, and after the war returned to Charleston where he resumed his law practice. He was for many years a member of the State legislature, was elected United States Senator in 1794 and gov¬ ernor of South Carolina in 1798. Consult McCrady, (South Carolina in the Revolution*

(1901-02).

RUTLEDGE, John, American jurist: brother of Edward Rutledge (q.v.) : b. Charles¬ ton, S. C., 1739; d. there, 23 July 1800. He stud¬ ied law in England, returned to Charleston in 1761 and there established himself in law prac¬ tice. From the outset of his career he was an ardent opponent of the oppressive laws govern¬ ing the colonies and as delegate to the congress at New York in 1765 openly advocated the united resistance of the colonies. In 1774 he was a member of the South Carolina convention which carried a resolution that South Carolina should be represented in the Continental Con¬ gress. He served as delegate to the Congress of 1775 and in 1776 was chairman of the com¬ mittee that framed the South Carolina consti¬ tution, was elected president of the State gov¬ ernment and commander-in-chief of the militia. When the British forces arrived off Cape Fear he fortified Charleston and prevented the in¬ vasion of the State. He resigned his office in 1778 through dissatisfaction with changes in the constitution, but was recalled in the follow¬ ing year and invested with dictatorial authority. He at once set about preparations for defense and held the city until 1780. He then joined the forces of General Greene and upon the recapture of Charleston resumed his duties as governor. In 1782 he was elected to the Con¬ tinental Congress, was re-elected in 1783 and in 1784 became chancellor of South Carolina. He was a member of the convention which framed the Constitution of the United States in 1787. He became chief justice of his State in 1791 and in 1795 was appointed chief justice of the Supreme Court. His mind failed in the following year and he held no further public office.

RUTTAN, Robert Fulford, Canadian chemist: b. Newburgh, Ontario, 1856. He was educated at the universities of Toronto, McGill and Berlin. From 1887 he was connected with the faculty of McGill University, occupying the chair of organic and biological chemistry there in 1902-12, since when he has been director of the department of chemistry. He has made many important contributions to the knowledge of medical chemistry. Author of c Artificial Alkaloids* ;

(Glycol Fats) ; (Physical and Chem¬ ical Constants of Margaric Palmitic and Stearic Acids*, etc.

RUWENZORI, roo-wen-zo're, a group of mountains in Africa, north of the equator, dis¬ covered by Stanley in 1888, in his great journey from the west to the east coast, when he rescued Emin Pasha. It is a chain of heights about 16,000 feet in elevation, is clad with snow and

Copyright by C. E. Anderson, Sec'y, 1901

JOHN RUTLEDGE

Chief Justice of the United States Supreme Court, 1795

traversed by large glaciers. It lies about 200 miles to the westward of the Victoria Nyanza and between the Albert Nyanza and Albert Edward Nyanza. The river Semliki, which connects the two lakes, flows in a valley near the range. The snow-line is about 13,000 feet above sea-level. These mountains are some¬ times identified with the Mountains of the Moon, spoken of by ancient writers.

RUY BLAS, by Victor Hugo, has held the stage better than any other of his dramas and has been popular in America also in the adap¬ tation (Don Cesar de BazanJ Here Hugo's dramatic theory of contrast of grave and gay, rapid alternation of tragic and grotesque, is pushed to its utmost verge. The scene is Madrid; the time 1699. Don Salluste de Bazan, scorned by Maria de Neubourg, second wife of the do-nothing King, Charles II, plots re¬ venge. Failing to enlist the aid of his scape¬ grace but chivalrous cousin, Don Cesar, he introduces his valet, Ruy Bias, to the court as his kinsman. Ruy Bias loves the queen and through her sympathetic interest gains official preferment which he uses for political and fiscal reform. The long speech, 101 lines, in which he contrasts the sordid struggle for sine¬ cures in a decaying monarchy with the glories of Charles V ranks among the most brilliant tirades of the French drama. The queen and Ruy Bias are betrayed into a compromising situation by Don Salluste, who, when Don Cesar threatens to balk his revenge, ruthlessly sacrifices his cousin to his injured vanity. Ruy Bias kills Don Salluste and then himself, consoled that his death has extorted from the queen an admission that love has overcome all prejudice of rank or station. This play, which Hugo says he began to write on 4 July 1838, has, except for the denouement, constant and perplexing likeness to Bulwer's (Lady of Lyons,) first

acted 14 Feb. 1838. The idea of a valet set by a scorned lover to woo a fine lady had been turned to dramatic account in Moliere's (Precieuses ridicules h Hugo certainly used Latouche's (La Reine d'Espagne) (1831). In his very inaccurate (V. Hugo raconte par un temoin de sa vie) he notes as sources the (Mem- oirs) of Madame d'Aulnoy (1690), (Solo Madrid es corte) (1675) and Vayrac's (Etat present d'Espagne) (1718). How carelessly he used all these is shown in detail by Morel-Fatio, (Ltudes sur l'Espagne) (Vol. I., pp. 177-244) (Ruy Blas) is translated in (Dramatic Works of Victor Hugo) (London 1913) and in (Dramas by V. Hugo) (Boston 1903). Consult Bire, (V. Hugo apres 1830) (Vol. I, pp. 236-251) and Bruner, (Studies in V. Hugo's Dramatic Char¬ acter (pp. 32-129, Boston 1908).

Benjamin W. Wells.

RUYSBROECK, rois'brek, or RUS- BROEK, roos'brok, Jan van, Dutch mystic : b. Ruysbroeck, 1293; d. Gronendal, 1381. He was educated at Brussels and for 26 years was vicar of the church of Sainte Gudule there. In 1353 he renounced the secular priesthood and entered the Augustinian monastery of Gronen¬ dal, in the forest of Soignies, where he became prior, lived a contemplative life and wrote his mystical works. His four principal works are (Die Zierde der geistlichen HochzeiD ; (Der Spiegel der SeligkeiC ; Won dem funkehiden Stein) ; and (Samuel. > They were originally

written in Dutch and are regarded by his countrymen as among the best prose of the Netherlands during the Middle Ages. Transla¬ tions were made into German, French and Latin. The four works cited were edited by Arnswaldt (1848) ; no collected edition has been made embracing his other works, which, however, are mainly restatements of the main features of the foregoing. Consult Engelhardt, { Rich¬ ard von S. Victor und Johann Ruysbrock> (1838) ; Ullmann, (Reformatoren vor der Re¬ formation.)

RUYSBROEK, Willem van (Guillaume de Rubruquis), Franciscan friar and traveler: b. Brabant, about 1215 ; d. some time after 1293. He was sent by Louis IX of France to Central Asia to bring about an alliance with Sartach, a supposed Christian prince of Kiptohak, then at war with the Saracens. In May 1253 he set out from Constantinople upon his mission with two other Fransican friars and an interpreter; crossed the steppes, now a part of the Russian province of Ekaterinoslav, reached the banks of the Don, and, after many hardships, the camp of Sartach near the Volga. Refused permission to preach Christianity in Tartary, he made his way across the Caucasus into Armenia, Persia and Asia Minor, reaching Tripoli in Syria in August 1255. An account

of the countries and peoples visited by these missionaries was writ¬ ten by Ruysbroek and sent to the French king. The best modern translation is that of Michel and Wright in Vol. IV of (Receuil de voyages et memoires de la societe de Geographie >

(1839).

RUYSDAEL, Jacob van. See Ruisdael.

RUYTER, ri'ter (Dutch, roi'ter), Michael Adriaanzoon de, Dutch admiral : b. Flushing, 24 March 1607 ; d. Syracuse, Italy, 29 April 1676. He early entered the navy and rose from cabinboy to captain (1635). In 1641 he was placed as rear-admiral in command of a fleet sent to the assistance of the Portuguese, who had thrown off the yoke of Spain, and he was afterward employed against the Barbary cor¬ sairs. In the war between the Dutch and Eng¬ lish, which was begun in 1652, Ruyter repeat¬ edly distinguished himself, especially in the battle fought in February 1653, near the mouth of the Channel, in which Blake, commanding the English, defeated Tromp and Ruyter, who commanded the Dutch. He became vice-ad¬ miral of Holland after the death of Tromp in 1653 and afterward served against the Portu¬ guese, the Swedes and the Algerines. He com¬ manded in the great battle fought in the Downs in June 1666, against Prince Rupert and the Duke of Albemarle, where he was defeated, but in the following year made his memorable expedition up the Thames, when he destroyed Upnor Castle and burned some ships at Sheer¬ ness. He was made admiral-in-chief of the Dutch fleet and commanded at the battle of Solebay (Southwold Bay) in 1672, when the Dutch were defeated by the English under the Duke of York; but in the following year gained a victorv over the combined English and French fleets. Consult

RUZSKY, rooz'ski, Nicolas Vladimiro- vitsch, Russian general : b. about 1854. He was educated at the Constantine military schools

and at the Nicolas General Staff Academy, served in the Turkish War of 1877-78, and in the Russo-Japanese War was quartermaster-general. At the outbreak of the European War Ruzsky was in command of the Russians North¬ ern Army and conducted the brilliant military operations which led to the capture of Lemburg in September 1914, a feat for which he received honors from both

England and France. He was retired because of ill-health in April 1915, but resumed his command in September. He was again relieved of his command in Decem¬ ber 1915, although he retained his position in the council of the Empire and the supreme military council. He was again in command of the Northern Army in July 1916-May 1917, and was then relieved to be reinstated by Keren¬ sky 14 Sept. 1917, as commander-in-chief of the Northern Army, taking up the difficult task of re-establishing discipline in the army under the disorganized conditions of the revolution.

RYAN, Abram Joseph, American poet and Roman Catholic clergyman: b. Norfolk, Va., 15 Aug. 1839 ; d. Louisville, Ky., 22 April 1886. He became a chaplain in the Confederate army shortly after his ordination to the priesthood, and served until the close of the war, after¬ ward engaging in clerical labors in New Or¬ leans, where he edited the Star. He subse¬ quently removed to Knoxville, Tenn., and thence to Augusta, Ga., where he established the Ban¬ ner of the South. He was later in charge of a parish in Mobile, Ala., but in 1880 went North where he engaged in lecturing and also super¬ vised the publication of his poems, subsequently returning to the South. His works include (The Conquered Banner and other •Poems) (1880) ; (Poems* (1880), etc.

RYAN, Edward George, lawyer and State judge: b. Newcastle House, near Enfield, County Meath, Ireland, 13 Nov. 1810; d. Mad¬ ison, Wis., 19 Oct. 1880. Edward George was educated at Clongowes Wood College from 1820 to 1827 and removed to New York city in 1830, where he studied law, supporting himself by teaching. Admitted to practice in 1836, he removed in the same year to Chicago, Ill. In 1839 he became the editor, in that city, of the Tribune, Democratic in politics, which ended its career in 1841. During a portion of this editorial period he was prosecuting attorney of Cook County. He removed in 1842 to Racine, Wis., and in December 1848 to Milwaukee in the same State. While residing in Racine he was in 1846 a delegate to a convention at Mad¬ ison, the capital of the then territory, which met to frame a State constitution. As a prac¬ titioner in Milwaukee he achieved great re¬ nown, especially in criminal cases and notably in 1853 in the impeachment before the State senate of Levi Hubbell, judge of the Second Judicial Circuit. On 7 June 1874 Mr. Ryan stepped from active practice at the bar to the position of chief justice of the Supreme Court. This was by executive appointment. In April 1875 he was elected by the people to the same office for a term to expire in January 1882 but did not survive to finish this term. Although a Democrat of the States' rights school, Mr. Ryan was always loyal to the government of the United States. The (

RYAN, James, American Roman Catholic bishop: b. Thurles, County Tipperary, Ireland, 1848. He came to the United States when a child, studied for the priesthood at the sem¬ inaries of Saint Thomas and Saint Joseph, Bardstown, Ky., was professor at Saint To- seph's and after ordination served on the Ken¬ tucky mission for seven years. In 1878 he was appointed to a charge at Wataga, Ill., and after¬ ward was for a time at Danville. He was rec¬ tor of Ottawa from 1881-88, when he was con¬ secrated bishop of Alton.

RYAN, John Augustine, American sociolo¬ gist and theologian : b. Vermillion, Dakota County, Minn., 25 May 1869. He received his education in the public schools of Minne¬ sota, at Saint Thomas College and Saint Paul Seminary, Saint Paul, and the Catholic Uni¬ versity, Washington, D. C. Dr. Ryan was ordained to the priesthood in 1898 and from 1902 to 1915 held the .chair of moral theology at Saint Paul Seminary, Saint Paul, Minn. Since 1915 he has been professor of moral theology and industrial ethics at the Catholic University of America, Washington, D. C. Dr. Ryan is recognized as an authority on social and labor questions, his moderation appealing effectively to all fair-minded persons. He is also very popular as a lecturer; is member of the American Economic Association, the Ameri¬ can Association for Labor Legislation, the Minnesota Academy of Social Sciences, etc. His published works are (A living Wage* (1906); (The Church and Interest Taking) ;

(Social Reform by Legislation) ; (Francisco

Ferrer: Criminal Conspirator* (1910); Al¬ leged Socialism of the Church Fathers* (1913) ; with Morris Hillquit, Socialism — Promise or Menace) (1914) ; distributive Justice) (1916) ; and numerous pamphlets on social questions.

RYAN, Patrick John, American Roman Catholic prelate : b. Cloneyharp, Ireland, 20 Feb. 1831; d. Philadelphia, Pa., 11 Feb. 1911. He studied at the Christian Brothers' school in Thurles and began his classical course at Mr. Naughton's school, parish of Rathmines. De¬ termined to become a missionary in the United States, he entered Carlow College and after receiving sub-deaconship there, came to the diocese of Saint Louis, Mo. He was ordained to the preisthood in 1853, made rector of the cathedral and subsequently appointed pastor of the Church of Saint John the Evangelist and vicar-general of the Saint Louis diocese. In 1868 Father Ryan accompanied Archbishop Ken- rick to Rome and while there preached a series of Lenten sermons that elicited great praise. On 14 April 1872, he was consecrated Titular Bishop of Tricomia and coadjutor to Archbishop

Ken- rick and on 11 Jan. 1894 was elevated to the titular archbishopric of Salamis, being trans¬ ferred the same year to the archiepiscopal see of Philadelphia. In 1883 he was among the United States prelates chosen to visit Rome in the in¬ terest of the Catholic Church in America. He gave two annual inaugural addresses at the State University of Missouri, lectured twice be¬ fore the representatives of the Missouri legisla¬ ture and delivered discourses in nearly all the large cities of the United States, notable among these lectures being that on Modern Skepticism. He published (What Catholics Do Not Be¬ lieveˆ and (The Causes of Modern Religious

Skepticism. y In 1902 President Roosevelt ap¬ pointed Archbishop Ryan a member of the Indian Commission and he was a member of the Executive Board of Catholic Indian Mis¬ sions. The archdiocese of Philadelphia, over which he so ably presided, has a Catholic population of about 475,000; more than 50Q priests; 240 churches; 117 parochial schools; 5 hospitals and 12 orphanages, besides many be¬ nevolent and educational institutions.

RYAN, Thomas Fortune, American capi¬ talist: b. Nelson County, Va., 17 Oct. 1851. He engaged in the drygoods business at Baltimore in 1868, but in 1870 went to New York and entered Wall street, becoming a member of the stock exchange in 1874, when but 23 years old. He was connected with the consolidation of the street railways and lighting systems of New York, Chicago and other cities; was interested in railroad and coal properties in Ohio and West Virginia; and in 1-905 he purchased a controlling interest in the Equitable Life As¬ surance Society of the United States. Upon his retirement in 1908 he was officer or director in more than 30 corporations. He was a sup¬ porter of the Democratic party, a liberal con¬ tributor to campaign funds, and served as a delegate to National Democratic conventions.

RYAZAN, re-a-zan'. See Riazan.

RYBINSK, rii'bensk, or RUBINSK, Rus¬ sia, in the government of Yaroslav, 52 miles northwest of Yaroslav, on the Volga, at the confluence of the Rybinsk. As the port of Petrograd, it is one of the most im¬ portant points of north central Russia. It be¬ came a centre

of traffic when the three canal systems connecting Petrograd with the Volga were opened. Its enormous business of transshipment and active trade in grain and hemp, during the season, increases the popula¬ tion by nearly 100,000 workers. Permanent pop. about 30,000.

RYDAL, England, a picturesque village in the county of Westmoreland, two miles north¬ west of Ambleside. It is situated in a narrow gorge formed by the projection of two mount¬ ains near Rydal Lake. The lake, onlv half a mile in area, contains two beautiful islets, is en¬ circled by meadows and dominated by rocky heights which add to the charm and calm beauty of the surroundings, so celebrated in English literature. Rydal Hall is a fine mansion in a park which contains many grand forest trees and a cascade immortalized in verse by Words¬ worth, who lived for some years at Town End, near by, the residence also for a time of De Quincey.

RYDBERG, riid'berg, Abraham Viktor,

Swedish writer: b. Jonkoping, 18 Dec. 1828; d. Stockholm, 21 Sept. 1895. He studied at the University of Lund, and in 1855 entered journal¬ ism. contributing to the leading paper of Gothenburg. In 1868 he was sent to an assembly of the church where he was the champion of liberal ideas and from 1870 to 1872 sat in the Riksdag. In 1884 he became professor of the history of civilization at Stockholm. He is the author of (The Pirate of the Baltic) (1857) ; (The Last of the Athenians) (1859), which has been translated into English, German and Danish; cThe Doctrine of Christ According to the

Bible) (1862) ; (Magic of the Middle Ages) (1864) ; (Romish Legends of the Apostles Peter and PauP (1871), etc. His works include studies in aesthetics, philosophy and psychology, besides poetry and a translation of Goethe's (Faust,) and he is regarded as one of the fore¬ most Swedish men of letters.

RYDE, rid, England, a watering-place in the Isle of Wight, on the Spithead shore, seven miles east-northeast of Newport. It is regularly laid out on a sloping site, and is a picturesque, elegant and well patronized summer-resort, having regular and frequent steamboat com¬ munication with Portsmouth, Portsea, Southsea, etc. Pop. about 13,000.

RYDELIUS, Andrew, Swedish prelate and scholar: b. Linkoeping, in 1671; d. 1738. He studied under John Bilberg, and became in¬ structor of philosophy and theology at Lund, where later he was appointed bishop. In 1718 he published a (Course of Philosophy) ;

his other works include ˆrammatista Philoso- phans) ; (Sententiae Philosophiae Fundament- ales) ; (Orationes AcademicaeP

RYDER, Albert Pinkham, American ar¬ tist: b. New Bedford, Mass., 19 March 1847; d. 28 March 1917. He studied under William E. Marshall and in the art schools of the National Academy of New York. He made a specialty of pastoral landscape and has been styled ((the last of the RomancistsP

RYDER, William Henry, American Uni- versalist clergyman: b. Provincetown, Mass., 13 July 1822; d. Chicago, Ill., 8 March 1888. He engaged in preaching when but 19 and at 21 be¬ came pastor of the First Universalist Society in Concord, N. H. He afterward preached at Nashua for two years and then traveled in the Holy Land. In 1850 he accepted the pastorate of the Universalist Church at Roxbury, Mass., from which he resigned in 1860 to become pastor of Saint Paul's Church, Chicago. At his death he bequeathed more than half a mil¬ lion dollars to various charitable, educational and religious organizations without regard to any difference in creed.

RYDQVIST, John Erik, Swedish author and critic : b. Gothenburg, 20 Oct. 1800 ; d. 19 Dec. 1877. He abandoned trade in 1820 to study law and ancient languages, and in 1827 received a civil appointment in the central ad¬ ministration. He became known by his literary and critical works, joined the staff of the Royal Library at Stockholm, and in 1843 was ap¬ pointed chief librarian. The same year he suc¬ ceeded Berzelius as member of the Swedish Academy. Besides numerous translations of Greek and English works into Swedish, literary and critical essays published in various collec¬ tions, notably in the (1838); (J. Olof Wallin* (1839), a biographical study; (Travels in Germany, France and Italy) ˆ 1838) ; and (The Laws of the Swedish Language) (2 vols., 1850-57),. a philological work of great value.

RYE, N. Y., a town of Westchester County, on the New York, New Haven and Hartford Railroad, eight miles northeast of New Ro-

chelle. Rye was founded in 1660, and five years later was organized as a town of Connecticut, the border line not being settled until 1700. One of Rye's interesting features is the Jay homestead, where John Jay spent his youth. Port Chester, a manufacturing village, is within the boundaries of Rye, and Rye Beach on Long Island Sound, with its

picturesque colony of bungalows, cottages and shacks, is a favorite summer resort for bathing, boating and other recreations. Pop. 5,308.

RYE (Secale cereale), a plant of the grass family, and allied to wheat, which yields the fifth most important cereal crop in the United States. It is an erect hardy annual, with slen¬ der stiff culms from four to six feet high, flat leaves, and a terminal, compact, somewhat flat¬ tened, bearded spike from four to six inches long. The spikelets are usually two-flowered, sessile, compressed, alternate, convex on one side and flat on that next the rachis. The outer glume is keeled and often carries a short awn, while the flowering glume carries a long awn. Each floret has three stamens and two very short styles. The grain is oblong, furrowed on the inside, hairy at the apex and generally free from the flowering glume and palea. The plant is not found wild, but is believed to be indigenous to the country bordering the Black and the Caspian seas. The granules of rye- starch are larger than those of wheat or bar¬ ley, some being .0016 of an inch in diameter. The form of the larger ones is that of a flat¬ tened disc with a depressed centre having cracks on its outer edge. The hilum is central with lines radiating almost to the circumference.

Rye is hardier than wheat and is usually cul¬ tivated in cool regions on sandy or light soils, and in the Eastern States on medium loams which have become physically or chemically de¬ fective and will not produce satisfactory wheat crops. It will thrive on reclaimed peaty soils. In rotation, rye occupies the same place that wheat would, and, like the latter, prefers a fine firm seed bed. For a grain crop, from one and one-quarter to two bushels per acre are usually sown in the autumn. Judicious rolling and har¬ rowing in spring is often beneficial. The crop is harvested just before it is fully ripe, a good yield varying between 15 and 30 bushels of grain and from one to two tons of straw. The straw is particularly tough and pithy and of little feeding value. It takes a long time to rot in the manure heap when used as litter, unless it is chaffed.

Two types of rye are grown, the common or autumn-sown usually grown for grain, and the spring-sown usually sown in spring, but the former may be sown in spring and the latter in autumn. Midsummer or Saint John's Day rye and giant or Tyrolese rye are spring varie¬ ties and good for forage, the latter requiring a rich soil. When grown, for forage, as a cover crop, or to be plowed in as green manure, three bushels of rye may be sown per acre at various seasons of the year, the only proviso being that there shall be sufficient moisture and warmth present to insure germination and growth. Green rye is an excellent feed, either for soiling or folding in the spring, being well

suited for cows in milk or ewes with lambs. As soon as the ear appears the straw becomes tough and woody, so that stock refuse it, hence it should be grown in small areas and a suc¬

cession put in. A bushel weighs about 56 pounds and each pound contains on an average about 21,000 kernels.

Feeding Value and Uses.— In northern Europe the grain is largely used for bread¬ making, but in this country it is chiefly em¬ ployed either in the manufacture of malt and spirituous liquors, as rye whisky, etc., or as food for stock. Holland's gin and the national Russian drink, kvass, are largely made from rye. The following table shows that rye does not differ materially from wheat in composi¬ tion, nor are its by-products chemically dissim¬ ilar from those of the wheat grain:

Average

percentage

composition

of

Water

Ash

Pro¬

tein

Crude

fibre

Nitro¬

gen-

free

extract

Ether

extract

Rye .

11.6

1.9

10.6

1.7

72.5

1.7

Rye flour. . .

13.1

0.7

6.7

0.4

78.3

0.8

Rye bran. . .

11.6

3.6

14.7

3.5

63.8

2.8

Rye shorts . .

9.3

5.9

18.0

5.1

59.9

2.8

The percentage digestibility of rye meal with ruminants is : dry matter 87, protein 84, nitro¬ gen-free extract 92, ether extract 64; while that of rye bran with pigs is : dry matter 67, pro¬ tein 66, nitrogen-free extract 75, ether extract

58.

In milling the outer portion of the rye kernel constitutes the bran, the second layer the ((mid- dlings® or ˆshorts,® and the inner portion the flour. For stock the whole kernel is ground. Rye flour is somewhat similar to corn meal as a source of protein and energy, but is more ex¬ pensive. Ground rye and rye bran are fed to cows in Denmark. Not more than three pounds daily should be given, as they are said to have a deleterious effect upon the quality of the butter. Experiments show that for pig feeding rye is of equal value with barley, and that one pound of rye is equal to six pounds of separted milk or 12 pounds of whey; that rye shorts are inferior to rye, the pork from the former being softer and showing more shrinkage. Ground rye may be safely fed to work horses to the extent of eight or 10 pounds daily, together with other feeds, as bran or oats. Owing to the hollow stems of rye holding considerable air, this crop is not making much progress for silage purposes.

Rye straw is longer and more uniform in size than that of other grains and when un¬ broken it is used for packing pottery, horse col¬ lars, mattresses, etc., and in the manufacture of a variety of articles, as paper, hats, bonnets, mats, slippers, toys and fancy articles. For such purposes it often commands a good price.

Diseases. — Ergot (Claviceps purpura) is the chief disease and is common on other gra- mineae. The elongated, curved, brownish or purplish spurs of ergot form on the head in place of a kernel and are sown with the seed unless it is carefully screened. If sown, they germinate and finally send out minute spores which, attaching themselves to the grass, live on it parasitically, send out small thread-like growths which finally reach the ovary, where they displace the rye grain and reproduce the cockspur or resting spore. Ergot should be

removed before rye is used as feed; it is dan¬ gerous to man and beast.

Statistics. — In 1910 the world's crop of rye was 1,675,898,000 bushels and the production of the United States, 33,039,000 bushels, both being almost the high record. In 1914, the last year in which complete world statistics are avail¬ able, the production was 1,596,882,000 bushels. In 1914 the leading countries growing rye were Russia, (est.) 800,000,000 bushels; Germany, 410,478,000 bushels; Austro-Hungary, 116,965,- 000 bushels. The average yield per acre for the first 15 years of the century are Germany 25.6 bushels; Austro-Hungary 18.3 bushels; United States 15.7 bushels; Russia 11.5 bushels. The United States production has been much in¬ creased. The Food Administrator's estimate of the crops of 1917 was 56,100,000 bushels, and, that 20,000,000 bushels were available for ex¬ port. The Canadian production is nearly as great. The 1917 rye harvest of the European Allies was estimated as 41,732,000 bushels. Wisconsin, Minnesota, Michigan, Pennsylvania and New York are the largest producers in America.

Samuel Fraser,

Instructor in Agronomy, Cornell University.

RYE-GRASS. See Grasses of the United States.

RYE-HOUSE PLOT, in English history a conspiracy which took place in the reign of Charles II, and which became famous from the fact that its detection involved the death of Lord William Russell, Lord Essex and Alger¬ non Sidney, who were in no way connected with it. The immediate object of the Rye- house Plot, which was contrived in 1683 among a number of obscure persons belonging to the party of which those celebrated men were among the leaders, was to assassinate the king and his brother, the Duke of York (afterward James II), as they returned from the New¬ market races. This plan was to have been exe¬ cuted at a convenient spot on the road from Newmarket to London, where there was a farm called Rye-house, belonging to one of the con¬ spirators named Rumboldt ; but the plan was frustrated by the king and his brother return¬ ing from Newmarket earlier than was expected. Soon after information of the matter was laid before one of the secretaries of state, and it was added that since this plot had been

frus¬ trated the plan for a general insurrection had been taken up by various eminent persons, among whom were those mentioned. A general insurrection had indeed been talked of, and the details and probable success of such a scheme appear to have been considered by the accused persons; but there was no evidence to show that the promoters of the wider scheme were involved in the minor plot, which was engi¬ neered, after the general insurrection had first been talked of, by a few of those already con¬ cerned in the larger plan. Yet from the way in which the revelations were made to the gov¬ ernment the two schemes were completely con¬ founded, and Russell, Essex and Sidney were arrested on the charge of treason. Essex put an end to his own life in the Tower, and Rus¬ sell and Sidney were condemned and beheaded. Lieutenant-Colonel Walcot, one of the real con¬ trivers of the Rye-house Plot, was at the same time brought to the block.

RYERSON, rl'er-son, Adolphus Egerton,

Canadian Methodist : b. Charlotteville, 24 March 1803; d. Toronto, 19 Feb. 1882. He entered the Methodist ministry in 1825 ; and became identified with the Methodist Episcopal Church of Canada at the organization of that body in 1828. In 1832 he went to England to form a connection with the parent body. In 1842 he became first president of Victoria Col¬ lege and in 1845 was appointed superintendent of education for the province of Upper Canada, a position he retained for 30 years. Besides founding and editing The Christian Guardian, he wrote (A Manual of Agricultural Chemis¬ try* ; (The Clergy Reserve Question) ; Com¬ pulsory Education.* Consult Ryerson, Egerton, (The Story of my Life) (1884).

RYEZHITZA, Russia, town in the govern¬ ment of Vitebsk, situated about 150 miles north¬ west of the town of Vitebsk and on the Petro-grad- Warsaw Railroad. It was founded by the Teutonic Knights in 1285 with the object of holding in check the turbulent Lithuanians and their neighbors the Letts. It was the object of frequent attacks by these peoples. It was called Roziten in the Livonian chronicles and in 1561 was traded to Poland. The Russians took it in 1567 and a second time 10 years later. In 1656-60 it was captured by the Swedes and its fortifications razed. In 1773 it became part of the Russian Empire. It enjoyed increased prosperity in the 19th century and in the same period its population grew to about 12,000.

RYGH, rug, Oluf, Norwegian archaeolo¬ gist : b. Stiklestad, 1833 ; d. 1899. He received his education at Trondhjem and at the Univer¬ sity of Christiania, where he was for 40 }^ears successively director of antiquities, professor of Scandinavian archaeology and professor of

history. His great work, however, was in re¬ ducing to system the archaeology of Norway. His best-known works are (Om den aeldre Jer- nalder i Norge) (1869; Fr. translation, 1869); (Om den yngre Jernalder i Norge) (1877) ; (Norske Oldsager* (1880-85) ; (Norske Gaard- navne) (15 vols., 1897 et seq.).

RYLAND, Henry, English artist : b. Big¬ gleswade, Bedfordshire. He was trained in art at the South Kensington schools and worked at Paris in the studio of Benjamin Constant, and at Julien's Academy under Boulanger and Lefebvre. His practical professional life was begun by him as a designer of stained glass and he contributed to the English Illustrated Magazine in its early days. His first work as a painter was exhibited at the Grosvenor Gal¬ lery, but he has since exhibited, chiefly water- colors, at the other exhibitions of London, and many of his pictures have been engraved.

RYLAND, William Wynne, English en¬ graver: b. London, July 1738; executed Ty¬ burn, 29 Aug. 1783. He acquired his profes¬ sional training from Ravenet and at Paris from Boucher and J. P. le Bas. He spent several years on the Continent and after his return to his native country executed portraits of Lord Bute, George III, Queen Charlotte and the Princess Royal with such success that he was given the official post of engraver to the king. He became a member of the Society of Artists in 1766 and was a frequent exhibitor. In his later years he abandoned line-engraving for the so-called ˆchalk-engraving® of stippled dots. In

the latter style he left copies of several old masters. He was a man of extravagant habits and after a series of troubles with his creditors was convicted of forgery, then a capital offense, and executed.

RYLANDS, John, English manufacturer: b. Saint Helens, Lancashire, 7 Feb. 1801 ; d. Stretford, 11 Dec. 1888. He received his edu¬ cation at the Saint Helens grammar school. In co-operation with his father and elder broth¬ ers, he founded at Wigan in 1819 the'cotton and linen manufacturing firm of Rylands and Sons. As the business expanded, bleach-works and dye-works were added to their plant and a coal mine was discovered beneath the firm's prop¬ erty, which added greatly to their wealth. About 1826 several spinning mills were added at Bolton and other centres. In 1847 John be¬ came sole conductor of the business and in 1873 it became a limited liability company. The

con¬ cern is now one of the largest in Great Britain. Rylands helped finance the Manchester Ship Canal and was active in philanthropy. The John Rylands Library at Manchester was erected as a permanent memorial by his widow in 1899.

RYLE, rll, John Charles, English Anglican bishop: b. Macclesfield, Cheshire, 10 May 1816; d. Lowestoft, Suffolk, 10 June 1900. He was educated at Oxford, took orders in the English Church, and was successively curate at Ex- bury, rector of Saint Thomas', Winchester (1843), of Helmingham, Suffolk (1844) and vicar of Stadbroke, Suffolk (1861). He was appointed honorary canon of Norwich, in 1872, and in 1880 was nominated dean of Salisbury, but before he had taken possession of this post was made bishop of the newly formed see of Liverpool. He was one of the most prominent members of the Evangelical party, and besides publishing numberless tracts which were widely popular, was author of such books as (Coming Events and Present Duties) (1867) ; Eishops and Clergy of Other Days) (1868) ; (The Christian Leaders of the Last Century > (1869) ; Expository Thoughts on the Gospels> (1856-

69).

RYLSK, Russia, town in the government of Kursk, 70 miles southwest of the town of Kursk, on a branch of the Kursk-Kiev Railway. Its industrial establishments comprise oil works, blast furnaces, soap and tallow factories, etc. There is a large trade in corn, hemp and agri¬ cultural implements. The town was founded in the 9th century and has a 15th century cathe¬ dral. Pop. 12,000.

RYMER, Thomas, English critic and anti • quary: b. Yafforth, Yorkshire, 1641; d. London, 14 Dec. 1713. He studied at Cambridge, subse¬ quently kept terms at Gray's Inn, and was called to the bar in 1673. In 1678 he published Edgar, a Tragedy. } In 1692 he succeeded Shadwell asˆ historiographer royal, and was entrusted with the preparation of a collection of public treaties, which he began to publish in 1704, under the title of Eoedera, Conventiones, et cujusc.unque Generis Acta publica, inter Reges Angliae et alios PrincipesP Of this valuable and learned work he completed 15 volumes, and five more were afterward added by Robert Sanderson. The publication of the whole work was completed in 1735.

RYMER, Thomas, of Ercildoune. See Rhymer, Thomas the.

RYOTWAR, ri'ot-war, in India, the lease of land by the government officers to the ryots or native cultivators at a fixed rent, a practice

chiefly prevalent in the Madras Presidency.

RYSBRACK, riis'brak, John Michael,

German sculptor: b. Antwerp, 1693 or 1694; d. 8 Jan. 1770. He went to England in 1720 and made a reputation by the exercise of his art, of which Westminster Abbey and several cathe¬ dral churches contain examples, among which may be mentioned the monuments of Sir Isaac Newton and the Duke of Marlborough. He also produced the equestrian statue of William III, at Bristol and the statue of Locke at Oxford.

RYSWICK, riz'wik (RIJSWIJK), Neth¬ erlands, a village between Delft and The Hague, famous for the celebrated treaty concluded there in September 1697, and known as the Eeace of Ryswickp signed between France, England, Spain, Holland and the Empire. It terminated a bloody nine years' war of the Grand Alliance against France. Louis XIV re¬ linquished his recent conquests except Strass- burg, which was taken in 1861 ; he abandoned Lorraine and Luxemburg, acknowledged the independence of Holland, repudiated the Stuarts and recognized the Protestant succession in England (William III).

RYSWICK, Peace of. See Ryswick.

RZHEV, rzhef, Russia, in the Tver gov¬ ernment, occupies the heights on both banks of the Volga. It is a railway terminus, about 90 miles southwest of Tver and the centre of a great transit trade between the provinces of the lower Volga and the ports of Petrograd and Riga.

s

Sthe nineteenth letter and fifteenth conso¬ nant of the English and several other alphabets, is classed as a sibilant or hissing letter. The sibilant is produced by emission of the breath while the end of the tongue is brought close to the front palate just behind the gums; this is the hard open sound ; the corresponding soft open sound is represented in the alphabet by z, but in practice is often represented by s. The form S is the Semitic shin , and the ancient Greek character r (sigma) with its angles rounded ; in the existing Greek alphabet the s is represented by 2. In some English words s is silent : island, aisle. The final th of verbs has changed to s because of the nearness of sound of j to th: loveth, loves ; hath, has. There are several words in English — and the like can be said of Greek — which, beginning with m or p or l, take on an initial s ; melt, smelt; pike, spike; lick, slick; Gr. mikros, smikros. Com¬ pare Ger. niesen; Eng. sneeze. The palatali¬

zation which is so characteristic of English and the romance languages has had the effect of generally giving to c or sc before e, i or y the sound of s. Sometimes the sound of s is changed to that of st ; the verb hoise becomes hoist, whiles becomes whilst ; and there is the mispronunciation of once, onst ; and the plural of mouse is mice. The digraph sh stands usu¬ ally for the ancient sc (sk) : Old Eng. sceal, shall, fisc, fish. It is pronounced with the edges of the tongue appressed to the teeth, but with the centre free; .? alone represents this sound in sure, sugar, issue, etc. This sound is a surd ; s represents its sonant in osier, measure, etc. ; sh is replaced by ch in machine; ci in social; sci in conscience ; ti in martial, all of which words are of Latin or French extraction. S stands for south, second, sulphur, shilling , and in combinations for science or society. SS. stands for steamship. See Alphabet.

S. P. Q. R., the initial letters of Senatus Populusque Romanus (the Senate and the Ro¬ man people), which expressed the political char¬ acter of the Latin nation. These initials were carried as a battle standard by the Roman armies.

SS., commonly used at the head of affidavits and other legal documents, follows the brace which includes the state and county names where the paper is witnessed or the action at law laid. On legal documents SS. or ss. (sci¬ licet), it is said, signifies ((to wit,® <(namely.® ((SS® is also <(a symbol of unknown antiquity worn on the collars of the superior judges and lord mayors of England; formerly by persons attached to the royal household and others. It was assumed by certain classes, never bestowed

and had no connection with heraldry.® — Storemouth.

From being an ornament of royalty, sup¬ posed originally to signify ˆsovereignty,® it became the badge of followers of the house of Lancaster and passed unofficially to persons in au¬ thority, like magistrates, mayors and justices; and from being used upon the collar came to be used on official writings to indicate the authority of the magistrate, mayor or judge who gave the same.

The mysterious <(ss® is then, we may con¬ clude, a symbol of official position. Whatever the origin of the symbol, the ((esses® is an orna¬ ment, passed into a sign of judicial or magis* terial authority, and as such follows the name of the State or county where a document is witnessed or an action at law is laid.

SA DE MIRANDA, Francisco de, fran- thes'ko da sa da me-ran'da,

Portuguese poet : b. Coimbra, Portugal, 27 Oct. 1485; d. there, 15 March 1558. He wrote much in Spanish, tak¬ ing for his models Dante and Petrarch, but in sentiment remained entirely loyal to his native country. His fame rests chiefly upon his poetical epistles and eclogues, though his entire work is excellent and characterized by sincerity and love of natural beauty. He is ranked as one of the six greatest Portuguese poets. An edition of his work edited by Caroline Michaelis de Vasconcellos contains 189 of his pieces, 74 of which are in Castilian.

SAADJA GAON, sa-ad'yiL ga-on' (Saadja ben Joseph, Arab Said), Jewish Rabbin; b. Fayum, the Biblical Pithom, Egypt, 892; d. Babylonia 941. In 828 he was appointed Gaon or principal of the Jewish Academy at Sura, near Babylon, into which dwindling institution his zeal and learning infused new life. His acquirements were many and varied, living in a time when philosophy and reason were in danger of usurping the authority hitherto wielded by tradition, to which end the Karaites particularly contributed. It was the work of Saadja to discover a common ground for the maintenance of Jewish dogma side by side with philosophical theory. This was the object of his great work, written in Arabic, (Emunot w'deot) ((Faith and Ethics*) which was trans¬ lated into Hebrew by Juda ibn Tibbon (1160) and into German by Fiirst (1845). Saadja wrote a commentary on some of the books of the Old Testament, treatises on grammar and hymns for the synagogue. On the 1000th anniversary of his birth a complete edition of his works was published by Joseph Derenbourg. Consult Gratz, (Geschichte der Jiiden* (1870) ; Guttmann, (Die Religionsphilosophie des Saadja* (1882).

SAALE, za'le, Germany, the name of sev¬ eral rivers, flowing between Baireuth and Hof, in the northeast of Bavaria. The most import¬ ant oi these is the river rising in the north side of the Fichtelgebirge at an altitude of 2,390 feet. It is navigable from Naumberg and passes Kahla, Jena, Kainburg — it becomes very cir¬ cuitous passing Merseburg and Halle, and finally connects with the Elbe, near Leipzig, by canal. It flows through a fertile and picturesque valley for 200 miles, its romantic heights crowned by many castles. It is of great

commercial value, having a wide and deep channel in the greater part of its length.

SAARBRUCKEN, zar'bruk-en, or SANKT- JOHANN SAARBRUCKEN, Germany, in the Rhine province, Prussia, is situated on the Saar, 39 miles southeast of Treves. Its sister- town across the river gives the town the double name. It is an important industrial centre, is well built, and has a castle. There is a cele¬ brated mining academy and a monument to Bismarck. The principal industries are wool¬ spinning, brewing and the manufacture of tobacco, chemicals, tin and stoneware. Trade is mainly dependent on the coal mines, the glass and iron works of the district. In 1870 the French and Prussian forces fought here the first engagement of the FrancoJGerman War resulting in a partial victory for the French, which the Germans retrieved four days later by their first victory at Spicheren in the vicinity. Pop., including Sankt- Johann about 106,000.

SAB, or ESPATOLINO. of

Gertrudis Gomez de Avellaneda, a Cuban who lived the greater part of her life in Spain, was written in 1844. Espatolino is a famous Italian bandit who wreaks vengeance on society by means of robbery and murder and who is captured only through treachery. The novel was at one time very popular during the vogue of Scott* Dumas, Hugo, and Georges Sand, all of whom influenced Senora Avellaneda. Es¬ patolino is characteristic of her work which is passionate and lyrical. She was a gifted poet and rises to eloquent heights in Espatolino's tirades against the established order of things social. Her work, however, has waned in popularity since the passage of time has ameliorated conditions in prison life and methods of punishment of criminals. Espa¬ tolino is a combination of Jean Valiean and Robin Hood. He is not a vulgar fugitive from justice; he has a noble, generous soul and in true Romanticist fashion strikes back hard at his pursuers. Annunziata is a passionately de¬ voted wife who consecrates her life to the uplift of her husband, but who fails through the treacherous machinery of man-made justice and is driven insane. may be found in the fourth volume of the author's Obras Literarias , Rivadeneyra, Madrid 1870. For a full critical estimate of (Espatolino, > consult (Biografia de G. G. de Avellaneda) by Aurelia Castillo de Gonzalez.

Samuel M. Wax man.

SABA, sa'ba, one of the Leeward Islands, Dutch West Indies, area five square miles. It is high and rocky, rising abruptly from the sea to a

height of nearly 3,000 feet. A small part is under cultivation ; the chief products are tropical fruits and vegetables, especially cab¬

bages and cotton. Fishing is also an important industry, and fishing boats are built on the island. The inhabitants are the descendants of Dutch and Scandinavian pirates who occupied the island in the 17th century. The island nominally belongs to Holland, but the people are practically independent, being exempt from taxes and electing their own governor. Pop. about 3,000.

SABADILLA, or CEVADILLA, the phar¬ maceutical term for seeds of a liliaceous plant (Sclicenocaulon officinale), growing in Central America, with a bulbous root, grass-like leaves and a flower-stalk some six feet in height. The papery, tri-capsular fruits contain a few pointed, wrinkled, blackish seeds, persistently acrid and sternutatory, a powerful irritant and poisonous. They are employed for preparing veratrine, which, in the form of a tincture or ointment, is used as an external application for neuralgia and rheumatism, but is likely to prove poisonous if the skin be broken, thus permitting absorp¬ tion. Sabadilla has also been given as a vermifuge but is dangerous, and is used for killing vermin.

ˆ SABiEANISM, sa-be'an-izm, or SABIAN- ISM, a religion whose believers were once numerous in Arabia, Syria and Mesopotamia, which while it recognized only one supreme be¬ ing, also worshipped, or paid high reverence to angels, or inferior divinities, supposed k) reside in the stars. This part of the Sabaean creed virtually amounted in practice to star-worship.

SABzEANS, an ancient people of Arabia, information of whom we have nothing ex¬ cept the mention made of them in the Bible and other contemporary literature to which must be added archaeological remains of vari¬ ous kinds including coins, carvings, inscrip¬ tions and buildings, generally in a very ruined condition. The Sabaean clans seem to have been quite extensive and to have been of consider¬ able importance and influence in their day. They extended from southern into northern Arabia. The Queen of Sheba, who visited Solomon, is said to have belonged to the Sa- baeans ; and the traditions which long told of her wealth and power, whether based on legend or history, or both, are but a reflection of the popular estimation of her people. Much specu¬ lation has been indulged in as to the real mean¬ ing of the visit of the Queen of Sheba to the Courts of Solomon ; and some critics have seen in the event a political alliance of two im¬ portant peoples against their common enemv the Minaeans. All the Biblical references to the Sabaeans convey ideas and pictures of their

greatness and their commercial activity. There are indications that already in the 8th century b.c., the Sabaeans had assumed active commer¬ cial and other relations with Assyria and had taken possession of territory in northern Ara¬ bia. From inscriptions and other archaeologi¬ cal remains the names of 15 Sabaean priest-kings ruling between 750 and 525 b.c., have been re¬ covered; and from this later date there are more or less accurate lists of other rulers. The Sabaeans in southern Arabia seem to have been known, at a comparatively early date, by both Greeks and Romans as the people of Yemen. In 24 b.c., when the breath of Roman domina¬ tion was in the air, an armed expedition under

JEYms Gallus was sent to subdue the southern Sabaeans. But here the Romans met with de¬ feat. That the Sabaeans were well known to the Latin world and that there was considerable interest in them in Rome, there is evidence in the fact that Pliny describes them at some length. Powerful though they once were the Sabaeans finally became subject to the Himya- rites, who seem to have retained dominion over them until 525 a.d., when they were subdued by the Aksumites, who were finally expelled from the country in 570. But the independence of the Sabaeans did not long continue for it was soon swept away by the wave of Moham¬ medan conquest. No doubt further excava¬ tions and unearthed records will rather in¬ crease than diminish the importance of the Sabaeans in the history of civilization in west¬ ern Asia during from 800 to 1,000 years imme¬ diately preceding the Christian era. That they carried on extensive commerce with all the surrounding nations and extended their trade relations into Egypt and India there is plenty of evidence. A vast amount of material rela¬ tive to Sabaean customs, life and history has been collected. This includes over 1,000 in¬ scriptions made by Glaser alone. But the work of translation and publication has lagged far behind that of excavation. Therefore much new light may be expected to be shed soon on the history, customs and mythology of the ancient Sabaeans.

<(Sabaeans® is also the name given to a modern eastern sect, the <(Christians of Saint John,® because they deny the Messiaship of Jesus and exalt John the Baptist.

The ancient star-worshippers of Western Asia were also called Sabaeans (from tseba, the host, that is of heaven, like stars).

The name was also applied to the descendants of Saba (Seba) who, tradition says, settled in Ethiopia.

To the Jews, the Sabaeans, even in the time of Christ, were fta people afar off® or of (

SABAISM, an ancient natural religion that extended through the countries of the Assy¬ rian and Medo-Persian empires as far as Asia Minor, between the Caspian Sea, the Euxine and the Mediterranean, from the Armenian Mountains as far as the banks of the Nile and southern Arabia. It assumed different forms in different countries, being sometimes more sensual, sometimes more spiritual. The objects of worship were the sun, the moon and the planets, or rather the planetary spirits of which the planets were believed to be the frame or the body. The worship of the sun (a female deity) was especially cultivated in Babylon and Phoenicia. The worshippers of the stars gen¬ erally ascribed to them a great influence upon and a knowledge of terrestrial affairs; and astrology and the casting of nativities were, therefore, the natural result of Sabaism. The astrological system was most largely developed by the Egyptians, while Parseeism was the purest and most perfect form of Sabaism. In

the Koran the star worship of ancient Arabia is designated by the name Sabaism. In the town of Haran, in Mesopotamia, a kind of Sabaism maintained itself, surrounded on alt sides by Christianity, until the Middle Ages. One sect of Sabaeans believed in the migration of the soul and in great world-periods, con¬ stantly renewed in an everlasting revolution. Oracles, sacrifices and massive temples were features of Sabaism. Incense was offered to the gods and used to purify the temples. The priesthood formed a powerful and well-organ¬ ized body to whom tithes were paid in the name of the gods. There was generally a temple con¬ nected with each Sabaean fortress. The Sabae¬ ans, who were a people skilled in the mechanical arts, great traders and wealthy, made hand¬ some gold and silver statues of their chief gods. Consult Glaser, E., (Skizze der Ges¬ chichte und Geographic Arabiens) (Vienna 1889) ; (Altjemenische Nachrichten) (Vol. I., 1906) ; Hommel, (Aufsatze und Abhand- lungeiP (1892) ; Mordtmann, J. H., (Musea Imperial Ottoman5 (Constantinople 1895) ; Nielsen, D., (Die Altarabische Mondreligion5 (1904) ; (Neue Katabanische Inschriften5 (1906) ; (Der Sudarabischer Gott Ilmekah5 (1909); Weber, O., (Gottes Symbole and Sii- darabischen Denkmaler5 (in the (Hilprecht- Buch,> 1909).

SABAL, or CABBAGE PALMETTO, the

most northern arborescent palm in the world. It is a tree attaining 80 feet in height. Until it is from 10 to 20 feet high, its straight, ro¬ bust stem is surrounded by the dry fibrous sheaths and the stubs of petioles of leaves pro¬ ject like spines and give a very picturesque and characteristic appearance. The leaves, massed at the top of the trunk are cordate, or fan-shaped, narrowly pinnatifid, each division cleft at its apex and recurved at the summit. The terminal bud, by which growth is continued, or <(cabbage,® is a favorite delicacy with the ne¬ groes, who cut it out of the young and healthy trees, — thereby causing the ultimate death of the palmetto — and cook it as a vegetable. Many palmettoes are killed by the removal of the tops of the young trees. These tops are sent to factories, where they are trimmed down to a disc some eight inches thick, the soft central parts are cut out and the disc is then boiled to loosen the fibres of the sheaths and petioles, which are made into scrubbing brushes. These buds for brushes are worth only about six or seven cents apiece and yet the trees are being exterminated for so slight returns. The mature leaves are used for thatching and the trunks resist teredos to such an extent that they are valuable for submarine pilings.

This palmetto has always been interwoven with the history of South Carolina, the Pal¬ metto State.® A fortification, or stockade, on Sullivan's Island in Charleston Harbor, 1776, was composed of earth and palmetto logs and succeeded in repulsing the attacking British fleet under Sir Peter Parker, whose shot had practically no effect on the wall, for they could not split the spongy trunks, but were imbedded in them. Therefore,, in memory of this event, the palmetto tree appeared on the seal of South Carolina, over an uprooted branchless oak-tree representing the oaken ships of England; on a flag adopted after the Ordinance of Secession

(1861) was passed; and also on a medal. At the signing of the secession ordinance, palmetto trees flanked the platform and at the back was the banner of the convention, bearing among other curious devices, a most unnatural pal¬ metto, with a gigantic rattlesnake wound about its trunk. Cockades, rosettes of blue ribbon with a palmetto imprinted on a button in the centre, were worn by Charlestonians in 1860-61.

SABALO, a name of the tarpon (q.v.), fur¬ ther known as savalle, savanilla, grande ecaille, silver-king, etc. ; also of the Hawaiian milk-fish (Chanos chanos).

SABAOTH, sab'a-oth, or sa-ba'oth, Lord God of, a term used in the Scripture, meaning <(Lord God of Hosts.® It has no connection with the word Sabbath.

SABATIER, sa-ba-te-a, Paul, French theo¬ logian and historian : b. Saint-Michel-de- Chabrillanoux, Ardeche, 3 Aug. 1858. He was educated in the theological faculty of Paris, and in 1885 became vicar of the French parish of Saint Nicholas at Strassburg. The German government offered him a superior appointment, involving his becoming a German citizen ; he re¬ quested to be allowed to retain his post as vicar, but the request was viewed as a political mani¬ festation, and he was banished from the country. For a brief time he was pastor of Saint-Cierge- la-Serre; then he withdrew from the ministry to devote himself wholly to historical studies. His chief work is (La Vie de Saint Frangois d'Assise> (1893), based largely on previously unutilized documents discovered by him in various Italian archives. Within a year from the appearance of the first French edition, edi¬ tions had appeared in almost all Continental languages, including Swedish and Polish. The Russian version was prepared under the direc¬ tion of Tolstoi. Sabatier published also (La Didache ou l'enseignement des douze Apotres) (1885), and editions of the (Speculum Perfec¬ tionˆ by Leo of Assisi (1898; translated into English by S. Evans as (Saint Francis of Assisi, the Mirror of Perfection > (1898), and of the (1911). Consult article by Rawnsley in Contemporary Review, Vol. 74, pp. 505-518 (1898).

SABAZIUS, sa-ba'zhi-us, a Phrygian divin¬ ity, identified by the Greeks in part with Zeus and in part with Dionysus. His symbol was a serpent. His worship extended to Greece, and was found also in Italy, especially in late pagan times. In (De Corona* Demosthenes describes various ceremonies connected with the mysteries of this deity, and he was said to have been the first to employ oxen for plowing.

SABBATAI ZEVI, sab-ba-ti' ze-ve', whose name is also spelled <(Sabtai Zefi® and Sab- bathais Zevi, a pretended Messiah : b. Smyrna, 1626; d. 1676. He was a man of great learning and magnetic presence, and he led thousands of followers, mainly in Smyrna, Salonica, Alex¬ andria and Jerusalem, to believe in him as the Messiah. In 1664 he ha

batai and six disciples, clad in white raiments, with garlands on their

heads. Having excited serious alarm at Constantinople, he was appre¬ hended at Smyrna, and terrified into a recanta¬ tion of his mission. He was said to have de¬ clared that his sole object had been to embrace Islam and to carry over all the Jews with him. The sultan declared himself satisfied and honored him with the title of an effendi, giving him an honorary post at the same time. He again aroused the jealousy of the Turks and was either poisoned in prison or publicly executed.

SABBATARIAN CONTROVERSY, the

dispute in various forms between those who .urge and those who oppose a rigid observance of Sunday. It has been going on from the time of King James I, of England, who favored Sunday sports, and hereby offended many of his subjects, and it has in late years included proposals to throw open to the public museums, libraries and galleries and other places of rec¬ reation and instruction, on the first day of the week. Most of these changes have been gen¬ erally adopted.

SABBATARIANS, a term applied to those

who urge rigid observance of Sunday. It was applied also in earlier times to the sect now known as Seventh Day Baptists, who observe Saturday for Sunday, and who, for that reason, are permitted in Rhode Island, where they are comparatively numerous, to work on Sunday.

SABBATH, the ancient Hebrews' weekly day of rest. In Hebrew the word means to cease, and the expression of Josephus (Apion ii, 2), who explains it as meaning <(a rest from all labor,® is rather to be looked upon as a com¬ mentary than as a derivation etymologically correct.

The Sabbath was the seventh day of the Hebrew week and lasted from sunset on Friday to sunset on Saturday. It was celebrated as a holy day; a day of rest and rejoicing; by ceas¬ ing from all labor, and by causing servants, strangers and cattle to cease also. Plants even were to rest ; they were neither to be sown nor reaped on that day. The services of priests and Levites in and about the tabernacle and temple were, however, to be performed through the Sabbath-day. Circumcision, too, could take place on the Sabbath, when it fell on the eighth day after the birth of a male child.

Profanation of the Sabbath was punished by stoning to death. It was not until after the exile that the character of the work by which the Sabbath could be profaned was strictly de¬ fined. In the law only one act of labor was specifically prohibited, that of lighting a fire for the

purpose of cooking. According to Josephus armies never proceeded on their march on the Sabbath. The Pharisees forbade even the plucking of grains of corn on that day; the healing of a sick man, or the walking of a cured patient bearing his bed. According to the Mishna even a broken bone was not to be set, nor dislocations poulticed or bound up on that day.

Origin of the Sabbath.— The Sabbath ap¬ pears to have been an institution of religion long prior to Moses. It is sometimes said that it was borrowed by him from older nations, such as the Egyptians. Such Latin writers as

Seneca and Ovid give intimations that the ven¬ eration for the seventh day had found some favor among the early Romans. It seems more natural to suppose that it had come down with the old traditions of theocratic religion which are found embalmed in the first chapter of Genesis. The poem of the creation, in which God is related to have created the world in six days and rested on the seventh day, embodies a tradition much earlier than the period of Mosaic legislation. There are several intima¬ tions in the patriarchal age that the followers of Jehovah, such as Abraham and Isaac, chose certain times for rest, meditation, prayer and sacrifice to God. In after times it would al¬ most seem as if the poem or hymn of the crea¬ tion was used as a special part of Sabbath-day devotions. On that day the people were called to reflect upon the fact that the whole universe, including themselves, had an ˆorigin in one per¬ sonal and supreme Being; that He had exerted His Omnipotence for a definite period and then had ceased from His work. They were con¬ stantly to remind themselves of the work of God, once for all completed, by their own six days' round of labor; and as God has rested from His work so were they to rest from theirs and tOxturn their thoughts toward Jehovah <(who had done so great things for them.®

Mosaic Ordinances of the Sabbath. — The scope and meaning of the Sabbath-day was very much extended and amplified bv the provisions of the law as contained in the Hexateuch. It was made to be a day on which not only the finished task of creation was to be commemo¬ rated, but on which the great providential deliv¬ erances of the children of Israel were likewise to be recalled. But first of all the command is given by the law in various forms of speech, but with the same intent throughout the books of the law, Exodus, Deuteronomy

and Leviticus, to remember the seventh day, the Sabbath, to keep it holy; most specifically in Lev. xxiii, 3: ((Six days shall work be done: but the seventh day is the Sabbath of rest, an holy convocation ; ye shall do no work therein : it is the Sabbath of the Lord in all your dwelling.®

First of all there are three specifications as to the manner in which the week is to be spent: (1) by labor — <(Six days shalt thou labor, and do all thy work:® (Ex. xx, 9) ; (2) by rest on the seventh day; on this day the people are ordered to rest, literally to take breath, then are enumerated in detail those who are enjoined from work: ((Thou, nor thy son, nor thy daugh¬ ter, thy manservant, nor thy maidservant, nor thy cattle, nor the stranger that is within thy gates.® The penalty of death is threatened against all who shall disobey this command. The reasons of this command are given: (1) as a counsel of mercy — ((Six days thou shalt do thy work, and on the seventh day thou shalt rest, that thine ox and thine ass may rest, and the son of thine handmaid, and the stranger, may be refreshed® (Ex. xxiii, 12) ; (2) as a commemoration of the deliverance from Egypt — (

Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day: wherefore the Lord blessed the Sabbath day, and hallowed it® (Ex. xx, 11) ; (4) as a sign of the covenant, just as circumcision was the sign of the Abrahamic covenant, and the rainbow the sign of the covenant with Noah — ((Speak thou also unto the children of Israel saying: Verily my Sabbaths ye shall keep, for it is a sign between me and you throughout your generations, that ye may know that I am the Lord that doth sanctify you. . . . It is a

sign between me and the children of Israel for ever : for in six days the Lord made heaven and earth, and on the seventh day He rested, and was refreshed® (Ex. xxxi, 13, 17).

The Jews of to-day who profess to keep up the tradition of their fathers still keep the Sab¬ bath as a joyful festival. The Sabbath is held from Friday evening to Saturday evening. It is among some of them considered a pious ob¬ servance to begin the celebration half an hour before Friday's sunset and to continue it half an hour after sunset on Saturday for the benefit of the souls of those who are in torment, for they believe that the damned are allowed a mitigation of their suffering during the feast. On Friday afternoon all the food for the fol¬ lowing day is prepared, and their festal array is laid out for the Sabbath. Some Jews have special raiment which they wear only on that day; on the morning of which the Sabbath lamp is lit and the Sabbath bread laid on the table. The master of the house at the close

of .the evening meal blesses the wine and passes it around. They eat three meals on the Sabbath- day and they have a maxim that it is good to honor the day in the body, in dress, in eating and in drinking. Consult Abrahams, Israel, (Jewish Life in the Middle Ages) (London 1896) ; Floody, R. J., Scientific Basis of Sab¬ bath and Sunday* (2d ed., Boston 1906) ; Tastrow, Morris, (Hebrew and Babylonian Traditions* (New York 1914) ; Lotz, Wilhelm, (Quaestiones de historia Sabbati* (Leipzig

1883).

SABBATIA, a genus of Gentianacece, often growing in sand or salt marshes. These plants have verticillate leaves, handsome terminal flowers, with white or pink rotate corollas 5 to 12-merous ; 4 to 12 stamens with thread-like fila¬ ments and two-cleft styles, capsules more or less globose, coriaceous and containing many small reticulated seeds. Several species have a tonic, although bitter, juice, and are used as febrifuges. Although named in honor of an , early Italian botanist, Sabbati, the genus is said to be so called because the Pilgrim Fathers discovered the local S. stellaris on a Sabbath. This charming species, called the marsh pink, or Rose of Plymouth, bears a very delicate pink flower, with a star-shaped yellowish eye.

SABBATICAL YEAR, the seventh year which the law of Moses provided should be a year of rest for the land (Ex. xxiii, 10, 11; Lev. xxv, 1-7). The land was not to be sown and that which grew of its own accord was not to be reaped, but to be left for the poor to eat. Vineyards and oliveyards were also to be left uncultivated, and their produce ungathered; but the people were allowed to fish and hunt, and attend to their bees and flocks, and a triple produce was promised for every sixth year to

make up for the deficiency of the seventh. The sabbatical year was also to be a year of release for Jewish debtors (Deut. xv, 1-6), but those who were able to lend were strictly enjoined not to refuse loans to poor and needy persons be¬ cause the year of release was at hand (Deut. xv, 7-11). In this year also the law was to be read solemnly to all the people assembled at the feast of Tabernacles (Deut. xxxi, 10). This institution seems to have been almost entirely ignored during the period which preceded the captivity, and in 2 Chron. xxxvi, 21, the time of the captivity is represented as one in which the land was

enabled, by the will of God, to enjoy the sabbaths or years of rest that the Israelites had omitted to allow it. After the captivity Nehemiah sought to secure the bet¬ ter observance of the septennial sabbath, as he did that of the weekly sabbath (Neh. x, 31), and he seems to have had some success in the former as well as in the latter effort. The historic fact that Alexander the Great remitted the Jewish tribute in the seventh year because the Jews were debarred by their religion from employing the means of raising it, shows that it was observed a hundred years after the time of Nehemiah.

SABBATION, sab-ba'te-on, or SAMBAT- YON, sam-ba'te-on, Syria, a legendary river in Hebrew history, mentioned in the Midrash Gen. Rabba, lxxiii, in the Palestinian Talmud, by Josephus, as ((the Sabbatic river,® and by Pliny as <(a river that ran for six days and rested on the seventh,® whence its name, derived from the Hebrew Shabbdth — Sabbath. It has been assumed to be the stream issuing from Fauwar ed-Deir, an intermittent spring in Lebanon. Mohammedans identify it with the Nahr-al- Arus in the neighborhood described by Josephus, which in modern times flows every third day. The river came into prominence in the 9th cen¬ tury owing to the story of the (Children of Moses, 5 by Eldad the Danite, who describes the territory of the site of the exile of the Ten Tribes as surrounded by <(this river of sand and stone which rolls during six work¬ ing days and rests on the Sabbath day. As soon as the Sabbath begins, fire surrounds the river, and the flames remain until the next evening, when the Sabbath ends.® The legend with variants has been repeated by different authors in succeeding centuries. See Lost Ten Tribes, The.

SABELLA, a genus of annelids dwelling on sandy shores in tubes formed solely of sand, the particles of which are glued together by means of a natural cement secreted by the worms, and thus form a smooth regular tube, presenting a striking contrast in its uniformity to the rougher dwelling-tubes of allied genera, such as Terebella. The worm itself possesses a slender body, the hinder part of which may be doubled up within the tube. The head is pro¬ vided with slender tentacles.

SABELLIANI.SM, the theological views of Sabellius (q.v.), which, though they had numer¬ ous advocates, were condemned by the Church as heretical. See Monarchians.

SABELLIUS, sa-bel'i-us, Christian teacher: b. Pentapolis, Africa, or Italy. He taught at Ptolemais in Upper Egypt during the pontificate

of Zephyrinus (199-217) and Calixtus I (21 7— 222), and is known as

the founder of a sect who considered the Son and Holy Ghost only as different revelations or manifestations of the Godhead, but not as separate persons (see Monarchians). The doctrines of Sabellius were opposed by Dionysius of Alexandria and Dionysius of Rome, by Epiphanius (who states that the Sabellians were very numerous around Rome and in Mesopotamia) and by Theodoret. Saint Augustine states that by the beginning of the 5th century they had entirely disappeared. Yet their views have always found adherents, and even now some theologians attempt to re¬ concile theology with reason by admitting con¬ ceptions of the Trinity coinciding with that of Sabellius. For his teaching Sabellius was ex¬ communicated by Pope Calixtus.

SABIANS. See Sabveans.

SABIN, sa'bln, Alvah Horton, American chemist: b. Norfolk, N. Y., 9 April 1851. He was graduated at Bowdoin College in 1876 and was professor of chemistry at the University of Vermont in 1880-86, also serving as State chemist in 1882-86. In 1888-1905 he was engaged in the varnish business in New York, and since 1910 has been consulting chemist for the Na¬ tional Lead Company, New York. He has been lecturer at New York University since 1897. He invented the process for manufacturing- sugar of milk in 1883. Since 1907 he has been sectional editor of the Chemical Abstracts Journal of the American Chemical Society. Author of Undustrial and Artistic Technology of Paint and Varnish) (1904) ; (German and American Varnish Making) (1911) ; (Red Lead as Paint MateriaP (1917), etc.

SABIN, Edwin Legrand, American writer: b. Rockford, Ill., 23 Dec. 1870. He was gradu¬ ated from the University of Iowa in 1892 and has published (The Making of Iowa) (1900) ; (The Magic Mashie5 (1902) ; (Beaufort Chums5 (1905); (When You Were a Boy5 (1905); (Bar B Boys) (1909) ; (Range and TraiP (1910); (Circle K> (1911); <01d Four Toes5 (1912) ; (Pluck on the Long TraiP (1912) ; (With Carson and Fremont5 (1912) ; treas¬ ure Mountain5 (1913) ; (On the Plains With Custer5 (1913) ; (Scarface Ranch) (1914) ; (Kit Carson Days5 (a biography, 1914) ; Buf¬ falo Bill and the Overland TraiP (1914) ; (Gold Seekers of '495 (1915) ; (With Sam Houston in Texas5 (1916); the Boy Settler5 (1916); (Opening the West with Lewis and Clark5 (1917) ; the Great Pike's Peak Rush5 (1917) ; (How are You Feeling Now?5 (1917) ; and contributions to magazines.

SABIN, Ellen Clara, American educator: b. Sun Prairie, Dane County, Wis., 29 Nov. 1850. Her father, Samuel Henry Sabin, served as first lieutenant in the 40th Wisconsin regi¬ ment in the Civil War. Miss

Sabin studied at the University of Wisconsin in 1865-68, and in 1895 received from that institution the honor¬ ary degree of A.M. In 1912 Beloit College conferred on her the degree of Litt.D. and in 1915 she received the degree of LL.D. from Grinnell. Miss Sabin began her professional career in 1866 as teacher in the district school at Sun Prairie, Wis. ; from 1869 to 1872 she was employed as teacher at Madison, Wis., where she became principal of the grammar school.

In 1873-85 she taught in Portland, Ore., spent the year 1885-86 in Europe, and in 1887-90 was superintendent of schools of Portland, Ore. In 1891 Miss Sabin became president of Downer College, Fox Lake, Wis., and since 1895 has been president of Milwaukee-Downer College. At the Columbian Exposition at Chicago in 1893 Miss Sabin was juror of the educational exhibit and from 1886 to 1892 was member of the National Council of Education.

SABIN, Joseph, American bibliophile: b. Braunston, Northamptonshire, England, 9 Dec. 1821 ; d. Brooklyn, N. Y., 5 June 1881. After apprenticeship to Charles Richards, bookseller of Oxford, he set up a bookshop of his own there, but in 1848 came to this country, where he conducted establishments for the sale of old and rare works in New York 1850-56, in Phila¬ delphia 1856-60, and New York 1860-81. His bibliographical knowledge was wide, and he is said to have crossed the Atlantic not less than 25 times for the purchase of unique specimens. From 1869 he published for a number of years The American Bibliopolist. He also prepared several compilations, among them 13 volumes of an uncompleted dictionary of Books relating to America.'

SABINE, Sir Edward, English physicist: b. Dublin, Ireland, 14 Oct. 1788; d. Richmond, Surrey, 26 June 1883. He was educated at the military colleges of Marlow and Woolwich and in 1803 entered the army where he was commis¬ sioned 2d lieutenant of artillery. He served in the war with the United States in 1813- 14 and accompanied Ross and Parrv in their Arctic expedition in 1818 and that of Parry in 1819-20. While on these expeditions he en¬ gaged in researches in terrestrial magnetism and in 1821-25 conducted a series of voyages extending from the Arctic regions to the equator, gathering data concerning the magnetic needle, the figure of the earth and other points in meteorological and terrestrial physics. He was instrumental in the establishment of permanent magnetical and meteorological ob¬

servatories, retaining directorship of those in the colonies for many years. In 1818 he was elected to the Royal Societv, was its vice-presi¬ dent in 1850 and in 1861-71 acted as its presi¬ dent. He received rank as lieutenant-general in the army in 1859 and was retired with full rank as general in 1874. His works include * An Account of the Experiments to determine the Figure of the Earth' (1825); (The Variability of the Intensity of Magnetism upon Many Parts of the Globe ' (1838), etc.

SABINE, Lorenzo, American historian: b. New Lisbon, N. H., 28 Feb. 1803; d. Boston, Mass., 14 April 1877. He sat in the New Hampshire legislature for three successive terms, but removed to Massachusetts in 1849, and was a Whig member of Congress in 1852- 53. He is best known for his important work on (The American Loyalists, or Biographical Sketches of Adherents to the British Crown in the War of the Revolution) (1847). He also published (Life of Preble) (1847) ; (Reports on the Principal Fisheries of the American Seas) (1853) ; (Notes on Duels and Duelling, with a Preliminary Historical Essay' (1856), etc.

SABINE, Wallace Clement, American physicist: b. 13 June 1868; d. 10 Jan. 1919. He

was graduated at Ohio University in 1886 and at Harvard in 1888. He was, until he died, connected with the faculty at Harvard, was professor of physics there in 1905-14, and after 1914 Hollis professor of mathematics. He was agrege professor at the University of Paris in 1916-17. Author of Architectural Acoustics'

(1900).

SABINE, a river of the United States, which has its rise in the northeastern part of Texas, in Hunt County, flows southeast about 250 miles, then turns southward and forms the boundary between Texas and Louisiana, and enters the Gulf of Mexico through Sabine Lake and Sabine Pass. The mouth of the river is Sabine Pass, a narrow channel which is ob¬ structed by a muddy bar. Considerable has been done to make this pass safe for naviga¬ tion; jetty-building and dredging was begun as soon as the interior of Texas, near the Sa¬ bine River, was settled. Sabine Lake is an ex¬ pansion of the river, but the Neches River also enters the lake. The Sabine River is about 500 miles long and is navigable in its lower course. See Boundaries of the United States.

SABINE, or SABINE PASS, Tex., town and port of Jefferson County, on Sabine Pass Harbor, between Sabine Lake and the Gulf of Mexico, 70 miles by water northeast of Gal¬ veston, on the Texas and New Orleans Rail¬ road. The Pass has been improved by the Federal government at great expense, thus opening a water route for the regions reached by the Sabine and Neches rivers, exports from which include petroleum, lumber, grain, iron ore and sulphur. Extensive concrete wharves have been built by the oil and lumber com¬ panies, and the commerce of the port is increas¬ ing rapidly, being confined chiefly to exports. Exports, $50,923,702. Pop. 8,600.

SABINE CROSS ROADS, Battle of, and BANKS' RETREAT TO ALEXANDRIA.

Three miles southeast of Mansfield, De Soto Parish, La., one of the main roads from Alex¬ andria to Shreveport is crossed by a road from Red River to Sabine River. At this crossing was fought a battle which marked the culmina¬ tion and failure of what is known as the Red River Expedition. On 23 Jan. 1864, General Banks, then at New Orleans, received a despatch from General Halleck, dated the 4th proposing an expedition, to consist of the forces of Banks, Steele and such as could be spared by Sherman, for the capture of Shreveport, La., on Red River, and the recovery of Texas, thus opening access to the cotton of that section and stimulat¬ ing trade. Banks had, on a previous occasion, for sound reasons, objected to such a campaign, but now acquiesced and promised a cordial co¬ operation ; but he set forth the difficulties in the way, and made suggestions to remove them, not one of which was regarded. Engrossed with duties concerning political affairs in Louisiana, which had specially been confided to him bv the President, Banks could not immediately leave New Orleans, and he entrusted the arrange¬ ments of the expedition to Gen. W. B. Franklin, his second in command, who was to move from the Teche 5 March, reach Alexandria on the 1 7th, and co-operate with a strong fleet under command of Admiral Porter. Porter arrived at the mouth of Red River on 7 March, with

a fleet of 15 ironclads and four light steamers, and there he was joined some days later by transports from Vicksburg, carrying four di¬ visions of Sherman's army, under Gen. A.]. Smith, and the Marine brigade of Colonel Ellet. A part of the plan of campaign was that Gen¬ eral Steele, with an army of 15,000 men, should move from Little

Rock, Ark., directly on Shreveport ; but Steele, after marching from Little Rock to Camden, was checked, fell back to Little Rock and took no further Dart in the campaign. (See Jenkins' Ferry, Battle of). Smith's forces advanced, attacked and in con¬ junction with the navy, 14 .March, captured Fort de Russv, up Red River, together with 283 prisoners, 10 guns, and many small arms, the Confederate covering force of 3,500 men, under General Walker, after burning two steamboats and a considerable quantity of cotton, retreating up the river. It was not until the 19th that Franklin, with very little opposition, which was brushed aside by his cavalry, reached Alexan¬ dria. Banks joined him on the 24th, but his entire column did not close up until the 26th. Meanwhile General Mower, with three brigades of Smith's division and a cavalry brigade of the 19th corps, marched from Alexandria on the 21st for Henderson's Hill, 25 miles westward, surprised the 2d Louisiana cavalry, and with slight loss captured 250 men, nearly as many horses, and four guns, with their cais¬ sons. Near Alexandria the fleet came to a series of rapids, and the water was so low that the ironclads could not run up them, but after a week's hard labor the lighter ones were car¬ ried over. The transports, which could not pass, returned to Vicksburg, and with them Ellet's 3,000 men. The withdrawal of the trans¬ ports made it necessary to establish a base at Alexandria and to use a wagon-train to carry the supplies, while it was also necessary to leave a guard of nearly 4,000 men (under General Grover) to protect the place. General Franklin, with the main column, advanced on the road running west of and oarallel to the river, to Natchitoches,. about 80 miles above Alexandria, driving before him the Confederate cavalry, and reaching Natchitoches on 3 April, where he was joined by A. J. Smith's column, which, ac¬ companied bv Porter's fleet, had come to Grand Ecore, four miles from Natchitoches. Porter had a fleet of 13 gunboats and 30 transports.

Banks' army, on the eve of march from Natchitoches for Shreveport, was composed of two divisions of the 13th corps, under Gen. T. E. G. Ransom ; five brigades of the 16th corps, under Gen. A. J. Smith ; Gen. W. H Emory's division, three brigades of the 19th corps ; and Colonel Dickey's brigade of colored troops, under General Franklin; Gen. A. L. Lee's division of cavalry and mounted infantry, four brigades; and a small artillery reserve, under Captain Closson. These numbered 31 March 25,735 officers and men, with about 65 guns. Lee's cavalrv force of 4,500 men had pushed out westward, 12 miles ; on 2 April it ran across Confederate cavalry, drove it back eight miles, and then withdrew to wait for the general advance. This beean on the morning of the 6th, led by Lee's cavalry, followed by the two small

divisions of the 13th corps, under Ransom, and by Emory with a division of the 19th corps and Dickey's brigade

of colored troops. On the morning of the 7th A. J. Smith followed with Mower's division of the 16th corps. A division of the 17th corps, 1,730 strong, under Gen. T. Kilby Smith, re¬ mained with the transports, under instructions to conduct them to Loggy Bayou, opposite Springfield, about midwav between Natchitoches and Shreveport, 110 miles by the river, above Grand Ecore. where he was to halt and com¬ municate with the army at Sabine Cross Roads. 54 miles from Grand Ecore. Porter, Smith and the transports, with six gunboats carrying 17 guns, started on the 7th.

Lee's instructions from General Franklin were to attack the enemy wherever found, but not to bring on a general engagement. On the 7th he drove a brigade of General Green's be¬ yond Pleasant Hill, and came upon a strong force under Green at Wilson's Farm. Lee at¬ tacked and after a hard engagement of two hours drove Green to Saint Patrice's Bavou, eight miles from Pleasant Hill. Here Lee bivouacked for the night, and sent back for in¬ fantry support. His loss had been 53 killed and wounded. Green's loss was greater, including about 100 prisoners. That night Franklin reached Pleasant Hill ; A. J. Smith's division was still a day's march in rear of Franklin. At daybreak of the 8th Lee, having been rein¬ forced by one of Landram's brigades of the 13th corps, dropped his wagon-train, and, mov¬ ing forward, drove the Confederates from Saint Patrice's Bayou and gradually pushed them to a wood beyond a clearing at Sabine Cross Roads, and found himself in the immediate front of Gen. R. Tayor's army of 10,000 men. Taylor, whose forces had been much scattered, in Ar¬ kansas, Louisiana, and Texas, had concentrated them, and near Mansfield had the three di¬ visions of Generals Green, Walker and Mouton — 10,000 men. On the morning of the 8th he moved three miles from Mansfield to Sabine Cross Roads and formed line in the edge of a wood, commanding, on both sides of the road, a clearing about 1,200 yards long, and 800 wide, through the middle of which was a deen ravine. He knew that Banks' column was stretched out on a single road for more than 20 miles, and was sanguine of success in attacking the head of it. Lee threw out a strong skirmish-line and waited for Banks' main body to come up. At noon Ransom arrived with a brigade, and line was formed. Banks rode up a little past noon, and sent back repeated orders for Frank¬ lin to hurry forward. After heavy and con¬ tinuous skirmishing, lasting until 4.30 p.m., Tay¬ lor threw his entire force of 10,000 men heavily upon the Union line ; Mouton's division and two brigades of dismounted cavalry made an impetu¬ ous charge upon the Union right, in which Mouton was killed at the first onset, while

Walker's division and a brigade on its right fell upon the centre and left of the line. For nearly an hour the men (not over 4,500) of Banks' command resisted this attack, and then were compelled to fall back to the woods in rear of the open space at the cross roads, with heavy loss, including three guns. Franklin had come up with Cameron's division of the 13th corps, and a new line was formed, to be immediately broken by heavy attacks on both flanks and front. The Confederates were gaining the rear, and the Union line was pressed back along the

narrow forest road filled with wagons and mules of the supply-train, stragglers, and camp- followers, which so blocked the way that an orderly retreat was impossible. Soon a panic set in, the cavalry train of 156 wagons was captured, Ransom's 10 guns were taken, along with 1,000 of his men; Franklin and Ransom were wounded, some of the best officers were struck down; and in spite of the heroic efforts of Banks and others to rally them, nearly the whole army broke into a disorderly retreat, which was checked only at Pleasant Grove, three miles from the field of battle. Here Gen¬ eral Emory, with his division, had come up at 6 p.m., and formed line in the edge of a wood, on a ridge overlooking a small stream ; and scarcely had his line been formed when the panic-stricken fugitives came rushing back through it to the rear. The Confederates were close on their heels, made an immediate assault upon Emory, and were met with a severe fire delivered at close quarters that instantly checked them. After an hour and a half of fierce bat¬ tle, in which they made desperate efforts to turn Emory's right, the Confederates were every¬ where repulsed with great loss, but held the shores of the stream. Banks' army, after hav¬ ing advanced to within two marches of Shreve¬ port, had been saved from total destruction (

Banks had been limited as to time in carry¬ ing out the objects of his campaign. General Sherman was calling for A. J. Smith's troops, and General Grant, who had set his heart on a movement by Banks from New Orleans on Mobile, had written him : (

Here the Confederates were repulsed with great loss. Meanwhile the right of the Union line, though hard pressed, stood firm until, the left being driven back, it was nearly enveloped and gave ground, and the Confederates pressed on to an attack on A. J. Smith, who held the second line in reserve. After a short and sharp ex¬ change of fire. Smith's and part of Emory's

men made a charge and pushed back the Con¬ federate line. All the reserves were now thrown into action, and the Confederates were routed, driven from the field and pursued until dark. Gen. E. Kirby Smith, the Confederate depart¬ ment commander, says ; <(Our troops attacked with vigor and at first with success, but, ex¬ posing their right flank, were finally repulsed and thrown into confusion. The Missouri and Arkansas troops, with a brigade of Walker's division, were broken and scattered. The enemy recovered cannon which we had cap¬ tured the day before, and two of our pieces with the dead and wounded were left on the field. Our troops were completely paralyzed and dis¬ organized by the repulse. . . . Our repulse

at Pleasant Hill was so complete and our com¬ mand was so disorganized that had Banks fol¬ lowed up his success vigorously he would have met but feeble opposition to his advance on Shreveport.®

Banks had at Pleasant Hill. 12,600 men, of whom 150 were killed, 844 wounded and 375 missing. Taylor had 14,300 engaged, of whom about 1,000 were killed and wounded, and nearly 500 missing.

Encouraged by his success at Pleasant Hill, Banks gave orders for a forward movement next morning on Shreveport, and preparations were being made for the march, when General Franklin and other officers dissuaded him from it, and it was decided to fall back to Grand Ecore and unite with the fleet. The retreat was resumed during the night and Grand Ecore reached on the 11th. E. Kirby Smith joined Taylor after the close of the battle of Pleasant Hill, and determined to move against General Steele in Arkansas. Taylor withdrew his in¬ fantry to Mansfield on the 10th and 11th, leav¬ ing the cavalry, under Green, and Polignac's infantry division of 2,000 men to watch and harass Banks. Upon his arrival at Grand Ecore, Banks intrenched, threw a pontoon- bridge across the river, put part of his force on the other side and waited for the fleet to come down. Porter, with the gunboats and Kilby Smith, with the transports, had arrived at Loggy Bayou on the afternoon of the 10th, where, two hours later, they received news of Banks' misfortunes, and on the morning of the 11th received his orders to return to Grand Ecore. The fleet turned down stream, but it was not to reach Grand Ecore without opposi¬ tion. On the evening of the 11th Green, who had been left at Pleasant Hill, started with 750 men and two batteries for Blair's Landing, and on the 12th, with about 500 men and three guns, attacked the fleet and transports as they were running down the river. A brisk fight followed, General Green was killed by a dis¬ charge of grape from one of the gunboats and his men were driven off, with small loss. The Union loss was 57 killed and wounded. By the 15th all the gunboats were back to Grand Ecore, and as fast as the vessels could pass the bar they made their way to Alexandria, one

gunboat being lost. The fleet having passed down, Banks marched from Grand Ecore on the 22d for Alexandria, and that night bivou¬ acked at Clouterville, 32 miles from Grand Ecore. The march was resumed on the 22d, and on the morning of the 23d, while marching along Cane River, a branch of the Red, the head of the column was checked at Monett's Ferry by General Bee, with four brigades of 2,000 men and four batteries. Bee's position was a strong one on a bluff commanding the crossing, and on the only practicable road to Alexandria, 35 miles distant. At the same time the Confederate cavalry under General Whar¬ ton and Polignac's infantry were harassing Banks' rear. General Birge, with his own brigade and Cameron's division of the 13th corps, in all about 5,000 men, crossed Cane River three miles above the ferry, and by a difficult flank march of several miles reached a hill, the occupation of which rendered Mon¬ ett's Bluff untenable. Birge attacked at 2 p.m., after a contest of two hours carried the hill, and the Confederates retreated and left open the road to Alexandria. The Union loss was 150 to 200 killed and wounded. Banks resumed his march on the 24th, and without further serious opposition entered Alexandria on the 25th. Banks reported that in the 24 days intervening between the march of the army from Alexan¬ dria and its return there his own army had marched 400 miles. He had fought several battles, and been successful in all but one, and his losses were 289 killed,. 1,541 wounded and 2,150 missing, an aggregate of 3,980. The dif¬ ficulty of getting Porter's fleet over the shallow rapids near Alexandria detained Banks at that place until 13 May, when he continued his re¬ treat. (See Yellow Bayou, Engagement at). Consult 'Official Records> (Vol. XXXIV); Taylor, 'Destruction and Reconstruction ; The Century Company's 'Battles and Leaders of the Civil War> (Vol. IV).

E. A. Carman.

SABINE MOUNTAINS, Italy, a branch of the Apennines, near the border of ancient Latium, east of Rome, is a lofty group in the upper valley of the Aternus ; the highest sum¬ mit reaches an altitude of about 4,200 feet.

SABINE PASS, Engagement at. On 6

Aug. 1863 General Halleck informed General Banks, in command at New Orleans, that there were important reasons why the United States' flag should be raised at some point in Texas, with the least possible delay. Halleck's dis¬ patch was by direction of the Secretary of War, and it was understood that the proposed move¬ ment was of diplomatic rather than a

military character, and intended to prevent European complications. Banks was left to his own judgment how to conduct the campaign, but it was suggested that the most feasible route would be by the Red River to Shreveport. Banks, deeming the Red River route imprac¬ ticable at that season of the year, fitted out an expedition to make a lodgment in Texas at Sabine City, on Sabine Pass, the outlet from Sabine Lake into the Gulf of Mexico, and the terminus of a railroad penetrating eastern Texas, and making connection with Houston, the capital of the State. General Franklin was put in charge of the advance of the expedition of 5,000 men, and was instructed to land a

few miles below Sabine Pass, move upon the Confederate works commanding it, and, if practicable, to seize Beaumont, on the railroad to Houston. Four light-draft gunboats, under command of Lieutenant Crocker, formed part of the expedition, which sailed from New Or¬ leans on 4 September. Franklin disregarded his instructions to land 10 or 12 miles below Sabine Pass, and on Crocker's representation that he could silence the Confederate works in the pass, he and Crocker arranged for the gunboats to make a direct attack upon the works, drive out the garrison, seize or drive away two Confederate gunboats reported on the river and then land the troops. From the army 150 sharpshooters were distributed on the four gunboats. Early in the forenoon of the eighth the gunboats and transports crossed the bar at Sabine Pass, and in the middle of the afternoon three of the gunboats opened fire upon the small fort, mounting eight heavy guns, and held by 44 officers and men. The fire was immediately returned, two of the gun¬ boats were disabled and surrendered and were taken in tow by two small Confederate craft. It was all over in less than an hour. Franklin made no serious attempt to land his troops, but immediately returned to New Orleans, having lost two gunboats, with their 15 heavy guns, nearly 50 killed and wounded and over 200 prisoners, among them Lieutenant Crocker, of the navy. Not a Confederate was hurt. Con¬ sult 'Official Records> (Vol. XXVI).

SABINES, sa'blnz (Lat. Sabini, sa-bl'nl), a people noted in the early history of Rome, whose territory they adjoined. The Sabines were en¬ gaged in agriculture and grazing, and from the simplicity of their lives and their physical prow¬ ess they obtained a reputation like that of the Spartans for severity of discipline and sturdi¬ ness of character. The narrow limits of the Sabine territory made emigration necessary, and probably in this way they came in contact with the growing power of Rome. They fought the Romans with great courage, but were sub¬ dued about 290 b.c., and admitted to Roman citizenship, but not permitted to vote in civic affairs. They became merged in the republic and subsequent empire, and were lost to view as a separate people.

SABINUS, Masurius, Roman jurist. He flourished during the reign of Tiberius, and was a pupil of Capito. He was the founder of the school of Sabiniani, and was the author of sev¬ eral works much used and commented upon by later jurists, the most important being 'Libri iii, Juris Civilis, which is not now extant.*

SABLE, one of the fur-bearing animals (Mustela sibellina), found in Siberia, Asiatic Russia and Kamchatka, or its American repre¬ sentative (M . amcricana) which differs so little that it is doubtfully named as a separate species. The average length of the sable is about 18 inches, excluding the tail, which is somewhat bushy. The body partakes of the form of the weasels generally, in that it is elongated and vermiform. The fur is smooth, glossy and may be pressed or smoothed in any direction, owing to the mode of attachment of the hairs to the skin. In color it is a rich deep brown, which near the head may exhibit white markings, and frequently assumes a gray tint about the neck. The fur is heaviest during winter, and the dan-

gers experienced by the sable-hunters from sudden snow-storms obliterating the track, or from the inclement cold, can hardly be over¬ estimated. Sables are for the most' part cap¬ tured in traps, but are cautious animals, and their pursuit is attended with much difficulty. They make their homes in dens or cavities in hollow trees, and produce from three to five young at a birth, the young being born in March or April ; and their general habits are those of the marten and weasel, but they are more shy and retiring.

Skins of the Russian sable fetch prices in Liverpool ranging from 3 to 10 guineas. The darkest skins are considered to be the finest. About 2,000 skins annually find their way to England. Most of these furs are used in Russia, where about 25,000 are said to be an¬ nually collected. When manufactured for linings sable fur may fetch prices as high as 1,000 guineas. The corporation robes of the London aldermen are lined with this expen¬ sive material, and the tails of sables are used in the manufacture of artists' brushes. See Fur-bearing Animals; Fur-trade.

SABLE, Cape. See Cape Sable.

SABLE ANTELOPE, one of the largest and most handsome of African antelopes (Hip – potragus niger), of the same genus as the roan antelope, blaubok and others, and like them rapidly approaching extinction, as civilization more and more encroaches upon the plains of southern and

eastern Africa. Its. coat is a deep glossy black, markings upon the face, the buttock and the under parts being white. The great-ringed horns sweep back from the fore¬ head in a sabre-like curve, and the neck is adorned with a mane. These antelopes went about, in old times, in herds, and were prizes for the sportsmen, while their flesh was excel¬ lent to eat. Extensive descriptions may be found in the writings of Gordon-Cummings, Anderson, Baker, Selous, Bryden and other African sportsmen-travelers.

SABLE ISLAND, a low-lying island in the Atlantic, in lat. 44° N. and long. 60° W., 85 miles east of Nova Scotia. It is a chain of sand dunes enclosing a lagoon, and is such a menace to navigation that the government of Canada maintains two lighthouses there. It was formerly 40 miles long and is now but 20, gradually sinking. Upon its sandy ridges grow cranberries and wild grass, and attempts are being made to raise pines and other hardy ever¬ greens. There are sandbanks in the vicinity. The only inhabitants are the lighthouse and lifeboat men attached to the establishment for the relief of shipwrecked persons. The island is known for its breed of hardy wild ponies.

SABOTAGE, sa-bo-tazh, a method used by labor revolutionists to force employers to ac¬ cede to demands made on them. It consists in a wilful obstruction and interference with the normal processes of industry. It aims at in¬ conveniencing and tying up of production, but stops short of actual destruction or of en¬ dangering human life directly. The practices are varied. The original act of sabotage is said to have been the slipping of the wooden shoe or "sabot® of a workman into a loom, in the early days of the introduction of machinery, to impede production. Some of the more com¬ mon forms are wasting of materials; telling

the exact truth to customers ; obeying orders punctiliously, especially on railroads ; using of bad materials so as to impair the standing of the employer ; placing sand or emery in wheel bearings ; loosening screws and nuts ; cutting belts ; sitting idle at machines ; mislaying tools, and any number of petty devices for hindering and delaying production. These methods were found to be more subtly effective by the syn¬ dicalists, and have been endorsed also by the I. W. W. (q.v.). Sabotage is conducted se¬ cretly, so that the blame cannot be fixed and the criminal law is thus avoided. Many promi¬ nent labor leaders consider it a slavish, wasteful and sterile instrument and prefer the strike as a form of direct action. Consult Brooks, J. G., American Syndicalism: the I. W. WP (Chap. XII, New York 1913).

SABOTS, sa-boz', wooden shoes largely worn by the peasantry of France, Belgium, Holland and some other parts of Europe. They are especially useful in wet weather, and in moist places generally, being well adapted to

preserve the feet from damp. Great numbers of sabots have been exported by France to Belgium. In some parts of England, as in Lancashire, shoes with thick wooden soles, but with leather vamps or "uppers,® are worn by most of the artisan class. See Boots and Shoes.

SABRE-TOpTHED TIGERS, extinct cats of the family Machcerodontida? (or Nirn- ravidee), a group whose remains occur as fos¬ sils from the Eocene up to the Pleistocene. They differ from ordinary cats (Felidce) in several anatomical features, having some pe¬ culiarities which ally them to the bears, and others recalling existing viverroids, as the foussa (Cryptoprocta) . They are remarkable for the character of the dentition, which in the earlier genera comes near showing the com¬ plete number of teeth, but displays a steady tendency as the family history is followed to¬ ward the reduced number possessed by exist¬ ing cats. At the same time the dentition is often distinguished by the huge size of the upper canines, which in some cases were five or six times as long as the neighboring teeth, and have been justly called "sabre-teeth.® These tushes reached their highest development in the genus Machcuodus, whose species were of very wide distribution, occurring in both North and South America and in Europe. These car¬ nivores were of various sizes, up to dimensions equal to those of modern tigers, and so little different in general from true cats that Cope places them within the Felidce. It began in the Eocene and continued down almost or quite to the Glacial Period, when the type seems to have become extinct because the great canines had overgrown their usefulness and become a hindrance instead of a help in getting a liv¬ ing. They finally became so large that the animal could not open its mouth wide enough to make use of them in biting, and the space be¬ tween them would admit none but a very small piece of meat to enter, even if a large piece could be torn away. "Even when the mouth opens so far as to allow the mandible to pass behind the apices of the canines,® remarks Cope, "there would appear to be some risk of the latter being caught on the point of one or the

other canine, and forced to remain open, caus-

•

ing early starvation.® Other prominent genera in the family are the plantigrade Dinictis; Nimravus and Pogonodon, with species as large as panthers; and Hoplophoneus, with dentition like modern cats. Consult Flower and Lydekker, (Mammals, Living and Ex- tinct) (1891) ; Cope, ˆVertebrates of the Ter¬ tiary Formation of the West) (in Report United

States Geological Survey, Vol. Ill, Washington 1884) ; Woodward, (Vertebrate Palaeontology5

(1898).

SABRE-TACHE, sa-br-tash, a leathern case or pocket worn by cavalry officers at the left side, suspended by three straps from their swordbelt. It came into use when the jackets of cavalry soldiers were too short or too tight to admit of pockets being made in them, but is now rather ornamental than useful.

SAC (sak) CITY, Iowa, county-seat of Sac County, on the north fork of the Raccoon River, and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern rail¬ roads, about 42 miles west by south of Fort Dodge. It is in an agricultural region where considerable attention is given to raising live¬ stock. The chief manufacturing industries are connected with farm products. The trade is mainly in farm and dairy products, flour and agricultural implements. The educational in¬ stitutions are the Sac City Institute (Baptist), a high school, public elementary schools and a public library. Pop. (1920) 2,630.

SAC AND FOX INDIANS, also known as MUSKWAKI, an Algonquian people called by the French Foxes (Renards), possibly because of their having a Fox clan. To themselves they were Muskwaki or red-earth people. When first noticed by the whites they inhabited cen¬ tral Wisconsin. The Ojibwas had driven them from the Lake Superior region and about 1760, being worsted in conflict with the French, they incorporated with the Sac tribe, with whom they have remained so intimately connected as to have been long regarded as one tribe. They are of the woodland type, formerly lived in bark houses and cultivated corn and vegetables. They developed a complex social organization and are noted for their conservativeness in adopting the customs of the whites. Their number at present is about 750. Consult Owen, M. A., (Folk-lore of the Musquakie Indians of North America) (London 1904), and hand¬ book of American Indians) (Washington 1907).

SAC FUNGI. See Fungi.

SAC-A-LAIT, sak'a-la, a fish. See Crappie.

SACAJAWEA, sa-ka'ja-we'a, SACAG- CEWEA, SAHKAHGARWEA, or SAH- CARGARWEAH (Minnetarre name Tsa- ka-ka-wias, ((Bird Woman® ; Shoshone name Bo-i-naiv, ((Grass Maiden®), American Indian guide of the Shoshone tribe, the only woman to accompany the Lewis and Clark Expedition of 1804—06: b. about 1784; d. Shoshone

Agency, Wyo., 9 April 1884. She was betrothed in in¬ fancy according to tribal custom, but was cap¬ tured by the Minnetarres when a child and later gambled away by her captor to a French¬ man named Charboneau, whose wife she be¬ came and with whom she was living in the Da¬ kotas when Lewis and Clark reached there. Charboneau and Sacajawea were engaged as guides and spent the winter at Fort Mandan,

where Sacajawea's son, Baptiste, was born 11 Feb. 1805. Sacajawea displayed remarkable ability as a guide, threading the way accurately to her own country which she had not seen since she was a child, and gaining the admira¬ tion of the expedition for her courage and re¬ sourcefulness. On one occasion at the risk of her life she rescued from an overturned canoe the records of the expedition and other light articles of great value to the explorers. She led the party to the camps of her own people 17 Aug. 1805, where she was immedi¬ ately recognized, her affecting meeting with her brother Cameahwait, chief of the tribe, being described in the journals kept by Lewis and Clark. She was claimed by her betrothed hus¬ band, who, however, relinquished his claims upon finding her the wife of another and mother of a son whom she had carried on her back all the way. Here the devotion of the Indian woman procured for the white men food and horses from the Indians, while her shrewd sense and good counsels prevailed over her brother's determination to destroy the whites for the sake of their goods. Finding all her people dead except her brother and the child of a dead sister she immediately adopted the sister's child as her own, and accord¬ ing to the custom of her people never ad¬ mitted the sister's son to be other than her own. This child, of pure Indian blood, was known as Basil; both children lived and had descendants. Satajawea accom¬ panied the • party to the ocean, which was reached 7 Nov. 1805, and returned with Cap¬ tain Clark by way of the Yellowstone, which region also she knew well. Upon their return to the Minnetarre country Charboneau refused all inducements to accompany the explorers to civilization, and Sacajawea remained with him. Further mention is made of her and her son Baptiste in Clark's letters, but she then disap¬ pears until she was found, an old woman, in the Shoshone Agency. She told a clear and in¬ telligible story, and although illiterate spoke excellent French, which, however, she spoke with less ease in the earlier days of the expe¬ dition. She died of old age when about 100 years old. Monuments have been erected to her at Portland, Ore. ; Bismarck, N. D., and by the State of Wyoming. Consult

SACBUT, or SACKBUT, the word by which translators have rendered the sabbeka of the Hebrew Scriptures. The exact form of the sabbeka has been much disputed, but that it was a stringed instrument is certain, for the name passed over into Greek and Latin in the forms sambuke, sambuca, and the instrument so called is described by Athenaeus as a harplike

instru¬ ment of four or more strings, and of a triangu¬ lar form. _ It is not unlikely that this instru¬ ment was introduced among the Jews from the East, since one of the musical instruments most frequently occurring in the Assyrian sculptures answers very closely to this description, and may perhaps be identified with the sabbeka, the name of which is, besides, Chaldaic. Nothing resembling this Assyrian instrument is to be found on the Egyptian monuments or in the sculptures of Greece and Rome. Since the sab-

beka was a stringed instrument the rendering sacbut is altogether wrong, since that was, at the time when our translation of the Scriptures was made, the name of a wind-instrument now called the trombone. See Trombone.

SACCATON GRASS. See Grasses of the United States.

SACCHARIN, sak'ka-rin, benzoic sulphi-

nide, CeH4 \gQˆ NH, has attained commercial

importance and is manufactured on a large scale in many countries on account of its intense sweet taste, chemically pure saccharin being 500 times sweeter than cane sugar. The com¬ pound was discovered in 1879 by I. Remsen and C. Fahlberg during an investigation of the oxidation products of toluene sulphone amide. According to a process outlined in D.R.P. 35, 211, saccharin is manufactured from toluene by treating this with sulphuric acid at tempera¬ tures not exceeding 100° C. The product is converted into the calcium salt, then into the sodium salt. With phosphorus trichloride in a stream of chlorine the dry sodium salt yields a mixture of ortho- and para-toluene sulphone chlorides. The solid para compound is worth¬ less as far as the manufacture of saccharin is concerned, but the oily ortho compound will, upon saturation with ammonia, yield toluene-ortho-sulphone amide, and the latter is readily oxidized into saccharin with a solution of neutral potassium permanganate. A more gen¬ eral method for the manufacture of saccharin consists of the treatment of toluene with excess of chlorsulphonic acid at very low temperatures. The reaction mixture is first poured on ice and then cooled for several hours at — 20° C. The oily ortho compound is now separated from the solid para compound by fil¬ tration ; the oil is treated with dry ammonium carbonate, or dry ammonia gas, and finally oxidized into saccharin with a neutral solution of potassium permanganate.

Saccharin is a white crystalline substance which melts with partial decomposition at 220° C. It is readily soluble in acetone, alcohol and ether, sparingly in benzene, toluene and amyl alcohol. Although its solubility in water is not very great — one part in 230 parts of water at 25° C. — the water solution possesses an intense sweet taste. Saccharin behaves like an acid, forming soluble crystalline salts with a number of metallic hydroxides and carbonates. Some of these salts possess the intense sweet taste of the original compound. The sodium

salt, C6H4 xsCF/ NNa.2H20, is the commercial

<(crystallose,® 400 times sweeter than cane sugar, and being very soluble in water is extensively used as a sweetening medium in preference to the less soluble saccharin.

Saccharin is used as a substitute for cane sugar in the treatment of diabetes, dyspepsia, obesity and in gastro-intestinal infections. According to some authorities the compound is rapidly absorbed and eliminated practically unchanged through the kidneys without produc¬ ing digestive troubles or toxic effects. On ac¬ count of its antiseptic properties saccharin has not found universal favor as an artificial sweetener in foods, confectionery and bever¬ ages. Saccharinated cake and pastry have been

condemned as indigestible foods, and govern¬ ment regulations require that in liquors, syrups and the like the presence and amount of sac¬ charin be plainly declared upon the label.

V. S. Babasinian,

Professor of Chemistry, Lehigh University.

SACCHAROMETER, or SACCHARI- METER, any instrument used to determine the strength of a sugar solution. One common form is a hydrometer with the stem so gradu¬ ated as to read per cents of sugar content in solution examined. Another is a form of polariscope devised by Mitscherlich with the scale on which the angle of deviation of the plane of polarized light is read so graduated as to show tha percentage of sugar in the solu¬ tion used. Another instrument of this type is the invention of Soleil.

SACCOPHARYNX, a genus of Murcenidce, with a single species (S', flagellum) , a deep-sea conger eel, of which only three specimens have been observed ; muscular system very feebly developed; bones thin and soft, wanting in or¬ ganic matter ; head and gape enormous ; stomach distensible in an extraordinary degree; vent at end of trunk. The specimens known have been found floating on the surface of the north Atlantic with

their stomachs much dis¬ tended, having swallowed some other fish many times their own weight. They attain a length of several feet. See Deep Sea Exploration.

SACHEVERELL, sa-shev'e-rel, Henry, English Anglican divine : b. Wiltshire, about 1674; d. London, 5 June 1724. He was edu¬ cated at Oxford and in 1705 was appointed preacher of Saint Saviour's, Southwark. While in this station he, in 1709, preached two famous sermons, the object of which was to rouse ap¬ prehensions for the safety of the Church and to excite hostility against the Dissenters. Be¬ ing impeached in the House of Commons he was brought to trial in February 1710, and on 23 March, when the trial was concluded, was suspended from preaching for three years. This prosecution, however, excited such a spirit in the High Church party that it helped to overthrow the ministry of Godolphin, and estab¬ lished the fortune of Sacheverell, who, during his suspension, made a kind of triumphal progress through the kingdom. The same month that his suspension terminated (1713) he was appointed to the valuable rectory of Saint Andrew's, Holborn, by Queen Anne. Of the offending sermons 40,000 copies at least were sold, and of the record of the trial 30,000. Little was heard of Sacheverell after this party ebullition subsided, except through his numerous squabbles with his parishioners. His abilities, even according to writers on his own side, were very slight. Consult Stanhope, (History of Queen Anne's Reign) (1872).

SACHS, saks, Bernard, American neurolo¬ gist: b. Baltimore, Md., 2 Jan. 1858. He was graduated at Harvard and the University of Strassburg, Germany, in 1882, and engaged as a medical practitioner in New York. He has made a specialty of the study of nervous dis¬ eases, regarding which he is a recognized au¬ thority. Besides numerous medical monographs he has published (Mental and Nervous Diseases of Children > (1895).

SACHS, Edwin O., English architect : b. London, 5 April 1870. He was educated at University College School, London, and at the University of Berlin, and engaged as an archi¬ tect in London in 1892. He has established a wide practice in connection with theatres and public buildings and in 1898 applied electrical power to the working of the stage for the first time in England. He founded the British Fire Prevention Committe in 1897 and organ¬ ized the first International Fire Prevention Con¬ gress in London in 1903 ; organized Special Fire Survey Force in connection with the European War. He has published (Modern Opera Houses and Theatres) (3 vols., 1896-98) ; (Facts on Fire Prevention (1902) ; (Stage*

Construc¬ tion (1898) ; (Fires and Public Entertain¬ ments J (1897).

SACHS, Hans, hants zaks, German meister- singer : b. Nuremberg, 5 Nov. 1494; d. there, 20 Jan. 1576. He was by trade a shoemaker, and followed his business and made verses with equal assiduity. From 1510 to 1515 he traveled over different parts of Germany, practising his craft, according to the custom of German work¬ men, in all the towns he visited. In the latter year he returned to his native town, where he was admitted as master in his guild. He early attached himself to the Reformation movement, to the spread of which among the bourgeoisie he contributed not a little by a poem written in 1523, (Die wittenbergisch Nachtigall, Die man jetzt horet fiberall, in which he hailed with approval the cause of Luther. In 1544 he was with the army of Charles V in France. The productions of Hans Sachs are extremely nu¬ merous. In 1536 he estimated the number of his poems at 5,000 or more. Three volumes of his poems were published during his lifetime, and two more after his death. In the 1 7th century, after the introduction of a more artificial style into German poetry, Hans Sachs fell into neg¬ lect, from which he was not withdrawn till Goethe, who had become acquainted with him in his studies for (Faust,* drew attention to his merit in a poem ((Erklarung eines alten Holz- schnitts vorstellend Hans Sachsens Poetische Sendung*) which apeared in the Deutscher Merkur (April 1776). The best edition of his works is that of Keller and Goetze, and the best selection that of Godeke and Tittmann in (Deutsche Dichter des sechzehnten Jahrhun- derts) (2d ed., 1883-85). He possessed a fruit¬ ful genius and, notwithstanding the rudeness of his language, his poems are distinguished for naivete, feeling, invention, wit and striking de¬ scription. Consult Schweitzer's (Etude* (1889) ; Goetze's (Hans Sachs) (1894); Genee's (Hans Sachs und seine Zeit* (1894), and Drescher, (Studien zu Hans Sachs> (1891).*

SACHS, Julius, German botanist : b. Breslau, 2 Oct. 1832; d. Wurzburg, 29 May 1897. He studied in Prague, where he became assistant in botany, and in 1867 became professor of botany at Freiburg. The following year he removed to Wurzburg, where in his own laboratory he made extremely important experiments in the physiology of plants. He published Udandbuch der Experimental-physiologie der Pflanzen> (1865) ; (Lehrbuch der Botanik) (1868-74) ; (Vorlesungen fiber Pflanzenphysiologie) (1882- 87) ; fGeschichte der Botanik vom 16. Jahrh.

bis 1860 (1875) ; (Gesammelte Abhandlungen fiber Pflanzenphysiologie* (1892-93).*

SACHS, Julius, American educator : b. Baltimore, Md., 6 July 1849. He was graduated at Columbia University in 1867 and later studied at the universities of Wfirzburg, Berlin, Got¬ tingen and Rostock. In 1872-1902

he was en¬ gaged as principal of preparatory schools, and in 1902-17 he was professor of secondary edu¬ cation at Teachers' College, Columbia Uni¬ versity, where he has since been professor emeritus. In 1890-91 he was president of the American Philological Association, and he filled that office for the Head Masters' Associa¬ tion of the United States in 1899. Author of (Syllabus of a General Course on the Theory and Practice of Teaching in the Secondary Schools) (1909) ; (The American Secondary SchooP (1912), etc.

SACHSE, sakse', Julius Friedrich, Ameri¬ can author: b. Philadelphia, Pa., 22 Nov. 1842. He has been librarian and curator of the Masonic Temple since 1906. He engaged in journalism and has written extensively, his publications including (The German Pietists of Provincial Pennsylvania, 1694-1708) ; horo¬ logium Achaz-Christophorus Schissler, Arti- fex ; (Justus Falckner, Mystic and Scholar> (1903); Pennsylvania: the German Influence in its Settlement and Development ; (The German Sectarians of Pennsylvania, 1 708-1803* ***; (The Wayside Inns on the Lancaster Road-side) ; (01d Masonic Lodges of Pennsylvania, Modern and Ancient 17,30-1800*** *; (The Ma¬ sonic Correspondence of George Washington,* etc.*

SACHSENHAUSEN, zak'sen-how-zen. See

Frankfort-on-the-Main.

SACHSENSPIEGEL, zak'sen-spe"gel, a private collection of legal precepts and legal customs which had the force of law in the Middle Ages in Germany, especially in the north of Germany. One of the six prefaces to the collection mentions one Eyke von Repgow as its author, and this account is generally ac¬ cepted as true. Its date is supposed to be earlier than 1235. The study of it has been revived in Germany. The best edition is by Homeyer (Berlin 1835-44).

SACKBUT. See Sacbut.

SACKEN. See Bugonia.

SACKETTS (sak'ets) HARBOR, N. Y.,

village, in Jefferson County, on Black River Bay, the inlet through which Black River dis¬ charges its waters into Lake Ontario, and on the Rome, Watertown and Ogdensburg branch of the New York Central and Hudson River Railroad. The village is about 10 miles from Watertown, eight miles from Lake On¬ tario and 170 miles west-northwest of Albany. It has a good harbor, large enough to accom¬ modate vessels of the largest size, and it has steamer connections with several of the lake ports. Sacketts

Harbor is one of the oldest places on the northern frontier; in 1809 the Oneida, the first United States war vessel, was built here. In the War of 1812 the village was the scene of several engagements and was an important United States naval station. The frigates Madison and Superior, war vessels, were made here in 40 and 80 days, respectively,

from the time the timber was cut. A third warship was nearly completed when peace was restored ; the hulk remained in the yard for a number of years. The United States military station, Madison Barracks, is located here. Sacketts Harbor is in an agricultural region, and although it has good water power, there is but little manufacturing. Pop., exclusive of garrison, 868.

SACKETTS HARBOR, Attacks on, in

the War of 1812. On the outbreak of the war the United States had only one ship on Lake Ontario, the Oneida, carrying 16 24-pounders and commanded by Lieut. Melancthon T. Wool- sey. -On 19 July 1812, when Woolsey was at Sackett's Harbor, a British fleet of six ships under Commodore Earle appeared with the ob¬ ject of capturing the Oneida. Woolsey at¬ tempted to escape but, failing in this, anchored the vessel where his guns could rake the en¬ trance to the harbor and mounted on shore the guns from the off side of the ship. At the end of the peninsula he also erected some guns and after an hour's fight compelled the British fleet to withdraw without inflicting any dam¬ age. Consult Cooper, J. F., cNaval History> (Vol. II, pp. 25, 147, 149) ; Maclay, E. S.,

(History of the Navy (Vol. I, pp. 472-473) ; Roosevelt, (Naval War of 1812) (pp. 145, 151).*

When Dearborn sent the expedition to York (q.v.) early in 1813, he left Sackett's Harbor in a defenseless condition, the garrison num¬ bering only 400 regulars and 250 volunteers under Gen. Jacob Brown (q.v.). Accordingly on the night of 26-27 May 1813, while Dear¬ born was preparing to capture Fort George (q.v.), Sir George Prevost embarked about 800 men on the fleet under Sir James Yeo and on 29 May attacked the garrison at Sackett's Harbor. At the first onslaught the volunteer militia fled but when the British reached the blockhouse they were halted by the desperate resistance of the regulars. Meanwhile Brown rallied the fugitive militia and, attacking the British in the rear, compelled them to retreat. The British loss was 259 killed, wounded and missing. During the battle the

naval lieutenant in charge of the shipyard, believing the battle lost, set fire to the barracks, burning the store¬ houses and doing considerable damage to ships on the stocks. Yeo then returned to Kingston where he remained inactive several weeks. Con¬ sult Adams, (The United States) (Vol. VII, pp. 163-171) ; Armstrong, John, (Notices of the War of 1812 (Vol. I, pp. 145-147) ; Maclay, (History of the Navy* (Vol. I, pp. 481-482) ; Lossing, (War of 1812 > (pp. 607-613) ; Roose¬ velt, (Naval War of 1 81 2 } (pp. 233-234) ; Wilkinson, James, (Memoirs* (Vol. I, pp. 582- 584, 634-638) ; Wiley and Rines, (The United States1* (Vol. V, pp. 408-409).*

On 19 May 1814 Yeo blockaded the harbor to prevent the exit of American frigates then under construction. Most of the supplies for the ships were at Oswego Falls a few miles away and on 28 May Woolsey attempted to carry these supplies in 19 small boats to Stony Creek and thence overland to the harbor. Yeo captured one of these boats before it reached Stony Creek and sent 180 men in seven small gunboats to capture Woolsey and his men. But the Americans ambushed the British and captured the whole force with their

boats. On 6 June Yeo raised the blockade. Consult Armstrong, (Notices of the War of 1812 J (Vol. II, pp. 73-74) ; Lossing, (War of 1812 (pp. 789-800) ; Maclay, (History of the Navy* (Vol. I, pp. 488-489); Roosevelt, (Naval War of 1812 5 (pn. 360-361) ; Wilev and Rines, (The United States* (Vol. V, pp. 422ˆ123).*

*SACKVILLE, sak'vil, Charles, 6th Earl of Dorset, English courtier and poet : b. 24 Jan. 1638; d. Bath, 29 Jan. 1706. He became a wit and roisterer in the company of Charles II, served under the Duke of York in the sea fight with the Dutch in 1663 and is said to have written or retouched on the night before the engagement of 3 June his famous song. ((To all you ladies now on land.** He succeeded to the earldom in 1677, but did not stand well in the favor of James II, and later became an ardent supporter of William of Orange, under whom he was lord chamberlain of the household from 1689 to 1697, and three times one of the regents during the king's absence. He was a patron of poets like Prior, and Wycherley, and Dryden dedicated to him the (Essay on Satire.**

SACKVILLE, Lionel Sackville Sackville- West, Baron, English diplomatist: b. Cam¬ bridgeshire, 19 July 1827; d. Knole Park, Seven- oaks, England, 3 Sept. 1908. He entered the diplomatic service in 1847, was secretary of lega¬ tion, respectively, at Turin, Madrid, Berlin and Paris, and was Envoy Extraordinary and Min¬ ister Plenipotentiary to the Argentine Confeder¬ ation (1872-78) and to Spain (1878-81). In 1881 he was appointed Minister to the United States, and in 1888 with Joseph Chamberlain and Sir Charles Tupper negotiated the fisheries treaty of that year. In October

1888 he received a letter from one C. F. Murchison, who, repre¬ senting himself as an Englishman naturalized in the United States, asked for which party he should vote in the ensuing Presidential election. The Minister in reply advised his correspondent to vote the Democratic ticket as favorable to English interests. The Murchison letter was generally regarded as a trap set for the embar¬ rassment of the Minister. His recall was at once asked for, and in default of a prompt compliance with the request the Department of State sent him his passports 30 October. The incident, occurring as it did during a Presi¬ dential canvass, was the subject of much dis¬ cussion.

SACKVILLE, Thomas, Earl of Dorset and Baron Buckhurst, English statesman and poet: b. Withyham parish, Sussex, 1536; d. Lon¬ don, 19 April 1608. He was a student in the Uni- versity of Oxford, but removed to Cambridge, and afterward became a student of the Inner Temple. At both universities he was distin¬ guished for his performances in Latin and English poetrv, and in the Temple wrote the last two acts of the tragedy of (Gorboduc, or Ferrex and Porrex (1565). Of a poem in¬ tended to comprehend a view of the illustrious but unfortunate characters in English history, entitled the (Mirror for Magistrates,* he fin¬ ished only a poetical preface (the (Induction*) and one legend of the life of the Duke of Buckingham. The work was completed by George Ferrers and Richard Baldwin (1559-63). He sat in the Parliament assembling 20 Tan. 1558, and in the first two Parliaments of Eliza-*

beth (1559-63) after which he traveled. In 1586 he was made a member of the court ap¬ pointed by Elizabeth to try Mary Queen of Scots. In 1598 he was joined with Burleigh in negotiations for peace with Spain, and renewed a treaty with the United Provinces. On the death of Burleigh he became Lord High Treas¬ urer. In January 1601 he was appointed lord high steward and presided at the trial of the Earl of Essex. On the accession of James I his post as treasurer was confirmed to him and in 1604 he was created Earl of Dorset. He ranks among the most prudent and able of the ministers of Elizabeth, was a good speaker and a still better writer. The tragedy of (Gorbo- ducC the subject of which is a sanguinary story from early British history, is the first example in English of regular tragedy in blank verse. Sackville's share is inferior in literary' value to his (Induction, > called by Sidney Lee the greatest English poem between the Canterbury Tales) and the (Faerie QueeneP

SACKVILLE, Canada, town in Westmore¬ land County, 95 miles northeast of Saint John, on the Intercolonial Railway. The Wesleyan Mount Allison

College is located here. Pop.

2,039.

SACO, Jose Antonio, ho-sa' an-to'ne-o sa'ko, Cuban historian and publicist: b. Bay- amo, Cuba, 7 May 1797 ; d. Madrid, Spain, 26 Sept. 1879. He was educated in Havana and in 1821 was appointed professor of philosophy in the Seminary of San Carlos. In 1832-34 he lived in Havana and edited the Revisita Bimes- tre Cubana, but his liberal and anti-slavery principles caused his banishment, though he was afterward allowed to return. He traveled in Europe and in 1840 settled in Paris where he resided for many years. He was elected a dele¬ gate to Madrid in 1866 to advocate political re¬ forms for Cuba and in 1878 was elected to the Spanish Cortes. He wrote (Paralelo entre Cuba y algunas colonias inglesas) (1838) ; (Su- presio del trafico de esclavos en Cuba) (1845) ;

(Ideas sobre la incorporacion de Cuba a los E. UP (1848) ; (Historia de la asclavitud desde los ticmpos mas remotos> (1876 et seq.), etc.

SACO, sa'ko, Me., city in York County, on the Saco River and on the Boston and Maine Railroad, about 15 miles west-south¬ west of Portland and four miles from the ocean. Four bridges span the river connecting the city with Biddeford and other localities. A fall in the river of about 40 feet furnishes ex¬ tensive water power. The tide-water extends to the falls. The chief manufacturing estab¬ lishments are cotton mills, boot and shoe fac¬ tories, lumber mills, manufactories of belting, brushes and cotton-mill machinery. The city has an extensive coast trade in cotton goods and other manufactures, and it ships consider¬ able farm products. Old Orchard, a popular seaside resort, is in the vicinity. The principal public institutions are Thornton Academy; York Institute, founded in 1866; a public high school and elementary schools, two libraries, one home for the aged, several fine churches and a num¬ ber of good business blocks. Pop. 6,817.

.SACO, a river which rises in the White Mountains in New Hampshire and flows south¬ east through New Hampshire and Maine and enters the Atlantic Ocean. It is about 105

miles long and drains an area of 1,750 square miles. It is a swiftly flowing stream having a number of rapids and falls, which furnish abundant water power for manufacturing. Great Falls is 72 feet high.

SACRAMENT. See Sacraments.

SACRAMENTALS, certain objects, actions or emblems, instituted or consecrated by Church authority, for the production of spiritual effects through which temporal benefits are experienced by believers. Of such are

the sacramental wine, bread or wafer; the rites of dedication, conse¬ cration, benediction; the emblem of the Agnus Dei or sacrificial lamb of God, in the celebra¬ tion of the Mass or the Holy Eucharist. (See Sacraments). Consult Lamburg, A. A., (Sac- ramentals of the Catholic Church (New York 1892) ; Probst, F., (Sakramente und Sakramen- talien) (Tubingen 1872).*

SACRAMENTARIANS, a religious term which at present is applied almost solely to members of the Protestant Episcopal Church in America and the Anglican Church in England and elsewhere, who sustain a <(high>:> view of the efficacy of the sacraments. In past ecclesiasti¬ cal history it had a wholly different meaning, and was applied to those Reformers who re¬ fused to agree to Luther's doctrine of the real presence of the body and blood of Christ in the bread and wine. The Sacramentarian party were the authors of the Tetrapolitan Confes¬ sion, so called from the four cities of Strass- burg, Constance, Lindau and Memmingen, which supported the Sacramentarian doctrines. This confession excluded all idea of a physical presence of Christ's body. The Swiss reformer Zwingli took a similar position on the question of Christ's presence in the Eucharist, and an article prepared by him declaring against the real presence was embodied in the confession of the Helvetic Church. The German Sacra- mentarians joined the general body of Prot¬ estants in resisting Charles V, and became merged with the Lutherans.

SACRAMENTO, Cal., city, county-seat of Sacramento County and capital of the State, on the Sacramento River and on the Southern Pacific and Western Pacific railroads, 90 miles northeast of San Francisco. The city is situ¬ ated in lat. 38° 33′ N., and long. 121° 20' W. ; and is built on a broad, low plain, 30 feet above sea-level. The streets are wide and straight and cross each other at right angles. Shade • trees are abundant. The shops and stores are built of brick and the dwellings mostlv of wood. The city is noted for its beauty of environment, is the centre of an extensive agricultural and horticultural section ; and has a mild, almost semi-tropical climate. The State capitol build¬ ing, completed in 1874, at a cost of $2,500,000, stands in a plaza covering 30 acres. There is a United States government building here, the Crocker Art Gallery, building of the Foresters, Odd Fellows, Masons and Fort Sutter (re¬ built), California State Bank, Roman Cath¬ olic cathedral, Sacramento Institute, College of the Christian Brothers, California State Li- braray (140,000 volumes), Public Library (28- GOO volumes), Howe's Academy, Saint Joseph's Academy, Heald's Business College, City Dis¬ pensary, Railroad Hospital and numerous churches, schools and charitable institutions.

The city has several daily newspapers and numerous weekly and monthly periodicals. Sacramento is the second manufacturing city in California and has a variety of industries, in¬ cluding flouring and grist mills, foundries and machine shops, canneries, potash works, lumber mills, manufactories for saddlery, harness, fur¬ niture, carriage, soap, candy, brooms, sewer and gas pipes, pumps, mattresses and crackers. The repair shops of both railroads are located here, giving employment to several thousand men. The industries of Sacramento represent a capi¬ tal invested of over $10,000,000, with an annual output valued at over $15,000,000. The city ex¬ ports immense quantities of flour and grist¬ mill products to China, Japan and Australia. The city is governed on the commission plan. There are well-equipped fire and police de¬ partments. The waterworks are owned and operated by the municipality. The assessed property valuation of the city is about $62,453,- 070, which is 72 per cent of the market value. The tax rate is $1.34 per $100 assessed valua¬ tion. The streets are lighted by electricity. An annual State fair is held here, and an exhibition building, park and race course are maintained by the State Agricultural Society. The first white settlement on the site of Sacramento City was made in 1839, by Capt. John A. Sutter, a Swiss by birth, but a naturalized American citizen, who obtained a grant of 11 square leagues of land from the Mexican government. In 1841 Captain Sutter built a fort which he called New Helvetia. He took many of the neighboring Indians into his service, collected a few white trappers, and by virtue of his isolated position and the number of his adherents secured influence and importance in the terri¬ tory. Sutter's Fort, as it was popularly called, was the first point in California settled by im¬ migrants crossing the continent; with the in¬ crease of the population the trade and im¬ portance of New Helvetia kept apace, and in October 1848 there was an auction sale of lots in the town of ˆSacramento,® which was first named in the advertisement of the sale. In Jan¬ uary 1849 the first frame house was built on the banks of the Sacramento River, and thither the settlement was moved from the fort. The site of the town was originally about 15 feet above low-water mark, and as the river frequently rose to 20 feet, the town was subjected to over¬ flows. In January 1850, in March 1852 and again in January 1853, the city was flooded so that boats were used in going from house to house. After this the lower streets were raised five feet, and a levee was built which saved the city from subsequent floods. On 3 Nov. 1852 a conflagration destroyed 600 houses and other property, entailing a loss of $5,000,000. In July 1854 another fire destroyed property valued at $650,000. The State capital was established here by an act of the legislature on 25 Feb. 1854, but not until 1861 was a capitol building erected. On 3 Feb. 1856, the first railroad was opened be¬ tween Sacramento and Folsom. In the gold days

of 1849-50 Sacramento was the great mart of the mines, the base of supplies and the metropolitan centre of various mining camps. Steamers ran daily to San Francisco and up the river to Red Bluff. The California Stage Com¬ pany with a capitalization of $1,000,000 ran daily stages to Maryville, Nevada, Downieville, Stock-

ton, Jackson, Mokelumne Hill and other lead¬ ing towns in the mining district. The city was first incorporated as a town in 1849, and was chartered1 as a city in 1863. Sacramento in 1860 had a population of 13,788; (1880) 21,420;

(1890) 26,386; (1900) 29,382; (1910) 44,696; (1920) 65,857.

SACRAMENTO, a river in California which rises in the northern part of the State, flows south in the valley between the Sierja Nevada and the Coast Range, and uniting with the San Joaquin River (q.v.), both break through the Coast Range, and enter the Suisun Bay, from which the waters pass through a strait into the Bay of San Pablo, and to the Pacific through San Francisco Bay and the Golden Gate. The chief tributaries are the Pitt River, from the northeastern part of the State, and Feather River, which enters the Sacramento about 15 miles above the city of Sacramento. The Sacramento is about 400 miles long; from the source of the Pitt to the mouth of the Sacramento is about 600 miles. The river is navigable for about 270 miles from its mouth, and the Feather River for about 30 miles from the Sacramento. The debris from placer mining has been a hindrance to navigation ; large sums have been expended to improve it. The Sacra¬ mento Valley is a fertile region, in which are raised large quantities of grain and fruits.

SACRAMENTO SALMON, PERCH, PIKE, etc., local names in California for vari¬ ous fishes caught in the Sacramento River, and more or less widely elsewhere. The salmon is the quinnat (q.v.). The Sacramento sturgeon is the white sturgeon. (See Sturgeon). The Sacramento perch is a fish (Archoplitis inter- ruptus) closely related to the Eastern rock-bass. (See Bass). It reaches from one to two feet in length, is blackish above, its sides are silvery, with about seven vertical blackish bars, more or less interrupted. It is an excellent food-fish. The Sacramento pike is a chub, from two to four feet in length. (See Squaw-fish). The sucker is a species (Catostomus occidentalis) formerly of great importance to the Indian population, but little esteemed in civilized mar¬ kets.

SACRAMENTS. The Latin word Sacra- mentum was in the classical period a judicial and military technical term. The underlying concept seems to be consecration to a divinity, something set apart for that purpose as sacred and inviolable. Thus the term was applied in jurisprudence to the specified

sum of money deposited with the judicial authorities by the parties to a suit, and was so designated either because the place of deposit was sacred, or be¬ cause the sum forfeited by the losing party was used for religious purposes. In military par¬ lance the word signified originally the pre¬ liminary engagement entered into by newly en¬ listed recruits, and afterward the military oath of allegiance which became obligatory after the Second Punic War (Liv. XXII, 38). Later on the term was used to designate any oath or solemn engagement whatever.

Among ecclesiastical writers the word has had various significations. In earlier usage, represented, for instance, by the ancient Latin version of the Scriptures, and maintained even in many passages of the Vulgate (for example,

Eph. v, 32, Rev. i, 20, etc.) it was a synonym of arcanum , and corresponded in sense to the Greek word pvorypiov , the notion embodied being that of something secret or mysterious, whence also, by extension, it came to denote the sign or symbol whereby hidden things were signified, especially in matters referring to re¬ ligion. Thus Augustine says : ((Symbols when pertaining to things divine are called sacra¬ ments.® As certain religious rites of paganism wore called mysteries on account of their occult signification known only to the initiated, the equivalent word <(sacrment® was naturally adopted by the early Christians to designate their own religious rites and ceremonies, and was used at first more or less indiscriminately with reference to any or all of them. There seems to have been no attempt on the part of early Christian writers to define the sacra¬ ments accurately or enumerate them. Thus they speak vaguely now of two, now of more sacraments, at times even restricting the term to the Eucharist as the sacrament, and oppos¬ ing it to Baptism. Nor do we find in their writings any definition of a sacrament more explicit than the rather general notion formu¬ lated by Augustine, ((a sign of something sacred.® In the literary treatment of this as well as other doctrinal topics analytic precision and s}'stematic classification came gradually with the development of theological thought.

Roman Catholic theologians of the mediaeval and subsequent periods understand by sacra¬ ments, in the strict specific sense of the word, a definite category of sacred rites or symbols of divine institution, and which in virtue of this institution have the power of conferring in- strumentally the grace or sanctity which they symbolically represent. Of these a certain num¬ ber are allowed to have belonged to the Old Dispensation, being

typical of the sacraments of the New Law, but the intrinsic efficiency attributed to them is. limited (with, however, certain reserves in favor of the rite of cir¬ cumcision taken to be the Old Testament type of Christian baptism) to the bestowal, not of internal, but external sanctity, that is, legal puri¬ fications, etc. With regard to the sacraments of the New Law, Roman Catholic theologians hold that they are seven in number instituted by Christ (namely, Baptism, Confirmation, Eu¬ charist, Penance, Extreme Unction-, Holy Orders and Matrimony), and this enumeration, together with the main points of doctrine con¬ cerning the sacraments collectively and indi¬ vidually has been fixed by the dogmatic defini¬ tions of the Council of Trent.

The Reformers of the 16th century who professed to retain only such beliefs as were clearly demonstrated from Scripture rejected the doctrine of the seven sacraments, but did not at once agree as to the number to be admitted, some recognizing besides Baptism and the Eucharist, Confirmation, Penance and Orders, while others rejected one or the other or all of these last. As regards the present status of opinion, if we except the High Church section of the Anglican communion, Protestant denominations as a rule recognize only two sacraments — Baptism and the Eucharist.

That the existence of seven sacraments in¬ stituted by Christ cannot be proved from the New Testament alone must, of course, be

granted, even by Roman Catholic theologians, but they claim that such proof is not necessary, since, according to the fundamental Catholic contention, the New Testament writings do not furnish a complete record of Christ's actions — they are not, unless supplemented by tradition and the voice of the living Church, an ade¬ quate criterion of Christian belief and practice. They contend, moreover, that if the Scripture alone is to be held as decisive in the matter, consistency would require that the ceremony of the washing of the feet (John xiii) be counted among the sacraments, since it seems to fulfil all the requisite conditions.

Be that as it may, it must furthermore be conceded, in connection with the appeal to tradi¬ tion, that no positive proof of the recognition in the earlier Church of seven sacraments, neither less nor more, can be gathered from the writings of the Fathers. An explanation of this silence has been sought in the heretofore widely assumed influence of the so-called Lex Arcani, or Discipline of the Secret, whereby the early Christians were, it was claimed, bound to secrecy, with regard to their beliefs and mys¬ teries for fear of profanation on the part of the pagans. But apart from the obvious con¬ sideration that there could have been no suffi¬ cient reason to make a secret of the number seven, especially when we find that things so sacred as Baptism and the Eucharist are cur¬ rently mentioned, the most competent

authori¬ ties of the present day, Roman Catholic as well as Protestant, deny the existence of the Lex Arcani as a general prohibitive measure. As such it is chiefly a creation of the 17th and 18th century, theologians (consult Batiffol, (Etudes d'Histoire et de Theologie Positive, > Paris, Lecoffre, 1902). Consequently, others en¬ deavor to explain the silence of antiquity re¬ garding the explicit mention of seven sacra¬ ments on the ground that no systematic, syn¬ thetic treatment of the subject was attempted by the early writers. Whatever may be the value of this consideration, it is certainly rather strange to find that so late as the 12th century Saint Bernard enumerates no less than 12 sac¬ raments. Roman Catholic theologians, there¬ fore, rely chiefly on the so-called argument of prescription which is formulated as follows : At the time of the Reformation the entire Christian Church, East and West, was in peaceful, undisturbed possession of the doc¬ trine of the seven sacraments. From the fact that then, as now, it was common to both the Greek and Latin communions, is inferred that it must have been held in the Church at a period anterior to the separation of the Greeks in the 9th century. For apart from the ante¬ cedent improbability that any doctrinal growth peculiar to the Latin Church wrould have been adopted by her hostile rival, we do not find, as a matter of fact, that in the various discus¬ sions relative to the reunion of the two churches there was ever any difference to be adjusted relative to the number of the sacraments, though matters of seemingly less consequence were often made the object of protracted dis¬ pute. A similar line of argument, though less cogent, is pursued with reference to the "Orien¬ tal sects — Nestorians and Monophysites — who*

- *F or a well meant but quite ineffectual defense of the old view concerning the Discipline of the Secret, consult McDonald, The * Apostles' Creed.'*

separated from the Church in the 5th century. Whence, it is argued: if this doctrine was that of the Christian Church in the 5th century, it cannot be of other than apostolic origin, for the spirit of the early Church was hostile to all doctrinal innovations, as is proved by the his¬ tory of the great controversies, and she would doubtless have resented any alteration of the original belief in a matter so important and of such a practical character as that referring to the number of the sacraments. It will .be noticed that this argument is partly a priori, involving the contested assumption, that with regard to the point at issue it was impossible for the Church to have undergone any change of belief.

In the synthesis of theological speculation elaborated by the scholastics, the sacramental system was conceived as an extended applica¬ tion and a consistent carrying out of the great principle embodied in the Incarnation. In this mystery, according to the belief of most Chris¬ tians, the invisible Godhead, the author of life and grace, was made flesh and dwelt among us, imparting to men through his tangible, hu¬ man life and ministry that life of the spirit without which salvation is impossible. Hence the idea of conferring and developing the spiritual life through the instrumentality of visible material things ordained to that pur¬ pose was recognized as a principle underlying the entire economy of external means of grace in the Church. As regards the seven sacra¬ ments the theory is thus systematically worked out in the theology of Thomas Aquinas (1226- 74). There is an analogy between the natural and the spiritual life in man. In the natural order man is born ; he attains strength and maturity through growth ; he is nourished by food; should illness occur he needs medicine; the common good requires the propagation of the race and the supervision of legitimate au¬ thority; and, finally, man needs to be prepared for his departure from this world. Now the parallel needs in the spiritual order are pro¬ vided for through the seven sacraments. Thus, man is born in baptism, strengthened in confir¬ mation, nourished by the Eucharist and cured from illness by penance; the Christian Church is propagated through matrimony, and by holy orders proper guides are provided in things spiritual; and lastly by extreme unction the believer is prepared for his passage into eternity.

While this comparison is ingenious and in¬ structive as a part of a logical coherent system, it cannot, of course, be adduced as a proof that there are precisely seven sacraments, for ob¬ viously it was excogitated to fit the case, and had the number of sacraments then admitted been six or eight or more, the analogy would doubtless have been worked out just as satis¬ factorily. It proves at most that in the 13th century the doctrine of the seven sacraments had been definitely recognized. As regards the effects of the sacraments, it may be remarked that Catholic theology claims for three of them (Baptism, Confirmation and Orders), besides the conferring of grace common to all, the im¬ pression upon the soul of an indelible mark or "character.® This effect is produced even when through a lack of disposition on the part of the subject no grace is bestowed, whence these three sacraments, when validly administered,

are never repeated. If sometimes in the case of baptized converts, baptism is again admin¬ istered conditionally, it is only on account of some doubt as to the validity of the rite pre¬ viously conferred. The proof for the existence of this "character,® which Protestants unani¬ mously reject, is based chiefly on the ancient practice of the Church with regard to the non¬ repetition of these sacraments, and on certain texts from the works of early writers who express more or less vaguely the doctrine formulated later on

by the theologians and the Council of Trent.

The views of the early Reformers concern¬ ing the mode of efficiency proper to the sacra¬ ments were, no less than those concerning their number, a radical departure from the re¬ ceived Catholic doctrine. According to the latter the sacraments produced their effects ex opere operato, by which formula is meant, that whenever the rite is properly administered and no obstacle or indisposition exists on the part of the subject, saving grace is imparted to the soul, by virtue of the rite itself as an instru¬ mental cause, and independently of the disposi¬ tions of the minister or subject — at least so far as the essential effect is concerned. This mode of efficiency is sometimes expressed by saying that the sacraments contain the grace which they signify. Not that grace can be inherited in the physical symbols, but that through a divine ordinance it is infallibly con¬ nected with their administration.

While Protestant authorities are generally agreed in rejecting this doctrine, there is among them much divergence of opinion when it is a question of determining the nature of sacramental causality. Thus according to the Zwinglian and Remonstrant doctrine the sacra¬ ments are not properly a means of grace. ((They were not ordained to signify, seal and apply to believers the benefits of Christ's Redemption, but simply to be significant emblems of the great truths of the Gospel.® The Reformed Church holds the sacraments to be a means whereby grace is conferred, but ((their efficacy is due solely to the blessing of Christ and the working of His Spirit, and this efficacy is ex¬ perienced only by believers.® According to the Lutherans the sacraments confer grace in virtue to their own inherent power, but their efficacy resembles that of a sermon; it can act with saving effect only upon believers, and the beneficial efficiency of the rite consists chiefly in animating the faith of the receiver and strengthening his confidence in the divine promises.

To substantiate the ex opere operato or di¬ rect, independent causality, Roman Catholic theologians adduce certain passages of the New Testament referring to sacramental efficiency, and in which the saving effect is attributed di¬ rectly to the rite itself as the secondary instru¬ mental cause. Thus in John iii, 5, spiritual re¬ generation is expressed as a birth of water and the spirit. Similarly Paul asserts that we have been saved "through the washing of regenera¬ tion® (Tit. iii, 5), and he admonishes Timothy to stir up the gift of God which is in him through the laying on of hands.

Another argument is based on the very an¬ cient custom of infant baptism, one that was retained by several of the Protestant denom¬ inations. If infants are really born again to a

new life by means of the ceremony of baptism, we can scarcely conceive such an effect other¬ wise than as due to the immediate efficiency of the rite itself. Obviously it is not because the faith of the subject has been stimulated. Neither can the faith of the minister be the efficient cause, since, apart from other reasons, the Church has always maintained the validity of baptism even when conferred by heretics and schismatics — the sacramental rite when properly administered was supposed to possess its own efficiency.

Consistently with this view it has been the constant teaching of the Church ever since the controversy between Pope Stephen and Cyprian in the 3d century, that neither faith nor right¬ eousness is required in the minister of the sac¬ raments for their valid administration. A cer¬ tain intention, however, is postulated, namely, that of doing what the Church intends to effect by the rite in question. In other words, it is required that the minister intend to perform the rite not in his own name, but implicitly, at least, as a representative of Christ and of the Church. This intention can be extremely vague — in fact, reduced to a minimum — provided the effect intended by the Church be not posi¬ tively excluded. As is well known, this ques¬ tion of the requisite intention is one of the main points at issue in the controversy concerning the validity of Anglican orders.

Other questions pertaining to the sacraments are of less importance and belong rather to a complete detailed treatment of the subject as found in the ordinary handbook of theology.

Bibliography. — Beet, A. T., (The Church, the Churches and the Sacraments5 (London 1907) ; Bull, P. B., (The Sacramental Principle5 (New York 1915) ; Dix, M., (The Sacramental System5 (New York 1893) ; Hodge, C. A., (Systematic Theology5 (3 vols., 1871-72) ; Knox, A., (Grace of Sacraments5 (New York 1905) ; Lambert, J. C., (Sacraments in the New Testament5 (New York 1903) ; Oswald, F. H., (Die dogmatische Lehre von dem heiligen Sakramenten5 (5th ed., Munster 1894) ; Pour- rat, P., (Theology of the Sacraments5 (Eng. trans., 2d ed., Saint Louis 1915) ; Schanz, P., (Die Lehre von den Sakramenten der Katho- lischen Kirche5 (Freiburg 1893) ; Wilhelm and Scanned, (A Manual of Catholic Theology5 (Vol. II). See Baptism; Confirmation; Eucharist, and related references.

Rev. James F. Driscoll, S.S., D.D.

SACRED HEART, Brothers of the. See

Orders, Religious.

SACRED HEART, Ladies of the. See

Orders, Religious.

SACRED HEART, League of, or APOS- TLESHIP OF PRAYER IN LEAGUE WITH THE SACRED HEART OF JESUS,

a pious association whose object, the glory of God and the salvation of souls, is expressed by its motto, ((Thy Kingdom Come.55 The asso¬ ciation was founded at Vais, France, on 3 Dec. 1844, the feast of Saint Francis Xavier, by Father Francis Xavier Gautrelet. The director- general of the League is the father-general of the Society of Jesus, and the principal seat or centre of the association is established at Tou¬ louse. There are also diocesan directors and local directors for every centre. Promoters, who assist in extending the work of the

association, are appointed by the local directors. The names and addresses of all the members of the association are kept on record. The num¬ ber is so great in many centres that the card catalogue system is used. The number of local centres in the world is more than 62,500, and in these centres there are registered over 25,000,- 000 associates or members. The directors of these local centres are in communication through their diocesan directors and 37 period¬ icals, called Messengers of the Sacred Heart, with the general director. The Messenger of the Sacred Heart is published in 22 languages ; 6 of the 37 are in English and 6 in Spanish. Other languages in which it is published are German, French, Albanian, Breton, Bohemian, Chinese, Catalonian, Croatian, Flemish, Dutch, Hungarian, Italian, Malabar, Indian, Polish, Portuguese, Slavonic, Hindustani, Arabian and Greek. There are about 5,000,000 members in the United States. In addition to the league periodicals, another most important means of communication is the leaflets distributed each month by the promoters to all the members. The leaflets give the (

SACRED HEART OF JESUS, Feast of the, a feast celebrated by the Roman Catholic Church the first Friday after the feast of Cor¬ pus Christi. This feast, originated in the latter part of the 17th century, as the special and formal devotion to the Heart of Jesus, owes its origin to Marguerite Marie Alacoque, a French nun of the Visitation Order. Her biographers relate that the Lord Himself appeared to her and gave her instructions regarding the devo¬ tion. Many in the Church had practised devo¬ tion to the Sacred Heart of Jesus from the time of the Crucifixion, as Cyril, Cyprian, Tertullian, Basil, Ambrose, Saint Francis of Assisi and others, but the devotion was not general nor popularly advocated until the time of

Margue¬ rite Marie Alacoque. Consult Gallifet, (The Adorable Heart of Jesus5 ; Tickell, (Life of Blessed Margaret Mary Alacoque5 ; Nillis, (De Rationibus Festorum Sacratissimi Cordis Jesu et Purissimi Cordis Mariae.5

SACRED MONKEY, any of several apes, monkeys and baboons regarded as venerable by barbarous people in various periods and regions. See Ape; Baboon; Langur, etc.

SACRED MUSIC. See Oratorio.

SACRED ORDER OF SIAM, The. See

Orders, Royal.

SACRED TREASURE, Order of the.

See Orders, Royal.

SACRIFICES, originally a religious act, which in primitive ages brought the gods and their worshippers into contact, undergoing vari¬ ous changes in the historical development of nations and religions. It is difficult to define the real nature of sacrifice or give its exact origin, because data from ancient eras are few and vague. One may indulge in more or less curious speculation from our present point of

view, with endless theories of the latter-day anthropologist, according to each critic's predi¬ lection, but the practical definite results are limited. It would seem that the more helpless and ignorant early mankind, the more numer¬ ous and approachable the deities. In fear at their terrible might, — everything in the heavens and on the earth being attributed to them — heat and cold, storm and calm, sickness and health, riches and poverty, victory and defeat, it was necessary to win their favor and secure their pardon, if the shadows and the burdens were ever to be removed. Hence arose offer¬ ings and sacrifices, accompanied by prayers. The differences among these deities and their potency in different places were all-powerful in framing the name of the god, the nature of the sacrifice and the character of the prayer or hymn.

In Babylonia. — The cult and ritual of the Babylonians and Assyrians throughout the pe¬ riods of their history from about 3000 b.c. to Khammarabi (2250 b.c.) and then from the As¬ syrian period (2000 b.c.) to the fall of Nineveh (606 b.c.) and from Nabopolassar to the conquest of

Cyrus (539 b.c.) including sacrificial offerings in profuse quantities. Their religion, with astral theology as its basis, gave rise to a remarkable system of gods, large and small, each with its assigned position in the pantheon. Popular tradition from primitive ages combined with the speculation of the schools were the streams of influence. Incantations, omens and hymns accompanied the offerings and were embodied in a system that was partly astronomical and dealt with divination through the liver of sacri¬ ficial animals, while libation, ritualistic purifica¬ tions and various symbolical rites were duly em¬ ployed. Yet the ethical growth was not to be mistaken, as well as the profound influence ex¬ erted on the ancient world, Semite, Greek, Ro¬ man, as late as the Gnostic, in Prof. Morris Jastrow's opinion. To particularize as to sacri¬ fice, cattle and agricultural products were offered as in Israel, but with other vegetables. For blood sacrifices, lambs, sheep, goats, bul¬ locks and gazelles were included, male as a rule, the sacrifices being boiled or burnt. It was voluntary, chiefly on public occasions and at festivals. Often daily sacrifice was made. The sacrifice in general is to be regarded, in the opinion of Professor Jeremias, as a kind of tribute from (

Ancient Egypt. — The vast number of deities in predynastic Egypt and later ages, local, cosmic, minor and demons, arranged at times in triads, mother, father and child, like the Babylonians, amazes the modern inquirer. It is not easy to understand the religion of the old Egyptian, although the sources are many. On the temple inscriptions offerings to the gods of every class and character are very frequent. They are painted on the walls, columns and most parts of the buildings. After the king, priest and soldiers were next in rank; he pre¬

sided in the temples and when present had the right to offer sacrifices. This gave special weight to the sacrificial cult. ' The numerous deities are recognized by different forms or hieroglyphic legends over them. According to Arab historians, it was a primitive custom to sacrifice annually a virgin to secure a plentiful Nile inundation. As a rule in the daily cult slaughtered oxen and geese were in the main sacrifices ; burnt offerings were to come later. In the final stages animal worship was revived, with sacrificial rites that aroused the mirth and scorn of contemporary Greek and Latin authors, despite the fact that Egyptian cults found ready lodgment in the great centres of the Roman Empire.

India. — The sacrificial system as practised in ancient India is told with much exactness in the Brahmanas, — a Sanscrit term given to a body of prose writings appended to the Vedic text collections. Such detailed explanations were required as sacrifices were more and more elaborated and each ceremonial, however insig¬ nificant, had a mystic sense of its own. Here, too, one finds a double current of interpreta¬ tion, one by the

younger and one by the older school of expositors, while the ceremonial manuals give an even more minute descrip¬ tion. Sacrifices were of two kinds — meat offerings, consisting of oblations of milk, butter, cereals, or flesh, or of oblations of the juice of the same plant. Three sacrificial fires were set up by each householder ; no one national altar existed as in old-time Israel. There were also new and full moon offerings, oblations at the beginning of the three seasons, first fruits, ani¬ mal sacrifice, day and evening milk offerings. Of a more complex nature were the Soma- sacrifices at important state functions, at which at least three animals were sacrificed and many hecatombs of victims. Each detail has given rise to the most elaborate interpretation, in which the ritualistic theologians delighted, but which here need not be further enlarged upon. In post-Vedic times, with distinct changes in religious beliefs and the rise of new sects, ani¬ mal sacrifices gradually declined, almost en¬ tirely to disappear. Among the Saktas, whose chief seat of worship to-day is Bengal, Assam and Behar, animal sacrifices, usually one or more kinds, continue, the flesh being cooked and served to guests at the ceremony. Some adherents use cocoanuts or pumpkins instead of animals.

Greek and Roman. — The material for de¬ scribing sacrifices among the Greeks and Ro¬ mans is very meagre, in the absence of the elaborate codes which have been preserved by other races. In their literature the heroes are treated like gods and the gods like heroes, with a familiarity which is typical. In the Hellenic world numerous were the deities, the degree of veneration varying, however, with the local¬ ity. The gods immigrated as their votaries wandered, although the inherited ritual, methods of propitiation and the name of the god would be continued, even if subjected to change. In the Eleusinian mysteries, for ex¬ ample, the gods were actors performing certain rites — the Homeric hymn to Demeter which celebrates the cult dates from the close of the 7th century b.c., if not earlier. On the third day sacrifices, comprising the mullet fish and barley cakes, were offered with special rites.

In the lack of a priestly caste, a sacrificial sys¬ tem was not nationalized. The legendary sacri¬ fice of Agamemnon's daughter, Iphigenia, a favorite in literature, to appease the offended Artemis, only illustrates the barbarism of the primitive cult before it had been modified by the Hellenic spirit. According to the Spartans the human sacrifices originally offered to the goddess were abolished by Lycurgus, who sub¬ stituted the flogging of youths. The Athenians used to practise human sacrifice at periods of national calamity, selecting for that purpose two from a number of criminals only kept for such a contingency, one for the men of the city and one for its women, who were both stoned to death outside the town to avert all danger. The Romans, always open to foreign religious influence, now the Etruscan, now the Greek, now the Egyptian, brought the conquered gods to Rome when they destroyed the cities of the enemy. In its earliest period when Fetichism developed into Animism, ritual played a great part in the Roman religion, and exactness was necessary in the character of the offerings — male victims to male deities, and female to female divinities, white to the gods above, black to the gods below. Special gods de¬ manded special sacrifices, but mere rustic deities were given milk and millet cake, not blood offering's. In -later ages when Rome was transformed into a spacious empire religious cults were many and human sacrifices grew. In the Saturnalia at Rome a human victim was slain annually, until the practice of human sacri¬ fice was wholly interdicted by Theodosius to¬ ward the end of the 4th century.

In the Old Testament. — The sacrificial system as laid down in the book of Leviticus has aroused considerable inquiry and criticism. It has been assumed that the entire plan was adapted by the law-giver, at the divine command, to the character and condition of the Israelites, just emancipated from Egyptian serfdom, that it was a concession to their state of civilization at an era when cotemporary nations employed sacri¬ fices as the expression of their sense of re¬ ligion. But long before the Exodus data as to sacrifices abound in the Pentateuch. They are mentioned in connection with Cain and Abel, with Noah after the Flood, frequently with the Patriarchs. The offerings were vegetable or bloodless and animal or blood-giving, and in one instance Abraham's faith was tested when the command came to sacrifice his son. In those early ages, too, the altar was of earth or of unhewn stones and could be placed any¬ where. Hence it was no sudden or startling innovation when Moses developed sacrifices, which in Egypt had been restricted to the paschal lamb, into a national religious system. The reform consisted in the limitation of sacri¬ fice to a special place and to a special group of sacerdotal agents. According to the law the legal place for the offerings was ((before the door of the tabernacle® (Ex. xi, 6),

before Yhwh (Lev. iii, 1, 7, 12; ix, 2, 4, 5) and after¬ ward in the Jerusalem Temple. The Biblical records disclose many violations of this law, which aroused the earnest rebukes of the prophets. Shiloh. Shechem. Mizpah, Gilgal, Hebron, Beer-Sheba, Beth El witnessed popular assemblies and sacrifices. Besides private sacri¬ fices in individual homes, Solomon, not a priest,

offered oblations while kings, priests and a class of prophets disobeyed the law's injunctions and offered to foreign idols, not disdaining human victims. Nor did the genuine national prophets — men of the type of Isaiah, Micah, Amos — show enthusiasm for the sacerdotal worship so readily abused by the people and their leader. On the other hand, passages occur in the Psalms and prophets that allude to the reinsti¬ tution of the sacrifices wdiich form so large a portion in Ezekiel's forecast (Ezek. xl-xlviii). It can thus be seen how difficult the subject from the historical point of view. Many theories have arisen in consequence, which fail to satisfy. The Mosaic system of sacrifice, as set forth largely in Leviticus, is clearly nar¬ rated. Divided into bloodless and blood-giving offerings, so far as their nature, vegetable or animal, is concerned, they are further classi¬ fied, according to the occasion and the wor¬ shipper's feelings, into burnt-offerings, thank or praise offerings, sin or trespass, purifying offerings. They also could be regarded as vol¬ untary or free-will, compulsory or obligatory offerings. Animal offerings were usually ac¬ companied by libation of wine and a drink offering. While the sacrificial animals de¬ manded were of the clean class, in the data some of the animals specified were not of that type, as bullock, ox, cow, calf, sheep, lamb, goat and kid were alike included. Fishes were wholly excluded: fowls, turtle doves and pigeons were acceptable under certain condi¬ tions, for example, from the poorer people. As for the bloodless sacrifice, these included flour, wine, oil, wfith frankincense and salt as additions; rarely honey and leaven were used. Animals to be sacrified were to be perfect — mostly a male was required, none were to be less than seven days old, first born males to be killed within the first year, mothers and young not to be slain on the same day, some offerings to be more than a year old, the animal, too, was at times one that had done no work nor borne any yoke. First fruits offering of corn was to be of the finest quality. Before sacri¬ fice ˆsanctification® was necessary, through cleansing of the worshipper. As the blood rep¬ resented the. life or soul, the priest took special care to receive it and sprinkle it ((round about on the altar® or on its parts. Certain oblations were eaten by the priests alone in the sanc¬ tuary's court; others by the priests and their families in any <(clean® place; while the Israel¬ ite who offered had to eat his share, within an appointed and limited time, with his family and guests in the city where the sanctuary stood. This completes, without further particularizing, a summary of the Mosaic sacrificial system!

whose ethical purpose was, as is proved by the Hebrew word for sacrifice, Korban, from the root (

Rabbinical View.— With the final destruc¬ tion of the temple and the passing away of the national sacrificial system, the early rabbis in their utterances emphasized the ethical spirit at the basis of the old order and told how the substitute for altar and offering was close at hand in the individual's daily life and character.

In this respect their view was that of the great national prophet leaders of Israel centuries be¬ fore as well as that of the law itself. It must not be forgotten, also, that sins which con¬ cern persons and can be grouped largely under the heading of moral law <(could not be atoned without proper restitutions,® as Schechter notes in his (Rabbinic Theology5 (p. 196). The lead¬ ing rabbinic authors unite in similar asser¬ tions. Maimonides, the most prominent rabbi of the Middle Ages, in his famous (More Nebuchim,5 shows how even sacrifices in their very nature were secondary as was declared repeatedly by the chief prophets, who laid more weight on inner than outward worship. The formalism of the law had its useful purpose but it was to be subordinated to character and good deeds. Prayer became equivalent to sac¬ rifice. Even if the maimed and defective were rejected at the altar, the broken-hearted are ac¬ cepted by God. The altar of the home is equal to the altar of sacrifice. <(Dead bodies do not render unclean, nor does water make clean; it is the life that gives the real answer to the cry of religion® — was the declaration in effect of Johanan ben Zakkai, in the era of reconstruc¬ tion after the fall of Jerusalem. The entire trend of rabbinic thought to our day, with but few exceptions, in many an apt statement, anecdote or decision stresses the subordinate character of ritual sacrifices, which were a concession to their age, to pass away as the people grew in spiritual power, although the loss of national independence had to occur to instill the needed lesson.

The Germanic Tribes. — Sacrifices formed a central institution among the early Germans and offerings varied from a gift of milk or flesh or grain carried out to a grove or set in the house corners to human sacrifices. After harvest certain animals were slain and a great feast was celebrated, while the priest swept out the temple precincts with the sacred broom, being careful not to breathe, while within, run¬ ning outside to draw a fresh breath. Prayers were recited for a bountiful crop, as a great cake was laid upon the altar. In family wor¬ ships, offerings of milk, honey, fruit and flowers were made. Blood was C(the savor and charm® of sacrifice which

was conducted with much pomp. It was caught in vessels or in a pit as the victim was led thrice about the altar and killed by the altar stone, amid festal song, and was sprinkled over the sacred trees, altar and walls of the holy place. Entrails, heart, liver and lungs were devoted to the gods — the rest was devoured by the people. The favorite animal for sacrifice was the horse; ox, boar, ram and cock, all males, were also accepted, white animals being preferred, but black were also chosen. Human sacrifice, too, was not disdained. The chain of evidence reaches from Tacitus to the borders of the Middig Ages. <(In old Scandinavian legend,® according to Gummere, ((the old ferocity lin¬ gered longest.® Captives, criminals or slaves furnished victims for the sacrificial altar, as illustrated by the Viking practice to redden the keel, at the launching of the new ship, by the victim's blood. The marked love of human sacrifice is proved by the Cimbrians in Italy, the wholesale sacrifices among battling Ger¬ man tribes and the emphatic testimony of vol. 24 — 7

Tacitus in his (Germania. 5 Gummere relates ((Germanic Origins,5 p. 464) that in 1843 when a new bridge was to be built at Halle, the peo¬ ple vainly insisted that a child should be walled into it to insure good luck.

In Other Lands. — How the Gauls favored human sacrifice is shown by Julius Caesar who writes ((heaped mounds® would be met in Gaul, which were places of sacrifice. A huge image in the form of a man or a deity would be erected all hollow within, into which human victims would enter and then be set on fire. In Africa in the last century a king of Ashanti, wishing to secure the favor of the gods for his palace, had 200 girls put to death and their blood mixed with the mortar for the new edifice. In Mexico where human sacrifices were very common the rain god was propitiated by the sacrifice of children and to ensure a good harvest men and children were sacrificed to the spirit of corn. A certain mimicry of sacri¬ fice is illustrated by the Mexican offering of a puppet of dough in the form of a man, while the maiden sacrifice to the Nile was an image of mud formed on the banks of the river. Not many years ago hundreds of human victims were offered on the west coast of Africa, where various forms of sacrifice existed. Among the American Indians sacrifices were not so common — the Pawnees and the Iro¬ quois were addicted to such practices. Some curious resemblances to the Mosaic sacrificial systems have been found in the religious cus¬ toms of the Aztecs and Latin- American races in general.

Kinds of Sacrifice. — A number of recent scholars, taking the initiative from Robertson Smith and Wellhausen, trace sacrifice to primi¬ tive forms of religion, connected closely with totemism, although it is difficult to derive what appears to be a universal tendency from so nar¬ row an origin. In the evolution of sacrifice, they distinguish various kinds, for instance, the communal, where a festal meal is shared in common by the god and the

worshipper ; the honorific, which consists of gifts and libations in honor of the god as if he were an earthly ruler; the piacular, when with consciousness of having done wrong and having brought upon oneself some stain or reproach, an offering is made to atone for the wrong or to cleanse from the impurity, as if the gods were estranged and angry; the mortuary, where, after a death, offerings, especially of human beings, are made as guides or companions in the other world, or as furnishing strength to the dead by the blood of the victim ; human, as in primitive cults when human victims are offered to rivers, in the redemption of the first born and as proved by the early law of blood revenge. Such theories, however, are hardly held as convinc¬ ingly as a few decades ago. The scattered evi¬ dence in their favor is not always trustworthy and may be at times susceptible of other mean¬ ings.

Bibliography.— Brinton, D. G., < Religion of Primitive Peoples) (1897) ; Cushing, F. H., (Zuni Tales) (1902) ; Frazer, (The Golden Bough) ; Farnell, (Cults of the Greek States5 ; Hoffman, (Berlin 1905) ; Jastrow, M., (The Study of Religion5 (1901); Lang, (Myth, Ritual and Religion5 (1899); Muller, Max, (Hibbert Lectures on the

Origin and Growth of Religion as illustrated by Religions of India } (1898) ; Reinach, S., (Orpheus, a General History of Religionˆ (London and New York 1909) ; Smith, Robert¬ son, (Religion of the Semites) (1894) ; Spencer, Herbert, Principles of Sociology) (part 1, xix, 1889) ; Trumbull, (The Blood Covenant (1885) ; Tyler, Primitive Culture) (1891) ; Westermarck, (Origin of Moral Ideas) ; Zim- mern, Peitrage zur Kenntniss der Baby- lonischen Religion } (1896).

Abram S. Isaacs,

Professor of Semitic Languages, New York University.

SACRILEGE, the act of violating or pro¬ faning any sacred thing or any place that has been dedicated to the service of God, as a church or a chapel ; in popular usage it means breaking into a place of worship and stealing therefrom. Another meaning of sacrilege is the alienating to laymen or to common uses, of what has been dedicated, appropriated or consecrated to religious persons or purposes. As thus understood, sacrilege is an offense tri¬ able by ecclesiastical courts. In the Roman law robbery of churches was, under the Justinian Code, punishable with death. It was formerly a capital crime in English common law also, but by the statutes 24 and 25

*Victoria burglary of churches is treated simply as burglary, and theft of sacred things from sacred places as larceny. Neither in the statutes of the United States nor in those of any of the individual States of the Union is sacrilege treated as a crime in any way different from common burglary or larceny. Consult Spellman, (The History and Fate of Sacrilege.**

SACRISTAN, the original of the name ˆsexton,® which is an abbreviation of sacristan, the former title being still retained in some churches. The sacristan is an officer in a church whose duty it is to take care of the church and all belonging to it, the sacred vestments and utensils, etc., and to prepare whatever may be required for the sacred offices.

SACRISTY, in the ancient Church a build¬ ing attached to the basilica and consisting of three parts: (1) The reception-room, in which the bishop was received by the clergy and also gave audiences. It was in this room at Milan that the Emperor Theodosius asked absolution of Saint Ambrose. (2) The sacristy proper in which the sacred vessels and vestments were kept for immediate use; here the officiating ministers robed themselves for divine service. (3) The chamber in which office books, vest¬ ments and church plate not in present use were kept. In many modern churches the sacristy is called the vestry, and consists of but one room.

SACROBOSCO, sak-ro-bos'ko, Johannes de (John of Holybush, Holywood, or Halifax), English mathematician and astronomer : b. Halifax, Yorkshire; d. Paris, 1256. He entered the University of Paris in 1221, afterward be¬ coming a professor there. His most celebrated work is a treatise,

de Computo Ecclesiastico' ; a work on arithme¬ tic, bearing the title (De Algorismo, which is one of the earliest treatises on the subject in which the Arabic numerals are used. It was printed at Paris in 1498, with the Commentary of Petrus Cirvillus.**

SACRUM, the sacred bone (os sacrum), a compound triangular bone situated at the lower part of the vertical column (of which it is a natural continuation), and wedged between the two innominate bones so as to form the key¬ stone to the pelvic arch. In man it consists of several vertebrae with their bodies and processes consolidated into a single bone. Its anterior surface is concave from above downward and from side to side. The posterior surface is con¬ vex, and presents in the middle vertical line a crest, formed by the fusion of the spines of the vertebrae, of which the bone is composed. The last sacral vertebra has, however, no spine, and the termination of the vertebral canal is here very slightly protected. In the female the sacrum is broader than in the male. The sacrum of man differs from that of the lower animals by its greater breadth in comparison wdth

its length. See Anatomy; Osteology; Pelvis ; Spine.

SACY, sa-se, Antoine Isaac, Baron Sil- vestre de, French Orientalist: b. Paris, 21 Sept. 1758; d. there, 21 Feb. 1838. Obtaining a thor¬ ough acquaintance with the Greek and Latin classics, he studied Hebrew, Syriac, Chaldee, Samaritan, and then Arabic and Ethiopic. To these he added a knowledge of the principal European languages, including Turkish. Later he mastered Persian. During the Revolution he withdrew to a short distance from Paris, and lived unmolested, though his attachment to mon¬ archy was well known. In 1795, when the Con¬ vention established a school of Oriental lan¬ guages, De Sacy was appointed professor of Arabic, and was allowed to retain this situation notwithstanding his refusal to take the oath to the new Constitution. Bonaparte made him pro¬ fessor of Persian in the College of France (1806), and afterward bestowed upon him the title of baron (1813). In 1808 he was elected by the department of the Seine into the legis¬ lative body; but took no part in the debates till 1814, when he voted for Napoleon's deposition. In 1815 he was appointed rector of the Uni¬ versity of Paris, and shortly after member of the commission for public education. While officiating in these capacities he formed around him a circle of scholars, by which he became indirectly the teacher of all Europe. He took a prominent part in founding (1822) the Asiatic Society of Paris, of which he was president; and it was by his recommendation that pro¬ fessorship of Chinese, Sanskrit, Manchu and Hindustani were established in the capital. In 1832 Louis Philippe raised him to the peerage and made him, after Remusat's death, which took place in this year, conservator of the Oriental manuscripts in the royal library. Among his works may be mentioned (Principes de grammaire generale (1799); (Grammaire Arabe) (1810), and (Chrestomathie Arabe> (1806) ; (Expose de la religion des Druses> (1838); (Calila et Dimma) (1816).*

SADDLE, a seat for a horse's back, con¬ trived for the safety and comfort of the rider. In early ages the rider sat on the bare back of

his horse, but in course of time some kind of covering was placed over the back of the ani¬ mal. The modern riding saddle consists of the trqe, generally of beech, the seat, the skirts and the flaps, of tanned pig's skin, and the con¬ struction and weight vary- according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles and side saddles for ladies. The name saddle is also given to a part of the harness of an animal yoked to a vehicle, being generally a padded structure by means of which the shafts are directly or

indirectly supported. It is further applied to the support of a rod in machinery or of a spar of a ship.

SADDLE MOUNTAIN, Mass., the chief group of the Taconic Mountains, in the north¬ ern part of Berkshire County, four miles south¬ east of North Adams, and containing Greylock Mountain, the highest peak in the State, 3,535 feet in altitude.

SADDLE REEFS. During the process of folding an anticline the beds at the crest or apex of the fold sometimes tend to open or separate just as a pack of cards might do when bent sharply. If these openings become filled with mineral matter they form a special type of veins which are known as saddle reefs be¬ cause of their saddle shape. Certain veins of the Nova Scotia gold field and of the Bendigo gold field in Australia are of this type.

SADDLEROCK OYSTER, a large and favorite kind of oyster originally obtained from a reef known as Saddle Rock near Norwalk Harbor, Connecticut. The supply was ex¬ hausted early in the last century, but in the first attempts at artificial cultivation of oysters (q.v.) in the eastern part of Long Island Sound many small ˆseed-oysters® were derived from that district, and so the name continued until it be¬ came a market term about New York for large and well-shaped oysters mostly sold to be eaten raw.

SADDUCEES, a sect or party of the Jews during the last three centuries preceding the fall of Jerusalem and the end of the old Jewish state (70 A.D.). The history of the party and the facts as to its constituency, beliefs and practices are only imperfectly known. The statements in Josephus and the New Testament, cur most important evidence, are not altogether satisfactory. The New Testament writers may have been indirectly influenced by Pharisaic prejudice, while Josephus, writing to please and interest Greek and Roman readers, limits himself to a few somewhat general and not altogether consistent observations. In the New Testament the Sadducees are linked with the Pharisees as opponents of Jesus (Matt, xvi, 1, 6, 11, 12, etc.) ; they are said to have denied the resurrection of the body (Matt, xxii, 23ff and parallels), also the existence of angels or spirits (Acts xxiii, 8). As influential priests and members of the Sanhedrin the Sadducees officially opposed the early preaching of the Apostles (Acts iv, 1; v, 17). They sat side by side with Pharisees in the Sanhedrin or Supreme Council of Judaism (Acts xxiii, 6ff), although the two parties were hostile to each other. ...

Josephus ((War,) ii, 8, 14;

fate (i.e., Providence) nor in the immortality of the soul. They emphasized human free will and responsibility and were more austere and inclined to

severity in judgment than were the Pharisees. They rejected tradition and held the written law alone to be authoritative. They be¬ longed mainly to the more wealthy and aristo¬ cratic circles and were not influential with the mass of the people. Josephus, doubtless, knew more about the Sadducees than he set down in his writings. It must be remembered that the evidence of both Josephus and the N.ew Testa¬ ment holds good mainly for only the very last period of Jewish history when these Sadducees were only a shattered remnant of a once great and powerful party. There is no trace of any distinct parties in post-exilic Judaism until about 180 b.c. when the close contact with Hel¬ lenism consequent on the Seleucid supremacy over Palestine, led to an ardent Hellenizing propaganda and consequently to a cleavage of the Jewish community into two factions, the conservative and the radical or Hellenistic. But it is a mistake to identify the Sadducees with the latter, who were willing to sacrifice even the law itself in favor of conformity to Greek ideas and practices. The conserva¬ tives stood for steadfast loyalty to the law and Jewish customs and prejudices. But within the conservative ranks — which comprised the majority of the people — two tendencies were operative. Some, with loyal acceptance of the law and reverence for it as the supreme re¬ ligious authority, were content with the Law as written. They opposed an accumulation of traditional interpretation as authoritative. Dog¬ mas not explicitly taught in the Law might be refused assent. On the other hand were those wTho sought to make the Law ever more com¬ prehensive and universally applicable through exegesis or interpretation. Such interpretations became an ever-enlarging body of tradition as binding as the Law itself. This was the party of the Scribes — ardent students of the Law — while the other tendency was mainly represented by the priests and aristocracy. The scribal po¬ sition was essentially that Israel was funda¬ mentally a church — a religious organization; the opposite position allowed full room for the conception of Israel as a political entity — a nation among the nations of the world. In the reorganization of the Jewish state under the Asmonean priest-princes (142-63 b.c.), the party of the scribes became definitely organ¬ ized as the Pharisees. The group or party op¬ posed to the Pharisees were known as the Sad¬ ducees, probably because so many of the Zado- kites (i.e., the priestly aristocracy, cf. Ezek. xliv, 15f.) were among its influential mem¬ bers. There is no evidence, however, that these were so strictly organized as was the case with the Pharisees (q.v.). In general, the As¬ monean rulers were inclined to favor the Sad¬ ducees. The Pharisees thus became the party of opposition.

The non-priestly aristocracy also generally sided with the government, that is, were counted as Sadducees. The numbers of this generally patriotic, conservative party were sadly dimin¬ ished in the civil strife preceding the Roman occupation (63 b.c.) and in the wars between Llerod and

Antigonus, the last Asmonean prince. Its representation in the Sanhedrin was re¬ duced and its hold on the people greatly dimin-

ished. In Herod's later years the party seems to Have bettered its condition but it never again recovered its earlier power and influence. As a party it ceased to exist with the fall of Jeru¬ salem, 70 a.d., and the complete disorganization of Judaism that ensued. The view advocated above is somewhat different from the tradi¬ tional one which takes the Sadducees to have been, as a party, somewhat irreligious, inclined to Hellenism, worldly and with little reverence for the Law and sacred things in general. That some Sadducees were such is probably true, but it certainly is not correct to so characterize the party as a whole.

The Sadduciac type of thought is represented in Jewish literature by such works as Eccle¬ siastes in the Old Testament, by Ecclesiasticus snd 1 Maccabees in the Apocrypha, and pos¬ sibly by the Testaments of the XII Patriarchs and the Book of Jubilees in the Pseud- epigrapha. A most interesting Sadduciac work, hitherto unknown to modern scholars, was recently discovered in the Cairo genizah by Dr. S. Schechter and published by him (Ox¬ ford 1910) under the title fragments of a Zadokite Work. In this we have evidence of the existence of a reform party or sect within the Zadokite circle which originated about 200 b.c. and was still in existence, hoping for bet¬ ter things, as late as near the beginning of the Christian era, the date of the fragment.*

Bibliography. — Wellhausen, J., Die Phan- saer und die Sadducaer (Greifswald 1874) ; Scharer, E., (Geschichte des judischen Volkes im Zeitalter Jesu Christi* (4th ed., Leipzig 1907) ; Bousset, W., (Religion des Judentums* (2d ed., Berlin 1906) ; Leszynsky, R., (Die Sad- duzaer* (Berlin 1912) ; Charles, R. H., frag¬ ments of a Zadokite Work* (Introduction, Text and Notes, Oxford 1912) ; Moore, G. F., in Harvard Theological Review (1911, pp. 330- 377) ; Lauterbach, J. Z., in Studies in Jewish Literature, etc. (Berlin 1913).*

Edward E. Nourse,

Professor of Biblical Theology, Hartford The¬ ological Seminary.

SADE, Donatien Alphonse Frangois,

Count, popularly called the Marquis de Sade, French libertine and novelist: b. Paris, 2 June 1740; d. Charenton, 2 Dec. 1814. From the age of 14 to

26 he was in active military service until his return to Paris in 1766 when his im¬ moral life became notorious. At Aix in 1772 he received the penalty of death for an un¬ natural crime and for poisoning, but escaped to Italy. Returning to Paris in 1777, he was re¬ arrested and jailed in Aix, but again escaped only to be recaught and finally committed to the Bastile where he killed time by writing lewd novels and plays. These include

SADHS, sads, or SAADHS, sa'ads, a Hindu sect which believes in one God, and teaches a pure morality. The sect was founded in 1658 a.d. by a man called Birbhan. They

have no temples, but assemble at stated periods in houses, or courts adjoining them. They are found chiefly in Farukhabad, Delhi, Mirza- pore, etc.

SADI, sa-de', or SAADI (Moslehedin Shirazi), Persian poet; b. Shiraz, about 1194; d. there, 1291 or 1292. After completing his studies and spending many years in travel, he settled in the neighborhood of Shiraz, where he enjoyed the favor of several Persian rulers. The Persians esteemed him exceedingly on ac¬ count of his golden maxims, which they con¬ sider a treasure of true wisdom, and also on account of his pure, simple and elegant style. His works comprise (1) a collection (Divan) of lyric poems in the Arabic and Persian lan¬ guages ; (2) (Gulistan* ((Garden of Roses*), a didactic work composed both of prose and verse, in eight books; (3) a work in verse, called (Bustan* ((The Orchard*), containing a collection of histories, fables and moral instruc¬ tions. The complete works of Sadi were pub¬ lished in Persian at Calcutta (1791-95). Graf has published translations from the (Divan* in ˆeitschrift der morgenlandischen Gesellschaft,* and there is a German translation of the politi¬ cal poems by Ruckert (with life of Sadi, 1894). There are editions of the (Gulistan) by Sprenger (1851) and others, and among English transla¬ tions are those by Eastwick (1880) and Ross (1823). The

SADI-CARNOT, sa-de kar-no. See Car¬ not.

SADLER, sad'ler, Anna Teresa, Canadian

writer: b. Montreal, Quebec, 1856. She has writ¬ ten much for the Roman Catholic press, and her published books include (Ethel Hamilton, and Other Tales> (1877) ;

SADLER, or SADLEIR, Sir Ralph, Eng¬ lish diplomatist: b. Hackney, 1507; d. Standon, Hertfordshire, 30 March 1587. He became the ward of Thomas Cromwell, was one of Henry VIII's principal secretaries of state and was appointed by Henry's will one of the council to assist the executors

upon whom was laid the government of the country and the guardianship of young Edward VI. He went into retire¬ ment during Mary's reign, but emerged after the accession of Elizabeth, and became one of Cecil's agents, especially charged with negotiat¬ ing Scottish affairs. In 1568 he became chan¬ cellor of the duchy of Lancaster and thereafter he was mainly occupied as one of the English commissioners to treat of matters relating to the queen of Scots. In 1580 he was for a time one of her guardians at Sheffield and Wingfield. His last mission was to James VI of Scotland in 1587 to endeavor to reconcile him to the execution of his mother. Consult Sadler's State Papers, with memoir and historical notes by Sir Walter Scott (1809).

SADLER, Reinhold, American legislator: b. Prussia, 10 Jan. 1848. He came to the United

States when young, and has been for many years a resident of Nevada. He was elected lieutenant-governor of Nevada in 1895, and on the death of Governor Jones in 1896 became governor. He was regularly elected to the office in 1898, which he occupied until 1903.

SADLIER, Mary Anne (Madden), Cana¬ dian author: b. Cootehill, County Cavan, Ire¬ land, 21 Dec. 1820; d. 1903. She early con¬ tributed to London magazines, and in 1844 emi¬ grated to Canada, where she settled in Montreal and in 1846 was married to James Sadlier. She was for many years editorially connected with the Roman Catholic press, and also translated religious and other works from the French. Author of (Alice Riordan) (1851) ; (The Con¬ federate Chieftains, a Tale of the Irish Re¬ bellion of 1641 > (1859) ; (Purgatory, Doctrinal, Historical and PoliticaP (1886), etc.

SADO, sa'do, Japan? an island off the west coast of Hondo, opposite and 32 miles from Niigata, with an area of 336 square miles, and a coast line of 135 miles. It has a diversified surface culminating in Kimpokuzan, 3,820 feet high. South of Kimpokuzan is the town of Aikawa, near the east coast, with the ancient and still productive gold and silver mines in its vicinity, to which Sado owes its celebrity. On the west coast 18 miles distant from Aikawa is Ebisuminato, the port of the island. Pop. of island about 120,000.

SADOLETO, sa-do-la'to, Jacopo, Italian theologian : b. Modena, 1477 ; d. Rome, 18 Oct. 1547. He was consecrated bishop of Carpentras, near

Avignon, in 1517; belonged to the Con- tarini Reform party, and was a member of the commission appointed by Paul III to take steps toward effecting a Church reformation.. He im¬ mediately opened a correspondence with Eras¬ mus, Bucer, Sturm and Melanchthon, but when in 1539 he invited the Genevans to return to the Roman Catholic Church, he received a harsh rebuff from Calvin. After that he confined himself largely to his own diocese. He had been appointed cardinal in 1536, but while he was frequently summoned to Rome he preferred Carpentras, and his study, well-stocked with books of the new learning, in which he was an adept, being one of the Latinists of his day. He wrote commentaries on the Psalms, and on the Epistles of Saint Paul, and so excellent was their style that Erasmus made the somewhat invidious remark that <(their very polish of . ex¬ pression will take off the edge of their pious suggestiveness.® His works were published in four volumes in 1734. He was a diplomat in whom successive popes had confidence and acted as ambassador to Francis I in the interests of peace in 1544. Consult Joly,

SADOWA, sa'do-va (Czech Sadova), Cze- cho-Slovakia, a village near Koniggratz, on the Bistritz, remarkable as one of the hotly contested Prussian positions in the decisive bat¬ tle of 3 July 1866, in which the Crown Prince of Prussia and Prince Frederick Charles com¬ manding the Prussians defeated the. Austrian forces under Benedek. This battle is known also as the battle of Koniggratz.

SADTLER, sat'ler, Samuel Phillip, Amer¬ ican chemist: b. Pine Grove, Pa., 18 July 1847. He was graduated at Lehigh University in 1867

and later studied at the universities of Berlin and Gottingen. He was professor of natural science at Pennsylvania College in 1871-74; as¬ sistant professor of chemistry at the Univer¬ sity of Pennsylvania in 1874—86, and professor there in 1887-91. He was professor of chem¬ istry at the Philadelphia College of Pharmacy in 1878-1916; and since 1891 has been a consult¬ ing chemical expert at Philadelphia. He was chemical editor of the (United States Dis- pensatory> (15th to 19th editions) ; and from 1900 was a member of the committee of re¬ vision of the (United States Pharmacopoeia. J Author of (Hand Book of Chemical Experi¬ mentation (1877) ; /Industrial Organic Chem- istry) (1891); and joint author of Pharmaceuti¬ cal Chemistry) (1895; 5th ed., 1917).

SiEMUND, samoond, Sigfusson, The

Wise, Icelandic scholar: b. Iceland, about 1056; d. Oddi, 1133. He undertook a course of foreign travel in pursuit of learning, and visited Paris and Rome ; then, returning to Iceland, he became a priest at Oddi (1176). He was un¬ known to scholars till about 1643, when the newly-discovered

(Elder Edda > and other writ¬ ings were falsely ascribed to him.

SAFE, a strong and substantial receptacle for money, important papers and valuables, usually of iron or steel, or of both combined; sometimes with a filling of concrete to resist heat. A safe, to justify its name, should be proof against fire, explosives, acids, drills, wedges and the other implements and opening devices resorted to by burglars. The great ma¬ jority of safes are designed mainly to preserve the contents from fire and to resist sneak-thieves. But the larger and most costly safes are built to safeguard the cash and securities of banks, trust companies, etc. The history of the progress of these strong safes is mainly a record of struggles between the burglar and the safe- manufacturer; the result is, that safes can now be obtained which are all but impregnable. With the modern safe of the best kind the lock may be said to be the only vulnerable point ; hence much care and ingenuity have been expended on its mechanism. Numerous patents, mostly of American origin, have been introduced in re¬ cent years. Of these, the keyless permutation locks deserve particular mention, as they obviate the danger which arises from lost or false keys. Such locks allow of opening only after an in¬ dicator has been moved in accordance with a certain combination of numbers arranged before closing the safe. Some safe-locks are so con¬ structed that to be freed they require different keys on different days, some can only be opened at a certain hour, this being fixed on before the door is closed; while others again require two or more keys in charge of different persons ; in fact, the arrangement contrived to render the plundering of safes next to impossible are too numerous even to mention. The connection of safes with electric alarms in a variety of ways forms another safeguard. See Vault.

SAFE-CONDUCT, a security granted by the sovereign authority, or persons delegated by it, to strangers or other persons to enable them to repair to and return from a certain place un¬ disturbed. In most of these cases passports have now taken the place of special safe-con¬ ducts. Sometimes the safe-conduct is given to

persons accused, to secure them against harm when summoned to an examination.

SAFE INDUSTRY IN AMERICA. Va¬ rious methods for the safe-keeping of treasure, jewels and other valuables have been in use since the earliest periods in history, and the ad¬ vancement in this line has necessarily kept pace with increased wealth. Thus we have wit¬ nessed the evolution from

the old-fashioned strong-box to the massive chilled-iron and steel vaults, absolutely fire-proof and burglar- proof, till they have reached the highest degree of efficiency and perfection that science and skill can make them. Locks of rude construction were in use by the ancient Egyptians, and during the Middle Ages by the Romans. The Chinese also used a lock similar in construction to the famous Bramah lock, invented in Eng¬ land in 1784. These were made of wood, the tumblers being of different length to fit the sizes of the wards in the keys. Beginning with the Middle Ages the inventive genius of man was turned toward providing something more sub¬ stantial than a lock as a method of warding off the burglar, who at that time had not attained to the remarkable skill and cunning of the modern ((cracksman,® and indeed the profes¬ sional thief of modern times would look back with envy on his predecessor who had nothing more than a mere wooden box, sometimes bound with iron, with which to cope. The first means of securing valuables was by placing them in some secret cavity in a wall, the door of which was opened by a spring or other device, but more often articles of household furniture were used, such as desks with secret drawers, or tables and chairs with false bottoms. These constituted the chests of the wealthy for some time and some of them were furnished with locks and bound with strips of iron, the whole very artistically made so as to ward off sus¬ picion of their contents. The oaken-chest or strong-box, reinforced with iron bands and knees, was in the beginning of the 18th cen¬ tury considered to be the best means of security. Such a chest was used in 1707 to guard the crown jewels of Scotland.

Prior to the 19th century the all-metal safe was unknown. The first improvement along this line was made in France about 1820, con¬ sisting of a metal box built within double walls, the space between being filled with a composi¬ tion of non-conducting substances. A little later a so-called fire-proof safe was constructed in New England, considered to be a vast im¬ provement over the existing types. This safe had a body of solid oak plank from three to four inches thick, which, after being thoroughly saturated with alkali, was covered with sheets of thin iron. To make this more surely fire¬ proof, bands of iron were crossed and recrossed over these plates and nailed down with large round-headed iron spikes. The great fire in New York in 1835 proved the worthlessness of these, several hundred of them being then de¬ stroyed. The idea of filling in the walls of a safe with non-conducting substances was first put into use in this country in 1843 by Daniel Fitzgerald. His idea was to fill the metal walls of the safe with plaster of paris because of its tendency to throw off heat, and having secured a patent on his invention he immediately began to manufacture a safe known as the ((Sala¬

mander.® His patent was later assigned to B. J. Wildey, who made a safe called <(Wildey's Patent,® the principle of these being to leave the space

between the walls empty, trusting that the contents of the inner portion of the safe would be protected from heat by the non-con¬ ducting properties of the air. Other mixtures, such as asbestos, mixed with plaster of paris, clay, alum, fire-clay, mica, chalk, etc., were then used to fill the vacant space, but none of these proved absolutely satisfactory. To-day the modern safe walls are filled either with alum or some other salt, which when heated gives off a quantity of water. Various water-chamber devices have also been employed, with a view to maintaining a body of steam between the inner and outer shells of the safe when ex¬ posed to a hot fire.

Outside of the fire element, the most im¬ portant part of the safe to be considered is the lock, for with our modern methods of fire protection the danger of burglary is often as great as possible loss by fire. The first sup¬ posedly non-pickable lock was the Bramah, but was finally proved to be valueless and easily picked, this being done by a Mr. Hobbs, by the ˆtentative process.® Three other locks then came into use, the Chubb, also picked by Mr. Hobbs, the Pye lock, invented in 1851, but picked by Linus Yale, Jr., of Philadelphia, by the ((impres- sion process,® and the Yale lock. Since then many new forms of locks have been invented, and the modern lock-combinations are con¬ structed in a manner which has made the trade of burglary extremely difficult.

There are three ways of procuring security against burglary, first by the laminated con¬ struction ; second, by the use of blocks of chilled iron, this method being more useful in the con¬ struction of large vaults than in the making of portable safes: and third, by the spherical chilled-iron safe. In the first method of con¬ struction the chamber is made of alternate lay¬ ers of hard and soft plates of iron and of plates of hardened steel, the two laid alternately over each other in the walls of the chamber in such a way that they form a single mass. Thus the body of the safe, being constructed of alter¬ nate plates of iron, welded iron and steel, carbonized and decarbonized steel, and crys¬ tal steel, fastened together by means of bolts from the inside, has made safes practically impregnable to drills, jimmies, jackscrews and other devices. Another method of making safes, in common use by manufacturers, is to roll down together while hot into one solid sheet of tempered steel three layers of soft iron or steel alternated with two intermediate layers of hard steel. These composite sheets, when they have been rolled till about one-half of an inch thick, are then built into the walls of the safe and alternated with plates of heavy steel about one-half inch thick. The doors are generally the weak point in the construction of a safe, for it is these which a burglar first attacks to see if there is any crevice into which a wedge might be inserted, or any crack into which nitro-glycerine or any other high ex¬ plosive might be introduced. In some safes the plates comprising the door are dovetailed, en¬ gaging with the corresponding parts of the jamb; in some an air-tight packing is used be¬ tween the jambs

and their abutments; while in others a screw door is used.

One solid mass of metal is used in the second and third types of safes, the tough and hard qualities of the metal being obtained by modern processes of steel-making. The metal used is a soft sheet-iron, the surface of which can be hardened by cooling. In the construction of many vaults, blocks of chilled- metal, weighing from three-quarters to several tons, are bolted together on the inside, the

sides being dovetailed together, and the outside surface is chilled to the highest degree of hard¬ ness. The door is a single casting of steel,

two inches thick, and also chilled on the out¬

side.

In the third type, the spherical, invented by William Corliss, the shell, constructed of steel from four to seven inches thick and

chilled to a depth of about two inches, some¬ times contains a ˆbugging® made from a special ore. Ihis material, which is excessively hard and is in appearance somewhat like crystallized silver, is so interwoven with wrought-iron rods that it can be battered with immense force with¬ out damage. The purpose of this construction of wrought and crystallized iron is to hamper a burglar in his work, it being supposed that in an attempt to drill through the walls of the • safe, the drill will penetrate the soft metal more readily than the hard, and, consequently, work¬ ing sideways, will be broken off when it strikes the hard metal. The "bugging® may, however, be used in precisely the opposite manner, the rods being made of the hardest tool-steel and the body of the filling composed of cast-iron segments, but the principle of turning the point of the "cracksman's® drill is the same. The circular door is especially suitable for the spherical safe. They are closed after the man¬ ner of the breech-block of a large gun, with an interrupted thread or screw.

In large banks and safe-deposit vaults there is no room sufficiently large to contain the num¬ ber of individual safes which would be required to hold the enormous masses of money and other valuable securities with which these insti¬ tutions are entrusted. This has turned the at¬ tention of the manufacturer in recent years to the building of large vaults which would be absolutely fire and burglar-proof. The interior of these vaults may be constructed to suit the tastes and requirements of the owner, but the walls

are now made much thicker than formerly and the builder has made more use of fire¬ proofing materials. The most important feature of the modern vault is the lock, which has now reached the acme of perfection. The first form of lock used was the combination-lock, an outgrowth of the "tumbler® lock, and the mechanism of these is very ingenious. These locks are not limited in the number of combina¬ tions upon which they may be set, and may be changed at any time should the combination become known to undesirable persons. The most valuable asset of the modern vault, how¬ ever, is the chronometer, or time-lock, the mechanism of which is as intricate and as com¬ plicated as the best watch, but at the same time it runs as true and as smoothly. To offset any possible disarrangement in the mechanism of a single clock, which would, of course, prevent the opening of the safe, three movements are usually enclosed in a single case. As these safes cannot be opened by any available agency until the time set for the clock to operate the

mechanism which swings back the ponderous doors, it is obvious that the chronometer com¬ bination is the greatest safeguard against rob¬ bery which the bank can employ.

In 1914 there were 31 establishments en¬ gaged in the manufacture of safes and vaults, capitalized at $6,898,000. They utilized the serv¬ ices of 2,107 employees, paying wages of $1,366,000; manufactured products totaling $5,- 366,000 in value, of which $3,571,000 was value added to the cost of materials. These figures indicate a serious reduction in the industry in the decade, for in 1905 there were 3,488 wage- earners, and the gross products were $7,861,000. The value of the American safe has been recog¬ nized in foreign countries, and to-day may be found throughout Great Britain, Europe, Asia, Africa, Australia, South America, etc. See Lock; Vault, Etc.

SAFED, sa'fed, Palestine, occupies the summit of a hill 2,700 feet high, on the shores of the Mediterranean, about 10 miles northwest of the Sea of Galilee. Safed was a fortified place of importance during the Crusades, and is one of the four holy cities of the modern Jews in Palestine, their settlement dating from the 16th century. Pop. (estimate) 19,000.

SAFETY-LAMP. See Lamps.

.SAFETY-VALVE, a device used upon steam boilers and other vessels subject to an internal pressure, for the purpose of automat¬ ically preventing that pressure from rising to a dangerous intensity. It consists essentially of an opening in the boiler (or other vessel) over which a suitable lid or "valve-disc® is fitted. The valve-disc is pressed against its opening with a definite, constant pressure, whose magni¬ tude is regulated

according to the pressure that the boiler is intended to carry. So long as the pressure that the steam within the boiler exerts upon the under side of the valve-disc is less than the constant force with which the disc is pressed down upon the opening, the valve re¬ mains closed and no steam escapes. If the pressure within the boiler rises, however, so that the steam exerts upon the disc a total pressure that is greater than the external force that tends to hold the disc in place, the valve opens and permits steam to escape until the pressure in the boiler is rufficiently reduced for the external force again to close the opening. There are three general types of safety-valve in use, which are respectively known as "dead- weight,® ((lever® and "pop® valves. The funda¬ mental principle of operation is the same in all and the classification relates merely to the means that are employed to hold the valve-disc against the opening in the boiler. In the "dead- weight® valve this is accomplished by placing weights directly upon the valve-disc. Safety-valves of this type can be recommended for low pressure boilers and they are much used, in England, upon heating and upon kitchen boil¬ ers. They are not adapted for use in connec¬ tion with high pressures, however, for the load resting upon the valve-disc must then be very great, in order to prevent the valve from open¬ ing at the ordinary running pressure. It is common, therefore, to use the "lever® type for high pressure service. In this type the valve- disc is held against its seat by the action of a weight, but the weight does not rest directly upon the disc. A horizontal lever two or three

feet long is provided, and this is pivoted at one end, while the weight is attached near its free end. The centre of the valve-disc comes directly under the lever, a few inches from the pivoted end, and the lever is supported by means of a stout vertical rod whose lower end rests upon the centre of the valve-disc. By this means the total downward force acting upon the disc and tending to keep it in position may easily be made to be 8 or 10 times as great as that which would be realized if the weight rested upon the valve-disc directly; and the pressure at which the valve will open can be nicely regulated by shifting the position of the weight upon the lever arm. In the "pop® valve the disc is forced against its seat by means of a stout spiral spring, which is held in position by a framework or casing which is securely attached to the boiler. The compres¬ sion on the spring is regulated by means of a screw that acts upon its upper end and which can be turned by a wrench. It is now custom¬ ary, however, to have the adjusting screw en¬ tirely within the casing of the valve so that the attendant in charge of the boiler cannot tamper with it ; the casing being provided with a lock, the key to which remains in the posses¬ sion of the owner of the boiler. The name "pop® refers to the sound that these spring valves make when they open

and close. Lever valves and dead-weight valves open and close gradually and before they open they give warn¬ ing by a hissing sound. "Pop® valves, on the contrary, open without any such premonitory signal, and when they close they do so with corresponding quickness. "Pop® valves are used exclusively upon railroad locomotives, as the violent swaying and vibration to which these are subject would render weighted valves unde¬ sirable.

SAFFLOWER, a large thistle-like compos¬ ite plant (Carthamus tinctorius) with orange- colored flowers, said to have been originally brought from the East, but now naturalized in many parts of Europe and extensivelv culti¬ vated. The tubular flowerets are collected, dried and used somewhat as a feeble laxative medicine, in place of, or as an adulterant of, saffron. They are, however, chiefly important as the source of carthamin, a dyeing principle originally much employed by the Chinese and later by Occidental silk manufacturers, as it gives brilliant, although fugitive, red tints ; mixed with French chalk it forms the cosmetic rouge. In Spain the flowers are used to color soups and other dishes. The Jews in Poland are remarkably fond of the flowers and mix them with their bread and most of their viands. Oil, in India, is expressed from safflower seeds, for culinary and lighting purposes.

S AFFORD, Truman Henry, American mathematician and astronomer: b. Royalton, Vt., 6 Jan. 1836; d. Newark, N. J., 13 Tune 1901. He was early known as a calculator of great skill; in 1845 prepared an almanac; by a method of his own he abridged by one-fourth the task of computing the rising and setting of the moon, and after his graduation from Har¬ vard was officially connected with the observa¬ tory there, 1854—66. In 1865 he was appointed professor of astronomy in the University of Chicago and director of the Dearborn Observa¬ tory; in 1874-76 was a member of the United

States Coast Survey, and in 1876-1901 professor of astronomy in Williams College. He was a Fellow of the American Academy of Arts and Sciences, of the American Association for the Advancement of Science and an associate of the Royal Astronomical Society of England. He studied the nebulae, discovering manv new ones ; computed cometary and planetary orbits and for some time devoted his attention to latitude and longitude work for the United States Corps of Engineers, for which he prepared a star cata¬ logue. Among his further published writings were a catalogue of polar stars, Mathematical Teaching and its Modern Methods, > and nu¬ merous contributions to astronomical journals, to the (Proceedingˆ of the American Acad¬ emy and to the notices of the Royal Society.

SAFFRON, a bulbous autumnal plant (Crocus sativus) and a commercial

dye-stuff ob¬ tained from it. The cultivated saffron orig¬ inated probably in the Levant, and was grown in early times about the town of Corycus, Cilicia (from which the Crocus genus may have taken its name). The Arabs cultivated it in Spain about the 10th century, and it was an im¬ portant crop in England, especially about Saf¬ fron Walden, Essex, in the 15th century, bring¬ ing the highest market price. It is now raised about the Mediterranean and in Asia. The saffron is low, with the grass-like leaves and long-tubed, funnel-shaped flowers, springing di¬ rectly from the ground, which are character¬ istic of the crocuses. Its flower is purple, with a style tipped with three orange-colored stigmas, each more than an inch long, depending from one side of the perianth. These stigmas are picked off in the early morning and dried on a kiln, either loosely or between layers of paper, and under the pressure of a thick board which forms the mass into cakes, about 4,000 of these stigmas being necessary to give an ounce of saffron. In either case the commercial saffron is liable to suffer from adulteration. This adulteration was so prevalent at one time that those guilty of it (when caught) were killed.

Saffron stigmas, when genuine, have a char¬ acteristic orange red color and an aromatic, bitter odor and taste. The substance has faint carminative and narcotic properties, but is sel¬ dom used medicinally, except for coloring tinc¬ tures and occasionally as a diaphoretic in the eruptive diseases of children. In the (Song of Solomon) the saffron is mentioned among the sweet-smelling herbs, and it was much in de¬ mand among the Greeks and Latins for its per¬ fume. A fragrant essence was made from it with water and wine for sprinkling in theatres and other places, even in the streets, for anoint¬ ing the hair and for the bath. Saffron was also much employed in culinary operations, chiefly for its aromatic taste and for coloring, as -the clown in the (Winter's Tale says he "must have saffron to color the warden pies.®*

Saffron, however, is most commonly used as a dye, giving a yellow hue to cloth, but it is being displaced by cheaper colors. This tint was in very early times the royal color in Greece, and was that of some of the women's court robes, but afterward appropriated by the hetairae. In Ireland and the Hebrides it was also the color of the king's mantle and of the shirts of persons of rank. Saffron enters largely into the composition of the sacred spot

on the forehead of a Hindu Pundit. An ex¬ tract made from saffron, used as a glaze on tin- foil, imitated gold in mediaeval illuminations, and was

also employed by painters.

Helen Ingersoll.

SAG HARBOR, N. Y, village in Suffolk County, on Gardiner's Bay, an inlet from the Atlantic Ocean, and on the Long Island Rail¬ road, about 100 miles east of New York. It has a good harbor, regular steamer connections with New York and several of the Long Island coast towns. It has several manufactories, chief of which are a watch-case and silverware fac¬ tory, flour and cotton mills, a tannery and ma¬ chine shops. The Sacred Heart of Mary Acad¬ emy (R. C.), opened in 1877, a union school, public and parish schools and a library consti¬ tute the educational institutions. There are three banks with a combined capital of $100,000. The village is a favorite summer resort. At one time Sag Harbor was noted for its interests in whaling; its income from that in¬ dustry amounting to $1,000,000 some years. In those days its tonnage equaled that of New York. The Indian relics found in and near the village show it was once an important Indian settlement. Pop. (1920) 2,993.

SAGA, Japan, capital of the province of Fizen, on the island of Kiu-siu, 74 miles north¬ east of Nagasaki. It is an important seaport and commercial centre. The town is intersected by numerous streams, chief of which L the channel of Sentonofutsi, 50 miles long. It unites the Gulf of Simabara with the Northern Sea, and is of considerable commercial import- tance. Pop. about 36,500.

SAGA. The word saga is cognate with Ger¬ man Sage , (

In a wider sense the word saga is applied to any narration of events of the past, mythi¬ cal as well as historical in character, but pos¬ sessing the traits of the genuine saga. In these tales some legendary champion, from whom the saga takes its name and around whom the important events are centred, is the hero. Heroic achievement and marvelous adventure, fact and fancy, are mingled freely. In the course of generations the saga undergoes im¬ portant changes, acquires accretions and takes on a more or less poetic and artificial character. Finally it is consigned to writing and handed down as a kind of rudimentary epic. When applied, as they frequently are, to works of that kind, in which the historic element is found in greater or less degree, the words saga, myth,

legend, Marchen, epopee and epos are used without clear distinction of meaning.

In the third and last stage of its develop¬ ment, the word saga has come to mean any free creation of the popular fantasy, sometimes incredible or

even burlesque in character. Here the historical element is entirely lacking. In its widest sense, saga is sometimes used to include the entire body of the history and mythology of a people, or their literature or some division of it: hence we read of the Norse, German, Irish, or Greek sagas; of saga poetry, saga cycles, heroic sagas, beast-sagas, the Cuchulain saga, the Karl saga, the Nial saga. ' In Norse mythology Saga is also the name of a goddess.

The Icelandic sagas may be classified (1) geographically, according to the part of the country in which they arose or in which their scenes are located; (2) as major or minor sagas, the latter being more distinctly local in character and simpler in plot and interest than the former; and (3), as here, as (a) historical, (b) mythical, or (c) romantic. To the class of historical sagas belong: The well-known

'Landnamabok, < (Book of Settlements® which contains a list of all the notable men who, up to 930, settled in the island. It contains much that is valuable on the religion, laws and customs of the people. It is preserved only in a version dating from the 13th— 14th century. The (Islen-dingasogurˆ which embody the lives and achievements of celebrated Icelanders and the fortunes of great Icelandic houses from 950 to 1130. The (Biskupasogur) are biographies of Icelandic bishops who flourished in the 11th and 12th centuries ; they constitute an ecclesiastical history of Iceland, of less literary interest than the secular sagas but of the utmost historical value.*

It would be difficult to say how much is to be regarded as authentic history in (Noregs Konungasogur,> also called (Heiinskringlaˆ ((World-Circuit,® from the words with which it opens. This was the work of the greatest of all Icelanders, Snorri Sturluson, who was born in 1178 in West Iceland and became distin¬ guished as statesman, scholar, poet and saga- man. It was written about 1230 and gives the history of the kings (chiefly) of Norway. The Icelanders never lost the feeling of connection with the motherland with which their country was in close relations especially in the time of Harald Harfagri, when Iceland was settled, and of Olaf Tryggvason, when it was con¬ verted. The Heimskringla possesses all the most excellent features of the best saga-art. At about the same time the (Gudhmundarsaga Dyra) was written. < Of historical importance also is the (Sturlungasaga,) ((the history of Sturla,® which is a collection of later Islendin- gasogur, telling of events which happened as late as the year 1250. The tales belonging to this saga arose in West Iceland about the be¬ ginning of the 14th century and contain some of the finest narrative passages in the whole body of Icelandic literature. The (Thordharsaga Sighvatssonar) treats of Icelandic history up to the same period. The mythical sagas are those that treat of the old heroic legends, some of which, like the (Volsunga Saga, which is a prose rendition of the Nibelungen story as given in the Eddie*

lays, are the common prop¬ erty of all the German peoples, while others,

like the (Frithjofs Saga, is particularly Scan¬ dinavian.*

The are mostly translations or adaptations of foreign (chiefly French) courtly epics and romances of chiv¬ alry, such as the tales of Troy, of Alexander, Charlemagne, Arthur and the Round Table, Barlaam and Josephat. They were reduced to writing in the 13th century and became favorites in the 15th. They are purely literary and have no historic value. Besides these, which are the three principal classes of sagas, there is a kind called Thattr, which is a short tale treating of a single episode in the life of a distinguished Icelander, and the simplest form of saga. There are also sagas dealing with the Faroes, the Orkneys, Norway, Denmark, Greenland and America. Among the minor sagas may be mentioned

The following four are the greatest of the Ice¬ landic sagas: (1) The (EyrbyggjasagaP which covers a period of about 140 years (890-1030) and was written probably by a cleric about 1225. It is remarkable for the great variety and richness of its adventure and for the light it throws on the manners and customs of the period. Its style is serious, measured and real¬ istic. (2) The (EgilssagaP which takes its name from that of the skald (poet) Egill, portrays the life of the 9th and 10th centuries. As his sources, its author made use of oral traditions, other saga material and Egill's own poems and put the whole into writing about the year 1200. (3) The

and is remarkable for the masterly way in which its plot, full of intrigue, love and hate, has been handled, and for its character-drawing and simple and effective style.

In Iceland and Ireland, more than anywhere else in western Europe, story-telling was a necessary part of every assembly. The pro¬ fessional sagaman wandered from place to place, told his stock-in-trade, received entertain¬ ment and rewards in return for them and gathered material for new stories. These tales, both those of an historical and those of a legen¬ dary character, being of oral transmission, even when later they were thought fit to be consigned to writing, always used the oral saga as a back¬ ground. Almost all the events narrated in them took place between the years 950 and 1030. That was the Saga Age of Iceland, when life, in a material sense, was almost barbarous and factional fights were of frequent occurrence. The sagaman made most of the abundant stuff at hand for heroic narrative. His heroes are represented as being almost more than

human men and women. They belong, for the most part, to the ruling class. The author gives a short account of the hero's family, of his youth and manhood, his loves, friendships and enmi¬ ties, his great deeds and his death, which was usually of a tragic character. Being based al¬ most entirely on actual happenings and being in close relation to the lives of those for whom they were recited or written, the sagas convey a wonderfully faithful picture of life not only in the Scandinavian world during those cen¬ turies but also among the other Germanic peo¬ ples who once lived in similar circumstances but have left no such record of their own past.

*The very language in which the sagas are couched is greatly conducive to the appearance of reality. It is in prose and very often in the form of dialogue. As the sagaman's main ob¬ ject was to move his hearers, he told his tales in unaffected, straightforward language, the everyday language of the people. Like a dis¬ passionate observer, showing no sympathy with either the events or their heroes, he was content to assemble the incidents and to relate them briefly and restrainedly. The result, however, is much more than a mere impersonal folktale. Even at that early date it is surprising how clearly the essential rules of all good story¬ telling seem to have been fixed and were ob¬ served to perfection; dramatic irony and sus¬ pense; the orderly, steady progression of the scenes; the recurrence of personages familiar from other sagas, the chief figure in one be¬ coming a subordinate character in another; the incidental mention of unheroic ((mean** details; all this adds to the interest of the saga. One thing the Icelandic sagaman — like the con¬ temporary Irish sgeulaidhe — could do su¬ premely well, and that was to tell a story. The Icelandic sagas stand apart at once as a notable phenomenon in literary history and as an abso¬ lutely independent creation of the northern mind. See Icelandic Literature.*

Bibliography.— Doring, (Bemerkungen fiber Stil u. Typus des islandischen Saga) (Leipzig 1877) ; Golther, (Nordische Literaturge- schichte) (ib. 1905) ; Golther, (Die islandische und norwegische Literaturen des Mittelalters (Sammlung Goschen, No. 254) ; Heinzel, (Beschreibung der islandischen Saga) (Vi¬ enna 1880) ; Olrik, A., (Nordisches Geistes-*

leben> (Heidelberg 1908) ; Ker, W. P.,

1887-94).

Joseph Dunn,

Professor of Celtic Languages and Literature , The Catholic University of America.

SAGARD-THEODAT, Gabriel, French Catholic missionary: b. 16th cent. He labored in converting the Huron Indians to Christianity during the 17th centurv and contributed in an important degree to a knowledge of Canada in its early colonial days as ((New France.® His principal works are (Travels to the Huron Country, towards the Freshwater Sea and the Uttermost Limits of New France, called Can¬ ada; Wherein is Treated of all Matters touch¬ ing the Country, the Manners and Character of the Savages ; their Government and their Ways, as Well in their Own Country as when Roam¬ ing; of their Faith and Belief; with a Diction¬ ary of the Huron Language1 (1632) ; also (History of Canada and the Journey Made by the Friars Minor Recollects Thither, for the Conversion of . Unbelievers } (1636). An edition of his works was published at Paris in 1866.*

SAGASTA, sa-gas'ta, Praxedes Mateo,

Spanish statesman : b. Torrecilla de Cameros, 21 July 1827; d. 5 Jan. 1903. He studied at the College of Engineers in Madrid; practised as an engineer in Valladolid and Zamora; in 1854 was elected from Zamora province to the Cortes, where his attitude was a radical one. In 1856 for participation in an unsuccessful re¬ volt he was compelled to escape to France. Upon the proclamation of amnesty he returned, became professor in the Madrid College of En¬ gineering, re-entered the Cortes, was identified with the Progressive minority and edited its journal, La Iberia. After the outbreak of 22 Tune 1866 he again fled to France, but at the beginning of the revolution of 1868 was once more in Spain, where he became Minister of the Interior in the provisional government. In October 1871 he was chosen to the presidency of the Cortes; in December he entered the Mal- campo Cabinet as Minister of the Interior; in February 1872 was commissioned to form a new ministry, but in May was forced to resign. In 1874 he appeared anew in office as Minister for Foreign Affairs in the Serrano Cabinet, but shortly afterward exchanged his portfolio for that of the Interior, and in August became president of the Ministry. He retired from office at the accession of Alfonso XII ; for a time was a leader without a party; as a mem¬ ber of the Cortes was finally associated with Martinez Campos (1881) in the organization of the new Liberal party, and upon the overthrow of the Conservatives became president of the Ministry. He was forced from power in 1883. Subsequently he was president of the Cortes in 1883-84 and of the Ministry in 1885-90 and 1892-95. In September 1897 he was again sum¬ moned to form a cabinet. He recalled Wevler from Cuba, appointed Blanco captain-general and drafted a plan for Cuban autonomy. Al¬ though opposed to the war with the United

States he waged it with such efficiency as his

limited resources would permit and was loudly denounced for signing the treaty of peace. On 4 March 1899 he resigned with his entire cab¬ inet, though on 6 March 1901 he again took the helm and, after averting a Carlist insurrection, remained in office until 3 Dec. 1902. He has been characterized as ((singularly devoid of the blind arrogance which has been the bane of so many Spanish statesmen.® After Canovas' death he was conceded to be the greatest political figure of Spain.

SAGE, saj, Henry William, American phi¬ lanthropist: b. Middletown, Conn., 13 Jan. 1814; d. Ithaca, N. Y., 17 Sept. 1897. In 1832 he engaged in the lumber business which he con¬ ducted until 1854, settling at Ithaca, N. Y. He entered the New York assembly in 1847. His earlier benefactions were the endowment of various schools and churches, the West Bay City, Mich., public library, and the Lyman Beecher lectureship at Yale College. In 1870 he became a trustee of Cornell University and his various gifts to that institution were $266,000 for the Sage College for Women; $200,000 for the Sage School of Philosophy; $50,000 for the Susan Lynn Sage chair of philosophy; $260,000 with an additional endowment fund of $300,000 for the University Library Building; $20,000 for the Museum of Classical Archaeology; $11,- 000 for the Sˆge professorship of philosophy; $300,000 for floating indebtedness. His careful management of timber lands owned by the in¬ stitution realized for it about $6,000,000.

SAGE, Russell, American capitalist : b. Verona Township, Oneida County, N. Y., 4 Aug. 1816; d. Lawrence Beach, L. I., 22 July 1906. He began life as clerk in his brother's grocery store ; entered the retail grocery business for himself in 1837, and during 1839- 57 was a wholesale grocer at Troy, N. Y. He was alderman of Troy in 1841-47; treasurer of Rensselaer County, and a Whig member of Con¬ gress during 1853—57. In 1863 he removed to New York and shortly began large operations in railroad and other securities. He accumu¬ lated one of the largest fortunes in America and was director in many laree corporations.

SAGE, Russell, Mrs. (Margaret Olivia Slocum), philanthropist: b. Syracuse, N. Y., 8 Sept. 1828; d. New York, 4 Nov. 1918. She was the daughter of Joseph and Margaret Pierson (Jermain) Slocum, and after early vicissitudes graduated at the Emma Willard Seminary at Troy, and became a school-teacher. She taught in schools at Philadelphia, Syracuse and Troy, until at the age of 41 she became the wife of Russell Sage (q.v.), a grocer at Watervliet (then West Troy). Their home life continued simple, in spite of the great wealth which they accumulated, and Mrs. Sage took such deep in¬ terest in her husband's affairs that five years before his death he turned over to her complete control of his business and found that his faith was

borne out by her successful operations. After his death her life was largely devoted to benevolent work and during the last seven years of complete stewardship of the $70,000,000 left by her husband, she returned nearly $30,000,000 to the public by systematic philanthropies.

SAGE, William, American novelist, son of Abby Sage Richardson (q.v.) : b. Manchester,

8 May 1864. He was educated in France and Germany, was engaged in railway and banking business 1881-96, and since then has given his attention to literature. He has published (Robert Tournay) (1900) ; (The Claybornes> (1902) ; (Frenchy — The Story of a Gentleman) (1904) ; (The District Attorney) (1905) ; (By Right Divine) (1907) ; (A Maid of Old Virginia) (1915).

SAGE, a name covering both the common garden herb (Salvia officinalis) and other plants of diverse families, somewhat resembling it in color or odor. The cultivated sage is a mint, and the genus differs from the majority of labiates in having two stamens instead of four. It is a native of southern Europe, a shrubby perennial of hoary aspect, bearing rough, wrinkled, gray-green, opposite leaves, on the decumbent stems, and pale-blue, streaked flowers in verticillate spikes at the extremities of the branches. It has been widely cultivated, for at least three centuries, on account of its aro¬ matic odor and bitter, pungent taste. It was formerly used in medicine, having slight tonic, stimulant and astringent properties. An in¬ fusion of the plant, or <(sage-tea,® was drunk in England before the advent of Chinese tea, was a favorite remedy for colds and is even now employed as a gargle. An old English prov¬ erb states that <(He that would live for aye must eat sage in May.® See Herbs, Culinary.

Many salvias, or sages, are frequently culti¬ vated for their brilliant flowers. The most com¬ mon, perhaps, are the scarlet sage or salvia (Salvia splendens) with racemes, perhaps a foot long, of slender flowers two inches long, ar¬ ranged in whorls, both calyx and corolla being of a most brilliant scarlet hue; and the equally large-flowered but blue-tinted 5". patens. The woolly white foliage of S. argentea has caused it to be included in gardens, and there are a score of others quite worthy of cultivation for ornament.

Several genera of the Chenopodiacece, a fam¬ ily which takes kindly to

alkaline soils, and which inhabit the desert regions of western North America, are called salt white, or silvery sages. Bitter sages are composites, and are more commonly known as sage-brush (q.v.). The salt sages are species of Atriplex, living on thousands of acres of waste lands, which are strongly impregnated with alkali, and so dry that little other vegetation can exist. Since water is so scarce in certain of these alkali deserts, stock cannot be taken into them in summer, and the sages make a good growth, the fruits, valuable for their nutritive qualities, become ripened and the leaves ((sun-cured,® which, together with the tender spring shoots, make excellent forage, particularly for sheep. The flocks are taken in in winter, when the snow furnishes water for them, and eat the salt-bushes greedily, Nuttall's sage (A. nuttal- lii) being the most valuable, as it is perennial with a deep, woody root, and although cropped, seeds and all, quite down to the ground, sur¬ vives and starts up again, during the summer, when it is undisturbed. In fact, the constant cropping of these pastures, and the constant manuring, are improving the winter ranges, which are thus becoming nearly as valuable as the summer ones. The white-sage or winter-fat (Eurotia lanata) is another highly prized

winter forage plant, a foot or more high from a shrubby base, whitened with long hairs, perennial and with abundant fruit, that contri¬ butes largely toward the great fattening quali¬ ties attributed to this sage, which is also sup¬ posed to have a beneficial effect on the grazing stock. The shad-scale, a spiny, shrubby salt- sage {Atriplex confertifolia) produces in the spring tender shoots and thick succulent leaves and enormous quantities of flat, winged seeds. These are eagerly sought at the time, and, in the autumn, when leaves and fruit have dropped and been blown into hollows of the plain, the sheep seek them out and devour them utterly.

Helen Ingersoll.

SAGE-BRUSH, any one of the species of the genus Artemisia — composites very abun¬ dant in the arid, alkaline regions of the western United States, where the soil is not too saline, and, with other desert vegetation, covering im¬ mense areas. The best-known sage-brush is the common shrub, or bitter-sage (A. tridentata), which is found growing on the plains and ascending to the sub-alpine parts of the moun¬ tains. It varies in different situations from a dwarfed shrub to almost tree-like proportions, when its trunk near the ground will measure nearly a foot through, being twisted and knotty and loosely enveloped in a light-gray, shreddy bark.

SAGE-BRUSH STATE, or SAGE-HEN STATE, a nickname for the State of Nevada, from the large amount of sage-brush growing there.

SAGINAW, Mich., city and county-seat of Saginaw County, on the

Saginaw River, 16 miles from Saginaw Bay, 97 miles northwest of Detroit and 65 miles northeast of the capital at Lansing. The railroads entering the city are six divisions of the Pere Marquette, three divisions of the Michigan Central and one division of the Grand Trunk. Built upon both banks of the beautiful Saginaw River, here spanned by seven public and four railroad bridges, the city lies at the head of deep-water navigation communicating with the Great Lakes. The fourth in size in the State, Saginaw is a city of great beauty and1 attractiveness ; it possesses an ideal climate without extremes of heat or cold, has handsome residences and ranks well with any city in the United States in the percentage of fine modern homes owned by its workmen. Upon the Dixie highway, sur¬ rounded by an excellent road system, it is a central point of the tourists' highways of the State, readily accessible to automobile tourists.

Industries, Manufactures, etc. — Industri¬ ally the city is fortunate in possessing an im¬ mense supply of hydro-electric current, and being the centre of the bituminous coal fields of Michigan, from which over 2,000,000 tons are mined annually in the neighborhood. Lumber, sand quarries and salt wells also abound, and a productive sugar-beet region is cultivated. Saginaw was at one time the centre of the white pine industry, and millions of. dollars worth of logs have been floated on her river. This vast industry, through deforestation, has given way to manufacturing, and the city is now distinc¬ tively a manufacturing and jobbing centre. Some of the manufactures are products of numerous general mortar plants, beet sugar,

plate glass, salt, iron and steel products, fur¬ niture, pianos and musical instruments, vehicles, baskets and a great variety of wood products, automobiles and flour. It has planing mills, lumber assorting yards, brick yards, tanneries, graphite works and a variety of foundry and machine shops, in addition to the big shops of the Pere Marquette Railroad Company. Over $35,000,000 of capital is invested in manufac¬ turing industries, and the annual value of the total products averages nearly $30,000,000.

Municipal Conditions. — Strong banks, met¬ ropolitan newspapers, a commission form of government since 1914, low tax rates, 100 miles of pavements, $10,000,000 in pavements, sewers, sidewalks and other municipal improvements, public baths and playgrounds, 60 churches, are

evidences of healthy civic development and growth. Saginaw has model school system which has set and kept the pace with other communities. It has been quick to grasp the public pulse and take advantage of advanced 20th century ideas. The city has an ad¬ vanced trade school in the Arthur Hill Trade School and a splendid manual training school in the Burt Institution. The Public and the Hoyt libraries are also well-equipped institutions. The hospitals are the Saginaw General Hospi¬ tal, Saint Mary's Hospital and the Woman's Hospital. Other charitable institutions are the Home for the Friendless and Saint Vincent's Orphan Home. The city has one of the finest Masonic Temples in the State, Elks' Temple, a handsome Federal building and post office, city hall, courthouse, K. of C. and Y. M. C. A. build¬ ings, handsome clubhouses, theatres and numer¬ ous capacious public halls. The streets of the city are for the most part notable for their width. They are traversed by an excellent elec¬ tric street railway system and interurban roads reach out into the surrounding country. The east and west sides are connected by a number of fine bridges over the river, so that access is easy from the business centre to the most remote parts of the city. In addition to the numerous small parks, the city has a large sub¬ urban resort, operated in connection with the street railway system.

History and Population. — The site upon which this prosperous community is located was first settled in 1815 by men of French origin and half breeds; and here, 24 Sept. 1819, the Treaty of Saginaw was concluded between Gen. Lewis Cass and the Indians, which ceded extensive tracts of land to the United States. The city of Saginaw is a consolidation of old Saginaw City, East Saginaw and the village of Salina or South Saginaw. The lat¬ ter was incorporated as a village in 1866 and became a part of East Saginaw in March 1873. East Saginaw was incorporated as a village in 1855 and as a city in 1859. . Saginaw City was never incorporated as a village, its first incorporation being as a city in 1857. The two municipalities, East Saginaw and Saginaw City, were consolidated by act of the legislature of 1889 into the city of Saginaw, and the first meeting of the common council of the consoli¬ dated city was held 12 March 1890. The popu¬ lation of Saginaw is cosmopolitan in character, the German possibly predominating, as attested by their numerous large and prosperous so¬ cieties of an educational and social character. The Irish, French, Polish and Bohemian are

also conspicuous elements of the city's popular tion, which was, in 1920, 61,903.

Chester M. Howell,

Assistant Secretary, Saginazv Board of Com¬ merce.

SAGINAW, a river in Michigan which is formed by the junction of the Flint and Shia¬ wassee, and flows nearly due north into Sag¬ inaw Bay. The main stream is only about 20 miles long, but with its branches it drains a large portion of the Lower Peninsula. It is navigable to the city of Saginaw, 16 miles.

SAGINAW BAY, the largest inlet of Lake Huron on the coast of the United States. It indents the east coast of the Lower Peninsula of Michigan. It is about 60 miles long and from 20 to 30 miles wide. It is a safe harbor and never dangerously rough, although it is sometimes subject to storms. The color of the water is different from that of the open lake; it is a brownish-green.

SAGITTARIA, saj-i-ta'ri-a, a genus of plants of the water-plantain family (Alls – macece). It is a widely distributed genus, wholly or partly aquatic, native to the temper¬ ate zones and the tropics. The species are handsome, with lance-like, elliptical or arrow- shaped leaves, erect or floating; the flowers are verticillate in threes around the upper part of the scapes that carry them well above the water, and are three-parted, with beautiful white and crinkled fungacious petals. The com¬ mon arrow-head (S. latifolia) grows in the mud along rivers and ditches, and is very ornamental with its charming whorls of flowers rising from the centre of a cluster of large, erect, sagittate leaves, varying surprisingly in different plants in respect to size and shape. It is a perennial, with thick fibrous rootstocks, which produce oval, fleshy tubers, often as large as a hen's egg, abounding in starch, and a staple and nutritious article of food with many Indian tribes. The squaws sometimes waded into the mud where the arrowheads grew thickly, loosened the tubers with their toes and when the plants floated to the surface captured them and flung them into canoes, to be boiled or roasted. S. chinensis is cultivated in China for food.

SAGITTARIUS, saj-i-ta'ri-us, in astron¬ omy, the ninth sign of the zodiac, into which the sun enters 22 November. The constella¬ tion consists of eight visible stars. It is rep¬ resented on celestial globes and charts by the figure of a centaur in the act of shooting an arrow from his bow.

SAGMULLER, Johannes Baptist, Ger- men ecclesiastical historian: b. Winterreute, Wiirttemberg, 24 Feb. 1860. He was educated at the Latin School of Mergentheim, the Ehingen High School and the Seminary of Tubingen. He was ordained to the Roman Catholic priesthood in 1884; was curate at Alpirsbach in 1884-87, and tutor at Tubingen Seminary in 1887-93. He was special professor of history in 1893-96 and since 1896 has been professor of canon law and pedagogics at the University of Tubingen. His published works include (Die Papstwahlen und die Staaten von 1447—1555 J (1890) ; (Die Papstwahlbullen und das staatliche

Recht der Exklusive} (1892); (Zur Geschichte des Kardinalats) (1893) ; (Die

Tiitigkeit und Stellung der Kardinale bis Papst Bonifaz VHP (1896) ; (Die Entwicklung des Archipresbyterats und Dekanats bis zum Ende des Karolingerreichs) (1898) ; (Lehrbuch des katholischen Kirchenrechts) (1904; 2d ed., 1909) ; (Die kirchliche Aufklarung am Hof e des Herzogs Karl Eugen von Wiirttemberg) (1906) ; (Die Trennung von Kirche und StaaP (1907); (Wissenschaft und Gleube in der

kirchlichen Aufklarung (1910) ; (Unwissen- schaftlichkeit und Unglaube in der kirchlichen Aufklarung* (1910); (Der Rechtsanspruch der katholischen Kirche in Deutschland auf finan- zielle Leistungen Seitens des Staates) (1913). He has also contributed to periodicals and en¬ cyclopedias.*

SAGO, a farinaceous food, obtained from the central portion of various species of tropi¬ cal palms, principally, however, from Metroxy- lon rumphii and M. laeve. The sago-palms flourish in wet soil, and are cultivated in the East Indies, and particularly in Sarawak. They are rarely over 30 feet high and have stout stems, with an outer rind about two inches thick, as hard as bamboo, but filled with spongy pith, containing a large proportion of starch.

*The preparation of sago is one of the in¬ dustries of the East Indies. The trees flower only once, and if allowed to do so, and to fruit, would exhaust the mass of starch stored in their stems, and then die, after propagating themselves either by seeds or by offshoots. To prevent this, the trees are felled when they are about 15 years old and on the point of flowering. The starchy tissue, then most pro¬ ductive, is extracted and pounded or grated to a powder. This is kneaded in water, in a cloth or sieve, the escaping water carrying the starch into a trough, where it is washed and settled out, until fit for use. The water is then drawn off and the caked residue is ready for native cookery. This cake, or meal, when made into a paste and pressed through a sieve, forms fine pearly grains, which are left either in their original brownish hue, or are bleached, and compose the commercial product ((pearl-sago.**

Sago-meal is eaten by the natives as pot¬ tage, or as biscuits, partially baked in earthen molds. It is not entirely soluble in hot water, as is

ordinary starch, and can, therefore, be employed in making puddings, etc., forming a valuable article of food, as it is cheap, nutri¬ tious and easy of digestion. In Europe it is used for feeding stock, making starch and by cocoa manufacturers for their beverages. In¬ ferior qualities of sago are produced by Phoenix farinifera, Corypha of various species, Caryota urens, Raphia flabelliformis, and two South American palms.

Portland sago is a delicate farina extracted from the corm of the European wake-robin (Arum maculatum). Wild sago is the product of the coontie-root (Zamia integrifolia) , a cycadaceous plant of Florida, well known as an article of food among the Seminoles ; and other cycads, incorrectly called <(sago-palms,** furnish a coarse kind of sago.

SAGOIN, sa-goin', or SAGOUIN, a

French form of the native South American name of a genus (Callitlirix) of Brazilian monkeys, of small size and remarkably light, active and graceful in their movements.

SAGOYEWATHA. See Red Jacket.

SAGUA LA GRANDE, sii'gwa la gran'da, Cuba, town in the province of Santa Clara, on the Sagua la Grande River, 150 miles east of Havana. It is. connected by railroad with La Isabela, its port on the north coast, with Cienfuegos, Havana and Matanzas, and with towns to the east; and carries on a consider¬ able trade, sugar and molasses being the chief exports. Formerly gold was mined in the Vicinity to some extent. It is well built, with wide and regular streets ; among its public build¬ ings are a hospital, a town-hall and a large church ; it has also several schools. Pop. about

12,500.

SAGUENAY (sag-e-na) RIVER, Canada, large river in the province of Quebec, empty¬ ing into the Saint Lawrence at Tadousac Har¬ bor. It is about 120 miles long and of remark¬ able depth — 17 to 500 fathoms. It drains Lake Saint John and flows with almost un¬ paralleled impetuosity, between high rocky walls and over deep precipices, forming numerous falls and cataracts in its upper course. Its magnificent scenery attracts many tourists. It is navigable for large vessels as far as Ha Ha Bay, 10 miles south of Chicoutimi.

SAGUNTUM, sa-gun'tum, now SA- GUNTO, or MURVIEDRO, Spain {His-

pania Tarraconensis) , situated near the mouth of the Palantias, three miles from the coast and 18 miles by rail from Valencia. It was a rich commercial town in early times, especially famous for its figs and

manufacture of a cer¬ tain kind of pottery. The town was founded by Greek, according to some, and by Italian colonists. In the interval between the First and Second Punic wars, it formed an alliance with the Romans, and became celebrated for the resistance it made to Hannibal in the siege of 219-218 b.c. The city was nearly destroyed at this time, but the Romans rebuilt it and made it a colony. The ancient city is now replaced by the modern Murviedro, and the only im¬ portant ruins are those of the theatre. Pop. about 9,000.

SAHAPTIAN. See Shahaptian In¬ dians.

SAHARA, sa-ha'ra, Africa, the great des¬ ert region in the north of the continent, ex¬ tending from the Atlantic eastward as far as the Nile, and from the Mediterranean provinces to the Niger and Lake Tchad. Its area is about 3,459,500 square miles, — a region equal to the whole of Europe. The configuration is irregu¬ lar and the surface highly diversified, reaching from 100 feet below the sea-level to an altitude of from 5,000 to 8,000 feet in Mount Tusidd. Some of the highest summits are those of the Ahaggar, a great mountain plateau. Air or Asben is an isolated mountain, midway between Tibesti and the Niger. Farther south is the extensive plateau of Adghagh. At the north¬ east in Fezzan are the dark mountains of Jebel es Soda. The rest of the Sahara consists gen¬ erally of undulating rocky surfaces and sand dunes interspersed with occasional oases. The date-palm flourishes on these green spots, also the olive tree. Apples, peaches, oranges, grapes, etc., grow, and wheat, barley, rice, durra and ether tropical crops are raised, and there is a considerable variety of flora. Mammals consist, outside of the domestic animals, such as camels, asses, black cattle, etc., of 15 species, compris-

ing the jerboa, fox, jackal, baboon, hyenas, mountain sheep, etc. ; about 80 species of birds, among which is the ostrich. There are also tortoises, lizards, chameleons, serpents, such as the python, horned viper, etc. The edible frog and fish also occur. There is an important trade in silk tissues and mixed goods, ivory, ostrich feathers, gums, spices, musk, hides, gold dust, indigo, cotton, palm oil, kola nuts, silver, dates, salt and alum. The exports are textiles, weapons, gunpowder, etc. Many thousand tons of phosphate are extracted. The range of temperature is very great. The chief centres of population are the oases. The inhabitants consist of Moors, Tuareg, Tibbu, Negroes, Arabs and Jews; the former occupy the region between Fezzan and Lake Tchad. The tribes of the desert inhabit the south of Algeria and Tunis. The Tuareg control the principal cara¬ van routes.

The Tibbu, who number about 200,000, live in the oases between Fezzan and Lake Tchad. The tribes of the desert are, gen¬ erally speaking, camel drivers, slave and salt dealers, guides and robbers. A few possess date-groves, but they usually subsist on the milk of their herds, bartering for fruits or grain. The principal caravan routes lead from Timbuktu to the Wady Draha, and to the oasis of Twat; from Haussa by Air or Asben and Cihat to Ghadames and Murzuk; from Bornu by Bilma and Murzuk to Tripoli; from Wady by Ojariga, Kufara and Aujilah to Benghazi, and from Darfur to Siut. Pop. about 2,000,000.

SAHARANPUR, sa-har-an-poor', or SE- HARUNPOOR, se-har-un-poor, India, (1) capital of a district of the same name, in the United Provinces of Agra and Oudh, 90 miles northeast of Delhi. It is an important railway junction. Among the buildings the most note¬ worthy are an old Rohilla fort (used as a court¬ house), and a fine Mohammedan mosque. The residential part is substantial and modern. There is a church, an American Presbyterian mission and a fine botanical garden for experi¬ ments in tea and cinchona. Commerce in grain, sugar, molasses and country cloth is consider¬ able. Pop. about 70,000.

(2) The district in the Meerut division has an area of about 2,242 square miles, and occu¬ pies an alluvial table-land between the Ganges and the Jumna. It consists partly of wildly picturesque broken ground, but the larger por¬ tion is tillable. Cereals are the chief products, and its commercial importance is considerable. Pop. about 1,200,000.

SAHIB, sa'Ib, the term of native address in India to a reputable European. It is an Arabic word, signifying companion or lord. The feminine form is Scihiba.

SAI, sa'i, a Brazilian native name for a local monkey of indefinite application, most often, perhaps, designating the capuchin (Cebns capucinus) .

SAID PASHA, sa-ed pash'a, Turkish statesman : b. 1835 ; d. Constantinople, 29 Oct. 1907. He commanded an army corps in the Russo-Turkish War, became governor of Cyprus and was later appointed Secretary of State. He was Premier 1879ˆ82, was grand vizier 1882-85 and was twice dismissed but re¬ instated by the sultan in 1883. In 1885-95 he was Minister of Foreign Affairs, and subse¬ quently president of the Council of Ministers.

SAIGA, si'ga, an antelope (Saiga tartarica) found on the steppes of Russia and in western Asia. It is about two and one-half feet high at the shoulders, pale bluish-gray in color and is remarkable for the greatly swollen

appearance of the nose, due to the thick cartilaginous cover¬ ings of the nostrils. It once had a far wider habitat in Europe, and is steadily diminishing in range and numbers.

SAIGO, Kichinoswke Takamori, Japanese general and patriot : b. Kagoshima, 1825-32 ; d. there, 24 Sept. 1877. He was of the samurai class and from early youth an enthusiastic par¬ tisan of the Mikado. In 1858 the vigor with which he urged the overthrow of the Tokugawa administration caused his banishment to Sat- suma. He took an important part in the restora¬ tion of the Mikado in 1868, fighting with the forces of the imperial family in the civil war which preceded it. He was afterward ap¬ pointed commander-in-chief of the army by the Mikado and retained the office until 1873 when, his desire to attack Korea being over¬ ruled, he resigned and retired to Kagoshima. Himself of the samurai class, which was largely disaffected because of opposition to the progres¬ siveness of the emperor, he rallied a large force to his support and early in 1877 launched a re¬ bellion against the government. After con¬ tinued stubborn fighting and a steady, if slow, forced retreat he fell in action at Kagoshima. The government, notwithstanding his attempt to overthrow it, mindful of his invaluable serv¬ ices in establishing the Mikado on the throne, afterward erected a bronze statue of him at Tokio.

SAIGO, Yorimichi (Judo), Marquis of, Japanese field-marshal and statesman, brother of K. T. Saigo (q.v.) : b. Satsuma, 1843; d. 1902. He was of the samurai class and took a prominent part in the restoration of the Mikado in 1868. In the crisis of 1873, when his brother Takamori withdrew from office, Saigo remained in sympathy with the govern¬ ment He commanded the Japanese expedition to Formosa in 1874, and from 1877 until his retirement in 1900 held various cabinet offices. He received rank as marquis in 1895.

SAIGON, sl-gon (Fr. si-gon), or SAI- GUN, Indo-China, the capital of Lower Cochin-China before the French conquest, is on the right bank of the Saigon or Don-nai River, 34 miles from the sea. The town was nearly destroyed by the French, and the present city dates practically from 1861. It has fine public buildings, modern shaded streets and zoological and botanical gardens; of educational institu¬ tions, the colleges of Chasseloup-Laubat and d'Adran are the most important. There is a large floating dock. The majority of the popu¬ lation is Asiatic, the Chinese element predomi¬ nating. The town has an active trade with China, Siam, Singapore and Java. Considerable French and English goods are imported. The main exports are rice cotton, silk and hides. The great market is Cholon, three and one-half miles from Saigon. Pop. about 80,000; Cholon,

127,000.

SAIL, or SAIL-TAILED, LIZARD, a

large agamoid lizard (Lophurus amboinensis) of the Philippines, Celebes, Java and neighbor¬ ing islands, which takes its name from the tall sail-like crest bone upon the upper surface of

the tail of the adult, which is supported by a great lengthening of the spines of the vertebrae of that region ; the tail otherwise is highly compressed, long and powerful. The lizard fre¬ quently exceeds three feet in length, is olive-green, spotted and marbled with black, and has many curious folds of skin about the neck. It is strong and active and spends much of its time in trees, but when alarmed or chased rushes for water, dives to the bottom and en¬ deavors to hide among the stones. It is de¬ fenseless and harmless, and its flesh, which is white and tender, is much liked by the islanders.

SAIL. See Ship.

SAILCLOTH, a coarse, strong linen, cot¬ ton or hempen cloth used in making sails. The best is made of flax; and combines flexibility with lightness and strength. See Ship.

SAILFISH, a large predaceous fish (Istio – phcrus nigricans) of the West Indian and neighboring waters, which is closely allied to the sword-fishes and of the same family as the spear-fishes (T e trap turns) . It reaches a length of six feet, has an elongated, much compressed body, covered with elongate scutes, and a pow¬ erful, deeply forked tail, while the dorsal fin is, relatively, of huge size and deeply notched outline, well simulating the appearance of a ship under sail as it appears above the water when the fish glides along the surface as it frequently does. The bones of the nose are prolonged into a <(sword,® not so long as that of the sword-fish, but sharper, and they are an effective weapon in a school of small fish.

SAILING. See Navigation; Ship; Sail¬ ing Vessels.

SAILING VESSELS. The first vessel of which history gives any description is the Ark , as built by Noah. Its proportions possess some interest, because, though not intended for a voyage, it may be inferred that it was con¬ structed to float with as little motion as pos¬ sible, considering that it <(went upon the face of the waters® for about five months. Assum¬ ing a cubit to be about 21 inches, its length was 525 feet, its breadth 87 feet 6 inches and its depth 52 feet 6 inches. Its length is thus seen to have been six times its breadth, which pro¬ portion is about an average of all types of

vessels. Its draft of water must have varied greatly during the period of its occupation, as 12 months' provisions must have formed a very large proportion of the original weight, and these must have been gradually consumed. It had three decks ; but was fitted with neither mast9, sails nor rudder.

Ancient History. — The paintings and sculp¬ tures, as the early records of Egypt, show regularly formed boats constructed of sawed planks of timber, propelled by numerous rowers, and also by sails. These vessels were long galleys with one mast and a large square sail, which was sometimes of linen and sometimes of papyrus. The oldest authentic record as to these sailing vessels is the illustration of one of them used as a decoration on an Egyptian amphora (in the British Museum), judged by the best authorities to have been made about 6000 b.c. It is to be noted, however, that these boats could sail only with the wind, and that the science of tacking and sailing against the wind was unknown for, literally, thousands of

years, during which vessels sailed if the wind was favorable, and unshipped the mast, and set the oarsmen at work when it was contrary. The Hebrews in the time of Solomon must have possessed vessels of considerable size, as men¬ tion is made in the sacred writings of that date of stately ships, and of voyages made to bring trees of considerable size to be used in the building of the temple. The Phoenicians about 1200 b.c. had sailing vessels which did not differ in any important respect from those of the Egyptians, but they seem to have developed the art of sailing to a considerable degree. Later they were connected with the Hebrews in their maritime expeditions, and this people appear to have been the most enterprising in navigation of all the nations of antiquity. Herodotus tells us of their feat of circum¬ navigating the continent of Africa in 604 b.c. They started from the Red Sea, passing Ophir on east coast of Africa, then rounded the Cape, and keeping by the west shore they entered the Mediterranean Sea through the Straits of Gibraltar, and arrived in Egypt in the third year of their expedition. Little doubt exists of the Phoenicians having been the discoverers of the art of sailing, as their skill in evading Nebuchadnezzar at the siege of Tyre for 13 years shows that they possessed more than a superficial knowledge of navigation. They were also engaged in concert with other nations in wars with the Greeks: and it was from them the latter nation learned in their conflicts what they knew of ships and navigation. The fact of the Grecian mariners making use of the screw pump to discharge water from their ves¬ sels' holds would lead to the conclusion that their vessels were no mere sloops; yet the relative placidity of the waters in which they sailed suggests that their vessels were sailing boats rather than sailing ships. An evidence of the want of strength in the construction of these ancient vessels is the fact of their being bound around the outside with heavy ropes. They were sometimes carried as part of the

vessel's outfit, and used as necessity required. Out at sea and in heavy weather, they were made use of. There were sometimes as many as 8 or 10 bands running fore and aft of the vessel. The Greek warships were strengthened to withstand the shock of ram¬ ming by the addition of longitudinal timbers secured, to the exterior of the hull. At this period it was the custom of mariners to draw their fragile vessels out upon the shores at the approach of autumnal storms, and to leave them there till mild weather came again in the spring.

Roman Galleys. — The Romans in the early stage of their history paid little attention to navigation, until it was forced upon them by the necessity of competing with their rivals, the Carthaginians. The galleys of this period ranged from a single bank up to five banks of oars. The oars in these large galleys were arranged in sets or banks; the number of these could be increased to any extent by giving in¬ creased length to the galley. The trireme, or three-bank galley, appears to have been gen¬ erally open, in the waist where the rowers sat, with decks or platforms at both ends for the soldiers. The galleys of greater size than the three tiers appear to have been always decked

vessels. At the time of the First Punic War the Roman fleet is said to have consisted of 330 vessels, each containing 300 rowers and 120 soldiers. The triremes were each 105 feet long and 11 feet wide, and the quadriremes were 125 feet by 13 feet.

Viking Ships. — Of much sturdier build were the ships of the Norsemen, designed to sail the turbulent waters of the northern seas. The custom of burying noted Vikings in the boats which they commanded has preserved un¬ der great burial mounds a number of specimens of these early ships. One of these, found in England, was 48 feet long, 9 feet 9 inches beam and 4 feet depth of hold. Another, un¬ earthed in Norway, was 45 feet 6 inches in length, about 14 feet beam and 4 feet deep. The ˆfamous Gogstad ship, exhumed in 1880, was 79 feet 4 inches long, 16 feet 6 inches beam, 6 feet deep amidships and 8 feet 6 inches deep at bowr and stern. All of these vessels were of cak, clinker-built and caulked with moss or hair of some animal. They have been decided by antiquaries to belong to the 3d century. The remains of a much larger vessel, prodigious for its time, were found in the Orkneys. It was 130 feet in length and had a depth of hold of about 15 feet. This vessel is regarded as be¬ longing to the latter part of the 9th century, and is believed to have been one of the ships with which the Vikings conducted raids on the coast of England. These raids served to stir Alfred the Great (848-890) with a spirit of ri¬ valry and he proceeded to build ships twice as large as those of the enemy, but of the same type. It is

noteworthy, however, that he failed to find seamen of experience in his own king¬ dom, but was compelled to hire them in Hol¬ land. Under Athelston, the grandson of Alfred (895-941), it is known that a considerable mer¬ chant trade was carried on with France and Flanders by English sailing ships ; and it is re¬ corded in history that King Edgar (944-975) had a fleet of some 4,000 sailing ships stationed as a guard around the entire coast of Great Britain.

The expedition of Richard Coeur de Lion (1157-99) to the Holy Land led to the remod¬ eling in some respects of the English sailing craft, through the adoption of some of the de¬ velopments in construction of the ships of the Mediterranean, which were much larger as to hull, and carried taller masts and a larger area of sail. But these improvements in the English ships were chiefly those for warlike purposes and the more important features of the Mediter¬ ranean vessels seem to have been overlooked, or at least neglected, for they did not appear in the English ships until the 15th century.

Merchant Ships.— It is generally supposed that ships intended only for merchant purposes were first built by the Genoese, and that not until the beginning of the 14th century were sails first used by that people. The fishing boats were the small beginning from which sprang the sailers and the larger sail vessels of a later period. But it is an indisputable fact that long before this time ships of three decks and of 600 or 700 tons, of Italian build, were sailing the' Mediterranean with both freight and passengers. In England, as early as 1344, many vessels of this character were in service. In the middle of the 15th century many large ves-

sels were built in England, but they were mostly naval -vessels. Prior to this the compass had come into more general use, and it was now possible to engage in longer voyages. The dis¬ covery of America and the passage around the Cape of Good Hope were early fruits of these improvements. The Portuguese employed ves¬ sels of small size in their voyages of discovery, but the Spaniards built larger vessels and long maintained a superiority in this respect. Eng¬ land was far behind the Peninsular nations in commercial enterprise at the opening of the 16th century, but under the reign of Queen Elizabeth (1533-1609) the merchant marine of England was relieved of many oppressive laws and the coasting trade of the British Isles was reserved exclusively for British ships. And not only did the coasting trade flourish, but Eng¬ lish shipping began to contest successfully with that of Italy, Spain and Portugal for the car¬ rying trade of the world.

Moreover, a distinct change appeared in the design of English ships in the abandonment of the high Spanish poop and forecastle prevalent on the vessels which sailed the Mediterranean. Meanwhile the French had not been idle, and while their mer¬ chant ships were few and small, they were building war vessels which compared well with those of Spain and England, though leaning in type toward the Spanish models. The Corde- liere of 700 tons and the Grand Louise of 790 tons were as large as any ships afloat.

The Spanish Armada, which visited English waters in 1588, comprised 130 sailing vessels of all sorts, with a total tonnage of 60,000. Some 60 of these were galleons of the largest type. The wrecking of one of them on the western coast showed it to be of 900 tons. At this time the ˆtreasure-ships® of Spain, 100 feet in length and 34 feet in breadth, were making regular voyages across the Atlantic for the gold and silver of the New World. More light on the shipping of those days is afforded by the record of the carak Madre de Dios, captured by the English in 1592. This vessel was 165 feet in length, 46 feet 10 inches beam and drew 26 feet of water. The height of her mainmast was 121 feet and her main yard was 106 feet long. Her capacity was 1,600 tons, by far the largest known up to that time.

The Dutch ships of this period were distinc¬ tive in model owing to the shallow waters in which they sailed. They were low and of com¬ paratively wide beam and large sail area. For their smaller craft the Dutch had already de¬ veloped the fore and aft rig, and were using both the sprit sail and sprit topsail on their galleons. It is to be noted in passing that the Dutch galleons were at this time determinedly engaged in the first polar explorations on rec¬ ord — the endeavor to find a northeast passage to China (1594, 1595 and 1596). From the earliest times the Dutch had been fishermen and accomplished navigators, and while their war fleet was small, their merchant fleet grew apace and by the early part of the 17th century they controlled the coasting trade as far south as Portugal . and were successfully monopolizing the East India trade of Britain. The English merchant marine was in a very depressed con¬ dition. Internal discords had put a damper on the enterprise of the merchants, and as the island was not yet famed for its manufactures,

commerce dropped with every disaster to trade. The British East Indies Company was formed under the auspices of Queen Elizabeth (1599) and some great ships were built for this trade, the largest being the Trade's Increase of 1,200 tons. From this time onward the British made every effort to control the shipping trade of the world. The Dutch were their

principal com¬ petitors, and had, without doubt, the best-built and best-manned fleet and had established colo¬ nies in South America, to which their ships made regular voyages. The British policy was to build larger ships than those of any other nation and in this they surpassed the Dutch, but the French excelled them. The Sovereign of the Seas, built in 1637, was the largest of the British ships at this period. She was 170 feet long, 48 feet beam and 19 feet deep and measured 1,683 tons. The largest Dutch ships at that time were the White Elephant of 1,482 tons and the Golden Lion of 1,477 tons. The French had the Soldi Royal of 1,946 tons and the Royal Louis of 1,800 tons. The English continued to build larger vessels and in the early 18th century had the Royal George of 2,047 tons, and in 1765 launched the Victory, Nelson's famous flagship of 2,162 tons. The capture by the British in 1792 of the French Commerce de Marseilles of 2,747 tons aroused new emulation of the French shipbuilders, and the direct result of this impetus was the Cale¬ donia, launched in 1808, a vessel 205 feet in length and of 2,616 tons.

The First American Ships. — This conti¬ nent having been fitted by nature in supplying it with an abundance of good timber, vessels have been built upon our shores from the first year of actual settlement. The first ship con¬ structed was for the purpose of carrying a small band of settlers back to England, who were discouraged with their prospects after the first winter. The vessel was built in 1607 at Stage Island, near the mouth of the Kennebec River in Maine. It was a staunch and excellent little vessel of 30 tons, a two-master, named Virginia. She is believed to have been about 30 feet long, 13 feet beam and 8 feet deep. She subse¬ quently made a number of voyages between America and England. The next vessel built was at New York in 1614 by Capt. Adrien Blok, who had lost his ship Tiger by fire while lying in Manhattan River. His new vessel was named Onrust (Restless) and was 38 feet keel, 4414 feet long over all and 11 feet beam. This vessel was employed for several years in ex¬ ploring the Atlantic Coast from the 38th to the 42d degree of latitude. Block Island was vis¬ ited during one of the excursions and took its name from Adrien Blok. With the exception of fishing boats and shallops, there is no record of the construction of any other boats until 1631. In that year the 30-ton bark Blessing of the Bay was launched at Medford, Mass., for the use of the Massachusetts colony. In the course of the season this vessel made several coasting trips and soon after visited Manhattan Island and Long Island. It is thought the vessel was lost with a load of furs and fish in 1633 off the capes of Virginia. By 1635 there were six of these small sailing vessels regularly employed in the trade with England. In 1636 the Desire of 120 tons was built at Marblehead and put into the fishing business.

Early Shipbuilding. — Shipbuilding at this time appears to have received its impulse from the same cause which threw the colonists upon their own

resources for the supply of many of the necessaries of life. They had been hitherto supplied with all but their corn and fish by the many emigrant ships which had yearly added to their numbers. A suspension of this emigration, brought about by the civil wars in England, and the diminished intercourse caused thereby, left them dependent on mer¬ cantile enterprise alone, which the state of navi¬ gation then rendered precarious in the extreme. Governor Winthrop then said, (

province. South of New York during colonial times there was little or no construction of vessels. New England developed her large shipping interests through the fisheries that were at her door and the coasting trade main¬ tained by the latter extended as far south as the West Indies during these early days. It might be said the fisheries were the cause of the large merchant marine of New England. Between the years 1674 and 1714 a total of 1,332 vessels were registered as built in New Eng¬ land yards, in many cases by men drawn from English shipyards. Of those built, 239 were sold to foreign owners.

The Schooner. — In 1745 Andrew Robinson of Gloucester, Mass., built a vessel with a square stern, which was fitted with two masts, bearing a sloop sail on each, and a bowsprit with jib. She was sharp on the bottom and on being launched sped over the water so fast from the impetus gained by descending from the ways as to elicit from a bystander the re¬ mark, <(See how she scoons.® Scoon was a word used by plain people to express the skipping of a flat stone over the surface of the water when skilfully thrown; and the builder of the vessel, having been somewhat at a loss for a name for the new rig, seized upon the trifling incident and replied, ((A scooner let her be,® and two- masted vessels, with jibs, and fore and aft sails have since been called by that name. This ves¬ sel was probably used in the fisheries. The schooner proved to be a very economical ves¬ sel to run, with fewer men to her sail area than any other type of sailing vessel. The largest schooners were those sent to the Grand Banks, and for many years after 1800 about 70 sailing vessels were sent annually to the Grand Banks, chiefly from Cape Ann. These early vessels were from 20 to 40 tons.

Colonial Merchant Marine. — Before the Revolutionary War our merchant marine was in a prosperous condition and took nearly first rank with us. By 1760 from 300 to 400 trading vessels were being built annually in the different provinces. In 1769 alone, 389 ships with a ton¬ nage exceeding in the aggregate 20,000 tons were turned out of American shipyards. Of these, 113 were square-rigged and a large proportion of the remainder were schooners. Few of these exceeded 200 tons. During the War of the Revolution the whaling and fishing fleets suffered seriously from raids by English cruis¬ ers. Foreign trade in our vessels suffered the same fate. A large part of the merchant and fishing fleet was employed during the war in privateering and it became a profitable field for them at times, as small armed sloops fre¬ quently captured large merchantmen under the British flag. The larger privateers built during the war, when the conflict was over, were con¬ verted into merchantmen and sent to the East Indies to trade. The Baltimore-built schooner took high rank as a privateer during the war. The 16 years that followed ending with the War of 1812 were perilous times for American ship¬ ping. England excluded us from a profitable trade with the British West Indies and the same interests led to the searching of our mer¬ chant vessels for British subjects, the capture and confiscation of our vessels and cargoes and a detention of a large number of them for evasions of the British law. The American merchant fleet which had increased to a total

registry of 848,307 tons in 1807 fell to 769,054 tons in 1808, under the restrictions of the Amer¬ ican embargo laid at the insistence of Great Britain. The repeal of the embargo in 1809 brought the tonnage of the merchant fleet to 910,059 and in 1810 it reached its high-water mark for many decades to come at 984,269 tons. Then came on the War of 1812 that lasted for nearly three years, during which many priva¬ teers were constructed that subsequently pur¬ sued the peaceful pursuit of trade. A change in the form of our sailing vessels now began to appear, giving them better entrance lines, and cutting off those high poop decks that had been such a fixture on large vessels for many years.

The Carrying Trade. — 'Prior to the War of 1812 our coastwise trade was carried on by no larger sailing vessels than those that were schooner rigged, while our foreign trade was most largely carried on in foreign-built bot¬ toms. Before 1812 a few sailing packets, or vessels carrying both passengers and freight, were brought into the transportation business, and cleared from port on regular days in each month, and were operated between special points only. At this time, however, there were many American-built whalers making three-year voy¬ ages to the Pacific from Massachusetts harbors and not a few had gone as far as Bering's Sea. The average tonnage of these daring vessels was less than 300 tons. When the

war ended there were only a few small British ships in the packet service between England and Amer¬ ica, and very few between America and other parts of the world. Soon after the peace, how¬ ever, a large number of lines came into exist¬ ence as a natural outgrowth of the rush of emigration from Europe to America, and the general expansion of ocean travel and trade. The carrying of passengers was a profitable business and there was considerable competition among shipping merchants to get the most business for their vessels. None but the best and finest vessels could be used in this trade and the old-fashioned freighting vessels with their small cabins and houses and poop decks, were subjected to many changes to adapt them to the passenger business. The merchants at most all our coastwise ports, from Portland, Me., to New Orleans, La., soon saw the ad¬ vantage of these packets for our coastwise trade and regular established lines were soon in operation that remained as carriers until the coastwise steamship lines began operations in 1847, when these lines of sailing vessels grad¬ ually withdrew from business. In this trade brigs, schooners and barks were used, while in the foreign service ships and barks only were placed in service.

Packet Lines. — It was at New York the packet business between Europe and America mainly centred. There were lines from other ports, but New York was the pioneer, always kept the lead and had the largest number and finest vessels for the service. In 1816 Isaac Wright and Company of New York founded the famous Black Ball Line, so called from the lound black circle in a white field, which was adopted as the pennant of the ships. There were at first four vessels in this line, each of 400 tons, and named Pacific , Courier, Amity and James Monro'e. This line was subsequently owned by Goodhue and Company, Charles H.

Marshall and others, and a dozen other ships added, from 300 to 500 tons burden. They were placed in the Liverpool trade and sailed once a month at first and during the first nine years the average time in voyages to Liverpool was 23 days and for returning home 40 days, hut one of the later ships, the Canada, the fast¬ est of them all, once made the outward voyage in 15 days and 18 hours and held for a long time the average record of 19 days outward and 36 days homeward trips. A London line followed the Black Ball line and then a Havre line was started. In 1821 a second Liverpool line was established from New York hy Byrnes, Trimble and Company, known as the Red Star line, consisting of the Manhattan, Hercules, Panther and Meteor, sailing once a month, and soon after Fish, Grinnell and Company, after¬ ward Grinnell, Minturn and Company,

founded the Swallow Tail line with four packets, mak¬ ing from New York at this time, one sailing for Liverpool each week. In 1830 the passenger fare in the cabin from Liverpool was $180, in¬ cluding beds, bedding, wines and stores of every description. The London packets now sailed twice a month and the Havre line had three sailings a month. There were also at this time sailing packets to South America and Mexican ports. In 1830 there were 1,510 arrivals at New York from foreign ports, of which 382 were ships, 28 barks, 714 brigs, 376 schooners, 8 sloops, 1 ketch and 1 felucca. Of these, 1,366 were American, 92 British, 7 Spanish, 12 Swedish, 2 Hamburg, 5 French, 8 Bremen, 6 Haitian, 9 Danish, 2 Brazilian, 2 Dutch and 1 Portuguese. The number of arrivals in 1829 was 1,310, and passengers, 16,064. In 1823 John Griswold established a London line of four vessels, that had been increased by 1837 to 12 vessels. These vessels down to 1845 were one- or two-decked vessels, and had increased in size from 900 to 1,000 tons. The between deck space, aft, w.as divided into cabins for the pas¬ sengers, the middle portion was fitted up with kitchens, pantries, etc. The steerage passengers and crew were placed forward. After 1830 there were frequent sailings of rival packets, tran¬ sient, but all American, from Boston, New York,, and Philadelphia to Great Britain and other parts of Europe. All the ships sailed with great speed and made the run across the Atlantic in excellent time. The Red Jacket once ran from New York to Liverpool in 13 days 11 Lj hours. The Mary Wliiteridge made the voyage from Baltimore in 13 days 7 hours; but the usual time was 19, 20 or 21 days to Liverpool and from 30 to 35 days homeward. English steamers were sent out in 1838 and 1840 to compete with these packet lines ; but the steamers did not at first make much better average time on a voyage than the packets, but in the course of a few years the increase in speed and their additional carrying capacity gave them an advantage and the packets could no longer successfully compete with them.

Clipper Ships. — After the packets came the clipper ships, vessels intended primarilv for freighting, and built to secure the highest pos¬ sible speed when laden with cargo. The packets were the fast sailers from 1816 to 1845, but after the latter date there grew up various branches of trade in which a quick delivery was as important for commercial mu-poses as it was

for the passenger trade. For instance, there was the tea trade from China to the United States, in which speed has alwavs been con¬ sidered essential. The cargoes consisted of teas, spices, coffee, dried fruits, etc., which were liable to deteriorate in a long voyage of four months to the home port, and to shorten the voyage as much as possible was desirable for many reasons. There were no telegraph lines and ocean cables in those days and the uncer¬ tainty of the markets made fast trips home from the East Indies very important. Mer¬ chants had repeatedly suffered heavy loss, some¬ times business ruin by the decline in eastern goods brought home by ships

during their ab¬ sence on the voyage out and back, and good ships were, therefore, always required in that trade. The first clipper, the Scottish Maid, was built in 1839 in Great Britain. She was a schooner of 150 tons and proved very fast and continued in service for 50 years. The first American, clippers were built at Boston and Medford. These were small schooners, the Angola of 90 tons and the Zephyr of 150 tons. They were used in the opium trade. The pioneer of the large clippers was the Helena, of 650 tons, whose dimensions were 135 feet length on deck, 30 feet 6 inch beam and 20 feet depth of hold, built by William H. Webb. She came out in 1841 and was constructed for A. and N. Griswold for the China trade. She was a good sea boat and a very fast sailer for her day, making many fast voyages between China and other East Indian countries and New York. Following the Helena came the Rain¬ bow of 750 tons, built by Smith and Dimon in 1843 for Howland and Aspinwall. She was the first of the extremely sharp type and at the time was claimed by her captain to be the fast¬ est ship in the world. Very few sailing ships since have equaled her records. This vessel made the voyage to Canton and return home in six months and 14 days, having spent three weeks of the time in loading and discharging cargo. The Helena and the Rainbow brought about a great change in this tvpe of vessel. They commanded better prices for freights than sloop ships, and in every way proved desirable. Then in 1844 followed the Montauk of 540 tons for William S. Wetmore, built by William H. Webb. Then A. A. Low and Company had Brown and Bell construct for them the How- qua of 706 tons, a very fast and fine vessel, which made a voyage from Shanghai to New York in 84 days. The owners of the Rainbow then had the noted clipper Sea Witch of 907 tons, built by Smith and Dimon, with the in¬ tention to have the fastest vessel of the type afloat. This vessel had finer under water lines than her predecessors, and may be said to have been the first of that advanced type of fast clipper ships. She made one voyage to Cali¬ fornia in 97 days; to Hongkong in 104 days; to Valparaiso in 69 days; and returned from Canton to New York in 85 days. Her best 24- hours run was 358 miles, a speed greatly ex¬ ceeding any steam vessel then existing. The era of fast clipper ships was now fairly in¬ augurated, and many of this class were now built not only at New York, but at Boston, Philadelphia and Baltimore. Nearly all the early ones did not exceed 1,000 tons register, or about 165 feet long, but competition led to

a great increase in size, and every year saw vessels launched that spread more and more canvas, longer, larger and faster than ever, and expressly intended to excel everything that had preceded them in the merchant

shipping of the world. In 10 years after the first clipper ship the size of 2,400 tons was reached and there were many built 2,000 tons each.

British Rivalry. — Foreign merchants were by no means idle spectators of what was going on in this country, and in 1846 England began to awake to the new and dangerous rivalry from America. The arrival of the Oriental, 1,003 tons, in London in 1850, 97 days from Hongkong, with 1,600 tons of tea, on which she collected $48,000 freight, created a furore. Not a single British ship was her -equal in speed or elegance of line and construction. The British Admiralty sought and were given permission to draught her underwater lines in drydock ; and a great imoetus in the building of fast ships resulted. Alex. Hall and Com¬ pany of Aberdeen made a specialty of clipper ships, and there were launched from their yard many superior and famous vessel's. But the Americans, though hard' pressed, were able to maintain the lead, and entitled to the best rec¬ ord ever made by ships sailing under canvas. There were several famous races home from China. Once the British clippers Chrysolite and Stornaway and the American clippers Race Horse, Surprise and Challenge engaged in a race from Canton to Liverpool and Deal and arrived at the home ports as follows: At Liv¬ erpool, Chrysolite in 106 days; at Deal, Storn¬ away in 109 days; Challenge in 105 days; Sur¬ prise in 106 days. The British ship Challenge ran from Shanghai to Deal in 113 days, and the American clipper Nightingale in 110 days. These races were claimed by both parties ; but the Americans kept the reputation of supe¬ riority, and several ships were ordered at our shipyards for foreign account. Then shortly after the gold fever broke out in California, and the John Bertram of 1,100 tons was built at Boston, Mass., and sent to the Pacific Coast in 1850 by Boston parties. This was the first clipper ship built for the California trade. The Witch of the Wave and four others of 1,500 tons each were immediately after built for the same parties. The Witch of the Wave made the trip from Canton to Deal in 90 days — 15 days faster than the best previous record, that of the Challenge.

Sailing Speed. — The speed of the clippers was remarkable. Six miles an hour was a good average rate of speed for long voyages and nine miles an hour excellent time, especiallv for a ship loaded with a full cargo of merchandise. Clippers ran across the Atlantic to Liverpool at an average speed of nine miles an hour, spurting at the rate of from 10 to 13 miles with a favorable wind, and on voyages that gave them the advantage of the trade winds they ran for days and weeks in succession at an average speed of from 12 to 15 miles an hour. To sail 300 miles a day was not excep¬ tional. The largest of them all was the four- master Great Republic, of 4,555 tons, built by Donald McKay in 1853 at East Boston. The length on load line was 314 feet, bearn molded 49 feet, molded depth 32 feet. She was burned at her dock before sailing. The hull was afterward rebuilt at

Greenpoint, L. I., and

was launched at 3,357 tons, being still the largest ship afloat. One of the noted clippers of the day was the Dreadnought built in 1853 at Newburyport, Mass. In 1859 she made the voyage from Sandy Hook to Liverpool in 13 days, 8 hours. Fast as the Dreadnought was she failed to surpass the records of the Red Jacket, a Maine-built clipper of 2,006 tons, of 13 days, 1 hour from Sandy Hook to the Rock Light, Liverpool (1854), and of the Andrew Jackson, built at Mystic, Conn., of 1,679 tons, holding the record for the west¬ bound voyage, 15 days from Rock Light to Sandy Hook (1860).

Other record passages of those days which have never since been beaten are the following:

James Baines, 2,515 tons, launched at East Boston in 1854; 12 days, 6 hours, Boston to Liverpool. From Liverpool to Melbourne in the then record time of 63 days ; and thence home to Boston in 69 days; making the cir¬ cuit of the globe in the unequaled time of 132 days.

Lightning, American-built ship of 2,090 tons, Melbourne to Liverpool, 63 days (1853) ; Ports¬ mouth to Calcutta, 87 days (1857).

North Wind, American built, 1,041 tons, London to Sidney, New South Wales, 67 days.

Mandarin, 776 tons, New York to Mel¬ bourne, 71 days.

Mary Whitridge, American built, 987 tons, Liverpool to Baltimore, 14 days, 9 hours (1855)'.

Marco Polo, American built, 1,512 tons, Liverpool to Melbourne, 61 days (1861).

Thermopylae , British built. 927 tons, Lon¬ don to Melbourne, 60 days (1869).

The record voyages of American sailing ships in the coastwise trade, known as the <(California clippers,® were:

Flying Cloud, 1,793 tons, New York to San Francisco, 89 days (1851). The same feat was accomplished in 1854 by the same vessel and repeated in 1860 by the Andrew Jackson.

Northern Light, 1,021 tons, San Francisco to Boston Light, 76 days, 5 hours (1853).

Comet, 1,836 tons, San Francisco to New York, 76 days (1854).

The best day's run ever made by a sailing ship was 436 nautical miles, recorded by the Lightning on her maiden voyage from Boston to Liverpool in 1854. The highest speed ever recorded by a sailing ship was 21 nautical miles per hour, made by the James Baines on 17 June

1856.

After 1860 there was no longer any necessity for great size and speed in this type of vessel. Too many ships had been built and a reaction set in that lasted for many years. By 1857 there were from 80 to 100 large ships in the Cali¬ fornia trade and the rates of freight fell off one-half, and the ships were thrown into the general trade of the world. In the next place, steam vessels, about 1852, had been built to run on all the principal ocean routes and there was no longer any need for sailing vessels to be fitted out with large cabins and roomy pas¬ senger accommodations. This ended the career of those fast clipper ships that had such a world-wide reputation from 1850 to 1860. Then the Civil War came on and our foreign trade was cut off for four years. After 1865 the grain trade attracted the larger sailing vessels from all over the world. This type of vessel was no longer an extreme clipper of the former

period, but a handsome, medium clipper of from 1,400 tons for the British ships to 1,600 and up to 2,000 tons register, for the American ; capable of carrying a large cargo at a fair rate of speed. The Maine shipyards at this time turned out a large number of strong wooden sailing ships of from 1,600 to 2,400 tons. These vessels continued in the Atlantic-Pacific trade until the American Hawaiian Steamship Line commenced operations in 1900.*

Modem Schooners. — The schooner, as pre¬ viously mentioned, was a distinctively Ameri¬ can product of a comparatively early date (1713). It was largely used in the coastwise trade, to the West Indies, to South America and later to Africa, and it may be said has not fallen from favor even to this day. The early vessels were not over on an average 75 tons. When it became necessary to increase the ton¬ nage of the vessel it was thought to be ad¬ vantageous to increase the power, so three masts were adopted. The earliest date of the building of a three-masted schooner in this country is thought to be about 1831. There were a few more built about 1845, and in 1847 the Midas was converted into a three-masted schooner,

the Zachary Taylor was built at Phil¬ adelphia in 1849 and the Spray at Wilmington, Del., the same year. The period when this type of sailing vessel had passed the experi¬ mental stage appears to have been in 1853 when there were built the Gardner Pike, the James H. Chadbourne , the Kate Brigham and the E. R. Bennett; and in 1855 the Eckford Webb and the William L. Burroughs ; and in 1856 the Hartstein and the Cordelia. The two latter were two-decked vessels and were the largest of the type built for some years. These vessels were used mainly in our coasting trade, as far south as the Gulf of Mexico ports. There were a few more built prior to 1860; the Civil War came on when but few, if any, were built. It was 1868 before three-masted schooners were again constructed, and by 1873 they were the most popular type of our coastwise sailing ves¬ sels. The first four- masted schooner was the William L. White, built at Bath. Me., and com¬ pleted in June 1880. The Northern lakes also had four-masters immediately after the William L. White. Then it was some years before the pioneer five- master was constructed in 1888 at Waldoboro, Me., as the Governor Ames. The latter was the largest schooner for 12 years, until the George W. Wells was, built in 1900 as a .fir-masted schooner. The largest of them all was the Thomas W. Lawson, built of steel in 1902, as a seven-masted schooner. This superb vessel foundered off the Scillv Islands in

1907.

Iron Hull Ships. — Although iron had been used in Great Britain for building hulls as far back as 1829 and came into common use in the early 40's, the first iron hull sailing vessel constructed in the United States was the schooner Mahlon Betts of 275 tons, built in 1854 at Wilmington; Del. Then there were none but wooden sailing vessels until the brig Novelty was built at Boston, Mass., in 1868, and the bark Iron Age constructed in 1869 for Tup- per and Beattie of New York. The sloop yacht V index was then built in 1871 at Chester, Pa., by Reanie Son and Archibold ; and in 1879 the yacht Mischief was built at Wilmington, Del.

The three-masted schooner Josephine followed in 1880, being built by William Cramp and Sons Company. Then there came much larger ves¬ sels in the Tillie E. Starbuck, built in 1883 by John Roach and Son at Chester, Pa.; and in the same year by Gorringe and Company, as the American Shipbuilding Company, the T. F. Oakes. These vessels were about 2,000 tons register each.

The world's recorded tonnage of merchant sailing vessels in 1850 totaled 7,701,885; of which 3,396,650 tons were British ; 3,009,507 tons American; 674,228 tons French; 298,315 tons Norwegian; 289,870 Dutch, and 33,315 Bel¬ gian.

In 1900, with more complete records, the total was 9,167,620, distributed thus: United States, 2,507,042 tons ; United Kingdom, 2,096,- 408 tons; Norway, 1,002,675 tons; France, 636,081 tons ; Germany, 593,770 tons ; Italy, 568,164 tons; Japan, 320,572 tons; Sweden, 288,687 tons; Finland, 287,154 tons; Russia, 269,460 tons; Greece, 175,867 tons; Denmark, 158,303 tons; Spain, 95,187 tons; Holland, 78,493 tons ; Portugal, 43,874 tons ; Austria-Hungary, 25,342 tons ; China, 20,541 tons.

In 1911, the latest year for which complete figures are available, the total of the merchant sailing marine was 7,454,189 tons, distributed as follows: United States, 2,564,721 tons; United Kingdom, 962,718 tons; Norway, 738,197 tons; France, 624,521 tons; Germanv, 510,059 tons; Japan, 451,529 tons; Italy, 410,791 tons; Fin¬ land, 327,625 tons ; Russia, 254,330 tons ; Sweden, 154,968 tons; Greece (1910), 145,284 tons; Denmark, 124,510 tons; Spain, 44,325 tons; Portugal, 43,844 tons; Holland, 42,312 tons ; Austria- Plungary, 32,871 tons ; China, 15,679 tons.

A comparison of decades shows that the zenith figures of the sailing fleets of the several maritime nations were as follows : United States, 1861. 4,662,669 tons; United Kingdom, 1870, 4,577,855 tons; Norway, 1890, 1,502,594 tons; Italy, 1870, 980,054 tons; Germany, 1880, 965,767 tons; France, 1860, 928,000 tons;

Sweden, 1880, 461,593 tons ; Holland, 1860, 423,790 tons ; Greece, 1870, 398,703 tons ; Rus¬ sia, 1880, 378,894 tons; Finland, 1911, 327,625 tons; Spain. 1880, 326,438 tons; Austria-Hun¬ gary, 1870, 279,400 tons ; Denmark, 1880, 197,509 tons ; Portugal, 1900, 57,925 tons ; Belgium, 1850, 33.315 tons.

A comparison of these figures will give a measurably accurate view of the rise and fall of the. sailing vessel in the principal maritime countries.

In the United States the zenith of the build¬ ing of sailing ships was reached in 1855, when 1,781 vessels, aggregating 510,690 tons, were launched. Of these, 381 were ships, 126 were brigs, 605 were schooners and 669 were sloops.

On 30 Tune 1917 there were on the register of the United States 134 square-rigged vessels; 82 of these being American built and 52 built abroad. These were 38 ships totaling 77,863 tons ; 55 barks, totaling 68,993 tons ; 38 barken- tines, totaling 37,987 tons, and 3 brigs and brigantines, totaling 940 tons. The materials of which these vessels were built were: Of wood, 81; . of iron, 28; of steel, 25.

The sailing vessels of the world, of 50 tons and upward in the year ended 30 June 1917,

a)

4)

k-

rt

3

*o**

C/1

TP

cS

4)

kH

c 3

cS

w

03

*4**

O

H

w

c

o

w

s

O

O

W

CJ

CO

hJ

W

w

H

CO

O

w

H

CO

$<$

s

s

w

$>$

w

CO

H

CO

W

W

o

3

LO

O

Ctf

cx

CO

cj

o

bX

G

o

C/3

G

o

- + -»

3

3

3

G

6

o

T3.

c/3

C/3

•G

O

G

a/

co

a

a>

Q

■o

TD

CD

0)

3

LO

e

CO

a/

PQ

<13

<13

i-0

3

CO

•G

4>

bX

G

03

|J

.

■

■

were recorded by the Bureau Veritas as 19,985 in number and of the aggregate of 4,731,707 tons. Of the whole number, 4,975 were British; 3,554 Russian; 1,851 American; 1,493 Japanese; 1.103 German; 963 Turkish; 949 Italian; 901 Swedish; 775 French; 734 Norwegian; 634 Dan¬ ish, and 585 Greek. By far the largest number are of wood.

In 1914 (The latest figures available) only 35 sailing vessels, 9,195 tons in all, were launched in British shipyards. In the United States 21 were launched, 4 of steel; totaling 3,262 tons; and 17 of wood, totaling 14,934 tons. The entire output of sailing vessels for the world in 1914 was 225 craft, aggregating 67,368 tons.

See also Merchant Marine of the United States; Naval Architecture; Shipbuilding; Ship Subsidies ; Shipping of the World.

Bibliography. — Abbot, W. J., (American

Merchant Ships and Sailers> (New York 1902) ; Bates, W. W., (American Marine) (Bos¬ ton 1892) ; Chatterton, E. K., (Sailing Ships5 (London 1909), and (Fore and Aft: The Story of the Fore and Aft Rig5 (Philadelphia 1912) ; Clark, A. H., (The Clipper Ship Era5 (New York 1912) ; Holmes, Sir G. C. V., (Ancient and Modern Ships5 (London 1900) ; Kirkaldy, A. W., (British Shipping5 (London 1914) ; Marvin, W. L., (The American Merchant Ma¬ rine5 (New York 1902) ; Spears, J. R,,

J. H. Morrison,

Author of (History of American Steam Navi¬ gation. 5

SAILOR'S CHOICE, the name of several excellent food fishes taken on the eastern and southeastern coasts of the United States, which are of small size and belong to the family of grunters. The best known, probably, is Orthopristis chrysopterus, also called pigfish, and especially common in the Gulf of Mexico. It is regarded as the best pan-fish of the region.

SAILOR'S CREEK, Battle of, the last great battle of the Civil War in the East. Sheridan says that it was <(one of the severest conflicts of the war ... so overshadowed by the stirring events of the surrender, three days later, that the battle has never been accorded the prominence it deserves.55 When General Lee abandoned Richmond and Petersburg on the night of 2 April 1865, he ordered the con¬ centration of his army at Amelia Court House, about 30 miles west of Petersburg, and it had collected at that point bv noon of the 5th. On the night of the 5th Sheridan's cavalry and the Second, Fifth and Sixth corps of the army of the Potomac were at or near Jetersville, under orders to march early next morning on Amelia Court House. General Meade began the ad¬ vance at 8.30 a.m., and when four miles out of Jetersville, Humphreys' Second corps, on the left, discovered that Lee was moving westward, passing by the flank of the Union army. The advance on Amelia Court House was suspended, and the army faced about ; the Second corps was ordered to move on Deatonsville ; the Fifth through Painesville, on the right of the Second; and the Sixth through letersville to the left of the Second. Sheridan's cavalry moved on the extreme left parallel to the Confederate line of

retreat-, impeding the march of the column wherever practicable, but Longstreet's corps suc¬ ceeded in reaching Rice's Station, on the Lynch¬ burg road, where he awaited the corps of R. H. Anderson, Ewell and John B. Gordon, the last- named commanding the rear-guard. The Sec¬ ond corps was checked at Flat Creek by the destruction of the bridge, but, soon repairing it, overtook Gordon and kept up a running fight with him for 14 miles, carrying several lightly intrenched positions, and capturing prisoners, colors, and wagons. The pursuit continued to Parkinson's Mill, on Sailor's

Creek, where Gor¬ don made a stand, but was soon driven across the creek, losing three guns, 13 colors, several hundred prisoners, and a large part of the trains of Lee's army. He attempted another stand be¬ yond the creek, but fell back as Humphreys crossed, and marched for High Bridge. Pursuit ended at night. During the day the Second corps had captured 1,700 prisoners, four guns, 13 colors, and several hundred wagons and ambulances. While the Second corps was en¬ gaging Gordon, the Sixth corps, with the cavalry commands of Merritt and Crook, had come up some three miles to the left and overthrown the corps of R. H. Anderson and Ewell. Cus¬ ter's division had interposed between Ewell and Gordon, destroying 400 wagons and taking prisoners and 16 guns ; and Crook, moving rapidly to the left, found R. H. Anderson's command posted on high ground behind breast¬ works running across the Rice's Station road, and sent a dismounted brigade to take posses¬ sion of and form across the road, thus cutting Anderson off from Longstreet. Ewell now proposed to Anderson that they make their way through the woods, around Sheridan's left, and get to Longstreet; but before anything could be done both were attacked. The Sixth corps had opened its artillery upon Ewell's 3,600 men, to which there was no reply, as Ewell was with¬ out artillery; and about 5 p.m. two divisions advanced, crossed Sailor's Creek, and attacked Ewell, who made a most determined resistance and, massing his troops, broke the centre of the Union line, but was checked by the artillery- fire from beyond the creek. The two divisions of the Sixth corps — Seymour's and Wheaton's — wheeled to the left and right respectively, enveloping Ewell's flanks; Stagg's cavalry brigade charged his right; and at the same time Merritt's and Crook's cavalry charged and routed R. H. Anderson's 6,300 men, killing wounding and capturing about 2,600. Ewell, now completely cut off and surrounded, sur¬ rendered his entire command. About 250 men of Kershaw's division, serving with him, es¬ caped. Seven general officers were included in the surrender. The total loss of Lee's army was not less than 8,000 men. The Union loss did not exceed 900. Longstreet, who had re¬ mained at Rice's Station during the day, wait¬ ing for Anderson, Ewell and Gordon to unite with him, marched as soon as night set in, with Fields'. Heth's and Wilcox's divisions, for Farmville. (See Farmville and High Bridge). Consult (Official Records5 (Vol. XLVI) ; Humphreys, (The Virginia Campaign of 1864-655 ; Walker, (History of the Second Army Corps5 ; Grant, (Personal Memoirs5 (Vol. II) ; Sheridan, (Personal Memoirs5 (Vol. II), E. A. Carman.

12C

SAILORS' SNUG HARBOR— SAINT ALBANS

SAILORS' SNUG HARBOR, a home for aged sailors on Staten Island, N. Y., established by Captain Richard Randall in 1800. The home is under

government supervision and is in charge of a naval commander.

SAINFOIN, san'foin, or ESPARSETTE, a leguminous plant (Onobrychis sativa), orig¬ inating in the Mediterranean countries and cultivated for centuries. The stem is about two feet high, with pinnate leaves composed of small leaflets. The pea-like flowers are rather large and of a showy pink color, and are disposed in short spikes, on long axillary peduncles. It is nutritious fodder, well liked by livestock, especially sheep. It makes good hay, and will grow on light, warm, chalky soils, where other pasturage does not thrive; the roots are long-lived and are useful for bind¬ ing light soils, while the foliage not only shades the pastures, but makes a good crop for plow¬ ing under. It is also recommended as a honey- producing plant for bee pastures.

SAINT, a person eminent for piety and other virtues. In the books of Scripture, both the Old and the New Testament, the whole body of the faithful people are called saints (2 Chron. vi. 41; Ps. xxxi, 3; Hebr. xiii, 14, <(Salute all the saints" ; Eph. i, 1, ((the saints at Ephesus.") It is customary to give the title saint to all the apostles, evangelists and other holy persons, men and women, named in the New Testament, to most of the Fathers of the Church, to all the martyrs. In the Church of Rome the title of saint is formallv and au¬ thoritatively bestowed on servants of God who in their lifetime were eminent for their Chris¬ tian virtues and graces, and whose sanctity has been proved by miracles after their death (see Canonization; Beatification); but thousands of saints are honored by that church, who lived in early times before the process of canonization was thought of. Intercession by the saints in heaven and invocation of the saints are articles of belief in the Catholic Church, Eastern and Western, as also in the schismatical Eastern churches: but that doctrine is repudiated by all the Protestant churches. The teaching of the Church of Rome, as pro¬ claimed by the Council of Trent, is that the saints reigning with Christ ((offer to God their prayers on behalf of men"; that it is good and useful (

angels in heaven rejoice when a sinner repents of his sin (Luke xv, 7). It were superfluous to cite the usage of the Catholic Church re¬ garding invocation of saints : it began with the beginning of Christianity itself.

*SAINT, The (). (The Saint, > by Conrad F. Meyer (1879), is a short novel, about the length of (Silas Marner,> centred around the great quarrel between Henry II and his Chancellor and Primate of England. Thomas Becket. In a broad sense based on history, its psychology is fancifully developed from a mediaeval legend found by Meyer in 1853 in Thierry's (Conquest of England' *(Book IX), according to which Becket was the son of an Englishman and of the sister of the Kalif of Cordova. The story of Henry's amours with beautiful Rosamond Clifford in the hidden*

bower suggested the secre-t palace in which Meyer's Becket rears his daughter Grace to save her from royal lechery. The accidental slaying of Grace after her seduction by the king inspires in Becket a deep-laid plot for revenge under the veil of pretended loyalty and later of saintly devotion when he becomes Primate on Henry's nomination, whereby he drives the king to alternate fits of despair and fury over the loss of political advantages and of the love of his queen and sons. The tragic ending is historical.

The story is put in the mouth of a Swiss bowman, who is supposed to have come on his wanderings to London, where he entered the service of the king and was a minor actor in all the events he relates. The style is vivid, swift and powerful, and the diction of wonderful force and color, suggestive of a Gobelin tapestry, or as Keller said, ((brocade." It is Meyer's most finished production, possibly his best. The English reader will find it curious to com¬ pare it with Tennyson's becket.' Consult (Der Heilige (66th ed., Leipzig 1913) ; American School Edition (ed. Eggert, New York 1907, with critical introduction) ; Frey, Adolf, (Con- rad Ferdinand Meyer) (Stuttgart 1900) ; Cred- ner, Karl, (C. F. Meyer, Der Heilige* (Berlin 1899) ; Langmesser, (K. F. Meyer) (Berlin*

1905).

Carl E. Eggert.

SAINT ACHEUL, France, archaeological site near Amiens which has given the name aclieulian to the paleolithic deposits discovered there, containing flint implements evidencing human industry at a time corresponding to the second glacial period in France.

SAINT ALBANS, al'banz, England, in Hertfordshire, 20 miles northwest of London, an ancient borough and market-town, standing on a height above the river Ver. Its abbey is one of the most remarkable Christian temples in England. Only a gateway remains of the original abbey, built in 793 in honor of Saint Alban, the first British Christian martyr. The present abbey has been so often extended and altered that it represents in its architecture many styles and various epochs of history, from the time of the Romans to that of Henry VII. It has the form of a Latin cross, with a length of 547 feet and breadth of 206 feet. Its tower has an elevation of 146 feet, crowned with battlements. Other churches are Saint Michael's, 10th century; Saint Stephen's, with some good Norman features, and Saint Peter's

whose nave is of the Early Perpendicular. There is an Edward VI grammar school, and of modern buildings those deserving notice are the corn exchange, courthouse, prison, baths and public library, besides benevolent institu¬ tions, including hospitals and almshouses. The chief industries are silk manufacture, straw- plaiting, and there are breweries and iron foundries. Two battles were fought between the houses of York and Lancaster near Saint Albans ; in that of 1455 Richard, Duke of York, defeated Henry VI, and in 1461 Marga¬ ret of Anjou defeated the army of York, com¬ manded by Warwick. Southwest of the present city stood the ancient Verulamium, one of the oldest towns in Britain, on Watling street. In the abbey the printing press was set up on which the first English translation of the Bible was printed. Nicholas Breakspear, the only English Pope, was born near Saint Albans. Pop. about 17,000.

SAINT ALBANS, Vt., city, county-seat of Franklin County, on the Central Vermont Rail¬ road, in the northwestern part of the State, about 45 miles north-northwest of Montpelier, the State capital, and three miles from Lake Champlain. It was settled in 1763 and char¬ tered as a city in 1897. In 1864 the town was raided by a band of Confederates who entered the United States from Canada. In 1866 a number of Fenians, who were planning an in¬ vasion of Canada, made Saint Albans their headquarters. The city is on a plain about 390 feet above sea-level and 373 feet above lake- level. The scenery is most pleasing; to the east are the Green Mountains, and on the west may be seen the Adirondacks. The city is in an agricultural region in which considerable attention is given to dairying. The chief man¬ ufacturing establishments are creameries, rail¬ road shops, machine shops and flour and grist mills. There are large shipments of farm and dairy products. Saint Albans contains the Warner Hospital, the Warner Home, Villa Bar- low Convent, an academy; Saint Mary's Acad¬ emy, public and parish elementary schools and a public library. Pop. (1920) 7,588.

SAINT ALBANS, W. Va., city situated at the confluence of the Coal and Kanawha rivers, 12 miles from Charleston, Kanawha County, on the Chesapeake and Ohio, the Coal River and the Kanawha and Michigan railroads. It is situated in a great natural gas field. The city has lumber factories, a large chemical plant, electrical supply factory, powder plant and pro¬ jectile and armor plants. The two local banks have combined capital of $55,000 and a com¬ bined surplus of $30,000. The value of taxable property is about $2,500,000. The chief public buildings are the city hall, Presbyterian, North¬ ern Methodist, Southern Methodist, Baptist and Episcopal churches. There are graded schools and a high school, also churches and schools for negroes. Under the revised charter of 1917 the government is vested in a mayor and six councilmen. The annual receipts are about $155,000. Saint Albans is the oldest town in the Kanawha

Valley, numbering Daniel Boone among its first residents. War industries in 1917-18 increased the population temporarily about 50 per cent. Pop. 3,000.

SAINT ALBANS, Confederate Raid on,

a foray made 19 Oct. 1864, when Lieut. Bennett

H. Young, with about 25 Confederates, nearly all of them escaped prisoners, armed with re¬ volvers and carrying chemical preparations with which to set fire to town and farm-houses, crossed the Canada line into the town intend¬ ing to burn it and rob the banks. Several citizens were killed or wounded, and three banks robbed of more than $200,000. An at¬ tempt to burn the town failed because of the defective character of the chemical prepara¬ tions. Young and his party remained in town less than an hour, when they rode back to Can¬ ada on horses they had seized. Pursuit was made by United States troops, who captured some of the men on Canadian soil and turned them over to the authorities, by whom they were released on the technical ground of want of jurisdiction.

SAINT ANDREWS, an'drooz, Scotland, an ancient city of Fifeshire, on the North Sea. 11 miles southeast of Dundee and 31 miles northeast of Edinburgh. It was created a royal burgh by David I in 1124, and after hav¬ ing been an episcopal see became an archiepis- copal see in 1472 ; it was long the ecclesiastical capital of Scotland. The ruined cathedral was begun in 1160 and took 157 years to finish. The old castle, also in ruins, was founded about 1200 and rebuilt in the 14th century; in it James III was born, Cardinal Beaton assas¬ sinated, and in front of it George Wishart was burned. Saint Andrews was a celebrated edu¬ cational centre as early as 1120; its university, the first in Scotland, dates from 1411; it con¬ sists of the united colleges of Saint Salvator and Saint Leonard and the college of Saint Mary, both at Saint Andrews, and embraces also University College, Dundee, founded in 1880. The united college of Saint Salvator and Saint Leonard has a principal (also principal of the university) and 11 professors, and the college of Saint Mary has a principal and three professors. Degrees, open to women as well as men, are conferred in arts, divinity, science, medicine and law, much as in the other Scottish universities; and the university also confers the diploma and title of L.L.A. (Lady Literate in Arts). The number of students is about 250. In connection with the university is a library containing about 100,000 printed volumes and 150 manuscripts. The university unites with that of Edinburgh in sending a member to Par¬ liament. Madras College or Academy, founded by Dr. Bell of Madras, the principal secondary school of the place, provides accommodation for upward of 1,500 scholars. Saint Andrews is a popular watering place and summer resort and the

headquarters of Scottish golf, its links being famous. The manufacture of golf clubs and balls is a thriving industry.

SAINT ANDREW'S CROSS. See Cross.

SAINT ANGELO CASTLE, Rome, Italy, a famous fortress situated on the right bank of the Tiber in the northwestern part of the city, opposite the bridge of Saint Angelo and a short distance from the main buildings of the Vatican. It was built by the Emperor Hadrian as a tomb for himself and his family. Origi¬ nally it was a round stone tower covered with marble and surmounted bya number of statues, which, together with the marble covering, have disappeared, leaving the bare stone structure. When the Goths besieged Rome it was used

as a fortress, and has served this purpose ever since, being held and garrisoned by the party in power in the city. Since the time of Inno¬ cent III it has belonged to the Popes, who strengthened the fortifications with outworks and connected the castle with the Vatican by an underground passage.

SAINT-ARNAUD, san-tar-no, Jacques Le¬ roy de, French soldier: b. Bordeaux, France, 20 Aug. 1796; d. at sea, 29 Sept. 1854. He entered the French army in 1813, but in 1822- 31 was engaged with the Greeks in their strug¬ gle for independence. He returned to the French army in 1831, and in 1837 he went to Algeria, where he rose to the rank of marechal- de-camp in 1847, and general of division in 1851, in recognition of his successful warfare against the Kabyle tribes. He was appointed Minister of War 26 Oct. 1851, was active in promoting the coup d'etat of 2 December, and was made a marshal of France in that month. He was placed in command of the French forces in the Crimean War and co-operated with Lord Raglan at the battle of Alma, 20 Sept. 1854. Consult Duperrel Sainte-Marie, (M. le General Leroy de Saint-Arnaud) (1852).

SAINT ASAPH, az'af, Wales, an episcopal city in the county of Flint, six miles southeast of Rhyl, occupies an eminence in the Vale of Clwyd, near the confluence of the Clwyd and Elwy. It is built irregularly and has a vener¬ able appearance. The encampment, Bron-y- Wylva, on the brow of the hill, is supposed to have been occupied by Roman forces. The ca¬ thedral, a small plain structure, dating from 1284, has been restored several times. Its li¬ brary contains some rare and valuable books. The bishop's palace is modern. The town has a grammar school, founded 1600,

county offices, a union workhouse and almshouses. Pop. about 7,000.

_ SAINT AUBAIN, san-to-ban, Andreas Nicolai de, Danish author, known largely by his pseudonym, ((fortune's Favorite)); (Kroniker fra Christian den An- dens Tid> ((Chronicles from the Time of Christian II, > 1847), and

*SAINT AUBYN, d'bin, Alan, pseudonym of Frances Marshall Bridges, English novel¬ ist : b. Surrey. She was the daughter of G. B. Bridges, a dramatist, and was married to Mat¬ thew Marshall of Saint Aubyns, Tiverton, Dev¬ onshire. Among her very numerous novels may be named (The Master of St. Benedicts) ; ˆBroken Lights) ; (A Prick of Conscience) ; (The Junior Dean. * She has also written many juvenile tales such as (Joseph and His Little Coat* ; (The Dean's Little Daughter* ; (Wap- ping Old Stairs.*

SAINT AUGUSTINE, a'gus-ten or a-gus'- ten, Fla., city, port of entry, county-seat of

Saint Johns County, on the Atlantic Coast, about 38 miles south of the mouth of the Saint Johns River. The city is in lat. 29° 48′ 30″ N., and long. 81° 35′ W., on a peninsula formed by the Saint Sebastian River on the south and west and the Matanzas River on the east. It is on the Florida East Coast Railroad and the East Coast Canal. It is the oldest city in the .United States, although not with a continuous existence, the latter honor belonging to Albany, N. Y. The city has many evidences of its ancient fortifications. The residence of the old Spanish governors is now a custom-house and post office. The principal streets extend north and south. The main thoroughfare, Saint George street, only 17 feet wide, extends through the centre of the city to the city gate¬ way; but beyond this point it is called San Marco avenue. Treasury street, which crosses Saint George, is only seven feet wide at the east end. Of the modern buildings, the hotels are the most beautiful. The Ponce de Leon is of the style of the Spanish Renaissance ; the buildings and furnishings cost about $3,000,000. A pictorial history of Spanish adventure in the New World, especially relating to the history of Florida, is given in the mural decorations of the dining-room and loggia.

Saint Augustine was settled 8 Sept. 1565 by Spaniards under Pedro Menendez de Aviles; but the place had been visited as early as 1512 by Ponce de Leon. For two centuries it re¬ mained under Spanish rule, although in 1586 it was plundered by Drake. The population in 1763 was 3,000, besides the garrison of 2,500. It became a British possession in 1763 which it remained until 1783. During the Revolution it was an important military depot. It became again a Spanish possession in 1783

and in 1821 it was ceded to the United States. (See Florida) . It was twice taken by the Federals during the Civil War. A disastrous fire in 1914 destroyed many of the city's famous landmarks. Some of the old buildings of the first Spanish regime are still in existence. The houses were then built chiefly of coquina, a formation found on Anastasia Island, a concrete made of broken shells cemented with shell-lime. The sea-wall, the city walls and the fort were made of the same material. San Marco, now Fort Marion, is a fine specimen of the knowledge of military engineering of that age. The government added a water battery in 1842-43, and has made occa¬ sional repairs, but it stands to-day about as built by the Spaniards. It is said to have been constructed by Mexican convicts and Indian prisoners, and to have been in process of erec¬ tion for about 100 years. The shaft of marble in the Plaza was erected in 1812-13 to com¬ memorate the adoption of a Spanish constitu¬ tion which was more liberal than the one under which the city had been governed. The in¬ habitants were ordered to destroy the shaft when the project failed, but the authorities only removed the tablets which have since been re¬ stored. A Roman Catholic Church begun in 1793 and used later as a cathedral, was burned in 1887; but the fagade remained almost unin¬ jured. In rebuilding, this front wall was in¬ corporated into the new structure ; and the bell bearing the date of 1682 is also preserved. The only part of the old wall which now remains is the city gateway with about 30 feet of the wall on each side. The wall extended south along

SAINT AUGUSTINE, FLORIDA

1 The Old City Gate

2 The Plaza

.

- '

SAINT BARTHOLOMEW— SAINT BERNARD DOG

123

San Sebastian River, and from the river to the castle of San Marco (Fort Marion) where were a wall and moat. The old city extended nearly a mile, from the Castle of San Marco to the Franciscan Convent, now Saint Francis bar¬ racks, and the old sea-wall, built to protect the city from the sea, was also limited by the castle and the convent. The government rebuilt the sea-wall in 1837-43, and there is now a granite coping three feet in width. For many years, until 1817, the entrance to the city from the mainland was by means of a drawbridge. Farm¬ ing, dairying and stock-

raising are extensively carried on in the vicinity.

There are a number of manufacturing indus¬ tries; chief among the establishments are the Florida East Coast railroad shops, printing plant, lumber and wood works. There are en¬ gaged in oyster canning and in fishing fully 250 persons. Saint Augustine is a famous winter resort ; about 25,000 persons visit the city an¬ nually. Two fine hospitals, the Alicia and the Florida East Coast, the public library, the State School for Deaf and Blind, several churches, and the municipal buildings are among the principal structures. The educational insti¬ tutions are Saint Joseph's Academy, Warden Academy (colored), three public schools (white), two parish schools (white), one parish school (colored), one kindergarten and one of the 17 best libraries in the United States, enti¬ tled to all government publications free, and a museum of natural history. The one bank has a capital of $100,000; the annual amount of business is about $1,100,000. The waterworks are the property of the municipality. The city has adopted the commission plan of government. Pop. (1920) 6,192.

SAINT BARTHOLOMEW, bar-tholo- mu, or SAINT BARTHfiLEMY, san bar¬ rel -me, West Indies, an island 190 miles east of Porto Rico. It is about eight square miles in area, of irregular form and mountainous. Al¬ though nearly treeless it is fertile; vegetables are cultivated in some of the valleys and ba¬ nanas, cassia, tamarinds, and sassafras are ex¬ ported. Rocks and shallows make access to the island difficult for any but the larger coasting craft. Lead and zinc ores have been found in the island but are not worked. The principal town is Gustavia, near the port. The island belonged to Sweden, but in 1877 was sold to the French who had previously held it from 1648 to 1784; the people, who had retained the French language and customs, desiring it. Slavery was abolished in 1848. Pop. 2,942.

SAINT BARTHOLOMEW, Massacre of.

See Bartholomew, Saint, Massacre of.

SAINT BEDE COLLEGE, a Roman Catholic institution, in Peru, Ill., opened in 1891, and in charge of the Order of Saint Benedict. The faculty numbers 18 professors, and the average annual attendance of students about 200. The courses are preparatory, commercial and classical. The classical course is intended for those studying for the priesthood or for the professions.

SAINT BENEDICT'S COLLEGE, At¬ chison, Kan., was founded in 1858 by Bene¬ dictine Fathers. Two courses of studies are offered, the classical and the commercial; the classical course leads to the degree of bachelor

of arts, while the degree of master of arts is conferred for two years' post-graduate study. The commercial course leads to the degrees of bachelor and master of accounts. A pre¬ paratory course is also provided. Two com¬ petitive scholarships are offered those who enter the classical course and there are five elective scholarships. Handsome new buildings with modern equipment grace the extensive college grounds since 1908. The average annual attendance of students is 250; the faculty numbers 26.

SAINT BERNARD, Great (Rom. Alphis

Pcenina), Alpine Mountain pass, 8,108 feet above sea-level, 15 miles east of Mont Blanc, leading from Martigny, Switzerland, to Aosta, Italy, a distance of 53 miles, and connecting the valleys of the Rhone and the Dora Baltea. It was known to the Romans and traversed by them as early as 57 B.C., while a military road is recorded in 79 a.d. It was used also in mediaeval times; and Napoleon used the pass with his army in May 1800. A carriage road now extends its full length.

The famous monastery or hospice of Saint Bernard, which stands at the summit of the pass, was founded in 962 by Saint Bernard of Menthon and is maintained for the relief of travelers lost in the snows or exhausted by the rigors of the journey. It is in charge of Augustinian monks, who, with their celebrated dogs, have saved countless lives, and who care for the bodies of the dead. There are remains of a temple of Jupiter Pcenius on the plain at the top of the pass, dating from the early days of the Roman Empire, and excavated in 1890-

93.

SAINT BERNARD, Little (Rom. Alphis Graia), Alpine Mountain pass. 7,235 feet above sea-level, leading from Italy to France and con¬ necting the valleys of the Isere and the Dora Baltea. It is believed to be the pass used by Hannibal and his army, 218 b.c. A monastery similar to that at Great Saint Bernard was founded here by Saint Bernard about 1000. A carriage road now traverses the pass. There are remains of a Roman road and temple.

SAINT BERNARD, Ohio, city in Hamil¬ ton County, a suburb of Cincinnati, on the Baltimore, the Ohio Southwestern, the Cleve¬ land, Cincinnati, Chicago and Saint Louis and the Norfolk and Western railroads, and the Miami and Erie Canal. There are large manu¬ factories of soap, fertilizers and cigars. Pop.

(1920) 6,312.

SAINT BERNARD OF CLAIRVAUX.

See Bernard, 'Saint,

SAINT BERNARD DOG, a race of large dogs which gets its name from the Hospice of Saint Bernard, where it has long been kept by the monks to aid them in rescuing perishing travelers. This dog is verv valuable in assist¬ ing the monks to keep to the line of the road and in finding their way back. They are seldom burdened. Dogs of other races are used for the same purpose in other parts of the Alps. The Saint Bernard dog is of two varieties : the rough and the smooth coated ; the first, which has long white hair with black or tawny spots are few in number. This famous dog, accord¬ ing to the traditions of the monastery, is the result of a cross between a Danish bull-bitch

and a mastiff, a native hill dog, though at what time effected it is impossible to say. After the breed was once established it was kept pure till 1812. About 1860 these dogs first attracted attention of English travelers, who imported them to Great Britain, where they were ex¬ hibited and at once excited much notice on account of their size and beauty. Others were introduced, and the Saint Bernard was soon established as the most popular big dog, a pop¬ ularity which has gone on increasing. The Saint Bernard, as bred to modern English ideas, is an immense red or orange colored dog, marked with white on muzzle, neck, chest, feet, and tip of tail. The head should be massive and imposing, with a strong square muzzle, a point of great importance. Legs should be straight, with large feet, and double or, at least, single dew claws. Hind feet should turn out, though not sufficiently to hinder the dog's move¬ ments. The coat of the rough variety is of medium length; it should not be too curly. In the smooth variety the coat should be short and wiry. Many of the finest Saint Bernards measure over 30 inches high at the shoulder and weigh over 150 pounds. While most of these dogs are good-tempered, strangers should be cautious in dealing with them; they are very likely to attack and kill small pet dogs, especially fox-terriers.

SAINT BONIFACE, Canada, city and county-seat of Provencher County, Manitoba, at the confluence of the Red River of the North with the Assiniboine, opposite Winnipeg, and on the Canadian Pacific, the Great Northern, the Canadian Northern and Grand Trunk Pacific railroads. It is the seat of the Roman Catholic archbishop of Manitoba, and has a col¬ lege, seminary, normal school, convent and two hospitals. It has meat packing and lumber in¬ dustries, as well as grain elevators, brickyards, glass works, and other manufactures. Pop.

7,483.

SAINT BRENDAN'S ISLE, a legendary island supposed to have existed to the s.outhwest of the Canary Islands and to have been dis¬ covered by the Irish monk, Saint Brendan, and 75 brother monks in the 6th century, after seven years spent in search for the land of saints. This legend is traceable as far back as the 11th century. Each of the various early geographers gives it a different location. The legend had some influence upon the discovery of America.

SAINT-BRIEUC, san-bre'e', France, city, capital of the department Cotes-du-Nord, 63 miles by rail northwest of Rennes. It is built on a hill rising 290 feet above the right bank of the river Gorret, a mile from its outlet, in its port of Le Legue, on the bay of Mont Saint Michel. A considerable coasting trade is carried on in fish, garden and farm products, and the manufacturing industries include iron, steel and agricultural implement works, lumber, brush and wool factories. The city dates from a monastery established by the Welsh missionary Saint Brieuc, in the 5th century, and has had a turbulent history, especially during the 18th century Reign of Terror. The 13th century restored cathedral, a church of the same period, the modern church of Saint Michael, the bishop's palace, the city hall with its museum and picture gallery, the military bar¬

racks, formerly an Ursuline convent, a statue of Du Guesclin, and the colossal statue of the Virgin on a dominating northern hill are among the chief features. Pop. urban, 15,300; com¬ munal, 23,000.

SAINT CATHARINES, Canada, town of Lincoln County, Ontario, on the Welland Canal, and on the Grand Trunk and Niagara, Saint Catharines and Toronto railways, 12 miles north¬ west of Niagara halls, 32 miles east of Hamil¬ ton. Saint Catharines is noted for its mineral wells, has large hotels and is in a picturesque and fertile region. It has important manu¬ factories of agricultural implements, sewing machines, foundry products, saws, edge tools, furniture, flour, saw, also planing, mills, ship¬ yards, tanneries, woolen factories and breweries. Saint Catharines also carries on an extensive fruit trade. It has good water and sewerage systems, gas and electric lights, banks and news¬ papers. The more noted local institutions are Bishop Ridley College, a marine hospital and a commercial college. Pop. about 15,000.

SAINT CHAMOND, san sha-mon, France, in the department of Loire, eight miles north¬ east of Saint Etienne by rail, at the confluence of the Gier and Janon, is a well-built manu¬ facturing city. There are large coal mines in the vicinity, famous dye-works and extensive metallurgical manufactures and various other industrial works, including large mills for the

manufacture of silk, lace, etc. The remains of a Roman aqueduct are found at Saint dia¬ mond. Pop. about 17,000.

SAINT CHARLES, Ill., city and county-

seat of. Kane County, 30 miles west of Chicago, on Fox River, and on the Chicago and Great Western and the Chicago and Northwestern railroads. It is built on both sides of the river, and has abundant water-power. It has milk condenseries, and manufactures steel ranges, chandeliers and pianos. Pop. 4,099,

SAINT CHARLES, Mo., city, county-seat of Saint Charles County, on the Missouri River, 20 miles from its mouth, and on the Wabash, the Missouri, Kansas and Texas railroads, about 14 miles northwest of Saint Louis. It was set¬ tled in 1769 by Blanchette ˆChasseus,® incor¬ porated in 1795, and chartered as a city in 1849. There is an electric road connecting Saint Charles with Saint Louis. The city is in an agricultural region, in which the chief products are wheat and corn. The principal manufac¬ turing establishments are car works and flour mills, shoe factory, oil engine works, and a stay factory. The city has large grain elevators, a foundry and machine shop. The principal pub¬ lic buildings are a court-house, 10 churches, 11 schools, post-office, city hall, and county jail. The educational institutions are Sacred Heart Academy, opened in 1818; Lindenwood College, the largest college for girls in the west, opened in 1830; a new high school, public and parish elementary schools, private schools and four li¬ braries. Saint Charles has Blanchette Park which is nature's wonderful place of recreation and an excellent playground for children. The five banks have a combined capital of $320,000. The government is vested in a mayor and a council of eight members, elected biennially. Pop. (1920) 8,503.

SAINT CHA.RLES, Engagement at, a

battle of the Civil War, fought in Arkansas County on the White River, 17 June 1862. On 10 June Capt. C. H. Davis, then in command of the Federal Mississippi flotilla, received a re¬ quest from General Halleck to open up the White River for communication ; he accord¬ ingly despatched a force under Commander Kilty, consisting of the ironclads Mound City and Saint Louis, and the wooden gunboats Lex¬ ington and Conestoga. Meanwhile the Con¬ federates had fortified the bluffs at Saint Charles and, on learning of the approach of the Union vessels, had sunk their gunboat

Maurepas across the channel and transferred her guns to the shore-battery. On 17 June a detachment of Federal troops landed below the bluffs, and the gunboats opened the attack upon the Confederate position, the Mound City lead¬ ing ; when she was within 600 yards of the shore a 42-pound shell entered her casemate and exploded her steam-drum ; badly crippled she was towed out of action by the Conestoga, and the other boats continued the attack. The commanding officer of the land forces very shortly signaled them to stop firing, and the troops successfully stormed the Confederate battery. The Confederate loss was six killed, one wounded and eight missing ; the most serious Federal loss was on the Mound City , the majority of her crew being killed by the escaping steam, or in consequence of jumping into the river. Of 175, only three officers and 22 men were saved. As there were no Confed¬ erate works farther up the river, this action gave control of the White River to the Federals. Consult Mahan, (The Gulf and Inland Waters, > p. 50; (Battles and Leaders of the Civil War (Vol. Ill, pp. 552-553).*

SAINT CHARLES COLLEGE, Catons- ville, Md., under the auspices of the Roman Catholic Church, was founded 11 July 1831 at Ellicott City, Md. The funds for the institu¬ tion were donated by Charles Carroll of Car¬ rollton, one of the signers of the Declaration of Independence, who gave 253 acres of land from his own domain, and $5,349 in money. The charter of the school as agreed upon by Archbishop Marechal of Baltimore and Charles Carroll, stipulated that the purpose of the school was <(the education of pious young men of the Catholic persuasion for the ministry of the gospel,® and that the legal administration of the college should be entrusted to five trustees, who must be citizens of the United States. The founder also requested that the trustees be members of the Society of Saint Sulpice. The school was not opened until October 1848. The faculty then consisted of the president, one as¬ sistant and four students. Under the direction of the Rev. Oliver Lawrence Jenkins during 18 years the college steadily developed, until at his death in 1869 the faculty numbered 13, the students 140 and 100 graduates were at work in the ministry. On 16 March 1911 the college was totally destroyed by fire. Plans for re¬ building were promptly set in action on a more eligible site at Catonsville generously deeded by Saint Mary's Seminary of Baltimore. Fine buildings and spacious grounds furnish all facilities. Saint Charles College forms the classical department of Saint Mary's Univer¬ sity and Theological Seminary of Saint Sulpice,

at Baltimore. The course including the pre¬ paratory work is six years. The college has power to grant degrees. Several scholarships are available in competitive examination. Recent statistics give the faculty numbers as 18, the students as 190. Of 4,461 students who have matriculated, over 1,500 have been ordained. Among its distinguished sons Saint Charles counts a

cardinal, five archbishops and 13 bishops.

SAINT CHRISTOPHER, popularly SAINT KITTS, West Indies, 45 miles north¬ west of Guadeloupe, is an island belonging to the Leeward group, and a British possession. Its area is 68 square miles; its length 23 miles; breadth five miles. It is traversed by a rugged range whose highest summit, Mount Misery, has an altitude of about 4,000 feet. Basse-Terre, the capital, on the coast, has a population of about 7,000. It is united administratively with Nevis, and the small island Anguila. The chief products are sugar, molasses, rum, salt, some coffee, tobacco and cattle. The island was dis¬ covered in 1493 by Columbus ; colonized by the French and British simultaneously in 1625, and held by those nations alternately for some time, passing over entirely to England in 1713.

ST. CLAIR, Arthur, American soldier : b. Thurso, Caithness, Scotland, 1734; d. Greens- burg, Pa., 31 Aug. 1818. He was a grandson of the Earl of Roslyn and was educated at the University of Edinburgh, after which he studied medicine. He came to America with the fleet of Admiral Boscawin and took part in the capture of Louisburg and of Quebec. In 1762 he resigned his commission of lieu¬ tenant and two years later established a home and a manufacturing industry in Ligonier Val¬ ley, Pa. He became prominent in his vicinity and held several civil offices. In 1775 he was made colonel of militia; and on 9 Aug. 1776 was appointed brigadier-general and was or¬ dered by Washington to organize the New Jer¬ sey militia. He fought at Trenton and Prince¬ ton, and having been appointed major-general in 1777, succeeded General Gates in command at Ticonderoga. At the approach of Burgoyne, with a force more than three times outnum¬ bering his, he evacuated the fort. A part of his force was attacked and defeated at Hubbard- ton. For this disaster he was tried in court- martial in 1778, but acquitted of the charges brought against him. He commanded a body of troops in 1781-82 under General Greene in the South ; was a delegate to the Continental Con¬ gress in 1785-87 and its president in 1787. He was appointed first governor of the Northwest Territory in 1789, and was appointed com¬ mander-in-chief of the forces engaged in war¬ fare with the Indians in 1791, but was defeated on 4 November, near the Miami villages. In March of the following year he resigned his commission and in 1802 President Jefferson re¬ lieved him of the governorship of the Territory. He published (A Narrative of the Manner in which the Campaign against the Indians in the year 1791 was conducted under the com¬ mand of Maj.-Gen. St. Clair, > with his obser¬ vations on the statements of the Secretary of War (1812). Consult Smith, W. H., (The Life and Public Services of Arthur St. Clair)

(1882).

SAINT CLAIR, Mich., city in Saint Clair County, situated at the mouth of the Saint Clair River, and on the Michigan Central Rail¬ road, about 43 miles northeast of Detroit and 12 miles south of Port Huron. A ferry con¬ nects the city with Courtwright on the Canadian side of the river. It is in an agricultural region and has considerable manufacturing interests. The chief industrial establishments are lumber mills, sash, door and blind factories, shipyards, salt works, brick works, iron works, foundry and tannery. The value of its taxable property is $1,708,475. There are good public, Catholic, Lutheran schools, and churches of the various denominations. The government is vested in a mayor and council There is a good system of waterworks. Pop. 3,204.

SAINT CLAIR, Pa., borough in Schuyl¬ kill County, on the Philadelphia and Reading, and the Pennsylvania railroads, five miles north of Pottsville. An electric railroad connects the borough with Pottsville. It is in an anthracite region, and the chief industries are connected with mining and shipping coal. It has large coal shipping yards, a large mining implement works, two shirt factories, and a miners' squib factory. There are a high school, public and parish schools, a private school, and a library. Pop. (1920) 6,585.

SAINT CLAIR, a lake on the boundary be¬ tween Michigan and Canada, and between Lake Huron and Lake Erie. It receives the waters of Lake Huron through Saint Clair River and discharges its waters into Lake Erie through Detroit River. It is about 30 miles long, from north to south; its maximum width is 24 miles and the average width 12 miles ; area, 396 square miles. It is about three feet higher than Lake Erie and five feet four inches lower than Lake Huron. The northern part is shallow, owing to the sediment from Saint Clair River; the average depth of the central part is 19 feet. The bed is covered with a blue mud, with sand and gravel in some parts, all supporting a dense growth of low vegetation in which are many forms of animal life. The lake is noted for the large number of steamers and the enormous tonnage which it carries each year.

SAINT CLAIR, a river called originally Sinclair, in honor of Patrick Sinclair, a British officer, who in 1765 purchased from the Indians a tract of land along the river. The river is the outlet of Lake Huron, and discharges its waters by several channels into Lake Saint Clair. The delta at the mouth is known as the Saint Clair Flats. A number of summer cottages

and ho¬ tels have been built on the Flats. One of the channels has been improved for navigation ; a canal about one and one-half miles long has been built at such an angle as to shorten the course, and of such a width and depth as to admit large lake steamers. A railroad tunnel under the river connects Port Huron in the United States with Sarnia in Canada. It is nearly two miles long, including approaches, and was opened for travel in 1891. The river is about 41 miles long.

SAINT CLOUD, san-kloo, France, in the department of Seine-et-Oise, on a height near the Seine, seven miles west of Paris, is charm¬ ingly situated and especially interesting for its historical associations. It commands a superb

view of Paris, and the beautiful shady park, with its chateau and elegant fountains, is a favorite resort of Parisians. Within the pre¬ cincts of Saint Cloud are situated the new national Sevres porcelain manufactory. The chateau was built by Gondi in 1572, purchased by the Duke of Orleans, the brother of Louis XIV in 1658, and by Louis XVI for Marie An¬ toinette in 1782. Henry III was murdered in the old mansion by Jacques Clement 21 Aug. 1589. Peter the Great was received there in 1717. It was the scene of Napoleon's coup of the 18th Brumaire, and his favorite residence; here he caused himself to be declared first con¬ sul, and here Bliicher had his headquarters (1815). At Saint Cloud, Charles X (1830) affixed his signature to the ordinances which doomed him. Here Napoleon III signed the declaration of war against Prussia (1870).

SAINT CLOUD, Minn., city, county-seat of Stearns County, situated on the Mississippi River about 65 miles north of Minneapolis, on the Northern Pacific and Great Northern rail¬ roads. It was settled by John L. Wilson, it being located on his homestead platted by him in 1855, was incorporated in 1856, and adopted its first city charter in 1868. Saint Cloud and surrounding region lies above extensive and very valuable quarry ledges of red and gray granite that are used for monumental purposes, some building and road work. The business of shipping the finished product, monuments, etc., has increased to such an extent that the output for one year alone was $2,000,000. The city possesses one of the finest waterpowers on the Mississippi River. The developed and un¬ developed waterpower amounts to 22,500 horse¬ power. The Public Service Company has a hydro-electric plant and owns 300 miles of high- voltage lines that supply light to 40 villages and cities, in addition to the electric power supplied to the city of Saint Cloud, State re¬ formatory and innumerable quarries in sur¬ rounding districts. They also own a gas plant. The chief manufacturing establishments are manufactures of automobiles, trucks and trac¬ tors, also drop-forgings. The Great Northern shops are located in the city. Other manu¬ factories are flour mills, iron works, foundries, machine shops,

woolen mills, sledge factory, broom factory, woodworking factories and blank book and tablet factories ; cold storage and creameries, agricultural implements, etc.

The Watab Paper and Pulp Mills, one of the largest in the Northwest, is located five miles north of the city. The large surrounding region has fine, large, fertile and productive farms; both grain and stock farms, of prize horses and cattle. Saint Cloud has the Minne¬ sota State reformatory prison, Saint Raphael Hospital and Saint Joseph's Home for the Aged. The educational institutions are the State Normal School, largest in the State, pub¬ lic schools, technical high school — cost about $280,000, junior high school, three Catholic parochial schools with their high school, and a Carnegie public library. The Saint Cloud In¬ stitute — one of the finest buildings for a com¬ munity centre is located here. Saint Cloud is the seat of a Roman Catholic bishop. There are 20 churches.

On 22 April 1912 the city of Saint Cloud adopted the commission form of government. Pop. (1920) 15,873.

SAINT CROIX (sometimes called Schoo- dic), (1) a river, the outlet of Grand Lake, flows south, east-southeast, and forms part of the boundary between Maine and New Bruns¬ wick. It empties into Passamaquoddy Bay. It is 75 miles long; navigable as far as Calais, Me., above which there is extensive water power. (2) A river which rises in Douglas County, Wis., flows southwest to the Minnesota border, then south, forming the boundary be¬ tween Wisconsin and Minnesota for a distance of about 100 miles, entering Mississippi River at Prescott, Wis. It is about 150 miles long and navigable to the Falls or the Dalles, a dis¬ tance of 54 miles from its mouth. At the Falls there is a descent of 50 feet in 900 feet, and below there is a canon.

SAINT-CYR, Laurent Gouvion, lo-ron

goo-ve-on san ser, Marquis de, marshal of France: b. Toul, France, 13 April 1764; d. Hyeres, France, 17 March 1830. In 1792 he entered the army and was attached to the staff of General Custine. He was rapidly promoted and in 1796 commanded the cen¬ tre division in the army on the Rhine under Moreau. He was appointed to the command of the army of Italy in 1798 where he re-established discipline, the army hav¬ ing been on the verge of revolt against their general, Massena. He returned to the army of Moreau in 1799, was victorious at Biberach in 1800, and in 1801 was

sent to Spain to com¬ mand the army which was to invade Portugal. After the treaty of peace was signed he became Ambassador to Madrid. He participated in the Prussian and Polish campaigns of 1807, and in 1808 was in command in Catalonia, where he relieved Barcelona. In 1811 he was assigned to the command of a corps in the Russian cam¬ paign. He was victorious at Polotsk in 1812 and was created marshal of France in recogni¬ tion of his services. He made a brilliant fight at Dresden, but was forced to capitulate and re¬ mained a prisoner in Hungary for some time. After the Restoration he was created a peer of France, was appointed Minister of War in 1815, Minister of Marine in 1817 and a few months later Minister of War again, retiring in 1819. He vcrote (Journal des operations de l'armee de Catalogue en 1808 et 1809) (1821); (Memoires) (1829-31), etc. Consult De Vernon, (Vie de Marechal Gouvion Saint-Cyr) (1857).

SAINT CYR, or SAINT CYR-L'ECOLE,

la-kol, France, a village near Paris, west of Versailles, at the end of the old park of Louis XIV, celebrated for its military school. Ma¬ dame de Maintenon founded here (1686) a seminary for the education of the daughters of families of high rank in reduced circum¬ stances. The convent chapel contained the tomb of Madame de Maintenon, and Racine's were written for the pupils of the school and first acted there. Dur¬ ing the Revolution this institution was abol¬ ished, and in 1806 Napoleon transferred to Saint Cyr the famous military academy which he had founded at Fontainebleau. Two ad¬ vanced forts of the new enceinte around Paris are situated at Saint Cyr. Pop. about 5,000.

SAINT DENIS, san de-ne, France, in the department of Seine, four and one-half miles north of Paris, is an important junction on the Northern Railroad. The town is especially

celebrated for its venerable abbey, from which it derives its name ; the two high towers are respectively Romanesque and Gothic; the rose window dates from the 13th century. The abbey was the burial place of the kings of France and in the chapels of the nave are the tombs of Louis XII, and Anne of Brittany (1591); of Henry II; Catharine de'Medici ; Louis of Orleans; Francis I; and Claude of France — one of the splendid tombs of the Renaissance; and that of Dagobert, one of the most curious of mediaeval (13th century) works of art. The Crypt dates partly from the time of Charlemagne. In the centre is the vault, where the last king reposes — Louis XVIII, the only one whose ashes have been respected. The crypt also contains the Bourbon vault, where repose Louis XVI and Marie Antoinette. Modern features deserving notice are an or¬ phanage (1886), the monument commemorative of the Revolution and other public statues, and

the railway station. In 1888 the old Hotel Dieu was converted into a hospital for old men. Pop. about 72,000.

SAINT-DENIS, the capital of the French island of Reunion in the Indian Ocean, on the north coast of the island. It is built on a long, narrow beach shut off on the land side by a range of high volcanic mountains. In the city are a cathedral, a palace for the governor, a theatre, and a large number of educational in¬ stitutions, including a lyceum, several large schools, a library, a museum, and a botanical garden. The harbor is an open roadstead ex¬ posed to frequent severe storms, but a new, protected harbor has been constructed at Pointe des Gallets, a few miles to the west, which is connected with the city by a railroad. Pop. about 25,000, chiefly French creoles.

SAINT DIZIER, san de-ze-a (ancient Desiderii Fanum), France, department of Haute-Marne, on the Marne, 35 miles southeast of Chalons. Part of the old castle is stand¬ ing and the church has some peculiar Gothic windows. There is a library and a museum. It is an important centre of the iron trade, with foundries of iron, steel, copper and bronze, en¬ gineering works, etc. It is a railway station. In 1544 Saint Dizier was besieged and taken by Charles V, although strongly fortified. In 1814 there was severe fighting nearby, between Napoleon and the Allies. The walls have been razed and the site now constitutes the prome¬ nade of the town. Pop. about 15,000.

SAINT ELIAS, Mount, in Alaska, in the southeastern part of the Territory; long. 140° 55′ 47.3″ W.; lat. 60° 17′ 35.1″ N. The United States Coast and Geodetic Survey report the height 18,100 feet above sea-level. It rises from an elevation of considerable height, and the foot-hills on the south side are covered with trees. The timber line is from 2,000 to 2,500 feet above sea-level. The mountain itself is covered with snow and ice and has many glaciers. The south side is almost perpendicu¬ lar; the storms of ages and the avalanches have removed many of its rugged features. The north side is more accessible, and has been explored to some extent. The Malaspina glacier (area with subsidiary glaciers 1,500 square miles) is on the slope and at the foot of Mount Saint Elias, near Yakutat Bay.

SAINT ELMO CASTLE, Naples, Italy, a fortress crowning a rocky hill on the western outskirts of the city. It was built by Robert the Wise in 1343. It has massive walls sur¬ rounded by fosses cut out of the solid rock, and was long held to be impregnable. It is now used as a military prison.

SAINT ELMO'S FIRE. See Elmo's

Fire, Saint.

SAINT ETIENNE, san ta-te-en, France, a manufacturing town in the department of the Loire, on the Furens, 32 miles southwest of Lyons. It is located amid some of 'the richest coal fields of France. The important buildings include the old abbey of Valbenoite, dating partly from the 13th century, a Protestant church, a synagogue, a town house, a school of mines with fine collections, and an art palace, with a museum and library, rich in old manu¬ scripts, collections of natural history, and of ancient artillery. The enormous metallurgical establishments yield one-third of the whole French production of steel, manufactured ac¬ cording to the Bessemer and Martin processes. Here are also the national gun factory and other metal works. The manufacture of hemp cables, pottery and lime, the weaving of ribbon, laces, trimmings, etc., and conditioning of silk are among the varied and active industries of the town, giving employment to thousands of men and women. The collieries are very ex¬ tensive, alone employing 15,000 miners, while 80,000 work in the ribbon factories, 16,000 oper¬ atives on heavy iron goods, 7,000 on hardware, and 6,000 on military and naval material, etc.

SAINT EUSTATIUS, or STATIA, an

island in the Dutch West Indies, one of the Lesser Antilles. In 1774, the closing of the port of Boston, by order of the British govern¬ ment, shut off the supplies of food hitherto furnished by the colonists, caused the death of 15,000 negro slaves in the West Indies. From immediately after the battles of Lex¬ ington and Bunker Hill, this island became the chief source of supplies for the Continental Congress and armies. Fleets of American pri¬ vateers, loaded with dried fish, rice, sugar, to¬ bacco and indigo, traded their cargoes for war munitions. Here, on 17 Nov. 1776, the Dutch governor, Johannes de Graeff, after having read the Declaration of Independence, shown him by Captain Josiah Robinson, of the United States man-of-war, Andrea Doria, 29 guns, ordered a salute to be fired in honor of ((the Congress flag® and the new nation. This was the first formal foreign salute in honor of the 13-striped American flag, on which were represented as many independent States in Union. From May 1775 until 1781, Saint Eusta- tius, or <(01d Statia,® as our fathers called it; was a mart for many nations. On 3 Feb. 1781, Admiral George Rodney, with the largest fleet ever assembled under the British flag — leaving Cornwallis in the lurch — captured the island and 24 American ships, including two men-of- war, with 2,000 sailors. Rodney auctioned off $11,000,000 worth of stores, but was plagued for years with lawsuits, since many of the traders were from Great Britain. Much of the confiscated property was

British, and some of his heavily loaded prize ships on their way to England were captured by French privateers. Consult De Graeff's

344, 1779) ; Griffis, New England Magazine , July 1893; Ferger, (Alone in the CaribbeaiP

(1918).

SAINT-EVREMOND, saii-tavr-moii, Charles de Marguetel de Saint Denis, French courtier and author : b. Saint Denis-le-Guast, 1 April 1613; d. England, 20 Sept. 1703. He was educated by the Jesuits, entered the army about 1629, served in Italy under Bassompierre and later in Germany in the Thirty Years' War. He was a witty and accomplished courtier, and was for a time a favorite with Conde and also with the king; but incurred their displeasure by his sarcastic raillery and especially by his letter on the Peace of the Pyrenees. In 1662 he went to England, where he became a favorite at court and received a pension of £300 ($1,500) from Charles II. He wrote dramas, essays and let¬ ters, his collected works being published in 1705. These include (Sir Politics, > written with Buckingham. Consult Merlet, Gustave, (Saint Evremond, etude historique) (Paris 1870).

SAINT FRANCIS, a river which rises in eastern Missouri and flows into the Mississippi River in Arkansas, lat. 34° 45′ N. It is a large river, and was formerly navigable 300 miles for large keel boats; but the earthquakes of 1811-12 raised its channel so much, and so irregularly, as to cause the waters to overflow the banks and form a vast number of lakes and swamps. At high water the river is still navigable at some seasons of the year for about 150 miles. Its waters abound with excel¬ lent fish. Length, about 450 miles.

SAINT FRANCIS OF ASSISI. See

Canticle of the Sun; Francis of Assisi.

SAINT FRANCIS XAVIER COLLEGE,

New York City. It was founded in 1847 by the Jesuits, and was granted the powers of a uni¬ versity in 1861 by the State board of regents. Its organization includes a collegiate and a pre¬ paratory department. The regular college course leads to the degree of A.B. ; it includes instruc¬ tion in logic, metaphysics, and theodicy, Eng¬ lish and the classics, mathematics and science, and history. Post-graduate work in literature, history, sociology and psychology is provided for, and leads to the degree of A.M. There are 46 scholarships. The college is well equipped; the library contains 115,000 volumes, and the grounds and buildings were valued at over $750,000. Student attendance averages 450, a large majority being in

the preparatory de¬ partment; the faculty numbers 38. In 1913, the college department was removed from the island of Manhattan to Brooklyn, N. Y., where it still continues to confer degrees as the Col¬ lege of Saint Francis Xavier, N. Y. The high school department remains at its former location.

SAINT GALL, gal, Switzerland, (1) capi¬ tal of the canton of Saint Gall, on the Steinach, in a high, narrow valley, about 50 miles from Zurich. It is the see of a bishop, and has be¬ sides the cathedral, several churches, a mon¬ astery, now containing public offices, a large town-house, library and orphan asylum. The town library is rich in works relating to the Ref¬ ormation. The ancient Benedictine Abbey was famous as an asylum of learning during the Dark Ages, and was one of the most celebrated educational institutions of Europe. Several of

the classics, namely, Quintilian, Silicus, Italicus, and Ammianus Marcellinus, were preserved solely among its manuscripts. Notker and Ek-kehard were among its pupils. Saint Gall is an important manufacturing centre, celebrated for its fine laces and embroideries. Pop. 38,683. (2) The canton covers an area of about 780 square miles. It has a diversified surface; the southern and central portions are covered by lofty Alpine ranges. Its principal lake is the Walensee but it also contains part of the Lake of Constance. The climate of the valley is mild, but in the mountainous district is rigorous. There are important stone quarries, much wood and good pastures ; on the lower slopes vineyards and orchards, and some arable lands. Manufactures consist of cotton and linen goods. The constitution is pre-eminently democratic. German is the main language spoken. Pop. about 301,141.

SAINT-GAUDENS, ga'denz, Augustus, American sculptor: b. Dublin, Ireland, 1 March 1848; d. Cornish, N. H., 3 Aug. 1907. He was brought to the United States in infancy and at 13 was bound in apprenticeship to learn cameo¬ cutting and spent several years at this art. Six years later (1867) he went to Paris and studied under the sculptor jouffroy at the Ecole des Beaux Arts. While at Rome in 1871 he pro¬ duced his first figure, (Hiawatha, 5 and the fol¬ lowing year returned to the United States. Saint-Gaudens was a sculptor of originality and freshness, who had adopted the best standards of French taste and method of execution with¬

out being hidebound by tradition. He had a style at once polished and free. Among his other works are the (President Lincoln5 statue in Lincoln Park, Chicago; the bas-relief (Adoiation of the Cross by Angels' ; the (Shaw Monument5 at Boston; and the (Diana5 on the tower of Madison Square Garden, New York. He also took part in executing the (Parnell Memorial5 monument in 1901, designed several medals of presentation authorized by Congress, and assisted John La Farge in decorating Trinity Church, Boston.

What perhaps is the most strikingly charac¬ teristic of all his ideal statues is (The Puritan5 (at Springfield, Mass.). It represents the puri¬ tan of earlier New England in all his aggress¬ ive and unbending strength — soldier, theo¬ logian, statesman. There is nothing winning or conciliating in his air. He is come to conquer the wilderness as Cromwell conquered the aris¬ tocracy of England and wiped out for the brief period of the commonwealth the haughtiest of European dynasties. The puritan, as Saint-Gaudens has portrayed him, carries the Bible next his heart in one hand and a stout cudgel of oak in the other. He personifies those un¬ swerving, and sometimes fanatic principles on which the ancient commonwealths of New Eng¬ land were established. The Sherman equestrian statue which was unveiled at the southeast en¬ trance of Central Park in 1904 is the last of a series of five in which he commemorated heroes of the Civil War, among the most notable of which is the remarkable statue of Farragut in Madison Square, New York. Of the Sherman monument, executed by Saint-Gaudens, a critic had said: (

powerful imagination and an original mind. The Victory is exactly where it belongs, and bears a relation as true, as unforced, as any¬ thing in nature itself to the horseman pressing close upon its flying robe. Once more a word on the sculptor's discretion is inevitable. He wanted to express movement in this monument, to give to Victory almost aerial lightness in her carriage, to embody in the horse a type of great strength, pushing its way to the front, and to make Sherman himself the very ideal of a leader, who spurns the miles behind him. The bronze seems almost sentient. The group quivers with vitality. But the rhythm of this dramatic conception is held so well in hand, it is so majestic, that classic art itself could not produce a more nobly monumental effect.55

SAINT GEORGE, Cape, Newfoundland, the westernmost projection of the island, form¬ ing the northwestern extremity of Saint George Bay, on the Gulf of Saint Lawrence.

SAINT GEORGE AND THE DRAGON.

See Dragon.

SAINT GEORGE'S CHANNEL, an arm

of the Atlantic which separates Ireland from England. At the north it unites with the Irish Sea. Its entire length from southwest to north¬ east is about 100 miles. The tide rises in this channel about the same time as in the English Channel, so that there is high water simulta¬ neously at Brest in France, Falmouth in Eng¬ land, and Cape Clear in Ireland.

SAINT GEORGE'S CHAPEL, Windsor, England. See Windsor.

SAINT-GERMAIN, san-zher-man, Count of, adventurer of the 18th century : b. perhaps 1710; d. Eckernfoerfe, Schleswig, 1784. A mystery enveloped his birth and origin, of which he took every advantage. He spoke English, German, Italian, Spanish and Portuguese to perfection, and French with a slight Piedmontese accent ; and was variously thought to be the son of a tax collector at San Germano, Savoy, an Alsatian Jew, a Portuguese marquis named Betmar, or the illicit offspring of a Spanish princess. After sojourning in various cities of Italy under as many pseudonyms, he lived from 1750 to 1760 at the French court under the patronage of Marshal de Belle-Isle, and, having a fine personal appearance and address, considerable erudition and a wonderful mem¬ ory, became a favorite of Mme. de Pompa¬ dour and the king. He was reported to be from 2,000 to 3,000 years old. Frederick the Great, having asked Voltaire for some particulars respecting this mysterious person, was told that he was <(a man who never dies and who knows every thing.55 He passed the last years of his life at the court of the prince of Hesse-Cassel, and is supposed to have been employed during the greater part of his life as a spy at the courts at which he resided. Cagliostro owned himself a pupil of the Count of Saint Germain. Consult Oettinger, (Graf Saint Germain5

(1846).

SAINT GERMAIN-EN-LAYE, on la,

France, a town in the department of Seine-et- Oise, on a height bordering the Seine, 11 miles west of Paris. At the edge of a forest, 200 feet above the river, the air is bracing and salubrious. It is a favorite summer resort and

residence of Parisians. The terrace of Saint Germain is one of the finest promenades in Europe and commands an extensive view of the valley of the Seine and surrounding hills. The ancient castle of the town now serves

as a museum of antiquities; it was destroyed and restored at various epochs. This castle was first built by Charles V (1370), on the site of a still older structure, and reconstructed and embellished by many succeeding sovereigns, especially Louis XIV. Here were born Charles IX, Margaret of Navarre, Henry II and Louis XIV. James II of England and most of his family here lived and died as exiles. In the Henry IV pavilion Thiers died (1877). Saint Germain is the seat of one of the cavalry garrisons which surround Paris; at a short distance is the Convent des Loges, connected with the Legion of Honor (Saint Denis).

SAINT GERMAIN DE RIMOUSKI.

See Rimouski,

SAINT GOTTHARD, goth'ard, Switzer¬ land, a mountain group on the confines of the cantons Uri, Grisons, Ticino and Valais, be¬ longing to the Lepontine or Helvetian Alps, which it connects with the Bernese Alps. It forms a kind of central nucleus in the great watershed of Europe ; each of its slopes giving rise to an important river — the north to the Reuss, the south to the Ticino, the west to the Rhone, and the east to the Rhine. All these rivers rise within a circuit of 10 miles from its centre. The culminating point has a height of 10,600 feet, and three other summits are beyond the limit of perpetual snow. The Col of Saint Gotthard, at its summit level, where the Hospice stands, is 6,808 feet high. A bridle path through the pass had existed since the 6th century and over it an excellent carriage road was completed in 1832, in which, particularly on the Italian side, formidable difficulties were sur¬ mounted, and much engineering skill displayed. A railway tunnel pierces this mountain group between Goschenen on the north and Airolo on the south, thus directly connecting the railway system of North Italy with those of Switzer¬ land and Western and Central Germany. This tunnel is the longest in the world, being 16,295 yards, or rather more than 9l/i miles long. Its construction, begun in 1872. was completed in 1881, and it was opened for traffic early in 1882. The total cost of the railway and tunnel was about $57,800,000, of which $11,500,000 was ex¬ pended on the tunnel alone, the expenses being met by Swiss, German and Italian state sub¬ ventions, by mortgages and shares. The ex¬ cavation was carried on simultaneouslv from the Italian and the Swiss side, the workmen finally meeting in the middle, where the height above sea-level is 3,785 feet.

SAINT GREGORY. See Gregory, Saint.

SAINT HELENA, Cal., the second town in size and importance in Napa County, 18 miles north of Napa, the county-seat, and 64 miles north of San Francisco, on the Southern Pacific Railroad. Saint Helena is part of

the Carne Humana rancho, a Mexican grant that com¬ prised all the northern part of Napa County. All lands in the rancho became the property of Dr. E. T. Bale by Mexican grant. The first men to settle the grant where Saint Helena is located were David Hudson and John York,

who came thither from Missouri in 1848. The town of Saint Helena was started in 1853 by J. H. Still, an Englishman, who opened a gen¬ eral merchandise store on one of the numerous wood roads, the country all around being thicklv wooded. Two years later Mr. Still donated building lots to others who would venture in business and a shoemaker's shop, blacksmith's shop and a few other enterprises were estab¬ lished. The town was named Saint Helena from the mountain of that name which stands at the head of Napa Valley. The honor oi naming the town was claimed by Henry Still, William Taylor and J. W. Booker. The first school was built in 1858. The town now has fine stone buildings to house its grammar and high schools. The Ursuline Sisters conduct an academy for girls and the Seventh-Day Ad¬ ventists conduct a church school, making the educational advantages unexcelled. Saint Helena also has a public library. The first church was built in 1857 and at present six denominations own their own places of wor¬ ship. The town was incorporated 24 March 1876 and reincorporated 14 May 1889. The municipality has a complete sewer system. Water is furnished by a private corporation and electricity for lights and power is distrib¬ uted by a company organized for that purpose. Saint Helena has several stone bridges and over eight miles of cement sidewalks. Its main street is paved. There are three banks the combined resources of which total $2,000,000. There are two newspapers, the Star and the Photogram. The principal industries are viti¬ culture and horticulture, poultry-raising and general farming. Business enterprises are well represented and there are several fraternal orders. Pop. (1920) 1,346.

SAINT HELENA, he-le'na, an island in the Atlantic, belonging to Great Britain, 700 miles southeast of the island of Ascension, the nearest land. The area is about 47 square miles. Although remote from the mainland, it is in the direct line of ocean communication via the Cape of Good Hope, many vessels making it a stopping point. It is of volcanic origin, the crater of the volcano forming the main ridge of the island. Many gorges, some of which are 1,000 feet deep, converge from the walls of the crater in all directions and numerous caves have been formed. High cliffs extend all along its shores to the water's edge, and there is a good harbor. The fauna and flora are interesting, many specimens being peculiar to the island. Farm and garden produce constitutes the entire wealth of the colony. Jamestown (3,000 inhabit¬ ants) is the only town. Longwood, where Napoleon died, is a farm-house, standing on a high plain. The Portuguese discovered the is¬ land, subsequently the Dutch took possession, and later it was ceded to Great Britain. Its chief interest is in its having been the

place of Napoleon's captivity.

SAINT HELENS, England, Lancashire, 11 miles northeast of Liverpool, a municipal county and parliamentary borough, and market town. A total hall (1875-76), a technical institute (1896), churches, schools, library and baths, an asylum and hospitals, numerous parks and recreation grounds are the main features. The town owes its importance to the coal-beds in the environs, copper-smelting, the manufacture

of iron and steel, chemical and lead works, pot¬ teries, breweries, its glass works and other in¬ dustries. Pop. about 97,000.

SAINT HELENS, a volcanic peak of the

Cascade Range, in the State of Washington; lat. 46° 12′ N., long. 122° 4′ W., height, 9,750 feet. The volcanic debris at the base and be¬ yond is of ancient origin; the mountain has all the appearance of an extinct volcano. It resembles Mount Rainier in its treeless sides and ice-covered summit, but it is smaller. On the north side, at the base, is Spirit Lake.

SAINT HELIER, hel-yer, Channel Islands, capital of the island of Jersey, and a favorite European summer resort, on the east side of Saint Aubin's Bay, on the south coast. It is strongly fortified and defended by Elizabeth Castle (1551-86), on a rocky island connected with the mainland by a causeway, and by Fort Regent, an imposing citadel dominating the town. The principal buildings are Victoria College, the Maison Saint Louis or Jesuit Col¬ lege, the court-house, public library, town hall, hospital, Norman parish church and the French Roman Catholic cathedral. Fine markets, an esplanade and marine drive four miles long en¬ circling the bay, and extensive and well-built harbors, are prominent features. There is con¬ siderable trade with England, France and India, in fruit, potatoes and cattle. Pop. about 30,000.

SAINT HENRI, or TANNERY WEST,

Canada, an incorporated city of Hochelaga County, Quebec, suburban to Montreal on the southwest. It is a busy industrial centre on the Lachine Canal, and has a station on the Grand Trunk Railway. Cotton, leather, confectionery, sewing machines and machinery are among its principal manufactures.

SAINT-HILAIRE, san-te-lar, Augustin Francois Cesar, called Auguste

Prouven- gal de, French naturalist and traveler: b. Orleans, 4 Oct. 1779; d. there, 30 Sept. 1853. A botanical expert, he set out in 1816 on a long journey through Brazil, carrying his explora¬ tions to regions then unknown, and returning in 1822 with valuable collections. In 1830 he was admitted to the Paris Academy of Sciences; subsequently he was made professor of botany in the Faculty of Sciences at Paris. He made several discoveries of scientific value, and pub¬ lished three narratives of travel, (Voyage dans les provinces de Rio de Janeiro et Minas Gera.es> (1830) ; (Voyage dans le district des diamants et sur le littoral du BresiP (1833); (Voyage aux sources de San Francisco et dans la province de Goyaz> (1847-48) ; besides (Flora Brasiliae Meridionalˆ (with Jussieu and Cam- bessedes 1825), and (Le?ons de Botamque)

(1840-41).

SAINT-HILAIRE, Marco de, pseudonym of Emile Marc Hilaire, French writer : b. Ver¬ sailles, about 1796; d. 5 Dec. 1887. He was edu¬ cated as a page at the court of Napoleon I, and finding himself without means of support after the Restoration, turned his attention to literature. Though not important as a writer, his constant glorification of Napoleon was pop¬ ular and undoubtedly did much to pave the way for the Second Empire. His work includes (Memoires d'un page de la cour imperiale) (1830) ; (Souvenirs de la vie privee de Na¬ poleon (1838); (Souvenirs intimes du temps*

de l'Empire) (6 vols., 1838-46) ; (Histoire de Napoleon IIP (1853), etc.

SAINT HUBERT, Order of, a Bavarian order founded by Gerhardt V in 1444, and originally named the Order of the Horn, so called from the hunting horns of which the links of chain were made. The membership was composed of the nobility, the number being unrestricted, while those of lower rank were limited to 12. A white cross with eight points, on each of which is a small golden ball, constitutes the decoration of the order. A crown surmounts the cross, while the arms of the cross are divided by three rays of gold representing Light from Heaven. On the me¬ dallion is pictured Saint Hubert's conversion, under which, on a red ribbon, is the inscription <(In trav vast» (Firm in Faith).

SAINT HYACINTHE, hi'a-smth (Fr. Sant e-a-sant), Canada, city and port of entry, county-seat of Saint Hyacinthe County, Que¬ bec, on the Yamaska and Black Rivers, and on the Grand Trunk, Canadian Pacific, Intercolo¬ nial and Quebec Southern railways; 35 miles northeast of Montreal. It is the seat of a Ro¬ man Catholic bishop, and among its more not¬ able institutions are Saint Hyacinthe College (Jesuit), occupying a handsome stone building, a nunnery with a seminary for young ladies, a

hospital in charge of the Sisters of Charity, and monasteries of the Precious Blood and Domini¬ can Fathers. The principal manufactures of the city are woolen goods, lace, linens, hosiery, corsets, boots and shoes, leather, flour, lumber, woodenware, organs, agricultural implements, and casting and machinery. Pop. about 12,000.

SAINT IGNATIUS COLLEGE, a Roman Catholic institution located at Chicago, Ill. It was chartered in 1870, and is under the control of the Jesuits. It has a collegiate or classical, and an academic department; religious instruc¬ tion is a part of all courses. In the collegiate department the degrees of A.B., B.S. and Ph.B. are conferred; and the degree A.M. for gradu¬ ate work. Though the college is designed espe¬ cially for Roman Catholic students, non-Catho- lics are admitted. The library contains over 50,000 volumes, including a select library for the special use of undergraduates ; there are also a good scientific laboratory equipment and valuable mineralogical and zoological museums. There are no dormitories. The college has no endowment, and is dependent mainly upon its tuition fees for income. In 1907 Saint Igna¬ tius College opened a department in law and was reincorporated under the name of Loyola University. Loyola University conducts depart¬ ments in law, in engineering (two years), medi¬ cine (The Chicago College of Medicine and Surgery, 706 Lincoln street) ; sociology (Ash¬ land Block) and two academies — Saint Igna¬ tius Academy and Loyola Academy (Rogers Park). The attendance in all departments is

1,850.

SAINT IVES, ivz, England, seaport and watering resort, in Cornwall on Saint Ives Bay, 57 miles southwest of Plymouth. The parish church of Saint Andrew is in the Early Per¬ pendicular style of the 15th century. The town- hall, a free library and a new pier are, with the harbor, the chief features of interest. Pop. about 7,000,

SAINT JACOB, or SANKT JAKOB,

siinkt ya'kop, Switzerland, a small village on the Birs in the canton of Basel, two miles southeast of Basel. It is noted for the impor¬ tant battle fought there on 26 Aug. 1444, be¬ tween the Swiss Confederates and the Armag- nacs, in which the latter were totally defeated.

SAINT JAMES' COFFEE-HOUSE, a

famous Whig coffee-house of London which flourished from the time of Queen Anne until late in the reign of George III. It stood on Saint James' street in the neighborhood of Saint James' Palace, and was much frequented by Swift, Harley and other men of note in its early days. It was here that Goldsmith's poem

Here lies poet Goldsmith, for shortness called Noll;

He wrote like an angel, but talked like poor Poll.

The retort above mentioned dealt in a satirical vein with the club members who had exercised their wit upon him.

SAINT JAMES' PALACE, England, a

royal palace in London, between Saint James and Green parks. It was built originally for a hospital, reconstructed by Henry VIII, enlarged by Charles I. Henry VIII annexed to the palace a park enclosed by a brick wall, connecting it with Whitehall. Queen Mary died here in 1558; Charles I spent his last night in this palace; and here were born. Charles II, the Old Pretender, and George IV. After Whitehall burned down in 1697, Saint James became the London residence of the sovereigns up to the time of Queen Victoria. It is still known as the Court of Saint James and is used for levees and drawing rooms. In 1837 Buckingham Pal¬ ace became the royal home. The park covers 58 acres.

SAINT JEAN D'ACRE, san zhon dakr,

Palestine. See Acre.

SAINT JEROME DE MATANE, or MATANE. See Matane.

SAINT JOHN, one of the 12 apostles of Jesus Christ. He and his brother James are often spoken of as sons of Zebedee. It is com¬ monly accepted (cf. Mark xv, 40 and Matt, xxvii, 56) that his mother's name was Salome and it is still further conjectured by many (see John xix, 25) that she was a sister of Mary, the mother of Jesus — a relation which would ren¬ der more natural the committing by Jesus of his mother to the care of John. The family seems to have possessed some means, as Zebe¬ dee employed hired servants in his fishing busi¬ ness ; Salome is mentioned among the pious women who aided in the support of Jesus and his associates during his ministry and John himself was personally known to the high priest.

Of his early life we know nothing. Pre¬ sumably he had the ordinary

training of the Jewish boy of his time and no more. In the order of narration, he first appears, according to an obvious inference, as an unnamed disciple of John the Baptist, who with Andrew follows Jesus (John i, 35-39). After some association with Jesus, John returned to his occupation as a fisherman, from which Jesus summoned him

and his brother, together with Simon and An¬ drew, to discipleship, which was the basis of his appointment as one of the 12 apostles. In this company he was one of the three who were admitted to the closest intimacy with their Master and, indeed, is generally understood to be <(the disciple whom Jesus loved.® Little in particular is noted, however, in reference to him while Jesus lived. He and his brother are said to have been called <(Boanerges,® defined as ((Sons of Thunder® (Mark iii, 17). While the meaning is somewhat obscure, it seems most probable that this hints at great stores of emo¬ tional power and passion. He, with his brother, is rebuked for proposing to summon fire from heaven to destroy the inhospitable Samaritan village, and he alone confesses attempting to check the activity of a healer who was not of their company. Only he of the apostolic com¬ pany is mentioned as present at the trial of his Master and at his crucifixion, where he re¬ ceived the commission to care for Mary, the mother of Jesus, which he faithfully carried out, making a home for her till her death.

It appears from the statements in Acts and of Paul in his Epistle to the Galatians that for some time John remained in Jerusalem. Beyond this we are dependent upon tradition, which con¬ sistently associated the latest years of his life with the city of Ephesus. To be sure, on the basis of uncertain inferences from an obscure passage possibly incorrectly quoted by Eusebius from Papias, it has been argued by many schol¬ ars that all the tradition that John was at Ephesus was due to the confusion of the apostle with a supposed presbyter and original disciple of Jesus bearing the same name. But all the positive evidence tends toward the association of John in his latest years with Ephesus. There is a fragmentary tradition that he went to Rome and was there plunged into a cauldron of boil¬ ing oil, from which he miraculously escaped unharmed, and that he was then banished to an island. John, the author of the Apocalypse, speaks of himself as being (

power which made him in his youth one of the ((Sons of Thunder,® although in his age he had learned repression and self-mastery.

*Bibliography.— Bacon, B. W., The Fourth Gospel in Research and Debate- * (1910) ; Chap¬ man, John, ‘ John the Presbyter and the Fourth Gospel) (1910) ; Drummond, James, ‘An In¬ quiry into the Character and Authorship of the Fourth GospeP (1903); Moffatt, James, (An Introduction to the Literature of the New Tes¬ tament (1911) ; Zahn, Theodor, ‘Introduction to the New Testament } (1909).*

David Foster Estes,

Professor of Nez v Testament Interpretation,

Colgate University.

ST. JOHN, Charles Edward, Ameri¬ can physicist: b. Allen, Mich., 15 March 1857. He was graduated at the Michigan Normal Col¬ lege in 1876 and studied physics at Harvard and at the University of Berlin. He became instructor of physics at Michigan Normal Col¬ lege in 1885’; was made associate professor at Oberlin College in 1897 and in 1899 became professor of physics and astronomy at that in¬ stitution. In 1907 he was appointed dean of the College of Arts and Sciences there. From 1908 he has been astronomer at the Mount Wilson Solar Observatory of Carnegie Insti¬ tution. He is a member of various national astronomical societies. He has written ‘Wave- Lengths of Electricity on Iron Wires } (1894); ‘A Study of Silphium Perfoliatum and Dip- sacus Laciniatus in Regard to Insects) (1887).

ST. JOHN, Frederick Edward Moly- neux, Canadian journalist and author: b. New¬ castle, England, 28 Nov. 1838. His father was one of Wellington’s veterans at the battle of Waterloo and the son followed him in a mili¬ tary career, on 23 April 1855 entering the Royal Marines (Light Infantry) as second lieutenant. He served under General Van Straubenzie throughout the operations against Canton in 1857-58 and acted with such gallantry under fire during the storming of the fort that in August 1858 he was promoted first lieutenant. In 1868 he came to Canada and being a member of the staff of the Toronto Globe was appointed in 1870 to accompany Colonel Wolseley’s Red River expedition and later served with Lord Dufferin on his tour of British Columbia. Upon the forming of the Northwest Territories, he became the first clerk of the legislature, the first secretary of the Protestant board of edu¬ cation and later was appointed sheriff and Indian commissioner. In 1879 he returned to England, where in 1884 he became the first emigration agent and London secretary to the Canadian Pacific Railway. He was at different times editor of the Winnipeg Standard, the Montreal Herald and the Manitoba Free Press and in 1888 was president of the Ottawa Press Gallery. He has published ‘A Sea of Moun¬ tainsˆ an account of Lord Dufferin’s tour (1877); and ‘Under the

Mistletoe,) a society play.

ST. JOHN, Henry. See Bolingbroke, Viscount.

ST. JOHN, James Augustus, English author and traveler: b. Carmarthenshire, Wales, 24 Sept. 1801 ; d. London, 22 Sept. 1875. At 16 he went to London and engaged in newspaper work and in 1827 started the Weekly Review.

He lived much of his life abroad, in France, Switzerland, Egypt and elsewhere and found material in his travels for many of his works. He contributed to 'Constable's Miscellany) in 1830 a 'Journal of a Residence in Normandy) and wrote 'Egypt and Mohammed Ali) (1834) ; 'Anatomy of Society) (1831); 'Manners and Customs of Ancient Greece) (1842) ; 'Egypt and Nubia) (1845) ; 'Views in the Eastern Archipelago (1847) ; 'Isis, an Egyptian Pil¬ grimage) (1853) ; 'Philosophy at the Foot of the Cross) (1854); 'Nemesis of Power) (1854) ; 'Preaching of Christ* (1856). He also wrote 'Lives of Celebrated Travelers) (1831); a biography of 'Louis Napoleon> (1857) ; an elaborate 'Life of Sir Walter Raleigh) (1868- 69), etc.*

ST. JOHN, John Pierce, American gov¬ ernor and prohibitionist: b. Brookville, Ind., 25 Feb. 1833; d. Olathe, Kan., 31 Aug. 1916. He went to California in 1853; later traveled in Mexico, Central and South America and Hawaii ; and fought in Indian wars in Ore¬ gon. He served in the Union Army in 1862- 65, attaining rank of lieutenant-colonel and subsequently removed to Missouri, where he en¬ gaged in law practice. In 1869 he settled at Olathe, Kan., and in 1879-83 he was governor of Kansas. He was Prohibition candidate for President in 1884, but in the first Bryan cam¬ paign affiliated himself with the Democratic party. He toured Kansas for woman suffrage in 1912 and in 1914 went on a speech-making tour of the East in behalf of prohibition.

ST. JOHN, Sir Spencer, English diplo¬ mat, son of J. A. St. Tohn (q.v.) : b. London, 22 Dec. 1825; d. Camberley, Surrey, 2 Jan. 1910. In 1848 he was appointed secretary to Sir James Brooke in Borneo, in 1850 became sec¬ retary to the mission to Siam and during 1856- 61 was consul-general in Borneo. During the years 1863-96 he was consul successsively in Haiti, Lima, Bolivia, Mexico and Stockholm. He was created K. C. M. G. in 1881. He has published 'Life in the Forests of the Far East) (1862); 'Life of Sir James Brooke, Rajah of Sarawak) (1878) ; 'Haiti, or the Black Re¬ public) (1885); 'Rajah Brooke, (1899); 'Ad¬ ventures of a Naval Officer) (1905) ; 'Earlier Adventures) (1906) ; 'Essays on Shakespeare and his Works) (1908).

SAINT JOHN, one of the Virgin Islands, formerly Danish West Indies, lying east of Saint Thomas (q.v.), area, 21 square miles. It is of volcanic origin and hilly; only a small portion of the land is cultivated; sugar is the chief agricultural product. Cattle are raised and ex¬ ported and bay rum is also exported. Coral Bay, on the east coast, is one of the best shel¬ tered and safest harbors of refuge during hur¬ ricanes in the Antilles. By the terms of a treaty with the United States, ratified by the Danish parliament 22 Dec. 1916, the entire Dan¬ ish West Indies, for and in consideration of the sum of $10,000,000, passed into the pos¬ session of the United States and are now ad¬ ministered by it. Pop. 925. See West Indies, Danish.

SAINT JOHN, British West Indies, the capital of Antigua, situated on the northwest coast, stands at the head of a safe but small bay. The residence of the English governor-

in-chief is the principal building. The staple of the island is sugar, which, together with pine¬ apples, forms the chief export trade.

SAINT JOHN, Canada, city and county- seat of Saint John County, New Brunswick, situated at the mouth of the Saint John River on the shores of the Bay of Fundy; on Canadian Government, Canadian Pacific and New Brunswick Southern railroads, 450 miles from Boston, 480 from Montreal and 275 from Halifax. It is the Atlantic terminus of the Canadian Pacific Railway.

Shipping Interests. — The harbor of Saint John has ample accommodations for ships of large tonnage. It has always been the principal port in New Brunswick for the shipment of lumber, for it commands the trade of the Saint John River and its tributaries, which flow through one of the great forest regions of the continent. The port is becoming the great winter port of Canada and there are now three grain elevators, and connected with them berths for seven large steamships which can all load or discharge at the same time. Other wharves are being built for the growing trade of the port, the exports of which amounted in 1916- 17 to $190,586,561. The development of the West is making Saint John a very important shipping port and the outlet for a large pro¬ portion of the products of the great prairie region beyond Lake Superior. During the year the sea-going vessels entering and cleared at Saint John numbered 2,161, totaling 2,336,- 614 tons. Lines of steamships run from Saint John to Great Britain during the winter and there are regular sailings to the West Indies.

Saint John has steamboat connection with Portland, Me., Boston, Digby, Yarmouth, Grand Manan and other points on the sea coast, and with Fredericton and other points on the river.

Business Interests. — Saint John has become a considerable manufacturing centre, and has cotton mills, iron and brass foundries, elevators, saw and pulp mills, nail factories, rolling mills, a broom and brush factory, flour mills, sugar refining plant and many other industries. Saint John is the only city in Canada which owns its own harbor.

Public Works, Buildings, etc. — Saint John has an electric railway system, electric lighting and a splendid water and sewerage system. It has a large public hospital, fine modern school- houses, exhibition buildings, free public library, and other public buildings of a similar char¬ acter. Its custom-house is said to be one of the finest in the world. The city has about 44 churches.

History, Population, etc. — The Saint John River received its name from Champlain, who visited it in the year 1604, and it was at that time the site of an Indian town. The French held possession of the country until the year 1713, when Acadia was ceded to Great Britain under the Treaty of Utrecht. A fort was built in 1630 by Charles La Tour on the west side of the harbor, which was afterward from time to time occupied by garrisons until the year 1700, when it was allowed to fall into ruin for about half a century. About the year 1758, however, it was taken possession of by the English, re¬ built and named Fort Frederick. The first English settlement at Saint John was in 1762, when Messrs. Simonds, Hazen and White be¬

gan business at what is now called Portland Point, engaging in the fisheries and in the manufacture of lime. In 1783, Saint John re¬ ceived a large accession to its population by the coming of the Loyalists, who had left the old Thirteen Colonies after the establishment of their independence. Saint John received a charter and became a city in 1785; it was the first city in Canada to adopt the commission form of government. Pop. 61,380.

James Hannay,

Author of cNew Brunswick: Its Resources and Advantages P

SAINT JOHN, Knights Hospitallers of.

See John, Order of Saint.

SAINT JOHN, Lake, Canada, in the Chi¬ coutimi district, Quebec, 200 miles by rail north of Quebec, a circular body of water, about 28 miles long and 25 miles broad, drained by the Saguenay River (q.v.). It receives

the waters of the Metabetchouan, the Mistassini, the Peri- bonca, the Ashuapmouchouan, the Ouiatchouan and several smaller streams.

SAINT JOHN RIVER, Canada, the lar¬ gest river of the province of New Brunswick, has its source in the highlands of northern Maine. After a course of 390 miles, it empties into the Bay of Fundy through a rocky gorge about 600 feet wide, having a total fall of about 17 feet. Throughout most of its upper course it forms the boundary between Maine and Canada. It is navigable for steamers of con¬ siderable size as far as Fredericton, a distance of 84 miles, while small steamers ascend to Woodstock, 145 miles.

SAINT JOHNS, Mich., village, county- seat of Clinton County, on the Detroit, Grand Haven and Milwaukee Railroad, about 20 miles north of Lansing and 100 miles west-northwest of Detroit. It is in an agricultural region and it has considerable manufacturing interests. The chief manufactories are a large table fac¬ tory, grist mills, lumber mills, carriage works, machine shop and foundry. There is consider¬ able trade in manufactures and farm products. The educational institutions are a high school, public graded school and a library, which is under the auspices of the Ladies' Library Asso¬ ciation. Pop. 3,925.

SAINT JOHN'S, Newfoundland, the capi¬ tal of the colony, situated on the east side of the island, on the Atlantic Coaist, midway be¬ tween Cape Race and Cape Bonavista, in lat. 47° 33' 54″ N., and long. 52° 40′ 18″ W. It is distant 1,691 miles from Cape Clear (Ireland), 1,213 from New York, 885 from Boston, and 488 from Halifax, Nova Scotia. The harbor is completely land-locked, with good holding ground, and is entered by a short passage, known as the ˆNarrows,® between high beetling cliffs. The town is situated on the north side of the harbor.

Communication. — Saint John's is the ter¬ minus of the Newfoundland Railway, which runs across the island to Port Aux Basques. Steamship lines connect with New York, Phila¬ delphia, Montreal and Sydney, Cape Breton, and in normal times with Liverpool and Glasgow. Constant communication is maintained with all parts of Newfoundland and Labrador by the fine steamers of the Bowring and Reid Lines.

SAINT JOHN'S, N. F,

1 Parliament House

2 The Governor's Residence

SAINT JOHNS — SAINT JOHN'S COLLEGE

Each hay has also a local steamer running in connection with the railway.

Shipping Interests. — Saint John's is not only the capital of the colony but the centre of all the business and financial interests of the island and Labrador. Three Canadian banks, Bank of Montreal, Bank of Nova Scotia and Royal Bank, have their headquarters in the city. All the principal merchants reside here, all the supplies for the chief business, the fish¬ ery, are bought in Saint John's, and the great bulk of the exports shipped from the capital, 90 per cent of the duties being paid and the revenue collected in Saint John's.

At the head of Saint John's Harbor there is a splendid dry dock, built by the government, but now leased to the Reid Newfoundland Com¬ pany. It is capable of taking up the largest ships. There is ample warehouse room and the Reid repairing shops are equipped with all the best modern machinery.

Manufactures. — There are several impor¬ tant factories, one of the largest being a rope- walk, also biscuit factories, oleomargarine fac¬ tories, tanneries, breweries, lumber factories, foundries, a large tobacco factory and an ex¬ tensive boot and shoe factory, with several minor establishments. The most extensive busi¬ ness is connected with the curing and drying of codfish for foreign markets, the exports of this fish in 1916-17 being valued at nearly $13,000,000. Seal, cod and whale oil are manu¬ factured and guano from the whale refuse. Between 300,000 and 400,000 skins of the hair seal are in normal times sold to be manu¬ factured into leather and fur abroad.

Public Works, Buildings, Etc. — The capi¬ tal of Newfoundland has an electric railway, electric light and owing to recent improvements one of the finest water services of any town in America. There are very complete telephone and telegraph lines, one belonging to the Anglo- American Telegraph Company, the other to the local government. The town possesses a large public hospital, convalescent home, lunatic asy¬ lum, poorhouse, a large Roman Catholic ca¬ thedral, and an Anglican cathedral, one of the most beautiful of churches, a masterpiece of the late Gilbert Scott, which has lately been restored after being destroyed by fire in 1892. The customs-house and courthouse are com¬ modious but not picturesque. Government house has fine grounds, but the building is very plain. There are also fine schools and churches.

Education. — Education is strictly denomi¬ national, even the Salvation Army having separate schools. The Anglican, Roman Catho¬ lic and Wesleyan bodies have very fine colleges and good schools, but no university.

History. — Owing to its unrivaled position in the centre of the great cod-fishing grounds Saint John's became, from the date of the dis¬ covery of North America in 1497, the centre and metropolis of this great industry. The date of -its foundation cannot be exactly determined. Its first inhabitants were part of the fishing ships' crews left behind to build boats, houses, stages, etc., for the fishery. There were 20 houses in Saint John's in 1540. In 1583, Hayes, the survivor of Gilbert's ill-fated expedition, speaks of the town as a <(place very populous and much frequented. » A large barter trade was carried on between the French, Portuguese, Spanish Basques and the English fishermen,

the principal traffic consisting in selling for cash, or bartering for fish and oil. Mediterra¬ nean products, salt, olive oil, fruits, wines, etc., were exchanged for the then as now famous West of England cloth, cordage, cloth caps and hosiery and the well-known Sheffield cutlery. There were 20,000 men engaged in this early transatlantic fishery, and the trade was one of the most important of the Tudor Age. The American colonists began trading with New¬ foundland as early as 1641. By the time of the Revolution, Saint John's did a business of $4,000,000 with the United States, mainly through Boston and New England.

The town was twice captured by the French and destroyed by them and their Indian allies. It was recaptured in 1762, by Colonel William Amherst, with the Highlanders and Royal Americans, the last and most gallant fight of the great Seven Years' War. Saint John's was built entirely of wood and has been several times utterly destroyed by fire, once in 1817, again in 1846 and partially in 1892. It has been greatly improved of late years and is now built chiefly of stone and brick, and is a well-laid-out city.

Government and Population. — Saint John's is governed by an elected mayor and an elected municipal council of six members. The popu¬ lation numbers about 32,292; nearly one-half are Roman Catholics.

D. W. Prowse,

Author of (The History of Newfoundland, from the Records P

SAINT JOHNS, Quebec, a town, the county-seat of Saint' Johns County, situated on the Richelieu River, 27 miles southeast of Montreal. It is a port of entry and a station on the Grand Trunk, Canadian Pacific and Cen¬ tral Vermont railroads. It has a high school, college, convent and hospital and military school. The principal manufactures are earth¬ enware and linen and silk goods. Large quan¬ tities of lumber and agricultural products from the lower Champlain region are exported through Saint Johns. Saint Johns is connected with Iberville .by a steel bridge; the combined

population is 12,000.

SAINT JOHNS, a river in Florida; the source, Lake Poinsett in Orange County, is about 12 miles from the Atlantic Ocean. The river flows north, nearly parallel with the coast, and enters the Atlantic about 15 miles north¬ east of Jacksonville. The total length is about 350 miles. It flows through swamps, ponds and lakes ; luxuriant vegetation is along its banks the greater part of the course. In some places are large trees, their green foliage intermingled with feathery brown and gray mosses which hang down to the ground. Reptiles are numer¬ ous in the marshes. In the north part of its course the land is higher and dryer. It is navi¬ gable to Enterprise in Volusia County. See Florida.

SAINT JOHN'S BREAD. See Carob.

SAINT JOHN'S COLLEGE, Cambridge, England, was founded by Margaret, countess of Richmond and Derby, mother of King Henry VII, in 1511 mainly through the exer¬ tions of Fisher, bishop of Rochester, then chancellor of the university, who raised suffi¬ cient funds to endow 32 fellowships. The col¬ lege replaced Saint John's Hospital founded in

the 12th century, and now consists of a master, at least 56 fellows, 60 foundation scholars and nine sizars; both fellowships and scholarships being open to all British subjects. Five fel¬ lowships are professorial fellowships to be held by professors of the university. There are three divinity studentships of the value of about $400, tenable for three years, and open to the competition of bachelors of arts not of sufficient standing to take the degree of M.A. ; also four law studentships of the value of $450, tenable for four years ; and a Hebrew scholarship of the value of $160, tenable for three years. Some $33,500 are expended annu¬ ally in assisting deserving students of the col¬ lege, and there are a number of prizes which are awarded on the results of the annual ex¬ aminations. The college has the patronage of 52 church livings. The buildings include four courts chiefly of brick; the new court (1826) across the Cam, built of stone, is united by an ornamental covered bridge, commonly called the ((bridge of sighs,® with the third court. The chapel (1869) is by Sir Gilbert Scott, and is a fine specimen of the Early Decorated style. The combination-room, 93 feet long, and the library (1623) are curious and striking. Ascham, Ben Jonson, Bentley, Rowland Hill, Wilberforce, Wordsworth and Lord Palmerston were mem¬ bers of the college.

SAINT JOHN'S COLLEGE, Oxford,

England, a college founded in 1555 by Sir Thomas White, a London alderman, for a presi¬ dent, 50 fellows and scholars, a chaplain, an organist, six singing men, eight choristers and two sextons. Some of the buildings belong to the earlier college or Saint Bernard dating from about the middle of the 15th century. With buildings added at subsequent dates the whole forms a picturesque group. Under the present statutes the college consists of: (1) Not less than 14 nor more than 18 fellowships, of which seven may be official fellowships, the rest ten¬ able for seven years. To these may at future times be added two ex-officio fellowships to be held by the Laudian professor of Arabic and the professor of civil engineering. (2) Not less than 28 scholarships, of which six shall be open, 15 appropriated to Merchant Tailors' School, two to Coventry School, two to Bristol School, two to Reading School and one to Tunbridge School. (3) Four senior scholar¬ ships confined to former pupils of Merchant Tailors' School. There are also the Holmes Scholarship, tenable for five years ; the Lambe Scholarship, tenable for four years; the four Casberd scholarships of $400 each per annum, and certain exhibitions for undergraduates not on any foundation, and of at least one year's standing in the college. There are also four fellowships, tenable for 14 years, open with certain limitations and under certain conditions in respect of literary proficiency, first to the kindred of the founder, Dudley Fereday of Ettingshall Park, Stafford, secondly to natives of Staffordshire, and then to any other person whatsoever. Thirty-three church livings are in the patronage of the college.

SAINT JOHN'S COLLEGE, located at Annapolis, Md. It was chartered in 1784 and opened to students in 1789, but is the direct successor of King William's School (founded

1696), which in 1784 was merged into the col¬ lege, thus being one of the oldest institutions of collegiate grade in the United States. The work of the collegiate department is arranged in four courses, classical, Latin-scientific, scientific and mechanical engineering; in each course certain studies are required and others are elective. The degree of A.B. is conferred for the completion of the classical and Latin- scientific courses; the degree of B.S. for the scientific and mechanical engineering courses. Graduate work is provided for, leading to the degree of A.M., and there is a preparatory school. Instruction in military science and military drill is a part of the curriculum and obligatory for all students. The State provides one full State scholarship for each senatorial district, and in addition 26 scholarships for tuition only, to be distributed among the counties in order of priority of application ; there are also other scholarships. In 1904 the grounds and buildings were valued at over $250,000; Henry Williams Woodward Hall, the new science building, was erected in 1900 ; the library contains about

10,000 volumes. The annual income recently was about $70,000; the students number about 200, and the faculty 14.

SAINT JOHN'S COLLEGE, an institu¬ tion in New York, opened 24 July 1841, under the auspices of the Roman Catholic Church. For its history and present development see Fordham University.

SAINT JOHN'S EVE. See John's, Eve of Saint.

SAINT JOHN'S RIVER, Quebec, the local name near the town of Saint John, of the Richelieu River (q.v.).

SAINT JOHN'S UNIVERSITY, College- ville, Minn., founded in 1857 and chartered the same year, is a Roman Catholic institution in charge of the Order of Saint Benedict. In 1869 the school was granted power to give degrees ; and in 1878 it was further empowered by Leo XIII to grant the degrees of doctors in the¬ ology, philosophy and canon law. In 1883 it received from the legislature of Minnesota the title of University. The institution comprises preparatory, commercial, academic or high school departments; the school of arts and sciences or collegiate department ; and the theo¬ logical school or seminary department. The courses lead to the degrees of B.A., M.A. and Ph.D. The location of Saint John's is ideal, the grounds comprise over 100 acres and the buildings are massive and imposing structures. The average annual attendance of students is 350 to 380; the faculty numbers 59.

SAINT JOHN'S UNIVERSITY, Toledo,

Ohio, under the direction of the Fathers of the Society of Jesus was opened in September 1898 and as <(The Saint John's College of Toledo, Ohio,® was incorporated 22 May 1900. On 29 Aug. 1903 with the corporate title changed to «The Saint John's University of Toledo, Ohio,® the power to grant degrees under an amended charter, was ratified by the Sec¬ retary of State. Well equipped buildings and grounds offer all possible facilities for higher education. An undergraduate department con¬ sists of a four years' course in the study of English composition and literature, Latin and

Greek, German, French, history, algebra and the principal business courses. The collegiate course extending through four years, is known as the college course of liberal arts, which, including mathematics, natural science, a higher course in religion, a study of history, foreign languages and a course in mental philosophy leads to the degrees of B.A., B.S., Litt.B. and Ph.B. A

law department also offers a three years' course of studies necessary for admission to the Bar. The average annual attendance of students is from 300 to 350; the faculty numbers 23.

SAINT JOHN'S-WORT, a large genus (Hypericum) of plants of- the family Hyper- . icacece. They are to be found nearly every¬ where in the temperate and torrid zones, and are often shrubs or small trees. The foliage is pellucid punctate or black-dotted and the leaves and blossoms emit, when bruised, a strong resinous-aromatic odor, and have a bitter taste, due to an oil possessing astringent and tonic properties, and which held a prominent place in old pharmacopeias. The flowers are perfect and numerous, bprne solitary or in cymose panicles and are generally yellow. Hypericum perforatum , to which formerly the name of Saint John's-wort was limited, has its leaves marked with pellucid dots, somewhat simulating perforations. It is a European plant which has become naturalized in our country, and is a troublesome weed. It is a very smooth, shining herb, sometimes two feet high, with opposite oblong leaves and bright-yellow flowers in broad terminal cymes. Both petals and leaves are black-dotted. Its yellow, acrid, resinous juice will stain the skin purple and was believed by Dr. Torrey to cause inflammatory trouble in cattle. The dried plant dyed wool yellow.

Tradition states that the Saint John's-wort was so called because blood-like spots appeared on its foliage immediately after the Saint was beheaded and reappeared on the anniversary of the date. It was regarded as a universal panacea and perhaps possessed some curative qualities, especially in external use. It was sup¬ posed to preserve persons and property against lightning, but was still more in demand as a preventive of witch-visits or those of other evil spirits, perhaps because, according to tradition, a baptized person anointing the eyes with the green juice of its inner bark could see witches. Italians gave it the name of ˆdevil-chaser.® It was not only worn as an amulet, but was hung over doors and windows; yet it was not safe to tread on it after dark, since the luckless wight that bruised it might be snatched up on a fairy horse and carried about all night. Saint John's- wort, plucked on midsummer night's eve, took its place among the love-charms.

SAINT JOHNSBURY, Vt., town, county- seat of Caledonia County, on the Passumpsic River, and on the Boston and Maine and the Saint Johnsbury and Lake Champlain railroads, about 34 miles east-northeast of Montpelier. It was settled in 1786 by Jonathan Arnold and associates, and incorporated in 1884. It is in an agricultural region in which there is con¬ siderable attention given to dairying; but the principal industry is the manufacturing of the Fairbanks scales. There are about 1,000 men employed in the Fairbanks Scales Works and an equal number in the combined smaller manu¬

factories. There are nine churches and one hos¬ pital. The educational institutions are the Saint Johnsbury Academy, Notre Dame Academy, public and parish schools, Saint Johnsbury Athenaeum and a free library, and the Fairbanks Museum of Natural History. The four banks have a combined capital and deposits of $2,000,- 000. The government is vested in a board of trustees. Pop. (1920) 7,163.

SAINT JOHNSVILLE, N. Y., village in

Montgomery County, 55 miles west of Albany, on the north bank of the Mohawk River, and on the New York State Barge Canal and the New York Central Railroad. It manufactures threshing machinery, gas engines, motors and piano actions, and has knitting mills and milk condenseries. Pop. 2,469.

SAINT JOSEPH, Mich., city, county-seat of Berrien County, on Lake Michigan, at the mouth of the Saint Joseph River, on the Cleve¬ land, Cincinnati, Chicago and Saint Louis, the Pere Marquette and the Michigan Central rail¬ roads, about two miles south of Benton Harbor and 23 miles north by west of Niles. It has steamer connection with the Lake Michigan ports, including Chicago, by means of the Graham and Morton Transportation Company and the Benton Transit Company, and is an at¬ tractive summer vacation resort. It is in an agricultural region, noted for its peaches and other fruit. The chief industrial establish¬ ments are flour and grist mills, fruit- basket and box factories, machine shops, foundries and hosiery mills. The edu¬ cational institutions are a high school, public elementary schools, parochial schools and a public library. Mineral baths, Sil¬ ver Beach and Lake Front parks, Berrien County Country and the Edgewater clubs add to the city's attractiveness. Its his¬ tory dates back to Father Allonez's visit in 1669 and to a mission and small fort founded in 1700 and destroyed by Pontiac in 1762. Finally set¬ tled in 1829 it was incorporated as a village in 1836 and as a city in 1892. Pop. (1920) 7,251.

SAINT JOSEPH, Mo., city and county- seat of Buchanan County, the third city in size and wealth in Missouri, 131 miles southeast of Omaha and 60 miles north of Kansas City, is situated on the east bank of the Missouri River, in Northwestern Missouri, near the junction of the four States of Missouri, Kansas, Nebraska and Iowa, and is the central gateway of the lower group of Missouri River cities. The city extending for three miles along the river front stands on high rolling ground, entirely above and free from floods or overflow, and covers an area of about 13 square miles. El- wood, Kan., a residential suburb, is reached by a steel railroad bridge 4,270 feet long. With its sightly hills, winding avenues, parks, lake and driveways, Saint Joseph is a picturesque, health¬ ful and desirable place of

residence. The rail¬ roads serving Saint Joseph are the Santa Fe System, Burlington Route, Rock Island Lines, Chicago Great Western, Missouri Pacific Sys¬ tem, Saint Joseph and Grand Island Railroad (Union Pacific System). Through their imme¬ diate connections Saint Joseph is served by every mile of railroad in the Northwest, South¬ west and Central West. Two electrical inter- urban lines operate from Saint Joseph into the

surrounding districts — both passenger and freight.

As compared with other cities in the United States, Saint Joseph stands among the first in bank transactions according to population ; third as a dry-goods jobbing centre; fifth largest live¬ stock market ; seventh largest candy manufac¬ turing centre;, and has the largest and best hard winter-wheat mill in the world.

Predominating Industries. — The leading industrial and commercial activities of Saint Joseph are manufacturing, merchandise distri¬ bution and livestock and grain marketing. The development of manufacturing in Saint Joseph has been steady and progressive. The principal manufactures are packing-house products, milling products, clothing, candy, shoes, dairy products, harness and saddlery tanning, foundry and machine-shop products, fur¬ niture, trunks, soap and glue. The annual value of manufactured products is $110,000,000; value of merchandise sold at wholesale and jobbing annually, $100,000,000; value of farm products marketed annually, $200,000,000; com¬ mercial freight received and forwarded annu¬ ally amounts to 2,750,000 tons. The post-office receipts (1918) were $502,320.20; bank clear¬ ings (1918) $991,532,996; total bank transac¬ tions (1918) $4,935,993,907. Eighteen bank and trust companies transact business in Saint Joseph.

Stock Yards. — A great impetus was given to the growth and prosperity of the city by the improvements and extensions made at the stock yards, which were begun in the year 1897. The stock yards proper consist of 500 acres of land, 80 acres of which are covered by the pens and sheds. There are 20 miles of railroad tracks upon the grounds and five packing-houses en¬ gaged in the slaughtering of animals, three of them, Swift and Company, Morris and Company and the Hammond Packing Company, erected large and extensive plants here at a cost of sev¬ eral millions of dollars.

Public Buildings. — Chief of these are the county courthouse, the Federal

building and post-office, the union railway station, the audi¬ torium, livestock exchange, the Corby-Forsee building, housing the Commerce Club, the Cen¬ tral Washington Park and Carnegie libraries ; 43 school buildings, of which the most important are the Robidoux, Beaton and La Fayette high schools, and central high school and junior col¬ lege. Other important buildings are those of the Young Men's and the Young Women's Chris¬ tian associations, Scottish Rite Cathedral, Ma¬ sonic Temple, the Home for Little Wanderers, the Buchanan or No. 2 State Hospital for the Insane, the Sisters of Saint Joseph, the Noyes and Ensworth hospitals and the numerous fine church structures of different sects. Attractive city features include Krug Park, Bartlett Park, Noyes Boulevard, Lake Contrary, the State fish hatchery, government weather observatory, two large opera houses, theatres and numerous places of amusement.

Government and Civic Conditions. — The

commission form of government is in force in Saint Joseph. The city owns an electric-light plant, representing in its original construction an expenditure of over $100,000, since enlarged to twice its present capacity in order to meet the demands for additional street lighting, re¬

sultant from the growth of the municipality; cheap fuel is furnished by natural gas. The gas plant, which was built in 1878 and has been in almost continuous extension and improvement since that time, now represents an invest¬ ment of about $1,000,000. It has in use 56 miles of main pipe and has a capacity of furnishing 2,000,000 cubic feet of gas every 24 hours. Saint Joseph is supplied with water through an extensive system of waterworks, first built in 1879 and improved and extended since that time, until it now rep¬ resents in cost of construction an expenditure over $1,800,000. The assessed valuation of property in the city, made upon a basis of about 60 per cent of its actual value, is $53,624,970; the city's bonded indebtedness is $722,550; the tax rate is $1.25 per $100. There is no floating debt, this being prohibited by city charter. For maintenance and operation the city expends an¬ nually an average of $1,200,000; the principal items being education, $500,000; fire department, $157,000; police department, $130,000; streets, $120,000; water, $50,000; lighting, $34,000.

History.— In 1826, Joseph Robidoux, born in Saint Louis of French parentage, established a trading post at this point, known as the <(Blacksnake Hills, >) and thus became the founder of the city, which he later christened with his own name. For hundreds of miles on every side the whole country was then an unbroken wilderness, inhabited only by the aborigines, who gained a scanty subsistence by trapping and hunting. The furs and pelts of the wild animals they killed soon became a source of

extensive traffic between the trader and his Indian neigh¬ bors. The famous (

77,403; (1920) 77,939.

Bibliography.— Barns, (The Commonwealth of Missouri (1877) ; Encyclopedia of the His¬ tory of Missouri } (1901); (History of Bu¬ chanan County, Missouri (1881); < Buchanan County and Saint Joseph* (1898);*

H. D. Ennis,

Secretary of the Commerce Club of Saint Joseph.

SAINT JOSEPH, an island in Lake Huron belonging to Canada. It is at the mouth of Saint Mary's River and near the mainland of both Michigan and Ontario. There are many high bluffs and large rocks on the coast, but nearby the whole of the surface is covered with trees, shrubs and flowers.

SAINT JOSEPH, (1) A river in Michigan whose source is in Hillsdale County. It flows west-northwest, then south into Indiana, west, then northwest, returning to Michigan and en¬ tering Lake Michigan at Saint Joseph (q.v.). South Bend, Ind., is on the banks of this river,

at the head of navigation. Its total length is about 250 miles. (2) Another river of the same name rises in the southwestern part of Mich¬ igan, crosses the northwestern corner of Ohio, enters Indiana and flows southwest and unites with Saint Mary's River at Fort Wayne, to form the Maumee (q.v.). Its total length is about 100 miles.

SAINT JOSEPH'S SEMINARY, a theo¬ logical school at Yonkers, N. Y. The local name for the place is Dunwoodie. The semi¬ nary belongs to the archdiocese of New York, but the attendance is not limited to any locality. The history of the school begins as far back as 1833, when Bishop Dubois began at Nyack, N. Y., the erection of a school on the plan of Mount Saint Mary's (q.v.), Emmitsburg, Md. The corner stone was laid 29 May 1833, but the institution was destroyed by fire before it was finished. Later the project of establishing the school in Brooklyn was proposed, but soon abandoned. The next location, selected by Bishop Hughes, was Lafargeville, Jefferson County, N. Y. A school was opened here, 20 Sept. 1838; but it was soon abandoned, as it was too far from New York. The Lafargeville school was intended for both theological and secular studies. The school was removed to Fordham, N. Y., in 1840 and is now known as Saint John's College. The theological de¬ partment was moved, October 1864, to a new home and Saint Joseph's Seminary, Troy, N. Y., was opened in charge of professors from the University of Louvain, Belgium. The present seminary at Yonkers is on a beautiful tract of land and built on the eminence known in history as Valentine Hill. The land was purchased in 1890 by Archbishop Corrigan (q.v.), and the new seminary was dedicated 12 Aug. 1896 and placed in charge of the Sulpician Fathers. In May 1898, one of the gifts presented to Arch¬ bishop Corrigan in honor of his silver jubilee was the certificate of the entire liquidation of the debt upon the

seminary. The seminary chapel was built entirely at the personal ex¬ pense of Archbishop Corrigan.

The conditions for admission are (1) a well- formed desire to study for the priesthood, (2) entrance examination, (3) must have completed a good classical course, (4) the permission of the bishop of the diocese to which the applicant belongs. The courses of study demand a large amount of work: as, the course in Sacred Scripture is for five and one-half years and the regular class work is supplemented by an academy or seminary composed of interested students who meet once a week to discuss par¬ ticular questions. In connection with this de¬ partment there are two courses of Hebrew and instructions are given in other Semitic lan¬ guages. All the other courses are equally thor¬ ough. In addition the students regularly visit hospitals, penal and charitable institutions and teach in Sunday schools. In 1917 there were connected with the seminary 13 professors and instructors and 246 students. The library, in the centre of the main building, contains about 30,000 bound volumes.

SAINT-JUST, san zhiist, Antoine Louis

de, French patriot: b. Decize (Nievre) 25 Aug. 1767; d. Paris, 28 July 1794. He studied law at Rheims, but devoted himself almost exclu¬ sively to literary pursuits until the outbreak of

the Revolution, when he became one of its most notable participants. His political career as deputy from Aisne to the convention at Paris in 1792 began with his famous oration setting forth his reasons for voting for the death of Louis XVI. Because of his youth he has been called the instrument of Robespierre, with whom he was closely associated throughout the Revolution. But the extreme measures attrib¬ uted to him were undoubtedly undertaken through intensity of personal conviction. In 1793 he was made president of the convention, and in 1794 was responsible for the execution of Danton, Hebert and Desmoulins. But the Revolutionary Tribunal, whose acts he had so mercilessly directed, was destined to be dis¬ solved. In July 1794 Robespierre and Saint- Just were executed upon the same scaffold by order of the Committee of Public Safety. The political works of Saint-Just were published in 1833-34. Consult Fleury, (Saint-Just et la Ter- reur) (1851) ; Hamel, (Histoire de Saint-Just } (1859) ; Aulard, (Les orateurs de la legislative et de la convention (1885).

SAINT KILDA, Scotland, an island of the outer Hebrides, belonging to Harris in Inver¬ ness-shire and lying 40 miles west of North Uist. It is three miles long by one mile broad with shores rising in perpendicular cliffs from the water's edge. The highest point is Conna- Ghair, a gigantic precipice 1,220 feet high. The richness of the verdure softens an other¬ wise bleak

and forbidding landscape. There are about 40 acres of arable land and sheep are raised. Sea-birds, petrels, etc., which supply feathers, oil and meat, form the chief source of income. The fisheries are productive but neg¬ lected. The population from 110 in 1851 had dwindled to 77 some 50 years later. The natives speak Gaelic and inhabit a little village at the head of East Bay.

SAINT KITTS, West Indies. See Saint Christopher.

SAINT-LAMBERT, Jean Frangois, zhon fran-swa san lan-bar, Marquis de, French philos¬ opher and poet: b. Nancy, France, 26 Dec. 1716; d. Paris, 9 Feb. 1803. He was for many years attached to the court of Stanislaus Leszczynski of Poland when that prince lived in Lorraine, and for a time he served in the French army. He won literary recognition by a volume of descriptive verse, (Les saisons) (1796), which received extravagant praise at the time but possessed little merit. His present fame seems to rest upon the fact that he was the successful rival in love of both Voltaire and Rousseau. His (Fugitive Poems) (1759) and

SAINT LAMBERT, Canada, town of the province of Quebec, opposite Montreal, with which it is connected by the Victoria Bridge across the Saint Lawrence River and on the Grand Trunk Railway. It has both Protestant and Roman Catholic academies. Pop. 3,344.

SAINT LAWRENCE, la'rens, an island belonging to Alaska, in Bering Sea,. intersected by long. 170° W. and lat. 63° N. It is about 100 miles long and varies from 10 to 35 miles in width ; it is about 500 feet at the highest point

above the sea, though some of the mountain peaks attain a height of some 2,000 feet. It is inhabited by Eskimos who are engaged chiefly in fishing.

SAINT LAWRENCE, Cape, Canada, the northwest projection of Cape Breton Island, Nova Scotia, on the Gulf of Saint Lawrence.

SAINT LAWRENCE CANALS. See

Canadian Canals.

SAINT LAWRENCE RIVER AND GULF. The Saint Lawrence River is in North America; its head-waters are about long. 93° W., and its mouth near long. 66° W. The total length from the source of the Saint Louis in

Minnesota to its entrance to the Gulf of Saint Lawrence at Anticosti Island is about 2,200 miles. The area of the basin is about 530,000 square miles. The area of the water surface of the Saint Lawrence River system, including all the rivers and lakes, is 95,300 square miles. The area of that portion of the basin which is drained by the Great Lakes is nearly 200,000 square miles. The length of the shore line of the Great Lakes and their rivers is 5,400 miles. This system is the only large one in North America whose main stream flows from west to east and the only large system, except Colum¬ bia, whose main stream does not run in the direction of the greatest extent of the continent.

Formation of Lakes. — Prior to the Glacial period the land area of this region was greater than at present and board valleys were ex¬ cavated by the rivers. With but few exceptions the last formed rocks in this great depressed region belong to the latest formations of the Palaeozoic strata. The whole region was under ice-cover during the Glacial period. This vast body of ice moved southward, elevations were worn down, the rocks were carved in fantastic designs, new grooves were formed and the en¬ tire topography was changed. In addition to change of form produced by the movement of the great mass of ice, other and equally great changes were made by the vast amount of debris deposited by the glacial drift. Of this debris one peculiar formation is found in the rocks in Ohio, western New York and other places, where angular and somewhat rounded stones are imbedded in bowlders or striated with rocks. Another is the arrangement of the bowlders, showing in many places their removal from their original beds. Sand, clay and gravel were washed by the streams into long lines, so that in the Saint Lawrence basin great sand belts extend across the country for miles and are usually found on the lowlands, at the places that were once edges of ice-coverings. The rocks formed before the Glacial period are in some places covered by glacial deposit for from 100 to 200 feet. On the south side of the Saint Lawrence, at the lower foot-hills of the Adirondacks, may be found rock layers con¬ siderably below the surface. Old river chan¬ nels were dammed, old valleys filled up and new drainage channels formed. The new sub-basins were changed by the glacial deposit and the re¬ moval of former divides. The depressions where the Great Lakes are now were formed in part when the southern margin of the glaciers was obstructed north of the divide which ex¬ tended through New York, Ohio, Indiana, Illi¬ nois and toward the Northwest by the ice-block.

The glacier south of the divide discharged its melted waters through streams flowing gen¬ erally south. The outlets of the glacial streams from the north ice-covering were at first south¬ erly. One was through New York State, near Ithaca and through a portion of the Mohawk and Hudson River valleys to the Atlantic Ocean. Another was south of Lake Michigan along channels into the Mississippi Valley and to the Gulf. Another was from

Lake Erie by way of Fort Wayne. At first there were only small but numerous depressions along the south margin of the northern glacier. They grew broader as the ice retreated slowly and grad¬ ually merged into each other until the vast lake basins were formed which still preserve proof of their age in the Palaeozoic strata which have undergone but little change. Mechanical and chemical agencies and erosion removed rocks and graded the lake beds. The ancient beaches of the early lakes show that at one time the water occupied a greater space than at present. The Iroquois beach, south of Lake Ontario, is quite distinct and shows that the old lake was much larger than the present Ontario. (See New York). The ancient lake is supposed to have extended north to the glacier. There are shore-line marks south of Lake Erie some distance from the present shore line and from 175 to 220 feet above the lake as it is now. East of Lake Huron are beaches showing a shore line from 25 to 260 feet above the pres¬ ent lake. This record of an ancient large lake is called Algonquin beach. The broad beaches of the ancient lake, of which the present Su- prior is a part, are in the north shore and ex¬ tend the whole length. They range from 100 to 600 feet above the surface of the present lake. The soils within the area of the lake- beaches now beyond the lake limits differ from the soils farther inland. They possess many of the characteristics of inundated lands. The beach lands are not alike ; near lakes Ontario and Erie are masses of yellow sands, in some parts approaching a gravel and between are large clay deposits. The Lake Superior beaches of the old lake show broad clay coverings, pink¬ ish in color. The combined area of the lakes north and west of Superior which flow into Su¬ perior is equal to one of the large lakes. See articles on each of the Great Lakes.

The Rivers. — The main stream of the sys¬ tem was the last to assume its present form, when the ice covering left the region and the waters began the formation of channels extend¬ ing to the sea. The streams from the divides gradually made their way to the lowest points of the valley and entered the main stream. The main outlet channel, or the river Saint Law¬ rence, may be said to have its source at Lake Ontario and to extend to below Quebec, to the island of Orleans, where it becomes an estuary. From Lake Ontario until it becomes a tidal stream it is a surface river, of which the waters are remarkably clear. The distance from Lake Ontario to the Gulf is 750 miles. The descent from Lake Ontario to tide water is 230 feet. The Saint Lawrence forms the boundary line between the United States and Canada to long. 74° 15′ W., after which its course is wholly in Canada. In width the Saint Lawrence varies from one to three miles, until it broadens into a very wide stream ; at Cape Gaspe it is over 50

miles wide. Just after leaving the United States boundary, the river expands and forms what is called Lake Saint Francis and a little above the city of Three Rivers is another ex¬ pansion called Lake Saint Peter. The chief tributaries are the Ottawa, Saint Maurice, Saguenay, from the north, the Chaudiere, Rich¬ elieu, Saint Regis, Racquette, Grasse and Os- wegatchie from the south. The Richelieu brings to the Saint Lawrence the waters of Lake Champlain. There are numerous beauti¬ ful islands in the Saint Lawrence ; at the be¬ ginning of the main outlet near Lake Ontario, there is a group (about 1,500 in all) called the ((Thousand Islands.® These islands are famous summer resorts.

The Estuary and Gulf. — The estuary, begin¬ ning below Quebec, is 350 miles long, with an extreme width of 35 miles until it flows beyond Anticosti Island, where it widens, as has been mentioned at Cape Gaspe to over 50 miles. The greater part of the Gulf and the estuary are submerged portions of the river valley. A sub¬ merged river channel 800 feet wide has been traced to the eastern edge of the continental plain, about 100 miles from the present coast line. The marine shells found in the sandw and clays above Montreal show that at one time the estuary began much farther up the stream than at present. The Gulf of Saint Lawrence has at its mouth in the large island, Newfoundland. It enters the Atlantic by three channels ; Cabot Strait, between Newfoundland and Cape Bre¬ ton, about 65 miles wide; Strait of Belle Isle, between Newfoundland and Labrador; and Gut of Canso, between Nova Scotia and Cape Breton Island. The principal islands in the Gulf are Prince Edward Island, Magdalen Islands and Anticosti.

Navigation. — Ocean steamers of the largest size ascend the Saint Lawrence to Quebec and large vessels go as far as Montreal. Above are several rapids and in Niagara and Saint Mary's River are falls. Steamers coming down the river often pass through the channels be¬ tween the rocks of the rapids, but ascending the stream they have to go through canals which have been built to overcome the obstructions to navigation. The Welland Canal (q.v.), in Can¬ ada, furnishes a means of going around the Niagara Falls. Two canals, one on the Ameri¬ can and one on the Canadian side, have been built at Saint Mary's Falls. Navigation on the rivers and lakes is closed in winter. The aver¬ age number of days the Lachine Canal is opened during the year is 220. See Canals ; for his¬ tory, see Canada; United States.

SAINT LAWRENCE STATE HOSPI¬ TAL, a State institution for the insane situated on the Saint Lawrence River near Ogdensburg, N. Y. It is built on the cottage system and consists of three principal groups and two detached cottages. The central group includes a central administration building and 12 cot¬ tages and utility buildings which are detached except for a one-story fireproof corridor to facilitate communication. The cottages are two

stories in height and are substantially and beautifully constructed of Potsdam sandstone and limestone. The cottages for men are on the west and those for women on the east of the administration building. The first is called Reception Cottage East or West and it is here

the patients are admitted from home accom¬ panied by a trained nurse sent from the hospital for that purpose. Every effort is made to give this cottage a home-like appearance and to avoid the depressing influence of a large institution. There is a cottage for convalescents, the doors of which are never locked and the patients are permitted to come and go at will. Other cot¬ tages are for the disturbed and noisy class, for the quiet and harmless and for working patients. The Infirmary Group and Group Number Three are one-fourth mile from the central group and each accommodates about 400 patients of the chronic classes. The Garden Cottage and Farm Cottage are each one mile from the administra¬ tion building and are occupied by patients who are employed at gardening and farming. The Saint Lawrence State Hospital is chiefly re¬ markable as one of the first institutions to abandon the Kirkbride or block system which dominated asylum construction in this country for 50 years and to establish in its stead a simple and more convenient plan. The first medical superintendent was Dr. Peter M. Wise, to whose genius the hospital owes its plan and organization. The hospital was opened for the reception of patients 9 Dec. 1890, but was not completed until 10 years later. The grounds and buildings cover an area of 1,219 % acres, of which 930J4 acres are under cultivation. There are accommodations for 2,174 patients and 397 employees. The value of real estate including buildings, is $3,006,750; value of personal prop¬ erty including furniture, etc., $179,200. The percentage of patients employed in useful work is males 63 per cent, females 50 per cent ; the estimated value of farm and garden products raised in a recent year was $65,920.70; of articles made or manufactured by patients dur¬ ing the year, $33,941.92. The disbursements amounted to $361,087.40; miscellaneous receipts, $399,116.46; the annual expenditure per patient was $208.

SAINT LAWRENCE UNIVERSITY,

Canton, N. Y., was chartered April 1856 for the purpose of ˆestablishing, maintaining and conducting a college for the promotion of gen¬ eral education and to cultivate and advance literature, science and the arts, and to maintain a theological school.® Like all other colleges of the State, it is a constituent part of the edu¬ cational system called the University of the State of New York. It now includes the Col¬ lege of Letters and Science, the Theological School, the Law School, the New York State School of Agriculture. Each department is in¬ dependent of the others in its faculty and funds and in the instruction and government of its students. The

College of Letters and Science offers courses leading to the degrees of bachelor of arts and bachelor of science. From the first, women have been admitted on the same terms as men. The by-laws of the corporation, adopted in 1856, provide that ((the College of Letters and Science is and shall re¬ main an unsectarian foundation.® Its unde¬ nominational character has been consistently maintained. In 1857 the legislature granted to the college $25,000, of which $10,000 was to be expended for ((books and apparatus® and $15,000 was to be kept as a permanent fund. The remaining productive funds of the college,

which now exceed a half million dollars, have been the result of private benefactions.

The Theological School, as provided by the by-laws of the corporation, ((is and shall remain an institution especially intended and organized for the preparation and training of persons for the ministry of the Universalist Church. w It was opened by Ebenezer Fisher, D.D., in April 1858. The first class was graduated in 1861. The degree of Bachelor of Divinity is granted upon completion of certain courses. Under the original charter the corporation was a self- perpetuating body. The Laws of 1868 amended the charter by providing for the election of trustees by the New York State Convention of Universalists. This law remained until 16 March 1910, when it was repealed and the power of the corporation to fill vacancies in its membership was restored.

The establishment of a law school was au¬ thorized by chapter 288 of the Laws of 1869, passed 22 April 1869. A law school was main¬ tained in Canton from 1869 until 1872, and two classes were graduated. In 1903 the Brooklyn Law School, which had been incorporated by the Regents of the University of the State of New York, was placed under the control of the Saint Lawrence University. A three-year course leads to the degree of bachelor of laws.

The New York State School of Agriculture was established pursuant to chapter 682 of the Laws of 1906, passed 31 May 1906, and is main¬ tained in the State of New York. It comprises an agricultural division and a domestic science division for women. No degrees are conferred on the graduates of this school as such, but cer¬ tificates are given on the completion of the prescribed courses. Commodious buildings com¬ pletely equipped and extensive grounds offer all facilities for the different departments of in¬ struction. The university faculty numbers 80 and the

average annual attendance of students is 550.

ST. LEGER, sant lej'er, or sil'in-jer, Barry, British soldier: b. 1737; d. 1789. He served in the siege of Louisburg in 1758, and under Wolfe at Quebec, and checked the flight of the British forces at the Heights of Abra¬ ham. He was also the leader of the expedition against Fort Stanwix in the American Revolu¬ tion. At the .close of his career in the British army, in 1784, he was commandant of the royal forces in Canada. His (Journal of Occur¬ rences in America1 was published in London in*

1780.

SAINT LOUIS, popular pronunciation sant loo-is, Missouri, city and port of entry, the metropolis of the State. By the Federal census of 1920 it is given sixth place in population among the cities of the country. Its location is on the west bank of the Mississippi River, 20 miles below the mouth of the Missouri River. The site averages 100 feet above all flood waters and 500 feet above the sea.

Topography. — The city directrix is an arbi¬ trary, level set in the wharf. It is 413.52 feet above the mean tide in the Gulf of Mexico, as established by the Mississippi River Commis¬ sion. A high stage of the river covers the directrix. A low stage is 30 feet below the directrix. There is a recorded difference of 43.35 feet between the highest and lowest stages of the river. On the 27 June 1844 the water

overflowed the directrix 7.58 feet. The lowest stage was on 2 Jan. 1900 when the water dropped 35.77 feet below directrix. Practically all of Saint Louis is well above the highest known stage of the river.

The site of Saint Louis is a succession of gentle ridges and depressions, each ridge toward the west rising higher. Broadway, the 5th street from the river, is 460 feet above the gulf level. At 1 7th street the altitude is 500 feet. At Grand avenue, the 36th street parallel writh the river, the ridge is 540 feet. At the western city limits the elevation is 600 feet. Westward from the city the ridges rise gradu¬ ally until the plateaus of the Ozarks attain alti¬ tudes of 1,000 feet. The area of the city is 61.37 square miles, or 39,276.8 acres. The boundaries are two curved lines, the Missis¬ sippi River on the east, an arbitrary limit on the west separating the city from Saint Louis county. The river front from north to south is 19.15 miles. At the widest part, about midway of the two curves, the distance across the city is 6.62 miles. The length of the western boundary is 21.27 miles. The length of the city from the northern point to the extreme southern tapering end is 17 miles by air line. There has been no increase in the city's area since 1875. Of 936 miles of streets 665 are paved. The city has 851 miles- of public

and district sewers. In topographical and geographical character Saint Louis is of the Ozarks — the foothills. Within the city limits are found the limestone ledges and the caves which are distinguishing features of the Ozarks. For earlier generations the water sup¬ ply was drawn from fine springs which boiled up from underground watercourses, just as they do now throughout the Ozarks. As the city grew sewage was drained into sinkholes leading down to the underground waters. Epi¬ demics of typhoid and cholera became frequent. Cholera carried off one-tenth of the population in a single year — 1849. Sanitary regulations compelled the closing of all wells. Springs were diverted into sewers. About 1875 the river became the exclusive source of water sup¬ ply, under a scientific system of waterworks described further on in this article.

Climate. — Saint Louis is in lat. 38° 38′ and long. 90° 15’. The latitude ensures what may be termed a medium temperature of the United States. The meridian from which cen¬ tral time is fixed is about 12 miles east of Saint Louis. Standard central time for Saint Louis, therefore, is only about one minute faster than mean solar time. The climate is influenced favorably, . in some degree, by the two large dyers adjacent. A prevailing breeze up the Mississippi relieves the heat of summer. The nearby waters temper the cold waves of winter. The highest temperature in 1915 was 94° ; the lowest — 4°. The mean temperature for the year was 56.3°. The rainfall in 1915 was 49.28 inches. The average annual rainfall from 1837 to 1915 inclusive was 40.08. The navigable channel depth of the river from Saint Louis to the mouth of the Ohio during most of the year is seven feet, and from Cairo south, 12 to 14 feet.

Commerce and Industry.— An exclusive privilege to trade in furs prompted the first settlement of Saint Louis in 1764. In 1915 the official report of the trade and commerce of

1

2

3

5

0

7

8

9

lO

11

12

13

O'FALIiON

Outline Map of

St. Louis

tun. rAldcrney

Coiuetery North St. 1 0 'Fallon Pari

Bridgeton 4

P WellB Irving

BttnouJ

^^^.Cabanne

Roeeda les~-£r^ V Forsyth Jc.

West St. Louis

Tower Grove

x if/ (iratlot | Linden wood ^hrowebury

§BSS?p18iM

Cahokiat l Lake/

Bobring

"Delinar-

Terraco

,,ngsburj

^tujTnstei

McPbcrso.

Linden

PavUion

laiMi,.

[ParWrV

‘Won

[Claytoi

TOiim/?

tanchester-

ri*~Av«.«; [rWuT-

‘\se»let

if*Vette

Ave.

3«SSOl/j

f^iirabetj

_Shenonrf,

f|^eiand f’Shenandp [botanical .

fielif r p|C~ Reber —

I / * – > , — ~

mmmm

ST. LOUIS

R»nd-McS*llj** 11 x 1-1 Map of til* Main Portico ofSt.LouU.

Copyright by Raod-McNolly Si Co.

SAINT LOUIS

Saint Louis, made by the Merchants' Exchange, claimed <(the greatest raw fur market in the world. ® The sales of raw ful's during that year amounted to $5,000,000. From 1764 to 1808, the pelt was the chief article of Saint Louis commerce. Against the protests of the fur merchants of Philadelphia and other At¬ lantic seaboard cities, the furs of the Indian trappers up the Illinois and as far as the Great Lakes found their way to Saint Louis. During a considerable portion of the colonial period the value of the furs handled at Saint Louis averaged $200,000 annually. Soon after the transfer of the Louisiana Purchase to the United States, fur companies, with headquarters at Saint Louis, were formed. One of these, the American Fur Company, became a strong monopoly. It gradually came, into control of the greater part of the fur trade as far west as the Rocky Mountains and as far north as the British possessions, even entering into competi¬ tion with the Hudson's Bay Company. The American Fur Company had its New York connection through John Jacob Astor. Among other fur companies formed by Saint Louisans were the Missouri and the Rocky Mountain. Saint Louis was the outfitting point for the expeditions and the receiving place for the packs of pelts. In 1820 the Saint Louis trade in furs had reached $600,000. Steam naviga¬ tion above Saint Louis had just begun. The average annual value of the fur trade was estimated conservatively at not more than $300,000. There were wide variations in the annual outputs. The value of the furs received in 1852 was $1,000,000, buffalo robes constitut¬ ing one-tenth of the product. After 1860 the Saint Louis fur trade decreased in volume. The Franco-Prussian War in 1871 destroyed one of the principal markets for Saint Louis furs. The trade was an inconsiderable part of the commerce of Saint Louis until about 1890 when a marked revival set in. The development has continued. In 1913 it was officially reported that (

From 1764 to 1850 the fur traffic over¬ shadowed other business to such an extent that it dwarfed enterprise in varied directions. On the profits in pelts were founded many family fortunes. But the decade from 1850 to 1860 brought important changes, both commercially and industrially, to Saint Louis. Writers pointed out forcibly that this concentration of effort in a single direction was not f6r the best interests of the city; that development of manufacturing had been retarded. The decade was hardly begun when Saint Louis, having depended up to that time entirely upon water routes, began to plan and build the first rail¬ road lines eastward and westward. The first train west from Saint Louis was run in 1854. In four years, with the population not quite 100,000, Saint Louis contributed $6,400,000 toward the construction of four railroads, one on the Illinois side of the Mississippi, three in Missouri, starting from the city. At the same time local capital, some of it derived from, the fur trade, was applied toward the

develop¬ ment of the iron industry. Furnaces were es¬ tablished along the river front. Iron ore, of high grade, was brought from two immense bodies of phenomenal character — Iron Moun¬

tain and Pilot Knob. During a number of years this output of ore was valued at $1,000,000 an¬ nually. Bituminous coal, easily worked and of inexhaustible quantity, was brought from mines a few miles distant on the Illinois side of the river. Pig iron production 40 years ago reached such proportions that Saint Louis confidently expected to become the centre of that industry for the whole country. ((The City of the Iron Crown® was the title claimed. But introduc¬ tion of new processes, the development of lower grade ores of the Lake Superior region and of the Southern States, together with increasing cost of mining at Iron Mountain and Pilot Knob, caused a gradual abandonment of smelt¬ ing. The manufacture of finished steel and iron products took the place of the pig-iron industry. In 1915 the Saint Louis district was using 350,000 tons of pig iron annually. Of this amount 25,000 tons was of local smelting. Within the year 1916 was organized the Missis¬ sippi Valley Iron Company, with a capital of $5,000,000, to increase the local production of pig iron. The many steel and iron industries of Saint Louis have invested $30,000,000. The annual output of these industries is $80,000,000. This includes structural iron, steel castings, foundry and machine-shop products, boilers, wire goods, tin enameled and galvanized iron, cutlery, tools and agricultural implements, stoves, ranges and furnaces.

As the production of iron ore declined, two other ores came into increasing prominence at Saint Louis about 1880. These were lead and zinc. Soon after the close of the Civil War, the government experts predicted coming ex¬ haustion of the Missouri lead deposits. They believed that it was a question of a few years until the galena, which was being found in pocket and nugget formations, at comparatively shallow depths, would fail. Then came the discovery of vast bodies of disseminated lead ore, — lead disseminated in the limestone. About the same time, the zinc ore, which the lead miners called <(jack® and which they had exca¬ vated in their search for lead and thrown away on the dumps as of no value, came into demand. Missouri mines, send to Saint Louis yearly, under normal conditions, 4,000,000 pigs of lead and 4,500,000 slabs of zinc and spelter. To 1916 the value of these iron, lead and zinc ores was estimated at $500,000,000. The present value of the lead industry to Saint Louis, in¬ cluding products from the raw material, not taking into account abnormal demands of the European War, is $10,000,000 a year. Among the industries allied with the iron, steel, lead and zinc are railroad and street cars, $18,- 000.000 ; plumbers' and steam fitters' supplies, $7,000,000; electrical manufactures, $18,000,000; paint, paint oils and white lead, $14,500,000.

The early experience with the fur trade and with smelting furnaces taught local capital the policy of diversity in industry and commerce. The Saint Louis district, which includes both sides of the river and extends a few miles be¬ yond the city limits, by the latest official reports, has 3,500 industries, with $407,000,000 capital employed. These industries employ 150,000 people and utilize $203,480,000 raw material. The manufactured products are $550,000,000. By the most recent summary of the Business Men's League, which is the central commercial and civic organization of the city, Saint Louis

manufactures $65,000,000 worth of shoes an¬ nually ; is the largest manufacturing centre of tobacco in the world ; holds first place in the output of American-made chemicals ; is the largest lumber market in America ; is the lar- est coffee distributing point in the United States ; has the largest horse and mule market in the world.

The introduction of power from the hydro¬ electric plant at the Keokuk Dam is a recent acquisition. In 1916 Saint Louis utilized 60,000 horse power from this source. Wires from the dam are carried on steel towers. They convey 100,000 volts at low amperage. At the city limits, this current is stepped down to lower voltage and higher amperage.

The Saint Louis Merchants' Exchange re¬ ported these sales of leading commodities in

1915:

Dry goods . $75,000,000 Vehicles . $20,000,000

Groceries . 72,000,000 Clothing . 19,800,000

Boots and shoes 65 , 000 , 000 Electrical appa-

Tobacco . 55,000,000 ratus . 18,000,000

Hardware . 50,000,000 Cars . 18,000,000

Lumber . 40,000,000 Soap . 16,000,000

Drugs . 25,000,000 Foundry products 1 6 , 000 , 000

W ooden ware .... 20 , 000 , 000 =

Saint Louis jobbing houses employ 10,000 people in stores and factories, and send out 1,000 traveling salesmen. The shoes manufac¬ tured in a year number 26,500,000, one for every fourth person in the United States. The lum¬ ber interests in Saint Louis represents $120,- 000,000 of capital, own 350 mills located in a dozen States and employ 117,000 people.

Reports to the comptroller of the currency at the close of business 12 Sept. 1916 showed that, the banks and trust companies of Saint Louis had deposits of $351,552,035, and total resouices of $441,689,464. These returns gave a gain of $50,000,000 in deposits, compared with September 1915. Loans and discounts were $249,353,650, and cash and exchange, $110,- 205,627. Bank clearings for 1915 were $4,- 153,520,336, an increase of 6.4 per cent.

The Universal Exposition of 1904, held by the Louisiana Purchase Exposition Company to celebrate the centennial of the acquisition of Louisiana Territory, had an attendance of 19,594,855, of which 12,854,616 was paid. The exposition was financed with $5,000,000 in sub¬ scriptions by individuals and corporations, with $5,000,000 bonds voted by the city, and with $5,000,000 aid voted by Congress. Subsequently Congress voted a loan of $4,600,000 which was repaid in exact accordance with the terms of the act. The exposition opened 30 April and closed 1 December. The international jury awarded to exhibitors 45,000 grand prizes, gold, silver and bronze medals. The total revenue of the exposition was $12,185,497, of which $6,243,358 was from admissions, $2,879,843 from concessions, $627,473 from the intramural rail¬ road.

A City of Brick Homes. — Saint Louis is a home-made city. The first settlers built their <(houses of posts® with trees cut on the sites. They placed the logs on end instead of hori¬ zontally after the manner of <(the Bostons® as they called the settlers east of the Alleghanies. They set the ends of these posts on the flat lime¬ stone quarried nearby and they chinked the cracks with the strong clay which was every¬ where. As the fur traders prospered, they huilt houses of limestone from the local quar¬

ries. The Saint Louisan of the latest decade does not go beyond the city limits for most of the building material. The local quarries are still worked. The brick in enormous quantities is manufactured here. The sand is pumped from the river bed. Lime and cement and sewer pipe and terra cotta, — all are local products of the value of many millions of dollars annually. Before the development of the more cheaply worked mines a few miles distant on the Illinois side, coal was taken from the seams underlying Saint Louis. When U. S. Grant sold cord- wood in Saint Louis at $4 a cord, he trimmed the branches with forks and sold these <(props® as they were

called to the Saint Louis coal mines at $5 a load. This abundance and cheapness of local building material has encouraged two distinguishing characteris¬ tics of Saint Louis. This is a city of brick. Even the elaborate and more costlv mansions, with few exceptions, are of this material. Saint Louis is a city of homes. In 1910 the census gave 105,650 separate dwellings for 155,563 families, an extraordinary proportion.

Transportation. — The first bridge at Saint Louis was completed in 1874. Crossing of the Mississippi had been by ferriage for 110 years. The bridge was constructed according to plans of James B. Eads, many of the engineering fea¬ tures being original with him. The cost, in¬ cluding the tunnel at the Saint Louis end, was over $10,000,000. To minimize interference with navigation, a height of 55 feet above high water was required. This made necessary a long and an expensive approach over the low¬ land on the Illinois side. The length of the bridge and tunnel is 6,220 feet. The tunnel passes under the retail businss district and opens on the Mill Creek Valley, a wide' depression ex¬ tending westward from the river to the city limits. About one-third of the city is south of the Mill Creek Valley. When Saint Louis was founded, a small river, fed by many large lime¬ stone springs, flowed down this valley. The first settlers dammed the river where the val¬ ley narrowed and built a mill where Seventh street is to-day. The dam created a lake half a mile wide and three miles long, known for sev¬ eral generations as Chouteau's Pond. This body of water, with irregular and wooded banks, was preserved until about 1850 when drainage from the growing city made it insanitary. Previous to that time it was a place of general resort for recreation, summer and winter. Travelers de¬ scribed the pond as one of the attractions of Saint Louis. After the pond was drained, an enormous sewer was built to take care of the sewage and the storm water of the central part of the city. When the Eads bridge and tunnel were opened the bed of the old pond became the logical location of terminals needed to ac¬ commodate the railroads which until then had maintained terminals on the Illinois side of the river. The railroads proposed that the city ac¬ quire land, construct and own terminals and grant use of them to incoming traffic on rental basis. A citizens' organization was formed and engineers employed. These engineers, with the engineers of roads on the Missouri side of the river, prepared what at that time was an elaborate plan for municipal-owned terminals, including depots, freight and passenger, yards and connections with all west side roads, via-

SAINT LOUIS, MO

1 Portland Place, one of the exclusive residential streets of the city Saint Louis is noted for its beautiful homes. lt iS I Kˆgshlg Wy,7 the' street° of hchiˆhe The cThuscaa Building' A' F & A' M'5 ˆ*

Saint Johnˆs Methodist Church (South): Temple Israel; and the Second Baptist Church

SAINT LOUIS, MO

SAINT LOUIS

145

ducts and loading tracks. The entire cost of ground, improvements and equipment was esti¬ mated by the engineers at between $5,000,000 and $6,000,000. The property and rights which could have been acquired by the citv 42 years ago at less than $6,000,000 are to-day valued at $100,000,000. The municioal government de¬ clined to accept the plan of the engineers. This refusal compelled the railroads on both sides of the river to organize a terminal association, buy ground and provide facilities to take care of traffic. No one of the 26 railroad systems passes through Saint Louis. The Wabash and the Missouri Pacific have lines on both sides of the river but Saint Louis is the initial point with all. The rails of the 26 trunk lines cover 64,071 miles, not including controlled systems. The terminal association has expanded its activi¬ ties until now it operates on both sides of the river. It uses the Eads bridge and tunnel and a second bridge, the Merchants. During the year ending 30 June 1916, the terminal handled 1,215,836 freight cars across the river, which was 100,000 more than in the previous year. In its service the terminal einplovs 100-ton locomotives which haul 100 cars. It employs 4,457 people. It has a belt line and 225 switches serving Saint Louis industries. During last year it interchanged with 95 connections 3,517,- 860 freight cars.

All of the steam railroads use the same pas¬ senger terminal. The union station was opened in 1894. At that time it was said to be the largest railroad passenger terminal in the United States. The facilities were enlarged in 1904. The train shed measures 606 by 810 feet. It has 32 tracks, aggregating six and five-tenths miles. Mails and baggage are handled through an extensive subway system underneath the tracks. The main subway is 100 feet wide and 600 feet long. There are six connecting sub¬ ways leading to adjacent buildings. The sta¬ tion is of the dead end type. All trains back in and head out. They are under the control of an interlocking system said to be the largest in the world. Three towers are equipped with 344 levers. There are 1,827 possible routes to get in and out of the train shed governed by tower No. 1. The average number of passenger trains daily in 1916 was 287. The average num¬ ber of passenger coaches daily was 1,534. Most of the trains arrive and depart between 7 a.m. and 9 a.m. and between 6 p.m. and 10 p.m. The passenger coaches handled during 1916 numbered 561,410. The average number of

tickets sold daily, not including exchange tickets, was 3,175.

Fifteen railroads constitute the terminal association. They are, the guarantors of the bonds and other obligations. All other com¬ mon carriers are given the use of all of the facilities on exactlv the same terms and con¬ ditions as prevail for the 15 lines. Decline of river traffic was steady after the development of the railroads. In 1915 the inbound traffic by river amounted to onlv 88,870 tons out of a total of 30,684,935 tons received, and 53,181 tons outbound out of 22,252,181 tons shipped. Until 1916 the river traffic continued to use the old sloped levee, the gangplanks and the manual labor of the negro roustabout. In 1916 the citv, in the effort to revive the river traffic, began the building of modern terminals with quay walls, VOL. 24 — 10

crane elevators, warehouses and railroad con¬ nections, the first unit costing $250,000.

The street car system is operated by one corporation, the United Railways Company. It consists of 344 miles of track within the city limits. The fare is five cents for adults and half fare for children. Universal transfers are given. From any point on any line the pas¬ senger is sent to any point on any other line by the most direct route even though it requires two changes. During 1915 the number of passen¬ gers carried was 227,863,250 on full fare and 4,908,140 on half fare. The transfers used were 124,043,205. The number of cars in daily use was 1,250. Besides paying regular taxes on property and franchises the company is required to pay to the city one mill for every full fare passenger. This yields the city about $250,000 yearly. The company operates under a number of franchises of different lines, the extension of all of these franchises to 1948 under a blanket ordinance being in dispute with the city. The Illinois Traction system enters the city over its own bridge and operates 4.74 miles of track to its terminus at 12th street and Lucas avenue. For the purpose of encouraging traffic to enter the city without paying the charges of the terminal association, the city has build a bridge across the river at the foot of Chouteau avenue. The expenditures upon this bridge, which is without terminals as yet, have been $7,000,000.

Cupples Station Blocks. — Where the tunnel under the central business district opens upon Mill Creek Valley, — the traffic aorta of Saint Louis, — are located the Cupples Station Blocks. They occupy 10 acres of ground. Merchandise of almost every character is received at and shipped from the back doors of these blocks. It goes to railroad points in all parts of the United States. Cupples Station does not merely save drayage between car and store. It con¬ serves labor and economizes time in the busi¬ ness of the largest shippers of Saint Louis. It saves the ordinary wear and tear of

merchan¬ dise. Hardware, woodenware and groceries are the heaviest lines of goods handled. The goods which pass through Cupples Station in a year are valued at $40,000,000. Two firms, the Sim¬ mons Hardware Company and the Cupples Woodenware Company, do $25,000,000 of this business. The amount of merchandise handled daily averages 1,000 tons. A network of switches and sidetracks reaches all parts of the station, entering alongside back doors and into basements. Sixtv cars find room on these tracks at one time, and under cover, ready for un¬ loading or loading. A single power plant for all of these blocks supplies light, heat and power, electric or hydraulic. The platforms have 100,000 square feet of space. They are of two main levels, one at the car doors and one a story higher. These levels are connected by nine powerful elevators, operated by the em¬ ployees of the station. The 30 tenants of the 20 blocks have 50 elevators reaching their various floors. Freight is moved between cars and stores on 5,000 trucks each with capacity for 5,000 pounds and especially designed for easy movement. The trucks represent an investment of $100,000. Traffic between cars and stores is conducted by a trained force which is part of the station service rendered the tenants. Dur¬ ing the night, cars having freight billed to

Clippies Station are placed upon the tracks along the platforms. At seven o'clock in the morning 100 station men open the cars, place the goods on trucks and wheel the trucks to the doors of the tenants. In two hours the cars are empty and the contents have been delivered to the several blocks. After nine o'clock the trucks with outbound goods begin to arrive on the upper platform. There the station em¬ ployees receive the goods and the bills of lad¬ ing are signed. The shipments are assorted ac¬ cording to schedules which show the order in which cars must be loaded for the several rail¬ roads in order to secure the most expeditious movement to destination. A most important part of the service rendered is this assortment of shipments, the loading of the cars and the delivery of the cars to the roads. The trained force and the system reduce to a minimum the time of delivery to the consignee. They afford the shipper great advantage over the usual methods of sending goods by dray to the freight depots. Cupples Station represents in Saint Louis the efficiency of the Bush terminals in New York City and of the 40 warehouses in Pittsburgh.

A New Post-Office Policy. — The new

Saint Louis post office, built at a cost of $1,250,- 000, was completed in 1912. At that time it was said to be the largest building in the world

devoted exclusively to the handling of mail matter. It was the first large post office con¬ structed by the United States under an entirely new policy as to location and architecture. The building is substantial in appearance ; it is not ornate and is only impressive in size. It is located a considerable distance from the busi¬ ness centre, is adjacent to the railroad terminals and separated from union station by a street. A large subway connects the post office with union station, passing under the 32 tracks. The tunnel is so located as to bring the mail trucks near the mail cars of the train of average length. Inbound mail is loaded on the trucks which are lowered into the tunnel and wheeled into the basement of the post-office. Outbound mail is collected from substations in all parts of the city by auto trucks, hauled to the post- office and delivered on the mail cars by the tunnel route. The new building abounds in au¬ tomatic traveling devices by which mail is car¬ ried from one part of the building to another. Clerks remain at their stations, saving 90 per cent of the time spent in walking about under the old system.

Education. — The public school system is maintained by a tax of 60 cents on the $100 valuation as shown by the municipal assessment, by an apportionment from the State school fund and by income from property owned by the board of education. Income from all sources for the year ending 30 June 1915 was $4,709- 494.43. The income is increasing at the rate of about $100,000 yearly. By the State constitu¬ tion the school tax rate is limited to six mills on the dollar. The board of education is com¬ posed of 12 members who are elected at large by the entire city, four members retiring every two years. The body is independent of the municipal government, having a separate char¬ ter and being authorized to levy taxes within the limit and to expend the revenue for school purposes. To preserve a non-partisan or bh

partisan character, the two principal parties have for several years divided equally the nominations for the board. There are six high schools, one of which is for negroes. The enrolment for 1916 was 8,253 in high schools and 80,474 in elementary schools. A notable development has been the increase in high school attendance. In 1900 the high school en¬ rolment was 25 to every 1,000 pupils in the schools. In 1916 it was 86 to every 1,000. Another notable fact is that while the number of children of school age increased from 1900 to 1915 only 9 per cent, the attendance increased 37 per cent. Among the departments of school work added in recent years are a teachers' col¬ lege for training, special schools for individual instruction of defectives, open air schools for children with tuberculosis tendency, extra hours in high schools, an educational museum, a de¬ partment to enforce attendance, a department of hygiene, summer term schools. The salary schedule has been increased $550,000 annually. The total assets of the board of education amounted to $17,848,198 in 1915.

They include 234 school buildings, several of them costing $500,000 each. The public school buildings are used for evening meetings of civic bodies, 1,320 of such meetings having been held in the schoolhouses the past year. The announced policy of the board of education is to add new features of school work as rapidly as funds will permit. Among these features are hand work for fourth, fifth and sixth grades ; physi¬ cal training in out-of-program hours ; increase in number and scope of evening schools; in¬ crease and scope of summer term schools ; more shop and laboratory opportunities in high schools; special classes for normal but re¬ tarded children ; survey of industrial condi¬ tions and vocational guidance.

Saint Louis schoolhouses are now built fireproof and with every modern convenience. With each new school provision is made for much more playground space than formerly. Teachers are appointed under a merit system. They maintain a pedagogical society and a teachers' benevolent annuity association, both of large membership. Women after 25 and men after 30 years of teaching may retire and re¬ ceive an annuity. The annual dues are 1 per cent of the salary.

Higher Education.— Washington Univer¬ sity, with a campus of 113 acres adjacent to Forest Park, with 12 granite buildings arranged in quadrangles, received its name from the fact that the charter for it was signed bv the governor of Missouri on 22 February, Wash¬ ington's birthday. _ The year was 1853. For a short time the institution was called Eliot Semi¬ nary, Rev. Dr. William Greenleaf Eliot having been foremost in promoting the organization. The institution has never received national, State or city aid further than that the charter exempted its property from taxation. The ac¬ tive endowment at present is $11,000,000, with about $5,000,000 more, the income from which will come later. All of this endowment was derived from the gifts of individuals and busi¬ ness corporations. It is receiving additions in considerable sums and frequently. The charter provided that the institution management must be non-sectarian and non-political. No profes¬ sor or tutor is asked his religion or politics be-

fore his appointment. Beginning with the college in 1857, the trustees added the law school in 1867, the engineering department in 1870, the school of fine arts in 1879, the school of botany in 1885. In 1915 new buildings for the medical department were completed at a cost of over $1,000,000. This department is conducted in close relationship with Barnes Hospital, buildings, equipment and endowment of which represent more than $1,000,000. The medical school limits its students to 250 and

teaches largely through research. The build¬ ings and endowment of the medical school will be an investment of $5,000,000. Four citizens of Saint Louis pledged $500,000 each. The foremost givers to Washington University have been Robert S. Brookings, now president of the board of trustees, and the late Samuel Cupples. Mr. Brookings, the active head of the Cupples Woodenware Company, planned and developed the great transportation asset of Saint Louis known as Cupples Station. Mr. Brookings and Mr. Cupples gave to Washington University this property when it had developed a valuation of several millions of dollars. Washington University encourages the most practical forms of education. It was the pioneer in manual training under the late Dr. Calvin M. Wood¬ ward and carried on a manual training school until this kind of instruction was made a feature of the public school system. The uni¬ versity has recently established a school of finance and commerce. It devotes much at¬ tention to advanced and graduate courses. Secondary schools of the university are Mary Institute for girls and Smith Academy for boys, each occupying its own building a mile or more from the university.

Saint Louis Universitv, conducted by the Jesuits, occupies a large group of buildings on Grand avenue. It has a library of 40,000 volumes, many of them rare and old, including the Christian Fathers, in Latin ; first editions of Luther ; the Bible in 21 languages ; f(Records of the English Government,® beginning with <(Doomsday Book® and ending with George IV. The university, in addition to classical and scientific departments, has law and medical schools and a school of finance and commerce. The will of the late James Campbell left the entire estate of $10,000,000 to Saint Louis Uni¬ versity for the promotion of medical education, subject only to life income interests of the widow and one daughter. The David Ranken, Jr., School of Mechanical Trades, to prepare youth for the skilled trades, is a recent addition to Saint Louis educational institutions. It was founded and endowed by David Ranken, Jr., a bachelor, with an endowment of more than $3,000,000. The College of the Christian Brothers and Forest Park College for girls are largely attended. Saint Louis has several inde¬ pendent medical schools, a college of pharmacy and numerous convent schools and seminaries. About 30,000 pupils attend parochial schools.

Institutions. — A central structure costing $1,500,000, six branches costing $100,000 each, 60 delivery stations, with collections sent out to schools, clubs and various associations, keep the 400,000 books of the Saint Louis Public Library in circulation. Mr. Carnegie contrib¬ uted $1,000,000. The city gave as much more and voted an annual tax for support. The new central library building is a fine study in archi¬

tecture. It has an impressive marble entrance hall, a great marble delivery

chamber, which is considered one of the most beautiful rooms in the country, an art room with a ceiling inspired by a Florentine church. The ceiling of the long reading-room was copied from the Laurentian Library in Florence. The reference and open- shelf rooms have ceilings of painted beams, after the style of old French chateaux. The City Art Museum is said to be the only mu¬ nicipal art museum maintained entirely from public funds. It occupies a fireproof building erected at a cost approximately of $1,000,000 by the Louisiana Purchase Exposition Company. The central nave into which the main entrance opens contains a collection of American sculpture said to be the largest and most representative in existence. The exposition company devoted $450,000 to the sculpture for the World's Fair, distributing the commissions among 150 Amer¬ ican sculptors. At the close of the fair the best of the works were installed permanently in the museum. (The Puritan) by St. Gaudens, (The Sculptor bv French,*

Mercantile Library, sustained by dues of members and by endowment, has 150,000 vol¬ umes. It is especially rich in historical literature pertaining to the West. It occupies a building of its own in the business centre. A large read¬ ing-room is supplied with 600 periodicals. The halls contain many paintings and statues.

Churches, Benevolent Institutions. — A dis¬ tinguishing feature of the population is the large number of the descendants of the early French settlers. Families of 10 to 15 children were not unusual in the colonial periods. A genealogical chart brought down to recent date gave the names of more than 900 descendants of Mme.

Marie Theresa Chouteau, the first woman resi¬ dent of Saint Louis, coming in the spring of 1764. Descendants of Madame Chouteau in the present generation married descendants of six nationalities. The devotion of the original Saint Louis stock to the Catholic Church has given Saint Louis a strong religious character. There are 380 churches, of which 80 are Catholic and the rest of almost all Christian denominations. Churches and other buildings devoted to re¬ ligious purposes aggregate in value $10,000,000, and include some fine structures, notable among which are the old Walnut Street Cathedral, dating from the French occupation of Saint Louis, and the Gothic interior of the church of Saints Peter and Paul, founded in 1848, the oldest German Catholic church in the city. For the maintenance of churches the people con¬ tribute $1,000,000 annually, and nearly as much to benevolent institutions.

Botanical Garden and Parks. — Henry Shaw, an Englishman and a bachelor, came to Saint Louis in 1819 and opened a hardware store. In 30 years he accumulated a fortune. He retired from business and established in 1858 what is now the most complete botanical garden in America. The tract, farm land when Mr. Shaw bought it, is now within a well-built section of the city. Mr. Shaw traveled exten¬ sively before selecting the location for the <(Missouri Botanical Garden,® as he named it. He chose Saint Louis because, he said, climate and soil here encouraged the greatest variety of plant life. In the 120 acres of ((Shaw's Gar¬ den,® as it is popularly known, are assembled 15,000 varieties of plants from all. parts of the world. Two new conservatories and a new palm house have been added recently to the already large collection of buildings. Orchids, one of the finest collections in existence, more than 1,000 varieties, are displayed in a special house. Another building is devoted to insec¬ tivorous plants. A medicinal garden, the her¬ baceous tract, the North American tract, the arboretum, the water garden, a collection of 1,000 varieties of cacti, a rose garden with 500 selected varieties — these are some of the divi¬ sions of the garden. Monthly displays of flowering plants are made in two large con¬ servatories. The garden is open to the public. On Saturdays visitors in groups are personally conducted. Ownership is vested in a board of trustees which administers income-bearing prop¬ erty valued at $4,000,000. The net income main¬ tains the garden and also the Henry Shaw School of Botany, a department of Washington University. The botanical library contains 18,550 volumes, 22,608 pamphlets, 66 manuscript volumes. In the herbarium are 400,000 sheets of specimens.

In addition to the garden, Henry Shaw gave Tower Grove Park of 266 acres adjacent and highly improved, the condition being that the city appropriate annually $25,000 toward the maintenance. The park contains three fine bronze statues given by Mr. Shaw — Shakes¬ peare, Humboldt and Columbus, executed by Mueller of Munich.

Forest is the largest of 53 parks, play¬ grounds and other reservations for recreation purposes. It contains 1,380 acres. The entire park acreage is 2,766. Installation of golf courses, tennis courts, soccer fields and swim¬

ming pools is of comparatively recent date, but is on a scale befitting the population. Fair¬ ground, a park of 128 acres, has the largest open-air swimming pool in the country, holding 4,000,000 gallons of water. Natural amphi¬ theatres in Forest Park have been used success¬ fully for open-air dramatic performances. The daily attendance upon the Pageant and Mlasque in 1914 was 100,000. In 1916 (As You Like It> was given to audiences of 10,000. The statuary in the parks includes Saint Louis (equestrian), Laclede, Washington, Benton, Blair, Bates, Grant and Sigel. Jefferson Barracks, at the southern limits of Saint Louis, is one of the

largest military reservations in the country. It is one of the four principal recruiting stations. The buildings represent an expenditure of $1,000,000. A part of the reservation is used for a national cemetery, with 12,000 headstones.

Municipal Government. — The constitution of Missouri, adopted in 1875, conferred upon the city of Saint Louis the power to frame its own charter and at the same time to separate from Saint Louis County. Accordingly a new charter was adopted for the city in 1876. The scheme of a separation was carried. The effect was to establish city boundaries not subject to the usual method of change as the city popu¬ lation grew. The boundaries of the city re¬ main as they were determined by the charter 40 years ago. Several municipalities — Maple¬ wood, Webster, Kirkwood,' Clayton, University City — have been formed adjacent to the west¬ ern limits of Saint Louis. They cannot be brought into the city without their consent and the consent of Saint Louis County. Move¬ ments to extend the limits of the city to fnclude thickly-settled portions of the county have not progressed satisfactorily. The effect upon the city's growth in population has already become quite apparent. Street car service, telephone service and some other utilities have crossed the county line without increase of rates. Many thousands of people do business in Saint Louis but live beyond the city limits and are not included in the city's population. The charter adopted in 1876 was continued, with a few amend¬ ments, until 1914, when, 30 June, a new charter on modern lines, making radical changes in the forms of municipal government was adopted. The number of elective offices was reduced materially. The mayor now appoints the as¬ sessor, treasurer, commissioner of supplies, register, city counsellor, marshal, City Court judges and clerks. For the bicameral legis¬ lative department has been substituted a board of aldermen, consisting of a president and 28 members, one for each ward. These aldermen must be residents of their respective wards but are elected by the general vote of the city until such time as the constitution of the State shall permit each ward to elect its alderman. The board of aldermen performs legislative duties only. Such administrative measures as were formerly within the scope of the municipal as¬ sembly are now at the disposition of a board of public service. The board of public service, likewise appointed by the mayor at the begin¬ ning of his four years' term, is composed of a president and four directors of departments. The departments are public utilities, streets and sewers, public welfare and public safety. A merit system requires the examination of can-

didates for appointive positions of subordinate classes. An efficiency board,

created by the new charter, conducts the examinations and main¬ tains eligible lists from which the three highest candidates are certified to the appointing offi¬ cers as vacancies are to be filled. The budget system has been introduced under the charter. A board of apportionment, composed of the mayor, the comptroller and the president of the board of aldermen, controls expenditures. The board of aldermen can reduce or cut out items in appropriation bills but cannot increase or insert. The charter confers the right of mu¬ nicipal ownership of public utilities of any kind. This was forbidden under the old charter.

Initiative, referendum and recall are pro¬ vided. Five per cent of the registered voters for a general election and 7 per cent for a special election have the power to submit to vote the initiated ordinances. Two per cent of the registered voters can prevent an ordinance, except an emergency measure, from going into effect at the 30-days' limit. Forty days more are allowed for the petition by 5 per cent, additional to the 2 per cent, of the registered voters, to compel submission of the suspended ordinance at the next general election; or 10 per cent of the registered voters can compel the submission of the referendum to a special elec¬ tion. After the filing of the petition by 5 per cent or 10 per cent of the voters the board of aldermen is given opportunity to reconsider and repeal the ordinance. If this is not done the ordinance goes to referendum vote.

Any elective officer may be recalled. The petition for the submission of the recall to the voters must be signed by 20 per cent of the registered voters, and these signers must in¬ clude 20 per cent of the registered voters in each of at least two-thirds of the 28 wards. No recall petition can be filed within the first six months or the last six months of an official term. A successor cannot be elected at the same election that passes upon a recall.

The charter established a complaint board, whose duty it is to investigate the complaint of any citizen about the conduct of any branch of the municipal government or of any public serv¬ ice corporation. The powers conferred by the charter are along modern lines and are exten¬ sive, restricted only by the State constitution. The State retains control of three departments: the board of police commissioners, the excise commissioner and the election commissioner, all of whom are appointed by the governor.

Municipal Finances.— The municipal reve¬ nue for the fiscal year of 1915, not including receipts from water rates and interest and sink¬ ing fund taxation, was $11,073,142.80. The rev¬ enue has doubled in 15 years. The tax rate for State, city and schools in 1916 was $2.35 on the $100 assessed valuation. The division of the rate was .18 for the State; .60 for the schools; .04 for the public library; .02 for the city art museum; $1.15 for municipal purposes; .36 for interest and sinking fund. The

assessed valu¬ ation by the city for the taxes of 1916 was: Real estate, $496,344,000; personalty, $98,048,520. The State board of equalization, which assesses railroad, bridge, telegraph, express and street railway property, added $36,069,769, making the total assessment for Saint Louis $630,452,289. The basis of assessment is two-thirds of actual valuation. The annual increase in the assess¬

ment is about $20,000,000. The bonded debt in 1916 was $23,443,000, with $2,791,276 in the sink¬ ing fund. This was a smaller debt than the city had 40 years ago. New issues of bonds have been put out from time to time but the debt has been reduced more than it has been in¬ creased, notwithstanding growth of population. The present debt of Saint Louis is $16,000,000 below the limit of indebtedness permitted by the State constitution.

Waterworks. — The valuation placed upon the waterworks of Saint Louis is $31,000,000, about two-thirds for the plant and one-third for the distributing system. The water is con¬ ducted from two intake towers in the channel of the Mississippi, at the extreme northern limits of the city, and a few miles below the mouth of the Missouri River. Three rivers supply the water, — the Missouri, the Missis¬ sippi and the Illinois, the proportions varying widely as the stages of the three rivers change. The waters of the Missouri and the Mississippi are of such different character that they do not unite in the few miles between the mouth of the Missouri and the Chain of Rocks, the loca¬ tion of the waterworks, but flow side by side. The intake tower nearest the Missouri shore receives almost exclusively the Missouri River flow. The city's supply is drawn largely from this tower, except when low stages of the river make it necessary to depend upon the more distant intake which is in a deeper part of the channel.

Decided preference is given to the Missouri River water for two reasons : The Missouri water, although more heavily loaded with silt and less attractive in appearance, yields more readily to the purifying treatment. More im¬ portant is the fact that there are no large cities on the Missouri for 250 miles above its mouth and there is less contamination from sewage than in the water from the upper Mississippi and the Illinois.

The water let in through the gates of the intake towers flows by gravity through tunnels 60 feet below the ground to the pumps. It is received in wells from which it is lifted by the pumps to settling reservoirs. Between the tun¬ nels and the reservoirs the water during its agitation from the pumps receives the treatment with lime and sulphate of iron, both in liquid form. The liquefaction takes place in the coagu¬ lant house. The two streams from the coagu¬ lant house are thoroughly mixed with the water. The chemical result is sedimentation so rapid and comprehensive that it cannot

be appreciated unless seen in operation. By the time the water has passed through the grit chamber and into the first reservoir coagulation has taken place to such a degree that more than 90 per cent of the mud and solid matter is carried to the bottom.

The city tried settling reservoirs for many years with only partial relief from the muddy water. Filters were in quite general use in Saint Louis homes. The solution of the water purification problem was discovered in March 1904, after long experimentation. At first the methods of applying the lime and iron were crude but they produced such gratifying results that the city developed the process with liberal expenditures now amounting to several millions of dollars. In 1915 the process was further improved by the installation of a mixing cham-

her and grit chamber before the water reaches the first reservoir. In this grit chamber 29 per cent of the solids drop to the bottom.

The iron and lime are reduced to liquid forms with elaborate automatic machinery in the coagulant house. The proportions of lime and iroq vary from hour to hour, as determined by laboratory tests of the (

In 1915 a filter plant, said to be the largest in the world, was added at a cost of $1,357,000. This plant receives the water after it has under¬ gone the purifying process with the lime and iron. In the passage of the water from the reservoirs through the filter to the supply con¬ duit of the city, chlorine and sulphate of alumina are added. The chlorine is introduced just before filtration and the alumina just after. In the first year's operation of the filter plant the 29,823,000,000 gallons of water received 1,225 tons of sulphate of alumina and 57,781 pounds of chlorine. The turbid water is rendered reasonably clear #of solids by the lime and iron process. Filtration afterward with the application of chlorine and alumina constitutes a "polishing® process which further improves the color and healthfulness of the water. The revenue from water rates in 1915 was $2,844,837. This revenue can be devoted only to waterworks operation and to the interest and sinking fund for waterworks bonds. The present average daily consumption of water by Saint Louis is 99,000,000 gallons. At the rate of increase in consumption the maximum ca¬ pacity, which is 150,000,000 gallons per day, will be reached in 10 years. Plans have been drawn for the location of new waterworks on the Missouri River about 20 miles above the mouth, the water to be pumped to one of the highest elevations in Saint Louis County and dis¬ tributed from a great storage

reservoir by gravity conduits to the western part of the city. The intimate relation of the water supply to health has been impressed strongly upon Saint Louis. For a quarter of a century, previous to 1894, water was taken from the river at Bissell's Point, in the upper part of the city, just below the mouth of a large creek which received suburban drainage. The year that the source of supply was changed from Bissell's Point to Chain of Rocks, the present location several miles up the river, the general death rate dropped from 1,935 to 1,700 per 100,000 population. The typhoid death rate was cut from 47 to 23 in 100,000 population. But in 1900 Chicago began sending sewage in

full volume down the drainage canal into the Illinois River. That year the typhoid death rate of Saint Louis began to climb again. It increased to nearly 50 in 100,000 population. The first year of the lime and iron treatment the typhoid rate went down. It dropped to 20 in two years. Since 1906 it has been below 20. With the opening of the filter plant in 1915 a further decline to 10 deaths from typhoid in 100,000 was noted.

Decline of the general death rate has been almost as significant as that of typhoid. The death rate for all diseases was from 1,600 to 1,700 under the influence of the Chicago sew¬ age. It dropped to 1,500 per 100,000 population, and then to 1,400, with the purification process. During 1915, the first year of combined clari¬ fication and filtration, the general death rate was below 1,300 per 100,000 population. For several years after the Civil War the water supply was drawn from the foot of Bates street, a mile above the business centre, but below a large residence section. Typhoid epi¬ demics were frequent. The general death rate was as high as 2,300 in some years, nearly twice what it is at present. The waste of lives in Saint Louis from contaminated water during 60 years past has been estimated at 92,706.

History. — <(The First Thirty,® as the origi¬ nal builders of Saint Louis were called, arrived at the foot of what is now Walnut street the night of 14 Feb. 1764. That night they slept on the large flatbottomed boat which they had poled and dragged along the ice-bound bank of the Mississippi 60 miles from Fort de Chartres. Where the 30 landed was a strip of sandy beach rising gently to the base of a limestone cliff from 35 to 50 feet in height. Through this cliff the water from springs and rains and snows had, in the years, worn a gully. On the morning of the 15th, Auguste Chouteau, a sturdy lad of 13, led the party up the gully to a plateau heavily wooded. He pointed to some recently marked trees. There, on a site now bounded by Main and Second, Walnut and Market streets, was begun the building of Saint Louis. The first structures were the head¬ quarters and warehouses for the fur company of Maxent and Laclede. Maxent was a New Orleans merchant. Pierre Laclede Liguest, the founder of Saint Louis, was the

younger son in the ruling family of Bedous, province of Bearn, on the French side of the Pyrennees. He received a military education and came to Louisiana to grow up with the country. Maxent and Laclede were officers in a colonial regi¬ ment raised to defend the French settlements from the Indians under British influence in the Seven Years' War. At the close of hostilities Maxent and Laclede were given, bv the gov¬ ernor-general at New Orleans, an exclusive grant to trade with the Indians in the Missouri River country. An expedition was outfitted, Laclede investing the Liguest property in¬ herited from his mother and taking command. Leaving New Orleans in August 1 763, Laclede reached Fort de Chartres in December. There he learned that France had ceded the territory east of the Mississippi to England and that the fort was about to be evacuated by the French garrison. Storing his goods and taking his stepson, Auguste Chouteau, as a companion, Laclede began an examination of the west side of the river northward to the mouth of the

Missouri. He selected the present site of Saint Louis, marked some trees to guide young Chouteau, and went back to Fort de Chartres. Ignoring the discouraging advice of the French officers, Laclede told them he had ((found a situation where he was going to form a settle¬ ment which might become one of the finest cities of America.® (Une situation ou il allait former un establissement qui pourait par la suite devenir une des plus belles villes de l'Amerique — Auguste Chouteau's Diary).

Laclede drew the plan of the settlement, organized (

Saint Louis remained under Spanish do¬ minion until 9 March 1804, when the United States government sent Captain Stoddard to receive the transfer of Upper Louisiana from the Spanish governor, Delassus. The population of Saint Louis and immediate vicinity was about 1,000 at that time. A terri¬ torial form of government was established with Saint Louis as the capital of the territory. Previous to the transfer, the few Americans who had migrated to the west side of the river had passed Saint Louis and had formed settle¬ ments beyond. With the establishment of United States authority at Saint Louis, the influx of Americans from the east side became rapid. In 1808 the first newspaper, the Mis¬ souri Gazette, was established in Saint Louis. Publication, but under a different name, has been continuous from that time to the present day. In 1809 Saint Louis was incorporated

as a town, the French habitants still being in the majority.

Growth and Crises. — Saint Louis was in¬ corporated as a city in April 1823. The char¬ ter was not adopted without opposition. Prop¬ erty qualification restricted suffrage to those who paid taxes. Of 197 votes cast 90 were against the charter. In the election of mayor the line was drawn between the Americans who had come after the transfer of sovereignty to the United States and the settlers under Colonial government. A Pennsylvanian, Wil¬ liam Carr Lane, was elected mayor over two candidates of the old regime by a majority of 24. Seven years after incorporation, the census of 1830 gave 4,977 residents. Saint Louis then ranked 44th among American cities. Ten years later, in 1840, it held the 20th place. In 1880 Saint Louis had passed 38 other American cities and had been passed by only one, Chicago. With the union of New York and Brooklyn, Saint Louis became the fourth city. It has held that rank more than two decades. In attaining the present position in population, Saint Louis has passed through three very serious crises. In the period between 1840 and 1850 a single fire destroyed 23 steam¬ boats at the levee, and swept 15 business blocks in the commercial centre of the city, at a loss of $3,000,000. In that same decade the greatest Mississippi flood of record covered the fertile lowlands to the Illinois bluffs from the mouth of the Missouri to the mouth of the Ohio. Within the period mentioned an epidemic of cholera caused 4,317 deaths. Notwithstanding these drawbacks the population of Saint Louis increased from 16,460 in 1840 to 77,860 in 1850. The European revolution of 1848 and the Irish famine prompted abnormal immigration of which Saint Louis was a large beneficiary. The second of the great crises in the city's history was the Civil War. Previous to 1861 the main traffic routes were between the North and the South. The rivers of the Mississippi Valley gave commercial advantage. Saint Louis was the toll gate of water transportation. The city remained steadfastly loyal to the Union. Chaos succeeded the city's former intimate and profitable business relations with the lower part of the Mississippi Valley. With the return, of peace came radical realignment. The main traffic arteries were now east and west. Dominant influences favored the northern routes across the continent. The prestige of Saint Louis suffered.

The third crisis, almost vital it might be said, followed logically the second. Saint Louis had grown rich and mighty on develop¬ ment of water transportation lines. In the dec¬ ades between 1870 and 1890 rails superseded rivers. The millions of Saint Louis capital in¬ vested in boats and navigation disappeared with the decadence of river traffic. Saint Louis was forced to meet the new conditions and did so, but at heavy cost in what had been chief natural advantages.

Population. — The census of 1910 gave Saint Louis 687,029 people. By 1920, the population had grown to 772,897, an increase of 12.5 per cent, over the 1910 figures. Previous to the Civil War the foreign popula¬ tion

was proportionally much larger than it is now. In 1910 the foreign-born population was 125,706. About one-third of the foreign-born,

47,765, was German. Russia came next with 15,480; Ireland, third with 14,268; Austria, fourth with 11,171. Other nationalities were inconsiderable. The negro population of Saint Louis was 43,960, a comparatively s.mall in¬ crease since the days of slavery abolished by a State constitutional convention in 1865.

Bibliography. — (Auguste Chouteau's Diary ; Douglas, (The Spanish Dominion) ; Billion,*

(Annals of Saint Louis ; Shepard, (History of Saint Louis) ; Edwards, (Great West) ; Scharff, (History of Saint Louis City and County) ; Hyde, Encyclopedia of Saint Louis) ; Stevens, (The Building of Saint Louis) ; id., (Saint Louis, the Fourth City) ; id., (Water Purifica¬ tion at Saint Louis.)*

Walter B. Stevens, Saint Louis, Mo.

SAINT LOUIS, Senegal, West Africa, the capital of the colony known to the natives as Timbuktu or N'dar, is on a small low island near the mouth of the Senegal River. The- principal buildings are the cathedral, the great mosque, courthouse, barracks and government buildings, bank, chamber of commerce, public library, printing office; and there is an agricul¬ tural society. The gardens of the suburbs and the avenues of palms are attractive features of the town. There are large warehouses and an extensive trade in gums, earthnuts, etc. Water is supplied by an aqueduct seven and one-half miles in length. Pop. about 23,500.

SAINT LOUIS UNIVERSITY, The, lo¬ cated at Saint Louis, Mo., and the oldest univer¬ sity in the Louisiana Purchase Territory, was founded by Jesuit missionaries from Maryland; the beginnings were made at Florissant, Mo., in 1823, when a school for the education of the Indians of the Missouri Territory was es¬ tablished at the request of President James Monroe and the Hon. John C. Calhoun, his Secretary of War. This school was transferred to Saint Louis in 1829, and classes were opened there for white students in 1829. In 1832 the institution was chartered as a university by act of the legislature of Mississippi. In 1842 a medical department was added and in 1843 a school of law. The schools of philosophy and divinity were organized in 1857. In 1888, owing to the encroachments of business, the univer¬ sity was moved to its present quarters and the various departments were erected on the new site with the exception of the school of medi¬ cine (1903), which is situated one mile

distant. The organization of the university now con¬ sists of the College, the Academy, the Com¬ mercial Department, Military Science, Normal School, School of Philosophy and Science, School of Divinity and School of Medicine. The College offers two courses, the classical, leading to the degree of A.B., and the scientific, leading to the degree of B.S. ; the degree of Litt.B. is also now conferred. The School of Philosophy and Science offers two courses, the philosophical, in which the Latin language and the scholastic method are used, and the sien- tific, including instruction in mechanics, the sciences and mathematics, with laboratory work. The course of divinity extends over a period of four years, leading to the degree of doctor of divinity. The Military Department is under the management of an officer of the United States army and military drill is obligatory on

all undergraduate students. Religious instruc¬ tion in Catholic doctrine forms part of the courses; non-Catholic students, however are exempt if they so wish.*

The buildings are : The College, the Acad-f emy, the School of Divinity, the School of Philosophy, the School of Medicine and the Normal School. The library contains 75,000 volumes, including the library for undergradu¬ ates; there are also departmental libraries in theology, philosophy, science and medicine. The productive funds amount annually to about $30,000, the students number about 1,500 and the faculty 210.

SAINT LUCIA, one of the Windward Islands, British West Indies, lying south of Mar¬ tinique ; area, 233 square miles. The surface is rugged and mountainous, the mountain sides being mostly covered with dense forests ; the valleys and lower heights are fertile and well cultivated. The chief products are sugar, cocoa and logwood ; coffee and tobacco are also raised and rum is manufactured and exported. The climate is healthful except in certain low, marshy districts. The island was discovered in 1502, colonized by the French in 1563, was claimed by both England and France and until 1803 its possession several times passed from one to the other. In 1803 it capitulated to the British and was definitely ceded to them in 1814. It then became a part of the govern¬ ment of the Windward Islands. In 1901 there were 44 government schools. Castries, the capi¬ tal of the island, is one of the most important ports and the second British naval station in the West Indies.

SAINT LUCIE GRASS. See Grasses in the United States.

SAINT LUKE, Academy of (Accademia di San Luca), an academy of fine arts organ¬ ized some time previous to 1517, when it was officially

*recognized by a brief of Pope Greg¬ ory XIII. Muziano organized it from the old statutes governing the so-called ((Universita delle Belle Arti,** which itself had grown out of a mediaeval guild of painters. During the pontificate of Sixtus V the new organization was placed under the patronage of Saint Luke and the revenues of Santi Martino e Luca were allocated to it. The academy awarded prizes in painting, sculpture and architecture. It received rich endowments from Zuccari and from Clement XI. Canova advocated a new constitution early in the 19th century, which was granted by Pius VII in 1818. The presi¬ dent is elected annually, there are 36 acade¬ micians, architects, painters, sculptors. The academy maintains a school of design in which is given instruction in architecture, painting and sculpture. The academy is housed in Via Bon- ella, where it maintains priceless collections. It now receives an income of $7,000 from state funds. Consult Armand, (L'Academic de Saint Luc a Rome5 (Rome 1866).*

SAINT LUKE, Guilds of, were associa¬ tions of painters organized in mediaeval times under the patronage of Saint Luke. The guilds flourished for many years in Holland and ad¬ mitted as members engravers, printers and other artists.

SAINT MALO, san ma-lo, France, in the department of Ule-et-Vilaine, at the mouth of

the Ranee, on the English Channel, occupies a rocky island, 43 miles northwest of Rennes. It communicates with the mainland by a cause¬ way called Le Sillon. The harbor affords a total t quayage of more than two miles. The principal buildings are the custom-house, cham¬ ber of commerce, the parish house of the 15th century, school of hydrography, the Hotel-de- Ville, with a museum and library, the Casino and statue of Chateaubriand before it, and the ancient castle. The manufactures are hosiery, nets, sailcloth, cordage. It is an im¬ portant seaport and shipbuilding is one of the chief industries. There is trade in Corn, fruit, wine and provisions, chiefly with England and the Channel Islands. Pop. about 12,000.

SAINT MARC, Fr. san mark, Haiti, town on Saint Marc's Bay, on the west coast, 44 miles northwest of Port-au-Prince. Near the town is a headland known as Crete a Pierrot, which was strongly fortified by English engi¬ neers and occupied by native soldiers in the war of independence, who here made a strong resistance against the French. It is the ship¬ ping port for a

fertile valley and exports chiefly coffee and logwood ; the town also contains several distilleries. Pop. 20,000.

SAINT-MARC-GIRARDIN, san mark zhe-rar-dari, Frangois Auguste, French states¬ man and author: b. Paris, 12 Feb. 1801; d. 11 April 1873. He was educated at the College Napoleon and at the College Henri IV, and in 1834 occupied the chair of poetry at the Sor- bonne, having exchanged it for that of history, held for a short time previously. His political life began also at this time as a member of the Chamber of Deputies. In 1871 he was elected to the National Assembly and was its vice- president when he died. Among his best- known books are (Political and Literary Notes on Germany) (1835) ; (Essay on Literature and Morals) (1845) ; (Course of Dramatic Litera¬ ture; or, The Use of the Passions in the Drama5 (1843-77) ; (La Fontaine and the Fa- bulists) (1867) ; and (Jcan Jacques Rousseau, His Life and Works> (1875).

SAINT MARK, Column of. See Venice.

SAINT MARK'S CHURCH (San Marco).

See Venice.

SAINT-MARTIN, san mar-tan, Louis Claude, French philosopher : b. Amboise, France, 18 Jan. 1743; d. Aurai, near Chatillon, 14 Oct. 1803. He traveled through Germany, England, Switzerland and Italy, making converts to his mystical philosophy, which he had derived from a study of the works of Jacob Bohme. His followers styled themselves ((Martinists)5 and held that man on one side of his nature was a type of the universe, a microcosm ; on the other the thought and reflection of God. By in¬ trospection all knowledge and wisdom could be reached. Of his works the most important are (Des erreurs de la verite5 (1775) ; (De l'esprit des choses5 (1800); T'homme de de- sir) (1790). Consult Caro,

SAINT MARTIN, sant mar' tin (Fr. san mar-taii), an island of the Lesser Antilles, lying north of the Leeward Islands and east of Porto Rico; area, 37 square miles. Its surface

is hilly, the elevation being highest in the centre- of the island. In the southern part are several salt lagoons from which considerable quantities' of salt are obtained. Sugar is the chief agri¬ cultural product, rum is manufactured and sugar, rum and salt are the chief exports. The island was settled in 1638 by French and Dutch, who were later driven out by the Spaniards. In 1648 they regained possession and divided the island between them, the French taking the northern portion (20 square miles) ; and the Dutch the southern portion (17 square miles) ; the French portion*

is a dependency of Guade¬ loupe, the Dutch, a dependency of Curasao. Pop. 7,000.

SAINT MARTIN'S DAY. See Martin I, Saint.

SAINT MARY HALL, originally this was the parsonage-house of the rectors of Saint Mary's Church, Oxford, until it was presented1 by Edward II in 1326 to Oriel College. It then became a university hall and the office of prin¬ cipal was held by Oriel fellows to 1656, from which time the chancellor exercised right of nomination. In 1902 it was regularly incor¬ porated with Oriel, in which its site, buildings and property are now vested.

SAINT MARYLEBONE, merl'lS'bon, England, a metropolitan borough in the north¬ west of London and a favorite residential dis¬ trict. Area, 1,473 acres. Regent's Park con¬ tains the Zoological Gardens and the Gardens of the Royal Botanical Society. Lord's Cricket Ground, the headquarters of the Marylebone Cricket Club (M.C.C.), Queen's Hall, a favor¬ ite concert hall, Madame Tussaud's waxwork and Harley street, mainly occupied by doctors, are all in the borough, which returns two mem¬ bers to Parliament. Pop. 118,160. Consult Clinch, (Marylebone and Saint Pancras5 (1890) ; Smith, (Account of the Parish of Saint Marylebone5 (1833).

SAINT MARYS, Canada, town and out-

port in the province of Ontario, on the Thames River, 100 miles southwest of Toronto, on the Grand Trunk and the Canadian Pacific rail¬ ways. Agricultural implements are manufac¬ tured here, and there are saw, grist, oatmeal and flax-mills. Pop. 3,388.

*SAINT MARY'S, Md., the first settlement made in the State. In 1634 Governor Calvert in his ship, the Ark, sailed up the Potomac to Saint Mary's River and bought land of the Indians and established a settlement near the mouth of the Saint Mary's. A Jesuit mission was established ; many of the settlers, however, were Protestants and absolute liberty of wor¬ ship prevailed. Though Saint Mary's was the capital of Maryland and for a number of years the only town in the colony, it was never more than a small settlement. In 1694, after Mary¬ land became a royal colony, the capital was * moved to Annapolis and Saint Mary's fell into decay.*

SAINT MARYS, Ohio, city in Auglaize County, on the Lake Erie and Western, Toledo and Ohio Central and the Western Ohio Trac¬ tion line, about 25 miles southwest of Lima. It was settled in 1795, by whom is not positively known ; but some county historians give the credit to Charles Murry. It was incorporated

in 1820, and became a city under the new code, June 1903. It is in an agricultural region and in the oil belt, but it has large manufacturing in¬ terests. The chief manufacturing establish¬ ments are chain works, spoke works, woolen mills, machine shops, box factory, straw board works and other smaller factories. The total number employed in all the manufactories is about 1,000. There are eight churches; and the educational institutions are public and parish schools and a business college. The three banks have

a combined capital of $180,000; the annual amount of business is $1,200,000. There are two building and loan associations, one daily and two weekly papers. The government is vested in a mayor, council and marshal. The council is composed of four members and three at large, who hold office two years. Pop. 5,679.

SAINT MARYS, Pa., borough in Elk County, 100 miles northeast of Pittsburgh, on the Pennsylvania and the Pittsburgh. Shawmut and Northern railroads. There is a Roman Catholic convent school of the Sisters of Saint Benedict here. In the surrounding district there are deposits of bituminous coal and fire clay, and there is an abundant supply of natural gas. Manufactures include flour, electrical sup¬ plies, fireproofing material, sewer pipe and wood alcohol. Pop. 6,967.

SAINT MARYS, a river connecting Lake Superior and Lake Huron. It receives the over¬ flow of Superior and discharges its waters into Huron. A fall of 22 feet in the river at Saulte Sainte Marie was an obstruction to navigation. Two canals have been made; one on the United States side of Saint Marys' Falls, and the other on the Canadian side. The United States canal was opened June 1855. This canal is now one and one-half miles long, 100 feet wide at the bottom, and 20 feet deep. Hay Lake Channel, adjoining Saint Marys River below the falls, has shortened, by 11 miles, the passage from Huron to Superior. Navigation is closed by ice part of the year. The registered tonnage the first year through the United States canal was 106,296, and for 1900, 20,136,782. The canal on the Canadian side was opened in 1895. The total freight traffic of both canals in 1915 was 71,290,304 short tons. The river is scanned by the International Bridge at Saulte Sainte Marie. There are a number of well-wooded islands in the river, all of which are favorite summer re¬ sorts. See Boundaries of the United States.

SAINT MARY'S CHURCH, Cavalry Engagement at. General Sheridan, after his Trevilian raid, arrived at White House, on the Pamunkey, 21 June 1864. On the 22d the depot at White House was broken up, Grant having established a new base at City Point, and a train of 900 wagons set out, under cover of Sheridan, to cross the James River on the pontoon-bridge at Bermuda Hundred. It crossed the Chicka- hominy at Jones' bridge and moved to Charles City Court House en route past Malvern Hill, in advance of which were Wade Hampton's and Fitzhugh Lee's cavalry divisions which had kept close to Sheridan after the battle of Tre¬ vilian Station (q.v.) and were now hanging on his flank. Keeping Torbert's division with the trains, Sheridan sent General Gregg, with his division and two batteries to Saint Mary's Church, to cover the exposed flank, and Gregg

intrenched in a strong position. There was some skirmishing during the

24th, and late in the afternoon Hampton and Lee attacked Gregg on the right flank and in front, and after a stubborn contest forced him to give wav, in some confusion, Sheridan says, but losing no material. Gregg, however, asserts that though the contest was unequal he retired without con¬ fusion or disorder; but he left his dead and wounded on the field. Hampton pursued to within two and one-half miles of Charles City Court House. The trains were moved back to Doutharts' Landing on the James and were ferried over, Sheridan following them across on the 26th. The Union loss as reported was 29 killed, 188 wounded and 122 missing. The loss in Hampton's division was six killed and 59 wounded. Fitzhugh Lee's loss is not reported.

SAINT MARY;S COLLEGE, located at Saint Mary's, Marion County, Ky. It was founded in 1821 by the pastor of the Catholic settlement as Saint Mary's Seminary; in 1833 the Jesuits took exclusive control, and the name was changed to Saint Mary's College; in 1837 the college was legally incorporated. A college farm was conducted, and all students were re¬ quired to work one day every week on the farm. In 1846 the Tesuits abandoned the control of the college, and in 1847 it was transferred to the charge of the secular clergy of the diocese of Louisville. Financial difficulties resulted in its being closed from 1869 to 1871. and in the latter year it was reopened under the charge of the Fathers of the Congregation of the Resurrec¬ tion, a teaching order, and was later recognized as the official Roman Catholic college of the diocese of Louisville. The courses are divided among three departments, the commercial or English high school, the academic or classic high school, the classic or collegiate depart¬ ments ; the courses of the first two departments occupy three years, the course of the collegiate department, four vears ; the degree of A.B. is conferred on graduates of the collegiate de¬ partment; A.M. is conferred for one year's graduate work. The library numbers over 7,000 volumes, . and is being steadily increased; the annual income $30,000 ; the students average 120, and the faculty 12.

SAINT MARYS FALLS CANALS. See

Sault Sainte-Marie Canals.

SAINT MARY'S SEMINARY, a Roman

Catholic theological school in Baltimore, Md. ; opened 30 Oct. 1791. From the first the semi- nary has been in charge of the Society of Saint Sulpice, an organization founded by Father Olier, in 1642, for the purpose of preparing young men for the priesthood. On the site of the present institution, when the Fathers pur¬ chased the place, was the well-known (VII pre¬ vailed, and the school continued its work. For a time Saint

Mary's College, Baltimore, now re¬ placed by Loyola College (1852), and Mount Saint Mary's College, Emmitsburg, were affili¬ ated with the seminary. The latter ceased to be

SAINT MAURICE

SAINT NICOLAS

155

ilQOAirt Mary's Seminary, Baltimore, in

1826. Saint Mary's Seminary was raised bv the Maryland legislature in 1804 to the rank of a university, with power to confer degrees in the different departments of the sciences upon such of the students and clergy as satisfy the exam¬ ination requirements. A student to obtain ad¬ mission to the seminary must have a well- formed desire to study for the Roman Catholic priesthood, be recommended by his ecclesiastical superior, and for the first year of philosophy, must have completed a full classical course, and pass a satisfactory examination. Students from other schools may be admitted to such courses as their examinations may entitle them. The main library contains about 50,000 volumes; special libraries are in the departments of theology and philosophy. There are well- equipped reading and study rooms. Particular attention is given to music, especially the Gre¬ gorian and Plain Chants. The members of the Association of Saint Camillus, which began in 1894—95 and was organized in 1898, visit hos¬ pitals and other institutions. Recently they had on their visiting list 15 institutions. In 1903 a scholarship was founded by Dr. Charles S. Grindall of Baltimore, for the benefit of (

SAINT MAURICE, Canada, a river in the province of Quebec, flowing into the Saint Law¬ rence at Three Rivers. Its course of 300 miles is marked by fine scenery, and waterfalls, one of which, 22 miles from its mouth, has a height of 160 feet.

SAINT MICHAEL (formerly Redoubt Saint Michael), Alaska, a settlement on Saint Michael's Island, in the southern part of Norton Sound ; lat. 63° 28′ N. ; long. 162° 5′ W. The settlement, or trading post, was founded in 1833 by Tebenkoff. The island is low and vol¬ canic and is covered with vegetation. Saint Michael is the port where ocean steamers trans¬ fer and receive freight which is carried up and down the Yukon. The river vessels pass through the Aphoon Channel, behind a bar, and enter the Yukon by its northern passage. Navi¬ gation opens in June and closes in September. After the discovery of gold, Saint Michael be¬ came important. During the summer there is a population of between 3,000 and 4,000. Many of the

permanent residents are Eskimos. Pop. about 400.

SAINT MICHAEL'S, or SAO MIGUEL.

See Azores.

SAINT MICHAEL'S COLLEGE, Ver¬ mont, a Catholic institution of higher learning at Winooski Park, near Burlington, opened in September 1904, and incorporated 28 Jan. 1913 by act of legislature, with powers to grant the usual college degrees. The buildings stand on high ground overlooking the beautiful valley of the Winooski River, and commanding a fine view of Mount Mansfield to the east, of Lake Champlain and of the Adirondacks to the west. The preparatory or academic department fur¬ nishes both classical and commercial courses, the collegiate department a liberal course lead¬ ing to the degree of bachelor of arts (A.B.). Several scholarships have been established. The

faculty numbers nine; the annual attendance of students average 100. The tuition fees are $50; board and living expenses $200 per annum.

SAINT MICHAEL'S MOUNT, England, in Cornwall, three miles east of Penzance, is an isolated rock of conical form, about 200 feet high. An ancient and picturesque castle stands upon its summit, from whose tower projects the stone lantern called ((Michael's Chair.® A causeway connects the island with the shore. A fishing village with a projecting harbor nestles at its base. The hill is a geological curiosity, being a vast mass of granite protrud¬ ing through schistous rocks. In remote times Edward the Confessor founded upon it a Bene¬ dictine priory, which at the time of the Con¬ quest was annexed to the abbey of Mount Saint Michel in Normandy. Its possession was disputed during the Lancastrian and Parlia¬ mentary wars. After a considerable period it passed from the monks into secular possession, becoming a manorial residence, and in 1660 the property of the Saint Aubyns.

SAINT-MICHEL, saii me-shel, Mont, France. See Mont-Saint-Michel.

SAINT MORITZ, or SAINT MAURICE,

Switzerland, mountain resort and watering- place in the Upper Engadine, canton of the Grisons, 42 miles east of Geneva. Its altitude is 6,037 feet, the highest of any village in the Engadine. The springs of chalybeate and car¬ bonic acid are about a mile south of the village. The waters were reported by Para¬ celsus in 1589. Saint Moritz is popular as a year-round pleasure and health resort. The scenery is magnificent. Pop. 1,684.

SAINT NAZAIRE, san na-zar, France, a seaport town in the department of

Loire-In- ferieure, near the mouth of the Loire and 40 miles west of Nantes by rail. Great improve¬ ments have been carried out in the port. The town is the terminus of the General Transat¬ lantic Company, and the shipbuilding yards of this company and that of the Loire employ about 2,500 men. Extensive forges employ 1,600 men in the manufacture of steel rails, sheet and bar iron, etc. The town is of recent growth and these industrial works form its chief buildings. Of peculiar interest in the vicinity is an ancient granite dolmen, 10 feet long and five wide, resting horizontally on two stones, which extend about seven feet above the surface of the ground. Saint Nazaire was one of the ports of debarkation of the Ameri¬ can Expeditionary Force in 1917-18. It is be¬ lieved that Saint Nazaire occupies the site of the ancient Corbilo, in whose harbor the Roman fleet was built (56 b.c.). Pop. about 38,000.

.SAINT NICOLAS, saii ne-ko-la, Belgium, in the district of Dendermonde, in East Flan¬ ders, 12 miles by rail southwest of Antwerp, oc¬ cupies a central position in the densely popu¬ lated region of Waes. The most important buildings are the town-hall and churches. It is an agricultural and manufacturing centre and has a large flax market and manufactures of cotton, wool, lace, needles, bricks and pottery. There is considerable trade in linens, flax, corn, etc. It is celebrated as the place where Philip the Fair about the beginning of the 14th cen¬ tury swore to maintain the privileges of Waes- land, of which Saint Nicolas was the capital. Pop. about 32,000.

SAINT OLAF COLLEGE, located at Northfield, Minn. It was founded by the pastor of the Norwegian Lutheran congregation of Goodhue County in 1874; until the year 1886 it had only an academic (secondary) depart¬ ment; from 1886 to 1890 it gradually developed into a college, and in 1890 was officially, placed under the control of the United Norwegian Lutheran Church. Though this official connec¬ tion was severed for a time in 1893, the college continued to be closely affiliated with the de¬ nomination, and in 1899 the official relation was re-established. In 1900 the college department of the United Church Seminary was united with Saint Olaf College. The organization of the • college includes two departments : the Academic Department and the Collegiate Department. The collegiate department offers two courses, classi¬ cal and scientific, leading to the degree of A.B. and B.S. ; a few electives are offered in the junior and senior years. The academic depart¬ ment has three courses, the classical and scien¬ tific, especially designed to prepare students for the corresponding collegiate courses, and the English course ; the latter includes

instruc¬ tion in bookkeeping, commercial law and domestic economy. Biblical or church history forms a part of the curriculum in both depart¬ ments ; and there is a musical department pro¬ viding courses in piano and voice culture. The Steensland Library building was completed in 1902 and contains the museum and a library of 8,000 volumes. The college is coeducational. In 1915 there were 555 students and a faculty of 34. There is a regular endowment of

$250,000.

SAINT OMER, san-to-mar, France, a for¬ tified city in the department Pas-de-Calais, 26 miles southeast of Calais, on the Aa River. It is situated on a marshy site, has two harbors and begins the canalized portion of the Aa. The Gothic cathedral is old and curious. It has fine portals (13th— 14th centuries), good paintings, interesting statues and monuments, wood carvings and fine stained glass and mo¬ saics. The other notable points of interest are the ruined tower and arches of the Benedic¬ tine abbey of Saint Bertin and a museum. The church of Saint Sepulchre is remakable for its beautiful stone spire and stained-glass windows. The town-hall contains valuable records, a picture gallery and a theatre. There is a large public library and extensive arsenal. Saint Omer manufactures tobacco pipes, cloth, hosi¬ ery, tulle, cambric and muslin embroideries. Its trade is in these articles and in paper, flour, sugar, beer and other liquors. The town has often suffered from attack and invasion by the French, Flemish and Spaniards.

SAINT OUEN, san-too-on, France, a sub¬ urb of Paris, in the department of the Seine, about one mile southwest of Saint Denis, is an important manufacturing centre and river-port, with spacious docks. The industrial establish¬ ments include foundries, forges, machine and glass works, sugar and sawmills and manu¬ factories of rubber-goods, varnish, printer's ink, canned foods and firearms. Here in 1814 Louis XVIII promised, over his signature, a constitutional charter to France. Pop. about

42,000.

SAINT OURS, saii-toorz', Jean Baptiste

de, Sieur D'Eschaillons, French-Canadian

soldier: b. Canada, 1668; d. Montreal, 1747. His father, Pierre de Saint Ours, was the first of the family to come to Canada, and obtained extensive grants of land. The son entered the army at an early age and in 1702 was made lieutenant. He was one of the commanders of the expedition against Fort Orange (Al¬ bany) in 1708. He commanded a

company in De Ramezay's expedition against the English in 1710, and in 1721 was sent on a special mis¬ sion to several Indian tribes by the governor, De Vaudreuil. On this expedition Saint Ours endeavored to put a stop to the liquor traffic with the Miamis, and tried to bring about peace between the Sioux and their enemies; also induced the Creeks to form a single village. On his return he subsequently became king's lieutenant of Montreal.

SAINT PANCRAS, England, a metro¬ politan and Parliamentary borough of London, lying east and north of Regent's Park. Area, 2,694 acres. It is well supplied with open spaces, which include Parliament Hill and Primrose Hill. The great railway terminals of Saint Pancras, King's Cross and Euston Square are within the borough, which has been the pioneer in the metropolis of the municipal sup¬ ply of electricity. Saint Pancras returns four members to Parliament. Pop. 218,387. Con¬ sult Clinch, (Marylebone and Saint Pancras) (1890) ; Coull, (History of Saint Pancras) (1861) ; Miller, (Saint Pancras Past and .Present (1874) ; Palmer, (Saint Pancras) (1870) ; Roffe, (Perambulating Survey of Saint Pancras* (1865).*

SAINT PATRICK'S COLLEGE, a theo¬ logical school in Maynooth, Ireland. It was founded in 1785 and endowed, the only Roman Catholic institution in Ireland which received a government endowment. Several attempts were made to repeal the act granting this aid, and in 1869 the opponents in Parliament were successful. The college received, in lieu of its annual income, a capital sum equal to 14 times its annual endowment. The college is now affiliated with the National University of Ire¬ land. It has a large faculty, well-equipped li¬ brary, laboratory and study-rooms. There are from 500 to 600 students in attendance each year. A large number of the students, who have been ordained priests, have been sent to all parts of the world, especially to North America, South Africa and Australia ; and have filled all ecclesiastical positions from the mis¬ sionary among savages to that of archbishop.

SAINT PAUL, the Apostle to the Gentiles. According to Acts xxi, 39 Paul was a native of Tarsus, the most important city of Cilicia. His parents were of pure Jewish descent, for he could boast that he was ((of the stock of Israel, of the tribe of Benjamin, a Hebrew of the Hebrews® (Phil. Hi, 5). His father, how¬ ever, was a Roman citizen. How he had acquired this privilege we are not told. It may have been purchased or obtained in some other way. Paul was content to say that he was freeborn. Tarsus was a centre of Greek culture and the son of a citizen of that town had ample oppor¬ tunities to secure the best classical education the times afforded. To what extent Paul shared these advantages is not stated, but his words (Acts xxii, 3) appear to mean that at a com¬ paratively early age he was sent to

to receive a Jewish rather than a Greek educa¬ tion. The social status of Paul's parents may have been high. There are good reasons for thinking that the family was wealthy. (Consult Ramsay, c Saint Paul the Traveller, > etc., pp. 310 ff). However, this did not interfere with the good Jewish custom of teaching the boy a trade. That he learned to make tents was the more natural since the wool of the long-haired Cilician goats was extensively used for tent- cloth. It is probable that he learned his handi¬ craft before he went to Jerusalem for his edu¬ cation.

Like other individuals with two names in the New Testament he was more familiarly known in Jewish circles by his Hebrew name, Saul. Paul was his Roman name, the cognomen given him probably by his father, for what reason we do not know. As his life work de¬ veloped and he felt himself called to minister to the great Gentile world he preferred his Roman- Greek name to the Hebrew one.

The date of Paul's birth cannot be fixed with exactness. In his letter to Philemon (9), written probably about 60 a.d., he calls him¬ self an elderly man (Tvpeoˆ√Ti]<;). This may be taken as signifying, approximately, one who has attained his 60th year. Probably he was born within a very few years of the beginning of the Christian era.

His personal appearance was not imposing. His opponents could easily admit that his letters were powerful and at the same time remark that (

To the young Jew of Tarsus the opportunity to study in Jerusalem at the feet of Gamaliel (Acts xxii, 3), one of the most learned rabbis of his day, was a privilege to be used to the utmost, no mere parent-imposed task. Proud of his Pharisaic ancestry and training the young man eagerly pursued his studies "advancing in Judaism beyond many® of his associates, "being more exceedingly zealous for the traditions® (Gal. i, 14). He studied the Old Testament and especially the Law not merely as the author¬ ities for the national religion or for orthodox Pharisaic theology, but as the foundation and source of his personal religion. He was anx¬ ious to attain the righteousness demanded by the Law. So far as externals went he succeeded in doing this (Phil, iii, 6). But the more thoroughly he probed his religious experience the more hopeless his case seemed. The sen¬ tence of the Law became to his sensitive con¬ science the sentence of death (Rom. vii, 7-25).

It was while Paul was thus pursuing his studies in the rabbinic schools that Jesus the Messiah lived and died. Whether Paul was in Jerusalem on any of the occasions when Jesus visited the place, or whether he ever saw Jesus in the flesh is doubtful. (2 Cor. v, 16 does not necessarily imply this). However that may have

been, Paul's opposition to Christianity did not begin with the first Christian preaching. Not until the early Church had become well started, when such a teacher as Stephen began to de¬ clare the merely temporal character of Jewish ordinances, was Paul's opposition aroused. We meet him first in the record of the martyrdom of Stephen at which the witnesses laid down their garments (Acts vii, 58, cf. Deut. xvii, 7) ((at the feet of a young man named Saul, who was consenting to his death® (Acts vii, 58, viii, 1). Though too young to have been a member of the Sanhedrin (Acts xxvi, 10 does not mean this) he stood high in the favor of the Jewish authorities and was only too willing to take the lead in a general persecution of all Chris¬ tians in Palestine and adjacent lands. After having caused the imprisonment of many in and about Jerusalem, some of whom were put to death, while others suffered great indignities (Acts xxvi, 1 0— 11, xxii, 19, ix, 1, Gal. i, 23), he secured authority from the chief priests to proceed to Damascus and take action against any Christians he might find there (Acts ix, 1, xxii, 5, xxvi, 12).

But Paul was not to enter Damascus as a persecutor. As he and his party neared the city a sudden and most profound transforma¬ tion took place. Paul had a vision, in which he saw Jesus the Nazarene and heard Him ask ((Saul, Saul, why persecutest thou me?® (cf. Acts, ch. ix, xxii and xxvi, and also Gal. i, 15, 1 Cor. ix, 1, xv, 8). It was enough. Henceforth Paul's entire point of view was changed. God had <(revealed His Son® in him. He had seen Jesus as Lord. It meant parting with all his past, though as yet he saw this only as to some main points. Above all, it revolutionized his idea of Jesus. That one had been to him only the justly crucified leader of a heretical move¬ ment. He was now and evermore the glorified Messiah. Accepted as a brother by the believers in Damascus, Paul soon began to proclaim Jesus as the Messiah to the Jews there. This only aroused their hostility and they plotted to get him in their possession. He succeeded in escaping (Acts ix, 25, 2 Cor. xi, 32) and made his way into Arabia (Gal. i, 17) where he stayed for upward of three years, not ((conversing with flesh and blood,® that is, not seeking light or in¬ struction from those who had been Christians before him, but in meditation and communion with God, seeking to sound the depths of that great revelation that had been granted him. What struggles and conflicts he then went through, what changes of view on many details of his Jewish belief, what great revolutions of opinion, what new-found hopes and convictions he now experienced — we can see all these reflected in his later speeches and letters. Finally he was

able to outline the main points involved in his new faith. That Jesus of Nazareth was and is the Son of God, that in His death forgiveness of sin is made pos¬ sible, and that through faith in Him forgive¬ ness and salvation are made a personal posses¬ sion, — these formed the core of his gospel of the cross, a gospel that no man taught him, but which came to him from God (Gal. i, 11).

He was now ready to learn details about Jesus' earthly life and ministry. He, therefore, returned to Damascus and then visited Jerusa¬ lem especially to talk with Peter. Having gained what he desired from Peter and by his

preaching having aroused the opposition of his former associates in Judaism, he soon left Jerusalem and went into <(Syria and Cilicia® (Gal. i, 21; cf. Acts ix, 30). After some years' labor in these regions, he was sought out by Barnabas and persuaded to join that good man in the work of building up the new church at Antioch, the metropolis of Syria. This church had almost from the first consid¬ ered Gentiles as worthy to be approached di¬ rectly with the Gospel message. In such an atmosphere Paul's own view of the Gospel as suited for man as man independent of his ante¬ cedents found room for full expression. After laboring here for a year Paul, with Barnabas, was delegated to carry an offering from the church at Antioch to the mother church at Jerusalem (Acts xi, 27-30, xii, 25). Since Paul makes no mention of this visit in his survey of his connection with the mother church in Gala¬ tians i and ii, it is probable that it was of no special importance to Paul personally. Return¬ ing to Antioch accompanied by John Mark of Jerusalem, Barnabas' cousin, it was soon de¬ cided to organize a mission to the adjacent lands. At a meeting of the church Barnabas and Paul were formally set apart to this work through prayer and laying on of hands (Acts xiii, 1-3).

Taking with them John Mark as assistant, the two set out on the First Missionary Journey (Acts xiii, 4-xiv, 28). Cyprus was first visited and traversed from end to end, then crossing the sea to the mainland they disembarked at Perga of Pamphylia. Here they decided to strike inland. For some reason Mark deserted them now and returned to Jerusalem. From Perga they proceeded to Antioch of Pisidia. At this important centre of trade the mission¬ aries stopped. Paul delivered an address in the Jewish synagogue, in which he sought to convince them that Jesus was indeed the Messiah promised in the Scriptures. So great was the interest aroused that a second ad¬ dress was asked for the following Sabbath. At this meeting the

majority in the synagogue refused to accept the message and the mission¬ aries then turned their attention to the Gentiles. A Christian Church was soon organized in which naturally Gentiles and Jews met on equal terms. The work grew rapidly but the opposi¬ tion of the Jews of the synagogue became so bitter that Paul and Barnabas thought it best to leave. From Antioch they proceeded east¬ ward to Iconium, where they met with much the same experience. From Iconium they went on to Lystra and thence to Derbe. At Lystra, the home of the future disciple, Timothy, the healing of a cripple led the pagan multitude to think that the gods were again visiting the earth. All these towns were on a great com¬ mercial highway leading through southern Asia Minor from Asia to Europe and, though orig¬ inally belonging to different nations, were then all included in the great province of Galatia. Consequently the churches founded on this journey may be those to whom the apostle addressed the Epistle to the Galatians (q.v.). From Derbe the missionaries retraced their steps and arriving at the coast sailed directly to Antioch without revisiting Cyprus. The jour¬ ney, which probably covered about a year and a half, had been a complete success. It proved

how the Gospel was capable of being applied to and understood by the pagan world.

Just at this time extremely conservative Jewish Christians from Jerusalem disturbed the peace of the Antioch Church by teaching, as the orthodox view, that Gentiles, in order to be saved, must not only profess faith in Jesus Christ and be baptized, but also be circumcised and obligate themselves to keep the Jewish law. What part Paul took in the discussion at Antioch we do not know, but so serious was the situation seen to be that the church decided to refer the matter to the apostolic body at Jerusalem and delegated Barnabas and Paul to represent them at the council so summoned.

The probable date of the Apostolic Council was 49 a.d. or possibly 48. If Paul counts the ((fourteen years® of Gal. ii, 1 from his conver¬ sion, then that event took place somewhere near 35 a.d. If the 14 years is to be counted from his visit to Jerusalem to see Peter (Gal. i, 18) then his conversion must have been as early as about 32-33 a.d. The report of the council in Acts xv needs to be supplemented by Paul's own statements in Gal. ii, 1-10. The result was a victory for Paul, at least to this extent, that the mother church put itself on record as rec¬ ognizing the legitimacy of the Gentile Christian movement and refused to order that Gentile Christians should be circumcised. To Paul himself was given full recognition of his Apos¬ tolic status.

Soon after their return to Antioch, Paul pro¬ posed to Barnabas that they

revisit their churches in Galatia. Barnabas wished to take Mark. Paul would not consent to this since Mark had deserted them on the first journey. The contention was sharp and the two friends separated. Paul now set out with Silas (Sil- vanus) as his companion on his Second Mis¬ sionary Journey (Acts xv, 40-xviii, 22, 49-51 a.d.) . Entering Asia Minor through the Cilician gates, in due time they arrived at Derbe and Lystra. Here they were joined by Timothy, a choice young convert. After spending some time with the churches organized on the first journey, they moved on through Asia Minor, perhaps founding some new churches in Galatia (see Galatians, Epistle to), and finally ar¬ rived at Troas, where, possibly, Paul met Luke. The ((we® sections of Acts begin at this point (Acts xvi, 10). Here the night vision of a Macedonian man calling for help convinced Paul that the Gospel must be carried into Europe. Crossing over to Macedonia, at Philippi, at Thessalonica and at Bercea, all Macedonian towns, Paul succeeded in organizing churches. His method was essen¬ tially the same in all cases, — first to address the Jewish inhabitants at their synagogue or other meetings, and then, when hostility manifested itself, to withdraw his adherents from the synagogue and organize a church of the free Gentile Christian order. The discontented Jew¬ ish element followed him with dangerous perse¬ cution and it was to avoid falling into their hands that he left Beroea hastilv and went on to Athens. Here apparently was an uninviting field. The city of philosophers and idlers was not thirsting for the Gospel of Paul. But in spite of misgivings he delivered his famous address on Mars Hill. Perhaps nowhere does Paul's versatility and breadth of view, his profound conception of the universal character of the Gos-

pci message show itself as it does here in this address. But Athens was not prepared for such a message and as soon as his helpers arrived from Macedonia with the report of the condi¬ tions there he sent Timothy back to Thes- salonica (1 Thess. iii, 1), while he himself (with Silas, see Acts xvii, 15 and xviii, 5) pushed on to Corinth. Making the acquaintance of Aquila and Priscilla, Jews lately banished from Rome, he joined them in working at the tent-maker's trade. At first he had little suc¬ cess, but the arrival of Timothy from Mace¬ donia with news of the devotion and constancy of the disciples there stirred him to new ef¬ forts (cf. 1 Cor. ii, 1 ff ; 1 Thess. iii, 1-6; Acts xviii, 1-8). For a year and a half Paul was busy at Corinth. To organize and build up a Christian community in that large, gay, wicked, commercial metropolis was no easy task. It was while here that he wrote his two letters to the church of Thes- salonica. The first one was occasioned by Timothy's arrival with good news and is full of words of commendation and hope. The second was written to counteract certain

wrong views or inferences, mainly of statements in the first letter. These epistles, perhaps the earliest of the New Testament books, show us the Apostle's mind before the great doc¬ trinal conflicts of the next few years had en¬ gaged his attention. The long stay in Corinth was perhaps shortened by the unsuccessful at¬ tempt of the Jews to have him tried by Gallio, the Roman pro-consul. Though this came to nothing Paul seems to have left Corinth soon after (fall of 51 a.d.) and crossing over to Ephesus with Aquila and Priscilla he hastened on to Antioch (Acts xviii, 18-22).

His stay in Antioch was not a long one. He soon found himself on his Third Missionary Journey (Acts xviii, 23-xxi, 17, fall of 51 to spring of 55 A.D.). Rapidly going through his old field in Galatia he arrived at Ephesus, then the great commercial emporium of Asia Minor. Here for nearly three years he made his head¬ quarters. For Paul this was a period of most intense activity. Ephesus was a meeting place for all sorts of philosophical and religious spec¬ ulations. As the patron city of the worship of the great goddess Artemis (Diana) whose tem¬ ple outside the city walls was one of the wonders of the world, it was a stronghold of paganism and superstition. It was an open door, (

came news to Ephesus of factious strife, of the adoption of Jewish customs and of growing hostility to himself on the part of those he had taught and trusted. But Paul, though bitterly disappointed and sorely tried, was equal to the qmergency. In the Epistles to the Galatians and Corinthians he tried to deal with these vexatious and difficult problems. In them he successfully met the points raised by his assailants and, at least in the case of the church of Corinth, succeeded in winning the church back to himself. For the details of these matters readers are re¬ ferred to special articles on these Epistles. During his sojourn at Ephesus <(all Asia® (Acts xix, 10) had the advantage of Paul's mission¬ ary activity. Not long after the tumult caused by Demetrius the silversmith (xix, 23-41) he set out for Corinth, but, uncertain of the recep¬ tion accorded to his first letter (1 Corinthians) and subsequent messages, he took the indirect route via Troas and Macedonia. In Macedonia Titus came from Corinth with most encourag¬ ing news (2 Cor. vii, 5-7) and Paul gladly pushed on to revisit the Corinthian church. He stayed at Corinth during the winter of 54-55 a.d. Before leaving Greece for his long con¬ templated visit to Jerusalem he penned his most comprehensive and important epistle, to the Christians of Rome, in which he set forth the great fundamentals of the Christian theology and thus prepared them for the visit he had in mind to make them. (See Romans). Paul now hastened to Jerusalem, not stopping at Ephesus, but saying farewell to a delegation from that church that met him at Miletus.

At Jerusalem he oresented the mother church with the great collection he

had been gathering for some time and was cordially re¬ ceived by James and other leading members, but advised to give evidence to the Jewish Christians that he himself still followed the an¬ cestral mode of life according to the Law (Acts xxi). Paul was willing to do this, but it brought him into conflict with certain fanatics who accused him of defiling the temple. These were not Jewish Christians, but Jews of Asia who knew of his work in Ephesus and were bitterly opposed to him. A great uproar fol¬ lowed in which Paul was nearly killed, and only rescued by the prompt action of the Ro¬ man captain who commanded the garrison of the castle of Antonia overlooking the temple. Paul's attempt to explain his position to the Jews only enraged them the more and soon after, convinced that plots v/ere being laid against Paul, Lysias the Roman captain sent him under a strong guard to Felix, the gov¬ ernor of Palestine at Caesarea. Although Felix soon discovered that Paul was not guilty of any serious offense, he kept him bound in easy con¬ finement, partly from mercenary motives, until his recall about two years later (that is, about 57 a.d.) . Felix was succeeded by Porcius Festus before whom Paul cut the whole matter short by appealing to the emperor (Acts xxv-xxvi).

Paul was sent to Rome at the first oppor¬ tunity (57 a.d.) . With other prisoners he ex¬ perienced shipwreck near Malta and was compelled to remain there all winter. In the spring the voyage was resumed and in due time they arrived at Rome. Paul's resolution and courage had commended him to the centurion in charge during

the voyage, and he was in consequence treated leniently. Friends met them some miles out¬ side of Rome. In the city, while awaiting the emperor's pleasure concerning his case, Paul was permitted to live in his own hired lodging and have free intercourse with any who might desire to see him. One of his first acts in Rome was to call the leading Tews of the city to¬ gether and set be'fore them the principles of Christianity. The result was, as usual, that some believed him; others did not. Luke says (Acts xxviii, 30-31) that this Roman captivity lasted two years (58-60 a.d.). If it had ended with his execution it would probably have been so stated. The natural inference is that he was released at the end of that period. It was during his Roman imprison¬ ment that he wrote the (Epistles of the Captivity,' that is Ephesians, Colossians, Philemon and, probably as the last, Phil- ippians. In these epistles the controversies that raged in Asia and filled his mind when writing to the Galatians and Corinthians are no longer prominent. His mind is full of the thought of the Church of Christ, and of the great divine personality who is its head. It is in these beautiful epistles,

especially in Philemon and Philippians, that the heart of Paul is seen as nowhere else except perhaps in 2 Corinthians. Some details as to Paul's experience in Rome may be gathered from Philemon and Philip¬ pians, not sufficient, however, to make a com¬ plete outline.

After his release (61 a.d.) Paul appears to have undertaken another missionary journey, possibly to Spain (Rom. xv, 24, also the tradi¬ tion in Clem. Rom.). He afterward revisited the East and while there (according to what seems the most probable theory) wrote 1 Tim¬ othy and Titus. Again arrested he was brought to Rome for a second trial. Before this took place he wrote a letter to Timothy (2 Timothy) beseeching him to come to him as soon as pos¬ sible. It was probably about 64 or 65 that the great Apostle was executed by command of Nero. (The points in this paragraph have been stated on the theory that the Pastoral Epistles are genuine Pauline letters).

It is hard to estimate adequately the signifi¬ cance of such a life. More than any other one Paul made Christianity the world-religion. No other man has so profoundly influenced the re¬ ligious thinking of mankind. He was the great¬ est man of the Apostolic Age, if not of all ages of the Church. Yet he was ever the disciple and Jesus the Master.

Bibliography. — Bacon, B. W., (Story of Saint Paul : A Comparison of the Acts and the Epistles) (Boston 1904) ; Bruce, A. B., (Saint Paul's Conception of Christianity' (New York 1894) ; Campbell, J. M., (Paul the Mystic' (New York 1908) ; Cohn, J. R., (Saint Paul in the Light of Modern Research' (London 1911) ; Cone, O., (Paul the Man' (New York 1898) ; Conybeare and Howson, (Life and Epistles of Saint Paul' (2 vols., New York 1906) ; Deiss- man, G. A., (Paul' (English trans., New York 1912); Drummond, J.. (Paul: His Life and Teaching' (London 1911) ; Du Bose, W. P., (The Gospel According to Paul' (New York 1907) ; Farrar, F. W., (Life and Work of Saint Paul' (new ed., New York 1902) ; Fletcher, R. J., (A Study of the Conversion of Saint Paul' (London 1910) ; Gardner, P., (The Re¬

ligious Experience of Saint Paul' (New York 1911) ; Garvie, A. E., (Studies of Paul and his Gospel' (New York 1911); Greenhough, J. G., (The Mind of Christ in Saint Paul' (London 1909) ; Gilbert, G. H., (The Student's Life of Saint Paul' (New York 1910) ; Hastings, J., dictionary of the Apostolic Age' (s.v.) ; Head- lam, A. C, (Saint Paul and Christianity' (Lon¬ don 1913) ; Johnston, C. N.„ (Saint Paul and his Mission to the Roman Empire' (New York 1909) ; Matheson, G., (The Spiritual Develop¬ ment of Saint Paul' (New York 1909) ; Mc- Giffert, A. C., (History of Christianity in the Apostolic Age' (rev. ed., New York 1900) ; Moffatt, J., ˆIntroduction to the Literature of the New Testament' (pp. 58 ff., Ne'w York 1915, full

reference to recent literature) ; Ram¬ say, Sir W. M., (The Church in the Roman Empire' (New York 1894) ; id., (Saint Paul the Traveler and the Roman Citizen' (3d ed., New York 1898) ; id., (The Cities of Saint Paul : Their Influence on His Life and Thought' (Lon¬ don 1907) ; id., (The Teaching of Saint Paul in Terms of the Present Day' (New York 1913) ; Robertson, A. T., (Epochs in the Life of Paul' (New York 1909) ; Sabatier, A., (The Apostle Paul' (English trans. by A. M. Heller, Lon¬ don 1912) ; Stalker, J., (Life of Saint Paul' (new and rev. ed., New York 1912) ; Stevens, G. B. (Pauline Theology' (New York 1892) ; Torrey, C. C., (The Composition and Date of Acts' (Cambridge 1916) ; Weinel, H., (Saint Paul: The Man and his Work' (English trans. by G. A. Bienemann, New York 1906) ; Wrede, W., (Paul' (English trans., Boston 1908).

Edward E. Nourse,

Professor Biblical Theology, Hartford Theo¬ logical Seminary.

SAINT PAUL, a remarkable island in the Indian Ocean, half wav between Africa and Australia, and about 50 miles south of the island of Amsterdam. These islands are the exact antithesis of each other, Saint Paul almost barren and Amsterdam covered with a dense vegetation. The island is two miles long, the highest point about 860 feet high and of vol¬ canic origin. Goats, cats, rats and mice flour¬ ish, insect life is abundant and sea-fowl in mul¬ titudes are characteristic. Fisheries are excel¬ lent. Saint Paul was ceded by England to France in 1892.

SAINT PAUL, Minn., the capital of the State, is situated on the Mississippi River, which, flowing for six miles northeastward from Fort Snelling on the Minnesota, and then bending southward, forms a letter S at this point. The greater part of the city is on the north bank of the river and is contiguous with Minneapolis on the west. The banks of the Mississippi at Saint Paul are from 100 to 200 feet high, in three terraces. The first of these is largely occupied by railroad yards, the second by the business section and the third and highest by residences. The picturesqueness of the river scenery has enabled the city, in col¬ laboration with Minneapolis, to achieve wonder¬ ful effects in parking and boulevarding. The Indian mounds, on the steep bluff that over¬ looks the river as it makes the southward turn cf the S, have long been famous. Adjacent are the grounds of the Minnesota Fish Hatcherv. Besides this river scenery the city possesses several lakes, two of which, Como and Phalen,

■

■

J

.

‘

‘

■

. •

.

•

■

‘

.

.

are appropriately parked and connected a boulevard that continues on to the Minnesota State Fair Grounds in the northwestern part of the city. Altogether, the parks, playgrounds and drives of Saint Paul comprise over 2,000 acres ; and in addition there are fine roads con¬ necting the city with many fine lakes in its immediate vicinity. The largest of these is White Bear, 12 miles from the centre of the city. The opportunity thus provided for recrea¬ tion, in both summer and winter, has been a chief contributor to the unusual health of Saint Paul; and another cause is the pure drinking water that the city procures from these outside lakes. The death rate is but nine per thousand. The mean summer temperature is 67 ; the mean winter temperature 8.4. The ele¬ vation above sea-level is 683 feet.

Buildings. — Within the past decade Saint Paul has been enriched by the erection of many fine buildings. Of these the most worthy of notice are the Public Library, a memorial to the late James J. Hill, the Railway Exchange, the largest railroad office building in the world, the Capitol and Merchants' national banks, the Saint Paul Hotel and the Catholic cathedral, which occupies a commanding site near the centre of the city. On another hill not far distant is the Minnesota Capitol, completed in 1905 at a cost of

$4,000,000 and containing mural decorations by leading American artists, and the Minnesota Historical Library. Within easy walking distance of one another in the re¬ tail district are the Auditorium, which seats 10,000, post office, city hall, the statelv old capitol, Lowry building, Manhattan block, Pioneer building and the Y.M.C.A. building. On the fair grounds are the grand stand, with a seating capacity of 25,000, livestock pavilion, used in the winter as a skating-rink, horticul¬ tural hall and several other structures of im¬ portance. A union passenger station costing $15,000,000 has recently been erected on the river front.

Public Works. — Saint Paul has 830 miles of streets, of which 90 miles are paved and 50 macadamized, 425 miles of sewers, 430 miles of water-mains, 400 miles of gas-mains and 170 miles of street railway track. Four routes con¬ nect the city with Minneapolis. The city is well lighted, having 1,200 incandescent cluster lamps, 5,000 gas incandescent and 2,700 nitro¬ gen-filled lamps.

Commerce and Industry. — Saint Paul is the United States internal revenue collecting point for the Northwest and the United States army headquarters for the same territory. The meat-packing trade of the Northwest is strongly centred here, producing an annual value of $50,000,000; but with improvements being made an increase to $200,000,000 is imminent. The largest individual horse market in the United States is at Saint Paul. The manufac¬ ture of shoes, grass carpets, refrigerators, ma¬ chinery, soft drinks, fur goods and law books employs a capital of $98,000,000 and produces annually $125,000,000, employing 23,000 persons.

Wholesale and Jobbing Trade. — Saint Paul, by virtue of its position at the head of navigation and as the capital city of Minnesota, early won precedence in the wholesale trade, and now contains some of tlje largest houses

in the United States. In 1918 this trade amounted to $500,000,000.

Transportation. — As the head of naviga¬ tion on the Mississippi the city has enjoyed enviable advantages in transportation. Until the coming of the railroads these advantages made Saint Paul the first city in the Northwest, and the railroads naturally made headquarters here. River traffic has declined, but the com¬ pletion of the government dam at Minnehaha promises to revive it through the use of barges towed by launches and the city has prepared itself to take advantage of the new opportunity. Excursion boats carried 50,000 persons during 1918. The Great Northern, Northern Pacific, and Chicago, Saint Paul, Minneapolis and Omaha have

main offices and shops at Saint Paul. In addition to these lines the Rock Island, Burlington, Great Western, Chicago, Milwaukee and Saint Paul and the Minneapolis and Saint Louis meet at the Union Station and at the Minnesota Transfer in the western end of the city. Freight cars to the number of 353,640 are handled annually. Besides the four traction routes connecting the city with Minneapolis, three rural trolley lines serve gardeners south and east of the city. Saint Paul, in close connection with Minneapolis, is the hub of a wheel-like system of railroads radiating in every direction and giving the city service to Chicago, Iowa, the Dakotas, Winni¬ peg, Duluth and Wisconsin points. Three routes are transcontinental.

Finance and Banking. — The bonded debt of Saint Paul is (1919) $8,360,000; the sinking fund is $220,983. The city has an assessed valuation of $467,670,129, of which $309,254,789 is real estate valuation and the remainder per¬ sonal property and money and credits. The tax rate is 42 mills. This is levied, according to State law, on a 25 per cent personal valuation, a 40 per cent real estate and 100 per cent money and credits valuation. On this basis the re¬ sources of the city for 1919 were $7,402,140. Of this sum $180,000 was spent for improve¬ ments, $456,000 for police, $755,000 for fire, $1,535,170 for schools, $182,000 for library, $161,000 for parks, $1,250,000 for water and lighting. On 1 Jan. 1919 there was a balance on hand of $20,000. The city has 26 banks, capitalized at $16,000,000. They hold deposits of $133,489,000. Their clearings in 1918 were

$1,057,199,127.

Education. — The public school system en¬ joys the advantage of being closely connected with the library, the same commissioner ad¬ ministering both. There are 60 buildings in¬ cluding four high schools, one of which is the Mechanics Arts. A teachers' training school is part of the system. There are 1,014 teachers and 30,000 pupils. Attending various parochial and private schools are 15,000 pupils. Saint Paul is easily accessible from the university, the grounds of which extend almost to the western limits of the city, and to the School of Agriculture and experimental farm adjacent to the Minnesota Fair Grounds in the north¬ western part of the city. Within the city are Plamline University (Methodist), Macalester College (Presbyterian), Saint Thomas College and Saint Paul Seminary (Catholic), Concordia College (German Lutheran), two Lutheran semi¬ naries and Saint Paul College of Law. In the

suburb of Saint Paul Park is Saint Paul Col¬ lege (German Methodist). Attending these in¬ stitutions of higher learning are 4,000 students. In addition to them there are six business schools and 10 schools of music. The Saint Paul Institute conducts evening classes and lecture courses.

Libraries. — The main public library is housed in the beautiful Hill Memorial Library finished in 1917 at a cost of $1,000,000. It con¬ ducts three branches. In 1918 955,585 volumes were circulated. The city owns 210,000 volumes. Besides the public library students in Saint Paul have the advantage of the State Law Library of 75,000 volumes, the Minnesota Historical Library of 115,000 volumes and a complete file of Minnesota newspapers, the Carnegie Library at Hamline University, those of the other colleges, and the Ramsey County Medical Library.

Churches and Charities. — Saint Paul has been the home of the Catholic archbishop of the province of Minnesota since pioneer days. Besides the cathedral there are 27 churches of this faith. There are also 15 Episcopal, 24 Methodist, 18 Presbyterian, 18 Baptist, 12 Con¬ gregational, 6 Christian Scientist, 41 Lutheran, 10 Jewish and 39 of other denominations. The Wilder Charity, on a foundation of $2,778,000 of invested funds, is the chief instrument of remedial work in the city. Closely connected are the Wilder Baths. In addition there are 12 hospitals, two childrens' homes and other insti¬ tutions ministering to the unfortunate.

Government. — Saint Paul is governed by a council of seven commissioners including the mayor, each of whom is elected, and then ap¬ pointed by the mayor to the responsibility of administering a department of government. These departments are : Finance, public works, public safety, including bureaus of health, fire and police; parks, playgrounds and public buildings; public utilities, including bureaus of water, lighting, markets and control of utili¬ ties; and education, including the management of the library and auditorium. The commis¬ sioner of education chooses the superintendent of schools. The commissioners, sitting as a council, choose a clerk and corporation coun¬ sel. The mayor appoints the purchasing agent. Under this system the legislative and executive functions of government are united; but the judicial department is free from council con¬ trol. The people have also reserved the right to elect the city comptroller. City elections occur on the first Tuesday in May in alternate years when the seven commissioners, comp¬ troller, three justices of the peace, two mu¬ nicipal judges and four constables are chosen.

History. — The first settlement on the site of Saint Paul was a group of cabins about the hut of a whisky-trader, named on account of a defect, (

40's the city, by reason of its position as the practical head of navigation,*

took the lead over other settlements and began to develop its famous ox-cart trade in furs and buffalo-meat with the Red River Valley. Upon the forma¬ tion of the Territory of Minnesota in 1849 it was the logical capital, and through years of political battle remained so. Railway communi¬ cation between Saint Paul and adjacent settle¬ ments, especially Saint Anthony (Minneapolis), Stillwater, on the Saint Croix, and points on the Minnesota River and the lower Mississippi were contemplated in the late 50's, after the first rush of immigrants to Minnesota; but the companies that were to construct the roads under pressure of financial panic, defaulted, so that it was 1862 before the first railroad train made its way from Saint Paul to Minneapolis; but during the next decade many thousands of miles were built in all directions from the capi¬ tal which, to its great river business, now added the advantage of a rail centre. Its chief figure in the development of this business was James J. Hill, who, by reorganizing the Saint Paul, Minneapolis and Manitoba into the Great North¬ ern and making it a pioneer into northern and western Minnesota, and later a transcontinental railroad, added immensely to the prestige of his city. In the late 80's an unfortunate specu¬ lative excitement which inflated property values and wasted the resources of the city in im¬ provements far in advance of its needs, be¬ sides expanding the boundaries beyond reason¬ able limits, received the approval of almost the entire city. The result was a depression that retarded the growth of the city for several years — until the beginning of the new century. Since 1900, however, Saint Paul has enjoyed a constant and consistent development in industry, commerce, education and the higher life, as expressed in music, art and religion. Without increasing its area it has more than doubled its population during the past 20 years ; and has expended its chief efforts to maintain and aug¬ ment the natural beauty of its surroundings and to safeguard the health and insure the culture of its people rather than to exploit its real estate.

Population. — In 1850 there were in Saint Paul 1,112 souls; in 1880, 41,473; in 1890, 214,- 744; in 1920 (United States census), 234,595. Of these 25 per cent are of foreign birth, 45 per cent of foreign parentage. Of the foreign¬ ers 30 per cent are Scandinavians, 24 per cent Germans, 23 per cent Russians and Austro- Hungarians, 19 per cent English, Scotch and Irish (8 per cent of the last), and the remainder chiefly French and Italians with a sprinkling of Dutch, Belgians, Greeks and Turks.

Bibliography. — Williams, J. F., (History of Saint PauP ; Andrews, (History of Saint PauP (1890); Folwell, (Minnesota (1910); Parsons, (The Story of Minnesota) (1916) ; Pollock, (Our Minnesota) (1917) ; Carney, (The Story of Minnesota> (1917); Pamphlets of the Saint Paul Association and Reports .of city depart¬ ments.*

E. Dudley Parsons, Author of (The Story of Minnesota P

SAINT PAUL DE LOANDA, lo-an'da,

Angola or Portuguese Southwest Africa, a city, seaport, bishop's see, the principal Portuguese settlement on that coast, and capital of the

SAINT PAUL, MINN

1 Minnesota Historical Society

2 Public Library (Hill Memorial)

SAINT PAUL, MINN

Saint Paul Athletic Club (Corner Fourth and Minnesota Streets)

SAINT PAUL SEMINARY — SAINT PETER

163

colony of Angola, on the south side of Bengo Bay, at the mouth of the river of the same name. The climate is comparatively healthful, the harbor is large, attractive and provided with three defensive works, and the city is built on sloping ground, on the heights of which are the principal residences, a railway line extends from Loanda to Lucalla (226 miles) and thence to Malanje (149 miles), with which it is intended to join the Central African Railway. In 1914 there entered the port 195 vessels of 293,531 tons, and cleared 187 vessels of 270,917 tons. The carrying trade with Europe was conducted by one Portuguese, three British and one Ger¬ man steamship line, the exports comprising ivory, coffee, rubber, hides, palm oil and bees¬ wax. Loanda was formerly the center of an extensive slave trade, and in the 17th century was noted for its fine churches and monasteries, now mostly in ruins. Pop. 17,541.

SAINT PAUL SEMINARY, The, a

Roman Catholic theological institution founded at Saint Paul, Minn., in 1890. Buildings, and an endowment, all totaling $500,000, were given by James J. Hill (q.v.) ; and the institution became the provincial seminary of the ecclesiastical province of Saint Paul. The seminary was opened in 1894. Archbishop Dowling is president of the board of trustees. The seminary has courses in theology and in philosophy; and three departments of in¬ struction, theology, philosophy, and arts ; the courses in the department of philosophy include mental philosophy, psychology, history of philosophy and biology ; the courses in the department of arts include

Hebrew, Greek, Latin, modern languages, and music, and form a part of the philosophical course ; the study of Hebrew, is optional. The seminary has a campus of 40 acres, the land sloping grad¬ ually toward the Mississippi ; the buildings in¬ clude the administration building, the class build¬ ing, .three residence halls, a dinner-hall, a gymnasium and the chapel. In 1919 the library contained over 25,000 volumes, the students numbered 213 and the faculty 12.

SAINT PAUL'S CATHEDRAL. See

London.

SAINT PAUL'S SCHOOL, a noted col¬ lege preparatory school at Concord, N. H., founded in 1855 by Dr. George Cheyne Shattuck and incorporated on 29 June of the same year. It was opened on 3 April 1856, its first rector being Rev. Henry Augustus Coit who held that position till his death in 1895. By the terms of the founder's deed the trustees of the school must be communicants of the Protestant Epis¬ copal Church. The course of instruction covers six years and the school is divided into six forms and an upper remove. In 1916-17 there were 47 masters and 360 students. The build¬ ings, some 60 in all, are situated in a pleasant rural locality rather more than two miles from the city of Concord, the most important of these, architecturally, being the library, the im¬ posing Upper School (built in 1903) and the spacious chapel, the latter containing a superb oaken reredos and a recumbent marble statue of the first rector of the school. The grounds belonging to the institution comprise about 2,000 acres. Rowing and cricket are the favorite sports of this school. The library contains 13,000 volumes and there are two literary so¬

cieties, the Cadmean and the Concordian. There lire 12 scholarships offered. The school journal, (Horae ScholasticseP was founded in 1860 and is issued monthly. Consult Adams, (Somc Famous Schools) (1903).

SAINT PAUL'S SCHOOL, London, Eng¬ land, an endowed grammar school, founded by John Colet in 1512, with no limitations as to country, nation or class. It was built to ac¬ commodate 153 students and until 1884 stood in Saint Paul's churchyard. It was instituted for the free education of poor children. The origi¬ nal building was burned down in 1666. In 1824, the second one, built by Wren, was taken down and another erected. In 1884 a new school was opened at West Kensington. The course of study was formerly classical, but is now de¬ signed to prepare for army examinations. It is interesting to note that Major Andre, Cam¬ den, Halley, Milton, Pepys, Judge Jeffreys, the Duke of Marlborough and Sir Philip Francis were students here.

SAINT PETER, one of the twelve apostles of Jesus Christ. Peter (from the Greek nerpoc a rock, of which the Aramaic equivalent was Cephas) was the son of a certain John or Jonah (cf. John i, 43; Matt, xvi, 17). He was born at Bethsaida of Galilee (John i, 44; xii, 21) but afterward resided at Capernaum where he had a house and was engaged in the fishing business in partnership with his brother Andrew, and with Zebedee and his sons James and John. (Mark i, 16-20; Luke v, 10-11). His proper name was Simon or Simeon, but the surname Cephas given him by Jesus (John i, 43; cf. Matt, xvi, 18) became, in its Greek form, Peter, the name he was generally known by in the early Church.

Since the firm to which Peter belonged owned boats and nets and hired assistants it is needless to think of Peter as poverty stricken, though it is not probable that he was wealthy.

Of his education we know practically noth¬ ing. It is likely that he spoke ordinary business Greek as well as his native Aramaic, for Galilee was largely bi-lingual. He may have been able to read the Old Testament in Hebrew. How¬ ever, he was not Uearned^ in the rabbinical sense (Acts iv, 13). He was probably familiar with the Greek Old Testament, but knew but little of the Jewish scholarship of the day.

When John the Baptist appeared- in the lower Jordan Valley with his announcement of the coming crisis, Peter and his business part¬ ners were among the many Galileans who went to hear the great preacher. Here he became acquainted with Jesus (John i, 40). This first acquaintance did not immediately result in full discipleship, since Jesus had not yet opened His public ministry. It is uncertain to what extent Peter accompanied Jesus before he was formally called when Jesus opened his Galilean ministry (Mark i, 16). Yet it was the earlier acquaintance with Jesus that prepared the way for the summons to a life-work (Mark i, 16; Luke v, 11), when at Jesus' word Simon left bis nets and boats and became one of the daily companions of the Great Teacher. As yet, how¬ ever, he was only one among many whom Jesus attracted to Himself during the early months of His work in Galilee. It was a test¬ ing time for Simon. He showed such appre¬ ciation of Jesus' person and teaching that he was chosen by Jesus to be one of 12, selected

from the larger body of ^disciples® who were to be (

Peter now took a leading part in the direc¬ tion of the little band of

disciples that was the nucleus of the Christian Church. He pro¬ posed the election of a successor to Judas Is¬ cariot (Acts i, 15ff.) and on the day of Pente¬ cost made the first statement of Christian doc¬ trine to the world. The sermon as given in Acts ii, 14-36 centres about the necessity of

proving to the Jews that the crucified but now risen Jesus was indeed God's Messiah. The argument from the analogy between ancient prophecy and the recent events connected with Jesus was a convincing one to many Jews and large numbers confessed their faith in Jesus as Messiah. Until the persecution because of Stephen the new movement was confined almost exclusively to Jerusalem and it was Peter who had the chief share in the guidance of affairs. His associate was John. These two figure prominently in the accounts of the first con¬ flicts with the Jerusalem authorities (Acts iii— iv). It was Peter who rebuked Ananias and Sapphira for their covetousness (Acts v, 1-11), who was spokesman for the apostles in their formal trial before the Sanhedrim (Acts v, 17-42), and whose fame was such that later tradition said that even his shadow was able to perform miracles (Acts v, 12-16). After the martyrdom of Stephen the Christian movement took on larger proportions. The work spread throughout Palestine and into neighboring coun¬ tries. To a certain extent it was supervised by the apostles. Acts records two visita¬ tions by Peter in this connection. The first was when he and John were sent by the apostles to oversee the evangelistic labors of Philip in Samaria. Here Peter came in con¬ tact with the magician Simon, severely rebuking his cupidity and lack of spiritual perception (Acts viii, 14-25). The second tour was an extensive one in the regions of the northwest of Jerusalem (Acts ix, 32ff.). On it he healed Eneas at Lydda and raised Tabitha at Joppa. From Joppa he was summoned to preach the gospel to Cornelius, a Roman centurion sta¬ tioned at Caesarea (Acts x). This was the first recorded preaching of the gospel by Jew¬ ish Christians to Gentiles. In this matter Peter unexpectedly found himself doing what he had never done before, fellowshipping freely with Gentiles, recognizing them as Christian breth¬ ren and eating with them.

Naturally such conduct provoked sharp criti¬ cism on the part of the stricter members of the Jerusalem Church. Peter's defense was that he had been guided by the Holy Spirit and that the Spirit's presence had been manifested while he was preaching to the Gentiles (Acts xi). Sometime after this Peter was arrested by order of Herod Agrippa I, and imprisoned in Jerusa¬ lem with a view to executing him on the follow¬ ing day. But he escaped and left Jerusalem im¬ mediately (Acts xii, 1-17). Whither he went is not said and for all further knowledge of Peter's movements we must trust to incidental statements in the New Testament or to the very uncertain notices in early Christian litera¬ ture. Since Herod Agrippa died in 44 a.d. the events narrated in Acts i-xii, in case they are arranged in

chronological sequence, must have covered a period of about 15 years. We may say then that for that length of time Peter was the foremost figure of the early Apostolic Church. During this period, three years after his conversion, Paul visited Jerusa¬ lem to talk matters over with Peter (Gal. i, 18), staying with him 15 days. This must have been somewhere near 40 a.d. His subsequent career was, doubtless, just as important, but its details have not been preserved. About 49 a.d. Peter was present at the council in Jerusalem and took a leading part (Acts xv, 6 ff . ; Gal. ii,

1—10). By this time he had become recognized as the <(Apostle of the Circumcision^ (Gal. ii, 7), through whom God was working as effectually as He was through Paul for the ((Un- circumcision® (that is, the Gentile world) . These expressions of Paul seem to indicate that Peter's activity was — like his own — largely missionary in character, to the Jews of the dispersion, as his was to the Gentiles. For this reason Peter was in Jerusalem only occasionally after his escape from Herod Agrippa in 44 a.d. We learn further, from Gal. ii, 11-14, that at Antioch, either soon after the council of 49, before Paul set out on his second missionary journey (49-52 a.d.) , or at the close of that journey when Paul was at Antioch for a while (Acts xviii, 23), Peter was sharply rebuked by Paul for weakly yielding to emissaries of the strict Tudaistic party of Jerusalem and withdrawing from familiar fellowship with the uncircum¬ cised Gentile members of the Church. It is of interest to note that Paul's own words in Galatians imply that Peter, Barnabas and others had been in the habit of thus freely mingling with Gentile Christians, which is only what we would infer from Acts x-xi. Full fellow¬ ship with the Gentile converts was not discussed at the Council of 49. and Peter's withdrawal did not violate the terms of the agreement reached in the council. It violated the principles there followed, however, and deserved Paul's rebuke.

For the remainder of Peter's career we are in almost total ignorance. He appears to have continued his missionary labors. In these he was frequently accompanied by his wife (1 Cor. ix, 5). Early Christians looked back to him as the first bishop of the Church of Antioch. Whatever truth there may be in this tradition it is certain that he did not organize that great Church. Other ancient traditions speak of his labors in Asia Minor, especially in the regions near the Black Sea. These may be no more than inferences based on the ad¬ dress of the First Epistle. At what point in this later period are we to place the two epistles attributed to him? The authenticity of the first is more certain than that of the second. It was written from ^Babylon® to the ^dispersion' of northern Asia Minor. Both terms have been taken in a*

figurative sense and most scholars hold that it was written from Rome to Gentile Chrisians in Asia Minor. Neither of these posi¬ tions rests on any very substantial evidence, though it is just more than possible that the letter was sent from Rome. Mark was with the apostle at the time, also Silvanus, who ap¬ pears to have penned the epistle (v, 12-13). Since Silvanus was Paul's companion as late as when he wrote 2 Cor. (i, 19) Peter's letter must be dated after 55 a.d. And since Paul's later letters from Rome, Philippians, Colossians, Ephesians and Philemon (58-60 a.d.) betray no evidence of personal contact with Peter in Rome, the probability is that Peter was in Rome between 55 and 58, and thence sent his message to the churches of Asia Minor; not to the Pauline churches there, but to other communities that were less directly connected with Paul's work, ffo what place Peter went after leaving Rome, whence he sent the second letter, in case it is his, and whether he returned to Rome — all these are matters

on which we possess no direct information. According to a widespread tradition, which has become generally accepted in Christendom, Peter suffered martyrdom at Rome. It must be admitted, however, that the direct evidence for this tradition cannot be traced much farther back than 180 a.d. At that time it was the firm belief of the Roman Church that both Peter and Paul were martyred at Rome and that the places of their martyrdom (or burial) could be pointed out. The same tradition thought of them as the founders of the Roman Church. All that can be said is that there is no sufficient ground for rejecting the kernel of the tradition, that is, that Peter was at Rome for a longer or shorter period and probably suffered martyrdom at that city. The Roman Catholic Church ac¬ counts Peter as the first Bishop of Rome and the first Pope.

Bibliography. — Barnes, A. S., (Saint Peter in Rome and His Tomb on the Vatican HilP (London 1900) ; Fouard, C. H., (Saint Peter and the First Years of Christianity (Engl, tr., New York 1900) : Hastings, J., dictionary of the Apostolic Church* (q.v.) ; Moffatt, (Intro¬ duction to the Literature of the New Testa¬ ment (pp. 318f., New York 1915) ; Howson, J. S., (Studies in the Life of Saint Peter) (London 1883) ; Lightfoot, J. B., (The Apos¬ tolic Fathers) (London 1890-92) ; Schmid, J., (Petrus in RonP (Lucerne 1892) ; Southouse, A. J., (Making of Simon Peter) (New York 1906) ; Thomas, W. H. G., (The Apostle Peter) (London 1905) ; Ramsay, Sir W. M., (The Church in the Roman Empire) (London 1893) ; id., (Saint Paul the Traveller and the Roman Citizen) (London 1895) ; Torrey, C. C., (The Composition and Date of Acts) (Cam¬ bridge 1916) ; (Facts and Fancies Concerning Acts) (American Journal of Theology, Jan. and April 1919).*

Edward E. Nourse,

Professor of Biblical Theology, Hartford Theological Seminary.

SAINT PETER, Minn., city and county- seat of Nicollet County, on the Minnesota River, and on the Chicago, Northwestern, and the Chicago, Saint Paul, Minneapolis and Omaha railroads, about 73 miles southwest of Saint Paul. It was settled in 1854 by Capt. W. B. Dodd ; incorporated in 1865, and chartered as a city in 1873. It is in a farming and dairying region and in the vicinity are limestone quarries. The chief industrial plants are flour mills, machine shop's, shirt and trouser factories, grain elevators, limestone quarries, iron foundries, creamery, etc. The State Hospital for the In¬ sane, located here, accommodates about 1,200 patients. The educational institutions are the Gustavus Adolphus College, co-educational (Lutheran), about 375 students; public and parish schools, a Carnegie Library and an armory. The city has a national bank (1917) with capital $50,000 and resources $565,139. The government is vested in a mayor and a board of aldermen elected annually. The city owns and operates the waterworks and electric light plant, being the first city in the State to own such public utilities. Pop. 4,335.

SAINT PETER PORT, Channel Islands, capital of the Island of Guernsey, on the east coast, rises in terraces on the slope of a hill,

and presents a very attractive appearance from the sea. The streets are narrow and steep ; the environs exceedingly beautiful, studded with handsome residences. The most interesting buildings are Saint Peter's cathedral-like church, a Gothic structure of the 14th century, Elizabeth College (1563), Ladies' College, pub¬ lic hospital, Hauteville House, where Victor Hugo lived in exile, 1856-70, and the handsome market. The Guille-Alles Library, founded by two New York merchants, natives of Guernsey, in 1882, contains 80,000 volumes. The Royal Court-House is used both as court of justice and as parliament house. The harbor is large and commodious, and is defended by the picturesque mediaeval Castle Cornet on a rocky islet at its mouth and by Fort George, a modern fortifica¬ tion on the heights, about one half mile south from the town. Pop. about 20,000.

SAINT PETER'S, ROME. See Rome.

SAINT PETER'S CANAL. See Cana¬ dian Canals.

SAINT PETER'S COLLEGE, or PETERHOUSE, England, is the oldest college in the University of Cambridge. It was founded as a hospital and

converted into a col¬ lege in 1257. This and the other sister colleges were modeled after the monasteries, to a certain extent. The present chapel was opened in 1632. The hall and combination rooms have been re¬ stored. The poet Gray belonged to this col¬ lege; also Isaac Barrow, Archbishop Whitgift and Sir William Thomson. In 1916 there were 211 members of the senate; statistics of teach¬ ers and students not given because of the war drain.

SAINT PETER'S LAKE, Quebec, Canada, an expansion of the Saint Lawrence River, be¬ tween the mouths of the Saint Maurice and the Richelieu, and extending nearly to Three Rivers. It forms the outlet of many rivers, chief of which is the Saint Francis. In its southern portion are found many islands, notable for their fine scenery. The length of the lake is 35 miles ; the breadth, 10 miles.

SAINT PETERSBURG, Russia. See

Petrograd.

SAINT PETERSBURG, Fla., city in Pinellas County, on Tampa Bay, and on the peninsula separating the bay from the Gulf of Mexico, on the Atlantic Coast Line and the Tampa and Gulf Coast .Railroad. It is popular as a winter resort, has a beautiful beach, an excellent harbor, and is a shipping point for saltwater fish. Pop. (1920) 14,237.

SAINT PETERSBURG, Declaration of,

an agreement between the European powers made in December 1868 at Saint Petersburg; signed by representatives of Austria, Belgium, Bavaria, Denmark, France, Great Britain, Italy, the Netherlands, Persia, Portugal, Germany, Russia, Sweden, Norway, Switzerland, Turkey and Württemberg. The powers agreed to use in war no explosive projectile of less weight than 400 grams, or 14 ounces avoirdupois. Other provisions were made to reduce the death rate and alleviate the suffering of injured and dis¬ abled soldiers by the use of more humane im¬ plements of war; practically all of the agree¬ ments were discarded by the Teutonic allies in the great World War.

SAINT PHILIP. See Fogo.

SAINT PHILIP, Fort. See Fort Jackson and Fort Saint Philip.

SAINT-PIERRE, Jacques Henri Ber- nardine de, zhak on-re bar-nar-den de san pe-ar, French author: b. Havre, 19 Jan. 1737; d. Eragny sur-Oise, 21 Jan. 1814. He received his education at Caen and at Rouen, and en¬ tered the government service as a civil engineer. Dismissed for insubordination in

1761, he wan¬ dered about the Continent for several years be¬ fore he began to write, endeavoring to realize a dream of a republican colony. He returned to France in 1766, and soon obtained a com¬ mission as engineer for the Mauritius, but after three years on the island he returned to Paris. His first book, 'Voyage a Pile de France) (1773), an account of his voyage to the island of Mauritius, did not attract attention. Sixteen years later his experiences in this lonely island became the background of his celebrated novel, 'Paul and Virginia, } which was published in Paris in 1788, and almost immediately trans¬ lated into English, Russian, Polish, Dutch, Spanish and Italian. He was the author of two other novels little known beyond his day, and of two volumes of poetical studies of nature: 'Etudes de la nature) (1784) ; and 'Harmonies de la nature) (1796) ; He was admitted to the Institute in 1795. His works besides those al¬ ready mentioned are (Essai sur Jean Jacques Rousseauˆ 'La chaumiere indienne> (1790); (Le cafe de Surate) (1790) ; and his (lCor-respondance> (1826). (See Paul et Virginie). Consult Barine, 'Les grands ecrivains frangais) (1891) ; Maury, 'Etude sur la vie et les oeuvres de Bernardin de Saint Pierre)

(1892).

SAINT-PIERRE, Jacques Legardeur de,

zhak la-gar-der de, French soldier: b. Nor¬ mandy, 1698; d. near Lake George, N. Y., 1755. He entered the army in early youth and went to Canada where he served against the Iroquois and against the English in the War of 1740. He was one of the first to explore the Rocky Mountains, making the journey up the Sas¬ katchewan River in 1752, and on his return was ordered to Fort de Bceuf, Ohio. While in com¬ mand there he received George Washington, then adjutant-general of Virginia, who brought a letter from Governor Dinwiddie requesting the withdrawal of French troops from English territory. Washington in his journal comments very favorably on the French commander. Saint-Pierre was succeeded by Contrecceur in 1753 and was appointed to the command of the Indian auxiliaries. He rendered valuable serv¬ ices in Baron Dieskau's expedition and was afterward killed in the action near Lake George, where Whiting's regiment was routed. His ac¬ count of the Rocky Mountain expedition is preserved in the National Library of Paris, and was published in the collection of John Gilmary Shea, 'Memoire on journal sommaire de Jacques Legardeur de Saint Pierre) (1862).

SAINT PIERRE, a town on the island of Reunion, in the Indian Ocean, on the west coast, 34 miles south of Saint Denis, the capital and the terminus of a railway 83 miles long, connecting with the capital, with Pointe-des-Galets, the chief port, and with Saint Benoit on the east coast. Pop.

29,481. See Reunion.

SAINT PIERRE, West Indies, a former chief town in the volcanic island of Martin¬ ique. (q.v.). Prior to the eruption in 1902 of Mont Pelee, Saint Pierre was the largest and most flourishing city not only of Martin¬ ique but of the Lesser Antilles, with a popula- ion of 26,000. It was an important seaport and a bishop's see. The principal buildings were the cathedral, lyceum and palace of justice. There was a fine botanical garden containing rare and peculiar specimens, etc. — all destroyed by the sudden catastrophe above noted, together with the entire population.

SAINT PIERRE AND MIQUELON,

mek-lon. The small colony of Saint Pierre and Miquelon is doubly interesting for France inasmuch as it is the only one of the French settlements which is situated outside the tropi¬ cal zone, and is furthermore the last link which exists of France's one-time Canadian empire. The colony, moreover, despite its small area, has been prosperous for a number of years, thanks to its fishing industry, but this latter has recently declined a little. The three islands of Saint Pierre, of Greater and Smaller Mique¬ lon, have an area of 241 square kilometers (93 square miles) and a population of about 7,000. The islands are situated on the Atlantic Ocean, 15 to 30 miles from the southern coast of New¬ foundland and about 3,700 kilometers (2,298 miles) from the port of Brest.

The form of Saint Pierre is most irregular: high and rocky from the cape of Aigle, run¬ ning in an eastern, northern and western direc¬ tion as far as Cape Savoiard ; becom¬ ing inflected toward the country dominated by Mount Galadry. The island of Mique¬ lon is divided into two parts : Greater Miquelon and Smaller Miquelon, the latter commonly called Langlade. Smaller Miquelon is separated from Saint Pierre by a stretch of sea about a league wide which is highly dangerous to navigation. Saint Pierre is the only part in the entire colony which possesses a harbor capable of anchoring large vessels arriving from Europe or America.

There are six islets dependent on Saint Pierre, Greater and Smaller Colornbier and the four islets, lie aux Chiens, lie aux Vain- queurs, He aux Pigeons and He Massacre.

The climate is severe. Although Saint Pierre is situated in a more southerly latitude than Paris, winter is very cold and long; living conditions are hard and were it not for the fishing industry the country would be desolate.

Industries, etc. — Cod fishing is the only remunerative industry of the colony. 1 his is a profitable trade for the ship-owners and makes an excellent school for sailors. The fisheries were very prosperous a few years ago, the exportation of cod amounting in 1899 to about 15,000,000 francs ($3,000,000), but fell to 6,000,000 in 1905 ($1,200,000), dropping still

lower in subsequent years. Connected with the cod fishing industry are all the other sea¬ port trades (carpentry, sailmaking, smithing, cooperage).

The agricultural resources of the colony are not very important. The island of Saint Pierre is really just a rock, almost devoid of fertile soil and would have been entirely unproductive if the inhabitants had not to a certain extent overcome nature. Miquelon is better suited for agricultural experiments. The average trade of

Saint Pierre and Miquelon during the five years 1911 to 1915 was 11,517,267 francs ($2,303,453), made up of 4,331,459 francs ($866,291) imports and 7,185,808 francs ($1,437,161) exports.

History. — Fishing attracted Frenchmen there from the time of Henri IV. While many Nor¬ mans and Saintonegals settled in Canada, Bretons and Basques came to the island in 1604 to fish for cod. Expelled from Newfoundland in 1713 and Acadia in 1763, many French Canadians settled in Saint Pierre and Miquelon. However, in 1778, the English forced these emigrants, numbering some 2,000, to return to France. After the Treaty of Versailles in 1783, they returned to the two islands only to be driven out again during the Revolutionary Wars, but came back in 1816 when the colony was definitely restored to France. The Anglo- French agreement of 8 April 1904 definitely settled all differences regarding the French shore, i.e., the rights of preparing and drying the fish. By this arrangement France retained fishing rights in the territorial waters of the French shore; or in other words over a coast 18 kilometers (12 miles) in length.

SAINT QUENTIN, san kon-tan, France, a city in the department of Aisne, on an acclivity overlooking the Somme, about 95 miles north¬ east of Paris. The location of Saint Quentin is of considerable strategic importance, and it has figured conspicuously in various wars, notably in 1557, in the Franco-German War in 1870, and most severely in the great World War of 1914-18. It was the centre of some of the most ruthless acts of warfare in the Teutonic assaults and little remained after the conflict but a great ruin pile. Under the terms of the Peace Treaty of 1919 German labor and capital, as determined by the Reparation Com¬ mission, have to effect a complete restoration. Prominent among its buildings is the fine Gothic church of Saint Quentin, erected 1114-77, with a special feature of double

transepts. Other buildings are the courthouse, library, theatre, hospitals and lyceum. The principal manufac¬ tures are cotton and woolen goods, tulle, em¬ broideries, lace and guipure of several kinds ; there are important foundries, machine works for various special industries, brick and tile yards, and in the vicinity, numerous sugar mills. There is an active commerce in cotton and linen yarn and in grain. Several monuments and statues commemorate the defense of the town and its native literary celebrities. Pop. about 55,600. See War, European.

SAINT RAYMOND, Canada, village in the province of Quebec, on Little River Sainte Anne, 28 miles west of the city of Quebec, and on the Quebec and Lake Saint John and the Canadian Northern Railroad. There is a Ro¬ man Catholic convent and Saint Raymond's College is located here. Pop. 1,653.

SAINT REGIS, re'jis, N. Y., and Canada, village, part in Franklin County, N. Y., and part in Huntington County in the province of Que¬ bec, on the right bank of the Saint Lawrence River, at the mouth of the Saint Regis River. It was settled in 1760 by the Saint Regis tribe of the Iroquois Indians, and is inhabited solely by their descendants. Both the British and the American branches of the tribe speak the Mohawk language. The village is about five miles from a railroad station in New York State ;

but it has steamboat connection with Cornwall, Ont., and in summer with all the Saint Law¬ rence River ports and with Hogansburg in New York, on the Saint Regis River. The vil¬ lage is in a fertile agricultural region; the Reservation extends along the Saint Law¬ rence, in both the United States and Canada, for a number of miles. Many of the Indians are engaged in farming, but the chief occupa¬ tion is basket-making in which they excel. There are two churches, a Roman Catholic on the Canadian side and a Methodist on the New York side, on the boundary of the Reservation. There are five schools in New York and two in Canada. Eleazar Williams lived for some time in Saint Regis. Pop. 1,400.

SAINT REGIS INDIANS, a group of Roman Catholic Iroquois from Caughnawaga, Quebec, who during the French and Indian War were established in a village which is now the boundary between New York and Que¬ bec. The Jesuits founded among them the mission of Saint Francis Regis, hence their present name. These Indians remained neutral during the Revolution, and their number was considerably augmented by other Iroquois early in the 19th century; but their reservation ex¬ tending across

the international boundary, they were divided in partisanship during the War of 1812. In 1904 the entire population was 2,634, of whom 1,426 were on the Quebec side and 1,208 on the New York side.

SAINT REMY, san re-me, France, in the department of Bouches-du-Rhone, near the forest of Saint Benoit, is a village 14 miles northeast of Arles. It is celebrated for its Roman antiquities, the chief of which are the triumphal arch (100 a.d.) and the monument of the Julii. The latter is attributed to the period of the early empire, and consists of a square base ornamented with military bas- reliefs, surmounted by Corinthian semi-col¬ umns connected by arches, which support a second series of 10 Corinthian columns and a dome. Two statues stand in the upper portion. In the neighborhood of Saint Remy is the old priory of Saint Paul-de-Mausole with a Ro¬ manesque church and cloister of historic in¬ terest. Near the village are building-stone quar¬ ries, and seed-cultivation is carried on.

SAINT RONAN'S WELL, a novel by Sir Walter Scott, published in 1823. The scene is laid about a mineral spring, a quasi watering place, called Saint Ronan's Well. The book is the only society novel attempted by Scott.

SAINT-SAENS, san-son, Charles Camille,

French musician: b. Paris, France, 3 Oct. 1835. He received his musical education in the Con¬ servatory of the metropolis and in 1853 was appointed organist of the church of Saint Merri, and in 1858 of the Madeleine, where he con¬ tinued till 1877. His first comic opera, (La princesse jaune, was produced in 1872, and VHP (1883) ; (Proserpine) (1887) ; (Ascanio* (1890) ; (Phryne* (1893), have not maintained their early popularity to the present day. He pro¬ duced (Andromaque* (1903), and (L'Ancetre* (1906), and was known also as a musical critic*

and author of (Rimes familieres (1886) ; (Problemes et Mysteres* (1894). He was elected member of the Academy in 1881. , Al¬ though he has not attained the highest rank in opera, many of his instrumental works, which include three symphonies, four symphonic poems, two orchestral suites, several concertos for piano and orchestra and violin and or¬ chestra and a quantity of chamber music, show consummate talent if not genius. Consult Neitzel,*

SAINT-SIMON, Claude Henri, kldd on-re

san-se-mon (Eng. sant si'mon), Comte de, French socialistic reformer: b. Paris, 17 Oct. 1760; d. there, 19 May 1825. Born of a family which traced its descent to Charlemagne fie conceived that his origin destined him to great achievements. At 13 he offended his father by skeptically refusing

to receive his first com¬ munion. Before he was 16 he gave his servant orders to call him in the morning with the sum¬ mons, (

In 1802 and 1803 he traveled in England and Germany, without, as he says, acquiring any new experience of importance. During his stay at Geneva he produced his first work.

(Lettre d'un habitant de Geneve a ses contem- porains.5 He proposed that the savants should be maintained at the public expense ; that spiritual power should be in their hands, tem¬ poral in that of the proprietors ; while the (

The death of Diard in 1810 plunged him again into want ; and having written two more works, (Sur la science de l'homme) and (Sur la gravitation universelle,5 he found himself without means to publish them. Later Augustin Thierry, who became his intimate disciple, co¬ operated in editing his work on the Reorgan¬ isation de la societe europeenne5 (1814), in which he endeavored to demonstrate the use¬ lessness of the Congress of Vienna, and to show that a European parliament, with the right to determine differences between different nations, was the only means of preserving general peace ; and for the promotion of this he advocated union between England and France. The last proposal, perhaps the most sensible he had yet made, caused him to be regarded as a mad¬ man. This was his first work which attracted general notice. Finding the difficulty of pro¬ curing the means of subsistence and of publish¬ ing his works increasing he made an unsuccess¬ ful attempt in 1823 at self-destruction, which resulted in a mutilated visage and the loss of an eye. He next produced his last work, (Le nouveau christianisme) (1825), to which he owes his position as the founder of a sect. Christianity he now averred to be a progress¬ ive system, which had been rendered immov¬ able by the bonds of ecclesiastical law. Taking its fundamental principle of love he held the Church to be a complete organization of so¬ ciety for ministering to the wants of the whole, and especially of the more numerous and poorer classes. A social hierarchy based on capacities and services, with authority to divide heritages, distribute salaries, regulate vocations and take all necessary means for making the labor of all contribute to the common good, was de¬ duced from these premises by his disciples, among whom may be mentioned Auguste Comte, Bazard, Enfantin, Henri Fournel, Pierre Le- roux, Felicien, David, Dubochet, Stephane Morey, Olinde Rodrigues, Leon Halevy, Bailly (de Blois) and Duvergier. Saint Simon con¬ tinued to the last to develop and promulgate his views in a periodical publication, Le

Pro- ductcur.

The disciples of Saint Simon rapidly grew into a sect, and were joined by other eminent men. They attempted to idealize the life of their founder, and make it a consistent whole, dominated from the first by the idea of the mission he was to accomplish. Society was divided by the Saint Simonian doctrine into three classes, priests, savants and laborers, and was to be governed by the chiefs of the three classes. Capacity was to be the ground of dis¬ tribution of functions. All property was to become on the death of the proprietor the prop¬ erty of the church or society. All children were

to leceive a general education till their par¬ ticular capacities became manifest. Saint Simonism in short .was an attempt to render men benevolent by external regulations ; to do the work of Christianity without its authority and without its weapons.

Bibliography. — Hubbard, (Saint Simon, sa vie et ses travaux5 (1857); (GEuvres choisies de Saint Simon5 (1859—61) ; joint works of Saint Simon and Enfantin (20 vols, 1865-69) ; Booth, (Saint-Simon and the Saint-Simonians> (1871) ; Janet, (Saint-Simon et le Saint-Simon- isme) (1878); Weill, (Un Precurseur du so¬ cialism5 (1894) ; Warschauer, (Saint-Simon und der Saint-Simonismus) (1892) : Weill, (L'Ecole Saint-Simonienne) (1896) ; Charlety, (Histoire du Saint-Simonisme) (1896).

SAINT SIMON, Louis de Rouvroy, Due

de, French author: b. Paris, 16 Jan. 1675; d. Laferte, 2 March 1755. He entered the army in 1693, but soon resigned because not given an¬ ticipated promotion, then was employed in several diplomatic missions, and was one of the council of regency under the Duke of Orleans, but with the accession to the regency of the Duke of Bourbon he fell into disgrace, and withdrew from public life. His memoirs, commenced in 1694, while serving in the army, and on which he labored for 60 years remained a long time in manuscript, and were afterward published in a mutilated form, with many sup¬ pressions. The first edition, in 13 volumes, ap¬ peared in 1791 ; an edition by Cheruel and Reg- nier, in 20 volumes, in 1856 et seq., and re¬ vised in 1873-77 ; and the first complete edi¬ tion appeared in Paris in 1829-31 (in 21 vols.), entitled (Memoires complets et authentiques du Due de Saint Simon sur le Siecle de Louis XIV, et la Regence, publies pour la Premiere Fois sur le Manuscrit Original Entierement Ecrit de la Main de 1' Auteur, par M. le Mar¬ quis de Saint Simon. > Consult Boschet, (Le Due de Saint-Simon5 (1874); Boislisle, new edition of the

SAINT SIMON, saint si'mon, an island of Georgia, at the mouth of the Altamaha River, and separated from Jekyl Island, on the south, by Saint

Simon Sound, and from Wolf Island on the north, by Altamaha Sound. It is one of a group of islands long famous for the pro¬ duction of sea-island cotton. In 1733 this island, together with some of the mainland adjacent, was ceded to James Oglethorpe by the Creek Indians. The settlement on the island was at¬ tacked in 1742 by a Spanish force from Saint Augustine. The soil is fertile and the vegetation luxuriant.

SAINT SOPHIA, so-fe'a, Constantinople, a renowned church and mosque, founded in 325-326 by Constantine, at the time when By¬ zantium became the seat of empire. Saint Sophia was enlarged, rebuilt, destroyed at various epochs, but the present structure is virtually that erected by Justinian. Over 10,000 workmen were employed seven years in its construction, and the rich materials used were taken from nearly every celebrated pagan tem¬ ple in all parts of the kingdom. The building was approached by a double porch 100 feet in depth. The building formed a square of 241 feet, whose interior represented a Greek cross,

surrounded by a woman's choir or gallery, supported by magnificent ancient pillars. A series of domes rise from the centre and rest upon each other, tier upon tier. The height of the dome is 175 feet. The interior was decorated throughout with sculptured marble and fine mosaics. The sedilia of the patriarch and those of the priests were of silver gilt; the dome of the tabernacle of pure gold, sur¬ mounted by a massive gold cross studded by precious stones. The sacred vessels and other apparatus were of pure gold, the altar-cloths embroidered with gold and pearls, and the altar itself consisted of molten gold into which had been thrown pearls, sapphires, diamonds and all gems which might enhance its value to the utmost. Its weight amounted to 320,000 pounds, and its total cost was £13,000,000 or $65,000,000. When the Turks took possession of Constanti¬ nople in 1453, they transformed Saint Sophia into a mosque, destroying or concealing the Christian fittings or emblems, by coats of plaster. The mosaic pictures were saved in this way, and when Sultan Abdul Medjid ordered a complete restoration of the building, the original mosaics of Justinian were discov¬ ered. With the sultan's consent, the king of Prussia sent German artists to make accurate copies of these interesting antiquities, which were published by M. Salzenburg, the artist, at the expense of the Prussian government. The interior is at present restored for Moham¬ medan worship, and all Christian decorations, especially those representing the human figure, strictly forbidden by the Koran, are hidden from view

under a white coating in which mosaics are imitated. Like all mosques, Saint Sophia is closed to all Christian visitors ex¬ cept by special permission, which is easily ob¬ tained by the hotel proprietors. Consult Von Plammer, (Constantinopolis und der Bosporus) (2 vols., 1822) ; Salzenberg, (Alt christliche Baudenkmale Konstantinopels) (Berlin 1854) ; Hughes, (Aya Sofia Constantinople) (1854) ; Edinburgh Review (April 1865, p. 456 et seq.) ; Besant, (Constantinople (1879).*

SAINT SULPICE, san siil-pes, the name of a famous seminary in Montreal, Canada, whose building is the oldest in that city, dat¬ ing back to 1684. It is also the name of a fa¬ mous seminary for priests in Paris, France.

SAINT SWITHIN, an English prelate of the 9th century, chaplain to King Egbert and tutor to his son, Ethelwulf. He was ordained to the priesthood in 830, was charged with the education of Prince (afterward king) Al¬ fred, and in 852 was made bishop of Winchester. He died about 10 years later. He was canon¬ ized a century later. The popular knowledge of this saint's name is due to the belief that if rain falls on 15 July (which is commonly known as Saint Swithin's Day) it will rain for six weeks after. This notion is said to have arisen from the fact that when the bones of Saint Swithin were about to be removed, after his canonization, from their original resting-place in Winchester church-yard to the interior of the cathedral, their removal, which was to have taken place on 15 July, was delayed for 40 days by the excessive rains which fell unin¬ terruptedly for that period. In France, the watery saints' days are those of Saint Medard (8 June) and saints Gervais and Protais (9

June) ; in Flanders the rainy saint is Saint Godelieve ; and in Germany there are three saints' days, to which this belief attaches. The origin of the tribute called "Peter's Pence® has often been assigned to Saint Swithin.

SAINT THOMAS, formerly one of the Virgin Islands, Danish West Indies, since 1917 a possession of the United States, lying 43 miles east of Porto Rico; area, 33 square miles. The surface is hilly, and only a small portion of the land is cultivated; sugar-cane, aloes, fibrous plants, fruit, cotton and vegetables are raised. Earthquakes are frequent but not as destructive as the severe hurricanes, which have several times done a considerable amount of damage in the island. Saint Thomas was once of great commercial importance, its capi¬ tal, Charlotte Amalie, was at one time one of the chief emporia of the West Indies. Since the introduction of steam vessels, and especially since 1885, its trade has greatly declined, and Barbados has taken its place as a trade centre. Charlotte Amalie is still of importance as a coaling station, and is a port of call for steam¬ ers. The island was first colonized by the Dutch, was held by Great Britain in 1667-71, 1801 and 1807-15, and finally came into the possession of

Denmark. In 1870 negotiations were made for its purchase by the United States, but Con¬ gress refused to ratify the treaty; it was also included in the treaty of 1902 for the pur¬ chase of the Danish West Indies by the United States, which was rejected by the Danish Folke- thing. The final act of more than 50 years' effort to bring the Danish West Indies under the American flag was completed 31 March 1917, when a treasury warrant for $25,000,000 was handed to the Danish Minister at Washington for Saint Thomas, Saint Croix and Saint John. Pop. 11,150. See Virgin Islands.

SAINT THOMAS, Canada, city and county-seat of Elgin County, Ontario, on the Canadian Pacific, Grand Trunk, Michigan Cen¬ tral, Wabash and Lake Erie and Detroit River railways, 75 miles southwest of Hamilton, and nine miles north of Port Stanley on Lake Erie. It is one of the most important railway centres in southern Ontario, is the receiving and dis¬ tributing centre for a rich fruit and farming country, and has an extensive local and ex¬ port trade. The Michigan Central Railway has large car-building and machine shops here em¬ ploying many men, and there are important manufactures of foundry products, farm imple¬ ments, carriages and wagons, mattresses, brooms, churns, blocks and tackle, flax, flour and planing mills, and breweries. Saint Thomas has gas, electric lights and waterworks; fine county buildings, city hall, market, Alma Ladies' College, Sinclair College, Collegiate Institute, public library, Amasa Wood Hospital, Thomas Williams Home for the Aged, children's home, 11 churches, many handsome residences and hotels, banks, and daily and weekly newspapers. Assessed property valuation about $9,874,957. Pop. 14,054.

SAINT THOMAS (Port. San Thome, san to-ma), West Africa, a volcanic island in the Gulf of Guinea, 170 miles west of the mouth of the Gabun River, belonging to Portugal. Its highest peak, Saint Anna, rises from the centre of the island to a height of about 7,000 feet. The valleys are fertile but unhealthful; the ele-

vated portions, swept by fresh breezes, are on the contrary, salubrious. The chief products are coffee and cocoa, cotton, sugar, indigo, sweet potatoes, dates, etc. There are large num¬ bers of domestic animals. Saint Thomas, on the northeast coast, is the seat of a bishop, and the chief town. The island was discovered by the Portuguese on Saint Thomas Day, 1471, and was colonized in 1493. The Dutch occu¬ pied it from 1641 to 1844. With the island of Principe it forms a province administered by a governor with a total area of 360 square miles, and total pop. of 68,221.

SAINT THOMAS. See Sao Thome.

SAINT THOMAS, Christians of. See

Christians of Saint Thomas.

SAINT VALENTINE'S DAY, the 14th of February, so called after a Christian martyr of the Roman period. The custom peculiar to the day of exchanging missives of affection and love is believed to have been handed

down from the Roman festival of the Lupercalia, celebrated in the month of February, when the names of young women were put into a box and drawn out by men as chance directed. For many centuries, if not up to the present time in certain remote districts. Saint Valentine's Eve was celebrated in a manner very similar to the fashion of Roman heathen times, maids and bachelors throwing billets with their names on into a receptacle and drawing therefrom by chance the name of some one of the opposite sex, who became thereupon for the year follow¬ ing the "valentine," or chosen companion, of the other more or less lucky individual. The send¬ ing of valentines by message or mail is one out¬ growth of the custom formerly prevalent. The custom has expanded in the presentation of affectionate valentines by parents to children and children to parents and husbands and wives to each other. In genial climates Valentine's Day is about the mating period of birds, and this is supposed to have had something to do with the origin of the customs with which the day is associated.

SAINT-VICTOR, san-vek-tor, Jacques Benjamin Maximilien, Comte de, West Indian author: b. Fort Dauphin, Santo Domingo, 14 Jan. 1770; d. Paris, France, 8 Aug. 1858. He was educated at the college of La Fleche, France, and entered journalism. During Napoleon's reign he was on the staff of Journal des Debats and after 1815 he established several Roman Catholic and royalist magazines. He revisited his native land in 1830, spent two years in the United States and then made a tour of the West Indies. He wrote 'Tableau historique et pit- toresque de Paris depuis les Gaulois jusqua nos Jours' (1808-12); ((Euvres ooetiques' (1882); (Lettres sur les Etats-Unis ecntes en 1832—33) (2 vols., 1835) ; 'Journal de Voyage) (2 vols., 1836), etc.

SAINT-VICTOR, Paul Binsse, Comte de, French author: b. Paris, 11 July 1825; d. there, 9 Tuly 1881. He first made himself known as a dramatic and art critic, but soon rose to em¬ inence as a student of the drama and of art and a permanent contributor to the literature of these subjects. His best-known books are (Men and Gods) (1867-72), and 'The Two Masques) (1880-83) He also wrote 'The Women of Goethe' (1869); 'Victor Hugo' (1885); 'An¬

cients and Moderns' (1886), and 'The Theatre of To-day' (1889).

SAINT VINCENT, vin'sent, John Jervis,

Earl, English naval officer : b. Medford, Staffordshire, 9 Jan. 1734; d. 15 March 1823. He entered the navy as able seaman in 1744 and in 1760 was promoted to captain and in 1787 to rear-admiral. In the Quebec expedition he led the advance squadron in charge of transports. In 1790 he was returned to Parliament for Wy¬ combe. He commanded in the naval

expedition against the French West Indies in 1793 and two years later was made admiral and given command of the Mediterranean fleet. In the en¬ gagement with the Spanish fleet of Cape Saint Vincent, 14 Feb. 1797, he captured four of the enemy's ships and averted the impending in¬ vasion of England. For this he was granted a pension and made Earl Saint Vincent. He was first lord of the Admiralty 1801-04 and intro¬ duced many reformatory measures. He held once more command of the Channel fleet, but retired in 1807. At his death the nation raised a statue to him in Saint Paul's Cathedral.

SAINT VINCENT, one of the Windward Islands, British West Indies, lying between Saint Lucia and Grenada, area, 150.3 square miles. A chain of volcanic mountains traverse the island from north to south, culminating in the volcano of Soufriere in the north (3,000 feet). Many of the valleys are fertile and about one-sixth of the total area is under culti¬ vation. Sugar was once the most important product, but the sugar industry has declined, especially since' the hurricane of 1898 which de¬ stroyed a large number of plantations. The production of arrowroot has correspondingly increased in importance; cocoa, cotton, fruits and vegetables are also raised, and good timber is obtained from the forests. There is a con¬ siderable trade, particularly with the United States. In 1914—15 the total imports had a value of $546,595; exports, $548,975; total reve¬ nue, $162,340; total expenditure, $190,225; pub¬ lic debt, $23,500. . The island was discovered by Columbus in 1498, and was then inhabited by Caribs ; the Caribs were finally subdued by Great Britain in 1795-96 and transported to Ruatan, in the Bay of Honduras; a few re¬ turned to Saint Vincent where a reservation was assigned them. The island is governed by an administrator and a legislative council of three official and four nominated unofficial members; before 1877 there was a representa¬ tive government. In 1812 an eruption of Soufriere devastated a part of the island, and in May 1902 occurred another eruption, con¬ temporaneous with that of Mont Pelee (q.v.). Premonitory signs of eruption were given as early as February 1901, and these warnings in¬ creased as soon as Mont Pelee began to be active ; the eruption commenced on 6 May, with a burst of smoke, followed by flames; it ceased for a time the next morning, but reached its full force in the afternoon of that day (7 May). Several large plantations were destroyed and about 1,600 persons killed. Pop. 41,877.

SAINT VINCENT DE PAUL. See Vin¬ cent de Paul, Saint.

SAINT VINCENT DE PAUL, Society

of. See Society of Saint Vincent de Paul.

SAINT VITUS' DANCE. See Chorea.

SAINTE AGATHE DES MONTS, Can¬ ada, village in Terrebonne County, Quebec, 60 miles northwest of Montreal, on Rouge River, and on the Northern Pacific Railroad. It has a lumber industry and is a year-round health re¬ sort. Pop. 2,020.

SAINTE ANNE DE BEAUPRE, sant an de bo-pra, Canada, a village of Montmorency County, Quebec, at the mouth of the Sainte Anne River, on the north shore of the Saint Lawrence River, 25 miles by rail northeast of Quebec. The fine modern basilica and the an¬ cient parish church, containing relics of Sainte Anne, are visited annually on the saint's feast day, 26 July, by thousands of pilgrims. Sainte Anne is also a favorite summer resort, with up- to-date stores and hotels. Pop. 2,066.

SAINTE ANNE DE BELLEVUE, or SAINT ANNES, Canada, town in the province of Quebec, on the island of Montreal, between the Lake of Two Mountains and Saint Louis Lake at the confluence of the Ottawa and the Saint Lawrence rivers, 20 miles southwest of Montreal, on the Grand Trunk and the Cana¬ dian Pacific railways. The Macdonald College of Agriculture is located here and there is a Roman Catholic college. The town is patron¬ ized as a summer resort. Pop. 1,416.

SAINTE ANNE DE LA POCATIERE, Canada, town in the province of Quebec, on the Saint Lawrence River, 70 miles northeast of Quebec and on the Intercolonial Railway. There is a Roman Catholic college and also an agricultural experiment farm and milling in¬ dustries. Pop. 2,412.

SAINTE-BEUVE, sant bev, Charles Au¬ gustin, French literary critic: b. Boulogne-sur- Mer, 23 Dec. 1804; d. Paris, 13 Oct. 1869. He was educated at a school in his native town, and from 1818 at the College Charlemagne and the College Bourbon in Paris. He studied the physical and natural sciences under Lamarck and Magendie and in 1823 entered the school of medicine, subsequently becoming assistant sur¬ geon to the Hospital Saint Louis. In 1824 he became a contributor to the Globe , a liberal and philosophical journal. A review of Victor Hugo's (Odes and Ballads5 contributed in 1827 gained him the friendship of the poet, and thenceforward he identified himself with the romantic movement. His first volume. (An Historical and Critical Tableau of French Poetry and the French Theatre in the XVIth Century,5 appeared in 1828. In 1829 appeared his novel, (Vie, poesies, et pensees de Joseph Delorme5 ; and in 1830 he dedicated a volume of poems, (Consolations, 5 to Victor Hugo. About this period he was associated with Saint Simonians, and afterward

with Lamennais, but soon broke with them and also with Hugo and the romanticists. Persuaded by M. Buloz, he undertook a series of literary portraits for the (Revue des deux mondes,5 in which he dis¬ played great skill. His novel (Volupte5 (1834), essentially autobiographical, may be regarded as marking this turning point in his career, but (Pensees d'aout5 (1837), a volume of poems, is still colored by his religiosity. His next and greatest work, (Port Royal5 (5 vols., 184CL60), is a history of Jansenism. He was admitted a member of the French Academy in 1844 and four years later accepted a professorial chair

at Liege. His lectures there formed the basis of his next work, (Chateaubriand et son groupe litteraire sous l'Empire5 (1860). He eagerly welcomed the coup d'etat and finding it impos¬ sible under the second empire to secure a hear¬ ing at the College de France, where he was professor, published his undelivered lectures in a volume entitled (Etude sur Virgile5 (1857). In 1865 he was appointed a senator and re¬ gained popularity by his defense of freedom of thought and speech. In 1849 he began the series of Monday critical articles on literary subjects which has gained him a European reputation. These articles were published in two series, (Causeries du lundi5 (1851-62) and (Nou- veaux lundis5 (1863-72). Among his other works are (Portraits de femmes5 (1844) ; Por¬ traits litteraires,5 Portraits contempora'ins5 (1846) ; (De la liberte de l'Enseignement5 (1868) ; P. J. Proudhon, sa vie sa corre- spondance5 (1872) ; Pettres a la princesse' (1873, being letters to Mathilde, sister of Napo¬ leon III) ; (Chroniques parisiennes5 (1876) ; (Correspondance5 (1877-78) ; (Nouvelle corre- spondance5 (1880) ; (Le clou d'or5 (1880) ; (La pendule5 (1880), and Pettres au Pro- fesseur Gaullieur5 (1895). (See Causeries du Lundi). Consult D'Haussonville, (Sainte- Beuve, sa vie et ses ceuvres5 (Paris 1875) ; Pons, (Sainte-Beuve et ses inconnues5 (ib. 1879) ; Troubat, (Souvenirs du dernier secretaire de Sainte-Beuve5 (ib. 1890) ; Vattier, (Sainte- Beuve5 (ib. 1892) ; Fisher, (A Group of French Critics5 (1897) ; Brunetiere, Pvolution des genres5 (Vol. 1, 1899) ; Harper, G. M., (Sainte- Beuve5 (New York 1909) ; Poliak, G., Hnter- national Perspective in Criticism5 (ib. 1914).

SAINTE CHAPELLE, Paris, one of the most interesting of the old architectural monu¬ ments of the French capital. It stands entire inside the Palais de Justice, in the large court to the left of the main entrance from the Boulevard du Palais. It was built in 1245-48, during the reign of Saint Louis, as the chapel of the royal palace, a few other remnants of which now form parts of the Palais de Justice. The main body (115 feet long and 36 feet wide) is a Gothic nave almost perfect in style. The upper chapel, used by the royal family, has an exquisite interior, and almost the entire wall-space is occupied by 15 large windows of stained glass set in beautiful tracery. Services are held in the chapel once a year at the open¬ ing of the

courts.

SAINTE-CLAIRE DEVILLE, sant'klar'- de-vel', Henri Etienne, French chemist: b. Saint Thomas, West Indies, 11 March 1818; d. Boulogne-sur-Seine, 1 July 1881, and educated in France. After considerable experience as a teacher of science he became nrofessor of chemistry at the Sorbonne in Paris in 1859. He early began important and far-reaching re¬ searches into the phenomena of ((dissociation,55 physicochemical reactions, which he was the first to study scientifically. In his own particular field of investigation and research he has done important work which increased and made more accurate our knowledge of chemical reactions. Deville put the aluminium and the magnesium industries on a practical and commercial foot¬ ing and he produced both metals on a large industrial scale. He discovered toluene and anhydride of nitric acid and made useful re-

searches into the metallurgy of platinum and other metals. Consult Gay, Jules, (Henri Sainte-Claire Deville, sa vie et ses travaux) (Paris 1889).

SAINTE CROIX, kroi, an island of the West Indies. See Santa Cruz ; Virgin Islands.

SAINTE CUNˆGONDE, ku'ne-gond, Canada, a city of Hochelaga County, Quebec, two miles distant from Montreal, of which it is a suburb. It has many handsome residences, churches and schools and some manufactures. Pop. about 12,000.

SAINTE GENEVIEVE, sant jen'e-vev, Mo., city, county-seat of Sainte Genevieve County, on the Mississippi River, 46 miles south of Saint Louis. It was first settled by the French in 1735, being the oldest settlement in the State. The site of this original settlement was about three miles south of the oresent site, but a severe flood in 1785 caused the colonists to move to higher ground. In 1810 it had a number of large stores and was the dace from which Saint Louis obtained supplies. It is situ¬ ated in an agricultural and stock-raising re¬ gion ; there are limestone quarries and copper mines in the vicinitv, and the city contains sev¬ eral lime kilns and flour mills; fruit-growing and wine-making are also important industries. It is the seat of a Roman Catholic convent and academy. Pop. 2,046.

ˆSAINTE THERESE, or SAINTE THE- RESE DE BLAINVILLE, tarez de blan'vel', Canada, village in the province of Quebec, on the Riviere aux Chiens, a loop of the Saint Lawrence River, 15 miles northwest of Mon¬

treal, on the Canadian Pacific Railway. There is a Roman Catholic college here and a convent. Industries include the manufacture of furniture and pianos. Pop. 2,120.

SAINTES, sant', France, town in the de¬ partment of Charente-Inferieure, 28 miles southeast of Rochefort, occupies a picturesque slope overlooking the Charente, which is crossed at this point by a bridge formerly sup¬ porting the ancient triumphal arch of Ger- manicus. Among other interesting Roman an¬ tiquities are the ruins of an amphitheater, which is only surpassed by the Colosseum of Rome. In the Antiquarian museums are pre¬ served 7,000 medals and many pieces of sculp¬ ture. Saintes, anciently known as Mediolanum, was once a bishop's see; the ancient cathedral (Saint Pierre), still standing, was nearly de¬ stroyed (1568) by the Huguenots. There are other ancient churches, including Notre Dame, a fine example of architecture of the 11th and 12th centuries, and the church of Saint Eutro- pius, founded in the 6th century and rebuilt in the 16th. The other public buildings are the Palais de Justice, a communal college, library and theatre. There are manufactures of iron, copper, woolen and cotton goods, pottery, casks and leather. Trade is in wheat, corn, brandy, timber, etc. Saintes was the ancient capital of the Santones, and later, of the province of Saintonge. Pop. about 20,000.

SAINTIN, san-tan, Jules Emile, French painter: b. Leme, Aisne, France, 14 April 1829; d. Paris, 14 July 1894. He studied under Droll¬ ing, Picot and Leboucher and won several medals in the Salon and a third-class medal at

the Paris Exposition of 1889. Several years of his life were spent in the United States where he painted some fine portraits and several genres such as (The Pony Express (1863) and*

SAINTINE, san-ten, pseudonym of Joseph Xavier Boniface, French novelist, poet and dramatist: b. Paris, France, 10 July 1798; d. there, 21 Jan. 1865. He wrote about 200 plays, a volume of poetry and several philosophical stories. His best known work is (Picciola) (q.v.) (1837), which received the Montyon

prize, ran through 40 editions and was trans¬ lated into several languages. He published a series of stories entitled Jonathan, the Vision¬ al (1827) ; (History of the Wars in Italy, etc.*

SAINTS' DAYS are days set apart by the Roman Catholic Church for religious services in honor of particular saints, after whom the days are named in the calendar. The celebra¬ tions differ in different countries, and according to the relation of the name of a particular saint to a particular locality. In the United States and Great Britain such celebrations take the

form of religious services held in churches. In continental Europe and in South America saints' days often take the form of great mu¬ nicipal or even national celebrations. In Sweden, which is Lutheran as to state religion, it is customary to celebrate what is known as the name-dav or day of the saint after whom a person is named, in a similar manner to a birthday.

SAINTS' EVERLASTING REST, The,

a devotional work published by Richard Baxter (q.v.) in 1650. By its deep piety and its style of dignified eloquence, hardly a word of which has grown obsolete, it has taken a place with the (Pilgrim's Progress) in the literary treasures of English Nonconformity. Consult French, (Baxter and the Saints' Rest (1877).*

SAINTSBURY, sants'bu-ri, George Ed¬ ward Bateman, English literary critic : b. South¬ ampton, 23 Oct. 1845. He was educated at Ox¬ ford, was senior classical master in Elizabeth College, Guernsey, 1868-74, when he became headmaster of Elgin Educational Institute 1874-76. From 1875 to 1895 he was engaged in journalistic and literary work in London, and in the last-named year became professor of Eng¬ lish literature in Edinburgh University. He holds a leading place among contemporary Eng¬ lish critics and among his many published works are (Primer of French Literature) (1880) ; (1887); 'History of Elizabethan Literature) (1887) ; 'Essays in English Literature 1780-1860 (1890) ; (Essays on French Novelists) (1891) ; Miscellaneous Essays* (1892) ; (The Earl of Derby) ; (Corrected Impressions) (1895); (19th Century Literature) (1896) ; (The Flour¬ ishing of Romance and the Rise of Allegory) (1897); 'Sir Walter Scott* (1897); 'A Short History of English Literature) (1898) ; Mat-*

thew Arnold (1899) ; (A History of Criticism* (Vol. I, 1900; Vol. II, 1902; Vol. Ill, 1904); (The Earlier Renaissance) (1901); Rod Critici) (1903); {Minor Caroline Poets* (Vol. 1, 1905; Vol. II, 1906); (A History of English Prosody-* (Vol. I, 1906; Vol. II, 1908); (The Later Nineteenth Century) (1908) ; (Historical Manual of English Prosody* (1910) ; (History of English CriticisnP (1911) ; (History of Eng¬ lish Prose RhythnP (1912) ; (The English NoveP (1913) ; (First Book of English Litera- ture) (1914) ; (The Peace of the Augustans)*

(1915).

SAIONJI, si'on-je, Kinmochi, Marquis, Japanese statesman: b. Kioto,

1849. He studied law in Paris as a young man and became ac¬ quainted with M. Clemenceau and the younger Radicals of the Third Republic. He was for a time Minister Plenipotentiary to Germany and Austria-Hungary. For many years closely as¬ sociated with the late Prince Ito, he succeeded the latter as leader of his party, became presi¬ dent of the House of Peers and of the Privy Council, Minister of Education and twice Prime Minister of Japan, 1906-08 and 1911-12. He is one of the three oldest statesmen of Japan, and acted as head of the Jananese delegation to the Inter-Allied Peace Conference in Paris.

SAIS, sa'is, Egypt, in hieroglyphics Sa, a ruined city on the Rosetta or Canopic branch of the Nile, 67 miles northwest of Cairo; site now occupied by the village of Sa-el-Hagar, or Sa of the Stone, which contains no remains of temples or palaces. It was an ancient re¬ ligious capital, whose famous temple of the goddess of Neith contained the mysterious veiled statue, the subject of Schiller's ballad and of Novalis' romance. In Sais the fete of burning lamps was celebrated, attracting many foreigners; 'and here was a tomb of Osiris. Sais was also a renowned educational centre frequented by the Greek sages. It gave its name to two Egyptian dynasties, founded by natives of the city. The Saiti kings ruled Egypt for 150 years, until the country was invaded by the Persians under Cambyses. Consult Lepsius, (Briefe) (p. 12) ; Wilkinson, (Modern Egypt (Vol. I, p. 183); Champollion, (L Egypte* (Vol. II, p. 219) ; also Herodotus (II, 29, 59, 169), and Strabo (XVII, 801).*

SAIVAS, si'vaz, one of the three great di¬ visions of the Hindu religion and meaning the worshippers of Siva. These are separated into sects which have varied in number at different periods in the religious history of Hindustan. The worship of Siva seems from a remote pe¬ riod more that of the learned and speculative classes than of the masses of the people. No poetic legends are recorded of this aeity. Con¬ sult Wilson, (Sketch of the Religious Sects of the Hindus (1862); Monier-Williams, Re¬ ligious Thought and Life in India) (1883) ; Barth, Religions of India) (trans., 1882).*

SAJOU, same as Sapajou (q.v.).

SAJOUS, sa-zhoo', Charles Euchariste de'Medicis, American physician and author: b. at sea off coast of France, 13 Dec. 1852. He was graduated from Jefferson Medical College, Philadelphia, in 1878, and was clinical lecturer there 1884 — 90 ; professor and dean of the med¬ ical faculty of the Medico-Chirurgical College 1898, and professor and president of the faculty of Temple University Medical School after

1909. He received the degrees of LL.D. from Saint Joseph College 1909, and Sc.D. from Temple University in 1915; was made officer of the

Academy of France in 1889; Knight of the Legion of Honor of France in 1892; Knight of the Ordˆ.r of Leopold of Belgium in 1890. Dr. Sajous is a Fellow of the American Philosophical Society and of the Academy of Natural Sciences and honorary and correspond¬ ing member of various foreign societies. He has edited Sajous's Annual of the Universal Medical Sciences (45 vols., 1888-96) ; Sajous' (Cyclopedia of Practical Medicine) (8 vols., 1896 et seq.) ; is senior editor of the New York Medical Journal (1911 —) ; was president of the American Medical Editors' Association 1903 and has written (Diseases of the Nose and Throat- (1884) and (The Internal Secretions and the Principles of Medicine) (1903-16). The latter work was the first to show that the ductless glands sustained life in the tissue cells and that they played a leading part in most diseases, as defensive organs.*

SAKAI, sa' ki, Japan, on the southwest of the island of Hondo, seven miles south of Osaka. Before the rise of the latter town it was the chief commercial port of Japan. Osaka now monopolizes the trade. Pop. 67,706.

SAKHALIN, sa-ga-len', or SAGHALIEN (properly KARAFTU), Siberia, a long mountainous island in the north Pacific, oppo¬ site the mouth of the Amur. Its area contains 24,560 square miles. The Strait of La Perouse separates it on the south from Yezo, Japan, and the Sea of Okhotsk bounds its eastern and northern shores. The narrow and shallow Strait of Tartary separates it from the main¬ land. Mounts Bernijet and Ktons-pal (2,000 to 5,000 feet) are the highest points of moun¬ tain ranges extending from north to south and interspersed with valleys of varying width. The principal rivers are the Tym and the Poronai, navigable for a short distance and teeming with fish, especially salmon. Petro¬ leum and naphtha exist and coal is mined by Russian convicts. Agriculture does not suc¬ ceed owing to the extremely rigorous climate. The island is covered with dense forests. Bears, tigers, sables and wild reindeer abound, yegetation is Siberian in character. Sakha¬ lin's history begins with the Stone Age, relics of which and of the Bronze Age are still extant, as seen in houses, bones and implements dis¬ covered. The island formerly belonged to the Chinese Empire, but early in the 19th century it was annexed by the Japanese who ceded it to Russia in 1875. By the Treaty of Portsmouth, N. H. (1905), following the Russo-Japanese War, the southern portion of the island was ceded to Japan by Russia, which retained the northern portion. The Japanese portion, now known as Karafuto, has an area of 13,253 square miles and a population of 49,463, and the Russian an area of 14,668 square miles and a population of 33,500. Besides the Russians and Japanese other inhabitants are Ainos, the aborigines, a primitive and peculiar race, Gil- yaks and Oroks. The most important industry of the island is the herring fisheries, but large areas are highly adopted to agriculture and pas¬ turage. There is a large forest area of larch and fir

trees. The chief minerals are coal and alluvial gold.

SAKHARA

SALA

SAKHARA, sak-ka'ra, Egypt, the ne¬ cropolis of Memphis, about two miles distant from the ruins of the ancient city on the con¬ fines of the Libyan Desert. The chief interest lies in its antiquities, tombs and catacombs. Many pyramids rise among its ruins, one of which is remarkable for its doorway of inlaid tiles, bearing a royal name. Mariette discov¬ ered numberless sarcophagi, catacombs of the sacred Ibis, tombs of the god Apis, numerous grottoes, etc. What is believed to be the oldest mummy in the world, that of a son of Pepi I of the 5th dynasty, probably over 6,000 years old, was discovered here.

SAKI, a South American monkey of the genera Brachyurus, Pithecia and related groups. Its marked peculiarities are a non-prehensile tail, covered with very long hair, round head, short muzzle, ears not unlike those of humans and long-hair covering of entire body. See Monkey.

SAKI, sa'ke, or SAKE, the native beer and common stimulating drink of the Japanese. It is made from rice and is drunk warm, produc¬ ing a very speedy but transient intoxication.

SAKIEH, sak'i-e, SAKIA, or SAKEE- YEH, a machine used in Egypt for raising water from the Nile for the purpose of irriga¬ tion. It is a modification of the Persian wheel and consists of a series of cogged wheels, turned by a buffalo or camel, each revolution of the wheel working up a series of earthen pitchers which empty themselves into a trough or pool.

SAKTA, sak'ta, the designation in the Hindu religion of a worshipper of the Sakti, the power or energy of the divine nature per¬ sonified in a female form. If the tendencies of the worshipper are toward the adoration of Vishnu, then the personified Sakti is termed Lakshmi or Maha-Lakshmi ; if it be toward that of Siva, the Sakti is dominated Parvati Bhavani or Durga. At least three-fourths of the Hindus of Bengal are of this sect, and of the remaining fourth, three are Vaishnavas to one Saiva. Wilson divides the Saktas into Dakshinis, Vamis, Kancheliyas and Kararis. Another clas¬ sification is into the Dakschinacharis and the Vamacharis, followers of the Right Hand and of the Left Hand Ritual. Consult (Religious Sects of the Hindus) (1862, p. 32).

SAKUNTALA, sa-kun'ta-lˆ. This mas¬ terpiece of Hindu literature is by

Kalidasa, the leading poet of India's second, or Sanscrit, period. It is a drama in seven acts and the underlying theme as well as many of its details are derived from the Mahabharata, the great national epic of the Hindu race. There are a number of versions of Sakuntala (also spelled Qakuntala or Shakuntala) extant, the Bengalee one coming closest to the original. The drama has also been fashioned for the use of the European stage by Wolzogen, Donsdorf and others. The story of the play runs as fol¬ lows : King Dushanta weds Sakuntala, the adopted daughter of the pious hermit Kama, but on her being brought to his court he fails to recognize her, owing to a curse having been pronounced against him. The despairing bride is translated to the realm of the genii, until finally the recovery of a ring, the pledge of mutual faith and love, leads to the reunion of the couple. The great charm of Sakuntala lies

in the descriptive powers displayed by the poet, his keen appreciation of the beauties of nature and of the seasonal changes ; his wealth of words is marvelous ; his phraseology is often brilliant and picturesque, and the sentiments ex¬ pressed, particularly as to the master passion, love, are delicate and psychologically true. The action, however, drags and is overburdened with side issues, and the diction suffers from its excessive artificiality and verbosity. Added to these defects is a lack of the sense of pro¬ portion, such as the Greek genius possessed in so high a degree. Nevertheless, all authorities are agreed on the rare and dainty charm of Sakuntala, and Goethe bestowed unqualified praise upon it. The exact time when the poet Kalidasa lived and wrote this drama is shrouded in uncertainty. Indian tradition and authorities variously assign the time to the 3d century b.c. and up to the 6th century a.d. From strong internal evidence, particularly be¬ cause of the extremely corrupted form of the Prakrit spoken in the play by the women and subsidiary characters, it is now concluded that the correct period must have been the 2d or 3d century a.d. Consult Schuyler, Montgom¬ ery, Editions and Translations of Qakuntala (in American Oriental Society Journal, Vol. XXII, Boston 1901) ; Henry, V., (Les litera¬ tures de l'Inde) (Paris 1904) ; Macdonell, A. A., (History of Sanskrit Literature^ (London

1913).

Wolf von Schierbrand. SAL-AMMONIAC. See Ammonia.

SAL-TREE, a valuable timber-tree of India (Shorea robusia) second in importance only to the teak. It is found in large forests along the base of the Himalayas and again in another belt in eastern India. It belongs to the order Dip- terocarpacece and yields a hard, heavy dark- brown, close-grained wood which is very dur¬ able and highly valued, particularly for gun- carriages and railway ties. A whitish aromatic resin (saldammar)

used to calk ships and also for incense (see Dammar) is obtained by tap¬ ping the trunk. The tusser silkworm feeds on the leaves. The sal forests are protected by the government of India.

SALA, sa'la, George Augustus Henry,

English journalist and author: b. London, 24 Nov. 1828; d. Brighton, Sussex, 8 Dec. 1895. He received some instruction in drawing, but at 15 was obliged to provide for himself. He was a theatrical scene painter for a time, then turned- to etching and engraving and had some success as an illustrator. In 1848 he turned to literature and from 1851 to 1856 contributed regularly to Household Words, edited by Charles Dickens. His first experience as ((spe- cial correspondent® was in the letters he wrote for this journal from Russia after the Crimean War. In 1863-64 he was in the United States reporting the Civil War for the Daily Tele¬ graph, and later published (My Diary in Amer¬ ica in the Midst of the WarP He followed Napoleon III to Algiers and published as a result, (A Trip to Barbary by a Roundabout Route > (1866). He established Temple Bar, a periodical which he edited from 1860 to 1866, and derived a large income from journalism, but much of his work is cheap and inflated, and no doubt was an important factor in the development of modern reprehensible news¬ paper methods. He wrote a critical biography

of William Hogarth (1860) ; and, in addition to works of travel already mentioned, (America Revisited) (1882) ; (A Journey due South) (1885); 'Right Round the World (1888), works embodying his observations as a tourist and lecturer across the American continent to Australia and India.*

SALAAM, sa-lam', or PEACE BE WITH YOU, the common salutation among Moham¬ medans. The answer is, ((On you be peace and the mercy of God and his blessings.® It is im¬ proper to address this answer to any but a believer.

SALAD PLANTS, various herbs whose tender, succulent foliage is eaten raw, with or without a dressing. In general, salads should be grown quickly and served as soon as pos¬ sible after being gathered. They all delight in moist, rich soil with abundance of humus and nitrogenous plant food. Most of them may be sown as soon as the soil can be worked in spring, and some may be sown in autumn and allowed to remain until spring. Few do well in hot weather. Clean cultivation is essential with all of them, and since they are usually quick¬ growing plants, they are favorites for growing between

the rows of later maturing plants, such as cabbage, peas, beets, etc., which are themselves used by market-gardeners in the same way, a later crop being put upon the land as soon as they are gathered. That is a crop of salads, one of cabbage and one of perhaps celery may be obtained from the same area in one season.

In America the most important salad is let¬ tuce, which is extensively grown by truckers and market-gardeners, especially in the East from Florida to Massachusetts, the season start¬ ing in January in the South and advancing northward until June, the hot weather checking its production. In the autumn there is a less marked southerly migration. In the North large quantities are also grown under glass to supply local demands. Probably the endive ranks sec¬ ond as a market salad. Its consumption is, however, far less than that of lettuce, and it is less cultivated in the South than in the North, where the cooler climate is more suitable. As a home-salad mustard and cress are probably of next importance in America; in Europe they are grown in enormous quantities for the gen¬ eral market, but in America they are seldom offered for sale. Watercress is more important as a market salad and probably ranks next to endive. It is grown in streams or in damp ground, immense quantities being shipped to the Eastern markets from Virginia. Chicory and dandelion are both popular in the East, but probably more as pot-herbs than as salads. They usually require longer to attain edible size than lettuce and like endive are generally blanched. Chicory is occasionally used in the United States to make barbe de capucin and witloof, two salads very popular in Europe. The roots are dug in autumn, trimmed and for the former laid horizontally in pyramidal heaps with alternate layers of sand or soil in dark cellars and kept moist by occasional watering; for the second they are buried vertically and covered with some fermenting material for a few weeks. The former is the succulent leaf produced ; the latter is a small head something like brussels sprouts. Either may be used as salad or as pot-herb.

SALADIN, sal'a-din, or properly SALAH- ED-DIN YUS.SUF IBN-AYUD, sultan of Egypt and Syria: b. Tekrit, 1137; d. Damascus, 3 March 1193. He entered the service of Nureddin, emir of Syria; became vizier in Egypt about 1169; suppressed the Fatimites in 1171; was proclaimed sultan in 1174 and con¬ quered Damascus and Syria. The great object of his policy was to expel the Christians from Palestine, and recover the city of Jerusalem (see Crusades). An atrocious massacre of Mohammedan pilgrims by Chatillon added to his ardor; and his vow of revenge against the per¬ petrator he was enabled to make good by his famous victory on the plain of Tiberias in 1187, where he captured Guy de Lusignan, king of Jerusalem, Chatillon (whom he cut down after the battle with his own scimitar) and many more. The fruits of this victory was the towns of Acre, Said and Beyrout; after which he laid siege to Jerusalem, which yielded

(1187) in a capitulation, to the articles of which Saladin faithfully adhered. He then proceeded against Tyre, but failed in consequence of the destruc¬ tion of his fleet by the Franks. The intelligence of the loss of Jerusalem reaching Europe pro¬ duced the Crusade under the Emperor Frederick Barbarossa (q.v.), whose death inspired Saladin with hopes soon damped by the arrival of the forces of Richard Cceur-de-Lion of England, and of Philip Augustus of France. The re¬ covery of Acre by the two kings took place in 1191, upon which event Philip returned to France, and Richard, after twice defeating the sultan, took Caesarea and Jaffa, and spread alarm as far as Jerusalem. At length a truce was concluded between Richard and Saladin (1192), by the terms of which the coast from Jaffa to Tyre was ceded to the Christians, while the rest of Palestine remained to the sultan. The departure of Richard freed Saladin from his most formidable foe. Though chargeable with unjustifiable means of acquiring power, Saladin employed it, when obtained, usefully for his subjects, whose burdens he lightened, while he benefited them by many useful works and establishments. Magnificent in his public undertakings, he was frugal in his personal ex¬ penses. He has been celebrated in Western literature for courage, moderation and justice. Scott introduces him into 'The Talisman, dis¬ guised as the physician Adonbec and as Ilderim. Consult Gaston-Paris, (La legende de Saladin) (Paris 1893) ; Reinaud, 'Notice sur la Vie de Saladin) (1874) ; Baha-ed-din, 'The Life of Saladin* (1897) ; Lane-Pool, 'Saladin, and the Fall of the Kingdom of Jerusalem* (1898); Yusuf ibn Rafi, 'The Life of Saladin* (tr. for Palestine Pilgrims' Text Society, London 1899).*

SALADO, sa-la'fho, a river of Argentina, rising in the eastern slopes of the Cordilleras, and emptying into the Parana after a course of 750 miles. It is salty, hence the name.

SALAL, an evergreen shrub (Gaultheria shallon), of the northwestern United States, from 2 to 10 feet high, with dark-green leaves and reddish twigs, bearing racemes of flowers, succeeded in August by dark-purple fruit, "salal- berries,® of the size of buck-shot, rough on the outside, very juicy and of a sub-acid flavor.

SALAMANCA, sal-a-man'ka, Mexico, a town in the state of Guanajuato, situated in the south-western corner of the state, on the rail-

road to Guadalajara. It lies in a wide, fertile but somewhat marshy plain. Among its seven churches one is aˆ Gothic structure built on an ambitious plan. I he chief industry of the town is the manufacture of porcelain. Pop. 13,497.

SALAMANCA, N. Y., village in Cattarau¬ gus County, on the Allegheny River, and on the Erie, the Buffalo, Rochester and Western and the Pennsylvania railroads, 54 miles south of Buffalo. It was incorporated as a village in 1878. Ihe lumber business is the chief industry, and there are several saw and planing mills ; the village also has a tannery, wire-mattress factory, cigar factories, an em¬ broidery factory, and railroad machine shops. It contains a national bank with a capital of $50,000, and resources of $1,248,948. It has both natural gas and electric-light plants, and a grav¬ ity system of waterworks. The town has a public high school, established in 1881, with a school library of over 3,000 volumes; and a Roman Catholic parish school. Pop. 9,276.

SALAMANCA, sa-la-man'ka, Spain, (1) zapital of a province of the same name, in Old Castile, 120 miles northwest of Madrid, occupy¬ ing three hills on the right bank of the river Tormes. The bridge across the river rests on 27 arches and is of Roman foundation. Its numerous and magnificent ecclesiastical and educational institutions have secured for Sala¬ manca the title of (

(2) The province of Salamanca has an area

of 4,829 square miles, the greater part of which is covered by forests of oak and chestnut, and an estimated population of 337,580. The prin¬ cipal rivers are the Tormes, Douro, Yeltes, Agueda and the Alagon. There are good har¬ vests of cereals, hemp, oil and wine. Gold is found in the streams, and iron, lead, copper, zinc and coal in the hills, but the mines are only partially developed, partly due to the difficulties of transportation. The manufactures are unim¬ portant and mainly for home consumption. The cloth of Bejar is especially good. Tanning of hides is a considerable industry. The province is traversed by a railway to Portugal. Besides the capital, the only other cities are Bejar and Ciudad Rodrigo.

SALAMANDER, the name applied gener¬ ally to the species of tailed Amphibians (Urodela) , but originally to the common Euro¬ pean genus Salamandra. The smaller strictly aquatic species are known as newts (q.v.) or tritons ; some of the larger species have re¬ ceived special names, as Kongo-snake, hellbender Siren and water-dog (qq.v.). The remaining salamanders are terrestrial or semi-aquatic and only rarely remain

permanently in the water. One Californian species (Autodax lugubris) is partly arboreal. They are of small size and lizard-like form ; but the popular notion that they are lizards is altogether erroneous as they are strictly batrachian in structure and life- history. The skin is smooth, glandular and scaleless, the skull possesses a well-developed parasphenoid bone and two occipital condyles, and all, except a few terrestrial species, pass through an aquatic gill-breathing stage. Some of the larger aquatic species advance but little beyond this condition; but in the great majority it is larval only and is succeeded by an abranchi¬ ate and sexually mature state. The axolotl (q.v.) of the genus Amblystoma, is a remark¬ able instance of a sexually mature larva. Many adult salamanders breathe by means of lungs, but a recent noteworthy discovery is the total absence of lungs in a large proportion of species, in which respiration takes place partly in the skin, but especially by means of a special vascular area of the pharynx. Most of the species deposit their large eggs in water, some¬ times in a mass of jelly, as Amblystoma (q.v.), sometimes separately or in strings, as Spelerpes ; but others, like Desmognathus fusca and Pletlio- don, seek drier places beneath stones and guard the eggs, and the terrestrial salamanders of Europe (Salamandra) are ovoviviparous. All are carnivorous and subsist upon insects, worms, etc. They are chiefly active at night, and dur¬ ing the day conceal themselves beneath stones and logs. During cold weather they pass into a more or less profound state of hibernation. Owing to the numerous cutaneous glands the skin is always moist and cold, from which arose the remarkable superstition that these animals, which, as a matter of fact require abundant moisture to sustain life, have the power not only of resisting, but of quenching, fire. Pliny records that he tried the experiment, and the salamander was burned to a powder; yet the fable continued to be credited till very recent times. From this old belief the name is applied to many articles, and by the ancients to a mythical creature, having fire-resisting quali¬ ties. The cutaneous secretion is poisonous to

many of the lower animals. (For a classification of salamanders see Urodela; for development see Embryology). Consult Cope, (Batrachia of North America) (Washington 1889) ; Gadow, (Amphibia and Reptiles) (New York 1901) ; Phisalix-Picot, Mme., (Recherches embryolo- giques, histologiques et physiologiques sur les glands a venin de la salamandre terrestre) (Paris 1900).

SALAMANDER, a kind of gopher (q.v.).

SALAMBA, the native Filipino name for a kind of fishing apparatus, used near Manila, fitted on a raft composed of several tiers of bamboos. It consists of rectangular net, two corners of which are attached to the upper ex¬ tremities of two long bamboos, tied crosswise, their lower extremities being fastened to a bar on the raft, which acts as a hinge ; a movable pole, arranged with a counterpoise as a sort of crane, supports the bamboos at the point of junction, and thus enables the fishermen to raise or depress the net at pleasure. The lower extremities of the net are guided by a cord, which, being drawn toward the raft at the same time that the long bamboos are elevated by the crane and counterpoise, only a small portion of the net remains in the water, and is easily cleared of its contents by means of a landing net.

S A L A M I S , sal'a-mis, ancient PIT- YOUSSA (Island of Pines), modern KO- LURI, an island off the coast of Greece, in the Gulf of iEgina, about 10 miles east of Athens. It covers an area of about 30 square miles ; is of irregular shape and rocky surface, and separated from the mainland by narrow, winding channels, giving access to the beautiful Bay of Eleusis, which has the appearance of a lake. Its soil is well adapted to the olive, and vineyards thrive. The other chief product is honey. The old city of Salamis stood on the south coast, and the famous naval battle of 480 b.c., between the Greeks and Persians, soon after the great battle of Thermopylae, was fought in the narrow eastern strait. The new city of Salamis is on the northeast coast. The principal town is Koluri. Solon and Euripides were natives of the old city.

SALAMMBO, sa'lam-bo', by Gustave Flaubert, is an attempt to renew, in an age of science and according to the spirit of realism, the historical novel, which in its typical form as created by Walter Scott and practised by his numerous followers was an outgrowth of the romantic temper. It presents a reconstruction of the life of Carthage in the 3d century b.c., utilizing some of the events of the war of the Mercenaries against the Carthaginians as told by Polybius (Book I, last chapter). In prepa¬ ration for his task he undertook a journey to the scene of his story, studied minutely the records and monuments of old Semitic civiliza¬ tion and sought patiently through familiar ac¬ quaintances with the present inhabitants of the region to discover in their life and character clues to the past. To those who impeached the accuracy of his picture he replied at length and in detail, citing authorities and warmly repelling all criticism that hinted either at ignorance or carelessness. But it is not for its erudition that the book has its fame, but for its art. Flaubert was first of all an artist, and if he

took great pains to ensure truth in the matter of his work, he took even greater pains to clothe the material in a perfect garment of words. For him, as for all great stylists, there was but one perfect word and one perfect

phrase in a given case, and he knew no peace nor rest till he had found it. Salammbo is not a moving tale of ad¬ venture, but a series of pictures, rich, full, vivid and exquisitely wrought, in a texture of words that caresses the ear. They have both an in¬ tellectual and a sensuous charm. But they are often violent, painful, abhorrent, leaving us op¬ pressed with a sense of the cruelty and mockery of life in Flaubert's pessmistic vision of it. Sainte-Beuve devoted a series of articles to Salammbo in (Nouveaux lundis) (Vol. V). Flaubert wrote a rejoinder that is to be found in current editions of the novel and in his (Correspondence, > Vol. II. An English transla¬ tion was made by M. French Sheldon (London

1886).

Arthur G. Canfield.

SALANDRA, sa-lan'dra, Antonio, Italian

statesman : b. Lucera, Apulia, 1853. For many years a professor of administrative law at the University of Rome, he entered Parliament as deputy for his native city and early became associated with Baron Sonnino (q.v.) in the <(party of constitutional opposition® against the political degeneracy of ˆGiolittism.® After holding various posts in several cabinets Signor Salandra became Premier in March 1914 on the resignation of Giolitti. During the first months of his administration he was engaged in a severe struggle against the Parliamentary ma¬ jority controlled by Giolitti. On the outbreak of the European War, Salandra refused the assistance of Italy to Germany and Austria on the ground that the Triple Alliance stipulated co-operation only in case of an attack. The Foreign Minister in his Cabinet, San Giuliano, inclined more toward the Central Powers or at least benevolent neutrality. Nor was the For¬ eign Minister the only member of the Cabinet to oppose the Premier's policy. With the sup¬ port of Signor Martini, the Colonial Minister (and a sincere friend of France), Salandra succeeded in overcoming the opposition of his colleagues. He had correctly gauged the temper of the country and the disinclination of the army and navy to fight on the side of Austria. His hands were strengthened by the somewhat opportune death of San Giuliano in October 1914, which enabled him to invite his former chief, Baron Sonnino, to accept the portfolio of Foreign Affairs. Both were resolved from the beginning to cast in their lot with the Allies in due course, though it was necessary first to place the army on an efficient footing and to break the links of economic dependence which bound Italy to the principal partner of the alliance. While Prince von Billow and other agents of the. Central Powers were exerting themselves to influence Italian opinion, the gov¬ ernment prepared for the breach. At the instigation of von Billow the ex-Premier Giolitti endeavored to stir up the king and Parliament to support the German

cause, and to bring about the fall of Salandra. These machinations were an open secret and only served to heighten public indignation against the conspirators. Salandra decided on a bold stroke. He ten¬ dered his resignation to the king on 13 May

1915. Italy was electrified ; enthusiastic gather¬ ings demanded «War or the Republic." It was openly expressed that the king would stake his crown if he yielded. Three days later came the news that Salandra's resignation was not ac¬ cepted; the demonstrations ceased; Giolitti and the German agents left Rome, and 10 days later Italy declared war. Signor Salandra resigned in June 1916 and was succeeded by Signor Boselli.

SALANGANE, a swift (Collocalia fuci- phaqa) of the Malayan Archipelago, famous as the producer of the edible birds' nests. See Birds' Nests, Edible.

SALARY GRAB, in American history, the popular name for the general increase in Fed¬ eral salaries in 1873. The Constitution pro¬ vides for the compensation of the President, senators, representatives, justices and Federal officers from the Federal treasury. The Act of 3 March 1873 provided that the President's salary be increased from $25,000 to $50,000, that of the chief justice from $8,500 to $10,500, those of the Vice-President, Cabinet officers, associate justices and speaker of the House from $8,000 to $10,000. and of senators and repre¬ sentatives from $5,000 to $7,500. Another act, 4 March 1873, was retroactive as regards the salaries of members of Congress during the previous two years. This, the essence of the (

SALAWATTI, sa-la-wa'te, a Melanesian island off the western coast of New Guinea, off the northwestern extremity of Paupa, from which it is separated by Galewo Strait, covers an area of about 670 square miles. A chain of chalk cliffs, rising to a height of 2,500 feet, skirts the northern coast ; the remaining portion is a deep valley covered with virgin forests. Sala- watti was discovered by Watson in 1764. It is regarded as belonging to Dutch New Guinea. Pop. (est.) 5,000.

SALAYER, or SALEYER ISLANDS,

East Indies, a small group of islands off the southern coast of Celebes from which they are separated by the Strait of Salayer, 13 miles wide. These islands form a part of the Dutch province of Macassar, the greatest native mart of the archipelago, in the trade passing east as far as and including

New Guinea — tortoise shell, pearl shell, spices, birds-of-paradise skins and beche- de-mer. The principal island of the group is Salayer, or Great Salayer, about 35 miles long by 8 miles broad. Pop. of group, 60,000.

SALDANHA (sal'da'na) BAY, South Africa, on the west coast of Cape Colony, 80

miles north of Cape Town, is a minor com¬ mercial port on the Atlantic, for the western territories of South Africa. It is chiefly of service in the coast trade, and of all the harbors of this seaboard is the only one affording shelter and anchorage at all seasons. It was formerly the chief Dutch naval station in South Africa.

SALE, George, English Oriental scholar: b. supposedly in Kent, about 1680 ; d. London, 13 Nov. 1736. Little is known of his life except that he was a solicitor in London, and at an early period turned his attention to the study of Arabic and other Oriental languages. In 1726 he began the publication of an Arabic translation of the New Testament for the So¬ ciety for the Promotion of Christian Knowledge, and was for years engaged in the work of that association. He is best known by his admirable translation of the Koran in 1734, still highly esteemed. He wrote many Oriental biographies for Bayles' (General Dictionary) (10 vols.,

*1734) and was a contributor to the Universal History) (1739). Consult Davenport, (Sketch of the Life of George Sale.**

SALE, Sir Robert Henry, English military officer : b. Buckden, Huntingdonshire, 19 Sept. 1782; d. Mudki, India, 18 Dec. 1845. He en¬ tered the army with an ensign's commission in 1795, was promoted lieutenant in 1797 and in 1798 was ordered to India. He was engaged at Seringapatam, and in 1810 took part in the ex¬ pedition against Mauritius. In 1813 he was pro¬ moted major, and in 1815 he returned to Eng¬ land with his regiment. He served in the expe¬ dition against Burma in 1824; in 1838 became brevet-colonel and was placed in command of a brigade in the army of the Indus. In the war with Afghanistan which followed Sale played an important part. He became major- general in 1840 ; was in command of the army which stormed Khurd Kabul Pass in 1841 and defended Jelalabad in the siege of 1841-42. He was knighted for his conduct at Kabul, received the thanks of Parliament for his services in the war, and the decoration of G.C.B. In the Sikh War he was wounded at the battle of Mudki, 18 Dec. 1845, and died three days later.

SALE, in law. See Sales.

SALEM, sa'lem, Ill., city, county-seat of Marion County, on the Baltimore

and Ohio, Southwestern and other railroads, 97 miles southeast of Springfield. It is in an agricultural and coal-mining region ; its chief industry is the culture, evaporation and shipment of fruit. It has also several flour mills. Under the Na- tiona Banking Law of 1913, it is in Federal Re¬ serve District No. 8, and in 1917 had a national bank with a capital of $50,000, and resources $452,337. It contains a public high school, founded in 1870. Pop. (1920) 3,457.

SALEM, India, (1) chief town of a dis¬ trict of the same name, 207 miles southwest of Madras. It is well built, but unhealthy, being located in a narrow valley and subject to sud¬ den and frequent changes of temperature. It has important manufactories of cotton, silk and cutlery. There is a municipal college, three printing presses, four reading-rooms and an English mission. Pop. 59,153. (2) The dis¬

trict embraces 7,529 square miles and is very hilly, intersected by broad plains. The principal rivers are the Cauvery with its numerous trib-

utaries. The forests are valuable, magnetic iron ore abundant, there are deposits of corun¬ dum and chromate of iron. The chief crops are millet, grain, rice, ragi, oil seeds and some cot¬ ton, indigo, coffee and tobacco. Much of the area is irrigated.

SALEM, Mass., city, one of the county-seats of Essex County, on a peninsula formed by two inlets of the Atlantic, known as North River and South River, and on the Boston and Maine Railroad, 14 miles northeast of Boston. It was founded in 1626 by Roger Conant and chartered by John Endicott in 1628. The church was organized 6 Aug. 1629 with Samuel Skelton and Francis Higginson as pastor and teacher. In 1633 Roger Williams was pastor of the church here, but was driven out in 1636. In 1692 the witchcraft delusion broke out, and 19 persons were hanged as witches on Gallows Hill, while Giles Cory was pressed to death for refusing to plead, the only instance on record in America under the English statute. (See Witchcraft). In 1774 the first provincial as¬ sembly was held here and declared for the inde¬ pendence of the Massachusetts colony; and in 1775 the British under Captain Leslie were pre¬ vented from crossing the North Bridge in their search for arms and ammunition. Salem fur¬ nished over 150 armed privateers during the Revolution. It was incorporated as a city in 1836, and furnished a large quota of troops dur¬ ing the Civil War. It was the birthplace, and for a time the residence, of Nathaniel Haw¬ thorne. Before the War of 1812 Salem had practically a monopoly of the

East Indian and China trade ; since then the foreign commerce has gradually been transferred to Boston and other ports, but there is an important coasting trade in coal, large quantities of which are landed here for transportation to inland towns. The manufacturing industries are also of im¬ portance ; they include a large cotton mill, tan¬ neries, a lead factory, chemical works, cordage works and shoe factories. In 1914 the city had 178 manufacturing plants, employing $9,823,- 520 capital, using materials valued at $7,936,035, and yielding products valued at $13,652,586. Under the National Banking Law of 1913, the city is in Federal Reserve District No. 1, and in 1917 had a national bank with capital $100,- 000, and resources $551,533. The city is con¬ nected with Beverly, Peabody, Marblehead, Lynn and other towns by electric road, and is a centre of local trade. The town is irregularly laid out, but has a number of beautiful modern residences and three public parks. There are also several of the earliest colonial houses stand¬ ing, and a large number of mansions built in the days of the town's commercial supremacy; among the former are the Corwen, or ((witch house,® and the birthplace of Timothy Picker¬ ing. Among the numerous points of interest in Salem are the old cemetery, formerly known as (

able manuscripts ; the Peabody Academy of Sciences contains an almost complete Essex County natural history collection, an ethnologi¬ cal collection from the Orient, Mexico and South America, largely gathered by the Salem sea captains, Japan and China being largely represented; also an interesting collection of the models and pictures of ships built in Salem. The charitable institutions include a hospital, an old ladies' home, an old men's home and a city orphan asylum. The city has a public classical and high school established 1856, and three Roman Catholic parochial schools; it is also the seat of two private secondary schools, a commercial school and a State normal school. The city government is vested in a mayor, a board of aldermen of seven members and a city council of 24. Pop. 42,529. Consult Felt, c Annals of Salem (2 vols.) ; Osgood and Batchelder, historical Sketch of Salem) ; Powell, historic Towns of New England) ; Putnam, (01d Salem> ; Silsbee, half Century in Salem, > and Visitor's Guide to Salem* (pub¬ lished by the Essex Institute).*

SALEM, N. J., city, county-seat of Salem County, on the Salem Creek near its junction with the Delaware, and on the West Jersey and Seashore Railroad, 31 miles southwest of Phila¬ delphia, Pa. It was first settled in 1641, and this first colony was succeeded by a Swedish fort; it passed into the hands of the Dutch, then to the English in 1664, and was in that portion of New Jersey which was bought by the Quakers in 1674. The Quakers established a new and prosperous colony, and in 1682 Salem was made a port of entry; in 1778 it was plundered by the British. It is the trade centre of a fertile agricultural region; and in addition to its railroad

facilities has regular steamboat communication with Philadelphia. It has also a variety of manufacturing interests, including fruit canning establishments, iron foundries, glass manufactories, Hour mills, an oil-cloth factory and a hosiery mill. It had (1917) two national banks with a combined capital of $250,- 000 and resources of $3,638,874. It contains a public library, founded in 1804, and a Friends' preparatory school. Pop. (1920) 7,435.

SALEM, Ohio, city in Columbiana County, on the Pennsylvania Railroad, 61 miles south¬ east of Cleveland1. It is the largest town in the county, and the centre of a rich agricultural and stock raising region. Its manufacturing in¬ terests are numerous and varied ; they include machine shops, manufactories of engines, wire nails, pumps and stoves, galvanized iron works, furniture, church furniture, church organ fac¬ tories, brick-works and tile-works. There are two national banks with a combined capital of $200,000 and resources of $2,963,298. The city has a public high school, established in 1863. Pop. (1920) 10,305.

SALEM, Ore., city, capital of the State and county-seat of Marion County, on the Willa¬ mette River, and on the Southern Pacific Rail¬ road, 44 miles south of Portland. It was first settled in 1840 by Methodist missionaries, was incorporated as a city in 1853 and became the State capital in I860. It has regular steamer connection with Portland, and is the trade cen¬ tre of a fertile agricultural region. Its manu¬ facturing interests are numerous and important ; they include flour mills, woolen mills, fruit

evaporating and canning establishments, tan¬ neries, brick-kilns, tobacco factories, carriage and wagon factories, and agricultural imple¬ ment works. In 1914 there were 67 manu¬ facturing plants, employing $2,365,366 capital, and yielding products valued at $2,845,844. The city is well built with wide regular streets and two public parks. The State capitol, built in 1875-76, is a handsome structure ; among the State institutions in the city are the Institute for Deaf-Mutes, the Institute for the Blind, the insane asylum, the reform school, and the penitentiary. Under the National Banking Law of 1913 the city is in Federal Reserve District No. 12, and in 1917 had two national banks with combined capital of $225,000, and resources of $2,72 6,256. The city contains the State and a Masonic library, and a public high school estab¬ lished in 1892 ; and is the seat of the Academy of the Sacred Heart (Roman Catholic),. of the Capital Business College and of Willamette University (Methodist Episcopal). At Chem- awa, a few miles distant, is an Indian industrial

training .school. Pop. (1920) 17,679.

SALEM, Va., town, county-seat of Roanoke County, on the Roanoke River, and on the Nor¬ folk and Western- Railroad, 51 miles west of Lynchburg. It is the centre of an agricultural and tobacco-jgrowing region, and has a variety of manufacturing interests, including tobacco factories, tanneries, chair and carriage factories. It has a national bank (capital, 1917, $75,000, re¬ sources $679,573) and a State bank. The chari¬ table institutions include two orphan asylums. There are medicinal springs in the vicinity, and it is a popular resort with Southerners. The town has a public high school, and is the seat of Roanoke College, establishedr 1853 under the control of the Lutheran Church. Pop. 4,159.

SALEM, W. Va., city in Harrison County, on the Baltimore and Ohio Railroad, 14 miles west of Clarksburg, the county-seat. Its indus¬ trial establishments include three window-iglass plants, a lamp-chimney factory, large planing mill, concrete block factory and gasoline refining stations. There are two banks, the Merchants and Producers, with resources of $700,000 and the First National, with resources amounting to $800,000. The value of. the taxable property within the city is approximately $3,000,000. The educational establishments include Salem Col¬ lege, a high school and a public school. The most noteworthy public buildings are those of the educational establishments just mentioned and the churches. The government is vested in a mayor and council. The city's receipts in a recent year totaled $21,000, and the expendi¬ tures $16,000. Of the 627 residences within the city 410 are owned by the occupiers. Pop. 2,920.

SALEM WITCHCRAFT. See Witch¬ craft.

SALEMA, a Pacific Coast food-fish (Ky- phosus analogus) , about 18 inches long and steel-blue in color. It is one of the rudder- fishes, allied to the croakers, and several closely related species are known as chopas, especially K. sectatrix, a large West Indian and Florida form, which is called "chub® at Key West, and affords good sport for the angler.

SALEMI, Sicily, city of the province of Trapani, 64 miles south by west of Palermo. The city is located on an elevation 1,450 feet

above sea-level. It contains the ruins of an old castle, a library, gymnasium, technical school. There is a trade in cattle, grain, wine and oil. Pop. 10,759.

SALEP, a demulcent and slightly nutritive drug, consisting of the oval tubers of certain orchids (Orchis mascula and O. mono), but not of the hand-shaped tubers of O. latifolia and other species. These tubers are

prepared in central and southern Europe and in the Levant, and are dug up as soon as the flower-stalks decay, being then in best condition ; the skin is rubbed off, and they are dried, appearing as brownish-yellow, translucent and horny bodies, inodorous and insipid in taste. The pow¬ dered salep, containing a large amount of muci¬ lage and starch, makes a nutritious jelly with water, and is a suitable food for convalescents. The Tacca pinnatifida, growing in the islands of the Pacific, furnishes a starch called Otaheite or Tahiti salep.

SALERATUS, aerated salt; originally po¬ tassium bicarbonate, an imperfectly carbonated salt, formerly much used in cooking. The name is now commonly applied to the com¬ mercial article sodium bicarbonate, which is used in cookery to neutralize acidity and for raising dough through the evolution of carbonic acid, and is also a common constituent of baking- powders.

SALERNO, sa-ler'no (Ital. sa-ler'no), Italy, (1) capital and seaport of the province of the same name, on the Gulf of Salerno, 32 miles southeast of Naples. It stands upon an acclivity whose summit is crowned by the ruins of an ancient citadel, and is surrounded by a massive stone wall. The Marina is a broad promenade winding for one and one-half miles along the shore. The lava-paved streets are bordered with few good buildings, the chief of which is the cathedral (1084), of Gothic architecture, adorned with a portico of porphyry and Corinthian pillars from Paestum — the ruins of which are in the vicinity. Here are the tombs of Margaret of Anjou, of Gregory VII and a sepulchre containing the bones of Saint Matthew. Other edifices are the governor's palace, theatre, hospitals, churches and con¬ vents. It also has courts of justice, a seminary and a lyceum. The chief industries are cotton and silk spinning and printing. The manufac¬ tures are glass, ceramics, macaroni, iron and leather goods, thread, linen, etc. There is ex¬ cellent wine in the neighborhood. Founded by the Greeks, Salerno became an important city under the Romans, passing into possession of the Goths and later to the Lombards, who in turn were expelled by the Normans. Of the ancient city, Salernum, are still to be seen sev¬ eral temples, an amphitheatre and a theatre. In the mediaeval period it was celebrated for its school of medicine, founded by Robert Guis- card (11th century). It was annexed to the kingdom of Naples at a later period. Pop. 48,247. (2) The province has an area of 1,916*

square miles. It occupies the extremity of Cam¬ pania on the Tyrrhenian Sea. It is covered with spurs of the Apennines, the chief of which are Monte Cervati, Polveracchio, Al- burno and Sacro. The principal streams are the Tusciano, Mingardo and Alerto ; the prod¬ ucts are wheat, corn, flax hemp, olives, figs, wine and fruit. Pop. 571,213. (3) The Gulf

of Salerno, or Gulf of Psestum, is a semi-circu¬ lar indentation of the Mediterranean Sea, sepa¬ rated from the Bay of Naples by Point Campanellas. On its shores stand the picturesque and interesting towns of Amalfi and Salerno and the ruins of ancient Paestum (q.v.).

SALERNO, School of (Schola Salerni- tana), a medical school at Salerno, Italy, fa¬ mous in the Middle Ages, and important not so much for its contributions to medical knowl¬ edge as for its services in retaining the knowl¬ edge already possessed, through a period when all branches of learning were suffering decline, and forming a connection between ancient and modern medicine. As early as the 7th century some of the prelates of the Benedictine mon¬ astery at Salerno were famous for medical as well as other learning; but the school, or group of schools of medicine, which came into exist¬ ence at Salerno was secular in character, the wives and daughters of the professors were often deeply learned and acted as teachers, and law and philosophy were taught as well as medicine. The school was at the height of its glory from the 9th to the 13th centuries; but from that time its decline was steady, owing to the more rapid advancement of other schools. At the zenith of the school's fame the city was known as Civitas Hippocrates, and it attracted many famous personages, among them William of Normandy, later Conqueror of England. The teachings of the school are fairly represented by existing works, but these are chiefly compilations founded on the teachings of Hippocrates and Galen. Such advances in knowledge as the school made were those of practical experience; and while a considerable knowledge of drugs was possessed at Salerno the treatment administered was in the main dietic. Anatomy they disregarded almost wholly. The medical school was dissolved by an edict of Napoleon in 1811, and the other depart¬ ments closed in 1817.

SALES, salz or sal, Saint Francis de. See

Francis de Sales, Saint.

SALES. A sale is a contract by which property is transferred for a price in money. Usually the term is restricted to the sale of per¬ sonal property. A sale is differentiated from other transfers of property by the fact that it is of the general or absolute ownership and by the further fact that it is for a price. A contract to sell, also called an executory con¬ tract of sale, is a contract by which the seller is to transfer property to the buyer for a price which the latter pays or agrees to pay. A contract of sale may be absolute

or conditional.

To constitute a valid sale, there must be, as in all contracts, competent parties and mutual consent. In addition, there must be a subject matter to be sold and a price or con¬ sideration in money. If the price exceeds a specified amount, the contract of sale, to com¬ ply with the Statute of Frauds, must generally be in writing unless there is a part payment or some of the goods are delivered and accepted. A contract for the sale of goods not yet ac¬ quired by the seller is construed to be a con¬ tract to sell. If parties agree upon a sale, but do not fix the price, the law implies a reason¬ able price. The acceptance of an offer to buy or sell may be expressed or implied. Many questions of real difficulty arise in the law as to

when title passes to the buyer, and the de¬ termination of the question is important in the law of insurance, liens, etc. Where a con¬ tract of sale provides that the buyer may re¬ turn the goods or pay the price, the property in the goods ordinarily passes to the buyer sub¬ ject only to a defeasance by the return of the goods. Under a completed sale of goods the title passes from the seller to the buyer im¬ mediately, at the place where the contract is completed. The intention of the parties con¬ trols if the sale is of specific or ascertained goods and this may be shown either by cir¬ cumstances or declarations. If by the terms of the agreement any condition is to be per¬ formed or any material act to be done, as to identify the goods, the title generally does not pass until such act is performed. A sale on trial or approval is held to be a sale upon a condition precedent and the contract is execu¬ tory, the title passing only after the buyer has accepted the goods.

Conditions are distinguished from warran¬ ties generally in that the former constitute the basis of the contract on a breach of which the parties may treat the contract as terminated, whereas a warranty is merely a collateral un¬ dertaking. Warranties are of two kinds : ex¬ press and implied. Formerly the harsh rule of caveat emp-tor was applied to sales, but to-day the law protects the buyer by implying various warranties in contracts of sale. Generally speaking, an implied warranty arises on sales as to merchantability, title, fitness for purpose intended and that the goods shall fill the re¬ quirements of the contract, but not as to quan¬ tity, quality or value. See Contract; War¬ ranty.

The law of sales in England and Ireland has been much simplified by the Sale of Goods Act, passed in 1893. The law of Scotland dif¬ fers somewhat from that of England as to dis¬ tinctions between conditions and warranties and as to the application of the Statute of Frauds in relation to sales.

An effort has recently been made in the United States to simplify the law of sales by codification, and up to June 1917 this effort had met with substantial success by the enactment of the Uniform Sales Act in no less than 18 States of the Union.

Edward F. Donovan.

SALESIAN FATHERS. See Orders, Re¬ ligious.

SALESMANSHIP, The Psychology of.

The salesman like the advertiser must influ¬ ence the minds of men. He must influence men to buy goods and to buy his particular goods. Serving in such a capacity a knowledge of the fundamental principles of psychology will gen¬ erally add to his effectiveness. He, too, must know when and how to make use of. argument, when to appeal to this motive and when to that one. He must know that in most acts of deliberation there is a point when the occur¬ rence of an apparently insignificant idea will swing a possible customer to favorable or un¬ favorable action and he must respond to that situation with the suggestive word destined to close his sale.

That the sales world recognizes the im¬ portance of psychological knowledge as a part of each salesman's equipment is clearly shown

by the inci easing number of books and articles intended to show how psychological fact may be used in increasing selling efficiency. Be¬ sides this there are growing up all over the country public and private sales schools and sales schools conducted by business organiza¬ tions for their employees, all of which are teaching with varying degrees of success a new science of salesmanship which has as its ˆaSm, elementary principles of psychology.

lhe opinion is also spreading that not alone the salesman but also the man who employs him, needs psychological knowledge. The mod¬ ern salesman is frequently given a thorough course of training before he is sent out to visit the customers of his firm or possible customers of his firm. Now modern educa¬ tional methods rest upon a distinctly psychologi¬ cal basis, so he who would train men in a sales school must, like any other teacher, famil¬ iarize himself with educational psychology in certain aspects, at least, if he would make the most of the training period of his men.

Then there is another highly important ap¬ plication of psychology to the

problems of the selling organization. The methods of select¬ ing the sales force have been and are still in many instances of a surprisingly hit or miss character. As a new development, psychologists are being called in by certain progressive con¬ cerns to standardize their methods of select¬ ing men. While the science of mental meas¬ urement is still in a comparatively undeveloped stage, certain facts regarding a man can be determined, with a fair degree of accuracy, by means of mental tests. For example, mental tests will give a strong indication of the gen¬ eral native intelligence of a man. This fact alone will not of course give complete infor¬ mation as to the selling ability of an appli¬ cant, but, all things considered, the greater native intelligence a man has the more likely he is to succeed in a selling position. So, when taken as additional information about an applicant, the information secured from such tests is highly valuable. Present mental tests investigations are hastening the day when more specific information about applicants for sales positions can be obtained by this method.

Psychological investigations into the prob¬ lems of character traits, the judgment of such traits and their bearing upon specific lines of work are bringing out further results of great utility for the sales manager. In short, the sales organization, like all other organizations so intimately concerned with the modes of human thought and action and with the dif¬ ferences which we know exist between one man and his neighbor, is sure to reap increas¬ ing benefits from the mo.dern efforts of psychol¬ ogists to work out practical solutions for the problems of the human failures and misfits.

Walter Dill Scott,

Director, Bureau of Salesmanship Research, Carnegie Institute of Technology, Pittsburgh.

SALFORD, sal'ford, England, a corpo¬ rate town of Lancashire, adjoining Manchester, of which industrially and economically it is practically an integral portion, and with which it is connected by 16 bridges and several rail¬ road viaducts ; area, eight square miles. There are four parks, a museum and four public libraries. Pop. about 23.3,970. See Man¬ chester.

SALIC LAW, an ancient code or system of jurisprudence of the Salians, a tribe of Ger¬ mans, who originally inhabited the country be¬ tween the Meuse and the Rhine, but in the 5th century invading and conquering Gaul under Clovis, they founded the French monarchy. Their code appears to have been committed to writing about the 5th century, but according to Hallam it did not originate before the time of Clovis. The particular law, commonly called the Salic law, by which females were ex¬ cluded from the throne of France, has been the subject of much dispute, and its modern application was probably fortuitous. The laws of the Salians do not appear

to have usually excluded women from inheritance, and the particular law on which the exclusion rests did not originally refer to the crown, but to certain lands called Salic; and does not ap¬ pear to have excluded women from the line of inheritance, but only from inheriting im¬ mediately. Its object may have been to secure the performance of military service. It re¬ mained in force from this time till the close of the French monarchy.

SALICIN, C13H1SO7, a glucoside, discovered by Leroux, existing in the bark and leaves of most varieties of the willow and poplar. Color¬ less, silky, crystalline needles, bitter taste, soluble in water or alcohol. Boiling with dilute acid gives glucose and saligenin or salicyl al¬ cohol. Oxidation gives salicylic acid. Used to some extent as an anti-periodic in malarial disorders, but not as efficient as quinine. Be¬ lieved by some to be valuable as a substitute for salic3dic acid in the treatment of rheuma¬ tism. Dose 10 to 30 grains.

SALICORNIA, a genus of the Chenopo- diacece, with about 10 species, growing in saline soils, named from the saline properties of the genus, and the horn-like branches. The three American species are curious naked, jointed plants, sometimes two feet high, with many opposite terete branches and leaves reduced to mere scales at the nodes, and appearing to ensheath the upper joints. The flowers are also reduced to pistils and stamens, and are pocketed in groups in hollows at the axils of, and behind, the upper scales. They are succu¬ lent herbs, so brittle as to be called glass- worts, and grow over such large areas of marsh lands that when their usual green hue turns to red in the autumn they form great patches of vivid color. Hence the common name marsh samphire. There are five or six known species, and some, of them yield soda in large quanti¬ ties, especially the Salicornia brachiata, common along the coasts of India and those of Indian salt-lakes.

SALICYLIC (sal-i-sil'ik) ACID AND SOME OF ITS IMPORTANT COM¬ POUNDS. Salicylic acid, ortho-oxy-benzoic acid, CcH4.OH.GOOH, occurs in the free con¬ dition in the buds of the Spircea ulmaria (meadow-sweet) and as a methyl ester in the oil of Gaultheria procumbens (wintergreen).

It may be prepared by oxidation of saligenin, a compound obtained from salicin; also by action of carbon dioxide on dry sodium pheno- late at ordinary temperatures. The resulting phenyl sodium carbonate is heated for several hours in an autoclave to about 285° when it is decomposed into dry sodium salicylate; which

is dissolved in water, precipitated by a mineral acid and the acid purified by recrystallization. A very pure form is obtained by the action of alkalis on oil of wintergreen. Fine white needle-like crystals of a sweetish acid taste, slightly soluble in cold water, easily so in hot. Its aqueous solution assumes a violet hue upon the addition of a small amount of ferric chloride. It is a valuable antiseptic, the pres¬ ence of even very small amounts being suffi¬ cient to prevent the decomposition of most animal and vegetable tissues or products. For¬ merly used extensively in the preservation of milk, beer, cider, meats, canned goods and other food products, it has more recently been con¬ demned as injurious to the digestive organs and to the general health, and in many of the States its addition to foods is prohibited. It forms a number of crystalline salts of the metals, the most important being.

Sodium Salicylate, a white or pinkish white finely crystalline body, of a sweetish taste, soluble in water or alcohol. Often used as a preservative in place of the free acid, but the most important use is as a remedy for rheuma¬ tism, gout, etc. Dose from 10 to 30 grains.

Methyl Salicylate, GH4.OH.CO.OCH,, forms about 90 per cent of the oils of winter- green and of birch. It may be made syntheti¬ cally by the distillation of two parts salicylic acid, two parts methyl alcohol and one part concentrated sulphuric acid, and is then called synthetic oil of wintergreen. The compounds derived from salicylic acid that are used in medicine are very numerous, some of the im¬ portant ones being Salicylanid, Saloi, Salophen, Betol, Salifebrin, Salipyrin, etc. They are used as antiseptics or as antirheumatics.

SALICYLOL, SALICYLIC ALDE¬ HYDE, or ORTHO-OXY-BENZOIC AL¬ DEHYDE, is a volatile oil occurring in the blossom of the meadow-sweet. May be ob¬ tained by careful oxidation of saligenin or sali- cin. An aromatic oil, colorless when pure but turning red on exposure to light and air, slightly soluble in water, easily so in alcohol. Used to some extent in the perfume industry, and as a flavoring substance. Said to be added to vermouth and other liqueurs.

SALIDA, sa-li'da or sa-le'da, Colo., city in Chaffee County, on the Denver and Rio Grande Railroad, 64 miles southwest of Colorado Springs. It is the centre of a mining region where iron, copper and silver are the principal ores ; marble, onyx and limestone are also quar¬ ried in the vicinity, and agricultural, dairying and stock-raising interests are of some im¬ portance. Medicinal hot springs have made Salida a favorite health resort. It has good roads and some of the best mountain scenery in the West. The city contains large railroad shops, and two banks. The Rio Grande Gen¬ eral Hospital is located here, and there is a pub¬ lic high school. The chief

public buildings are the library, city hall and churches. The value of taxable property is $3,050,000. The govern¬ ment is vested in a mayor and council. The municipal receipts and expenditures average $38,000 yearly. Pop. 4,689.

SALII, sa'li-i, priests of Mars in ancient Rome, so called from the Latin word salire, to leap and dance. Numa fixed their number at 12; Tullus Hostilius added another 12, who

were called Salii Collini. Their origin is thus accounted for by the Romans : In the time of Numa, Rome was desolated by a pestilence, which ceased when the gods let fall from heaven the ancile (a shield of a peculiar form). The soothsayers declared that this shield was the sign of the perpetuity of the Roman power, and advised that 11 others should be made simi¬ lar to it, so that the true ancile could not be so easily purloined. This advice was followed. On the 1st of March every year when the Salii offered sacrifices to Mars they carried the shields ahout the city, clashing them together, executing warlike dances and singing the Salian hymns — ancient songs in praise of Mars and the other gods, and of distinguished men, particularly of Mamurius, who made the 11 shields. The dress of the Salii was a purple tunic embroidered with gold, and bound with a brazen belt, and a toga with a purple border. On their head they wore a high cap in the form of a cone, with a sword by their side, a spear or rod in their right hand and an ancile in their left. None but patrician youths whose parents were alive could be admitted among the Salii.

SALINA, sa -le'na, Kan., city, county-seat of Saline County, on xhe Smoky Hill River, and on the Union Pacific, the Missouri Pacific, the Atchison, Topeka and Santa Fe and the Chicago, Rock Island and Pacific railways, 110 miles west of Topeka. Salina was founded in 1857 by Col. William A. Phillips ; became a borough in 1873 and a city in 1880. It is gov¬ erned by a mayor and eight councilmen, elected for two years. It is the commercial centre for a fertile agricultural and stock-raising region, and a valuable salt springs and gypsum quarries are in the vicinity. It has several grain eleva¬ tors and exports large quantities of grain; ex¬ tensive flour and paper mills and other manu¬ factories. Under the National Banking Act of 1913, the city is in Federal Reserve District No. 10, and in 1917 had two national banks with combined capital of $3,796,648. There are 11 denominational churches, high school, public li¬ brary and Federal court buildings. It is the seat of Saint John's School (Protestant Episcopal), Kansas Wesleyan University, Normal Univer¬ sity and the Kansas Wesleyan Business Col¬ lege. Pop. (1920) 15,085.

SALINA CRUZ, Mexico, Pacific seaport in the state of Oaxaca, 12 miles south of Tehuante¬ pec, on the Tehuantepec Railroad, of which it is the

southern terminal. It had a fine harbor and steamship connection with many foreign countries. Pop. 6,138.

SALINA FORMATION, or SALINA STAGE, in North American geology an im¬ portant group of beds, belonging to the upper part of the Silurian series (q.v.), named from a township in Onondaga County, N. Y., where salt springs, issuing from this formation, were discovered in the 17th century bv the Jesuit missionaries. The > formation, which consists mainly of shales, with frequently extensive salt and gypsum beds, comes to the surface in an east and west belt extending from Herkimer County, N. Y., westward across the Niagara River into Canada. Its erosion has caused a belt of low, often swampy, country, averaging normally from 8 to 15 miles in width, which is followed by the Erie Canal and the New

York Central and other railroads. The forma¬ tion extends across Canada, where its outcrop is chiefly drift-covered, into Michigan, where it comes to an end. Southward it is known in northern Ohio (500 feet thick) at a depth of 2,000 feet below the surface, but disappears in southern Ohio. Southeastward the formation is known in Pennsylvania and Maryland. The salt of the formation is distributed in irregular lenticular beds, which, with their outer strati¬ fied shale seams, often aggregate several hun¬ dred feet in thickness. The salt is largely ob¬ tained from wells by the leaching process and the solar evaporation of the brine. The chief localities where this is carried on in New York State are Syracuse and Warsaw. The beds of this formation are for the most part non-fos- siliferous and were deposited in an enclosed basin or dead sea which characterized eastern North America in late Silurian time. See Paleozoic ; Salt.

SALINAN (sa-le'nan) INDIANS, named from Salinas River. A linguistic family of North American Indians formerly inhabiting parts of San Luis Obispo, Monterey and San Benita counties, California, their habitat ex¬ tending from the Coast Range to the Pacific and from the headwaters of the Salinas River to near the present Solidad. Thev subsisted by hunting and fishing, ekeing out their livelihood by means of acorns, seeds and roots. They manufactured coiled basketry, but of their gen¬ eral habits and customs almost nothing is known. No name for themselves as a body, for their language or for any division, either in their own or in any other Indian language, is known. They were named by Lathman (1856) and Powell (1891), and are known to have practiced cremation. The missions of San Antonio (1771) and San Miguel (1797) were established among them by the Spanish fathers, the baptisms during the mission period

number¬ ing 4,400 and 2,400 respectively. The population gradually decreased, however, and now. the stock is represented by only a score of indi¬ viduals.

SALINAS, sa-le'nas, Cal., city and county- seat of Monterey County, 85 miles southeast of San Francisco, on the Southern Pacific and the Pajaro Consolidated railroads. It is situated in an agricultural and dairying region and sugar- beet culture is an important industry. In the town are machine shops and flour mills and nearby is a large beet-sugar factory. Pop. 4,308.

SALINAS, a river in California, in Mon¬ terey County, which flows north by west into Monterey Bay. It is about 150 miles long.

SALIS-SEEWIS, za'lis-za'vis, Johann Gaudenz, Baron von, Swiss poet: b. Seewis, canton of Grison, 26 Dec. 1762; d. there, 29 Jan. 1834. He went to Paris in 1779, entered the Swiss Guards and eventually became ad¬ jutant to Massena. He lived in Switzerland after 1793, was influential in Swiss politics and until 1817 was inspector-general of the Swiss military forces. His verse was widely known and deals chiefly with nature. Several of his poems were translated bv Longfellow. His col¬ lected verse appeared

SALISBURY, salz'bu-ri, Edward El- dridge, American philologist: b. Boston, Mass., 6 April 1814; d. New Haven, Conn., 5 Feb.

1901. He was graduated from Yale in 1832 and from Yale Divinity School in 1835. After some years spent abroad in the study of Orien¬ tal languages, he was professor of Arabic and1. Sanskrit at Yale in 1841-54. On resigning the chair he provided an endowment for it and subsequently gave the university his Oriental library. He was president of the American Oriental Society in 1863 and for several years conducted its official organ. He was the author of a (Discourse on Arabic and Sanskrit Litera- ture) (1843) ; Principles of Domestic Taste> (1877); (Genealogical and Biographical Mono¬ graphs } (3 vols., 1885-88), etc.*

SALISBURY, Robert Arthur Talbot Gascoyne Cecil, 3d Marquis of, English statesman : b. Hatfield, Hertfordshire, 3 Feb. 1830; d. there, 22 Aug. 1903. He was a descend¬ ant of the great Lord Burghley, Queen Eliza¬ beth's Secretary of State. Educated at Eton and Oxford, he was elected a Fellow of All Souls' College in 1853 and in the same year was elected member of Parliament for Stamford in Lincolnshire. He held this seat as a Conserva¬ tive or ((Tory® until his succession to the mar- quisate on the death of his father in 1868. As a young man he visited Australia and New Zealand, where he worked for a time in the gold mines. While in the Commons he was known as Lord Robert Cecil, until the death of his elder brother in 1865, when he assumed the courtesy title of Viscount

Cranborne. Be¬ tween 1860 and 1883 he contributed 33 articles to the Quarterly Review on foreign affairs and weighty domestic problems. For some years, also, he wrote editorials on foreign affairs for the London Standard. In Parliament he quickly made his mark as a brilliant and caustic debater, active in the discussion of public measures and an uncompromising upholder of the central doc¬ trine of conservatism, namely, that it is better to endure almost any political evil than to risk a breach of the historic continuity of govern¬ ment. In the Derby Cabinet (1866) he became Secretary of State for India, which post he resigned in 1867 because of the Reform bill. In 1869 he was elected chancellor of the Univer- s'itv of Oxford, and was again sent to the India Office by Disraeli in 1874. At the close of the Turkish-Serbian War in 1876 he was sent as Special Ambassador to Constantinople, visiting the Paris, Berlin, Vienna and Rome chancel¬ leries on the journey. He was virtually the leader of the seven plenary meetings held at the conference, which broke up in January 1877 on Turkey declaring that its recommendations of reform were inadmissible — and Europe withdrew to await the inevitable war. At the end of the Russo-Turkish War (q.v.) Salis¬ bury became Foreign Secretary three weeks after the signing of the Treaty of Saint Ste- fano, when he immediately issued the famous ((Salisbury Circular.® This was an admirable exposition of British policy in the Near East and declared that, as the position of Turkey had been settled by the Powers of Europe in the Treaty of Paris, 1856, the signatories thereto had the right and the duty to see that no modifications of it should be made without their consent. Russia recognized that the cir¬ cular meant either war or a conference, and the Berlin Congress (q.v.) resulted. Beacons- field and Salisbury represented Great Britain at the congress.

The Gladstone campaign of 1880 brought the Liberals into office and Salisbury into op¬ position till 1885, when Gladstone was defeated on a budget resolution. In June, Salisbury formed his first ministry, taking the Foreign Office for himself. In February of the follow¬ ing year (1886) Gladstone came into power again. By Tuly he had introduced his first Home Rule bill and had been defeated, giving place to the second Salisbury administration, the latter again combining within himself the offices of Premier and Foreign Secretary. Dur¬ ing this administration, which lasted till 1892, several measures of importance were intro¬ duced ; but Home Rule, once more placed at the head of the Liberal program, aroused, through Gladstone's influence, so wide an in¬ terest that the general elections of June 1892 once more swept the Conservatives from office and Gladstone returned with a majority of 40. Perhaps the most memorable

achievement of Lord Salisbury's foreign policy was the Anglo- German agreement with regard to Africa (1890), by which the relations of Germany, Portugal and Great Britain in Africa were set¬ tled and ((spheres of influence55 were marked off. England obtained the protectorate of Zanzibar and gave Germany the island of Heligoland. When the second Home Rule bill was thrown out by the House of Lords, Gladstone relin¬ quished the premiership to thfc Earl of Rose¬ bery, who resigned in 1895. Salisbury then en¬ tered on his third and last premiership, from 2 July 1895 to 11 July 19Q2. He had to deal with the Armenian and Cretan questions, with the Chinese imbroglio, the Venezuelan bound¬ ary controversy and the South African War (1899-1902). After the 1900 elections, bv which the government received a popular mandate to carry the war on <(to a finish,® Lord Salisbury reconstructed his cabinet and handed the For¬ eign Office over to Lord Lansdowne. Salisbury withdrew from public life 11 July 1902 and was succeeded as Premier by his nephew, Mr. Arthur James Balfour (q.v.). Between 1895 and 1902 the leading figure in the gwernment was the late Joseph Chamberlain, Colo¬ nial Secretary, a former bitter antagonist of Salisbury. Throughout his long public career of 47 years, the Marquis of Salisbury was a consistent Tory. He had many intellectual gifts; an extensive knowledge, a mastery of the English language, a mordant and effective style in debate and a singular mental clear¬ sightedness. He saw so clearly and stated so plainly the reasons against any particular course of action that he frequently seemed to stop the way to any action at all. On occasion, too, he asserted the claims of his country with such unflinching and rigid logic as to place the other side in a position of difficulty and almost of humiliation, though he was not prepared to fol¬ low up his words by deeds, and was quite ready to accept a compromise. He harbored a strong dislike and a mistrust of Germany; he re¬ garded the ambitions of that country as a stand¬ ing menace to England. In later years he at¬ tempted to bring about a better understanding with Germany, as well as with France and Russia. From the outset of the Spanish- American War he strongly set his face against the scheme of a European coalition in favor of Spain. Of a scientific bent of mind — he was an expert electrician and a keen student of

chemistry — Lord Salisbury was entirely indif¬ ferent to public opinion and impatient of cere¬ monial and court functions. In his early career he rather mistrusted the masses, a sentiment gradually reolaced in later years by an un¬ swerving belief in the solid sense of his countrymen. He never played to the gallery or made flowerv speeches. Yet he ultimately ac¬ quired the supreme confidence of both partisans and opponents, simply because he was above the political temptations of ordinary men.

Bibliography. — Aitkin,

SALISBURY, Rollin D., American geolo¬ gist: b. Spring Prairie, Wis., 17 Aug. 1858. He was graduated from Beloit College, Wisconsin, and taught in the academy of that institution in 1881-83. He accepted the chair of geology there in 1884, occupying it until 1891 with the ex¬ ception of 1887—88, which he spent at the Uni¬ versity of Heidelberg. He was appointed pro¬ fessor of geology at the University of Wiscon¬ sin in 1891, and since 1892 has occupied the chair of geographic geology at the University of Chicago. He has been dean of the Ogden Graduate School of Science in the University of Chicago since 1899, and head of the depart¬ ment of geography in the same university since 1902. He has been connected with the United States Geological Survey since 1883, was con¬ nected with the New Jersey State Geological Survey from 1891 to 1910. and has been with the Geological Survey of Illinois since 1900. Besides various lesser reports, he has published a volume on the (Physical Geography of New Jersey5 (1896), and another on (Glacial Geology of New Jersey5 (1902). He has also published (Geography of Chicago and its Environs,5 with W. C. Alden (1899) ; (Geography of the Region about Devil's Lake and the Dalles of Wiscon¬ sin5 with W. W. Atwood (1900) ; a three- volume treatise on ˆGeology,5 with Prof. T. C. Chamberlin; (College Geology5 and in¬ troductory Geology,5 with the same author;

(Physiography, Advanced Course5 ; two smaller works on physiography: (Elements of Geog¬ raphy,5 with Prof. H. H. Barrows and W. S. Tower, and (Modern Geography,5 with the same authors.

SALISBURY, formerly FORT SALIS¬ BURY, Africa, capital of Southern Rhodesia, in Mashonaland, 372 miles by rail from Beira on the eastern coast, and 298 miles by rail north of Buluwayo. Its two parts are known as the Causeway and Kopje, separated by an intervening space of about three-quarters of a mile. Municipal and government offices have been established ; and there are several hos¬ pitals, a cathedral, stock exchange and other buildings. Causeway is the residential district and government headquarters; the Kopje, the

business district. Gold and coal mines abound in the environs, and the plateau is suitable for agriculture. The increasing native and Eu¬ ropean population includes over 500 whites.

SALISBURY, Conn., town, Litchfield County, on the Housatonic River, and on the Philadelphia, Reading and New England Rail¬ road, 63 miles northwest of Hartford. The town contains the villages of Salisbury, Lake¬

ville, Lime Rock, Chapinville and Ore Hill. It was first settled about 1720 by Dutch from New York; New England settlers came to the town about 1740 and it was incorporated in 1741. The mining of the iron ore found in the vicinity soon became an important industry, and during the Revolutionary War much of the cannon, shot, etc., for the colonies was made at Salisbury. The iron mines continue to yield ore of excellent quality, and the town has several blast furnaces, also a cutlery factory, a railroad machine shop and a foundry. The region is hilly, and the township contains Bear Mountain, the highest elevation in the State. The Connecticut School for Imbeciles is located here; there is a public academy (high school!, a public library, established by the Library Association in 1771 ; also Saint Austin's School, a Protestant Episcopal secondary school, Saint Mary's Convent, Hotchkiss School, Scoville Memorial Library. Pop. 3,522.

SALISBURY, or NEW SARUM, nu-sa' rum, England, a cathedral city, the capital of Wiltshire, 80 miles southwest of London, stands on the Avon at its confluence with several smaller branches. It is built in. modern style, and the streams by which it is divided are crossed by bridges which connect the various sections of the town. Most conspicuous among the public buildings is the splendid cathedral, dating from 1220, one of the grandest and most interesting specimens of Gothic architecture in England. It is in the form of a double cross, with a graceful and exquisite interior and has a spire 404 feet high. The light and airy pillars and pilasters are of Purbeck shell marble. There is some stained glass, and many inter¬ esting old monuments. Within the spacious precincts of the cathedral are the episcopal palace, the deanery and other buildings. There are three parish churches in the town, besides a Roman Catholic chapel, an artistic structure. The market-place is a central wide open space, at the southeast corner of which stands the council-house, with a handsome Doric portico. Saint Nicholas Hospital and the Poultry Cross are ancient edifices of some architectural merit. Educational and charitable institutions are numerous. Salisbury was formerly renowned for its manufactures of woolens and cutlery, but is at present chiefly important as a dis¬ tributing centre. Pop. 21,476.

SALISBURY, Md., village, county-seat of Wicomico County, on the Wicomico River, and on the Baltimore, Chesapeake and Atlantic, and the New York, Philadelphia and Norfolk railroads, 84 miles southeast of Baltimore. It is in an agricultural and lumbering region, and has a large trade, exporting chiefly grain, fruit, vegetables and lumber. The most im¬ portant manufacturing establishment is a yellow pine box factory, the largest in the United States; there are also saw and planing mills, flour mills and a wool carding mill. There

are (1917) two national banks, with combined capital of $180,000 and

resources of $1,633,985. The village has a public high school established in 1872. Pop. about (1920) 7,502.

SALISBURY, N. C., city, county-seat of Rowan County, on the Southern railroad, 130 miles west of Raleigh. It was originally settled by English churchmen from Salisbury, England, and was named for that city; it was selected as the county-seat as earlv as 1753, but was not chartered until 1770. It is the centre of an agricultural and mining region ; and contains tobacco-factories, iron foundries, machine shops, railroad workshops, tanneries and cotton and woolen mills. There are (1917) two national banks, with combined capital of $150,000 and resources of $1,737,757, and a State bank. The city has a public high school, established in 1899; and it is also the seat of Livingston College, established in 1882, by the African Methodist Episcopal Church, for the education of the colored race, and the State Colored Normal School. Pop. (1920) 13,884.

SALISBURY PLAIN, England, in the county of Wilts, is a high rolling plain of con¬ siderable extent and of chalky formation, from which diverage the majority of the hill chains of central and southern England. The name applies actually to the district lying between Salisbury and Devizes, although the plain may be said to extend both north and south of Salisbury. It is about 20 miles long, by 14 broad, the greater length being from north to south. Eight miles north of Salisbury upon this plain stands the historical and desolate Stonehenge (q.v.).

SALISHAN (sa'lish-an) INDIANS (Okin- agan, salst, ˆpeople®), referring specifically to the Flathead Indians, hence Salish, or Selish, of which the stock name is an adaptation. A linguistic stock of North American Indians comprising a large number of tribes or bands, most of them insignificant in numbers, the original habitat of which included an isolated area on the Oregon Coast, occupied by the Tillamook and Nestucca, who were separated from their congeners to the north by Chinookan and Athapascan tribes ; then beginning on the northern coast of Shoalwater Bay, Salishan tribes occupied the entire northwestern part of Washington, including the Puget Sound region, excepting small tracts about Cape Flattery and southward, and near Port Townsend, which were held by Chimakuan tribes. Eastern Van¬ couver Islands was also inhabited by Salishan tribes, while the greater part of their territory lay on the mainland opposite, including much of the upper Columbia. On the south they were hemmed in mainly by Shahaptian tribes; on the east they dwelt to a little beyond the Arrow lakes and their feeder, one of the ex¬ treme northern forks of the Columbia, where they were met by Lewis and Clark in 1804. On the northeast Salishan territory extended to about lat. 53°. In the northwest the main area did not reach Chilcat River, but the Bella- coola occupied an isolated area on Dean Inlet, Burke Channel and Bellacoola River, British

Columbia. The Salashan tribes were success¬ ively visited by Juan de Fuca (1592), by the Spanish navigators who later explored the coast, by George Vancouver (1792-94) and bv Lewis and Clark (1804-06), who gave the first

definite information regarding them. The fur- traders penetrated their country early in the 19th century and while Astoria, at the mouth of the Columbia, was not founded within their immediate territory, its establishment formed the beginning of the change in the primitive condition of the Salishan and the sur¬ rounding tribes which perhaps reached its climax soon after the establishment of the trading post at Victoria, British Columbia., in 1843. In their habits and customs ihe Salishan Indians may be divided into the coast and the interior groups. Among the former, at least, the gentile system is recog¬ nized, descent being in the male line; their houses are long communal structures, built of puncheons and designed to accommodate sev¬ eral families, each with its own fire. Sea prod¬ ucts formed their chief sustenance; the canoe played an important part in their daily life ; slavery was practised, and the potlatch , a curious institution which consisted of elaborate feasting and the distribution of personal prop¬ erty, held sway to such an extent as frequently to impoverish the most progressive members of the tribe. The interior Salishan tribes hunted and fished for salmon in the many streams that drain their former territory. Their houses, unlike those of the coast, were conical and constructed of poles covered with grass, pine-needles, bark and earth. The custom of head-flattening was practised particularly among the coast Salish, but, strange as it may seem, this habit did not prevail among those members of the stock now designated by the name ((Flat- heads.® There are many tribes or sub-tribes of the Salishan stock in Washington, Montana and British Columbia, numbering in all about 18,500 individuals, of whom about 8,000 are within the limits of the United States. The principal Salishan tribes within Canadian terri¬ tory are the Lillovet, Okinagan, Thompson Indians and Lhuswap. Of the population of the Canadian divisions of the stock little re¬ liable information is obtainable, as many tribes or tribal divisions are assembled on each of several reservations, only the combined popula¬ tion of which is known. These are distributed as follows: Fraser River Agency, about 5,000; Kamloop's Agency, about 2,600; Cowichan Agency, about 1,850; Okinagan Agency, 950; Williams Lake Agency, 1,900; Kootenay Agency, 50. The principal Salishan tribes or bands on reservations in the United States are :

Colville Agency, Washington. — Cceur d'Alene (Skitsuish), 474; Colville,

296 ; Kalispel or Pend d'Oreilles, 150; Lake or Senijextee, 307 ; Spokane, 653 ; Okinagan, 575 ; Sanpoil and Nespelim, 400, making a total of 12,350.

Puyallup Agency, Washington. — Chehalis, 156; Georgetown, Humptulip, Quaitso and Quinaiel, 324; Nisqualli, 107; Puyallup, 536; Skallam or Clallam, 317; Skokomish, 165; Squaxon, 118.

Tulal.'p Agency, Washington. — Lummi,

340; Muckleshoot (collective), 148; Port Madi¬ son, 150; Swinomish, 313; Tulalip, 488.

At Large in Washington. — Nooksak, 200; Piskwans or Wenatchi, 166.

Flathead Agency, Montana. — Chariot's band of Flatheads, 157; Confederated Flat- heads, Pend d'Oreilles and Kootenai, 1,310; Lower Kalispel or Pend d'Oreilles, 53 ; Spo- kan, 77.

Since the above statistics were published many of the younger Indians have left the reservations and gone into civilized life, which has reduced those remaining on the various agencies to over 10,000 in Canada and over 8,000 in the United States. Consult Curtis, E. S., (Indian Days of the Long Ago) (Yonkers 1914) ; Farrand, L., (Basket Designs of the Salish Indians (New York 1900) ; Trey, A., Won Salis-Seervis) (Frauenfeld 1889) ; Hill-Tout, C., (British North America) (London 1907) ; Hodge, (Handbook of American In- dians) (Washington 1910) ; Poder, G. W., (Der Dichter Johann Gaudenz von Salis-Seervis) (Saint Gall 1863) ; Smet, P. J. de, 'Letters and Sketches* (Philadelphia 1843).*

SALIVA. See Salivary Glands.

SALIVARY GLANDS, the glands which secrete saliva, the fluid of the mouth, or spittle. By means of these secretions the food in the mouth is brought to a pulpy state, and through the chemical action of saliva certain changes are effected in the constituents of the food. In man the salivary glands comprise three pairs, as in the mammalian class generally. Of these the largest is the parotid gland, lying in front of the ear, before the mastoid process of the temporal bone, and behind the ramus of the lower jaw. Its duct is the parotid duct, or duct of Steno. It opens into the mouth opposite the second upper premolar tooth. This gland meas¬ ures from two and one-half to three inches in length, and is supplied with blood by branches from the main trunk of the external carotid artery, from the temporal, facial and other blood-vessels. The nerve supply is chiefly de¬ rived from the vegetative nervous system. The submaxillary gland, next in size, is in the lower portion of the lower jaw, above the digastric muscle. Its duct

(Wharton's duct) is about two inches long, and its arteries and veins are derived from the facial and lingual vessels. The third distinct salivary gland, the sublingual, is still smaller, and is situated on the floor of the mouth, beneath the front part of the tongue. It is from one and one-half to two inches through its long axis. Its numerous ducts open on the floor of the mouth by many minute' apertures. The excretory ducts of subsidiary glands in the mouth open simply on the mucous membrane of the mouth. The minute or microscopic structures of the salivary glands are composed of lobes in turn composed of lobules, each of which contains a small branch of the main duct of the gland, the subdivisions of which ultimately terminate in minute vesicles or sacs, known as acini. The salivary fluid as found in the mouth is usually mixed with the mucus secreted by the mucous or lining mem¬ brane of the mouth, and is thus rendered of viscid consistence.

Salivary glands are absent in some mam¬ mals, as whales ; in some reptiles, as crocodiles ; and in most fishes. In mammals alone salivary glands are present of the definite structure seen in man; but in many reptiles, as in serpents, definite (buccal) glands exist, within the in¬ side margin of the jaws. In birds the sub¬ maxillary glands may be of large size; and in some forms, as woodpeckers, the saliva may be normally of a viscid consistence, adapted for smearing the tongue, and for thus aiding in the capture of insect-prey. Swifts, as is well

known, secrete in their salivary glands a glutin¬ ous substance of which in great part, often almost wholly, they build their nests. (See Birds' Nests, Edible).

When first secreted, saliva gives an alkaline reaction. During digestion this alkaline condi¬ tion persists. During fasting .saliva gives a neutral reaction, as also when slowly secreted, its alkalinity then being neutralized by the acid of the mucus of the mouth. Microscopically examined, saliva shows minute solid particles, probably derived from the secreting structures; and when mixed with the fluids of the mouth it contains also epithelial scales from the mouth and tongue, and mucus corpuscles, mostly from the tonsils. Freed from these, the saliva is a fluid either colorless or bluish-gray.

During mastication the flow of saliva is greatly accelerated, the presence of food in the mouth acting as the stimulus to it's secretion ; and different foods affect the secretion in different degrees; while mental impressions, without the presence of food, will cause saliva to flow, or will (

The secretion of the pancreas markedly re¬ sembles that of the salivary glands in chemical composition, and exerts an action on the food similar in many respects, and in those forms in which salivary glands may be wanting or undeveloped the pancreatic secretion may sup¬ ply the place of the salivary fluid. This action is chiefly confined to a slight action upon starches, partly converting them to sugars. Hence the slight sweetness of bread when chewed. Among invertebrates salivary glands are usually well represented. Insects and other Annulosa and the generality of mollusks thus possess definite structures devoted to the secre¬ tion of the salivary fluid.

CalcuLous concretions (salivary calculi) may form in the salivary glands, and may cause obstruction of their ducts, and necessitate the performance of an operation for their removal. Saliva would appear to become abnormal and to constitute a source of infection in hydro¬ phobia or rabies; and syphilis is said to have been transmitted through this medium. Occa¬ sionally the elements of urine have been present in saliva — forming the so-called urinary saliva of pathologists — in consequence of diseased conditions, on the removal of which the secre¬ tion became restored to its normal composition. Milky saliva, so named from the presence of milk constituents, has also been described as a condition occurring in some parturient women. See Higier, (Vegetative Neurology)

(1919).

SALIVATION, or PTYALISM, a super¬ abundant secretion of saliva, sometimes occur¬ ring in disease, but usually, in medicine, either determined locally by the use of masticating irritants or by drugs which act upon the whole system, especially by mercurial preparations.

In the last case it is accompanied by a coppery taste and by the swelling of the gums, which become of a pale rose color, except close to the teeth, where they are of a deeper red. The breath is ˆmercurial® and very fetid, and the teeth seem elongated and loosened. If the use of mercury is continued the swelling of the gums increases ; it affects the tongue and all the salivary organs ; finally, the mucous membrane is studded with small superficial ulcers covered with a white skin. Salivation is ordinarily an¬ ticipated, during mercurial treatment, by main¬ taining cutaneous perspiration by means of warm baths, friction and exercise. If saliva¬ tion is persistent notwithstanding the use of these means,, emollient gargles containing more or less of opium are used, and on the abatement of the salivation they are replaced by astringent tonics. Salivation was formerly frequent, but has become rare through modifications in mer¬ curial treatment.

SALIX, one of the two genera of the fam¬ ily Salicaceoo (the other being

Popuhis). The species are dioecious trees and shrubs, inhabiting principally the northern hemisphere and the temperate and arctic zones, and very abundant therein, especially along the banks of streams and ponds. The leaves are alternate and nar¬ row and the small flowers, reduced to a disc bearing either stamens or pistil, according to sex, are gathered into unisexual catkins, each flower subtended by a bract. These catkins usually appear before the leaves, and are ferti¬ lized by insects, having nectaries for their at¬ traction, the male flowers, moreover, showing large bright-colored anthers and a honey-like odor. The two-valved capsules contain numer¬ ous seeds, crowned by dense plumes of soft hairs, which enable them to float off on the wind and be disseminated by it. There are described nearly 300 species of Salix, which have been broadly classified as Sallows, Osiers and Willows.

Many fossil forms of Salix have been found. Salicin is a crystalline glucoside obtained from the bark of various species of Salix, and is one of the sources of salicylic acid, for which it is sometimes substituted in medical practice. See also Willow.

SALLEE, sa-le', SALI, SLA, or SULLEE,

Morocco, a seaport on the western coast of the Atlantic, 106 miles west of Fez, at the mouth of the Buregreb, formerly the great centre of Moorish piracy, immense depredations being committed from it upon European commerce. It is particularly noted for the carpets which it produces, of fine texture and bright colors. The river, which formerly admitted large ves¬ sels, is now choked up with sand. On the op¬ posite side of the river stands Rabat (q.v.), called often New Sallee. Pop. of Sallee about

17,360.

SALLUST, sal'ust . (Gaius Sallustius Crispus), Roman historian: b. Amiternum, in the Sabine district, 1 Oct. 86 b.c. (668 a.u.c.) ; d. Rome, 13 May 35 b.c. (719 a.u.c.) or 34 b.c. (720 a.u.c). He held the offices of quaestor and tribunus plebis, attained senatorial rank, was of the Caesarian faction in the Civil War, went to the war in Africa as praetor in 47 b.c. and after the close of the struggle at Thapsus was made commander in Africa with title of pro- consul. Having returned to Rome in 45 B.C., he formed the extensive gardens celebrated as

the horti Sallustiani. The chief remains of his historical works are two monographs, one on the conspiracy of Catiline ((De Conjuratione

CatilinaP), the other on the war against Jugurtha ((De Bello Jugurthino”). The Cati¬ line was prepared more largely from literary sources than from the original documents which appear to have been accessible ; hence it is vague and inaccurate as to chronology and fact. It aims rather at the explanation of mo¬ tive and general development, and this it ex¬ presses with • frequently epigrammatic neatness, but at times so sententiously as to be obscure and involved. The Qugurtha,* which commem¬ orates the five years’ war between the Romans and Jugurtha, the king of Numidia, or from 111 b.c. to 106 b.c., exhibits much the same features, but is based on a more thorough re¬ search and is more finished and even in style. Of Sallust’s largest work, the five books of (Historic,) there are extant only four speeches, two letters and a few fragments. This work is believed to have been planned to describe the events occurring between Sallust’s death, 78 b.c. and the year of Cicero’s praetorship, 66. There are editions of the Catiline* by Schmalz (1886), Thomas (1884), Cook (1884) and Tur¬ ner (1887); of the (Jugurtha* by Thomas (1887); Schmalz (1886) and Brooks (1885); Frazer (1890), Merivale (1858), and Capes (1884). There is an English version by Pol¬ lard (1882).*

SALLY-LUNN, the name given a popular teacake; so called from Sally Lunn, a pastry cook of Bath, England, who used to cry them about in a basket at the close of the 18th cen¬ tury. Dalmer composed a long-popular song about the cakes.

SALM-SALM, zalm-zalm, Felix, German soldier: b. Anhalt, Prussia, 25 Dec. 1828; d. Gravelotte, Alsace, 18 Aug. 1870. He was the youngest son of the reigning prince Salm-Salm, and became an officer in the Prussian army, but later joined the Austrian army. In 1861 he came to the United States and served during the Civil War as colonel of the 68th New York regiment. He next offered his services to Maximilian, of Mexico, whose fortunes he fol¬ lowed as aide-de-camp and chief of the imperial household, until the death of that emperor, when he again entered the service of Prussia. He was killed in the battle of Gravelotte dur¬ ing the Franco-Prussian War. His wife, Agnes Leclerq (b. Baltimore, Md., 25 Dec. 1840; d. Karlsruhe, Germany, 21 Dec. 1912), an Ameri¬ can actress, whom he married in 1862, accom¬ panied him upon all his subsequent campaigns, and became known for her deeds of bravery and ministrations to the sick and wounded, especially during the Franco-Prussian War. Her experiences in Mexico and other fortunes of war are told by her husband in his book (My Diary in Mexico in 1867.) She published (Ten Years of My Life (1875).*

SALMAGUNDI, a dish of minced meat, seasoned with pickled cabbage, eggs, anchovies, olive oil, vinegar, pepper and similar ingredi¬ ents. In an applied sense the word means pot-pourri, a medley, a miscellany.

SALMAGUNDI CLUB, a famous club of

artists in New York, organized in 1871. In 1917 it had 480 resident and 234 non-resident members. The club house in West 12th street,

New York, was formerly the residence of Rogers, the sculptor.

SALMASIUS, sal-ma'shi-us, Claudius (Latinized name of Claude de Saumaise), French scholar: b. Semus-en-Auxois, 15 April 1588; d. Spa, 3 Sept. 1653. His father, a learned man, instructed him in the ancient lan¬ guages, and then sent him to Paris to study philosophy. His edition of (Floras, published in 1609, is a remarkable proof of his early erudition. In 1606 he went to Heidelberg to study law under the celebrated Gothofredus (Godefroi). On his return to France in 1610 he began to practise law, but soon withdrew to devote his whole time to critical labors and learned controversies. His mother, a Calvinist, had educated him in Protestant principles ; and in 1623 he married a Protestant. Several years later he passed some time at the country-seat of his father-in-law, near Paris, where he com¬ pleted his great labor on Pliny and Solinus. In 1629 his father was desirous of transferring to him his own place as magistrate, but as he openly professed Calvinism, the keeper of the seals, Marillac, refused to sanction the nomina¬ tion. In 1651 he accepted the professorship which had been held by Scaliger at the Univer¬ sity of Leyden. His friends made several at¬ tempts to recall him to France, and Cardinal Richelieu offered him a pension on condition of his writing a history of his ministry; but Salmasius declined all these offers. In 1649 Charles II of England induced him to write a defense of his father ((Defensio regia pro Carolo P), which was answered by Milton's (Defensio pro Populo Anglicano.* (See Milton). The (Defensio Regia) offended his republican patrons in Holland, and he accepted the invitation of Queen Christina to visit Swe¬ den (1650). But the climate was so unfavorable to his health that he returned to Holland the fol¬ lowing year. The most important of his works are (Plinianse Exercitationes in Solinum* (1629); (Scriptores Historiae Augustae) ; (De Mutuo* ; (De Usuris) (1638); (De Modo Usurarum* (1639): (De Fcenore Trapezitico) ;*

Romanum (1645). Besides the classical and many modern languages, he was acquainted with Hebrew, Chaldaic, Arabic, Persian and Coptic. A collection of his (Letters, to which his (Life) is prefixed, was published after his death by Antony Clement (Leyden 1656).*

SALMON, Daniel Elmer, American veteri¬ narian : b. Mount Olive, N. J., 23 July 1850; d. 20 Aug. 1914. He was educated at the universities of Cornell and Paris. In 1879-84 he was in¬ vestigator for the United States Department of Agriculture, after which he organized the Bureau of Animal

Husbandry, acting as its chief in 1884—1906. He was head of the de¬ partment of veterinary science at the University of Montevideo, Uruguay, in 1906-12. In 1898 he was president of the United States Veteri¬ nary Association. Salmon made many important investigations concerning communicable dis¬ eases of cattle and was responsible for much of the advancement in recent years of the care and inspection of cattle and the prevention of dis¬ ease among them.

SALMON, sam'on, George, Irish mathe¬ matician and theologian: b. Dublin, Ireland,

25 Sept. 1819; d. there, 22 Jan. 1904. He was educated at Trinity College, Dublin, took orders ***9 the Anglican Church and was professor of divinity at Dublin University in 1866-88. He was president of the mathematics and physics section of the British Association in 1878, and from 1888 till his death was provost of Trinity College, Dublin. He published (Conic Sec¬ tions*** *; (Geometry of Three Dimensions) ; (The Reign of Law) (1873) ; (Non-miraculous Chris¬ tianity * (1881) ; (Gnosticism and Agnosticism) (1887); Unfallibility of the Church* (1888); Untroduction to the New Testament (4th ed., 1890) ; (Cathedral and University Sermons > (1900), etc.*

SALMON, a fish of the family Salmonidce, regarded as the highest type of the true or teleostean fishes. The eminent American ich¬ thyologist, Dr. D. S. Jordan, who has made a special study of this group, speaks of it as fol¬ lows : <(As now restricted, this is no longer one of the large families of fishes, but in beauty, activity, gaminess and quality as food, and even in size of individuals, different members of the group stand easily with the first among fishes. The Salmonidce are confined to the northern regions, and north of about 40° N., are everywhere abundant where suitable waters occur. Some of the species, especially the larger ones, are marine and anadromous, living and growing in the sea, and entering fresh ' waters to spawn. Still others live in running brooks, entering lakes or the sea as occasion serves, but not habitually doing so. Others again are lake fishes, approaching the shore, or entering brooks in the spawning season, at other times retiring to waters of considerable depth. Some of them are active, voracious and gamy, while others are comparatively defense¬ less and will not take the hook. The large size of the eggs and their lack of adhesiveness, with the ease by which the eggs may be impregnated, render the salmon and trout especially adapted for artificial culture. The Salmonidce are of comparatively recent evolution, none of them occurring as fossils, unless it

be in recent de¬ posits. The instability of the specific forms and the lack of sharply defined specific characters may be in part attributed to their recent origin, as Dr. Gunther has suggested®

The family includes the American genera Coregonus (whitefish), Argyrosomus (ciscoes), Stenodns (inconnus), Cristivomer (lake-trout), Salvelinus (chars or «trout»), Oncorhynchus (Pacific salmon), and Salmo (Atlantic salmon, and salmon-trout).

Atlantic Salmon. — The body of the Atlan¬ tic salmon (Salmo salar), native to the rivers of both sides of the North Atlantic, is moderately elongate and but little compressed ; the greatest depth is about one-fourth the total length with¬ out the caudal fin. The length of the head is about equal to the depth of the body. The mouth is of moderate size. The scales are com¬ paratively large and number about 120 in the lateral line. The dorsal fin has 11 rays and the anal, nine rays. The color, like the form, varies with sex, age, food and condition. The aoult is brownish above and silvery on the sides, with numerous small black spots often X or XX shaped, on the head, body and fins, and with red patches along the sides of the male. Young salmon (parrs) have about 11 dusky cross-bars,

besides black and red spots. Weight 15 to 40 pounds.

Its original natural range in America stretched from Greenland to Long Island Sound.

The vast abundance of salmon was one of New England's chief recommendations to immi¬ gration in colonial days. The Merrimac is reported to have been so filled with them during the spring migration that they sometimes crowded those near the banks out on dry land. Even as late as 1783 Peters reported in his (History of Connecticut that the <(shad, bass and salmon more than half supported the province.® There is no good reason to suppose that they did not originally run in the Hudson, although direct evidence that they did so in abundance is lacking. DeKay mentions that one was taken in August 1840, near Troy, N. Y., weighing 40 pounds. Long before that year, however, the New York market had ceased to be supplied from the Connecticut, and had begun to bring salmon from the Kennebec, packed in ice. In the Saint Lawrence, however, few if any salmon entering the river from the sea ever ascended as far as Lake Ontario, and the salmon inhabiting that lake and its tributaries have always, as a rule, made the lake their sea, and the limit of their downward migrations. The reason for the decline was everywhere the same — over-fishing in the rivers with seines, and the damming of the upper streams for milling or other purposes. Although Peters had recorded that in 1783 salmon (

In respect to the habits and feeding of the salmon Dr. G. Brown Goode has writ¬ ten at great length. He remarks that most of the tribe are peculiarly fresh-water fishes, though several share the sea-dwelling habit, and others, like the brook-trout, descend into salt water when not prevented by bar¬ riers of temperature. ((I am inclined to the view that the natural habitat of the salmon is in the fresh waters, the more so since there are so many instances . . . where it has been

confined for years in lakes without apparent detriment. . . . The salmon while it remains in the sea, or in the brackish estuaries, takes particular delight in feeding on crustaceans and their eggs, small shrimps and young crabs. When in the rivers they eat but little, though they are at times eager enough for food, as testify their voracious rushes at the angler's flyhook. The absenteeism of the salmon is due principally to the dearth of desirable food in the rivers. The young fish stay in fresh water for one and frequently two years. When they pass down to the sea they weigh but a few ounces. They find congenial food and begin to grow rapidly. The broad world of ocean affords them new opportunities for adventure and self¬ advancement. and it is only when summoned by the duties of family life that they return within the narrow limits of the old home. When sal¬ mon live in the lakes they prey upon minnows and other small fishes, but those of the sea delight also in small crustaceans and their eggs, to which they owe the vivid color of their flesh. The habits of successive generations be¬ come hereditary traits.®

It is as an adult, four years or a little more old, that the salmon enters the rivers and work their way toward their head. They have been for two or two and a half years in the sea, where and how living is little known ; but the probability is that they do not go very far from the mouth of the river in which they were born. They enter as soon in the spring as the water has reached a moderate degree of warmth, and therefore appear in southern rivers much earlier than in northern ones. They are in magnificent condition, and make their way up¬ stream with extraordinary persistence and force, overcoming swift rapids, climbing cataracts and leaping unbroken falls as much as 12 feet high ; but only the strongest can accomplish so great a feat, and sometimes only after repeated efforts. It is during this early advance that the angler seeks the streams where they are Tun¬ ing and throws his line for the grandest sport afforded by fly-fishing in fresh waters. Hav¬ ing reached, as near as time or circumstances permit, to the sources of the stream the eggs are poured out in vast quantities by the females, and simultaneously the males void their milt, so that

impregnation takes place at once. This takes place in our rivers late in October or in November. The development of the embryo proceeds for a time, but soon is checked by the winter cold, so that it does not burst the shell of the egg until the next April or May.

At this time the embryo salmon has a slender half-transparent trunk, less than an inch in length, carrying, suspended beneath, an immense ovoid sac — the ˆyolk-sac® ; for about six weeks after hatching it hides in crevices among stones, keeping up an incessant fanning with its pectoral fins. During this period it takes no food, but is supported and nourished by the yolk-sac, the substance of which is gradually absorbed into the fest of the body, and not un¬ til the sac has nearly disappeared does the sal¬ mon really look like a fish and begin to seize and swallow food. It now puts on a mottled coat, with several heavy dark bars across its sides, and bright red spots, larger and fewer than those of a trout, and looks therefore very unlike the adult salmon but much like a young trout. In this stage it is termed, in Scotland and England, a ˆparr,® and it was formerly thought to be a wholly different species from salmon.

The parr stage lasts a year or two in British rivers, and the few observations made in Amer¬ ica indicate that it is more likely two years than one in our rivers. The parr, at first but little over an inch in length, is provided with good teeth and a good appetite, and beginning to feed at a season of the year when the water is almost crowded with small insects and other more minute creatures, it grows rapidly, probably increasing its weight 30 or 40 times the first sum¬ mer. In two years it reaches the length of six or eight inches, and its bright red spots and dark bars have given place to a silvery coat like the adult salmon. It is now termed a ˆsmolt® and is ready to go to sea, which it does with little delay, and passes out beyond the range of man's observation, but to a region where it finds a rich feeding-ground and rapidly increases in size. In northern rivers, those of New Bruns¬ wick and beyond, as in those of northern Eu¬ rope, the salmon returns from the sea when it has attained a weight of two to six pounds, and is

*then termed a ˆgrilse.** In the rivers of Canada, in general, grilse occur in great numbers, com¬ ing in from the sea at a later date than the adults, but ascending like them to the upper waters, mingling freely with them, rising to the same fly, and caught in the same weirs. In our rivers grilse are seldom seen ; yet it by no means follows from this that our salmon do not pass through the same phases of growth, or that the growth is more rapid, but merely that when in the grilse stage they generally lack the instinct that impels their more northern relatives to seek fresh water.*

Of the characteristics of grilse, as ascertained in the rivers they frequent, it

will be sufficient to say that they exhibit to a great degree the characteristics of the adult; that the main ex¬ ternal differences are a shorter head, slenderer form, and a difference in the color and mark¬ ings ; that thev are remarkably active and agile, leaping to great heights : that the male is sex¬ ually well developed and mates with the adult, but that the female is immature, and that, like the adult, they abstain from food and conse¬ quently lose flesh during their stay in fresh water.

Pacific Salmon. — There are five species of salmon on the Pacific Coast which belong to the genus Oncorhynchus, namely, the chinook or quinnat salmon (O. tschawytscha) , the red or blueback salmon (O. nerka), the humpback sal¬ mon (O. gorbuscJia) , the silver salmon (O . kisutch, and the dog salmon (O. beta). The features which separate the Pacific salmons from the Atlantic salmon are not marked, and consist chiefly in a larger number of rays in the anal fin, and more branchiostegals, gillrakers, and pyloric cceca.

The characters noted in the following key will usually be sufficient to distinguish the dif¬ ferent species of Pacific salmon :

Quinnat Salmon. — Scales in longitudinal series from 135 to 155, averaging about 145; pyloric coeca 140 to 185; gillrakers compar¬ atively short and usually 23 in number, 9 being above the angle; rays in anal fin 16; branchi¬ ostegals 15 to 19. Body robust; head conic; eye small; caudal fin deeply forked. Color above dusky, sometimes with bluish or greenish tinge; sides and belly silvery; head dark with metallic lustre; back and the dorsal and caudal fins with numerous round black spots.

Blueback Salmon. — Scales in longitudinal series about 130; pyloric cceca 75 to 95; gill¬ rakers comparatively long and 32 to 40 in num¬ ber; rays in anal fin 14 to 16; branchiostegals 13 to 15. Body rather slender; caudal fin much forked; anal and dorsal fins low. Color, above bright blue, sides silvery, no spots.

Humpback Salmon. — Scales very small, 210 to 240 in longitudinal series; pyloric cceca very slender, about 180 in number; gillrakers short, about 28, 13 being above angle; anal rays 15; branchiostegals 11 or 12. Color bluish above, silvery on sides; hind part of back, adipose fin, and tail with numerous black spots, largest and of oblong form on tail.

Silver Salmon. — Scales large, 125 to 135 in longitudinal series ; pyloric cceca comparatively few and large, 45 to 80 in number; gillrakers long and slender, 23 in number, 13 below angle; anal rays 13 or 14; branchiostegals 13 or 14. Body long; head short, conic; snout blunt; eye small; fins small, caudal deeply forked. Color

bluish green, sides silvery, finely punctulated ; spots few and obscure on head, back dorsal, adipose dorsal, and upper rays of caudal.

Dog Salmon. — Scales of medium size, 138 to 155 in lateral line; pyloric coeca 140 to 185; gill- rakers short and few, 9 above and 15 below angle; 13 or 14 rays in anal fin; branchiostegals 13 or 14. Form of quinnat, but head longer and more depressed. Dusky above and on head, paler on sides ; very fine spots on back and sides, often wanting; tail plain dusky or finely spotted, with black edge ; other fins blackish.

These salmons are the most important group of fishes entering the rivers of North America. The steelhead (Salmo gairdneri), technically a trout, but popularly regarded as a salmon, also inhabits the waters of the Pacific coast and adds to the importance of the salmon tribe.

In recent years the annual catch of salmon in the Pacific States and Alaska has been over 100,000,000 pounds. In 1899 the quantity of sal¬ mon canned was 2,450,000 cases of 48 one-pound cans. The weight of the fresh fish represented by this pack together with the large quantities sold, fresh, salted and smoked, was about 175,000,000 pounds, with a value, as placed on the market, of nearly $9,000,000.

The quinnat is known in various parts of its range as Chinook, king, Columbia, Sacramento or tyee salmon, and is the most important of these salmons. It is not only superior in food qualities, but attains a vastly larger size, has a wider geographical range and a greater commercial value. When fresh from the ocean it is a very handsome, well-formed fish, greatly resembling the Atlantic salmon, although less symmetrical and graceful. It is of a uniform rich red color, becoming paler or streaked upon the approach of the spawning season. Its value for canning purposes is largely enhanced by the persistence of the red color of the meat after cooking. In size no other salmon in the world compares with it. In the Yukon River, Alaska, it reaches a weight of over 100 pounds. Farther south, it runs smaller, although in the Sacra¬ mento individuals weighing 50 or 60 pounds are not rare ; 22 pounds is a fair average weight in the Columbia River and 16 pounds in the Sacramento. Its known range is practically from Monterey Bay (latitude 36*4) to the Yukon River, but it probably ranges farther north. While in the sea, quinnat salmon probably do not wander very far from the mouths of the rivers they have left, and for this reason usually return to spawn in the rivers in which they were hatched. They prefer the larger rivers, like the Sacramento, the Columbia, the

Nushagak and Yukon. They are very per¬ sistent in ascending the rivers to spawn, and have been seen crowding up the rivulets which form the headwaters of the Sacramento until nearly half their bodies were exposed to the air. No matter how far the headwaters of a river are from the ocean, some of the salmon will press forward until stopped by impassable obstructions or water too shallow for them to swim in. On reaching the headwaters they re¬ main for a week or two before proceeding to the spawning grounds. Their rate of progress varies with the season, and probably depends to a great extent on the rainfall and the state of the river, rain, roily water or high water always hastening their progress.

When they first come from the ocean the sexes are almost identical in appearance, but as the time for spawning approaches a differ¬ ence is noticed between the males and the females, which during the spawning season be¬ comes more marked. The fully developed ova of the female give her a round, plump appear¬ ance, while the male grows very thin. His head flattens, the upper jaw curves like a hook over the lower, the eyes become sunken ; large, powerful, white, dog-like teeth appear on both jaws and the fish acquires a gaunt and savage appearance. As soon as they reach fresh water their appetites grow less, their throats begin to narrow, and their stomachs to shrink. This does not at first entirely prevent them from feeding, but it changes them enough to enable them to overcome the temptation to return to their well-stocked feeding-grounds in the ocean, and the longer they remain in fresh water the greater are the changes, and the desire to turn back for food is correspondingly lessened. This change comes about gradually, increasing day by- day from the time they leave tidewater until at the near approach of the spawning season their throats and stomachs become entirely in¬ capacitated for receiving food, and the desire and ability to feed leave them entirely. The great reserve of flesh and blood which they bring with them from the ocean enables them to keep the vital organs active until their mis¬ sion up the fresh-water streams is accomplished.

Quinnat salmon, like all the Pacific salmon, do not return to the sea, but die on or near their spawning grounds. After spawning they rapidly deteriorate, the flesh shades off to a light, dirty pink and they become foul, dis¬ eased and much emaciated. Their scales are wholly absorbed in the skin, which is of a dark olive or black hue, and blotches of fungus ap¬ pear on their heads and bodies, and in various places are long white patches where the skin is partly worn off. Their fins and tails become badly mutilated, and in a short time they die exhausted.

The spawning season of the quinnat varies in different rivers and,

considering the entire coast, lasts at least six months. In July the summer run is spawning at the headwaters of the McCloud and Sacramento rivers in Cali¬ fornia; in August and September, farther down these rivers. In October the fall run has begun in the McCloud and below, and this run con¬ tinues spawning through November into Decem¬ ber. In the Columbia the spawning begins at the headwaters in June; at Clackamas, 125 miles from the mouth of the river, it begins about the middle of September and continues until November. A few days before they are ready to spawn the salmon hollow out elongated cavi¬ ties with their heads and tails in the gravel beds of the river where there is some current, and here in due time the eggs and milt are deposited. The eggs drift into the crevices in the pile of stones thrown up below the hollow, sink to the bottom, and remain in that pro¬ tected position during incubation; here, also, the young remain until the umbilical sac is ab¬ sorbed. The eggs and young are liable to de¬ struction by freshets, but are comparatively safe from other injurious influences. The quin¬ nat is not so prolific as the Atlantic salmon, 300 or 400 eggs to each pound weight of the parent fish being a fair average.

As the salmon ascend the rivers they are caught by gill nets, fyke nets, pounds, weirs, seines, wheels and other devices, but in the Sacramento and Columbia the greater numbers are caught with gill nets drifting with the cur¬ rent or tide as they head upstream. In the rivers they are comparatively safe from enemies except otters, ospreys and fishers, but immense numbers are destroyed at the mouths of the streams by seals and sea-lions. The quinnat has been introduced into Japan, Australia, New Zealand and Europe, but efforts to acclimatize it on the Atlantic Coast of the United States have so far been unsuccessful.

Considering the entire west coast the blue- back salmon (O. vierka) is probably more nu¬ merous than all the other salmons combined. It is known in different regions as blueback, redfish, red salmon, Fraser River salmon and sock-eye or saw-qui. It ranks next to the chinook in commercial value, being especially important in the Columbia and Fraser rivers and in Alaska. For canning purposes it is but little inferior to the chinook, the color of the flesh being a rich red, which persists after canning. Large quantities are canned in British Columbia and in Alaska, particularly on Kadiak Island, and its commercial importance to that territory is indicated by the fact that nearly half of the entire salmon pack of the world comes from Alaska and the majority of the fish there canned are of this species. Comparatively few red salmon are sold fresh in the United States. It is next to the smallest of the salmons, the maximum

weight being about 15 pounds, but it rarely weighs over eight pounds and the aver¬ age is scarcely five pounds. In various lakes this fish weighs only half a pound when mature, and is called the little redfish. It ranges from Humboldt Bay, California, to the far north, but in general it ascends only those rivers which rise in cold, snow-fed lakes. Except in the breeding season the color of this fish is a clear bright blue above, with silvery sides and belly. At the spawning period the back and sides be¬ come red, and the male develops an extrava¬ gantly hooked upper jaw.

The humpback salmon is the smallest of the Pacific salmons; its average weight is only five pounds, and it rarely reaches 10 pounds. Its range is from San Francisco probably as far north as the Mackenzie River, and it is also common on the Asiatic Coast. In food quali¬ ties the fresh-run humpback is scarcely inferior to any other salmon. While the flesh has a very fine flavor, it is paler than that of other red salmon, and the species has consequently been neglected by canners; but it is probable that it will eventually be utilized for canning purposes, and its excellent qualities when fresh are undoubtedly destined to give it a great commercial value. Its chief consumption now is by Alaskian natives. The humpback salmon generally seeks the smaller streams for the purpose of spawning and deposits its eggs a short distance from the sea, sometimes within only a few rods of the ocean. At Kadiak Island, Alaska, where it is often very abundant, it arrives in the latter part of July, the run con¬ tinuing only a few weeks. Spawning takes place in August.

The silver salmon is also known as silver- sides, skowitz, kisutch, hoopid salmon, and coho

salmon. It is a beautiful fish, having a grace¬ ful form and a bright silvery skin. Its flesh, which is fairly good, usually has a bright red color, but as this fades on cooking it is not highly regarded for canning purposes, though large quantities are thus utilized. Its average weight in the Columbia and Puget Sound is eight pounds, but in Alaska it averages nearly 15 pounds. Its range is from San Francisco to northern Alaska, and as far south on the Asiatic Coast as Japan. It runs up the rivers tc spawn in fall or early winter, when the waters are high, but usually does not ascend great distances from the ocean.

The dog salmon is the least valuable of the Pacific salmons, , although it is dried in large quantities by the Alaskan natives. Its average weight is 12 pounds and the maximum is about 20 pounds. It is found from San Francisco to Kamchatka, being especially abundant in Alaska. The enlargement and distortion of the jaws give the species a very repulsive look, and the large teeth give to it its common name. When just from the ocean, the flesh has a beautiful red color and is not unpalatible, but it

deteriorates rapidly in fresh water. It spawns in shallow rivers and creeks. Larger quantities are utilized in Puget Sound than elsewhere in the Pacific States, and it is also used considerably by the natives of Alaska.

The Steelhead. — Another anadromous sal- monoid fish found on the Pacific Coast, popu¬ larly regarded as a salmon, is the steelhead (Salmo gairdneri), known also as hardhead, winter salmon, square-tailed trout, and salmon trout. It resembles in form, size and general appearance the salmon of the Atlantic Coast, and is distinguished from other Pacific Coast salmon by its square tail, its small head, round snout, comparatively slender form, light-colored flesh, and its habit of spawning in spring. It is more slender than the quinnat and consequently not so heavy for its length. Its average weight in the Columbia is about 10 pounds, although it sometimes reaches 30 pounds. Its range is very extended, reaching from the southern coast of California to the Alaska Peninsula, and is found in almost all the streams of the Pacific States which empty into the ocean. It begins to enter the Columbia in the fall, and is then in prime condition. Like the chinook, the steel¬ head ascends rivers for long distances, and it has been found almost as far up the tributaries of the Columbia as the ascent of fish is possible. As the greatest quantities of steelheads are caught in the spring, when they are spawning and are in a deteriorated condition, they are not generally esteemed as food; but when they come fresh from the sea and are in good con¬ dition, their flesh is excellent. As the demand for. salmon has increased, steelheads have been utilized for canning, and they have formed a noteworthy, part of the canned salmon from the Columbia River for a number of years past, as well as from the short coast rivers of Wash¬ ington and Oregon. Their consumption fresh has been increasing yearly and considerable quantities have been sent to the Eastern States in refrigerator cars.

Artificial Propagation.— The first steps in an effort to restock with salmon the rivers of the eastern coast were undertaken by Massa¬ chusetts and New Hampshire about 1865. At

first eggs were obtained from Canada, but this source was cut off, and the authorities were compelled to attempt to get eggs by capturing salmon in the spring at the mouth of the Penob¬ scot River, in Maine, and keeping them alive and well until they spawned in November. After some experimenting a few live salmon were safely caught and carried in floating cars to Craig Brook, near the mouth of the Penob¬ scot, where ponds and hatcheries fed by a clear stream had been prepared for them. The fish

throve ; year by year quantities of eggs were obtained and despatched to other places to be hatched. In 1889, however, the Craig Brook station was acquired by the United States Fish Commission and enlarged into a regular establishment for the rearing of fry, on an extensive scale, to the age of six or seven months. Later other establishments were opened for the rearing and distribution of the landlocked salmon. Still more extensive oper¬ ations in salmon culture have been undertaken on the Pacific Coast to replenish the rivers of California and the Columbia basin, from 40 to 50 millions of fry (principally quinnat) are annually being artificially hatched, reared and placed in the headwaters of the various rivers. For treatment of the eggs and fry, see Fish- culture. See also Fisheries.

Bibliography.— Day, F., (British and Irish SalmonidaP (London 1887) ; Goode, fisheries Industries) (Sec. I, Washington 1884) ; Gun¬ ther, A. C, (Catalogue of Fishes in the British Museum* (Vol. VI, London 1866) ; Hodgson, W. E., (Salmon Fishing) (New York 1906) ; Jordan, D. S., (Fishes) (New York 1908) ; Jor¬ dan and Evermann, (Fishes of North and Middle America) (Washington 1896) ; id., American Food and Game Fishes) (New York 1914) ; Kavraisky, F. F., (Die Lachse der Kaukasuslander* (Tiflis 1896) ; Malloch, P. D., (Life History and Habits of the Salmon, Sea Trout and Other Freshwater Fish* (New York 1910) ; 'Reports* and

SALMON, a river in Idaho, which rises in Custer County, flows north and west into Snake River, 40 miles south of Lewiston. Its course is irregular; its total length is about 450 miles.

SALMON DANCE, among the American Indians, a dance of the Yurok, Karok and other tribes, held in the early spring on the Pacific Coast when the salmon begin to run up the rivers. No one is permitted to catch a salmon before the dance, nor for 10 days afterward.

SALMON-TROUT, a name applied to several distinct species of Salmonidce : in the eastern United States to the great lake trout (• Cristivomer or Salvelinus namaycush) which resembles the true chars or trouts except for the crested and toothed vomer bone and prom¬ inent teeth on the base of the tongue. The color varies greatly, but is. usually dark gray with numerous well separated rounded spots of lighter gray. This species reaches a length of upward of three feet and has been known to at¬ tain a weight of 125 pounds. It is especially characteristic of the Great Lakes, but is found in fresh waters from Maine to Vancouver and northward to Alaska. Except when spawning in the autumn they live in the deeper waters

of the Lakes and are extremely voracious. Next to the whitefish the lake-trout is the most im¬ portant food-fish of the Great Lakes, and is caught

chiefly by means of extensive gill nets operated by tugs. In order to maintain the fisheries many millions of eggs arc now hatched artificially, both by the United States and by the Michigan Fish Commissions. In the West the steclhead salmon (Salmo gairdneri) and related species are sometimes known as salmon- trouts. The steclhead resembles the rainbow trout (q.v.), but is very much larger, has small scales and a larger mouth. It is abundant in nearly all of the rivers of the Pacific Coast, from California to Alaska, and is caught in con¬ siderable quantities for canning, and when cap¬ tured in the fall immediately after leaving the sea, is esteemed as a fresh fish. The common Atlantic salmon (Salmo salar) also sometimes receives the name of salmon-trout, as in the Gulf of Saint Lawrence. The salmon-trout of Europe (Salmo trutta), also known as bull¬ trout and sea-trout, occurs in the Baltic Sea, about the British Isles and along the coast of France, and enters the rivers emptying into these seas. Its life history resembles that of the common salmon, with which it readily hybridizes. See Salmon; Trout.

SALMONIDiE, a family of highly-organ¬ ized fresh-water and anadromous fishes of the northern parts of the world, which includes the salmon, salmon-trout, whitefish, grayling and their relatives. See Salmon.

SALOL, Phenyl Salicylate, CgHiOHCOOGLL, is obtained by heating sali¬ cylic acid or sodium salicylate with phenol or sodium phenate, in the presence of condensing agents, such as phosgene, phosphorus trichlor¬ ide, phosphorus pentachloride, or phosphorus oxychloride. It has also been prepared by heat¬ ing salicylic acid at 160°-240° C. for a long time in the absence of air.

Salol is a white crystalline powder. It melts at 42°-43° C., readily dissolves in chloroform, ether, alcohol and many other organic solvents, but is almost insoluble in water. The com¬ pound was introduced into medicine by Nencki in 1886. When taken internally it passes un¬ changed through the gastric juice of the stom¬ ach, but upon reaching the small intestine it is slowly hydrolysed into phenol and salicylic acid by the alkaline pancreatic juice. Salol is therefore a good intestinal antiseptic, and has been extensively used in the diseases of the intestinal canal. It is a valuable substitute for salicylic acid in the treatment of rheumatism ; and a mixture of salol and camphor has been recommended as a local anesthetic. Salol has also been employed for the coating of pills and capsules containing solids or liquids. The salol coating renders them insoluble in the stomach and permits their passage into the in¬ testines.

V. S. Babasinian, Lehigh University.

SALOME, sa-lo'me, a Hebrew female name, common in Palestine in the

days of Jesus Christ. The most notable bearer of it was the granddaughter of Herod the Great, born 10 a.d., who married her uncle, Philip the tetrarch, and is known in history as Salome, the dancer. She appears in the gospel as a young girl, who is instigated by her mother Herodias to ask of Herod Antipas the execu-

tion of Saint John Baptist. Josephus says she first married Philip the tetrarch, son of Herod the Great and Cleopatra, and afterward Aristobulus, son of Herod, King of Chalcis, her cousin-german, by whom she had several chil¬ dren. The name was also borne by Zebedee the mother of James the Elder and John the Evangelist, one of those women of Galilee who attended Jesus in his journeys and ministered to him. (Matt, xxvii, 56). She asked of Christ for her sons a special place of honor in his kingdom (Matt, xx, 21) ; and was a witness of the crucifixion (Mark xv, 20). Some infer, from comparing Matt, and John xix, 25, that she was a sister of Mary the mother of Jesus.

SALOMON, Haym, American patriot and financier: b. Lissa, Poland, 1740; d. Philadel¬ phia, Pa., 6 Jan. 1785. But meagre details are preserved of his early career, but his record as an American patriot and his services in aid of the government in Revolutionary days are well known. He was called ((the good Samari¬ tan® by S. H. Gay in his life of James Madi¬ son, and is referred to by Madison as rejecting all recompense for the pecuniary help bestowed. He was a prisoner in New York in 1775, and in 1778 escaped to Philadelphia. There acquir¬ ing wealth as a banker, he freely loaned to Robert Morris over $350,000. He negotiated all the war subsidies from France and Holland and when Continental money was withdrawn, causing suffering among the poor of Philadel¬ phia, he distributed $2,000 in specie to relieve distress. The large indebtedness of the gov¬ ernment to Haym Salomon was never repaid to him nor to his heirs and has been the subject of some discussion. It was favorably reported to the United States Senate in 1850. Although the amount of public securities and Revolution¬ ary papers filed in the register's office, Philadel¬ phia, 15 Feb. 1785 reached $353,744, the inroads of the British army in 1814 destroyed every record in relation to the vouchers. On 24 Feb. 1893 a bill was presented to the House that a gold medal be struck off in recognition of Haym Salomon's services, his heirs to waive all claims for indemnity ; but the measure, al¬ though reported favorably, was too late for consideration. Consult (A Sketch of Haym Salomon, from an unpublished manuscript in the papers of Jared Sparks ; Adams, H. B., in Publications of American Jewish Historical Society, No. 2* (1894).*

SALOMONS, Sir David Lionel Gold¬ smith-Stern, English electrical engineer: b. 28 June 1851. He was mayor of Tunbridge Wells in 1895, has been vice-president of the Institu¬ tion of Electrical Engineers, and has published (Electric Light Installations) ; Photographic Formulae ; and various monographs on elec¬ trical topics.*

SALON, sa-lon', The Paris, (1) the large gallery in the Louvre, in Paris, in which art exhibitions were formerly held; (2) a name given the annual art exhibition in Paris; (3) the leading galleries where modern artists ex¬ hibit their works; (4) an apartment for the reception of company, in the plural, fashionable assemblages, or circles of fashionable society. See Paris.

SALONICA, or SALONIKI, the ancient Thessalonica, a sea-port of Greece, in the De¬ partment of Macedonia, which was taken from

the Turks at the close of the Balkan wars (q.v.) in 1913 and passed into the possession of Greece. Until then Salonica had been the capi¬ tal of a Turkish vilayet of the same name. Sit¬ uated on the Gulf of Salonica, in the ZEgean Sea, 315 miles southwest of Constantinople, the town occupies a fortified slope, and, surrounded by stately cypresses and lofty white walls, as¬ cends from the shore in triangular form. Its architecture is characteristically Oriental, the early Christian churches having been converted into mosques. Chief of these is Saint Sophia, similar to the celebrated mosque of that name in Constantinople, on a smaller scale, but beautiful ; the church or mosque of Saint George (with walls 20 feet thick), which con¬ tains early Christian mosaics dating from 400 a.d. ; Saint Demetrius, destroyed by fire in 1917, had a fine interior; and various others, besides Greek churches and Jewish synagogues. The numerous antiquities include the Citadel, or ancient Acropolis, with its seven towers, called by the Turks Y edi-Kuleh, containing a trium¬ phal arch which dates from the time of Marcus Aurelius ; the Propylaeum of the Hippodrome, a splendid Corinthian colonnade of five pillars ; the triumphal arch of Augustus, commemorat¬ ing the battle of Philippi; the arch of Con¬ stantine, etc. There are large bazaars, and aqueducts bring water from the distant hills to the city. Saloniki, however, was also char¬ acterized by much squalor and miserable quar¬ ters, though considerable improvements have been introduced under Greek rule. Since the construction of various railway systems and harbor improvements, the trade, already .consid¬ erable, has increased. The exports consist of corn, cotton, wool, tobacco, silk cocoons, opium, wine, brandy, skins, antimony and timber; the imports, of sugar, flour, coffee, coal, iron and hardware, petroleum, salt, rice, glass, etc. Great Britain had the largest volume of trade before the war; next in importance were Italy, France, Austria-Hungary and Turkey. Salonica (for¬ merly Therma) is mentioned in historical annals, in connection with Xerxes' march through Greece. It was refounded by

Cassander in 315 b.c. Saint Paul preached here and ad¬ dressed two of his epistles to the converts of this place (Thessalonians) . During the Roman-Macedonian wars it figured as the chief station of the Macedonian fleet. After the civil wars it became the first city in Greece. It was a seat of the Christian Church at a very early period. During the barbarian invasions, it was the most important stronghold and place of defense of the Eastern empire. In mediaeval times its was taken (904) by the Saracens; (1185) by the Sicilian Normans; (1430) by the Turks. The population, about 165,000, is mainly composed of Greeks, Turks, Jews, Bulgars, Serbs, Italians and French.

During the first Balkan war Salonica sur¬ rendered to the Greeks with a Turkish army of 29,000 under Hassan Tahsin Pasha on 8 Nov. 1912. In the course of the European War Salonica was the scene of violent international complications owing to the failure of Greece to come to the assistance of Serbia against Bulgaria, as stipulated by treaty. On 18 Aug. 1917 a great fire broke out in the town and burnt for two days. Quite two-thirds of Salonica proper was destroyed and 100,000 per¬ sons rendered homeless. All the banks, busi-

ness premises, hotels and most of the theatres were reduced to ashes. Only the bare walls of the old Byzantine Church of Saint Demetrius re¬ mained standing, while most of the other churches escaped destruction. See Greece; Venizelos, E. ; War, European.

SALONICA, Gulf of (ancient Sinus Ther- maicus), is the extreme northwestern arm of the 2Egean Sea, between the peninsula of Chal- cidice and the coast of Thessaly. Its length is about 85 miles ; breadth, 50 miles, and consists of two distinct parts — one wide, extending from the southeast to northwest; the other nar¬ row, from southwest to northeast.

SALPA, a genus of free-swimming as- cidian of the order Thaliacea, and the family Salpidce. They are met with as single or soli¬ tary organisms and as aggregate or compound collections, the so-called ((salpa chains,® but these are states of the same species. The soli¬ tary salpa produces by budding from a process termed the stolon, a long chain of aggregated embryos, which become the salpa chain. The individuals of this compound chain have the power of producing, by means of eggs, new solitary salpse. This is one of the instances brought forward by Steenstrup in illustration of his views of the alternation of generations. The entire life-history, however, is not so much one of an alteration of generations as of a proc¬ ess of

budding (asexual), alternating with re¬ production by means of eggs (sexual). Thus, the first salp produces aggregate salps which are unlike itself, but the aggregated salps pro¬ duce solitary salps unlike their parents, but resembling their grandparents. Each salpa is of oval or quadrate form, with an aperture at either extremity. Locomotion is effected by the expulsion of water from the posterior aperture, and the salpa-chains thus swim over the surface of the ocean. The principal or¬ gans of the body are compacted to form the so- called ˆnucleus,® The salpse are beautifully transparent and colorless and often phospho¬ rescent. They abound in the waters of the Gulf Stream and in the Mediterranean.

SALSIFY, sal'si-fi, a biennial composite (Tragopogon parvifolius) , sometimes attaining four feet in height. The genus is popularly known as Goat's Beard, because of the long silky beard or poppus of the seeds. It grows wild in the south of Europe, but is cultivated as a vegetable. It has narrow grass-like leaves and solitary showy purple heads of ligulate florets, the involucre consisting of lanceolate leaflets much longer than the florets. The flowers close before noon. The fruits are plumed and float through the air like those of a dandelion. Salsify is hardy and has a veiw long tapering tap-root, white and fleshy, and with a flavor resembling oysters, whence it is sometimes called vegetable oyster or oyster plant. Black salsify (Scorzoneia his panic a) comes from Spain and is closely allied to the true salsify. It has a root like that of Tragopo¬ gon, except that it has a blackish skin. The leaves are undulate and the flowers yellow. The plant was once used for snake-bites.

SALSILLA, the common name of several species of the amaryllidaceous genus Bomarea, which produce edible tubers. Some are culti¬ vated in greenhouses for their large gorgeously spotted flowers, borne in cymes on twining

stems, and B. edulis is cultivated in the West Indies as a vegetable, its fleshy roots being also a diuretic and sudorific.

SALSOLA, a genus of the Chenopodiacece, with about 50 widely distributed species growing in saline soils, or on seashores, popularly known as saltwort. The small, axillary flowers are apetalous, but have a five-parted calyx, which in fruit encloses the utricle, and has a broad, horizontal, membranous wing. A maritime species (S . kali), the prickly saltwort, is a familiar spiny annual, its decumbent branches spreading from the central tap-root so as to form large rosettes on the sand. The closely-set rigid leaves radiate in all directions; they are small, awl-shaped and succulent, the mid¬ vein ending in a strong prickle. It is a widely diffused species and like some other plants of the same family, was formerly collected and burned for the impure carbonate of soda found in its tissues.

Lumps of the fused ash were an important article of commerce, called barilla (q.v.), and yielded about 50 per cent of soda, being the original source of that chemical. Sal- sola was also a component of the ((sope,® men¬ tioned by Jeremiah. To this genus also be¬ longs the Russian thistle (q.v.).

SALT, salt, Henry Stephens, English biog¬ rapher: b. Nynee Tal, India, 1851. He was educated at Cambridge and subsequently en¬ gaged in literary work and social reform. He has been honorary secretary of the Humani¬ tarian League from its founding in 1891 and editor of The Humanitarian and The Humane Review. He has published (Life of James Thomson5 ; (Life of Thoreau5 ; (Richard Jefferies: a Study5; Shelly: Poet and Pioneer5 ; (Tennyson as a Thinker5 ; (Animals' Rights5 ; (The Logic of Vegetarianism5, etc.; and edited (Songs of Freedom5 ; (Kith and Kin5 (poems of animal life), and works by Godwin, Thoreau, Melville, etc.

SALT, Sir Titus, English manufacturer: b. Morley, Yorkshire, 20 Sept. 1803; d. 29 Dec. 1876. He was the first to introduce the manu¬ facture of cloth from the wool of the alpaca into England. The model village of Saltaire (q.v.), three miles from Bradford, on the river Aire, was built in 1853 for the workmen engaged in his factories. He was a member of Parliament in 1859 and in 1869 was made a baronet. Consult Balgarnie, (Life of Sir Thomas Salt5 (1877) ; Holroyd, (Saltaire and its Founder.5

SALT, the common name for sodium chlo¬ ride, NaCl. It occurs native in large quantities and it may also be prepared by neutralizing hydrochloric acid with sodium carbonate or with sodium hydrate and evaporating the solu¬ tion. It is soluble in water, its solubility at the boiling point being only a little greater than the solubility at the freezing point. It is insoluble in absolute alcohol and in aqueous alcohol it dissolves to a greater or lesser extent, accord¬ ing to the proportion of water present. Salt crystallizes in the isometric system, usually in cubical or pyramidal forms, though octahedra also occur. Its solution is neutral to test papers and a saturated solution, when cooled to some degrees below the freezing point of pure water, deposits a hydrate having the composition NaCl + 2LLO. When cooled to 9° F. below zero, a saturated solution throws down the hy-

drate NaCl + 10H2O. Pure salt is ordinarily white in color, but it is transparent and color¬ less, with an ice-like lustre when crystalline. It is slightliy hygroscopic and when heated it de¬ crepitates markedly. It melts at about 1500° F., and it may be vaporized by raising it to a strong white

heat in a current of nitrogen gas. Its specific gravity is 2.16 and its specific heat is about 0.214. Salt is far more transparent to radiant heat than glass is and physicists there¬ fore employ prisms and lenses of clear rock salt in experiments upon the infra-red rays of the spectrum. (Consult on this point, Tyndall,

(Contributions to Molecular Physics in the Domain of Radiant Heat.}) Salt, from its abundance, is greatly used in the arts as a source of chlorine and of sodium. See Chlo¬ rine and Sodium).

In chemistry, a general name for any com¬ pound which may be regarded as consisting of an acid with its hydrogen partially or wholly re¬ placed by one or more metallic bases, or by basic radicals ; or for a compound consisting of a basic substance whose hydrogen has been more or less completely replaced by acid radi¬ cals. Ordinary sodium chloride, NaCl, for ex¬ ample (which is the substance commonly known as <(salt® about the household), may be regarded as hydrochloric acid, HC1, in which the hydro¬ gen has been replaced by sodium. Acetamide, (C2H30)H2N, is a <(salt® in accordance with the second portion of the definition, since it may be regarded as consisting of ammonia ; NH3, in which one atom of hydrogen has been replaced by the monovalent radical <(acetyl,® C2H30, of acetic acid. Simple chemical salts are classified, for convenience, as <(acid,® ((nor- mal,® and <(basic.® An ((acid® salt is one whose acid radical still contains one or more atoms of replaceable hydrogen ; while a ˆnormal® salt is one which contains no replaceable hydrogen. When sulphuric acid (H2S04), for example, re¬ acts with salts of potash, the potassium may re¬ place half of the hydrogen of the acid, or all of it. In the former case we have the compound KHSCh, which is known as <(acid sulphate of potassium® ; and in the latter case we have the compound K2S04 which no longer contains hy¬ drogen, and which is therefore called the ((nor- mal® sulphate. The acid salt may be regarded as an intermediate stage between the original acid and the "normal® salt. A "basic® salt is one which contains one or more molecules of hydroxyl, or of a metallic oxid, which can be replaced by an acid radical with the formation of a normal salt. A basic salt may therefore be regarded as intermediate between the base and the normal salt. Comparatively weak bases such as lead and bismuth, form basic salts, but pow¬ erful bases like lime and soda do not. Lead, for example, forms a basic nitrate having the composition Pb(0H)N03; and when this is treated with nitric acid (HN03), the hydroxyl is replaced by an ((N03® radical, as indicated by the equation.

Pb(0H)N03 + HN03 = Pb(NOa)2 + H20.

A salt which contains two different basic or acid radicals is called a

((double salt.® Ordi¬ nary sodium-potassium tartrate, or ((Rochelle salt,® KNaLUGOo + 4H20, is an example, and so also is strontium aceto-nitrate, SrN03(C2H3 02). The phenomena which occur when two normal simple salts combine to produce a double

salt are doubtless quite complicated in some in¬ stances. The double salt MgS04.K2S04, which is formed by the combination of the normal sul¬ phates of magnesium and potassium, appears, when in solution, to be a simple mixture of the two constituent normal sulphates ; but, on the contrary, the double salt PtCh.2NaCl, which is formed by the union of platimc chloride (see Platinum) and sodium chloride, acts as though it were the normal sodium salt of an acid hav¬ ing the composition H2PtCl6.

Physiological Uses of Salt. — Salt as a uni¬ versal commodity has been used in all ages and civilizations. In biblical times the Jews of¬ fered salt to Jehovah with the first fruits of the harvest and the fruits of the earth; Homer calls it divine and chronicles its use in the repasts of his heroes; Tacitus tells of furious wars be¬ tween the Germanic tribes for the possession of salt springs near their territories. Mungo Park saw the inhabitants of the coast of Sierra Leone give all that they possessed, even their wives and children, to obtain a salt supply. Salt is, in fact, an object of so general consumption, so necessary to man, that it affords an assured medium of exchange. The need for salt is not confined to man. Many animals seek this sub¬ stance with avidity. Nothing pleases the appe¬ tite of sheep more than salt. Cattle may suffer cruelly from a lack of salt, and that, on the other hand, they thrive when it is added to their ration. Reindeer and red and roe deer love to lick the surface of brackish puddles and saline efflorescences. In all climates, in all lati¬ tudes, wild ruminants and other hoofed animals resort to salt licks, a circumstance of which hunters take advantage, choosing their shooting covers either where salt naturally effloresces or where they themselves have scattered it.

Salt was first used as an aliment at the time of transition from the pastoral and nomadic stage to sedentary and agricultural life. The Indo-European languages have no common word to designate salt, nor have they any for the greater number of the objects that relate to agriculture. But, on the other hand, they have common roots for all words relating to pastoral occupations. This is an indication that the primitive peoples from which modern races sprang were separated before they abandoned a pastoral life. They did not learn the art of agriculture until later, and with it they learned the use of salt. There are populations, ethnic groups, and castes that have never adopted it. The Egyptian priests did not salt their food. Plutarch was astonished at this strange disdain. And in the same way there are animals of the farm that are very fond of it, the dog and cat that do not care for it at all.

There is a well-established relation between a vegetable diet and the need for salt, and recip¬ rocally between an animal diet and the exclu¬ sion of this article from food. The two kinds of diet, however, are not distinguished from each other by the quantity of salt which they con¬ tribute to the organism. In fact, both kinds are very poor in salt. Although both contain equally small quantities of chloride of sodium, they are distinguished from each other by another min¬ eral product which they possess in an unequal though considerable degree. This is potash. In marked contrast with common salt, this sub¬ stance, always abundant, varies greatly in its

relative quantity in different kinds of food. There are foods that contain a great deal of it, and these are precisely those that are taken from the vegetable kingdom. Plants are generally distinguished by their richness in potassic salts. They accumulate enormous quantities of them, drawing them from the poorest soils. Inversely there are other aliments derived from animals that are generally relatively poor in these com¬ pounds. In fine, the capital difference that dis¬ tinguishes in the eyes of the chemist the two modes of diet, is the abundance of potash in the vegetarian ration and its deficiency in the meat ration. The information given by chemical analysis may be succinctly stated as follows : The vegetable kingdom furnishes the economy with much potash and very little soda — about 25 to 150 times more potash than soda. On the other hand, the animal kingdom reduces the sup¬ ply of potash without reducing in the same de¬ gree the supply of soda. It introduces into the economy no more than two to five times as much potash as soda. All this is perfectly true and interesting in itself, but what hidden relation is there between the proportion of potash that dis¬ tinguishes the two diets and the inequality in the need for salt which they produce. M. Bunge believes that he has discovered this relation. His hypothesis is that potash is responsible for the like or dislike of salt in cookery. This he justifies by a series of closely connected induc¬ tions. The need for salt is the consequence of the loss of salt from the organism, as thirst is the consequence of the loss of water due to hemorrhage, transpiration or other causes. The need for salt implies a previous loss of salt. Secondly, the loss of salt should be a phenome¬ non of a chemical nature resulting from reac¬ tions of disintegration. Thirdly, this chemical phenomenon having, as is proved by experi¬ ment, a relation to the different kinds of diet, should be caused by their chemical characteris¬ tics — that is to say, by the difference in their proportions of potash. Contrary to M. Bunge, it is claimed by other chemists that an exclusive vegetable diet causes a need, a particular appe¬ tite, which can be satisfied by substances hav¬ ing the taste of cooking salt and containing either chloride of sodium

or chloride of potas¬ sium. In brief, from a chemical point of view, it is a need for chlorides; from a physiological point, a need for salty flavor; that is to say, for a particular kind of gustative sensation.

Condiments and seasonings are found to have a justification that is to some degree of a physiological character. They insure the proper action of the stomach. Salt does more. At the same time that it puts in motion the se¬ cretion of the stomach it furnishes it with materials, at least with some of them. Hydro¬ chloric acid, which is characteristic of the gas¬ tric juice and ensures its digestive efficacy, is derived from salt, from the chloride of sodium of the blood. The same origin should be ascribed to the chlorine compounds found in the juices of the stomach, fixed chlorides and organic chlorine. In other terms the material for the chlorine compounds of the gastric juice comes primitively from the salt of our food. Ordinary salt, the chloride of sodium, is one of the constituent elements of animal organ¬ isms, existing everywhere in them. The blood has a saline taste more or less marked; all the

secretions are salty; the tears themselves are more salty than bitter, whatever good people may say about them. Salt water, in fact, bathes all living particles and leaches continu¬ ally from the organic structure, escaping from all its tissues, carrying with it the waste matters which should be rejected from the body. Com¬ mon salt is more suitable than any other for this purpose. In a dose of nine grams per 1,000 it forms a solution innocuous to the anatomical elements, that can circulate around the most delicate of them without causing the least dam¬ age. This close association with salt has be¬ come habitual to them from immemorial usage ; they have adapted themselves to it, and it would lead to some inconvenience if another mineral constituent should be too abruptly substituted for it. In certain animals that have been bled to exhaustion, life may be kept up for some time if the blood is replaced by a saline solu¬ tion, named, because of its properties, the physiological solution. A turtle or a frog in whose veins this fluid circulates continues to live for a considerable time.

According to statistical data the daily con¬ sumption of salt in Europe is on the average 17 grams per capita. Of these about two grams are necessary to cover the loss by disassimila- tion. These two grams represent nutritive salts. The remaining 15 grams would then represent on the one hand 8 to 10 grams carried away by excretions and necessary for restoring the constitution of the circulating liquids and a surplus ; but, considering the in¬ fluence of salt upon the secretions, it would not be prudent to say that this surplus is a sacrifice made to the pleasures of appetite.

Besides taking an active part in certain of the vital phenomena, common salt fulfils better than any other substance the conditions of a medium that

is indifferent and yet suitable for the physiological necessities of living matter. In animals as well as in plants, in the mobile corpuscles of the blood as well as in the fixed elements of the tissues, living protoplasm is always rich in potassic salts. The interior medium which bathes it abounds, however, in sodic salts, particularly the chloride of sodium, resembling in this respect sea water, which might, if properly diluted, circulate in the veins and replace for a time the plasma of the blood, as we have seen may be done with the physio¬ logical solution. Some naturalists, recalling the circumstances under which life appeared on the globe and the manner in which it was for a long time maintained in the saline waters of the Palaeozoic seas, have thought they perceived in this fact the survival of an ancestral condition. From this point of view chloride of sodium would be an element handed down from remote times, belonging to a medium suitable to animal life, to the blood and to the organic humors; and salted food, by introducing it about the anatomical elements of the body, would recall the marine origin of animal life, would connect, as one may say, the physiology of the present with that of the past.

Origin of Salt Deposits. — Nearly all rocks contain sodium in small quantities, in combi¬ nation with other rock elements. When sodium¬ bearing rocks decay, the sodium, on account of its ready solubility, is one of the first elements to be contributed to circulating waters. Com-

bining with chlorine, it forms common salt. Much common salt exists in sedimentary rocks, and is contributed directly to circulating wa¬ ters. By rivers it is carried down to lakes or to the ocean.

When rivers flow into lakes that have out¬ lets, whatever salt is carried to the lake is car¬ ried out again by the out-flowing stream. But in lakes with no outlet and in the ocean, where there is little loss of water except by evapora¬ tion, salt is constantly being added and none removed. Since practically all rivers carry ex¬ tremely small amounts of salt, in the course of time the ocean and most undrained lakes come to be very saline. When sufficiently salty to be perceptible to the taste, such lakes are spoken of as salt lakes. These lakes usually contain other salts in addition to common salt.

The salinity of various well-known bodies of water is tabulated below :

	Per Cent Common Salt	Per Cent Total Salts
Mississippi River at Memphis	*. . 002*	*. 02*

Atlantic Ocean . 2.790 3.63

Great Salt Lake . 12.000 14.99

Dead Sea . 8.030 22.30

When the degree of concentration becomes so great in these bodies of water that they can hold no more, salt will be deposited; just as brine, by boiling, leaves a crust of salt on the bot¬ tom of a dish. It is only in basins where evapora¬ tion is excessive that waters become concen¬ trated enough for salt to be deposited. Such conditions are usually found only in arid regions, in undrained lakes and in arms of oceans or seas where evaporation is greater than river or spring supply, so that salt water from the open ocean or sea flows in to replace the excessive loss.

Many places are known where the less solu¬ ble salts are now being so deposited. In certain bays of Great Salt Lake and in many smaller lakes of the Great Basin, salts are now being laid down. Before the Salton Sea in southern California was flooded by the Colorado River, as high as 29 inches of salt was deposited daily during the dry season, most of which was com¬ mon salt. Karaboghaz Bay, an eastern arm of the Caspian Sea, evaporates so rapidly that salt water from the main lake is constantly flowing in to make up for the loss. The con¬ centration is so great that no life exists in the water and the less soluble salts are being pre¬ cipitated, though as yet it is not saline enough for common salt to be deposited.

At seasons of flood, when rivers carry much sediment, the salt layers on the bottoms of the lakes or bays may be buried beneath layers of mud or sand. More salt may then accumu¬ late as before and again mud and sand be washed in, until the salt is buried to a depth of hundreds, or even thousands of feet. The sands and muds solidify into rocks and later uplift of the land and erosion by rivers may expose the salt, as layers in the rocks, or they may be found by deep drilling. Such salt layers are common and are worked extensively in New York, Michigan, Kansas and other States, and in many foreign countries. Often many beds lie one above another, separated by layers of rock. In New York and in Kansas beds of solid salt over 300 feet thick have been dis¬ covered, and one at Sperenberg, Germany, is known to be over 3,000 feet in thickness.

It may also happen, as in the peculiar "Domes® of Louisiana, that water which seeps through salt beds at great depth may find its way toward the surface along cracks in the rocks and fill these with salt which it deposits on its upward way. Sometimes the force of the growing salt crystals may arch up the over¬ laying rocks into "Domes.®

From deep beds, salt is secured in two ways. In New York, shafts have been sunk into the salt beds and it is mined like coal. But this underground method is employed more com¬ monly in Europe. At Wieliczka, in Austria, about 1608 a.d., was opened up what is even yet the largest salt mine in the world. It is 984 feet deep and extends 300 feet below sea- level. In the mine are over 25 miles of railroad, converging at a central station carved entirely out of solid salt. In an enormous ball room the walls and ceilings of which glitter with salt crystals many royal fetes have been held. Over 1,200 miners are employed in the mine. Such underground mines, however, are rare. In the majority of cases wells are drilled through the overlying rock, and water is forced down into the- beds and dissolves the salt, which is then pumped up in the form of brine and is evap¬ orated either by the heat of the sun or over fires.

It also happens, as at Onondaga Lake, New York, and in many other places, that under¬ ground waters seeping through the salt beds come out at the surface as natural brine springs, whose waters are evaporated as in the previous case.

At a few localities about Great Salt Lake and San Francisco Bay, the salt waters are allowed to flow into shallow artificial basins, in which they can be completely shut off from the main body of water. These are allowed to stand until the sun's heat has evaporated the water, leaving a layer of salt. This process is much more widely employed in Europe than in the United States. (See Mineral Production of the United States). Consult Dake, C. L., Journal of Geography (Vol. XI, 1913, p. 285).

SALT DEPOSITS, Formation and Geol¬ ogy. See Silurian.

SALT-GLAZING. See Glazing.

SALT INDUSTRY, The.— Salt occurs in nature in two forms: as rock salt in beds; and as natural brine. In the United States the larger part of the production is from the rock salt deposits. New York leads the other States in output of rock salt, producing more than twice as much annually as Kansas, its nearest competitor ; with Louisiana in third place and Michigan fourth. In the manufacture of brine salt Michigan led in 1917 with an output of 891,195 tons; New York ranking second with 517,273 tons; Kansas third, with 299,877 tons; and California fourth, with 192,565 tons. Rock salt produced and marketed as such in the United States in 1917 amounted to 1,605,025 tons, valued at $3,897,595 — an average value of $2.43 per ton. The actual prices varied over the country from $1.66 per ton in Kansas to $10 per ton in Idaho. Of other grades of salt marketed in 1917 the totals were: 1,048,572 tons of common fine packers' salt ; 688,022 tons of table and dairy salt; 493,515 tons of coarse packers'

salt; 159,361 tons of solar salt; 93,094 tons of pressed block salt; and 2,890,588 tons

in the form of brine. The prices throughout the country for grained salt varied from $2.41 per ton in New Mexico, and $2.52 per ton in New York, to $15 per ton in Hawaii, and $15.60 per ton in Idaho. The consumption of salt in the United States in 1917 was nearly 140 pounds per capita. The exports in 1917 amounted to 113,993 tons, valued at $1,000,773 — nearly all going to Canada and Cuba ; and the remainder distributed widely all over the world. The history of the manufacture of salt in this country is somewhat obscure in its early dates, but covers the entire period subsequent to the settlement of the colonies by the English. The early processes of making salt, which was first produced in this country in Virginia prior to 1620, consisted of exposing sea-water to the rays of the sun or by boiling it in pans or kettles till the salt had settled to the bottom. Later these same processes were used in ex¬ tracting salt from the natural salt springs, but at the present time sea-water is little used for this purpose. Instead wells are sunk into the salt deposit, fresh water pumped in or allowed to flow in from a natural channel, and when thoroughly saturated the brine is pumped out and the salt extracted by evaporation. There are several methods of evaporating the brine; kettles, open pans, vacuum pans or grainers in which the brine is heated either directly by a fire below or by steam-pipe coils. Where kettles or open pans are used, the brine is usually boiled by direct heat, whereas in the grainers and vacuum pans steam heat is used. In the grainer process the brine is evaporated from rectangular vats about 12 inches deep by means of coils of pipes suspended in them and carry¬ ing either live or exhaust steam ; when the water has been evaporated, the salt is removed from the bottom of the pan by mechanical scrapers. Solar salt is made in vats or ponds, covered or uncovered, and rock salt is mined and is now produced, in much greater quantities than solar salt. The solar process is in use in California, Utah, and in Svracuse, N. Y. ; the open pan process in New York, Michigan and Kansas ; the vacuum pan in Michigan and the grainers in New York, Michigan, Ohio and Kansas. (See Salt; Silurian System). The statistics of the industry as given in the 1914 census are as follows :

1904

1914

Number of establishments. . . r'.apit.R.I .

146

$25,586,282

418

$487,425

4,666

$2,066,399

4,166,137

9,437,662

98

$33,151,134 724 $968 , 409 5,089 $3,041,294 4,455,457 10,271,358

Clerics officials, etc .

Wage-earners .

Wages .

Cost of materials used .

Value of product .

The table following shows the quantity of salt produced by States for the year 1917.

The number of plants in operation increased from 98 in 1914 to 128 in 1916; in 1917, 125 plants were active. The output of 4,872,656 short tons in 1914 was increased to 6,978,177 tons in 1917, and the value of the 1917 output was $19,940,442; an increase of 9.7 per cent in quantity and 46.1 per cent in value over the figures for 1916.

STATES

Number of plants

Production, short tons

Value

Michigan .

24

2,250,939

$6,877,202

New York .

23

2,164,069

5,371,713

Ohio .

9

1 ,026,803

2,839,575

Kansas .

10

746,976

2,027,466

California .

26

215,154

933,429

Texas .

85,181

79,195

24,844

16

564,029

352,145

191,044

216

Utah .

West Virginia .

Idaho .

All Others .

385,000

783,623

The group <(all others® in the table above includes Hawaii, Louisiana, Nevada, New Mex¬ ico, Oklahoma, Pennsylvania, Porto Rico and Virginia. The individual figures are reserved to avoid revealing private business details to competitors.

For purposes of comparison the salt industry will be described according to States.

California. — The Spaniards, Mexicans and Indians first gathered salt in this State from the <(tide lands® along the shores of Alameda Bay, the natural sinks or ponds there retain¬ ing the water which was evaporated by the sun, thus leaving the salt. No attempt was made to improve the quality of the salt till 1864, at which time the Crystal Salt Works were built. These works consisted of ponds for receiving and settling the sea-water so as to precipitate the gypsum and other im¬ purities less soluble than the salt. After the salt itself was precipitated, the mother liquor, or bittern, was drained off leaving a salt of high quality, which was gathered up and con¬ veyed to the warehouses. Thousands of tons of salt are taken to refining works in San Fran¬ cisco, where it is subjected to artificial heat for the purpose of more thoroughly drying it, and ground into various forms used in chlorination works, packing-houses and silver mills, and for table and dairy uses. The principal salt works in California are located at Alvarado, Newark, Mount Eden, Russell and Baumberg on the eastern shore of San Francisco Bay, under the management of the Federal Salt Company, but there are other works located at Redwood City and San Mateo, in San Mateo County; at Salton, in Riverside County; National City, in San Diego

County; near Danby, and at Ostend Station, near Los Angeles, in San Bernardino County; from the saline springs near Sites, in Colusa County; and at Black Lake, in San Luis Obispo County. The dense brine of Owens Lake yields a high percentage of salt and its waters are estimated to contain 160,000,000 tons beside much potassium chloride. The Searles Lake basin covers nearly 12 square miles — a crust from 60 to 100 feet thick, mostly salt. Rock salt outcrops for four or five miles on the north side of the Avawatz Mountains in San Bernardino County and is beginning to be worked. It is of excellent quality, 98 per cent pure. In 1917 the total production in California was 1,536,199 barrels valued at $933,429.

Idaho. — In recent years salt has been made chiefly in Bannock and Bear Lake Counties, in the vicinity of Stump Creek and Tygee Val¬ ley in southeastern Idaho. The product is derived from salt springs, but it is known that

these are underlaid by beds of rock salt. The industry is centred at Auburn, Wyo. The 1917 output was very small, hardly reaching 20 bar¬ rels, used for feeding cattle.

Illinois. — 'There is only one establishment in Illinois, located at Saint John, Perry County, which in 1917 produced but a small quantity of salt.

Kansas. — 'The first salt produced in Kansas came from the marshes scattered over the cen¬ tral part of the State, along the banks of which crude factories were engaged in the business till 1868, but these were in time superseded by others of a more modern character. In 1867 wells were sunk at Solomon City and a plant erected for the purpose of drying the brine which had been struck at about 75 feet. In 1874 William Dewar established a plant in the same city, using the solar system of drying. The manufacture of salt was not very exten¬ sive prior to 1880, when 2,000 barrels were made ; by 1890 this amount had increased to 1 ,140,799 barrels, and in 1900 to 1,645,350 bar¬ rels. The greater portion of the salt made in 1900 was evaporated by the grainer and open pan methods, though a small amount was made by solar evaporation. Brines are found in many localities in the eastern part of the State and are worked locally to some extent. In the development of the coal and petroleum in¬ dustries in 1887, rock salt was struck near Hutchinson. In the same year a body of salt was also struck at Lyons, in Rice County, by a party of prospectors in search of oil or natural gas. In 1890 a company was formed and a shaft sunk, the drill penetrating the body of salt at 800 feet and passing through

the bed to a further depth of 265 feet, making the total depth of the mine 1,065 feet. On sinking this shaft through the bed of salt, 15 workable veins, ranging from 4 to 18 feet in thickness, and alternating with layers of shale from three- quarters of an inch to five feet in thickness, were penetrated. In mining this salt, mining or channeling machines operated by compressed air are first used to undercut the salt; holes are made by air drills, dynamite inserted and exploded by electricity, thus bringing the salt to the bottom of the mine. It is then removed from the mine to the mill above ground, crushed and separated into nine different grades by passing over screens. It is then stored in bins ready for shipment or to be loaded on railway cars. At Anthony the salt beds show a combined thickness of 404 feet in a total depth of 1,350 feet; at Lyons the thickness is 275 feet in a depth of 790 feet ; and at Kan- opolis 250 feet in a maximum depth of 900 feet. The beds at Lyons and Kanopolis fur¬ nish the brines now worked at Ellsworth, Hutchinson, Sterling and elsewhere. Rock salt is known to underlay all of Rice and Kingman counties, nearly all of Reno County, and parts of Saline, Ellsworth, Barton, McPherson and other counties in the south central part of the State. The quantity of salt produced in 1917 in Kansas was 5,333,408 barrels valued at $2,-

027,466.

Louisiana. — Until 1898 nearly all the salt produced in Louisiana came from Avery Island, where the first attempt to make salt in the State was made in 1791 by John Hays. The first shaft sunk on Avery Island was eight by eight feet and 83 feet deep. This was after¬

ward leased to the American Salt Company, which continued it to a depth of 190 feet. In

1897 a new shaft, 500 feet deep, was sunk near the old one, and the new works were equipped with the most modern appliances. In 1898 a shaft was sunk on Belle Isle by the Gulf Company, of Morgan City, but water by dropping through the roof forced the abandonment of this, and a new one was sunk near it, an evaporating plant erected, and a con¬ siderable quantity of salt produced by the grainer process. The most important deposits in the State are on the Five Islands, or Salt Islands, as they are variously called, comprising Petite Anse, Grande Cote, Belle Isle, Cote Blanche, and Cote Carline. On the two first named rock salt is mined on an extensive scale. There are also large areas of rock salt in the north central and northern parts of the State. Owing to the very few operators, the figures of the yearly output are not reported in the interest of privacy of individual affairs.

Michigan. — An appropriation of $3,000 was made on 4 March 1838 by

the State for experi¬ mentation by the State geologist, and other work was done in 1840, 1841 and 1842, but no well was sunk till 1859 when a private corporation established a plant at Saginaw. During the year 1860, 472 barrels were pro¬ duced and was gradually augmented, but ir¬ regularities in manufacture soon compelled the establishment of a State salt inspection bureau, and the salt manufactured was regularly in¬ spected by the State official. The productive districts are three: (1) the southeastern part of the State, along the Detroit and Saint Clair rivers; (2) the central (nearly) part of the Lower Peninsula, especially in the Saginaw Valley; (3) along the west coast of the Lower Peninsula. Rock salt is worked at Ludington and Manistee and there is an undeveloped area on Thunder Bay near Alpena where five beds make up a total depth of 300 feet, with inter¬ vening streaks of gypsum and anhydrite. The output of commercial salt in Michigan is larger than that of any other State in the Union, and is approached only by that of New York. In 1917 it amounted to 16,071,704 barrels, valued at $6,877,202.

Nevada. — The most important deposits are along Virgin River in the southeast part of the State. There are also numerous saline valleys throughout the Great Basin. In 1909 there were only three establishments in the State, the prod¬ uct being made from brine springs by solar evaporation. In that year the production was valued at $19,847. The production in 1915 was 6,926 barrels, valued at $3,950. Since that year the production has been concealed by grouping it with that of other States.

New York. — The manufacture in New York by white men was begun in 1788 in the On¬ ondaga district. In 1797 the State assumed control of this reservation, maintaining it until

1898 when the title was sold because of the great expense of keeping up the works. Dur¬ ing the first 44 years only boiled salt was made in the district, but in 1841 solar salt was also made. In 1883 the Warsaw district was opened up and about the same time the Genesee dis¬ trict began producing. In 1885 rock salt min¬ ing was begun near York, Livingston County; in 1892 shafts were sunk at Livonia and Greigs- ville in the same county. In 1888 the Solvay

Process Company of Syracuse found salt in the south end of the valley of the Onondaga Creek in the town of Tully. Within three years 29 other wells were put down to the salt bed. They were all connected with the Tully Lakes, the water flowing by gravity into the salt shafts and forming a brine which is pumped out and carried to the works. The area in New York underlain with rock salt comprises a corner of Genesee County; the east half of Wyoming County; nearly all of Livingston County; and that part of Ontario County west of Canandaigua Lake. It has recently been developed also in Erie County, at Eden Valley, Springville, Perry and Gowanda, whence the bed reaches as far south as Pittsburgh, Pa. In 1917 the production amounted to 15,451,453 barrels, valued at $5,371,713.

Ohio. — Saltmaking was first attempted in 1798 at the Old Scioto Salt Works on the Salt Creek, in Jackson County. These continued till 1808 when the management was taken over by the State under the direction of the State super¬ intendent, but as they became unprofitable as a State institution, they were later sold. It was not till 1825 that the other properties in Ohio were developed. The bulk of the present day production comes from two districts: (1) in the northeast section of the State, comprising Cuyahoga, Medina, Summit, Wayne and Lake Counties; and

(2) in Meigs County, in the same basin in which the chief West Virginia salt area lies, just across the Ohio River. In the latter locality there are 148 feet in aggre¬ gate thickness, in layers varying from 3 to 52 feet thick, alternating with limestone and white shale to a depth of 3,710 feet. The industry centres at Pomeroy, where enormous quantities of brine have been raised, draining strata from many miles to the north, owing to the dip to¬ ward Pomeroy. , The principal grades of salt made are table, dairy and common fine, solar and rock salt. The total production in 1917 was 7,331,373 barrels valued at $2,839,575.

Oklahoma. — The first works were estab¬ lished in 1896, near Okeene, on a branch of the Cimarron River, and this was soon fol¬ lowed by three others. There are also works near Ferguson in the western part of the State and near Salton and Vincent in the south¬ western part. The industry is for local con¬ sumption only.

Pennsylvania. — The salt industry was es¬ tablished in the Conemaugh River Valley early in the 19th century. About 1810 William John¬ son commenced boring on this river near the mouth of the Loyalhanna, and was soon fol¬ lowed by many others. In 1812 salt was dis¬ covered near the present site of Saltsburg, in Indiana County, and by 1820 there were 32 pans and 190 kettles in operation in this county; Armstrong County had 38 pans in operation ; Erie County 18 kettles of 32 gallons each; and Westmoreland County six establishments pro¬ ducing 70,000 bushels. In 1909 there was only one establishment in the entire State. The total output is comparatively small and consumed locally. It is now included in ((Other States®

Texas. — The first well was sunk at Colo¬ rado City in western Texas in 1884, followed by another in 1889, and by a third in 1899. The principal production at present comes from Palestine (Anderson County) and Grand Saline (Van Zandt County) in the eastern part of the

State. Considerable quantities are made also from the salt lagoons along the southwest coast. The total production in 1917 was 608,192 barrels valued at $564,029; the greater portion of the production being made in grainers or open pans.

Utah. — The first salt was harvested in 1848 from the shores of the Great Salt Lake. In 1900 the production amounted to 246,935 bar¬ rels, nearly all of which was made by the solar evaporation process. There is also a consider¬ able production at Garfield, and natural brines are worked at Nephi. Rock salt is mined in the Sevier Valley, near Salina, Redmond and Gunnison. About 1860 the chlorination process for the reduction of silver from its ores was discovered, and salt for this purpose, produced at the

Great Salt Lake, was first used at the Alice Mine in Butte, Montana. The total pro¬ duction in 1917 amounted to 565,452 barrels valued at $352,145.

Virginia. — The only factory in this State is located in Saltville, in the valley of the Shenandoah River. The production is rela¬ tively small and is used in the production of soda-ash, bicarbonate of soda, etc., by elec¬ trolytic process.

West Virginia. — The principal points at which salt has been manufactured in this State are: Charleston, on the Kanawha River; Hart¬ ford, Mason City, Clifton and other places in Mason County, along the Ohio River; and near Birch on the Elk River; but the seat of the industry at the present time is in Mason County, opposite the Pomeroy workings of Ohio, only one of the four establishments in operation being outside. The first salt fur¬ nace in Kanawha County was erected in 1797, by a Mr. Brooks. On 1 Nov. 1807, David and Joseph Ruffner began boring for salt on the land which is now the present site of Charles¬ ton, on 15 Jan. 1808 struck a large stream of brine, and on 8 February secured their first output. By 1817 there were 30 furnaces and 15 or 20 wells in operation, which number had in¬ creased in 1835 to 40 furnaces. In 1849 Wil¬ liams and Stevens erected the first salt furnace on the Ohio River at West Columbia ; in 1854 another was erected by Hartford, Conn., parties; a third was erected at Mason City; and within a few years 10 more were erected, but the development of the industry in other States so overwhelmed the trade in this State that in 1909 there were only four in operation. Since then the industry has improved, reaching 238,397 barrels in 1916. The total output in 1917 was 177,386 barrels, valued at $191,044. Con¬ sult United States Bureau of Mines Bulletin 146, technology of Salt Making (Wash¬ ington 1917) ; United States Geological Survey Bulletin 669, the Salt Resources of the United States) (Washington 1919) ; Martin, G., the Salt and Alkali Industry) (New York 1916).*

SALT LAKE CITY, Utah, capital of the State, county-seat of Salt Lake County, and the central seat of the "Mormon® Church, is finely located on a gentle slope at the western base of the great Wasatch range of mountains. The magnificent mountains behind the city, the lovely valley in front, the stately Oquirrh Range beyond the valley and Great Salt Lake, 20 miles to the northwest, add immensely to the attractions of the city. The elevation of the site above sea-level is 4,800 feet. The

main portion of the city is laid out in blocks of 10 acres each ; the streets run at right angles and are 132 feet wide. Being in the arid belt, all vegetation depends upon irrigation, but nevertheless it is a city of gardens, shade- trees and flowers. The city is a central station for the Rio Grande Western Railroad, the southern terminus of the Oregon Short Line Railroad of the Union Pacific system, the eastern terminus for the Los Angeles and Salt Lake Railroad and the Western Pacific from San Francisco.

The trade of the city is very great, extend¬ ing over Utah, western Wyoming, southern Idaho and eastern Nevada. The great mining districts of Park City, Big Cottonwood, Tintic, Bingham, are none of them more than three or four hours' ride from the city; the great smelters are in the valley only eight miles away, and Salt Lake is the general depot and clear¬ ing-house for their business. The miners from all over Utah and far into Nevada and Idaho send their ores to Salt Lake smelters for re¬ duction, and purchase their supplies in the city. The bullion purchased in the city aggregates $25,000,000 annually. There are 20 banks in the clearing-house, five savings banks and several loan associations. The total clearings for all the banks in 1915 amounted to $350,000,- 000. The Salt Lake Mining and Stock Ex¬ change, one year, sold 10,169,741 shares that aggregated $6,165,323.15. The Lehi Sugar Factory, the chief ownership and business of which is in Salt Lake, one year made from 70,000 tons of beets, 23,000,000 pounds of sugar. The Salt Works on the lake shore, and owned in the city, manufacture annually 60,000,000 pounds of salt, valued at $300,000. The Zion Co-operative Mercantile Institution sells goods to the amount of about $6,000,000 annually. The product of its shoe factory amounts to over $1,000,000. The manufacturing establishments include car shops, boot and shoe factories, machine shops, foundries, cement and lime works, harness works, lumber yards, cigar and tobacco factories, and confectionery plants. The total products exceed $30,000,000 annually and employment is furnished about 10,000 persons.

The city has many fine structures. The joint city and county building is a most attractive building and cost, with furnishments, $800,000. The Mormon Church has recently constructed their Administration Building costing about $1,000,000. It is 165 feet in length by 102 feet in width, and four stories in height. For architectural effect it is one of the most beau¬ tiful office buildings in the United States. _ It is built of white Utah granite and the interior is finished in marble and onyx. The city has many imposing business blocks ; some of the homes are palatial; the public schoolhouses are among the noblest in the country. Both the Episcopal and Catholic denominations have great hospitals, and the Latter Day Saints have a commodious hospital. There are private hospitals, as well as beautiful homes, for the poor and needy. The Saint Ann's orphanage, just south of the city, is a home and school for orphans and indigent children.

The first known surgical operation for the removal of gall stones was performed in Holy Cross Hospital, Salt Lake City. The Latter Day Saints' College oc¬ cupies several imposing structures, one of which

is a Memorial Hall built in honor of Brigham Young. The Utah State University has a com¬ manding site on the bench east of the city. The Military Post of Fort Douglas is three miles east of the centre of the city at an altitude 600 feet above Main street. There are two theatres in Salt Lake, one built by the people several years ago, prior to the coming of the railroad. A Home Dramatic Company was formed; in¬ structors were sent for; there was plenty of native talent; the theatre was a success; the Home Dramatic Company still flourishes. One result has been that Salt Lake has more first- class musical talent than any other city of its size in America. The tabernacle choir of 500 voices has a national reputation. The organist in the tabernacle, the leader of the orchestra in the theatre, are both native Utahans. At the great jubilee celebration in 1897 there were 18 native martial bands in the procession.

Since 1847 Salt Lake City has been the headquarters of the Church of Jesus Christ of Latter Day Saints (see Mormons), the home of the president and many of the high officers of the Church ; the place where the semi-annual general conferences of the Church meet in April and October. The temple, the tabernacle and assembly hall (for winter services and for meetings of the priesthood and consultation), with the temple annex, occupy a square. The tabernacle is a unique structure, 150 feet by 250 feet in size, roofed like a beehive, the roof arches being without support over the structure, with comfortable seating capacity for 8,000 people, though not infrequently 10,000 people gather there. It has one of the finest pipe organs in America. It is the chief place of worship for the Mormon people, though each of the wards of the city has a meeting-house where services and Sunday schools are held every Sabbath morning, and evening meetings during the week. The temple is one of the most splendid structures in America. Its walls are of gray Wasatch granite, in solid blocks nine feet thick at the bottom, six feet thick at the top, with a foundation 16 feet thick and 16 feet deep. The building is 186ˆ4 feet long by 99 feet wide, and is 10 7j4 feet high from foundation to cap stone, while towers and pinnacles extend 50 feet higher. The ground was consecrated and work begun in 1853 ; it was finished and dedicated in 1893. It is used for marriages, baptisms and all the rites and ceremonials of the Mormon Church. Since its dedication only the faithful are permitted to enter it. It cost, with furnishments, about

$4,000,000.

About half of the people are Latter Day Saints. They have over 40 places

for public worship. In 1876 the Roman Catholics estab¬ lished a mission in Salt Lake, a little later built a church and hospital. They now have charge of the great Holy Cross Hospital, the Saint Ann Orphanage, Saint Mary's Academy. Their cathedral is one of the finest and largest in the West — fullv completed. A Protestant Epis¬ copal Church was founded in Salt Lake in 1867, and two years later a hospital. It now con¬ ducts the hospital, has a church and a cathedral and carries on Rowland Hall, a modern high-class seminary for girls and young women. The Methodists came in 1869. They have five churches in the city, and a number of lesser

*«**

SALT LAKE CITY, UTAH

The Mormon Temple

SALT LAKE CITY, UTAH

Shiplers, Photo.

View of Main Street

structures. A Presbyterian Church and school were founded in 1875. Westminster College has been added to its schools, and a new and very fine church is now completed. The Congregationalists have a great school and beautiful church. The Unitarians, the Central Christian Church, the Baptists and Christian Scientists have places of worshio. The Jews have a fine synagogue.

The public schools of Salt Lake are in¬ teresting features of the city. The law re¬ quires the attendance of all minors (six to 18 years) for a fixed number of months annually. Books to pupils are free. The schools are governed by a board of education of 10 mem¬ bers. The board and superintendent are elected by the people biennially. There are 49 school buildings. In 1919, 23,341 pupils were enrolled, 21,687 attended the primary and grammar schools, 2,654 the high schools. The curriculum covers all branches taught in the best schools of the country, including music, dancing, sew¬ ing and manual training. In the high schools military training is insisted upon during the first and second years; and students are fitted for any of the universities of the country. In the graded schools 721

teachers are employed; in the high schools 160. Teachers' wages are from $50 per month to $125. The rule is to in¬ crease the salaries of the younger teachers from $20 to $40 per annum until the maximum wage is reached. In the schools one or more teachers came from practically every State in the Union. One public school building was completed at a cost of $633,000. The annual expense for schools is over $1,271,000. The value of the school property is $4,000,000, or about 4 per cent of the total valuation of property in the city. Cost of maintaining schools, per annum, $860,- 965; cost of books, $60,000; cost, based on en¬ rolment, $105 per capita; cost per capita for books, 44 cents. There is a good public library with four branches.

Salt Lake City has the commission form of government since 1911. There are five com¬ missioners, and the chief of police, fire chief, board of public works, water superintendent, board of health, city physician and building in¬ spector are all appointed by the mayor and confirmed by the commission. The city has warm springs within its limits, and the hot springs, four miles out, have wonderful medic¬ inal virtues. In the bathing season trains run every few hours to Great Salt Lake, 25 minutes' ride. The city owns its own water system. A private monopoly owns the light, the electric power plant and street car franchises, of the city. The car company operates 135 miles of electric road.

The first settlement on the site was made by the immigrants who came in the .first immigra¬ tion under the leadership of Brigham Young, and reached the valley on 24 July 1847. The history of Salt Lake has no counterpart. The first band of immigrants were desperately poor. The soil they located on would produce noth¬ ing except through irrigation; they were 1,000 miles from any settlement east or west; they came as refugees ; they were met by desolation ; still at their coming they knelt upon parched soil and held a praise service. Their first crop was almost a failure, their second nearly all destroyed by locusts; that they lived through their trials must have been because they had

grown superior to distress. But they did live and multiplied. They had disciplined them¬ selves to be content with life's barest neces¬ sities ; they had few comforts, luxuries they did not dream of. They had been tossed naked upon the frontier ; ((a flaming sword that

turned every way® was behind them. Since then there has been much clashing; once the government sent an army against them, but the city has grown and has become a great trade centre; it is the spot from which the Church of Jesus Christ of Latter Day Saints in every land receives direction; it is a beautiful city in itself; its surroundings are altogether august. No better climate can be found than in Salt Lake. In winter the thermometer

seldom descends lower than 12 degrees above zero ; it seldom reaches 100 degrees in summer ; it has more clear days than any other city, and with the lake, the mountains, the springs and the in¬ vigorating air, it is a natural sanitarium. Pop.

(1880) 20,768; (1890) 44,843; (1900) 53,531; (1910) 92,777; (1920) 118,110.

Consult Bancroft, H. H., (History of Utah (San Francisco 1889), and Powell, L. P., his¬ toric Towns of the Western States) (New York 1901).*

J. David Larson,

Secretary Commercial Club of Salt Lake City.

SALT LICK, a place where salt is found on the surface of the earth, to which wild animals resort to lick it up; sometimes near salt springs.

SALT MARSHES. See Shore Lines.

SALT RANGE, or KALABAGH, India, a mountain system in the Punjab, beginning on the south side of the Jhelum, and extending west to the Indus, reaching an elevation of from 3,200 to 5,000 feet. It consists of two chains running from east to west, which join in a high plateau ; the general relief is bleak and dreary, while wildly picturesque. The mountains derive their name from the precipitous hills of solid rock-salt which occur on the border of the plateau. The salt stands out in huge cliffs at Mari, and the town of Kalabagh is built in an almost perpendicular hill of solid salt, in success¬ ive tiers, — the roof of each tier forming the street for the tier above. About 60,000 tons of salt are quarried annually, four-fifths from the Mayo mines, near Pind Dadan Khan. Coal and other minerals also are found.

SALT RIVER, (1) in Kentucky, has its rise in Boyle County, in the central part of the State; from whence it flows north, then west, then north by west to the northern boundary of the State, where it enters the Ohio at West-point, about 20 miles southwest of Louisville. It is about 100 miles long; and the chief tribu¬ taries are Rolling Fork, East Fork and Beech rivers. (2) A river in Missouri, which has its source in Schuyler County, in the northeastern part of the State, flows south by southeast to Monroe County, turns east, then northeast and southeast, and enters the Mississippi near the town of Louisiana, in Pike Countv. It is about 200 miles long, and is formed of three branches, North, Middle and South Forks.

SALTA, sal'ta, or SAN MIGUEL DE SALTA, Argentina, (1) capital of a province of the same name, in the elevated and well- watered valley of Lerma (1,202 metres), about

800 miles northwest of Buenos Aires. It is a bishop's see, and has a cathedral. Other im¬ portant features are: the main square or Plaza on which stand the Cabildo, or capitol ; the Colegio National ; a branch of the National Bank ; an orphan asylum, hospital and the above-mentioned cathedral. There is a brisk trade, especially transit trade with Bolivia. It is connected by rail with Buenos Aires and Jujuy. The town is neat but unhealthful. Pop. 38,000. (2) The province of Salta is situated

in the northern part of Argentina, and covers an area of 48,302 square miles. Its frontier borders on Bolivian territory. At the west it is mountainous. The highest summits reach an elevation of 6,000 metres, the plateaus 1,300 to 4,000 metres, and some of the passes 3,600 metres. The Sierra Lumbre and the Sierra de Sanita Maria border on the Andes. The moun¬ tains contain rich mineral deposits of gold, silver, copper, nickel, iron and lead. The water¬ ways are numerous: The Vermejo and its trib¬ utaries, Rio San Francisco and Rio Balle, and Rio Passage (del Juramento), which joins the Parana as Rio Salado. The climate depends upon the altitude, and different crops are planted accordingly. The products are sugar, corn, wine and European fruits; barley, pota¬ toes and fodder-crops. The lower slopes and valley contain the pampas ; the high summits and plateaus are treeless. The inhabitants are for the most part a mixed race of Spaniards and Calchaqui Indians. Pop. 161,150.

SALTER, William Mackintire, American author: b. Burlington, Iowa, 30 Jan. 1843. He was graduated from Knox College (Ill.) in 1871 ; studied for the ministry at Yale and at Harvard and was graduated as B.D. at the latter in 1876; subsequently he studied philoso¬ phy, as Parker-Fellow of Harvard University, at Gottingen, and political science at Columbia University. From 1883 to 1908 he was lecturer for the Societies for Ethical Culture in Chicago and in Philadelphia; from 1909 to 1913, a special lecturer for the department of philosophy in the University of Chicago. He is the author of (On a Foundation for Religion* (1879) ;

SALTILLO, sal-tel'yo, Mexico, capital of the State of Coahuila; situated on the Tigre River, 65 miles southwest of Monterey, near the border line between that State and its neighbor on the north, the state of Nuevo Leon, eleva¬ tion 5,249 feet above sea-level. It was given the rank of city in 1827 and named Leon-a Vicario, or Saltillo, by which latter name it is universally known. It was noted for many years for the superiority of the serapes made by the Indians of the vicinity, — a distinction, however, which has hardly been maintained in recent years. The battle field of

Buena Vista, the scene of the defeat of the forces of Santa Ana, by General Taylor, in 1847, is but five miles distant, and near this are the baths of San Lorenzo. In the immediate vicinity are successfully grown all the fruits of the tem¬

perate zone and many which pertain to the tropics. The principal buildings are the Civil hos¬ pital, the penitentiary and the Acun-a Theatre, and the chief manufacturing establishments are cotton mills, flouring mills and soap and cotton seed oil manufactories. The city enjoys a favorable reputation as a health resort. The three principal educational institutions, — the Juan Antonio de la Fuente School, the College of San Juan Nepomenceno and the Normal School maintain creditable museums and there are four public libraries, — the State library and those connected with the three schools above named, which altogether contain over 6,000 volumes. The Bank of Coahuila, with a capital of $1,600,000, and agencies of the National Bank, the Bank of London and Mexico and the Bapk of Nuevo Leon provide the financial re¬ sources of the community. Pop. 35,414.

SALTO, Uruguay, the capital of the de¬ partment of the same name on the northwest frontier opposite Concordia, Argentina, and at the head of navigation for large vessels on the Uruguay River. It is the shipping port of the surrounding region, a rich stock-raising dis¬ trict, and is 250 miles northwest of Montevideo, the capital of the republic, with which it is connected by rail. Pop. of town 19,788, of de¬ partment 66,493.

SALTON SEA, a lake in the wide Colo¬ rado Desert or Imperial Valley in Imperial and Riverside counties in southeastern California. Under ordinary conditions it is a salt marsh covered in places by shallow lakes, about 30 miles long, 12 miles wide and 280 feet below sea-level. At times of freshets the lakes ex¬ pand into a water body covering from 40,000 to 50,000 acres. In 1905 and 1906 the basin was flooded by accidental influx of water from irri¬ gation ditches from Colorado River and it be¬ came a sea 42 miles long, 10 to 16 miles wide and 93 feet deep covering an area of about 470 square miles. The surface of the water at this stage was 198 feet below sea-level. In 1907 the influx of river water was finally stopped by dikes and since then the water area has been diminishing because of the great excess of evaporation over the very scant rainfall. The decrease in depth has averaged about 5.8 feet a year and at this rate the sea will return to its original condition in 1926 or 1927 when evaporation will equal the inflow of torrential waters from the slopes of the enclosed basin. Terraces slightly above sea-level on the sides of the basin indicate that there was formerly present a lake, called Lake Cahuilla by Blake, which was more than 120 miles long and 30 miles wide. Consult Men¬ denhall, W. C., (Ground Waters of the Indio Region, California, with a sketch of Colorado Desert) (U. S. Geological Survey, Water Sup¬ ply Paper 225,

1911); Newell, F. H., (Salton Sea) (Smithsonian Institution, Annual Report for 1907) ; MacDougal, D. T., (The Salton Sea (Carnegie Institution, Pub. 193, 1914).*

SALTONSTALL, sal'ton-stal, Gurdon, American colonial governor : b. Haverhill, Mass., 27 March 1666; d. New London, Conn., 20 Sept. 1724. He was graduated at Harvard in 1684, and became minister of the Congrega¬ tional church of New London, Conn., in 1691. He succeeded Governor Winthrop as chief executive of Connecticut in 1708, and continued

in office until his death. The Saybrook Con¬ vention was suggested by him, and the his¬ toric <(Platform)) largely shaped by him. Through his efforts the first printing press was established in the colony. He was also active in the founding of Yale and in its establish¬ ment at New Haven.

.SALTPETRE. See Nitrate of Soda.

SALTPETRE, Chile. See Nitrate of

Soda.

SALTS, a very important class of sub¬ stances in chemistry. The word salt was first used to designate the solid residue obtained by evaporation of sea water, and as sodium chlor¬ ide is its chief constituent the term salt came to mean popularly that substance alone.

Many other substances besides common salt are known by the general name salts because of their similarity to common salt in general physical properties, such as solubility in water, taste, having crystalline form, etc. Some of the most common are saltpetre (potassium nitrate), smelling salts (ammonium chloride), etc.

The chemical meaning of the term salt is quite another thing. While the substances men¬ tioned above are indeed salts in the chemical sense, many other substances, as oil of winter- green, for example, that have none of the physical characteristics of common salt must also be included under this term. To the chemist, a salt is a chemical compound that may be considered as derived from an acid by the replacement of part or the whole of the hydrogen of the acid by a metal or a "radical® playing the part of a metal. For example, the salt sodium nitrate, NaN03, is derived from the nitric acid HNO3, by the re¬ placement of the hydrogen by the metallic

ele¬ ment sodium, Na; also ammonium chloride NH4CI is derived from the hydrochloric acid HC1 by similar replacement of hydrogen by the radical NH4. The most general chemical con¬ ception of the composition of salts is that which formulates them as MxNy, where M is the basic or positive portion and N the acid or negative part of the salt. Both M and N may be either elementary atoms or groups of different atoms acting as single atoms (radicals).

Taking common salt (NaCl) as an example, the positive radical Na may be replaced by an¬ other metal, or by a complex group of elements which is positive as compared with the other component of the resulting salt. Likewise, the negative radical Cl may be replaced by some other non-metal, or by a group of ele¬ ments which is negative as compared with the other component. When solutions of two salts are mixed it is quite common that the positive radicals make a more or less complete exchange of their negative partners. This exchange is called in chemical parlance, "reaction.®

Salts are formed in many ways ; one of the most important being by the action of an acid on a base by which water and a salt are formed, the salt differing in properties from both the acid and base used. Thus hydrochloric acid and potassium hydroxide mutually react, the prod¬ ucts being potassium chloride and water. HC1 + KOH = KC1 + H2O. Salts are fre¬ quently formed by the action of an acid on a metal. Zinc and sulphuric acid forming the salt zinc sulphate and hydrogen Zn + H2S04 = ZnSCh + H2. A very common method for the

formation ot salts is by the process called double decomposition, whereby two new salts are formed when solutions of two salts are brought together. When a solution of barium chloride is added to a solution of sodium sul¬ phate a white solid separates which is a new salt barium sulphate, while in the solution is an¬ other new salt, sodium chloride. BaCl2 + Na2S04 = BaSCh + 2NaCl.

Salts are often classified as normal, acid, basic and double. An acid having more than one hydrogen atom replaceable by basic atoms or groups may form both acid and normal salts according to whether a part or whole of that hydrogen is replaced. An acid salt is therefore to be regarded as potentially an acid. Sul¬ phuric acid H2S04 can form acid salt KHS04 and the normal salt K2S04. An acid having three replaceable hydrogen atoms can form three varieties of salts. Phosphoric acid H3P04, for example, can give two acid salts KH2P04, K2HP04 and a normal salt K3P04. A basic salt is one derived from a base having more than one hydroxyl (OH) group and in which all of the hydroxyl groups have not been re¬ placed by acid groups. Basic bismuth nitrate Bi(0H)2N03 is derived from bismuth

hydrox¬ ide Bi(OH)3 by replacement of only one (OH) by the acid group N03. An acid salt still contains acid hydrogen and will unite with more base to form a normal salt. A basic salt still contains basic hydroxyl (OH) and will unite with more acid to form a normal salt. A normal salt contains neither acid hydro¬ gen nor basic hydroxyl. The term double salt has been applied to two different classes of compounds, the dividing line between which is, however, often very faint. Acids having more than one replaceable hydrogen atom may form normal salts in which two or more different basic atoms or groups are combined with the acid group, as magnesium ammonium phos¬ phate, Mg(NH4)P04 or potassium sodium tar¬ trate KNa(C4H406). Another class of double salts is formed by the union of two or more molecules of certain normal salts IGSChiALa (S04)3, PbL:2KI, etc. Double salts occur most commonly through the combination of one normal salt with another normal salt. One of these components will be a salt of a strong base which forms acid salts but not basic salts : the other component will be a salt of a weaker base which forms basic salts but not acid salts. That component which is the salt of the strong base, being the more acidic, appears as the negative radical ; and the component which is the salt of the weaker base, being more basic, appears as the positive radical. Thus in the formula MxNy, in the case of double salts both M and N are in fact salts, and the double salt a union of a positive radical with a radical simewhat less positive.

Method of Naming Salts. — Part of the name is derived from the basic element or group present; thus those containing sodium are called sodium nitrate, nitrate of sodium, or often nitrate of soda, chloride of soda, etc. The other portion is derived from the acid element or group present. Thus salts derived from nitric acid are called nitrates; from hydro¬ chloric acid, chlorides; from sulphurous acid, sulphites; from perchloric acid, perchlorates. It will be noticed that all but the last syllable is the same as the name of the acid and also

that this last syllable differs according to the last syllable of the name of the acid. An acid whose name ends in ic forms a salt whose name ends in ate (see exceptions below). One ending in ous forms an ite salt. A salt in which the acid part is a single element has the ter¬ mination ide, even though the acid name ends in ic. Tlius sulphuric acid forms sodium sul- ph ate; sulphurous acid, sodium sulphi'fi?; hypo- phosphorons acid, sodium hypophosphtte ; hy¬ drochloric acid, sodium chloride. Sometimes a metal forms twro salts with the same acid in which the number of acid groups united with one atom of the metal varies. Thus iron (fer- rum) unites with

nitric acid forming two salts, Fe(N03)2 and Fe(N03)3. The first one con¬ taining the smaller number of acid groups is called ferrous nitrate while the other is ferric nitrate.

The naming of acid salts has called into use a few other terms. The acid sodium salt of sulphuric acid HNaSCb is called acid sodium sulphate or hydrogen-sodium-sulphate. With an acid like phosphoric H3P04 having three acid hydrogens we have FFNaPCh di-hydrogen- sodium-phosphate or primary sodium phosphate, HNaJPCh hydrogen-di-sodium-phosphate or sec¬ ondary sodium phosphate. The normal salt Na3P04 is also called tertiary sodium phos¬ phate.

As has been said, the term salt, salts, sal, are often applied to various substances of household or medicinal use. A few of the most common are given below with list of their correct chem¬ ical names. Sal soda, sodium carbonate ; Ep¬ som salts, magnesium sulphate ; Rochelle salts, sodium potassium tartrate ; saltpetre, potassium nitrate; sal ammoniac, ammonium chloride; salts of tartar, potassium carbonate; Glauber salts, sodium sulphate. See Reaction ; Solution.

SALTUS, sal'tus, Edgar Everston, Amer¬ ican novelist: b. New York, 8 June 1858; d. 30 July 1921. Educated, Sorbonne, Paris, Heidel¬ berg and Munich, and was graduated from Columbia Law School in 1880. His first book was (Balzac: a Study' (1884), which he fol¬ lowed by (The Philosophy of Disenchantment (1885) and (The Anatomy of Negation) (1887), two works attempting a popular exposition of the theories of Schopenhauer and von Hart¬ mann. Among his novels are (Mr. Incoul's Misadventure) (1887) ; (The Truth About Tris- trem Vanck' (1888); (1888) ; (A Transaction in Hearts) (1889); (Enthralled' (1894); (When Dreams Come True' (1895) ; (The Yellow Fay' (1905) ; (Historia Amoris) (1906) ; (The Lords of the Ghostland) (1907) ; 'Daughters of the Rich' (1909); (The Crimson Curtail (1916); 'The Paliser Case) (1919).

SALTUS, Francis Saltus, poet, linguist and musician: b. New York City, 1849; d. Tarry- town, N. Y., 24 June 1889. He was an elder brother of Edgar Everston Saltus (q.v.). He was educated at Columbia College and spent many years abroad He made himself master of 10 different languages and contributed to magazines and newspapers a large number of sketches and poems in English, French, German and Italian under his own name and his pen name, (

death he left the completed manuscript of 'The Witch of Endor,' 50 long poems on biblical subjects, 'Flask and Flagon,' 'Poems of Places, ' (Pastels and Profiles,' 'Flower and Thorn,' (Flesh and Spirit, } 'Moods of Mad¬ ness^ an unnamed volume of French poetry and two volumes of humorous

poetry. In prose he left 'A Life of Donizetti, ' (A Life of Rossini, ' (Kings of Song,' 'Great Baritones, ' (Romance of the Opera, ' monographs on Bellini and Mercadante, a musical dictionary, and more than a thousand musical sketches. He also left comic histories of France, Greece, Germany, England and Rome, a comic 'Robinson Crusoe,' and a large number of comic sketches. After his death his poems were edited in four vol¬ umes by his father.

SALTVILLE, Engagement at. The ex¬ tensive salt works at this place, in southwestern Virginia, furnished that State, the adjacent States of the South and the Confederate armies their supply of salt. Not until the third year of the war did the Union forces make any serious efforts to destroy these works. On 2 May 1864 General Crook started from Charlestown, on the Kanawha, to join General Sigel in the Shenan¬ doah Valley, and one column of 2,600 cavalry, under General Averell, was directed upon Salt- ville to destroy the works, and was afterward to rejoin the main column under Crook. After a very difficult march through the mountains Averell reached Tazewell Court House, where he learned that Saltville was well defended by earthworks and artillery, and was held in strength by Gen. W. E. Jones, whereupon he abandoned the idea of an attack, and, after a severe engagement at Wytheville on the 10th, joined Crook at Union on the 15th.

Late in September 1864 Gen. S. G. Burbridge with a mounted force of about 5,000 men, ad¬ vanced through eastern Kentucky to Preston- burg and up the Louisa Fork of the Big Sandy on Saltville. He was met 23 miles from Salt¬ ville by a small brigade of Confederate cavalry, which delayed him two days, thus enabling Gen¬ eral Breckinridge to gather about 3,500 men at Saltville, so that when Burbridge appeared before the place, 2 October, he found the salt works well defended, with Breckinridge in com¬ mand. He made an immediate attack and was stubbornly resisted, but after a hard struggle he gained the right and centre of the Confederate works. The Confederate left resisted all his efforts, and at 5 p.m. Burbridge withdrew from the contest, and abandoning his dead and wounded, marched all night toward Preston- burg, thence continuing his retreat. The Union loss was 54 killed, 190 wounded and 104 cap¬ tured. The Confederate loss was much less. On 12 Dec. 1864 General Stoneman, with 5,700 men, started from Bean's Station, Tenn., on a raid into southwestern Virginia. He attacked Saltville and carried it on the 20th, burned the town and destroyed the salt works. (See Stoneman's Raid). Consult (Official Records' (Vols. XXXVII, XXXIX, XLV) ; Pond,

SALTZMANN, zalts'man. Karl. German painter: b. Berlin, 23 Sept. 1847. He was a pupil of Goldschmied and of the marine painter

Hermann Eschke. He made a trip round the world in the train of Prince Henry of Prussia and later became professor in the Academy at Berlin. His principal works are (Dawn by the Sea> (1874); (Entrance into Harbor of Colberg) ; (1884).

SALUS, sa'lus, in Roman mythology the goddess of health, prosperity and public welfare.

SALUTATION, any mode of greeting or of kindly or respectful or reverential address, by word or gesture when persons meet, whether equals with equals or inferiors with superiors. The lowest class of salutations, which merely aim at giving agreeable bodily sensations, are compared by Tylor ((Early History of Man¬ kind,) ch. iii), to the tokens of kindliness ex¬ changed among the lower animals : such are patting, stroking, kissing, pressing noses, blow¬ ing, sniffing, etc. Among American Indians one mode of greeting consists in rubbing each other's arms, breast or abdomen and their own; to the same class belong the pattings and slap- pings of the Fuegians. The Andaman Islanders salute by blowing into another's hand with a cooing murmur; Charlevoix tells of an Indian tribe on the Mexican Gulf who blew into one another's ears, and a similar usage was found existing in Equatorial Africa by Du Chaillu. The kiss is by no means what it has been by some authors reputed to be, a universal and instinctive act of salutation : it is unknown over half the world, and there the prevailing usage is that of smelling or sniffing, called ((rubbing noses.® Darwin finds this custom existing among the New Zealanders and Lin¬ naeus among the inhabitants of the Lapland Alps; but it is the custom of Polynesians, Malays, the populations of Indo-China and the Eskimos. In ancient Greece it was customary to kiss the hand, breast or knee of a superior ; in ancient Rome the kiss was a token of civility and was a customary mode of salutation among kinsmen and close friends. In the early Chris¬ tian Church the kiss was a sign of fellowship, and Saint Paul in four places of his epistles and Saint Peter in one make such mention of the (

your worship's hands.® The embrace is almost universal : it is used by the rude Andaman Islanders, the Blackmen of Australia, the Fue¬ gians, as it was used by the Patriarch Jacob or by Philcetius and Eumaeus when, on recog¬ nizing Ulysses (Odyssey , Dryden, xxi),

Around his neck their longing arms they cast.

His head, his shoulders, and his knees embraced;

or as it is still used among highly cultured peo¬ ple. The attitude of covering or crouching in presence of a superior is seen represented in all the sculptures of ancient Egypt and Assyria ; and in barbarous countries it still persists, as in Dahomey or in Siam ; little different is the self- abasement of a Siberian peasant in presence of a noble. Bowing in sign of reverence may range all the way from Jacob's bowing himself to the ground seven times to do honor to Esau, and the gesture little more than a nod practised in modern society. Clasping hands was among the ancient Romans, as among us, customary among acquaintances; it is a custom not very widely diffused, but in late years it has been in¬ troduced among rude peoples, such as Austral¬ ians, Hottentots and Fuegians through their con¬ tact with European traders and missionaries. The familiar words of greeting differ but little among modern civilized peoples. Our "Good morning and "How do you do?® have their equivalents in the other European language- s. But in German countries wherever the popula¬ tion is chiefly Catholic a current form of salu¬ tation, especially among peasants, is Gelobt sei Jesus Christus, and the response, in Ewigkeit. Amen (Praised be Jesus Christ for evermore. Amen). In Ireland it is, or used to be, a cus¬ tom among simple folk for one on entering a house to pronounce the benison, "God save all here,® and the response would be, "God save you kindly, sir (or ma'am).® The biblical "Peace to thee and to thine house® is still in use among the Moslem : Salam 'alaikum. Wa- ' alaikum as- salam (Peace be on you. And on you be the peace). The salutation of the ancient Greeks both at meeting and parting was Xaipe (be joyful) ; the Romans used two words, both signifying "be in health® or "be well® ; on meet¬ ing their word was Salve, at parting Vale. The English phrase Good-by is the remnant of the ancient pious formula, God be wi'ye, and an¬ swers to the French Adieu, Spanish A'Dios, Italian Addio, etc.

SALUTES, Military, an essential form of discipline regulated and enforced by military law. All officers salute on meeting and on making or receiving official reports. Military courtesy requires the junior to salute first or when the salute is introductory to a report made at a military ceremony or formation to the rep¬ resentative of a common superior, as for exam¬ ple to the adjutant or officer of the day, the officer making the report, whatever his rank may be, is required to salute first; the officer to whom the report is made will acknowledge by saluting that he has received and understood it. When under arms the salute is made with the sword or saber if drawn, otherwise with the right hand, and a mounted officer always dis¬ mounts before addressing a superior who is not mounted. On official occasions officers, when indoors and under arms do not uncover, but salute with the sword, if drawn, and otherwise with the hand. If not under arms they uncover

and stand at attention, but do not salute except when making or receiving a report.

When an enlisted man without arms passes an officer he salutes with the right hand, and officers are to be saluted whether in uniform or not. When armed with the saber and out of ranks an enlisted man salutes with the saber, if drawn, but otherwise with the hand. If on foot and armed with a rifle or carbine he salutes with his weapon. A mounted soldier dismounts before addressing an officer not mounted. An enlisted man, if seated, rises on the approach of an officer, faces him and salutes; if stand¬ ing he faces the officer for the same purpose. If both remain in the same place or on the same ground such compliments need not be re¬ peated, and soldiers, if at work, do not cease work to salute an officer unless addressed by him. Before addressing an officer an enlisted man salutes as prescribed, and he also makes the same salute after receiving a reply. In¬ doors and unarmed an enlisted man uncovers and stands at attention on the approach of an officer. He does not salute unless -he addresses or is addressed by the officer. If armed he salutes as though outdoors.

When an officer enters a room where there are soldiers the word "attention® is given by someone who perceives him, when all rise and remain standing in the position of soldier till the officer leaves the room ; but soldiers at meals do not rise. Officers are required to at all times acknowledge the courtesies of enlisted men by returning salutes given, and when sev¬ eral officers in company are saluted, all who are entitled to the salute return it.

SALUTES WITH CANNON. The sa¬ lute to the Union — one gun for each State — is fired at noon of the Fourth of July at every military post and on board commissioned naval vessels belonging to the United States. The National Salute of 21 guns is the salute for the National flag, the President of the United States, presidents of foreign republics or sovereigns of foreign states visiting the United State. The Vice-President of the United States and American and foreign ambassadors are saluted with 19 guns; the president of the Senate, Speaker of the House of Representa¬ tives, members of the Cabinet, the chief justice, a congressional committee, governors within their respective States or Territories, viceroy or governor-general of provinces belonging to foreign States, general of the army, admiral of the navy and same ranks in foreign armies and navies, 17 guns; American or foreign envoys, or ministers plenipotentiary, as¬ sistant secretaries of the navy or war, lieuten¬ ant-general or a major-general commanding the army, and

corresponding ranks in the navy and foreign armies and navies, 15 guns; min- isters-resident accredited to the United States, major-general, rear-admiral and corresponding ranks of foreign armies and navies, 13 guns, and charge d'affaires, brigadier-general, com¬ modore and corresponding ranks in foreign armies and navies, 11 guns. Consuls-general accredited to the United States receive a salute of nine guns.

Salutes are only fired between sunrise and sunset, and not on Sundays, except in interna¬ tional courtesies. The national colors are al¬ ways displayed at the time of saluting. The

salute to the flag is the only salute which is re¬ turned, and this must be done within 24 hours. United States vessels do not return the salute to the flag in United States waters if there is any fort or battery there to do it. Nor do United States vessels salute United States forts or posts.

If there are several batteries or forts within sight or six miles of each other, one of them is designated as the saluting fort, and returns all salutes of foreign men-of-war. In New York, Castle William, on Governor's Island, is the saluting fort.

SALVADOR (in official documents, EL SALVADOR), the smallest and most densely populated of the Central American republics, is bounded on the north and northeast by Hon¬ duras, on the southeast by the Gulf of Fonseca, on the south by the Pacific Ocean and on the west by Guatemala. Its area is usually given as 7,225 to 7,325 square miles. The capital, San Salvador, is situated in the valley of Las Hamacas, on the Acelhuate River, 2,115 feet above sea-level. Frequent disasters have taught the inhabitants the art of building earthquake- proof structures, with utilitarian rather than aethetic motives; nevertheless the desire to secure good architectural effects reasserts itself (notably in the design of the National Palace) ; there are pleasant parks, and efforts are being made to complete the paving and the drainage system.

Physiography. — On the northern frontier rises the great mountain chain, the Sierra Madre or Cordillera, with peaks 7,000 to 8,000 feet high, in which primitive rocks predominate. About 15 miles from the coast and running parallel with it is a range composed of plutonic material. Both systems include transverse ridges ; the latter, the Coast Range, is inter¬ sected by the valleys of the Lempa and Grande rivers, and in or near it are situated the vol¬ canoes San Vicente (7,683 feet), San Sal¬ vador, Santa Ana, San Miguel, Usulutan, Apaneca, Izalco, Sociedad and Chinameca (4,200 feet). Izalco is almost continuously active. Earthquakes are of frequent occur¬ rence : the capital has been wrecked by them 12 times since 1539, and is, in fact, "so subject to rockings and tremblings of the

earth as to have acquired the name of the swinging ham¬ mock.® The best natural harbor is that of La Union, but it is not yet connected with the capital by rail. Acajutla, El Triunfo, La Con¬ cordia and La Libertad are the other ports. The largest lakes are Giiijar (15 miles long by five wide) and Ilopango (nine miles by three) ; the chief rivers are the Lempa, the Paz and the San Miguel.

Political Divisions and Cities. — The re¬ public of Salvador is divided into 14 de¬ partments, subdivided into districts, and these into towns and municipalities. The political subdivisions of the republic, with their capitals and populations, are shown in table on follow¬ ing page.

Fauna and Flora. — Among the native ani¬ mals are the deer (Census mexicanus) , arma¬ dillo, the jaguar and its little brother called ocelote on the coast, the pecari (Sus ameri- canus), puma or American lion (Felis con- cclor), tapir, coyote (Canis aureus mexicanus) , etc. We mention, among the avifauna, the

DEPARTMENTS

San Salvador. La Libertad. . Sonsonate Ahuachapan . Santa Ana . . . Chalatenango Cuscatlan. . . .

Cabanas .

San Vicente. .

La Paz .

Usulutan . . . . San Miguel . .

Morazan .

La Union

Capitals

Populations of capitals (approxi¬ mate)

San Salvador .

75,000

Nueva San Salvador. . .

15,000

Sonsonate .

15,000

Ahuachapan .

15,000

Santa Ana .

40,000

Chalatenango .

10,000

Cojutepeque .

10,000

Sensuntepeque .

12,000

San Vicente .

12,000

Zacatecoluca .

7,500

Usulutan .

7,500

San Miguel .

25,000

Gotera .

5,000

La Union .

5,000

quetzal (Trogon splendens) and among reptiles the lagarto or caiman (Crocodilus americanus) , the iguana and the boa constrictor. Dr. Guz¬ man calls attention to the ˆsurprising vitality of the vegetable kingdom® and gives an in¬ teresting list of medicinal and dye plants, to¬ gether with those he classed as textile, _ oleag¬ inous and alimentary. The balsam, which the Indians call Hoitziloxitl and which is com¬ monly known as ((balsam of Peru® although it is produced only in this part of Central America ; the indigo and maguey (Agave ameri- cana) may well head such list.

Mineral Resources, Soil and Climate. — In a report devoted to mining operations, the consul-general of the United States writes from San Salvador : <(For this republic a report can only be made on the production of gold and silver. While a number of promising copper fields are known, almost nothing has been done as yet in their development.® In 1916 the au¬ thoritative statement was made that the out¬ put of gold and silver <(amounts to about $1,500,000 annually.® The soils on the slopes of mountains, table-lands and in the valleys, formed by the detritus of the rocks and decom¬ posed vegetable matter, are remarkably fertile. The year is divided into two seasons — the rainy months being those from May to October, the dry from November to April. Low coast lands are hot and unhealthful ; a comparatively cool and agreeable climate is found in the highlands of the interior.

History. — In the summer of 1524 Pedro de Alvarado invaded the territory now called Sal¬ vador, coming from Mexico by way of Guate¬ mala. The Indian capital, Cuscatlan, was cap¬ tured the following year. On 4 April 1528 the city of San Salvador was founded, but it be¬ came necessary to abandon the site originally chosen in favor of the present one, and the transfer was made in 1539. As a subordinate part of the viceroyalty of Guatemala, Salvador continued to be a Spanish possession until 1821. Between 15 Sept. 1821, when Guatemala sev¬ ered her connection with Spain, and 1824, when the Central American confederation was formed, Salvador was compelled to assent, to the annexation of her territory by Mexico. After the federation had dissolved (1839) Mo¬ razan tried to reunite the five small states of which it had been composed ; in September 1842 he was made prisoner and shot at San Jose, Costa Rica. In 1885 the President of Guate¬

mala, Gen. Justo Rufino Barrios, made an effort to restore the old relations between the states in the northwestern part of Central America. He also

failed. On 13 Aug. 1886 Salvador pro¬ mulgated the constitution which is now in force, displacing (it is expressly stated in the final clause) the constitution of 1883. The most im¬ portant single fact in the history of the little republic, as in that of Guatemala (q.v.), is the survival of the Indian element in undiminished force. Educated Salvadorians of the present day, when writing of the sufferings of the natives during the period of Spanish supremacy, unconsciously refer to the wrongs sustained, not inflicted, by their own ancestors. (It is de¬ sirable to add, in view of the diversity of usage, that the forms ((Salvadorian® and ((Ecua- dorian® seem to be preferable to ((Salvadoran® and ((Ecuadoran.®) In February 1913 Presi¬ dent Araujo was assassinated. On the conclu¬ sion, in 1915, of the term for which Dr. Araujo had been elected, the distinguished Carlos Melendez took office for the term 1915-19. For Salvador's interest in the canal treaty between the United States and Nicaragua (Treaty Series, No. 624, Washington 1916) see Nicaragua and Nicaragua Canal. The most important subjects inviting the attention of the Melendez administration were educa¬ tional and financial.

Government. — By the constitution Uegisla- tive power is vested in a body called the Na¬ tional Assembly of Deputies,® which meets in February, each year. Deputies, three from each department, are elected by the people. ((Execu- tive power is vested in a citizen who shall have the title of President of the Republic® ; his term is four years ; he cannot be re-elected until after the expiration of a second period of equal duration. The vice-president is also chosen for four years. Secretaries or ministers are appointed by the President, the portfolios being: Foreign Affairs, Public Instruction and Justice; Interior, Promotion and Charities; Fi¬ nance, Public Credit and Agriculture ; War and Marine. ((Judicial power is vested in a Supreme Court of Justice, in Chambers of third and second instance,® etc. Each of the 14 departments has its governor and deputy gov¬ ernor (Constitution of the Republic of El Sal¬ vador, 13 Aug. 1886, IX, Art 3), whom the Executive appoints. Municipalities are gov¬ erned by officers chosen by the people.

Diplomatic and Consular Service. — The United States has at the capital, San Salvador, a minister, a consul-general, a vice- and deputy- consul ; Great Britain sends a minister and consul-general, a consul and (at San Salvador and La Union) a vice-consul. El Salvador maintains a minister in Washington and has a consul-general at San Francisco and consuls in New York and New Orleans. In Great Britain El Salvador has a charge d'affaires and consul- general, with consular agents at London, Liver¬ pool, Glasgow, Southampton, Newport, Brigh¬ ton and Birmingham.

Population, Education and Religion. — The

census of 1 March 1901 showed, as the total number of inhabitants, 1,006,848, of whom 772,- 200 were mestizos, ladinos and whites and 234,- 648 Indians of pure blood. In 1917 population was given as about 1,700,000. Under the con¬ stitution (Art. 33), ˆteaching is free. Primary

instruction is compulsory. The instruction given in the establishments supported by the state shall be laical and gratuitous.® Besides the ordinary six-year elementary schools, rural schools have been established which give a brief course of instruction covering three years and provide not only for the children of the white people but also for native Indians. About 31,000 students and pupils are enrolled at the institutions of learning of various grades : the university, the normal and high schools and the 700 primary schools. On 6 April 1919 a school for rural teachers was opened in the city of Santa Ana, in which will be given lectures on methods of carrying out the official program of public instruction. Article 12 of the con¬ stitution provides : (

Agriculture. — Nearly all of the high valleys and table-lands of the republic are well adapted to agriculture, which is, therefore, the princi¬ pal occupation of the inhabitants. Products are coffee, indigo, rubber, cacao, balsam, tobacco and a variety of grains, seeds and fruits. In regard to coffee, the following statistics were prepared by the government : Area planted in coffee trees, 153,517 acres with 95, OCX), 000 trees; virgin lands suitable for growing this crop, about 50,000 acres; average bearing life of a coffee tree in Salvador, 30 years and average production, 350 grams. The shipments of coffee from the republic to foreign countries in 1915 and 1916 amounted to 80 per cent in the value of the total exports ; in 1914 their aggregate was 34,666 tons — other exports being sugar (1,008 tons), indigo (134 tons), hides (178′ tons), leaf tobacco (33 tons), balsam (71 tons) and gold and silver ($1,481,772) . Most of the 1917 coffee crop was damaged by the earth¬ quake and volcanic eruption of 7 June 1917. Other agricultural products are cheese, beans, upland rice, corn and sugar. The government is encouraging cotton-growing by bounties on exports. Efforts are also being made toward wheat cultivation and tree planting is encour¬ aged. There are in Salvador 281,013 head of cattle, 74,336 horses, 21,457 sheep and 422,980 pigs.

Commerce. — In 1917 the imports subject to duties aggregated $2,719,095 and the exports amounted in the same year to $10,588,900. The trade is chiefly with the United States, the United Kingdom and France. The principal im¬

ports in 1916 were cotton, hardware, flour, silk goods and yarn. The chief exports in the same year were coffee, 35,585,498 kilos (Kilo = 2.04 pounds), valued at $23,297,003 silver dollars; in¬ digo, balsam, $298,498; tobacco $30,566; and sugar $646,528. Of the total coffee exported, 20 per cent went to the United States; 20 per cent to Norway; 2 per cent to Holland, 29 per cent to France; and 4 per cent to Great Britain.

Banking and Finance. — The government's estimate of public revenues in the budget for 1915-16 was 10,800,000 pesos. Memorandum number two, by the delegation of El Salvador (Proceedings of the First Pan American Fi¬ nancial Conference, Washington 1915, pp. 629- 634) gives the import revenues of 1913 as 7,263,- 042.98 silver dollars or pesos and of 1914 as only 6,076,770.61, showing a loss of 1,186,272.37 pesos in the first year of the war. The dele¬ gates add : ((Before the world crisis, the mone¬ tary situation of Salvador was good (because the banks had been obliged, under govern¬ mental decree, to bring up their silver reserves at the time of the failure of the so-called Banco Nacional, which had no connection what¬ ever with the government). As a matter of fact, the capital of the three banks now doing business is 6,000,000 pesos. They may issue double their capital in notes, on condition of having on hand 40 per cent (Banco Occidental and Agricola Comercial) or 50 per cent (Banco Salvadorene). In our national budget there is always an item called (public credit,) which has varied in the last few years from 3,000,000 to 4,000,000 silver dollars or pesos, for the amorti¬ zation of the English loan and of the domestic loan and for the payment of the respective interests involved.®

The message of the President of Salvador to the National Assembly in the Diario Oficial of 20 Feb. 1917 contained a statement of the rev¬ enues and expenditures of the country during the year 1916, which showed a more favorable condition of affairs than at any time since

1913. The revenues of Salvador during those four years, in silver pesos (peso = 3978, fluctu¬ ating), were as follows: 1913, 13,734,133 pesos;

1914, 12,423,752 pesos; 1915, 10,625,174 pesos; 1916, 12,779,082 pesos, showing that in the last year the downward tendency was checked and an increase of 2,153,908 pesos over the previous year was reached.

The revenues and expenditures in the year 1917 are shown, as follows:

REVENUES

Pesos

EXPENDITURES

Import duties .

Export duties .

Tax on liquors .

Stamps and sealed paper Miscellaneous revenues. . Direct (income) taxes . . . Interest .

5,856,185

1,963,317

2,653,966

501,680

816,404

269,365

718,165

National assembly. .

Executive .

Government .

Promotion (fomento)

Agriculture . . .

Foreign relations

Justice .

Public instruction . . .

Philanthropy .

Treasury .

Public credit .

War and marine .

Pesos

120,405

84,309

2,603,929

1,292,715

63,105

205,932

823,968

1,174,386

630,760

833,956

1,597,579

3,037,038

12,779,082

12,468,082

Total

Total

SALVAGE — SALVARSAN AND NEOSALVARSAN

213

The President called attention to the rev¬ enue of 137,794 pesos derived from the income tax established last year, to be increased by 74.- 670 pesos in late collections. Payments on the national debt during 1916 amounted to 2,168,- 572 pesos silver. The President pointed out the need of an established monetary system to prevent fluctuations in the foreign exchange and recommended measures for new coinage. The monetary system is based on a silver stand¬ ard ; the peso, divided into 100 centavos, con¬ taining 25 grammes of silver .900 fine. The par value of the peso in currency of the United States is normally 0.3978, and the value of $1.00 is 2.51345 pesos.

Railways, Roads, Shipping, Etc. — A nar¬ row-gauge railway line connects the port of Acajutla with the capital, San Salvador, 65 miles; a branch line extends 25 miles to Santa Ana ; and other branch lines connect Santa Tecla with the capital and Santa Ana with Ateos. According to the Pan American Union's Latin America , page 42, ((the system of the International Railways of Central America which is intended to connect the Salvadorian port of La Union with ports in Guatemala is under construction.® The total length of rail¬ way open is 210 miles, all of narrow-gauge. Great improvements has been made during the last 10 or 12 years in the methods of construct¬ ing highways and other roads which facilitate travel in the interior. There are 1,467 miles of good road in the republic. Over 400 steamers enter the ports of the republic annually; regu¬ lar steamship connection is maintained with Salina Cruz on the north, Corinto on the south and intermediate ports ; through steamers be¬ tween San Francisco and Panama call at the ports of Acajutla, La Libertad and La Union when traffic warrants ; and, in order to stimulate maritime commerce, subventions have been given at different times to several important steamship companies. There are 117 post offices, 203 telegraph offices, with 2,521 miles of wire and 176 telephone stations, with 2,074 miles of wire.

Bibliography. — (Album Patriotico) (San Salvador 1915) ; Alvarado, H., and Suarez, B. U.,

1911).

Marrion Wilcox.

SALVAGE, the act of saving a ship or goods from extraordinary danger, as from fire, the sea, an enemy, pirates or the like. In com¬ mercial and maritime law: (1) A payment or compensation to which those persons are en¬ titled who have by their voluntary efforts saved ships or goods from extraordinary danger, as from fire, the sea, an enemy, pirates, or the like. The amount of salvage to be paid is generally

agreed on between the salvors and the owners of the property salved; but if they cannot agree, the sum to be paid, and the proportions in which it shall be paid, are determined by the Admiralty Court. The crew of a ship are not entitled to any salvage for any extraordinary efforts they may make in saving their own ves¬ sel. (2) The property saved from extraor¬ dinary danger by the voluntary efforts of the salvors. See Admiralty Law.

SALVARSAN AND NEOSALVARSAN.

The term salvarsan is used commercially as the equivalent of dioxydiamido

arsenobenzol, the formula for which is C12 Hi2 O2 N2 As2. It is popularly known as 606 because its originators Ehrlich and Hata made that number of experi¬ ments and combinations with arsenical prepara¬ tions before arriving at salvarsan. Its dis¬ covery was announced in the early part of 1911. It is also known as the Ehrlich-Hata prepara¬ tion. The active element in this combination as indicated in the formula is arsenic of the ter- valent form, the quinquevalent form being much less potent as a spirochsetocide. The aim and the hope of Ehrlich in his long series of patient efforts was to find a substance which in a single dose at a single blow should overpower svphilis (q.v.) a goal which he termed therapia magna sterilisans. A very ambitious project, almost an impossibility, and yet he barely missed it.

In the experimental work in which apes had been successfully syphilized with cultures of Spirochaeta pallida, contrary to the belief that animals could be inoculated with syphilis, Ehr¬ lich's dream had been partially realized. Apes, including chimpanzees, had been sterilized, that is. they had been cured of experimental syphilis with a single dose of salvarsan but in human beings this cannot be done. Still salvarsan js one of the greatest of human achievements in the field of therapeutics.

Remarkable results, not cures, have been ob¬ tained and may still be obtained with a single dose of salvarsan, especially if the disease is treated in the very early stage, but to produce such a profound effect as is implied in the cure of syphilis would require a larger dose than could be tolerated by a human being, it would produce a poisonous and probably a fatal result.

Salvarsan is prepared as follows : Sodium amalgam (28.8 grams of 4 per cent sodium) is added to 30 cubic centimeters of water and 32 cubic centimeters of 2N- acetic acid containing 4.98 grams of 3-amino-4-hydroxyphenylarsenious oxide. A yellow precipitate is produced. When the amalgam has been used up there is added 25 cubic centimeters of 2V-acetic acid and 28.8 grams more of the sodium amalgam. This procedure is once more repeated, when the re¬ duction will be complete. The precipitate is then dissolved in 60 cubic centimeters of methvl alcohol, and the calculated amount of methyl- alcoholic hydrochloric acid is added. The salvarsan hydrochloride is then precipitated by adding ether after filtering.

Commercial salvarsan is a pale yellow, bulky, micro-crystalline powder which is permanent when dry, but highly oxidizable in air, and de¬ composes in aqueous solution, and especially in those which are alkaline, even in the absence of air. It dissolves readily in water, methyl- alcohol, ethylene-glycol, and glycerol and spar¬ ingly in ether and acetone. It has an alkaline

reaction. As found on the market it is gen¬ erally mixed with impurities, and is quite vari¬ able as to its content of arsenic. For thera¬ peutical use it must be dissolved in distilled, not in boiled water, for it has been found, or at any rate supposed that the albumen from the organisms in the water which has been boiled for the solution would vitiate the action of salvarsan when introduced into the body. Un¬ like mercury it may not be taken by the mouth nor rubbed into the skin by means of an oint¬ ment. It is used entirely by iniection, three methods being possible, the subcutaneous, the intramuscular and the intravenous. The sub¬ cutaneous method has been practically aban¬ doned for the' substance remains within the tis¬ sues as an infiltrate, without producing any ap¬ preciable effect upon the spiroehetes which are the cause of the disease. In fact it becomes a distinct source of harm, and cases have repeat¬ edly been reported in which it has resulted in abscess and extensive neurosis of tissue.

Intramuscular injections have been approved by some physicians and discarded by others. The large muscles of the gluteal region are usually selected for this purpose and the injec¬ tion into them is made deeply. The objections to this method are the intense and persistent pains which follow the injections and the con¬ tinuance for a prolonged period of the infiltra¬ tions. These infiltrations do not terminate in suppuration but the salvarsan may become dis¬ integrated and cause arsenical poisoning.

The form of injection which now receives the approval of the majority of experienced syphilographers is the intravenous.

The veins at the bend of the elbow are se¬ lected for the injection, the skin being first carefully sterilized. A tourniquet is secured around the arm and the injection is made into either of the veins which are thereby distended. After the operation of injection has been ac¬ complished the wounded vein must be carefully dressed, this precaution being an important one.

It is also very important that the injection should not be made as a matter of office routine, but in- the patient's house, or in a hos¬ pital where all necessary appliances are at hand. The patient should remain in bed from 24 to 48 hours after he has received the injection. The reaction which may be expected from an in¬ travenous injection of salvarsan usually consists of slight elevation of temperature, chill, fever, headache and vomiting.

The quantity af salvarsan which should be used in an injection is from 0.4 to 0.6 gram. Death has been attributed to arsenical poisoning in some of

the fatal cases, as large a quantity as three or more grains of arsenic having been liberated into the body by the disintegration of the injected salvarsan.

It is quite apparent that the danger which attends the intravenous method is much greater than that which attends the intramuscular. Contra-indications to the use of salvarsan are heart disease in various forms, including aneurysm and dilatation, myocarditis and un¬ compensated valvular disease. It should not be used in cases of advanced nephritis, nor in those cases of tertiary syphilis in which the cerebral and meningeal symptoms are threaten¬ ing, in arterio-sclerosis nor in the presence of

high fever. Blindness and deafness have oc¬ curred after the injection of salvarsan but thev have usually cleared up after a suitable course of treatment with mercury. It is now believed that syphilis cannot be cured with salvarsan alone but that it should be used in conjunction with mercury, except ppssibly in primary syphilis. <(Sodium salv-arsan,® prepared by pre¬ cipitating with alcohol a solution of salvaisan in aqueous sodium hydroxide in the presence of a stabilizer (such as sodium hydrosulphite, mannitol or other polyhydric alcohols), has proved satisfactory in the ambulatory treatment of syphilis. <(Copper salvarsan,® prepared by adding sodium hydroxide to a solution of sal¬ varsan and a copper salt, has been found useful in the treatment of ˆsleeping sickness.®

Neosalvarsan or Novarsenobenzol. — The untoward results which attended the use of sal¬ varsan induced Ehrlich to continue his experi¬ ments in the hope of discovering a substance by which they might be obviated. In October 1911 he introduced Neosalvarsan or ((Ehrlich 914® (the number indicating the total in the series of his experiments, from the beginning), a con¬ densation product of formaldehyde, sulphoxy- late of sodium and salvarsan. Its distinct ad¬ vantage over salvarsan is that it is neutral in reaction, salvarsan being alkaline.

It is a dry powder which is readily soluble in water or preferably in a dilute solution of sodium chloride.

It is used by injection either intramuscularly or intravenously, and will not cause infiltrations like salvarsan, nor will it cause necrosis of the veins into which it is injected, nor will it pro¬ duce the severe pain which is caused by salvar¬ san. Because of its neutral reaction it will modify or abolish certain distressing symptoms which have frequently followed the use of sal¬ varsan including vaso-motor disturbances and congestions which have sometimes resulted in collapse, oedema of the face, diarrhoea, colic, etc. Larger doses of this substance may be used than of salvarsan of which it contains 66 per

cent. It is always safer, however, to begin the treat¬ ment with a small dose, especially in women, and increase them as the indications may war¬ rant. Thus the limits of dosage may be placed between 0.3 and 1.5 gram. The contra-indica¬ tions are the same as for salvarsan.

A pronounced advance in the treatment of syphilis and kindred disorders has been made possible by the development of two other neo- salvarsans, known as <(Galyl® and <(Ludyl,® re¬ spectively, ((Nq. 1116® and <(No. 1151® of Mouneyrat's series. The first is an acidic sub¬ stance dissolving in aqueous sodium carbonate to a neutral solution, and as such, very suitable for intravenous injection in the treatment of syphilis and other protozoal diseases. Ludvl is prepared by the Schotten-Baumann reaction from benzene-m-disulphonic chloride of sal¬ varsan. Both galyl and ludyl, as used in the treatment of syphilis, have a verv energetic spirillicidal action, while being but feeblv toxic and well tolerated in the system. There is no apparent congestive action of the organs of the body following their use, and no secondary ill effect on the nervous system ; while their action upon the blood and general nutrition is favor¬ able.

Under the use of these substances, especially

when combined with mercury, the symptoms of syphilis rapidly improve, and the Wassermann test, which should be repeated every month or two, will indicate the progressive destruction and disappearance of the spirochetes.

There is no .definite time limit within which salvarsan or neosalvarsan, in connection with mercury, should be used; it may be a year; it may be much longer. A persistent negative Wassermann reaction indicates the disappear¬ ance of the cause of the disease, but just when this limit will be reached it will be impossible to predict in any given case. The use of sal¬ varsan and the neosalvarsans has also been ex¬ tended to the treatment of relapsing fever, scarlet fever, malaria and various nervous dis¬ eases including cholera.

Andrew F. Currier, M.D., Associate Surgeon, New York Woman's Hos¬ pital.

SALVATIERRA, sal-va-te-er'ra, Mexico, city in the state of Guanajuato, on the Rio Lerma, and the Celayo-Acambaro railroads, 50 miles southwest of Queretaro. The chief in¬ dustry is cotton-spinning. Pop. 14,322.

SALVATION ARMY, The. The story of The Salavation Army is the story of an aggres¬ sive religious organization that has won its way around the world entirely on its own merits and has built itself up from what had hitherto been regarded as most unpromising material. The Army is organized on military principles, with a view to reaching the non¬ churchgoing masses of the world. It was first started in July 1865, in the East End of London as the Christian Mission. Thirteen years later, at Christmas 1878, it received the name of The Salvation Army. Since then its growth throughout the world has been phenomenal. The late Gen. William Booth (q.v.), its well- known father and founder was born in Notting¬ ham, England, on 10 April 1829; d. London, 20 Aug. 1912. In 1852 he entered the ministry of the Methodist Church and became a power¬ ful evangelist, attracting immense crowds and witnessing thousands of conversions. Finding, however, that the churchless masses could not be reached by ordinary methods, he resigned his pastorate and established the Christian Mis¬ sion which afterward developed into The Army. In this he was ably assisted by his wife, Cath¬ erine Booth, who was familiarly known as the Mother of The Salvation Army. She was born in 1829 and died on 4 Oct. 1890. She was re¬ garded by many as the most eloquent and powerful woman speaker of the century and did more than any other to open up the way for women to preach the Gospel. The absolute equality of women as leaders, officeholders and preachers became one of the cardinal planks in The Army platform. As a temperance move¬ ment the value of the work of The Army can¬ not be over-estimated. It has been said that The Salvation Army has been the means of converting hundreds of thousands of confirmed drunkards. As total abstinence is a condition of membership, this can be readily understood.

The international headquarters of The Army are in London. Its world-wide operations are carried on in 61 countries and colonies, embrac¬ ing 9,673 posts, under the charge of 23,200 offi¬ cers and employees, with 61,685 local officers, 28,- 1 50 brass bandsmen. Eighty periodicals are pub¬

lished in 35 languages, with a weekly circulation of about 205,000. There are 1,173 social relief institutions and 615 day schools in the world, under the charge of nearly 3,100 officers and employees. About 7,399 fallen women annually pass through the 119 rescue homes and from 80 to 90 per cent of these are permanently restored to lives of virtue. About 2,701 ex-convicts pass annually through the prison gate homes. There are 147 slum settlements in the poorest districts of great cities, the worst dives, saloons and tenements being regularly visited. The number of annual conversions in connection with the spiritual work have averaged from 225,000 to 275,000 during the past 10 years, making a total of approximately 2,500,000, of whom not less than 250,000 were converted from lives of drunkenness.

The headquarters of The Salvation Army in America are in New York. Commander Evangeline Booth, daughter of the founder of The Army, is in charge of the work. A sepa¬ rate territory has been formed of the country west of the Mississippi, under Commissioner Thomas Estell, with headquarters in Chicago. The first party of officers, under Commissioner George Railton, landed in New York in March

1880.

The social relief work of The Salvation Army rose, without deliberate plan, to meet certain immediate needs. After 25 years of application The Salvation Army has trained a large body of men and women who are ex¬ perts on all questions of social relief. Munici¬ pal governments in all parts of the country call its officers to council on the problems of poverty and unemployment and the criminal and its various homes in many cities are con¬ sidered necessary parts of the corrective sys¬ tem. The Prison work of The Salvation Army has made long strides during the last 10 years and its prison department is assuming consider¬ able worth to the parole boards of several States.

Training colleges for cadets have been es¬ tablished for the training of officers in New York and Chicago.

The principal literature of The Salvation Army includes the following books: (Darkest England, > (Religion for Everyday y and drain¬ ing of Children/ by General William Booth; (Servants of A1P and

SALVATOR, one of the names of the monitor lizard ; and also applied to a South American lizard, the teju (q.v.).

SALVE REGINA, sal've re-ji'na, the first

words of a prayer addressed to the Mother of Christ, in Roman Catholic religious services. The words are also applied to the music used in connection with the prayer.

SALVIA, a large genus of the Labiatce, occurring in temperature or warm regions, sev-

eral living in the southwestern United States. They range in size from herbs

to shrubs, in foliage from entire to pinnatifid leaves and in inflorescence, from axillary to panicled. The flowers are sometimes two inches long and of nearly every hue except yellow ; and the floral leaves are often changed into colored bracts, adding to their brilliance. The genus is re¬ markable for the arrangements made for cross- fertilization. The blossoms have a two-lipped corolla, two rudiments of stamens and two pol- liniferous stamens. The latter stand at the en¬ trance to the throat of the flower, have short immovable filaments and a very long connective between the two anther cells of which the lower is abortive. This connective is crescent-shaped, the horns pointing outward and rocks upon the filament in such a manner that a bee entering the blossom pushes back the lower arm and brings down the other on its back, so that the pollen-filled anther cell deposits part of its con¬ tents there.

Salvia officinalis, the common sage (q.v.) and many others are cultivated either for sav¬ ory herbs or for their flowers ; or, as in the Clarys (S. selarea), for colored bracts; or, as in S. argentea, for its wholly white foliage.

SALVINI, sal-ve'ne, Tommaso, Italian tragedian: b. Milan, 1 Jan. 1829; d. 1 Jan. 1916. He began his studies at Florence but showing a talent for acting, his father, who was an actor, put him under the instruction of Gustavo Mo¬ dena and at 16 he entered upon his stage career. In 1849 he left the stage to take part in the war of Italian independence, was made a corporal and served throughout the siege of Rome. He returned to the stage the following year and acted in the company with Adelaide Ristori. He soon began the study of those parts that he later played with such success, orosmane in ; Palo in (Francesca da Rim¬ ini } ; QEdipus in a play of that name written for him by Nicolini ; Conrad in (La Morte Civile) ; in (Sampson, the Gladiator,) ˆMacbethp (King Lear, 'Uoriolanus,* and finally in 1891 at Flor¬ ence as Iago. Consult Winter, William, (Shadows of the Stage) (New York 1892) ; id., (The Wallet of Time* (ib., 1913) ; (Leaves*

from the Autobiography of Tommaso Salvini (London and New York 1893).*

SALVINIA, a genus of an aquatic family (Salviniacece) of cryptogams, They are float¬ ing plants, widely distributed irt warm regions and not far removed from the ferns. S. iidtails, Common in southern Europe and tropical America, has a sparingly branched stem lying on the water and develops three leaves at each node ; two of these float as oval, green, and papillose foliage, hairy underneath, while the submerged third is divided into numerous hairy filaments, hanging like tassels in the water and metamorphosed into absorptive organs, that pear to be true roots, but are

not. The spheri¬ cal spOrocarps, or sori, are borne near the junc¬ tion of these filaments with the stem and are generally in groups of three, each enclosed in a cuplike growth from the filament, like the indusium of a fern and enclosing unisexual sporangia. The sporangia are composed of either microspores or macrospores. The mi¬ crospores form antheridia and liberate sperma- tozoids which fertilize the archegonia developed by the macrospores. Several species of the Safoiniacea are useful in aquaria.

SALWIN, sal'wen, SALWEEN, or SALUEN, Burma, the most important river of the country. It has its source in the Tania Mountains, south of the Kuen Lun, drawing also from the Kara Nor, some of its water. At its source, it is known as Nagtschu, and con¬ sists of the united volume of water coming from the glaciers of the mountain streams rising on the Tibetan plateaus. Its name among the Chinese is Lu-Tse-Kiang. The Burmese call it Thanlwin. About 160 Kilometers from its mouth appear many dangerous rapids, a great menace to navigation. The current is variable. It is a wild and picturesque stream, whose as¬ pect varies greatly in the dry and wet seasons. After the rains the water washes high up the slopes against the trees of the forests ; the average difference between high and low water amounting to from 50 to 90 feet. In the lower part of its course, islands also obstruct naviga¬ tion (not visible at high water). The worst part is the gorge between the Yonzalin and Kyankhnyat rivers. Many ferries are used to cross the river and at these points villages are built on the heights above. There are a few bridges in Chinese territory. The Salwin's chief tributaries are the Nam Yu, Nam Oir Hsipa Haw, Nam Nim, Nam Ting, Nam Kyek, Nam Nang, Nam Koa, Nam Hka and Nam Pang — its largest tributary, — the Nam Hsimr Me Sili and Me Sala; the Nam Hang, Nam Pan, Nam Teng, Nam Pawn, the Thaung-yin and the Yonzalin. The Salwin cuts the British Shan states almost in two. Kyodam, the great timber depot, lies 30 miles below the junction of the Thaung-yin and the Salwin. A cable stretched across the river at this point catches all the timber (teak), which is made into rafts, and floated down to Kado near Maulmein (where the revenue is collected). From Kyo- dan southward and as far as Shwegon, 63 miles from Maulmein, boats and steamers of light draft can safely navigate. The area of the Salwin Basin is 62,700 square miles. Its length 800 miles, breadth from one to four miles.

SALZBRUNN, zalts'broon, Germany, a -'roup of three villages (New, Lower and Upper Salzbrunn), in Prussian Silesia, 30 miles south¬ west of Breslau. It is famous as a watering place and has eight mineral springs. The water is alkalo-saline. Many thousand bottles are exported annually and

several thousand persons visit the springs in the season. The water is especially adapted to pulmonary com¬ plaints, There are various industrial works, including glass and porcelain factories, wool looms, coal mines and brickyards. Pop. 6,459.

SALZBURG, zalts'boorg, Austria, (1) capi¬ tal of the duchy or province of that name, occupies a position of singular beauty on the Salzbach, 87 miles southeast of Munich. It lies in a valley from which tower the wooded slopes of the Salzburg Alps. The steep sides of the Monchsberg rise from the midst of the town, rocky and rugged. In the ancient ceme¬ tery of Saint Peter, the vaults are hewn in rocky clefts. Many of the private and public buildings are handsome marble structures and are suggestive of the Italian. Shady prome¬ nades skirt the winding river. The cathedral is a fine specimen of Renaissance, built in 1614-28 in imitation of Saint Peter's. A monument to Mozart, who was born here, stands in Mozart- Platz. The present palace of the archbishops is an imposing edifice, opposite to which are the government offices and law courts. Across the river is the Mirabell palace, once the sum¬ mer residence of the prince-archbishops. There are 24 churches, a theological seminary and schools, hospitals, fine libraries, a museum, rid¬ ing schools, etc. Salzburg is a very popular summer resort, which contributes much to its development and progress. A park, theatre, art gallery and baths are among the most recent improvements. There are numerous benevolent and charitable institutions. Salzburg engages in a variety of small manufactures, such as musical instruments, marble ornaments, iron¬ wares, cement, artificial wool, etc. Its trade is improving. Its origin and development were equally ecclesiastical, its archbishops German princes. The monastery and bishopric founded here (500-700) by Saint Rupert of Worms, was the nucleus of the present town. It has been the scene of several religious conflicts and is distinctively Catholic. Pop. about 38,000. (2) The duchy covers an area of 2,762 square miles. It is characteristically mountainous with longi¬ tudinal valleys intersecting the hills. Of the 200 lakes, Lake Zell is celebrated for its won¬ drous mountain panorama. It has many min¬ eral and thermal springs and valuable mines and forests. Pop. about 200,000.

SALZMANN, zalts'man, Christian Got- thilf, German Protestant clergyman and edu¬ cator: b. Sommerda, Thuringia, 1 June 1744; d. Schnepfenthal, 31 Oct. 1811. He was edu¬ cated at Jena, served as pastor in 1768-81 and was teacher of morals and religion at the Philanthropinum, Dessau, in 1781-84. He was a believer in the natural religion, and the school which he established at Schnepfenthal was or¬ ganized on especially broad principles. Salz- mann held the theory that isolation was a re¬ quisite of moral education, was a determined opponent of many methods of teaching then in force and held the faults of the pupil to be

justly credited to the master. His school at¬ tained a considerable reputation and was con¬ tinued after his death. His writings on edu¬ cational matters were extensive, most of them being in the form of fiction or of satire upon prevalent practice in instruction. Author of (1780-86) ; (1900) and Ackerman in (Bib- liothek padagogische KlassikeD (1897-1901). Consult the < Memoir } published by the school at its centennary in 1884.

sAmal, sa'mal, an island of the Philip¬ pines in the northern part of Davao Bay form¬ ing the east shore of Pasiputan Strait, length 17 miles, width 13 miles, area 140 square miles. Its general elevation is 820 feet, some parts of the shores are low and wooded and other por¬ tions are high and rocky. The soil is fertile, and chocolate is the chief product; excellent timber is also obtained. The island is well populated, having seven small towns on its western coast.

SAMALES, sa-ma'lez, (1) a small tribe of the Philippine Islands, living on the island of Samal in the Gulf of Davao, on the east coast of the island of Mindanao. They are of the Malay race. (2) The name sometimes given to the Moros inhabiting the islands between Basi- lan and Sulu, Philippines ; they are also called Samales-Laut.

SAMANA (sa-ma-na ') BAY, an indenta¬ tion of the eastern coast of Santo Domingo, Haiti, 30 miles long and 10 miles wide. It affords an excellent harbor, being well sheltered and deep, capable of accommodating the largest vessels. The ports of Sanchez and Santa Bar¬ bara de Samana are on the north coast. The bay has an important position near the route from the United States to the Isthmus of Panama; in 1870 a treaty was negotiated pro¬ viding for its purchase by the United States, which the United States Senate refused to ratify.

SAMAR, sa'mar, an island of the Philip¬ pines, the third in size of the archipelago. It lies southeast of Luzon, in the extreme north¬ eastern part of the Visayan group and east of Leyte, from which it is separated by the nar¬ row strait of San Juanico; length northwest and southeast 156 miles; width 75 miles; area 5,198 square miles, with dependent islands 5,488 square miles. A central mountain chain trav¬ erses the island from northwest to southeast, being divided near the centre by the valley of the Ulut River; there is also a group of moun¬ tains in the extreme northwest. Their height rarely exceeds 1,700 to 1,800 feet. The island has a number of rivers, of which the largest and most important are the Oras and Ulut on the east, the Bato on the north and the Gandara on the west, and there are four lakes. Among the natural curiosities is an arch over the Basey River formed by two limestone rocks from 34 to 40 feet high. In the rocks on the left a cave opens 37 feet above the water, which is 94 feet deep; it has been

partially destroyed by the cav¬ ing of the rocks overhead. The place is known

as the Cuevas de Sojoton. The soil is fertile and adapted to the production of all the staples of the Philippines; the most important products are hemp, sugar, rice and cocoanuts ; the hemp product for export amounted to over 21,000,000 pounds in a single year. Coffee, chocolate, tobacco and wheat are also cultivated in abun¬ dance. A number of medicinal plants grow on the island, the most famous being the one pro¬ ducing the seed called <(isigud,® or the <(fruit of San Ignacio,® also known as ((Catbalogan seed,® because large quantities of it are grown near the town of Catbalogan. This is highly prized by the Chinese as an efficacious remedy for cholera, Valuable timber is found; bamboo and rattan are abundant, and wax and honey are obtained in large quantities. Coal, gold and copper are found in the mountains, but have not been mined. The raising of horses, cattle, hogs and goats is an important industry. Sugar and cocoanut-oil are manufactured and there are other manufactures for domestic use. Though there are few roads in the island there is good communication with the interior by means of the rivers which are navigable for native boats. There is also an extensive coast¬ wise trade and trade with Manila. The people of Samar are of Visayan blood, representing most fully the characteristics of the Malay race. They are, as a rule, industrious. Some native refugees, about 10,000, live in the mountains, practically independent and savage in their man¬ ner and customs. During the last insurrection there was an insurgent stronghold at Sojoton which was captured by United States troops in November 1901. The island of Samar with its adjacent islands was constituted a province and placed under civil government in 1902, in ac¬ cordance with the provincial government act of the Philippine Commission. Pop. 266,237.

SAMARA, sa-ma'ra, Russia, (1) capital of a province of the same name, at the junction of the Samara River with the Volga, 550 miles southeast of Moscow. It is the seat of a gov¬ ernor and of a bishop, and one of the main ports of the Volga. Its principal buildings are its churches — mostly Russian — convents, schools and seminaries; theatres, banks, industrial es¬ tablishments, philanthropical institutions, public libraries and museums. Its manufactures in¬ clude machinery, leather, soap, etc. There is an enormous trade in corn, hides and meat, fish and caviare and salt, and a large transit trade between Samara, Khiva, Bokhara and Tashkend. Three markets are held annually. The Koumiss health resorts are celebrated. Pop. 145,600. (2) The province of Samara, in the south¬ east, has an area of

58,321 square miles. At the north it consists of flat low tablelands, in¬ terspersed by deep river valleys. The chief streams are the Volga, Tcheremshan, Sok and Samara. The Zheguleff Mountains rise opposite the town of Samara, from the banks of the Volga. The remainder of the province is cov¬ ered by low, flat steppes, excepting two spurs of the Obshchiy at the southeast. Agriculture and gardening are the chief occupations of the inhabitants, also stock-raising and bee culture. There is considerable domestic and foreign commerce. The principal fairs are held at Novouzcnsk and Bugulma. More than an average number of schools are provided. The Serghievsk mineral springs are much fre¬

quented. There is a large German colony. The chief towns are Samara, Bugulwa, Buguruslan, Buzuluk, Nicolayevsk, Novo-Uzen and Stav¬ ropol. In 1889 Samara suffered from famine and a great plague and the Russian Red Cross Society cared for 100,000 people. Pop. 3,710,-

100.

SAMARANG, sa'ma-rang', Java, a seaport town on the north coast, 255 miles east of Batavia, the principal port for the trade of Middle Java, since 1873 connected at Surakarta with the Java Railway. The European quarters have all the appearance of a typical Dutch town. The more important buildings are a military hospital, the city hall (1854-64), Christian churches and schools. A fort and a coast bat¬ tery provide defense for the town. The river is silted up at its mouth, but a canal, constructed in 1879, serves as a harbor. The roadstead is exposed during the west monsoon. Pop. (1905) 96,660, including 12,372 Chinese and 4,800 Europeans.

SAMARIA, sa-ma'ri-a, Palestine, (1) the ancient capital of Samaria, 36 miles northwest of Jerusalem, occupied the acclivity of an iso¬ lated and abrupt height — Mount Sameron, which is separated from the surrounding moun¬ tains by a rich and well-watered plain. The town rose in terraces from this plain to a height of 400 or 500 feet. Samaria was the capital of Northern Israel from the date of its founda¬ tion by Omri, about 925 b.c., to the time of its capitulation to the Assyrians 721 b.c. The site was selected by Omri for a stronghold and capital, as commanding two of the most im¬ portant high-roads. The situation surpasses greatly that of Jerusalem, though not so pic¬ turesque. It commands, however, a charming view toward the Mediterranean, the mountains of Schechem and Mount Hermon. The most important ruins are those of the time of Herod. It was in Samaria that the 10 tribes of Israel founded their independent state after the re¬ volt, perpetuating their mutual animosity by incessant warfare. Thus the name Samaritan became a term of bitter reproach. This an¬ tipathy was religious as well as political, but was later mitigated by the

return of the Samaritans to the ancient form of worship, and by the erection of a temple, modeled after that of Solomon in Jerusalem, soon after Alexander the Great had passed through Syria. Samaria having been presented by Augustus to Herod, he rebuilt the city which had been the residence of all the kings of Israel till its overthrow by the Assyrians — calling the new temple Sebaste, in honor of the donor. An old church or mosque, once dedicated to John the Baptist, in the adjacent village of Sebastieh, marks the scene of that saint's burial or martyrdom. In the great World War the city was in the zone of military operations by the British against the Turks, resulting in the surrender of Jeru¬ salem, 10 Dec. 1917, after being in possession of the Mohammedans, with two brief intervals, for more than 1,200 years. (2) Samaria, the name also given to the kingdom of Israel and the subsequent Roman province forming the central portion of Palestine stretching south¬ ward from the Plain of Esdraelon, declining south of Hebron, into the desert plateau of Et Tih.

SAMARITAN LANGUAGE AND LITERATURE, the tongue and literary pro¬ ductions belonging to the inhabitants of Samaria, a region in Central Palestine of in¬ definite boundaries, possessing a capital of the same name.

Samaritan Language. — The Samaritan lan¬ guage was formed of varied elements gradually collected and assimilated from the Hebrew, Chaldee and Syriac. Greek, Latin, Persian and Arabic also contributed words to this dialect which grew up among a people isolated and even secluded in some respects, but through whose territory passed the immemorial trade route which connected Egypt and Africa with Assyria and the far East. Thus roots and heterogeneous scraps of language were jumbled together in the vernacular of an illiterate people, whose grammar was irregular, whose orthog¬ raphy was uncertain ; there appears a complete confusion between the gutturals and cognate letters severally; quiescents or silent vowels pre¬ vail, and while vowel sounds are uncertain that of a is the most prominent. When the Arabians conquered Palestine in the 7th century this language gave place to that of the conquerors excepting among the priests, where it survived as the language of religion and ritual; thus it shared the fate of Hebrew among the Jews, Latin in Italy and the Roman provinces and Sanskrit in Hindustan. Like all Semitic lan¬ guages it is read from right to left and the alphabet consists only of consonants, namely, alaf, bith, gaman, dalat, i, ba, sen, it, tit, jud, kaph, labad, mim, nun, simcat, in, phi, sadi, goph, rish, shan, tav. The two vowels with which certain words begin have a slight conso¬ nantal value. There are no accents or other diacritical symbols and no vowel points as in other Semitic languages, but some

consonants are used as vowels. The numbers are written as in Hebrew. The characters appear in two forms, one of which is found in manuscripts, the other being confined to engraved inscrip¬ tions.

Samaritan Literature. — The literature of the Samaritan people consists of many depart¬ ments, including grammar and lexicography. Three grammatical treatises on the Samaritan language were published from a manuscript at Amsterdam in 1862. They expound the theories of certain Arabian grammarians, from whose philological works whole passages are copied word for word. The Samaritan pronunciation may be judged of by the transliteration of He¬ brew words into Arabic. No Samaritan lexicon has yet come to light. The lexicography, there¬ fore, of the language is in an inchoate condi¬ tion. The nearest approach to a glossary is to be found in the fragments of

Praise of the Lord of the Human Race, that is, Moses, who is credited with a divine nature, while great emphasis is laid upon the circum¬ stances of his birth and the miracles he wrought. These two are typical of a somewhat extensive Samaritan legendary literature. The Samaritan commentaries on the Pentateuch are many in number and interesting as showing the doctrines of these people. It abounds in quo¬ tations from the Pentateuch, the prophets and the Mishna, and avoids all references to the Deity which imply an anthropomorphic concep¬ tion. A number of fragments from the com¬ mentaries are also preserved at Saint Peters¬ burg. The Samaritan Chronicle or Book of Joshua,* sent to Scaliger by the Samaritans of Cairo in 1584, seems to have revised and re¬ dacted into its present form about 1300 a.d. from four special manuscripts, three Arabic and one Hebrew, that is Samaritan. Among other things it relates that <(King Joshua® waged war with 300,000 mounted men against two kings of Persia, and was succeeded on his throne by five ˆroyal® rulers — the last being Sampson. The Chronicle of Abulfath) covers a period from Adam to Mohammed and is full of the wildest fables. Consult Uhlemann, Hnstitu- tiones linguae Samaritanae) (Leipzig 1837) ; Petermann, H., (Brevis Linguae Samaritanae*

*Grammatica) (Berlin 1873) ; Gesenius, W., (De Pentateuchi Samaritanae indole) (Halle 1815) ; Brüll, A., (Kritische Studien fiber Samaritanische Fragments in Oxford (Frank¬ fort 1875) ; Kohn, S., *Zur Sprache, Litteratur und Dogmatik der Samaritaner) (Leipzig 1876) ; id., c Samaritanische Studien) (Breslau 1868) ; Cowley, (The Samaritan Liturgy) (Ox¬ ford 1909).*

SAMARITAN PENTATEUCH, an an¬ cient version of the books of Moses, which has been preserved by the Samaritans, and along with the book of Joshua, constitutes their sacred scriptures. The Samaritan Pentateuch is

most probably a recension of the same original as that from which the Jewish came, and possesses an independent value in determin¬ ing the text. It is written in a non-Hebrew character, probably older than that of the Hebrew Septuagint. A manuscript copy of the Samaritan Pentateuch is in existence which is said by the Samaritans to have been written by Abishua, the great-grandson of Aaron. There are various other manuscript copies of this version, besides a translation of it in the Samaritan vernacular and one in Arabic, which after the 7th century superseded Samaritan as the language of the people. The work was known only through Origen, Jerome and other early writers until Pietro della Valle discov¬ ered a copy of it at Damascus in the 17th century. There are now several printed edi¬ tions. See Samaritan Language and Litera¬ ture.

SAMARITANS, so called from the city of Samaria, the capital of the kingdom of Israel, and from Samaritis, the region adjoining that city. The policy of the Israelitish kings was, as a rule, to keep their subjects apart from too close association with the kingdom of Judah, and the breach between the two peoples was made wider, when, after the captivity of Israel, Assyrian colonists intermarried with the rem¬ nant left behind by the conquerors, and the

Samaritans ceased to be of purely Hebrew descent. The New Testament shows the aver¬ sion with which they were regarded by the Jews in the time of Christ, and even to this day when the Samaritans are represented by a few families still worshipping at Mount Gerizim, the dislike with which the Jews look upon them is as strong as ever. The Samaritans claim to be purely Mosaic in their creed, and that the Jews have departed from the ancient teachings of IsraeL The} worship one God, practise circumcision and the purifications, and keep the feasts, except the Purim and the feast of the Dedication. They look for a Messiah and believe in a resurrection from the dead and retribution in a future life for wrongs done in the present one. They marry among them¬ selves only and practise polygamy in a limited degree. See also Jews and Judaism; Jewish Sects.*

SAMARKAND, sam-ar-kand' (ancient, Marcaxda), Turkestan, Asiatic Russia, chief town of the province of the same name, and formerly capital of Sogdiana, in a fertile valley, 130 miles east of the city of Bokhara. The citadel stands at the west and beyond is the newlv-built town. The Righistan, or main square, is of unrivaled beauty in its archi¬ tectural features. The principal buildings are a palace, the bazaars, the Ulg-beg madrasa, or college ; the tombs of Timur and his wives ; two other colleges

of the 17th century — splendid buildings, highly decorated with arabesques, enameled tiles of various colors, rich marble, and inscriptions of gold, etc., and 250 mosques. There is a brisk trade, and the chief items of commerce are cotton, silk, wheat, rice, horses, asses, fruit and cutler}. Gardening is the principal occupation, and there is some manufacturing. Wheat, rice and silk are ex¬ ported, chiefly to Bokhara; silkwares, fine fruits, and rock-salt are imported. Samarkand has been for more than two centuries a great Asiatic mart. As Marcanda, it was taken by Alexander the Great : Timur made it his capital and in his time it contained a population of 150,000. In the 15th century it was celebrated as a school of astronomy and mathematics. It had a checkered history; taken in 712 by the Arabs, who introduced the creed and customs of Islam, it finally fell into possession of the Russians in 1868. Pop. of city (1910) 94,650; province (1914) 1,198,000.*

SAMARSKITE, a rare and exceedingly complex, velvet black, nearly opaque mineral, occurring mostly massive, rarely in crystals. It is distinguished by its dark reddish-brown streak, splendent, vitreous to resinous lustre and conchoidal fracture. Its hardness is 5 to 6, specific gravity 5.6 to 5.8. Its usually rough crystals are rectangular prisms of orthorombic symmetry. It is a niobate (and tantalate) of iron uranium, and the cerium and yttrium metals. It is chiefly remarkable for the large number of rare metals which it contains, in¬ cluding samarium, terbium, gadolinium, and the doubtful mosandrum, decipium and phillipium. Its only European locality is Miask, Russia, but it is found sparingly in Canada, also in the United States in Connecticut, Maryland and Colorado. The only localities of commercial importance are in North Carolina.

SAMBOURNE, sam'born, Edward Linley,

English cartoonist: b. London, 4 Jan. 1845; d. 3 Aug. 1910. He was educated at the City of London School and Chester College, and at 16 became an engineering draughtsman. In 1867 Mark Lemon, editor of Punch I, accepted a small drawing from his hand, and he soon formed the connection that lasted through life. In 1871 he was given a seat at the table and in 1901 he succeeded Sir John Tenniel as chief cartoon¬ ist. He had practically no artistic education, but developed for himself an original style after first showing some inclination to the methods of Leech and Keene. He displayed ingenuity and firmness of touch, and a classic feeling for line. He was perhaps the least humorous of the Punch artists, being weighted with a strain of seriousness and dignity. He illustrated Burnand's (New History of Sanford and Mer- ton) (1872) ; Kingsley's (\Vater Babies) (1885) ; (Hans Andersen's Fairy Tales) (1887), etc.

SAMBRE, sanbar, river of France and Bel¬ gium, a tributary of the Meuse.

It rises in the northern part of the French department of Aisne, flows between steep and rock} heights, receives several smaller streams, and finally, after a very tortuous course, empties at Namur into the Meuse. The Sambre is 110 miles long. It is navigable from Landrecies for 148 kilo¬ meters, and from that point for 67 kilometers is canalized, having 10 locks. The Sambre Canal passes southward as far as Oise, connect¬ ing the Seine and Maas. Practically the vicin¬ ity of the entire length of the river in France formed a vast battlefield after the Teutonic armies had invaded France in the early part of the great World War.*

SAMBUKE, an ancient musical instru¬ ment ; though applied sometimes to several musical instruments of different kinds, such as a lyre, a dulcimer, a triangular harp or trigon and the large Asiatic and Egyptian harps.

SAMBUR, a large deer (Ccrvus unicolor), widely distributed throughout southeastern Asia, and especially the hill country of India and the species of most importance to the sportsman. Large bucks approach five feet in height at the withers, and may exceed 500 pounds in weight. The antlers are large and rough, have the brow-tine sprouting at an acute angle with the beam instead of at or near a right angle, and dividing into two subequal tines at the extremity; the beam sometimes ex¬ ceeds 40 inches in length in fine specimens from the Bay of Bengal. The color is properly a uniform deep brown, but paler and less hand¬ some hues are often seen ; the hair is long and win, and forms an erectile mane on the necks of full-grown stags. This deer is an inhabitant of the woodlands, coming out to graze on the hill-slopes, at times, for like the wapiti it sub¬ sists mainly upon grass and herbage, but never far from a refuge in the jungle; yet at certain seasons browses the new twigs, or seeks for fruits. There is great variety in their circum¬ stances and habits throughout the wide area of the distribution of this species, and conse¬ quently a puzzling amount of variation in their form and appearance, so that several separate species have been without good reason, as fur¬ ther study has shown. Consult Blanford. (Mammals of India* (1888) ; Lydekker,*

SAM BUR (Cervus Unicolor)

SAMIAN WARE, the name of a kind of ancient Greek pottery made of Samian earth, or to a variety of Roman pottery made in imi¬ tation of this. The vases are of a bright red or black color, covered with a lustrous silicious glaze, with separately molded ornaments at¬ tached to them.

SAMNITES, an ancient people sprung from the Sabines, and inhabiting the province of Samnium, in Lower Italy. They were divided into four nations: 1, the Caraceni in the north, capital, Aufidena ; 2, the Pentri in the centre, capital, Bovianum, who constituted the most powerful nation of the Samnite stock; 3, the Caudina in the southwest ; 4, the Harpini in the south, capital, Beneventum. The Samnites are described in Roman history as a people fond of war and of liberty, who were brought com¬ pletely under the Roman yoke after long and bloody wars, which continued with few inter¬ ruptions 53 years. After the most fatal de¬ feats, and the entire devastation of their country, the Samnites, together with the other nations which had assisted them, found them¬ selves obliged to submit to the supremacy of Rome, 290 b.c. When the Italian allies of Rome revolted against her in the year 90 b.c. the Samnites once more rose against their oppress¬ ors, and fought with desperation. But Sulla entirely subdued them, and commanded that every Samnite should be put to death. Three days after the battle he ordered 4,000 of them who had been taken prisoners to be put to death on the Campus Martius. The few that remained lived from that time scattered in villages. The Samnites cultivated various arts and manufac¬ tures, for the proximity of the refined Greeks in Lower Italy had a very beneficial influence upon them. Even their laws and constitution were borrowed in a great degree from the Greeks. Their form of government was democratic. At the commencement of a war they were accustomed to choose a common general.

SAMOA DISASTER, The. See Samoan Islands.

SAMOAN ISLANDS, The, or SAMOA,

formerly known as the Navigator Islands, an important group in the South Pacific Ocean, belonging till 1914 partly to Germany and partly to the United States. They are about 2,000 miles south of the Hawaiian Islands, in an al¬ most direct line between San Francisco and Australia and extend from about lat. 13° to 15° S., and from long. 168° to 173° W. They lie 2,410 miles north of Auckland, New Zealand, and about 4,200 miles southwest of San Francisco. The group comprises 14 islands, of which only Savaii (700 square miles), Upolu (500 square miles), Tutuila (200 square miles) and the Manua group (26 square miles) are important. The total area is about 1,700 square miles. The climate is tropical, with abundant rainfall and a mean temperature of 80° in December and 70° in July.

All the islands are peaks of a submarine chain of volcanic mountains. Barrier reefs en¬ circle the large islands more or less, and especi¬ ally Upolu. Brown and bare in many places at low water, the reefs are submerged at high tide, when the surf booms and bursts upon them in miles and miles of snowy whiteness. Between the outer reef and the shore

stretches a lagoon of multi-tinted waters, varying in

width from 200 yards to two and three miles. This generally smooth belt of water is, in effect, a canal encircling the islands and is the high¬ way along w'hich all intercourse is had between different points of the islands. In the in¬ terior lofty mountains rise, leaving broad stretches of comparatively level land bordering the shore and reaching up to low-lying foot hills. Water courses extend down the moun¬ tain side through which the tremendous rains, turning into furious torrents in a few minutes, have cut great ravines. In many places the sides of the mountains are not far from per¬ pendicular. Yet such is the climate that they are held in place by the network of growrth that covers them. Over such a surface is spread a tropic forest of often giant trees.

Savaii, the most westerly member of the Samoan group is much the largest and most rugged. It is ridged with lofty, cloud-en¬ circled mountains that are covered with a mantle of dense tropical foliage, giving to them an evenness of outline that delights the eye of the newcomer. The interior of the island, which has never been explored and concerning which little is known, is wholly occupied by mountains. Only a small strip of alluvial land bordering the shore is productive and the island is capable of sustaining a small population. Ten miles east of Savaii is Upolu, in many respects the most attractive island of the group. Its centre is occupied by a range of hills, the sides of which are covered with vegetation and slope gently down to the sea with many intervening valleys and broad plains. The soil of these slopes is for the most part stony. A compara¬ tively small part of it can be cultivated, but on the lower foot-hills it is largely alluvial and consequently very fertile. Here all the productions of the tropics grow in abundance and the gentle, half civilized natives have made their villages and plantations, where they spend an indolent life, with a minimum of care and labor. Upolu has no perfectly sheltered harbors except those of Apia and Saluafata, upon the north coast, which are anchorages of consider¬ able area. They afford convenient shelter from the easterly trade winds and for the most part are perfectly safe, except during the hurricane season, which includes the months of December, January, February and March. At this time, these anchorages, being opened to the north, are exposed to the full fury of the cyclonic storms that annually traverse this region, and blow most heavily from that direction. Upon such occasions great losses occur. Ships are driven ashore, where they break up on the coral reef ; sometimes they go down at their anchors. About 40 miles off the eastern coast of Upolu lies Tutiula, on the south side of which is Pango-Pango harbor. This is the only land¬ locked anchorage in the group and affords pro¬ tection in all kinds of weather to the largest men-of-war or ocean vessels. The land around the harbor is level and well adapted for wharves, warehouses or other structures. It is more suited to steamers than to sailing vessels, since

the heavy trade winds sometimes blow directly into the entrance, making it difficult for vessels under sail to leave it. But as a harbor for steamships it probably has no equal among the thousand islands of the Pacific. It lies, moreover, directly in the great circle track between Australia and America, and is, there-

fore, a convenient calling place for vessels traversing the Pacific.

Within the sea reef of Upolu lies the island of Manono, little more than a barren rock, which has played a great part in the domestic history of the group. It has always been the cradle of a feudal aristocracy and the focus of native politics. Its chiefs have held a com¬ manding influence in all Samoan affairs. The Manua Islands, three in number and of small area, are 60 miles east of Tutuila. Although they are properly classed with the Samoan group they have little in common with the three larger islands already mentioned save in their language and origin.

The Samoans belong to the so-called brown people or Malayo-Polynesians. Although they have always been considered as having affinities with the Malays of the Indian Archipelago, nothing is positively known about their origin. That they are a branch of the Malay race or family is not much questioned and they are also remotely allied to the Malagasy of Mada¬ gascar. The parent race has disappeared; but that branch from which the Samoans are de¬ scended was one of its earliest offshoots, and having remained almost free from admixture of blood, nearly represents the original. They trace back directly to the great Aryan family

melancholy air and meekness which Humboldt first pointed out as a characteristic of the islanders of the Pacific. Their skin is dark olive, resembling polished copper, presenting no difference in the sexes, though the prominent chiefs and better families are much lighter, with smoother skin. They are also taller and more symmetrical in person than the common people. The infant is much lighter in com¬ plexion than the adult. The male Samoan is tall, erect and proud in bearing, with smooth, straight and well-rounded limbs, the contour seldom presenting muscular protuberance or development. Females are generally slight, especially the young girls; erect and symmetri¬ cal, easy and graceful in their movements, the charm of light-heartedness seeming to follow every action. Beauty of feature is not the rule; though many of the village maids are ex¬ ceedingly attractive.

The Samoans build primitive houses, stone fences and canoes, and in war time dig ditches, throw up earthworks and construct forts and palisades. They cultivate the yam and taro and to some extent, since the advent of the whites, collect cocoanuts and make copra ; they manufacture cloth and mats and engage in fish¬ ing and in collecting the food that nature offers to them freely for the gathering. The fale-

1′

,nO

2° I

1° is

6 CM

6 ib

E OF MILES

20 30 40 fiO

13°

SAT All

(To Ger.)

„ C”’ !;c, tu

*Fellalupq^T^-^Assau j *

\ \ \ Amoa

“V q Sapap

BalealuS^ Palaiilg^ J

South St. vr® (V /

*VV <5^*

*-14° 4**

UPOLU

(To Otr.)

j +*

1. FANUATAPU u

T v

ji»_ –*

’V •’•HUUTKEK I.

Itopa

\eet

TUTUILA. .

e Cape M’atututa

Cape&k^J

OFOO

MANUA

(To V.S. J

■ >

8 it CO., N.Y. 1

[2° Longitude West 1

71° from Greenwich 1

rc°

Map of Samoan Islands.

and their ancestors centuries before the present era emigrated from India and established them¬ selves in the Indian Archipelago, whence they afterward pushed further on into the Pacific. Never having been subject to the inroads of other alien races, and the consequent admixture of blood, the Samoans have preserved uncor¬ rupted and unchanged many of their original racial characteristics. They are of splendid physique, handsome, bright, strikingly erect, sound, healthy, vigorous and of tremendous strength. Many of the distinctive marks of the European appear in their faces, giving that

teles or council houses features of all the vil¬ lages, in many instances are of imposing dimen¬ sions. The houses are built of the wood of the bread-fruit tree. They are slightly oval, some 25 or 30 feet high. In building them three centre posts are raised, which support a ridge pole, while cross beams are lashed in at dif¬ ferent heights, thus binding the structure firmly together. A thatching of sugarcane or pan- danus leaves covers the roof. Large houses generally have prominent sides; the smaller ones are open all around, but are curtained by mats.

The first Christian missionary visited Samoa in 1830. In 1903 nearly every native had em¬ braced the Christian religion. Food is collected on Friday and prepared on Saturday. On the Sabbath scarcely a boat is to be seen ; the hunter is never in the woods. Attendance upon church meetings affords almost the only sign of life; even the sports of the children are sacrificed, in a large degree, to the strict ob¬ servance of the day. To a stranger the villages seem deserted. Three denominations have been established in Samoa and there has been strong rivalry between them. All the churches have good schools, those of the London Missions and of the Catholic Church being especially well conducted and prosperous. At Malua, on the coast of Upolu, 12 miles to the west of Apia, the London Missionary Society main¬ tains a settlement or college founded by the Rev. Dr. Turner. The establishment consists of a house for the principal, or resident mis¬ sionary, a large building which is used as church and schoolroom, and a number of cot¬ tages standing in regular order round an open place or square. At Leulumoenga is a college, established about 1890 for the purpose of edu¬ cating the sons of the chiefs and of teaching them English. Roman Catholics took the initi¬ ative in teaching English. The Protestant mis¬ sionaries, at first, declined to admit natives who desired to learn English into schools attended by whites and half-castes, nor would they teach English in the native schools. Later they erected near Apia a fine high school or college for Samoan girls of the upper class.

In education the Samoans have displayed quite as marked proficiency as in their assimila¬ tion of Christianity. Probably fully one-half of all persons over 20 years of age can read and write. Under that age, all of both sexes, with but few exceptions, are educated to that extent. Beyond this, and the addition of elementary arithmetic, education does not extend, save to those in the mission schools, who are preparing themselves for the ministry. Samoans are keenly alive to all the advantages of education. Every village, without exception, has its resident pastor, or faife'au. This person is at once min¬ ister and teacher, regularly teaching the village school besides

attending to his ministerial du¬ ties. In like manner each village is provided with a building that serves for the purpose of schoolhouse as well as church.

Cotton, sugar, coffee and cocoanuts are the leading articles of trade in the islands. The copra of commerce is obtained by drying the kernel of the cocoanut, the copra, which is exported to Europe and the United States, where it is used in the manufacture of cocoa- nut oil.

History. — The islands were first visited by whites in 1721. The French explorer, De Bou¬ gainville, named the group in 1768. In 1787 John F. G. de la Perouse spent several weeks in and around the islands ; his experiences with the natives were not altogether agreeable, for on the island of Tutuila Captain de Langle, the sec¬ ond in command of the expedition, with several sailors, was massacred. In 1839 the famous expedition of Commodore Charles Wilkes, of the United States navy, made the first thorough survey and exploration of the principal islands of the group. Wilkes also negotiated an agree¬

ment with the principal chiefs by which the interests of the natives and the whalers and traders visiting the islands from time to time were provided for. He appointed a consul to represent the United States and took measures to insure amicable relations in the future be¬ tween the islands and the United States. This agreement was the beginning of treaty connec¬ tions between the Samoans and the outside world. A third of a century elapsed after Commodore Wilkes' visit before anything more formal or important developed in the relations of the islanders to the United States or to any European nation. Notwithstanding the steady development of commercial interests in the islands, no serious attempts were made by any nation to obtain a footing in Samoa. Dur¬ ing this entire period, however, the islanders had a friendly disposition toward the United States, and later a coaling station at Pango- Pango was secured by the American govern¬ ment. The native government of the islands had been from time immemorial under the two royal houses of Malietoa and Tupea except on the island of Tutuila which was governed by native chiefs. In 1873 at the suggestion of former residents a house of nobles and a house of representatives were established, with Mali¬ etoa, Laupepa and the chief of the royal house of Tupea as joint kings. Subsequently Malietoa became sole king. In 1887 he was deposed by the German government on the claim of unjust treatment of German subjects, who formed the bulk of the foreign population of the island, and was deported first to German New Guinea and then to Kamerun, in Africa, and finally in 1888 to Hamburg. Tamasese, a native chief, was in the meantime proclaimed king by the Germans, though against the protest of the British and American consuls at Samoa. Mataafa, a near relative of Malietoa, made war on Tamasese and

succeeded to the throne.

Meanwhile a commercial treaty was nego¬ tiated between a representative of the Samoan government and the United States Secretary of State, William M. Evarts, by which the claim of the United States to the harbor of Pango- Pango as a coaling and naval station was affirmed. Germany followed in the footsteps of the United States in negotiating a treaty, secur¬ ing to that country practical control of the harbor of Saluafata. The same treaty also gave the Germans unusual commercial privileges and exceptional power in the adjustment of affairs between German residents at Apia and the Samoans. Great Britain also concluded a treaty, securing a naval station and coaling depot and other privileges.

In 1889 a conference between the represen¬ tatives of the American, British and German governments was held at Berlin, at which a treaty was signed by the three powers guaran¬ teeing the neutrality of the islands in which the citizens of the three signatory powers would have equal rights of residence, trade and per¬ sonal protection. They agreed to recognize the independence of the Samoan government and the free rights of the natives to elect their chief or king and choose a form of government ac¬ cording to their own laws and customs. A Su¬ preme Court was established, consisting of one judge styled the Chief Justice of Samoa. To this court were referred all civil suits con-

cerning real property situated in Samoa; all civil suits between natives and foreigners or between foreigners of different nationalities; all crimes committed by natives against for¬ eigners or committed by such foreigners as are not subject to any consular jurisdiction. The capital was located at Apia. A commis¬ sion was appointed to investigate titles to land alleged to have been purchased from the natives, and this in 1894 completed its labors, confirming about 75,000 acres of land to Germany, 36,000 to British and 21,000 to Americans.

By tne agreement of 2 Dec. 1899 the Samoan Islands were divided between the United States, Germany and Great Britain. The latter, how¬ ever, traded her claims to Germany for certain concessions in Africa and other places. Under this agreement the United States retained Tutulia and all other islands of the Samoan group east of longitude 171° west of Green¬ wich, while Germany obtained all the Samoan territory to the west of American holdings. The king of Norway and Sweden was made arbitrator to determine and adjudge the amount of claims due to citizens and subjects

of British, German and American governments having pos¬ sessions on the islands and affected by recent military operations there. German Samoa was administered by an imperial governor and a native chief assisted by a native council, while the American possessions were placed in charge of a naval governor. Shortly after the open¬ ing of the European War in 1914, an expedi¬ tionary force of New Zealanders captured German Samoa. By the terms of the Peace Treaty of May 1919 the German portion was placed under the administration of New Zealand. The German and the American fleets suffered very severely from a sudden tempest in the roadstead of Apia on 16 March 1889. The American losses were the Trenton and the Vandalia, and 52 men; the German losses, the Adler and the Eber, and 134 lives. A volcanic erruption in the interior of Savaii, which be¬ gan in August 1905, continued until 1909, thus forming the greatest known volcanic disturb¬ ance in the world's history.

Bibliography. — Brown, G., (Melanesians and Polynesians5 (New York 1910) ; Griffin, A. P. C., (Books on Samoa and Guam, pub¬ lished by the United States Library of Con¬ gress5 (Washington 1901) ; Henderson, J. B., (American Diplomatic Questions5 (New York 1901) ; La Farge, John, (Reminiscences of the South Seas5 (New York 1912) ; Stevenson, R. L., (A Foot-note to History5 (London 1892) ; (Letters from Samoa5 (New York 1906).

SAMOKRISCHTCHINS. See Religious Sects.

SAMOS, sa'mos, now SAMO, or SOU- SAM-ADASSI, an island in the yEgean Sea belonging to the Grecian Archipelago. It is 45 miles southwest of Smyrna, and is separated from the coast of Asia Minor by a narrow channel, Little Boghaz, and from Nikaria and the Furni Islands by the Great Boghaz. It covers an area of 213 square miles and has several good harbors on the coast ; it is trav¬ ersed by two rocky and barren mountain ranges, relieved by some forests of pines, with vineyards and olive groves on the lower slopes. The valleys are well-watered and fertile, and contain beautiful scenery. The capital and chief

city is Vathy, on the north side. The old capital, Khora, is a poor place on the south side. This was the site of the famous temple of Hera. The island is extensively cultivated, produces excellent Muscadine wine, corn, fruit and vegetables. The minerals include silver, lead, antimony, calamine, manganese and cop¬ per. Samos is renowned as the birthplace of Pythagoras and other distinguished men. It was formerly inhabited by Ionian Greeks. The chief exports are wine, brandy, raisins, hides, leather, oil, tobacco and carob-beans. Samos was constituted a principality under Turkey, with the guarantee of France, Great Britain and Russia, 11 Dec. 1832. In November 1912 the island was seized by the Greeks and has

since been held by them. The question of the ZEgean Islands was further complicated by the Great War and local changes, and had not been settled by the middle of 1918; therefore Samos was still under Greek rule.

SAMOSATENES, or SAMOS ATIANS, a

heretical sect, followers of Paul of Samosata, bishop of Antioch, from 260 to 274 a.d. He denied the divinity of Jesus Christ, saying Jesus was simply man, though favored with the in¬ dwelling of the Logos from the instant of his conception : by the unvarying conformity of his will to the Divine will, he became like unto God, and through love he became one with him. His doctrine was condemned as impious by three councils of bishops, the third of which by decree deposed him, 269 a.d. ; but Paul would not comply with the decree, till at last, after the overthrow of his great patron, Zenobia, queen of Palmyra, it was enforced by order of the Emperor Aurelian, 274 a.d., who de¬ clared that the controversy had been determined by the judgments of the bishops of Italy, and in particular the bishop of Rome. The Samo- satenes are also called Paulinians and Pauli- anists.

SAMOTHRACE, sam o-thras, or sa-mo- thra'se, or SAMOTHRAKI (Turkish, Sama- drek), an island of the .TEgean Sea, about 40 miles northwest of the entrance to the Darda¬ nelles, and nearly opposite the mouth of the Hebrus, 36 miles from the coast of Thrace. It is rugged and mountainous and of almost oval form ; its highest summit, Saoce, reaches an elevation of 5,248 feet. On the northern coast are sulphur springs of considerable renown. The principal products are grain, wood, oil, honey and wax, and on the coast there is a considerable sponge fishery carried on by traders from Smyrna. In the northern part of the islands the ruins of ancient Samothrace were found (1873-75), consisting of Cyclopean walls; a Doric temple of marble and another of cir¬ cular form. Samothrace was of importance from early times and is frequently mentioned in the works of Pliny, Homer and others. Here Poseidon witnessed the contests between Greeks and Trojans on the plains of Troy. But its chief renown was due to its having been the seat of worship of the Cabiri, and to its religious mysteries, supposedly derived from the Pelasgians. The island is once mentioned in history in connection with the expedition of Xerxes, one of its ships having taken a con¬ spicuous part in the famous battle of Salamis. The island was first colonized by Phoenicians, afterward joined by Greeks. It always en-

SAMOVAR

SAMPLERS

joyed autonomy, partly owing to its sacred character, partly to its lack of political im¬ portance — due to the fact of its having no good harbor. Saint Paul visited the island in the course of his second missionary expedition (Acts xvi, 11). The inhabitants are mostly Christians. Pop. 4,600. Samothrace, with all the other 2Egean Islands, was in the possession of Greece and Italy in 1918, pending a definite arrangement with regard to their future control.

SA.MOVAR, a Russian tea kettle, the water in which is boiled by means of hot coals con¬ tained in an iron tube, and then poured over the tea.

SAMOYEDES, sam'oi-dez, or SAMOIE- DES, a Mongolian people inhabiting the shores of the Arctic Ocean, from the Kanin Peninsula, on the eastern shores of the White Sea, in European Russia, to the Gulf of Khatanga, in the northeast of the government of Yeniseisk, Siberia. They consist of three principal tribes, speaking different dialects. Their origin is un¬ known, but they are supposed to have come from more southern regions, and have been erroneously confounded by the Russians with the Laplanders, whose country, called in the Lapland tongue, Sameanda has probably given them their name. They are nomadic and live chiefly by fishing, hunting and keeping rein¬ deer. Their principal wealth consists in herds of reindeer, which supply them with food, clothing, tents, utensils, etc. They are of small stature, usually between four and five feet; have a flat, round and broad face, thick lips, wide nose, little beard, black hair, in small quantity. They are extremely superstitious and generally peaceable. They are unacquainted with the art of writing, their traditions being imperfectly preserved only in their songs. When Russian expansionists first became ac¬ quainted with them they had already been driven from their native seats by the Tartars, and separated from their kindred tribes.

SAMP, originally an Indian article of food consisting of maize, broken or bruised, which is cooked by boiling and eaten with milk.

SAMPAN, a boat of various build used on the Chinese rivers, in Straits Settlements and elsewhere, for the conveyance of merchandise, and also frequently for habitation.ˆ They are swift sailers both with oar and sail.

SAMPHIRE, an umbelliferous plant (Crith- mum maritimum), pale-green with bi-triternate leaves and fleshy very succulent leaflets, and umbels of small yellowish flowers followed by fennel-like fruits. It grows wild along the rocky shores of northwestern Europe, near the water, and when abundant, is used as a pickle, salad or potherb. It can also be cultivated in gardens, if not too far from the coast, and if supplied with plenty of salt

and soda solutions. The name is a corruption of the old French <(herbe de Sainte Pierre,® and it is also called in England Saint Peter's-wort.

SAMPLE, Robert Fleming, American Presbyterian clergyman : b. Corning, N. Y., 19 Oct. 1829; d. New York City, 12 Aug. 1905. He was graduated from Jefferson College in 1849. From 1853 he was engaged in various pastorates in Pennsylvania and Missouri until 1887 when he assumed charge of the West¬ minster Presbyterian Church, New York, where

he remained and was pastor emeritus from 1902 till his death. He was professor of Chris¬ tian ethics in Lincoln University, was editor of (North and West) in 1895-1902, traveled widely in Europe and Palestine, and was connected with numerous religious educational and re¬ ligious organizations. He published (Early Dawn) (1861) (Memoir of Rev. John C.

Thorn) (1868) ; (Beacon Lights of Reforma- tion) (1889); (Elements of Pulpit Power) (1901), etc.

SAMPLERS. A strip, or square of linen, or canvas, recording specimen stitches and pat¬ terns, was, for hundreds of years, worked by every young girl of aristocratic and well-to-do families. The sampler had the double value of giving the child skill as she worked it and of serving as a guide and source of reference all the rest of her life. The sampler ceased to be¬ come a part of education in the middle of the 19th century. After 50 years of oblivion, it came into prominence in a new way, to enjoy fame by appealing to the fancy of the collector. The first and finest collection was made by the late A. W. Drake and is now scattered. A splendid collection is in the South Kensington Museum, London. Although no earlier ex¬ amples exist than the 17th century, the sampler, which is nothing more nor less than a pattern- book for the embroiderer, is probably as old as the art of embroidery (q.v.) itself.

The embroiderer was seldom the designer of the decoration that grew beneath her needle. The sampler was, therefore, a kind of notebook (corresponding to the artist's sketch-book), ex¬ hibiting various stitches and suggestions for embroidery, or for making cross-stitch letters, numbers, patterns, etc. It was, consequently, of both artistic and practical value. The name tells plainly what it is.

Chaucer uses the word ensampler as a synonym for pattern, and the poet Skelton (1469-1529) speaks of <(the sampler to sew on, the lacis to embraid.® The inventory of Edward VI (1552), mentions ((a sampler, or

set of pat¬ terns. worked in Normandy in green and black silks.® Shakespeare mentions it twice — in (A Midsummer Night's Dreamt when Helena re¬ minds Hermia that they worked together on a sampler, and in (Titus Andronicus) in reference to the Greek story of Philomela. From the 16th century samplers are constantly met with in records and diaries and even in wills, for they were deemed worthy of special bequest. Sam¬ plers of the 16th and 17th centuries often con¬ tained insertions of reticella or cutwork (see Lace), drawn-work and patterns for needle¬ point lace; for although pattern-books of lace were published, they were hard to procure and the supply was limited.

The evolution of the sampler is as follows: First, the sampler consisted of decorative pic¬ tures thrown here and there upon the surface of a piece of canvas; then came designs placed in orderly rows and making in themselves a harmonious whole ; next, alphabets and numerals chiefly for the use of these who marked the linen; and next, imitation of tapestry pictures by the addition of figures, houses, birds, animals and flowers. Last of all the sampler was adopted as an educational task in a dame's school as a specimen of a pupil's phenomenal achievement at an early age.

The sampler was used in all European coun¬ tries; and beautiful specimens of Spanish, French, Italian, Dutch and German work exist. To us the English examples are the most inter¬ esting because the American samplers are Eng¬ lish in character of workmanship and design.

The earliest of all known samplers is in this country. It is owned by the Essex Institute in Salem, Mass., and was worked by Ann Gower, the first wife of Governor Endicott. She came to Salem in 1628 and died in 1629. The sampler was, of course, worked in her girlhood in Eng¬ land. The upper part consists of the alphabet and the lower contains examples of needle-work. Another early sampler, worked bv Loara Standish, daughter of Captain Miles Standish, is preserved in Pilgrim Hall, Plymouth, Mass.

The age of a sampler is told by the char¬ acter of the designs and lettering, coloring, border and insertions. The earliest samplers are long and narrow. A conventional strawberry and oak leaf, or acorn, appears in almost every 17th century sampler. The rose is very fre¬ quent, but is not so much used as the ((Persian pink,® or carnation.

The curious human figures with outstretched arms, known as <(Boxers,® appear between 1648 and 1742. When they disappear, their place is taken

by Adam and Eve in the garden of Eden. During the early part of the 18th century the sampler consisted exclusively of long sentences worked in silks of everv imaginable hue. A peculiar mustard-colored linen was introduced as groundwork for the stitches after 1700. To¬ ward the middle of the century blues, greens, yellows and blacks were the prevailing colors for the silks. The stag, which had appeared but rarely before 1700, now became the fashion and continued to be worked as long as samplers were made. About 1728 the border encircled the whole sampler; and it is noticeable that as the variety of patterns decreased the sampler became shorter. From 1740 onward the border always appears and the sampler is a picture in¬ stead of a pattern-sheet. Next, the border de¬ velops into a wreath of naturalistic flowers. A few dates of decorations will aid the curious in determining the period of any sampler. Alphabets, name of the maker, rows of orna¬ ments, stag (occasionallv), and Boxers date from 1648; numerals, 1655; inscriptions, 1662; crown, 1691; motto or text, 1686; verse, 1696; Adam and Eve, 1709; border, 1726; floral bor¬ der, 1730; fleur-de-lis, 1742; flower in vase, 1742; heart, 1751; stag (commonly used), 1758; house, 1765; mustard-colored canvas, 1728; Spies to Canaan, 1804; crewels replace silk,

1820.

The inscriptions consist of moral sayings, allusions to death and its terrors, hymns, melan¬ choly and lugubrious verses and quotations from the Bible. Sometimes an entire Psalm was worked in letters as clear and neat as those of a printer. The plodding needle also took for its task the Lord's Prayer, or the Ten Com- mendments. Sometimes, too, the samoler was worked with the names and dates of birth and death of an entire family, proving once again that needlework occasionally fulfilled its ancient purpose of recording events. See Embroidery.

In the 18th century maps were worked on samplers in the dame's schools for the double purpose of teaching geography and needlework. Many of these survive. Darning samplers were

made in the 19th century. These show various kinds of darning stitches suitable for mending certain textiles, and are arranged in circles and squares around a basket, or a vase of flowers. Consult Huish, Marcus B., (Samplers and

Tapestry Embroideries) (London 1900) ; Jour- dain, M. A., (English Secular Embroidery >

(London 1910) ; Earle, Alice Morse, (Home Life in Colonial Days (New York 1898), and (Child Life in Colonial Days) (New York 1899) ;*

Century Magazine (1912).

SAMPSON, Archibald J., American diplo¬ mat and author: b. near Cadiz, Ohio, 21 June 1839. He was graduated from Mount Union College, Ohio, in 1861 and from the Cleveland Law School in 1865 ; served through the Civil War in the Union army, starting as private and attaining the rank of captain ; was admitted to the bar in 1865 and settled in Sedalia, Mo., where he engaged in the practice of law. There he was successively city, county and dis¬ trict attorney. He removed to Colorado in 1873, locating in Canyon City and establishing his law practice. There he was again county at¬ torney and in 1876 was elected attorney-general of the State. In 1889 President Harrison ap¬ pointed him American consul at Paso del Norte, Mexico. On leaving there he located in Phoenix, Ariz. In 1897 President McKinley ap¬ pointed him Envoy and Minister of the United States to the republic of Ecuador, where he re¬ mained until 1907, being the first person for over 60 years living in a territory to receive a diplomatic appointment. Since his return to the United States he has spent a good part of his time lecturing on ((Masonry as seen in Foreign Lands,® and other subjects. Mr. Sampson is past department commander, Arizona Depart¬ ment of the G. A. R.

SAMPSON, Deborah, American heroine: b. Plymouth, Mass., 17 Dec. 1760; d. Sharon, Mass., 29 April 1827. She served in the Con¬ tinental army for three years during the Revolutionary War, disguised as a man and bearing the name of Robert Shurtleff. She gained a reputation for coolness and courage in action and was engaged in many daring enter¬ prises. She was wounded by a sabre cut on the temple in a skirmish near Tarrytown and later was shot through the shoulder. During the Yorktown campaign she was seized with brain fever and her sex was discovered. She was dis¬ charged by Washington, receiving from him a note and a purse of money and later was in¬ vited to the capital, where Congress voted her a pension and a grant of lands. She published her experiences under the title (The Female Re- view) (1797; new ed. with introduction and notes by Rev. John A. Vinton, 1866).

SAMPSON, William Thomas, American

naval officer: b. Palmyra, N. Y.. 9 Feb. 1840; d. Washington, D. C., 6 May 1902. In 1860 he was graduated from the United States Naval Academy, where he had been the highest officer of the cadet battalion. His first assignment was on board the frigate Potomac. He was pro¬ moted lieutenant, 16 July 1862 and two years later became executive officer on the ironclad Patapsco of the South Atlantic blockading squadron. He held the watch, 15 Tan. 1865, on the turret roof of the Patapsco when that ves¬ sel was blown up and sunk by a torpedo in Charleston Harbor. Only

saved his life in that catastrophe. He became lieutenant-commander in 1866 and commander in 1874. In the autumn of the last-named year he was detailed for the third time as instructor at the Naval Academy and remained there four years in charge of the department of physics. Later he became assistant superintendent of the Naval Observatory, and in 1884 was a member of the International Prime-Meridian and Time Conference at Washington. He was superin¬ tendent of the torpedo station at Newport, 1885-86; representative to the International Ma¬ rine Conference at Washington in 1886. and superintendent of the Naval Academy 1886-90, where he introduced great improvement in the state of training. In 1889 he was promoted captain and later put in command of the San Francisco, the first steel cruiser of the new navy. During his term as chief of the Bureau of Naval Ordnance, 1893-97, the use of smoke¬ less powder was perfected by experiments con¬ ducted under his supervision. Upon quitting this post he was put in charge of the battleship Iowa, which had been placed in commission in June 1897, and with this ship he took his place as senior captain in the North Atlantic squad¬ ron. On 17 Feb. 1898, two days after the battle¬ ship Maine was blown up in Havana Harbor, he was appointed pj-esident of a board of in¬ quiry directed to investigate the causes of that disaster. On 22 March the investigation was concluded and Captain Sampson, promoted to the rank of acting rear-admiral, succeeded Ad¬ miral Sicard in command of the North Atlantic squadron. Upon the declaration of war with Spain, 21 April, he was ordered with his fleet to blockade the northern coast of Cuba. A few days later the Navy Department was in¬ formed of a Spanish fleet under Admiral Cer- vera having sailed from the Cape Verde Islands toward Cuba. Admiral Sampson was forth¬ with ordered to intercept this fleet in its sup¬ posed progress to the relief of Havana. On 1 June he arrived off Santiago, where the Span¬ ish fleet had meantime been located and at once effected a strict blockade. On 3 June, under his orders, an unsuccessful attempt was made by Naval Constructor R. P. Hobson and others to prevent egress of the Spanish fleet by sinking the Merrimac in the channel entrance to the harbor. On the morning of 3 July Sampson had withdrawn on the flagship New York and was proceeding to Siboney for a conference with General Shafter, the commander of the land forces, when it was discovered that the Spanish ships were leaving the harbor of San¬ tiago. The New York was put about and, under full steam, overtook the blockading fleet already giving battle under the direction of Commodore Schley, commander of the flying squadron and second in command of the block¬ ading fleet. The entire

Spanish fleet was de¬ stroyed and Admiral Cervera was captured. After the close of the war a long and bitter newspaper discussion ensued over the question whether the chief honors of this victory be¬ longed to Sampson or Schley. A court of in¬ quiry which met three years later, at the re¬ quest of Schley, decided against his claims, but the controversy prevented Congress from awarding any official recognition to Sampson for his success. For two years from October 1899 Admiral Sampson held command of the Boston Navy Yard. In October 1901 he was

placed on waiting orders ; his health was much impaired; he was retired from active service 9 Feb. 1902, and resided in Washington until his death.

SAMSHUI, China, a treaty port in the prov¬ ince of Kuang-tung, situated on the river West, about 100 miles west of Canton. The town is small, but favorably situated for foreign trade.

SAMSON, one of the judges over Israel. He was of the tribe of Dan, and the circum¬ stances attending his birth, heralded as it was by an angel, his consecration as a Nazarite, and those visitations of the Spirit of the Lord through which he was enabled to perform feats of heroic might, marked him out as a man raised up to meet a national emergency. The first recorded instance of the exercise of his great strength is in connection with his mar¬ riage to a daughter of the Philistines. At the wedding-feast Samson proposed a riddle to the guests, wagering 30 shirts and as many suits of clothes that they could not guess it in seven days. The secret of his riddle being be¬ trayed to them by his wife, Samson went to Askalon, killed 30 Philistines and gave their clothes to his guests. His wife having, during his absence in his own country, married again, he caught 300 foxes and tying them together tail to tail, with a fire-brand between them, let them loose in the fields of the Philistines. His own countrymen bound and delivered him into the hands of his enemies, but he snapped the cords asunder and killed 1,000 Philistines with the jaw-bone of an ass. From this period Sam¬ son was judge of Israel for 20 years. While on a visit to Gaza the gates of the city were closed upon him by the Philistines, whose in¬ tention it was to kill him, but he rose and car¬ ried off the gates to a distance of 20 or 30 miles. Not long after he fell in love with Delilah, to whom he revealed the secret of his strength, and she by cutting off his hair de¬ prived him of his powers and betrayed him to his enemies, who put out his eyes and set him to work in a mill with slaves. At a great fes¬ tival in honor of Dagon Samson was brought out to furnish sport to the Philistines. But his hair had grown again, and his vigor hav¬ ing returned with it, he took vengeance on his enemies by pulling down over their heads the building in which they were assembled. Milton has made his death the subject of a drama — (Samson Agonistes> (1671), Handel that of an oratorio,

SAMSON AGONISTES, a tragedy in blank verse and irregular meters, the final work of the English poet, John Milton, was pub¬ lished in 1671. In substance the drama is based on the story of Samson in Judges xiii-xvi ; in form it follows rigorously the model of classical tragedy.

The action is limited to the final episode of Samson's life, his destruction of himself and great numbers of the Philistines by pulling down the pillars of their theatre, at a public festival to which he had been brought as a captive to entertain the populace. Preparation for the catastrophe is made by a series of events, comprised in a single day, which rouse Samson to make final use, for the glory of the

Hebrew God, of the power which had been en¬ trusted to him and which through his own sin he had temporarily lost. A chorus of Hebrews reviews the events of Samson's life and in¬ terprets the changing emotions of the action.

The intensity of feeling which Milton has put into his picture of Samson is due to the analogy which he felt between the lot of his hero, a chosen champion of God, <(blind amid enemies,® and his own position in the alien society of the Restoration. Though lacking the poetic brilliancy and the variety of (Paradise Lost, (Samson Agonistes,* by virtue of its moral and spiritual energy and its consummate art, makes a profound impression on the reader. More nearly than any other work in our litera¬ ture it is the modern counterpart of The Book of Job. Consult the works on Milton listed under Paradise Lost; also (Samson Agonis- tes) (edited by Verity, A. W., 1892) ; and Jebb, R. C., (Samson Agonistes and the Hellenic Drama.*

James H. Hanford.

SAMUEL, Hebrew judge and prophet about 1140 b.c., whose rule preceded the estab¬ lishment of the kingly office. His name, in Hebrew <(Shemuel,® meaning ((asked from,® or ((heard of God,® is explained by his story as a child. He was the son of Elkanah, of Rama- thaim-zophim, belonging to the tribe of Levi, by Hannah. Hannah had been barren previous to the birth of Samuel, but she prayed earnestly to the Lord for a man-child, and vowed that if her petition were granted she would conse¬ crate the child to the Lord all his days. Her prayer being heard she took her son to Shiloh to surrender him to the high-priest to be trained to the service of the Lord. The boy grew up devoted to the temple service ; but after the death of Eli nothing more is heard of Samuel for a space of about

20 years, while the Ark, restored by the Philistines, was in the house of Aminadab. He then exhorted the Israelites, when they were hard pressed by the Philistines, to abandon their idolatry, and to fear God and worship him, as their only means of deliver¬ ance. His prayers and sacrifices gained for them the victory at Mizpeh, and it is probable that from this time, and in consequence of the leading part Samuel then took, he obtained the name and authority of judge. It is recorded that he judged Israel all his life, going a yearly circuit from Ramah, where was his home, to Bethel, Gilgal and Mizpeh. At Ramah he built an altar to the Lord. His administration was distinguished by the restoration of the neglected worship of Jehovah. He also established schools of the prophets. In his old age the corruption of his sons, to whom he had trans¬ mitted the active duties of the office of judge, excited discontent among the Hebrews, who de¬ manded a king. Samuel reluctantly yielded to this revolution, but at the same time anointed the king of the general choice. After the establishment of the monarchy Samuel still con¬ tinued to be judge in matters affecting morals and religion, in addition to the exercise of his prophetic functions. In his bearing toward Saul Samuel conducted himself with wonderful dignity and kindliness. He earnestly desired that Saul, as king, should rule well in the fear of the Lord, and that his dynasty should be permanent. When Saul attacked the priestly

office and privileges Samuel anointed a new king, David. He did not live to see the con¬ test between David and Saul decided ; but even after his death his spirit, evoked by the witch of Endor, threatened Saul with the divine vengeance. See Samuel, Books of.

SAMUEL, Books of. In the Hebrew Bible the two books of Samuel, like Kings, formed originally one book. The title is derived from the name of the prophet who appears as the principal character in the earlier part of the narrative and who played a most decisive part in the founding of the Hebrew monarchy.

The book seems to have been composed, in essentially its present form, shortly before the publication of the law of Deuteronomy in 621 b.c. After that event Samuel received some editorial revision and additions, but no such rigid framework, designed to teach the great lessons of Deuteronomy, as is seen in Judges and Kings. It thus belongs to the first great era of Hebrew historical writing, which began in the latter half of the 10th century b.c. and ended with the publication of Deuteronomy. The analysis of this book into its component documents has not been so satisfactorily worked out in detail as in the case of the narrative books of the Hexateuch, but there is no great difficulty in recognizing a general distinc¬ tion between the older and younger elements, at least in the first part of the work. The earlier strand gives a vivid, natural account of the rise of the

monarchy, with Samuel appear¬ ing as a local seer and leader of a religious- patriotic movement, eager to unite the Hebrew tribes in a struggle against their Philistine op¬ pressors. In the later strand, Samuel figures as himself a recognized military leader and <(Judge® of united Israel, who wins overwhelm¬ ing victory in the struggle against Philistia and is at first opposed to the establishment of the kingship. The earlier picture shows the <(king maker® as a really greater and nobler man than the later represents. From a rela¬ tively obscure position, with keen vision he recognizes in the unawakened giant who comes to consult him the possibilities of a king who shall unite and free the tribes, and he very skilfully sets in opera¬ tion influences that make Saul's own action sure. In the later tradition, which took shape in Samuel's own tribe, the figure of the prophet has grown into that of one who holds a posi¬ tion of recognized leadership and authority, but it is no longer one who sees the real need of the time. Many scholars connect the earlier strand with the great Judean history that ap¬ pears throughout the Hexateuch, and the later with the similar Ephraimite history. It seems more probable, however, that the later strand was written after the composition of the Ephraimite history, while the early stories of Samuel and Saul were composed before the Judean history of the Hexateuch. In the lat¬ ter part of 1 Samuel and in 2 Samuel we do not have so clearly an inweaving of an earlier and later document, but it is possible to dis¬ tinguish, to some extent, the younger and older elements. Recognition of the composite origin of the book relieves the obvious difficulty of the duplicate narratives that puzzle any at¬ tentive reader — the two introductions of David to Saul, the two origins of the saying con-

cerning Saul among the prophets, the two ac¬ counts of sparing Saul's life, etc. The analysis also brings into clear relief as a separate docu¬ ment the wonderful, dramatic story which, with some later elements, constitutes chaps, ix to xx of 2 Samuel.

The book as a whole attained substantially its present form earlier than any other of the historical books of Israel. In its completed form, it falls into five principal sections, due in part to the plan of the compiler and in part to the form in which the materials came to him: (1) Samuel and the establishment of the kingdom under Saul (1 Samuel i-xiv) ; (2) Saul and the rise of David (1 Samuel xv- xxxi) ; (3) the establishment of David as king (2 Samuel i-viii) ; (4) court and family life of David (2 Samuel ix-xx) ; (5) Appendix (2 Samuel xxi-xxiv). Some would treat (2) and (3) as one section — the summaries of the reigns of Saul and David introduced into 1

Samuel xiv and 2 Samuel viii would favor such division. In the opening chapters of the book the scenes lie in the days of the Judges, when the tribes of Israel are without political union or any common organization. The birth and boyhood of Samuel are recounted. The de¬ feat of Israel by the Philistines with the cap¬ ture, vicissitudes, and restoration of the Ark precede Samuel's judgeship and victory in bat¬ tle against the Philistines. The circumstances leading to Saul's selection as king and his early victories are followed by the summary of his wars and a notice of his family. The sec¬ ond section opens with the rejection of Saul and the introduction of David to the history. It is occupied chiefly with Saul's growing jealousy and David's flight and outlaw life. Saul's last battle against the Philistines closes this section. The third division gives David's elegy over Saul and Jonathan, taken from a collection of national songs known as the Book of Jashar. The narrative goes on to record the steps by which David becomes king over all Israel, with the Philistines subdued and the Hebrew capital established at Jerusalem. The summary of David's victories and his court officers closes this section. The following di¬ vision (2 Samuel ix-xx) tells the story of the birth of Solomon and the troubles in David's family that resulted in the deaths of older brothers, making room for Solomon's ascent to the throne. The conclusion of this dramatic narrative is not given in the book of Samuel, but forms the introduction of the book of Kings. The appendix contains two songs ascribed to David, one of which occurs also as the 18th Psalm, lists of David's heroes, and two very primitive stories of a famine and pestilence that occurred during his reign. Samuel thus contains a history of the trans¬ formation of a group of tribes into an organ¬ ized state, commanding the respect of neighbor¬ ing kingdoms and able to weather the storms of rebellion and civil war.*

Viewing the book as literature, the early narrative of Saul's selection, beginning with chap, ix, the stories of his jealous struggle against the rising prestige of David, and the complex story of David's court and family life are to be noted as the earliest examples of connected prose in ancient Israel. As such they constitute the beginnings of genuine his¬

torical literature in the writings of the world. From these vivid narratives, committed to writing soon after the events had occurred, the writers of Judah and Israel later went on to compose the story of the earlier past. In power to select the significant points that make char¬ acter and event living and intelligible, these early narratives are unexcelled in prose litera¬ ture. The religious and moral conditions re¬ corded show many primitive traits, yet the narratives are characterized by a devotion to the God of justice, who cares for right conduct among men, that makes them perennial sources of moral and religious inspiration.

Bibliography. — Fowler, H. T., (History of the Literature of Ancient IsraeP

(New York 1912) ; Kennedy, A. R. S., ((Samuel):> (in (New- Century Bible, New York and Edinburgh 1905) ; Kent, C. F., beginnings of Hebrew History J (New York 1904) ; Kirkpatrick, A. F., ((Samuel)) (in Cambridge Bible, Cambridge 1894) ; Smith, H. P., ˆSamuel® (in (International Criti¬ cal Commentary, > New York 1902) ; Encyclo¬ pedia Biblica* ; Hastings, dictionary of the Bible) ; (Jewish Encyclopedia, * Old Testament Introductions of Cornill, Creelman, Driver, Gray, McFadyen, Moore.*

Henry Thatcher Fowler, Professor of Biblical Literature and History, Brown University.

SAMURAI, the feudal warriors of Japan, who, prior to the revolution of 1867-68, com¬ prised about one sixteenth of the population (see Japan) and are now represented by the shizoku, or knights. They were distinguished by indomitable courage, their marvelous feats of arms, fervent patriotism, intense loyalty and a strong antipathy to foreigners, which was in marked contrast to the hospitable and cour¬ teous demeanor of the mass of the population. They were the military retainers of some 276 daimios or feudal chieftains, the more powerful among whom were those of the southern clans Satsuma, Choshiu, Tosa and Hizen. After the reopening of foreign relations due to United States initiative in 1854, the enlightened Jap¬ anese discovered at once that to place them¬ selves commercially and politically on a level with the progressive nations of the world they had to adopt Occidental methods and the prom¬ inent chiefs and their samurai were the first to advocate the suppression of the Tokugawa shogun, the supremacy of the mikado, the surrender of feudal powers, and a reorganized administration for the building up of a con¬ stitutional monarchy, most of which was ef¬ fected by the revolution of 1868.

The samurai expected that the military and naval services would be exclusively reserved for them and their descendants. The radical measures adopted in 1871, however, led to the total abolition of feudalism and the absorption of the samurai into the mass of the people, in many cases with a praiseworthy self-abnega¬ tion, but in others not without serious opposi¬ tion. That of the famous Saigo of Satsuma, hitherto one of the most prominent reformers, culminated in the civil war of 1877 and the total defeat of the samurai and their preten¬ sions. ‘ See Japan.

.SAMVAT, a method of reckoning time in India, generally used except in Bengal. Chris-

tian dates are reduced to Samvat by adding 57 to the Christian year. See Calendar.

SAN ANDRES, san an'dras, or PICO DE ORIZABA, Mexico, an extinct volcano, called by the Aztecs Citlalepetl, or Mountain of the Stars, 6 x/z miles southeast of the city of Ori¬ zaba. It is 5,550 metres high and the loftiest mountain of Central America. Its highest pass, Cuchilla, has an elevation of 4,418 metres, snowline of 4,292 metres; the deepest glacier, El Corte, 4,015 metres. It was first ascended in 1848, by two American officers, Reynolds and Maynard. Its last eruption extended from

1545-66.

SAN ANGELO, an'jel-d, Texas, town, county-seat of Tom Green County, on the Con¬ cho River and on the Gulf, Colorado and Santa Fe Railroad, 180 miles northwest of Austin. It is the centre of a prosperous stock-raising and wool-growing region ; agriculture is also carried on successfully in the vicinity; fruit and celery being important products. The town contains flour mills and an ice factory. In 1918 there were four national banks with com¬ bined capital of $625,000 and resources of $4,- 670,410 and the assessed property valuation exceeded $6,000,000. It has an elevation above sea-level of 2,000 feet and is a health resort, especially for consumptives. There is a public high school established in 1889. Pop. 9,392.

SAN ANTONIO, Texas, city, county-seat of Bexar County and the largest city in the State, is on the San Antonio River, 150 miles from the Gulf Coast and about the same dis¬ tance from the Rio Grande border at Laredo. This quaint and picturesque old city of Spanish origin is beautifully laid out on a plateau 661 feet above the sea-level, along both banks of the San Antonio, a few miles from where it bursts forth — at once a river of volume and great natural beauty — from hundreds of crys¬ tal springs, in a noble woodland park. Through the western part of the city runs a smaller stream flowing out of another group of sparkling waters, situated in a live-oak grove, known as San Pedro Springs.

Railroads. — The Southern Pacific, Interna¬ tional and Great Northern, Missouri, Kansas and Texas, San Antonio and Aransas Pass and San Antonio and Gulf railroads pass through the city and the extension of the Frisco main line makes it a great railroad centre, from which four distinct lines penetrate into Mexico.

Waterworks and Sewer System. — The

San Antonio Water Works Company, a private corporation, maintains a thoroughly modern system of water supply. The water is obtained from 17 large artesian wells, furnishing a daily supply of 50,000,000 gallons of wholesome water. The company also owns riparian rights around the head springs of the San Antonio River and has a large reservoir adjacent on a hill, kept fully supplied for any emergency. In addition many of the office buildings, hotels and manufacturing plants have their own wells yielding an additional 45,000,000 gallons daily. The sewer system, constructed after the most approved engineering science, meets the latest sanitary requirements.

Street Railway and Lighting. — The trac¬ tion company has 96 miles of well-built elec¬

tric lines furnishing modern equipment and excellent service to an annual average of 32,000,- 000 passengers carried. There is also main¬ tained a complete plant for gas and electric lighting and power, with all the necessary mains and supply lines.

Parks and Plazas. — There are 26 cultivated parks and plazas in the city comprising 423 acres and valued at more than $2,000,000 under the management of a park commissioner. The city is renowned for the beauty of its natural parks and the attractive features of its old Spanish plazas. Brackenridge Park, situated adjacent to the head springs of the San An¬ tonio River, is a noble forest of 230 acres, left in its natural state of oak, pecan and shrub growth and containing miles of well-kept walks and drives. In this park there is maintained a rare collection of buffalo, deer, antelope, elk and other wild animals. Through it flows the San Antonio River which furnishes the site of the Lambert Bathing Beach, one of the most popular resorts of its kind in the country. San Pedro Springs is another favorite resort, with lakes, shady groves and an excellent "zoo.® Seventeen iron bridges span the ser¬ pentine windings of the river in its 13 miles' course through the city, giving picturesque views at many points.

Many of the quaint characteristics of the old Spanish regime are still to be found in the public plazas, fragrant with their tropical trees and plants and famous for their Mexican chile and tamale stands and in the narrow streets in the old parts of the city, still called by their liquid Spanish names. The San Antonio Club, country fishing and hunting associations, golf links and tennis grounds afford recreation for the society world ; the military reviews and artillery drills of the large garrison at Fort Sam Houston and during the late war Camp Travis, Camp Stanley, Kelly Aviation Fields and Balloon School draw crowds of visitors ; and the annual spring carnival and battle of flowers on San Jacinto day have made San Antonio as noted as the Mardi-Gras spectacles have New Orleans.

Public Buildings. — Among the public build¬ ings are the courthouse, the Federal building, the market house and convention hall, with a seating capacity of 4,000; the city hall, the Grand opera hous£, the San Fernando cathe¬ dral, part of which was built in 1749; the Saint Mark's Cathedral, the city and county hospital, the many fine hotels, whose open courts are filled with tropical plants, palms and flowers; several theatres and numerous stately and orna¬ mental business blocks.

Commerce, Banking and Manufactures. — The unique situation of San Antonio, 200 miles from any rival business centre, has given it a commanding position as to the trade of a large section of Texas and Mexico. Large whole¬ sale houses push their business through an extensive territory. The city possesses about 269 manufacturing establishments,

including several machine shops and foundries, flouring mills, binderies, cotton presses, cement works, broom factories, oil mills, etc., and their prod¬ ucts are distributed through a vast section. There are 24 banks: National, State and private. Their combined capital is more than $8,000,000; their deposits average about $40,000,-

SAN ANTONIO, TEXAS

1 Court House and Main Plaza

2 City Hall — Military Plaza

,

SAN ANTONIO

231

000; their cash on hand averages about $16,000,- 000 and their loans over $36,000,000. The manufacturing establishments employ 7,000 people, are capitalized at $18,000,000 and pro¬ duce merchandise to the value of $30,712,876. The city is a prominent cotton market and is the financial centre of the most extensive stock interests in the Southwest. San Antonio is surrounded by many acres of irrigable farms, with water supplied by numerous artesian wells obtained at an average depth of about 1,200 feet. Truck gardening is here conducted on an ex¬ tensive scale, largely by Belgian gardeners, and the products are shipped to the northern mar¬ kets, where they are months ahead of similar products from other sections.

Churches and Education. — San Antonio has two beautiful cathedrals and 79 churches of the leading denominations. The public schools are under the control of a school board elected by the people. There are 34 public elementary and three high school buildings, valued at $3,000,000. The total annual enrolment of pupils is 25,000. There are also located in the city and its suburbs 36 private schools and colleges, making it one of the most important educational centres in the South. These private institutions contain several thousand pupils. The Carnegie Library, established through the liberality of Andrew Carnegie, occupies a build¬ ing constructed at an expense of $50,000 on a site valued at $15,000. It is under the control of a board of trustees; has endowment funds of $10,000 invested, the income of which, to¬ gether with a special tax of some $5,700 annu¬ ally levied under a special provision of the city charter, maintains its work.

Government. — The administration of mu¬ nicipal affairs is under the commission form of government. The mayor is the chief executive officer,

assisted by four commissioners. An excellent paid fire department and a thoroughly efficient uniformed police force are maintained. The assessed valuation of property in the city for taxable purposes is $130,368,660. The total tax rate for city and school purposes, $2.15. The Somers system of realty equalization be¬ came operative 1 June 1914. Under the State organization there are held in San Antonio three district courts, one of them with criminal jurisdiction, a court of civil appeals of three judges, a county court with probate jurisdiction and two justices of the peace courts, and under the Federal Jurisdiction District and Circuit courts.

Suburban Attractions. — There are several attractive suburban additions, not strictly in¬ cluded within the city limits, such as West End, Alamo Heights and the Hot Sulphur Wells. These are all noted for their handsome im¬ provements and beautiful surroundings. The Sulphur Wells Company has an elaborate bath¬ ing pavilion where medicinal, Turkish and vapor baths are given, with all the usual mas¬ sage accompaniments, and a modern, well-con¬ ducted hotel for its patrons. There are also in close proximity to the city other medicinal, hot sulphur and chalybeate artesian wells, notably the Terrell and Dullnig properties, whose re¬ markable curative qualities are well established. Corpus Christi, Rockport and Aransas Pass for sea fishing and duck hunting, Lake Medina and Mitchell Lake, Laredo, where excursions may be made into old Mexico, are all within easy access.

Climate. — The altitude of the city is 661 feet above the sea-level at the main plaza; at Fort Sam Houston on the government hill it is 768 feet. The average annual temperature is 68° ; mean maximum in summer, 79°; mean mini¬ mum in winter, 57°. The air is dry, bracing and aseptic, the average relative humidity being 67°. The summer heat is tempered by a strong cur¬ rent of air which blows for nearly eight months almost constantly from the Gulf, making the summer nights delightful. The winter climate most of the time resembles, in its salubrity and temperature, that of Cairo, Sorrento, or the Ri¬ viera, varied at times by a norther, which stim¬ ulates like a tonic. The attractions of the cli¬ mate, the wealth, refinement and hospitality of its cosmopolitan people, its quaint and artistic beauty and its interesting historical associa¬ tions and landwarks make San Antonio one of the most charming, picturesque and notable cities in the Union.

History. — The first Spanish settlement at San Antonio grew out of the fierce rivalry be¬ tween Spain and France for the possession of Texas. There were probably temporary mili¬ tary encampments made on the site of the pres¬ ent city by the exploring expeditions of Alonzo de Leon and Domingo Teran, in the latter part of the 17th century; but the real beginning of the city dates from 1716, when the presidio (gar¬ rison) of San Antonio de Bejar (or Bexar, pronounced Bay-har) was established on

the San Pedro Creek, within the present city limits, by Don Domingo Ramon.

Two years later followed the Franciscan mission of San Antonio de Valero, and in 1722 both the presidio and mission are found firmly settled on the Plaza de las Armas, now the mili¬ tary plaza of the modern city. In 1730, under a royal decree issued with a view of colonizing the new military and religious settlement, 15 families were brought from the Canary Islands, the head of each raised to the dignity of a hi¬ dalgo, and all located adjacent to the presidio, where, around what was then called the Plaza de las Yslas and now constitutes the main plaza, they proceeded to establish the pueblo (or villa) of San Fernando de Bejar. The mission of San Antonio de Valero was afterward, in 1744, removed half a mile farther east to the site still occupied by the historic chapel of that mission, known as the Alamo, and forever hallowed as the scene of the desperate and tragic struggle of 6 March 1836. From these various names of the presidio, mission and pueblo, respectively, there has been evolved by some gradual blend¬ ing process the modern name of San Antonio de Bexar, the affixed name having, under the State organization, been finally given to the county.

While Texas was a Spanish and Mexican province, San Antonio, called indiscriminately in those days San Antonio and Bejar, was most of the time the capital and always an important military station. During the long war of the revolution of Mexico against Spain, the old city witnessed many scenes of fierce strife and cruel bloodshed. Revolutionists and royalists engaged in bitter contests for the possession of the city, amidst scenes of unparalleled atrocity. In 1811 the head of Nicolas Delgado, a prominent ad¬ herent of the revolutionary party, was stuck upon a pole on the main street, after his cruel execution by order of the Spanish governor, Salcedo. On 29 March 1813, the battle of the Rosillo was fought a few miles from the city,

in which the royalist army, under Governor Sal¬ cedo, was defeated, with the loss of 1,000 men, by Mexican revolutionists and American adven¬ turers under Gutierrez and Kemper. San An¬ tonio "at once fell, and a junta of revolutionary chiefs ordered butchered immediately in cold blood, in revenge for the execution of Delgado, the governor, Manuel de Salcedo, Governor Herrera of New Leon and 15 other Spanish officers who had surrendered. On 4 June 1813, General Elisondo with a royalist force of 1,500 was defeated on the heights of the Alazan, one mile west of the city, after a desperate battle, by the revolutionists and Americans under

Gutierrez and Colonel Perry.

The famous Spanish general, the Marquis of Arredondo, now marched on San Antonio with a new army of 2,000 men, and 18 Aug. 1813, met the Republican forces commanded by Toledo and Perry, near San Antonio, on the Medina, and, after a furious contest, defeated them amidst frightful carnage. Arredondo im¬ mediately entered the city with his triumphant army, and proceeded to make the most cruel exactions and bloody reprisals upon the patriot population. Private property was confiscated; 600 citizens were crowded into narrow and un¬ wholesome prisons, where many died through suffocation; others were at once shot, includ¬ ing all the male members of the Delgado family, not sparing even a boy of nine years ; hundreds of women of the best families were imprisoned in the Quinta and compelled to grind corn for Arredondo's army. These bitter contests and periodical revolutions nearly ruined the city; and it was not until the independence of Mexico was finally won in 1821 that its prosperity began to revive. By 1823 its population had increased to nearly 5,000.

In 1835 the revolution of Texas against the dictaiorial government of Santa Anna (pro¬ nounced Sant' Anna) broke out. A Texan force of 800 men under Burleson and Milam advanced upon the city, then under the command of Gen¬ eral Cos, with an army of 1,400 men, and, after a siege of a month, the city was gallantly stormed by the Texans, losing in the assault their courageous leader, Ben Milam. On 10 Dec. 1835 Cos surrendered his entire command, with 21 pieces of artillery, and large stores of ammunition and supplies. During the succeed¬ ing winter the city was held by a small force of Texans under the command of Wm. Barret Travis, assisted by such heroic spirits as the re¬ nowned frontiersman, Davy Crockett of Ten¬ nessee, James Bowie, who had lived several years in San Antonio and had married there Governor Veramendi's daughter, and the chival¬ rous Colonel Bonham of South Carolina. The dictator, Santa Anna, in February 1836, com¬ pleted his vast preparations for retaking San Antonio and marched from Monclova with a force of nearly 6,000 men, the elite of the Mex¬ ican army. Learning of his near approach, Travis, with 145 men, subsequently increased by volunteers to a total of 179 men, retired from the presidio on the military plaza and estab¬ lished his little command in the abandoned mis¬ sion-fortress of the Alamo. Santa Anna took possession of Bejar 23 Feb. 1836, and rapidly completed the investment of the Alamo, sur¬ rounding the mission on all sides. He had three brigades of infantry under Generals Sesma, Tolsa and Gaona, a cavalry command under An¬

drade, and ample siege artillery directed by General Ampudia. The hardy Texans had not only their deadly rifles to depend upon, but also 14 pieces of artillery which had been mounted by their Mexican predecessors on the

church itself and on the walls surrounding the rect¬ angular court of the mission. These walls have long since disappeared, but the site of this court is the northern part of the present Alamo plaza. Here, then, for 10 days, took place the most memorable, thrilling, tragic and sanguinary siege in American history; 179 indomitable American frontier riflemen against an army of 6,000 brave and disciplined troops, led by vete¬ ran officers. After many desperate assaults and bloody repulses, on 6 March 1836, four storming columns of 2,500 picked troops, led by Cos, Duque, Romero and Morales, amidst death¬ dealing volleys and horrible carnage from the murderous rifles and artillery of the Texans, finally succeeded in scaling the walls. The heroic defenders fought desperately hand to hand, from wall to courtyard and courtyard to buildings, until the last man perished, there be¬ ing no survivors of the dreadful massacre but two women, two children and two servants. Santa Anna's total losses in this desperate siege were estimated by Alcalde Ruiz, who superin¬ tended the burial of the dead, at 1,600, of which over 600 were killed or died of wounds.

It was on this sacred spot, thus baptized by the blood of heroes, that San Antonio elected to receive President McKinley on the occasion of his visit in 1901, and there to tender the Chief Magistrate of the country the enthusiastic wel¬ come of its people. In 1840, 65 Comanche In¬ dians came into the city to enter into negotia¬ tions with Texas commissioners for a treaty of peace. A row broke out in the council house over the surrender of white prisoners; fierce fighting began in the building and continued into the plaza and streets until 32 Indian warriors were killed and all the rest of the party cap¬ tured. Seven Texans were killed and eight wounded in this bloody contest. In the fall of 1840, 18 dead bodies were brought in from the edge of town and laid out in the courthouse. Nineteen young men had gone out riding for pleasure and had been surprised by a sudden attack of Indians and all had been killed but one, and their bodies left stripped and horribly mutilated.

Mexico still kept up hostilities against the new republic, and 11 Sept. 1842 a Mexican army of 1,300 men under General Adrian Woll sur¬ prised the city and captured it, making prison¬ ers of 52 of the most prominent citizens, in¬ cluding the venerable judge of the District Court and the entire bar of lawyers. They were driven on foot in front of mounted guards, a cruel and toilsome march of over 1,000 miles, and imprisoned at hard labor, chained together in couples, for nearly two years in the castle of Perote, in the state of Vera Cruz. Woll, who had remained in San Antonio with his main army, was badly defeated a few days later by Colonels Hays and Caldwell and 220 Texans, in a desperate battle on the banks of the Salado, five miles east of the city, and was obliged to beat a hasty retreat into Mexico.

Military Post.— From the close of the Mex¬ ican War to the present time — save during the Civil War — San Antonio has been a military station for troops and generally also the head-

SAN DIEGO, CALIF

U. S. Grant Hotel and Office Buildings in the centre of business district, with the famous palm-bordered plaza

• •

quarters of the army in Texas. The present military post of Fort Sam Houston and head¬ quarters department of Texas, located on a commanding site in the northeast part of the city, occupying some 640 acres, is one of the largest in the United States, and its construc¬ tion has cost upward of $5,500,000. It has nor¬ mally in garrison from 3,000 to 5,000 soldiers. A United States arsenal for storage of ord¬ nance supplies and the manufacturing and repairing of equipment is situated in the south¬ western part of the city. Also part of the mili¬ tary establishment are: Camp Travis, one of the national army cantonments, covering 4,000 acres, erected to meet war needs at a cost of $6,000,000, which had in garrison normally about 50,000 troops ; Camp Stanley, a great training and manoeuvre field of 33,000 acres with a permanent encampment of 5,000 men; the Aeronautical Training School and the great Kelly Fields where 20,000 aviators were train¬ ing in 1918.

Population. — The city has shown a mar¬ velous development since the Civil War. Its growth has been as follows: (1870) 12,266;

(1880) 20,255; (1890) 37,673; (1900) 53,321;

(1910) 96,614. The United States census (1920) gives a population of 161,379. The winter popu¬ lation including tourists reaches 235,600.

Bibliography. — Corner, W., (San Antonio de Bexar > (San Antonio 1890) ; Bancroft's ac¬ count of the Storming of Alamo and other ref¬ erences to San Antonio; (Fall of Alamo1 (pam¬ phlet) ; (Memoir of Mary A. Maverick, > one of the first white women to live in San Antonio; Spanish documents and reports in Bexar ar¬ chives, touching Arredondo's victory and opera¬ tions and various points in early history.*

SAN ANTONIO, a river in Texas, which has its rise in Bexar County,

formed by the confluence of the Medina River and Leon Creek. It flows east through three counties, a distance of about 200 miles and enters Espiritu Santo Bay, an inlet of the Gulf of Mexico.

SAN BERNARDINO, san ber-nar-de'no, Cal., city, county-seat of San Bernardino County, on the Southern Pacific and the Santa Fe railroads, about 70 miles from the Pacific Coast, where the transcontinental railroads break through the mountains. Many electric lines connect the city. It was settled in 1851 by Mor¬ mons ; was incorporated as a town in 1868 and chartered as a city in 1886. It is west of Mount San Bernardino, in a rich agricultural and mining region, where fruit grows in abundance. The chief industrial establishments are the Santa Fe railroad shops, lumber mills, grain elevators and factories in which are made crates for the shipment of fruit. There are about 1,400 men working in the railroad shops and on the trains. In 1914 there were > 54 industrial plants, employing a combined capital of $1,392,209, and yielding products valued at $2,612,669. The city makes extensive shipments of fruit, grain and lumber. San Bernardino is a famous health resort both summer and winter, on account of the equable climate, the beauti¬ ful scenery and the variety and abundance of fruit. The principal public buildings are the courthouse, the hall of records, the hotels, the seven churches, the Southern California State Hospital for Insane and an orphan asylum.

In 1918 there were three national banks with combined capital of $300,000 and resources of $3,409,112. The educational institutions are Saint Bernardine of Sienna Academy, a high school, public and parish schools and a private business college. The government is vested in a board of trustees elected every four years. Pop. (1920) 18,721.

SAN BERNARDINO, (1) a range of mountains in the southwestern part of Cali¬ fornia ; an extension of the Coast Range. (2) A mountain peak of the San Bernardino Range ; the highest mountain of the Coast Range and the peak which has given name to the group of mountains to which it belongs. The height is 11,604 feet.

SAN BERNARDINO, a strait of the Philippines between the extreme southeastern point of Luzon and northwestern Samar, con¬ necting the Pacific Ocean with the Visayan Sea. It is of commercial importance as forming the eastern end of the Verde Passage between the United States and Manila.

SAN BLAS, bias, Mex., in the territory of Tepic, situated on the Pacific Coast south¬ east of the mouth of the Rio Grande de San¬ tiago. It is the terminus of the Mexico-Guada- lajara Railway, and an important port. The industries are ship-building, lumbering and agriculture. In the vicinity are

considerable gold, silver, copper and lead mining interests. Pop. 3,500.

SAN CARLOS, kar'l6s, Chile, town in the province of Nuble, in the northern part of the state, on the main railway of Chile, 15 miles northeast of Chilian. Pop. 9,300.

SAN CARLOS, Philippines, pueblo, prov¬ ince of Pangasinan, Luzon, on a tributary of the Agno River, 10 miles southeast of Lingayen. It is the centre of four main highways and near the Manila and Dagupan Railroad. Pop.

27,166.

SAN CARLOS, Order of. See Orders, Royal.

SAN CRISTOBAL DE LOS LLANOS,

kres-to'hal de los la'nos, or CIUDAD DE LAS CASAS (City of Las Casas), Mexico, largest city of the state of Chiapas, lies north¬ east of the capital, Tuxtla-Gutierrez. It occu¬ pies a high (1,981 metres), fertile and beautiful valley on the eastern slope of the central moun¬ tain range. It is the see of an archbishop and has a cathedral, several convents, seminario conciliar, or university, a grammar school and a hospital, and a handsome capitol. It has an active trade, especially in coffee ; it also has manufactures of earthenware and coarse tex¬ tiles. The chief occupation, however, is the raising of cattle, horses, mules and swine. The town was founded in 1528 on the site of the ancient Zacatlan, and named in honor of the celebrated priest Las Casas. Pop. 18,700

SAN DIEGO, de-agd, Cal., city, port of entry and county-seat of San Diego County, on San Diego Bay, and on the Atchison, Topeka and Santa Fe and the San Diego and Arizona railroads, about 125 miles south of Los Angeles. San Diego Bay, landlocked and safe at all seasons, has an area of 22 square miles, with 39 feet water, low water, over bar. It is one

of the world's 10 great harbors. The city spent $1,400,000 recently for a municipal pier. In 1915 the Panama-California Exposition was held here, and in 1916 the Panama-California International Exposition. The climate is re¬ markable, equable and salubrious ; the average varies but 8° between summer and winter, and but 2° from day to day. The community pro¬ duces a large amount of fruit, honey, poultry, grain and cattle. There are 200 manufactur¬ ing concerns established, the largest being the Hercules Powder Company (potash plant), Swift and Company (potash), Savage

Tire Company, Magnesite company, fish canneries, etc. The principal buildings are the Federal building, library, State normal school, high school and stadium, Spreckels building, Union building, Watts building and the American National Bank building. The school system has no superior, considering the population of the city. There are also a number of private schools of splendid merit. San Diego has many fine church edifices ; a number of theatres, one costing $1,000,000; hotels and apartments, one hotel costing $1,500,000, another $2,000,000. The bay was discovered in 1542, the San Diego Mission founded by Father Serra in 1769 and the city laid out in 1867. The principal points of interest are Balboa Park, Mission Cliff Gar¬ dens, Old Town, Point Loma (one of the three greatest views of the world), La Jolla Caves, Sunset Cliffs, Coronado Hotel and beach, Fort Rosecrans and a wireless station. Pop. 74,683. Consult Gunn, (San Diego: Climate, Produc¬ tions, Resources, Topography > (San Diego 1887) ; Smythe, W. E., (History of San Diego (ib. 1907).*

SAN DOMINGO, san do-meng'go'. See Santo Domingo.

SAN DOMINGO INDIANS, a Pueblo

tribe of New Mexico. See Queres.

SAN FELIPE, fa-le'pa, Chile, an agricul¬ tural town and capital of the province of Aconcagua, 40 miles north of Valparaiso, with which it has railway connection, in the fertile valley of Aconcagua. It is an interesting regu¬ larly built town, with an attractive central square and highly improved boulevards. Pop.

13,000.

SAN FELIPE INDIANS, a Pueblo tribe of New Mexico. See Queres.

SAN FERNANDO, fer-nan'do, Chile, town, capital of the province of Colchagua, and a railway junction, 80 miles south of Santiago. Pop. about 8,500.

SAN FERNANDO, Philippines, (1) Pu¬ eblo, province of Cebu, on the east coast, 16 miles southwest of Cebu, the provincial capital ; pop. 18,200. (2) Pueblo, province of Pam-

panga, Luzon, on the Manila and Dagupan Railroad, five miles northeast of Bacolor. It is the railroad shipping point for Bacolor, with which it is connected by highway, and is an important centre of the sugar industry, con¬ taining sugar mills and warehouses. It also has an extensive wholesale and retail trade in groceries and drugs; pop. 13,270. (3) Pueblo,

capital of the province of Union, Luzon, on San Fernando Bay, 45 miles north of Dagupan. It is on the coast highway and also on the pro¬ jected route for the continuation of the Manila

and Dagupan Railroad. It has also frequent communication with Manila by sea. Fishing is an important industry; pop. 13,270. There are three smaller pueblos of the same name: (a) pueblo, province Ambos Camarines, Luzon, a road centre with good trade; pop. 3,270; (b) pueblo, Ticao Island, province of Masbate, also known as Butuan ; pop. 2,367; (c) pueblo,

province of Zambales, Luzon, on Bancal Valley highway ; pop. 453.

SAN FERNANDO, Spain, on the Isla de Leon, seven miles southeast of Cadiz, in the province of Cadiz, is a fortified town built in modern style. It has two churches, two hos¬ pitals, a naval academy and workshops, an extensive arsenal, a fine observatory (the south¬ ernmost of Europe) and an iron foundry. It has numerous domestic industries and a brisk trade in salt. Pop. about 30,000.

SAN FRANCISCO, san fran-sis'ko, Cal., metropolis of the Pacific Coast and one of the largest cities in the United States west of the Mississippi, ranking 12th in the whole country and second only to New York in commercial im¬ portance, is situated on a hilly peninsula 40 miles long between the Bay of San Francisco and the Pacific Ocean, in 37° 47′ 22″ N. lat. and 122° 25′ 40.76″ W. long. San Francisco Bay, the only commodious harbor on the Pacific Coast south of Puget Sound or north of San Diego Bay, is entered through Golden Gate Strait, about three miles long and nowhere less than a mile in width, north of the city. The bay is about 90 miles long (50 miles in medial line) and from 5 to 15 miles wide. It has an area of 450 square miles and a shore line of over 300 miles. It is completely sheltered from the sea gales by the low hills of the peninsula and forms the biggest land-locked harbor in the world, affording excellent anchorage ground re¬ gardless of tides. It is supplied with drydocks and every facility for the care of vessels. The city is connected with regular lines of steam¬ ships: (1) with all ports on the Pacific Coast of North and South America, the distances in nau¬ tical miles to the principal points in the north being Portland, Ore., 653; Seattle, Wash., 804; Vancouver, British Columbia, 833; Juneau, Alaska, 1,608; Sitka, Alaska, 1,784; the distances to the principal ports to the south being San Pedro, port for Los Angeles, 393 ; San Diego, Cal., 482; Mazatlan, Mexico, 1,478; Acapulco, 1,836; Guaymas, 1,954; Panama, 3,277; Valpa¬ raiso, 5,140; (2) with the Atlantic seaports via the Panama Canal, the distances being to New York, 5,262; Liverpool, 7,836; (3) with Hawaii, Japan, China, Siberia, the Philippines, distances being Hawaii, 2,100 ; Honolulu, 2,100; Yokohama, 4,545; Shanghai, 5,387; Plong- kong, 6,049; Vladivostock, 4,570; Manila,

6,221; (4) with Samoa, New Zealand and Australia, the distances being Apia, 4,200; Auckland, 5,930; Sydney, 7,210. The city is also connected by rail with all points north and south on the Pacific Coast and all points in the Middle West and east of the United States, the distances being by shortest mail route : to Seattle, 808 miles ; to Los Angeles, 482 miles; New Orleans, 2,490 miles; to Chicago, 2,357 miles; to New York, 3,269 miles. Nearly in front of the city are three important islands, Alcatraz (fortified), Angel Island (fortified) and Yerba Buena or Goat Island.

Main Portion of

SAN FRANCISCO

SCALE

Rand McNally' 11 x 14 Map of Main Portion of San Franclaco Copyright by R&nd McNally 1 Co.*

EXPLANATION Steam R. R.

SAN FRANCISCO

235

General Description. — The city, which was originally built on the shore of the bay and on the steep hills rising from it, has gradually extended across the peninsula (here six miles wide) to the ocean. On the north it is bounded by the Golden Gate. The city of San Francisco includes within its munic¬ ipal territory 46jl square miles, covering a tract of land which is almost square in shape, about seven miles long and s.even wide. Many of the streets, especially in the northern and western sections of the city, are very steep, which would have presented an insurmountable obstacle to ordinary street railway traffic, but this problem was simply solved by the cable car system, invented by A. S. Hallidie, whereby the cars are drawn along the tracks by an un¬ derground wire cable. Only 25 years ago the western section of the peninsula was an arid waste of shifting sand dunes, continually being augmented by the sands being blown up from the sea beach by the strong sea breezes, but this district has since been entirely built over and the well-paved streets now stretch from the shores of the bay over to the sea shore. In the early days there was a deep dent in the inner, or bay shore of the peninsula. This was filled in and is now the heart of the wholesale busi¬ ness section of the city. The site of the recent Panama-Pacific Exposition was, only a few years ago, a salt meadow marsh which has also been filled in.

The streets are unusually broad and are well paved. The main thoroughfare

is Market street, 120 feet wide, which cuts the city diag¬ onally from the water front in a southwesterly direction. The district south of Market street is flat and constitutes the manufacturing sec¬ tion and the homes of the wage-earning classes. But farther to the westward and southward lies the old Mission District, largely a better-class residential section. To the north of Market street lie the steep thoroughfares along which are built the big office buildings and the shops of the better sort and, farther west, the homes of the more prosperous classes and the wealthy capitalists. In the lower part of this section near the water front and within the business district is Chinatown, which has always been one of the picturesque features of the city. Slightly north of Chinatown rise the bald bluffs of Telegraph Hill, whose signal station announced the approach of incoming ships in the early days. Below Telegraph Hill lies the Latin Quarter, where live the few sur¬ viving families of the old Spanish population.

Parks. — In 1918 San Francisco had 32 public parks and squares, covering 1,399 acres, or nearly one-twentieth the total area. The chief public park is Golden Gate Park, comprising 1,013 acres of rolling and hilly land reclaimed from the sand dunes. Of about the same shape as Central Park in New York City, it begins almost in the centre of the city and stretches westward over to the shore of the Pacific. Besides its vast lawns and well-graded driveways and boulevards, it includes among its features nine baseball diamonds, a dozen tennis courts, a well-equipped children's playground, a zoological park, a Japanese tea garden, a chain of lakes, an aviary, a botanical garden richly stocked with tropical plants and a 30-acre stadium. Within the past few years the city has spent much money on extending its system

of boulevards and driveways, the most notable of these later improvements being the great driveway running along the ocean beach for three miles. At the upper end of this driveway, just below the mouth of Golden Gate Strait, is the famous Cliff House, built on the brow of a cliff overlooking a number of rocky islands out beyond the surf line, on which hundreds of sea lions bask and romp in the sun. Just below the Cliff House and also on the beach is the bathing establishment, one of the biggest in the world, known as Sutro Baths, to whose con¬ crete tanks the water is admitted directly from the ocean. The baths are 250 feet wide and 500 feet long and hold 1,805,000 gallons of water. The Presidio, farther back and on the shore of the strait, is another public park reservation, embracing 1,500 acres, including the barracks and parade grounds of the troops of the De¬ partment of California. A magnificent new boulevard extends to the summit of Twin Peaks, where a splendid view of the city can be had.

Climate. — The climate of San Francisco is very equable, a snowfall being so rare as to cause considerable excitement among the peo¬ ple, while frost

may appear for only a few nights during the winter. The lowest tempera¬ ture on record was 29 degrees, while the aver¬ age temperature for the summer months is 70 degrees, though occasionally it rises to 100 de¬ grees. The mean annual temperature is about 55 degrees. Rain falls only in the winter months, the average rainfall being about 28 inches. During the summer months the south¬ west trade winds prevail, forming a rather un¬ pleasant feature in that in the afternoons they often attain an almost violent force and sweep the streets with stinging clouds of dust and sand. Fogs, too, are very frequent, especially in the mornings, sweeping in from the sea. In regard to these two disagreeable features the climate of San Francisco differs markedly from the climate of the suburban towns across the bay, Oakland, Alameda and Berkeley, whence large numbers of business men and the more prosperous class of wage-earners commute daily into the city.

Municipal Government and Public Service.

— San Francisco has a combined city and county government, based on a charter which went into effect 1 Jan. 1900. Legislative power is vested in the board of supervisors whose 18 members are elected at large. The mayor is elected for a four-year term and he has the power to veto any item in the budget, a five- sixths vote of the board of supervisors being required to override his veto. He appoints the three members of the board of public works, the four police commissioners, the three civil serv¬ ice commissioners, the five members of the board of health, the four members of the board of education, the four fire commission¬ ers, the five election commissioners and the five park commissioners and, within certain limita¬ tions, he may remove his own appointees. Ap¬ pointments to the public service are made under strict civil service rules. The auditor, treas¬ urer, assessor, tax collector, coroner, recorder and the county clerk are elected by the people. The waterworks and the gas and electric light¬ ing systems are in the hands of private corpora¬ tions, but part of the street railways are owned by the city, San Francisco being the first large

city in the United States to establish a system of municipal street railways. The Twin Peaks Tunnel, a subway system built by the munici¬ pality, will accommodate 100,000 passengers daily and contains a double-track railway 12,000 feet long. A municipally-owned waterworks is also contemplated for the near future. Under an Act of Congress, approved 13 Dec. 1913, the city was granted the rights to a watershed of 420,000 acres in the Yosemite Valley, the famous Hetch Hetchey grant. In 1919 the city

had already spent nearly $10,000,000 on this work. It is planned to secure a flow of 400,000,000 gallons of- water a day. Before the great fire, in 1906, San Francisco had practically no debt, but by 1 Jan. 1919 the net bonded debt amounted to $44,476,100. There are 97 public schools and an enrolment of 70,800 pupils. There are also two richly endowed technical schools, while the departments of law, medicine, dentistry, phar¬ macy, veterinary science and art of the Univer¬ sity of California are also within the city. There are over 200 charitable agencies and 21 hospitals.

Public Buildings. — The cost of rebuilding San Francisco since the great fire of 1906 is estimated at an amount not far short of the sum spent in the construction of the Panama Canal. During this period the city has- been building public structures as never before in its history. The most important of the many new building enterprises is a group of public build¬ ings which forms the Civic Centre, for which a bond issue of $8,800,000 was raised. Half of this was spent on a city hall. The public library cost another million. The Auditorium was built by the Panama Pacific Exposition at a cost of $1,275,000. All these buildings are grouped about a spacious plaza, or public square and it is estimated that the paved space will accommodate 20,000 people. Aside from these there is the hall of justice, overlooking the old Plaza, now Portsmouth square, where the first American flag was raised over San Francisco. This building cost $3,500,000. About $3,000,000 has been spent on hospitals. The Union Ferry depot, where the gigantic ferry boats connecting the city with the rail¬ roads across the bay land, was erected by the State harbor commissioners in 1896 at a cost of over $1,000,000. It is 659 feet long, 156 feet wide and contains the railroad ticket offices, waiting-rooms, the California development board and the State mining bureau. The United States Appraisers' building also cost over $1,000,000 and contains the internal revenue, secret service and marine offices. Another big Federal building is that of the United States Mint, ranking second in the country. It is kept constantly in operation coining the gold pro¬ duced on the Pacific Coast. Another big public building which survived the great fire is the post office, a large structure of granite costing over $5,000,000. Among the important educa¬ tional and scientific institutions may be men¬ tioned the Memorial Museum, Palace of Fine Arts, the Mechanics' Institute, the School of Mechanical Arts, the San Francisco Institute of Art, the Lux School of Industry, the Cogswell Polytechnic Institute. There are scores of hotels, theatres, etc. The State University is at Berkeley and the Leland Stanford University at Palo Alto, 33 miles southeast by rail. Among the big office buildings are the

Pacific building, one of the largest reinforced concrete buildings of its kind in the world, the Hobart Building, 21 stories high, and the Claus Spreckels, 19 stories high, which stood through¬ out the fire that raged on all sides of it.

Manufactures. — In 1914 San Francisco ranked 11th in the United States in the number of its manufacturing establishments. But until the recent discovery of crude petroleum in large quantities in California the city, in common with the rest of the State, suffered a handicap in manufacturing on account of the lack of fuel, which was in part imported from such distant points as England, Australia and Penn¬ sylvania. That difficulty is now removed and crude oil is used for this purpose. There is still the handicap of having to import iron from distant points, but in spite of that the iron industry thrives, as was shown by the shipbuilding that was done during the Great War and is still being continued. The need of mining machinery was really the foundation of the iron industry in San Francisco, and mining machinery is now exported to all parts of the world. The agricultural development of the State has of late been a more important stimulus to the building up of the industries of the city. San Francisco being the near¬ est port of entry for Hawaiian sugar, much of that product is refined there. Slaughter¬ ing and meat packing come next, this indus¬ try being supplied by the herds of cattle, flocks of sheep and the hogs which are raised in the interior valleys. The largest fruit and vegetable cannery in the world is located in San Fran¬ cisco, and the largest shipbuilding plant, dry-dock, cooperage and cordage factory in the West are also part of the city's industries.

Trade and Commerce. — The commercial importance of San Francisco is even greater than its relative size in regard to population. In 1919 its bank clearings amounted to $5,629, 321,142, which was nearly a million dollars more than the combined bank clearings of the four next largest cities on the coast. In its foreign imports it ranked fifth in the United States and the same in the foreign export of domestic goods. Most of the foreign commerce of the United States on the Pacific passes through San Francisco. A large part of the imports and exports of domestic produce from California and neighboring States also passes through the city, and much Californian and other Pacific Coast produce is gathered at San Francisco and shipped out by rail. The city has, in consequence, extensive wharves and warehouses and a large coastwide trade. In 1918 San Fran¬ cisco imported $245,524,209 worth of goods from foreign countries by sea, and exported to for¬ eign countries by sea goods amounting to $210,- 562,365. The principal countries to which San Francisco sent domestic products in 1918 were Japan, $59,378,616; Australia and New Zealand, $46,877,524; Mexico and Central America, $8,359,533; Philippine Islands, $30,676,149; China, $13,450,929; Dutch East Indies, $14,657,- 206. The largest imports of foreign merchan¬ dise came from Japan, $17,406,822; China, $21,- 872,230; Australia and New Zealand, $33,971,- 032; Straits Settlements, $34,065,606; Dutch East Indies, $30,674,778; British India, $29,790,- 557. The pi 'incipal articles

imported from abroad during 1918 were rice, sugar, coffee,

SAN FRANCISCO, CALIF

General view of San Francisco, showing the Ferry Building and Bay from Nob Hill

SAN FRANCISCO, CALIF

Union Square

SAN FRANCISCO, CALIF

1 Seal Rocks and Cliff House

2 San Francisco from the Bay

SAN FRANCISCO, CALIF

- ■*ag&m*

"T

1 The Cliff House

2 Market Street, looking east

SAN FRANCISCO

237

copra and tin. The principal articles of foreign export are canned goods, mostly fruit and sal¬ mon, raw cotton, iron and steel manufactures, fuel oil, leather and lumber.

Finance and Banking. — In 1918 San Fran¬ cisco ranked third in the United States in average capital per national bank. Bank statis¬ tics indicate that one-half the population are savings-bank depositors. The real and personal property of the city was assessed for purposes of taxation at $780,723,824, of which $481,457,146 was land assessed as 50 per cent of its true value. The ratio of taxation is $2.41 on each $100 of assessed valuation. The city budget for 1918-19 allowed for a total expenditure of $16,015,747. Of this amount $1,315,618 was for public works; $1,003,080 for the board of health; $1,610,000 for fire protection; $1,557,396 for po¬ lice department ; $390,000 for parks and $3,289,-652 was for bond interest and redemption.

Population. — There is probably no city in the United States whose population is so cosmo¬ politan in character as is that of San Franciso. Not only are all the races and nations of Europe represented here, but the brown races are repre¬ sented here as nowhere else in the whole coun¬ try. According to the census figures for 1910 the population was 416.912, of which almost exactly half was composed of native whites. The foreign-born whites constituted 43.1 per cent of the whole and 6.4 per cent were of the colored races. The greatest single foreign ele¬ ment was the German which numbered 24,137, after which came 23,151 Irish, 9,815 English and 6,244 French. The Chinese numbered 10,582, showing a marked decrease since previous years, while the Japanese numbered 4,518. There were only 1,642 negroes in the city. In 1920 the population was (U. S. official census) 506,676. For a truer estimate of the size of San Francisco from the point of view of popu¬ lation, some consideration should be given the suburban towns across the bay — Oakland, Alameda, Berkeley and Sausalito — which are really included within the metropolitan area. About 50,000 commuters come into the city daily from these points. Together these sub¬ urban districts include another 384,801 popula¬ tion which, if added to that of the city proper, would make San Francisco the fifth most populous city in the United States. In the past San Francisco has at various times been visited by more or less severe earthquakes. On 18 April 1906 it was shaken by an earthquake more violent than any of previous occurrence, but it was the fire caused by the commotion, rather than the earthquake itself, which caused the loss of life and the tremendous loss of prop¬ erty that followed, the latter amounting to over $500,000,000. On account of the city's prox¬ imity to the vast forests of the Puget Sound region, which makes timber one of the cheapest building materials, most of the dwellings, even to the larger flat houses, were constructed of wood. The result was that when the water mains were dislocated by the earthquake and the fire companies were unable to extinguish the various outbreaks of fire that occurred simultaneously all over the city, the flames soon swept the entire community. The energy and the rapidity with which the city has not only been rebuilt but improved over its condition previous to the fire has been a source of world¬ wide wonder.

Influence of the Panama Canal. — That the opening of the Panama Canal, with its con¬ sequent shortening of sailing routes between San Francisco and the Atlantic ports of both America and Europe, exerted a powerful in¬ fluence on the commercial and industrial de¬ velopment of the city is beyond doubt. But the brief period that has elapsed since the opening of the canal, together with the abnormal con¬ ditions created by the European War, makes it impossible to determine how potent that in¬ fluence will yet be. In 1915 San Francisco cele¬ brated the opening of the Panama Canal by holding a great international exposition. See San Francisco, Panama-

Pacific Interna¬ tional Exposition.

History. — The site of San Francisco (origi¬ nally called Yerba Buena by the Spaniards) was first visited by Europeans in the autumn of 1769. Under date of 28 Nov. 1775 Bucareli ordered a fort, presidio, and a mission (Mission Dolores) founded on the Bay of San Francisco. The expedition to carry out this order left Monterey 12 June 1776 and arrived on the peninsula 27 June. Part of the equipment was sent by sea on the San Carlos and arrived on 18 August. The ceremony of taking formal posses¬ sion was held on 17 September, when the Fran¬ ciscan friars Palou and Cambon founded the first permanent settlement on the peninsula. The ceremonies attending the founding of the mission at San Francisco were held on the 9th of the following October. Vancouver, in his (Voyage Round the World) (iii, 9), describes the settlement as it appeared in 1792. The pre¬ sidio represented the military authority, while the pueblo and the mission stood for the civil and religious factors respectively. The earliest towns of California were organized under the laws of Philip II. And ((when a pueblo was once established, no matter how or by whom composed and officially and legally recognized as such, it came immediately within the provi¬ sions of the general laws relating to pueblos and was entitled to all the rights and privi¬ leges, whether political, municipal or of prop¬ erty, which the laws conferred upon such organ¬ izations or corporations® (Cal. Rep., 15, 541) ; and <(among these rights was the right to four square leagues of land, in the form of a square, or in such other form as might be permitted by the nature of the situation® (Cal. Rep., 35, 432). Since San Francisco was bounded on three sides by water it was impossible for the town to have four square leagues of land in a square; a line was, therefore, drawn across the penin¬ sula from east to west and <(the four square leagues (exclusive of the military reserve, church buildings, etc.) north of this line, con¬ stitute the municipal lands of the pueblo of San Francisco® (Cal. Rep., 16, 230). Before 1834 the Territorial governor and the military com¬ mandant of the presidio conducted the govern¬ ment of the town. The former imposed license fees and taxes and the latter acted as a judge of first instance. A little later an ayuntamiento was formed, composed of an alcalde, two regi- dores and a sindico. Between 8 Jan. 1838 and February 1840 the ayuntamiento was abolished, and the government of the town passed into the hands of justices of the peace. In 1846, when San Francisco passed into American hands, it was merely a Mexican village. After the Amer¬ ican occupation the ayuntamiento was re-estab-

lishetl. Commodore Montgomery,ˆ after he had raised the flag of the United States at San Francisco, appointed Lieut. Washington A. Bartlett to be the first alcalde of San Francisco under the new regime. Before the American occupation the alcaldes acted as judges of first instance, and they in a large measure made the law which they executed, ((at least, they paid but little regard either to American or Mexican law further than suited their own convenience and conduced to their own profit.® In 1847 a com¬ mon council of six persons was elected, and held its first meeting in September of that year. With this the alcalde assumed some of the functions of a mayor. He presided at the meet¬ ings of the council and could give a casting vote in case of a tie, but could not participate in the discussion. At this time the police force of the town consisted of two elected constables. The next year, 1848, gold was discovered in California by James W. Marshall. After the news became known the town appeared as if it had been suddenly stricken with a plague. <(Its houses were left unoccupied and unprotected; its former trade ceased; its lots fell to a small part of their value; its two weekly newspapers, The Californian and The California Star, were suspended in May and June; and the town, deserted by the bulk of its inhabitants, was at one time, without a single officer clothed with civil authority.® (Moses, cThe Establishment of Municipal Government in San Francisco,) 35). But in October 1848 an election was held and the town government was reconstituted. At an election held on 1 Aug. 1849 there were 1,516 votes cast, and John W. Geary, candidate for the office of first alcalde, received the whole number.

The town was incorporated 15 April 1850. California had already adopted a constitution, but it had not been admitted into the Union. The first municipal election under the charter was held 1 May 1850. The common council held its first meeting on 9 May and proceeded at once to plunder the city treasury. It pro¬ posed to fix the salary of the mayor at $10,000 a year; aiid at the same sum the salaries of the recorder, the marshal and the city attorney. The other officers, including the members of the council, were to have salaries ranging from $4,000 to $6,000 annually. After the admission of California to the Union as a State the city was reincorporated 15 April 1851 and the essen¬ tial forms of the pre-existing government were retained. When the mail steamer Oregon brought the news that California was admitted to the Union (9 Sept. 1850) the inhabitants were <(half wild with excitement.®

“ Business of almost every description was instantly suspended, the courts adjourned in the midst of their work, and men rushed from every house into the streets and towards the wharves, to hail the harbinger of the welcome news. When the steamer rounded Clark’s Point and came in front of the city, her masts literally covered with flags and signals, a universal shout arose from ten thousand voices on the wharves, in the streets, upon

the hills, house-tops, and the world of shipping in the Bay." And "at night every public thoroughfare was crowded with the rejoicing popu¬ lace. Almost every large building, all the public saloons and places of amusement were brilliantly illuminated — music from a hundred bands assisted the excitement — numerous balls and parties were hastily got up — bonfires blazed upon the hills, and rockets were incessantly thrown into the air, until the dawn of the following day." (Annals of San Francisco, 293.)

In its early history the city suffered from several fires. These occurred 24 Dec. 1849, 4 May 1850, 14 June 1850, 17 Sept. 1850, 4 May

*1851 and 22 June 1851. Two effects of these fires were the use of better materials in build¬ ing and the formation of various hook and ladder, engine and hose companies. They also called attention to the fact that the city was full of criminals who were making profit out of the fires. This fact and the recognized in¬ efficiency and corruption of the city govern¬ ment led a large number of citizens to organize the famous ((Vigilance Committee® which flour¬ ished in 1851. In August 1850 the Society of California Pioneers was organized. Its de¬ clared purpose was ((to cultivate the social virtues of its members, to collect and preserve information connected with the early settlement and conquest of the country and to perpetuate the memory of those whose sagacity, enterprise and love of independence induced them to settle in the wilderness and become the germ of a new State.® The great production of gold, while it led immediately to the abandonment of the city, was the first important ground of its prosperity. As the output of the mines became more and more abundant, prices rose, imports multiplied and the population increased; but in 1854 the rise had culminated and the flood of gold began to decline. It then became clear that speculation had outrun safe limits, and there followed a severe crisis in mercantile affairs. By 1856 the crime and corruption which were rife in the city had become intoler¬ able to those who wished to live in a decent and orderly community. Affairs reached a critical stage when Mr. King, editor of the Bulletin, was murdered bv James P. Casey. His vigorous denunciation of crimes and the crim¬ inals who infested the city had given great offense. This act was t*he final incentive to action. The memory of the Vigilance Com¬ mittee of 1851 was revived and a new organi¬ zation effected. On Monday Mr. King died and on Tuesday Casey and another murderer by the name of Cora, who had killed United States Marshal Richardson, were tried by the execu¬ tive committee of the recently formed organiza¬ tion. On Wednesday, Casey and Cora were hanged in front of the Vigilance headquarters. After several months of activities in defiance of the law, the committee disbanded, having rid the city of many criminals and purged it of much of its political corruption. Although there was a decline in the yield of gold in the years between 1854 and 1860, there was at the same time a marked extension of agriculture;*

by this the continued prosperity of San Francisco was assured. Then following the marvelous development of the silver mines. They brought a sudden increase of wealth and led to a large amount of excited speculation. San Francisco reaped the principal harvest from the silver mines of Nevada. A small group of its citi¬ zens acquired immense fortunes from this source. Their wealth may be compared with that of another small group of San Franciscans who became very rich as the chief leaders in the overland railway enterprise.

Railway connection with the eastern United States was established in 1869 ; the city is now the western terminus of the great continental railroads and of many short lines. The agita¬ tion against Chinese labor was begun in 1877 by Denis Kearney (q.v.). On 23 Oct. 1860 San Francisco was connected with New York by telegraph. The free public library was founded

in 1879. In 1880 the forcible ejection of poor squatters from the Sand Lots by the Southern Pacific Railroad led to a conflict in which sev¬ eral persons were killed. A panic on the Stock Exchange in December 1886 caused 14 of the principal brokers to suspend. After years of agitation not unaccompanied by disorders and bloodshed, the Chinese Exclusion Act of 1888 removed a long-standing grievance of Cali¬ fornia in general and San Francisco in par¬ ticular. In the following year the city suffered a plague of millions of crickets. In 1891 the police destroyed the joss-houses of the "high¬ binders55 — members of a Chinese secret society of blackmailers. The first shipment of block tin extracted from the Temescal mines, River¬ side County, Cal., arrived in San Francisco 15 June 1891. The first great exposition was held in the city in 1894; a new charter was ratified in 1898 and came into effect on 8 Jan. 1900, by which the government was vested in the mayor. In 1903-04 political disturbances led to the conviction and imprisonment of two ex¬ mayors charged with graft (1906-08), an affair which dragged on until 1911. The principles of the initiative and the referendum were incor¬ porated in a series of amendments to the city charter. During 1906-07 an anti-Japanese cam¬ paign raged over the question of segregating Japanese pupils in the public schools.

The most important event in the life of San Francisco was the great earthquake which over¬ whelmed the city on 18 April 1906, fol¬ lowed by a gigantic conflagration which lasted four days and destroyed 497 city blocks covering an area of five square miles. Some 28,188 buildings were demolished, causing damage to the extent of nearly $1,000,000,000 and

the loss of about 500 lives. It was not long, however, before the energy of the citizens succeeded in restoring the place on a grander and more solid scale than before. Within three years some 20,000 new buildings had been erected, mostly fireproof and equipped with the best fire-pre¬ venting apparatus. Since the fire 80,092 build¬ ing permits have been issued, amounting to $329,773,878. From the ashes of that dis¬ aster there has arisen a new and magnificent city, with noble edifices ranged on wide, well- paved thoroughfares, cleanly kept and brilliantly lighted..

Bibliography. — (The Bay of San Francisco, the Metropolis of the Pacific Coast, and its Suburban Cities: A History) (Chicago 1892); Aitken, F. W., (A History of the Earthquake and Fire in San Francisco) (San Francisco 1906) ; Bancroft, H. H., (Some Cities and San Francisco, and Resurgam5 (New York 1907) ; Bonnet, T. F., (The Regenerators) (ib. 1911); Holway, R. S.,

ber of Commerce Handbook for San Fran¬ cisco, historical and descriptive5 (ib. 1914) ; Wright, B. C., (San Francisco's Ocean Trade, past and future, 1848—191 1 5 (ib. 1911); Young, J. P., (San Francisco, a History of the Pacific Coast Metropolis5 (ib. 1912).

L. B. Wilson,

San Francisco Chamber of Commerce.

SAN FRANCISCO BAY, on the coast of California; a land-locked arm of the Pacific Ocean. The channel connecting the bay proper with the ocean is called the Golden Gate. The bay, including San Pablo at its northern point, is 55 miles long and varies in width from 3 to 12 miles. It is the finest bay on the Pacific Coast of the United States. There are a num¬ ber of islands; Alcatraz, a fortified island, is four miles from the mouth; Angel and Yerba Buena, or Goat Island, are the largest. San Pablo Bay, on the north, is nearly circular in form, about 10 miles across. The Straits of Carquinez connect 'Suison Bay with San Pablo. Suison Bay is about eight miles long and four miles wide. A number of other smaller bays furnish harbor advantages for several villages and towns. Nearly all the drainage of Cali¬ fornia enters the ocean through this bay. San Francisco (q.v.), Oakland (q.v.) and a number of smaller places are on its coast.

SAN FRANCISCO, PANAMA-PA¬ CIFIC INTERNATIONAL EXPOSITION OF 1915. This exposition was held to cele¬ brate the opening of the Panama Canal and the quatercentenary of the discovery of the Pacific, was opened at San Francsico on 6 Feb. 1915 by President Wilson in Washington. He pressed a gold-studded button, whereupon, over 3,000 miles away, the doors of the various exhibitions swung free and mechanical

exhibits began to move. The exposition having been decided on several years before, a competition arose be¬ tween San Francisco and New Orleans as to which of the two cities should be the seat of the undertaking. Private enterprise in San Francisco promised $7,500,000 and the State and municipality authorized an appropriation each of $5,000,000. In March 1911 Congress selected San Francisco for the undertaking, and on 14 October in the same year President Taft turned the first shovelful of earth on the chosen site. The location fronted San Francisco Bay for nearly two and a half miles from Van Ness avenue and Fort Mason to and within the Presidio. Its average depth was about half a mile from the bay to the residential section of the city, and comprised an area of approxi¬ mately 625 acres. Divided into three sections, the central space was assigned to the division of exhibits, where 11 magnificent palaces were erected at a cost of about $12,000,000, each de¬ voted to some specific exhibit — art, education, agriculture, transportation, machinery, etc. No charge was made for exhibit space. In 1912 a commission of five visited Europe to invite par¬ ticipation. Invitations were also issued to for¬ eign countries to send warships to assemble with those of the United States. Altogether 42 nations and 43 States produced some 80,000 ex¬ hibits, which were reviewed by an international jury of awards. The opening address was de¬ livered by the late Secretary of the Interior Franklin K. Lane of California. It was estimated

that 400,000 persons visited the grounds on the first day. The splendor of the buildings, the innumerable attractions and shows, the beauti¬ ful scenery, tournaments, sports, historic collec¬ tions, pageants and Orientalia presented a spectacle never before witnessed. The total receipts amounted to $12,524,090, of which $4,715,523 was derived from admission fees, the total number of visitors being 18,756,148. The gross receipts from concessions were $7,809,565; net revenue from the same, $1,830,- 331. The responsibility for the conduct of the undertaking rested entirely upon the State, of California and the city of San Francisco, which, together with corporations and individuals, sub¬ scribed over $20,000,000 to finance the scheme.

Bibliography. — (San Francisco: Panama- Pacific Exposition1 (1915) ; (The Library at the Exposition1* (1915) ; (The Legacy of the Expo¬ sition; Interpretation of the intellectual and moral heritage left to mankind by the world celebration at San Francisco) (1916) ; (The Architecture and Landscape Gardening of the Exposition: A pictorial survey, y with an intro¬ duction by L. C. Mullgardt (1915) ; (Le Science Franchise:*

Exposition universelle et international de San Francisco) (1915) ; Brinton, C., impressions of the Art at the Panama- Pacific Exposition (New York 1916) ; Foght, H. W., (Rural and Agricultural Education at the Panama-Pacific Exposition (Washington 1917); Macomber, B.. etc. (San Francisco 1915) ; Neuhaus, Prof. E., (The Art of the Exposition (1915), and (The Galleries of the Exposition (1915) ; Ryan, W. C., (Edu- cation Exhibits at the Exposition1 (Washington*

1916).

SAN FRANCISCO MOUNTAIN, a con¬ ical mass with area of about 40 square miles rising about 5,000 feet above the Arizona Pla¬ teau, a few miles north of Flagstaff, Coconino County, Arizona. Its two highest summits are San Francisco Peak, 12,611 feet and Agassiz Peak, 12,340 feet. The mountain consists of moderately old lavas and breccias, the products of five distinct stages of eruption. The old vent is near the centre and the top has been somewhat lowered by erosion. It is estimated that the lava outflows had a volume of 38 cubic miles and they piled up as a viscous mass on a platform of Kaibab limestone, constituting the general plateau. The mountains are partly covered with pine woods. From the top there is a wonderful view of Grand Canyon to north, Painted Desert and Hopi Buttes to east and many recent cinder cones and lava flows on all sides. Consult Robinson, H. H. (in United States Geological Survey, Prof. Paper 76).

SAN GERMAN, san her-man', Porto Rico, city, near the southwestern coast, 35 miles southwest of Arecibo. It was settled in 1511. It is in a fertile agricultural region, the pros¬ perity of which has, however, declined. It is a picturesque town, with narrow old-fashioned streets ; it contains several churches, a Domini¬ can convent, hospitals and a seminary, and ex¬ ports sugar, coffee, tobacco and fruit. An effi¬ cient public school system has been established under the American control. Pop. city 4,999; pop. municipal district, 25,000.

SAN GERMANO, Italy. See Cassino.

SAN GIULIANO, san jool-ya'no, Anto- nino, Marquis de, Italian diplomat and states¬ man : b. Catania, 1852; d. Rome, 16 Oct. 1914. He was educated at the University of Catania, studied law, in 1882 was elected to the House of Deputies and afterward was life Senator. He was Under Secretary for Agriculture in the Giolitti ministry in 1892-93, and Minister of Posts and Telegraphs in the Pelloux ministry in 1899-1900. He was appointed Foreign Min¬ ister in the Fortis ministry in December 1905, but early in 1906 was sent as Ambassador to London, remaining in that office until 1910, when he returned home to become Minister for Foreign Affairs

in the Luzzatti Cabinet. He also served in this capacity through the suc¬ ceeding Giolitti and Salandra ministries. Under his tenure of office Italy declared her neu¬ trality in the European War on the grounds that in a war of aggression her treaty obliga¬ tions to Germany and Austria were not to be enforced. He resigned 3 Oct. 1914, but the government refused to accept his retirement and he directed the affairs of the Foreign Office from his sick room, so far as was possible, until his death, a few days later.

SAN ILDEFONSO, el'da-fon'so. or LA GRANJA, Treaties of, two secret agreements between France and Spain, both extremely dis¬ advantageous to Spain. (1) Arranged in 1796, while France was at war with England, pledged the two countries to support each other in time of war with 25 ships and 24,000 troops, of which 6,000 were to be cavalry; an agreement which at once involved Spain in the war then in progress and for which she was severely punished by England. (2) Concluded 1 Oct. 1800 and ratified 30 Oct. 1800, by which Spain re-ceded to France the territory of Louisiana, with the understanding that the territory was not to be sold by France except to Spain; in return for which Napoleon agreed to make the Duke of Parma king, adding either Tuscany or the Roman legations to his territory, so that the population of his kingdom should be above a million. Napoleon, however, disre¬ garded the treaty and sold Louisiana to the United States without consulting Spain.

SAN ISIDRO, e-se'dro, Philippines, pueblo, capital of the province of Neuva Ecija, Luzon, on the Grande de la Pampanga River, 48 miles north of Manila. It is a well-built town, at the intersection of several main highways which connect it with Manila, with several points on the Manila and Dagupan Railroad and with other important towns. It is in a fertile agri¬ cultural region and has a considerable trade. Pop. 9,800.

SAN JACINTO, ja-sin'to, Battle of, in

American history, a notable battle of the Mex¬ ican War that decided the independence of Texas. It was a desperate engagement between a Mexican force of 1,600 in command of Santa Ana and 783 Texans led by Sam Houston, 21 April 1836. The Mexicans were defeated and utterly routed. The scene of this event was on the banks of the San Jacinto River, 17 miles southeast of the present city of Houston.

SAN JOAQUIN, ho-a-ken', Philippines, pueblo, province of Iloilo, island of Panay, on the southeast coast, 31 miles southwest of

A SYMBOL OF AMERICAN MASTERY OF THE PACIFIC

The Figure of Victory on the Monument erected in San Francisco to

Commemorate the

Battle of Manila Bay

.

Iloilo, the provincial capital. It is on the coast highway. Pop. 14,333.

SAN JOAQUIN, a river of California which has its rise in a small glacier southeast of the Yosemite Valley, near Mount Lyell, on the east slope of the Sierra Nevada. It Hows southwest about 100 miles; then in Fresno County it changes its course to a northwest direction to its confluence with the Sacramento River; then flows west into Suisun Bay. In Fresno County it receives the waters of Tulare system of lakes through King's River, after which it passes through the Sanjon, or Big Salt, Slough. It is about 350 miles long, and is navigable for 50 miles to Stockton all the year, and in winter and spring about 200 miles farther. The valley through which the San Joaquin flows is noted for its fertility.

SAN JOSE, hd-sa', Cal., city, county-seat of Santa Clara County, on the Coyote and the Guadalupe rivers, and on the Southern Pacific Railroad, 47 miles southeast of San Francisco, eight miles from San Francisco Bay, and 28 miles north by east of Santa Cruz. It is con¬ nected by railroad with Santa Cruz and Mon¬ terey, both on the Pacific, and with San Fran¬ cisco by three lines of railroad and by water. The first settlement was made about 1770 and the pueblo of San Jose was established in 1782. It was the State capital under the first constitution of California. The completion of the overland railroad, in 1869, and the further development of transportation facilities, have aided greatly in promoting the prosperity of the city. The form of the city is that of a paral¬ lelogram; the streets are wide, well shaded, and clean. The four public parks, the excel¬ lent roads extending out into the valley, the equable climate, all contribute toward making San Jose a desirable residential city. It is situated in a fertile agricultural region, the beautiful Santa Clara Valley, famed for the variety and amount of its fruit. There are 37 large canneries, 30 packing-houses, and ship¬ ping establishments connected with the fruit industry, also flour mills, lumber mills, basket and box factories, a foundry, machine shops, yards for marble-cutting and granite polishing, tanneries and several other industrial establish¬ ments. The annual output of the farm and fruit products is valued at $25,000,000.

The principal public buildings are the gov¬ ernment building, which cost

$200,000 ; the city hall, in the Plaza; the courthouse and Hall of Records, opposite Saint James Park; the Y. M. C. A. building, the Y. W. C. A. building, the churches, schools and chari¬ table institutions. There are 32 churches, representing 12 different denominations ; five religious societies not having churches, and several missions, among which are the Florence Night Mission and Christ's Rescue Mission.

The educational institutions are the State Normal School, in Washington Square, a park of 28 acres ; the University of the Pacific (Methodist Episcopal) ; Notre Dame College (Roman Catholic), for young women; Acad¬ emy of Notre Dame (Roman Catholic) ; Notre Dame College (Roman Catholic), for boys; Notre Dame Institute (Roman Catholic), a training and technical school for orphans; a public high school, six public kindergartens, public and parish elementary schools, two com- VOL. 24 — 16

mercial colleges, four private schools and a pub¬ lic library. The charitable institutions are the Pratt Home for Old Ladies, the O'Connor Sanatorium, the San Jose Sanatorium and Home, Josephinum Orphanage and the Home of Benevolence, maintained by the Ladies' Benevolent Association. Numerous medicinal mineral springs are in Alum Rock Park, sev¬ eral miles east of the city; area, 1,000 acres.*

The annual amount expended for municipal maintenance and operation is about $250,000. The national bank has a capital of $300,000, and the five State banks a combined capital of $2,200,000. Pop. (1920) 39,604.

James T. Brooks,

Secretary San Jose Chamber of Commerce.

SAN JOS&, Costa Rica, capital of the re¬ public, on an elevated plateau 4,500 feet above sea-level, about 15 miles northwest of Cartago (the ancient capital), with which it is con¬ nected by rail. It is in a rich agricultural dis¬ trict and is a centre of commerce, on the in¬ ternational railway from Puerto Limon to Punta Arenas. The most conspicuous build¬ ings are the palaces of the president, and the bishop and the National Palace; the Univer¬ sity, to which is attached a medical school and a museum ; the restored cathedral, and the National Theatre, a monument of artistic beauty, containing Italian marbles, pillars, col¬ umns, statues, and frescoes, and in its elaborate decorations resembling the Library of Congress at Washington. It cost almost $1,000,000. There is a good school system and the city is progressive. The merchants are mostly for¬ eigners. The railroads, banks and electric- light plants were largely built by English capi¬ tal. The French are the chief coffee-growers; the United States are

mainly interested in the railroad's, mines, cattle ranches, and the banana industry. Coffee is the principal product. San Jose is a popular health resort. Pop. 34,784; with suburbs, 49,750.

SAN JOSf, Guatemala, the chief port of the republic, on the Pacific Ocean. It is the starting point for the railroad trains to the cap¬ ital, and a steamer station. The exports are cochineal, indigo, sarsaparilla, wood, flax, coffee, sugar, cotton, hides and rubber. Pop.

1,500.

SAN JOS£, Philippines, pueblo, province of Batangas, Luzon, on the Malaquintubig River, 10 miles north of Batangas, the provincial cap¬ ital. It is on the main highway, and on the line of a projected railroad, and is a military and telegraph station. Pop. 8,996.

There are also several smaller pueblos of this name: (1) pueblo, province of Bulacan, Luzon ; destroyed by the Spaniards in the in¬ surrection; pop. 1,378; (2) pueblo, island of Corregidor, 27 miles southwest of Manila; chief town of the island with good anchorage; pop. 574; (3) pueblo, de Pampanga River, 11 miles northeast of San province of Nueva Ecija, Luzon, on the Grande Isidro; a road centre ; pop. 852.

SAN JOS£ DE BUENAVISTA, da bwa-

na-ves'ta, Philippines, pueblo, capital of the province of Antique, Panay; on the west coast. The town has a good harbor, carries on an active trade by sea with Iloilo, and is con-

nected by highway with the other towns of the province. Pop. 6,768.

SAN JOS£ DE CUCUTA, da koo'koo-ta. See Cucuta.

SAN JOS£ DE LAGONOY, da la-go-noi', pueblo, province of Ambos Camarines, Luzon, 22 miles northeast of Nueva Caceres. It is the most important town of the sub-district of Lagonoy, which is largely isolated from the rest of the province. Pop. 8,314.

SAN JOSlS SCALE. See Scale Insects; Orange Pests.

SAN JUAN, Philippines, pueblo, province of La Union, Luzon, on the west coast, four miles north of San Fernando. It is on the main highway. Pop.

11,223. There is also a smaller pueblo of the same name in the prov¬ ince of Bohol.

SAN JUAN, hoo-an, or SAN JUAN DE LA FRONTERA, da la fron-ta'ra, Argentina, (1) capital of the province of the same name, east of the River San Juan, on the eastern slope of the lower Cordilleras, north of Men¬ doza. It is the see of a bishop. The principal buildings are the bank, national college, normal school, large seminary, hospital and custom house. There is some export trade in wine and cattle. Pop. 15,262. (2) The province

covers an area of 37,865 square miles. On the west the Cordilleras are interspersed with fer¬ tile valleys, on the east are found salt steppes or pampas. In the Andes lofty peaks rise to the height of 5,580 (Cerro Gordo) to 6,798 (Meredario) metres. East of the Rio Jachal are high mountains, then follows the chain of the Sierra Huerta. The principal streams are Rio Vermegio and Rio San j on; on the south¬ ern frontier extends the large lake of Guana- cache. Gold and copper mines are operated. The climate is mild and the country well watered. Grapes, olives and wheat are exten¬ sively cultivated. Pop. 130,412.

SAN JUAN, or SAN JUAN DE PORTO RICO, Porto Rico, city, capital of the island; built on a small island adjacent to the north¬ eastern coast, connected with the mainland by a bridge. It was founded in 1511 by Ponce de Leon, and was strongly fortified. It was at¬ tacked by the Dutch in 1625 and on several oc¬ casions by the English, the last time in 1797, when a large force under Abercrombie laid siege to the city; its fortifications, however, rendered it impregnable. In 1898 it was occu¬ pied by American troops, and remains the seat of government for the island under American rule. The main part of the town is enclosed by mediaeval ramparts and defended by Morro Castle, at the entrance of the harbor, forts Sant Elena and San German, and the citadel of San Cristobal. Within the walls the city is laid out in regular squares ; the houses are substantially built and the streets well paved. Sanitation was neglected under Spanish rule, but after the American occupation the best sani¬ tary measures were strictly enforced, and the general health of the city greatly improved. It contains a number of notable public build¬ ings, including the bishop's palace, a large cathedral, the old government building, the city hall, the casa blanca, the custom house, a mili¬ tary hospital, an arsenal, a Jesuit college, a Carnegie library, and a theatre. It has a trol¬

ley car system which connects it with the pretty suburban towns, Santurce and Rio Piedras. The harbor is one of the best in the West Indies, affording anchorage for the largest ships. The entrance, however, is very narrow and difficult for navigation. In 1912 a harbor board was created and bonds

total¬ ing $500,000 were authorized, to which $100,000 was later added, for the purpose of enlarging and improving the harbor. This work will transform the city into the most commodious, safe and modern port in this part of the world. Another local improve¬ ment of much importance is the new bulkhead completed in 1917. This is of reinforced con¬ crete on piles, is 2,000 feet long, has its eastern end covered with a steel shed 841 feet long and 24-54 feet wide, and provides a depth of water of 18-24 feet. At the same time the marginal boulevard was undergoing a radical transformation in keeping with the new harbor work. In the calendar year 1917 the imports of merchandise at the port of San Juan from the United States had a value of $3,866,565, and the exports to the United States $9,535,- 712. After the United States entered the World War the citizens of San Juan organ¬ ized a Red Cross chapter, and subscribed liber¬ ally to the various Liberty loans. The public school system of graded schools includes a high school, which is open to pupils from all parts of the island. There are also several special schools established by the government, includ¬ ing night schools, an industrial school, an ex¬ perimental kindergarten, and a school for trained nurses. Pop. (1899)' 32,048; (1910)

48,716.

SAN JUAN, Central America, a river form¬ ing the outlet of Lake Nicaragua, and flowing southeastward on the boundary between Nica¬ ragua and Costa Rica into the Caribbean Sea. Part of it would have formed a link in the interoceanic waterway if the Nicaragua Canal had been decided on. It is 130 miles long, and for the greater part of its course is a broad, deep and tranquil stream. It is, however, com¬ pletely blocked at five places by rapids, of which the Machuca Rapids are the largest. The river enters the sea through a large delta, one arm of which forms the harbor of Grey- town, though the bar is too shallow for large vessels.

SAN JUAN BAUTISTA, bow-tes'ta, Mex¬ ico, the capital of the state of Tabasco, situated on the Rio Grijalva near the centre of the state. It is built on low and level ground, has street-car lines and several pretentious build¬ ings, such as the government palace, a theatre, and several churches. It is the trade depot for the interior of Tabasco and northern Chiapas. Pop. about 10,000.

SAN JUAN DE BOCBOC, da bok-bok\ Philippines, pueblo, province of Batangas, Luzon, on Tayabas Bay at the mouth of the Sinturis (or Lanay) River. There are two towns, the old town built directly on the bay, the new town further inland on the river. Many horses are raised in the surrounding region. Pop. 14,017.

SAN JUAN BOUNDARIES. See Bound¬ aries of the United States.

SAN JUAN HILL, Battle of. See Santi¬ ago de Cuba.

SAN JUAN ISLANDS, a group belonging to the State of Washington. They begin in the Strait of Georgia and extend south into Puget Sound. The largest islands of the group are San Juan, Oreas, Lopez and Shaw. In 1850 these islands were claimed by both the United States and Great Britain, and both American and British garrisons were on the islands. See San Juan Question.

SAN JUAN DEL MEZQUITAL, del

mas-ke-tal', Mexico, a town in the northwestern part of the state of Zacatecas.

SAN JUAN MOUNTAINS. The southern part of the western range of the Rocky Moun¬ tains in southwestern Colorado, mostly in San Juan, San Miguel, Mineral, Hinsdale, Archu¬ leta, Rio Grande and Conejos counties. About 100 miles long from northwest to southeast. Many of its peaks are more than 13,000 feet above sea-level, Mount Wilson 14,250 feet high being the highest. These mountains consist of a great variety of sedimentary and igneous rocks with many rich mines of various kinds notably in the Silverton, Telluride and Ouray districts. A southern extension of the same up¬ lift extends along the east side of Rio Arriba County, New Mexico.

SAN JUAN QUESTION, in American history an early boundary line dispute between the United States and Great Britain. In negotiating the treaty of 1846, by which the 49th parallel, from the Rocky Mountains to the sea, was made the boundary, a controversy arose concerning the course of the line through the channel which divides Vancouver Island from the mainland. The Americans contended for the Canal de Haro, the British for the Rosario Strait. To avoid conflict, it was decided that both nations occupy the island of San Juan at opposite ends. In 1872 Emperor Wilhelm I of Germany, acting as arbitrator, decided for the United States.

SAN JUAN DE NICARAGUA, da ne-ka- ra'gwa, or SAN JUAN DEL NORTE, del

nor'ta. See Greytown.

SAN JUAN DEL RIO, del reo, Mex¬ ico, a town in the state of Queretaro,

situated about 30 miles southeast of Queretaro, with which it is connected by railway. It is sur¬ rounded by beautiful gardens, and there are important silver mines in the neighborhood.

SAN JUAN RIVER. One of the large branches of Colorado River in southeastern Utah and northwestern New Mexico with its main affluent Rio de las Animas heading in the San Juan Mountains in southwestern Colorado. Total length about 250 miles. The lower part of its course is in a deep canyon which opens into that of Colorado River above Glen Canyon.

SAN JUAN DEL SUR, del soor, Nica¬ ragua, a port on the Pacific Coast in the south¬ western corner of the republic. It has a safe harbor and is the commercial outlet for the products of southwestern Nicaragua. It has submarine cable connection with Mexico and Panama, and is a station for regular steamers. The terminus of the proposed Nicaragua Canal would have come a little to the north of the town.

SAN JUAN DE ULUA, da oo-looa, or ULLOA, Mexico, a fort defense in the east of the harbor of Vera Cruz, standing upon a small island of its own name. Here Cortes made his first landing in 1519. The fort was built in the 17th century and was of . great strength. It has figured conspicuously in the history of Mexico.

SAN LEANDRO, Cal., city in Alameda County, on San Leandro Creek, 17 miles east of San Francisco, on the Southern Pacific and the Western Pacific railroads. There are can¬ neries, manufactures of farm implements, hay pressing works and a considerable lumber in¬ dustry. Pop. (1920) 5,703.

SAN LORENZO EL REAL, Treaty of.

See Boundaries of the United States.

SAN LUCAR DE BARRAMEDA, W-

kar da bar-ra-ma'tha, Spain, a seaport, province of Cadiz, Andalusia, at the mouth of the Guadalquivir, 18 miles north of Cadiz. The most conspicuous buildings are several convents and the palace of the Due de Montpensier, con¬ taining valuable art treasures; the ruins of a Moorish castle; churches; townhouse and the hospital of St. George, which dates from 1517. There are good schools directed by religious orders generally. The chief occupations of the inhabitants are fishing and the culture of grapes, olives, tropical fruits and vegetables, and there is considerable trade in sherry wines. The chief imports are coal from England ; sulphur and vegetables from France : exports, salt, wine, fruit and oats. Columbus embarked from this point on his third voyage, and Magellan on his voyage

of 1519. Pop. about 25,000.

SAN LUIS, loo-es', or SAN LUIS DE LA PUNTA, Argentina, (1) Capital of the prov¬ ince of that name, at the southern extremity of the Sierra of San Luis, on the Chorillo, 480 miles northwest of Buenos Aires on the trans¬ continental railway. It has a national college, normal and primary schools and a branch bank; also water supply. The chief industries are the manufacture of ponchos, and trade in horses, hides and wool. It was founded in 1597, con¬ sists of adobe huts, and is surrounded by forests of ferns. Pop. (est.) 10,000. (2) The prov¬

ince is situated in the central west of the re¬ public, with an area of 29,035 square miles. At the northeast terminates the Sierra de Cordoba; through the northeast extends the Sierra de San Luis rich in copper and precious metals, which are, however, little exploited. In the south extend salty pampas. The climate is dry and healthful, marked by great extremes. The rivers are not navigable; transportation facili¬ ties are poor, and there is little industry. Pop.

126,895.

SAN LUIS OBISPO, o-bes'po, Cal., city, county-seat of San Luis Obispo County, on the Southern Pacific Railroad, about nine miles from Port San Luis (Port Harford) on San Luis Obispo Bay, an arm of the Pacific Ocean, and midway between San Francisco and Los Angeles. It is in an agricultural and stock- raising region. The industries are chiefly con¬ nected with the farm and dairy products, the cultivation and shipping of fruits and nuts, and the transportation and refining of oil. Port San Luis is the most important oil port in California. The educational institutions are

the California Polytechnic School (State), a high school, public and parish schools. There are two banks in San Luis Obispo, one State bank and one national bank, with combined total assets of over $4,147,533. Pop. 5,895.

SAN LUIS POTOSI, po-to-se', Mexico, an inland state, bounded by the states of Coahuila, Nuevo Leon, Tamaulipas, Veracruz, Hidalgo, Queretaro, Guanajuato, Jalisco, and Zacatecas. It is divided into 13 districts, has an area of 25,316 square miles, and a population of 627,800. Its surface for the most part lies within the great plateau of Mexico, but the southeastern part in the valley of the Panuco is several thousand feet lower than the rest of the state. Fever and malaria are prevalent in the low elevations but the climate is healthful in the part of the

state on the plateau. The soil is fertile and there is an abundance of forest. Agriculture is in a backward state. Tropical fruits are grown to some extent and stock- raising is becoming important. Gold, copper, lead, silver, iron, mercury, zinc, and petroleum are found in considerable quantities, and the mining and extraction of these is now the state's leading industry. Manufacturing and commerce have shown a decided upward trend in recent years. The principal cities and towns are San Luis Potosi (the capital) (q.v.), Catorce, Matehuala, and Rio Verde.

SAN LUIS POTOSI, Mexico, capital of the state of San Luis Potosi and fourth larg¬ est city in the republic, 326 miles from Mex¬ ico City by the National Railway, 477 miles from the United States border at Laredo, Texas, and 275 miles from the Gulf of Mexico at Tampico by the Mexican Central Railway, altitude 6,250 feet above the sea. It is the centre of an important mineral and smelting interest, extensive ore deposits existing in al¬ most every direction and is the home of the greatest silver-lead reduction works in the world, — the smelting plant of the Compania Metalurgica Mexicana, with a capacity of 1,000 tons daily and requiring the services of 1,400 men in all departments. As a distributing and general business centre the city is regarded as one of the most important and promising in the republic. The opening of the port of Tam¬ pico has proven very beneficial to its commer¬ cial interests. Its manufacturing industries in¬ clude clothing, furniture, cotton goods, tallow and other articles of commercial importance. It has a street railway, telephone service and an excellent electric lighting system. The gov¬ ernor's palace of rose colored stone is an im¬ posing building and the cathedral is one of the notable ones of the country. A university, The Instituto Scientifico, in which the professions and exact sciences are taught, is the principal educational institution of the city. There are also a scientific museum, with a library of over 15,000 volumes and five other libraries, with a total of some 10,000 volumes. A fine statue of the patriot Hidalgo, occupies a prominent place in the Alameda or principal public square. This city. is the seat of one of the most important Catholic archbishoprics in the republic. The local bank of issue is the Bank of San Luis Potosi, with a capital of $1,100,000; but there are branches or agencies of the National Bank and the London and Mexico Bank, both of Mexico City. The city was founded about

1550 and has played an important part in the Mexican civil wars; in 1863 was the seat of government under Juarez ; later was occupied by Bazaine and recovered by Juarez in 1867. Pop. 68,022.

SAN MARCOS, mar'kos, Tex., town and county-seat of Hays County, on the San Mar¬ cos River and on the International and Great Northern and the Missouri, Kansas and Texas railroads, 30 miles southwest of Austin. It became the county-seat on the organization of the county in 1848. It is in

an agricultural re¬ gion, cotton and corn being the chief products; stock-raising is also carried on in the vicinity. The town contains steam cotton-gins and cot¬ tonseed-oil mills, also a United States fish cul¬ ture station. There are two national banks with a combined capital of $130,000. A group of boiling springs is located within the town limits. It has a public high school, established in 1891 ; and contains the grounds of the Texas Chautauqua Association. It is also the seat of the Coronal Institute, a secondary school established by the Methodist Episcopal Church South in 1879 and of the Lone Star Business School, the Southwest Texas Normal, estab¬ lished in 1905, with an enrolment of 1,000 students, the San Marcos Baptist Academy, established in 1909 and costing between $175,-000 and $200,000 and the Southwestern Con¬ servatory of Music, established in 1915 and enrolling 110 the first term. A summer resort affording accommodation for 500 is located here. The town has seven churches and three missions. It is on the government highway between Austin and San Antonio. Pop. 4,527.

SAN MARINO, ma-re'no, Europe, the smallest republic in the world and claiming to be the oldest state in Europe, comprises an area of 38 square miles, enclosed by Italian territory, among the terminating spurs of the Apennines near the Adriatic Coast. The gov¬ ernment is peculiar and eminently democratic; Its legislative power is vested in a Great Coun¬ cil of 60 members elected by popular vote, two of whom are appointed every six months to act as regents and a smaller Council of 12 members, divided into four congresses or departments. The executive authority is ex¬ ercised by the regents. There is no public debt. The town, standing on a mountainous crag 2,420 feet high, was built round a hermit¬ age dating from 441 and is surrounded by a great wall with forts. But one road enters the town. Borgo is an aristocratic suburb at the foot of the hill. Silk is the principal manu¬ facture. There are numerous massive and stately buildings including the governor's palace and six churches, one of which contains the tomb and statue of Saint Marino, besides several schools, a museum, theatre, town-hall and convents. Agriculture is the chief pursuit. A new treaty of friendship with Italy was signed in 1907 and revised in 1908 and 1914. The republic has extradition treaties with Eng¬ land, Belgium, Holland and the United States. On 24 May 1915 the republic declared war against Austria-Hungary, the day following the similar Italian declaration. Pop. 11,513.

SAN MARINO, Order of. See Orders, Royal.

SAN MARTIN -SAN PIOQUINTO

SAN MARTIN, Jose de, ho-sa' da san mar-ten', South American general: b. Yapeyu, Argentina, 25 Feb. 1778; d. Boulogne, France, 17 Aug. 1850. he was educated in Spain and entered the army in 1791. In 1811 he attained the rank of lieutenant-colonel, but resigned and sailed for Buenos Aires in 1812, where he of¬ fered his services in the cause of independence. He defeated the viceroy Vigodet on 13 Jan. 1813 at San Lorenzo and the next year, being appointed commander-in-chief of the army of Upper Peru, prepared to attack the Spanish forces by an approach through Chile. An army of invasion was drilled for two years at Men¬ doza, whence San Martin began 17 Jan. 1817, his famous march over the Andes, leading his army through the Uspallata Pass. On 12 Feb. 1817, he gained the victory of Chacabuco and captured and occupied Santiago 15 February. He was defeated on 19 March 1818 at Cancha Rayada, but repulsed the royalists on 5 April at the Maipo and drove the Spaniards from Chile. He next invaded Peru and captured and occupied Lima, 12 July 1821. On 27 July he proclaimed the independence of Peru and on 3 August was appointed protector. He resigned his office to the Peruvian Congress, 22 August, leaving Bolivar to complete the independence of Peru. He then went to France and lived there till his death.

SAN MIGUEL, san me-gel', Salvador, the capital of a department of the same name on the San Miguel River, nine miles east of the active volcano of San Miguel (7,775 feet), and 70 miles southeast of San Salvador. It is an active commercial and agricultural centre, noted for its great annual fair. Indigo is an important article of commerce. The climate is malarious. Pop. 24,768.

SAN MIGUEL ALLENDE, al-yen'da, Mexico, a manufacturing city in the state of Guanajuato, on the Rio de la Lara and on the Mexican National Railroad, 34 miles north of Ceyala; named after the Mexican patriot, Gen. Ignacio Allende (1779-1811), who was born here. Woolens, saddles and weapons are the chief articles produced. Pop. 39,000.

SAN MIGUEL DE MAYUMO, da ma-

yoo' mo, Philippines, Pueblo, province of Bula- can, Luzon, on the San Miguel River, 26 miles north of Bulacan. It is on the main high¬ way at the junction of several others; and the river is navigable for native craft. It is the commercial centre of a fertile agricultural region ; excellent timber is obtained on the sur¬ rounding mountains ; iron is mined at Sibul, eight miles distant; and gold and petroleum are known to exist in the vicinity, but are with¬ out paying exploitation, the chief manufactures are cloth goods. The climate is especially healthful and there are medicinal springs in the vicinity of the iron mines. The town suf¬ fered considerable damage during the insur¬ rection on account of its proximity to insur¬ gents' hiding

places in the mountains. Pop.

14,919.

SAN MINIATO, me-ne-a'to, Italy, in the province of Florence, 21 miles west of the city of Florence, on the Arno. The ancient cathe¬ dral dates from the 10th century and is adorned with many interesting monuments. Glass, olive oil, hats and leather are manufactured. The

town has considerable historical interest, es¬ pecially as being the cradle of the Napoleon family.

SAN NICOLAS, ne-ko-las', Philippines, (1) Former pueblo of the province of Cebu, incorporated as a part of the municipality of Cebu, the provincial capital in 1901. Pop. 18,330. (2) Pueblo, province of Ilocos Norte,

on the Laoag River, three miles south of Laoag. It is on the coast highway. Pop. 10,- . 880. (3) Pueblo, province of Pangasinan, near

the Agno River, 34 miles east of Lingayen. It is connected with Lingayen and also with towns to the south by highway. Pop. 9,780.

SAN NICOLAS, or SAN NICOLAS DE LOS ARROYOS, da los ar-ro'yos, Argentina, a town in the province of Buenos Aires, situ¬ ated at the head of the delta of the Parana, 35 miles southeast of Rosario, with which it is connected by rail. It is an important railroad centre and a station for ocean steamers. It has electric light and street railways, large beef-packing houses, Hour-mills and distilleries. The chief exports are wool and cattle products.*

SAN PABLO, pa'blo, Philippines, pueblo, province of Laguna, Luzon; 17 miles south by west of Santa Cruz. It is on the main road from Santa Cruz to Tayabas, at the junction of other highwa3rs. It is the centre of an area of volcanic elevations, with five small mountain lakes in the vicinity. There are indications of valuable mineral deposits. Pop. 22,612.

SAN PABLO BAY. See San Francisco Bay.

SAN PEDRO, pe'dro, Cal., city and port of entry, annexed to Los Angeles, 1909 ; on San Pedro Bay, an inlet of the Pacific Ocean and on the San Pedro, Los Angeles and Southern Line and the Southern Pacific railroads, 22 miles south of Los Angeles. The harbor, en¬ larged and otherwise improved by the Federal government is one of the best on the Pacific Coast. The breakwater, 8,000 feet long, cost over $3,000,000. The harbor improvements, completed in 1904, afford a clear depth of 30 feet, permitting the largest vessels to enter the inner harbor. San Pedro is in an agri¬ cultural region and near sections in which there is considerable mining. Its chief industries are connected with exporting grain, fruit and min¬ erals. Pop. (1920, United States Census) 15,000. See Los Angeles.

SAN PEDRO, Paraguay, a town situated on a branch of the Paraguay River, about 100 miles north of Asuncion. It is accessible for small steamers and exports mate. Pop. 8,700.

SAN PIOQUINTO, pe'o ken'to, Philip¬ pines, a port on the western coast

of Camiguin Island, north of Luzon, extending two miles in¬ land and three miles wide. It is sheltered by Font Island lying in the middle of the entrance with a channel on each side. Near the entrance to the south is a boiling spring of salt water, regarded as evidence of comparatively recent volcanic activity in this and the Batanes group on the north and the north sections of Luzon on the south. A stream of fresh water enters this harbor. It is one of the principal cruising stations of the United States navy in the waters of the northern Philippines ; here, on 3 May 1899 the United States steamship Concord

raised the United States flag; and here, later, the crew of the wrecked United States steam¬ ship Charleston camped till rescued.

SAN RAFAEL, ra-fa-el', Cal., town, county-seat of Marin County, on San Pablo Strait and on the Northwestern Pacific Rail¬ road, 15 miles north of San Francisco. It is the centre of a stock-raising, dairying, agricultural and suburban region and has frequent com¬ munication with San Francisco both by rail¬ road and ferry. It is situated near Mount Tamalpais and is a well-known health resort. It contains Saint Vincent's Male Orphan Asy¬ lum. It has a public high school, with a library of about 16,000 volumes and is the seat of San Rafael Institute, the Dominican College (for girls), a Roman Catholic secondary institu¬ tion, the Plitchcock Military Academy and the Mount Tamalpais Military Academy. Pop. (1920) 5,512. Also has water transportation with San Francisco Bay; $70,000 municipal bath house (natatorium) ; about six miles of paved streets ; $3,000,000 municipal water system ; San Francisco Theological Seminary (Presby¬ terian) ; Presbyterian Orphange and Farm; now city of second class governed by city coun¬ cil and city manager; picturesque scenic sub¬ urban city with particularly salubrious climate free from fogs and winds.

SAN REMO, ra'mo, Italy, city and seaport, in the province of Porto Maurizio, 30 miles northeast of Nice, on the Mediterranean, in the famous Riviera district and a much frequented health and pleasure resort. The town is ter¬ raced, the ancient upper town with narrow and crooked streets lined with lofty buildings form¬ ing a strong contrast to the modern edifices of the lower town. Among its attractions are the cathedral, the Santurio della Guardia, the San- turio dell'Assunta with four handsome ala¬ baster pillars and the palace of the Marquis Borrea d'Olmo, the latter containing a noted picture gallery. The city is so ancient that its origin is obscure. It was self-governed in 1170 and one of its bishops later sold it to Genoa. Pop. about 22,000.

SAN SALVADOR, sal'va-dor, Salvador, city and capital of the republic, situated near the base of the volcano San Salvador about 25 miles from the port of La Libertad on the Pacific Coast with which it has rail connec¬ tion, in a pleasant valley at an altitude of 2,- 102 . feet, the cone of the volcano rising dis¬ tinctly above it. The city is well laid out, hav¬ ing many pleasant parks and suburban resorts. It is subject to earthquakes and this fact has modified the methods of house construction, all the houses being low and surrounded by open areas. Its most noteworthy building is the Casa Blanca (white house), the residence of the President. Other notable structures are the library, university and observatory. The city is an important industrial centre ; its manu¬ factured products including soap, cigars, can¬ dles, cotton cloth, sugar and spirits. It is also a thriving commercial centre, doing a large trade in the products of the region, especially indigo and tobacco. It is the official residence of the United States Minister to El Salvador and the seat of a United States consul-general. Jorge de Alvarado founded San Salvador in 1525. An earthquake all but destroyed it in 1854, another laid it low in 1873 and that of

1917, when millions of dollars' worth of prop¬ erty were destroyed, is still vividly remem¬ bered. In spite of these fateful blows from nature and devastating waves of man-made revolutions, San Salvador to-day is reckoned among the important cities of the American mid-continent. Pop. 60,000.

SAN SEBASTIAN, sa-bas-te-an', Spain, capital of the province of Guipuzcoa on the Bay of Biscay, 42 miles northwest of Pampeluna, is a port and a natural and fortified stronghold. It has been the summer resort of the Cortes since 1886. The principal buildings are the churches of San Maria and San Vicente, a nunnery, the courthouse, the schools of navi¬ gation, commerce, etc., theatre and hospitals. In the environs, on the Bay of La Concha, is the royal palace. The industries of the town have greatly developed and include saw and flour mills, breweries, manufactures of pre¬ serves, soap, candles, glass and paper, and there is considerable trade in English and French goods and in normal years, exports of wool, flour, wine, cutlery, firearms, copper- ore and lead, and imports of sugar, silk, cotton and linen goods, cocoa, machinery and salted fish. San Sebastian is an aristocratic watering place, bathing, bull-fights, gambling and local festivities attracting many visitors. Histor¬ ically it has played an important role and has sustained several sieges, the most memorable in 1813, when Wellington took it by storm. Pop.

(1910) 49,008.

SAN STEFANO, stef'a-no, Treaty of, a

peace treaty of the Russo-Turkish war, con¬ cluded 3 March 1878, at San Stefano, a port on the Sea of Marmora. By its terms Bulgaria was to become a principality, extending from the Danube to the Aegean, and Rumania, Servia and Montenegro were recognized as independ¬ ent. Russia was to receive a war indemnity of 300,000,000 rubles and the Dobrudja, Kars, Batum and other possessions. The congress held at Berlin, in June and July, 1878, greatly altered the provisions of this treaty, effecting peace on somewhat more moderate terms.

SAN VICENTE, ve-san'ta, or SAN VI¬ CENTE DE AUSTRIA, Salvador, 23 miles east of the capital, lies almost central in the republic close to an extinct volcano of its own name. It is an attractive town ; its handsome church is the only conspicuous building. It occupies a fertile region and the chief occupa¬ tions are tobacco and indigo planting ; and the manufacture of the former, and of clothes, silks, shoes, hats. The annual fair is much frequented. The town suffered from an earth¬ quake in 1899. Pop. about 18,000.

SAN XAVIER DEL BAC, Spanish

mission in Santa Cruz valley, eight miles south of Tucson, Arizona, established about 1687 by fathers Kino and Salvatieraz, Jesuit missiona¬ ries to the Indians. The present church, erected about 1727, has the form of a cross 105 feet long and 27 feet wide inside. It is built of adobe with stone foundation and cov¬ ering of fine cement. It faces south with a beautiful facade in a good state of preservation, highly ornamented with scroll work adorned with the arms of the Franciscan Order. Two towers, one never finished, surmount the front. Over the main chapel is a massive dome of

splendid proportions and lightness. Several fine frescoes remain and there are many ad¬ mirable and interesting architectural features and adornments. Its preservation is due to the devotion of Papago Indians who took charge when the priests were driven off by Apaches in 1827.

SANAA, sa-na', or SANA, Arabia, the capi¬ tal of Yemen, lies in a high and well-watered valley, 260 miles north of Aden and 140 miles northeast of Hodeida on the Red Sea. It is of great antiquity, massively built and sur¬ rounded by a wall. Each street is arranged with reference to business confined to that locality, according to Asiatic custom. The principal mosque is of recent construction, an Oriental building with fine domes and

minarets. The chief manufactures are gold and silver articles, gunpowder, sword-blades, etc. Trade is in coffee — the great staple — dried fruits and raisins. Sanaa was long the capital of the in¬ dependent Imams of Yemen, but in 1872 came under Turkish rule, since when its commercial importance has declined. Pop. 45,000, of whom about 20,000 are Jews.

SANATORIUM, a term used interchange¬ ably with sanitarium, specifically a health re¬ treat, strictly a place where the treatment is prophylactic instead of therapeutic; in a broad sense a place for rest cure.

SANBORN, san'bern, Alvan Francis,

American journalist: b. Marlborough, Mass., 8 July 1866. He was graduated from Amherst in 1887 and filled several journalistic positions, among them that of Paris correspondent of New York and Boston periodicals from 1899. He published (Moody's Lodging House and Other Tenement Sketches) (1895) ; (Meg Mc¬ Intyre's Raffle and Other Stories) (1896) ; (Paris and the Social Revolution (1903), be¬ sides editing (Masterpieces of Prose) (1893) ; (Reminiscences of Richard Lathers) (1907), etc.

SANBORN, Franklin Benjamin, Amer¬ ican philanthropist and author : b. Hampton Falls, N. H., 15 Dec. 1831 ; d. 24 Feb. 1917. He was graduated from Harvard in 1855, became active in politics as a member of the Free Soil party in New Hampshire and Massachusetts, was for a time secretary to the Massachusetts State Kansas committee, and aided John Brown in the invasion of Harper's Ferry after having vainly opposed the scheme. From 1863 to 1868 he was an editor of the Boston Commonwealth; in October 1863 became secretary of the Massa¬ chusetts State board of charities, the first es¬ tablished in America; and in 1865 assisted in the organization of the American Social Science Association, of which he was until 1897 secre¬ tary. With Bronson Alcott and W. T. Harris he founded the Concord school of philosophy in 1879; and he was also an organizer of the National Prison Association (1871), and the National conference of charities (1865). Among his publications are (Life and Letters of John Brown1 (1885) ; biographies of Thoreau (1882), Alcott (1883), Dr. Howe (1891), and Dr. Earle (1898) ; (The Personality of Thoreau1 (1902) and (The Personality of Emerson) (1903). He was through all his active life a journalist, having begun to con¬ tribute to the New Hampshire Independent

Democrat in 1849, to the Boston Transcript in 1852, to the Christian Register in 1853, the Bos¬ ton Traveller in 1856, and to the Springfield Republican in 1856. He was editor of the Re¬ publican after June 1868, furnishing from three to six columns a week. Between 1900 and 1917 he published Ellery Channing's (Poems of 65 years) (1902); Channing's

ˆThoreau the Poet-Naturalist1 with additions (1903) ; Thoreau's (The Service) (1902) ; (Bronson Alcott at Fruitlands) (1908), and (Hawthorne and His Friends> (1908) ; Recollections of 70 Years1 (2 vols., 1909), and (Sixty years in Con- cord) (1916). A final life of Thoreau,

(Thoreau and his Earliest Writings) (1916). He also edited two volumes of (Theodore Parkers Writings) (1914), introduced Newton's (Lincoln and Herndon1 (1913), and wrote brief biographies of Dr. Langdon, president of Harvard College, of Ellery Channing and of Mrs. Abbott-Wood of Lowell. For 30 years he edited the American Journal of Social Science, (1867-97), and contributed largely to the Pro¬ ceedings of the Massachusetts Historical So¬ ciety (1903-15), and edited for the Boston Bibliophile Society five volumes of Thoreau's manuscripts, a volume of the Shelley-Payne correspondence, and one of the Fragments and Letters of T. L. Peacock.

SANBORN, John Benjamin, American military officer: b. Epsom, N. H., 5 Dec. 1826; d. 1904. He was educated at Dartmouth Col¬ lege, studied law, was admitted to the bar in 1854, and in that year removed to Saint Paul, Minn., where he engaged in law practice. At the outbreak of the Civil War in 1861 he was adjutant-general and .quartermaster-general of Minnesota and assisted in the organization of the troops sent to the front. In 1862 he went to the front with the rank of colonel. He com¬ manded a brigade at Iuka, was engaged at Corinth, Port Gibson, Raymond, Jackson, Champion Hills, and at the siege and assault of Vicksburg. He had been commissioned brigadier-general of volunteers in 1863, and in October 1864 took command of the district of southwest Missouri. He bore the unique record of never having been defeated in action and with the exception of the assault of Vicksburg, never failed of complete success. He conducted a campaign against the Indians in 1865, amicably adjusted the Indian difficulties the next year, and in 1867-68 was a member of the Indian Peace Commission. He served in the Minne¬ sota legislature for several terms.

SANBORN, Katherine Abbott (((Kate Sanborn®), American author and lecturer: b. Hanover, N. H,, 11 Tuly 1839; d. 9 July 1917. She earned her first money by writing, at the age of 11, and at 17 engaged in teaching. She lectured on literary topics for 20 years, was teacher of elocution at Packer Institute, Brook¬ lyn, and for several years occupied the chair of English literature at Smith College. She pub¬ lished (Home Pictures of English Poets) (1869); (Round Table Series of Literature Lessons) (1884) ; (The Vanity and Insanity of Genius) (1885) ; (Adopting an Abandoned

Farm) ; Abandoning an Adopted Farm) ; (The Wit of Women) ; (My Literary Zoo> ; (01dtime Wall Papers) (1905) ; (Hunting Indians in a

Taxi Cab1 (1911) ; a series of calendars, etc.

SANBORN, Walter Henry, American jus¬ tice: b. Epsom, N. H., 19 Oct. 1845. He was graduated at Dartmouth College in 1867, studied law, and in 1870 engaged in law practice at Saint Paul, Minn. From 1892 he was United States circuit justice of the Eighth Judicial Cir¬ cuit, and from 1903 he was presiding justice of the United States Circuit Court of Appeals of the Eighth District. He conducted the re¬ ceiverships of the Union Pacific Railroad, 1893- 98; the Chicago Great Western, 190S-09; and the Frisco Railroad, 1913-14. He also handed down important decisions in the Trans-Mis¬ souri Freight Association Case, 1893 ; the Stand¬ ard Oil Case, 1909 ; and the Oklahoma Gas Case, 1911.

SANCHO, an instrument of the guitar species, made of hollowed wood and furnished with a long neck. It is strung with the tough fibres of a creeping plant, and is tuned by means of sliding rings.

SANCHO PANZA, san'ko pan'za (Sp. san'cho pan'tha), the faithful squire of Don Quixote (q.v.), who accompanies his master upon his travels, but who takes a prosaic view of the incidents colored and distorted by his master's illusions. He is famous for his shrewd proverbs.

SANCHUNIATHON, san-ku-ni'a-thon, or SANCHONIATHON, alleged author of a history of Phoenicia and Egypt, entitled ˆhoinikikaC arid published by Philo (q.v.) of Byblus, a grammarian of the 2d century, as a Greek translation from the Phoenician. Ac¬ cording to Philo, Sanchuniathon was a native of Berytus, a Phoenician town near his own native place, and flourished during the reign of the Assyrian queen Semiramis. Others speak of him as a Phoenician living before the Trojan War. Some critics maintain that no such per¬ son ever existed, and that the work attributed to him was the composition of Philo himself, or, as others think, of Eusebius. A fragment of the work is preserved in Eusebius, who quoted Sanchuniathon as evidence in corroboration of certain biblical statements which Porphyrv had assailed. The Greek fragments still extant were published by Orelli (1826) and by C. Muller (1849), and were the occasion of much keen controversy. The conclusion arrived at by Renan is that a Phoenician of the time of the Seleucides, whose real or feigned name was Sanchionathon, wrote in Phoenician, a work on history and mythology, and that a free trans¬ lation of this was afterward made by Philo of Byblus.

SANCROFT, sang'kroft, William, English prelate: b. Fressingfield, Suffolk, 30 Jan. 1616; d. there, 24 Nov. 1693. He was graduated from Cambridge in 1637, was appointed dean of York in 1664, took orders in the English Church, and shortly afterward became dean of Saint Paul's Cathedral. In 1678 he was con¬ secrated archbishop of Canterbury, but in 1688 on refusing to publish the declaration of the liberty of conscience ordered by James II, was committed to the Tower for trial. He was ac- ciuitted, but after the Revolution refused to take the oath of allegiance to William and Mary, was deprived of his see, thereafter living in seclusion in his native town until his death.

SANCTI SPIRITUS, sank'te spe're-toos, Cuba, city, province of Santa Clara, 50 miles southeast of the city of Santa Clara. It was founded in 1514, being one of the seven original towns of the island established by Diego Velasquez. It is connected by a branch road with Las Tunas, on the South Coast, and with the main railroad system of the island \ but has little commercial importance. Its situa¬ tion is unhealthful; its streets are narrow and crooked, but were improved somewhat during American occupation of Cuba, nine streets be¬ ing completely remade. It contains two hos¬ pitals and a college. Pop. (1907) 36,572.

•SANCTIFICATION, a theological term in .the definition of which divines Protestant and Catholic differ widely. For the former, sancti¬ fication is totally distinct and separable from justification: for Catholic theologians, sanctifi¬ cation and justification are inseparable and hardly even in thought distinguishable one from the other. Calvin (Inst. Book 3, ch. ii) the Lutheran symbol (Solida Declaratio) (ch. de fide justif. § 7), and Luther and Melanchthon in many places teach that justification is simply a judicial act of God's free grace liberating the sinner from condemnation, while original sin still persists in man's nature and in all his powers inward and outward, to be weakened, not extir¬ pated, by the communication of the Holy Spirit; thus sanctification is a process which begins after justification. Justification in the teaching of the Catholic Church is defined by the Council of Trent (Sess. 6, ch. vii) to be ((not only re¬ mission of sins but also sanctification and reno¬ vation of the inner man through the free ac¬ ceptance of grace and gifts® ; and in another place (Sess. 6, ch. v) the Council teaches that "justification is a transference out of that state in which man is born a son of Adam, into the state of grace and adoption of the children of God, by the Second Adam, Jesus Christ, our Saviour.® From which it appears that in Cath¬ olic theology sanctification is inseparable from justification, which depends upon it; and that "the sinner is justified and sanctified by the one same act® ; nno eodemque act liuomo peccator jnstus sanctusque efficitur (Perrone, (Praelect TheolU tr. de Gratia, Pt. 2, ch. i).

SANCTUARY, Privilege of, the exemption of certain places and of criminals taking refuge in them from the ordinary operation of the law of arrest; called also privilege of asy¬ lum (q.v.). The six cities of refuge mentioned in the Book of Numbers xxxv, were to afford the privilege of sanctuary to "any one that kill— eth any person unawares.® That institution in Israel and the institution of asylum among the heathen nations gave rise to the similar institu¬ tion of sanctuary in Christendom. The privi¬ lege of sanctuary was accorded to certain churches in the time of Constantine ; afterward, through the period of the empire, eastern and western, and throughout the Middle Ages, it was recognized as attaching to all churches. In England a person accused of felony might take refuge in a sanctuary, and then before the coro¬ ner, within 40 days, take oath of abjuration en¬ tailing perpetual banishment into a foreign Christian country. Statutes of the time of Henry VIII greatly curtailed the privilege of sanctuary, and- the statute of 21 James I totally abolished it. But the privilege of sanctuary

against civil process still persisted, attaching to certain places, parts or supposed parts of royal palaces, as Whitefriars (<(Alsatia®) , the Savoy, and the Mint : these were secure refuges for debtors till 1697, when their privilege was abolished by the statute 8 and 9 William III. All religious sanctuaries in Scotland were done away at the Reformation; but the Abbey and Palace of Holy Rood with its precincts, includ¬ ing the hill of Arthur's Seat and the Queen's Park still afforded protection against civil process for debt ; and the privilege still exists in form, though in fact it never has to be in¬ voked since the abolition in 1880 of imprison¬ ment for debt It was the abuses to which this system gave rise, as tending to defeat the ends of justice, that led to its abolition in all Chris¬ tian countries. A modern form of the system is extraterritoriality (q.v.).

SANCTUS, or TERSANCTUS, a passage in the liturgical service of the Catholic Church, eastern and western, and in part still retained in the Anglican Book of Common Prayer : it is the final passage of that part of the liturgy (and of the Anglican communion service) which is called the Preface. The name Sanc- tus or Tersanctus (thrice holy) is given to it because of the word sanctus (holy) thrice re¬ peated, with which it opens. Sanctus, sanctus, sanctus, Dominus Deus Sabaoth, etc., that is, <(Holy, holy, holy, Lord God of Hosts, heaven and earth are full of Thy glory. Hosanna in the highest. Blessed He that cometh in the name of the Lord.

Hosanna in the highest.® In the prayer book only the first clause is used, followed by ((Glory be to Thee, O Lord Most High. Amen.®

SAND, sand, George, assumed name of Lucile-Amandine-Aurore Dupin, French novel¬ ist : b. Paris, 1 July 1804; d. Nohant, in Berry, 8 June 1876. Her father's mother was an illegitimate daughter of the noted Maurice de Saxe, son of Augustus II, king of Poland, and was herself widow of the Comte de Horn, bastard of Louis XV, when she married George Sand's grandfather, Dupin de Francueil. George Sand's aristocratic, though clouded, paternal an¬ cestry was mated with plebeian blood, her mother being a Parisian modiste. She was brought up chiefly in the country at her grand¬ mother's home in Nohant, but was partly edu¬ cated at the Couvent des Anglaises in Paris. Her youth was dreamy and emotional. At 18 she was married to the Baron Casimir Dude- vant, but the marriage proved unhappy, and resulted, after some years, in a separation. In 1831 she began a Bohemian career in Paris, associating with young literary men and stu¬ dents and herself often wearing masculine cos¬ tume. The first important one of her many liaisons, so often with younger men, was with Jules Sandeau. They wrote at first under the name of Jules Sand, but soon she composed her own novels, signing them George Sand. Her first independent book was (Indiana) (1832). George Sand's extraordinarily numer¬ ous novels are usually divided into four chron¬ ological groups. The earliest ones, in particu¬ lar, which reflect her emotional discipleship of Rousseau and of the Madame de Stael of ˆelphine and of as well as her own domestic infelicities, aroused a storm of criticism. Her hostility to accepted social con¬*

ventions, her attacks on the tyranny of mar¬ riage, her portrayal of the misunderstood and unappreciated woman or femme incomprise,. aroused the tumult of indignation which greeted In 1838-39 she made a journey to Majorca with the consump¬ tive Chopin, a trip commemorated in (Un hiver a MajorqueP The intimacy continued for several years longer and Chopin appears in dis¬ guise in (Lucrezia FlorianiP At the beginning of the republic of 1848, George Sand greeted the new regime with joy, wrote (Lettres au peupleP collaborated with Ledru-Rollin, but soon became disheartened at popular excesses and ceased her political propaganda. Mean¬ while she had gradually turned to the compo¬ sition of novels of a third category. As early as 1844 in (Jeanne) she had tried to combine the mystical spirit with a story of rustic life; then devoting herself to the idealized portrayal of the country, especially of her own province, she composed the pastoral idylls which are her works most read to-day (La mare au diable, (La petite Fadette,* (Frangois le champip (Les maitres sonneursP (Les beaux messieurs de Bois-DoreP is an incursion into the literary pastoral under the influence of Honore d'Urfe's (AstreeP Finally, during the last period, beginning about 1860, she wrote senti¬ mental*

stories, but of a more conventional char¬ acter and free from the impractical utopianism

or even impossible fantasy which had char¬ acterized many of her earlier works. To this class belong (Jean de la Roche) and (Le Mar¬ quis de Villemer. This last work won even greater success when dramatized with the help of the younger Dumas who gave it a wit and vigor which the diffuseness of George Sand herself could never achieve. Her style was, indeed, extremely diffuse. Her facility of composition was extraordinary and her plots came as she put pen to paper. She could write or stop writing at any hour of the day or night. Thus we can understand the abundance of her works, of which only a few can here be men¬ tioned. Her influence has passed away, and she has long ceased to be thought of as revolution¬ ary, but her books will always be remembered as both the reflection and inspiration of utopian visions of her age, and her intimacies with so many famous men give an interest to her in addition to her own merits. Her (Histoire de ma vie> of 1855 is of interest in this respect and of much psychological value. See Elle et Lui.*

Bibliography. — George Sand's collected works were issued as (Romans et nouvelles) (84 vols.) ; (Memoires, Souvenirs, Impressions, Voyages) (8 vols.) ; 'Theatre (4 vols.) ; 'Theatre* de Nohant> (1 vol., Paris 1862-83). A uniform edition of her writings was issued in America (20 vols., Phil¬ adelphia 1901). For the incident of the Vene¬ tian doctor, Pagello, consult Cabanes, (Cabinet secret de l'histoire* (Paris 1897), and Maurras, C., (Les amants de Venise) (ib. 1904). Consult also Caro, E. M., (A Life and Study of George Sand* (London 1888) ; Buis, Lucien, (Les theories sociales de George Sand* (Paris 1910) ; Doumic, Rene, (George Sand: Some Aspects of Her Life and Work) (English trans. by Alys Hallard, New York 1910) ; Karenine, W., 'Life of George Sand* (3 vols., 1899-1912).*

Charles H. C. Wright, Professor of French Language and Literature, Harvard University.

SAND, a mass of unconsolidated mineral grains of practically uniform size, large enough to be detected with the unaided eye, but too small for the grains to be readily picked up by hand. In composition sand varies greatly, from grains of pure silica or pure calcium car¬ bonate to a complex mixture of many minerals. Pure silicious sand is in most cases primarily derived from the disintegration of igneous or other rocks, containing silica, which remains be¬ hind after the removal of other minerals more subject to

chemical disintegration. The separa¬ tion is usually accomplished by the waves of the seashore, and in general it may be said that the longer the sands are subject to wave activ¬ ity the more complete will be the sorting proc¬ ess. Calcareous sands result mostly from the grinding up by the waves of shells, corals, etc., or of limestone beds ; and may be of all degrees of purity. The so-called eolian limestone of the Bermudas consists of calcareous shell sand which has drifted into great dunes, and later been consolidated. Drifting dunes of gypsum are known in New Mexico. Granite, when broken down by mechanical agencies, forms a quartz-feldspar sand known as feldspathic sand, or arkose sand. Basic rocks, similarly disin¬ tegrated, form ferro-magnesian or gray wacke

sand. On the shore, the sands are kept firm by the water held between the grains by capil¬ lary attraction. If this evaporates, the sands are driven inland by the winds, piled up into sand-dunes and often convert extensive dis¬ tricts into sand-deserts. (See Desert). River sands derived from crystalline or metamorphic rocks often carry gold or other precious metals in the forms of grains or nuggets. Auriferous sand constitutes the source of much gold, in placer deposits. Sands washed by temporary streams from glaciers or glacial moraines and deposited in front of the ice, build up sand-plains, which are the chief source of sands and gravels in glaciated regions. (See Glacial De¬ posits). The ordinary grades of sand are much used in the building trades for mortar and con¬ crete; very pure quartz sand is largely used in glass manufacture ; and various other grades of sand are employed for a very large number of purposes. See Mineral Production of the United States.

SAND, Musical. See Musical Sand.

SAND-BADGER, or HOG-BADGER, a

*small East Indian badger (Arctonyx collaris), which gets its first name from its customary station and burrowing habits, and the second from its pig-like rooting snout. Another fre¬ quently heard name is "balisaur.** It frequents stony ground and occupies natural crevices and dens when these are handy, but elsewhere digs rapidly and deeply burrows in which it spends its days for the most part, waiting until night to go abroad in search of its small prey. Its general habits are like those of its type. See Badger.*

SAND-BLAST, an invention for the use of sand as a blast in cutting and engraving glass, stone, metals, etc. The sand is blown against the article to be cut by a blast of air or steam, which quickly cuts away the unprotected sur¬ face, leaving in relief that part of the surface guarded from the effect of the sand by patterns of iron or other substance harder than that which it is desired to efface. The sand-blast is much used to clean the exterior of

stone build¬ ings, and it has been used largely in the prepara¬ tion of soldiers' tombstones, and other large con¬ tracts of a similar character.

SAND-BUR, either of two very dissimilar plants. One, also called the buffalo-bur (Solatium rostraturn), is a weed, native to the western plains of the United States; it is the original food of the potato-bug, and is working eastward, its seeds having traveled at first, per¬ haps, in the coats of the bison. It has even crossed to Europe, by some means. The sand- bur is an annual, densely pubescent and prickle¬ armed plant, having the characteristic star¬ shaped flowers of the potato,, although yellow in hue. The calyx is densely prickly, and sur¬ rounds the berry in fruit, the prickles becoming as long as the berry itself. Sand-bur seeds oc¬ cur among fodder-seeds grown in the West, but careful cultivation will subdue this weed. The plant is light and bushy, and is blown over the prajries as a tumble weed.

*A grass (Enchrus tribuloides) is also called <(sand-bur,** and is commonly found near sea¬ shores or in waste land, in the eastern half of the United^ States, where it is becoming a nox¬ ious weed in some places. It has robust stems,*

partly decumbent from an annual root, and branches freely. The leaves are flat, and the floral involucres are crowded in terminal spikes on a rough stem, and form spiny burs, which stick easily to clothing or the hair of animals, and so may be carried long distances.

SAND-CAKE, or SAND-DOLLAR, a

name along the New England coast for one of the flat, dollar-shaped, villose sea-urchins of the genus Echinarachnius ; several species are to be found on sandy bottom near shore and others are numerous in greater depths, affording some food to cod, flounders and other bottom-feeding fishes. See Cake-urchin.

SAND-CRACK, a crack or fissure in the hoof of a horse, due to a disease generally re¬ ferred to the coronet, sometimes to the laminae covering the pedal bone, specifically to the mem¬ brane which secretes an essential adhesive sub¬ stance entering into the constitution of the hoof. The crack generally extends from the coronet toward the sole. In the fore feet the inner quarters are most frequently attacked; in the hind feet, the toes. There are various forms of sand-crack, the most common of them being usually called quarter-crack. See Hoof.

SAND CREEK MASSACRE, a sanguin¬ ary attack by Colonel Chivington on 29, Nov. 1864, on a Cheyenne and Arapaho camp in Kiowa County, Colo. The Indian Commis¬ sioner had sent about 400 Indians of the tribes above named to a camp at Sand Creek. The military desired to cow the Indians by heavy punishment for their atrocities against the whites, while the Indian Department earnestly sought to mediate between the white settlers, the military and the aborigines. Chivington slaughtered 131 men, women and children, and a long and costly struggle ensued. Not until 1871 did the Cheyenne put aside the sword and consent to go on a reservation.

SAND-DARTER, a genus (Ammocrypta) of small fresh-water fishes (see Darter), whose species, especially A. pellucida, common in the mid-continent streams, buries itself in the sandy bottom with astonishing quickness and completeness.

SAND DUNE. See Dune.

SAND-GROUSE, a family (Pteroclidw) of birds related, on the one hand, to the pigeons (Columboe) , and, on the other, to the grouse (Gallince) . The sand-grouse inhabit the plains and sandy deserts of the tropical regions and countries of the eastern hemisphere. The legs are longer than in grouse, the tail and wings pointed and the general aspect dove-like. The best-known species are the Pterocles alchata and the P. arenaria. Both of these birds occur in southern Europe. They fly well and feed upon seeds and insects. The eggs are four or five in number and the nest is constructed in a rough fashion on the ground. Other species inhabit Asia and Africa. Pallas' sand-grouse has been made the type of a different genus, Syrrhaptes, in which the tarsi are feathered and the anterior toes united in a common integu¬ ment, as well as feathered to the claws, the hallux absent. It is a native of the plains of central Asia, where it occurs in vast numbers. Much interest was excited in 1863 and again in 1888 by great numbers of these birds invading Europe. They crossed the North Sea and were

found in considerable numbers throughout Britain, and as far north as the Faroes. They even bred in Great Britain in one or two cases. Smaller invasions occurred in other years. Sand-grouse are classed as game-birds in the regions in which they occur and especially in India.

SAND-HILL CRANE. See Crane. SAND-HOPPER. See Amphipoda.

SAND-LAUNCE, or SAND-EEL, a small teleost fish of the family Ammodytidaz, which is represented on all the colder coasts of the world by some 10 species, but whose relation¬ ships are undetermined. They have the shape of eels, from 6 to 12 inches long, according to species, but are distinguished by the fact that the tail-fin is well developed and is distinct

from the dorsal and anal fins, while it is also forked at its extremity. The skin is silvery in appearance, but destitute of true scales. The lateral line runs along the side of the back. The dorsal fin begins just behind the head and ex¬ tends nearly to the caudal fin. The anal fin ex¬ tends to about one-third or one-half the length of the body. Several species are to be found on both coasts of North America.

SAND-MARTIN. See Bank-swallow.

SAND-PAPER, an abrading agent made by coating paper or thin cotton cloth with glue and dusting fine sand over it with a sieve. Sand-paper is intermediate between glass paper and emery paper in its action on metals, but is less energetic than glass paper in its action on wood.

SAND-PIKE, a fish, the sauger (q.v.).

SAND PIPE, cylindrical hollows, often of great depth and filled with sand and gravel. They are characteristic of all rocks, but have been particularly described from the white chalk of England and France, where Lyell has found them up to 12 feet in diameter and over 60 feet deep. They are analogous to pot-holes formed along mountain streams through the gyrating motion of the water in an eddy. The holes are cut by loose rocks kept in constant circular motion by the water. Analogous hol¬ lows, termed glacial pot-holes or moulins, are also found where a superglacial or englacial stream plunges down a crevasse and sets the rocks at the bottom of the crevasse in motion, thus often cutting to great depths. These holes or pipes are afterward filled with sand and gravel either by the stream or upon the melting of the ice. These holes have also been attrib¬ uted by Lyell to the chemical action of water charged with carbonic acid gas, which was de¬ rived from the decaying vegetation of the soil through which the water passed.

Similar deposits of sand, generally solidified into sandstones or quartzites, are not infre¬ quently found in the older rocks of all coun¬ tries. These are generally masses in the form of dikes penetrating sedimentary or crystalline rocks, often to a great depth. Many of these sandstone dikes were formed at a very early period in the earth's history, when the fissures were formed . either . through solution, at¬ mospheric disintegration or in some cases through earthquake shocks.

SAND-SHARK, a small voracious shark of the family Carchariidce, which is mainly ex-

tinct, the three existing species occurring chiefly in the Atlantic, where Carcharias lit- toralis (J. and E.) occurs numerously on the American coast between Cape Cod and Cape Hatteras; it is doubtfully different from the one frequently seen along the European coast. These sharks are similar to the mackerel sharks (Lanuridce) and reach a length of five or six feet.

SAND-SUCKER, a local name in Cali¬ fornia for a familiar fish, the whiting (q.v.).

SAND-WASP, any of many solitary wasps which burrow in sand or loose earth and leave their eggs there in well-provisioned cells. There are numerous species in all parts of the world. See Wasp.

SAND WHEEL. The removal of fine waste, sand and slime from mills where ores are crushed and concentrated may call for the use of special devices, one of which is the sand wheel. If the mill stands on a hillside such refuse can usually be washed down troughs, called launders, to lower ground where it may accumulate. If the mill site is level land and the mill handles a large amount of rock then the refuse must be lifted that it may flow to a settling place. Various types of elevators and conveyors are used for this purpose. The sand wheel, though bulky, has the merits of sim¬ plicity and few wearing parts, and is simply a development of the water wheels used since ancient times for irrigation purposes in Eastern countries. At ore mills in many parts of the world sand wheels may be seen, notably at the great gold mines of the Transvaal, where are some over 50 feet in diameter.

A giant sand wheel, one of the largest ever erected, handles the mingled sand and water from the great crushing and concentrating plant of the Calumet and Hecla Mining Com¬ pany at Lake Linden, Mich. This mill treats an enormous tonnage of copper-bearing rock and the resulting waste is run into the lake where the accumulations of years cover many acres. The large wheel was erected that the waste might be lifted higher to flow over the old de¬ posits. It is 65 feet in diameter, elevates the water and waste to a height of 50 feet and has a capacity of 75,000,000 gallons in 24 hours.

It was constructed by the Robert Pool and Son Company of Baltimore, Md. In the gen¬ eral principles of design involved the wheel does not differ materially from other segmental iron and steel wheels of large diameter, but is of interest from its size. The axle, a hollow cylinder made of Krupp's crucible cast steel, was forged at Essen, Germany, but finished at Baltimore ; it is 27 feet long, 32 inches in diam¬ eter at the middle and has a 16-inch hole through the centre. This axle weighs 42,000 pounds.

The axle journals are 25 inches in diameter and 42 inches long. Fitted to either end of the axle is a massive gun-iron hub, weighing 20,000 pounds, and from these hubs radiate 40 four- inch steel rods or spokes to the inner face of the rim. The inner end of each spoke is fitted with a thread, nut and lock-nut by which the requisite tension is given for securing and truing the rim. The outer end of each rod is turned into an eye and fastened to a steel flange on the rim by an eyebolt. The rim is built up in 20 segments. It consists of two concentric

rings, an inner or main ring of box-shaped cross section to which the spokes are attached, and an outer or toothed ring fastened through inwardly projecting flanges to the inner rim by bolts and keys. On the periphery of this outer rim are gear teeth, accurately milled in two rows, staggered. Each row of teeth is 12 inches wide, making the effective width 24 inches. And there are 26 teeth in each segment or 520 in all.

To each side of the sectional rim is riveted a triangular plate iron box, carrying on its inner side 275 buckets, making 550 in all, each bucket measuring 4 feet 3f4 inches, by 3 feet 4 inches. The wheel makes about four revolu¬ tions per minute and the peripheral speed of the buckets is about 12 feet per second, but the buckets are set at such an angle that the periph¬ eral speed prevents their discharge till they are near the top of the wheel. The tangential strains due to the loads of sand in the buckets are taken up by a system of tangent tie-rods which extend from the lugs, already referred to, on the rim, to the periphery of a tangent hub which is keyed to the centre of the axle, between the two outer hubs. These tie-rods are arranged in pairs and in opposite directions so that, although the load at the periphery may exert either a right-handed or a left-handed strain-, no transverse bending strain is brought upon the main spokes of the wheel. The ten¬ sion of the tangential tie-rods is adjusted by means of turnbuckles placed at the centre of each rod. The wheel, with buckets attached, is nearly 12 feet wide across the face. It is driven by an electric motor of 750 horse power through a pinion wheel 37 inches in diameter having a shaft carrying a wheel that engages a pinion on the motor shaft. The wheel dips into a pit 100 feet long, 12 feet wide and 30 feet deep that receives the sand and water. From this pit the refuse is scooped up and discharged into a launder at an elevation of about 50 feet. For protection against the elements, the winter climate being severe, the wheel is housed in a building high enough to cover it entirely.

SANDAL, a kind of covering for the feet used among the ancient Jews, Greeks and Ro¬ mans and which we find to be of the highest antiquity. It usually consisted of leather or of a thick cork sole covered above and beneath with leather and neatly stitched on the edge. It left the upper part of the foot bare and was fastened on by means of straps, crossed over and

wound round the ankle. In later times sandals became articles of much luxury, being made of gold, silver or other precious material and beautifully ornamented. See Boots and Shoes.

SANDAL-WOOD, a fragrant wood fur¬ nished by the genera Santahim and Fusamis, of the family Santalacea ?. The principal source of the genuine sandal-wood is a small evergreen tree (Santahim album), partly parasitic in growth, with opposite entire leaves and thyrses of yellowish flowers which resemble those of the privet. It grows wild and is now also cultivated in the dry regions of southern India and on the mountains of the Malay Archipelago.

The trees are mature in about 20 years and are then cut down, the trunk being then about a foot in diameter. The felled trunks are left on the ground in order that the white ants may eat off the useless sapwood, the insects

GIANT SAND WHEEL FOR THE CALUMET AND HECLA MINING COMPANY

Diameter, 65 feet; Weight, 50 tons; Number of buckets, 550

.

•*

-

.

leaving the aromatic heart wood untouched. When thus cleaned the sandal-wood is sawn into small pieces and then dried slowly to im¬ prove the fragrance and to prevent splitting. This heart wood is yellowish-brown, very hard and close-grained and made odorous by the presence of an oil, which is still more abundant in the root. The oil is distilled from the roots and chips and is largely used as a perfume, especially in India, and also as a medicine ; it is said to have replaced copaiba in the treat¬ ment of diseases of the mucous membrane. The heart wood is used especially by the Chi¬ nese for carvings, fans, boxes, etc., not only be¬ cause of its lasting perfume, but because it re¬ pels insects; it was employed in India during

the 5th century at least and is still a necessary article in various Buddhistic ceremonies, in cremations, for caste marks and for incense. It was probably one of the ingredients of the Levitical incense and the almug of Scripture. Sandal-wood was originally obtained only in India, but other species (S . freycinetianum and S. pyrularium) were found in Hawaii and in other Pacific islands and led to a trade so high¬ handed that many deaths ensued and the supply of trees was nearly exhausted.

A small leguminous tree (Pterocarpus san- talinus) furnishes the red sandal- or sanders- wood, having a heart wood, first dark-red, but becoming brownish on exposure, and used as a dyestuff, giving reddish-brown hues to woolens. Powdered it was employed to color foods and was considered by Hindu physicians to be astringent and tonic. Various inferior qualities of sandal-wood are obtained from Bucida capi- tata, the Myoporacece and other trees.

SANDARACH, a friable, dry, almost trans¬ parent resin, which is imported "from Morocco, in pale yellow tears, somewhat harder than mastic. It exudes from the bark of the small coniferous sandarach-tree, also called the tear tree (Callitris quadrivalvis) , a native of the north of Africa and a characteristic tree of the Atlas Mountains. The Australian species of Callitris furnish a similar resin. Sandarach is not used in great quantity. Although a med¬ icine in high repute at one time and later used for a pounce-powder, to prevent ink from spreading when writing over an erasure, its chief employment now is in the making of var¬ nishes, the same as mastic. The mahogany- colored wood of the sandarach tree is highly balsamic, extremely durable and is utilized by cabinet-makers and mosque-builders; it is said to have brought fabulous prices in Pliny's time.

SANDAY, William, English Biblical scholar: b. Holme-Pierrepont, Nottinghamshire, 1 Aug. 184-3. He was educated at Oxford, took orders in the Anglican Church and has been Lady Margaret professor of divinity and canon of Christ Church, Oxford, from 1895. He is the author of (The Authorship and Historical Characters of the Fourth GospeP (1872) ; (The Gospels in the 2d Century > (1876) ; (Inspira¬ tion } (1893-96) ; (The Catholic Movement and the Archbishops' Decision } (1899), etc.

SANDBAGS, in fortification and other mili¬ tary operations, are coarse canvas bags, about 30 inches long and 15 inches thick, filled with sand, and much used in cases where cover for troops is required to be speedily obtained.

SANDBURG, Carl, American author: b. Galesburg, Ill., 6 Jan. 1878. In 1898-1902 he studied at Lombard College, Galesburg, and in 1910-12 was secretary to the mayor of Mil¬ waukee, Wis. He became associate editor of

System Magazine in 1913 and was also editorial writer on the Chicago Daily News. Mr. Sand¬ burg was awarded the Levinson prize in the Poetry Magazine in 1914. He served in Com¬ pany C, 6th Illinois Volunteers, in 1898 and saw active service in Porto Rico. In 1918 he was a member of the editorial board of the National Labor Defense Council.

SANDBY, Paul, English painter: b. Not¬ tingham, 1725; d. London, 9 Nov. 1809. He was one of the earliest painters in water colors in England, and has been styled ((the father of the water color school,® but began life as a teacher of boys and only resolved on an artistic career after his appointment to the staff of the military drawing department of the Tower of London (1741). In 1747 he was draughtsman for the government survey o. the Highlands of Scotland, which gave him a good opportunity for sketching to scenery. In 1752 he made 70 drawings of Windsor Castle and Eton, and afterward accompanied Sir Joseph Banks on a tour of Wales. In 1768 he was appointed draw¬ ing-master at Woolwich Academy, and became one of the most fashionable art teachers of his day. His (Views of the Encampment in the Parks> (1780) illustrate his style. He outlined his subjects with a pen and then washed them in with colors in a very simple and direct way. His best works are those in body colors, which are tinted with richness, depth and refinement and are not conventionalized by the bold pen outline. As a caricaturist, he is known by his ridicule of Hogarth's (Line of Beauty, > and his caricature portraits, such as those of (Lords North and ThurlowP He was a member of the Incorporated Society of Artists, and one of the original members of the Royal Academy, founded 1768.

SANDEMAN, san'de-man, Robert, Scot¬ tish religious leader: b. Perth, Scotland, 1723; d. Danbury, Conn., 1771. He studied at Edin¬ burgh and afterward engaged in the linen trade. On marrying the daughter of the Rev. John Glass (founder of the Glassites), he adopted his pastor's views in opposition to all church establishments and became an elder in his con¬ gregation. He soon after published a series of letters, in which he endeavors to show that a justifying faith means nothing more than a simple assent to the divine mission of Christ. Sandeman went to London in 1760 and managed to gather together a congregation of his own followers, who were called Sandemanians. The Glassites or Sandemanians number at pres¬ ent less than 2,000 throughout the world. In 1764 Sandeman accepted an invitation to New England, and became the author of some theo¬ logical tracts, letters, discourses, etc., besides his (Letters on Theron and AspasioP The Sandemanians revived the love-feast (to take place in each other's houses) ; the kiss of peace; the support of the poor members by the com¬ munity; washing each other's feet; community of goods; they maintained the unlawfulness of saving money, etc. They still have a slender following at Danbury, Conn. The most noted personage professing the Sandemanian

was the great scientist, Michael Faraday (q.v.), who lived and died in that communion.

SANDEMANIANS. See Sandeman, Ro¬ bert; Religious Sects.

SANDERLING, a sandpiper (Calidris are- naria), peculiar in lacking the hind toe. This bird averages seven to eight inches in length, and is colored in winter, gray on the upper and white on the under parts ; the spring plumage differs in exhibiting reddish tints, marked with black. It is nearly cosmopolitan, breeding in the Arctic regions of both hemispheres, and mi¬ grating to the southern parts of Soˆith America and Africa, though many winter in the Southern States. The food consists of worms, Crustacea, etc. These birds chiefly inhabit the sandy tracts of the sea-beach, and the estuaries of rivers, but are common about large bodies of water in the interior also, and associate with other species. The flesh is nutritious and pleasant to the taste, and the bird is a favorite with gun¬ ners in quest of shore-birds.

SANDERS, san'derz, Frank Knight, Amer¬ ican Biblical scholar: b. Batticotta, Jaffna, Cey¬ lon, 5 June 1861. He was graduated from Ripon College, Wisconsin, in 1882, was in¬ structor at Jaffna College, 1882-86, and studied Semitic languages at Yale 1886-87. He was Woolsey professor of Biblical literature at Yale 1893-1901 ; held the chair of Biblical history and archaeology and became dean of Yale Divinity School, 1901-05 ; was secretary of the Congrega¬ tional Sunday School and Publication Society 1905-08; president of Washburn College, Kansas, 1908—14 ; and from 1914 director of the Board of Missionary Preparation. He has pub¬ lished with C. F. Kent cThe Messages of the Bible) (12 vols., 1897-1912) and is author of (The Teachers' Life of Christ5 (1907) ; (Studies in the Life of PauP (1908) ; (The Messages of the Sages) (1915) ; (History of the Hebrews) (1914), etc.

SANDERS, Henry Arthur, American classical scholar : b. Livermore, M.e., 1868. He was educated at the universities of Michigan, Berlin and Munich. He was c6nnected with the faculty of the University of Michigan in 1893-95, and continuously after 1899, becoming pro¬ fessor of Latin there in 1911. In 1915-16 he was on leave of absence and served as acting director of the School of Classical Studies of the American Academy at Rome, Italy. He is a contributor to various philological, archaeolog¬ ical and

educational journals; edited (Roman History and Mythology5 (1910) ; and is author of (Roman Historical Scenes and Institutions5 (1904) ; {The New Testament Manuscript in the Freer Collection5 (1912) ; (The Old Testa¬ ment Manuscript in the_ Freer Collection5 (1917) ; (Washington Manuscript of the

Psalms5 (1917), etc.

SANDERS, Liman von, German general and field-marshal: b. (?). (

ment in hindering the actions of the Turkish peace party's plans. He personally conducted the defense of the Dardanelles against the pow¬ erful attacks of the British navy and army, es¬ tablishing his headquarters at Gallipoli, the cen¬ tre of the fighting. He informed American war correspondents in October 1914 of the practical impossibility of the capture of the Gallipoli peninsula with its impregnable fortifi¬ cations, which had been the work of the British covering a number of years. He was succeeded in August 1915 by the Grand Duke of Mecklen¬ burg and was made commander-in-chief of the Turkish forces on the Caucasian front. At the British investment of Jerusalem he forsook the Turkish army and returned to Constantinople in September 1917. When the Entente and as¬ sociated powers concluded an armistice with Turkey in 1918 Liman von Sanders was ar¬ rested in Constantinople and remained under detention there until August 1919 when he was repatriated.

SANDERS' RAID INTO EAST TEN¬ NESSEE. On 14 June 1863 Col. W. P. San¬ ders, with 1,500 mounted men and two guns, left Mount Vernon, Ky., to destroy the East Ten¬ nessee and Virginia Railroad. Crossing the Cumberland River he surprised a body of 400 Confederates at Montgomery, Tenn., on the 17th, capturing 105 officers and men and a large amount of supplies. Avoiding the Con¬ federates at points on the way, he struck the railroad at Lenoirs on the morning of the 19th, captured three guns and about 65 prisoners, burned the depot and other buildings, contain¬ ing five guns, 2,500 stand of small arms and ammunition, and then destroyed the railroad to within a short distance of Knoxville. Leaving a regiment south of the city to demonstrate on it, Sanders, with the rest of the command, passed around the place during the night, struck the railroad north of it, burned the bridges and on the morning of the 20th made a strong dem¬ onstration on Knoxville by the Tazewell road. Artillery firing and skirmishing continued an hour, during which Sanders captured two guns, 30 prisoners and some horses, and then followed the railroad to Strawberry Plains, destroying all bridges, including one over the Holston 1,600 feet long, near which, after a sharp engagement with the bridge-guard, he took 140 prisoners, five guns and a train of cars loaded with sup¬ plies. At daylight 21 June he started up the railroad for the Mossy

Creek bridge, destroy¬ ing the road at several points, and also the bridge. Large quantities of stores and 120 pris¬ oners were captured. He now left the railroad to return by Rogers' Gap, avoiding forces sent to intercept him. The gap was found blocked by fallen timber and guarded by infantry and artil¬ lery, and adjoining gaps were found similarly obstructed. With the enemy in his front and closing on his rear, he found but one way to escape, and that by a trail impassable for artil¬ lery. He abandoned his guns, after destroying them and their ammunition, and by a wood road moved through Smith's Gap, three miles from Rogers', driving a cavalry regiment from it, and after a hard march in the Cumberland Moun¬ tains, in which some of his men took wrong roads, he reached Boston, Ky., on the 23d with a loss during his raid of two killed, four wounded and 13 missing. He had captured 10

guns and 10,000 small arms and paroled 461 prisoners. Consult (Official Records) (Vol. XXIII).

SANDERSON, John, American author: b. near Carlisle, Pa., 1783; d. Philadelphia, 5 April 1844. He was professor of Latin and Greek in the Philadelphia High School from 1836 until his death. With his brother he was author of (Biography of the Signers of the Declaration of Independence) (Vols. I— II, 1820), and was sole author of (Sketches of Paris) (1838; London ed., (The Americans in Parish 1838).

SANDERSVILLE, Ga., city, capital of Washington County, on the South Carolina and Georgia Railroad, 120 miles northwest of Sa¬ vannah. It is situated between the Oconee and Ogeechee rivers, in a fertile cotton region, and has a considerable export trade in cotton. It has a high school for colored pupils established in 1890. Pop. 2,695.

SANDFORD, Frank W., American reli¬ gious leader: b. Bowdoin, Me., 1862. He was educated at Bates College and at Cobb Divinity School, Lewiston, Me., and entered the ministry of the Free Baptist Church. In 1893, after some years as a pastor, he made the announce¬ ment at the convention of his denomination that he had received divine revelations. He thereupon left the Free Baptists and founded a sect known as the Holy Ghost and Us Society, a communistic organization at Durham, Me. Members are required to turn all their property over to the society, and all legal titles are vested in Sandford, the leader of the com¬ munity. There are about 300 members. Their belief includes miraculous healing, the literal interpretation of the Apocalypse, Daniel and the judgment pictures in

the Synoptic Gospels and the near approach of the end of the world. They insist upon baptism by immersion under their own rites.

SANDFORD AND MERTON, The His¬ tory of, a famous book intended for juvenile reading by Thomas Day, published 1783-89. Portraying English social ideas of more than 100 years ago, it is now regarded as a literary curiosity. It is named for two school boys whose adventures are related in sedate fashion. Morals are drawn from every incident of their daily lives and from the stories which they read in their lesson books. Not the least re¬ markable feature of the book is the polished language used by these children of six years of age, which was typical of the refinement ad¬ vanced English culture of the period sought to instil in youth.

SANDPIPERS, small limicoline birds of the family Scolopacida, but not clearly dis¬ tinguished, either in ornithology or in common practice, from the snipes (q.v.), although at¬ tempts have been made to erect them into one or more sub-families, T ringing, etc. Most of the group collect about the typical genus Tringa, and as a whole the sandpipers may be said to be intermediate between the snipes and the plovers. The bill is snipe-like in its form and sensitiveness, but is much shorter, while the legs are generally longer than in the true snipes, and the tail-feathers are not cross- barred, and sandpipers are further distinguished from the snipes and allies by the well-marked

seasonal changes of the plumage. From the plover the sandpipers may be at once known by the straight and slender bill and by the pos¬ session of a well-developed hind toe, with the single exception of the sanderling (q.v.), as well as by numerous other characters. The true sandpipers are all birds of small and some of diminutive size. Like most of the plovers they are, with few exceptions, gregarious and fre¬ quent the shores of sea, lake and river in large flocks, but they differ from the plovers and re¬ semble the snipes in their mode of procuring food; they probe the soft mud with their slen¬ der sensitive bills and extract from it various kinds of worms, crustaceans and larvae. Most of the species breed in the north and perform extensive migrations. The simple nests are built on the ground and the eggs are almost invariably four and of a strong marked pyriform shape well adapted to prevent them from roll¬ ing away. The young are fully covered with down and are active as soon as freed from the egg shell. Very nearly all of the sandpipers belong to the northern hemisphere during the breeding season, and as they are especially prone to wander during the migrations, a large propor¬ tion of the Old World species have occurred as more or less regular stragglers in North Amer¬ ica. Our fauna includes about 25 species exclu¬ sive of the related phalaropes, willets, god- wits, tattlers and curlews (qq.v.), all of which, except the last, are by some writers comprised within the sandpiper group.

Some of the species are treated in other parts of this work under the names knot, dunlin, robin-snipe, sanderling, etc. Among other im¬ portant species are the stilt sandpiper (Himan – topus mexicanus) , which might well be classed as a snipe because of the length of the bill, which is often distinctly curved. The legs are unusually long and small webs occur between the bases of the front toes. This species is about nine inches long and the plumage is much mottled, black, white, tawny and reddish, with a general dark effect in the breeding season; but during the fall and winter grayish and ashy from the absence of black and reddish. The stilt breeds on the shores of Franklin and Hudson bays and appears in the United States in July and August, but, except in Florida, is rare. It winters as far south as Argentina. The purple-sandpiper (Tringa maritima) has the short legs unusually well feathered and the front toes unusually long and margined, the hind toe very short. In its winter dress the plumage is characterized by the distinctly purple gloss of the dark upper parts, the lower being chiefly white. It is a circumpolar species and breeds in the far North, in Iceland, Greenland, Nova Zembla and beyond and may even winter in Arctic regions. It seldom enters the United States until December and ordinarily winters in the New England and Middle States, seeking rocky sea-shores in small parties. A few also occur about the Great Lakes and the species is nowhere abundant. A closely related species is the pectoral sandpiper (T. maculata) , the jack- snipe, grass-snipe or krieker of gunners, the last name in imitation of its call. It is about nine inches long and is readily distinguished from the last by the deeper grooving of the bill, the naked lower half of the tibial portion of the leg and the thickly streaked breast ; and from simi-

larly colored species by its large size. This species is abundant along the Atlantic Coast during August and September when the old birds, accompanied by the young of the year, are journeying from their arctic summer home to the pampas of Argentina and Patagonia. In habits this is more a snipe than a sandpiper, as it frequents the salt meadows and grassy mar¬ gins of pools and seldom flocks on the sand beaches or associates with related species, though often found in the company of plovers. The spring flight northward follows the Mis¬ sissippi Valley and few are found at this sea¬ son along the sea-shore. The male is larger than the female and has remarkable courting habits. As he struts and crosses in front of the female his oesophagus is inflated like that of a pouter pigeon, and at the same time a deep resonant note is produced. The least sandpiper (T . minutilla) is in form and color an almost exact miniature of the last, being not over six inches long and the smallest of the group. It is also known as

the stint of peep and is a typical sandpiper, breeding in British America and frequenting the sea-shore in large flocks along with other species in April and May and in augmented numbers again in August and September. It is, however, found inland, as well, in suitable localities throughout North America and spends the winter from our southern borders to Patagonia. A constant as¬ sociate of the least sandpiper, which it re¬ sembles in distribution, habits and appearance so closely that the two are frequently con¬ founded, is the semi-palmated sandpiper (Erennetes pusillus). It may, however, be easily separated by the well-marked webbing between the front toes. Passing over the god- wits, willets and yellowlegs, which form a some¬ what distinct group of large species, the well- known and much appreciated Bartromian sand¬ piper, upland plover or grass plover (Bar – tramia longicauda) next requires notice. This species is about one foot long and approaches the tattlers in the cross-barred tail-feathers and unusually long gape which extends below the eye, while the tail is remarkably long and the grooving of the bill is absent from the terminal fourth. The sexes are alike and no seasonal changes occur. It is found in summer and breeds throughout North America, chiefly east of the Rocky Mountains, and spends the winter in upper South America. Unlike most of the group this is an upland bird, preferring dry plains and grassy fields to the vicinity of water. It arrives in early May and shortly after builds a nest of a few straws and grasses in a slight depression on the ground and lays four pyri¬ form eggs of a clay color very thickly spotted all over with small discrete spots of brown and purplish gray. After the breeding season it leaves the meadows for cultivated fields and feeds very largely on crickets and grasshoppers, though other insects and berries are also eaten. This species flies high and swiftly and, unlike most sandpipers, will perch on fences and even trees. It has a peculiar wild cry which is heard by night as well as day. In the east the upland plover, by which name it is best known, is seen chiefly singly or in pairs and families, but in the great grass regions of Kansas and Texas, where it is vˆry abundant, large flocks are formed. A species somewhat closely related to the upland plover in form and habit is the buff-breasted

sandpiper (Tryngites subrufficolis) which is about eight inches long, breeds in the interior of British America and is nowhere very com¬ mon during the migrations through the United States. Another related species is the well- known greenish spotted sandpiper or pee-weet (Actitis macularia) found everywhere through¬ out North America along small streams, as well as on the shores of lakes and the sea and breeding throughout its summer range. To most people it is the most familiar species of all the sandpipers and requires no description.

To the gunner most of these and other species of sandpipers are classed along with many of the plovers, yellow-legs, curlews, etc., as shore and bay

birds, all of which are shot along the entire coast line during the autumn migration. These birds flock to the exposed shores to feed at ebb tide and are gregarious and attracted by their own or kindred species feeding on the beaches. The gunner places wooden decoys, cut and painted in rude imita¬ tion of the various species, at some favorable point and conceals himself behind a blind of seaweed or brush within range of his stool of decoys. As the birds pause over the latter to examine them, often in compact flocks, a single shot will often kill several, and large bags used to be secured during a single tide; but these birds have been so continuously persecuted that a dozen or two of the larger and medium sized species is now considered ample reward for a day's shooting. Species which, like the pectoral sandpiper, frequent the pools on the salt meadows are also caught by tramping or tolled within range of a blind by imitating their calls. The sport afforded by the upland plover is of a quite different and more worthy sort. These birds are extremely wary and difficult to approach and, as they do not flock in the East, may be brought within range only by a most careful approach, while their flight is so rapid as to require the best exertions of a quick and accurate shot. On the prairies of the West this same species is sometimes shot from a wagon, of which the birds are less suspicious. For the table most of the sandpipers are highly prized and few delicacies surpass a well-turned upland plover.

Bibliography.— Aflalo, < Sport in Europe5 (London 1901) ; Baird, Brewer and Ridgeway. (North American Water Birds5 (Boston 1884) ; Coues, Elliott, (Birds of the Northwest5 (Washington 1874) ; Elliot, D. G., (North American Shore Birds5 (New York 1898) ; Hudson, W. H., (The Naturalist in La Plata5 (4th ed., London 1903) ; Sanford, (The Water Fowl Family5 (New York 1903).

SANDPOINT, Idaho, city and county-seat of Bonner County, at the outlet of Pend d'Ore- ille Lake, 325 miles north of Boise and 48 miles northeast of Spokane, Wash., on the Northern Pacific, the Great Northern and the Spokane International railroads. The region is noted for its superb scenery and excellent fishing, and there are lumber industries. Pop. 2,876.

SANDRART, sand'rart, Joachim von, Ger¬ man artist and art critic : b. Frankfort-on-Main, 2 May 1606; d. Nuremberg, 14 Oct. 1688. He studied painting and copperplate engraving under eminent painters and engravers at Utrecht and also traveled in England where he was employed by Charles I and the Duke of

Buckingham, and Italy (1627) where he be¬ came, at Rome, the intimate friend of Claude Lorraine. Among other pictures, he painted (The Death of Seneca> for the king of Spain and a (Nightpiece5 in the style of Honthorst; besides furnishing the illustrations for (Galeria Giustiniana5 (1631). He executed under com¬ mission from Urban VIII several portraits and pictures for the churches in Rome and made a number of sketches in central Italy for M. Zeiter's Htinerarium Italise> and Gottfried's (Archontologia Cosmica.5 On his return to Frankfort he painted for Maximilian I of Bavaria in the gallery at Schleissheim (The Twelve Months) and (Day and Nights He subsequently inherited the estate of Stockau, near Ingolstadt, assumed a title and henceforth gave a good deal of his time to art literature, painting also some portraits of the nobility. His masterpiece is (The Company of Archers assembled to do Honor to Maria de Medici when she visited Amsterdam,5 now in the town-hall of that city. But his works on art are so im¬ portant that they have almost obscured his fame as a painter. These books include (Deutsche Akademie der edlen Bau-Bild- und Malereikiinste) (1675-79; critical edition by Sponsel 1896) ; (Admiranda Sculpturae seu Statuariae Veteris) (1689), and Unsignium Romae Templorum Prospectus Exteriores et Interiores.5

SANDRINGHAM, sand'ring-am, England, in Norfolk, seven and one-half miles northeast of Lynn, is an estate comprising 7,000 acres. It was purchased in 1862 by the Prince of Wales, later Edward VII, who erected a man¬ sion in Elizabethan style as a country resi¬ dence. It is surrounded by a charming park of 200 acres. The <(Norwich gates,55 the dairy and the cottages are interesting features. The Germans made an aerial attack on Sandringham in January 1915.

SANDROCOTTUS, san-dro-kot'us, the In¬ dian king to whom Megasthenes was sent by Seleucus Nicator, in 306, as his Ambassador. Megasthenes improved the opportunity to col¬ lect materials for his historic work in four books,

SANDS, Benjamin Franklin, American naval officer: b. Baltimore, Md., 11 Feb. 1811; vox.. 24 — 17

d. Washington, D. C., 30 June 1883. He en¬ tered the navy as midshipman in 1828, was commissioned lieutenant in 1840 and served in the Mexican War. In 1851-59 he was engaged in the coast-survey service, receiving promotion to commander in 1855. In 1862 he was com¬ missioned captain. In 1862-65 he was senior officer in command of the blockade off Wil¬ mington, N. C., participated in both attacks on Fort Fisher, was in command of the blockade off the coast of Texas from February to June in 1865, and raised the flag at Galveston, the last post held -by the Confederates. He was commissioned commodore in 1866, was

superin¬ tendent of the naval observatory at Washington in 1867-73, commissioned rear-admiral in 1871 and placed on the retired list in 1874.

SANDS, Henry Berton, American sur¬ geon: b. New York, 27 Sept. 1830; d. there, 18 Nov. 1888. He was graduated from the College of Physicians and Surgeons in 1856 and later studied abroad. On his return from Europe he became demonstrator of anatomy at the Col¬ lege of Physicians and Surgeons ; in 1869 was appointed professor of anatomy and in 1879 professor of the practice of surgery, holding the latter position till his death. He was at¬ tendant or consulting surgeon for several dif¬ ferent hospitals, but gradually gave up his hospital work to give his attention to a rapidly increasing private practice. He became one of the foremost surgeons of the city and was called for consultation in President Garfield's case. His publications include (Aneurism of the Sub Clavian, treated by Galvano Puncture> (1869) ; (Esmarch's Bloodless Method5 (1875) ; (Treatment of Intussusception by Abdominal Method5 (1877) ; (Question of Trephinery in Injuries of the Head5 (1883), and (Rupture of the Ligamentum Patellae and its Treatment by Operation5 (1885).

SANDS, Robert Charles, American poet and author: b. Flatbush, L. I., 11 May

1799; d. Hoboken, N. J., 17 Dec. 1832. He was graduated from Columbia in 1815, admitted to the bar in 1820, but devoted himself almost exclusively to literature. He established and edited in 1824 the Atlantic Magazine , which later became the New York Review, and in 1825-27 was associated with William Cullen Bryant in editing it. From 1827 until his death he was on the editorial staff of the Commercial Advertiser. He wrote with Bryant and Ver- planck a series of essays published in the form of an annual, (The Talisman5 (1828-30), in which appears one of his longest poems, (The Dream of the Princess Papantzin.5 He also wrote (Historical Notice of Herman Cortes5 (in Spanish, 1828) ;

SANDS, William Franklin, American dip¬ lomatist: b. Washington, D. C, 29 July 1874. He was educated at Saint Michel, Fribourg, Switzerland, Stella Matutina College, Feldkirch, Austria, and Georgetown University, Washing¬ ton, D. C. He was appointed second secretary of the American legation at Tokio, Japan, in 1896; became first secretary at Seoul, Korea, two years later and was charge-d'affaires ad interim in 1899. From 1900 to 1904 he was adviser to the emperor of Korea, in 1905-07 was secretary and charge at Panama, in 1907-

08 in Guatemala and in 1908-09 in Mexico. In 1909-11, Mr. Sands was American Envoy Ex¬ traordinary and Minister Plenipotentiary to Guatemala. While in Korea he suppressed a revolution on the island of Quelpaert and for his services to French citizens during the Boxer Rebellion he was made Chevalier of the Legion of Honor. Mr. Sands is a member of the American Society of International Law and of the American Geographical and other societies.

SANDSTONE, consolidated sand. The grains of a sand, chiefly silica, may be com¬ pacted by pressure alone, forming easily work¬ able free stone, but generally they are held to¬ gether by some cement, as (1) iron oxide, which coats the grains and cements their adjoining por¬ tions, forming a brown-stone; (2) silica, which fills in the interstices between the grains and generally causes secondary enlargement of each grain in such a manner that the new quartz forms a continuous crystal (as far as optical properties, etc., are concerned) with the old quartz grain, the rock thus becoming a solid mass of crystalline quartz; (3) lime; or (4) clay, forming calcareous and argillaceous sand¬ stones respectively. Impure quartz sandstones may be argillaceous, calcareous, feldspathic, glauconitic or micaceous, according to the ad¬ mixture. When derived from unassorted dis¬ integration-products of crystalline (feldspathic) rocks, they are called ˆarkoses.® Sandstone composed wholly or in large part of com¬ minuted coral or shell sand, cemented by infil¬ trated calcium carbonate, have been called ˆcalcerenites,® and make up extensive beds of clastic limestones to which the name sandstone is commonly applied by the quarrymen. Such lime-sandstones may analyze as high as 99.6 per cent calcium carbonate. Ordinarily the term sandstone is applied to quartz sandstones whether pure or impure.

Sandstone very commonly shows lines of stratification or bedding, where exposed in sec¬ tion, and a cross-bedding structure is very com¬ mon, the various minor layers of a bed being inclined in different and often opposite direc¬ tions. All sandstones of shallow-water deposit may show ripple marks, rill marks, wave marks and impressions and traces of various animals, while seolian sandstones may show fine bedding and wind rippling, together with great diversity in thickness. Fossils are not uncommon in sandstones, but only their impressions generally remain in the more porous rocks.

In the United States quartz sandstones are widely distributed geographically and geolog¬ ically. Among the more important commercial deposits are the following: The Cambric sand¬ stone of New York (Potsdam sandstone), Wis¬ consin, Minnesota, Michigan, etc. (Saint Croix sandstones), and the Rocky Mountain region, as well as early Cambric sandstones of the southern Appalachians; the Ordovicic (Saint Peter's)

sandstone of the upper Mississippi ; Medina (Siluric) sandstones of New York and Pennsylvania; the Oriskany, Hamilton and Portage (Devonic) sandstones of New York, mostly used for flagging purposes; the Waverly (Lower Carbonic) sandstones of Ohio, which furnishes the bulk of all the whetstones and grindstones of the country; the Pottsville and lower Coal-measures sandstones of Pennsyl¬ vania, West Virginia, etc.; the red-sandstones of the Connecticut Valley; New Jersey and

Nova Scotia (Jura-Trias) , and the Dakota (retacic) sandstone of the West.

(<01d Red Sandstone)J is the term applied to the continental (non-marine) type of deposit formed during the Devonic era in Great Britain and Ireland. This consists of a mass of red sandstone shales and conglomerates from 10,000 to 16,000 feet in thickness and contains igneous rocks aggregating 6,000 feet thick near the middle. From it many remarkable first-re¬ mains have been obtained. New Red sandstone was used for red sandstone of Permian and Triassic age in Great Britain. Consult Ries, H., (Building Stones and Clay Products (New York 1912) ; (Mineral Resources of the United States* (Washington, ann.).*

SANDUSKY, Ohio, city, port of entry, county-seat of Erie County, at the mouth of the Sandusky River, on Sandusky Bay, and on the Baltimore and Ohio, the Cleveland, Cincinnati, Chicago and Saint Louis, the Pennsylvania, the Lake Erie and Western and the New York Central railroads, about 55 miles west of Cleve¬ land.- A number of electric railroads enter the city from Cleveland, Toledo, Loraine, Norwalk and ether places. Johnson's Island, near by, was used as a place of confinement for Confed¬ erate prisoners during the Civil War. Cedar Point, Put-in-Bay, Kelly's Island, Middle Bass, Pelee and Gibraltar islands are all favorite fish¬ ing resorts and easy of access during the sum¬ mer months. The city has steamer connections with all the principal ports on the Great Lakes and considerable trade with Canada. The city is in a fertile agricultural region, in which the chief products are grapes, peaches, apples, grain and vegetables. Fishing is an important industry of the city; the annual amount sold in the local market and shipped is $1,500,000. Until prohibition the annual wine output was 2,000,000 gallons. Sandusky has 141 industrial es¬ tablishments, 28 of which are engaged in the products of iron and steel and other metals. Farm tractors, marine aeroplanes and stationary motors, iron and steel castings being a large part of this number. Other important products are brick, glass, limestone, sand, wearing ap¬ parel, paper and paper products, boxes, tools and cement. There are large coal and lumber yards. The coal export business ranks very high, the Pennsylvania Railroad maintaining the largest single road coal terminal on the Great Lakes. Chemicals, paints, crayons and dyes are fast becoming one of the major industries, the largest part of the crayons used in the United States being

manufactured here. There are two daily and two weekly newspapers. In 1915 the value of the annual product of the various in¬ dustrial establishments in Sandusky was $15,- 508,000, with an annual payroll of $3,500,000. The United States hatcheries at Put-in-Bay and the State hatcheries at Lakeside foster the fish industry. There are four banks, two national and two State, with a combined capi¬ talization of $550,000 and total assets of $9,000,- 000. The principal public buildings are the government building, public library, county courthouse, the State Soldiers and Sailors' Home with accommodations for 1,600 persons, and the new high school building, erected at a cost of $275,000. Sandusky has 25 churches, 6 public grade school buildings besides the high schools, 4 parochial schools and a modern busi ¬ ness college. The city was first settled in 1817

and was incorporated as a city in 1845. The Indians on 16 May 1763 captured Fort San¬ dusky and massacred the entire garrison with the exception of Ensign Paully, the commander. In 1782 the Indians defeated a force of 480 men under the command of Colonels Williams and Crawford. The municipal affairs are ad¬ ministered by a city commission of five and a city manager operating under the charter of 1915. Pop. (1920) 22,897.

SANDUSKY, a bay indenting the north¬ ern part of Ohio, an inlet of Lake Erie. It is 20 miles long and five miles wide and forms an excellent harbor. In some places large groves extend almost to the water edge.

SANDWICH, John Montagu, 4th Earl of, English politician: b. 3 Nov. 1718; d.. Lon¬ don, 30 April 1792. He was educated at Cam¬ bridge, traveled extensively in the Mediter¬ ranean countries and in 1739 returned to Eng¬ land where he took his seat in the House of Lords and became a political follower of the Duke of Bedford. He became Lord Commis¬ sioner of the Admiralty in 1744 and was shortly afterward appointed captain in the Duke of Bedford's regiment. His promotion in the army was rapid and at his death he was senior general on the list. He was appointed Ambas¬ sador to Madrid in 1763, but before he could depart on his mission he was made one of the principal Secretaries of State. While in this office he took part in the famous prosecution of John Wilkes. In 1768 he became Postmaster- General and in 1771 was nominated First Lord of the Admiralty, an office he held for 11 years. His own gain and party interest were made of paramount importance and to the insufficient equipment of the navy was justly laid much of the disaster which the British navy encountered in those years. His administration was on the whole

disastrous; his immoral private life was revealed by the murder of his mistress, and perhaps no jnan of the 18th century was held in more bitter contempt in England. He lived a practically retired life after 1782 and is the re¬ puted inventor of the sandwich as a time-saver for his gambling propensities.

SANDWICH, Canada, town and county- seat in Essex County, province of Ontario, on the Detroit River, opposite the city of Detroit, Mich., and three miles below Maidstone, On¬ tario. There is a Roman Catholic college, a government fish hatchery and manufactures of wines and robes. Pop. 2,302.

SANDWICH, England, a cinque, port and market-town in Kent. Saint Clement's Church is an example of early Norman architecture, and Saint Peter's dating from the reign of King John, has been restored and contains fine medieval monuments.

SANDWICH, Ill., city in De Kalb County, 50 miles west of Chicago, on the Chicago, Bur¬ lington and Quincy Railroad. There are man¬ ufactures of corn shelters, plows, reapers and windmills. Pop. 2,409.

SANDWICH ISLANDS. See Hawaii.

SANDY HILL, now HUDSON FALLS,

N. Y., village in Washington County, on the Hudson River, the Delaware and Hudson and the Hudson Valley railroads, about 52 miles north of Albany. There are rapids in the Hud¬ son and Baker's Falls about 70 feet in descent,

which serve to furnish good water power. Hudson Falls is in an agricultural region and in the vicinity are quarries of the well-known Kingsbury building stone. The chief industrial establishments are lumber mills, brick yards, furnaces, machine shops, paper and pulp mills, wall-paper print works and the extensive bag factories of the Union Bag and Paper Trust. There are large shipments of stone, farm prod¬ ucts and manufactures. The three national banks have a combined capital of $150,000. The vil¬ lage has an excellent high school, public graded schools and a public librarv founded in 1867, also a public park. It is one of the two county- seats of Washington County (Salem the other), has a courthouse and jail; also county clerk's office removed there (1905) from Argyle. Its name was changed to Hudson Falls in 1910. Between Hudson Falls and Fort Edward in the Union Cemetery is located the grave of Jane McCrea (q.v.) ; also that of Maj. Duncan Campbell of Inverawe, killed at the battle of Ticonderoga, 1758. Pop. (1920) 5,761.

SANDY HOOK, N. J., a low, sandy penin¬ sula in Monmouth County, about 18 miles south of New York. It begins at the Navesink High¬ lands and extends north six miles ; its width is less than a mile. On the west side of the penin¬ sula is Sandy Hook Bay. At the northern ex¬ tremity is a beacon light and, about a mile south of this point, is a lighthouse, 90 feet in height. At the outermost point is Fort Han¬ cock. On the peninsula is a government prov¬ ing-ground for ordnance and armor-plate.

SANDYS, Sir Edwin, English statesman and colonist, second son of Edwin Sandys, archbishop of York: b. Worcestershire, 9 Dec. 1561 ; d. October 1629. He was graduated at Corpus Christi College, Oxford, in 1579, taking his B.C.L. there in 1589. He entered upon a political career in 1599 and became a supporter of James I, upon whose coronation in 1603 he was knighted. He was a member of the king's first Parliament, and in 1619-21 he was treas¬ urer of the Virginia Company, which he ably promoted, rendering assistance enabling it to surmount many initial difficulties, and continu¬ ing his interest in the colony's affairs until his death. He was in his later years suspected of sympathy with the Parliamentary cause, but re¬ tained the favor of the king. Consult Brown, A., (Genesis of the United States) (1890) ; Fiske, J., (01d Virginia and Her Neighbors) (2 vols , 1900).

SANDYS, George, English poet; traveler and Virginia colonist, brother of Sir Edwin Sandys (q.v.) : b. Bishopsthorpe, Yorkshire, 2 March 1578; d. Boxley, near Maidstone, Kent, 1644. He studied at Oxford and later traveled in France, Italy, Turkey, Egypt and Palestine, writing an account of his journeys, which was of considerable ethnological and geographical value. He was appointed treasurer of the Vir¬ ginia Company in 1621, succeeding' his brother, Sir Edwin, and sailed for Virginia soon after¬ ward. He built the first water mill there and established shipbuilding and iron works. He was treasurer until 1625 and was appointed member of council in 1624-26-28. In 1631, after some controversy concerning his alleged in¬ fringements of the rights of other settlers, and failing to receive the post of secretary to the

new Commission for the Better Plantation of Virginia, he returned to England. He trans¬ lated while in Virginia the first 10 books of Ovid's (Metamorphoses (1626), the first work of the sort accomplished in America, and upon which his reputation as a poet rested to a con¬ siderable extent. He vas also author of Para¬ phrase upon the Psalms and Hymns) (1636) ; Paraphrase of the Song of Songs) (1641), and translated*

Grotius's 'Christ's Passion) (1640).

SANFORD, Edmund Clark, American col¬ lege president: b. Oakland, Cal., 10 Nov. 1859. He was graduated at the University of Cali¬ fornia in 1883 and in 1888 took his Ph.D. at Johns Hopkins University, where he held a fellowship in 1887-88. He taught at Oahu Col¬ lege, Honolulu, Hawaii, in 1883-85 ; became con¬ nected with the faculty of Clark University in 1889, was professor of psychology there in 1900-09, and since then has been president of the university. From 1895 he was joint editor of the American Journal of Psychology ; and he was president of the American Psychological Association in 1902. He is author of many papers on psychology and of (A Course in Ex¬ perimental Psychology (1898).*

SANFORD, Henry Shelton, American diplomatist: b. Woodbury, Conn., 15 June 1823; d. Healing Springs, Va., 21 May 1891. He studied for a time at Heidelberg University and in 1847 entered the diplomatic service and be¬ came attached to the Saint Petersburg legation. The next year he was acting secretary to Andrew J. Donelson at Frankfort and during 1849-54 secretary of legation at Paris. He was United States Minister to Belgium, 1861-69, and rendered service of the utmost importance dur¬ ing the Civil War. He negotiated the Scheldt Treaty of navigation and commerce and the first postal convention with France. In 1877 he was a founder of the International African As¬ sociation (now the Independent State of the Kongo) and secured the recognition of its in¬ dependence by the United States. In 1885 he was a delegate to the International Kongo Con¬ ference at Berlin, and in 1889 a delegate to the Anti-Slavery Conference at Brussels. In 1870 he founded the city of Sanford, Fla., and in later years gave much attention to its develop¬ ment.

SANFORD, Fla., city in Seminole County, on Lake Monroe, an expansion of the Saint John's River, and on the Atlantic Coast Line, 125 miles south of Jacksonville. The land was sold to Gen. H. S. Sanford in 1870, and he surveyed and cleared the site of the city, and built a saw mill, shops, etc. It has brick-paved streets and cement sidewalks. It is at the head of navigation for large steamers and exports oranges and other fruits and early vegetables including great quantities of celery. It contains railway car shops, machine shops, fruit preserv¬ ing and cigar factories. There is an efficient public school system. Pop. 5,588.

SANFORD, Me., town in central part of York County, on the Mousan River, and on the Boston and Maine Railroad, 35 miles southwest of Portland. The land was purchased from the Indians in 1661 and the project of laying out a town was formed as early as 1676, but no per¬ manent settlement was made till after 1730 — the exact date being uncertain. The chief man¬

ufacturing industries include shoe factories, woolen and worsted mills, flour and grist mills, saw and lumber mills; a capital of about $5,000,000 is invested in its industries. A large electric power shop derives power from the river and supplies the factories and lights for the town. There is a high school, established in 1874, and a public library which was founded by a library association in 1898 and became a free public library in 1900, and a town-hall. Its three banks have combined resources amounting to $3,100,000. The value of taxable property is $4,800,000. The government is vested in a town clerk, three selectmen, a treasurer, school board of three, auditor and the usual minor town officials. The municipal receipts and expenses average about $133,000. Pop. (1920) 10,691.

SANGALLO, sang-gal'lo, Antonio da,

Italian architect: b. Florence, 1455; d. there, 1534. He built in Montepulciano the church of the Madonna di San Biagio ; the palaces Cervini and Bellarmini ; in San Savino the palace of the Cardinal di Santa Prassede, in Arezzo the church of the Annunziata and the citadel in Civita Castellana.

SANGALLO, Antonio da (Coordiani), Italian architect, nephew of the preceding: b. Mugello, near Florence, 1485; d. 1546. He de¬ signed and built the church of Madonna di Loreto, at Rome; the Porta di San Spirito; the church of San Spirito; the palace Sacchetti ; the palace Farnese ; all in the same city. He also enlarged the Vatican and executed the famous fountain at Orvieto and had a share in building the Pilgrim's Church at Loreto. He was also successful in the construction of forti¬ fications.

SANGALLO, Juliano da, Italian architect (brother of Antonio the Elder) : b. Florence, 1445 ; d. there, 1516. At Florence he built the monastery of Santa Maria Maddalena de Pazzi and the Palace Condi; in Prato, the church of Madonna delle Carceri ; in Cajano, the Villa Poggio for the Medici. He also constructed the fortress at Ostia; and in Rome he built the fagade of Santa Maria dell Anima ; the monas¬ tery of San Pietro in Vincoli, and the flat roof in the church of Santa Maria Maggiore. He also constructed the citadel at Pisa. Consult Redtenbacher, 'Die Architektur der Renais¬ sance > (1886).

SANGAMON, sang'ga-mon, a river of Illi¬ nois, its headwaters are in Champaign and Mc¬ Lean counties. It flows southeast to Sangamon County where it unites with the south fork of the river, and changes the direction of its course, flowing northwest, then west, then northwest and enters the Illinois River by two channels. Total length, 225 miles. The con¬ fluence of the main stream (north fork) and the south fork is six miles east of Springfield and the mouth of the river is about 44 miles west-northwest

of Springfield.

SANGER, Adolph L., American lawyer: b. Baton Rouge, La.; d. New York, 3 Jan. 1894. He was graduated from the Columbia College Law School in 1864, and in the practice of his profession won rapid success. In 1870 he was appointed one of the commissioners of the United States Deposit Fund, and in 1885 was elected president of the board of aldermen of New York by a plurality of 25,000 votes. He

was a Presidential elector of the State of New York in 1880 and 1884, and 1886 was appointed commissioner of education, serving for three terms, and elected president of the board in 1893. He was one of the leaders of the Order of ((B'nai B'rith,® was president of the Board of Delegates of American Israelites, and for some years vice-president of the Union of American Hebrew Congregations.

SANGER, Joseph Prentice, American mil¬ itary officer : b. Detroit, Mich., 4 May 1840. In 1858-60 he studied at the University of Michi¬ gan and in 1872 received the degree of A.M. at Bowdoin. He served in the Civil War, being successively second lieutenant of the First Michi¬ gan Infantry, second lieutenant of the First United States Artillery and first lieutenant after October 1861 with battery of light artillery. He was wounded and was twice brevetted for gal¬ lantry; was orderly officer to President Lincoln for a short time in 1862, and after the war was adjutant of his regiment. He took part in the expedition against the Fenians in 1866. In 1872— 75 he was professor of military science, tactics and law at Bowdoin and in 1874 was admitted to the bar at Portland, Me. He was detailed to accompany General Upton on a tour of in¬ spection of the armies of japan, China, Persia, India, Turkey, Italy, Russia, Austria, France and England in 1875-77. In Mav 1898 he was made brigadier-general and in 1899 was as¬ signed to command the department and subse¬ quently the district of Matanzas, Cuba. Subse¬ quently he was made director of the census of Cuba and Porto Rico ; in 1901-02 was in¬ spector-general and chief of the staff, director of the Philippines, director of the Philippine census in 1902; became major-general in 1904 and was retired the same year. In 1910 he was a member ot the Brownville court of inquiry.

SANGIR (sang-ger') ISLANDS, Malay Archipelago, a group midway between the northeast extremity of the Celebes and the southern extremity of the island of Mindanao in the Philippine group. The largest islands of the group are Great Sangir, Siau (Siave, Siauw) and Tagulanda. The former is

the most northerly and contains the volcano of Aboe (4,000 feet), whose eruptions of 1812, 1856 and 1892 caused great destruction and ap¬ palling loss of life. All of the islands are mountainous, partly volcanic and well culti¬ vated. From the craters of the volcanoes of Siau and Roang constantly issue clouds of sul¬ phur, and earthquakes are frequent. The chief products are rice, pisang, sago and cocoanut-oil. Edible birds' nests abound in the smaller islands, yielding considerable profit. The ex¬ ports are copra, nuts and nutmegs. The natives are Malays. They adopted in the 1 5th century the Mohammedan faith, but were afterward converted to Christianity by the Portuguese. The islands constitute a dependency of the Netherlands, and through the missionaries schools have been built. The islands are gov¬ erned by padschas or princes. Pop. 76,900.

SANGRAAL, sang-gral'. See Grail, The Holy.

SANGRE DE CRISTO, san'gra da kres'to, a range of mountains in the south cen¬ tral part of Colorado. See Rocky Mountains,

SANGSTER, Charles, Canadian poet: b. Kingston, province of Ontario, 16 July 1822; d. 1893. He was self-educated, and in 1849 became editor of the Amherstburg Courier, but shortly afterward returned to Kingston and engaged in journalism there. He was employed in the Post-office Department at Ottawa in 1868-86. His verse received favorable notice both in America and England, and the highly patriotic character of it is credited with greatly ad¬ vancing the cause of confederation in Canada. Author of (Saint Lawrence and the Saguenay (1856) ; Hesperus and Other Poems) (1860).*

*SANGSTER, sang'ster, Margaret Eliza¬ beth Munson, American writer: b. New Ro¬ chelle, N. Y., 22 Feb. 1838; d. 3 June 1912. In 1858 she was married to George Sangster, en~ gaged in writing for periodicals and in 1871 be¬ came associate editor .of Hearth and, Home. In 1873-79 she was editor of The Christian at Work and in 1889-99 she was editor of Harper's Bazaar. After 1899 she was a staff contributor to the Ladies * Home Journal. Her works are marked by a high religious purpose and an earnest desire to brighten and beautify every¬ day life. Her juvenile works include (May Stanhope and Her Friend> ; (Little Knights and Ladies, * etc. Among her most noted poems are (Our Own' ; (The Sin of Omission) ; (Are the Children Home?' and her other publications include (Poems of the Household) (1883) ; (Home Fairies) (1887) ; (Winsome Woman¬ hood5 (1900) ; (Lyrics of Love) (1901) ; (The Little Kingdom of Home5 (1904).*

SANGUINARIA, a monotypic genus, the bloodroot (q.v.) of the family Papaveracece, indigenous to eastern North America and often cultivated for ornament. It prefers sheltered places in woods, where it can grow in

leaf- mold. The thick, palmately lobed leaf is lapped around the bud, which swiftly outgrows its protector, loses its two fugacious sepals and opens into a star-shaped flower with several fleshy white petals and a mass of golden stamens in the centre. The flower closes again at night or on shady days, since it blooms in the earliest, cool days of spring. The leaves continue to grow during the summer and be¬ come nearly seven inches long. The seeds are contained in spindle-shaped capsules. The whole plant is very brittle and succulent and when broken, especially at its thick fleshy root- stock, an acrid red juice flows copiously forth. This juice has caused the plant to be called bloodroot, and it was considered, by the doc¬ trine of signatures to be a cure for blood diseases ; later it becomes officinal as a cathartic, emetic and expectorant. The sanguinaria is also called red puccoon or Indian paint, because th aborigines used it as a stain for their skins and as a dyestuff.

SANHEDRIN, san-he'drin, a Jewish court of justice, especially the supreme judicial tri¬ bunal of the Jews, existing in and before New Testiment times. According to rabbinical tradi¬ tion the institution of the Sanhedrin is to be traced to the time of Moses and the events mentioned in Num. xi, 16, 17, but this view is now generally rejected, and the time of its in¬ stitution referred to a much later date. The most probable opinion is that it consisted of 71 members, including the president. From in¬ cidental notices in the New Testament we

learn that the members were drawn from three different classes: (

1807).

SANHITA, san'hi-ta, the Hindu designa¬ tion of that part of the sacred writings of the Brahmins, which contain the mantra or hymns.

SANIDINE, or GLASSY FELDSPAR,

an important rock-forming mineral. It is a variety of orthoclase, is found in tabular or square-prismatic crystals, often Carlsbad twins, frequently quite vitreous in appearance. It oc¬ curs only in the recent eruptive rocks such as obsidian, phonolyte, trachyte and rhyolite. Its best-known locality is the Drachenfels, Ger¬ many.

SANITARY COMMISSION. See United States Sanitary Commission, The.

SANITARY ENGINEERING, the" branch of civil engineering which relates

to structures and operations for promoting and guarding the health of communities. It deals with the means of providing cities and towns with pure and wholesome water, with the means for the re¬ moval in underground channels of the spent water supply called sewage, as well as of such ground water and rain water as may be neces¬ sary, and also with the means of collecting and lemoving the various solid waste products and refuse by cartage, such as garbage, rubbish, ashes and street sweepings. In other words, sanitary engineering embraces the design and construction of all works contributing to public health and comfort and all means of preventing offensive conditions due to a large number of persons living closely together, as in cities or towns.

In all cases the sanitary engineer, giving his first attention to sanitation, should have for his second purpose the construction of his works so as to bring about the desired result at the least cost, when considering both the first investment and the operating expenses.

The relations of the public health to this branch of engineering are made plain in the article Sanitary Science. With the rapid ad¬ vance of practical knowledge the profession of sanitary engineering has in recent years gradually called for an increased practical knowledge of vital statistics, of chemistry and biology as applied to its special branches. It is not necessary for the sanitary engineer to be a trained analyst, or accomplished in the de¬ tails of state medicine, but he should be in touch with the general progress in these sub¬ jects, if his work is to be on the highest plane of excellence. This necessity will be better ap¬ preciated after noting a brief review of the leading phases of sanitary engineering.

In Europe, progress in sanitary engineering commenced at an earlier date than in America, largely because the population abroad was much denser. The need for improvements resulted in laws which compelled the installation of bet¬ ter sanitary works at a rapid rate. In this country the States of Massachusetts, New York, Ohio and a few others, through their boards of health, have a general supervision of ques¬ tions of water supply and sewerage, so far as the sanitary aspects of new or additional works are concerned. This has been generally helpful, and eventually will probably be extended to practically all of our States. The rules, regu¬ lations, etc., of the State sanitary authorities on these matters is a feature of the subject which the sanitary engineer has to consider, as well as the decision of courts where these form a precedent relative to the sanitary problem under consideration.

For a clearer discussion of the subject to be dealt with hereunder, it will be well to divide it into three parts: (1) Water Supply and Its Purification; (2) Sewerage and Sewage Dis¬ posal, and (3) Refuse Collection and Disposal.

1. Water Supply and Its Purification. — In Biblical days, pure mountain water in some in¬ stances was collected and conveyed through gravity aqueducts to cities and towns. There are some cases to-day, even in civilized coun-

tries, where substantially the same procedures as used many centuries ago are still applied. Generally speaking, however, the rapidly in¬ creasing density of population, the wide dif¬ ferences in climatic, geological and topographi¬ cal conditions, and the improvements made in materials and methods of construction, have rendered necessary a vast elaboration of the early principles, in order to furnish the essential basis upon which modern water supplies under various conditions are built and operated. This is true to a greater degree in the case of works for the purification of sewage and water, and the disposal of garbage, which have more recently furnished practical problems in this country.

In the field of water supply engineering there are some instances where pure mountain waters can be readily obtained ; some where the sup¬ plies can best be obtained from underground sources; others where the most available sup¬ plies are obtained from rivers near at hand, which require purification and pumping to reservoirs of artificial construction and still other instances where large cities have at hand only small streams, upon which it is necessary to build large dams to store water during the rainy seasons to serve the needs of the com¬ munity during times of drought.

Before the development and general accept¬ ance about 1880 of the germ theory of dis¬ ease, comparatively little attention was given to the sanitary character of water supplies. Al¬ though the. danger of sewage pollution was then recognized by some, its full significance was not appreciated, especially in the case of water¬ sheds. where the population was largely rural in its nature, until there were encountered dis¬ astrous typhoid fever epidemics, as at Plym¬ outh, Pa., Lowell and Lawrence, Mass., New Haven, Conn., etc. In recent years there has been a marked awakening to the needs of pure water supplies in America, as shown by the consideration given this subject by a majority of the larger cities, and by the practical accom¬ plishments reached in many instances. Com¬ pared with the European water supplies, there is yet wide room for improvement in this country, as our prevailing standards are gen¬ erally below those established in northwestern Europe. Thus, in Germany it is an edict of the Imperial Board of Health, following the cholera epidemic in Hamburg in 1892, that no surface water shall be used as a public water supply without first being filtered in a satis¬ factory manner. In Europe generally this view is now held, and the benefit is shown by the fact that the death rate from such water-borne diseases as typhoid fever is only one-third to one-half of what it is in American cities.

As to the so-called mountain streams, the rapid increase in population in this country makes it each year more and more difficult to obtain even reasonably pure municipal water supplies from sparsely inhabited watersheds. In the case of small cities and towns this can still be done in some instances, but usually it neces¬ sitates the purchase of many properties situated on the watercourse, and a systematic patroling of portions of the remaining area, in order to guard constantly against pollution. This latter procedure is especially effective in conjunction with large storage reservoirs in which self¬

purification takes place, as in the case of the New York and Boston supplies.

A ground water supply, where the conditions are favorable, yields as good a water from a sanitary standpoint as can be obtained. This results, of course, from the efficient filtration which takes place under the conditions of nature, as the rainfall percolates through the earth and reaches the underground natural reservoirs from which it is drawn. In this country the most notable ground-water supply is that which furnishes about half of the sup¬ ply for the city of Brooklyn, and aggregates a daily quantity of about 50,000,000 gallons. Long Island is essentially a large territory of sand, the pores of which afford facilities for the storage of large volumes of rain-water in this naturally formed reservoir, and from which water can be

obtained continuously dur¬ ing ordinary dry weather in daily quantities equal to at least 400,000 gallons per square mile. These conditions are unusual, and there is no other instance where such a large volume of underground water is obtained. Many small cities and towns, however, obtain a satisfac¬ tory supply from underground streams, which flow through valleys containing deep layers of porous sand and gravel. With varying con¬ ditions in the geological formation, these under¬ ground supplies naturally present marked differ¬ ences in the quality of water obtained there¬ from. In some instances the ground water is very highly charged with lime and magnesia, thus making the water too hard for acceptable use by the consumers, and especially by those who use it for steam-raising purposes. Under these conditions the sanitary engineer has sometimes to consider the chemical aspect of the problem and to recommend plans for the softening of the water, such as is the case in many places in the southern part of England, where water is obtained from wells driven into the chalk cliffs, and in some of our own cities of the Middle West.

Another feature which the sanitary engineer has to consider with regard to ground waters is the presence of iron dissolved from the materials in which the underground water is stored, and which causes it to deposit iron rust, which is seriously objectionable because of the stains it produces in laundry use. This feature can be eliminated by aerating the water and passing it through filters, as is done at Reading, Mass., Red Bank, N. West Su¬ perior, Wis., and a number of places in the northern parts of Germany and Holland.

Water derived from rivers flowing near cities and towns forms one of the principal sources of supply in America. In early years raw-river water supplies were fairly satisfac¬ tory in their hygienic condition. But with the rapidly increasing population, river pollution has become so great that now it is rare for a town or city of any size to obtain a fairly satisfactory supply from river water when taken in its raw condition.

In the Southern and Western country there is the added difficulty of the well-known mud¬ diness, due to the large quantities of silt and clay entering the rivers from soil erosion, and which for many months at a time make the water decidedly turbid and dirty. To remove this silt and clay constitutes one of the prin-

cipal tasks of the sanitary engineer. This, as is described in Water Supply,

is accomplished by sedimentation and filtration, and in the last few years a large number of the more im¬ portant cities have projected, or are building, improvements of this nature.

The cities situated upon the Great Lakes at one time obtained from them clear and pure water quite readily. In the instance of several of the larger cities, however, the time has ar¬ rived or is rapidly approaching when there is serious difficulty in obtaining pure water from the lakes in its raw condition, owing to the amount of sewage which reaches the water sup¬ ply intakes. Usually the pollution is from the city's sewers, but in some instances it is from those of neighboring cities. The earlier intakes, located half a mile or so from shore, were pre¬ sumably in many cases capable of yielding as pure water as now can be obtained from in¬ takes four miles or more distant from the shore. That the time is approaching when some treatment of the lake supplies is becoming de¬ sirable, if not necessary, is shown by the con¬ sideration given to that subject by the cities of Milwaukee, Chicago, Cleveland and Buffalo.

In the northern, and especially in the north¬ eastern, section of the country, water supplies are frequently obtained from small streams, upon which it is necessary to store water in large impounding basins in order that portions of the rainfall of wet seasons may be made available for seasons of drought. This has de¬ veloped many problems' for the sanitary en¬ gineer to consider, especially the care necessary in the selection and preparation of reservoir sites to guard against various vegetable growths, such as give rise to objectionable tastes and odors. The storage of water for long periods of time in such basins naturally results in sedi¬ mentation, and in bleaching should the water be colored, which improves the quality of the water so far as its appearance and sanitary aspects are concerned, and which incidentally brings about safety through the long interval which elapses as the water passes through the basins, thus bringing about the death of many objectionable germs which enter the reservoir.

The number of water purification plants for municipal water supplies is rapidly increas¬ ing each year, and eventually it is fair to as¬ sume will include every important surface- water supply in America, as is now the case in the most developed parts of Europe. There are now in this country over 200 filtration plants, the great majority of which are plants of the so-called rapid or mechanical type, which were built at first in a not very durable manner and are lacking in many appurtenances now recognized as essential to good works.

While filtration works will always be neces¬ sary where the raw water is sometimes or al¬ ways turbid and unpleasant to sight, there are many cases where the expense for filtration is prohibitive, but where some

treatment or puri¬ fication is necessary.

Since about 1905 a process has been de¬ veloped in this country which has been a great boon to the sanitary engineer. It had been found that small amounts of hypochlorite of lime, and later of liquid chlorine, when added to the water would destroy pathogenic bacteria contained in it and yet not be injurious to the

consumer of the water. It was found con¬ trary to what had previously been thought nec¬ essary, that not all bacteria required destruc¬ tion, but only those that were pathogenic and fortunately least resistant to the chlorine. By this simple and comparatively inexpensive means, typhoid fever and similar bowel diseases, when due to a polluted water supply, are almost entirely prevented.

While American engineers can design and build good filtration plants, it is an unfortunate fact that up to the present time the filtration plants in America, of both the slow or sand type and the rapid or mechanical type, have not, generally speaking, been well operated, al¬ though there are exceptions to this rule in the case of filtration works of each type. The proper operation of waterworks systems to provide palatable and pure water at all times, especially in connection with purification or filtration works, is of exceeding importance and will require the aid of engineering talent. In this field there appears a favorable opening for many young sanitary engineers. In addition to the sanitary aspect of waterworks engineering, the engineer has frequent occasion to use his judgment and knowledge concerning other line of hydraulics, including the flow of streams, the construction of dams and reser¬ voirs, pumping stations and distributing systems which will afford suitable quantity of water and pressure not only for domestic use but also for fire purposes. The engineer by his knowl¬ edge cannot only heighten the efficiency of his works, but save large sums of money, as, for instance, in the distribution system, by apply¬ ing among others the principle that a pipe of double capacity will not cost twice as much money, etc.

It is important to control the quality of the water, not only for sanitary purposes, but also for the preservation of the piping system in a proper condition. If in purification plants too much carbon dioxide is allowed to remain in the water, we are apt to get the (

2. Sewerage and Sewage Disposal. — A sewerage system has for its purposes the col¬ lection and removal of the foul waters of a community. The term ((sewerage® is applied to the system of collecting pipes and underground channels. It begins in the houses at the various receptacles where water is used for cleansing purposes, extends through the streets and

ends at one or more places where this dirty water, which we call sewage, is finally discharged. Sewage contains a small quantity of organic refuse matter in a condition to be easily and rapidly decomposed. In round numbers it con¬ tains in our country less than one part of or¬ ganic matter and one part of mineral matter to every thousand parts of water. Although this organic matter is so greatly dilluted, it is nevertheless capable of causing considerable trouble. It decomposes rapidly in warm weather or within 24 hours, and then putrefac¬ tion sets in with the accompaniments of offen¬ sive odors, due largely to the growth and ac¬ tivity of those lower forms of life called bac-

leria. Fresh sewage has no strong or offensive odor. It smells like dish water, and no worse odor than this prevails at the outfall or point of discharge, in a system of sewers that is not very large but fs well planned, built and care¬ fully maintained and operated.

It is one of the tasks of the sanitary en¬ gineer to cause sewage in its flow through the sewers to be discharged both quickly and com¬ pletely, so as to allow no sewage matters to be stranded and retained in the sewers. To this end it is necessary that the pipes be given a grade or pitch, which will cause the sewage to flow with a good velocity and keep on mov¬ ing with its suspended matter without inter¬ ruption, from the starting point at the house to the place of final disposal. It is also necessary to see to it that the curves, bends, junctions, etc., are so designed and built that they will not operate to retard the flow nor allow accu¬ mulations of solid matter at various points where they will decompose and give rise to objectionable odors. An important considera¬ tion, formerly overlooked, is the necessity of giving the sewage as smooth a surface as possible to flow upon. This not only causes less friction, a greater velocity and smaller sewers, but also prevents the adhesion and growth of algae and suspended sewage par¬ ticles, which by putrefaction produce foul¬ smelling gases. Therefore, vitrified pipes are advantageous. When bricks are used the mortar joints should be carefully smoothed. When ce¬ ment concrete is used the interior surface should be well compacted and smoothed.

To avoid trouble from bad odors it is neces¬ sary to have an open and free communication from the sewers of the houses and streets to the outer air, so that there can either be a free escape or free admission of air, as the case may be, and so that a constant atmospheric pressure is maintained on both sides of all traps to the system.

Due to the variation in the volume of liquid flowing through the sewers at different times of the day, it is impossible to avoid entirely some incidental deposits of solid matters by adhesions to the sides of the sewers, and ac¬ cordingly it is essential from time to time to flush them, that is, to cause a materially in¬ creased flow of water intermittently to pass through them, either by natural or artificial means. To secure the best ventilation of the sewers it is customary to have frequent open¬ ings in the streets through manholes covered with gratings and also to extend the house pipes beyond the roofs, so that the differences of temperature in the various parts of the sewer system will permit of a free and natural circulation of air.

The removal of ground water and storm water forms another of the tasks of the sani¬ tary engineer. In some cases they are removed in the same sewers as is the domestic sewage. Then we have a so-called combined system of sewerage. In others there are separate systems for removing the storm water and the sewage. Where cities are situated on very flat areas, drainage is one of the most important munic¬ ipal works, as at New Orleans, where exten¬ sive drainage canals and pumping stations are in operation to collect the rainfall and dis¬ charge it into Lake Pontchartrain.

There were very few well-built sewers in

this country, prior to 1875, and no city which was equipped with a thorough system. Since 1880 great progress has been made in this branch of sanitary engineering in America, partly due to the fact that American cities, as regards sanitary matters, were far behind the European cities, notably in England and Germany, and partly due to the rapid growth of many communities in this country. Many sewerage systems are now built in the United States, the design and construction of which compare favorably with European works.

Prior to 1880 the subject of sewage disposal and sewage purification made little demand upon the sanitary engineer, for the reason that invariably the sewage was discharged into the nearest watercourse and, generally speaking, serious nuisances did not result under the con¬ ditions then existing. With the development of sewerage facilities in this country and the in¬ crease in population this subject began to press for attention. In Europe there were a few isolated cases where sewage had been used for purposes of irrigation for 100 years or more, but it was not until the middle of the 19th cen¬ tury that it became the object of careful study in Europe, especially in England.

The first method of purification for the dis¬ posal of sewage was that of irrigation, that is, the application of sewage to land to facilitate the raising of crops. In some places, as Paris and Berlin and many places in England,

this is still done with considerable advantage, although in no instance does the income received from the sewage farms equal the capital charges upon their purchase and adaptation for irrigation pur¬ poses. In many places, also, it is very difficult and expensive to secure adequate areas of suit¬ able land within any reasonable distance of the community having to dispose of the sewage. This condition resulted about 1850 in England in various efforts to secure those constituents of sewage which may be used for fertilizing pur¬ poses in a manner so that they could be placed upon the market. Various chemical treatments to facilitate this end were developed and pat¬ ented, until there was suggested a chemical treatment for the disposal of sewage which in¬ volved the use of one or more of nearly every chemical which was then manufactured on a commercial scale. Although all efforts then and since failed to establish any method by which the fertilizing properties of sewage could be availed of with commercial success, this propo¬ sition now and then still comes to the attention of the sanitary engineer. The cause of the im¬ practicability of this feature lies in the great dilution of the sewage matters and the expense of handling so much other material to get in available form so little nitrogen, potash and phosphorus. In arid parts of our country the value of the fertilizing parts of the sewage is almost insignificant to that of the water itself for the irrigated farms, particularly as its sup¬ ply is quite regular and reliable. The problem of sewage disposal has been and will continue to be one for the sanitary engineer to solve at the least expense necessary for getting rid of the sewage in a manner so that there will be no sanitary objection to the procedure.

After 1870 chemical precipitation processes in various forms were introduced throughout Europe, especially in England, where the density of population and the small size of the streams

first forced the attention of engineers to this general subject. In some instances chemical precipitation, which can remove under favor¬ able circumstances about 50 per cent of the ob¬ jectionable organic matter and about 90 per cent of the total suspended matter, was ade¬ quate for local conditions. In this country chemical precipitation works were built about 1890 at Worcester, Mass., and were earlier projected for Providence, R. I., although many delays occurred in the carrying out of the works for the latter city. A few small cities also adopted this method of purification, but it seems to have had no widespread development in America, nor are there indications that such will be the case in the future. In England chemical precipitation methods have in many cases outgrown their usefulness, due to the fact that they are not capable of producing a suffi¬ cient degree of

purification, and the time is ripe when other and more efficient methods must be considered to supplement chemical precipitation works if the latter are to be used at all. Thus, at Worcester, Mass., several acres of sand beds have been built by which to further purify the effluent of the chemical precipitation works. In New England, generally speaking, sufficient areas of porous land (glacial drift formation) are available, so that the cheapest and best method of sewage purification is afforded by the application of the sewage to land for short periods at a time, between which the land is thoroughly cleansed by the entrance of air. This is called intermittent filtration.

There are two aspects to the problems of sewage disposal. One refers to conditions when it becomes necessary to purify the sewage so as to protect the body of water into which it is discharged, if this is to be used for drinking purposes farther down stream. The other re¬ lates to the prevention of over-polluted bodies of water to a degree that results in nuisances from bad odors. In Massachusetts the first of these aspects of the problem of sewage disposal has been developed further than elsewhere in America. Intermittent sand filters have been adopted in numerous cases to purify the sewage with sufficient thoroughness so that the streams into which the filtered sewage is discharged may be used for drinking purposes after some additional treatment. Thus the sewage of the small cities and towns of Natick, Framingham, Marlboro and Westboro is purified nominally to protect the water supply of the city of Bos¬ ton, and also the brooks themselves into which the effluent is discharged.

The prevailing method of sewage disposal in America is by a sufficient dilution in the most convenient watercourse. Seaboard cities find this method to be generally satisfactory, par¬ ticularly if the sewage is first carefully screened so as to free it from those particles which would float and be unsightly. Some in¬ land cities on lakes and large rivers can also dispose of their sewage in this manner satisfac¬ torily for some time yet, but there are others where more or less trouble results at times of low stream flow, and these troubles are bound to increase as the cities grow in size. Many of them are gradually shaping things somewhat toward the ultimate adoption of some form of sewage treatment works, but generally the ex¬ pense is so great that material progress is slow.

and it may perhaps only be accelerated by the action of the courts.

Sewage purification works require a con¬ tinual municipal expense which usually results in comparatively little benefit to those who have to bear it. Accordingly, where land treatment is not available, cities are anxiously awaiting the results of new methods by which the cost of works of artificial construction will be les¬ sened as compared with those of earlier designs.

This is true not only in America but also in Europe, where improvements are needed in many cases.

Accordingly, a few years ago much was heard by the sanitary engineer of this country concerning the merits of the so-called septic process and of contact beds made of coke or broken stone, which procedures have been much studied in England since 1895. More recently still other methods have been proposed and much discussed in both England and our coun¬ try. They are the activated sludge process which was very extensively investigated in Mil¬ waukee and the Miles acid process tested in New England. The former is a process re¬ quiring a very thorough settling and aeration of the sewage. The result is a very clear and in¬ offensive effluent on the one hand and a concen¬ trated but odorous sludge on the other, which can be converted into a good fertilizer. The Miles acid process is designed to extract grease from sewage, by adding sulphuric or sulphurous acid to precipitate the solids and by degreasing the resulting sludge.

All these methods are more or less intimately associated with biological processes bv which the bacteria convert putrescible organic matter into harmless and stable mineral matter. While these processes are not so effective or econom¬ ical as was at first claimed for them, they have merit and are worthy of careful consideration, where other methods are found more expensive or are impracticable. The disposal of liquid trade wastes is becoming an important factor in some of the industrial centres, and this prob¬ lem is one which in future years is bound to come more and more within the attention of the sanitary engineer.

Generally speaking, the sewage disposal methods should consist of means (1) to remove the objectionable floating matter; (2) to let the solids readily settle; (3) to treat the liquid freed from floating and solid matter, so that it will be oxidized and become inoffensive. The first method may be accomplished by screens, also scum boards.. The second by settling basins and tanks. Grit is deposited when the velocity slows down to less than 12 inches per second, and can be collected in small basins. Lighter matter will settle when the velocity is not over a very few inches per second. Large basins are required for this purpose, the size depending upon the quantity of suspended matter thus to be removed. The third method requires the oxidation of the liquid. This is accomplished by a discharge into a running stream of which the minimum flow is sufficient for the required oxidation (dilution). It is also accomplished by a percolating through porous material. If it is sand the percolation is slow and a high degree of oxidation is secured (intermittent filtra¬ tion). If it is broken stone of egg size and the sewage is sprinkled over it the percolation is

more rapid and the oxidation is not as great (trickling filters), but is sufficient for many cases, particularly where a subsequent dilution in a sufficiently large stream can be given. Oxidation can also be accomplished bv allowing the sewage to be in contact with the sides of broken stone for several hours and then dis¬ charged (contact beds). Here the oxidation is also not complete and usually requires subse¬ quent dilution or sand filtration of the effluent.

The disposal of the floating matter is gen¬ erally done, first by pressing and then by burn¬ ing in a furnace. The disposal of the grit is generally by washing and then dumping. The disposal of the finer sediment forming sludge is less simple. The sludge from septic or single tanks has usually been dumped in shallow layers over prepared areas and dried. It is quite offensive until dry. The sludge from Imhoff or double-deck tanks is kept quietly under water and separated from the flowing sewage. This permits a decomposition that is not septic, the gases evolved being almost wholly carbon di¬ oxide and methane. After several months the sludge is sufficiently decomposed so that it can be withdrawn, inoffensively dried and used as a garden soil which it resembles.

3. Refuse Collection and Disposal. — An¬ other branch of municipal works to which the attention of the sanitary engineer is beginning to be drawn is the cleaning of streets and the disposal of garbage and other municipal wastes which cannot be removed by water carriage in underground channels. They include ashes, street sweepings, dry rubbish and kitchen garbage, all of which require collection by special cartage. In small communities the dis¬ posal of this refuse is not very difficult or ex¬ pensive, but in the large cities it is frequently a perplexing and expensive undertaking. It is also an important sanitary matter, as disease, bad odors and general discomfort result from improper and ineffective attention to these matters.

Street cleaning in this country has not yet been developed to the standards of western Europe, which is due to their better methods of city government. The conditions for clean streets are, first, a firm and fairly smooth pave¬ ment ; secondly, a well-trained and permanent force of cleaners and flushers; and, thirdly, a systematic and frequent sweeping, and, where practicable, also a flushing to remove the dust which cannot otherwise be thoroughly removed.

The refuse originating in the houses consists of garbage, ashes and rubbish. It is necessary to educate the people to a proper house treat¬ ment to prevent unsanitary conditions and to suit the method of collection which

the city has established. This may be a combined or sepa¬ rate collection. If it is combined then all refuse is dumped at the house into the same receptacle or can and thus collected. If it is separate, then the refuse is generally and best separated into three parts — garbage, rubbish and ashes. Each material is put into a separate can and collected at different periods. Garbage, because it rapidly putrefies, should be collected daily or at least every two days in summer, and in winter at least twice weekly. Rubbish and ashes are col¬ lected weekly or monthly as deemed best. All vehicles should be specially designed to prevent any nuisance frofn leakage, dust or odors. The

collectors should be well trained to perform their specific duties and to thoroughly know their territory.

The disposal of refuse differs according to local conditions. It should first be sanitary and second economical. Sanitary engineering can now provide the solutions. In Europe the usual custom is a combined collection and a disposal by incineration. In America this is practised in some of our cities. In most of them a separate collection has been found to be more econom¬ ical. The reason is that we discard and throw into the refuse much material which is utilized in European houses. The rejected matter when collected in large quantities may be utilized at a profit. Fresh garbage from American hotels and residences furnishes an excellent food for hogs and is valuable for this purpose. Many small cities in the United States and some large ones (Baltimore) are now adopting this method of disposal. Where it cannot be collected fresh enough for feeding it can be subjected to a treatment with heat and naphtha so that it yields a paying quantity of grease and of fertilizer filler. This process is called reduction and is employed in most of the large cities of this country, from New York down. The war has caused a greater economy in the use of food and, therefore, a serious reduction of wasted grease, so that most of the reduction works have lately been working at a great disadvan- tage.

Picking over the rejected matter at suitable establishments has also been practised in Europe as well as here. But in Europe it has almost entirely been given up, as the profit was small and the danger of disease propagation was feared. In our country picking is still practised in a few cities.

Incineration, used extensively in Europe, is also gaining in practice here. The general rub¬ bish from houses, when it cannot be safely dumped to fill low places, is best disposed of by- burning. It is the safest solution from a sani¬ tary point of view and its destruction by fire is also generally the cheapest method if steam can be produced and used. It has been attempted to destroy also garbage in furnaces. While this may be a satisfactory

sanitary disposal, it re¬ quires the addition of fuel, is therefore ex¬ pensive and consequently the process is shirked. The temperature even when destroying organic matter is too low to produce steam. Better success has been had by burning garbage and rubbish together. The best success in Europe has been gained by adding also the discarded ashes, which in England contain about 25 per cent of unburnt coal.

In Europe and in some of our cities the in¬ cinerators have developed temperatures sufficient to produce steam, which is more or less utilized. In Hamburg and a few other cities the steam produced not only operates the plant, but is con¬ verted into electric power through storage bat¬ teries for wagons collecting the refuse. In all plants their required power and lighting is ob¬ tained from the incineration of refuse.

Shallow burial of garbage has also been practised with more or less success in forming productive soil, notably in Berlin, Germany. In our country the conditions are in many cases so different from Europe and even in the vari¬ ous parts of our country, that only a careful

study by competent engineers can reveal the best method, where the sanitary conditions are obtained at the least cost.

Speaking generally, the accomplishments in sanitary engineering in America since 1875 have been marked by furnishing cities and towns with good water supplies and with efficient sewers and drainage, and some have also plants for refuse disposal. Improvements in this line began at a later date here than abroad, and in many ways the Europeans are still in advance as regards the carrying out of the well-estab¬ lished principles of this subject, although the contributions and experiences of Americans have added much to its general knowledge, espe¬ cially as applied to the specific conditions here existing. In no field of civil engineering does there appear a more promising opening, for study and practical activity than in the sanitary branch. See also Sanitary Science.

Rudolph Hering,

Hydraulic Engineer and Sanitary Expert.

SANITARY SCIENCE. The term sani¬ tary science is conveniently employed to cover that body of precise, correlated and organized knowledge which has to do with health, and es¬ pecially such part of that knowledge as deals with the environment rather than the individ¬ ual

person. It is one of the inductive sciences like physics, chemistry and biology, of which last it is a subdivision. Like the other induc¬ tive sciences it depends upon observation, gen¬ eralization and verification, and includes a body of established doctrines which have been reached by these processes. From the etymological point of view sanitary science is literally the science of health, and is, therefore, strictly speaking, equivalent to hygiene. Until quite re¬ cently, however, the term sanitary science was used in Great Britain largely to the exclusion of the term hygiene, while on the Continent the reverse was and still is the case. The present tendency in America appears to be to employ both terms, with somewhat special meaning at¬ tached to each ; although the fact that large numbers of medical and scientific men have brought home with them from Germany the term "hygiene" is unquestionably having its in¬ fluence in favor of this term in America as well as in Great Britain. The probability is that for the next few years at least both terms will be used, perhaps somewhat indiscriminately, sani¬ tary science and sanitation- being applied to the more familiar and more practical aspects of hygiene, such as water supply, milk supply and food inspection, and especially to its more en¬ gineering aspects ; the term hygiene being more often reserved for the less familiar and es¬ pecially for the more medical and physiological aspects of the science of health.

Definitions. — In point of fact there is to¬ day a real and practically important distinction between the two terms. Hygiene in its broadest aspect undoubtedly includes everything re¬ lating to health and covers, therefore, both per¬ sonal and public hygiene. Of late years, how¬ ever, with the development of its engineering aspects (sanitation) on the one hand, and its physiological aspects (especially serum therapy) on the other, there has come about a real and practical differentiation between hygiene and sanitation, the former being largely in the hands of physicians, the latter largely in the

hands of sanitary engineers. This differentia¬ tion has furthermore a sound biological basis; for if we regard health as the normal operation of the human mechanism and disease as its abnormal operation, then it is easy to see how some diseases may be warded off by increasing the efficiency (and especially the vital resist¬ ance) of that mechanism, while others may be prevented by an adequate control of the en¬ vironment. Smallpox, for example, may be warded off by vaccination, a purely physiologi¬ cal or medical, and, therefore, on our classifi¬ cation "hygienic" process, but not by mere sani¬ tation. Typhoid fever, on the other hand, was formerly prevented chiefly by proper control of the environment — for example, by the purifica¬ tion of water supplies, the purification of sewage and the protection of the purity of food supplies such as milk and oysters, these being "sanitary" procedures dealing directly with the environ¬ ment, and

only indirectly with the individual or person. To-day, however, it is also and very efficiently prevented by "vaccination" with a serum made from dead bacilli of the same dis¬ ease. We may still advantageously employ both terms, namely, hygiene and sanitation (the basis of which latter is sanitary science), keep¬ ing hygiene more particularly for procedures directly affecting or dealing with the bodies of the people themselves and sanitation for proced¬ ures dealing directly with the environment and only indirectly with the human mechanism. If, however, the term hygiene be preferred for the whole subject, then obviously the engineering, environmental or "sanitation" aspects of it fall under the subdivision "public hygiene" or "public health," and the remainder under "per¬ sonal hygiene" or personal health. See Public Health ; Hygiene, etc.

It is important at the outset to form ideas as clear and definite as possible of the nature of health and disease, terms which though con¬ stantly used are often but little understood. We shall probably not go far wrrong if we accept the dictum of Huxley that "the characteristic of modern as contrasted with ancient physiology is the conception of the human body as a phys¬ ical mechanism" and regard the latter as an in¬ tricate piece of machinery subject to all the conditions and limitations to which any machine is exposed. If around this essentially mechan¬ ical view of the human body we throw that other modern conception, the "environment," that is to say, if we picture to ourselves the hu¬ man body as a mechanism not only deriving en¬ ergy' from its environment and doing mechan¬ ical and other forms of work, but giving back to the environment heat and waste products (an idea which lies at the very basis of modern physiology), we shall readily arrive at a clear, consistent and helpful conception of the human mechanism and its workings, from which we can readily pass on to clear and logical ideas of health and disease. For in that case we have only to think of the body as a piece of mechan¬ ism with all its parts in good working order, or, in other words, sound, normal and whole, and working in a favorable environment, and to this condition to apply the term health. Conversely we may regard any condition of the mechanism in which one or more of its parts (organs) is seriously out of order, unsound or abnormal, or working under unfavorable conditions, as a condition of disease. In the normal, sound or

healthful condition the parts of the organism work together with ease, but in the unsound or abnormal condition this may not be the case and "dis-ease® may be the result. In short, the word health (related to the modern word hale, Old English hole) actually means hale-ness or whole-ness, in

which form it appears for ex¬ ample in the Scriptural phrase ((They that be whole need not a physician.®

Health and Disease. — Sanitary science then regards health and disease very much as biology regards life, as a special state or condi¬ tion, and the essential basis of health as sound and proper construction and operation of the human mechanism under favorable conditions. The sources of health are plain. They are ob¬ viously good timber, good construction and wise operation or management of the human mechanism, to which we must add favorable ex¬ ternal surroundings or environment. In so far as sound and normal, or unsound and abnormal, mechanisms are inherited, they are clearly for the most part beyond the control of sanitation and hygiene, but in so far as health and dis¬ ease are dependent upon good care, manage¬ ment or operation, and especially in so far as they are dependent upon favorable external conditions or environment, they are obviously to a greater or less extent subject to our influ¬ ence and control ; and herein lies the broad and practical field of the applications of sanitary science. If, for example, observation and ex¬ perience have established the fact that certain trades are more than usually dangerous, then it is the privilege and the duty of the professors of sanitary science to verify and make known these facts. If it can be shown that certain climates are destructive of health and of life, while other climates conduce to good health and longevity, then it is the duty of students of sanitary science to establish and proclaim these facts. If, as appears from the results of innu¬ merable investigations to be true, polluted water and polluted milk are apt to convey the germs of typhoid fever, these facts may be verified, made known and acted upon.

For the purposes of sanitary science diseases may be roughly classified into two grand divi¬ sions, namely, (a) those which are due to de¬ fects of material or construction or operation and may hence be described as constitutional, and (b) those which proceed more directly from external sources and are plainly due to mechanical injuries, parasites, poisons or other external or environmental conditions. These last the sanitarian may hope in part at least to control, while the former, being largely heredi¬ tary, are for the most part beyond his reach. It should not, however, be overlooked that the materials and construction of the mechanism may suffer damage from the action of slight or long-continued external influences, or that some so-called "constitutional® diseases may be really environmental in origin.

Causes of Disease. — Turning now to the obvious external causes of disease, with which in this article we shall chiefly deal, we may quickly dispose of those which are plainly chemical, mechanical or physical (burning, crushing, freezing, gunshot wounds, dagger thrusts, earthquakes, lightning and the like), of obvious external origin and preventable only by

removing or avoiding the cause. In the same way we may set aside deaths by drowning or

execution (hanging, electrocuting, etc.), and even suicide in so far as this is produced by external conditions such as loss of friends, loss of property, etc., and not from internal or con¬ stitutional defects or changes. Another group of obvious external causes of disease is that series of phenomena which comes under the head of poisons coming in or acting from the environment, such as arsenic, strychnine, mor¬ phine, nicotine, caffeine, chloral, alcohol, co¬ caine, etc. Disturbances of the mechanism due to the entrance of these essentially foreign bodies are only too familiar and are obviously readily preventable by removing or avoiding the cause. There still remains to be dealt with, however, one great class of external causes which may be roughly grouped together under the head of living agents of disease or para¬ sites ; including in this term not merely the coarser and more obvious parasites such as tapeworms, fleas, lice, mosquitoes and trichinae, but also those far more elusive and dangerous micro-organisms, the microbes, bacteria or dis¬ ease-germs. Some of these are dealt with else¬ where (see Bacteria; Hookworm Anatomy and Life History; Mosquito; Parasites; Trichina; Tapeworm; etc), but with the re¬ lations of these parasites (and more especially of the microbes) to the health of individuals and of communities we have still to deal.

The Germ Theory. — One of the most fruit¬ ful discoveries of the 19th century was the fact that some diseases of previously unknown ori¬ gin, such as some of the more common fevers — typhoid fever, diphtheria, Asiatic cholera and tuberculosis — are due to the entrance into the body from the environment of certain micro¬ parasites, microbes or micro-organisms. When to this discovery was added another, namely, that these micro-parasites are capable of living for longer or shorter periods outside of the bodies of plants and animals, in the environ¬ ment of man, and especially in earth, air, water, milk and other materials intimately associated with human life, it became easy to understand, what had up to that time been an insoluble mystery, not only how certain diseases are caused, but also how they are spread among the people and, at the same time, how they may be controlled and even overcome. The whole problem of the prevention, not only of individ¬ ual cases of disease but of those wholesale at¬ tacks of disease upon communities which had long been known as epidemics, plagues and pes¬ tilences, now became possible of solution, and one of the most promising fields for the im¬ provement of the health of communities as well as of individuals in the 20th century lies in a complete elucidation, along the lines thus marked out, of the precise methods by which diseases are caused and conveyed, and conse¬ quently how they may be prevented. To this end not only further knowledge is required, but also an education of the people at large in the elements of

sanitary science, so that diseases anywhere arising may be restricted as nearly as possible to their places of origin and there by the arts of disinfection blotted out and extermi¬ nated. Once the principle has been clearly rec¬ ognized that there exists a large class of dis¬ eases (known as the infectious and contagious diseases) all of which are probably due to the entrance into the bodies of animals or plants of living external agents, called germs, mi-

crobes, micro-organisms or micro-parasites, to¬ gether with the additional fact that these germs or micro-organisms, microbes, micro-organ¬ isms or micro-parasites find their way from person to person either directly (((contagion®) or indirectly in devious ways through the en¬ vironment (ˆinfection®) — it becomes a fasci¬ nating study to detect and discover the precise routes by which infection and contagion travel ; the material vehicles by which the germs in question are conveyed; the conditions of their ˆlongevity® or endurance in the environment under various conditions ; their resistance to agents of destruction, such as cold, heat, acids, alkalis and other disinfectants ; their distribu¬ tion from person to person, from community to community, and sometimes even from nation to nation, as they move in or are carried about by water, milk or other food materials; by in¬ sects such as flies, fleas and mosquitoes ; by wind in the form of dust ; by emigrants travel¬ ing from country to country; by letters through the post-oflke ; and by linen through laundries, sweatshops, clothing houses or other like estab¬ lishments.

Owing to the obscurity pertaining to most epidemics, plagues and pestilences, strange and unusual phenomena were formerly associated with them as causes. Terms such as ((miasms,)) <(effluvia,® "telluric influences,® and <(formites,® were commonly used to describe causes of dis¬ ease not very many years ago, but to-day these have practically disappeared. As a result of the new points of view described in the foregoing paragraphs, infection and contagion are no longer regarded as obscure, mysterious influ¬ ences, such as strange atmospheric conditions, earthy exhalations or intangible gaseous ema¬ nations from swamps or forests, but rather as due to the aggressive activity of specific organ¬ isms entering the body and causing within it definite and peculiar alterations. Like bullets, daggers, slivers and other extraneous bodies coming from the environment, these are mate¬ rial, tangible and recognizable causes of dis¬ ease, natural rather than supernatural, and sim¬ ply microscopic rather than macroscopic.

The search for the agents of disease had not, however, continued long before it began to be recognized that the invasion of the body by germs of whatever sort is, to all intents and purposes, an attack upon it by parasites, and once this became clear it was evident that, as in other cases of parasitism, the process is essen¬ tially a struggle between the invading parasite upon the one hand and the resisting organism on the other. We now know that the process by no means consists of an active attack upon a passive subject, but is rather a battle or a strug¬ gle between host and parasite (for example, be¬ tween man and microbe), in which the physical or physiological conditions of the host tend on the one hand to overcome and destroy the parasite ; while the parasite on the other attacks and injures the host in various ways, often by mechanical injury of tissue and sometimes by the excretion in the course of its own vital activity of products essentially poisonous or toxic to the host. In the case of diphtheria, for example, the diphtheria bacillus first invades the throat of its (

of diphtheria, which substance so damages the cells of the host in the vicinity as to allow a free exudation of lymph, and this, quickly coagulat¬ ing, produces the white patches of the throat characteristic of this disease. But this is not all. Some of the toxin is also absorbed into the general circulation of the host and produces fever and other general constitutional symptoms of a grave character. Meantime the tissues of a strong and healthy host actively produce what are known as ((antibodies® or <(antitoxin,® a substance capable of neutralizing the toxin either in the body itself or even in a test-tube; and it is owing to the possibility of causing some of the lower animals, especially horses, to be habituated to the diphtheria toxin, and to pro¬ duce antitoxin in their blood that we have been enabled to secure from these animals this bene¬ ficent remedy for use in cases of diphtheria in human beings. In consequence ot discoveries of this sort a field of splendid promise has been opened up for 20th century hygienists, along the lines of serum-therapy (as it is called), that is to say, the production of various blood serums rich in antidotes for the poisons gen¬ erated by the microbes of specific diseases. See Antitoxins; Immunity; Serum-therapy; Toxins and Antitoxins ; Vaccination.

Parallel with preventive medicine we have to-day preventive hygiene and preventive sani¬ tation — the first being essentially a modifica¬ tion of the body by medicines such as serums and vaccines; the second its modification by exercise, play, diet and the like ; and the third the prevention of disease by control, not of the body but of the environment.

Practical hygiene and sanitation may obvi¬ ously proceed along either of the two lines indi¬ cated, namely (a) reinforcement of the organ¬ ism in its struggle with infectious microbes, or (b) exclusion of the microbes and

their destruc¬ tion in the environment. The latter is commonly known as Sanitation.® It deals rather with the control of the environment than with that of the human mechanism, and it is, there¬ fore, largely connected with problems of sani¬ tary engineering. See Hygiene; Public Health ; Sanitary Engineering.

Bibliography. — See list of works at end of article on Public Health. Consult also Sew¬ age Disposal) by Kinnicutt, Winslow and Pratt; (Milk Supply > by J. S. MacNutt; (Water Supply) by W. P. Mason; (Air Conditioning) by G. E. Soper; (Typhoid Fever, > (State Sanitation and (Vital Statistics) by George C. Whipple.

William T. Sedgwick,

Late Professor of Biology and Public Health, Massachusetts Institute of Technology.

SANKHYA, san'khya, the name of a philo¬ sophical system of ancient India. It is attrib¬ uted to a writer by the name of Kapila, about whom we know absolutely nothing. While the extant texts do not date back much further than a.d. 1380 Sankhya writings are known to have been translated into Chinese in the 6th century, and the inception of the school is prob¬ ably considerably earlier. The philosophy is strictly a dualism, and indeed the name of the school may be translated as ((pluralistic.® The Prakriti, or matter of the universe, is opposed to the Purushas, or souls, of which there are an un¬ limited number. The Prakriti assumes eight

forms and 16 modifications. That deliverance from continual rebirth which constitutes the goal of all .Indian philosophy is attained, ac¬ cording to the Sankhya school, by a complete knowledge of the soul principle and of the' 24 modifications of matter. This deliverance con¬ sists in the separation of the soul principle from its pain-giving material environment. The material world has a certain history determined by its very nature. It is tripartite, consisting of goodness, darkness and passion. These were primitively in an equilibrium which gradually becomes upset until a new equilibrium is formed and a new universe. Without the intervention of the Purusha, the Prakriti develops within itself a world-intelligence. This generates con¬ sciousness, which by a gradual process of deg¬ radation gives rise to the cruder matter form¬ ing the object of our experience. Thus the entire psychical life, in so far as it may be analyzed and expressed in discourse, is derived from the matter constituent of the universe rather than from the

soul constituent. The method in accordance with which the individual soul comes into contact with a particular part of the material universe is by no means clear. In whatever context it occurs, the soul is unmoved by emotion, without will, and entirely absorbed in a cognition which has no object. Notwith¬ standing its inactivity, it stimulates the material body-consciousness complex into will, emotion and the knowledge of definite objects. Since . to the Indian mind the notion of consciousness is inseparable from that of pain, the union of soul and body in life is by its very nature pain¬ ful, so that the purpose of philosophy is to inter¬ rupt the continual imprisonment of the soul in one body after another. As has been said, the Sankhya philosophy maintains that when the distinction between the psychical and the mate¬ rial is clearly envisaged throughout the universe, this distinction becomes a real distinction as well as a conscious one, and the soul lapses into the unconsciousness of a trance.

It will be seen that the Sankhya philosophy gives an explanation of the world-processes which conforms rather to the mechanical than to the teleological type. Accordingly, this school has no need for the Deus ex machina employed by the other doctrines of India. It is therefore known as (the atheistic doctrine. > The Yoga philosophy (q.vT differs from the Sankhya in little but the belief in a Deity. Con¬ sult Ballantyne's translation of the Sankhya- pravachana of Kapila ; Davies' translation of the Sdnkhya-karikd of Isvarakrihna ; Grabe, R.. (Sankhya Philosophy (Leipzig 1894) ; id, (Sankhya und Yoga) (Strassburg 1896) ; Saint Hilaire, B., (Memoire sur le Sankhya > (Paris 1852) ; Roer, E., ˆLecture on the Sankhya Philosophy > (Calcutta 1854).

SANNAZARO, san-nad-za'ro, Jacopo, Italian poet and epigrammatist, descendant of a noble family of Spanish origin : b. Naples, 28 July 1458; d. there, 27 April 1530. After study under Pontanus, he was admitted to the Arcadian Academy as Actius Syncerus, the name he selected to be known by, according to the prevailing custom. He spent several years in foreign travel and on his return to Naples soon became famous as a poet and courtier. His verse attracted the attention of King Ferdinand and his sons Alphonso and Frede¬

rick. The last named when he ascended the throne as Frederick III in 1496 gave him the villa of Mergellina with a pension of 600 ducats. In 1501, when Frederick was forced into exile by Louis XII, Sannazaro accompanied him and remained with him until his death in 1504. During this period he completed his famous (Arcadia, > a pastoral poem published in 1504, which passed through 60 editions before the close of the 16th century, and was largely imi¬ tated. His subsequent works include (De partu Virginis) (1526), a Latin poem which earned him the title of the ((Christian Virgil® ; and his collected (Sonetti e canzoni> (1530). His elegance of expression,

no less than the poetical beauty of his thoughts, give him a dis¬ tinguished place among the Latin poets of the Renaissance, and despite some adverse criti¬ cism, his

SANSEVIERIA, san"sev-i-e'ri-a, a genus of plants of the family Liliacece, of tropical Africa and the East Indies, named in honor of the Prince of Sanseviero^ a Neapolitan. It in¬ cludes tender foliage plants useful in window gardening, since much sunshine is not necessary for their welfare, and they are easily propagated by division or leaf cuttings. The sansevierias have thick rootstocks, bearing tufts or rosettes of rigid, sometimes stem-like leaves, from one to four feet long; and, in the species cultivated in America these are sword-shaped, terete or oblanceolate, dark-green and banded more or less with grayish-white. The flowers have long and slender perianths, are white, and clustered among dry bracts in a dense raceme, rising from the centre of the group of leaves on a tall naked stalk. Bowstring hemp, used in India, is the long, durable fibre, also called Moorva and Marool, which is obtained from the East Indians zeylanica.

SANSKRIT is the literary high speech of India from the beginning of its historical tradi¬ tion to the present day. A dozen or more lan¬ guages or linguistic groups (Iranian, Greek, Italic, Celtic, Teutonic, Balto-Slavic, etc.), in close relation with Sanskrit, constitute the so- called Indo-European family of languages. Of these Sanskrit is the oldest and best preserved member. Together with the Iranian (Persian) and Scythian, it makes up the Aryan subdi¬ vision of the Indo-European family. This is the settled, scientific use of the term Aryan; but Aryan is widely and confusingly used in popular writings as the equivalent of Indo- European.

Certain cuneiform inscriptions of Western Asia (Mitani and Hittite) exhibit proper names which are clearly Aryan. They are dated at about 1500 b.c. The date at which Aryan clans began the occupation of Hindustan is unknown, but may for inner reasons be as¬ sumed to be no later than 1500 b.c. From that time on to the present day, that is, during a period of roundly 3,500 years, some form of Sanskrit has been the main instrument of Hindu literary, religious or cultural expression.

The name Sanskrit is used in a double sense, one general, the other more particular. In its

general sense it refers to the entire history of the highest speech form of India, beginning with the earliest period of the religious hymns of the Veda,

to the present day. In this sense it is to be compared with Latin in which the language of the 12 tables, of Plautus, Livy, Saint Augustine, or Thomas Aquinas represents, in spite of much change, phases of one and the same language. In this sense, too, Sanskrit is contrasted with ((Middle-Indic,® the so-called Prakrit dialects (Pali and Prakrit), which represents a secondary speech development, closely analogous to that of the Romance lan¬ guages out of Latin. Like Romance, Prakrit, in distinction from all forms of Sanskrit, repre¬ sents popular languages, differing considerably from one another according to time and place; like Romance, Prakrit shows extensive phonetic and morphological changes, often curiously alike in the two fields ; and like Romance, Prakrit dialects, such as Pali (the language of the canon of the Southern Buddhists) ; the Prakrit used by the sect of the Jainas; the Maharastri, etc., attained in various periods the character of literary languages. Middle-Indie appears for the first time in the earliest Hindu inscriptions, namely those of the famous Bud¬ dhist Emperor Aqoka, in the middle of the 3d century, b.c., where these dialects show them¬ selves in already differentiated forms. About 1,500 years later the Middle-Indie dialects de¬ velop into the modern languages of India, such as Hindi, Bengali, Penjabi, Guzarati, Marathi, etc., some of which in their turn, blossom out into literary languages of no mean quality. Thus Sanskrit as a whole holds the position of mother to the Middle-Indie, grandmother to the modern languages of India.

But the term Sanskrit is used also in a narrower, technically more correct sense. The early language of the Veda does not, curiously enough, designate itself by any name. The grammarians of the classical language speak of the . sacred Vedic language as chandas, <(metre,® referring to the metrical Vedic hymns, and constrasting that language with the later language of secular literature as bhasa <(speech.® Now this sacred language is prac¬ tically restricted to the books of the Veda; it is therefore spoken of either as Vedic, or hy- bridly, as Vedic Sanskrit. The term Sanskrit does not appear until after the time of the great Epic (Mahabharata) . It is an academic term coined by the grammarians (Panini and his followers), whose activity ended in the 2d century b.c., for the language of the classical and secular litera¬ ture which developed after the time of the Epic. The term sam-skrta means ((formed,® and re¬ fers, strictly speaking, to the grammatical processes assumed to underlie the formation of words (sam-skara). Yet the language of the Epic and other post-Vedic literature, such as the (Polity Book) (Arthagastra) of Kautilya or Canakya, written about 300 b.c., are so close to the Sanskrit of the grammarians, as properly to be included in that term. This then is what is called Classical Sanskrit, or Sanskrit for short. For more than 2,200 years, until the present day, Sanskrit has always led a more or less artificial life, and has always been en¬ croached upon by more popular speech forms descended from it (Prakrits and

modern lan¬ guages). Nevertheless, it has during all that

time dominated the culture of India, and re¬ mained its paramount expression in literature. Even at the present time Sanskrit is not quite a dead language in the sense in which Latin is a dead language among scholars or clerics ; or Hebrew a dead language with the Jewish Rabbis. More spontaneously and extensively Hindu pandits, kings and ministers still speak or hold learned disputations in that language, or compose good Sanskrit poetry and prose. And there is plenty of evidence that in earlier times, say around 1000 a.d., Sanskrit was not only spoken by literary and scientific men, but was spoken or understood widely by cultivated people, both men and women. The grammarian Panini states rules for Sanskrit which can apply only to spoken language, and the gram¬ marians in general testify to dialectic differ¬ ences in the Sanskrit of different parts of India which, again, means spoken language. In the second half of the 11th century the poet Bilhana tells that in the capital of his native Kashmir even women could speak both Sanskrit and Prakrit. Other writers present the same similar testimony. In the Sanskrit drama men of su¬ perior station : kings, ministers, generals and Brahmans, speak Sanskrit; the rest of the men and the women, Prakrit, making the dialogue bilingual. Those who did not themselves speak Sanskrit must, therefore, at least have under¬ stood it.

Though Sanskrit in the broader sense of the highest speech of India is a single language from the beginning to the end it by no means ‘ passes through its long history of about 3,500 years without change. The language of the Vedic hymns differs from classical Sanskrit about as much as the Greek of Homer does from Attic Greek. The apparatus of Vedic grammatical forms is richer and less definitely fixed than that of classical Sanskrit, which has given up many forms of the earlier language, without, as a rule, supplying proper substitutes. The subjunctive is lost; a single infinitive takes the place of about a dozen very interesting Vedic infinitives. Classical Sanskrit also has given up the most important single heirloom which it brought with it from prehistoric times, namely, the Vedic system of accentuation, which in classical times is swept off by a totally new mode. For all that Vedic, though at most points richer in form and less settled in character, is not a popular dialect, but a more or less arti¬ ficial high speech handed down by generations of priestly bards. Thus both Vedic and classi¬ cal Sanskrit are languages adapted to literary use by the cultured classes of their respective times. But the extent and conscious purpose of that regulation differs widely in the two phases ; the handling of classical Sanskrit by Panini and his followers went beyond any academic attempt to regulate speech recorded in the history of civilization.

An older linguistic time, lying behind the Veda, is still quasi-historical,

though it can be reconstructed only by the aid of comparative philology. The Vedic people were immigrants to and conquerors of India; they came from the great Iranian region that stretches from the other side of the Himalaya Mountains almost as far as the Mediterranean. The comparison of Vedic (and to a lesser extent Sanskrit) with the oldest records of Iranian speech, the Avesta, and the cuneiform inscriptions of the Achemeni-

dan Persian kings, yields the startling result that these languages are collectively mere dialects of the same older idiom. This is known as the Aryan or Indo-Iranian. The recon¬ structed Aryan language differs less from the language of the Veda than Classical Sans¬ krit does from Pali and Prakrit. The language of the Avesta is so much like that of the Veda that entire passages of Avestau may be con¬ verted into good specimens of Vedic by merely eliminating the special sound changes which Avestan has evolved in the period of its separate existence. And the literary style, the metres, and above all the names of the mythologic per¬ sons in Veda and Avesta are enough the same to make the study of either to some extent de¬ pendent upon the other. In fact the spiritual monuments of the Avesta as well as the stone monuments of the Achemenidan kings became intelligible chiefly by the aid of Sanskrit.

The Sanskrit language regarded by itself is the most important and most highly organized of human languages. In verb inflection, for instance, it shows a larger number of categories than any other; there are some 14 varieties of expressing various shades of continuous verb kind (the so-called "present-systems®) ; it has imperfect, perfects, more than half a dozen aorists, futures; it has indicative, subjunctive, injunctive, optative and other mode classes; it has active, middle and passive voices. The so- called secondary verb kinds are abundant in variety and indefinitely productive ; intensive, causative, desiderative and denominative. In the noun it shows seven cases and a wealth of differentiated noun stems unequaled by any other language.

From the comparative point of view Sanskrit is the oldest sister (not the mother) in the Indo-European family of languages, the most widespread, the most enduring, and historically the most important family of languages. Since the revival of classical learning there has been no event in the history of culture as important as the discovery of Sanskrit in the latter part of the 18th century. There is at present no domain of historic or linguistic science un¬ touched by the influence of Sanskrit studies. The study of this language opened up the primi¬ tive Indo-European period, and originated the science

of comparative philology in all its bear¬ ings. Linguistic science, comparative grammar, comparative mythology, science of religion, comparative jurisprudence and other fields of historical or philosophical study, either owe their very existence to the discovery of Sanskrit, or were profoundly influenced by its study. See Language, Science of; Pali Language and Literature; Prakrit; Rig Veda; Vedic Litera¬ ture.

Maurice Bloomfield,

Professor of Sanskrit and Comparative Phi¬ lology, Johns Hopkins University.

SANSKRIT LITERATURE. Sanskrit is the Anglicized form of samskrta (from sam, a preposition of intensifying force in compounds, and the root kr "to make,® cognate with Latin creare, "the adorned® or "perfected,® that is, "speech®). It is employed to designate the second period in the literary development of the Aryans in India. For the first period, see Vedic.

vol. 24 — 18

Distinction of the Two Periods. — The dif¬ ference between Vedic and Sanskrit literature is not merely one of time, but extends to mat¬ ter, spirit and form. The literature of the first period is religious, that of the second in spite of a marked tendency to moralize is profane. The purpose of the first period is practical, its primary object being to obtain happiness in this world. The second period in consequence of the doctrine of transmigration is filled with the idea of the misery of all existence, and its pur¬ pose is artistic, to satisfy an intellectual want. As the literature of the first period was prac¬ tical, a natural prose style had been developed in the Brahmanas. The artistic purpose of the second period led to the almost total abandon¬ ment of prose in favor of verse, often to the detriment of subjects requiring exact treatment, for example, the law. Prose when employed is either mingled with verse as in parts of the epic, the drama, fairy tales and beast fables; or so artificial as in the kavyas or prose romances, that conform to the rules of poetics ; or so awkward and obscure, as in the grammatical and philosophic treatises, as to be hardly worthy of being called prose.

Striking as these differences are, they are in reality less important than the less obvious changes that have taken place in the language. Hence it is quite appropriate that, while the first period is named from its literature, the second is named from its language — the Sans¬ krit.

Development of the Language. — The dif¬ ference between the language of literature and that of everyday life is always of cardinal importance, but

nowhere is it more strongly marked than in India. That it existed even at the time of the composition of the hymns of the Rig Veda is unquestionable. The language in which the "hieratic® hymns are composed is no spoken language, but an artificial dialect that was transmitted from generation to generation in the families of the priestly singers. This is shown by the fact, that in spite of varying au¬ thorship, there is nothing like dialectic variation within this class of hymns. It is evidenced also by the way in which forms of different periods appear side by side ; by the unthinking repetition of phrases ; by incorrect uses of words and forms ; by false formations and by the way in which the necessities of the metre are allowed to determine the choice of synony¬ mous forms. The language of the priests them¬ selves may have approximated to this type with the omission of the most archaic and poetic elements ; but the language of the masses of the people must have been very different. Positive proof of this is afforded by the fact that some words in the Rig Veda show already the phonetic pecularities that are characteristic of the mediaeval dialects. Such words must have originated in the language of the lower classes and thence made their way into the literary language. They show that the language of the lower classes had already advanced far in its development. The differences between this hieratic type of language and that of the popu¬ lar hymns have generally been interpreted as due to differences in time; and attempts have been made to assign the different hymns to different periods on this basis. It has recently been shown, however, that the forms that have

been considered evidences of later date are fre¬ quently prehistoric and hence, certainly, as old if not older than the forms of the hieratic language; and that the language of the popular hymns is not a continuation of the language of the hieratic hymns, but that we have in these types parallel dialects, whether their dif¬ ference be geographical or, as seems more probable, due to their employment by different social strata. The language of the Brahmanas and Sutras again is a continuation of neither of these types, but must be considered as an adaptation to literary purposes of the language spoken by the Brahmans at the time and place of their composition, under the influence of the literature that already existed.

Finally, there was fixed in the grammar of Panini a type of language closely related to that of the Sutras. This eminent grammarian from the northwestern part of India, whose date may be assigned to the 4th century b.c., represents the culmination of the grammatical studies that had their beginnings in the Brahmanas. Of predecessors he mentioned no less than 64; but the success of his grammar has led to the dis¬ appearance of their

works. His grammar be¬ came the standard for the classic language so absolutely, that from this time the language is fixed — there being no further development of language but only of style. This language is called the Sanskrit, that is <(the adroned® or (

With regard to the differences between the classic language and the various forms of Vedit it is to be noted that the phonetic status of the language has remained almost exactly the same,

that • there has been no important addition to the formative or inflectional elements, but that the change has consisted partly in dropping forms that seemed superfluous, partly in settling the usage in favor of one form, for which two or more forms of synonymous value had previ¬ ously existed ; and finally that the vocabulary has been increased by new formations made with the means that were already at hand. The nature of these changes also shows that we are dealing with a literary language. The natural development of the language of the Aryans in India is to be seen only in the speech of the lower classes. The existence of these vernacu¬ lars by the side of the literary language is at¬ tested, as has been noted, from the time of the Rig Veda. In literature they appear only with the rise of. the two great heresies Jainism and Buddhism. These in their oldest phases em¬ ploy the Prakrit and Pali dialects, afterward they too resorted to Sanskrit, so that Prakrit remained in literature only in certain parts of the drama in which it had a traditional right. From these mediaeval dialects were evolved in turn the modern dialects, the literary employ¬ ment of which begins about the 11th century of our era.

Sanskrit Literature. — By Sanskrit litera¬ ture is meant, therefore, the literature which is composed in the language that conforms to the grammar of Panini. Certain parts of the Epics are no doubt older than that grammar, but it is impossible to tell exactly which these parts are, and moreover in the later working over of this material the tendency has been to bring it into harmony with the classic standard. It will be seen, therefore, that there is no sharp chrono¬ logical line that can be drawn between the two periods ; because on the one hand the beginnings of the classic literature go back to the time before Panini and on the other the later monu¬ ments of the Vedic literature were produced after that date. The wealth of the classic lit¬ erature is enormous, every department except history being well represented and it will not be possible to give more than the briefest men¬ tion of the most important authors and works.

Epic Poetry. — Two classes of works are to be distinguished : Itihasas, Akhyanas or Pu- rapas, ˆancient tales,® and the Kavyas or arti¬ ficial epics. The chief representatives of each are the Mahabharata and the Ramayana. The first is a heterogeneous mass of about 100,000 distichs.

The main story is the strife of two Aryan tribes, the Kurus and the Pancalas. To this only about one-fifth of the poem refers. The remainder consists of episodes and didactic disquisitions chiefly on the duty of the warrior class that have changed the poem from an epic to a dharmacastra or legal textbook. The Mahabharata itself recognizes the nature of its origin, when it gives as its author Vyasa, <(re- dactor.® It is known to have reached its present form by 500 a.d. and probably had become a dharmagastra by the beginning of our era, while the epic nucleus may be some five centuries earlier than that date. The 18 Puranas that have been preserved are of much later date. Their original character has been changed by abridgment or omission of the ancient tales and the substitution of didactic elements. They are all sectarian, generally Visnuite. The Ram¬ ayana, a poem of some 24,000 distichs, is for

the most part the work of a single poet Val- miki. Its subject is the story of Rama, espe-. dally the abduction of his wife Slta by the demon Ravana who carried her to his strong¬ hold Lanka in Ceylon, from which she was res¬ cued by Rama with the help of Hanuman, king of the monkeys. In the later additions Rama is made into an avatar of Visnu. The story has been interpreted as an historical allegory but is more probably merely mythological. The main portion of the work is probably older than the formation of the epic kernel of the Maha- bharata. The Kavyas, or artificial court epics, extant range from the time of Kalidasa (the beginning of the 5th century) to the 12th cen¬ tury, though there is epigraphic evidence to show that this style of poetry originated before our era and continued in vogue. Of these the most important are the Raghu-vanga, (The Family of Rama5 and the Ivumarasarhbhava, (Birth of the Wargod, 5 of Kalidasa. As Kav¬ yas are also classed certain prose romances of the 6th and 7th centuries — • the best known being the Daga-kumara-carita of Dandin or ((the Adventures of the Ten Princes.55

Lyric Poetry. — Long lyric poems are rare. Such are Kalidasa's Meghaduta, or (Cloud Mes¬ senger,5 in the 115 stanzas of which an exile implores a cloud to bear to his wife the message of his love ; and the highly poetical description of the seasons from the point of view of a lover, by the same poet entitled Rtu-sarhhara, (Cycle of the Seasons.5 More frequently each stanza is a poem in itself : these are published in collections frequently styled (patakas, Cen¬ turies.5 Religious lyric poetry is represented by similar collections. Famous in both depart¬ ments was Bhartrhari (of the 7th century).

Drama. — This is the department in which Sanskrit literature has reached the highest point ot merit. Noteworthy are the resemblances to the Elizabethan drama, the absence of tragedy, the mixture of prose and verse, and the employ¬ ment- of different dialects, mentioned above. The origin of the drama is obscure, but there is no reason to assume Greek influence. Etymology points to the original prominence of dancing. Combined with song and pantomime it consti¬ tutes the germ from which by the addition of the dialogue — at first extemporized — the drama was evolved. The first and greatest of the dram¬ atists is Kalidasa and his masterwork is the Cakuntala. Besides this have been preserved the Vikramorvagi and Malavikagnimitra. Bha- vabhuti of the 8th century is the next in fame: of his works remain, the Malati-madhava, Mahavira-carita and Uttara-rama-carita. Be¬ tween these in time are the Mrcchakatika, Clay Cart5 and the Ratnavali, (Pearl Necklace,5 at¬ tributed to the kings under whose patronage they were brought out.

Fairy Tales and Fables — This department is historically most interesting because of its deep influence upon the mediaeval and modern literature of Europe. Characteristic is the hu¬ man-like role assigned to the animals ; the ming¬ ling of prose with poetry of a gnomic char¬ acter and frequently of a high order of merit; and the system of arrangement, story being set in storv as in Arabian Nights. The source of the beast fables is the Jatakas or Buddhistic birth stories, the chief character being identi¬ fied with Buddha in a previous existence. Works of this class are called Niti-gastras or

(Text-Books on Good Behavior,5 being in¬ tended for the political and ethical training of princes. They have been recast by the Brah¬ mans in the interests of their religion. Of these the oldest is the Panca-tantra, so called from its five books. Its existence in the 6th century is proved by its translation at that date into Pehlevi. From it chiefly is derived the Hito-padega, (Book of Good Counsel,5 the manu¬ scripts of which go back to the 14th century. The most important collection of fairy tales is Somadeva's Katha-sarit-sagara, (Ocean of the Streams of Stories,5 of the 11th century.

The works of Sanskrit literature relating to the sciences and arts, grammar, lexicography, metrics, poetry, rhetoric, philosophy, law, astronomy, mathematics, medicine, music, paint¬ ing, sculpture and the technical arts, cannot come within the scope of this article. For works of reference, see under Vedic.

George Melville Bolling, Professor of Greek, Ohio State University, Columbus, Ohio.

SANSOVINO, san-so-ve'no, Andrea, Ital¬ ian sculptor : b. Monte San

Savino, near Montepulciano, 1460 (whence he was familiarly known as Sansovino, his real name being Contucci) ; d. 1529. He was a pupil of A. Pollaiuolo, and early formed his style on that of Leonardo da Vinci. It was under their in¬ fluence that he produced such reliefs as the (Coronation of the Virgin5 ; (The Annuncia¬ tion,5 and the (Pieta.5 In 1491 he was sum¬ moned by the king of Portugal to Lisbon, where for nine years he exercised his art as sculptor and architect. Returning to Florence in 1500 he carved the group of (Christ's Bap¬ tism5 over the east portal of the Baptistery, which exhibited a nobility of form and expres¬ sion unparalleled at that period, although he never completed the group. A statue of the Madonna and one of John Baptist for the cathedral at Genoa were his next works, and afterward he accepted a commission from Pope Julius III to execute the tombs of Cardinals Basso and Sporza for the choir of Santa Maria del Popolo. In these sepulchral monuments we see that the high-water mark of the 15th cen¬ tury art is reached ; they are the most masterly sculptures of their kind that Rome possesses. In 1512 he completed his (Saint Anne with Two Other Saints5 in the church of San Agostino in Rome. He was then entrusted by Pope Leo X with the decorations of the church at Loreto (1513-29). Among the reliefs there the An¬ nunciation5 ; the (Nativity5 ; and the statue of (Jeremiah5 .are his own works; the rest of the decorations were produced under his direction by various artists. Nothing can be finer than the blending of classic severity with the fresh¬ ness of Renaissance life in these figures which exhibit the results of a pure study of nature. Expression and action are full of deep feeling, yet not so emphasized as to overstep the line of modesty.

SANSOVINO, Jacopo Tatti, Italian sculp¬ tor and architect: b. Florence, 1479; d. Venice, 27 Nov. 1570. He took his name from the great artist who had been his teacher, and began his career in Florence where his first works of note were his statue of (Jacob5 in the cathedral and his marble (Bacchus 5 in the Bargello. Be¬ longing also to this early period is a (Madonna

and Child > in the church of San Agostino at Rome. In 1527 he went to Venice where his genius being quickly recognized he was ap¬ pointed architect to the republic. His untiring labors from that time to his death have left his stamp both on the sculptural and architectural monuments of Venice. He is a brilliant ex¬ ample of the Italian artists in the noonday splendor of the Renaissance and in his archi¬ tectural creations unites play of fancy and ele¬ gance of proportion with the most impressive and monumental dignity. His pre-eminence as a sculptor is not so evident ; his

plastic work is often unpleasing and evidences a failure to master either the principles or the materials of his art, so that his work appears mannered and mechanical. His greatest successes in archi¬ tecture are the (Corner Palace) (1532) ; the library of Saint Mark's, a splendid example of Italian Renaissance (1536) ; the Mint; and the churches of San Martin, San Giorgio dei Greci and San Giuliano. The (Burial of Christ) and the Resurrection, > are fine reliefs on the bronze doors of the sacristy of Saint Mark's, and among other plastic works of his are ai sitting figure of (Saint John) in Santa Maria dei Frari; the statues of Rope0 and Rove on the tomb of the Doge Venier in San Salvatore; and the gigantic figures of (Mars) and (Nep- tune) in the Doge's palace. Consult Rosen¬ berg in Dohme's Runst und Kiinstler.*

SANTA ANA (san'ta a'na) INDIANS, a

Pueblo tribe of New Mexico. See Keresan.

SANTA ANA, Cal., city, county-seat of Orange County, on the Southern Pacific and the Southern California railroads, 30 miles southeast of Los Angeles. It was founded in 1869. It is the commercial centre of Santa Ana valley, on the most fertile sections of Cali¬ fornia; oranges and fruits of all kinds, vege¬ tables, wheat and sugar beets are produced in this region, and there are also large peat-beds in the vicinity. The principal industries include a fruit and vegetable cannery, flour mills, large lumber and planing mills and soda-works. Santa Ana is connected by a local railway with Newport Beach, 10 miles distant, a popular sea¬ side resort. There is a public high school, estab¬ lished in 1889, and a public library; the Orange Countv Business College is also located here. The city owns its waterworks, the supply being derived from artesian wells. Pop. (1920) 15,485.

SANTA ANA, Salvador, city and depart¬ mental capital, 50 miles by rail northwest of San Salvador and the Pacific port of Acajutla. It is a well-built city, the second in size of the republic, and lies about 2,100 feet above sea- level, in a mountain-encircled valley, abounding in coffee and sugar plantations, and forests. The Doric church, municipal building, hospital and military barracks are the principal buildings. There are numerous manufactures of domestic commodities and an active export trade in coffee and sugar, which increased considerably after the railway reached the city in 1900. Pop. 48,200. In the vicinity is the source of the Santa Ana River a tributary of the Lempa; and Santa Ana 8,300 feet high, the loftiest volcano in the republic, rises nearby.

SANTA ANA, Philippines, formerly a pue- eblo of the province of Rizal, constituted a dis¬ trict of the city of Manila in 1902. It is the

centre of extensive vegetable gardening for Manila markets. Pop. 2,200.

SANTA ANNA, san'ta an'na, or ANA, AN¬ TONIO LOPEZ DE, Mexican general and politician: b. Jalapa, 21 Feb. 1795 (?) ; d. Mex¬ ico City, 20 June, 1876. He entered the army at 15, and attained public prominence as a sup¬ porter of Iturbide in 1821. The following year, after having expelled the royalists from Vera Cruz, he took command in that city, where he led a revolt (2 Dec. 1822), which hastened the retirement of Iturbide, who had made himself emperor. After the defeat of the Federal party in 1822 Santa Anna retired to his estate ; but he emerged again in 1828 in support of Guerrero's claims to the presidency, in which the latter supplanted Pedraza. In 1829 the Spanish invasion furnished Santa Anna a favorable opportunity, and as minister of war and commander-in-chief at the head of the Federal forces he compelled Barradas to capitulate at Tampico, 11 September. He soon joined with Bustamante in overthrowing Guerrero, and setting up the former in his place, but also, in 1832, led in the overthrow of Bustamante himself, and the restoration of Pedraza. In 1833 Santa Anna was chosen President, and soon after renounced the party of the Federalists and put himself at the head of the Centralists, who desired the centralization of power in the executive government. His popularity with the army was not shared in by the nation at large, which feared that he was aiming at imperial power. On 11 May 1835 he defeated an insurgent army on the plains of Guadalupe, and as the blow was fatal to the – Republicans he was shortly afterward named dictator. The Federal Constitution was abolished and the governors of the several states became dependent upon the central power. Texas, how¬ ever, having long nourished a revolutionary feel¬ ing, now broke out into rebellion. Santa Anna attacked San Antonio in February 1836, stormed the Alamo (q.v.), and massacred its defenders, 6 March, and going forward pursued the Texans under Sam Houston (q.v), by whom, however, 21 April, at the battle of San Jacinto (q.v.) his forces were routed and himself taken prisoner. He secured his release by a treaty recognizing the independence of Texas, which, however, was repudiated by Mexico, that country also sus¬ pending his dictatorship. He was permitted to go to the United States, and after his return to Mexico in 1837 lived in retirement for a year, but offered his services to his country against the French in 1838, and taking command of the troops, repelled the assault on Vera Cruz (5 December) and forced the enemy to retire. In this engagement he lost a leg, a casualty which, however, contributed to restore him to popular favor. He again became a leader of the Cen¬ tralists, and from October 1841 to June 1844 was virtual dictator under the title of Presi¬ dent. The new Constitution of 12 June 1843, under which he was formally elected President, increased his dictatorial powers, the exercise of which led to a fresh revolution, resulting in his overthrow. He was taken prisoner in January 1845 and

banished. But on the eve of the war with the United States, he was recalled (July 1846), and was first appointed generalissimo by the provisional government and in December was made provisional president. At the open-

*ing of 1847 he led an army of 20,000 against the American troops under General Taylor, and fought the battle of Buena .Vista (q.v.) 22-23 February, in which he was defeated. On 18 April he was attacked and defeated at Cerro Gordo (q.v.) by General Scott. Immediately after the battle of Chapultepec (q.v.) the City of Mexico fell and was entered by the Amer¬ icans (14 September). Santa Anna, escaping from the city, briefly continued a desultory war¬ fare ; but on 5 April 1848, having resigned the presidency, he received permission to retire from the country and sailed for Jamaica, going thence to Venezuela. In 1853 he was recalled and elected President for one year, but after setting up an odious despotism, he proclaimed himself (December 1853) President for life, with the title of Serene Highness and the right of nominating his successor. Revolution fol¬ lowed in March 1854, and when he saw that his cause was lost Santa Anna fled from the capital (9 Aug. 1855) and found refuge in Cuba, Venezuela and Saint Thomas. In this absence he was tried and condemned for trea¬ son, and his estates were confiscated. He re¬ turned to Mexico during the French occupation (1864), but was not permitted to remain. In 1867 he again returned, but was once more ex- ded and went to live in the United States. Finally, after the death of Juarez and the amnesty of 1874, he was permitted to reside in his own country, where his career ended in poverty and obscurity. Consult Wilson, (Mex- ico) (1856). See Mexican War; Mexico; Texa*s.*

SANTA BARBARA, bar'ba-ra, Cal., city,

county-seat of Santa Barbara County, on Santa Barbara Channel, an arm of the Pacific Ocean; and on the Southern Pacific Railroad, about 360 miles southeast of San Francisco. It has regular steamer communications with San Fran¬ cisco, San Pedro, San Diego, and other Pacific ports. The Santa Ynez Mountains shelter the city from the north winds, and the ocean breezes serve to make the temperature equable and salubrious all the year. The number of health seekers who visit the place in winter has given it the name <(American Mentone.® It was vis¬ ited, in 1603, by Sebastian Vizcaino. In 1782, Governor Felipe Neve established a presidio which was maintained until the arrival of Gen¬ eral Fremont. Among the earliest

white set¬ tlers were Andrew, John and Thomas McDon¬ nell of County Galway, Ireland, who for many years maintained the greatest sheep ranches of the West in Santa Barbara County. Santa Bar¬ bara is in a remarkably fertile agricultural re¬ gion. It raises large quantities of beans, chiefly limas, and large quantities of English walnuts. Probably a thousand carloads of walnuts are marketed from this county yearly. In the northern portion of the county there are many oil wells, some yielding as many as 3,000 barrels daily. In the vicinity, are mineral springs, from which many hundred thousands of bottles of Veronica and Bythinia waters are shipped. Santa Barbara is noted for the quality of the lemons shipped from its confines.

The education establishments of the city in¬ clude the State normal school located on a high hill just north of the city, and a high school with an attendance of 450 pupils. It has the usual grade schools. The Saint Francis Col¬

lege, conducted by the Order of Saint Francis, has two fine buildings and some hundred stu¬ dents in collegiate work. It has a faculty of much more than ordinary ability. The parochial school of the parish church at Santa Barbara is excellently conducted, and gives to the children of Catholic parents an opportunity to have their children educated within the pale of the Church. The four banks within the city have a combined capital of $1,000,000, and deposits of $5,000,000.

The Old Mission founded by the immediate successor of Junipero Serra is situated just without the city limits. The building was built in 1815, and upon the ruins of the former mission established in 1786. Montecito is situ¬ ated to the east of Santa Barbara and is a suburb of that city. In this locality famed the world over for its beauty are hundreds of beautiful homes. Many of them are works of art. Pop. (1920) 19,441.

SANTA BARBARA, Honduras, the capi¬ tal of the department of Santa Barbara, situ¬ ated on the Santa Barbara River, 65 miles southwest of Puerto Cortes. It is a compara¬ tively well-built town, manufactures sombreros and spirits, and is a commercial depot for the products of the surrounding country destined for Puerto Cortes. The latter is reached by a high-road and, for a part of the way, by rail. Pop. between 5,000 and 8,000. Also a town on Samana Peninsular, San Domingo. Pop.

5,000.

SANTA BARBARA, Philippines, pueblo, province of Iloilo, island of Panay, between a branch of the Janipaan River on the north and the Tigon River on the south, 12 miles north of Iloilo, the provincial capital. Pop. 13,000.

There is also a smaller pueblo of the same name, province of Pangasinan, Luzon, 12 miles east of Lingayen; at the crossing of two roads. Pop. 7,595.

SANTA BARBARA, a channel in the

Pacific Ocean, between the northern islands of the Santa Barbara group and the mainland of California. It varies in width from 20 to 30 miles.

SANTA BARBARA ISLANDS, a group off the coast of California, lying 20 to 60 miles from the mainland, south and southeast of Santa Barbara city. They are nine in number; San Miguel, Santa Rosa, Santa Cruz, Anacape, Santa Barbara, Santa Catalina (q.v.), San Clemente, San Nicolas and San Juan. From San Miguel on the north to San Clemente is about 155 miles.

SANTA BARBARA DE OCAMPO, da

6-kam'po, Mexico, a town in the state of Tamaulipas, situated 45 miles south of Ciudad Victoria. It lies in a fertile river-plain at the foot of the eastern Sierra Madre, and is the centre of a rice, sugar and fruit-growing dis¬ trict. Pop. about 10,000.

SANTA CATALINA, kii-ta-le'na, an island of California, one of the Santa Barbara Islands, separated from the mainland by San Pedro Channel and Gulf of Saint Catalina. The island was discovered in 1542 by Juan Rodriguez Cabrillo, a Portuguese explorer in the service of Spain, and was named by him San Salvador. The explorer Sebastian Vizcaino visited the island 60 years later and gave it the present

name, in honor of Saint Catharine of Sienna. The island is 25 miles long, with an average width of four miles; area, about 55,000 acres. It is hilly and well-wooded and has many deep gorges. Avalon (q.v.) is the only town on the island. The surrounding waters abound with fish. The island is a favorite resort, especially from June to October.

SANTA CATHARINA, ka-ta-re'na, Bra¬ zil, a southern maritime state bounded on the north by the state of Parana, on the east by the Atlantic, on the south by the state of Rio Grande do Sul and on the west by the Argen¬ tine territory of Misiones ; it includes the forti¬ fied island of the same name and several smaller ones on the coast; area, 28,620 square miles. Desterro officially Florianopolis, is the capital. A series of valleys run west to east, formed by spurs of the boundary moun¬ tain range, and the state is watered by the rivers Sao-Francisco, Aracary, Tapecu, Tijuca,

Tufarao and numerous streams all falling into the Atlantic. The headwaters of the Uruguay River are in this state. The soil, though in the lower lands sometimes sandy, is fertile, the climate mild and the seasons regular. Sugar, rice, mandioca, millet, beans, onions of im¬ mense size and garlic are the chief cultivated products, considerable quantities of which are exported to Rio de Janeiro. The indigo and cochineal plants grow luxuriantly, and wheat and flax give good returns. The state is well wooded, producing excellent timber; and gold, silver, iron, coal and petroleum exist. The forests are infested by ounces, coatis, monkeys, pigs and other animals. Birds are numerous, including several varieties of humming-birds, and the lakes and rivers are frequented by innumerable geese and other water-fowl. Pop.

320,289.

SANTA CLARA, kla'ra, Cal., town in Santa Clara County, on the Southern Pacific Railroad, 46 miles southeast of San Francisco. It was settled by the Franciscans in 1777, be¬ came a town in 1852, and received a new charter in 1867. It is the centre of a rich agricultural and fruit-raising region, and has a number of fruit-packing establishments; it also contains Several mills, a tannery, sash and door factory, casket-works and a wind-mill factory. It is connected with San Jose, the county-seat, by a railroad and electric street railway. The pub¬ lic school system includes a high school and there is a public library. The town is also the seat of Santa Clara University, a Roman Catho¬ lic institution founded in 1851, and the Notre Dame Academy, a Roman Catho¬ lic convent school and the University of the Pacific (q.v.) is nearby. The Carmelite Order of Nuns occupy a magnificent monastery erected at a cost of $250,000, founded by the late Alice Phelan Sullivan. The Black Company is the largest green-fruit packing industry on the Coast. The Santa Clara Journal, the semi¬ weekly newspaper, is the oldest publication in Santa Clara County. The old Santa Clara mission is of great historic interest. A fine boulevard, the Alamada, connects the town with San Jose. The government is by a board of five trustees, three of whom are elected two years. Pop. 4,998.

SANTA CLARA, Cuba, (1) city, capital of the province of Santa Clara, on the Cuba

Railroad, 155 miles east-southeast of Havana. It was founded in 1689. Formerly it was the eastern terminus of the railroad from Havana, but in 1902 the railroad system was extended to the eastern end of the island. It is the centre of a fertile agricultural region, is the second largest inland city of Cuba, and has consider¬ able commercial importance, which is increas¬ ing with the development of the railroad facili¬ ties. Silver has been mined in the vicinity, but not successfully; an excellent quality of asphalt and

graphite are obtained and exported ; and illuminating gas for lighting the city has been manufactured from this asphalt ; petroleum is also reported in the vicinity. The city is well built, the streets are wider than is usual in the older Cuban cities, and municipal sanitation has been improved since 1898. The location is naturally healthful and favorable for further commercial development. Pop. 54,885.

(2) Province in the central part of Cuba, bounded on the east by Camagiiey and on the west by Mantanzas ; area, 8,266 square miles. The surface is undulating, with ranges of hills in the east and south, the highest peak rising 2,900 feet. It has rich agricultural lands; the production of sugar is the chief industry, the province containing some of the largest sugar plantations and factories in the island. Tobacco, coffee and fruits are other products of com¬ mercial importance ; wax and honey are ob¬ tained, and the timber is abundant and valuable, there being 307,910 acres of 'public forests in the province. There are also excellent grazing grounds and cattle raising is a profitable indus¬ try. The mineral resources are second only to those of the province of Oriente, but not so well developed; asphalt is mined, and cop¬ per, gold and silver have been located. The Cuba Railroad traverses the province from east to west and there are short branch roads ; there are few good highways, however, and the need of improvement in transportation facili¬ ties is felt. Pop. 569,416.

SANTA CLARA, Order of. See Orders

(Royal) and Decorations.

SANTA CLARA, University of, an insti¬ tution for higher learning established at Santa Clara, Cal., on the site of the old Santa Clara Mission in 1851. It was incorporated as a university in 1875, but was known as a college until 1912 when the title university was as¬ sumed. Its courses comprise philosophy and letters; general science; civil, mechanical and electrical engineering; architecture; pedagogy; and a pre-medical course. It is Roman Catholic in denomination. There are 325 students and 34 instructors ; the buildings and equipment are valued at $720,000.

SANTA CLAUS, san'ta klaz. See Nicho¬ las, Saint.

SANTA CROCE, san'ta kro'cha. See Florence.

SANTA CRUZ, san'ta kroos, Andres, Bo¬ livian soldier and politician : b. La Paz, Bolivia, about 1794; d. Saint Nazaire, France, 1865. He was of partial Indian descent, entered the Span¬ ish army and rose to the rank of colonel. He was captured by the patriots in 1820, persuaded to adopt their cause, became a general in the army, and led an invasion of Upper Peru in

1823. In 1826-27 he was acting President of

Peru under Bolivar and in 1829 he was elected President of Bolivia for a term of 10 years, receiving also the title of grand marshal. His measures were progressive and the country en¬ joyed great prosperity under his administration. From the first he adhered to his purpose of uniting the Pacific Coast republics, and his suc¬ cessful invasion of Peru in 1836 was followed by his proclamation of the Peruvian-Bolivian confederation. In 1839 a Chilean army invaded Bolivia and defeated Santa Cruz at Yungay. He resigned and left the country, whereupon the confederation was dissolved. He was after¬ ward engaged in Europe on various diplomatic missions for Bolivia.

SANTA CRUZ, Cal., city, county-seat of Santa Cruz County, on the Bay of Monterey, and on the Southern Pacific and South Pacific Coast railroads, 60 miles south of San Fran¬ cisco. It was first settled in 1791 by Francis¬ can missionaries, and was incorporated as a city in 1876. It is in a fruit-raising region; the chief manufacturing establishment in the city is a powder factory; other manufactures of importance include lead, bitumen and leather; and there are also lumber and planing mills, a soap factory and a box factory. The city is beautifully situated on land rising gradually from the bay, the climate is equable and pleas¬ ant, and it has become one of the most popular health and tourist resorts of central California. A bathing beach, picturesque drives and a large public park overlooking the bay add to the attractions of the place. The public buildings include a courthouse, a hall of records, the city hall, and the public library. The city has a public high school and parochial schools ; and is the seat of the School of Holy Cross (a Ro¬ man Catholic convent school), and of the Cath- erwood's Business College (coeducational). The city is governed on the commission plan. Pop.

(1920) 10,917.

SANTA CRUZ, san'ta kroos, five Mexican towns bear this name, the largest being in the state of Guanajuato, situated in a fertile agri¬ cultural district a few miles southeast of Guana¬ juato, with a population of 7,239.

SANTA CRUZ, Philippines, pueblo, capital of the province of Laguna, Luzon; on southeast shore of the Bay Lagoon (Laguna de Bay), at the mouth of the Santa Cruz River, 34 miles southeast of Manila. It is connected by high¬ way with Manila, Batangas, Cavite and Tayabas, and

carries on an important trade. It is also the terminus of a projected railroad from Manila. The region is famous for the manufacture of palm wine or brandy, the sale of which was a government monopoly under Spanish rule. The town is well built and contains fine municipal and ecclesiastical buildings. Pop. 13,140.

There are also three smaller pueblos of the same name: (1) Pueblo, province of Davao, Mindanao, on Davao Bay, 15 miles south of Davao; it has an excellent harbor of good depth; pop. 720; (2) Pueblo, province of Ilocos Sur, Luzon, 34 miles south of Vigan; on the main highway; pop. 5,876; (3) Pueblo, province of Zambales, Luzon, on sea-coast; 32 miles north of Iba; on the main highway; pop. 4,600.

SANTA CRUZ, san'ta krooz, or SAINT CROIX, sant kroi, the largest of the Virgin Islands of the United States, lying 60 miles east by south of Porto Rico; area, 84 square miles.

-'Ilf 7 '

It is hilly except in the southern part ; well- watered, and fertile, and has a larger propor¬ tion of land under cultivation than the other islands of the grroup. Sugar is the chief prod¬ uct; tobacco, cotton and fruits are also culti¬ vated. Some cattle are raised. The chief articles of export are sugar and bay rum. The climate is at times unhealthy, the temperature vJfries from 54° to 72°. Earthquakes and hurri¬ canes are frequent. The capital and residence of the governor is Christianstadt ; and in the island is another small town called Frederik- stadt. The island was discovered by Columbus in 1493, and was occupied by the Dutch, the English, the Spaniards and the French; ceded to Denmark by France, it was occupied by the English in 1807, but finally restored to Den¬ mark by the Treaty of Paris. It came into the possession of the United States by purchase 31 March 1917. Pop. about 16,000. See Virgin Islands.

SANTA CRUZ ISLANDS, or QUEEN CHARLOTTE ISLANDS, Melanesia, an archipelago in the Pacific Ocean, belonging to Great Britain, and situated in lat. 10° S. and long. 166° E., north of the New Hebrides, and east of the Solomon Islands. The group com¬ prises about a dozen small islands, with a com¬ bined area of 362 square miles. The larger islands are volcanic and mountainous. Most of them are surrounded by coral reefs, and nearly all the small islands are of coral formation. The climate is hot, humid and unhealthful, but the soil is very fertile, and the vegetation lux¬ uriant. The inhabitants, who are chiefly Melan¬ esians and still uncivilized, are supported partly by their plantations of coco-palms, partly by fisheries and by trading with neighboring is¬ lands. The archipelago was discovered in 1595 by Mendana. Bishop Patterson was murdered there in 1871. Since

1893 it has been an admin¬ istrative dependency of the Solomon Islands. The population is about 7,000.

SANTA CRUZ DE NAPO, krooth da na'po, pueblo, province of Marinduque, Philip¬ pines, on the northeast coast, 18 miles east of Boac. The town lies about a mile arid a half from the shore, and three miles from the an¬ chorage ground. It is a port of entry for coasting vessels, and the anchorage is well protected ; there is difficulty, however, in landing at the point nearest the town. Santa Cruz is sur¬ rounded by a fertile agricultural country; it is not as well built as Boac, the provincial cap¬ ital, but its situation is more advantageous ow¬ ing to the superior harbor. Pop. 15,800.

SANTA CRUZ DE LA SIERRA, kroos da la se-er'ra, Bolivia, (1) town, capital of the department of Santa Cruz de la Sierra; on the Piray River, on the eastern slopes of the Andes. The town was founded in 1575, and originally bore the name of San Lorenze de la Fontera. The houses are mostly one story high, built with timber and earth, with large balconies and un¬ even roofs. Pop. 18,335. (2) Department, the

easternmost department of Bolivia, bounded on the north by department of Beni, and the Bra¬ zilian province Matto-Grosso ; on the east by the river Paraguay and the Brazilian territory ; on the south by the desert of Gran Chaco and Chuquisaca department; on the west by the department of Cochabamba ; area, 126,340 square miles. It is mostly level, except in the western

part, where it reaches the Andes. It is drained by the Rio Mamore and the Rio Beni, and their tributaries. The central region is heavily wooded, with some open marshes and plains. It is thinly populated, the most of the towns being in the western part and along the rivers. The soil between the mountains and the central forests is fertile and yields sugar, coffee, cacao and rice. Some cotton cloth is manufactured and gold is mined in the mountain district. Pop. (estimated) 209,850.

SANTA CRUZ DE TENERIFFE, krooth da ten-e-rif', Canary Islands, city, capital and commercial port of the Canary Islands, on the northeast coast of the island of Teneriffe (q.v.). Many of the houses are handsome, and of one and two stories high; but the majority are low. The streets are well paved, and lighted by elec¬ tricity. There is a square, surrounded by wooden edifices, and adorned with a colossal statuary group representing

the apparition of the Virgin of Candelaria to the Guanches, the original inhabitants. Besides the custom-house and the military hospital, there are scarcely any public buildings; the church of San Fran¬ cisco is the finest. The harbor, which is very secure, has a magnificent mole, of modern con¬ struction; other works, including a breakwater, have recently been constructed. Tomatoes, ba¬ nanas, potatoes, wine, brandy and cochineal are the chief articles exported; and the imports consist largely of English, French, Spanish and German manufactures, with coal, grain, flour, etc. Pop. 16,000.

SANTA F6, fa, or SANTA FE DE LA CRUZ, Argentina, (1) Capital of the province of the same name, near the junction of the Salado with the Parana, 299 miles by rail north¬ west of Buenos Aires. It stands on an emi¬ nence which is prominent in a district otherwise level. The Cabildo, the most important building, stands on the plaza or main square. Santa Fe is the seat of the governor, legislature, and the bishop. There are several churches and mon¬ asteries, also a normal school for teachers. Hides and timber form the chief articles of trade. The principal industrial works are : a foundry, macaroni and oil factories, and tile works. Pop. 33,200.

(2) The province of Santa Fe covers 50,916 square miles, and has a rapidly increasing pop¬ ulation. Rosario (q.v.) is the largest city. There are vast numbers of cattle, sheep and horses on extensive farms, and 3,688,118 acres of land are planted in cereals. Pop. 816,401.

SANTA FE (Holy Faith, contracted from La Villa Real de Santa Fe de San Fran¬ cisco), New Mexico, city, capital of the State and county-seat of Santa Fe County, on the Santa Fe River, the Denver and Rio Grande, the New Mexico Central and the Atchison, To¬ peka and Santa Fe railroads; it is 21 miles east of the Rio Grande and 58 miles northeast of Albuquerque. Chartered as a city in 1890.

Principal Features.— The streets in the older part are narrow and crooked and are oc¬ cupied chiefly with one-story adobe houses, but in the more modern portion the streets are broad and straight and are improved with good business houses and neat residences, many of them of stone and brick. A public park, known as the Plaza, occupies a square in the middle of the city, in which are two monuments and a

memorial fountain. The city contains also a monument to Governor Perez, who was assas¬ sinated in 1837, and another to Kit Carson who lived at Taos. Santa Fe is the seat of a Roman Catholic archbishopric and until 1897 the mili¬ tary post known as Fort Marcy was situated there. The city contains the oldest national bank in the State of New Mexico, and has a public high school and ward schools. In ad¬ dition to the State library

there are three public and school libraries. The rooms of the Mu¬ seum of New Mexico, the School of American Research, and the New Mexico Historical So¬ ciety contain interesting historical and archaeo¬ logical collections, while the attractive new building of the Museum of New Mexico, con¬ structed in the style of the New Mexico mis¬ sion architecture, houses the art collection of the State. Santa Fe is beautifully sit¬ uated at an altitude of 6,998 feet, in the midst of an agricultural and mining region and its principal business consists of sup¬ plying the immediately surrounding country with merchandise. Water for domestic pur¬ poses, for local irrigation and electric power, is supplied by reservoirs above the city on Santa Fe Creek. There are commodious hotels. Ow¬ ing to its unsurpassed climate Santa Fe has be¬ come a popular resort for health-seekers and its deep historical interest attracts many tour¬ ists; but as a business centre it has declined since the building of the first railroad brought the overland trade via the Santa Fe trail to a close and diverted much traffic to Albuquerque. Pop. (1920) 7,236.

Buildings, etc. — By reason of its long po¬ litical and ecclesiastical importance Santa Fe contains by far the most interesting and some of the finest buildings in the Southwest. First in historical importance is the "Palace,® a mas¬ sive-walled, one-story structure of adobe, a block in length and facing the Plaza on the north. It was doubtless erected early in the 17th century and originally was square, with a large court in which the Spanish garrison was quartered. The building formed the headquar¬ ters of the Spanish and Mexican provincial governments successively until 1846, when Gen¬ eral Kearny took possession of New Mexico for the United States. Diego de Vargas, the reconqueror of New Mexico in 1692, and Zebulon Montgomery Pike (after whom Pikes Peak was named), with many others of note, were imprisoned therein, and Gen. Lew Wal¬ lace finished his (Ben Hui° in one of its rooms while governor of the Territory of New Mexico. Next in importance, perhaps, is San Miguel Church, a plain adobe structure, largely destroyed by the Indians in 1680, restored in 1710, and greatly modified within recent years. The cathedral, a fine modern sandstone edifice, is built around a parish church known as the Parroquia, which was probably erected on the site of a still older church, built by Fray Alonso de Benavides in 1622-27, but destroyed in the revolt of 1680. The cathedral contains hand¬ some carved stone reredos originally erected in the former Capilla de los Soldados (built in 1730 on the south side of the Plaza) by Gov¬ ernor Marin del Valle and his wife in 1761. Of interest also in the history of Santa Fe are the Rosario Chapel, said to occupy the spot where Vargas made his vow before the surrender of the city in 1692 ; the Garita, formerly a military

1 The so-called “ Oldest Dwelling House in the United States ”

2 The Old Palace at Santa Fe

.

?cv7?°S which the leaders of the rebellion of 1837 were executed, and long the site of a cemetery; the earthworks of Old Fort Marcy, north °f the city, erected during the Mexican War; and an ancient dwelling mistakenly be¬ lieved to antedate the Spanish conquest. The State Capitol, of brick and stone, completed in 1900, at a cost of $200,000, is an attractive building. There are also the new Museum of New Mexico, above mentioned, a Federal building, the Scottish Rite Cathedral, a State penitentiary (cost $150,000), a county court¬ house, Saint Vincent’s Hospital, Saint Vin¬ cent’s Sanatorium, Saint Vincent’s Orphan¬ age, an Industrial School for the Deaf and Dumb, the Allison Presbyterian Mission (opened in 1881), the Government Indian School with 300 pupils, Saint Catharine’s School (R.C.), San Miguel College (R.C.), Loretto Academy (R. C.), Mary E. James Mis¬ sion School, and the School of American Re¬ search. Besides the cathedral there are two other Roman Catholic churches, a Protestant Episcopal church, an English and a Spanish Presbyterian church and an English and a Spanish Methodist Episcopal church.*

History.— Santa Fe was established, on the site of at least one prehistoric Indian pueblo, by Juan de Onate in 1605; it is, therefore, the second oldest white settlement in the United States, Saint Augustine, Fla., alone exceeding it in point of age. (See New Mexico). The prospects of the town during its first few years were not encouraging. In 1617, there being only 48 colonists and soldiers in the province, which was surrounded by predatory tribes, the king, in response to an appeal for aid, rendered the desired succpr, and by 1630 Santa Fe con¬ tained 250 Spanish inhabitants. In 1623 Fray Alonso de Benavides, custodian of missions, began the erection of a church, which was fin¬ ished five years later, probably on the site of the present cathedral (see above). On 10 Aug. 1680 the Pueblo Indians, led by a native named Pope, arose in rebellion against the Spaniards, killed 400 of the 2,500 colonists, soldiers and priests, and laid siege to the capital until the 20th, when Governor Otermin and a thousand survivors who had taken refuge in the palace made a sortie, killing 300 of the Indians and capturing 50, who were afterward hanged, and on the following day started on a long overland journey to El Paso, Tex. Santa Fe remained in possession of the Indians until September 1692,

when Governor Vargas re¬ captured the town with but little opposition, and late in the following year it was resettled with about 800 new colonists. Hostilities were renewed during the winter, but the Indians were soon overpowered and 70 of the partici¬ pants hanged in the Plaza. There were sev¬ eral proposals to move the seat of the provin¬ cial government in the 18th century, but noth¬ ing was accomplished. French-Canadian trap¬ pers found their way to the Rio Grande by the middle of the century, followed by a brisk trade between New Mexico and Chihuahua, and, early in the 19th century, between the prov¬ ince and the American frontier, Santa Fe be¬ ing the western entrepot. This trade, which became known as the ˆcommerce of the prai¬ ries,® was conducted over the Santa Fe trail, first from Kaskaskia, Ill., later from Franklin and Independence, Mo., and increasing from

$15,000 in 1822 to $750,000 in 1844. During the rebellion of 1837 Governor Perez, the chief justice and other officials were killed and a Taos Indian installed as governor, but he was succeeded in 1838 by Manuel Armijo, who thwarted an attempt by 300 Texan rangers to invade Santa Fe in 1841. On 18 Aug. 1846 Gen. S. W. Kearny took possession of the town in the name of the United States, issuing a proclamation to that effect on the 22d. An adobe fort and blockhouse were erected on the northern heights and named in honor of Secre¬ tary of War Marcy, and under its embank¬ ments 200 Missouri volunteers were buried dur¬ ing the winter of 1846-47. Charles Bent, the first American civil governor, was murdered at Taos in January 1847 ; in the same year the first legislative assembly was held at the capi¬ tal, the first newspaper was established and a saw-mill erected. In 1848 the treaty of peace with Mexico was proclaimed from the Palace, the New Mexican (still published) was founded and the Roman Catholic vicariate- apostolic of Santa Fe was established. New Mexico becoming organized as a Territory of the United States 3 March 1851, Santa Fe was established as its seat of government on 14 July. On 3 March 1862, during the Civil War, Santa Fe was abandoned by Union forces and occupied a week later by Confederates, but it was again evacuated on 8 April and occupied by the Federals on the 11th. The first railroad entered Santa Fe 9 Feb. 1880. Consult Ban¬ croft, H. H., (History of Arizona and New Mexico) (San Francisco 1884) ; Hodge, F. W., (Santa Fe) (in L. P. Powell's (Historic Towns of the Western States, > New York 1901) ; Twitched, R. E., 'Leading Facts of New Mex¬ ican History) (2 vols., Cedar Rapids 1910) ; Old Santa Fe 1914-17.

F. W. Hodge,

Smithsonian Institution, Washington, D. C.

SANTA FE TRAIL, The. See Roads and Highways.

SANTA Ft DE BOGOTA, da bo-go-ta', and DE GUANAJUATO, da gwa-na-hoo- a'to. See Bogota and Guanajuato.

SANTA MARIA, ma-rea, Domingo, Chil¬ ean politician: b. Santiago, Chile, 4 Aug. 1820; d. there, 1889. He was graduated from the University of Santiago, admitted to the bar in 1847, interested himself in political matters and in 1851-52 was involved in an insurrection which caused his banishment for a year. On his return he was elected to Congress, made a reputation as an orator, and in 1858-59 was again banished. He was Minister of Finance under Perez in 1863-64, and in 1868 was ap¬ pointed to the Supreme Court. He afterward served as Minister of Foreign Affairs, of the Interior and of War under Pinto, and gained great popularity by his measures during the war with Bolivia and Peru. He was elected President in 1881 for a term of five years, suc¬ cessfully terminated the war, subdued the Araucanian Indians, and by his able adminis¬ tration of affairs retained his popularity throughout his term of office. He was after¬ ward president of the Senate. He is the au¬ thor of 'Biogrofia de Jose Miguel Infante) (1853) and (Memoria sobre los sucesos ocur- ridos des de la caida de D. Bernardo O'Higgins en 1823 > (1858).

SANTA MARIA, Philippines, (1) Pueblo, province of Ilocos Sur, Luzon, 15 miles south of Vigan. It is on the main highway, and sev¬ eral cart roads lead from here to the interior. In December 1900, 2,150 insurrectionists sur¬ rendered here and took the oath of allegiance to the United States. Pop. 10,030. (2)

Pueblo, province of Zamboanga, Mindanao, also called Biasongan, on the western sea-coast at the mouth of a river, 56 miles north of Zamboanga. It has a well-sheltered harbor. The surrounding region is heavily timbered with valuable woods, and one of the largest saw-mills in the southern Philippines has been erected here.

Two smaller pueblos have the same name: (1) pueblo, province of Pangasinan, near the Agno River, 32 miles east of Lingayen ; pop. 3,940; (2) pueblo, province of Zamboanga,

Mindanao, in the extreme southwest, three miles northwest of Zamboanga, the provincial capital ; pop. 2,200.

SANTA MARIA DE PANDI, da pan'de, Philippines, pueblo, province of Bulacan, Luzon, on the Santa Maria River, three miles from its mouth, six miles northeast of Bula¬ can. It was almost entirely destroyed during the

insurrection, as it was the military centre of the insurrectionists, and was burned by American troops ; it is, however, being rebuilt. It is in a productive rice and fruit region, has good roads and is near Manila and the Manila and Dagupan Railroad ; there are also facilities for river transportation. Pop. 10,510.

SANTA MARTA, mar'ta, Colombia, capi¬ tal of the department of Magdalena, stands on the north coast near the mouth of the Magda¬ lena River. The surroundings are attractive but not salubrious. It has a good harbor, is an episcopal see, and has a noteworthy cathe¬ dral. Pop. 8,348.

SANTA MAURA, mow'ra, 9r LEUCA- DIA, Greece, an island of the Ionian group off the western coast, from which it is separated by a strait which was rendered navigable in 1903 by a canal cut through the sand-banks which block the shallow channel. It covers an area of about 180 square miles, is mountainous, the ranges running north and south and ter¬ minating in the white cliffs from which the island derives its name. The eastern portion is unproductive; the west and north are fertile, producing vines, pomegranates, olives, citrons, almonds and some corn. The chief source of wealth consists in the bay-salt, about 8,000 tons of which are exported annually. Bee-culture is carried on, but agriculture is the principal industry; navigation and fisheries also occupy a considerable number of the inhabitants. Cape Ducato (q.v.), formerly Leucates, at the ex¬ tremity of the peninsula on the southwest, is the high rock (200 feet) where once stood a temple of Apollo, also known as Sappho's or the Lover's Leap. It was also the scene of several earlv Grecian tragedies. Amaxichi is the principal town, on the northeast, with about 6,000 inhabitants. Nearby is the fortress of Santa Maura.

SANTA MONICA, mon'i-ka, Cal., city in Los Angeles County, 15 miles west of the city of Los Angeles, on the Pacific Ocean and on the Southern Pacific and the Southern Cali¬

fornia railroads. It is a popular summer re¬ sort, has excellent bathing and boating and other amusement facilities. It is headquarters for several motion picture companies. There are considerable shipping interests and there is a 1,600-foot concrete pier. The Santa Monica Military Academy is located here. Pop. (1920) 15,252.

SANTA ROSA, ro'sa, Cal., city, county- seat of Sonoma County, on Santa Rosa Creek, and on the Northwestern Pacific, the Southern Pacific and on the Petaluma and Santa Rosa Electric railroads, about 52 miles north by west of San Franciso. Settlements were made in the vicinity about 1850; but the place was not laid out nor incorporated until 1854. It re¬ ceived its name partly from the profusion of roses which are found here all the year. It is situated in a productive agricultural region noted for its fruits, vegetables, grain, etc. It has large stock-raising interests, and consider¬ able attention is given to dairying. The chief industrial establishments are fruit-drying and canning works, flour mills, machine shops, soap works, carriage factory, basalt quarries, wooden factories, stove factories and lumber yards. It suffered severely in the earthquake of 18 April 1906. It contains a convent, experimental botanical gardens (of Luther Burbank), public library, hospitals, county jail, high school, post-office, city hall, etc. Many trees shade the broad streets which are clean and well kept. The educational institutions are the Ursuline Academy, high school, Santa Rosa Ladies' Col¬ lege, the Pacific Methodist College, public and parochial schools, private schools, etc. The citv is on level ground, 152 feet above sea- level. There are five banks with deposits aggregating about $500,000. The total value of public property is $750,714. The waterworks are municipally owned. The city is very well built, and is modern in every respect. Pop.

(1920) 8,758.

SANTA ROSA, Philippines, pueblo, prov¬ ince of Languna, Luzon, on the west shore of the Bay Lagoon, . 20 miles west of Santa Cruz. It is on the main road and on the line of a projected railroad. Pop. 9,450.

SANTA ROSALIA, ro-sa'le-a, Mexico, a town in the southern part of the state of Chihuahua, on the Mexican Central Railroad. It is noted for its hot sulphurous springs. Pop. about 8,000.

SANTA TECLA, ta'kla, a picturesque town in Salvador. See Nueva San

Salvador.

SANTAl PARGANAS, san-tal' par-gun'- as, India, a district in the Bhagalpur division of Bengal, bounded on the north and partly on the east by the Ganges. Area, 5,456 square miles. The district is named from the Santals, who form the most chara- teristic portion of its inhabitants, and are also found elsewhere in India. They are one of the aboriginal races belonging to the Dra- vidian stock, are dark-colored, and mostly pro¬ fess a religion of their own, in which the worship of a chief deity and subordinate deities and a sort of ancestor worship play a chief part. They live chiefly by hunting, and are exceed¬ ingly fond of flute-playing, dancing and sing¬ ing. The Church Missionary Society and the Scandinavian Home Mission have succeeded in

improving their condition and promoting edu¬ cation among them. The district is crossed by lines of the East India Railway. It contains the old Mohammedan city of Rajmahal on the Ganges and also Deogarh, the Hindu place of pilgrimage. The capital is Dumka. Pop. 5,326. Pop. of district, 1,809,737.

SANTALS, or SANTHALS. See Santal

Parganas.

SANTANA, san-ta'na, Pedro, West Indian soldier and politician : b. Hineha, Santo Domin¬ go, 29 June 1801; d. there, 14 June 1864. He was a lawyer and a wealthy land owner living quietly on his estates until 1844 when the Do¬ minicans revolted against Haiti. He joined their cause, was appointed brigadier by the junta and speedily rose to the chief command of the insurgent army. He was elected Presi¬ dent for four years in November 1844 and ad¬ ministered the affairs of the government with great success, endeavoring to promote agri¬ cultural interests and to increase the resources of the country. In 1849 he was called to the command of the army, defeated the invader Soulouque, deposed President Jimenez and ruled as dictator until the election of President Baez in October 1849. He was re-elected President in 1853, and again repulsed the in¬ vasions of Soulouque in 1855 and 1856. He resigned in 1857 and was succeeded by Baez, but after the revolt of 1858 again assumed the government. He had strongly favored annexa¬ tion to the United States in 1849 but the move¬ ment had been defeated by Baez, and now, in despair of bringing the government to a satis¬ factory basis, he ceded it to Spain. He was given

rank as lieutenant-general in the Spanish army and retired to his estates, but when the insurrection against Spanish authority broke out he marched to Azua, where he at once crushed the rebellion. When, however, the insurrectionary spirit became general he again retired to his estates where he died shortly before the end of Spanish rule. His last days were embittered by the hatred of many of his countrymen who regarded him as a traitor, but he is now generally recognized as a thoroughly honorable and upright man who acted solely from disinterested motives, while his courage is held unquestioned even by his enemies.

SANTANDER, san-tan-dar', Francisco de

Paula, Colombian soldier and statesman: b. Rosario de Cucuta, New Granada, 2 April 1792; d. Bogota, 5 May 1840. In 1810 he engaged in the war for independence, fought in the ensuing campaign, in 1817-18 was with Bolivar, and assisted the Liberator to gain the battle of Boy- aca (7 Aug. 1819). For his services he was promoted general of division. In 1821 he was elected to the Vice-Presidency of Colombia, with Bolivar as President. While the latter was absent in the southern Isthmus and Peru (1822— 27), he administered the government with much ability. Re-elected in 1827, he became the leader of the opposition to Bolivar, and when the latter (1828) arrogated to himself dictatorial powers Santander was deposed, and sentenced to death on an unsupported charge of attempted assassination of the dictator ; and though the sentence was later commuted to exile, he was deprived of all rank. The Colombian Republic ended in 1831, Santander was elected President of New Granada in 1832, and after the close

of his term (1837), served also in the Congress. His administration was one of order and prog¬ ress, and laid the basis of the Republic of New Granada, the modern Colombia. He was among the wisest leaders of the time, and wrote a justification of his political course in (Ayunta- mientos para las Memorias de Colombia y Nueva Granada (1837).*

SANTANDER, Colombia, a department sit¬ uated in the north central part of the country, between Venezuela and the Magdalena River. Area, 17,865 square miles. The greater part is occupied by the Eastern Cordillera of the Co¬ lombian Andes, which runs lengthwise through the department. The range is cut near the middle by the deep valley of the Sogamoso River. Only the uplands are inhabited ; the lowland along the Magdalena is an unhealthful and densely forested wilderness. The chief products are sugar, coffee, cocoa, tobacco, cot¬ ton, rice and wheat. The mountains, however, are rich in minerals, including gold, silver, iron, copper and coal. Pop. 400,084.

SANTANDER, Spain, (1) capital of a province of that name, and one of the chief ports of the Peninsula, 207 miles by rail north of Madrid, near the Bay of Biscay. The principal modern buildings are the town-hall, theatre, market, barracks, bull-ring, clubs, civil and mili¬ tary governor's residences, the institute and other schools, custom-house and hospitals. There are numerous open squares and magnifi¬ cent promenades, notably that of (

(2) The province of Santander, on the north coast of Spain, covers an area of 2,108 square miles. It is enclosed on all sides but the north with lofty summits and traversed by railroads of various kinds. It possesses extensive forests and important mines of iron and lead; it also produces large quantities of grain. The industries of mining, sylviculture and agricul¬ ture are steadily improving. Livestock is abundant and valuable, especially in the high¬ lands. Pop. 312,282.

SANTEE (san-te) RIVER. See Wateree River.

SANTERRE, sari-tar, Antoine Joseph,

French revolutionist: b. Paris, 16 March 1752; d! there, 6 Feb. 1809. He was a brewer by trade and through his wealth and generosity possessed of much influence. His brewery in the Faubourg Saint-Antoine was used as a meeting place for the Jacobins and he exerted much authority over their movements. He commanded a battalion of the national guard in the storming of the Bastille in 1789, was conspicuous in the riots of the Champ de Mars, in the attack on the Tuileries in 1792 and in the insurrection of August in that year. He rose to be commander-in-chief of the national guard and field-marshal. In 1793 at the head of an army of 20,000 men he was defeated at Coron, was recalled and arrested as an Orleanist, and did not gain his release until the fall of Robes¬ pierre, after which he retired to private life. There is no evidence to substantiate his classi¬ fication as one of the extremists of the Revolu¬ tion. Consult Carro, (Santerre, sa Vie politique et privee) (1847).

SANTI, san'te, Angelo de, Italian musician : b. Trieste, 12 July 1847. He was educated in Germany, France and Austria; entered the Society of Jesus in 1863, and was ordained to the priesthood in 1877. From 1877 to 1887 he was director of the Gymnasium, Zara, Dal¬ matia. Pope Leo XIII called him to the edi¬ torial staff of the Civiltd Cattolica, with the charge of restoring ecclesiastical music to its former conformity to the spirit of the

Church. In 1887 he also became professor of liturgical chant at the seminary of S. Apollinare. With Carlo Respighi, Father Santi founded Rassegna Gregoriana in 1902, and in 1909 attended the National Congress of Sacred Music at Pisa. In 1911 he founded a superior school of sacred music at Rome and served on the Pontifical Commission for the Vatican edition of the Gregorian Liturgical books. He has published (Adolfo Kolping e les Societa cattoliche degli artigianP (1891);

SANTIAGO, san-te-a'go, capital of the Re¬ public of Chile, situated at the base of the Cardillera of the Andes. It occupies an area of eight square miles in a fertile plain about 2,000 feet above sea-level, and is divided into two districts by the Mapocho River, which is crossed by many iron bridges. The most im¬ portant part of the city is that which lies be¬ tween the river and the Alameda de las Delicias a very wide avenue with many rows of fine trees. Cerro Santa Lucia, a hill rising to a height of more than 200 feet above the gabled or flat house tops, is made an attractive place of public resort by gardens and an open-air theatre. Other distinctive features are Cousino Park and the Agricultural School Farm, each 320 to 330 acres in extent ; the former devoted merely to outdoor recreation while the latter is the most useful centre of public instruction in Chile. Established in 1842, this school farm (Quinta Normal de Agricultura) now includes the Agricultural Institute and Training School, botanical gardens and conservatories, a zoologi¬

cal garden, the Museum of Natural History, Veterinary Institute, institutes of Vegetable Pathology and Animal Vaccine, and the Chemi¬ cal Laboratory. Noteworthy buildings are Congreso Nacional, the Moneda (residence of the President of the republic), cathedral and archiepiscopal palace, National Library (160,000 volumes), city hall, Palace of the Courts of Justice, university, National Conservatory of Music, Municipal Theatre, Astronomical Obser¬ vatory; museum of fine arts (where annual ex¬ hibitions of painting and sculpture are held). Central Railway Station, palace of the exposi¬ tion and many luxurious private residences. Educational institutions include district and private schools, those maintained by religious bodies, the National Institute (secondary in¬ struction), commercial technical institute and professional school for girls. The university provides instruction in medicine (its most im¬ portant faculty), law, engineering, etc. There are also normal schools, a good school of arts and trades, institute of pedagogy and schools of the fine arts. The board of public hygiene exerts an excellent influence for the control of diseases which were formerly prevalent. The water supply is good and abundant. Santiago has a mild climate: frosts are not unknown, though .snow rarely falls. Indus¬ trial establishments are flour and wood-work¬ ing mills, foundries, breweries, tanneries, etc. There are seven national and three foreign banks; electric street cars and a belt-line rail¬ way; and

railway service for communication with the coast. The state shares with four pri¬ vate companies the task of maintaining the telegraph service. There are two telephone companies. The municipality has an income of about $2,000,000 for public expenditures. On 8 Dec. 1863 the church La Compania was destroyed by fire during service, and about 2,000 out of the 3,000 of the congregation, mostly women, per¬ ished, and on 16 Aug. 1906 the city was visited by a severe earthquake, followed by fire. Pop. 397,941. See also Chile.

SANTIAGO DE LOS CABALLEROS,

da los ka-bal-ya'ros, Santo Domingo, city, on the Yaqui del Norte River, 80 miles northwest of the city of Santo Domingo, 20 miles south of Puerto Plata. It is connected with Puerto Plata by railroad, and also with the east coast by a continuation of the road originally ex¬ tending from Sanchez to Concepcion de la Vega. It is situated in the Vega Real, the most, fertile agricultural section of Santo Domingo, and is the largest and most prosper¬ ous inland city of the country, having extensive commercial interests, especially in tobacco. Pop. about 12,000.

SANTIAGO-DE-COMPOSTELLA, da-

kom-pos-tel'ya, Spain, a city on the Sar, in the province of Coruna, 32 miles south of the city of Coruna, romantically situated on a slope of Monte Pedroso. It is the seat of a univer¬ sity and of an archbishopric. The cathedral, begun 1082 and completed 1128, is in the form of a Latin cross, is well preserved and has a remarkable interior. It is on the site believed to be the grave of the apostle Saint James, whose bones are said to be in the foundation. Other notable buildings are the episcopal palace, the hospital (founded by Ferdinand and Isabella in 1504),

the town-house, the College of Tonseca and the great convent of Saint Martin (overhanging a ravine), formerly one of the wealthiest Benedic¬ tine establishments and now a barrack. In the large square or Plaza the bull-fights take place. There are many promenades, fountains and mineral springs in the vicinity, besides pastures and fertile valleys, which produce grain, hemp, fruit, etc. The local industries are distilleries, breweries, soap, chocolate, linen, crystal, paper and small silver articles. There are good schools and a fine library in the university (founded in 1532). Long the most frequented place of pilgrimage in western Europe, the city acquired the popular designation of the C(Mecca of Spain.® Pop. about 25,000.

SANTIAGO DE CUBA, da koo'ba or ku'ba, former name of the largest and most eastern province of Cuba, now Oriente; area, 14,227 square miles. It contains the principal mountain ranges of Cuba, the general trend of which is from southeast to northwest; the river Cauto, the largest river of the island run¬ ning from east to west, divides the mountain system ; the ranges to the north are very con¬ fused and irregular ; the best defined range is that of the Sierra Maestra, near the southern coast. The valleys and sea-coasts are very fer¬ tile ; sugar, coffee, cocoa and tobacco are the chief products ; bananas and cocoanuts are culti¬ vated, and vegetables and fruits may be raised with little care or supervision. Mahogany, eb¬ ony and other valuable hardwoods grow in abundance in the interior, and are exported. Oriente has more mineral wealth than any other province of the island; iron, manganese and copper have long been mined in quantities of commercial importance, and zinc and lead have been found. Good grazing lands abound in portions of the province, and stock raising is an industry of increasing importance. The de¬ velopment of the province was long retarded by lack of transportation facilities, but. with the increase of railroads following American occu¬ pation, opportunity is afforded for further ex¬ ploitation of the large resources. Pop. 567,988.*

SANTIAGO DE CUBA, chief city of the province formerly of the same name, now Oriente, situated on a fine bay about six miles from the southern or Caribbean coast of the island of Cuba. It is the centre of the mining district, and has a large foreign trade, though the places of business are unpretentious or even shabby. Many of the dwelling-houses are a single story in height; their gardens, the Alameda, some points on the slopes of the sur¬ rounding mountains and the shores of the bay are especially attractive. A noteworthy build¬ ing is the old cathedral, fronting on the Plaza de Armas. The mean temperature in winter is 82° F., and in summer 88°. It was formerly re¬ garded as an exceedingly unhealthful town, yellow fever being prevalent throughout the year; but a marked improvement in this respect was effected through the sanitary reform measures carried out under the direction of . the military government (army of the United States) after the war of 1898. The population, as shown by the official census, in 1914, was 62,358. The city has a good water-supply, fur¬ nished to 94 per cent of the dwellings, etc., through an aqueduct called El Paso de la Vir- gen. Santiago was founded in 1514; from 1522

to 1552 it was the capital of the island. It is full of historical interest, the battlefields of San Juan and Caney, the peace tree, and the remains of the Spanish squadron, destroyed outside of the harbor, being of especial interest to Americans. For subsequent events, and es¬ pecially the important naval and military opera¬ tions in 1898, consult Marrion Wilcox, (A Short History of the War with Spain.) See also Cuba.

SANTIAGO DE CUBA, Military and Naval Operations at. For an account of these events of the Spanish-American War, see United States, War with Spain.

SANTIAGO DEL ESTERO, del es-ta'ro,

Argentina, (1) capital of the province of that name, lies in a fertile valley on the right bank of the Rio Dulce. Its chief buildings are the cathedral, national college, normal school, primary schools and bank. It has extensive orchards. The town was founded in 1553. Pop. 12,000.

(2) The province of Santiago del Estero is situated in the north-central part of the re¬ public, covers an area of 55,385 square miles and consists of a broad plain with several low ranges in the west, and a few salt marshes in the south. The streams are the Salado and Dulce rivers. Irrigation is necessary; sugar, corn, wheat, grapes, cotton and tobacco are grown. The chief industries are lumbering, agriculture, stock-raising and wool-weaving. The forests contain valuable woods. The cli¬ mate is hot. Pop. 247,000.

SANTIAGO DE LAS VEGAS, da las va

gas, Cuba, a town in the province of Havana a few miles south of the capital, on the Havana- Guanajay Railroad. The town lies' on elevated ground, and is a suitable place for the ac¬ climatization of foreigners. It is regularly built, with two plazas and a handsome church. The tobacco industry is predominant.

SANTIAM, a tribe of the Kalapooian stock of North American Indians formerly re¬ siding on Santiam River, a tributary of the Willamette, in Oregon. About 100 are at Grande Ronde reservation, Oregon, when as American citizens they support themselves by agriculture. Consult Lewis, (Tribes of the Columbia Valley and the Coast of Washington and Oregon> (Lancaster, Pa., 1906).

SANTILLANA, san-tel-ya'na, Inigo Lo¬ pez de Mendoza, Marquis of, Spanish soldier and poet : b. Carreon de los Condes, Old Cas¬ tile, 19 Aug. 1398; d. Guadalajara, 25 March 1458, generally known as the Marquis of San- tillana. He was of noble family and inherited large estates from his father while still a child. These his mother managed to keep together in a very turbulent and insecure age and to afford the boy the best education possible. He early became a soldier and was mixed up in the civil troubles of Spain and, somewhat later, he distinguished himself in wars against the Moors of Granada. He defended and widened the boundaries of the territory held by the Christians in Spain. At the battle of Olmedo (1445) his success was so signal that it won for him the title of Marquis de

Santillana and Conde del Real. He was also given the right to use that title <(Don® which was then con¬ sidered a very high privilege. He followed his

successful political career and soon became the most powerful figure in Castile. At the same time his reputation as a poet and a scientist kept pace with his political advancement; and his fame extended to foreign countries from which came many noted literary men and am- lˆtious students to visit at his home, where all were made welcome. Santillana was one of the most brilliant figures of his age. He dis¬ tinguished himself in the rough sports and contests of the knights ; he was a noted public speaker, a master spirit at the banquet, a natu¬ ral courtier, a successful and popular leader of men. To all these qualities he added poetic gifts superior to those of most of the Spanish poets of his day. So enthusiastically was he admired by his contemporaries for his poetic gifts and his philosophical studies that he was called the <(wisest of the wise.® His literary work cov¬ ers a wide field. He began as an imitator of the ancient troubadours, displaying in his work strong notes of originality. He soon gained a reputation as a writer of sprightly songs and love poems of a true lyrical ring. But among his work of this period are his <(serranillas® or mountain songs, a species of poetry which he continued to cultivate later in life with such signal success that the best of his serranillas are still of interest on account of their simplic¬ ity, naturalness of tone and poetic beauty of form and expression. He became the master writer of troubadour poetry of his time. In every anthology of Spanish poetry are included ˆserranillas® of Santillana, many of which are still popular in Spain. He was less successful in gaining popularity for his didactic poetry and his imitation of the Italian poets, especially Dante. He followed the allegorical tendencies of the latter and he was fond of making a display of learning which often amounts to pedantry and detracts from the brilliancy of his poetical talent. Though his fame is greatest as a writer of troubadour poetry, Spanish literary critics agree that he shows more origi¬ nality and poetic talent in his didactic work. Among his works in this field are (Dialogo de Bias contra fortuna, (Doctrinal de Priva- dosP (E1 CentiloquioP These show originality greater than that of any contemporary poet. They are graceful, beautiful in form, chaste in language and vigorous in style. It is in his imitation of Dante that his philosophical studies are most seen. His classical and mythological allusions and adornments are so excessive as almost to become a vice. The added fact that everywhere his imitation of Dante is so patent detracts from the actual literary value of*

this part of his work. But it has a secondary value in that it brought strongly to the attention of Spain the great mine of literary wealth exist¬ ing in Italy. He introduced into Spain the Italian form of the sonnet and produced excel¬ lent imitations of Petrarch. He was also one of the first Spanish writers to dig into the mine of literary wealth of Boccaccio.

Santillana, owing to his popularity, had a large literary following and many imitators, yet he cannot be said to have created a school. His influence on the Spanish language was more general and prolonged than specific and confined to a certain definite time. Among his works, in addition to those already mentioned, are his Vaqueira pastorals, (Proverbios de gloriosa doctrina e fructuosa ensenanzaP

(Comedieta de PonzaP Consult Menendez Pelayo, M., (Antologia de poetas liricos cas- tellanos> (Madrid 1894) ; Rios, Jose Amador de los, (Obras de Inigo Lopez de Mendoza, Mar¬ ques de Santillana) (Madrid 1852) ; Sanvisenti, B., (Primi Influssi di Dante, del Petrarca e del Boccaccio sulla letteratura spagnuola) (Milan 1902) ; and good Spanish literature such as that of Ticknor.

SANTLEY, Charles, Sir, English baritone: b. Liverpool, 1834. He studied music in Eng¬ land and Italy and made his debut in opera at Covent Garden in 1857. He won a great suc¬ cess at Hoel in the opera 'Dinorah in 1859 and in the part of Rhineberg in*

(Reminiscences of my Life) (1909).

SANTO DOMINGO, san'to do-meng'go, called also Haiti, the second in size of the West Indian Islands. Its greatest length is about 400 miles; its greatest width 160 miles; its area is estimated at 28,249 square miles. For particulars in regard to physical geography, geology and mineral resources, history, popu¬ lation, etc., see Haiti ; and Dominican Re¬ public, the political divisions of the island.

SANTO DOMINGO, Dominican Republic, the capital of the Republic, situated at the embouchure of the Ozama on the south coast. It is regularly built and has a large Gothic cathedral. There is a statue of Columbus in the central square. The city was founded by Bartholomew Columbus in 1496; is the oldest European settlement in America. Pop. 26,000

SANTQ DOMINGO DE BASCO, da

bas'ko, Philippines, town of the Batanes Is¬ lands, province of Cagayan, on the northwest coast of Batan Island. It is the chief town of the group and is well built, with several fine buildings. It has a good anchorage in Santo Domingo Bay; the inhabitants are chiefly engaged in the coasting trade and

in fishing. Pop. 2,800.

SANTO TOMAS, to-mas, Philippines, town of the province of Batangas, Luzon, 26 miles north of Batangas. It is on the main road to Manila and on the line of a projected railroad, near the boundary of Laguna. It has good schools. Pop. 9,500.

There is a smaller pueblo of the same name in the province of Union, Luzon, 22 miles south of San Fernando, at the head of the port of Santo Tomas on the main road. Pop. 6,000.

SANTO TOMAS, a mountain of the Philippines, in the southern part of the province of Union, east of Agoo. It is 7,418 feet in height, the highest peak in the province. On its western side the land slopes rapidly to the coast.

SANTONIN, a proximate principle (CisHisOa), the active principle of santonica, possessing acid properties, obtained from wormseed, the seed of a species of southern¬ wood. It is colorless, crystallizable and soluble in alcohol, and in the fixed and volatile oils, is bitter and is one of the most efficacious ver¬ mifuges for roundworms. Its administration

produces changes in the urine and also affects the vision for a few hours; but no ill results follow.

SANTORIN, san-to-ren', THERA, or CALLISTE, Greece, the largest of one of the island groups in the zEgean Archipelago, 60 miles north of Crete. It has an area of 27 square miles. The eastern slope is covered with vineyards; the western shores are precipitous, with deep ravines and volcanic indications. The town occupies the lofty heights overlook¬ ing precipices. The wines of the island are the chief staple and are called vino-brusco and vino-santo. Various eruptions have occurred in the vicinity which from time to time have changed the surrounding topography. There are practically no trees and the water supply often fails, it becoming necessary to procure fresh water from neighboring islands. There are many ancient remains, and excavations have brought to light numerous inscriptions of the Mycene and early periods. Pop. 19,597. Con¬ sult von Gaertringen, Hiller et alia, (Thera, Untersuchungen, Vermessungen und Ausgra- bungen in den Jahren 1895— 98) (Vols. I-IV, Berlin 1899-1902) ; and (Inscriptiones Graecse Insularum Maris ˆEgsei) (Vol. II, ib., 1898).

SANTOS, san'toos, Brazil, city in the state of Sao Paulo, on the Atlantic Coast, 200 miles southwest of Rio de Janeiro and 45 miles from the city of

Sao Paulo. The immense export and import trade of the interior region which it serves has made it the second port of the republic, the total value of its trade reaching about $251,000,000 annually. The harbor is ac¬ cessible to the largest vessels. Santos is the largest coffee' exporting port in the world, be¬ ing the outlet for the great coffee-producing parendas of Sao Paulo. Coffee to the value of about $65,000,000 is shipped annually from this port to the United States. The annual export of coffee to all countries from this port has averaged over $120,000,000 for the last 12 years. The chief exports from Santos to for¬ eign countries in 1915 were coffee, valued at $113,424,679; hides, $539,275; cacao, $289,340; bran. $69,754 ; and tobacco, $24,254. Exports to the United States in the same year totaled $63,055,465, of which coffee represented $62, 431,991; hides, $318,817; and cacao, $292,500. Frozen meat is fast becoming an important export, the value now exceeding $2,000,000 annually, Great Britain, Italy and the United States being the chief purchasers. Bananas now rank third in the list of exports, being valued at $500,000 annually and going to Argen¬ tina. Santos is situated on an island, protected from the ocean by a larger island, with a chan¬ nel six miles long between the two. A sea-wall three miles long has been constructed on the side of the city. This made possible the re¬ claiming of much pestilential and malaria¬ breeding swamp land, and the city's health¬ fulness has been greatly benefited in conse¬ quence, yellow fever being no longer endemic. The city is well built, has many fine streets and boulevards. Churches crown the heights of Monserrate. There are several monasteries, a city hall, custom-house, two hospitals, an arse¬ nal, banks, electric-lighting plants, electric street railways, gas system and modern water-supply system. A railway connects the city with Sao Paulo and the interior. Pop. 90,000. Consult

Rines, G. E., and Wilcox, M. (eds.), (Encyj clopedia of Latin America) (New York 1917).

SANTOS, san'tzoz, Francisco, Spanish writer: b. in the first half of the 17th century in Madrid; d. about 1700. He published, be¬ tween 1663 and 1697, 16 volumes, principally of short stories, intended, as the author professes, for popular amusement. (Dia y noche en Madrid, } the first of this series, contains many excellent and startlingly graphical pictures of life in the capital of Spain. (Perequillo, el de las guallineras) (Madrid 1668), a story written in opposition to the picaresque novels still ex¬ tensively read in his day, was also popular and is still read in Spain. (Verdad en el potro y el Cid resuscitado) (Madrid 1679) is of in¬ terest on account of the songs and popular ballads it contains, many of which date back to an early period of Spanish literature, and some of which differ from all other known versions. Among his other popular stories are CE1 diablo anda suelto) (Madrid 1677) ; (E1 vivo y el defunto) (Madrid 1692) ; (Ta- rascas de Madrid y tribunal espantoso) (Va¬ lencia 1694) ; and (Los Gigantones de

Madrid. > Few of Santos' stories now appear in their original form because the literary taste of the Spanish people has changed since his day; but they have been recast by other authors and the ideas contained in many of them have been made use of by some of his successors in the literary field. Consult any good history of Spanish literature.

SANTOS CHOCANO, zho'kan-6, Jose, Peruvian poet : b. 1875. Since the death of Ruben Dario (q.v.) in 1916, Santos Chocano has been the undisputed leader of Latin Amer¬ ican literature ; and even before the disappear¬ ance of the latter from the scene, Santos Chocano had become a figure at least equal in importance with him on the literary horizon. He influenced Dario strongly and for the bet¬ ter, by enlarging his view and making him, in his latter years, more cosmopolitan. It was through Santos Chocano that Dario was led to see the United States and the American people with other and more favorable eyes. Endowed with a broad vision, he threw behind him, early in his career, all sectionalism and local views, which had hampered most of the preceding Latin American poets and prose writers, and announced himself the apostle of cosmopolitanism and Pan-Americanism. At a time when other younger poets like Rubino Blanco Fombona of Venezuela made it their special business to vilify the United States and all things American and to hold her people up to ridicule as uncouth, uncultured, rude dollar- grabbers, overbearing and unbearable, Santos Chocano proclaimed himself the singer of America in all its varying moods and phases, past and present. He sang, (My lyre has a soul, my song an ideal. > The sound of his lyre was America; the ideal of his song the unity and harmony of all things American. In his (E1 Canto del Porvenir) (Song of the Future) he sees the spiritual union of the North and the South, of the Latin and the Saxon. He believes the one is necessary to the other, and that they have been placed together in the Western world for a purpose. Santos Chocano has the truest vision of all the Latin American writers; and his influence, which has

become very widely extended, has been gener¬ ally exercised for good. His (Alma America, in which he emphasizes the idea of race unity on the Western continent, is a stirring poem which became immensely popular and exercised a strong influence on the younger poets of Latin America. Santos Chocano has become, in a sense, the leader of a new school of poetical thought, whose self-imposed task is to sing the beauties and glories of America. Though united through this ideal, the members of this school use widely different literary methods to attain their ends ; and some of them are not broad minded enough to see beyond the bound¬ aries of Latin*

America. Yet all of them can sing with him: <(When I feel myself an Inca, I render homage to the Sun which gave me the sceptre of royal power; when I feel my Spanish blood, I evoke Colonial days.® Santos Chocano has traveled much and has found a warm welcome in nearly all the Latin American countries. Some years ago he was lionized in Mexico City, and the Central American na¬ tions have paid high tribute to his genius. Con¬ sult Coester, A., (The Literary History of Spanish America) (New York 1916) ; Gon¬ zalez Blanco, Andres, (Select Poems of Jose Santos Chocano> (Introduction to

SANTOS-DUMONT, do-mon, Alberto, Brazilian aeronaut : b. Sao Paulo, Brazil, 20 July 1873. He was educated chiefly in France, and has resided in Paris since the death of his father, a coffee planter. Having experimented in aeronautics he made an ascent on 4 July 1898 from the Jardin d'Acclimation, Paris, in a spherical balloon 18 feet in diameter. At this time he was engaged upon the construction of a dirigible balloon which he completed so as to make the trial ascent on 20 September. It proved itself dirigible, but the experiment ended in disaster owing to the insufficiency of the air-pump. A second and a third machine were constructed, the latter being cigar-shaped, 66 feet long and l\y2 feet in greatest diameter. It carried a four and one-half horse-power petroleum motor to work a five-foot propeller making 2,500 revolutions a minute. It was steered by a rudder of silk and bamboo having an area of about 25 feet. This machine as¬ cended from Vaugirard, 13 Oct. 1899, sailed to the Champs de Mars, encircled the Eiffel Tower several times, proceeded to Auteuil and finally landed at the manoeuvre grounds at Bag¬ atelle. He continued experiments with new balloons, and on 18 Aug. 1901 his balloon col¬ lapsed and fell to the roof of the Trocadero Hotel. On 19 Oct. 1901 he won the Henri Deutsche prize of $50,000 offered for a trip from the Aero Club at Saint Cloud around the Eiffel Tower and back to the point of departure in less than an hour. The actual time employed was 29 minutes and 30 seconds, the return being made against a strong wind. In 1902 he went to Monte Carlo with the design of crossing the Mediterranean and after making several ascents suffered an accident which pre¬ cipitated himself and his balloon into the Bay of Monaco. In 1904 he was made chevalier of the Legion of Honor and five years later be¬ came officer. See Aeronautics, History of — The Dirigible; and consult Mr. Santos- Dumont's (My Airships> (New York 1904).

SANUTO (san'oo-to), or SANUDO, Marin, the Elder, of Torcello, Venetian states¬ man, traveler and geographer: b. Venice, about 1260; d. 1330-38. He traveled widely, knew the coasts and much of the interior of west¬ ern, central and southern Europe, northern and eastern Africa, and southern and west¬ ern Asia. He used his vast knowledge of geography and the trade routes of the world in an effort to reawaken the crusading spirit. To

further the plan he wrote in 1303-07 his (Liber secretorum fidelium super Terrae Sanctse re- cuperatione) (Hanover 1611; Eng. trans., Lon¬ don 1896). This he presented to Pope Clement V ; and in 1312-21 he was engaged upon two supplementary volumes, which when completed were presented with their predecessor to Pope John XXII, together with maps of the world and of Palestine, as well as the cities of An¬ tioch and Acre, and charts of the Mediterra¬ nean and Black Seas and the West European coasts. The maps were probably the work of Pietro Vesconte, and on the whole compare favorably with modern maps. The books con¬ tain definite plans for the conquest of Palestine, displaying an extensive knowledge of the cus¬ toms, wealth, extent and population of the countries described. There are 23 manuscript copies of the (Secreta in existence, of which the most important are those in the Riccardian Library, Florence ; the British Museum, Lon¬ don; and the Paris National Library.*

SANUTO, or SANUDO, Marin, the

Younger, Venetian senator, historian and trav¬ eler: b. Venice, 22 May 1466; d. 1533. He was of patrician birth, and at the age of 17 went on a journey through Istria and the mainland provinces. He sought out famous people, places of interest and libraries wherever he went, copied inscriptions and made a careful and exhaustive record of his observations and experiences. Because of his exceptional ability he was elected to the Maggior Consiglio at the age of 20, five years less than the legal age, and in 1598 he became a senator. His diaries begin 1 Jan. 1496 and continue until September 1533, covering the proceedings of the legislative bodies in which he served and giving an ex¬ haustive record of his experiences and associa¬ tions during that period, filling 58 volumes. He was permitted to examine the secret ar¬ chives of the state, and his friendships in¬ cluded the most famous and learned men of his time ; so that his minute and accurate rec¬ ords, governed by his broad learning and rich associations, are of great value and undisputed authority. He collected a splendid library, in¬ cluding foreign as well as Venetian manu¬ scripts, his activities generally fitting him for the post of historian to the republic, an ap¬ pointment he greatly desired. This, however, twice passed to others, but Sanuto's services as a historian were eventually recognized by the republic through a yearly pension of 150 gold ducats. He was author of (Itinario in terre ferma (London 1847) ; (I Commentarii della guerra di Ferrara* (Venice 1829) ; XXII, 1828) ; and the (Diarii* (Venice 1872-1903).*

SAO FRANCISCO, san fran-ses'k5, a river of Brazil, which rises in the Serra da Canastra, in the southwest of the state of

Minas Geraes, flows north-northeast through that state and the state of Bahia, then turning east forms the boundary between the states of Pernambuco and Alagoas on the north and Bahia and Sergipe on the south. It falls into the Atlantic 50 miles north-northeast of the town of Sergipe by two mouths, one to the north, called Aricari, so shallow as to be scarcely navigable even by canoes ; and the other to the south, hence called Francisco do Sul, much larger and deeper, but unfortunately encumbered at its mouth by a large bar about six miles broad, covered with a heavy surf, and with seldom more than four feet of water on it. It is a large and majestic river, with a course which has been estimated at 1,600 miles, but, in addition to the bar at its mouth, has numerous rapids and cataracts, which make its continuous navigation impossible ; those at Paulo Affongo, about 190 miles inland, are about 60 miles in length. Its principal affluents are, on the right, the Paraopeba, Guacuhi or Velhas, Jequitahi and Verde; and on the left the Andaia, Borrachudo, Abaite, Paracatu, Urucaia, Carinenha, Correntes and Grande. Railroads have been built around some of the rapids and in conjunction with inland steamers on the river afford continuous communication for about 1,000 miles.

SAO JOAO DA BARRA, san zho-oon' da bar'ra, or SAO JOAO DA PARAHYBA,

Brazil, a town on the Atlantic Coast of the state of Rio de Janeiro, at the northern end of the state. It is the port of Campos, with which it has railroad connection. But since Campos became connected by rail with Rio de Janeiro, Sao Joao has lost its importance, as the port is only an open roadstead. Pop. 5,000.

SAO JOAO DEL REY, del ra'e, Brazil, a town in the state of Minas Geraes, situated 75 miles southwest of Ouro Preto, on the rail- read running west from Barbacena. It was founded as a gold-mining town, but the gold has been exhausted, and the chief wealth of the town now comes from cattle raising and the manufacture of cloth and leather. Pop. 10,000.

SAO LEOPOLDO, la-oo-pdl'do*, Brazil, a town in the state of Rio Grande do Sul, situated on the railroad 18 miles north of Porto Alegre. The town has two churches, a Jesuit college and two high schools. It has had a considerable industrial and commercial development. Agri¬ culture, viticulture and cattle-raising are carried on successfully in the surrounding country, and the town manufactures leather-goods. The products of the town have amounted to over $6,000,000 annually, most of them going to Porto Alegre, which, besides the railroad connection, can be reached by steamboats on the Rio dos Sinos. The town was founded by German im¬

migrants in 1824, and most of the inhabitants are still Germans. It was almost totally de¬ stroyed during the civil war of 1846. Pop.

7,500.

SAO LUIZ DE MARANHAO, loo-ezh da

ma ran yan. See Maranhao.

SAO PAULO, pow'loo, a state of Brazil, bounded on the north and northeast by Minas Geraes and Rio de Janeiro, on the southeast and south by the Atlantic Ocean and Parana, and on the west by Matto Grosso. Area, 112,307 square miles, including a large section of fertile

but unsettled land near the Parana River, which forms part of the western boundary. The prin¬ cipal mountains are between the capital of the state and Santos, Serra do Mar (average height about 3,000 feet) ; and, toward the interior, spurs of the Mantequeira range. Adjoining the coast is a comparatively narrow strip or zone, low-lying and tropical in its characteristics; but an abrupt ascent leads from this to the plateau which extends westward to the Parana, sometimes cut by the valleys of the river sys¬ tem, sometimes rough and mountainous, but in general maintaining an altitude which ensures a temperate climate. In fact, the winters in the southern part of the state are decidedly cold, frosts occurring many times during a single season ; and at the capital the temperature occasionally falls below 32° F. The fertile red soil of the plateau is peculiarly adapted to the cultivation of coffee. The railway system of this state, with that of the neighboring Rio de Janeiro (q.v.), is the best in Brazil. A notable piece of engineering is seen on the line which crosses the Cubatao range at a height of more than 2,500 feet. The principal cities are the capital, Sao Paulo (founded by the Jesuits in 1552, became a city in 1712, created a bishopric in 1746) and the leading port, Santos. The Bulletin of the Pan American Union, April 1919, notes that the population of the city of Sao Paulo, which in 1900 was 239,820, at the end of 1918 had reached 504,278 — an increase of 115 per cent in eighteen years. In 1900 there were 22,407 buildings in the city, valued at 33,306 paper contos (one conto, paper = $270 U. S. gold). In 1918 fully 55,356 buildings were re¬ ported, valued at 89,456 contos. Santos (1919 est. 80,000) is built on an island, a narrow channel separating it from the mainland. Its harbor and general sanitary conditions have been improved by important works. It is not only the shipping centre of the State of Sao Paulo but also ranks as the largest entrepot of coffee in the world. Two of the main causes of the prosperity of this state — which is generally regarded as the most

progressive part of Brazil — are success¬ ful agriculture, undertakings to improve the means of communication, and immigration. For description of the coffee industry, cattle¬ raising, etc., in this state, see Brazil — Agri¬ culture and Forest Products.

Marrion Wilcox.

SAO THOME, to-ma', or SAINT THOMAS, Africa, an island in the Gulf of Guinea belonging to Portugal, and situated a little north of the equator in long. 6° 30′ E., 150 miles northwest of Cape Lopez. Its area is 358 square miles. The whole island consists of a volcanic mountain 7,026 feet high, and heavily forested. The climate is equable, temperate and healthful, and the soil is very fertile. The chief products are coffee, cocoa, oranges, lemons, figs, grapes, pine-apples, vanilla, cinna¬ mon, india-rubber, cinchona, etc. The exports are valued at over $10,000,000 annually. Pop. 53,969. There are nine miles of railway in operation. Sao Thome forms, with the neigh¬ boring island of Principe, a Portuguese prov¬ ince. The capital is Cidade, with a safe harbor and a pop. of 3,000.

A

SAONE, son (ancient, Arar), France, a river which rises at Viomenil, in the department of Vosges, flows southwest through that depart-

ment, traverses the department of Haute-Saone, and on entering the department of Cote-d'Or, receives the Ognon. Continuing a southwest course, past Auxonne, it receives its most im¬ portant tributary, the Doubs. It flows past Chalons and Magon to Lyons, where it joins the Rhone after a course of about 280 miles; of these 190 miles are navigable. The Canal du Centre, Canal de Bourgogne and Rhone and Rhine Canal, bring it into communication with the Loire, Seine, Meuse, Moselle and Rhine.

SAOSHYANT. See Sosiosh.

SAP, the fluid which circulates in plants, and consists of water carrying various nutritive salts in solution. This water and its contents, "crude sap,® so-called, is absorbed by root-hairs and permeates the plant, passing through the woody portions of the vascular bundles, in the newer rings of the "sap-wood,® which, in dicotyledons, constitutes a woody cylinder be¬ tween the bark and the heart-wood or pith. This sap, by some process which is not fully under¬ stood, but which is ascribed to root-pressure, transpiration, or suction, severally or col¬ lectively, carries its raw

materials to the chlo¬ rophyll granules in the green, growing parts of the plant, where they are metamorphosed into organic substances, and are again taken away through the vast cells to those places where they are needed for the life or propagation of the plant, or are stored for future use. Maple and corn sugar, india-rubber, opium and the milk of certain plants are all saps, and the products of the lactiferous cells. Many plants, such as cacti and others, living in desert regions, store away water to carry them through the droughts, a fact which is taken advantage of by travelers in thirsty lands.

SAP-GREEN, a yellowish-green pigment which is prepared by mixing the purplish-red juice expressed from the ripe berries of buck¬ thorn (Rhamnus catharticus) with an alkali. The liquid is fermented, evaporated until it has reached a proper consistency, and then sus¬ pended in bladders, to harden into a brittle mass. The color is used by water-color painters, paperstainers and leather-dyers, but is very fugitive.

SAPAJOU, or SAJOU, a French adapta¬ tion of an Indian word, and now applied to several species of American monkeys of the family Cebidce. The sapajous live in flocks in the forests of Brazil, Peru, Guiana, Colombia and Venezuela, and possess tails of feebly pre¬ hensile powers, and feed on fruits, eggs, small birds, etc. They are familiar in habits, become soon domesticated, and are thus in favor among mountebanks, etc., who teach these monkeys to become very expert in performing tricks. Com¬ mon species of sapajous are the sai (Cebus cap\ucinus) and white-throated sapajou or sajou (C. hypoleucos) .

SAPAN, or SAPPAN-WOOD, red dye-

woods, obtained from two genera of the Legu- minosce, but principally from Ccesalpinia sappan. This tree is indigenous to tropical Asia and to the Indian Archipelago, but since it gives a good, red dye, similar to that of Brazil-wood, al¬ though somewhat difficult to fix, its cultivation is promoted in the West Indies and Brazil.

SAPHO. Of Daudet's (Parisian Dramas> the most widely read and most intensely poig¬

nant is Sapho (1884). Though Edmond de Goncourt pronounced it the author's (

Benjamin W. Wells.

SAPI-UTAN, a small wild ox of Celebes. See Anoa.

SAPINDACEiE, sap-in-da'se-e, a family closely allied to the maples, and

containing the soap-berry (Sapindus) , litchi-nut {Nephelium) , and other genera. The species are usually tall trees or vines with watery juice. The leaves are generally compound, and alternate, ever¬ green and abruptly pinnate. The flowers are small, but often showy sometimes apetalous, sometimes with four or five unequal and im¬ bricated petals, and about the same number of sepals ; the stamens are eight, and are situated on a disc ; the ovary is 3-celled, becoming in fruit capsular or indehiscent, or composed of several wing fruits, or a drupe, or nut, or berry. The species are mostly found in warm countries. The fruits of several, such as the Nephelium, are eaten, but the leaves of many are poisonous. The typical genus Sapindus has a very sapona¬ ceous fruit, used in the place of soap. In Brazil, a paste called "guarana® is made from the pounded seeds of the sapindaceous climbing shrub, Paullinia cupana, and serves for food, for medicine (since it contains caffeine), and for the preparation of a refreshing drink.

SAPODILLA, or SAPODILLA PLUM,

an evergreen tree (Achias sapota) some 20 feet high with thick, shining leaves, clustered at the ends of the branches and a milky juice. It is sometimes called bully-tree, also, and is in¬ digenous to tropical America, where it is

often cultivated for its fruit which in the West Indies is sometimes called naseberry. The flowers are small and whitish and the sapo- dilla, the fruit, resembles a russet apple in color and size and has a milky acrid juice, which disappears when over-ripe, leaving the fruit in a sugary condition and with a pleas¬ ant, pear-like flavor. It is a valuable food in warm countries. The seeds are large and black and used as an aperient and diuretic. The juice of the sapodilla is made into chewing-gum, the bark is astringent, and employed as a febrifuge (Jamaica bark), and the wood is reddish-brown, hard, heavy and durable.

SAPONIN, a glucoside contained in the roots of Saponaria officinalis or soapwort and many other plants; also in the fruit of the horse-chestnut, in quillai-bark or soap-bark, etc. By means of boiling alcohol it is readily ex¬ tracted from the root of soapwort, the alcohol, as it cools, depositing the saponin as an amor¬ phous sediment. It derives its name from its behavior with water, in which it is soluble in all proportions, yielding an opalescent fluid which froths when shaken like a solution of soap, if even one one-thousandth part of sa¬ ponin be present. Its solution, or an infusion of

soapwort, is sometimes employed in place of a solution of an alkaline soap for cleansing the finer varieties of wool from grease. Many preparations for cleaning kid gloves, etc., de¬ rive their virtues from saponin.

SAPOTACEiE, sap-6-ta'se-e, a large genus of trees and shrubs of the heath tribe, indige¬ nous chiefly to the tropics and principally to the tropical islands. The leaves are entire, alter¬ nate and leathery, with flowers clustered in the axils of the leaves, or at the older stem-nodes. The flowers are regular, bisexual, with stamens borne on the corolla, as many, or twice as many, as its lobes ; the calyx-lobes are rigid and obtuse, and longer than the corolla-tubes ; the fruits are baccate. The Sapotacece have a milky juice which furnishes true gutta-percha (q.v.). The sapodilla and star apple of the West Indies are fruits produced by this family. The genus Bassia contains species valuable for the oils which they yield and the seeds of Mimusops elengi also yield oil abundantly. The sapotads are natives chiefly of tropical India, Africa and America; known genera 21, species 212. Consult Gray, (School and Field Book of Botany5 (1875).

SAPPAN-WOOD. See Brazil-wood.

.SAPPHIRE, a mineralogical name includ¬ ing all highly colored and transparent varieties of corundum (q.v.), except the red, which is called ruby, an exception confined chiefly to jewelers. Sapphire corundum occurs in three forms — as small, distinct crystals, hexagonal or rhombohedral in various modifications ; as transparent portions of ordinary corundum ; and at times as nodules or small rounded masses enclosed in ordinary corundum, though distinct. Most gem sapphires are of the first kind ; but some fine stones have been cut from material of the two latter kinds, especially in the corun¬ dum workings in North Carolina, notably the Culsagee mine in Macon County. Sapphires present almost every variety of color, although blue is the most familiar, deep shades being most valued. Other blue gems occasionally seen

are blue tourmaline (called Brazilian sapphire), cyanite and iolite, which is known somewhat as water-sapphire. True sapphires are, however, easily distinguished by their greater hardness (9), and density (3.95 to 4.1). The main sources of sapphire are Ceylon, Cashmere and the Pailin district of Siam, also the Anakie district of Queensland, Australia. In the United States, sapphires are obtained chiefly in Montana; first from the ((bars55 or low bluffs, of gold-bearing gravel, along the Upper Mis¬ souri River, east of Helena and later from a decomposed igneous dike at Yogo Gulch, in Fergus County; also at Rock Creek, Granite County and Dry Cottonwood Creek, Deer Lodge County. The river bars and Rock Creek yield a great variety of rich and delicate colors, as in Queensland, but Yogo Gulch furnishes the deep blue shades most valued and is being worked very

extensively. Small and poorly colored stones are largely sold for watch-jewels. All blue and green sapphires, like rubies, possess marked dichroism, a point im¬ portant to the lapidary, as the tint of gems from such crystals depends upon the direction in which they are cut. In biblical history the sapphire was a stone of an azure color (Exod. xxiv, 10) and very precious (Job xxviii, 16). It was the second stone in the second row of the high priest's breastplate, which is now believed to have been the lapis lazuli, and not the modern sapphire, as doubtless was also the stone mentioned in Rev. xxi, 19. Among the Greeks the sapphire was sacred to Jupiter. See Precious Stones.

SAPPHO, saf'o, Greek poetess: b. Mitylene, or Eresus, Island of Lesbos. She was the greatest of ancient poets of her sex and flour¬ ished between 630 and 570 b.c., being a younger contemporary of Alcaeus. Little is known cer¬ tainly of the events of her life. On account of political commotions she left Lesbos for Sicily. But in later years she returned to Mitylene where she became the centre of a female coterie, a school of poetry of which the fa¬ mous Erinna wras a member. She was the author of various poems ; hymns, odes, elegies, epi¬ grams — of which only twTo complete pieces, an ode (To Aphrodite5 and (To a Maiden,5 together with some fragments, have come down to us; these display intense feeling, glowing imagination and a high finish. One of them is quoted in full by Longinus in his treatise (On the Sublime.5 She is said to have in¬ vented several metres; at least one still bears her name and has been used by such ancient poets as Horace and such modern ones as Can¬ ning in his (Needy Knife-grinder.5 There is an edition of the extant fragments with translations and memoir by H. T. Wharton (3d ed., Chicago 1895). Ancient papyri have recently brought other fragments of Sappho's verse to light. Consult Bergk, (Poetse Lyric5 (Vol. Ill, Leipzig 1914) ; Edmonds, J. M., (in Classical Review, Vol. XXII, Vol. XXVIII, London 1909 and 1914) ; Classical Quarterly (Vol. Ill, ib. 1909) ; Hunk, A. S. (in Classical Studies, Vol. IX, p. 39, ib. 1915) Brandt, P., (Sappho5 (Leipzig 1905) ; Christ-Schmid, (Geschichte der Griechischen Literatur5 (6th ed., Munich 1912) ; Farnell, G. S., (Greek Lyric Poetry5 (London 1891); Wright, W. C. (Short History of Greek Literature) (New York 1907).

SAPPHO. Following the success of his first great tragedy of Fate, (Die AhnfrauC which was written in 16 days, Franz Grillparzer wrote a second poetic drama (Sappho > (1819), also composed at white heat and resembling (Die AhnfratP in the general character of its poetry although differing from it in form and spirit. In its conception it is half way between

the tragedy of fate and the modern tragedy of character; in its form, too, it is half way between the classical and the modern. Out of the slight tradition which tells how Sappho, one of the greatest poets of her age, threw herself from the high Lesbian cliffs into the sea when she found her love for the youth Phaon unrequited and her own hand¬ maiden preferred, Grillparzer has made a stir¬ ring drama, with an acting quality strong enough to carry it to success on the stage when well performed. At the same time he has de¬ veloped a poetic symbolism in the story, and the conflict between the spiritually gifted Sap¬ pho and the beautiful Melitta becomes, in Grill- parzer's hands, the conflict between art and the pleasures of life. Although the verse has neither the dignity nor the sheer beauty of some of Grillparzer's later work, notably (Des Meeres und der Liebe Wellen,) it has the cumulative quality which often accompanies verse written in long stretches at a single sit¬ ting, a quality which does not detract from its distinctly dramatic value. Through the dig¬ nity and the success of his early dramas Grill¬ parzer forged the link that bound the drama of Austria definitely to the literature of Germany.

Edith J. R. Isaacs.

SAPPHO'S LEAP. See Cape Ducato.

SAPR2EMIA. See Blood-poisoning.

.SAPROLEGNIACEiE. See Fungi —

Water Molds.

SAPROPHYTES, a class of plants living on the carbonic compounds resulting from the decay of organic life. They sometimes con¬ tain chlorophyll, but generally do not, and since organs of assimilation are therefore not necessary, the leaves in many kinds are re¬ duced to mere scales. This habit of existing only on decaying organisms makes the higher saprophytic plants very difficult to transplant. Algae are often saprophytes, making use of the decaying refuse of the sea ; and fungi, especially the molds and dung-loving genera as Splach- num, are the most generally known cryptogams acting as scavengers in this manner. Even the globular alga, the <(red snow® (Sphce – rella nivalis), exists on the corpses of insects, pollen-grains and other decaying materials drifting across the snow. Certain other sapro¬ phytes attach themselves to the bark of trees, not to suck the juices of the host in the man¬ ner of parasites, but to subsist on the decay¬ ing bark and on the organic dust and material in solution washed down by the rain and stopped by the projecting mass of the plants. Many saprophytic plants living in the cracks of rocks have only the humus collected in tiny pockets and the supply of dissolved organic matters in

percolating water, to draw upon. Some orchids, as the coral-roots (Corallor – hiza) , that have no true roots, but a thin- skinned rootstock, which absorbs nutriment directly; the familiar Indian pipes (Mono –

tropa) and others spring from the humus of decaying leaves, in close connection with the hyphae of fungi. The meadow pastures sup¬ port such saprophytes as the true mushroom (Agaricus campestris) , the moonwort (Botry – chium lunaria) and the blue and violet flowered gentians. These micro-organisms, non-virulent and always present in animal intestines, may in certain conditions become virulent poisons. See Botany; Fungi.

SAPSUCKER, the popular American name of several small woodpeckers, but properly re¬ stricted to the yellow-bellied woodpecker (Sphyrapicus varius) , an Eastern species repre¬ sented in the Rocky Mountain region by va¬ riety nuchalis and along the Pacific Coast by variety ruber. This woodpecker is of moderate size ; is black and whitish above ; black on breast ; rump black and white mixed ; belly more or less yellowish ; sides streaked with dusky; crown red in the adult; chin scarlet and throat black in the male, but both white in the female. This bird illustrates well the curious tendency toward increase of red in plumage toward the Pacific Coast. In variety nuchalis, the nuchal band is red instead of brown, ex¬ tending the chin red by so much ; in specimens from Nevada, the scarlet area is still larger; and in the Coast form (ruber) the whole head, neck and breast are red, sometimes obliterating the normal pattern. This woodpecker is mi¬ gratory, spending its summers and breeding only in the cooler parts of the United States and northward, and going South in midwinter. Its habits differ from those of other wood¬ peckers mainly in its custom of drilling a great number of holes in the bark of trees, to get at and eat the new wood and sugary sap lying beneath it. In many cases serious harm is done to fruit trees by the great number of chains of holes so bored, although many harm¬ ful insects are also devoured. See Woodpeck¬ ers, and consult authorities cited thereunder.

SAPUCAIA (sap-oo-kla) or PARADISE NUTS, the seeds of Lacythis zabucayo, or sometimes those of L. ollaria, belonging to the Myrtacece and closely allied to the Brazil nut. The trees, often 75 feet high, grow abundantly in the northern part of South America. The nuts which have a sweet almond-like flavor are more wholesome than Brazil nuts. They are about two inches long and an inch thick, with a corky shell furrowed lengthwise, and are found in hard urnshaped fruits, six inches across and with a woody wall half an inch thick. These curious, very hard capsules, have lids which fit closely, but fall off when quite ripe. Like the fruits of other members of the genus they are called monkey-pots, perhaps not only on account of their shape, but because monkeys are said to be very fond of the seeds, which are scarce for this reason. An edible and soap-making oil,

which soon grows rancid, is expressed from sapucaia nuts.

SAPULPA, sa-pul'ua, Okla., city and county-seat of Creek County, 102 miles north¬ east of Oklahoma City, on the Saint Louis and San Francisco Railroad. It is the centre of a region producing oil and natural gas in great quantities and ot a rich agricultural region. It has oil refineries, railroad repair shops, glass plants, cotton gins, machine shops and

manufactories of bricks, candy, cigars, ice, oil- well supplies, etc. The city has 10 miles of paved streets, a large passenger railroad sta¬ tion, modern electric light and power plant, an electric street and interurban railway, a water- supply system owned by the city, storm and sanitary sewer system, several churches of the principal religious denominations, fine high school building, four ward schools, manual training and domestic science building, Colored Baptist College and district school, and the Euchee Indian Mission. There are four banks with over $4,000,000 on deposit and two daily and three weekly newspapers. The freight re¬ ceipts, an index of the city's manufacturing strength, average $3,000,000 annually. Pop.

(1920) 11,634.

SARA, sa'ra, Philippines, pueblo, province of Iloilo, Panay; in the district of Concepcion, two miles northwest of the town of Concep¬ cion. Pop. 11,300.

SARABAND, a dance, said to be derived from the Saracens. Its character is grave and ex¬ pressive. It originated in Spain, where it was formerly danced to the castanets. Handel, Bach and other masters frequently wrote tunes of this description for the harpsichord or clavichord. It became popular in Europe in the 16th century, but was prohibited for a time in Spain because of its indecency. The name is used now to denote a musical com¬ position written for the saraband.

SARACENIC ARCHITECTURE. See

Mohammedan Art.

SARACENS, sar'a-senz, a people mentioned by Ammianus Marcellinus as inhabiting the northern district of Arabia Felix. At the period of the Crusades the term was employed to designate all infidel nations, against which crusades were preached; and in course of time it became the generic name of all the Arabian tribes who embraced Mohammedanism and ex¬

tended their conquests in Asia and Africa.

SARAGOSSA, sar-a-gos'a, Maid of, Span¬ ish heroine : d. Ceuta, Spain, 1857. Her name was Augustina and she was a vivandiere in the Spanish army. During the siege of Saragossa (1808-09) she distinguished herself on several occasions in battle and was made a sub-lieuten¬ ant. Her praises are sung by Byron in (Childe Harold, canto i, 54—56.*

SARAGOSSA, or ZARAGOZA, tha-ra-

go' tha (ancient Oesar-Augusta) , Spain, (1) Capital of a province of its own name and of the ancient kingdom of Aragon, situated on the river Ebro, in a fertile plain, 174 miles north¬ east of Madrid. The town is highly pictur¬ esque with its forest of towers, cupolas and spires, the houses of solid masonry highly ornamented, a city of castles and palaces. Many of the chief buildings were destroyed by the French invaders. Others deserving notice are the exchange (1551); the Torre Nuevo; the old citadel, Aljaperia, built by the Moors; hospitals, numerous churches and charitable institutions, town-house, new university, schools of medicine, theology, etc., many monastic in¬ stitutions, theatre, bath, museum, bull-ring and botanical gardens and promenades. Agricul¬ ture is the principal occupation of the inhab¬ itants and the industries include machinery and iron foundries, tanneries, carriages, pre¬

serves, breweries, glass, candles, soap, liqueurs, distilleries and porcelain. Some of the articles referred to are imported besides rice, dried cod, bar-iron, timber and dye-stuffs. The exports consist chiefly of chocolate, paper, cast iron, wool, hats, dyed silks, soap and especially wheat and flour — mainly to Catalonia. Saragossa was the salduba of the Celt-Iberians, but the walls are all that remain of the ancient city. It renounced paganism at an early period and Aulus Prudentius, the first Christian poet, was born here in 348 a.d. It suffered from various wars, and in 1808 sustained two memorable sieges, costing 60,000 lives, but finally capitu¬ lated to the French.

(2) The province of Saragossa contains 6,607 square miles. The highest elevation is 7,700 feet. On the northwest are the spurs of the Pyrenees. The Ebro, Jalon, Huerva, Aguas, Arva and Gallego and part of the Ara¬ gon are the chief streams. The lower moun¬ tain slopes are covered by forests. The soil in the plains is fertile, producing wheat and other cereals, flax, hemp, oil, wine, etc. Silk¬ worms are reared, sheep are bred. The grow¬ ing industries include paper, leather, soap, bran¬ dies, liqueurs, machinery, various kinds of car¬ riages, railway material, pianos, beds, glass, bronze, chocolate, jams, woolen and linen goods and foundries. Several railways and a canal connecting the Atlantic and Mediterranean are the chief ways

of communication. Pop. about

433,000.

*SARAH (Heb. ˆPrincess**), the daughter of Terah, half sister and wife of Abraham, who in her 90th year bore to him a son, Isaac, according to the promise of God. She died in Plebron at the age of 127 years. See Abra¬ ham.*

SARANAC (sar'a-nak) LAKE, N. Y., village in Franklin and Essex counties, on Lake Saranac, and on a branch of the New York Central and Hudson River and the Cha- teaugay railroads, about 70 miles south by east of Malone. The village is in a part of the Adi¬ rondack region noted for its healthfulness and the beauty of the scenery. The hunter and lumberman settled here in 1860-70, but the railroad brought the health and pleasure seek¬ ers in great numbers. In the vicinity are the Trudeau and the Gabriel sanatoria for con¬ sumptive patients. The principal public build¬ ings are the hotels, the churches and the schools. The government is vested in a village president and a board of trustees. Pop. 5,174.

SARATOGA, The, a former wooden sail¬ ing ship of the United States navy; displace¬ ment, 1,025 tons. Sailing ships of this class are fast disappearing from the navies of the world, but for training the young apprentice into an able-bodied man-o'-war's man there is no better school.

SARATOGA, Battles of, two battles of the American Revolution, called also the battles of Bemis' Heights, or of Stillwater, fought on ground about 12 miles east of Saratoga Springs and near the Hudson River. Both battles were fought under the same officers, the Americans being commanded by Horatio Gates (q.v.), who was ably served by Benedict Arnold and Daniel Morgan (qq.v.), and the British by John Burgoyne (q.v.). The first battle, 19

Sept. 1777, was indecisive. Burgoyne, having crossed the Hudson on the 13th and 14th, and encamped on the heights and plains of Sara¬ toga, confronted Gates' army on Bemis' Heights at Stillwater, which the Americans had strongly fortified. About 4 p.m. on the 19th the American left wing, under Arnold, was at¬ tacked by Burgoyne's right. The engagement lasted until dark, and both sides claimed the victory. The British held the field, but Bur¬ goyne had failed in his attempt to flank the American position. The British loss was more than 500 men, while that of the Americans was under 400. Burgoyne, whose communications with

Canada were cut off, was now placed in peril through the capture of his supply-boats by Lincoln in his rear. Having reason, however, to expect that Sir Henry Clinton would come up the Hudson to his assistance, he fortified his position and waited. But in view of the non¬ arrival of Clinton, of the shortness of his own supplies, and of the difficulty of retreat, Bur¬ goyne was forced to risk another battle. Ad¬ vancing, 7 October, with 1,500 men and six pieces of artillery, he was attacked on the right by Morgan's riflemen and a New Hamp¬ shire brigade, while Arnold, without orders, and in defiance of Gates, pressed to the front and assumed actual command of the Ameri¬ cans, leading them in a determined assault upon the British lines. The Americans were rein¬ forced at the critical moment, the British again and again gave way, and the battle ended in their retreat with loss of their artillery. In this engagement the British general Simon Fraser was mortally wounded, and Arnold re¬ ceived a severe wound in the leg. The Amer¬ icans, animated by success, pursued Burgoyne's men, assaulted furiously, and gained partial possession of their camp. This battle like the first, ended with darkness. During the night, while the American forces lay on their arms, Burgoyne withdrew to the heights in his rear, not far to the north, and on the following day, to avoid capture, he retreated to Saratoga. After vainly waiting again for aid from Clin¬ ton, being still nearer the end of his provi¬ sions, exposed to the American fire, and find¬ ing further retreat impracticable, Burgoyne proposed a cessation of hostilities. He refused Gates' demand for unconditional surrender, and Gates modified the terms, which finally pro¬ vided that the British should march out with the honors of war, and should freely take pas¬ sage for England, on condition of not again serving against the American army. Congress failed to ratify this agreement, and the cap¬ tured British, with the exception of Burgoyne and a few other officers, were held as prisoners until the end of the war. The troops surren¬ dered numbered 5,791. An artillery train of 42 guns, more than 4,500 muskets, and a great quantity of ammunition were taken.

SARATOGA LAKE, a lake in Saratoga County in New York State, about four miles east of Saratoga Springs. It is a favorite place for regattas ; it has a straight-away course three miles long and is wide enough to accom¬ modate eight racing sculls abreast. In one of the intercollegiate regattas held here, 16 col¬ lege crews competed, and had ample room. A sleam railroad and electric cars extend from the ˆSprings® to the lake. In the summer it is a favorite resort for fish and game dinners.

SARATOGA SPRINGS (from an Indian word meaning ((Hillside of the Great Riverw), N. Y., city in Saratoga County, on the Dela¬ ware and Hudson, the Boston and Maine and the Adirondack railroads, 38 miles north of Albany and 185 miles north of New York. It is easily accessible to many of the large East¬ ern cities, the <(Saratoga Specialˆ making the run

from New York in four hours; Boston may be reached in six hours; Albany and Troy one hour; from Buffalo, Rochester, the Adiron- dacks, the Green Mountains, the White Moun¬ tains and many other places fast trains are run, especially in the summer season. It is a re¬ markably healthful place and all precautions known are used to keep the water pure and the sewerage system free from defects. The mis¬ sionaries were the first known white men to visit this region. In 1684 the land now consti¬ tuting Saratoga Springs and adjacent counties was ceded to the Dutch by the Indians. The first white owner of the now celebrated ˆSprings® was Rip van Dam, and Sir William Johnson (q.v.) was the first who had the effi¬ cacy of the waters tested. In 1774 the first hotel was erected. The ˆSprings® have made for the place a world-wide reputation. Thou¬ sands come to this city each year to use the waters, making the city one of the most popular health resorts in the country. Since 1826 the waters have been bottled and sent to various parts of the world. The Saratoga bat¬ tlefield, the scene of the surrender of Burgoyne to Gates, 17 Oct. 1777, is 12 miles east of the city.

Saratoga Springs is situated on the southern¬ most spur of the Adirondacks, at an elevation of more than 300 feet above tide-water. The region around has practically no swamps nor marshes ; the rainfall is moderate and the win¬ ters cold, the summers mild and pleasant. There are but few manufacturing establish¬ ments and the region around is composed largely of productive farms. The mineral springs are about 50 in number, 40 of which are well known. The most frequently visited and the waters of which are most extensively used are the Congress, Vichy, High Rock, Aron dack, Hathorn, Patterson, Re-Mo-Ho, Red, Magnetic, Columbian, Geyser and Excelsior. The waters are cathartic, tonic, alterative and diuretic. The springs are in three groups : one about a mile south of the city, one a mile north of the city and the largest number within the corporate limits. The Saratoga Racing Park is a mile from the centre of the city. A paved sidewalk leads to the entrance gates. Polo Park, the golf links ground and other grounds furnish opportunity for outdoor sports. Saratoga Lake (q.v.) is about four miles distant.

The principal public buildings are Conven¬ tion Hall, which seats 5,000 and which cost $100,000; the town-hall containing the theatre, a State armory and the hotels. The hotels of the city have on several occasions accommo¬ dated 40,000 guests. On account of its spacious hotels and its convention halls, it is a favorite place for conventions. There are 18 church buildings, representing eight different denomi¬ nations. The educational institutions are the Skidmore School of Arts, a high school, public and parish elementary schools, several private schools, a public school library, the McMillan

Reading Circle Library and the Athenaeum. The charitable institutions are the Saratoga, Saint Faith and Saratoga Cure hospitals, Home of the Good Shepherd, Saint Christina Home and the Children's Home. The State of New York has established a reservation about the mineral springs. It was established in 1909 and is main¬ tained and operated by the State Conservation Commission. Approximately 550 acres of land are included within it. Upon this property are 122 natural springs and wells, including practically every naturally mineralized and nat¬ urally carbonated water in the Saratoga region. The purpose of the State in assuming control over the Saratoga springs was to stop their commercial exploitation for carbon dioxide gas and to ensure the flow of their curative waters continuously for the benefit of the public. There are three parks upon the State Reserva¬ tion, Geyser Park, High Rock Park and Lin¬ coln Park. At three different places upon the State Reservation bath houses are conducted for administering various courses of treatment. They are run in accordance with the highest standards of the medical profession and many of the baths are given only under physicians' prescriptions. At the Lincoln Park bath house are two large, outdoor, fresh-water swimming pools which are well patronized in the summer months. The Saratoga bath house, in the cen¬ tre of the city, is operated throughout the year, and every treatment may be obtained here. The Lincoln and Washington bath houses are oper¬ ated all summer and as late into the fall as the demand for them continues. The Washington bath house, erected in 1919, is the largest and most completely equipped mineral-water bath house in the United States, with facilities for every important hydrotherapeutic treatment.

The two banks have a combined capital of $225,000 and a surplus of $200,000. The an¬ nual receipts and expenditures are each about $125,000. The hotels expend during the sum¬ mer season about $40,000 for orchestral music. The city expends a large amount on the streets, keeping them clean and in good repair. Since 1915 the commission form of government has been in operation. In that year a city char¬ ter was granted. Pop. (1920) 13,181.

SARATOV, sa-ra'tof, Russia, (1) Capital of the government of the same name, on the Volga, 459 miles southeast of Moscow, in a fertile valley, surrounded by lofty hills. It is one of the most important and best-built cities of eastern Russia. It occupies terraced slopes, intersected by ravines, dividing the city into three parts. It contains 30 churches, besides a public

library; a fine art gallery; an excellent theatre; a school of drawing; primary and technical scHbols, and is the seat of sevesal important courts and public offices. There are manufactures of cordage, bells, pottery, tiles, soap, tobacco, textiles, flour, oil, etc. The trade is chiefly transit by the Volga, between Moscow and Astrakhan. The industrial works com¬ prise flour-mills, iron and oil works, works for the manufacture of railway plants, and tobacco factories. There are extensive distilleries and manufactures of liqueurs. Agriculture and gardening are the chief occupation of a section of the population. Pop. 217,418.

(2) A government of southeast Russia, on the Lower Volga, with an area of 32,624 square

miles. The surface is diversified by numerous hills with intervening valleys and many streams which with a mild climate and good soil con¬ tributes to rich pastures and munificent crops. There is a scarcity of timber. The chief ex¬ ports are corn, flour, hemp, flax, tobacco, hops and madder. Wheat, oats, rye and tobacco are the principal crops. The mulberry is cultivated for rearing silkworms. Most of the inhabitants are Russians, although there are many Finns, Tatars and Germans, etc. Bee-keeping is a thriving industry. The value of the manufac¬ tures is approximately $12,000,000 yearly. The colonists have much improved industry by their labor and example. Pop. 3,156,100.

SARAVOFF, sa-ra'vof, Boris, Bulgarian soldier, leader in the Macedonian revolutionary committee : b. Turkey, about 1870. He studied in the military academy at Sofia, obtained a lieutenant's commission in the 1st Bulgarian infantry, in 1895 resigned his commission to devote himself to the cause of the Macedonian revolutionists, and performed many daring ex¬ ploits in that service. His death was frequently reported in the press.

SARAWAK, sa-ra-wak', Borneo, East Indies, an independent state, governed by an Englishman with the title of rajah, and now under British protection. It is situated on the northwestern side of the island, and its coast extends from Cape Datu on the southwest to Brunei Bay on the northeast, having a length of about 400 miles; the inland boundary is mainly formed by the Dutch territories, while in the northeast is the independent sultanate of Borneo proper, also now under British pro¬ tection. The area of Sarawak is about 42,000 square miles and the population about 500,000. The shore is generally low and undulating, but immediately behind it the ground rises rapidly and becomes mountainous. The principal rivers are the Rejang, Baram, Batang, Lupar and the Limbang. The climate is equable. The soil is very productive, and sugarcane grows readily even without cultivation. Cloves, nutmegs and cinnamon thrive well ; the more important vegetable productions are cocoanuts, rice

and sago. Metals, particularly gold, anti¬ mony, silver, quicksilver and nickel, are very abundant and are worked to a considerable ex¬ tent. Diamonds and other precious stones are also found, and excellent coal, favorably situ¬ ated both for working and shipping. The original inhabitants are Dyaks, but are now in¬ termixed with Malays and Chinese. They had made considerable progress in civilization. Owing to misgovernment and marauding expe¬ ditions for the purpose of obtaining slaves and other plunder they were in a wretched condi¬ tion till Sir James Brooke was appointed rajah by the Sultan of Borneo in return for distin¬ guished services in quelling disturbances and restoring order. Under his mild yet vigorous administration a happy change was produced, and extended its benefits beyond Sarawak to the adjoining territories. Sir James Brooke, who died in 1868, was succeeded by his nephew. Sir Charles Brooke. The exports con¬ sist chiefly of gutta-percha, sago, gambier, pepper, dried fish, edible birds' nests and anti¬ mony.

The seat of the government is at Kuching, on a river of the same name. It consists of a native and a European town. Pop. est. 25,000. A battery commands the reach immediately below the town, and there a number of Chinese houses have been built. The trade of the town is considerable, and is carried on chiefly in large boats, some of them of 100 tons, which sail annually to Singapore with sago and other productions of the coast, receiving in exchange European goods, Japanese cloths, brass-work, and coarse earthenware, made in China. The revenue is derived chiefly from customs and the opium, gambling, arrack and pawn farms, exemption taxes payable by Malays. There are import duties on tobacco, salt, kerosene, wines, etc., and export duties on sago, gambier, pep¬ per, jungle produce, dried fish, etc. The reve¬ nue is $900,000 annually and the expenditure about $750,000. Imports annually amount to about $4,000,000 and exports to $5,500,000. There are military and police forces, the former consisting of 500 Dyaks under an English army officer. There are 23 post offices and wireless stations are located at Sadong, Sibu and Miri. Straits Settlements currency is in use, of which one dollar is equivalent to 58 cents of United States currency. Consult Baring-Gould, S., and Bampfylde, C. A., (History of Sarawak)

(London 1909) ; Low, Sir H., Residence in Sarawak5 (ib.) ; Ranee of Sarawak, (My Life in Sarawak5 (ib. 1913) ; Roth H. Ling, (The Natives of Sarawak and British North Borneo) (2 vols., ib. 1896) ; Saint John, Sir S., (Life of Sir Charles Brooke, Rajah of Sarawak5 (Lon¬ don 1879) ; (Rajah Brooke) (ib. 1899).

SARCEY, sar-sa, Francisque, French jour¬ nalist and dramatic critic : b. Dourban, 8 Oct. 1828; d. Paris, 15 May 1899. After several years spent in general journalistic work he be¬ came dramatic critic for {Le Temps5 (1867), and in this position, which he held until his death, was a dictator of dramatic criticism, his word being accepted as final by a large part of the public. He was the author of (The Word and the Thing) (1862) ; (Le Siege de Paris> (1871), which reached 30 editions in its first year; (Etienne Moret) (1875); (Comediens et Comediennes5 (1878-84) ; (Souvenirs de Jeun- esse) (1884); (Souvenirs d'Age mur5 (1892); (Quarante Ans de Theatre5 (1893).

SARCINA, sar-si'na, a genus of micro¬ scopic fungi, consisting of cubic or prismatic masses, made up generally of 8, 16 or 64 rounded, cubic cells, the faces of each cell being divided into four frustules or projections by two light grooves which cut each other at right angles. Each cell has a diameter of about yˆth toTˆ0th of a line, and consists either of a com¬ pletely homogeneous mass only, without nucleus or granulations, or of such a mass with four, sometimes two or three nuclei. The cells are separate from each other by rectangular striae. Sarcinae are found sometimes in considerable quantities in the vomitings of persons ill with chronic affections of the stomach, in the faeces of chronic diarrhoea, etc. ; they have likewise been detected in the stomachs of rabbits, dogs, tortoises and other animals; in the urine; in the pus of gangrenous abscesses; in the bones, etc. The appearance of sarcinae in vomitings indicates a particular form of dyspepsia, for which the best-known remedy is sulphate of

soda, 10 grains to one dram, dissolved in water, and taken soon after a meal. The genus Sarcina is closely allied to that of Bacterium. See Bacteria.

SARCINE, hypoxanthine, C5H4N4O, a weakly basic organic substance closely related to xanthine and to uric acid. Found in the muscle juice and in many other fluids of the body. Colorless crystalline needles, slightly soluble in cold water, more so in hot. Unites with acids and certain metallic oxides to form compounds many of which are crystalline.

SARCODINA. A class of unicellular organisms (protozoa) that are without an exten- nal membrane or cell wall. During the active, or vegetative stage of existence they form pseudo¬ podia, processes of the protoplasmic body sub¬ stance by which locomotion is achieved and food material seized and taken in. For protec¬ tion many of them construct a shell of lime, silica or chitin though a few cement together fragments of foreign material to form such a test. The common ameba, very similar in gen¬ eral structure to the white blood corpuscles, is usually regarded as a typical representative of the group. It illustrates the simplest forms in that no skeleton or other specialized structures are present although at certain times a tem¬ porary

cyst wall is formed as a protection against cold or drought, or during spore forma¬ tion. The character of the pseudopodia and of the shell are the main factors utilized in distin¬ guishing the subdivisions of the class. Certain amebse are parasitic and are indistinguishable in general structure from the free-living species. They are indeed doubtless descended from slime-inhabiting forms which would require very little physiological modification to adapt themselves to parasitic existence in the intes¬ tine.

Most species exhibit under a high power a narrow marginal zone of clear material the hyaline ectoplasm which includes a more fluid granular endoplasm. The latter is in constant movement and contains food particles, non- contractile vacuoles, reserved materials, waste products, and one or more nuclei. The con¬ tractile vacuoles are located at the indefinite boundary line between the ecto- and endoplasm. They are, however, rarely found in parasitic species.

Multiplication is ordinarily simple cell di¬ vision. The periodic encystment is usually ac¬ companied by formation within the cyst of numerous swarm spores by multiple division. In some cases and perhaps always before en¬ cystment two individuals come together with an exchange of nuclear substance or complete fusion as a preliminary to the rapid division that produces the numerous spores. Such swarm spores are very minute. In parasitic species they are the elements for the infection of new hosts and this is brought about ordina¬ rily by the transfer of ripe cysts, or less easily of the vegetative state of the organism.

Differentiation of species is very difficult and demands knowledge of the cyst and of de¬ tails of spore formation. Many amebae in vege¬ tative form are merely developmental stages of other organisms and even those which are properly members of the group of Sarcodina are so similar that accurate differentiation is not yet possible in most cases.

The parasites of amebic dysentery have been known since 1860 but the form known as Endamceba coli, which is believed by the major¬ ity of investigators to be harmless, has only recently been clearly differentiated from the pathogenic species E. histolytica. Both often occur together in the human intestine. While amebic dysentery is in general a disease of the tropics and subtropics the Mayo Clinic has tabulated within a short period over 500 cases which came from every northern State in the Union and from the Canadian Northwest. In¬ fection in temperate regions is much less fre¬ quent than in the tropics where, as in the Philippines, e.g., careful

reports show an in¬ fection of 37.5 per cent.

The free living Sarcodina fall chiefly in two orders. Among the most abundant of marine animals are the Rhizopoda whose calcareous shells also form large deposits in the rocks. The Radiolaria are equally abundant in the Pacific and connecting oceans as well as in fossil strata. These forms construct a skeleton of silica the form of which is characterized by sharp radiating spicules. The number and variety of these organisms is beyond'conception. They form a considerable part of the bottom ooze found in the deep sea everywhere.

Other free living species are abundant in fresh water bodies and in fact occur in almost any moist . environment. Recent discoveries have even disclosed the occurrence of enormous numbers of small amebse in surface soils where they live in conjunction with various types of bacteria and are believed to play an important part in determining the fertility of the soil.

Henry B. Ward,

Professor of Zoology, University of Illinois. SARCOMA. See Tumor.

SARCOPHAGUS, originally the name given to a kind of stone that used to be quarried at Assos in the Troad, and which was employed for coffins or tombs : a coffin made of this stone was supposed to possess the property of con¬ suming within a few weeks a dead body laid in it: in Greek sarkophagos means flesh-consum¬ ing, or flesh-devouring. Sarcophagus is now used only in the sense of coffin or tomb made of stone, or of terra-cotta or concrete as in the case of the highly ornate tombs which are found among the remains of ancient Etrurian art. Some of the sarcophagi found in Egypt are contemporary with the pyramids : the earliest are squared or oblong, the later ones, whether plain or ornamented with reliefs, have the same shape as the swathed mummies. Phoenician sarcophagi were modeled like the mummiform sarcophagi of Egypt, and were of marble or basalt ; some of them showed the principal con¬ tours of the body. Before cremation of the dead came into general use at Rome, the illus¬ trious dead were deposited in massive sarcoph¬ agi ; celebrated among these is the tomb of the Scipios ; under the empire Roman sarcophagi were very elaborately ornamented after the manner of the Etrurians. In modern times de¬ ceased men of great eminence or great wealth are sometimes laid away in stone chests or sar¬ cophagi. Consult Robert, (Die Antiken Sar- kophag reliefs) (Berlin 1897) ; Strong, (Roman Sculpture) (London 1907) ; Fowler, hand¬ book of Greek Archeology) (New York 1909) ;

Myres, handbook of the Cesnola Collection' (New York 1914).

SARCOPSYLLA, a genus of parasitic fleas which bury their heads in the flesh of their hosts and create bad sores. The most noted species is Y. penetrans, the chigo (q.v.). In our southern States and elsewhere another species, the chicken-flea (Y. gallinacea) , buries itself in the eyelids of domestic fowls.

SARCOSINE, methyl glycocoll, methyl gly¬ cine, CH2.NHCH3.COOH, a substance discov¬ ered by Liebig in the decomposition product of the creatine obtained from meat extract. Later made by the action of methyl-amine on mono- chlor-acetic acid. A colorless crystalline com¬ pound easily soluble in water.

SARD, a translucent, reddish-brown variety of chalcedony, extensively used as a ring- stone. See Cornelian.

SARDANAPALUS, sar-da-na-pa'lus (As-

SUBbani-pal) Assyrian king, ruled 668-625 b.c. He was the eldest son of Esarhaddon, grandson of Sennacherib, and great-grandson of Sargon. His father resigned the throne to him in 668 b.c., reserving only Babylon to himself. The following year the father's death left Sardana- palus sole ruler. Revolts being common upon a change of rulers, the attention of the new Assyrian king was called to the suppression of one in Egypt, where Tirhakah of Ethiopia had overthrown the system of princes tributary to Assyria. Tirhakah was driven southward out of Egypt after a disastrous battle, but his suc¬ cessor renewed the revolt and met with defeat. Thebes was robbed of an immense amount of treasures of art and wealth. Tyre also revolted, but after a prolonged blockade its king sub¬ mitted. The kings of Arvad, Cilicia and Tabal were put in subjection, and Gyges of Lydia, who besought an alliance with Sardanapalus to aid him against his Cimmerian enemies from the Black Sea region, found he was accepted on terms which implied submission ; and when later he assisted Psammetichus in throwing off the Assyrian yoke in Egypt he was destroyed by Sardanapalus. War broke out with Urtaku, king of Elam, who had made a raid upon Ac- cad, ruled by the brother of the Assyrian king. It took a long struggle to complete the subjec¬ tion of the country but it was accomplished finally during the reign of Teumman, Urtaku's usurping successor. After a great victory near Susa, LTrtaku's sons were placed over the king¬ dom as Assyrian vassals. The decline of the empire began when the king's brother, Samas- sum-ukin (or Shamash-shum-ukin) , ruler of Babylon, as vassal-king, instigated a revolt which was so widespreading as to include Elam, Arabia, Egypt, Chaldaea and other Asiatic coun¬ tries. Egypt alone under Psammetichus secured her independence. Babylon was taken after a long siege and Samas-sum-ukin perished in the flames of his burning palace. Between 646-640 b.c. Elam was subjugated and Susa, after being pillaged,

was razed to the ground. Sar¬ danapalus celebrated his victories in Arabia by a triumphal procession through Nineveh.

Assurbanipal figures in classical literature under the name of Sardanapalus and there is described as a mere sensualist. Though cruel and implacable to foes, he was an enlightened despot, and literature and art, particularly archi¬ tecture, flourished in his reign and attained

their highest degree of perfection. The king collected a famous library of all the known cuneiform tablets. The remains of his splendid palace with its priceless library were excavated at Kuyanjck. The tablets now belong to the British Museum, and form the basis of our present knowledge of the civilization and his¬ tory of Assyria. Consult Oppert, (Histoire des Empires de Chaldee et d'Assvrie) ; Lenormant, (Manual d'Histoire Ancienne de TOrienC (1869) ; Rawlinson, (Five Great Monarchies of the Eastern World) (1879) ; and the works cited of A. H. Sayce (q.v.).

SARDINES (sar'denz') AND SARDINE FISHERIES. The name sardine is a general one applied to various small fishes of the family Clupeidce as well as, and less correctly, to the young of some of the larger species. < (Thus, there are the Spanish sardine of the West Indies and Florida; the California sardine, found along the entire west coast of the United States; the Chile sardine; the oil sardine of India, and the sardines of Japan and New Zealand. But the sardine par excellence is the French sardine, so-called from the island of Sardinia, in the Mediterranean, about whose shores the fish are abundant.® The sardine or pilchard (Clupea or Clupanodon pilchardus) is usually about five or seven inches long, of an olive-green color above and silvery on the sides and below, with very large easily displaced scales, only about 30 of which form a complete longitudinal row. The usual French sardines are the yearling fish of what becomes, when full grown, the pilchard of English fishermen, at¬ taining a length of 8 to 10 inches. Geographic¬ ally it ranges throughout the Mediterranean; in the Atlantic from Madeira to Ireland and in the North and Baltic seas. They feed on minute crustaceans, larval forms and floating fish-eggs, the only kind of food for which their nearly toothless mouths are adapted. The pilchard spawns throughout the summer in the open sea, laying about 60,000 buoyant eggs. On the coast of Brittany, where the principal fisheries are located, sardines are now caught throughout the summer, and to a less extent at other sea¬ sons, exclusively by means of gill-nets of very fine twine and small mesh, which varies to suit the size of the run of fish. These nets are dyed blue, partly to preserve, partly to ren¬ der them

inconspicuous in the water; and the schools of fish are tolled into them by means of a bait made of the salted roes of various fishes, chiefly cod. The nets are operated from small two-masted boats which never go beyond a few miles from the shore. The catch is brought ashore and a portion is consumed fresh, but the bulk is sold to the canning factories.

The fishes, when bought for curing, are first beheaded and then gutted, and sorted according to size. They are then washed in sea-water and dried by being suspended on wire screens, nets or willows in the open air, and are then plunged into a cauldron of boiling olive-oil. For the cheaper grades peanut or cottonseed- oil is used. The sardines are laid in the caul¬ dron on wire gratings, two rows deep, and are kept therein until sufficiently cooked, when they are taken out and allowed to drip, the oil-drip¬ pings being carefully collected. They are packed in the tin cases, which are filled with oil, and sealed hermetically. Throughout the process

the greatest care is exercised to keep the fish in the best condition. The offal and waste of the sardine-curing industry is sold as manure to the farmers.

The sardine fishery is the most important fishery industry of France, employing before the war about 32,000 fishermen and more than 8,000 boats, and yielding an annual product of about 60,000,000 kilograms of sardines, valued at about 9,000,000 francs. At the last ante bellum enumeration about 15,000 persons were employed in the canning factories with an an¬ nual output of 4,000,000 or 5,000,000 boxes. The better grades are consumed in France, but the United States imports French sardines, chiefly of the cheaper grades. Sardines are also packed to a smaller extent elsewhere in Europe, especially in Spain and Portugal.

In the United States a true sardine (C . cceru- leus) occurs on the coast of California and, judging from the results attained in the can¬ ning of small quantities, it promises to rival the French product in delicate flavor and industrial importance. But the principal sardine industry of the United States centres about Eastport, Me., where the young of the herring is packedi These fish are caught chiefly in brush weirs (see Pound-net Fishing) and are sold to the canneries, where they are treated in gen¬ eral after the French method with some local modifications. Drying rooms or ovens are em¬ ployed in place of the open air ; when ovens are used the fish are not boiled in oil, but are at once sealed ; cottonseed-oil is almbst universally employed instead of olive-oil ; and various labor-saving devices have been introduced. The product is distinctly inferior to the best or even middlegrade French sardine. Various special grades, put up in mustard, tomato sauce and spices, are also packed. The output of the 45 canneries in Maine is about 550,000 cases, valued at about $2,000,000, annually.

Bibliography. — Cunningham, (Natural His¬ tory of Marketable Marine Fishes) (London 1896) ; Fage, (Recherches sur la Biologie de la Sardine) (in (Archives de Zoologie,5 Paris 1913) ; Hall, (Herring Fisheries of Passama- quoddy Bay} (Report United States Fish Com¬ mission for 1896) ; Smith, (The French Sardine Industry) (1901) ; (Statistiques des Peches Maritimes) (Paris) ; Stevenson, Preservation of Fishery Products for Food) (United States Fish Commission Bulletin for 1898). See Herring.

SARDINIA, sar-din'i-a, Island of (Italian,

Sardegna), in the Mediterranean Sea, south of the island of Corsica, from which it is separated by the Strait of Bonifacio, not quite seven miles wide, extends between lat. 38° 50′ to 41° 15′ N., and long. 8° 5′ to 9° 50′ E. It is 152 miles long from Cape Teulada in the south to Longo Sardo in the north, and has a central breadth of about 66 miles. Its total area is 9,299 square miles divided into two provinces of the kingdom of Italy (q.v.), Cagliari and Sassari, the former comprising the districts of Cagliari, Iglesias, Oristano and Lonusei, and the latter those of Nuoro, Alghero, Ozieri, Sassari and Tempio, named after the principal urban aggregations. The density of the population is 94.7 per square mile. Cagliari (q.v.) (pop. 59,600) is the capital. Before the consolidation of the Italian king¬ dom in 1861, Sardinia with its surrounding is-

lands, the principal of which are San Antioco, San Pietro, Asinara, Madalena, Tavolara and Caprera formed that part of the Sardinian states named the Kingdom of Sardinia. See Sardinian Monarchy.

Topography. — The island is nearly in the form of a parallelogram. In a prehistoric age it was united with Corsica. The interior is generally mountainous, the great chain which traverses Corsica from north to south being evidently, notwithstanding the interruption of the Strait of Bonifacio, continued into Sardinia, where it usually follows the same direction, but occasionally sends out transverse branches east to west. The culminating point is the peak of Generagentu, situated a little to the east of the centre of the island, which attains the height of 6,132 feet. Between the mountain ridges are several extensive plains, of which the most celebrated for beauty and fertility are those of the Campidano in the south, and of Ozieri in the north. There are several large sandy or stony districts called macchie, of a very sterile nature. The streams are numerous, and add considerably to the fertility of the districts through which they pass, but are of no navi¬ gable importance. The Tirso, the largest, pours its waters into the Gulf of

Oristano on the west coast. The lakes are situated chiefly in the vicinity of the coast, where they form a series of lagoons. Sardinia has a total coast line of 835 miles. The north coast is generally rugged and precipitous, presenting a succession of bold headlands. The principal bay is that of Porto Torres, in the Gulf of Asinara. The west coast is extremely diversified in character, rocky headlands (the principal of which is Cape Argentiera, 5,200 feet high), beaches, low hills, tablelands, open bays and bold islets suc¬ ceeding each other. Guarding the strait of Bonifacio a group of fortified islands consti¬ tutes the naval station of Maddalena. Cape Teulada, nearly 900 feet high, forms the most southerly point of the island. Turning north from Cape Spartivento a number of rocky islets present themselves, lining a low and marshy beach, which continues almost unbroken. The Island of San Macario forms the southwest entrance of the Gulf of Cagliari. This gulf, besides having the capital situated on its north¬ ern shore, everywhere furnishes excellent anchorage in ample depth, and in the grounds along and behind it exhibits the best specimens of cultivation of which Sardinia can boast. The east coast, from Cape Carbonara northward, stretches nearly in a straight line, the continuity of which is seldom interrupted by indentations. The most conspicuous of all the headlands is that of Monte Santo, a rugged promontory up¬ ward of 2,400 feet high, sloping toward the sea, and terminating in bold precipices of limestone, within which is an extensive cave fantastically adorned with enormous milk-white stalactites.

Geology. — The greater part of the rocks are of crystalline texture and belong to the earliest formations, consisting of granite, over- lain by gneiss and mica-schist. Trachyte, basalt and other rocks of volcanic formation are most largely developed in the Northwest, but also occupy a greater number of isolated spots throughout the island, and more especially in the southwest, where the adjacent islands of Saint Pietro and Saint Antioco are almost en¬ tirely composed of them. In many cases the

mouths of ancient craters and the lava-streams issuing from them can be distinctly traced. Sedimentary Silurian rocks break the continuity of the granite on the east, and a large tract in the southwest belongs to the same forma¬ tion, extending in a southwest direction till it reaches the southern extremity of the island and forms the remarkable promontory of Teulada. The limestones and chalks at the top of the secondary formation are not largely developed, but occupy a number of isolated tracts both in the interior and on the coast. In the latter portion they form conspicuous ob¬ jects in the northwest, where the cliffs to the north of the Gulf of Alghero are composed of them, and in the east, where they form the great mass of Monte Santo and contain its celebrated stalactical cave. Tertiary rocks of travertine, marl and sandstone occupy a consid¬ erable tract near the town and along the Gulf of Sassari, and also in the south, where they form the

eastern boundary of the plain of Cam¬ pidano. That plain itself, however, has a deep covering of alluvium, which partly accounts for its remarkable fertility. Similar tracts of allu¬ vium, though of much more limited extent, are found in the Plain of Ozieri in the north and along the Gulf of Palmas in the south and that of Paglia in the southwest.

Minerals. — The mineral riches of the island were well known to the ancients, whose exten¬ sive workings can still be traced. Tradition enumerates gold among its metals, but no traces of it can now be found. Lead, however, exists in considerable abundance, and is generally highly argentiferous. Mines of it are profusely scattered over various districts. Zinc ore (cala¬ mine) is worked, also lead ore; and both are exported. Copper occurs in several quarters and occasionally furnishes beautiful specimens of malachite. Quicksilver has been found and was once partially worked, and both bismuth and antimony are said to exist; iron of excellent quality is plentifully distributed and is worked in several districts. The other mineral products deserving of notice are porphyry, basalt, alabas¬ ter, marble, volcanic enamels, rock-crystals and a variety of beautiful pebbles, lignite, . gypsum and nitre. Salt, in its mineral form, is found only in the grottoes of Serrenti, but is exten¬ sively obtained from the salt-pans along the coast, and forms one of the most profitable sources of royal revenue, for the sake of which it is strictly maintained as a government mo¬ nopoly. There are about 12,000 engaged in mining, and the island takes fifth place in this industry among the Italian provinces.

Climate. — The climate of Sardinia has for many ages borne a very bad name; at certain seasons large districts become so insalubrious as to be regularly deserted by their inhabitants, while in others the mortality is remarkably great. The range of the thermometer is be¬ tween 34° and 90° and the mean annual temperature 61° 7". Hence" neither heat nor cold can be said to be in excess. During the hot season, in the low-lying lands, miasmata are continually arising to taint the air, the malignant properties of which become so virulent at night or in the cool of the even¬ ing that the natives never quit their homes until an hour after sunrise and hasten to return be¬ fore sunset, carefully closing every door and window. The disease which then prevails is i

known by the name of intemperie, and is said to be even more fatal than the malaria by which parts of Italy and Sicily are infested.

Flora and Fauna. — The whole surface of Sardinia has been divided into

three portions — one occupied by mountains, where not abso¬ lutely barren, is covered with forests or clothed with pasture ; one occupied by marshes, lagoons and the almost sterile mac c hie, and one under tolerably regular culture, as arable land, olive- yard, vineyard, etc. See paragraph on Agriculture.

Game of all kinds is very abundant. Wild . boars, stags, deer and mufflons frequent the woods and forests; and foxes, hares and rabbits are so numerous that their skins furnish a con¬ siderable article of export.

Fisheries. — From the extent of seacoast the fisheries naturally form an important branch of industry, which, however, is almost entirely in the hands of strangers. The most valuable fishery is that of the tunny, which is carried on extensively on various parts of the coast. An¬ chovies and sardines, the latter at one time so numerous as to have derived their name from the island, have become comparatively scarce. Fine mullet, bream, eels and other fish abound, and are staple articles of consumption and com¬ merce. The coral fisheries, more celebrated in ancient than in modern times, are still car¬ ried on on the western and southern coasts. The Pinna nobilis also, the inhabitant of a shell of from 15 inches to 27 inches in length, abounds in the smooth water of shallow bays, as at Porto-Conte and Liscia, and is the object of an important fishery, partly on account of the pearls, generally of very indifferent quality, obtained from it, and still more on account of its byssus, or tuft of silky hair, which is about eight inches long, and is spun into gloves, stockings or other articles of dress.

Ethnology. — The inhabitants resemble the Spaniards rather than the Italians in character. Their demeanor is grave and dignified compared with the vivacity of the Italians, and they are characterized by their unwavering fidelity to their sovereign, their chivalric sense of honor and their hospitality. They suffered much, how¬ ever, from long neglect and misgovernment, are ignorant and bigoted, and when they have re¬ ceived an injury are insatiable in their thirst for revenge, but the celebrated blood-feuds are now uncommon and brigandage has ceased. With the exception of the inhabitants of Cagliari and Sassari, the two chief towns of the island, the Sardinians have as yet been little influenced by the modern advances of civiliza¬ tion, and in some remote districts the traveler may imagine himself translated to a period several centuries earlier.

Agriculture. — Much of the land is of re¬ markable fertility but the system of agri¬ culture pursued is imperfect. The Italian system of partnership or colonia parziaria, more especially in mezzadria, consisting in a form of partnership between the proprietor and the cultivator, is practised to some extent. The grain raised considerably exceeds the consump¬ tion of the

present inhabitants, and might easily be increased so as to supply three times the number. The whole operations of the farm are conducted in an antiquated manner. The prin¬ cipal crop is wheat, which is generally of ex~

cellent quality, and forms an important article of export in the form not only of grain but of flour, biscuit and macaroni. The culture of barley is more limited and the quality of the produce is comparatively inferior; maize thrives well, and though not yet a general crop is rising rapidly into favor; beans and peas are exten¬ sively grown both for home consumption and export. Dairy farming flourishes, the island being second of the Italian provinces in cheese production. The vine is well adapted both to the climate and the soil. The produce, however, is more remarkable for its quantity than its quality, all the preparatory processes being con¬ ducted in a careless and imperfect manner. The most esteemed wines are those of the Campi- dano, Alghero, Sorso and Ogliastro. Beautiful and extensive olive-grounds are met with in various quarters, but the culture might easily be extended and made much more profitable than it has yet proved to be. The best oil is that of Sassari. The only other crops deserving of notice are tobacco, which is grown to some extent in several districts, but particularly around Sassari, Alghero and the adjacent vil¬ lages ; linseed, which is produced in the greatest abundance in the neighborhood of Oristano ; cotton, for which the soil and climate of the Campidano appear well adapted ; madder, which grows wild in many parts of the island, and, though neglected, might easily be cultivated to great advantage ; and silk, well fitted to become a staple product, but at present produced chiefly for amusement.

Industries and Commerce. — Manufactures have made very little progress and are chiefly confined to a few coarse tissues woven by the women at their homes for private use. Tobacco and gunpowder — both, like salt, government monopolies — are manufactured to a consider¬ able extent. Industrial establishments number 4,015, with 34,016 employees, utilizing 13,064 horse power, according to available statistics. The trade consists of the exports of raw produce, the greater part of which have al¬ ready been enumerated, including corn, wine, brandy, timber, seeds, fish, cattle, lead ore, cala¬ mine, salt, tobacco, etc. ; the imports include all the ordinary tissues, more especially cotton, colonial produce, hosiery, hardware and metals, hemp and cordage, etc. One great obstacle to the progress of trade was the miserable state of the roads, but good roads have now been made and railway lines constructed. The coin¬ age, weights and measures are the same now as those on the mainland.

Language, Education, Religion, Govern¬ ment, etc. — The language consists of a number of dialects differing widely in many of their roots ; several of them closely resemble Spanish. Over 73 per cent of the inhabitants are unable to read or write. There are two universities, one at Cagliari and the other at Sassari. The people are Roman Catholics. Sardinia now has a provincial government similar to the rest of Italy.

History. — The early history of the island is involved in much obscurity. Its prehistoric monuments of the Bronze Age (2000-1800 b.c.) are of considerable archaeological interest. Its original inhabitants, according to Cicero of Libyo-Phoenician, and according to Strabo of Tyrrhene extraction, were living independent

when, about 530 b.c., they were attacked by the Carthaginians, and obliged, after a valiant but ineffectual resistance, to quit the low country and retire into their mountain fastnesses. Dur¬ ing the first Punic War the Romans made strenuous exertions to become masters of the island, and ultimately, on agreeing to make peace, obtained a formal cession of it from the Carthaginians. This cession is mentioned by Livy as one of the causes which led to the sec¬ ond Punic War, in which Rome, though finally victorious, was brought to the brink of ruin by Hannibal. During the struggles between Rome and Carthage, Sardinia often became the theatre of war, and suffered equally from both the powerful states which contended for its possession. At a very early period the inhabit¬ ants were converted to Christianity. They passed successively into the hands of the Van¬ dals,

the Goths, the Longobards and Saracens. By the united efforts of the Genoese and Pisans the Saracens were ultimately expelled from the island, and then rival claims were set up for it by its liberators themselves. During the dis¬ putes that ensued some of the judges or gov¬ ernors succeeded in establishing themselves as independent princes. In 1297 Boniface VIII invested the kings of Aragon with Sardinia, and it continued in the possession of Spain till 1708, when it was taken possession of by the British. In 1713, in terms of the Peace of Utrecht, it was yielded to Austria. In 1720 it was ceded by Austria to Victor Amadeus II, Duke of Savoy, in exchange for Sicily. The Duke of Savoy thereafter assumed the title of king of Sardinia, which was finally exchanged in 1861 for that of king of Italy. Pop. 880,863.

Bibliography. — Alinari, V., (In Sardegna, note di viaggio) (Florence 1915) ; Bennet, (La Corse et la Sardaigne ; Etude de voyage et de climatologie) (Paris 1876) ; Boullier, A., (L' lie de Sardaigne> (Paris 1865) ; Deecke, W., Htaly, including Malta and Sardinia) (London 1904) ; Edwardes, C., (Sardinia and the Sardes> (London 1889) ; Flitch, J. E. C., Mediter¬ ranean Moods: Footnotes of TraveP (New York 1911); Pais, E., (La Sardegna prima del dominio romano> (Rome 1881) ; Tennant, R., (Sardinia and its Resources (London 1885) ; Vuillier, G., (The Forgotten Isles) (New York 1896) ; and Dolmens, (Tombs of the Giants and Nuraghi of Sardinia) (in Papers of the British School at Rome, Vol. LXXXIX, 1910).*

SARDINIAN MONARCHY, a former south European kingdom, comprising Sardinia (q.v.) and its surrounding islands as the nu¬ cleate portion with several dependencies on the Italian mainland, which included the duchy of Savoy, whence came its kings; the principality of Piedmont; the county of Nice; the duchy of Genoa and parts of the duchies of Montferrat and Milan. These latter were divided for ad¬ ministrative purposes into 11 divisions — Turin, Genoa, Chambery, Alessandria, Coni, Novara, Nice, Annecy, Ivrea, Savona and Vercelli. Pre¬ vious to the annexation of its territories conse¬ quent on the events of 1859 (see Italy), and the disjunction from it of the duchy of Savoy and the county of Nice, which, in the same year, were ceded to and now form part of France, comprised in the whole an extent of 28,229 square miles, with a population in 1858 of 5,194,807. A new constitution was volun¬ tarily granted by Charles Albert in 1848, under

which two legislative chambers were introduced, freedom of the press conceded and important reforms carried through. Catholicism was the religion of the state, but all other forms were tolerated. The last Sardinian king was Victor Emmanuel II, afterward king of Italy, who suc¬ ceeded to the throne in 1849. The royal title was King of Sardinia, Cyprus and

Jerusalem, and Duke of Savoy. The crown-prince was styled Prince of Piedmont.

History. — The country which formed the Sardinian states was known in ancient times in its southern part by the name of Liguria, and in its northern part, bounded on the north by the Pennine and on the west by the Graian and Cottian Alps, by the name of Gallia Cisalpina. Savoy, separated from the other parts, and lying beyond the Alps, was considered as belonging to Gallia Narbonensis. From this remote cor¬ ner of the territory sprang the present royal house of Italy. In the middle of the 11th cen¬ tury, Humbert, Count of Maurienne, a great vassal of Rudolf III of Burgundy, appears ex¬ ercising jurisdiction not only over Maurienne, but various other parts of Savoy, the Lower Valais and Aosta. This jurisdiction was ex¬ tended to the banks of the Po by Humbert's son, Otho, who died in 1060, leaving two sons, who became successively counts of Savoy. Under Amadeus III a long series of changes followed, during which the house of Savoy was sometimes brought to the verge of destruction, and at other times attained to such prosperity as to excite the jealousies or fears of neighboring states. One of the counts, called Peter, ruled from 1263 to 1268. He added the canton of Vaud to his dominions, and in many ways im¬ proved the fortunes of his house. Henry III of England, who had married his sister, made him Earl of Richmond, and gave him for resi¬ dence a palace on the banks of the Thames, which hence took the name of Savoy House. Among Peter's successors the most distinguished are Amadeus V, whose prosperous rule, from 1284 to 1323, procured him the title of Great. Amadeus VIII at the termination of his long reign of 49 years, in 1440, left his successor in possession of territories which gave him a dis¬ tinguished place among the sovereigns of Europe. Being, however, interposed between France and Germany, they were often made the battlefield on which these great countries met to decide their quarrels. Notwithstanding this disadvantage, the house of Savoy, at the Peace of the Pyrenees in 1659, by which the wars of the French and Spanish monarchies were ter¬ minated, after they had raged for nearly 80 years, found itself under Charles Emmanuel II as great and prosperous as ever. He was suc¬ ceeded in 1675 by Victor Amadeus II, during whose reign war between France and Germany again broke out. Amadeus became almost neces¬ sarily involved, but played his part so ably, that at the Peace of Utrecht in 1713 he not only •added considerably to his continental posses¬ sions but obtained possession and was formally crowned king of Sicily. By a subsequent ar¬ rangement he exchanged Sicily for the Is¬ land of Sardinia, from which he and his suc¬ cessors took the title of king. On his death in 1730 he was succeeded by Emmanuel III, who became involved in the war of the Spanish Succession and saw his territories laid waste by contending armies. The Peace of Aix-la-

Chapelle compensated him by the addition of several important districts, and his own en¬ lightened administration added greatly to the internal resources of his kingdom. He was succeeded in 1773 by his son Victor Amadeus III, who reigned till the French Revolution broke out; and was succeeded in 1796 by his son Emmanuel IV, who, after seeing his continental dominions overrun by the armies of the French, took refuge in the Island of Sardinia in 1799, and three years after abdicated in favor of his brother Victor Emmanuel, who remained in Sardinia till 1814, when he again fixed the seat of gov¬ ernment at Turin. Shortly after the Con¬ gress of Vienna added Genoa to his terri¬ tories. An insurrection led to his abdication in 1821 in favor of his brother, Charles Felix, whose reign of 10 years was marked by some important internal improvements. Having left no male issue, a collateral branch succeeded in the person of Charles Albert, who promulgated the liberal constitution of 1848, the provisions of which are referred to above. The same year saw him at the head of a league intended to expel the Austrians from Italy. The disastrous results led to his abdication in March 1849, in favor of his son, Victor Emmanuel II, and very probably to his death in the following July. Under the government of Victor Em¬ manuel the cause of progress and liberal insti¬ tutions steadily advanced, some of the more im¬ portant of the reforming measures being the establishment of universal toleration in re¬ ligious matters, the suppression, with a few ex¬ ceptions, of the monastic houses, and an un¬ fettered freedom accorded to the press in the discussion of political matters. Such a develop¬ ment of liberal principles naturally proved ex¬ tremely distasteful to Austria, whose arbitrary sway, exercised over the adjoining kingdoms of Lombardy and Venice, presented so marked and glaring a contrast. Frequent aggressive at¬ tempts were made by her, and pretexts sought for provoking hostilities with Sardinia ; but the flame only burst out finally in 1859, when, in the month of April of that year, the Sardinian territories were invaded by an Austrian army. The war which then ensued ultimately issued in the establishment of the present kingdom of Italy, into which the Sardinian states have all been incorporated, with the exception of the duchy of Savoy and county of Nice, which King Victor Emmanuel was obliged, as before mentioned, to cede to France. (See Italy). Consult Cambridge Modern History,5 Vols. V-VI (New York 1908-09) ; Gallenga, A., his¬ tory of Piedmont5 (3 vols., London 1855) ; Ricotti, ‘Storia della monarchia piemontese) (Florence 1861-69) ; Straforell, G., (Sardegna) (Turin 1895) ; Sergi, G., ‘La Sardegna) (Turin

1907).

SARDIS, sar'dis, Asia Minor, the capital of ancient Lydia, stood at the foot of Mount Timolus (5,906 feet high), two and one-half miles south of Hermus. It was traversed by the Pactolus, which flowed through its market¬ place. To-day nothing remains at its site (Sart) but a village and some ancient mounds. It was once a wealthy mart, the luxurious capi¬ tal of the proverbially rich Croesus, and carried on an enormous trade between the highlands and the coast. Its principal manufactures were

woolen goods and carpets. Its strong citadel was destroyed by the Cimmerian Gauls in the 7th century b.c. ; by the Athenians in the 6th ; by Antiochus the Great, 215 b.c., and by Timur in 1402. An earthquake overturned it in the reign of Tiberius. Xerxes and Cyrus the Great re¬ sided here before entering upon their great ex¬ peditions. The ancient cemetery is of vast ex¬ tent, and there are interesting remains of the tomb of Alyattes and of the temple of Cybele.

SARDONYX, a variety of the mineral quartz, in which layers of sard (q.v.), each of even thickness, alternate with layers of white chalcedony. It was highly prized by the an¬ cients for cameos, intaglios, seal rings and en¬ graved gems.

SARDOU, sar-doo, Victorien, French dramatist: b. Paris, 7 Sept. 1831; d. there, 8 Nov. 1908. He was for a time a tutor of philosophy, mathematics and history, but soon began his literary career by writing for reviews and encyclopaedias. His first play, 'La Taverne des Etudiants) failed at the Odeon in 1854, and for a time he abandoned the theatre. But ere long he was dramatizing again, and he won a popular success in almost every field of the drama save tragedy. He was elected a member of the academy in 1877. In the long list of titles are (Les Pattes de Mouche) (1869) ; (Les Pres Saint-Gervais> (1862) ; 'Nos In¬ times5 (1862) ; (Les Vieux Garqons5 (1865) ; 'Seraphine5 (1868) ; 'Patrie5 (1869) ; 'Le Roi Carotte5 (1872), an opera bouffe, set by Offen¬ bach; 'Rabagas5 (1872); 'L'Oncle Sam5 (1873) ; 'Ferreol5 (1875) ; (Dora5 (1877) ; (Les Bourgeois de Pont-d'Arcy5 (1878) ; 'Daniel Rochat5 (1880) ; 'Divorqons5 (1880) ; (Odette5 (1881); 'Fedora5 (1882); 'Theodora5 (1884); 'La Tosca5 (1887); 'Cleopatre5 (1889); the series on the French Revolution, 'Les Merveil- leuses,5 'Thermidor5 (1891), and 'Robespierre,5 the last written for Sir Henry Irving; 'Madame Sans-Gene5 (1893) ; 'Gismonda5 (1894) ; 'Mar- celle5 (1896); 'Spiritisme5 (1897); and 'Pamela, Marchande de Frivolites5 (1898). Several of these from 'Fedora5 onward, were specially written for Sarah Bernhardt (q.v.). In his comedy, Sardou revealed rapid move¬ ment, witty dialogue, frequently clever satire on contemporary matters, unconvincing character portraiture, loose construction and improbable episodes. His "historical55 dramas aimed at the heroic, but were simply grandiose, their con¬ nection with authentic

history being generally tenuous, their interest largely one of empty me¬ chanical display. The last specimen, 'Dante,5 presented in the United States by Irving in 1903-04, suffered from a lack of coherence. Sardou's dramaturgic skill was great, but his works had no literary value. Consult Monte- gut in the 'Revue des Deux Mondes5 (1877) ; Matthews, 'French Dramatists5 (1888) ; Sar- razin, 'Das moderne Drama der Franzosen5 (1888) ; Doumic, 'Ecrivains d'aujourdhui5

(1895).

SARGASSUM, the most highly organized genus of the marine algae, Fiilcacece, or rock weeds. They are seaweeds which are either attached to stones by a discoid hold-fast or are floating, with long filiform stems, much branched and bearing long, narrow, leaf-like fronds with distinct midribs. The air-bladders are little, stalked globes, with slender project-

ing tips, and stand out from the axils of the fronds, like solitary grapes. It is to this char¬ acteristic that the generic name remotely re¬ fers and which has given rise to the common names, tropical grapes and grape-weed. Sar¬ gasso stems are much employed in South America under the name of goitre-sticks, for the cure of goitre. Sargassum baccifemm is the famous gulf-weed, which forms rafts or islands floating together on vast areas of the various oceans and called "sargasso seas.® The one lying in the North Atlantic Ocean, be¬ tween the Azores and the Antilles (roughly 20° to 38° north latitude and 30° to 65° west longitude), its exact position being determined by the central whirl of the Gulf Stream, is so dense as to be often a hindrance to navigation. It covers a territory nearly equal to the Euro¬ pean continent and was discovered by Colum¬ bus on his first voyage, he and the succeeding Spanish navigators calling it the Mar de Sar- gago ; it is connected by a narrow belt with a smaller sea between the Bermudas and the Ba¬ hamas. There is still another sea in the Pacific and one in the Antarctic Ocean. It is a dis¬ puted question whether th.e weeds have been torn from the shore and blown to their final resting place or whether they live and propa¬ gate themselves on the high seas. At any rate these floating islands furnish a permanent home to many small pelagic animals and of predace¬ ous animals seeking them as food.

SARGENT, Dudley Allen, American edu¬ cator, lecturer and director of physical training: b. Belfast, Me., 28 Sept. 1849. In 1875 he was graduated at Bowdoin College and in 1878 re¬ ceived the degree of M.D. at Yale University. From 1879 he was director of the Hemenway

Gymnasium at Harvard University and from 1879 to 1889 was assistant professor of physical training at Harvard. In 1881-1916 he was di¬ rector of the Normal School of Physical Train¬ ing at Cambridge, Mass., and since 1916 has been president of its successor — the Sargent School for Physical Education. In 1907-16, Dr. Sargent was president of the Health Education League. He is the inventor of modern gym¬ nasium apparatus, of the Sargent Anthropo¬ metric charts, and has published Universal Test for Strength, Speed and Endurance) (1902) ; (Health, Strength and Power5 (1904) ; (Physical Education> (1906) ; also numerous articles and papers on physical education.

SARGENT, Epes, American poet and dramatist: b. Gloucester, Mass., 27 Sept. 1813; d. Boston, Mass., 31 Dec. 1880. He was edu¬ cated at Harvard, was for a time connected with newspapers in Boston and New York, and in 1836 began writing for the stage. His plays include the (Bride of Genoa) ; (Change makes Change) ; (Velasco,5 and (The Priestess.5 He published (Songs of the Sea> (1847) ; (1840); (What's to be Done5 (1841); (Fleetwood) (1845); (Peculiar: A Tale of the Great Transition (1863). Still other works are (Life of Henry Clay) (1843) ; (American Adventure by Land and Sea5 (1847) ; (The Critic Criticised) (1856) ; (Arctic Adventures by Sea and LancP (1857) ; (Original Dia¬

logues 5 (1861); and posthumously Cyclo¬

paedia of English and American Poetry 5 (1883).

SARGENT, Frank Pierce, American labor leader and government official : b. East Orange, Vt., 18 Nov. 1854; d. 1908. He was engaged in various occupations until 1880, when he became fireman on the Southern Pacific Railroad. He was chief of the Brotherhood of Locomotive Firemen in 1885-1902 and was prominent in the strikes of 1892-94. He gained the reputation of a forceful leader for the firemen, and at the same time was notable for his moderation and reasonable methods of dealing with employers. He was offered appointments as member of the Industrial Commission and as director of the Bureau of Printing and Engraving by President McKinley, but declined because of his desire to remain with the brotherhood. In 1902, however, he accepted President Roosevelt's aopointment of him as Commissioner-General of Immigra¬ tion, an office he occupied until his death.

SARGENT, Henry, American artist and soldier: b. Gloucester, Mass., 25 Nov. 1770; d. Boston, Mass., 21 Feb. 1845. He studied art in England in 1793-97. In 1799 he entered the United States army, was aide-de-camp to the governor of Massachusetts with rank as colonel in the War of 1812, and later adjutant-general. He served two terms in the legislature and

afterward resumed his profession. His first painting, (The Landing of the Pilgrims,5 was ruined by being rolled on a pole of fresh pine, but the wofk of the same name at Pilgrim Hall, Plymouth, Mass., is said to be a repro¬ duction of the destroyed work. His other paint¬ ings include (Christ Entering into Jerusalem5; (The Starved Apothecary) ; (The Tailor's News) ; (The Dinner Party5 ; a full length por¬ trait of Peter Faneuil at Faneuil Hall, Boston, etc.

SARGENT, Herbert Howland, American soldier and military historian : b. Carlinville, Ill., 29 Sept. 1858. He was graduated at Black¬ burn University, 1878, and at the United States Military Academy in 1883. He was commis¬ sioned second lieutenant, Second Cavalry, 13 June 1883; first lieutenant, 19 June 1890; cap¬ tain, 2 March 1899; major, 8 Jan. 1909. He served as professor of military science at the University of Illinois, 1886-87, and served on frontier. At the outbreak of the Spanish-American War he was ordered to Washington to help organize volunteer forces and was colonel of the Fifth United States Volunteer Infantry, 20 May 1898-31 May 1899. He organ¬ ized a regiment at Columbus, Miss. ; served at Santiago and Guantanamo, Cuba, under Gen. Leonard Wood, and as lieutenant-colonel of the 29th United States Volunteer Infantry 5 July 1899 to 10 May 1901. He fought insurgents in the Philippines and commanded attacking forces 19 Dec. 1899 at the battle of San Mateo in which Major-General Lawton was killed. He was recommended by Generals Wood and Otis for brevets for meritorious service in Cuba and Philippines, 1898-99. He was professor of mili¬ tary science and tactics at the Agricultural and Mechanical College of Texas, 1903-07, and graduated at the Army War College in J909. He retired -November 1911. On 27 June 1917 he was recalled to active duty and until 25 Sept. 1917 was assistant to the quartermaster's department of the Western Department, after

which he was professor of military science and tactics at Princeton University. He has writ¬ ten Napoleon Bonaparte's First Campaign) (1893) ; (The Campaign of Marengo) (1897) ; (The Campaign of Santiago de Cuba) (1907). He was ordered to Washington in November 1907 from South Dakota, where he was taking part in an Indian campaign to receive from President Roosevelt in person an especial com¬ pliment on his history of the campaign of San¬ tiago de Cuba.

SARGENT, John Singer, American painter: b. of American parents, blorence, Italy, 1856. He was educated in Italy, France and Germany, and received his early art training under Carolus Duran. He was elected

member of the Royal Academy of England in 1891 and of the National Academy of Design, New York, in 1897. He has lived abroad all his life and has never spent more than a year in the country of his parents. Having had the advantage of be¬ ing chosen bv Carolus Duran as an assistant in the execution of important government commis¬ sions, he thoroughly mastered the secrets of French technique before adopting a method and style which are purely his own. His chief works are in portrait and genre. Among his portraits may be mentioned that of (Carolus Duran ; (General Leonard Wood) ; (Mr. Joseph Jefferson* ; (Major Francis Lee Higginson) ; (Homer Saint Gaudens* ; (President Roose- velt) ; (Henry G. Marquand) ; ; (Ada Rehan.* ˆHis genres include (Fishing for Oysters at Can- cale* ; Neapolitan Children Bathing* ; (E1*

Jaleo. His most ambitious and original works, however, are the decorations in the Boston Li¬ brary, which include the now famous (Frieze of the Prophets. * As a painter his manner is French in brilliant versatility and epigram, but his treatment infinitely superior to the millinery effects of Duran and his school. FQs portraits reflect clearly the characteristics of his sitter and his intuition is unerring in detecting the subtilest traits of individuality. As a specimen of his wall-painting we may cite that portion of the Boston Library decorations known as the (Dogma of the Redemption.* It is divided into an upper and a lower panel which would seem to represent Heaven and Earth severally. In the upper panel are the three persons of the Trinity enthroned, with hands raised in blessing, the Father wearing the triple crown, or tiara; each enrobed in a flowing, cope-like garment. In the centre of this picture is set up the cross on which Christ is suffering, while Adam and Eve catch in chalices of gold the blood that drips from his hands. Below the foot of the cross is the pelican, symbol of self-sacrificing, love. Above the arms of the cross runs the inscription Remissa sunt peccata mundi (((The sins of the world have been remitted®). Across the mold¬ ing which separates the two divisions of the subject is a monkish distich.*

Factus homo factor hominis, factique redemptor,

Redimo, corporeus corpora, corda deus.

(I, man's maker, now made man, and redeemer of him I made, God in flesh, redeem all human hearts and bodies.)

In the lower panel are angels bearing the in¬ struments of the passion, namely, the reed, the nails, the spear,, the pillar of scourging and the scourge, the crown of thorns and the ladder. The work has all the pomp and dignity of

Byzantine conventionalism, and for richness of color and splendor of arrangement is one of the most impressive of this magnificent series. It is deeply devotional in tone and must, be looked upon as among the finest Christian paint¬ ing of the period. In 1910 Sargent practically abandoned portraiture for landscapes and genre subjects. Among his later oil paintings are (The Weavers) (1913) ; (Cypresses and Pines and (The Courtyard* (1914). A notable ex¬ hibition of his water-color drawings was held in London and New York in 1912, from which the Boston Museum acquired 45 and the Brook¬ lyn Museum 83 examples.*

SARGENT, Winthrop, American soldier and Territorial governor: b. Gloucester, Mass.,

1 May 1753; d. New Orleans, La., 3 June 1820. He was graduated at Harvard in 1771 and in 1775 entered the Revolutionary army, serving through the war and attaining rank of major. He was interested in the development of the West, became associated with the Ohio Land Company in 1786 and was soon afterward ap¬ pointed surveyor-general of the Northwest Ter¬ ritory. In 1787 he became its secretary and in 1798-1801 he was governor of the Territory. He served in the Indian Wars of 1791 and 1794-95. He was a member of the American Academy of Arts and Sciences. Author of (Papers Relating to Certain American An- tiquities) (1796) ;

SARGENT, Winthrop, American lawyer and author, grandson of the preceding: b. Phila¬ delphia, Pa., 23 Sept. 1825 ; d. Paris, France, 18 May 1870. He was graduated at the Univer¬ sity of Pennsylvania in 1845 and at the Har¬ vard Law School in 1847, practised law for a short time in Philadelphia and later settled in New York. He was well known in the period¬ ical press as a writer on history and genealogy. Author of (History of an Expedition against Fort Duquesne in 1775, under Major-General Braddock) (1855); (The Loyalist Party of the Revolution (1857) ; (Life and Career of Major John Andre (1861); (Les Etats Confederes et de l'esclavage) (1864), etc.*

SARGON, sar'gon, a king of Assvria, suc¬ cessor of Shalmaneser, reigned from 722 to 705 b.c. See Assyria.

SARK, sark, the "Pearl of the Channel Islands,® situated seven miles east of Guern¬ sey and 13 miles northwest of Jersey, is about three and one-half miles in length and one and one-half in extreme breadth. It is sur¬ rounded by inaccessible rocks, the chief landing- place, Creux (hole) Harbor, being on the east coast, where a cave has been enlarged and tun¬ neled through the cliff to give access to the interior. The island consists of two portions, Great Sark and Little Sark, connected bv a high and rocky

isthmus, called the Coupee, narrow¬ ing to the width of only a few feet. On the west is the small islet of Brecqhou. Sark is annually visited by several thousand tourists owing to its interesting and picturesque scenery and numerous romantic caves. The inhabitants are chiefly engaged in fishing and agriculture. Sark is administered as a dependency of Guernsey.

SARMATIA, sar-ma'shi-a, a name given by the Romans to the country between the Vistula and the Caspian Sea and corresponding

largely to central and southern Russia. The inhabitants were known to the Greeks as Sauro- matae and to the Romans as Sarmatae. See Sarmatian.

SARMATIAN, the name of a people in¬ habiting the region known as Sarmatia, who were persistent enemies of the Romans. The Sarmatians were of Aryan origin, excellent horsemen and fierce fighters. The modern Russians are probably descended in part from Sarmatians who remained in their native land and did not fall victims, theretore, to Roman or Goth.

SARMIENTO, Domingo Faustino, Ar¬ gentine statesman: b. San Juan, Argentina, 15 Feb. 1811; d. Asuncion, Paraguay, 11 Sept. 1888. In 1829 he fought in the insurrection against Rosas and was obliged to flee to Chile, but re¬ turned in 1836. He was again obliged to leave the country, and going a second time to Chile he established a normal school at Copiapo. He traveled in the United States and Europe 1845— 47 studying modern educational systems. Re¬ turning to Argentina in 1851 he helped over¬ throw Rosas and in 1856 organized a depart¬ ment of public education of which he was the head. He was Minister to the United States 1861-68 and President of Argentina 1868-74, giving the country one of the most successtul and progressive administrations it ever had. Sarmiento established schools andi colleges throughout Argentina and founded a national observatory. He was the author of (Popular Education) (1848) ; (Vida de Abran Lincoln) (1866); (Life of Quiroga) ; (Civilizacion y barbarie) ; 'Las escuelos, base de la prosperida en los Estados Unidos) (1868). See Argen¬ tina.

SARMIENTO GAMBOA, sar-me-en'to gam-ba'a, Pedro de, Spanish mariner : b. Ga¬ licia, Spain, about 1530; d. there, about 1590. He was in command of the naval station in the Pacific in 1578 and in 1579 was ordered by the viceroy to take possession of the Straits of Magellan for the purpose of intercepting Drake, then engaged in his depredations off the coasts of Peru and Mexico. Drake evaded him, return¬ ing by way of the

Cape of Good Hope, and after waiting for several months he explored the coast and returned to Spain in 1580. In 1581 he was sent by Philip II, with a fleet of 24 vessels, to fortify the Straits, holding joint command of the expedition with Diego Flores. The latter became jealous of Sarmiento and deserted him, taking 12 vessels, which left Sar¬ miento with but four, eight having been pre¬ viously destroyed in a storm. In 1583 he founded San Felipe (Port Famine), garrisoned it with 300 men and in 1584 sailed for Europe, but was captured by the English and im¬ prisoned until 1588. His colony lost all but two of its members by starvation, one being rescued by Cavendish in 1587 and another by Meriche in 1589. After his liberation he en¬ deavored to secure redress for his treatment by Flores, but his complaint was neglected and he died in poverty.

SARNIA, sar'm-a, Canada, town, port of entry and county-seat of Lambton County, On¬ tario, on the river Saint Clair, near Lake Huron, and on the Grand Trunk and Lake Erie and Detroit River railways, opposite Port vol. 24 — 20

Huron, Mich., with which it is connected by ferry and by the famous Saint Clair tunnel, two and one-quarter miles long, built and operated by the Grand Trunk Railway. Sarnia has a good trade in grain and livestock and oil and salt refineries, tanneries, breweries, foundries and machine shops, flour and saw mills, and manufactories of carriages, agricultural imple¬ ments, woolens, wooden-ware, etc. It is lighted by gas and electricity and has a good water system.

SAROLEA, sa'ro-la', Maurice, Belgian edu¬ cator, war correspondent, editor and author : b. Tongres, 25 Oct. 1870. He was educated at the University of Liege and later studied at Paris, Palerno and Naples. He traveled in North Africa, America, the Caucasus and the Near East, and since 1894 has been first lec¬ turer and head of the French and romance de¬ partment at the University of Edinburgh. He was Belgian consul at Edinburgh from 1901, and founded and was editor of Everyman in 1912-17. He became war correspondent ot the Daily Chronicle in 1914 and at the close of 1918 had raised $300,000 for Belgian relief. He is general editor of the Collections Nelson and Gallia. Author of (H. Ibsen) (1891) ; (La Liberte et le Determinismˆ (1893) ; (The Rus¬ sian Revolution (1905) ; (The Balkan Ques¬ tion (1906) ; (Victor Hugo (1911) ; (How Belgium Saved Europe) (1916) ; (Nurse CavelP (1916) ; (German Problems and Personalities' (1917) ; (La Reveil de la France) (1918), etc.*

SARONIC GULF (Sinus Saronicus), Greece, the ancient name of the Gulf of ZEgina. See .TEgina.

SAROS, sa'ros, in astronomy, an ancient Assyrian period, the origin and exact length of which are unknown, though they have been the subject of much disputation. By some authors the saros has been confounded with the Metonic cycle.

SARPEDON, sar-pe'don, one of the heroes of the Iliad, slain by Patroclus at the siege of Troy. His grandfather of the same name is represented in Grecian mythology as the son of Zeus and Europa, who founded a kingdom in Lycia.

SARPI, sar'pe, Paolo, Italian historian : b. Venice, 14 Aug. 1552; d. 14 Jan. 1622. He entered young into the religious order of the Servites and was appointed chaplain to the Grand Duke of Mantua and lecturer on the canon law. After two years he returned to Venice and became provincial of his order (1578). He was afterward made procurator- general of the Servites (1585). His leanings toward Protestantism and his intercourse with Protestant leaders brought on him the imputa¬ tion of favoring heresy, if not of being a here¬ tic. In a dispute between the Pope and the Venetian government on the subject of ecclesi¬ astical matters Father Paul showed himself a strenuous advocate of Venice and was sum¬ moned to Rome to answer for his conduct, but the affair was compromised. His political enemies attempted to assassinate him in 1607, on which occasion he received many dangerous wounds. Father Paul employed the latter part of his life in writing the history of the Council of Trent, a work which has proved of little historical value and is now accounted to be

untrustworthy on account of its extreme and evident partisanship. His labors extended to diverse branches of knowledge ; he was skilled in the canon law, and was also distinguished for his acquaintance with anatomy. He appears to have discovered the valves of the veins which facilitate the circulation of the blood. His Hstoria del Concilio Tridentino) was first pub¬ lished in London in 1619, having been trans¬ mitted to that country through the medium of the British resident at Venice, Sir Henry Wot- ton, a personal friend of the author. This work is strongly anti-papal, nay, even ration¬ alistic in tone and was answered by a volumi¬ nous work on the same subject by the Jesuit Pallavicino. The works of Father Paul were printed at Verona 1761 (8 vols.) and at Naples 1790 (24 vols.). His life has been written in Italian by Bianchi-Giovini (1836), and in Eng¬ lish by A. Robertson (1894). Consult also Atlantic Monthly (January and February 1904) ; Trollope, T. A., (Paul the Pope and Paul the Friar) (1860).

SARRACENIA, sar-a-sem-a, a genus of carnivorous plants, of about eight species, grow¬ ing in bogs in eastern North America and named in honor of Dr. J. A. Sarracin. They have peculiar large nodding flowers solitary on their scapes. The five sepals are bracted at the base and the five fiddle-shaped petals are purple, brown or yellow and hang about a style which is dilated at the apex until it resembles an inverted umbrella, with five rays, terminat¬ ing in hooked stigmas under the angles. The anthers are grouped about the base of the styles. The three- to five-celled ovary becomes a colored capsule in fruit. The name <(side- saddle flower® has been given because of its resemblance to a pillion. The origin of the other vernacular names — pitcher plant, trumpet leaf or huntsman's horn — is very evident, for the leaves are hollow and with a lid more or less erect.

These leaves are dispersed in rosettes and are very curiously adapted, in the several species, for entrapping and digesting insects. The most common species is Sarracenia pur¬ purea, which has tubular leaves, inflated at the middle and contracted at the orifice, where a heart-shaped wing, curved somewhat like a scoop, joins the hallow leaf. Another ribbon¬ like wing, starting from the base of the leaf, extends along the concave surface of the tube to the orifice. The whole pitcher-like leaf is green, veined with reddish purple. The scoop¬ like wing at the summit of the leaf catches rain¬ water and deflects it into the pitcher, which is often half-filled. The inside of the scoop is lined with glandular hairs which secrete honey, and the whole inner surface of the pitcher is lined with stiff spinous bristles, slippery and pointing downward, and the nearer the base the longer the points become. The reason for this apparatus appears when insects are attracted to the Sarracenia by the honey secreted in the hood-like wing. Some fly to it, some crawl up from the ground, helping themselves to climb by the longitudinal wing. Once there they feed on the honey, but if they carelessly stray from the wing to the orifice, where the slippery bristles begin, they promptly fall into the water collected in the pitcher. In spite of their strug¬ gles they can never crawl up past the relentless

chevaux-de-frise of glassy, down-pointed teeth, and ultimately drown in the liquid. So many sometimes meet this tragic death that the putrid odor arising from the pitcher is offensive. Just what happens to the decaying bodies does not seem to be certain. Other carnivorous plants digest their victims with acid secretions and pepsin, and insects seem to be macerated in the Sarracenia purpurea pitchers more quickly than by ordinary rain-water, yet it is believed that the plants profit mainly by the liquid manure obtained. Consult Darwin, (Insectivorous Plants (new ed., New York 1900).*

SARRAIL, Maurice, French general: b. (?). In 1913 he commanded a division of the Sixth Army Corps at Rheims and at the open¬ ing of the

war was sent to command at the Argonne. Together with Dubail he protected the French right flank against the most fero¬ cious attacks from Thionville and Metz. He splendidly organized the defense of Verdun, holding it against the rush of the Germans in August and September 1914 with the Third Army. Much of the strategy in the retreat to the Marne was given to his execution. About the middle of the year 1915 he was withdrawn from command but was appointed commander- in-chief of the Army of the Orient in August to succeed Gouraud. He made Saloniki, Greece, his headquarters and with his forces, which were a mixture of troops of the most heterogeneous nature (British, French, Italian, Greek, East Indian, African, etc.), he captured Monastir in December 1915 but advanced no further. He was recalled December 1917.

SARSAPARILLA, an alterative drug ob¬ tained from the roots of a species of Smilax, indigenous to Central and South America. The drug-yielding species of this genus, to which the American cat-briers belong, are not very exactly identified, although sarsaparilla has been known to Europeans since 1536-45, and was ex¬ tensively used soon afterward. Smilax of¬ ficinalis, S. medica and S', papyracea are be¬ lieved to be the principal sources of supply of sarsaparilla. They are tough, twining shrubs with square or round prickly stems, small flow¬ ers and generally shining leaves. Sarsaparilla plants were somewhat cultivated in Jamaica, but are chiefly obtained by trade with the ab¬ origines of the countries where they grow. The drug itself is extracted from the horizontally creeping roots of the Smilax, which radiate from the stems, and are so long that it takes an Indian many hours to disentangle them from the soil and other roots. They are then dried and wrapped for transportation. The form of the original package in which the roots reach the pharmacist is an indication of the market from which it is sent, and the country from which it is exported furnishes the commercial name 'of the drug. Thus, Rio Negro, otherwise known as Para or Lisbon sarsaparilla, is al¬ ways exported in cylindrical bundles, about three and one-half feet long and five or six inches in diameter, composed of finely wrinkled roots, brown with adhering earth, cut square and even at both ends, and wound closely with the stems of Pothos. Jamaica sarsaparilla (a name which formerly included many other va¬ rieties, now differentiated) is sent out loosely. Sarsaparillas are classed as mealy or non-mealy sarsaparillas, according to the amount of starch

granules in the parenchyma, a condition which seems to depend upon locality, and they differ in the color of their barks and in microscopical characters.

Several plants are used as substitutes for true sarsaparilla. The aromatic roots of Aralia nudicaulis and A. hispida furnish re¬ spectively the wild and bristly sarsaparilla, in America (see Aralia). Texas sarsaparilla comes from the roots of Menispermum caha- dense. Australia has its spurious sarsaparilla in the spindle-shaped root of Hardenbergia. Indian sarsaparilla is derived from Hemidesmus indicus ; German sarsaparilla is the roots of various species of Carex. while the Italian drug of that name is the root of Smilax aspera.

SARSFIELD, Patrick, Earl of Lucan, Irish Jacobite: b. Ireland, about 1645; d. Neth¬ erlands, 19 August 1693. He became a colonel in the Irish army in 1686 and was a strong sup¬ porter of the cause of James II in Ireland, by whom he was created Earl of Lucan. He drove the English out of Sligo, fought at every im¬ portant engagement of the war and had charge of the defense of Limerick. When that city capitulated in 1691, he crossed over to France where James gave him command of the Irish troops in the intended invasion of England the following year. After the battle of La Hogue, 19 May 1691, he tendered his services to France, fought at Steenkirk on 3 Aug. 1692, and was mortally wounded at Neerwinden in the battle of Landen, 19 August.

SARSI (sar'se) INDIANS. Also Sarcee, Sarsee, Sussee, etc., from a Blackfoot word said to signify ((not good.® Their own name is Sotemia. A tribe of the Montagnais division of the Athapascan stock of North American In¬ dians who formerly subsisted mainly by hunt¬ ing, fur-trading, but who now gain a livelihood by farming, stock-raising and haying and as laborers. They are under the Sarcee agency at Calgary, Canada.

SARTAIN, sar'tan', Emily, American artist: b. Philadelphia, 17 March 1841. She is the daughter of John Sartain (q.v.), under whom she studied and worked at engraving, afterward studying (1864— 70) at the Pennsyl¬ vania Academy of Fine Arts, then in Italy, and still later (1871-75), under Luminais, in Paris. She excels in mezzotint engraving, in etching and in portrait-painting; has accomplished much in book-illustration and the etching of framing prints, and in genre work has also distinguished herself. She received a medal at the Centennial Exhibition in 1876, and the Mary Smith prize at the Pennsylvania Academy in 1881 and 1883. In 1875 and 1883 she exhib¬ ited oil paintings at the Paris Salon. From 1881 to 1883 she was an editor of Our Con¬ tinent, and after 1886 principal of the Phila¬ delphia School of Design for Women. In 1900 she went to Paris as official delegate from the United States government to the International Congress on Instruction in Drawing.

SARTAIN, John, English-American en¬ graver and editor: b. London, 24

Oct. 1808; d. Philadelphia, 25 Oct. 1897. Before reaching his majority he did notable work, having studied line engraving under John Swain; and his illustrations for Ottley's books on early Italian prints (1826) gave promise of his future achievements. He came to the United States in

1830, settled in Philadelphia and introduced in this country mezzotint, which he had begun two years earlier to practise. Entering actively into his work here, he added to engraving minia¬ ture-painting on vellum and ivory and portrait¬ painting in oil. He was the designer of sev¬ eral public monuments, of which the best known is that to Washington and Lafayette in Phila¬ delphia. He was also editor of the Foreign Semi-monthly Magazine and of the Union Magazine, which he renamed Sartain's Union Magazine. Among his more important engrav¬ ings are (Christ Rejected) (1862), after Ben¬ jamin West; (The Ironworker and King Solo- mon) (1876), after Christian Schussele, and the (Battle of Gettysburg, after Rothermel. He engraved many other historical paintings and also portraits of famous Americans, after well-known artists. By his long and varied career of productive work, his services as chief administrator of fine arts at the Centennial Exhibition in 1876 and through the many posi¬ tions which he held in connection with prom¬ inent societies and institutions, he accomplished results of great importance in the development of art, particularly the art of his adopted coun¬ try. He wrote (Reminiscences of a Very Old Man> (1899).*

SARTAIN, William, American landscape, genre and portrait painter : b. Philadelphia, 21 Nov. 1843. He is the son of John Sartain, and after graduation from college engraved for three or four years, then studied under Schus¬ sele and at the Pennsylvania Academy of Fine Arts. He then went to Paris and studied seven years under Bonnat and at the ficole des Beaux Arts. He traveled in Spain, Italy and Algiers, and after exhibiting in London (1875) and New York Academy (1876) returned to Amer¬ ica, settling in New York. He was one of the original founders of the Society of American Artists and was for some years professor of the life class of the Art Students' League, New York. His oil paintings include Utalian Head) (1876); ; (Nubian Schiek) ; (Chapter from the Koran (in Metropolitan Museum) ; (In the Basilicate) ; (Portrait of his Mother,* and other portraits. He now has studios in New York and Paris. Represented in many museums in the United States and South America.*

SARTO. See Andrea del Sarto.

SARTO, Giuseppe. See Pius X.

SARTOR RESARTUS. Among autobi¬ ographies, Sartor Resartus (((the tailor patched®) remains unique. It was built up out of Carlyle's thinking

and his experience of life during his first happy married years at Craigen-puttoch. It is a thickly veiled autobiography. Thomas Carlyle appears in a mask as Diogenes Teufelsdrockh, professor of things in general in the German university of Weissnichtwo. The second book deals with the advent, educa¬ tion, love affair and spiritual development of this remarkable professor. This is the most easily understood portion of the book and con¬ tains the most famous passages, such as the noble chapter, <(Natural Supernaturalism.® The first and third books profess to give translated excerpts from this imaginary professor's im¬ aginary treatise on clothes, with comments and explanations by the ((English editor.® These

are Carlyle's radical opinions set forth, not in a complete system, but as fragments of a philosophy.

Most undeservedly (Sartor > has the reputa¬ tion of being in prose what is in verse. The varied, impassioned, richly allu¬ sive style is supposed to be ((German,® and the matter to be beyond ordinary human compre¬ hension. This widespread misconception is due to the fact that

The spiritual experience delineated in the second book is typical. Teufelsdrockh at the nameless university loses the simple creed of childhood and passes into doubt, denial, unbe¬ lief. He is in consequence utterly miserable. From this stage in his spiritual progress he passes, by way of the <(Centre of Indifference® to "The Everlasting Yea,® or positive working philosophy. The main ideas of renunciation, duty, work are derived from Goethe, whom Carlyle reverenced.

America welcomed (Sartor } before the writer's own country. Thanks to Emerson, an American publisher had the honor of producing the editio princeps. America also led in appre¬ ciation. The philosophy of

Archibald MacMechan.

SARTORIUS, the tailor's muscle (from the Latin sartor, a patcher, tailor), a muscle of the thigh which is attached at one end to the edge of the anterior, superior, spinous process of the ilium or chief bone of the pelvis, and at the other to the superior, anterior and internal part of the tibia. It takes its name from the fact that it is by the contraction of the two sartorius muscles that the legs are crossed in sitting in the manner of tailors. See Anatomy.

SARTS, a name given to the settled inhabit¬ ants, whether agriculturists or

traders, as dis¬ tinguished from the nomad inhabitants of Tur¬ kestan, Afghanistan, Persia and the adjacent regions of Asia. Strictly speaking the name has no ethnological significance.

SARUM, sa'rum, Old, England, an ancient deserted city of Wiltshire, two miles north of Salisbury, or New Sarum, to which the inhab¬ itants of Old Sarum removed after 1219 owing to an insufficient water supply. Notwithstand¬ ing its desertion, the old site retained its elec¬ toral rights to return two members to Parlia¬ ment, until its disenfranchisement by the Re¬ form Bill of 1832. It has passed into English literature as a type of the ((rotten boroughs,® acquired by purchase ; its most distinguished

representative was William Pitt, whose first ap¬ pearance in Parliament was as member for Old Sarum.

SASIN, an East Indian antelope, the black- buck (Antilope cervicapra) , blackish brown in color. See Antelope.

SASKATCHEWAN, sas-kach'e-wan, the central prairie province of Canada, named after the river (q.v.). Prior to 1905 it was a portion of the Northwest Territories, with an area of 107,092 square miles and with a small and scattered population. On 1 Sept. 1905 it was created a province with full rights of self-gov¬ ernment and including the territory of Assini-boia with a portion of Athabasca. The area became 251,700 square miles of which 8,318 square miles was water surface — chiefly small lakes.

Physical Features and Climate. — The

province is traversed by the North and South Saskatchewan rivers. In the farthest north is the Churchill River. The Qu'Appelle and the Souris rivers are in the centre and south. There are some large lakes, among which may be mentioned the Athabasca 2,842 square miles, the Reindeer 2,437 square miles, the Wollaston 996 square miles, the Quill lakes 163 square miles, the Last Mountain 98 square miles. The best evidence as to climate is the production of the province — its grain, vegetables and live¬ stock compete with the best in the world. The atmosphere is clear and bright — a large pro¬ portion of sunshine, with a never-failing breeze to temper the heat of the summer days. The winters are cold but bright and dry. It is very similar in a general way to that of Alberta and Manitoba.

Progress of the Province. — The railwaj' mileage increased from 900 in 1896 and 1,520 in 1905 to 6,148 at the end of 1919. While the long-distance telephone mileage was nil in 1900, it was 1,500 in the end of 1908 and 20,152 in 1919, with rural lines totaling 110,481 miles. The townships partially settled and under a form of local or municipal

government were 882 in 1905 and 2,700 in 1919. The Loan Com¬ pany investments which in 1906 totaled $12,000,- 000 were in 1910 $40,000,000. By the end of 1918 $1,845,178 had been spent on university buildings and $2,922,078 on Parliament build¬ ings.

Resources. — The province is the centre of the grain-raising area of Canada, also stock- raising, fisheries and timber. The undeveloped coal resources in the southern portion of the province are of great extent. Mineral forma¬ tions abound north of Township 52, but there has been no development to any great extent due to lack of railway transportation facilities. One mine, at present operating, packs ore 60 miles overland to rail-head and ships to a smelter in British Columbia. The government is conducting tests of lignite fields in the south with a view to its use for commercial pur¬ poses. In 1918 wheat acreage was 9,249,260 with a yield of over 92,492,600 bushels ; oats, 4,988,499 acres, with a yield of 214,542,728 bushels ; barley, 699,296 acres, with a yield of 4,894,572 bushels ; flax, 840,957 acres, with a yield of 4,204,785. The value of the 1918 wheat crop at government price was $474,139,428.88. The province is becoming more of a livestock country annually. Formerly considerable

SASKATCHEWAN, CANADA

Topley, Photo

1 Threshing from the Stook, near Moose Jaw, Saskatchewan 2 Sheep-ranching, near Cypress, Saskatchewan

ranching was carried on in the western part of the province, but this is now giving place to mixed farming, grain and stock-raising com¬ bined. In 1918 there were in the province horses, 1,000,076; milch cows, 352,989; other cattle, 926,342; sheep, 134,177; hogs, 521,240. Considerable of the packing of meat is now done in the province, but most of the stock is shipped east and south. The timber cut in 1918 was valued at $2,036,029.

Settlement and Population. — Immigration poured into the province after its separate organization. To-day the whole of the eastern half of South Saskatchewan is practically homesteaded, while Central Saskatchewan, from Manitoba to the South Saskatchewan River, is thickly dotted with homesteads — excepting the heavily timbered district in the northeast. Large settlements have also been made west and south of Saskatoon, as well as south of Battleford and farther north, in the Prince Albert district. In all these districts as well as in the southwest triangle of the province —

some 23,000,000 acres — which include the lands south of the main line of the Canadian Pacific Railway, from Moose Jaw west, as well as all the lands which remain unoccupied north of Swift Current and Maple Creek, there are still thousands of homesteads available. In all, there are in the province 86,826,240 acres available for settlement. Homesteading in¬ variably proceeds from railway lines and the building of the Grand Trunk Pacific and rapid extension of other lines of railway during the past few years have been a great factor in bringing settlement to Saskatchewan. In population the province has increased from 91,000 in 1901 to 744,000 in 1919. Villages are springing up almost daily and the growth of a settlement of one family into a town of 1,000 persons within a year is quite common. Some of the more notable places are Yorkton, Wey- burn, Battleford, Estevan, Swift Current, Mel¬ ville, Indian Head, Rosthern, Moosomin, Wolseley, Maple Creek, Qu'Appelle, Humboldt, Strasborg, Areola, Watrous, Lumsden, Lloyd- minster, Melfort and Wilkie. The larger cen¬ tres are Regina (40,000), Moose Jaw (16,809), Saskatoon (21,054), Prince Albert (10,000).

History, Education, etc. — The policy of the government has been one of local develop¬ ment. Elaborate Parliament buildings have been constructed at Regina, the University of Saskatchewan built and organized at Saskatoon, hundreds of bridges constructed throughout the province, the telephone system acquired and managed, grain elevators worked in co-opera¬ tion with the farmers, the railway-operated mileage increased from 2,025 in 1907 to 6,148 in 1919. Arrangements were made with the Canadian Northern and the Grand Trunk Pacific in 1909 for the construction of branch lines under a total government guarantee of $11,999,000. As to education the enrolled pupils increased from 31,275 in 1905 to 135,358 in 1919; the school districts from 1,190 to 4,204.

Government. — The provincial government is vested in a lieutenant-governor and a legis¬ lative assembly of 62 members, elected for five years. Women were given the franchise in 1916. The revenue in 1916 was $5,631,910 and the expenditures $5,529,610.

Consult reports of various government de¬

partments; The Public Service Monthy (Regina) ; (Bulletin IX> (Fifth Census of Canada) ; Black, (History of Saskatchewan (Regina 1913) ; Boam, H. J., and Brown, A. G., (The Prairie Provinces of Canada (London 1914) ; Gilbert, Louis. (Le Saskatchewan (Paris 1914) ; Short, Adam, and Doughty, (Canada and its Provinces) (22 vols., Toronto*

1913).

SASKATCHEWAN, a river in Canada, which has its sources in the Rocky Mountains near long. 115° W. It is formed by the junc¬ tion of two main branches, called respectively the North and South Saskatchewan, which flow generally east to their junction, about 25 miles east of Prince Albert. Thence the river takes a curve northeast and southeast, receives the Carrot River from the south, and passing through Cedar Lake empties into Lake Winni¬ peg, after a course of about 1,300 miles measuring along the south branch, some 70 miles less than along the north branch. It flows through a region yielding coal, salt, iron, gold, etc., and now attracting numerous settlers. From the south branch of this great river northwest to Peace River the climate is adapted to the growth of wheat, and the valley of the river is said to be fitted to sustain as dense an agricultural population as any area of equal extent in the world. The main stream and its branches afford about 1,000 miles of navigable waterway, and steamers now ply on it.

SASSABY, or BASTARD HARTBEEST.

See Hartbeest.

SASSACUS, Pequot Indian chief : b. near Groton, Conn., about 1560; d. Mohawk Settle¬ ment, N. Y., June 1637. He was a powerful chief, a great warrior, and was believed by his own and other tribes to possess supernatural powers. The Pequot tribe occupied a large tract of land in southeastern Connecticut and con¬ sisted of about 700 warriors who were the ter¬ ror of the settlers along the New England coast. In 1637 he attacked the English fort at Saybrook, Conn., massacred its inhabitants and then attacked Wethersfield, where he mur¬ dered several women and made captives of others. The colonists mustered their forces under the leadership of John Mason (q.v.) and destroyed the Pequot settlement, 5 June 1637. Sassacus took refuge with the Mohawks, who soon afterward murdered him.

SASSAFRAS, a tree of the laurel family (Sassafras sassafras), characterized by fra¬ grant bark and roots, common in the eastern United States. Since it is readily propagated by seeds or by suckers which spring up from interminable slender root-stocks, and is ap¬ parently not liked by cattle, it is one of the first trees to reforest pastures and fields that have the light, moist soil that it affects. It is a veritable pest to one trying to clear land, as the smallest piece of rootstock left in the soil seems to send up a vigorous sprout. Its long roots, however, make it a difficult tree to trans¬ plant, unless young. Near the lower Mississippi, the sassafras attains its greatest height (about 100 feet), and is stout, with horizontal rugged branches, so that the foliage has a stratified appearance and a flatfish top; it decreases in size as its northern limit is reached until it becomes only a tall shrub. The bark on old

trees is very thick and gray, with longitudinal scaly ridges ; on the young twigs it is pale green and easily slips off. The shining, bright- green leaves will range in shape, on one spray, from an oval to a three-lobed outline, the <(mitten shape,® with one lobe at the side of the leaf, being characteristic. The flowers ap¬ pear before the leaves in late winter if sheltered, and are generally unisexual, male and female blooms being found on different trees. They dangle in tassel-like .racemes and are honey-colored and honey-scented, and thus at¬ tractive to bees. The staminate flowers are apetalous, with a six-lobed calyx, orange- stalked glands and nine stamens ; the pistillate flowers have a similar perianth, a pale green ovary and style, and orange rudiments of stamens. The fruits are very brilliant, dark- blue, oblong, thin-fleshed berries, surrounded at their bases as the cup encloses the acorn, with a bright scarlet calyx-tube, borne on a thickened and elongated stalk. Unfortunately they are so soon taken by the birds that they are seldom seen, but the leaves assume dis¬ tinct tints in autumn, which deepen from soft tones of yellow to dark red.

Sassafras is a member of the laurel family, to which camphor also belongs, and the whole plant, from the roots with the scaly, orange- colored bark to the leaves, is aromatic. Thoreau says of it : <(The green leaves bruised, have the fragrance of lemons and a thousand spices.® There is a legend that sassafras odor was wafted to the nostrils of Columbus on his first voyage, and convinced him that land was near.

The roots of sassafras very early in Amer¬ ican history became an important article of medicine, worth three shillings a pound, and they were one of the objects for which an Eng¬ lish expedition landed in Massachusetts in 1602. It was also called <(ague tree,® as a decoction of its bark was supposed to cure that disease. In American household practice, sassafras tea, an infusion of the young shoots and roots, has long been a favorite remedy for colds and a tonic, being a sudorific and stimulant. It is also an ingredient of root-beer. The bark of twigs and the pith are rich in mucilage (as are the leaves), and make a lubricant for oculists, and a yellow powder to thicken Creole gumbos, much as akra is used. The oil of sassafras is used for a perfume for soaps, etc. The wood itself is orange-colored with pale sap-wood, and when stripped of its bark resists decay for some time, while in contact with soil, so that it can be made into fence posts, although too brittle and coarse-grained for most purposes.

Australian sassafras is the name given to several large evergreen trees with aromatic barks, growing in Australia and Tasmania, namely:

Atlierosperma moschata, Doryphora sassafras and Daphnandia micrantha. Brazil¬ ian sassafras, or sassafras nut, is the pichurim bean. Swamp sassafras is the Magnolia glauca.

Helen Ingersoll.

SASSANIDZE, sas-an'i-de, a dynasty of Persian kings which succeeded that of Arassidse in 226 a.d. The founder of the line was Ardeshir, known to the Greeks as Artaxerxes; he was the grandson of Sassan, from which fact the dynasty is named. The Persian Em¬ pire was much extended under this dynasty as the outcome of successful wars against the

Roman and Byzantine emperors. The Zoroas- trian religion was brought back and maintained. The dynasty lasted until the death of Yezdegerd III in 1652. This king had been beaten by the caliph Omar in the battle of Nehavend, 10 years before, his territory having fallen into the hands of the Mohammedans. See Persia.

SASSARI, sas'sa-re (also called Sarsina), Italy, in Sardinia. (1) capital of the province of its own name, 12 miles southeast of its port, Porte Torres. It is situated on a height 650 feet above the sea, amid orange and olive groves. It is well built and has several hand¬ some palaces, churches, monasteries, nunneries, colleges, universities, an old citadel, a library, hospital, etc. Tobacco is the staple manufac¬ ture; trade is carried on in grain, fruits, oil cheese and goat-skins. Commercial population about 43,118. (2) The province occupying the

north part of the island, having an area of 4,122 square miles; pop. about 310,000.

SASSOFERATO, Giovanni Battista Salvi,

jo-van/ne bat-tes'ta sal've sas-so-fa-ra'to, Ital¬ ian painter: b. Sassoferato, Ancona, Italy, 11 July 1605; d. Rome, 18 April 1685. He learned the elements of his art from his father, and afterward went to Rome and Naples and studied under Raphael, Domenichino, Guido and Al- bani. His paintings, whose subject is chiefly the (Madonna and Child,) are filled with deep and true feeling and the coloring especially is elaborated with exquisite care, the principal scheme of his pictures including warm, lu¬ minous flesh tints, bright blue scarfs and crim¬ son robes, harmonized with inimitable skill. He has also executed some good portraits and landscapes ; his pictures are still highly es¬ teemed and in 1858 his (Marriage of Saint Catharine> was sold for £1,076 sterling, about*

$5,880.

SASSOLITE, native boric acid, B(OH)s, occurs in the lagoons of Tuscany and in other natural waters, from which it is derived on a . terge scale by evaporation. It is also found in small, pearly, white scales, and as an in¬ crustation.

SASSULITCH, sas-sool'ich (SASSOUL- ITCH, ZASSULITCH), Vera, Russian Nihil¬ ist : b. Russia, 1853. She was accused of com¬ plicity in a Nihilist plot in 1869 and unjustly imprisoned for many years. In 1878, indignant at the treatment inflicted on a prisoner by the Saint Petersburg chief of police, Trepoff, she armed herself with a revolver and on 5 Febru¬ ary coolly attempted his assassination. She was tried and acquitted in April 1878. The trial was afterward declared null and void, but she dis¬ appeared and has since lived in retirement in Switzerland. Her writings were collected in two volumes and published in 1906.

SASTEAN (sas'te-an) INDIANS. See

Shasta Indians.

SATARA, sa-ta'ra, or SATTARA, India,

in Bombay, (1) capital of the district of the same name, 56 miles southeast of Poona, crowns a small, steep and rocky hill, just be¬ low a strong hill fort. It consists of one long street of uniform appearance, excepting the rajah's palace, which is of modern construc¬ tion. The town was formerly the chief seat of the Mahrattas. Pop. 29,601. (2) The dis¬ trict, covering an area of 4,825 square miles.

Much of the territory is irrigated, and the chief crops are millet, pulse, oil-seeds and sugar¬ cane. The manufactures are cotton-cloth, blank¬ ets and brassware. Modern improvements are the Kistna Canal and irrigation works. The Southern Mahratta Railway traverses the dis¬ trict from north to south. Pop. about 1,200,000.

SATELITE, the trade name for a fibrous serpentine having a chatoyant effect ; mined as a gem in Tulare County, Cal.

SATELLITES, in astronomy, secondary planets or moons. One satellite has been ob¬ served with Neptune; four with Uranus; Saturn has 10, Jupiter eight, Mars two and the earth one. The rings of Saturn are tech¬ nically

said to be composed of a great num¬ ber of satellites, but these are probably ex¬ ceedingly small, and are possibly not larger than particles of sand or dust.

SATIN, in textile manufacture, a closely- woven silk, in which the weft is hidden, pre¬ senting a glossy surface. In the manufacture of other silken stuffs each half of the warp is raised alternately; but in weaving satin the workman only raises the 5th, 8th or 10th part of the warp ; thus the weft is hidden beneath the warp, which, presenting an even, close and smooth surface, is the more capable of reflect¬ ing the rays of light. In this way satin acquires that lustre and brilliancy which distinguish it from most other kinds of silks. Sometimes satin is made with a pile and flowered pattern and it is then termed satin-damask. A cotton imitation is called satin-sheeting. The chief seats of this branch of manufacture are Lyons in France, and Genoa and Florence in Italy. From the East Indies are imported those light stuffs called Indian or Chinese satins. They are either plain, damasked striped, open- worked or embroidered. See Silk and Silk Industry.

SATIN-BIRD, a kind of Australian bower- bird (Ptdlonorhynchus violaceus) . The adult male is conspicuous for the satin texture of its glossy black plumage. The younger bird is at first entirely of a dull green color, which grad¬ ually becomes mottled with black, and eventually changes entirely into that hue. Long before the construction of the nest, and quite inde¬ pendently of it, they, with consummate skill, weave an arbor-like gallery of uncertain length (see Bower-birds), in which they amuse them¬ selves with the most active glee, the male dis¬ playing himself therein to attract the hen bird. The architecture of the bower is very tasteful, and scarely a day passes without some fresh arrangement of the shells, feathers, bones and other decorative materials, which they bring from long distances in the bush to ornament the bower and the platform on which it stands.

SATIN-FLOWER, or SATIN-POD, a

cruciferous plant of the genus Lunaria, native to Europe and Asia. One of the two species (L. rediviva) is perennial, the other (L. annua) is annual or biennial, and is called ˆhonesty.® Both are pubescent, branching herbs, with mostly cordate leaves, and are cultivated not only for their four- merous, large violet flow¬ ers in terminal racemes, but for the long-stalked pods, which are more than an inch long, very flat and two-celled. The veined valves covering the seeds, which are long stemmed, soon fall off

with the seeds and leave only the partition wall between the cells. This is elliptic in shape, of parchment-like texture and shining with a sil¬ very gleam that makes the groups interesting for decoration, and they are much

sold on Paris flower-stands for this purpose.

SATIN SPAR, a fine, fibrous variety of either gypsum or calcite. These may be dis¬ tinguished from each other by the effervescence of the calcite satin spar with acids and also by its superior hardness. The color is usually snowy white, sometimes flesh or salmon red. Owing to the fibrous structure, the mineral shows a beautiful satiny or pearly opalescence. It is rather extensively manufactured into cheap jewelry and ornaments. The best material for this purpose comes from England and is sold at many tourist resorts, notably Niagara Falls, near which place small quantities of inferior material occur native.

SATIN-WOOD, the product, principally of the Chloroxylon swietenia, of India and Cey¬ lon. This is a small tree with large panicles of whitish flowers and deciduous, long, pinnate leaves, and can furnish a log three to six inches square. The wood is very hard, close-grained and durable and light orange in color ; it takes a fine polish and when of the feathered variety is very beautiful, but liable to split. In the 18th century this ornamental wood was much in demand for handsome furniture, with scroll work, and with medallions painted upon it. It is now principally used for cabinet-work, for picture-frames, the backs of brushes and mar¬ quetry. Several other species of trees in the East and West Indies, especially the Maba buxifolia and Xanthoxylum caribceum, produce woods of similar appearance, quality and name.

SATINET, an inferior fabric, woven much thinner than ordinary satin. The name is also given to a kind of cloth woven, with cotton warp and woolen weft, to imitate satin.

SATIRE, a kind of literary composition in verse or prose, in which wickedness or folly is censured and held up to reprobation; it is a word of Latin origin and the ancient Roman poets were the inventors of the satire. From the time of Lucilius (d. 103 b.c.) till now, says Dryden, (

he enforces it with so much dramatic liveliness and gay humor that he has ever been the favorite poet of men of letters and epigram¬ matists. A totally different form of satire is the mediaeval (Reynard the Fox, the (Owl- glass) (Enlenspiegel) , (Piers Plowman*; fol¬ lowed in the Reformation epoch by Ulrich von Hutten's (Epistolae Obscurorum Virorum,* Erasmus' (Praise of Folly,) Rabelais, ˆGar¬ gantuan Buchanan's (Franciscanus,* etc. In Spain, where no freedom of criticism*

*existed, the spirit of satire took refuge in the picaresque novel, prototype of Lesage's (Gil Blas> ; Cer¬ vantes' (Don Quixote * too might be classed as a satire were it not so much more. Most of the great dramatists of the 17th century were more or less satirists : among them Moliere stands pre-eminent. Butler's (Hudibras* is a model of unadulterated satire; and political satire is carried to perfection in Dryden's (Absalom and Achitophel.* In France, Boileau was regarded as the modern Horace in satire and in the mock-heroic, but in both respects he was equaled or even surpassed by Pope. In Germany the most conspicuous satirists have been Hagedorn, Kastner, Wieland, Tieck, Goethe ; in England in the 19th century the foremost were Byron, Hood, Hook, Jerrold, Thackeray, Carlyle; in the United States James Russell Lowell, through his (Biglow Papers,* held rank among the foremost in political satire.*

*SATIRE MENIPPEE (so called because it mingles prose and verse after the manner of the Menippean satires of Varro), the title of a political satire directed against the Ligue and the Spanish party and their efforts to keep Henry of Navarre from the throne of France. It parodies in telling fashion the pro¬ ceedings of the States-General which had just voted (February 1593) to set aside the Salic law in order that claim to the crown might be made through the female line. It consists of two parts. The first is a sort of prologue. Two hawkers are introduced who cry most vociferously, in the approved style of the patent-medicine vendor, the wonderful virtues of the famous <(catholicon d'Espagne,** or Spanish panacea. Then the assembling of the States-General is described, and the hall where their sittings are to be held, with its many tapestries, each of which contains in the scene which it represents some sharp satiric thrust at the Ligue. The second and longer pa'rt gives the deliberations of the body and reports the speeches. Various chiefs of the Ligue, in burlesque harangues, in which buffoonery and coarseness abound, betray the personal ambi¬ tions, the hope of extortion and dishonest gain, the disregard of national honor, that animate them In sharp contrast with them is the speech of the spokesman of the third estate. Claude d'Aubray, who with sober eloquence and an accent of sincere patriotism pictures the sad state of France, torn by civil strife, lays the blame at the door of the Ligue, and points the way to national unity, order and well-being in the choice of Henry IV. The (Satire Menippee* appeared at the beginning of 1594, though it was circulated in manuscript some months be¬ fore, not, however, till the Parliament of Paris (June 1593) had declared the decision of the States-General void and upheld the Salic law.*

So it came too late to play a decisive part in the struggle, but it helped strengthen the cause already won. Its good sense, sharp wit and strong national feeling delighted a very large public, and it speedily became famous. D'Au- bigne expressed the general estimate when he called it (

The satire was the work of six men: Pierre Le Roy, a priest; Jacques Gillot, Nicolas Rapin and Pierre Pithou, men of the law; and Jean Passerat and Florent Chrestien, poets and scholars. It appeared anonymously, and the share of each contributor is not certain. But tradition generally ascribes to Le Roy the gen¬ eral conception and plan of the work and the composition of the first part, and to Pithou the longest and most serious piece, the speech of d'Aubray.

Arthur G. Canfield.

SATISFACTION, in law, the satisfying of an obligation or claim, as by performance, pay¬ ment or giving an equivalent ; indemnity for an injury. The doctrine of satisfaction is of importance in the interpretation of wills and also in the law of contracts. For example, if a debtor by will bequeaths to his creditor a legacy at least as great as an existing debt, such legacy is held to be a satisfaction of the debt in the absence of any circumstance re¬ butting this presumption. Likewise it has been held that where a person has agreed to manu¬ facture, to the satisfaction of the buyer, an article, as an engine, in which personal taste is not directly involved, but merely mechanical utility, the buyer is bound by the contract if he has no reasonable grounds for refusing the article after its completion.

SATOLLI, sa-tdl'le, Francesco, Italian ec¬ clesiastic: b. Merciano, Perugia, 21 July 1841; d. Rome, 8 Jan. 1910. He became professor of dogmatic theology at Urban College of the Propaganda, Rome, and in 1888 was made arch¬ bishop of Lepanto. He was the papal repre¬ sentative at the celebration of the centenary of the establishment of the see of Baltimore in 1889, and returned to the United States in October 1892 in the capacity of appellant judge with extraordinary discretion. His action in regard to several notable Church controversies raised up a party of opposition against some of his proposed measures in ecclesiastical af¬ fairs in America. In January of the next year an order came from Rome quelling the opposi¬ tion and creating Monsignor Satolli permanent American apostolic delegate. He returned to Rome in 1896 and was elevated to the cardinalate. During the Saint Louis Exposition in 1904, he again visited the United States.

SATRAPS, sat'raps or sa'traps, the name given the . governors of provinces in the an¬ cient Persian empire. The power of the satrap, so long as he retained the favor of his sov¬ ereign, was absolute; he levied taxes at his pleasure and aped the capricious tyranny of his master unchecked. When the monarchy of Cyrus began to decline many of the satraps threw off their allegiance, and founded inde¬ pendent kingdoms of their own. The term

satrap is sometimes used to signify a petty despot.

SATSUMA, sat-soo'ma, Japan, province in the southwestern part of the island of Kiushu, now a part of the prefecture of Kagoshima. It has played an important part in the history of Japan, and before the revolution of 1868 it was one of the most powerful feudal strong¬ holds. Its samurai ably supported the revolu¬ tion which placed the Mikado in power, and readily yielded their prerogatives in order to secure a stronger nation. However, they rose in rebellion under Saigo (q.v.), in protest against the predilection of the court for in¬ stituting foreign customs in 1877 ; but the re¬ bellion was put down. The province manu¬ factures a beautiful porcelain, known as Sat- suma ware.

SATSUMA WARE, a fine kind of pottery or semi-porcelain made in Japan, having a feldspathic glaze of a light straw color, the surface of which is covered with a network of fine cracks. Red and green colors and dulled gold are employed for decorating the ware. Fine old Satsuma ware is highly esteemed by collectors. See Art; Japan; Porcelain; Pot¬ tery.

SATURATION, in meteorology. A space is said to be ˆsaturated® with aqueous vapor when its condition is such that the temperature cannot be reduced by the smallest amount with¬ out the production of condensation. In meteor¬ ology we have to deal mainly with spaces that are filled with ordinary atmospheric air. Hence the phenomena which relate to atmospheric saturation are of the greatest practical import¬ ance. The quality of moisture that is required to saturate a given mass of air is independent of the pressure of the air, but it depends largely upon the temperature of the air. A given mass of heated air can contain a much greater quan¬ tity of moisture than the same mass can retain when cold ; and the quantity of moisture that any mass of air can retain without condensa¬ tion is sensibly equal to the quantity of moisture that would be required to saturate the space occupied by the air, if the air itself were absent. When a given space contains a given quantity of aqueous vapor, the temperature at which the space is precisely saturated is called the <(dew- point,® corresponding to the quantity of vapor that is present. If water is introduced into a closed vessel from which the air has been ex¬ hausted, a portion of it will evaporate, and the evaporation will proceed until the pressure in the vessel, due to the presence of the aqueous vapor, attains a certain definite value, which de¬ pends solely upon the temperature of the vessel and its contents. The limiting pressure (or, as it is called, the ((tension of the saturated vapor®) so attained at various ordinary temperatures, is given in the table following.

The condition of the air with respect to saturation is called its <(hygrometric state® ; and the hygrometric state is defined, so far as its numerical estimation is concerned, as the frac¬ tion that is obtained by dividing the tension (or pressure) of the vapor that is actually present, by the tension of the vapor that would be re¬ quired to completely saturate the same bulk of air, at the observed temperature. The tension of the vapor that is actually present in the air

Temp.

Fahr.

Tension of vapor at saturation in inches of mercury

Temp.

Fahr.

Tension of vapor at saturation in inches of mercury

0°

0.044

60°

0.522

5°

0.054

65°

0.622

10°

0.068

70°

0.739

15°

0.086

75°

0.873

20°

0. 108

80°

1.029

25°

0. 135

85°

1.209

30°

0. 167

90°

1.417

35°

0.203

95°

1.655

40°

0.248

100°

1.926

45°

0.300

105°

2.236

50°

0.362

110°

2.589

55°

0.436

115°

2.987

under given conditions may be determined by means of the ((hygrometer,® an instrument which is made in a great variety of forms. In Reg- nault's form (which is very accurate, although not well adapted to general use), a polished silver tube is placed in a vertical position, and partially filled with ether, into which a delicate thermometer dips. A current of air is then drawn up through the ether by means of an aspirator, and as the ether is gradually chilled by the consequent evaporation, there comes a time when moisture begins to condense from the air upon the polished exterior of the silver tube. The temperature of the ether is then noted by the thermometer that dips into it ; and we take this temperature as the <(dew-point® of the air that is in contact with the outer surface of the silver tube. By reference to the table given above, we are then able to determine, at once, the tension of the vapor that is actually present in the air; and upon dividing this by the tension of saturated vapor corresponding to the actual temperature of the air, we obtain the fraction which expresses the ((hygrometric state® of the air. Suppose, for example, that the temperature of the air is 70° F., so that if it were saturated with moisture the tension, of the vapor that it contains would be equal to the pressure produced by 0.739 inch of mercury. Let us further suppose that the hygrometer shows that dew is deposited upon the silver tube when the temperature falls to 50° F. We should then know that the quantity of vapor actually present in the air is sufficient to produce saturation at a temperature of 50° F. ; and by reference to the table we see that this signifies that the actual tension of the vapor present in the air is the same as the pressure due to 0.362 inch of mercury. The ((hygromet- ric state® of the air is then found by dividing 0.362 by 0.739. That is, it is 0.492.

SATURDAY, so called from the planet Saturn, the seventh day of the week; the Sab¬ bath of the Jews. It is called by the Italians Sabbat o; by the French, Samedi and by the Germans, Sonnabend (Sunday eve), or in High German, Samstag, a corruption of Sabbathstag (Sabbath day) ; and in Lower Germany, Sater- dag, of the same origin as the English.

SATURN, an ancient Italian divinity, hus¬ band of Ops and father of Picus. He was the god of seed-time and harvest and is represented as bearing a sickle. He was later identified with the Greek Chronos, who, driven from his

supreme throne by Zeus, came to Latium and set up his kingdom there. Under his reign was the Golden Age. At Rome his throne was shared by Ops, afterward identified with Rhea, and in the time of the last Tarquin a temple was built to him at the foot of the Capitol and was afterward used as the treasury (Saturni 2Erarium). The foundations of this temple and eight pillars still remain. The statue of Saturn was all year long swathed in woolen bandages excepting during his festival, the Saturnalia (q.v.), when it was uncovered to the eyes of the people.

SATURN, the sixth major planet in the order of distance from the sun. Although this planet is not quite so large as Jupiter, its grand array of rings and satellites renders it the most stupendous object in the solar system. To the naked eye, when near opposition, it shines as a bright star of the first magnitude. Its light is somewhat yellow, bearing a great resemblance to that of Arcturus, both in color and bright¬ ness. Saturn, like the other superior planets, is best seen in opposition, when it rises at sun¬ set, and is visible almost the entire night. An opposition occurred about 12 Aug. 1904, and the times to look for it in future years may be found by the rule that it occurs about 13 days later every year than it did the year before. Its time of revolution is 29.6 years, at the end of which period it will return to opposition at the same time as at the beginning, and will present the same general aspect.

The rings of Saturn render it a beautiful and striking telescopic object. They are about 173,000 miles in external diameter, and the cen¬ tral opening of the ring is about 111,000 miles. This makes the breadth of the ring itself, from its inner to its outer circumference, about 31,000 miles, or more than four times the diameter of the earth.

This object was an enigma to the early ob¬ servers with the telescope. Galileo correctly described it as seeming handles of the planet, a circumstance which, up to the present time, has led to their visible ends being called ansa. As Saturn moved forward in its orbit these handles disappeared from view, owing to the rings being seen edgewise, a circumstance which greatly perplexed Galileo, and encouraged those of his opponents who were disposed to throw doubt on the accuracy of his observations. But the correctness of the latter was shown in a very few years by the reappearance of these seeming handles. The mystery was at last solved by Huyghens in 1656, who, after long and careful study, announced that ((the planet is surrounded by a thin, plain ring, nowhere touching it, and inclined to the ecliptic.®

When the rings of Saturn are carefully ex¬ amined with a powerful telescope they are found to be quite complex in their make-up. Shortly after Huyghens made known the real form of the rings, Cassini, of the Paris Observatory, an¬ nounced that there were really two rings sep¬ arated by a fine dark line. The outer one was much narrower than the inner one. The line of separation is called the Cassini division. About 1843 Encke of Berlin announced that the outer ring was sometimes seen as if divided. Care¬ ful study of the appearance makes it probable that there is no real division here, but only a somewhat soft, dark marking round the ring.

Shortly afterward it was announced by Bond and others that there was really a third ring between the two hitherto known and the planet, which had escaped observation because it was very faint and dusky, looking somewhat like a band of crape. This dusky ring was for many years an object of much curiosity on the part of observers; but it is now found not to be a separate ring at all, but only a dark-shaded extension of the inner ring. It is now so easily seen in a good telescope that the failure of the earlier observers to see it suggests a possible change in the object. A suspicion that the inner ring at least was becoming broader and its inner edge approaching the planet, was pro¬ pounded by Struve, who based his conclusions upon a comparison of drawings and measure¬ ments made from the time of Huyghens to that of Herschel. But this change is not considered as established.

The equator of Saturn and also its rings are inclined to the plane of its orbit around the sun by about 27°. As the planet moves round the sun, its axis, and hence its equator and rings, preserve the same direction in space, on the same principle that the axis of the earth keeps its direction in going round the sun. Conse¬ quently there are equinoxes and solstices for Saturn as for the earth. At the time of the Saturnian equinoxes the plane of the rings passes through the sun. There being two such equinoxes, at opposite points of the orbit, the interval between them will be half the time of

revolution of Saturn, or 14.8 years. As the earth is quite near the sun compared with the distance of Saturn, the rings will be seen edge¬ wise from the earth about the time of these equinoxes. They are then found to be so thin as to almost disappear in the most powerful telescope. The last occasion on which this oc¬ curred was in 1907; other opportunities will be offered in 1922 and 1937. At intervals inter¬ mediate between these times the rings are seen under the greatest angle, which, however, is never greater than 27° , which is their inclina¬ tion to the orbit of the planet. At these times it is at its brightest, because the rings are opened out the widest to our view.

Another perplexing question was, how these objects could be kept in place — accompanying the planet in its orbit, and always centred on it, without meeting destruction by falling upon it. A very little mathematical calculation suffices to show that two bodies of this shape ought, on the least disturbance, to be gradually attracted toward the planet on one side or the other, falling upon it as surely as a chair, balanced on one of its legs, will fall to the floor. Laplace suggested that this might be avoided by the rings being liquid and not solid. But it was found by subsequent investigation that a liquid ring would fare no better than a solid one. Professor Benjamin Peirce suggested that the rings might be kept in place by the attraction of the satellites. But this suggestion proved no better than the others.

The mystery was at last solved by Prof. Clerke Maxwell of England, in a paper on (

SATURN

The Planet Saturn, as drawn by Proctor, but modified to take account of the extension of the Dusky Ring observed at Washington, 1‘JOl

‘• m | | |

.

the rings did would be a cloud of small satel¬ lites, possibly particles no larger than pebbles. A suggestion of this fact had been made more than a century before by Cassini, but little notice had been taken of it. This announce¬ ment made it of great interest to discover whether any other proof could be found for such a view. One consequence of Maxwell’s theory is that the rings cannot all revolve to¬ gether like a solid body, but

that the inner por¬ tions must revolve more rapidly than the outer ones, the rate of revolution, in every part of the ring, being that appropriate to a satellite in that position. As the particles forming the rings were separately invisible, there was no way of deciding by telescopic observations whether they followed this law of revolution.

It was reserved for Keeler, at the Allegheny Observatory, by the use of the spectroscope, to demonstrate Maxwell's theory by observation. Bringing Saturn and its rings in such a posi¬ tion that they should fall across the slit of his spectroscope, only a single line of light pene¬ trating the slit, it was found that, after being refracted by the prism, the dark lines of the spectrum were not straight, but were broken exactly in a way to indicate that the inner por¬ tions of the ring revolved more rapidly than the outer ones.

Saturn is surrounded by a retinue of 10 satellites, more than surround any other planet, their distances having a wide range, as will be seen by the table below:

Dist. from Sat¬ urn in radii Periodic

name of planet time Discoverer and date

Mimas . 3.1 0 d. 23 h. W. Herschel in 1789

Enceladus . 4.0 Id. 9 h. W. Herschel in 1789

Tethys . 5.0 1 d. 21 h. Cassini in 1684

Dione . 6.3 2 d. 18 h. Cassini in 1684

Rhea . 8.9 4 d. 12 h. Cassini in 1672

Titan.. . . 20.5 15 d. 23 h. Huyghens in 1655*

Themis . 24.8 20 d. 20 h. W. H. Pickering in

1905

Hyperion . 25.1 21 d. 7 h. Bond in 1848

Japetus . 59.6 79 d. 8 h. Cassini in 1671

Phcebe . 213.5 546 d. 12 h. W. H. Pickering in

1901

Phcebe and Themis were discovered at the Harvard Observatory, by photographs of stars surrounding Saturn. The motion of the former is retrograde, while that of the remaining nine satellites is direct.

The largest and brightest of these objects is Titan, which may be seen in a telescope of moderate size. The faintest (except Themis and Phoebe), is Hyperion, which requires a large telescope to show it. Mimas also is a difficult object to see; but a telescope of three or four inches' aperture will commonly show several besides Titan. The Astronomical Ephem- eris gives the apparent orbits and data for each year by which the visible satellites can be readily identified. One difficulty in doing this arises from the small stars which are frequently seen in the neighborhood of the planet.

Japetus, the outer satellite, has the singular peculiarity of being much brighter at the west¬ ern than at the eastern elongation. The varia¬ tion of brightness goes on with such regularity that it can be attributed only to one cause- — the satellite is darker in color on one side than on the other, and revolves on its axis in the same time that it goes round the planet, thus always presenting the same face to the latter, as the moon does to the earth. A peculiarity of

Japetus, Themis and Phcebe is that the plane of their orbits deviate from the planes of all the other orbits. One of the curious features of the Saturnian system is that the rings of the orbits of the six inner satellites all lie in the plane of the planet's equator. It is known that the planes are thus kept together by the mutual action of all these bodies, combined with the attraction of the equatorial protuberance of Saturn itself.

It will be seen from the distances given in the above table that the satellites are divisible into several groups. The five nearest the planet follow each other at fairly regular and not wide intervals. But the sixth, Titan, is more than twice as far as the one next within it. Themis and Hyperion are only a little outside of Titan, and move in very eccentric orbits. There is a curious action between these bodies, in conse¬ quence of which three revolutions of Hy¬ perion are almost exactly equal to four of Titan; and the motions of the two satellites are so timed that they come into conjunction only at the point where Hyperion is farthest from the planet. These conjunctions occur at inter¬ vals of 65 days, during which Titan will have made four revolutions and Hyperion three.

This and other relations which exist between the motions of the satellites have the result that their mutual attractions upon each other give rise to curious results in making first one and then another swing back and forth in their orbits. The mathematical problems thus arising tax the abilities of the ablest investigators of the motions of these bodies.

Physical Constitution and Rotation of Saturn. — The physical constitution of Saturn would seem to be quite similar to that of Jupiter; but the former, being nearly twice as far as the latter, is more faintly illuminated by the sun, and more difficult, of observation. Careful telescopic observations show that Saturn has a slightly mottled or cloudy appear¬ ance ; but the mottling is so faint that it is im¬ possible to locate any one feature, so as to fol¬ low it from hour to hour. It is, therefore, as a general rule, impossible to see the rotation of the planet. But on three occasions' since the telescope has been used in observing Saturn, a spot or region of unusual brightness has been formed upon its disc which enabled its time of revolution to be observed. The first of these was in the time of the elder Herschel ; the second in 1876, when the planet was carefully observed by Professor Hall; and the third in 1903, when a spot was discovered by Barnard and observed by many astronomers. On the second occasion it was found that the spot gradually spread out, the brightest point being near one end, while it gradually faded out at the other end. In consequence of this, it was impossible to fix the period of rotation with entire exactness, because it would depend upon whether we took the brightest part of the belt into which the spot was stretched, or the middle of the belt, as the point of comparison. The results of the time of revolution on the three occasions, so far as worked out, are as follows :

Herschel

Hall….

Barnard

10 h. 16 m. 10 h. 14 m. 10 h. 38 m.

Very remarkable is the deviation of the last period from the two others. It is easy to

determine what this means. The white spots observed by Herschel and Hall were on or near the planet's equator, while Barnard's spot of 1903 w'as in middle latitude. We therefore con¬ clude that Saturn is like Jupiter and the sun, in that its equatorial portions rotate in a less period than those nearer the poles.

Saturn also resembles Jupiter in its very small density, which is even less

than that of water. We therefore reach the same con¬ clusion as in the case of Jupiter — that the outer visible surface of this planet is probably gaseous; that the planet, in fact, is a ball of vapor surrounding a comparatively dense nucleus.

Simon Newcomb.

Revised by Eric Doolittle.

SATURNALIA, the name of a Roman fes¬ tival, instituted, according to the popular belief of the ancients, in commemoration of the happy period under the reign of Saturn, when free¬ dom and equality prevailed, and violence and oppression were unknown. It originated prob¬ ably as a harvest celebration. The festival con¬ tinued at first one day; then three; afterward five ; and finally, under the Caesars, seven days, namely, from the 17th to the 23d of December. At the commencement of this festival a great number of wax tapers were lighted in the tem¬ ple of Saturn, as a sign that no more human victims were to be sacrificed. During its con¬ tinuance no public business could be transacted, the law courts were closed, the schools kept holiday, to commence war was impious and to punish a malefactor involved pollution. The slaves were freed from restraint, wore caps as badges of freedom and went about dressed in tunics, adorned with purple, and in white togas. Masters and slaves changed places ; and while the servants sat and banqueted at the tables, they were waited on by their masters and their guests, who, if they did not do this, were obliged to submit to all sorts of ridiculous punishments. Jests and freedom everywhere prevailed; and all ceased from their various occupations.

SATURNIAN VERSE, a metre employed by the earlier Roman poets. It consists of two members; the first an iambic dimeter catalectic, the other a trochaic dimeter brachy-catalectic. It points to the transition from the accentual versification of Etruria and Latium to the quantitive verse of fully developed Roman literature modeled as this latter was on Greek usage. It was originally employed in the hymns to Saturn sung at harvest time, hence its name; and it is also found in extant fragments of Nsevius, Livius Andronicus, Ennius, etc. The basis of the metre is thus shown :

/

which corresponds with the metre of the old jingle,

There was a man in our town | wondrous wise and cunning.

The metre is met with in all primitive forms of European poetry, whether Spanish, Ger¬ man, or Anglo-Saxon, and is the underlying measure for almost all ballad literature.

SATYRS, sat'ers or sa'ters, in Greek my¬ thology, a race of woodland divinities, who were followers of Dionysus (Bacchus), and represent the luxuriant vital powers of nature.

They are not mentioned by Homer, but Hesiod describes them as a worthless race, unfit for work. They were supposed to be the sons of Hermes (Mercury) and Iphthima, or of Silenus. They appear in early works of art and poetry as robust in human frame with bristly hair, broad snub-noses, ears large and pointed like those of animals, two little horny knobs on their foreheads and a tail like that of a horse or goat. They are described as being fond of wine (whence they frequently appear with a wine cup or a thyrsus in their hands), and of every kind of sensual gratification, whence they are often represented sleeping, playing musical in¬ struments, or engaged in voluptuous dances with nymphs. Like all the forest and field deities,, they were greatly dreaded by mortals. By later writers, especially the Roman poets, the satyrs are confounded with the Italian Fauns, and are accordingly represented with larger horns and goats' feet, although they were origi¬ nally quite a distinct class of beings. Ancient sculptors were fond of representing the satyr whether in his coarser or finer type — one of the most famous specimens of Greek art being the Satyr of Praxiteles, in which the revolting animal features of the conception have disap¬ peared, and the satyr is portrayed as a beautiful and graceful youth.

SAUCONITE, a zinc-bearing clay from mines at Friedensville, Pa.

SAUERKRAUT, sowr'krowt, a salted preparation of cabbage, much esteemed by Ger¬ man and other northern European people, and of which large quantities are prepared for win¬ ter use. The common white cabbages are taken when they have formed firm hearts ; these are sliced into small pieces and packed in layers in a cask with culinary salt, a few juniper berries and caraway-seeds or cloves being added according to taste, the whole mass being packed down as hard as possible without crushing the slices and covered with a lid pressed down with weights. Partial fermentation sets in after some time, and the watery juice rises to the surface. This juice is poured off, and water containing a solution of salt is poured in and changed till it rises without a scum and a fetid smell. The cabbage is then fit for use, and is stored in a cool place in the barrels still under pressure. It may be eaten boiled in the same way as fresh cabbage, or stewed with bacon or salted meat.

SAUGER, or SAND-PIKE, a fish of the rivers and lakes of the northern Mississippi Valley, a pike-perch of the genus Stizostedion, and hence a relative of the wall-eyed pike. The sauger (S . canadense) is much smaller than the wall-eyed pikef seldom more than 18 inches long and one to two

pounds in weight. It varies in quality and estimation both as food and as a game fish, but in some tributaries of the upper Mississippi affords good sport by trolling over ripples with a minnow. Its color is olive gray, the sides grassy or orange with dark mottlings, round black spots on the dorsal fins and a large black blotch on the base of the pectoral fin.

SAUGERTIES, sa'ger-tiz, N. Y., village in Ulster County, on the Hudson River at the mouth of Esopus Creek, and on the West Shore Railroad, about 12 miles north of Kingston. A

ferry connects Saugerties with the New York Central and Hudson River Railroad at Tivoli, on the opposite side of the Hudson, and there are regular steamer communications with all the Hudson River ports. It is in an agricul¬ tural region, and has good water power for manufacturing. In the vicinity are bluestone and limestone quarries. The chief industrial establishments are factories for making writing- paper, blank-books, envelopes, cardboard and coated paper for lithographing purposes, and the pulp mills. There are also brick works and quarries, and a white-lead factory close by. The manufacturing and export products of Saugerties and the nearby villages are shipped mainly from Saugerties by water. The edu¬ cational institutions are a high school, the public and parish schools and the Y. M. C. A. library and reading-room. There are several banks. The government is vested in a presi¬ dent and board of trustees. Pop. 4,013.

*SAUGUS, sa'gus, Mass., town in Essex County, on Lynn Harbor and Saugus River, and on the Boston and Maine Railroad, about four miles west of Lynn and 10 miles northeast of Boston. Within its corporate limits are the villages of East Saugus and *Cliftondale. It is a residential section with several manufacturing establishments, chief of which are woolen mills, and boot and shoe factories. The town has a high school and graded elementary schools. Pop. (1920) 10,874.*

SAUL, first king of Israel from about 1040 b.c. He was the son of a Kish, a wealthy and powerful Benjamite, was noted for his per¬ sonal beauty and courage ; and when the people became dissatisfied with the theocratico-repub- lican constitution, was selected by Samuel for their king. He was not acknowledged by the whole people until after he had gained a victory over the Ammonites. Repeated successes over the Philistines, Edomites, Moabites, Ammonites, and even over a king beyond the Euphrates, confirmed his authority. But Samuel, offended by the encroachments of the king on the privi¬ leges of the priesthood, and by his disobedience to the

commands of Jehovah in a war against the Amalekites, secretly anointed David as king. His reign was terminated by a catas¬ trophe. A battle was fought against the Philis¬ tines at Mount Gilboa ; the Hebrews fled, Jonathan and two other sons of Saul fell and the king slew himself with his own sword. David, whose skill in poetry equalled his musi¬ cal genius, honored in a touching elegy the memory of his fallen friends and foes (2 Samuel i), who, "lovely and pleasant in their lives, were even in their death not divided; they were swifter than eagles, they were stronger than lions.®

SAUL. This "dramatic lyric® by Brown¬ ing, one of the most popular of his poems, is founded on 1 Samuel xiv, 14-23, which tells how David by playing upon his harp exorcized the king's evil spirit. The first nine stanzas of (SauP were published in 1845; to these were later added seven stanzas, and the entire poem was published in 1855. Its noble and inspiring outlook on life, its profound emo¬ tional appeal, its fine imagery, . its dramatic quality and the vigorous rush of its verse, place (SauP among the most remarkable of English

lyrical poems. David is the speaker. As he and his friends are tending their sheep in the morning, he tells the story of the night when he sang and played before Saul. He finds the king in his tent, apathetic and almost uncon¬ scious. Saul must be aroused, made to feel the joy of life, quickened to a sense of his own personal worth. First, David plays the tunes to which the wild animals respond — the quail, the crickets, the jerboa; then, the tunes associated with simple human customs, the reaping, bury¬ ing, marrying and worshipping. Saul begins to respond. David then sings the joy of living, of "our manhood's prime vigor® and of Saul's great place in the world. The king's spirit is roused; but the harpist must lead him far higher. So he sings of fame after death, of the place Saul shall hold in the memory of generations yet unborn ; finally, of immortality and love, and of the Christ as the living em¬ bodiment of man's highest longings. Saul is restored. As the singer hastens homeward through the night, he receives nature's own at¬ testation of the new law of love. Much of Browning's philosophy of life is embodied in

Marion Tucker.

SAUL, a Biblical tragedy in five acts, by Vittorio Alfieri (1749-1803), is generally re¬ garded as his masterpiece. It is written in blank verse, or, rather, in unrhymed hendec- asyllables, broken and varied, thus avoiding the monotony of the French Alexandrine verse which the author disliked. Alfieri, as he re¬ lates in his Wita (Autobiography, Epoca IV, Cap. 9), had been reading with intense in¬ terest the Bible during a quiet stay in Rome (1782-84), and had his imagination enkindled by the fierce struggle between two opposite passions in the breast of Saul. Thus the idea of the*

tragedy came to him on 30 .March 1782; and by 30 July the play was finished. Alfieri would have dedicated Saul to Pope Pius VI (Jean-Ange Braschi), but His Holiness thought it would be unbecoming to be asso¬ ciated in any way with a theatrical pro¬ duction. ((Vita, 1783).*

The tragedy was first performed in Flor¬ ence, in 1793, by amateurs, in a private house before a small audience, with good success. (SauP is representative of Alfieri's genius, and has had the most constant success of all his tragedies on the stage. The superb tragic elements in the Biblical story have long made it a favorite for treatment by poets, sculptors, painters and musicians — witness (Saul le fur- ieux of Jean de la Taille, the (SauP of Vol¬ taire, and of A. Soumet, in France, of Paul Heyse and J. G. Fischer, in Germany, and of Aaron Hill, in England, and of Charles Heavy- sege, in America. In extreme simplicity of structure (SauP is like the author's other tragedies yet is less austere, in that humanity here reveals itself more pleasingly. While Alfieri sympathized with Saul in his conflict with the priesthood, that struggle does not form the main interest of the play; nor is David, the instrument of God, at all like the tyrants who represent the opposition in most of Alfieri's tragedies, but on the contrary he grows throughout the plays in nobility, loyalty*

and tenderness. Saul, a prey to conflicting emotions, perishes not because of his crimes or passions, but through remorse, intensified by the terror which has taken possession of his soul. The (Song of David in the third act is one of the gems of Italian lyric poetry. A use¬ ful edition of well annotated, is that of Mario Menghini (Florence 1893).*

James Geddes, Jr.

SAULSBURY, Willard, American lawyer and legislator: b. Georgetown, Del., 17 April 1861. He was educated at the University of Virginia, and was admitted to the bar in 1882, since when he has been engaged in law practice at Wilmington, Del. He came of a family prominent in Democratic political circles in Delaware, was delegate at large from Delaware at the Democratic National conventions in 1896, 1904 and 1912. He was United States senator in 1913-19, afterward returning to pri¬ vate life. He consolidated the street and elec¬ tric railroads of Wilmington, and is director in various banks and trust companies.

SAULT SAINTE MARIE, soo'sant ma'ri or (Fr.) so sant ma-re, Canada, town and port of entry of Algoma District, Ontario, on the Saint Mary

River, the Sault Sainte Marie Canal and on the Canadian Pacific and Algoma Central railways. It is connected by the inter¬ national bridge, one mile long, with Sault Sainte Marie, Mich., hence with the Duluth, South Shore and Atlantic and the Minneapolis, Saint Paul and Sault Sainte Marie railways. It is in an agricultural and mining region and is a popular summer resort. In addition to the ship canal around the rapids, Sault Sainte Marie has a large power canal, which already sup¬ plies important industries and will supply power to future manufactories. The most important industry is the manufacture of wood-pulp and paper, the large mill at Sault Sainte Marie having cost in construction more than $1,000,- 000 and being one of the largest in the world. There are also nickel steel works, utilizing the nickel ores from the Sudbury mines, foundry and machine shops and lumber mills. The city owns and operates its electric-lighting plant and waterworks. A new power plant is under con¬ struction. It is the seat of the Anglican bishop of Algoma and the Roman Catholic bishop of northern Canada ; has good schools, banks and weekly newspapers. Pop. with Steelton ad¬ joining, absorbed in 1917, 19,500.

SAULT SAINTE MARIE, Mich, city, port of entry, county-seat of Chippewa County, on Sainte Mary's River, near the outlet of Lake Superior, on the Sault Sainte Marie (q.v.) Ship Canal and on the Duluth, South Shore and Atlantic and the Minneapolis, Saint Paul and Sault Sainte Marie railroads. The international railroad bridge across Saint Mary's River connects the city with the city Sault Sainte Marie in Canada, thus making direct connections with the Canadian Pacific Railroad. The principal industrial products are calcium carbide and leather ; other manu¬ factories are machine shops, foundries, planing mills, woolen mill and shingle mills. It has a shipyard, large lumber yards and warehouses. Two hydro-electric plants develop approxi¬ mately 5,000 horse power from the falls of the Sault Rapids. About 75,000,000 tons of freight

are passed down the Sault locks annually. The total value of imports for the fiscal year ending 30 June 1918 was $12,934,377 ; while that of ex¬ ports for the same period amounted to $10,000,- 000. A branch of the State fish hatchery is maintained here. There are 12 churches repre¬ senting the various denominations. The educa¬ tional institutions are Loretto Academy, a high school, public and parish schools and private business schools. The three banks have a com¬ bined capital of $300,000, and there are also two building and loan associations. The city's prop¬ erty assessment in 1918 was $15,654,960. The locality has a romantic place in United States and Canadian history, and before the white man it must have been, from its situation, a well-known passing point on Indian trails ; it is known to have been one of the favorite fishing grounds of the Chippewa Indians, and the first explorer as early as 1634 found about 2,000 natives living here. The French missionaries Rambault and Jogues visited this

locality in 1641, followed by Pere Menard in 1660; and a mission was established by Jacques Marquette in 1668, which, however, was abandoned 20 years later, the settlement continuing as a trad¬ ing post. It was at Sault Sainte Marie that the governor-general of New France gathered a great council of Indians in 1671, and in the name of the king of France took formal and solemn possession, by proclamation, of all the country south to the Gulf of Mexico and west to the Pacific Ocean. Pop. (1920) 12,096.

SAULT SAINTE MARIE, soo sant ma'ri, or French, so sant mare', SAINT MARY'S FALLS, or the «SOO» CANALS. The early

trappers and traders of the Northwest found free navigation insuperably impeded by the sault, or rapids of the Saint Mary's River, whose descent of 18 feet to the mile compelled costly portaging of the increasing cargoes of furs and merchandise. Finally, the Northwest Company, seeking to gain an advantage over its rival, the Hudson's Bay Company, constructed a canal with a single lock on the Canadian side of the Falls. This was in 1797-98, and the canal was in use by canoes and bateaux until 1814, when all but its timber floor and sills was destroyed by United States troops. No further attempts at canal building in this remote spot were made until 1853, when a ship canal — the first within the borders of the United States — was begun by the State of Michigan, to connect lakes Superior and Huron, and was finished in 1855. The length of the canal was 5,674 feet, and it was provided with two tandem locks, each being 350 feet in length and 70 feet wide, and allowing passage of vessels drawing 12 feet, the original cost being $1,000,000. The United States government, by consent of the State, began in 1870 to enlarge the canal, and by 1881 had increased its length to 1.6 miles, its width to an average of 160 feet, and its depth to 16 feet; also had built a single lock, called the Weitzel Lock, 515 feet long and 80 feet wide, with a depth of 17 feet on the sills, which was located 100 feet south of the State and ar¬ ranged for an average lift of 18 feet locks. The State relinquished all control of the canal in March 1882. In 1887 the State locks were torn down and replaced by a single lock 800 feet long, 100 feet wide and a "depth of 21 feet of water on the sills. This lock, called the

TF

SAULT SAINTE MARIE

1 NutrfeT, Poe, Davis, and Sabin Locks

2 Opening of Fourth or Sabin Lock

1 Jack-Knife Bridge

2 Sabin Lock showing construction

((Poeˆ lock, built at a cost of $3,000,000, was put in commission in 1896. The canal was also deepened to 25 feet. From 1892 to 1903 many millions of dollars were ex¬ pended in laying out a new and straighter route through Hay Lake and other channels, eliminat¬ ing a number of short turns and giving dredged areas over 30 miles in length. This was one of the chief causes of the reduction of the cost of the freight-ton through the canal from 13.57 mills in 1882 to 3.53 mills in 1909. A new work of great importance was begun in 1908. It consisted of the widening and deepening of the canal above the locks and in the Middle Nee- bish channel, and the construction of the new canal and the great Davis lock. This work was completed in 1914 at a cost of $5,000,000, the result being that the canal is now 500 feet wide at the upper entrance, 270 feet at the basin, 108 feet at the lock gates and 1,000 feet wide at the lower entrance. The improved Middle Neebish channel is now 300 feet in width and has 22 feet of water over the rock at mean low stage level of Lake Huron. The excavations for the third or Davis lock were completed early in 1912 and allowed for a lock chamber 1,350 feet long and 80 feet wide with a minimum depth of 24 to 25 feet below extreme low water. A separate and free waterway was also con¬ structed to feed the new locks. One result of the opening of the new lock in 1914 was that the largest sized bulk freighters, which since 1895 had been using the Canadian canal, began again to take advantage of the United States canal. (See below).

The plans adopted in 1907 were designed with a view to affording an approach also to a fourth lock, with the same dimensions as the third, and an appropriation was noted in 1912, and work on the excavations commenced soon thereafter. The lock pit was finished in the spring of 1915, the masonry work was half completed by the beginning of 1917, and the lock was opened for navigation in 1919, the cost being $3,275,000. The great length of the third and fourth locks, 1,350 feet as compared with 1,000 feet in the Panama Canal, enables sometimes as many as five ships to go through in one lockage. As many as 125 ship passages are made in these locks in a single day. The new jack-knife bridge which spans the canal, providing means for passing over the third and fourth locks, is claimed to be the largest bascule bridge in the world. Besides the canals on

the American side of the international line, the 1 Dominion government opened a large Cana¬ dian canal in 1895. This canal is one and one-eighth miles long, 150 feet wide and 22 feet deep, with a lock 900 feet long and 60 feet wide, with 22 feet on the mitre sill. (See Canadian Canals). The commerce passing through these canals which are toll-free eight months of the year is far greater than is borne by the Suez Canal, the Kiel Canal and the Manchester Canal combined in a whole year; the commerce of the Erie Canal, the •Welland Canal and the canals of the Saint Lawrence may be added and the aggregate will still fall short of the tremendous tonnage pass¬ ing through the (

was 71,290,304 short tons, and in 1916 it totaled 92,000,000. Through the Canadian canal the freight totaled 16,816,649 tons. In 1918 the cost of operating the American canals amounted to $120,000, averaging less than two mills per ton of freight.

SAUMAREZ, so-ma-ra', or SAUSMA- REZ, James, Baron de, British naval officer: b. Saint Peter Port, Guernsey, 11 March 1757; d. there, 9 Oct. 1836. He served in the Ameri¬ can War; was raised to the rank of commander after the engagement between the English and Dutch in 1781, and was captain of the Russell in the combat between Rodney and De Grasse. In 1793 he was knighted for the capture of the Reunion, a French frigate. In March 1795 he was appointed to the command of the Orion, in which ship he opened the battle of L'Orient, in which the French fleet was defeated, 23 June; he shared in the victory off Cape Saint Vincent, 14 Feb. 1797, and was second in com¬ mand to Lord Nelson in the victory of the Nile, 1 Aug. 1798. In 1801 he was made rear-admiral, created a baron and appointed to the command of the squadron cruising off Cadiz. He de¬ feated a Franco-Spanish fleet of 10 sail of the line and four frigates. At the beginning of the war with Russia (1809) he commanded the Baltic fleet. In 1821 he became vice-admiral of Great Britain, was raised to the peerage of the United Kingdom with the title of Baron de Saumarez of Saumarez, in 1831, and thenceforth lived in retirement. Consult Ross, (Memoirs of Ad¬ miral Lord de Saumarez (1838).

SAUNDERS, san'derz, Alvin, American legislator: b. Fleming County, Ky., 12 July 1817; d. Omaha, Neb., 1 Nov. 1899. He re¬ moved with his parents to Illinois in 1828, and at 16 went to Iowa. He studied law, was post¬ master for seven years and eventually became a banker. He was a member of the convention which framed the constitution under which Iowa was admitted to statehood, was State senator for eight years and a commissioner to organize the Pacific Railroad Company. In 1861-67 he was governor of the Territory of Nebraska and during the Civil War sent 3,000 troops to the front besides repelling the attacks of the Indians, although the entire population of the Territory numbered but 30,000. He

served in the United States Senate in 1877-83, was active in the movement for the resumption of specie payment, secured a labor school for the Indians on the Pawnee Reservation, ob¬ tained 600,000 acres for Nebraska by straighten¬ ing its northern boundary line, and was prom¬ inent as a commissioner on Indian affairs.

SAUNDERS, Frederick, American libra¬ rian, publisher and author : b. London, Eng¬ land, 14 Aug. 1807; d. New York, 12 Dec. 1902. He came to the United States in 1837 and established in New York a branch of his fa¬ ther's publishing business, and did some earnest if unsuccessful pioneer work in the interest of an international copyright law, a project in which he had the support of Irving Bancroft, Bryant and other famous authors. He was city editor of the New York Evening Post for a time ; and in 1859 he became assistant li¬ brarian at the Astor Library, filling the office of chief librarian in 1876-96, when he resigned. He was well known as a contributor to maga¬ zines and reviews and was author of (Salad

for the Solitary by an Epicure (1853) ; 'About Woman, Love and Marriage) (1868) ; 'Pastime Papers) (1885); 'Character Studies* (1894), etc.*

SAUNDERS, Richard, the name under which Benjamin Franklin published his 'Poor Richard's Almanac1 (1732-57).*

SAUNDERS, Thomas Bailey, English au¬ thor : b. Alice, Cape Colony, 2 Dec. 1860. He was educated at King's College, London, and at University College, Oxford, became a bar¬ rister in 1886 and has since engaged in literary work. He has made translations of much of the work of Schopenhauer and Goethe and has written 'Life and Letters of James McPher- son) (1893); 'The Quest of Faith (1899); 'Prof. Harnack and His Oxford Critics* (1902); 'Schopenhauer* (1901), etc.*

SAUNDERS, William, Canadian agricul¬ turist, pharmacist and entomologist : b. Devon¬ shire, England, 16 June 1836; d. 13 Sept. 1914. He accompanied his parents to Canada in 1848 and became a manufacturing chemist at Lon¬ don, Ontario. Becoming extensively interested in agriculture, he made a study of soils and insect pests, and did much to further the de¬ velopment of scientific agriculture in Canada. He was professor of materia medica at Western University in 1882-85 and public analyst for western Ontario in 1882-86. He was one of the founders of the Ontario College of Pharmacy and served as its president for two years. In 1885, under government direction, he investi¬ gated agricultural experiment work in the United States and Europe, his report resulting in the

establishment of the Canadian experi¬ ment farms, of which he was in charge in 1886- 1911. He was a founder of the Ontario Ento¬ mological Society, and was one of the original fellows of the Royal Society of Canada, of which he was president in 1900. Author of 'Insects Injurious to Fruit (1882; 2d ed.,*

1898).

SAUNDERS, William Lawrence, Amer¬ ican engineer and inventor : b. Columbus, Ga., 1 Nov. 1856. He was graduated at the University of Pennsylvania in 1876, and in 1878-81 he was with the National Storage Company at Com- munipaw, N. J. He was afterward president of the Ingersoll-Sergeant Drill Company and an officer in other companies manufacturing tools and machinery. He invented a com¬ pressed air system of pumping liquids; a drill for use upon submerged rocks, and the Inger- soll track and bar channelers for quarrying stone. In 1915 he was appointed to the United States Naval Advisory Board and subsequently became its chairman. Author of 'Compressed Air Information (1903) ; 'Compressed Air Production,* and joint author of 'Subways and Tunnels of New York; 'Rock Drillings.**

SAUREL, a fish. See Scad.

*SAURIA, sa'ri-a, a term variously applied in the classification of the reptiles, but in this work restricted to designate the subclass com¬ posed of the orders Lacertilia (lizards) and Ophidia (serpents). In popular speech the phrase "saurian reptiles** usually means alli¬ gators or crocodiles. See Reptiles.*

SAURIN, Jacques, zhak sovran, French Protestant preacher: b. Nimes, 6 Jan. 1677 ; d.

The Hague, 30 Dec. 1730. After study at Ge¬ neva he became pastor in 1701 of a Walloon congregation in London, but in 1705 went to The Hague to take charge of a church of French refugees assembling there, in a chapel of the Prince of Orange. Here his pulpit ora¬ tory was so greatly admired that it roused the bitter envy of his clerical brethren, who charged him with heresy and subjected him to a series of petty persecutions which shortened his life. His doctrines were those of moderate Calvin¬ ism. As a pulpit orator he has been likened to Bossuet, and so far as vigor of presentation goes this may be thought just. He was the au¬ thor of 12 volumes of 'Sermons, selections from which were translated into English, and published between 1775 and 1784 in five volumes (with a 'Memoir*),*

a sixth being added in 1796. Among his other works are 'Etat du Christianisme en France (1725) ; 'Abrege de la theologie et de la morale Chretienne* (1722) ; 'Discours sur les evenements les plus memor- ables du vieux et du Nouveau Testament* (1726-28). Consult 'Life* by Berthault (1875).*

SAUROPODA, sa-rop'o-da, a sub-order of dinosaurian reptiles which included gigantic forms, such as BrontcsauruSj Morosaurus, Diplodocus and the like. (See Dinosauria). It is difficult, remarks Gadow, to understand how these huge, long-necked Sauropoda lived and moved about. The long neck suggests at first sight predaceous habits, but the teeth, rather feeble in Diplodocus, and distinctly of the plant¬ cutting type in other genera, put this out of the question. The high position of the impaired nasal opening, and the shortened nasal bones of Diplodocus are features indicative of aquatic habits, but the short-toed plantigrade limbs are absolutely adapted to terrestrial life, and we cannot well assume that such enormous brutes as Atlantosaurus could possibly have ventured into swampy ground.

SAUROPSIDA, a primary division of ver- tebrated animals, comprising the reptiles and birds, the other two corresponding divisions being the Ichthyopsida (fishes and amphibians) and the Mammalia. These divisions, set apart by Huxley, are in accordance with genetic re¬ lationships. For the similarities in structure between birds and reptiles, showing descent from a common sauropsidan ancestor, see Ornithology; Reptiles.

SAURURiE, the name given by Huxley to an order of the class of birds (see Ornithology), constructed for the reception of Arckceopteryx (q.v.), a fossil bird, the oldest and most primitive bird-fossil known, remark¬ able for its lizard-like tail.

SAURY-PIKE, or SKIPJACK, a fish

(Scomberesox saurus), having a greatly elon¬ gated body covered with minute scales and the jaws prolonged into a long sharp beak. It is about 15 inches long, occurs plentifully on the north Atlantic coasts, frequenting inlets in shoals so dense that it may be taken in pail¬ fuls. In order to escape the pursuit of the porpoise and large fishes it often leaps out of' the water or skims rapidly along the surface. Consult Goode, 'American Fishes (1888).*

SAUSAGE, an article of food consisting of minced meat, highly seasoned, and enclosed generally in the intestines of some animal.

Among the Romans the sausages of Lucania were held in high repute ; they were made of fresh pork and bacon finely minced with nuts of the stone-pine, and flavored with pepper, cummin seed, bay leaves, pot-herbs and garum. The Bologna sausages of Italy are still highly prized; they consist of veal, salt beef, salt pork and bacon, finely chopped up, seasoned with sage, mixed herbs, ground pepper and mixed spice. The smoked sausages of Germany are also considered as a delicacy by many; they are made of fat and lean pork preserved for about a week by salt, saltpetre, black pepper and alspice being rubbed into the meat ; it is then cut small and mixed with some shreds of shallot or garlic, pressed into an ox-skin, wrapped in a fold or two of muslin and then smoked in the same way as ham. The pork sausages of our own country are made and seasoned in various ways to please different palates. See Meat Packing; Meats and Meat Production.

SAUSSURE, so-sur, Horace Benedict de,

Swiss savant: b. Conches, near Geneva, 17 Feb. 1740; d. Geneva, 22 Jan. 1799. He began his studies in natural science in Geneva and at 22 was appointed professor of philosophy. Later he was elected member of the Council of Two Hundred in the new legislature of his country. His name has since become famous from his services to geology, geodesy, the geographical distribution of plants and the applied sciences. His most remarkable work was done in the investigation of plant anatomy. In pursuit of his chosen studies he traveled through France, Holland, England, Italy and Sicily; thoroughly exploring the Alps, especially the glaciers of Chamounix, and was the first to reach the summit of Mont Blanc (1787) and to measure its height by barometric pressure. He is also the inventor of the electrometer, hydrometer and similar instruments. As founder and presi¬ dent of the Society of Arts of Geneva he did good service to the industries of that city. Among his writings the most important are (Voyages dans les Alpes> (1779) and (Partie Pittoresque) (1890).

SAUTERNE, so-tern', a white Bordeaux wine of high repute, produced from grapes grown in the neighborhood of Sauternes, a vil¬ lage in the department of Gironde, near Bor¬ deaux.

SAUVEUR, so'ver, Albert, American met¬ allurgist : b. Louvain, Belgium, 21 June 1863. He studied at the Liege School of Mines, and, coming to the United States, was graduated at the Massachusetts Institute of Technology in 1889. He was chemist and metallurgist in dif¬ ferent steel works until 1897 ; and in 1897-1905 he o.wned and directed the Boston Testing Laboratories. He lectured on metallurgy at the Massachusetts Institute of Technology in 1898-1903; was connected with the Harvard University

faculty from 1899, and since 1905 has been professor of metallurgy there, also holding that position at the Massachusetts In¬ stitute of Technology since 1917. In 1917 he became metallurgist with the American Aviation Commission in France and has also served since that time as metallurgical expert for the French Ministry of Munitions. He edited the Met- allographist in 1898-1903 and the Iron and Steel Age in 1903-06. Author of (Metallography of

Iron and Steel> (1912); (Germany and the European WaU (1915).

SAVAGE, Edward, American portrait painter and engraver: b. Princeton, Mass., 26 Nov. 1761; d. there, 6 July 1817. He was a goldsmith and engraver in early life, but event¬ ually turned to portrait painting, and estab¬ lished his reputation through his portraits of Washington, who sat for him several times, and of whom he in 1790 finished the portrait painted as a gift to Harvard. He studied abroad in 1791-94, under West in London and later in Italy. On his return to the United States he established a studio in Philadelphia and later painted in New York, maintaining there for many years an art gallery. He painted por¬ traits of Thomas Jefferson, Anthony Wayne, Knox and other famous persons; finished R. E. Pine's (Congress Voting Independence> (Phil¬ adelphia Historical Society), and executed (Family Group at Mount Vernon > (1796), as well as making many steel engravings of his own portraits.

SAVAGE, Henry Wilson, American the¬ atrical manager: b. New York, 19th century. He was graduated at Harvard University in 1880 and afterward engaged in the theatrical business. He is president of the Henry W. Savage Company and of the Castle Square Opera Company, Boston ; and is director of the National Association of Theatrical Pro¬ ducing Managers of America.

SAVAGE, James, American antiquarian: b. Boston, Mass., 13 July 1784; d. Boston, 8 March 1873. He was graduated from Harvard in 1803, studied law, was admitted to the bar, served in both branches of the legislature and then retired from political life to engage in literary work. He published numerous histori¬ cal and political pamphlets and edited many works concerning New England history. His work is unfortunately marred by a partisan spirit and is somewhat confused in plan. He wrote (Genealogical Dictionary of the First Settlers of New England, showing three Gen¬ erations of those who came before May 1692 (4 vols., 1862-64), and edited Winthrop's his¬ tory of New England* (1825-26); Paley's (Works) (5 vols., 1828), etc.*

SAVAGE, Minot Judson, American Uni¬ tarian clergyman: b. Norridgewock, Me., 10 June 1841 ; d. 22 May 1918. He studied at Bow-doin College, and thereafter was graduated from Bangor Theological Seminary in 1864 and for three years (1864-67) was a Congregational home missionary, in California. There he established churches in Grass Valley and San Mateo. He occupied Congregational pulpits in Framingham, Mass., and Hannibal, Mo. (1867-69), (1869-73). Becoming a Unitarian he was made pastor of the Third Unitarian Church in Chicago (1873- 74), and a year later became pastor of the church of the Unity, Boston, where he remained for 22 years. In 1896 he became pastor of the church of the Messiah, New York City, resign¬ ing the pastorate in May 1906. He represented the more radical element of his denomination and was the first clergyman who accepted <(evolu- tionT He was a voluminous writer upon ethical and religious subjects. Among his many books are Christianity the Science of Mankind) (1873); (The Religion of Evolution (1876);*

(Social Problcms) (1886); 'My Creed (1887); 'Religion of To-Day* (1897); 'Our Unitarian Cause) (1898) ; 'Life Beyond Death> (1901); 'Life's Darkest Problems) (1905); 'The Passing and Permanent in Religion)*

(1901).

SAVAGE, Richard, English poet: b. Lon¬ don, 10 Jan. 1698 (?); d. Bristol, 1743. He claimed to be the illegitimate son of Anne, Countess of Macclesfield, by Richard Savage, Earl Rivers, but was probably the son of a woman who had been employed to nurse a natural son of the countess by that earl. This child, according to the countess, died when quite young, and she declared that Savage was an imposter. Savage was apprenticed to a shoe¬ maker, having probably received some education at a grammar school near Saint Albans. He turned to literature and became an author as a means of livelihood. His first work, a pamphlet on the Bangorian controversy, was followed by two comedies, 'Woman's a Riddle, performed in 1716, and (Love in a Veil.* These procured him the acquaintance of Sir Richard Steele and Wilkes, the actor. His tragedy, 'Sir Thomas Overbury,* was brought out in 1723, the author himself playing the leading part, but with little success. Savage was rising in reputation when, in 1727, he killed a man in a tavern brawl. He was tried and sentenced to death, but through the influence of Lady Hertford was pardoned. In 1728 appeared 'The Bastard, * a poem of some merit. Soon after Lord Tyrconnel (a nephew of his alleged mother) received him into his house and allowed him £200 a year. In 1729 be published 'The*

Wanderer: a Moral Poem. A quarrel with his patron once more turned him adrift upon the world. A birth¬ day ode addressed to Queen Charlotte in 1732 procured him a pension of £50 from the queen. In 1735 a satire against the clergy, entitled 'Progress of a DivineP caused a prosecution to be instituted against him; but the informa¬ tion was dismissed. From this period he ap¬ pears to have sunk into the lowest misery. The death of the queen and the loss of his pension completed his ruin, although Pope and a few friends raised a subscription with a view of enabling him to reside in Wales. But at Bristol he was arrested for debt and thrown into the county jail, where, after a detention of some months, he died. Besides the works above mentioned he was the author of much occa¬ sional verse and other miscellaneous writings. Savage was the friend and companion of Samuel Johnson at the time when the latter was sleeping in the streets of London houseless and penniless. Consult Johnson, (Life of Savage' (1744); Galt, (Lives of the Players*; Boswell, 'Life of Johnson*; Thomas, in 'Notes and Queries) (1858).*

SAVAGE, Richard Henry, American sol¬ dier and novelist: b. Utica, N. Y., 12 June 1846; d. New York, 11 Oct. 1903. He was grad¬ uated from West Point in 1868 as brevet second lieutenant and in 1871 served as vice-consul of the United States at Rome and Marseilles. In 1872 he was military secretary, with the rank of major, in the Egyptian army and in the latter part of 1872 and during 1873 was United States commissioner to Texas, to settle the Mexican-Texas border dispute. During the Spanish-American War he served as senior

major of the United States volunteer engineers. He was a voluminous writer and published among other books 'My Official Wife, which has been translated into 17 languages; 'For Love and Life) ; 'In the Shadow of the Pyra- mids) ; 'Brought to Bay*; 'The Midnight Pas¬ senger } (1900).*

SAVAGE ISLAND, or NIUE, an island

of the south Pacific, 40 miles in circumference, and lying between the Samoa and Tonga groups. It is very fertile. Chief products — copra, coffee and fruit. Trade is almost exclu¬ sively with New Zealand, to which it was. an¬ nexed in 1901. The inhabitants are a mixed race of Samoans and Melanesians. They are a quiet people and have become Christians. They speak a Samoan dialect.

SAVAGE STATION, Battle of. While

General Sumner was engaging General Ma- gruder at Peach Orchard or Allen's Farm on the morning of 29 June 1862, General Franklin was informed that "Stonewall® Jack- son, after repairing the bridges, was

crossing the Chickahominy in force and advancing toward Savage Station. Franklin immediately withdrew Smith's division from an isolated and exposed position on Sumner's right and notified Sumner, who at 12 o'clock fell back two and one-half miles to Savage Station and united with Franklin, who had Smith's division only, Slocum's having been sent by McClellan across White Oak Swamp. McClellan had ordered Heintzelman, with his corps, to hold the Wil¬ liamsburg road until dark, at a point where were several field-works and a skirt of timber between these and the railroad; but through a misunderstanding of his orders, and being con¬ vinced, he says, that the whole open space near Savage's was crowded with troops, more than he supposed could be brought into action ju¬ diciously, in the afternoon he marched his en¬ tire corps, except two batteries, to the rear across White Oak Swamp, without orders from any one, and without a word to Sumner, who, by seniority, was in command, McClellan not being on the field. On reaching Savage Station, Sumner and Franklin drew up in line of battle in a large open field to the left of the railroad, the left, held by Sumner, resting on the edge of the woods, Richardson's division forming his right, Sedgwick's his left. Smith's division on the right extended down to the railroad, with Hancock's brigade reaching into the woods to the right and front to hold the railroad. Davidson's brigade was in reserve, and Osborn's battery was on the line. It was after these dispositions had been made that Heintzelman withdrew and imperiled the left of Sumner's line. Magruder had slowly and cautiously fol¬ lowed Sumner from the Peach Orchard and it was . near 5 o'clock when McLaws' division, moving along the Williamsburg road and through the timber that Heintzelman was sup¬ posed to be holding, began an attack upon Sum¬ ner's left, and was held in check by the vigor¬ ous fire of Sumner's artillery. McLaws pressed his attack with great impetuosity, and a hotly contested fight took place on the Williamsburg road. Six regiments of Sedgwick's division, followed by one of Richardson's, were hastened to the threatened point; Brook's Vermont bri¬ gade was thrown into the woods that Heintzel¬ man had abandoned, six batteries opened fire,

and at dark, after partial success on either side, the battle ceased, with Sumner's line intact, and the Confederates repulsed. A novel feature of the engagement was the use by the Confeder¬ ates of a 32-pounder gun, mounted on a plat¬ form-car, plated with iron, which was pushed down the railroad, and sent its shells into Sum¬ ner's line. Soon after the cessation of the fight, and the destruction of a large amount of sup¬ plies, Sumner continued the retreat across White Oak Swamp, abandoning to the Confed¬ erates 2,500 sick in the hospitals. McLaws re¬ ports a loss of 345

killed and wounded; the total Confederate loss was about 400 killed, wounded and missing. The Union loss is not accurately known.

Consult (Official Records) (Vol. XII) ; Webb, (The Peninsula) ; Walker, (History of the Second Army Corps ; Allan, (Army of Northern Virginia) ; The Century Company's { Battles and Leaders of the Civil War> (Vol. II).*

E. A. Carman.

SAVAII (sa-vi'e) ISLAND. See Samoan Islands

SAVANILLA, one of the names of the great tarpon (q.v.).

SAVANNA, Ill., city in Carroll County, on the Mississippi River, 130 miles northwest of Chicago, on the Chicago, Milwaukee and Saint Paul and the Chicago, Burlington and Quincy railroads. It is a shipping point for the produce of the district; has grain elevators, and manu¬ factures sash and doors. Pop. (1920) 5,237.

SAVANNAH, Ga., city and capital of Chatham County, on the Savannah River, 18 miles from its mouth. It is the northern ter¬ minus of the Atlantic Coast Line system; the eastern terminus of the Central of Georgia Railway; the southern terminus of the Charles¬ ton and Savannah Railroad, a part of the At¬ lantic Coast Line, and the chief south Atlantic terminus of the Southern Railway and the Sea¬ board Air Line systems ; also Savannah and At¬ lanta Railway, Savannah and Statesboro Rail¬ way and Midland Railway, thus being one of the most important railroad centres in the South. It has regular steamship and sailing connections with Boston, New York, Baltimore, Philadelphia, Jacksonville, West Indies, Cen¬ tral and South America, and other ports.

Commerce. — Next to New Orleans, Savan¬ nah is the most important commercial city in the South. It is the greatest cotton port on the Atlantic Coast of the United States. It has a water frontage of seven and one-half miles. The largest sea-going vessels load at the city wharves, and the river is navigable by steamers as far as Augusta. It has large exports of cot¬ ton, lumber, fertilizers, tobacco and naval stores. The value of its foreign exports aggre¬ gating $104,286,925 places Savannah second in position on the Atlantic Coast in the value of foreign exports.

Manufactures. — The number of industries and their products has largely increased in re¬ cent years. The industries include fertilizer plants, cotton-seed oil mills, iron foundries, saw mills, planing mills, rice and flour mills, cotton mills, furniture, sash, doors and blind, broom and varnish factories, printing offices, book binderies, a lithographing establishment, sugar

refinery and barrel manufacturers. About $10,- 250,000 is invested in local manufacturing in¬ terests, and the annual value of products reaches about $16,710,000.

Banks and Banking. — There is one national and 10 State banks and nine savings and loan associations, which are under State control, with a total cash capital and surplus of approxi¬ mately $10,500,000, with deposits approximately $50,000,000. The bank clearances for the year ending 1918 were $435,619,000. The largest State bank south of Baltimore and fourth largest in the entire South is located at Savan¬ nah, Ga.

Public Buildings. — The city has a county courthouse, United States post-office and court¬ house, city hall, custom-house, arsenal of the First Battalion heavy artillery, armory of First Regiment of infantry, chamber of commerce, cotton exchange, board of trade, Saint Joseph's Hospital, Episcopal Orphans' Home, Savannah Hospital, Telfair Hospital for Females, Ma¬ sonic Temple, theatre. Odd Fellows' Home, Georgia Historical Society, public library, Tel¬ fair Academy of Arts and Science, Auditorium and many large buildings of modern architec¬ ture. Ten miles from the city is the Bethesda Orphan House, founded by Rev. George White- field in 1740.

Churches and Schools. — Prominent among the church buildings are Christ Church, Wes¬ ley Monumental Church, Trinity Methodist Church, First Baptist Church, Saint John's Church, Saint John's Roman Catholic Cathedral, Hebrew Synagogue Mickva Israel and Inde¬ pendent Presbyterian Church. There are over 30 churches in the city, 13 of which are for colored congregations. The city also has the Convent of Saint Vincent de Paul and an excel¬ lent public school system. There are 9,000 en¬ rolled pupils in the public schools, which are maintained at an annual expense of $125,000.

Parks and Monuments. — The streets are wide and beautifully shaded and intersected with parks or squares at regular intervals. In Johnson, Monterey and Madison squares are monuments to Nathanael Greene. Count Pulaski and Sergeant Jasper, heroes of the Revolution. In Forsyth place stands a monument to the Confederate dead. There is also a monument to Tomichichi, the Indian chief, and other pub¬ lic memorials.

Government. — The city is governed by a mayor and city council. The annual cost of maintaining the municipal government is about $1,200,000. The artesian waterworks system, with 58 miles of mains, cost $1,250,000. The city has an area of seven square miles with 98 miles of streets, of which 35 miles are paved. The sewer system covers 18 miles of mains. The streets are lighted by electricity at an an¬ nual cost of $39,000; the police

department costs annuahv about $90,000, and the fire depart¬ ment $85,000.

*History. — Savannah was founded by Gen. James Oglethorpe in 1733 and was chartered in 1789. In 1778 the British captured the city. In October of the following year it was be¬ sieged by the American and French forces, and in a battle fought on the 9th of that month the combined armies were defeated. In this as¬ sault Count Pulaski was mortally wounded. The town remained in the possession of the British until th*e close of the Revolutionary*

War. During the Civil War the city was a prominent depot of supplies for the Confederate armies and was the objective point of General Sherman in his march to the sea. After a brief defense it was evacuated by the Confederates and the Union army took possession 21 Dec.

1864.

Population. — In 1850 the population was 15,312; in 1900, 54,244. The corporate limits of the city have since been extended and the popu¬ lation in 1910 had increased to 65,064. At present (1920) the population is 83,252.

Thomas Purse,

Secretary of Savannah Board of Trade.

SAVANNAH, Mo., city, county-seat of An¬ drew County, on the Chicago Great Western and the Kansas City, Saint Joseph and Council Bluffs railroads, 13 miles north of Saint Joseph. It was settled in 1842 and was incor¬ porated as a city in 1854. It is the centre of an agricultural, fruit-growing and stock-raising region, and has a flour mill and a creamery. The city has a public high school with a school library of over 700 volumes. Pop. (1920) 1,831.

SAVANNAH, a river formed by the junc¬ tion of the Tugaloo and Seneca rivers, and which, from its source, forms the boundary be¬ tween Georgia and South Carolina. The length of the channel from its source to its mouth is 450 miles, but from the source to the mouth in direct line is only 250 miles. The area of the drainage basin is about 8,500 square miles. The current in the upper part of its course is rapid; considerable quantities of silt are brought down each year, and bars form in the broad portions of the

stream where the current moves slowlv. The tidal wave ascends to a point about 25 miles above Savannah. At Savannah the rise and fall of the tide is six and one-half feet. The river is navigable for small vessels to Augusta, 230 miles, and for large vessels as far as Savannah.

SAVANNAH (Ga.) OPERATIONS AGAINST, in the American Revolution. Since operations in the North had been barren of results, the British determined to re¬ new the attack on the South, beginning the campaign at Savannah. Late in November 1778 Col. Archibald Campbell sailed from New York, landing three weeks later near the mouth of the Savannah River, and quickly dislodging a small force of Americans who attempted to dis¬ pute the British advance. Gen. Robert Howe (q.v.) with 800 American troops encamped be¬ tween the landing place and the city, but a negro apprised Campbell of a by-path by which he could gain the rear of the American camp, and in the battle that followed the Americans found themselves between a cross-fire. Hence they retreated, leaving 100 of their number dead and wounded and about 400 in British posses¬ sion. The Americans fled up the Savannah River and crossed into South Carolina, while the British occupied the city and remained in possession until the close of the war. Mean¬ while, in November 1778, Comte d'Estaing (q.v.) had sailed with a French fleet to attack the British West Indies, after which, at the solicitation of the Americans, he went to Savan¬ nah, arriving 1 Sept. 1779 with 22 ships of the line and other smaller vessels. Gen. Benjamin Lincoln (q.v.) with 1,000 troops, reinforced by troops under Count Pulaski (q.v.), and Colonel

McIntosh and a detachment of 3,000 French troops, lay siege to the city by land while d'Estaing carried on the naval operations. The city was defended by Gen. Augustine Prevost (q.v.) with about 2,500 troops. On 23 Sept. 1779 siege works were begun and on 1 October the various batteries opened the bombardment, which continued for several days without effect. Despairing of capturing the city by this method the allied forces decided to storm the British works. Accordingly, on 9 October, 4,500 French and Americans advanced in three columns, but were met with such a galling fire from the Brit¬ ish batteries that, though successful in planting standards on the redoubts, they were repulsed with considerable loss. With 200 troops Pu¬ laski endeavored to strike the garrison in flank, but he was killed and his troops dispersed. Unable longer to withstand the British fire, the attacking forces retired, the French having suffered a loss of 640 killed and wounded and the Americans 450. The British loss was com¬ paratively small. On 18 October the siege was abandoned, the Americans recrossing the Savan¬ nah at Zubly's Ferry, and taking position in South Carolina, while the French embarked on their ships and sailed away. Consult Stedman, Charles, (American War (Vol. II, pp. 121— 134) ; Lossing, (Field-Book of the Revolution > (Vol. II) ; Lee, Charles,*

(Memoirs of the War) (Vol. I, pp. 99-112) ; Carrington, H. B., (Battles of the Revolution (pp. 478-482) ; McCrady, Edward, (South Carolina in the Revolution (pp. 403-417) ; Mahan, Alfred T., (The In¬ fluence of Sea Power upon History) (pp. 374 — 375) ; 'Georgia Historical Society Collections) (Vol. V, Pt. I) ; Moultrie, 'Memoirs* (Vol. II, p. 41) ; Ramsay, David, devolution in South Carolina) (Vol. II) ; Wiley and Rines, 'The United States* (Vol. III. pp. 159-171) ; Lowell, E. J., (Hessians in the Revolution.*

SAVANNAH TO GOLDSBORO, Sher¬ man's Campaign from (including the battles of Averasboro and Bentonville). Sherman's March to the Sea (q.v.) culminated in the capture of Savannah 21 Dec. 1864. It was a brilliant campaign, but of minor importance compared with that upon which he immediately prepared to enter. He says: "Were I to ex¬ press my measure of the relative importance of the march to the sea, and of that from Savan¬ nah northward, I would place the former at one, and: the latter at 10, or the maximum.® Before the capture of Savannah, Sherman had received from General Grant a letter, dated 6 December, in which he had given his idea of Sherman's further movement, which was to establish a base on the sea-coast, fortify it, leave all artillery and cavalry, and enough infantry to protect them and threaten the interior, so that the militia of the South would have to be kept at home, and with the remainder of his command take transports for James River, join Grant before Richmond and participate in the destruction of Lee's army and the overthrow of the Confederacy. Sherman replied: "I had expected, after reaching Savannah, instantly to march to Columbia, S. C, thence to Raleigh, and then to report to you." After the surrender of Savannah, Grant (27 December) accepted Sherman's plan and instructed him to start on his expedition northward without further de¬ lay, break up the railroads in South Carolina

SAVANNAH, GEORGIA

A General View of the City

.

.

>

.

.

' • I m I 1

.

and North Carolina and join the armies operat¬ ing against Richmond as soon as he could and by the route he deemed best. Sherman has¬ tened his preparations ; General Grover's divi¬ sion of the 19th corps was detached from the Army of the Shenandoah and ordered to Savan¬ nah as a garrison, and General Foster, com¬ manding the Department of the South, was in¬ structed to follow Sherman's inland movements by seizing in succession Charleston and other points on the coast, which might be abandoned. Ammunition, rations and clothing were accumu¬ lated, and 14 Jan. 1865 the 17th corps, General Blair, took transports at Savannah for Hilton, S. C., and moved to Beaufort, thence to Poco- taligo, on the Charleston and Savannah Rail¬ road, thus threatening Charleston. Later the 15th corps, except Corse's division, joined the 17th. The left wing, 14th and 20th corps, under General Slocum, with Corse's division and Kil¬ patrick's cavalry, moved up the Savannah River, 40 miles, to Sister's Ferry, thus threatening Augusta. When Slocum arrived at Sister's Ferry the river had overflowed its banks and submerged the adjacent lowland, and there was a delay of some days before the waters had fallen sufficiently for a crossing. On 1 Feb¬ ruary, when the general movement began, the army was composed of two wings : the right wing, under Gen. O. O. Howard, consisted of the 15th corps, Gen. John A. Logan, and the 1 7 th corps, Gen. F. P. Blair; the left wing, un¬ der Gen. H. W. Slocum, consisted of the 14th corps, Gen. J. C. Davis, and the 20th corps, Gen. A. S. Williams. The cavalry division, under General Kilpatrick, moved with the left wing, as also, at first, Corse's division of Logan's corps. The strength of the army 1 February was 53,923 infantry, 4,438 cavalry and 1,718 artillery, in all 60,079 men with 68 guns. There were about 600 ambulances, 2,500 wagons and provisions for 20 days, mostly of bread, sugar, coffee and salt. Beef cattle were driven and it was expected that a good supply of cattle, hogs and poultry would be gathered on the march. The disposition of the forces from Sister's Ferry on the left to Pocotaligo on the right menaced Augusta, Columbia and Charles¬ ton and left the Confederates in doubt as to the true point upon which Sherman was to move. The Confederates, under General Hardee, whose headquarters were at Charleston, and who had about 16,000 men, occupied the line of the Salkehatchie River, while Wheeler's cavalry operated on the heads and flanks of the ad¬ vancing column. On 1 February the movement began. Howard's right wing marched from Pocotaligo for the Beaufort and Rivers' bridges of the Salkehatchie for the purpose of pushing on to the Edisto River, thus flanking Charleston. There was a sharp engagement (3 February) at Rivers' bridge, in which two

divi¬ sions of Blair's corps waded breast deep through the swamp and carried the bridge with a loss of 88 killed and wounded, the Confederate loss being 52 killed and wounded. The Confederates, driven from the line of the Salkehatchie, re¬ treated to Branchville, behind the Edisto, burn¬ ing the bridges behind them. The left wing, under Slocum, marched through Barnwell, and on 10 February both wings were in the vicinity of Branchville on the Charleston and Augusta Railroad. Kilpatrick on the left went as far

as Aiken and threatened Augusta. From Branchville the railroads in every direction were thoroughly destroyed, and the army started for Columbia, each of the four corps taking a separate road. Howard went by the Orange¬ burg road, and on the 16th his head of column approached Columbia, which was occupied by Gen. C. L. Stevenson's division of infantry, and Butler's and Wheeler's divisions of cavalry, in all about 5,000 men. Stevenson fell back to Winnsboro, leaving Wade Hampton, command¬ ing the cavalry, to follow. On the 17th the 15th corps marched through the city and en¬ camped beyond it on the Camden road. Dur¬ ing the night the greater part of the city was accidentally burned. Slocum, advancing by Barnwell and Lexington, destroyed the Charles¬ ton and Augusta Railroad for several miles, and, after menacing Augusta, received orders to cross the Saluda River, at Mount Zion's Church, above Columbia. During the night a bridge was constructed and next day Slocum and Kilpatrick crossed, passed over Broad River and on the 21st arrived at Winnsboro, destroy- . ing on the way several miles of railroad north and south of Alston. Sherman, with the right wing, marched from Columbia, on the 20th, on the direct road to Winnsboro, and threatened Charlotte, N. C. He destroyed the railroad be¬ tween Columbia and Winnsboro, and joined Slocum at the latter place. On the day that Sherman occupied Columbia, General Hardee evacuated Charleston, after destroying the pub¬ lic buildings, two iron-clad steamers, cotton and other property, and with about 14,000 men. moved to Cheraw, on the Peedee River, and thence by a long march to Fayetteville, N. C. Next day Charleston was occupied by the Union troops of General Foster, who found 450 aban¬ doned guns. The city had been fired, churches and private residences burned and everything presented a scene of desolation. Sherman, in his march, had made a clean swath of 40 miles, burning bridges, wrecking railroads and devour¬ ing nearly everything. Each family was left a reasonable amount of food, but all horses, mules and wagons were taken. From Winnsboro, Slocum destroyed the railroad as far north as Chester, threatened Charlotte, and then, forcing to the left the Confederates who were concen¬ trating to dispute the march on Charlotte, the entire army turned eastward for Fayetteville, Slocum crossing the Catawba River at Rocky Mount and joining Howard, who had marched by roads farther south, at Cheraw (3

March), where were found 24 guns, 3,600 barrels of gun¬ powder and large supplies of stores, public and private, sent from Charleston for safe-keeping. Hardee made no opposition to the occupation of the place, and retreated to Fayetteville, leav¬ ing Wade Hampton's cavalry to cover his rear and burn the bridges behind them. On the 6th Sherman resumed his march on Fayetteville, by four different roads, and reached it on the 10th, Hardee again retreating without a show of de¬ fense, leaving Wade Hampton to skirmish with Sherman's advance and burn the bridge over the Cape Fear River. Kilpatrick, covering the movement on Sherman's left and rear, was surprised on the night of the 9th by Hampton's cavalry and pretty roughly handled, being driven from his camps and losing all his guns, which, however, he regained. He lost 183 men,

of whom 103 were captured. The march through South Carolina had been greatly delayed by almost incessant rains and the swampy nature of the country. Nearly all the way the army was compelled to corduroy the roads before the trains could be moved, in some instances the first corduroying was out of sight before the trains had all passed, and another road was laid over it. All this was done cheerfully by the men, working in icy water up to their knees. Before reaching Fayetteville it was heard that General Terry had taken Wilmington, and the day after the arrival of the army a Union steamer came up Cape Fear River, confirming the news and bringing mails and dispatches. Having thoroughly destroyed the arsenal build¬ ings, foundries and machine-shops at Fayette¬ ville, the army crossed Cape Fear River on the 13th and 14th for Goldsboro, the objective point of the campaign, where it was to unite with Generals Schofield and Terry, who were march¬ ing on that place from Newbern and Wilming¬ ton. It was now known that Gen. J. E. John¬ ston had been ordered to delayed Sherman's advance, and Sherman estimated that he had 37,000 men for the purpose. Apprehending that Johnston would seek an opportunity to strike him on the last stage of the march, Sherman ordered Slocum on the left to send his trains under a strong guard by an interior road on his right, and to keep at least four divisions with their artillery on the left well in hand, to meet an attack. Under this order Geary's and Baird's divisions were detailed to guard the trains. Slocum, preceded by Kilpatrick's cav¬ alry, advanced on the direct road to Averasboro, to make a feint on Raleigh, and Kilpatrick was then to strike the railroad near Smithfield. Sherman says he ((proposed to drive Hardee well beyond Averasboro and. then turn to the right by Bentonville for Goldsboro.® On the 15th Hardee was retiring from before Slocum, having for his rear-guard a brigade composed of artillery troops that had garrisoned Charles¬ ton, under

command of • Col. Alfred Rhett. During the evening Kilpatrick, in skirmishing with this rear-guard, near Taylor's Hole Creek, took some prisoners, among whom was Colonel Rhett. •

Battle of Averasboro. — On the morning of the 16th opposition to the march was quite stubborn, and Kilpatrick, forcing back the Confederate rear-guard, came upon a line of intrenchments, on a narrow neck of swampy land, between Cape Fear and South rivers, and covering the road to Bentonville, along which Sherman intended that Slocum's wing should march to Goldsboro. Kilpatrick's cavalry was moved to the right and Jackson's and Ward's divisions of Williams' 20th corps were deployed in front of the Confederate line, and the two divisions of the 14th corps ordered up on Wil¬ liams' left. Case's brigade was sent by Wil¬ liams to the left to gain the flank and rear of the Confederate line, and succeeded in striking it in flank and sweeping it from position, capturing McBeth's Charleston battery of three guns and 217 of Rhett's artillery acting as infantry. Jackson's and Ward's divisions ad¬ vanced and came upon the Confederates in an¬ other line of works about 400 yards in rear of the first. Kilpatrick was sent to the right to seize the Bentonville road, but his leading brigade was driven back by a furious attack of

McLaws' division, upon which the Union in¬ fantry advanced directly against Hardee, who also was advancing, and drove him inside his works, and Slocum went into bivouac in his immediate front. During the night, which was stormy and very dark, Hardee retreated, leav¬ ing 108 dead and 68 wounded on the field. His entire loss, as estimated, was about 650, of whom 175 were captured. Slocum's loss was 77 killed and 477 wounded. Next morning Ward's division pursued Hardee a short distance be¬ yond Averasboro and ascertained that he had retreated toward Smithfield.

Sherman was now under the delusion that no serious opposition would be made to his march on Goldsboro. ((A11 signs,® he savs. <(in- duced me to believe that the enemy would make no further opposition to our progress, and would not attempt to strike us in flank, while in motion.® Under this impression his command¬ ers were instructed to march their troops in the easiest manner and by the nearest roads to Goldsboro. The left wing marched from Averasboro on the direct road and on the night of the 18th, after driving back Hampton's cav¬ alry to a position selected by Hampton for a battle, the 14th corps in advance, encamped 25 miles from Goldsboro and five from Bentonville, at a point where the road from Clinton to Smithfield crossed the one to Goldsboro. Two divisions of the 20th corps were camped 10 or 12 miles in rear, while Geary's and Baird's divisions wTere on other roads, with the trains still farther to the south. Howard's two corps were to the south and east, their advance at Lee's Store, more

than a day's march distant. Sherman had been with Slocum and the left wing since the 14th and very early on the morning of the 19th started to join How¬ ard, several miles to the east and south, to con¬ centrate hjs forces and unite with Slocum at Goldsboro, \Vhere he expected to meet Schofield and Terry. He had no suspicion that General Johnston with a strong forc§ was then in Slocum's immediate front, and supposed that the only opposition to be met would be from cavalry. When about to leave Slocum he ex¬ pressed the opinion that Hardee had fallen back to Raleigh and that Slocum could reach Neuse River the next day, in which opinion Slocum concurred. But General Carlin, commanding a division of the 14th corps, and who was nearest the enemy, had observed matters that indicated a large force in front prepared for battle, and sought to impress his own convic¬ tions upon Sherman, who made light of them, said nothing but cavalry was in front and rode away to join Howard.

On 23 February Gen. J. E. Johnston had been assigned to the command of all the forces that could be collected to make head against Sherman. At this time Hardee was moving toward Fayetteville, N. C. ; Beauregard was directing the march of C. L. Stevenson from Winnsboro to Charlotte ; Cheatham, with his division of Hood's army, had come from Au¬ gusta, Ga., and was moving toward Charlotte, but on the west side of the Congaree and Broad rivers, and A. P. Stewart, with about 1,000 men of Hood's army, was marching for Charlotte. Johnston's first task was to concentrate these troops, which was done at Smithfield, N. C., where he was joined by Hoke's division from Lee's army at Richmond, which had unsuccess-

fully engaged General Cox, near Goldsboro (see Kinston, Battle of), and also by S. D. Lee, with about 3,000 men of Hood's army. In all Johnston had about 20,000 men. He had as subordinate commanders Generals Bragg, Hardee, A. P. Stewart, S. D. Lee, Wade Hamp¬ ton and others of high rank, who had long been the pride and ornaments of the Confederate armies.

Battle of Bentonville. — On the 17th Gen¬ eral Johnston had become satisfied that Sher¬ man was not marching on Raleigh. He heard on the morning of the 18th that Sherman was marching on Goldsboro, and was informed by Wade Hampton that the 14th corps was in his immediate front, that the 20th corps was several miles in rear on the same road, while Howard's two corps were on roads some miles to the south, and he de¬ termined to crush the 14th corps before the 20th could come to its support,

and then fall upon the 20th. He ordered Hampton to hold Slocum's head of column in check un¬ til he could march from Smithfield, 16 miles distant, and join him to give battle on ground that Hampton had selected, and to which he was forced back that evening, which was at a point about three miles south of Bentonville. In order to attack the head of Slocum's column early next morning, Johnston immediately marched his army from Smithfield, intending to bivouac that night between Bentonville and the road on which Slocum was moving. But the distance was greater than expected, the roads bad, and but a small part of the column reached Bentonville that night, the main column bivouacking some distance in the rear. As soon as Hardee's troops reached Bentonville next morning they were marched by the left flank, Hoke's division leading, to the ground selected by Hampton, on the eastern edge of an old plantation, extending one and one-half miles to the west, lying principally on the north side of the road, and surrounded east, south and north, by dense thickets of black-jack. As there was but one narrow road through the thicket, the deployment of the troops consumed a weary time. Hoke's division was formed with its centre on the road, its line at right angles to it, on the eastern edge of the planta¬ tion, and its left extending some 400 yards into the thicket to the south. Two batteries, the only artillery, were on his right, commanding the ground in front to the extent of the range of the guns. The troops belonging to the Army of Tennessee were formed on the right of the artillery, their right strongly thrown forward, conforming to the edge of the open ground. Meanwhile, and before these dispositions had been completed, the battle had opened. Very early in the morning Hampton had thrown forward his cavalry, and when Carlin's division of the 14th corps began its march at 6 o'clock it became almost immediately engaged with the Confederate cavalry, which offered such a stubborn resistance that Carlin deployed his entire division and brought up his artillery, and one brigade was sent to the left to de¬ velop the Confederate line, and as the resist¬ ance increased Morgan's division was moved to Carlin's right as a support, and the entire line was ordered to go forward, and was soon severely engaged, convincing Slocum that he had something more than cavalry in his front,

of which fact he was soon further convinced by a deserter from the Confederates, who in¬ formed him that Johnston was in his imme¬ diate front, and that the talk in the Con¬ federate camp was that Slocum was to be crushed.

Slocum prepared for defense by throwing up works, ordered Williams, commanding the 20th corps, to throw his train to the right and hasten up, and sent a messenger to Sherman with the information that Johnston's army was in his front. Carlin's division in advance- ing struck Hoke's division and after some severe fighting was repulsed, upon which John¬

ston ordered Hardee to charge with the right wing, Stewart's Army of Tennessee troops and Taliaferro's division, and General Bragg to join in the movement with his brigades suc¬ cessively, from right to left, each making the necessary change of front to the left in ad¬ vancing. Hardee led his men forward and drove Carlin back just as the advance of the 20th corps came up, one brigade of which was sent to Carlin's support, and was driven back with him, and another put in the gap between Carlin and Morgan just as the Confederates reached the line, the remainder of the corps forming on Carlin's left. The Confederates had become somewhat broken up in advancing through the woods, and when they received a telling fire from behind the slight entrench¬ ments that had hurriedly been thrown up they fell back. On the right Morgan's division of the 14th corps, with its supports, held its ground against Bragg's persistent attacks. The Con¬ federate assaults were repeated several times until a late hour, each assault finding the Union line better prepared to receive it. John¬ ston had given the 14th corps a heavy blow, but had failed to crush it, and determined not to renew the attack, but only to hold the ground until his wounded could be removed. The bat¬ tle of the 19th was fought by about 16,000 men of the 14th and 20th corps on one side and about the same number of Confederates on the other.

When Capt. Joseph B. Foraker delivered to Sherman the message from Slocum that he had run up against Johnston's whole army, Sher¬ man was incredulous, but he sent word to Slocum to hold on, ordered the 1 5th corps, which was well to the rear, to turn at once toward Bentonville, and the 17th corps to move in the same direction. Hazen's division of the 15th corps reported to Slocum during the night and was placed on the right. Early in the morning of the 20th Geary and Baird, each with two brigades, arrived on the field. Baird was placed in front of the works and moved out beyond the advanced position held on the pre¬ ceding day. The day was spent in strengthen¬ ing the position and developing the line of the enemy, which brought on sharp skirmishing. The right wing under Howard came up late in the afternoon of the 20th and on the morn¬ ing of the 21st. It had marched 20 miles over bad roads, skirmishing a great part of the way with the Confederate cavalry. There was heavy skirmishing during the day, but no general at¬ tack, and during the night Johnston retreated, crossing Mill Creek by the bridge at Benton¬ ville and bivouacking on the night of the 22d near Smithfield. The Union loss in the battle was 191 killed, 1,168 wounded and 287 missing,

an aggregate of 1,643. The Confederate loss was 239 killed, 1,694

wounded and 673 missing, an aggregate of 2,606.

On the 22d Sherman resumed his march on Goldsboro and on the 23d and 24th his entire army was assembled around the place and junc¬ tion made with Schofield's and Terry's forces, which had occupied it two days before. (See Goldsboro, Kinston, etc.). "Thus," writes Sherman, "was concluded one of the longest and most important marches ever made by an organized army in a civilized country. . . . The country generally was in a state of nature, with innumerable swamps, with simply mud roads, nearly every mile of which had to be cordu¬ royed. In our route we had captured Columbia, Cheraw and Fayetteville, important cities and depots of supplies, had compelled the evacuation of Charleston City and Harbor, had utterly broken up all the railroads of South Carolina and had consumed a vast amount of food and forage, essential to the enemy for the support of his own armies. We had in mid-winter ac¬ complished the whole journey of 425 miles in 50 days, . . . and had reached Goldsboro with the army in superb order and the trains almost as fresh as when we had started from Atlanta." Consult < Official Records > (Vol. XLVII) ; Van Horne, (History of the Army of the Cumber- land) (Vol. II) ; Sherman,

SAVARY, sa-va-re, Anne-Jean-Marie- Rene, Duke of Rovigo, French general: b. Marcq, department of Ardennes, 26 April 1774; d. Paris, 2 June 1833. In 1789 he entered an infantry regiment. He served under Custine, Moreau and Desaix, and accompanied the last named on the expedition to Egypt. After the battle of Marengo he was appointed adjutant to Bonaparte, and soon rose very high in his confidence. After rising to the rank of lieu¬ tenant-general he was rewarded, after the vic¬ tory of Friedland, with the title of Duke of Rovigo. In 1808 the emperor sent him to Madrid, where he negotiated the arrangement by which the Spanish king and his son Were kidnapped. In 1810 he succeeded Fouche as minister of police. On Bonaparte's return from Elba he gave in his adhesion to him, and was appointed inspector-general of gensdarmes. He was carried to Malta in 1815, but escaped after being a prisoner for seven months. While there he began his (Memoirs. 5 Later he stood trial at Paris as one who had contributed to Na¬ poleon's return, but was acquitted. In 1831-33 he was military commander of Algiers.

SAVASTANA. See Grasses in the United States.

SAVE, sav, or SAU, sow, Jugo-Slavia, river tributary to the Danube, formed near Rad- mannsdorf from the waters of the Wurzen and Wochlein Save which have their source in the eastern slope of the Julian Alps, and flow south¬ east through Illyria, along the southern part of Styria into Croatia. At the frontier it be¬ comes exceedingly tortuous, and finally flows through the Wocheiner See. The fall is rapid until the Leibach is

received, and then the river becomes navigable, flowing through a narrow valley enclosed by mountains; it fol¬ lows a circuitous route for about 540 miles

and joins the Danube at Belgrade. Its main tributaries are all on the right — the Kulpa, Una, Vrbas, Bosna and Drina. In the lower part, forming the boundary between Austria and Servia, it flows through flat plains, often devastating them by inundation. It forms an important outlet for the produce of the dis¬ tricts through which it flows.

S AVERY, Thomas, English engineer: b. Shilstone, near Modbury, Devonshire, about 1650; d. London, May 1715. He became a mili¬ tary engineer and rose to be captain in 1702. He is known for his inventions, most import¬ ant of which was a machine for raising water from mines, which was the first practical ap¬ plication of steam power to a mechanical pur¬ pose. A patent granted him in 1698 extended until 1733.

SAVIDGE, Eugene Coleman, American physician and author: b. Maryland, 21 Oct. 1863. He was graduated from the University of France in 1888; from that of New York in 1889. He was for a time editor of the Express-man and is now attending gynecologist at Saint Mark's Hospital, New York. He has written (Wallingford5 (1882) ; (Life and Times of Brewster> (1891) ; (The American in Paris5 (1895) ; Selective Involution5 ; (Philosophy of Radio-Activity5 (1914); (The Problem of Cancer5; Unclassified Dreams5 (1915).

S A VIGNY, sa-ven-ye, Friedrich Karl von,

German jurist; b. Frankfort-on-the Main, 21 Feb. 1779; d. Berlin, 25 Oct. 1861. He studied chiefly at Marburg, became a lecturer there in 1800, and in 1803 professor of jurisprudence. In 1808 he was made professor of law in the University of Landshut, in Bavaria, and in 1810 obtained the chair of jurisprudence in the newly established University of Berlin, where he continued to lecture with uninterrupted suc¬ cess for 32 years. He was elected a member of the Prussian Academy of Science in 1811, was appointed a councilor of state in 1817 and in 1842 Minister of Justice for the revision of the law. He retired in 1848. His principal works are (Geschichte des romischen Rechts im Mittelalter5 (1815-31) ; (System des heuti- gen romischen Rechts5 (184CM8), to which (Das Obligationenrecht5 (1851-53) forms an appendix; (Vermischte Schriften5 (1850), a collection of essays which had appeared in legal periodicals. He brilliantly applied the his¬ torical method to the exposition of the Roman law. Consult the biographies by Bethmann- Hollweg (1867) and Enneceerus (1879).

SAVILE, say'll, or SAVILLE, George,

Marquis of Halifax, English statesman and writer : b. Thornhill, Yorkshire, 11 Nov. 1633; d. London, 5 April 1695. On the death of Crom¬ well he distinguished himself by his exertions in behalf of Charles II. In 1669 he was ap¬ pointed a commissioner of trade, in 1672 became a member of the Privy Council, and in 1682 was created Marquis of Halifax and lord privy seal. Under James II he was made president of the council, but was dismissed from office because he opposed the repeal of the Test and Habeas Corpus Acts. From this time Lord Halifax continued in opposition, and contributed to the elevation of William III to the throne. He was the author of (Advice to a Daughter5 (1868), and of a variety of political tracts, the principal of which are (Maxims of State5 ;

*Character of a Trimmer * ; (Character of King Charles IP; (Anatomy of an Equivalent; (Letter to a Dissenter.?*

SAVILE, Sir Henry, English scholar: b. Bradley, near Halifax, Yorkshire, 30 Nov. 1549; d. Eton, 19 Feb. 1622. He was educated at Ox¬ ford, became tutor in Greek to Queen Elizabeth, and in 1585 was made warden of Merton Col¬ lege and provost of Eton in 1596. He was knighted in 1604. In 1619 he founded two professorships in geometry and astronomy at Oxford, besides conferring several other valu¬ able benefactions, both in property and books. Among his works the principal are his Com¬ mentaries on Roman Warfare (1591) ; (Rerum Anglicarum post Bedam Scriptores) (1596) ; (Praelectiones tresdecim in principium elemen- torum Euclidis) (1621) ; and his edition of the writings of Saint Chrysostom (1610-13), in eight folio volumes, a work on which he is said to have spent £8,000.*

SAVILLE, Marshall Howard, American archaeologist: b. Rockport, Mass., 24 June 1867. He studied anthropology as a special student at Harvard University in 1889-94, and afterward engaged in field work under Prof. F. W. Put¬ nam. He conducted a series of investigations of the remains of the Ohio Mound Builders, making some notable discoveries. He also made important explorations in Yucatan in 1890; in Honduras in 1891-92, 1915; in Mexico in 1899, 1902-04; in Ecuador in 1906-10, 1913; in Colom¬ bia in 1914; and in Central America in 1917. He was assistant curator at the American Mu¬ seum of Natural History in 1894-1902; and in 1902-05 curator of anthropology and Mexican and Central American anthropology there. Since 1903 he has been professor of American archaeology at Columbia University. He is au¬ thor of numerous

monographs on anthropology and archaeology.

SAVIN, or SABIN. See Juniper.

SAVINGS BANK. See Banks and Bank¬ ing.

SAVIOUR, Order of the. See Brigit-

tines ; Orders, Religious.

SAVONA, sa-vo'na, Italy, in the province of Genoa on the west coast of the Riviera, 26 miles southwest of Genoa, is one of the most important towns of that region. It is pictur¬ esquely situated amid vine-clad hills and orange groves. The Castle of Saint George (1542) is now a military prison; the other buildings de¬ serving notice are a Renaissance cathedral, with the magnificent tomb erected by Sixtus IV to his parents; the Della Rovere Palace, now oc¬ cupied by municipal officers ; other churches, a lyceum, a technical and a commercial institute, other educational institutions, a fine theatre, and a large hospital. It is a centre of the iron industry, having foundries of all kinds, besides glass-works, potteries, tanneries, brickyards and sulphur mills. It is an important seaport. Its chief imports are coal, petroleum, iron, cereals, and the exports consist of tomatoes, wood and candied fruits. The harbor, which is good, is defended by a fort. Pop. 50,000.

SAVONAROLA, Girolamo, je-ro'la-mo sa-vo-na-ro'la, Italian religious reformer: b. Ferrara, Italy, 21 Sept. 1452; d. Florence, 23 May 1498. As a boy he was well acquainted with mediaeval learning and his family intended that

he should become a physician, but a disappoint¬ ment in love turned his thoughts to the church, and in 1475 he left home secretly and joined the Dominican order. After passing a severe novitiate in the monastery at Bologna he was made a teacher there, and in 1482 was sent to Saint Mark's monastery in Florence where he became disgusted at the corruption in church and state, and began to attack the abuses in his sermons. His first success as a preacher was at Brescia in 1484-35. He fascinated the worldly Italians by his terrible denunciations of vice and wickedness, and returned to Flor¬ ence with a reputation as a popular preacher. In 1490 he was made lector in Saint Mark's, 'and crowds came to hear him. A year later he was chosen prior of Saint Mark. Though his convent had been favored by Lorenzo di Medici, Savonarola refused to do homage to him, as was customary. Lorenzo tried in vain to con¬ ciliate the friar who continually preached against the abuses in state and church. In 1492, Lorenzo di Medici, the chief opponent to the work of Savonarola in Florence, died. In

the political confusion that followed, and during the invasion of Italy by Charles VIII of France, Savonarola by his public services acquired great influence among the Florentines. He desired a democratic government for Florence, and, yvhen in 1494 the people drove out the Medici, he opposed the schemes of the aristocracy to seize the government, called a mass-meeting of the citizens and practically assumed the dictatorship of Florence, superintending the formation of a government in which the people were to fear God and amend their conduct, and prefer pub¬ lic to private interests. A general amnesty was proclaimed, and a council modeled on that of Venice was chosen to administer the govern¬ ment. There was no doge as in Venice, but for three years Savonarola was dictator. His enthusiasm for liberty, his zeal in religion, and his eloquent sermons, caused light-hearted pleas¬ ure-loving Florence to become a city of Puri¬ tans. Thomas Aquinas and the Old Testament furnished the spirit of the laws. Though not of the Renaissance and hostile to its spirit, espe¬ cially to the pagan influence derived from the classics, Savonarola was not an enemy to learn¬ ing and fine arts, though in 1497 he encouraged committees of children and devotees to search the city for frivolous books, cards, profane songs and music, and works of art of evil tendencies, which were destroyed under the direction of the government. No good books or works of art were destroyed at this time, though the next year many were lost in a second ((burning of the vanities.® Savonarola aimed at reforming the Church in the same caustic way. With his moral reforms he closely knitted political schemes and doctrines, and several ‘ times preached vigorously against Pope Alexander VI, who first tried to conciliate him. Savonarola spurned his advances, and in 1496 was ordered to cease preaching, and to undergo a trial for heresy. Silent for a time, Savonarola was at¬ tacked by the Franciscans and began again to preach. In 1497 he was excommunicated and Florence was threatened with an interdict if she harbored him. For a year he defied ex- communication and demanded that a general council be called to depose Pope Alexander. But he had presumed too much upon the sup¬ port of fickle citizens. Many were weary of

the Puritan rule and longed again for the flesh pots of Egypt; the other cities of Italy were hostile to Florence because of her course dur¬ ing the French invasion and because of her democratic government; there had been famine and pestilence, which Savonarola had been un¬ able to alleviate; some of the followers of the Medici had been executed and thus powerful enemies made ; and now Florence was threatened with an interdict. Savonarola had to be guarded by armed followers when he went to preach. In 1498, while still powerful, he in a sermon had called upon Heaven to consume him' with fire if he had acted from unchristian motives. A friar of the Franciscan order thereupon offered to pass through the ordeal of fire with Savonalora, who treated the offer with con¬ tempt. But the Dominicans volunteered to undergo the ordeal to show their faith in Savon¬ arola, and after hesitation, which his enemies made the most of, Savonarola consented to the judgment by ordeal, believing in Divine inter¬ vention in his favor. The fires were made ready and the opposing champions seemed ready to enter the flames, when the Franciscans, who had no intention of carrying out the judgment by ordeal, began to raise disputes to cause delay. They insisted that the Dominicans must not bear the crucifix nor the host through the flames. Savonarola would not agree to give up the latter and the dispute lasted until a rain came and gave the Franciscans an opportunity to slink away. But upon Savonarola was blamed the failure of the ordeal. The populace was infuriated because they had missed the show, and called Savonarola an impostor who was afraid of the ordeal. Florence turned against him ; he was arrested, accused of heresy and after six days' torture and a hasty and un¬ fair trial, was condemned to be hanged and then burned. The sentence was carried out with all the refinements of cruelty. Savonarola was a powerful, typical medievalist, hostile to many of the manifestations of the Renaissance spirit. His talent for political organization was pro¬ found, but he was mistaken in thinking the Florentines capable of self-control in politics or of puritanism in religion. The Italian despots understood the people better than Savonarola, and only as a despotic leader was Savonarola himself to any degree successful. His ideals were those of an ascetic, uncompromising, rigid. An eloquent speaker, he, for a time, imposed his ideals upon the Florentines, who when weary of being good, left him to his enemies. Of a mystical turn of mind, he attached great im¬ portance to dreams and visions which he related in his sermons. The writings of Savonarola were voluminous, embracing sermons, essays and poems on religious subjects, and a treatise on the government of Florence.*

Bibliography. — Madden, (Life of Savona- rola) (1853) ; Villari, (Life and Times of Giro¬ lamo Savonarola (2 vols., London 1880; 10th ed. 1909) ; Symonds, (The Age of the Despots) (1875) ; Meier, Karl, (Girolamo Savonarola, aus grossen Theils handschriftlichen Quellen dargestellt* (Berlin 1836) ; Perrens, F. T.,*

(Jerome Savonarola, sa vie, ses predications, ses ecrits (3d ed., 2 vols., Paris 1859) ; Luotto, P., (I1 vero Savonarola) (Florence 1897) ; Pas¬ tor, Ludwig, (Zur Beurtheilung Savonarolas) (Freiburg 1898) ; Hoosburgh, E. L. S., Savon¬ arola* (London 1901) ; (Cambridge Modern*

History) (Vol. I, London 1902) ; Lucas, Her¬ bert, (Fra Girolamo Savonarola) (2d ed., Lon¬ don 1906) ; Villari, Pasquale, (Studies, His¬ torical and CriticaP (New York 1907) ; Gobi- neau, J. A., (The Renaissance) (New York 1913) ; Myers, F. W. H., (Lectures on Great Men) (5th ed., London 1861) ; Von Ranke, Leo¬ pold, (Historisch-biographische Studied (Leip¬ zig 1877) ; Chesterton, G. K., (Varied Types) (New York 1903) ; Gherardi, A., (Nuovi docu- menti e studi intorno a Girolamo Savonarola) (2d ed., Florence 1887) ; Olschki, L. S., bibli¬ otheca savonaroliana) (Florence 1898) ; also George Eliot's (Romola (1863), and Alfred Austin's drama (Savonarola) (1881) ; O'Neil, (Jerome Savonarola) (1898) ; Lucas, (Life of Savonarola) (1899).*

SAVONNERI TAPESTRY. See Tapes¬ tries.

SAVOU, sa-voo ', SAVOE, or SABOE, an island of the Asiatic Archipelago in the Indian Ocean, near the islands of Timor and Sandal¬ wood. It covers an area of 237 square miles. The surface is elevated in the centre, sloping seaward. It is well-watered and fertile, yield¬ ing millet, corn, beans ; tropical products as usual in this latitude, including betel, cinnamon, mangoes, cotton, tobacco, etc. Domestic ani¬ mals are numerous, besides buffalo, wild boars and deer. Horses and tobacco are the chief exports, sent to Timor. The island consists of five principalities, subject to the Dutch gov¬ ernment of Timor. The inhabitants are Ma¬ lays — a strong race with pagan practices, in¬ cluding dog sacrifices. Pop. 16,000.

SAVOY, House of. The territory of Savoy formed part of ancient Gaul, and from 122 b.c. to 407 a.d. was in possession of the Ro¬ mans, by whom it was divided into two prov¬ inces, the Graian and Pennine Alps. At the latter date it was seized by the Burgundians, but with Burgundy it became subject to the Franks in 534, was included in the Carloving- ian empire, and on its dissolution in 887 was granted by the Diet of Tribur to Rudolph, king of Transjurane Burgundy, and with that king¬ dom was united to Cisjuran Burgundy or Arles. On the accession of the last king of Arles to

the imperial throne as Conrad II in 1027, the more powerful nobles of northwestern Italy, such as the Marquis of Susa, the Counts of Maurienne, Turin and Chablais, became vas¬ sals direct of the emperor. Umberto Blanca- mano, Count of Maurienne, was the first of the family who took a prominent place among the princes of northern Italy. His nephew, Amadeus II (1060-80), in right of his mother, Adelaide, heiress to the Marquisate of Susa, added nearly the whole of Piedmont to the original possessions of his house. Humbert II, his son and successor (1080-1103), further in¬ creased his dominions by the conquest of Tarantasia. Amadeus III (1103-49) received from the Emperor Henry V the title of Count of Savoy in 1111 ; and his grandson, Thomas I (1188-1233), who supported Frederick II in his contest with the popes, obtained important accessions in Chambery, Turin, Vaud and other lordships. Amadeus IV (1233-53), like his father a warm adherent of the emperor, obtained the submission of the city of Turin to his rule, and ceded Piedmont to one of his brothers, Thomas, Count of Maurienne. He was sue-

ceeded by Boniface (1253-63), and Boniface by his unicle, Peter (1263-68), who reconquered Turin, which had rebelled. His nephew, Ama¬ deus V (1285-1323), now mounted the throne; he assisted Philip the Fair in his war against Flanders, and accompanied the Emperor Henry VII to Italy. His grandson Amadeus VI aided the Greek emperor, John Palaeologus, against the Turks and the Bulgarians and ac¬ companied the pretender Louis of Anjou, in his expedition to Naples. His son, Amadeus VII (1383-91), forced the Count of Provence to cede to him Nice and Vintimiglia. Ama¬ deus VIII, grandson of the preceding (1391- 1451), received the ducal title from the Emperor Sigismund in 1416, acquired the county of Geneva, together with Bugey and Vercelli, and re-annexed Piedmont. Louis, who on the abdication of his father had governed as regent, assumed the title of duke in 1440. The elder male line becoming extinct in 1496, the crown devolved on the nearest collateral heirs, Phili¬ bert II (1496-1504), and his brother Charles III (1504-53). The latter aided the Emperor Charles V against Francis I of France, and after losing Valais and Geneva, which joined the Swiss Confederation in 1533, and the canton of Vaud, seized by the Bernese in 1536, he was finally deprived of all his territories by the French king. But his son Philibert Emmanuel, surnamed the Iron Head (1553-80), commander- in-chief of the Spanish army, succeeded in gain¬ ing back the greater part of the paternal domains by the treaties o'f Cateau-Cambresis (1559) and Lausanne (1564). In 1560 he was induced by the courts of Rome, Spain and France to at¬ tempt the conversion of the Waldenses by force, but they offered such

vigorous resistance to his troops in several encounters that he granted them, under certain conditions, the free exercise of their religion (5 June 1561). Charles Em¬ manuel I (1580-1630) was defeated by Henry IV of France, who invaded Savoy and Pied¬ mont. His son Victor Amadeus I speedily regained the possessions his father had lost, and added to them Montferrat, Alba, and some other places, surrendering to France in ex¬ change Pignerol, La Perouse, Angrone and Lucerne. His younger brother Thomas was the founder of the line of Savoy-Carignan. Victor Amadeus II (1675-1730), grandson of the first of that name, at the beginning of the war of the Spanish Succession, sided with France; but bribed by brilliant offers, allied himself to Austria by the Treaty of Turin, 25 Oct. 1703. The victories of the Duke of Ven- dome compelled him to retire to Genoa, but the defeat of the French under the walls of Turin by Prince < Eugene (7 Sept. 1706) re¬ stored his possessions. In 1709 he severed the Austrian alliance, and remained neutral until the end of the war. By the Treaty of Utrecht (1713) he received a part of the duchy of Milan, with the island of Sicily, which con¬ ferred upon him the title of king. In 1720 he was compelled to give up Sicily to Austria in exchange for Sardinia, which with Savoy, Pied¬ mont and his other continental dominions, were erected into the kingdom of Sardinia. Con¬ sult Wiel, (The Romance of the House of Savoy (1901).*

SAVOY, Military Order of. See Orders, Royal.

*SAVOY, or SAVOIE, sa-*wa, France, consists of two eastern departments, Savoie and Haute-Savoie, formed in 1860 out of the former duchy of Savoy, one of the states of*

the Sardinian monarchy (q.v.) ; it covers an

area of 4,162 square miles (2,368 in Savoie and 1,774 in Haute-Savoie), and is exceedingly mountainous. The region is separated trom Switzerland by Lake Geneva and is dominated by Mont Blanc, the loftiest peak of the Alpine chain, whose many ramifications extending in all directions present a relief of successive mountains and valleys. Savoy belongs to the Rhone basin, which forms its western boundary. The other rivers are the Arve, Isere and Arc.

The chief lakes besides Geneva are those of

Bourget and Annecy. The climate is, generally speaking, cold. Savoy is rich in mineral waters, of which the most famous are those of Aix- les-Bains (hot-sulphur), Marlioz, Challes (strong natural sulphur), Salins-Montiers (hot, saline, various minerals) , Brides-les-Bains (soda, calcium). The extent of arable ground is limited, but a scarcity of grain is supplied by the

chestnut which forms a staple food among the peasants and the poor. The vine is somewhat cultivated in the lower valleys and slopes. The main source of profit is in the cattle and dairy produce, as hay and pasture alone are obtained from much of the land. The forests, which cover vast mountain slopes, also afford a rich supply of timber. The minerals are not sufficiently exploited to be of any im¬ portance. The manufactures are coarse woolens, linen and cotton goods, felt hats, leather and hardware. Other industries are silk, tanning and weaving. There is an important transit trade carried on between France and Italy, by way of Mont Cenis. Coal, skins, cotton, pro¬ visions are imported; cattle, dairy produce, wood, stones, mineral waters, silk goods, tanned leather and paper are exported. There are some schools, all speak French and they are exclusively Roman Catholic. The University Academy is at Chambery, and clock-making is taught in two special schools at Annecy, em¬ ploying 2,000 hands. (Here is also a large cotton mill). The inhabitants are industrious, honest, hospitable and intelligent; their chief characteristic, however, is love of country. Though often compelled to leave their homes for winter employment, wandering through France, Switzerland, Spain, or Italy, in order to earn a livelihood, they return to their native mountains at the earliest moment. Sardinia ceded Savoy to France in 1860. It was formed into the two departments of Savoie and Haute- Savoie, whose capitals are respectively, Cham¬ bery and Annecy. Pop. Haute-Savoie 255,137; of Savoie about 248,890; total, 503,027.

SAVOY CABBAGE, a variety of cabbage (q.v.) with many sub-varieties, forming large close heads with wrinkled leaves, and cultivated for winter use, requiring a light, rich soil.

SAVOY CONFERENCE, a conference held in 1661 at the Savoy Palace, London, be¬ tween a number of Church of England and Presbyterian divines for the purpose of ˆad¬ vising upon and reviewing the Book of Com¬ mon Prayer; and of taking into serious con¬ sideration the several directions and rules, forms of prayer, and things in the same book;

of consulting also upon the several objections which shall now be raised against the same; and, if occasion need be, to make such neces¬ sary and reasonable alterations, corrections and amendments as shall be agreed upon to be need¬ ful and expedient for the giving satisfaction to tender consciences, and the restoring and con¬ tinuing of peace and unity in the churches under his majesty's government and protection.® When the Parliamentary cause triumphed in the civil war of 1642-46 the majority of

the clergy, who were royalists, were either turned out of their pulpits and their places were filled by Presby¬ terians, then a strong body in England; and at the Restoration of Charles II a large number of the ministers connected with the church strongly objected to Episcopalian order and practice be¬ ing again introduced. The government was fully aware of this state of matters, and it was accordingly resolved that the determination of all matters appertaining to the establishment of unity should be left to the advice of a national synod. On 25 March 1661, therefore, the letters-patent above quoted from were is¬ sued, appointing 12 bishops, with nine clergy¬ men as assistants on the Episcopal side, to meet with an equal number of Presbyterian divines and discuss the matters therein mentioned. The commissioners met for the first time on 13th April. Sheldon opened the discussion by observing that the Episcopal party, being per¬ fectly satisfied with the established forms of worship, had nothing to propose, and would therefore expect that any objections to the ex¬ isting order of things, and any innovations that might be desired, should be mentioned by their opponents. The Presbyterians moved that Bishop Ussher's Reduction of Episcopacy, a scheme in which the elements of the Scotch system of presbyteries, synods and general as¬ semblies were combined with distinctions of ecclesiastical ranks, should be laid down as a ground-work to treat upon. They further offered several exceptions to the liturgy, against the many responses of the people, and desired that all might be made one continued prayer. They objected to lessons being taken out of the Apocrypha, and wished that the psalms used in the daily service should be according to the new translation. They excepted to many parts of the baptismal service that infer the doctrine of the regeneration of the baptized. They also moved that the practice of kneeling at the Lord's Supper, and that the use of the surplice, the cross in baptism, of godfathers as sponsors, and the celebration of the holy days, should be abolished. It was urged in reply to the demand for the adoption of Ussher's scheme, that the king's commission gave them no power even to take into consideration any questions relating to the government of the church; and the Pres¬ byterians proceeded to discuss the minor points, mainly the alterations in the liturgy. Baxter undertook the preparation of what was called a Reformed Liturgy, but the Episcopalian com¬ missioners rejected it at once, without examin¬ ing it. The two parties finally separated at the end of four months, the period assigned by the letters-patent, without coming to a single reso¬ lution, and the government passed in the fol¬ lowing year the famous act of uniformity, the stringent clauses of which drove about 2,000 clergymen from the Anglican Church.

SAVOY DECLARATION, the document uttered by the Independents and Presbyterians who met at the Savoy Hospital in London 29 Sept. 1658. In it these religionists declared the principles of tlreir faith and polity. The

Declara¬ tion is substantially the same as the West¬ minster Confession. See Confession of Faith, Westminster.

SAVORY, aromatic herbaceous or half- shrubby plants of the labiate genus Satureia, native to the Mediterranean region and the Levant. They are cultivated in kitchen gardens. Summer savory (S. hortensis) is an annual with slender branching stems nearly a foot high, bearing soft, lanceolate leaves, often stained with purple, and with lilac or white mint-like flowers in the axils. The young shoots are plucked at flowering time, and dried for flavor¬ ing dressings, etc. Winter savory (S. montana) is a perennial species, with similar qualities.

SAW-FISH, a ray of the family Pristidce, so called from the sword-like snout, the sides of which are armed with spines, so as to give it the appearance of a large doubled-toothed saw. Armed with this formidable weapon, which may measure two or three feet or more in length, the saw-fish is said to attack even whales, and to inflict severe injuries upon them, while it is certainly destructive to shoals of small fishes upon which the saw-fish subsists. The true teeth of the mouth are small, blunt, and arranged pavement-like. The mouth is sit¬ uated on the under surface of the head, and the breathing apertures are large and set behind the eyes. The fins, tail and granular scales are shark-like in most respects. About five species are known, all inhabitants of the open ocean, whence they seldom approach the shore; and they perfer warm waters. A common species on the Gulf Coast of the United States is Pristis pectinatus, which sometimes enters the lower Mississippi or wanders northward on the Atlantic Coast; it is 10 to 20 feet long. The Pristisphoridce, which bears a similar weapon, are sharks.

SAW-FLIES, insects of the family Ten- thredinidce, so called because the ovipositors are constructed of parallel, toothed blades with which the females cut holes in vegetable tissue to receive their eggs. Unlike the wasps, bees, ants and other members of the order Hyme- noptera, the abdomen is united by its full girth to the thorax; that is, it is sessile. In gen¬ eral they resemble other members of the order in having two pairs of transparent wings with rather few veins and cells, biting mouth-parts, and a complete metamorphosis. The larvae resemble caterpillars, but have at least six pairs of prolegs instead of five as do the larvae of lepidopterous insects. They are also frequently slimy, and often they keep part of their bodies curved beneath the edge of the leaf upon which they are feeding. All feed upon living vegetable tissue, and some are troublesome upon cultivated plants. The currant-worm or slug (P ter onus ribesii), a yellow bodied European insect, whose black-dotted green larvae appear shortly after the leaves in spring, eat gluttonously for about three weeks and transform to adults below the ground. Two or three broods may appear in a season. The pear

slug (Eriocampoides lamacina) is a slimy larva which sometimes

damages pear foliage. Rose slug, grape slug, raspberry slug, turnip fly and willow saw-fly are other well known species which occasionally do damage. In such cases they have been com¬ bated with an insecticide (q.v.) which must be eaten, though in some cases dust, forcible spraying with water, and other remedies have been reported effective.

SAW-MILL, a complete sawing machine, with all its adjuncts, for converting logs into planks, boards and slabs. The earliest form was the sawpit with raised trestle horses upon which the log was raised and then sawed by hand saws or by whip saws. Windmill power was applied about the beginning of the 13th century and was soon followed by water power.

All attempts to establish saw-mills in Eng¬ land during the period of 1660-1770 were unsuc¬ cessful on account of the opposition of the hand sawyers ; but in the United States, beginning with the erection of the mill at Piscataqua Falls in the State of Maine in 1634 a vast number of mills have been built in all of the wooded districts of the country and by the develop¬ ment of improved methods in handling the logs, and in arranging the machinery, have made such States as Maine, Michigan and Wisconsin famous as lumber producing areas.

Of these mills the earlier forms are known as gate or sash saw-mills and consisted of two upright guide posts held in position by a trans¬ verse beam at the top. A heavy rectangular wooden frame carrying a straight band saw at¬ tached to the top and bottom pieces, worked with a vertical reciprocating motion in slides be¬ tween the guide posts. The reciprocating mo¬ tion was imparted to the sliding frame by a connecting rod, the lever end of which extended to one end of a water-wheel shaft. The car¬ riage bearing the log was moved by a rack and pinion arrangement operated by a feed-wheel and the log was fed endwise to the saw, which was run, usually, at a speed of 150 strokes per minute and was capable of producing from 500 to 2,000 superficial feet of lumber per day of 10 hours.

A larger output was obtained by introducing the <(gang® feature, which consisted of attach¬ ing several saws to the sliding frame. In the <(Yankee gang,® the saws were arranged in two sets, with the tooth edges of one set facing in a direction opposite to that of the other set, and enabled the sawing of two logs at one movement of the carriage. Other forms, des¬ ignated <(slabbing gang,® ((stock gang® and ((pony gang,® applied the

method to special purposes.

The ((muley® saw followed the gate and gang saws and was adopted generally by the smaller mills on account of the great reduction in the weight of the reciprocating parts. In this ar¬ rangement, the ends of the saw are attached to two light cross-heads opposite each other, which oscillate up and down. The saw is kept in line by means of slides working in a strong iron frame swung from an overhead beam. The cut¬ ting is accomplished entirely by the downward motion, during which the action of the slides causes the saw-teeth to hug close to the wood and then recede from it during the upward motion, so as to reduce the friction. Muley saws are driven at a speed of about 300 revo¬ lutions of the driving wheel per minute and are

capable of turning out about 6,000 superficial feet per day.

Saw-mills employing circular saws are of comparatively recent date. The experimental point in the use of the circular saw as the main saw of a mill was passed about the middle of the 19th century, since which time it has been developed to a state of very high efficiency and general usefulness. By its use a continuous cut¬ ting motion is obtained and driven by engines ranging from 25 to 100 horse power circular saws in connection with steam feeding arrange¬ ments are capable of sawing from 20,000 to 100,000 superficial feet per day, practically limited only by the capacity of the handlers to remove the lumber.

The saw, which is a disc of steel with a toothed edge, is mounted on a shaft which is rotated by gear wheels, or by belts operated by the shaft of a water wheel, steam engine, etc. The cutting depth of the saw is somewhat less than half the diameter of the disc and the saws generally employed rarely exceed a maximum diameter of six feet on account of the increased thickness required to obtain rigidity, and the consequent increase in the amount of the kerf or cut waste. Water power was used almost exclusively until 1835, but it has been almost completely supplanted by steam engines. (

The mechanical arrangement consists of two broad-faced wheels mounted one above the other. Over these wheels, a continuous band of steel, which is the saw, works like a belt over two pulley wheels, with a continuous motion, and the logs are fed endwise against the cutting •or toothed edge by a traveling carriage. Mills employing band saws are capable of producing from 40,000 to 80,000 superficial feet of lumber per day and require from 25 to 45 per cent less driving power than mills employing circular saws. The latest thing in band saw-mills is a portable mill in which the log is stationary and the band saw, toothed on both edges, travels in guides

lengthwise of the log, dropping the thickness of a board at each traverse and sawing at both the forward and return movements.

Many saw-mills employ both circular and gang saws. Both ordinary blade and band-saws are run in gangs and some band saws run on wheels as large as 10 feet in diameter. The mill is usually built upon the banks of a river or pond. The general construction is quite simple and consists of a saw floor and log deck built at an elevation of about 10 or 12 feet above the water level. A jack ladder con¬ structed of heavy timber with its lower end resting on the bottom of the stream, leads up to the saw floor at the rear end of the mill. Ribbons of iron are fastened to the top sides of the ladder and form the track upon which the log car is operated. The arrangement and installation of the saws vary according to the size of the mills and the kind of work that is done. Since the depth of cut is less than

three feet, usually in mills . handling logs of large diameter, increased depth of cut is ob¬ tained by mounting two saws one above the other, so that they cut in the same line — the upper one cutting down from the top of the log to the cut of the lower or main saw. In the mills in California, logs measuring up to 10 feet in diameter are sawed by arranging four saws one above the other, some cutting horizontally and others vertically, thus permitting the hand¬ ling of very large trees.

The gigantic trunks of the redwood trees of California,' Washington and other States on the Pacific Coast, ranging from 10 to 25 feet in diameter, are first quartered by explosions of gunpowder and then passed through the mills.

One great disadvantage in the use of circu¬ lar saws is the excessive kerf waste, which is fully 20 per cent greater than that resulting from the use of the band or the gang saws, and is one of the principal reasons for the employ¬ ment of the last named forms in the smaller mills where the uniform character of the lum¬ ber and the saving of raw material are impor¬ tant factors.

The majority of the American mills use single circular saws, but many of them have saws installed upon each side of the mill floor, and the logs are rolled to either side by the log jack placed in the centre of the building. In addition to these rotaries, the larger mills have from one to four gang saws.

The arrangements for handling the logs which are floated down upon the rivers from the distant forests to the mills, consist of piles driven at

convenient distances apart, into the bed of the river adjacent to the mill, to which strong "booms® of logs, are attached by heavy chains and serve to hold the logs as in a pen, until they are required and also to leave a free channel in the middle of the stream. When the mill is in operation, the boomed logs are drawn from the water by an endless chain which runs in a V-shaped log slide and is provided with spikes to prevent the log from slipping back. The logs follow each other in endless succes¬ sion. When a log reaches the log deck, it is loaded upon the skids by the action of a lever operated by the sawyer, which causes a pair of arms to rise through the mill floor and raise the log forcibly upon the skids. The skids lead to the log carriage, upon the ((head blocks® of which the log is securely fastened by the inser¬ tion of a ((dog ,® and it is then ready to be ad¬ vanced to the saw. This is accomplished in several different ways — by rack and pinion worked by <(cone feed,® consisting of two par¬ allel cones operating a belt which regulates the motion of the pinion shaft ; by <(rope feed,® consisting of a wire rope which passes over pulleys set in the floor to a drum underneath, and is so arranged as to be under the control of the sawyer in the forward movement of feed¬ ing, or in the reverse movement of returning the carriage to its original position ; or by C(steam feed,® commonly termed <(lightning feed,® de¬ rived from the force of a steam cylinder about 10 inches in diameter, which is laid upon the mill floor underneath the saw carriage to which the piston is attached. As the log is fed and when the first slab has been removed, the sawyer touches a lever and brings the ((nigger,® a piece of iron-bound timber with spikes upon its front face, through the floor. The spiked

face catches the side of the log and turns it axiallv at once, to any desired position. If the log is being ((canted,® or prepared for the gang saw, the slabs are removed from the two oppo¬ site sides, a hook is thrown over the rear end of the cant so as to prevent it from returning with the saw carriage, and it is dropped upon a set of rollers which starts it toward the gang. From the time that the log is drawn out of the water and until it emerges from the gang, all of the operations are performed by machinery.

The finished product of saw-mills are beams, planks, boards, etc., of varying sizes in length, breadth and thickness, too numerous to enumer¬ ate specifically; laths, consisting of strips four feet in length, three-eighths inch in thickness and one and one-half inches in width, used for lath and plaster work. The total production of the 31,833 saw-mills in operation in the United States, in 1900, was over thirty billion superficial feet, with a market value of about $425,000,000. According to the United States census of 1900, these mills represent a total invested capital of $805,785,236, and give em¬ ployment to 229,710 workmen. The 1914 census does not afford figures for comparison.

For technical description of saws see Saws and Sawing; Metal-working Machinery, and Wood-working Machinery.

SAW-WHET OWL, a small American owl (Nyctale acadica) , which takes its name from the rough tone of its cry. It is northerly in its distribution, ranging across the continent, but rarely dwelling as far north as Hudson Bay. It is not so large as a robin and has incon¬ spicuous ear-tufts; bill black; cere tumid; gen¬ eral color : above, chocolate brown, streaked with white; below, white with brown stripes. Its food consists mainly of insects and its nest is made in a hollow of a tree, in an old crow's nest or any convenient place. Compare Spar¬ row-owl.

SAWBILL, a motmot (q.v.).

SAWDUST, a general name given the ac¬ cumulated particles caused by sawing wood, stone, etc. Besides the more common uses of sawdust, it is commercially valuable as the basis of various manufactures. Oxalic acid is man¬ ufactured on a large scale from wood sawdust. Sawdust is also used in the ((carbonating® stage of the process for the manufacture of soda ash. The sawdust of mahogany and rosewood is used in dressing furs and the small fragments of some woods, such as the pencil cedar, made by saw cuts or the turning tool, yield perfumes. Sawdust sinks in water, though the wood from which it is cut floats.

SAWS AND SAWING. A saw is a tool consisting usually of a thin, flat blade of highly tempered steel serrated or having a series of triangular-shaped teeth usually on one of the edges, but sometimes on both edges. It is one of the most important of the various forms of cutting tools and is extensively used for work¬ ing wood, metal, stone and other substances^ but principally wood.

Saws are made in a great variety of forms and sizes in order to adapt them to the varying characteristics of the material worked and to suit them to the particular kind of work for which they are used and also to suit the cir¬ cumstances attending the manner in which they are operated or handled.

For illustration of power-driven saws see Wood-working Machinery.

In this article the consideration of the sub¬ ject will be confined to the construction and adaptation of the various makes of saws for

g 6 Points to the inch.

WWWVWSW

r l -inch. |

Fig. 1.

specific purposes and to the identification of their generally applied trade names with those purposes.

The characteristic action of the saw being the removal successively of minute portions of the material worked by the cutting or tearing action of a series of sharp edges thrust against the material indicates that it is essentially a tool adapted for cross-cutting or cutting at right angles to the fibre of the material. Necessity and custom, however, have compelled its appli¬ cation for ripping or cutting with the grain also, thus adapting it to work which otherwise would be accomplished by the use of cutting tools such as axes and chisels. These conditions define two primary classes of saws — the cross-cut saws and the rip-saws which divide all the dif-

Uniform

W1AJVW \A«A/VA/W

_ _ K _ _

Regu/ar order of change

Fig. 2.

ferent kinds of saws into two groups according to the general purposes for which they are used.

Saw Terms. — The principal terms used in describing a saw are as follows: (See Fig. 1, Diag. A).

Space. — The distance between two contigu¬ ous teeth, measured from point to point.

Pitch or Rake. — The inclination of the face

of a tooth or the angle of the face of a tooth measured from a vertical line drawn through its point.

Gullet. — The depth of the tooth from the point to the root-line, the throat. Also the concave space at the back of a tooth.

Gauge. — The thickness of the blade, usually measured by the wire gauge.

Set. — The amount of lateral inclination

given to the teeth, either to the right or to the left of the plane of the blade, in order to pro¬ duce a kerf or cut of sufficient width to effect a proper clearance of the sawdust and to pre¬ vent the saw from binding or being pinched by the sides of the cut.

Fleam. — The side angle of a tooth.

Points. — The number of teeth points to an inch. The coarseness and fineness of saws are usually estimated by the number of points in¬ stead of the number of teeth to an inch, and it should be observed that there is always one less tooth per inch than there are points. (See Fig. 1, Diag. B).

The several parts of a saw-tooth are usually described by the following terms: (See Fig. 1, Diag. A).

Fig. 4.

Face. — The front or cutting edge of the tooth.

Back. — The following or back edge of the tooth.

Point. — The lower end of the V between

saw-teeth ; in another sense the outer cutting extremity.

Saw-teeth vary in spacing, length or depth of gullet, angle, pitch, set, fleam and form of

gullet. The teeth may be uniform throughout, or the blade may have several different kinds of teeth. In the latter case all the teeth of a kind are made uniform, or they are arranged in a regular order of change. (See Fig. 2).

The "angle® of a saw-tooth is that which is included in its point between the face and the back. The generic angle is 60 degrees, but it varies in the different kinds of teeth from 45 degrees to 70 degrees, according to the char¬ acter of the material worked and the specific purpose for which the saw is used. The angle suitable for cutting soft wood and for ripping purposes is always more acute than that used for cutting hard wood and for cross-cutting. For soft wood, the front angle varies from 65 dergees to 70 degrees; for hard wood

from 80 degrees to 85 degrees. In saws employed for cutting very hard knotty wood, and in those used for cutting metal, the teeth are arranged in a series of equilateral trian¬ gles, the pitch of each tooth being evenly di¬ vided between the front and the back. In saws used for a general line of work, the angle usu¬ ally adopted is 40 degrees, with the pitch evenly divided. In saws used for cutting soft woods and for ripping purposes, an effective placing of the angle is attained by making the face up¬ right, and sloping the back. (See Fig. 3, Diags. A, B. C, respectively). The pitch of a saw tooth is obtained by subtracting the back angle from the front angle. These terms and rules apply generally to all the different kinds

of saws from the smallest hand and machine saws used by jewelers, machinists and car¬ penters, to the largest power-driven saws em¬ ployed in the various classes of saw mills.

The various kinds of saws manufactured and used at the present time are of the following named general types :

The rip-saw, the hand-saw and the panel- saw. (See Fig. 4).

The carpenter's hand-saw for miscellaneous work is usually made from 20 to 30 inches in length, and is used for the common work of sawing material of moderate thickness both longitudinally and crosswise.. The rip-saw and the panel-saw are modifications of the hand¬ saw, from which they differ in the size of the teeth, and in the length of the blade. The rip¬

saws range from 28 to 36 inches in length, and the panel-saws from 12 to 24 inches. The usual spacing of the teeth of the three types is as fol¬ lows : Hand-saws, 5 to 12 points per inch ; rip-saws, three to five points at the heel or handle end, and six to eight points per inch at the point; and the panel-saws, 8 to 12 points to the inch. All three forms are made with a straight upper edge, or a "skewback® curve as shown in Fig. 5. A novel and useful form is represented by the "combination® saws. These are graduated along the upper edge, and some¬ times furnished with a level attachment as

Fig. 9.

shown in Diag. A, Fig. 7. Other useful modi¬ fications of the hand-saw are the gauge-saw, the ship-carpenter's saw, and the movable-back saw, shown by Diags. A, B, C, respectively, of Fig. 7. The gauge-saw is equipped with a movable at¬ tachment by means of which it may be adapted to tenoning, shouldering, curving, cog-cutting or to any other purpose where a definite depth of cut is required. The movable-back saw com¬ bines the advantages of a thin-bladed hand-saw and a first class back-saw. The ship-carpenter's

saw has a very long narrow blade and is espe¬ cially suitable for cutting sweeps or curves of long radius. It is handled like the rip-saw, and is extensively used by cabinet-makers, pattern¬ makers and others for work requiring a narrow saw.

The compass-saw and its modifications, the various form of keyhole-saw, which are also commonly known as pad-saws and socket-saws, are shown in Fig. 8, Diags. A and B, respec¬ tively. The blades of the compass-saws range from 10 to 20 inches in length, and taper from one-eighth inch at the point to two or more inches at the heel. They are used for cutting

curves and sweeps by hand and are sometimes called table-saws. The regular keyhole-saw and its modification, the pad-saw, are simply smaller forms of compass-saws, and are used for cutting curves of small radius, such as keyholes and other small holes in the central

portions of work. A saw of this type consists of a narrow blade which slides into a hollow handle or pad, to which it is secured in place by one or more set screws, only so much of the blade being drawn out as may be required by the character of the work. These saws are made both simply and in ˆnests.® A nest of

saws consists of a handle and three interchange¬ able blades, one each of the keyhole or pad, the compass and the table or pruning-saws. (See Fig. 9, Diag. A). A very useful novelty in this line is the nest of saws designed for cutting square holes. In this combination, the keyhole and compass blades are fitted with an attach-

Stra/ght Blade-Cross-cut teeth- HdorSftM V,

Y/WWWW\VWWWWWWWWWVA'/WV/WWWWV/WWWWW'WWWWWV'/"

Straight B/ade-ff/p teeth- for Soft Wood

*1_ — ˆ. . — >«»■«> **

Fig. 12.

ment at right angles to the plane of the blade as shown at (C) Diag. B, Fig. 9.

The back-saws are a class of hand-saws characterized by deep thin blades stiffened with a metallic back as shown in Fig. 10. The prin¬ cipal forms

are the mitre-box saw, the tenon- saw, the sash-saw and the dovetail-saw. The

last named has the thinnest blade, so thin that simple filing gives the teeth sufficient set. The blades of the others are somewhat thicker and require a slight amount of set. All back-saws are best used in a mitre box or in some other form of guide rest. In cutting, they should be held firmly with the least practicable expend¬ iture of force in controlling their direction, and the cut should be commenced by placing the heel of the blade on the farthest edge of the work and then drawing the saw steadily toward the body of the operator. Back-saw blades range from 8 to 18 inches in length,

the number of teeth varying in number from 10 to 14 per inch.

The pruning-saws are of several kinds, the principal forms of which are shown in Fig. 11. They vary from a large form of compass saw to straight saws toothed on both edges as shown in Diag. A, and also to those with curved blades as shown in Diag. B, a form extensively used on the Pacific Coast. They are also made of narrow blades attached to metal frames, the shape of which produce a tapered combination which permits of the use of the saw in very narrow spaces. See Fig. 11, Diag. C.

The construction of the tapered pruning-saw places it on the dividing line between what may be termed the regular bladed saw and the frame saw. In the former, the pressure on the cutting edge is resisted by the rigidity of the blade itself, while in the latter the pressure is re¬ sisted by the distribution of the tension of the blade through the various parts of the frame. Of the frame saws, the most familiar are the wood-saws shown in Fig. 12, the butchers' saws shown in Fig. 13 and the hack-saws shown in Fig. 14. The last named is shown in its ad¬ justable and extendable form, in which the frame may be lengthened or shortened to fit blades of varying length. The saw has a thin, narrow blade and equilateral triangular-shaped teeth. It is stretched between the upright por¬ tions of a wrought-iron or steel frame, the

requisite tension being imparted by means of a thumb-screw at the forward end. A handle is attached to the back end of the frame, which is usually grasped by the right hand of the oper¬ ator, and the downward pressure imparted to the tool during the act of cutting by laying the left hand upon the back or top of the frame. This saw is extensively used by fitters and me¬ chanics for cutting odds and ends of metal, and has now become one of the most important tools in a machinist's toolbox. For general work, the blades are made with 14 teeth to the inch, but those used for cutting tubing

and thin metal are

usually made with a greater number of teeth, about 25 per inch, in order to prevent a free bite and to reduce the danger of stripping the teeth. As in the case of the file, the fineness of the bite depends upon the number of the teeth in contact with the work; therefore, the judgment of the operator usually determines the amount of pressure that should be applied to the saw to suit the varying conditions of the cut. As in the case of other cutting tools, experience teaches that a hack-saw will work more effectively under a pressure sufficient to make the tool bite freely, than when it is al¬ lowed to scrape and glaze the surface under a light pressure. In order to use a hack-saw properly, the blade should be strained in the frame to prevent its kinking, and the cutting strokes should be made uniformly at a rate not exceeding 40 per minute. The blades should

be as short as possible, so as to reduce the cost and the danger of breakage, and oil should never be used on the teeth as it decreases their cutting efficiency. The reverse is true in the case of wood-working saws. Hack-saw blades as regularly manufactured range from 6 to 18 inches in length. Those longer than eight inches for hand-saws and 12 inches for power-driven saws are seldom required. The rail- saw is a modification of the hack-saw, the height of the frame being increased to adapt it for large work, such as the cutting off of rails, large beams, girders, etc., and is found to be a very valuable tool for contractors. The frames are fitted to carry blades ranging from 9 to 18 inches in length.

The cross-cut saws employed for cutting timber and other large work are made in an

almost innumerable variety of forms and sizes both as to the blades and to the teeth. The (

Other saw terms are defined as follows: Arbor, the shaft, spindle or mandrel of a cir¬ cular saw ; crown-saw, the end of a cylinder having saw teeth arranged to cut out a round hole, called also a cylinder- or drum-saw ; jump-saw, a circular saw made adjustable in up-and-down position ; razor-saw, a hardened steel toothless wheel made thin for cutting stone, etc. ; ring-saw, a band-saw set on guides to operate in a ring or circle; saw-back, the stiffening piece on the back of a band-saw; saw-bench, a bench fitted with guides, gauges, stops, clamps, fences, etc., for supporting and guiding work to be sawed; saw-gate, a frame in which gang-saws are set to

stiffen them and prevent buckling, a similar device is termed a saw-hanging; saw-jointer, a mechanism for holding in position the blades of gang-saws while they are filed and set; saw-jumper, a device for spreading or setting saw-teeth ; saw- table, the level surface on which the work is fed to a circular or band-saw that cuts through a gap in the table ; saw-wrest, levered device for straining a saw-blade in giving the teeth a spring-set. The saw industry of the United States is mainly confined to about 100 factories, having 4,500 employees. In 1914 these produced a gross value of $12,517,000, but more than half of this was the value of the steel and other materials used. The industry about doubled its production between 1899 and 1914. Illinois is

Fig. 16.

the leading State, followed by New York. See Wood-Working Machinery ; Lumber Indus¬ try in the United States.

SAWYER, sa'yer, Sir James, English phy¬ sician: b. Carlisle, Cumberland, 11 Aug. 1844. He was educated at Queen's College, Birming¬ ham, and at the London University. He is con¬ sulting physician to the Queen's Hospital at Birmingham, has held the chairs of pathology (1875-78), materia medica (1878-85), and medicine (1885—91) , at Queen's College, Bir¬ mingham, and is the author of several impor¬ tant medical works. Among them are float¬ ing Kidney5 (1883) ; (Ether in Medication by the Skin) (1890), and (Causes and Cure of Insomnia5 (1904); (Dietetics of Diabetics) (1904); (Longevity5 (1905);

SAWYER, Leicester Ambrose, American clergyman and Biblical scholar: b. Pinckney, N. Y., 28 July 1807 ; d. 1898. He was educated at Hamilton College, studied at Princeton Theo¬ logical Seminary, and in 1832 entered the Pres¬ byterian ministry. After filling pastorates in New York and Connecticut, he became presi¬ dent of Central College, Ohio. In 1854 he with¬ drew from the Presbyterian denomination and joined the Congregationalists. He made a com¬ plete translation of the Bible, that of the New Testament being published in 1858, the prophet¬ ical books of the Old Testament in 1860 and some of the remaining books in 1864. In some respects he was a pioneer in modern Biblical criticism, having for one thing abandoned the doctrine of verbal inspiration. His works in¬ clude (Elements of Biblical Interpretation (1836) ; (Mental Philosophy) (1839) ; (Organic Christianity, or the Church of God) (1854) ; (The Reconstruction of Biblical Theories, or Biblical Science Improved) (1862) ;

and final Theology5 (1879).

SAWYER, Sylvanus, American inventor : b. Templeton, Mass., 15 April 1822; d. Temple¬ ton, 25 Oct. 1895. His attention was early turned to invention, and in 1839 he engaged in business with his brother-in-law in Augusta, Me., and invented a steam-engine, a screw pro¬ peller and a car run by foot-power. His first big invention, however, was the machine for making chair-cane from rattan, first invented in 1843 and used in his factories after 1850. Sawyer then turned his attention to gun and rifle projectiles and made important inventions, his projectiles making the rifled cannon a prac¬ ticality. He also invented in 1853 an arrange¬ ment by which shells would explode on impact, by use of percussion caps. These inventions were put into use and did great service against the Confederacy in the ensuing war. Other in¬ ventions, after the war, perfected the cast-steel rifled guns, the first battery of which he fur¬ nished. His other inventions include calipers, and dividers, steam generator, sole sewing-machine, centring watchmaker's lathe.

SAWYER, Thomas Jefferson, American

Universalist clergyman : b. Reading, Vt., 9 Jan. 1804; d. 1899. He was graduated at Middlebury College in 1829, and held pastorates in New York (1830-45 and 1852-61). Between these periods he served as principal of the Liberal Institute at Clinton, N. Y., in which he also taught theology. He was one of the founders

of Tufts College, Medford, Mass., where he became professor of theology. As an advocate of Universalist doctrine and as a scholarly con¬ troversialist he acquired a wide reputation. His discussion with Isaac Westcott was published under the title of (The Doctrine of Eternal Sal¬ vation (1854). He also published (Who is Our God? the Son or the Father ?) (1859), in which he controverted in particular some of the opinions at that period held by Henry Ward Beecher.

SAXE, saks, John Godfrey, American poet : b. Highgate, Vt., 2 June 1816; d. Albany, N. Y., 31 March 1887. He was graduated at Middle¬ bury College and admitted to the bar in 1843. During 1850-56 he conducted the Sentinel at Burlington, Vt., and in 1856 became attorney- general of Vermont and deputy collector of customs. Removing to Albany, N. Y., he edited the Evening Journal. He was a conspicuous figure on the lecture platform and at scholastic anniversaries, where he often read his verse. His reputation as a humorous poet was consid¬ erable during the mid-century, his verses often appearing in Harper's Magazine and in the Knickerbocker. He published (Progress, a Satirical Poem) (1846) ; (Humorous and Satir¬ ical Poems5 (1850) ; (The Money King and Other Poems5 (1859) ; (The

Masquerade and Other Poems5 (1866) ; (Fables and Legends of Many Countries5 (1872), and (Leisure Day Rhymes5 (1875).

SAXE, Maurice, marshal of France: b. Dresden, 28 Oct. 1696; d. Chambord, near Blois, France, 30 Nov. 1750. He was a natural son of Augustus II of Poland. His military career was begun at the age of 12, and a few years later he was put in command of a cav¬ alry regiment which took part in the war with Sweden. After the Treaty of Utrecht he at¬ tached himself to the armv of France, and in 1720 was made camp marshal to the Duke of Orleans. He was offered the command of the Saxon army at the death of his father but chose to remain in the French service. For his defense of Alsace in 1743 he was created mar¬ shal of France. Carlyle has described his heroic conduct in the battle of Fontenoy, in his life of Frederick the Great. He was one of the most fearless but also one of the most dissolute men of his day. He wrote with a singular disregard of the rules of orthographv a book on the art of war, entitled, (Mes Reveries.5 Consult Weber, Karl von, (Moritz von Sachsen5 (1863) ; Due de Broglie, (Maurice de Saxe et le Marquis d'Argenson5 (1891-93).

SAXE-ALTENBURG, saks al'ten-berg.

See Altenburg.

SAXE-COBURG-GOTHA, ko'berg go-'ta, Germany, comprising the provinces of Gotha and Coburg, constitutes one of the central states of the republic, containing an area of 764 square miles. It lies on the south side of the forest of Thuringia. Its principal rivers are the Apfelstedt, Gera, Leina-Horsel, Nesse and Un¬ strut, in Gotha, and the Itz, Rodach, Lauter and Steinach, in Coburg. Both parts are moun¬ tainous with undulating and fertile tracts. The highest summits are the Great Beerberg (2,850 feet), the Schneekopf (2,829), and the Tnselberg (2,655). The government is a con¬ stitutional monarchy. The educational institu-

tions are gymnasiums at both Gotha and Coburg; Salzmann College at Schnepfenthal ; commercial school, Gotha ; teachers' seminaries and technical schools in both towns ; deaf and dumb institute, Coburg; and an observatory near Gotha. The Lutherans predominate. The chief occupations are agriculture and cattle¬ raising, especially in Coburg. The products are grain, peas, beans, hops, hemp, flax, pota¬ toes (principal article of food) and wine. The forests yield timber, pitch, charcoal and potash. The chief manufactures include machinery, fire¬ proof safes, nickel goods, rifles,

papier-mache, tobacco, pipes, watches, toys, needles and pot¬ tery; besides textile button and paper industries. There are also numerous breweries, distilleries, tanneries, bleaching establishments and saw¬ mills. The chief exports are grain, butter, fat, cattle, leather, wood, linen and other manufac¬ tured goods. Ruhla is celebrated for its meer¬ schaum pipes and cigar holders, which are ex¬ ported to all parts of the world. Inselberg, Schneekopf, Ruhla and Friedrichroda are pic¬ turesque towns and summer resorts; Neudieten- dorf or Gnadenthal is a Moravian settlement founded in 1742. The state returns one mem¬ ber to the Bundesrat and two to the Reichstag. The elder line of Saxe-Coburg was founded in 1680. The Duke of Albany, grandson of Victoria of England, succeeded to the duchy in 1900. Pop. 216,128, Protestants greatly pre¬ ponderating.

SAXE-MEININGEN, mi'ning-en, or SAXE – MEININGEN – HILDBURGHAU- SEN, hild'boorg-how-zen, Germany, a central state of the Republic, in Thuringia. It belongs to the basins of three great rivers, the Weser, Rhine and Elbe; is hilly, and covers 953 square miles. The ridges on the north belong to the Frankenwald, on the east to the Thiüringerwald and on the west to the Rhongebirge. The highest summits are the Kieserle and the Bless, respectively 2,851 and 2,834 feet high. The high land is interspersed by fertile valleys, watered by the Werra and various tributaries of the Main and the Saale. There are several small lakes and some mineral springs. The soil is not very productive; in the higher dis¬ tricts it is unfitted for cultivation, but well wooded. The best land is in the valleys of the Werra and Saale. The chief crops are rye, oats, barlev, potatoes and wheat. Hops, flax, tobacco and some wine are also grown in sheltered localities. The pastures are good, so that stock-raising is important. The chief minerals are roofing slate, salt and iron. There is a brisk manufacturing industry, especially in Sonneberg, Grafenthal and Saalfeld. The prin¬ cipal articles include various kinds of hard¬ ware, glass and pottery, school-slates, marbles, all kinds of ingenious wooden and pasteboard objects, especially toys; and there is also a small textile industry. The principal exports, outside of the articles just mentioned, are wood, salt, wool and cattle. The schools include gymnasia, a normal college, technical schools, etc. The capital is Meiningen. The govern¬ ment until the collapse of the Empire in 1918 was a hereditary and limited monarchy. The line of Saxe-Meiningen was founded by Duke Bernhard, son of Ernst I of Saxony, friend and companion of Gustav Adolf of Sweden. Two-thirds of its present territory

was added in 1826. In 1866 it sided with Austria. A compromise in 1871 terminated the long dispute, dating from 1826, concerning the respective rights of the duke and the Diet to the state lands. The state under the Empire sent two members to the Bundesrat and three to the Reichstag. Saxe-Meiningen entered the North German Confederation with the other

states. In 1918 it became a component state of the Ger¬ man Republic and in 1919 adopted a Republican Constitution. Pop. 278,762, mainly Lutherans.

SAXE-WEIMAR, vi'mar, or SACHSEN- WEIMAR-EISENACH, i'ze-naH, Germany, a central state of the new Republic, the largest of the Thuringian states, consisting of three large and 24 smaller divisions, the former com¬ prising Weimar, Neustadt and Eisenach. The entire area comprises 1,388 square miles. The state is of circular form, with undulating sur¬ face and fertile soil. The Ilm, Saale and Un¬ strut are the principal rivers. The chief towns: Weimar, the capital, on the Ilm; Jena (with the general University of Thuringia), on the Saale; and Apoldo, in the west. Eisenach, the second division in size, yields the poorest crops, but contains fine forests and picturesque scenery. Its chief streams are the Werra, Horsa and Ulster. Its highest summits are The Hohe Vogelheid, Glockner, Ringberg and Ottowald; the Hohe Rain, Elnbogen, Bayerberg and the Glaserberg. Eisenach is the only considerable town. Neustadt has no especially interesting features ; its principal rivers are the White Elster, Weida and Orla. Neustadt, Auma and Weida are the chief towns. The chief occupa¬ tion is agriculture in all parts of the state, and stock-raising is carried on to some extent. The manufacturing industries are important and in¬ clude textiles, especially woolens, pottery, scientific instruments, pipes, tobacco, leather, cork, paper and glass. The chief imports, be¬ sides colonial goods, are raw wool, hides, coal, meerschaum (from Smyrna and Vienna), amber, horn, etc. The chief exports are timber, wool, gin and dried fruit. The chief centres of trade are Eisenach and Weimar. There are numerous breweries. The minerals are silver, copper, iron, manganese ; besides salt and pot¬ ters' clay. The government until 1918 was a limited hereditary monarchy and was constitu¬ tional. By becoming a component state of the German Republic, a Republican form of gov¬ ernment was obligatory. A constitution was adopted in 1919. Most of the inhabitants are Lutherans, distinguished for their industry and intelligence.

The reigning family of Saxe-Weimar under the Empire was the oldest branch of the Ernes¬ tine line, thus of the Saxon house. Weimar in early times was the seat of a line of counts; it finally fell into possession of Fred¬ erick the Mild of Saxony, and did not acquire historical independence until 1640. Later it was split into several factions, but became reunited under Ernest Augustus. The reign of Charles Augustus, his grandson, marks the most bril¬ liant epoch in the history of Saxe-Weimar. Goethe,- Schiller and Herder were members of the illustrious literary society which Charles Augustus gathered about him, and the Univer¬ sity of Jena became a focus of light and learn¬ ing. This prince granted the duchy a constitu¬ tion, and freedom of the press. In 1866 the

grand duchy joined Prussia against Austria, and later entered into the North German Con¬ federation. See Germany: War, European. Pop. 417,166.

SAXHORN. See Horn.

SAXIFRAGE, a plant of the typical genus of the family Saxifragacece, the name arising from an old Roman notion that the plants, which they often saw growing in cracks in rocks, had split the rocks themselves, and apply¬ ing the doctrine of signature (q.v.), they con¬ cluded that the saxifrage would also break up stones in the bladder. The many species of saxifrage are found chiefly in the north tem¬ perate and arctic zones, increasing in number northwards; they are also characteristic of sub- alpine and alpine floras. This northern and mountain habit has made them valuable for rock-gardening, especially as the Alpine species have comparatively large flowers. The species are easily propagated by stolons and offshoots. Saxifrages are closely allied to the Rosacea, and have numerous regular flowers, mostly in corymbs or panicles, and white, yellow, or pink in eolor. The individual flowers are generally small, five-parted, with a two-celled ovary, be¬ coming a small two-beaked pod with many seeds.

The London Pride (Saxifraga umbrosa) is much cultivated in European gardens, and sends up from a rosette of thick glabrous leaves small pink flowers panicled on a stem nearly a foot high. The purple saxifrage (S. oppositifolia) is one of most widely distributed species of Alpine and Arctic floras, and one of the first to bloom. It extends as far southward in the United States as Vermont, and carpets the rocks with its evergreen mats of thick foliage, nearly covered with solitary lilac blossoms. The most familiar saxifrages in eastern America are 5”. virginiensis and V. pennsylvanica. The for¬ mer is one of the first spring plants to bloom. It grows in rock-crevices and begins to open its small white flowers, while they are still close to the rosette of spatulate leaves. As the spring advances, the naked, pubescent flower scape elongates until, in fruit, it is perhaps a foot high and branched in a loose panicle. The swamp saxifrage (S. pennsylvanica) is a little later in blooming, larger and frequents swamps and wet banks ; it has greenish flowers in pani¬ cles, and oval to oblanceolate leaves.

SAXO-GRAMMATICUS, sak’so gra-mat- l-kus (that is, Saxo the Grammarian, or the Learned), early Danish historian: b. about 1140; d. Roeskilde, about 1206. He was a native of Denmark, of which kingdom and its dependencies he compiled history down to 1186 under the auspices

of Absalom, bishop of Roes¬ kilde, whose secretary or chancellor he appears to have been. This work, (Historia Danica, is written in good correct Latin, which Erasmus has praised, and occupied 20 years in its com¬ position. Saxo chose as his models the later Roman historians, especially Valerius Maximus, yet in some of his expressions and in his mode of representation he is quite mediaeval, though he stands at the head of his class. The work is divided into 16 books, the earlier of which give a highly colored and imaginative account of ancient Danish history as learned from tales and traditions and is full of living pictures of*

old heroic wars and adventures ; the first nine books can scarcely be looked upon as reliable history, but when the writer approaches his own time his history is of the greatest value.

*SAXON, the name of a Teutonic race, which took part with the Angles in founding Anglo-Saxon dominion in Britain, and which until a recent period was an important power in Germany. The Saxons (German Sachsen) were a warlike people, somewhat given to piracy, and during the existence of the West¬ ern Empire a thorn in the side of Rome. Charlemagne subdued them and caused them to become Christians. After the extensive Saxon emigration to Britain in the 5th century, those who remained in Germany were known as (<01d Saxons.** The dukedom of Saxony was for a time the most powerful of the German states and Duke Henry in 919 was elected German king, his son, grandson and great- grandson succeeding him in that dignity. The duchy afterward passed (1127) to the Bavarian branch of the Guelf family, of which Henry the Lion (q.v.), celebrated for his contest with the emperor, was a member (1146-95). After several changes, which it is unnecessary to enu¬ merate here, Frederick the Warrior, Margrave of Meissen and Landgrave of Thuringia, be¬ came (1424) Duke, and Elector of Saxony. The union of these three countries rendered the Saxon elector one of the most powerful princes in Germany. After the death of Frederick the Good, son of Frederick the Warrior, Ernest and Albert, sons of the former, divided the family possessions between them (1485) and founded the Ernestine and Albertine Saxon lines, which still exist. The latter received Meissen or Misnia, and now constitutes the royal Saxon house. The former retained the electoral dignity and Thuringia. Ernest was succeeded in the electorate by his sons, Fred¬ erick the Wise (1486-1525), and John (1 525— 32). The former is celebrated as the protector of Luther, the promoter of the Reformation and the founder of the University of Witten¬ berg. By the Wittenberg capitulation (19 May 1547) the electoral dignity was transferred to the Albertine line in the person of Maurice. The Ernestine house is how divided into the two branches of Weimar and Gotha, the latter of which consists of the three lines of Mein-ingen, Altenburg and Coburg.*

The duchy became a kingdom under Fred¬ erick Augustus I, who paid by the loss of a large part of his dominions the penalty for taking the side of Napoleon in the struggle between France, on the one side, and Russia Austria, Prussia, England and Sweden on the other. Saxony made another expensive blun¬ der when it allied itself with Austria against Prussia in 1866, when the kingdom was spared on condition of paying 10,000,000 thalers to Prussia and entering the North German Con¬ federation. In the war of 1870 against France the Saxons were on the side of Prussia and the feeling between the two courts has since been cordial. The Saxon people have ceased to be distinct from other Germans and national patri¬ otism has taken the place of sectional jealousy. The Saxons possess the virtues without the faults of their distant ancestors and are noted for industry, frugality and thrift, while the average of comfort among the industrial and

agricultural classes is as high as in any part of Europe. See Germany ; Saxony.

SAXON ARCHITECTURE, the stage of early English architecture which preceded the Norman. The relics left us of this style ex¬ hibit its general characteristics as having been rude solidity and strength. The walls are of rough masonry, very thick, without buttresses and sometimes of herring-bone work; the tow¬ ers and pillars thick in proportion to height, the former being sometimes not more than three diameters high ; the quoins or angle ma¬ sonry are of hewn stones set alternately on end and horizontally ((

SAXONY, sak'sn-i (German, Sachsen, zak'sen), a state of central Germany, fifth in area and third in population of the states of the German Republic. It is surrounded by Prus¬ sia, on the north ; Bohemia, south ; Bavaria, southwest; Reuss, Saxe-Weimar and Saxe-Al- tenburg, west. It covers an area of 5,787 square miles, has the form of a right-angled tri¬ angle and lies mainly within the basin of the Elbe. It belongs to the central mountain re¬ gion, only the districts near Leipzig and along the northern border sloping into the great north European plain. This tract is covered by pe¬ culiar and interesting sandstone formations. The chief mountain ranges are the Erzgebirge and Elstergebirge, along the southern border. The mountains of Upper Lusatia (2,600 feet) rise in the southeast, connecting with the Rie- sengebirge. That portion extending from Bo¬ hemia to Pirna on either side of the Elbe is wildly picturesque, hence the name ((Saxon Switzerland.® The highest summits in these mountains are no more than 2,000 to 2,500 feet high. The Fichtelberg in Oberwiesenthal (3,700 feet)

towers above them all. The low¬ est point in the country is found where the Elbe enters Prussian territory, between Strehla and Miihlberg. The loftiest summits consist generally of sandstone and gneiss and are rich in mineral deposits ; . as the mountain ranges divide and merge into lower extensions, fertile valleys and plains are formed, suitable to agri¬ culture. Most of Saxony belongs to the basin of the Elbe. At the east this river receive? only minor affluents, but on the west has sev eral important tributaries, the chief of which are the Mulde and Elster, themselves formed by the junction of smaller streams. The lakes are numerous, particularly in the north, but in¬ significant. Mineral springs are numerous; the chief are Bad Elster, Augustusbad, Neustadt, Warmbad (near Wolkenstein) , Schweizer- muhle, Wiesenbad, Hohenstein, Marienborn, Tharandt, Grünthal (sulphur and iron), etc.

The climate in the higher districts, called Voigt- land, is cold, otherwise analogous to other countries of Europe in similar latitude. Some marshy tracts on the Elbe and Pleisse alone are unhealthy. The Erzgebirge is that in which most rain falls. Leipzig enjoys the driest climate. Saxony is one of the most fertile parts of Ger¬ many, yet poor as compared to fertile soils elsewhere. Agriculture was long fettered by ancient customs, a condition no longer existing, and every inch of land now is developed to its utmost capacity. Sheep-farming has de¬ clined; cattle-raising is important. The forests are extensive; the mines, the oldest in Germany, are, with manufacturing, the chief sources of wealth. The principal crops are rye, and oats, potatoes (Voigtland), beets (for feed) and flax (Erzgebirge and Lusatian mountains). Enormous quantities of cherries, plums and apples are produced in the vicinity of Dresden, Leipzig and Coldetz. Vineyards, chiefly in¬ teresting for their antiquity, are found on the banks of the Elbe near Meissen and Dresden. The chief mining districts are Freiberg, silver and lead; Altenberg, tin; Schneeberg, cobalt, nickel and ironstone; and Johanngeorgenstadt, ironstone and silver mines. Coal occurs near Dresden and Zwickau. Peat is abundant in the Erzgebirge, sandstone on the hills of the Elbe ; fine porcelain clay occurs near Meissen. Precious stones are found among the southern mountains, such as jasper, amethysts, fine topazes, etc. The textile industry is very im¬ portant. The chief manufacturing centres are Zwickau, Chemnitz, Glauchau, Meerane, Hohen¬ stein, Camenz, Pulsnitz and Bishofswerda and the principal articles are cotton, woolen, linen, damask and lace goods ; other industries are straw-plaiting, wax-cloth, artificial flowers, stone and earthenware and porcelain (((Dres- den china,® celebrated) ; pianos, leather, cigars, paper and all kinds of machinery, especially at Chemnitz and Dresden ; printing presses, breweries and distilleries ; the smelting and re¬ fining foundries, chiefly at Freiberg. Leipzig is the centre of trade, especially for furs and books. The principal exports are the produce of the factories and mines.

Commerce has de¬ veloped rapidly. Education in Saxony is highly cultivated, and its foundations of schools and universities of ancient date. The university and conservatory of music at Leipzig; the en¬ dowed schools at Meissen and Grimma; the mining academy at Freiberg and school of forestry at Tharandt, are best known. The art collections of Dresden, the capital of the state, are celebrated. The government until 1918 was a constitutional monarchy. The reigning family was Roman Catholic, but 94 per cent of the population is Lutheran. Saxony under the monarchy returned four members to the Bun- desrat and 23 to the Reichstag. Under the new constitution of the German Republic, adopted in 1919, Saxony with the other states was obliged to adopt a Republican constitution, with a universal, equal, direct, and secret franchise on the proportional system. Freedom of con¬ science, the press, and of assembly are guaran¬ teed.

The duchy was founded in 880, and in 1423 passed into possession of Frederick, Elector of Saxony. The Ernestine line was succeeded by the Albertine line, now occupying the throne.

Frederick Augustus embraced the Catholic re¬ ligion (1697) to obtain the crown of Poland. The succeeding monarchs fought against France for Poland and in the Seven Years' war joined their forces to those of Austria against France. After the battle, of Jena, how¬ ever, Frederick Augustus III, the Elector, and his army fought with Napoleon, who conferred on him the title of king. In 1807 and 1809, Saxony acquired large additions of territory and in 1813 was the scene of Napoleon's strug¬ gles with his allies. The battles of Liitzen, Bautzen, Dresden and Leipzig were followed by a congress at Vienna, when much of Saxon territory was ceded to Prussia (1814). A period of progress followed, interrupted by the revolution of 1848-49. In the Austro-Prussian War (1866) Saxony sided with Austria and Prussia would have incorporated the kingdom, had not Austria, supported by France, inter¬ fered and she was admitted into the North German Confederation. In the Franco-Prus- sian War, Saxony fought with the other Ger¬ man states against France. Albert (crown prince at that time) commanded ' the German forces on the Meuse. See War, European; Germany. Pop. 4,806,661.

SAXONY, Orders and Decorations of.

See Orders, Royal.

SAXOPHONE, the name of a group of musical instruments invented by M.

Sax. They consist of a conical brass tube, sounded by a mouthpiece furnished with a single reed simi¬ lar to that of the clarinet. They have 20 holes covered by keys and studs for the first three fingers of each hand and are all fingered alike.

SAXTON, Joseph, American inventor: b. Huntingdon, Huntingdon County, Pa., 22 March 1799; d. Washington, D. C., 26 Oct. 1873. Having made his way to Philadelphia he was there employed in watchmaking and later in engraving, and devised, as his first invention, an ingenious machine for cutting the teeth of chronometer wheels. In 1830-37, after having constructed an astronomical clock with a compensating pendulum and original escape¬ ment, and having been admitted to the Frank¬ lin Institute, he was in England, where in June 1833 he exhibited before the British Associa¬ tion a magneto-electric machine.- Here he won a considerable reputation as a maker of in¬ struments of /precision1, constructing among various apparatus that by which Wheatstone measured the velocity of electricty in its pas¬ sage through a long wire. Upon his return to the United States he was made constructor and curator of the standard weighing apparatus in the mint at Philadelphia, and in 1843 began the construction of the standard balances, weights and measures to be presented to each State for securing uniformity. In 1851 he was awarded a gold medal for a large balance of great precision exhibited at the London World's Exhibition of that year. He was also some¬ what of a student of archaeology, geology and mineralogy, and became a charter member of the National Academy of Sciences (1863). Consult the sketch by Henry in Vol. I of the biographical Memoirs> of the National Academy.

SAXTON, Rufus, American soldier: b. Deerfield, Mass., 19 Oct. 1824; d. Washington,

D. C., 23 Feb. 1908. He was graduated from West Point in 1849 and in 1855 became lieutenant. He led a surveying party across the Rocky Moun¬ tains 1853-54, was on the coast survey 1855-59 and instructor in military tactics at West Point 1859-60. He was chief quartermaster on the staff of General Lyon in the Missouri cam¬ paign, participated in the West Virginia cam¬ paign under General McClellan in 1861 in the same position and filled a like post with Gen¬ eral Sherman in his Port Royal expedition of 1861-62. He was commissioned brigadier-gen¬ eral of volunteers in 1862, and defended Har¬ per's Ferry against General Jackson in 1862, receiving a medal from Congress in recogni¬ tion of his services. In 1862-65 he was military governor of the Department of the South, was brevetted major-general of volunteers in 1865 and mustered out of the volunteer service in 1866. After the war he served as chief quartermaster in the various departments until 1888 when he was retired with rank as colonel and

assistant quartermaster-general.

SAY, Jean Baptiste, zhon bap-test sa, French economist: b. Lyons, 5 Jan. 1767; d. Paris, 16 Nov. 1832. His early life was spent in England where he began a commercial career. The French Revolution called him to Paris, and his acquaintance with and interest in the social philosoptry and political economy of his time to the staff of the famous Courrier de Provence, the journal of Mirabeau. He was afterward secretary to Claviere, Minister of Finance. At the close of the Revolution he conducted La De cade, a journal in which he presented with great clearness and ability the economic principles of Adam Smith, and such subjects as the public credit, the currency and taxation. He wrote (Catechisme d'economie politique) (1815-18) ; (Lettres a Malthus) (1820) ;

SAY, Thomas, American naturalist : b. Philadelphia, Pa., 27 July 1787; d. New Har¬ mony, Ind., 10 Oct. 1834. He was one of the earliest entomologists and is said to have dis¬ covered more species of the genus Insectivora than any naturalist before him. His contribu¬ tions to natural science were contained in his reports upon his expedition to the coast of Georgia and Florida in 1818, and that as chief geologist to the United States Survey of the Rocky Mountain region under Major Long in 1819-20, and have been collected by later natu¬ ralists. He was one of the founders of the Academy of Natural Sciences in Philadelphia in 1812. In 1825 he joined Robert Owen in his communistic colony at New Harmony. Con¬ sult (American ConchologyP edited by W. G. Binney (1858) ; (American Entomology, > with memoir, edited by Le Conte (1859).

SAY AND SELE, sel, William Fiennes,

Viscount, English politician and colonizer in America: b. 28 May 1582; d. 14 April 1662. From his first appearance in Parliament he was generally of the opposition, which found in him a tactician and debater of considerable skill. During the constantly increasing restive¬ ness under the government of Charles I, he was a prominent malcontent ; at the opening of the Long Parliament held high place in the

Lords by reason of his identification with the popular party in the lower house; recruited a regiment for Parliament; but from 1647 advo¬ cated compromise, and at the king's death re¬ tired. On the restoration he was made lord privy seal. With Lord Brook and 10 other associates he obtained from Lord Warwick and the New England Company a patent for a large

tract on the Connecticut (19 March 1632). A shipload of colonists was sent over and Say- brook (q.v.) was founded under the immediate direction of Lion Gardiner (q.v.). Say and Brook also purchased a plantation at Cocheco (or Dover), in the present New Hampshire. Say later abandoned these enterprises, the Cocheco estate being made over to Massachu¬ setts and Saybrook being sold to Connecticut. Consult Palfrey, (History of New England'

(1858).

SAYBROOK, Conn., town in Middlesex County, at the mouth of the Connecticut River, on the New York, New Haven and Hartford Railroad, 29 miles east of New Haven. It was first settled at Saybrook Point by the English in 1635. The town was incorporated in 1667 ; since then several townships have been sepa¬ rated from the original town: these are Ches¬ ter (incorporated 1836), Old Saybrook (1852), Centerbrook (added to Essex, 1859). The industries include a box factory and the manu¬ facture of ivory goods, of augers, gimlets and other small metal articles. The town- hall corn- tains all the official records of the original town of Saybrook. There is a public high school, established in 1892. The Collegiate School of Connecticut (now Yale University) was located at Saybrook from 1701-16. Pop. 1,907.

SAYBROOK PLATFORM, a declaration of principles adopted in 1708 by the Congre¬ gational Church synod at Saybrook ; substan¬ tially the same as the Cambridge platform (q.v.).

SAYCE, sas, Archibald Henry, English Assyriologist : b. Shirehampton, near Bristol, 25 Sept. 1846. He received his education at Queen's College, Oxford, where he was gradu¬ ated in 1868. He was elected a Fellow in the following year and became a tutor in 1870. In 1876 he was appointed deputy professor of comparative philology at Oxford, and since 1891 has occupied the chair of Assyriology in the same university. He was a member of the Old Testament Revision Company. He is an hon¬ orary member of the Asiatic Society of Bengal, the Royal Academy of Spain and the Anthro¬ pological Society of Washington. His larger and more important works are (An Assyrian Grammar for Comparative Purposes' (1872) ; (The Principles of Comparative Philology' (1874) ; (The Astronomy and Astrology of the Babylonians' (1874) ; ˆLectures on Babylonian Literature' (1877) ; Untroduction to the Sci¬ ence of Language' (1880) ; (The Vannic In¬ scription Deciphered and Translated' (1882); (The Ancient Empires of the East' (1884) ; (The Origin and Growth of Religion as illus¬ trated by the Religion of the Ancient Baby¬ lonians' (1887) ; (Life and Times of Isaiah' (1889) ; (The Higher Criticism and the Verdict of the Monuments' (1894) ; (Early History of the Hebrews' (1897) : (Babylonians and

Assy¬ rians' (1900) ; and (Assuan Papyri' (1906). The following popular works: (The Monu¬

ments of the Hittites' (1881); (Assyria: its Princes, Priests and People' (1882) ; (The Hit¬ tites' (1889) ; (The Races of the Old Testa¬ ment' (1891) ; (Social Life among the Assy¬ rians and Babylonians' (1839) ; cThe Egypt of the Hebrews and Herodotos' (1895); (Mur¬ ray's Handbook of Egypt' (1896) ; and (Israel and the Surrounding Nations' (1898).

SAYLES, salz, John, American jurist: b. Vernon, N. Y., 9 March 1825; d. Abilene, Tex., 22 May 1897. He was graduated from Hamil¬ ton College, Clinton, N. Y., but studied law in Texas, where he was admitted to the Supreme Court of his adopted State, and from 1853 to 1855 served in the Texas legislature. His first contributions to the literature of jurisprudence were published soon after the close of the Civil War, in which he served as brigadier-general in the Confederate army. In 1880 he became a professor of law in Baylor University, Texas. His writings include (A Treatise on the Prac¬ tice in the District and Supreme Courts of Texas' (1858) ; (Treatise on the Civil Jurisdic¬ tion of Justices of the Peace in the State of Texas' (1867) ; and (Revised Civil Statutes and Laws Passed by the Legislature of Texas'

(1888).

SAYRE, Lewis Albert, American surgeon : b. Battle Hill (now Madison), N. J., 29 Feb. 1820; d. New York, 21 Sept. 1900. He was graduated from Transylvania University in 1839, and three years later from the College of Physi¬ cians and Surgeons in New York. He was made professor of orthopedic surgery in the medical college of Bellevue Hospital in 1861, and pro¬ fessor emeritus at its consolidation with the New York University in 1898. In 1854 he successfully performed the first operation in the United States for the removal of the head of the femur in hip-joint disease, and became known as the greatest American orthopedist. His original methods and his invention of in¬ struments used in the treatment of deformed children made his name familiar to the entire medical world. He was the author of Prac¬ tical Manual of the Treatment of Club Foot' (1869) ; ˆOrthopedic Surgery and Diseases of the Joints' (1876), etc.

SAYRE, Stephen, American banker and patriot: b. Long Island, 1734; d. Virginia, 27 Sept. 1818. He was graduated from the Col¬ lege of New Jersey (Princeton) in 1757, be¬ came a merchant and banker in London, at¬ tained there considerable influence in political circles, but was committed to the Tower on an unwarranted charge of treason. The affair soon ended in his release; but his banking busi¬ ness failed as a result and

he was compelled to withdraw from England. Subsequently he was private secretary to Franklin, went with Arthur Lee's embassy to Berlin and at Copen¬ hagen, Stockholm and Saint Petersburg was successful in obtaining supplies for the further¬ ance of the cause of independence. He was an opponent of Washington's administration in

1795.

SAYRE, Theodore Burt, American novel¬ ist and playwright: b. New York, 18 Dec. 1874. He was graduated from the New York College of Pharmacy in 1892, but almost immediately began to write for the stage. In 1896 his

in New York, and in the following year his (Charles O'Malley > at the Lafayette in Wash¬ ington. These were followed, among others, by (A Classical Cowboy > (1900) ; (Edmund Burke) (1905) ; (Eileen Asthore) (1906) ; (0'Neill of Derry (1907); (The Wearing of the Green) (1910) ; (Love's Young Dream* (1912) ; (The Irish Dragoon* (1915), etc. He also produced the novels (Two Summer Girls and I* (1898) ; (The Son of Carleycroft* (1900) ; (Tom Moore* (1902).*

SAYRE, Pa., borough in Bradford County, on the north branch of the Susquehanna River, and on the Lehigh Valley Railroad, about 15 miles north of Tonawanda, the capital of the county, and 18 miles southeast of Elmira, N. Y. Sayre is in an agricultural region and near the coal fields of the State. The industries are connected chiefly with farm and dairy products. The chief industrial establishments are machine shops, stove fixture works, metal works, lumber and coal yards. There is considerable trade in the shipment of farm and dairy products and poultry. The borough has a high school, ele¬ mentary schools, a public library and (1918) two national banks with combined capital of $100,000 and resources of $1,623,272. Pop.

(1920) 8,078.

SAYULA, sa-yoo'la, Mexico, a town in the state of Jalisco, situated 55 miles south of Guadalajara. Agave and sugar are cultivated in the surrounding country, and the town has a thriving commerce. Pop. about 8,000.

SAZONOFF, sa'zo'nov, . Sergi Dimitrie- vich, Russian statesman: b. 1861. Entering the diplomatic service, he was second secretary at the Russian embassy in London from 1890 to 1894 and councillor of Embassy

1904-06. His skilful handling of the difficulties arising from the Dogger Bank incident in 1904 marked him for promotion. From London he went to Rome in 1894 as secretary to the newly-created mis¬ sion to the Holy See, and in 1906 he returned to Rome as Minister to the Vatican. In 1909 he was recalled to Russia to assist M. Isvolsky, then Foreign Minister, whom he succeeded in 1910. A year later he exchanged views in Paris with the French government, and in 1912 visited the king of England. In the diplomatic, crisis preceding the European War, M. Sazonoff appeared to be the only allied statesman who saw the one method of averting the impending conflict. In the words of Mr. G. Bernard Shaw, «One man among them keeps his head and looks the facts in the face. That man is Sazonoff, the Russian Secretary for Foreign Affairs"

(Current History, Vol. I, p. 19). In a tele¬ gram from Saint Petersburg dated 25 July 1914 the British Ambassador, Sir George Buchanan, intormed Sir Edward Grey of an interview with Sazonoff, in the course of which the latter said that ((he did not believe Germany really wanted war, but her attitude was decided by ours" [the British attitude]. ((If we [Great Britain] took our stand firmly with France and Russia there would be no war. If we failed them now, rivers of blood would flow, and we would in the end be dragged into war. . . . His Excellency said that unfortunately Ger¬ many was convinced that she could count upon our neutrality" (British Blue Book, dispatch No. 17). M. Sazonoff resigned his office in July 1916, and in January 1917 was appointed

Ambassador to Great Britain, but retired shortly afterward.

SBARETTI, sba-ret'te, Donatus, Italian Roman Catholic prelate : b. Montefranco, Italy, 12 Nov. 1856. He was educated at the Col¬ lege of Saint Apollinaris, Rome, and was ordained in 1879. For eight years after his ordination he occupied the chair of speculative and moral philosophy in the College of the Propaganda, Rome, and subsequently served as subsecretary of the Propaganda in affairs con¬ cerning the United States. He was made pri¬ vate chamberlain to Leo XIII, with title of monsignore, and in 1893-1900 was the first to occupy the office of auditor of the Apostolic legation at Washington. He was consecrated bishop of Havana in 1900, appointed extraordi¬ nary Apostolic Delegate to the Philippines in 1901, titular archbishop of Ephesus later in that year, and since 1902 has been Delegate Apostolic to Canada.

SCAB, or SCABIES, a skin disease in sheep, analogous to the itch in the human sub¬ ject and to mange in horses and dogs. It is caused by a parasitic mite, Sarcoptes scabiei. See Itch.

SCABBARD-FISH, the name of certain pelagic fishes, allied to the

mackerels, and so called because of their compressed and elon¬ gated shape. One is Lepidopus cccudatus , rare in American waters, but known in the eastern Atlantic, Indian and south Pacific oceans. It is the <(frost-fish" of New Zealand, where it comes ashore in the surf on moonlit winter nights, and is caught on the beach by men watching for it. It is a favorite food-fish and reaches a length of five or six feet, but weighs only about six pounds. Another is the cutlass- fish, silver-fish or hair-tail (Trichiurus lepturus), wnich attains a length of three feet or more, and whose tail ends in a filiform point without a caudal fin. It is found on the American coast from New England to South America, and is silvery, with a golden lateral line and grayish- yellow dorsal; the lower jaw is the longer, with two teeth projecting beyond the upper when the mouth is closed, and the whole armature of the jaws indicates carnivorous habits. It is rarely seen except when found benumbed with cold floating on the surface.

SCAD, a name given to several species of fishes of the family Carangidce ; in the United States to Decapterus punctatus , a fish about a foot long found along most of our Atlantic coast and abundant southward, where it is a foodfish of some importance. In England the name belongs to the fish also called horse- mackerel (Trachurus trachurus) which appears in large shoals and is dusky olive on the back, the sides variegated by bands of bluish. It is also known as saurel, cigar fish, round robin, etc. A related species (Trachurops crmnenop- tlmhnus) , common in the West Indies, and known on most tropical coasts, is called big- eyed scad.

SCZEVOLA, sev'6-la, Caius Mucius, Ro¬ man hero and founder of the plebeian family of Mucii : lived about 600 years b.c. Livy tells how Caius Mucius, a young patrician, sought to kill Porsenna of Clusium, the protector of the expelled Tarquins, who was besieging Rome and had reduced the city to great dis-

tress. Mucius went to the tent of Porsenna to kill him, but mistaking his secretary for the chief plunged his sword into him. Porsenna, in rage, had Mucius brought before him, whereupon the young Roman expressed regret at not having killed Porsenna himself, and told him that other attempts would be made and would be successful. Upon Porsenna threaten¬ ing to have Mucius burned alive if he did not betray the conspirators, Mucius thrust his right hand into a flame and held it there. Porsenna, in admiration for this fearlessness, ordered the young Roman freed, and the latter in return for his courtesy told Porsenna that 300 Roman youths had sworn to assassinate him or die in the attempt. This so alarmed Porsenna

that he raised the siege and withdrew from Rome. Scaevola, meaning <(the left-handed,® was the name bestowed upon Mucius in honor of his deed. Quintus Mucius, called (

SCATELL, ska-teP, or SCAW FELL,

England, a mountain in the county of Cumber¬ land, bordering on Westmoreland, 13 miles southwest of Keswick. It rises from the centre of the lake region, its two peaks reach¬ ing an elevation respectively, of 3,229 and 3,092 feet, making the mountain one of the conspic¬ uous features of the scenery. It consists of granite with a superformation of slate, except¬ ing the summit which is composed of trap porphyry.

SCAGLIOLA, skal-yo'la, an Italian term for an imitation marble used in columns, walls and floors for surface decoration. It was in¬ vented by Guido del Conte in Modena in the early part of the 17th century. It is composed of plaster and glue mixed with splinters (scag- liole) of spar, marble, granite, concrete, gyp¬ sum, veins of clay, etc., artificially colored and smoothed down and polished to a semblance of the quality of polished marble.

SCAIFE, Walter Bell, American author : b. Pittsburgh, Pa., 10 Sept. 1858. He was grad¬ uated at the University of Michigan in 1880 and subsequently studied at Johns Hopkins and at the University of Vienna. Since 1889 he has lectured at Baltimore, Pittsburgh, Washing¬ ton and Boston on history and other subjects. He published (American Geographical History, 1492-1892, 5 Florentine Life During the Renaissance,5 (A Dissertation on Law and History, 5 (A History of Geographical Lati- tude) (1889) ;

(1917).

SCALA, La, la ska'la, Milan, Italy, a his¬ toric theatre and opera-house opened in 1778, with accommodation for 3,600 auditors.

SCALD-HEAD, an affection of the scalp, as ringworm of the head, etc., the term being

vulgarly applied to various disorders similar in nature. See Ringworm.

SCALE, from Lat. scala, ladder or stair¬ case, in music, the tone ladder marking the regular succession of intervals in any given key, from the keynote to the octave, and indicating the relative pitch of tones. See Musical Ele¬ ments and Terms; Mode.

SCALE INSECTS, certain species of the

family Coccidce (see Coccus). Some species of this family popularly called mealy bugs more often than scales, are readily distin¬ guished by being free-moving, whereas the scales proper are stationary except for a few hours after birth or hatching. The males of the family are remarkable in having a complete metamorphosis (other Hemiptera have incom¬ plete, and so do the females of this family), one pair of wings, a pair of hooks replacing the rear wings, and an extra pair of eyes in the adult, instead of mouthparts. The female has six legs when newly hatched, but after molting the legs are wanting and the insects are grub-like, stationary, wingless, and are con¬ cealed beneath a powdery, cottony or waxy secretion and the cast-off skins. On account of their appearance some of the species are called gall insects, a name more correctly applied to species of the family Cy nip idee and Gallicolce, which produce nut-galls or galls.

The family embraces several species which have been useful to man for many centuries and also some that are troublesome upon cul¬ tivated plants. The scarlet grains of Poland are scale insects (Coccus polonicus) found on the roots of knawel and were formerly an im¬ portant article of commerce, being used in dyeing various fabrics. Another species found on the roots of burnet has long been used by the Moors for dyeing wool and silk various tints of pink. Kermes or scarlet grain is the dried body of Lecanium ilicis which lives on the young shoots of the kermes oak (Quercus coccifera) , a low evergreen shrub common from Spain eastward to India. In parts of this region this insect furnished a source of revenue to the people. The females grow about as large as peas and before the eggs are hatched, during May, they are gathered, dropped into vinegar, dried in the sun or in ovens, and sold. They have been used for ages to dye cloth a dark brownish-red, but except locally they are almost entirely superseded by cochineal. See Coccus.

Cochineal is a species (Coccus cacti) of the mealy bug group. It is a native of Mexico where it feeds upon certain species of cactus, especially the nopal (Opuntia c o chin ellif era) , a kind of prickly pear (q.v.). It is also found in many regions where this plant has been intro¬ duced, notably in the Canaries, Java and the Mediterranean region, in some parts of which it has been cultivated. In Mexico pieces of the cactus covered with the insects are cut out at the close of the dry season and protected until the end of the wet season, when they are used for re-stocking the plantation in October. The females lay about 1,000 eggs, about 99 per cent of which produce females. In December the first crop is gathered and other harvests are made until May when the rainy season be¬ gins. The females are brushed off the water, or on hot irons, and dried. They usu-

ally lose more than half their weight in the process. A days' work is represented by about two ounces of dried insects — that is, more than 8,000 ! These insects have been used for dyeing scarlet and crimson, for which pur¬ poses they are unequaled, though coal tar products, being cheaper, more readily procured, and in greater variety, have largely replaced them. They are used also for manufacturing pigments such as lake and carmine (q.v.) and for coloring confectionery. See Cochineal.

Several other species have been used for dyeing, some being employed by the ancient Egyptians, Jews and Persians for giving the brilliancy or delicacy of tint to certain fabrics formerly highly valued by these nations and the peoples embraced in their commerce.

Other members of the family are noted for their wax, which is used in some countries for candles, varnishes, sealing wax, lacquer and many other purposes. The wax insect of China (Coccus' sinensis) is a small white species which lives upon sumac and other trees upon the branches of which it deposits its secretion. This resembles hoar frost during June, but becomes somewhat darker and more continuous by August when it is scraped off and melted in boiling water. After straining and cooling ir is ready for use. The French have intro¬ duced this species into Algeria. In South America another species is locally but not commercially, important as a source of wax and in other countries are several species that might become similarly useful. But the prin¬ cipal species are the lac or shell-lac insects of Asia. See Lac.

Among the species considered troublesome upon cultivated plants perhaps the cottony cush¬ ion scale (Icerya purchasi) is perhaps the most noted in the United States. This is an Aus¬ tralian insect which was accidentally intro¬ duced into California where, being free from the conditions that held it under control in its native habitat it spread rapidly upon orange, lemon and other citrus trees to the dismay of orchardists. It was found that certain species of ladybird beetles (q.v.) play important roles in checking the spread of this scale in Aus¬ tralia ; so, some were imported in the hope that they would eradicate the scale in California. They did. The scale is now practically extinct in California and the lady-bird beetles, being deprived of their food supply, have followed it, since they seem to be unable to adapt them¬ selves to other foods. This is one of the most remarkable instances of man's intervention to bring natural controls to his aid instead of resorting to artificial methods which are fre¬ quently cumbersome or unsatisfactory.

The armored scales of the sub-family Dias – pince are generally of small size, but being ex¬ ceedingly prolific and voracious are of ill- repute. They

are generally flattened or slightly convex, covered with a parchment-like mem¬ brane, and are of many shapes. The larvae are either hatched from eggs or are born. They crawl to a suitable place to feed, usually before they are a day old, and become fixed. They are tiny, flat, six-legged larvae with a pair of feel¬ ers and with long sucking beaks. Soon waxy threads appear, coalesce and cover the crea¬ tures. After molting the larvae are legless. After the second molt the males can be readily recognized, being a pupa with wings, legs and

antennae visible ; the females become still more grub-like. The male soon emerges, flies a short time, pairs and dies. In some cases the females hibernate, in others they lay eggs, in others bear young, sometimes there may be several generations in a season. Some of the best-known species are the oyster-shell scale, especially Mytilaspis pomorum, which is well known upon apple, lilac, willow and other trees. They are named from the shape of the scale, which resembles the shell of some kinds of oysters. This species winters in the egg, the young appear in May, and in the North there is only one brood ; two in the South where the insects are believed to hibernate. A very simi¬ lar species lives upon citrus fruits, and speci¬ mens may often be found upon oranges and lemons, especially those that come from the Mediterranean region. The San Jose scale (Aspidiotus perniciosus) is viviparous and enormously productive. It lives upon the woody members of the order Rosaccce, for ex¬ ample, apple, cherry, rose and pear, and upon currants, gooseberries, elm, chestnut, oak, wal¬ nut and many other trees and shrubs. The scurfy scale (Chionaspis furfurus) is an oval scale with the cast skin at the small end and is frequently found upon apple and pear trees. The red scale of the orange is a close relative of the San Jose scale and is well known in California, Florida, etc. See Orange.

The cottony maple scale (Pulvinaria innu- merabilis) is often found on Virginia creeper, grapevines, and some other plants, as well as on maples. It is a soft scale which is usually rather conspicuous in spring from its cottony appearance upon the young growths. The ˆcotton® is really a gum since it can be drawn out into cobweb-like threads. The black scale (Lecanium olece) is another soft scale which is well known to California olive and orange growers.

Several species of scale insects arc found in greenhouses and nurseries devoted to ornamen¬ tal plants. But they present no more remark¬ able features in life-history or habits than the preceding, and being of somewhat smaller im¬ portance need not be discussed specifically.

Where the natural controls seem to be in¬ adequate to cope with the species various arti¬ ficial methods have been tested to determine their efficacy. But in many instances these are so cumbersome, expensive,

dangerous either to plant or operator, and difficult to apply intel¬ ligently, that they have been discarded. Spraying and fumigation are the principal ones in vogue. But it seems highly probable that in many instances the natural controls would hold the scales in check. Man has, however, not yet discovered these controls except in a few cases and in most of these has not made use of them more than experimentally.

Consult numerous bulletins of the agricul¬ tural experiment stations and the United States Department of Agriculture; also references under Insecticide.

M. G. Katns.

SCALE-TAIL, an African flying squirrel of the family Anomaluridce, distinguished from the true squirrels by dentition and various other peculiarities, and especially by the posses¬ sion of a series of strong keeled scales at the root of the tail, which seem to serve as an aid

in climbing. There are several genera and species, of which the best known is Anomalurus pedi of the Gold Coast, which is black and white, and is regarded as a delicacy by the na¬ tives. The food and habits are similar to those of the northern flying-squirrels.

SCALES. See Balance.

SCALIGER, skal'i-jer, Joseph Justus,

French scholar and author: b. Agen, France, 4 Aug. 1540; d. Leyden, France, 21 Jan. 1609. He was the 10th son of his learned father, Julius Caesar Scaliger (q.v.), and received from him a fine classical education, as well as a boastful and arrogant nature. He studied Latin at Bordeaux, and Greek at Paris. Ac¬ cording to Henisius, he shut himself into his room and committed the whole of Homer in 21 days; he memorized the rest of the Greek poets in three months and the entire body of Greek literature in two years. It was his boast that he was equally familiar with 13 languages. In his 22d year he was converted to Protest¬ antism, a fact which probably retarded his ad¬ vancement in France. From this period until 1578 he traveled extensively making a poor liv¬ ing from his teaching and writings, but refus¬ ing the money offered him by admiring patrons. In 1578 he became professor of belles-lettres at Leyden, a position which he held until his death. Joseph Scaliger's most important works are upon chronology. His (De Emendatione TemporunP (1583) gave the first complete sci¬ entific

chronology, and for -this work, with his

.SCALIGER, Julius Caesar, Italian classical scholar : b. Riva, Lake Garda, 23 April 1484 ; d. Agen, France, 21 Oct. 1558. He is generally accepted as the son of Bendetto Bordoni, a miniature painter of Padua, but Scaliger claimed descent from the Scaligeri princes of Verona, as did his son, Joseph Justus Scaliger. The elder Scaliger, according to his own account, was a page of Emperor Maximilian for 17 years, then received a pension, studied at Bo¬ logna, commanded a squadron under the French viceroy, studied natural law, and in 1525 accompanied the bishop of Agen to his diocese in France where he settled as physician. In 1530 he married a lady of rank and from that time put forth pretentious claims as to his ancestry. He was a man of unusually great learning, a versatile Latin poet, but bold and arrogant, so that while his writings brought him admirers among the scholars of his day, his personal conduct gained him many enemies. His principal works include commentaries on the work of Hippocrates (De Insamnis) (1538) ; of Aristotle, (De Plantis) and Theo¬ phrastus, (De Causis PlantaruirP (1566) ; an attack on Erasmus, (Oratio pro Cicerone contra ErasmuirP (1531), (De Causis Linguae Lati- nae) (1540) ; (Poetices Libri VIP (1561).

SCALLOP, a well-known bivalve mollusk. The scallops form a family (Pectinidce) related to the oysters, which they resemble in having a single adductor muscle. The genus Pcctcn, which in the wide sense is nearly coextensive with the family, has the following character¬

istics: The shells are more or less orbicular, with an ear developed on each side of the umbo, making a straight hinge-line, generally orna¬ mented externally with more or less developed radiating ribs. The hinge-teeth are lamellar, but usually small and obscure, the principal liga¬ ment is internal and solid, and the muscle-star is single. The mantle margins are open all around, reduplicated and, besides a fringe of tactile filaments, bear numerous conspicuous eyes of a brilliant blue or silvery lustre. These eyes are the most complex known among the P elccypoda and consist of a nervous layer, a choroid coat, lens and cornea and receive an optic nerve from the circumpallial trunk. The gills are delicate and of peculiar structure, the foot small and papilliform and in the young has a byssus gland, and the genital ducts open into the kidneys or near their apertures. Only the posterior adductor muscle is present, and this is large, round, central, and remarkable from its constitution in part of striated and in part of nonstriated fibres. Scallops are remark¬ able, especially when young, for their activity, and swim in a peculiar jumping fashion by opening and powerfully closing the shell valves as though flying, thus forcing out the contained water and propelling themselves forward. As they become older and the shells heavier they are more quiescent. Fully 200 living and a still

greater number of fossil species are known beginning in the Carboniferous strata. Per¬ haps 40 species occur in North American waters, the great majority southward and in moderately deep water. Several of our own and foreign species are of commercial im¬ portance, furnishing the well-known scallops of the markets. P. jacobccus, a native of the Mediterranean, is the scallop shell which pil¬ grims were accustomed to wear in front of their hat in token of having visited the shrine of Saint James at Compostella.

Although the richly colored and beautifully formed shells of the scallops are much used in fancy work of various kinds, these mollusks derive their commercial importance from the use of the muscle for food. Before the advent of the white man they were largely gathered for this purpose by the Indians. The principal fisheries are on the coast of Maine, in Long island Sound, Buzzard Bay and contiguous waters, and on the coasts of New Jersey and California, the first two having the greatest magnitude. South of Cape Cod Pccten irra – ‘ dians, which has the shell marked with about 20 prominent radiating ribs on each side, is the species sought. This lives especially in the shoal waters of the bays or on flats in the Sound. Scallops vary greatly in abundance from year to year and the seat of the fisheries changes accordingly, some formerly favorite grounds being abandoned and others developed. The commercial scallop fishery of Maine origi¬ nated about 1880 and has since developed into an important industry at many points east of Casco Bay. Here the giant scallop (P. magel- lanicus) is the species sought. This is much larger than P. irradians, and the valves are marked with numerous fine radiating lines, the lower valve being nearly flat and white and the upper convex and brown. This species lives in deeper water and like the other changes its feeding ground. Scallops are now taken almost exclusively in small dredges, resembling in most

features the oyster dredge, and pulled’ over the ground by means of small boats; larger vessels when used serve chiefly for transportation, etc. The fishing season varies; south of Cape Cod it covers the cold months, but about Mount Desert the bulk of the cdtch is made during July and August.

Consult Ingersoll, (The Fisheries Industries of the United States, } Sec. V (Washington 1887) ; Smith, (The Giant Scallop Fishery of Maine) ; Bulletin United States Fish Commis¬ sion 1889 (1891) ; Stearns, Overland Monthly (1873) ; Zittel and Eastman, (Textbook of Palseontology) (Vol. I, London 1900) ; Risser, (Thirty-first Report of the Commissioner of Rhode Island Fisheries) (Providence 1901).

SCALP, the outer covering or integument of the upper part of the skull or brain-case. Except in the fact that hair in both sexes grows more luxuriantly on the scalp than else¬ where the skin of the scalp differs but slightly from ordinary skin. But besides its constituent of skin, the scalp is composed of the expanded tendon of the occipito-frontalis muscle, and of intermediate cellular tissue and blood-vessels. Injuries of the scalp, however slight, must be carefully watched, for they may be followed by erysipelas, inflammation, suppuration or pyaemia that may easily prove fatal. Prompt antiseptic dressing lessens the danger in such accidents. In the treatment of scalp-wounds no part of the scalp should be cut or torn away; and, if pos¬ sible, stitches should be avoided, as plasters and bandages will generally keep the separated parts in apposition. Burns of the scalp are very liable to be followed by erysipelas and diffuse inflam¬ mation, but the brain is comparatively seldom affected in these cases. Tumors of the scalp are not uncommon, the most frequent being the cutaneous cysts popularly known as wens, and vascular tumors. Parasitic diseases also affect the scalp, and require special treatment. Catarrhal inflammation of the hair-follicle and other hair-destroying diseases result from micro-organisms. See Dandruff; Pityriasis; Ringworm.

SCALPER, a common term in the United States applied to any person who buys railroad, theatre or steamship tickets at a discount from people unable to use them, and sells them again at an advance on the price he paid for them. Theatres and transportation companies have de¬ vised various plans to break up this trade, and in some States laws have been passed forbid¬ ding the sale of railroad tickets at cut-rate prices.

SCALPING, the act of partly cutting and partly tearing off the skin of the head, with the hair attached, of a living or a dead victim. Scalping was practised in early times, by most of the savage and barbarous nations of the eastern hemisphere, as the Scythians, Gauls and other wild peoples of Asia and Europe, and later by the American Indians residing princi¬ pally in the eastern United States and the lower Saint Lawrence region. It seems to have been unknown until comparatively recent times, in the great plains regions ; and it was little prac¬ tised among the Pueblo and other more cul¬ tured tribes of the United States. It was un¬ known south of the Rio Grande except where introduced by American tribes ; and was absent from Central and South America. Nor was

scalping practised in the Canadian Northwest or along the whole Pacific Coast. Sometimes the entire head was taken in lieu of the scalp. After the scalp was taken, it was tanned and then stretched on a small hoop of wood, and the side opposite to that having the hair was painted in various colors, and even the hair was tinted likewise. Sometimes the portrait or the hieroglyphic device of the person scalped was placed on it. Persons scalped*

did not always die from the effect. Scalps were regarded as trophies of victory and prowess. Joutel relates that in 1687 among the Cenis of Texas, a scalp was waved or offered in ceremony to the four quarters of the world, and that tobacco and hominy were offered to the scalps that were paraded. In 1703, Bienville offered 10 ˆescus® (ecus, about 10 crowns) for every scalp of a man killed or prisoner taken of the Chetimachas and Alibamons (Alibamas). The American colonies offered bounties for scalps. In 1724 Massachusetts offered 100 pounds sterling (about $500) for Indian scalps; 30 years later, during the so-called French and Indian war, the French offered a bounty for British scalps, and the colonists for Indian scalps. In 1755, 40 pounds sterling (about $200) was offered by Massachusetts for the scalps of male Indians over 12 years of age, and 20 pounds sterling (about $100) for the scalps of women and chil¬ dren.

This official encouragement to scalping led to the extension of the practice to tribes that had never before indulged in it. Naturally among these latter tribes the scalp had little or no ceremonial significance as it seems to have had among eastern tribes. Scalping appears to have probably arisen out of head-hunting which seems to have been common in parts of America at an early date. Among the tribes originally addicted to scalp-taking, a scalp dance formed a part of the ceremonies held on the return of a war party. In this dance the women, not the men, carried the scalps. The scalp was not, as popularly supposed, a standard by which to judge the powers of the warrior.

Consult Braunschweig, (Scalping> (Smith¬ sonian Reports 1906-07) ; Friederici, (Skalpieren und ahnliche Krugsgebrauche in Amerika) (1906) ; Handbook of American Indians,

(Scalping (Washington 1910).*

SCALY ANT-EATER. See Mantis.

SCAMANDER, ska-man'der (ancient Xan- thus), Turkey in Asia, a small stream in the Troad, rising near the city of Ilion. It had two sources, one of which was hot, the other cold. Strabo asserts, however, that it had but one source, which was in Mount Ida. Its direction was west-northwest, and about two miles from its mouth it received the small river Simois; it emptied into the Hellespont. Since the begin¬ ning of the present era these rivers have had separate courses. The Scamander is sometimes identified with the Mendere or Meander (q.v.).

SCAMMONY, a gum-resin obtained from the Convolvulus scammonia, native to the bushy wastes of western Asia. This is a climbing plant with irregularly arrow-shaped leaves, white or purplish flowers like morning-

glories, and a fleshy tapering perennial root. When in flower, incisions are made obliquely in the upper part of this root, and shells fastened below the gashes, in which the sap is caught as it exudes. They

are then emptied, the juice added to scrapings from the root, thoroughly mixed, dried, and kneaded into cakes. Scammony is much adul¬ terated, but when pure or <(virgin® is greenish- gray or blackish in color, internally porous and ˆ of a resinous lustre, breaking with an angular fracture and translucent in thin pieces. It has a peculiar somewhat cheeselike odor and an acrid taste. Different kinds of the drug are named after the districts in which it is collected and the place of export. Scammony is a strong purgative usually used in combination with other medicines, and supposed to have been known to the Greeks as early as the 3d century b.c., also to have been one of the medicines recommended by Helias to King Alfred the Great.

SCAMOZZI, Vincenzo, 'ven-chen'd'zo ska- mot'se, Italian architect: b. Vicenza, 1552; d. Venice, 7 Aug. 1616. He was taught by his father, also an architect, and by Palladio and Sansovino, at Venice; and at Rome he studied ancient monuments. Returning in 1583 he was commissioned to erect a monument to the family of Marc Antonio Barbari, in the church of the Carita, and so much was this work ap¬ proved that he was appointed to finish the grand library at Saint Mark's, to build the Trissino Palace at Vicenza and the Cornaro Palace on the Grand Canal, Venice. By this time Scamozzi's fame had spread over Europe and he was in great demand. He built the Ravaschieri Palace at Genoa, and added the second story to the Palazzo Strozzi at Florence (1594). About 1604 he designed the cathedral of Salzburg, Austria, and a part of the Schloss at Prague, Bohemia. His writings include dis¬ courses on the Architecture of Rome' (1582) ; and (Ideas of Universal Architecture, two volumes, of which were completed before his death.*

SCANDERBEG, skan'der-beg, Albanian prince: b. 1404; d. Lissa, Albania, 17 Jan. 1468. His real name was George Castriotes, and he was the fourth son of John Castriotes, an Albanian prince. The sons being given to Sultan Murad II in 1423 as hostages of peace, the sultan named the youngest Iskender Bey (whence Scanderbeg) and made him a janissary after having poisoned his three brothers. When Scanderbeg's father died in 1432 and the sultan annexed Albania as a province, Scanderbeg determined to revolt. He had gained distinction in the Ottoman campaigns, and his opportunity came when, in 1443, he was sent to Hungary against the Christian

Huniadi. He entered into agreement with the latter, gave him the victory, and fled to the sultan's powerful fortress of Croia, of which he gained command as the sultan's representative. Abjuring Moham¬ medanism, he now organized the Albanian forces and successfully repelled the armies of the entire Ottoman empire for 17 years, when the sultan's successor, Mohammed II, made a treaty with him acknowledging the independence of Albania and Epirus. A few years later he was persuaded by the Pope to join the Venetians against the Mussulmans and with an inferior force won eight great victories over Moham¬ med IT.

SCANDINAVIA, skan-di-na'vT-a, a general designation for the three north-European king¬ doms, Denmark, Norway and Sweden (qq.v.),

sometimes applied in a more restricted sense to the two latter only. In the Middle Ages the name of Northmen was bestowed indiscrimi¬ nately on the inhabitants of the three countries, whose closely related languages and common mode of life and political fortunes afforded suf¬ ficient basis for considering them one people. As a geographical term Scandinavia is rapidly passing out of use, but the appellation is still employed in an ethnographic, and especially in a literary sense.

SCANDINAVIAN LANGUAGE AND LITERATURE. See Danish Language, Danish Literature; Norwegian Language, Norwegian Literature; Swedish Language, Swedish Literature.

SCANDINAVIAN MUSIC. From the earliest known records it is evident that the music of the Scandinavian peoples was an ac¬ companiment of songs and ballads based on the sagas, or prose epics embodying the myths and heroic tales current among their remote ancestors. The Danish UCalenpeviser, the richest poetical remains of the folk-lore of the Middle Ages in Europe, consists of songs and ballads concerning giants, demigods and other supernatural creatures in Scandinavian mythology, the composition of which in the old Northern or Icelandic tongue has been re¬ ferred to the 14th century. It is evident that throughout the Middle Ages the literature of Iceland was enriched with numerous national and other sagas whose subjects were drawn largely from scaldic songs. The (Kalevala) or (Kalewala, > meaning (*

In the development of modern musical com¬ position, Denmark, Finland, Norway and Sweden present a strong array of masters, among whom are the following, with representa¬ tive works :

Denmark. — Johan P. E. Hartmann (1805— 90), credited with being the first Danish com¬ poser to impart a distinctively Scandinavian flavor to his music ; works : overtures, sym¬ phonies, cantatas, operas; (Ib and Little

*Chris¬ tina, } (The Golden Hours, * (The Corsairs,* (Liden Keristen.* Niels W. Gade (1817-90), pronounced a master of instrumentation; works: chamber, symphonic and choral music; cantatas (Zion,* (The Crusaders,* prize over-*

ture lNachklange von Ossian.1 Edward Las¬ sen (1830-1904), composer of popular drawing¬ room songs; operas (Fanenlob> and (Le captiP ; ballet (Diana) ; music to (CEdipus in Kolonus,* (Faust, } (Pandora) and (Nibelun- gen) (Hebbels). August Enna (I860-), specialist in fairy opera based on Andersen's tales; works: (Ib and the Little Christian, > (The Match-girl,* (The Witch, * Cleopatra,* (Au- cassin and Nicolette,* (Gloria Arsena.**

Finland. — Jean Sibelius (1865—) , to whom Finland owes much of its recent musical fame; works : symphonies, symphonic poems, (Tor- nissa olija impi) ((The Maid in the Tower), the first Finnish opera;*

Norway. — In the noted Lindemann family of composers, father and four sons, Ludwig M. (1812-87) was conspicuous because of his great collection of Norse folk-songs, the treasure house of music. Halfdan Kjerulf (1818t-68) ; works: forty (Norske Folkeviser ((Norse Folk-song1*) , (Spring Song,* (Shepherd's*

Song, (Cradle Song.* Johan S. Svendsen (1840-1911), violinist, court conductor at Copen¬ hagen; works: symphonies, Norwegian Rhap¬ sodies, * (op. 23, 46, 55), (Elegische Melodien) (op. 34), (Nor- wegische Tanze* (op. 35) and (Popular Nor¬ wegian Melodies) (op. 66). Agatha Backer-Grohudahl (1847-1907), dean of Norwegian women composers ; works : studies, sketches, songs. Ole Olesen (1851—) , works: operas, oratorios, cantatas, symphonic poems, choral songs, orchestral music, (Asgaardsreien.* Christian Sinding (1856—), works: (Violin Concertos) and (Sonatas,* opera (Der heilige Berg,* symphonies, chamber music, piano solos, songs (Rondo Infinito,* (Episodes Chevaler- esques.**

Sweden. — The preservation of a great mass of early Swedish folk-songs is due in large measure to two enthusiasts : Erik G. Geijer (1783-1847), published a collection of modern Swedish songs, another of Swedish folk-songs and a third of original songs in the old Swedish vein; Arvid A. Afzelius (1785-1871), published two collections of Svenska Folks- visor ((Swedish Folk-songs*) and (Afsked of Svenska Folksharpen) ((Farewell of the Swedish Folks-harp)) . Composers: Franz Berwald (1796-1868),*

works: symphonies, chamber music, opera (Estrella di Soria.) Adolf F. Lindblod (1801-78), called ((the Schubert of the North,® noted for his songs made popular by Jenny Lind (1820-27), (

Sodermann (1832-76), works: operettas, (The Wedding at Ulfasa ; music to Schiller's (Jung¬ frau von Orleans* ; a mass pronounced his best*

work; concert overture, choral ballads. An¬ ders Hallen (1846-), dramatic composer; works: (Harold der Viking, (Swedish Rhap¬ sodies* (op. 17, 23), (Vineta* (Choral rhap¬ sody), (Vom Pagen und der KonigstochterP Emil Sjogren (1853-), organist Johankirke, Stockholm; works: (Novelletten) (op. 15),*

(Geschicte der Musik seit Beethoven) (1901) ; Soubise, (Histoire de la Musique: Etats Scan- dinaves) (1901) ; Baltzell, (A Complete History of Music (1905) ; Niemann, (Die Musik Skandinaviens) (1906) ; Stanford-Forsyth, (A History of Music* (1916).*

SCANDINAVIAN MYTHOLOGY. The

mythology of Scandinavia was distinct from that of ancient Greece and Rome, although both systems resemble each other in certain essen¬ tial features, and they may possibly have had a common origin in the far-off prehistoric period. The differences were such as might be expected to exist between a nation cradled in the frozen North and nations living in the genial South. In the Scandinavian, as in Greek mythology, there are two periods, the prior one apparently reflecting misty traditions of the earth's development from chaos and darkness into order and light, perhaps stories which the cave-man had handed down to his children and they to their children, until they became crystal¬ lized into an ideal system of supernatural be¬ ings by the Vikings, who afterward invaded and conquered the Scandinavian countries. Geology has strangely verified the facts which were dimly shadowed forth in the early North¬ ern mythology. The terrible ice age which con¬ verted Europe into an arctic waste, and pushed its awful precipices into the Atlantic beyond the Hebrides and the western coast of Ireland, evi¬ dently made an indelible impression on the mind of prehistoric man, who learned to regard ice as the deadly enemy of human existence, and the sun, with its vivifying heat, as the source of happiness and joy. This thought, almost a second nature, is reflected in the earlier my¬ thology of the Scandinavian race, in its shadowy and crude mind-picture of something that had really happened, and that, it was feared and believed, might and would happen again.

The second and younger period of Scandina¬ vian mythology reflects a new era. Men have conquered their old dread of an ever imminent

catastrophe. They had battled with nature and found themselves often victorious. They have had heroes of their own, sharing their loves and revenges, triumphing in war and enjoying the rewards of valor and virtue. Nor were their women unwarlike, as became the daughters of heroes. The Amazons, real or imaginary, of Grecian story had their counterparts in the lore of the North. A new mythology grew out of new conditions, different from, yet linked with, the old, from which it was a natural evo¬ lution, and it is with this younger mythology,

its gods and goddesses, that Christianity was brought into contact, ultimately crushing it out after a struggle which proved the deep attach¬ ment of the Northmen to their ancient faith.

It is to be said for Scandinavian mythology that it never descended to the sensuousness of Greece and Rome, and was equally superior in breadth and imagery to the absurd polytheism of Egypt. It was terrible in some of its ideals, but never depraved. It imaged the spirit of the Viking race, and was well calculated to inspire them to the deeds of prowess which brought to their feet even the militant races that had founded kingdoms on the ruins of imperial Rome.

According to the earlier Scandinavian my¬ thology there was originally no heaven and no earth, but a vast deep, a world of mist in the North called Niflheim, a fountain which was called Hvergelmer that flowed from the mist, and 12 rivers that issued from the fountain. These rivers froze into ice and filled the deep — a picture of the ice age. The world of fire and light was in a southerly direction, and was called <(Muspelheim.>) The light and heat from the world of fire melted the ice from the world ot mist, and from the melted drops sprang the ice-giant Ymer. A little man and woman pro¬ ceeded from Ymer's left arm, and a son from one of his legs, and these were the ancestors of a race of ice-giants. A cow also came into being from the ice and heat, and gave milk to the giant Ymer, at the same time keeping itself fed by licking salt blocks of ice. One evening while the cow was licking the blocks, human hair grew out of them; on the following day a head, and on the third an entire man, who was called Bure. Bor, the son of Bure, married Bestla, the daughter of the giant Bolthorn, and they had three sons, Odin, Vile and Ve. The sons of Bor slew the ice-giant Ymer. From his body they created the heaven and the earth. His flesh became earth ; his bones rocks ; his teeth and pieces of his jaws became stones; his hair, grass and trees, and his blood the sea and rivers. His skull was used to make the sky, which was extended over the earth, with four dwarfs,

Austre, Vestre, Sudre and Nordre, rep¬ resenting the East and West, South and North, at the four ends. Out of the heat and light from Muspelheim they made stars, which they fixed in the heavens to give light to the earth. Ymer's brain became clouds. From two ash- trees were created a man, Ask, and a woman, Embla, who were endowed with reason, lan¬ guage, hearing and sight. The tree of the world called Ygdrasil, stood over the well of time, with its top above the heavens, and three great roots, one among the gods, another among the giants and the third in the lower regions. The fountain of wisdom and the sacred fountain flowed forth near the roots. By the sacred fountain the gods held their councils, and from this and the fountain of wisdom sprang three beautiful maidens, the Norns, similar to the Fates of Greece and Rome. The Norns were Urd (the Past), Verdande (the Present) and Skuld (the Future). The Norns decreed the fate of men and gave them aid or punishment as they deserved. The gods dwelt in Asgard, in which was Gladsheim, the hall of gladness. The giants dwelt in Jotunheim and men in Manheim.

Nature-worship came in more distinctly with

the latter Scandinavian mythology. Odin, ruler of the universe, the Jupiter of the North, and his wife, Frigg, have for sons Thor, the god of thunder, and Balder, the god of justice and of eloquence; and Balder is father of Forsete, god of harmony. Njord, god of winds and of commerce, is father of Frey, who gives rain or sunshine, abundance or famine, to mankind, and of Freyja, who is goddess of love, but also, far different from the Grecian Venus, a model of womanly goodness and wifely devotion. Other gods and goddesses there are, most of them beneficent, and representing the better qualities of heart and conscience; all of them superior to the generally dissolute throng of immortals who sat in the court of Olympus when they were not engaged in some intrigue on earth.

The system was not without its terrors, how¬ ever, its monsters who personified evil and presided over the doom of those debarred from happiness above. The malignant Loke was father of Hel, goddess of the infernal regions, and from whom is derived the name by which they are designated in the English tongue. She dwelt in Helheim, the hall of grief, with hunger for her table and disease for her bed. There the prisoners of fate led a dark and cheerless existence, in marked contrast to the delights of Asgard.

Scandinavian mythology dealt also with the future of the world and of humanity, and here again it is remarkably in accord, in some of its features, with the teachings of science, and it may be added also of religion. Heaven and earth are to pass away. The end will be pre¬ ceded by great wars, severe winters, destructive storms and a covering of the face of

the sun. The wolf Fenrer will devour the earth and giants will make an attack on heaven. The gods will perish. Then there will be a new sun; the earth, rescued from the jaws of Fenrer, will exist again, and a human pair, saved from the general destruction, will renew the human race.

Such was the faith of the fathers of that race which settled Normandy and conquered England, which gave rulers to Muscovy and Sicily, and guardians to the degenerate heirs of the Constantines — the race from which the English-speaking peoples of to-day are largely descended, and from which some of their most valuable qualities are derived.

Bibliography. — Anderson, Rasmus B., (Norse Mythology5 (7th ed., Chicago 1901); id., (Mythologie scandinave5 (Paris 1886) ; Bugge, Sophus, (Home of the Eddie Poems5 (London 1898) ; Chantepie de la Saussaye, (Re¬ ligion of the Teutons5 (Boston 1902) ; Golther, W., (Handbuch der germanischen Mythologie5 (Leipzig 1895) ; Guerber, H. A., (Myths of Northern Lands5 (New York 1895) ; Gum- mere, F. B., (Germanic Origins5 (ib. 1892) ; Holtzmann, Adolf, (Deutsche Mythologie5 (Leipzig 1874) ; Grimm, Jakob, (Deutsche My¬ thologie5 (4th ed., Berlin 1878) ; Hahn, (Odin und sein Reich5 (Berlin 1887) ; Mannhardt, W., (Germanische Mythen5 (Berlin 1858) ; id., (Die Gotterwelt der deutschen und nordischen Volker5 (ib. 1860) ; Muller, Wilhelm, (Ge- schichte und System der altdeutschen Religion5 (Gottingen 1844) ; Meyer, E. H.,

thology> (New York 1913) ; Wolf, J W., (Beitrage zur deutschen Mythologie5 (Gottingen 1854) ; Rydberg, (Teutonic Mythology5 (3 vols., London 1906).

SCANDIUM, in chemistry a rare metallic element discovered by Nilson (1879) in the mineral euxenite ; symbol Sc-; atomic weight 44.1. It is of special interest because its ex¬ istence and properties were deduced theoreti¬ cally by Mendeleef from his periodic system of the elements. He called the to-be-discovered element ekaboron. As Nilson's scandium showed exactly the same atomic weight and chemical properties foretold by Mendeleef it is a further proof of the value of the Men¬ deleef hypothesis. Scandium occurs in very small amounts in the minerals euxenite, gado- linite and yttrotitanite. It forms a white oxide Sc203 and a number of salts related to the same. The salts are colorless and have a rather acid astringent taste.

SCANLAN, Lawrence, American Roman Catholic bishop: b. Tipperary, Ireland, 28 Sept. 1843; d. 10 May 1915. He was educated at All Hallows College, Dublin, where he was ordained priest in 1868. Coming to America, he was as¬ sistant at Saint Patrick's, San Francisco, Cal., 1868 to 1870 and at Saint Mary's Cathedral in that city for the two years following. In the end of 1871 he was sent to Pioche, Nev., where he built the first church in the section; in 1872 to Petaluma, Cal. ; in 1873 to Salt Lake City, Utah, where he was first pastor for Utah Ter¬ ritory and then vicar forane. He was so suc¬ cessful in his management of church finances in Salt Lake that he cleared the church of debt and raised a sum sufficient to purchase a large tract of land, on which he built an academy. This kind of work he followed until 1887, build¬ ing churches and schools, and in 1886 founding the college of All Hallows in Utah. On 25 Jan. 1887 he was appointed bishop of Laven- den, in partibus and apostolic vicar of Utah. On 29 June 1887 he was consecrated at Saint Mary's Cathedral, San Francisco, by Archbishop Riordan, assisted by Bishops O'Connell and Manogue. He became the first bishop of the diocese of Salt Lake, Utah, 30 Jan. 1891.

SCANNELL, Richard, American Roman Catholic bishop: b. Cloyne, County Cork, Ire¬ land, 12 May 1845; d. 8 Jan. 1916. He was educated at the College of Middleton, Cork, and at All Hallows College, Dublin, at which latter place he was ordained priest, 26 Feb. 1871. He came to the United States the same year and was appointed assistant in Saint Mary's Ca¬ thedral, Nashville, Tenn. He served successively at Saint Columba's Church and as pastor of Saint Mary's Cathedral, 1871—85, being adminis¬ trator of the diocese of Nashville, 1880-83; and as pastor of Saint Joseph's Church, West Nash¬ ville, which he organized, 1885-87. On 9 June 1887 he was appointed bishop of the diocese of Concordia, Kan. and was consecrated in Saint Mary's, Nashville, 30 Nov. 1887, by Archbishop Feehan, assisted by Bishops McCloskey and Rademacher. Upon the death of the Rt. Rev. Jas. O'Connor he was transferred 30 Jan. 1891 to the diocese of Omaha.

SCANSORES, skan-so'rez, an obsolete order of birds represented by cuckoos, wood¬ peckers, parrots, toucans and trogons, and the

like, popularly known as that of the "climbing® birds, and distinguished primarily by the fact that the toes are directed two forward and two backward. It was an artificial group, whose members have been scientifically re-classified in the Coracii formes and other groups, and are also known as Zygodactyly, from the arrange¬ ment of their toes. Compare Natatores.

SCAPA, an abbreviated designation for the London organization known as the Society for Checking the Abuses of Public Advertising, the purpose of which is the elimination of adver¬ tising displayed on boardings and other promi¬ nent places to the disfigurement of both towns and rural scenery. The society endeavors to reach its ends through both legislation and awakening public interest in its crusade.

SCAPE-GOAT, a goat which according to the Mosaic law was sent into the wilderness, on the Day of Atonement, bearing the sins of the people (see Lev. xvi, 1-6; Matt, xii, 43; Luke xi, 24). Under later Jewish practice the goat was thrown over a precipice about 12 miles from Jerusalem. Hence the term "scape¬ goat® is applied to any person who is made to suffer for the wrongdoing of others.

SCAPHOPODA, a class of Mollusca of a low type, known as fossils from the Devonian to the present, and surviving in only a small number of forms, typified by the tusk-shells (Dentalium) . The head is rudimentary, the mantle-edges ventrally concrescent, forming a tube opening before and behind, and covered with a slight-curved shell shaped like an ele¬ phant's tusk. The body has its dorsal side to¬ ward the concave side of the shell, and is at¬ tached to the shell by muscles near the posterior or pointed end. The foot, which can be pro¬ truded from the anterior or wider aperture, is rather long, pointed and has sometimes two lateral lobes. All are marine, and some species live in very deep water. Consult Cooke, (Mol¬ lusca5 (London and New York 1895).

SCAPOLITE, the name of an important group of rock-forming minerals, including the species meionite, wernerite, mizzonite, maria- lite. Of these minerals wernerite (q.v.) is by far the commonest. All the species of the group crystallize in the tetragonal system and are hemihedral. Their color is generally white, gray or flesh-red ; hardness, 5 to 6.5 ; specific gravity, 2.57 to 2.74. They are all silicates of aluminum, calcium and sodium ; chlorine is also often present. Their composition has been ex¬ plained by Tschermak by placing meionite at one end of the series with a typical formula of Ca4Al6Si6025 and marialite at the other end with a typical formula of NaiAhSkCUCl, and assuming that wernerite and mizzonite are isomorphous combinations of these two com¬ pounds in varying proportions. The scapolites are thus an interesting group of minerals simi¬ lar to the feldspars in their formation of a series of compounds gradually varying in com¬ position, the silica, soda and chlorine increas¬ ing as the alumina and lime decrease. Scapo¬ lites occur abundantly as primary minerals in Archaean rocks in limestone and gneiss ; meio¬ nite occurs in the volcanic rocks of Vesuvius, but with this exception, the scapolites occur in eruptive rocks only as secondary minerals, be¬ ing products of the alteration of feldspars.

SCAPULA. See Anatomy; Osteology; Shoulder-Joint.

SCAPULAR, or SCAPULARY, an article of attire worn over the shoulders (scapula?) by the inmates of monastic houses. Originally* in the Benedictine Order, it was worn over the regular monastic dress by the brethren when engaged in manual labor, but it is now part of the ordinary habit of the older religious orders, whether of monks or of friars. The word, however, is now commonly used to signify a sort of emblematic scapulary, consisting of two small squares of cloth held together by strings, from which the pieces of cloth are suspended so that one square reaches to the breast and the other to the back at the shoulder blades of the devotee who wears the scapular. There are several different kinds of these scapulars, to the wearing of which are attached sundry obliga¬ tions and sundry spiritual privileges, such as indulgences, participation in the merits and the prayers of their fellow-members of a scapulary confraternity, etc. These miniature scapulars were brought into use in the 13th century by Saint Simon Stock, an Englishman and general of the Carmelite Order.

SCAR-TATTOOING. See Tattooing.

SCARABiEIDiE, skar-i-be'i-de, an exceed¬ ingly large family of beetles, including the most gigantic forms, although some of the species, as the chafers, dung-beetles, etc., familiar in the United States and Europe, are of moderate or small size. The terminal segments of the antennae are composed of flattened plates, pro¬ ducing comb-like clubs. Unlike those of their relatives, the Lucanidcc , these plates can be brought closely together so the club appears compact. These plates are relatively larger in the males than in the females. The pronotum, especially in the males, is often ornamented with conspicuous and curiously shaped horns whose purpose is unknown as in the rhinoceros beetle. In structural detail and habits the members of this family differ widely among themselves. Some feed on manure. Certain American species roll together balls of dung wherein they lay their eggs, thus providing food for their grubs. Very many feed on plants, the beetles eating leaves ; the larvae the roots. The grubs are white and fleshy, usually bent into a semi-circle; the large head has powerful mandi¬ bles and no ocelli ; the body-segments are often transversely wrinkled, and the hindmost seg¬ ment is often greatly swollen. Some of the adult Scarabccidce are dull black — the dung- beetles for example; while others are of bright metallic hues. The family ranges all over the world, but is most abundant in tropical coun¬ tries. Several species are serious pests ; for in¬ stance, May beetles or June bugs the larvae of which feed on grass

roots and when numerous destroy pastures and lawns and rose beetles, the adults of which destroy roses, grapes, etc. Rotation of crops eliminates the pests, and spraying with extra strength, sweetened arsenate of lead as an insecticide is one of the best pre¬ ventives to control the scourge. A typical ex¬ ample of the group in the sacred beetle of Egypt (see Scarabs), whose carved images are called scarabeids.

SCARABS, representations of the sacred beetle found on Egyptian gems, coins, mum¬ mies, obelisks, and works of art. The appear¬

ance and rapid multiplication of beetles in the mud on the subsidence of the Nile gave rise to the belief in their spontaneous generation, and they became the symbol of creation and creative power. Their circular shape and the bright, golden tints of their wing-cases sug¬ gested the shape and lustre of the sun. Thus they were taken to be one of the forms under which the sun-god appeared. Accordingly, scarabs were cut in stones and employed as seals and amulets, and after being bored through lengthwise were strung like beads, and easily worn on the person. After the commingling of the Egyptian with other races, Gnostics and Christians interpreted the meaning of these gems in accordance with their own religious systems. Those of the most ancient period, such as are found on mummies, are inscribed with the names of the kings held in highest veneration, Thutmosis III, Rameses II, and Amenophis III, and frequently with some hieroglyphic symbol. The larger of them have some short religious or historic inscription on their under side.

SCARAMOUCH, skar'a-mowch, term de¬ rived from Scaramuccia, a famous Italian buffoon, who acted in England in 1673, and died in Paris in 1694; applied to one of the grotesque characters of the Italian stage, who was dressed entirely in black, wore a mask, and represented the swaggerer and poltroon. In France the scaramouch was used for a greater variety of parts.

SCARBOROUGH, skar'bu-ro, John, Amer¬ ican Protestant Episcopal bishop: b. Castlewel- lan, Ireland, 25 April 1831 ; d. Trenton, N. J., 14 March 1914. He came to the United States when very young, was graduated from Trinity College, Hartford, in 1854, from the General Theological Seminary in 1857, and was or¬ dained to the priesthood in 1858. He was as¬ sistant rector of Saint Paul's, Troy, in 1857-60, rector of the Church of the Holy Comforter, Poughkeepsie, N. Y., in 1860-67, of Trinity Church, Pittsburgh, Pa., in 1867-75, and in the last-named year was consecrated bishop of New Jersey, where he remained until his death.

SCARBOROUGH, William Sanders,

American educator: b. Macon, Ga., 16 Feb. 1852. He was graduated from Oberlin in 1875, studied at the Theological Seminary there, and later occupied various chairs at Wilberforce Univer¬ sity, of which he was vice-president 1895-1908, and then became president. He is of African descent and is actively interested in the educa¬ tion and uplifting of his race. His publica¬ tions include (First Lessons in Greek) (1881) ; (Our Political Status) (1884) ; (Birds of Aris- tophanes} (1886), etc. He was an authority on Hellenistic and Classical Greek, negro folklore, and philological and archaeological subjects.

SCARBOROUGH, England, in the county of York (North Riding), popularly known as <(The Queen of English Watering Places,® is on the North Sea, 39 miles northeast of York. The main part of the town is on the south bay, and rises in successive terraces; the new quar¬ ters are divided from the older by a deep ravine crossed by two bridges. The modern period of the town dates from the discovery of mineral springs in 1620. The Grand Hotel, on Saint Nicholas Cliff, is one of the largest in England. There is a fine aquarium, a museum

— a Roman Doric rotunda — a mechanics' in¬ stitute, and the Spa and its grounds are attract¬ ive features of the place. There are fine promenades. The People's Park occupies both sides of the valley. Fishing and the manufac¬ ture of jet ornaments are the chief occupations. Ihe castle erected about 1136 was held against the Barons by Piers Galveston, and it was twice besieged by the Parliamentary forces. Later it became a fortified barrack. In 1914 it was bombarded with a loss of civilian life by a German squadron. Pop. 37,000.

SCARBRO, W. Va., town situated on the Chesapeake and Ohio and Virginian rail¬ roads. The chief industry is coal mining, the famed New River smokeless coal being pro¬ duced here. The value of the town's taxable property is $400,000. It contains a 10-room graded school. The annual receipts and ex¬ penditures average about $2,000. The town is situated at an altitude of 1,800 feet and was named for the English town of Scarborough. Pop. 5,000.

SCARECROW, The. The prolific pen of Percy Mackaye has never turned out a more satisfactory drama than this, called by him ((a tragedy of the ludicrous.® It is clearer in its philosophical purpose, more skilful in its dramatic treatment, more direct in its human application than anything he has yet done. When it was given in New York, at the Gar¬ rick Theatre, on

17 Jan. 1911, with the excellent support of Frank Reicher, as Ravensbane, and Edmund Breese, as Dickon, a Yankee improv¬ isation of the Prince of Darkness, it met with the cordial recognition it deserved. Were repertory the fashion at the present day (1919) in the American theatre, it would occupy a worthy place among the plays for constant re¬ vival.

The inspirational source for (The Scare- crow) is Nathaniel Hawthorne's ˆeathertop, a tale included in his (Mosses from an Old Manse) ; Mr. Mackaye acknowledges his de¬ pendence on the story for the main ideas of his plot. But he writes an introduction to the printed play, showing the main details in which he and Hawthorne differ. These may be summed up briefly : Hawthorne's Scarecrow ((is the imaginative epitome or symbol of human charlatanism, » the satire being aimed against fashionable society. Mr. Mackaye stretches his philosophy to wider application. His Scare¬ crow, Ravensbane, is the ((emblem of human bathos.® Are we not all more or less human scarecrows, composed of rubbish, out of which we have to hew our own salvation? When Dickon and Goody Rickby construct a scare¬ crow, and breathe into him, by their devilish magic, the breath of life, svmbolized by the glow of a pipe, which keeps Ravensbane alive, they do so in order to wreak vengeance on the old justice, Gilead Morton. But they give no thought to the tragedy which might befall a scarecrow thus thrust upon the world and sub¬ ject to human experience. They do not realize that when, at the end, in love with the justice's niece, Ravensbane looks into the magic mirror, which reveals people as they really are, he will see himself as a scarecrow, and the tragedy of the ludicrous, so entertaining to the onlooker, will fall heavily on his own poor pumpkin head.*

(

tion!® writes Mr. Mackaye; ((Yet the sense of our highest deficiency is, after all, our salva¬ tion. There is one reality which is a basic hope for the realization of those dreams. This sense is human sympathy, which is, it would seem, a more searching critic of human frailty than satire. It is the growth of this sense which dowers with dignity and reality the hol- lowest and most ludicious of mankind, and be¬ comes in such a fundamental grace of char¬ acter.®

Where Hawthorne ends, therefore, so Mackaye claims, his play begins ; where Haw¬ thorne's shafts hit charlatanism, he mingles human sympathy with irony, and there is for Ravensbane, the scarecrow, the same feeling of pity that one feels, now and again, for Don Quixote. In his object the dramatist succeeds well. With the result that (The Scarecrow } may be accounted a good drama, admirably ful¬ filling its purpose, and admirably reflecting New England temperament of the early witchcraft days.

Montrose J. Moses.

SCAREY CREEK, Engagement at. On

2 July 1861 General McClellan, then preparing to advance from Buckhannon against the Con¬ federate forces under General Garnett at Rich Mountain, ordered General Cox to move with one brigade from Camp Dennison, Ohio, cross the Ohio River at Gallipolis, and operate in the Kanawha Valley, the object of the movement being to secure McClellan's right flank and to prevent General Wise from reinforcing Garnett at Rich Mountain. With three regiments Cox arrived at Gallipolis, where he was joined by another regiment, and on the 10th crossed the river to Point Pleasant, where he received orders from McClellan to drive Wise from the Kanawha Valley. Cox went up the Great Kanawha on steamboats, and at the mouth of Scarey Creek, on the south side of the river, found his passage disputed by a force of 200 men, with two guns, under command of Colonel Patton. It was necessary to dislodge Patton, whose two guns commanded the river. A small body of Cox's command had reconnoitered the position, and awaited the arrival of Cox's main body, which came up on the 16th. Cox landed on the north side of the river, and on the 17th Colonel Lowe, with the 12th Ohio, two com¬ panies of the 21st, and some cavalry, in all 1,020 men and two guns, was landed on the south side of the river and advanced upon Patton, reaching the bank of the creek about 3 p.m. The two guns were put in position and the cavalry advanced, but were speedily driven back by the Confederate guns. The artillery now opened on both sides and, after some sharp firing, Patton's men were seized with a panic; but reinforcements coming up, they were rallied, and the Confederates advanced and took position along the bank of the creek, across which there was quite a severe contest. A small Union force was sent across the creek to turn the Confederate left and seize their guns; but, not waiting for this movement to develop, the main body charged across the creek and drove the Confederates up the hillside, back upon their guns, and another panic ensued. But more reinforcements coming up, the Confed¬ erates rallied and poured such a telling fire into the advancing Union line that it fell back in*

disorder, leaving dead and wounded on the field, recrossed the creek, and continued the retreat. The Union loss was two officers and 12 men killed and 47 men wounded ; the Con¬ federate loss one officer and four men killed and nine wounded. Two colonels, a lieutenant- colonel, and two captains of Cox's command, whose regiments were not engaged, but who were led by curiosity to see a fight, left camp on the north side of the river

and were taken prisoners. This check delayed Cox's advance up the river several days, until he could get land transportation. Consult (Official Record) (Vol. II).

SCARID.7E, a large family of fishes, repre¬ sented by the parrot-fishes, which occur in all warm seas, lingering about coral reefs and weedy rocks. Few species are of any value as game or for food, but some are utilized in the West Indies and Hawaii. See Ichthyology.

SCARLATINA. See Scarlet Fever.

SCARLATTI, skar-laa'te, Alessandro,

Italian composer: b. Trapani, Sicily, 1659; d. Naples, Italy, 24 Oct. 1725. Appointed maestro di capella by Queen Christina of Sweden, he wrote his first opera for performance in her palace. He produced his first oratorio (I Dolori di Maria sempre Vergine, in 1693, and was then appointed maestro di capella to the viceroy at Naples. He held the position of chapel-master at Santa Maria Maggiore, Rome, 1707-09, and then returned to Naples. Scar¬ latti was possessed of great fertility of imagina¬ tion. In method he opposed the enemies of the counterpoint, being considered the greatest con¬ trapuntist of his age, and the inventor of ac¬ companied recitative. His compositions, few of which have been published, included 115 operas, 200 masses, 9 oratorios, 500 cantatas, and mis¬ cellaneous minor pieces. Three of his operas,*

SCARLET FEVER, or SCARLATINA,

an acute infectious disease, the specific cause of which has not yet been discovered (1919). The disease is characterized by a rapid onset of fever, general symptoms of poisoning, and later by the appearance of a typical rash. The disease was not definitely described until the latter part of the 16th century, although an oc¬ casional case is suggested in literature before that time. Epidemics ravaged Europe for 150 years before the disease made its appearance in America; this was in Massachusetts in 1735; and the disease then spread all over New Eng¬ land and the rest of North America. Not until 1830 did it get a foothold in South America, but since that time epidemics have been wide¬ spread and frequently very malignant.

In spite of laborious researches, the caus¬ ative agent has as yet eluded detection. The disease is transmitted directly from one indi¬ vidual to another, or through articles which have been in the sickroom, such as clothing, bedding, paper, pictures, and particularly those substances from which infectious material is not readily dislodged. The virus is not killed by

cold, but dry heat, steam and gasses such as fornjaldehyde or chlorine are thought to destroy it after a comparatively short exposure to their action. It is doubtful if this is true. The con¬

tagion is given off in the discharges of the nose and throat, in the vomit, in mother's milk and in the desquamated skin. It may also be carried in the milk-supply, as animals are liable to the disease. It occasionally happens that the disease is transmitted before the appearance of the rash, but the most contagious period is after the onset of desquamation. The young are particularly liable to the disease. One attack usually protects the individual for life.

The period of incubation lasts from two to seven days, and occasionally longer. The onset is usually sudden and active, the patient appear¬ ing very sick and dull, complaining of sore throat and general pains througout the body. Severe and persistent vomiting ushers in the attack. The temperature rises rapidly, reaching 103° or 104° F. in the first 24 hours. These symptoms constitute the prodromata, lasting from 12 to 36 hours; at the end of which period the rash appears, first on the front of the neck and chest, and gradually spreads over the entire body in two or three days. This rash is a dif¬ fuse blush of brilliant scarlet hue, showing tiny elevations of a deeper color scattered through the general redness. The temperature and severity of the disease increase until the rash is all out, then gradually subsides, the temper¬ ature reaching normal about the 10th day. The tongue shows similar elevations to those described on the skin, and hence is described as ((strawberry tongue.® The throat presents a general intense redness of the pharynx, palate and tonsils, with sometimes small white spots, or considerable patches of false membrane of a pearly white appearance. Desquamation be¬ gins about seven days from the appearance of the rash, and the parts that are first affected are the first to desquamate. The process continues until the entire skin of the body is shed. At first the desquamation is in the form of tiny particles, but after it has continued for a few days the skin begins to peel off in large flakes, sometimes even the entire skin of the hand or foot being shed in one piece. This process is not completed in less than 10 days, and may take over six weeks, the skin between the toes and fingers being the last to peel. There may be an entire second desquamation, but it is doubtful if this ever carries contagion. The popular belief that the disease is more serious to adults than to children does not seem to be warranted by the observation of eminent au¬ thorities.

The complications of scarlet fever are com¬ mon and frequently very serious. From the throat germs may pass through the Eustachian tubes to the ears, causing inflammation there. The lymphatic glands of the neck may be en¬ larged by the poison passing through them, and sometimes they suppurate. Inflammation of the joints having all the characteristics, of

rheuma¬ tism is very common ; and affections of the heart may follow this rheumatic complication. There is probably more or less affection of the kidneys in all but the very mild cases, but in some the inflammation of the kidney structure is so severe that the picture of acute nephritis is paramount. (See Kidneys). From such in¬ flammation the patient may entirely recover, being left with normal kidneys, or he may suc¬ cumb because of their impairment ; or, again, the kidneys may be left permanently changed; this last condition being particularly apt to

occur when the inflammation sets in late in the disease or during convalescence. Ordinary cases of scarlet fever are seldom fatal if the complications referred to are absent.

The diagnosis, before the appearance of the rash, is suggested by the rapid onset of the symptoms, the intensely red throat, and the per¬ sistent vomiting. The prolonged period of fretfulness, watery eyes and running nose of measles does not occur in scarlet fever; and, differing from that of scarlet fever, the desqua¬ mation of measles is bran-like. If a membrane is formed in the throat, it may be necessary to resort to bacteriological examination to distin¬ guish between diphtheria and scarlet fever. There are many drugs which may cause a rash, closely resembling that of scarlet fever; among them, carbolic, benzoic, boracic and salicylic acids, salol, alcohol, antipyrin, phenacetin, ar¬ senic, mercury, potassium chlorate, quinine, sul- phonol, belladonna, hyoscyamus, copaiba, cubebs, rhubarb, strychnine and various pto¬ maine poisons. The rash caused by these sub¬ stances comes out very quickly, and usually is of very short duration, while differentiation is also made by the absence of constitutional symptoms or the peculiar symptoms of the drug.

The malignant types of scarlet fever have sometimes characterized entire epidemics, but they are now rarely seen. Such cases are seen from the start to be very serious, being attended with high fever, rapid and feeble pulse, intense and persistent vomiting, headache, delirium and coma, death ensuing in two or three days.

Treatment. — As scarlet fever is self-limit¬ ing and no specific remedy is known that in any way reduces the virulence of the intoxica¬ tion, reliance must be placed on careful nurs¬ ing of the patient, constant watch to ward off complications, measures for the relief of such complicating inflammations as do develop and scrupulous efforts to prevent the spread of the disease. Since isolation must be continued for six weeks at least it is

important to select a bright, sunny room, if possible, having an open fire. The patient is kept in bed for at least two weeks, commonly much longer. The vom¬ iting is relieved by small pieces of cracked ice ; the throat is sprayed twice daily with a mild antiseptic, such as boric acid ; the patient is bathed with lukewarm water if the temperature is high, but antipyretic drugs are best avoided. After desquamation begins the entire body is covered daily with a simple ointment to favor it and to diminish the possibility of the con¬ tagion being carried. For the first four weeks of the disease the diet consists entirely of milk, but careful watch must be kept of the kidneys, as their impairment may demand a longer con¬ tinuance of that diet. Not until the lapse of six weeks at least is the patient allowed to go out of doors, and not then if the weather be inclement. To prevent the spread of the dis¬ ease, thorough disinfection of the sickroom and all of its contents is essential. The patient, is thoroughly washed with a solution of corrosive sublimate, then removed to another room to be dried and dressed. The mattress is wrapped in wet cloths, removed from the house, and pref¬ erably destroyed. Everything that has been left in the sickroom should be disinfected with solutions of antiseptic property, or subjected to the action of steam in a closed chamber.

The wall paper should be scraped off, and the walls, ceiling and floor washed with a strong solution of corrosive sublimate, a mop or a loaf of bread being used. Formaldehyde gas is then to be generated in the room for 10 hours, after which the windows are left wide open for several days.

SCARLET GRAIN, a dye-stuff consisting of coccid insects allied to cochineal. See Coccus.

SCARLET IBIS. See Ibis.

SCARLET LETTER, the first and by gen¬ eral consent the greatest of Nathaniel Haw¬ thorne's four chief romances, was originally planned as a short tale, and was expanded to its present proportions on the urgent advice of the author's friend and publisher, James T. Fields. When, with the change of administra¬ tion in 1849, Hawthorne was removed from the surveyorship of customs at Salem, he under¬ took a collection of short pieces that might have borne to the custom-house, where he had worked, the same relation that his preceding collection had borne to the Old Manse, where he had lived. An introductory sketch, (The Custom-House, written for this collection, is always prefixed to (The Scarlet Letter,* though it has no real connection with the romance, and though it contains some unfortunate personali¬ ties which show the writer's ill-temper over the loss of his position. The account in this sketch of the finding of a moth-eaten em¬ broidered ((A** and a manuscript in the upper rooms of the custom-house is of course fanci¬ ful. Years before, in the tale of (Endicott and the*

*Red Cross, * Hawthorne had made inci¬ dental mention of a woman who was forced to wear a scarlet <(A** in token of her guilt, and the thought of this punishment, or rather of its effect on the wearer, seems to have remained with him until it resulted in the creation of Hester Prynne. (The Scarlet Letter) was pub¬ lished in the spring of 1850, and instantly won for the author a recognition that had been denied to the delicate and finished shorter tales of his earlier collections. Its reputation in America has increased rather than diminished with time, and it has been warmly praised in England. In other countries it is less known, perhaps partly because many of its effects are too subtle for translation, partly because the peculiar New England quality is not readily appreciated by those of another race. (The Scarlet Letter) is in every way typical of Hawthorne. The background is colonial New England, and the theme is the effect of a great sin on the four persons most concerned — Hester Prynne, who wears the scarlet letter, her paramour, the wronged husband, and the child who is the offspring of illicit love. When the tale opens, the sin is a thino- of the past, and the judgment of the law has been imposed. The author passed by the story of love, fempta- tion, yielding, and discovery, and beginning where another novelist might have ended he traced the moral and spiritual tragedy which followed. Even in the handling of this material he made no use of the ordinary devices of the story-teller. Thus, the identity of the guilty man, which might have been so treated as to arouse curiosity and then revealed with star¬ tling effect, is allowed to transpire quietly. The chief contrast is between Hester, who suffers*

openly, and her partner in guilt, who maintains his honorable position in the community unsus¬ pected ; and the lesson which is most likely to be drawn is that of the virtue of open expia¬ tion, and the evil of concealment, even where there seem to exist the strongest arguments against confession. In the author's own words, <(Be true! Be true! Be true! Show freely to the world, if not your worst, yet some trait whereby the worst may be inferred!® A sec¬ ondary moral, the deadening effect of a secret and long-continued plotting for revenge, as seen in the husband, Chillingworth, is almost too obvious. Yet (The Scarlet Letter, while it is sure to stimulate thought, is not in any sense a preachy book. The reference in the conclusion to Hester's belief in <(a new truth® which should (*

William B. Cairns. SCARLET TANAGER. See Tanager.

SCARLETT, Sir James Yorke, English soldier: b. 1799; d. December, 1871. He was educated at Eton and Cambridge, entered the army, and in 1854

was sent to the Crimea in command of the heavy brigade. On the 25th of October he led the brigade in its famous charge at Balaclava, and later in the day it brought out of action the remnants of the light brigade after its even more famous charge. In both of these actions Scarlett took a prominent part in the hand-to-hand conflict. For these services he was promoted to the rank of major- general, on 12 December following, and upon the retirement of Lord Lucan took command of the entire cavalry forces in Crimea. In July 1855 he was created a K.C.B. He commanded the camp at Aldershot 1865-70, and retired from active service in the last-named year.

SCARP. See Fault; also Escarpment.

SCARPA, skar'pa, Antonio, Italian anat¬ omist: b. Friuli, Italy, 13 June 1747; d. Pavia, Italy, 31 Oct. 1832. He studied medicine at Padua, in 1772 was appointed professor of an¬ atomy at Modena, and published in that year his first work on the anatomy of the ear, (Ana- tomicae Observationes de Structura Fenestrae rotundae AurisP In 1783 he resigned this chair to accept a similar one at Pavia, where he pub¬

lished his great work, (Anatomicae Disquisi- tiones de Auditu, etc. (1789). At the time of the revolution in Italy he was deprived of his professorship in the university on account of re¬ fusal to take the oath required by the Cisalpine republic. He now published his celebrated work on (Aneurisms) (1804). When Napoleon, after his coronation as king of Italy, arrived at Pavia (1805), and received the officers of the university, he inquired after Scarpa. He was informed that he had long ceased to be a mem¬ ber of the university, and was told the reason. (*

SCARPANTO, skar'pan-to (ancient Car- pathos), a Turkish island of the Mediterra¬ nean, 28 miles southwest of Rhodes. It is 27 miles long by six miles wide, is rocky and mountainous, and has four harbors, two on the east, one on the north and one on the south¬ west side, known respectively as Port Pernesi and Port Avdemo, Port Skomaco and Port Grato. There are indications pointing to a former dense population, as judged from the numerous ruins of towns. Pop. 5,000.

SCARRON, ska-ron, Paul, French author and playwright: b» Paris, France, 6 July 1610; d. there, 6 Oct. 1660. Refusing to take orders he led a wild life in Paris and in Rome, to which city he went in 1634. Shortly alter his return to Paris in 1637 he was stricken with an illness which left him a paralytic for the rest of his life. His mind was not affected, however, and he made his livelihood by literature. At one time he was the pensioner of the queen, but los¬ ing his pension through the influence of Car¬ dinal Mazarin, he then wrote in revenge his satirical (Mazarinade (1649), one*

of his best- known works. He married in 1652 the young and beautiful Francine d'Aubigne, afterward Mme. de Maintenon. Both before and after this event, which Scarron survived eight years, his house was the centre of a brilliant literary society. The most famous of Scarron's writ¬ ings in his own time is said to have been his

1786).

SCARZONERA, a genus of composite plants with numerous species, chiefly indige¬ nous to the Mediterranean regions. The flowers are yellow or rarely rose-colored, having many series of involucral bracts, plumose and unequal pappus, and achenes without a beak and gen¬ erally wingless. Y. hispanica, sometimes known as viper's grass, has long been cultivated for its tapering, fleshy, edible roots, the dark-brown skins of which have caused it to be called black salsify. The leaves are long and lanceolate with waving edges. Other species are also cultivated for their roots.

SCAUP, skap, or BLACKHEAD DUCK,

a duck (Aythya marila), of the same genus as the redhead (q.v.), which it closely resembles in form but from which the green-glossed black

head of the male and the white face of the female distinguish it. It is a very abundant duck about the shores of the North Atlantic, frequenting the sounds, bays and estuaries of the United States to Central America in winter and in the spring passing northward and inland to breed. On the coasts of the New England and Middle States the scaup is most abundant during the fall migration, occurring in flocks which feed chiefly upon small mussels and other marine animals, especially mollusks, secured by diving.

A closely related species is the lesser scaup duck (A. affimis), which is almost an exact smaller counterpart of the blackhead, except that the head of the male is glossed with purple instead of green and the length is about 16 instead of 18 inches. This species regularly con¬ sorts with the larger scaup and is altogether similar in distribution and habits. Both species are shot in large numbers by sportsmen and market gunners and regularly sold in the mar¬ kets, but the flesh is rather coarse and strong- flavored.

SCELIDOTHERIUM. See Megathe¬ rium.

SCELOPORUS, se-lop'6-rus, a genus of lizards of the family I guanidcB , to which the Florida chameleon (Anolis) and the horned toads (

Phrynosoma) also belong. Among its kindred, this genus is distinguished by its im¬ bricated keeled scales, the absence of a dorsal crest, of gular folds or a gular sac and of head- spines. The tympanum or ear-drum is exposed between the small scales of the side of the head ; the tongue is fleshy and shaped some¬ what like an arrowhead ; teeth are confined to the jaws and have trilobate summits. Femoral pores, the secretion of which assists the sexes in mating, are well developed. Between 30 and 40 species of this genus are known, all of them American and most of them confined to Central America, Mexico and the southwestern United States. In this region these lizards are ex¬ ceedingly abundant and are everywhere con¬ spicuous objects. They are chiefly terrestrial, but many of the species also live upon stone walls or fences or run up tree trunks when alarmed. Their food consists of insects, which they seize with the greatest agility. In tem¬ perate regions they hibernate in cold weather. The males are generally ornamented with bright colors on the under parts which may be con¬ sidered to be secondary sexual characters. The eggs, which have a parchment-like shell hardened with lime, are usually retained in the oviducts until the young are partly or wholly developed ; when deposited, holes in the ground, decayed stumps, etc., are utilized for their con¬ cealment. As in many other lizards, the tail is easily broken along an unossified plate across the body of the vertebrae, after which it regen¬ erates, but always imperfectly. The only eastern species is the common swift or fence-lizard (S. undulatus). Consult Cope, (The Crocodilians, Lizards and Snakes of North America (United States National Museum, Washington 1900).*

SCENES OF BOHEMIAN LIFE, The,

by Henri Murger (1822-61), though published at the beginning of his literary career (they began to appear in the periodical press in 1847) mark the highest point in his achievement. His poetry (he always believed himself a poet) has

not stood the test of time, and his later novels are outranked by their predecessor. This suf¬ fices, however, to give him his place which is larger in the affectionate remembrance of his compatriots than in French literary history, for his success was due to the peculiar optimism and buoyancy of his temperament rather than to any special artistic quality. This temperament allowed him to regard his own difficult and har¬ assed life as a subject for comedy and high- spirited rejoicing. His famous work frequently reproduces scenes and incidents in his own experience. The son of a Paris janitor and tailor, he was driven from home as a lad and in his effort to win recognition as a poet was reduced to a condition of starvation which resulted in impairing his vitality and fre¬ quently brought him into the wards of Paris hospitals. To support himself he was at in¬ tervals, like

his hero Rodolphe, reduced to uncongenial and often unpaid tasks on cheap ephemeral trade journals like the Scarf of Iris or Beaver (Le Castor) of the Scenes. On one ever memorable occasion he, however, received for past and future services 500 francs, which provides one of the well-known incidents of his story. The indulgent ever-smiling young Bohemiennes, like Mimi and Phemie and the rich young lady cousins, never if ever appeared in the doorway of his garret where he toiled unremittingly for success. It is for this reason that it is no true picture either of his own struggle or of the hard-working and serious life of the Latin Quarter of his time, which, though it had its rare gala days of festival and high spirits, had also its long months and years of unrequited toil that often ended in final poverty and failure. For this reason those who know ((Bohemia)) best refuse to recognize Mur¬ ger as its portrayer. A truer picture is to be found in the biographies of Balzac or Zola or Daudet, who passed through its toil and trials before or after this time. It should also be remembered in this connection that of the hun¬ dreds of talented young men who struggled with them only a very small percentage won lasting recognition or any financial reward. Murger was, therefore, not in any sense a realist but a delightful humorist and idealist who created certain exaggerated but ever fresh and amusing types and who made a life of toil against heavy odds, relieved by the joys of youthful comradeship and kindred aims, appear as one long and uninterrupted holiday. This exaggeration of type is the reason why his heroes and heroines with but little change make the strikingly successful characters of the light opera by Puccini based upon his work. It was Bohemia as he would have wished it, but as it never was for him or his serious brothers in the fellowship of art. See Bo- heme, La.

Christian Gauss.

SCEPTICISM, in its widest meaning, is a state of doubt or suspense of judgment. It is often used in connection with religious belief, and here indicates doubt or disbelief of author¬ ized doctrines. The word scepticism has a spe¬ cific meaning, however, which is implied in its more general uses, and in this meaning it has a philosophical reference and relates to the problem of knowledge. Thus used, scepticism signifies systematic doubt or entire disbelief in

the ability of the human mind to attain knowl¬ edge of positive or objective truth. Such scep¬ ticism has been of frequent occurrence in the history of thought from antiquity to the present time. It has received systematic expression from several noted thinkers who supported their conclusions by

explicit arguments. The grounds of systematic scepticism are many and cannot be given in full detail. Its fundamental basis in theory is usually found in the assump¬ tion that knowledge arises from a succession of particular sensations which are (1) subjective modifications, and (2) detached and transitory mental states. As subjective modifications, these sensations are the product of the sense- organs of the individual. Their nature de¬ pends upon the structure of the particular sense-organ, which varies with each individual, and also upon the bodily condition of the indi¬ vidual which varies from moment to moment. Hence these sensations, being relative to indi¬ vidual structures and conditions, have only a subjective value, and can yield no truth that is objective and necessary for all. As detached and transitory mental states, these sensations can furnish no criterion of truth beyond the single sensation. Because detached and par¬ ticular, such a single sensation can justify no conclusion of universal validity. Because itself transitory, such a single sensation can reveal nothing of a permanent and abiding reality. Beside these theoretical considerations, many practical reasons have been urged to support scepticism, such as the difference of opinion and belief among different peoples upon most vital matters of life and morals. In antiquity the first important exponents of scepticism were the Sophists of Greece. Of this school Protagoras held that all truth was relative, since all sensations were subjective. At a later period in Greek thought, a systematic scepti¬ cism was developed by Pyrrho of Elis and elaborated by his school. According to the Pyrrhonic scepticism, the real nature of things is entirely unknown to us because of the sub¬ jectivity of our impressions and opinions; and, consequently, our proper attitude is one of sus¬ pense in judgment and apathy in conduct. The foremost representative of scepticism in modern times is David Hume. He maintained that ((all knowledge resolves itself into proba¬ bility® ; for, being based upon particular im¬ pressions, it can reveal nothing of permanent or objective reality beyond the succession of sensations. In estimating the importance of scepticism in the history of thought, one must distinguish between scepticism as (1) a pro¬ visional stage and (2) a final conclusion of thought. As a provisional stage, scepticism has discharge an important office in the devel¬ opment of thought. In the life of both indi¬ vidual and race, periods of scepticism are use¬ ful in disposing of traditional beliefs which lack adequate foundation, and so in preparing the way for better-established conclusions. Thus with Descartes a stage of doubt was pre¬ liminary to his positive thought, and likewise the scepticism of Hume was preliminary to the constructive philosophy of Kant and his suc¬ cessors. As a final conclusion scepticism has never been permanently satisfactory, because the inherent demand of the human mind is for positive truth.

Consult Plato,

Epicureans, and Sceptics) (tr. London 1892) ; Hume, (Treatise of Human Nature} ; Owen, (Evenings with Sceptics. }

SCEPTRE, originally a staff, the emblem of sovereign power. The baton, or short sceptre, has always remained a sign of distinc¬ tion. In the Greek assemblies a person who wished to speak received a sceptre from the herald; and the judges also bore it while in • the exercise of their authority. Kings swore by the sceptre. By degrees it became the emblem of power alone. Through the Roman emperors it passed to the western monarchs.

SCHAAFFHAUSEN'SCHER, A., (shaf-

hou'zen-sher bank-fer-ine,) BANKVEREIN. The A. Schaaffhausen'scher Bankverein of Cologne was founded in 1848 as a reorgan¬ ization of the firm of Abraham Schaafhau- sen (seriously affected by the troubles of the same year), with a capital of 5,187,000 thalers (about 15,600,000 marks), of which the initial issue was 3,199,800 thalers. In 1914 it was absorbed by the Disconto-Gesellschaft (q.v.) , retaining its name and clientele under the management of W. L. Deichmann, Gustav Me- vissen and Victor Wendelstadt, men of caution and experience, the institution began its activi¬ ties in the fostering of important industrial en¬ terprises. Its purpose may be inferred from an excerpt from the annual report for 1852 — (

branches and numerous agencies, deposit offices and subsidiary connections. Most im¬ portant, however, is the community of interest, mutual in terms, between the Dresdner Bank and the Bankverein, beginning 1 Jan. 1904. Representation is maintained on the boards (1908) of 94 other industrial and financial in¬ stitutions. The capital of the Bankverein (1908) was 145,000,000 marks; and 34,157,125 marks surplus. The total capital power of the A. Schaaffhausen'scher Bankverein group was (1908) 278,538,001 marks, of which 231,000,000 marks constituted the capital, and 47,538,001 marks the surplus. Consult Riesser, Dr. J. (1909), (Die deutsche Grossbanken und ihre Konzentration5 ; Germany's Economic Forces) (1913) ; (Report on Co-operation in American Export Trade > (Washington 1916).

SCHADOW, sha'do, Johann Gottfried,

German sculptor: b. Berlin, 20 May 1764; d. there, 27 Jan. 1850. After many vain struggles to become an artist, he was admitted to the studio of the sculptor Tassaert and thus at length succeeded in devoting himself to his

chosen art. Soon afterward he ran off with his sweetheart to Vienna, and there married her; and then, at the expense of his father-in- law, went to Italy, where he wrought with un¬ wearied diligence from 1785 to 1787 in the mu¬ seum of the Vatican and of the Capitol, win¬ ning a prize by his group (Perseus and Androm¬ eda. } In 1788 he obtained the position in Berlin which had become vacant by the death of his teacher Tassaert. His first great work was the monument erected in the Church of Saint Dorothea, Berlin, to the memory of the margrave, natural son of Friedrich Wilhelm II. This was followed by the colossal statue of Ziethen in hussar uniform; the statue of Fred¬ erick the Great in Stettin ; of Leopold of Des¬ sau in Berlin; of Blucher in Rostock; the Tauenzien monument in Breslau; Luther's in Wittenberg, etc. The four-horse chariot of Victory, over the new Brandenburg Gate of Berlin, was modeled by Schadow. Schadow executed many busts of his eminent country¬ men and numerous relievos and statuettes. In 1788 he was made rector and in 1822 director of the Academy of Art in Berlin, a position which he retained until his death. He was one of the first of the modern sculptors who dared to withstand the fantastic mannerism of the 18th century for which he substituted a power¬ ful representation of character based on a study of the antique. His most eminent pupil in this respect is Rauch ; among his other pupils may be named Dannecker, Tieck and Zauner. His chief literary works are (Wittenberg Denk- maler der Bildnerei, Baukunst und Malerei, mit historischen und artistischen Erlauterungen5 (1825) ; (Polyklet, oder von den Massen des Menschen nach dem Geschlechte und Alter) (1834) ;

SCHADOW, Rudolph, son of the preced¬ ing, German sculptor: b. Rome, 9 July 1786; d. there, 31 Jan. 1822. He was trained as sculptor by his father and his principal works are

(Spinning GirP; (Achiles and Penthesilea) ; (John Baptist5 and (Virgin and Child.5

SCHADOW-GODENHAUS, go den-hows, Friedrich Wilhelm, younger brother of the preceding, German painter : b. Berlin, 6 Sept. 1789; d. Dusseldorf, 19 March 1862. He re¬ ceived his first lessons in drawing from his father, then turned to painting and became the pupil of Weitsch. He served in the war between 1806 and 1807 and three years later resumed his artistic studies in Rome, where Cornelius, Over¬ beck, Veit and others had founded the new school of the Nazarenes (q.v.). He joined their company and from that time made the Italian masters his models, while the favorite subjects of his pencil were' biblical, or selected from the mystical and allegorical wonders of mediaeval tradition. As in the case of Overbeck, his devo¬ tion to this latter field of human imagination led him to become a member of the Roman Catholic Church. He painted (Heaven's Queen) for Madame von Humboldt and a (Holy Fam- ily) for the Crown Prince

Ludwig of Bavaria. The best work he did at Rome is seen in the frescoes for the Casa Bartholdy; (Jacob with Joseph's Bloody Coat) ; (Joseph in Prison) (both in the Berlin National Gallery). In 1819 he was called to Berlin as professor of the Art Academy there. During his incumbency he painted the (Bacchanalian Procession5 on the proscenium of New Theatre; many portraits; the (Visit of the Wise Men5 in the Garrison Church at Potsdam and another altar-piece for the church at Schulpforta. One of his finest pictures is (Freeborn Poetry,5 a lovely winged maiden rising from earth to heaven. In 1826 he was made director of the Academy in Dus¬ seldorf and with a circle of enthusiastic pupils became the founder of the Dfisseldorf school. He retained this connection until 1859, when age and failing sight led him to retire. Among his religious paintings are (Christ on the Mount of Olives5 ; (Christ at Emmaus5 ;

(1869).

SCHAEBERLE, sha'berle, John Martin,

American astronomer: b. Wfirtemberg, Ger¬ many, 10 Jan. 1853. He was brought to Ann Arbor, Mich., in his infancy, and was graduated from the University of Michigan in 1876 as a

civil engineer. He has, however, devoted him¬ self to the study of astronomy, to which de¬ partment of knowledge he has made valuable contributions. From 1876 to 1888 he taught astronomy in the University of Michigan, and was then called to the Lick Observatory at Mount Hamilton, Cal., where he made several important astronomical investigations. He had charge of the expedition to witness the eclipse at Cayenne in 1889, and of those for the same purpose to Chile in 1893, and to Japan in 1896. He is now, and has been for some years past, engaged in theoretical and experi¬ mental investigations on gravitation, light, heat and electricity. He is a frequent contributor to astronomical journals.

SCHAEFFER, Nathan C., American cler¬ gyman and educator : b. Maxatawny, Berks County, Pa., 3 Feb. 1849; d. Lancaster, Pa., 14 March 1919. In 1867 he was graduated at Franklin and Marshall College after which he studied divinity at the Theological Seminary of the Reformed Church and finished his educa¬ tion at the universities of Berlin, Tubingen and Leipzig. From 1875 to 1877 Dr. Schaef¬ fer was professor at Franklin and Marshall College and from 1877 to 1893 was principal of the Keystone State Normal School. In the year last named he became State

superintendent of public instruction, a post he held until his death. He also served as president of the State board of education and was president of a commission that prepared a new school code for the State, and was a member of the simplified spelling board. In 1879 he received the degree of doctor of philosophy and in 1904 received the degrees of doctor of divinity and doctor of laws from Dickinson College. He was a prolific writer on educational and re¬ ligious subjects. His works include 'Thinking and Learning to Think> (1900) ; (History of Education in Pennsylvania) ; (editor) 'Bible Readings for Schools) (1897) ; introduction to Hinsdale's (Civil Government ; Riddle's Nicholas Comenius) ; (Life of Henry Harbaugh,5 and editor of the Pennsylvania School Journal after 1893.

SCHAFF, shaf, David Schley, American Presbyterian clergyman and educator, son of Philip Schaff (q.v.) : b. Mercersburg, Pa., 17 Oct. 1852. He was graduated at Yale in 1873 and in 1877 was ordained in the Presbyterian ministry. He served as pastor in 1877-1907 ; was professor of church history at Lane Theo¬ logical Seminary in 1897-1903 ; and since 1903 has been professor of ecclesiastical and doctrinal history there. He was a delegate to the Pan- Presbyterian Council at Aberdeen, Scotland, in 1913. He was one of the editors of the 'Schaff-Herzog Encyclopedia (4 vols., 1883) ; and of 'History of the Christian Church* (Vols. I— II, 1907-10) ; and author of 'Commen¬ tary on Acts) (1882) ; 'Life of Philip Schaff* (1897) ; 'John Huss) (1915), etc. He trans¬ lated 'The Church* by Huss (1915).*

SCHAFF, Philip, American clergyman and scholar: b. Coire, Switzerland, 1 Jan. 1819; d. New York, 20 Oct. 1893. He studied at Tubingen, Halle and Berlin, and was a lecturer in the latter university in 1842-44. He then came to this country where he was professor in the theological seminary of the German Re¬ formed Church at Mercersburg (Pa.) 1844-63.

*In 1864-69 he was lecturer in several theologi¬ cal institutions, and in 1870 became professor of sacred literature in Union Theological Sem¬ inary, New York. This post he held until his transference in 1887 to the chair of church his¬ tory in the same institution. He was one of the founders of the Evangelical Alliance and went as delegate to its general conferences at Basel in 1879, and at Copenhagen in 1884. He was president of the American Bible-revision com¬ mittee, organized by him in 1871 at the request of the British committee. He was a prolific writer and editor, his works including 'History of the Apostolic Church) (1853); 'History of the Christian Church) (1867; new and enlarged edition, 7 vols., 1889-92) ; 'Creeds of Christen¬ dom * (1877) ; 'Schaff-Herzog Encyclopedia of Religious Knowledge* (as editor) ; 'Dictionary of the Bible * (1880) ; 'Church and State in the United States) (1888) ; 'Literature and Poetry)*

(1890).

SCHAFFHAUSEN, shaf'how-zen, Switzer¬ land : (1) Capital of the canton of its own

name, situated on an eminence overlooking the Rhine, 24 miles north of Zurich. It is quaintly and irregularly built. The buildings most worthy of notice are the feudal castle of Munot, of Roman construction, standing on a command¬ ing height; the parish or Saint John's Church; and the cathedral (1052), a massive basilica con¬ taining a bell whose inscription suggested Schiller's 'Song of the Bell, and Longfellow's 'Golden Legend) ; the town-house (1412); the Imthurneum, containing theatre, concert rooms, etc., the museum containing manuscript col¬ lections of Johann von Muller, who was born here, the town library, etc. There are primary and high schools. The environs are beautiful; three miles distant are the celebrated falls of the Rhine, almost 300 feet broad, falling more than 70 feet in three cascades formed by two pillars of rock. The Fasenstaub is a fashion¬ able promenade. The principal industrial works are the wagon and carriage factories, cotton and woolen manufactories, iron works, distilleries and breweries. Pop. about 15,957. (2) The canton of Schaffhausen covers an area of 114 square miles; and occupies the most northern angle of the Swiss territory. It be¬ longs to the Swabian Jura, and the population uses almost exclusively the German tongue. The canton entered the Swiss Confederation in 1501, and by the constitution of 1876 became exceedingly democratic. Education is com¬ pulsory. The taxes are very low. Financially it is the most favored among the Swiss cantons. All the cereals are raised, besides hemp and flax. There is abundance of fruit, especially grapes. The principal manufactures are alumi¬ num, wagons, wool, ropes and watches. Pop. about 47,270.*

*SCHAFFLE, sha'fle, Albert Eberhard Friedrich, German political economist and so¬ ciologist: b. Nurtingen, Wiirtemberg, 24 Feb. 1831 ; d. Stuttgart, 24 Dec. 1903. He was edu¬ cated for the ministry at Tubingen but adopted a journalistic career. In 1861 he was called to the University of Tubingen as professor of political economy, and in 1868 to Vienna. His principal contributions to the literature of polit¬ ical science are his 'National Economy * (1861- 73) ; 'Capital and Socialism* (1870) ; 'The Fundamental Principles of Taxation > (1880) ;*

and Quintessence of Socialism7 (1884, 8th ed., 1885). In 1895 he began to write upon sociological questions and to develop the biological theory of

society. His (Bau und Leben des socialen Korpers) is a more detailed attempt to explain society as a living organism than that essayed by any previous writer. This book, completed in 1896, placed him in the ranks of modern sociologists.

SCHAFFNER, Jakob, German novelist: b. Basle, Switzerland, 15 Nov. 1875. He carried on his university studies in his native city, and there he wrote most of his works until he changed the scene of his studies to Charlotten- burg, near Berlin, in 1912. His best novels are (Vol. XIX, New York 1914).

SCHALCKEN, shal'ken, Godfried, Dutch

artist : b. Dordrecht, 1643 ; d. The Hague, 16 Nov. 1706. He was the pupil of Samuel van Hoogstraten and Gerard Douw. He visited England where he painted portraits, especially one of William III. His best work is in genre, and here he approached though still remaining inferior to his master Douw. He was fond of representing scenes by candle light, though he was scarcely ever quite true in the color rep¬ resentation of such light. When he attempted portraits in full length, as the fashion of the time of Sir Godfrey Kneller demanded, his efforts were not successful, with the possible exception of the portrait of William III, now in the Amsterdam Museum, but he soon be¬ came sensible of his error, and again painted on a small scale. Some of his best works are at the museums of Vienna, Dresden, Munich, Berlin, Amsterdam, The Hague, and at the Louvre.

SCHAMYL, sha'mil (Samuel), Tartar imam and warrior, leader among the tribes of the Caucasus : b. Aul Himri, northern Daghes¬ tan, 1797 ; d. Medina, March 1871. From 1824 to 1831 he took energetic part in Kasi Mollah's Roly war® against the infidel Russians, being severely wounded at the storming of Himri. A Sufi, he labored for the recrudescence of his faith in Daghestan, and was markedly success¬ ful. From 1837 he was temporal and spiritual head of the mountain tribes. His guerrilla method of warfare long enabled the Circassians to continue the struggle against Russia. Dur¬ ing the Crimean War he was supplied by the allies with arms and money. After incredible escapes he was at last taken (6 Sept. 1859), and kept under surveillance, though treated with consideration.

SCHARF, sharf, Sir George, English artist: b. London, 16 Dec. 1820; d. Westminster,

19 April 1895. He studied art under his father, a Bavarian artist who had settled in England, and in 1838, after gaining medals from the Society of Arts, entered the Royal Academy schools. In 1840 he visited Asia Minor, and again in 1843 as draughtsman to a government expedition. On his

return he devoted himself to painting in oil and to book-illustration, among the books illustrated by him being Murray's (Prayer Book,7 Macaulay's Rays, 7 Milman's Horace,7 Kugler's (Handbook of Italian Painting,7 Layard's books on Nineveh, Keats' Poems, and Sir W. Smith's Classical Dictionaries. He rendered valuable assistance to the Crystal Palace authorities in planning the Greek, Roman and Pompeian courts, and to Charles Kean in his Shakespeare revivals of 1851-57. He was art secretary to the Man¬ chester exhibition of 1857, and on the founda¬ tion of the National Portrait Gallery he began to make a special study of portraits, on which he soon became a recognized authority, and in 1882 he received the title of director of the gallery. His publications comprise Recol¬ lections of Scenic Effects7 (1839), the part on sculpture in Waring's (Art Treasures of the United Kingdom7 (1857). To his great knowl¬ edge and industry the National Portrait Gal¬ lery owes almost its whole value.

SCHARF, John Thomas, American his¬ torian : b. Baltimore, Md., 1 May 1843 ; d. there, 28 Feb. 1898. At the outbreak of the Civil War he entered the Confederate army, was engaged in the battles around Richmond, at Cedar Mountain, the second Battle of Bull Run and at Chancellorsville, and in 1863 became a midship¬ man in the Confederate navy. He participated in the capture of the Underwriter, near New Berne, N. C., and after the blockade was estab¬ lished he again joined the army. While on his way to Canada with dispatches he was cap¬ tured. In 1874 he was admitted to the bar, was a member of the legislature in 1878 and in 1884 he was appointed commissioner of the land office of Maryland. He was editor of the Balti¬ more Telegram and of the Morning Herald and wrote Qhronicles of Baltimore7 (1874) ; (History of Maryland7 (3 vols., 1879) ; his¬ tory of the Confederate States Navy7 (1887) ; (Natural and Industrial Resources and Advan¬ tages of Maryland7 (1885-90), etc.

SCHARNHORST, sharn'horst, Gerhard Johann David von, Prussian general : b. Bor- denau, Germany, 12 Nov. 1755; d. Prague, 28 June 1813. He entered the Hanoverian army in 1780 and soon distinguished himself as an officer of artillery. In 1804 he. was knighted by the king of Prussia, and in 1813 attained the rank of general in the Prussian army. In the re¬ organization of the army of Prussia in 1809-13 he proved himself an able general. The national spirit, awakened by the loss of the territories west of the Elbe, was greatly aug¬ mented by the genius of Scharnhorst, who in¬ fused the military spirit throughout the scat¬ tered populations of the Prussian domain by raising a large and well-disciplined volunteer army for the War of Liberation. In this cam¬ paign he was chief of staff under Bliiche-r, but was mortally wounded at the battle of Lutzen. Consult Rife by Lehmann (1886-87) ; von Boyen, Rrinnerungen7 (1891).

SCHECHEM, shek'em, Palestine. See Nabulus.

SCHECHTER, shelter, Solomon, Ameri¬ can theologian and Orientalist : b. Foqsani, Ru¬ mania, 1847; d. 19 Nov.. 1915. Participating in the rabbinical training given to Jewish children of his environment, in maturer years he. at¬ tended the Berlin and the Vienna universities and was graduated as rabbi in Venice. He was reader of Semitics, Cambridge University, Eng¬ land, 1892-1902, and professor of Hebrew at University College, London, 1898-1902. He traveled in Italy, Egypt and Palestine and made interesting discoveries of manuscripts in Cairo of peculiar value to students of the Old Testa¬ ment. He wrote 'Aboth de Rabbi Nathan) (1887) ; 'Studies in Judaism1 (1896) ; 'The Wisdom of Ben Sira1 (1899) ; 'Midrash-Ha- gadoP (1902) ; 'Saadyana) (1902) ; 'Studies in Judaism1 (2d series, 1908) ; 'Some Aspects of Rabbinic Theology1 (1909); 'Documents of Jewish Sectaries1 (2 vols., 1911) ; and after 1902 was president of the Jewish Theological Seminary of New York. In 1911 Harvard con¬ ferred on him the degree of Litt.D.

SCHEDONE, sha-do'na, or SCHIDONE, Bartolommeo, Italian painter : b. Modena, about 1570; d. there, 1615. He acquired an ad¬ mirable style by a careful and long continued study of Correggio, and his natural genius un¬ der the inspiration of that master enabled him to produce a great number of graceful and delicate pictures, both in fresco and oils. His portraits are the most remarkable of his pro¬ ductions and he painted many of the principal citizens of his native town. He also produced a great many religious paintings and was a successful etcher.

SCHEELE, sha'le, Karl Wilhelm, Swedish chemist : b. Stralsund, 19 Dec. 1742 ; d. Koping, 21 May 1786. His early education was received at Gothenburg. In 1770 he was made assistant professor of chemistry at Upsala, and there be¬ came celebrated as one of the greatest scien¬ tists of his time. His independent discovery of oxygen, a few months after that of Priestley, places him in the front ranks of the early phys¬ icists. He is known also as the discoverer of tartaric acid (1770), chlorine (1774), baryta (1774), glycerine (1784), and prussic acid (1782), and, ignorant of the results of Priest¬ ley's experiments, he also claimed the discovery of oxygen (1777). A new coloring matter com¬ monly known as Scheele's green was obtained by his experiments with arsenic. He was the author of 'Chemical Observations and Experi¬ ments on Air and Fire1 (1777) ; 'Essay on the Coloring Matter in Prussian Blue1 (1782).

SCHEELITE, native calcium tungstate. A mineral often found in crystalline quartz, asso¬ ciated with cassiterite, topaz, fluorite and wol¬ framite. It is

distinguished by its high specific gravity, 5.88 to 6.14, moderate hardness, 4.5 to 5, vitreous to adamantine lustre, the pyramidal hemihedrism of its tetragonal crystals, and their eminent pyramidal cleavage. Its streak is white, but its superficial colors vary greatly, white, yellowish or brownish being the most common. It is widely distributed, though not an abun¬ dant mineral, its occurrences in Bohemia, Saxony, Piedmont and England are the best known, while in Tasmania and at Trumbull, Conn., it is found in commercial quantities and

has been mined as an ore of tungsten. Molyb¬ denum is usually present replacing part of the tungsten.

SCHEFER, shaf'er, Leopold, German au¬ thor: b. Muskau, Lower Lusatia, 30 July 1784; d. there, 16 Feb. 1862. After a gymnasial train¬ ing he devoted himself to literature the only post he held being that of superintendent of the estates of Count Piickler, with whom he made in 1816-20 a journey to Italy and the East. His study of Oriental philosophy and religion appears in much of his verse. His works, of fiction, structureless and vague in characteriza¬ tion, are greatly inferior to his poetry, which is collected in such volumes as 'Vigilien1 (1842) ; 'Gedichte1 (3d ed., 1846) ; 'Das Laien- brevier1 (1834; 18th ed., 1884), and 'Der Welt- priester1 (1846). The last two were turned into English by C. T. Brooks (q.v.), as 'The Layman's Breviary1 (1868) and 'The World Priest1 (1873). Schefer was also something of a composer, writing an opera ('Sakontala1) and several quartettes. His 'Ausgewahlte Werke1 appeared in 1845-46 (2d ed., 1857). Consult the biography by Brenning (1884).

SCHEFFEL, shef'fei, Joseph Victor von,

German poet: b. Carlsruhe, 16 Feb. 1826; d. Carlsruhe, 9 April 1886. He was educated for the law at Heidelberg, Munich and Berlin, but gave up his legal career almost as soon as it was begun for that of literature. His first and greatest book, 'Der Trompeter von Sackin- gen,1 appeared in 1854. This poetic romance of the Thirtv Years' War reached its 190th edition in 1891. His second book, a romance in prose entitled 'Ekkehard1 (1855), was also one of the most popular of German love stories. His other works are 'Hugideo1 (1884) and 'Gaudeamus1 (1867-91), both romances; 'Frau Aventiure1 (1863-83); 'Bergpsalmen1 (1870- 83); ' Waldeinsamkeit1 (1880). (See Trump¬ eter of Sakkingen, The). Consult Klar, 'Scheffel und Seine Stellung in der Deutschen Literatur1 (1876) ; Lives of Proess (1887) ; Ruhemann (1866); Pilz (1887), and Zernin, 'Erinnerungen1 (1886).

SCHEFFER, shef'fer, Ary, Dutch painter: b. Dort, Holland, 1795 ; d. Argenteuil, near Paris, 15 June 1858. At an early age he sought Paris to study for the profession of an artist. Here he became a pupil of P. Guerin.

His first pic¬ ture, 'Abel Singing a Hymn of Praise,1 was exhibited in 1812, and at once established his reputation. In 1817 he produced the 'Death of Saint Louis1 ; in 1819 the 'Surrender of Calais to Edward IIP; and in 1822 'Francesca da Rimini.1 Of extremely versatile talents. Schef¬ fer traversed a very wide field in the domain of art, and his pictures comprise subjects both sacred and secular, historical and imaginative. Of the first of these the most celebrated are 'Christ Blessing Little Children1, 'The Agony in the Garden,1 and 'Christ the Comforter.1 From the writings of Goethe he has produced some admirable works, such as 'Margaret,1 'Mignon,1 the 'King of Thule1 and others; from Dante, 'Beatrice,1 from Byron, 'Me- dora,1 and from Schiller, 'Eberhardt.1 Schef¬ fer's pictures are principally remarkable for the refinement of expression and depth of feeling which they display. They are highly prized by collectors and a small replica of 'Paolo and Francesca da Rimini1 was sold in 1870 for

$9,607. Many of his chief works are in the Luxembourg or at Versailles.

SCHEIDEMANN, shi' de-man, Philip, Ger¬ man Socialist leader: b. Cassel, 26 July 1865. His father was a skilled artisan and the boy attended both the Biirgerschule and the Real- schule of his native city, later learning the trade of printer (1879-83). He became a member of the Social-Democratic party at the age of 18, and has been engaged in its activities ever since. In 1895 he became editor of a Socialist paper at Giessen, in 1900 at Nurnberg, later also at Offenbach and Cassel. In 1913 he toured the United States, lecturing in many cities before German-speaking branches of the Socialist party. In August 1914 he became rightly noto¬ rious through having defended the action of the Imperial German government declaring war on France and Russia, and, contrary to all the teachings of Socialism, aided in securing to the government the support of the Social-Demo¬ cratic party, which published aggressive justi¬ fications of the imperialistic war and induced a chauvinistic spirit throughout the country. After the German Revolution of 7 Nov. 1918 Scheidemann was a powerful factor in the counsels of the right wing of the party, sup¬ porting the new Socialist Chancellor, Friedrich Ebert, who took office 9 November. Most of the great Socialist leaders of the country were opposed to his tactics in retaining the former Imperial Minister, Dr. Solf, in the new Cabinet, and frequent uprisings of the Berlin ultra Rad¬ icals showed this disapproval of the Scheide- mann-Ebert regime, 6 Dec. 1918. Scheidemann was for a moderate revolution in Germany; he expressed his disapproval of the Russian Bol¬ shevik Revolution in the strongest terms.

SCHEINER, shi'ner, Christolph, German astronomer: b. at Waldt in Swabia, about 1575; d. 1650. Scheiner was professor of Hebrew and mathematics at Freiburg and at Ingolstadt from 1610-16, and after several years' residence in Rome he became rector of the Jesuit College at Neisse in Silesia. In 1612 he published his

SCHELDT, skelt, or SCHELDE, shel'de (ancient Scaldis), a river belonging in the various parts of its course to France, Belgium and the Netherlands. It rises in the French department of Aisne, at a height of 295 feet above sea-level, in the small lake of Beaurevojr, near Catelet. It flows northerly to Cambria, Valenciennes, Boudain and Conde, where . it first becomes navigable after junction with the Saint Quentin Canal. It enters Bel¬ gium between Montagne and Hollain, passes Doornik, Oudenarde, Ghent, Dendermonde, Rupelmonde, Tournai and Antwerp; at Ghent is joined by the Lys and the canals which con¬ nect that city with Sas and Bruges. There is considerable tide at Ghent, somewhat modified by sluices. The river makes a great bend toward Dendermonde and Antwerp, flows cir¬ cuitously north forming the boundary between Antwerp and East Flanders provinces. At

Antwerp it measures 1,600 feet in width, 45 feet in depth and still wider below, forms a secure harbor, which is capable of receiving the largest ships. Again turning northward, it is finally lost in the estuaries among the islands of Zealand. After reaching the Dutch frontier it divides into the East and West Scheldt, the latter and main stream flowing into the North Sea, below Flushing. Both branches connect with the Meuse and the Rhine. The entire length of the river is 211 miles. Its principal affluents are the Haine Dender, the Rupel, the Sensee, Scarpe and Lys. The entire region traversed by the Scheldt was made memorable by the appalling operations of the Teutonic armies in the World War from the time (1914) when Germany violated the guaranteed neu¬ trality and political integrity of Belgium by sending her armies through it to gain entrance into France.

SCHELLING, shel'ling, Felix Emanuel,

American educator: b. New Albany, Ind., 3 Sept. 1858. In 1881 he was graduated at the University of Pennsylvania, where he received the degree of LL.B. in 1883 and that of A.M. in 1884, and of Litt.D. in 1903 and LL.D. in 1909. Since 1893 he has been John Welsh Cen¬ tennial professor of English literature at the University of Pennsylvania. Dr. Schelling is a member of the National Institute of Arts and Letters, of the American Philosophical Society and of the Modern Language Association of America. He has published (Literary and Verse Criticism of the Reign of Elizabeth) (1891) ; (Life and Works of George Gascoigne (1893) ; (A Book of Elizabethan Lyrics> (1896) ; (A Book of 17th Century Lyrics> (1899) ;*

(The English Chronicle Play) (1902) ; (The Queen's Progress and Other Elizabethan Sketches) (1904); (History of Elizabethan Drama) (1908) ; (English Literature during the Lifetime of Shakespeare> (1910) ; (The Res¬ toration Drama (Cambridge History of Lit¬ erature, 1912) ; (The English Lyric) (1913) ; (A History of English Drama) (1914). He has edited (Ben Jonson's Discoveries> (1892) ;*

(Eastward Ho and the Alchemist (1903) ; (The Merchant of Venice) (1903) ; (Macbeth* (1910) ; ˆBeaumont and Fletcher* (1912).*

SCHELLING, Friedrich Wilhelm Joseph von, German philosopher : b. Leonberg, in Wiirttemberg, 27 Jan. 1775; d. Ragaz, Switzer¬ land, 20 Aug. 1854. He studied theology and philosophy at Tubingen and natural science at Leipzig. His philosophy of nature as presented in (Ideen zu einer Philosophic der Natur> (1797) and in Won der Weltseele) (1798), gained for him an appointment as professor at the University of Jena (1798). There he be¬ came the leading philosopher of the ((early romanticists® and was highly esteemed by Goethe. In 1803 he married Caroline, the former wiˆ of A. W. Schlegel (q.v.), and accepted a • professorship in Wurzburg. From 1806 to 182Gkhe lived in Munich as a member of the Acaoemy of Science and also (since 1809) as general secretary of the Academy of Arts. He resumed his academic work from 1820 to 1827 at Erlangen, and from 1827 to 1841 at Munich. The theosophical turn of his later works induced Frederick William IV of Prussia to call him to the University of Berlin (in 1841), as a counterweight against the radi-

cal left wing of Hegel's disciples. But his lec¬ tures on mythology and revelation met with scant success and he retired in 1846. Among the ever-changing phases of his philosophical evolution two main periods may be distin¬ guished ; the first, which found its consumma¬ tion in his <(system of identity,® is pantheistic in its general character; in the second period, be¬ ginning about 1806, he elaborates his "positive® philosophy, which rests on a theistic and theo- sophical basis.

Schelling had originally started as a dis¬ ciple of Fichte's <(Philosophy of the Ego,® but his study of Spinoza and his own love of nature soon induced him to attempt a vindica¬ tion of the external world, which Fichte had degraded by defining it as the mere <(Not-self.® In Schelling's Philosophy of Nature the ex¬ ternal world is the preliminary stage (Vor-stufe) of the Spirit. Nature is the unconscious side of the <(Absolute® or "Infinite,® just as the Spirit is its conscious side. Like Fichte, he conceives the "Absolute® as a process, as an activity (not as a substance) which continu¬ ously ascends from lower to higher forms of development. In carrying out this scheme he made use of many of the new ideas and dis¬ coveries that were then revolutionizing the natural sciences. Polarity (as exhibited in the two poles of a magnet) appears to him as the principle of all phenomena of nature. Everywhere, he sees dualism and polarity: positive and negative factors which neutralize each other, leading up to and producing a new reality. By means of repeated steps from lower to higher potencies the ((Soul of Nature® (Weltseele) unfolds itself. The primal dual¬ ism of expansion (((imponderable matter,® ether) and contraction (((ponderable matter,® gravity) reveals itself more distinctly in the magnetic, electrical and chemical phenomena of the inorganic world, and in the corresponding functions of reproduction, irritability and sensibility of living organisms.

In the phenomena of sensibility the external order of things reaches its culminating point. But the same processes of polarity and evolu¬ tion appear again on a different plane in the inner world of conscious existence. In his (System of Transcendental Idealism (1800; ex¬ tracts translated in Prof. Benj. Rand's (Modern Classical Philosophers,* 1908) Schelling repre¬ sented the (*

The first period of his philosophy found its final expression in his "system of identity,® as set forth in the (Darstellung meines Systems) (1801), in the platonic dialogue

regions variously denominated as Nature and Self, Matter and Spirit, Real and Ideal. But the connecting faculty of reason or "intellektuale Anschauung® (intellectual sight or perception, which is akin to the "intuition® of artistic genius) shows the antithesis of the two regions as only relative. Both are originally and es¬ sentially One; they are only two different forms of manifestation of the One Infinite. The In¬ finite or Absolute is the eternal Identity of the Real and the Ideal, which are the two poles of the Absolute. The process of the Universe con¬ sists in the splitting up of the original <(absolute Indifference® into the opposites that were latent in it, and in the striving for a reunion of the "differences® in an ultimate absolute Identity. This active process of the Absolute, ascending

from (

*After 1806, Schelling gradually became con¬ vinced that this rationalistic pantheism, which he now stigmatized as "negative,® must find its counterpart and consummation in a "positive® system. The "thread of dialectical movement may be sufficient as a guide through the world of the purely rational but it breaks as soon as it takes the weighty step into reality,® into the world of empirical specification. Here the con¬ tingent must be added to the necessary, and rational knowledge must be supplemented by irrational, but definite, experience of a higher order, which acquires the character of "Revela¬ tion.® The creation of the World is now the free act of a supernatural and personal God; the actual or contingent world has come into existence by a mystical falling away from the original identity in which it lived in the bosom of the Absolute and Divine Being. Schelling's (Essence of Human Freedom * (1809) shows clearly the influence of Jacob Bohme's theoso¬ phy. His (Philosophy of Mythology and of Revelation,* published after his death, consists of mystical speculations about pagan mythology and Christian doctrines. He distinguishes a Petrine and a Pauline Christianity which are represented in the Catholic and Protestant churches. Both are dominated by the Johannine theology which is the highest form of Chris¬ tianity.*

As an eclectic of the highest order, Schelling assimilated and welded into an imposing syn¬ thesis such divergent types of human thinking as Kant, Spinoza, Leibniz, Fichte, Plato, Bruno, Bohme, Plotinus and the Gnostics. His phi¬ losophy of nature alone gained an immediate and powerful influence, not only in Germany, where Goethe, the romanticists and most of the scientists considered him as their philosophical spokesman, but in the rest of Europe also through disciples like Coleridge and V. Cousin. His conception of one continuous process of evolution which would embrace in successive steps the lifeless and the living world, was a great philosophical anticipation and did much to promote a scientific study of nature. But his method of reasoning by. suggestive analogies and, in general, the artistic turn of his mind brought him into discredit among the younger school of exact scientists. For a time it was customary to deride him as the founder of "speculative physics.® But many of his leading

ideas have since been vindicated before the scientific world.

Bibliography. — Brehier,

1912) ; Braun, O., (Schelling als Personlich- keit5 (1908) ; (Caroline, Briefe aus der Friih- romantik,5 edited by Erich Schmidt (2 vols.,

1913) ; Fischer, Kuno, (Schelling) (in (Ge- schichte der neueren Philosophies Vol. VI, 3d ed., Heidelberg 1902) ; Fuchs, E. (ed.), (Schopf- erisches Handeln,5 short selections (1907) ; Haym, R., (Die romantische Schule5 (1870; new ed., 1914) ; Plitt, G. L.,. (Aus Schellings Leben) (3 vols., Leipzig 1869-70) ; Schelling's Samtliche Werke,5 edited by his sons (14 vols., 1856-61) ; Taggi, (Schelling e la filosofia dell' arte) (1909); von Hartmann, E., (Schelling's philosophisches System5 (Leipzig 1897) ; Wat¬ son, J., (Schelling's Transcendental Idealism) (1882) ; Weiss, O. (ed.), (Schelling's Werke (Auswahl in 3 Biinden, Leipzig 1907).*

Traugott Boh me.

SCHENCK, shenk, Carl Alwyn, American forester : b. Darmstadt, Germany, 25 March 1868. He studied at Darmstadt and Tubingen, and was graduated from the University of Giessen. He was forest assessor of the grand duchy of Hesse, served in the German army, came to the United States in 1895, and became director of the Biltmore Forest School and forester to George W. Vanderbilt's Biltmore estate. He wrote (Our Yellow Poplar5 (1896) ; (Forestry for Kentucky5 (1899) ; (Forest Utilization5 (1904) ; (Biltmore Lectures on Sylviculture) (1905) ; (Forest Management5

(1907) ; (Forest Policy5 (1911), etc.

SCHENCK, Robert Cumming, American diplomat: b. Franklin, Ohio, 7 Oct. 1809; d. Washington, D. C., 23 March 1890. He was graduated at Miami University in 1827, and re¬ mained there as tutor until 1830. In that year he became a student of law in the office of the Hon. Thomas Corwin at Lebanon, Ohio, and was admitted to the bar in 1831. He began the practice of law at Dayton, Ohio, and soon achieved marked success in his profession. In 1840, during President Harrison's <(Log Cabin55 campaign, he was elected to the legislature of Ohio, and entered upon his political career. He soon became a leader in the Whig party, and was recognized throughout his section as an able and effective public speaker. In 1843, after an exciting political contest, he was elected to his first term in Congress, retaining his seat until 1851, and becoming one of the most promi¬ nent leaders of his party at Washington. In 1851 he was appointed United States Minister to Brazil, where he remained some years, and performed important diplomatic service.

When the Civil War began he promptly offered his services to the government, and received a commission of brigadier-general of volunteers.

He was severely wounded at the second battle of Bull Run, and his right hand and arm permanently disabled. He was later promoted to the rank of major-general, and served in the army until December 1863, when he resigned his commission to accept a seat in Congress, to which he had been elected in the fall of 1862 over Clement L. Vallandigham (q.v.). General Schenck's military and political abilities were at once recognized and he was appointed chairman of the Military Committee of the House and rendered important and ardu¬

ous services. He was three times elected to Congress. He served as chairman of the Com¬ mittee on Ways and Means and became the leader of his party in the House. On 22 Dec. 1870 he was appointed Minister to Great Britain by President Grant, a position which he filled with distinction until 1876. During this term of service he was appointed member of the historic Joint High Commission which assem¬ bled at Washington, and provided by treaty for the Geneva Conference, a measure that resulted in substituting arbitration instead of war in the settlement of the serious controversies that had arisen between Great Britain and the United States, regarding the Alabama claims and other important subjects. His tact and force, and his knowledge of international law, were most useful in determining the great questions in¬ volved.

SCHENCK, William Edward, American clergyman: b. Princeton, N. J., 29 March 1819; d. Oakenout, Pa., 14 Dec. 1903. He was grad¬ uated from Princeton in 1838, from the theo¬ logical seminary there in 1841 and was ordained in 1843. He was engaged in pastoral work in New Jersey and New York until 1852, was secretary of the Presbyterian Board of Publi¬ cation in 1854-86 and its editor in 1862-70, and from 1865 was a director of Princeton Theo¬ logical Seminary. He published historical Account of the First Presbyterian Church of Princeton, N. J.5 (1851); (Church Extension for Cities5 (1854) ; hearing Home5 (1863) ; (The Fountain for Sin5 (1864) ; (Children in Heaven5 (1867), etc.

SCHENECTADY, N. Y., city, county:seat of Schenectady County, on the Mohawk River, new Barge Canal and on the New York Cen¬ tral and Hudson River and the Delaware and Hudson railroads, 16 miles west of Albany. It has connection with the Boston and Maine Rail¬ road at Scotia and with the West Shore Rail¬ road at South Schenectady. Local lines con¬ nect the city with Troy, Mechanicville, Saratoga Springs and other nearby places. That part of the city along the bank of the river is the oldest ; most of the modern buildings have been erected on the surrounding heights.

Buildings and Municipal Improvements. — The principal public buildings are the post office, county courthouse, municipal buildings, Van Curler

Opera House, a State armory, Home of the Friendless, Children's Home, Ellis Hospital, the Young Men's Christian Association build¬ ing and the church and school buildings. The location, in the Mohawk Valley, is in a fertile agricultural region. The slope to the river is such as to make the natural surface drainage almost sufficient, but a good sewerage system has been introduced. The water is distributed by means of the Holly system.

Manufacturing. — Figures relative to the number employed here show a total of over 26,000. Unlike many other cities all but 2,000 of these are employed in two large industries.

The census of 1914, like that of 1909, with reference to manufactures, excluded the hand trades, the building trades and the neigh¬ borhood industries, and took account only of establishments conducted under the factory system. In the last census, also, as in that for 1909, statistics were not collected for establish¬ ments having products for the census year

valued at less than $500, except that reports were taken for establishments idle during a portion of the census year, or which began operation during that year and whose products for such reason were valued at less than $500. Schenectady is also the headquarters for the General Electric Company and for the Ameri¬ can Locomotive Company whose plants in this city alone are employing 24,000.

Summary for the City. — A comparative summary for the city for 1909 and 1914 follows :

Census	Per cent of increase, 1909-1914	1909	1914

Number of establish-

ments .

184

134

37.3

Persons engaged in

manufactures .

Proprietors and firm

21,262

17,728

19.9

members .

176

120

46.7

Salaried employees .... Wage earners (average

3,380

2,677

26.3

number) .

17,706

14,931

18.6

Primary horse power . .

61,584

49,181

25.2

Capital .

$57,383,000

$51,816,000

10.7

Services .

17,445,000

13,088,000

33.3

Salaries .

4,633,000

3,086,000

50.1

Wages .

12,812,000

10,002,000

28.1

Materials .

22,520,000

21,952,000

2.6

Value of products .

Value added by manu-

48,761,000

38,165,000

27.8

facture (value of products less cost of materials) .

26,241,000

16,213,000

61.8

Churches and Schools. — There are 70 churches, embracing all denominations. The educational institutions are Union University (q.v.), 24 public schools, two parish schools, two business colleges, three private schools, a free public library and the college and high school libraries.

Banking and Finances. — There are two national banks with a combined capital of $200,000, a savings bank with deposits of about $5,500,000 and two trust companies with $500,- 000 capital and surplus. The annual cost for municipal maintenance and operation is about

$850,000.

History. — Schenectady was settled in 1661 by Arent Van Curler, and letters patent were granted in 1684. On 8 Feb. 1690 the place was attacked by a force of French and Indians, who massacred all but 60 of the inhabitants and burned the town. In 1765 it was incorporated as a borough and in 1798 chartered as a town. In 1819 a disastrous fire destroyed nearly all the business portion of the city. Among the early steam railroads in the United States was one from Albany to Schenectady. The water com¬ munication by means of the Mohawk, increased by the new Barge Canal and the railroad com¬ munication at an early date, all contributed toward making the city a commercial and in¬ dustrial centre. It has increased steadily in population and industries. Pop. (1880) 13,655;

(1890) 19,902; (1900) 31,682; (1910) 72,826; (1920) 88,723.

SCHENK, Leopold, Austrian embryolo¬ gist: b. Urmeny, Hungary, 23 Aug. 1840; d. Schwanberg, Styria, 17 Aug. 1902. He was graduated at Vienna in 1865 and was ap¬ pointed assistant professor of embryology there in 1873. He attained world-wide notoriety and the censure of the medical

profession generally for his theories concerning sex control of the embryo through the diet of the mother. He also worked the theory into an elaborate plan

for control of the development of the race. He was eventually forced to resign his position in the university. Besides several textbooks he was author of (Einfluss auf das Geschlechtsver- haltniss des Menchen und der Thiere) (1898; Eng. trans., (The Determination of Sex,1 1898).*

SCHENSCHIN, shen'shm, Afanassij Afa- nasjewitch, Russian poet: b. Mzenek district, government Orel, 4 Dec. 1820; d. Moscow, 4 Dec. 1892. He studied at Moscow, was in the army in 1853-56, then devoted himself wholly to literature, and under the pseudonym <(A. Fet55 published several collections of lyrical verse (1840, 1850, 1863, 1883-91). He also made ex¬ cellent renderings from Shakespeare, Goethe and the Latin classics.

SCHERER, sha-rar, Edmond (Henri Adolphe), French critic: b. Paris, 8 April 1815; d. Versailles, 16 March 1889. He studied at the law faculty of Paris, took a course in theology at Strassburg, entered the Protestant ministry in 1840 and in 1845 became professor of exegesis in the Ecole Evangelique, Geneva, pop¬ ularly known as L'Oratoire. This he resigned in 1849 and became a leader in the liberal movement in Protestant theology. He was elected to the National Assembly from Seine- et-Oise in 1871 and became life-senator in 1875. In both chambers he was a prominent represen¬ tative of the left centre. He was made chief literary critic of the Temps in 1860, later its editor. He took rank as a brilliant though opinionated critic, his reputation in this field having been made by a series of articles on im¬ portant thinkers and writers of other literatures in the Revue des Deux Mondes. Among his writings in book form are (Dogmatique de l'Eglise Reforme5 (1843) ; (La Critique et la Foi5 (1850) ; (Alexandre Vinet, sa vie et ses ecrits5 (1853) ; (Etudes Critiques sur la Littera- ture Contemporaine5 (1863-89) ; Diderot5 (1880), and the posthumous (Etudes sur la Litterature au XVIIIe Siecle5 (1891). He also wrote a biography of Melchior Grimm (1887). Consult the study by Gerard (1890) ; article by Dowden in the Fortnightly, Vol. XLV (1889) ; Fisher, (A Group of French Critics5 (1897).

SCHERESCHEWSKY, sker-es-kus'ki, Samuel Isaac Joseph, American Protestant Episcopal bishop: b. Tanroggen, Lithuania, Russia, 6 May 1831; d. Tokio, Japan, 1906. He studied in Russia and Germany, and, after coming in 1854 to the United States, at the Western Theological Seminary (Allegheny, Pa.) and the General Theological Seminary; was ordained deacon of the Protestant Episco¬ pal Church in 1859, priest in 1860 and was a missionary in China in 1860-75. In 1877 he was consecrated third

Protestant Episcopal bishop of China, but he resigned his office in 1883 and afterward resided in the United States, China and Japan. With J. S. Burden he trans¬ lated the (Book of Prayer5 into Mandarin, and he also prepared a complete revision of the Mandarin Bible (1895) and a wholly new rendering of the Bible into Wenli, the classical language of China (1902).

SCHERMERHORN, sker'mer-horn, Mar¬ tin Kellogg, American Unitarian clergyman : b. Durham, N. Y., 20 March 1841. He was educated at Williams College and at Union Theological Seminary, was ordained to the

Presbyterian ministry in 1867, held Unitarian pastorates in 1871-84 and Protestant Episcopal rectorships in 1885-96 and returned to the Uni¬ tarian ministry in 1897. He has published (Ancient Sacred Scriptures) (1882); (Sacred Scriptures of the World) (1898); thoughts for the Twentieth Century (1900) ; (Universal Worship* (1904); (World-Religion* and*

(World-Religion Hymns and Prayers) (1914), etc.

SCHERR, sher, Johannes, German author and literary critic: b. Hohenrechberg, Swabia, 3 Oct. 1817; d. Zurich, Switzerland, 21 Nov. 1886. He was educated at the University of Tubingen and in 1843 settled in Stuttgart, where he became a teacher. He allied himself, politi¬ cally, with the Democrats among whom he be¬ came a leader; in 1848 he was elected to the assembly and in the revolution of that year he took so prominent a part that he was compelled to flee to Zurich in 1849. He was appointed professor of history and literature in the Uni¬ versity of Zurich in 1860, holding the position until his death. His works are characterized by their caustic wit and many peculiarities in point of diction. His writings include (Ge- schichte der deutschen Literatur (1854) ; (Michel, Geschichte eines Deutschen unserer Zeit* (1858) ; (Deutsch Kulturund Gitten- geschichte) (1852); (Geschichte der deutscher Frauenwelt* (I860) ; (Blucher, seine Zeit und sein Leben> (1862-63), etc.*

SCHIAPARELLI, skya-pa-rel'le, Giovanni Virginio, Italian astronomer : b. Savigliano, 5 March 1835; d. Milan, 5 July 1910. He was educated at the University of Turin, and later studied at Berlin, under Encke, and at Pultowa, Russia, under Struve. Returning to Italy in 1859, he became assistant astronomer at the Milan Observatory, and its director in 1862. In 1861 he discovered the asteroid Hesperia. His discoveries of the relations

between comets and falling stars were published as (Note e riflessioni sulla teoria astronomica dele stelle cadenti (1867). In 1877 he published the first accounts of his observations of the ˆcanals® of Mars, to which his name has been given. He published many books on astronomy.*

SCHIAVONE, skya-vo'na, Andrea (The

Slavonian), Italian painter whose original name was Meldolla (Medolla or Medula) : b. Sebenico, Dalmatia, probably in 1522; d. Venice, 1582. In youth he was placed with a house-painter in Venice, where in leisure hours he studied the works of Parmegiano, Giorgione and Titian. The latter took him under his care, and later employed him in the library of Saint Mark, where he is said to have painted three entire ceilings. Later he was accounted one of the finest colorists of the Venetian school. Among his works are two parables and two landscapes in the Berlin Museum, < Christ before Pilate) in the Venice Gallery, (Christ before Caiaphas) (Vienna), 'Parnassus (Mu¬ nich), and numerous other specimens to be seen in collections at Florence, Rome, Naples, Dresden, Paris and Petrograd. His (Perseus and Andromeda) and 'The Apostles at the Sepulchre) are in the royal collection at Wind¬ sor. He also etched 119 plates, making use of some soft material, probably tin.*

SCHIEDAM, sHe-dam', Netherlands, in the province of South Holland, a seaport near

the influx of the Schie into the Maas, four miles west of Rotterdam. Of the old walls four gates have been preserved. The town is inter¬ sected by numerous canals, and though ir¬ regularly built has broad streets and many good houses. Its chief buildings are the Re¬ formed and other churches, a fine exchange, town house, a handsome concert hall, schools of language, art, business, etc., a public library and various hospitals. The principal manufac¬ ture is the Geneva gin or Hollands. Prior to the World War there were over 220 grain and other distilleries in constant operation. Other manufactures were linen, thread, copper and iron castings, white lead and litharge, cordage and vinegar. There was considerable traffic in gin, grain and coal. Pop. about 35,166.

SCHIEFFELIN, shef'e-lin, Bradhurst,

American druggist and publicist: b. New York, 21 Sept. 1824. He entered the wholesale drug manufacture, and in 1860 placed petroleum on the market. During the Civil War he organized a committee of prominent citizens for consulta¬ tion with and support of President Lincoln, and in

the financial troubles succeeding the war was active in charities. The Bread and Shelter So¬ ciety, for sending destitute persons from cities to rural districts for their self-support, was organized by him, and he personally sheltered and fed thousands. With Charles O'Connor and Horace Greeley he formulated the petition introduced into Congress by Roscoe Conkling, for the prevention of the appropriation for the use of religious corporations of public moneys or property.

SCHIFF, shif, Jacob Henry, American

banker: b. Frankfort-on-the-Mam, Germany, 1847; d. 25 Sept. 1920. He came to New York in 1868, where he entered a banking house and became in a few years head of the firm of Kuhn, Loeb and Company. His leadership in finance was quickly acknowledged and his firm has been identified with many prominent enter¬ prises. He has devoted a large portion of his wealth to charitable and educational purposes and among his most noted benefactions are the Semitic Museum at Harvard University, and in New York the Nurses' Settlement, the Young Men's Hebrew Association building and the Jewish Theological Seminary. He is president of the Montefiore Home for Chronic Invalids of New York; vice-president and trustee of the Baron de Hirsch Fund; member of the American Museum of Natural History; the Metropolitan Museum of Art; the American Society of Fine Arts, and is an ex-vice-presi¬ dent of the New York Chamber of Commerce. He has long been associated with movements for civic reform.

SCHILLER, shfl'ler, Ferdinand Canning Scott, English philosopher: b. 1864. He was educated at Balliol College, Oxford, and at Cornell University. In 1893-97 he was an in¬ structor at Cornell; afterward returning to Ox¬ ford, where he was tutor and Fellow of Corpus Christi College after 1903. He gained a wide reputation as an exponent of pragmatism, which he discusses under the term humanism. He contributed to magazines and reviews and was author of 'Riddles of the Sphinx) (1891) ;

(Humanism) . (1903 ; 2d ed., 1912); 'Plato or Protagoras ? (1908) ; (Formal Logic, a Scien¬ tific and Social Problem* (1912), etc.*

SCHILLER, Johann Christoph Friedrich

(von), German dramatist, poet, historian and philosophic thinker : b. Marbach in Swabia, 10 Nov. 1759; d. Weimar, 9 May 1805. His father was an officer in the army of the Duke of Wiirttemberg, his mother a pious housewife nowise distinguished above her kind. The parents early decided

to fit their son for the priesthood in the Lutheran Church. To this end they sent him to the Latin school at Lud- wigsburg, which was then the ducal residence. Duke Karl Eugen was conspicuous among the German princelings who aped the style of the Bourbon kings, Ludwigsburg being his Ver¬ sailles. Here he maintained a costly opera, spent large sums on building projects and governed through mistresses and adventurers. The boy Schiller had thus a good opportunity to observe the ways of petty autocracy under the old regime, and he used his eyes to good advantage. Presently the duke experienced a change of heart, became an exponent of virtue and went in for works of benevolence. In this spirit he founded a military academy which was to train the sons of his officers for the public service. That he might have the boys under his own eye and mold them to his liking, he assembled them under his own roof in his castle ˆSolitude,® where for a time he played the schoolmaster with them. His offer of a scholarship to the boy Schiller was a princely favor not to be rejected by the loyal parents, though it involved giving up their plan of mak¬ ing him a pastor. To this school the lad went in 1773 and started in as a student of law, but floundered badly at first. After two years the school was transferred to Stuttgart, where it became virtually a university minus the theologi¬ cal faculty. A medical faculty was now added, and to secure students certain eleves (French was the official language of the school) were allowed to go over to medicine. Schiller, who had been at the foot of his class, eagerly ac¬ cepted this chance. From this time (1775)' on he devoted himself with average assiduity and success to medical studies. In 1780 he was honorably dismissed, but without a doctor's degree.

The discipline of the school was severely military. The students were kept under con¬ stant surveillance, their reading was censored and their quarters often searched for contra¬ band books. But they found wavs to smuggle in the forbidden literature, which of course tasted the sweeter for the prohibition. It is certain that young Schiller read nearly all the revolutionary productions — works of the so- called <{storm and stress,® — that were just then coming out. They soon raised his incipient radicalism to the boiling-point. A friend called his attention to a magazine story by Schubart dealing with a pair of enemy brothers, a theme just then in favor with the literary radi¬ cals. The hint was enough. Schiller, who by this time felt sure that the writing of tragedy was to be his vocation, began to pen his (Rob¬ bersˆ in which a dissolute but soft-hearted young nobleman named Karl von Moor, while leading a wild life as a Leipzig student, re¬ ceives a harsh letter from his dotard father telling him that he is disinherited. Driven to fury by the missive and not suspecting the machinations of his scoundrel brother, Franz, he puts himself at the head of a band of

scapegrace students and leads them to the Bo¬ hemian Forest, where they become outlaws and run amuck against society. Moor robs and murders on

a terrific scale, yet not for vulgar gain. He tries to correct the inequali¬ ties and injustices of the social order, imagin¬ ing that he is doing a righteous work as the avenger of the poor and oppressed, and fully believing that God is on his side. When he learns the truth he gives himself up to the law which he has outraged. Thus the play is a tragedy of fanaticism, and as such it marks the emergence of a new dramatic type. It has glaring faults of extravagance and over¬ emphasis, but is none the less the work of a born dramatist, all clearly visualized for ac¬ tion and powerfully bodied forth. It was chiefly the fame of this thunderous play that led, in the course of time, to Schiller's being made an honorary citizen of the first French republic. There is an authentic tradition that in reading the scenes of the nascent (Robbers> to his spellbound fellow-students, he would some¬ times snort and roar and stamp in the white heat of his indignation.

Toward the end of 1780 he left the academy and was made army doctor to a regiment of invalid soldiers stationed at Stuttgart. The service was disagreeable and poorly paid. To increase his pittance of an income he bor¬ rowed money and published the play he had written, letting it appear anonymously as a book for the reader. It made no great stir as mere literature, but caught the attention of Dalberg, director of a theatre at Mannheim, who suggested a revision for the stage. Schil¬ ler complied and the new version was played at Mannheim in 1781 with memorable success The audience went wild over the performance and the obscure army doctor at once emerged into the glare of notoriety, though he had sad¬ dled himself with a debt whicn was destined to afflict him for years. After such a success he was naturally disposed to try again. He wrote a second play, on the abortive conspiracy of Fiesco at Genoa in 1547, conceiving it at first rather vaguely as a ((republican tragedy.® Meanwhile he had got into serious trouble with his lord and master, the duke. In the first place, he had left his post without per¬ mission in order to attend the first perform¬ ance of the

STATUE OF SCHILLER, BY BEGAS, BERLIN

.

been put at his disposal by a friendly lady named Henriette von Wolzogen. At first he went under the name of Dr. Ritter and scat¬ tered misleading letters as to his whereabouts, but his friends soon learned where he was

and it became evident that the Duke of Wiirttem- berg was taking no steps to have him ar¬ rested. Being now free for his favorite em¬ ployment, he wrote a third play, which he at first called ˆuise Miller,5 afterward (Cabal and Love,5 and sketched a fourth, which was to be known as (Don Carlos.5

In the summer of 1783 he returned to Mann¬ heim under a year's contract as theatre-poet, Dalberg having become convinced that there was no danger to be feared from Stuttgart and hoping that the new plays would repeat the huge success of the (Robbers. 5 In due time (Fiesco) was put on the stage with moderate success, but not as a Republican tragedy.® By a stroke of the pen its author had given it a happy ending. Instead of being siain as a selfish usurper by the fanatical re¬ publican Verrina, Fiesco is made, in the mo¬ ment of his triumph, to cast off his ducal robes and bid the Genoese embrace him as their hap¬ piest fellow-citizen. This ending clearly sup¬ ports the republican idea, but we are hardly prepared for such a turn by the preceding trend of the play, which makes Fiesco con¬ tinually vacillate between republican idealism and the lure of personal aggrandizement. (Cabal and Love) is a tragedy of class-conflict and incidentally a drastic comment on the ways of German courts and courtiers. A high- minded nobleman falls in love with a fiddler's daughter and wishes to marry her in spite of her humble birth. But his father, who has risen by crime to the presidency of the ducal council, will have none of such a misalliance and concocts a vile plot to force his son into a marriage with the duke's mistress. This is the ®cabal.)) The plotters succeed in making Ferdinand madly jealous, so that he poisons Luise and then commits suicide. In writing the play Schiller had the Wiifttemberg court in nflnd, and little touches here and there re¬ flect ˆactual history. But the duke himself does not appear and there are no telltale names. < Cabal and Love) has many strong scenes and is the only class-conflict play of that epoch which is still alive on the German stage. But its effect is marred at the last by the fatuous conduct of the tongue-tied heroine, who for¬ feits sympathy by her seeming lack of com¬ mon sense.

The three plays just considered, all written in prose and characterized by a vehement, high- keyed diction, are the most important yet not the sole expression of Schiller's youthful radi¬ calism. While still living in Stuttgart he started a magazine called the Wiirttemberg Repertory, for which he wrote a number of minor papers. He also published a so-called Anthology for the Year 1782 containing numerous short poems. The dominant note of Schiller's early verse is a certain high-pitched vehemence which is apt to suggest poetic feigning. He is as far as possible from the simple realistic manner of the young Goethe, having a marked fond¬ ness for soaring and sonorous diction.

At the end of his first .year in Mannheim the contract with Dalberg was not renewed, so that Schiller found himself in the summer of

1784 without income and without prospects. He was oppressed by debt and generally un¬ happy. Mannheim had become a prison. He decided to try his fortune by starting a dra¬ matic magazine to be known as the Rhenish Thalia, but hardly had he launched it when he was called away from the Rhine country by a friendly message from Gottfried Korner, a young lawyer just then living in Leipzig. After a short sojourn in the university town Schiller followed his new-found friend to Dresden, where he remained nearly two years in intimate association with the Korner family. He continued to publish his magazine, now called simply Thalia, and at the same time worked in a desultory fashion on his (Don Carlos.5 This he had originally planned as a love-tragedy in a king's household, purpos¬ ing incidentally to scourge the Spanish In¬ quisition. But the mood of the revolutionist and special pleader gradually gave way to the serener ambition of the poet and he decided to write his new play in verse, as Lessing had lately done in the case of (Nathan.) In the illusory hope of receiving valuable criticism he began to publish it piecemeal in succes¬ sive numbers of the Thalia. As he worked his mind changed, important characters began to appear in a new light and the centre of grav¬ ity shifted. The result was thac the very long play completed in 1787 was something very dif¬ ferent from the one he had conceived four years before. (Don Carlos5 is a tragedy of political idealism wrecked by a passion for in¬ triguing methods and would-be heroic fool¬ hardiness. The weightiest character is not the nominal hero, but the Marquis Posa, who pleads with Philip II of Spain to grant the Netherlanders freedom of thought and to end the Spanish regime of force and terrorism. Posa is a humane idealist of the 18th century and voices Schiller's own convictions as ma¬ tured by his intercourse with Korner. Viewed in its relation to its author's personal develop¬ ment (Don Carlos) occupies a middle position between the rather crude realism of his early prose plays and the matured art of his later and more famous poetic dramas. In (Don Carlos) his peculiar sonorous diction begins to show itself at its best. But the play as a whole suffers from a lack of simplicity and clearness. It is too long and complicated for the three hours' traffic of the stage.

In the summer of 1787 having tired of his dependence on Korner, Schiller decided to try his fortune in Weimar, whose duke had previously given him the title of councillor. Goethe was then in Italy, but the visitor soon made the acquaintance of Herder and Wieland. Ere long he decided to settle in Jena and de¬ vote himself to the writing of history. He had now lost touch with the stage and his experience with it had been on the whole dis¬ appointing. On the other hand, he had become very much enamored of historical study, and his reading for (Don Carlos5 had given him a special

interest in the great Dutch-Spanish con¬ flict of the 16th century. He planned a bulky treatise of six volumes on the subject, but only wrote one. It was published in 1788 under the title (Defection of the Netherlands.5 The book is brilliantly written, the author's sympa¬ thies being obviously with the Dutch in their struggle for freedom, and contains a number

of splendid literary portraits. But Schiller got his information rather easily and made no very careful study of the sources. His merit as a historian has been often attacked and as often defended. At any rate he made litera¬ ture out of history, the first achievement of that kind in the German language. His suc¬ cess as a historian led to his appointment, through Goethe's influence, to a professorship at the University of Jena. But hardly had he entered on his academic duties when a danger¬ ous illness shattered his health. He never fully recovered, but led henceforth the circumspect life of a semi-invalid. A gift by the Duke of Augustenburg freed him temporarily from pe¬ cuniary anxieties — he was^ now married to the dowerless Charlotte von Lengefeld — and he resolved to devote his freedom to the study of Kant. He felt that critical thinking had largely destroyed his imaginative spontaneity and that the only possible cure lay in a further study of fundamentals : the <(rules^ must re¬ pair the damage they had wrought. So for several years he devoted himself about equally to history and philosophy, writing rather copiously in both fields. In the former we have his (History of the Thirty Years' War,5 which he conceived as a revolt of the Prot¬ estant princes of Germany against the cen¬ tralizing despotism of the house of Hapsburg. It is eminently readable, especially where it treats of the great Swedish king who is Schil¬ ler's hero. He also wrote a number of minor historical papers. To enliven the columns of his Thalia he published in it his one attempt at prose fiction, the (Ghostseer,> a fragmentary yarn which exploits various phases of con¬ temporary interest in the supernatural. It is fair to call it a yarn because he himself never took it seriously and even called it a ^Sudelei.® In general, this period of Schiller's life is rather barren of poetic production. To it belong, however, the (Gods of Greece) and the ((On Winsomeness and Dignity5). In a more popu¬ lar and readable form his philosophy of art is expounded in his (Letters on Esthetic Edu¬ cation and his famous essay on (Naive and Sentimental Poetry. 5

In 1794 began the famous friendship of Schiller and Goethe. For seven years the two men had lived as mutually indifferent neighbors, each acquainted with the other's work but neither caring for a closer relation. A casual meeting at a scientific lecture put an end to this mutual aloofness,

explanations and visits ensued and ere long they were close friends and literary allies. Goethe became a frequent contributor to Schiller's magazine Die Horen

and took a keen interest in its success. But it did not succeed and after three years was dis¬ continued. It was largely their irritation over this failure that led the two men to unite in the literary campaign of the ˆXenia,5 a col¬ lection of epigrams in the ancient distich form, wherein they paid their respects to men and tendencies they did not like. Nearly a thou¬ sand of the distichs were written and about half that number were published in 1797 in Schiller's Musenalmanach, where they caused great excitement. There was a shower of (Anti-Xenia, 5 to which the perpetrators of the original ((as they called it) paid no attention. They agreed that the published 'Xenia5 should be included in the works of both, and that they would give no information as to their separate authorship. Some of the epigrams are sharply censorious, others with¬ out any sting at all. The majority, relating as they do to men and matters of ephemeral in¬ terest, now seem rather pointless. Their chief historical importance is that they caused Schil¬ ler and Goethe to be generally regarded as militant allies fighting the same battle. The two men came to be known as the Dioscuri.

Schiller had now definitelv returned to poetry. In conjunction with Goethe he made a study of the epic style and out of this study grew a number of ballads and romanzas which are among the most popular of his works. Special favorites of those who enjoy this phase of Schiller's art are the 'Diver,5 the Pledge,5 the

trilogy in the Greek sense, but a portentously long tragedy in 10 acts, preceded by a dramatic prologue.

Next came (Mary Stuart, indubitably the best for the stage of all the many plays in divers languages dealing with the famous Queen of Scots. Here the problem, as Schiller saw it, was to create genuine tragic sympathy for his heroine, but without extenuating her con¬ duct and so making a distinctly Catholicizing play. He solved the problem by concentrating the plot into the last few days of Queen Mary's life and introducing her as a woman whose conscience is heavily burdened by the admitted crimes of long ago, but who feels that in her present plight she is the victim of rank in¬ justice. As she is helpless to avert her im¬ pending fate, her situation, according to Schil¬ ler's conception of dramative art, is pathetic rather*

than tragic. It was necessary to make her in some sense visibly responsible for her calamity. To meet this dramaturgic difficulty Schiller resorted to two unhistoric inventions: first, Queen Mary's attempt to escape at the instigation of the Catholic renegade, Mortimer, this attempt endangering the life of Queen Elizabeth ; secondly, a meeting of the two queens at which Mary loses control of herself and puts a deadly insult on her rival. This scene is the stage-climax of the play, but its psychological climax comes in the fifth act, when Queen Mary humbly accepts her ig¬ nominious death as a divinely appointed ex¬ piation for the sins of long ago. While the play's appeal is thus shifted from politics to religion and made to rest on a purely human basis that is neither Catholic nor Protestant, there is much in it that indicates Schiller's artistic sympathy with the Catholicizzing tend¬ ency of the new romatic movement just then acquiring momentum. The portrait of Eliza¬ beth is little better than a caricature.

*Still more marked is the Catholicizing drift in the (Maid of Orleans, * which was given the subtitle of <(romantic tragedy® for the very reason that it requires us to accept the super¬ naturalism of the legend at its face value. Schiller follows the tradition rather closely ex¬ cept that he makes Joan's "voices® enjoin virginity as a condition of success in her patriotic mission, and that he departs radically from history in respect to the manner of her death. In his view of the matter tragic guilt of some kind was indispensable to tragedy; so he makes Joan fall strangely in love with the English general Lionel just as she is about to take his life on the battle-field. From that in¬ stant, feeling that she has violated the spirit of the divine command, she loses her self-con¬ fidence and with it her supernatural power. After great suffering and humiliation, which supposedly expiate her offense, she recovers her power by a miracle and dies in glory on the field of battle fighting for France. In this bold romanticization of the Maid's character it was Schiller's deliberate intention to idealize her and rescue her from the obloquy cast upon her by Voltaire's (La Pucelle.*

His next play was the (Bride of Messina, in which he attempted to find a substitute for the Greek chorus. He invented a mediaeval plot in which two brothers fall in love with the same girl, who is in reality their sister. She has been brought up in seclusion, her existence un¬*

known to them, in order to defeat the dire prediction of soothsayers. Jealousy and mutual antipathy lead on to the death of both. Schil¬ ler provides each brother with a band of re¬ tainers who take part in the action and also function as semi-choruses, each speaking through a chosen leader. In what they say an attempt is made to imitate the detached atti¬ tude and lofty moralizing of the Sophoclean chorus. Schiller's noble poetic diction is at its very best in the (Bride of Messina> and especially in the so-called choral passages; but it is evident that words spoken by one per¬

son, without group-singing or group-dancing, could convey hardly more than a dim sugges¬ tion of the old Greek chorus. Schiller's ex¬ ample has not been imitated and the (Bride of Messina is but rarely played.*

Last came

Schiller has always been regarded as the greatest of German dramatists. He had but little of the lyric gift and wrote no songs that have become highly popular. Fastidious critics have often taxed him with being a rhetorician rather than a poet, but anything like posing or insincerity was quite foreign to his nature. His personal character endeared him to all who knew him and he lived his life on a high plane of thought and feeling. His aspiring idealism has always appealed particularly to the young; so that his writings, popularized by school and theatre, are, or at least were, for the Germans a great educative force. His name, linked habitually with Goethe's, stands for all that is best in the best epoch of Ger¬ man letters. See Song of the Bell; Wallen¬ stein; William Tell.

Bibliography. — There is a vast quantity of literature pertaining to Schiller; consult Vol. V of Goedeke's (Grundriss zur Geschichte der deutschen Dichtung) and the survey in the Ap¬ pendix to Thomas's (Life of Schiller. Only a few outstanding titles can be mentioned here, and these, owing to blockade conditions created by the Great War, must be restricted to works that were published prior to its beginning.*

The first complete edition of Schiller's works was that of his friend Korner, 12 vols., 1812- 15. This formed the basis of the later Cotta editions which appeared in different forms and different degrees of completeness. Down to about 1868 these were rather uncritically edited. Between 1868 and 1872 appeared the Historisch- kritische Ausgabe, 15 vols., edited by Goedeke and others. To the same period belongs the

cheap popular edition issued by Hempel, in Ber¬ lin — well edited but unsightly. Good later editions are those of Boxberger and Birlinger, forming part of Kürschner's Deutsche National- Literatur, 12 vols., and of Bellermann, 14 vols., 1895 ff. Of special merit is the Sakular-Aus- gabe, 16 vols., 1904. The numerous letters of Schiller, where his style was at its best in Goethe's opinion, have been well edited by Jonas, 7 vols., 1892 ff. Editions of the sepa¬ rate plays, issued by competing publishers for school and college use, are numerous but can¬ not be listed here.

Biographies short and long are almost legion. Of the early ones those by

Carlyle (1825) and bv Karoline von Wolzogen, the poet's sister- in-law (1830), are still interesting, as is also the booklet (Schiller's Flucht von Stuttgart) (1836) by his friend and fellow-traveler, Streicher. Between 1838 and 1842 Hoffmeister brought out his monumental treatise in five volumes, which was followed by the shorter work of Viehoff (1846) and Schaefer (1853). The centenary jubilee of 1859, at which Schiller was glorified as the poet of freedom by Ger¬ mans all over the world, brought forth a mass of more or less eulogistic literature. Of the longer biographies dating from this epoch of Schiller enthusiasm the best is that of Palleske (1858-59), of which an English translation by Lady Wallace was published in 1860. Less fervid and also less readable are the biographies by Diintzer (1881) and Hepp (1885). Highly learned biographies, going deep into all sorts of minutiae, were begun by Minor (2 vols., Berlin 1890) and by Weltrich (three instal¬ ments in one volume, 1899), but have remained unfinished. The same is true of the less exhaus¬ tive work of Brahm (Vol. I, 1892). An excel¬ lent illustrated life of Schiller is that of Wych- gram (1891). Of solid merit also is the little book of Harnack (1898), the larger one by Kiihnemann (5th ed., Munich 1914) and the two-volume treatise by Berger (8th ed., Munich 1914). In English, aside from translations, there are short biographies by Bovesen (New York 1882), Sime (Edinburgh 1882) and Nev- inson (New York 1889) ; also a longer one by Thomas (New York 1901). The best trans¬ lations of the po.ems are those of Bulwer Lyt- ton (London 1844) and Arnold Foster (1902).

Noteworthy special studies (but the list is far from complete) are the following: Bel¬ lermann, (Schiller's Dramen) (2 vols., 1898- 99; 3d ed., 3 vols., Berlin 1905-08); Koster,

(Schiller als Dramaturg5 (Leipzig 1891) ; Tomaschek, (Schiller in seinem Verhaltnisse ztir Wissenschaft5 (1862; which won a prize offered by the Vienna Academy) ; Harnack, (Die klassische Aesthetik der Deutschen) (Ber¬ lin 1892) ; Rieger, (Schillers Verhaltnis zur franzosischen Revolution (Berlin 1885) ; Wilm, (The Philosophy of Schiller in its Historical Relations5 (Boston 1913), and Ludwig, Schil¬ ler und die deutsche Nachwelt5 (Berlin 1909).

Calvin Thomas,

Professor of Germanic Languages and Litera¬ tures, Columbia University.

SCHILLER, in mineralogy, a peculiar lustre due to reflection from the surfaces of minute enclosed crystals, probably of goethite. It is best illustrated by sunstone (q.v.), and is also noticed in bronzite, hypersthene and labradorite.

SCHILLING, shil' ling, Johannes, German sculptor: b. Mittweida, Saxony, 23 June 1828; d. 1910. He studied art at Berlin and Dresden. In 1868 he became professor at the Dresden Royal Academy. His chief works include the Sour Seasons) at Dresden, statues of Schiller at Vienna, of Maximilian at Trieste, the War Memorial at Hamburg and the German National Monument on the Niederwald, op¬ posite Bingen on the Rhine, which bears a colossal figure of Germania, and the statue of Wilhelm I at Wiesbaden (1894).

SCHINDLER, shind'ler, Solomon, Ameri¬ can rabbi: b. Niesse, Silesia, 24 April 1842; d.

5 May 1915. He came to America from West¬ phalia in 1871, having been for some years out of sympathy with orthodox Judaism, and, after a period of struggle in his adopted country, be¬ came known as one of the leaders of the advance movement among Hebrew religionists. He was called to the congregation of Adeth Israel in Boston, Mass., in 1884. In this pastor¬ ate he continued nearly 20 years, during which time he not only helped to liberalize the He¬ brew faith but to promote a better understand¬ ing between American Hebrews and Christians than had before existed. In 1895-99 he was superintendent of the federated Jewish chari¬ table organizations of Boston; in 1899-1909 superintendent of the Leopold Morse House; he then retired. He was author of (Messianic Expectations and Modern Judaism) ; dissolv¬ ing Views of the History of Judaism5 ; (Young West, a Sequel to Bellamy's Looking Back¬ ward^ etc.

SCHINKEL, shin'kel, Karl Friedrich,

German architect and painter: b. Neuruppin. Brandenburg, 13 March 1781 ; d. Berlin, 9 Oct. 1841. He was educated at the gymnasium of his native town, and after 1795 in that of Berlin. He became a pupil of Professor Gilly, and on the death of the latter in 1798 succeeded to his private practice as an architect. At the same time he continued his studies, and in 1803 he went with this object to Italy, returning in 1805 by way of France to Berlin. The period of the war being unfavorable for architecture, he took to landscape painting, and from 1808 to 1814 painted a series of dioramas for Gropius. On the return of the royal family to Berlin some of his designs for alterations in the palace were adopted and carried out. In 1811 he was ad¬ mitted to the Academy, and in 1820 became a professor at the Academy. The designs to which chiefly he owed his architectural reputa¬ tion include those of the royal guardhouse, the (MemoriaP of the War of Liberation, the new theatre, the new Potsdam Gate, the ar¬ tillery and engineers' school, all in Berlin; and the observatory; the casinos in Potsdam and Glienicke; and a large number of castles, churches and minor public buildings. As a painter he produced numerous wall and easel pictures. His

(Primeval History of Mankind) in the vestibule of the Berlin Museum exhibits him to advantage as a wall painter. His land¬ scapes are chiefly architectural views, of which the best known are the (Theatre at Taormina) ; (Square of Saint Mark's, Venice> ; (Ocean Caves near Sorrento) ; (The Cathedral at Milan) ; (Interior of Saint Peter's, at Rome5 ; (The Capitol by Moonlight.5 He exercised a

profound influence over every department of the art production of his day, including carpet and furniture making. His taste was strictly classical, but while he reproduced some of the purest forms of Greek art of the Periclean Age, he also occasionally chose the motifs both of mediaeval and Renaissance architecture as ele¬ ments in his designs. These designs, with his own comments and explanations, were pub¬ lished in different forms, his principal work being (Sammlung architektonischer Entwiirfe>

(1820).

SCHIPKA PASS. See Shipka Pass. SCHIPPERKE. See Terrier.

SCHIRMER, shlr'mer, Johann Wilhelm,

German artist: b. Jiilich, Rhenish Prussia, 5 Sept. 1807; d. Carlsruhe, 11 Sept. 1863. He studied historical painting under Schadow at the Diisseldorf Academy until he came under the influence of Lessing's landscapes, where¬ upon he turned to that metier, producing his¬ torical landscapes after the manner of Poussin. In 1830 he became assistant professor, and in 1839 professor at the Diisseldorf Academy, meantime visiting and painting in Belgium, the Black Forest, Switzerland, Holland, Normandy and Italy. In 1853 he became director of the art school at Carlsruhe. Among his works are six Biblical landscapes, with the (Life of Abra¬ ham^ National Gallery, Berlin; (Grotto of Egeria,* (Nether German Landscape, > Leipzig Museum ; series of 26 Biblical landscapes, Diis- seldorf Gallery; (Via Mala,* four landscapes with story of Good Samaritan; (Storm on the Campagna,* Carlsruhe Gallery.

SCHIST (crystalline), a metamorphic rock generally found only in regions which have been subjected to regional or dynamic metamor¬ phism, that is, those in which the strata have suffered intense folding and shearing. The gen¬ eral characteristics of schists are the fine and pronounced lamination, and crystalline char¬ acter of component material. They grade on the one hand into gneisses and on the other into scarcely altered mica slates or sandstones. The more important varieties are broadly classi¬ fied,

according to the principal ferro-magnesian silicate present. Thus we have: (a) Mica schists; (b) Hornblende schists or Amphi¬ bolites, and (c) various minor schists. The mica schists range in silica from over 80 per cent to less than 50 per cent, according to the amount of quartz present. The most promi¬ nent and abundant minerals of this variety are quartz, muscovite and biotite, which are more or less distributed in layers. Among the other minerals present are feldspars, both orthoclase and plagioclase, the rock thus approaching gneiss; garnet, often in large and well-formed crystals; staurolite, cyanite, sillimanite, tourma¬ line, varying from black through blue, green, red, to white, often of the precious type; opalite, pyrite and magnetite. The term Hydromica schists is used commonly for the finer varieties, in which the scales of mica are indistinguishable (sericite, peragonite, etc.). These pass imperceptibly into phyllites. Mica schists result largely from the metamorphism of sandstones, shales and clays, but also through crushing and excessive shearing of igneous rocks. They are found over wide areas in New England, the Appalachians, Lake

Superior and the West. The Hornblende schists or Amphibolites generally result from the dynamic metamorphism affecting igneous or pyroclastic rocks, and rarely from ordinary sedimentary rocks. Hornblende here takes the chief place, quartz being normally absent, while biotite and the basic feldspars are char¬ acteristic constituents. Garnet, magnetite, pyrite and other basic minerals are also com¬ mon. These schists occur as belts in other metamorphic rocks, generally representing dikes, sheets, flows, or ash beds in the sedimentary series. They occur in New England and other Eastern States, and are important in the min¬ eral regions of Lake Superior. They also occur in the Black Hills, and in the Rocky Mountain and California ranges. Among the minor schists may be mentioned chlorite schist, talc schist, epidete schist and others. In each of these, the mineral giving name to the rock is more or less admixed with quartz, feldspars and numerous other minerals. They probably result most commonly from the alteration of igneous rocks, and are found in the older metamorphic districts. See Foliation; Meta¬ morphism.

SCHIZiEA, ski-ze'a, the typical genus of the family Schizceacece . ferns widely distributed, mostly in tropical regions, and which are small and distinct in habit. The sporangia have an entire apical ring and are sessile in close dis¬ tichous spikes along the middle veins of the narrow pinnae of the fertile fronds; the sterile fronds are linear, fan-shaped or dichotomously many-cleft. S. pusilla, the curly-grass, is the only species in North America, and is very rare and local, being found only in the pine-barrens of New Jersey and Nova Scotia. Its fertile one-sided fronds form the most conspicuous part of this tiny plant, the twisting linear sterile fronds being very like grass. See Ferns and Fern Allies.

SCHIZOPODA. See Crustacea; Opos¬ sum-shrimp.

SCHLATTER, shlat'ter, Michael, Amer¬ ican German Reformed clergyman : b. Saint Gall, Switzerland, 14 July 1716; d. near Phila¬ delphia, Pa., November 1790. He was edu¬ cated at the University of Helmstedt, taught for several years and then entered the German Reformed ministry. He offered his services as a missionary to the German Reformed emi¬ grants in Philadelphia in 1746, and went to Pennsylvania in that year. He served as pastor of the united churches of Germantown and Philadelphia in 1746-51, organized a synod which met in Philadelphia in 1747 and made extended missionary tours through Pennsyl¬ vania, Maryland, Virginia, New Jersey and New York. He visited Europe in 1751, secured a much needed reinforcement of six young preachers, substantial aid in the way of money and returned in 1752. As a result of his appeal £20,000 was raised in England and Holland for the establishment of schools among the Germans in America, and in 1755 Schlatter became superintendent of the enter¬ prise, but in 1757 he resigned because of the opposition encountered from the Germans, who objected to the teaching of the English lan¬ guage in the schools. In 1757 he was appointed chaplain of the Royal American regiment, and

remained with the army until 1759. He then preached at Chestnut Hill and surrounding places. In 1777, while still attached to the royal army, he refused to obey orders on ac¬ count of sympathy with the colonial cause and was imprisoned. Consult Harbaugh, Henry, (Life of Rev. Michael Schlatter (1857).*

SCHLEGEL, shla'gel, August Wilhelm von, German critic, poet and translator : b. Han¬ over, 5 Sept. 1767; d. Bonn, 12 May 1845. At the University of Gottingen he received a thor¬ ough philological training under Heyne and be¬ came an admirer and friend of Burger, with whom he was engaged in an ardent study of Dante, Petrarch and Shakespeare. From 1791 to 1795 he was tutor in a Dutch family at Am¬ sterdam. Soon after his return to Germany he settled in Jena (1796), following an invitation of Schiller. His critical contributions to Schil¬ ler's Horen and to the Jenaer Allgemeine Litteratnr-Zeitnng, together with his transla¬ tions from Dante and Shakespeare, established his literary reputation and gained for him a professorship at the University of Jena (1798). His house became the intellectual headquarters of the "romanticists,® and was visited at vari¬ ous times between 1796 to 1801 by Fichte, Fried¬ rich Schlegel, Schelling, Tieck, Novalis and others. From 1798 to 1800 he and his

brother Friedrich edited the Athenceum. a periodical intended to express the "romantic® view of life and literature. In 1801 he went to Berlin, where he lectured before distinguished audi¬ ences on the aesthetic and philosophical creed of the romanticists. In 1804 he began to accom¬ pany Mme. de Stael, as tutor to her sons and adviser in her literary work, on her extended travels in Switzerland, France, Italy, England and Scandinavia. Mme. de S tael's book (De rAllemagne) shows distinct traces of his in¬ fluence. In 1808 he was in Vienna and deliv¬ ered his celebrated (Vcwlesungen fiber drama- tische Kunst und Literatur (pub. 1809-11). In 1813-17 he acted as secretary to the crown prince of Sweden, after which he joined again the household of Mme. de Stael until her death in 1817. In 1818 he became professor at the University of Bonn. He founded a special printing office for Sanskrit and edited several old Indian texts. As an Orientalist he was un¬ able to adapt himself to the new methods opened by Bopp. As a critic he carried) on the tradition of Lessing and Herder. Without pos¬ sessing Lessing's power of style and personality he commanded a wider range of artistic sus¬ ceptibility. His unerring linguistic and histor¬ ical scholarship and the calm objectivity of his judgment enabled him to carry out, even more successfully than Herder himself, Herder's de¬ mand that literary criticism should be based on a sympathetic penetration into the specific individuality of each poetic production rather than on the application of preconceived aesthetic standards. He established models for the new method of analytical and interpretative criticism in his essays on Goethe's (Hermann and Dorothea * and on Shakespeare's (Romeo and Juliet.* His Vienna lectures *On Dramatic Art and Literature) were translated into most of the languages of Europe and stand as a perma¬ nent . contribution to critical literature; his definition of the terms "classic® and "romantic® met with general recognition; his views on the*

so-called "three unities® and on the "correct¬ ness® of Shakespeare evoked an especially strong echo in England and finally made the Johnsonian attitude toward Shakespeare ap¬ pear obsolete.

Formal perfection of language is the chief merit of his poems, which suffer from a lack of originality. In his drama

His universal receptivity for poetical values, together with his rare facility of linguistic ex¬ pression, predestined him to be a translator of the first order. His translations from Shakes¬ peare were his greatest artistic contribution to German literature. It is due to him that Shakespeare is hardly less known in Germany than he is in England. Only 17 plays of the so-called Schlegel-Tieck Shakespeare were translated by Schlegel (1797-1810) ; the re¬ mainder were added, from 1825 to 1833, by Graf Wolf Baudissin and (very inadequately) by Dorothea Tieck, while Tieck himself acted only as a reviser and annotator. Schlegel also translated parts

*of Dante's (Divina Commedia> (1791-97). His (Blumenstrausse, italianischer, spanischer und portugiesischer Poesie) (1804) included Petrarca's sonnets. The two volumes of (Spanisches Theater * (1803-09) introduced five plays of Calderon into German literature. His theoretical essays on the art of translating have guided several generations of German translators. His breadth of culture made him truly a "cosmopolitan of art and poetry.® As a critic and as a translator he has lastingly con¬ tributed to the realization of Goethe's idea of a "Welt-Literatur.®*

His first wife, Caroline Michaelis (1763- 1809), whom he married in 1796, was the widow of Dr. Bohmer. She was the most bril¬ liant among the "romantic® women. She as¬ sisted Schlegel in some of his literary produc¬ tions, . and the publication of her correspond¬ ence in 1871 established for her a posthumous reputation as probably the greatest of German letter-writers. She separated from Schlegel in 1801 and became the wife of the young philoso¬ pher, Schelling, soon after.

Bibliography. — Schlegel's (Samtliche Werke) have been edited in 12 volumes by E; Booking (1846) ; (Vorlesungen fiber schone Literatur und Kunst } (ed. by Minor, 3 vols., 1884) ; (CEuvres ecrites en frangais (3 vols., 1846). Consult Strauss, D. Fr., (Kleine Schrif- ten) (1862); Haym, R., (Die romantische Schule) (1870; new ed., 1914) ;, Huch, Ricarda, (Blfitezeit der Romantik) (1899) ; (Caroline, Briefe aus der Frfihromantik) (ed. by Erich Schmidt, 2 vols., 1913) ; Sidgwick, Mrs. Alfred, (Caroline Schlegel and her Friends* (1889) ; Bernays, M., (Zur Entstehungsgeschichte des Schlegelschen Shakespeare) (1872) ; Genee, R., (A. W. Schlegel und Shakespeare* (1903) ; Gundolf, F., (Shakespeare und der deutsche Geist* (1911) ; Helmholtz, A. A., (The Indebt¬ edness of S. T. Coleridge to A. W. Schlegel**

(1907).

Traugott Boh me.

SCHLEGEL, Karl Wilhelm Friedrich von, German critic and philosophical writer,

brother of A. W. Schlegel : b. Hanover, 10 March 1772; d. 11 Jan. 1829. As a student at Gottingen and Leipzig he was a voracious reader, especially of the classics. In his earliest publications, including the important essays (Von den Schulen der griechischen Poesie) (1794) ; Pber die Diotima> (1795) ; Pber das Studium der griechischen Poesie) (1797), he appeared

as a brilliant classical scholar and as an ardent worshipper of the objective harmony of ((1798), his (Gesprach fiber die Poesie> (1800) and a great mass of aphorisms, pub¬ lished as

dogmatic standpoint in religious questions and reactionary tendencies in politics.

His wife, Dorothea (1763-1839), was the daughter of Moses Mendelssohn, the Jewish philosopher. In 1798 she left her first husband, the banker Veit, in order to become F. Schlegel's devoted "comrade® and literary help¬ mate. She published the products of her own pen, including the novel Plorentin) (1801), un¬ der her husband's name ; her adaptations of (Merlin the Magician (1804) and of Poherand Mailer* (1805) have been included in Bohn's English edition of Schlegel's collected works. The (Samtliche Werke,* published in 15 volumes (1846), excluded the most important works of his pre-Parisian period. His Prosaische Jugendschriften,* on which his fame now rests almost entirely, were collected in two volumes by J. Minor (1882). Good selections ((Frag¬ mented were edited by E. von der Leyen (1904) ; Priefe an seinen Bruder Wilhelm,* ed. by Walzel (1890) ; Haym, R., Pie roman- tische Schule* (1870; new ed., 1914) ; Wernaer, R. M., (1913).*

Traugott Boh me, Professor of Greek and History.

SCHLEICHER, shli'ner, August, German philologist: b. Meiningen, 19 Feb. 1821; d. Jena, 6 Dec. 1868. He devoted himself to the study of theology and Oriental languages, first at Leipzig and afterward at Tfibingen. In 1846 he took the degree of doctor of philosophy at Bonn, and soon after qualified himself as a teacher of philology, to which he ever after devoted himself. In 1850 he was called to Prague as extraordinary professor of phi¬ lology, a chair soon exchanged for that of comparative philology. At Prague he made himself more fully acquainted with the Slavonic languages and undertook a several months' journey to Lithuania in order to learn the Lithuanian language. In 1857 he ac¬ cepted the appointment of honorary pro¬ fessor of the science of language and Old German philology in the University of Jena, where he continued until his death. He pub¬ lished a work on the comparative history of languages, Pur vergleichenden Sprachenge- schichte) (1848), and another containing a sys¬ tematic review of the European languages, Pie Sprachen Europas) (1850). Later works are Pie Formenlehre der kirchenslawonischen Sprache, erklarend und vergleichend dargestellt (1853) ; (Handbuch der litauischen Sprache * (1856-57). Pur Morphologie der Sprache*; Pie deutsche Sprache) (1860) ; Compen¬ dium der vergleichenden Grammatik der indo-germanischen SpracheiP ; Pie Darwinische Theorie und die Sprachwissenschaft* ; Peber die Bedeutung der Sprache ffir die Naturge-*

schichte des Menschen (1865).*

SCHLEIDEN, shli'den, Matthias Jakob,

German botanist: b. Hamburg, 5 April 1804; d. Frankfort, 23 June 1881. He was educated for the law in Heidelberg, but in 1833 took up the study of botany. He occupied the chair of botany at Jena from 1839 to 1863, when he was called to the Botanical Gardens at Dorpt. He was one of the first botanists to study plant

tissue, and his name is associated with that of Nageli, the Swiss botanist, in the early de¬ velopment of the cell theory. His works in¬ clude (Grundzuge der wissenschaftlichen Bo- tanik) (1842-43; trans. into English as Prin¬ ciples of Scientific Botany, 1849) ; (DiePflanze und ihr Leben) (1848) ; (Baum und Wald) (1870) ; (Die Rose> (1873).*

SCHLEIERMACHER, shli'er-mak'er, Friedrich Ernst Daniel, German theologian and philosopher: b. Breslau, 21 Nov. 1768; d. Berlin, 12 Feb. 1834. He was educated by the Moravian Brethren at Niesky. In 1787 he be¬ gan at Barby the study of theology, which he continued at Halle. In 1794 he was ordained and appointed assistant preacher at Landsberg on the Warthe. From 1796 to 1802 he was chaplain in the Charite-Haus at Berlin. During this period he translated some of Plato's Dia¬ logues, contributed to the Athencuum conducted by the two Schlegels, and wrote the dis¬ courses on Religion, the*

His discourses on Religion, addressed to the educated among its despisers) (1799), show him under the influence both of Spinoza's pan¬ theism and of Kant's criticism. Dissatisfied with the popular rationalistic theology of his times no less than with Kant's moralistic inter¬ pretation of religion, he assigns to religion a special province of the human soul, conceiving it to differ essentially from the intellectual and ethical sphere of our mind. Religion, therefore, is neither knowledge nor practice, but a state of feeling, an elevating tone of the whole mind. One of the main characteristics of religious experience is the feeling of being one with the All, the sentiment of an all-embracing and all- absorbing life. This (

stitutes, according to Schleiermacher, only one manifestation of religious sentiment; its equally important counterpart is the ˆself-intuition® and <(self-determination® of a man's own ((eternal self.® Thus he reasserts the value of human personality, which had been somewhat neglected in Kant's system.

In his (Monologues (1800) he assimilates, from the monadology of Leibniz, the idea that each individual is an independent mirror of mankind as a whole and is destined to realize within itself the common ideal in an individual example. Each one should represent mankind in his own way, that is the first principle of morality. But the individual comes to life only in the whole. Thus Schleiermacher, contrary to Kant's ethical formalism, attaches great im¬ portance to the actual contents and results of morality, to existing institutions of culture and morality such as the family, society, church, state, arts, sciences, historical religions. The establishment of a higher order of things through the combined individual effort of human beings in human society becomes the central idea of his religious ethics. In his later writings, especially in his (Christian Morality* and (Christian Faith) the free philosophical religiousness of his (Discourse) and v Mono¬ logues) gave way to a more definite apprecia¬ tion of the historical or ((positive® religions and their consummation in Christianity. He finds in the person of its founder a living piesenta- tion of the endless process at the end of which appears the union of the divine and the human. By such interpretation he is enabled to adopt the Christian Church as a gradual realization in practice of the divine order of things, of the Civitas Dei. All positive affirmanons with ref¬ erence to the Deity he held to be figurative and anthropomorphic. In his Pife of Jesus, > which anticipated that of D. F. Strauss in im¬ portant respects, he appears as one of the first representatives of the critical school of Biblical research. His Pialektik* assumes the identity of thinking and being as the indispensable pre¬ supposition of all knowledge. His works on psychology, on aesthetics, on pedagogy have re¬ cently won renewed attention. Schleiermacher occupies a unique position as a representative alike of philosophy and theology. Practically all the modern endeavors to investigate the function of religion in the life of the human soul can be traced back to Schleiermacher. He is generally regarded as the greatest theologian of the Protestant Church since the time of the Reformation. His works have been published in three series entitled (Theology) (11 vols.), (Sermons) (10 vols.), Philosophical and mis¬ cellaneous writings * (9 vols.), Berlin 1836-65. Otto Braun edited an excellent critical selection from his works in four volumes (1910-13). The (Discourses* and the (Monologues* have been published in separate editions. Consult Dilthey, (Leben Schleiermachers J (1870) ; (Schleiermacher's Life, as unfolded in his Au¬ tobiography and Letters* (tr. by T. Rowan, London 1860, 2 vols.) ; Bender, W., (Schleier- machers' Theologie) (2 vols., 1876-78) ; Lich- tenberger, (History of German Theology in the 19th Century* (1889) ; Pfleiderer, Protestant Theology in Germany since Kant) (1890) ; Troeltsch et al., (Schleiermacher, der Philosoph des Glaubens) (1910) ; Cramaussel, Pa phi¬ losophic religieuse de Schleiermacher* (1908) ;*

Siegmund-Schultze, (Schleiermacher's Psychol¬ ogy (1913).

Traugott Bohme.

SCHLESINGER, sles in -jer, Frank, Amer¬ ican astronomer: b. New York, 11 May 1871. He was graduated at the College of the City of New York in 1890 and took his Ph.D. at Columbia in 1898. He was an observer in charge of the International Latitude Observa¬ tory, Ukiah, Cal., in 1898, and in 1899-1903 he was astronomer at Yerkes Observatory. Since 1903 he has been the head of the Allegheny Observatory at the University of Pittsburgh. He is author of numerous papers on variations of latitude, spectroscopic binaries, stellar paral¬ laxes and the reduction of astronomical photo¬ graphic plates.

SCHLESWIG, shlaz'vig, Germany, a sea¬ port in the province of Schleswig-Holstein, Prussia, at the head of the Schlei, 29 miles northwest of Kiel. It resembles a Dutch town in point of architecture and is divided into three parts — the Alstadt, or Old Town, the Lollfuss and the Friedrichsberg. The only square is the market-place in the Altstadt. The principal street, two miles long, is the Lollfuss. The buildings of importance are the three churches, of which the cathedral (12th century) is a fine Gothic pile, with a tower 368 feet high. Other buildings are the old castle, various benevolent institutions and the Convent for Noble Women. At the south are the remains of a wall erected by pagan kings against the invasion of Jut¬ landers. As early as the 9th century the city was a great mart for exchange of goods be¬ tween the countries of the North Sea and those of the Baltic. The chief manufactures are woolen goods, laces, sugar, earthenware and leather. There are seven annual fairs. Pop.

19,905.

SCHLESWIG-HOLSTEIN, shlaz'vig- hol'stin, Germany, a maritime province of Prus¬ sia, between Denmark on the north ; the Baltic, Liibeck and Mecklenburg on the east ; Meck¬ lenburg and the territory of Hamburg on the south; Hanover southwest and the North Sea on the west. It covers an area of 5,805 square miles. Schleswig is separated from Holstein by the Eider and the Schleswig-Holstein Canal. The province includes several islands in the Baltic and North seas and belongs to the great North German plain. Heligoland belongs to the province. The hilly district on the eastern coast contains the most productive land in the province; the central part is nearly barren, the western coast is protected by many dikes, and is fertile.

The Baltic Coast, about 300 miles long, is hilly and contains numerous fjords which make excellent harbors. The North Sea Coast is low and flat. The Elbe forms the boundary on the south for 65 miles. The Eider is the principal riyer. Other rivers are the Trave and Stor. There are numerous lakes in the north¬ east, chief of which are Witten-See and Gottes- logs-See. The chief occupations of the inhabit¬ ants are agriculture and stock-raising. The majority of the occupants of Schleswig are Danish; of Holstein, German. The industrial works include sugar refineries, breweries and distilleries. The principal ports are Al- tona, Heligoland, Kiel, Flensburg, Neumuhlen, Wyck and Tonning, and the capital, Schles¬ wig. The province became a united duchy

in 1386. By the Treaty of Prague, North Schleswig was to choose between Denmark and Prussia, but the privilege was ignored. Its history is a record of continuous strife between Danes and Germans, closing in favor of the latter. The united government of Holstein and Schleswig was first recognized by Margaret of Denmark in 1386, and the basis of this union was the Succession Act, and the practical con¬ tradiction between their feudal duty and their own inseparable connection gave rise to the celebrated ((Schleswig-Holstein question,® caus¬ ing interminable separations and fusions. By the protocol of 1850 England, France, Austria, Russia, Sweden and Denmark settled, as far as diplomacy could, the much-discussed and diffi¬ cult question of the duchies of Schleswig and Holstein in favor of Denmark. The unity of Denmark, Schleswig, Holstein and Lauenburg was secured by a uniform law of succession, and as far as was practicable their internal affairs were placed under a common administra¬ tion. The protocol was succeeded by the treaty of 1852, which historians call ((its logi¬ cal consequence.® This treaty assigned the suc¬ cession to the kingdom of Denmark and the duchies to Prince Christian of Gliicksburg, and declared the integrity of the whole Danish mon¬ archy to be permanent; but the rights of the German Confederation with regard to Holstein and Schleswig were ˆreserved.® The declara¬ tion was made in accordance with the views of France, Russia and England; the reservation was inserted in the interest of the German powers. It was under this protocol and its suc¬ ceeding treaty that Denmark expected the aid of England when, in 1864, Austria joined with Prussia to overthrow the treaty and seize Schleswig-Holstein. England called a confer¬ ence of the signatory powers and attempted by peaceful means to put an end to the war. To quote a modern historian in (The Historians' History of the Worlds ((English diplomacy had made every effort imaginable to save the Lon¬ don Protocol and the integrity of the Danish State; but the sole price at which Napoleon III conjointly with England would venture on the strife, the conquest of the left bank of the Rhine, seemed too high, and so it satisfied itself with inviting the subscribers of the protocol to a conference in

London. The latter met for no other purpose than the rupture of the protocol, from which the German powers also detached themselves, and to confirm the overthrow of the Danish State, which at the close of the dip¬ lomatic tournament saw itself thrown on its own resources. The first notable encounter between British and German warships after the opening of the World War occurred off Heligo¬ land on 28 Aug. 1914.

The Treaty of Versailles of 1919 made provi¬ sion for settling the ultimate fate of this province by plebiscite. For this purpose Schleswig was divided into two zones. The plebiscite was held in March 1920, when the vote in the northern zone was in favor of in¬ corporation with Denmark, that in the southern was for remaining in Germany. The posses¬ sion of Holstein, of course, was not in question. The result was a loss of 1,535 square miles of the province to Germany. Pop. of province and Heligoland, 1,462,187. See Denmark.

SCHLEY, sll, Winfield Scott, American naval officer: b. near Frederick, Md., 9 Oct,

1839; d. New York, 3 Oct. 1911. He was graduated at the United States Naval Academy in 1860 and went as midshipman on the Niagara to China and Japan. Returning in 1861, he was made master, served on the Winona in the West Gulf blockading squadron, later on the Monongahela and the Richmond, and partici¬ pated in all the engagements which led to the capture of Port Hudson in 1863, having been promoted to the rank of lieutenant in 1862. Ordered from Southern waters in 1864 to the Pacific squadron, he served on the Wateree as executive officer till 1866, when he was pro¬ moted lieutenant-commander. In this period he suppressed an insurrection of Chinese coolies on the Chincha Islands, and for protection of United States interests landed a body of men at San Salvador during a revolution. From 1866 to 1869 he was instructor at the Naval Academy; then, being assigned to the Asiatic station, served there on the Benicia for three years, earning distinction at the taking of the Korean forts on the Salee River in 1871. Again, in 1872, he was detailed as instructor at the Naval Academy, and in 1874 was made com¬ mander. After serving in Europe and on the west coast of Africa, he commanded the Essex, on the Brazil station, 1876-79. He was selected to command the third government relief expedi¬ tion (1884) for the rescue of Lieut. A. W. Greely (q.v.), which he promptly accomplished. Having served (1885-89) as chief of the Bu¬ reau of Recruiting and Equipment, he was pro¬ moted captain in 1888. From 1889 to 1891 he was in the southern Pacific as commander of

the cruiser Baltimore, and in the latter year interposed at Valparaiso, Chile, when American sailors were assaulted in the streets.

In 1895 he was placed in command of the New York ; was chairman of the Lighthouse Board 1897-98; in February of the last-named year became commodore, and after the out¬ break of the war with Spain was given com¬ mand of the Flying Squadron. Sailing from Hampton Roads, 13 May 1898, he began the historic search for Cervera's Spanish fleet, dis¬ covered it and finally established a blockade of the harbor at Santiago de Cuba (see United States — War with Spain), where, on 29 May, Cervera was found to be. Schley's squadron was united 1 June with the fleet under acting Rear-Admiral W. T. Sampson (q.v.) and the blockade was continued until 3 July, when the Spanish ships came out of the harbor and were destroyed by the American vessels, which, during the temporary absence of Samp¬ son, were under the immediate command of Commodore Schley, on board the Brooklyn. In August 1898 Schley was raised to the rank of rear-admiral.

An unfortunate controversy arose between partisans of Schley and those of Sampson over their respective claims to the credit of this great victory. Of that discussion neither officer personally took public notice until after the appearance of a work by Edgar Stanton Mac- lay (q.v.), entitled (History of the United States Navy,} in which the author referred to Commodore Schley as a ((caitiff, poltroon and coward.® The proofs of the book had been read and approved by various naval officers, among them Rear-Admiral Sampson; and on 22 July 1901 Schley applied to the Secretary of the Navy for a court of inquiry. This request

was granted 24 July. The court was convened 12 September and its sessions continued for one month. It consisted of Admiral Dewey, presi¬ dent, and Rear-Admirals Benham and Ramsey. The verdict, returned 14 Dec. 1901, was a dis¬ agreement, Admiral Dewey refusing to sub¬ scribe to censures on Schley's conduct which were made by the two other members. The ˆmajority® report, signed by two members only, found Schley guilty of vacillation, lack of en¬ terprise and disobedience, and in other particu¬ lars strongly criticised his conduct, both before and during the battle of Santiago de Cuba, while recognizing his personal courage in the action. Admiral Dewey, however, presented a (

SCHLICH, shlik, Sir William, English for¬ ester: b. Darmstadt, 1840. He was educated at Darmstadt and the University of Giessen and was appointed in 1866 to the Indian forest de¬ partment. He held the offices of conservator of forests, 1871, and inspector-general of for¬ ests, 1881 ; and organized the first school of forestry in England, at Cooper's Hill, in 1885. He was made F.R.S. in 1901 and knighted in 1909. He is the author of (A

Manual of For- estry} (5 vols., 1889-96) ; (The Outlook of the World's Timber Supply ; (Afforestation in*

Great Britain and Ireland) ; (Forestry in the United Kingdom.)

SCHLIEMANN, shle'man, Heinrich, Ger¬ man archaeologist: b. Neubuckow (Mecklen- burg-Schwerin), 6 Jan. 1822; d. Naples, 27 Dec. 1890. He spent five years as a pupil in retail business in Fiirstenberg, then embarked as cabin-boy on board a ship bound for Venezuela. The ship was wrecked on the coast of Texel, but Schliemann was saved and taken to Amster¬ dam. Here he obtained a post in a commercial house and set himself to acquire a thorough knowledge of the chief European languages. In 1846 he was sent to Saint Petersburg as agent for another Amsterdam firm. In 1850 he hap¬ pened to be in California on 4 July when the State entered the Union and acquired Ameri¬ can citizenship. By 1856 he had learned mod¬ ern Greek and begun the study ' of ancient Greek, and in 1858—59 traveled in Sweden, Den¬ mark, Germany, Italy, Egypt, Syria and Greece. Having amassed a considerable fortune in trade, he retired from it in 1864 in order to devote himself wholly to archaeological studies. He traveled round the world in 1864-66, and in 1868 went to the coast of Asia Minor by way of Corfu and the Morea. In 1870 he under¬ took at his own cost the excavation of the heaps of ruins at Hessarlik, in the Troad, which he believed to be the site of ancient Troy

(q.V.). These excavations he carried on with interruptions until 1890. Contrary to agreement with the Porte, he retained possession of all the spoils discovered there, and was compelled by the Greek courts to pay the sum of $10,000. He presented his collections to the Museum fur Volkerkunde at Berlin. In 1876 he began similar excavations at the site of ancient My¬ cenae in Greece. Little confidence was at first placed in his methods by trained archaeologists, and when his discoveries had been made their historical value was for a time doubted. But scholars now generally agree that they attest powers adequate to the Trojan War, and make the traditional account probable in its main outlines. Consult his autobiography edited by his wife (Leipzig 1891) ; Schuchardt, (Schlie- mann's Excavations and Archaeological and His¬ torical Studies) (London 1891) ; Sandys, J. E., (A History of Classical Scholarship) (Cam¬ bridge 1908); Hawes, C. H. and H., (Crete: the Forerunner of Greece (London 1909).*

.SCHLOSSER, shlos'ser, Friedrich Chris¬ toph, German historian: b. Jever,

Oldenburg, 18 Nov. 1776; d. Heidelberg, 23 Sept. 1861. He studied at the University of Gottingen 1794-98, and published his first history, (Geschichte der bildersturmenden Kaiser des Ostrom in 1812. He was professor in the Lyceum of Frankfort 1812-14 and city librarian until 1819, when he was called to Heidelberg as professor of his¬ tory at the university, a position retained until his death. Schlosser's writings, which are characterized by a great love of truth and a high moral tone in judgment, include (Welt- geschichte in zusammenhangender Erzahlung* (1817-24) ; (Geschichte des 18. Jahrhunderts) (1823) ; (Universal-historische Uebersicht der Geschichte der alten Welt und ihre Kultur)*

(1824-34).

SCHLUNDT, shlunt, Herman, American chemist: b. Two Rivers, Wis., 16 July 1869. He was graduated at the University of Wisconsin in 1894 and took his Ph.D. at the University of Leipzig in 1901. He was for a time connected with the faculty at the University of Wiscon¬ sin, and from 1902 was associated with that of the University of Missouri, where he was professor of physical chemistry in 1907-13, and chairman of the department of chemistry in 1910-15, He is author of numerous articles on physical chemistry and radio-activity and of laboratory Experiments in General Chemis— trv (1912).*

SCHLUTER, shloo'ter, Andreas, German sculptor and architect : b. Hamburg, 20 May 1664; d. Saint Petersburg, 1714. His father was a sculptor and brought him in early life to Dantzic. He left that place for Marschau, where he opened a studio as a sculptor and eventually (1694) settled in Berlin. The Baroco style of architecture, then popular in Holland, attracted his fancy and in this stvle he began (1696) to make designs for rebuilding the royal residences. Before carrying them out he took a journey through Italy, where he built the central front of the castle at Charlotten-burg, and subsequently began the restoration of the royal castle at Berlin and became activelv engaged in designing buildings of this class in other parts of the country. He eventually re¬ moved to Saint Petersburg and became court architect to Frederick the Great. Among the

statues he erected in Berlin are the statue of the grand elector (cast by Jacobi in 1700). Be¬ sides the bronze statue of the Grand Elector Frederick III at Konigsberg, the tomb of Frede- erick I and his wife in Berlin and the marble screen in the church of Saint Mary, he pro¬ duced numerous designs for the gorgeous in¬ terior decoration of the Goldsmiths' Hall, Ber¬ lin, and other buildings. Consult Adler, An¬ dreas Schliiters LebenP

SCHMALKALDEN, shmal'kal"den, Arti¬ cles of, a Protestant confession

which was drawn up at the instance of John Frederick, Elector of Saxony, by Luther and other divines, and signed at Schmalkalden in February 1537. These articles were essentially the same as those of the Confession of Augsburg, but in much stronger language. See Reformation, The.

SCHMALKALDIC LEAGUE, the league formed at the close, of 1530 by the Protestant princes of Germany, assembled at Schmalkalden, to resist the aggressive measures contemplated by the Emperor Charles V. It ultimately in¬ cluded the whole of northern Germany, Saxony, Wiirtemberg and Denmark, with portions of Bavaria and Switzerland. The object of the league was the common defense of the political and religious freedom of the Protestants, and the confederacy was first intended to continue only for six years, but subsequent events in¬ duced them in 1535 to renew it for another period of 10 years, and to raise a permanent army to carry out the objects of the league. About this time it was joined, among others, by the king of France, Francis I, though only from political motives, and Henry VIII of Eng¬ land declared himself its protector. The con¬ federacy received a fuller consolidation by a new Protestant confession, drawn up at the instance of John Frederick of Saxony by Luther and other divines, and known as the Articles of Schmalkalden, from the circum¬ stance of their having been signed (1537), like the league itself, at the town of Schmalkalden. These articles were essentially the same as those of the Confession of Augsburg. The league was latterly crippled by mutual jealousy and the conflict of interests, and its early suc¬ cesses in the so-called Schmalkalden War were ultimately more than outweighed by the com¬ plete rout at Miihlberg and the capture of John Frederick. The ends of the league, howevei, were ultimately gained through the instrumen¬ tality of Duke Maurice, now Elector of Saxony, who in 1552 declared war against the emperor, and forced him in 1552 to grant the Treaty of Passau, which secured the religious liberty of the Protestants. See also Charles V ; Refor¬ mation, The.

SCHMAUK, smak, Theodore Emanuel,

American Lutheran clergyman : b. Lancaster, Pa., 1860. He was graduated at the University of Pennsylvania in 1880, ordained to the Evan¬ gelical Southern ministry in 1883; was editor- in-chief of the Lutheran Church Review from 1895 ; literary editor of the Lutheran from 1889; professor of Christian faith in the Lutheran Theological Seminarv from 1911 and president of the General Council of Evangelical Lutheran Churches in North America from 1903. He published (The Negative Criticism of the Old Testament (1894) ; (Historv of Old Salem and Lebanon> (1898) ; (The Early*

Churches of the Lebanon Valley5 (1902) ; (The History of the Lutheran Church5 (1903) ; (The Christian Kindergarten (1906) ; (The Con¬ fessions and Confessional Principle of the Lutheran Church) (1909) ; Christianity and Christian Union) (1913), etc.

SCHMID, shmit, Matthias, Austrian painter: b. See, Tyrol, 14 Nov. 1835. He studied at the Munich Academy (1856) under Schrandolph, and was a pupil of Piloty (1869), when the persecution to which the clergy sub¬ jected him on account of his liberal views caused him to leave Tyrol. . He won the Vienna medal in 1873. Among his canvases are (The Entombment5 ; (The Flight into Egypt5 ; (The Judge of Morals5 (1873) ; (Festival of the Parson's Cook5 (1874) ; (The Betrothal5 (1879) ; Repairing the Damage5 (1882) ;

(Blind Man's Buff5 (1884) ; (Forsaken5 (1885) ; (In the Picture Gallery5 (1886). He has also done in fresco at the Innsbruck Ceme¬ tery (The Three Marys at Christ's Tomb5

(1859).

SCHMID, Ulrich, German historian : b. Niederrieden, Swabia, 4 July 1876. He was edu¬ cated at the Memmingen Latin School and the Wurzburg Gymnasium, the universities of Wurzburg, Freiburg-in-Breisgau, Munich and Vienna. He has devoted much of his time to the study of the history of culture and since 1904 has edited Walhalla at Munich. He has published (Saint Ulrich, Bischof von Augsburg5 (1901) ; (Traditionen an die Kirche Saint Veit am Golsen5 (1904) ; (Kirchen- und profan-historische Mitteilungen aus italienischen Ar- chrien und Bibliotheken5 (1905) ; (Das deutsche Volkslied5 (1905) ; (Johann Geyler a Kaisers-berg5 (1906) ; (Das Chorgestiihl in der Saint Martinskirche zu Memmingen5 (1906) ; (Agnes die Bernauerin und Herzog Albrecht III der Giitige5 (1906) ; (Die Schlacht bei Hoflach- Alling und ihr Denkmal5 (1906) ; (Tagebuch des Pfarrers Michael Gotzmann5 (1907) ; (Otto von Lonsdorf, seine Herkunft und Reformen im Passauer Hochstift5 (1909); (Karl Haider, ein deutscher maler5 (1910) ; (Albin Egger- Lienz5 (1910) ; (Reisebilder Bamberg-Wiirz- burg5 (1910); Utalienische Reisebilder5 (1911); (Das katholische Kirchenjahr in Wort and Bild 5 (1912). He edited (Das katholische

Kirchenjahr in Bildern5 (1910), and the re¬ ligious art series of Glaube und Kunst since

1912.

SCHMIDT, shmit, Johannes, German phi¬ lologist: b. Prenzlau, 29 July 1843; d. Berlin, 4 July 1901. After study at the University of Bonn he was there made professor (1873), in the same year removed to Gratz, and from 1876 until his death was at Berlin. In 1884 he was elected to the Prussian Academy of Sci¬ ences. Probably he was not excelled by any scholar of his time in an extensive scientific knowledge of the grammar of the Indo-Euro¬ pean group of languages. From 1875 he edited (with Kuhnl the (Zeitschrift fur vergleichende Sprachforschung5. Among his more important works are (Zur Geschichte des indogermanischen Vokalismus5 (1871-75) ; (Die Verwandschafts- verhaltnisse der indogermanischen Sprachen5 (1872) ; (Die Pluralbildungen der indogerman¬ ischen Neutra5 (1889), and (Kritik der Sonan- tentheorie5 (1895).

SCHMIDT, Johann Kaspar, German phi¬ losopher (1806-56), better known under his pseudonym of Max Stirner (q.v.).

SCHMIDT, Nathaniel, American Oriental¬ ist : b. Hudiksvall, Sweden, 22 May 1862. He was educated at the universities of Stockholm, Colgate and Berlin. He became professor of Semitic languages and literature at Colgate University in 1888 and since 1896 holds the same chair in Cornell University. In 1904-05 he was director of the American School for Oriental Study and Research in Jerusalem. He was president of the Society for Biblical Lit¬ erature and Exegesis in 1914. Among his pub¬ lications are (Introduction to the Hexateuch5 (1896) ; (Biblical Criticism and Theological

Belief5 (1897); (The Republic of Man5 (1899); outline histories of Egypt, India, Babylonia and Assyria, Syria and Arabia (1901-04) ; (The Prophet of Nazareth5 (2d ed., 1907) ; (The Original Language of the Parables of Enoch5 (1908) ; (The Messages of the Poets5 (1911). He has written a number of articles on the books of the Old Testament for The Encyclopedia Americana, and has also contributed largely to other encyclopedias and to theological publi¬ cations.

SCHMITZ, Eugene F., American politi¬ cian: b. San Francisco, 19th century. He was elected mayor of San Francisco on the Union Labor ticket in 1900 and was twice re-elected. In 1907 he, with Abe Ruef (q.v.), was tried on a charge of extortion in connection with the sensational graft scandals then uncovered. He was convicted, but succeeded in having the judgment set aside. Later he again became active politically and he was his party's candi¬ date for mayor in 1915, but was not elected.

SCHMUCKER, shmuk'er, SMUCKER, Samuel Mosheim, American historical writer: b. New Market, Va., 12 Jan. 1813; d. Philadel¬ phia, Pa., 12 May 1863. He was graduated at Washington College,

Pennsylvania, in 1840, and was licensed to preach in the Lutheran Church. In 1848 he resigned his duties as a pastor to study law, was admitted to the bar and prac¬ tised for a time in Philadelphia; but after 1855 devoted himself almost wholly to literature. Author of (Errors of Modern Infidelity5 (1848) ; (Court and Reign of Catherine II, Em¬ press of Russia5 (18551; (Life of John C. .Fremont5 (1856) ; (Life of Alexander Hamil¬ ton5 (1856) ; (Life of Thomas Jefferson5 (1857); (Arctic Explorations and Discoveries5 (1857) ; {Life of Dr. Elisha Kane and Other American Discoverers5 (1858); (History of Modern Jews5 (1860) ; (Life of Daniel Web¬ ster5 (1859), etc. At his death he had com¬ pleted one volume of his (History of the Civil War in the United States5 (1863).

SCHMUCKER, Samuel Simon, American Lutheran clergyman and educator: b. Hagers¬ town, Md., 28 Feb. 1799; d. Gettysburg, Pa., 26 July 1873. He was educated at the Univer¬ sity cf Pennsylvania and at Princeton Seminary and was ordained in the Lutheran Church in 1821. He served as pastor in 1821-26 and 1826- 64 he was chairman of the faculty of the Theo¬ logical Seminary at Gettysburg, Pa. He was instrumental in securing a connection between the Lutheran churches in America and Europe. He was a voluminous writer. Author of ˆle-

*ments of Popular Theology * (1834) ; fra¬ ternal Appeal to the American Churches on Christian Union) (1838) ; (Lutheran ManuaP (1855) ; (Evangelical Lutheran Catechism**

(1859) ; (Unity of Christ's Church (1870), etc.*

SCHNEIDER, shni'der, Charles Conrad,

American engineer : b. Apolda, Saxony, 24 April 1843; d. 8 Jan. 1916. He was graduated at the Royal Technical School, Chemnitz, Germany, in 1864, came to the United States in 1897 and engaged in locomotive and bridge construction. He was vice-president of the American Bridge Company in 1900-03 and in 1911 became a mem¬ ber of the board of engineers for the Quebec bridge. Among the many bridges he designed and built are the cantilever Fraser River bridge on the Canadian Pacific Railway, and the Niagara cantilever bridge. In 1905 he was president of the American Society of Civil Engineers. Author of (General Specifications for Railroad Bridges (1886) ; (General Speci¬ fications for Highway Bridges* (1901) ; Gen¬ eral Specifications for Structural Steel Work in Buildings* (1905; new ed., 1910).*

SCHNEIDER PROCESS OF ARMOR PLATE. See Armor Plate.

SCHNITZER, shmt'ser, Edward. See

Emin Pasha.

SCHNITZLER, Arthur, Austrian drama¬ tist and novelist: b. Vienna, 15 May 1862 (the son of the well-known laryngologist, Professor Johann Schnitzler, 1835-93) ; still living at Vienna. He studied medicine at the Univer¬ sity of Vienna, receiving his degree in 1885, was interne in the Vienna General Hospital from 1886 to 1888, and then became an assistant at the Vienna Polyclinic as well as a private gen¬ eral practitioner. In judging the general tone, style and choice of subject of the Viennese writers of Schnitzler's generation it is import¬ ant to remember that they differ from their Berlin contemporaries in that the former are more affiliated, in the emulation of their models, with French and Italian writers, while the latter incline more to an imitation of the Rus¬ sians and Scandinavians. This means greater perfection of form and style among the Viennese, greater depth of treatment and recognition of the social milieu among the Ber¬ liners. Schnitzler and Gerhart Hauptmann may well be regarded as typical representatives of their respective cities in the same generation. (Berlin 1892), Schnitzler's first pub¬ lication, is typical of almost all his later work. It is a series of seven dramatic scenes, each depicting, in delicate psychological treatment, a different phase in the rather frivolous love- life of the hero. (Liebelei) (1896) is a drama depicting love in a more tragic aspect. (Der grime Kakadu (1899) , was played by Mrs. Fiske in New York as (The Green Cockatoo,* as a ˆcurtain-raiser® to Hauptmann's (Hannele) ; it is a one-act play of powerful dramatic construc¬ tion, dealing with a superficial episode of the French Revolution. His later plays become more mystical and resigned in tendency, al¬ though the erotic undercurrent is absent only in one play ((Professor Bernhardi,* see be¬ low):*

(Der junge Medardus) (1910), (Das weite Land (1911). (Professor Bernhardi* (1913) is a serious comedy, a satirical presentation of Austrian political intrigue, in which great is¬ sues are made to depend on trifling happen¬ ings. Only one female character appears in the play, a hospital nurse, who drops from view as soon as she has started the mischief. The treatment of anti-Semitic tendencies in ousting a Jewish hospital-director from his position because he has come into conflict with the'interests of the ruling church receives added interest from the fact that Schnitzler is him¬ self by birth a Jew and by training a physician, and it is not unlikely that the subject may be taken from one of his own experiences. In 1915 Schnitzler published ˆomodie der Worte,* three one-act plays, in which he shows, by again resorting to erotic subjects, that the war in Europe has not*

always been successful in turning men's minds to serious topics. In one of the plays ((Die Stunde des Erkennens*) a physician who has been married for 22 years orders his wife to leave the house for a marital infidelity committed 10 years before. This is a theme occurring again and again, especially in his short stories, which must not be overlooked, as their artistic value is perhaps even higher than that of his plays. Among the best short stories are (Sterben* (1895), (Die Frau des Weisen) (1898), (Leutnant Gustl* (1901), (Die griechische Tiinzerin* (1904), (Der Tod des Junggesellen.* There are also two longer narratives (the second a long novel) : (Frau Bertha Garlan* (1901), (Der Weg ins Freie) (1908). Schnitzler's collected dramas have appeared at Berlin (1910, 4 vols.), as well as the collected narratives (1910, 3 vols.). (See Anatol). A translation of the one-act play (Literature> will be found in (The German Classics of the 19th and 20th Centuries1* (New York 1914), and a number of other plays have been translated by Edwin Bjorkman. Consult Hartmann, J. W., <(Schnitzler's Vienna® (The New Review, New York, January 1916) ; Pol¬ lard, Percival, (Masks and Minstrels of New Germany* (Boston 1911) ; Salkind, Alexander, (Arthur Schnitzler* (Leipzig 1907) ; Ratislaw, J. K., (Arthur Schnitzler* (Hamburg 1911); Kapp, Julius, (Arthur Schnitzler* (Leipzig

1912).

Jacob Wittmer Hartmann, The College of the City of New York.

SCHNORR VON KAROLSFELD,

shnor fon kar-ols-felt, Julius, German painter: b. Leipzig, 26 March 1794; d. Dresden, 24 May 1872. His father was a painter and initiated him into the rudiments of art. In 1811 he proceeded to Vienna, and while there produced several works. In 1817 he visited Italy, spent a year at Florence and then took up his resi¬ dence at Rome. Here he attached himself to the <(Nazarenes,® then under the leadership of Cornelius and Overbeck. His painting (The Wedding in Cana* attracted so much notice that he was chosen, along with the two painters already named, to paint the walls of the Villa Massimi at Rome. Among other works pro¬ duced by him at Rome are (Jacob and Rachel* ; (Ruth and Boaz* ; (The Flight into Egypt,* and (Children brought to Jesus.* He remo.ved to Munich in 1827, and was appointed pro¬ fessor of historical painting in the Academy of

Fine Arts there. He was next commissioned to decorate the new palace with

frescoes of scenes from the national poem of the 'Nibelun- genlied ; and adorn the Festsaalbau with in¬ cidents in the lives of Charlemagne, Frederick Barbarossa and Rudolf of Hapsburg. These are perhaps the most popular of modern works in fresco in Munich. In 1846 he became direct¬ or of the picture gallery and professor at the Academy of Fine Arts in Dresden. While here he completed his illustrations of the Bible, (Die Bibel in Bildern) (1852-60). They ex¬ hibit wonderful animation, variety and power. To the Dresden period also belong the oil painting of 'Luther at the Diet of Worms/ and the designs for a window for Saint Paul's, London, representing scenes from the life of Saint Paul.*

SCHODDE, George Henry, American scholar: b. Allegheny, Pa., 15 April 1854; d. 15 Sept. 1917. He was graduated from Capital University 1872 and from Leipzig University 1877, was professor of Greek and theology at Capital University, Columbus, Ohio, from 1880, editor of The Lutheran Standard from 1880 and of The Theological Magazine from 1897. He was also a contributor to the Independent, the Sundav School Times and a large list of church periodicals. He published 'The Protest¬ ant Church in Germany) (1903) ; and trans¬ lated (The Book of Enoch and 'The Book of Jubilees,* from the Ethiopic, and (Day in Capernaum* from the German of Delitzsch, Weiss' (Religion of the New Testament (1905). Weiss' Commentary on the New Testament (4 vols. 1906), etc.*

SCHOEBORN, she'born, August, American architect : b. Germany, about 1827 ; d. Wash¬ ington, D. C., 25 Jan. 1902. He came to Wis¬ consin in 1849, but later removed to Washing¬ ton, D. C., where until his death he was a member of the staff of the architect of the Capitol. In Civil War time he drafted plans of barracks, hospitals and forts for the quarter¬ master-general's department, and maps and plans for the use of General McDowell.

SCHOEFFER, shef'fer, Peter, Cerman printer : b. Gernsheim, near Mainz, about 1430; d. about 1502. At about the age of 20 he was a student at the University of Paris, and a copyist. It seems likely that Gutenberg taught him what he knew of printing and em¬ ployed him in his establishment at Mainz. After Fust and Gutenberg dissolved partnership Schoeffer was connected with the former, and the two names are associated on the imprint of the 'Book of Psalms, printed in 1457. The reputation of his being the inventor of matrices and the typemold got abroad during his life¬ time and was aided by his own artful insinua¬ tions ; but modern research has disproved his claim to the work done by Gutenberg. He fol¬ lowed the career of printer after the death of his partner, Fust, and issued many works alone. He was succeeded by three sons who became eminent printers. Consult De Vinne, (The Invention of Printing1* (1876).*

SCHOENECK, shen'ek, Edward, Ameri¬ can lawyer: b. Syracuse, N. Y., 1 Aug. 1875. He studied law at Syracuse University and was admitted to the bar in 1903. In 1902 he becdme a member of the board of supervisors of Onondaga County, was a member of the

New York assembly, 1904-07 and mayor of Syracuse, 1910-13. He was elected lieutenant- governor of New York State 1915-16.

SCHOENFELD, schen'felt, Hermann, professor and author: b. Oppeln, Germany, 21 Jan. 1861. He was educated in the universities of Berlin, Breslau and Leipzig, and in 1888 accepted a call as instructor in modern lan¬ guages at Providence, R. I., and later at New Bedford, Mass. In 1891 he was appointed to Johns Hopkins University; in 1893 sent by President Cleveland as consul at Riga, Russia, and delegated by the United States Bureau of Education to investigate higher education in Russian, Austrian and Prussian Poland. Since October 1894 he has been professor of Ger¬ manics at Columbian (now George Washing¬ ton) University. Dr. Schoenfeld is a con¬ tributor to many German and American magazines and encyclopedias, including The Encyclopedia Americana. He has published (Brant and Erasmus) (1892) ; (Erasmus and Rabelias) (1893) ; 'Higher Education in Poland1 (1896) ; 'German Historical Prose1* (1896) ; Leopold von Ranke) (1899) ; (Treitschke) ; he edited Schiller's (Maria Stuart* (1899) and 'Wilhelm Tell> (1902); Bismarck's 'Orations and Letters) (1905) ; 'History of Teutonic Women, and Slavic Women* (1906) ; 'Essays on Universal Peace and German Arm- aments) (1913) ; 'Causes of the European Conflagration* (1914-15). Since 1914 he has also contributed extensively to journalistic literature on contemporaneous European his¬ tory, especially of the Slavs and the Near East.*

SCHOENLEBER, -shen'la-ber, Gustav, German painter: b. Bietigheim, Wiirtemberg, 3 Dec. 1851. He studied under Kurtz in Stutt¬ gart and. Adolf Lier in Munich, and traveled in Italy and Holland, in the latter country espe¬ cially finding congenial themes for his landscape art. He reproduced the tender tints of the flat, moist land with now and then a church steeple or a clump of trees as a diversifying feature. In 1880 he was made professor at Carlsruhe. Among his works are 'Harbor of Genoa) at Rotterdam; 'Venetian Fishing Boats1 at Hamburg Gallery; 'View of Flushing at Low Tide1* (1881), Dresden Museum; 'Evening near Dordrecht,* Stuttgart Museum.*

SCHOENN, shen, Aloys, Austrian artist : b. Vienna, 11 March 1826; d. Krumpendorf, 16 Sept. 1897. He studied at the Vienna Academy under Fiihrich and Leander Russ. He served through the Italian campaign of 1848 and fought in the Hungarian war. During 1850-51 he studied at Paris, and then traveled in the East. Flis field is genre. Some of his works

are 'Evening on the Nile ; 'Departure of Tyrolese Students from Vienna in 1848* ; 'Storming of Ladrone,* 'On the Coast of Genoa,* 'Goose Market at Cracow,* at Vienna; 'Scene in Perse¬ cution of Jews*; 'Festival in Capri*; 'Fish Market at Chioggia* ; '-Market in Bosnia* ; 'Market in Tunis.*

SCHOFIELD, skd'feld, John McAllister,

American military officer : b. Gerry, N. Y., 29 Sept. 1831 ; d. Saint Augustine, Fla., 4 March 1906. He was graduated from West Point in 1853, and assigned to garrison duty in South Carolina and Florida. In 1855-60 he was as¬ sistant professor of philosophy at West Point, and was professor of physics in Washington

University, Saint Louis, Mo., in 1860-61. He acted as mustering officer for the State of Mis¬ souri at the outbreak of the Civil War, served on the staff of General Lyon in the Missouri campaign and in November 1861 was appointed brigadier-general of volunteers. He was in command of the District of Missouri in 1861— 62, of a division in the Army of the Cumber¬ land in 1863, and again commanded the Depart¬ ment of-Missouri in 1863-64. In 1864-65 he commanded the Department of the Ohio, was engaged in the Atlanta campaign and com¬ manded at the battle of Franklin, Tenn., in 1864, receiving rank as brigadier-general and brevet major-general in the regular army in recognition of his services. He continued in the army after the war, was Secretary of War in 1868-69, and commanded various depart¬ ments until 1888 when he was assigned to the command of the army of the United States as senior major-general. In 1895 he was pro¬ moted lieutenant-general, a grade created for him, and later in the same year he was retired. He published (Forty-six Years in the Armv

(1897).

SCHOFIELD, Walter Elmer, American artist: b. Philadelphia, Pa., 9 Sept. 1867. He studied at the Academy of Fine Arts, Philadel¬ phia, and in Paris under Bougereau, Aman Edmond Jean, Ferrier and Doucet. During a three years' residence at Saint Ives he special¬ ized independently in landscape work and not¬ able examples are

SCHOFIELD, William Henry, American educator : b. Brockville, Ontario, 6 April 1870. He was graduated at the University of To¬ ronto in 1889, and took his Ph.D. at Harvard in 1895, studying at Paris, Christiania and Copenhagen in 1895-97. He was master of modern languages at Collegiate

Institute, Ham¬ ilton, Ontario, in 1889-92. From 1897 he was connected with the faculty at Harvard, and from 1906 he was professor and head of the depart¬ ment of comparative literature there. He was Harvard exchange professor at Berlin in 1907- OS ; and was lecturer at the Sorbonne, Paris, and at the University of Copenhagen in 1911. He was editor-in-chief of (Harvard Studies in Com¬ parative Literature. Author of < Studies on the Libeaus Desconus> (1895) ; (The Home of Eddie Poems) (1899) * (English Literature from the Norman Conquest to Chaucer) (1905) ; < Chivalry in English Literature :*

(1912); (A Blind Bard from Faery (1918)*

SCHOHARIE, N. Y., town and village, county-seat of Schoharie County, on Schoharie Creek, and on the Middleburg and Schoharie and the Schoharie Valley railroads, about 28 miles west of Albany and 20 miles southwest of Schenectady. It is in an agricultural region, and in the vicinity are valuable stone quarries. It has a high school, graded elementary schools

and a school library. Pop. town, 2,526; vil¬ lage, 996.

SCHOHARIE GRIT, a more or less sili- cious and calcareous shale, or a silicious lime¬ stone typically found in the Schoharie Valley of eastern New York, from which it takes its name. It is intimately associated with the over- lying Onondaga limestone of New York, with which together it forms the Ulsterian sub¬ group of the Mid-Devonic group. At its type location it is not over six feet thick and richly fossiliferous. In the Hudson Valley it is a shale, almost barren and sometimes 100 feet or more in thickness. See Devonian ; Old Red Sandstone.

SCHOLAR-GIPSY, The, and THYR- SIS. Matthew Arnold's pastoral idyls, (The Scholar-Gipsy) (1853) and (Thyrsis> (1866) are linked by internal references and, like (L' Allegro and (I1 Penseroso* by similarities of form, mood, scene and theme, both being interpretations of the sentiment of the Cumner country near Oxford as felt by a poetic spirit somewhat ill at ease amid the distractions of his century. The earlier poem was suggested by an incident related in Glanvil's (Vanity of Dogmatizing) (1661) of an Oxford lad who had joined a band of gypsies and had acquired from them a secret for working wonders through the power of imagination. Arnold makes this lad a symbol of the simple-hearted idealism of an elder day, and feigns that his shy spirit still haunts the Cumner hills and appears to shepherds and reapers and village maidens dancing around the Fyfield elm in May— his hands filled with ((dark bluebells drench'd with dews of summer eves.® Apostro¬ phizing this charming genius loci, the poet bids him shun the*

feverish contact of men infected with ((this strange disease of modern life, with its sick hurry, its divided aims, its heads o'ertax'd, its palsied hearts.®

" Roses that down the valleys shine afar ,

And open jasmine-muffled lattices.

And groups under the dreaming garden-trees And the full moon, and the white evening-star."

Death and the call of the busy world ended this Theocritean holiday and harshened and silenced the music of these young singers, but by the magic of these two poems Arnold and Clough and the nameless Oxford lad will be associated forever, in the minds of all lovers of poetry, with the romance of the (

lish spring. For periodical criticisms consult Smart, T. B., (Bibliography of Matthew Ar¬ nold ' (1892) ; books on Arnold by Saintsbnry, George (1899); Paul, H. D. (1902); Russell, G. W. E. (1904); Dawson, W. H. (1904); Dixon, J. M. (1906) ; Sherman, S. P. (1917).

Stuart P. Sherman.

SCHOLASTICISM (Lat. schola, <(school®). Scholasticism is the philosophy of the ((Schools.)> Charlemagne (742-814), inviting leading schol¬ ars of the Church to his court, established a Palatine School and a series of cloister and diocesan schools throughout his empire, and out of these as the mediaeval centres of learning arose the scholastic philosophy. The term ˆscholastic® (Doctor Scholasticus) was applied not only to teachers of the seven liberal arts in these Carolingian institutions and the later established seats of learning, but also to teach¬ ers of theology and philosophy. The term gradually became narrowed to denote the latter class. The movement extends from 850 to 1453 a.d. and may be divided into two periods :

(1) 850-1200, that is, from Johannes Scotus (or Erigena) to John of Salisbury and the Arabs;

(2) 1200-1453, that is, from Alexander of Hales to the fall of Constantinople and the rise of Humanism. The first period is characterized by the controversy on the subject of universals. The second period is marked by the fusion of Aristotelianism with dogmatic theology, the de¬

limitation of the spheres of faith and reason and the controversy regarding the primacy of the will over the intellect. In the first period the chief figures are Johannes Scotus, also called Erigena (that is, Irish-born, b. 810, d. 877, the earliest notable scholastic, fused Neo- Platonism with Christian theology, Gerbert (c. 1003 as Pope Sylvester II and distinguished for investigations in mathematics and natural science), Roscellinus (b. 1050, originator of Nominalism), Peter Lombard (d. 1164 as bishop of Paris, writer of the famous

period is the subservience of philosophy to theol¬ ogy. Philosophy is under the rigid censorship of the Church and although the intrinsic spirit of scholastic philosophy may not be that of a ((handmaid to theology® (ancilla theologies) , yet ecclesiastical authority reduces it practically to that position. Its real spirit is no doubt the desire to harmonize rational and revealed truth, and not to diminish the claims of reason. Nevertheless, its historical function was not so much the discovery of truth, as the defense of dogma. The service demanded of philosophy is apologetic and, therefore, the discipline of logic is particularly important and widely studied. Knowledge is subordinated to faith. In the scho¬ lastic era the Church was the bearer both of science and religion, but as the interests of the latter were the primary concern of the Church and in its estimation the most important for man, the subordination of science to theology was, from the Church's viewpoint, both legitimate and necessary. Gradually, however, science and philosophy asserted their independent claims, and in the Renaissance, the rebirth of the Greek spirit and of the dignity and worth of profane culture, — reason assumed a distinctive position for itself. The result was a long warfare be¬ tween science and theology, between reason and creed. Although scholasticism was a com¬ bination of Hellenic thought with the Church dogmas, yet the rationalistic spirit of Greek philosophy remained practically dormant during the entire scholastic period and did not really awake until the rise of Humanism. The most important question for early scholasticism was the ontological significance of logical genera or universals. In this controversy the scho¬ lastics split into two great parties, the realists and nominalists.

Realism is the doctrine that genera and species have existential reality, that is, they are entities, and extreme realists regarded such uni¬ versals as existing apart from and independent of particulars. The formula for the extreme realists is that universals exist ante rem (((be- fore the particular,® Platonism) ; of the mod¬ erate realists that they exist in re (((in the particular,® Aristotelianism). The extreme opposition was formed by the nominalists who maintained that universals or genera are only class names and have no existence apart from the name. A middle party was formed by the conceptualists or sermonists, who maintained that universals are concepts and have ideal ex¬ istence as notions in the mind, or, as

Abelard more specifically held, the word becomes uni¬ versal by means of predication. The formula for nominalism and conceptualism is that uni¬ versals exist post rem (after the particular®). These discussions of the Middle Ages were powerless to advance knowledge, being mainly exercises in abstract dialectic, although carried on with great subtlety and genius in logical analysis. The question acquired, however, an important bearing by involving the doctrine of the Trinity and the existence of God. Accord¬ ing to the realists the greater the universality, the greater the reality; the wider the concept the more extensive its being. God, as the most universal notion, has the most complete reality; as ens generalissimum He is ens realissimum. Further, the nominalists regarded as real only the individual, concrete thing. The realists urged against this that according to nominalism,

only the three persons (as individuals) of the Trinity have reality; therefore, there is no God¬ head and we have Tritheism. For this con¬ sequence of nominalism Roscellinus was con¬ demned at the Council of Soissons (1092). It was also maintained that if realism is not true, then such universal ideas as Humanity, the Church and Original Sin refer to no real ex¬ istence. Anselm, Hast of the Fathers,® main¬ tained that the universals existed before partic¬ ular things in the mind of God. The most memorable controversy on the subject took place in Paris between William of Champeaux and Abelard, in which the latter gained a dialec¬ tic victory. Scholasticism reached its complete formulation in Thomas of Aquino (<(Angel of the Schools®). Thomas developed a system of philosophy by the fusion of Aristotelianism with Christian theology and Thomism remains to the present time the most generally accepted system of Christian philosophy in the Roman Catholic Church. Thomas sought to correlate more pre¬ cisely than his predecessors the spheres of faith and reason. Reality and truth are one contin¬ uous realm, although certain truths transcend reason and are apprehended only by faith. Truths that belong to the mysteries of faith are the doctrines of original sin, the creation of the world in time, the incarnation and resurrec¬ tion of Christ, the Trinity and the final judg¬ ment. These are not demonstrable by human reason, but are matters of revelation and are assented to by faith. Faith and revelation do not contradict reason ; they transcend it. Faith and reason together apprehend the continuous and harmonious reality of the supernatural and natural. It is not possible, according to Thomas, that what is true for faith may be false for reason. Yet many scholastics took refuge in the doctrine of a <(twofold truth,® asserting that what is true for reason may not hold good in theology. An absorbing question for the late scholastics was the psychological question whether primacy belongs to

the will or to the intellect. Does the will determine our ideas, or do our ideas determine the will? — a question that was bound up by the scholastics with the will's freedom. Thomas is Determinist; Scotus is Voluntarist. It is the will or the intellect de¬ cisive for character? On the side of the primacy of the intellect (cf. the Socratic theory that virtue is knowledge) were ranged Thomas Aquinas, the mediaeval Aristotelians, the Ger¬ man mystics and the Dominicans; on the side of the will Duns Scotus, the Augustinians, Wil¬ liam of Occam and the Franciscans. On the question of universals Thomas and Scotus took similar ground, namely, that of moderate realism. Both maintained that the universals exist in the mind of God (ante rem) as ideas before creation, substantially and immanently in things (in re), and as notions and names employed by the indi¬ vidual mind (post rem). The revival of nom¬ inalism in William of Occam marks the grow¬ ing interest in the world of particular, concrete things, as the only real things. The renewal of nominalism was symptomatic of the condition of the age, of a growing interest in empiricism ; it stood for the reform tendency, and although in the 14th and 15th centuries it grappled with realism in a final struggle and was vanquished in the Church, it found outside a powerful ally in secular science in whose triumph it shared.

The philosophy of the Arabs during the scho¬

lastic era is essentially Aristotelianism combined with elements of Neo-Platonism (the emanation theory). Their interest was mainly in medicine, natural science and mathematics. The chief Arabic philosophers are Alfarabi (d. 950), Avicenna (980-1037), Algazel (1059-1111), and Averroes (1126-98), and they were important as the carriers of Aristotelianism and the seeds of natural science into Europe through Spain. The Jewish philosophy of the scholastic period is partly the Cabbala (a secret emanistic phi¬ losophy recorded in the works of Jezirah and Sohar) and Aristotelianism. The most import¬ ant figure is that of Moses Maimonides (lived in Cordova and Cairo 1135-1204), who combined the sublunary philosophy of Aristotle with Hebrew theology.

The great and serious effort of scholasticism was to fuse philosophy and theology into a com¬ plete system free from inherent contradictions, to exhibit the harmony of natural and revealed truth, but the trend of modern thought has been to emphasize the breach between theology and science. The historical consequence has been that the original ascendency of the former over the latter has in the long struggle yielded to the asserted dominance of science over official creed. While it was the endeavor of scholasticism to unite the dogmatic theology of the Church with philosophy, it has been the endeavor of modem philosophy to divorce them and to erect a purely rationalistic and scientific system of truth. The philosophical

significance of scholasticism is apt, however, to be underestimated. It was the in¬ terpreter of questions that were vital for that age, an age in which the one question was con¬ fined to the relation between revealed and natural truth. Their fundamental problems, however, the problems of universals, of the relation of faith to reason, of mysticism, of the claims of revealed truth, are neither artificial subtleties, nor are they as yet settled.

Bibliography. — De Wulf, M., (History of Medieval Philosophy) (trans. London 1909) ; Erdmann, (History of Philosophy (Ancient and Mediaeval) > (1891); Haureau, (Histoire de la philosophic scolastique) (1872-80) ; Stockl, (Ge- schichte der Philosophic des Mittelalters) (1864-66) ; von Eicken, (Geschichte und Sys¬ tem de mittelalterlichen Weltanschauung) (1887) ; Werner, (Die Scholastik des spateren mittelalters> ; Maurice, (Mediaeval Philosophy)

(1870).

Wm. A. Hammond,

Professor of Ancient and Mediceval Philosophy,

Cornell University.

SCHOLIA and SCHOLIAST. See Scho¬

lium.

SCHOLIUM, plural SCHOLIA, a mar¬ ginal note or comment : specially such note or remark made upon a passage of any of the writings of the Greek or Latin classic authors by early grammarians. The writers of these scholia, the scholiasts, are mostly anonymous.

SCHONEFELD, she'ne-felt, Henry, Amer¬ ican musician : b. Milwaukee, Wis., 1856. He studied in Leipzig in 1874-79, and afterward engaged in teaching, composing and conducting in Chicago. He was among the first composers to use the -folk melodies of the American negroes. Author of two concertos and numer¬ ous instrumental pieces.

SCHOOL, The Corporation. A corpora¬ tion school is one maintained by a business con¬ cern, and not under public supervision and control, having for its purpose the training of new employees for efficient service, or for the further training of older employees to fit them for positions of greater

responsibility as fore¬ men, executives or technical experts. Probably the first such corporation school was one estab¬ lished by the Chaix Printing Company, of Paris, France, in 1863. The oldest American school was founded by the R. Hoe Printing Press Company of New York in 1875. Most of the corporation schools now in operation have been organized since 1905.

The National Association of Corporation Schools was organized 24 Jan. 1913. The ob¬ ject of the association is to aid corporations in the education of their employees by providing a forum for the interchange of ideas, and by collecting and making available data as to suc¬ cessful and unsuccessful plans in educating employees.

Many different types of corporation schools are maintained and for every variety of pur¬ pose.

The <(special training schools® are generally schools open to college graduates and other technical men. The students usually enter directly from college with little or no execu¬ tive or business experience. Such schools aim to connect up as soon as possible the theoreti¬ cal work of the technical school and the prac¬ tical routine of the manufacturing or commer¬ cial institution.

The <(company continuation schools® gener¬ ally admit any employees who desire to enroll. Their purpose is to aid such employees to equip themselves for advancement by means of either technical or general training. Such schools are maintained by the Curtis Publishing Company, the General Electric Company, the International Harvester Company, the Standard Oil Com¬ pany of New York, the Fox River Shipbuilding Company, the Yale and Towne Manufacturing Company and many others. Sometimes these schools are on a co-operative basis and the <(study® part of the school is conducted under and administered by public or private school authorities. In the case of co-operation with public schools the <(educational work® is usually paid for out of public funds. Frequently the company pays the student for the time spent in school as well as for that spent on productive work.

Special training schools and company con¬ tinuation schools are maintained for the train¬ ing of wholesale and retail salesmen and office workers, as well as for the training of persons connected with industrial enterprises and the business of railroading and transportation and public utilities.

<(Schools for unskilled laborers® furnishing instruction in common school subjects or for the teaching of English to foreigners have been established in

increasingly large numbers since 1916. One of the most fruitful sources of accidents in factories is the inability of foreign¬ ers to understand English. The teaching of English to foreigners is being fostered by the United States Bureau of Education through its Division of Immigrant Education.

In some States the work is being carried on

under public guidance or under public super¬ vision and control and at public expense.

The Ford Motor Company has enrolled as high as 2,700 foreigners in the Ford English School.

The trade apprentice schools are probably the most important type of corporation school in that they serve by far the largest number of employees. The National Association of Corporation Schools in 1916 reported almost 30,000 students in corporation schools main¬ tained by member companies of the association. Apprentices are accepted usually at the ages of 16-20 and under definite agreement as to rate of pay, period of apprenticeship and char¬ acter of training to be given. The academic and technical part of the apprentice training is frequently given on a co-operative basis in pub¬ lic or private schools, while the practical trade is given in the shop under the actual shop con¬ ditions. Sometimes a concern will set apart a special shop or section of the plant for the giving of the apprentice training, placing this department in charge of a foreman who serves as an apprentice teacher.

Under the terms of the Smith-Hughes Fed¬ eral Vocational Education Act a portion of the funds which are distributed to the States for trade, industry and home economics education must be used if at all for part time or continu¬ ation schools under public supervision and con¬ trol. It is, therefore, probable that practically all of the academic and technical instruction will be given to trade apprentice school students by public school teachers in the near future, either in the public schools or as is possible in the factories and business establishments.

Lewis A. Wilson,

Director, Division of Agricultural and Indus – trial Education, The State Department of Education, N. Y .

SCHOOL BUDGET. The modern school

budget provides for a fourfold classification of school expenditures, (1) by function, or the kind of work performed. The functions of a public school system are (a) a regulative and executive service by the school board and

the superintendent; (b) instructional service, sub¬ divided into supervision and teaching; (c) pro¬ prietary service, consisting of the provision, care and disbursement of funds, supplies, equip¬ ment of buildings; and (d) auxiliary and social services such as health, library, lectures, recrea¬ tion, provision for indigents, etc. (2) Ex¬ penditures by character showing tfie fiscal nature of the transactions as administrative, operative, upkeep and capital outlay. (3) Pay¬ ments classified by objects of expenditure; (a) personal service; (b) services other than per¬ sonal; (c) supplies; (d) equipment; (e) build¬ ings and non-structural improvements. Finally a classification by location indicates the depart¬ ment office or school building or playground to which each payment is chargeable.

SCHOOL DISTRICT. See District.

SCHOOL EXAMINATIONS. No suc¬ cessful means of testing knowledge or of determining intellectual progress without some form of examination has yet been devised. The history of education affords frequent evi¬ dence of the attempt to free school children from this universal bugbear. The examina-

lions persist, however, and are freely em¬ ployed by those who approve of them, by those who condemn them and by those who regard them as a necessary evil. The truth seems to be that no better way of gauging school prog¬ ress has been found, or is ever likely to be found, and that it is the careless misuse, and not the legitimate employment, of examinations which so frequently condemns them. Examina¬ tions in some form or other characterize the administration of our schools throughout the country.

The State of New York has the most highly organized system. The country boy in New York who desires to become a physician, for instance, in pursuing the usual course, is ad¬ vanced from grade to grade through a system of grade examinations, is admitted to high school through a system of preliminary ex¬ aminations, is graduated from high school and admitted to college, or directly to a pro¬ fessional school through a system of regents or academic examinations, gains credit in college or professional school subject by subject by passing of examinations, and is finally author¬ ized by the State to practise medicine by pass¬ ing a medical licensing examination. The situation in other States does not differ materially so far as the individual is con¬ cerned. New York simply sets up the edu¬ cational barriers more conspicuously than other States and exercises larger central authority in their administration.

Certain general principles may be said to underlie any system of school examinations which is calculated to be a sound means for producing a useful end and which does not confuse teaching with examining. These gen¬ eral principles may be stated as follows: (1) The examinations should be confined to soundly conceived and clearly announced courses of study; (2) Admission to all examinations should be predicated upon reasonable evidence of the successful completion of the courses of study upon which the examinations are based; (3) Persons actually engaged in teaching should have some part in the framing of question papers, and all examinations should be framed so as to discover what the candidate knows and can do rather than what he does not know and what he is unable to do ; (4) Answer papers in all examinations should be rated by thoroughly qualified persons in accordance with settled methods of procedure, without settled determination in advance of the rating as to the exact forms or character of a perfect answer; (5) The credentials springing from examinations should be a reward of merit, and should have generally acknowledged value.

The examination system which is founded on these principles will not yet be free from criticism because the inevitable tendency of any examination system is to emphasize stuffing at the expense of teaching. The end of life is after all ((not knowing, but being.® There is truth in the charge that teachers are often so absorbed in the sharpening of their tools that they almost forget the objects upon which they are to be used. Now an examination rightly used is never more than a tool, is not the object of all teaching, but only an incidental means of testing the results of teaching. The real dan¬ ger in the employment of any examination

system lies in the tendency to make the exam¬ inations fundamental rather than incidental. As tools in the hands of teachers, examinations serve useful ends in affording passports for individuals and in setting standards by which institutions may judge themselves; as the masters of teachers, examinations dwarf teach¬ ing and defeat the whole purpose of education.

Further reference to the system of examina¬ tions employed in the State of New York may serve to illustrate the above statements. The State does not offer any of its examinations as a mere intellectual game of chance. The underlying purpose of the State is missed en¬ tirely when whole school systems and when in¬ dividual teachers employ examinations to test knowledge or to gauge capacity in the way in which we cast a die or toss a ball to settle a dispute. It is after all, as has been intimated, not the wise use, but the flagrant misuse of soundly conceived examinations, which not in¬ frequently brings them into educational dis¬ repute.

The experience of the New York country boy on his educational way to the

practice of medicine may be in further point. The certifi¬ cate of advancement from the fifth to the sixth grade or from the sixth to the seventh grade which he secures from the district super¬ intendent of schools upon passing the pre¬ scribed grade examinations is not in itself evidence of sound primary training. The cer¬ tificate means, if it means anything, not simply that the boy has passed certain examinations, but that he has spent a given time in school in the study of the subjects in which he has been examined, and that he has with some determinable degree of success pursued the courses laid down by the State and in the way suggested by the State.

The preliminary certificate which he later receives at the end of his grammar school course is not in itself proof of his ability to go on with work of high school grade. If the certificate has any value whatever, it must carry with it not simply evidence that its possessor has passed reading, writing, spelling, geography, arithmetic, elementary English and elementary United States history in the preliminary ex¬ aminations, but also that he has completed the work of the elementary school course through the eight grades as laid down by the State in its elementary course of study, and that he is believed to be ready for advancement.

The academic diploma or college entrance diploma which the young man secures at the end of his high school course as a result of academic examinations taken throughout that course is not, if it is worth anything, the product of the casting of a die or the tossing of a ball. It is the reward given by the State to a faithful student who has put in four years of serious successful study in a school of ap¬ proved grade, and is the official declaration of the belief of the State that the holder is quali¬ fied to begin advanced work in college or pro¬ fessional school. It is not simply a record of creditable passing marks. It is official evidence of one's profitable association with his fellows for four years. It is official evidence of the accomplishment of a purpose.

The medical licensing examination which this patient youth meets in turn after long in-

tellectual discipline is simply the means em¬ ployed by the State to determine who shall and who shall not practise medicine ; in other words, to separate medical practitioners from other persons. The State's chief concern in the li¬ censing of its physicians is not in its own ex¬ aminations which admit to practice but in the sound preliminary schooling of the

candidate and in his four years of systematic study of medicine in an approved medical college. The examination is the State's label and not its fundamental concern.

Thus it can hardly be too strongly urged that any system of examinations, however con¬ stituted, should be a means and not an end of teaching. The examination never ought to be of itself alone a court of last resort to deter¬ mine the knowledge and power of a student ; it should be only one of the many useful agen¬ cies employed by a wise teacher incidentally to impart knowledge and fundamentally to de¬ velop power. Wisely used and properly con¬ trolled, a soundly conceived system of school examinations may do unmeasured good ; al¬ lowed to dominate teaching and to control schools, it may become a positive menace. The school, or the system of schools, is safe which uses examinations and does not become pos¬ sessed by them.

Harlan H. Horner,

Dean, State College for Teachers, Albany, N. Y.

SCHOOL GARDENS. In America, school gardens originated in the city. The children of congested living show a marked loss in cer¬ tain broad educational attainments. Training in the care of living plants and of animals will supply in a large measure this necessary development. This training will give sympathy, love for the beautiful, ability for self-support, physical vigor and moral stamina.

The high cost of living, and particularly the intensive necessity for food production brought on by the World War of 1914, has greatly em¬ phasized the school-garden work. The potential¬ ity of the backyard garden in suburban parts of cities and towns, and the great value of the garden at the school as a model and as an incentive, has been increasingly accepted since 1914.

The school garden is a term used to cover the agricultural operations conducted under the auspices of the school. The garden may be at the home of the child, on a vacant lot, in a park or on school grounds. It is still a school garden so long as the school controls or di¬ rectly influences it. Children's gardens con¬ ducted by other agencies than the school, such as gardens conducted by commercial institu¬ tions, welfare associations and private individ¬ uals, are properly called school gardens in the sense that the agencies operating those gardens for children are undertaking an educational function. This work is, therefore, properly the school-garden work of the conducting agency.

Valuation. — Almost every possible educa¬ tional value has been given to school garden¬ ing. It is undoubtedly of the greatest physical benefit for growing children to work in the open. Children must also learn much of natural phenomena, growing plants and the living or¬ ganisms given to their care. A full discussion of these more evident values could be carried on profitably at great length, but the particular

necessity of school gardening for city children lies in the following comments:

Background of Experience. — Before the child can learn to talk and write and compute with forcefulness, he must have come into intimate knowledge with things, and especially with animate things, in order that he may have something to talk about, or to write about, or to calculate upon. He must live the life. He must come into the experi¬ ences of his race. The city child is peculiarly denuded of these human experiences. The child that trains a plant from seed to fruit must learn not only to love the plant but he must acquire the skill to grow plants.

Idealization of Best Living Conditions. — The school garden that does not blossom in the home garden is a poisonous weed. The child will never do at home that which is beneath his teacher at school. When there is a garden at the school and the teacher works with the child, then gardening becomes posi¬ tively worth while; it has its social valuation. Father, mother, and child alike, become proud of the home garden. If they have no home garden, they move into less congested quarters, where they can have a home garden. This is the result of the idealization of garden work under the auspices of the school. The school and the church naturally establish the ideals of any community.

Self-Support Emphasized. — The school

garden, when managed properly, must tend toward teaching self-support. The child soon learns that he can grow something of value and that that value is real food. He learns responsibility and his place in the world as a worker and a supporter. He comes into a feeling of ownership and of positive individ¬ uality. He differentiates himself from his fellow. He thinks in terms of freedom. He acquires high incentives of attainment, and higher ideals of sympathy, love and brother¬ hood.

History. — In America, the school garden movement had its beginning in the city of Boston in 1891, when Henry L. Clapp, principal of the George Haven Putnam School, established a wild-flower garden at his school. This beginning was formally published as a school garden, and the efforts in the schools of the country, which have been more or less regular, doubtless

originated from this begin¬ ning. It is notable that in this effort in Boston, and in all the efforts that have followed it, the education of children has been the great aim. America has not taken up school gardenine so much by way of increasing agriculture as to increase the potentialitv of education. The school garden has been considered everywhere the laboratory of natural science, and has been further looked upon as a valuable all around means of child training. This motive was verv different in the inception of school gardening in Europe. We find that as early as 1869 Sweden and Austria passed laws requiring the wide establishment of school gardens. France did so in 1880, Russia, Belgium and England followed with school garden requirements. In Switzerland, however, we find that education by means of school gardening was a large motive in the work, but in all other countries of Europe it appears to have been undertaken to promote agriculture as an industry. This

1 School Garden, Public School 89, Brooklyn, N. Y.

2 A class at work on a 10-acre School Farm at Pelham Bay, Bronx, New York City

motive materially affected the method of teach¬ ing school gardening in Europe so that little has been gained by those teachers in America, who have gone abroad to study school garden¬ ing, that could be directly adapted in this country.

In 1904 Sir William Macdonald, of Mon¬ treal, Canada, established some 20 gardens in the various provinces of Canada. This be¬ came the initiative of a great interest in ele¬ mentary garden work in Canada, and large grants on the part of the Dominion govern¬ ment have been made to encourage the work since that time.

In 1897, John H. Patterson, of Dayton, Ohio, founded a boys' garden at the National Cash Register Company grounds. This was the first and most successful children's garden known in America. Nearly all of the children's gardens, especially those conducted by welfare organizations and private individuals, have imi¬ tated this endeavor in Dayton, Ohio. For more than 20 years Mr. Patterson's effort there has grown and has become more thoroughly estab¬ lished with each season. Early in the century a number of normal schools established school gardens, notably the one at Hyannis, Mass., and it is reported that the Cook County Normal College, in Chicago,

had a school garden in 1885. In 1900, the Cleveland Home Garden Association sold penny packets of seeds through the schools to the children of Cleveland. This originated a plan of seed distribution which has been taken up by a number of other cities as well as commercial houses and has greatly facilitated the movement. In 1902, Mrs. Henry Parsons, of New York, started the Children's Farm in the De Witt Clinton Park. This farm and three other large farms have been main¬ tained by the Park Department of Manhattan ever since that time.

Cleveland, Ohio, and Philadelphia, Pa., were the first cities to formally accept school garden¬ ing as a part of the regular school work. These cities have conducted regular school garden work for more than a decade.

The United States Bureau of Education, in 1914, established a school garden department. It emphasized the home garden side, and termed it "School Supervised Home Gardens.® This work has grown, and has lately been given a large Federal grant to operate the United States School Garden army, so that in the last 25 years the school garden movement in America has become a distinct educational factor and a distinct economic gain in accelerating love and interest in garden work in thousands of schools and millions of homes in the United States.

School Garden Types. The Garden at School — Indoors, the school can support the schoolroom window box and schoolroom flowerpot. The greenhouse on the roof of school buildings is the most practicable, and it may serve as the laboratory for nature study and the natural sciences as well as in part for physical science. Plants may be planted at school by the children and then taken to their homes to be grown, and later exhibited at the school. Class lessons in care of plants, plant¬ ing seeds, transplanting, watering and other exercises can be easily conducted in the school¬ room. The outdoor garden at the school should be as near to the school building as possible.

It should be on school property and large enough to contain 40 plots, each plot not smaller than 50 square feet. This will accommo¬ date one class, or grade, and presupposes that all children may have direct work in the school garden, at least during one grade of their school course. One teacher in a given city school should be the teacher of gardening, and preferably a teacher of elementary sciences as well. The garden work should be part of the curriculum, and credit for it should be given as for any other subject.

The best vegetables to begin with in school garden work are evidently the hardy, short sea¬ son varieties. Beans, beets, kohl rabi, radish, Swiss chard, cabbage, tomatoes, carrots, lettuce, corn, are undoubtedly the best. The best flowers for school garden work are likewise the hardy annuals

and long blooming varieties. Sweet alyssum, nasturtium, marigold, asters, zinnia and cosmos are leading varieties.

It is always best to fence the school garden, if not to protect against petty thievery, then it should serve to keep out dogs, cats and other small animals. The school garden should be supplied with running water ; should have good drainage ; should be in the sunlight and should be richly fertilized. The work may be done with few tools, but a hoe should be supplied for every pupil. Rakes, watering cans, hand weeders, spading forks and garden lines are the principal additional tools required.

The Garden at Home. — The garden at the home of the child has hardly been operated by the school long enough to develop acceptable standardization. There is a general agreement, however, that a home garden, managed by the schools, should be visited by teachers, or those who understand gardening, as frequently as possible. The child should keep a complete record of his garden work according to accept¬ able standards, and his record should be ex¬ amined and rated. His garden should be rated at each visit, and instruction should be given in the garden, as far as possible, but the major part of the instruction must of necessity be given at the school garden, if the expense of home garden work is to be kept within the possible appropriation. It would, therefore, seem that the school garden and home garden must go hand in hand if any high attainment in gardening is to be accomplished.

Management of School Gardens. — In the management of school gardens the point of view is important, and on account of agricul¬ tural demands the education of the child is very liable to be subordinated. The child is greater than the produce. In other words, it is much better that a child plant a row of radish seeds with his own hands, and cover it with his own hoe, than it is to have the teacher plant that row while the child looks on. The radishes planted by the teacher would undoubtedly do better than the radishes planted by the child, provided the skill of the teacher is what it should be, but the child is undoubtedly taught much better by doing every possible agricultural act himself in the school garden.

Individual Project. — This is undoubtedly the very best means of facilitating successful school garden work. Every child who is' able to do garden work should work out his own individual project or problem in agriculture on a plot of ground assigned for his sole use.

This individual plot of ground mav vary in size according to the age, sex and experience of the child, as well as neighborhood limitations, from 50 square feet to 800 square feet. As a rule it is best that no individual worker grow less than five vegetables, presupposing that these five vegetables may be followed by four or five others at a second planting. This produce pro¬ vides for educational experience and also for a continuity of interest. For example: If a child were to plant his entire plot to lettuce, he might take the entire crop of lettuce out on the 20th of June, and his interest, of course, could not be retained in his work during the rest of the season.

Produce for the Child. — Each child should have the produce which he raises on his own in¬ dividual plot. This gives educational experience and retains interest. When conducted by the school, the direct collections of money for produce is most objectionable. It, therefore, should not be undertaken. However if funds are greatly needed by a given agency undertak¬ ing school garden work, it would seem as if each individual worker might be taxed a cer¬ tain percentage of his produce to maintain the common garden.

Course of Study. — One of the greatest hin¬ drances to school garden work is that it has found such slow acceptance in the regular course of study of the school. This has doubt¬ less been due to the fact that the schools are not in session during the chief growing sea¬ son, which is summer. Shop work, cooking and other manual arts have been placed in the curriculum, and credit for attainment has been given to pupils. But not so generally with school gardening. School gardening can never come into its own until it is placed in the cur¬ riculum, either as an industrial art or as a natural science. Pupils who attain the desired standards should be given credit.

School Program. — Another thing that has hindered gardening in schools has been the fact that the work can be done outside of what are termed the regular school hours, so that many schools have failed to program school gardening at all as a regular exercise. It, therefore, loses value with teacher and pupil alike. It should be done continuously or not at all. Consequently, the movement has suffered greatly from gardens not properly attended to, which have grown up to weeds.

Garden Teacher. — The school garden teacher should be one of the regular teachers in a given school. The departmental plan of teaching provides for sufficient specialization. The teacher of the sciences, as a rule, should have charge of school gardening.

Support and Control. — If school gardening is worth while as an integral, educational factor,

then it is worth regular public support. The school appropriation for a given city should carry the school garden work. It is indeed un¬ fortunate that welfare organizations have too frequently been entrusted with a burden too great for them to carry long, and hence valu¬ able and devoted effort have frequently ended in dismal failure. Every city in the land with a population over 100,000 should employ a school garden director to administer this work.

The possibilities of food production in large cities where great suburban tracts have been divided up into partly improved city lots have grown out of the school garden development. In many cities large community gardens have been successfully managed. The people have formed a garden club and the nearest vacant lots have been divided into family plots of from 800 square feet to 12,000 square feet each. The features of the Community War Garden have been a number of small family gardens in one group, and these gardens have been upon vacant lots. Some few communities have been able to maintain the gardens in walking distance of homes. A great variety of management has resulted. A city department for food produc¬ tion and conservation should follow these food gardens in our cities. The growth of school gardens has been most striking. Nearly every city in the United States and Canada now has some form of school gardening. The United States School Garden army reports an army of 1,500,000 children gardeners for 1918.

Van Evrie Kilpatrick, Director of School Gardens , Department of Education, City of New York.

SCHOOL LUNCHES. See Retardation of Pupils.

SCHOOL NURSES. See Retardation of

Pupils.

SCHOOL PLAYS. See Festival.

SCHOOL SANITATION. See Educa¬ tion, Elementary.

SCHOOL SAVINGS SYSTEMS. The

savings bank section of the American Bankers' Association in a report with respect to the ex¬ tent of savings of schools gives the following statistics as of 1 Jan. 1915, or the nearest date thereto. It appears that the school savings system is in operation in schools located in 280 cities. The number of schools having school savings banks is 1,925, with 928,784 pupils enrolled. Of the pupils enrolled 398,540 are depositors, and the amount of their de¬ posits is stated at $1,792,640.10. There are 37.- 051 depositors

in individual school banks, 334,- 964 in systems, and 26,525 over the counter, as detailed in the appended table.

School Savings.

Number of schools

Number of pupils

Number of depositors

Amount of deposits

Number of accounts transferred to regular bank accounts

Individual schools .

283

1,482

160

136,282 704,722 87 , 780

37,051

334,964

26,525

$305,195.57

1,170,068.67

3 17,375.86

11, 7B3

91,476 1,736

Systems .

Over the counter .

Total United States (280 cities) .

1,925

928,784

398 , 540

$1,792,640. 10

104,995

SCHOOL FOR SCANDAL— SCHOOLS, BIBLE IN THE

393

The individual school system is not under the control of the superintendent of schools or board of education. The term “systems® refers to the savings systems installed in all schools by the board of education or superintendent, the accounts being kept in the superintendent’s office. The term “over the counter® is applied to those schools where the deposits are not col¬ lected in the school, the system being operated directly through the bank.

SCHOOL FOR SCANDAL, The. Sheri¬ dan’s (The School for Scandal* was produced 8 May 1777, by the author himself as manager and part owner of Drury Lane Theatre, which he had taken over some time before from Gar¬ rick. Unlike the earlier ‘The Rivals) the play was an instant success. It ran 20 nights the first season ; 65 nights the second season, and has held the stage ever since.

(The School for Scandal,* the only play of later date to challenge comparison with Con¬ greve, may be studied as an index of dramatic tendencies since the Restoration. The move¬ ment for correcting the morals of the stage, traces of which were seen in ‘The Way of the World,* have now culminated in a definite brand of technique. Though scandal is spoken in the play none is actually seen in the action. The polite subterfuges demanded by modern English taste have begun. The tradesman has been introduced into comedy. Moreover, though Sheridan ridicules sentiment, the primary action of the play revolves around a sentimental motive. Joseph Surface is a false sentimental hero, while Charles Surface is a true sentimental hero. Oliver and Rowley are characters from sentimental comedy.

‘The School for ScandaP is of the school of Congreve once removed. Whereas Con¬ greve conventionalizes life, Sheridan conven¬ tionalizes the stage. With Congreve, wit is the specific; with Sheridan it is entertainment. (The School for ScandaP is a crowded fabric of “situations® derived from a broad reading of English comedy and an intimate acquaintance with the stage. Much worked over in composi¬ tion out of scattered scenes and different plays, the central idea of a school for scandal goes back to the

cabal nights of Lady Wishfort in (The Way of the World. Action has become more important than speech, and events follow each other in rapid succession. There is little repartee. The brilliancy of give and take gives way to broken monologues. Dialogue serves not as a fencing of wits but as the rapid patter of characters manipulated through a fore¬ ordained intrigue. To keep the conversation running rapidly is the first requirement. Therefore a spirit of raillery is maintained.*

When these things are said it must be ad¬ mitted on the other side that the play occupies a significant position. It was the last of the comedies of manners and the first of the modern plays of entertainment The former were written for the discriminating; the latter for the crowd. The plot is regular and ex¬ pert in the handling of a crowded action. In theatrical "effects® the play has been a store¬ house of devices for a century of writers of comedy. On account of its adjustment of old materials to the requirements of the new day the play has maintained vitality unabated to this day. Editions: Rae, W. F., ed., Sheridan's Plays now Printed as he Wrote Them' (1902) ;

Nettleton, G. H., (The Major Dramas of Sheri¬ dan (1906) ; (Everyman's Library* (Vol.*

LCV) ; (The Temple Dramatists. Consult Sichel, W. S., Sheridan from New and Origi¬ nal Material* (2 vols., 1909) ; Rae, W. F., (Biography* (2 vols., 1896) ; Oliphant, M., 'English Men of Letters Series* (1898).*

Thomas H. Dickinson.

SCHOOL SUPERINTENDENT. See

Education — Office of School Superintend¬ ent.

SCHOOL SYSTEM, Public. See Public,

or Common Schools.

SCHOOLCRAFT, skool'kraft, Henry Rowe, American ethnologist and author : b. Watervliet, Albany County, N.)[., 28 March 1793; d. Washington, D. C., 10 Dec. 1864. He was educated at Middlebury and Union colleges, in 1820 was made geologist to an exploring ex¬ pedition under Gen. Lewis Cass to die Lake Superior copper region and the upper Missis¬ sippi, and in 1822 became Indian agent for the northwestern frontier, with headquarters at first at Sault Sainte Marie and later at Michili- mackinac (or Mackinac). From 1828 to 1832 he was a member of the Michigan territorial legislature. He commanded in 1832 the expedi¬ tion which discovered the sources of the Missis¬ sippi, and in 1836 concluded with the Indians about the lakes a treaty by which cession of 16,000,000 acres of land was made to the United States. Soon afterward he received the ap¬ pointment of acting superintendent of Indian affairs and disbursing agent for the northern department. In 1847, he began the preparation, under government appointment, of his elaborate work, 'History and Statistical Information Re¬ specting the History, Condition and Prospects of the Indian Tribes of the United States (1851-57). For the hrst five volumes an appro¬ priation of nearly $30,000 per volume was made by Congress ; the sixth and last was published at the expense of the War Department. The work was finely printed, and illustrated by 336 plates. It was the first means of introducing Indian legend and tradition to the general reader and gained a considerable reputation as a work of scholarship. Parkman, however, whose opinion is of very high value, considers that the work was quite inadequately done ; particularly in view of the unusual facilities placed at the author's disposal. Among School¬ craft's other volumes are 'Algic Researches* (1839) ; 'Oneota; or Characteristics of the Red Race of America* (1844) ; 'Personal Memoirs of a Residence of 30 Years with the Indian Tribes* (1851) ; and 'Scenes and Adventures in the Semi-Alpine Regions of the Ozark Mountains* (1853).*

SCHOOLEY PENEPLAIN. See Pene¬ plain.

SCHOOLS, Bible in the. The Bible may

be used in schools for one or both of two quite distinct purposes. It may be used for the purpose of establishing or confirming reli¬ gious convictions or it may be used simply to give familiarity with and appreciation of a great body of poetic and historic literature, the most important, perhaps, that the world has produced. The use of the Bible for the first of the purposes mentioned is, in the nature of things, restricted in all countries where there

is no established Christian church. In the United States where all sects and all denomi¬ nations stand upon an equal footing, it would be manifestly improper to levy a general tax to maintain religious instruction, which, in many cases, would be heresy to some. In pri¬ vate institutions founded by particular reli¬ gious organizations and maintained for the purpose of promoting and fostering particular religious sects, Bible instruction would be not only eminently fitting and proper, but, in fact, essential to the accomplishment of the purpose for which such schools exist.

In the early colonial days in the United States, schools were, for the most part, main¬ tained by the churches. Religious instruction based on the Bible was, in the schools at that time, an essential part of the curriculum. But public education in the United States has now become thoroughly recognized as a State func¬ tion and as a result religious instruction has been excluded from the public schools. In a few cases, for example, in New York City, the reading of the Bible without comment is a daily exercise required by law, but such cases are few. In most States of the American Union the reading of the Bible in the public schools without comment is permitted by the common law if no objection thereto is made, and the practice of such reading is quite gen¬ eral, but where the question has been raised, the decisions of the courts have been uniformly against the practice.

Victor M. Rice, State superintendent of public instruction in New York State in 1866, said that (

But this exclusion of religious and Bible instruction from the public schools has not in any degree lessened the belief in the importance of such instruction, but has resulted in a new movement, which has for its purpose a wider dissemination of knowledge regarding this great literature through study carried on out¬ side the school, but still having certain relations to the school.

We are just beginning to appreciate the fact that knowledge and culture in any field may be acquired outside the school. Formal regula¬ tions have been adopted in many States for giv¬ ing credit toward the completion of a high school course for study carried on outside the school and this plan has been extended in many States to include credit for Bible study. Such work is already definitely organized in the following States: Arkansas, California, Colorado, Idaho, Illinois, Indiana, Iowa, Kan¬ sas, Michigan, Mississippi, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, Oregon, Texas, Virginia, Washington, West Virginia.

The plan adopted varies somewhat in the different States but in the main it includes the following definite features :

(1) A syllabus indicating definitely the parts

of the Bible that are to be studied and the points that are to receive special attention.

(2) A definite period of study at home or in Sunday school under the instruction of parents, Sunday school teachers, or ministers of the gospel.

(3) A written examination conducted at the school by the school authorities.

(4) The crediting of the subject, if the ex¬ amination is successfully passed, toward a regular high school course.

In many cases the syllabus and the question papers are prepared by committees which con¬ tain Catholics, Protestants and Jews, and the answer papers are read and rated by similar committees.

Courses have been arranged on this general plan covering full four years with specific as¬ signments for each year.

Following is the outline of the course now in operation in the State of Colorado :

Course I. Heroes and Leaders of Israel.

Course II. First Semester. The Friends and Followers of Jesus.

Second Semester. The Life and Labors of Jesus.

Course III. First Semester. Bible History.

Second Semester. Biblical Literature.

Course IV. Social Institutions and Social Application of Bible Teachings.

1. The Family and the Community.

2. The State and the Church.

3. The Industrial Order.

Charles F. Wheelock, Assistant Commissioner for Secondary Educa¬ tion, The University of the State of New

York.

The United States Federal Board for Voca¬ tional Education gives official sanction to the following definitions :

“ A part-time school is a school open to minors and adults who have entered upon employment. When the school aims to complete general education, it is designated a part-time continuation school; when it aims to increase skill and intelligence in a vocation other than that in which the pupils are employed, it is a part-time trade preparatory school; and when it provides training that is strictly sup¬ plementary and related to the employment of its pupils, it is a part-time extension school.”

The need for the existence of continuation schools is found in the fact that even under compulsory attendance laws, a large number of children of 14 years of age or over are obliged

to leave school and go into industrial employ¬ ment before they have completed even the ele¬ mentary grammar grades, while the general education of those who leave school after hav¬ ing completed the grammar grades is frequently so defective that their opportunities for ad¬ vancement after entering an industrial occupa¬ tion are very limited. From the investigations of the Elementary Board for Vocational Edu¬ cation it appears that in the United States <(there are about 5,000,000 children between 14 and 18 years of age out of school, and that practically all of the boys and a large propor¬ tion of the girls not at school in these ages are at work. A very large proportion of these workers have left the public school without completing an elementary education or prepar¬ ing themselves for any specific vocation.® Moreover, modern industrial conditions tend to make the kind of occupation open to this class of children extremely monotonous and deadening to all intellectual activity. Such occupations consist usually of the repetition of a single simple operation or the operating of a single machine; hence, there is offered almost no opportunity for acquiring general knowl¬ edge of any trade as a whole and consequently almost no opportunity to progress in earning ability such as was afforded under the now al¬ most obsolete apprentice system.

The principal specific purposes of schools organized to meet this situation are: (1) gen¬ eral education looking toward general culture, broader vision and better citizenship; (2) pre- vocational training and vocational guidance

looking toward the better adjustment of the individual to his job; (3) training for a spe¬ cific industry; (4) instruction supplementary to that received in the shop or factory practice in which the student is engaged, looking toward improvement in such practice; (5) instruction in homernaking for girls. The evening school was the earliest form of continuation school and such schools have been in existence in most European countries as well as in the United States for about 100 years. At the beginning such schools were intended to give instruction in the three R's only and were attended chiefly by those whose early education had been en¬ tirely neglected. Gradually the field covered has been extended until at present, in many cases, they offer complete high school courses in the subjects regularly offered in the day high schools, but the trend is toward industrial and commercial courses and homemaking. Even¬ ing schools, which are tax-supported, now exist in most of the cities and larger towns of the United States and of Europe. Attendance upon these schools is mostly voluntary, but certain classes of students who have failed to complete courses in elementary schools are re¬ quired to attend either evening high schools or some other form of continuation schools.

One serious difficulty in the way of attain¬ ing the desired end of a continuation school through the evening high school is in the fact that the student fully employed during the day is not in physical or mental condition to benefit to the fullest extent from evening study and instruction. To avoid this difficulty, part- time schools have been organized. In these schools students are occupied in regular re¬ munerative employment for a portion of the regular working hours and are in school dur¬

ing the remaining working hours, work and school thus alternating. In some cases stu¬ dents are employed alternate half days and are in school alternate half days. In other cases entire days are given to work and alter¬ nate days to school. In still some other cases alternate weeks are given to school and to work. In this way a uniform attendance is secured time school students are divided into two equal groups. Students working in any particular shop, factory or business concern are divided into two groups which alternate, one group be¬ ing in school, the other group being at work. In this way a uniform attendance is secured both in school and on the job thus permitting the employment of a constant teaching force and a constant working force. The special school organized and conducted by business concerns aims more particularly to give to the employees of the concern such instruction as will render them more efficient in the particular work which they are called upon to do. Such schools are of more recent development and are increasing in number. In these schools the usual procedure is to combine in each day's work some hours of instruction and some hours devoted to the regular occupation. The special schools conducted by the New York Central Railroad and by the Wanamaker

stores are well-known examples of this sort of organiza¬ tion.

In some of the States, notably in Pennsyl¬ vania and Wisconsin, statutes provide that chil¬ dren between 14 and 16 not in regular attend¬ ance at day schools, whether at work or not, must attend continuation classes for certain hours each week, and if such children are em¬ ployed they must be released from employment during these hours, and the laws in these States also provide that schools must be established and maintained under public instruction and control for this purpose. Movements in sev¬ eral other States are already under way look¬ ing toward the enactment of similar laws. It is evident that the time is not far distant when provision will be made for the compulsory at¬ tendance upon some form of continuation school for all children up to 18 years of age who are not regularly in day schools, whether such children are employed or not, and that schools providing the opportunity for instruction of such children especially along vocational lines will become a part of the regular educational system of the country and will be under public supervision and control.

In most of the countries of Europe the part- time vocational school has reached a notable degree of development. For details concern¬ ing the development of this movement in the United States, reference is made to the reports of the Federal Board for Vocational Educa¬ tion, Washington, D. C.

Charles F. Wheelock,

Assistant Commissioner for Secondary Educa¬ tion, The University of the State of New York.

SCHOOLS, Inspection of. Various agen¬ cies exist throughout the country for the visi¬ tation and inspection of schools. Many State universities employ an officer known as a high school visitor whose business it is to deter¬ mine what schools shall be placed on the uni¬ versity's accredited list for entrance. Such an officer does nof ordinarily have any legal

authority but is usually a welcome visitor be¬ cause of the desire of all ambitious high schools to be enrolled on the accredited list of their neighboring university. Private universities, colleges and college entrance boards also main¬ tain like friendly relations with the secondary schools which prepare students for them. Systems of inspection are also maintained by sectarian organizations for schools under their jurisdiction.

Beyond these various private agencies, prac¬ tically every State in the Union now makes attempt through its department of education or public instruction to inspect its schools. This authority is frequently exercised especially for the elementary and rural schools through county or township officers. In many States the power of the State department is limited both by statute and by the funds available for the purpose. The State of New York has per¬ haps the most thorough system of school in¬ spection in the country both through the exer¬ cise of central and of delegated authority. The rural schools and the smaller union schools outside of cities and villages of a population of at least 5,000 are subject to the frequent in¬ spection of a group of 207 district superin¬ tendents, who are in turn under the immediate supervision of the State department of education. The authority of the force of State inspectors may also be exercised in these schools by direc¬ tion of the central office, but the State's im¬ mediate staff is concerned chiefly with the work of the secondary schools. A brief review of the working of this central system of inspec¬ tions will present the' problems common to all the States. New York's educational system is spreading its influence to other States. The ex¬ amination system is the backbone of the educa¬ tional scheme ; in one form or another it con¬ stitutes the structural framework of the State's relations to its elementary and secondary schools and has an important bearing on the inspection work of the department. The inspection of schools is predicated upon the examination of students, and the valuation of the work of school systems, through the medium of ex¬ aminations. The examination system inevitably brings to light the result of poor teaching and unwise administration and it is the distinct busi¬ ness of the inspectors with their first-hand knowledge of the weak spots to help schools to provide better teaching and to institute sounder administrative methods. Inspectors find that their work in the field is sharply divided be¬ tween questions of administration and instruc¬ tion. The large problem with which the de¬ partment is confronted in the one-, two- and three-year academic schools, and in the full high schools in the union free-school districts outside of the villages and cities, is primarily one which calls for the qualities of a general practitioner rather than those of a specialist. Questions of sound organization, orderly pro¬ cedure and definite purpose take precedence even over the always important question of the quality of the teaching. There are upward of 200 changes in principalships in these smaller schools every year. Many of these smaller schools are in a special sense the wards of the State because their frequent changes in manage¬ ment and in entire teaching force as well make continuing local policy impossible. If their work is to be carried on coherently from year

to year and if purposeful results are to be secured, it must be through the immediate help¬ fulness of the general practitioners of the field staff of the

department. The representative who goes into these schools need not be a specialist in this subject or that, but, like the country physician who treats a multitude of ills, he must be an accomplished general prac¬ titioner. He must know the courses of study, elementary and academic; he must know the ideals and the aspirations of the leading teach¬ ers of the State; he must know how to organ¬ ize a school, how to lay out a program, how to conduct a recitation and how to observe a reci¬ tation politely, kindly and sympathetically. He must know how to correct without reproving, how to advise without complaining and how to praise without flattery. He must know the requirements of the mandatory statutes ; he must know good housing from bad; he must know how and where to provide for library and laboratory. He must know human nature well enough and be trained keenly enough in a sensible diplomacy to be able to convince prin¬ cipals and teachers that he means at all times to help them; and he must have iron enough in his constitution, when occasion demands, to deal straight forwardly with a recalcitrant school board. In other words, he must use his good sense quite as much as his erudition.

The highly trained specialist finds a broader field of course in the more stably organized schools. In the larger union schools and in the high schools in the villages and cities, where questions of school administration are in the main matters of settled policy and are ably cared for by local supervisors, the department specialists find wider opportunity to aid teach¬ ers in their several groups of subjects, and to set up guideposts as possible attainable stand¬ ards for all alert, progressive teachers. And the day is coming when the teaching profession will not have room for any others. It is here that the capacity of the field staff is put to its test on its scholarly side, and it is here that its service, if it is to be worth while, must in the long run be of the most significance. A body of trained men, each doing intensive work in a limited field, observing in the course of a year or two the best and the worst teaching in the State, must become in time a clearing-house, from which teachers who seek help may get in¬ spiration and may find out what other suc¬ cessful teachers are doing. There are many schools, soundly organized, with thoroughly trained teachers,' where the State cannot be of special service but where it can get help and suggestions to carry to other less fortunately situated schools. All that is best, it is the busi¬ ness of the State to distribute as widely and as generously as possible. See School Examina¬ tions ; State Systems of Education; Uni¬ versity of the State of New York, and re¬ lated topics.

SCHOOLS, Instruction in Sex Hygiene

in. The importance of the reproductive func¬ tion in its relations to general hygiene, the alarming prevalence of venereal disease and the amownt of damaging misinformation intention¬ ally disseminated by vendors of patent

medi¬ cines are among the most important reasons that have been urged for the giving of regular instruction in sex hygiene in schools. A feeling of delicacy regarding all reference to sex that

has been developed through centuries of cus¬ tom, a lack of scientific knowledge of the sub¬ ject on the part of ordinary teachers, the diffi¬ culty of securing reliable data from any con¬ siderable number of normal persons and the fear that conscious attention to sex will tend to aggravate rather than to ameliorate objec¬ tionable conditions are reasons urged in oppo¬ sition to the giving of such instruction.

During the period from 1912 to 1915 the subject of instruction in sex hygiene was prominent in the programs of educational asso¬ ciations, and articles on this subject were not infrequent in educational periodicals and in the secular press. During the same period a con¬ siderable number of books were published treat¬ ing various phases of the general question ; but since 1915 the subject seems to have been dropped almost entirely and it does not appear that the agitation had any considerable results so far as concerns the introduction of such teaching into the elementary or secondary schools. The one tangible result of the agita¬ tion mentioned has been a more candid and fearless discussion in the public press of the extent and consequences of venereal diseases in such a way that this information is now be¬ ing brought to the attention of all pupils and teachers who read current magazines and news¬ papers and in a manner that is not open to the principal objections urged against direct school instruction. The need for such direct school instruction in this phase of the subject is, there¬ fore, largely removed.

It is very doubtful if we have yet reached a point where other and important phases of this subject may be properly and profitably introduced as a regular subject of instruction in the public elementary or secondary schools. While it is possible that the problem of general sex hygiene may at some time in the future be discussed in the public schools as scientifically and as frankly as we now discuss circulation, digestion and excretion, it is clear that such a course is not possible under present conditions.

The best high schools are now laying a foun¬ dation for such instruction and are preparing the public mind for it by a frank treatment of the fundamental facts of sexual reproduction in plants and animals in connection with the study of botany and of general zoology. Most textbooks in these subjects now present the essential anatomical and

physiological facts underlying this subject frankly, scientifically and in a manner that does not offend genuine modesty. It is doubtful whether the schools should attempt generally to go farther than this at the present time. The wise teacher of general hygiene will always impress upon pupils the sacredness of every organ and every func¬ tion, the importance of cleanliness, of the avoidance of all excesses and abuses, and in that manner will be able to reach the end sought. The problem is not so much one of overcoming ignorance as one of establishing a due respect for the body as a whole. For the present it seems wise to leave more specific instruction to parents or to conferences of teachers with in¬ dividual pupils after a full understanding be¬ tween the teacher and the parent of such pupil.

Charles F. Wheelock,

Assistant Commissioner for Secondary Educa¬ tion, The University of the State of New York.

SCHOOLS, Open Air. See Health Edu¬ cation.

SCHOOLS OF DRAMA, Modern. There

have been five great periods of dramatic pro¬ duction in Europe since the Middle Ages. The first took rise in England about three and a half centuries ago, its central figure being the immortal Shakespeare. The next was located in Spain. Temporally it was almost coincident with the first, and its two greatest exponents were Calderon and Lope de Vega. Then came the era of French classicism, represented by Corneille, Racine and Moliere. Toward the end of the 18th century we have the period of Ger¬ man classicism, with Lessing, Schiller and Goethe. And within the last four decades we have witnessed the fifth great movement, which is the subject of the present article.

There is a big difference between the first four periods and the last, inasmuch as the former were all confined to particular nationali¬ ties, while the latter is cosmopolitan in char¬ acter. The starting point of the modern move¬ ment is to be found in the works of Henrik Ibsen, the great Norwegian dramatist (1828- 1906). Ibsen, indeed, may be considered the father of the modern drama. His works — among which may be mentioned (Ghosts, } (A Doll's Housed (Rosmersholm) and (The Wild Duck — are characterized by the perfection of their technique, their realistic nature and the ideas or truths which they convey. His central idea is the insistence on true and unhampered expression of the individual's personality. Con¬ temporaneous with him we find two other great Scandinavian dramatists, the Norwegian Bjorn- son ((A Bankruptcy,* (Beyond our Power,* etc.)*

*and the Swedish Strindberg ((The Father, * (Miss Julia, * (Comrades,* etc.). The best works of these also belonged to the re¬ alistic category.*

From Scandinavia the movement spread in every direction. Hardly a country in Europe, indeed, which has not at present its constellation of dramatic geniuses. In France, to mention but a few, there are Lavedan, Porto-Riche, Hervieu, Brieux and Rostand. In Germany and Austria there are Hauptmann, Sudermann, Wedekind, Schnitzler and Hofmannsthal. Eng¬ land has produced Wilde, Shaw, Barker and Galsworthy; Spain is represented by Eche- garay and Galdos, Italy by D'Annunzio and Giacosa ; Holland has Heijermans, Belgium Maeterlinck, Russia claims Tolstoi, Gorky, Tchekoff and Andreyeff.

There are two main currents or schools by which the modern drama is represented. The first and most important is the realistic, the other the romantic — or as it has been styled in contradistinction to a previous movement, the neo-romantic. The former is the character¬ istic product of the age — that which is due to the impetus of Ibsen, and to which most of the writers mentioned, besides many others who have not been mentioned, claim allegiance. The nature of the realistic drama is perfectly ex¬ pressed by its name. It is a form of art which aims at a faithful depiction of life, without falsification or idealization. In former times this had not been the chief aim. Most previous dramas belonged to the categories known as classic or romantic. The subject matter in many cases was semi-mythical, as in the old

Greek and classic French drama. The char¬ acters, if they were real at all, were preferen¬ tially drawn from the ranks of the distinguished and high-born ; unusual situations and plots were the rule ; idealizations were common, and the exalted, unnatural character of the presen¬ tation was expressed by the prevailing poetry of the dialogue. All this is changed in the modern realistic drama. The characters which are brought to view belong to every rank of society, even the most humble. The plot loses its artificial character, and we are presented with a natural development of life itself, such as we can witness about us on every hand. Exact directions are given by the author as to the appearance of the actors and the setting of the stage, so as to produce an illusion of reality. And the language takes the form of prose, fre¬ quently imitating in its peculiarities of dialect and its exclamations and hesitations the exact form of speech of ordinary, everyday people. Barker's (Madras Housed for example, shows us people moving about and conversing just as they do in real life. The same is true

of the many scenes from society life in the dramas of the French, examples of which may be found in Lavedan's (Le Prince d'Aurec) and Don- nay's (The Other Danger. > Hauptmann's (Weavers) and Galsworthy's (Strife) exhibit the scenes of misery, suffering and revolt which are connected with labor troubles, Gorky's (Night Shelter) portrays the lowest and most painful aspects of Russian city life. There is little plot to the majority of these plays, just an unrolling of experience and a depiction of character.

It is impossible to go into a detailed exposi¬ tion of the many excellent dramas that have appeared under the sway of naturalistic ideas. Suffice it merely to name a few of the more important, in addition to those already cited. We shall confine ourselves, in the case of every writer, to a single play. Porto-Riche is the author of Becque has written (Les Cor- beauxB Brieux ˆes HannetonsP In German countries Hauptmann has given us (Fuhrmann Henschel, Sudermann (Die Ehre,* Schnitzler*

On this side of the ocean the naturalistic drama has not found embodiment in many works of superior literary value. In general, American plays do not make much pretense to literary worth, but are written solely for the stage. Many of the most effective are of a local and historic nature, and make telling use of picturesque, scenic and ethnographic back¬ grounds. Such are Bronson Howard's Shen¬ andoahˆ Herne's Shore Acres> and Moody's (Great Divided Recently, however, there have been promising signs of a genuine literary awakening. And there has been a revival, fol¬ lowing the example of England, of dramatic pageants. These are open-air performances, generally of a historic or symbolical nature, in which great numbers of people take part.

As already mentioned, the modern drama has been characterized by a return to romantic¬ ism, in addition to the development along

naturalistic lines. The chief exponents of this movement have been Rostand in France, Maeterlinck in Belgium, Hauptmann in Ger¬ many, Hofmannsthal in Austria, Yeats, Synge and Lady Gregory in Ireland. Rostand is famous through his (Cyrano de Bergerac, like¬ wise his (Chantecler.* Maeterlinck has written, among other works, (Pelleas et Melisande* and (The Blue Bird.* Hauptmann has given us (Die versunkene Glocke) and (Der arme Heinrich. * In part the movement in question has been due to the natural tendencies of the individuals who have furthered it, the romantic disposition being one which is always latent in human nature ; in part it has had its source in a reaction against naturalism.*

Like all great art movements, the realistic drama is an outgrowth of the age, and forms a faithful mirror of many of its constituent currents. Thus the scientific spirit finds a re¬ flection in its exact observation and accurate

description. There is an incident in Haupt¬ mann's (Einsame Menschen, for example, which neatly illustrates the principle involved. Jo¬ hannes Vockerat has just had a conversation with his wife and a friend, in which he has evinced considerable irritability. He leaves the room and steps out on the veranda, where he engages in calisthenic exercises. His wrife and friend meanwhile continue the conversation, when suddenly the door' opens and Johannes calls in : (*

The psychological trend of modern thought is also reflected in the realistic drama and comes to view in the mental and emotional na¬ ture of the conflicts portrayed. Of action there may be little — nothing but thought and emo¬ tion, expressed in words and gestures.' The democratic conception of life is apparent in the treatment of the humblest aspects of existence, the prevailing interest in social questions in the nature of the problems that are considered. In general, the subject matter of the dramas is intensely modern. Except for the few scattered romantic plays, there is no looking backward to ages long gone by. Modern labor conditions, modern relations between husband and wife, modern demands for the emancipation of woman — these and many other subjects equally alive form the basis of dramatic treatment.

Along with this community of subject mat¬ ter and treatment, however, there are national differences between the dramas that are equally pronounced. Thus, there is a strangeness of conduct on the part of the characters in Scan¬ dinavian plays that is typical. Ibsen's men and women are subject to morbidly exalted courses of action. Strindberg's people are swayed by the most peculiar reversals of feeling. The question is justified whether these extravagant manifestations may not be brought into relation with the unusual aspects of nature in Scandi¬ navian countries. As Bjornson says ((Beyond our Power)) : <(There is something in nature here which demands the unusual of us, also. Nature herself is beyond all reasonable limits. We have a night which lasts almost the whole winter. And our day lasts almost all summer. . . . Swarms of birds in millions; (shoals of

fish as long as from Paris to Strassburg . . . mountains that rise sheer out of the sea. They don't resemble any other mountains. And the whole Atlantic breaks upon them.® The ques¬ tion is also apropos whether all this is related . likewise to the strangeness of harmony in the compositions of Grieg. In general there is a remarkable analogy between the literary produc¬ tions of a country and its musical compositions.*

This is evident when we come to the dra¬ matic works of the Russians. If Scandinavian plays are eccentric, those of the Russians, like their music, are pitched in the minor key. The outlook upon life, as in Russian novels as well, is melancholy and pessimistic. Tolstoi's (Power of Darkness) and Gorky's (Night Shelter show us humanity at its lowest depths, Andreyeff's (Life of Man) concentrates into a single picture all the tragedy of existence. If we wish for a more specific analogy from the realm of music, we need but turn to the works of Tschaikowsky, and especially to his immortal Pathetic Symphony.*

Spanish plays make constant use of the motif of honor, a fact which harmonizes with Spanish conceptions of life. And in Italy D Annunzio reflects the passion for beauty which is inherent in the Italian race.

The Irishmen Wilde and Shaw exhibit a talent for brilliant wit and satire. Character¬ istic as this is likewise of their countryman Sheridan, it must be regarded as typical of the race. And as we meet with similar manifesta¬ tions throughout the literature of France, it may be regarded as typical of the Celtic people as a whole.

Especially pronounced is the contrast be¬ tween French and Teutonic dramas. In spite of their naturalism, the French still retain the agreeable exterior. Thoroughly discordant and repulsive aspects of life are rarely brought be¬ fore us. The personages that are exhibited are mostly drawn from the well-to-do if not aris¬ tocratic circles of society. There is the glitter ot wealth, education and social eminence. Like¬ wise the conversation is characteristically lucid and polished. The subject matter of dramatic exposition is largely exhausted by the passion of love. Donnay confines himself entirely to this subject, Porto-Riche has collected his plays under the title of (Theatre d' Amour.) Fur¬ thermore, it is the illicit side of love that is preferentially dwelt upon. The characters in the plays are likely to be few, the number of plays of a particular playwright limited. The style is exquisite, the flow of dialogue smooth and connected. It is a drama that reminds us of the salon: polished, fastidious, well-arranged.

Far different in the north. Here it is as if we passed from the restraints of polite society into the boundless freedom of nature. There is a wider range of subject matter, a greater seriousness of interests. The plays are more numerous, the characters apt to be many, the words suggestive and replete with significance. Ibsen's (Emperor and Galilean, Hauptmann's (Florian Geyer,* Galsworthy's*

Shakesperean. Hauptmann, especially, illus¬ trates this trait, as his works exhibit every shade of dramatic expression, from harrowing tragedy to light comedy, from crass realism to mystic romanticism. Likewise he is a

wonderful por¬ trayer of character. His men and women re¬ mind us of the realistic pictures of the old Dutch and German schools, with their sharply defined, expressive countenances. And there is a brooding, introspective tendency which is thoroughly German. In contrast we have the Viennese Schnitzler. If Hauptmann represents the sombre North German, Schnitzler stands for the mild, light-hearted Austrian. There is a delicacy and sweetness to his works that re¬ mind us of the tender strains of his country¬ man Mozart.

The realistic drama, like the music-drama of Richard Wagner, has been the subject of many controversies. Special theatres were at first required for its presentation (Theatre Libre in Paris, Freie Biihne in Berlin), as the weight of tradition was strong against it, and many plays were prohibited by the censor. Even to-day there are voices that are raised against its excesses of naturalism. But what¬ ever may be the verdict of posterity, whatever the direction which dramatic expression may take in the future, it has been an honest, in¬ spired form of art, and has given voice to a demand of thought and feeling which was bound to find vent. In art, as in heaven, there are many mansions. There are countless ways of expressing beauty, and no one of these has an exclusive right to be considered legitimate. Furthermore, there is a temporal sequence of expressions which seems to be in accord with evolutionary laws. One form of beauty gives way to another with a sort of necessity, and the very fact that a school is in the ascendant to-day, far from being a reason why it should remain so to-morrow, is the strongest reason why it should yield. So naturalism came as a legitimate successor of previous forms of drama. It will doubtless be superseded by forms that are different. But it will not pass by without leaving its trace behind. As Guyau says, every new work of art changes the very conditions of beauty. So likewise with the works of the naturalistic school. They have added an ele¬ ment of truthfulness and seriousness which will never be entirely lost, but will have its influence on all the works that are to follow.

Albert Gehring.

SCHOOLS OF DRAMATIC ART. See

Schools of Drama, Modern.

SCHOOLS OF LIBRARY ECONOMY.

See Library Schools.

SCHOOLS OF TECHNOLOGY. See

Technology, Schools of.

SCHOONER. See Sailing Vessels; Ships, Sail and Steam.

SCHOORL, shoorl, SCHOREL, or SCOREL, Jan van, Dutch painter: b. Schoorl, near Alkmaar, 1 Aug. 1495; d. Utrecht, 6 Dec. 1569. At 14 he was placed with the painter Willem Cornelis. Three years later he traveled to Amsterdam, and spent some years in the studio of Jakob Cornelis, one of the most cele¬ brated painters and engravers on wood of that period. He next became a pupil of John of Mabuse, in Utrecht, and subsequently visited

many cities, including Cologne and Spires, where he studied architecture and perspective. He was received kindly by Diirer in Nurem¬ berg. At 22 he passed through Carinthia to Venice, and thence to Palestine. For three years he remained within the walls of Jerusa¬ lem sketching views of the city and surrounding country. On his return he spent some time at Rhodes, and afterward at Rome, studying the works of Raphael, Michelangelo and Giulio, till Adrian VI, a native of Utrecht, ascended the papal chair in 1522, and committed to him the superintendence of the Belvedere. The death of Adrian the following year induced Schoorl to return home, which he did by way of France. He now executed many splendid pieces in Utrecht, afterward in Haarlem and from time to time in other cities in the Nether¬ lands. He has been compared with Jan van Eyck, whom he equaled in splendor and truth of coloring, in expression, in warmth of repre¬ sentation ; and, at the most, was inferior to him only in the execution of particular parts. Un¬ happily the rage of the fanatics in a subsequent age for destroying pictures was fatal to many of his most valuable works. Consult Toman, (Studien fiber Jan van ScoreP (1889).

SCHOPENHAUER, sho'pen-how-er, Ar¬ thur, German philosopher and man of letters : b. Dantzig, 22 Feb. 1788; d. Frankfort-on-the Main, 21 Sept. 1860. He was of Dutch an¬ cestry on both sides. His father, Hendrick Schopenhauer, was a rich merchant, whose love of freedom was so great that he removed to Hamburg in 1793, when his native city, Dantzig, lost its independence and became a part of Prussia. Schopenhauer's mother, whose maiden name was Johanna Troisner, was a woman of artistic temperament and literary aspirations, some 20 years younger than her husband. After his death in 1805, she removed to Weimar, becoming a member of the literary coterie there, and gaining a reputation as a popular novelist. Heinrich Schopenhauer, proud of his position as an independent merchant, determined that his son should succeed him as the head of the business which he had established. With this

object in view, he had him instructed in modern languages, especially in French and English, and took the boy with him on extensive trips through England, France, Holland and Ger¬ many, in order to give him a knowledge of the world. When Schopenhauer was 17 his father placed him in a business house in Hamburg. The work was distasteful to him and after his father's death, when he had vainly attempted to accommodate himself to a business career, he decided to follow his bent and devote him- , self to study. After receiving the necessary preliminary training at Gotha and Weimar, he entered the university at Gottingen in 1809, registering as a student in medicine. Later he studied in Berlin, where he heard lectures from Fichte and Schleiermacher, and finally re¬ ceived the degree of doctor of philosophy from the University of Jena in 1813, on submitting a thesis on "The Fourfold Root of the Principle of Sufficient Reason.® After a residence of sev¬ eral years in Dresden, where he wrote his chief work, (The World as Will and Idea) (Die Welt als Willie und Vorstellung, 1818), and a visit to Italy, he qualified as private lecturer (Privat Docent) in the University of Berlin. He came

there with the most extravagant estimate of the importance of his own views, and with the greatest contempt for the prevailing idealistic philosophy, of which Hegel, then at the height of his popularity at Berlin, was the chief repre¬ sentative. Schopenhauer announced lectures at the same hour when Hegel's principal course was given. As a result, his audience was very small ; and to make matters worse, his style of lecturing was not popular; his audience fell off and the lectures had to be discontinued before the end of the semester. This embittered him still more, and he imagined that he was the vic¬ tim of a deliberate plot on the part of various "school philosophers® who had conspired to prevent his views from obtaining a hearing. He made a second visit to Italy, lasting almost three years, but returned to Berlin in 1825, residing here, until 1831, when the epidemic of cholera that carried off Hegel drove him to Frank¬ fort. Here (with the exception of a short stay at Mannheim) he continued until his death. Toward the close of his life his philosophy be¬ gan to attract popular attention, and Schopen¬ hauer eagerly received the admiration and rec¬ ognition of a circle of devoted disciples. His old age was the most happy and serene period of his life, though his estimate of his own work was so high that it was not possible to satisfy his demands for recognition and adulation.

Schopenhauer maintains that philosophy can¬ not be a science; that is, a body of truths de¬ rived through logical processes and open to anyone to learn with more or less trouble ; but true philosophy is art, a revelation dependent on the intuitive insight of the man of genius. As in the case of a picture or musical compo¬ sition, one will only perceive in a system of philosophy what one has the capacity to per¬ ceive. "There is no one

philosophy,® says Schopenhauer, "existing or acceptable for everybody. The difference in grades of in¬ telligence is too great for that. The true phi¬ losophy, when it makes its appearance, will only command the attention of a few heads of the first order.® To the circle of men of genius, then, Schopenhauer confidently claims to be¬ long, and he expresses his contempt for the procedure of the savants who vainly seek phil¬ osophical truth by logical processes and ac¬ cumulations of erudition. For Plato and Kant, Schopenhauer has the greatest admiration and his own thoughts are constantly connected with their ideas. In Plato what attracted him es¬ pecially was the doctrine of an ideal world and its contrast with the unreality of the world of sensible phenomena. Kant maintained the same contrast and Schopenhauer always claims to be the true successor of Kant, although he replaces the latter's table of 12 categories with the single principle of "sufficient reason,® which appears in a fourfold form. With re¬ gard to Kant's doctrine that we cannot know the true nature of reality, Schopenhauer also differs from his master. Science is, indeed, limited to the world of phenomena. But we can know the nature of reality by a more direct and intimate method than that which science pursues. In the immediate consciousness of myself I know myself as will; this is the side, the true reality of what appears objec¬ tively as body. After the analogy with ouselves everything is to be interpreted: in ourselves,

we have the key that enables us to under¬ stand the world. The universe is in itself will. Like the individual, it has its phenomenal side, which can be known by the objective sci¬ ences. But its ultimate nature is will, blind, unconscious striving toward existence. The es¬ sence of each thing is found in its will. This essence manifests itself in various ways, and with varying degrees of consciousness, from the unconscious manifestations of inorganic forces like gravitation, to the conscious volitions of men.

1 hough the will is the ultimate source of reality, it creates for itself an external or phe¬ nomenal order. This is the order of the in¬ tellect, known in terms of the idea, and ap¬ pearing as an external order of events in space and time which are connected by the principle of cause and effect. So far as the world of phenomena is concerned Schopenhauer is there in fundamental agreement with Kant. That is the realm of scientific knowledge of law and of intelligibility. But behind this as its source and

centre is the reality of the irrational will.

The doctrine that the essence of all things is will, is the basis of Schopenhauer's Pessi¬ mism (q.v.), just as Hegel's view that reason is the ultimate ground of all things is the foundation of his optimism. Will, for Schopen¬ hauer, is essentially and radically irrational. Under the concept of will he includes all de¬ sires, strivings and impulses, all tendencies to change. These, Schopenhauer declares, are all manifestations of dissatisfaction and pain. Our life itself is essentially painful. Pleasure is merely negative, being nothing but the relief arising from the temporary cessation of our pain and desires. Since the will, both in us and in nature, is irrational in its inmost nature, there is no hope of things becoming better. Pessimism necessarily results from insight into the ultimate nature of things. Schopenhauer dwells with extraordinary eloquence on the un¬ speakable misery of life and upon the aimless striving and irrationality that is everywhere manifested in the world process. But yet, in a way, this insight into the worthlessness of existence brings with it a means of escape. Re¬ lief is possible only when the will is stilled and the desires and appetites are silent. Such re¬ demption one can attain in the contemplation of works of art or in listening to music. In this artistic enjoyment our wants cease to exist, the attitude of will is canceled. This relief, from its very nature, can only be transitory. Final redemption from the will must corug through ethics. We must perceive that all willing is vain and pleasure unattainable, and also that since individual existence is untrue and only phenomenal, all individuals are at bottom identical in essence, that is, all are manifestations of the one world will. This is to some extent effected through sympathy. There is, however, a higher and more complete virtue than sympathy. It is found in the com¬ plete negation of the individual will, the denial of the will to live, based on insight into the nothingness of finite existence. Of this nega¬ tion of the will we have examples in Christian and Oriental asceticism. This denial of the will is holiness and blessedness in one. It is from the point of view of knowledge Nirvana,

nothingness, yet in it the soul finds its highest peace and truest reality.

Bibliography. — ■ A complete edition of Scho¬ penhauer's works, edited by Frauenstadt, ap¬ peared in 6 vols. (1873-74; 2d ed., 1877) ; by J. Giseback (1890) ; and by Steiner in 13 vols. (1894). His (Fourfold Root of the Principle of Sufficient Reason' is translated by Hille- brand in the Bohn Library (1894), together with his essay, (On the Will in Nature.' (The World as Will and Idea' has been translated by Haldane and Kemp (3 vols., 1884-86). cThe Two Fundamental Problems of Ethics,' trans¬ lation in Bohn Library by B. Bax; (The Art of Controversy,' translated by

Saunders (1896). Consult also Zimmer, (Schopenhauer, His Life and Philosophy' (1876) ; Wallace, (Life of Arthur Schopenhauer' (1896) ; Caldwell,

(Schopenhauer's System in Its Philosophical Significance' (1896) ; Fischer, Kuno, < Arthur Schopenhauer' (1893) ; Sully, (Pessimism' (2d ed., 1891) ; Ribot,

James E. Creighton,

Professor of Philosophy, Cornell University.

SCHOULER, skoo'ler, James, American lawyer and historian ; b. Arlington, Mass., 3 March 1839. He was graduated from Harvard in 1859, admitted to the bar in 1862 and built up a large practice which he was. obliged to give up in 1870 because of deafness, caused by service in the Civil War. He then devoted himself to literature almost exclusively until 1884 when he engaged successfully as a lec¬ turer. He has since been lecturer and pro¬ fessor at the Boston University Law School and at the National University Law School at Washington and in 1891 was appointed lecturer on constitutional law and history at Johns Hopkins. His publications include (The Law of Domestic Relations' (1870) ; (The Law of Bailments' ; (The Law of Personal Property' ; (The Law of Husband and Wife' ; (Eighty Years of Union' (1904); (Executors and Ad¬ ministrators' (1883); (Wills' (1887); (His- . tory of the United States under the Constitu¬ tion, 1783-1877' (7 vols., 1880-1913) ; (Life of Thomas Jefferson' (1897) ; (Alexander Hamil¬ ton' (1901) ; (Americans of 1776' (1906) ;

(Ideals of the Republic' (1908).

SCHOUTEN, show'ten, Willem Cornells,

Dutch navigator: b. Hoorn, 1567; d. Madagas¬ car, 1625. For several years previous to 1610 he was in the employ of the Dutch East India Company. He then determined to discover a new route to the Indies and with Isaac Lemaire of Hoorn began the formation of a company with 200,000 florins capital, Schouten's share being one-eight. He sailed in command of an expedition, 14 June 1615, was the first to round the cape which he called Cape Horn and crossed the Pacific to Batavia. Here he was arrested for infringement of the East India Company's privileges; but on his return was acquitted, while the company was fined. He discovered Schouten Island on the northern coast of New Guinea.

SCHRADER, shra'der, Frederick Frank¬ lin, American journalist and dramatist, son of an American citizen : b. Hamburg, Germany, 27 Oct.

1857. Author of plays, (The Man from Texas,' (The Modern Lady Godiva,'

French Ball, and*

SCHRADER, Julius, German painter: b. Berlin, 16 June 1815; d. Lichterfelde, 16 Feb. 1900. He studied at the Berlin Academy and at Diisseldorf under Schadow, 1837-45. Subse¬ quently he traveled in Italy, England, Holland and Belgium and in the last country fell under the influence of the colorists Gallait and Biefoe. In 1851 he became professor at the Berlin Academy. Among his chief works are Sur¬ render of Calais to Edward IIP (1847) ; Fred¬ erick the Great after the Battle of Kolin) (1849) ; (Death of Leonardo da Vinci) (1851) ; (Milton and His Daughters) (1855) ; Crom¬ well at the Death-Bed of His Daughter (1859). In fresco he painted First Twelve Christian Monarchs* in the Royal Chapel, and (Conse¬ cration of the Church of Saint Sophia, Con-stantinople) in the New Museum, Berlin. Among his portraits are those of Humboldt and Ranke, the historian.*

SCHREIBER, shri'ber, Sir Collingwood,

Canadian railway engineer : b. Essex, England, 14 Dec. 1831. He settled in Canada in 1852 and engaged in engineering practice at Toronto. He was assistant engineer of the Toronto and Hamilton Railway in 1852-56; superintending engineer of the Northern Railway in 1860-62; division engineer for the Nova Scotia govern¬ ment in 1863-67 ; and in 1867-73 he had charge of the surveys of the Intercolonial Railway and was chief engineer of the government rail¬ ways in operation. He was appointed chief engineer of the Canadian Pacific in 1880; be¬ came chief engineer and Deputy Minister of the Department of Railways and Canals, Ot¬ tawa; and in 1905 he was appointed consulting engineer to the Canadian government and chief engineer of the western division of the Na¬ tional Trans-Continental Railway. He was knighted in 1916.

SCHREINER, shriner, Olive (better known by name of Olive Schreiner Cronwrtght), pseudonym (

to S. C. Cromvright with whom she published

SCHREINER, Oswald, American agricul¬ tural chemist: b. Nassau, Germany, 29 May 1875. He was graduated at the Baltimore Polytechnic Institute in 1892, the Maryland Col¬ lege of Pharmacy in 1894, and later

studied at Johns Hopkins University and at the University of Wisconsin. He was United States Pharma¬ copoeia Research Fellow in 1895-96, and in 1903 was appointed chemist of the United States Bureau of Soils. From 1906 he was chief of the Division of Soil Fertility Investigation; and in 1914 he was appointed consulting professor of chemistry at the American University. He has prepared many of the bulletins of his de¬ partment and is also author of (The Sesqui- terpenes) (1904); (Chemistry of Soil Organic Matter (1910) ; (The Nitrogenous Soil Con- stituents) (1913), etc.*

SCHREYER, shri'er, Adolf, German artist: b. Frankfort-on-the-Main, 9 May 1828; d. Kronberg, Prussia, 29 July 1899. He studied at the Stadel Institut, Frankfort, then at Stutt¬ gart, Munich and Diisseldorf and supplemented this school instruction by wide travels in Eu¬ rope and the East. In 1862 he became court- painter to the Grand Duke of Mecklenburg-Schwerin. He was a member of the academies of Antwerp and Rotterdam. Before 1870 he lived much at Paris; but after that year lived alternately there and at Kronberg. He was an animal painter, especially choosing the horse for his model and depicting it in vigorous ac¬ tion or, when held in rein, with pawing feet and distended nostril. He was, also, a fol¬ lower of Fromentian in his love of Eastern subjects, particularly mounted Arabs dressed in brilliantly colored clothes, surrounded by a heated palpitating atmosphere. Some of his pic¬ tures are (Artillery attacked by Prussian Hus- sars) (1854) ; (Wallachian Transportation Train in Rainy Weather, at Hamburg; (Charge of Artillery of the Imperial Guard* (1865); (Horses of the Irregular Cossacks) (1864) at Paris. His Fattle near Waghensel, in 1849) (1858); Fattle of Komorn,**

SCHROEDER, shre'der, Seaton, American rear-admiral: b. Washington, D. C., 17 Aug. 1849. He was graduated at the United States Naval Academy in 1868, and accompanied Commodore Rodgers' expedition against the Korean forts in 1871. He was on special duty supervising the construction of the dynamite cruiser Vesuvius in 1888-90, and was in com¬ mand of that ship in 1890-93. He was execu¬ tive officer of the Massachusetts in 1897-99, and was advanced three points in rank for his services in the Spanish-American War. He was naval governor of the island of Guam and commander of the Yosemite in 1900-03; at¬ tained rank as rear-admiral in 1908, and was in charge of a division of the Atlantic fleet in 1908-09. From March 1909 until June 1911 he

was commander-in-chief of the Atlantic fleet. He then served on the General Board until 17 Aug. 1911, when he was retired upon reaching the

age limit. He was retained on special serv¬ ice with the navy in 1911-14; and in 1917 was appointed hydrographer. Author of many essays and of (Fall of Maximilian's Empire)

(1887).

SCHUBART, shoo'bart, Christian Fried¬ rich Daniel, German poet : b. Obersontheim, Swabia, 26 March 1739; d. Stuttgart, Germany, 10 Oct. 1791. He studied theology at Jena where he lived a dissipated life, and became musical director at Ludwigsburg in 1758, but was banished because of his dissolute conduct. After years of wandering he founded his Deutsche Chronik at Augsburg in 1774, but was driven thence in 1777 and removed his Chronik to Ulm. He there published a false report of the death of Maria Theresa and was imprisoned for 10 years when he was released at the demand of Frederick the Great in 1787. He then became musical and theatre director in Stuttgart and continued -the publication of his paper under the title Vaterlands-Chronik. He wrote (Gedichte aus dem Kerker (1785) ; (Hymnus auf Friedrich den Grossen) (1786), etc. His (Gesammelte Schrifte und Schick- sale) was published in eight volumes (1839- 40). Consult Strauss, (Schubart's Leben in seinen Briefen) (1849).*

SCHUBERT, shoo'bert, Franz Peter, Aus¬ trian composer: b. Vienna, 31 Jan. 1797; d. there, 19 Nov. 1828. His extraordinary musi¬ cal gifts were displayed at a very early age, and his talents were so pronounced that his teach¬ ers had little else to do but kindle the ever¬ present though dormant spark.

Before he was 11 years old he was the lead¬ ing soprano in the Lichtenthal choir, and he also played the violin solos in the services, be¬ sides composing songs and pieces for strings and piano. In his 12th year he entered the Imperial Convent, or school for educating chor¬ isters for the court chapel. His first piano composition, dated 8 April-1 May 1810, appears to have been a four-hand Fantasia, containing a dozen or more movements. While at the (

and it is said that he could readily keep up a conversation while writing even his best pieces. He never hesitated, and seldom revised any¬ thing he wrote. His compositions included more than 70 part songs, some 18 works for the stage, 8 sacred pieces, 20 string quartets, 10 symphonies, and 24 pianoforte sonatas, but after all it was not through these that Schu¬ bert's name was immortalized, but through his songs, the titles of nearly 500 of which are recorded. They were full of dramatic inten¬ sity, poetry and pathos, and full of music of infinite beauty set to long, complex poems, to which he arranged accompaniments of complete fitness and endless variety.

His engagement as teacher of music in the family of Count Esterhazy during the summer of 1818, at Zselesz, was the source of his first regular income. There were two daughters in the Esterhazy family, Marie and Caroline, and a little boy of five. The congenial occupation of teaching them was renewed later, in 1824, at which time he composed his (Grand Duo) (opus 140), full of individualism and truly a symphonic work in its fullest sense. During that summer he also composed his sonata in B flat, the variations in A flat, and a number of other pieces, presumably for use in the musical education of the Count's children.

To attempt to even mention any consider¬ able number of Schubert's compositions here is manifestly impossible, but very complete lists of his works, arranged both alphabetically and also in the order of their composition, may be found in Grove's dictionary of Music.*

One of Schubert's closest friends was Vogl, the tenor, through whose influence the atten¬ tion of theatrical managers was attracted toward him. He had already written a comic operetta, the willingsbrüder,* for the Karnt- nerthor theatre, and not long after he was commissioned by a rival theatre to write the music for the dauberharfe or (Magic Harp,> which he is said to have completed in two weeks, and which was first performed on 19 Aug. 1820 in the Theater an- der-Wien. Dur¬ ing this year, too, he wrote several of his best songs, including the famous Urn Walde> or ˆaldesnacht.*

In the following February, when Schubert was entering his 25th year, his talents began to receive recognition, and the publication of his songs was at last within sight. The (Erl King> was chosen first and was published (on commission) on 1 April 1821, enough money having been subscribed at one of the Gundelhof concerts to defray the cost of printing, en¬ graving, and still leave something over for fu¬ ture publications. Seven more songs (consti¬ tuting op. 3 and 4) were published on 29 May, op. 5 on 9 July, op. 6 on 23 August and op. 7 on 27 November. The next appeared on 9 May 1822, as <(the property of the publishers,® who now stopped publication by commission, realizing that they could assume the responsi¬ bility without risk.

In August 1821 he began his symphony in E, which, although he did not complete the writing of it, is remarkable for the rapidity with which it was composed. It is said that he probably did not occupy himself with it for more than a few hours, and yet it filled 167 pages. A month or two later he wrote two acts of < Alfonso and Estrella,* the words being

supplied by Schober. The third act was fin¬ ished in February 1822, but no public perform¬ ance of it was given until 26 years after Schu¬ bert's death, one cause of this delay being that the original accompaniments proved impossible for a band to play. During 1823 Schubert paid special attention to operatic music but without marked success, perhaps because the librettos were unsuitable. On this point Liszt regarded it as extraordinary that one who had been brought up to love the finest poetry should ac¬ cept the absurd and impracticable librettos which were offered him, and which resulted in so much of his brilliant music being practically lost to the world. It was in this same year that his famous ((Miüller-lieder® were com¬ posed, consisting- of musical settings to Wilhelm Muller's poems, a copy of which he had bor¬ rowed from his friend Randhartinger when visiting him.

The rejection of his opera

Some of his best compositions in 1826 were the string quartet in D minor and G, the (Rondeau brilliant, > as well as the sonata in G major, which Schumann regarded as his <(most perfect work both in form and composition.® The number of pieces published in that year was very large, showing that a popular demand for his music had arisen, but nevertheless Schubert was always poor, partly because his profits were so small, and partly because he al¬ lowed himself to be imposed upon by his friends.

The year of 1827 was notable as the one in which Beethoven died. He and Schubert had not been intimate, and the latter's visit to Beethoven in 1822 had ended disastrously, for on looking over the

The last year of Schubert's life, 1828, was remarkable for the number of his compositions, among which, writes Grove, were ((his greatest known symphony (in C), his greatest and longest Mass, his first Oratorio, his finest piece of chamber music, three noble pianoforte sona¬ tas, and some astonishingly fine songs.® On 26 March he gave his first evening concert in the hall of the Musik-Verein. The program was very attractive and the applause great. In the month before he died he wrote a new a long scena for a soprano voice, and a song entitled (Die Taubenpost, which is thought to have been his last composition. He was buried, in accordance with his dying wishes, in the Ortsfriedhof in the village of Wahring, and in*

a grave only separated by two others from the one which held the remains of Beethoven.

Schubert's most prominent characteristics were truthfulness, honesty, good-humor and a cheerful, contented disposition. With his inti¬ mates he was entirely at ease, genial and even boisterous at times, but at a fashionable

gather¬ ing he was shy and silent. Of his musical genius no better description can be given than in the words of Liszt : (

(1888).

SCHUCHERT, shuk'ert, Charles, American palaeontologist: b. Cincinnati, Ohio, 3 July 1858. He received a common school education, but possessing a natural aptitude for scientific in¬ vestigation he early began a collection of fos¬ sils and the study of palaeontology. He was as¬ sistant to different experts in 1885-91 ; and in 1891-92 assisted in the geological survey of Minnesota. He was preparator of fossils with Dr. C. E. Beecher at Yale in 1892-93; served on the United States Geological .Survey in 1893-94; and since 1904 he has been professor of palaeontology and Yale professor of the history of geology at Sheffield Scientific School, and curator of the geological collections at Peabody Institute. Author of (Textbook of Geology) ; historical Geological Paleograph of North America) ; (Revision of Paleozoic Stelleroida, with Special Reference to North American Asteroida) (1915), etc.

SCHULMAN, shool'man, Samuel, Ameri¬ can rabbi : b. Russia, 14 Feb. 1864. He came to America as a child, was graduated at the Col¬ lege of the City of New York in 1885 and studied at the University of Berlin in 1885-89. He was rabbi at Helena, Mont., in 1890-93 ; at Kansas City, Mo., in 1893-99; and since 1899 has been rabbi of Temple Beth-El, New York. He was a member of the board of editors for the English translation of the Bible for the Synagogue; a contributor to the (Jewish En¬ cyclopedia^; and is author of articles on re¬ ligious topics.

SCHULTZ, shults, Sir John Christian,

Canadian administrator: b. Amherstburg, On¬ tario, 1 Jan. 1840; d. Winnipeg, 13 April 1896. He was educated at Oberlin College, Ohio ; Queen's. University, Kingston; and at Victoria University, Cobourg, taking his M.D. in 1860. He then engaged in practice at Winnipeg (then Fort Garry), also becoming interested in the fur trade and editing the NoSwester, the first newspaper of the region. He led the Canadian

party at the time of the first Riel Rebellion, 1869-70, was taken prisoner and sentenced to death by Riel. He made his escape, however, and in 1872 became a member of the North West Council. He was a member of the

Dominion Parliament in 1871-82; and was a Dominion senator in 1883-88. He was lieu¬ tenant-governor of Manitoba in 1888-95. He was actively interested in railway and telegraph development and in colonization ; and was for many years a member of the Dominion board of health for Manitoba and the North West Territory. He was knighted in 1895.

SCHULTZE, shoolt se, Carl Emil, Ameri¬ can newspaper artist: b. Lexington, Ky., 25 May 1866. He was educated at Lexington and at Cassel, Germany, began drawing for newspapers and under the name of "Bunny® created the popular "Foxy Grandpa® series of comic pic¬ tures published since January 1900 in two New York journals. Since 1913 he has been presi¬ dent of the Bunny Amusement Corporation of New York. He is the author of (Vaudevilles and Other Things) (1900) ; (The Adventures of Foxy Grandpa (1900) ; (The Bunny Book> (3 vols.), etc.*

SCHULZ, shoolts, Leo, American musi¬ cian : b. Posen, Germany, 28 March 1865. He was educated at Posen, and in the Royal Academic High School of Music in Berlin, came to the United States in 1889, was professor of the New England Conservatory until 1898, was connected with the New York Philharmonic Society .in 1890-1906. He published ('Cello Album, ('Cello Classics) and ('Cello Composi- tions) (two books 'each), and author of many unpublished 'cello compositions, songs, or¬ chestral overtures, cantatas, etc.*

SCHULZE-DELITZSCH, shoolt'se-da'- lich, Hermann, German politician and econ¬ omist: b. Delitzsch, Prussian Saxony, 29 Aug. 1808; d. Potsdam, 29 April 1883. After legal courses at Leipzig and Halle, he entered the Prussian public service; but from 1841 devoted his attention to the economic betterment of small farmers and artisans. Among his various activities, the most important was the establish¬ ment of the "people's bank® system, inaugurated at Delitzsch. In these banks, the subscribers made small deposits, obtaining proportional credit and dividends; the management being vested in a board composed of subscribers. In 1859 the more than 200 such banks were cen¬ trally organized under the direction of Schulze- Delitzsch. At the time of his death there were in Germany alone 3,500 branches with more than $100,000,000 in deposits ; while the system had been extended to Austria, Italy, Belgium and Russia. He published (Chapters of a Ger¬ man Workingman's Catechism) (1863) ; (The Laboring Classes and Associationism in Ger¬ many (2d ed., 1863) ; (Monev Advance and Credit Associations as People's Banks* (5th ed., 1876). Consult his life by Bernstein (1879).*

SCHUMANN, shoo'man, Clara Josephine Wieck, German pianist, wife of Robert Schu¬ mann : b. Leipzig, 13 Sept. 1819; d. Frankfort- on-Main, 20

May 1896.. She was the daughter of the pianist Frederick Wieck, from whom she received instruction for 15 years and for the first time took part in a public concert in her ninth year. When Paganini appeared at

Leipzig in 1829 he produced a profound im¬ pression upon her and her musical genius was developed still further by a tour with her father through the musical centres of Germany and France. While she derived her marvelous tech¬ nique from her father, she was well grounded in the theory of music by Kupsch and H. Dorn. She was the first to bring Chopin's works into notice and favor with the German public. In 1840 she was married to Robert Schumann (q.v.) and shared his artistic work and Euro¬ pean successes until his death in 1856, after which she pursued her public career alone. In 1878 she was appointed teacher in the Con¬ servatory of Frankfort-on-Main, where she met with success in that capacity, and continued to turn out a series of brilliant pupils until 1892. She was equally gifted as a performer, teacher and composer, and among her works at least 40 are in print and comprises songs, a concerto for the piano, a trio for the piano, preludes and fugues. Consult La Mara, (Musikalische Stu- dienkopfe (Vol. V) ; Kohut, (Friedrich Wieck) ; Von Meichsner, (Fredrich Wieck und seine beiden Tochter.*

SCHUMANN, Robert, German composer: b. Zwickau, Saxony, 8 June 1810; d. Endenich, near Bonn, 29 July 1856. His father, who was a bookseller and an author of some note, while not directly assisting him toward a musical career, encouraged him, and endeavored to ob¬ tain the services of Von Weber as his in¬ structor. After his father's death, when Robert was 16, he attended the gymnasium at Zwickau, and later the University of Leipzig. At 17 he set a number of his own pieces to music. His academic work had been largely confined to law and. philosophy, but at 20 he began serious piano study under Wieck and Heinrich Dorn. An unwisely chosen method, intended to secure independent action of his fingers, resulted in the crippling of one of the fingers of his right hand, which unfitted him for becoming a piano- player, and thenceforward he devoted himself to composing. In 1834 he assisted in found¬ ing, and until 1844 edited, a musical journal, the Neue Zeitschrift fur Musik, for advancing the art and emancipating it from old-fashioned methods and from French and Italian influ¬ ences. Convinced that German art had not yet reached its full development, he thus expressed himself : "Consciously or unconsciously a new and as yet undeveloped school is being founded on the basis of the Beethoven-Schubert roman¬ ticism, a school which we may venture to ex¬ pect will mark a special epoch in the history of art.®

In 1833 Schumann occupied himself with studies in composition, and also published his first (Impromptus) (op. 5). In this year, too, he commenced his (F minor Sonata (op. 11), and completed the toccata which he had*

com¬ menced in 1829. A turning-point was reached in his life in October 1835 when Mendelssohn and he met at a musical gathering at Wieck's. A strong intimacy seems to have grown up be¬ tween them. Schumann declared that Men¬ delssohn was the greatest living musician and that he looked to him as a "high mountain- peak.® Mendelssohn at first saw in Schumann only the literary man and the art critic, but it is significant that when, in 1843, Mendelssohn established the Leipzig Conservatorium, Schu-

mann was appointed teacher of playing from score. While there he introduced the use of the piano with pedals as a preparation for play¬ ing the organ.

Schumann's marriage in 1840 to Clara Wicck, daughter of his old teacher, was ap¬ parently a very happy one, and the fact that he soon afterward began to compose love songs does not weaken this belief. At the same time his wife regarded it as her greatest privilege to interpret his compositions faithfully to the pub¬ lic, nor was it long before she became the lead¬ ing woman pianist of Germany. In the year after his marriage he paid more special attention to symphonic work, composing three entire num¬ bers, only one of which, however — in B|? — was published at that time. He also wrote the first movement of the (Pianoforte Concerto in A minor.5 In 1842 Schumann accompanied his wife on a concert tour to Hamburg. The latter proceeded alone from there to Copenhagen, while he returned to Leipzig. Later they visited Bohemia and met Prince Metternich, at whose invitation they went to Vienna. In 1844 they traveled to Russia, Madame Schumann giving concerts in several of the large cities; but Schumann, who loved the quiet of domestic life, was always impatient to return home.

The style of Schumann's compositions under¬ went a decided change in 1843, the principal work of the year being (Paradise and the Peri,5 for solo voices, chorus and orchestra. It was first performed on 4 December, and was con¬ ducted by Schumann in person. He also com¬ posed his popular Variations5 for two pianos (op. 46), and from this time his reputation in Germany was firmly established. Thus en¬ couraged he began in the following year the second of his two most famous choral works consisting of a musical setting to Goethe's (Faust. 5 About this time he gave up the editor¬ ship of his paper and changed his residence to Dresden, where he at first lived in seclusion on account of his nervous condition, resulting doubtless from overwork. In 1845-46 he com¬ posed his (Studies5 and (Sketches5 for the pedal-piano, as well as his famous (C major Symphony,5 first produced by Mendelssohn at the Gewandhaus in

Leipzig, 5 Nov. 1846. In Dresden he met Richard Wagner, for whose work he expressed great admiration, but on account of their very different natures they were never in close sympathy. The former was high-spirited and talkative, while Schumann, al¬ ways reserved, was growing more and more silent. The idea of the improvement of Ger¬ man operatic music, long a favorite subject with Schumann, now led him to write an opera. He chose as his subject the legend of Saint Genevieve, but only after long and irritating delays was the first performance of (Genoveva5 arranged. This took place on 25 June 1850 under Schumann's own direction. The criti¬ cisms of this first attempt at dramatic work were on the whole unfavorable, -and it is said that he derived far more gratification from the reception accorded to his music of (Faust. 5 He also wrote an excellent musical setting for Byron's (Manfred, 5 which had its first per¬ formance in Weimar 13 June 1852.

While living in Dresden he undertook the direction of the Liedertafel, and in 1848 he established a choral society. Two years later he accepted the position of municipal director

of music at Diisseldorf. Here he had the di¬ rection of a vocal organization and an orchestra. His duties were sufficiently light, however, to leave him ample time for social enjoyment, in which he took great pleasure. His generous nature was manifested by his arrangement of a series of concerts, some of which were de¬ voted wholly to the works of other living com¬ posers. This was in line with his desire to aid in advancing the interests of those less famous than himself. As a conductor Schumann was not regarded as a success. His lack of pres¬ ence of mind and of sympathy with the players was conspicuous and contributed largely to his unpopularity as a leader. This unfortunate con¬ dition of things, combined with the return of a brain affection, symptoms of which had been first manifested as far back as 1833, at length made it necessary for him to resign his post, which he did in 1853. During his residence in Diisseldorf the number of his compositions was very great, including the celebrated (Et> Sym¬ phony,5 which, it is believed, was intended to convey by musical expression the impressions he received during a visit to Cologne. It was first performed on 6 Feb. 1851, almost exactly three years before that sad day when, in a state of utter mental distraction, he sought to end his life by jumping into the Rhine. He was saved by some boatmen, but unmistakable signs of insanity soon appeared, although for a brief period later his mind became wonderfully calm and clear, and with it returned his old love of work. His mental powers were shattered, how¬ ever, and the last two years of his life were spent in an asylum at Endenich. He was buried at Bonn. A monument over his grave was un¬ veiled on 2 May 1880.

Schumann's works present a rare combina¬ tion of passion and tenderness. He did much for the development of piano-playing and his numerous songs reveal the grandeur and depth of his unselfish nature. His compositions con¬ sist of orchestral works, vocal works with orchestral accompaniment, choruses, a large number of songs, chamber music and also many pieces for the organ and piano. Striking features of Schumann as a composer are his originality and his cautious approach to the more difficult classes of work. At the outset of his career he chose simple forms, building sev¬ eral together for his longer pieces. From this method, however, resulted no unevenness or in¬ harmoniousness, a fact which bears strong wit¬ ness to the greatness of his creative abilities. In the composition of songs Schumann must be conceded to take rank with such composers as Schubert and Mendelssohn. As one of his biographers writes : < (Schubert shows the greatest wealth of melody, Mendelssohn the most perfect roundness of form; but Schumann is by far the most profoundly and intellectually suggestive.55

Until Schumann reached his 30th year he wrote almost entirely for the piano, and his method of treating the instrument must be re¬ garded as strictly original. He followed none of the methods of the older composers, al¬ though he was evidently familiar with their work. His earlier compositions strike the hearer as the result of sudden impulses and, therefore, contain much that is apparently at variance with the established laws of art, but this in no wise detracts from, but rather adds

to, the freshness and originality of their con¬ ception.

His symphonies are generally regarded as the most important contributions of this class since the time of Beethoven, whom he ap¬ proached quite nearly at times, and whose works occasionally served as his models. His love for sacred music was developed only a few years before his death. In writing to a friend in 1851 he said : ((It must always be the artist's highest aim to apply his powers to sacred music. But in youth we are firmly rooted to the earth by all our joys and sorrows; it is only with ad¬ vancing age that the branches stretch higher, and so I hope that the period of my higher efforts is no longer distant.® Several composi¬ tions of this class are recorded, one of the most famous being op. 71, an Advent hymn for solo, chorus and orchestra; op. 93, a motet for men's voices; op. 144, a New Year's hymn for chorus and orchestra; his ass,' op. 147, and a (Requiem op. 148. These, while not counted among his greatest works, were grandly con¬ ceived, and with his other compositions must be a lasting monument to his

imperishable genius.

A list of Schumann's works may be found in the catalogue of Schuberth and Company (1860-61), while a complete index to all his published compositions was compiled by Alfred Dorffel and was printed as a supplement to the (Musikalisches WochenblatD (Leipzig

1875).

R. I. Geare,

National Museum, Washington, D. C. SCHUMANN-HEINK, hink, Ernestine, nee Roessler, American opera and concert singer: b. Lieben, near Prague, Bohemia, 15 June 1864. She was educated at an Ursuline convent and studied music under Marietta Leclair at Gratz. She made her debut at Dresden, 13 Oct. 1878, and sang in opera there for four years, afterward singing for many years at Hamburg and Bayreuth, winning a wide reputation for her magnificent contralto voice and splendid acting. She made her London debut at Covent Garden, 8 June 1892, repeating her former triumphs, and first appeared before an American audi¬ ence at the Metropolitan Opera House, New York, in 1898. Since 1908 she has been en¬ gaged chiefly in concert work, although she has made occasional appearances at the Metropoli¬ tan Opera House and with the Chicago Grand Opera Company. She ranks as the leading con¬ tralto of her time. She was thrice married, to Herr Heink in 1883 ; to Paul Schumann in 1893, and to William Rapp, Jr., in 1905, _ divorcing him in 1915. She is an American citizen and has for some years made her home in America. During the European War she gave freely of her time and talent in war benefits and the great loan campaigns.

SCHURMAN, shoor'man, Jacob Gould,

American educator: b. Freetown, Prince Ed¬ ward Island, 22 May 1854. He is of a Dutch family which in the 1 7th century settled in New Holland, now New York, where his grand¬ father was born. He was educated in the prov¬ inces where he gained the Gilchrist Dominion Scholarship in 1875 and studied later at London and Edinburgh universities. He was elected to the Hibbert traveling fellowship in 1878 and spent two years at Heidelberg, Berlin and Gottingen, mainly occupied with the study of

philosophy. In 1880 he became professor of philosophy and English literature at Acadia College, Nova Scotia, and in 1882 removed to a similar post at Dalhousie College. In 1886 he became professor of philosophy at Cornell Uni¬ versity and in 1890 was made dean of the Sage School of Philosophy there. In 1892 he was elected president and resigned

in 1920. He was appointed by President McKinley chair¬ man of the United States Philippine Commis¬ sion in 1899 and spent the larger part of that year in the Philippine Islands. During the year 1912-13 he was United States Minister to Greece and Montenegro. He was appointed Minister to China in June 1921. He wrote (Kantian Ethics and the Ethics of Evolu¬ tion } (1881) ; (The Ethical Import of Darwin¬ ism } (1888) ; (Belief in God) (1890) ; Agnos¬ ticism and Religion } (1896) ; (A Generation of CornelP (1898); Philippine Affairs — A Re¬ trospect and Outlook > (1902). He is also joint author of the (Report of the Philippine Com¬ mission rendered to Congress in 1900; (Why America is in the War) (1917).

SCHURZ, shoorts, Carl, German-American publicist, editor and author : b. Liblar, near Cologne, Prussia, 2 March 1829; d. New York City, 14 May 1906. He studied at the University of Bonn, in 1848 with others published a revo¬ lutionary journal, in 1849 escaped to the Palat¬ inate upon the failure of an insurrection which he promoted at Bonn, took part in the defense of Rastadt and upon its surrender fled to Switzerland. In 1850 he returned to Germany, going thence to Scotland and to Paris, where he was a correspondent for the German press, and, after a year in London, came to the United States (1852), where until 1855 he re¬ sided in Philadelphia. Having then removed to Madison, Wis., he identified himself with the Republican party, and by his speeches made himself an important factor in determining the German element of the State against slavery. He participated in the Lincoln-Douglas sena¬ torial canvass in Illinois, entered legal practice at Milwaukee, was a member of the National Republican Convention of 1860 and assisted largely in the framing of its platform. During the ensuing campaign he spoke much in both German and English. He was appointed by Lincoln Minister to Spain, but in December 1861 resigned to enter the army, receiving a commission as brigadier-general of volunteers. He distinguished himself at the second Bull Run (Manassas), was promoted major-general, 14 March 1863, commanded a division at Chan- cellorsville, held temporary command of the 11th corps at Gettysburg and took part at Chat¬ tanooga. After the war he returned to profes¬ sional practice, in 1865-66 was Washington cor¬ respondent of the New York Tribune, and was made by President Johnson a special commis¬ sioner to report on the workings of the Freed- men's Bureau. In 1868 he was temporary chair¬ man of the convention that nominated Grant, whom he actively supported in campaign. In 1869-75 he was senator from Missouri. He vigorously opposed many of the leading meas¬ ures of the Grant administration, in 1872 helped to organize the ˆLiberal® party and presided over the Cincinnati convention which nominated Greeley, but in 1876 supported Hayes, by whom he was made Secretary of the Interior. He introduced competitive examinations for posts

in the civil service, and provided for forest pro¬ tection on public domains. From the close of the administration to 1884 he was editor of the New York Evening Post. In the canvasses of 1884, 1888 and 1892 he supported Cleveland. He had been prominently identified with the Civil Service Reform League and later with the Anti-Imperialist League. His speeches and contributions to periodicals were numerous and able. Among his many publications are a vol¬ ume of speeches5 (1861), a (Life of Clay> (1887), and (Abraham Lincoln: An Essay5 (1891). A statute of him has been erected on Morningside Drive at 116th street, New York City.

SCHUVALOFF, shoo'va-lof, Peter An- dreievitch, Count, Russian diplomat : b. Saint Petersburg, Russia, 15 July 1827 ; d. there, 22 March 1889. He early entered the army, rose to the rank of general at 30, was head of a department in the Ministry of the Interior in 1862, governor of the Baltic provinces in 1864- 66, and in the latter year was appointed chief of the secret service. He was sent to London in 1873 as Special Ambassador and arranged the marriage between the daughter of Alexander II and the Duke of Edinburgh. In 1878 he was a representative at the Congress of Berlin, where his pacific course cost him his popularity and influence at home, and later as Ambassador to England he was instrumental in preserving friendly relations between Great Britain and Russia after the Russo-Turkish War of 1877—78, but Prince Gartschakoff was displeased with his concessions and recalled him from London, and thereafter he took no part in pub¬ lic affairs.

SCHUYLER, ski'ler, Aaron, American educator: b. Seneca County, N. Y., 7 Feb. 1828; d. Salina, Kan., 1 Feb. 1913. He was educated at Seneca Academy, Ohio, and was its prin¬ cipal, 1851-62. He was professor of mathe¬ matic's at Baldwin University, Ohio, 1862-75, and president 1875-85, and from 1885 till his death he was professor of mathematics and mental philosophy at Kansas Wesleyan Univer¬ sity, Salina. He was author of (Complete Al¬ gebra5 (1870; rev. ed., 1883) ; (Elements of Geometry5 (1876) ; (Higher Arithmetic5 (1877) ; (Empirical and Rational Psychology5 (1882) ; (Outlines of Psychology5 (1893) ;

(Systems of Ethics5 (1902), etc.

SCHUYLER, Eugene, American diplomat: b. Ithaca, N. Y., 26 Feb. 1840; d. Cairo, Egypt, 18 July 1890. He was graduated at Yale in 1859 and at Columbia Law School in 1863. After practising law he entered the diplomatic service in 1866, was consul at Moscow and Reval and secretary

of legation at Saint Peters¬ burg, 1870-76. In 1876 he was transferred to Constantinople and that year, after careful in¬ vestigations, rendered an important report on the Turkish massacres in Bulgaria. In 1878 he was consul at Birmingham ; the next year con¬ sul-general at Rome and in 1880 became charge d'affaires and consul-general at Bucharest. In 1881 the United States government authorized him to arrange and sign the commercial and consular treaties with Rumania and Serbia and in the following year he assumed toward those two countries and Greece the post of Minister- resident and consul-general. In 1889 he became consul-general at Cairo. He published (Peter

the Great Emperor of Russia5 (1884) ; Tur¬ kestan: Notes of a Journey in Russian Turke¬ stan, Khokand, Bokhara and Kuldja5 (1876);

(American Diplomacy and the Furtherance of Commerce5 (1886). He also made translations from Tolstoi and Turgenieff.

SCHUYLER, Louisa Lee, American so¬ cial worker, great-granddaughter of Gen. Philip Schuyler and of Alexander Hamilton : b. about 1838. She was a member of the United States Sanitary Commission in the Civil War; was one of the organizers and for many years, an officer of the New York State Charities Aid Association, founded in 1873 ; in 1874 origi¬ nated the first American training school for nurses at Bellevue Hospital against the pro¬ test of a considerable share of the manage¬ ment, which grudgingly allotted six wards for its practice field; and in 1907 she was ap¬ pointed a trustee of the Russell Sage Founda¬ tion. She received in 1915 an honorary LL.D. from Columbia University in recognition of her more than 50 years of public service. Author of numerous reports and papers.

SCHUYLER, Montgomery, American journalist: b. Ithaca, N.Y.,19 Aug. 1843; d. New Rochelle, N. Y., 16 July 1914. He was educated at Hobart College, served in the Union army in 1862-63, was on the staff of the New York World in 1865-83, New York Times in 1883- 1907 and New York Sun from 1912 till his death. He published The Brooklyn Bridge5 with W. C. Conant (1883); (Studies in Ameri¬ can Architecture5 (1892) ; (Westward the

Course of Empire5 (1906).

SCHUYLER, Philip John, American sol¬ dier: b. Albany, N. Y., 20 Nov. 1733; d. there, 18 Nov. 1804. He was the second son of John Schuyler, owner of a large estate near Albany. He served in the French and Indian War in two campaigns (1755-58), first as captain and after¬ ward as commissary with the rank of major. In 1761 he went to England to settle the colonial claims. Returning in 1763 he successfully en¬ gaged in the

lumber business at Saratoga. He built the first flax mill in America. In 1764 he acted as a boundary commissioner to determine the line between New York and Massachusetts, and later helped settle the New Hampshire boundary. In 1768 he was chosen as Albany's representative in the colonial assembly, where he earnestly defended the side of the colonists. In 1775 he was a delegate to the Continental Congress and served on the committee to frame rules and regulations for the Continental army. He was appointed (19 June 1775) major-gen¬ eral and placed in command of the department of northern New York, with headquarters at Albany. He planned to invade Canada and proceeded as far as Lake Champlain, where he left Gen. Richard Montgomery in command of Fort Ticonderoga, while he returned to Albany to raise more troops and forward supplies. Early in 1776 he led an expedition to Johns¬ town, N. Y., where he captured the military stores of the British. Owing to a clash with Gen. Horatio Gates he offered his resignation (14 Sept. 1776), which Congress would not accept. In 1777 he was appointed chief of the Pennsylvania militia, and in June was again placed in command in northern New York. On 4 July 1777 Ticonderoga was evacuated by Gen.

Arthur Saint Clair, and later General Schuyler was tried by court-martial for alleged neglect of duty in permitting its capture. He was ac¬ quitted and completely vindicated. On 29 July 1777, he evacuated Fort Edward and retreated down the Mohawk Valley before Burgoyne. Notwithstanding the patriot success at Benning¬ ton (16 August), he was superseded by Gates (19 August), yet he remained with the army and to him belongs credit of effecting Burgoyne's surrender (19 October). He Was again a dele¬ gate to the Continental Congress (1778— 81) and his counsels were often sought by Washington. As president of the board of Indian commis¬ sioners he visited the tribes of the Six Nations and made treaties that secured their neutrality. He was a member of the New York senate (1780-84, 1786-90 and 1792-97) and actively pro¬ moted the building of a canal between the Hud¬ son and Lake Erie. He was United States senator from New York (1789-91 and 1797-98). He resigned because of ill-health. He was mar¬ ried (17 Sept. 1755) to Catharine Van Rens¬ selaer and had 11 children. His daughter Eliza¬ beth became the wife of Alexander Hamilton. Consult Lossing, (Life and Times of Philip Schuyler) (1860-62 ; 2d ed., 1872-73) ; Tucker- man, (Life of General Philip Schuyler (1904}*

SCHUYLERVILLE, skl'ler-vil, N. Y., vil

lage, Saratoga County, on the Hudson River, and on the Fitchburg Railroad, about 10 miles east of Saratoga Springs, and 35 miles north of Albany. It was named in honor of Philip Schuyler (q.v.) who planned the campaign against Burgoyne. The village is in an agri¬ cultural region, and has a number of industries connected with farm and dairy products. It is a favorite summer resort; and many tourists visit the village on account of its historical as¬ sociations. A tablet on one of the business blocks gives the information that near is the place where Burgoyne surrendered to Gates. A half mile up the slope from the main street stands the Saratoga Battle monument, erected by the Saratoga Battle Monument Association. The corner stone was laid on the 100th anniver¬ sary of the Burgoyne surrender, 17 Oct. 1877. It is ornamented on each side of its four fronts by niches, three of them containing bronze statues of Generals Schuyler, Gates and Morgan. The south niche, where would have been placed the statue of Benedict Arnold, stands empty. All roads from Schuylerville seem to lead to battlefields whereon were fought and won the independence of the republic.

SCHUYLKILL, skool'kil (from the Dutch,

meaning ((hidden channel®), a river in Penn¬ sylvania, which has its rise in Schuylkill County, flows southeast and enters the Delaware River at Philadelphia. The total length is about 125 miles. In 1816-25 the river was made navigable for freight boats to Port Carbon, three miles above Pottsville (q.v.). Phila¬ delphia obtains from the Schuylkill a large part of the city water supply. The river furnishes considerable water power which is used for manufacturing at Pottsville, Reading, Norris¬ town and other places on its banks, and also at Philadelphia.

SCHUYLKILL HAVEN, Pa., borough in Schuylkill County, on the river of the same name, 25 miles northwest of Reading, on the

Pennsylvania, the Philadelphia and Reading and the Lehigh Valley railroads. It is situated in a coal mining region, and is an important coal¬ shipping point, having a coal storage yard of a million tons' capacity. There are rolling mills, railroad car shops, pipe mills and manufactures of underwear, hosiery, shoes, soap, paper boxes and flour. Pop. (1920) 5,437.

SCHWAB, shwab, Charles M., American financier: b. Williamsburg, Pa., 18 April 1862. He was educated at Saint Francis College, Loretta, Pa., entered the service of the Car¬ negie Company as a stake driver in the en¬ gineering corps of the Edgar Thompson Steel Works, and became chief engineer and assistant manager in 1881. He was superintendent of tlie Homestead Steel Works in 1887-89; president of the Carnegie Steel Company in 1897-1901 ; and president of the United Steel Corporation in

1901-03. He is chairman of the board of the Bethlehem Steel Company and of the Bethlehem Steel Corporation, and director in many trust and manufacturing companies. He was appointed director-general of shipbuilding of the United States Shipping Board Emer¬ gency Fleet Corporation, 28 April 1918, and earned high approbation for the energy and ability with which he handled its affairs.

SCHWAB, John Christopher, American political economist: b. New York, 1 April 1865; d. New Haven, Conn., 12 Jan. 1916. He was graduated from Yale in 1886 and later studied at the universities of Berlin and Gottingen. He was instructor, assistant professor and pro¬ fessor of political economy at Yale in 1890- 1905, editor of the Yale Review from 1892 and librarian from 1905. He published his¬ tory of New York Property Tax (1890) ; (The Confederate States of America) (1901), etc.*

SCHWANN, shvan, Theodor, originator of the cell theory: b. Neuss, 7 Dec. 1810; d. Cologne, 14 Jan. 1882. He was educated in philosophy and medicine at Bonn, Wurzberg and Berlin. From 1834 to 1839 he was the assistant of Johannes Muller (q.v.). While occupying this position he discovered pepsin (q.v.), and published numerous important re¬ searches on artificial digestion, on the trans¬ mission of nerve-impulses, on the law of mus¬ cular contraction, on the walls of the capillaries, on decomposition and fermentation, on pro¬ creation, etc. In 1838 Schwann became pro¬ fessor of anatomy at Louvain, and in 1848 at Liege. In 1858 he was also appointed to the chair of physiology. His (Mikroskopische unter- suchungen uber die Ubereinstimmung in der Struktur und dem Wachstum der Tiere und der Pflanzen) (Berlin 1839) marks an epoch in biology. Here he points out that both animals and plants are made up of elementary units, the cells (q.v.). This book was translated into English in 1847 by Henry Smith under the title, (Microscopical Researches into the Accordance of the Structure and Growth of Animals and Plants. > Schwann also wrote the article (Anatomie du corps humain) in the Encyclo¬ pedia populaire) (Brussels 1855).

SCHWANTHALER, shvan'ta"ler, Ludwig von, German sculptor: b. Munich, 26 Aug. 1802; d. there, 28 Nov. 1848. He attended the Art Academy at Munich, and was a pupil of the battle painter Albrecht Adam ; but in 1821

took up his father's profession of sculpture and at once received a commission from King Maximilian to furnish a model for a silver epergne decorated with incidents from the fable of Prometheus. After a year's travel

in Italy (1827) he executed the figures for the 2Egina Gallery of the Glyptothek at Munich, and other decorative work for the same building. His (Shakespeare) in the vestibule of the theatre in his native city belongs to this period, as does the Bacchus frieze in the ballroom in the palace of Duke Max. On being appointed professor in the Art Academy at Munich he soon gathered a great number of pupils about him. He was meanwhile busy in numerous important works; a frieze illustrating the (Voyage of the Argonauts1 ; a statue, (Poetry of Hesiod* ; the reliefs illustrative of Pindar; the statues of zEschylus, Sophocles and Aristophanes ; the re¬ liefs illustrating the myth of Aphrodite. Of his monumental work in marble and bronze, are the pediment groups in the Walhalla, consist¬ ing of 15 statues illustrating the (Victory of Arminius over Varus* ; and the two pediment groups for the Munich propylaeum. The great¬ est, however, of his works of this class is the figure of (Bavaria,* more than 20 feet in height, for the Hall of Fame in Munich. He also executed many statues of notable individuals. Among his ideal works are the life-size figures in sandstone of (Venus* ; (Diana* ; (Vesta and Ceres* ; (Apollo* ; (Eros* ; Bacchus* ; and*

(Pan. This series was completed in 1840 for the castle of Wiesbaden. His < Dancing Girl,* a life-size figure in white marble is a work of remarkable beauty. His (Shield of Hercules,* begun at Rome, is conceived in the pure classic spirit. It illustrates, after Hesiod, that divinity's exploits, etc., in 140 figures; has been cast in bronze, and replicas are to be found both in Germany and England. He was a sculptor of the Romantic school and his works, did much to promote the cause of Romanticism, an art cause which lost much by his death. While several of his works exhibit great spontaneity, sometimes he overelaborates to such a degree as to impair the force of his original concep¬ tion.*

SCHWARTZ, shvarts, Christian Fried¬ rich, German Protestant missionary: b. Son- nenburg, Prussia, 26 Oct. 1726; d. Tanjore, India, 13 Feb. 1798. He was educated at the University of Halle, 1746-49, ordained at Copenhagen and sailed from London for India 1750. He was stationed at Tranquebar, a Danish mission, until 1766, when, having trans¬ ferred himself to the English Society for Pro¬ moting Christian Knowledge, he removed to Trichinopoly and founded a church and a school. He removed to Tanjore, in 1778, and went as an ambassador to negotiate peace with Hyder Ali, at Seringapatam, in which he was successful after all others had failed. In a later war he succeeded in saving the city of Tanjore from famine by his influence with the peasants, whom he induced to send supplies. He gained the friendship of the rajah of Tan¬ jore and of Hyder Ali, and the former, on his deathbed, entrusted his son and successor to the missionary's care. A monument designed by Flaxman and erected at Tanjore commemorates the young rajah's gratitude for his tutor, while

another at Madras testifies to the general ap¬

preciation of the services of Schwartz in India. Consult Pearson, (Memoirs of the Life and Cor¬ respondence of C. F. Schwartz (1833).*

SCHWARTZITE, a mercury-copper ore worked in Sumber district, Baker County, Ore.

*SCHWARZ, Berthold, a Franciscan friar of Freiburg or Dordmund : d. Venice, 1384. His real name was Constantin Anklitzen : Berthold was his monastic name, and the epithet Schwartz, ((black,** was added to it, because of his addiction to the study of chemistry, in the course of which he is supposed to have dis¬ covered an explosive, formed by the combina¬ tion of saltpetre, sulphur and quicksilver; or of saltpetre, sulphur, lead and oil. Thus he is sometimes credited with the invention of gun¬ powder. This is said to have taken place in the early part of the 14th century. Schwarz, whether the inventor of gunpowder or not, was undoubtedly the inventor of artillery. In 1380 he came to Venice, and was commissioned by the government to cast some cannons, which are described as of an enormous size. The price agreed upon for his work not being forth¬ coming he became importunate, and was re¬ warded by being cast into prison, where he died. In 1853 a statue was erected to him in Freiburg. Consult Hansjakob,*

*SCHWARZENBERG, shvart'sen-berg, Adam of, Franconian count: b. 1587; d. Span- dau, Prussia, 17 March 1641. He was descended from one of the oldest families of Franconia, was Prime Minister to George-Wilhelm, the Elector of Brandenburg, was all-powerful during the Thirty Years' War, and caused great calamities to the electorate of Brandenburg through his promoting an alliance with Austria against the Swedish Protestant League. When the <(Great Elector** assumed the reins of government in 1640 he punished Schwarzenberg by divesting him of his power and imprisoning him in the fortress of Spandau, where he died.*

SCHWARZENBERG, Karl Phillip of,

Franconian prince and soldier: b. Vienna, Aus¬ tria, 15 April 1771 ; d. Leipzig, Germany, 15 Oct. 1820. He received a military training and served with distinction in the battles of Wa- gram, Hohenlinden and Ulm, and after the Peace of Vienna 1809, was Austrian Ambassa¬ dor to Paris, where he is said to have arranged the marriage between Maria Louisa and Napo¬ leon. At Napoleon's request he was created a field-marshal and, in 1813, placed at the head of the Austrian army of observation in Bohe¬ mia. When Austria joined Russia and Prussia, Prince Schwarzenberg commanded the allied forces, gained the battle of Leipzig and led the victorious armies into Paris 1813. Consult Prokesch-Oesten, (Denkwiirdigkeiten aus dem Leben des Feldmarshalls Fiirsten Schwarzen¬ berg (1882).*

SCHWATKA, shwat'ka, Frederick, Amer¬ ican Arctic explorer: b. Galena, Ill., 29 Sept. 1849; d. Portland, Ore., 2 Nov. 1892. He was graduated at West Point in 1871, served as second lieutenant, United States army, until

1878, when he obtained leave of absence, and headed an expedition to King William's Land, in search of records and remains of Sir John Franklin's Arctic exploring party. He was successful and

brought back in 1880 some valuable geographi¬ cal information as well as the buried records, then having made a sledge journey of 3,251 miles, the longest on record. Schwatka next explored the Yukon River in Alaska, and returning in 1884, resigned his army commission, having meantime been promoted to first lieutenant. He led three other exploring expeditions : one to Mount Saint Elias, which he ascended for 7,200 feet, for the New York Times in 1886; one in 1891 to Alaska, opening up some 700 miles of new territory; one in 1889 to Chihuahua in Mexico, for the journal America. He was the recipient of the Roquette Arctic medal from the Paris Geographical Society, of a medal from the Imperial Geographical Society of Russia and of honors from geographical so¬ cieties of Rome, Berlin and Geneva. He was the author of (Along Alaska's Great River (1885) ; (Nimrod in the North* (1885) ;*

SCHWEINFURTH, shvln'foort, Georg August, German explorer and botanist : b. Riga, 29 Dec. 1836. He was educated at Heidelberg, Munich and Berlin, specializing in botany, and in 1863-66 explored the valley of the Nile and the African Coast of the Red Sea; in 1869-71, aided by the Royal Academy of Sciences of Berlin, he ex¬ plored equatorial Africa in the countries of the Bongo, Madi, Dinka and other peoples, and discovered a tribe of pigmies and the river Welle. He founded the Egyptian Geographical Society 1872, and in 1880 became the director of all the Egyptian collections in Cairo. In other explorations he investigated the oasis of El-Chargeh; the botany of various districts of Egypt; the southern portion of Arabia, and Helouan and the Italian colony of ErjUhrea. His publications chiefly relate to travel and botany, and include (Plantse quaedam Niloticae (1862) ; (Beitrag zur Flora ˆthiopieus* (1867); (Reliquiae Kotschyarae) (1868) ; (Im Herzen von Afrika* (1874) ; (Artes Africanae) (1875), etc.*

SCHWEINITZ, shvi'mts, Edmund Alex¬ ander, de, American bishop of the Unity of the Brethren Church, son of L. D. von Schweinitz (q.v.) : b. Bethlehem, Pa., 20 March 1825 ; d. South Bethlehem, Pa., 18 Dec. 1887. He was graduated at the Mora¬ vian Theological Seminary at Bethlehem in 1844, and studied at Berlin in 1845. He held various pastorates in 1850-80, and in 1870 was consecrated bishop. His fam¬ ily for more than 100 years was continuously represented in the American branch of the

Moravian ministry. He was president of the Theological Seminary at Bethlehem in 1867-84. In 1856 he founded the Moravian and edited it in 1856-66. Author of (Moravian ManuaP (1859); (The Moravian Episcopate (1865);*

SCHWEINITZ, Emil Alexander de,

American bacteriologist: b. Salem, N. C., 18 Jan. 1866; d. Washington, D. C., 15 Feb. 1904. He was graduated from the University of North Carolina in 1882, subsequently studying at Gottingen and taking a medical degree at

Columbian University, Washington. He was dean and professor at the Columbian Medical School and director of the biochemic labora¬ tory of the Department of Agriculture at Wash¬ ington, and made many original investigations in regard to bacteria, tuberculosis, disinfectants and hygienic problems. The results of these investigations appeared in numerous published scientific papers.

SCHWEINITZ, George Edmund de,

American opthalmologist, son of Edmund A. de Schweinitz (q.v.) : b. Philadelphia, Pa., 26 Oct. 1858. He was graduated at the Moravian Col¬ lege in 1876 and took his M.D. at the University of Pennsylvania in 1881. He was professor of opthalmology at the University of Pennsylvania from 1902; and was consulting opthalmologist at the Philadelphia Hospital and consultant at the Philadelphia Polyclinic. He was for many years first lieutenant in the United States army medical reserve corps and was promoted major in 1917. He was coeditor of the (Opthalmic Year Book (1905-09), and author of dis¬ eases of the Ear* (8th ed., 1916) ; (Toxic Amblyopias* (1896) ; diseases of the Eye, Ear, Nose and Throat* (1899), etc.*

SCHWEINITZ, Louis David von, Amer¬ ican Moravian clergyman and botanist : b. Bethlehem, Pa., 13 Feb. 1770; d. there, 8 Feb. 1834. He was educated in Germany, entered the Moravian ministry and in 1812 returned to America as the general agent of the Moravian Church in the United States. He afterward filled other important offices in the Church both at Salem, N. C., and at Bethlehem. He was an enthusiastic botanist and added 1,400 new speci¬ mens to the catalogue of American flora. He devoted himself particularly to the study of American fungi, which had hitherto received scant attention. At his death he possessed the largest private collection of plants in America, and this he willed to the Philadelphia Academy of Natural Science. Author of (Conspectus Fungorum Carolinae (1818) ; (Synopsis Fun- gorum in America Boreali Media Degentium* (1832), etc.*

SCHWEINITZ, Rudolf, German sculptor: b. Charlottenburg, 15 Jan. 1839; d. Berlin, 8 Jan. 1896. He was a pupil of the Berlin Acad¬ emy and of Schievelbein, took a prominent part in the decoration of the National Gallery at Berlin and executed numerous commissions for monuments, public works and official buildings. Among his works were many busts, such as those of Crown Prince Frederick William (1872) . and William I (1882) in marble. The memorial of William I and Frederick III at Fiirstenwalde is also by him, as are also .20 decorative statues for the equestrian memorial of Frederick William III at Cologne.

SCHWENKFELD, shvenk'felt, Kaspar von, German mystic and religious leader : b. Ossig, Silesia, 1490; d. Ulm, 10 Dec. 1561. He studied at Cologne and other universities, in 1516 entered the service of the Duke of Lieg- nitz, and was made a councillor. A learned scholar, he differed from Luther on several points of theology, and was thus opposed by both Catholics and Protestants. His writings are of interest in the study of the times of the Reformation. Those who adhered to his views were subjected to greater or less persecution and in 1734 many emigrated to Pennsylvania,

where they settled in Montgomery and adjacent counties. There they maintain a few small churches, the doctrines, disciples and govern¬ ment of which in many particulars resemble those of the Society of Friends. The Schwenk- felders or Schwenkfeldians have sometimes been erroneously identified with the Dunkards. Consult Kadelbach, (Ausfohrliche Geschichte Kasper von Schwenkfelds und der Schwenk- felder in Schlesien, der Ober-Lausitz und Amerika) (1861).

SCHWENKFELDIANS, shvenk'fel-di-

anz. See Religious Sects.

SCHWERIN, shva-ren, Germany, capital of the Free State of Mecklenburg-Schwerin, picturesquely situated on the west shore of the Lake of Schwerin, 20 miles south of the Baltic, and 130 miles northwest of Berlin. The lake is 14 miles long and 3 broad, and has smaller lakes behind it. The town is surrounded with handsome ˆsuburbs and contains the grand castle (1845-58), a Renaissance structure, erected by Wallenstein on a small island, one of the finest Gothic cathedrals in northern Ger¬ many, begun in 1248 and completed in the 15th century, with interesting monuments and stained glass; an arsenal; a museum and pic¬ ture-gallery, and manufactures lacquered wares, machinery, cloth, tobacco, beer, etc. Pop.

about 43,131.

SCHWIND, shvint, Moritz von, Austrian painter: b. Vienna, 21 Jan. 1804; d. Munich, 8 Feb. 1871. He was a pupil of the Vienna and Munich academies, and in 1832-34 decorated a room in the Konigsbau with encaustic pictures; in 1834-35 he undertook one of his greatest works, the painting of 60 compositions in water- color for Castle Hohenschwangau ; became a professor in the Munich Academy in 1847 ; in 1854-55 painted the frescoes in Wartburg, and in 1864-67 those in the Vienna Opera House. He was a member of the Berlin, Vienna, Paris and other academies, and was knighted in 1855. He is considered one of the foremost of modern painters and the best representative of German romanticism. He worked as well in fresco, oils or water-colors, and his compositions num¬ ber several hundreds.

SCHWYZ, shvits, Switzerland, capital of the canton of Schwyz, on the Gotthard Railroad, three miles northeast of the Lake of Lucerne. The interesting old town-hall contains the earliest trophies of the Swiss struggles for in¬ dependence. There are also a handsome church and several higher educational institutions. The chief industries are cotton-spinning and the manufacture of bricks. Fruit and cattle-rais¬ ing are extensively carried on in the neigh¬ borhood. Pop. about 9,000. Schwyz took such a conspicuous and leading part in the revolts against the house of Hapsburg that its name was applied to the whole of the Swiss Confederacy.

SCIACCA, shak'ka, Italy, a seaport town and bishop's see in Sicily, in the province of Girgenti, 30 miles northwest of Girgenti on a sloping hill. It is badly built; its principal buildings are the cathedral (11th century), some ancient castles, several convents and a techni¬ cal school and gymnasium. It is the Sicilian headquarters of Mediterranean coral fishing.

There are manufactures of bricks, pottery, bar¬ rels, baskets, olive oil and many persons are employed in fish-curing. Pop. about 27,000.

SCLffiNID.®, sl-en'i-de, a family of perco- morphous, spiny-rayed teleostomous fishes, somewhat resembling perches, in which the body is usually slightly compressed and elon¬ gated and covered with thin, slightly ctenoid scales. The head is scaly and its superficial bones are remarkable for the extensive de¬ velopment in them of passages for the mucous canals. The premaxillary bones are protractile and the chin is provided with pores and some¬ times a barbel. Jaw teeth are well developed but, beyond the formation of enlarged canines, are not differentiated, but large molar teeth may pave the pharyngeal bones. The fins are well developed, the soft dorsal long, the caudal usually rounded or truncate and the anal short and preceded by one or two spines, never more. With few exceptions the air-

bladder is large and of complicated structure ; and it is by forcing air through this organ that the peculiar grunting and rumbling sounds produced by these fishes are caused. Most of the species are marine and littoral, but a few are fresh-water. Most of them feed upon other fishes but some upon crustaceans and mollusks. The family is an extensive one of 30 genera and about 150 species widely distributed and especially nu¬ merous in warm seas, and most of them are good food-fishes, two species, the Maigre and the Bearde dumbrina, being particular favor¬ ites for the table. Nearly all of the genera and more than 100 species are recorded as occur¬ ring in North American waters, including some food-fishes of first-rate importance and several game-fish. There may be mentioned as be¬ longing here the weakfishes, drums, croakers, kingfish, spot and yellowtail.

SCIATICA, sl-at'i-ka, a painful neuritis of the sciatic nerve, which is the chief nerve of the back of the thigh and leg. It is character¬ ized by extreme pain, often excruciating and occurring in paroxysms, and increased by any change of temperature and moisture ; there is stiffness and generally swelling of the limb at the beginning of the disease, but after repeated attacks the limb seems to shrink, owing to the wasting of the muscles. In some cases the articulation of the hip seems affected, and per¬ manent immobility of the limb takes place. Mild attacks are often called neuralgia of the sciatic. In all cases very careful examination of the pelvis and the bones of the lower part of the spinal column should be made, and all causes for chronic poisoning sought for. It is a very chronic condition. See Neuralgia; Neuritis.

SCIDMORE, skid'm5r, Eliza Ruhamah,

American traveler and author : • b. Madison, Wis., 14 Oct. 1856. She became identified with the National Geographic Society at Washing¬ ton, D. C., in 1890, and later its corresponding and foreign secretary. Her published works include (Alaska: The Southern Coast and the Sitkan Archipelago) (1885) ; Jinrilcisha Days in Japan> (1890) ; (Guide to Alaska and the Northwest Coast (1890) ; (Westward to the Far East> ; (From East to West) ; (Java: the Garden of the East> (1897) ; (China, the Long- Lived Empire (1900); (Winter India) (1903); (As The Hague Ordains) (1907), etc.*

SCIENCE OF LANGUAGE. See Lan¬ guage, Science of.

SCIENCES, Classification of. The effort

to classify systematically the manifoldness of scientific achievements is a part of the method¬ ology of science, and thus ultimately a part of logic. It has attracted the philosophical think¬ ers from the days of Plato to the present time. It came to the foreground of logical thought especially at those epochs in which new scien¬ tific movements started. It was thus mostly much more than a mere dividing and subdi¬ viding of the already existing sciences. It was essentially an endeavor to open new perspec¬ tives and to show the way to new possibilities of development. The new ordering and group¬ ing of the parts of knowledge was thus always a symptom of great philosophical movements and an expression of deepest energies in pro¬ ductive ages. Only those periods whose scien¬ tific thought was lost in specialization without originality neglected the logical task of working out a survey of the whole field.

The principles of classification have changed frequently, and it would be almost artificial to seek a direct continuity in the successive ef¬ forts. Essentially psychological are those classi¬ fications with which both the classical philos¬ ophy and the modern philosophy answer the problem for the first time, inasmuch as both Plato and Bacon group human knowledge in relation to mental faculties. When the Platon- ists divided all knowledge into dialectics, physics and ethics, the three large parts cor¬ responded to the activity of the reason, to the sensory perception and, thirdly, the desires and impulses. Bacon, also, comes to a three-fold division of human learning, corresponding again to three mental regions. It is memory, imagina¬ tion and reason which are responsible for the subdivision of the ((intellectual globe.® The memory gives us history; imagination gives us poetry; and reason furnishes us with philos¬ ophy or the sciences. History is divided into Natural History, with its subdivisions of Nor¬ mal, Abnormal and Artificial Phenomena ; and Civil History, with its subdivisions of Politi¬ cal, Literary and Ecclesiastical History. Poetry is to be divided into Parabolic, Dramatic and Narrative. Philosophy, or the sciences, finally refer first to Man, secondly, to Nature, thirdly, to God. The Science of Man is subdivided into Civil Philosophy, with its departments of In¬ tercourse, Business and Government; and on the other side, Philosophy of Humanity, which refers either to the Body, with Medicine, Athlet¬ ics, etc., or to the Soul with Logic and Ethics. The Science of Nature is Speculative, and as such either Physics or Metaphysics; or it is Applied, and as such either Mechanics or Magic.

This classification of Bacon remained a classic model for more than a century. The French Encyclopaedists still stood completely under his influence, and d'Alembert substituted only art in general for poetry, thus continuing the intellectualistic attitude, according to which poetry and art are defined as technical means of communication and expression and thus as parts of the system of knowledge. Yet the onesidedness of every

psychological classifica¬ tion was always felt, especially because there is no knowledge which originates from one group of mental functions only. It thus seemed a natural antithesis to refer the sciences not

to their mental origin but to the mental pur¬ poses which are to be fulfilled by them. It can be said that such a reference to purpose controls the classification of Aristotle. He combines the Dialectics and Physics of the Platonists into the one group of Sciences with theoretical purpose. A second group is then formed by the Sciences which refer to practical ends of action. And the third group, finally, are the Sciences related to creative activity. The Theoretical Sciences are divided into Analytic, Metaphysics and Physics; the Prac¬ tical Sciences into Ethics and Politics; the Creative Sciences into Art and Technics. In a similar way, Locke, too, adjusts the divisions of knowledge to three groups of purposes. The first end of Knowledge is a theoretical under¬ standing; the second purpose is the good and the useful ; and the third is the development of Science in the interest of the understanding. He comes thus to the separation of Physics, Ethics and Logic, defining Logic as a nominal¬ istic science.

The progress of natural science, with its important efforts of classification in descrip¬ tive botany and zoology suggested in the mean¬ time more and more a classification of all knowledge with reference to the various groups of objects. Of course, in the subdivision such grouping with reference to the various things in the universe had always been acknowledged ; but complete systems of classification of this type were now worked out from various sides. Both the physicist Ampere and sociologist Bentham, for instance, start thus from the dif¬ ference of physical and mental phenomena, the one dividing all sciences into Cosmology and Noology, the other into Somatology and Pneu- matology. Their further classifications elab¬ orate a complex system in which partly theo¬ retical, partly practical, principles are influential. Their fundamental division corresponds in a certain way to the two large classes with which in our present time the unphilosophical efforts of popular science are usually satisfied. Popu¬ lar sciences prefer, indeed, to-day mostly to group all knowledge with reference to the ma¬ terial and, accordingly, to work with a classi¬ fication which begins with a separation of physi¬ cal and mental facts. The physical facts are then subdivided with reference to the differ¬ ent classes of objects and the mental facts of the individual and of society with regard to the different groups of mental interests.

Yet the classification, with reference to men¬ tal faculties, practical purposes or groups of material are not the only ones which have be¬ come influential in the development of thought. Even a naturalistic age could not overlook the fact that, after all, the different sciences do not really deal with different objects, but more often with different aspects of the same

object. Man himself, for instance, can play a role in a large variety of sciences which do not be¬ long together at all. These various aspects which interest the different sciences are, how¬ ever, not simply co-ordinated ; otherwise they would be unfit to constitute a systematic order. Comte recognized that they were dependent upon each other, and thus he created a system in which the fundamental sciences were con¬ ceived in one straight line of logical order. If each member of the series really demands the foregoing as its presupposition, it is a necessary

consequence to see with Comte in this logical order at the same time the historical order of the sciences. The latest and most complex group of knowledge is that which he called Sociology, which contains practically all the knowledge of history and civilization, all the mental and moral facts as far as they enter into a system of positive knowledge at all. But this whole social life presupposes the under¬ standing of man as an organism. The science of sociology is thus dependent upon the science of biology. But the biologist, again, tries to bring back his facts to the laws of chemistry, which he presupposes, and so forth. The one¬ dimensional system of Comte thus begins logi¬ cally with a most general type, with mathema¬ tics, and goes from that to astronomy, from that to physics, then to chemistry, then to biology and finally to sociology. Spencer's system is essentially an elaboration of Comte's. He, too, begins with the most abstract science, mathematics; progress is then to the abstract concrete sciences which deal with the general forces of the universe, mechanics, physics and chemistry for which mathematics is the pre¬ supposition, and thence to the concrete sciences which refer to single objects; that is, to astron¬ omy, geology and biology, while psychology and sociology become special parts of biology. The shortcomings of all these efforts are evi¬ dent as soon as we consider that such posi¬ tivistic systems crowd the totality of mental and moral sciences and all that refers to history and civilization under the conception of sociol¬ ogy. That means, of course, a strictly natural¬ istic aspect of the history of culture. All that the inner civilization of mankind has produced, politics and law, literature and art, knowledge and religion and philosophy, become then noth¬ ing but functions of the biological organism ; and yet everyone who takes the standpoint of the historian or jurist, of the philosopher or theologian, feels the artificiality of such a naturalistic standpoint for these disciplines. The principle of grouping the sciences with reference to their logical relation is, however, in itself, of course, not responsible for this artificiality and for this unfairness to the his¬ torical and cultural disciplines. It was the ma¬ terialistic metaphysics of those positivistic sys¬ tems which brought about this overweight of natural

science. On idealistic ground the refer¬ ence to logical relations yielded accordingly a system of very different type. In Hegel's philo¬ sophical system, for instance, the sciences are brought, too, into logical relations with fullest justice to the demands of the moral sciences.

But while the Hegelian system has lost its influence in our day through its speculative character, our time is, in its deeper thought, strongly influenced by a newer movement which again brings order into the intellectual globe by insisting on logical differences which had been neglected too long a time. This move¬ ment, starting with Windelband, considers as the more essential difference between the vari¬ ous special sciences whether the logical aim is to find laws or to understand the individual ob¬ jects. When Spencer separates those more abstract sciences of the physical and chemical energies from the sciences of the concrete in¬ dividual object, it is a matter of course for him that these sciences of individual objects have to overcome the concrete individuality and have

to find general laws which hold for all the con¬ crete objects of that special group. This newer school, on the other hand, insists that there are sciences which on principle do not want to find laws and are not interested in gen¬ eralities, but seek to understand and to inter¬ pret the concrete objects just in their individual¬ ity. All the historical sciences then belong to this group as against the natural sciences wdiich seek the abstract laws. It is evident that this division has again nothing to do with the separation of the different kinds of objects, as any kind of material may be considered from both standpoints. Any process may be on the one side considered as a special case of a general law, interesting thus only in so far as it allows the recognition of any law in it, and, on the other hand, it may be considered in its incommensurable individuality. As a mat¬ ter of course from such a logical standpoint mental life, too, allows both ways of considera¬ tion, and enters thus on the one side, into the law-seeking naturalistic sciences, on the other side, into the historical sciences which seek the unique individuality. Psychology would be the natural science of the mental phenomena.

It can be said that these various motives which have alternated in the classification of science are all still influential to-day, partly as after effects of historical movements like those of Comte and Spencer or Fichte and Hegel, partly as results of conditions which ever again repeat themselves. Especially the different emphasis on different sciences must lead always anew to different methods of grouping. The philosopher, _ the physicist, the historian, the psychologist insist instinctively on different schemes of classification, the one perhaps influenced by the manifoldness of ma¬ terial, the other by the manifoldness of method or by the variety of purpose ; the one anxious to draw sharp demarcation lines between the different

fields and thus taking care for an exact logical relation, the other much more anxious to express and to favor in his system the manifoldness of interrelation between the various parts of human knowledge and science. It is thus hardly possible to sketch a classifi¬ cation of sciences which would find general agreement and which would be in principle independent of a particular philosophical stand¬ point. Yet it may be possible to characterize at least certain chief tendencies which can be recognized in the scientific life of our time and which express themselves in the practical di¬ vision of scientific labor, for instance, in the organization of the higher institutions of learn¬ ing.

The largest division of knowledge may be that which separates the Theoretical Sciences and the Practical Sciences. It cannot be de¬ nied that even this separation offers logical problems. On the one side it has been said that the so-called Practical Sciences, for in¬ stance, those of the engineer or of the physi¬ cian, of the lawyer or of the minister, of the diplomat or of the teacher, are after all theo¬ retical as far as their really scientific content is concerned, while that element in them which makes them practical is an art and not knowl¬ edge. The skill in diagnosing disease or teach¬ ing pedagogically, or presenting legal argu¬ ment, can be imparted by training but cannot be communicated in judgments, while every

science must he a system of judgments. The juristic ot theological or technological science, on the other side, seems just as theoretical as history or mathematics. While in this way the knowledge element of the practical sciences would go over into the sphere of the Theo¬ retical Sciences, others have taken the opposite view and have claimed that there is no knowl¬ edge but practical knowledge. It is a philo¬ sophic doctrine which became popular partly in the sphere of biological thinkers, partly among radical empiricists. They all agree that knowl¬ edge is a function of the human organisms which became developed through the practical needs of life. Every science, including all the so-called theoretical ones, thus exist only by their fulfilling certain practical needs of men.

But even if we accept the arguments on both sides, that fundamental division of Theoretical and Practical Science remains justified. The question whether all knowledge serves ulti¬ mately practical ends and has its meaning in this relation to practical purposes is an epis¬ temological one ; the separation between theo¬ retical and practical sciences, for instance, be¬ tween physics and engineering, between biology and medicine, is a

methodological one. The arguments thus move on different levels. In a philosophical sense every science may be practi¬ cal ; in a logical sense astronomy is strictly theoretical, while the science of bridge-building is not. It is again such logical argument by which we must reject the opinion that all Prac¬ tical Sciences are ultimately theoretical. Of course, if we were to call theoretical every group of propositions which can be communi¬ cated and learned, the science of bridge-building would be just as theoretical as geometry. But the logician has the duty to discriminate be¬ tween these sciences which consider the facts as such without any relation to our own prac¬ tical purposes and those other sciences in which the whole grouping of facts, the sifting and combining of the material, is controlled by a practical human end. Medical science is cer¬ tainly made up of statements which would find their place in a complete theoretical system of the physical world. But in such a concrete description of the processes in the universe the pathological variations of the human organism would play a most insignificant role, and a knowledge of the chemical substances which bring harmony again into the organism would be accidental. In the Practical Science of med¬ icine such curing of the diseases becomes a centre of the thought system, and the selection of theoretical facts which are to enter into this science is completely determined by this prac¬ tical end.

It is thus not even sufficient to characterize the Practical Sciences as applied sciences. The latter expression suggests that the logical dif¬ ference between the theoretical and practical disciplines is given merely by the fact that the one considers a certain relation theoretically and the other teaches how to apply it. Every Practical Science would thus correspond exactly to a special theoretical science. But the relation is a much more complex one, inasmuch as the Practical Science cannot logically be character¬ ized by the relation to the theoretical starting point, but only by the relation to the practical end. The one end may demand the co-operation of a dozen sciences and one Theoretical Science

may enter as a means into a dozen different Practical Sciences. We have to acknowledge thus for the Practical Sciences a unique and independent logical structure and the system of practical sciences would demand subdivisions which would not correspond at all to the sub¬ divisions of theoretical knowledge. The chief human ends and aims would have to determine the grouping of these practical disciplines. We might separate thus, firstly, the Utilitarian Sci¬ ences ; secondly, the Sciences of Social Regu¬ lation ; and thirdly, the Sciences of Social Cul¬ ture. In the Utilitarian Sciences the practical aim refers to the world of things ; it may be the technical mastery of nature, or the treat¬ ment of the body, or the production, distribu¬ tion and consumption of the means of support. Here belong, therefore, also the disciplines which are studied in the institutes of

technology and in the medical schools, in the agricultural institutions, and so on. The Sciences of Social Regulation serve those aims which refer to the mutual relations of subjects; they deal with the political, legal and social problems. The Sciences of Social Culture, finally, refer to those aims in which not the individual relations to things or to other subjects are in the fore¬ ground, but the purposes of the development of the subjects themselves; education, art and religion here find their place.

On the other side we find, then, the universe of Theoretical Knowledge as it is studied in the collegiate departments and graduate schools of the universities. Inasmuch as the pure theo¬ retical knowledge for Knowledge's sake made up the original meaning of the word Philos¬ ophy, the whole of it might be called Philosoph¬ ical Sciences in the widest sense of the word. This tradition is still alive, for instance, in the German universities, where all Theoretical Sci¬ ences are classed together in the Philosophical . Faculty as against the Faculties of Law, Medi- cine and Divinity; and in a corresponding way the American universities confer the Ph.D., that is, doctor of philosophy, on the student of mathematics or history, of languages or natural sciences. In the historical development of sci¬ entific work this unity of theoretical knowledge has been replaced by the most complex mani¬ foldness of scholarly endeavors. One part of theoretical knowledge after the other was dis¬ missed from philosophy as soon as it reached a certain independent importance, and yet phi¬ losophy in the narrower sense of the word re¬ mained in its traditional role of furnishing a theoretical view of the world. It was no longer identical with the totality of knowledge, but it – fulfils the same purpose by bringing unity into the manifoldness of scattered special sciences, in examining their fundamental conceptions, their relative values, their methods and the position of the whole of knowledge in the sys¬ tem of human purposes. We can divide, thus, the totality of Theoretical Sciences from the first into the special sciences on the one side and the unifying philosophy on the other.*

If we abstract from philosophy, we have thus to subdivide further the specialistic sciences. It would be certainly unfair to the actual tendencies of the scientific life of our day if we accepted the scheme which was more or less modeled after the old positivistic sam¬ ples. The work which our modern historians are doing, the work of the students of litera-

hire and language, of art and religion, is not done in the spirit of those who saw in it only special applications of natural laws and thus a sociological department of biology. However widely opinions may diverge as to the logic

of historical thinking, the whole scientific work of our time is decidedly aware of a fundamental difference between the naturalistic and the his¬ torical attitude toward the world. We should thus have to divide the non-philosophical theo¬ retical sciences into naturalistic and historical sciences. The historical sciences which aim toward a connected view of the one develop¬ ment of our human civilization might then be subdivided into political history, history of art, history of religion, history of language, history of economics, and so on.

*The natural sciences, on the other hand, which start from the single objects only to find the general laws might well be subdivided with reference to their mutual dependence. We have, then, in mechanics the science of the most general relations of natural objects; and if me¬ chanics represents the top of this pyramid of special sciences, the lower level would be rep¬ resented by physics and chemistry and the broad basis by astronomy, geology, mineralogy, bot¬ any, zoology, anthropology. There would re¬ main uncertain the position of mathematics. In some and very important respects mathe¬ matics is a science which studies the formal relations of the natural objects and might thus well be grouped with mechanics. But at the same time mathematics has its fundamental re¬ lations to logic and thus to philosophy. The elements of mathematical knowledge are not found, like the physical things, but are created by human thoughts and their relations are valid for the universe because we cannot think the universe otherwise than through the categories .of our thought. It must depend upon the em- *phasis which we lay on the one or the other side of the mathematical science whether we group it with philosophy or with the natural sciences.*

We have further to acknowledge that the totality of sciences which are naturalistic in their logical structure cannot be grouped to¬ gether into that one pyramid whose top is mechanics, because we have so far neglected the psychological sciences. Their general constitu¬ tion corresponds indeed completely to the natural sciences and is thus also sharply to be separated from the historical sciences; but their material cannot be brought under the category of mechanical movement. The mental phe¬ nomena are certainly related to the physical brain process, but the meaning of psychology is destroyed if physiological processes are really substituted for mental facts. We have thus to consider the sciences of mental life as a special group of naturalistic sciences. The top of their pyramid would be general psychology, and its basis the special sociological sciences. While psychology is thus independent and not at all merely a part of biology, we have to acknowl¬ edge it as a special science and thus to keep it separated from philosophy. That does not deny that by many traditional ties psychology is still nearly related to philosophy and it will remain so, inasmuch as its special work is more than that of other sciences dependent upon a critical philosophical

examination of its funda¬ mental conceptions.

Bibliography. — Bacon, (De Augmentis Scientiaram) ; D'Alembert, Encyclopedic, Dis¬ cours preliminaire) ; Comte, A., (Cours de Philosophic Positive; Spencer, (The Classifica¬ tion of the Sciences * ; Sedgwick, W. T., (A Short History of Science) (New York 1916) ; Wuedt, (Uber die Einteilung der Wissenschaf- ten) ; Congress of Arts and Science, Universal Exposition, Saint Louis 1904 (Vol. I).*

Hugo Munsterberg,

Late Professor of Psychology, Harvard Uni¬ versity.

SCIENCES, National Academy of, an as¬ sociation incorporated by act of Congress, 3 March 1863, the object of which is to investi¬ gate, examine, experiment and report upon any subject of science or art whenever called upon by any department of government; the actual expense of such investigations to be paid from appropriations which may be made for the purpose. The Academy holds a stated session each year at Washington, D. C., in April and another in autumn at such places as may be determined. In 1918 there were 135 active members and foreign associates, comprising in¬ vestigators in every department of science. Headquarters in Smithsonian Institution, Wash¬ ington, D. C. A national research council is connected with the Academy.

SCIENCES, Normative. Normative sci¬ ences are systems of propositions whose con¬ tents are not facts, but norms ; not experiences but values, and whose teaching is, therefore, not that something is, but that something ought to be. There is thus a possible place for logic, ethics and aesthetics, for philosophy of law and religion. Yet it would be meaningless to apply the term, normative sciences, to every kind of logic, ethics and aesthetics. The term has gained its characteristic importance in immediate rela¬ tion to certain definite philosophical presupposi¬ tions. The conception of norm is intended to mean more than an empirical prescription, more than a social agreement which binds the individual through merely social inducements, and also more than a merely biological neces¬ sity. A large variety of so-called philosophical enterprises has been at all times and is to-day satisfied with just such sociological or anthro¬ pological doctrines of ethical, aesthetic and logical functions. There is indeed no logical difficulty in building up a system of ethics, for instance, which describes and explains how at different times and with different peoples dif¬ ferent groups of actions became enforced through the organs of society. Biological so¬ ciology can easily show that a social organism can exist only when certain rules of behavior secure a social harmony. From the standpoint of such empirical philosophy, the moral con¬ science becomes an emotion which is

artificially trained by the suggestions of education and the norm of action has no more value than any legal statute which is voted by a majority and reinforced by threatening the violators with punishment. From the same standpoint aesthet¬ ics describes and explains the various tastes which have been developed in the history of civilization by the silent agreement of the richest minds, their norms shading off into the changing prescriptions of fashion. Finally, in a similar way, logic becomes a description and explanation of those ways of thought which a

certain period accepts as leading to such propo¬ sitions as a particular society calls its truth.

In all these cases it is not meaningless to speak of an ought. Anyone who wants to agree with the demands of the community stands under a certain obligation to act, to feel and to think in the prescribed way. He must subor¬ dinate his particular wishes to the general trend, otherwise he will appear immoral or tasteless or erratic. On the other hand it is evident that the so-called norms cannot claim any other au¬ thority than as being the expression of the will of a number of individuals and as offering a certain appropriateness for the development of the social organism. Such sociological systems would themselves repudiate every idea of an absolute value for the ethical, aesthetic and log¬ ical norms; the impossibility of such a claim would seem to them sufficiently proved by the fact that one nation or one period prescribes to the conscience actions which are forbidden at another time or by another nation. In the same way the history of art shows how the aesthetic standards were changing all the time, and the history of science demonstrates how the scientific theories were always only the expres¬ sions of certain tendencies, superseded con¬ stantly by new ideas. It would thus appear ab¬ surd to claim an eternal value for the norms of behavior, of art and of science which chance to be influential with us to-day.

Those who believe in ((Normative Sciences® do not contest the facts which are gathered in such sociological disciplines, and they do not underestimate their value. But they see in all such empirical accounts only contributions to the history of civilization and they believe that the conception of norms can be taken in a deeper sense, independent of the advanced pre¬ scriptions of a social organization. Norm means to them an absolute obligation, and only the consequences of the absolute values con¬ stitute for them a true Logic, Ethics and Esthetics. Those sociological doctrines then become merely empirical introductions to the true philosophical

discipline of valuable acting, feeling and thinking. The norm is then sharply to be separated from anything which in prin¬ ciple changes like fashions and tastes or legal statutes. The norm is that which is absolutely valuable without any reference to any individual or to any social group of individuals, indepen¬ dent alike of the chance obedience which indi¬ viduals offer to it and of the effects which may result from its application. That two times two is four is a truth which is eternally valuable; that is, which remains valid without any refer¬ ence to the question whether we understand it or not. No one may think it truth, but every¬ one who wants to think, ought to think so, if he is to be acknowledged at all times as a logical subject. It is of course meaningless to ask for the reasons or for the causes of such an absolute value. It is the ultimate foothold for our thought. Whatever we might offer as an explanation would have meaning only if we again called it a truth, and if we had to give account of what we mean by that, it could again be only the acknowledgment that it is that thought which we ought to think. It is a thought which we think without reference to our personal interests and without reference to any social demands but simply because we ac- VOL. 24—27

knowledge an absolute duty to prefer this thought to its opposite.

Of course, there remains the possible objec¬ tion that we can live our life without respecting such absolute duty; that we can think, for in¬ stance, without claiming more than relative value for our thoughts. We should thus be satisfied with the conviction that whatever we call truth may be found untrue by a future generation. But the philosophers of the nor¬ mative sciences answer that this is an impossible standpoint. A knowledge which is not anchored in any absolute truth contradicts itself. If, for instance, the skeptical sociologist insists that there is no absolute truth, this at least is a judgment which he affirms with the conviction and with the understanding that it is itself a truth of absolute character, otherwise its mean¬ ing were lost. A consistent relativism, in short, destroys itself in the field of thought, and the acknowledgment of absolute norms is thus the indispensable presupposition for logic. A particular thought or a particular theory may, • of course, be superseded, but the duty to think consistently and in accordance with logical axioms cannot be touched by the changes of civilization.

The same holds true for morality. The particular rules may change, but the meaning of morality is lost if we do not give absolute value to the fulfilment of duty. It depends upon chance conditions, which contents become the duty of the man ; but he is to do what his duty prescribes independent of his personal desires, ready to sacrifice himself for that which he acknowledges as his duty; that is a norm of absolute value. The normative ethics, just as the normative logic, thus are formal disci¬ plines. But just

their independence of any spe¬ cial content makes those logical and moral forms eternally valid. The same repeats itself finally in the field of art and religion where again the absolute form may be filled with the varying content which the history of civilization offers, but where the form alone gives eternal meaning to the ought which is involved.

Hugo Munsterberg.

SCIENTIFIC MANAGEMENT. Defini¬ tion. — The term scientific management char¬ acterizes that form of organization and pro¬ cedure in purposive collective effort which rests on principles or laws derived by the proc¬ ess of scientific investigation, experiment and analysis, instead of on tradition or on policies determined empirically and casually by the process of trial and error. The principal phases of scientific management are: (1) Exhaustive investigation of the elements usable in collec¬ tive effort — manual and machine processes, materials, tools and equipment, physical and psychological operating conditions — and their reactions in all possible relations, in order to determine the combination which for any specific purpose is most economical in technical energy — human and material; the formulation of the results of such investigation in principles and laws, and the establishment on the basis of such principles and laws of standards of pro¬ cedure and result ; (2) the development and maintenance of such precise and automatic co¬ ordination and control of the collective effort as to accomplish, in accordance with the estab¬ lished standards of procedure and result, with

economy of energy and time, any purpose of the collective effort; (3) organization of the personnel, processes, materials and equipment in such functional co-operative relations as to bring to bear in the collective effort the highest available and developable technical skill in planning, supervision and execution.

A clear understanding of scientific manage¬ ment requires that management be not confused with administration. Management characterizes the organization and procedure through which collective effort is effected; administration char¬ acterizes those considerations and decisions which establish the purposes which create the need for management and those broad, govern¬ ing policies under which the management pro¬ ceeds. Whether a railroad shall expend capital in further development of a main line for better service or in the acquisition of feeders for larger traffic, whether a manufacturer shall dis¬ tribute through the

established trade channels . or through branches and stores established by himself, whether a department store shall sell trade mark merchandise or private brand merchandise, whether any institution shall operate in an extensive or a restricted area, serve a particular class of the public, estab¬ lish an open or closed shop or admit its workers to some sort of participation in administration and management, are administrative problems. These problems once settled and policies relat¬ ing thereto determined by the administrative authority (which may overlap or even coincide with the management authority), managerial problems arise concerned with establishing an organization and procedure, and the conduct of such procedure, to carry out the adminis¬ trative policies. This distinction between ad¬ ministration and management clearly in mind, it may be understood that administration is largely a process of forming judgments, may have serious social, political and other moral aspects, must be largely empirical and can utilize in but a limited way principles and laws determined by the scientific method of investi¬ gation ; whereas management on the other hand is concerned with the relations and reactions of particular forms of organization, routine, materials, equipment and physical and psychical conditions, may proceed upon principles deter¬ mined by the scientific method of investigation and is more or less mechanistic in its nature. It may be understood also how, through absence of a clear comprehension of the difference between administration and management, and through a failure to distinguish between the nature and technical efficiency of scientific management per se and the administrative problems (social, political and otherwise moral) arising from its use, confusion and controversy have appeared in the public's attempt to appraise scientific management.

Early History: The System. — In 1878 Frederick Winslow Taylor (1856-1915) entered the employ of the Midvale Steel Company as a laborer who had served his aporenticeship as pattern-maker and machinist. He became suc¬ cessively time clerk, lathe gang boss, assistant foreman, master mechanic of repairs and main¬ tenance, chief draftsman, and in 1884, at the age of 28, chief engineer. From the beginning Per°d he was in continual struggle with the workmen to increase output, which he*

knew from his experience as a workman was extremely low. There developed the anomalous situation, not infrequent in industry of that day, of agreeable personal relations between foreman and individual workmen accompanied by a bitter struggle concerning output between foreman and the workers as a group. Taylor, as foreman, attempted to apply the then cus¬ tomary foremen's method of suasion and force with the usual result of increasing the bitter¬ ness of the struggle. Concluding that he could master the situation only by knowing more than the most skilled workman about the technique of production in the shop, and about what a skilled workman

should do, he applied his in¬ vestigative and inventive mind (he came sub¬ sequently to hold over 100 patents) to the problem and began two lines of experiments which he pursued through many years with great thoroughness and at great expense. One related to the machine, the tool and the material (metal cutting), and the other to the workman's method of handling the machine, the tool and the material (time and motion study). The former line of experiments, continued later at the Bethlehem Steel Company, led to the dis¬ covery of high-speed steel, and revolutionized the art of metal cutting (transactions Ameri¬ can Society of Mechanical Engineers, XXVIII, 21, 1906) ; the latter line of experiments greatly broadened led to the development of a co-ordinated system of shop management and ultimately, as an interpretation of that system, to the formulation of the philosophy of manage¬ ment which came to be known as scientific management. The logical and approximately the chronological steps of the development of the system of management, essential to an understanding of the principles which came to be formulated, were: (1) Experiments leading to dependable knowledge of how long a partic¬ ular machine operated, or a particular manual process performed, by a skilled workman would require to accomplish any specified result, with a given material, according to a specified most effective method of operation, and under specified working conditions. This knowledge, obtained principally by stop-watch studies of unit-time performances, permitted the setting of practicable _ standards per man-hour or machine-hour higher than the average of cur¬ rent^ performance ; (2) the establishment of a routine of preparation and direction which would ensure maintenance of the conditions under which the standards were set, which led to the working out of such mechanisms as routing, order of work, instruction cards, pur¬ chasing materials according to specifications, central stores and controlled conditioning and delivery of materials and tools; (3) the selec¬ tion and assignment of personnel to machines or operations on the basis of skill and the further development of skill in workers ; and (4) the establishment of specialized skilled supervision of workmen to ensure maintenance of conditions and to provide instruction. These objects (3 and 4) were accomplished by func¬ tionalized foremanship, a gang boss having general supervision of the order of work in the shop, a speed boss supervising the setting up of the machine and an inspector inspecting the product both at the beginning and at the com¬ pletion of a job. (5) The constant and current*

checking of progress against standards by cost accounting, the data for which was derived from the operating papers; and (6) of far- reaching importance in its ultimate influence on the managerial attitude of mind, the

substitution in place of the conventional ((foremen's persua¬ sion® in securing performance by workers, of voluntary application on the part of the latter through the incentive of a higher wage made possible by the increased productivity. During the years 1891-1900 these gradually developed devices became co-ordinated into a smoothly- working system, in which those supervisors whose duties required personal contact with workers remained in the shop, while those whose duties were in the nature of planning, preparation and control through ((papers® were brought together in an office called the plan¬ ning room,® adjoining the shop.

Later History: the Principles. — The inter¬ pretation of this system of management in terms of principles of management seems to have been inspired by Taylor's contacts in the American Society of Mechanical Engineers, which he joined in 1886. In that year, Henry R. Towne presented to the society the paper ((The Engineer as an Economist® (Transac¬ tions American Society of Mechanical Engi¬ neers VII, 425-32, 1886), significant because first directing attention to management as some¬ thing other than the expression of executive ability, in the assertion that to ensure good management there must be joined to executive ability <(a practical knowledge of how to ob¬ serve, record, analyze and compare essential facts in relation to wages, supplies, expense ac¬ counts, and all else that enters into or affects the economy of production and the cost of the product.® During the 10 years following the presentation of that paper other papers, relating principally to a particular phase of the manage¬ ment problem — methods of wage payment, were presented and discussed in the Society. Taylor's (XVI, 856-903, 1895) is the most notable among these in that he therein described the general system of management which he had developed, arguing that it embodied managerial principles which must be the basis of any sound system of wage payment involving premiums or other differential reward. The title and emphasis of this paper centred attention on his differential piece-rate and not, to his disappointment, on the management principles implied. Therefore, in 1903 he again appeared before the society with the paper "Shop Management® (transac¬ tions American Society of Mechanical Engi¬ neers, XXIV, 1337), in which he attempted to direct attention from his piece-rate system to what he called a philosophy of management. The body of this philosophy, as presented by him, was essentially the following principles:*

(1) The objective of good management is the combination of high wages and low unit costs;

(2) this objective can be achieved only by the application of strictly scientific methods of research and experiment to the study of the detail problems of management, and (3) the establishment thereby of laws or principles which may be expressed in standards of pro¬ cedure which give

control of operation; (4) the scientific selection of workmen, materials and processes and the establishment of work¬

ing conditions to meet the requirements of the standards; (5) the scientific training of the workmen to improve the application of their skill in accordance with the standards; and (6) the establishment of such intimate and friendly co-operation between management and workers as to ensure a stability of the psychological environment of the shop which would make possible the application of all the principles above enumerated and the utilization of the mechanisms necessary to give them effect. It should be observed that a systematic and com¬ plete formulation of the principles of scientific management was not for Taylor or his genera¬ tion.

Recent History: since the Eastern Rate Case. — Again Taylor's audience in the Amer¬ ican Society of Mechanical Engineers failed to appreciate the significance of his contribution. Interest of the members of that society and of the . public in general was attracted, not by these serious, scientific papers and discussions, but by sensational testimony concerning the results of scientific management in the shops in which it had been developed, given at a hear¬ ing before the Interstate Commerce Commission in 1911, involving consideration of the effi¬ ciency of the railroads (Interstate Commerce Commission reports, XX, 243), and at an inv- vestigation in the same year by a special commit¬ tee of the House of Representatives appointed to investigate, on a petition of organized labor, the effects of Taylor methods at Watertown Arsenal. It was at these hearings and in the title of a book which Taylor published at this time (Principles of Scientific Management, 1911) that the term ((scientific management® was first used. From that time on public interest in scientific management was intense and sus¬ tained, and discussion of it continuous and oc¬ casionally acrimonious, although not always dis¬ criminating. Interest and discussion was not confined to the United States, and foreign de¬ mand caused the translation of Taylor's papers into French, German, Italian, Japanese, Dutch, Russian and Lettish.*

This sudden intensification of interest in scientific management may be accounted for by the fact that in 1911 the industrial community was prepared for such a body of logical and practical management principles manifested in a comprehensive system of management mechan¬ isms. There had been for a decade a growing general interest in betterment of management. This general interest had yielded improved management devices such as cost accounting and "systems® of control through ((forms® which made more precise but did not modify to any great extent existing practice. It had inspired an increasing volume of books and articles concerning special problems of manage¬ ment and descriptive of industrial organizations and procedures which represented the best in existing

practice. It had led to books and articles of an exhortatory nature and of stimu¬ lating influence which gave a touch of idealism to the consideration of management problems (Harrington Emerson, Efficiency as a Basis for Operation and Wages, 1909; (Twelve Principles of Efficiency,* 1910). But it was not until the Eastern Rate Case of 1911 that interest became widespread and intense. The testimony concerning the accomplishments of scientific management in decreased unit costs and in-*

creased profits combined with higher wages appealed to the primary motive of industrial activity; the completeness and coherence of Taylor's system and of the principles which it expressed appealed to the intellect of the serious student of management problems; and the very term ˆscientific management® appealed to the imagination of everyone. The public mind and discussion at once seized upon the term and gave it a generalized application almost as broad as had been represented by the term ˆefficiency.® For that reason students of management must exercise discrimination in distinguishing be¬ tween the definite, historical meaning and the popular, generalized meaning of the term, and between real, partial and in some instances al¬ leged cases of the application of the principles.

Results. — The results of the development of scientific management in industrial plants have not been adequately summarized and pre¬ sented. Management engineers have been .con¬ servative, as a matter of professional ethics, in disclosing results of work in the plants of their clients. Many investigations by others have been vitiated by one of two attend¬ ing circumstances ; either the investigator has been biased in a desire to find con¬ troversial evidence or'by a preconceived philoso¬ phy of industrial relations; or he has failed to inform himself concerning the history and nature of scientific management, and has been led to investigate plants reputed to have, but really not having, scientific management. The most reliable and complete evidence of results is to be found in the records of the hearings be¬ fore the Interstate Commerce Commission and of the special committee of the House of Rep¬ resentatives, referred to above, veritable mines of information, and the most satisfactory sum¬ maries in articles by C. Bertrand Thompson (<(The Theory and Practice of Scientific Management,® Ch. Ill) and Henry H. Farquhar (in Quarterly Journal of Economics, XXXIII, 466) ; in Brandeis' Scientific Management and Railroads) (1917), a published part of a brief submitted to the Interstate Commerce Commis¬ sion, and in the reports of the Chief of Ord¬ nance, United States of America, 1911, 1912 and 1913. It is the concurring testimony of these several investigations that

scientific manage¬ ment reduces unit costs and increases wages and profits, in many instances simultaneously with reduction in selling prices, and that in¬ dustrial relations with the workers immediately concerned are improved.

Labor and Scientific Management. — An almost incomprehensible phase of the history of the scientific management movement is the existence, side by side, of improved industrial relations in those plants in which scientific management has been developed and strong op¬ position on the part of the management of the American Federation of Labor. The opposition of the management of organized labor seems to have been inspired by fear of the impairment of a fundamental element of their strategy (that their organization must be increased in membership and held intact, for the accom¬ plishment of their larger objectives) by one of the least important mechanisms of scientific management, the differential wage system. In¬ spired by this fear, and taking advantage of certain opinions held by workers (such as the opinion that increased output will cause unem¬

ployment) and certain infelicities ot speecn and illustration on the part of expounders of scien¬ tific management (such as the famous Schmidt case), and presenting statements concerning the actual operation of scientific management not based on critical investigation and not conform¬ ing to facts (that workmen are speeded up and worn out, that time-studies are secret, that rates are cut, etc.) the management of organized labor undertook a campaign of education of its mem¬ bership which resulted in an almost solid oppo¬ sition by the rank and file as well as the officers of organized labor to scientific management. In public discussion, to the opposition of organ¬ ized labor was added the opposition of many social scientists who, without information de¬ rived from either experience or investigation, asserted that scientific management would make impossible the achievement of any ideal of in¬ dustrial democracy. Throughout all this con¬ troversy the natural confusion of polemical discussion was worse confounded by absence of critical investigation of facts, inadequate in¬ formation, and particularly by a failure to dis¬ tinguish in the discussion of scientific manage¬ ment as a social problem, between management and administration. In this controversy the arguments against scientific management as a system of management technique were in¬ effective because not supported by the facts ; on the other hand the arguments against scientific management with respect to its social implica¬ tions were significant and of influence, but they were really arguments concerning administra¬ tive policy governing the use of management technique, and not more pertinent to scientific than to any other form of management. Super¬ ficial critics failed to perceive the point that the effective working of the scientific manage¬ ment mechanisms in particular depends so vitally upon sympathetic co-operation between planner, supervisor and operator,

that anti¬ social administrative policy is inconsistent with its development and technical effectiveness.

Influence of the War. — The status of scientific management has been profoundly in¬ fluenced by the war. Three influences are note¬ worthy: (1) Although the prejudice of workers engendered by the sharp controversy preceding the war has not disappeared, open and active hostility of labor has been discontinued and apparently will not be resumed ; (2) the de¬ mand for output during the war, supported by labor, compelled a wider extension of efficient production methods, in some instances of the methods of scientific management, not only in the United States but also in Europe, and both labor and management have learned by experience that scientific management technique is not inconsistent with wise, humane and co¬ operative administrative policies; (3) labor and management have observed that during and following the war managers of scientific management plants and scientific management engineers have been in the van of those inspir¬ ing and directing the establishment of the most humane and co-operative administrative policies, in accordance with the most farsighted princi¬ ples of industrial relationship. War seems to have cleared away prejudice and misunderstand¬ ing and to have made possible an appreciation of the value of scientific management as an instrument for the increase of the productivity of human effort under wise administration.

*Bibliography. — Babcock, (Taylor Principles in Franklin Management- * (New York 1918) ; Merrick, (Time Studies as a Basis for Rate Setting* (New York 1919) ; Parkhurst, (Ap- plied Methods of Scientific Management* (New York 1912) ; Taylor, (The Principles of Scien¬ tific Management* (New York 1913) ; id., (Shop Management* (New York 1911) ; id., (The Art of Cutting Metal* (New York 1906) ; Thomp¬ son, (Scientific Management* (Cambridge, Mass., 1914) ; id., (The Theory and Practice of Scientific Management* (Boston 1917); Bulle¬ tin of the Taylor Society (New York) ; In¬ dustrial Management (New York).*

Harlow S. Person,

Managing Director Taylor Society, New York City.

SCIENTIFIC SOCIETIES, organizations of scientists for the furthering of scientific study. They are largely devoted to the fur¬ thering of research work and the publishing of scientific journals, memoirs, etc.; and their conventions, which in the case of the larger societies are usually held in

different large cities, promote discussion and intercourse among scientific students. The most important of the older scientific societies of foreign nations are the Royal Society ot London (founded 1660), the Royal Institution of Great Britain (1799), the French Academy of Sciences (1666), the Imperial Academy of Sciences, Russian (1725), and the Royal Academy of Sciences of Ger¬ many (1700), of Sweden (1739) and of Den¬ mark (1743).

The American national societies include the American Philosophical Society, founded 1743, the American Academy of Arts and Sciences (1780), the American Association for the Ad¬ vancement of Science (1848), and the National Academy of Sciences (1863). In addition there are local academies or scientific societies in many States and cities. These often have a museum and scientific library, and hold meetings for scientific discussion. The oldest of these is the Connecticut Academy of Arts and Sciences at New Haven, founded in 1799; the Maryland Academy of Sciences dates from 1819; the Cali¬ fornia Academy of Sciences, in San Francisco, from 1853. So many have since been estab¬ lished that it is impossible here to catalogue them. In all of the States there are academies that hold winter meetings, with programs covering the different sciences. Among the prominent city institutions are the New York Academy of Sciences, founded 1817, the New York Scientific Alliance, the Philadelphia Academy of Natural Sciences, the Boston Scientific Society, the Boston Society of Natural History and the Chicago Academy of Sciences. Other cities having scientific academies or so¬ cieties are Salem, Worcester, Gloucester and Williamstown, Mass. ; Portland and Augusta, Me. ; Hanover and Keene, N. H. ; Brattle- boro, Vt. ; Providence, R. I. ; Hartford, Meri¬ den, New Britain, Middletown and Bristol, Conn.; Albany, Buffalo, Rochester, Binghamton and Poughkeepsie, N. Y. ; Reading and Media, Pa.; Wilmington, Del. ; New Orleans, La. ; Saint Augustine, Fla. ; University, Ala. ; Chapel Hill, N. C., Detroit, Mich., Saint Louis, Mo. ; Brook- ville and Terre Haute, Ind. ; Elgin, Peoria and Princeton, Ill. ; Davenport and Muscatine, Iowa; Saint Paul, Minn., and Topeka, Kan.;

Santiago and Santa Barbara, Cal., and Tacoma, Wash. In addition, there are various institutes that, are really the home of many scientific so¬ cieties. See Smithsonian Institution ; Car¬ negie Institution of Washington ; Brooklyn Education, etc.

The work of these general societies has suf¬ fered from the specialization which the growth of modern science requires ; the American Asso¬ ciation for the Advancement of Science, the New York Academy of Science, and others of the larger organizations have met this require¬ ment by a subdivision into sections for the dif¬ ferent sciences. The specialization, however, has been favorable to the establishment of local and national

societies devoted to single sciences and the various technical branches. All the lead¬ ing sciences have national organizations in the United States ; among such are the American Chemical Society (1876), the American Ento¬ mological Society (1859), the American Mathe¬ matical Society (1888), the American Society of Naturalists (1883), the Astronomical and Astrophysical Society of America (1897), the Botanical Society of America, and the Geolog¬ ical Society of America (1888). The societies of technical science, while somewhat concerned with the professional interests of their members, are chiefly devoted to research. The oldest of these is the American Society of Civil Engineers (1852) ; others are the American In¬ stitute of Electrical Engineers (1884), the American Society of Mechanical Engineers (1880), and the American Institute of Mining Engineers (1871). For a complete list consult (Handbook of Learned Societies, published by the Carnegie Institution at Washington, D. C.*

SCILLA, SQUILL, WILD HYACINTH, or BLUE BELL. See Bluebell.

SCILLY (sil'i) ISLANDS, England, a rocky granitic group at the entrance to the English Channel, forming part of Cornwall, about 30 miles from Land's End. They rise abruptly from the sea, form a compact group about 30 miles in circumference, and are about 140 in number; there are only six of any im¬ portance, the remainder being mere rocks and islets. The six are Saint Mary, Saint Agnes, Saint Martin, Tresco, Bryher and Sampson. Saint Mary, the largest, contains Hugh Town, the capital. Telegraph and telephone connec¬ tions with the mainland and a periodical steamer service with Penzance facilitate com¬ munication. The climate is very mild and equable, and plants flourish out-of-doors that do not grow elsewhere in England. The in¬ habitants are chiefly engaged in flower-growing, agriculture and fishing. Immense quantities of narcissus and similar flowers are sent to Lon¬ don in spring, and early potatoes and other vegetables are also grown. The grain crops in¬ clude a small proportion of wheat. On several of the islands are to be seen prehistoric re¬ mains of rude pillars, circles of stones, kistvaens, rock basins and cromlechs. The islands are the unsubmerged portions of the traditional land of Lyonesse. The group is named from an almost inaccessible island about an acre in extent, probably from its position near dan¬ gerous rocks, similar to that of Scylla near Sicily. The islands were granted to some monks, who settled at Tresco, by Athelstane in 936. Subsequently Henry I granted them to

the Abbey of Tavistock, and Queen Elizabeth gave them to the Godolphin family. They are now the property of the Crown.

SCINTILLATION, the scientific term for what is familiarly called the twinkling of the stars. We all know that this cannot arise from any actual change in the light of the star itself ; and it must have long been evident that it is due to the atmosphere through which we neces¬ sarily see the stars. But the exact way in which the atmosphere produces this effect is a question on which the views of experts have differed. Arago, in an essay on the subject, cites a dozen different explanations of the effect ; and since his time many other writers have propounded explanations. But there is not so much divergence between these different theories as might appear at first sight, and physicists of the present day will probably agree upon the essential cause of the phenomenon. If the atmosphere were perfectly at rest, it is cer¬ tain that there would be no twinkling, any more than there would be in looking at a star through a piece of glass. The stars scintillate because the atmosphere is continually in motion. In¬ visible waves produced by the ascent and descent of warm and cold currents of air are always present. We can see these waves at the side of a hot stove, or, in summer time, on the side of a brick wall heated by the sun, or on a road passing over the top of a hill when we are so situated that the sky-line is the road itself, and the latter is heated by the sun's rays. In con¬ sequence of these wave-like motions, a ray of light coming from a star is continually under¬ going a slight refraction or bending of its course, which is changing every moment and is not the same even for two rays side by side. The result is that a ray of light which would reach the eye if it kept on its course is refracted away, while another ray reaches the eye which was not directed exactly toward it. But there may be no relation between these two rays ; and thus sometimes for a moment less light will reach the eye, and at the next moment more. Thus we have the scintillation. The rays which actually come to the eye also reach it from slightly different directions. Thus the direction of the star also seems to change in twinkling, but this change is not noticeable except when we use a powerful telescope. Then, in an un¬ steady atmosphere, the stars seem to dance round and change their form in a manner which is very troublesome to the astronomical observer.

It is not the stars alone which twinkle. If we watch gas or electric lights of an evening several miles away we shall always see twinkling. As a general rule, the planets do not twinkle like the stars unless very near the horizon. This is because their visible disc has a certain surface, so that the rays of light which reach the eye from the planet do not pass through the air along a single fine line, but form a cone of which the breadth at any point is propor¬ tional to the distance of the point from the eye of the observer, and may be a foot or more in diameter at a distance of two or three miles.

If we view a bright star through a spyglass and give a slight motion to the latter so as to shake the image of the star round, we shall see that it is continually changing in color, going through most of the colors of the

spectrum from

red to blue. This is probably caused by the different refractions of the rays of light of different colors, which are separated in the >vay we have described and then brought together again. The result may be partly due to the interference of light, an effect which cannot be treated in the present article.

The scintillation is always greater near the horizon, and least around the zenith. This is because the layers of the air are denser and more disturbed near the horizon, while the course of a ray of light through them is longer.

Simon Newcomb.

SCIO, si'o or shi'o. See Chios.

*SCIOPPIUS, stse-6-p'pe-oos, Kaspar, Ger¬ man scholar: b. Neumark in the Palatinate, 27 May 1576; d. Padua, Italy, 19 Nov. 1649. He re¬ ceived his education at Heidelberg and at Alt- dorf, and before the age of 21 had published several learned books, the most noted being his Werisimilium Libri QuatuorP and (Suspectae LectionesP which attracted the attention of Pope Clement VIII. During a visit to Italy in 1589 he renounced Protestantism, and became a protege of the Vatican. He is said to have written more than a hundred books, most of them under an assumed name, satirizing the leaders of the Protestant movement. The first person whom he attacked was the illustrious Joseph Justus Scaliger (1540-1609), against whom he launched his (Scaliger Hypobolimoeus) (1607), in which he also assailed Henry IV. In 1608 he published more than 20 pamphlets against the Protestants, urging the Roman Cath¬ olic powers to exterminate them. Among his later books the most notable are (Grammatica Philosophica) (1628), and (Paradoxa Literaria**

(1628).

SCIOTO, si-6'to, a river in Ohio which rises in Auglaize County, flows southeast for a few miles, then northeast into Hardin County, then south by east to near the centre of Marion County, from where its general direction is south to the Ohio River, which it enters near Portsmouth. Other cities on its banks are Columbus, Circleville and Chillicothe. It is about 200 miles long, is navigable for about 130 miles and for 90 miles feeds the Ohio and Erie Canal. It flows through a fertile valley.

SCIOTO COMPANY, The, in American history, a land-speculating organization formed in the Eastern States in 1787 for the purchase of territory along the Ohio and Scioto rivers. John Cleves Symmes, Joel Barlow and William Duer, of New York, were largely interested. The

organizers at first bought lands of the Ohio Company and appointed Barlow their agent in Europe to make sales of them and to induce immigration. Barlow had been in England pre¬ viously on similar business for the Ohio Com¬ pany. Symmes parceled out the lands to other parties, the tract which now embraces the city of Cincinnati falling to the share of Matthias Denman, Robert Patterson and John Tilson, of New Jersey. As a result of Barlow's activities 218 emigrants sailed from Havre to settle on those lands, 19 Feb. 1790. About 50 of them settled at Marietta and the remainder formed the Gallipoli's settlement. The emigrants suf¬ fered from lack of promised supplies and in¬ ability to get clear titles to their lands, and

the company, failing to meet its obligations, was charged with swindling operations.

SCIPIO ZEMILIANUS AFRICANUS MINOR, sip'i-o e-mil-i-a'nus of-ri-ka'nus mi'- nor, Publius Cornelius, Roman soldier : b. about 185 b.c. ; d. 129 b.c. He was an adopted son of P. Cornelius Scipio, the son of Scipio Africanus Major. He began his public career in 151 when the Roman senate was about to dispatch a new army to repress the disturbances in Spain. Exasperated by the constant failure of the wars against the Spanish tribes, the peo¬ ple obstinately refused to serve. At this junc¬ ture Scipio came forward, and by a spirited and powerful harangue, made such an impression on the public mind that a multitude of Romans of all classes voluntarily enlisted. In 152 he ac¬ companied the consul Lucius Licinius Lucullus to Spain as military tribune. In 149 b.c. the Third Punic War broke out, and Scipio fol¬ lowed the army to Africa. He served under the consul M. Manlius Nepos, and by his cour¬ age and vigilance rendered important services. Manlius recommended him in the most emphatic manner to the senate. Hence in 147, contrary to the usual custom, not being of the legal age, he was unanimously chosen consul and leader of the forces against the Carthaginians. The Carthaginians defended themselves with desper¬ ate courage, but although able to hold out until winter brought a temporary cessation of hostili¬ ties, on their resumption Carthage was reduced in 146.

By the express command of the Roman sen¬ ate this rival of Rome, once so powerful, was demolished and burned. The sight of the ruined city affected Scipio to tears. He was honored with a magnificent triumph at Rome after the war was terminated, and was surnamed the (

For his conquest of this powerful city a tri¬ umph was decreed to Scipio, and he received the surname of (

SCIPIO AFRICANUS MAJOR, sip'i-o af-ri-ka'nus ma'jo-r, Publius Cornelius, Roman soldier : b. 237 (?) b.c. ; d. 183 b.c. In 212 he was unanimously elected aedile, and in 210 became proconsul in Spain. His first successful enter¬ prise of importance was the conquest of New Carthage, the stronghold of the Carthaginians in Spain. For the kindness and magnanimity he displayed op this and other occasions toward the native Spaniards he was rewarded by num¬ bers of them attaching themselves to his stand¬ ard. The next year (209) Scipio totally de¬ feated Hasdrubal, Hannibal's brother, notwith¬

standing the latter's advantageous position, but was unable to prevent him collecting more troops, and eventually crossing the Pyrenees to the assistance of Hannibal. In the meanwhile the Carthaginians collected a fresh army, which Scipio decisively defeated in 207. The result of this and subsequent engagements of minor im¬ portance was that the Carthaginians were wholly driven from Spain, and the greatest part of their country subjected to Rome. In 205 Scipio was elected consul. He now besought the sen¬ ate to allow him to lead an army against Carthage herself, and was accordingly em¬ powered to go to Sicily with an army and a fleet, in order, after mature deliberation on the means of effecting a landing on the coast of Africa, to execute the plan he had formed. In 204 he sailed from Lilybaeum and landed in Africa, where he prosecuted hostilities with in¬ creased vigor, and such success as to oblige the Carthaginians to recall Hannibal from Italy. The Carthaginian army, however, had been by this time so much reduced that that general was able to effect but little change, and after some fruitless negotiations for peace the great battle of Zama was fought 19 Oct. 202 b.c., resulting in the total defeat of the Carthaginians. The latter, on the advice of Hannibal, sought for peace, which was granted on hard conditions. On his return to Rome, Scipio was honored with a triumph, and received the surname of <(Africanus.® He was censor in 200 and consul in 194 (with Titus Sempronius Longus). In 189 he was accused of peculation and bribe¬ taking. When his trial came on he contented himself, in answer to the accusations of his enemies, with reminding them of what he had done for the republic, and ended by saying that this was the anniversary of the defeat of Han¬ nibal at Zama, and calling upon the people to neglect all disputes and lawsuits, and follow him to the Capitol, there to pray the gods that they would grant the Roman state other citizens like himself. This they did, leaving the accusers alone in the forum. Scipio immediately quitted Rome, and retired to his villa at Liternum, where he spent the few remaining years of his life.

SCIRE FACIAS, si're fa'shi-as, a judicial

writ, directing the adverse party to show cause why the plaintiff is not entitled to execution or other benefit on a judicial record, as a judg¬ ment, or why a non- judicial record, as a patent, should not be declared invalid ; also, the pro¬ ceedings under such writ. The defendant may make the same defenses to this writ as to an action. It is often issued to revive a judgment. In the Federal courts of the United States a proceeding in the nature of a scire facias is used to annul letters patent for inventions. In England it is still used in garnishee proceedings in certain cases, in revenue suits involving corporations, and to enforce judgments against shareholders in certain companies, but it has been abolished there in proceedings to annul letters patent for inventions. It has been abolished in some code States in this country and a motion used in its place.

SCIRPUS, ser'pus, bulrush, sedge, a large genus of rush-like or grass-like plants of the sedge family (Cyperacece) universally distributed. Many species are of partial or complete aquatic habit, annual or perennial, some small or some

large. The small, perfect flowers have usually a perianth of bristles, and are in spikelets, with or without subtending involucres, and mature into variously shaped achenes. The spikelets are either solitary or in groups, and are very commonly umbelled. These plants are often called rushes or bulrushes, and are common in wet woods or swamps, and often rise conspicu¬ ously out of shallow water. Scirpus cyperinus, the brown wool-grass, has immense drooping umbels of spikelets, supported on slender cylin¬ drical stems. It is perennial, two to six feet high, with curving grass-like leaves, and is a familiar plant at the edges of forest ponds, growing in colonies. S. cernuus, one of the few species cultivated, is a good pot-plant, having long drooping stems, forming a dense mat at the base, and with solitary spikelets. S. lacustris, the great bulrush of the Old World, is known as the mat-rush, because it was employed for weaving into mats, chair-bottoms and cordage. It is a curious aquatic plant whose very smooth, blue-green, tall stems bear at the top flexuous umbels of spikelets. This species and the allied Y. tat ora, are the ˆtules® (q.v.) of the American Southwest.

SCIRRHUS, or HARD CANCER, a

scirrhous cancer. See Cancer.

SCISSOR-BILL, a bird. See Skimmer.

SCIS.SOR-TAIL, a beautiful flycatcher

(Milvulus forficatus) of the lower Mississippi Valley, which receives its name from its habit of crossing and recrossing in flight the two very long outer feathers of its tail. It is white with dark wings and a roseate flush upon its breast and on the lining of its wings, and is exceed¬ ingly graceful. Its general habits are those of the flycatchers (q.v.).

SCISSORS. See Cutlery; Hardware In¬ dustry in America.

SCLEROMETER, scler'dm-e'ter, an in¬ strument for the accurate determination of the hardness of minerals. In one form the mineral is mounted on a small carriage moving along a track. Upon this is a lever with weighted diamond point which is in contact with the sur¬ face to be tested. Weights are then added to a pulley connected with the carriage until they are just sufficient to move the carriage and pro¬ duce a scratch on the mineral. In the micro- sclerometer of Jagger hardness is ascertained with any one of four variables : rate, weight, depth or duration (see Amer. Jour. Sci., IV, 399, 1897). The sclerometer shows that differ¬ ent faces of crystals vary in hardness. By rotating a crystal through 180 degrees and re¬ cording the weight required to produce a scratch for each 10 degrees, it is possible to secure data from which the ((curve of hardness® can be constructed. Jagger has determined the absolute hardness of some of the minerals in the Mohs scale, assuming a value of 1,000 for corundum, as follows: topaz 152, quartz 40, othoclase 25, apatite 1.23, fluorite .75, calcite .26, gypsum .04.

SCLEROTIC, SCLEROTICA, or SCLEROTIC COAT. See Eye.

SCOLECIDA, sko-les'i-da, a group of worms and worm-like animals, mostly internal parasites, term now used only in a general way,

as its members have been more scientifically distributed in classification in the phyla Platy- helminthes, N ' cmatohelminthes, etc.

SCOLECITE, skol'e-sit, a mineral belong¬ ing to the natrolite group of the zeolite family. It is a hydrous silicate of aluminum and cal¬ cium, CaAbShOio + 3H20. When heated be¬ fore the blowpipe it swells and sometimes curls up like a worm, to which property it owes its name, from the Greek skolex, a worm. It then fuses easily to a white, blebby enamel, thus distinguishing it from natrolite, which fuses with equal ease and without intumescence to a colorless glass. Its crystal habit is slender-prismatic and much resembles natrplite. Its crystals are, however, horizontally striated on the prisms and are monoclinic twins, the twin¬ ning being revealed by feather-like diverging striations on the clinopinacoid, while natrolite crystals are orthorhombic and show vertical striations in the prismatic zone. Its snow-white or transparent, vitreous crystals are usually

clustered in diverging groups. It is also found massive or in radiated nodules. It is a sec¬ ondary mineral usually in trap or amygdaloid. Among the best known of its many localities are Poona, British India, and Berufiord in Ice¬ land; it has been found sparingly in the United States in the Palisades of the Hudson and at Golden, Colo.

SCOLLARD, skol'ard, Clinton, American

*poet and novelist: b. Clinton, N. Y., 18 Sept. 1860. He was graduated from Hamilton Col¬ lege in his native place and was a professor of rhetoric and English literature there 1888- 96 and 1911-12. He has traveled extensively, and since the last-named date has devoted his entire attention to literary pursuits. His early work was mainly verse of a light and musical character evincing great command of metres, but with no very salient characteristics. His later verse shows a marked increase of strength as well as melody, while the earlier facility has now become an almost faultless technique. The lyric is his especial field, although he has now and then attempted epic forms. In re¬ cent years he has produced several noteworthy historical romances. Among his books of verse may be cited (Pictures in Song} (1884) ; (With Reed and Lyre> (1886) ; (01d and New World Lyrics) (1888) ; (Songs of Sunrise Lands**

(1892); (Lyrics of the Dawn) (1900); (The Lutes of Morn) (1901). His most important novels are (A Man at Arms (1898) ; (The Son of a Tory* (1900) ; (The Cloistering of Ursula) (1902) ; (Lyrics of the Dawn' (1902) ; (Count Falcon of the Eyrie) (1903) ; (Foot- faring) (1904) ; (The Lyric Bough* (1904) ; ˆBallads of Valor and Victory,* with Wallace Rice (1904) ; (Lyrics and Legends of Christ¬ mas-tide* (1904) ; (Odes and Elegies) (1905); (A Southern Flight,* with F. Dempster Sher¬ man (1906) ; (Easter Song) (1907) ; (Voices and Visions* (1908) ; (Pro Patria* (1909) ; (Chords of the Zither) (1910) ; (The Vicar of the Marches* (1910) ; (Songs of a Syrian Lover) (1911) ; (From the Lips of the Sea) (1911) ; (Lyrics from a Library* (1913) ; (Poems — Selected) (1914); (The Vale of Shadows and Other Verses of the Great War* (1915) ; Utaly in Arms and Other Verses* (1915); (Ballads Patriotic and Romantic) (1916) ; (Let the Flag Wave and Other Verses)*

(1917) ; (Elegy in Autumn) (1917). Mr. Scollard edited Fords' (Broken Heart) (1894) ;

Ballads of American Bravery) (1900), and (Poems' of Frank Dempster*

Sherman.

SCOLOPACID.7E, skol-oˆpas'i-de, a cos¬ mopolitan family of wading birds, comprising the snipes, sandpipers, curlews and allied genera. The bill is long, very slender and flexible. They frequent bogs and marshes or the banks of rivers and ditches, where they probe the ground for worms, insects and tes¬ taceous mollusks. In the most moderq classi¬ fication these groups of birds are combined with the plovers, under the broader name Charadriidce, of which all but the plover (Charadriina ?) constitute the subfamily Scol- opacince. Consult Evans, (Birds (New York*

1900).

SCOLYTIDiE. See Bark-beetles.

*SCOMBRIDiE, skom'bri-de, a family of percomorphous fishes, comprehending the mackerel (q.v.) and its allies. The body has an elongated fusiform shape, oval in cross- section, with a conical pointed head and deeply forked caudal fin with falcate lobes. The scales are minute and anteriorly form a peculiar area known as the corselet, and the prominent lateral line takes a wavy course for its entire length. The mouth is large and armed with strong, sharp teeth, the eye large and the gill-slits ex¬ tensive and free. Of the fins the pectorals and ventrals are small, the former situated high on the sides and the latter on the belly nearly or quite beneath them ; the §pinous dorsal is far forward and supported by slender spines; the second dorsal and anal are of similar shape and usually situated near the level of the vent, and each is continued to the base of the tail by a series of small detached finlets. The caudal peduncle is slender and bears lateral keels. The colors are generally metallic steel blue above, marked with bands, streaks or spots of black or yellow and silvery white or golden below. Internally the pyloric caeca are numer¬ ous and the swim bladder may be present or absent. The flesh is oily and a streak of deep red muscle extends along either side and is sharply distinguished from the remaining pale muscles. All of the mackerels are extremely active, predaceous, pelagic fishes, which roam far and wide over the sea in large schools and often approach the coasts to spawn. They are especially well adapted by the form of the body for rapid swimming, and resistance to the water is much lessened by the completeness with which all fins and other prominences can be depressed into recesses, so that they become exactly flush with the surface. The number of genera and species is not great, about 12 of the former and 60 of the latter being recognized, but most of them are widely distributed and have occurred or are likely to occur in our waters. Besides the mackerel, some of the most important are the Spanish mackerel, bonitoes and tunnies or horse mackerel. Consult Jordan and Evermann, (American Game and Food Fishes * (New York 1902).*

SCONE, skoon, Scotland, a village in Perthshire, on the north bank of the Tay, a little above Perth, famous as having been the seat of one of the most noted Scotch abbeys. Scone is first mentioned in the beginning of the 10th century and in its abbey, built prob¬

ably about the same period, was located the famous stone, according to tradition (

SCOPAS, skd'pas, Greek sculptor: b. Paros, and flourished between 395-350 b.c. He was the son of Aristandros, a sculptor in bronze, and went to Athens about 377 b.c., where he lived about 25 years. He belonged to the Later Attic School of which Praxiteles was another distinguished member. For the temple of Athena Alea at Tegea he made the sculptures of both pediments and the statues of (Asklepios) and (Love, Longing and Desire) at Me- gara. One of his most famous statues was the (Bacchante, ornamenting the theatre of Dionysus at Athens; another was the of which the copy of the lost original is in the museum at Florence. He is credited with hav¬ ing wrought some of the ornamental sculpture of the tomb of Mausolus at Halicarnassus in Caria, portions of which are now deposited in the British Museum. He was more extreme than Praxiteles in his departure from the re¬ pose of the earlier Phidian manner. With him sculpture represented many of the violent emo¬ tions of life, expressed with great freedom of movement. The lines of the figure, though flexible, were made to convey vehement bodily action, and the face often wore the expression of intense feeling, as, for instance, may be noted in the lines of grief in the face of Niobe. Consult Perry's (Greek and Roman Sculpture) (1882), and Hoppin, J. M., (Great Epochs in Art History> (1901).*

SCOPOLAMINE, sko'po-lam'm, or HYO- SCINE, hi'oˆsen (C17H21O4N), an alkaloid ob¬ tained from various plants of the Solonaceae, used in medicine as a soporific and anesthetic, and generally employed in the form of sco¬ polamine hydrobromide (C17H21NO4, HBr,3H20). It is valuable as a cerebral sedative. For the relief of pain it is combined with morphine, and it heightens the effect of bromides. It is re¬ garded as uncertain in its effects. In large doses it results in loss of memory while under its influence, a characteristic which led to its employment in the combination of drugs used to induce the condition known as (

SCORE, in music the original transcript of a musical composition, with the parts for all the different voices or instruments arranged and placed in juxtaposition; so called from the practice of drawing the bar through all the parts. As a general rule the highest part should be placed uppermost, the others under it and each other, according to the lowness of the part,

All the parts of a chorus should be placed to¬ gether : the soprano standing on the upper staff, the mezzo or second soprano (if any) on the one immediately below it, and so descending in the following order — contralto, second con¬ tralto (if any), tenor, second tenor (if any), bass and, lowest of all, second bass (if any). A good musician is able to form a pretty close idea of the effects the composer intends to pro¬ duce by carefully reading the score. See Music.

SCOREL, Jan van. See Schoorl, Jan van.

SCORESBY, skorz'bi, William, English Arctic explorer: b. Cropton, near Whitby, Yorkshire, 5 Oct. 1789; d. Torquay, Devonshire, 21 March 1857. He was the son of a whale- fisher of the same name and made his first voyage with his father in the Dundee when but 10, and for eight years after 1803 they made annual voyages, young Scoresby studying at the University of Edinburgh between voyages. In May 1806 in the Resolution they reached the highest northern latitude (81° 30') then at¬ tained. The elder Scoresby resigned his com¬ mand of this ship in 1811 and was succeeded by his son, who continued the northern whaling expeditions and at the same time made observa¬ tions of the electrical phenomena of the Arctic regions and it was through his reports that the government was induced to send out the Arctic expedition under Sir John Ross in 1817. In 1823 after 17 voyages to the Greenland and Spitzbergen regions he quit whalefishing, and several years later became a divinity student at Queens College, Cambridge. He was gradu¬ ated in 1825, ordained in that year and subse¬ quently held various livings and became well known for his philanthropic labors. He visited the United States in 1842 and in 1848, and made a voyage around the world in 1855-56 in the pursuit of magnetic researches. He published (History and Description of the Arctic Re- gions) (2 vols., 1820) ; (Journal of a Voyage1* (1823) ; discourses to Seamen* (1831) ; (Mag- netical Observations* (1839-52) ; (Zoistic Mag¬ netism* (1849) ; (The Franklin Expedition* (1850); (My Father: Being Records of the Adventurous Life of the Late William Scoresby, Esq.* (1851), etc. Consult his (Life* by R. E. Scoresby- Jackson.

SCORODITE, a mineral occurring in small leek-green to reddish-brown quartzoid crystals of orthorhombic form associated with the arsenical minerals of Europe, Siberia, Brazil, Utah and many other localities. It is also found as a pale green incrustation around hot springs, occurring thus in Nevada and the Yellowstone Park.

SCORPZENIDZE, skor-pe'm-de, a family of marine fishes, represented prominently by the California rockfish (q.v.).

*SCORPIO, in astrology the <(accursed constellation,** the <(false sign,** ominous of war, discord and woe. It is of ((watery triplicity,** and is attended at its setting by tempests and by autumnal diseases.*

In astronomy the eighth sign of the Zodiac, its symbol is H. The main star of this con¬ stellation is Antares, a red star of the first magnitude, which has a green companion of the seventh.

*SCORPION, arthropod animals forming the order Scorpionida of the class Arachnida (q.v.), which also includes the spiders, mites, ticks, etc. Like all other Arachnida the scor¬ pions possess eight legs; but they are distin¬ guished from the spiders by the possession of a distinctly ringed elongated tail, terminating in a hooked claw or <(telson,** the outlet and sting of a poison-gland situated at its base. The tail consists of a broader anterior pre-abdomen of seven segments and a slender post-abdomen of five segments and the sting, and it merges gradually into the anterior cephalothorax. There are four pairs of walking limbs borne on the thorax, a pair of large chelate pedipalpi, with crushing jaws at their bases, and a pair of small chelate or nippered jaws or chelicerce, corresponding to the crustacean antennae. The genital ducts open on the basal segment of the pre-abdomen, the second segment bears a pair of comb-like sensory organs and the four suc¬ ceeding segments each a pair of lamellate re¬ spiratory sacs opening by stigmata. The eyes are simple and usually consist of one pair of large ones with from two to five pairs of smaller ones.*

The scorpions inhabit warm countries and some of the species of tropical Africa and South America reach a length of 10 inches. The females are said to exhibit great care for their young, and carry them on their backs for several days after being hatched, whilst they tend them carefully for about a month, when they are able to shift for themselves. Scorpions are active at night and by day live in dark places and under stones. The food consists chiefly of insects, which they seize by means of their chelae, and sting to death. The sting is rarely fatal to man, that of the smaller tem¬ perate species not exceeding the sting of a hornet in severity, but it may prove dangerous to persons of weakly constitution. The poison is said gradually to lose its effect on man, so that the more frequently a person is stung the less noxious do the effects of the sting become. Painful effects follow the sting, such as nausea, swelling of the bitten part, etc. The remedies most to be relied upon appear to be ammonia, tobacco, ipecacuanha, etc., together with warm applications to the limb, and attention to pre¬ vent the spread of the virus, as by tying a ligature above the wound.

Among the 20 or more North American species are Broteas alleni, with six ocelli, of Lower California; Vejovis carolinensis, of the entire southern United States, with eight ocelli, and Centrums infamatus of similar range.

The book-scorpions or pseudo-scorpions (Pseudo-scorpionida) are common small forms with short broad abdomen and no sting.

Consult Kraepelin, (Scorpions and Pedi¬ palpi (Berlin 1899), and Banks, (American Naturalist* (1900) ; Warburton, ((Scorpions** in (Cambridge Natural History* (Vol. IV, New York 1909).*

SCORPION-FLY, a neuropterous insect of the family Panorpidce, in which the head is prolonged to form a beak. The body is long and slender. The legs are long, the tarsi being five-jointed; and two spur-like processes exist in the tibiae or shins. They have four, multi- veined wings. The name Scorpion-fly is derived from the appendages attached to the abdomens of some species. In certain species the sixth

and seventh joints of the abdomen are attenu¬ ated and capable of extensive motion; while the last joint forms a pair of forceps resembling those of the earwigs. When at rest this tail is curled over the back, but when irritated the forceps are used as weapons of offense or de¬ fense. These insects are found chiefly in damp situations, under bushes, etc.

SCORPION-SHELL, or SPIDER- SHELL, one of the strombs, so called from the projecting spines with which the shells are provided. The most familiar one (Pteroceras lambis) is a mottled chestnut, variegated with white and orange lines. Internally its hue is pale brown and yellow. Its length is three or four inches. The orange-mouthed scorpion- shell (P . aurantias) is creamy white outside and orange within, and its curved spines are white and glistening. These shells are chiefly found in the Indian and Chinese seas ; and the genus Pteroceras is represented by many fossil species, beginning in the Liassic formations.

SCORPION-SPIDER, or FALSE SPI¬ DER, a small spider-like arthropod allied to the scorpion, various species of which constitute the order P edipalpida. The body consists of unsegmented cephalothorax and flattened ab¬ domen of 11 to 12 segments. The chelicerce are simple, the pedipalps simple or chelate, the first pair of legs terminate in a many-jointed flagel¬ lum. See Arachnida.

SCORZONERA, a genus of composite plants with numerous species, chiefly indigenous to the Mediterranean regions. The flowers are yellow or rarely rose-colored, having many series of involucral bracts, plumose and un¬ equal pappus, and achenes without a beak and generally wingless. S', hispanica, sometimes known as viper's grass, has long been cultivated for

its tapering, fleshy, edible roots, the dark- brown skins of which have caused it to be called black salsify. The leaves are long and lanceo¬ late with waving edges. Other species are also cultivated for their roots.

SCOT, skot, or SCOTT, Michael, a mediae¬ val Scottish scholar and man of science : b. probably about 1175; d. probably about 1234. He is said to have studied at the universities of Oxford, Paris and Bologna. After a period in the service of Frederick II at Palermo, he continued his studies at Toledo, where he learned Arabic. On leaving Toledo he again repaired to Sicily, where he was closely asso¬ ciated with the Emperor Frederick, to whom he was appointed astrologer. He took orders, and was appointed by Honorius III to the arch¬ bishopric of Cashel in Ireland, but declined the post. He was at Oxford in 1230, probably sent by Frederick to bring before the university the translations of Aristotle made by himself and others. Scot was a scholar learned in the science of time, but has been transformed by legend into a magician. As such he is referred to by Dante (Hnferno^ canto xx) and Boc¬ caccio ((Decameron)) , and he plays a prom¬ inent part in the popular superstitions of the border districts of Scotland. Manv works are attributed to him, of which the following have been printed: (Liber Physiognomise Magistri Michaelis ScotP (1477) ; a Latin translation of Aristotle's (De Animalibus) (1496) ; (Quaestio Curiosa de Natura Solis et LunaP (1622), on alchemy; and (Mensa Philosophica) (1602),

anglicized as (The Philosopher's Banquet (1614). Consult Brown, J. W., (Life and Legend of Michael Scot*. (1897) ; Sir Walter Scott's notes to (Lay of the Last Minstrel.)*

SCOT, Reginald or Reynold, English writer: b. Scotshall, Kent, probably about 1538; d. 1599. He was a student at Oxford, but re¬ turned home without taking a degree and de¬ voted himself to the study of old and obscure mystical authors and the pleasures of gardening. The work on which his reputation is founded is entitled (The Discovery of Witchcraft (1584), and was directed against the belief in witchcraft, alchemy, astrology and other preva¬ lent superstitions of his time. King James I ordered the first edition of the book to be burned by the common hangman, and attempted a reply to it in his (Demonology.* Refutations were also published by Meric Casaubon, Joseph Glanvil and others.*

SCOTCH FIR, or SCOTCH PINE, the

only pine (Pinus sylvestris) indigenous to Great Britain, but common all over northern Europe, especially in Scandinavia. Trunks of it dating from prehistoric times have been found in peat-bogs. It has two leaves in each sheath, and ovate cones about as long as the leaves, with cone-scales terminating in a pyra¬ midal recurved point. The cones reach maturity in

the second year. Scotch firs sometimes at¬ tain the height of 120 feet, and although conical when young become picturesque in age, with gnarled, twisted boughs covered at the extremi¬ ties with dense glaucous foliage and gathered into a mushroom-like head. The straight trunk, sometimes four feet in diameter at the base, has a bright reddish-brown bark, and a heart wood of the same color, which furnishes the lumber called deal, that is nearly as durable as oak. This is so valuable, especially for shipbuilding, that the Scotch pine is extensively planted; naval stores, also, are made from the abundant resin, and the sap-wood, while more perishable than the heart, is used for agricultural pur¬ poses, railway sleepers and paving blocks. The bark will serve for tanning.

*SCOTCH or SCOTS LAW, the system of jurisprudence and judicial practice as developed in Scotland. Ancient Scotch law bore a marked resemblance to the law of England, but changes developed so that the two systems dif¬ fered to a considerable extent as early as the end of the 16th century. Shortly before this the Court of Session, which had been estab¬ lished more than a century before, was abol¬ ished and another court, known as the College of Justice, was substituted. The system of legal procedure adopted by this court was modeled after the Roman law, and the judges showed a marked preference for Roman sub¬ stantive law also. As a result the differences between Scotch and English law grew greater as time progressed, and although in recent years legislation has brought the legal systems of both countries more into harmony, there still exists considerable divergence in procedure, substantive law and terminology. For instance, the term ((pursuer® as used in Scotch law is equivalent to ˆprosecutor® or <(plaintiff® in English law. The pleading of the pursuer in criminal actions setting forth the material grounds of the action is called the <(condescend- ence .** Offenses are divided into two classes ;*

In Scotland few crimes are constituted by statute, the common law being so construed that if a judge directs an act to be a crime and a jury convicts, such act is a crime. In the past this has served as an instrument of political oppression, but such is apparently not its effect to-day. The summons goes into considerable detail, and is regulated by the Act of 1850. The practice of including the grounds of the action in the summons has been discontinued, such grounds now being contained in the con¬ descendence and pursuer's plea in law annexed to the summons. The usual form of accusation is by indictment drawn by the public prosecutor, and ordinarily

a grand jury is impaneled in cases of treason only. Private prosecutions are rare. The old procedure by criminal letters has been abolished. A copy of the indictment, with a list of the witnesses, must be served on the defendant. An action in the Court of Ses¬ sion now commences with a summons by the pursuer. The statement of the defender is called his defenses. The procedure in this court was amended by the Court of Session Act of 1868. The pleadings in the Sheriff's Court are similar to those in the Court of Session, and the procedure is governed by the Sheriff Courts of Scotland Act of 1876. One of the distinctive characteristics of Scotch criminal law is the ((not proven® verdict of the jury, which corre¬ sponds to 'the non-liquet of the Roman law, and which is permissible in certain cases. In legal effect it is equivalent to <(not guilty/-' and bars any further action on the same charge, but it falls far short of an acquittal on the reputa¬ tion of the defendant. Criminal procedure in Scotland was much simplified by an act passed in 1887.

The ordinary appellate tribunal in Scotland for decisions of superior courts and of the lords ordinary is the Court of Session, sitting in two divisions. In criminal cases appeals from inferior courts go to the Court of Ses¬ sion sitting in the High Court of Justiciary. Since the year 1707 the House of Lords has been the final appellate tribunal for Scottish

civil causes, but has never acted in criminal cases.

The Court of Admiralty of Scotland was continued at the Union in 1707 for the deter¬ mination of all maritime cases within the juris¬ diction of that court, but in 1830 its civil juris¬ diction was transferred to the Court of Session and the Sheriff's Court. The last-named court has also limited criminal jurisdiction.

Jury trials were first used in Scotland for certain forms of civil cases in the 19th century, but are not frequent to-day.

Edward F. Donovan,

Formerly Editor (Unabridged Standard Dic¬ tionary,) (Standard Bible Dictionary ,y etc.

SCOTCH MUSIC. Much conjectural mat¬ ter has been written about the origin of Scotch music, discussing, among other questions, whether it was the creation of one of the artist favorites of James III, or was brought over and naturalized by David Rizzio. That much of it is as old at least as the 16th century was proved by a manuscript collection of the tunes in a handwriting and notation which brought them close back to that period. This collection, known as the (Skene Manuscript, was edited by a man of*

scholarly attainments who had de¬ voted himself to musical study — William Dau- ney, F.S.A., Scotland. His conclusions on their value as preserving the music of the country in its original purity are <(The favorable con¬ trast which many of the Scotch airs therein contained present to the dull, tiresome, meretri¬ cious productions which from time to time have been palmed off upon the public under that name, and the vitiated copies of the same tunes which have been handed down by tradition alone, are the most gratifying results of its discovery. We are now no longer at a loss for a standard by which we can test the genuineness of our national music, distinguish¬ ing the true from the false, the pure ore from all admixture of baser metal.® One of the most prominent features of the Scottish music is the prevalent omission of the fourth and seventh in the scale, and the consequent absence of all semitones ; another is the substitution of the descending for the ascending sixth and seventh of the minor scale. Modulation often takes place between the major key and its rel¬ ative minor, and the melody keeps ever true to the diatonic scale of the principal key, no accidentals being introduced. Many airs open in the major key and close on the minor. Closes are not confined to the tonic, and are found on the third, fifth and sixth, and in Highland music on the second of a major and the seventh of a minor key. Consult Thomson, G., ed., ˆMelodies of Scotland, with symphonies and accompaniments, by Pleyel, Kozeluch, Haydn, Beethoven, Hummel and Weber) (6 vols. 1793-1841) ; Graham, G. F., (The Songs of Scotland, > and Fulcher, (Lays and Lyrics of Scotland) (Glasgow 1870).

SCOTCH TERRIER. See Dcg; Terrier.

SCOTER, or SURF DUCK, a duck of the genus CEdemia , characterized by a broad short bill curiously swollen, bright-colored at the base of the upper mandible and with a hooked nail. These are the most marine of all ducks, though the American species may also occur about tlm Great Lakes, etc. They are comparatively weak

fliers but expert divers and feed chiefly upon mollusks and other animals, for which they dive and grope in the mud of shallow waters. The males of all the species are uniformly velvety black, with or without white markings on the head and wings, and with bright colors on the bill. The females are plain brownish above, grayish below, with dull-colored bills. There are three common American species; the black scoter (CE . americana) , the white-winged scoter (CE . delandi), and the surf duck or sea coot (CE. perspicillatd) , and the European species occasionally wander into our

territory. All of this species breed in the far North and winter within the United States as far south as New Jersey and Chesapeake Bay on the Atlantic and California on the Pacific side. A few may linger through the summer in Maine, etc.; and the second species is the most abundant. The flesh is unpalatable on account of its strong fishy taste; but this quality permits its being eaten by Roman Catholics on fast-days.

SCOTIA, sko'sha, N. Y., village in Sche¬ nectady County, on the north bank of the Mo¬ hawk River, three miles northwest of Sche¬ nectady, on the New York Central and the Boston and Maine railroads. It is situated in a dairying region and is chiefly a residential town. It was settled in 1758. Pop. 4,358.

SCOTIA SEMINARY, an institution for the education of Negro girls located at Con¬ cord, N. C. It was founded in 1880 under the auspices of the Presbyterian Board of Missions for Freedmen. There are four departments of study, the Normal and Scientific Department, the Grammar School, the Preparatory Depart¬ ment (elementary grade) and the Industrial Department. Instruction in music is also given; physical training and instruction in hygiene, principles of ventilation, etc., form a part of the curriculum. The normal course extends over two years and the scientific course con¬ tinues one year longer and includes instruction in Latin, geometry, astronomy, rhetoric, civil government, nursing, mental science and ethics. Manual training is a part of the whole course ; in the lower classes (Grammar Department) ; this training is given chiefly by the students doing the work in the boarding department ; for the higher classes there are courses in cook¬ ing, household economy and sewing. No tui¬ tion is charged except for instruction in music ; the institution is largely supported by the Pres¬ byterian Board of Missions. The library con¬ tains more than 2,500 volumes. The students average 300; the faculty 20.

SCOTISM, the philosophical and theologi¬ cal system founded by Joannes Duns Scotus, toward the close of the 13th century and which in succeeding centuries was the greatest of the systems opposed to that of Thomas Aquinas. Scholastic philosophy was the philosophy of Aristotle interpreted, developed and reconciled with the Christian faith. In the latter part of the Middle Ages, scholastic theology, accepting the data of Catholic faith, occupied itself in arranging, defending and drawing deductions from them on the principles of scholastic philos¬ ophy. Of this scholastic philosophy and theol¬ ogy, there were two great schools, of which the Thomist found its home in the Dominican, the Scotist in the Franciscan, order. The Nominal¬

ist school found adherents in both of these orders and in the Church generally, but never exercised an influence like that of the older systems,

and really marks the decay of Schol¬ asticism as a whole. The principles of Scotism are stated in the (Opus Oxoniense) and the commentary (The Four Books of the Sentences, > written by Scotus at Oxford. His whole philosophical and theological teaching is here in collected form. Scotists no less than Thomists were, in the strictest sense of the word, scholastics. The one as well as the other accepted the whole tradition of the Church as it was collected by Peter Lombard; to Scotus no less than to Saint Thomas the Pope is the supreme guardian and divinely in¬ stituted exponent of the deposit of faith left to the Church, the highest guide and ruler of the Christian commonwealth. Again Scotus, as well as Thomas, accepts Aristotle as the rep¬ resentative of human reason, the decisive au¬ thority in philosophical discussion. The Scot¬ ists were greater Realists than the Thomists. To the Thomists no universal exists as such. The essence is only actually found in the in¬ dividual; it is by a process of the intellect — abstraction — that we separate humanity in gen¬ eral from humanity as it manifests itself in a particular man and reach the idea of man in general. To the Scotists the nature in all in¬ dividuals of the same species was numerically one. The obvious difficulties of this theory led later Scotists to modify it till it was scarcely discernible from Thomism. The Scotists be¬ lieved that in individuals there was an <(Lsec- ceitas,® something which made them individual apart from matter; also <(the created will is the total and immediate cause of its volition, so that God in respect thereto has no immediate but only mediate efficacy.® The will is like a ((free horse,® grace like the rider, and the horse can throw its rider; otherwise, the will could not be free, and there would be no possi¬ bility of sin. Scotism denies the possibility of proving by reason the immortality of the soul; claims that the Word would have become man, even had there been no fall ; that the merits of Christ were not infinite in themselves and from the union of his human nature with the Word, but only from the acceptation of them as in¬ finite on the part of God. Consequently, the system denies the infinite value of the sacrifice of the Mass. The Scotist teaching in regard to the sacraments differed greatly from the Thomist position, admitting only a moral effi¬ cacy instead of the physical efficacy taught by the latter. Thomism denied the indifference of any deliberate action while the Scotists reject this reasoning, and hold that the end, and, therefore, the action, might be indifferent. The Scotist philosophy and theology are now aban¬ doned but many of its opinions have been adopted. The Scotist opinion on the Immacu¬ late Conception finally triumphed, and its theory on the Incarnation has recommended itself, as a philosophical view of that mystery, even to writers of note outside the Church. Consult Werner, (Scholastik des spateren mittelalters> (Vol. I, Vienna 1881), from which this article is principally taken, (The Catholic Encyclo- pedia) (New York 1910).

SCOTLAND, skot'land, UNITED KING¬ DOM, the northern division of the island of Great Britain, extending between lat. 54° 38′ and 58° 40′ 30″ N., and long. 1° 46′ and 6° 8′ 30″ W. It is separated from England sub¬ stantially by the Solway, Cheviots and Tweed, the border isthmus being about 60 miles across ; but the irregular boundary line, the historic Border-land, measuring fully 100 miles. On all other sides it is bounded by the sea. The great¬ est length, from north-northeast to south-south¬ west, between Dunnet Head and the Mull of Galloway, is 287 miles. The breadth varies from 140 miles to less than 30, the latter in the north, between Dornoch Firth and Loch Broom. Few points in the mainland are more than 40 miles from the sea, the country being deeply penetrated by inlets. The country was formerly divided into a number of districts, many of the names of which are still familiar, such as Lothian, Tweeddale, Galloway. Breadal-bane, etc., but for political purposes it is di¬ vided into shires or counties, as may be seen in the following table. Edinburgh (the capital), Glasgow, Dundee and Aberdeen each contain upward of 100,000 inhabitants. After these come, in order of population, Pais¬ ley, Leith, Greenock, Coatbridge, Kilmarnock, Kirkcaldy, Perth, Hamilton, Motherwell and Falkirk.

Islands and Coasts. — The islands of Scot¬ land are said to number altogether nearly 800. On the east coast they are few and small ; but on the northeast are the two large groups, the Orkneys and Shetlands, the former num¬ bering 52 islands. 28 permanently inhabited; the latter 100 islands, 29 inhabited ; while on the west coast the islands are large and nu¬ merous. Here the Hebrides (q.v.) extend for

COUNTIES

Area in square miles

Popula¬

tion,

1901

Popula¬

tion,

1911

Aberdeen .

1,955

304,439

312,177

Argyle .

3,213

73 , 642

70,902

Ayr .

1,128

254,468

268,337

Banff .

640

61,488

61,402

Berwick .

460

30,824

29,643

Bute .

217

18,787

18,186

Caithness .

685

33,870

32,010

Clackmannan .

47

32,029

31,121

Dumbarton .

241

113,865

139,831

Dumfries .

1,062

72,571

72,825

Edinburgh .

362

488,796

507,666

Elgin or Moray .

475

44 , 800

43,427

Fife .

492

218,840

267,739

Forfar or Angus .

875

284,082

281,417

Haddington .

271

38 , 665

43,254

Inverness .

4,088

90,104

87,272

Kincardine .

383

40,923

41,008

Kinross. . . .• .

72

6,981

7,527

Kirkcudbright .

897

39,383

38,367

Lanark .

881

1,339,327

1,447,034

Linlithgow .

120

65 , 708

80,155

Naim .

195

9,291

9,319

Orkney and Shetland .

926

/ 28,699

\ 28,166

53,808

Peebles .

354

15,066

15,258

Perth .

2,527

123,283

124,342

Renfrew .

245

268,980

314,552

Ross and Cromarty .

3,078

76,450

77,364

Roxburgh .

665

48 , 804

47,192

Selkirk .

257

23,356

24,601

Stirling .

447

142,291

160,991

Sutherland .

2,027

21 ,440

20,179

Wigtown .

485

32,685

31 .998

Total .

29,785

4,472,103

4,760,904

200 miles from north to south, and are di¬ vided into the Inner and Outer Hebrides, the former lying close to the western coast of the mainland and stretching from Skye to Islay; the latter, parted from the Inner Hebrides by the straits of the Minch and the Little Minch, comprise the long chain of islands from Lewis to Benbecula. Enclosed in the Firth of Clyde are the islands of Arran, Bute and the Cum- braes, forming a county by themselves. The west coast of the mainland is. generally a wild, deeply indented mountain-wall, presenting a series of inlets or sea lochs, while toward the middle the coast is cleft by two great inlets with openings to the southwest, the Firth of Lorn and its continuation Loch Linnhe, and the Firth of Clyde and its ramifications running far inland. The east coast is sometimes low and sandy, but is often formed by steep rocky cliffs of considerable elevation, the chief inlets being the Firths of Forth and Tay, and the Moray Firth, Cromarty Firth, etc.

Orography. — From the configuration and geological structure the country divides into three divisions, the Highlands, Central Low¬ lands and Southern Uplands. The first of these divisions lies north of a line stretching in a southwesterly direction from the coast of Kin¬ cardineshire to the Firth

of Clyde; the third is the country south of a line drawn from Dunbar southwesterly to Girvan ; the country between these lines forms the Central Lowlands. The Highland division is remarkable for the number and elevation of its mountain-masses, many of the summits being over 4,000 feet high. The mountains best known by name are the Gram¬ pians, which form a system or series of masses covering a large area and culminating on the west coast in Ben Nevis, 4,406 feet high; while 55 miles to the northeast rises a remark¬ able cluster of summits reaching in Ben Macdhui the height of 4,296 feet. The Gram¬ pians and their connections are separated from the mountains farther to the north by Glenmore or the Great Glen of Scotland, a remarkable depression stretching quite across the country from sea to sea, and forming, by the series of lakes occupying it and the Caledonian Canal connecting them, a waterway from the west coast to the east. The Southern Uplands are also essentially a mountainous region, summits of over 2,000 feet being frequent, though none exceed 3,000 feet above the sea. The central region, though much less elevated than the other two divisions, has none of the monotony usual in flat countries. Though occupying not more than a sixth of the whole surface, the fertility of the soil and its mineral treasures make this part by far the wealthiest and most populous. The present form of the land sur¬ face of Scotland is the effect of erosion or denudation. The country was at one time an elevated table-land, the upper surface of which is indicated by the summits of the mountain- masses, but has been deeply trenched and fur¬ rowed in all directions by the erosive action of water, ice and frost. The slope of the ancient plateau is determined by the direction of the principal river ; in the northern part it is chiefly toward the east, in the southern more equally east and west.

Hydrography.— The chief rivers flowing east to the German Ocean are the Tweed, Forth,

M(|]l -ˆJlenn'm \>m

TOtlTKAT _ Oˆoilll KoNALLlbl

f yarth , ˆort,i B

*Sound *S1 r ,i*

WF. STRAY

Longitude West from Greenwich

,ANDAY

Halt a

Sou nd

iiTBONSAY

Blr9Rj .Marwick ^

(\ North Roju

GairsaY o

^Fktlar

fie anti Rendai 'POMONA

5(M'a11xlakd>

'll Barra

Skftill,

AU8KKRRT'

Out Skerries

Kirknnll a

*t|lhorJT^*

'^*8capfi*

StromneS

Hoy Sound.

RackwlcH Rora Head fc.*

leerneM 9C0PINSHAY ^^URRA I-

Margaret's Hop®

hfuUTH RoNALDSrfAY ^

Ibid Head /"

Pentland .'Skerries . ns rt. ,

'Duucansbay Head

IIALSAY

testing Bay

jNouTirS

**Wai.lh*

Penllan

Strom.

Dunnctv^. "^Castletowp. 0 Dower

.Georgemns w. Wattes

>FreswicK

F,Th A*

\ #»4 BO"1.* 5. p .7 < > ™4K"®i"*!Frl*

£ ReayX x j Halkirk

ptsral

B"y

rr Noes Head ✓ Pulteoeytown.

Melnes S Th<;*

ft tfeUj'eh, "Bettybill **

Cbannerwl

JSt. JNinian'a 1. and B.

V' Swainbost^o

*v r Flvepenny-/^*

' Lor\e/ 0

Shade t/S

*r*s*

o'Brazar " Tolstn, Shaw.boet s. •ˆCarlowayX 7 v Back c ˆ > < vO""

k. Breasclet ˆ v_ˆ

KkˆSssL

Leurbost ˆ3

&H I R Eˆpˆ,

y r Eruurt.J.

.Cellar Head

?o%V 1

t haoyhal

Rhlcftpieh

/ Forslnali

1

ForslnardP-

'Sarclefc

FAIR ISLE

Mtoabreao

Tolsta Head

. -o11'3 I

ˆ ˆd-Tiumpan Head

V Peniksula (' "°Garrabo«t

P'B.jble N,

' Scour!# jBadcall

Naver.

Great < Hernerai

iBEN_HEE.

Altnaharr

A0hneF?®k'v j 17 t

flBRECK KlnbracaSta.

'T.at heron lunbeath

Gallon Head.

Ulj

Mhangurstay1ˆ

T'laslinwleQi

L Assynt Oj

t?' LochinveW

Berrledal®

BˆVord of Caithness QSˆtelmsdale Sport Gower 1 lino to.

*1 nuhnadaiJTj*h> VˆBEN' MORˆ f'fCffoASSYNT*

mealasbhalUm

ilcmnui

, V.Polbalti

V,0ˆAcbiltibuie

Kebock Head

oRogart

Srianacb Head

.Rosehair

The Mount

Jlnveran

n arshin

SkalW Ronar Br. Clasbrnore (*

Embo

Culrain<

RˆCarrou

Kincaruin

lornoih.

.Fearnˆsˆ1

Edderton'

j'ykihait

rfnVer

cyCadboll

Tlalintoreˆj.

Aultbi

MelvaigL EmeHˆ/X-.

ji.N.Erradalef VPoolev Bo.vGa 1 g>w-Oairlw;W r. QairL~t \V

[BEN DEARQ

ITˆ/ˆOlllmuir,

AlneeAj — ˆ/T

kSpyni«'

lˆraddVˆ

CaDiabaig

vCornhilll mg Edwa|

romarty .

I ✓

Orth Uisr

W PUsUf^-^eWX-^v

”

*{Turriff – - ^_L = *cr*

^er °

udhterleM tA

) Aucnpa – \ . . .

■Forres

t South

NewmiR

Pnrtiose

demat

Jjurnbaven

Eoddam

Rothes

.Rovay

Smzort :

mjlonio

Jruden

(L Gartly –

^Culsamohd^j

Diiirinish f A %d Kuag t^^ortre • » < o^Bracatlali

‘W iay’ WatersteinR Head‘d Ramasaig

afalna

ˆUoUieston

[ewburgb

«’ CultftV inethmotirc

ilenlivel

Howmore’

jdrigill PtT

i. Braro’

Xlacbar

‘lhelvl®

*.Ushinis**

ifamfay

,Inveu

drone.

p AbernAj

\ /YˆNetbybri

AL ICnock -ofef

ˆKincardine

X •f x

QA.l’RNpP

Dklarossie

Rudha .\rdvula(

Tomlntj

Sligicban

’

Talisker

j/mt. heclk JL. Eynort

>nbucket

L. EynoriCˆ

L F L. Brittle Dunan Pt.e Soay’I.

Canna I.

/ f? ir+yf’j

— -x * e(}Bi4ibiim

fa“> aˆtatRDEtN

th-XSv n,t>

oC”ve

Ban alaryˆulter Findon

rpe« Much alls .ySkatˆraw _

-Cowit—Bj

.elg > \ ‘f7/ S

jClufiie-tnoo

Arnisdale ˆ (X1

KinlocliV’niiin-

Tomdown

ˆortAugustus

‘L. JJoisdale ‘

larrlsdale

Nr-MACOHUi’ OU L ’

faloch

Sanday 1-

Etteridge /

_ Stonelmveu funnottay‘X

lithu/ JCrawton | i imlNE Jr.atterllnc ,

/Todbca’I Point j Klnnoff I Bervie ‘Laurencekirk

aˆTBssr j Qst ‘*

Kinlochailort 7

l!ˆ-5 I? i

Shkl/ft. Ch rf William

iaitnversˆd^^,^^|EN

Arcoaracle ˆ — — – > ˆ/oUnidi'Xj ife

Brae mar.

Hvsker Is. | % ilarrisV

1 MASK!

Pa pad i!

*Y CTarfsidejˆ ‘ }_*

•TO lVv •>f’U H 0

• V-; • • Irjy, Mcnnnur 0 /

jenˆ. o KingoldrunˆˆiˆG’

auld KjrriemudXˆrx Fri

1 ,,T#r[” ,l>’ o % ˆr\Newtjlo

rt)UN D E E

V Fetter cal

Fasoadale-/**

A. ,X..,‘rUinmcl.vIJroJ. illiohonaa ” c m— . — TKInloch 1

-S7nRonpc,‘^11^”’^

•||EHj.MORE Fortingaif «

Ardnamurcban Pt. . 1. Mon , \

CUbh.chXy/^,. <

v€° y * “”“i.iii

UalgarJT^

^ T.nhai.b(> ^

Tresiimhii *

“Scarnish !*• * ITi^E

nish 8ta fta I. . » I»*

» riNGALS Cove

‘Montrose

(Ferryden.

Ivilhoan

Ranb’«ch

Lcuen

; Strontian

/Corrj

/Aberfeldy wA°

> Kemuore ^AX icbarn Inver W

\Briiuinn

AvKillundl

GunnaI.

Vaul

reroraiVt

ireetˆ o ˆVˆCargil

Bankfoot /rˆtanley

Kllchenichbet

.Ardchattan

■■ˆBEN Bal.i hiil dorr

ˆtKilmore Kilchrenahc Lilninver .it S,

fXew burgh

-‘Cupar.,

*tdy bank jy**

Bay.

■ˆ’ˆ-ˆ““rbllls Y’n V. F’fe XeBS

vSeAnstrulher

itte n « ee n

ˆjlsbE’Or.

v«, W

wth »/ Forth i v

Inverariiiny MORI

Fort®viot Abernet

FARRAlh’ˆfRoSS oE

1MONO

Kildjelford

.ocfigo(llhe|d

pord 0

rjKilmartin

tberfoyle

irnton

Tleanston

/^Stracliur,

dratblachlal

Dunn Artach

^ ^ Olengarrlsdal

■f

3 SchallaMiig<^ a I S

/. Alfdlu

kinish Pt.f^Xf A-' ^ / Oro.nsay qy° ,■ 1/ ^

;.rmli#lrkC,;1'1-V

'/^^Burnt island

{•rk^l.'hing 1 ^V-

fGArelorhhVsaX 1 Bebnah*/^ K-PPen^ ^ r>Al

% .stirlinx^

.■y /Drem ^ P^punbar >

'restonpans Garvald «

dAfflris- H C«^baig-j Lchahoisk'

BithgAU

PaS S

NA V

Ardnave Pt,

Imoutb

■nmoutb

mju lua

PAFSrOfT

ivtbriilge wVitb< Tlotli e rt N^VJshatv \vT\j Carluke

Kllborry i Uilllown /

ftudhnna V

Traill,

^S.^Edro.

-Duns

R \V

Offeft- o ;rr^^Gl

irwlck ,)on Tweed

. . .

.Largs^t

iKilliirnio

7 0 long)

J Dairy J wanningy

. A Y v

'T|Bridgend>\ 'Bo win or] ■xffgan 1*

*V Kildalton, \ Lagga- – -eSoulin^^**

Jvllchomnn« Eort Chari.

•Linton’

5,6itU.nalg(

y ✓oClaehai

BoTwarth recnlitw. [stream \

dphintt i

i W^»

Ediftestonj; l. Pechler

^ao^Innei

^DunBjr®>

wQ-Ca’rBtaira

GicTWa I

Ardminia rdmora ^

Portnahaven Rhja»» ”“‘j Pw.t “r®5

trathavi

Stonermusc lack wood0 j

f^anmoi-

ipAf/rei^

^^parbam.

toxbnrgltS^

■jkford

Klllean

i Ardrossan | | Saltcoats

Irodick

Wooler

V* C»

Glenharr A

l>£ckford • ‘ ,, _x7^ ‘^Morehatllg,

^r%ncu:,

X B U. W G . H /«

[>,La.nlaifl^»f>bY

7>^* f I] a

lov al cr fool mbliM.

Mauchline

Lb Ay’

§* Kilkenzittc »_

Cnjiiplifltpwn,

’ ilte Tolnt/ ^

sVuthinl^ck

3 Kill Vop0

Bennanllead

m pt>t)pw

Y o

Hh ii ad •£.

Point ~i.

wrt

Moffat V

\ Eskdalemu AW amphVay I

s/ Patna / >

(f 0 ^ X^Waters'ide \

.NVw =.

r~ ~ . poon-Jf '

Turnherry

^Kirkos»ald

juthend_

.o^ Rathlin ^P>

Cars! Mull of' J^Kintyi

AC •:>!'

^Thornhill

)\U\M

'Sanda I.

Ails a Craig <3an'

Ballycastle

istleton

Lendalfpot Bounnne llcad^ Jlallantrae

Langholm^ Lockerbie 'tfj; \ Ecclefecban '

Bellingham'1

0 Coleraine

itnaben° aT

\ Jllu in fricx

\ r\Dalton \ Glencaple

j* I ^DalryV _/]{# ^ New Galloway^j °

CIRlCUQB

New Galloway Sta. .

maolellan_Ju — ˆ S Maxwclltowi

rvg h v

Parpn

d Bay

.Garron Point

Canbnbiej . Kirknairi

Coraewall Pt.

Hexham

Minnlgaff

ˆleWton Stei

tDalbeattielˆ

Kirkl > eano

Glenarm

ˆˆADromore i > — ˆ

Jreetown Castle Douglas _ A , Ff CoT Twynli..lm0 jonglur XˆXWYeet OF I b

P. %Kird&lirlsljl

Bucks

Carlisle

Black IleadlY

PortpatricV

Larne

*) Black Head ˆ White Head “**

LOtl!/1′ \~-

- CoPBbASD

Ardwell Bayjˆ and PointaT

Port Logan Klrkmaid4

Mochntmo . Port WilliauˆSoi Luce Bay Scare. N{

HRocks* Glassertt

ˆrunim or#

Uaryport

Penrith’

ˆ IV hithorn

Bead.

Workington

Donaghadee1

Mull of Galloway

SHETLAND ISLANDS.ˆ-

Gtour

North

>Jrangi

1

JSt. Mngnus , Bay *• MfCKLK ROI

rATA.STOVR

Sandm ‘Walts Ness

Vaila

>SFota*

VTllam v*> ˆ

ptl’e Burr/

8 _

‘^rUushinUh Pt^LW [X^WIV’IS

A/

r Tarav’ay 1.

w

“‘‘ll11 V’

*. • o -vw, vy.v Shi ant Is. iC ‘

jr.f Suillay &*, • . CY.^O.’^ocalpa . V

At/ v U/.1; v^NjtMiuj ,t a

p‘“‘‘VsS^Al ,

^ 114 <

°’!ra,

Q;

Bevrecula Bo»becuia •xArdivachar Pt..

Dallhurgl

Hoisdale’

Pt-

^>Mu£DOaN(CH I.

U ?1\T~ u E Q R 1 .D E S

^Mingalay

Uarra oBtRNER*y Head

KKERRYVORE , a. ir. a.

SCOTLAND

SCALES

Statute Miles, 28 1 Tnelu

Kilometres, 45 = 1 Iucli.

Rand McNally A Co.'s NewTl jf.H.Map of.Sootland. Copyright by Rand MpNally k Co.

335

SCOTLAND

431

Tay, South Esk, North Esk, Dee, Don, Deveron, Spey, Findhorn, etc. ; those entering the sea on the west are the Clyde, Ayr, Doon, Dee, Nith, Annan and Esk. The Clyde in its lower course carries a vast traffic, this being rendered pos¬ sible chiefly by dredging. Many of the rivers are valuable from the numbers of salmon they produce. A striking feature of the country is the great multitude of lakes varying in size from Loch Lomond (28 square miles) to the pool-like mountain tarns. In the Northern Highlands almost every glen has its lake and every mountain hollow is filled by a stream or spring. Among the more noted are lochs Lo¬ mond, Katrine, Tay, Earn, Rannoch, Awe, Shiel, Laggan, Lochy, Ness, Maree, Shin, in the Western and Northern Highlands; Loch Leven, in the Central Lowlands ; and Saint Mary's Loch, lochs Ken, Dee and Doon in the Southern Uplands.

Geology. — The older or Palaeozoic rocks predominate almost everywhere in Scotland. The Highlands are composed almost entirely of crystalline schists, gneiss and quartzites; the Central Lowlands of Old Red Sandstone, Car¬ boniferous and Permian strata ; the Southern Uplands mostly of rocks of Silurian Age. In certain localities remains of secondary forma¬ tions are represented over small spaces, while volcanic rocks cover considerable areas. Gran¬ ite exists in great masses in many localities, and in some parts is extensively quarried. The most valuable mineral region is the Central Lowlands, where coal and iron exist in such quantity as to make this one of the most im¬ portant mineral fields of Great Britain.

Agriculture. — Oats form the prinicipal cereal crop, and is the only crop available on the moist oceanic border. Wheat is grown in the Lothians, Fife and the Merse of Berwick, where the average number of bushels to the acre is the largest in Great Britain. Barley, potatoes and roots are other crops of the east coast. The average crop of roots in Scotland amounts to half that of England. Important fruit-growing districts are the Carse of Gowrie and around Blairgowrie and Coupar-Angus. The mountain pastures of the

Southern Uplands and the Lower Highland hillsides support sheep. Notable breeds of cattle are the Ayrshire, a dairy breed, black-polled Aberdeen, Angus, a beef stock, West Highlanders and black-polled Galloways. Clydesdale is the originator of a famous breed of horses. The average acreage under crops is about 5,100,000 acres. The yield of oats in 1917 was 41,321,568 bushels, barley, 9,103,204 bushels; turnips and swedes, 8,000,- ,000 long tons; potatoes, 1,000,000 long tons. There are about 8,000,000 sheep in the country and about 1,000,000 cattle. In 1916 there were 76,754 holdings, of which 2,558 contained over 300 acres, 23,227 from 50 to 300 acres, 32,985 from 5 to 50 acres, and 17,984 from 1 to 5 acres.

Mining. — The mineral region of Scotland is the Central Lowland. The largest coal fields lie in Lanarkshire, which produces over 40 per cent of the total output, Ayrshire, Fife, the Lothians and Stirling. The dron fields lie near the coal, in the counties of Ayr, Lanark, Linlithgow, Renfrew, Fife, Midlothian and Stirling. Oil shale is mined round Edinburgh and Linlithgow. Other important mineral prod¬

ucts are the red and gray granite of Aberdeen¬ shire, limestone, found principally in Fife and Midlothian ; slate of Argyll and Perth ; and lead, fire-clay, etc. Coal production in 1917 reached 35,596,800 tons; oil shale, 3,000,000 tons; iron, 675,000 tons. The total value of all min¬ eral products in the same year was $106,320,000.

Manufactures. — The most important indus¬ tries are those of textiles, metals and machinery, and shipbuilding. Glasgow is the chief seat of all industries. The cotton industry centres chiefly in Glasgow and Paisley, the latter being noted for its thread. The woolen manufacture is settled in Stirling, Kilmarnock, Bannockburn and Paisley, while the wool produced on the Southern Uplands, combined with the presence of water as a motive-power, has helped to locate the manufacture of woolen cloths in the Tweed-Valley towns of Hawick, Galashiels and Sel¬ kirk. The linen industry first began in For¬ farshire, at Glamis, in 1790, and has since re¬ mained in several Forfar towns, such as Dun¬ dee, which also specializes in jute, Arbroath, Brechin and Forfar. In Fife, Dunfernline specializes in damask, and Kircaldy in linoleum, Airdrie, Coatbridge, Falkirk, Kilmarnock and Hamilton smelt and work iron. Glasgow turns out machinery of all descriptions, and Kilmar¬ nock makes locomotives and rolling-stock. Shipbuilding centres in Glasgow, Port Glasgow, Greenock, Patrick, Govan and Dumbarton. This industry is also pursued to a smaller ex¬ tent on the east coast. A special quality in the water has in each case assisted in developing paper manufacture in Midlothian, while Edin¬ burgh, next to London, is the greatest print¬ ing centre in the United Kingdom, and in Aberdeenshire, whisky distilling and dyeing at Perth and Dumbarton are*

important industries. Sugar-refining and tobacco manufacture are carried on at Glasgow. The annual value of the output of the textile factories is about $200,- 000,000. Shipbuilders before the war turned out an average of 500 vessels annually, aggre¬ gating about 900,000 tons. During the war this production was vastly increased but the cen¬ sorship rendered it impossible to give the pro¬ duction figures. The war also greatly affected the production of distilled! spirits, which for¬ merly reached the staggering annual total of about 25,000,000 gallons. This has been greatly curtailed.

Commerce. — The indented coast of Scot¬ land and its deep inrunning estuaries have greatly favored the development of commerce, as has the fact that the producing areas on the Central Lowland are either actually on or quite close to the maritime outlets. The west¬ ern ports trade chiefly with America, the west of England and Ireland; the eastern ports chiefly with the Netherlands, Hamburg and the Baltic. The commercial connection with Ire¬ land and the West is shown by a large import into the Clyde ports of bacon, ham, grain, flour, tobacco, livestock, leather, lard, timber, iron ore. Representing foreign imports in the east¬ ern parts are butter, grain and floor, eggs, linen, yarn and timber, all principally from Rus¬ sia and other Baltic countries. The exports in either case are identical in character with Brit¬ ish exports generally. The value of all im¬ ports is about $275,000,000 annually and the exports reach about the same amount, although

the latter have been greatly curtailed during the war. See Great Britain — Commerce.

Communications. — Railway lines reach Edinburgh and Glasgow from the south by skirting round the Southern Uplands through the eastern edge of plain-land, and, by means of river valleys, penetrating the heart of the Southern Uplands themselves. While the flat country between Edinburgh and Glasgow has made railway construction easy. Northward, .connection from Glasgow and Edinburgh is provided by the North British Railway, which crosses the Forth and Tay by two magnificent bridges, and runs along the flat coastal sill to Aberdeen, whence the Great Northern of Scot¬ land carries it on to Elgin and to Inverness. Another north route is by the Caledonian Rail¬ way, which enters Strathmore through the gap between the Campsie Falls and Ochils, and continues through Perth and Forfar, to the coast at Montrose, whence it runs on to Aber¬ deen. The Highland Railroad from Perth pene¬ trates up the valley of the Tay and of the Garry to Inverness, whence it continues north to Wick and Thurso. The total

railway mileage is 3,871. Scotland possesses three canals. The Caledonian connects the nearly continuous line of lochs which fill Glenmore, and is used prin¬ cipally for tourist traffic, as is the Crinan Canal across the peninsula of Kantyre. A deep depression secured the construction of the Forth and Clyde Canal (1790) between Bowling and Grangemouth.

Finance. — The Scottish fiscal system is part of that of the United Kingdom. Scotland's an¬ nual contribution to the revenues is about $100,000,000, made up of the excise tax, income tax, estate dues, customs, land taxes, etc. The non-tax revenue from postal, telegraph and tele¬ phone service amounts to about $14,000,000 yearly. See Great Britain — National Fi¬ nances.

Population. — In 1801 the official census showed the population numbered 1,608,420. In the following half-century it had increased to 2,888,742, and in 1901 it stood at 4,472,103. In 1911 it reached 4,760,904, and the estimate for 1915 was 4,785,598. Of these 75 per cent live in towns of 1,000 or more inhabitants; about 8 per cent are non-Scots, mostly Irish and Eng¬ lish. Previous to the war about 50,000 emi¬ grated annually to the colonies and the United States.

Fisheries. — Both the freshwater and sea fisheries of Scotland are important, especially on the eastern coast. Aberdeen is the chief fishing centre; others are Peterhead, Wick, and, on the west coast, Stornoway. The chief food fishes are herring, especially those of Loch Fyne; haddock, flat fish, notably Forth flound¬ ers, and cod. In recent years sail-boats have been superseded by motor-boats and steam¬ fishing vessels. About 100,000 are employed in the industry; the value of the catch in 1917 exceeded $20,000,000.

Religion. — The strongest religious body in Scotland is the Presbyterian, the established branch of which has a membership of about 725,000 distributed among 1,450 churches. The second largest religious body is the Roman Catholic with 525,000 adherents, next comes the United Free Church of Scotland with 510,-

000 members. The Episcopal Church is repre¬ sented by about 54,000 members.

Political Constitution. — The Parliament of Scotland anciently comprised, till the reign of James VI, all who held any portion of land, however small, from the Crown by tenure of military service when the small barons or free¬ holders were excused from attendance in per¬ son, <(two or more wise men® being deputed from each county in proportion to its size. Its powers were nominally extensive, but the su¬ preme power was virtually in

the king, who by his influence often entirely controlled its pro¬ ceedings. The Parliament on the whole con¬ sisted of three estates — the nobility, the digni¬ fied clergy (consisting of bishops, abbots and priors), and the lesser barons, or representa¬ tives of shires and burghs. When Presby¬ terianism was formally ratified by law after the Revolution of 1688, the ecclesiastical estate ceased to have a place in Parliament. Every measure brought before Parliament was pre¬ viously prepared by a committee, styled the lords of the articles, chosen from each of the three orders, but in effect little better than royal nominees. Before the Union there were four great officers of state — the lord high- chancellor, the high-treasurer, the lord privy- seal and the secretary; and there were also four lesser officers — the lord clerk-register, the lord-advocate, the treasurer-depute and the justice-clerk. Previously to the era of the revolution the Privy-Council of Scotland as¬ sumed inquisitorial powers, and even torture was administered under the sanction of its au¬ thority; but it is now entirely merged in the privy-council of Great Britain. The number of peers in the Scottish parliament was latterly 160, and of commons 1 55, and all sat in one house, and voted promiscuously. At the union of the kingdoms the political system of Scot¬ land was almost entirely incorporated with that of England. See Great Britain — Parliament.*

The Court of Session is the supreme civil court of Scotland. The Court of Justiciary, or criminal court, composed only of judges of the Court of Session, is supreme in the highest sense, since its decisions in criminal cases are not subject to any review. The principal subor¬ dinate judicatories are sheriff-courts, established in each county or stewartry. Sheriff-substi¬ tutes, or judges ordinary, one or more holding separate courts in different districts, decide in the first instance, subject to the review of the principal sheriff or sheriff-depute, whose de¬ cisions, though final within the limits of his jurisdiction, are reviewable by the Court of Ses¬ sion, with the exception of classes of cases pro¬ vided for by special statutes. Besides the Sheriff-Court, each county or district of a county has its justice of peace courts, in which judges, not stipendiary, decide on principles of equity in minor crimes ; and in every town of any im¬ portance are bailie, dean of guild and police courts, with limited jurisdictions.

Education. — Scotland has had a national system of elementary education for over two centuries, a school having been established in every parish by a law of 1696 (where such a school was not already established), according to a system proposed by John Knox long be¬ fore. This scheme did effective service for the education of the people, till the great increase

SCOTLAND SCENERY

1 Fingal's Cave

of population, especially in towns, rendered it unequal to the task laid upon it, and this was notwithstanding the erection of many schools by various religious denominations. By the Elementary Education Act of 1872 the Scottish Education Department was instituted, and each burgh and parish or group of parishes was required to have a school board to administer both elementary and secondary schools. Ele¬ mentary education is compulsory between the ages of 5 and 14, with exemption, on conditions, for children over 12. In 1889, by a capitation grant, education was made free for the com¬ pulsory standards. In 1897 provision was made for grants in aid of voluntary schools. In 1916, 3,369 schools were in receipt of grants ; these had an enrolment of 1,106,240 and an average attendance of 752,566. There are also numerous grammar or high schools and academies in every town of any size, though no systematic scheme of secondary education. Other institutions are the normal or training schools and colleges of the different religious bodies, and four universities of Edinburgh, Glasgow, Aberdeen and Saint Andrews. The first university was that of Saint Andrew, dat¬ ing from 1411; next came that of Glasgow (1450), then King’s College and University Aberdeen (1494), then Edinburgh University (1582), lastly Marischal College and University Aberdeen (1593). The two Aberdeen universi¬ ties were united in 1860. In board-schools now education is practically free.

Civil History. — The country now called Scotland emerges from pre-historic obscurity during the Roman occupation of Britain, though for many centuries little is known of its his¬ tory. It is supposed that the earliest inhab¬ itants of the country were a non-Aryan race resembling the Iberians, and typified now by tfie Basques. A Celtic (and Aryan) people seem subsequently to have entered the country, and to have gained predominance over the non- Aryans, the combined people occupying at the Roman invasion most of the country north of the Forth and Clyde estuaries, which was called Caledonia (q.v.) by the Romans, and its people Caledonians. The southern part of the country was inhabited by another Celtic race, the Brythons or Britons, of the same blood as the Welsh. The descendants of the Caledonians were afterward called Piets, and were the pre- domiant people in North Britain at the begin¬ ning of the 6th century,

when a colony of Scots or Dalriads from Ireland effected a settlement in Argyll, and gradually spread over the ad¬ jacent regions. It is from these Scots (a Celtic and Gaelic-speaking people) that the country afterward received the name of Scotland, the original Scotland (Scotia) being Ireland. The Pictish tribes were divided into two great sec¬ tions, the Piccardach or Southern Piets, aqd the Cruithne or Northern Piets. In the 9th century the Dalriadic Scots with the help of the Cruithne conquered the Southern Piets, but the Northern Piets, the ancestors of the modern Highlanders, still retained their independence. The Teutonic element was introduced into Scotland as early as the 4th century, when bands from North Germany seem to have formed settlements on the east coast south of the Firth of Forth; and this part of the country was subsequently united to the Anglian kingdom of Northumbria, which vol. 24 — 28

extended from the Forth to the Hurnber. To the west of this kingdom, from Dumbarton to the Solway and into England, extended the kingdom of Strathclyde or Cumbria, inhabited by Romanized Britons.

About the middle of the 9th century Ken¬ neth MacAlpin, son of a ruler of a body of Scots established in Galloway, but of Pictish descent through his mother, united in his own person the sovereignty of both the Piets and the Scots. The Norsemen had already estab¬ lished a footing on the islands of the north and west coasts as far south as the Isle of Man, and a Norse earldom of Orkney was established. Kenneth's kingdom comprised Cen¬ tral Scotland (Argyle, Perth, Angus, Mearns and Fife), with Scone as capital, the north of Scotland being mostly under independent chiefs, or maormors. The reigns of Kenneth and his immediate successors, Donald I, Constantine I, Grig, Donald II, Constantine II, Malcolm I, Kenneth II, Malcolm II, Duncan and Mac¬ beth, were one continued warfare with the Norsemen on one hand and with the Britons of Strathclyde and the English of Northum¬ bria on the other. Malcolm I (943-954) ob¬ tained Cumbria (Strathclyde) as a territorial fief from Edmund I, and in 1018 his grandson, Edmund II, secured Lothian, hitherto pˆrt of Northumbria, two events which materially in¬ fluenced the after history of Scotland.

On the advent of Malcolm Canmore (1058) to the throne after the death of Macbeth, the able usurper and murderer of Duncan (see Macbeth), the purely Celtic monarchy came to an end.

The conquest of England by William of Normandy, the usurpation of the English throne by Stephen, and various other incidents of English history embroiled Scotland. Sir Wil¬ liam Wallace (q.v.) distinguished himself in disputing the claim of Edward I to the throne of Scotland and Robert Bruce securing the independence of the country and his title to the throne by the decisive battle of Bannock¬ burn in 1314. He was succeeded by his

nephew, Robert Stewart, and he by his eldest son, Robert. He being a weak prince, the reins of government were seized by the duke of Albany, who starved to death the eldest son of the king. James, the second son, to escape a similar fate, fled to France; in the year 1424 he returned to Scotland, and having excited the jealousy of the nobility, he was assassinated in a monastery near Perth. James II, his son, an infant prince, succeeded him in 1437. He was killed by the bursting of a cannon at the siege of the castle of Roxburgh. James III ascended the throne at the age of seven years. His reign was weak and inglorious, and he was murdered in the house of a miller, whither he had fled for pro¬ tection. James IV, a generous and brave prince, began his reign in 1488. He was slain at the battle of Flodden. James V, an infant of less than two years of age, succeeded to the Crown. He died in 1542, and was succeeded by his daughter, the celebrated Queen Mary, whose history and tragical end are well known (see Mary Stuart). She was succeeded by her son James, who, in 1603, ascended the throne of England, vacant by the death of Queen Eliza¬ beth, when the two kingdoms were united into one great monarchy which was legislatively

united in 1707. A joint commission was ap¬ pointed to draw up articles of union in 1706. The Scottish Parliament met to consider the articles, which encountered a strong opposition headed by the duke of Hamilton, and strongly backed up by the bulk of the people. A ma¬ jority of the parliament, however, carried the measure, 16 Jan. 1707; it received the royal as¬ sent 4 Mardh ; and the Union took effect 1 May. The chief provisions of the Act of Union were (1) that the two kingdoms should be united under the name of (

For further information see articles under Great Britain — Scottish History; The Con¬ quests; Medieval England; The Reforma¬ tion; The XVIIth Century; The XVIIIth Century; The XIXth Century; Parliament; Crown and Cabinet; The Judicial System; Local Government; The Civil Service; Na¬ tional Finance; Banking; Commerce; Ship¬ ping; Railways; Agriculture; Fisheries; Mining; Religion; Education; Army; Navy, etc.

Bibliography. — For topography ethnology, geology, etc., consult Geikie, (Scenery of Scot¬ land Viewed in Connection with its Physical Geography) (2d ed. London 1887) .; Lauder, < Scottish Rivers) (Edinburgh 1874) ; Groome, (The Imperial Gazetteer of Scotland) ; Leslie, (The Gaelic Topography of Scotland) (Edin¬ burgh 1869) ; Geikie, (Geological Survey of Scotland) (London 1861-65) ; Johnston, his¬ torical Geography of the

Clans of Scotland) (London 1872) ; Leslie, (The Early Races of Scotland (Edinburgh 1866) ; Anderson, Scot¬ land in Pagan Times •* (Edinburgh 1883-86) ; Graham, Social Life in Scotland in the 18th Century) (2d ed., London 1900) ; Rogers, Social Life in Scotland) (London 1884-86) ; Bremner, (The Industries of Scotland> ; Kerr, Scottish Banking) (London 1897). For history consult Skene, (Celtic Scotland) (Edinburgh 1876-80) ; Lansdale, Scotland Historic and Ro¬ mantic (Philadelphia 1902) ; Inness, Sketches of Early Scottish History* (Edinburgh 1861) ; Rhˆs, (Celtic Britain* (London 1884) ; Munro, Prehistoric Scotland and Its Place in European Civilization (Edinburgh 1899) ; Duke of Argyll, Scotland as It Was and as It Is) (Edinburgh 1889) ; Tytler, history of Scotland from Alex¬ ander III to the Union * (Edinburgh 1866) ; Robertson, Scotland under Her Early Kings) (Edinburgh 1862) ; Burton, history of Scot¬ land* (Edinburgh 1899) ; Mackinnon, (The Union of England and Scotland } ; Rae, (The History of the Last Rebellion (1775); Craik, (A Century of Scottish History* ; Struthers,*

(The History of Scotland from the Union to the Abolition of the Feudal Jurisdiction ; Chambers, history of the Rebellions in Scot- land> ; Day, J. T., Public Administration in the Highlands and the Islands of Scotland (London 1918) ; Kermack, W. R., historical Geography of Scotland) (London 1913) ; Mackie, R. L., Scotland from the Earliest Times to the Death of Scott) (London 1916) ; Macmillan, D., Short History of the Scottish People* (ib. 1911). Consult also the bibliog¬ raphies appended in articles under Great Britain.*

SCOTLAND, Church of. See Discipline,

Books of; Presbyterianism.

SCOTLAND, Language and Literature of. I. Language. — Previous to 1400, the term <(Scottis,® i.e., Scottish or Scots was used in Scotland exclusively to refer to Gaelic, the language of the Celtic inhabitants of the north and west ; the speech of the Low¬ lands being then and for a century later known as English, of which it was in fact a dialect. But after 1500 it became common to speak of the Lowland tongue as (

As to origin, <(Scots® is in the main a de¬ velopment of Northumbrian, the Teutonic lan¬ guage spoken by the Anglian settlers in the region between the Humber and the Forth. Of the steps in this development previous to the 13th century we have, for that part of North¬ umbria lying north of the Tweed, little direct evidence; and when finally we find, about the beginning of the 14th century, undoubted Scot¬ tish documents, the language differs little if any from what is known as Northern Middle Eng¬ lish. This indentity is natural enough when we remember that the boundary

between the king¬ doms had been for centuries a shifting one, the border counties being now English, now Scot¬ tish. But after the present frontier was vir¬ tually settled, the wars over Scottish independ¬ ence, the chronic estrangement which they produced between the two kingdoms and the political alliance with France, all combined to produce conditions which made probable a sep¬ arate linguistic development for Scotland; so that by 1450, when the Midland dialect had practically driven all others out of the literary field in England, <(Scots® (now called Middle <(Scots,® as distinct from the previous stage of Early <(Scots® was in a fair way to independ¬ ence. The flourishing of a national literature in the years between 1475 and 1550 aided this development; and in spite of the great influence of Chaucer, Gower and Lydgate, the northern tongue reached in the first half of the 16th century its point of greatest dissimilarity to English. The basis of the language remained, of course, the same as that of English, except that it was from the Northumbrian form of the parent speech that it was derived. The inflec-

tions had tended to disappear earlier in the Northern than in the Midland dialect, larger admixtures of Norse and Celtic had taken place, and, though English had absorbed more French, Scots had received independently many French words not found in the south. There was, be¬ sides, in the Scottish writers of the 16th cen¬ tury a strong tendency to import words direct from the Latin, and we find, especially in the courtly style of the period, a large number of barely naturalized Latinisms that found no per¬ manent home in the vernacular.

Had nothing arisen to disturb the detach¬ ment of the two kingdoms, it seems likely that a sister language to English would have been established in the north, with distinct qualities of vigor, music and picturesqueness of its own. But the effect of the Reformation was to enable England to displace France in Scotland's for¬ eign relations; and the influence of Protestant England on the speech of the Scottish pulpit was greatly strengthened by the acceptance in Scotland of English translations of the Bible. These forces, which have continued to work in Scotland to the present day, soon accustomed the common people to the use, if not of pure English, at least of a highly Anglicised form of Scots ; and while supplying the peasantry with a polite dialect for purposes of religion and inter¬ course with the gentry, left the national lan¬ guage, now devoted to more homely uses, to become a mere patois. The moving of the Court from Edinburgh to London at the Union of the Crowns in 1603 still further accentuated the change, both by deciding that English was to be the

language of high society throughout Britain, and by making clear to Scottish men of letters that, if they were to reach the larger audience, they must cultivate the language of "the predominant partner.®

Thus passed the possibility of a real national language for Scotland. Various attempts to restore it were made from time to time, and with the intellectual revival in Scotland in the 18th century, Allan Ramsay, Fergusson, and finally Burns, turned once more to the ver¬ nacular as their medium of expression. But it was a greatly changed vernacular. The century and a half of the domination of English in mat¬ ters of culture had reduced its scope, and broad "Scots® could be maintained only in the treat¬ ment of a limited range of subjects. Even into these, English and semi-English forms con¬ stantly intruded, and anything like a pure de¬ scendant of the pre-Reformation "Scots® of Lindsay and Douglas it is impossible to find. Though the old tradition, impoverished as it was, was valiantly upheld by Burns, and turned to artistic uses with amazing success, yet with Burns the account is practically closed. He has had many imitators; other authors of Scottish birth have written in the dialect; but we are not again to have a "Scots® writer using the old tongue as his normal literary medium. The race of the "makars® is ended, and the dialects into which the old speech has disintegrated have crept into corners to die.

II. Literature. — Few vestiges of the earliest writings in "Scots® have survived. Some frag¬ ments of patriotic verse have come down from the troublous times following the death of Alexander III, but the earliest name is that of Thomas the Rhymer of Erceldoune, a shadowy figure long regarded as a prophet. He seems

to have flourished in the end of the 13th cen¬ tury, and is himself the hero of the romance of (Thomas of Erceldoune^ His name is con¬ nected with the Northern romance of (Sir Tris¬ tram > ; but no general agreement has yet been reached as to the probability of his authorship. The poem itself is a paraphrase from the French, written in an elaborate stanza but with¬ out great poetic distinction. Somewhat later than Thomas, but hardly less shadowy, is an¬ other supposed writer of romance, Huchown of the Awle Ryale, who, according to Wyntoun,

" Made the gret gest off Arthure And the Awntyre off Gawaine,

*The Pystyll als off Swete Swsane.'**

The last of these is easily identified with a version of the story of Susanna and the Elders, written in a difficult stanza with interlacing rhymes and alliteration. But the relation of the extant poems on Arthur and Gawain to those mentioned by Wyntoun is a puzzle yet unsolved, as is also the

identity of Huchown himself, whom some have found in a certain Sir Hew of Eglintoun, who died in 1375. Practically all the anonymous Northern romances have been as¬ signed to Huchown ; but the absence of criteria of dialect sufficient to place these poems definitely on either side of the border makes it difficult to decide which, if any, of them should be regarded as Scottish literature.

With the author of (The Bruce) we come out into clear daylight. John Barbour (?1320- 95) was in 1357 already Archdeacon of Aber¬ deen, and we have record of his employment in clerical offices about the royal household. (The Bruce, J on which he was at work in 1375, is a celebration of the life and exploits of Robert I, written in the octosyllabic couplet and in the general manner of the metrical romances. It contains much history and some — it is un¬ certain how much — fiction. The poet was con¬ temporary with many who knew Bruce, and it is more than probable that much of his material was derived from eye-witnesses of the events related. His work is raised above the level of mere chronicle by the warmth of his patriotism and hero-worship and by the vividness of occa¬ sional sketches of character and incident. To the same author have been attributed fragments of a poem on Troy and a collection of saints' legends, but neither ascription is now believed to be valid.

Barbour's patriotic task was carried on in the beginning of the next century by Andrew of Wyntoun (fl. 1395-1424) in his long and uninspired (Orygynalle Chronykiip a history of Scotland in octosyllabic couplets, from the crea¬ tion of the world to the reign of James I. A third poem with patriotic purpose is (The Wallace, > usually attributed to Henry, a blind minstrel who flourished in the latter half of the 1 5th century. It is stated by the historian John Major (b. 1469) that this Henry, blind from birth, composed a book on Wallace when Major was a boy; but the manuscript of the extant

Wallace oil which the patriotism of Scottish children is still fed, and in a modernized version, made by Hamilton of Gilbertfield in 1722, it continued popular into the 19th century. It is probably the earliest poem in Scots to em¬ ploy the heroic couplet.

The influence of Chaucer occasionally dis¬ cernible in (The Wallace) had already made it¬ self evident in Scotland in (The Kingis Quair) of James I. This is a beautiful example of the conventional love-allegory of the Middle Ages, written in the seven-line stanza of Chaucer, and in a form of Scots

greatly modified in imita¬ tion of Chaucer's English. The heroine is ap¬ parently Lady Jane Beaufort, whom James married at the close of his captivity in England; but precise autobiography should not be sought in an allegory. There is no more charming specimen of this type of love-poem in any Eng¬ lish dialect ; and the romantic character and tragic death of its royal author have combined with its poetic quality to give it a unique place.

Contemporary with Blind Harry was the most versatile and original poet Scotland had yet known, Robert Henryson (? 1425- ? 1506) , schoolmaster in Dunfermline. His greatest single achievement is (The Testament of Cres- seidp a continuation of Chaucer's

Early Scottish poetry is generally regarded as having reached its height in William Dunbar (? 1460- ? 1520). Most of Dunbar's life was spent about the court of James IV, where he remained in the hope, never fulfilled, of receiv¬ ing a fat benefice. He wrote in two styles which may as a rule be fairly easily distin¬ guished. In the one, his <(aureate® style, are composed his courtly allegories, complimentary addresses, and devotional poems ; in the other, his satirical and humorous poems. The aureate style is laden with Latin words of the type of

<(celsitude® and ˆpulchritude,® often coined for the occasion; and the versification, especially in its rhyme schemes, is often very elaborate. Among the most notable in this style is (The Goldyn Target a prettily worked-out allegory of the Court of Love type, differing from the mass of poems of its kind chiefly by the firm hold kept by the poet on the psychological sig¬ nification of his symbols and personifications. (The Thrissil and the Rois) belongs to the same class, and celebrates the marriage of James IV to Margaret Tudor. Of the poems written in the broader vernacular, the most extreme is the

Gavin Douglas (1475-1522) was thˆ third son of Archibald, Earl of Angus. Like Dunbar, he was a churchman, but of far different fortunes. Provost of Saint Giles in Edin¬ burgh and later Bishop of Dunkeld, he was led by his family connections into various political and diplomatic activities, and the fall of his house from power led to the loss of his bishopric and his exile. He died in London of the plague. His (Palice of Honour) is the most elaborate specimen of the allegory in Scots, and it exhibits most of the vices of its kind. It abounds in descriptions of pagan deities in pro¬ cession and of wonderful gardens and castles, written in fluent verse decorated with copious <(aureate® terms ; and the classical element is varied by a suffusion of Catholic theology and morality. But the style lacks fire, and the allegory itself is rambling and incoherent. (King Hart, the ascription of which to Douglas is usually though not universally accepted, is a shorter production of the same general type, more directly didactic in aim, but also*

much clearer in conception. But Douglas's fame de¬ pends chiefly upon his translation into heroic couplets of the 12 books of the

Maphaeus Vegius, and original prologues to each book. The work is notable as the first com¬ plete translation of a classical poem into verse in Britain, and is in itself no small achieve¬ ment. Some of the prologues are remarkable for highly realistic descriptions of nature, in which the ˆcatalogue55 method is carried to an extreme.

The last notable figure of the group carries us down almost to the date of the Scottish Ref¬ ormation. Sir David Lindsay of the Mount (1490-1555) became attached to the royal house¬ hold while still a young man, apparently as some kind of entertainer; and in 1512 he was appointed attendant to the infant King James V. Later he was knighted and made Lyon King at Arms, an office which carried with it, besides heraldic and diplomatic functions, the supervision of court fetes. His poetry begins with (The Dreme5 (1528), an allegorical vision in rhyme royal, combining science with the ex¬ posure of contemporary abuses. (The Com- playnt to the King) (1529) presents a request for reward in the manner of Dunbar, recalls the poet's early intimacy with the king, and criticises his advisers. (The Testament and Complaynt of our Soverane Lordes Papyngo) (1530) contains much political matter and some very frank satire on the priesthood. (An Answer to the Kingis Flyting) shows Lind¬ say engaged in a political altercation with his master, scarcely less scurrilous than that be¬ tween Dunbar and Kennedy. Satire on the court appears also in the (Complaynt of the Kingis auld Hound) ; (The Jousting between Watson and Barbour) ridicules a mock tourna¬ ment between two court physicians; the (De- ploratioun of the Death of Queen Magdalene5 is an official production on conventional lines ; (Kitteis Confession,5 an amusing attack on the Confessional; (Ane Supplicatioun againis Syde Taillis,5 a witty if coarse satire on feminine fashions. (The Tragedy of the Cardinal5 (1547) is a virulent attack on Cardinal Beaton, lately murdered. (The Historie of Squire Meldrum,5 the freest of his poems from satire or didactic¬ ism, is a narrative of the martial and amorous adventures of a contemporary laird, modeled on the mediaeval metrical romance, and exhibit¬ ing a lighter touch and more charm than any¬ thing else of Lindsay's. His last work, the (Dialogue concerning the Monarchic5 is a long and tedious production dealing with the history of the world and the kingdoms thereof from the Creation to the Day of Judgment. But by far the most important of his works is his (Satyre of the Thrie Estaitis,5 a vigorous Morality with interspersed Interludes, satirizing the various abuses under which Scotland

suf¬ fered, with special stress on the corruption of the clergy, and offering abundant advice to the king, before whom it was acted in 1540. From this enumeration of his works it will have ap¬ peared that Lindsay was much more a re¬ former than an artist. But his vigor and sincerity, his earnestness and outspokenness, not only made him a powerful force in the over¬ throw of the Catholic Church in Scotland, but enabled him alone of the pre-Reformation poets to remain popular in the following centuries. Over 50 editions of his works, in whole or in part, have been issued since his death.

In spite of the absorbing interest of religious controversy, there existed a group of poets in

Scotland in the second half of the 16th century who wrote on other themes. Alexander Scott (1547-84) is almost exclusively a love-poet; and his 36 surviving pieces exhibit such techni¬ cal skill in versification and so much genuine lyrical power as to make him, in this respect, the most worthy predecessor of Burns. Alex¬ ander Montgomerie (? 1 540— ? 1610) , his disciple, worked under the further influence of that movement in English poetry which is repre¬ sented by Tottel's (Miscellany,5 as is seen by the frequency of the sonnet among his verse- forms. He seems to have invented the peculiar 14-line stanza, imitated by Ramsay and Burns, known by the name of the first poem written in it, (The Banks of Helicon.5 His more popu¬ lar poem, (The Cherry and the Slae,5 is in the same form ; and he experimented largely in other stanzas. His chief subjects were love, nature and religion ; and he added one more to the list of Scottish flytings. More interesting than the work of the minor writers of the period such as Maitland, Sempill and James VI is the book of (Gude and Godlie Ballates,5 a remarkable collection of Protestant verses, many of them violently controversial, written to the tune and often parodying the words of popular secular songs, and intended for purposes of propaganda. Most of them are ascribed to James and John Wedderburn, whose brother Robert wrote anti-Papist plays.

Of literature in vernacular prose, Scotland has little to boast. Most of that written be¬ fore 1600 is translation, the most important being the anonymous (Complaynt of Scotlande.5 This curious work was written by a strong partisan of the French as opposed to the Eng¬ lish alliance, and the scheme of the allegory on which the political part of the work is based is adapted from (Le Quadrilogue Invectif5 of Alain Chartier. More original than this serious setting forth of the woes of Scotland and their remedies is an inserted (Monolog Recreative5 containing a mass of curious description, with lists of popular songs, tales and dances, used by a group of shepherds. The works of Knox and his followers and opponents belong to religious controversy rather than to literature ; and most of the writings of

George Buchanan (q.v.), the great Scottish humanist, were in Latin. Through the whole period so far discussed flourished the traditional Ballads (q.v.), which vie in interest and value with the works of the known authors.

In the period following the Union of the Crowns, the most important men of letters such as Sir Robert Aytoun, William Alexander, Earl of Stirling and Drummond of Hawthornden, wrote in English. One family, the Sempills of Beltrees, kept up the vernacular tradition, and Sir Robert (? 1 595— ? 1660) revived in (The Life and Death of Habbie Simson5 the six-line stanza which has come to be the recognized vehicle for Scottish elegy. Most of the songs of this period are anonymous, but the names of Lady Grizel Baillie, Lady Wardlaw and Hamilton of Gil- bertfield show that the dialect could still be written by the upper classes. Hamilton is the chief link between the Sempills and Allan Ram¬ say (1686-1758), whose work both as a poet and as a collector marks the definite revival of the vernacular. Ramsay first a wig-maker and then a bookseller as well as a poet, and we owe much to his enterprise in issuing his two collections, ((The Tea-Table Miscellany55 con-

taining songs old and new, Scots and English, and (The Evergreen,5 selections of Scots verse, chiefly from the Bannatyne manuscript. He wrote himself many songs, tales and fables, his most popular work being the pastoral drama, (The Gentle Shepherd.5 The corruption of the later Scots is abundantly exemplified in Ram¬ say's diction ; and the substance and tone of his poems suffer from an analogous defect in the mixture of Scots and English influences. Yet his songs were undeniably popular ; he had some gift of comedy and satire ; and he gained through his pastoral a prominent position in that field. As an editor he helped to preserve older poetry which might otherwise have been lost, and to revive interest in the national literature; but his methods were those of his time, and he amended and ˆimproved55 ruth¬ lessly.

Ramsay's activity was followed by the pro¬ duction of many good songs by a variety of writers, but none of the importance of Robert Fergusson (1750-74), a youth of genius, whose career in too many respects foreshadowed that of Burns. He sought relief in conviviality from the drudgery of a clerkship, fell a victim to religious melancholy, and died mad at 24. In his Scots verse Fergusson carried on the na¬ tional tradition both as to language and versi¬ fication, and displayed gifts not only of wit and humor but of genuine poetry, and a sense of style much surpassing Ramsay's. In his poems Burns found inspiration and models for some of his

most popular productions; and he has left in poems like (Auld Reekie5 a vivid picture of the Edinburgh of his day.

In the achievement of Robert Burns (q.v.) Scottish poetry reached its climax and virtually its conclusion. A few poets whose lives over¬ lapped his have been hailed by their respective admirers as his successors. Joanna Baillie (1762-1851) wrote some good humorous songs; Caroline Oliphant, Baroness Nairne (1 766— 1845), sang with poignancy the pathos of the lost Jacobite cause; and James Hogg, the Ettrick Shepherd (1770-1835), her rival in Jacobite lyric, attempted a much more am¬ bitious task in (The Queen's Wake.5 Two at least of the poems in this composite and un¬ even work are worthy of remembrance, the deli¬ cate and charming ((Kilmeny,55 and the weirdly humorous ((Witch o' Wife.55 Many song-writers must be left unmentioned here. Scott, Steven¬ son and their successors wrote occasional ver¬ nacular lyrics and introduced vernacular dia¬ logue into their novels, but the day for the spontaneous and complete use of Scots as a medium of expression by Scottish men of let¬ ters is past.

Bibliography. — The authoritative account of the origins and development of the Scots language is Dr. J. A. H. Murray's (Dialect of the Southern Counties of Scotland5 (London 1873). Consult also Smith, G. G., Specimens of Middle Scots with glossary5 (Edinburgh 1902). For the literature, Dr. Irving's (History of Scottish Poetry5 has been largely superseded by T. F. Henderson's (Scottish Vernacular Literature5 (rev. ed., Edinburgh 1910), and the ˆLiterary History of Scotland,5 by J. H. Millar (New York 1903). Dr. J. M. Ross's (Scottish History and Literature to the Period of the Reformation5 (Glasgow 1884) and Hugh

Walker's (Three Centuries of Scottish Litera¬ ture,5 from the Reformation to Scott (2 vols, Glasgow 1893), taken together give a fairly complete view of the subject. Most of the works of the earlier writers are now ac¬ cessible in the publications of the Scottish Text Society; and the (

William A. Neilson,

Professor of English, Harvard University.

SCOTT, skot, Austin, American college president : b. Maumee, Ohio, 10 Aug. 1848. He was graduated from Yale in 1869, and later became private secretary to George Bancroft, the historian. After serving as instructor in German at the University of Michigan, and as¬ sociate professor in history in Johns Hopkins, he assisted Bancroft in collecting and arranging material for his Constitutional History.5 In 1883 he was called to Rutgers College, where he taught in the departments of history and political economy until he became its president in 1890-96, when he again assumed his pro¬

fessorial duties.

SCOTT, Charles, American soldier: b. Cumberland County, Va., 1733; d. 22 Oct. 1813. He served under Braddock in 1755 as a non¬ commissioned officer, and at the outbreak of the American War for Independence he raised and commanded the first company raised south of the James River. He was promoted colonel in 1776, was prominent at the battle of Trenton in 1777, and was promoted brigadier-general. He served in the two subsequent New Jersey campaigns, and under Gen. Anthony Wayne at Stony Point in 1779. He was taken prisoner in 1780 and was held until nearly the end of the war. He then settled in Woodford County, Va., and later saw service in Indian wars. He served under General St. Clair in 1791 and under General Wayne at the battle of Fallen Timbers later in the same year. In 1808-12 he was governor of Kentucky.

SCOTT, Charles Felton, American electri¬ cal engineer : b. Athens County, Ohio, 19 Sept. 1864. He, was graduated at the Ohio State University in 1885, and later studied at Johns Hopkins University. He was engaged as an electrical engineer in 1888-1911, since when he has been professor of electrical engineering at the Sheffield Scientific School, Yale.

SCOTT, Clement, English author and journalist: b. London, 6 Oct. 1841; d. 25 June 1904. He was educated at Marlborough Col¬ lege and became widely known as a dramatic critic to the Daily Telegraph in 1873. Previous to his editorship of The Free Lance he was a well-known writer upon the staff of the Sun¬ day Times, the Weekly Dispatch, the London Figaro, and other publications of note, and in 1880 became the editor of the Theatre, a Lon¬ don magazine. While not a great dramatic critic, he became a leader of popular opinion in things theatrical. He was the author of (Lays and Lyrics5 ; (Thirty Years at the Play5 ; (From the Bells to King Arthur5 ; (The Wheel of Life5 ; (Madonna Mia,5 and (The Drama of Yesterday and To-Day5 ; (Sisters by the Sea5 ; (Ellen Terry.5

SCOTT, David, Scottish painter: b. Edin¬ burgh, 10 Oct. 1806; d. there, 5 March 1859. He

*early determined to become a painter, and be¬ gan by drawing vignettes and frontispieces for books. In 1827 he formed an association with some artists, who founded the Life Academy for the study of the living model. The fol¬ lowing year he exhibited his first picture, 'The Hopes "of Early Genius Dispelled by Deaths 'The Combat "of Fingal with the Spirit of Lodi,**

(Sarpedon Carried by Sleep and Deaths (Monograms of Man, and other works painted between 1828 and 1832 indicated the wild and incoherent character of his genius, and the numerous large canvases which he filled with tireless industry and enthusiasm quite failed .in producing the effect he anticipated, his pic¬ tures being grandly conceived, but wanting in color and finish. In 1841 he exhibited what has generally been considered his greatest pic¬ ture, (Vasco de Gama Encountering the Spirit of the Storm at the Cape,* which was subse¬ quently purchased for the Trinity House at Leith. His whole career was an arduous strug¬ gle, not with absolute failure, but with a suc¬ cess far from adequate to his aspirations, and he must be looked upon as the Scottish counter¬ part of Haydon.*

SCOTT, Dred, American negro slave : b. Missouri, about 1810; d. after 1857. See Dred Scott Case.

SCOTT, Duncan Campbell, Canadian poet : b. Ottawa, Ontario, 2 Aug. 1862. He was educated at Stanstead Wesleyan College, and entered the Canadian civil service in 1879, be¬ coming chief accountant in 1893. Besides his con¬ tributions of verse to the current periodicals, he has published in verse (The Magic House (1893); (Labour and the Angel* (1898); 'New World Lyrics and Ballads* (1905) ; 'Via Borealis* (1906), and in prose, (The Village of Viger,* a collection of stories (1896) ; 'John Graves Simcoe* (1905), in the ' Makers of Canada* series.*

SCOTT, Eben Greenough, American au¬ thor: b. Wilkesbarre, Pa., 15 June 1836. He was graduated from Yale in 1858, and is the author of 'Interstate Law of Pennsylvania ; de¬ velopment of Constitutional Liberty,* and Re¬ construction During the Civil War.**

SCOTT, Fred Newton, American educa¬ tor and authority on English: b. Terre Haute, Ind., 20 Aug. 1860. He was graduated at the University of Michigan in 1884, and has since been associated with the faculty of that uni¬ versity, becoming professor of rhetoric there in 1901. He was university editor in 1897-1900. He edited many classic and standard works, is joint author of (Guide to the Literature of Esthetics (1890) ; and of numerous textbooks on the English language. Author of 'Esthet¬ ics, Its Problems and Principles* (1890) ; Principles of Style* (1890), etc.*

SCOTT, Sir George Gilbert, English archi¬ tect : b. Gawcott, near Buckingham, 13 July 1811 ; d. London, 27 March 1878. While still a youth he was placed by his father in the office of an architect, where his tastes drew him mainly to the study of Gothic architecture. The Martyrs' Memorial, erected at Oxford in 1841, was the first work which brought him into notice. It was followed by the new church at Camberwell, and in the same year he was the successful competitor for the rebuilding of the

church of

Saint Nicholas at Hamburg, which had been de¬ stroyed by fire. Among his other designs are included the cathedral church of Saint John's, Newfoundland; Glasgow University; Leeds In¬ firmary; chapels at Exeter College, Oxford, and Saint John's College, Cambridge; the Memorial to the Prince Consort, London; Saint Mary's Cathedral at Edinburgh, etc. Toward the close of his life he was engaged in carrying out the restoration of the cathedral at Saint Albans. Among the restorations accomplished by him are those of many English cathedrals. He was the author of Plea for the Faithful Restoration of Our Ancient Churches (1850) ; 'Conservation of Ancient Architectural Monuments* (1864); 'Lectures on the Rise and Development of Mediaeval Architecture* (1878) ; Personal and Professional Recollections* (1879).*

SCOTT, Harvey W., American editor: b. Tazewell County, Ill., 1 Feb. 1838; d. 7 Aug. 1910. He removed to Oregon in 1852, and in 1865 became editor and chief owner of the Portland Oregonian. He made that newspaper the leader among the Pacific Coast papers, while his sturdy independence of policy and clear, forceful writing made him as an editor a political power. The Oregonian stood for the gold standard in the election of 1896 and Scott had the satisfaction of seeing Oregon carried by the Republicans, the only Pacific Coast not registering its vote against the gold standard.

SCOTT, Hugh Lenox, American military officer : b. Danville, Ky., 22 Sept. 1853. He was graduated from the United States Military Academy 14 June 1876 and was commissioned second lieutenant 15 June 1876; first lieutenant 28 June 1878; captain of cavalry 24 Jan. 1895; major and assistant adjutant-general, United States Volunteers, 12 May 1898; lieutenant- colonel and assistant adjutant-general, United States Volunteers, 17 Aug. 1899; major 25 Feb. 1903. Served in Sioux expedition, 1876; Nez Perce expedition, 1877 ; Camp Robinson, Nebraska and Cheyenne expedition, 1878; sub¬ sequently performed routine duty, principally with the Indians of the Plains, 187S-91 ; honor¬ able mention from War Department, 1891 ; in charge investigation of Ghost Dance disturb¬ ances, 1890-91 ; enlisted and commanded Kiowa, Comanche and Apache Indians, troop L, seventh cavalry, 1892, until mustered out after five years' enlistment (last Indian troop mustered out) ; in charge of Geronimo's band of Chiri- cahua Apaches, 1894-97. On duty at Bureau of Ethnology, Smithsonian Institution, writing work on sign language, Plains Indians, North America, November 1897, until outbreak of Spanish War. He served as adjutant-general of Second and Third Divisions of First army corps, May 1898 to February 1899; adju¬ tant-general, Department of Havana, under General Ludlow, March 1899, to May 1900; adjutant-

general of the Division of Cuba until November 15, when the Division of Cuba was changed to Department of Cuba; adjutant-general of Department of Cuba 1900-02, and acting governor-general of Cuba; took part in turning over the govern¬ ment of Cuba to the Cubans, 20 .May 1902 ; was on duty with General Wood winding up the affairs of the Military Government of Inter¬ vention in Cuba, 1902. He served in the Philip¬ pines, 1903-06, in the establishment of civil gov-

ernment, as governor and commander of troops in Sulu Archipelago ; the conquest and pacifi¬ cation of the Sulu Archipelago and brought about the abolishment of slavery and the slave trade therein.

On 31 Aug. 1906, he was appointed super¬ intendent of the United States Military Acad¬ emy, with rank of colonel, and served as such until 31 Aug. 1910. On 3 March 1911, he was commissioned lieutenant-colonel of cavalry, and on 18 Aug. 1911, he reached, in due course of promotion, the rank of colonel, and was as¬ signed to command of the Third cavalry. In November 1911, he was sent by the Secretary of War on a special mission to New Mexico and Arizona to adjust Indian troubles; on 23 March 1913 was promoted to rank of brigadier-general. During year April 1913 to April 1914, he com¬ manded the United States troops on southern border from Texas to California, at time of our difficulties with Mexico. On the breaking out of severe troubles with the Navajo Indians on Beautiful Mountain, Arizona, November 1913, he was sent there with four troops of cavalry and was so successful in settling a difficult situ¬ ation that he received the commendation of both the President and the Secretary of War. On 22 April 1914, he was appointed assistant chief-of-staff, and on 17 November of same year became chief -of -staff. In January 1915 he settled by diplomacy the impending conflict on the Mexican border at Naco, Arizona. In March 1915, he settled the Piute Indian trouble at Bluff, Utah. On 30 April 1915 he was pro¬ moted to rank of major-general. In August 1915, he was sent down to the Mexican border on a special mission, and was successful in re¬ covering property of foreigners in Mexico con¬ fiscated by General Villa. In 1917 he was a member of the United States Commission to Russia and on 26 Dec. 1917 was made com¬ mander of the 78th Division of the National Army at Camp Dix, Wrightstown, N. J. In March 1918 he was made commander of Camp Dix. In 1910 he received the L.H.D degree from Princeton University, and in 1915 the LL.D. degree from Columbia College. General Scott is a member of the Geological Society of America, American Anthropological Associa¬ tion, Historical Society of Texas, Historical Society of North and South Dakota, Society of

Moro Campaigns, Society of American Wars, Military Order of Foreign Wars, and Society of the Spanish- American War. He is author of various monographs and reports relating to the Plains Indians.

SCOTT, Hugh Stowell, English novelist, known by the nom-de-plume ((Henry Seton Merriman® : b. Newcastle-on-Tyne, 1862; d. Ipswich, 10 Nov. 1903. He was a short while in business, made numerous sea voyages, finally devoted himself wholly to literature, and from the appearance of his novel (The Phantom Fu- ture5 in 1889 wrote a long series of somewhat melodramatic works of fiction, particularly suc¬ cessful when dealing with Russia and Nihilistic plots. His best book was perhaps (The Sow- ers) (1896). Others are

SCOTT, John Morin, American soldier and legislator: b. New York, 1730; d. there, 14

Sept. 1784. He was graduated at Yale Uni¬ versity in 1746, and engaged in practice in New York. He was an early supporter of American rights against the British Crown, was one of the Sons of Liberty and an advocate of extreme measures. He was a leading member of the New York General Committee in 1775, and a delegate to the Provincial Congress in that year, In 1776 he was appointed brigadier-general in the Continental Army, and he participated in the battle of Long Island. He was secretary of State for New York in 1777-79, and served in Congress in 1780-83.

SCOTT, Julian, American artist: b. John¬ son, Vt., 14 Feb. 1846; d. Plainfield, N. J., 4 July 1901. He entered the Northern army in 1861 and while in service made his mark by his sketches of hospital life. He entered the Na¬ tional Academy, New York, in 1863, and sub¬ sequently studied under Emmanuel Leutze. He became an associate of the Academy in 1871. His pictures are largely scenes of army life, such as (Rear-Guard at White Oak Swamp) (1869-70), owned by Union League Club; bat¬ tle of Cedar Creek) (1871-72, at the State-house, Montpelier, Vt.) ; 'Battle of Golding's Farm) (1871); 'The Recall (1872); 'On Board the Hartford* (1874) ; (Duel of Burr and Hamil¬ ton (1876) ; (Reserves Awaiting Orders >*

(1877) ; (In the Cornfield at AntietanP (1879) ;

(Charge at Petersburg) (1882) ; (The War is Over (1885) ; 'The Blue and the Gray * (1886) ; (Death of General Sedgwick,* in the Plain- field (N. J.) Public Library.*

SCOTT, Levi, American Methodist Epis¬ copal bishop: b. Odessa, Del., 11 Oct. 1802; d. there, 13 July 1882. He was chiefly self-edu¬ cated, was licensed as a local preacher in 1826 and in 1834-36 he was presiding elder

of the Philadelphia Conference. He was principal of the Dickinson Grammar School in 1840-42, and was connected with the Methodist Book Con¬ cern, New York, in 1848-52. In 1852 he was elected and ordained bishop.

SCOTT, Orange, American clergyman : b. Brookfield, Vt., 13 Feb. 1800; d. Newark, N. J., 31 July 1847. He entered the New England Conference of the Methodist Episcopal minis¬ try in 1822; was presiding elder of the Spring- field, Mass., district in 1830-34, and of the Providence, R. I., district in 1834-35. From 1833 he was a zealous anti-slavery worker, and failing to receive the support of his bishop he withdrew from the Church in 1842. In 1843 he organized the Wesleyan Methodist Church at Utica, N. Y., becoming its president. He was editor of the True Wesleyan, an anti¬ slavery and anti-episcopal publication, in 1842- 44. Failing health compelled his retirement from the ministry in 1846. Author of (An Appeal to the Methodist Episcopal Church)

(1838).

SCOTT, Sir Richard William, Canadian statesman: b. Prescott, Ontario, 24 Feb. 1825; d. Ottawa, 23 April 1913. He was admitted to the bar in 1848; was mayor of Ottawa in 1852; was elected a member of the Canadian assembly in 1857-63, and of the Ottawa assem¬ bly in 1867-73, where he was speaker in 1871— 73. He was also member of council and com¬ missioner of1 the Crown lands of Ottawa in 1871-73. He was a member of the Dominion Senate from 1874, and was Secretary of State

in 1874-78 and again in 1896-1908. He secured the enaction of the separate school act for the province of Ontario, and the Canadian temper¬ ance law known as the ((Scott Act.ˆ He was knighted in 1909.

SCOTT, Robert Falcon, English naval of¬ ficer and Antarctic explorer : b. Outlands, Devenport, 6 June 1868; d. Antarctic regions, 29 March 1912. He was educated at Stubbington, Fareham, and entered the navy in 1882. He become interested in Antarctic exploration and in 1900 after his promotion to commander he began preparations for his first exploring tour. In 1901-04 he commanded the Royal Geo¬ graphic Antarctic Expedition, discovered Ed¬ ward VII Land and reached the farthest point south then penetrated, lat. 82° 17', long. 163°. Returning in 1904 his achievements were highly acclaimed. He was appointed naval assistant to the First Lord of the Admiralty in March 1909 but resigned later in that year to make

preparations for his second journey of ex¬ ploration in the Antarctic regions. He set out in 1910 on the Terra Nova, and established headquarters at MacMurdo Sound late in that year. (See Antarctic Regions — Explora¬ tion). With four others in the party making the last part of the journey he reached the South Pole 18 Jan. 1912, after the longest sledge journey ever made, 1,842 miles. Here awaited him the bitter disappointment of the discovery that Amundsen had gained the Pole five weeks earlier. Scott photographed the tent surmounted by the Swedish flag left by Amundsen and carried with him the letter to King Haakon according to the request left by his victorious rival. Scott's observation placed the pole only one-half mile from the point selected by Amundsen, and he planted the Brit¬ ish flag there, made the necessary observations and set out upon the return journey. From the first ill-fortune dogged them; two of the party succumbed while Scott and the other two reached a point but 11 miles from One Ton Base and 155 miles from MacMurdo Sound on 20 March, with provisions for two days. They were held there by a blizzard and all died of hunger and exposure 29 March. Scott wrote in his diary until the last day, complet¬ ing his records and leaving letters to the families of his companions, his own family, friends and officers, all stamped with matchless spirit. His observations of the expedition were in excellent order and of high scientific value. These and his diary were later published in the same style as his account of the first journey. The bodies of Scott, Wilson and Bowers were recovered in the spring of 1913. The officers of the navy contributed the funds for a bronze monument of Scott executed by his wife — who after his death was by Royal order known as Lady Scott — at Waterloo Place, London, in 1915. Author of (Voyage of the Discovery) (2 vols.. 1905) ; '"Scott's Last Expedition (posthumous, 2 vols., 1913).

SCOTT, Robert Kingston, American sol¬ dier and governor: b. Armstrong County, Pa., 8 July 1826; d. Napoleon, Ohio, 13 Aug. 1900. He studied medicine and engaged in practice in Henry County, Ohio, in 1851-57, later en¬ tering the mercantile business. In 1861 he was commissioned lieutenant-colonel in the 68th Ohio regiment, and in 1862 he was promoted

colonel. He took part in the campaigns in Tennessee and Mississippi, and was commis¬ sioned brigadier-general of volunteers 12 Jan. 1865. He was assistant commissioner of the Freedman's Bureau in South Carolina in 1865- 68 and was elected governor of South Carolina in 1868 and in 1870. He was charged in 1871 with being party to a fraudulent overissue of State bonds, but cleared himself and defeated the movement to impeach him. His adminis¬ tration was further complicated by the activities of the Ku-Klux-Klan, which compelled him to appeal to President Grant for United States troops to put down the disorder. He removed to Napoleon,

Ohio, upon retiring from office,, and in 1880 he shot and killed Warren G. Drury, but was acquitted on the grounds that it was accidental.

SCOTT, Thomas, English Anglican cler¬ gyman and Bible commentator: b. Braytoft, Lincolnshire, 4 Feb. 1747; d. Aston Sandford, Buckinghamshire, 16 April 1821. Possessing a strong love for learning he obtained a wide knowledge of both Latin and Greek, and in 1773 took orders in the Church of England. Through his friendship with John Newton he became an ardent Calvinist, defending Calvinism both in the pulpit and in the public press. He was chaplain of the Lock Chapel, London, in 1785-1801, and was then appointed rector of Aston Sandford, where he remained until his death. His reputation rests chiefly on his Commentary on the Bible } (1788-92), of

which it is estimated that 100,000 copies have been sold. His other publications include (The Force of Truth) (1779) ; (Remarks on the Bishop of Lincoln's Refutation of Calvin- isnP (1812), etc. His collected (Theological Works> were published (5 vols., 1805-08; 10 vols., 1823-25).

SCOTT, Thomas Alexander, American railway manager: b. London, Pa., 28 Dec. 1824; d. Darby, Pa., 21 May 1881. He entered the service of the Pennsylvania Railroad in 1850; became its general superintendent in 1858, and its vice-president in 1859. His services as super¬ intendent of all government railroads and tele¬ graph lines at the beginning of the Civil War placed him in the ranks of men of extraordinary ability, from which he was appointed Assistant Secretary of War in August 1861. This post he resigned in the following June, but re-entered the government service later and achieved dis¬ tinction in the rapid construction of railroad lines necessary to the relief of General Rosecrans at Chattanooga. Again entering the service of the Pennsylvania Railroad, he in¬ augurated the policy of securing control of Western railway lines for the purpose of operat¬ ing them in conjunction with the Pennsylvania lines. From 1874-80 he was president of the Pennsylvania and at various times of other lines.

SCOTT, Sir Walter, Scotch poet and novel¬ ist: b. Edinburgh, 15 Aug. 1771 ; d. Abbotsford, 21 Sept. 1832. He was the ninth child of Walter Scott, a writer to the Signet (lawyer), who belonged to the strenuous Border clan of Buccleugh, and of Anne Rutherford, a repre¬ sentative of another famous family. There were 11 other children, six of whom died in infancy. Walter at the age of 18 months suffered from spinal meningitis which caused a permanent

lameness of his right leg. On account of this he was early sent to the country, where he learned to love nature. Later his imagina¬ tion was impressed by a journey to Bath and London. At the age of seven he was entered at the school in Edinburgh, where he displayed a love of sport and of good reading, though no great aptitude for hard, systematic study. For a short time he was at school at Kelso, where he formed his friendship with James Ballantyne. All accounts show that he was a manly, at¬ tractive boy who loved stories, poems like (The Faerie Queened ballads and family legends.

In November 1783 he entered the University of Edinburgh, where his course was impeded by illness and his desultory habits were not over¬ come. His knowledge of the classics was slight, but he learned something of the chief Romance literatures and, while riding or walking for his health, he laid the foundations of his immense stock of antiquarian learning. In 1786 he was apprenticed to his father and, strength having come to him, he developed systematic habits of labor. He attended law lectures and debating clubs and in 1792 was called to the bar; but his interest in literature and history was no less than it had been, and he enjoyed the con¬ vivial society of his fellow law students. De¬ spite his lameness, he was tall, strong, athletic and manly in appearance, full of life and merri¬ ment, and attractive to both sexes. An early attachment to a pretty young woman was to be expected, but impediments presented themselves and Scott was left with memories which bore witness to what is thought to have been (

His early work at the bar did not interfere with his making excursions into the Highlands and along the Border, which added to his stock of ballads and legends and gave him an ex¬ traordinary insight into the character of his countrymen. The life with which he came in contact had its seamy side, especially with re¬ spect to intemperance, but his was a romantic temperament that was not to be contaminated. A new interest also came to him in 1792, when, with his friend William Erskine, he began to study German. A few years later he attempted a paraphrase translation of Burger's Wenore,5 which he was persuaded to print along with another imitation of a ballad by the same author. This led to an introduction to <(Monk® Lewis (q.v.), who brought about the publication in 1799 of Scott's translation of Goethe's ˆotz, and persuaded his young friend to write some more ballads. Having thus had a taste of the pleasure of writing and publishing, though his success was far from dazzling, the young lawyer made plans to have his collection of bal¬ lads printed by his friend Ballantyne.*

Meanwhile, his income from his profession had increased, and he had fallen in love with the attractive daughter of a French refugee, Char¬ lotte

Mary Carpenter (Charpentier) . She had a small income settled on her, so that marriage did not seem a rash step. They took it in December 1797 and lived together congenially, although it does not appear that she was a specially qualified helpmate. In 1799 Scott was appointed sheriff-depute of Selkirkshire with a salary of £300 and few duties. Soon after, he prosecuted with energy the task of editing and publishing his important (Minstrelsy of the Scottish Borderˆ the first two volumes of which

appeared in 1802, the third in 1803. This con¬ tained some imitations of the old ballads, but fortunately did not include a narrative poem on the legend of Gilpin Horner, that was at first intended for it. The excluded poem, written in the free measure of ˆhristabeF which a friend had recited to Scott, was slowly elab¬ orated into (The Lay of the Last Minstrel, which was published early in 1805 and achieved great success. Here the creative genius of Scott first manifested itself in marked powers of nar¬ ration, characterization and description, though scarcely in what may be called the strictly poetic gifts of high imagination, inevitable phrasing and noble harmony.*

He now determined to follow literature seri¬ ously, but also to secure a more definite income than could be had from that or from his not specially brilliant work at the bar. With this end in view he undertook to perform the reportorial duties of an infirm clerk of session, who was to keep the emoluments of the office till his death or, as it turned out, until he was pensioned. Six years later (1812) Scott came into the comfortable salary of £1,300, but he had given much time to the clerkship and had done in addition work that would have worn out any less herculean constitution. He took some interest in politics, became a partner in James Ballantyne's printing business, proposed publishing schemes, wrote articles and edited books, working early in the morning, took rides (especially when he was at his beautiful home of Ashestiel near Selkirk), answered corre¬ spondents faithfully and yet found time for reading and study. There is scarcely another such energetic and copious genius of a high order in several spheres to be found in the annals of English literature.

His most important creative works during this period were

These difficulties were tided over by loans and by the transfer of more or less worthless books to the publisher Archibald Constable, and the success of the "Waverley® novels for some years made Scott feel more confident of his financial position than a prudent man should have felt. His was, indeed, a glorious genius

SCOTT

with a splendid energy to match, but he had also costly tastes which he aspired to gratify on a magnificent scale. His social position meant much more to him than his fame as a writer, and to maintain and increase that posi¬ tion he thought that he must acauire large estates and dispense a profuse hospitality. He began to realize his dream in 1812 when he bought the small farm of Abbotsford. Then he added one piece of land after another until he had spent about £30,000; he built himself a castle, and he lived on a scale which, in view of his tangled affairs, even his large income did not justify. It was only the discovery of his incomparable gifts for prose romance that his financial ruin was postponed for so long.

Early in July 1814, just after the edition of Swift in 19 volumes marked the culmination of Scott's career as an editor though not as a critic, the romance (Waverley, or 'tis Sixty Years Since, } an anonymous story dealing with the period of the Young Pretender, made its appearance and took the novel-reading world by something like a storm, six editions being needed before the close of the year. Scott had begun the tale as far back as 1805, the year of the ˆLay,® but Erskine and James Ballantyne, who wanted another well-paying poem, dis¬ couraged his attempt, and the easy-tempered author put it aside. In 1808 his attention was again directed to historical fiction through the fact that he undertook to prepare for the press an unfinished romance by the antiquary Joseph Strutt, entitled

Of course his fears proved to be ill-founded and there was no necessity for his preserving his anonymity, but he seems to have liked the mystery involved, and perhaps he thought that by remaining (

tive of his art ; but it is not difficult to understand him and it seems idle to be irritated with him. After all, he did not succeed thoroughly in his attempt to remain anonymous, for competent critics like John Wilson (q.v.) saw in the author of the novels the man who had written the poems and edited the ballads. The matter was enough discussed, however, to lead to the writing of J. L. Adolphus's ((Letters® to Heber on the Waverley Novels and the question of their authorship (1821), but even after this un¬ masking Scott continued to wear his tenuous disguise for about six years.

was followed shortly by (Guy Mannering, which illustrated his genius as a painter of Scotch life and a revealer of Scotch character — especially in the lower ranks of life. Like its predecessor it was dashed off, but was none the less immensely successful. Scott was delighted, particularly as money be¬ gan to flow in and he was thus enabled to pay obligations and buy more land. He visited London and was over-enchanted at the flattering reception given him by the Prince Regent; but then Scott was a born Tory*

and consequently not likely to see the spots in a royal sun. His cordial relations with Byron were much more to his credit, especially as he championed that unfortunate poet when all England was crying out upon him. Later he visited Waterloo and met Wellington, who greatly impressed him. The literary results of this tour, (Paul's Letters to His Kinsfolk) and (The Field of Waterloo, > a poem, were failures ; yet Scott was a great martial poet, would probably have been a sol¬ dier if he had not been lame and could scarcely have had a more congenial subject. Fortunately no decline was visible in (The Antiquary ; and in (01d Mortality,* which came later in 1816, forming with (The Black Dwarf* the first series of (Tales of My Landlord,* Scott produced a story which in construction, characterization, historical imagination and sympathy, power of description and broad human interest, ranks deservedly, not only very high in the list of his own creations, but as one of the masterpieces of English fiction. The style is not flawless, the psychology is not penetrating, the art in gen¬ eral is less subtle and refined than that to which the novelists who have followed in Scott's wake have accustomed us ; but in the essential points of wholesomeness and truth to nature and of large, copious, equable creative powers, Scott, as his influence upon other lands and generations plainly shows, has little reason to fear com¬ parison with any of his successors.*

At the close of 1817 (Rob Roy) followed and six months later came (The Heart of Midlothian, > which to many readers marks the culmination of Scott's genius as a novelist. The public responded heartily to every fresh appeal, but, unfortunately, Scott's popularity was used as a club to force publishers to take over the worthless stock of his publishing firm, and Scott and the Ballantynes were inextricably involved with Constable, who finally became Scott's sole publisher and dragged him down in his own failure. Meanwhile, the tragic (Bride of LammermoorJ which appealed so deeply to the sombre genius of Poe, and (The Legend of Montrose) appeared in 1819, despite the fact that Scott had suffered tortures from a stomachic trouble. The heroic way in which he dictated the

Ballantyne is well known, as is also the fact that, when he got up from an illness which it was feared would prove fatal, he could not recall ((a single incident, character or conver¬ sation® in the story. Yet such was his pluck that he not only began a new book, but actually branched out into a new type of novel by cross¬ ing the border and throwing his scene back into a remote past, HvanhoeC for so this important venture was named, appeared at the close of 1819 and may be regarded, not as the best, but as the most

popular of all Scott's works and as the one which made him a favorite and a great influence throughout Europe. The brilliance of its descriptions and the thrilling interest of its plot continue to atone for the carelessness of its construction and the untrustworthiness of its representation of the epoch in which its scene is laid.

Scott was now at the height of his literary and his social renown. In 1820 he accepted a baronetcy from George IV — he had previously declined the laureateship — and published (The Monastery) and (The Abbott The next year came the popular followed in 1822 by (The Fortunes of Nigel, } and in 1823 by (Peveril of the Peak.) A stroke that seemed apoplectic did not affect the power of that masterly portrayal of the age of Louis XI, (Quentin Durward) (1823), but (Saint Ronan's Well, a novel of contemporary manners, has never been popular, a fate shared by (1829), were the work of a still vigorous and an even more heroic man ; those of his complete phys¬ ical breakdown, (Count Robert of Paris* and (Castle Dangerous) (1831), call for no criticism.*

Meanwhile, the crash had come. Scott, con¬ fident in his powers, had not narrowly scruti¬ nized his relations with the Ballantynes and Constable and, in his mania for lands and build¬ ings and lavish hospitality, he had raised money on Constable's notes given for novels yet un¬ written. A general period of depression came on and Constable failed in January 1826, bring¬ ing down with him the firm of James Ballan¬ tyne and Company, of which Scott was a part¬ ner. The result was that as Ballantyne was practically without resources, Scott felt bound in honor to pay off alone a debt of nearly £120,000. How he set to work on (Wood-stock, how he refused all offers of help, how he made in two years, especially through his (Life of Napoleon Buonaparte) (1827), the enormous sum of £40,000, how he bore the loss of his wife (1826) and his own infirmities, how he turned his pen to every possible task of profit — (Tales of a Grandfather> (1829) com¬ bined pleasure with profit, — how he wrote ad¬ mirable prefaces for a new edition of his novels — all this is familiar to the reader of Lockhart.*

Early in 1830 he had a paralytic stroke and after that his efforts to save Abbotsford, where his creditors let him continue to reside, as the seat of the family he had so longed to estab¬

lish, became truly pathetic. In April 1831 he had a still more serious stroke and a little later he suffered perhaps even more acutely from the rude treatment he received from the mob at Jedburgh, where he had gone to protest against the proposed reform of Parliament. A born conservative and ever a true child of the past, it was time for him to say good-bye to a A \orld that was entering upon a series of rapid and far-reaching changes.

After his last novel had been published, it seemed that he ought to try a milder climate in order to prolong, his life. The government offered him the use of a frigate; and, after a notable parting with Wordsworth, he set out for Plymouth to take it. He visited Malta, Naples and Rome, then the Tyrol and the Rhine region. At Nimeguen, on 9 June 1832, he was severely stricken and was shortly after brought home to Abbotsford, where, on the afternoon of 21 Sept. 1832, he died, surrounded by his children.

He had been what, in his last words, he told Lockhart to be — a good man. His foibles and faults — we cannot lay the whole blame for his misfortunes on the Ballantynes and Constable — when they were not those of his class and his age, were such as detracted little from the greatness of his character, and much the same thing may be said of his defects as a writer. There have been few nobler spirits in the world's history; nor is it clear that since Mil- ton's day a more illustrious or, take him all in all, a greater writer has been born within the lands that use the English tongue. Abbotsford yields only to Stratford as a literary shrine, but it is an ironical comment on Scott's labors to aggrandize his family that no direct male heir should welcome pilgrims to it. See Guy Man- nering; Heart of Midlothian: Ivanhoe; Kenilworth; Lady of the Lake; Marmion; Old Mortality; Quentin Durward; Rob Roy; also Scott, Lockhart's Life of.

Bibliography. — The standard editions of Scott's poems and novels are those in 11 and 48 volumes with his prefaces (1829-33). The miscellaneous works fill 28 volumes in the edi¬ tion of 1834-36. Of the numerous later edi¬ tions mention may be made of the (1897), Norgate, G. Le G., (Life of Sir Walter Scott (London 1906), and others. Attention should also be given to Scott's last (Journals) (1890) and his (Familiar Letters* (1894) edited by David Douglas. For criticism con¬ sult Lang's biography and introductions; F. T. Palgrave's introduction to the "Globe® edition of the poems; Leslie Stephen, < Studies of a Biographer* (Vol. II, 1898) and (Hours in a Library* (Vol. I) ; Ruskin, (Fors Clavigera* and the histories of English literature.*

William P. Trent,

Professor of English Literature, Columbia Uni¬ versity.

SIR WALTER SCOTT

SCOTT

445

SCOTT, Walter, Canadian statesman : b. London, Ontario, 27 Oct. 1867. He was edu¬ cated in the public schools, and early settled in the North

West Territory, where he engaged in printing and journalism. He owned and edited various newspapers in 1892-1906, and in 1900 was elected to the Canadian House of Com¬ mons. He was instrumental in creating the provinces of Saskatchewan and Alberta in 1905, became the leader of the Liberal party in Saskatchewan and served as its first Prime Minister in 1905-17. He was also Minister of Public Works in 1905-12, and later was presi¬ dent of the council and Minister of Education.

SCOTT, William Amasa, American politi¬ cal economist: b. Clarkson, Monroe County, N. Y., 17 April 1862. He was graduated from the University of Rochester in 1886, was pro¬ fessor of history and political science in the University of South Dakota, 1887-90 instructor and graduate student at Johns Hopkins Uni¬ versity, 1890-92, receiving the degree of Ph.D. from that institution in June of the latter year; assistant professor of political economy in the University of Wisconsin, 1892-93; associate pro¬ fessor there 1892-97 and professor 1897-1900. Since the date last named he has been director of the school of commerce and professor of political economy in that institution. In 1911 he received the honorary degree of LL.D., from the University of Rochester. He has published Repudiation of State Debts) (1893) ; (Money and Banking) (1903; 5th ed., revised and en¬ larged, 1916) ; (Money) (1914) ;

SCOTT, William Bell, Scottish poet and painter, brother of David Scott (q.v.) : b. Edin¬ burgh, 12 Sept. 1811; d. Perthshire, 22 Nov. 1890. He received his first education in art from his father, who was an engraver, and in 1834 began to write poetry for the current magazines. His first picture of note, (The Old English Ballad Singer, was exhibited in 1838. From this time forward his reputation as a painter was established. He is best remem¬ bered, however, as a poet. While for many years he was an exhibitor in the Royal Acad¬ emy, his greatest activity was along literary lines. His most noted poetical works are (The Year of the World> (1846) ; Roems by a Painter-* (1854) and (Ballads,) etc. (1875). His other writings include Rectures on Art* (1861); (Albert Diirer : His Life and Works) (1869); (The Little Masters* (1879); Rife and Works of David Scott.**

SCOTT, William Berryman, American geologist, brother of Gen. H. L. Scott (q.v.) : b. Cincinnati, Ohio, 12 Feb. 1858. He was graduated at Princeton University in 1877, and took his Ph.D. at Heidelberg in 1880. He was associated with the Princeton faculty from 1883 and from 1884 was professor of geology and palaeontology there. He conducted the Princeton expeditions in Patagonia and was joint editor of the reports of the expeditions

(8 vols.). He has written numerous mono¬ graphs on geology and

palaeontology and is author of (Introduction to Geology (1897; 2d ed.,' 1907) ; (History of Land Mammels of the Western Hemisphere* (1913) ; (The Theory of Evolution* (1917).*

SCOTT, Winfield, American soldier: b. near Petersburg, Dinwiddie County, Va., 13 June 1786; d. West Point, N. Y., 29 May 1866. After study at William and Mary College in 1805, he read law at Petersburg, and having obtained his license, rode the circuit and was retained in several causes. In 1808 he obtained a captain's commission in the United States army, and in 1809 embarked with his company from Norfolk to New Orleans. On 18 June 1812 war was declared by Congress against Great Britain (see War of 1812). On 6 July following Scott was commissioned the lieu¬ tenant-colonel of the Second Artillery. He at once was ordered to mobilize his regiment at Philadelphia and soon after, at his request, to proceed to the Canadian frontier. He ar¬ rived at the headquarters of Brig.-Gen. Alex¬ ander Smyth 4 October. The affair at Queenstown took place on 13 October. Scott did not take part in the successful attack on the heights, but commanded the American forces in the ensuing battle, and after brisk fighting was obliged to surrender to much superior numbers. He was soon after exchanged, in March 1813, was appointed adjutant-general with rank of colonel, and at about the same time was promoted colonel of his regiment. With the regiment he joined General Dearborn on the Niagara frontier, became Dearborn's chief of staff, led the successful attack on Fort George 27 May, commanded the rear guard in the re¬ treat from Stony Creek to Fort George and co¬ operated with the naval forces in the descent on Burlington Heights and York. Promoted 9 March 1814 to be brigadier-general, he estab¬ lished a camp of instruction at Buffalo. Scott's brigade and Ripley's crossed the Niagara 3 July 1814; Fort Erie was invested and captured; and on the 4th Scott moved toward Chippewa. On 5 July occurred the battle of Chippewa (q.v.). Scott greatly distinguished himself, and General Brown, commanding, declared that to Scott more than any other the American victory was due. The battle of Lundy's Lane (q.v.) followed on the 25th, where Scott again dis¬ played great ability. These battles, both won chiefly by Scott, fully established American military prestige. For his services, Scott re¬ ceived a gold medal from Congress, and was made brevet major-general (from 25 July). He declined to act as Secretary of War, and was in Europe in 1815-16. In 1826 he was made president of a board of army and militia officers convened at Washington for the consideration of various military questions, and in 1829 was assigned to the command of the Department of the East. In July 1832 he was ordered to Illinois to take command of the forces in the Black Hawk War (see Black Hawk), and left Buffalo for Chicago with 1,000 troops. He was not in the active campaign, but co-operated with Governor Reynolds of Illinois in con¬ cluding treaties with the Sacs, Foxes, Winne- bagoes, Sioux

and Menominees. At the time of the nullification troubles he was sent to South Carolina (1831-32), where he was successful

in averting civil war. He prosecuted the Semi¬ nole and Creek campaigns in Florida (1836), and superintended the removal of the Cherokees from Georgia to their reservation west of the Mississippi. On 25 June 1841 he became major-general and general-in-chief of the army. In 1839 at the Whig Convention at Harrisburg, Pa., Scott was presented as a candidate for the Presidency, though he urged Clay as first, Har¬ rison as second, choice and the 62 votes cast for him went ultimately to Harrison. He was ordered on 23 Nov. 1846 to Mexico to take charge of the forces there. He assembled his troops at Lobos Island, moved transports in February, landed at Vera Cruz 9 March and effected its surrender 29 March. From this time he proceeded on the uniformly victorious campaign which practically closed the war by his entry into the City of Mexico on 14 Sep¬ tember. (For complete account see Mexican War and articles on various battles). At the close of the war Scott relinquished the com¬ mand to Gen. W. O. Butler, and returned to the United States, where he received a gold medal from Congress, and was a candidate in 1848 in the Whig Convention which nominated Taylor for the Presidency. In 1852 he was defeated by Franklin Pierce, and in 1855 made brevet lieutenant-general. In 1859, when the American and British governments were adjust¬ ing the northwestern boundary question, he was sent to Puget Sound to adjust the difficulties caused by the precipitate occupation of San Juan Island. At the outbreak of the Civil War, he took command at Washington 12 Dec. 1860, provided for the safety of the national capital, and the organization of the .army, but resigned the command to McClellan 1 Nov. 1861. Scott was a strict disciplinarian and this, with his formality, led to his army nickname of (<01d Fuss and Feathers.® As to his skill as a mili¬ tary leader there can be no question. He gained notable distinction in two wars. Web¬ ster, in a Senate speech (20 Feb. 1848), called the Mexican War ((the most brilliant campaign on recent military record,® and Grant writes of the faultless strategy at Churubusco. His political defeats in no way detracted from his reputation. He published (General Regulations for the Army) (1825) and Unfantry Tactics) (1835). Consult biographies by Mansfield (1846); Headley (1852); Victor (1861) and Wright (1894) ; Scott's (Memoirs) (1864) ;

Townsend, (Anecdotes of the Civil War (1884) ; Wilcox, 'History of the Mexican War* (1892) and Barnes, J., (Giant of Three Wars* (New York 1903).*

SCOTT: Lockhart's Life of. The 'Life of Scott by John Gibson Lockhart is the biog¬ raphy usually mentioned as a serious rival of Boswell's (Life of Johnson. * The works have many points in common. Each has for subject one of the greatest men in English literature ; each was written by a man intimately ac¬ quainted and thoroughly in sympathy with the subject; each is constructed upon a large plan, with canvas filled even to the smallest details. Furthermore, Lockhart followed the autobio¬ graphical plan of Boswell. Beyond these re¬ semblances, however, there are striking dis¬ similarities. So far as command over language is concerned, Lockhart was probably superior to Boswell ; but as a biographical artist he was*

clearly inferior. He did not possess Boswell's dramatic skill, nor his ability to report a con¬ versation, nor his discrimination in selecting the most important material.

The (Life of Scott is probably the longest biography of established rank in the English language. Carlyle, who reviewed it before the publication of the seventh and last volume, deplored what seemed to him the excessive length of the narrative. "Study to think it nothing miraculous,® he wrote, "that seven biographical volumes are given where one had been better . . . Scott's biography, if un¬*

composed, lies printed and indestructible here, in the elementary state and can at any time be composed, if necessary, by whosoever has a call to that.® Carlyle's opinion has in the main been justified. In 1911 Sir Sidney Lee ex¬ pressed his conviction that ((Lockhart's merit is mainly due to the excellence and the abun¬ dance of the raw material provided for him in Scott's ample journals and correspondence.® In short, the (Life of Scott) is a Gothic cathe¬ dral, overawing us by its size and magnifi¬ cence, rather than a Greek temple, gaining our admiration by its artistry and simplicity.

With all of its limitations, however, the biography is great. The combination of sub¬ ject and biographer is sufficient to guarantee its greatness, and, to a certain extent, its final¬ ity. Lockhart, personally acquainted with Scott since May 1818, became his son-in-law on 29 April 1820, when he married Sophia Scott. The biography was completed in 1838, six years after Scott's death. Lockhart had access to all documents ; his work, therefore, together with the journals of Scott later pub¬ lished in full, must always remain the great mine of information from which later biogra¬ phers must dig. In writing the life of his father-in-law Lockhart had set <(the truth and the fear of God® before his eyes ; his work, consequently, is not a panegyric; but, like Boswell's (Life of Johnson, a straight¬ forward account of faults as well as of virtues. Professor Hugh Walker, in (The Literature of the Victorian Era* (pp. 920-923), highly commends Lockhart upon the skill and insight with which he interprets certain*

manifestations of Scott's character, particularly his love of display and his consequent lavish expenditure. The style of the biography is admirable ; several passages, notably the description of Scott's death, are among the best in English literature. All in all, the work, by its very length and ex¬ haustiveness, forms a noble monument to the memory of a man who did all things on a large and magnificent scale.

Waldo H. Dunn.

SCOTTDALE, skot'dal, Pa., borough in Westmoreland County, on the Baltimore and Ohio and the Pennsylvania railroads, about 30 miles in direct line southeast of Pittsburgh and 16 miles south of Greensburg, the county-seat. It is in an agricultural and coal mining region, and it has considerable manufacturing interests. The chief manufacturing establishments are large pipe-works, rolling mill, foundry, machine shops and steel works. The coal mines of the vicinity contribute to the prosperity of the borough. The two banks have a combined capital of $100,000. The principal buildings are ■the churches and schools. The educational in-

stitutions are a high school, public and parish elementary schools, a private school and a public library. Pop. 5,678.

SCOTTISH CHIEFS, The, a romance by Jane Porter, published in 1810. It was still popular, and historically correct in all import¬ ant points. The narrative opens with the year

1296.

SCOTTISH CLANS, Order of (Ameri¬ can), an organization with 4,000 members, hav¬ ing its headquarters in Boston, Mass. It is a fraternal and benevolent order, having in 1903 a total income of $85,214. In the same year it paid out claims to the amount of $67,000.

SCOTTISH GAELIC LITERATURE.

The Gaelic spoken in the Highlands and islands of Scotland forms one of the subdivisions of the Gaelic language, the other two being Irish and Manx. (See Celtic Languages; Gaelic Literature). It was introduced into the southern part of Argyll by the Dalriads, who emigrated from Ireland in the 6th century, and there established the subkingdom of Dalriada. The language spread until it became paramount, and it was used at court as late as the reign of Malcolm Canmore. Gaelic, which was the lan¬ guage of

the district of Buchan in Aberdeen¬ shire, in the 12th century, and was spoken in Galloway in Queen Mary's reign, gradually re¬ tired north and west beyond the Highland line, until now its strongholds are Arran and the Hebrides, the counties of Argyll and Inver¬ ness, Ross and Sutherland, and parts of Perth and Caithness. A strong Gaelic-speaking colony was founded in Carolina in the 18th century. In 1772 the first Gaelic-speaking immigrants landed in Cape Breton Island, Nova Scotia, and in the first quarter of the 19th century some 25,000 landed in that part of Canada. Prince Edward Island, Glengarry in Ontario and other parts also received settlers who spoke the Gaelic tongue and have maintained it to the present time. One of the objects of Lord Selkirk in founding the Red River Settlement was the formation of a Gaelic-speaking colony, which, through difference in language, would be proof against any tendency to amalgamate with the Americans. Within the past half century there has been a marked revival of interest in the Gaelic literature of the Highlands, one of the proofs of which was the founding of a Gaelic chair in Edinburgh University in 1882.

For nearly 300 years Scotland and Ireland had a common literary tradition, and the tales of the great Irish legendary heroes were current in the Scottish Highlands. Adamnan's life of Saint Columba, written in the island of Iona before 713 a.d., is the first literary product of Gaelic Scotland that survives. The (Book of Deer) is of the 9th century; the (Book of the Dean of LismoreC by Sir James MacGregor and his brother Duncan, is a manuscript col¬ lection of date 1512-26. John Knox's Liturgy was the first book to be printed in the Gaelic dialect (1567). Long after the invention of printing the output was small in this language ; only some 20 books had been printed in Gaelic up to the time of the Rebellion of 1745. A valuable collection of manuscripts is deposited in the Advocates' Library, Edinburgh. The language has been peculiarly rich in poets, a succession of notable bards appearing for about 300 years. Among them may be cited Mary

Macleod (b. 1659) ; John Macdonald, a member of the Keppoch family; Alexander Macdonald, an officer in Prince Charles's army; Robert Mackay (Rob Donn, 1714-78) ; Ban McIntyre (1724-1812) ; Ewen McLachlan of Aberdeen (1755-1822), and William Livingston of Islay (1808-70). Consult Stuart's edition of the (Book of Deer) (1862) ; (Book of Lismore) (edited by MacLauchlan, 1862, and by Cameron, 1892) ; Blackie, (Language and Literature of the Scottish Highlands) ; Hendersonˆ (Norse Influence on Celtic Scotland) (1910); Sinclair, (Gaelic Bards from 1411 to 1517> (1890) ; Car¬ michael, (Carmina Gadelica: Hymns and In¬ cantations, with Illustrative Notes orally col¬ lected in the Highlands and Islands of Scotland, and translated into English > (2 vols., 1900) ; McAlpine, Pronouncing Gaelic Dictionary, with a Grammar (12th ed.,*

1903) ; McLeod, dictionary of the Gaelic Language (1909) ; Mac Bain, (Etymological Dictionary of the Gaelic Language* (1911) ; Maclean, (Typo- graphia Scoto-Gadelica ; or, Books printed in the Gaelic of Scotland from 1567-1914, with Bibliographical and Biographical Notes) (1915).*

SCOTTISH PHILOSOPHY, School of,

the school of philosophy founded by Thomas Reid, whose aim was to disprove the skeptical conclusions of Hume, which had obtained a wide vogue in Great Britain and on the Con¬ tinent. Reid, who was born in Kincardineshire, Scotland, 26 April 1710, and died in 1796, in¬ sisted upon certain principles as everywhere present in experience, and he appealed to human consciousness and intelligence against what he called (

SCOTUS, sko'tus, John Duns, Franciscan friar, one of the great lights of the mediaeval scholastic philosophy and theology. The years 1265 and 1275 are variously assigned for his birth; he died at Cologne, 8 Nov. 1308. His cognomen Scotus plainly betokens his Gaelic origin. The chief advocate on behalf of Ire¬ land is Luke Wadding, who contends that Scotus cannot have been an Englishman, since his epitaph runs, ((Scotia me genuit, Anglia sus- cepit® ; not a Scotchman, since Bonaventure, in a list of the Franciscan provinces, mentions that of ((Scotia, or Ireland®; on behalf of North Bri¬ tain, Thomas Dempster (1579-1625), (

duced,® wrote a quarto volume designed to prove Duns Scotus a Scotchman ; and on behalf of England the celebrated antiquary John Leland (1506-52), adduced considerable proofs of Scotus' English origin. Duns Scotus entered the order of Franciscan friars early in life, studied at Merton College, Oxford, and became a Fellow of the same. He went to Paris in 1304, to Cologne in 1308, where he died sud¬ denly the same year and was buried in the Franciscan Church. His works consist of com¬ mentaries on the logical works of Aristotle and the (Isagoge) of Porphy, a commentary on Aristotle's (De Animal two commentaries on Aristotle's Metaphysics, besides a shorter work (Conclusiones ex XII Libris Metaphys. Aristotelis* ; (Grammatica Speculativa> ; (Trac- tatus de Rerum Principio* ; (De Primo Prin- cipio) ;*

SCOTUS ERIGENA, e-rij'e-na, Jo¬ hannes, Christian philosopher of the Carlovin- gian period. Everything concerning the place or date of his birth is conjectural. It has been divined from his name that he was of Scottish race and Irish birthplace. He was probably born between 810 and 815. He

is said by some apocryphal authorities to have traveled in Greece, Asia, Egypt, Italy and France. But his first actual appearance in history is in the court of Charles the Bald, who was himself de¬ voted to letters. He was induced by this mon¬ arch to translate the treatise (On the Heavenly Hierarchy, the work of the pseudo-Dionysius, the Areopagite. The attention of Hincmar, archbishop of Rheims, was attracted by the fame of Erigena who wrote at that prelate's request his work on (Predestination.* (The Heavenly Hierarchy) was a work which had a great deal of influence in development of mys¬ ticism (q.v.) in France. Pope Nicholas I in 867 complained to Charles the Bald that such works as this version of the Neo-Platonist's work were of doubtful tendency; it is not known what reply he received, but after that date Erigena drops out of the light of history. Johannes Scotus Erigena translated all the works of the supposed Areopagite; he also com¬ posed a treatise on the Eucharist in which he denied the real presence. His philosophical views were set forth in his (Divisions of Na¬*

*ture) which caused him to be charged with pantheism ; and modern historians of philosophy have looked upon him as the precursor of Spinoza. It is certain that 400 years later (1225) Pope Honorius III, during the Albi-gensian crusades, condemned the book and ordered it to be burned publicly. Consult Hjort, (Johann Scotus Erigena) (1823) ; Guizot, (Histoire de la civilisation en France) ; Mil- man, (History of the Latin Church.**

SCOURGE OF GOD, The. See Attila.

SCOURING-RUSH. See Dutch Rush; Rush.

SCOVEL, Sylvester, American journalist and engineer: b. Denny Station, Pa., 29 July 1869; d. Havana, Cuba, 11 Feb. 1905. He was educated at the University of Michigan, and in 1895 went to Cuba as war correspondent. He broke through the Spanish police and military lines 30 times, was twice captured, once mak¬ ing his escape, and on the second occasion, in

1897, was released at the request of the United States government. He was subsequently cor¬ respondent in the Turco-Greek War, in Spain, and in the Klondike, and returned to Havana just before the destruction of the Maine in

1898. He was with the army and navy until the surrender of Santiago, and after that was engaged in the promotion of various Cuban enterprises. In 1899-1902 he was consulting engineer for the United States military gov¬ ernment Cuban customs service.

SCRANTON, George Whitefield, Ameri¬ can manufacturer: b. Madison, Conn., 11 May 1811; d. Scranton, Pa., 24 March 1861. With his brother, Joseph H. Scranton, he engaged in the manufacture of iron at Oxford, N. J., in 1839, and in 1840 they established smelters at Slocum, now named in their honor, Scranton, Pa., using anthracite coal in their furnaces. Later Scranton became interested in railroad transportation, and he was president of the Lackawanna and Western and of the Cayuga and Susquehanna railroads. He served in Con¬ gress in 1859-61.

SCRANTON, Miss., town and county-seat of Jackson County, on the Pascagoula River, near the Gulf of Mexico, and on the Louis¬ ville and Nashville Railroad, about 48 miles southwest of Mobile, Ala. It is in a lumber¬ ing region, and the town is known also for its extensive fisheries, especially the oyster in¬ dustry. The chief industries are eonnected with the manufacturing and shipping of pine lumber, and, in the season with the canning and shipping of oysters. Pop. about 2,500.

SCRANTON, Pa., city and county-seat of Lackawanna County, is the third in population in the State. It is 167 miles from Philadelphia, northerly, and 134 from New York, westerly; and a central point on the Delaware, Lacka¬ wanna and Western Railroad. It is also en¬ tered by the Central Railroad of New Jersey, branches of the Delaware and Hudson, the Erie and the New York, Ontario and Western rail¬ roads. The Lackawanna and Wyoming Valley Railroad (Laurel Line), of new and costly construction and operated by electricity, is an¬ other connecting link south and eastward. Built on both sides of the Lackawanna River, which merges into the Susquehanna River some eight miles to the southward, the city is pleasantly

SCRANTON, PA

i uil

*S *)*

I®® Wntws jii mi pullli*

awMiiis fein'.Miiw Mitsui mm mm.

jnns mg

i I.-

***»* f** •~*

WkW

fi.M

*m IH *4′*

*ih »**

1 Lackawanna County Court House, showing Scranton Board of Trade Building

2 Skyline of Scranton's business section

SCRANTON, PA.

1 Nay Aug Falls in the heart of Scranton

2 Delaware, Lackawanna and Western Railroad Viaduct, Nicholson, near Scranton, Largest concrete bridge in the world

situated on an undulating plateau in the Lack¬ awanna \ alley, at a mean altitude of between 700 and 800 feet above sea-level. Mountain ranges on either side attain an elevation of from 1,000 to 1,200 feet more. Laid out with wide streets and avenues, it has also many driveways, a courthouse square and three parks. Among the prominent public buildings in Scran¬ ton are the post office, courthouse, municipal building, public library (Albright Memorial), 13th Regiment Armory and the Moses Taylor Hospital. There are three other general and two private hospitals, a Y. M. C. A. building, the buildings of the International Correspond¬ ence School, theatres, numerous public and private schools and churches of all denomina¬ tions, many of the church and school buildings being large and costly.

Industries. — Scranton is the centre of the chief anthracite coal district of the United States and has many large collieries within its limits. Prior to its development in coal min¬ ing, a blast furnace was first erected here in 1840 and was soon followed by a rolling and rail mills. Subsequently other important estab¬ lishments working in iron, but less extensively, became well-known producers of mining ma¬ chinery and other tools, and of steam boilers, locomotives, car wheels, wagon axles, stoves, grates, nuts and bolts, railway spikes and the like. For reasons of an economic nature the rolling and rail mills have in later years been taken elsewhere, but the other industries con¬ tinue ; and still more diversified ones have been introduced, manufacturing articles of various materials, including silk and silk goods,

under and outer wear, buttons, lace curtains, pianos, pumps, iron founding, locomotive and stationary engine works, etc. Steam heating by the district plan is supplied on a large scale to the business and many residential sections by a private company. In addition to much Scranton capi¬ tal invested in all parts of the country, other local interests are cared for by 20 banking institutions with a capital and surplus of $11,- 891,107, total deposits of $41,643,983, and annual clearings of about $175,000,000, and sundry building and loan associations. Local newspapers, daily and weekly, and numerous monthly and other publications are regularly issued. The International Correspondence Schools are located here. This is the largest educational establishment in the world. It gives employment to more than 4,200 people, and has enrolled 1,400,000 students, representing every nationality in the world.

History. — This locality was originally set¬ tled 1788-1800. Early in the century it was called Slocum Hollow, after the Slocum family, then prominent in its affairs. More active de¬ velopment took place after 1840, largely through the initiative of Col. George W. and Seldon T. Scranton, and associates. It was named in honor of the former and has since been known as Scranton. It was incorporated as a bor¬ ough in 1854 and as a city in 1866.

Government and Social Life. — The city is governed by a mayor elected for four years, city controller and council of five members. The administrative departments are those of public safety, public works, city treasurer, city attorney, assessor, city clerk and the sinking fund commission. Social life of Scranton is evidenced in numerous associations, clubs and

lodges of all kinds; while many and effective public and semi-public charities are also well supported by the citizens.

Statistics. — The municipal area is practi¬ cally 20 square miles, divided into 24 wards. TRere are 185 miles of streets, avenues and courts, of which 68 miles are paved; and the sewer system measures 110 miles. Public light¬ ing is by electricity; the police department costs annually not less- than $120,000, and the fire department $125,000. The school enrolment exceeds 20,000 pupils, and annual expeditures for public education are more than $900,000. Assessed property valuation in 1918 was about $100,000,000. Average annual death rate is less than 16 per thousand, but only 13 for the year 1916. Scranton is one of the few large cities in the United States having an almost un¬ limited water supply, though not controlled by the city. The water is soft and pure, impounded from mountain streams and a large, well-pro¬ tected watershed. It is

delivered by gravity from several reservoirs and a large artificial lake. The daily water consumption is about 25,000,000 gallons, while an average of about 5,000,000,000 gallons is kept in store the major part of the year. Pop. (1920) 137,783.

.SCRATCHING. See Ballot.

SCREAMERS, the name given to two or three genera of birds, forming the family Pala- medeidce. In the genus Palamedea the nostrils are oval, the head possesses a slender frontal horn more than three inches long; the wings each bear two. sharp shoulder spines with bony cores, and the long toes are covered with square scales above. To this genus belongs the horned screamer (P. cornuta), of the Amazon Valley and Guiana, which inhabits hot morasses and swamps. This bird equals a turkey in size. The voice is shrill and loud and the birds scream in concert. The plumage is a blackish-brown above, the head and neck having the feathers marked with white. The genus Chauna, of which the chaja or crested screamer (C . cristata) is the representative, has the tip of the bill hooked. No horn exists on the head. The name (< chaja® is given to this species from the sound of its cry. It occurs in Brazil and Paraguay. It is of solitary habits. The wings possess, as in the former case, two spurs each. The color is a bluish-gray marked .with black, the neck being encircled by a black collar, while a tuft of feathers on the head constitutes a crest. Round the eyes the skin is naked and of a red color. The food consists chiefly of plants and the flight is strong. The eggs are two in number. A third form (Ischyromis derbiana), closely related to the last, inhabits Central America. A remarkable feature of all of these birds is the great development of sub¬ cutaneous air-sacs, like a thick layer of bub¬ bles beneath the skin, which make a crackling sound when pressed. Although galline in ap¬ pearance and general habits, these birds are more closely related to the ducks and geese. Consult Evans, A. H.,

SCREEN, in ecclesiastical architecture, a partition of stone, wood or metal to separate different parts of the building; as, the nave or an aisle from the choir, or a private chapel from

the transept. The term is also applied to a partition extending across the lower end of a mediaeval hall, forming a lobby within the main entrance doors, and having often a gal¬ lery above ; also to a decorated wall enclosing a courtyard in front of a building.

SCREW, a wooden or metal cylinder having a spiral ridge (the thread) winding round it in a uniform manner, so that the successive turns are all exactly the same distance from each other, and a corresponding spiral groove is pro¬ duced; also a reversed mechanism, in which the interior of a cylinder in a cylindrical hole or nut is provided with a corresponding uniform spiraled groove or thread, into which a screw (as first defined) may fit. For differentiation the primary screw is termed a male screw, and the secondary form a female screw. The male and female screw in combination form one of the six mechanical powers, being simply a modification of the inclined plane. The energy is transmitted by means of a hollow cylinder (the female screw) of approximately equal diameter with the solid one (the male screw). Hence the one will work within the other, and by turning the convex cylinder, while the other remains fixed, the former will pass through the latter, and will advance every revolution through a space equal to the distance between two contiguous turns of the thread. As the screw is a modification of the inclined plane it is not difficult to estimate the mechanical advan¬ tage obtained by it. If we suppose the power to be applied to the circumference of the screw, and to act in a direction at right angles to the radius of the cylinder, and parallel to the base of the inclined plane by which the screw is supposed to be formed, then the power . will be to the resistance as the distance between

two contiguous thfeads to the circumference of the cylinder. But as in prac¬ tice the screw is com¬ bined with the lever, and the power applied to the extremity of the lever, the law becomes : The power is to the resistance as the distance between two con¬ tiguous threads to the cir¬ cumference described by the power. Hence the mechanical effect of the screw is increased by less¬ ening the distance between the threads or making them finer, or by length¬ ening the lever to which the power is applied. The law, however, is greatly modified by the tre¬ mendous friction induced. The uses of the screw are various. It is an invaluable contrivance for fine adjustments such as are required in fine telescopes, microscopes, micrometers, etc. It is used for the application of great pressure as in the screw-jack and screw-press; as a borer in the gimlet ; and in the ordinary screw- nail we have it employed for fastening separate pieces of material together. The differential screw, or Hunter's screw, is formed of two screws, a larger and a smaller, the former being screwed internally to allow the latter to screw into it; the pitch of the two screws differs slightly, and for each turn of the chief or

larger screw the progress of the point of the compound screw is the difference of pitch. Great power is in this way attained without the weakness due to a screw with fine threads. Screws for working in wood are commonly tapered, coming to a point ; while machine- screws for use in metal are cylindrical and commonly flat or dull-pointed on the forward

end. Exceptions are the set-screw, which has a sharp circular ridge on the forward end, to give it a bite or set when screwed down hard ; and screws that are pointed or squared for some special purpose. Machine-screws were originally made by hand, a blank being forged on the anvil, and the thread being cut on a lathe or even with a file. Under this primitive system no two screws were alike, and when a screw had to be replaced it was difficult to make another that would fit. Henry Maudsley, of England, about the opening of the 19th cen¬ tury, gave great study to the production of uniform and accurate screws, laying the foun¬ dation for modern interchangeable machine- screws. He was followed by Sir Joseph Whit¬ worth, who established the primary system of uniform threads subsequently accepted by lead¬ ing machine-builders all over the world. Later, the Sellers standard was adopted in America and largely followed. The chief difficulty was the attaining of accurate and uniform pitch or spacing of the screw-threads, because any error was multiplied. For instance, an error of one ten-thousandth of an inch in a space between screw-threads, which would ordinarily pass un¬ noticed if there were only half a dozen turns, would increase with the length of the screw and number of threads, so that with 24 threads to the inch, a screw a foot long would multiply that error by 288, so that the screw would bind and jam before it would go far into its coun¬ terpart. It was found, in cutting a thread, that the very heating of the bar of metal and of the cutting tools, by their own friction, caused a variation in the threads, because" of the ex¬ pansion of metal under heat. But by ingenious means such errors have been compensated, and screws are now turned out very cheaply with great accuracy.

To cut a screw-thread by hand, the blank or bit of stamped metal, or a metal rod of the desired diameter, is mounted between the cen¬ tres of a lathe, while a cutting tool is fixed on the slide-rest, and forced against the rotating blank, the slide-rest having a positive lateral rate of movement, so that a spiral is cut in the blank, the form of such spiral being deter¬ mined by the ratio of the speed of rotation of the blank to the lateral movement of the cutting tool. This process is repeated until the thread is sufficiently deep, and it matches a master screw, which is placed beside it to test its ac¬ curacy. Another method is to use a screw-die and die-stock, which carries a pair of hardened steel cutting dies of the desired standard. These dies are placed straddle of the rod or blank, and being fixed in the die-stock, either the work or the stock is rotated until the thread is cut, the dies being pressed together gradually by a screw in the stock. Similarly a female thread may be formed with a screw-tap worked into a hole with a wrench. But in modern screw-making only the above principles. are fol¬ lowed, screws being made on lathes specially

designed to work automatically and cut a large number of accurate screws at one operation. 1 hese machines are so thoroughly automatic, that an attendant can watch several of them, so that vast numbers of small screws can be turned out at surprisingly small cost, when their almost perfect accuracy is considered. By employing what are termed "change-wheels® on the heads of the lathes, the number of screw-threads may be altered from one stand¬ ard size to another. A common principle used in screw-cutting is to employ a master-screw, or hardened screw known to be of accurate standard, as a guide for the cutting of dupli¬ cates. This master-screw carries a nut, which travels and directs the movement of the blank or bar that is being threaded. The heads of screws may be formed — (a) by upsetting or thickening the blank before cutting; or (b) by using a bar of the diameter of the head, and milling away the superfluous metal. In modern practice a milling cutter is often employed in making screws on a special machine which is half lathe and half miller. The milling cutter is mounted on a swiveling device for forming various angles in the thread. This method is well suited to forming screws that are of al¬ loyed metal, where the cutting speed must be made suitable to the alloy. It is not adapted to very small screws, but is admirable for cut¬ ting worms or other very broad threads.

The familiar types of screw are named from the thing to which they are attached, as bench- screw, a coarse screw on a carpenter's bench for clamping the work; from the form or shape of the head, as square, hexagonal, round, conical, countersunk screw, etc.; from the character of the thread, as standard V, double (having two parallel threads running together), triple, etc. A winged or thumbscrew has a flat head that may be turned with the thumb and fingers ; the Archimedian screw is a spi¬ raled trough or tube which when laid at an angle of about 35 degrees, with the lower end in water, can be made to raise the water by turn¬ ing; the differential screw has two different threads on one solid body, so that its ultimate motion is the difference between the pitch of the two threads ; flat-screw, a spiral on the face of a disc, as a Victor record; inter¬ rupted screw, one having grooves cut longitu¬ dinally with threads like a tap ; screw-coupling, a pipe coupling or metal collar with interior or female threads for joining pipes or round rods; screw-dog, a lathe-dog having a screw for gripping the work; screw-eye, a screw having a loop or eye for a head — when made with a hook it is a screw-hook; screw-plate, the holder of a die-stock; screw-press, a press in which the power is applied by a screw, as the primi¬ tive form of printing press; screw-rod, a rod having a screw-thread cut on one orˆ both ends ; screw-wrench, any wrench whose jaw is moved by a screw; tractor-screw, the screw- propellor of an aeroplane when placed in front as a tractor.

In 1914 there were 66 establishments in the United States devoted to manufacturing ma¬ chine-screws and 12 to wood-screws. The number of employees was larger with the wood- screw makers, being 4,464 and 3,643, respec¬ tively; but the gross money value was $7,- 248,000 for the machine-screws and $6,217,000 for the wood-screws. Probably this is less

than half th,e production of the entire country, as very many machine manufacturers make their own screws.

Charles H. Cochrane, Author of (Modern Industrial Progress P

SCREW-PINE, a popular name for species of Pandanus, order Pandanacece. Tne species, of which more than 50 have been described, are natives of the tropics, and are especially nu¬ merous in the Australasian Archipelago. They are mostly trees or shrubs with slender or stout trunks, frequently with aerial roots. Each naked branch is terminated by a tuft of long sword-shaped spiny-edged leaves. In tropical countries P. utilis is highly valued for its edible fruits, and the fibres of its roots and leaves. The leaves of P. odoratissimus also yield a valuable fibre (q.v.). The former species, which has green leaves, and P. veitchii, which has variegated foliage, are widely popular in greenhouses, being easy to rear, fairly rapid in growth, and striking in appearance. The name screw-pine is suggested by the perfect spiral arrangement of the leaves easily observed in mature specimens, and also from their re¬ semblance to the pineapple.

SCREW PROPELLER, a mechanical de¬ vice embodying the principle of the screw, em¬ ployed in the propulsion of various kinds of marine craft — ocean steamships, warships, tug¬ boats, yachts, motor-boats, etc. — and all forms of aircraft. Only the marine form will be treated here : for the air propeller see Aero¬ plane — Constructional Features.

The marine propeller consists of a cylin¬ drical or spherical hub or boss to which two or more blades are attached with bolts, and forms the screw which acts in the water some¬ what like a screw bolt in a nut and the rapid rotation of which around its axis pushes the vessel forward.

It is the accepted modern method of ship propulsion and although known to waste at least 40 per cent of the power delivered to it by the driving engines, it has almost completely superseded the paddlewheel and confined the application of the latter to river steamers and other light draft craft.

Although known in principle to the ancients, and suggested in France by Bernouille in 1752, by Edward Shorter in 1800, and by Dallery in 1803, the credit for its modern reinvention and practical application appears to belong to Ressel, the Austrian inventor, who took out a patent for it in

1812 and used it practically on the steamer Civetta, in 1829. The idea was further developed by Sauvage in 1832, and a few years later, in England, by Smith and Ericsson. Smith's modification — the reduction in the number of blades, was suggested by an accident which broke off one of the six blades in his propeller, resulting in a decidely acceler¬ ated motion of the vessel.

In America, Evans and Fitch experimented with screw propellers in 1780 and 1790, and Stevens successfully operated a steamboat equipped with a screw propeller, in 1802, but it was most practically developed and applied by Ericsson in 1839, in connection with the United States steamer Princeton which was the first screw-propelled war vessel ever built in any country. She was built through the recom¬ mendation of Commodore Stockton, under

Ericsson's personal superintendence. She had a tonnage of about a thousand tons, and was the first war vessel in which the machinery was entirely below the water-line, and her un¬ qualified success not only demonstrated the particular value of the screw for vessels of war, but quickly led to its general application to those of the merchant service as well, before the close of the year 1870.

Each blade of a screw propeller may be considered as the small portion of a complete screw-thread of great pitch, and considerable depth relative to the pitch. The pitch of a propeller is the distance through which a point on the tip of one of the blades would move — in one revolution, assuming the water in which it turns to be a solid medium. As the water is not solid, but gives way as soon as its low degree of inertia is overcome, the shape given to the blade is not that of the true helical screw, but is so modified as to give it the firmest possible grip on the yielding water. There are two general types — (1) those in which the blades are plain warped surfaces, and the pitch is constant at all points, that is, the generating line of every blade keeps the same angle with the boss, and (2) those in which the blades are curved and bent in vari¬ ous ways, and the pitch is variable at different parts of the blades. Many different screws of this type, with variable or increasing pitch, have been designed in the attempt to produce a form that would reduce to a minimum the loss of applied power due to the rotary motion of the screw which forces the water away radially and the loss due to the friction of the blades. In the earlier forms, in which the boss was of small diameter — about twice that of the shaft — the increasing angle of the blade surfaces, as they approached the axis, placed them at the boss in

a position parallel to the keel, so that the central portion of the screw gave very little propulsive efficiency — a great deal of the power being used up merely in churning and agitating the water. Another cause that wasted a great deal of energy was the number and length of the blades, and their great width at the ends, all of which absorbed power by surface friction.

To obviate these faults, Griffiths substituted for the central portion a large spherical boss, one-third the diameter of the whole propeller, which revolved smoothly in the water. He also diminished the width of the blades, and at¬ tached them to the boss in such a manner that they could be turned upon their axes and thus given various inclinations according to the speed intended for the ship. In the latest types of propellers, the diameter of the boss varies from one-fifth to one-third of that of the whole screw; while the diameter of the whole screw depends upon the speed required, the character of the driving machinery, the form of the ship, and many other conditions for which only ap¬ proximate rules can be given. It is interesting and valuable to note in this connection, that upon the basis of the data derived from the actual tests of a great variety of screw propel¬ lers it is safe to state that the exact effect due to the form of their blades has not as yet been definitely determined, and that the shape of the hull of the vessel is by far the chief controlling factor in determining the question of speed.

Another factor which adds greatly to the loss of applied power is the ((slip)) resulting from the working of the screw in a yielding or fluid medium and, therefore, requiring a greater num¬ ber of revolutions to travel a given distance than would be required if it worked in a solid medium. Slip is a factor which adds greatly to the waste of applied power in all forms of pro¬ pellers — sails, oars, paddlewheels, etc. In the case of the screw propeller, the difference be¬ tween the distance traveled by the screw in a fluid, and the interval of its advance in a solid medium is known as the <(apparent slip® ; while the backward velocity given to the water imme¬ diately acted upon by the screw, is called the ((real slip.® Both of these results are conse¬ quences necessitated by the working of a screw in a fluid medium, and may under certain cir¬ cumstances vary considerably from each other. "Negative slip® is a term used to denote the actual speed of a ship above its calculated speed, very often attained by a change of the size or form of the propellor. Real slip may

v + f — ˆ

be expressed by the formula – , in

v

which (z/) represents the speed of the screw, (j) the speed of the vessel,

and (/) the velocity of the forward motion of the water following in the wake of the vessel. The factor (/), be¬ ing due to the frictional resistance of the vessel, depends so much upon the shape of its hull, that it is not susceptible of accurate determi¬ nation, so that in considering the loss of, applied power in this connection, the result ordinarily referred to is the apparent slip.

The speed of propeller is expressed by multiplying the number of its revolutions per minute by its pitch. This expression gives the theoretical speed per minute. The slip being subtracted from this gives the actual or ef¬ fective speed. If the vessel were moored to a dock while the screw was running, the entire speed would be nullified by the slip.

The efficiency of different forms of propel¬ lers differs but slightly so long as their pitch, and their blade areas are designed correctly to suit the conditions for which they are em¬ ployed. In general three-bladed propellers are the most efficient and are freer from vibra¬ tions than the other forms. As previously stated, however, the most important element af¬ fecting the propulsive efficiency of a screw pro¬ peller is the form of the vessel. For low speeds, bluff bows and full sterns gives results equally as good as sharp bows and lean sterns with a long hollow run ; while on the other hand the last-named qualifications give a form that allows the waves of replacement to flow in solidly to the propeller, and is the most ap¬ propriate for high speeds. In general it may be said that the problem of the most efficient propeller for any given ship depends upon the speed at which the ship is intended to be driven. This being decided, the hull must be modeled in such lines that the water pushed to either side by the passage of the vessel shall have ample time and room to come solidly together again before the propeller begins to work in it. Hence, the slower the speed the fuller the stern may be modeled ; and the higher the speed, the finer the lines of the stern approaching the propeller. Upon the

modeling of the hull, therefore, depends the speed of the engines. If the propeller is turned too fast for the possible speed of the model through the water it will simply churn the water (in part) to foam, at a great loss of efficiency. So that the number of revolutions of the screw per minute is actually determined by the shape of the hull, and its consequent re¬ sistance to motion through water. A slow moving screw may have narrower and longer blades, thus reducing the friction of the blade surfaces on the water, and in this way making for efficiency of the power delivered by the engine. And a slow moving screw may also have a greater pitch than a fast

running screw, and this also tends to increase efficiency. The most satisfactory slow propellers (those on merchant ships) have a pitch of 1.2 to 1.5 times the diameter of the screw. On the con¬ trary, the fast screws on passenger ships and war vessels, particularly those run by turbine engines, have a pitch of less than their diameter, and broad squat blades. Broad¬ ening the tip of the propeller blade increases the thrust, but slows down its speed. Con¬ versely, the slow engine admits of a propeller of larger diameter, and with wider tips ; and the efficiency of engines is greater at moderate speeds. So that the problem of the propeller depends upon the skilful balancing of many requirements and each must be given its weight in the compromise to achieve the best possible result.

Figs. 1 to 8 show a few of the 150 forms of screw propellers, designed at different periods, and illustrate in a general way its development from the primitive form designed by Ressel in 1812. All of those used at the present time,

however, are modifications of the Griffiths, Thornycroft, and Jarrow> types. The Hirsch propeller has not come into general use for shipping, although in all trials it has shown an

efficiency from 3 to 8 per cent higher than the other types. It has, however, been largely adopted for motor-boats and small yachts and speed boats, and there are numerous modifica¬

tions of it under various trade names. The so-called ˆweedless® propellers are on Hirsch lines.

Propellers are t)uilt of iron, steel or bronze. The last named is the preferred material and while there are as many formulas as there are

manufacturers, they may be classified generally under four groups: (1) Admiralty bronze, with a composition of about 87 per cent copper ; 8 per cent tin ; 5 per cent zinc ; and with a strength of 15 tons to the square inch; (2)

phosphor bronze, 82.2 per cent copper ; 12.95 per cent tin; 4.28 per cent lead; 0.52 per cent phosphorus; and with a strength of 17 tons per square inch; (3) aluminum bronze,, 95 per cent copper and 5 per cent aluminum ; with a strength of 25 tons per square inch ; and (4) manganese bronze, of secret composition, ex¬ cept that it contains both copper and zinc, and has a strength of 30 tons per square inch. The cast iron or cast steel propellers of the slow-going merchant ships have a strength of from 10 to 20 tons per square inch. This would not be safe for a fast running propeller. The blades

are cast solid with the boss, or made separate and bolted or attached to it in various ways. For small boats a reversible pro¬ peller is made in such fashion that the pitch of the blades may be altered from right-hand to left-hand by moving a lever working through a hollow propeller shaft, thus reversing the direction of the thrust without reversing the engine. A screw propeller when in position is secured to the end of the shaft of bronze or steel called the propeller or tail shaft, which is connected to the line shafting attached to the crank shaft of the driving engine. The push

or thrust of the screw, which is equivalent to the resistance of the hull, and amounts to about 20,000 pounds per 1,000 horse power, is re¬ ceived on a thrust bearing provided with a series of collars and grooves which fit similar ones on the shaft. Small vessels, and those de¬ signed for slow speed, are usually equipped with single screws ; but for large high speed vessels, twin screws placed horizontally at right angles to the keel, one on each side of the stern post, are the most efficient. Some vessels have been fitted with three screws, but the amount of additional efficiency derived from the ar¬ rangement is a very doubtful quantity. On the other hand, high-powered vessels equipped with turbine engines employ multiple screws, the engines operating two, three or more shafts, with the advantage of dividing the work of generating the enormous power re¬ quired by large modern ships among several small engines instead of one large ponderous machine, thus reducing to a minimum the diffi¬ culties and dangers incident to breakdowns. Sailing vessels using steam only as an auxiliary power are equipped with ˆfeathering® screws, the blades of which can be closed together in a line parallel with the keel, and thus prevent them from acting as a drag when the vessel is propelled by the sails alone.

Fig. 9 shows the stern of the United States cruiser New York with twin screws in position.

Fig. 9. — Twin Propellers, U. $. S. New York.

Bibliography. — Baker, G. S., (Ship Form, Resistance and Screw Propulsion) (New York 1915) ; Dyson, C. W., (Screw Propellers and Estimation of Power for Propulsion of Ships) (New York 1913) ; Peabody, C. H., (Propel- lers) (New York 1912) ; Seaton, A. E., (The

Screw Propeller and Other Competing Instru¬ ments of Marine Propulsion> (London 1909).

SCREW-WORM FLY, one of the flesh- flies (q.v.) most troublesome to

domestic ani¬ mals in the southwestern United States. It lays its eggs in wounds, and the twisted larvae feed and move in the flesh, making a bad sore.

SCRIABIN, skri'a-ben, Alexander, Russian composer: b. Moscow, 10 Jan. 1872; d., there, 1915. In early life he was trained for a mili¬ tary career, but entered the Moscow Conserva¬ tory where he studied piano under Safonov and composition with Taneiev. In 1892 he won the gold medal for piano playing and during Euro¬ pean tours achieved fame as a virtuoso. Dur¬ ing 1898-1903 he was professor in the Moscow Conservatory, then resigned and devoted his energies to composition. Chopinesque yet origi¬ nal, his early piano pieces are marked by fervid spirituality, which led him after 1900 to formu¬ late a synchronous theory of music, color and perfume which he sought to prove by means of his <(color keyboard,® and his symphonic work (Prometheus or Poem of Fire. > His other works include a piano concerto and four symphonies.

SCRIBE, skreb, Augustin Eugene, French dramatist: b. Paris, 24 Dec. 1791; d. there, 20 Feb. 1861. He was originally intended for the legal profession, but early abandoned it for the more congenial occupation of a writer for the stage, in which after a careful study of the pub¬ lic taste his success was very decided. His first piece was (Les dervis, written in conjunc¬ tion with his friend Germain Delavigne, and produced in 1811. Scribe's dramatic pieces com¬ prise all the departments of the. lighter kind of drama, and from their gaiety and interest of plot, as well as the felicitous manner in which modern French life is depicted, have acquired a universal popularity in Europe, and have also been introduced on the English stage in trans¬ lations. Among his vaudevilles may be men¬ tioned (Le comte OryP (1833) ; (Le verre d'eau) (1840) ;*

(Adrienne LecouvreuD (1849) and (Les contes de la reine de Navarre) (1850). In collabora¬ tion with Legouve he wrote (BatailIe des dames> (1851) and (Les doigts de fee) (1858). As a writer of opera librettos Scribe is also deservedly famous, having supplied composers with the text of the most celebrated of those produced at the Grand Opera and Opera Comique. Of these mention may be made of (La dame blanche) (1825) ; (Fra Diavolo) (1830); (Robert le Diable (1831); (La juive} (1835); (Les huguenots) (1836); (Les dia- mants de la couronne) ; (Les martyrs) and (Le prophete (1849). From the multiplicity of works with which he was engaged, Scribe, like other French authors, availed himself largely of the assistance of collaborateurs, and much,*

therefore, which bears his name was in reality only subjected to his revision and superintend¬ ence. In 1836 he was admitted a member of the French Academy.

SCRIBE, The, an early Egyptian statue now in the Louvre Museum, Paris. Colored red, and with inlaid eyes of crystal, it is re¬ garded as one of the most characteristic illus¬ trations of the art of the fifth dynasty.

SCRIBES, Jewish. Originally nothing more than copyists of the law, a business which they followed as a means of livelihood, the Jewish scribes gradually increased the import¬ ance of their position until, after the dissolu¬ tion of the commonwealth, they became the vital force which determined the later form of Judaism. The importance of their office as doctors of the law and interpreters of the Scriptures is shown in many passages in the Old and New Testament. During this rise in the influence of the Jewish doctors they were known by five distinct appellations: (1) the Sopherim, or ˆScribes.® who guarded the Bible against corruption and who read the law ; (2) the Tanaim, or teachers of the law; (3) the Amoraim, or doctors of the law; (4) the Sa- boraim, or teachers of the law after the conclu¬ sion of the Talmud; (5) the Gaonin, or last doctors of the law in the chain of rabbinic suc¬ cession, the latter title being applied to the presidents of the colleges, which when assembled together explained difficult points in the Tal¬ mud, discussed and answered all ritual ques¬ tions and enacted new laws for the regulation of the dispersed congregations.

SCRIBLERUS CLUB, The, a club organ¬ ized by Swift in 1714. An association of writ¬ ers, its object was the suppression of ex¬ hibitions of literary incompetence by means of satire. Pope, Gay, Bolingbroke and other au¬ thors of that day were prominent as members.

SCRIBNER, skrib'ner, Charles, American publisher: b. New York, 21 Feb. 1821; d. Lu¬ cerne, Switzerland, 26 Aug. 1871. He was grad¬ uated from Princeton in 1840, and in 1846 es¬ tablished with Isaac D. Baker the publishing house of Baker and Scribner, which after the death of his partner in 1850 became known as that of Charles Scribner and Company. Scribner's Magazine, founded by this firm in 1870, was purchased by other publishers and became the ■Century Magazine in 1881. A new Scribner's Magazine was established by the firm, known since the death of its founder as Charles Scribner's Sons, in 1887.

SCRIBNER, Frank Kimball, American author: b. New York, 22 Feb. 1866. He was graduated from Williams College in 1890, studied at Harvard Law School, engaged in literary work since 1903 and was for four years on staff of the New York Sun. He has contributed articles to current

publications and has had published series of hunting and fish¬ ing stories, (The Honor of a Princess) (1897) ; (The Love of the Princess Alice) (1898) ; (The Fifth of November) (1898) ; (A Continental Cavalier) (1900); (The Red Lion) ; (The Ravens of the Rhine) ; (The Secret of Frontel- lac.) He is a member of the Author's League of America, the Williams Club, the National Geographic Society, American Forestry Asso¬ ciation and the Social Science Club.

SCRIBNER, Frank Lamson. See Lam-

son- Scribner.

SCRIP, in commerce, a term commonly used for a certificate of loans or shares in a joint-stock company, whether as a temporary acknowledgment or the permanent voucher of the holder's interest. Script may accordingly be either transferable or not transferable. The valid transfer of interest may be effected only by registration in the books of the company, or the transfer of the scrip itself may be held to represent a valid transfer of interest. In heraldry, a bearing representing a pouch or almoner. The word also means a scrap of paper or parchment usually with some writing on it, and during and after the Civil War in America was applied to the fractional paper money issued by the government of the United States.

SCRIPTURE, skrip'tur, Edward Wheeler,

American psychologist : b. Mason, N. H., 21 'May 1864. He was graduated from the College of the City of New York in 1884. After pursu¬ ing his psychological investigations at the uni¬ versities of Berlin, Leipzig and Zurich, he was called to Yale, where he became director of the psychological laboratory in 1898. In 1902 he became assistant professor of psychology there and four years later was made lecturer at Johns Hopkins. In 1909 he became lecturer on psychiatry at Columbia. He has attained dis¬ tinction as the discoverer of a method of measuring hallucinations and processes of imagination, and as the originator of a method of producing insensibility by means of elec¬ tricity. He is also known as the discoverer of the law of the ((1898 ; 2d ed., 1905) ; (The Elements of Experimental Phonetics) (1902) ; (Report on the Construction of a Vowel Organ (1905) ; Researches in Experimental Phonetics) (1906) ; (Stuttering and Lisping) (1912). In 1892-1902 Dr. Scripture edited the Studies from the Yale Psychological Laboratory.*

*SCRIVENER, skriv'ner, Frederick Henry Ambrose, English Biblical scholar: b. Bermond¬ sey, London, 29 Sept. 1813 ; d. Hendon, 26 Oct. 1891. He was educated at Trinity College, Cam¬ bridge, and from 1846 to 1856 was headmaster of Falmouth School and incumbent of Pen- werris, retaining this living till in 1862 he was presented to the rectory of Gerrans, Cornwall. In 1870 he was appointed a member of the New Testament Revision Company, and in 1872 was granted a pension from the civil list in recog¬ nition of his services in connection with Bibli¬ cal criticism. In 1875 he became vicar of Hen¬ don, Middlesex, and prebendary of Exeter. He took high rank in the philological criticism of the New Testament, on which he published some valuable works, beginning with an edition of the Greek text in 1858, executed after collat¬ ing about a score of unexamined manuscripts. His chief work was his (Plain Introduction to the Criticism of the New Testament * (1861). He also published Cambridge Paragraph Bible* (1873) and (Bezae Codex Cantabrigien- sis,* etc.*

SCROFULA, a diseased state of the body characterized by usually indolent cheesy glan-

dular tumors which suppurate and imperfectly heal, leaving fistulous passages or ugly scars. It is also known as struma, scrofulosis, tuber¬ culous adenitis and tuberculosis of the lym¬ phatic system. It is a mild

grade of tuberculous infection and should be treated as such. Some¬ times internal organs, especially bones and joints, are attacked by a low grade of inflam¬ mation followed by a caseous degeneration. Scrofula was common in ancient and mediaeval times. It was formerly called king's evil, and for centuries was treated by the touch of the kings of England and France. It is now less common than formerly, owing to better hygienic conditions. It is essentially a disease of early life, but may occur at any age. Formerly it was considered a hereditary form of tubercu¬ losis; but before Koch discovered the bacillus of tuberculosis in 1882 scrofula was looked upon by many as a true tuberculosis, since mili¬ ary tubercles were found in the glands, as afterward were the typical bacilli. Modern » medicine does not recognize any disease as scrofula. It is usually tuberculosis (q.v.).

SCROGGS, skrogz, Sir William, English jurist: b. Deddington, Oxfordshire, about 1623; d. London, England, 25 Oct. 1683. His name is a synonym for judicial injustice and cruelty. He was appointed chief justice in 1678 in which office his brutal methods and infamous partiality in conducting the trial of the victims of the (

SCROPHULARIACEiE, skrof-u-la-n-a'-

se-e, an order of herbs, sub-shrubs or shrubs widely distributed throughout the world. Some botanists estimate the number of species at 2,000, among which are many well-known gar¬ den flowers, such as foxglove, musk-plant, veronica or speedwell, snapdragon, calceolaria, eyebright, mullein and salpiglossis. Other species have been used in medicine and still others are considered poisonous. They are characterized by irregular personate or bilabiate flowers, arranged in racemes or spikes or in the axils of leaves; fruits either capsular or fleshy; and alternate, whorled or opposite leaves of various forms, generally scentless but some¬ times fetid.

SCRUB-BIRDS, a family (Atrichornithidce) of large, brown, harsh-voiced birds of the Australian forests, nearly related to the lyre¬ birds; also called brush-birds.

SCRUB RACE, in American political his¬ tory. In 1824 in the Presidential campaign and election the candidates were not nominated by Congressional caucus, as had been the custom. Crawford, of Georgia, was put forward by a quasi-caucus; New England's candidate was John Q. Adams, Clay was nominated by Ken¬ tucky, Louisiana, Missouri, Illinois and Ohio; and Andrew Jackson by Tennessee and other States. Jackson received the largest popular vote, but Adams was chosen by the House.

SCRUB-TURKEY. See Megapodes. SCRUPLE. See Weights and Measures.

SCUDDER, skud'er, Henry Martyn, Amer¬ ican clergyman and foreign missionary: b. Panditeripo, Ceylon, 5 Feb. 1822; d. Winches¬

*ter, Mass., 4 June 1895. He was graduated from the College of the City of New York in 1840, and from Union Theological Seminary in 1843. From 1844 to 1857 he was a missionary to India from the Reformed Dutch Church of America, and again devoted his efforts to this cause in 1860-63. His later years were spent in various cities of the United States, where he held Dutch Reformed, Congregational and Presby¬ terian pastorates. In 1887 he established an in¬ dependent Protestant mission in Japan, together with his son and daughter, who were also mis¬ sionaries. He was the author of a (Liturgy of the Dutch Reformed Church) (1862) ; (The Bazaar, or the Vernacular Teacher's Com¬ panion, * etc.*

SCUDDER, Horace Elisha, American author: b. Boston, Mass., 16 Oct. 1838; d. Cam¬ bridge, Mass., 11 Jan. 1902. He was graduated from Williams College in 1858, engaged as a teacher in New York for three years, and in 1867-70 he edited the Riverside Magazine for Young People. He then entered business life, but soon withdrew to devote himself entirely to literature. His juvenile publications, which were widely popular, include (Seven Little Peo¬ ple and their Friends) (1862); (The Bodley Books) (1875-87) ; (The Book of Legends Told over Again (1899), etc. His work was not, however, confined to juvenile literature. He edited the Atlantic Monthly in 189CL98, and con¬ tributed much to it, though usually anonymously ; edited (American Commonwealths* ; (American Poems) (1879) ; (American Prose> (1880), and wrote (Life and Letters of David Coit Scud- der, a Missionary in India1* (1864) ; (Noah Webster, a Biography> (1882) ; (Men and Let- ters> (1887) ; (James Russell Lowell, a Biog¬ raphy* (1901), etc.*

SCUDDER, Janet, American sculptor : b. Terre Haute, Ind., 27 Oct. 1873. She was educated at the Cincinnati Art School, the Art Institute, Chicago, and at the academies of Vittis and Colorossi in Paris and at MacMon- nie's studio there. She has lived abroad most of her life. She was awarded the bronze medal at the Chicago Exposition in 1893 ; and the prize medal at the Saint Louis Exposition in 1904. Her works include (The Frog Fountain) (Metropolitan Museum, New York) ; (Young Diana (Paris Salon 1911) ; (Little Lady of the Sea* (Paris Salon 1913); lighting Boys Fountain* (Chicago Art Insti¬ tute) ; and others at the Luxembourg, Paris ; the Congressional Library, Washington ; the Peabody Institute, and in other noted collec¬ tions.*

SCUDDER, John Milton, American eclec¬ tic physician : b. Harrison, Ohio, 8 Sept. 1829 ; d. Daytona, Fla., 17 Feb. 1894. He was edu¬ cated at Miami University, Oxford, Ohio, and was graduated in medicine at the

Eclectic Medi¬ cal Institute of Cincinnati, Ohio, in 1856. In 1857 he was appointed demonstrator of anatomy and served as professor of obstetrics and dis¬ eases of women in his alma mater, 1858-60. From 1860 to 1887 he filled the chair of pathol¬ ogy and practice of medicine and from 1887 to his death the chair of hygiene, principles of medicine, physical and specific diagnosis. In 1869 he published the doctrine of specific medi¬ cation, originated by him, and since that time the basis of practice of the eclectic school of

medicine. For 32 years he was editor of the Eclectic Medical Journal, the oldest periodical devoted to American eclectic medicine. He wrote (Practical Treatise on Diseases of Women- (1858) ; (Eclectic Materia Medica and Therapeutics> (1860) ; (The Eclectic Practice of Medicine5 (1864) ; (The Use of Inhalations5 (1865); (Domestic Medicine5 (1866); (The Principles of Medicine5 (1867) ; (Diseases of Children5 (1867) ; 'Specific Medication5 (1871) ; Reproductive Organs and Venereal Diseases5 (1874) ; 'Specific Diagnosis5 (1874). He was the most conspicuous eclectic physician of his time.*

SCUDDER, Samuel Hubbard, American entomologist: b. Boston, Mass., 13 April 1837; d. 17 May 1911. He was graduated at Wil¬ liams College in 1857 and at Harvard Univer¬ sity in 1862. He was custodian of the Boston Society of Natural History in 1864-70, and was its president in 1880-87. He served as palaeontologist on the United States Geological Survey in 1886-92. Author of 'A Century of Orthoptera5 (1879) ; 'Butterflies5 (1881) ; 'Fossil Insects of North America5 (1890) ; (American Fossil Cockroaches5 (1895) ; Cata¬ logue of the Described Orthoptera of the United States and Canada5 (1900) ; /Index to North American Orthoptera Described in the Eighteenth and Nineteenth Centuries5 (1901), etc.

SCUDDER, Vida Dutton, American edu¬ cator and author: b. Madura, India, 15 Dec. 1861. She was graduated from Smith College, Northampton, Mass., and studied at Oxford, England, and in Paris, France. She became connected with the formation of college settle¬ ments, was instructor in English literature at Wellesley College in 1887-92 and from 1892- 1910 was associate professor when she became professor of that department. She is the author of (How the Rain Sprites Were Freed5 (1883) ; (The Life of the Spirit in Modern English Poets5 (1895) ; 'Social Ideas in English Letters5 (1898) ; (Introduction to the Study of English Literature5 (1901) ; (A Listener in Babel5 (1903) ; 'An Introduction to the

Writ¬ ings of John Ruskin5 (1904) ; 'The Disciple of a Saint5 (1907) ; Socialism and Character5 (1912) ; 'English Poems5 (1915).

scudery, skii-da-re, or scud£ri,

Madeleine de, French writer: b. Havre, 15 Nov. 1607; d. Paris, 2 June 1701. She gives an account of her early life under the name of "Sapho,55 the title assigned to her by her con¬ temporaries, in her romance, Re grand Cyrus.5 At 12, she says, she was spoken of as a person of mature judgment, and much admired. On coming to Paris she was admitted to the so¬ ciety of the Hotel de Rambouillet, and began to assist her brother Georges, a writer of plays, romances and sonnets, in his literary labors. Her first romances were published in her brother's name, and he doubtless assisted in the formation of the plot, or at least suggested the plan of her works. The character of the works themselves is sufficiently explained by the cir¬ cumstances of their production, but their pro¬ tracted popularity is not so easy to understand. Her admirers range from Christina of Sweden to Mascaron, Flechier and Massillon. Boileau himself did not dare to publish his satire dur¬ ing her lifetime. Her works may be regarded

as a reflection of the society in which she moved. They consist chiefly of long romances replete with sentiments of love and gallantry; their predominant characteristic is affection.

The heroes of Mile. Scudery are the heroes of antiquity, Cyrus, Horatius Codes, Mutius Scaevola and Brutus. These and similar per¬ sonages meet and discuss with appropriate heroines the anatomy of passion in endless con¬ versations of the most refined subtlety.

The names of her characters were only a transparent mask behind which her readers saw and read themselves. The society of the Hotel de Rambouillet furnished the originals for all the heroes of antiquity. Cyrus, it is well known, was the great Conde. The society of the day furnished her with endless materials and the gallantries of the preceding night formed the subject of the day's description. Thus with conversation, epistle, sonnet and madrigal she worked out a chronicle of petty intrigue under the greatest names of the world's history. After the reunions at the Hotel de Rambouillet had been broken up by the troubles of the Fronde, Mile, de Scudery opened her own house to a select society on Saturday evenings. In this society, where everybody assumed a senti¬ mental name, love was discussed, according to Mme. de Sevigne, in language so involved, that the speakers were ever in danger of being lost in their own mazes. The interminable conver¬ sations and meaningless gallantries which make her works dull at present were precisely what gave them interest when all her characters were known ; and as she was admired and respected by those

she portrayed, it is evident they were flattered by her portraits. Her princinal works are Ubrahim, ou L'illustre Bassa5 (1641) ; 'Ar- tamene, ou le grand Cyrus5 (1650) ; 'Clelie, histoire romaine5 (1656). Besides these are numerous other romances, poems and 10 volumes of conversations and moral discussions. She obtained the prize in the first competition of the French Academy in eloquence for a 'Le discours de la gloire5 (1671). See Clelie.

SCUDO, skoo'do, an ancient Italian coin named from its bearing the impress of the he¬ raldic shield of the sovereign by whom it was is¬ sued. The scudo was of different value in dif¬ ferent states and at different times. The recent value of the Italian scudo was about $1. The Roman scudo was of gold and worth about $16.

SCULLING. See Rowing.

SCULPINS, the name given to various species of spiny-rayed teleostomous fishes of the family Cottidce, or to the members generally of that family. The sculpins are fishes of strik¬ ing appearance owing to the peculiar manner in which the body tapers regularly backward from the large, depressed head, and the large size of the fins. The mouth is large, the eyes placed so that they look more or less upward, a bony rod runs across the cheek between the suborbital and the preopercular bones, and the bones of the head are ornamented in varied fashions with numerous ridges and spines. The skin is largely naked but is often provided along the lateral line and elsewhere with bony plates or spines. All of the fins, and especially the pectorals, are of large size and! the latter has a remarkably extended base of attachment. The family is a large one, embracing more than 60 genera and 250 species. Most of the species

live in the northern seas among rocks in shal¬ low water, but some remarkable forms live in deep water. Some small species inhabit fresh waters. All are of small or moderate size and are little used for food. Among the numerous North American species the best known is the common or big sculpin (Myoxocephahts qroon- landicus). This species reaches a length of two feet, but is usually smaller and is abundant in the North Atlantic, on the American side as far south as New York. In the far North it ap¬ proaches the coast from the deeper water in summer, but on our shores is most plentiful during the winter spawning season. The eggs are laid in large masses attached to seaweeds or rocks. Sculpins are exceedingly active and voracious and devour all kinds of animals dwelling

on the bottom. The sea-raven (Hemitripterus americanus) (q.v.) is another noteworthy member of this family. Of the fresh-water sculpins the miller's thumbs (Cot¬ tas) are represented by numerous species of little fishes which dwell among stones in cold springs, brooks and lakes, laying their eggs in masses on the under side of stones and guard¬ ing them until hatched. Consult Jordan and Evermann, (Fishes of North and Middle America) (Part II, Washington 1898) ; Goode and Bean, (Oceanic Ichthyology (Washington 1895) ; Gill, T. (in Smithsonian Miscellaneous Collections, Vol. II, Washington 1904).*

SCULPTURE is the art of shaping figures either in the round out of or in relief upon various durable substances. This shaping is accomplished by modeling for wax or clay; by carving for wood, stone, marble and ivory; and by casting for plaster and bronze. The model¬ ing of a small figure in wax — to make trial of the general effect — and of a full-sized one in clay form the first steps in life-sized or other large-scale sculpture of human subject; and these are comparable to the sketch in painting. In very large work, the wet clay is worked onto a rough framework of iron bars and coarse wires by means of the fingers aided with wooden and iron tools; and consequently allows

Egyptian.

great freedom of change in every detail. The small wax figure is fashioned with little or no use of a human model, but the full-sized figure is usually executed either in constant presence of one or with very frequent reference to it; not indeed to copy the living form, but to in¬ sure a general truth or keep a hold upon the possibilities of life. Furthermore, in full-sized work, even the draped figure is very generally

modeled nude, in the first place, in order to secure harmony of action between the various members whether hidden or exposed. Thus, the legs must lead to the body, as the body to the head if the figure be seated; and legs must anatomically support the body if the figure stand. The modeling must combine with this living reality such abstract beauty as is possible in the case. The plaster cast which is taken

Venus de Medici. Achilles.

from the wet clay model is often retouched by its sculptor. Transference into marble is made by a marble-cutter aided by a pointing ma¬ chine, and usually supplemented by the artist's own hands. Reproduction in bronze is done by casting in a mold, which has been made upon either model or cast, for all but colossal works like the Liberty in New York harbor, which are made from hammered plates. The bronze may be left its natural color, or

be stained or gilded. The tough and durable bronze, which moreover can be cast hollow, is preferred to the brittle and — in cold climates — disintegrat¬ ing marble for out-door use. But for interiors the merits are divided; the pale marble makes even delicate transitions of light-and-shade ef¬ fective, while its translucence imparts softness to the exquisitely rounded surface; but the dark and opaque bronze obscures these quali¬ ties, and therefore calls for emphasis of pro¬ jections and sharpening of corners to impart clearness to their shadows. Ivory in plates was sometimes used for the fleshy parts of draped statues, and ivory is now used for statutettes. Wood is used extensively in China and Japan, where its liability to warp and split is obviated by the use of smaller pieces glued together and by lacquering.

Sculpture in relief is used mostly in archi¬ tectural decoration where its aid is invaluable to relieve the flatness on frieze, panel, or pilas¬ ter. In low or bas-relief, the figures project less than half the rounded form, usually much less; whereas in high-relief they exceed that limit, and then often show heads, arms, etc., wholly detached, and other parts so undercut as to appear detached. Of course, there is a

middle-relief between high and low, and some¬ times figures are merely outlined by a groove. Relief and background are usually of the same material, but may properly be diverse.

The beauty of sculpture may be analyzed as follows: Though the mass of sculpture mat¬ ters less than its form, the heroic size befits the grand subject, and pieces destined to elevated or remote location must be enlarged to corre-

Niobe.

spond, and at the same time changed in the proportions of their parts and trimmed of de¬ tails. Since sculpture has the third dimension of thickness, it may be enjoyed by touch as well as by sight, precisely as acquaintances are rec¬ ognizable by a blind person, and finely modeled statuary has been so appreciated in privileged cases. This solidity also renders possible an endless variety of aspects, according as the ob¬ server changes standpoint. The surfaces of the animal or human body — which commonly form the objects of sculpture — are exquisitely rounded in every direction, and the outlines which become visible when we look at these sur¬ faces against a background are mostly curves of consummate beauty, combining lines

nearly straight with others of greatest flexion; and the Philistine needs to learn that those on foot or nates are in no wise inferior to those on shoulder or head. These curved surfaces, moreover, can be expressive of underlying sub¬ stances as varied as bone, sinew, muscle, flesh and veins; and when they are so, the surface is said to be sensitive, but when they are not, then puffy or monotonous. Contrast is secured by means of massively rounded forms, as of the nude, against the sharp folds of drapery and crisp locks or wavy tresses. Unity among this variety is secured by dominant lines, as in the Discobolos of Myron, where an approxi¬ mate semi-circle may be traced from the discus, along the right arm, across the shoulders, down the left arm and left leg, to the left foot; while the bowed trunk and bended right leg show a zigzag quite as plainly.

The effect of the single color in bronze and of the absence of color from marble and plaster

is to concentrate attention on the form and line of sculpture, which on that account is enjoyed by certain temperaments more than is painting, and can be utilized by all as special opportunity for a revel in line. But the injury both given and received by a large patch of white among the colored objects of a picture gallery or par¬ lor is undeniable, and should be remedied by investment of the marble statue or relief with some warm tint, as was apparently the practice of the Greeks at all periods. Failing such rem¬ edy, the distraction of the gleaming and ghostly marble should be precluded by assigning to it a separate recess or room. But in general the tinting is preferable, since sculpture can then be admitted to the company of flat walls and pictures which its projection will greatly re¬ lieve, while they also aid it. Statues and re¬ liefs never appear to such disadvantage as when jostling each other in a store or museum, where numbers satiate, rivalry discounts and nothing serves as a foil.

The element of light-and-shade becomes im¬ portant in that mainly through it form is re¬ vealed to the eye. This in turn requires that the sculpture should be modified to suit the lighting available, namely, as it comes from either side, from the front, or from above; while of course it should never come from the back, though statuettes placed in windows cause that very effect. A brilliant play of such light- and-shade is the only peer to beauty of line in sculpture; and is often referred to by sculp¬ tors under the misnomer color, *as if to make amends thereby for the absence of color from modern sculpture.*

As in all other arts, worthy meaning or sig¬ nificance should be wedded to the beauty of

Papirius and Mother.

sculpture; but here the case has peculiar strength. Since sculpture is solid, it must fully express or exhibit the form of whatever it shows, whereas painting can merely suggest an object, which is indifferent or repulsive in it¬ self, and throw around it the glamour of light or color. Sculpture is, therefore, limited to such subjects as are capable of exciting interest

by their forms taken separately, although it must not be forgotten that form is explained to the eye by delicate gradations of shade, the surfaces seeming tinted in this way as they receive light more or less directly. The nobler animals, and especially man in the typical activi¬ ties that become him, form the subjects of the separate or independent sculpture most in fashion in the 19th and 20th centuries. Sculp¬ ture of such character as this is necessarily the highest in rank. This characteristic of sculp¬

ture reaches its maximum in the undraped human figure, which must, therefore, belong to the_ noblest type both physical and mental, that is, in both beauty and significance; but when it so does, proves a very gospel of art in the uplift to finer sense and sentiment which it elicits from the normally minded observer. Sculpture is also the noblest of the decorative arts as well as that the most constant in use in all ages. Architectural sculpture occupies itself largely with vegetal forms, mingling with them animal and human forms freely treated;

ered within and without with scenes from the victories and consequent offerings to the god made by a king. The workmanship on some of the hardest stones known was superb and achieved only with immense toil, to lessen which the statue was generalized as much as possible, though at the same time made to ex¬ press the salient traits of the subject. The ushabti, on the other hand, called for a realistic portrait, and this was achieved in the softer material with great skill. All of the reliefs and most of the statues received a decorative coloring. Curious conventions gave part of a figure in profile, but part full face; and prin¬ cipal objects, like gods and kings, were repre¬ sented larger than their fellows.

Chaldaean sculpture showed great technical skill as early as the fourth millennium b.c. The tomb had little importance, since the corpse was burned, but temples sheltered idols in stone, and palaces contained demoniac images, royal statues and historical stelae. Stone was used for the larger pieces, terra-cotta for the smaller. The Assyrians adapted Chaldsean art traditions, but gave chief attention to the palace where reliefs depict a king in war or the chase. The style ex¬ cels in vigor and

movement especially in the rep¬ resentation of animals, but lacks variety and ignores the life of woman. The art of Egypt and Assyria was carried by the Phoenicians both eastward and westward, and proved of special moment in the development of the Greeks.

The wide distribution of the Greeks in Eu¬ rope, Asia and Africa combined with their tribal distinctions to favor a healthy rivalry in the arts. The largest and chief classes of sculp¬ ture consisted of, first, free statues, some of

Elgin Marbles from the Parthenon, Athens.

and finds its highest reach in the nobly designed human form with its drapery, as in the Carya¬ tid porch of the Erechtheum and the portals of Rheims cathedral.

Egyptian sculpture, whose first monuments date from the fifth millennium b.c., forms, with that of Chaldea- Assyria, the two tap-roots for subsequent tradition in Europe. Tomb and tem¬ ple are responsible for the great mass of Egyp¬ tian sculptures. Religious belief held that sur¬ vival of the ka or spirit after death depended upon preservation of the body (as a mummy), or failing that, upon provision of a ushabti or sculptured portrait. Scenes from the past and future life of the deceased were also sculptured upon the wall of his tomb. Temples were cov-

which were representations of divinities, others votive offerings, portraits set up at tombs and the like; and secondly, temple reliefs, but there also appear civic monuments and others cele¬ brating the life of a sovereign or statesman. Terra-cotta figurines with mythological and sometimes grotesque subjects, were fashioned for the home, and stelse (sculptured slabs) to mark the resting place of the departed. Statu¬ ary of rough material or crude execution was colored generally, as where the terra-cotta statuettes have their garments colored through¬ out, but finer works received intense color to express or emphasize details, as the border or pattern of a cloak, while a tint was spread over the whole. Gold, silver and bronze were both

CLASSIC SCULPTURE

CVRa“pH ‘-‘VIE

1 Perseus

2 Apollo Belvidere

3 Discus Thrower

4 David

CLASSIC SCULPTURE

‘

*mm**

1 The Muses in the Vatican Museum

2 Famous Statues in the Vatican Museum

SCULPTURE

461

hammered and cast into statues, which were then variously inlaid and provided with realistic eyes. Wood was carved and then painted or else covered with metal plates ; and wooden figures made to be covered with drapery were fitted with heads and hands of finer material. Terra-cotta, which ranked with wood as the earliest material used for sculpture and largely in architectural accessories, was also painted in

part or whole. In all Greek sculpture, there¬ fore, the finished work was polychromatic.

Crude statuettes remain from a Greek pre¬ historic stone age, 2500-1500 b.c., and stone re¬ liefs from the Mycenaean bronze age, 1500-1000 b.c. Incursions of Hellenic tribes from Thes¬ saly led to transition and progress, until by the 6th century sculpture in marble and bronze had become a national art, of which there were two types. The Ionic preferred rounded forms, slender proportions, light draperies revealing the figure; and organic groups. It quickly devel¬ oped the draped female figure. The Doric type shows sturdy, muscular forms, heavy draperies and figures merely juxtaposed. It developed the nude male figure. But Athens drew sculptors from both sources, and thus combined grace and force’to form a third school, the Attic. The 5th century witnessed achievement of a mas¬ tery that allows interest in prior work else¬ where only in so far as it contributed to this, and that has remained until this present time a source of perennial delight and instruction. We are told that Polykleitos brought his athlete carrying a spear, the Doryphoros, to such per¬ fection as to furnish a canon or standard for all such subjects. Myron showed fine natural¬ ism in his Discobolos, and the artists who worked under the direction of Phidias com¬ bined figures of unsurpassed dignity and beauty into coherent compositions, such as those on the pediments, metopes and friezes of the Parthenon. The 4th century saw a movement toward slender

proportions and graceful line, especially with Praxiteles, as in his Hermes and the Aphrodite of Knidos. The Apoxyomenos of Lysippos, probably well represented by the

marble statue in the Vatican, which is assumed to be a copy of the lost original, shows the same qualities, in contrast to the Polykleitan canon. Scopas is said to have excelled in ex¬ pression of spirited action whether as boar hunt or bacchante. The Aphrodite of Melos, in the Louvre, free equally from shame and co¬ quetry, and uniting superb form with facial expression, belongs to this or a century later. The 3d and 2d centuries saw the diffusion of Greek art over the known world, and the vari¬ ous modifications consequent upon it. The friezes on the altar of Zeus at Pergamon ex¬ hibited originality of design and vigorous ac¬ tion ; and akin to them are such statues as the Apollo Belvedere, the Diana of Versailles and the torso of the Belvedere. The group known as the Laokoon belongs to the same general type and period, the ripe autumn of Greek art, but not in any sense a degeneration.

The Romans as a race were deficient in plas¬ tic sense. Sculpture appealed chiefly to their personal ambition as portraiture, which under the early empire reached a realistic perfection never before attained Relief was the next most

Michael and Satan — Flaxman.

practised branch of sculpture, and reached great excellence as decorative art and as commemo¬ rative representation, in such monuments as arches and columns, especially those of Trajan. Roman taste for imaginative sculpture depended almost entirely upon Greek sculptors resident in Rome and upon Greek masterpieces, which were transported thither in great numbers from the entire Greek world. Finally, sculpture de-

dined along with the Roman Empire, until in the 4th century a.d. not even fair copies could be made.

Early Christian art, which extends from the 3d to the 6th centuries, found use for sculpture only on sarcophagia, where scenes from the Old Testament were depicted in high relief by arti¬ sans rather than artists. What the barbarian incursions did to break the continuity of artistic tradition in the West was accomplished in the East by the Iconoclast persecutions, so that Byzantine sculpture from the 7th to the 9th cen¬ tury calls for no further notice.

Mediaeval sculpture, from the 8th to the 14th centuries, had various fortunes in Italy and the North. In Italy it was applied as re¬ lief. to the decoration of church furniture such as pulpits, altars and fonts; whereas in France and Germany both reliefs and statuary formed an integral part of the Gothic architecture on portal and fagade. Sculpture, founded upon classical models, was revived in Italy near the middle of the 13th century, under the leadership of Niccola Pisano. His son, Giovanni, felt the influence of northern schools and introduced thence the allegorical and symbolic qualities of Gothic. His successor, Andrea Pisano, led the Gothic school in Italy to the highest excellence it attained. His breadth, vision and technique transformed sculpture precisely as these quali¬ ties in Giotto did the contemporary painting. The worthy successor of Andrea Pisano was Andrea Orcagna, a genius who gave less atten¬ tion to sculpture than he did to its related arts.

The splendid development of stone sculpture in France, from the 11th to the 14th cen¬ turies, occurred in its application to the ex¬ teriors of Romanesque and notably of Gothic cathedrals. Front and side portals and fagade niches were crowded with life-sized or colossal statues, while archivolts and tympana were filled with high reliefs. This subordination of sculp¬ ture to architecture involved loss of freedom

and sacrifice of details, but the earlier severe stiffness had been overcome by the 13th cen¬ tury, when new buildings were in progress all over northern France. The thousands of fig¬ ures on such cathedrals as Chartres, Rheims, Amiens and Notre Dame were planned to vis¬ ualize the encyclopedia system of mediaeval the¬ ology. Almost no artists' names are known, and the scanty data indicate that while the ablest masters went to nature and to human models, both nude and draped, the mass of sculptors followed canons of form and pose pre¬ scribed for them by these masters, who must also have superintended the whole composition. These French sculptors of the Gothic period ac¬ quired the same technical mastery over stone as did the Greeks of the best period; and, like them again, were fond of polychromy, though this has only lately been recognized by his¬ torians of art. French sculpture of the late 13th and the 14th century loses in dignity, but gains in charm, humor and dramatic effect.

Mediaeval sculpture of stone achieved no such results in Germany as it did in France, but excelled all other European countries in metal sculpture for church furniture, as it did also in goldsmith's work, where it followed early Christian and Byzantine models. In the 12th century German sculptors applied stone statu¬ ary to the enrichment of cathedral interiors, especially about the choirs; and in the 13th century, under French influence, extended this enrichment to the exterior, but the figures were both fewer and soberer, copying French light¬ ness and grace only in the Rhenish

school. About the middle of the 15th century, natural¬ ism in wood carving for altar-pieces, etc., displaced the formalism of this architectural sculpture.

The Renaissance in sculpture, as in the other arts, took place in Italy, whence it was carried to other countries. Powerful families now dis¬ placed the community in patronage of art, just as the single artist did the school in its produc¬ tion. Associated with this individualism was the naturalism that showed itself both in the choice of contemporary subjects and in change from a conventional to a naturalistic treatment of forms. Both were powerfully promoted by the revival of classic subjects and forms, which is signified by the term Renaissance. In point of form, however, the modern sculpture was more nearly pictorial than the classical as a whole. The 15th century wa,s one of transi¬ tion, the 16th felt the full sway of the new spirit. In both these centuries the subjects most in demand remained religious for the lavish decoration of churches both exterior and in¬ terior, in both relief and the round. But squares and gardens, palaces and houses, also shared in the exuberance of restored art. The religious subjects were of necessity drawn from the Scriptures and the legends of the saints, with the Madonna and Child by far the most popu¬ lar. But civic and domestic sculpture frequently employed classic themes, and wealthy persons resumed the Roman practice of collecting an¬ tiques. Bronze came again into general use, and the demand for refined form favored marble among the stones. The intensity of white marble was toned down by use of wax, and details such as hair and ornaments were usually gilded. Terra-cotta and the still cheaper stucco displaced marble in works destined for

cpuntry towns; and reproductions of master¬ pieces often reached the common people by this means.

Only the chief sculptors can here be selected for brief notice. The leadership among eight distinct schools of sculpture during the 15th century was held by Florence. Its masters dur¬ ing the first half of that century were Ghiberti, Donatello and Luca Della Robbia. Ghiberti's

English Gothic Sculpture.

From Peterborough Cathedral. From York Cathedral.

masterpiece was the bronze doors for the bap¬ tistery at Florence in which sculptural per¬ spective and harmonious composition called forth Michelangelo's encomium. Robbia showed masterly composition in his

choir-gallery reliefs, and founded a school of glazed terra-cotta sculpture. Florentine masters during the late 15th century were Desiderio da Settignano, Benedetto da Majano, and Mino da Fiesole in marble, and Verrocchio and Pollajuolo in bronze. Desiderio was distinguished for a har¬ mony and refinement much emulated by his contemporaries. Verrocchio's masterpiece was the equestrian statue of Colleoni in Venice, re¬ puted to be the finest extant. The Milanese school indulged a taste for luxuriant decoration in terra-cotta, and the Venetian for rich, grace¬ ful forms that appealed to emotion.

The high Renaissance, nearly conterminous with the 16th century, brought to sculpture an influence over its sister arts of architecture and painting that it had never before enjoyed.. This sculpturesque treatment went to excess when statuary overbalanced the architectural construction of a wall tomb or even of an entire fagade. In sculpture itself dignity of design yielded its late prominence to modeling of sur¬ face, posing of arms and legs, and the move¬ ment of drapery, all aimed at greater effective¬ ness. Other artists of the period were over¬ shadowed by Michelangelo Buonarroti, a mas¬ ter equally of architecture, sculpture and paint¬ ing, but sculpturesque in all; for his dominant interest was with the nude human form. His chief sculptures in his best manner are the Moses, the Two Slaves and the Medicean

tombs at Florence. Each is but member of an incomplete whole. The freedom of modeling developed in marble by Michelangelo was paralleled in bronze and goldsmithy by Ben¬ venuto Cellini and Giovanni da Bologna. Cel¬ lini's masterpieces consist mostly of smaller decorated objects, but larger works are the Nymphs at Fontainebleau and the Perseus at Florence. Bologna treated classic themes with great freedom and grace. During the deca¬ dence of the 18th and 19th centuries, sculpture ran riot in Italy, both as to quantity and quality. Dignity and repose were displaced by dramatic emotion and movement. Lorenzo Bernini swayed 1 7th century sculpture by pandering to this theatrical taste.

The Renaissance in other countries than Italy was no rebirth, but simply an importa¬ tion of the new Italian style and modification thereof by the national spirit. In France, where the splendid Gothic impulse had not yet ex¬ pended itself, magnificent work was done by such sculptors as Michel Colombe, Ligier Richier and the unknown artists of the churches at Abbeville and Saint Riquier; but the Italian style found a welcome in the actual person of numerous Italian sculptors. The 16th century witnessed the transformation or erec¬ tion of great chateaux, public buildings and churches, all of which called for sculptured decoration after the early Renaissance style. The great sculptors in this work were P. Bon- temps, J. Goujon and G. Pilon, among whom Goujon especially displayed the new

harmony and elegance. In the 1 7th century the tendency was to superficial pomp of the Versailles type, which characterizes the work of F. Girardon and P. Puget and of their successor, N. Coyse- vox, at the beginning of the next century. This

grand art of Louis XIV was succeeded by one of grace and delicacy in the course of the 18th century, when J. B. Lemoyne, E. Bouchardon, J. B. Pigalle and J. A. Houdon did their work, the last named especially in portraiture.

The Renaissance movement in other coun¬ tries offers little interest. In Germany it re¬ inforced the naturalistic movement already be¬ gun there, but was accepted slowly especially

in the northern part where Gothic influence from the Netherlands continued. In the 16th century forms peculiar to Flemish Renaissance mixed with those of the Italian throughout Ger¬ many, and in the 1 7th and 18th centuries the Rococo style of the Romanists shared the field with the bareness of the Protestants.

The Netherlands combined Italian with its native style in the 16th century; Austria fol¬ lowed in the wake of Germany; while Spain and England depended upon imported Italian artists, until the 1 7th century, when native sculptors appeared. In England, N. Stone supplied sculpture for many buildings designed by Inigo Jones, as did G. Gibbons for others by Sir C. Wren. All important English works of the 18th century were executed by Flemish or French sculptors, but toward its close John Flaxman started a home revival by his ex¬ quisite reliefs for Wedgwood pottery.

Bibliography. — Barstow, C. L., (Famous Sculpture) (1916) ; Brown, (The Fine Arts) (1896) ; Brownell, (French Art* (1892) ; Burck- hardt, Jakob, (Der Cicerone) (Vol. II, new ed., 3 vols., Leipzig 1907) ; Calvert, A. F., Sculp¬ ture in Spain* (New York 1911) ; Liibke, Wil¬ helm, (History of Sculpture) (Eng. trans., by E. F. Bunnett, 2d ed., 2 vols., London 1878) ; Marquand and Frothingham, (Text-Book of the History of Sculpture) (New York 1911) ; Murray, < History of Greek Sculpture) (1890) ; Perkins, C. C, (Tuscan Sculptors) (London 1864) ; Radcliffe, Schools and Masters of Sculpture * (ib. 1894) ; Short, E. H. (History of Sculpture> (ib. 1907) ; Sturgis, R., (The Ap¬ preciation of Sculpture) (New York 1904) ; Viardot, Louis, (Les Merveilles de la Sculpture) (Paris 1869).

Edmund Buckley,

Editor of (University Lessons on Artd

SCULPTURE, Education in. We know little of the education of the sculptor in ancient Greece, and can only guess at the training which produced the greatest sculptors the world has seen. In the Middle Ages and the Renais¬ sance education in sculpture proceeded on much the same lines as education in painting, the young sculptor entering the workshop of a master and learning thoroughly all the mechan¬ ical parts of the trade before he attempted any¬ thing in the way of independent study of na¬ ture. To-day the education of the sculptor is organized in the same way as that of the painter and the student has much the same training in the observation of nature and much the same lack of training in the essentials of art. There are, however, certain differences between the conditions under which sculpture and painting are carried on in modern times which seem to favor the education of compe¬ tent craftsmen in sculpture. The mere bulk and weight of material involved in the creation of heroic statues or groups makes it inevitable that the sculptor should have some assistance, and most prominent sculptors are more like the heads of mediaeval shops than are almost any modern painters. Apart from the more or less illegitimate employment of what are known as ˆghosts® (that is, artists, often, of more ability than the employer, who actually produce the work for which the employer secures the com¬ mission and appropriates the rewards), a sculp¬ tor may have a corps of perfectly legitimate

helpers who vary from the mere studio boy of the caster to the accomplished modeler. Many young sculptors thus pass through the studios of their seniors and gain invaluable ex¬ perience in the actual production of works of art which is sunolemented, either before or afterward, by education in a regular school of art. Such a double training is the best our time has to offer, and is certainly far better than either an apprenticeship or a term of study in an art school taken singly, but it is not yet an ideal training.

The technique of sculpture, as far at least as regards the handling of the clay or wax model, is an infinitely simpler thing than that of painting. There are no complicated proc¬ esses to master, no questions of the chemistry of pigments, of the optical effects of colors on each other or of the different qualities of re¬ flected and transmitted light, such as are in¬ volved in the manipulation of paint. Modeling is a matter of knowledge of form and facility of hand, and both the knowledge and the facil¬ ity might be attained as readily in the school as in the studio, for there is so much rough manual labor to be done in a sculptor's studio that a helper might work there for years with¬ out doing much real modeling. And the tech¬ nique of modeling is, after all, of relatively little importance ; for the sculptor, unlike the painter, puts his personal handiwork upon a thing

destined to be destroyed and never to be seen by the public. He works in clay or wax while it is the interpretation of his work in marble or bronze that is set before the world, so that he is almost in the position of the draughtsman upon the wood block, whose work ceases to exist and is replaced by that of another. The sculptor of the Renaissance was either a stone carver or a bronze founder or both, and the craft he practised was the craft of carving or of metal working, the modeling being only a preliminary and being sometimes dispensed with altogether. The modern sculp¬ tor tends to become a modeler and to put all his strength into the clay, the final carrying out of his ideas being largely entrusted to others, and his knowledge and invention count for much more than his skill of hand, while the worker in stone or bronze rarely becomes an original artist. Of course the best of our sculptors do not only control and oversee the final carrying out of their work, but actually put hand to it themselves, at times, and even when they do not they must vary the manner of modeling they employ according to the material of the defini¬ tive work, and these variations of manner they will teach their assistants. Also there is a great deal to be learned in a sculptor's work¬ shop hardly likely to be picked up elsewhere, were it only the mechanics of setting up great armatures, the processes of pointing and en¬ larging small models and the rest. Still there is some tendency to a divorce between the original artist and the workman, and it is diffi¬ cult for the modern sculptor to become a thor¬ ough master of his craft, thinking naturally in stone or bronze rather than in clay.

There is another respect in which the edu¬ cation afforded by the apprenticeship of the Renaissance was greatly superior to that ob¬ tainable in a modern studio. The Renaissance master was often a painter as well as a sculp-

tor and, not infrequently, an architect as well, and the essential unity of the three great arts of design was inevitably impressed upon his pupils. The modern sculptor rarely knows anything of painting or architecture, and his studio assistant has little opportunity even to learn drawing, the foundation of all the arts. If he would learn to draw he must study in an art school, and he is generally encouraged to do so in such time as his necessary work leaves at his own disposal. In the modern art school the students are allowed, or even re¬ quired, to change from class to class, and their chance of acquiring some notion of the inter¬ dependence of the arts, and some breadth of artistic culture, is greater than that of the mere studio assistant. Such interchange of work between drawing or painting and modeling would be of great benefit to the painter also, if he more often took advantage of it,

but is hardly as essential to him as to the sculptor.

In some measure, then, the schools offer a valuable supplement to the training of the studio, but they do not give nearly all that they might or should give. Of the true meaning of composition, and of the difference between artistic expression and imitation, the school, at its best, can give no such idea as can the studio, where the actual production of a work of art, through all its stages, may be watched. Yet the students might be encouraged and aided in the actual carrying out of original work, taught something of the difference between the use of the model for the attainment of a pre¬ determined result and the mere copying of a set pose, and, possibly, instructed in casting, pointing, marble cutting and even bronze founding and chasing and the production of various patinae. He should, assuredly, be given a thorough training in ornament and be taught more than he is of the history of art and the development of styles. A thorough mastery of drawing cannot be too much insisted upon. Of course the constant study of modeling from the living figure would continue to be the principal element of training, but it would be well if some study of drapery and costume could be added to it. The graduate of our art schools, either painter or sculptor, generally knows lit¬ tle or nothing of the arrangement of draperies and this is one of his most serious deficiencies.

Such a course of instruction as is here sketched has been attempted, but has never been thoroughly worked out in our schools. It could hardly fail to prepare the student for more efficient service in the studio of a master than he is now generally able to give, and to enable him to acquire more surely and rapidly that practical knowledge of real work which no school, however managed, can supply. See Architecture, Education in; Painting, Edu¬ cation in. Kenyon Cox.

SCULPTURE OF THE 19TH CEN¬ TURY. The beginning of the 19th century found classicism dominant wherever the art of sculpture was practised. Canova, now 43, was the recognized leader and was destined to hold his position as an amiable dictator until his death, 22 years later. Thorwaldsen was already in Rome acquiring the elements of his more virile art. The works of the antiquarian Winckelman had been translated from the German into various languages and with the

etchings of Piranesi had carried the worship of the antique into distant lands. All Europe was <(doing Greek,® as it fondly imagined. Sim¬ plicity was the watchword; a simplicity which to-day seems as amusingly ostentatious as the theatrical art which it displaced. Canova was followed by a large brood of disciples of whom Giuseppe Fabris alone requires

mention. The realistic impulse of the time was represented by Lorenzo Bartolini (1777-1850), whose sculp¬ ture, while often literal, revealed a new vitality. Pietro Tenerani also left works of interest. The first really to belong to the 19th century was Giovanni Dupre (1817-82), who was strong enough in personality to put soul into his very realistic works. Giulio Monteverde likewise struggled to express ideality in terms of realis¬ tic imitation. Antonio dal Zotto, of Venice, a pupil of Ettore Ferrari of Rome, made many public monuments, among them his vivid of Venice. Vincenzio Vela (1820- 91), whose naturalism was liberally leavened with imagination, is best known to us through the (Last Days of Napoleon) in the Corcoran Gallery. Of contemporaries, Vincenzo Gemito (b. 1852) is typically Neapolitan, while Ernesto Biondi (b. 1855) has run the gamut of subjects and treatments from (The Saturnalia) to (Les Recluses Miserables. Most idealistic of all modern Italian sculptors is Lorenzo Bistolfi (b. 1859), of Turin, <(the poet of Death,® whose (Grief Comforted by Memory, > and (Sacrifice) — the latter on the national Victor Emmanuel Memorial at Rome — show forth the beauty of his sculptural thoughts.*

In France the opening of the 19th century found the great master Houdon at the age of 59 still producing those vivid portraits which have made his fame. His airy (Diana, } the ever admirable (Voltaire) and the stately (Wash- ington) of Richmond, Va., had been completed, however, a few. years earlier. Among the orthodox classicists of the time were Bosio, Cortot, Chaudet, Giraud and Pradier, all men of skill but with little to say. Their art seems to us singularly colorless and anemic. Three names stand pre-eminent in the first half of the 19th century: David d' Angers, Barye and Rude. Pierre Jean David (1789-1856) — called <(of Angers® to distinguish him from his namesake the painter — is remembered for his hundreds of medallion portraits of contemporaries and for the austere pedimental group of the Paris Pantheon. Antoine Louis Barye (1796-1875), the great interpreter of animal life, was a patient and perhaps unconscious revolutionary. Coming in a period of convention, no less ex¬ acting in matter of themes than in manner of treatment, his novel works were inevitably met with disapproval. Following an untrodden path, he made no mistakes; whatever he touched became true sculpture. Before his death his recognition . was complete. The greatest personality of this period was Frangois Rude, who was born at Dijon in 1784 and died in Paris in 1855. Rude imagined himself a classicist and tried to be one; but his art at times transcends schools, and once at least he becomes sublime. (The Departure) upon the Arc de Triomphe (1832-35) is the greatest achievement, the most inspired work ever wrought by a French sculptor. Rude's brilliant pupil, Jean Baptiste Carpeaux (1827-75), worked with a feverish touch and threatened to

set all of the statues of Paris a-whirl on their pedestals. of the Tuileries, (The Dance,* of the opera, and the crowning group of the Fountain of the Observatory are the most im¬ portant examples of his restless but fascinating art. Another pupil of Rude to win eminence wa9 his nephew, Emmanuel Fremiet (1824— 1900). Like Barye he was known as an animal¬ ist, but he modeled the human figure with com¬ plete authority. His various startling trag¬ edies of the jungle are well known, but a more lasting fame will be based upon his equestrian

A great quickening, of sculptural activity was destined to follow the modest and almost reticent leadership of Paul Dubois (1829-1905). Chancing to find his metier too late to aspire to the Prix de Rome, he went to Florence for independent study and there was profoundly impressed by the art of the 15th century, es¬ pecially the works of Donatello and Jacopo della Quercia. In a sense he re-discovered this period to France. He modeled and exhibited in 1865 his (Young John the Baptist, 5 its cordial reception being soon shared by the well-known (Florentine Singer.* As a result he was en¬ trusted with a very important commission, the tomb of General Lamoriciere for the cathedral of Nantes. Completed in 1878, this work re¬ ceived in the exposition of that year the high¬ est honors, and Dubois was recognized as the head of a new movement distinctly inspired by the early Italian Renaissance. Men of like sympathies grouped themselves around him, and the 70s and early ’80s saw a succes¬ sion of notable works from such masters as Henri Chapu ((Joan of Arc*) ; Ernest Bar- rias ((The First Funeral,* (The Defense of Paris*); Eugene Delaplanche ((L’Aurore,* (La Musique*), and Rene de Saint-Marceaux ((Genius of Death Guarding the Secret of the Tomb*). Alexandre Falguiere constantly oscil¬ lated between themes spiritual and themes <(frankly carnal.® Antonin Mercie, another gifted southron, had sent his

Strength is ever followed by decay; virtuosity takes in time the place of inspiration. No ad¬ vance is ever so successful that it has not an op¬ position movement in its shadow. Some of these great artists became careless in their work. Some stopped thinking, although their wonder-working hands toiled on. Nearly all of them made regrettably incoherent public monuments in the style of Dalou’s dizzy (Delacroix.* Their followers were left in a particularly sad plight with no one to think for them. Between an art of meaningless vehemence on one side and meaningless grace on the other, the unintelligent imitator found himself helpless. It was time for a new leader. Rodin’s remarkable nude, (L’Age d’Arain/ was first seen in 1877, to be followed two years later by the still more unconventional

(John the Baptist, a work so intense and so starkly*

human that it caused many a shudder and many a protest. It was the reaction that had to be. Elegance and carefully composed limbs gave way to as carefully planned crudities. The arose rude and impregnable where erstwhile had reigned the smiling graces. The (Gates of Hell, in which their author attempted to pic¬ ture all the sins of humanity, were never to be completed, but from them poured forth a long series of works culminating in (The Thinker.* The years moved on and the master's hand be¬ came impotent, his utterance faltering; yet stranger things, ranging from amorphous puerility to a realism akin to taxidermy, have been brought forth by his imitators. Among these, Boudelle and Maillot are apparently the most Virile. A great spirit is Paul Albert Bartholome, the painter turned sculptor, whose monument (Aux^Morts* rewards one's visit to the cemetery of Pere Lachaise. Carved in broad, simple planes in the Paris limestone, it has been an object lesson to many young sculp¬ tors weary of realism or of factitious grace. Among these men of promise — and of fulfil¬ ment — are Henri Bouchard, Paul Landowski, Frangois Sicard, Roger Bloche, Jean Boucher and others.*

Many of the able sculptors of France leave but a single work of great value. Competition is fierce and opportunity comes but once. With Aube it was his superb rather than the restless Gambetta monument. Lanson's (Age deFer, Massoule's (Un Ancetre,* Escoula's (Le Baton de la Vieillesse,) Dampt's (Le Baiser de l'Aieule,* Longepied's (L'Immortalite,* Gustave Michel's (La Pensee* are among the works which come readily to mind. The animalists were never more numerous than to-day. Fremiet and Cain were followed by a host of whom Georges Gardet is best known. Even more numerous are the modernists led by Chaplain and Roty. Eclecticism guides modern French sculpture. Individualism is supreme. Temperament alone, whether displayed through romanticism or through naturalism, has guided expression. The result is the most varied art the world has yet seen. These French masters represent a living force and their achievements form a splendid contribution to the art of our time.*

Spanish sculpture remained long out of touch with the modern world. To-day Barce¬ lona and Seville boast a number of skilful men whose works have much in common with re¬ cent Italian productions. Augustin Querol (1863-1909) was popular, but his monuments are extremely flamboyant. His statue of Fran¬ cesco de Quevedo in Madrid is, however, ad¬ mirable. Mariano Benlliure made interesting monuments to Martinez Campos and Sagasta, while some of his architectural decorations are very fine. Aniceto Marinas combines with much fluency a truly southern delight in detail, but is surpassed by Ricardo Bellwer who is prodigal in realistic accessories. Much freer from this fault is Miguel Blayy a pupil of Chapu, who has done

much good realistic sculpture. An idealist of truly poetic inspira¬ tion is Jose Clara.

Modern Belgian sculpture begins with the names, of Guillaume, Geefs, De Bay and Simonis, all of whom more or less ably fought against the influence of the then dominant

SCULPTURE OF THE NINETEENTH CENTURY

SCULPTURE OF THE NINETEENTH CENTURY

1 Au but (At the Goal) by Boucher

2 Tiger devouring a Crocodile by Barye

SCULPTURE OF THE NINETEENTH CENTURY

1 Joan of Arc at Domremy by Chapu 3 The Grandmother's Kiss by Dampt

2 The Child by Bloch 4 The Thinker by Rodin

SCULPTURE OF THE NINETEENTH CENTURY

1 Lincoln by St. Gaudens 3 Nathan Hale by MacMonnies 5 Columbus by Bartlett

2 Standard Bearer by Bitter 4 Washington by French 6 Rochejaquelein by Falguiere

SCULPTURE OF THE 19TH CENTURY

classic school. Paul de Vigne (1843-1901) was an idealist who produced many beautiful works. Charles van der Stappen (b. 1843) expressed himself largely in architectural sculpture. Thomas Vingotte likewise did much to decorate the beautiful city of Brussels. Jef Lambeaux (T852-1918) was an artist of unusual vigor and originality; his latter works, however, be¬ came exaggerated and gross. His female figures seem to have been inspired by Rubens. Joseph Dillens has brought forth work of more uniform excellence. The austere yet sympa¬ thetic productions of Pierre Braecke point the way to Constantin Meunier (1831-1910), who is undoubtedly the great figure in recent Belgian sculpture. His art is that of Millet the painter, one of intense sympathy for the laboring man and an almost classic simplicity of rendering. His figures and reliefs of miners and iron workers; his statues of

The name of Bertel Thorwaldsen (1770- 1844) looms large not only in the annals of Denmark, but in the history of modern sculp¬ ture. His art was Italian, though he believed it to be Greek. He brought to it the robustness of a strong-bodied, simple-minded peasant, and his life work contributed in no small degree to the great advance of sculpture. While he had little charm and little color sense, and person¬ ality is carefully obliterated from his ideal works, there remains nevertheless a simple, manly directness in his approach to every sub¬ ject which wins our respect. What he created was always sculpture.

Thorwaldsen left no successor in his own land. The Norwegian Stefan Sinding^ (b. 1846) brought a new fame to Copenhagen, his adopted city. His (Captive Mother5 and A Man and a Woman5 are elemental and truly great works. Per Hasselberg of Sweden (1850-94) was an artist of poetic gifts. His (Snowdrop5 and (Frog Girl5 are well known in America. Karl Milles and Carl Eldh are to-day prominent in Sweden.

The English have long patronized sculpture but have not until recently produced notable works. It was the French element which de¬ signed and decorated the noble cathedrals of England. John Flaxman (1755-1826) was one of the first Englishmen to win distinction in this essentially southern art, and his valuable contribution was largely in the form of designs for low reliefs. The many monuments by Sir Richard Westmacott (1775-1856) and by Fran¬ cis Chantrey (1782-1841) resemble those exe¬ cuted by Flaxman. John Gibson (1791-1866) was a pupil of Canova and his work shows much of the grace and delicacy of his master. Alfred Stevens (1817-75) approached grandeur in his Wellington memorial in Saint Paul's.

Thomas Woolner, Hugh Armstead, J. H. Foley and Edgar Boehm were prominent in their time and were succeeded by Thomas Brock (b. 1847), Hamo Thorneycroft (b. 1850), Onslow Ford (1852-1901) and Alfred Gilbert (b. 1854), men of much ability. Others notable to-day are Alfred Drury (b. 1857), Sir George Framp- ton (b. 1860), Bertram MacKennal (b. 1863) and Gilbert Bayes (b. 1871). A considerable number follow the example of Alfred Gilbert in uniting pure sculpture with an intricacy of detail such as wrought iron Entanglements55 and combinations of enamels and richly chis¬ eled metals, attaining in the side-lines of the art to very great dexterity. Several British painters have in the past turned with consider¬ able success to the sister art; both Watts and Leighton did distinguished work, as did also, in animal subjects, Landseer and Swan.

German sculpture of the early 19th century offers but two or three names of importance, Gottfried Schadow of Berlin (1764-1850), a man of considerable talent, was somewhat eclipsed by Christian Rauch

(1777-1857), a sculptor whose art was a perfect expression of his people and the time in which they lived. His monument to Frederick the Great in Berlin is an impressive work believed by many to mark the highest point reached by German sculpture. Rauch was assisted and succeeded by a num¬ ber of pupils, among whom Friedrich Drake was perhaps the most gifted. Albert Wolf executed the (Horseman attacked by a Lion,5 of the Berlin Museum ; its more famous com¬ panion group, the Amazon and Panther,5 was made by Augustus Kiss (1802-65). An artist of exceptional refinement was Ernst Rietschel (1804-61) of Dresden, who glorified poets rather than warriors. Among his works are important monuments to Lessing, Goethe and Schiller at Weimar and to Martin Luther at Worms. Enke and Schaper, Hahnel of Dres¬ den, and Blaser of Cologne likewise made con¬ tributions of value. Germany's love of the colossal began to reveal itself in such gigantic figures as Schwanthaler's (Bavaria5 in Munich, Schilling's Aermania5 in the Niederwald and Bandel's (Hermann Arminius5 in the Teuto- burg Forest. Reinold Begas (1831-1911) was the favored sculptor of the new empire. His pompous and restless monument to William I in Berlin is an example of his <(official55 art; his (Bismarck,5 in the same city, is even less happy. Joseph Uph)ues has skill and bet¬ ter taste. A veteran of Munich is Adolf Hildebrand (b. 1847), highly esteemed even by the new and insurgent generation. His Wittels- bach fountain in Munich is especially notable. Another whose work is always dignified is Louis Tuaillon, famed for his two equestrian statues of the Emperor Frederick and a fine Amazon.5

Of a type quite different from any of these is the massive and archaic treatment to-day dominant in German sculpture. One of its most complete expressions is the enormous (Bismarck,5 which, like a grim sentinel, over¬ looks the city of Hamburg. It is the work of Hugo Lederer (b. 1871), an Austrian by birth, who has designed several of these impressive memorials in which the sculpture becomes an organic part of the architecture. The Kyffhan- ser memorial is another cyclopean effort with a figure of (Barbarossa5 by N. Geiger. No one

has practised the new and strange sculpture of Germany with greater virtuosity than Franz Metzner (b. 1870), another Austrian established in Berlin, whose works abound to-day in all northern Germany. The greatest of these will be found in the Leipzig Volkerschlacht me¬ morial, which has been characterized as ((the most complete embodiment of brute force — of the power to crush — that architecture has af¬ forded since the pyramids.®

Among the many younger men who followed the new-old archaistic movement are Hermann Haller, Hans Damman, Geiorg Kolbe, Arthur Lange; Bernhard Hoetger and Ludwig Habich of Darmstadt; Benno Elkan and Hermann Hahn of Munich. Theodor Georgii of the latter city is apparently content to do good sculpture without tinge of the momentary fad. A leader in animal sculpture is August Gaul (b. 1869). Certain German painters, notably Franz Stuck and Max Klinger, have attracted much atten¬ tion through their experiments, especially in polychromatic sculpture.

Austria is prolific in sculpture, even supply¬ ing many leaders to Germany. The traditions of Vienna are of a florid art, as illustrated in the well-known frieze, (The Triumph of Bac¬ chus and Ariadne, in the Court Theatre, the work of Rudolph von Wehr. Earlier, however, in the century come the names of Prof. Franz Bauer, the brothers Hans and Joseph Gasser, Anton Fernkorn, Johann Meixner and Kaspar von Zumbusch. Of the succeeding generation were Edmund Hellmer and Victor Tilgner and the ingenious Arthur Strasser. Among the many able men of to-day are Karl Stemolak and Karl Krikawa. Prague has its own abundant tradition; examples range from the stately Wenzel monument to the fascinating works of Jan Sturza. Nicholas Ligeti and Geza Marothi are honored names in Budapest. Cracow likewise presents a varied record of recent tendencies, among which may be men¬ tioned Winulski's monument to Jagello and Szymanowski's impressive (Cortege of the WawelP One of the strangest products of the Viennese school is the young Dalmatian, Ivan Mestrovic, whose chosen work is the celebration of the prowess and suffering of his Serbian ancestry. His primitive art is weirdly impress¬ ive.*

In Russian sculpture the name of greatest prominence is Marc Antokolsky (1845-1902). His powerful (Ivan the Terrible) was followed by a series of dramatic works. Among his pupils was Ilia Ginsbourg. Lancere is the best of many who have made small military and equestrian groups of great vigor. Leopold Bern- stamm is better known in Paris than in Rus¬ sia. Prince Paul Troubetskoy is famed for his impressionistic statuettes ; but his method is less satisfactory in public monuments. Naoum Aronson (b. 1872) combines delicacy with forcefulness.

The artistic talent which exists everywhere in solution found but small encouragement during the first two centuries of American life; the slight achievements of Mrs. Patience Wright, modeler in wax; of William Rush of Philadelphia, carver of national figure heads, and of John Frazee in his portrait busts, are about all of which we have record. The history of American sculpture really begins with Horatio Greenough of Boston (1805-52), who in 1825

left Harvard College to study in Rome — the first of an endless procession who have sought inspiration and training abroad. Greenough's efforts naturally reflected the then dominant influence of Canova; his Zeus-like (Washing¬ ton^ intended for the rotunda of the National Capitol, was his most important work. Hiram Powers (1805-73) of Cincinnati, who followed in 1837, settled in Florence. His (Greek Slave) had vast popularity at home and in England and is a landmark in American art history. Thomas Crawford (1813-57) crowded much enthusiastic work into a short life; his is the pediment of the Senate and the (Freedom } upon the dome of the Capitol; also the Washington Monument at Richmond. It was Clark Mills, however (1815-83), who in 1853 created the first eques¬ trian statue in America, the astonishing An¬ drew Jackson) of Washington, D. C. Other pioneers were Thomas Ball (1819-1911), who made the (Lincoln Emancipating the Slave) in Washington and Boston, and the equestrian (Washington in the Boston Public Gardens; Henry Kirk Brown (1814-86), whose (Washing- ton) in Union square, New York, remains one of our finest equestrian statues ; Randolph Rog¬ ers (1825-92), William Wetmore Story (1819— 96) and Harriet Hosmer (1830-1908). Last, and perhaps most skilful of the American ^classicists,® was William H. Rinehart (1825- 74) of Baltimore.

Erastus D. Palmer (1817-1904) of Albany and John Rogers (1829-1904) were of more distinctly native inspiration, the former creating works of no little ideal beauty, the latter cele¬ brating patriotism and the homelier virtues in naive, realistic statuettes. John Q. A. Ward (1830-1910) designed many virile monuments culminating in his noble statue of Henry Ward Beecher in Brooklyn. Other names of the early years are Launt Thompson (1833-94), Larkin J. Meade (1835-1910), Franklin Sim¬ mons (1839-1913), Martin Milmore (1844-83) and George Bissell (1839-), who have lived to see a marvelous development in American sculpture. Howard Roberts (1843-1900) of Philadelphia and Olin L. Warner (1844-96) were the first to seek training in Paris and thus turned the eyes of American students in a new direction.

It was Augustus Saint-Gaudens (1848-1907) who, after a thorough preparation in the ficole des Beaux-Arts, was called to the primacy among our sculptors. His (Admiral Farragut in Madison square, New York City (1881), set a new standard in American monumental art. It was followed by a series of distinguished works including the Lincoln5 of Lincoln Park, Chicago; the Shaw memorial in Boston; the Adams memorial in Rock Creek Cemetery, Washington; (The Puritan,* Springfield, Mass., and finally the equestrian (Sherman> in New York City. These achievements, coupled with various ideal works and a host of remarkable portraits in low-relief, not only gave their author a commanding position among the fore¬ most sculptors of the world but have greatly influenced the trend of*

American sculpture. No one has done so much to elevate the standard of craftsmanship in this country.

Daniel Chester French (b. 1850) has pro¬ duced a great amount of admirable work. Best known is his well-beloved (Death and the Sculptor.) This was followed by the colossal

(Republic of the Columbian Exposition, the O'Reilly Memorial of Boston; (Alma Mater) of Columbia University, the

George Grey Barnard has a personal expres¬ sion of great originality and vigor, as demon¬ strated in his (Two Natures, (The Great God Pan,* and two enormous groups for the State House of Pennsylvania. His*

Andrew O'Connor (b. 1874) won an early triumph with his bronze doors of Saint Bar¬

tholomew's Church in New York City, and has done much vivid sculpture, notably his im¬ pressionistic

Albert Jaegers (b. 1878) in his Von Steuben Monument in Washington; A. A. Weinman (b. 1870) in his Baltimore military memorial and his (General Macomb) in Detroit have made valuable contributions to the monumental art of America, as have William Couper (b. 1853), Augustus Lukeman (b. 1872) and several

others. Nor is any chronicle complete without mention of the Piccirilli family of New York, all skilful craftsmen and, in case of two at least, Attilio and Furio, admirable artists. John Donoghue (1853-1903) is remembered for one beautiful work, his (Young Sophocles) in the Art Institute of Chicago, and Edmond A. Stewardson (1860-92) for (The Bather. Another whose death was untimely was Bela L. Pratt (1867-1917), of Boston. Among the many gifted men of a younger generation who are practising with success the ancient art are Robert Aitkin, Sherry Fry, Chester Beach and Albin Polasek, all but the first being graduates of the American Academy in Rome; as are Paul Manship, John Gregory and Leo Fried- lander, who have been greatly influenced by the present archaistic tendencies of that institution.*

Like Philadelphia, Baltimore has its little band of sculptors and Cincinnati and Saint Louis, each, at least one; Chicago has a large school and an exceptionally united group of craftsmen, while San Francisco shows

numer¬ ous public works of Douglas Tilden and his pupils. Inspired by the traditions of Saint- Gaudens several American medalists have won distinction, among them Victor Brenner, John Flanagan, J. E. Fraser and A. A. Weinman. In the sculpture of animals Edward Kemeys (1843-1907) long stood alone, but to-day such skilful men as Edward C. Potter, A. Phimister Proctor, Solon H. Borglum and Edward Roth have won high places.

The women sculptors of America who have been honored by membership in the National Sculpture Society are Mrs. Gail Sherman Cor¬ bett, Misses A. St. L. Eberle, Harriet W. Frishmuth, Laura Gardin, Frances Grimes, Anna V. Hyatt, Evelyn B. Longman, Mrs. H. H. Kilson, Mrs. Carol B. MacNeil, Miss Janet Scudder, Mrs. Bessie Potter Vonnoh, Miss Nellie V. Walker and Miss Enid Yandell.

Lor ado Taft,

*Author of (The History of American Sculp¬ ture ,**

SCULPTURE SOCIETY, National, a

society founded 30 May 1893, and incorporated 1896. Up to the earlier of these dates sculpture had received somewhat grudgingly a place in the picture exhibitions and this fact led the sculptors to band together for a separate organ¬ ization. In 1895 an exhibition for sculpture alone was held in New York, the objects shown having the advantage of a background of archi¬ tecture, trees, shrubbery and flowers and pe-

riodical exhibits have since been held. One reason for the existence of the National Sculp¬ ture Society was to provide a centre of author¬ ity regarding public and private monuments, and its influence has been beneficially exerted on the decorations and the decorative sculptures of many important public buildings and festival undertakings. The headquarters of the society are at 212 West 57th street, New York City.

SCUP, one of the names of an important American food-fish (Stenotomus chrysops) be¬ longing to the family Sparidce, to which the sheepshead and snapper also belong. Besides some technical characters of the skeleton and swim-bladder the scup may be known among fishes inhabiting the same region by its deep compressed body, prominent dorsal spines, of which the third is elongated and the canine-like incisor teeth. The color is silvery gray with purplish reflections above, pure silvery on the sides below. This fish is

abundant from Cape Cod to the Carolinas and reaches a large size on rocky ledges where food is abundant, though ordinarily not exceeding 9 or 10 inches in length ; it reaches a remarkable size at the age of two years. In the South it is known popu¬ larly as porgy. Consult Goode, G. B., (Amer-can Fishes, (New York 1888) ; Jordan and Evermann, (American Food and Game Fishes,* (New York 1902).*

SCURVY, a disease resembling purpura, characterized by inanition, anemia, asthenia, ecchymoses and a tendency to swelling and bleeding of the gums. It is mainly due to dis¬ ordered nutrition from improper food. Some¬ times it follows a deficiency of fresh vegetables and fruits, or an excess of salt fish and pork, the use of tainted food, a too monotonous diet, or an insufficient amount of food. General ill health and malnutrition, and a cold, damp win¬ ter, compelling persons to house themselves, are predisposing causes. No condition of the blood differing from that found in other anemias has been recognized. Some believe that the disease is an infection because it has often spread rap¬ idly in prisons, workhouses, etc., and sometimes has a distinct period of incubation, and because one attack, as a rule, confers immunity. It is not related to relapsing fever, which is con¬ tagious.

Up to the middle of the last century scurvy was frequent during wars, pestilences and famine, and especially on long sea-voyages when the diet consisted largely of bread, tea and salt meat. During the Crimean War 23,000 cases of scurvy occurred among the French troops alone, and in the American Civil War 15 per cent of the deaths were from this disease, though many cases recovered, owing to the use of vegetable food furnished by the Sanitary Commission. At the present time scurvy is comparatively rare, as most vessels going on long voyages are supplied with a variety of anti-scorbutics, canned meats, lime- juice, lemons, and other fruits, vegetables, etc., and on land, in civilized countries, or at least where hygiene is not rudimentary, fresh fruits and vegetables are more used than formerly.

In scurvy the blood coagulates poorly, its red corpuscles are diminished, while the white are increased in number. Sometimes there is oedema of the feet and ankles and serous exu¬ dation into the pleural and large joint cavities.

There are purpuric spots in the skin, especially on the legs, ecchymoses in the pleura, pericar¬ dium, cerebro-spinal meninges, synovial mem¬ branes and in the mucous lining of the bronchi and alimentary canal ; and haematoma in mus¬ cles like the gastrocnemius and glutaeus, which may suppurate or in part organize. The gums are swollen, especially about the teeth, and their deeper layers are thickened ; fatty changes occur in the

liver, spleen, kidneys and heart; the bones may be carious or fractured; and the bone-marrow and mesenteric glands may dis¬ play hemorrhagic infiltration. In infants the ecchymoses are almost entirely subperiosteal, the blood raising the periosteum (usually of femur, sometimes of tibia or fibula, rarely of the bones of forearms or other parts) in a fusiform swelling, surrounding the bone. The bones become thickened and sometimes super¬ ficially necrosed. The epiphyses may separate. The gums may be spongy.

The symptoms of scurvy, which usually de¬ velop slowly, include lassitude, anemia, flac- cidity of muscles, a cool, dry skin, with some¬ times a yellowish pallor. When the disease is developed the gums are red, nodular or fun¬ gous, and bleed readily. When the disease is advanced, hemorrhage occurs internally or ex¬ ternally, the breath is offensive, the gums ulcer¬ ate, and the teeth loosen. There is thirst, with a craving for sour food and condiments ; the joints are swollen and painful; syncope, dysp¬ noea, and pulmonary congestion are common ; the urine is scanty, high-colored, and less than normally acid ; the temperature is subnormal (96° F. or 97° F.). The patient is pale, feeble, much emaciated, mentally depressed, and may have low delirium and coma. Meningeal hem¬ orrhage may cause convulsions or hemiplegia. In infants, over the inflamed periosteum there is intense pain and tenderness, swelling and a tense, shiny skin. The child screams when moved, loses appetite, emaciates, grows pale and feeble, perspires freely. There is usually diarrhoea, sometimes hematuria, hemorrhagic blebs in the pharynx, and extravasation of blood in the orbit. Other extravasations, how¬ ever, are rare. The present day attitude is to regard scurvy as a disease duct, the deficiency of certain ingredients in the diet. These are usually chemical or nitrogenous phosphorus compounds, often called vitamines.*

SCUTAGE, or ESCUAGE, in the feudal system the fee on payment of which the mili¬ tary service due from the holder of a knight's fee was not exacted. It originated about the 11th century, and the irritation caused by its exaction was one of the causes that moved the barons to oppose King John in 1214. Consult Baldwin, J. F., (The Scutage and Knight Serv¬ ice in England (Chicago 1897).*

SCUTARI, Anatolia, city on the east shore of the Bosporus, opposite Constantinople. It is a busy trading centre of ancient date, and now an important railway junction, with manufac¬ tures of silk and cotton textiles, leather, etc. Historic Chalcedon as the modern village of Kadikoi is two miles distant to the south. Scu¬ tari was prominent during the Crimean War 1854-56, as the scene of the ministrations of Florence Nightingale and her co-workers, and was also the centre of great activity during the European War. Pop. about 100,000.

SCUTARI, skoo'ta-re, Albania, (1) capital of the province of Scutari, at the confluence of the Drin and Boyana, lies near the Lake of Scu¬ tari. The town is fortified, the citadel crowning an eminence. There are besides, two castles, mosques, Greek and Catholic churches, ship¬ building yards and factories for cotton and firearms. There is an active trade. The ex¬ ports include wool, wax, hides, skins, tobacco and dried fish, sent to Trieste, Venice and Avona. The imports are colonial produce, silk and other manufactured goods which are sold at the large fairs. The fisheries are im¬ portant. Pop. 32,000.

(2) The province or sanjak of Scutari con¬ tains 4,516 square miles and has a population of 322,000.

(3) The Lake of Scutari is 18 miles long by 6 miles wide ; on the northwest it receives the Moratcha. The Boyana forms its outlet into the Gulf of Drino in the Adriatic Sea.

.SCYLLA, sil'a, a character in mythology, the daughter of Nisus, king of Megara, who, when Minos came from Crete to attack Megara, in revenge for the death of his son, Androgeos, was led by her love for Minos to cut off from the head of her father, King Nisus, a purple lock of hair which while it remained on the head of Nisus made it impossible for Minos to take the city. Megara was captured and Nisus slain, and Scylla was either drowned or changed into a fish which Nisus, changed into an eagle, constantly pursued.

Also another Scylla, mentioned in the Odys¬ sey, as a monster with 12 feet, six necks and six mouths, and occupying a rock on the Italian coast. Legends represent her as having been a beautiful woman changed into a monster through the jealousy of Circe or Amphitrite.

SCYLLA and CHARYBDIS, ka-rib'dis, the former a promontory of southern Italy, at the entrance of the strait which divides Italy from Sicily. Navigation around this promon¬ tory was considered dangerous by the ancients, but is- regarded by moderns as not attended by special difficulty. Charybdis is a whirlpool nearly opposite the entrance to the harbor of Messina in Sicily, the navigation of which is regarded as very dangerous even to vessels of the present age and which must have been extremely perilous in ancient times. "Between Scylla and Charybdis, » means to be confined to a choice between two dangerous situations.

According to the Odyssey (xii, 73ff.) these were two sea monsters,

personifying the dan¬ gers of rocks and eddies. A description of Scylla is given under that heading. Charybdis sat opposite her, on a low rock under a fig tree, sucking in and belching forth, thrice daily, the adjacent water. In the (Alexandreis) of Gautier de Lille occurs the famous line, "In- cidis in Scyllam cupiens vitare Charybdim."

SCYTHIANS, the writers of the Classic Age confounded under this name several peo¬ ples, who dwelt from the present Rumania to the Pamir across middle Russia and the Cas¬ pian steppes. However, the authors who have best described these peoples distinguish the Scythians proper or Scolotes, as they called themselves, the immediate neighbors on the north of the ancient Greeks, from the Sar- mates who lived to the east of these, and from

the Saks who dwelt further east in the land now known as Turkestan.

The Scythians proper occupied from the time of Herodotus the region between Atlas (the present Aluta, tributary of the Danube) on the west and the Tanais (the Don or per¬ haps the Molotchnaia) flowing into the Sea of Azov on the east. To the south their frontier was marked by the lower course of the Dan¬ ube from the mouth of the Aluta, and by the Black Sea. To the north their territory ex¬ tended to the country of the Agathyrces (Transylvania?), to the Neuri in the upper basin of the Dneister and the Bug, and to the Androphages. Altogether they occupy the eastern part of Wallachia, almost all Moldavia, Bessarabia, the present Russian provinces of Kherson and southern Podolia, and the Crimea, except the mountainous southern portion of the latter, which remained in possession of the savage Tauri. Herodotus divides the Scythians into (1) cultivators, dwelling in the valleys of the Dneister and the Bug, adjoining the Neuri and in the lower valley of the Dneiper and the Panticapee (probably the present Ingouletz) ; (2) the nomads of the eastern Crimea and south of the mouth of the Dneiper; (3) the Royal Scythians in the eastern Crimea and be¬ tween the Dneiper and the Tanais; (4) the Kallipydes between the Bug and the mouths of the Danube. The Scythians are mentioned for the first time in Hesiod, and many ethnologists are of opinion that their arrival in Europe was about the 15th century b.c. The principal trait of nomadic life — sustenance from ass's milk — is recorded in every ancient description of this people, who were for the most part, nomads and warriors. Hippocrates gives a detailed de¬ scription of their mode of life — in four- wheeled chariots, impervious to rain, wind and snow, and often divided into two or three com¬ partments. These chariots were drawn by hornless cattle, the women and children re¬ maining within them while the men accom¬ panied them on horseback. They remained in the same place while there was forage suffi¬ cient for their animals, failing which they moved onward. They lived on cooked meats, ass's milk and cheese.

Excellent horsemen, the Scythians hunted and fought on horseback; they were famed as bowmen, but were poor swordsmen. Enemies slain in battle were scalped and their blood drunk from the skulls of others previously slain.

Their religion was a kind of polytheism without external worship. They had no temples nor images of deities to which prayers and sacrifices were offered. The god of war alone had special places reserved for his especial adoration. To him animals and even human beings were offered in sacrifice. Fire worship was general. Women enjoyed a certain amount of consideration due, it is thought, to the legend that the people were descended from a female- warrior race, the Amazons.

The mode of life of the nomadic Scythians led many to a belief in their Mongolian origin. This opinion is, however, no longer held. The little we know of their language, customs and re¬ ligion leads rather to the conclusion that they were Iraneans. About the second century b.c. the Scythians were conquered by the Sarmates and absorbed by them. Thereafter they dis-

appear from history. Consult Deniker, (Races of Man) ; Ratzel, (History of Mankind (3 vols., London 1900).*

SEA. See Oceans.

SEA-ACORN, or ACORN-BARNACLE,

a barnacle of the family Balanidce. See Barnacle.

SEA-ANEMONE, a popular name, having reference to their flower-like aspect, for certain polyps or coelenterate animals belonging to the suborder Actinaria of the order or class An- thozoa. The sea-anemones are sac-like animals of a more or less cylindrical form, usually fixed by a base or foot to some firm body, and with a disc at the opposite end in which is the slit-like mouth surrounded by whorls of simple hollow tentacles in greater or less number, but nearly always some multiple of six. From the mouth a short tubular gullet or oesophagus reaches into the cavity of the body to the walls of which it is connected by radiating septa or mesenteries, which divide the body-cavity into a correspond¬ ing number of sacs, with all of which the oesophagus communicates by a central space into which the septa do not reach. A pair of ciliated grooves or siphonoglyphs extend along opposite sides of the oesophagus and into the correspond¬ ing

corners of the mouth. These always remain open and are the seat of inflowing and out¬ flowing currents of water, serving a respiratory function as well as for the transportation of waste matter from the body. The body-walls, as well as the tentacles, which are outgrowths from them, are very contractile and largely composed of muscles arranged in a circular and a longi¬ tudinal layer, the former serving for purposes of extension, the latter for retraction. These muscles have special relations to the mesenteries. The mesenteries are vertical radiating septa reaching from the mouth disc or peristome to the base, and from the body wall to the oesophagus, but below the level of the latter end¬ ing freely. They are not strictly radial in ar¬ rangement but are grouped in pairs almost al¬ ways, like the tentacles, in some multiple of six. The mesenteries corresponding to the siphono¬ glyphs differ in structure from all of the others and are termed directive; the others form different classes according to the order and degree of development. The inter-mesenteric sacs may further communicate by one or two pores in each mesentery. Along the edges of the septa the testes and ovaries are developed from the cells lining the gastric cavity. Diges¬ tive cells are also found in the same region as well as an area filled with stinging thread cells or nematocysts. In some species the latter are found in addition upon delicate threads or acontia which may be protruded through the mouth or cinclides.

Most of the anemones live singly, but some are colonial, in which case they never, like the closely related stone corals, form an internal limy skeleton, but may form a superficial one in the ectoderm. Generally they live attached to rocks or piles, but a few burrow in mud or sand, some as commensals fix themselves to shells inhabited by hermit crabs, etc., and a few are truly parasitic in jellyfishes. All are marine; most sublittoral, some deep-sea and a very few pelagic. They reproduce both asexually by budding and fission and sexually by eggs

and spermatozoa, which are usually produced by different individuals. The eggs are fertilized in the gastric cavity and escape from the mouth in most cases as minute free-swimming larvae or planulae which soon attach themselves, develop mouth, tentacles and mesenteries, the latter in a definite order, until the adult struc¬ ture is attained. Sea-anemones are car¬ nivorous, but, having very limited powers of locomotion, are dependent upon such food as falls upon the expanded tentacles and peri¬ stome. This is captured through the paralyzing effect of the stinging cells or engulfed by the enfolding tentacles and passed through the mouth into the gastric cavity for digestion, the undigested portion being rejected through the mouth. They will devour a surprising quan¬ tity of food and grow rapidly; and if starved, gradually shrink to almost the point of disap¬ pearance without losing their form. The species are quite numerous and are chiefly distinguished by the arrangement of the septa and tentacles, with

color, form, etc., as minor characteristics. Most of them and particularly the tropical forms are beautifully colored. A large, handsome and variable species very common on the rocky shores of New England is Metridium margin¬ atum, which makes an interesting inmate of the marine aquarium. Consult Agassiz, E. C., and A., (Seaside Studies in Natural History) (Bos¬ ton 1871) ; Arnold, A. F., (The Sea Beach at Ebb Tide (New York 1900) ; Mayer, A. G., (Sea-Shore Life* (ib. 1905) ; Lankester, treat¬ ise on Zoology,* Pt. II (London 1901); for American species, Parker, {American Natural¬ ist (1900).*

SEA-BASS, a fish (Centropristis striatus) of the family Serranidce (q.v.), also known as the black-fish, etc. It commonly attains the length of about a foot and a weight of two to four pounds, and is readily known by the large mouth with the teeth of moderate and nearly uniform size, the smooth area on top of the head, the rather large very rough stenoid scales, continuous dorsal fin with a very strong spine and the slightly trilobate tail with a short filamentous tip to the upper angle. The color is mottled blackish with more or less evident parallel pale streaks. The sea-bass is well known along the entire Atlantic Coast of the United States and is very common from Cape Cod to the mouth of Chesapeake Bay. It lives on rocky ledges wherever an abundance of food offers itself, and feeds voraciously upon all sorts of small crustaceans, fishes, squids and other mollusks, etc. The sea-bass is a sluggish bottom-loving fish, but appears to be somewhat migratory. It spawns in June and the eggs are of small size and buoyant. During the sum¬ mer large numbers of the young collect in the shallow bays, where eel-grass grows in abund¬ ance. Owing to its abundance and the readiness and determination with which it takes the hook this is deservedly a favorite with anglers who lack the opportunity or skill to cope with nobler game. The fishing is done with hand-lines in from 5 to 20 fathoms of water, a heavy lead and a stout hook, preferably baited with squid, being required. Where they are plentiful two fish are frequently brought up simultaneously on as many hooks and large strings are taken during a single slack water, which is the time best suited to their capture. For the market large

numbers of sea-bass are taken by lines and in pound nets on the coasts of New' Jersey and Massachusetts. The firmness, whiteness and sweetness of its flesh makes this a table favorite, especially for chowder. The sea-bass is readily propagated artificially, but there has been no necessity for entering upon this work on a large scale. The name is also sometimes applied to various other more or less closely related species.

SEA-BEANS, very hard-shelled seeds of tropical plants carried by ocean currents and deposited on beaches, where they take root. Those washed up on the Florida sands take a high polish and are made into jewelry and souvenirs. The polished, marble-like, pale-gray seeds are those of a tall Central American shrub (Ccesalpinia bonducella) , known in their native country as the nicker or bondue nuts. They are employed for necklaces and by Indian doctors as a tonic and vermifuge. Other com¬ mon sea-beans are flattened, like lima beans, with a pitted or granular surface, and are of various sizes and hues, ranging through shades of red and brown to black or mottled. These are the fruits of species of Mucuna and Stizo- lohhun, the former climbing shrubs, the latter annual herbs, widely dispersed through the tropics and very annoying to travelers, as the seed-pods are covered with stinging hairs, easily detached. The Queensland nut, the Kin- dal-Kindal of Australia, is a nutritious nut, the fruit of a small Australian tree (Macadamia ternifolia) and so valuable as a food that no one is allowed to fell the trees. The seed is about the size of a hazelnut, with somewhat the same flavor. It is squarish, jet black, with a polished surface of iron-like hardness. A woody climber (Entada scandeus), native to Australia, the West Indies and other tropical countries bears pods two to four feet long and several inches wide. Its seeds, known as liner- beans, from their color, are used for washing the hair and for laundering and the shells are made into receptacles for trinkets.

SEA-BEAR. See Seal.

SEA-BLITE. See Goosefoot.

SEA BOUNDARIES. See Boundaries of the United States.

SEA-BREAMS, fishes of the marine family Sparidce, represented in the United States by the sheepshead and its congeners. They are coast-fishes of modern size, distributed through¬ out the warm and temperate parts of the world and are usually of dark coloration. They are distinguished by the strength and elaboration of their teeth, fitting them for seizing and chewing crustaceans, mussels and shellfish of all sorts. The fish most famous under this name is probably that of the Mediterranean Chrysophrys anrata, called gilthead in England, wdiich sometimes reaches a weight of 20 pounds, and was one of the kinds fattened by the Ro¬ mans of the classic age in fish ponds and re¬ garded as especial delicacies.

SEA BUCKTHORN, or SALLOW- THORN, a monotypic genus (Hippophac) of the Elceagnacece, confined to temperate Europe and the steppes of central Asia, and living near sea-coasts and alpine rivers. The single species, H. rhamnoides, is a thorny shrub, sometimes cultivated, especially for hedges near the sea in

sandy soil, where it grows luxuriantly. The leaves are linear lanceolate, silvery in color; the inconspicuous dioecious flowers on the female plants are followed by succulent orange- colored, agreeably acid fruits. When the fruit is ripe in the fall the female plants are very beautiful because the berries are very abundant. These are used for making fish-sauces, jellies and condiments.

SEA-COCOANUT. See Palms.

SEA-COOT, a gunners' name for certain dark-colored ducks, especially the American scoter.

SEA-COW, a name often applied gener¬ ally to sirenians (see Sirenia; Manatee), but especially restricted to the species formerly in¬ habiting the Pacific Coast of Kamchatka, — Steller's sea-cow (Rhytina stelleri), now ex¬ tinct. Structurally it differs from other sire¬ nians in the total absence of teeth, the masticat¬ ing surfaces of the jaws being merely horny pads, very dense and hard. The tail was lobed and the fore limbs small truncate paddles. This was a very large animal, attaining a length of 25 feet and being very bulky. It is now en¬ tirely extinct and was under the observation of white men for a bare quarter of a century. In 1741 the explorer Bering and the naturalist Steller discovered this great animal about the shores of two small islands, now known as Bering and Copper islands, in the extreme north Pacific Ocean. It is not known to have lived elsewhere and there is no proof that any examples have been seen since that killed in 1768. Steller has preserved an account of their habits and anatomy during the period when he was a shipwrecked resident of that inhospitable region. The animals were at that time very abundant in the shallow waters about the islands, where they fed upon the large sea¬ weeds which grow there so plentifully. They were extremely sluggish and inactive and of an unsuspicious, affectionate disposition. Upon Steller's return to Germany his discovery and suggestion that the flesh of these great sea- cows be utilized by explorers were published. Russian traders and trappers visited the islands in large numbers and in the short space of time noted exterminated this interesting animal. Consult Nordenskiold, N. A. E., (Voyage of the Vega> (English trans. by Alexander Leslie, 2 vols., New York 1881), and Stejneger, L. H., in the American Naturalist (Vol. XXI, Salem, Mass., 1887).

SEA-CUCUMBER, a holothuria (q.v.).

SEA-DEVIL, a devil-fish (q.v.).

SEA-DOVE, the little auk. See Dovekie.

SEA-EAGLE, an eagle of the genus Ha- liaetus, especially the white-tailed eagle or Erne (H . albicilla) of Europe. See Eagle.

SEA-EGG. See Egg-urchin; Sea-urchin.

SEA-ELEPHANT. See Elephant-seal.

SEA-FAN. See Gorgonia.

SEA-FIR, a sertularian. See Ccelenterata.

SEA-FOX, a shark. See Thresher.

SEA-GULL, The (Chaika), a tragedy of Chekhof, first performed in Saint Petersburg in 1896, when the author was 31. It failed, but later met with brilliant success at the Moscow Theatre, and has perhaps been the most popu-

lar of Russian plays on the English stage. It was translated into English by Marian Fell (Mrs. Van Agnew) and published in New York in 1912. A hint at the plot may be given by a sort of algebraic formula : A, a famous actress, is the mistress of B, a famous novelist, who comes with A to visit her brother C, a typical landowner and invalid. A's son, D, who has ambitions as a playwright is in love with E, the beautiful daughter of a wealthy landowner. E, being unhappy at home, has a great desire to go on the stage, and easily falls a victim to B, who seduces her and de¬ serts her, after their child is born. E comes back secretly after two years and has a pas¬ sionate interview with D, confessing that she still loves B. She disappears, and D shoots himself. On C's estate is a beautiful lake which is the haunt of gulls. D kills one of them and has it stuffed. This (

There are passages of wit and humor in the play, but it is chiefly notable for its revela¬ tion of the darker strains of human nature, depicted with relentless realism and yet with a passionate sympathy with all suffering, physical, mental and moral. It is also interesting here and there, especially in contrasting the literary methods and aspirations of B and D, giving a hint at Chekhof's own literary creed. And E, the lovely young heroine, shows her whole atti¬ tude, in advance of the tragedy which, while it ruins D, only gives the cachet to her own ability as an actress, when she exclaims to her seducer: <(For the joy of being an author or an actress I could endure want and disillusion¬ ment and the hatred of my friends and the pangs of my own dissatisfaction with myself; but in return I should demand

fame — genuine, resounding fame.®

Nathan Haskell Dole.

SEA-HARES, a genus (Aplysia), of opis- tho-branchiate gastropod mollusks, in which the shell is either absent or very rudimentary, and is concealed by the mantle. These animals are slug-like in appearance and derive their popular name from the prominent character of the front pair of tentacles which somewhat resemble the ears of a hare. The side lobes of the mantle are used as fins, and are reflected over the sides and back of the sea-hares, these portions of the mantle thus concealing the shell. This lat¬ ter structure, when developed, is of oblong, flexible and transparent character. The gills are placed in the centre, and at the posterior portion of the dorsal surface or back; and four tentacles exist. Eyes are present, and are situated at the base of the hinder tentacles.

The sea-hares are widely distributed through¬ out most seas, and generally inhabit muddy or sandy tracts. The eggs are deposited in long strings. The food consists chiefly of sea-weeds, but they also devour small crustaceans, mol¬ lusks and annelids. The mouth possesses thick muscular lips, and the stomach is of compound nature, consisting of a crop, muscular gizzard and accessory cavities. The sea-hares were no-

torious among the ancients for their supposed venomous properties, and formed ingredients in the poisonous compounds used of old to de¬ stroy enemies. Locusta is thus said to have used them against the enemies of Nero; and they formed ingredients in the draught pre¬ pared for the tyrant himself. Domitian was similarly suspected of administering the poison¬ ous Aplysiadse to his brother, Titus. And when Apuleius was accused of practising magic a chief proof against him was the fact that he had employed fishermen to obtain sea-hares for him. These animals, however, are harmless so far as poisonous properties are concerned, ex¬ cept that some species exude an acrid liquor irritating to the human skin. The <(lernsea® (Aplysia leporina) of the Bay of Naples has an evil reputation among fishermen for caus¬ ing pain and sickness when touched. The sea- hares also emit a fluid of a rich purple hue, which, like the ink of the cuttle-fishes, has the property of diffusing itself quickly throughout the surrounding water. Gosse mentions that a West Indian species of Aplysia, on being put into a basin of clear sea-water, emitted suffi¬ cient of this purple secretion to tinge deeply the whole of the water within a few minutes. Con¬ sult ˆCambridge Natural History) (Vol. Ill, New York 1895) ; Lankester, (Treatise on Zoology) (Vol. V, London 1906) ; Parker and Haswell, (Text-book of Zoology) (Vol. I, New York 1910).

SEA-HORSE, a small fish of the genus Hippocampus, in which the head bears a close resemblance to that of the knight in chess. They belong to the order Lophobranchii and the same family (Syngnatliidcc) as the pipe-fishes. From the latter, and indeed from all other fishes, they differ in having a prehensile tail, which is long, tapering and quadrate in section, owing to the integument of angulated, bony plates, and lacks altogether the caudal fin. The body is compressed, curiously prominent below, protected by rings of spinous bony plates, and bears small pectoral, dorsal and anal fins. In addition to its form the head is remarkable in being supported at right angles to the body- axis on a neck-like construction. Like other parts it is protected by tuberculated or spiny bony plates. A prolonged snout bears the small toothless mouth at its end. The gills are tufted and their arches and covers poorly developed. About half a dozen closely similar species are found in our waters, the best known of which is H. hudsonicus found in shallow bays and estuaries along the Atlantic Coast as far north as Cape Cod. There is no more interesting in¬ mate of the marine aquarium than the sea¬ horse, which twists its tail about the stems of sea-plants, among which it seeks concealment or swims slowly in a very unfishlike attitude, with coiled tail, upright in the water. As in the pipe-fishes the eggs are protected until hatched in a brood-pouch at the base of the tail of the male. Other species occur in the warm waters of the Gulf of Mexico and California. A re¬ markable related genus is Pliylloperyx of Aus¬ tralian seas, which bears numerous long cutane¬ ous streamers closely mimicking the seaweeds among which the animal dwells.

In symbolic and heraldic art a ((sea-horse® appears as a fabulous marine animal with fore¬ parts like those of a horse, and with hinder

parts like a fish. Neptune is depicted as using them to draw his chariot. In the sea-horse of heraldry a scalloped fin runs down the back. In Biblical literature and early books generally the term often refers uncertainly to the walrus or to the hippopotamus. Consult Gunther, Al¬ bert, introduction to the Study of Fishes) (London 1880), and Jordan, D. S., (Fishes) (New York 1907).

SEA ISLAND COTTON. See Cotton in the United States.

SEA ISLANDS, the islands off the coast of South Carolina, south of Winyah Bay. They are a chain of low, flat islands noted for their fertility. The principal islands are Hilton Head, Port Royal, Saint Helena, Edisto, Johns and James. The quality of the long fibred <(Sea Island cotton® is

famous, and the rice product is large. In 1893 and in 1894 hurricanes devas¬ tated several of the islands, inundating them with the tidal waves and destroying the crops.

SEA-KALE, a cruciferous, large-leaved perennial (Crambe maritima) indigenous to the coasts of Europe. It has glaucous cabbage-like foliage and clusters of showy white flowers and is cultivated in rich soil for the young shoots and unfolded leaves, which are blanched and eaten as spring vegetables, like asparagus.

SEA-LAMPREY. See Lamprey.

SEA LAVENDER, SEA PINK, THRIFT,

a name common to various species of Statice (q.v.), and to the closely allied species of Limonium. Several of the former, being hardy, are popularly cultivated as border plants. They include annuals, biennials and perennials with abundant small blue, lilac, yellow or white flowers which are often used for ˆeverlasting® bouquets. Species of Limonium are mostly perennial, are useful for cut flowers and for planting among rocks.

SEA-LEMON, a shell-less mollusk of the nudibranch family Doridce, of cosmopolitan range. The body somewhat resembles a lemon in color, showing a beautiful plume-like tuft of gills (when expanded) on the back. These mol- lusks are carnivorous, feeding on zoophytes, Crustacea, etc., and live under stones on the beach, usually near low- water mark. The eggs are emitted embedded in broad gelatinous rib¬ bon-like masses, which may be found attached to the fronds of sea-weeds. These <(spawn- coils,® as they are named, include immense numbers of eggs. Darwin estimated that up¬ ward of 600,000 ova were contained in a coil found at the Falkland Islands.

SEA-LETTUCE, the delicate, thin, wav¬ ing fronds of Ulva lactuca, a pale green sea¬ weed often used for food.

SEA-LILY, a crinoid (q.v.), especially a living example, as Pentacrinus; fossil crinoids are often called stone-lilies.

SEA-LION. See Seals.

SEA-MAT, or HORN-WRACK, a colony of polyzoans (see Polyzoa) ; specifically, on British shores. Some species of Flustra, as the broad horn- wrath (F. foliacea).

SEA-MINK, one of the names of the king- fish (Menticrrhus americanus). See King- fish.

SEA-MOUSE, a free-moving marine an¬ nelid of the genus Aphrodites, the most highly

organized of ((the world of worms.® The body is oval, the head is provided with tentacles and two eyes and the back is covered with scales, which, by their expansion and contraction, pro¬ vide for the admission and expulsion of water from the gills or branchiae, situated beneath them. The most notable feature of these ani¬ mals, however, is the beautiful iridescent hues exhibited by the hairs, which, as in other Er- rantia, fringe the sides of the body. The setae of Aphrodite s, even preserved in spirits of wine, still give up these brilliant hues. These animals inhabit deep water and may be obtained by dredging, although they are frequently cast up on shores after storms. Various genera and species exist, some of which are North Ameri¬ can. Consult Verill, (Zoology of Vineyard Sound5 (1875).

SEA-ONION, a squills. See Scilla.

SEA-OTTER, a fur-bearing animal (En – hydris or Latax Intris) of the weasel family {Must elides) , and in its webbed hind feet and aquatic habits resembling the true otter, with which it is united zoologically in the subfamily Lutrinee. The sea-otter is of a robust build, about four feet long, with a short blunt tail, short limbs, small fore feet and large, fully- webbed hind feet. The ears are small and the broad muzzle bears spreading tufts of stout bristles. There are but two incisor teeth on each side of the lower jaw and the molar and premolar teeth are remarkable for their mas¬ siveness and the bluntness of the cusps. The inner fur, which is very soft, dense and woolly, is deep brown or, in old animals, black, the longer white-tipped hairs being scanty on the body, to which they impart a hoary aspect, but more abundant on the yellowish or grayish head and neck. Sea-otters were formerly very abun¬ dant on rocky shores and islands of the north Pacific on both the American and Asiatic sides. The natives of the Aleutian Islands clothed themselves in their skins, but with the increased demand for the fur in China, Europe and America, and especially among the Russian nobility, their unremitting pursuit by native and white hunters has rendered them one of the rarest and most valued of fur-bearing animals. In greatly reduced numbers they are still found in Alaska and within the United States on a very limited reach of the Oregon coast. The otters are now found especially on the island¬ like, masses of the giant bladder kelp or sea¬ weed and much persecution has made them ex¬ ceedingly shy and wary. They are strictly marine and never leave the vicinity of water. Their food consists of various kinds of Crus¬ tacea, mollusks and sea-urchins, which are easily crushed between the blunt massive teeth which are not at all adapted to a fish diet. A single young is born at a time and at any sea¬ son, and is nursed by the mother as she lies on her back in the water. A century ago a single trading company secured as many as 15,000 skins,

valued at $1,000,000, in one year, but now the annual production of all the hunters would not exceed 5,000, and single skins are worth $150 to the hunter and $1,000 or more at the final market. Formerly they were taken in nets, or shot, speared and clubbed ; but now are usually shot with rifles either by the natives from boats or while patroling the beach, or from observation tripods erected by white hunters

on the shores. The Alaskan fishery is now reg¬ ulated by law. Consult Elliot, H. W., (Report on Alaska) (Washington 1875) ; Coues, E.,

(Fur-bearing Animals) (Washington 1877) ; Taylor, W. P., (Osteology and Evolution of the Sea-Otter) (in (University of California Pub¬ lications, Vol. VII, No. 25, Berkeley 1914).*

SEA-PEN, an alcyonarian coral of the fam¬ ily Pennatulidce (class Actinozoa). It is a compound organism, which consists of a main stem with lateral pinnae or branches, forming a feather-shaped community. The lower end of the stem is fleshy, destitute of polyps and contains an internal coral-rod, by which the sea-pens attach themselves loosely to the mud of the sea-bed. In color they are reddish-pur¬ ple, the lower extremity being of a bright orange hue. The branches are studded on their upper margins with the individual polyp, which are connected together through the fleshy medium or ccenosarc. These organisms are common in all the warm seas. The Arctic species, Umbellularia groenlandica, attains sometimes the extreme length of four feet.

SEA-RAVEN, a large and very spiny and irregular sculpin (Hemitripterus americanus), common about rocky shores and reefs from the Arctic coasts to Cape Cod. See Sculpin ; Sea- robin.

SEA-ROBIN, a popular name for certain of the gurnards (Triglidcu) in allusion to their generally reddish color and large wing-like pectoral fins. They have rather large heads, encased in bony plates and with flattened snouts and elongated tapering bodies covered with small scales. The pectoral fins are very large and spreading and are especially remarkable in having the three lowermost rays separated from the fin-web and free from one another; they are somewhat enlarged, provided at the end with special organs of touch and are used much like so many fingers to feel the bottom, turn over stones and other small objects and to de¬ tect the presence of food. Numerous species of the genus Prionotus inhabit American seas, especially southward, the best known of which are the short-winged sea-

robin (P . carolinen- sis), with the pectoral fins red and less than half as long as the body and the long-winged sea-robin (P. strigatus) with the pectorals brown and more than half as long as the body. Both are common as far north as Cape Cod and the former in Massachusetts Bay also. The sea-robins are extremely interesting to watch, as they turn over small objects on the bottom with their tactile rays in search of the small fishes and crustaceans upon which they feed. Large numbers are caught upon lines and in nets, but though the flesh is white and very excellent, they are not considered to be a food- fish. Several related species are found on the Pacific Coast, and elsewhere, and some are called flying-fish. See Sculpin.

SEA-SERPENT, a more or less mythical sea-monster of serpentine form and reputed gigantic size, whose appearance has been re¬ ported at varying intervals and in many seas from the earliest times. The existence of a definite species of serpent of this sort is firmly believed in by most sea-faring men, many of whom have observed conformatory appear¬ ances. In a large number of instances these have been quite satisfactorily explained as tide-

rows of sea-weed, etc., moved in an undulating fashion by wave action; as schools of porpoises moving in a single file, as giant squids swim¬ ming at the surface with their serpentine arms trailing behind, or in a variety of similar ways. There remain, however, a number of accounts whose circumstantiality and general agreement, together with the trustworthiness of the nar¬ rators, are such that many zoologists are con¬ vinced of the existence of such a monster and few are willing to deny it, although, in the absence of direct proof, a scientific skepticism prevails. That large fishes of serpentine form live in the open ocean is well known and these may prove to be the foundation of many of the sea-serpent stories. Among these are the rib¬ bon-fishes (Regaleidce) of which a number of species have been described. They have elon¬ gated, compressed, tapering bodies with oblong heads and toothless jaws and a continuous dor¬ sal fin for the entire length, rising on the head into a prominent crest. Specimens of these fishes exceeding 20 feet in length have been actually washed ashore and examined by natu¬ ralists, and others of much larger size have been observed swimming swiftly at the surface, pre¬ senting a veritable sea-serpent aspect. One has been taken in the Bermudas, another on the coast of California and perhaps a score on other shores, while many more have been seen alive. The ribbon-fish is supposed to live in the depths of the sea and to come to the surface only occa¬ sionally. A slender eel-like shark (Clamydose – lache) also lives in the deep waters of the Pacific, and if it attains a large size might jus¬ tify reports of sea-serpents seen in that region. In past ages huge serpent-like creatures did actually roam the high seas, and some natural¬ ists have considered the possibility of some of these persisting in the oceanic abysses down to the present times. The most

important of these were the mosasaurs (Pythonomorpha) , rather closely related to true serpents. During the Cretaceous period they were widely distributed and some reached a length of 60 or 70 feet and were extremely elongated and slender, with pointed heads and two pairs of paddle-like limbs.

The only true marine serpents of the present day are the sea-snakes (Hydropkidce) , which live in warm seas of most parts of the world, often far from land. All are of small size, with compressed tails, and are very venomous. They feed on fish, are viviparous and produce their young among the rocky shores of islands, etc.

Consult Goode and Bean, (Oceanic Ichthy¬ ology (Washington 1875) ; Gunther, ˆChal¬ lenger Reports* (Vol. XXII, London 1887) ; Boulenger, (Natural Science* (1892); Lee, (Sea Monsters Unmasked* (London 1883) ; Oudemans, A. C., (The Great Sea Serpent: An Historical and Critical Treatise* (London 1893) ; Wilson, A., (Leisure-Time Studies* (ib.*

1878).

SEA-SIDE GRAPE, a small tree (Cocco – loba uvifera) of the family Polygonacecz, which grows on the sea-coasts of Ffiorida and the West Indies. It has clusters of edible fruit somewhat resembling currants, and a beautiful hard, violet-colored wood, which produces a red dye and a juice known as West Indian kino, that is nearly as valuable as the officinal kino.

SEA-SLUG, a nudibranchiate mollusk. See Nudibranchiata.

SEA-SNAKE, a venomous, marine East Indian serpent of the numerous family Hydro- phidce. See Sea-serpent.

SEA-SPIDER, a spider-like (

SEA-SQUIRT, an ascidian or tunicate (qq.v.), so named from the habit of emitting jets of water from the orifices of the body when touched or irritated in any way. Other less apt names found in British books are sea-pear, sea-pork, etc.

SEA-SWALLOW. See Tern.

SEA-TROUT, a popular name for various fishes, primarily for the common salmon-trout (S. trutta) of British waters. In other parts of the world

various fishes more or less re¬ sembling it are called sea-trout, as the weak-fish (q.v.) in the southern United States.

SEA-URCHIN, an echinoderm of the class Echinoidea (q.v.), members of which differ from crinoids or starfishes in their compact spheroid, discoid or heart-shaped forms without arms or a stalk. The numerous species differ greatly in the number and arrangement of the calcareous plates forming the continuous test and in the character of the spines and other appendages with which the latter is studded. Of both fossil and living forms about 250 genera and 4,000 species are known. Although representatives of the 400 or so living species occur in most seas they are more numerous in warm waters, the West Indian fauna being the richest in the world. Regular sea-urchins are distributed widely in the littoral zone, but the irregular ones are especially characteristic of deep waters and the southern oceans, some of them extending to the utmost abysses. The shallow-water forms being subjected to the con¬ stant beating of the surf along the rocky shores which they chiefly inhabit are provided with a highly developed system of suctorial ambulacral feet, by means of which they are enabled to retain a hold. Many species also possess the remarkable power of boring into solid rock in which they excavate chambers exactly fitting them and increasing in size with their growth. Frequently the orifice representing the earlier dimensions of the chamber is too small to per¬ mit the urchin's escape and the animal is at once imprisoned in its cave and protected from any possibility of injury by the beating waves. The long-spined Diadema thus completely honey¬ combs the surface of the coral rock of the Bahama Islands, etc. Although this power of excavation is most displayed on soft calcareous rocks, the fact that solid granite is similarly bored in some parts of the world shows that it is not the result of a solvent action, but of a slow wearing away of the rock by the jaws and constant movements of the spines. Sea-urchins of most species swallow rock debris and sand in large quantities, digesting the abundant minute animal and plant life which it contains. Most of the species are gregarious, vast numbers col¬ lecting in certain areas on the sea-floor until their bodies completely pave the bottom. Dur¬ ing the reproductive season, usually the sum¬ mer, the ovaries and testes, found in separate individuals, become so greatly enlarged that

they fill almost the entire interior of the test. Such forms are called sea-eggs, and this name is sometimes applied to regular sea-urchins generally. In some countries they are baked and eaten while in this condition. The egg- urchin (Hipponoe esculenta) of the West In¬ dies is a large species so utilized. But very few species of sea-urchins are found in the shallow waters of the Atlantic Coast of the United States. The green sea-urchin (Strongylocen – tratus drobachiensis) is very common on the rocky shores of New England and the Pacific States. Besides the diatoms, etc., which it digests from the sand that it swallows, it also devours dead animals of

every kind. Another example of the regular urchins is the purple or deep brown Arbacia punctulata, which is provided with very stout spines and is found from Cape Cod to the Gulf of Mexico. The species of Diadema and Toxopnenstes occur only in the South Atlantic States. Of the flat or cake urchins (Clypeasteroidea) the sand dollars (Echinarachinus parma and Me llit a tes- tudinata) are examples. Both live in great numbers buried in the sand or lying on its sur¬ face on shoals, the first being most plentiful northward, the last southward. The heart urchin {Moira atropos) is the only example of the Spatangoidea that reaches even as far north as North Carolina in shallow water. Many interesting species of this and the other group9 have been dredged in the deep water along the continental slopes and elsewhere. See Echin- odermata; Echinoidea.

Consult Agassiz, (Revision of the Echini and subsequent articles in the Memoirs of the Museum of Comparative Zoology (Cambridge 1872) ; Agassiz, (Seaside Studies) (Boston 1871) ; Lang, (Lehrbuch der vergleichenden Anatomie) (Jena 1894).*

SEA-WHIP. See Gorgonia.

SEABOARD AIR LINE RAILWAY COMPANY, the corporate name of a transpor¬ tation system of southeastern United States. Its main arteries extend from Norfolk and Richmond, Va., southward to Tampa and Venice, Fla., and southwestward to Bessemer and Montgomery, Ala. Under a consolidation agreement of 11 Oct. 1915 the Seaboard Air Line Railway was consolidated on 16 Nov. 1915 under the laws of Virginia, North Carolina and South Carolina with the Carolina, Atlantic and Western Railway under the corporate name of the Seaboard Air Line Railway Company. The Carolina, Atlantic and Western Railway was a consolidation (April 1914) of the North and South Carolina Railway, the Charleston North¬ ern Railway, the South Carolina Western Rail¬ way and the South Carolina Western Exten¬ sion Railway, and had a total mileage owned of 330 miles and 86 miles under construction. Its lines extended from Hamlet, N. C., via An¬ drews, S. C., to Charleston, S. C., also from Lanes, via Andrews, to the port of Georgetown, S. C, also from McBee, S. C., through Harts- ville, Darlington and Florence to a connection with the first-mentioned line at Poston, S. C., with branches to Sumter and Timmonsville. The 86 miles under construction were from Charleston to Savannah, which was opened to freight operation on 15 Oct. 1917 and to pas¬ senger operation on 5 Nov. 1917. The former Seaboard Air Line Railway was incorporated

10 April 1900 in Virginia as successor to the Richmond, Petersburg and Carolina Railroad, a 102-mile road between Richmond, Va., and Norlina, N.- C. The Georgia and Alabama Railway was acquired by purchase 20 Feb. 1902; other roads were absorbed in November 1901, and the Florida Central and Peninsular Railroad on 27 June 1903, the system comprising lines extending from Richmond, Va., to At¬ lanta, Ga., and Jacksonville and Tampa, Fla., with numerous branches, embracing in all over 3,120 miles of road. In November 1909 the Atlanta and Birmingham Air Line Railway, 237 miles; the Florida West Shore Railway, 19 miles, and the Tallahassee, Perry and South¬ eastern Railway, 39 miles, were merged in the Seaboard Air Line Railway. Its total mileage at present is 3,461.34 miles. The property of the Atlantic, Suwanee River and Gulf Railroad Company, the mileage of which had previously been included in that of the Seaboard Air Line, was transferred during the fiscal year 1909-10. In 1911-12 the Seaboard Line absorbed the properties of the Seaboard and Roanoke Rail¬ road and the Roanoke and Tar River Railroad. The Georgia and Alabama Terminal Company is practically merged with the Seaboard, al¬ though its corporate existence is maintained. In April 1917 the Seaboard Company took over control of the Tampa and Gulf Coast Railroad and the East and West Coast Railway. It con¬ trols by ownership of entire capital stock the Baltimore Steam Packet Company, which oper¬ ates a fleet of steamers between Baltimore, Norfolk, Portsmouth and Old Point Comfort, Va. ; the company also owns a substantial in¬ terest in the capital stock of the old Dominion Steamship Company and a one-sixth interest in the Richmond- Washington Company. Under traffic agreement with the Pennsylvania Rail¬ road the Seaboard Air Line Company main¬ tains through car service between New York, Philadelphia, Washington and the South. On 2 Jan. 1908 the company was placed in the hands of receivers. A reorganization plan was drawn up and declared operative on 10 Sept. 1909; on 4 Nov. 1909 the receivership was ended and the road returned to the stockholders. The company's equipment comprises 568 locomo¬ tives, 176 passenger coaches, 116 combination, baggage, etc., 105 express and baggage, 23 din¬ ing cars, seven mail and two parlor cars, 10,380 box cars, 2,596 flat cars, 70 stock cars, 3,969 gondola cars, 45 coal and coke, 187 caboose cars and 409 miscellaneous. The gross revenue for the year 1917 amounted to $30,345,146.01, showing an increase over 1916 of $4,160,658.76; the operating expenses amounted to $23,097,- 430.89; the increase over 1916 being $4,354,- 832.88; the net income was $854,067,14; a de¬ crease of $757,943.48, due largely to war condi¬ tions, from the net income recorded in 1916 of $1,612,010.62. The general offices are at Ports¬ mouth and Norfolk, Va. ; and the New York office at 24 Broad street.

SEABRIGHT, N. J., borough in Mon¬ mouth County, on the Atlantic

Ocean, five miles north of Long Branch, and on the Central of New Jersey Railroad. It is a popular seaside resort. Pop. 1,327.

SEABURY, se'bu-ri, Samuel, American Protestant Episcopal bishop: b. North Groton, Conn., 30 Nov. 1729; d. New London, Conn.,

25 Feb. 1796. He was graduated at Yale Col¬ lege in 1748, and three years later took a course in medicine at the University of Edinburgh. He did not, however, practise this profession, but entered at once upon a course of theological study. He was ordained deacon and priest in the English Church in London in December 1753. Returning to America in the following summer, he became rector of Christ Church, New Brunswick, N. J. In 1757 he took charge of Grace Church, Jamaica, L. I., and in 1766 of Saint Peter's, Westchester, N. Y. In the autumn of 1775 he was obliged on account of his Loyalist sympathies to leave his parish and he resided, during the greater part of the war, in New York. He wrote numerous articles in support of the Tory cause, of which he was one of the ablest advocates, and suffered much, even to imprison¬ ment and exile, for his loyalty to the king, though when peace was declared no one was more faithful to the United States. Immedi¬ ately after the articles of peace were received in New York, 10 out of the 14 Episcopal clergy¬ men in Connecticut assembled at Woodbury to consider action as to the organization of the Church under the changed civic conditions. On the first formal ballot, they elected Dr. Seabury as bishop. He then sailed for England, and waited in London more than a year for con¬ secration by the English bishops. Owing to the connection between the Church of England and the state, various political reasons stood in the way, and he finally determined, in pursuance of his original instructions, to apply to the Scot¬ tish bishops, who were in a more independent position. On 14 Nov. 1784, Seabury was ac¬ cordingly consecrated at Aberdeen by the bishop and coadjutor-bishop of that see and the bishop of Moray and Ross. He then re¬ turned to America and there, in addition to his episcopal duties, assumed the rectorship of Saint James' Church, New London, which he held until his death. His jurisdiction was recognized over Rhode Island as well as Con¬ necticut and afterward over Massachusetts ; but the validity of his consecration was de¬ nied by many, partly owing to the prejudice excited by his former political attitude. In 1789, however, it was expressly affirmed by the General Convention. Seabury exercised much influence on the final shape of the constitution and liturgy of his Church, especially (in ac¬ cordance with his agreement with the, Scot¬ tish bishops) by insisting on the restoration of the oblation of the elements and invocation of the Holy Ghost in the Eucharistic office. He was a man of pronounced views, but of great simplicity, humility and self-sacrifice; and the value of his services to the infant Church can scarcely be overestimated. Consult Beardsley, (Life and Correspondence of Samuel Seabury) (1881) ; Tyler,

(Literary History of the Ameri¬ can Revolution (1897).

SEABURY, Samuel, American Protestant Episcopal clergyman, grandson of Bishop Samuel Seabury (q.v.) : b. New London, Conn., 9 June 1801 ; d. New York, 10 Oct. 1872. He was privately educated but took his A.M. at Columbia College in 1823. He was ordained in 1828, was professor of languages at Flush¬ ing Institute and Saint Paul's College in 1828- 34 and in 1834-49 he edited the Churchman. He was rector of the church of the Annuncia-

tion, New York, in 1838-68, and from 1862 he was professor of Biblical learning at the Gen¬ eral Theological Seminary, New York. Au¬ thor of (The Continuity of the Church of Eng¬ land in the Sixteenth Century > (1853) ; (Amer¬ ican Slavery Distinguished from the Slavery of English Theorists and Justified by Law of Nature) (1861) ; (Theory and Use of the Church Calendar> (1872), etc.

SEABURY, William Jones, American Episcopal clergyman: b. New York, 25 Jan. 1837 ; d. 30 Aug. 1916. He was graduated at Columbia University in 1856 and received his master's degree there three years later. He took the degree of doctor of divinity at Hobart College in 1874, receiving the same degree from the General Theological Seminary in 1885. Meantime he studied law in the office of the late Stephen P. Nash, was admitted to the bar in 1858 and for a short time engaged in practice. Wm. Seabury succeeded his father in 1868 as rector of the church of the An¬ nunciation, where he remained until 1898. He was appointed to the chair of ecclesiastical polity and law in the General Theological Semi¬ nary in 1873 and occupied it until his death. During the latter part of his tenure he was the senior professor in the service.

SEACOAST ARTILLERY. See Artil¬ lery.

SEAGER, Henry Rogers, American econ¬ omist : b. Lansing, Mich., 21 July 1870. He was graduated at the University of Michigan in 1890, at the University of Pennsylvania in 1894, and later studied at Johns Hopkins Uni¬ versity, and at Berlin, Halle and Vienna. He was professor of political economy at the Uni¬ versity of Pennsylvania in 1897-1902 ; was con¬ nected with the faculty of Columbia University from 1902, and since 1905 has been professor of political economy there. In 1917 he was appointed secretary of the Shipbuilding Labor Adjustment Board at Washington, D. C. Au¬ thor of (Introduction to Economics) (1904) ; 'Economics Briefer

Course) (1909) ; Social Insurance) (1910) ; Principles of Economics (1917), etc.*

SEAL, an engraved stamp bearing a device or inscription pertaining to the owner; also, the impression of such a stamp on a plastic sub¬ stance, such as wax. A seal upon a document was originally a substitute for a signature; a seal upon a place of deposit was for security. The use of seals is of the highest antiquity, and one of the earliest and commonest forms was the signet-ring. In Egypt impressions of seals were made in fine clay, and attached to documents by slips of papyrus. The Romans use clay, bees-wax, and in the time of the em¬ pire lead for taking impressions. The use of bees-wax was introduced by the Normans; sealing-wax was invented in the 17th century. Documents in England are still sealed as a formality, but the true voucher to which alone any real importance attaches is the signature.

There are three seals officially used in Eng¬ land by or in name of the sovereign — the great seal, the privy seal and the signet. In the United States, on 4 July 1776, Congress ap¬ pointed Benjamin Franklin, John Adams and Thomas Jefferson a committee to prepare a de¬ vice for the great seal of the United States.

The committee reported various devices. Wil¬ liam Barton, of Philadelphia, was appointed to submit designs. Sir John Prestwich, an Eng¬ lish antiquarian, suggested a design to John Adams in 1779. Combining the various designs of Barton and Prestwich, a seal was adopted 20 June 1782 as follows: Arms: Paleways of 13 pieces argent and gules; a chief azure; the escutcheon on the breast of the American eagle displayed proper, holding in his dexter talon an olive branch and in his sinister a bundle of 13 arrows, and in his beak a scroll with the motto: E Pluribus Unum; Crest: a glory break¬ ing through a cloud proper and surrounding 13 stars ; Reverse : A pyramid unfinished. In the zenith an eye in a triangle, surrounded with a glory proper, over the eye the words, Annuit Cceptis. Beneath the pyramid, MDCCLXXVI and words, Novus Ordo Sceculorum. The Con¬ federate seal adopted by the Confederate Con¬ gress, 30 April 1863, was designed by Thomas J. Semmes, of Louisiana. The device repre¬ sents an equestrian portrait of Washington, surrounded by the principal agricultural prod¬ ucts of the Confederacy.

SEAL ISLANDS. See Lobos.

SEAL SKINS. See Fur Trade, The.

SEAL OF THE CONFEDERACY. See

Great Seal of the Confederacy.

SEAL OF SOLOMON, Order of. See

Orders, Royal.

SEAL OF THE UNITED STATES, Great. See Great Seal of tke United States.

SEALING. See Seals.

SEALING-WAX, a resinous preparation used for securing folded papers and envelopes, and for receiving impressions of seals set to instruments. Ordinary red sealing-wax is made of pure bleached lac, to which when melted are added Venice turpentine and vermilion. In¬ ferior qualities consist of common resin and red-lead, and black and other colors are pro¬ duced by substituting appropriate pigments. Sealing-wax was invented in the 17th century. Its use for sealing letters has been generally given up in favor of mucilage, which when moistened fastens envelopes much more effec¬ tively and with greater rapidity than sealing- wax.

SEALS AND SEALING. Under this term are usually grouped two very widely dif¬ ferent types of animals, the so-called fur seals and the hair seals or true seals. The former are not properly seals at all, but are allied rather to the bears, and were appropriately called "sea-bears® by their discovery. The fur seal yields a valuable fur; the hair seal has no fur, but a valuable oil is obtained from its fat and leather from its hide. The principal habitat of the hair seal is in the north Atlantic and Arctic oceans, although small groups of the commoner species are found widely scat¬ tered over the globe. The fur seals are more or less widely distributed throughout the south¬ ern seas, but are found at the present time chiefly in the north Pacific Ocean and Bering Sea. They are not found in the north Atlantic. The hair seal belongs to the suborder of the Pinnipedia and has feet not truly plantigrade, short with long claws. The posterior limbs only are used in swimming and are not susceptible

of bending forward at the knee. When on land the animal cannot walk or run, but merely wriggles with a belly-wise motion, the neck being short and the head scarcely capable of being raised. There is no external ear. The fur seals belong to the suborder of the Gres- sigrada. The feet are plantigrade, the anterior limbs only being used in swimming, having rudi¬ mentary claws, if any. The head and neck can be raised as in the bear. The external ear is moderately developed, and the animal can run or lope along the ground as do ordinary mammals and with considerable rapidity. The

internal structure of the two animals shows equally marked differences. The hair seals, whatever their origin, must have come from a different parent stock and their relation to land carnivora must be more remote. Beyond the fact that both are carnivorous mammals, feed¬ ing on fish and perfectly adapted to life in the water, the two animals have little in common. In both the thick blubber goes with life in the icy waters of the north. They resort, in one case to certain island shores, in the other to the ice floes, to bring forth and rear their young. But these resemblances, associated with aquatic habitat, are only analogies and have no value in scientific classification. In structure, appear¬ ance, degree of intelligence, habits, disposi¬ tion and method of locomotion, the two types are entirely distinct and their evolution as pelagic animals has been along separate lines.

Hair Seals. — 'The hair seals are found off the coasts of Newfoundland and Labrador, in the waters of the Gulf of Saint Lawrence, in the Greenland seas, and about the island of Jan Mayen, and in the White and Caspian seas. In these places they occur in sufficient numbers to make their hunting profitable. In small isolated groups they are found about the British Isles, among the pelagic islands of the southern seas and about the island shores of the Pacific Ocean and Bering Sea. The principal species hunted are the saddleback or harp seal (Phoca grcznlandica) , so named from the peculiar marking thought to resemble an ancient harp; the rough or ringed seal (P . fcetida) , having its name also from color mark¬ ings; the harbor or common seal (P. vitulina) , so-called because of its wide distribution and its fondness for bays and sheltered waters; the Caspian seal (P. caspica) , confined to the sea of that name; the hooded seal (Cystophora cristata), so named because of its crest or hood; and the gray seal (Halichcerus grypus). The two last are unimportant, being taken only when met with in search for other seals. The harbor seal is the commonest form and most widely distributed. But the most important in point of numbers and value of its products is the harp seal, the seal of Newfoundland, of the Greenland seas and the Arctic.

The hair seals show considerable variation in size and coloration. The harp seals are in general whitish or yellowish-white, the nose and head black, the throat and chfn spotted with black. The harbor seal is yellowish-gray above, varied with irregular spots of dark brown or black, and yellowish-white beneath with smaller spots. The ringed seal is the smallest form, the gray seal the largest, attain¬ ing a length of eight to nine feet. The ordi¬ nary species are from five to six feet in length

and weigh from 60 to 300 pounds. The female is slightly smaller than the male, in the case of the harp seal about one-fourth less ; but there is no such wide disparity between the sexes as exists in the case of the fur seals.

The animals are said to be monogamous. With the exception of the harbor seal, which is non- migratory, the hair seals obey a more or less well-defined semi-annual migration, although their movements are nowhere so definite as those of the fur seals of the north Pacific Ocean. In a general way the herds move south¬ ward on the approach of winter, returning to the north and eastward in the spring as the ice recedes. They are found, however, with unfailing regularity at certain definite locali¬ ties in the breeding season, as for example, the ice fields off Newfoundland, and about Jan Mayen Island. In the vicinity of Newfound¬ land the young are born between the middle of February and the latter part of March. At Jan Mayen the season is somewhat later, approach¬ ing April. The single young, whitish in color at birth, changing to darker, grows very rapidly, attaining a weight and size approximating that of its mother in six weeks or two months. It remains on the ice, the mother returning from her feeding excursions to nourish it. In the course of a month it takes to the water, reluc¬ tantly at first, finding it necessary to learn to swim. The young seals form the most valuable part of the catch and yield the best quality of oil. The food of the hair seal consists of fish, in certain species supplemented by mollusks and crustaceans.

Of the various sealing grounds or districts, by far the most important is that of Newfound¬ land, to which the seals flock in February of each year in <(countless numbers.® The sealing fleet clears principally from the port of Saint Johns, sailing vessels being allowed to depart as early as 1 March, steam vessels on the 10th, and to begin sealing as soon as the seals can be found. The sealing season extends until the 1 May. In addition to the sealing on the ice the hunting is also carried on by means of nets and guns along the shores of New¬ foundland and the Gulf of Saint Lawrence. This form of sealing has been practised from the earliest times and constituted the beginning of the industry, which, however, attained no considerable importance prior to the beginning of the 19th century, the yearly catch probably not exceeding 5,000 seals. Vessels seem to have been first used in this sealing in the year 1763. For the year 1805 we have record of a catch of 81,000. We know that in 1807 the. sealing fleet numbered 30 vessels. The catch for 1815 was 126,000 and that for 1822, 306,000. In the period from 1830 to 1850 the Newfoundland sealing industry was at its maximum develop¬ ment. The fleet numbered approximately 400 vessels, with crews aggregating 10,000 men and an annual catch ranging from 500,000 to 700,000 seals. From the close of this period the in¬ dustry declined, and fewer but larger vessels were employed. In 1871 we find the fleet re¬ duced to 168 vessels. The catch for 1856 was 361,000. It rose again in 1876 to the 500,000 mark, but in 1880 it fell to 223,000. For the 21 years (1881-1901) it averaged 226,000 seals. The catch for 1907 was 245,051 seals and for 1913, 272,065. For the period 1906-13 the ex-

ports of seal hides and oil for Newfoundland reached a total value of $5,208,579. The New¬ foundland sealing is essentially a British in¬ dustry, the major part of the fleet hailing from the ports of Saint Johns and Concep¬ tion Bay, the English vessels from Dundee and Peterhead. The principal species taken in this catch is the saddleback or harp seal (Plioca granilandica) , which constitutes also the bulk of the catch in the Jan Mayen and Greenland sealing.

Next in importance comes the sealing in the vicinity of Jan Mayen Island. This is confined to an area of about 400 miles diameter about the island. The seals arrive in this region some¬ what later and some British vessels, after com¬ pleting the Newfoundland season, go on to Jan Mayen. This sealing is also participated in by German and Norwegian vessels, the former sailing from Hamburg, the latter from Tonfierg and Tromso. The area covered is so limited that this sealing is very destructive. In 1876 it became necessary to establish a closed sea¬ son for the Jan Mayen sealing, which was accomplished by an agreement among the nations concerned by which sealing in the area between lat. 67° and 75° N. and long. 5° E. and 17° W. should not begin before 3 April. The records for the Jan Mayen sealing extend back to 1720. The catch by a fleet of 19 ves¬ sels from Hamburg in 1760 is said to have been 44,000. For 1790 the catch was 45,000; for 1850, 48,000. We learn that in 1868 a fleet of 15 Norwegian vessels, carrying 600 to 700 men, took part in this sealing, the catch for five years preceding this date being approxi¬ mately 65,000 a year. The British fleet has been smaller, ranging, in the period 1865 to 1871, from 4 to 12 vessels, taking a catch of from 16,000 to 90,000. The best estimates avail¬ able for the total catch of the Jan Mayen seal¬ ing for this period would seem to be about 200,000 seals a year. Since 1880, despite the regulations, this sealing has greatly declined. The statistics for the German and Norwegian vessels are not available, but those for the British fleet are given each year by Thomas Southwell in the (London). From this source we -learn that the catch for 1881 was 27,894; for 1885, 26,448; for 1887, 1,100; for 1889, 15,079, and for 1891, 1,560. Since 1895 the Jan Mayen sealing has been abandoned by the British fleet.

On the west coast of Greenland a con¬ siderable catch of seals is made by the natives. The flesh of the animals is sought for food and the skins for clothing, and they form the chief resources of the inhabitants of the region. The product of this sealing formerly, according to Dr. Rink, in his account

of Green¬ land, averaged about 89,000 seals each year. In recent years it is said to have fallen off to about one-half, probably from the same cause that has affected the Jan Mayen sealing.

At Nova Zembla and in the White and Cas¬ pian seas are important sealing grounds worked by the Russians. Professor Schultz in his ac¬ count of the seal and other fisheries of these waters speaks of the White Sea sealing as covering an area of 230 miles and engaging 2,000 hunters. The methods of sealing and the species sought are the same as in the North Atlantic. The catch has been estimated at from 65,000 to 75,000 a year. The Caspian Sea sealing is more

important, the annual catch for five years prior to 1882, as given by Professor Schultz, was 130,000. Statistics regarding the results of seal¬ ing in the White and Caspian seas in recent years are not available.

The methods employed in taking the seals vary with the different conditions under which the animals are found. Along shores of New¬ foundland nets and sealing frames are used. A common form of net is one making with the shore an oblong enclosure, the ends capable of being lowered as the animals approach and raised after they are within. They are then frightened until they have hopelessly entangled themselves in the meshes of the suspended net. Two men manage such a net, which may be as much as 150 fathoms in length and in a single such net 1,800 seals are said to have been taken in one season. The natives of Greenland use the net also, but employ chiefly the harpoon or spear with wooden shaft and detachable head, the latter secured to the boat by means of a cord by which the captured ani¬ mal is drawn up to the hunter and dispatched with the club or knife. Stationary nets are also used in connection with the rocks where seals are accustomed to haul out to rest and also about their breathing holes in the ice. Dead¬ falls, sealing hooks and other devices are used as circumstances warrant. But the really im¬ portant method of capture is that used upon the ice fields where the seals are found congre¬ gated in immense herds. When a vessel has sighted seals its hunters are put ashore on the ice. They round up the animals, cutting them off from the open water and then club them over the head. When the seals are all killed the hunters remove the skins, with the adhering layer of blubber, and drag them back to be stored in the ship. This process is repeated layer of blubber, and drag them back to be found, or a cargo is obtained. At port the fat is separated from the skin and the latter preserved by salting. The fat is rendered into oil. In former times this was accomplished by throwing it into huge vats to melt by its own weight under the action of the sun and weather. In recent years this method has been replaced by the more rapid

one of rendering by steam. The oil thus obtained is used as a lubricant and luminant and in the manufactures. The hides are made into leather and used for a variety of purposes, among them the covering of trunks and knapsacks.

The vessels used in the sealing industry were originally small sailing schooners. Steam ves¬ sels began to be used about 1866, and have gradually superseded the sailing vessels. Of the fleet of 107 vessels of 1873, one-fifth are said to have been steamers. At the present time steam vessels are employed almost ex¬ clusively in the Nedfoundland and Jan Mayen sealing. The ships must be staunchly built with iron-shod prow for breaking through the ice and with strength to withstand the pressure when caught in the shifting ice. The busi¬ ness is a hazardous one, vessels not infre¬ quently being wrecked by storms or ground to pieces between the icebergs. Vessels sometimes fail to come up with seals and so return empty. But the catches are in the main good and at times exceptionally so. Catches of 30,000 to 40,000 seals are not infrequent for single ves¬ sels, and each animal is worth from one to

three dollars, a rich booty for a season of from six weeks to two months. In the case of steam vessels the men of the crew share one- third of the catch among them, two-thirds going to the owners of the vessel. The catch is di¬ vided equally between crew and owners in the case of sailing vessels.

It is not easy to bring together in any com¬ plete way the statistics of the hair-seal in¬ dustry. For the period 1881 to 1901, Mr. Southwell, in his annual notes in the (Zoologist) cn the (Seal and Whale Fishery, gives rather complete data for the British fleet taking part in the Newfoundland and Jan Mayen sealing. His figures do not, however, include the shore hunting and the seals taken by sailing vessels. The following table is compiled from his an¬ nual notes:*

Catch of Steam Sealing Vessels of the Brit¬ ish Fleet.

YEAR

Greenland sealing

Newfoundland sealing

Vessels

Catch

Vessels

Catch

1881 .

23,894

13

139,985

1882 .

8

22,142

13

63 , 204

1883 .

13

37,920

31

286,000

1884 .

12

39,700

20

192,175

1885 .

10

26,448

19

211,587

1886 .

3

4,500

18

195,396

1887 .

1

1,100

20

177,733

1888 .

4

13,388

16

210,810

1889 .

4

15,079

19

303,287

1890 .

7

6,603

19

209,000

1891 .

5

1,560

19

343,495

1892 .

5

3,478

20

349,369

1893 .

3

325

22

129,060

1894 .

3

4,712

21

152,821

1895 ....

20

270,058

1896 .

20

187,516

1897 .

21

126,628

1898 .

18

241,708

1899 .

18

268,787

1900 .

19

353,276

1901 .

19

345,380

Of the value of the total product of the industry various estimates are available. The catch of 1857 of 500,000 seals is valued at $2,125,000. This sum was divided among 375 vessels and 13,600 men. The catch of 1871 of 486,262 seals is said to have yielded 6,943 tons of oil valued at $972,000, the skins themselves being valued at $486,262, making a total of $1,458,26 2. These figures related to the New¬ foundland catch. For

the years 1895-1901, Pro¬ fessor Southwell gives the following estimates for the catches of these years as shown in the preceding table:

1895 . £77.824

1896 55,362

1897 . 32,564

1898 . 80,000

1899 . 68,527

1900 . 96,720

1901 . 77,819

The following exports of seal products for Newfoundland are recorded in (The Statesman's Yearbook :

YEAR

Seal skins

Seal oil

Total

1906 .

$314,048 164,509 140, 137 433,620 460,220 275,287 380,693 321,551 206,449

$297,430

$611,478

1907 .

447,967

612,476

1908 .

308,997

449,134

1909 .

252,262

685,882

1910 .

459,814

920,034

1911 .

385,250

660,537

1912 .

296,519

677,212

1913 .

270,275

591,826

1916 .

403 , 640

610,089

Totals .

$2,692,514

$3,122,152

85,818,668

The number of seals taken in 1916 is given as 241,302, and for 1917 only 196,228.

When the hair-seal industry was in its prime its total catch from the various grounds numbered about 1,000,000 seals annually, at a value of approximately $3,000,000. The catch has fallen off in recent years, perhaps to one-half, but the industry is still a valuable one and worthy of such measures as may be necessary to preserve and perpetuate the race of animals upon which it depends. The fate of this in¬ dustry in the North Atlantic Ocean would seem to be equally important with that of the fur-seal industry in the North Pacific Ocean. The danger which seems to threaten in one case is much the same as in the other — indiscriminate and wasteful killing.

Fur Seals. — The fur seals or sea bears con¬ stitute two groups or genera, Arctoceplialus (A. tozvnsendi, Guadalupe Island; A. philippi, Galapagos Islands; A. australis, southern coasts of South America and neighboring islands; A. forsteri, coasts of New Zealand and southwest¬ ern Australia ; A. delalandi, islands off South Africa; A. gazella, Kerguelen and Prince Ed¬ ward Island), once numerous and widely dis¬ tributed among the pelagic islands of the south¬ ern hemisphere but now practically extinct

through indiscriminate slaughter in the greater part of its habitat, remnants of importance only existing on Lobos Island, in the mouth of the River Plata in Uruguay, and on the islands of Cape Horn, receiving in both places government protection; and Otoes (Callorhinus) , O. ur- sinus. Commander Islands; O. alascanus, Pribi- lof Islands, in Bering Sea, and O. curilensis, Kurile Islands and Robben Island, in the Sea of Okhotsk, limited to the waters of the North Pacific Ocean now the sole variety of any con¬ siderable commercial importance.

The typical male fur seal or "bull® attains maturity at about the age of seven years, weighs from 400 to 500 pounds, is about six feet in length and has a girth of four and one-half feet. His color is blackish or dark brown, with yel¬ lowish-white water hairs, especially long on the back of the neck, forming the so-called "wig® or mane. The fore-limbs or flippers, with broad membrane connecting and extending be¬ yond the toes, are used in swimming. The animal stands erect and runs or lopes along the ground when on land. The adult female or "cow® is smaller, averaging about 80 pounds in weight, with length and girth in proportion. Her fur is of varying shades of brown. She bears her first young or "pup® at the age of three years. The breeding grounds are bowlder- strewn beaches or rocky-hill slopes near the shore, and on these the gregarious instinct of

SEALS

A Herd of Fur Seals, Gorbatch Rookery, Pribilof Island, Alaska

•

the animals leads them to congregate in closely- set masses called "rookeries.® The fur seals are polygamous, each adult bull getting about him as many cows as he can control ; these family- groups forming the unit of rookery life are called "harems,® and range in size from 1 to 100, depending upon advantage of location, the average size being about 30. The bulls reach the inlands early in May and select their places, awaiting the arrival of the cows which begins early in June. The incoming is gradual, the number on the rookeries growing steadily to a climax at about the middle of July, when the greatest number (not, however, more than one-half at any one time) are present, the num¬ ber diminishing to one-fourth 'at and after the close of the breeding season about the 1st of August. The single pup, weighing 10 to 12 pounds and black in color, soon changing to gray, is born within 6 to 48 hours after the arrival of the mother. Within a

week she is served by the bull and goes away to sea to feed, returning at gradually lengthening inter¬ vals to nourish her young, which remains on shore. The young males of one, two, three and four years, called "bachelors,® herd by themselves on beaches adjacent to but distinct from the breeding grounds, the fact upon which depends the principle of land killing by which only the superfluous males are taken. The bulls having fasted since their arrival in May go away early in August to feed. The pups learn to swim at the age of six weeks and in Novem¬ ber, on the approach ot winter, swim away with their mothers to the south. The winter migra¬ tion of the Pribilof Islands herd extends to the latitude of Southern California, which is reached by a more or less direct route through the ocean, late in December. The return jour¬ ney is made more slowly and follows the out¬ line of the coast. The Commander Island seals make a similar journey to the southern extrem¬ ity of Japan and return on their course. The seals of Robben Island have their migration route in the island sea of Japan. The fur seals •find their food, chiefly squid (Gonatus amcenus) and a small smelt-like fish (Therobromus cal- lorhini) , in deep water, and their feeding grounds in Bering Sea and on the spring mi¬ gration lie in a general way along the 100- fathom curve.

We owe our first knowledge of the fur seals of the north Pacific to Georg Wilhelm Steller, the naturalist of Vitus Bering's second voyage, in 1841. On the return trip Bering's ship was wrecked on one of the two islands now known in his honor as the Commander Islands. The survivors of the wreck wintered on Bering Island where the great commander died. Steller succeeded to the command of the expedition and during the winter made a study of the fur seals or sea bears, among other animals which he found on the island, the great rookeries of Bering Island furnishing him with a wealth of material.

The Commander Islands lie in Bering Sea in lat. 55° N. and long. 166° E., 97 miles to the eastward of the peninsula of Kamchatka and 180 miles to the westward of the island of Attu, the westernmost land of the Aleutian Archipel¬ ago. They are barren, mountainous sti etches of land of no interest or importance aside from the fur-bearing animals found upon them. In

addition to the fur seals, the blue or Arctic fox was once numerous, as was also the sea-otter, the latter now very scarce because of excessive hunting. The sea-lion and the sea-cow or manatee were also found in numbers about these islands. The latter is now extinct. Bering Island is the larger of the two. It is about 35 miles in length by an average width of about 15 miles. Its companion, Copper Island, is very much smaller. Small villages exist on each island in which the native sealers and the offi¬ cials of the government and commercial com¬ pany live. The islands belong to Russia,

hav¬ ing remained in her possession since their dis¬ covery in 1741.

The Pribilof Islands are the home of the most important of the northern fur seal herds. They lie in the eastern portion of Bering Sea, about 200 miles from Cape Newenham on the mainland of Alaska and a like distance from the island of Unalaska, in lat. 56° N. and long. 170° W. There are five islands in the group, of which two only, Saint Paul and Saint George, are important, the former having an extreme length of 13 miles and a width of about 7. Saint George Island is about one-half as large. Like the Commander Islands they were un¬ known to aboriginal man. They were discovered in 1786 by Gerassim Pribilof, a Russian navi¬ gator in the employ of the trading, companies then engaged in exploiting the resources of the Commander Islands and already seeking new fields. Each island has a native vil¬ lage with its company store, Greek-Riissian church and American school. The village of Saint Paul numbers about 200 people, that of Saint George half as many, natives from the Aleutian Islands brought over in the early days by the Russians to work the fur seal industry. The natives are paid for their labor at so much per skin, the present price being 50 cents. The sum thus earned is treated as a community fund and is divided among the heads of families on the basis of age and skill. When the annual quota numbered 100,000 skins the natives were rich. Since 1890 the catch has declined steadily, not exceeding an average of 15,000 annually for the period ending 1911. In 1912 the commercial catch was cut off for five years. Congress has by annual appropriation supplemented the earn¬ ings of the sealers and is now maintaining them as wards of the government. The affairs of the islands were until 1904 administered by the Treasury Department through agents resid¬ ing on the islands. In 1904 the islands were transferred to the Department of Commerce and managed as a separate division. Since 1909 they have been under the special charge of the Bureau of Fisheries. The Pribilof Islands were joined with the Commander Islands, and re¬ mained under the control of Russia until 1867, when they passed, with the Territory of Alaska, into the possession of the United States.

After many experiments, some of them dis¬ astrous, the Russians worked out a system of management of the fur seal industry which with slight modifications is still in vogue on the islands. The important feature of this system is the absolute protection of the female herd. The land sealing is confined to the young males of two and three years of age, 29 out of every 30 of which are superfluous for breeding pur¬ pose, owing to the polygamous habit of the

animals. These young males, as they rest on their hauling grounds, are surrounded at night by the sealers, rounded up and driven slowly inland in great droves of from one to 3,000. On the killing grounds the large droves are gradually broken up into small groups or pods of from 20 to 50. From these men armed with stout clubs knock down those of killable size, leaving those too large or too small to escape and return to the water. The skins are re¬ moved by other workers. A crew of 20 to 30 men will thus kill and skin 1,500 to 2,000 seals in half a day. The different hauling grounds are driven in succession during the killing season, which lasts from 1 June until about 1 August, after which time the skins begin to get stagey, owing to the shedding of the water hair. The skins are gathered up and salted in kenches. After remaining in the salt for 10 days or two weeks they are taken out and wrapped in bundles, two in each, and are ready for ship¬ ment. They are eventually shipped to Lon¬ don, where practically all the seal-skins of the world are prepared for use. The two im¬ portant processes in the treatment of the raw skin are the removal of the coarse water hairs, which have to be carefuly plucked out, and the dyeing of the fine under fur. Both require the greatest skill, and when the skin has been thus dressed and dyed its value has been doubled. When the United States came into possession of the Pribilof Islands in 1868, fol¬ lowing the example of Russia, she leased the fur seal industry to the Alaska Commercial Company, which controlled the industry for a period of 20 years. The company paid a rental of $55,000 a year for the islands and a royalty of $3 on each skin taken. During the period of its lease the company took an average annual quota of 100,000 skins. The government also derived revenue from import duties on dressed sealskins brought over from London for con¬ sumption in this country. In all, the govern¬ ment received during this first period of 20 years, in rental, royalty and import duties, nearly $13,000,000, or about twice the total cost of the entire Territory of Alaska. It is needless to say that the industry proved a source of wealth to the company controlling it. The same company leased the Commander Islands from Russia and took there a quota of about 50,000 skins a year. In 1890 the fur seal industry of the United States passed into the hands of the North American Commercial Company for a term of 20 years. The terms of the new lease were more advantageous to the government, the royalty on each skin being approximately $10. The fur seal herd had, however, suffered a serious decline in its breeding stock and this became evident in the first year of the new lease when only 21,000 skins were taken. A catch of 30,000 skins was taken in 1896, but the average for the 20 years did not exceed 15,000 skins. The cause of this decline was found in the development of a rival sealing industry, the hunting of the seals in the open sea while on their migrations and feeding excursions.

Pelagic sealing, as this hunting is now called, is the outgrowth of a custom

practised by the Indians of the Northwest Coast from the earli¬ est times. Going out from the shore in the vicinity of Cape Flattery and Vancouver Island in their canoes they captured with the spear such

stragglers from the migrating herd as came within their reach. The number of animals taken in this way was small, probably not ex¬ ceeding 5,000 a year, until 1879. The skins found their way to the markets through the traders and, as sealskins increased in value, this irregular source of supply became an ob¬ ject of attention. In 1879 vessels began to be used to convey the Indians and their canoes out to the main body of the herd, to remain with them, affording shelter at night and in time of storms, and enabling the hunters to move with the progress of the herd. From a single vessel in 1879 the pelagic industry expanded enor¬ mously until in 1891 the sealing fleet numbered 122 vessels, each with from 5 to 20 sealing crews, and in 1894 it made a total catch of 143,000 seals. From this point the pelagic catch declined steadily with the diminishing herd. In 1902 it numbered about 15,000 seals or about the average land catch at that time. The methods of pelagic sealing may be described as follows : When the sealing vessel comes into sight of seals its boats are lowered and the hunters put off to windward in diverging direc¬ tions. The spearsman stands in the bow and the steersman manages the boat. The seals are usually found sleeping on the surface of the water. The boat approaches noiselessly and the spear is thrown by means of a long detachable shaft. The spear head is attached to the boat by a line, and when the captured animal is tired out it is drawn up to the boat and killed with a short club. If the shotgun is used the animal is similarly approached and, after being shot, the body is quickly recovered with a gaff to prevent its sinking. The operations of the sealing fleet were gradually extended from the vicinity of the Straits of Fuca until they covered the entire migration route of the Pribilof herd, from the Santa Barbara Channel to the passes of the Aleutian chain. Finally it entered Ber¬ ing Sea and attacked the herd on its summer feeding ground. In a similar way the pelagic fleet covered the migration route of the Com¬ mander herd.

Pelagic sealing was necessarily indiscrimi¬ nate, as the sex of the animal could not be dis¬ tinguished in the water and the hunter tried to kill every animal found. The killing of the males on land naturally left the herd as found at sea composed chiefly of females. The killing of the female seal on the spring migration in¬ volved the death of her unborn offspring. When killed in Bering Sea in August and Sep¬ tember her dependent young was left to starve on the rookeries. Investigations of the pelagic catch in 1895 and 1896 showed the percentage of females in the pelagic catch for these years to be 63 and 84 per cent respectively. In the latter season 20,000 starved pups were counted upon the rookeries of Saint Paul and Saint George, their mothers having been killed at sea.

Aware of the disastrous effects of pelagic sealing, and acting under shadow of a claim made by Russia in 1820 to absolute jurisdic¬ tion over Bering Sea in the interests of her fur seal herd, a claim since found untenable, the United States in 1886 began seizing sealing vessels operating in Bering Sea, among them Canadian vessels. This brought on a diplomatic discussion with Great Britain which dragged

along until 1892, when the two nations agreed upon a treaty submitting to a court of arbitra¬ tion the question of jurisdiction in Bering Sea, and of what regulations, if any, were necessary for the protection and preservation of the fur seal herd when beyond the ordinary territorial limit of three miles; This tribunal .of arbitra¬ tion met in Paris in the spring of 1893 and rendered its decision in August of the same year. The decision on the legal questions in¬ volved was adverse to the contention of the United States and, as provided in this event, a set of regulations was formulated for the protection of the herd, to be enforced jointly by the two nations. These regulations provided, after the analogy of game laws, for a closed season in May, June and July, when all sealing should be suspended, and for a closed zone of 60-miles radius about the islands, within which no sealing whatever should be allowed. The closed season covered the breeding period, the protected zone was supposed to provide a safe feeding ground for the mother seal while her young was dependent upon her. The regula¬ tions, however, failed of their object, because the mother seal does not feed within the pro¬ tected area, but far outside of it. She was, therefore, taken by the pelagic sealer as before, and her young was left to starve. The largest catch in the history of pelagic sealing, that of 1894, was made in the first season of the opera¬ tion of the very regulations designed to so limit and restrict pelagic sealing as to protect and preserve the herd.

In 1896, because of the continued decline of the fur seal herd, it was agreed between the United States and Great Britain to reopen the question with a view to a possible revision of the regulations, and each nation sent a scientific commission into Bering Sea to inquire into all facts relating to seal life. The commission for the United States was under the direction of President David Starr Jordan of Stanford Uni¬ versity, California, that for Great Britain, under the direction of Prof. D'Arcy Wentworth Thompson of University College, Dundee, Scot¬ land. At the close of the investigations which covered the seasons of 1896 and 1897, the two commissions met at Washington in a joint con¬ ference known as the Conference of Fur Seal Experts, and after a full discussion of the re¬ sults of their labors reached an agreement on all essential facts, establishing the fact of de¬ cline, its

probable rate and its cause. The cause was fixed as the killing of females at sea involved in pelagic sealing and the agreement foreshadowed — commissions having no power to consider ways and means — the abolition of pelagic sealing as the only means of saving the herd. On the basis of this agreement the fur seal question passed into the hands of the Joint High Commission called at Quebec in 1898 to consider this among a number of other questions in dispute between the United States and Can¬ ada. Unable to reach an agreement on the boundary dispute this Joint Commission accom¬ plished nothing in the fur seal matter. In 1903 a Japanese sealing fleet joined the Canadian and as the Japanese sealers were not bound by the regulations of the Paris Award they were able to establish themselves on the three-mile terri¬ torial limit about the islands and to operate throughout the summer. Under these con¬

ditions the damage to the herd was greatly increased and its extermination threatened. In 1911 negotiations for the abolition of pelagic sealing were taken up anew, Russia and Japan participating in them. The conference was held at Washington and the treaty, suspending pelagic sealing for 15 years, was signed by the United States, Great Britain, Russia and Japan on 7 July. It was duly ratified and went into effect in the season of 1912. This treaty pro¬ vided that the United States and Russia, as owners of the principal seal herds, should share their land catches with Canada and Japan, 15 per cent each to each, in return for the aban¬ donment of pelagic sealing. Unfortunately in enacting the law necessary to give this treaty effect Congress added a clause suspending land sealing on the Pribilof Islands completely for five years and limiting its extent for nine fur¬ ther years, practically the full life of the treaty. This law was enacted 24 Aug. 1912, and in the four seasons which have passed it has caused a loss of approximately $2,000,000 to the three nations concerned under the treaty. If its pro¬ visions are fully carried out the loss will reach a total of not less than $4,500,000 and the excess of male life created upon the rookeries will be injurious in high degree to the herd.

With the close of the lease of the North American Commercial Company in 1909 the government entered upon the direct control and management of its fur seal herd. The catch of 13,000 skins for 1910 was taken by the government agents and sold in London for $437,000, yielding to the treasury nearly four times as much as would have been received under the leasing system. The similar catch of 1911, amounting to 12,000 skins, brought $423,000. The catch and attendant income should not have fallen below the figure of 1911 for with that season pelagic sealing ceased and the herd began to increase.

It is probable that in the days of its greatest prosperity (1870-85) the fur seal herd of the Pribilof Islands numbered 2,500,000 animals of all classes.

In 1912, at the time of its release from the drain of pelagic sealing, the herd numbered approximately 250,000 ani¬ mals. The Russian herd of the Commander Islands, originally about one-half the size of the American herd, had suffered practically the same proportionate decline. These herds under protection at sea will increase year by year at approximately 15 per cent until they again reach their maximum limits, determined in all probability by the question of food supply which they must find in the open sea. In 1919 the Alaska herd was estimated at 600,000.

In addition to the fur seal herds of the north Pacific Ocean two herds of the southern hemisphere yield a limited supply of skins. One of these is the herd of Lobos Island off the mouth of the river La Plata, in Uruguay, yielding 12,000 to 15,000 skins annually, and the other, on islands off Cape Horn, yielding 5,000 to 10,000 annually.

The herd of the Pribilof Islands alone has yielded, since its discovery in 1786, approxi¬ mately 6,000,000 sealskins. In its present state it is capable of yielding an annual catch of 15,000 skins and this will rise steadily to a maximum of 100,000 to 150,000. Sealskins in the past 20 years have ranged in value from

$20 to $50 each. The herd is a governmental resource of great importance and value.

Bibliography. — Allen, (North American Pinnipeds> (1880) ; Rink, (Danish Greenland) (1877) ; Carroll, (Seal and Herring Fisheries of Newfoundland- (1873) ; Schultz, (Fisheries and Seal-hunting in White Sea, Arctic and Caspian Sea,5 translated in Report of United States Commission of Fish and Fisheries, Part III (1873-74) ; Southwell, (Notes on Seal and Whale Fishery,* Zoologist (London 1883 1902) ; Elliott, (Fur Seal Islands of Alaska) (1882); Proceedings of Tribunal of Arbitra¬ tionˆ 15 vols., (1895) ; Jordan and others, (The Fur Seals and Fur Seal Islands of the North Pacific5 (1898); Statesman's Year Book,5 (1906-19).*

George Archibald Clark, Secretary of the Fur Seal Commission 1896-97, Late Academic Secretary of Leland Stanford , Jr., University.

SEALSFIELD, selz'feld, Charles, pseu¬ donym of Karl Anton Postl, Austrian novelist : b. Poppitz, Moravia, 3 March 1793; d. Solothurn, Switzerland, 26 May 1864. He early entered a monastery and was ordained in the priesthood, but in 1822 fled to Switzerland and t-hence to the United States where he lived in 1822-26 and 1827-30. In 1829 he

edited in New York the Courier des Etats Unis, and after 1832 made his residence chiefly in Switzerland, though he visited the United States at intervals. He sub¬ sequently engaged in novel writing, his work creating a sensation in Germany. His publica¬ tions include Pie Vereinigten Staaten von Nordamerika5 (1828) ; Per Legitime und die Republikaner5 (1833) ; Pebensbilder aus bei- den Hemispharen5 (1835-37) ; Pas Kajiiten- buch5 (1840) ; (Sitden und Norden5 (1842-43), etc.

SEAMAN, Louis Livingston, American surgeon: b. Newburgh, N. Y., 17 Oct. 1851. He was graduated at Cornell University in 1873, at Jefferson Medical College in 1876 and at University Medical College, New York, in 1877. He was resident surgeon in the New York State Emigrant Hospital in 1877-79 ; superin¬ tendent of the State Emigrant Insane Asylum in 1879-81 and chief -of staff at Blackwell's Island in 1881-85. He made a tour of the world and special study of the contagious dis¬ eases of the Orient in 1886. He was surgeon with rank of major in the American War with Spain ; served with the Second Imperial army of Japan in Manchuria in 1905, and was special correspondent of the Independent in the Euro¬ pean War. Author of (The Real Triumph of Japan5 (1906) ; Priumphs of Medical Science in Peace and War in Foreign Lands5 (1908); (The Tse-Tse Fly and Sleeping Sickness5 (1908) ; Pair Play for the Republic of China5 (1912) ; (The Aftermath of the Balkan War5 (1914); (Crucifixion of Belgium5 (1916), etc.

SEAMAN, se'man, Owen, English writer: b. 18 Sept. 1861. He was educated at Clare College, Cambridge, in 1888 became lecturer in literature at the Durham College of Science (Newcastle-on-Tyne) , and in 1890 was there appointed to the newly-established professor¬ ship of literature. In 1897 he was admitted barrister of the Inner Temple. He began con¬ tributions in 1894 to the National Observer, in

1895 to the World and in 1894 to Punch, whose staff he joined in 1897, and of which he be¬ came editor in 1906. Among his books of verse are (With Double Pipe5 (1888) ; (Horace at Cambridge5 (1894); (Tillers of the Sand5 (1895) ; (The Battle of the Bays5 (1896) ; cIn Cap and Bells5 (1899) ; Porrowed Plumes5 (1902); (A Harvest of Chaff5 (1904); Sal¬ vage5 (1908), and (War Time Verses5 (1915).

SEAMAN, a person below the rank of of¬ ficer who is employed in the navigation of a vessel either coastwise or on the high seas. The word (

The discovery of America gave a great im¬ pulse to seamanship and may be said to have created a new race of sailors, who were also adventurers and whose feats of navigation have never been surpassed for daring, skill and achievement. In the early days of the Ameri¬ can colonies and indeed

up to the time when manufactures attracted the surplus population of the rural districts, Americans might almost have been called a race of sailors. They sailed around the world in their merchant ships, fight¬ ing French privateers and, when nearer home, dodging English revenue cutters, and in 'this school of varied hardship and adventure they learned the lessons of seamanship as no others had learned it before. Good sailing ability to navigate a- ship to the best advantage was al¬ most as requisite as good gunnery in the naval battles of a century ago, and America's splendid naval record of 1800 to 1815, in combat with French, Barbary pirates and British proves that American seamen could both navigate and fight.

The seamen in vessels trading in American ports for years have been mostly of foreign origin. Scandinavia supplies a large propor¬ tion of them and they are excellent sailors. Strict laws are on the statute books regulating the engagement and treatment of seamen, their claims to pay and their discharge and return to this country, if abroad. Seamen can no longer be beaten and cuffed with impunity by brutal shipmasters. The authorities, both civil and criminal, are quick to uphold the cause of a seaman who has a real grievance. Merchant seamen make their contract by signing a writ¬ ten agreement called the shipping articles. This must set forth the voyage, the ports at each end and all other matters which are necessary

to an intelligent understanding of the contract. The contract, when signed, is not absolute evi¬ dence of agreement on the part of the seaman, who may prove, if he can, that he was induced to sign by fraudulent representations, or while irresponsible. The law provides penalties for violation of the contract by either party; the amount and quality of provisions while .on a voyage are regulated by statute, and the master is bound to pay the wages due, unless he can show that the seaman has been insubordinate or inefficient. A seaman refusing, without good cause, such as illness or other disability, to do the work assigned to him may be put in irons while on board and prosecuted in the nearest United States court. If he deserts he may be arrested and punished by forfeiture of wages and imprisonment. He can justify de¬ sertion by proof of cruel treatment. If a sea¬ man is discharged without cause and against his will in a foreign port the master can be punished by six months' imprisonment or a fine of $500. If the seaman, who has done his duty, is willing to be discharged abroad, and the master on his part is willing to let the man go, the master must pay him three months' wages beyond what is due, one-third of which amount goes to a fund for the maintenance of American seamen abroad and for bringing them home. It is part of the duty of American consuls to be

vigilant in the protection of American seamen, and the master of a vessel must present his papers for examination by the American consul or consular agent in all ports visited and must explain the reasons for the absence of anyone entered in the list of the crew.

Unfortunately many seamen are ignorant of the provisions of law intended to guard them from abuse and imposition, and the dissipation in which many of them indulge when on shore helps to make them easy victims of unscrupu¬ lous boarding-house-keepers and shipmasters, who conspire to rob them of advance money and virtually kidnap them on board vessels on which they had no intention of sailing. This evil is undoubtedly winked at, in some instances, by corrupt officials, who presumably receive a share of the proceeds. Some outrage, greater than usual, calls attention at intervals to the wrongs being perpetrated on seamen, and then there is a brief spasm of public anger and talk of prosecution and reform. This dies out, as a rule, without serious action having been taken and matters go on as before. The lot of the American seaman is, however, immeasurably better than it was in the early part of the 19th century, for now the law is on his side, when invoked, whereas formerly all its power was exerted on the side of the shipmaster, however cruel and unscrupulous.

In England also the seaman has had ample legal protection for over half a century, since the passage of the Mercantile Marine Act of 1850, which lays down minute rules for the government of both masters and seamen. The provisions of the act are very similar to the American laws bearing on the same subject.

The decline of the American merchant ma¬ rine is attributed largely to the fact that, as a sop to American labor unions, laws were nassed obliging vessels carrying the American flag to comply with certain regulations tending to in¬

crease the pay of the seamen. Because vessel- owners could hire seamen in foreign ports cheaper than in the United States they have chosen almost universally to fly a foreign flag. The World War, with the indiscriminate sink¬ ing of neutral craft by German submarines, stimulated the United States government to inaugurate a heavy shipbuilding era, and the consequent demand for American seamen has resulted in increased pay and better conditions.

In 1915 the Congress passed a new seamen's act providing improved conditions as to hours, food, sleep, pay, living quarters and terms of service. One clause called for 75 per cent of the crew to be able to understand orders in English. Penalties for desertion were removed and one-half the wages due were made payable on demand at any port ;

assignments of wages were voided. On the other hand, the seamen can be dismissed for cause, even in a foreign port, by taking certain action before a United States consul, but to deliberately abandon a seaman in a foreign port is punishable crim¬ inally. Seamen's quarters are prescribed to be not less than 16 square feet of deck and 120 cubic feet of air space per individual ; washing and toilet arrangements are ordered and med¬ ical care and attendance.

SEARCH, Right of, so far as it applies to the homes, persons, papers and effects of Amer¬ ican citizens, is regulated by the Fourth Amend¬ ment to the Constitution of the United States, which provides that the right of the people to be secure against unreasonable searches and seizures shall not be violated. This provision appears also in State constitutions. A magis¬ trate should issue a search warrant only on evidence sufficient for a reasonable presumption that stolen articles, or articles used in viola¬ tion of law, such as gambling implements, are to be obtained by the search, or that evidence essential to a prosecution for serious crime may thus be secured. An officer holding a warrant for the arrest of a person charged with crime may enter upon any premises where he believes that person to be, but is responsible both civilly and criminally for abuse of his authority. If an officer makes an arrest without lawful au¬ thority he is liable for false imprisonment. Persons not charged with crime may be arrested and detained as witnesses.

The extent of the right of search by belliger¬ ents of the vessels of neutrals is a much dis¬ puted question, and although it has been agi¬ tated for over a century it is far from a com¬ prehensive pnd satisfactory decision. The asser¬ tion by Great Britain, during the wars with Napoleon, of the right to search American ves¬ sels on the high seas for alleged deserters from the British navy — some of whom were hanged after being taken from an American man-of- war — provoked the War of 1812. When peace was made, although other points in dispute were adjusted, this question was left unsettled, England, at that time, making no further at¬ tempt to interfere with American vessels, and the fall of Napoleon removing the causes which had led to England's high-handed measures.

The Declaration of Paris, signed by the plenipotentiaries of France, Russia, Great Brit¬ ain, Austria, Prussia, Turkey and Sardinia, 16 April 1856, sought to settle the various ques¬ tions relating to the right of search, declared

privateering abolished, that the neutral flag covered enemy's goods, except

contraband of war, that neutral goods, except contraband of war, were not liable to seizure, even under the enemy's flag, and that blockades, to be bind¬ ing, must be effective. The United States did not assent to this declaration, and matters were in this condition when the American Civil War broke out.

In 1861 a collision between the United States and Great Britain was nearly caused by the unauthorized action of the commander of a Union war-vessel, who stopped the British mail steamer Trent on the high seas and took from the Trent as prisoners Messrs. Slidell and Ma¬ son, commissioners of the Confederate States proceeding to Europe. England made prepara¬ tions for war, but the government at Washing¬ ton disavowed the stoppage of the Trent and released the commissioners. No privateers were chartered by the United States either dur¬ ing the Civil War or the Spanish-American War. In the latter conflict the United States and Spain proclaimed their intention to adhere to the principles of the Declaration of Paris, and this determination was adhered to through¬ out the war.

The right to search a neutral vessel for con¬ traband of war is universally admitted, this right, however, being confined to private mer¬ chant vesssels and not applying to ships of war. The exercise of this right must be con¬ ducted with due care and regard to the rights and safety of vessels. All civilized powers also exercise the right of stopping and searching and, if cause be found, seizing or destroying, should resistance be shown, a vessel suspected of piracy or slave-trading. The right of search came into prominence again in 1914, 1915 and 1916, when Great Britain went to the limit in stopping neutral vessels in nearby waters and taking them to British ports. The action was violently opposed by many American shippers and was the subject of considerable diplomatic correspondence between the United States and British governments. Owing to the fact that American sympathies were mainly pro-British and that the United States later joined the Allies in the Great War, the entire question was dropped, and the conditions of right of search remain more indefinite than ever. See Blockade; Contraband of War; Paris, Dec¬ laration of.

SEARCH WARRANT is a warrant re¬ quiring the officer to whom it is addressed to search a house or other place therein specified for property therein alleged to have been stolen, and if the same shall be found upon such search, to bring the goods so found, together with the person occupying the same, who is named, before the justice or other officer grant¬ ing the warrant, or some other justice of the peace or other lawfully authorized officer. It should be given under the hand and seal of the justice and dated. The right is now extended to the search for other articles the possession of which is forbidden bv law. The Constitu¬ tion of the United

States declares that <(the right of the people to be secure in their per¬ sons, houses, papers, and effects, against un¬ reasonable searches and seizures, shall not be violated; and no warrants shall issue, but upon probable cause, supported by oath or affirma¬

tion, and particularly describing the place to be searched, and the person or things to be seized."

SEARCHLIGHT, a light-projecting appa¬ ratus by which electric-light rays are concen¬ trated and reflected practically parallel in a beam to a great distance thereby disclosing to view at night objects far off. The source of introduction of the searchlight was the light¬ house, where metallic parabolic mirrors have been in use for many years. The rapid dulling of the metal surface led to using silvered glass reflectors, but the parabolic form in glqss was not attainable for a long time, hence spherical surfaces were in use of necessity. This, how¬ ever, made focal arrangement at angles neces¬ sary to diminish deviation of the reflected light from parallelism. Fresnel's investigations pro¬ duced fine results along the line of knowledge, such as that the rays transmitted from a con¬ vex! glass lens are in a nearly parallel beam so long as the diameter of the lens is small compared to its focal length, and but a small proportion of the light coming from the source is available. Fresnel's lenses were constructed of concentric rings and, surrounding the lens, totally reflecting prisms directed the light rays falling outside the prisms into the direction of the lens. For searchlights far better results arose from the outcome of the researches of Mangin who avoided all spherical aberration of reflection from a spherical mirror by using a concavo-convex lens bringing the light rays from the glass into the air almost free of de¬ viation from parallelism, the divergence being practically negligible providing the diameter of the mirror is no greater than its focal length. In practice Sautter, Lemonier and Company constructed an apparatus on these principles in 1876, though the mirror reflected (by its effective angle of about 60 degrees) but a small part of the light from the source. The Sautter-Harle firm has made great improve¬ ments since. Schuckert of Nuremberg, in 1886, produced parabolic mirrors from a single piece of glass using a process patented by him and Munker, and they excelled all others for search¬ light purposes. The significant rule is that the intensity of a searchlight is directly proportional to the area of the mirror and to the intrinsic brilliancy of the source of light. The advantage claimed for the Mangin mirror is that though the zone illuminated has a . smaller diameter than the parabolic, the illumination is greater.

The uses to which searchlights are applied have been chiefly of a military or naval char¬ acter, and are specially constructed for such purpose as field activities; on land fortifica¬ tions; at naval stations and in coast defense; on battleships, etc. With the successful prac¬ tice of aerial

navigation the searchlight became a necessary weapon of defense in anti-aircraft service. The searchlight finds frequent useful work in the merchant marine in avoiding colli¬ sion, during fog, also in the navigation of nar¬ row or tortuous rivers.

In modern searchlights the usual essential features entering into their construction are (1) The body with its mirror, lamp and carbon¬ adjusting gear, and the front glass. (2) Turn¬ table with arms carrying the trunnions that support the body and handgear for turning and tilting the body. (3) Base mounted on ball¬ bearings and supports for slip rings. In recent

SEARCHLIGHT

The projector is mounted on a turntable and is electrically operated so that it may be swung on both a horizontal and vertical axis the movement being controlled from a distance of 500 feet. The arm is raised by a mechanism operated from a power take'-off from the driving shaft of the chassis. It is provided with safety devices, controls, etc. It operates rapidly and throws a powerful light for a distance of many miles

SEARCHLIGHT

o.

S'

B w

ft> o

>1 l-l r^»

*O) **

c ™ – w • " w

.C0 H (D

**1 p Pi ►i*

o o

wcr — c: 7«

35

f®

» 5j.

a

Cl

o >

II

2.3

&9

SEARCY

SEARS

489

years searchlights utilize the arc lamp as the source of light. In these the carbons are placed horizontally and within the principal focal axis of the mirror or reflector. The positive carbon is adjusted at the front end of the pro¬ jector and the negative carbon, which is of smaller diameter, next to the mirror. The light¬ ing power required, according to evidence of recent experts, would appear to be that emanat¬ ing from the incandescent crater not the lu¬ minous dux caused by the flame or the incandes¬ cent point of the negative carbon (see Arc Light). Searchlight arcs range from 25 and 30 amperes up to 200, or perhaps 250 amperes when used on fortification in coast defense work. Mirrors of recent use are of silvered glass or gilded metal. In military or naval usage the light beam is masked by a louvre mechanism or by flashing shutters which in¬ hibit any passage of light. Searchlights are of two kinds actually, those with concentrated beam and those with dispersed beam. The latter is especially useful for illumination of water where mines are planted, etc.

Improvements in the essential features of the arc for searchlights during a number of years were not noteworthy, though changes in the measurements of the films have increased the available light rays slightly. The greater advance has been made in producing a more steady light, increasing the current per lamp. But the increased current enforces larger reflectors to obtain greater luminosity, the limit having practically been reached already. But the use of a cored carbon for the positive electrode invented (1910) by Heinrich Beck of Meiningen allows an increased brilliancy of the crater causing 300 per cent greater lu¬ minosity. The Elmer A. Sperry development of several years ago was also an advance some¬ what on the

Beck lines. In advancing the capabilities of the carriage and elevating mechanism for portable searchlights much in¬ ventive genius has also been expended. The Strauss portable searchlight apparatus type used in the United States Coast Artillery, as illus¬ trated here, affords a good diagrammatic exposi¬ tion of the land service searchlight and its equipment. This outfit makes its own nower, travels at the rate of 15 miles an hour and car¬ ries a powerful 36-inch projector which can be raised 22 feet. In battle the projector can be controlled electrically by operators 500 feet away from the apparatus.

SEARCY, sar'se, Ark., town and county- seat of White County, 50 miles northeast of Little Rock, on the Missouri and North Arkan¬ sas, the Rock Island and other railroads. It is the seat of Galloway Female College, con¬ tains a courthouse, city hall and Federal build¬ ing and both public and high schools. It has three banking institutions and manufactories of staves, spokes and felloes, an oil mill and an ice plant. The value of its taxable property is about $1,000,000. Pop. 4,000.

SEARING, Laura Catherine Redden

((< Ho ward Glyndon®), American author: b. Somerset, Md., 9 Feb. 1840. At 10 she lost the power of hearing and of speech through illness, and was educated at the Missouri Insti¬ tute for Deaf-Mutes. Later she largely regained the faculty of speech at Clark Institution, Northampton, Mass. She was married to Ed¬

*ward W. Searing in 1876. Her literary career began when she was 18, and during the Civil War she was a newspaper correspondent at Washington. In 1866-67 she was in Italy as correspondent for the New York Times and also engaged in literary work for the Depart¬ ment of Agriculture. During the Franco- Prussian War she wrote (German War Gossip> for the New York Tribune, was on the staff of the New York Mail in 1868-76, and in 1886 removed to California, where she has con¬ tinued writing for the leading periodicals. She has published (Notable Men in the House of Representatives) (1864) ; { Idyls of Battle**

(1864); (Sounds from Secret Chambers) (1874); (E1 Dorado, poems (1897) ; translations from French of (A Little Boy's Story,* etc.*

SEARLE, serl, George Mary, American clergyman : b. London, England, 27 June 1839 ; d. 7 July 1918. He came to the United States in 1840; was educated at Brookline High School and at Harvard University, being graduated at the latter institution in 1857. He was computer for the Nautical Almanac in 1857 and assistant at the Dudley Observatory, Albany, N. Y., in 1858-59. In 1859-62 he was engaged as com¬ puter in

the United States Coast and Geodetic Survey and in 1862-64 was assistant professor of mathematics at the United States Naval Academy. In 1866-68 Mr. Searle was assistant at the Harvard Observatory. He entered the Panlist ord'er in 1868 and was ordained in 1871. In 1895-97 he was professor of mathematics at the Catholic University, Washington, D. C. ; in 1904-10 was superior-general of the P'aulist Fathers; in 1910—1 1 was engaged in astronom¬ ical observations, particularly relative to Halley's Comet, at Newman Hall, University of Califor¬ nia. In 1911-15 Father Searle was stationed at Saint Mary's Church, San Francisco, and after 1915 at the Apostolic Mission House, Brook- land, Washington, D. C. He was a Fellow of the Association for the Advancement of Science and member of the American Academy of Arts and Sciences, the American Mathematical So¬ ciety, etc. He published (Elements of Geome¬ try (1877); (Plain Facts for Fair Minds* (1895); (How to Become a Catholic* (1905); (The Truth about Christian Science* (1916), and contributions to periodicals.*

SEARS, Barnas, American theologian and educator: b. Sandisfield, Mass., 19 Nov. 1802; d. Saratoga Springs, N. Y., 6 July 1880. He was graduated at Brown University in 1825 and later studied at Newton Theological Seminary. He was professor at Hamilton Literary and Theological Institute (now Colgate Univer¬ sity) 1831-33, and afterward studied in Ger¬ many, where he assisted in establishing Baptist missions. He was professor and, later, presi¬ dent of Newton Theological Seminary; and in 1855—67 he was president of Brown University. He was general agent of the Peabody Educa¬ tional Fund from 1867 until his death. For some years he edited the Christian Review. Author of (The Life of Luther (1850); and several textbooks and translations.*

SEARS, Edmund Hamilton, American Unitarian clergyman and poet : b. Sandisfield, Mass., 1810; d. Weston, Mass., 14 Jan. 1876. He was graduated at Union College in 1834 and at Harvard Divinity School in 1837. He was

pastor at Wayland, Mass.,ˆ in 1839-40; at Lancaster, Mass., in 1840-47 ; editor of the Monthly Religious Magazine in 1847-65 ; and after 1865 was pastor at Weston, Mass. Au¬ thor of (Regeneration ' (1853); (Pictures of the Olden Time) (1857) ; (Christian Lyrics) (1860); 'The Fourth Gospel: the Heart of Christ' (1872), etc.

SEARS, serz, Isaac, American patriot: b. Norwalk, Conn., 1729; d.

Canton, China, 28 Oct. 1786. He descended from Richard Sears, who emigrated from Colchester, England, in 1630, and settled in Massachusetts. He was in command of a privateer against the French in 1758-61, and after losing his vessel settled in New York and engaged in the West Indian and European trade. He became a prominent member of the ((Sons of Liberty," and was chairman of the first committee of correspond¬ ence established in New York. He commanded the troop that raided the printing establish¬ ment of James Rivington, editor of the Royal Gazette. After destroying the presses, the topes were carried away to be cast into bullets. He was a member of the provincial congress in 1783, and also of the State assembly of New York. Having lost his fortune, he shipped as supercargo on a merchant vessel and contracted a fever on the voyage to China, from which he died.

SEARS, Joseph Hamblen, American au¬ thor and publisher : b. Boston, 1865. He was graduated from Harvard in 1889, and has since published 'The Governments of the World To¬ day' (1893) ; 'Fur and Feather Tales' (1897) ; (None But the Brave' (1902) ; (A Box of Matches' (1904).

SEARS, Lorenzo, American rhetorician :

b. Searsville, Mass., 18 April 1838; d. 1 March 1916. He was graduated from Yale in 1861, from the General Theological Seminary, New York, in 1864, and was engaged in pastoral duties in New England in 1864-85. He was ap¬ pointed to the chair of rhetoric and English literature at the University of Vermont in 1885, which he filled until 1890, when he oc¬ cupied that of rhetoric and American literature at Brown University until 1906. He has pub¬ lished (History of Oratory' (1896); (The Oc¬ casional Address, Its Literature and Composi¬ tion' (1897) ; Principles and Methods of Literary Criticism' (1898) ; (American Litera¬ ture in the Colonial and National Periods' (1902); (Seven Natural Laws of Literary Composition' (1904) ; 'Makers of American Literature' (1904) ; 'Wendell Phillips, Orator and Agitator' (1909); 'John Hancock, the Picturesque Patriot' (1912) ; (John Hay, Au¬ thor and Statesman' (1914).

SEARS, Taber, American artist: b. Bos¬ ton, Mass., 1870. He was educated at the Bos¬ ton Museum of Fine Arts, School of Arts and at the Julien Academy, Paris, and studied under Jean Paul Laurens and Luc Olivier in Paris, as well as studying at Rome and Florence. He has specialized in mural paintings and in de¬ signs for stained glass windows. His mural paintings include 'The Spirit of Niagara' (Buf¬ falo Historical Society) ; 'Among the Nations' (New York city hall) ; frieze of the Apostles (Epiphany Church, Pittsburgh), etc.

SEARSPORT, Me., town on Penobscot Bay, five miles northeast of Belfast,

and about 30 miles southwest of Bangor. Its chief indus¬ tries are shipbuilding, ice-gathering, shipping hay and lumber and poultry products. It has lumber and grist mills and a spool mill. It has a high school, graded elementary schools and the Sears Public Library, opened in 1872. The national bank has a capital of $50,000; the sav¬ ings bank has a large amount of deposits. Pop.

1,444.

SEAS, Freedom of, a term of international law and diplomacy employed to describe the legal nature of the high seas, in respect to the right of every nation to navigate their waters freely beyond a certain limit, usually three miles from the coast, without being subject to the control of any nation. This freedom, now so well established, was not universally recognized in earlier times. As late as the 15th century Portugal asserted sovereignty over the Indian Ocean, and a large part of the Atlantic Ocean south of Morocco, while Spain asserted an equal right over the Pacific and the Gulf of Mexico, and the Pope supported their claims. In later times Great Britain asserted extravagant claims over the English Channel and certain great arms of the sea which washed the shores of the British Isles. Still later other nations, from time to time, asserted more or less jurisdiction over certain waters of the open seas. Thus the United States recently under¬ took to exclude other nations from killing fur seals in the Bering Sea many hundreds of miles from the American coast, but the question having been submitted to an international tri¬ bunal of arbitration, the tribunal decided against the American claims. Even now some nations claim and exercise jurisdiction in re¬ spect to fisheries and revenues over their littorals extending far beyond the three-mile limit, and although this assertion has occasion¬ ally produced irritation and conflict it has usu¬ ally been acquiesced in. Formerly also certain nations claimed and exercised the right to con¬ trol great bodies of the open sea connected by straits within their jurisdiction. The claims asserted by Denmark over the Baltic Sea were a well-known instance, and her claims were not finally abandoned until the middle of the 19th century. Grotius in his (Mare Liberum' pub¬ lished in 1609 in answer to Selden's attack upon the freedom of the seas revived the doctrine of the Roman law that there could be no property in anything which could not be effectually oc¬ cupied; hence the oceans were free to the navigation of all, subject to the control of no nation. Since Grotius' time the general prin¬ ciple of the freedom of the seas in time of peace has been universally recognized and ex¬ cept for the depredations of pirates and slave traders it has been generally enjoyed for pur¬ poses of navigation. This, of course, does not mean that a nation cannot restrict the maritime trade between its own continental ports or be¬ tween itself and its colonies to its own citizens and to vessels flying its own flag, or that it cannot prescribe conditions under which foreign ships may enter or depart from its

own ports. What freedom of the seas in time of peace means is the right of the ships of all nations to navigate freely the high seas outside the ter-

ritorial waters and beyond the three-mile mar¬ ginal sea without being subject to the right of search or molestation by the vessels or authori¬ ties of any nation.

In time of war no such freedom of naviga¬ tion is recognized. This freedom is limited by the admitted right of belligerents to intercept and confiscate articles of contraband on their way to the enemy and to prevent by means of lawful blockade all intercourse or trade in any and all goods, whether contraband or not, with the enemy. To this end, the public vessels of a belligerent may stop and search on the high seas any neutral vessel with a view to ascertain¬ ing its nationality as well as the character and destination of its cargo and, under certain con¬ ditions, both may be confiscated or even de¬ stroyed. During the late war certain belliger¬ ents, notably Great Britain, went to the length of taking neutral vessels into distant ports for the purpose of conducting the searches, against all of which neutral governments vigorously protested. Mails from neutral steamers were likewise taken in, searched, cen¬ sored and detained. Many neutral vessels were also stopped and persons of enemy nationality were taken off and imprisoned. Mines were sown in the open seas, first by Germany and then by Great Britain, and a goodly number of neutral merchant vessels innocently navigating the high seas were destroyed. Germany, and to a less extent Great Britain, also declared great areas of the open seas to be war zones, (

While the United States was still a neutral the President denounced these infringements upon the freedom of the seas, and in an ad¬ dress to the Senate declared that the <(paths of the sea must alike in law and in fact be free® and that (

qua non of peace, equality and co-operation.® As one of the 14 conditions of peace which he announced to Congress on 8 Jan. 1918 was the following : ((Absolute freedom of navigation

upon the seas, outside territorial waters, alike in peace and in war, except as the seas may be closed in whole or in part by international action for the enforcement of international covenants.® It was pointed out at the time that the seas were already free in time of peace and his proposal must, therefore, apply only to the freedom of the seas in time of war. There was a

difference of opinion as to the exact meaning of the proposal for ((absolute® free¬ dom of navigation and it was the subject of much discussion. Literally interpreted it would mean the abolition of the belligerent right of blockade, at least of commercial blockade, the right to seize contraband of war going to the enemy, the surrender of the right to prevent unneutral service and perhaps of the right to capture enemy private property at sea and to destroy enemy merchant vessels. Great Bri¬ tain and France in their replies to the Presi¬ dent's proposals accordingly stated that since the point relating to the freedom of the seas was ((open to various interpretations,® some of which they could not accept, they must, there¬ fore, (

zones,1 >) and to destroy systematically and gen¬ erally neutral merchant vessels, they should be forbidden altogether. These measures would not ensure "absolute® freedom of the seas but they would remove the most irritating sources of controversy, which is probably all that can be expected for the present. Consult Grotius, Hugo, (Freedom of the Seas} ; Ormond, S. W. T., (The Law of the Sea} ; Corbett, Sir Julian, (The League of Peace and a Free Sea) ; Wool- sey, T. S., (Freedom of the Land and Freedom of the Seas> (Yale Law Journal, Vol. XXVIII, p. 151) ; Hays, A. G., (What is Meant by Free¬ dom of the Seas) (American Journal of In¬ ternational Law, Vol. XII, p. 283) ; Anderson, C. P., (Freedom of the Seas> (in Annals of the American Academy of Political and Social Science , July 1917).

James W. Garner,

Professor of Political Science , University of Illinois.

SEASHORE, Carl Emil, American psy¬ chologist: b. Morlunda, Sweden, 28 Jan. 1866. He was graduated at Gustavus Adolphus Col¬ lege in 1891 and from Yale University in 1895. He was assistant in the Psychological Labora¬ tory at Yale in 1895-97; and from 1897 was as¬ sociated with the faculty at the University of Iowa, where he has been professor of psychol¬ ogy since 1902, head of the department of philosophy and psychology since 1905 and dean of the Graduate School since 1908. He invented many psychological instruments, among them being the voice tunoscope, spark chronoscope, pyscherogograph, audiometer, sound perimeter and multiple recorder. He is editor of the Uni¬ versity of Iowa's Studies in Psychology, joint editor of the Journal of Educational Psychol¬ ogy; and consulting editor of the Psychological Reviczv. Author of (

Elementary Experiments in Psychology > (1908) ; Psychology in Daily Life) (1913) ; (The Psychology of Talent } (1917), etc.

SEASICKNESS, an affection attended with nausea and other disagreeable sensations produced by the motion of a vessel. Its causes and etiology are as yet imperfectly understood. Some refer it to causes dependent upon the al¬ tered or affected functions of the nervous cen¬ tres ; others to the regurgitation of bile into the stomach ; and still others to irritation of the liver by the unusual movements of the body, in¬ creased secretion of bile being secondary. Prob¬ ably each of these views contains something of the real explanation of the disorder.

When a landsman goes to sea, the move¬ ments of the ship, and the shifting lines and sur¬ faces, unsettle his visual stability, as the differ¬ ent inclinations of the plank he stands on unsettle his muscular sense. The consequent derangement of these faculties reacts upon the nervous centres and through the latter upon the viscera, thus producing nausea and vomiting. Recollection of the disturbing sensations, to¬ gether with the emotional state which they orig¬ inally excited, may itself become an efficient cause, at least in individuals, of peculiarly irri¬ table stomachs, or of highly sensitive nervous systems ; for this plays downward upon the sen¬ sorial centres in such a manner as to excite in them the same condition as that which was originally produced through the medium of the

sensory nerve. This may explain why certain individuals show all the symptoms of seasick¬ ness on going aboard a vessel perfectly at rest. So, no doubt, imagination is a potent and im¬ portant factor in the case. The fact that visual impressions predispose travelers to seasickness suggests that a susceptible individual, when on deck, should shut the eyes.

But perhaps the chief causes of seasickness may be summed up thus: (1) Effusion of blood to the brain; (2) disturbance of the digestive system; (3) over-eating, and also under-eating. Many preventive measures referring to the con¬ struction and arrangement of vessels have been tried with little success; yet experiments with vessels having a swinging saloon, designed to preserve equilibrium in any sea, and vessels with a breadth intended to minimize the rocking motion, show that nautical men and shipbuild¬ ers are becoming alive to the interests and com¬ fort of travelers. Preventive measures regarded from the patient's point of view are practically limited to the regulation of diet before a voy¬ age. The diet for some days previously should be plentiful, but of light and nutritious charac¬ ter. Above all, the bowels should not be con¬ stipated and food should not be taken for at least five or six hours before going on board, although a cup of strong coffee just before em¬ barking will prove beneficial as a slight stimu¬ lant. On the ship a position as near the centre as practicable is to be

preferred. It is best when lying down to lie on the back, with the head and shoulders very slightly elevated. As a comfortng measure during the attack of nau¬ sea and vomiting, some form of alcohol and ice in small doses has been recommended. A bandage moderately tight, across the pit of the stomach, or an ice-belt or even cold compresses all along the spine may afford relief ; while some are benefited by sipping frequent drafts of lukewarm or cold water, though a glass of hot milk may be better. The presence of any harmless fluid in the stomach tends at least to prevent the disagreeable sensations of retching. Th ree or four drops of chloroform on lump- sugar may prevent vomiting and a suitable dose of bromide of soda and antipyrine will often give further relief. Many medical men consider that if drugs must be taken, the best all-around remedy is chlorobrom (jiot chloroform), a com¬ pound of chloralamide and bromide of potas¬ sium, while some prefer five grains of bromide of ammonia.

SEASONS, the four grand divisions of the year. Spring is from the vernal equinox, when the sun enters Aries, to the summer solstice; summer is from the summer solstice to the au¬ tumnal equinox; autumn is from the autumnal equinox to the winter solstice; winter is from the winter solstice to the vernal equinox. The earth's axis is inclined to the plane of the eclip¬ tic at 66J/2 degrees, and as the earth moves round the sun in the course of a year, the north¬ ern hemisphere is turned to the sun in summer (most so at the summer solstice) ; at the equi¬ noxes the line of light and shade on the earth passes through the poles, and at the winter sols¬ tice the northern hemisphere is turned from the sun. It is evident that the characters of the seasons are reversed to inhabitants of the south¬ ern hemisphere. See Autumn; Earth; Sum¬ mer; Spring; Winter, etc.

SEASONS, The, a poem in blank verse by James Thomson (q.v.), which has been char¬ acterized as (

SEATON, Sir John Colborne, 1st Baron of. See Sir John Colborne.

SEATON, William Winston, American journalist: b. King, William County, Va., 11 Jan. 1785; d. Washington, D. C., 16 June 1866. He engaged in journalism at 18 and edited various newspapers until 1812 when he became associated with his brother-in-law, Joseph Sales, Jr., writh whom he was editor and owner of the National Intelligencer at Washington. From 1860, until just prior to his death, he was sole editor and manager. In 1812-20 Seaton and Gales were exclusive Congressional reporters, one attending the sessions of each house. Their publications are highly

authoritative and of great historical value. They include 'Annals of Congress, Debates and Proceedings of the Congress of the United States from 3 March 1798, till 27 May 18245 (42 vols., 1834-56); 'Register of Debates in Congress from 1824- 3 75 (29 vols., 1827-37) ; 'American State

Papers5 (21 vols., 1832-34). Consult the 'Life5 by his daughter (1871).

SEATTLE, Wash., largest city of Pacific Northwest, county-seat of King County, and a seaport important in coastwise, Alaska and Oriental trade, is situated between Puget Sound on the west and Lake Washington on the east ; 865 miles by water north of San Francisco, Cal., 185 miles by rail north of Port¬ land, Ore., 123 miles by rail south of Canadian boundary. The city area is 94.47 square miles, of which 35.91 square miles are water.

Location. — Seattle has a beautiful natural setting with the snow-capped Olympic Moun¬ tains and Puget Sound on the west, while on the east are Lake Washington and the Cascade peaks, including Mount Baker (10,730 feet) and Mount Rainier (14,408 feet). Lake Washing¬ ton, 22 miles long, four miles wide, 225 feet maximum depth and a shore line of 80 miles, has been recently connected with Puget Sound by a ship canal more than eight miles long, built by local and State appropriations. The canal, 150 feet wide and 36 feet depth of water, joins lake and sound through Lake Union, in the heart of the city, two miles long by three- quarters of a mile wide. The level of Lake Washington and Lake Union is the same, while one set of locks (cost to United States

government, $2,27 5,000) connects the fresh wa¬ ters of the latter with the salt waters of Puget Sound. These locks have one chamber 80 X 825 feet in dimensions and another 30 X 100 feet, with a depth of water from 36 to 42 feet. The larger chamber requires 25 minutes and the smaller 15 minutes to pass a ship through. The canal, opened in July 1916, has extended Seattle's waterfront area from 40 to 140 miles, adding a fresh water, non-tidal harbor, unique in the world. At the south end of Elliott Bay an¬ other artificial waterway has recently been completed by the straightening of the Duwamish River through local appropriations. The Du¬ wamish waterway, five miles long, 300 feet wide and 30 feet deep at low tide, taps a level dis¬ trict rapidly coming to the front as a manufac¬ turing section.

The general contour of Seattle is hilly, rang¬ ing from sea-level to 500 feet on the West Seattle crest. Queen Anne Hill, a prominent residence district, is 464 feet high. The valleys have a north and south trend and the promi¬ nent hills include Beacon Hill, First Hill, Ren¬ ton Hill, Capitol Hill, Queen

Anne Hill and Madrona Hill. Cable lines running east and west serve the higher hills direct, while the elec¬ tric lines follow winding routes to the various parts of the city. Regrading in recent years has torn down some of the hills which ob¬ structed business and has filled in the hollows creating a level area. More than 34,000,000 cubic yards of earth have been removed, largely by the hydraulic process, and hills 130 feet high have been leveled. While business houses oc¬ cupy the lower, level areas, the general resi¬ dence districts are on the slopes possessing per¬ fect drainage and a wealth of sunshine, fresh air and scenery. In addition to Lake Union and Lake Washington there is in the north central part of the city adjoining Woodland Park, a small lake about a mile long and half a mile wide. The waters of these lakes are clear and pure and do not freeze as the average winter climate in Seattle is 40° above zero.

Climate. — The equable temperature of the Puget Sound region, ranging from 40° to 64° (the high summer average) is due to the effect of the Japan current and has much to do with Seattle being the healthiest city in the world. The death rate in 1918 was 6.80 per 1,000. The city has the best of water, sewers, pave¬ ments and sidewalks. Seattle has no extremes of heat, cold, floods, nor drought (annual rainfall, 29.2 inches). There are 622 miles of watermains ; 495 miles of sewers; 282 miles of paved streets.

Banks. — There are 31 banks with deposits aggregating about $170,000,000 and clearances of about $2,000,000,000.

Communications. — The terminus of several transcontinental railroads, Seattle is reached by the Great Northern, Northern Pacific, Chi¬ cago, Milwaukee and Saint Paul and Union Pacific (Oregon-Washington) railroad com¬ panies over their own rails, while through trans¬ continental trains are operated by the Canadian Pacific (over Northern Pacific tracks), the Chi¬ cago, Burlington and Quincy (over Northern Pacific tracks), and the Southern Pacific (over Oregon-Washington tracks). There is a short line local railroad — the Columbia and Puget Sound. The Grand Trunk Pacific and Canadian Pacific operate their steamships from Canadian

terminals at Prince Rupert, British Columbia, and Vancouver, British Columbia, respectively, to the Grand Trunk and Central Pacific railroad docks in Seattle. The several important steam¬ ship lines having their headquarters in Seattle give the most frequent service to Alaska of any Pacific Coast port, thus supplementing Seattle's geographical position as the natural trade gate¬ way to the North country. The Alaska Rail¬ road

Commission, building a government line from Seward to Fairbanks, has its office in Seattle. Practically all the gold from Alaska and the Yukon Territory is received here and the United States Assay Office established in 1898 has since received about $265,000,000 worth of gold. Among the leading Alaska steamship lines operating freight and passenger vessels from Seattle are the Alaska Steamship Com¬ pany, the Pacific Alaska Navigation Company, the Pacific Coast Steamship Company, the Hum¬ boldt Steamship Company, the Northland Steamship Company, the Border Line Trans¬ portation Company, the Westward Navigation Company, the Canadian Pacific and Grand Trunk Pacific. Many of these companies also operate coastwise to California ports and utilize the Panama Canal to reach Atlantic Coast ports. Being 1,250 miles nearer Oriental ports by the Great Circle Route than by any of the steamship lines operating from California, Seattle is naturally an important figure in the Far Eastern trade. Great liners operate from this city to Japan, China, Siberia, Hawaii, the Philippines, Straits Settlements, Australia, Mexico, South America, Europe, and, in fact, to every part of the world. Seattle is both the commercial and industrial centre of the Puget Souhd Customs District, which leads every other district on the Coast in value of imports and exports. In 1918 the net tonnage of ves¬ sels entering Elliott Bay, Seattle's Harbor, was 20,418,247 tons. The foreign exports in 1918 (harbormaster's report) totaled $212,501,489; foreign imports, $368,306,395. Seattle has a large fleet of steamers owned locally and oper¬ ating to ports on Puget Sound and adjacent waters. A fleet of steamers operates with freight and passengers on Lake Washington. The total water-borne commerce of Seattle in 1918 (including foreign, coastwise and local) was valued at $792,120,736. Leading articles of export included wheat, flour, lumber, fish, coal (from mines in vicinity of Seattle), hay, fruit, livestock, dairy products and general merchandize, a large part of which is produced in the vicinity of Seattle or in Washington. The leading imports were silk, rice, tea, coffee, sugar, spices, indigo, curios and Oriental prod¬ ucts of various kinds.

Public Buildings. — Seattle has more than 300 churches, including Chinese, Japanese, Fin¬ nish, Jewish, Scandinavian, German and Rus¬ sian, and is the See of the Roman Catholic bishropic of Seattle (formerly Nesqually). Among the attractive religious edifices are Saint James Cathedral, First Baptist Church, First Church of Christ Scientist and First Pres¬ byterian Church, the last-named seating 3,000 in the main auditorium. Among the other buildings worthy of note are the following: 42-story L. C. Smith Building (highest office building outside of New York City), the cost

of which was $1,500,000; Metropolitan Building (White-Henry-Stuart), cost $1,500,000; Provi¬ dence Hospital, cost $1,000,000; Washington Hotel, cost $970,000 (with ground and furnish¬ ings, $1,500,000) ; Hoge

Building, $700,000; Alaska Building, $700,000; Cobb Building, $600,-000; City and County Building; Carnegie Li¬ brary, Oregon-Washington and Union depots, Arctic Club, Sunset Club and Rainier Club. Among the leading theatre buildings are the Metropolitan, Moore, Pantages and Orpheum.

Industrial Activities. — The cheap water and hydro-electric power obtainable in Seattle have aided in making it the most important manufacturing, as well as commercial city of the Pacific Northwest. The municipal electric plant represents an investment of $6,660,000. Seattle is said to be among the best lighted cities in the world. Private power in large quantities is also sold at rates from one-half cent per kilowatt hour up by the Puget Sound Traction, Light and Power Company. A recent industrial census showed 1,811 industries in Seattle, an increase of 588 plants over 1909, or a percentage of 57.4. Among the important industries are the following: flour, $15,000,000; lumber products of the State of Washington, $120,000,000; canned salmon and preserved fish handled at Seattle, $80,000,000. The shipbuild¬ ing industry is also of great and increasing magnitude in Seattle.

Parks, Recreation Centres, etc. — The

parks and boulevards are unusually complete for a city of the age and size of Seattle. There are 1,815 acres under the jurisdiction of the park commissioners, including 44 improved parks and 24 equipped and supervised play¬ grounds. Connecting the thickly forested parks in the various parts of the city by winding drives with easy gradients, now skirting the Lake Washington shore or overlooking the waters of Puget Sound and the mountains, the scenic boulevard system of 31 miles within the city limits is one of the most attractive in the United States. It will be 50 miles long when fully completed, practically encircling the city and touching all the more sightly elevations. The sum of $5,089,606 has been spent on park ex¬ tensions and improvements. These figures in¬ clude the pavilion and bathing facilities at the municipal beach at Alki Point and the munic¬ ipal golf links at Jefferson Park. .Other im¬ proved parks include Seward (198 acres) on Lake Washington; Woodland (179 acres) ad¬ joining Green Lake in the north part of the city and embracing the zoological department, athletic field, recreation and picnic grounds, boating, bathing, fishing and concert facilities; Ravenna Park, including Sulphur and Mineral Springs, immense trees, water falls and natural ravine; Washington Park, a large tract of natural wood bordering Union Bay of Lake Washington, and containing city speedway; Volunteer Park on Capitol Hill overlooking both Lake Washington and Puget Sound has statue of William Henry Seward by Richard Brooks, Municipal Conservatory filled with ex¬ quisite blooms the year 'round, formal gardens, concert facilities, and a public observatory

460 feet above sea-level; Alaska-Pacific-Yukon Ex¬ position Grounds on University of Washington Campus containing formal gardens ; Schmitz

SEATTLE, WASHINGTON

Business section of Seattle with Olympic Mountains across Puget Sound

SEATTLE, WASHINGTON

1 Seattle Waterfront

2 North Business District, Olympic Mountains in distance

Courtesy Seattle Chamber of Commerce

3 Volunteer Park, formal gardens

SEATTLE, WASHINGTON

)

— «r*~.

a

a

o

O

«*M

o

<1>

-o

O

D

c n

©

U

CO

a

a

.©

^3

b£)

>.

Cm

u.

d

O*

CO

a>

a>

d

o

£

d

a>

o

A

6

4->

o

H

0)

o

d

d

4-*

.2

*5

a>

43

4-*

d

• H

a

oj

p$

S

0)

Q<

d

o

(/)

>»

c/5

> >

t-4

o

4-t

w

o

£

4-»

I

> > v. J

lH

o

SEATTLE

495

Park, a beautiful natural park on West Seattle Peninsula with ravines, lakes and big trees ; Kinnear Park on Queen Anne Hill with formal improvements and marine view; Madrona Park on Madrona Hill overlooking Lake Washington and Mount Rainier, with winding walks, pago¬ das, swings and tennis courts ; Denny Blaine, Mount Baker, Leschi and Atlantic, smaller lake¬ side parks surrounded by home districts; Frink, Cowan, Denny and Salmon Bay parks in the midst of residences. Among the leading play¬ grounds are Lincoln, Walla Walla, Collins, Bea¬ con, Rogers, South Park, Day, Columbia, Miller, Rainier Beach, Ballard, University, West Seat¬ tle, Alki, Queen Anne, Mercer and Ross, all fully equipped with modern apparatus and many with adult instructors and supervisors. Wad¬ ing pools and sand piles are provided in addi¬ tion to tennis, baseball, cricket, football and other facilities. Elaborate field houses equipped with gymnasium apparatus, stages for amateur plays and recreation rooms have been erected at a total cost of $75,000 in the

following play- fields : Collins ($25,000) ; South Park ($20,000) ; Ballard ($15,000) ; West Seattle ($15,000). There are 20 equipped playfields and four addi¬ tional playground sites are unimproved. Among the largest of several open spaces in the busi¬ ness district is Pioneer Place where the famous Totem Pole stands and where the park com¬ missioners have constructed an underground public comfort station to accommodate 12,000 persons daily. Other stations are located at Pike Place market, Public Library, Sixth ave¬ nue and Westlake and similar popular portions of the business district. In addition to the munic¬ ipal amusement places there are private amuse¬ ment parks, including Luna Park and Golden Gardens, both located on Puget Sound; For- tuna and other parks on Lake Washington. The links of the Seattle Golf and Country Club are north of Seattle and of the Earlington Golf and Country Club north of the city.

The University of Washington has a golf links on its campus of 355 acres within the city limits.

Education. — The university (established here by legislature of 1854-55) is rapidly ad¬ vancing to leadership on the Pacific Coast. It has 6,000 students, 310 professors and instruct¬ ors with several permanent buildings of beauty valued at $1,200,000. On the campus is a statue of George Washington by Lorado Taft and a bust of James J. Hill by Finn Frolich. The Museum, Forestry Building and open air audi¬ torium are of interest to strangers. The grounds of Fort Lawton (605 acres given by Seattle to the Federal government) are in the northwest part of the city overlooking Puget Sound. The navy yard, Puget Sound, located at Bremerton about 15 miles west by south of Seattle, is protected by Fort Ward and has one of the two largest dry docks in the United States navy, — 863 feet long and 110 feet wide. It also has a dry dock 627 feet long and 39 feet deep. The yard is equipped at government ex¬ pense for building battleships and as the result of its natural advantages promises to be one of the largest in the country.

The public schools of Seattle are of an excellent standard including six high schools, 72 grade schools, 50,000 pupils and 1,010 teachers. The high schools are of the latest type with gymnasium, domestic science and nor¬

mal school equipment and cost as follows: Franklin (Mount Baker district), $426,000; Broadway, $425,000; Lincoln (Green Lake), $386,000; Ballard, $330,000; Queen Anne, $253,- 000; Jefferson (West Seattle), $250,000. In addition to the University of Washington, Seattle has the Washington Preparatory School for Girls, Academy of the Holy Name, College of Our Lady of Lourdes, Adelphia College, Seattle College, Brothers School for Boys, nu¬ merous business colleges, dramatic schools and conservatories. The Parental School for un¬ ruly children is located on Mercer Island in the southeastern part of Lake Washington.

Libraries. — The city library system has about 314,000 volumes in the Carnegie Library and nine branches with 70,167 borrowers, a circulation of 1,336,143, and buildings and grounds worth $1,100,000.

Public Monuments. — Among the statues in the business area in recognition of his services to the State and in making possible the Lake Washington Canal construction, as well as other community endeavors, is one of the late Gover¬ nor John H. McGraw, by Richard Brooks, at Times square on Westlake avenue. Other works of art in Seattle include statues and paintings owned by the Washington State Art Association with exhibition galleries in the White Building, and including the following : Bronze statue, (Diana and EndymionP by Ernst Dame, standing in <(Totem Gardens® ' at Fifth avenue and University street ; bronze statue, (Mercury in Repose, > duplicate of one taken from ruins of Herculaneum and now in Na¬ tional museum at Naples, Italy; portrait of Henry Yesler, a Seattle pioneer, by J. Carroll Beckwith, of New York; oil painting (9X9 feet), (Jesus in the TombP by Henry Levy; oil painting, (Dorset, Vermont, by the late Frederick Crane; oil paintings of Alaskan scenery, by Leonard Davis. The association owns the Tozier Collection of Indian Relics and Curios, the most complete record of the art of Alaskan Indians in existence. This in¬ cludes baskets, implements used in hunting and daily life, ivories, and carved black jade, and remarkable totem carvings, some of the totem poles being on display in ((Totem Gardens® at Fifth and University.*

Charitable and Correctional Institutions.

— A charities endorsement committee cre¬ ated (1903) is operated by the Seattle Cham¬ ber of Commerce and Commercial Club. There is a Charities Organization Society, a charities commission appointed by the county board of commissioners, a receiving home for children (1896) under the Washington Chil¬ dren's Home Society; Seattle Children's home (1884) under the Ladies' Relief Society of Washington; Children's Orthopedic Hospital (1907) ; Girls Home and Training School (1909) under the auspices of the Seattle Feder¬ ation of Women's Clubs; Kenny Home for elderly men and women under the auspices of the Presbyterian Church; Seamen's Home un¬ der Seattle branch of American Seamen's Friend Society; Firland Anti-Tuberculosis In¬ stitution built and operated by the city; Anti- Tuberculosis League of King County (1909), treatment in homes and special hospitals; Flor¬ ence Crittenden Home, branch of the National Crittenden Mission; Lebanon Rescue Home for fallen girls; Japanese Women's Home; Volun-

teers of America; Salvation Army; Young Men's Christian Association; Young Women's Christian Association; Red Cross Society, a branch of the National organization; Humane Society of Seattle; Seattle Fruit and Flower Mission; House of the Good Shepherd (Sisters of the Good Shepherd) ; Mount Carmel Mis¬ sion and Columbus Sanitarium and (Missionary Sisters of the Sacred Heart) ; Catholic Social Betterment League; Ladies' Hebrew Benevolent Society; Ladies' Montefiore Aid Society; He¬ brew Benevolent Association; Hebrew Immi¬ gration Aid Society; Seattle Day Nursery; John Walter A'ckerson Home; and the Pacific Coast Rescue and Protective Association. The Seattle Foundation was recently organized as a clearing house for charities and beneficences. The principal hospitals are: Providence Hos¬ pital (1877), under the Sisters of Charity; Seattle General Hospital (1894) ; Wayside Emergency (1900); Minor Hospital; Swedish Hospital; Pacific Hospital; Municipal Hospital, under control of city; County Hospital, under control of county commissioners. The county has platted its former poor farm property in the city limits into industrial sites, having rail and salt water transportation, and is leasing them to new industries. The commissioners have bought a county farm of 407 acres at a cost of $113,000 to house the indigent.

Societies for Civic Betterment. — Among the civic organizations working for community advancement is the Seattle Chamber of Com¬ merce and Commercial Club, the oldest organi¬ zation of the kind in the city and now includ¬ ing industrial, publicity, conventions, taxation, transportations, foreign and domestic commerce, Alaska charities and exhibits bureaus. Other semi-public organizations include the Manu¬ facturers Association, Merchants Exchange and Washington State Art Association, in addition to numerous business and educational bodies, technical and local improvement clubs. Leading social clubs include the Rainier, Arctic, Uni¬ versity, College and Seattle Athletic organiza¬ tions for men and the Sunset and Women's college clubs for women. Musical organiza¬ tions include the Amphion Society, Symphony Orchestra, the Northwest Musical Festival As¬ sociation, which gives a week's festival in July each year, and several conservatories and col¬ leges of music. The Y. M. C. A. and Y. W. C. A. own their buildings.

Street Railways. — The street car lines pur¬ chased by the city from the Puget Sound Trac¬ tion, Light and Power Company cover 260 miles, besides two municipally owned lines, one entirely in the city and the other operating partly within and outside the city limits. The Puget Sound Traction, Light and Power Com¬ pany also operates interurban lines to Tacoma and Everett, while the Seattle, Renton and Southern operates an interurban line to Renton. The city of Seattle conducts its own garbage collection, disposing of same by incinerators and sanitary fills.

Public Markets. — The ferries are of spe¬ cial service to the farmers and ranchers in the vicinity of Puget Sound, enabling them to con¬ vey easily and economically their produce to the public markets for which Seattle is noted and which contribute to the low cost of living in this city. There are municipally or privately owned market places in various parts of the

business districts where the growers, fishermen and other producers sell direct to the house¬ wife, insuring fresh foods and low prices.

Other Features. — Seattle is the headquart¬ ers of the Immigration Service of the Pacific Northwest and the United States Detention Station is located here. Canadian immigration and customs officials are also established at this port. The centre of the Northwest good roads movement, Seattle is the terminus of the Savannah to Seattle Transcontinental Highway, on the Pacific Highway from Canada to Mex¬ ico, prominent on the National Parks Transcon¬ tinental Highway as the gateway to Rainier National Park, as well as the famous Sunset Highway through Snoqualmie Pass (3,010 feet) in the Cascade Mountains, and also on the Georgian Circuit which includes the Olympic Peninsula and British Columbia highways. The headquarters for the 13th Division of the United States Railway Mail Service are located here.

Water Supply. — Seattle's municipal water system is valued at $11,000,000 and has a daily capacity of 62,500,000 gallons with a daily con¬ sumption of about 33,000,000 gallons. There are 48,000 accounts on the department's books and 9,000 hydrants supplied by 704 miles of pipe line. The city's storage capacity is 271,137,000 gallons, conveyed by two pipe lines, aggregating 62.64 miles, from the watershed in the Cas¬ cade Mountains, 28 miles from Seattle. The fates are low and the water is cold, sparkling, and almost as soft and pure as distilled water.

Newspapers, Periodicals, etc. — The city has many publications, including daily news¬ papers, weekly newspapers, social, professional, trade and technical publications and monthly magazines. There are Japanese, Swedish and German newspapers here. The principal news¬ papers are the Post-Intelligencer, daily and Sunday (1867); Times , daily and Sunday (1881) ; Star, daily (1899) ; Union Record, daily (1918).

Government. — The city government con¬ sists of a mayor elected biennially, a council of nine elected at large, three annually for three- year terms, treasurer, comptroller and corpora¬ tion counsel and the following departments : city engineer's, public utilities, water, streets, building, lighting, police, fire, civil service, health, parks and library. The harbormaster's department in charge of the port warden keeps the harbor clear of floating logs and the men¬ aces to navigation. The port

commission, es¬ tablished in 1911 and consisting of three mem¬ bers elected for three years, is a county body and has spent about $10,000,000 in harbor ter¬ minals, including special docks for lumber, grain, with bulk elevators, cold storage and other equipment. The port operates a ferry to West Seattle, and one across Lake Washington, while the county operates a ferry on Lake Washington to Vashon Island on Puget Sound, and to Harper, Kitsap County.

History. — Seattle, named for Sealth, a friendly Snvash Indian chief, was settled in 1852, , the first settlers landing at a point now within the city limits which they called New York Alki, the latter word meaning in Siwash <(By and by.® The town (population 300) with¬ stood an Indian uprising in 1856, was incorpo¬ rated in 1865 and reincorporated as a city in 1869. In 1884, the first railway reached Seattle

SEAWEEDS

1. Gulf-weed (Sargassum vulgare 2. Dead-Men's-Fingers (Laminaria digitata). S, vVing-weed (Laminaria esculenta). 4. Bladder-weed (Macrocystis pyrifera). 5. Comb- weed (Plocamium coccineum). 6. Coral-moss (Corallina officinalis). 7. Horn-tangle (Ceramium rubrum). 8. Reed-weed (Polysiphonia urceolata). 9. Rib-weed (Delesseria san- guinea). 10. Irish Moss (Chondrus crispus). 11. Hide-weed (Schizymenia edulis'4 12. Sea-lettuce (Ulva latissima). 13. Cladophora glomerata. 14. Chandelier-weed (Nitella flexilis). 15. Chandelier-weed (Chara fragilis).

-

.

after the entire citizenship had wielded pick and shovel to build a line threatening to con¬ nect with the Canadian Pacific. Anti-Chinese riots in 1885 were quelled by a local vigilance committee. A disastrous fire in 1889 destroyed the business district causing a $7,000,000 loss. Pledges of contributions by Seattle to the Johnstown flood sufferers went forward in the face of the disaster. The indomitable Seattle¬ ites soon rebuilt better than before. The finan¬ cial panic of 1893 retarded Seattle's growth but the first shipment of Alaska gold in 1897 gave new impetus to her forward movement, which has not since been halted. In 1909, from 1 June to 15 Octobei, an exposition on the University of Washington Campus was attended by about 4,000,000 people and upon its close turned over to the university 19 buildings of various sizes for college purposes. To start*

construction of the exposition, representing an expenditure of $10,000,000, Seattle citizens subscribed in one day more than $600,000 in stock and the project was entirely financed by city and State without Federal assistance (except as an exhibition). The exposition was unique in being completely ready on the opening day and closing with all debts paid.

Population.— (1870) 1,107; (1880), 3,533;

(1890) 42,837; (1900) 80,671; (1910) 237,194;

(1920) 315,312. In 1910, more than one-

quarter of this population (61,134) were of foreign or mixed parentage, including 9,850 English Canadians; 8,676 Swedes; 7,191 Nor¬ wegians; 6,172 Germans; 6,127 Japanese; 5,797 English; 3,176 Irish; 1,879 Danes; 1,298 Finns and 924 Chinese.

Bibliography. — Denny, (Pioneer Days> ; Bagely, (History of Seattle, Washington) ; Beaton, (City That Made Itself J ; Publicity Bureau, Seattle Chamber of Commerce, Pic¬ turesque Seattle and Puget Sound) ; (Seattle) ; Port Commission, Port of Seattle Year Book 1914. >

H. W. Margeson,

Publicity Director, Chamber of Commerce.

SEAWEEDS, the simpler kinds of plants which grow in the water. The term is restricted to the lower plants, and does not include the aquatic kinds of mosses, liverworts, fernworts, and flowering plants. (See Algˆe). Originally the term was applied exclusively to the plants which live in the seas and oceans, but these are now called "marine seaweeds® to distinguish them from the "fresh-water seaweeds® which grow in rivers, lakes, and ponds. The simplest of all plants, the blue-green slimes (Cyanophy – cece) are the lowest of the seaweeds. They oc¬ cur mostly in fresh waters; some, however, are marine. The green seaweeds (Clilorophycece) are of considerably higher organization, the cells being distinctly nucleolated, and possessing well defined chromatophores, in which the green coloring matter resides. They include such single-celled types as the common green slimes (Protococcus) , desmids, diatoms, the filamen¬ tous pondscums, green felts (Vaucheria), as well as some larger leaf-like and massive kinds (Ulva , Caulerpa, C odium, etc). They occur abundantly in both fresh and salt waters throughout the world.

The brown seaweeds (P lice ophy cece) are closely related to the green seaweeds, and dif¬ fer from them mainly in having an additional brown coloring matter which hides the green

color of the chromatophores. The simplest forms are minute few-celled plants, others are branching filaments, while still others are large, massive plants many feet in length, and com¬ posed of root, stem and leaves. In all the mode of reproduction is of a simple type, show¬ ing their low grade in spite of the great size of some of the species. Among the larger plants of this group are the kelps (Macrocystis , Les- sonia, etc.), devil's aprons (Laminaria) and rockwecds (Fuchs). Some Pacific species of the first-named genus attain a length of several hundred feet, and are doubtless the longest plants in the world. Nearly all brown sea¬ weeds are marine, a few only living in fresh waters. The red seaweeds (Rhodophycece) are by far the most beautiful and interesting of aquatic plants. They are of a higher organiza¬ tion than those of the preceding groups. A few are composed of simple slender filaments, but they are more commonly multicellular stems, with roots below, and leaf-like or finely divided branches above. Although they are green plants, having well-developed chromatophores in their cells, they have in addition a reddish or purplish coloring matter which hides the green color. This often gives them a beautiful color, which, added to their delicate and regular branches, makes them exceedingly attractive ob¬ jects of study. They are commonly collected by seaside visitors, under the name of "seamosses.® A few species live in fresh waters, all the others being marine. Some species are edible, as notably the so-called "Irish moss® (Chon- drus crispus), of the Atlantic Coast of America and Europe, from which is made the delicacy known as blanc mange. The highest of the sea¬ weeds are the stoneworts (Characece) , which resemble some of the red seaweeds, but are of a green color, the red coloring matter not being developed in them.

SEAWELL, se'wel, Molly Elliot, Ameri¬ can novelist and playwright : b. Gloucester County, Va., about 1868; d. Washington, D. C., 15 Nov. 1916. After the death of her father, a nephew of President Tyler, Miss Seawell and her mother removed to Washington, D. C., where she began writing stories and sketches in 1886. Her first signed story was Maid Marian, > which was subsequently dramatized. The next offering of Miss Seawell was (Throck- morton) (1890). It met with success as did (Children of Destiny,) which followed it in 1893. A prize of $500 offered by the Youth's C ompanion for a study of boys presented a new field for conquest. She won the prize over 3,000 competitors with (Little Jarvis. > So great was the popularity of the story that it was made the first of a series entitled (Young Heroes of Our NavyP The succeeding volumes — (Decatur and Somers,* Midshipman Paulding) and (Paul Jones) were written by Miss Seawell, and maintained the success won by the first. In 1895 her (Sprightly Romance of Marsac* won a prize of $3,000 offered by the New York Herald for the best novelette. In 1900 she dramatized the story. In 1908 she won another

*Herald prize for a short story with (John Main waring, Financier. * Miss Seawell's other stories include (Twelve Naval Captains) ; cThe Rock of the Lion* ; (The Imprisoned Midship- man) ; (The Lost Duchess of Belgrade> ; (The Secret of Toni* ; (The House of Egremont* ; (Papa Bouchard) ; (Garvin Hamilton* ; (A*

Strange, Sad Comedy) ; ˆhe Victory0 ; (The Chateau of Monplaisir) ; (The Marriage of Theodora' ; (A Virginia Cavalier' ; (The Jug¬ glers' ; (The Loyer of the Lady Arabella' ; (History of the Lady Betty Stair' ; (Fran- cezka' ;

SEBACEOUS GLANDS, small structures of glandular nature and sacculated form which exist in the substance of the corium, or deep layer of the dermis or true skin. They are very generally distributed over the entire skin-sur¬ face, but are most numerous in the face and scalp. Those of the nose are of large size, and may frequently become enlarged from the accumulated secretion of the glands; while the largest in the body are the sebaceous glands of the eyelids, the Meibomian glands (see Eye). Around the orifices of the mouth and anus, nose and external ear, these glands are found in numerous array; but they appear to be absent from the skin of the palms of the hands and soles of the feet. Each sebaceous gland con¬ sists essentially of a lobulated or sac-like struc¬ ture opening by a single efferent duct. The wall of the sac, as well as that of the duct, is lined by cells of cubical epithelium. These cells secrete the sebaceous matter which is chiefly fat, which collects in the gland, the cells be¬ coming transformed into the secretion and breaking down in the process. The separate sacculi, or little pouch-like divisions which make up each gland, may vary in number from 2 or 5 to 20. As a general rule the ducts of the sebaceous glands open into the hair-follicles, or sac-like involutions of the skin which sur¬ round and enclose the roots of hairs. But in many cases the ducts open simply on the ex¬ ternal surface of the skin. There are generally two sebaceous glands in connection with each hair. A curious little parasitic mite, harmless in its nature — the Demodex folliculorum — is frequently found inhabiting the sebaceous ducts of the nose, especially when their secretion is pent up. This little organism is not known to occur elsewhere.

The sebaceous glands are first developed in the sixth month of embryonic life, and appear in their earliest condition as sac-like append¬ ages to the hair-follicles. The secreting cells, containing fat particles, appear in the centre of the developing gland; these cells gradually en¬ large and, escaping by the root or attached portion of the sac, constitute the first

secretion of the gland. The functions of the sebaceous secretion are chiefly those of keeping the skin moist and from being cracked by the influence of heat and of the air. Friction between skin surfaces is also diminished in the same manner by the sebaceous secretion. The secretion is present in greatest amount in those races which inhabit warm climates and are greatly exposed to the sun's heat. Pimples and boils are the most frequent types of inflammation of the sebaceous glands. See Hair; Skin.

SEBAGO (se-ba'gd) SALMON, the land¬ locked salmon of Sebago Lake, Maine, and a few neighboring inland waters, which has lately been widely distributed through fish-cultural operations. It was long regarded as a mere land-locked variety of the Atlantic salmon, but Jordan and Evermann consider it entitled to

rank as a species (Sa'mo sebago) distinct from that and from the Ouananiche (q.v.). In Se¬ bago Lake it averages about 10 pounds in weight. Its habits are like those of the typical species with such modifications as the physical differences between the ocean and lake make necessary. <(In Sebago Lake in the fall, struc¬ tural and chromatic changes occur, and it as¬ cends tributary streams to spawn. After this function is performed it returns to the lake, which is its ocean, and resorts to deep water. In the spring as soon as the ice breaks up, when smelts, upon which it extensively feeds, are running up the streams to spawn, the salmon follow them." Consult Jordan and Evermann, (Food and Game Fishes' (New York 1903), and American angling authorities generally.

SEBASTIAN, se-bas'tl-an, Saint, a saint of the Roman Catholic calendar: b. Narbonne, Gaul, toward the middle of the 3d century; d. Rome, 20 Jan. 288. His position as captain in the Praetorian Guard at Rome gave him many opportunities of spreading Christianity, and pro¬ tecting its adherents ; but he was finally arrested and carried before Diocletian. The emperor ordered him to be shot to death by archers. A Christian woman named Irene, finding him still alive, drew out the arrows, took him home, and nursed him till he recovered. He then presented himself before Diocletian, and remon¬ strated with him for his cruelty; whereupon the emperor ordered him to be beaten to death, and his body to be thrown into the common sewer, whence it was taken by another Chris¬ tian woman, called Lucina, who buried it at the feet of the apostles, Peter and Paul. In the 9th century his relics were carried to Soissons, whence they were dispersed through France, Spain, Germany and the Netherlands. A church was erected to this saint by Pope Da- masus. Saint Sebastian is invoked against the plague, and is considered the patron saint of marksmen. His day is the 20th of January. There are many pictures of this saint by the Italian and other painters. He is generally represented as a beautiful youth tied to a tree and transfixed by arrows. The most famous pictures of his

martyrdom are those by Luini, Bassi, Mantegna, Holbein, Paul Veronese and Ribera. In the cathedral at Lucca the subject has been treated in sculpture by M. Civitali.

SEBASTIAN, Dom, king of Portugal: b. 1554, d. 1578. He was the posthumous son of the Infant John by Joanna, daughter of Charles V, and ascended the throne in 1557, at the death of his grandfather, John III. During his minority the government was conducted by his great uncle, Cardinal Henry, brother of Eman¬ uel the Great. He was educated by his guardian, Catharine of Austria, wife of John III (sister of Charles V). He was imbued with religious enthusiasm and a chivalrous de¬ sire to undertake a crusade. His constant dream was the conversion of Asia and Africa to Christianity, and the subjection of these continents to Portugal. At 20 he made an ex¬ pedition to Ceuta, Tangier and Magazar, the only possessions that remained to the Portuguese from former conquests in Africa. From these places he suddenly fell upon the unsuspecting inhabitants and although no material results ensued, his lust for conquest became more con-

firmed. Soon afterward (1578) a war of suc¬ cession broke out in the kingdom of Fez and Morocco. Mulei Malek, the youngest son of the last emir, had, contrary to his father's will, been excluded from the throne, but with foreign aid had finally succeeded in conquering his hereditary kingdom, and compelling his nephew, Mulei Mohammed, who had usurped it, to flee. The latter sought aid from Sebastian, who yielded to the request, hoping to effect some¬ thing for Christianity and the fame of Portugal. In spite of the admonitions of his counselors, he equipped a fleet and an army, part of which he had collected in Spain, Germany and Italy, and sailed for Africa, 24 June 1578. The ex¬ pedition reached Tangier in safety, but at Aicazarquivir was met by the far more numer¬ ous host of Mulei. Here on 4 Aug. 1578, a decisive battle was fought, in which Sebas¬ tian was completely defeated. Almost all his followers, including the best of his nobility, were either slain or taken prisoners, and he himself was among the missing. A corpse sup¬ posed to be the king's was found, but it was disfigured with so many wounds that identifica¬ tion was impossible. His death in consequence remained doubtful and gave occasion to the rise of several pretenders, the most notable of whom appeared in Venice 20 years afterward, and, after various vicissitudes, succeeded in arousing the sympathy of all Europe. Faith in his pre¬ tensions eventually subsided and he lapsed into obscurity. Consult D'Antas, Miguel, (Les faux Don Sebastien) (1865).

SEBASTIANO DEL PIOMBO, sa-bas- te-a'no del pe-om'bo. See Piombo, Sebastiano del.*

SEBASTOPOL, se-bas'to-pol or seb-as-to'- pol, or SEVASTOPOL (Russ, sa-vas-to'poly), Russia, in the government of Taurida, an im¬ portant seaport in the southeast of the Crimea, on a harbor famed for its excellence — an in¬ let of the Black Sea, .four and one-half miles long, one-half mile wide at the mouth and one mile wide further inland, afterward averaging one-half mile across. Depth from three to 11 fathoms. It is enclosed by high limestone ridges, and is accessible to the largest ships. The river Tchernaya enters the harbor at the east. The principal part of the town occupies a slope between South Bay or Dockyard Har¬ bor, and Quarantine Bay. Prior to the destruc¬ tion of the town (1854-55) it was solidly built; the forts were marvelous strongholds mounted by 700 guns and the docks were among its most important works. The dock basin was supplied with water by a canal from the Tchernaya. The town was almost unprotected on the in¬ terior side, however, but the temporary defenses erected by -General Todleben, during the Crimean War (the most formidable of which were the works of Malakoff and Redan) have since that time become celebrated. These works were, however, at last captured, at the end of a memorable siege by the allied French and English forces, the Russians retiring after the town had been ruined. The French and Eng¬ lish engineers then blew up the docks and forts, which, by the Paris treaty (1856), were not to be rebuilt. These restrictions were annulled in 1871 by the London conference. The docks and forts were restored by the Russian govern¬ ment in 1885, and Sebastopol is now again the*

naval port for the Black Sea fleet. The town was bombarded by the Turks in the great European War. The town has been partially rebuilt — it was once an important commercial port, but Kaffa (q.v.) has taken its place since 1899, in this regard. The value of imports en¬ tering this port was formerly over $5,000,000; of exports, $15,000,000. Sebastopol was founded on the site of Akhtiar in 1783, by Catharine II. Many historical reminiscences render this an interesting spot. The promontory where the town now stands was once occupied by the temple where Iphigenia, daughter of Agamem¬ non, officiated as priestess. Later, Greeks colonized the promontory, but were overcome by the Genoese, who established themselves at Balaclava. The ruins of the Genoese castles are still to be seen. Pop. about 77,000.

SEBILLOT, sa-be-yo, Paul, French folk¬ lorist: b. Matignon, France, 6 Feb. 1846. He was educated at the communal college of Dinan, studied law at Rennes, and established himself in Paris as a notary, but soon abandoned the law for art. From 1870-83 he exhibited about 20 pictures at the Salon, but his travels through Saint-Brieuc, Pont-Aven, and various out-of- the-

way sections of Brittany aroused an interest in folklore, and he gradually drifted from art to the study of folklore, on which he wrote a series of excellent books. He succeeded to Henri Martin's seat in the commission for Megalithic Monuments, became chef du cabinet at the ministry of public works, and in 1889 chevalier of the Legion of Honor. From its foundation in 1885 he was editor of the Revues des traditions populaires. His works include (Contes populaires de la Haute-Bretagne> (3 series, 1880-81-82) ; (Legendes, croyances, et superstitions de la mer) (2 vols., 1886-87) ; (Litterature orale de l'Auvergne) (1898) ; (Le folklore des pecheurs) (1901) ; (La mer fleurio le rivage Marius et corsaires) (1903) ; (Le folklore de France) (1904-07) ; (Le folklore, litterature orale et ethnographic traditionelle)

(1913).

SEBORUCCO, a narrow bench of coral rock margining a large .part of the coast of Cuba. It is mostly a few yards wide and elevated about 15 feet above the sea. It is due to fringing coral reef raised by a general up¬ lift of the island.

SECALE, in botany, rye, a genus of the Tri- andria Digynia class and order, in the natural order of Gramina or grasses. Essential charac¬ ter, calyx opposite, two-valved, two-flowered, solitary. There are four species; the villosum, orientale, creticum and cereale. Secale villosum or wood-rye grass is distinguished by a calyx with wedge-shaped scales, and by the fringe of the glume being woolly. The glumes of the se¬ cale orientale are shaggy and the scales of the calyx are shaped like an awl. The glumes of the secale creticum are fringed on the outside. The secale cereale or common rye has glumes with rough fringes. There are two varieties, winter and spring rye. The winter rye, which is larger in the grain than the spring rye, is sown in the autumn, at the same time with wheat, and sometimes mixed with it; but as the rye ripens sooner than the wheat, this method is exceptionable. The spring rye is sown along with oats, and usually ripens as soon as the

winter rye; but the grain produced is lighter and it is therefore seldom sown. See Rye.

SECAUCUS, N. J., borough in Hudson County, two miles north of Jersey City, on the Lackawanna Railroad. There are manufactures of chemicals and pearl buttons, and the town has large power houses. Pop. (1920)

5,423.

SECCHI, sek'ke, Angelo, Italian astrono¬ mer: b. Reggion nell', Emilia, 29 June 1818; d. Rome, 26 Feb. 1878. He entered the order of the Jesuits in 1833, and after teaching in various Jesuit colleges, including Georgetown Univer¬ sity, Washington, D. C., he was in 1849 ap¬ pointed professor of astronomy and director of the observatory at the Collegio Romano. When the Jesuits were expelled Irom Italy in 1870 he was permitted to retain his position. Father Secchi's services to astronomy were of the ut¬ most value. He made a careful study of the physical constitution of the sun, the nature of sun-spots, and the solar prominences, but of much greater importance was his pioneer work, carried out with less perfect instruments con¬ temporaneously with that of Huggins in stellar spectroscopy or astrophysics. He made the first systematic spectroscopic survey of the heavens and proposed a classification of stellar spectra under four main types, which has proved a valuable basis for subsequent research. Among his works are (Catalogo delle Stelle di cui si e determinate lo Spettro luminoso) (1867) ; (L'Unita delle Forze fisiche) (1869) ; (Le SoleiP (1870); (Le Stelle> (1877). Con¬ sult Pohle, (Angelo SecchP (1883).

SECESSION, the act of withdrawing from, a term of great political importance, especially in the history of the United States. Whenever a State has claimed the right to withdraw from the Union, it has based its claim on the doctrine of State sovereignty. This claim must be con¬ sidered as emphatically distinct from the right of revolution, insurrection or violent revolts, in all of which there is no claim technically of legal right, and the appeal of which is to force in¬ stead of reason. Nearly every State of the Union, in its turn, has advanced the right of secession and usually each has been condemned by the others as treasonable. This claim was specifically brought forward or involved in the Kentucky ˆResolutions,® the Hartford <(Conven- tion,® and the ˆNullification Ordinance® (qq.v.). The election of Abraham Lincoln to the Presi¬ dency of the United States in 1860, when the political situation was flanked with sectional dif¬ ferences resting on State claims, was all that was necessary to change the theory of secession in the South into an attempt to effect the real¬ ity. South Carolina took the lead. No single State was prepared or willing to secede alone, but Florida, Mississippi and Alabama agreed to secede with any other State. Again South Caro¬ lina was leader in calling a State convention and on 20 Dec. 1860 the Act of 1788, ratifying the National Constitution, was repealed and it was declared <(that the union now subsisting be¬ tween South Carolina and other States, under the name of the United States of America, is hereby dissolved.® A declaration of the causes for this act was formulated and was adopted on the 24th. The governor proclaimed <(the seces¬ sion of South Carolina® the same day. Mis¬ sissippi was the first to follow this example, 9 January 1861 ; then in

succession came Florida,

10 January; Alabama, 11 January; Georgia, 19 January; Louisiana, 26 January; and Texas, 1 February, though in the case of this last State the proceedings were irregular. Virginia fol¬ lowed in April; Arkansas and North Carolina in May and Tennessee in June. The Civil War was the consequence and its final issue was the victory of the Union government and the full federation of the United States of America. See Secession in the United States; United States — Secession ; Civil War.

SECESSION CHURCH, in Scottish ec¬ clesiastical historv, a religious body which with¬ drew from the Established Church of Scotland in 1733, when several preachers were ejected in consequence of their opposition to the law of patronage. The ejected ministers formed them¬ selves into an ecclesiastical court, under the name of the (

SECESSION IN THE UNITED STATES. To properly understand the causes which led to the secession of the Southern States in 1861 and the reasons which actuated those by whom such action was advocated, we must confine our investigations to the history of the country and the conditions which existed prior to the dates when the seceding States withdrew from the Union. If we look back from the standpoint of to-day the events of over half a century intervene and we see but little of the picture which was presented at that period. We must study the theory of the Constitution as it was understood and ex¬ plained by the creators of that instrument, and the history of the period prior to 1861, at least so far as it relates to constitutional rights and construction. It will also be interesting and instructive to consider the views entertained by the advocates of the State Rights doctrine as distinguished from the views of the ex¬ treme nationalists, and we must also become informed regarding the long-continued struggle between the leaders of these two parties. In 1860 not only the leaders but the Southern peo¬ ple generally were firm in the belief that a State had the legal right to secede from the Federal Union. This was the natural result of the teachings of more than half a centurv. Whatever opposition existed in the several State conventions or among the people of the seceding States arose not on the question of the principle of secession, the right to secede, but upon the expediency of seceding. Perhaps the most conspicuous example of the unity of the people of the seceding States is to be found in the proceedings of the Alabama Convention. A very large minority of this convention, for a while supposed to be a majority, was elected on the following platform: <(That we hold it

to be our duty, first, to use all honorable exer¬ tions to secure our rights in the Union, and if we should fail in this, we will maintain our rights out of the Union; for, as citizens of Ala¬ bama, we owe our allegiance first to the State ; and we will support her in whatever course she may adopt.®

With rare exceptions the arguments against such action were on the ground that it was inexpedient and inadvisable, but when the act was consummated it was generally recognized in the seceded States as the supreme law of the land, the exceptions being for the most part confined to a few counties in East Tennessee and the sparsely inhabited strip of mountain land known as the southwestern part of the Alleghanies. In this connection it is important to state that in 1861 and for years prior to that time this belief in the right of secession was by no means confined to the South, or to the so- called pro-slavery party. Horace Greeley, edi¬ tor of the New York Tribune, was outspoken in upholding the rjght of secession, and for months after the establishment of the Confed¬ erate government army officers from the South openly discussed the question of remaining in the Union army or joining the Confederacy, and those who decided upon the latter course were allowed to go freely.

General Joseph E. Johnston and Col. Robert E. Lee both continued in the performance of their army duties in Washington for nearly two months after the inauguration of President Lincoln, the former holding the all-important position of quartermaster-general of the army of the United States ; and it was after it was generally known that Colonel, afterward General, Lee had decided that it was his duty to give his fealty to his native State, Virginia, that Mr. Lincoln offered him the appointment as commander-in-chief of all the armies of the United States. At that time the authorities in Washington did not use the words treason and traitors in referring to the Southern officers who resigned their commissions and joined the Confederate army. But the results of the appeal to arms whereby the advocates of secession were overwhelmed have clouded and caused to be utterly forgotten the legal and logical prin¬ ciples for which the States Rights party had contended for three-quarters of a century.

Greeley said in 1860: ((War is a hideous necessity at best, and a civil conflict, a war of estranged and embittered fellow countrymen, is the most hideous of all wars.® (New York Tribune, 16 Nov. 1860). And his words were prophetic. In the terrible internecine war of four years more than 1,000,000 human beings, most of whom were the youth of the land, fell in battle or succumbed to disease and the hard¬ ships of campaign, or were wounded and maimed; while in nearly every home, North and South, heartbroken mourners were crushed by the awful sacrifice to the God of Battles. Dur¬ ing and at the close of the war every branch of the government was under the control of those responsible for the coercive

policy which brought it on. With rare exceptions the whole press of the Northern States and its literature were dominated by the same influences. The chief executive and all his subordinates in the government with one acclaim pronounced the edict that those who had not supported their views should be made odious to the American

people, and from that time the teaching to the youth of the land has been of this character. The causes which influenced the action of those who brought about the secession of the South¬ ern States became utterly obscured and for¬ gotten.

Causes of Secession. — The general assump¬ tion that slavery was the sole cause of secession and the war that followed is very far from correct. It is clearly to be seen that far away and beyond the question of slavery, even in the very earliest days of the life of the nation, the two parties began the struggle — the one to maintain the unrelinquished rights of the States, the other to establish and vest greater power in the central government. But although this leading question, and other cognate questions were really at issue in this conflict, slavery was the proximate occasion of the Civil War. The anti-slavery agitation focused and brought into active operation the theories of the extreme nationalists that the central government had the right to go into the domain of State govern¬ ments and regulate their domestic affairs. And the threats of the abolitionists awoke the South¬ ern people to the realization that the guarantees of the Constitution for the protection of slave property were to be nullified and, at least to that extent, the rights of the States destroyed. It is, therefore, necessary to review the history of this contributing, if not paramount, cause, without entering upon any discussion of the question of slavery itself.

History of Slavery. — Slavery was not only a heritage from the mother country, but the his¬ tory of early colonial times shows that it was a forced heritage that was resisted and opposed by the colonies. In the same spirit the Southern people opposed slavery at the time of the Dec¬ laration of Independence and were vigorous in resisting the further importation of slaves from Africa. The wise men of that day foresaw the evils attending such a traffic. Its enormous profits would cause a further great influx of people hardly removed from savagery. But when slavery became a fixed institution, recog¬ nized, guaranteed and protected by the Consti¬ tution, the people of the South sought to ameliorate, so far as possible, all the evils at¬ tending it. Slavery was part of the common law of England prior to the settlement of the first colonies in America, and became the com¬ mon law of the colonies; and at the time of the Declaration of Independence existed in each of the 13 colonies. As above stated, this con¬ dition existed despite the efforts of some of the colonies to terminate it. Judge Cooley in his continuation of Story's Commentaries on the Constitution, says: <(No*

colony was so per¬ sistent in its efforts to check the [slave] trade as Virginia, and Judge Tucker enumerates 23 acts on the subject, beginning with 1699.® Georgia, under Oglethorpe, prohibited the im¬ portation of slaves until 1752, when the pro¬ prietors surrendered the charter and the colony became part of the royal government, when the power of the colonists to prevent the im¬ portation of slaves ceased, the Crown pro¬ hibiting the exercise of any such power by the colonists. In 1760 South Carolina passed an act prohibiting the further importation of Af¬ rican slaves. The act was rejected by the Crown ; the governor was reprimanded ; and a circular was sent to all the governors of the

colonics warning them against presuming to countenance such legislation.

England not only considered the slave trade beneficial, and fostered and protected it, but had actually inaugurated and established it. Its first appearance in history is in the grant of a char¬ ter by Queen Elizabeth to a company formed to supply African slaves to the Spanish-American colonies — the queen herself being a share¬ holder in the company. In 9th and 10th William III an act was passed reciting that ((the trade was highly beneficial and advantageous to the kingdom.® In 1708 the House of Commons re¬ solved : <(That the trade was important, and ought to be free and open to all the queen's subjects trading from Great Britain.® And as late as 1775 the Earl of Dartmouth, in answer to a remonstrance from the agent of the colonies, said : ((We cannot allow the colonies to check or discourage in any degree a traffic so beneficial to the nation.® And so popular was' this traffic that slaves were openly sold in the public squares of London. Thus were the efforts of the colonies, led by Virginia, Georgia, Maryland and South Carolina, to put an end to the traffic, thwarted by the greed of the traders in the mother country.

The first African slaves imported into Amer¬ ica were landed by a Dutch trading vessel at Jamestown in 1620, and from that time the traffic became general throughout all the colonies Pecuniary profit to the traders and the need of the negro as a laborer was not the only incentive to this traffic. The press and even the pulpit contended that it was humane and Chris¬ tian to bring these heathen savage negroes to the protective care of civilized people. Slaves were imported in large numbers into New Eng¬ land until it became apparent that they were not fitted to the rigorous climate of the North. Im¬ portation to the northern colonies and States gradually diminished and finally ceased, but New England shipowners continued for many years to be actively engaged in the business of im¬ porting and selling slaves.

Notwithstanding the reasons in favor of this business the leaders of thought among the Southern colonists continued to fight against the traffic, and Jefferson, in his first draft of the Declaration of Independence, brought forth, as one of the counts in his indict¬ ment of the king, ((this cruel war against human nature itself . . . this piratical warfare,® and charged that the king had ((prostituted his negative for suppressing every legislative at¬ tempt to prohibit or to restrain this execrable commerce® in order to keep open a market for the sale of human beings. Jefferson gave, among other reasons for omitting this clause from the final draft of the Declaration: <(Our Northern brethren also, I believe, felt a little tender under those censures ; for, although their people had very few slaves, yet they had been pretty con¬ siderable carriers of them to others.® This traffic against which the colonies had waged war for a century continued to exist at the time of the Declaration of Independence; and when the Constitution was adopted slavery existed in every colony with the possible exception of Massachusetts, where in 1781, not by legislative enactment, but by a decision of the Supreme Court of that colony, it was declared incon¬ sistent with the declaration of the Bill of Rights that (

The framers of the Constitution (q.v.) real¬

ized the sensitive and delicate nature of the question of slavery, and wisely left it untouched except to protect the property rights of the slaveholders and to give to Congress the power to prohibit the importation of slaves after a certain date. The third paragraph of section 2 of Article IV of the Constitution provided that <(no person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered upon claim of the party to whom such service or labor may be due.® Under this clause Congress passed the Fugitive Slave Law (q.v.) of 1793. The first paragraph of section 9 of Article I of the Constitution provided : <(The migration or importation of such persons as any of the States now existing shall think proper to admit shall not be prohibited by Congress prior to the year one thousand eight hundred and eight, but a tax or duty may be imposed on such impor¬ tation, not exceeding ten dollars for each person.®

The history of the adoption of this clause sheds much light upon the attitude of the Southern slaveholders. The first draft pro¬ vided: <(No tax or duty shall be laid, etc., on the migration or importation of such persons as the several States shall think proper to ad¬ mit; nor shall such migration or importation be prohibited.® South Carolina and Georgia insisted that the freedom of importation should be limited, and insisted upon a limitation as a condition of the Union; and the clause limiting until 1808 the prohibition against Congress of preventing such importation was finally

adopted.

During the period from 1787 to 1808 the question of prohibiting the importation of slaves was entirely under the control of the States, and every Southern State which had not already done so enacted laws prohibiting further importation of slaves. Jefferson's earnestness in opposing the traffic has already been noticed, and Virginia was the first State to prohibit it. Georgia was the first State to incorporate such a prohibition in the Constitu¬ tion. Henry Laurens of South Carolina writ¬ ing to his son, 14 Aug. 1776, said: <(You know, my dear son, I abhor slavery. I was born in a country where slavery had been established by British kings and parliaments, as by the laws of that country, ages before my existence. . . . Not less than 20,000 pounds sterling, would all my negroes produce, if sold at pub¬ lic auction to-morrow. I am not the man who enslaved them ; they are indebted to English¬ men for that favor; nevertheless I am advising means for manumitting many of them, and for cutting off the entail of slavery. ... I per¬ ceive the work before me is great.®

Mr. Lowndes of South Carolina, speaking in the House of Representatives on 14 Feb. 1804, of the impossibility of prohibiting the im¬ portation of slaves into his State, said: ((With navigable rivers running into the heart of it, it was impossible for us, with our means, to pre¬ vent our eastern brethren from introducing them (the negroes) into the country. The law was completely evaded.®

In 1807 Congress passed an act prohibiting the importation of slaves into any part of the United States after 1 Jan. 1808. The vote in

the House of Representatives was almost unani¬ mous, being 113 against 5, Of the five who voted against it only three were from the South, OnG being from the Portsmouth district, New Hampshire, and One from Vermont. Mr. Betton from New Hampshire represented large ship¬ ping interests ; and that the vote of Mr. Crit¬ tenden of Vermont was approved by the people of his State is shown by the fact that he was three times re-elected to Congress, and was subsequently elected governor and judge. This vote shows the absence of any sectional division of sentiment oil the subject. In the meantime in 1784 Virginia had ceded to the United States the great Northwest Territory, and in 1787, before the adoption of the Constitution, the Congress had adopted the Ordinance for the Government of the Northwest Territory. This was adopted at the instance of Virginia, and its Sixth Article provided that <(there shall be neither slavery nor

involuntary servitude in the said Territory, otherwise than in punishment of crimes whereof the party shall have been duly convicted.® In December 1805 the legislative council and house of representatives of the ' Indian Territory petitioned Congress to sus¬ pend the operation of the Sixth Article, and petitions of numerous inhabitants of the Ter- • ritory, together with a letter of William Henry Harrison, governor of the Territory, of the same purport, were forwarded to Congress. These petitions were referred to a committee of seven members consisting of representatives from Virginia, Pennsylvania, Ohio, New York, Kentucky and South Carolina, who reported favorably to the petition, but no final action was taken by Congress. In January 1807 a letter from Governor Harrison enclosing reso¬ lutions unanimously adopted by the legislative council and house of representatives of Indiana, petitioning for the suspension of the Sixth Article and for the introduction of sla¬ very, was laid before Congress. The matter was again referred to a committee whose mem¬ bers were drawn from various sections of the country. The committee again reported favor¬ ably, the House adopted a resolution suspend¬ ing the article, but the Senate failed to concur in it and the matter was dropped.

Although the importation of slaves was pro¬ hibited the institution of slavery became more firmly intrenched in the slave-holding States, and at the same time a sentiment in favor of its abolition grew stronger in the non-slave¬ holding States. In 1819 a violent dispute arose between the North and South, the occasion being the proposal to admit Missouri as a State. After a year of bitter controversy a settlement was reached in a compromise whereby Missouri, with a constitution permit¬ ting slavery, was admitted, but as to the re¬ maining portion of the territory of the United States lying north of lat. 36° 30′ N., it was provided that slavery should be prohibited. In the North the compromise was exceedingly un¬ popular, and a general movement looking toward the abolition of slavery was commenced. In 1840 and in 1844 the anti-slavery party had Presidential candidates in the field. The an¬ nexation of Texas, the war with Mexico and the further acquisition of territory furnished cause for additional controversy. In 1848 the anti-slavery party showed growing strength, and political campaigns took on increasing bit¬

terness. The one side depended upon the guarantees of the Constitution to protect its property rights ; the other insisted upon their right to prevent the extension of slavery, (

The almost unanimous sentiment, North and South, upon the question of re-opening the African slave trade is shown by the vote on the following resolution introduced in the House of Representatives by Mr. Orr of South Carolina, on 15 Dec. 1856: <(Resolved, That it is inexpedient, unwise and contrary to the set¬ tled policy of the United States, to repeal the laws

prohibiting the African slave trade.® This resolution was adopted by a vote of 183 to 8, and most of those voting against it explained their votes by stating that no proposition look¬ ing to the opening of the slave trade having been presented the resolution was out of place. In 1856 the anti-slavery party had made great progress and came near electing their candidate for President. It was hoped that the decision of the Supreme Court in the Dred Scott case (q.v.) would put an end to the political agita¬ tion, but the decision being adverse to the theo¬ ries of the abolitionists added fuel to the flame. The Supreme Court and the venerable chief justice became objects of the most venomous abuse. In the controversy which now raged, moderation and reason seemed annihilated in the bitterness of feeling. The ablest minds of the North were exercised in constructing argu¬ ments to justify the coercive policy. Floods of anti-slavery literature were poured out before the impressionable youth. The pulpit and the lecture hall rang w'-th appeals in which slander and denunciation were the key-notes, and the press took up and echoed their appeals.

While many people in the North were actu¬ ated solely by the belief that slavery was a wrong that should be abolished yet it was not until the question became one of national and political importance that the party opposed to the one in power used it as a means to secure control of the government. Like all other questions which become political, misrepresenta¬ tions of the grossest character were made in order to attain political ends. Therefore, the pictures of slavery as presented to the North¬ ern mind were in marked contrast to actual conditions as seen by those who were sur¬ rounded by them. It is true that there were

exceptional cases where there was apparent Cruelty, and some cases where the slaves en¬ dured real hardships ; and these cases >werei al¬ most exclusively confined to the Mississippi and other alluvial bottom lands where the slaves were removed from the care and protec¬ tion of their masters and were controlled by overseers, whose sole effort was each year to attain the highest financial results for their employers. But while the cases of hardship were few in number they were seized upon, colored and exaggerated in order to, so far as possible, inflame the Northern mind against the institution. The conditions as they appeared to the Southern people were, with rare excep¬ tions, in marked contrast with the tales spread in the North. The planter of the South, or his ancestors, had seen the most degraded of human beings brought from Africa. Most of them had been, in their native land, slaves of tyrannical and cruel negro masters. They had become the property and in a certain sense mem¬ bers of

humane, Christian families. The in¬ stincts of humanity and the interests of owner- ship had combined to lift these negro slaves from the lowest conditions of savagery into a state of civilization, where they were well fed, well clothed, protected and all their physical wants attended to, and furthermore where they were uplifted morally, surrounded by Christian influences and given Christian instruction. While slavery had its evils, history has record of no people who made so rapid an advance from a low condition of savagery and immoral¬ ity to one of comparative civilization and moral responsibility as was shown by the improvement in the condition of the savage negroes that were brought to this country by the slave-traders. It has been charged that the Southern people took care of their slaves only because they were, property and because the loss of a slave was a monetary loss. This charge is unjust in the extreme, and is in line with other calumnies which would deny all humanity to the slave¬ holding Southerners. The Southern people as a class cared well for their slaves, not only be¬ cause they were property, but also because there was a real bond of affection between the master and the slave, and between all the members of the master's family and all the slaves in his house or on his plantation. Proof of the real conditions can be found in the following ex¬ tract from Booker T. Washington's (Up From Slavery) :

One may get the idea, from what I have said, that there was bitter feeling toward the white people on the part of my race, because of the fact that most of the white population was away fighting in a war which would result in keeping the negro in slavery if the South was successful.

In the case of the slaves on our place this was not true, and it was not true of any large portion of the slave population in the South where the negro was treated with anything like decency. During the Civil War one of my young masters was killed, and two were severely wounded. I recall the feel¬ ing of sorrow which existed among the slaves when they heard of the death of " Marse Billy." It was no sham sorrow, but real. Some of the slaves had nursed " Marse Billy others had played with him when a child. " Marse Billy " had begged for mercy in the case of others when the overseer or master was thrashing them. The sorrow in the slave quarter was only second to that in the " big house." When the two young masters were brought home wounded, the sympathy of the slaves was shown in many ways. They were just as anxious to assist in the nursing as the family relatives of the wounded. Some of the slaves would even beg for the privilege of sitting up at night to nurse their wounded masters. This tenderness and sympathy on the part of those held in bondage was a result of their kindly and generous natures. In order to defend and protect the women

and children who toete left, on the plantations when the white males went

to wars the slaves Would have laid down their lives. The SlaVe who Was Selected to sleep in the ‘ big house ” during the absence of the males was considered to have the place of honour. Any one attempting to hartn 11 young mistress ” or “ old mistress ” during the night would have had to cross the dead body of the slave to do so. _ I do not know how many have noticed it, but I think that it will be found to be true that there are few instances, either in slavery or freedom, in which a member of my race has been known to betray a specific trust.

As a rule, not only did the members of my race entertain no feelings of bitterness against the whites before and during the war, but there are many instances of negroes tenderly caring for their former masters and mistresses.

As a general rule (the exception being in the bottom lands where but few white people lived except the overseers, and where the worst and most untractable negroes were sent) the virtue of the negro women was carefully guarded by the slave-owners, and for several reasons. First, the Southern people were, as they are to-day, essentially religious and, as above started, took great care of the moral training of the negroes. In most of the small establishments the mistress of the house assumed this as one of her duties, and on most of the large plantations where there were from 100 to 1,000 slaves, a chapel was provided and a minister employed to teach re¬ ligion and morals. A plantation upon which there were no mulatto children was the more valuable, and conveyed an idea of commenda¬ tion which attached to all who were connected with it. In the third place marriage and chastity among the slaves were fostered and promoted for property reasons. So far did the Southern people go in protecting the female slaves that regular patrols were organized for the purpose of arresting and punishing the lower class of white men who prowled around at night among the negro cabins. Of course the Southern peo¬ ple were greatly incensed by the gross misrep¬ resentations as to their cruelty and immorality, and believed that the object of these misrepre¬ sentations was to arouse a sentiment which would lead to the attempt of the Northern peo¬ ple, acting through the national government, to interfere with the right of self-government guaranteed by the Constitution, and to deprive them of their property. And the feelings of resentment which naturally followed widened the breach day by day, month by month and year by year ; until it became apparent that only a cessation of the agitation could prevent com¬ plete separation of the two sections. So that from the moment of the John Brown raid into Virginia the South saw the necessity of pre¬ paring to protect its rights and property — in the Union if possible — out of it if necessary. These were the conditions when, in 1860, the anti-slavery or Republican party elected its can¬ didate, not so much by the strength in the North of its own following as by the division among the Democrats. By the vote which elected Mr.

*Lincoln the South was given to understand that the Constitution was to be dis¬ regarded and slavery destroyed, and so de¬ stroyed as to bring financial ruin, if not utter annihilation upon *the South, for Wendell Phil¬ lips, a recognized leader, has said ((The state of things is just what we have attempted to bring about. . . . The Republican party is a party of the North, pledged against the South.® And the Southern people turned to the remedy which for three-quarters of a century they had believed to be the legal and proper one for*

denial of rights by the national government, namely, withdrawal from the Union — secession.

The Doctrine of Secession. — As stated from the foundation of the Federal govern¬ ment until 1861, and even at that date, the right of secession was insisted upon not only in the South but in the North. In fact New England had been the first to advocate and threaten it. To discover the basis of this doctrine the his¬ tory of the Federal government must be briefly reviewed. The colonies were settled by the Cavaliers in Virginia, the Puritans in New Eng¬ land, the Hollanders in New York, the Catholics in Maryland, the Quakers in Pennsylvania, the Huguenots in South Carolina and the followers of Oglethorpe in Georgia. The colonists of New England whose descendants spread west¬ ward were very different in their ancestry, their education, their beliefs and their customs, from those who settled the South and whose descend¬ ants spread over the Southwest. Those of New England were largely the descendants of the Roundheads of England, and entertained ideas similar to theirs. Those of the South sprang from the Cavalier class of England and France. The colonial States when they renounced their allegiance to Great Britain were separate and distinct commonwealths, entirely independent of one another. The desire for complete inde¬ pendence was the claim that welded their union in their efforts to achieve their common end. The political union of these independent colonies was based solely upon the terms of agreement and compact entered into by these separate and distinct bodies. The first union of this charac¬ ter was that formed by the 13 colonies in 1774, which was followed by the union of the States under the Articles of Confederation of 1777 (Maryland being the last State to ratify them, in 1781). On 4 July 1776, the colonies declared <(that they are and of right ought to be Free and Independent States ® — ((that whenever any form of government becomes destructive of the ends for which it was established, it is the right of the people to alter or abolish it, and to institute a new government.® In the Articles of Confed¬ eration the States, while agreeing to clothe the

Congress with the powers of a common agent, expressly stipulated <(that each State retains its sovereignty, freedom and independence and every power and right which is not, by this Con¬ federation, expressly delegated to the United States in Congress assembled.® Great Britain in Article I of the treaty of 3 Sept. 1733, Ac¬ knowledges the said United States, namely® (mentioning each of the 13 States), <(to be Free, Sovereign and Independent States .® The con¬ federation under the Articles of 1777 was suc¬ ceeded by the Union under the Constitution adopted by the 12 States assembled in Constitu¬ tional Convention (Rhode Island holding aloof) and subsequently ratified by all the States. It is to be remembered tha't until North Carolina rati¬ fied the Constitution in November 1789, and Rhode Island ratified it in May 1790, these two States were considered as entirely independent commonwealths.

In the Constitutional Convention, and there¬ fore until 1861, the Supreme Court of the United States and the highest courts of the several States maintained in their decisions the prin¬ ciple of the unrelinquished sovereignty of each State, all holding that the central government had no right to exercise any powers, except

such as were expressly delegated, or Congress k> enact any laws except in pursuance of an ex¬ press right granted by the States through the Constitution. This doctrine was formally enun¬ ciated in the tenth amendment to the Constitu¬ tion : (

Alexander Hamilton was without question one of the most extreme advocates of a strong central national government, but even he ex-

pressed himself emphatically that any attempt on the part of Congress to enact a law which involved the exercise of power which was not granted by the Constitution would be an inva¬ sion of the power reserved to the States. He discussed this question in the 31st number of the Federalist, and concludes in these words : ■"Hence we perceive that the clause which de¬ clares the supremacy of the laws of the Union, like the one we have just considered, only de¬ clares a truth which flows immediately and necessarily from the institution of a Federal government. It will not, I presume, have escaped observation, that it expressly confines this supremacy to the laws made pursuant to the Constitution? At the time of the adoption of the Constitution, during the period of ratifi¬ cation and for many years thereafter this prin¬ ciple was not questioned. It was so thoroughly recognized that so long as any members of the Constitutional

Convention remained members of Congress, and for a long period thereafter, that body confined its acts to expressly granted powers ; and the messages of the Executive to Congress were only explanations of the con¬ dition and state of the Union — so very different from the messages since 1865 which are largely devoted to proposed policies of the administra¬ tion, and exact from the President's party loyal obedience thereto.

In 1839 John Quincy Adams in his speech on the occasion of the 50th anniversary of our government under the Constitution said:

But the indissoluble union between the several States of this confederated nation is, after all, not in the right but in the heart. If the day should ever come (may Heaven avert it) when the affections of the people of these States shall be alienated from each other; when the fraternal spirit shall give way to cold indifference, or collision of interest shall fester into hatred, the bonds of political asseveration will not long hold together parties no longer attracted by the magnetism of conciliated interests and kindly sympathies; and far better will it be for the people of the disunited States to part in friendship from each other than to be held together by con¬ straint. Then will be the time for reverting to the precedents which occurred at the formation and adoption of the Con¬ stitution to form again a more perfect Union by dissolving that which can no longer bind, and to leave the separated parts to be reunited by the law of political gravitation to the centre.

That Mr. Adams felt that these views were consistent with a true interpretation of the original compact which bound the people to¬ gether is shown by the fact that three years later, 24 Jan. 1842, he presented to Congress a secession petition from citizens of Haverhill, Mass. In the Congressional Globe (Vol. II, p. 977) appears the following:

Monday, January 24. — In the House Mr. Adams pre¬ sented the petition of sundry citizens of Haverhill, in the State of Massachusetts, praying that Congress will immedi¬ ately adopt measures, peaceably to dissolve the Union of these States: First, because no union can be agreeable or permanent which does not present prospects of reciprocal benefits; second, because a vast proportion of the revenues of one section of the Union is annually drained to sustain the views and course of another section, without any adequate return; third, because, judging from the history of past nations, that Union, if persisted in in the present state of things, will certainly overwhelm the whole nation in destruction.

On the question of the reception of the peti¬ tion, there were 40 votes in favor of it and 166 ' against. The following resolution was then in¬ troduced : "Resolved : That in presenting to the consideration of this House

a petition for the dissolution of the Union, the member from Massachusetts (Mr. Adams) has justly incurred the censure of this House.® Another resolu¬ tion was introduced declaring that Mr. Adams

had offered the deepest indignity to the House and an insult to the people of the United States. In defending his position Mr. Adams said;

I hold that it is no perjuryt that it is hb high treason, but the exercise 6f a sacred tight to offer such a petition, and that it is afe false in rhorals as it is inhuman to fasten that charge ott men who, under the countenance of such declarations as I have here quoted, come and ask this House a redress of grievances. And if they do mistake their remedy this government should not turn them away and charge them with high treason and subornation of perjury; but ought to take it up, to weigh the considerations which can be urged in their favor; and if there be none but those which are so eloquently set forth in the pamphlet I have quoted, these should be considered. If they have mistaken their remedy, the House should do as the gentleman from Ken¬ tucky (Mr. Marshall) told us he was ready to do — admit the facts.

"The trial of Mr. Adams, to the exclusion of all other business, commenced on 25 January, and terminated on 7 February, when the whole proceedings were laid on the table without de¬ ciding a single question.® This action of the House was construed by some as an admission that circumstances might arise which would justify States in withdrawing from the Union. Daniel Webster in his speech at Buffalo on 22 May 1851 denounced the anti-slavery agitators who were opposing the enforcement of the Fugitive Slave Law, and demanded that they should observe the laws and the Constitution. And a little later, at Capron Springs, he said :

How absurd it is to suppose that when different parties enter into a compact for certain purposes, either can dis¬ regard any one provision, and expect, nevertheless, the other to observe the rest. ... I have not hesitated to say, and I repeat, that if the northern States refuse wilfully and deliberately to carry into effect that part of the Constitution which respects the restoration of fugitive slaves, and Congress provide no remedy, the South would no longer be bound to observe the compact. A bargain cannot be broken on one side and still bind on the other side. I say to you, gentlemen in Virginia, as I said on the shores of Lake Erie and in the city of Boston, as I may say again in that city or elsewhere in the North, that you of the South have as much right to receive your fugitive slaves as the North has to any of its rights and privileges of navi¬ gation and commerce. ... I am as ready to fight and fall for the constitutional rights of Virginia as I am for those of Massachusetts.

Horace Greeley, the abolitionist, strongly in¬ sisted, in 1860, upon the

right of the Southern States to secede, as the following extracts from the Tribune show:

New York Tribune, 9 Nov. 1860. — If the cotton States shall become satisfied that they can do better out of the Union than in it, we insist on letting them go in peace. The right to secede may be a revolutionary one, but it exists nevertheless.

And again in the same issue of his widely circulated and influential paper, Mr. Greeley said :

We must ever resist the asserted right of any State to remain in the Union and nullify or defy the laws thereof. To withdraw from the Union is quite another matter; and whenever a considerable section of our Union shall deliber¬ ately resolve to go out, we shall resist all coercive measures designed to keep it in.

New York Tribune, 16 Nov. 1860. — Still we say, in all earnestness and good faith, whenever a whole section of this republic, whether a half, a third, or only a fourth, shall truly desire and demand a separation from the residue, we shall earnestly favor such separation. If the fifteen slave States, or even the eight cotton States alone, shall quietly, decisively, say to the rest, " We prefer to be henceforth separated from you," we shall insist they be permitted to go in peace.

New York Tribune, 19 Nov. 1860. — Now we believe and maintain that the Union is to be preserved only so long as it is beneficial and satisfactory to all parties con¬ cerned. We do not believe that any man, any neighborhood, town, county, or even State may break up the Union in any transient gust of passion; we fully comprehend that secession is an extreme, an ultimate resort — not a con¬ stitutional but a revolutionary remedy. But we insist that

this Union shall not be held together by force whenever it shall have ceased to cohere by the mutual attraction of its parts; and whenever the slave States or the cotton States only shall unitedly and coolly say to the rest, "We want to get out of the Union," we shall urge that their request be acceded to.

New York Tribune, 30 Nov. 1860. — Are We Going to Fight? — But if the cotton States generally unite with her in seceding, we insist that they cannot be prevented, and that the attempt must not be made.

New York Tribune, 24 Dec. 1860. — Most certainly we believe that governments are made for the peoples, not peoples for the governments; that the latter derive their just power from the consent of the governed; and whenever a portion of this Union, large enough to form an independent self-sustaining nation, shall show that, and say authentically to the residue, " We want to get away from you," I shall say, and we trust self-respect, if not regard for the principles of self-government, will constrain the residue of the American people to say, " Go."

New York Tribune, 28 Dec. 1860. — . . . Nor is it

treason for the State to hate the Union and seek its dis¬ ruption. A State, a whole section, may come to regard the Union as a blight upon its prosperity, an obstacle to its progress, and be fully justified in seeking its dissolution. And in spite of the adverse clamor, we insist that if ever a third or even a fourth of these States shall have deliberately concluded that the Union is injurious to them, and that their vital interests require their separation from it, they will have a perfect right to seek separation; and should they do so with reasonable patience and due regard for the rights and interests of those they leave behind, we shall feel bound to urge and insist that their wishes be gratified — their demand conceded.

During the time the States were seceding Mr. Greeley published many similar statements. Nor was the Tribune alone, for much of the New York press and prominent journals and able editors in many of the Northern States coincided in these views. ((Wayward sisters, go in peace,® was the cry on every hand, echoed from the lips of the general of the army, with the refrain uttered by the eminent Republican leader Salmon P. Chase : <(The South is not worth fighting for; let them alone.® The New York Herald, a journal which claimed to be independent of all party influences, said on 25 Nov. 1860: <(Coercion in any event is out of the question. A Union held together by the bayonet would be nothing better than a military despotism.® And the same paper said : <(Each State is organized as a complete government, holding the purse and wielding the sword, pos¬ sessing the right to break the tie of the con¬ federation, and to repel coercion as a nation might repel invasion. . . . Coercion, if it were possible, is out of the question.® The New York Times of 3 and 4 Dec. 1860 ap¬ pealed to the people of the North to repeal the State laws preventing the return of fugitive slaves and by moderation and forbearance to prevent the threatened and almost inevitable dis¬ solution of the Union. In March 1861, after Lincoln's inauguration, the Commercial, the leading Republican paper of Ohio, said :

We are not in favor of blockading the southern coast. We are not in favor of retaking by force the property of the United States now in possession of

the seceders. We would recognize the existence of a government formed of all the slaveholding States and attempt to cultivate amicable rela¬ tions with it.

In January 1861, after six States had seceded, James S. Thayer said, at a great meeting in New York:

, We can at least, in an authoritative manner, arrive at the basis of a peaceable separation. . . . The public

mind will bear the avowal, and let us make it, — that if a revolution of force is to begin, it shall be inaugurated at home. And if the incoming administration shall attempt to carry out the line of policy that has been foreshadowed, we announce that, when the hand of black Republicanism turns to blood-red, and seeks from the fragments of the Constitution to construct a scaffolding for coercion — another name for execution — we will reverse the order of the French

Revolution, and save the blood of the people by making those who would inaugurate a reign of terror the first victims of a national guillotine!

These expressions were received with enthusias¬ tic applause. At the same meeting ex-Gov. Horatio Seymour asked whether ˆsuccessful coercion by the North is less revolutionary than successful secession by the South? At the same meeting ex-Chancellor Walworth said: <(It would be brutal, in my opinion, to send men to butcher our own brothers of the Southern States as it would be to massacre them in the Northern States.® Other distinguished speakers and editors throughout the North and West repeatedly expressed the same sentiments. Even Mr. Lincoln, when delivering his inaugural address on 4 March 1861, although arguing the right to secede, did not openly enunciate the right of coercion, and while asserting his inten¬ tion (

Course of Secession. — The Southern States having no hope of retaining or obtaining their rights under the Constitution except by a sepa¬ ration from the Federal government called con¬ ventions to decide upon what course to pursue, and ended by withdrawing from the Union. South Carolina took the lead, her Ordinance of Secession being adopted 20 Dec. 1860. Six other States quickly followed her in the follow¬ ing order: Mississippi on 9 January, Florida on 10 January, Alabama on 11 January, Georgia on 18 January, Louisiana on 23 January and Texas on 1 Feb. 1861. As one by one the Southern States fell into line asserting their right and determination to renounce the Federal compact, the United States officials in these States, both military and civil, peacefully turned over their charge within the limits of each State to the authorities of the same, the only exceptions being the

isolated fortifications of Fort Sumter and Fort Pickens. The machinery of government went on without delay, the same officials performed their customary duties, and when the provisional government was estab¬ lished the only change was the substituting the authority and name of the Confederate States for those of the United States. On 21 Jan. 1861 Jefferson Davis, in his speech when relin¬ quishing his seat in the United States Senate, said :

I rise, Mr. President, for the purpose of announcing to the Senate that I have satisfactory evidence that the State of Mississippi by a solemn ordinance of her people, in convention assembled, has declared her separation from the United States. . . . If it be the puipose of gentlemen

they may make war against a State which has withdrawn from the Union; but there are no laws of the United States to be executed within the limits of a seceded State. A State, finding herself in the condition in which Mississippi has judged she is — in which her safety requires that she should provide for the maintenance of her rights out of the Union — surrenders all the benefits (and they are known to be many), deprives herself of the advantages (and they are known to be great), severs all the ties of affection (and they are close and enduring), which have bound her to the Union; and thus divesting herself of every benefit — taking upon herself every burden — she claims to be exempt from any power to execute the laws of the United States within her limits . . . We recur to the principles upon which

our government was founded; and when you deny them and when you deny to us the right to withdraw from a government which, thus perverted, threatens to be destruc¬ tive of our rights, we but tread in the path of our fathers, when we proclaim our independence and take the hazard.

Here in the words of the man who was after¬ ward the chosen chief of the reorganized fed¬ eration, the reason for secession is given and the right of secession claimed. The senators from Florida and Alabama withdrew at the same time.

The Peace Congress. — On 19 Jan. 1861, the legislature of Virginia in extraordinary session passed a resolution requesting all the States to send delegates to Washington to meet in con¬ vention on 4 February to confer upon 'some feasible and possible plan upon which to settle the difficulties between the sections. The body which is known in history as the Peace

Con¬ gress sat in Washington from 4 to 27 February, but accomplished nothing. Five Northern States were not represented, and while there still existed a very conciliatory spirit in many parts of the North, it was unfortunate that many prominent men were bitterly opposed to the slightest concessions to the South. The speech of Judge Chase of Ohio, afterward Chief Justice of the United States, distinctly gave it to be understood that the Northern States would make no concessions. He said :

The result of the national canvass which recently termi¬ nated in the election of Mr. Lincoln, has been spoken of by some as the effect of a sudden impulse or of some irregular excitement of the popular mind; and it has been somewhat confidently asserted that, upon reflection and consideration, the hastily formed opinions which brought about that election will be changed. ... I cannot take this view of the result of the presidential election. I believe, and the belief amounts to absolute conviction, that the election must be regarded as a triumph of principles cherished in the hearts of the people of the free States. . . . We

have elected him [Mr. Lincoln]. After many years of earnest advocacy and of severe trial we have achieved the triumph of that principle. By a fair and unquestioned majority we have secured that triumph. Do you think we, who represent this majority, will throw it away? Do you think the people will sustain us if we undertake to throw it away? I must speak to you plainly, gentlemen of the South. It is not in my heart to deceive you. I therefore tell you explicitly that if we of the North and West would consent to throw away all that has been gained in the recent triumph of our principles, the people would not sustain us, and so, the consent would avail you nothing.

The Congressional Globe, Vol. 31, Part 2, p. 1247 (27 Feb. 1861) contains letters from Sen¬ ators Bingham and Chandler to Governor Blair of Michigan. Senator Bingham wrote as fol¬ lows :

Washington, 15 Feb. 1861.

Dear Sir: — When Virginia proposed a convention in Washington in reference to the disturbed condition of the country I regarded it as another effort to distract the public mind, and a step towards obtaining that concession which the imperious slave power so insolently demands. . . .

We have been assured by friends upon whom we can rely that if those two States, Michigan and Wisconsin, should send delegations of true unflinching men, there would probably be a majority in favor of the Constitution as it is, who would frown down rebellion by enforcement of laws. . . . It . cannot be doubted that the recom¬

mendations of the convention will have a considerable influence upon the public mind, and upon the action of Congress. . . .

I hope I shall be pardoned for suggesting that it may be justifiable and proper, by any honorable means, to avert the lasting disgrace which will attach to a free people who, by the peaceful exercise of the ballot, have just released themselves from the tyranny of slavery, if they should now succumb to treasonable threats, and again submit to degrading thraldom. . . .

K. S. Bingham.

To His Excellency, Governor Blair.

Senator Zach Chandler wrote :

Washington, 11 Feb. 1861.

My dear Governor: — Governor Bingham and myself telegraphed you on Saturday, at the request of Massachu¬ setts and New York, to send delegates to the Peace or Compromise Congress. They admit that we were right, and that they were wrong; that no Republican State should

have sent delegates; but they are here and they cannot get away; Ohio, Indiana, and Rhode Island are caving in. and there is danger of Illinois; and now they beg us, for God's sake, to come to their rescue, and save the Republican party from rupture. I hope you will send stiff-backed men, or none. The whole thing was gotten up against my judgment and advice, and will end in thin smoke. Still, I hope, as a matter of courtesy to some of our erring brethren, that you will send the delegates.

Truly your friend,

Z. Chandler.

His Excellency, Austin Blair.

P. S. — Some of the manufacturing States think that a fight would be awful. Without a little blood-letting, this Union will not, in my estimation, be worth a rush.

These letters were promptly published in the Detroit Free Press and also in the Con¬ gressional Globe. Senator Powell commenting, in the Senate, upon the letters, said : ((I think it evident from these letters that there is and has been a fixed purpose in certain quarters, that the peace conference should do nothing. It is very evident that these (stiff -backed) gentle¬ men

were to be sent in order to prevent any com¬ promise being presented.® Senator Chandler said: <(It is a question in which the people of Michigan take a great interest. They are op¬ posed to all compromises ; they do not believe that any compromise is necessary, nor do I. They are prepared to stand by the Constitution of the United States as it is ; ay, sir, to stand by it to blood, if necessary.® A majority of the convention or congress was sufficiently moderate to recommend a measure to Congress which would, without doubt, have preserved peace and union, but when presented to the United States Congress it was met with cool indifference, ob¬ jection was made to its consideration and upon a vote it was rejected.

The failure of the Peace Congress and the finally expressed determination of the govern¬ ment to make no concessions and to exercise the forces of the government in coercion forced Virginia and the other so-called border States from their conservative position. Arkansas adopted an Ordinance of Secession on 15 April, and Virginia on 17 April. In the latter State the Ordinance was to be made subject to the ratification of the people late in May, but the action of the Federal government in preparing for war and the proclamation of President Lincoln calling for troops hastened her union with her sister States of the South. Tennes¬ see passed an Ordinance of Secession on 6 May, which was ratified by the people on 8 June, and North Carolina seceded on 20 May. Such a di¬ vision of sentiment existed in Kentucky and Missouri that while they did not secede they were given representatidn in the Confederate Congress.

Formation of the Confederate Govern¬ ment. — In the meantime the several conven¬ tions of the first seven seceded States appointed deputies to a congress, naming Montgomery, Ala., as the place and 4 February as the time of meeting. This assembly formed a new federation under the name of the Confederate States of America, elected Jefferson Davis of Mississippi, President and Alexander H. Ste¬ phens of Georgia, Vice-President, and drew up a Constitution establishing a provisional government, and on 11 March adopted the permanent Constitution of the Confederate States. Alexander Stephens, who knew his people, had distinctly declared that (

vatism,® and this was true as well of all the other States. It was Mr. Lincoln's proclama¬ tion of 15 April that destroyed the last remain¬ ing vestige of the hope entertained by the con¬ servatives that a return to the principles of the Constitution by the people of the North and the Federal government might bring about a reconstruction of the Union, a hope to which their hearts still clung tenaciously. Had not two States held aloof

from the compact of 1787 to return in 1789 and 1790? Why might not history repeat itself? they thought and argued. The seat of government of the Confederacy was removed to Richmond, Va., and the Pro¬ visional Congress met there on 20 July 1861. At this session delegates from Virginia, North Carolina and Tennessee were added to the body. The Second Congress met on 22 Feb. 1862, with full representation from Alabama, Arkansas, Florida, Georgia, Kentucky, Louisi¬ ana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas and Virginia. In the Second Congress which convened on 22 Feb. 1862, the 13 States above named were represented and delegates were present from Arizona and from the Cherokee, Choctaw, Creek and Seminole Nations.

Secession of West Virginia. — As above noted the Virginia Convention passed an ordi¬ nance of secession on 17 April 1861, which was submitted to the people and adopted by them. There was a majority against it in the north¬ western part of the State. In June 1861, a con¬ vention of the Unionist counties was held in Wheeling. This convention adopted an ordi¬ nance for a reorganization of the State govern¬ ment, and in August adopted an ordinance pro¬ viding for the formation of a new State. Most of the citizens being in the field as soldiers on one side or the other, a very small vote was polled, but a majority was for the formation of a new State. In May of 1862 the ((reorgan- ized government® of this part of Virginia passed a bill authorizing the formation of a new State. On 31 Dec. 1862, the Congress of the United States passed an act admitting the State of West Virginia into the Union, the law having the following preamble :

Whereas, the people inhabiting that portion of Virginia known as West Virginia did, by a convention assembled in the city of Wheeling on the twenty-sixth of November, eighteen hundred and sixty-one, frame for themselves a Constitution with a view of becoming a separate and independent State; and whereas at a general election held in the counties composing the territory aforesaid on the third day of May last, the said Constitution was approved and adopted by the qualified voters of the proposed State; and whereas the legislature of Virginia, by an act passed on the thirteenth day of May, eighteen hundred and sixty- two, did give its consent to the formation of a new State within the jurisdiction of the said State of Virginia, to be known by the name of West Virginia, and to embrace the following named counties. . . .; and whereas both the

convention and the legislature aforesaid have requested that the new State should be admitted into the Union, and the Constitution aforesaid being Republican in form, Con¬ gress doth hereby consent that the said forty-eight counties may be formed into a separate and independent State.

The End of Secession. — Although the Su¬ preme Court of the United States several times decided that the seceded States were never legally out of the Union, yet for four years the secession of 11 States was an accomplished fact, and for four years the Confederate States of America was a de facto government, exercising, through its executive, legislative and judicial de¬ partments, all the powers and functions of a Federal government within the territory of the

States which comprised it, under a constitution modeled upon the Constitution of the United States and adopted and ratified by the people of its States. In the States themselves there was no change nor interruption in any of the affairs of government except in the places which were occupied by the Federal armies. But by force of arms the Confederate government was over¬ thrown and each of the seceded States, after a period erf reconstruction, came back and took its place in the Union under the old Constitution as amended by the victorious party in the great conflict. See also Civil War; United States

— Causes of the Civil War; United States

— Secession.

Brig.-Gen. Joseph Wheeler, Author of (Military History of Alabama d

SECESSIONISTS, the members of an association in Germany similar to that formed in the Societe des Beaux Arts at Paris. The Secessionists were artists who revolted against the strictly academic and traditional spirit in

which selections and awards were made by the jury which decided the hanging of pictures in the Academy of Art and distributed the medals and other awards voted to their merits. In 1892 Piglhein (q.v.), F. von Uhde (q. v.), Dill, A. Keller, Stuck and others founded a new school of naturalism, and this movement in German art was greeted with the same howl of derision as that with which the Pre- Raphaelites in England had been met. The movement gained ground, especially in Munich, however, the headquarters of a strong conserva¬ tive and academic coterie. The new spirit here burst into actual revolt; and the members of the ((Munich Secession® actually built a new exhibition building for themselves. Their work, moreover, won public recognition and the leaven of their example did its work in vivifying German art. The movement is now merged in the Deutscher Kiinstlerbund founded in 1904. Consult Bierbaum, (Fritz von Uhde) ; De la Mazeliere, (La peinture Allemande au XIXe siecle) (1900).

SECESSIONVILLE, se-sesh'on-vil, Battle of. In May 1862, Gen. D. Hunter, commanding the Department of the South, began prepara¬ tions for throwing troops upon James Island to make a quick advance upon Charleston, S. C. On 2 June the advance of Gen. I. I. Stevens was landed in the southwest part of the island, and next day made a reconnaissance in force to within a short distance of a battery at Secessionville, about two miles from Stone River, with water on three sides. It was on a narrow causeway bordered by swamps, and approachable by land only from the west. The gunboats co-operated in the movement, which was but partially successful, the Con¬ federates, under Lieut-Col. Ellison Capers, 24th South Carolina, defending the position and inflicting upon Stevens a loss of 17 killed and wounded and taking 22 prisoners. The effect was increased watchfulness on the part of the Confederates, the strengthening of the forces on James Island and the stoppage at Charleston of troops that had been ordered to Richmond to resist McClellan. On the 8th Stevens made another reconnaissance, came under artillery fire and withdrew with a loss of seven killed and wounded. On the same day General Wright's division arrived from Edisto

Island and the next day marched to near Grimball's Landing, two or three miles to the left of Stevens, who was covering the position opposite Legareville, on John's Island. It was determined to carry the battery by a rush, and thus open the way to Charleston, but 10 miles distant ; and orders were given for an assault to be made at dawn of 11 June, but Col. T. G. Lamar, in command of the Confederate works at Secessionville, assumed the offensive and toward evening of the 10th attacked Wright's

pickets and advance posts with infantry and artillery and was repulsed, suffering severe loss and inflicting upon Wright a loss of about 25 killed and wounded. This caused a post¬ ponement of the assault and the beginning of the construction of a battery to silence the Con¬ federate guns. General Hunter, disappointed in his expectation of carrying Charleston with a rush, returned to Hilton Head on the 11th, leaving orders with General Benham, next in command, to make no attempt to advance on Charleston or on Fort Johnson until largely reinforced but to provide, however, for ((a se¬ cure intrenched encampment.® At the end of five days the battery had been constructed, but it failed to silence the Confederate guns, and Benham, as Hunter says, <(disobeyed posi¬ tive orders and clear instructions® and against the emphatic protest of his two division com¬ manders proceeded to assault the work. He had for the purpose 3,100 men under General Wright and 3,500 under General Stevens. The work to be assaulted had an earthen parapet seven to eight feet high, outside of which was a ditch seven feet deep and in front of which was a strong abatis. A line of rifle-pits ex¬ tended on both flanks and in the rear, sweep¬ ing the open interior of the work. Its arma¬ ment was six heavy guns — 8-inch columbiads and rifled 24- and 18-pounders. It was de¬ fended by about 1,000 men, and there were supports near that came at the close of the action. Stevens, with his 3,500 men, was to make the assault and Wright, moving from GrimbaH's Landing, was to co-operate by mov¬ ing on his left and rear. Stevens had two brigades, Colonel Fenton's (8th Michigan, 7th Connecticut, 28th Massachusetts) and Colonel Leasure's (46th and 79th New York and 100th Pennsylvania), and four guns. At 3.30 a.m.-, the troops were assembled beyond the camps and at 4 a.m., when it was so dark one man could not follow another except at short inter¬ vals, the column moved forward, Fenton lead¬ ing, with a storming party of two companies of the 8th Michigan, closely followed by the other eight companies of the regiment, the 7th Con¬ necticut and the 28th Massachusetts. Leasure followed Fenton. The advance moved quietly and when within 800 yards of the work sur¬ prised and captured a small picket-guard with¬ out firing a shot and orders were given to accomplish the allotted task with the bayonet only. Lamar had knowledge of the movement and had sent for reinforcements and was stand¬ ing by his heavy gnns, which had been charged with canister, as the leading regiment came within 300 yards and deployed into line; then his guns opened their canister-fire, and at the same time heavy volleys of musketry from dikes and hedges were poured upon the right flank of the assaulting column. The Union regiments closed up rapidly and made a rush

for the work, shooting down the gunners; all the regiments got close to the work and men of each went through the abatis ; men of the 8th Michigan and 79th New York gained the ditch and scaled the parapet. ((Some of

them,® says Beauregard, (XIV.

E. A. Carman.

SECHEM, Palestine. See Nabuius.

ˆ SECHIUM, a genus of the gourd family (Cucurbitacec p) with one species (S. edule). This is a perennial, rough-stemmed, climbing vine native to the West Indies and the neigh¬ boring mainland, sometimes cultivated for cov¬ ering arbors, since it makes a rapid and sturdy growth, but chiefly for the valuable food af¬ forded by its roots and fruits. It has large, thin, heart-shaped leaves five-angled like those of the cucumber ; branched tendrils opposite the leaves, and yellowish, monoecious flowers, the pistillate solitary or paired in the axils, the staminate in a raceme. These flowers have ro¬ tate calices and five-parted corollas and a one- celled ovary with six-lobed stigma, which ma¬ tures into a pear-shaped fruit, some six inches long. It has an irregularly ribbed or furrowed surface slightly spiny, but shining, and in color ranging from pale green to creamy tints; the interior is fleshy and white, and contains a large flat seed, which germinates within the pericarp, often before it falls from the vine, so that the whole fruit is planted. This fruit is edible, as is also the very large, corky and starchy root-tuber, sometimes weighing 20 pounds, and both are cooked as vegetables hav¬ ing somewhat _ the flavor of turnips. The sechium fruit is called vegetable pear in the British colonies, and has local names such as chayote or pepinella.

SECKENDORF, Friedrich Heinrich, fred'-

riH hln'riH zek'en-dorf, Count von, Franconian soldier and diplomat: b. Konigsberg, 5 July 1673; d. Meuselwitz, Germany, 23 Nov. 1763. He served in the war against the Turks on the Danube, and in that of the Spanish Succession, greatly distinguished himself at Blenheim in 1704 and was present as an Ambassador at the conclusion of the Peace of Utrecht. He also served in the war against Sweden, 1715, and against the Spaniards in Sicily, 1720. In 1726 he was Ambassador to Berlin and gained over Frederick William I to acknowledgment of the pragmatic sanction and an alliance with Austria.

Seckendorf next served in the war of the Polish Succession, gaining victory over the French at Klausen. During the Turkish War he was made field-marshal in 1737, and com¬ mander-in-chief. He was unsuccessful, how¬ ever, and was recalled and imprisoned in the fortress of Gratz. Receiving

no appointment when released, he entered the service of Charles VII of Germany against Maria Theresa. He cleared Bavaria of Austrian troops, but on the emperor's death in 1745 peace was established and Seckendorf was restored to his Austrian honors. He retired to his castle at Meuselwitz, but in 1788 was imprisoned by Frederick II of Prussia, on 4a charge of intriguing against that country, and was only released after six months upon the payment of 10,000 thalers.

SECKENDORF, Gustav Anton von, Baron (((Patrick Peale®), German dramatist and novelist: b. near Altenburg, Germany, 26 Nov. 1775; d. Alexandria, La., 1823. He was edu¬ cated at Leipzig, Freiburg and Wittenberg, be¬ came well known as a writer and lecturer and died while on a lecturing tour in the United States, where he was known as ((1814) ; (Des Vaters Bild > (1822), etc.

SECKER, Thomas, English prelate: b. Sib- thorpe, Nottinghamshire, 1693; d. Canterbury, England, 3 Aug. 1768. He studied medicine at London and at Paris, and took his degree at Leyden in 1721, after which he decided to enter the ministry. He was graduated from Oxford in 1722, and in the following vear was ordained a priest. His first living was at Houghton-le-Spring in 1724, and in 1727 be¬ came rector of Ryton and prebendary of Dur¬ ham. He was appointed chaplain to the king in 1732, became rector of Saint James', London, in 1733, bishop of Bristol in 1735, of Oxford in 1737, dean of Saint Paul's in 1750 and arch¬ bishop of Canterbury in 1758. He was a wise, large-hearted and hard-working bishop, and an able though not a brilliant preacher.

SECOND, a division of time, the 60th part of a minute of time or ot a minute of a degree. The hour and degree are each divided into 60 minutes (marked thus, 60'), and each minute is subdivided into 60 seconds (marked thus, 60").

In music, the interval of a second is the dif¬ ference between any sound and the next nearest sound above or below it. There are three kinds — the minor second or semitone, the major sec¬ ond and the extreme sharp second. Also a lower part added to a melody when arranged for two voices or instruments.

SECOND ADVENT OF CHRIST. See

Millennium.

SECOND ADVENTISTS. See Adven¬ tists.

SECOND CENTURY. The outstanding feature 'of the history of the 2d century is the series of reigns of the so-called Spanish Caesars. Trajan

(98-117) who ruled when the Roman Empire was at its greatest extent was the first. His successors until 180 a.d. are all men selected for their tasks by wise predeces¬ sors, to become benevolent autocrats in the best sense of the word. Ruling the civilized world with firmness and wisdom, humanity is said to

have had more chance for happiness under them than in any other corresponding period of the world's history, and yet even they persecuted the Christians. Trajan's successors were Adrian, or Hadrian (117-138) ; Antoninus Pius (138-161) and Marcus Aurelius (161-180). Each of these adopted a successor whom he thought capable of bearing the great burden of ruling the Roman Empire worthily. Marcus Aurelius, however, was succeeded by his son, Commodus (180-193), profligate and cruel to an extent that has made his name a by-word in history, weak and incompetent as a ruler, so that the barbarians played sad havoc on the frontiers of the empire. After Commodus, Pertinax (193) was proclaimed by the Praetor¬ ian guards who assumed the function of dis¬ posing of the empire. He was murdered after a reign of three months. Then the empire, offered for sale by the Praetorians, was bought by Didius Julianus (193) for some $10,000,000. He was put to death not long after by an order of the Senate and was succeeded by Septimius Severus, elected by the soldiers of the army of the Danube. Severus defeated two rivals for the empire who had also been elected by their soldiers and proceeded to give Rome a strong government. His reign was stained at the beginning of the 3d century by a bitter persecution of the Christians (202).

The Spanish Caesars have an individuality that has won for each of them a special place in history. Trajan was a native of Spain and a soldier, elected by the Senate after the death of Nerva, who had made him an associate in the government. Trajan pushed the limits of the Roman Empire farther than ever before. He conquered Armenia and invaded the lands be¬ yond the Euphrates to bring most of what had been Assyria under Roman rule. Out of the conquered territory he made three Roman provinces under their names of Armenia, Mesopotamia and Assyria. In the earlier part of his reign he had conquered the Dacians and thrown a bridge across the Danube, some of the piers of which are still standing. He brought a colony of Romans to settle in the conquered provinces, so that ever since it has been called Roumania. In honor of his conquests, Trajan erected at Rome the famous column called by his name, which tells the story of his Dacian wars. The spiral band of sculptures on it contains more than 25,000 figures. In spite of his beneficent rule, Trajan is responsible for the third persecution of the Christians, the first having come under Nero and the second under Domitian. A letter of Pliny the Younger to Trajan tells how rapidly this ((contagious super¬ stition® as he calls it was spreading throughout not only the cities but the towns and the coun¬ try. Trajan

feared that their refusal to sacri¬ fice to the Roman gods would lessen their fidelity to the empire, so he began a bitter persecution. The blood of martyrs only proved the seed of new Christians and attracted world¬ wide attention to this faith for which men were ready to die.

Trajan's successor Adrian, another Spaniard born, did much to consolidate the Roman Em¬ pire. In person he superintended the construc¬ tion of a wall across the northern part of what is now England, from the Tvne to Solwav Firth. The remains of the old Roman wall can still be plainly traced over most of its course.

Then he spent some time in Gaul, proceeding to the East, everywhere to devote himself to the good of the empire. Whenever he stayed long in a city, he made it a point to leave some magnificent public structure, temple, arch, theatre or other building as a memorial of his presence there. He spent some time in Athens and did very much to restore its old glory. The last years of his reign he was at Rome, where he built the Pantheon, still one of the architectural wonders of the world, and a magnificent tomb for himself on the other side of the Tiber, not far from the Vatican, now known as the Castle of Saint Angelo. During his reign, the Jews who had flocked back in large numbers to Palestine from which they had been driven by Titus, had all their religious feelings outraged to the last degree by the at¬ tempt to place a statue of Jupiter on the site of what remained of their old temple. They re¬ volted and more than half a million of Jews perished, nearly all of the survivors being forced into exile. This was the final dispersion of the Chosen People.

Hadrian's successor was his adopted son, Aurelius Antoninus, surnamed Pius. He reigned 23 years, during which the empire was absolutely peaceful and extremely prosperous. He devoted himself to the benefit of the prov¬ inces and the marvelously beautiful Roman aqueduct near Nimes in France erected by him is a type of his work for them. Happy peoples have no history and the greatest event in the reign of Antoninus was the association in the government with himself early in his reign of his adopted son, Marcus Aurelius. They are often spoken of as the Antonines and the 42 years of their reign from 138 to 180 are in Roman phrase a red-letter time for humanity. Marcus Aurelius (q.v.) was a philosopher of the Stoic school and his Meditations (see Meditations of Marcus Aurelius) probably represent the highest flight of merely human thinking with regard to man's duties toward himself, his fellows and the Author of the uni¬ verse in which he is placed. Marcus Aurelius not only wrote and studied but*

worked. He accomplished an immense amount of good for the poor of Italy in a spirit that closely resem¬ bled that of Christianity.

It seems not unlikely that he was influenced by the Christian writings. He established homes for orphans and also for the old and made it one of the tasks of his life to see jus¬ tice done. When the poor of Italy were loaded with taxes which had accumulated until they could not pay them, he caused all the tax claims to be heaped in the Forum and burned, thus freeing the people from an oppressive bur¬ den at one stroke.

Marcus Aurelius' life of meditation was rudely disturbed by the necessities of his reign as emperor. He had to direct and lead armies against barbarians on all frontiers. Roman generals defeated the Parthians and Aurelius was compelled to extend the Roman frontier in the East into Mesopotamia once more, though he had hoped that the Euphrates was sufficient protection. Teutonic tribes along the Rhine and the Danube compelled him to lead his legions himself and practically all his later years were spent in camp. Roman affairs were very discouraging after the period of peace and

worse was to follow. The bubonic plague was brought back from the East by the armies who had fought there and it raged with fearful vir¬ ulence. Some towns and districts were actu¬ ally depopulated, the few remaining alive pre¬ ferring not to dwell in the old scenes. Between wars and the plague, the Romans were tempted to believe that there must be some fault of theirs calling down the vengeance of the gods. They concluded that it must be the Christians' worship of a new god who had provoked the anger of the old gods. So much disaffection was created by this that finally the philosopher emperor, in spite of his own refusal to believe any such nonsense, was brought to consent to the beginning of the frightful persecution of the Christians which occurred in his reign. Ever since the year 112, under Trajan, the Christians had lived in the danger of persecu¬ tion, at times tolerated, at others the subject of severe measures. This state continued in spite of the philosopher emperors for the full hundred years down to 211.

Commodus was a typical example of that non-heredity so often noticed in the sons of great men. Few men in the history of human¬ ity have been worse. Born at Lanuvium in 161, he became emperor before he was 20, after having been a youth of great promise and ap¬ parently excellent character. His father wrote the Meditations, it is said for the benefit of his son. How disappointed he would have been in him had he lived! For some three years, Commodus, under the influence of the wise counsellors, appointed by his father, was a model ruler. Then the discovery of a conspir¬ acy against his life changed his whole charac¬ ter and his rule*

was little better than that of a maniac. He succeeded with almost insane cun¬ ning in securing the popular favor by brilliant shows and spectacles in the amphitheatre, and kept the Praetorians from revolt by bribery, meantime reigning as a disgrace to the royal dignity. Perhaps nothing in political history is so significant as the Senate of Rome voting to this lunatic who had perpetrated awful cruel¬ ties and almost unspeakable crimes divine honors and the added names, Pius and Felix. He was finally put to death by members of the imperial household who found that they them¬ selves were soon to be the victims of his in¬ sanity, so they anticipated his designs.

Commodus was followed by the so-called ((barrack emperors.® The designation is due to the fact that they were elected by the army who, in nearly a century (192-284), chose 25 emperors, of whom 21 were murdered. Be¬ tween them and the invading barbarians on every side, Rome sank rapidly into decadence. Greek intellect still maintained its primacy and one of the great men of the century is Galen of Pergamum, who spent some years at Rome as the physician of Marcus Aurelius. He was an indefatigable worker, who wrote hundreds of works on medicine of which 83 remain. He was one of the most observant physicians who ever lived and his works are a mine of acute clinical observation. He suggested that phthi¬ sis was best treated by fresh air and good food and that the best food was milk and eggs. He was long the supreme authority on medicine and especially during the Middle Ages his dicta were accepted as almost infallible. The de-

velopmciu of medicine in modern times has made us realize how fortunate it was that the mediaevals should have chosen so safe and sound a guide in medicine, though their rever¬ ence for him used to be set down rather as a fault than a virtue.

The two noteworthy victims of Marcus Aurelius's persecution of the Christians were Justin Martyr and Polycarp. Justin owed his conversion to the effect produced upon him by seeing the Christians suffer tortures and death so bravely. He had been a deep student of Plato and after his conversion he wrote the well-known Apology for Christianity and subse¬ quently a second one and a Dialogue with the Jew Tryphon. These contain many autobio¬ graphical details. Eusebius mentions apolo¬ getic works addressed to Antoninus Pius and Marcus Aurelius. . Justin suffered martyrdom under the prefect Rusticus (circa 165). His writings have continued to exert a deep influ¬ ence on Christianity all down the centuries

and as a very early witness he is of great signifi¬ cance. Of high, pure soul, in the midst of the paganism of the time, he found himself com¬ pelled, when brought in contact with Christian¬ ity, to admire the superhuman constancy it gave. He was taken by its pure moral teach¬ ing, and then after he had acquired knowledge of it was forced to accept its truth. His life and martyrdom are a supreme tribute to early Christianity.

The other victim of Aurelius' persecution was Saint Polycarp (69-155), who is often said to have known in his youth John the Evangelist and to have been deeply influenced by him. John lived on to the age of Trajan, so that Polycarp is the 2d century link with the Apostles. The old man was 86 when he was apprehended. His flock had hidden him and succeeded for years in keeping him from seiz¬ ure. The proconsul urged him, when he was brought before the multitude in the Stadium, to curse Christ and save his life. Polycarp made his famous reply: <(Fourscore and six years have I served Him and He has done me no harm. How then can I curse my king that saved me?® It was too late in the day to throw him to the wild beasts, the sports being over, so it was resolved to burn him, and the populace collected the wood for the fire. His career is just a typical example of a kindly old Christian who, in their superstitious desire to appease their gods so that Roman good fortune might return, was put to death by the mob.

Many of the Romans of the 2d centur}' were very wealthy and not all of them spent their money foolishly or for merely personal pleas¬ ure. Some of them found a special pleasure in erecting magnificent structures for the adorn¬ ment of the cities in which they lived and for the benefit of their fellow-citizens. Theatres, baths, temples and triumphal arches were often erected by the cities themselves, sometimes with the help of generous contributions from wealthy citizens. Aqueducts, bridges, fountains and other monumental works of definite public utility were also constructed through imperial or private beneficence. Some of them remain down to the present day or sufficient remains of them are left to enable us to appreciate how good was the taste and how fine the execution of such structures. One of the wealthy men noted for such beneficence was Herodes, sur- named Atticus, who enriched his native city,

Athens, with a large number of structures, but particularly a huge marble stadium capable of accommodating the entire population of the city. He is said to have given over half a million of dollars in our values to aid the city of Troas in Asia Minor to build an aqueduct for the bringing of pure water into the city.

These beautiful buildings came in the midst of serious intellectual

decadence. Magnificent theatres were erected in many places and yet no dramatic literature was written that has proved worthy of preservation. The older Greek plays were given occasionally for those who might be interested in Greek, but as a rule what attracted people to the theatre was shows of various kinds, (is the one book from this time that is read in the modern time, but entirely because of its erotic interest. Melancthon is hardly too severe on the style of the book when he says that <(Apuleius brays like his own ass.® Aldus Gellius, the gram-

marian, writes better, though not much, and only the lawyers of the time seem to have known how to write Latin. Gellius is the last of the so-called Latin classics. The true liter¬ ary tradition was lost. The century had, how¬ ever, a number of Greek writers whose names and works deserve to be recalled. Ptolemy, the astronomer after whom the Ptolemaic system was named, and Lucian, the writer of satires, are the best known. Diogenes Laertes, the Greek historian, and his colleagues, Arrian, Appian and Pausanias, are often referred to.

The most serious popular interest was the amphitheatre, where the gladiators fought with each other or with wild beasts, sometimes unto death. The people who sat on the benches lacked the courage to keep back the barbarian invasion already beginning, but they liked to be thrilled by the sight of blood and of bravery in others, and have the ultimate emotion of seeing people die. Rome set the fashion which was followed enthusiastically in the great amphitheatres built in so many of the cities of the Roman world. The special delight of the populace during the persecutions, and a state of persecution existed almost continually dur¬ ing the century, was to see the Christians thrown to the wild beasts. After a while some of them objected because the Christians went to death so calmly and made no resistance, though occasionally, of course, some timid soul lost confidence and escaped martyrdom at the last moment by offering incense to the gods or perhaps ran screaming toward the barrier when it was too late for rescue and the beasts inter¬ cepted him. Such incidents furnished some variety to the otherwise monotonous spectacle of seeing men and women and little children devoured by the wild beasts, but it must not be forgotten that the people who crowded to see such spectacles were not in any sense of the word barbarians, but on the contrary, as a rule, refined, well-dressed, educated Roman citizens, who bathed every day, often several times, had beautiful art objects in their homes, who ate many course dinners and sometimes had a country house as well as a city home, and who knew the classical Roman literature and often not a little about

Greek literature.

James J. Walsh,

Author of (The Thirteenth Greatest of Cen¬ turies P

Principal Events of the Second Century.

117. Trajan, Roman emperor, dies and is succeeded by Hadrian who limits the Roman Empire at the Euphrates. 121. Caledonians drive the Romans out of Scotland. Hadrian builds the wall from the Tyne to Solway Firth to keep them out of England.

131. Revolt, massacre and exile of the Jews. Galen, the celebrated physician, bom.

138. Completion of the Pantheon and Hadrian's Tomb at Rome.

Antoninus Pius begins a reign of peace and prosperity for 23 years.

155. Martyrdom of Polycarp at Rome.

161. Marcus Aurelius succeeds Antoninus Pius.

163. The bubonic plague ravages Europe. The Christians persecuted.

165. Justin Martyr put to death at Rome.

166. Rome sends an embassy to China, to establish a trade in silk.

180. Commodus begins to reign. Goths, settled on the Vistula and Oder, take possession of the coast of the Black Sea.

194. Commodus assassinated; Septimius Severus succeeds after the short reigns and assassinations of Pertinax and Didius Julianus.

196. Capture and destruction of Byzantium by Septimius Severus.

SECOND SIGHT, an extraordinary power of vision, mental or physical, real or imaginary, believed to be possessed by certain individuals. This belief, by many held to be superstitious, but by not a few regarded as having a basis in the natural laws of mental and sensuous percep¬ tion, once prevailed throughout the Scotch Highlands and the Hebrides, where it has now almost wholly disappeared together with the belief in the Brownie or in the Greonach, the (<01d Longbeard,® and with the general use of charms and incantations. Like that superstition, however, it still lingers in retired nooks of the Highlands and of the Western Isles Second sight, called

by the Scotch Gael taish (Irish Gaelic taise, fetch, spectre), is recognized by many eminent students of psychic phenomena as a faculty possessed by many persons whereby they have vision (or other sense-perception) of persons and occurrences at distances far tran¬ scending the range of normal vision or hearing. Dr. Samuel Johnson's definition of second sight and his illustrations of its phenomena are exact and without prejudice; he left the Western Isles deeply impressed with a philosophic curiosity regarding this mysterious faculty, not believing but only ((willing to believe® ; he could not Ad¬ vance his curiosity to conviction.® <(The sec¬ ond sight,® he writes, <(is an impression made either by the mind upon the eye, or by the eye upon the mind, by which things distant or future are perceived, and seen as if they were present. A man on a journey far from home falls from his horse ; another, who is perhaps at work about the house, sees him bleeding on the ground, commonly with a landscape of the place where the accident befalls him. Another seer, driving home his cattle, or wandering in idle¬ ness ... is suddenly surprised by the ap¬ pearance of a bridal ceremony, or funeral pro¬ cession, and counts the mourners or attendants, of whom, if he knows them, he relates the names, if he knows them not, he can describe the dresses.® It is seen that though taish means spectre, ghost, it means also phantasmal appear¬ ances of living persons and material objects — (

SECONDARY ENRICHMENT, a proc¬ ess of weathering chiefly effective on sulphide (q.v.) ores, whereby the ore is rendered much richer than it was when originally deposited. The process is largely the result of the affinity of oxygen for the sulphur of the sulphides. Above the water table (q.v.) the pores of the rock are easily permeated by the atmosphere and oxidation can readily take place. Any iron sulphide present is weathered to the oxide limonite which is very insoluble and remains behind in the upper part of the vein as an iron stain known as the Gossan, or Iron Cap. Sulphides of copper, zinc and other metals oxidize to soluble sulphates. These may in part be further altered, especially where the wall rock is limestone, and form carbonates or other compounds, which may remain in the oxidized zone or gossan above the water table. But since the sulphates are mostly very soluble they are usually carried down by the water to or below the water table, where by certain reactions with other sulphides present they are reprecipitated as sulphides. This is then a place of enrichment, where the vein has the metal it originally carried, and also that leached down from above. It is known as the enriched zone, or the secondary sulphide zone. Below this is a zone where the vein is of the original composition. This is known as the lean sulphide zone.

SECONDARY ROCKS, (a) Rocks formed during the secondary or Mesozoic Age of the earth. In this sense the term is rarely used now. (b) Rocks resulting from the alteration of other or primary rocks ; among these are gneisses, schists, greenstones and rocks gener¬ ally formed through metamorphosis, whether static, dynamic or thermic. Clastic rocks, being derived from originally deposited rocks, are a4so secondary, as are also in the strictest sense all non-clastic rocks which have resulted from the fusion and recooling or solution and re¬ precipitation of older rocks, that is, stalactites, silicious or calcareous tufts, etc. See Sedi¬ mentary Rocks.

SECRECY OF BALLOTS. See Ballot.

SECRET SERVICE, United States, orig¬ inally, a department or bureau of the Treasury Department, organized in 1864, and having 28 secret service districts throughout the country. The bureau was not originally created by law, nor recognized by Congress by special expense appropriations. While its duties are not defi¬ nitely defined, the work of the bureau until recent years was largely the detection of coun¬ terfeiters, moonshiners, smugglers and other criminals who attempt to defraud the United States Treasury. During the Civil War the bureau was by necessity made an important branch of government service, the chief being a military officer with the rank of brigadier- general of volunteers. The assassination of President Lincoln brought about a more care¬ ful guarding of the person of the chief execu¬ tive, and since 1865 secret service officers have invariably accompanied the President upon his journeys and during his absence from the White House. And since the shooting of Presi¬ dent McKinley, secret service men have in¬ creased their vigilance in guarding. While certain trained secret service officers are de¬ tailed for this work, others are stationed in

foreign countries, and a number of so-called revenue officers are constantly engaged in Ken¬ tucky, Indiana, Tennessee and other States, detecting the illicit distilling of liquor and bringing moonshiners to justice.

Counterfeiters. — The bulk of the work of the bureau for many years before the war has been the detection and punishment of counter¬ feiters. John E. Wilkie, chief of the service, in 1899 said: <(Certainty of swift detection should perhaps prevent counterfeiting, but so long as there is a gambler's chance of escape, there will be found those who feel sure they can succeed where others have failed. Hence the necessity for the secret service branch of the government. And as the making of spurious money is a fascinating enterprise for a cunning rogue, so the checkmating of that same rascal in the countless schemes devised to yield an illegitimate fortune is a game of absorbing interest to him who plays it. The liberty of one, perhaps the life of one or the other, are the stakes in this battle royal. The

advantage lies first with the law-breaker. He plans and works in secret for months and some¬ times years ; then stealthily, through trusted channels, the product of his labor is marketed and bad money is quickly turned into good. But work as he may, some imperfection in his spurious bills which has escaped him one day arrests the glance of the keen-eyed money handler. Familiarity with the characteristics of genuine money results in the involuntary de¬ tection of a counterfeit. No two cases are ever exactly alike, for the counterfeiter is a fertile fellow, and is a constant student and inventor of precautionary measures that he feels certain will insure his safety.®

In the investigations made by the division, the chief has constantly before him the ex¬ haustive daily reports of each man in the serv¬ ice, and a careful weighing of the various points submitted by operatives working often at widely separated localities will frequently suggest a move in the right direction. The gravity of the crime makes progress slow, for no step is taken till facts are established to warrant it. It is al¬ ways considered desirable to so arrange the final act in this drama that the criminal may be taken wholly by surprise. There is a sort of moment¬ ary paralysis following the shock of sudden dis¬ aster, and when a raid is properly planned the chances of serious resistance are minimized. Occasionally it happens that it becomes neces¬ sary for a deal to be made directly with the handlers of spurious money, and in these cases it takes a man of nerve and keen wit to bring it to a successful issue. Such transactions are always fraught with great personal danger.

Informers. — There is small encouragement for the private citizen to aid the government in the arrest of counterfeiters as the following circular will show :

U. S. Treasury Department,

Secret-Service Division,

Washington, D. C. – .

The general principles governing the action of this division in presenting small gratuities of money as an expres¬ sion of its thanks to persons who perform meritorious service in bringing counterfeiters to justice are:

1st. Expenses incurred or services rendered in detecting crime against the United States, when unauthorized by this division, are not reimbursed or compensated by it.

2nd. As all United States officers are expected to aid in the suppression of crime against the United States when their attention is directed to any

specific violation of law,

this class is excluded from receiving the gratuities awarded by this division.

3rd. All persons not of the foregoing class, who arrest and procure the conviction and sentence of a counterfeiter, or whose evidence is regarded by the prosecuting attorney as having been more material in the case than that of any other witness, upon application, in writing to the office of the Chief at Washington, D. C. (accompanied by a certificate from the prosecuting officer, which certificate should set forth the docket-record of the case, and state that the applicant is the meritorious person through whose agency a conviction of the counterfeiter was procured), will, if approved by the Assistant Secretary of the Treasury, receive a gratuity, the amount to be graded by various considerations — such as, the ability for mischief, and the antecedents of the person arrested and convicted; the length of the term of imprisonment for which he is sentenced; the quantity and character of counterfeit money and counter¬ feiting material captured with or through him.

No application for a gratuity in any case will be considered until all the counterfeit money and counterfeiting material connected with the case have been expressed to this office. (Express charges C. O. D.)

There are no blanks for use of such applicants. Persons in making application should state fully the service rendered for which a gratuity is asked.

In order to avoid errors and trouble, it should be the practice of all informers to put tnemselves in communication with operatives of this division, advising tnem of every movement. As a matter of protection in their rights, this course is indispensable, for an operative is bound to com¬ municate daily to the office of the Chief all information he gains, so that his records, and those at headquarters, stand for the justification of the informer whenever he avails himself of their facilities.

In the absence of an agent of this division, informers should confer with United States Attorneys, Marshals, Com¬ missioner.?, Collectors of Customs or of Internal Revenue, who will gladly advise with them on such matters.

This circular is not intended to give the holder any authority to act for the Secret Service Division of the United States Treasury Department. Chief.

Statistics. — The reports of William J. Flynn, the chief of the secret service, to the Secretary of the Treasury show that about 400 arrests are made annually. Of this number one-half are of persons manufacturing, pass¬ ing or having in their possession counterfeit silver coin. The greatest activity of the coun¬ terfeiters was in 1896, when a total of $757,531 in notes and $10,678 in coin was captured. Since then the normal yearly find runs between $20,- 000 and $50,000 worth of notes and $10,000 to $25,000 worth of coin. The number of counter¬ feit printing plates captured which was 935 in 1895, in recent years is usually below 100. In 1916 of 417 arrests for counterfeiting 229 were convicted, 19 acquitted, 55 released for cause and the remainder awaited trial. California and Texas furnished the most delinquents.

The department has estimated that the aver¬ age of counterfeit coin in circulation is three dollars in every $100,000, and of paper one dollar in $100,000.

There is to-day, as part of the Federal gov¬ ernment, a new secret Service, which is larger and more powerful because of the greater lati¬ tude it is given in its work. Its duties take its agents to all points of the world. It is author¬ ized to act for every branch of the government, and to handle all manner of cases of violation of the Federal statutes. It has come into being only in recent years, yet it employs more secret agents, spends more money, performs a greater variety of service, than has any other such body of men. It is under the Department of Justice, and its province is to gather evi¬ dence in all manner of cases that this depart¬ ment represents before the courts. Anti-trust prosecutions, violations of the national banking laws, land graft, bucket shop frauds, night riding, smuggling, peonage, white slavery, and above all treason against the United States

come under its jurisdiction. In the work of all the departments it takes hold where investiga¬ tions point to crime. There are investigating bureaus in most of the departments. These amass facts and figures but no evidence. The province of the new secret service is to procure evidence admissible in court in any case where the government may appear as the prosecutor. The force numbers several hundred and is supported by Congressional appropriation.

In the Philippines. — In the Philippine Is¬ lands there are 25 employees of the Secret Service Bureau under charge of a chief, since the organization on 7 Aug. 1901 of the Manilla district. Previous to that date the department was under the jurisdiction of the military au¬ thorities, when the duties performed consisted of general secret service work incidental to the military occupation of a foreign country, namely, to detect and frustrate plots against the government, locating and arresting insurgent leaders and the

capturing of insurgent records and munitions of war, as well as performing all the criminal work necessary. At this time, the country being under martial law, arrests were made under that authority, without the application of civil process, simplifying to a great extent the duties of the secret service agents as compared with the present. As the insurgent army disbanded, great numbers of its officers and soldiers came to Manila, and as they had done nothing but soldier for many years, they were not disposed to settle down immediately to peaceful vocations, and were willing to engage in any pursuit that did not de¬ mand any mental or physical exertion. During the early days of American occupation, and while the Bilibid prison was still in charge of the Spanish authorities, great numbers of pris¬ oners of the worst class effected their escape, and although the secret service office continu¬ ally located them and returned them to prison, the majority remained at large. The Manila office maintains a correspondence with the other large cities of the Orient and the United States with reference to criminal information. There are on file about 3,000 photographs of convicted criminals of all classes and nationalities, to¬ gether with a complete description of the same, and the records contain information pertinent to every political and criminal case which has ever come under the supervision of the Secret Service. The Post Office Department also maintains a secret department, though it is not so called, being named inspection department. Its duties are to protect the public against frauds carried on through the mail.

SECRET SOCIETIES have existed in all ages known to history, and among all classes of mankind, except, perhaps, savages of the very lowest type. In the ancient world they were chiefly religious, or at least professedly so, but in ancient times religious and temporal power were so closely associated that it was difficult, if not impossible, to draw a dividing line. There were the mysteries of Osiris and Serapis in Egypt, of Orpheus and Dionysus in Greece, of Cybele in Phrygia and of Mithras in Persia, all of which tended to surround the worship of the gods with elements of secrecy and awe, which appealed to the conscience and imagina¬ tion oi men, and helped to keep the ignorant multitude in submission to the hierarchy and

all that it represented. The tendency of ancient religions, in all countries, was toward secrecy and mysticism, and it was not easy to obtain admission to the inner circle of the elect. Once admitted, however, as a participant in the mysterious rites, the initiate became one of a fraternity whose influence was felt in every walk of life, and whose power even the most despotic tyrant did not care to defy. In ancient Egypt there was secret organizations,

which taught the Eleusinian mysteries (q.v.), and among mystics to-day there is evidence of the influence of this secret body. Among Jews as well as Gentiles secret societies held potent sway. The Essenes (q.v.) were a religious sect, devoted sincerely to the purer life which the Pharisees, with less sincerity, professed, and their asceticism was attended by a large degree of mysticism. It has been claimed that Jesus Christ was a member of the Essene order. The Cabalists were successors of the Essenes, and also had their mystic practices and secret signs, and the Christian Gnostics were an exclusive sect with occult ceremonies and teaching.

In the Middle Ages the secret courts of Westphalia were practically vigilance commit¬ tees, bound to secrecy by the very object of their existence. The Knights Templar were a secret order, although there is no trustworthy evidence that they were guilty of the practices alleged against them as a ground for the sup¬ pression of the order, and the seizure of its wealth.

The Freemasons originated in the combina¬ tions formed by operative masons in the Mid¬ dle Ages for self-protection while they were building the cathedrals and other great struc¬ tures which excite the admiration of the modern world. It is generally believed by students of antiquity that the origin of the order rests on a still more ancient body from which it sprung. Speculative Freemasonry, as it is called, was based on the more ancient form, and found in it a useful groundwork for the vast organi¬ zation which has spread over the globe, and has its members in every class, from emperor and king to the toiler who works for his daily bread.

The secret societies which hgve arisen within the 19th century have been chiefly political and benevolent. The struggle for freedom in Italy gave birth to powerful secret organizations, which continued to exist after Italian unity had been gained, and have caused, at times, much anxiety to the authorities. Ireland has also had and still has a number of secret political so¬ cieties, including the United Irishmen, the Fe¬ nians, the Orangemen and other orders of the past and present. In Russia the revolutionary society known as Nihilists (see Nihilism) has slain one tsar, and is an ever-present menace to autocratic government. In China secret so¬ cieties pervade every class of the population; some of them are continually hatching rebellion, and one of them, known as "Boxers,® caused the attack on the legations at Peking, which provoked Europe and Japan to severe reprisals.

Coming down to modern American secret societies, we find that they divide naturally into groups. Many are concerned with political or semi-political movements, as the United Ameri¬ can Mechanics and the Knights of Labor; others are of religious character, as the Rosicrucians, and various alliances

and leagues within the several denominations; others foster

temperance or some moral issue, as the Good Templars; others are fraternal, and have gen¬ erally insurance features, as the Odd Fellows (q.v.) and Eagles (q.v.) ; others are ap¬ proximately fraternal, as the Greek letter so¬ cieties (q.v.) of the colleges; others grow out of trade alliances, as the ancient guilds and modern trades unions; the military also have their secret societies, of which the most con¬ spicuous is the Grand Army of the Republic (q.v.) now being fast decimated by death, but surviving in the Sons of Veterans (q.v.). With very many of these there is little or no need of secrecy, and it is maintained largely to avoid the nuisance of visitors not in harmony with their work, or simply because they have become used to it, and it is hard to change cus¬ tom.

The famous Tammany Society of New York, less generally known as the Columbian Order, dates from 1789, being only a fortnight younger than the republic itself; it was based on an earlier secret society, the Sons of Liberty of Maryland, one of those bodies that had to be conducted largely in secret, as de¬ veloping the spirit that culminated in the Revolution of 1776. Tammany is now a wholly political body, within the Democratic party. (See Tammany). The Independent Order of Red Men (q.v.) developed from the same parent stock as Tammany, but along radically different lines of fraternity. It is one of many important societies, described and enumerated under the title of (Fraternal Societies in America) in this Encyclopedia. A number of organizations have grown up in opposition to the spread of political activity of Roman Catholic societies. Earlv among these were the United American Mechanics (q.v.), the American Protective Association (q.v.), better known as the A. P. A., Sons of Seventy-Six, Order of the Star Spangled Banner and more recently Guardians of Liberty. Their policies have been directly opposed to those of the An¬ cient Order of Hibernians (q.v.) and the modern Knights of Columbus (q.v.). The Sons of Temperance (q.v.) is the earliest organiza¬ tion noted interested in this work, having been founded in 1843. It was later followed by the Independent Order of Good Templars, which had a vast, following in 1875-85, but declined when Prohibition became prominent. A large number of the more important secret societies will be found under their respective titles.

There seems to be no doubt that secrecy of organization in America is on the wane, as the trend of public thought is toward publicity. Secrecy is a relic of the times when men were not permitted to think and act for themselves, and had to avoid domination. It is safe to as¬ sert that there is not an organization to-day in the United States, where secrecy is regarded as of great importance, even Freemasonry (q.v.) making public a great deal of its work and doings. The fact that so many secret or¬ ganizations retain

very large memberships seems to be due, not to the secrecy, but to their having engaged in useful or fraternal work, and having a mission to accomplish. There are secret societies that are bad, however. Of such societies with evil purposes, the most noted is the Mafia (q.v.), of Italy, which is said to have been introduced into the United States with the large Italian immigration, and to which many

crimes have been ascribed. The Molly Ma¬ guires were a society in the Pennsylvania coal regions, about 35 years ago, organized for the objects of terrorism and murder. It was sup¬ pressed by a relentless prosecution on the part of the State, and the execution of the leaders. Consult Heckethorn, (Secret Societies of All Ages) ; de la Hodde, Z., (Secret Societies of France) ; Frost, (Secret Societies of the French Revolution, > etc. See Societies, Criminal; Ku Klux Klan ; Essenes : Fraternal Socie¬ ties in America; Masonic Fraternity; Odd Fellows, and other secret societies under their respective titles.

SECRET SOCIETIES, College. See

Greek Letter Societies.

SECRETARIAL EDUCATION. The dis¬ tinction between the secretary and the stenog¬ rapher is not sharp. The duties of the two fre¬ quently shade the one into the other. The stenographer of course has distinctive abilities. He knows some system of shorthand, he is a typist and he can transcribe his shorthand notes on the typewriter. The secretary, on the other hand, while he will find these abilities of the stenographer useful, will find that they are only a small beginning of what he needs. In fact the secretarial range of usefulness is very wide, too wide to be wholly comprehended in a single course of training. It is advisable to consider secretarial education under two heads, general or preparatory education and technical or special education.

Whether we have in mind the general or technical training it is necessary to classify the secretarial work. We may distinguish between the private or personal secretary and the in¬ stitutional or organization secretary. The lat¬ ter is a person who records the minutes of meetings of boards of trustees, boards of di¬ rectors, committees, etc. This type of secretary needs very little technical training but should have a good general education. The private or personal secretary may .be a social, educa¬ tional, literary, political, ecclesiastical or busi¬ ness secretary, according as he serves a

per¬ son engaged in any of these professions or oc¬ cupations. The word secretary has its best application only in this sense, signifying a per¬ son who has charge of the secreta (secrets) of his employer.

Secretarial education presupposes a thor¬ ough high school or other secondary school course. After this preparatory training follows a liberal education with major emphasis on the particular field in view. The prospective social secretary gives major emphasis to philanthropy, history, art, literature. The prospective educa¬ tional secretary centres his major interest on comparative education, educational administra¬ tion, the philosophy of education, history of education, etc. The literary secretary must have literary taste, a knowledge of style and a wide acquaintance with the world's best liter¬ ature. The political secretary will need thor¬ ough acquaintance with history, economics, sociology, law, etc. The ecclesiastical secretary must add to a liberal education a knowledge of church polity. The business secretary must lay emphasis on economics, geography, indus¬ trial history, commercial law, accounting, soci¬ ology and psychology. It is clear that the best results can be obtained only when the general

education has consciously aimed at the partic¬ ular field in which the secretarial duties are to be performed. Without such general educa¬ tion the secretary remains merely a clerk or a stenographer.

Secretarial education in its technical or specialized form should, therefore, be assigned to the last two years of the regular college course or, preferably, it should be a graduate course. With collegiate courses as a back¬ ground, this technical training can be given in one or two years. It should offer the follow¬ ing features : Applied psychology, correspond¬ ence, business organizations, office management, filing systems, publicity methods, library meth¬ ods, including cataloguing, business law, finance, stenography, typewriting.

History of Secretarial Education.— Busi¬ ness colleges have undertaken the training of secretaries but they have been unable to com¬ mand the best standards of preparation or of training. They admit as students persons who have had less than a grammar school education. Their product is, therefore, defective in the use of English, frequently inaccurate in the use of ordinary office machinery, and wholly unpre¬ pared for the secretaryship as outlined above. The best business college product furnishes good material for stenographers.

High school commercial departments are rapidly entering this field. Their entrance re¬ quirements are higher and they give a broader training in language, history, science, etc., but they often fall short of thoroughness in

the mechanics. That is, they give insufficient time to secure the necessary speed and accuracy in stenography and typewriting. The high school commercial product at its best approaches a secretarial standard but falls far short of the best conception of the secretaryship.

Both the business college and the high school commercial department are temporary means for meeting an ill-defined need. As the secretarial definition becomes clarified, the de¬ mand grows for a higher type of training. Colleges are adding secretarial courses and several universities are offering advanced courses in Business Administration. Among them are Simmons College, Harvard, Yale, New York University and others. A typical undergraduate secretarial college course is the following: Freshman year: English, French, German, history, hygiene, physics, filing. Soph¬ omore year,: English, French, German, history, penmanship, stenography, typewriting. Junior year: Business law, economics, English, ste¬ nography, typewriting, French, German, his¬ tory, sociology. Senior year: Accounts, busi¬ ness methods, commerce, commercial teaching, economics, education, English, French, German, government, history, sociology, Spanish. A typical graduate course, open only to students who have already earned the bachelor's degree, is the following: Accounts, administration, business practice, stenography, typewriting, business law, library practice, commerce.

A. R. Brubacher,

President, State College for Teachers, Albany,

N. Y.

SECRETARY-BIRD, or SERPENT EAGLE, a remarkable raptorial bird (Serpen – tarins secretarins) of South Africa, represent¬ ing alone the family S erpentariidce, associated

with the vultures. The general aspect of the bird is that of a long-winged, long-tailed, gray- and-black hawk mounted upon very long legs, so that as it stalks across a plain it might easily be mistaken for a crane. It runs with the speed of a horse and will fly when forced to do so, and may soar to a considerable height. It builds a big substantial nest in some bush or tree and reoccupies it from year to year. Their food consists of small animals and reptiles of all sorts, and especially of snakes, which it kills with a powerful forward kick, or, if the first stroke is not effective, repeats it with feet and knobbed wings, actively dodging the serpent's lunges, until the reptile is

disabled or dead. These birds are frequently tamed and kept about the farmyard in South Africa as vermin destroyers. They take their name from the tufts of erectile feathers growing on each side of the head, which suggest a bunch of pens stuck behind a clerk's ear: the Arab name means <(thirty ears.® Consult Evans, (Birds' (New York 1900).

SECRETARY OF STATE, an officer whose business is to superintend and manage the affairs of a particular department of gov¬ ernment. In the United States the Secretary of State has entire charge of foreign affairs, consular agencies and diplomatic matters. He is a member of the President's Cabinet and is usually considered the principal adviser to the chief executive. In Great Britain there are five secretaries of state, namely, those for the Home, Foreign, Colonial, War and Indian departments. The Secretary of State for the Home Depart¬ ment has charge of the privy signet office ; he is responsible for the internal administration of justice, the maintenance of peace in the coun¬ try, the supervision of prisons, police, sanitary affairs, etc. The Secretary for Foreign Affairs conducts all correspondence with foreign states, negotiates treaties, appoints ambassadors, etc. The Colonial Secretary performs for the colo¬ nial dependencies similar functions to those of the Home Secretary for the United Kingdom. The Secretary for War, assisted by the commander-in-chief, has the whole control of the army. The Secretary for India governs the affairs of that country with the assistance of a council. Each secretary of state is assisted by two under-secretaries, one permanent and the ether connected with the administration, with numerous subordinates. The Chief Secretary for Ireland is not a secretary of state, though his office entails the performance of similar duties to those performed by the secretaries of state. In 1885 the office of Secretary for Scot¬ land was revived ; he exercises in Scotland many of the powers and duties of the secretary for the home department, but has no cabinet rank by virtue of his office. The Secretary to the Admiralty is a subordinate member of the government, always a member of the House of Commons, in which he represents the Admi¬ ralty when the First Lord of the Admiralty is a peer. A secretary of embassy, or of legation, is the principal assistant of an ambassador or envoy.

SECRETION, the process whereby certain structures — glands or membranes — elaborate, separate or secrete, from the common medium presented by the blood, definite and specialized products destined either for use in the economy

of the body, or for being sent out of the organism. In this way the process of secretion subserves a double function, or exhibits a double aspect, inasmuch as it not only manufactures products for home consumption, as it were, but provides also for the removal of waste matters from the body. Substances or products elab¬ orated for the use of the organism are named

secretions. Products secreted only to be dis¬ charged from the organism are called excretions. Take the liver and its bile as an example of a true secretion destined — primarily, at any late — for use in the body, that is to say, in the process of digestion and elaboration of food; then as an illustration of the excretory form of the process, observe the kidneys and their secretions, these organs secreting from the blood urea, carbonic acid and other products which, in the form of urine, are destined to be discharged sooner or later from the body. The work of secretion is thus primarily seen to be among the most important of those actions the perfect performance of which contributes to the welfare of the organism; and interruption to the secretory processes results necessarily in the induction of disease of more or less serious kind. As both secretions and excretions are poured out from the secreting organ either upon the outer surface of the body or into some of its internal channels or ducts, it would ap¬ pear that the two processes are identical in their ultimate aims and ends.

But true secretions (for example, bile and milk) consist of substances or compounds which, as such, do not exist in the blood, but demand a process of elaboration in the glands or secreting structures for their due and per¬ fect formation. Excretions, such as the urine, consist of substances which exist in the blood in a form somewhat related to the final product. The elements are collected and thrown out more or less as such. Secretions exist poten¬ tially in the blood, and require for their elabo¬ ration definite and special structures. Excre¬ tions actually exist in the blood, and demand for their elimination and separation processes more analogous to mere filtering, and less com¬ plicated than those demanded by the work of secretion. This latter distinction receives practical confirmation and support from the fact that when excretions are checked in their natural discharge they may appear in their characteristic form in the blood. This result is well seen in cases of suppression of urine through disease or injury of the kidneys. But if true secretions be checked they cannot, under the same or ordinary circumstances, be de¬ tected in the blood ; and removal of the secret¬ ing organ forever prevents the reappearance of the secretion. A pent-up secretion may be reabsorbed by the blood, and be detected in that medium, but this does not affect the grand distinction to be drawn between the actual na¬ ture of and differences between the two processes.

The essential structural characters of a secreting surface consist, firstly, of a structure¬ less primary or basement membrane; secondly, of blood-vessels, which bring the blood from which the secretion is elaborated ; and lastly, of cells or special structures devoted to the fur¬ ther elaboration of the constituents derived from the blood. A simple membrane, such as a serous or mucous membrane, exhibits the ar-

rangement of these elementary parts in its simplest phase; while more complicated ar¬ rangements of the same essential parts result in the formation of the more definite secreting parts which we term glands. Of these struc¬ tures, in themselves constituting most of the chief organs or viscera of the body, three great plans may be distinguished, so far as the ar¬ rangement of their elementary parts is con¬ cerned. Thus the simple tubular glands — well exemplified in the tubular follicles of mucous membranes, in the gastric follicles or glands of the stomach, in the sweat or sudoriparous glands of the skin, etc. — consist of simple tubu¬ lar involutions or depressions of the membrane which forms them, or with which they are con¬ nected. Each consists, therefore, of an open and elongated pouch or vesicle, the wall of which is composed of the primary membrane, while its lining is formed of secreting cells. This primary and elementary form of glands may be complicated by presenting a saccular rather than a merely tubular form, or by hav¬ ing the simple tube developed in a coiled form. The aggregated or conglomerate glands form the second division of gland structures. Such are the true mucous glands of the membranes of that name, the salivary and mammary glands, the prostate gland and the pancreas or sweetbread. These glands exhibit an essential structure composed of rounded clusters of vesi¬ cles termed acini, grouped together in various ways, which contain gland-cells, and which open by minute ducts gradually uniting to form the main duct of the gland. These acini or vesi¬ cles, as before, are lined by secreting cells. The third variety of glandular structures is that comprised in the idea of convoluted tubu¬ lar glands. The kidney and the testicle exem¬ plify this latter class of structures. In these glands we find tubules of basement membrane of generally uniform size, presenting a convo¬ luted appearance, and terminating either in blind pocket-like extremities or by dilatations, as seen in the Malpighian corpuscles. (See Kidneys.) Sometimes, however, such tubular structures may, as in the testicle, form a loop, and then return along their original course. The tubules are lined by their secreting cells, and in their tortuosity evince a structure which presents a large secreting surface frequently comprised within a very small space or extent.

The exact means or rationale whereby each gland is enabled, from the common medium furnished to all, to elaborate through its own special cells its characteristic secretion, presents a problem from the perfect solution of which physiological science seems as yet far off. The cells of the liver contain bile; those of the mammary gland contain the fatty particles of the milk; and those of the testicle spermato- zooids. But it can only be said that cells se¬ crete; of the origin of these secreting powers and of the exact manner in which they are ex¬ ercised nothing is known ; yet that some acute and distinct specialization of the powers of secreting or gland-cells

takes place over those of other and ordinary cells there can be no doubt whatever.

The view that secretion and the great proc¬ ess of nutrition (q.v.), to which secretion min¬ isters, are identical is a reasonable and thor¬ oughly consistent opinion. Viewed as mere organs, and apart from all purely functional

considerations, the structure and formation of secreting glands might be regarded as simply processes of pure nutrition.

The greater the vascularity or blood-supply sent or distributed to any secreting organ the greater generally are its secreting powers. But the rate of circulation through a gland, or the mere quantity of the blood itself, cannot be shown to exert any direct influence on its secre¬ tory powers. Secretions may be retained for a lengthened period in some glands — such as the testicle — which are only periodically active, or they may be almost continually discharged, as is the case with the secretion of the kidneys. Under stimulation most if not all glands secrete more rapidly and abundantly, but the nature of the stimulation varies in different cases, or may be either of normal or abnormal kind. The discharge of secretions is effected by pressure from behind, while occasionally, as in the ure¬ ters and bile-ducts, the pressure of muscular fibres aids in the expulsion of secretions. The particular quality of blood may affect secretion, as at certain times a greater quantity of a par¬ ticular material may be contained in the blood, the presence of this material stimulating the action of some appropriate gland.

The influence of the nervous system is im¬ portant in connection with the general condi¬ tions of secretion, but much belonging to this topic exists in a still obscure state. It is known, however, that by regulating the supply of blood to a gland the nervous system may indirectly operate in preventing or forwarding the work of any gland, and that through the agency of conditions acting upon the nervous centres and upon the vegetative nervous system, effects are respectively wrought upon the glands. Food in the mouth induces a reflex action (q.v.), which action, produced through impressions made on nerve centres and reflected to the nerves of the salivary glands (q.v.) in¬ duces a copious flow of saliva through the stimulation of the glands. Mental conditions alone, and without material stimuli, will excite secretion, as seen in the flow of tears, or in the flow of saliva following the description of dainties; while the sudden stoppage of the milk secretion through fear or sorrow affords an illustration of the same fact. One secreting surface or gland bearing a functional relation to another gland (for example, kidneys and skin) may, through diminished or increased action, affect that other. Consult Bayliss, Principles of General Physiology)

(2d ed.,

1918).

SECTOR (Latin, seco, to cut), denotes in geometry that portion of the area of a circle included between two radii and an arc; or, a mixed triangle formed by the radii mentioned and the arc of a circle. Thus ABC contained within the radii C A, C B, a nd the arc A B is a sector of the circle of which the arc A B is a portion. The area of a circular sector is equal to the product of the arc of the sector by one- half of the radius. If the angle at the centre is given, the. length of the arc of the sector may be found, since it is equal to n multiplied by the radius into the ratio of 180 degrees to the number of degrees of the sector. Thus: —

S=,rri80°'andA = ,r"360»' for the area.

A spherical sector (the one just described is a circular sector) is a volume or solid that may be generated by revolving a circular sector about a straight line drawn through the vertex of the sector as an axis. The arc of the spherical sector generated the surface of a zone called the base of the spherical sector and the two radii generate the surfaces of the two cones, having a common vertex at the centre of the sphere. The volume of the spherical sec¬ tor is equal to the zone which forms its base, multiplied by one-third of the radius of the sector.

Sector is also used as the name of an instru¬ ment employed in practical mechanics. It is sometimes called the sectorial scale of equal parts. It is usually a scale of wood, brass or ivory, consisting of two arms which open by turning round a joint or hinge at their com¬ mon extremity. On each arm there is a diagonal line drawn through the point about which the arms revolve. These are divided into equal parts, which are numbered from the com¬ mon point outwards.

The sectorial scale is so marked with lines of sines, tangents, secants, chords, etc., as to fit all radii and scales, and is useful in making diagrams : laying down plans, etc. Its principal advantage consists in the facility with which it gives a graphical determination of proportional quantities. It becomes incorrect comparatively, when the opening is great, or the result greater than the data. The sector is founded on the fourth proposition of the sixth book of Euclid, where it is proved that equiangular triangles have their homologous sides proportional.

This instrument is said to have been invented by Guido Uvaldi about 1568, though Gaspar Mordente of Antwerp describing it in 1584, at¬ tributes its invention to his brother Fabricius in 1554. It was described by several German and English writers in the same century, and again by Galileo, who claimed to have invented it in 1604. Frenchmen call it the compass of pro¬ portion.

Another instrument, used in astronomical observation, is called sector. A limb of this in¬ strument embraces only a portion of a circle used for measuring differences of declination too great for the compass of a micrometer. This instrument was contrived for the purpose of measuring with great accuracy the zenith distances of' stars, and when it is so employed it is called a zenith sector. It was by means of the zenith sector that Bradley discovered the existence and magnitude of two very important astronomical elements — the aberration of light, and the nutation of the earth's axis. The in¬ strument has been at times used in trigonometri¬ cal surveys for determining the difference of latitude between two stations. For the differ¬ ence of the zenith distances of the same star, observed at its meridianal passages at two places, gives the difference of the astronomical latitudes of such places without any regard to the star's declination.

There is yet another way in which the word

sector is used. It sometimes denotes an arc¬ shaped attachment to an equatorial mounting often used for communicating the motion of the driving clock to the polar axis. A driving clock, obiter dicta, is a powerful and accurate clock motion used in astronomical and physical investigations to turn an equatorial telescope round its polar axis, so as to hold an object fixed in the field of view; or, for driving a chronograph or other instrument.

SECTS, Religious. See Religious Sects.

SECULAR GAMES, in Roman history, games celebrated at long and irregular intervals, and not, as their name would seem to indicate, once every century. Under the republic they were known as the Tarentine games, from a nlace in the Campus Martius, called Tarentum, where they were celebrated, and appear to have been instituted about the time of the consul Valerius Publicola. Nothing is known of their origin beyond the fact that they were celebrated in honor of Pluto and Proserpina for the pur¬ pose of averting from the state some great calamity. Under Augustus they were revived in 17 b.c. with considerable pomp, occupying three days and nights, and being accompanied by sacrifices to Jupiter, Juno and all the superior deities. For this occasion Horace wrote his (Carmen Sseculare) in honor of Appollo and Diana, sung by a chorus of youths and virgins. The secular games were celebrated on subse. quent occasions, namely, in the

reign of Claudius in 47 a.d., in that of Domitian in 88, and in that of Philip in 248, exactly 1,000 years after the building of Rome.

SECULARISM, an ethical system founded on the principles of natural morality and inde¬ pendent of revealed religion or supernaturalism. Its first postulate is freedom of thought — the right of every man to think for himself : this is now admitted, at least in theory, by most Chris¬ tians; but it was not so when the platform of Secularism was first promulgated about the year 1846 by George Jacob Holyoake in England. Implied in this postulate as its neces¬ sary complement is the right to difference of opinion upon all subjects of thought. And this right would be nugatory without the right to assert that difference. Finally, Secularism asserts the right to discuss and debate all vital questions, such as the commonly received opinions regarding the foundations of moral obligation, the existence of God, the immortality of the soul, the authority of conscience, etc. Secularism does not maintain that there is no other good but the good of the present life: with that question it does not meddle: but it does maintain that the good of the present life is a real good, and to seek that is good; and it aims to find ((that material condition in which it shall be impossible for man to be deprived or to be poor.® In this life there are, it asserts, material agencies which cannot be neglected without folly or hurt, and that it is ((wisdom, mercy and duty to attend to them.® It does not combat the pretensions of Christianity; does not say there is no light or guidance save in nature; but maintains that ((there is light and guidance in secular truth, whose conditions and sanctions exist independently, act independently, and act for ever.®

SECULARISTS. See Religious Sects.

SECURITIES. See Banks and Banking — Functions of Banks, etc.

SECURITY OF PERSON. See Rights.

SEDALIA, Mo., city, county-seat of Pettis County and the largest city of the central por¬ tion of the State, on the Missouri Pacific and Missouri, Kansas and Texas railroads, 189 miles west of Saint Louis and 96 miles east of Kansas City. Sedalia is the terminal point of four divisions of the Missouri Pacific and of three divisions of the Missouri, Kansas and Texas Railroad, including the main lines and branches. The general car and repair shops of the latter road are located at this point, occupy¬ ing 37 acres of ground, with buildings and machinery costing $160,000 and employing 600 to 800

men. In 1904 the Missouri Pacific Rail¬ way Company established at Sedalia its general shops for repairs and construction of cars and locomotives for the entire system at an ex¬ pense of over a million dollars and calculated for the employment of 2,000 men, the citizens donating $230,000 in money and land as an in¬ ducement.

There are numerous manufactories of domestic commodities and several large jobbing and distributing, packing and shipping-houses. There are three national banks, two State banks, and one trust company, with a total capital, surplus and undivided profits of $850,500; de¬ posits, amounting to $5,000,000; also two loan companies. The banks operate a clearing-house for the country banks in surrounding counties, clearings amounting to $1,250,000 per month.

The public buildings include the courthouse, a stone structure, costing $110,000; city hall, market, government building, engine-houses, etc.; Carnegie library, cost $50,000; Y. M. C. A., cost $60,000, 650 members. The public park of 50 acres in city cost $85,000, with swimming pool, tennis court, nice lake for boating, chil¬ dren's playground equipment, large convention hall that has a seating capacity of 1,500. The Missouri State Fair was located in Sedalia in 1901, and $1,000,000 has been spent in build¬ ings and improvements. There are 27 churches and excellent free schools. There are a dozen public school buildings, with furniture, libra¬ ries, etc., valued at $350,000; 100 teachers, an¬ nual pay roll $57,000. Besides the public schools are two business colleges, one college for colored students, supported by the Methodist Episcopal Church, and several private and parish schools. The high school has a four- years' course and articulates with the State Uni¬ versity.

Public utilities are represented by water, gas and electric companies, with a capital of $3,- 250,000, supplying 2,000,000 gallons of water per day, gas, electric light and power; a street rail¬ way company, operating nine miles of street railway, also furnishing electric light and power; a steam heating company, all operating under franchises protecting public and private rights; and two telephone companies. The municipal and school elections are conducted the same as the national and State elections ; having the two political parties — Democratic and Republican — each party nominates a candidate for each office. The government is vested in the mayor and board of eight aldermen. Other officers are police judge, clerk, marshal, assessor, col¬ lector, treasurer and attorney. The total valua¬

tion for taxation in 1915 was $5,733,045, being 40 per cent of cash value. Tax levy for cur¬ rent expense and sinking fund 1 per cent. Total revenue, $105,179.82. Bonded debt $172,000, of which a part bears 4 per cent

and the balance 4/2 per cent. Prior to 1860 the present site of Sedalia was wild prairie. Foreseeing the build¬ ing of the Pacific Railway, Gen. George R. Smith, a resident of Pettis County, acquired a tract of land in 1836 and 11 Nov. 1857 filed a plat of the town of Sedalia. The first settle¬ ment on the town site was in 1860, the railway reaching the place in January 1861. Owing to the breaking out of the Civil War, the west¬ ward advance of the railway was delayed, and Sedalia for several years wasi the western terminus and an important military post and shipping point for the Southwest. The place was held by the Federal troops throughout the war, save for its capture, after a sharp fight, in October 1864, by the Confederate general, Jeff Thompson, who was driven out the next day by Gen. A. J. Smith. The impetus in growth given to Sedalia during the wrar was afterward con¬ tinued by its becoming a railway centre of im¬ portance, and its growth, though slow, has been constant. Pop. (1920) 21,144.

M. V. Carroll,

Secretary of Chamber of Commerce.

SEDAN, sa-dan, France, a town in the de¬ partment of Ardennes, near the Belgian fron¬ tier, on the Meuse River, opposite Torcy, and about 160 miles northeast of Paris. Its prin¬ cipal buildings are the theatre, public library and college. The town has important cloth manufactures, employing the majority of the inhabitants. Its chief interest is connected with the defeat of the French army by the Ger¬ mans, and the surrender of Napoleon III with 100,000 soldiers 2 Sept. 1870. Pop. about 22,000. See Franco-German War.

SEDAN-CHAIR, so called from Sedan, a town in northern France. A covered chair, cushioned and decorated, used as a vehicle for carrying one person who sits within it, the en¬ closure being therefore of much greater height than width. It is carried on two poles which pass through rings secured to the sides, usually by two bearers. They were introduced in western Europe in the 16th century, but their use was extended greatly in the 18th century when they were the common means of trans¬ portation for ladies and gentlemen in England and France. Similar chairs carried on the shoulders of two or more bearers, have long been in use in China.

SEDDON, James Alexander, American statesman: b. Falmouth, Va., 13 July 1815; d. Goochland County, Va., 19 Aug. 1880. He was graduated from the law school of the Uni¬ versity of Virginia and practised law in Rich¬ mond. He was a Democratic member of Con¬ gress 1845-47 and 1849-51, after which he re¬ tired to his estate. In February 1861 he was one of five delegates to the ((Peace Congressˆ at Washington where he

maintained the right of a State to peaceful secession. In Julv 1861 he was a delegate from Virginia to the Con¬ federate provisional Congress, and in November 1862 became Secretary of War in the Con¬ federate Cabinet. This position he held until the Civil War was nearly over, resigning 28 Tan. 1865 and retiring from public life.

SEDDON, Richard John, New Zealand premier: b. Eccleston, Lancashire, England, 1845; d. at sea, 10 June 1906. Emigrating to Australia at 18 he was attracted to New Zea¬ land four years later by the gold discoveries. He sat in the New Zealand Parliament in 1879— 81 and 1881-90; later he became minister for defense and public works, commissioner of trades and customs, and finally rose to be pre¬ mier. By profession he was a mining engineer, and he was an associate of the American Insti¬ tute of Mining Engineers. He was the body and the soul of the New Zealand government.

SEDGE, a common term indiscriminately applied to the many marshy plants of the family Cyperacece , and particularly to the genera Cyperus and Carex. The sedges are grass-like or rush-like herbs with slender stems, generally solid, often triangular, and but rarely swollen at the nodes. The leaves are pointed and nar¬ row (the word "sedge® refers to their cutting edges), with closed sheaths, with or without reduced ligules, and are three-ranked. The flowers are either perfect or otherwise, and are very small, having a hypogynous perianth, gen¬ erally consisting merely of bristles or scales, with from one to several stamens having slen¬ der filaments, and a simple, toothed or cleft style. The fruits are one-celled and are len¬ ticular or three-cornered. The tiny grass-like flowers are gathered into spikelets of one or more, each (or rarely a pair) in the axil of a scale, which may be persistent or deciduous ; the spikelets are themselves arranged in various inflorescences, often in conspicuous umbels. The sedges frequent marshy lands, chiefly, and are occasionally useful in binding sea-sands or in contributing to the growth of peat-bogs.

SEDGWICK, Adam, English geologist: b. Dent, Yorkshire, 22 March 1785; d. Cam¬ bridge, 27 Jan. 1873. He was graduated at Trinity College, Cambridge, in 1808, became a Fellow there in 1810 and in 1816 was ordained in the Anglican Church. Because of general high ability he was appointed professor of geology at Cambridge in 1818, a chair hitherto something of a sinecure. Sedgwick, however, set at once about acquiring a knowledge of geology that enabled him to raise the chair to one of importance in the university: was one of the founders of the Cambridge Philosophical Society in 1819, through which he greatly as¬ sisted the

development of the study of natural science ; and labored indefatigably to augment the geological collections of the university, often at his personal expense. He continued his duties as a clergyman and made important geological investigations in Wales, Yorkshire, Devonshire, the Lake Country, the Isle of Wight and northern Scotland. He founded the Cambrian and the Devonian systems ; but was for long engaged in a controversy with Mur¬ chison, whose Lower Silurian system overlapped Sedgwick's Upper Cambrian system. The mat¬ ter was disputed until the substitution of the term Ordovician after Sedgwick's death. He was president of the Geological Society in 1829-30, and was awarded its Wollaston medal in 1851. He was also awarded the Copley medal of the Royal Society in 1863. As a memorial to him the Sedgwick Museum was opened at Cambridge in 1903. Author of Geo¬ logical Relations and Internal Structure of the

Magnesian Limestones> (1828) ; discourse on the Studies of the University of Cambridge) (1833); (Synopsis of the Classification of the British Palaeozoic Rocks) (1855), etc. With Murchison he wrote (Physical Structure of the Rocks of Devonshire) (1839).

SEDGWICK, Anne Douglas (Mrs. Basil de Selincourt), American novelist: b. Engle¬ wood, N. J., 28 March 1873. She left the United States when a child and has since lived chiefly in Paris and London. She studied paint¬ ing in Paris but later turned her attention to literature. She was married in 1908. Author of (The Dull Miss Achinard> (1898) ; (The Rescue) (1902) ; (Paths of Judgment (1904) ; (A Fountain Sealed) (1907);

SEDGWICK, Arthur George, American lawyer and editor, son of Theodore Sedgwick (1811-59, q.v.) : b. New York, 6 Oct. 1844; d. Pittsfield, Mass., 14 July 1915. He was grad¬ uated at Harvard University in 1864, entered the Union army as first lieutenant in the 20th Massachusetts regiment in that year, was taken prisoner and held at Libby Prison. He after¬ ward entered the Harvard Law School and was admitted to the bar in 1866. He then prac¬ tised law at Boston and was engaged with O. W. Holmes, Jr., in editing the American Law Review in 1866-72. He practised in New York in 1875-81, and was contributing editor to both the Evening Post and the Nation until 1905. He was law lecturer at Lowell Institute, Bos¬ ton, in 1885-86, and was Godkin lecturer at Harvard University in 1909. He was joint author of (Treatise on the Principle and Prac¬ tice Governing the Trial of Right to Land) and author of (Elements of Damages) (1909) ;

(Democratic Mistakes) (1912).

SEDGWICK, Catharine Maria, American

author, daughter of Theodore Sedgwick (1746- 1813) : b. Stockbridge, Mass., 28 Dec. 1789; d. Roxbury, Mass., 31 July 1867. She was for many years the principal of a famous school for young ladies, and in her day was widely known as an American novelist. Her best-known works are (A New England Tale) (1822) ; Redwood, first published anonymously, trans¬ lated into four European languages, and erro¬ neously attributed to James Fenimore Cooper; (The Travelled (1825) ; (Hope Leslie, or Early Times in Massachusetts) (1827) ; and (The Linwoods) (1835). Consult Dewey, (Life and Letters of Catherine Sedgwick) (1871).*

SEDGWICK, Ellery, American author: b. New York, 27 Feb. 1872. He was graduated at Harvard University in 1894 and taught at Groton School, Massachusetts, 1895-96. He was on the editorial staff of the Worcester Gazette 1896 and The Youth's Companion 1896-1900; and from 1900-05 was the editor of Frank Leslie's Popular Monthly. After a brief connec¬ tion with McClure's Magazine and with Messrs. D. Appleton and Company, he became editor of the Atlantic Monthly and president of the com¬ pany 1909. In 1915 he was elected member of the National Institute of Arts and Letters. He has published (Life of Thomas Paine) (1899).

SEDGWICK, John, American soldier: 6. Cornwall, Conn., 13 Sept. 1813; d. Spottsylvania C. H., Va., 9 May 1864. He was graduated at

West Point in 1837 and served in the army from that time until his death, taking prominent part in three wars and in many engagements against the hostile Indians in the West. During the second Seminole War in Florida 1837-38, he was second lieutenant of artillery, was promoted in 1839, and took part in the Mexican War 1846- 47, receiving promotion for gallantry after Churubusco and after Chapultepec. When the Civil War began he became lieutenant-colonel of artillery and rose to the rank of major-general. Stationed first at Washington, he was afterward commander of brigade, then of divi¬ sion in the Army of the Potomac, being placed in command of the Sixth army corps in 1863. He took part in the battle iof Fair Oaks, the Seven Days' Battles ; was severely wounded at Antietam, and after a leave rejoined the army in time for Chancellorsville and Fredericksburg. He played a distinguished part at Gettysburg, and in 1864 participated in the battles of the Wilderness and Spottsylvania, at which latter place he was shot by a Confederate sharp¬ shooter during a movement of his troops. A bronze statue of him was erected at West Point in 1868. His death forms the subject iof a painting by Julian Scott, now in the public library at Plainfield, N. J.

SEDGWICK, Henry Dwight, American lawyer and author, brother of Ellery Sedg¬ wick (q.v.) : b. Stockbridge, Mass., 24 Sept. 1861. He was admitted to the bar in 1884 and was engaged in practice in New York in 1885—98. He has since been occupied with literary work. Author of (Letter of Father Cuellar> (1896) ; (Life of Father Hecker) (1897) ; (Life of Samuel Champlain) (1901); (Life (1908) ; (Italy in the Thirteenth Century) (1912) ; (An Apology for Old Maids (1917) ; (1919), etc.*

SEDGWICK, Robert, American colonist and soldier: b. Woburn, England, about 1590; died Jamaica, West Indies, 24 May 1656. He emigrated to Charlestown, Mass., in 1635, being one of the first settlers there; in 1638 he assisted in organizing the Ancient and Honourable Artil¬ lery Company of Boston (having received his training in the Artillery Company of London), and two years later became its captain. He rose to the command of the militia, in 1652. With John Winthrop, Jr., he. helped establish, in 1643, the first iron works of the United States. Under Cromwell's orders he captured several French ports in the Penobscot region and in 1655 assisted in the capture of Jamaica. Crom¬ well raised him to the rank of major-general and made him governor of that island.

SEDGWICK, Theodore, American jurist and legislator: b. Hartford, Conn., May 1746; d. Boston, 24 Jan. 1813. He studied at Yale, was admitted to the bar in 1766, began practice at Great Barrington, Mass., and soon removed to Sheffield, where he attained eminence in profes¬ sional and civil affairs, frequently representing the town in the Massachusetts legislature. At the beginning of the Revolution he entered the Continental army, serving on Gen. John Thomas' staff in the expedition to Canada, and later acting unofficially as commissary. In 1785-86 he was in the Continental Congress, and in the winter of 1787 was prominent in the sup¬ pression of Shays' rebellion (q.v.). He was

speaker of the State house of representatives in 1788, and in that year also a member of the State convention for the ratification of the Federal Constitution; from 1789 to 1796 a representative in Congress; and in 1797-99 United States senator, being president pro tern, in 1797. Then he was again in the House, and its speaker until 1801. From 1802 until his death he was a justice of the Supreme Court of Massachusetts, being noted on the bench for the clearness of his opinions. He was one of council who secured a decision (1780) by which such a construction was given to the constitu¬ tion of Massachusetts as to abolish slavery in that State. He was an active Federalist, and a member of the American Academy of Arts and Sciences.

SEDGWICK, Theodore, American author,

son of Theodore Sedgwick (q.v.) : b. Albany, N. Y., 27 Jan. 1811; d. Stockbridge, Mass., 9 Dec. 1859. He was graduated at Columbia College in 1829, and was admitted to the bar in 1833. He was attache at the United States legation at Paris in 1833-34, and after¬ ward practised law in New York until 1850. From 1858 until his death he was United States district attorney of the southern district of New York. Author of (Memoir of William Livingston) (1833) ; (What is Monopoly ? (1835) ; (Treatise on the Rules Which Govern the Interpretation and Practise of Statutory and Constitutional Law> (1857; 2d ed., 1874), etc. He edited the political writings of William Leggett (2 vols., 1840).*

SEDGWICK, William Thompson, Amer¬ ican biologist: b. West Hartford, Conn., 29 Dec. 1855; d. 26 Jan. 1921. He was graduated from the Sheffield! Scientific School of Yale University in 1877 and later studied at Johns Hopkins University. He was an instructor at the former 1878-79; was at Johns Hopkins as a Fellow in biology 1879-80; as instructor and associate professor of biology at the latter also 1880-83. After 1883 he was professor of biology in the Massachusetts Institute of Technology. He was biologist for the Massachusetts State Board of Health 1888-96. He is a joint author of (General Biology) (1886); and published (The Principles of Sanitary Science and Public Health) (1902);

(1906).

SEDILIA, in architecture, originally the rows of seats in a Roman amphitheatre. Later applied to the stone seats on the south side of the altar in Roman Catholic churches ; used by the priest, deaoon and sub-deacon in the inter¬ vals of the church service. In cathedrals a row of such seats is provided for the clergy.

SEDIMENTARY ROCKS, as originally

applied, a term used to indicate those deposits or sediments laid down by water, as contrasted with those rocks which have solidified from a fluid condition and known as igneous. The term has been somewhat expanded in recent usage, to include also the deposits formed by wind and those made by glaciers. They may be divided on the one hand into those laid down in the sea (marine), and those formed on land (terrestrial or continental). On another basis they are divided into aqueous, eolian and glacial. On still another basis they may be considered as of mechanical, chemical or

organic origin. The most familiar types are consolidated gravels,

conglomerates ; consoli¬ dated sands, sandstones; consolidated clay, shales ; and consolidated marls or lime oozes, limestones. For a more detailed account of these rocks and the methods by which they are formed, see Shale, Sandstone, and the sec¬ tion on Sedimentary Rocks in the article on Rocks.

SEDITION, an offense short of treason but more serious than ordinary breach of the peace, or conduct tending thereto. Sedition, as a distinct offense, is unknown to English law, and is also unknown to United States laws, save in acts of Congress relating to the army and navy, and there it evidently means a mutiny or uprising against superior authority, for it is provided that a soldier joining any sedition, or who being present at a sedition does not do his utmost to suppress the same, shall be pun¬ ished with death, while a sailor uttering sedi¬ tious words can be punished at the discretion of a court-martial. State laws relating to sedi¬ tion treat it as a minor offense, to be punished when it amounts to an actual attempt, whether in speaking or writing, or by actual violence, to agitate the overthrow, by unlawful means, of established authority. Anarchist meetings are within this description ; when they lead to riot and murder, moreover, as in the case of the Haymarket Riot, in Chicago, the offense is more serious, and all parties concerned are held as principals or accessories to the crimes which result directly from their course of action.

The Alien and Sedition laws enacted by Con¬ gress in 1798 embodied an extension of the meaning of sedition which the majority of the American people evidently did not approve, and were aimed at freedom of speech and of the press. The motive for these laws was the sup¬ pression of the revolutionary tendencies excited by the French Revolution, the Republican (afterward called the Democratic) party sym¬ pathizing with the Revolution, and the Federal¬ ists being adverse at least to the extreme phases of that great convulsion. Several prosecutions under the Sedition Law served to make it more odious, and the censequence was the retire¬ ment of the Federalist party from power, and the election of Thomas Jefferson to be Presi¬ dent of the United States. Since that time, ex¬ cept during the late Civil War, no attempt has been made to interpret as sedition the editorial utterances of the press regarding current events. See Alien and Sedition Acts.

SEDITION LAWS. See Alien and Se¬ dition Acts.

SEDLEY, sed'li, Sir Charles, English poet, dramatist and wit: b. Aylesford, Kent, 1639; d. 20 Aug. 1701. He was educated at Oxford, but did not graduate. He wrote comedies and songs; of the latter one or two are still popu¬ lar, but the former are unequal to his reputa¬ tion. His first comedy, (The Mulberry Gar¬ den, > partly founded on Moliere's <£cole

des Maris, > was published in 1668; and among his other works of this class are (Bellamira or The Mistress> (1687), based on the In later life he entered Parliament and took an active part in politics, uniformly opposing the unconstitu¬ tional policy of James II, and was one of the chief promoters of the Revolution.

SEDRAT, the name given in the religious lore of the Mohammedans to the lotus tree, standing on the right-hand side of the invisible throne of Ali, with two rivers running from its roots. Its boughs extend farther than the dis¬ tance between heaven and earth, while number¬ less birds sing among them, and countless angels rest beneath their shade.

SEDUCTION, in law , the act of wrong¬ fully persuading a woman, as by promise of marriage, to surrender her chastity. The the¬ ory of this offense in English law is that it is not against the seduced person but against the parent or person standing in that relation, who may sue for damages for actual loss of services caused by such seduction. If this be proved, he can recover not only any pecuniary loss he may have sustained but also compensation for injury to his feelings and damages by way of punishment of the offender. Very slight evi¬ dence of service is sufficient to establish the relation of master and servant and to fix the defendant's liability. The action is usually brought by the father, but it may be brought by any person who stands in the relation of master to the seduced person. Usually the woman cannot sue in her own name, but in Scots law she may do so if the deceit of the defendant has been the sole cause of the in¬ jury. The action, as a rule, can be brought only in behalf of an unmarried woman, the seduction of a wife being known as criminal conversation, but in England it was formerly held that an action might be brought by the father of a married woman living in his house separated from her husband and giving even the slightest services to her parent. By stat¬ ute, however, the husband can now demand damages in a suit for divorce where the se¬ ducer is corespondent. While the rule in Eng¬ land is that the parent cannot sue if the daugh¬ ter is not performing at least slight services for him, this has been modified in the United States to the extent that the parent may bring action if he is entitled to her services during minority, whether she is in his service or not. Statutes in the United States have greatly modified the old common-law rule. For instance, seduction was not a crime at common law, but in many of the States it has been made so by statute if the woman seduced was previously chaste, par¬ ticularly when accompanied by a promise of marriage. Likewise in some States the seduced woman may bring the action in her own name and may have both a criminal and a civil remedy.

SEDUM, a genus of plants of the family Crassulacece, the many species of which inhabit chiefly the north temperate and Arctic zones. They have

succulent, generally smooth foliage, of varying form, but often crowded on the stems, and four or five parted flowers, with distinct petals, usually in cymose inflorescences and of pink or yellowish hue. The carpels of the fruit are separate or united at the base. The sedums are pre-eminently useful for rock- gardens, and for cultivation in plots or in poor soil, since they are remarkably hardy under adverse conditions. Some prefer barren rocks, and spread luxuriantly over them, thus earning their common name of stone-crop. Like the house leeks (Sempervivuni) , which they closely resemble, they are easily propagated by seeds

or offshoots, and are possessed of great vital¬ ity. .S', telcphium is the orpine (q.v.), a live- for-ever, or live-long, so called because a cut branch, fastened out of doors, will grow, and perhaps bloom, drawing upon the store of re¬ serve tissue in its fleshy bulk, and since it will occasionally start into growth when pressed and dried it is also called Aaron's rod. This species was further known as Midsummer men, as it was used for love-charms on midsummer's night, two stems of it being set up to see if one, representing a lover, would turn to the other. S. acre, the English wall-pepper, is a common creeping plant covered with yellow, star-like flowers, fond of sunny, rocky places, and is an emetic and cathartic. One of the handsomest species is the old-fashioned border plant, 5'. spectabile, with upright stems and broad cymes of purplish flowers. .S', tele- phioides and 5'. roseum, the rose-root or rhodia of old time shops, with rose-scented roots, make themselves conspicuous by growing in great masses on mountain ledges. S. album was formerly used as a medicine, and cooked or eaten as a salad under the name of worm grass or prickmadam.

SEE, Horace, American naval engineer: b. Philadelphia, 17 July 1835; d. 1909. He re¬ ceived his training as a mechanical engineer in a machine shop. As superintendent engineer of the firm of William Cramp and Sons he was identified with its fame as the builder of high- class ships. He is known as the inventor of the hydropneumatic ash ejector, the cylindrical mandrel for face bearings and other important mechanical devices. He was consulting engi¬ neer and naval architect for several noted cor¬ porations in the United States.*

SEE, Sir John, Prime Minister of New South Wales: b. Felling, Huntingdonshire, Eng¬ land, 1844; d. 1907. In 1853 he went to Aus¬ tralia, and in 1880 was elected member of the colonial Parliament, to which he was re¬ elected several times as member for Grafton until 1904. In 1885 he was appointed Post¬ master-general and from 1891 to 1894

was Treasurer. In 1899-1901 he held the portfolio of Chief Secretary and Minister of Defense, and from 1901 to 1904 was Prime Minister. In 1902 he was knighted. Ill health compelled his retirement in 1904.

SEE, Thomas Jefferson Jackson, American astronomer and mathematician : b. on a farm near Montgomery City, Mo., 19 Feb. 1866. In 1884 he entered the University of Missouri and was graduated (A.B., L.B., S.B.) at the head of his class in 1889, with the Missouri astro¬ nomical medal for an original thesis on the (Origin of Binary Stars.' He at once entered the University of Berlin, for post-graduate study, and won with high honors the degrees of A.M., Ph.D., 10 Dec. 1892 Upon returning to America 25 Dec. 1892, he organized and had charge of the department of astronomy at the University of Chicago, and aided in establishing the Yerkes Observatory, 1894. In 1896 Dr. See entered upon a survey of southern double stars and nebulae for the Lowell Observatory. Dur¬ ing two years at Flagstaff, Ariz., and at the City of Mexico, he examined with a 24-inch telescope some 200,000 fixed stars, between 15 and 65 degrees south declination, and discov¬

ered some 600 new double stars, besides meas¬ uring about 1,400 stellar systems previously reorganized by Sir John Herschel and other observers. Dr. See lectured on Sidereal As¬ tronomy at Lowell Institute, Boston, in Decem- ber-January, 1898-99, and was immediately afterwards appointed professor of mathemat¬ ics, United States Navy, by President McKin¬ ley. On duty at the Naval Observatory, Wash¬ ington, 1899-1902, with 26-inch telescope, he observed double stars and satellites, and meas¬ ured the planets and satellites by daylight and at night, thus deducing the absolute diameters and constants of irradiation of the chief bodies of the solar system. On duty at the Naval Academy, 1902-03 ; since in charge of the Naval Observatory, Mare Island, Cal. During 1902-03, he investigated the position of Laplace's ˆInvariable Plane of the Solar Sys¬ tem® ; and during 1904-06 carried out impor¬ tant researches on the moments of inertia, in¬ ternal densities, pressures, temperatures and rigidities of the heavenly bodies, earthquakes, etc. He has made numerous other researches in regard to the origin of the solar system, the cause of the land and water hemispheres of the terrestrial globe, gravitation, etc.

He has published (Die Entwickelung der Doppelstern-Systeme) (Berlin 1893) ; Re¬ searches on the Evolution of the Stellar Sys- tems) (Vol. I, Lynn 1896) ; Vol. II, (Capture Theory of Cosmical Evolution' (1910) ; Re¬ searches on the Physics of the Earth } (in Proc. Am. Philos. Soc. 1906-13) ; ˆDynamical Theory of the Globular Clusters) (in Proc. Am. Philos. Soc., 1912) ; (Electrodynamic Theory of Mag¬ netism and of Universal Gravitation: Discovery of the Cause of Gravitation, with proof that this fundamental force of nature is propagated with the velocity of

light } (communicated to the Royal Society of London, by Lord Rayleigh, Feb. 1915) ; determination of The Physical Cause which has established the Unsymmetri- cal Equilibrium of the Solid Nucleus in the Fluid Envelope and thereby produced the well- defined land and water hemispheres of the Ter¬ restrial Spheroid) (in 202d volume of the Astrom. Nadir., Kiel, January 1916).

SEE, a word applied to the seat or throne of a bishop, but more usually employed as the designation of the city in which a bishop has his residence, and frequently as that of the juris¬ diction of a bishop, that is, as the equivalent of diocese. The Holy See is located in Rome.

By universal usage, see designates the city (thence, at least in popular language, the en¬ tire diocese) in which the seat of the bishop is placed. Sees have, as a rule, been in some city, or considerable town, and in general the name of a see is taken not from the district governed by the bishop but from the city or town. To this usage, the names of most of the Protestant Episcopal sees in America are an exception. Sees In Partibus Infidelium were those which retained their ancient names, though in many cases not merely the cities themselves, but even all traces of the Chris¬ tian religion, in the sites on which they an¬ ciently stood, have disappeared. In the Roman Catholic Church, the Pope alone es¬ tablishes sees, and alters their distribution and their local limits and boundaries ; though

these changes are not made except in ex¬ treme cases (e.g., the French Revolution) with out consent of the actual bishop. In the C hurch of England, all changes in dioceses, their limits, boundaries, etc., are done by au¬ thority of Parliament. In America the Gen¬ eral Convention of the Protestant Episcopal Church creates new sees and changes limits

of diocese. See Diocese.

•

SEE, a river of France in the department of La Manche. It waters the arrondissement of Avranches and flows into the bay of Mont Saint Michel, which until the great tidal wave of the year 709 was a forested area 60,000 acres in extent. Equinoctial tides sometimes reach a vertical height of 50 feet at the river's mouth.

SEE-ADDER, an English name for a ma¬ rine Stickleback, one of a group of small fishes (Gastrosteus) common in the coasts of the north temperate zone. The European varieties are found in certain districts in brackish water. Most species are well proportioned, the marine varieties being a trifle elongated. The mouth is moderately wide. The teeth are small but firmly set. A hard bony covering protects the head. There are no scales on any part of the body, but a set of shields or scutes protect the sides. The first dorsal and the ventral fins carry pointed spines. There are wide variations, how¬ ever, between the several species and even within a species in regard to the degree of this armature. The sea-stickleback reaches a length of seven inches and has 15 spines on the back. It is never found in large schools. The stickle¬ back is a short-lived animal, reaching an age of only three or four years. When the warm season approaches each male selects or appro¬ priates a certain territory to himself and de¬ fends it against all comers especially against members of his own species and sex.

SEEBACH, Marie, German actress : b. Riga, 1834; d. 3 Aug. 1897. Her father was an actor and placed her at Cologne to pre¬ pare to become an operatic star. She held very many successful engagements and a num¬ ber of starring tours and in 1887 was called to the Theatre Royal in Berlin. Her favorite role was Gretchen, but she was also very suc¬ cessful as Klarchen in and Louise in (Kabale und LiebeA She paid a visit to the United States in 1871 and gave there about 160 performances in 17 cities. The Marie Seebach Stiftung, a home for the poor of her profession, was endowed by her at Weimar in 1895. Consult Gensichen, (Aus Marie Seebachs Leben) (Berlin 1900).

SEEBERG, Reinhold, German Lutheran theologian : b. Porrafer, Livonia, 1859. In 1878-82 he studied at the University of Dorpat, and in 1882-84 at the University of Erlangen. In 1885-89 Dr. Seeberg was successively privatdocent, assistant professor and univer¬ sity preacher at the University of Dorpat. From 1889 to 1894 he was professor of Church history and of New Testament exegesis at the University of Erlangen, and from 1894 to 1898 held also the chair of systematic theology there. In 1898 he became professor of systematic theology at the University of Berlin. He is the author of several works on the history of

dogma and on the relations of the Church to the social life of the time, all

of which are highly esteemed. The chief of these are (Der Begriff der christlichen Kirche) (1885) ; Wehr- buch der Dogmengeschichte) (2 vols., 1895-98; 2d ed., 3 vols., 1907-13) ; (Die Kirche und die so- ziale Frage) (1897) ; (Grundriss der Dogmen- geschichte) (1901; 3d ed., 1910); (An der Schwelle des zwanzigsten Jahrhunderts> (1901; 5th ed., (Die Kirche Deutschlands im 19. Jahrhundert,) 1904) ; (Die Grundwahrheiten

der christlichen Religion (1902; 5th ed., 1910; English translation cThe Fundamental Truths of the Christian Religion,* 1908) ; (Das Abend- mahl im Neuen Testament (1905; 2d ed., 1908) ; (Aus Religion und Geschichte) (2 vols., 1906-08) ; (Die kirchliche soziale Idee) (1907) ; (Offenbarung und Inspiration (1908; English translation (Revelation and Inspiration 1910) ; (Sinnlichkeit und Sittlichkeit* (1909) ; (Alte und neue Moral* (1910) ; (System der Ethnik) (1911) ; Worn Sinn der Geschichte) (1913).*

SEEBOHM, se'bom, Frederic, English eco¬ nomic historian : b. 1833 ; d. 1912. He was educated at Edinburgh and at Cambridge. In 1856 he became a barrister of the Middle Tem¬ ple, but devoted much of his attention to the study of the social organization of the Saxon, Celtic and early English tribes, and has pub¬ lished (The English Village Community) (1883- 90) ; (Tribal Custom in Anglo-Saxon Law) (1902) ; (Tribal System of Wales) (1895) ; (The Oxford Reformers: Colet, Erasmus and More) ; (The Era of the Protestant Reforma¬ tion ; (Customary Acres and their Historical Importance (posthumous, 1914).

SEED PLANTS, plants of the highest branch of the vegetable kingdom, characterized by producing seeds (q.v.) as a result of the fertilization of their egg-cells, and called Spermatopliyta, formerly known as the An- thophyta, and Phanerogamia. The first of these names is to be preferred, since it means <(seed plants.® The second which means ((flowering plants® is less applicable, since in many plants, as the gymnosperms, there is properly no flower; and the third, meaning ((visible mar¬ riage,® is quite inapplicable, since the act of fertilization is very difficult to observe. There are more than 100,000 known kinds of seed plants, divided into two classes, namely: Gym¬ nosperms, with naked seeds, and Angiosperms, with seeds enclosed in dry pods or fleshy fruits. The former, of which there are less than 500 kinds, include the pines, spruces, firs, cedars, cypresses, etc., while the latter include the lilies, grasses, orchids, buttercups, pinks, mints, roses, beans, parsleys, sunflowers and thistles. The Angiosperms are properly the ((flowering plants,® in which alone the organs of the flower are fully developed. For the families of seed- plants see Vegetable Kingdom.

SEED TESTING, the determination of the purity and the viability of seed by natural or artificial means. The purity of seed embraces not only the idea

of freedom from weed seeds, seeds of nearly related species, and such things as chaff, bits of stem, dirt, etc., but it also in¬ cludes the idea of ((trueness to type," or ®purity of stock,® as the seedsmen term it. This last, however, is generally a matter of seed-grow¬ ing, the grower being held responsible for the ejection of <(rogues,® or plants which differ

from the particular variety in hand. In some cases, for instance with certain varieties of peas, the rogues may be removed by sieves where they are smaller or larger than the type, or by hand-picking where the color as in certain beans indicates a difference. Winnowing is also use¬ ful in various cases. The presence of rogues always lowers the value of the sample and care¬ ful seedgrowers and reputable seedsmen exer¬ cise constant vigilance in this respect. It is impossible, however, except with certain species or varieties, to recognize rogues by their seeds. Occasionally rogues are superior to the re¬ mainder of the crop ; in such cases, when ob¬ served in time they may become important varieties, after due selection and growing by themselves for several years. For the satisfac¬ tory testing of purity of stock, samples of seed are grown in the field together with samples known to be pure and due comparisons are made, the conditions of soil, season, etc., being as nearly identical as possible. Trueness to type is far more important to the customer than either freedom from most impurities or a high per cent of germinable seeds, because the im¬ purities can frequently be removed and de¬ ficiencies in germination may be adjusted by heavier sowings. Many specialists both in Europe and in America have devoted much time and study to the purity of seed; that is, the freedom from weed seed. Among their popular methods the following are most frequently used. Samples of equal weight are taken from various parts of the bulk and after thorough mixing a sample of this composite is taken. This is weighed and spread upon white paper or glass, and the impurities are picked out by means of forceps, each kind of impurity being placed by itself. Any seed not of the kind examined constitutes an impurity; that is, radish seed would be an impurity in cabbage samples. Each kind of impurity is then weighed and its percentage determined. These percentages vary considerably with the different kinds of plants, cereal and most vegetable seeds being grown under clean cultural methods, and being gen¬ erally easy to clean, should be nearly if not fully 100 per cent pure; whereas clovers and grasses, being grown without such cultural care, and be¬ ing much harder to clean without considerable loss of good seed, may often have as much as 25 per cent of impurities. These percentages have been tabulated both in Europe and in America, and form a basis by which the ex¬ periment stations of both continents judge samples sent in for inspection. The next opera¬ tion

is the determination of the character of the impurities. If these consist of useful seeds they may not seriously affect the value of the sam¬ ple; but if noxious weeds are present the sam¬ ple is condemned, and if 1 per cent or more of ordinary weed seeds is found many specialists condemn the sample. The presence of Canada thistle, cockle, dodder, wild mustard, chess, wildoats, Russian thistle, or of the bulbs of wild onion or garlic, even in small quantities, is generally sufficient to condemn the sample. These may all be seen with a hand-lens or even, in some cases, with the unassisted eye.

Germination tests are conducted either in soil under glass, out of doors, or in specially constructed germinators, some of which are rather elaborate in order to maintain particular conditions during the test. These devices are

seldom used except in the botanical laboratories of agricultural experiment stations. Many of the leading seedsmen devote some of their greenhouse space to the testing of seeds for viability. Their methods are about as follows : The samples are taken in various ways ; but frequently the operator estimates the percentage that from his experience he feels sure will not grow. Then he picks out 100 or 200 seeds that he thinks will germinate and plants them. Upon the basis of the estimate and the actual be¬ havior of the sample planted, he figures the ap¬ proximate value of the seed. When greenhouses are not available seeds are often sprouted be¬ tween sheets of damp blotting paper, upon por¬ ous saucers plaster of paris dishes, etc. — methods of value also for the home testing of seeds. Temperatures favorable to the germina¬ tion of each kind of seed must be maintained; these range from about 45 degrees to 80 degrees or even more. Oat seed will germinate upon melting ice. Moisture and an adequate supply of air must also be given and daily inspection and the removal of the sprouted seeds are es¬ sential. Some seeds germinate in a few hours; others require weeks.

Otherwise seed-testing is more interesting than useful, and it has not the all-importance formerly attributed to it, because, under exist¬ ing conditions, arbitrary standards can rarely be established, because systematic inspection would be too cumbersome and costly, and be¬ cause the reputable seedsmen are on the alert to keep their stock up to the highest practical grade without other inspection than that they exercise themselves. With them the price of seed is usually a rather safe index of purity, viability, etc., the higher price, other conditions being equal, indicating the superior quality. Such should be given the preference, especially with grass and clover seeds and such other seeds as are difficult to clean.

For interesting tables, details of methods, descriptions of apparatus, etc., consult various publications of the Division of Botany, and the Wear

Books) of the Department of Agricul¬ ture; also an epitome of these in the Cyclo¬ pedia of American Horticulture) (New York

1900-02).

SEEDS, the fertilized ovule of a phanero¬ gamic plant, containing the embyro of a new plant like the parent and its food supply. Only one class of plants, the spermaphytes, develop true seeds. This class is subdivided according to the character of the ovules — whether naked and fertilized by pollen lying directly upon them (Gymnosperms), or enclosed in a pericarp, and fertilized through the medium of a stigma and the style (Angiosperms). The simple seed or seeds and the surrounding pericarp, formed by structural changes in the persistent parts of the flower or stalk, constitute the fruit. Often a one-celled indehiscent fruit containing a seed is mistaken for the seed itself.

The essential parts of a seed are developed from those of the ovule. They are the nucleus or embryo, and its food supply, and at least one, but nearly always two integuments, although assuming different positions in the seed. The embryo is generally visible as a distinct dif¬ ferentiation in the seed tissues, and one, two or several leaves may be seen issuing from the short axis or stem portion of the embryo called

the hypocotyi. These are the seed leaves or cotyledons. The number of cotyledons in Gym- nosperms may vary from two to several ; in Angiosperms, the embyro has either one or two, and this characteristic is so constant, that this class is further divided into monocotyledons or dicotyledons, according to the appearance of the seedling with one or two seed-leaves. The hypocotyi, often clasped between the cotyledons, bears at one end a mass of tissue called the plumule, where two tiny leaflets (in dicotyle¬ donous seeds) may sometimes be discerned, and at the other end another mass called the radicle. Verjr often nutritive tissue is formed between the embryo and the seed-coats, and may be hard or horny. This reserve tissue, or albumen, as it is called, when derived from the nucellus is called perisperm, but when developed within the embyro-sac is the endosperm. The embyro itself, when this external nutriment is absent, is filled with an accumulation of reserve material, especially in the cotyledons.

When started into growth by the proper con¬ ditions of heat, oxygen and moisture the em¬ bryo liberates itself in many ways. In some

monocotyledons, where the nutriment is stored outside of the embryo, the one seed leaf is pro¬ vided with absorbent cells at its apex and is connected with the cells of the reserve tissue at that point, transferring the sustenance to the young embryo. Among the dicotyledons in such seeds as the gourd, the radicle pushes out through an aperture in the seed-coat, and fastens itself in the ground with lateral rootlets. It carries out one end of the hypocotyi with it, but cannot disengage the other, clasped between the cotyledons in their tightly fitting case, until the hypocotyi, arching itself in the effort to grow upward toward the light, finally exerts such a strain that the seed-case is ruptured, and the seed-leaves are pulled out. Then the hypo¬ cotyi straightens up and the two cotyledons turn green and act as foliage leaves. Often split acorns are found lying on the ground in early spring, anchored by a fleshy white thread. The embryonic leaves nearly fill the seed-coats, and are thick, swollen and tense, clasping the hypocotyi. The acorns take up water from their environment, the embryo begins to grow, the seed-coats burst at one end, and the radicle, the hypocotyi and the thick stalks of the cotyle¬ dons are extended. The radicle turns downward into the soil, producing root-hairs, and the plumule, extricating itself from the clasp of the seed-leaves, starts upward, but the cotyle¬ dons themselves remain in the coats of the acorn, and gradually give up all their store of nourishment to the embryo and dwindle away. In the mangroves, the whole process of germi¬ nation takes place while the seed is still on the tree, and the embryo itself tumbles into, the mud with such force that it remains in position to continue growth.

The seed-coats are variously constructed, the inner usually a papery colorless membrane, or of a mucilaginous, easily-swelling nature; the outer one, the ((testa,):> while sometimes of other hues, is more often brown, gray or black. The testa is usually made of several layers of cells, each of which may be differently fashioned; but often provision is made for the extrusion of the embryo, and the hilum. or place of attach¬ ment, shows on the smooth or rough surface. Another growth is occasionally developed from VOL. 24 — 34

the base of the seed as it matures. This is either very small, mere fleshy ridges or bumps surrounding the base, and then called a caruncle, which often becomes a specific character as in the Polygalacece ; or entirely or partially en¬ closes the seed, being then known as an aril, as in the orange investments of the spindle tree and the mace.

There are innumerable variations of the outer coats adapted to their needs of seed dis¬ persion, protection and germination. Some seeds, like those of the quince, are enveloped in an adhesive mucilage which serves to cement them to the soil, so that the embryo may have a chance to strike into it. Certain smooth or polished seeds, when moistened, are capable of

developing a similar mucilage either from the whole surface or from special groups of cells. In such cases as that of the squirting cucumber, which violently ejects sticky seeds, the mucilage not only secures the seed to the ground, but to- any animal that chances to touch one, and they are therefore carried to some dis¬ tance. Birds are fond of the viscid mistletoe berries and often carry the seeds away on their beaks, wiping them off on a convenient branch, to which they stick and start growth.

Plants native to loamy soils are likely to have seeds with irregular integuments, pitted and reticulated with delicate ridges which suf¬ fice to fix them in the earth, and others have developed spines for further anchorage. Others have growths of hairs, which in riverside wil¬ lows, for instance, adhere to mud, or in the Spanish moss, become entangled in the rough¬ nesses of the bark. The growth of hair upon a seed, however, is of more general use in the dispersion of the species. The cotton seed has a hairy investment which keeps it afloat in the wind, and the tufts of hair on.fireweed and milkweed are familiar sights, sailing along in autumn and spreading these weeds far and wide. Some seeds instead of hairs, develop wings, as those of the cinchona and pine Orchids have seeds so light and small that they drift away like dust.

Aquatic plants have seeds curiously adapted for dispersion by water. Nymphaea seeds are loosely enveloped in an aril, leaving an air chamber between it and the outer seed-coat, and the seeds therefore float and are driven about by the wind. Many smaller water plant seeds manage to keep afloat, and sometimes become entangled in the feathers of water fowl, to be transferred to other bodies of water. Very many seeds have extremely hard shells, and are practically impermeable to water like those sea- beans (q.v.) which come ashore on the sea coasts, having traveled over seas. Some of these hard-shelled seeds are transferred from place to place by birds and animals which eat their pericarps and eject the seeds uninjured. The vitality of certain varieties of . seeds is extraordinarv, some of them retaining their powers of germination for 20 to 30 years.

SEELER, Edgar Viguers, American archi¬ tect : b. Philadelphia, Pa., 18 Nov. .1867. He was graduated from the Philadelphia Central High School in 1884, entered an architect's office, and later studied architecture at the Massachusetts Institute of Technology, and the ficole des Beaux Arts, Paris, where he was for three years under Victor Laloux. He returned

to America in 1893 to accept the assistant pro¬ fessorship of design in the

architectural depart¬ ment of the University of Pennsylvania, began independent practice in 1895, but in 1898 with¬ drew from teaching, though remaining staff lecturer and adviser in the architectural depart¬ ment. Among important buildings designed and erected by him are the Astronomical Observa¬ tory and the Dental Laboratory of the Univer¬ sity of Pennsylvania; the Winona Free Public Library, Minnesota (with W. P. Laird) ; the Real Estate Trust Company's office building, Philadelphia; the First Baptist Church, Phil¬ adelphia, and the James V. Brown Memorial Library, Williamsport, Pa., as well as many city and country residences. He was elected a Fellow of the American Institute of Architects in 1900, and a member of the faculty of the Pennsylvania Academy of the Fine Arts in

1902.

SEELEY, se'li, Sir John Robert, English historian and essayist: b. London, 10 Sept. 1834; d. Cambridge, 13 Jan. 1895. He was graduated from Christ's College, Cambridge, in 1857; was elected Fellow and made classical lecturer there. He published (under the pseudonym ((John Robertson®) a book

SEELYE, se'li, Julius Hawley, American college president: b. Bethel Conn., 14 Sept. 1824; d. Amherst, Mass., 12 May 1895. He was graduated from Amherst in 1849, and after¬ ward studied theology at the Auburn Theolog¬ ical Seminary and at the University of Halle. From 1853 to 1858 he was pastor of the First Reformed Dutch Church of Schenectady, N. Y., from which charge he was called to the presi¬ dency of Amherst College. He was a member of the 44th Congress from Massachusetts, and was later engaged in the revision of the tax laws of that State. His writings include (The Way, the Truth, and the Life) (1873) ; (Christian Missions) (1875; (Empirical Psy¬ chology5 (1882); (Citizenship : a Book for Classes in Government and Law) (1894).

SEELYE, Laurenus Clark, American col¬ lege president, brother of J. H. Seeley (q.v.) : b. Bethel, Conn., 20 Sept. 1837. He was grad¬ uated at Union College in 1857 and during the next six years he was engaged in theological

study at Andover, Mass., Heidelberg and Berlin. After a brief pastorate in the Congregational denomination at Springfield, Mass., he accepted a call to the chair of English literature at Amherst in 1865, and in 1873 became the presi¬ dent of Smith College. In 1910 he was made president-emeritus. His best known books are (The Antiquity of Celtic Literature5 (1870); (Our Celtic Inheritance) (1870); (The Ancient Fenians) (1871) ; and (The Higher Education of Women : its Perils and its Bene- fits) (1888) ; also various articles and ad¬ dresses ion educational and religious topics.

SEER, ser, a weight in India, formerly varying in different parts of the country, but by an act of the Anglo-Indian government 31 Oct. 1871 adopted as the primary standard of weight, and made equivalent to a kilogram.

§EFATIAN.S. See Mohammedanism.

SEGAN-FU, se-gan'foo, China. See Sin-

gan-fu.

SEGANTINI, Giovanni, Italian artist, (the

painter of the Alps5 : b. Arco, Trentino, 15 June 1858; d. Maloja, Oct. 1899. Bred in poverty, his mother dead, and abandoned by his father; before his teens herding flocks in the hills to earn a living, he amused himself by sketching surrounding scenes. His drawings becoming known, after further vicissitudes, he at length studied at the Brera Academy, Milan, while supporting himself by portrait painting and art tuition. His first pictures (The Choir of San Antonio,5 (The Ship, 5 (The Falconer,5 and (The Dead Hero,5 showed his improving quality, and in 1882 he settled near Lake Como at Brianza, where he painted the (Ave Maria,5 which was awarded the gold medal at the Amsterdam exhibition (1883). This was fol¬ lowed by (Mothers,5 (A Kiss,5 (Moonlight Ef¬ fect, } and (After a Storm in the Alps.5 In 1886 he removed to Val d'Albola, 5,000 feet above sea-level in the Swiss Alpine Engadine, and influenced by Millet's vogue, sought his subjects in the lives of the lowly agriculturists of the region. (The Drinking Place5 won the gold medal in Paris in 1899; Ploughing in the Engadine, } now in the Munich Pinakothek, won the gold medal at Turin, 1892; (At the TetherP (In the Sheep-foldP (Dark HoursP (By the Spinning WheelP (Return to the Old Home5 are also of this period, as well as Mid¬ day on the Alps) and (Winter at SavogninoP As if premonitory of his all too early death he developed a moralizing and mystical vein which is shown in (Sorrow finding Comfort in Faiths painted in 1896, now in the Hamburg Gallery; (Unnatural Mothers5 in the Vienna Gallery; (Punishment of Luxury5 in the Walker Gallery, Liverpool; (Angel of Life5 in the Buda¬ pest Gallery ; (The Massacre of the Innocents,5 (Divine Youth5 and the (Annunciation.5 Se- gantini is ranked as the greatest of modern Italian artists. At Saint Moritz is the Segantini Museum, where many of his pictures are ex¬ hibited, including his unfinished (Panorama of the Alpine World,5 intended for the Paris Ex¬ hibition. Consult monographs by Montandon (Bielefeld 1904) ; Ritter (Paris 1898) ; Segan¬ tini (Munich 1913) : Servaes (Vienna 1902) ; Sizeranne (Paris 1899) ; Villari (London 1901).

SEGAR. See Cigar.

SEGESTA, se-jes'ta (Gr. Egesta), Sicily, the northwestern extremity of the island, lies 11 miles from Castellamare (q.v), its port. Its interest is wholly historical, as the site is now unoccupied. Segesta was built upon a steep mountain, now known as Monte Varvaro, on the river called at present 'Fiume Gaggera. It formed an alliance with Athens in 416 b.c., and in 413 with the Carthaginians (after the fall

SEGMENTATION OF THE EGG. See

Embryology.

SEGdVIA, se-go'vi-a (Sp. sa-go've-a), Spain, (1) capital of the province of the same name, on the Eresma, 43 miles northwest of Madrid, occupies a rugged height (3,300 feet), surrounded by ancient walls and defended by a turreted castle, the Alcazar. Its old-fash¬ ioned buildings are quaint but stately ; its cathe¬ dral, a fine specimen of the Gothic, is scarcely surpassed in Spain. There are besides several other churches, suppressed convents, bishop's palace, mint, military academy, church seminary, theatre, hospitals and a picture gallery. The lofty aqueduct (built by Trajan) is the finest Roman ruin in Spain. Segovian Romanesque architecture is one of the most remarkable provinces of Spanish art. In few parts of the world can so much fine architecture and decora¬ tive sculpture be found. Paper, linen and glass are manufactured. The kings of Castile and Leon made Segovia their place of residence. In 1808 the town was entered and sacked by the French troops.

(2) The province covers an area of 2,713 square miles, whose surface is diversified by mountains and plains. The Sierra de Guadar- rama, containing the famous defile of Somo- sierra, is the principal mountain. Silver, copper, lead, iron, marble and jasper are found in the mountain districts. The chief agricultural products are wheat, barley, madder, flax, hemp; besides grapes, olives, carobs and chestnuts. Large numbers of sheep are raised. Pop.

187,000.

SEGREGATION, in geology that tendency of mineral ingredients to separate from the parent magma, and to crystallize out, each by itself. In granite and other crystalline massive rocks, veinlike portions are found in which the matter is either coarser or finer than the rest of the mass. These

were produced at the final stage of cooling of the rock, when the segrega¬ tion from the original molten or viscous mass occurred along certain lines or around par¬ ticular centres. These are termed segregation veins. Cracks or cavities may also be filled with mineral matter segregated from the sur¬ rounding rock mass. See Mining.

SEGU, sa'goo, or SEGO, sa'go, West Africa, an important town of the French Sudan, in Bambara, on the left bank of the Niger, about 30 miles above Sansandig, and 350 from Timbuktu. The houses are built of clay, of a square form, with flat roofs; some of them have Iwo stories and many of them are whitewashed. Besides these buildings, Moorish mosques are seen in every quarter. This town has been for

many centuries a stronghold for the Mohamme¬ dan faith. Pop. over 30,000.

SEGUIDILLA, seg-i-del'ya, a Spanish form of versification, consisting of four lines, generally assonant lines, of seven and five syllables alternately. It usually has a close of three verses, called estribillo, of which the first and last lines rhyme.

SEGUIN, sa'gwin, Edouard Cnesimus,

American physician : b. Clamecy, France, 20 Jan. 1812; d. New York, 28 Oct. 1880. He was educated at the college of Auxerre and Saint Louis and studied medicine under Jean Gaspard ltard. The latter urged him to undertake the treatment of idiocy, and after careful study of the causes and conditions of congenital delin¬ quencies, he opened a first school for the train¬ ing of idiots in 1839. In 1844 a committe of the Academy of Sciences examined and com¬ mended his methods. After the revolution of 1848 he settled in the United States. In 1873 he was American commissioner to the Vienna exposition and published a (Report on Educa¬ tion. } During his later years he gave attention to the study of animal heat and invented a physiological thermometer. He was connected with various medical societies and president of the Association of Medical Officers iof American Institutions for Idiotic and Feeble-minded Per¬ sons. His published contributions to the sub¬ ject include, (Theorie et pratique de l'education des idiots) (1841-42) ; (Traitement moral, hy¬ giene et education des idiots et des autre enfants arrieres) (1846) ; (Historical Notice of the

Origin and Progress of the Treatment of Idiocy, translated by J. S. Newberry (1856) ; (Idiocy and its Treatment by the Physiological Method) (1866). Besides these he wrote a number of works on medical thermometry.*

SEGUIN, Edward Constant, American physician and neurologist: b. Paris, France, 1843; d. New York, 19 Feb. 1898. He was the son of Dr. Edouard Onesimus Seguin (q.v.), and came with his father to America after the revolution of 1848. He was educated in the public schools of Ohio, began studying medicine with his father in 1861 and continued it at the College of Physicians and Surgeons in New York. He spent two years in the medical de¬ partment of the Union army while enrolled as a student, and contracted a tubercular difficulty, to cure which he served among the United States volunteers at Little Rock, Ark., during part of 1864-65, and again in New Mexico during 1868-69. During the winter of 1869-70 he studied nervous diseases under such Parisian specialists as Brown-Sequard, Charcot, Ranvier and Cornil, and on his return to New York entered into a medical partnership with Dr. W. H. Draper. He was appointed pathologist to the Connecticut Hospital for the Insane at its opening and held the post 10 years. From 1871 to 1885 he was a member of the faculty of the College of Physicians and Surgeons, giving lectures on the spinal cord and on nervous diseases. In 1873 he founded a clinic for nervous diseases. Apart from these duties he carried on an independent practice in his specialty, beginning with 1876. He was one of the founders of the American Neurological Association, and the New York Neurological Association. He bequeathed to the Academy of

Medicine his large collection of books and pamphlets relating to nervous diseases, and to the College of Physicians and Surgeons other books and instruments.

SEGUR, sa-giir, Joseph Alexandre, French writer: b. Paris, France, 1756; d. there, 1805. He was author of operas and comedies which are still read, and also wrote (Correspondance secrete entre Ninon de l'Enclos, le Marquis de Villarceaux et Madame de Maintenon) ; (La femme jalouse,5 etc. A selection of his works has been published, (QEuvres diverses) (1819).

SEGUR, Paul Philippe, Comte de, French historian, son of the preceding: b. Paris, 4 Nov. 1780; d. there, 25 Feb. 1873. He entered the army in 1796 and rose to be brigadier- general and aide-de-camp to Napoleon during the Russian campaign. He was made a peer by Louis Philippe, and after the second Restora¬ tion retired to private life. He wrote (His- toire de Napoleon et de la grande armee pendant l'annee 1812) (1824); (Histoire de Rus- sie) (1829) ; (Histoire de Charles VHP (1835).

SEGUR-D'AGUESSEAU, da-ge-so, Louis Philippe, Comte de, French dramatist and his¬ torian, brother of the preceding: b. Paris, France, 10 Dec. 1753; d. there, 27 Aug. 1830. He was forced by his father to enter military life, served under Rochambeau in America, was appointed ambassador to Russia in 1783, and after the overthrow of the monarchy devoted himself to literature. He was appointed a member of the council of state by Napoleon and after the Restoration was received into the Chamber of Peers. He published (La politique de tous des cabinets de l,Europe) (1793) ; (Theatre de l'Hermitage) (1798) ; tableau historique et politique de l'Europe de 1786-965 (1800) ; (Histoire des principaux evenements du regne de Frederic-Giullaume IP (1800) ; (Histoire universelle) (1817); (Histoire de France 5 (2 viols., 1824-34) ; (Memoires ou

Souvenirs et Anecdotes5 (1825) ; (CEuvres com¬ pletes5 (34 vols., 1824 et seq.).

SEGURA RIVER, _sa-goo'ra, Spain, a river rising in the province of Jaen, and flowing east¬ ward in a winding course, past the city of Murcia, into the Mediterranean Sea. It enters the latter about 45 miles north of Cartagena after a course of 150 miles. In its upper course it flows through arid heath-lands, but lower down it has been made to irrigate its valley by means of numerous canals, the result being the proverbially fertile Huerta de Murcia. As a consequence of drawing off the water, how¬ ever, the main channel is practically un- navigable.

SEIDEL, sl'del, Emil, American socialist politician: b. Ashland, Pa., 13 Dec. 1864. He learned the wood carver's trade in Germany. He was one of the organizers of the Wood Carvers' Union, and of the Socialist party at Milwaukee, Wis. He was Socialist candidate for governor of Wisconsin in 1902; and was elected mayor of Milwaukee in 1910, serving one term.

SEIDL, zi'd'l, Anton, Hungarian composer and musical director: b. Budapest, Hungary, 6 May 1850; d. New York. 28 March 1898. He studied at the Leipzig Conservatory, and later at Budapest under Hans Richter, and by that musician was recommended to Richard Wagner

when the latter was preparing for the opening of the Baireuth Festspielhaus. As a conse¬ quence he came into intimate association with Wagner and acted as stage manager during the first season of music dramas there in 1876. In 1878 Seidl became musical stage manager at the Royal Opera House, Vienna, and the next year migrated to Leipzig where he was made conductor. After conducting the Nibelung dramas at London in 1882 he joined a company traveling through Germany, Austria, Hungary, Italy, Belgium and Holland during the seasons of 1883-84, which produced only the Wagner operas. He was made conductor at the Metro¬ politan Opera

House, New York, in 1885 after the death of Dr. Leopold Damrosch, and thenceforth, though he made temporary so¬ journs in Europe filling musical engagements, he regarded America as his home. His in¬ fluence upon the development of musical taste in this country was extended. Besides being made conductor of the concerts of the Philhar¬ monic Society he was the organizer of the popular concerts held during several successive summers at Brighton Beach. Consult Krehbiel, H. E., (Anton Seidl5 (New York 1898.

SEIDLITZ (sed'lits) POWDER, an aperi¬ ent powder named from the mineral spring of Seidlitz or Sedlitz in Bohemia. Seidlitz powders are prepared in two parts, each con¬ tained in a separate envelope. The alkaline por¬ tion, which is contained in a blue paper, consists of two drams of Rochelle salts (tartrate of soda and potash) and 40 grains of bicarbonate of soda; and the acid part, in a white paper, of 35 grains of tartaric acid. In preparing for use, the alkaline portion is dissolved in half a tumbler of water, and the acid part is then added, producing effervescence ; and the draught is to be taken while the effervescence is going on. Sometimes a little sulphate of magnesia is added to increase the strength.

SEIGNIORAGE, se'nyor-aj. See Coinage; Finance.

SEIGNORY, or SEIGNIORY, (1) in

English law, the lordship retained by a grantor after alienation of land in fee simple, and re¬ garded as an incorporeal hereditament. The seignory dates back to Roman times, and later found its way to England, where the only seignories now existing are those created be¬ fore 1290. By a statute passed in England in 1882, a tenant for life of a manor may alienate the seignory of any freehold land within such manor. The lordships of manors are the only seignories of consequence to-day in England.

(2) In Canada, land held by a tenure re¬ sembling that of feudal times; also, a seignor's mansion.

SEISIN, in law, (1) possession of land by one claiming a freehold therein; also, the land so possessed. The possession must be actual and by a person entitled to the land or by one claiming a freehold interest therein. If the person having possession is disseized by one who intends to hold the freehold, either with or without legal right, the freehold is thereby transferred to the disseizor. Actual possession is known as ((seisin in deed,55 while a right of present possession is known as ((seisin in law.55

(2) The ceremony accompanying the de¬ livery of possession of land held in freehold: in this sense often called <(livery of seisin.55

SEINE, san (ancient, Sequana), a river in France, which rises in the department of Cote- d'Or, at the southwestern extremity of the Plateau de Langres, on the northern slope of Mont Tasselot, in the Bois de Chanceaux, about six miles northwest of Saint Seine and 20 miles northwest of Dijon. The first part of its course is north-northwest through the departments of Cote-d'Or and Aube, passing Chatillon and Troyes. After receiving the Aube at Marcilly, it proceeds almost due west, passing Nogent and entering the department of Seine-et-Marne, re¬ ceives the Yonne at Montereau and shortly after the Loing and the Loing Canal, all on the left. Here its course becomes again north- northwest and it proceeds through the depart¬ ments of Seine-et-Marne, passing Melun; the southeast of Seine-et-Oise, passing Corbeil ; and Seine where, shortly before entering Paris, it receives the Marne on the right. Traversing Paris it shortly after commences a long series of remarkable windings, receives the Oise on the right, traverses the northwest of Seine-et-Oise, passing Mantes ; the department of Eure, pass¬ ing Pont de l'Arche and receiving the Eure; and that ot Seine-Inferieure, where it flows through Rouen. Resuming its series of wind¬ ings across the southern part of that depart¬ ment it forms a long and wide estuary and finally joins the English channel near Le Havre. Its direct course is 270 miles; its wind¬ ing course about 500 miles. Of the latter, 350 miles, commencing at Mery below Troyes in the department of Aube, are navigable, but only by barges, which require to be tracked against the current if not moved by steam. The navi¬ gation properly commences at Rouen, from which to the port of Havre the river is usually distinguished by the name of the Seine-Mari¬ time and at full tide floats sailing vessels of from 400 to 500 and steamers of 600 to 800 tons. Its estuary is much encumbered by shift¬ ing sandbanks and dredges are constantly em¬ ployed to remedy this evil. At the time of the equinoctial gales and at spring-tides a tidal bore locally the mascaret with a perpendicular front rushes up the river with a great noise as far as Jumieges and sometimes even to Rouen. The area of the basin of the Seine is 16,700 square miles. The river is well supplied with fish. The scenery, though in parts surpassed by the Loire, Saone and Garonne, taken as a whole, with the hills and valleys, torests and meadows, superb mansions, numerous villages, populous towns and famous cities which line its banks make the Seine the finest river in France.

SEISMOGRAPH, sls'mo-graf, or SEIS¬ MOMETER, an instrument for recording the period, extent and direction of each of the vi¬ brations which constitute an earthquake. For a complete seismograph, three distinct sets of apparatus are required: (1) To record hori¬ zontal motion; (2) to record

vertical motion; and (3) to record time. The horizontal and vertical motions must be written on the same receiver, and if possible side by side, while at the instant at which the time is recorded a mark must be made on the diagram which is being drawn by the seismograph. The first instru¬ ments were merely modifications of the Seis- moscope (q.v.), but successive improvements have been introduced, and the seismograph has

been brought to a high pitch of perfection. Some of the best, if not the best, forms known are in use in the Imperial Observatory at Tokio, Japan. Milne's pendulum seismograph is a common form. This has a horizontal pen¬ dulum, swinging like the boom of a schooner. At the movable end of the pendulum is a box with a light which shines through the hollow pendulum rod, coming out through slits. By an ingenious mechanism any trembling of the light coming through the slits is recorded on a band of paper passing over a slowly moving timed cylinder. The Marvin seismograph, used by the Weather Bureau at Washington, employs a pendulum pointing upward, as in a metro¬ nome. The balance mechanism is of exceeding delicacy, and the mounting of the instrument is extremely solid to protect it from local vibra¬ tions. The record is taken on a traveling paper band in the ordinary manner.

SEISMOLOGY, sis-mol'o'-ji, that branch of physical science which is concerned with the study and investigation of the phenomena of earthquakes, their causes and effects, their dis¬ tribution, and the various circumstances attend¬ ing their occurrence. Its pursuit is regarded as of the utmost importance to geological and other forms of terrestrial research. Seismol¬ ogy, however, is not limited to the study of earthquakes in the usual restricted sense, but deals with related phenomena occurring under many and differing aspects. According to lead¬ ing authorities, it should investigate minute movements or tremors of the earth which es¬ cape ordinary observation ; pulsations of the earth which, by reason of the length of their period, are not noticed; and oscillations, or elevations and subsidences of the earth which slowly alter the relative land and sea levels. Seismology has been developed almost wholly since the beginning of the 19th century, and must still be regarded as in the early stages of its progress; but already it has a great and growing body of materials and of literature, and its possibilities seem to point to the appli¬ cation of the science in practical ways. One of these, it is confidently predicted, will be the warning of dwellers in seismic regions when earthquakes or similar disturbances impend. See Earthquake.

SEISMOSCOPE, the earliest and simplest form of earthquake recorder. The first known was invented by a Chinese named Choko, in 136 a.d., and shows the occurrence and direction of an earthquake by the fall of a column, a principle which was afterward independently adopted in the

West. Vessels filled with viscid liquids have been used ; the height to which the liquid is washed up the side of the vessel being taken to indicate the intensity, and a line joining the points of maximum motion to de- not the direction of an earthquake. Palmieri's seismoscope consists of horizontal tubes turned up at the end, partly filled with mercury. To intensify the motion of the mercury, small floats of iron are placed on the surface, attached by threads to a pulley provided with indices mov¬ ing in front of a scale of degrees, whence the intensity may be read off. The direction is de¬ termined by the azimuth of the tube giving the maximum indication, several tubes being placed in different azimuths. Pendulum seismoscopes,

both swinging and fixed, have also been em¬ ployed. See Seismograph.

SEISTAN, sas-tan, or HAMUN, Lake,

Afghanistan, a large, irregularly-shaped, shal¬ low lake or swamp on the western frontier ad¬ joining the Persian province of Khorassan; a division of this province is named Seistan after it. The lake is not a single expanse of water, but is divided into three depressions. A great part of the area is generally dry; but, as the basin has no outlet, when the Helmund and its ether feeders are in flood this lake regularly overflows its boundaries, fertilizing large tracts of country. The great variations in the size of this remarkable salt water lake give it a pe¬ culiar interest. The rainfall of the region is usually not over three inches, and in the spring a few pools only mark the seistan area. But as the depression here is 1,000 feet below sea level, it attracts the drainage of some 125,000 square miles, so that at times the lakes or chain of lakes is quite extensive. A sufficiency of grain is easily grown to support the population — over 200,000. There is an abundance of water-fowl, living in the vast reed-beds of the salt marsh.

SEITZ, sits, Don Carlos, American news¬ paper manager : b. Portage, Ohio, 24 Oct. 1862. He was graduated at Liberal Institute, Norway, Me., in 1880. He was city editor of the Brook¬ lyn Eagle in 1889-91 ; was later connected with the New York Recorder and with the Brooklyn World; was advertising manager of the New York World in 1895-97, and has been its busi¬ ness manager since then. Author of (Discov¬ eries in Everyday Europe5 (1907) ; (Writings by and about James McNeill Whistler5 (1910) ; (Surface Japan5 (1911) ; (The Buccaneer5 (1912) 5 ; (Whistler Stories5 (1913); (In Praise of War5 (1917), etc.

SEIXAS, sek'sas, Gershom Mendes, Amer¬ ican patriot and minister: b.

New York, 14 Jan. 1745; d. there, 2 July 1816. He was a son of a refugee from Lisbon (who settled in New York about 1730), and choosing the Jewish ministry as his profession in 1766 was placed in charge of the Spanish and Portuguese Syna¬ gogue of his native city. On the outbreak of the Revolution he espoused the American cause, closing the synagogue rather than continue it under British rule. While the majority of his people went to Philadelphia he settled in Strat¬ ford, Conn., until in 1780 he was asked to or¬ ganize a synagogue in Philadelphia, the ((Mikve Israel,55 where he continued to display his patri¬ otic zeal. Owing largely to his efforts on 23 Dec. 1783 a modification in the test clause in the Pennsylvania constitution was made, whereby Jews were subjected to no disqualification for office. After the evacuation of New York in 1784, the old synagogue was re-established and Seixas resumed his former charge. In 1787 he was appointed one of the trustees of Co¬ lumbia College, holding the office uninterrupt¬ edly until 1815. When Washington was inaug¬ urated in 1789 Seixas was selected as one of the ministers to take part in the ceremonies.

SEJANUS, se-ja'nus, Lucius .TElius, son of a Roman knight, and favorite of Tiberius : b. Vulsinii in Etruria; d. Rome, 31 a.d. In 14 a.d. he was made commander of the Praetorian bands, and acquired the confidence of the sus¬ picious Tiberius, to such an extent as to govern

him completely; while the servile senate paid complete deference to the powerful favorite, the praetorian cohorts were also favorable to him, and there was no obstacle in the way of his attaining the supreme power he aimed at but Drusus, son of Tiberius, and the sons of Ger- manicus, Drusus and Nero, the nearest of kin to the emperor. Drusus was put out of the way by poison ; the latter, with their mother, were banished and thrown into prison, a step which they did not long survive. Several friends of Germanicus were beheaded at the instigation of Sejanus; and when Tiberius finally retired from Rome, and withdrew from the government, Sejanus governed with abso¬ lute power, and the senate ordered that the stat¬ ues erected in his honor should be publicly worshipped. But at the moment of his highest elevation the suspicions of Tiberius were awak¬ ened, and his measures were taken so cautiously, that Sejanus suspected nothing until openly accused by the emperor before the senate. He was then imprisoned, condemned to death, and executed on the same day. The historian Taci¬ tus has given a searching and vivid, although possibly a prejudiced, account of the character and intrigues of Sejanus, while his fate is the subject of a tragedy of Ben Jonson's. Con¬ sult Tacitus, (Annals5 (iv, 1, 2, 3, 8, 39ff. ; 74, and v, 6ff) ; Suetonius, Tiberius5 ; Jiilg, (Vita Lucii 2Elii Sejani5 (Innsbruck 1882) ; and Tarver, J. C., (Tiberius the Tyrant5 (New York 1902).

SEKAKUL, an African parsnip (q.v.).

SEKI KOWA, sa'ke kowa, or SEKI SHINSUKE KOWA, or TAKAKAZU, Jap¬ anese mathematician: b. Fujioka, near the present Tokio, province of Kozuke, 1642; d. near there, 1708. He was of the samurai class and became the greatest mathematician of his time in Japan, benefiting, however, by the work of several great Japanese mathematicians im¬ mediately preceding him, among whom was Yoshida. He was famous both as a teacher and for his discoveries, and his work greatly improved the algebra of the Japanese, which had come to them from the Chinese. He un¬ derstood the native calculus, yenri, which he may have invented ; and also knew the principle of determinants. Most of his manuscripts are lost. Consult Mikami, Y., development of Mathematics in China and Japan5 (1913) ; and Smith, D. E., and Makimo, Y., (A History of Japanese Mathematics5 (1914).

SELACHII, se-la'ki-i, the order of fishes now known more generally as the Elasmobran- chii, which includes the sharks, rays and their allies. See Ichthyology; Sharks, Etc.

SELAGINELLA, se-laj-T-nefia, club moss, a genus of mostly tropical plants with small scale-like leaves and propagated by spores. (See Ferns and Fern-Allies) . The species are very numerous, and widely distrib¬ uted in warm regions. They are generally quadrangular, the two lower rows of small cne-veined leaves larger than the upper two rows, thus giving a flattened look to the fronds. They are generally creeping plants, often form¬ ing moss-like mats of foliage, but in some species supported by other plants, are erect and often several yards long. Selaginellas are cultivated in green houses both as pot plants, for edgings, and for hiding bare earth.

with their verdant foliage, sometimes iridescent, or changing in hue. 5. lepidophylla, a Mexican species, growing in flat rosettes, while not very beautiful, is one of the familiar resurrection plants, because it becomes desiccated in time of drought and revives when moist conditions return. When dried out, it rolls its branches inward forming a ball, in which condition it is blown to a new situation by the wind. If it be placed in water the brown stems uncurl, flatten out into fern-like fronds and become green, and if this be done within a reasonable time after its uprootal, the selaginella will start into a new, genuine growth.

SELAH, se'la, a Hebrew word which occurs 71 times in the book of Psalms

and three times in the prayer of the prophet Habakkuk (Hab. iii), and is retained in the English Authorized version of the sacred texts ; in the Septuagint version it is represented by the word diapsalma. Its signification cannot be definitely ascertained, but commentators interpret it variously as in¬ dicating either a pause or repetition, or the end of a strophe, or playing with full power, or a short recurring symphony, or, finally, a bending of the body in reverence. Dr. C. A. Briggs explains the term as a derivation from a verb meaning ((to lift up" as in ˆraising® a hallelujah. Consult Jacob in (Zeitschrift fur alttestament- liche IVissenschaft (Vol. XVI, Giessen 1896) ; Briggs, C. A., in Journal of Biblical Literature (Vol. XVIII, Boston 1899) ; Briggs, E. C, in American Journal of Semitic Languages (Vol. XVI, Chicago 1899) ; Briggs, C. A. and E. C., Commentary on the Psalms) (New York 1906-

07).

SELBORNE, sel'born, Roundell Palmer,

1st Earl of, English statesman: b. Mixbury Oxfordshire, 27 Nov. 1812; d. Petersfield, Hampshire, 4 May 1895. He was graduated from Christ Church, Oxford, in 1834 and was called to the bar in 1837. He was returned to Parliament for Plymouth in 1847, became Solicitor-General in 1861, and was Attorney- General in 1863-66. He was knighted in 1861 and subsequently was made Baron Selborne. He was appointed Lord Chancellor in 1872 and did much to aid the establishment of a Supreme Court of judicature in 1873, but on the fall of the ministry in 1874 he again went out of office. He was reinstated as Lord Chan¬ cellor in 1880, was created Earl of Selborne in 1882, and in 1886 he separated from Glad¬ stone on the Home Rule question and there¬ after his political work was concerned chiefly with legal reform. He published (The Book of Praise5 (1863); (Notes of Some Passages in the Liturgical History of the Church of England5 (1878); (Ancient Facts and Fictions Concerning Churches and Tithes.5 Consult < Selborne Memorials5 (London 1896-98).

SELDEN, John, English scholar and states¬ man : b. Salvington, Sussex, 15 Dec. 1584; d. London, 30 Nov. 1654. He was educated at Oxford and afterward called to the bar of the Inner Temple. His first work,

so offended James I that its author was se¬ verely censured by the High Commission court, and later cast into prison by the king for denying that Parliament owed its privileges to the Crown. As a member of the first two Parlia¬ ments of Charles I, in the second of which he supported the impeachment of the Duke of Buckingham, and in the famous Long Parlia¬ ment in 1640, his career was marked by great zeal for the advance of civil

and religious liberty. In 1629 he published the work upon the Arundel Marbles ((Marmora Arundellia5), for the translation of whose inscription he is famed. His other publications include (De Successionibus in Bona Defuncti Secundum Leges Hebrseorum5 (1634) ; (De Successione in Pontificatum Hebraeorum Libri Duo5 (Ley¬ den 1638) ; (De Jure Naturali et Gentium juxta Disciplinam Hebrseorum5 (1640). His (Marie Clausum5 (1635) was written in reply to Grotius' (Mare Liberum.5 His most famous work, however, is his 'Table-Talk5 (published by his amanuensis, Richard Milward, in 1689 and reprinted in London 1868). Consult Wil¬ kins' collection of Selden's works, with life of the author (1726) and Aikin, 'Life of Selden5 ; Johnson, G. W., 'Memoirs of John Selden5 (10 vols., New York 1883-84); and Waters, Robert, (John Selden and His Table-Talk5 (ib. 1899).

SELECTIVE SERVICE LAW AND DRAFT. The Act of Congress authorizing the President to increase temporarily the Mili¬ tary Establishment of the United States, ap¬ proved 18 May 1917, provided for the raising and maintaining by selective draft of incre¬ ments (in addition to the regular army and national guard of 500,000 men each, together with recruit training units for the maintenance of such increments at maximum strength, and the raising, organizing and maintaining of ad¬ ditional auxiliary forces and also for raising and maintaining at their maximum strength, by selective draft when necessary, the regular army and the national guard drafted into the service of the United States. It also provided that such draft shall be based upon liability to military service of ˆall male citizens, or male persons not alien enemies, who have declared their intention to become citizens, between the ages of 21 and 30 years, both inclusive55 ; that the several States, Territories and the District of Columbia should furnish their proportion¬ ate shares or quotas of the citizen soldiery determined in proportion to the population thereof, with certain credits allowed for vol¬ unteer enlistments in branches of the service then organized and existing. The nation was confronted with the task of constructing, with¬ out delay, an organization by which the selec¬ tion might be made for the entire country by means of a uniform and regulated system. A suggestion of administration, incomplete be¬ cause of entirely different conditions, arose from the precedent of the Civil War draft; and on 22 May 1917 the judge-advocate-general was detailed as "provost-marshal-general55 and charged with the execution, under the Secretary of War, of so much of the act of 18 May "as relates to the registration and selective draft.55 Plans had already been formulated for the operation of the selective draft, and with the formal designation of the provost-marshal-geu-

eral the work of organization began. It was obvious that to build up a new Federal organ¬ ization would require a greater period of time than was afforded by the military necessity. The existing governmental organizations of the several States were presented as available sub¬ stitute and the statute authorized their use. This expedient was unprecedented, but its prac¬ tice abundantly justified its adoption.

The immediate need was for a comprehen¬ sive registration of every male of draft age. To effect this registration each State was divided into districts containing a population of approximately 30,000, in each of which a regis¬ tration board was appointed by the governor. Usually this board consisted of the sheriff, the county health officer and the county clerk; and where the country's population, exclusive of cities of more than 30,000 inhabitants, exceeded that number, additional registration boards were appointed. Cities of over 30,000 were treated as separate units. The election district was established as the actual unit for registra¬ tion in order that the normal election machinery might be utilized, and a registrar for every 800 of population in each voting or election precinct was appointed by the registration board. In cities approximating 30,000 of population the registration board was made up of city officials, and where the population exceeded the unit number additional registration boards of three members were appointed, one a licensed phy¬ sician.

Governors and mayors were given consider¬ able latitude in making geographical divisions of the States and cities for the purpose of defining registration jurisdictions; the only lim¬ itation being that approximately 30,000 inhabit¬ ants should be included within the confines of a district. The general scheme was that the board of three should exercise supervision over the precinct registrars, the governors supervis¬ ing the work of the registration boards, while the mayors of cities containing 30,000 or more inhabitants acted as intermediaries between governors and registration boards. Each State was constituted a separate unit and each gov¬ ernor was charged with the execution of the law in his State. By proclamation of the Pres¬ ident, 5 June 1917, was designated as registra¬ tion day throughout the United States, with the exception of Alaska, Hawaii and Porto Rico ; and, due to the fact that registration or¬ ganization of the States had been so quickly and thoroughly completed, 9,586,508 male citi¬ zens of the designated ages were registered on the day set, and the first step in the operation of the selective service law was accomplished. Registration consisted in entering on a card essential facts necessary to a complete identifi¬ cation of the registrant and a preliminary sur¬ vey of his domestic and economic circum¬ stances.

With the registration completed there fol¬ lowed the operation of examination, selection and mobilization. The unit jurisdiction of ap¬ proximately 30,000 of population was main¬ tained as far as possible, and for each district or division a local board of three members was appointed by the President upon the recommen¬ dation of the governor. The board members were residents of the districts they served, and the personnel comprised representative and re¬ sponsible citizens of the community, including

usually a licensed physician. In many cases registration boards were reappointed local boards. Such boards exercised original juris¬ diction in all cases except claims for discharge on account of engagement in industry or agri¬ culture. In every Federal judicial district one or more district boards were organized, con¬ sisting usually of five but in some cases of a larger number of members, comprising leading citizens of the community and appointed by the President upon the recommendation of the governor. District boards exercised appellate jurisdiction over local boards and original jurisdiction in industrial and agricultural claims. The initial step in the process of ex¬ amination and selection was to establish the order of liability of each of the registrants to be called for service. The cards within the jurisdiction of each local board, taken as a unit, had been serially numbered when com¬ pleted and filed, and duplicates of the cards so numbered were deposited with the governor and with the district boards. The average number of registrants within the jurisdiction of a local board was about 2,500, the highest being 10,319. In order to establish the order of liability of each registrant in relation to the other registrants within the jurisdiction of the same local board, a drawing was held 20 July 1917 in the public hearing room of the Senate Office building in Washington, as a result of which every registrant was given an order num¬ ber and his liability to be called for examination and selection determined by the order number. The official lists of the numbers drawn by lot were furnished to every local board and from these lists the boards made up the availability order list of all registrants within their respec¬ tive jurisdictions.

The selective service law required certain persons to be exempted from military service, including Federal and State legislative, execu¬ tive and judicial officers, ministers of religion, students of divinity, persons in the military or naval service of the United States and certain aliens. The law further authorized the dis¬ charge from draft, under such regulations as the President might prescribe, of county and municipal officers, custom-house clerks and other persons employed by the United States in cer¬ tain classes of work, pilots and mariners, and, within prescribed limitations, registrants in a status with respect to persons dependent upon them for support and persons found physically or morally unfit. Exemption from combatant service only was authorized in the case of per¬ sons found to be

members of any well-recog¬ nized religious sect or organization whose existing creed or principles forbid its members to participate in war in any form, and whose religious convictions are against war or par¬ ticipation therein. The success of this great undertaking was primarily due to the painstak¬ ing forethought and the statesmanlike breadth of view with which the provost-marshal-general and his associates organized the machinery for its execution. But other elements have con¬ tributed to its success, and first among these was the determination to rely upon the co-opera¬ tion of the governors of States and State agencies in the assembling of the registration and exemption boards. By reason of this asso¬ ciation of State and local agencies with the National government the law came as no man-

date enforced by soldiers, blit as a working of the home institutions in the hands of neighbors and acquaintances pursuing a clear process of selection, and resulting in a gift by the States to the nation of a body of men to be trained. The press of the country co-operated in a most helpful way, drawing the obvious distinctions between this mode of selection and those puni¬ tive drafts which have sometimes been resorted to after the failure of volunteering, and point¬ ing out to the young men of the country that the changed conditions of warfare made neces¬ sary a mode of selection which would preserve the industrial life of the nation as a foundation for successful military operations. The country seemed generally to have caught enough of the lessons of the European War to have realized the necessity of this procedure, and from the very beginning criticism was silenced and doubt answered by the obvious wisdom of the law. The unquestioned fairness of the arrangements, the absence of all power of substitution, the fact that the processes of the law were worked out publicly, all co-operated to surround the draft with assurances of fairness and equality, so that throughout the whole country the attitude of the people toward the law was one of approval and confidence. This does not mean that the law is perfect either in its language or in its execution, but that its passage may be regarded as a milestone in progress toward self-con¬ sciousness and national strength. Its acceptance shows the unity of spirit of the people, and its operation shows that a democracy has in its institutions the concentrated energy necessary to great national activities, however much they may be scattered and dispersed, in the interest of the preservation of individual liberty, in time of peace. The problem presented involved not merely the selection of forces to be trained into armies but officers to do the training. By the provisions of the national defense act of 3 June 1916 officers' reserve corps had been authorized. Rules and

regulations for their organization were promulgated in July 1916, and amended in March 1917. Immediately upon the passage of the act the building up of lists of reserve offi¬ cers in the various sections of the military establishment was undertaken, with the result that at the end of the fiscal year some of the branches of the service had substantial lists of men available for duty in event of call. The largest number of commissions were issued in the technical services, for which professional non-military training was the principal requi¬ site. The largest reserve corps was that in the medical department, in which more than 12,000 physicians were commissioned. The expansion of these technical services proceeded easily upon the basis of the reserve corps beginning, but the number of applicants for commissions in the strictly military or combatant branches of the service was relatively small. They consisted of men who had had military experience either in the regular army or the national guard, and men who were graduates of schools and col¬ leges affording military training, and of the training camps which had been maintained at Plattsburgh and throughout the country. Their number, however, was wholly inadequate, and their experience, while it had afforded the ele¬ ments of military discipline, had not been such as was plainly required to train men for partici¬

pation in the European War with its changed methods and conditions.

The original selective service law, with its subsequent amendments, mobilized the man power of the nation between the ages of 18 and 45, inclusive. Under the original and later acts approximately 23,709,000 men were registered and slightly over 2,800,000 were inducted into the military service in a manner that was fair to the individual, efficacious in providing the army with men as quickly as they could be equipped and utilized and provocative of a min¬ imum of disturbance to the industrial and eco¬ nomic life of the nation. After 15 Dec. 1917 the administration of the law was greatly im¬ proved by the system of classification that was employed in the selection of men. The eco¬ nomic needs of the nation required that men whose removal would interfere with its civic, family, industrial and agricultural life should be taken in the order in which they could be best spared. On 15 December all exemptions that had previously been granted were annulled and all registrants were required to file ques¬ tionnaires giving detailed information in regard to industrial status and claims for exemption. Registrants were arranged in five classes in the inverse order of their importance to the eco¬ nomic interests of the nation and the support of dependents. The men thus placed in class one were first rendered liable for military serv¬ ice, those in the other four so-called deferred classes being granted temporary exemption. On 16 May 1918, according to a joint resolution of Congress, it became possible to frame new regulations whereby the quotas to be furnished by the several States were apportioned

accord¬ ing to the number of registrants in class one, instead of according to population, as was re¬ quired by the original act of the previous year. Further registrations of men who had attained the age of 21 years since the first registration were held on 5 June 1918 and 24 Aug. 1918, according to the provisions of presidential proc¬ lamations, authorized in the joint resolution of Congress, approved 20 May 1918. On 7 Aug. 1918 the distinguishing appellations ((Regular Army,® (

ditional types of local boards were established to aid in the administration of the draft. Medi¬ cal advisory boards were appointed by the President on the recommendation of the gov¬ ernors. These boards varied in membership from 3 to 40 and consisted of leading medical authorities who were in a position to act in an advisory capacity to those who were charged with making physical examinations of registered men. At the same time legal advisory boards were also established to assist registrants and draft officials in the interpretation of the selec¬ tive service law. These boards consisted of three permanent members appointed by the President on the recommendation of the gov¬ ernor and an indefinite number of associate members appointed by the governor direct. On 4 July 1918 the provost-marshal-general in a letter to the local draft officials suggested the advisability of establishing boards of instruc¬ tion, which should get into close and immediate touch with newly drafted men and give them preliminary directions in order better to fit them for the duties facing them. Slightly over 2,800,000 of the registrants were inducted into military service, 2,541,000 through calls issued to local boards to furnish their allotted quotas and 259,000 through induction of individuals. Approximately 140,000 of the latter were in¬ ducted in October and during the first 10 days in November for the Students' Army Training Corps. The inductions during each month are shown in the following table:

Month

Men

Inducted

Month

Men

Inducted

1917

April .

174,377

September ....

296,678

May .

373.063

October .

163,644

June .

301,941

November .

35,721

July .

401,147

December .

20,320

August .

282,898

September .

252,295

1918

October .

250,000

January .

23,288

November .

10,000

February .

83,779

March .

132,484

Total .

. . 2,801,635

With the exception of the Students' Army Training Corps and a few thousands of volun¬ tary inductions, no men of the last registration were inducted into the army. This means that of the 10,481,000 registrants between the ages of 21 and 30 approximately 2,630,000, or 25 per cent, were taken into military service through the draft. At the time of the signing of the armistice class one of the 21 to 30 years old group was practically drained of men capable of rendering full military service. Those re¬ maining classified therein were men qualified for limited service only, men granted temporary deferment on account of employment with the Emergency Fleet Corporation and men classed as delinquents on account of failure to file ques¬ tionnaires. These groups constituted about 6 per cent of the total registrants. About 4 per cent of the registrants were placed in deferred classes on the ground of employment in a neces¬ sary industrial or agricultural enterprise and about 65 per cent on all other grounds.

The balance sheet of the first draft as pre¬ pared by the provost-marshal-general's office, as of 30 Aug. 1918, shows the registration of 5 June 1917, 9,586,508; inducted or otherwise ac¬

counted for prior to 1 Dec. 1917, 897,061 ; num¬ ber due to file questionnaires, 8,689,447 ; number placed in Class I, 2,473,680; number placed in Class II, 497,261 ; number placed in Class III, 416,456; number placed in Class IV, 3,406,240; number placed in Class V, 1 ,895,810 ; total, 8,689,447. Analysis of Class I — Total number in Class I, as of 1 Sept. 1918, 2,473,680; de¬ linquents, 285,895 ; emergency fleet, 46,552 ; lim¬ ited service, 245,234; remedial defectives, 58,- 950; not physically

examined, 42,801 ; total, 679,- 432. Fighting men left, 1,794,248; registration of 5 June 1918, 744,865; number placed in Class I, 408,517; total, 2,202,765. Delinquents, 11,107; emergency fleet, 5,530; limited service, 32,589; remedial defectives, 9,433 ; not physically ex¬ amined, 37,771 ; total, 96,430.

The nationality of aliens registered was : Co-belligerents — Belgium,- 3,952 ; France, 3,510. Great Britain — England, 27,553; Ireland, 20,- 840; Scotland, 7,491; Wales, 1,563; Canada, 47,258; elsewhere, 16,479. Greece, 68,005 ; Italy, 245,679; Portugal, 21,943; Rumania 7,695; Rus¬ sia, 275,413; Serbia, 2,852; China, 7,170; Japan, 15,336. Neutral — Denmark, 8,063; Nether¬ lands, 6,679; Norway, 16,678; Sweden, 24,663; Switzerland, 4,929; Mexico, 59,145; Central and South America, 5,429; sundries, 22,688. Enemy — Germany, 40,663 ; Austria-Hungary, 238,768. Allied with enemy — Bulgaria, 7,271 ; Turkey, 36,031 ; total, 1,243,801.

As an average per capita cost for register¬ ing men for the Federal draft and inducting them into the national army by 30 June 1918 that of $1.42 in the State of New York, as shown by the Selective Service Bureau of the adjutant-general's office, may be cited. In New Rochelle the cost to the government was noth¬ ing, that city bearing the expense. In other places the induction cost per capita ran from 12 cents a man by Board 164 of New York City to $2.58 a man by Board 161 of New York City. The boards ranking next to New Rochelle and Board 164, New York City, in lowest cost were: Board 184, New York City, 26 cents per man of 2,833 men ; Oneida County Board 2, 27 cents a man for 1,698 men ; Orange County Board 2, 31 cents a man for 2,428 men. The highest per capita cost in cities outside of New York was in Albany City Board 1, where 2,036 men were inducted at $2 each. The highest per capita cost in counties was in Rensselaer County Board 1, where the average was $2.44 for 1,822 men going into the service for the period end¬ ing 30 June 1918.

Edward S. Farrow,

Consulting Military and Civil Engineer.

SELECTMEN, a name given in the New England States to the chief officer of a town or village. English parishes had their vestries, which were of two sorts, common vestries, com¬ posed of all the rate-payers and select vestries. In the latter, concerns were managed by select vestrymen. Hence the term selectmen, as used in New England, for the governing board of a town. The practice is found in Massachusetts as early as the issue of the The selectmen acted under the orders of the town meeting. See Town and Town Meetings.

SELENE, se-le'ne. See Luna.

SELENGA (sa-leng'ga) RIVER, Asia, a river rising in the Khangai Mountains in west¬ ern Mongolia, flowing northeast through Mon-

golia and the Russian Transbaikal district, and emptying, into Lake Baikal near its southern end. It is 750 miles long, and navigable for light vessels to its junction with the Orkhon. It receives through the Egin-kol the overflow of the large Lake Kosso-gol. The Selenga is the main beadstream of the Angora, the prin¬ cipal tributary of the Yenisei.

SELENITE, the crystallized or distinctly foliated variety of the mineral gypsum, hydrous calcium sulphate. It is number two in the scale of hardness, is flexible, but when broken has a ((fibrous fracture® which consists tof two imper¬ fect cleavages. When pure it is colorless and transparent. The cleavage plates have a pearly lustre which is characteristic of the clinopina- coid while the other faces of the crystal are subvitreous. Plates of selenite several feet across and perfectly transparent are not un¬ common, while crystals five feet in length have been found in Utah. Fine large crystals are also found in Italy, France and Switzerland. Limpid crystals of matchless beauty occur in the Sicilian sulphur mines. Twin crystals are common in all these localities, the most typical of which are the ((fish-tail® twins. Foliated selenite is abundant in Nova Scotia, also at Lockport and elsewhere in New York, while crystals of model-like perfection are found near Ellsworth, Ohio. Like massive gypsum, selenite is an exceedingly common mineral. It has been used to some extent as a filler for paper, paints, etc.

SELENIUM, symbol Se, atomic weight 79.2. It was discovered by Berzelius (1817) in the refuse iof a sulphuric acid factory. A non- metallic element occupying an intermediate place between sulphur and tellurium. Occurs in the free state in small amounts usually associated with native sulphur. Found in many minerals combined with various metallic elements as cop¬ per, lead, mercury, silver, etc. Here again the compounds of selenium are found in company with the analogous compounds of sulphur. Free selenium is prepared from the compounds

It is found that there occurs a remarkable variation in the electrical resistance of selenium as the intensity of the light which falls upon it is varied ; when the light to which selenium is exposed is increased in intensity, the elec¬ trical resistance is diminished. It is this prin¬ ciple that

is the basis of the ((Selenium Pho¬ tometer® of astronomy, an instrument of extreme delicacy by which the variations in intensity of the feeble light of the stars can be measured with an accuracy which is unapproachable by any other means.

Selenium exists in two allotropic forms. The one obtained as above is a red amorphous powder soluble in carbon di-sulphide, while if this powder be melted and again , cooled sud¬ denly to 210° C. it forms a dark vitreous mass insoluble in carbon di-sulphide. Crystalline forms are also known.

In general chemical behaviior it is closely related to sulphur and tellurium, all three form¬ ing analogous oxides, oxygen acids and hydro¬ gen compounds.

Selenium Dioxide, Se02 a white crystalline compound formed when selenium is burned or by healing selenious acid. It dissolves readily in water forming selenious acid.

Selenious Acid, H2Se03, a crystalline solid found by oxidation of selenium in presence of water, as above.. It is a di-basic acid forming salts called selenites having the general formula M2Se03. .

Selenic Acid, H2Se04, a heavy liquid re¬ sembling sulphuric acid and formed by action of powerful oxidizing agents on selenium or selen¬ ious acid. It differs from sulphuric acid in being unstable, losing its oxygen readily and thereby passing to selenious acid. Also a di¬ basic acid forming salts called selenates (M2Se04).

With hydrogen selenium forms a very dis¬ agreeable smelling gas called seleniuretted hydrogen (H2Se), the analogues of sulphuret¬ ted hydrogen. Selenium forms compounds with many metallic elements (see above) called selenides. These are analogous to the sulphides and usually occur along with them. They may be made by heating selenium with the metal.

SELENODONT TEETH, a type of molar teeth, characteristic of modern herbivorous ani¬ mals, on which the crown of the tooth exhibits curving ridges of enamel instead of rounded tubercles. See Bunodont.

SELENSULPHUR, an orange- to brown¬ ish, mineral consisting of sulphur and selenium. It is a result of volcanic action, and occurs as an incrustation in the islands

SELEUCIA, sel-u'si-a, Asia, the name of several cities founded by Seleucus Nicabor. (1) The most celebrated was Seleucia-on-the- Tigris, made the capital of Babylonia in place of Babylon, from which it was distant about 30 miles, and which it eclipsed in wealth and splendor. The Tigris and

Euphrates flowed near its walls, and rendered it one of the richest commercial cities of ancient times. The num¬ ber of its inhabitants at the time of its greatest prosperity is estimated to have been about 600,- 000, chiefly Greeks. During the decline of the Seleucidae monarchy it became independent, and from its great wealth became the centre of attraction to the pillaging tribes of southern Armenia and Media, by whom it was partially plundered several times. In 116 a.d. it was burned by Trajan, and a few years later its destruction was completed by Lucius Verus, the Roman emperor. From that time it was de¬ serted and became as desolate as Babylon itself. (2) Another important city, Seleucia Pieria, founded in 300 b.c., was situated in the sea- coast at the foot of Mount Pieria, 12 miles west of Antioch. Its natural strength was im¬ proved by every known art of fortification, and this combined with its magnificent buildings ob¬ tained for it a distinguished position among the great cities of antiquity. It occupied a very prominent place in the wars between the Seleucidse and the Ptolemies, but it rapidly de¬ clined under the Roman dominion, and in the 6th century of our era the city had fallen into complete decay. (3) Seleucia Tracheotis, a city of Cilica on the Calycadmes, was also built

by Seleucus. It was once a rival of Tarsus, and on its site are many ancient ruins. The modern Selefke is located here. (4) Seleucia, a city in Persia, was founded by Alexander the Great and called Alexandria. It was re¬ built as Seleucia by Antiochus I of Syria. Among the other cities of the name were Seleucia in Mesopotamia on the Euphrates ; on the Belus in Syria; in the Pisidia ; and in Pamphylia. The city of Tralles was also called by this name at one time. Consult Bouche- Leclercq, (Histoire des Seleucides5 (2 vols., Paris 1913-14).

SELEUCIANS. See Religious Sects.

SELEUCIDAE, se-lu'si'de, the descendants of Seleucus, a dynasty of kings who succeeded to that portion of the empire of Alexander the Great which embraced the eastern provinces, Syria and a considerable part of Asia Minor.

Seleucus I, surnamed Nicator, one of the diadochi or successors to the divided empire of Alexander, 365 ; d. 281 b.c. His father Antiochus was a general of Philips and he himself was one of the most distinguished officers of Alexander the Great, who invested him with the government of Babylonia and Media. On the death of Alexander in 323 Seleucus joined the conspiracy against Perdic- cas, which resulted in the death of the latter,

and in the second division of Alexander's dominions the satrapy of Babylon fell to his share. Like the other generals of Alexander he asserted his independence, and this step be¬ ing opposed by Eumenes, he obtained the aid of Antigonus against him. Their united efforts proved successful, but Antigonus now turned upon Seleucus himself, who, rather than face him, withdrew to Egypt (316 b.c.). Two or three years later he succeeded in inducing Ptolemy, the governor of Egypt, along with Lysimachus and Cassander, to take the field against their common enemy Antigonus, now grown very powerful. Their forces proving victorious, he assumed' the title of king of a vast dominion extending from the Euphrates to the Indus (306). After a final victory over Antigonus the whole of Syria and a great part of Asia Minor fell to the share of Seleucus. By subsequent victories over Lysimachus and Demetrius his possessions were extended so as to include the whole of Asia Minor. He was assassinated by Ptolemy Ceraunus. He was the protector of the arts and sciences, the bene¬ factor of his people and the most upright of Alexander's successors. Besides several cities of the name of Seleucia, he likewise founded Antioch. He was succeeded by his son An¬ tiochus I. (See Antiochus). Seleucus II, surnamed Callinicus, succeeded his father Antiochus II in 246. He murdered his step¬ mother Berenice, and Ptolemy Euergetes, her brother, invaded the territories of Seleucus to avenge her death, but eventually concluded a truce with his foe and retired. After this Seleucus with varying success engaged in con¬ tests with his brother Antiochus Hierax, Tiri- datus, king of the Parthians, then with Ptolemy, who had broken the truce. In an expedition, however, against the Parthians he was defeated by Arsaces I, king of Bactria. He died in 226 b.c., having reigned 20 years, and was suc¬ ceeded by his son Seleucus III, who only

reigned three years, being followed by Antiochus III, surnamed the Great. Seleu- cius IV, surnamed Philopator, succeeded his father Antiochus III in 186. Syria had been greatly weakened by the war carried on by Antiochus against the Romans, and Seleucus had to pay immense sums to the victors. His reign was signalized by few events of impor¬ tance, and after he had been 12 years on the throne he perished from poison (175). An¬ tiochus IV, surnamed Epiphanes, succeeded him, and is notorious for his cruel persecution of the Jews, whose religion he attempted to extirpate. Antiochus V, surnamed Eupator, was the next in line (164-162). Under his reign the government was weak and corrupt. De¬ metrius I, surnamed Sotor, followed, but was defeated and killed by an imposter who claimed to be the son of Antiochus Epiphanes, Alexander Balas (150-145). The succeeding rulers were Demetrius II (Nicator), who was taken prisoner by the Parthians, and in whose place Antiochus VI ruled (145-140), but who later ascended the throne himself (140-137) ; Antiochus VII (Sidetes) who restored the roval line and was the last strong ruler of the Seleucidae;

Seleucus V, who was murdered by his mother Cleopatra; Antiochus VIII (Gry- pus), who reigned in 125-96 sharing from 111 his kingdom with his step-brother Cyzicenus Antiochus IX; Seleucus VI (Epiphanes), 96-95; Antiochus X (Eusebes), 94-92; Philip I, 95-83; Antiochus XI (Epiphanes), during 95; Demetrius III (Eucˆerus), 95-87; Tigranes (84-69), who gained the sovereignty next by conquest; Antiochus XII (Dionysus) and Antiochus XIII, Asiaticus (69-64) who was conquered by the Romans under Pompey who made Syria a Roman province in 64 b.c.

The power of Seleucidae began to decline as early as the reign of Seleucus II, and they successively lost, through revolts and otherwise, Bactria, Parthia, Armenia, Judaea, and what subsequently remained was converted into a Roman province in 64 b.c. Consult Bevan, E. R., f House of Seleucus) (2 vols., London 1902) ; Bouche-Leclerq, (Histoire des Seleu- cides) (2 vols., Paris 1913-14) ; Haussoullier, Bernard, (Etudes sur l'histoire de Milet et du Didymeion) (Paris 1902) ; Macdonald, G., (Early Seleucid Portraits5 (in Journal of Hel¬ lenic Studies, Vol. XXIII, London 1903).

SELF-CONSCIOUSNESS, the conscious recognition that one is an ego or personality; distinguished from Consciousness (q.v.). In the article in this encyclopedia on consciousness, it is treated from the material point of view. Self- consciousness here will be treated from the occult or Eastern viewpoint. Each one of us is conscious of himself as an identity or unit, different from every other individual. We know this as fundamentally as we know any¬ thing, and while we cannot prove to any of our five senses just what this identity is, this does not militate against the fact of its being a truth. The five senses inform us of material outside things, which science has catalogued and philosophy reasoned upon; but self-conscious¬ ness comes to us as an intuition, being recog¬ nized in the same way as that which we call conscience, which may be defined as a phrase of self-consciousness. It is characteristic of this

self-consciousness that it instinctively knows right from wrong, and thus tends to a recog¬ nition of morality as the way of evolution. That the consciousness of all men is in a stage of evolution is easily reasoned out. The babe has a very dim consciousness, and hence little re¬ sponsibility. The drunkard or dope fiend has reduced his consciousness, and we hold him to be little accountable for what he does under such conditions. The wise man is one who has opened his consciousness to a great many things, and wre expect much more of such a one and hold him to a much higher

responsibility. It is not too much to say that the destiny or forward movement of the race seems to rest mainly with its wise men, those who are wise in morals as well as science. We cannot set our ideals any higher than what we can conceive of ; in fact man appears to be ever setting his ideals above his actions, never quite as good or as clever as he could wish ; and when he im¬ proves he sets his ideals yet higher, and so never reaches them. This condition is named the development of consciousness. There comes a time in the progress of every man when he realizes that he is higher and apart from matter — and this is true even if men have not yet attained to that realization. We are not mere animals, but are imbued with a life principle and a higher force which is higher even than the human mind. The proof of this is that a few men and women have learned to control their minds, to concentrate on a fixed point until the active mind is absolutely stilled. Any person of good intelligence can do this with practice, if he have the will and the patience, for it takes a great deal of both. That which is highest in man — call it the soul, the Divine spark, the ego or what you will — is designed to govern both the mind and body. The ma¬ jority of people have little government over their bodies, and a still smaller fraction have definite control over their minds. Yet all truly great men do rule both their appetites and their minds, for thus can they rise far above the crowd and accomplish the things for which we call them great. But the self-conscious indi¬ vidual is one who has come to recognize this divinity of the higher nature, this attribute of the God within, and who is striving to evolute to still higher paths of usefulness, that he may serve humanity. For it is a characteristic of those who have attained the greatest degree of self-consciousness that they discover nothing higher in the way of accomplishment than the service of mankind; and if they give time and effort to developing themselves it is that they may be the more fit to serve their fellows. The intellectual materialist who has not proceeded far on the way toward self-consciousness will probably challenge some of these statements because he has not experienced them, and what he has not felt he refuses to accept, as if it were possible for any one man to have all ex¬ periences or all knowledge. These sort of truths are taught by all grades of philosophers from ancient to modern times. But without de¬ pending upon authority, each of us can ask himself the question, «What is this within me that I call If— that sits in judgment on my acts? — that impels me toward higher things, and condemns me when I yield to lower de¬ sires?® This it is that is here characterized

as self-consciousness. The more I consult it, the more I listen to its voice, the more plainly it speaks, and it always teaches unselfishness and morality. When it is listened to, it in¬ forms a man of his faults, and thus assists him in curing them. To those who study their own consciousness it reveals other things — that they have faculties and powers, and that these

appear supreme in their own domain. In other words, a man has will, which is his own, and choice, of which no one can deprive him. Will and choice send one man in search of the North Pole, another to the forefront of a battle, another to the bedside of the dying, another to the accumulation of wealth, another to a study of the stars, another to investigation of the laws of electricity, and so on ad infinitum. It is these qualities of finite godship which lead many to the conclusion that man is a spark of the Divine, and bound to evolute forever; that while he has freedom of will and choice for good or evil, he is never free from the hyperphysical superior will of good (or God) which always overcomes evil. Consult Steiner, (The way of Initiation (English trans., New York, 1910) ; Besant, (A Study in Conscious- ness) (1900) ; Hudson, (Evolution of the SouP ; Judge,*

Charles H. Cochrane.

SELF-DEFENSE is the right to protect one's person or property from injury. The law further sanctions the mutual and reciprocal de¬ fense of those who stand in the near relation of husband or wife, parent or child. It is law¬ ful to repel unlawful force by force, for the fundamental law in such cases is that one has a primary right to stop injury to oneself, to one's family, or those who rightfully look upon one as a protector. But it is an essential prin¬ ciple of law that we must not use more force than is necessary for self-defense. The law of self-defense is founded on necessity, and one in order to avail himself of this defense in law must show belief, and the reason to believe, that there was imminent danger to life, or of receiving bodily harm, and that as a reasonable person no other means of defense would be effectual ; the danger must be apparent and im¬ minent and either existing at the very time, or reasonably believed to be so. Threats alone do not justify or excuse homicide; there must be some actual demonstration of an intent to take life, or inflict bodily harm in order to establish self-defense to the extent of taking a life. In cases of mere assault it is generally held that the right of self-defense does not arise until reasonable effort has been made for protection. One who is in legal possession of property has the right to defend the same against one who manifestly intends or endeavors by violence to commit a felony, and may under certain exigencies in such defense kill his adversary. (See Manslaughter). An officer of the law authorized to make an arrest has the right to use necessary force, and if the person whom he is attempting to arrest, by resistance, brings violence upon himself, this cannot be made to justify the killing of an officer. In many of the States the principles of law respecting right of self-defense is the subject of statutes. (See Assault; Criminal Law; Murder; Homi¬ cide). Self-defense in boxing is termed the (

duty to know how to defend himself with his natural weapons in case of assault. It com¬ prises a training in sparring or warding off blows, both fair and foul, and is a valuable acquirement taught in the United States navy. See Boxing.

SELF-DENYING ORDINANCE, in Eng¬ lish history a measure carried through the British Parliament in 1645 by the influence of Cromwell and the Independents, by means

SELFRIDGE, Thomas Oliver, Jr., Amer¬ ican naval officer : b. Charlestown, Mass., 6 Feb. 1836. He was graduated from the United States Naval Academy 1854, and six years later was promoted lieutenant. During the Civil War he was

1898.

SELIGMAN, Edwin Robert Anderson,

American political economist: b. New York, 25 April 1861. In 1879 ne was graduated at Co¬ lumbia University, from which he received the degrees A.M. and LL.B. in 1884, Ph.D. in 1885 and LL.D. in 1904. After graduation at Co¬ lumbia he spent three years at the universities of Berlin, Heidelberg, Geneva and Paris. He was made prize lecturer in political economy at Columbia in 1885, adjunct professor of polit¬ ical economy from 1888 to 1891 and full pro¬ fessor until 1904, when he became McVickar professor of political economy. Dr. Seligman served on the committees of 70, of 250, and secretary of the committee of 15, New York: was member of the mayor's advisory committee on taxation and finance of 1905 and of the special State tax commission of 1906. In 1908 he was member of President Roosevelt's Committee on statistical reorganization,- and from 1905 to 1910 was chairman of trustees of the bureau of municipal research. In 1914—16

Dr. Seligman was chairman of the mayor's tax committee, in 1902-04 he was president of the American Economic Association, and in 1913-15 of the National Tax Association. He is presi¬ dent of the Society for Ethical Culture and is member of very many learned societies, Amer¬ ican and foreign. He also edits the Political Science Quarterly and the (Columbia Studies in History, Economics and Public Law.' Dr. Seligman's works include (Railway Tariffs' (1887) ; (Finance Statistics of the American Commonwealth' (1889) ; (The Shifting and In¬ cidence of Taxation' (3d ed., 1910) ; Progress¬ ive Taxation in Theory and Practice) (2d ed., 1908) ; (The Social EviP (2d ed., 1912) ; (Essays in Taxation' (8th ed.,

1913) ; (Two Chapters on Mediaeval Guilds of England' (1887); Pconomic Interpretation of History' (2d ed., 1907); Principles of Economics' (7th ed., 1917) ; (The Income Tax' (2d ed., 1914). Other publications are to be found in the proceedings of the American Economic Association, the National Tax Association, the American Association of University Professors, and in the issues of the Political Science Quarterly, the Quarterly Journal of Economics and the British Economic Journal.

SELIGMAN, Joseph, American financier: b. Bayersdorf, Bavaria, 22 Sept. 1809; d. New Orleans, 25 April 1880. The eldest of eight brothers, all of them later to be united in a banking firm, with branches throughout the world, his attention was first directed to medi¬ cine and theology, but his tastes soon developed in other lines. In his 17th year he came to America and entered the employ of Asa Packer (q.v.) in Pennsylvania as cashier. He went next to Greensboro, Ala., where he opened a store, his success encouraging two of his brothers to settle in Watertown, N. Y., about 1841. In 1848, the rest of his family having emigrated, he removed to New York and or¬ ganized with them an importing house which was soon among the most prominent in its line. When the Civil War began, the Seligmans es¬ tablished the banking firm .of J. and W. Seligman and Company, with branches in London, Paris, Frankfort and San Francisco, each in charge of one of the brothers. Joseph was offered the secretaryship of the treasury by President Grant, who felt entire confidence in his financial ability and patriotism, which had already done so much to maintain the national credit.

SELIM I, se'lim or se-lem', sultan of Tur¬ key : b. about 1465 ; d. Constantinople, 22 Sept. 1520. He was the son of Bajazet II, whom he succeeded in 1512 and subsequently poisoned. To secure himself ion the throne he murdered his two brothers, Ahmed and Korchud, and like¬ wise his nephews, after massacring about 40,- 000 Shiites in order to rid his country of a Mohammedan sect to which he was inimical. He went no further, however, than the conquest of Diarbekir and Kurdistan. He next made war against the Mamelukes of Egypt, and in 1516 obtained a victory which left him master of Syria. Following up his victory by marching against Touman Bey, he routed the Mamelukes in the plains of Gaza, and of Rudania in the following year, and then entered Cairo with¬ out opposition. Touman Bey and many others were put to death, and Egypt, which had been an independent empire since the time of the

Crusades, was incorporated with the Ottoman Empire. The title of iman

and the standard of the Prophet were at this time granted to Selim by the last descendant of the Abassides, who at that time was residing in Egypt, and in consequence of this concession the sultans of Constantinople became the chiefs of Islam, the representatives of Mohammed. Owing to this proceeding Arabia acknowledged his supremacy. He was succeeded (on the throne by Solyman I.

SELIM II, sultan of Turkey: b. 1524; d. 12 Dec. 1574. He succeeded his father, Solyman II, in 1566. The chief events of his reign were his capture of Cyprus from the Venetians in 1570 and Tunis from the Spaniards in 1571. In that year occurred the great naval battle of Lepanto in which he suffered defeat at the hands of the combined Spanish and Italian fleets.

SELIM III, sultan of Turkey: b. 14 Dec. 1761 ; d. 8 May 1808. He succeeded his uncle, Abdul-Hamid I, in 1789, at which time a war was in progress with Austria and Russia. The Turks were defeated, and in 1791 Selim was compelled to cede Choczim to Austria, and in the following year he signed the Peace of Jassy, which required the surrender to Russia of all Turkish possessions beyond the Dniester. He formed an alliance with Russia and England at the time of the French expedition into Egypt in 1798. - Egypt was restored to Turkey by England after a temporary loss and peace was concluded with France in 1802. Selim now entered with great ardor upon a system of reforms ; he estab¬ lished cannon foundries, and organized a corps of troops, which he armed, clothed and exer¬ cised in European fashion. This proceeding, however, was looked upon with jealousy by the people who burst into open revolt in 1807. The attempts to quell the rebellion were unavailing; the rebels marched upon Constantinople, and compelled Selim to yield the throne to his cousin, Mustapha IV. An attempt afterward made by Mustapha-Baraiktar to reinstate Selim ended in failure, and he died by assassination.

SELINUS, se-li'nus, Sicily, an ancient Greek colony, founded probably about 628 b.c. on the southwest coast of the island. Its great power and wealth and the rich treasures of its temples are mentioned by Thucydides. Its dis¬ putes with Segesta were said to be one of the causes leading to the Athenian expedition of 415 b.c. and it was conquered by the Carthagin¬ ians in 409 b.c. and in 249 b.c. destroyed by them. There are still important ruins of ancient Greek temples here, and valuable sculp¬ tures belonging to them have been preserved. Consult Baedeker, K., Southern Italy and Sicily) (16th Eng. ed., Leipzig 1912); Gardner, E. A., (A Handbook of Greek Sculpture) (Lon¬ don 1911) ; and Koldewey, R., and Puchstein, O., (DIe griechischen Tempel in Unteritalien und Sicilien) (Berlin 1899).

SELISH INDIANS. See Salishan In¬ dians.

SELJUKS, sel-jooks', a Turkish family which derived its name from Seljuk, the chief of a small tribe of the Hoei-He, which had gained possession of Bokhara and the surround¬ ing country in the 9th century of our era. Dur¬ ing the 11th and 12th centuries the Seljuks founded various dynasties in Mesopotamia, Persia, Syria and Asia Minor. Among the

most distinguished of these were the following: (1) The Seljuks of Iran or Bagdad, who ruled at Bagdad and Ispahan. This dynasty was the most powerful of them all, and boasted the most illustrious princes. The founder was Togrul Beg, a grandson of Seljuk, who in 1038 made himself master of Khorassan, a Persian prov¬ ince, assumed the title of sultan and obtained from the caliph of Bagdad, whose daughter he married, the dignity of governor-general or emiml-omrah. He subsequently completed the conquest of Persia by the reduction of Irak- Arabi and Mosul about 1061. He died in 1063, and of his successors may be mentioned Alp- Arslan (1063-73), who vanquished and made prisoner the Greek emperor Romanus ; Melek-Shah (1073-93), who was the most powerful prince of the dynasty, and by means of his gen¬ erals conquered and annexed to his empire Arabia, Asia Minor, Armenia, Syria and Pales¬ tine, and in the administration of the empire was signally aided by his minister Misam-el- Moulk, who was distinguished for the wisdom and moderation with which he regulated the affairs of the vast empire, and for the encour¬ agement he gave to the arts and sciences ; Mohammed-Shah (1105-18), who carried on successful wars in India and against the Cru¬ saders; and Sanjar, who reigned from 1118 to 1158, and was one of the most illustrious of the Mohammedan princes. This dynasty became extinct in 1194 with Togrul-Shah, who was vanquished by Tekesh, sultan of Kharizm. (2) The Seljuks of Kerman , who ruled in the three provinces of Kerman, and never acquired the same distinction as the preceding. Founded by Kaderd, a nephew of Togrul-Beg, to whom the latter in 1039 confided the administration of these provinces. The dynasty subsisted till 1091. (3) The Seljuks of Aleppo, in Syria, founded in 1079 by Tutush, a brother of Malek-Shah, and to whom the latter entrusted the adminis¬ tration of Syria. This dynasty became extinct in 1114. (4) The Seljuks of Damascus, in

Syria, founded in 1096 by Dekkak, a son of Tutush, who possessed himself of the city of Damascus, and whose successors reigned till 1155. (5) The Seljuks of Iconium, or of Asia

Minor, founded by Soliman-ben-Kutulmish, one of the great-grandsons of Seljuk, to whom the Sultan Kalek-Shah granted a territory in Asia Minor. This was the longest lived of all the Seljuk dynasties. Under the reign of Alla-ed-Din II, one of the last princes of the dynasty, the Turk Osman distinguished himself as chief captain. His descendants it was who founded the dynasty of Osman in Asia Minor. The whole of the extensive empire of the Sel¬ juks now fell under Mongol domination. Con¬ sult also Mirchond's (History of the Seljuks, > which has been translated from Persian into German (Giessen 1838).

SELKIRK, sel'kerk, Alexander, Scottish sailor: b. 1676; d. 1721. In May 1703 he joined Dampier's privateering expedition to the South Seas, and sailed as master in the Cinque Ports under Captain Stradling. In consequence of some difference with his commander he was put ashore on the island of Juan Fernandez (Mas- a-Tierra) off the Chilean coast, and remained in his solitude till he was taken away by Capt. Woods Rogers, in January 1709. Some account of his residence was published by Steele in the

Englishman (No. 26; 3 Dec. 1713C in Rogers' 1 Voyage Round the World) (1712), and in Cooke's (Voyage to the South Sea and Round the World' (1712); but there is no reason to believe that he had any papers or journal of any sort. He is known as the prototype of the (Robinson Crusoe> (1719) of Daniel Defoe (q.v.), who apparently derived such information as he had from Steele, Rogers and Cooke. Little of the details of the famous narrative, however, is derived from Selkirk's adventure. Consult Howell, (Life and Adventures of Alexander Selkirk' (1829); Sutcliffe,

SELKIRK, Thomas Douglas, 5th Earl of: b. Kirkcudbrightshire, Scotland, June 1771 ; d. Pau, France, 8 April 1820. He was educated at Edinburgh University, and in 1799 succeeded his father in the earldom. He was active in the promotion of the emigration movement to the Red River and the colony established there was known as the Earl of Selkirk's Settlement. He published 'Sketches of the British Fur Trade' (1816) ; (The Red River Settlement' (1817).

SELKIRK, Canada, town and capital of Selkirk District in the province of

Manitoba, on Red River of the North, 23 miles north of Winnipeg and on the Canadian Pacific Railroad. The town has a summer resort business, con¬ siderable fishing interests, and there are large cold storage plants and government shipyards and dry docks. Pop. 2,977.

SELKIRK MOUNTAINS, a range of the Rocky Mountains, in British Columbia, from about lat. 52° to 48° N. The Columbia River is on the eastern side for some distance, and the Canadian Pacific Railroad crosses the range be¬ tween the peaks Sir Donald and Glacier House at an altitude of 4,300 feet.

SELLERS, sel'erz, Coleman, American en¬ gineer : b. Philadelphia, Pa., 28 Jan. 1827; d. 28 Dec. 1907. He obtained a degree at Stevens Technological Institute and was professor of engineering practice there from 1886. He was chief engineer of the Niagara Falls Power Company, and chief mechanical engineer of the Canadian Niagara Power Company. He made numerous inventions in mechanical appliances, was a member of many American and foreign scientific societies and was widely known as a consulting engineer.

SELLERS, Matthew Bacon, American aeronautical engineer : b. Baltimore, Md., 29 March 1869. He was educated in France and Germany, took his LL.B. at Harvard University in 1902 and later studied at the Lawrence Scientific School, Harvard, and at the Drexel Institute, Philadelphia. He has been engaged in aero-dynamic research since 1900; was ap¬ pointed a member of the Aerodynamic Labora¬ tory Committee by President Taft in 1912; and in 1915 became a member of the Navy Consult¬ ing Board. He was the first to determine the lift and drift of arched surfaces by means of the ((wind tunnel" ; and he invented the lightest aeroplane in the world.

SELLERS, William, American mechanical engineer and manufacturer: b. Upper Darby, Pa., 19 Sept. 1824: d. 1905. He was apnrenticed to a machinist, and in 1848 became a member of

the firm Bancroft and Sellers, which in 1855 be¬ came William Sellers and Company, manufac¬ turers of tools. He made many improvements in tools and invented many new appliances. He suggested the first formula ever offered for screw threads and nuts, which has since become standard in United States and Europe. He was president of Franklin Institute in 1864-67. He became president of the Edge Moor Iron Com¬ pany in 1868, and in 1873-87 directed the Mid¬ vale Steel Company, Nicetown, Pa., manufac¬ turing materials for small arms and ordnance for the government. He was elected to the National Academy of Sciences in 1873.

.SELLERS, Col. Mulberry, the name ot a character in the novel, (The

Gilded Age,' by Mark Twain and Charles Dudley Warner. He was a visionary Southern speculator, and was created on the stage by John T. Raymond.

SELLEW, Walter Ashbel, American Methodist Episcopal bishop: b. Gowanda, N. Y., 27 Feb. 1844. In 1866 he was graduated at Dartmouth, from which he received the degree of A.M. in 1869. In 1872 he was ordained to the ministry of the Free Methodist Church; held pastorates successively at Tonawanda, N. Y., Rochester, N. Y., Spring Arbor, Mich., Dunkirk, N. Y., Gerry, N. Y., Allegany, N. Y., and Buffalo. In 1887-98 he was pre¬ siding elder at Chautauqua, Allegany, Buffalo, Oil City, Bradford and Pittsburgh districts. On 15 Oct. 1898 he was elected bishop. He is treasurer of the Gerry (N. Y.) Home for Aged Persons and the Gerry Orphanage. He is also president and treasurer of the A. M. Chesebrough Seminary, North Chili, N. Y. ; is member ot the executive committee and of other governing boards of the Free Metho¬ dist Church. He made an official missionary tour around the world in 1906 and again visited China and Japan in 1910. Bishop Sellew pub¬ lished 'Clara Leffingwell, a Missionary' and other religious publications.

SELLSTEDT, sel'stet, Lars Gustaf, Amer¬ ican painter: b. Sundsvall, Sweden, 30 April 1819. He came to the United States in 1834, and subsequently served in the United States navy. After settling in Buffalo, 1842, he de¬ voted himself to the study of art, and in 1875 was elected a National Academician.

SELMA, Ala., city, county-seat of Dallas County, on Alabama River, at the head of year- round steam navigation, and on Louisville and Nashville, Southern Railway and Western Rail¬ way of Alabama, 50 miles west of Montgomery, 158 miles north of Mobile and 98 miles south of Birmingham. It has steamer connections with Mobile, is located in a rich agricultural section, known as the Black Soil Belt. Cotton, live¬ stock and forage crops are the chief products. The principal industrial establishments are cot¬ tonseed-oil mills, cotton factories, iron works, railroad shops, woodworking plants and brick¬ yards. It is the jobbing centre for a large terri¬ tory and markets . a great amount of cotton. Educational institutions include Alabama Methodist Orphanage, Convent of Mercy, Car¬ negie library and a well-equipped public school system. Selma University for negroes is also located here. The four banks, two national and two State, have a capital and surplus of

over $2,000,000. During the Civil War the city was the centre of military operations, and had a Confederate navy yard, arsenal, powder works and artillery foundries. It was cap¬ tured by the Union forces on 2 April 1865, when the army under General Wilson burned the business district. Pop. (1920) 15,589.

SELMA (Ala.), Battle of, an engagement of the Civil War, 2 April 1865, one of the bat¬ tles of General Wilson's cavalry raid in the operations against Mobile. The Union cavalry camped at a point 19 miles north of Selma on 1 April and on the morning of the next day began the movement against the town. One division advanced from the north on the Sum-nerville road, and a second division from the northeast on the Burnsville road, while a third division was dispatched to burn railroad bridges, trestles, stations, etc., as far as Burnsville. The troops were in position before Selma by 4 p.m. and, dismounting, assaulted and carried the works at a single charge, the distance over which they charged, exposed to the enˆny's fire, being 600 yards. The Selma fortifications con¬ sisted of a bastion-line with a radius of three miles; the Confederate force on the line against which the charge was made was over 1,500; the Union force engaged numbered 1,550. The Federals captured 31 field-guns, a large number of prisoners and quantities of stores of all kinds. Consult (Battles and Leaders of the Civil War> (Vol. IV).

SELOUS, Capt. Frederick Courtney, fa¬ mous big game hunter : b. London, 31 Dec. 1851 ; killed in action, East Africa, 5 Jan. 1917. Of mixed French, English and Scottish parentage, he was educated at Rugby, Neuchatel and Wies¬ baden, and at 19 set out for Africa to become an elephant hunter. After spending a time on the Kimberley diamond fields he entered the wild Matabele territory (now Southern Rhodesia) and obtained permission from the savage chieftain Lobengula to carry out his ob¬ ject. By the time he was 25 Selous was known as the most daring and successful ivory hunter in Africa. Nor did he restrict his activities to elephants alone; lions, hippo and rhinoceroses fell to his unerring rifle. In 1889 he traveled down the Zambesi to the sea and in 1890 led the pioneer expedition of the Chartered Com¬ pany into Mashonaland and secured that terri¬ tory for Britain. He fought in both the Mata¬ bele wars, and in later life resumed his hunting adventures. In 1909-10 he organized and ac¬ companied Colonel Roosevelt s hunting expedi¬ tion in British East Africa. Though over 60 years of age he offered his services for the war; was gazetted lieutenant in the Royal Fusiliers in 1915 and captain a few months later. In September 1916 he received the D. S. O. "for conspicuous gallantry, resource and endurance. » Selous wrote (A Hunter's Wanderings in Africa (1881), a book regarded as a classic on hunting, and summarized his vast stories of knowledge about African wild game in < Afri¬ can Nature Notes and Reminiscences) (1908). He also published (Travel and Adventure in*

Southeast Africa) (1893); 'Sunshine and Storm in Rhodesia) (1896) ; 'Sport and Travel, East and West) (1900), and 'Recent Hunting Trips in British North America (1907). Selous was the original model of 'Allan Quarter- VOL. 24— 35*

main' in Rider Haggard's romance of that name. His eldest son, Capt. F. H. B. Selous, attached to the Royal Flying Corps, also fell in action, on 4 Jan. 1918. A brilliant scholar and a fine athlete, he had been awarded the Military Cross and the Italian Silver Medal of Military Valor. He was 19 years old.*

SELUNGS, a race of men, now few in number, and of doubtful affinities, but usually classified as Indonesian, inhabiting the Mergui Archipelago and other islands along the eastern coast of the Bay of Bengal. They live almost wholly in boats made of palm-leaf ribs sewed together by threads of coir and subsist almost exclusively on sea-food, to which fact is at¬ tributed the prevalence of leprosy among them. Their principal industry is the gathering of edible- birds' nests from the towering cliffs of granite by means of immensely long bamboo ladders. They also gather some mother-of- pearl and other salable shells with which they occasionally come to the ports on the mainland to trade for cloth, etc. They are despised by both the Burmese and Malays, with whom they most often come into contact.

SELVAGE. See Gouge.

SELWYN, sel'win, Alfred Richard Cecil,

Canadian geologist: b. Kilmington, Somerset, England, 28 July 1824; d. 1902. In 1845 he was ap¬ pointed assistant on the Geological Survey of Great Britain and in 1852 director of the survey of Victoria, Australia, which was not completed until 1869, when he was appointed director of the Canadian survey, completed in 1895. He also investigated the coal and gold fields of Tasmania in southern Australia in 1854—59. He is a Fellow of the Royal Society. His writings include, beside some odd volumes of reports of geologic and natural history survey, portions of Stanford's 'Compendium of Geography and Travel.

SELWYN, George Augustus, English wit and politician: b. Gloucestershire, 11 Aug. 1719; d. London, 25 Jan. 1791. He was educated at Eton and Oxford, but quitted Oxford before graduating on account of a reputed insult to the Christian religion. He was ap¬ pointed to several offices at. the mint involving no work and bringing him a small salary. In 1747 he entered Parliament for Ludgershall and from 1754 to 1780 sat for the city of Gloucester. He never spoke at Parliament, but his vote being always cast with the court party secured him lucrative appointments. He was a famous

*wit at the clubs and an intimate of the Duke of Queensbury, Horace Walpole a*nd Lord Carlisle. Consult Jesse, 'George Selwyn and His Con¬ temporaries' (1843).*

SELWYN, George Augustus, English bishop: b. 5 April 1809; d. Lichfield. 11 April 1878. He was educated at Eton and at Cam¬ bridge; rowed in the first inter-university boat race (1829). His remarkable powers as an athlete were found very serviceable in after life. In 1841 he was consecrated bishop of New Zealand and Melanesia, a territory since then divided into seven dioceses. On the voyage out he studied Maori and navigation and in his own vessel visited every portion of his diocese be¬ fore setting about the work of organizing it. A visit to England in 1854 brought back John Coleridge Patterson, afterward bishop of Melanesia, where he was murdered by the na-

tives. In 1867 Bishop Selwyn attended the first Pan-Anglican Synod at Lambeth and was ap¬ pointed bishop of Lichfield. He was present at the General Convention of the American Epis¬ copal Church at Baltimore in 1871.

SELWYN COLLEGE, Cambridge, Eng¬ land, founded in 1882 in memory of George Augustus Selwyn, bishop of Lichfield, is an institution meeting the requirements of An¬ glican theological students, on a more econom¬ ical basis than those of the older established colleges, ((combined with Christian training ac¬ cording to the principles of the Church of England.®

SEMANTUS (SEMASIOLOGY, or the SCIENCE OF MEANINGS). See Lan¬ guage, Science of.

SEMAPHORE, a term originally applied to the moving arm of a signaling post in a system of coast telegraphy adopted by the French, and subsequently to any kind of sig¬ naling arms moving round pivots placed at or near their extremities. The semaphore, from the ease and rapidity with which the movable arms could be worked, was much superior to any telegraph previously in use. The French sem¬ aphores consisted of two or three movable arms, mounted on posts and turning upon separate pivots, one above the other. These were mounted on the top of towers, erected in com¬ manding positions at distances of from 5 to 10 miles apart. When signals were made at one tower they were read off at the next by means of a powerful telescope, and then transmitted to a third, and so on, if necessary, to the end of the series. In this way a message might be

dispatched with great rapidity. In 1809 Captain Pasley, an English officer who had previously constructed what he termed a polygrammatic telegraph, saw the French semaphore, and ap¬ plied the principle of it to his own telegraph. As thus modified it consisted of three opposite pairs of arms pivoted on a post at certain inter¬ vals, representing hundreds, tens and units. Till 1816 the British Admiralty had employed a tele¬ graph which had been submitted in 1795 by Lord George Murray and which consisted of several shutters placed in a vertical frame, by the open¬ ing and closing of which the signals were made. In the year named it was determined to sub¬ stitute, for these telegraphs, semaphores con¬ structed on the principle of those used in France, with certain improvements suggested by Sir Home Popham. In Popham's semaphore there were only two arms, but these being upon separate pivots, though on the same post, each of them could be made to assume six different positions, and in combination the two could give 48 signals, a number more than sufficient to ex¬ press all the letters of the alphabet, together with the nine digits. The vertical post of this semaphore was a hollow hexagonal mast, which passed through the roof of the tower, and being fixed upon a pivot it could be made to turn so as to display its signals in any direction. It was not till the introduction of the electric telegraph that government semaphore stations were abandoned. For the modern semaphore, see Block Signal System.

SEMBRICH, zem'briH, Marcella, Austrian opera singer: b. Lemberg, Galicia, 15 Feb. 1858. She studied violin and piano at first, her mas¬

ter on the latter instrument being Franz Liszt. When it was discovered that she had a re¬ markable voice she went to Milan to study with Lamperti, and made her first appearance at Athens in (I PuritaniP Shortly afterward she became attached to the company of the Royal Opera House, Dresden, and remained until 1880. That year she appeared first in London. She came to the United States in 1883, since which time she has reappeared here in several seasons of concerts and opera. In 1903-04 she was the leading coloratura soprano at the Metropolitan Opera House. Her repertory em¬ braces a wide range of Italian operas.

SEMECARPUS, a genus of trees of the Anacardiacece, containing about 35 species. The marking-nut tree (S. anacardium) is the most important species. The pericarp of its fruit furnishes a juice greatly used in India for printing cotton cloth, for ink and for dye. It is also employed for warding off white ants and for a medicine in rheumatism, warts and leprosy. When pounded and boiled in rape- seed-oil it stays putrefaction when started in hides. The seed itself, which is called Oriental cashew-nut or melacca bean, and the fleshy pedicel are eaten by the natives. The resin of this species yields Sylhet varnish and an oil derived from it mixed with the milk of euphor¬ bia is made into birdlime. This species is culti¬ vated to a limited

extent in southern Florida.

SEMELE, sem'e-le, according to Greek mythology, the mother by Zeus of Dionysus or Bacchus, the god of wine.

SEMERARA, sa-ma-ra'ra, (1) A group of islands of the Philippine Archipelago lying two miles south of Mindoro, in the channel between Mindoro and Panay. The group consists of eight islands and a number of small islets; area, 60 square miles. The people are Visayans, and are mostly engaged in turtle and trepang fish¬ ing. Pop. 500. (2) The largest island of this

group, area, 35 square miles. It is hilly, the highest elevation being 512 feet. The west coast is indented with several bays, bui none afford good anchorage ; there is sheltered anchorage to the south of the island during the northeast monsoon. Coal of good quality is found, especially in the north.

SEMI-AUTOMATIC GUNS. See Ord¬ nance.

SEMINOLE (sem'i-nol) INDIANS (Creek Simanoli, "separatist,® "renegade®). An important tribe of the Muskhogean stock of American Indians. The name was originally applied to those Creeks and Hitchitis on lower Chattahoochee River who left the main body about 1762-68 and removed to the peninsula of Florida, in the territory that had been occupied by the Appalachis who were practically ex¬ terminated some 60 years before, although some Creeks, who later became part of the < (Seminoles,® have resided in the southern part of Florida since the middle of the 16th century. The separation of the Creeks and Hitchitis from their northern kinsmen was due chiefly to over¬ population of the older towns, followed by turbulent and undesirable elements, criminals and desperadoes (whence the opprobrious ap¬ plication of the term Lemicea by the Creeks who 'remained at home, and the forcible migra¬ tion of others owing to the encroachments of

civilization). The Hitchiti elements consisted principally of Mikasukis ; there were also prob¬ ably some Yamasis, and certainly some Yuchis and negroes. The Seminoles are known to his¬ tory chiefly through their two wars with the United States — the first in 1817-18, provoked by the upper Creeks, the other in 1835-42, which was the bloodiest and most furiously contested struggle with Indians in which the government has ever engaged, resulting from the refusal of a part of the Indians to remove to the In¬ dian

Territory, under the provisions of a treaty agreed to by them in 1834, in which they ceded their lands in Florida to the United States. On the final surrender of the hostiles, in 1842-43, the Seminoles (with the exception of some who fled to the swamps) to the number of 3,824, were moved to the West, where they now form one of the five civilized tribes of the Indian Territory, the others being the Cherokees, Choctaws, Chickasaws and Creeks. The Semi¬ noles in 1915 numbered 3,129 (including some negroes and adopted white). The total area of their nation comprised 365,852 acres, of which 1,932 acres were reserved for town sites, railroad rights ot way and other pur¬ poses. With the exception of a few minor details the tribal affairs of the Seminole nation were practically completed in 1915 and the nation incorporated in the United States.

SEMINOLE WAR, the second of the two wars in which the Seminole Indians of Florida engaged against the United States, the first having been a short conflict in 1817-18, which was ended by General Jackson, who destroyed villages of the Indians and wholly subdued them. The second, which is that usually re¬ ferred to as the Seminole War, began in 1835 and ended in 1842, and was the fiercest of all wars waged by the United States against In¬ dians. It began in consequence of the refusal of a part of the tribe to make a cession of its lands in Florida and submit to removal to the Indian Territory, in accordance with the terms of a treaty ratified in 1834. On the In¬ dian side the war was at first conducted by the celebrated chief Osceola (q.v.), with whose name it is largely associated; and on the part of the United States it was carried on by Scott, Taylor, Jesup and other commanders. After a protracted struggle the Indians were com¬ pletely subjugated, and in 1843 about 4,000 of them were removed, those who arrived in the Indian Territory forming one of the five civil¬ ized nations now located there.

SEMIPALATINSK, se-me-pa-la-tinsk', or SEMIPOLATINSK, Asia, in Siberia, (1) capital of a province of the same name, situ¬ ated on the left bank of the Irtish River. It is fortified and the chief points of interest are the government buildings, offices, mosques, churches, bazaars and barracks. There is considerable trade with Kirghiz, Tashkend, Khokand, Bok- kara and Kashgar.

(2) The province of Semipalatinsk covers an area of 178,128 square miles. The Alex¬ andrian Mountains separate it from Turkestan on the south. Several other ranges traverse its territory. The principal streams are the Irtish, Ili and Chui. The lakes: Issik-Kul, Ala-Kul and Balkash. Cattle raising forms the only in¬ dustry of the inhabitants. Some lead and cop¬ per, etc., occur. Its climate is comparatively

mild. Apricots and apples are spontaneous. Pop. about 690,000.

SEMIPALMATED SANDPIPER. See

Sandpipers.

SEMIRAMIS, se-mir'a-m!s, a fabulous queen of Assyria. She was a daughter of the fish-goddess Derceto of Ascalon, in Syria, by a Syrian youth. Being exposed by her mother, she was miraculously fed by doves until dis¬ covered by the royal shepherds, the chief of whom, Simmas, took her to his own house and brought her up. Her surpassing beauty, accord¬ ing to Ctesias, having attracted the notice of Onnes, the governor of Nineveh, he married her. She subsequently accompanied her hus¬ band to the siege of Bactra, where by her ad¬ vice she assisted the king's operations. Capti¬ vated by her abilities as well as by her beauty, Ninus, the founder of Nineveh, asked her of her husband, who refused to yield her, and when Ninus added threats to entreaties hanged himself. As queen of Assyria, Semiramis built Babylon, adding fine buildings and hanging gardens. She led campaigns against Persia, Egypt, Libya and Ethiopia. Finally with a host of 3,000,000 foot, 500,000 horse and 100,000 war-chariots she engaged in battle with King Stabrobates and was defeated in a battle on the Indus with the loss of one-third of her forces. Upon this it is said she vanished in the shape of a dove or slew herself. Evidently she has no existence in history. She is the god¬ dess of war and of love, the Istar of the As¬ syrians, to whom the dove was sacred. Con¬ sult Lenormant, (La Legende de Semiramis J

(1873).

SEMITES, a name given by J. G. Eichhorn in 1787, in his (Introduction to the Old Testa¬ ment (2d ed., i, 15) to a group of nations al¬ lied in language, religion, manners and physical features, represented in Gen. x, as descended chiefly from Shem, a son of Noah. Their habitat is Abyssinia, Arabia, Palestine, Phoeni¬ cia, Syria and the countries of the Euphrates and Tigris. Into those lands, according to one theory which is supported by Lenormant and others, there had preceded them an immigra¬ tion of Cushites of the Hamitic race, who. proceeding from central Asia, occupied not only the lands that afterward became Semitic, but also the Nile Valley. Their Hamitic language and civilization the Semites are said to have adopted. In language the Semites do show some affinity with the Berbers and the inhabitants of the Nile Valley, and Gen. x does, for political and geographical or other reasons, distribute the sons of Ham and Shem in a pe¬ culiar manner. But the increasingly prevalent theory is that not less than 4,000 years b.c. the Semites migrated as nomadic tribes, probably from Arabia into Mesopotamia. There they found a Turanian population dwelling in cities built of brick, under the regular government of priest kings, skilled in the use of metals, using the cuneiform mode of writing, and

com¬ paratively far advanced in literature and cul¬ ture. The hold of the Semites on Shumir, the lower, more fertile and more thickly inhabited part of the Euphrates Valley, was not at first so strong as on Accad, the upper part. In 3800 b.c. the Semitic adventurer Sharrukin usurped the kingdom of Accad. In Elam also the Turan-

lan population was early overpowered by the intruding Semites, who came to form the up¬ per strata of society. In 2280 b.c. the Semite Khudur-Nankhundi of Elam invaded and con¬ quered Shumar and Accad, founding the Elamite line of princes ; and about 2200 b.c. one of his successors, Khudur-Lagamar (Chederlaomer), carried his conquests as far as Palestine (Gen. xiv).

These painful and oppressive impulses, and probably others like them, seem to have occa¬ sioned emigrations of many Semites. Some proceeded toward the northwest, reached the Mediterranean Sea, founded Sidon, Tyre and other cities and became known afterward as C'anaanites or Phoenicians. Later, from Ur went others in the same direction, settled be¬ hind the Phoenicians and were afterward known as Israel. Others went north and built cities which developed into the empire of As¬ syria. While the Semites were in Mesopotamia they used the Turanian language in their public documents till they attained the ascendant in political power; and when afterward they used their own language they continued to use the Turanian cuneiform mode of writing. The Turanian religion also was adopted by the Semites, and mixed with what religion their own primaeval tribal religion or totemism had developed into. This amalgamation was con¬ summated by Sharrukin II of Accad about 2000 b.c.

The Semites as a race have a fine physical organization, are mentally quick, clever but not inclined to change, and not persistent in progress. They have been distinguished by a brilliant imagination and love of the beautiful; but have not shone in philosophy or in science. Their literature has neither epic nor dramatic poetry worth notice. Almost their only arts are the sculpture of Assyria, the exquisite glass and pottery and the textile fabrics and em¬ broidery of the Phoenicians. Impatient of re¬ straint, the Semites have not by political apti¬ tude welded together themselves or others into large, compact and enduring commonwealths. They have made their mark on the world in the Phoenician commerce, which visited even the Atlantic shores of Spain and France and drew tin from Britain; in the Phoenician colo¬ nies, which, dotting all the coasts and many islands of the Mediterranean Sea as far as Cadiz, and the coast of Asia as far as

India, dispensed manufacture, developed primitive navigation (even to the extent of circumnavi¬ gating Africa more than 2,000 years before Vasco da Gama), stimulated industry, trade and ingenuity, and radiated the light of ma- » tcrial civilization; in the Carthaginian Empire within Europe and Africa; in the exploits of Hannibal; in the dissemination of alphabetic writing, whereof the Phoenician form was the mother of the European and of most Asiatic alphabets, while the alphabet of the great Sa- baean kingdom, or of the great and still more ancient Minaean kingdom in Arabia, is ap¬ parently the eldest of all alphabets hitherto dis¬ covered ; in the Babylonian and Assyrian em¬ pires; in the Hebrew Bible and the Jewish re¬ ligion; in the New Testament and the Chris¬ tian religion; in the Koran and the Moham¬ medan religion; in the Mohammedan conquests and empire, and in the preservation of cul¬ ture thereby during the Dark Ages and the

Middle Ages. The difficulty of generalizing with exactitude as to the origin and character of the Semites is increased, as Noldeke has shown, by the fact that we assume that the most im¬ portant traits of some Semitic peoples are common to all. In reality some striking features which are ascribed to racial influence are due to external conditions of life, which under similar circumstances are also developed among non-Semitic races. Linguistically, too, it is a no less formidable task to understand aright the kinship of the Semites. They are usually divided into two groups — Northern and South- tern. The latter include Arabs, Yemenites, Abyssinians; the rest compose the Northern, whose classification is less happy, as their re¬ lationship to each other is less close. As to Semitic origins, it is usually held that Arabia was the Semitic cradle-land, with North Africa that of the Hamito-Semitic race. It is now doubted that they originated in certain dis¬ tricts in Armenia, while the ingenious theory of an eminent Italian Orientalist, Guidi, that the lower Euphrates was their home meets equal disfavor. Consult Brinton, (Races and Peoples) (New York 1890) ; Ripley, (Races of Europe5 (1901) ; Barton, (Sketch of Se¬ mitic Origins5 (New York 1902).

SEMITIC LANGUAGES, the languages

spoken by the nations of whom Shem was con¬ sidered the common ancestor. The word Sem¬ itic comes from the Septuagint form of the name Shem, Shemitic, derived directly from the Hebrew, being much less frequent. The Semitic languages form a group somewhat like the Aryan group, although the relationship of the different languages is much closer. The mem¬ bers of the group do not entirely correspond to the list of the descendants of Shem given in Gen. x, 21-31 ; Elam, for example, which is in¬ cluded, in x, 22, was not a Semitic people, while the Canaanites, including the Sidonians, who were Semitic, are given in x, 15 among the

de¬ scendants of Ham. Such facts indicate that the table of nations in Gen. x was not entirely ethnological, but at least partly geographical : the nations were grouped according to their geographical distribution in the time of the writer.

General Divisions. — The Semitic languages are often divided into two main divisions, Northern and Southern. But the former can be divided into three groups, Eastern, North¬ ern and Middle, which are separated from each other by differences very nearly as great as those between the two divisions first mentioned. It seems better, therefore, to recognize the gen¬ eral division as fourfold, into Eastern, North¬ ern, Middle and Southern Semitic languages.

The Eastern Branch.— The Eastern branch includes the Babylonian and Assyrian languages. Assyrian is really a dialect of Babylonian, there being but very slight phonetic differences be¬ tween the two, although the difference is some¬ what greater in the form of the characters. Babylonian is found much earlier than Assyrian and also continues somewhat later. The Baby¬ lonian inscriptions thus far found begin prob¬ ably about 4000 b.c., possibly somewhat earlier, and extend to the capture of Babylon in 538 b.c. Babylonian was also used later as a literary language under the Persian and Greek rulers of Babylonia. Assyrian inscriptions ex-

tend from about 1800 b.c to shortly before the fall of Nineveh in 606 b.c.

The Northern Branch. — The Northern Semitic or Aramaic branch includes many lan¬ guages and dialects, to all of which the general term Aramaic is applied. The oldest Aramaic literature is found in the inscription of Zakkur, 9th to 8th century b.c., and in the inscriptions from Senjirli, of the 8th century b.c., some words on Assyrian and Babylonian tablets being only a little later. The language of these' in¬ scriptions differs very much from the later Ara¬ maic languages and resembles the Canaanite lan¬ guage in many particulars. The Aramaic lan¬ guages are divided into two principal branches, Western and Eastern, the geographical distri¬ bution of which was largely in harmony with these names. Western Aramaic may be called one language, with the following principal dia¬ lects : Biblical Aramaic, being the language of portions of the Old Testament books of Daniel and Ezra, and of a few words elsewhere in the Old Testament; Targumic Aramaic, usually so- called, the language of the Palestinian Targums; the similar language of most of the Gemara of the Palestinian Talmud and of the Palestinian Midrashim, which is also found in small

parts of the Mishna, and also of the Babylonian Ge¬ mara ; Samaritan, the language of the Samari¬ tan Targum to the Pentateuch; the language of some Jewish inscriptions and papyri from Egypt, dating somewhat before the time of Christ; the language of the few Aramaic words found in the New Testament; the language of the inscriptions found in Tadmor or Palmyra; and the language of the Nabatean inscriptions found in Idumea and vicinity. The only mod¬ ern representative of Western Aramaic is the language spoken at the present time by a few people near Damascus, in and near the village of Malula, which is written in the Syriac char¬ acter but belongs in this class. Eastern Ara¬ maic includes Syriac, Mandaic, being the lan¬ guage of the Christian sect of Mandaeans who lived east of the Tigris, and the language of the most of the Babylonian Gemara. Syriac was the language of the Christian Arameans and was employed in an extensive literature, chiefly of an ecclesiastical nature, extending from the 2d to the 13th century a.d., including the trans¬ lation of the Bible known as the Peshitta. The word Syriac means the same as Aramaic and was adopted by the Arameans from the Greeks, because the word Aramaic had come to be used as meaning heathen. After the separation of the two sects known as the Nestorians and Jacobites, each developed its own dialect, known as the Nestorian and the Jacobite, respectively. The actual dialectical differences are but slight, chiefly in the pronunciation of the vowels. In writing, somewhat different forms of the char¬ acters were used and the vowels were repre¬ sented by entirely distinct systems, in the Nes¬ torian dialect by dots, in the Jacobite by char¬ acters borrowed from the Greek. The modern representative of the Nestorian branch is the language used by the Nestorian Christians, in parts of Persia, especially in the city of Urmia and vicinity, in some villages in Kurdistan and in portions of Mesopotamia. This language shows very many changes from ancient Syriac, those in the verb being especially striking, while the vocabulary has received very many foreign words, especially from Arabic, Persian and

Kurdish. Further, this language shows forms not found in Syriac, but preserved in other Aramaic languages as well as in some of the other Semitic languages, so that it is evidently descended not from ancient Syriac itself, but from a closely related dialect. There are four principal dialects of modern Syriac, that used in Urmia and vicinity, that of northern Persia and some adjacent regions in Turkey, that of Kurdistan and that of Mosul and vicinity. While the language is the same in all these, yet there are very many dialectical variations. The modern representative of the Jacobite Syriac is the language of Tur Abdin, in western Kurdis¬ tan, which is similar to the modern Nestorian language, but with many differences.

The chief general feature that distinguishes the Eastern and Western Aramaic languages is the preformative of the imperfect. This is y in all the Western Aramaic dialects, although a few forms with l are found in

Biblical Aramaic, and n in all the Eastern, although Mandaic and the Babylonian Talmud have l along with n. In modern Syriac the verbal form is so much dif¬ ferent that no preformative is used.

The Middle Branch. — The middle Semitic branch is also called Canaanite, for all its lan¬ guages are often included under the general term Canaanite. The only one of these lan¬ guages in which much literature has survived is the Hebrew. Nearly all of the Old Testa¬ ment is in ancient Hebrew. Aside from this, the oldest Hebrew documents are probably about 75 inscribed potsherds found at Samaria in 1910, written in ink by a reed pen, contain¬ ing brief business memoranda. These are usu¬ ally ascribed to the time of Ahab, the first half of the 9th century b.c. A small limestone cal¬ endar tablet was found at Gezer in 1908 and is assigned to the 8th century. The Siloam in¬ scription is usually dated at about 700, but is possibly much later. Various inscribed Hebrew seals have been found, dating per¬ haps from the 8th century on. Coins with Hebrew characters are from the 2d century b.c. to the 2d century a.d. New Hebrew or Mish-naic Hebrew is found chiefly in the Mishna, and also somewhat in the Gemara and in related works. Hebrew has continued to be used some¬ what by the Jews as a literary language even to the present time, most of the later literature being produced in the Middle Ages. The lan¬ guage as thus used is ordinarily similar to Mishnaic Hebrew. The Phoenician has much that is identical with the Hebrew, while the dif¬ ferences are slight, ‘ affecting the vowels more than the consonants, although the vocabulary shows some variations. It is found in inscrip¬ tions from Phoenicia and her colonies, prominent among the latter being Carthage, where the language was called Punic. Considerable por¬ tions are also found quoted in works of Latin and Greek authors, chiefly in the Poenulus of Plautus. Most of the Phoenician inscriptions are from the 4th century B.c. and later, some are as old as the 6th century, while the oldest inscription may belong to the 8th century or a little earlier. The inscription of Eshmunazar, from the time of Alexander the Great, is the most important. In this group are also in¬ cluded the Canaanite, Moabite, Ammonite and Edomite languages. The last two are known only from the proper names found in the Old Testament and the inscriptions of other nations,

the Moabite from that source and also from the Moabite stone, written by Mesha, king of Moab, and dating from about 850 b.c. The Canaanite, aside from information given in the Old Testa¬ ment, is known from glosses found in the Tell el-Amarna tablets (see Amarna Letters) about 1400 b.c. All four are substantially identical with Hebrew, the Canaanite

and Moabite, which of course are known more fully than the other two, showing slight dialectical variations. Moabite and Phoenician, like Hebrew, have waw consecutive with the imperfect. Some of the Philistine proper names given in the Old Testament are Semitic. It is generally agreed, however, that the nation was not Semitic, but perhaps learned and used the common Canaanite language after their arrival in Palestine.

The Southern Branch. — The Southern Semitic branch is sometimes called the Arabic group, because the Arabic language is its most important representative. Under Arabic may be included ancient or classical Arabic, its de¬ scendant, modern Arabic, and southern Arabic, often improperly called Himyaritic, including the closely related dialects of Sabaean and Minaean. The great work in ancient Arabic is the Quran, composed by Mohammed (570-632 a.d.), although a few poems are older than this. Printed modern Arabic is substantially the same wherever found and does not differ greatly from the ancient language. The spoken lan¬ guage, however, is divided into many dialects, of which the most important are those of Syria, Egypt, Mesopotamia, Tunis, Malta and Oman and Zanzibar. Under the general head of mod¬ ern Arabic may be included the very extensive Arabic literature from soon after the time of Mohammed down to the present time. Sabaean and Minaean are found in inscriptions, chiefly in southern Arabia. These are of uncertain date, although it is now often claimed that the earliest Minaean inscriptions are earlier than 1000 b.c., while the oldest Sabaean are somewhat later. Modern representatives of these dialects are found in the present dialects of the same region, of which little is known, two of them being the Mahri and the Socotrl. Included in the Southern Semitic branch is also Ethiopic, or more properly Geez. This was probably a descendant of Sabaean. The ancient Ethiopic was the language of Abyssinia. It closely re¬ sembles the Arabic dialects, sharing with them some of their most characteristic features, while in many other respects it differs greatly from them. It was the spoken language of Abyssinia till about the 13th century a.d. The earliest known literature comes from about 500 a.d. Most of the literature consists of trans¬ lations from other languages. The most im¬ portant documents are the translation of a part of the Bible, made about 500 a.d., and the apoc¬ ryphal book of Enoch, which is a translation from a lost original. Modern representatives of the language in the same region are the Tigre, the Tigrina and, with extensive incorporation of foreign elements, the Amharic, together with dialects related to the Amharic, such as the Harari and Gurague.

The Egyptian language is by some classed as Semitic. It seems evident, however, that that is not the case, but that very early, in prehis¬ toric times, it was subjected to strong Semitic

influences, doubtless from invaders coming from Asia.

The Written Characters. — The written character of the Babylonian and Assyrian lan¬ guages is the cuneiform, the writing being partly ideographic and partly syllabic, but not at all alphabetic. (See Cuneiform Writing). This, however, according to the common view, was not the invention of the Babylonians, but was taken by them from the earlier inhabitants of the land, the non-Semitic Sumerians. It was originally a picture writing, like the hieroglyph¬ ics of the Egyptians, but has been so largely conventionalized that in most cases the resem¬ blance to the original picture has been lost. The Assyrian forms, when they differ from the Babylonian, show modifications in the direction of greater conventionalizing and increased regu¬ larity. Aside from the cuneiform, all Semitic languages use an alphabet, consisting entirely of consonants, which goes back to the same orig¬ inal forms. Ethiopic is an apparent excep¬ tion, in that the vowels are written with the consonants, that is, each consonant has six or more different forms according to the vowel following it. These forms have such a re¬ semblance to those of the other Semitic lan¬ guages, however, and in particular to the Sa¬ baean which is written without vowels, that it is probable that the earliest form contained simply the consonants, and that the modifica¬ tions of form for the expression of the vowels show a later development. What is commonly regarded as the earliest form of the Semitic al¬ phabet is usually called the Phoenician, a name given to it by the Greeks because they obtained it from the Phoenicians. But the Phoenician al¬ phabet at the time of our earliest knowledge, about the 8th century b.c., was practically identi¬ cal with the forms found at about the same time among the other Canaanites and the Ara¬ maeans. The origin of this alphabet is doubt¬ ful, the common view at the present time being that it was derived from certain Egyptian char¬ acters, while some regard it as taken from the Babylonian. After the Greeks obtained this alphabet, it passed from them to the Romans and then to the many modern alphabets derived from the Greek and Latin. The earliest in¬ scriptions known in this alphabet are probably the ostraka from Samaria in Hebrew, of the 9th century, the Hebrew Gezer inscription, of the 8th century, the Moabite stone, about 850 b.c., in the Moabite language, a Phoenician in¬ scription of about the same date, the Siloam in¬ scription, about 700 b.c., in Hebrew, the Zakkur inscription and the inscriptions from Senjirli, about the 8th century b.c., in Aramaic. All these have substantially the same forms. Within the next few centuries two types gradually arose, the old Hebrew and the Aramaic or square characters. The old Hebrew was used in writing Hebrew till the Jews adopted Ara¬ maic as their vernacular, which was at any rate before the time of Christ, when they naturally came to use ordinarily the Aramaic form of character for the Hebrew as well. The Samari¬ tans have always used the old Hebrew form of character, with many changes, especially in- the direction of greater elaborateness. The only modern use of this form of character is in the

Samaritan of the present day.

The earliest Syriac character, known as the Estrangela, was a cursive writing developed

from the Aramaic form. From this came the later Syriac forms, both Nestorian and Jacobite, and also the Arabic characters, including both the Kune and the Neskhi.

The southern Arabic characters, found in Sabaean and Minaean, differ greatly from those already mentioned, and are perhaps earlier than any other forms which have been found. They are to be traced, however, to the same common character in an early form. The Ethiopic char¬ acter is a development of the southern Arabic form.

The Ethiopic language and the Assyrian and Babylonian are written from left to right. All the other Semitic languages are written from right to left.

General Characteristics of the Semitic Languages. — The modern Semitic languages and dialects have of course been greatly changed by the influence of the other languages with which they have been brought in contact. These, therefore, should not receive a prom¬ inent place in the consideration of the general characteristics of the Semitic languages, al¬ though they may offer confirmatory testimony in some particulars. Some of these general characteristics of the ancient Semitic languages may well be noted, keeping in mind a compari¬ son with other languages, especially with the Aryan group. It is not claimed, of course, that the characteristics which will be here named have no similarities elsewhere, but rather that they may fairly be considered general character¬ istics of the Semitic group, as they could not be of any other group.

The Semitic languages divide the letters into two general classes, consonants and vowels, the consonants being the more important. Roots are composed only of consonants, while the vowels are used, along with consonantal changes, to express modifications of the funda¬ mental root idea. Although the vowels are thus important, it is in a domain entirely subordi¬ nate to the consonants. The result of this is that in all the languages except the Assyro- Babylonian and Ethiopic the consonants only were originally written, and the vowels added by means of small marks, for the most part above or below the consonants. In fact, it was only in comparatively late times that the vowels were written at all. The inscriptions, such as those of Phoenicia and of Senjirli, the Moabite stone

and the Siloam inscription, have no vowels. In the Assyro-Babylonian the vowels are expressed, but the characters are usually supposed to have been borrowed, as has already been noted. In the Ethiopic the vowels are expressed by slight changes in the form of the consonant, a feature, however, which is prob¬ ably to be regarded as a late development, although going back to the earliest known liter¬ ature. The consonants alone were probably originally written.

Originally the Semitic languages were char¬ acterized by the possession of a large number of gutterals, some of them very peculiar. In course of time, however, part of these were lost by most of the languages, the Arabic preserving them the most fully.

The Semitic roots are almost entirely tri¬ literal, that is, each consists of three consonants. An occasional root is found which contains four or more consonants, but these are exceptional. On the other hand, the belief is growing that

many of the triliteral roots, especially some of the so-called weak roots, were originally bilit¬ eral. But here the tendency of the languages toward triliterality is seen plainly from the fact that to a large extent these roots have assumed the appearance of triliterality.

The relation between nouns and verbs is very close. In fact most of the features of in¬ flection are the same in both, the noun being the earlier.

A prominent characteristic of verbal inflec¬ tion, with many similarities in the nouns as well, is the development of many different stems or conjugations from the same root. These are formed partly by internal change in consonants and vowels and internal additions and partly by external additions. Thus one stem has an intensive meaning, another a causative, another a reflex, etc. In the original Semitic there must have been many different stems. Some have been lost in each language. The Ethiopic has preserved the largest number, next the Arabic, then the Assyrian. These stems afford a very concise way of expressing many different shades of meaning connected with a single root idea, each of which would in most languages require either a compound verb or the addition of separate words for its expression.

The languages use pronominal suffixes at¬ tached to nouns, verbs and prepositions. These are really shortened forms of the pronouns. With nouns they have the force of a genitive, with prepositions of a dative and with verbs ordinarily of an objective accusative.

The languages are distinctly objective. The personal standpoint of the

speaker or writer counts for little. In the verb, the third person is the simple uninflected form, the starting point of the inflection, it is the first person in the Aryan languages. The present time, the time of the speaker or writer, is of little importance in comparison with the past and future. The use of the tenses is often based upon an as¬ sumed standpoint. So also many phases imply the assumption of a standpoint other than that of the writer or speaker.

Certain phenomena may be classed together under the general statement that they show a lack of development in the languages. This is not, however, due to lack of time or of favoring circumstances, because these features are ordi¬ narily found to characterize in a similar way all the languages at all times and under all cir¬ cumstances. These phenomena indicate rather psychological characteristics of the people, their natures are not complex, they show limitations in some directions. Certain developments which are common in Aryan languages the Semites did not feel to be necessary. Among these characteristics may be mentioned the follow¬ ing:

Most of the Semitic languages have only two tenses, usually called the perfect and the im¬ perfect. Whether these differed in their funda¬ mental meaning from some of the tenses of the Aryan languages is a question on which there is difference of opinion. The later forms of several of the languages developed a present tense from a participle, which is only suggested in the earlier usage. In general the Semitic tense usage is thus much less fully developed than the Aryan. Moods also are relatively undeveloped. They are found only in connec¬ tion with the imperfect tense, even the impera-

tive being derived from it, and in most of the languages they are not widely used.

The nouns have only two genders, masculine and feminine.

There is an almost entire absence of com¬ pound words, both nouns and verbs, except in proper names.

The syntax is in many particulars of a simple and undeveloped kind. There is a strong tend¬ ency to leave much in the relation of clauses and sentences to inference. This leads to the very frequent use of parataxis. There is but a small number of particles of every kind. In most of the languages the original case endings have been lost, but there has been no

great development of prepositions to take their place. There is also a scarcity of adjectives in most of the languages, so that nouns are often used in their stead.

Relation to the Primitive Language. — No

existing language can be called the common mother of the other Semitic languages, nor even the most primitive in every respect. Each of the languages is probably in some features more primitive than any other. But the Arabic preserves far more that is primitive both in grammatical forms and syntactical usage than any other of the languages. This is in spite of the fact that the known Arabic literature is very late. The Arabs in their desert home remote from other nations changed the language less than other peoples in a short space of time. Thus the Arabic preserves the case endings, which have been largely lost in the other Semitic languages, except in the Assyro-Baby- lonian where they are often used indiscrimi¬ nately. The Arabic preserves the original end¬ ings, sometimes consonants, more often vowels, both in verbs and nouns, which are largely lost elsewhere. The Arabic retains in most cases the original vowels, which in the other lan¬ guages undergo various changes, such as heigh¬ tening, shortening (volatilization) and contrac¬ tion, although the Ethiopic has also retained many of .these. The formation of the plural nouns by internal changes, the broken plurals, which is so prominent a feature of the Arabic, is only found elsewhere in Ethiopic. This was probably a primitive feature.

See Arabic Language; Assyria.; Baby¬ lonia; Ethopia; Hebrew Language and Lit¬ erature; Moab; Phoenicia.

Bibliography. — Brockelmann, Carl, (Grun- driss der vergleichenden Grammatik der semit- ischen Sprachen) (2 vols., Berlin 1908-13) ; id., (Semitische SprachwissenschafG (Leipzig 1906) ; Lidzbarski, Mark, (Handbuch der nordsemitschen Epigraphik) (Weimar 1898) ; Lindberg, O. E., (Vergleichende Grammatik

der semitchen SpracheiP (Goteborg 1897) ; Littmann, E., (Semitic Inscriptions) (New York 1905) ; Noldeke, Theodor, (Die semitischen Sprachen) (2d ed., Leipzig 1899) ; Renan, Ernest, (Histoire generale et systeme compare des langues semitiques) (5th ed., Paris 1878) ; Wright, William, (Lectures on the Compara¬ tive Grammar of the Semitic Languages) (Cambridge 1890) ; Zimmern, H., (Vergleich¬ ende Grammatik der semitischen SpracheiP (Berlin 1898).

George Ricker Berry,

Professor of Old Testament Interpretation and

Semitic Languages, Colgate University,

SEMITIC NATIONS, those nations whose languages were Semitic, and which are conse¬ quently supposed to have been racially con¬ nected. It is recognized, of course, that lan¬ guage is not an infallible evidence of race, and that the conclusions on that point drawn from it have at least a small degree of uncertainty. But in the absence of much evidence of any other kind, the data supplied from this source must be used as a working basis. (See Semitic Languages). In considering the Semitic nations as a group, the first question is, of course, concerning their primitive home. Prim¬ itive is here used only in a relative sense, for the very earliest history of these nations goes back to a time concerning which, in the present state of knowledge, there is no positive infor¬ mation or plausible inference. The considera¬ tion of that time would involve a discussion of the origin of the whole human race, which is a question too broad to be entered upon here. By primitive home is meant, therefore, the loca¬ tion of the Semites when they were one people, the common distributing point of the Semitic nations. While entire certainty on this point is not attainable, yet there are some indications which may be followed.

Some have found this primitive home in . Babylonia or its vicinity. For this the chief argument is based upon language. A considera¬ tion of the words common to all the Semitic languages is thought to point to the conditions prevailing in Babylonia, or in some adjacent country from which Babylonia was the first stopping place of the undivided race. But this argument from language is inconclusive, in view of the possibility of the disappearance from a language of words once common, and also of the borrowing by one Semitic language from another. The fact that the known history of Babylonia extends back to a point much earlier than that of any other Semitic nation has very little to do with the question.

There are many arguments in favor of Arabia, that is, central and northern Arabia, as the primitive home. Arabia is a country which is largely desert, except in the southern part. Such a country, it is said, best explains the racial characteristics. These characteristics, as usually given, are intensity of faith, ferocity, exclusiveness and imagination. It is also said that the Arabs have preserved the Semitic character and characteristics in their purest form. Certainly those characteristics which have just been mentioned are found combined among the Arabs more fully than elsewhere. A desert origin seems, also, to explain most sat¬ isfactorily some features of the Semitic lan¬ guages. This is true especially of the great predominance of gutterals. Such a development of these as was found in primitive Semitic de¬ mands good physical powers, which would come from an outdoor life in a pure atmosphere, and plenty of leisure for conversation. These con¬ ditions are met in Arabia. In this connection it is important to note that the

Arabs have preserved the gutterals more fullv than any other Semitic nation, the others having consid¬ erably modified their primitive habits of life. Again, it is by some regarded as a universal law that nomads may adopt settled habits of life, but that the reverse process does not take placp. This rule perhaps is not invariable, yet it does represent the usual tendency. When,

therefore, we find some Semitic nations no¬ madic and others not, it follows that the nomadic form of life is probably the earlier. For this nomadic form of life the natural loca¬ tion is Arabia. Further, the close resemblance of the Semitic languages to one another, much closer than in any other known group of lan¬ guages, indicates some of the early conditions surrounding the nation. It suggests that the primitive nation lived in a comparatively limited space for a long period of time before being divided, giving opportunity for much common development of the language and also that it was largely isolated from other nations who would influence the language. Such a country of moderate size, in comparative isolation from other countries, is Arabia alone in the region inhabited by Semitic peoples, or in their vicinity.

Another view is that the primitive home was in Africa. According to this view, however, as ordinarily held, the Semites very early migrated into Arabia and there lived for a long period of time before any division took place. This view would, therefore, make Arabia the centre of distribution for the Semitic nations. Hence the arguments already adduced in favor of Arabia would still be valid upon this view, but additional arguments are presented in favor of going back one step further to an African home. In support of this view the chief argument is that there is supposed to be a racial connection between the Semitic and Hamitic peoples. By Hamitic peoples are not meant the negroes, but the Egyptians, Berbers, etc., although it is by no means certain that the Egyptians are Hamitic. For this racial connection there are two chief arguments. One is from resemblance in physical characteristics, concerning which, however, the evidence is inconclusive. The other is from resemblance of the languages and is of greater force. The general resemblance between the Hamitic and Semitic groups of lan¬ guages are the following: the pronouns are similar; the verbs have similar tenses and formation of stems; it is claimed by some that the Hamitic roots, like the Semitic, were orig¬ inally triliteral; the ending for feminine gen¬ der is the same, t; several of the numerals are very similar ; both groups form nouns by means of a prefixed m; both write without expressing the vowels ; and 50 or more words of ancient Egyptian are said

to be identical with Semitic words. The possibility of accounting for these resemblances by borrowing from the Semitic languages by the Hamitic does not seem, how¬ ever, to be entirely excluded. Of course, not all of the resemblances are such as are most liable to be borrowed, but any of them might be. The possibility of such borrowing is increased, too, by other considerations. For the Egyptian resembles the Semitic languages more than any other Hamitic language. And it has been thought, on other grounds, that Egypt has been subject to Semitic influences in early times. Some have believed, for example, that certain features in early Egyptian civilization were taken from the Babylonians. Others have thought that Arab invaders came into Egypt in early times. Such a relationship as is claimed between the Semitic and Hamitic races can not be said, therefore, to be yet established. And even if there were such a relationship, no sufficient reason appears for thinking that the

primitive race must have had its home in Africa rather than in Arabia.

The conclusion that the earliest known home of the Semites was in Arabia may be said, therefore, to be reasonably well established. The arguments which are thought to show a previous residence in Africa are inconclusive. That view can only be regarded, in the present state of knowledge, as a conjecture with very little evidence to support it.

Separation into Nations. — Concerning the precise, or even approximate, date of the sepa¬ ration of each nation from the parent stock nothing is known. The recorded history of every Semitic nation begins long after that time. Even the order of departure of the dif¬ ferent nations is not certain. Here, however, the languages themselves come in to supplement our direct knowledge. On account of the re¬ semblances of the languages to each other, the order of separation is often stated thus. All the other groups departed from the southern, that is, migrated from Arabia, and settled in Babylonia and its vicinity. After dwelling here together for a long time, the Arameans first separated, then the Canaanites, and finally the Assyrians. There was also emigration south¬ ward, giving the southern Arabs, a branch of whom ultimately migrated to Abyssinia. It is doubtful, however, whether this outline is cor¬ rect in all details. It assumes that the Canaan¬ ites are more closely related to the Babylonians than are the Arameans, while in reference to some features of the languages the reverse is true. It also presents difficulties in accounting for the Arameans from the time of such sepa¬ ration until their appearance in history. For while some had settled in upper Mesopotamia at an early time, yet the Assyrian inscriptions indicate that fresh streams of migration were coming into upper Mesopotamia, and into Baby¬ lonia and Assyria, for a considerable period of time before and after 1000 b.c., apparently from Arabia. It seems probable then, that at the first general separation between north and south,

the ancestors of the northern nations went not to Babylonia, but to northern Arabia. After a considerable sojourn there, the Babylonians continued their journey to Babylonia, and part or all of the Canaanites, after a time, went on to Canaan, while the Arameans remained in northern Arabia, from which region successive waves of migration swept over Mesopotamia, Syria and their vicinity. The nomadic habit of life of many of the Arameans, which seems to be indicated in the Assyrian accounts, also points to such a residence in Arabia as is here indicated. Contact after the original division doubtless had much influence on language. The Arameans were probably thus influenced by the Arabs and by the Babylonians. The Babylo¬ nians themselves were also influenced by the Arabs with whom they had commercial inter¬ course in early times. Further, the Canaanites were without doubt influenced by the early in¬ tercourse between Babylonia and the region of Palestine.

The Individual Nations. — The earliest Se¬ mitic nation of which we have any history was in Babylonian. Their own records, which begin perhaps about 3000 b.c., give the first informa¬ tion concerning them. The earliest inscriptions show them already in Babylonia, but there are indications, as usually understood. of early con-

flicts with the original Sumerian inhabitants in southern Babylonia. Ultimately, however, the Sumerians became subject to the Babylonians and were gradually incorporated by them. In course of time the people of Babylonia became a mixture of various elements, Semitic and non- Semitic. The non-Semitic Elamites and Kas- sites had dominion over the land at various times, and must have contributed materially to the population. In the course of their history also it is probable that many Arabs and Arameans were incorporated into the popula¬ tion. The Babylonians remained a distinct people until their conquest by the Persians under Cyrus in 538 b.c., after which time they never again became independent, and doubtless were mingled with the Persians and others with whom they associated. The Babylonians were never nomads in historical times, but dwelt largely in cities. In all early history and to about 2000 b.c., the government was one of cities, with no power actually supreme. The Babylon¬ ians were not unwarlike, but were especially devoted to religion, commerce, science and edu¬ cation. Assyria was doubtless settled by colonists from Babylonia somewhat before 2000 b.c., and was at first subject to Babylonia. From about 1500 b.c., however, the nation was independent, and for most of the period from 745-606 b.c. held Babylonia in subjection, as well as at times before 745. Their national his¬ tory

ended with the capture of Nineveh by the Medes in 606 b.c. The Assyrians were much more warlike than the Babylonians, and con¬ siderably given to commerce, but cared much less than the Babylonians for religion, science and education.

The Arameans were not one nation, but rather many tribes. They came in waves of migration from Arabia to the frontier of Baby¬ lonia, and to upper Mesopotamia and finally reached the country later called Syria. In the Old Testament, Arameans are alluded to in con¬ nection with Abraham and his descendants, especially Jacob. The earliest mention of the Arameans elsewhere is probably in the Tell el- Amarna letters in the early part of the 14th century b.c. The Assyrian kings also speak of them from time to time in their inscriptions, beginning in the 14th century. From all indi¬ cations it would seem that their earliest set¬ tlement of importance was in the upper Mesopotamia, between the rivers Euphrates and Khabur. This settlement was reinforced by fresh arrivals from time to time. Just when they passed over the Euphrates and occupied Syria is uncertain, but the indications suggest that somewhat before 1000 b.c. they had ob¬ tained possession of most of the country, es¬ pecially the northern and middle portions, de¬ feating and driving northward the Hittities who had previously possessed the country. About the same time they began to come in large num¬ bers into the territory of Assyria and Baby¬ lonia, especially along the Euphrates. In the times of Tiglathpileser III and later, 745 b.c. and afterward, they also had settlements along the lower Tigris. In the earliest notices of them they were largely nomadic, but they soon turned to settled habits of life. In their gov¬ ernment there was little unity; each political division consisted of a strong city and the peo¬ ple inhabiting a greater or less amount of ter¬

ritory around the city. Several of these city states would unite for a campaign, but these leagues never lasted long. The Old Testament speaks of the Arameans in connection with several cities, namely, Damascus, Zobah, Maa- kah and Beth Rehob. Other prominent cities of the Arameans were Hamath in Syria and Haran in Mesopotamia. Upper Mesopotamia is spoken of in the Old Testament as a region by the names Aram Naharayim and Paddan Aram. The most powerful of the Arameans were in¬ cluded in the kingdom of Damascus, but their power was broken when Damascus was cap¬ tured by Tiglathpileser IV about 732 b.c. After this time the population of Syria and upper Mesopotamia no doubt continued to be largely Aramean for centuries, although the people did not form a nation, and had little political power. Of the many who used the various Aramean languages and dialects after this time (see Semitic Languages), it is prob¬ able that a large part were Arameans. But naturally many others were mingled with them, so that in their latter history the Aramaic¬ speaking people represented a mixture. The language was also adopted by those who

were not Arameans, as, for example, by the Jews. Some who have left inscriptions in the lan¬ guage were not Arameans, but Jews and Arabs. The Arameans were a people of considerable warlike ability, although with little taste for political organization, and were much given to commercial pursuits.

All the Canaanite Semitic nations aside from the Hebrews, namely, Canaan, Ammon, Edom, Moab and Phoenicia, were occupying their respective countries before the arrival of the Hebrews from Egypt, how long before is not known with certainty. The Phoenicians are mentioned in Egyptian records as early as the 16th century and are prominent in the Tell el- Amarna letters. The Phoenicians were dis¬ tinguished beyond any other Semitic nation as a commercial people, especially on the sea, and were great colonizers. Their form of govern¬ ment was the city state, Tyre and Sidon being the two most prominent cities. Whether the Hebrews were actually Canaanites or were a branch of the Arameans is uncertain, the indi¬ cations for the latter view coming entirely from the Old Testament. If this view be correct, the Hebrews spoke Aramaic on their arrival in Canaan, and learned the Canaanite language from the people there. The other view is, how¬ ever, rather more probable, according to which the Hebrews were themselves a branch of the Canaanites, although traditionally associated with the Arameans in the experience of Abra¬ ham, the founder of the nation, and his immedi¬ ate descendants. The earliest statements con¬ cerning Abraham in the Old Testament con¬ nect him with the city Ur in Babylonia. Both the Old and New Testaments originated among the Hebrews. The Hebrews were not particu¬ larly distinguished as warriors, and in ancient times had no inclination toward commercial pursuits.

If the earlier conclusions concerning Arabia as the distributing point of the Semites are true it is evident that after the departure of the nations hitherto mentioned the Arabs remained by themselves in central and northern Arabia at a period long before we have any record of

them. There are no indications in the early his¬ tory that the Arabs had a centralized govern¬ ment. Rather it would seem that, being no¬ madic, they were early separated into many dif¬ ferent tribes, having no political unity. They are mentioned quite often by the Assyrian kings who fought against them, beginning with Shal¬ maneser III in 854 b.c. Their chief military activity came during and after the time of Mohammed.

Of the time of migration into southern Arabia there is no definite information. South¬ ern Arabia is (of a different character from the rest of the land, being fertile and adapted to agriculture. The immigrants here naturally abandoned the nomadic habit of life. The knowledge of these south Arabian kingdoms comes chiefly from their own inscriptions, whose dace is by no means certain. It is now thought, however, by those who have given special at¬ tention to the matter that the earliest south Arabian kingdom was the Minsean, extending from about 1250-600 b.c., at the latter date being conquered by the Sabaeans, while the Sabaean kingdom lasted from about 750-100 b.c. Both were evidently kingdoms of considerable power. Probably about 350 a.d. some Sabaeans migrated to Abyssinia, and there founded the kingdom of Aksum, where the language called Ethiopic was spoken.

Characteristics of the Semitic Peoples. —

It is evident that the Semites as a whole were decidedly religious. But it is now evident that there was no Semitic tendency to monotheism, as was formerly supposed. The three great monotheistic religions of the world, to be sure, Judaism, Christianity and Mohammedanism, have come from the Semites. But Mohammed¬ anism was strongly influenced by Judaism, and Judaism and Christianity owe more of this teaching to the work of great individuals than to any natural tendency of the Hebrews. The Hebrews had, in fact, a tendency to poly¬ theism, as is shown by their history in the Old Testament. The Arabs were polytheists before the time of Mohammed. All the other Semitic nations, so far as we know, were poly¬ theistic.

In considering other characteristics and achievements of the Semites, especially in com¬ parison with the Aryans, it needs to be remem¬ bered that the prominence of the Semitic nations precedes that of the Aryans. Hence the Aryans have been able to profit by whatever was good in the Semitic achievements. Considered in the light of their own times, the Semites were not deficient in those traits which have distinguished the Aryans. Usually, however, not more than two or three Semitic nations have manifested conspicuously any one of such traits. In warfare the Arabs, under Moham¬ med and his successors, the Assyrians and the Babylonians achieved signal success. The Assyrians, for their own time, were great or¬ ganizers of conquered territory. The scientific attainments of the Babylonians were such that nearly all nations of antiquity learned many things from them, such as astronomy and mathematics. The Assyrians and Babylonians showed much artistic ability. Much of the literature of the Semitic nations is imaginative, especially the poetry and mythology.

See Arabic Literature ; Assyria ; Baby¬

lonia; Ethiopia; Hebrews; Language; Lit¬ erature; Phcenicia; Syria.

Bibliography. — Barton, George A., (A Sketch of Semitic Origins> (New York 1902) ; Brinton, Daniel G., (The Cradle of the Semites) (Philadelphia 1890) ; id., (Races and Peoples } (Philadelphia 1901) ; Hommel, Fritz, (Die semitischen Volker und Sprachen> (Leipzig 1883) ; id., (The Ancient Hebrew TraditioiP (New York 1897) ; McCurdy, James F., his¬ tory, Prophecy and the Monuments) (3 vols., New York 1895-1901) ; Noldeke, Theodor, (Die semitischen Sprachen) (2d ed., Leipzig 1899) ; Smith, W. Robertson, (Lectures on the Reli¬ gion of the Semites) (2d ed., London 1907) ; Wright, William, (Lectures on the Comparative Grammar of the Semitic Languages > (Cam¬ bridge 1890).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

SEMLIN, Charles Augustus, Canadian statesman : b. Ontario, 1836. He went to Brit¬ ish Columbia in 1862, spent some years in the Cariboo district and finally settled at Cache Creek. He was largely interested in agricul¬ ture and in the meat industry. He served many years in the assembly of British Columbia and was Premier in 1898-1900. He was afterward Commissioner of Lands and Works, Provincial Secretary and Minister of Education.

SEMMERING, zem'er-mg, Austria, an Al¬ pine pass on the borders of Styria and Lower Austria, 44 miles southwest by west of Vienna. The road over the Semmering Pass (2,940 feet) is of ancient date and here between 1848 and 1853 was built the famous Semmering Rail¬ way, the first of the European mountain railways. The railway begins at Gloggnitz and is carried along the face of preci¬ pices by means of 15 tunnels and 16 via¬ ducts to Miirzzuschlag. The scenery along this portion of the line is of the grandest and most picturesque description. At its high¬ est elevation, 2,891 feet, the line pierces the Semmering in a tunnel 4,667 feet long. Its en¬ tire length is 25 miles and it was constructed for the Austrian government at a cost of about

$7,000,000.

SEMMES, semz, Raphael, American naval officer : b. Charles County, Md., 27 Sept. 1809 ; d. Mobile, Ala., 30 Aug. 1877. He became a midshipman in the United States navy in 1826, a lieutenant in 1837, was volunteer aide to Gen¬ eral Worth in the Mexican War and secretary to the lighthouse board in 1859-61. Upon the secession of Alabama he resigned

his commis¬ sion and was assigned to the command of the steamer Sumter, the first vessel of the Confed¬ erate navy. With this ship he cruised with suc¬ cess against Northern commerce in the West Indies. He then had the swift steamer Ala¬ bama, or No. 290, built in England, and in September 1862 started on his well-known voyage. He flew British colors when approach¬ ing his prey, hoisting the Confederate ensign when sure of his prize. His seamen were chiefly English. After a destructive career, during which he captured 64 vessels and burned all but seven, his ship was sunk off Cherbourg Harbor, France, by the Federal steamer Kearsarge. Subsequent to the war he practised law. His writings include (Afloat and Ashore During

the Mexican War> (1851) ; (The Cruise of the Alabama * (1864) ; (Campaign of General Scott in the Valley of Mexico* (1852) ; (Memoirs of Service Afloat During the War Between States*

(1869).

SEMNOPITHECUS, a genus of Asiatic monkeys, the langurs, including species pos¬ sessing an elongated tail, cheek pouches and ischial callosities. All of this genus are inhabit¬ ants of Asia and Asiatic islands. The sacred entellus monkey is a familiar example. See Langur.

SEMOLINA, hard grains of wheat left in the bolting cloth when the fine flour has been passed through its meshes and some times man¬ ufactured by millers. Certain hard, large¬ grained wheats growing in southern Europe produce the best semolina, which is used for thickening soups, for macaroni, for a French bread, as an addition to the Italian polenta and is employed in puddings, especially in England.

SEMPACH, zem'paH, Switzerland, in the canton of Luzerne, lies eight miles northwest of the town of Luzerne, on the lake of the same name. It is a walled town and its chief interest consists in its having been one of the outposts of the Swiss in their conflict with Austria. The battle of 9 July 1386, in which the Austrians under Duke Leopold received a crushing defeat at the hands of the confederated Swiss, was fought under its walls — a victory the more re¬ markable as won against extraordinary odds, and in which the famous Winkelried was the hero ; the duke with 600 knights were left upon the battlefield. The anniversary of this victory is always celebrated on this spot by prayers and thanksgiving. Pop. 1,200.

SEMPER, zem'per, Gottfried, German architect: b. Hamburg, 29 Nov.

1803; d. Rome, 15 May 1879. He attended the Johanneum of his native town and studied law in the Univer¬ sity of Gottingen, but changed to the profession of art, having been attracted to the study of architecture under Gau. He then took a jour¬ ney through Italy, Sicily and Greece. On his return he published (Bemerkungen fiber bemalte Architektur und Plastik bei Alten (1834), and the essays (Die Anwendung der Farben in der Architektur und Plastik* and (Dorisch-Griechische Kunst in 6 Tafeln mit Farben* (1836). He became the pupil of Schinkel in Berlin, who ungrudgingly recog¬ nized his talent and educated him to fill the place of professor of architecture in the Dres¬ den School of Building. Between 1837-41 he built several important structures in Dresden, including the Court Theatre, and in 1849 traveled to Paris and London, in which latter city he undertook, among other things, the arrange¬ ment of the statuary in Kensington Museum. He was active up to the time of his death in Dresden, Vienna and other places, where his work is still a commanding feature of city architecture. He was an uncompromising ad¬ herent of the Renaissance style, as far as this was founded on the Roman of the later em¬ pire, especially as exhibited in the composition of the forums. His buildings are distinguished for harmony of composition together with purity and moderation of detail. Among his many works on architecture may be noted (Uber Poly chromie und ihren Ursnrung* (1851); (Wissenschaft, Industrie, und Kunst*

(1852), and (Der Stil in den technischen und techtonischen Kfinsten (1860-63). Consult Lipsius, (Gottfried Semper in seiner Bedeut- ung als Architekt* (1880).*

SEMPER, Karl, German naturalist : b. Al- tona, Germany, 6 July 1832; d. Wfirzburg, Bavaria, 29 May 1893. He was educated at Kiel, Hanover and Wfirzburg, traveled exten¬ sively in Europe and was engaged in a tour of the Philippines, China, Japan and the South Sea Islands in 1858-66. On his return he was appointed to the chair of zoology at Wfirzburg which he occupied until his death. He deliv¬ ered a course of lectures before Lowell Insti¬ tute of Boston in 1877, afterward published under the title (Animal Life as Affected by the Natural Conditions of Existence (1881). He edited nine volumes of (Arbeiten aus dem Zoologischen Institut* in Wfirzburg, and also wrote (Reisen im Archipel der Philippinen* (1867-72) ; (Die Palau Inseln im stillen Ozean* (1873); (Die natfirlichen Existenzbedingung der Thiere* (1880), etc.*

SEMPILL, Robert, Scottish ballad writer: b. about 1530; d. 1595. He was probably a cadet of the house of Sempill, of illegitimate birth; received an excellent education; spent part of his early life in Paris, and upon his re¬ turn to Scotland went into military service. He ardently supported the Reformation in Scotland in his writings and severely attacked the Catho¬

lic cause. The majority of his poems have been preserved in the original, the most noteworthy of them being (Ane Complaint upon Fortoun (1581) ; (The Legend of the Bischop of Saint Androi's Lyfe* (1584), and the (Sege of the Castel of Edinburgh.* Two complete editions of his writings were published, (The Sempill Ballates,* edited by T. G. Stevenson (Edin¬ burgh 1872), and (Satirical Poems of the Time of the Reformation* (edited for the Scottish Text Society by James Cranstoun, 2 vols., Edinburgh 1889-93). The last two poems were included in the Scottish Poems of the Six¬ teenth Century* (edited by Sir John Graham Dolyel, 2 vols., Edinburgh 1801).*

SEMPLE, Ellen Churchill, American

anthropogeographer : b. Louisville, Ky., 1863. She was graduated at Vassar College in 1882 and in 1891-92 and 1895 studied at the Univer¬ sity of Leipzig. She has specialized in the study of the effect of geography on the development of races and on national life. She is a con¬ tributor to the Bulletin of the American Geo¬ graphical Society, the New York Journal of Geography and to the London Geographical Journal. She was awarded the gold medal of the American Geographical Society in 1914. Author of (American History and Its Geo¬ graphic Conditions (1903) ; Unfluence of Geographic Environment* (1911).*

SEMPRINGHAM, Order of. See Or¬

ders, Religious.

SEN, Keshub Chunder, an Indian religious reformer: b. village of Garifa (Gouripore), Bengal, 19 Nov. 1838; d. 8 Jan. 1884. His edu¬ cation was partly Hindu and partly English. He became attracted in 1858 to the Brahmo- Somaj, the Theistic Church of India, so much so that he soon began a campaign of religious reform for the regeneration of his fellow-countrymen. In 1865 a split in this Church oc-

curred, resulting in the formation of one body under the leadership of Sen and assuming the name of (

SENAC, Jean Baptiste, an eminent French physician : b. in the diocese of Lombec, Gas¬ cony, about 1693; d. 1770. He was graduated in physics at Rheims and later at Paris and in 1752 was appointed physician to Louis XV. He was a member of the Royal Academy of Sci¬ ences at Paris and of the Royal Society of Nancy. His greatest work and to which he owes his

anatomical reputation was (Traite de la Structure du Cceur, de son Action, et de ses Maladies (2 vols., Paris 1749). He also pub¬ lished an edition of (Heister's Anatomy* (Paris 1724) ; (Discours sur la Methode de Franco, et sur celle de M. Rau touchant l'Operation de la Taille* (1727) ; (Traite des Causes, des Aeci- dens, et de la Cure de la Peste) (1744), and (Lettres sur la Choix des Saignees* (1730), written under the pseudonym of Julien Morison.*

Sl£NACOUR, Etienne Pivert de, French philosophic writer: b. Paris, November 1770; d. Saint Cloud, February 1846. He was of a melancholy and seclusive nature even as a boy, and read eagerly everything obtainable, espe¬ cially such books as related to travel. For four years he studied philosophy at the College de la Marche and was then sent to the Seminary of Saint Sulpice by his father's orders, but escaped from there and went to Lake Geneva. In 1798 he returned to Paris and devoted himself to literature, though the main source of his meagre income was a pension obtained from Louis Philippe through the good offices of M. Vil- lenain. His chief works are (Reveries sur la Nature primitive de l'homme) (Reveries of the Primitive Nature of Man) (1799) ; (Ober- mann> (1804) ; (Libres Meditations d'un Soli- tarie Inconnu) (Free Meditations of a Recluse) (1819). Of these (Obermann, a collection of letters from Switzerland treating on nature and the human soul, is by far the best known, and while a doubt bordering on atheism is ex¬ pressed in its lines, yet the work is entirely original and contains many beautiful passages showing a delicate and charming feeling for nature.*

SENATE, United States. The Constitu¬ tion of the United States provides that ((all legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representa¬ tives. The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof, for six years, and each Senator shall have one vote.® It was further provided that the senators chosen at the first election should be divided into three classes, the seats of senators of the first class to become vacant at the end of two years; of senators of the second class at the end of four

years and senators of the third class at the end of six years, thus providing that one-third should be chosen every second year, and it is further provided that, wif vacancies happen by resignation, or otherwise, during the recess of the Legislature of any State, the executive thereof may make temporary appointments until the next meeting of the Legislature, which shall then fill such vacancies.®

Regarding the qualifications of senators the Constitution provides that ((no person shall be a Senator who shall not have attained to the age of thirty

years, and been nine years a citi¬ zen of the United States, and who shall, when elected, be an inhabitant of that State for which he shall be chosen.®

The Vice-President of the United States is president of the Senate, but has no vote unless the Senate is equally divided. The Senate is authorized to choose other officers, and also a president pro tempore, in the absence of the Vice-President, or when he shall exercise the office of President of the United States. The Senate has the sole power to try impeachments, and when sitting for that purpose its members must be under oath or affirmation. When the President of the United States is tried, the chief justice of the Supreme Court of the United States presides, and the concurrence of two- thirds of the members present is requisite to convict. Judgment in cases of impeachment cannot extend further than to removal from office and disqualification to hold and enjoy any office of trust or profit under the United States. The legislatures of the respective States are empowered to fix the time, place and man¬ ner of electing senators, but Congress may make or alter such regulations, except as to the places of choosing senators. The members of the Senate, like those of the House of Represen¬ tatives, are in all cases, except treason, felony and breach of the peace, privileged from arrest during their attendance on the sessions of the Senate and in going to and returning from the same, and they are exempt from being held re¬ sponsible elsewhere for anything said in debate in the Senate. No person holding any other office under the United States can be a senator, and no senator can be appointed to office, the emoluments of which have been increased dur¬ ing his term of service in the Senate. These restrictions apply also to members of the House of Representatives. The Senate may propose or concur in amendments to revenue bills, but cannot originate them, that power resting in the House.

The Senate received its existing form as a recognition of the equality of the several States and had not this concession to State's rights been granted by the convention which framed the Constitution the minor States would prob-ablv not have accepted that instrument.

The proceedings of the Senate were held in secret until the session of 1793, when discus¬ sions as to Albert Gallatin's right to a seat therein were held with open doors. This pub¬ licity had been urged from the beginning by those who argued that secret debates diminished the responsibility of the Senate and of its indi¬ vidual members to the people, and that pub¬ licity would inspire popular confidence in the Senate and its course. A resolution was passed that after the termination of the session then being held and as soon as suitable galleries

should be provided, the galleries, except on special occasions requiring secrecy, should re¬ main open while the Senate was engaged in legislative business. Executive business is still disposed of in secret session.

The question of electing United States sena¬ tors by direct vote of the people, instead of by the legislatures of the several States, has been agitated for many years. For this purpose an amendment to the National Constitution is necessary. In 1903 the legislatures of the sev¬ eral States passed resolutions asking Congress to call a convention for the purpose of con¬ sidering an amendment to the Constitution pro¬ viding for such election of United States sena¬ tors. Resolutions to the same effect were pre¬ sented in other legislatures, and finally in 1913 the matter culminated in the adoption of the Seventeenth Amendment to the Constitution which specifies <(The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof for six years ; and each Senator shall have one vote. The electors in each State shall have the quali¬ fications requisite for electors of the most nu¬ merous branch of the State Legislatures.®

Next to President of the United States, and hardly excepting the Vice-Presidency, the office of senator is more sought than any other under the national or State governments. In the earlier period of the government, when the States still regarded themselves as almost inde¬ pendent sovereignties, the governorship of a State was looked up to as an office but little short of the Presidency. In the more recent years of the republic governors have often been eager aspirants for the senatorial office, and very willing to give up their places as chief magistrates of their respective States to sit in the so-called Upper House at Washington. Many of America's great statesmen have been members of the Senate, and no body of modern legislators has more august traditions or asso¬ ciations. Some of the States make it a rule to re-elect the same senators practically for life, and this is especially the case with the New England States and in certain Southern States. Senators are extremely jealous of their liberty of debate, and their prerogatives. The salary of senators is $7,500 per annum. The present full membership of the Senate is 96, but several seats are usually vacant through disputed elec¬ tions or for other reasons.

SENATORIAL COURTESY, a custom in the United States Senate by which the pro¬ cedure of that body is based on personal honor rather than on a code of rules. For instance, the Senate along this line of courtesy will not confirm a Presidential appointee in a State whose senators object to the person nominated.

SENATORIAL DISTRICT. See Dis¬

trict.

SENDAI, sen-di', Japan, capital of the province Ken Mijagi, on the island Hondo, near the eastern coast, 190 miles northeast of Tokio. It is celebrated for its silk and lacquer manu¬ factures, and carries on a considerable trade in fish and salt. It is on the railway running north from the capital.

SENEBIER, Jean, Swiss natural philoso¬ pher and historian: b. Geneva, 1742; d. 1809. After studying ffieHogy he was ordained a minister about 1762 and for several years

preached at Chancy. Philosophy and natural history, however, held more charm for him than divinity and in 1773 he left the ministry to be¬ come keeper of the public library at Geneva. In 1787 he also became one of the conductors of the Journal of Geneva. His most important works are (Essai sur l'Art d'observer et de faire des Experiences> (2 vols., 1775) ; (Memoires Physico Chimiques sur l'lnfluence de la Lumiere Solaire sur les Trois Regnes de la Nature) ; (Rapports de l'Air avec les Etres organises ; (Histoire Litteraire de Geneve* (3 vols., 1808) ; besides which he also published (Catalogue des Manuscripts dans la Biblio- theque de la Ville de Geneve.**

SENECA, Lucius Annaeus, Roman philoso¬ pher, son of the rhetorician of the same name : b. Corduba (Cordova), Spain, about 4 b.c. ; died in Rome by his own hand at the order of Nero, 65 a.d. As his family was wealthy and of equestrian rank, the boy was brought to Rome to be educated for the bar and an official career. He attended also with enthusiasm the lectures of several noted Pythagorean, Stoic and Cynic philosophers. He had gained great fame for elo¬ quence and had entered the Senate through the quasstorship, when, in 41, at the instance of Mes- salina, who accused him of an intrigue with Julia Livilla, sister of the late Emperor Ca¬ ligula, he was banished to Corsica. From there he sent to his mother, Helvia, the charming Wonsolatio, but exhibited little fortitude in his exile. Finally, in 49, Agrippina, who, after the execution of Messalina, had married Claudius, and had prevailed upon him to make her son Nero the heir to the throne, secured Seneca's recall that he might act as tutor to the young prince, then 11 years of age. At Nero's acces¬ sion in 54, he wrote the curious political satire (still extant) on the death of Claudius, com¬ monly known as Apocolocyntosis, ((Pumpkinifi- cation,® a word formed upon the analogy' of apotheosis <(deification.® During the first years of the new reign. Seneca, in conjunction with Burrus, prefect of the Praetorian guard, was, on the whole, successful in keeping Nero within the bounds of*

humanity. Agrippina, ambitious and cruel, was determined to rule the state through her son, and Seneca seems to have palliated the latter's excesses in order to destroy his mother's influence over him. Finally, when Poppaea Sa¬ bina, with whom Nero had become infatuated, induced him to order the assassination of his mother, Seneca wrote for the emperor a letter to the Senate, asserting that Agrippina had con¬ spired against his life, and had committed sui¬ cide upon being discovered. The death of Bur¬ rus in 62 made Seneca's position quite insecure. Nero fell into the hands of men like the infa¬ mous Tigellinus ; money was needed to meet his extravagant expenditures and Seneca had be¬ come enormously wealthy. Foreseeing his prob¬ able ruin, he offered to resign to Nero all that he had, and, upon receiving a declination, couched in terms of specious affection, retired into the country and lived with utmost simplicity. In 65 he wa,s implicated in the conspiracy of Piso and was ordered to commit suicide. With his wife, Paulina, who insisted on dying with him (see the affecting account in Tacitus, (Annals,) XV, 60-64), he opened the veins of his arms. Paulina's life was barely saved by her slaves; Seneca, after suffering prolonged

agony, during which he displayed the utmost serenity, was finally suffocated in a vapor bath.

"Nothing in life became him like the leaving it.;) He was undoubtedly an earnest seeker alter truth and right. The Roman world was much his debtor for the wise and humane ad¬ ministration of the state during the t(golden quinquennium ® of Nero; but he lacked real strength of character, and in his connection with Nero too often acquiesced in the doing of posi¬ tive evil that a greater good might be accom¬ plished. As a man of letters, he is incompar¬ ably the most brilliant figure of his time. He was an extremely prolific writer, his subjects are exceedingly varied, the ideas usually nobly conceived and eloquently expressed. In strik¬ ing contrast to the periodic style of Cicero, he loves short, epigrammatic sentences. He is an expert in the use of every variety of rhetorical ornamentation, which, in harmony with the pre¬ vailing taste, he carries to excess. Though by no means a profound thinker, he is broad¬ minded and sympathetic in his presentation of the ethical principles, Stoic in the main, by which man's daily life should be guided. He was, indeed, by certain Fathers of the Church believed to have been a Christian, and there are still extant 14 letters, undoubtedly spurious, of a correspondence with Saint Paul. His moral essays embrace 12 so-called dialogues, (On Peace of Mind, (On Anger, > (On the Short¬ ness of Life,* etc.; 3 books (On Clemency, > addressed to Nero; 7 (On Benefits, } and 20 books of (Letters to LuciliusP With these may be*

grouped the seven books of (Naturales Quaes- tionesP which handle physics as a basis for ethical reflections. We possess also nine trag¬ edies, composed rather to be read aloud than to be acted, and so rhetorical in substance that, though fine passages are not lacking, they are rather declamations than real poetry. They had, however, a great influence upon the drama of the 16th century.

Bibliography. — The best text of the prose works is by F. Haase, in the Teubner series (1893-95) ; of the tragedies, by F. Leo (Berlin 1878-79.) The (Apocolocyntosis) has been edited by A. P. Ball (New York 1902). Consult also Merivale's (History of the Romans under the Empire) (cc. 50, 52-24) ; Zeller's (Eclectics) (London 1883) ; Farrar's (Seekers after God> (London 1886).

Nelson G. McCrea,

Professor of Latin, Columbia University.

SENECA INDIANS, Mohegan "Sinne- kens,® "place of the stones,® a tribe belonging to the Iroquois family. Their own name is Tson- ondowanenaka, or Tsonondowaka, (

daigua lakes and extended westward to Genesee River. As a member of the League, the Senecas were called H onehninhohonte , signifying, (

Bibliography. — Butterfield, C. W., his¬ tory of Seneca County > (Sandusky 1848) ; Con¬ over, G. S., (Seneca Villages (Geneva, N. Y., 1889) ; Doty, L. L., (History of Livingston County, New York* (Geneseo 1876) ; Dutton and Wentworth, (Memorials of Seneca Indians) (Boston 1840) ; Gernier, J., (Des missions de la Conception, etc.* (Quebec 1858) ; Harris, G. H., (The Indian Bread Root of the Senecas* (New York 1890) ; Hawley, C., (Early Chapters of Seneca History* (Auburn, N. Y., 1884) ; Mar-*

shall, O. H., (The Niagara Frontier (Buffalo 1885) ; Merrihew and Thompson, (Seneca In¬ dians in the State of New York0 (Baltimore 1840) ; Phillips, J., (Indians and Friends in Pennsylvania in 1791 } (London 1792) ; Turner, O., (History of the Pioneer Settlements, etc.* (Rochester 1852) ; Wooddy, W., devolution in the Government of the Senecas in 1848) (Balti¬ more 1875).*

SENECA LAKE, a lake west of the cen¬ tral part of New York State, about

25 miles south of Lake Ontario (q.v.), into which it dis¬ charges its waters by the Seneca and Oswego rivers. It is about 37 miles long, from north to south; and from one to four miles wide. Its depth is about 630 feet and it is 445 feet above sea-level. It is one of the group called the <(Finger Lakes.®

SENECA RIVER, a river of New York; flows east from the north end of Seneca Lake to the north end of Lake Cayuga, then turns north and is joined on the left by the outlet of Lake Canandaigua, then turns east, and re¬ ceives in succession the drainage of the other parallel ((finger lakes,® Owasco, Skaneateles and Onondaga, then turns northwest, taking the name of Oswego River (q.v.) and enters Lake Ontario at Oswego. Length, including the Oswego, nearly 100 miles.

SENECA, or SENEGA, ROOT. See

Polygala.

SENECA FALLS, N. Y., village in Seneca County, on the Seneca River and Barge Canal, near Cayuga Lake, and on the New York Cen¬ tral and Hudson River Railroad, about 160 miles west by north of Albany, and 37 miles west by south of Syracuse. Electric lines connect the village with Cayuga Lake Park, three miles dis¬ tant, and with Waterloo and other villages. A fall of 50 feet in the river affords extensive water power for manufacturing, and explains the name of the place. Seneca Falls is in an agricultural and fruit-growing region. The chief industrial establishments are machine shops, woolen factories, fire-engine and pump works, grist mill and furniture factory. The shipments are chiefly farm products, fruit, dairy products, pumps and fire-engines. There are three banks ; the national bank has a capital of $100,000. The educational institutions are a high school, the Mynderese Academy, public and parish elementary schools, private business schools and a public library. The government is vested in a village president and a board of trustees. Benevolent institutions include a hos¬ pital and the Johnson Home for Indigent Females. Seneca Falls was founded in 1791 and received its charter of incorporation in 1831. Pop. about 7,000.

SENECIO, se-ne'si-o, one of the largest known genera of plants, comprising about 1,000 species; it belongs to the family Asteracece, and is universally distributed. It is, therefore, prac¬ tically impossible to give a compact description of the generic characters ; but it may be said that these plants are annual or perennial herbs, shrubs, or even arborescent, have basal or alternate leaves, and solitary, corymbose or paniculate heads of flowers, usually yellow in hue. These are made up of both radiate and tubular flowers, the latter being five-toothed and perfect, or of the tubular ones

alone, on a

flattened or slightly convex receptacle. The in¬ volucre surrounding each flower head is cylin- dric or campanulate, with its principal bracts in one series, distinct or slightly united at the base, and encircled very often with a ring of shorter scales. The achenes are mostly terete or compressed, sometimes curiously papillose. After wetting, these papilla put forth pairs of spiral hairs which secrete adhesive mucilage. The generic name has been derived from the Latin senex, an old man, in reference to the tuft of soft bristles surmounting the achene, and mostly white. These parachutes have so well distributed the seeds of the common groundsel (S . vulgaris), originally European, that it is found all about the civilized temperate zone as a troublesome weed. It is a more or less glabrate annual, about a foot high, with spatulate pinnatified leaves and rayless yellowish heads in corymbs. It blooms at all seasons, and is often sold in English cities as food for cage- birds. At one time it was even regarded as a love charm, and was said to have formed a part of the Virgin's bed. It was also of old repute for poulticing. S. aureus is a charm¬ ing, slender, American species, with cordate basal leaves, called golden ragwort, and bloom¬ ing in the spring. Squaw-weeds are other species of Senecio.

The plants known as Cinerarias, having dark-blue rays, — a rare color among com¬ posites, — are greatly cultivated and hybridized, but not many other senecios are valued in horticulture. Among these are the familiar German ivy (S. mikanioides) , an easily prop¬ agated, rapidly growing, glabrous, twining vine, with small yellow flowers in axillary or terminal clusters, and glossy, deltoid-ovate leaves ; and the Cape ivy (S', macroglossus) , a beautiful greenhouse climber with golden flowers as large as marguerites and ivy-like leaves. One of the Musty millers® is S', cineraria, a tall peren¬ nial, enveloped in white wool, and with small compact corymbs of rayless flowers. The handsome S', pulcher, with reddish-purple rayed flowers, of strong growth and cobwebby foliage; the great S', japonicus, over five feet high, and extremely ornamental, with its large palmate leaves, and large yellow flowers ; and S', petasites, valuable for its large panicles of big, yellow fragrant flowers, blooming in mid¬ winter, are also cultivated.

SENEFELDER, za'ne-fel-der, Aloys, Bo¬ hemian inventor of lithography: b. Prague, 6 Nov. 1771 ; d. Munich, Bavaria, 26 Feb. 1834. The son of an actor, in early life he tried un¬ successfully to be both actor and dramatist. Having learned something of printing he con¬ ceived the idea of inventing a process of his own, and was finally led by accident to his great discovery of lithography (q.v.). Subse¬ quently he made important improvements, con¬ trived a press, procured a patent and set up an establishment, which he carried on success¬ fully. In 1809 he was appointed inspector of the royal

lithographing establishment. He pub¬ lished the (Elements of Lithography) (1819), a curiously illustrated work, which he trans¬ lated into English and French. Consult Nagler, (Aloys Senefelder und der Geistliche Rath Simon Schmidt (1832); Pfeilschmidt, E., (Aloys Senefelder) (Dresden 1877) ; Muller, J.*

W., 'Invention of Lithography) (New York

1911).

SENEFELDER, Leopold, Austrian physi¬ cian: b. Vienna, 25 Sept. 1864. He was edu¬ cated at the Preparatory Seminary of Maria- schein, the Mies Gymnasium, Bohemia, and the University of Vienna. In 1888-89 he served as interne at the Garnisons-Spitale No. 1, Vienna, was physician to the reserves and as¬ sistant physician at Rudolf Hospital, Vienna, in 1889-91. He established a practice at Sankt Polten, Lower Austria, in 1892 and at Vienna from 1893 to 1905. After 1908 he was lecturer on the history of medicine at the University of Vienna. In 1902 Dr. Senefelder accompanied Cardinal Gruscha to the Jubilee Celebration at Rome. He is librarian and archivist of the yienna College of Physicians and has pub¬ lished (Anathema esto?> (1892) ; (Die Kata- komben bei St. Stephen (1902) ; (Die kaiser- liche konigliche Weiberstrafenstalt in Wiener- Neudorf* (1903) ; (Dispensatorium pro phar- macopceis Viennensibus in Austria) (1907) ; (Acta Facultatis medicae universitatis Vindo- bonensis) (Vols., IV, V, VI, 1908-11). He col¬ laborated in (Geschichte der Stadt Wien* (1904) and contributed to various periodicals.*

SENEGAL, sen-e-gal', West Africa, (1) a river which flows into the Atlantic near Saint Louis, the capital of the French colony of Senegal, in lat. 15° 48′ N. It is formed by the union of the Hafing and the Bakhoi, at Ba- fulabe, the former rising in the Futa-Jallon Mountains, southwest of Timbo, and the latter near Wosebugu. From the opposite or western side of the mountain in which the Bafing rises springs also the Faleme, another great branch of the Senegal, which runs north in a more di¬ rect course until it joins the united head streams above Bakel. The Senegal is about 1,000 miles long, and is navigable up to the cataracts of Felou in Kassan, about 700 miles from its mouth. A river service from Saint Louis to Kayes, 460 miles, is maintained during the flood season, and a railway line has been built from Kayes to Bafulabe (82 miles), and is being extended to Bamaku and Tulimandis on the Niger. The delta is marked by numerous marigots or chan¬ nels which disperse its waters through the adjacent plains; and its

mouth is dangerously barred, so as to be accessible only for small vessels in the dry season. Dredging operations are in progress to facilitate navigation. (2) A French colonial possession comprised in the government-general of French West Africa, named after the river and comprising the coastal strip from the British colony of Cambia north to Cape Blanco and extending inland to the French military territories of Niger and Mauretania. By a decree issued in 1899 the colony of Senegal was extended so as to in¬ clude the western part of the former French Sudan territory. The area of Senegal is now about 74,012 square miles. The whole is under a lieutenant-governor, who has direct juris¬ diction in the communes of Saint Louis, the capital, on the coast, Dakar, the chief port, near Cape Verde, Goree and Rufisque. Several other districts are under administrators. The colony is represented in the French Chamber by one deputy. Dakar is fortified, and there is a military force of about 3,000 men, nearly

one-half of them natives. The budget of the directly administered territory in 1916 amounted to $1,280,909, and the local budget, $413,916. All towns having a sufficiently numerous Euro¬ pean or assimilated native population have urban schools, giving the same instruction as the French primary schools, modified to suit local requirements. At Dakar there is a su¬ perior technical school. At Saint Louis are a normal school for the training of native teachers, of interpreters, kaids (native judges) and chiefs' sons. There is a Mussulman su¬ perior school at Saint Louis with 20 pupils, and there is a large hospital for natives at Dakar. Millet, maize and rice are cultivated by the natives ; the natural products include gums, castor-beans, earth-nuts, cocoanuts, rub¬ ber and kola. A salt industry is being de¬ veloped. Cattle, sheep, goats and camels are domesticated, and some weaving, pottery-mak¬ ing and other industries are carried on. In 1913 the imports were valued at over $16,000,000, and the exports, consisting chiefly of earth- nuts, gums and rubber, at over $14,000,000, the trade being chiefly with France, although steam¬ ers ply also to Liverpool and Hamburg. In 1916 751 miles of railway line were open, the chief line being the coast line between Dakar, Ru¬ fisque and Saint Louis. In the same year there were also 1,494 miles of telegraph and 100 miles of telephone line in operation. A sub¬ marine cable connects Dakar with Brest. There is a river service on the Senegal from Saint Louis to Kayes (490 miles). Dakar has regular communication with French ports by the steam¬ ers of four French lines, and also with Liver¬ pool and Hamburg. The French first settled Senegal in 1637. It was taken by the English in 1756, retaken by the French in 1779 and sub¬ sequently held by the English until the peace of 1814. The settlements did not flourish until the appointment of General Faidherbe as gov¬ ernor in 1854. He began a vigorous line of action, subdued the Berber chiefs who pre¬ vented the French advance inland and

annexed their territories. This policy was pursued in the same spirit by subsequent governors ; dis¬ tricts were annexed and protectorates pro¬ claimed with extraordinary rapidity, though the two powerful chiefs Ahmadou and Samory occasioned a great deal of trouble, 1887-90. Pop. 1,282,566. Consult Lasnet et al., (Une mission au Senegal, ethnographique, botanique) (Paris 1900).

SENEGAL-NIGER, Upper, French colony forming part of the government-general of French West Africa. It is bounded on the north by the Algerian sphere ; on the west by the Feleme River and the frontier of French Guinea ; on the south by the frontiers of the Ivory Coast, Gold Coast, Togoland and Da¬ homey, and now includes Fada-N'Gourma and Say, and on the east by the military colony of the Niger. It, therefore, includes the valley of the Upper Senegal, more than two-thirds of the course of the Niger, the whole of the countries enclosed in the great Bend and a large part of the Sahara to the Algerian sphere of in¬ fluence. The area is about 568,273 square miles with a population in 1914 of about 5,778,296 natives and 1,269 Europeans. The colony was formed in 1904 from the territories of Sene-

gambia and the Niger, less the Senegal Pro¬ tectorate, which was restored to Senegal. At the same time the military territories were broken up and became a part of the colony. The first military territory was incorporated in Upper Senegal-Niger, and is administered by a colonel under the authority of the military governor; the second territory was handed over to the civil administration and the third is still an autonomous unit. Upper Senegal-Niger is entirely under civil administration, with the same judicial and educational systems as the other colonies comprised in the government-general. The budget of the colony for 1916 amounted to $1,788,641; the local budget for 1914 was $1,918,981. The most important and populous towns are Bobo-Dioulasso (8,736 in¬ habitants), Bamako, the capital (6,553), Sikesso (7,544), Segou (6,550), Kayes (5,900). All the principal towns have urban schools. There is a professional school at Kayes and a school for sons of chiefs. There is a Mussulman superior school at Timbuktu (5,100 inhabitants), which has 67 pupils. The natives cultivate ground nuts, maize, millet, cotton and rice; rubber and kariti are also produced. The principal native industries are pottery, jewelry, brick and leather-making and weaving. Cot¬ tons, foodstuffs and metal work form the chief items of import, while cattle, ground nuts, hides, wool and rubber are exported. In 1912 there were 4,050 miles of telegraph line and 74 miles of telephone line. The Senegal-Niger Railway extends from Kayes to

Koulikoro, a distance of 349 miles. Small steamboats ply be¬ tween Koulikoro and Timbuktu. In 1914 the imports into Upper Senegal were valued at $1,079,426, and the exports amounted only to $462,164. The Niger (territory) is farther inland than Upper Senegal, therefore, more remote from the seaports through which all West African trade must pass; in consequence the over-seas trade is inconsiderable. The value of the imports into the Niger in 1914 amounted to $193,117, the principal articles, in addition to government purchases, being cotton goods and tobacco; the exports reached $117,656 in the same year and consisted mainly of cattle, hides, ostrich feathers, native salt and tanned sheep and goat skins. Consult Lenfant, (Le Niger> (Paris 1903) ; id., (La grande route du Chad> (ib. 1904).

SENEGAMBIA, sen-e-gam'bi-a, West Af¬ rica, so named from the Senegal and Gambia rivers (qq.v.), an extensive region comprising the countries between lat. 10° and 17P N. ; long. 4° and 17° 30′ W. ; bounded on the north by the Sahara, south by Guinea and west by the At¬ lantic. The area is estimated at from 400,000 to 700,000 square miles, and is almost wholly under French influence, with the exception of Bissagos Island and some coast territory at the mouth of the Rio Grande River, belonging to Portugal, and the British Gambia colony at the mouth of the Gambia. The name Senegam- bia is not used by the French, who call their colony and protectorate Senegal (q.v.). The western portion of the country is a low, flat and, to a great extent, swampy plain. East of this the country is mountainous, and the val¬ leys run north and south. The principal rivers are the Senegal, the Gambia, the Jeba or Rio Grande and the Nunez. In the level tract bor¬

dering the coast the rivers during floods over¬ flow their banks, inundating the plains, and become connected with one another by means of canals. On the lower Senegal, so far as the inundation reaches, vegetation is very luxuriant. Rice, maize and other grains, with bananas, manioc and yams, are cultivated equally on the hills and plains. The orange, citron and other fruits introduced by the Portuguese are now extensively cultivated on the hills. Wild ani¬ mals comprise the elephant, hippopotamus, monkey, antelope, gazelle, lion, panther, leop¬ ard, hyena, jackal, crocodile, etc. The cli¬ mate is intensely hot and unhealthful for Euro¬ peans. The inhabitants are of many races, the principal being the Yolofs, Foolahs and Man- dingoes. These negro tribes inhabit for the most part Middle Senegambia, between the Senegal and the Gambia. Upper Senegambia, to the north of the Senegal, is largely inhabited by Moors, who carry on an extensive trade in gum, etc., with the Europeans. The total popu¬ lation is estimated at 12,000,000.

SENEY, se'ni, George Ingraham, Ameri¬ can banker: b. Astoria, Long

Island, N. Y., 12 May 1826; d. New York, 7 April 1893. He was educated at the Wesleyan University and at the University of the City of New York where he was graduated in 1847. He engaged in the banking business and in 1877-84 was president of the Metropolitan Bank, New York. He lost heavily at the time of the bank's fail¬ ure in 1884, but later succeeded in partially re-establishing himself financially. Before 1884 his benefactions amounted to about $2,000,000. He gave $500,000 to establish the Seney Hos¬ pital in Brooklyn and $500,000 to both the Wesleyan University and the Methodist Orphan Asylum in Brooklyn. He also gave $250,000 to Emory College and the Wesleyan Female Col¬ lege, Macon, Ga., and liberal sums to other public institutions. He sold his famous collec¬ tion of paintings at auction in 1885, receiving $406,910 for them. From a later collection he gave 20 valuable paintings to the Metropolitan Museum of Art, New York.

SENIJEXTEE. See Salishan Indians.

SENILE DISEASES. See Old Age and

Its Diseases.

SENILITY. To obtain a clear conception of senility we must consider old age as con¬ sisting of two periods, the presenile and the senile. Physiologically these periods exist and are divided by a critical period called the senile climacteric which occurs about the 70th year. This period corresponds to puberty during the period of development and the menopause and the male climacteric during the period of ma¬ turity. The senile climacteric, like the male climacteric, usually causes so little distress that it passes unnoticed. Occasionally those around the aged person notice marked changes in men¬ tality, more profound physical changes, greater debility, while some prominent manifestations of senility will appear less pronounced. In some cases the climacteric changes are very evident and the person passes rapidly from a condition of bright middle-aged mental and physical activity into a state of senile decrepi¬ tude.

During the senile climacteric the organs and tissues which have degenerated slowly now

break down rapidly and the degenerative proc¬ esses which have gone on rapidly before be¬ come less active. There is really a readjust¬ ment in the degenerative processes and this is followed by the progressive degeneration of all the organs and tissues and a diminution in their functions.

The toute ensemble of senility is characteris¬ tic. The stature is diminished through the greater curvature of the spinal column, flatten¬ ing of the pelvis, depression of the heads of the femurs and, generally, broken-down arches. A further apparent diminution in stature is oc¬ casioned by the attitude of aged persons. The head sinks down and forward, the knees are bent to maintain equilibrium and there is a general slouching appearance which is partly relieved when a cane is used. The skin be¬ comes pale and thin and, owing to the waste of subcutaneous fat and muscle, it becomes flabby, wrinkled and falls into folds. The teeth fall out, the alveolar process in which the teeth are imbedded wastes and there is a waste of the bone substance of the lower jaw. When the jaws are now closed the lower jaw is drawn further up to meet the upper jaw and the small, weazened face of the aged is pro¬ duced. The eyes become dull and there is generally a gray ring called the arcus senilis around the iris. The nose and ears become thin and pale, the lips become flaccid and darker in hue, the color being a fair indica¬ tion of the extent of the blood impairment. The hair rapidly whitens or falls out but there is often a growth of hair in unusual places as in the ears, nose, chin and on the upper lip of women, etc.

The face is expressionless and it is seldom roused to reflect interest or emotion.

The mental changes in senility are peculiar. In those who have had little intelligence or education there is a gradual diminution in all mental faculties. Memory fails until the event of a moment ago is forgotten, reason and judg¬ ment are lost, interest can be aroused with difficulty and only with greater difficulty can it be maintained; only the most powerful sensory impressions are received, interpreted and get responses. The emotions are dulled, there is neither fear nor hope, joy nor sorrow, and the individual will smile or weep without apparent cause. Usually he is apathetic, gradu¬ ally lapsing into a state of complete amentia in which even the fundamental instinct of self- preservation is lost.

The intelligent, educated person generally retains reason and judgment but the mind is less active and brain fag develops rapidly. Memory is impaired, recollections of early events coming unbidden while later events can¬ not be recalled by any effort of the will. Old persons find it difficult to displace old ideas, habits and hobbies by new ones, and they are, therefore, called old-fashioned. Imagination sometimes develops delusions, such delusions always possessing the element of self-aggran¬ dizement. It is difficult to arouse interest or maintain attention. Under some extraordinary stimulus mental acuity will be revived but this lasts only a short time and is followed by mental exhaustion. Weak sensations are not received owing to the impairment of the sen¬ sory organs but the mind correctly interprets sensations that it does receive. The emotions

are dulled, there is seldom hope or joy, but usually there is a depressed, hopeless resigna¬ tion to the inevitable. Sometimes religious teachings overcome the haunting fear of death, in some cases a materialistic philosophy makes the mind indifferent to death. Usually as the mind becomes weaker the fear of death and all other fears diminish; it is doubtful, however, if there is developed an instinct for death as Metchnikoff assumed;

Some individuals possess remarkable mental powers in old age. A critical study of the mentality of such individuals reveals in almost every case a concentration of mental faculties in one channel or direction while in every other direction there is profound mental impairment. The absent-mindedness and other peculiarities of these aged geniuses are really evidences of mental impairment. In the rare cases where the mental faculties retain their power with little or no impairment, the physical changes are slight and the whole process of senile in¬ volution is apparently retarded.

A remarkable phenomenon in senility is the approximation of the sexes toward a neuter type. The female chest gradually approaches the senile male chest in shape and the male pelvis becomes flattened until it resembles the female pelvis. In the male the hair on the face becomes thin while there is a growth of hair on the face of the female. His voice be¬ comes higher, her voice becomes lower in pitch. The small weazened face and the dull expression give to both a similarity in features. It is a common observation that old couples re¬ semble each other and through long association they exhibit similar mental traits. This phase of senility has not been sufficiently studied. While imagination undoubtedly plays a part in noting this resemblance it is in many cases sufficiently marked to attract attention. Vir- ilescence usually begins soon after the meno¬ pause ; its counterpart in the male is rarely observed before the period of, senility. See Old Age.

I. L. Nascher, M.D.,

Author of (Diseases of Old Age and Their

Treatment ?

SENIOR, se'nyor, Nassau William, Eng¬ lish political economist: b. Compton, 26 Sept. 1790; d. Kensington Gore, London, 4 June 1864. He was graduated from Eton and from Oxford, and in 1819 was called to the bar at Lincoln's Inn. He was the first professor of political economy at Oxford 1825-30 ; was appointed a master in chancery in 1836 and resumed his chair at Oxford in 1847. Of his writings, which comprise a number of excellent treatises on po¬ litical economy, mention may be made of (An Outline of the Science of Political Economy> (1836) ; < Political Economy ˆ (1850) ; (Essays on Fiction) (1864); and historical and Philo¬ sophical Essays > (2 vols., 1865).

SENLAC, sen'lak, or HASTINGS, Battle

of, the one battle in the Norman conquest of England. It was fought 14 Oct. 1066 at Senlac Hill, a few miles from Hastings, between Wil¬ liam, Duke of Normandy, and Harold II (q.v.), king of England. Harold's fortified position was attacked at 9 a.m. by the Norman army in three divisions, strong in cavalry and archers, the centre led by William in person. The Eng¬ lish made a stout resistance with their battle-

axes and other weapons, but part of them pur¬ suing William's flying Bretons, the whole body was led into a trap by the feigned retreat of many of the Norman forces, the disordered ranks of the English being easily overborne by their enemies, who stormed and carried the hill. The death of Harold, who was pierced in the eye by an arrow about sunset, disheart¬ ened his men and they shortly dispersed. Bat¬ tle Abbey was erected by William on the field where Harold fell and portions of it still exist. Among the literary treatments of the event are two poems of Chatterton and a drama by Cum¬ berland. Consult Green, (The Conquest of England> (1899) ; Freeman, (Norman Con¬ quest (Vol. Ill, 1876). See William I.

SENN, Nicholas, American surgeon: b. Buchs, Switzerland, 31 Oct. 1844; d. Chicago, Ill., 2 Jan. 1908. He was brought to this coun¬ try when a boy and settled in Wisconsin. He was educated at the Chicago Medical College and the University of Munich, was house phy¬ sician at the Cook County Hospital 1868-69 and practised medicine in Wisconsin 1869-93, being at

one time surgeon-general of that State. After 1893 he practised in Chicago, where he was attending surgeon of the Presbyterian Hos¬ pital and surgeon-in-chief of the Saint Joseph's Hospital. He was appointed in 1898 chief sur¬ geon of the Sixth army corps, ranking as lieu¬ tenant-colonel of volunteers and chief of staff in the field. From 1884—90 he was professor of surgery at the College of Physicians and Sur¬ geons, Chicago, and after 1890 professor of practical and clinical surgery at the Rush Med¬ ical College. He was also professor of surgery at the Chicago Polyclinic and lecturer on mili¬ tary surgery at Chicago University. Among his works are (Four Months Among the Sur¬ geons of Europe) ; Experimental Surgery) (1889) ; 'Surgical Bacteriology > (1889) ; Prin¬ ciples of Surgery) ; 'Tuberculosis of Bones and Joints) ; 'Medico-Surgical Aspects of the Span-ish-American War} ; and a 'Nurse's Guide for the Operating Room (1903).*

SENNA, Nelson Coelho de, Brazilian law¬ yer and author: b. Serro, Minas Geraes, 11 Oct. 1876. He was educated at the Normal School at Diamantina, Historical Institute at Rio de Janeiro, Sao Paulo, Nichtheroy and Ceara, and the Academy of Juridical Sciences, Ouro Preto. He has been successively secretary of the police and agriculture departments of his native state, professor of Brazilian and history at Mineiro Gymnasium, Bello Horizonte, and vice-presi¬ dent of the council of public instruction of Minas Geraes. He served in the first, second and third Latin-American scientific congresses. He is member of many learned societies both of South America and of Europe. His pub¬ lished works are 'Quest5es internacionaes do BraziP ; 'A Edade da Pedra do BraziP ; 'Elogio literario de Jose Elov Ottoni, poeta sacro brasiliero) ; (A Hulha Branca> ; 'Los Indios del BraziP ; 'Contes Sertanejos) ; 'Paginas de historia religiosa do BraziP ; 'Discursos Acad- emicos) ; 'A Bacia do Rio DoceC etc. He edited Annuario Historic o e Estatistico do Estado de Minas Geraes after 1906.

SENNA, a nauseous, bitter but valuable purgative drug, obtained from the leaves of several tropical species of the leguminous genus Cassia (q.v.). The officinal species are shrubby

plants, with nearly regular, five-parted flowers in racemes and alternate, pinnate leaves sub¬ divided into many leaflets. Alexandrian senna is formed of the leaflets of Cassia acutifolia, which are dried by cutting the shrubs until the leaflets shrivel and tumble off. C. angustifolia grows in and about Arabia, where it was used in domestic practice by the Arabs, who were apparently the first to introduce the drug to Europe. It is called Indian senna, as it is cultivated in South India. Bombay senna is a very inferior quality of this variety, much mixed with stalks and dead leaves; the variety Tin- nevelly, on the contrary, is the largest and clean¬ est senna in commerce. C. obovata, formerly of good repute, producing senna-pods and

culti¬ vated in India, is now classed among the infe¬ rior qualities and rarely met with except as an adulterant. Still other sennas are known under the name of the port of export, or place of growth. American or wild senna is the Cassia rnarylandica, a perennial abundant in the south¬ ern United States, sometimes eight feet high, with obtuse, oblong leaflets, numerous yellow flowers, with clawed petals and long linear pods. It has the qualities of Oriental senna in a lesser degree and was formerly used for the same purposes in popular medicine. Bladder senna is the Cohit ea arbor escens and is also a purgative sometimes called bastard senna'.

SENNAAR, sa-nar', Anglo-Egyptian Sudan, a province extending between the Blue and . the White Nile, from Khartum to Fazogl. It covers an area of 40,000 square miles. Gener¬ ally speaking, it is a broad plain with occasional granite mountain heights and is at the north steppes thickly overgrown by wild grass and bushes; the southeast has tall forests intersected by fertile valleys. Gold and iron occur, and palms, tamarinds, etc., grow on the plain. Monkeys, lions, gazelles, giraffes, elephants, be¬ sides marsh and water-birds, are numerous ; also domestic animals. The chief occupation is fishing. The products are rice, grain, melons, tobacco, sugar, senna, ebony and sandal-wood. The climate is exceedingly warm and during the rainy season is unhealth ful. The inhabitants are negroes — the Funj, Nubian and Galla, and of mixed races, and are sometimes classified according to color. Slaves are imported. Sen- naar (pop. 18,000), the former capital, stands on the Bahrel-Azrik or Blue Nile. The other towns are Fazogl (or Famaka), Roseres, Wod- Medineh and Khartum. Near the latter town are the extensive, ruins of Soda, the ancient capital of the Funj, a negro race, who migrated there from Central Africa in 1500 and founded the Senaar kingdom, which lasted until 1821.

SENNACHERIB, se-nak'e-rib, an Assyrian king, son of Sargon, succeeded his father on the throne 705 b.c. Among his first acts as king was the suppression of the revolt of Babvlonia and after accomplishing this he directed his arms against the Aramean tribes on the Tigris and Euphrates, of whom he took 200,000 cap¬ tive. He then reduced a portion of Media, till then independent; placed under tribute Tyre, Aradus and other Phoenician cities; advanced against Philistia, made war upon Egypt and finally marched against Hezekiah, king of Judah, who had revolted. Hezekiah, terrified, yielded in a panic, and paid the tribute exacted, namely, 300 talents of silver and 30 talents of

gold On his return to Assyria Sennacherib made another attack on

Babylonia and after¬ ward reinvaded Judah. Having marched through Palestine he laid siege to Libnah and Lachish and finding that his messengers Tartan, Rabsaris and Rabshakeh had failed in obtaining the submission of Hezekiah, he wrote an in¬ timidating letter to Hezekiah ; but before he could bring his forces against the city, accord¬ ing to the Bible record, a visitation from the Lord during the night caused the death of 185,- 000 of his troops. In consequence of this calamity Sennacherib returned to Nineveh and troubled Judah no more. From Herodotus we learn of the Egyptian tradition regarding the destruction of Sennacherib's host, which is, that a multitude of field mice devoured all the quivers and bowstrings of the enemy and gnawed the thongs by which they bound on their shields. No mention of the destruction of his host is found in the monuments of Sen¬ nacherib. This ruler was one of the greatest of the Assyrian kings and was not only a great warrior but also a great builder. His largest architectural work was the palace of Koyunjik, which covered an area of fully eight acres. Of the death of Sennacherib all that is known is contained in the brief Scripture statement of 2 Kings xix, 37 and Isa. xxxvii, 38, from which it appears he was murdered by his own sons. See Assyria ; Assyriology ; Babylonia.

Bibliography. — Johns, C. W. H., 'History of Assyria (London 1911) ; King, L. W., 'Sennacherib and the Ionians) in Journal of Hellenic Studies, Vol. XXX (London 1910) ; Olmstead, A. T., 'Western Asia in the Reign of Sennacherib* in American Historical Associa¬ tion, Annual Report (Washington 1911); Rogers, R. W., 'History of Babylonia and As- syria) (New York 1900) ; id., 'Cuneiform Parallels to the Old Testament (New York 1912) ; Schrader, E., 'The Cuneiform Inscrip¬ tions and the Old Testamentˆ (I, 278-310) ; Smith, G., 'The History of Sennacherib> (Lon¬ don 1878) ; Tiele, 'Babylonisch-Assyrische Geschichte) (Gotha 1885).*

SENORA AMA, drama in three acts by Jacinto Benavente, was acted at Madrid 22 Feb. 1908. The story is one of peasant life on the plains of High Castile, a presentation of contemporary rural Spain as brilliant in color, but sordid and dead within, palsied with the degeneracy of a decaying civilization, from which all impetus and inspiration have dis¬ appeared, and merely husks of Church and State remain. Few dramas are of equal pessimistic power. As a veracious psychologic study, the play is of great value, depicting the sterility of the retarded country-side which is sunk in jealousies, sensuality and greed, where only the maternal instinct breathes unstunted amid the insentient fields. The minutest details are of unimpeachable realistic veracity. The author avoids any semblance of generalization. Yet in the absence of physical descriptions, the aspect of the Castilian plain and sierra is projected from the austere mentality of the peasantry with a rudeness of coloring and distinctness of outline which the Spanish painters have not surpassed. The sense of the motionless back¬

ground provided by centuries of Spanish civil¬ ization is conveyed with the same economy of means. Upon the technical side the play is one for the artist. In illuminative insight and

potency of imaginative suggestion, although a work 6f pure realism, it rivals in completeness the universality of idealistic art. There is the customary lack of coups de theatre, reinforced by a contemptuous disregard of the conventional conceptions of the stage. The first edition ap¬ peared at Madrid, 1908. Consult also Bena¬ vente, 'Teatro (Vol. XVII, Madrid 1909). The English translation is included in the third series of the 'Plays by Jacinto Benavente* (New York 1917 et seq.).*

John Garrett Underhill.

SENS, France, archiepiscopal city and capi¬ tal of an arrondissement in the department of Yonne, situated on the right bank of the Yonne River, 70 miles southeast of Paris. The city contains the cathedral of Saint Etienne dating from the 12th century and a fine city hall, which contains also a museum of precious stones, a library and an art gallery. Manu¬ factures consist chiefly of fertilizers, farm implements, leather, glue, serge, etc., and there is considerable trade in wine, corn, hemp and flax. Sens was known in ancient times as Agenticum and later as Senones and was one of the largest cities of Gaul, vestiges of the old Roman walls still being visible. Pop. about

15,000.

SENSATION. This term is used broadly to designate any form of consciousness which originates immediately from the stimulation of the sensory end-organs of the nervous system (e.g., the eye or ear). This usage fails, how¬ ever, to distinguish between sensation and sense perception. In the narrower psychological meaning sensation applies to the elementary forms of consciousness originating under the conditions mentioned. Sensations are in this technical sense cognizant of simple sensuous data, such as colors, tones, etc., whereas per¬ ceptions are cognizant of objects. For example, we perceive a sunset, a complex visual object displaying various color qualities, e.g., white¬ ness, redness, etc., of which we become con¬ scious as sensations. These sensations are re¬ garded as simple and incapable of further analysis. We perceive a musical sound when a note is struck upon the piano. This sound is made up of a simple fundamental tone and its overtones. Our consciousness of one of these simple pure tones is a sensation. On these terms sensation is evidently largely an abstrac¬ tion of the psychologist. Our actual sensory consciousness is commonly cognizant of ob¬ jects, i.e., is perceptual.

Certain authors extend the meaning of sensa¬ tion so as to include not only all elementary sense qualities arising directly from sensory stimuli, but also all such qualities when aroused in processes of imagination, as when, for in¬ stance, one closes the eyes and gets a visual image of a rose. They speak, therefore, of peripherally and centrally originated sensations. In so far as this usage calls attention to the fact that the sensory and ideational elements are qualitatively alike, whether called out by central or peripheral stimulation, it is justifiable. But well-established custom is violated by the proce¬ dure and it may be questioned whether it will endure.

The commonly recognized groups of sensa¬ tions are as follows : color, including bright¬ ness, sound, taste, smell, pressure, heat, cold,

pain, articular, tendinous, muscular, thirst, hun¬ ger, sex, circulatory (including tickling, itch¬ ing. etc.), respiratory and static (dizziness sen¬ sations from the semi-circular canals of the ear).

Psychologists are wont to treat sensation under four principal aspects, i.e., quality, dura¬ tion, intensity and extensity. . Of these four quality is generally considered most basal. A sensation of tone, for example, may vary in duration without appreciable alteration of the pitch, which constitutes its most essential qual¬ ity. Again, a color sensation may under certain conditions vary in extent without noticeable variation of quality. But a sensation which had no duration or no intensity would obviously be no sensation at all, and in general, if any aspect which a given sensation can manifest be reduced to zero, the whole sensation vanishes. Certain psychologists maintain that every sensation pos¬ sesses all these aspects, but probably the ma¬ jority hold that auditory sensations at least, and perhaps a few others, like smell, are lacking in extensity. Certain interesting facts concerning the relations of sensation intensities to one an¬ other are formulated in Weber's and Fechner's laws. (See Weber's Law). According to Weber equal differences in sensation intensity are produced by relatively equal differences in stimulus intensity. If we place a weight of 20 grams upon the hand, we shall notice no change until we have added another whole gram, i.e., of the original stimulus. If we take a weight of 100 grams, we must now add not one gram but of 100 grams or 5 grams, before we notice a change. The same sort of relation holds for a number of the senses within the medium ranges of intensity.

Sensations depend upon the stimulation of specific end-organs connected with specific brain centres. No one ever gets visual experiences who does

not possess an optical centre in the cerebral cortex and who has not at some time possessed a functioning retina. No one ever gets auditory experience without a similar use of the ear and the auditory cortex and the same sort of thing is true for each of the sensations.

The stimuli which produce sensation are classified as adequate and inadequate, internal and external, mechanical and chemical. The only pair which requires any explanation is the first. Each sense organ is fitted to respond primarily to some special form of physical stimulus, e.g., the eye to light, the ear to sound, etc. Such stimuli are called adequate. In ad¬ dition to these adequate stimuli, however, the senses can be aroused by other forms of stimu¬ lation designated inadequate. Thus an electric current conducted to the frontal region of the head may produce sensations of light. Pressure on the eyeballs similarly occasions color sensa¬ tions. It may be added that sensations often continue after the stimulus is removed. Such sensations are known as after-sensations. In the case of vision they present very remarkable characteristics and are commonly called after¬ images.

Sensations combined in various ways and re¬ instated in the form of memory and imagination furnish the basis of all our ideas. They are ac¬ cordingly the foundations upon which rests the whole structure of knowledge. To understand their function in this particular it must be borne in mind that in actual experience they are not

mere naked qualities, but that they serve to con¬ vey meanings and that it is in this manner that they achieve fundamental import for mental life.

Bibliography. — James, Principles of Psy¬ chology > (New York 1890) ; Kiilpe, (Outlines of Psychology (1895); Bain, Senses and In¬ tellect (London 1855). For special senses see literature of special articles, Vision ; Organic Sensations, etc.*

James Rowland Angell, President of Yale University, New Haven, Conn.

SENSATION, Organic. The term organic sensation is nowadays applied broadly to all those sensations which originate from internal bodily stimulations. They are called forth by mechanical, chemical and thermal changes in the organism. Among the sensations which are commonly held to belong to this group may be mentioned pain, pressure and temperature from the interior of the organism ; sensations from the muscles, tendons and joints; sensations from the alimentary canal ; sensations from the cir¬ culatory, respiratory and sexual organs ; and finally sensations which are supposed to origi¬ nate from the semi-circular canals of the inter¬ nal ear. These sensations are sometimes distin¬ guished from the other forms of sensation like vision and hearing on the ground that they con¬ vey to us

primarily a knowledge of the state of our own organism rather than knowledge about the external world. This distinction is, how¬ ever, only roughly accurate.

The sensation qualities which originate from these senses can be described only with ap¬ proximate accuracy, for psychological analysis has not succeeded as yet in unraveling all their complexities. Pain, pressure and temperature are familiar experiences requiring no descrip¬ tion. From the muscles we obtain sensations which suggest dull pressure, becoming under conditions of fatigue somewhat unpleasant and in condition of cramp leading to distinct pain. From the tendons we obtain sensations which inform us of the movement of our limbs and particularly sensations of strain and resistance. It is generally held that from the joints we receive important sensations which also inform us of the movements of our limbs and in partic¬ ular make us aware of their position. Certain authorities have called in question — both on anatomical and psychological grounds — the significance of the articular sensations. These sensations from muscles, tendons and joints commonlv occur together and are sometimes spoken of in a group as the (

although, with the exception of the sexual or¬ gans, it is difficult to say whether they produce any real sensations apart from those already mentioned. The respiratory, circulatory, ali¬ mentary and sexual sensations are sometimes spoken of as the ((vital sensations.ˆ

The semi-circular canals together with the vestibular portion of the internal ear are com¬ monly regarded as responsible for our impres¬ sions of the movement of the body as a whole; but it seems certain that under ordinary condi¬ tions other senses contribute to these impres¬ sions and only in the case of dizziness is it at all clear that the sensations themselves are dif¬ ferent from those hitherto mentioned. It is in any case reasonably certain that these organs constitute part of a reflex system by means of which the body equilibrium is maintained.

The term common sensation, or sometimes common feeling, has been applied more or less indefinitely to this whole organic group of sen¬ sations with special reference to the fact that our general feelings of vigor, health, discomfort, depression and so on depend upon them. When these terms are used at present they are more commonly applied to sensations like pressure and pain, which are conceived as widely dis¬ tributed over the body and therefore as more or less common to the impressions gained from various

sense organs.

Organic sensations are undoubtedly depend¬ ent like other sensations on the stimulations of sensory end-organs connected with centrip¬ etal neural pathways leading to the brain. These end-organs instead of being placed upon the surface of the body, like those of the more familiar senses, are imbedded in the various deep-lying tissues of the organism. A marked peculiarity of many of these sensations is their tendency to set up massive, widespread irradi¬ ating effects often quite remote from the seat of stimulation. This is probably brought about by means of the intimate connections of many of these organic sensory nerves with the sympa¬ thetic nervous system. This is less true of the kinsesthetic sensations and certain forms of pre- sure than of the remaining members of the group. Pain affords many striking instances.

The organic sensations play an extremely important part in the phenomena of feeling and emotion. In such emotions, for example, as fear and anger it is clear that a large .part of the content of our feeling is made up by sensa¬ tions of this character, e.g., sensations of tin¬ gling or flushing which come from circulatory changes in the skin, painful sensations. from the region of the heart, sensations of choking which come from the respiratory passages, sensations of trembling which come from the motor mechanisms, and so on. The James-Lange theory of emotion makes the reflex stimulation of these organic sensations the cardinal fact in emotion whereby it is distinguished from other forms of consciousness.

These sensations are also held to possess distinct significance for the processes of memory and recognition. It is thus maintained by cer¬ tain authorities that the characteristic psycho¬ logical process when we recognize a familiar object is found in the arousal of certain of these organic sensations which are called forth by familiar objects, whereas a different set of organic qualities is aroused by unfamiliar ob¬ jects. It seems fairly certain in any event that

the process of recognition is characterized by the presence of a definite mood and the specific qualities of our various moods are by general consent of psychologists determined by the presence of definite organic sensations.

Ribot and others urge furthermore the existence of <(affective memory.® By this they mean that in addition to our ability to recall ideas and in addition to our ability to remember whether any given past experience was agree¬ able or disagreeable, we possess the capacity actually to reinstate in some measure the origi¬ nal affective coloring of a past experience. This is brought about, they maintain, either by our capacity freshly to arouse the

organic sensations which originally belonged to the experience, or by our ability to arouse the images or mental copies of these sensations. Certain psycholo¬ gists deny the existence of these images. With¬ out attempting a discussion of the merits of this doctrine it is safe to say that individuals vary vastly in the degree to which they actually possess this capacity of fresh arousal of either the organic images or sensations characterizing a former experience.

Aside from the particulars already men¬ tioned organic sensations possess small value for the cognitive side of mental life. They bring us relatively little exact knowledge and in conditions of health come only infrequently to clear consciousness. On the other hand they are ordinarily marked with distinct feeling-tone, are definitely agreeable or disagreeable. Under conditions of health they seem to afford the basis of our feeling of well-being, a feeling which is sometimes vivid but usually dim and vague. They are very disagreeable and painful when the bodily processes are overtaxed or disturbed in any way and it is in connection with such experiences that we most often find them coming distinctly into the foreground of the mind. The discomfort of indigestion, ex¬ treme fatigue and headache will illustrate the point.

Although their value for our knowledge processes is small, their significance for the life of impulse and volition is tremendous. The two great impulses represented by hunger and sex may suffice to illustrate this side of the subject. All our processes of will and the whole sub¬ structure of character are honeycombed with influences which originate in these impulses, and the impulses themselves are but the motor ex¬ pressions of stimulations from organic sensa¬ tions.

Bibliography. — Beaunis, (Les sensations in- ternes) (Paris 1899) ; Titchener, (Text-book of Psychology (New York 1911); Ebbinghaus, (Grundzuge der Psychology (Leipzig 1897— 1902) ; Stout, (Manual of Psychology > (London 1898-99) ; Bain, (Senses and Intellect (Lon¬ don 1855).

James Rowland Angell, President of Yale University, New Haven, Conn.

SENSATIONALISM, in philosophy the doctrine that our ideas .originate solely in sensation and consist of sensations transformed Locke has been classed with Condillac and other philosophers of the 18th century as hold¬ ing the doctrine of sensationalism ; but Locke teaches that ((all human thoughts, even the most complex and abstract, are due to ex- perience)) : they are all made up of <(simple

ideas,® and are due to phenomena of which we are percipient in the five senses, or else they are due to reflection on ((the operations of the mind.® Condillac most distinctly refers all ideas to sensation. He supposes a statue organized within like a man, but as yet without sensibility. He endows this statue with one sense after an¬ other till it becomes perfectly a human being, and holds that it then would possess exactly the same ideas as ourselves, though in its first state it had no ideas.

SENSE-ORGANS. See Anatomy, Com¬ parative.

SENSES, in psycho-physics, anatomy, phys¬ iological-psychology and in philosophy, special¬ ized nervous apparatus and the psychological process by the stimulation of which (or its equivalent) qualitatively distinct sensations are produced. Sense is equivalent to the Latin word ((sensus,®* the Italian (

The use of ((sense® as equivalent to <(con- sciousness,® as in the phrases <(time-sense,® ((sense of responsibility,® and in (sense of the heart* (the so-called occult sense of the mystic, Jonathan Edwards, who claimed by it one might know spiritual worth, truth, etc., by a kind of intuition), is confusing and inaccurate. (Con¬ sult Baldwin, dictionary*). States of con¬ sciousness are nothing but the states of aware¬ ness or feelings connected with not only sensa¬ tion, but also with perceptions, ideas and voli¬ tions. These states constitute the entire ((sub- ject.® Memory and imagination are at times de¬ fined as senses — 1 internal senses ; but this dis¬ tinction is psychologically of no particular im¬ portance. Sensation (in German <(Empfindung,® in French ((sensation,® and in Italian <(sensa- zione®), is a word confined by definition to those sense-impressions fully realized in con¬ sciousness, and this definition excludes the

- One may recall that the Latin names of the five senses, with the word “ sensus ” itself, are all of the fourth declension in that tongue, and are thus nouns having one form only to express both numbers. Awkward as is any form of these Latin words in English, students have come to it, and speak of “ sensuses,” and even of “ visuses,” “ sensus,” “ visus,” ” auditus,” “ gustus,” “olfactus,” and “ tactus,” whether employed as Latin or as English words, are, however, all nouns which reveal number only in the accidence of words with which they are grammatically connected. See the pro¬ test of H. Id. Wilder, “ Desmognathus Huscus [sic] ”, in Science (19 April 1918, New York); and the Reply of Pro¬ fessor Wilder by T. L, Casey in the same journal (21 June

1918),

cerebral process of image-reproduction, etc,, which is normally aroused in the absence of stimulation. It is at all times a very great ad- vantage in thinking to recall that the terms ((sense,® <(sensation,® and even ((matter® are, after all, at best concepts arrived at through a process of abstraction. For even so great a psycho-physicist as Ernst Mach (to cite one example) used <(sensation® as synonymous with <(reality® itself. Man generalizes, he marks and describes those features which a set of events has in common; but while generalizations are symbolized by mere words they deal with the events which are aglow with life or action. (*

Organism developed from protoplasm whose potentialities are four in number; and an organ¬ ism whose histologic units are four would seem to have also four psychic facultative mani¬ festations. Irritability, contractibility, metabol¬ ism and reproduction in the cell correspond to epithelium, muscle, connective tissue and ner¬ vous tissue in higher animal forms. In the mind, they become sense, will, understanding and ideation. Epithelium has its analogon in ((sense,® and ideation, its parallel in <(tissue formation,® or ˆreproduction.®

Professor Ernst Haeckel in one truly pro¬ found lecture, beautifully explains how each animal cell, and even each plant cell, is en¬ dowed with a peculiar kind of <(soul-life® of its own. In higher animal forms, he tells us, there are formed through division of work special (

To Demosthenes, the eloquent orator of classic antiquity, is ascribed the statement that all the senses are modifications of the sense of touch. Sentiency is always an awareness of objects in external material existence. So too is it with the senses. Kant dis¬ tinguishes two sources of knowledge — sensa¬ tion and pure reason. Sensations are in¬ cidental and particular; come to us singly in a haphazard way and without affording any information concerning a necessary con¬ nection. The character of pure reason alone is the intrinsic necessity and universality of its statements. The sequence in which the spe¬ cialized apparatus of each sense appeared in the evolutionary process is unknown. Touch, taste, sight, hearing and smell are at times said to represent that sequence. The senses originated through irritation received at the periphery of

an organism. Taste is most highly differentiated in man. Sight is perhaps keenest in birds and bees. Hearing is the strongest faculty of the hare. Smell

is the peculiar faculty of the blood¬ hound and of the ant. Touch attains a high degree of perfection in the trunk of the elephant. The bee is sometimes said to pos¬ sess a peculiar faculty, an ((hygrometric sense,® as it is named. This quality or power of the bee is attributed to the little animal owing to an inference based on its undeniable power to ((detect® and avoid a coming storm. It is just possible, however, that the bee employs sight rather than an hygrometric sense to detect the approach of storms, and to avoid them.

Through experience, a nerve, the optic nerve, became adapted to waves of ether. There irritations are transferred to the optic ganglions, and there possibly the disturbance is accom¬ panied by the awareness called light. So also a nerve, the auditory nerve, became adapted to air waves. The irritations effected by these waves are transferred to the auditory ganglion, where possibly the disturbance is accompanied by the feeling known as sound. All other nerv¬ ous cells of specialized sense, whether olfactory (or of smell), gustatory (of taste), or tactile (of touch), arose in evolution and function in a way similar to the senses of sight and hearing. Along the whole line of nervous fibres, from the point where sense-impressions enter to the place where muscular contraction such as usually follows the transmission of a shock from sensory to motor nerves, there is, physiologically, one uninterrupted chain of nerve motion. Yet the feeling or consciousness which accompanies a sensation is no motion.

One does not exhaust the number of sensa¬ tions, however, if indeed one does the number of the specialized senses, in any mere enumera¬ tion of the sense-organs. These latter are the eyes, ears, nose, tongue and skin. In addition to the sensations of vision, hearing, smelling, tasting and touching (all of which Aristotle enumerated long ago), are to be mentioned, if only for greater completeness, pressure, temper¬ ature, pleasure, pain, muscular sensations, sen¬ sations in the ears, and sensation from the inner contents of the body. Pain and pleasure (see Irradiation), muscle sense, sensations from the semi-circular canals and vestibules of the ear, hunger, thirst, sexual-sense, fatigue, and sensations from the visceral organs — are internal, or organic sensations. Suffocation, in¬ ternal warmth and chilliness are others of the same class. In all one perceives the characters of ordinary sensation, the sense-process or psychic function involved in the apprehension of anything by the senses.

As belonging to the outer world one speaks of sensations and their complexes aris¬ ing in our own body as organic sensations, be¬ cause we locate them in our own body. Ex¬ amples are sensation of fatigue of our muscles, and the pressure and pain sensation of our inner organs. The relatively uniform elements of touch and organic sensations are distributed among sensations of pressure, warmth, cold and pain. In contradistinction

to these, the special senses of hearing, seeing, smelling and tasting present an abundance of sensations, each of which according to its peculiar constitution is called a quality of sensation. Each such qual¬

ity is variable in its intensity. Qualities of sensations all refer to the objective world. Our own body, to which touch and organic sensations relate, forms in contradistinction to our consciousness (the subjective reality, our real selves) a part of the outer world; — near¬ est to us indeed, but still a mere part of the objective or external world. Subjective exist¬ ence is constituted of those feelings or states of consciousness whose activity is no motion. Objective existence is represented by things whose activities are motions. Man has ab¬ stracted from a group of sense-perceptions an idea of his <(body.® The group of facts so collectively designated as (

Sensations, while they are psycho-physical processes normally due to actual stimulation, can occur without any stimulation being pres¬ ent. Delirium and the manifold examples of what are wrongly called sense-illusions are cases in point. Audition colaree, which seems to associate sound with color, is an example of excessive associative power, a result of insuffi¬ cient balance of associative capacity, whereby the less near is approached because of the loss of what commonly should have been associated. When an adult professes to perceive a color, for example, every time he hears a letter of the alphabet named, it is hypothetically safe to say that were an investigation undertaken, it might disclose that the colors which such an adult professes to ((hear® are the very colors in which the letters were printed on the blocks from which as a child such an adult learned his letters. There is no recorded instance worthy of credit of what has been styled ((sense-trans- ference,® either concerning people in the som¬ nambulistic state (as has been claimed) or out of it. No person ever read, tasted, heard by the fingers, or the .stomach or any parts of the body other than through those organs by which reading, tasting, hearing, as functions of the sense organs, are naturally performed. Those <(higher® phenomena of clairvoyance prevision, retrovision, introvision and telepathy do not (in the ordinary sense of these words) exist at all. Mysticism of this sort colors the thought of only those people who in regard to some matters ((spiritual® have strong convictions based on no evidence. The recollection of a sensation is nearly the same (but not the same) as an original sensation. For were it a sen¬ sation with a present stimulus then one might actually freeze to death through frigid imagi¬ nation. Such recollection resembles the origi¬ nal sensation only (as being like it) a psychic event. By means of our senses we secure mental impressions through certain organs, — sensory or sense-organs, — concerning the world of objects, including impressions concerning changes in the condition of our bodies : and nothing more. There is a telepathy, or <(far- feeling,® however, which does not

stand in miraculous contradiction to the mechanical in¬ terconnection of cause and effect in the external world. In and through our eyes most distant stars are seen. Only in this sense has telepathy any claim to recognition by scientific psychol¬ ogy. Yet the feeling feature of sensations is

purely subjective. Things are mirrored in our eyes ; sounds are heard with our ears ; and abstract notions are formed mentally to repre¬ sent them. It would of course be very absurd to expect that the things represented in a sen¬ suous-manifold should migrate bodily into our heads ; and yet it would be equally as absurd as some far feeling telepathists profess to be¬ lieve, that things or objects in the external world could be felt without the normal use of the sensory organs.

Though no animal has specialized more senses than five, many are much more spar¬ ingly endowed. Of very great importance as regards our enjoyments and our sufferings all knowledge besides has its roots in sensation. <(All our knowledge,® observed Gassendi long ago to Descartes, ((appears plainly to derive its origin from the senses, and though you deny the maxim (Quicquid est in intellectu processe debere in sensu, yet this maxim appears never¬ theless to be true ; since our knowledge is all ultimately obtained by an influx or incussion from things external; which knowledge after¬ ward undergoes various modifications by means of analogy, comparison, division, amplification, extenuation and other similar processes which it is unnecessary to enumerate.® (Gassendi, in (Objectiones in Meditationem SecundanP).*

Hallucination is a misinterpretation of sensa¬ tions. The feelings are real enough in such cases ; but the representations concerning what are supposed to evoke these feelings are not valid. Sensations become precepts, many pre¬ cepts of one kind become concepts. From these concepts by the help of the reason abstractions are drawn. Thus all the objects of our sur¬ roundings are mirrored in their relation toward us and among themselves in the living sub¬ stance of the brain.

Bergson attributes to intutition a peculiar power. (Consult (Creative Evolution, Eng¬ lish trans. 1913). That there is something unique and new at every moment may be granted. That it is also true that that this can¬ not be fully expressed by means of intellectual concepts may be also granted. Only direct knowledge can acquaint us with what is unique and new. But direct acquaintance of this kind is given fully in sensation and*

does not (as Bergson contends) require any special mystical faculty of intuition, for its apprehension. It is neither intellect nor intuition (in the Berg- sonian sense), but sensation that supplies new data. Bergson makes much of evolution. It must be pointed out that it is only through the intellect that evolution can be known. If the intellect is misleading the whole of man's bio¬ logical ancestry which we know through the intellect is presumably an erroneous inference. Bergson's advocacy of intuition as against in¬ tellect is thus a self-stultification.

Kant distinguishes two sources of knowl¬ edge — sensation and pure reason. Yet the ulti¬ mate data of experience and the bases of all knowledge are sensations. These data of ex¬ perience are the several states of consciousness, the elements of which are the sensory impres¬ sions, which fully realized in consciousness are sensations. Experimenting with the purely formal is indeed a kind of experience, and may be distinguished as inner experience, just because it is not merely a subjective process, but ideal. Objectively and scientifically the ex¬

ternal objects of one's sensations are those sen¬ sations measured in terms of what we suppose to be their causes. We no longer feel, owing to long practice of projection, our sensations as states of consciousness, but conceive of an independent reality as given immediately. But sensation is nevertheless only the psychical fea¬ ture of the data of experience, and in the idea of a sensation, the material and physical stimu¬ lus is excluded. All one's sensations are in one's self, not in their cause. We are conscious primarily of our self-sensing and of our feel¬ ings; and not with the objective world. What man knows of his environment is all pure de¬ duction from his own conscious states, particu¬ larly deductions from the feelings attending sensations. All these deductions serve no other purpose than that of the explanation of these sensations in terms of what we affirm to be their causes. Into that side of human con¬ sciousness in which reasoned reflection has no part, the vast contexture of material existence finds entrance in terms of sound, color, taste, cold, heat, resistance, weight, hardness, shape, situation and motion. Whatever one can know of one's environment results when recourse has been taken by one to causation, a concept yielded by pure reason, which causality having been projected into the external world, renders an explanation of sensations possible. Boyle long ago observed that whenever one speaks of experience correcting reason, one speaks improprly; for, he observes, it is reason itself that corrects reason with information supplied by experience. Here it should be noted that man knows many natural phenomena not di¬ rectly observable through the senses ; for ex¬ ample, the chemical constitution of the stars.

The psychological characters of sensation considered without reference to the conditions of its production are hearing, vision, smelling, tasting and

touching. All these (we infer) are the effects of external causes or facts. They are so many subjective methods of representing certain processes of the objective world.

Even sensations are a kind of abstractions. By abstractions are meant a singling out, and isolating, a separation of sense impressions, so that they can be held for thought. Our eyes, for example, abstracts certain ether vibrations called light and transforms them into vision. The ears abstract only certain air vibrations and we transform them into sounds. The mus¬ cular sense abstracts resistance and we trans¬ form this into an idea of corporeality. The skin abstracts temperatures yielding elements for our notions of heat and cold. So is it with all other sensations. They abstract certain fea¬ tures of reality, or facts, and impress us.

There is a firmly rooted muscular sense of rest, uneasiness and of exertion. Various muscular efforts occurring in the head and face have become associated with definite emotions. The labial nasal, and ocular external coverings are muscles of expression. Certainly the vocal muscles give the same kind of an expression, not visible but audible. (Consult T. H. Evans, on (Some Curious Psychosensory Relation¬ ships^.

There are no such things as illusions of sense. What is illusory is only an inference to which the feeling elements give rise in sen¬ sation. The sensation and its feeling are real psychic events; and it is indeed only by some

reality not merely sensible that even dreams can be condemned. What is illusory is mani¬ fest only in misinterpretation of certain experi¬ ences.

Vision, hearing, taste, smell and touch de¬ pend upon certain stimulations from without ; — mechanical (touch), molecular (taste and smell), physical (sight and hearing), and mus¬ cular (muscular sensation). At times the re¬ quired stimulation may be effected within the nervous system. The cerebral processes by which vision (for example) is produced may not only be started in the brain itself, but when so started may result in those identical interpre¬ tations which normally accompany the proc¬ ess when set at work by stimuli from the ex¬ ternal world.

According to Roamnes there is a constant ratio between the amount of agitation produced in a sensory nerve and the intensity of the corresponding sensation. Weber states that if sensations are to increase in intensity by equal amounts the stimulus must increase by rela¬ tively equal

amounts. His law is that the per¬ ceptible increment of sensation is proportional to the quantity of irritation. More precisely: In most cases the quantity of sensation is pro¬ portional to the logarithm of the quantity of irritation. Further researches in this direction were undertaken by Fechner, Volkman and Appel ; and to their works the students of the subject may be recommended. It is entirely true that we do not experience sensation in the sense-organs. We feel the state of our nerves. The brain itself is the seat of all sen¬ sation.

Taste, smell, sight and hearing are operative because of special organs connected by special nerves with the brain. As to touch, while there are special organs, it is an unsettled question whether tactile sensations are conveyed by spe¬ cial nerves or by the ordinary sensory nerves of the skin. The organs of sense depend upon the alertness of the brain for efficiency. It is in fact the brain that sees, hears, etc. As sight, hearing and touch seem to be most concerned with the wants of the intellect, they are some¬ times spoken of as the intellectual senses; while taste and smell, being intimately connected with nutrition, are known as the corporeal senses.

Cultivation of the senses, especially if begun in early life, will develop their usefulness. It produces the accurate hearing of the musician, the keen eyesight of the pilot, engineer and expert microscopist, and the accurate touch of the blind. But training may be carried to such an extent as to make these senses sources of misery. Certain persons are painfully conscious of the slightest discord; others almost in¬ stantaneously detect, with a feeling of disgust, the inharmonious blending of tints which, to the average person, are all in harmony; still others are made uncomfortable by an odor perceptible to no one but themselves. All the senses become accustomed to continued impressions, so that they no longer perceive their existence. This condition may prove a source of danger, for one may, for example, become habituated to harm¬ ful odors. Sense-education of the feeble¬ minded, as accomplished by Seguin and his wife, by "constant, assiduous, philosophical training,® is a noteworthy achievement. It seems to be a rule, with but few exceptions, that when one

sense is lost or seriously impaired nature sharp¬ ens some other.

Touch, or tactile sensibility, enables us to appreciate by actual contact, the size, form and consistency of objects and the character of their surface. It is most sensitive in the margin of the lips, tip of the tongue, palms of the hands, and under surfaces of the fingers. Some writers speak of "general sensibility® as one of the senses, and include under this term, touch, mus¬ cular sense or the sense of pressure, sense of temperature, etc. The organs of touch are end- bulbs and tactile corpuscles. See Muscle- Sensation.

Taste enables us to discover and recognize flavors. This sense resides in the tongue, soft palate, uvula, pillars of the fauces, tonsils and the upper part of the pharynx. The organs of taste are taste-bulbs and various papillae. The nerves of taste are the gustatory branch of the fifth pair of cranial nerves and the lingual branch of the glosso-pharyngeal nerve. Only those substances can be tasted which are dis¬ solved, and at the same time the mucous mem¬ brane of the mouth must be moist.

It is said that the German physiologist Va¬ lentin could detect a 100,000th solution of quinine. What we know of the different tastes are complex experiences made up of odors, motor experiences, pressure and pain sensa¬ tions, visual elements and a far more limited number of taste elements than we suppose. Their number seems to be four : sweet, salt, sour, bitter. Of the physical stimuli of taste sensations we know even less than of the in¬ definite localized physiological organs of taste. Chemically different substances may even arouse the same sensational response; for ex¬ ample, both sugar and acetate of lead yield a ((sweet® taste. Only one statement may be hazarded; namely, that the taste stimulus is always in a liquid form. Taste sensations and their brain area (little known) all involve at¬ tention, discrimination, judgment, and so on. The tongue tastes. It also feels. Aerated water is Melt® ; alum (

The most satisfactory classification of smells as we meet them in nature is that adopted from Linnaeus by the Dutch physiologist, Zwaarde- maker. It recognizes the following classes: (a) Etheral smells, including all fruit odors; (b) aromatic smells, like those of camphor, spices, lemon, rose; (c) fragrant smells, like those of flowers; (d) ambrosiac smells, like those of musk; (e) alliaceous smells, like those of gar¬ lic, assafeetida or fish; (f) empyreumatic smells, like those of tobacco and toast; (g) virulent smells, like that of opium ; (h) nause¬ ating smells, like that from decaying animal matter.

Many smells are of course like tastes obvi¬ ously complex experiences containing elements of taste, touch and vision as well as sensations of smell. The <(pungency® of such smells as that of ammonia is a "touch® quality. Smell stimulus is gaseous, not liquid, and the prop¬ erty of stimulating the end-organs of smell is a function of the physical molecule, not of the atom, since most of the chemical elements are odorless.

Smell is the sense by which odors are per¬ ceived. The olfactory nerve is, like the optic nerve, a prolongation of the cerebrum. The olfactory bulb is at the anterior extremity of the

olfactory nerve (more strictly the olfactory tract), of which it is an enlargement, and the development of the bulb bears direct relation to the acuteness of smell. In some animals, in which smell is very acute, the bulb is of such size that it is called the olfactory lobe. In man the impressions of this sense often need to be confirmed through other senses. Odors, to be recognized, must be presented in a gaseous or vaporous form. Dryness of the mucous mem¬ brane of the nose and excessive secretion blunt the sense of smell. Some persons are so sus¬ ceptible to odors and emanations that the smell of certain substances, as of roses, new-mown hay, etc., or of certain powdered drugs, may excite in them an inflammation of the nasal passages. Hay fever (q.v.) is one form of such inflammation. There is an intimate relation between smell and taste. Delicate flavors are not appreciated when the nose is obstructed, as by catarrh, etc., or in cases of anosmia (q.v.), loss of the sense of smell. Smell influences the respiratory process, and the breathing of a fine odor increases the amplitude of the respiratory movements. The sense of smell may be highly developed, especially where there is deficiency in other senses. By it certain blind and deaf persons are able to recognize anyone with whom they have previously come in contact. This delicate sense is impaired by oversecretion of the nasal mucous membrane (catarrh), by its dryness or its frequent irritation, and may be destroyed by disease or injury.

Sight is the faculty whereby we receive im¬ pression of light, movement, form, size, shades of color, and the manifold beauties of nature and art. The organ of sight is the eye, the nerve of sight, the optic nerve. Necessary also to proper vision are the eyebrow, eyelid, eye¬ lashes, lachrymal and Meibomian glands, tear- passages, and certain muscles. Clear vision de¬ pends on the focusing rays of light through clear media upon the retina, and the conveyance of impressions so brought to the cerebrum by means of the optic nerves. Defects in vision are color-blindness, myopia, presbyopia, hyper- metropia, astigmatism, etc.

Hearing is a sense whose organ is divided into three parts, external, middle and internal. The latter is essential, the others are accessory. Hearing is effected by means of impressions made by the vibrations of elastic bodies (ordi¬ narily the atmosphere). Impressions of sound¬ waves are conveyed through the complex ap¬ paratus of hearing to the auditory nerves, and through them to the brain. Any interference with the delicate mechanism of the auditory apparatus, as by inflammation or injuries, blunts the sense of hearing. See Anatomy, Compara¬ tive; Nose; Nose and Throat; Salivary Glands.

SENSITIVE PLANT, or HUMBLE PLANT, an herb (Mimosa pudica) of

the family Mimosacece, a native of tropical America. It is an erect spiny or hairy plant with long- petioled pinnate leaves and numerous purplish flowers in roundish heads, followed by spiny, jointed pods. It is naturalized in many warm countries, and is cultivated as a curiosity in greenhouses and as a summer annual in gardens. The seeds are sown in early spring in any good garden soil and given ordinary care. The plants are chiefly interesting because of the movements of the leaves when touched, If only lightly

touched the leaflets close in pairs, but if more roughly the petioles become depressed. Young foliage responds more quickly, the movement usually occurring within one second after con¬ tact. In a few minutes the leaves gradually resume their former expanded position, the time required depending upon the age of the foliage, the warmth of the atmosphere, etc. At night the plants (

*.SENSORY AREA, a portion of the brain in which the terminals of the sensory nerve- filaments finally end, constituting the cerebral centres of sensation. The location of the gen¬ eral sensory area is by no means definitely known. There are a number of sensory areas : thus the area for the sensations of sound is located in the superior temporal convolutions of the brain, and destruction of this area does not prevent the patient from hearing save when both auditory centres are destroyed, but does prevent him from the intellectual appreciation of what is heard. The sensory area for sight is located in the occipital region ; for smell in the brain-base. The general feeling sense-area, however, the so-called sensory centre in the brain, is thought to lie below the motor area, somewhat overlapping it. It will probably be many years before the exact limits of the vari¬ ous areas in which the different sensory axones terminate are known. When that time does come, however, the student of the diseases of the mind will be in a much better position to understand the different variations in person¬ ality as shown in diseases of certain areas. Consult Flechsig, (Gehirn und Seele) ; Barker, (The Nervous System.**

SENTENCE, a combination of words so arranged as to express a complete thought. A sentence is, therefore, the unit of thought ex¬ pression and as such it determines the construc¬ tion of words in accordance with their relationˆship to one another and to the sentence itself. Sentences have been classified in various ways. According to grammatical form, they are simple, compound and complex; agreeable to rhetorical construction they are classed as periodic, loose and balanced. A simple sentence contains but one subject and one predicate, and sometimes one or the other of these two essential parts may not be ex¬ pressed; but in this case it is necessary that it should be understood. The suppression of the subject pronoun is very common in some languages, notably Spanish. A compound sentence

contains two or more principal clauses; example, <(The way was long; the wind was cold; the minstrel was infirm and old/- A complex sentence must contain but one principal clause and one or more subordinate clauses: <(The stag at eve had drunk his fill where danced the moon on Mona's Rill.® A periodic sentence is so constructed as to hold the thought in suspense until its close: <(Having come to the town early in the morning and having wandered about it all day, it was only in the evening that he went to pay the ex¬ pected visit to his friend.® A loose sentence, on the contrary, may be terminated in two or more places, each termination making complete*

sense : (

Parts of a Sentence. — A sentence may con¬ tain subject, predicate, complement, object and various modifiers. In general, in English, the subject and object must be expressed in an im¬ perative sentence, when the pronoun subject is generally suppressed. The complement is used to express the completion of a verbal idea which the verb does not, of itself, com¬ plete : (

SENTENCE, in law , is a judgment pro¬ nounced by the court or judge on a criminal, being the final determination of the court through a judicial decision, publicly and officially declared in a criminal prosecution. It is not the discretionary act of the court, but the judg¬ ment of the law, which it is the ministerial duty of the court to pronounce.

SENTIMENTAL JOURNEY, A.

Sentimental Journey Through France and Italy,) by the Rev. Laurence Sterne (171 3— 68), was the result of a seven months' trip that the author took for his health in 1 765— 66. On his return he completed (Tristram Shandy) and, though delayed by serious illness, had written two books of (A Sentimental Journey by December 1767. These were pub¬ lished on 29 Feb. 1768, and added greatly to the reputation acquired through the former novel. Sterne's death, on March 18, left the book unfinished. What we have is a small volume usually regarded as one of the most original and choice books in English literature, though not of the highest quality. In France its reputation has been even greater than in England.*

The book is essentially a more detailed and expanded form of the idea of the seventh volume of (Tristram Shandy, written while Sterne was in France in 1762-63, with his wife and daughter. Some of the characters and*

episodes are the same, as that of the mad girl Maria, but the book is composed from a more definite and special point of view; it was ((designed to aid us to love the world and our fellow creatures better than we do.® Hence, instead of describing show places and scenery or talking of anything in the usual tourist fashion, Sterne deals largely with chance acquaintance and humble adventure — with postillions, innkeepers, grisettes, monks, a star¬ ling, statesmen, chambermaids, traveling com¬ panions, the old officer, the mad Maria, and with such simple episodes as giving alms, buy¬ ing gloves, breaking a harness. The aim, however, in all cases is to show the various subtle states of feeling and the sentimental relationships in all such situations. Apparently very rambling and episodical, the essence of the book lies in the delicacy and good-natured feelings of pity, appreciation, sensibility, benignity, or what not, that these various en¬ counters arouse. One or two situations seem to be somewhat strained and are even mawkish and dangerous, but the general tone is cordial, humorous and charitable. Among the best known and characteristic are those of the monk, of the starling, and of Maria, who utters the famous phrase, "God tempers the wind to the shorn lamb.® The style, like that of Tris¬ tram Shandy, is detached and parenthetical and highly wrought, in detail ; in general, it is digressive and episodical. It has much of the humor but does not essay the peculiar wit of the earlier book. Consult the (Life of Laurence Sterne) by Percy Fitzgerald, the biographical criticism by Paul Stapfer, and H. D. Traill in the English Men of Letters series.*

William T. Brewster.

SENTIMENTAL TOMMY, a novel by J. M. Barrie, published in 1896. It details the life and development of a young writer and is taken to contain considerable autobiographic material. Its sequel is Tommy and GrizeP

(1900).

SEOUL, se-ool', S(3UL, or locally HAN¬ YANG, Korea, the capital of the country, on the river Han, about 70 miles by water from its mouth in the Yellow Sea, and 25 miles by rail from Chemulpo, its seaport. The city

proper is a short distance from the river, in a basin partly surrounded by heights, and en¬ closed by a wall. The former royal palace is the chief edifice, and with its grounds occupies over 500 acres enclosed by a lofty wall. Seoul is the seat of various foreign embassies; a Ro¬ man Catholic cathedral and a Gonfucian temple are other noteworthy buildings. Silk,

paper, tobacco, mats, fans and similar commodities are the principal products of native industry. There are schools for the teaching of Japanese, French, Chinese, Korean, Russian and English, and an American Mission School, which is sub¬ sidized. Two Korean and 23 Japanese news¬ papers are published in Seoul, which is con¬ nected with all the ports of Korea and with the outer world by telegraph. Under Japanese rule considerable advance has been made. Electric lighting and electric street railways have been introduced, and there is railway communication with Chemulpo, Wiju and Fusan. Pop. about 303,000 including over 50,000 Japanese.

SEPARATE ESTATE. See Law of Hus¬ band and Wife.

SEPARATIST SOCIETY OF ZOAR.

See Zoar, Separatist Society of.

SEPARATION. See Law of Husband and Wife.

SEPARATISTS, in Church history, (1) Those who in the reign of Queen Mary of Eng¬ land refused to conform to the public services of the Roman Catholic Church. Among them was Mr. Rose, who was apprehended with 30 of his congregation while celebrating the Lord's Supper in Bow-church Yard, London. Another well-known Separatist was Mr. Rough of Is¬ lington, who with several others was burned at the stake by order of Bishop Bonner. (2) In Ireland the Separatists were numerous, consist¬ ing chiefly of the Walkerites, founded by the Rev. John Walker, who seceded from the Es¬ tablished Church of Ireland and founded a small church in Dublin, with the doctrines of the Sandemanians as their creed. Other Irish Separatists were Rev. Mr. Kelly and his adherents who left the Established Church and formed an individual and independent Sande- manian communion. The Darbyites of Ireland were Separatists Millenarians from whom sprang the Plymouth Brethren. (3) The Ger¬ man Separatists seceded from the Lutheran Church in the 18th century and founded a Pietist sect in Wiirtemberg. Persecution drove them to emigration and they settled under George Rapp (q.v.) in Pennsylvania, where they founded the Harmony Society, calling themselves Rap- pists. Those who remained in Germany estab¬ lished themselves at Kornthal, under the name of Kornthalites. All who in Germany refused to conform to the German Evangelical Union, founded by Frederick William III of Prussia, were also known as Separatists. (4) The name was taken by some of the early Puritans such as the Traskites (q.v.). They were subse¬ quently represented by the Quakers. Among the most important sects which have assumed this name are the Separatists of Zoar, a village of Tuscarawas County, Ohio. Their constitu¬ tion is strictly communistic ; they refuse to serve as soldiers; consider celibacy a higher life than marriage; reject all religious

ceremonies, while maintaining the cardinal doctrines of Chris¬ tianity. Although their numbers are consider¬

ably under 1,000 they enjoy great prosperity; but, belonging as they do to the peasant class of Germany, are simple and uncultured. They have neither audible prayer, nor anything that corresponds with the office of a preacher or minister in their public services. Consult Gard¬ ner, (Faiths of the World. >

SEPIA. See Cuttlefish.

SEPIOLITE, a compact, clay-like mineral of smooth feel, hardness 2 to 2.5, specific grav¬ ity 2. Owing to its porous nature it floats on water when dry. Color white or slightly tinted gray, yellow, red, or green. It is a hy¬ drous silicate of magnesium, HiMigaSiaOio. Ex¬ tensive beds in Spain are utilized as a building stone. The mineral from Morocco is used in Algeria as a substitute for soap. It occurs as a secondary mineral derived from magnesite in the plains of Asia Minor, in alluvial deposits. The mineral from these deposits, popularly known as ˆMeerschaum® (q.v.), is used in the manufacture of tobacco pipes.

SEPOYS, se'poiz, or se-poiz', the name given in India to the forces composed of natives, dis¬ ciplined after the European manner. The French were the first to see that the transpor¬ tation of troops from Europe to their Indian colonies would be too expensive and that Euro¬ peans would perish in great numbers by the ex¬ posure at sea and in the climate of India. They therefore took Hindus into pay and the English adopted the same policy. In 1900 the total strength of the native army in India was 155,249, and that of the European was 73,638. Though not generally equal in courage and dexterity to European soldiers, the Sepoys are hardy and capable of enduring much, and very temperate in their food.

SEPT-FOIL, a typical figure in Roman Catholic Church worship composed of seven equal segments of a circle, used to denote the number of the sacraments, gifts of the Holy Ghost, etc.

SEPTEMBER, the ninth month of the modern year, but the seventh of the old Roman year, which began in March. It has always contained 30 days. See Calendar.

SEPTEMBRISTS, in French history, the

name given to the agents in the massacre which took place in Paris on 2 and 3 Sept. 1792, dur¬ ing the French Revolution. The numbers that perished in this massacre have been variously given ; but the term has become proverbial throughout Europe for all that is bloodthirsty and

malignant in human nature.

SEPTENNATE ACT, The. In the Ger¬ man Parliamentary elections of 1887 the strug¬ gle centred around the septennate, or seven- year army period. On 14 January the emperor dissolved the Reichstag and ordered new elec¬ tions to take place. The government had pro¬ posed the addition of 40,000 men to the stand¬ ing army, and sanctioned the maintenance of the present military force for another septen¬ nate. No previous army grant had been for more than two years. Prince Bismarck favored the measure. The emperor said, ((The septen¬ nate means peace. Reject it and there will be war.® But the delegates voted the supplies for three years only, and the chancellor, by a decree from the throne, dissolved the house. The government secured a majority of about

40 votes in the general election, 1 Feb. 1887, and on 11 March the new Reichstag passed the sep- tennate bill.

SEPTENNIAL ACT, 1716, superseded the Triennial Acts (q.v.) of 1640 and 1694. It ex¬ tended the duration of a British Parliament to seven years. Th'e Parliament Act of 1911 re¬ duced the maximum duration to five years. This measure was suspended during the Euro¬ pean War. See Great Britain ; Parliament.

SEPTICAEMIA. See Blood-poisoning; PY¬ EMIA.

SEPTUAGESIMA (sep"tu-a-j es'i-ma) SUNDAY, the third Sunday before Lent, so called from its being about 70 days before Easter (septuagesimus , 70th).

SEPTUAGINT, sep'tu-a-jint, the oldest Greek version of the Old Testament. Although nothing is positively known of the origin of the Septuagint it is accepted as probable that we owe the work, also called the LXX, the Alex¬ andrine Version, the Version of the Seventy, etc., to some Alexandrine Jews, who, having lost the knowledge of the Hebrew, caused this translation to be made by some of their learned countrymen, for the use of the synagogues, and called it the Septuagint from the great sanhedrin of 72 members. It dates from the 3d century b.c. At first onlv the Pentateuch was trans¬ lated; and the version of the remaining books of the Old Testament was accomplished gradu¬ ally, the whole being finally completed in the 2d century b.c. From the varieties of style shown in the version it is clear that there must have been several translators, though how many it is impossible to ascertain. The lan¬ guage of the LXX is the Hellenistic Greek of

Alexandria, based upon the Attic dialect. The most skilfully executed portion of the Sep¬ tuagint is the Pentateuch, next to that the book of Proverbs. The translation of the Psalms and Prophets is very indifferent. Of the Prophets the version of Jeremiah is the best, and that of Daniel the poorest. It is inferred regarding the Hebrew manuscript or manuscripts from which the version was made, that the letters were sub¬ stantially the same as the present square char¬ acters, that there were no vowel points, no separation into words, no final letters, and that the words were frequently abbreviated. From the harmonv found to subsist in a multitude of instances between the Septuagint and the Samaritan version, it has been surmised that the latter was the basis of the former; but the enmity existing between the Jews and Samari¬ tans militates against this hypothesis. To ex¬ plain the resemblance between the two versions Gesenius supposes them both to proceed from a common recension of the Hebrew Scriptures, and other hypotheses have been made. The Septuagint is the original of every ancient ver¬ sion of Scripture with the exception of the Syriac Peshito and the Samaritan. It was the sole standard of authority during the first four centuries, and has been the Bible of the Eastern Church from the first. Of 350 direct quotations in the New Testament from the Old Testament, scarcely 50 are found which differ materially from the Septuagint. It does not appear, how¬ ever, to have obtained general authority so long as Hebrew was understood at Alexandria, nor can it be proved to have been commonlv sub¬

stituted by the Jews for the original in the synagogue service at an early period. It was, however, adopted by Philo and Josephus, and was universally received by the early Christians. In the transcription of the Septuagint, of which numerous copies were made, a great number of mistakes crept into the text. The task of recti¬ fying it was undertaken by Origen, and the version as amended by him finds a place in his Greek Hexapla. The Septuagint is of undoubted value to the Bible critic, though the translation is not always literal, and misapprehensions of the meaning of the original are frequent. Glosses are very often inserted, and arbitrary paraphrases are numerous. The principal ex¬ tant manuscripts known are the Codex Alexan- drinus in the British Museum, the Codex Vati- canus in Rome, and the Codex Sinaiiticus (im¬ perfect) in Petrograd. The principal printed editions are the Complutensian (1517), the Ro¬ man or Sixtine (1587). the Oxford of 1707-20, the Oxford of 1798-1827 (Holmes-Parsons, five vols., folio), and the Cambridge edition by H. B. Swete (1887—94 : 2d ed., 1895-99, three vols.). The Septuagint, which had been used by Jews and Christians long after Christ, was gradually superseded by other Greek versions, such as those of Aquila and Symmachus, representing more closely the Hebrew text as it latterly stood, but only small fragments of these now exist. There is a Concordance to the Sep¬ tuagint by Hatch

and Rcdpath. See Bible.

SEPULCHRAL ARCHITECTURE, a

form of art whose purpose is to give beauty or magnificence to tombs or to buildings used only for purposes of sepulture. The term may be extended to represent even the ornamental treat¬ ment of headstones or slabs. No particular style of architecture belongs strictly to sepul¬ chral structures ; the fashion being largely de¬ rived from the styles of civic or religious build¬ ings prevailing at the period. Some styles, it may be said, lend themselves more readily than others, at least for splendor of effect. Such for instance is the Gothic, in which style many beautiful specimens exist, particularly in the cathedrals and abbeys of England. In this style is the sepulchral church of Brou at Bourg-en- Bresse. A distinction is here to be noted be¬ tween the practice of ancient and mediaeval times. In the case of the former the tomb was a 'building, large or small, apart from structures devoted to the uses of religious worship. The pyramids of Egypt were the most imposing of all human structures; the mausoleum at Hali¬ carnassus, one of the wonders of the ancient world. The buildings erected in memory of the Mohammedan rulers in northern India as well as the Taj Mahal are to be taken with the fore¬ going as not strictly tombs, but as belonging to the domain of sepulchral architecture. Of all the Aryan peoples the Romans were conspicuous for their imposing tombs, specimens of which exist in the remains of the tomb of Caecilia Metella and the Mole of Hadrian, now called the castle of Saint Angelo at Rome. Belonging to the period of the Renaissance are the tombs of the Medici, erected by Michelangelo, though of these the sculptural features are more im¬ portant than the architectural. One of the most perfect specimens of this period is the tomb of Loys de Breze, erected by his wife Diane de Poitiers in the cathedral of Rouen, and. at-

tributed to Jean Goujon and Jean Cousin. In America the most notable specimen is the tomb of General Grant, a structure resembling in general form the tomb of Caecilia Metella. See Mausoleum; Monuments; Sculpture; Tomb; Burying-Places.

SEQUESTRATION, in law, the act of

taking possession of property by legal authority, as to satisfy creditors, for the use of the State, etc. ; also, an equitable writ, directed to a sheriff or a number of commissioners ordering them to enter upon the estate of the

defendant and to take the rents, issues and profits and to keep or pay out the same as the court shall direct. It is also used by chancery courts to force compliance with their decrees or orders.

SEQUIN, se 'kwin, or sek'in, an Italian and Turkish gold coin. It was first struck at Venice about the end of the 13th century, and after¬ ward in all the other Italian cities, and from the Levant was introduced into Turkey. The Tuscan sequin is worth $2.30, the Turkish from $1.10 to $1.75.

SEQUOIA, a genus of Coniferce, included in the sub-family Taxodioidce, of which the ether genus is the Tax odium or deciduous cy¬ press. The Sequoia genus (named in honor of the Cherokee chief Sequo-yah, who invented the alphabet of that tribe), was for a time known as Taxodium or Wellingtonia ; it com¬ prised two species, S. sempervirens, the red¬ wood, and N. gigantea, the "big-tree,® both natives of California. The genus was once widely distributed, as fossil remains testify, and the petrified forest in Arizona is stated to be composed of species of sequoia. The flowers of the sequoias are monoecious and are borne in scaly inflorescences as terminal or axillary shoots in such great profusion, that the pollen covers the ground beneath the trees during their winter blooming. The pistillate flowers mature into a fruit, or oval cone, hav¬ ing persistent woody scales, broadened at their outside ends into a rhomboidal flat top, very much wrinkled, and with a slightly prickle- tipped apex. Their scales are slightly separated to allow the many brown, compressed seeds to escape and then spin away on their lateral wings. The leaves are acute, compressed and keeled, decurrent on the stem, alternate and in¬ serted in spirals, very scale-like on the branch- lets, but on older branches linear and spread- ing.

The redwood, which was the first Sequoia discovered, is the more common species, and grows along the Pacific Coast just so far inland as the sea-fogs can go. It is a very straight, handsome tree, with columnar trunk, and spreading branches and branchlets, and reaches in some instances as great a height as the ether and more famous species. See Redwood.

SEQUOIA GIGANTEA, the "big-tree of California,® is more rare. It is found in 10 small groves, forming an uninterrupted "belt® extending for 200 miles on the western slope of the Sierra Nevada Mountains, and nowhere else in the world. It grows at elevations of 4,000 to 7,000 feet. This has suggested that possible lower growths were destroyed by glacial action. The Calaveras grove near the northern extremity of this series is the most picturesque and important group of big trees,

and was first discovered by J. Bidwell in 1841. These famous trees are the most massive of any in the world, but are not the tallest, being surpassed by the Eucalyptus trees of Australia. They are practically exempt from disease,

and, if they were not injured by fire and by man, would have apparently an almost endless life. Some of them are judged, by the number of annual rings, to have been thousands of years old. Fully grown trees average a height of 275 feet, and a diameter of 25 feet. One of the most gigantic, cut down, with great diffi¬ culty, in 1853, was 302 feet in height, 96 feet in circumference, and after the bark was re¬ moved (which was itself nearly 18 inches thick, the diameter of the solid wood in the stump was 25 feet, 6 feet from the ground. This stump was used as a dancing floor, holding 40 or more persons. Others have been estimated as between 350 and 400 feet high. A section of one of these great trees has been placed in the Museum of Natural History in New York, and another in South Kensington, England.

The younger sequoias are very graceful, and charming in their dark blue-green foliage, being often grown in English and European parks. They have a straight, tapering stem from which the branches spring to form a nar¬ row spire-like pyramid. After a few hundred years they begin to lose their branches, and be¬ come dome-like. Ultimately they become our picturesque trees, with a great trunk enlarged at the base, and strongly buttressed, fluted with low broad ridges, and covered with cin¬ namon brown bark (purple-tinted in the shadow) which follows the contour of the lobed trunk, and is deeply, longitudinally fur¬ rowed, and separated into fibrous scales on the ridges. This tapering shaft is naked for 100 or more feet, when great branches, eccentric in development, join in constructing the narrow, but massive domes which stand out above the other tall trees of the Sierras, and break into delicate but dense spray of much divided pen¬ dulous branchlets, blue-green when young but developing a bronzy tint when mature.

The big trees, while standing, have served as shelter for men and cattle, and are a con¬ stant attraction for tourists, the largest being known by name. One, the Wawona, in the Mariposa grove, has a portal cut through its base, which allows the passage of vehicles. But there is constant danger of their extinction. Only one comparatively unimportant and unin¬ teresting group, the Mariposa grove, is effi¬ ciently protected. The others are owned by private interests and often by lumbermen, who cut down the magnificent trees for the sake of their light soft wood, bright red in the heart, and durable when in contact with soil, and which is dynamited apart, with enormous waste, and made principally into fencing and shingling. The big-tree has not the tremendous reproduc¬ tive powers of ‘ the redwoods, the seeds have very low vitality, and in some groves almost no seedlings are found; moreover, the flocks of sheep pastured on the mountains • destroy the saplings, and the dreaded forest fires not only decimate the patriarchs but devour the young growth. Consult Jeffrey, Comparative Anat¬ omy ... of the Coniferales, pt. 1, Vol. V, Memoir*

Boston Society of Natural History (1903). See Redwood.

t

SEQUOYAH, se-kwoya, or GEORGE GIST, or GUESS, Cherokee Indian inventor: b. about 1770; d. near San Fernandino, North¬ ern Mexico, 1842. He exercised his ingenuity in numerous ways, — as silversmith, blacksmith, artist. In 1821 he completed the Cherokee al¬ phabet, for which he received in 1823 a silver medal from the Cherokee general council. This alphabet was perfectly adapted to the pe¬ culiarities of the Cherokee tongue, which it expressed as the English alphabet never could. He borrowed many symbols from an English speller. His alphabet was quickly adopted, was very successful, and was employed by the mis¬ sionaries and, in part, in printing a newspaper, The Phoenix. The giant Sequoia tree was named in his honor. Consult Foster, Se¬ quoyah, the American Cadmus and the Modern Moses) (Ithaca, N. Y., 1885) ; Mooney, J., (Myths of the Cherokee) in Annual Report, Bureau of American Ethnology, Vol. XIX (Washington 1902).

SERAC, a term applied to the ridges or ice pinnacles between closely spaced glacial crev¬ asses. See Glacier.

SERAGLIO, se-ral'yo-, Constantinople, Tur¬ key, the former imperial palace of the Osmanli sultans, occupying the extreme eastern part of the city proper, at the entrance of the Bosporus. It stands on the site of ancient Byzantium and is of great historic interest. The existing buildings date from the time of Mahmoud II, and chiefly occupy the summit of a hill, which is surrounded by fine gardens, the whole being enclosed by ruinous walls, partly of mediaeval origin. The entrance is on the west, near the church

SERAING, se-ran, Belgium, a town in the province of Liege, three miles southwest of the city of that name, on the Meuse river. The castle, formerly the residence of the Prince Bishops of the Church, was converted into one of the largest iron manufactories on the Continent. These extensive works cover a tract of 270 acres, and employ 10,000 men. The annual output is worth about $9,000,000. All kinds of machinery are manufactured. Con¬ nected with the establishment are hospitals, orphan homes, savings banks, schools, etc.

Other industries are the glass-works (very ex¬ tensive) and coal-pits.

Shipbuilding is also carried on. During the European War (1914- 18), the industries suffered exploitation and devastation at the hands of the Germans, for which reparation was subsequently enforced. Pop. about 42,000.

SERAJEVO, sa-ra' ye-vo. See Bosna- Serai.

SERAJGANJ, se-raj-gunj', India. See Sir-

AJGANJ.

.SERAMPORE, ser-am-por', or SRIRAM- PUR, India, in Bengal, a town on the Hugh River, 12 miles north of Calcutta, and opposite Barrackpur. It has a school, church, college and library, connected with the Baptist Mission. The principal industry is the manufacture of paper and mats. The town under the name of Frederiksnager, belonged to Denmark until 1845, when it was purchased by the English East India Company. Early in the 19th century it was the scene of Baptist missionary activities, and contains the graves of Carey, Ward and others associated with the work. The town is attractive, and a summer resort for citizens of Calcutta. Pop. about 50,000.

SERAO, sa-ra'd, Matilda, Italian novelist: b. Patras, Greece, 1856, the daughter of an Italian political exile and a Greek mother. She became a schoolmistress at Naples, and her ex¬ periences struggling with poverty during this period are related in the introduction to (Leg- gende Napolitaine) (1881). At the same time she assisted her father in editing his news¬ paper, and contributed short stories of Neapoli¬ tan life to II Piccolo and other local publica¬ tions. She first attracted attention by a short story, followed by her first popular novel (Fantasia } (1883). From 1880 to 1886 she lived in Rome interested in literary work with D'Annunzio, Scarfoglio and others, and pub¬ lished (Cuore Inferno) (1881) ; (Fiordi Pas- sione) (1883); (Piccole Anime) (1883); (La Virtu de Checchina) (1884) ; and (La Con- quista di Roma) (1885). She married Scar- fioglio and with him founded the short-lived II Corriere di Roma; later returning to Naples where she edited II Corriere de Napoli and subsequently founded II Mattino and II Giornio, which attained large circulations. She actively continued her book production. (Ventre di Napoli appeared (1885); (Paese di Cuccagna) (1891) ; (Addio Amore) ; c All 'Erta Sentinella) ; ; (Ella non respose) ; and others. English translations of her chief works have appeared. Her early work distinguished for the vigor of its realism, acute sensibility and accurate ob¬ servation, developed these traits with clearer insight and deeper psychological analysis in her later works. See La Ballerina; Paese di Cuccagna. Consult Croce, B., (Matilde Serao) in La Critica (Vol. 1 ; Naples 1903) ; Dornis, J., (Le roman Italien*

contemporain (3d ed., Paris*

1909).

SERAPEUM, the designation of Egyptian temples dedicated to the god Scrapis. The Serapeum at Memphis was the most famous. It

was the cemetery of the Apis, and close to the Apeum, where the bull dwelt while in life. Within its precincts also were the dwellings of the priests, and a hospital for the sick, who flocked here to be cured by the dreams vouch¬ safed them by the god. The approach to the temple from the city was through an avenue of sphinxes. The ruins of the edifice, as well as the dromos iof sphinxes, which had already be¬ come partially buried in the sand in the days of Strabo, were discovered by M. Mariette in 1850. After excavating a length (of 7,000 feet, and un¬ covering 141 sphinxes, he discovered at the end of the avenue a semi-circle adorned with statues of the sages, poets, and philosophers of ancient Greece, and this is supposed to have formed part of the library of the Serapeum. Near this a trensverse avenue led on the right to a temple of Apis, erected by Nectanebos, and on the left to the Serapeum itself. Further excavations dis¬ closed the subterranean tombs of the mummies of the Apis. This great cemetery divided itself into two parts, the one, a vaulted gallery, con¬ taining 20 sepulchral chambers, of dates ranging from Rameses II to Psammetichus I ; and the other, a souterrain, divided into a number of galleries, begun in the 52d year of Psammetichus I, and continued till the beginning of the Ro¬ man Empire. The bull mummies of this divi¬ sion were deposited in gigantic monolith sar¬ cophagi of Syenitic granite, sometimes as high as 12 feet, with a length of 15 feet, and weigh¬ ing upward of 60 tons. The dead bull was treated as a deceased human being, and the sar¬ cophagi were accompanied by sepulchral vases and by the usual sepulchral figures offered to the dead. Votive tablets were placed over the lintels of the doors of the chambers, and as one of these always contained the date of the birth or discovery, the enthronement, and death or burial of the particular Apis, they have become of great importance in determining the chronol¬ ogy of the 19th and subsequent dynasties. They end with Ptolemy Euergetes II (177 b.c). The discovery of 146 papyri now in various museums), dating from the 18th to the 24th year of Ptolemy Philometor, shows that the tem¬ ple was under the direction of prefects, dele¬ gates, vicars, sub-administrators and store¬ keepers. Two priestesses also served ˆEsculapius and Serapis, and certain male devotees lived in celibacy and seclusion within the precincts of the temple, which they never left. A large number of

bronze figures and various other antiquities were also discovered among the ruins. The tablets found numbered 1,200, and altogether about 7,000 objects were discovered, nearly half of them referring to the worship of the Apis. See Egypt.

SERAPHIM, a plural Hebrew noun which occurs only in one passage of the Bible, Isaiah vi, 2-6, where it denoted certain heavenly crea¬ tures of human form but having each six wings, with one pair of which they covered the face, with another pair the feet, and with the third pair did fly. Their station was above the throne of the Most High, and one cried to another, (

his sin. The Seraphim are in the later Jewish theology and in Christian angelology classed as the highest of the orders of angels, holding the first place in the first triad of the angelic hierarchy — Seraphim, Cherubim and Thrones. The word Seraphim, if it is of Hebrew ety¬ mology, means "burning ones.® It is of the plural number, and the singular form is Seraph.

SERAPHIM, Order of. See Orders, Royal.

SERAPION, physician of Alexandria, of the sect of the Empirici, who flourished about the 3d century. He occupied himself almost exclusively with inquiries into the nature of drugs, and was a keen opponent of Hippocrates.

SERAPIS, se-ra'pis, or SARAPIS, an

Egyptian divinity whose worship was introduced into Egypt in the reign of Ptolemy I. It is related by Plutarch and Tacitus that Ptolemy having seen in a dream the image of a god, which he was ordered to remove from the place in which it stood, sent to Sinope, on the sug¬ gestion of a traveler named Sosibius, and brought thence a colossal statue, which he sent up to Alexandria. It was declared to represent the god Serapis, affirmed by Manetho to be Pluto or the Jupiter of Sinope. A magnificent temple was built at Alexandria for the reception of the statue of Serapis, and this temple — the Serapeum — was the last hold

SERASKIER, ser-as-ker', the name given to the commanders-in-chief of the Turkish armies, and particularly to the Minister of War. As applied in the latter sense tin seraskier has very extensive powers, and is second only to the grand vizier.

SERBIA (Kraljevina Srbija), a kingdom in the Balkan Peninsula, now a constituent part of Jugoslavia, between lat. 42° 26′ and 44° 59′ N. and between long. 19° 18′ and 22° 52′ E. It is bounded north by Slavonia and

Banat, the natural boundaries being the rivers Save and the Danube, east by Rumania and1 Bulgaria, west, after the Balkan Wars of 1912-13 and in conformity with the Treaty of Bucharest (1913), by Bosnia (from which it is separated by the river Drina), Montenegro and Albania, and south by Greece. Its area is 42,098 square miles, of which 23,448 square miles were added after the Balkan and World Wars.

Topography, etc.— The greater part of the country with Shumadiya (forest-covered land) as its centre, forms a high plateau in which intermingle the four mountain systems: the Dinaric Alps, the Carpathians, the Balkans and the Rhodopes. The Carpathian system is slop-

ing gradually from Banat into Serbia across the Danube where it is broken by a very narrow defile, below Orsova, called ˆDjerdap® (Iron Gate) and consists chiefly of schist and other crystalline rocks and partly also of chalky lime¬ stone interrupted accidentally by certain species of rock of volcanic origin intermingled with different ores and coal. The high plateau formed in the northeast by the Golubinje moun¬ tains, between the rivers Morava and Timok, the precipitous heights in the mountain range Lukavitza (with Rtanj 1566 metres), the deep gorges and snow-covered summits of the Suva Planina and Shar Planina, offer most pictur¬ esque and romantic scenery. The mountain range in western Serbia with the Kopaonik, Jastrebac, Jadar, Rudnik, Cer, Ovchar, Kablar, Cer, etc., encircle central Serbia, which is densely covered by woods (oak, beech, pine, etc.). The Macdva and Morava valleys are considered the most fertile and beautiful re¬ gions of the kingdom. The rivers for the most part flow to the north, and none of them is navigable although the Morava, which tra¬ verses the land and divides it in almost two equal parts, and the Drina have large volumes of water. The Danube and the Save are navi¬ gable for small boats, and their banks are for the most part very low ; thus they irrigate abundantly the adjacent valleys. Among the tributaries of the Danube the most important are the Save, the Morava, the Timok (which with the Danube separate Serbia from Ru¬ mania), the Mlava, the Pek and Porechka. Of the tributaries of the Morava the principal are the Nishava and the Ibar. The newly acquired territories of Old Serbia and Macedonia are watered by the Vardar, which might eventually be joined to Morava and form thus a most important waterway from Belgrade to Salonica, the Bregalnica, the Drim (or Drin), the Crna and the Treska.

Climate and Soil. — On the whole the climate in Serbia is centro-European, although the country is situated in the same latitude as north¬

ern and central Italy. Alongside the Save and the Danube the climate is rather temperate, the average annual temperature being+ 13° C., vary¬ ing between 8, 34° and 15, 63°, but the more one goes to the south the more rigid winters prevail, which may be explained by the moun¬ tainous configuration of the soil of central and southern Serbia. Severe winters prevail in the region between the Suva Planina and Rudnik, lasting sometimes five to six months, and very low temperatures have been recorded, the low¬ est, however, being —25° C. Rains are abun¬ dant, especially in the spring and autumn, and most frequent in October, but summers are often alarmingly droughty, so that the peasantry often have recourse to superstitious rites ("dodole®) and religious processions imploring Nature for rain. The most important winds are the Severatz (north wind) and the Koslava (east wind), neither of which, however, is as trying as in most other Mediterranean countries. The soil of Serbia is very fertile; all kinds of cereals growing in abundance, notwithstanding the very primitive manner in which they are cultivated. Of all the cereals maize is most widely cultivated for it serves as the principal food of the population. Wheat of a high qual¬ ity is also grown and constitutes Serbia's chief

article of exportation. Of no less importance are barley and oats which grow in abundance and serve chiefly as food for horses. All kinds of fruit are cultivated, apples, pears, peaches, grapes, etc., but the most important are plums of which there are many varieties, especially in the districts of Kruseval, Macva, Sabac, Obreno- vac and Kragnjerac. Plums are exported to a large extent, fresh and dried, also crushed and preserved in their own juice pekmez (mar¬ malade). Excellent brandy (

Mining. — The mining industry in Serbia seems to be the oldest and the most developed, for there are archaeologic remains in the mer¬ cury mines of Mount Avela, in the district of Belgrade, indicating that they have been worked trom the Neolithic Age, and according to his¬ tory silver mining constituted in the Middle Ages the principal source of wealth of the Nemanjichi's kingdom. As for gold there are remarkable formations in the diluvial and allu¬ vial deposits of the rivers Timok and Pek, as also in the quartz veins and crystalline masses found in the department of N ego tin and in the Majdanpek and Deli-Jovan. The Black River is famous for its alluvial washings, containing gold in trachytic rocks. But the most important of all Serbian ores are undoubtedly the unusu¬ ally rich deposits of copper found in Bor, dis¬ trict of Pozharevatz, mostly in the shape of articular masses of various pyrites but also, and especially at Majdanpek, in conjunction with iron sulphates, zinc and lead. Other im¬ portant copper deposits have been found, and to some extent worked, in the mountains of Maljen, Povlen, Subovar and Vis. Lead ores are found in many parts in the valley of the Sava River (Podrinje), but none is of any great importance. However the Serbian gov¬ ernment has built factories for smelting lead in

the mountain of Krupanj. Zinc ores are fre¬ quent in Kuchajna and Rudnik, and nickel in connection with chrome oxide occurs in small quantities near the town of Kraljevo in the mountain of Suvobar. The most important mines of brown coal are those at Senje, and coal-beds of the Tertiary period and Tertiary lignite are to be found almost everywhere along the rivers Drina, Sava and Morava. There are several mines of basic coal, mixed with sandy clay, at Dobra, Zajechar and along the river Timok, but the working of them is wholly in¬ adequate and primitive. The quarrying industry (granite, lithographic stone, millstone and marble), and mineral waters is very sadly neg-

lected despite the most liberal concessions which the government grants to those who wish to exploit them.

Commerce and Industries. — As Serbia is pre-eminently an agricultural and cattle-breeding country the principal articles of exportation are cereals of all description, fruit (fresh and dried), cattle, sheep, wool, pigs and products thereof, wax. honey, and certain domestic dyes. But the foreign commerce in Serbia has been greatly hindered by the insufficient mileage of railways, navigable rivers and other ways of communication ; most especially has Serbian commerce suffered on account of the absence of an outlet to the sea. Under the new regime Serbia enjoys the great advantage of seaports. Austria-Hungary was the natural consumer of Serbian products, but that powerful monarchy at all times exercised a rigorous policy toward Serbia, limiting the number of heads of Ser¬ bian cattle and pigs to a small minimum and subjecting the same to most vexing regulations, which led directly at first to the Tariff War in 1905 and then to the European War of 1914. The principal articles of importation into Ser¬ bia are paper and paper products, colonial ware, metallic products, clothes, glass and china, and machinery of all description. Before the out¬ break of the European War Serbia had con¬ cluded treaties of commerce with all the most important countries, granting to the United States of America the clause of the most favored nation. Besides their agricultural and pastoral pursuits the Serbian population busy themselves with the manufacture of raw ma¬ terials and some domestic industries, which are not only primitive but show a marked decadence. This is chiefly due to the apparent superiority and comparatively low prices of imported prod¬ ucts over those made by the peasants them¬ selves. Women work the wool, the hemp and the flax from which they make, with an admix¬ ture of cotton not only linen for shirts and underwear but even the cloth for outer clothing of both men and women of the family, while men — and especially those

who have no large landed property — show great mechanical skill in shoe-making, for industry and other most elementary handicrafts. Much more could be said of the textile industry which is developed to a considerably high degree and which has earned a world-wide reputation for the Serbian rugs (manufactured chiefly in Pirot) woven on hand looms by women. Those rugs are much sought for on account of their solid workman¬ ship, their original domestic designs and, most especially, their bright and permanent, natural coloring. But the most successful industry is flour-milling, which has been developed con¬ siderably owing to the natural advantage of water power and to the fact that the duty imposed by the late Dual-monarchy of Austria- Hungary on Serbian cereals was so high that the peasantry were forced to export them in the form of flour. The brewing industry is also prosperous in Serbia for it supplies almost the entire home consumption, but beer is not by any means a popular or widespread drink among Serbian peasants. Sugar refining, manufacture of cheese, meat-packing, and, to some extent, timber and metal industry constitute almost the entire employment of the land. With the excep¬ tion of a few factories on the banks of- the

Danube and the Save, there are only small fac¬ tories in the interior of Serbia; among those mention should be made of that at Vranjska Banja for treatment of hemp, at Leskovatz and Parachin for textiles. But on the whole industries in Serbia are only in their infancy, and the government realizing the great advan¬ tages which domestic industries bring to a country, is always prepared and even eager to grant most liberal concessions to persons, whether Serbian or foreign citizens, desiring to establish a new industry. The government grants to such enterprises not only free land necessary for the construction of factories and lodgings for workmen, but even exempts them from paying any custom duties on machinery, raw materials, and half-wrought articles of which they may have need in such factories. Furthermore the government sells to such in¬ dustrials coal at the cost price and reduces the railway rates by 25 per cent from the fixed tariff.

Education and Religion. — Illiteracy in Ser¬ bia is very high, there being only about 20 per cent of the entire population who can read and write. Elementary schools are now to be met with it in nearly every little village and pri¬ mary education is free and compulsory. In larger towns there are "gymnasiaˆ (Real and classic) corresponding somewhat to the Ameri¬ can high schools. In Belgrade there is a uni¬ versity with faculties of philosophy, law and engineering, a military academy, a state academy of commerce and a theological seminary. All these schools are entirely maintained by the state, and there are very few private educational institutions. The Royal Serbian Academy of Science publishes and rewards the works of deserving writers, scientists and artists, and spreads knowledge

all over the country by means of its excellent periodical Glas Akedemije Nauka. Prior to the 7th century the Serbians, and indeed all the Southern Slavs, were pagans, but there is only a slender material available concerning their worship of nature. Soon after the Serbian immigration into the Balkan Penin¬ sula, during the 7th and 8th centuries, Chris¬ tianity which was already deeply rooted with the Byzantines, easily destroyed the ancient faith, not, however, without great struggle. Owing to the absence of competent interpreters of the Christian faith, and to the unintelligible manner and language in which it was enforced, as it were, on the population, great numbers of sur¬ vivors of paganism remained in the Serbian provinces ; most especially around the river Isieretva. In the course of some thousand years Greco-Oriental myths and legends, ancient Illy¬ rian and Roman propaganda and Christian leg¬ ends and apocryphal writings, exercised so great an influence upon the ancient religion of the people that it is impossible to unravel from the tangled skein of such evidence as is available a purely Southern-Slavonic mythology, and throughout the Middle Ages, nay even to this day, the ancient worship of popular pagan di¬ vinities has persisted.

According to Constantine Porphyrogenitus the Serbians adopted the Christian faith at two different periods, first during the reign of the Emperor Heraclius, who had requested the Pope to send a number of priests to convert those peoples to the Christian faith. Yet the

Dalmatian Serbs remained pagans as late as the reign of Pope John IV (640-642). The Croa- tians already belonged to the Roman Church at the time when its priests were converting the Serbians to Christianity between the years 642 and 731, i.e., after the death of Pope John IV and before Leon of Isauria had broken off his relations with Rome. The second conver¬ sion of those Serbians who remained pagans was effected about 879, by the Emperor Basil I. The Grand Zupan Stefan Nemanja over¬ threw that subjection, but the Pope again suc¬ ceeded, after Nemanja's death, in imposing his hegemony, only to be definitely overthrown by Nemanja's son Stefan Prvovenchani. The first Serbian archbishop was Rastko (later Saint Sava), Nemanja's youngest son, who was crowned by the Royal Wreath which King Stefan Prvovenchani obtained from the Ponti- fex Maximus. But the great Serbian ruler, Emperor Dushan the Mighty, brought the Serbian Church to its apogee when he elevated (in 1346) the Serbian archbishopric to the de¬ gree of Patriarchate, an act which drew upon it an anathema from the ever-jealous Patri¬ archate of Constantinople. When the Serbian Empire was lost on the battlefield of

Kosovo (1389), and subjugated by the Osmanli Turks, the Church became a centre of nationalism, and in the course of nearly five centuries of Otto¬ man dominion, planned the insurrection against the oppressors. But the dominion was un¬ bearable, and Serbian patriarch Arsenije Crno- jovich fled to Austria-Hungary, together with 37,000 Serbians. His example was followed by one of his successors (1738) whose name was also Arsenije. In the beginning of the 19th century the Greek Phanariots associated them¬ selves with the tyrannic Pachas in the Serbian lands and gave a mortal blow to the Serbian Patriarchate of Pech (Ipek) and abolished even the Serbian episcopal see. But Prince Milos Obrenovich of Serbia succeeded in restoring the autonomy of the Church, giving the entire rule to the archbishop of Belgrade, Melentius, with the title of Metropolitan of Serbia. The elec¬ tion of the Metropolitan, however, was subject to the approval of the Patriarch of Constan¬ tinople who was to receive also a tribute in money; and it was only in 1879 that the Serbian Church became entirely independent. The pres¬ ent state religion in Serbia and Montenegro is the Eastern-Orthodox, and it maintains a union with the Universal Eastern Church. Serbia is divided in eparchies, the eparchs being elected by the Council of Bishops, which has the high¬ est ecclesiastical authority. There are the High Ecclesiastic Judicial Court, the diocesan ecclesi¬ astic courts, the department arch-priests and the deans of districts, and the parish priests. Public worship by other denomination (Cath¬ olics, Protestants, Jews and Mohammedans) is allowed in Serbia by the law, but the authori¬ ties of all religions are placed under the con¬ trol of the Minister of Public Instruction and Public Worship.

Finance. — The principal revenues are de¬ rived from direct and indirect taxes imposed on every citizen and owner of property, customs duties, excise, state monopolies of salt, sugar, tobacco, matches and petroleum. Prior to the Treaty of Berlin, Serbia had practically no debts but the construction of the International rail¬ way from Osternl to Constantinople forced

Serbia to construct her part and to enter into European financial markets and to conclude, in a rapid succession, the following loans: (1) Russian loan ($1,200,000) ; (2) Lottery Loan of 1881 (2 per cent) $4,945,000; (3) Loan from the Serbian State Mortgage Bank (5 per cent) $1,455,000; (4) Primary loan of 1888, $1,835,000 ; (5) Unified loan of 1895 (4 per cent) $67,580,- 000; (6) Railway loan of 1899 (5 per cent) $960,000; (7) Monopoly loan of 1902 (5 per cent) $2,300,000; (8) State loan of 1906 (4 14 per cent) $18,835,000. The war loans of 1912- 18 are yet unknown but they certainly exceed $1,000,000,000. The State Budget in recent years has exceeded annually $60,000,000 one- third of which is generally expended by the war office.

Railroads and Transportation. — Railways in Serbia have a total length of about 1,000 miles consisting of the following lines: (1) Belgrade-Nish ; (2) Belgrade-Semendria ; (3) Nish-Vranja-Risbovatz-Uskub-Gjevgeli ; (4)

Stalat-Uritze ; (5) Nish-Pirot-Tzaribrod ; (6) Belgrade-Valjevo ; (7) Nish-Knjazevatz ; (8) Paratyin-Zaietchar-Negotin ; (9) Uskub-Mitro- vitza; (10) Monastir-Greek frontier. Naviga¬ tion on the Danube and the Save is of enormous importance in Serbian economic life. Apart from the steamships (about 15 in number) owned by the Serbian government and private companies, there are two foreign navigation companies, one Austrian and the other Russian. Roads and highways connecting principal towns in Serbia are fairly well constructed but the roads between smaller towns and villages are in very bad condition chiefly owing to the moun¬ tains and the rocky nature of the soil. The rivers Morava and Vardar, which traverse the country, are navigable only for very small boats.

History. — The region inhabited at present by the Serbian race (Serbia proper, Monte¬ negro, Bosnia, Herzegovina, Dalmatia, Croatia, Slavonia, Istria, Backka, Banat, Syrmia (Srem), the Sandjak of Novi Bazaar and Macedonia, was originally populated mostlv by Thracian and Illyrian tribes, and ruled at first by Mace¬ donia, then, during the 1st century, by the Ro¬ mans. In this fertile and picturesque country flourishing towns sprang up on the banks of the Danube (Singidunum , to-day Belgrade) and the Morava (Naessus-Nish), but during the following centuries, lying as it does close to the great highway through Europe, it was overrun in succession by the Huns, East Goths and Langobards, and brought, about a.d. 550, under the sway of the Byzantine Emperor Justinian, only to be torn from his successors by the Avars, who again laid it waste. It was at the beginning of the 7th century that the Serbians descended from the Carpathian slopes to the shores of the Black Sea, thence moved west¬ ward along the northern bank of the Danube, and, crossing the river, settled mostly in the . same territories which they inhabit at the present time. Under what circumstances and under what leaders they effected their migration is unknown, but the ancient inhabitants of these regions (Latins, Illyrians, Thracians, Greeks, and the Pelasgs) seem to have been easily driven toward the Adriatic Coast. Their emperor, Heraclius (610-641), unable to oppose an ef¬ fective resistance, ceded to the Serbians all the provinces which they had occupied and peace

was thus purchased. The pagan and uncultured Serbians came now into constant intercourse with the civilized Byzantines, and soon (from 7th to

9th century) were converted to Chris¬ tianity, especially by the so-called Slav apostles Cyrillos and Methodius, who translated the teaching of Christ into the ancient Slavonic language. As the Serbians during the 7th and 8th centuries were divided into many tribes, they became, despite their warlike character and innate bravery, an easy prey to the attacks of the Byzantines, the Fino-Bulgars and the Franks, but they never were subjugated by any of their aggressors. The Serbians, however, were forced to realize that only by centraliza¬ tion of their power could they offer resistance as a nation, and several efforts were made to found a state on the banks of the Morava, with Korea Margi (now called Chupriya) as its capi¬ tal, in the early part of the 9th century, but ow¬ ing to the hostility of the Bulgarians, this proved abortive. At about that time, Bosnia, which was one of the Serbian Zhupanias (county'), severed her relations with the other Serbians and formed an autonomous banstro (i.e., province, ruled by a ban or prince). Zupan (or Zhupan, count or prince) Vlastimir succeeded in emancipating his province from the Byzantine suzerainty and established an independent state called Rashka, extending around the rivers Piva, Tara and Lim, touching the basin of the river Ibar in the east and that of Vrbas in the West. But in the very begin¬ ning of their civil life there were dissensions among the leaders which facilitated the inter¬ ference of the Bulgarian chieftain Simeon, who took into captivity a Serbian rebel Chaslav and supported him in his claims to the throne of Rashka. At about 931, however, Chaslav suc¬ ceeded in wresting from his Bulgarian ally Simeon a new state which comprised, together with Rashka, the territories of Zetta (to-day Montenegro), Trebinje, Neretva and Hum. After his death great disorder reigned in the principality. In the course of the following century the Byzantine emperors, having again brought the now enfeebled Bulgaria within their rule, also overpowered Rashka, vdhose Grand Zhupan fled. The ruler of Zetta Zhupan Vojislav (1031-51) took the opportunity of declaring himself king of the Slavs {rex Scla- vornm). He was acknowledged in that dignity by Pope Gregory VII in the year 1077. Under the rule of King Bodin, the son of Mihajlo, the Serbian of Chaslav was restored, and Bosnia was annexed. But after Bodin's death new disorder ensued, caused mainly by the dissen¬ sions among the several and ever malcontent pretenders to the throne. Despite all the un¬ fortunate internecine strife, which has been the most fatal, and constant, feature of Serbian rulers of all times, the Grand Zhupan Stefan Namanja (1169-96) defeated, in a deadly battle, his own three brothers, and then began an epoch of two centuries of complete independ¬ ence for Serbia and a dynasty which covered the country with military glory. Nemanja suc¬ ceeded not only in uniting under his sceptre all the provinces held by his predecessors, but also in annexing those (Ham, Scutari, Cattaro, etc.) which never had been Serbian before, and he placed Ben Kulin, an ally, upon the throne of Bosnia. Nemanja abdicated in favor of his

able son Stefan, and withdrew into monastic life, together with his youngest son Saint Sava. Stefan Nemanjich, who was the first crowned king of Serbia, had to struggle with his elder brother, Vukan, and with the Holy See. Vukan as the rightful heir to the throne antagonized his brother Stefan, using the influence of Hun¬ gary and the popes. When the Crusaders took Constantinople, Saint Sava, Nemanja's youngest son, succeeded in emancipating the Serbian Church from the influence of the Patriarchate of Constantinople, and obtained complete au¬ tonomy (1219), becoming himself the first Ser¬ bian archbishop. King Stefan Prvovenchani was succeeded by his worthless son Radoslav (1227-33), only to be dethroned by his brother Vladislav (1233ˆ-2), who was in no wise of any greater importance to the Serbian people, and who was removed from the throne by his third brother Urosh the Great (1242-76). This ruler wisely availed himself of the German miners who were ousted by the Tartar invaders of Hungary, and who developed to a high de¬ gree the exploitation of the Serbian mines (es¬ pecially silver) ; thus the Serbian state became one of the wealthiest in Europe. But this prince was dethroned by his eldest son, Dragutin, after a bloody battle in Herzegovina, only to be him¬ self ousted from the throne to a monastery by his brother Urosh II Milutin, whose reign (1281-1321) was marked by his conquest of Macedonia. He also reduced to obedience Shishman, a Tartar satrap of the Bulgarian province of Vidin. In the meantime Dragutin obtained from his mother-in-law, the Queen of Hungary, as fief, the lands between the rivers Danube, Save and Drina, and assumed the title of King of Sirmia, but he yielded the greater part of that territory and his title to his brother Milutin, while the remainder was left under the suzerainty of the kings of Hungary. After Milutin's death, the usual fatal discord arose concerning the succession to the throne. How¬ ever, order was re-established by Milutin's son Stefan Dechanski, whose reign is remarkable for his glorious and complete victory over the Bulgarians in the memorable battle of Velbuzhd (Kustandil) 1331, in which the Bulgarian ruler was killed. In commemoration of that victory Stefan built the magnificent monastery of Dechani, from which he obtained his name ˆDechanski.® The whole of Bulgaria came under the sway of a Serbian king. Stefan Dechanski was dethroned, and, according to all appearances, strangled by his own son Dushan the Mighty (1331-55), under whose glorious rule Serbia reached the summit of power. He aimed to establish his sway over the entire Balkan Peninsula, for he had a curious present¬ ment of the Ottoman invasion, and having overpowered nearly the whole of the Byzantine Empire, he proclaimed himself, in agreement with the Vlastela (Assembly of Great Nobles), Tsar of Serbia. Furthermore, that prince elevated the Serbian archbishopric to the dig¬ nity of the patriarchate and subdued the whole of Albania and Epirus as far as Janina. Thanks to the dissensions between Emperor John V. Paleologus and the notorious Prince Kanta- kuzen,.

Dushan succeeded in overpowering and annexing to his state the whole of Macedonia, with the exception of Salonica and Thessaly. Tn 1349 Ban Stefan Kutromanich of Bosnia pil-

SERBIA

laged Trebinje, but Tsar Dushan was unable to chastise that rebel on account of the threatening danger from the Turks, whom Kantakuzen had now brought over to forward his ambitions. Always conscious of the Turkish danger, Tsar Dushan espoused Princess Helen, the daughter of the newly-elected Bulgarian ruler John Strazimirovich, and started energetic negotia¬ tions for an alliance between Serbia, Bulgaria, Venice, Hungary and Pope Innocent; to the people he promised even to introduce the Catholic faith provided he were named the commander-in-chief of all the Christian armies in a crusade against the Turks. His sudden death, in December 1355, frustrated his ingen¬ ious plan and marked the beginning of the Serbian downfall. In the interior administra¬ tion, Tsar Dushan's epoch is marked by the de¬ velopment of commerce and industry, construc¬ tion of roads and highways, and most especially by his memorable ˆZakonik® (code of laws) governing customs and ordinances of his prede¬ cessors and ratifying the privileges of the clergy and nobility. As Dushan's son, Urosh the Weak, was not of age at the time of his father's death, the rule of the country passed to one of the vassals of Macedonia, King Vukashin, who, together with his brother and other lords, held independently the whole terri¬ tory adjoining Prizren to the south of the mountain in Sar. Profiting by the dissensions amongst the Serbian lords and the weak rule of Urosh (1356-67), the Byzantines rescued Macedonia while the Hungarians took back Bel¬ grade. Soon Epirus, Acamania and Thessaly were lost, and governors of other provinces in rapid succession renounced obedience to the new king. In 1371 Emperor Urosh the Weak was killed while hunting (according to all likeli¬ hood by the hand of King Vukashin), and with him the dynasty of Nemanjices died out and Serbia virtually lost her independence. The haughty Vukashin proclaimed himself king, and in co-operation with his brothers, gathered an army of about 80,000 men to resist the already well-advanced Turkish invasion now threaten¬ ing Serbia. His armies, however, although suc¬ cessful at first, were surprised on the night of 20 Sept. 1371, by the Turkish cavalry and an¬ nihilated on the banks of the Marica. Both King Vukashin and his brother perished in that disaster, and Prince (Kraljevich) Marko, the favorite hero of the Serbian National Poetry, proclaimed himself king of the Serbians, but the assembly ol nobles, in their session at Pech (Ipek) in 1374, placed the crown of Serbia on the head of Lazar Hrebeljanovich, who as¬ sumed the modest title of Kneh (prince), and who subdued not only Prince Marko but also the other princes and barons. Furthermore, Prince Lazar caused the Patriarch of Constanti¬ nople to withdraw his anathema from the Ser¬ bian Church, and even to recognize the autonomy of the Serbian patriarchate, but Ban Turtko of Bosnia, who was a descendant of the Neman- jich dynasty, endeavored to uphold that

tradition and crowned himself king of all Serbia in the Monastery Mileshevo. Prince Lazar, instead of declaring war on that ambitious prince, suc¬ ceeded in making an alliance with him, and gathered an army of about 100,000 men with which he faced the forces of Sultan Murat (numbering over 300,000) but, partly because

one of the malcontents, Vuk Brankovich, be¬ trayed his sovereign by misleading his 12,000 horsemen, and partly because the alliance with Ban Turtko proved abortive, the Serbian armies were utterly annihilated in the disastrous battle of Kossovo (15 June 1389). Prince Lazar was captured and beheaded, and Sultan Murat per¬ ished by the hand of a Serbian knight, Prince Milosh Obilich. That unfortunate disaster, al¬ though it did not crush the Serbian state, left upon the Serbian people a deep impression and a cycle of most beautiful epic poetry immortal¬ ized the event. (See Serbian Literature — Serbian National Poetry). The tottering Ser- . bian state came now under the sceptre of Lazar's son Stefan Lazarovich (1389-1427) who fought the Turks in several battles of minor importance, but, owing to overwhelming num¬ bers of the enemy, was compelled to cede his realm to the victor. After his death he was succeeded by the grandson of Lazar's daughter Djuradj Brankovich (1427-57), but all his efforts to shake off the Ottoman dominion re¬ mained without avail. When Despot Djuradj died the nobles could not agree concerning his successor, and in the disorder that ensued the Turks completed their conquest of Serbia in 1459 and invaded Bosnia. The last Tomashevichs fled to Rome, and the flower of Serbian aristoc¬ racy which survived the Battle of Kossovo, took refuge in the Orthodox Courts in Wallachia and Moldevia, in Dalmatia and Hungary. Some of them fled even as far as Scotland and Ire¬ land. The subjugation of Bosnia was an ac¬ complished fact by 1453, and Herzegovina fol¬ lowed her fate in 1482. But the only orthodox Serbian state that never succumbed to the Turkish pashas was Montenegro (Zrna Gora), whose mountains, inaccessible to the Ottoman horsemen, became the nests of Hajduks and Uskoks (guerilla warriors), members of the Serbian high aristocracy. Albania, with her chieftain of Serbian descent, George Kas- triotovich, surnamed Skandarbeg (1443-68), offered a stubborn resistance in a series of battles (see Albania), but finally was subdued by the overwhelming foe. The cruel nature of Turkish rule soon forced thousands of Serbia's best families to emigrate and join their brothers in Southern Hungary (Bachka, Banat, Croatia and Syrmia). Those who remained were either forced to embrace Islam (which was especially the case in Bosnia), or to live as raya (slaves), for the Turkish spahis (landlords) confiscated the land hitherto belonging to the native nobles.

But when the hajduks and uskoks abandoned their original plan — that of exercising a check on occasional tyranny of certain haughty Turk¬ ish

pashas and sparing and protecting the help¬ less Christian population, and made both high¬ way robbery and murder their profession, the iron hand of the Turkish rule was bitterly felt, and with the beginning of the 17th century, especially after the wars between the Turkish and Austro-Hungarian empires in which the Serbian volunteers helped Austrian ambitions, an epoch of terror began on the part of the Turks, and cruelties of indescribable baseness became the regular occupation of the Janis¬ saries and Dahis for, after the conclusion of the Treaty of Svishtov (1791) the Sublime Porte gave guarantee that the Serbian volun-

teers would not be punished for their uprising and four Dahies were murdered, the pacific vizer of Belgrade, the Mustafa Pasha, as well as more than a hundred popular and promi¬ nent Serbians. This they did for fear lest a fresh insurrection should be instigated by the leaders. There were some prominent Serbians who took refuge in the mountains, inaccessible to the Turkish horsemen, and elected George Petrovitch (or as the Turks called him Kara- George, i.e., Black George) as their leader. The rebellion was organized and started in January 1804. Under the leadership of this great strat¬ egist the Serbians fought successfully and re¬ covered from the Dahies the entire Pasha- lik of Belgrade. However, the Turks profited by the engagement of Europe, and more espe¬ cially of Russia, in the struggle with Napo¬ leon, and sent large armies in three different directions which subdued the insurgents and subjugated the territories won by them. George Petrovitch and other leaders left the country to seek aid, first in Austria and later in Russia. In this absence Milosh Obrenovich, one of Kara-George's lieutenants, made a fresh attempt to liberate the Serbian people from the Ottoman yoke, and in 1815 was successful in re¬ establishing the autonomy of the Belgrade Pash- alik. During the progress of his operations, George Petrovitch returned to Serbia, but was assassinated at Smederevo (Semendria) by order of Milosh, who then proclaimed himself hereditary prince of the occupied territory, and was approved as such by the Sublime Porte in October 1815. While very wise in home affairs, Milosh openly opposed Russian influence in Serbia and incurred the bitter hos¬ tility of that power, which forced him to abdi¬ cate in 1839 in favor of his son Mihajlo. This young prince was a very subtle diplomat, and rescued from the Turks, and annexed to his independent state several important Serbian towns. He was banished in 1842 and was suc¬ ceeded by Alexander Karageorgevich (1842-60) son of Kara-George Petrovitch. Under the pru¬ dent, though meek, rule of that prince Serbia obtained a modern constitution, but an unfor¬ tunate foreign policy and the corruption of the Serbian statesmen forced him to abdicate the throne and leave the country.

The Skup¬ shtina (or national assembly) restored Milosh in 1860, but he died the same year. His son Mihailo succeeded (1860-68), but was assassi¬ nated at Topchider, near Belgrade. As Milan, the only heir, was not of age, a regency of three (Blaznavaz, Gavrilovich and Ristich) was ap¬ pointed, and secured from the Porte an ac¬ knowledgment of the young prince as heredi¬ tary ruler. They framed (in 1869) a consti¬ tution measurably satisfactory to the con¬ flicting political parties. When Milan attained his majority in 1872 he ascended the throne and soon precipitated a war against Turkey (1876-78) which resulted in the annexation to Serbia of a few new districts. The Treaty of Berlin acknowledged Serbian independence, and in 1882 the principality of Serbia was pro¬ claimed a kingdom. The unfortunate war against Bulgaria in 1885, which was instigated by Austria and by which Milan hoped to pre¬ vent his neighbors from annexing East Rume- lia, forced that haughty prince (in 1888) to grant a liberal constitution to his people in order to retrieve his lost position. However,

his unpopularity, aggravated by his enforced divorce from Queen Nathalie, made it neces¬ sary for him to abdicate in favor of his 12 years old son Alexander. During Alexander's minority the executive power was delegated to a regency under the leadership of Ristich. At the age of 16 Alexander deposed the Regency by a well-planned coup d'etat (in 1893), and in the following year he abrogated the constitu¬ tion of 1888 and restored that of 1869. In 1900 he married his former mistress, Draga Mashin, under whose influence he entered upon a period of tyranny almost Neronian in type, thus alienating his people and his friends and playing into the hands of his enemies who finally murdered him in 1903. The National Assembly (Skupstina) immediately elected to the throne Prince Peter Karageorgevitch son of Prince Alexander and grandson of Kara- George Petrovitch, who had spent a long life in exile and whose reign forms a most import¬ ant epoch in Serbian history. Strictly con¬ stitutional, he gave carte blanche to his cabinet headed mostly by M. Nikola Pashitch, to whom Serbia was indebted for avoiding war with Austria on more than one occasion. With the growth of trade and industry, for which M. Pashitch established a new and solid basis, Ser¬ bia's position of complete economic dependence, on the openly hostile or extortionate markets of Austria-Hungary, became more and more impossible, for exportation to and importation from that monarchy began rapidly to diminish, and in order to obtain some relief from this thraldom Serbia concluded, in 1906, a customs treaty with Bulgaria. To this Austria replied by a war of tariffs, the so-called ˆPig-War® ; swine being one of the most important items of Serbia's export trade. The resulting eco¬ nomic crises, which, however, were soon over¬ come by new routes to Egypt, France and England, greatly embittered the peasantry against Austria-Hungary and indirectly led to a closer

reapproachment with Russia. Still more hostile was the dual monarchy, when she clearly saw that her policy of impoverishing her neighbors and then crushing them, proved futile, for Serbia revised and concluded new treaties of commerce with almost all European countries and manifestly showed herself as a fully-grown member in the family of nations. Profiting by the disorder caused in Turkey by the young Turks, and bitterly opposed to the just aspirations to a union of the Southern Slavs (or Jugoslavs), Austria threw a bomb¬ shell among the European Powers, signatory of the Treaty of Berlin, in wanton violation of that ((scrap of paper® by annexing Bosnia and Herzegovina, which provinces of the Otto¬ man Empire she had administered for the pre¬ vious 30 years. Serbia was in no mood to acquiesce, for all the Jugoslav provinces, nota¬ bly Bosnia and Herzegovina, were conscious of their fundamental unity of race, language and aspirations with the Serbians, and were looking to the free kingdom of Serbia to lead them all toward independence, as Piedmont had led the other Italian states in 1860. In July 1912, Serbia, Bulgaria, Montenegro and later Greece formed a league, known as the Balkan Alliance, and the respective govern¬ ments delivered to the Porte an ultimatum em¬ bodying the demand that autonomy should be granted to the European provinces under Otto-

man rule. At the same time, on 30 Sept. 1912, they began to mobilize their forces, to which Turkey replied with similar measures. The Powers at once made an ineffectual attempt to intervene and urged patience on the Balkan Alliance, while a joint note was presented to Turkey inviting immediate discussion of re¬ forms in Macedonia. But the Balkan Allies, having determined not to be played with any longer, pushed events beyond the control of diplomacy, and on 17 September Turkey de¬ clared war on the recalcitrants. The Serbian forces totalled 330,000 men and were divided into four armies. While the first three armies converged upon Skoplje (Uskub) the fourth army was detailed to clear the Turks out of the Sandjac of Novi Bazaar and to proceed to the assistance of Montenegro. The decisive battle of the entire campaign, in which the Ottoman forces were crushed, took place on the field of Kumanivo before Uskub. In Albania the Serbians and Montenegrins took Ljesh (Ales- sio) and Drach (Durazzo), and in Macedonia the Serbian troops were successful in every battle, notably in those for Prilip, the birth¬ place of Serbia's national hero Prince Marko, and Bitolj (Monastir), while the Bulgarians invested Adrianople which finally fell into the hands of the Allies, thanks to the powerful help of the Serbians (50,000 men and 120 siege guns) rendered beyond the stipulations of the treaty. The London Conference (1912-13), hard pressed

by the Austro-German menace, erected a new political state (which had never in history existed as such) under the name of Albania. The Montenegrins were ordered by the Powers to quit Scutari and the Serbians to evacuate the dearly won ports on the Adri¬ atic, being allowed only a commercial route to that sea. The results of the entire cam¬ paign exceeded all the expectations of the Allies. As the Bulgarians had promised in that treaty to help Serbia with 200,000 men in case Austria should attack her, and as that aid was not needed nor given, but, on the contrary, Serbia had helped Bulgaria to secure Adri¬ anople and Thrace, and in order to preserve European peace from threatening Germany and Austria, Serbia had abandoned Albania and her absolutely indispensable ports on the Adri¬ atic, the necessity for a revision of that treaty was strongly felt, Bulgaria, however, abso¬ lutely refused to entertain the suggestion, ex¬ acting from Serbia the abandonment of the southern part of Macedonia as far as Monastir and the lakes which had fallen to the Serbians, and insisted on forcibly occupying Salonica which was conquered by the Greeks. The Bul¬ garian government even refused to submit, in accordance with the third article of the Secret Appendix of the Serbo-Bulgarian Treaty of Alliance of 1912, the case for a final decision to Russia, and advanced secretly, and endeav¬ ored to surprise the Serbian armies on the night of 29 June. But the ingenious Serbian General Putnik utterly routed the Bulgarian forces in the memorable battle of Bregalniza. By the peace that was concluded at Bucharest, Serbia shared the Sandjak with Montenegro and re¬ tained Macedonia north of the Ochrida-Doiran line with the promise of a railway outlet on the Adriatic. Having settled the point in a broad and generous spirit, Serbia gladly hung up her sword and prepared for a period of

peace and recuperation. of social and industrial advancement. On 28 June 1914, the Archduke Franz Ferdinand, heir to the Hapsburg throne, and his consort were murdered, under most mysterious circumstances, in the streets of Sera- jevo, the capital of Bosnia, by two fanatic mal¬ contents who were natives of Bosnia and Aus¬ trian subjects. On 20 July the Austro-Hunga¬ rian Minister in Belgrade handed toithe Minister for Foreign Affairs a note charging Serbia with fomenting a revolutionary propaganda within the territory of the Dual Monarchy. It was asserted that the Serajevo assassinations were planned, and the murderers equipped, in Belgrade. Among other demands the Austro- Hungarian government exacted from the Ser¬ bian government (paragraph 4) the removal from the army and civil service of a number of officers and officials guilty of anti-Austrian propaganda, whose names would be furnished by the Austrian government (paragraph 5) ; to accept the collaboration in Serbia of agents appointed by the Austro-Hungarian govern¬ ment, for the suppression of the subversive movement (paragraph 6) ; to institute a judi¬ cial inquiry into

the crime of 28 June; this in¬ quiry to be held in Serbian territory, Austro-Hungarian delegates to take part in this in¬ vestigation, etc. The French and British Am¬ bassadors and the Russian Charge d'affaires expressed indignation at the form, contents and the time-limit (48 hours) of that note and declared it to be inacceptable by any sovereign state in the world. The Serbian government unreservedly accepted all the demands of Aus¬ tria-Hungary, except paragraphs 5 and 6, and promised to revise those articles of the con¬ stitution which stood in the way of these de¬ mands, and declared its readiness to refer any disputed point either to the Hague Tri¬ bunal or to the Powers who had taken part in the settlement of the controversy concerning the annexation of Bosnia and Herzegovina. Refusing the Serbian answer, the Austro-Hun¬ garian government declared war on Serbia on 28 July 1914, which was followed by a desul¬ tory bombardment of the defenseless city of Belgrade. In spite of the German ambassa¬ dor's assurances that Russia, being unprepared, would remain passive, and that the war on Serbia would be a mere (

military prestige at the battles of Belikamen and Jadar. Having made good their heavy losses the Austrians advanced again with a fresh army of 250 battalions of infantry and numerous guns, and took by surprise the Suvo-hor mountain. Retreat on the part of the Serbians was imperative on account of the lack of ammunition. However when the long-ex¬ pected munitions arrived, about 23 December, the Serbians rapidly retook the line Lazaravac- Valjero-Uzice, and the enemy was hurled back across the Drina. Belgrade, which had been evacuated by the Serbians, soon fell a victim to the violent artillery of the Serbian attacks from the surrounding hills. The pontoon- bridges having been subject to a fierce fire from the Serbian heavy guns the Austrian de¬ bacle was complete. They left behind in Ser¬ bia 40,000 prisoners and hundreds of guns, with the transports and stores of a vast army. Almost the entire year that ensued passed in a comparative quietness that gave the Serbians time to rest and recuperate. But in July 1915 Bulgaria signed a secret treaty of alliance with Austria-Hungary and renewed those con¬ cluded in 1908. This gave hopes to the Aus¬ trians, and aided by several Prussian and Bava¬ rian divisions, they attacked Serbia in October 1915 from the north and the Bulgarians at¬ tacked from the south. Against these odds the Serbians fought desperately, but finally were forced to retreat through Albania, which they found as hostile as their own ally Greece. This retreat constitutes the summit of human endurance and the saddest page in Serbian history. The few remnants of the Serbian army, and the great mass of the non-combatant population, found a refuge in Corfu, Italy and in southern France. The

mysterious surrender of Montenegro and the escape of King Nikolas to France and his son Prince Mirko to Vienna aggravated the national cataclysm of the Ser¬ bian people. See War, European.

An agreement was reached at Geneva, 7 Nov. 1918, by the Serbian Prime Minister and delegates to the National Council at Agram as the governing body of the Serbs, Croats and Slovenes. Under this agreement the Jugo¬ slavs of the former empire of Austria-Hun¬ gary became incorporated with Serbia and sought recognition from the Entente Powers of the Agram National Council as the de facto and de jure government of the new Jugo-Slav state. The government of the new state is a limited monarchy in form, with a bicameral parliament. By 21 December the terms of union between Serbia and her sister Slovak states were agreed upon and a ministry repre¬ senting them all was formed.

Government. — After the catastrophe of 15 June 1903 in which the last member (Alex¬ ander) of the Obrenovitch dynasty perished, the constitution of 1888 was restored. By that constitution the legislative power is shared by the king (the dynasty of Karageorgevitch) and the Skupshtina (or National Assembly), while the executive authority is in the hands of the Council of Ministers (eight in number) ap¬ pointed by the sovereign. The Skupshtina, too, can force the Cabinet to resign as soon as it cannot command the confidence of the na¬ tional representatives. The members of the Skupshtina are elected by scrutin de liste by entire counties (i.e., departments), the number

of which varies (from 4 to 12) according to the population of each department. The deputies are inviolable and irresponsible during their term of office, before the courts for whatever they say in the Skupshtina. All Serbians who are of age and pay direct taxes are eligible, but each department must have at least two candi¬ dates, apart from the general conditions and requisites prescribed by the constitution, who must possess a university degree or its equiv¬ alent in order to assure the representation of the educated classes, for nine-tenths of the Ser¬ bian population are illiterate peasants. The Skupshtina consists of only one chamber, whose deputies are elected almost by universal suf¬ frage as the voting right is granted to all Ser¬ bians who are 21 years of age and who pay 15 dinars (about $5) yearly in direct taxes. The deputies have the right to impeach ministers of the state and possess the sovereign right of controlling the budget. Although the sovereign has the right of convoking the Skupshtina in ordinary or extraordinary session, of closing and proroguing the sessions and of dissolving the Assembly, he cannot paralyze its work or exercise a determining power over the course of state affairs, for the constitution expressly ordains that the Skupshtina shall be convoked in ordinary sessions each year which cannot be closed before the budget for the

following year has been voted. The constitution provides also for a Council of State (Senate with 12 members) which is the highest administrative body, passing resolutions in judgments between the state authorities and the autonomous au¬ thorities, exercisingsupreme supervision over the carrying out of the various electoral functions, and its advice must be taken upon all projects of law (bills) which are to be presented to the Skupshtina. The members of the Council of State are irremovable and independent, and six of their number are elected by the Skupshtina from a list of candidates presented by the king, and the remainder are appointed by the king from a list of candidates drawn up by the Skupshtina. Besides the ordinary Skupshtina there exists the Great Skupshtina which is con¬ voked only on very important occasions, such as election of the new sovereign or establish¬ ment of succession to the throne, amendments of the constitution, cession or exchange of the territories of the state; or it can be called even by the king himself if he deems consultation im¬ perative. Serbia is divided into departments (okrugs), arrondissements (srezovi) and com¬ munes (opshtine) . The governor of the de¬ partment is the representative of the central power. Justice is rendered by the courts of the communes, courts of the departments, the court of appeals and the Supreme Court or the Court of Cassation.

Army. — In accordance with the Law for the Organization of the Army, voted by the National Skupshtina in 1901, compulsory service in the army is general for all able-bodied men ; those who are unfit for military service must pay 30 per cent additional indirect taxes. The military forces are divided into the national army and the home defense, the former begin¬ ning at the age of 21 and ending at 45 inclusive and consisting of three categories, while the lat¬ ter lasts from 18 years to 21 and from 45 to 50. The terms of service in the standing army are

two years in the cavalry and artillery and 18 months in all other arms. For the educated classes there exists a shorter term of six months, provided the candidate passes success¬ fully the examination qualifying him for the rank of sub-lieutenant in the reserve. Those who fail at the examination must serve 14 months. The enrolment of recruits takes place every year in July and August. The minimum height of the recruits is 150 centimetres and chest 78 centimetres (60 and 32 inches re¬ spectively). Previous to the Balkan wars of 1912 and 1913 (since which Serbia has doubled her territory and population) the standing army consisted of five divisions of infantry; one division of cavalry of four cavalry regiments, each of four squadrons and two-horse bat¬ teries; one fortress artillery team of two

bat¬ talions ; one regiment of mountain artillery of seven batteries ; one command of engineers and one battalion of pioneers; two companies of cantoneers ; one company of railway men ; one company of telegraph men ; one company of miners; and the royal guard consisting of one squadron of cavalry and one company of in¬ fantry. In the Balkan War of 1912 the entire Serbian army numbered 350,000, but in 1914 its strength was estimated between four and five hundred thousand. At Belgrade there is a very high class military academy for the train¬ ing of officers, and at Kragujevatz there is an artillery school for non-commissioned officers. The standard of military education can be compared favorably with that of any first-class military power in Europe.

Political Divisions and Population. — The departments of Serbia, with their areas and populations, are as follows :

DEPARTMENT

Area in square miles

Population

1910

Old Territory

Relgrade .

782

155,815 157,648 252,937 189 025

V a 1 y£ vr> .

949

Vranye. .

1,676

886

TCrJacni vp.vat.z .

TCrayina .

1,123

112,142

167,371

203,638

TCnizhp.vat.z .

1,046

1,120

M nrava .

Nigh .

988

198,768

Pirot .

934

112,314

PoHrin vp. .

1,371

238,275

Pnzarpvat.z .

1,605

259,906

P iiHnik .

606

85,340

143,216

RmpHprpvo .

493

Ti rn olr .

1,234

1,096

1.270

149,538

Tonlit.zft .

110,218

146,763

TTiitz6 .

C1, h arh ale .

1,466

5

138,911

PpIcttaHp Citv .

89,876

Total (Old Territory) .

18,650

2,911,701

New Territory

Novi Bazar .

133,401

239,386

62,601

166,939

153,293

82,476

97,763

315,759

Pristina .

Pljeolja .

Kumanovo .

Skolpje .

Debar .

Kavadar .

Bitolj .

Tetovo .

1 5 7 i 248

227,425 67,575

Prizren .

Stup .

New Territory 1918-19 .

Total (New Territory) .

23,448

1,703,866

The area of Serbia is therefore 42,098 square miles, with a population of 4,955,631 of whom 2,911,701 inhabit Old Serbia and 1,703,866 New Serbia. In Old Serbia, 1910, 2.528,819

were rural dwellers and 382,882 were urban dwellers, 2,890,602 were Serbian citizens and 21,086 were foreigners, comprising 6,060 Turks,

6,605 subjects of Austria and 5,518 Hungarians. Serbian was the language of 2,778,706 and 32,556 could speak Serbian and Rumanian, while a few thousands spoke German, Albanian, Hun¬ garian, Greek, Turkish, etc. In 1900, over 2,000,000 were dependent on agriculture, 166,599 on industries, 109,998 on commerce, 116,566 on public offices and the liberal professions, and 6,440 on primary production other than agri¬ culture. Of the Jews, 2,636 spoke Serbian or other Slav language; 1,544 Spanish, 462 Ger¬ man, 40 Hungarian and 1,047 spoke other lan¬ guages. Of the gipsies, 27,846 spoke Serbian, 4,709 Rumanian, 181 Turkish and 13,412 Gipsy. Less than 20 per cent of the population are able to read and write. Belgrade is the most populous centre with 90,890 inhabitants. Other important cities are: Nish, with a population of 24,949; Kragouyevatz, with 18,452; Leskovatz, 14,266; Pozarevatz, 13,411; Vranye, 11,439; Pirot, 10,737. In the new territories are the cities of Monastir (Bitobj), with 59,856 in¬ habitants; Uskub (Skoplye), 47,384; Prizren, with 21,244; and Novi Bazar, with 13,434 in¬ habitants.

Bibliography. — Auboyneau, (Essai de Bibli¬ ographic pour servir a l'histoire de l'Empire Ottoman) (Paris 1911) ; Baily, H., (Les vic- toires Serbes) (Paris 1916) ; Bain, R. N.,

(Siege of Belgrade, English History Review (April 1892) ; Balkanicus, (Aspirations of Bul- garia) (London 1915) ; Bengescu, (Essai d'une notice bibliographique sur la Question d'orient, 1821— 1897> (Paris 1897) ; Borchgrave, Emile de, (L'Empereur Etienne Duchan ; La Serbie et la Peninsule balkanique au XIVe siecle,* Bull, de l' Acad, royale de Belgique (Brussels 1884) ; Boucabeille, (La Guerre turco-bal- kanique) (Paris 1912) ; Bowring, Sir John,*

(Servian Popular Poetry (London 1827) ; Bruckner, A., (Ursitze der Slawen und Deutschen) Archiv fur Slavische Philologie (Vol. XXIV) ; Chadwick, (The Heroic Age* (Cambridge 1910) ; Cognelle, (London 1914) ; Gopcevic, (Serbian und Serben) (Leipzig 1888) ; Goubernatis, (La Serbie et les Serbes* (Paris 1898) ; Gueshoff, W. E., (The Balkan League) (London 1915) ; Jagic, (V erwandtschafts-Verhaltnisseinnerhalb der Slavischen Sprachen) (Archiv fur Slavische Philologies Vols. XIX, XX, XXII); and (Zur Enstehune Geschichte der Kirchen-slavischen Sprache* ((Denkschriften Kaiserlichen Aka- demic der Wissenschaften,* Vol. XVII, Vi¬ enna) ; Jirecek, C., (Die Hearstrasse von Bel- grad nach Konstantinopel und die Balkan- passe* (Prague 1877) ; and (Die Handelstras- sen und Bergwerke von Serbien und Bosnia wahrend des Mittelalters) (1853) ; und (Ge- schichte der Serben* (Gotha 1911) ; Jovanovic, (The Near Eastern Question, 1481— 1906> (Bel¬ grade 1909) ; Kanitz, (Serbien, historischethno-*

graphische Reisestudien) (Leipzig 1868) ; Karic, (Paris 1889) ; Miklosic, (Monumenta Serbica) (Vienna 1858); Miller, W., (Medieval Serbian Empire,* Quar¬ terly Review (London October 1916) ; Mallatt, J., (Le Serbie contemporaine) (Paris 1902) ; Markovic, M., (Die Serbische Hauscommunion (Zadruga)*; Mijatovic, Cedomilj, (Servia and the Servians) (London 1908) ; Newbigin, Marion L., Geographical Aspects of Balkan Problems) (London 1915) ; Novakovic, Stojan, (Zakonik Cara Dusana,* Emperor Dusan's Code (Belgrade) ; and (Die Wiedergeburt des Ser- bischen Staates) (Serajevo 1912) ; and (On the Zadruga* (in (Serbian Academy Proceedings,* Vol. XXIV) ; Prince Lazorovic-Hrebeljanovic, (The Serbian People: its past Glory and Des¬ tiny* (New York 1910; London 1911); Petro- vic, W. M., (Serbia: Her People, History and Aspirations* (New York 1916) ; and (Hero Tales and Legends of the Serbians) (New York 1915) ; Peisker, (Die Serbische Zadruga) (Graz 1896-1900) ; Protic, Stojan, (The Secret Treaty between Servia and Austria-Hungary*

(Fortnightly Review, May 1909) ; Royal Ser¬ bian Academy of Sciences, (Essai de biblio¬ graphic frangaise sur les Serbes et les Croates, 1554 — 1900> (Belgrade 1900) ; Racic, F., (Le royaume de Serbie) (London 1901); Safarik, (Elenchus actorum spectantium ad historiam Serborum et reliquorum Slavorum meridiona- lium, qui in archivo Venetiarum reperiuntur> (Belgrade 1858) ; Seton-Watson, R. W., (The Southern Slav Question) (London 1911) ; Se- donius, S., (Les Patriarchats dans TEmpire Ottoman et specialement en Egypte> (Paris 1907) ; Steed, H. W., (The Hapsburg Monar¬ chy* (London 1912) ; Salesbury, (Two Months with Tchernaieff in Servia-* (London 1877) ; Stead, Alfred, (Servia by the Servians* (Lon¬ don 1909) ; Safarik, (Slavosche Alterthumer* (Leipzig 1834-44) ; Tuma, A., (Serbien* (Han¬ over 1894) ; Thalloczy, (Studien zur Geschichte Bosniens und Serbiens im Mittelalter) (Munich 1914) ; Von Ranke, Leopold, (History of Serbia,* (English trans. from the German, London 1853) ; Vivian, H., (The Servian Trag¬ edy } (London 1904) ; and (Servia, the Poor Man's Paradise* (London 1897) ; Belimizobiv, Nicholas, (Religion and Nationality in Serbia: the Soul of Serbia) (London 19)5-16). See Serbian Language; Serbian Literature.

W. M. Petrovitch,

Chief of the Slavonic Division, New York Public Library.

SERBIAN LANGUAGE. The Serbian is the principal of all the South Slavonic (Jugo- slavonic) languages. With the Croatian and the Slovenian,

which are mere dialects of the Serbian, the Serbian language belongs to the Southwestern Slavonic group characterized by its pronounced softness which is affected by the abundance of vowels and pleasant hissings,

*linguals, and dentals. The Serbians use the Cyrillic alphabet reformed by Vuk-Stefanovich- Karadjich and reduced to 30 letters for the 30 sounds, thus making the language ideally phonetic. Vuk's golden rule is ((Write as you speak and read as it is written. ** The Croatians and Slovenians use the Latin alphabet with the aid of certain diacritic signs. The tonic accent falls always on the first syllable in bisyllabic words, but there is no rule for polysyllabic words. There is no definite or indefinite article. There are three genders (masculine, feminine and neuter) ; two numbers (singular and plural) ; the ancient Slavonic dual has been preserved only in oci (ocki , eyes) and usi (ushi , ears). Substantives are divided in five principal declen¬ sions with seven cases. The Serbian is very rich in tenses of verbs, and compound tenses of all verbs, transitive and intransitive, are made by means of the auxiliary biti, to be. But the wealth of verbs in Serbian consists chiefly of the various aspects of one and the same verb. These are (1) imperative aspect, denoting an action or state which is being performed before our eyes and lasts indefinitely, e.g., lupati, to knock; (2) perfective aspect, indicating an action which is* performed at the moment when we speak or which will soon be ended, e.g., lupiti, to knock once for all. (This aspect is subdivided into (a) inchoative, indicating an action as fully begun without intimating that it has been or will be ended, e.g., pevati, to sing, inchoative, zapevati, to begin to sing; or from plakati, to weep, inchoative, zaplakati to burst in tears; (b) terminative, denoting an action which is terminated and after a substantial lapse of time, e.g., from pevati to sing, termina¬ tive ; odpevati, to finish singing) ; (3) semel- factive aspect denoting that an action is being performed but will last only for a second or will be performed but once and may happen again only to last for another second, and so on, e.g. lupnuti, to knock once; (4) iterative aspect denoting an action which has been or is being performed more than once, i.e., in repeated customary efforts, e.g., lupkarati, to keep on knocking, to persist, to persevere knocking. There are three principal dialects : stokavski used by the Serbians, cakavski used by the Croatians, and kajkavski used by the Slovenians, deriving their appellations from the manner in which the word <(what** (sto ca, kaj) is pro¬ nounced. The stokavski dialect, according to Djuro Danichich and Jagich, is only the later phase of the cakavski, while the kajkavski is in a phase transitory from the Slovenian to the Croatian. Among the oldest and most char¬ acteristic monuments «of the Serbian language are (The Record of the Commercial Conven¬ tion* concluded between Ban Kulin of Bosnia and a Ragusan ambassador in 1189; the (Code (Zakonik) of the Emperor Dushan the Mighty) (1349) ; Stoyan Novakovich's Ghrestomathy of Literature and Language of the*

Serbian and Ancient-Serbian) (Belgrade 1877).

W. M. Petrovitch.

SERBIAN LITERATURE. The ancient

history of Serbian literature, written in the old church Slavonic language and developed from the ecclesiastic books by the so-called Slav apostles Saint Cyril and his brother Meth¬ odius, comprises the epoch from the 9th cen¬ tury to the end of the 14th. The principal

monuments are : the manuscripts of the Miro¬ slav Gospel from the middle of the 12th century, the Vukan Gospel beginning 13th century, the Nikol Gospel, end 14th century. The semi- ecclesiastical and the non-ecclesiastical books are written in a language slightly different from that of Saint Cyril and bear the impress of a powerful influence from Byzantium. There would belong the stories of Alexander of Macedonia, (The Trojan War,* as also some apocryphal and Bogomil writings. But of vastly greater importance for Serbian national history are the numerous lives and genealogies of the ruling princes and high church digni¬ taries, amongst which the (Life of Stefan Nemanja,* written by his sons Stefan the First-Crowned King (13th century), Saint Sava and the latter's disciple Domentian, and the (Life of Despot Stefan) (14th century) by Konstantin the "Philosopher,* are undoubtedly the most noteworthy. The (Duishanov Zakonik) (i.e., the Code of Emperor Dusan the Mighty) is an invaluable monument of Serbian mediaeval jurisprudence, and has served as a model to the legislators of other Slavonic nations. The great calamity which befell the Serbian Empire in the year 1389, at the Battle of Kosovo, interrupted the free course of Serbian literature, and the prosperous republic of Dubrovnik (Ragusa) be¬ came the focus of science and art. Some enthusiastic literary historians call that epoch ((Serbian Classic® or <(Golden Age,® but in true essence the Ragusan literature, although written in a comparatively pure Serbo-Croatian lan¬ guage, and'more accessible to the masses of the people, is but a mere shadow »of the Italian models. The earliest Ragusan poets sang partly in Latin and partly in Serbian or Italian (Marko Marulic, 1450-1528; Jerolim or Jeronim Papalic; Sisko Mencetic Vlahovic). More distinctly Serbian in type is Gjore (or Gjordje) Drzic whose short poem, (Zaludnje Muke* (Vain Pains) is a superb specimen of false emotion in imitation of the Humanists. Hannibal Lucic with his drama (Robinja* (Woman Slave) offers the first play of a period, or epochal character in Serbian literature; Stjepo Gucetic*

*(1490-1550) with his satire Dervis (dervish) ; Andrea Cubranovic (1500-50) with his humor¬ istic and delightful poem Jedjapka (a Gypsy-Girl) ; Petar Hektorovic (1550—57) with his Ribanje (Fishing) ; Nikola Naljeskovic, Marin Drzic, Dinko Ranjina and Dinko Zlataric mark a decisive effort to emancipate Serbian liter¬ ature from Italian influence as they looked to the national life, customs and traditions for their subject matter and inspiration and mani¬ fest sincere emotions, at times almost epic in type. But the prince-poet of the Serbian liter¬ ature in Dalmatia is Dzivo (or Jovan) Gundulic (1588-1638) whose masterpiece (Osman, * a long and impressive epic poem, glorifying now with virtuosity now with real poetic art, the long struggle of the Christians with the Ottoman Mohammedans (most especially the battle of 1621 between the Poles and Sultan Osman), and celebrating after the manner of a national , minstrel, the triumph of the Cross over the Crescent, will remain forever one of the noblest proofs of Serbian poetic genius, and may be justly called the ((Jerusalem Redeemed® of the South-Slav world. However the epic element in (Osman) is subordinate to the chain of lyric*

songs which constitute the greater part of the poem and which are of an incomparable beauty. Gundulic is pre-eminently a lyric poet, lacking in true emotion but excelling in the dramatic-idyllic field. His (Ljubovnik Sramezl-jev (A Shy Lover) is a free transversification of Gisolamo Preti's, and very characteristic of the epoch. Dzono Palmotic (1606-57) exceeds all his contemporaries in dramatic art with a romantic tendency for painting at once the good and evil, the sublime and the grotesque in man. Djivo Bunic Vucicevic, author of some charm¬ ing erotic songs full of genuine feeling, forms a contrast to his contemporary, Gundulic. Ingjat Djordjic (1657-1737) is the last of the chain of pseudo-classical Dalmatian writers. As a link between Dalmatian literature and the new literature of the Austrian Serbians of the sense¬ less ((Slavjano Serbskaja Skola® (Slav*

were translated into German by Talvj (2d ed., Leipzig 1853) and into English by Sir John Bowring (London 1827). His other writings brought to light the inexhaustible treasures of the Serbian national customs, proverbs, anec¬ dotes, enigmas, charades, etc., with which even his remarkable dictionary abounds. In his work he was powerfully aided by the ruling prince of Serbia, MiLos Obrenovic, by Kopitar and the famous Serbian philologist Djuro Danicic. Around Vuk in Vienna there formed a circle of young Serbian poets, among whom Branko Radicevic (1824-63) with his lyric poems, occupies the highest place among modern Serbian lyric poets. Sima Milutinovic (

W. M. Petrovitch.

SERBIAN NATIONAL POETRY. Per¬ haps no people in the world possess such a wealth of national poetry as the Serbians. All Serbian national poetry is divided into two main groups :

the heroic songs (junacke Pjesme) which are sung, or recited, to the accompaniment of the gusle, by men only, and the lyric or women songs which are sung by both women and men. From time immemorial the Serbian has pos¬ sessed an exceptional natural gift brought from his ancient abode in the north for composing heroic ballads; and the beautiful scenery of his new surroundings in the Balkan Peninsula and the contact with the civilized Byzantine in¬ fluenced it so considerably that in some of those ballads one can find a marvelous union of rough force and virility of a naive and healthy people with all the splendor and picturesqueness of the ancient Hellenic pattern. The cycle of^ heroic songs about the disastrous Battle of Kossovo (1389) resemble the Homeric epic rather than any product of the genius of the northern Slavs. The most ancient cycle of ballads dwells on marvelous and mythological subjects, often ex¬ hibiting, like the Edda, notions about the crea¬ tion of the world and some curious reminiscence of India as if to show that that land was the prehistoric abode of the ancient Slavs. The second cycle contains mostly songs of a re¬ ligious character from the early Christian era, not without a mass of phantastic legends that were furnished by the apocryphal writings. The third cycle dwells on the events of the Turkish invasion and the struggle of the Cross against the Crescent. The fourth cycle, which is still in development, deals mostly with the wars and insurrections against the Turks and other oppressors. The guslari (national bards or minstrels or troubadours) used to go from one village to another, from one castle to another, chanting in an easy decasyllabic blank verse the exploits of Serbian heroes, the hajduks (robber-knights), and of the poems on great and national events. But by far the most popular are those which glorify the deeds of the wonderful and favorite national hero, Kral- jevic Marko (the Royal Prince Marko) and his horse Sarac. The exuberance of romance and the music of the language of those poems offer a majestic and strange contrast to the sim¬ plicity in which the guslar tells his story and the modesty of the musical instrument by which he accentuates his recitation. The heroic decasyllabic lines have invariably five troches, with the fixed caesura after the second foot, and almost every line is in itself a complete sentence. The women-songs dwell mostly on Eros, but there are also many occasional songs which are sung at weddings, Christmas, Easter and numerous social gatherings (moba , selo, prelo, etc.). Many of those lyrics sing of birds and animals and even inanimate objects which are personified in the intense imagina¬ tion of the woman poet. The vehement out¬ burst of love and friendship manifest in some of those songs constitute a striking

contrast to the hidden pain and slave-like tears with which others abound. The metre is most diverse, there being lines of from 4 to 16 syllables, but in those of 8 or more the caesura appears as a regular and constant repose. While the heroic verse, with the exception of accidental assonances, is blank, the rhyme of the lyric songs is very rich. Elision is most infrequent and inadmissible in Serbian verse; yet there are poets who in reciting, exceed all boldness. When Vuk Stefanovic Karadzio published in

Vienna (1814), his first collection of Serbian national poetry which contained in one volume 200 lyric and 23 heroic songs, Jacob Grimm, after having learned Serbian and translated into German a few of the poems, exclaimed, <(The Serbian national poetry deserves indeed a gen¬ eral attention. . . . On account of these

ballads I think the Serbian will now be uni¬ versally studied.® Seven years later Karadzic published at Leipzig a second edition in three volumes containing 406 lyric songs and 117 heroic ballads. It was from this edition that Sir John Browning made his metrical transla¬ tion of a number of those poems which he pub¬ lished in 1827 in London under the title Ser¬ vian Popular Poetry. > The third edition of Karadzic's work appeared in Vienna at intervals between the years 1841 and 1866; it had now grown to five volumes. The Serbian govern¬ ment published later (1891) several collective editions in seven and nine volumes. Of the many attempts to render those poems in any of the foreign languages, besides that of Browning, the following deserve a special mention : von Talvj's (Volkslieder der Serben) (in verse, Leip¬ zig 1853) ; Dozon, A., (L'Epope Serbe) (in prose, Paris 1888).

Bibliography.— Kapper, S., (Die Gesenge der Serben} (Leipzig 1858) ; Pypin, (Istoriya Slavyanskih Literatur) (Petrograd 1879) ; Karadric, V. S., (Srpske Narodne Pjesme) (Belgrade 1891) ; Stepovic, (Ocherki istorii serbohorvatskoy literaturP (Kief 1899) ; Bos- kovic, S., (Bacvanske Pesme) (Novi Sad 1863) ; Radicevic, (Gusle Crnogorske) (Bel¬ grade 1872) ; Filipovic, (Kraljevic Marlco u narodnih pesmah) (Zagreb 1880 and 1891) ; Hormann, (Narodne Pjesme Muhamsdanaca u Bosni i HercegovinP (Sarajevo 1880 and 1889).

W. M. Petrovitch,

Chief of the Slavonic Division, New York Pub¬ lic Library.

SERENADE, properly, music performed in a clear night; hence a musical

entertainment provided by a lover under the window of his mistress. It consists generally of instrumental music, but vocal is sometimes added. The prac¬ tice existed even among the Greeks and Ro¬ mans. Such music is sometimes performed merely as a mark of esteem and good-will to¬ ward distinguished persons, and then is not in¬ frequently accompanied by long processions with torches. Hence the different character of serenades. A single singer may accompany his song with the guitar, mandolin, lute, etc. ; or wind-instruments may be used, as flutes, horns, clarinets, hautboys; or, as is the fashion in some of the largest cities in northern Germany, many singfers may join. Serenades are also sometimes used as concert-pieces, and then, of course, experience some change of character.

SERFS, the body of laborers, the working classes in general under the feudal system in Europe, and whose condition, though not ex¬ actly that of slaves, was little removed frorn it. Under this system, from the vassals of the king downward, the whole community was subject to certain degrees of servitude, and it was only on condition of specific services to be rendered to his superior that any individual held his fief. In the case of the lower classes this servitude amounted to an almost complete surrender of their personal liberty. There were two classes

of laborers, the villeins and the serfs proper. The former occupied a middle position between the serfs and the freemen. Hallam remarks, in reference to these two classes, that in England, at least from the reign of Henry II, one only, and that the inferior, existed; incapable of property and destitute of redress except against the most outrageous injuries. A serf could not be sold, but could be transferred along with the property to which he was attached. The revival of the custom of manumission counteracted the rapid increase of serfs. A serf could also obtain his freedom by purchase, or by residing for a year and a day in a borough, or by military service, or by dying. By these various means the serf population gradually decreased. In most parts of the Con¬ tinent they had disappeared by the 15th century. The extinction of serfdom in England and Scot¬ land was very gradual. As late as 1574 Eliza¬ beth issued a commission of inquiry into the lands and goods of her bondsmen and bonds¬ women in specified counties in order to com¬ pound for their manumission; and even in the 18th century a species of serfdom existed among Scottish miners. Serfdom in Russia was abolished by a manifesto of Alexander II on 17 March 1861. Consult Page, T. W., (End of Villainage in England> (New York 1900) ; Vinogradoff, Paul, (Growth of the Manor> (New York 1911) ; Mavor, James, (Economic History of Russia) (New York 1915). See Feudal System.

SERGE, a kind of twilled worsted cloth, used for ladies' dresses, gentlemen's summer suits, etc. Navy serge is a thick durable make of this cloth.

SERGEANT, Army, an inferior or non¬ commissioned officer in a company of infantry appointed to see discipline observed, to teach the soldiers the exercise of their arms, and to order, straighten, and form ranks, files, etc. He also commands small bodies of men, as escorts and the like. He ranks next above the corporal, and is usually chosen from the steadiest of the corporals. There are four sergeants in a com¬ pany, and of these the senior is called color- sergeant. Staff-sergeants are higher than these, and the highest sergeant of all is the sergeant- major.

SERGIPE, ser-zhe'pe, or SERGIPE-DEL- REY, Brazil, a state on the Atlantic Coast; area, 15,090 square miles. The coast is flat and sandy; the interior consists of wooded hills. Streams in the populated eastern portion are numerous, but on the west are few. The chief river is the Sao Francisco; besides the Vasa- Barris or Irapiranza. The flora on the slopes of the Serra de Itabaiana is rich in valuable cabinet and dyewoods ; iron-ore and crystal quartz occur. Although the soil is not very productive, sugar-cane, cacao, cotton, tobacco, corn, rice and flax are grown. On the Campos de Criagao de Gados stock-raising is profitable. The industries include sugar refineries, distil¬ leries, flour-mills and tanneries ; shipbuilding on a small scale is carried on. Sugar and cot¬ ton are the principal exports. Capital, Ara- caju. Pop. about 426,250.

SERGIUS, ser'jl-us, the name of four

popes, as follows :

SERGIUS, I: b. Syria, about 630; d. Rome 701. He succeeded Conon in 687. He opposed several provisions of the Quinisext Council of Constantinople in 692 and in consequence Jus¬ tinian II sent to arrest him. Sergius, however, was protected by the exarch of Ravenna. He died in Rome after a pontificate of nearly 14 years.

SERGIUS II: b. Rome; d. 847. He suc¬ ceeded Gregory IV in 844, and during his pon¬ tificate the Saracens from Africa ascended the Tiber, and plundered the environs of Rome.

SERGIUS III: d. 911. He was raised to the papal chair in 904, after the anti-pope Christopher had been expelled. On the strength of Luitprand's testimony, his character has been deeply calumniated. But contemporary chroni¬ clers speak of him in the highest terms as a pious and enlightened pope. He restored the Lateran ChurG1. and filled the Holy See nearly seven years.

SERGIUS IV: d. 1012. He succeeded John XIX, in 1009, and during his pontificate, and as a result of his exhortations, the Italian princes united to drive out the Saracens from the country. It was in his time also that the Normans began to enter Italy.

SERI (sa-re') INDIANS (Opata, "spry®), an exceedingly primitive tribe of North Ameri¬ can Indians, speaking a distinct language and living on Tiburon Island, in the Gulf of Cali¬ fornia, and the adjacent mainland of Sonora, Mexico. Although known since 1540, when some of Coronado's men visited them, almost nothing was known of their character, save that they were warlike and extremely conserv¬ ative, until Dr. W. J. McGee led a small expe¬ dition among them, in the interests of science in 1894 and again in 1895. The Seris are unusu¬ ally tall and well-built ; they wear little cloth¬ ing and subsist chiefly on turtles, water-fowl, fish and other food of the sea, eked out with the vegetal and animal products of the mainland desert. Their houses are flimsy bowers of cac¬ tus and shrubbery, sometimes rudely shingled with turtle shells £ind sponges. Bows and ar¬ rows are habitually used as weapons, harpoons of cane are employed for taking turtles, and unworked bowlders or cobbles form a ready means for serving meat, crushing bones, mull¬ ing seeds, etc. They make graceful balsas of canes lashed together for use in navigating the strait between their island and the mainland; manufacture a very light pottery and some bas¬ ketry. Shells are used for cups and to some extent for implements. The modern Seris are loosely organized in a number of maternal groups or clans, which are notable for the prominence given to mother-right in marriage and for some other customs. Polygamy pre¬ vails. These savages manifest an implacable hatred toward aliens, whether Caucasian or In¬ dian, and the shedding of alien blood is re¬ garded as their highest virtue. Two centuries ago the population of the tribe was estimated at several thousands, but it has been reduced by almost constant warfare, so that now it is barely 350. Consult McGee, (The SJeri In- dians) ; 1 7th Report of the Bureau of American Ethnology, Washington, D. C.

SERICULTURE. See Silk and Silk

Industry.

SERIES. A series is a succession of num¬ bers or terms, usually proceeding according to some definite law. The law of the series may either define how a given term is derived from those that precede it, or it may define a term as a function of the number denoting the posi¬ tion which it occupies in the series. Thus, the series 1, 2, 3, 5, 8, 13, . . . is such that each term after the first two is obtained by adding together the two terms immediately preceding it, and the law of the series might be expressed by the formula un- t-i = «n— i + un, in which un— i, un, un+ 1 are any three

consecutive terms. On the other hand, the series 1, f, f , f, ... may be de¬ fined by the law that the wth term of the series is

Tl

- – 7. Each term is then a function of the num-

2 n — 1

ber n which determines its position in the series. One and the same series may frequently be de¬ fined in both ways. Thus, the series, 1, b j, f, . . . is such that each term may be obtained from the preceding one by multiplying it by It may also

be defined by the formula — — t as the expres¬

sion for the wth term. A series is not uniquely determined when a number of its terms are given. In fact, an infinity of series may be found which include as terms any finite num¬ ber of. arbitrarily assigned numbers. In such a case the simplest law that can be found is naturally to be taken as the law of the series. Important use is made of this principle in the physical sciences. Series of numbers fre¬ quently arise in connection with experimental observations, which evidently proceed according to some definite law, and it is often of great interest to determine the nature of the law. Such series occur, for example, in the theory of spectrum analysis. Balmer's formula

4

, in which c is a certain constant, deter¬

mines, for different integer values of n, the wave-lengths of a long series of lines in the hydrogen spectrum. A variety of formulas have been obtained for other spectra. A very instructive account of the methods used in determining such series is given in Kayser's (Handbuch der Spectroscopie, Vol. II, pp.*

503-573.

A series is said to be finite or infinite ac¬ cording as the number of its terms is limited or unlimited.

Finite Series.

The law of the series being given, the most important problems relating to a finite series are the determination of the term occupying a given position

and finding the sum of the series. The following cases are those of chief interest.

Arithmetic Series. — This series is a, a + d, afi~2d, ...,/, so that the difference between any two consecutive terms is constant and equal to d. The wth term l is evidently obtained by adding d n — 1 times to a and hence / = a + (n — l)c?. If S denote the sum of the series, then S = = = a T (o f d) + (a + 2d) T. . . + /. By writing the terms in reverse order, the sum may also be expressed in the form

S = l + (l — d) + {l — 2d) + . . . + a.

The addition of these two equations gives 2S — (a + /) + (a + /) + . . . to w terms, whence S~in(a + /)=Jw[a + (w — 1) c?] . In particular the sum of the first n integers 1, 2, 3, . . ., n is

SERIES

593

iw(w + 1), and the sum of the odd integers 1, 3, 5, . . 2 n — 1 is w2.

Higher Arithmetic Series. — The general ex¬ pression 0 + (w — 1)d for the wth term of an arithmetic series is an integral function of the first degree in n. A more general series may be formed in which the expression for the wth term is an integral function of degree in the n. Such a series is called a higher arithmetic series of order s. Let ai, 02, 03, . . . represent the series. A new series bi, h 2, b3, . . . is formed from this by taking the differences of consecutive terms, so that bi = 02 — Oi, bi — ch — a2, etc. This is called the series of first differ¬ ences. Let a series Ci, c2, . . . be formed from bi, bi, . . . in like manner. These are the sec¬ ond differences. Let ch, ei, . . . be the first terms in the series of third, fourth, . . . dif¬ ferences respectively. Since an is a polyno¬ mial of degree ˆ in w and an+i is the same polynomial in (w + 1) , it follows that bn, which equals an+ 1 — 'an, is of degree 5 — 1 in w; and, finally, that the nth term of the series of (jr — > 1) th differences is of degree one in n; that is, the last series of differences is a simple arithmetic series. The series of 3th powers of the natural number 1, 2s, 3s, ... ns is the sim¬ plest example of a higher arithmetic series of order

The wth term of the series ai, a2, 03 . . . can readily be expressed in terms of n, bi, c 1, . . . namely,

, , 1 \ v 1 (w— l)(w— 2) _

0n = 0i +(w — l)oi H –

, (w— l)(w— 2)(w— 3) J ,

+ – TT5 – dl +

the last term of the formula being of degree s in w. With fractional values of w this formula is much used for the purpose of interpolating between the terms of a given series numbers which shall follow the same general law of variation. For example, suppose it be required to find log 91.43, given log 91 = 1.9590414, log 92=1.9637878, log 93 = 1.9684829, log 94 = L9731279. The required number is inter¬ mediate between log 91 and log 92, which are the first and second terms of the series having log (90 + w) for its wth term. As the number 91.43 corresponds to w=1.43, the value of log 91.43 may be calculated approximately by assuming that for a small number of terms the series of logarithms coincides very nearly with a higher arithmetic series of order s, the close¬ ness of the approximation increasing with higher values of s. The first terms of the suc¬ cessive series of differences are bi =.0047464, Ci = — .0000513, ch = . 0000012, etc. First try s— 1, that is, use only two terms of the formula for an. This gives log 91.43=1.9590414 + .43 (.0047464) = 1.9610824, which is correct to only five decimals. With s — 2, log 91.43 = 1.9610886, which is less than the true value by one unit in the seventh place of decimals. With s — 3, that is, by using four terms of the formula for an, the value is obtained correctly to seven decimal places.

Geometric Series. — This is composed of the terms, a, ax, ax2, ax 3, . . . Each term is formed from the one preceding by multiplying it by x, so that the wth term is axn~ l. If S denote the sum of w terms of the series, then S — a + ax + ax 2 + . . . + ax”—1.

VOL. 24 — 38

The multiplication of this expression by x gives xS — ax + ax2 + ax 3 + . . . + axx-, whence, by sub¬ tracting from the preceding, (1 — x)S—a — axn,

and accordingly S =

a(1 — xn)

1 — x

Recurring Series. — A more general form of

series is the arithmetic o- geometric series, in which the wth term is of the form (a + bn)xn~l It reduces to the arithmetic series when x~\, and to the geometric series when b = 0. This in turn is a special case of a

recarring series, which is defined as follows : Let ah aix, a3×2, . . . , anxˆ —1 be the terms of such a series. If w + 1 successive coefficients ai are connected by a homogeneous linear relation of the form an + pian — 1 + pian — 2 + • . • + pran — r = 0, in which pi, pi, . . . , p r are given numbers and « > r, the series is called a recurring series of order r. The sum of w terms of a recurring series can always be found. The result is a rational fraction in x. The method of summation may be illustrated by the series of order 2. The defining relation is

an + p\On — 1 + piOn — 2 = 0.

Let S=ai + aix + a3×2 + . . . + an£n—1. Mul¬ tiply by 1 + pix + pix2. This gives

(1 + pix +/>2ˆ2)6'=ai +(<22 + pia\)x

+(03 + piai j piai)x2-- (04 + pia%-- piai)x 3 + . . . + {an + pian — 1 + pian — i)xn 1

+ (gnpi + an — 1 pi)xn + anpiXn~hl.

Since as + pias—i + pias—i = 0, the above ex¬ pression reduces to

0i x--{anPi-- an — 1ˆ2)#" anpixn~h1, and hence

0i + (02 +piai) x + {anpi +an—ipi) xn+anp2xn+1

1 + pix + pix2

The Harmonic Series is — , — , . . . ,

0 a + 0 0+20

its terms being the reciprocals of the terms of an arithmetic series. The wth term is accord¬ ingly — . The series is so named be-

cause the harmonic tones of a fundamental musical note are produced by the divisions of a vibrating string (or column of air in a tube) into lengths, which form a harmonic series. No formula exists for the sum of w terms of a harmonic series.

Infinite Series.

Convergent Series.— Let ui, «2, ... , un, . . . , be the terms of an infinite series, and let Sn denote the sum of the first w terms. If Sn approaches a definite, finite limit as w increases to infinity, the given series is said to be con¬ vergent. If, on the other hand, Sn increases without limit, the series is

divergent. If Sn does not approach any limit, the series is called indeterminate, as in the case of the series 1 — 1 + 1 — 1 + 1 — . . for which, Sn takes the values 1 and 0 alternately as w increases. To illustrate these definitions, consider the infinite geometric series a + ax + ax 2 + . . . + axn~l + . . . By the formula given above for the £ , . . c 0(1 — xn) T

sum of a geometric senes Sn— — ˆ — – — . If x

is numerically less than unity, xn diminishes to zero as w increases to infinity, and hence Sn

approaches – a — as a limit. This expression

1

x

is called the generating function of the series. The series and its generating function are equal for all values of x for which the series is convergent, that is, for values of x numeri¬ cally less than 1. But if x is numerically greater than 1, Sn approaches infinity as n increases without limit. The series is then di¬ vergent and is no longer equal to the generat¬ ing function. Similarly, with a recurring series, if its terms approach zero as a limit with increasing n , the terms anxn, an—\Xn, anxv+x in the above formula for the sum of n terms of a series of order 2 approach zero and hence

Sn has for limit 5 = U' f fad) x . ˆ jike

1 + pix + P2X2

result holds for a recurring series of any order.

A series can represent its generating func¬ tion only for such values of the variable (or variables) on which it depends as will make it convergent, and hence the question of the convergence of a series is of paramount im¬ portance. Suppose at first that the terms of the series are positive. Then, if the ratio un+ i :un becomes and remains less than a proper fraction k as n increases without limit, the series U\ + u2 + . . . f un + . . . is con¬ vergent. For in that case «n+i <ˆkun, un-\-2

1 + k + k2 + . . . is convergent and equals

Accordingly un + un+i + . . . which is less

than the finite quantity — , is a convergent

series. If to this portion of the series the finite sum u\ + u2 + . . . + un— 1 be added, the re¬ sult is finite and the given series is, therefore, convergent. While the condition just given is sufficient to ensure the convergence of a series it is not necessary. Thus, if a and b are such that 0 bf 1, then the series a + b2 + a3 + 64 f a5 + . . . is convergent, since it con¬ sists of the sum of the two convergent geo¬ metric series a + a3 + . . . and b2 + b4 j . . . . But un+ 1 -un alternates between large and small values as n increases and does not, therefore, re¬ main less than a proper fraction.

If some of the terms of a given series are negative, the series is convergent provided that the series obtained by changing the signs of all the negative terms is convergent. For ex¬ ample, the series 1 — k + k2 — k3 + k 4 — . . . , in which k is a positive number, is less than the series 1 f k + k2 + k3 + . . . and is, therefore, con¬ vergent if k < ^l. It follows from the preceding considerations that any series is convergent if the ratio un+i'.un has a limit numerically less than 1 as n increases to infinity. Thus, for the logarithmic series log (1 + x) =x — \x2 -f-fx3

. _ £71 -}-l

— . . . + — + — ; — – . . . the numerical value of “ n n + 1

un+ 1 :«» is the same as that of

xn--l xn

n

X.

n + 1 ‘ 71 n + 1 The limit as n increases to infinity is x. The series will accordingly be convergent if x is nu¬ merically less than 1. For the exponential series

x £

X3

ex=] *_+_ +

+ – +

I „ | I • • • >

n !

Un+i :«n =

x n n\

xv—1 (n — 1) !

x

n

For any finite value of x this ratio becomes and remains a proper fraction as soon as n exceeds x in absolute value. Hence the series is con¬ vergent for all finite values of x.

A series of positive and negative terms is said to be absolutely convergent if the series obtained by making all of the terms positive is convergent. When the second series is di¬ vergent it sometimes happens that the first series is convergent, in which case it is called conditionally convergent, because the value of the sum is conditioned on the arrangement of the terms. For example, the logarithm^ series is absolutely convergent for all values of x nu¬ merically less than 1. If x =1, it becomes 1 — \ + i — ‘ i + 3 — • • • > which is convergent and equals log 2. But the series 1 + | $.* • •. ob¬ tained by making all the terms positive is diver¬ gent. A conditionally convergent series has the peculiar property that by changing the sequence of the terms the sum of n terms may be made to approach any desired limit as n increases to infinity, as may be exemplified by the preceding series. For let c be any number. Select in order as many ‘ of the positive terms of 1 — ^ . as will be sufficient to make a sum greater than c. Then select just enough nega¬ tive terms so that when added to these the sum shall become less than c. Then add more positive terms until the sum becomes greater than c, and so continue. This process is possi¬ ble, since the positive or the negative terms alone form a diverging series. With such an arrangement of terms the sum may be made to approach as near to c as desired.

Uses of Series. — Series are of the utmost value as affording a means for the expression of any given function. In particular, functions which are defined as solutions of differential equations are most frequently not expressible in any other form. In the theory of functions as developed by Weierstrass the convergent power-series is made the fundamental instru¬ ment of investigation, and from the properties of its defining series the

nature of a function is determined. (See Complex Variable, Theory of Functions of). The expression of a func¬ tion in the form of a series is of especial im¬ portance when it is desired to calculate its numerical value. It is by this means that vari¬ ous numerical tables, such as the logarithmic and trigonometric, are calculated.

Taylor's series: j(x) = /(a) + /'(a) (x — a) +

i/"(a) (x— a)2 + . . . + —./(«) (a) (x — a)" + . . .

Zj • r 1 •

is the formula most generally useful for the purpose of expanding any given function fix) in ascending powers of x — a, a being a given constant so chosen that the functions and its derivatives fix), fix), . . . , /(n)(x), . . . are finite and continuous for values of x sufficiently near to a. Another form for Taylor's series, and the one to which the name is more fre¬ quently applied, is obtained by writing h in the place of x — a so that x — aX~h. The above equation then takes the form

fia + h) = fa) + fia)h

+Xf"(a)h* + . . . + i /<») (a)hn + . . . z 1 n\

This series is convergent, if h is not too large. Maclaurin's series for the expansion of a func¬ tion of x in ascending powers of x is obtained as a special case of the first form of Taylor's

SERIES

595

series by putting a — 0. The formula is of course inapplicable if the given function or any of its derivatives are not finite when x — 0.

For the purposes of numerical calculation it is essential to know how close an approxima¬ tion to the true value of the function may be obtained by using a given number of terms in Taylor's series and discarding the rest. If Sn denote the sum of the first n terms of the series and Rn the remainder of the series, then f(x) = Sn + Rn and the amount of error intro¬ duced. by using Sn as the approximate value of f(x) is equal to the remainder Rn . An expres¬ sion for the remainder in Taylor's series (sec¬ ond equation) was obtained by Lagrange in the

form Rn = — -. f(v){a + 6h)hn , in which 0 denotes a n !

certain number between 0 and 1. To illus¬ trate, the formula for sin (a + h) expressed in terms of Lagrange's remainder is

sin (a + h) = sina + cos a'h — \sma-h2

— — . cos crh2 + . . . -1 — , sin a-f «- + Oh) hn. 3! n\ \ 2 • /

Since sin.r does not exceed 1 in numerical

value the error in discarding the remainder of

the series after n terms is not numerically

hn

greater than — . If, for example, knowing

sin 45° = cos 45° = —r = ˆ, it is desired to calculate

V 2

sin x for succeeding angles at intervals of 1", the value for h is taken to be .0000048481, which is the radian measure for 1″ in degree measure. Two terms of the preceding formula give the value of sin 45° 1″ correct to 10 deci-

— sin + Ohj

mals. For the remainderds R2 = – - – • h 2,

*JL**

the first factor of which differs slightly from — — r- =, while h2 has no significant figure before

2V2

the eleventh decimal place.

The cases in which Lagrange's formula is practicable for determining the limit of error are comparatively few in number. A conven¬ ient limit of error may frequently be found by comparing the given series with a simpler one of less rapid convergence, the limit of error for which can be determined. In particular, a series ux — u2 + u2 — m4 + • • • of alternately posi¬ tive and negative terms which are numerically decreasing toward zero as a limit is convergent, and the error in taking only n terms is less than the next succeeding term un + u but greater than ttn-fx — Un- (2.

For the series may be written (mx — u2) + («3 — Ui) + . . . ,. which is a sum of positive terms and, therefore, increases, with the number of terms, toward a finite limit, or be¬ comes indefinitely large. But the series may also be written ux — (u2 — u%) — (ui — W5) — . . . , in which all the terms after the first are negative and hence the sum is less than U. The numerical value of Rn is un+ 1 — un+ 2 H~ un+ 3 — . . . > which, by a repetition of the preceding argument, is greater than Un+ 1 — un h and less than un+. Thus, for the logarithmic series mentioned above, the error in stopping with the nth term is

less than — ~ (if x is positive). For x = — n ~r 1 to

*the value of log (1 + *) is given by Sn correct*

to at least (n+1) decimal places. For values of x near 1 the series converges very slowly. A more rapidly converging series can be obtained by changing x into — x, which gives

*log (1 — x) = — * x — fx2 — ˆx3 — . . . , whence, by subtracting the series for logO+.r),*

iogLA=2(+ i** + *** + . . .).*

1

X

In this x is replaced by

1

2z + r

from which follows

log 1 = log (2 + 1) — log 2

= 2

r 1

+

1

+

L2z + 1 ‘ 3(2 2 + l)3

This series is convergent for all positive values of z. The remainder after n terms is

2I” – - – 1 _ _ _ -

. l(2n + l){2z+l)*n+l ˆ(2«+3)(22 + l)2”+3 which is evidently less than the geometric series

1 +

1

1

(2w + l)(2Z + l)2»+1L (22 + l)2 ‘ (22 + l)4

the sum of which is

+ •••

2(2 n + 1)(2 2 + l)2«+ff22 +2)’

The error in neglecting Rn is accordingly less than the value of this expression.

The importance for numerical computation of having a series of sufficiently rapid con¬ vergence is illustrated by the formula for tt. Gregory’s series is = 1 — ˆ + £ — 7 + . . . which converges so slowly that according to Newton it would require 5,000,000,000 terms and 1,000 years’ time to calculate the value of ft to 20 decimals. On the other hand, by means of Machin’s formula, which converges very rapidly. Shanks has computed the value of ˆ to 707 decimal places.

Divergent Series. — It was supposed by the earlier mathematicians that divergent series were entirely useless. There is, however, a class of such series that have been found not only useful but necessary for the purposes of ap¬ proximate computation. These have been em¬ ployed for a long time by astronomers even after their divergence had been proved, their use being justified by the close agreement be¬ tween calculation and observation. The series in question have the property that the terms at first decrease in numerical value until a certain minimum term is reached, after which they in¬ crease without limit. The series is converging as far as its minimum term, beyond which it is diverging. The converging portion of the series frequently affords a very good approxi¬ mation to the value of the

given function. The

series

e“^dt

is an example of this kind. By expanding e~t2 in powers of f and integrating term by term, this function is expressed by means of the series 1 „ . 1 1

x~rx

+

xa

x7 +..., which is conver-

5-2! 7-3!

gent for all finite values of x. For large values of x the convergence is too slow for practical purposes and the series

v

7 r

e- x2 2x

1

1

+ ^- 1 09..J

1-3-5

+

is used instead.

2×2 22-x4 23,x6

While this series is divergent

beyond a certain term, the sum of the converg¬ ing portion gives an approximation having an error less than the numerical value of the last term used. This approximation is so good and the convergence so rapid that for values of x as small as 3 this series is more convenient to use than the first one and gives a value correct to eight decimals, the first 11 terms being convergent, while for jr = 10 the first 100 terms are convergent and give a value which is correct to at least 110 decimal places.

The theory of divergent series has recently been receiving considerable attention, chiefly from the French mathematicians. In particu¬ lar, the problem of determining in how far the divergent series may validly be used as a purely formal representation of a function has been studied by Poincare, who has developed some important and far-reaching results. An inter¬ esting account of the present state of the sub¬ ject is given by Borel in his (Legons sur les series divergentes) (Paris 1901).

Series of Functions; Multiple Series. — It is often important to express a function as a series the terms of which are given functions such as trigonometric or Bessel functions. 'Such series are of great service in mathematical physics, especially the Fourier series of sines and cosines of multiple angles, which is much used for representing functions having a peri¬ odic character. This series was first employed for that purpose by Fourier (1822) in his (Theorie analytique de chaleurP

In a simple series th, U2,... the general term un is a function of a single integer n defining its position in the series. A double series is one in which the general term um, n is a function of two independent integers m, n. A multiple series is one in which the general term is a function of several integers m, n, p, ... Such series are of fundamental importance in the study of various classes of functions such as the elliptic functions and the multiple theta func¬ tions.

History and Literature. — Some of the properties of arithmetic and geometric series were known in very ancient times, as the oldest manuscript in existence, the Rhind papyrus, which is believed to be a copy of a work dating back 3,000 or more years before Christ, gives an account of some problems which are solved by means of these series. There is considerable ground for supposing that the general formula for the sum of an arithmetic series was known at that time, al¬ though it does not occur explicitly in mathe¬ matical literature until the time of Archimedes (287-212 b.c.). The formula for the sum of a geometric series was known to the Greeks as it is given by Euclid (about 300 b.c.), while the summation of the infinite series 1 4 ? + (d)2 + (4)" + . . . was effected by Archimedes. The general expression for the sum of an infinite geometric series was first given by Vieta (1540-1603 a.d.). A formula for the sum of the squares of the*

positive integers was given by Archimedes, and for their cubes by Nikomachus (about 100 a.d.). Except for these two particular cases no knowledge of the sum¬ mation of higher arithmetic series is apparent before the 16th century. The subject as we now know it was developed chiefly in the fol¬ lowing century and it took its present form in the (Ars conjectandP of Jacob Bernoulli (1713).

The name ˆarithmetic series of higher .order® was given by Leibnitz. Newton was. the first to recognize the importance of infinite series as an instrument of mathematical investigation.

His results were published in 1669 (not printed until 1704) in a work entitled (Analysis per Aequationes Numero Terminorum InfinitasP A systematic treatment of series was given by Euler in his (Introductio in analysin infini- torum) (1748). The principle that an infinite series cannot be safely employed unless it is convergent was first given in this work. Gauss (1813) inaugurated the modern epoch in the theory of infinite series in his memoir, (Dis- quisitiones generales circa seriem infinitam,

x2-...5 Heinsist

. , aFb ,a(a + l)'b(b + 1)

+ l/+ l-2-c-(c + 1)

ed on rigorous tests for convergence and was first to give definite criteria for convergence and divergence. In the (Cours d'analyse de l'Ecole Polytechnique) (Paris 1821), Cauchy extended the theory of power-series to the expansion of functions of a complex variable and gave the important theorem that a series is convergent

n

if the limit ofwVnis numerically less than 1 when n increases to infinity. Further con¬ tributions, including additional criteria for con¬ vergence and a development of the principle of continuity of series, were made by Abel (1826) in his (Recherches sur la serie,

, , m , m{m — 1) , , ,

*1 + -y x -1 – — * + • •*

((Euvres completes, } Vol. I, p. 223). This celebrated memoir is a model of scientific ac¬ curacy and comprehensiveness, and exerted an important influence on the growing spirit of rigorous and critical investigation.

Among modern works on series the follow¬ ing may be mentioned: Chrystal's (Algebra) (Edinburgh 1886), chaps, xx, xxvi-xxxi ; Os¬ good's introduction to infinite series) (Har¬ vard University Publications 1897) ; Godefroy's (Theorie elementaire des series (Paris 1903) ; Runge's (Theorie und Praxis der Reihen) (Leipzig 1904) ; Borel's (Legons sur les series a termes positifs) (Paris 1902) ; Hadamard's (La serie de Taylor) (Paris 1901) ; Jordan's (Cours d'analyse* (Paris 1893), Vol. I, chap, iii ; (Encyclopadie der Mathematischen Wissen- schaften) (Leipzig 1898-1904), Vol. I, part 1, pp. 47-146.*

John I. Hutchinson,

Professor of Mathematics, Cornell University.

SERIES, the term applied to the rocks laid down during an epoch. Thus we speak of the Acadian series as laid down in the Acadian epoch. Series is a subdivision of system (q.v.) just as epoch is a subdivision of period (q.v.).

SERIES-PARALLEL CONTROLLER.

See Electrical Terms.

SERIN, in ornithology, a finch, Serinus hortulanus, which is closely allied to the canary. The bird's mantle and back are of a dark- grayish brown, each feather being edged with a broad strip of yellow. Its head is olive-gray and the throat and breast are of a bright gamboge-yellow, shading to white on the belly. It is four and one-half inches long. The serin- finch is noted as a lively and indefatigable singer. It is migratory and spends the summer and oftentimes the winter in Middle Europe.

SERINGAPATAM, ser-ing-ga-pa-tam' (properly, Sri-ranga-patanam, <(city of Vishnu"), India, a celebrated town and fortress, the former capital of Mysore, 245 miles west by south from Madras, on an island formed by two branches of the Kaveri. The fort, a massive structure, stands on the western end of the island and contains within its walls the ruins of the palace of Tippu Saib (q.v.), a mosque built by the same ruler and an old temple. Just out¬ side of the fort is Tippu's graceful summer palace, now in ruins. At the east end of the island, near the suburb of Ganjam, where almost all the inhabitants now reside, is the mausoleum in which Tippu and his father, Hyder Ali, are buried. The fort was three times besieged by the British, first in 1791 and afterward in 1792 and 1799. On the last occasion the fortress was carried by assault, Tippu being slain. The

town once contained about 150,000 persons, but its population in course of time has steadily de¬ creased until now it is only about 12,500.

SERINUS, in ornithology , a genus of the sparrow family Pringillidcc (q.v.), having a stout cone-shaped bill, broad at the base ; the nostrils basal, round and hidden by stiff frontal feathers directed forward, gape straight, with¬ out bristles. The serinus is small, compact and active; the legs are short and scutelate; the feet strong ; the wings which are moderately long and somewhat pointed have a minute outer primary; and the tail is deeply forked. The serin (q.v.), Serinus hortulcinus, the S. canon¬ ical, the A. canarius, the canary, and N. Pusillus, the red-fronted finch, are inhabitants of the Western Palaearctic regions, but some species are to be found in the Eastern Palae¬ arctic, Oriental and Ethiopian regions.

SERIOLA, in ichthyology [, a genus of Carangidce, divided into 12 species and inhabit¬ ing temperate and tropical waters. The body is oblong and slightly compressed, and the abdo¬ men is rounded ; the first dorsal fin is con¬ tinuous, with feeble spine; villiform teeth in jaws and on the Vomer and palatine jaws. The smaller species are valueless, but the larger species which range from four to five feet in length are used as food.

SERIPHOS, se-ri'fos, or SERPHO (now Serphos), Greece, a mountainous island of the Cyclades group, 50 miles south of Euboea. It contains iron, copper and lead ore — 'formerly exploited. The products are chiefly corn and wine. The ancient town participated in the bat¬ tle of Salamis, furnishing the Athenians with several ships. Seriphos was also a place of exile for the Romans. Pop. 4,000.

SERLIO, sar'le-6, Sebastian, Italian artist: b. Bologna, 6 Sept. 1473; d. Fontainebleau, 1554. He worked as painter and architect at Pesaro for 14 years, leaving that city (1514) for Rome and Venice, where he became Titian's associate. He published at Venice in 1537 his voluminous treatise (Regole Generale d' Architectural He is supposed to have worked with Pierre Lescot on the Louvre. Primaticcio in 1541 was ap¬ pointed architect at Fontainebleau with Serlio as assistant.

SERNA Y HINOJOSA (la-sar'na e en-o- ho-sa), Jose de la, famous Spanish general: b. Jerez de la Frontera, 1770; d. Cadiz, 1832. He fought in the Peninsular War against the*

French and served under Wellington in 1813. After working his way up from the ranks to the position of major-general, in 1816 he was placed in command of the Spanish Royalist army in Upper Peru. In this capacity he was in constant conflicts with the natives and numerous uprisings gave him

the opportunity to display his military ability. He was, however, defeated by the patriots at Salta and Jujuy, and owing to disagreements with the viceroy in regard to the conduct of the army during the campaign, resigned in 1819, but was at once made lieutenant-general and president of the council of war. Not long after this he was again appointed to the command of the army to suppress the uprising under San Martin, and on 29 Jan. 1821, upon the deposition of the viceroy Pezuela by his officers, he became viceroy. He was not able to stem the tide of San Martin's successes and on 6 July 1821 was forced to evacuate Luna, retreating to Cuzco. From here he directed his army and maintained it for over three years against the patriots without any assistance from Spain, and keeping his ground in the interior with great skill and resolution. He was finally defeated on 9 Dec. 1824 by the patriot leader, General Sucre, in the battle of Ayucucho. Though out¬ numbered by the Royalists, the patriots won the battle and Serna with his whole army was captured. He was severely wounded during the fight, and was afterward released and sent back to Spain, where he died at the age of 62.

SEROUS MEMBRANE, a delicate glisten¬ ing tissue of flattened endothelial cells, sup¬ ported by a fibrous and elastic layer in which are capillaries and lymphatics, that glistens on exposure. The serous membranes of the human body are so called because moistened by a serous fluid, and form closed sacs. For the most part they line certain cavities of the body and are reflected over the surface of the organ or organs contained in the cavities. The por¬ tion of the membrane lining the walls of the cavity is known as the parietal portion, the other is the visceral portion. The serous membranes, six in number, are the peritonaeum, lining the abdominal cavity and reflected upon the stom¬ ach, liver, intestines, etc. ; the two pleurae lining the thoracic or chest cavity, and reflected upon the lungs ; the pericardium, a fibro-serous sac covering or enclosing the heart ; and the tunica vaginalis, a closed sac surrounding each testicle. In the female, where the ovum passes from the ovary into the Fallopian tube, the peritonaeum is not a closed sac. The serous membranes are kept moistened by a watery lymph-like fluid, a variety of serum, which, if secreted in large quantity, as in dropsy, may produce bad results. Lymphatic vessels open freely on the surface of serous membranes, hence they are sometimes spoken of as lymph-sacs and the cavities they line as lymph-cavities. A grave danger arising from injuries and inflammation of serous mem¬ branes is the absorption of septic material by the lymphatics. Dropsical effusions, hemor¬ rhage, formation of pus and deposits of fibrous exudations which cause adhesions and prevent mobility of viscera are the principal results of inflammation of these membranes. See Peri¬ toneum.

SEROW, a shaggy goat-antelope (Nemor – rhccdus bubalinus) of the Himalayas, where it

frequents, singly, or in family parties, the roughest slopes, at an altitude between 6,000 and 12,000 feet. Its habits are similar to those of the goral, Rocky Mountain white goat (qq.v.) and other members of the genus, all of which are called ˆserows** by some writers. Consult Lvdekker, (The Game Animals of India>

(1907).

SERPA PINTO, sar'pa pen'td. See Pinto, Alexandre Alberto da Rocha Serpa.

SERPENT, (1) in astronomy, one of the 48 varieties of ancient constellations extending serpent-like through a wide expanse of sky. (2) In music, an almost obsolete bass instrument, consisting of a wooden tube, about eight feet long, increasing conically from one inch diam¬ eter at the mouth-piece to four inches at the open end, twisted into U-shaped turns, followed by a large circular convolution. This is covered with leather, and has a mouth-piece like a horn or trombone, and keys for the several notes to be produced. The serpent is a transposing in¬ strument, being in B flat, and the part it is to take is, therefore, written a note higher than its real sound. Its compass is three octaves and one note.

SERPENT-CHARMING, an art largely practised in Egypt, India a*nd other Eastern lands ; there are allusions to it in the Hebrew sacred books, namely, Ps. lviii, 5, the adder which will not hearken to the voice of charmers ; Eccles. x, 11 and Jere. viii, 17; also in some of the Greek and Latin classics. The power of charming the most formidable serpents, as exer¬ cised by the snake-charmers, is unquestionable; nor is it true that before making an exhibition of their art the charmers always extract the poison fangs of the creature, though that is often done. Dr. Davy, in his (Interior of Cey¬ lon,* expresses his belief in the reality of this singular power. ((I have examined the snakes, w he writes, ((and have found the fangs in and uninjured. These men do possess a charm, though not a supernatural one — namely, that of confidence and courage. . . . They will play their tricks with any hooded snakes (Naja tripudians), whether just taken or long in con¬ finement, but with no other kind of poisonous snakes. w The serpent-charmers are sometimes employed to rid gardens of serpents ; and they readily recognize when a serpent is concealed anywhere. In practising their art for this pur¬ pose, as also in their exhibitions, they employ a kind of flute in aid of their incantations. When the serpents issue from their hiding places the performer secures them by

pinning them to the ground with a forked stick. Those familiar with hypnotism and the French fad for hypnotizing chickens, that flourished in Paris early in the 19th century, will easily recognize that serpent-charming is hypnotic in character.

SERPENT-EAGLE, the secretary-bird

(q.v.).

SERPENT-HEAD, or WALKING-FISH,

a fish of the East Indian and African genus Ophiocephalus, the type .of a family, allied to the climbing perch, and like it able to live a long time out of the water, and to travel by wriggling through moist grass, from one pool to another. The body is elongate, two to three feet long, and covered with medium-sized scales, those on the depressed head being platelike. About 30

species are known, inhabiting many parts of Asia, the commonest being O. striatns, which is sometimes found torpid in dried-up pools and irrigation tanks. When living in muddy water they must rise to the surface from time to time to take in air, or they will smother to death. These fishes are eaten throughout the Orient.

SERPENT-WORSHIP, or OPHipLA- TRY, a primitive form of religion which is still found existing among uncultured races. The serpent's change of skin may well have been suggestive of resurrection and immortality; the more common supposition that the serpent was regarded by his savage worshippers as the per¬ sonification of evil and of maleficence, and as a power to be appeased by gifts and worship, does not appear to be justified by the reports .of travelers, though the Apophis-serpent of the Egyptian Hades, as well as the wicked Aji Da- haka of the Zoroastrians, were undoubtedly wor¬ shipped purely through fear. The brazen ser¬ pent erected by Moses in the wilderness and afterward preserved until the days of Hezekiah was broken in pieces by that king (2 Kings xviii, 4), the image having been made an object of religious worship ; this was apparently a recrudescence of primitive serpent-worship among the people of Judah. The brazen serpent, it is conjectured by Renan ((Hist. Peuple d'Israel I, xi), was a primitive idol of Jahve. In the Biblical narrative Satan assumed the form of a serpent; among the ancient Egyp¬ tians, Typhon was the evil deity, and this idea has generally persisted in Asia, and is ap¬ parent in the hieroglyphics of both the Chinese and Mexicans. The serpent whose head the Messiah was to crush, in heathen fable became the hydra of Hercules, and in India the great monster over whom Krishna triumphed, while Roman mythology developed the 100-headed snake slain by Jupiter. We see a trace, and more than a trace, of a primitive worship of the serpent in

*the great serpent which guarded the citadel of Athens and which was fed every month with honey-cakes ; also in the embassage from Rome on the occasion of a plague, to the temple of ZEsculapius at Epidaurus, whence was brought a living serpent which was received at Rome with great ceremony. Serpent-worship is still extensively practised in India. Among no people has the mystery of this worship weighed more than on the aborigines of Amer¬ ica. It has given name to rivers : examples, Kennebec and Antietam. The name for spirit and snake are one among the Dakotas, the Shawnees and the Sacs. The Ojibways and other aborigines dread to kill a rattlesnake, and if they find one in their path they pray it to go away and spare them and their families. In Mexico sculptured images of serpents are found as large and as carefully wrought as those of India. There is a vast amount of liter¬ ature on the subject, which covers the folk¬ lore of all peoples, and the serpent seems to have been worshipped more than any other creature, and to have been associated with the idea of fertility or fecundity. In many East Indian ceremonies the serpent deities are con¬ stantly associated with women ; certain priest¬ esses were selected for their purity, and other women were chosen as ˆwives** of the snake, and participated in licentious rites. The lore*

*of the serpents is much mixed with dragon literature. Consult all folklore books, and Brinton, (Myths of the New World * (1896) ; Hartland, (Primitive Paternity) (1909) ; Frazer, (Golden Bough* ; Deane, (Serjpent Worship* ; Lawson, (Modern Greek Religion* (1910) ; Bourke, (Snake Dance of the Moquis* ; Fow¬ ler, 1 Roman Festivals* ; Fergusson,*

SERPENTINE, hydrous magnesium sili- , cate, is an abundant and widely distributed mineral. Its hardness varies more than that of any other mineral, ranging from 2 in the variety picrolite up to 6 in bowenite. Its specific gravity varies from 2.14 in some chry- sotile to 2.80 in some precious serpentine. It often occurs in pseudomorphs, over a dozen of which have been described. Among these the most common are the pseudomorphs after chry¬ solite, enstatite, amphibole and pyroxene. Its varieties are mostly based on structure. The massive include precious serpentine, translucent and of rich, dark or pale green color; common serpentine, similar in color, but nearly opaque. The lamellar varieties include antigorite and marmolite. Williamsite, though more massive, is one of the lamellar varieties. It is apple- green and translucent and is often cut and polished. Chrysotile is fine fibrous, the fibres being easily separable and flexible. Its lustre is silky, color pale green, yellow or brown. It often occurs in veins in massive serpentine. See Asbestos.

*Serpentine rocks occur in masses often of enormous dimensions. They are formed, as in¬ deed are all serpentines, by the alteration (((ser-pentization**) of other minerals, most com¬ monly olivine (peridotyte), pyroxene or amphi¬ bole. They are often more or less mixed with limestone or magnesite, these minerals giving the mass a clouded or veined appearance. Verd antique (q.v.) or ophicalcite and many other serpentine rocks are known as serpentine mar¬ bles and are extensively used in interior decora¬ tion. Some of them are very highly prized for their rich green, yellow and brown colors, others are beautifully mottled with red. (Con¬ sult Merrill, (Stones for Building and Decora¬ tion*). Many buildings in Philadelphia and other cities are constructed of a green serpen¬ tine rock from West Chester, Pa. Among the most noteworthy regions producing serpentine are England, Ireland, Maryland, New Mexico, California and Washington.*

SERPENTS, or SNAKES, reptiles of the

saurian class Ophidia, characterized by an elon¬ gated, cylindrical, limbless, scaly form, and distinguished from lizards (q.v.) by the fact that the halves (rami) of the lower jaws are not solidly united at the chin, but movably con¬ nected by an elastic ligament. The vertebrae are very numerous, gastrocentrous and proccelous, Each vertebra is connected with its neighbors that is, hollow in front and convex posteriorly, by free ball-and-socket joints, horizontal con¬ necting projections preventing twisting, while admitting of considerable vertical and horizon¬ tal play; and bears ribs, which may exceed dOO pairs in number. No front limbs, sternum or sacrum are ever developed, but vestiges of an¬ cestral hind limbs remain in the boas, pythons and closely related forms, and in some lowly burrowing groups. The ventral tips of each

pair of ribs are fastened to opposite ends of one of the abdominal scutes (gastrosteges), forming a mechanism for locomotion in the absence of legs. Progression is by three methods. (

*It is impossible for any ophidian to jump, and it is with extreme difficulty that more than the anterior half of the body can be raised, unas¬ sisted, from the ground.**

Structure. — The skull of serpents consists of a series of bones homologous with the cranial bones of other vertebrates, but slight and, out¬ side of the brain-box, joined by elastic liga¬ ments, permitting great distention of the mouth and throat, so that serpents are able to swallow objects of large bulk. This arrangement is fur¬ ther facilitated by the quadrate bone, which articulates the lower jaw with the skull, being movable. The jaws are provided with hooked teeth of conical shape, ossified to the jaws, but not

*lodged in distinct sockets, which are use¬ less for mastication, and are of service only in holding the prey in the mouth. The teeth are never permanent, but are capable of being re¬ newed, like those of fishes, whenever the old ones become worthless. Valuable characters in classification are derived from the conforma¬ tion and disposition of the teeth. Thus in the typical, non-poisonous serpents, both jaws and the palate bear continuous rows of solid con¬ ical teeth and the upper maxillae are immobile. In the viperine snakes simple conical teeth are absent on the upper maxillary or jaw bones, which are of small size and can be moved up¬ ward or downward at will. The upper maxillae in these latter snakes further bear each a so- called ((poison-fang,** an elongated canaliculated tooth perforated by a canal which communi¬ cates internally with the duct of the poison- gland. These fangs are capable of being ele¬ vated or depressed. (See Rattlesnake; Vi¬ pers). As regards their internal structure ser¬ pents present few points requiring notice. The digestive system comprises large salivary glands, a distensible gullet, stomach and intes¬ tine, which terminates in a cloaca — the exter¬ nal opening of the cloaca being transverse in conformation. There is no urinary bladder, yet serpents drink a great deal of water and must have it in abundance when kept in cap¬ tivity; at the same time they have remarkable powers of long fasting. The heart (see Rep¬ tiles) consists of three chambers only — two auricles and a ventricle, the circulation being of the mixed character characteristic of reptiles and amphibians. The lungs, ovaries and other paired or symmetrical organs exhibit an abor¬ tive condition of one of these structures/ the left lung, for example, far outgrowing the right one, and doing all the work. ((The trachea is long and may be provided with air-cells and the*

larynx can be projected during the tedious process of swallowing, when, too, the air-cells and the posterior reservoir come into play.® All these modifications are in adaptation to the slender, elongated form of the animal and to its methods of life. The sexes are perfectly distinguished and the penis of the male con¬ sists of a pair of organs (hemipenes), grooved on their inner sides, which when erected are pressed together and so form a tubular intro- mittent instrument. The special modifications of this organ constitute one of the most stable "characters® or criteria by which to classify the subdivisions of the Ophidia. The eggs of the viperine, and some other snakes, are retained within the oviduct of the female until the young escape, so that these species are ovo-viviparous. In the majority of serpents, however, the eggs, which are oblong and have a leathery integu¬ ment, are deposited in warm soil, among rotting wood, in heaps of decaying

vegetation or in some similar warm and concealed place, where they are left to mature ; but the pythons coil about their eggs and incubate them by the feeble heat of their bodies; and all kinds wait for and protect their young when born. It is true, to a limited degree, that at times of danger, the little snakes take refuge in the capacious mouth and throat of the mother.

Sense-organs. — The senses of serpents vary in respect to acuteness. The skin is highly sensitive to touch, and a few snakes have ten¬ tacle-like outgrowths upon the muzzle sup¬ posed to be "feelers® ; this sense is principally developed, however, in the tongue, which is thread-like, forked at the end, usually black, very long and far-protrusible through a notch in the upper lip when the mouth is closed. With this tongue — mistaken by the ignorant for a "sting® — the animal tests the quality of all objects as it moves about and gains most of its information. There are no external ears, but the hearing in some, if not in all, is good. The nostrils are at the tip of the snout, and the sense of smell is keen, — serpents find and fol¬ low their prey mainly by its aid. The eyes of serpents have no eyelids, yet they sleep ; a watch-glass-like layer of the skin overlies and protects the ball and peels off in the annual exuviation of the outer skin (see Molting). The pupil is usually round, but in the boas and some others is a mere vertical slit.

Phylogeny. — Serpents are the latest and highest development of the reptilian type and seem to be the only representatives of the class which are now flourishing rather than declining. They are distributed principally in the warmer regions, only the smaller forms extending into the northern temperate zone. Where the cli¬ mate is even moderately cold in winter snakes creep into animals' burrows, holes among loose rocks and other underground places and un¬ dergo hibernation, — often many entwine to¬ gether, especially toward spring, when they are seeking mates. A similar retirement (aestiva¬ tion) occurs in countries exposed to annual periods of heated drought. By far the greater number of ophidians are terrestrial, although some are arboreal, others amphibious and a few exclusively marine. About 400 recent genera and 'nearly 1,800 species are known, but only about 35 fossil forms, according to Eastman, who reminds us that many fragmentary remains of the Cretaceous Age, at first regarded as

ophidian, are now known to be dolichosaurian. Tertiary snakes can hardly be distinguished from modern species and occur in all parts of the world, including the Eocene of New Jersey and the Eocene and Miocene of the Rocky Mountain region. These remains and other considerations make it plain that the serpents are an outgrowth from the same ancestral stock (Sauria) as the lizards.

Classification. — The following is a progres¬ sive arrangement of families, from lowest to highest in organization, some of them including' several

groups formerly regarded as separate families :

1. Typhlopidce. Burrowing snakes of south¬ ern Asia and the islands of the Indian Ocean. Have vestiges of the pelvis and the eyes cov¬ ered by skin.

2. Glauconiidco. Replace the Typhlopidae in Africa and tropical America.

3. Ilysiidce. Burrowing snakes of the tropics with vestigial hind limbs. Tail short and blunt (blind snakes).

4. Uropeltidce. Burrowing snakes of Ceylon and southern India. Tail truncate, ending in a flat shield (shield-tails).

5. Boidce . Large, typical snakes, with rudi¬ ments of hind legs and pelvis and ventral scales transversely enlarged. The family comprises about 70 species, found all over the world in tropical and subtropical countries and noted for their rapacious habits and ability to crush ani¬ mals, large as compared with themselves. Typ¬ ical genera are Python (q.v.), with about 20 Palseo-tropical and Australian species, one in Mexico, and the Boa (q.v.), which has many South American species and a few in Mada¬ gascar.

6. XenopeltidcE, one Malayan species.

7. Colubridce. Includes 90 per cent of all snakes; the pterygoid bone reaches the quad¬ rate. It is divisible into three series: (1) No teeth grooved ; (2) the posterior maxillary teeth grooved (poison-fangs) ; (3) the anterior max¬ illary teeth grooved (poison-fangs). The first includes the non-venomous colubrine snakes of more than 1,000 species, such as the blacksnake, garter-snake, water-snake, hog-nose and the or¬ dinary harmless serpents of all parts of the world. The second group (2) comprises opis- thoglyph, partly poisonous snakes, found in the tropics of both continents, terrestrial, aquatic, even marine species. The third group (3) contains many violently poisonous, protero- glyph snakes. Here fall the cobras, coral snakes and other elapine serpents, whose bite is to be dreaded.

8. Amblycephalidcu. Tropical snakes, in which the ends of the pterygoids are free, not reaching the quadrates. Harmless, but re¬ sembling poisonous snakes.

9. Viperidce. Maxillaries, short and mov¬ able, so as to erect the poison-fangs, which are the only maxillary teeth. Two subfamilies: (1) the Old World vipers; (2) the rattlesnakes (q.v.) and related pit-vipers.

Bibliography. — Books mentioned under Reptiles; also Hopley, (New York

1901); Fayrer, (Thanatophidia of India) (London 1874) ; Ewart, (Poisonous Snakes of India (London 1872) ; Kreft, (Snakes of Australia) (Sydney*

AMERICAN SERPENTS

1 Milk Snake

2 Copperhead

3 Blacksnake

4 Mountain Blacksnake

5 Eastern Rattlesnake

G Water-snake

7 Ribbon-snake

8 Garter-snake

1869) ; Holbrook, (North American Herptol- ogy) (Philadelphia 1842) ; Ditmars, (The Rep¬ tile Bookˆ (New York 1907) ; Cope, (Croco- dilians, Lizards and Snakes of North America> (Washington 1900). The last named is the most complete work on American serpents and is published by the Smithsonian Institution, in whose annual reports and other publications will be found much additional valuable infor¬ mation, especially the contributions by Yarrow, Stejneger, Mitchell and Hay.

Ernest Ingersoll.

SERPUKHOV, ser-poo-Hof', or SERPU- CHOW, Russia, a town in the government of Moscow, on the Nara River, 57 miles southwest of the city of Moscow, comprising three divi¬ sions. One of these, the Eort, is enclosed by walls, now in ruins. An ancient cathedral is the only building worth noting. Agriculture is an important industry, and there are manufactures of wool, cotton, leather, paper, chemicals, etc. An active trqde with the interior is carried on, especially over the Oka River.

SERPULA, a tube-making marine chseto- pod worm (see Chˆtopoda), which often lives and reproduces its tubes in such close proximity over considerable areas as to form, with the cemented fragments of coral, sea-

shells, sand, etc. ; caught among its entwined tubes may be large masses of rock. Such are to be seen on the coast of Florida.

SERRA DA ESTRELLA, sar'ra da es- tral'ya, Portugal, in the province of Beira, is the highest range of the country, attaining an altitude of 6,540 feet. It belongs to the Guadarramas system, and is a continuation of the Gata Range in Spain, terminating in the Serra de Lousao. Numerous lakes, some of which are warm, occur in the ridge, and the rivers Condicira and Unhaes form fine cascades. The surrounding scenery is remarkably pictur¬ esque.

SERRA DO MAR, doo mar, a coastal range of mountains running east by north from Sao Paulo, Brazil.

SERRANID.7E, a family of acanthropter- ygian bony fishes typified by the sea-bass (q.v.). The body is generally rather short and heavy, slightly compressed, with moderate or large head and covered with usually ctenoid scales. The mouth is usually large and is provided with numerous teeth all of one kind arranged in broad bands on the vomer and palatine bones as well as on the jaws. The fins are well de¬ veloped and the dorsal spines usually large and strong but variable in number. Sometimes the dorsal and caudal fins are furnished with fila¬ ments or streamer-like appendages. The swim- bladder is usually comparatively small and at¬ tached to the body walls. This is a large family of carnivorous fishes, including about 70 genera and more than 400 species, almost all of which are marine and especially abundant in tropical waters. They are closely related to the Percidcz and, like that family, include a large number of valuable food-fishes. In, North American waters no less than 28 genera and 90 species are found, almost all of which are good and a number very important food-fishes. Among them may be mentioned, in addition to the sea-bass, the striped bass, white perch, yel¬ low bass, jew-fish, groupers and squirrel-fish,

most of which are described elsewhere in this work. Consult Jordan and Evermann, (The Serranidse,> Bulletin No. 8 (United States Fish Commission, Washington 1890).

SERRANO Y DOMINGUEZ, ser-ra'no e do-men'gath, Francisco, Duke de la Torre, Spanish statesman: b. Anjonilla, Andalusia, 18 Sept. 1810; d. Madrid, Spain, 26 Nov. 1885. He entered the Military College in 1822, became an ensign in 1825 and served in the coast guard until 1833, but after the death of Ferdinand VII he gained favor with Queen Isabella and espoused the cause of the child queen Isabella II, against the Carlists. He played an active part in the troublous politics of Isabella's reign, at times holding high offices in the administra¬ tion and again at variance with the

ministry. For implication in the insurrection of Saragossa in 1854 he was exiled but in June returned and took part in the successful revolution of Espar- tero and O'Donnell. In 1857 he was sent as Ambassador to Paris, and in 1860 he went to Cuba as captain-general. In 1866, after the overthrow of O'Donnell's government, Serrano was banished, but in 1868 returned, assisted in overthrowing the queen's army and forced her to leave the country. He then acted as regent until the accession of Amadeus of Savoy in 1870. He was successful in his warfare against the Carlists both in 1872 and in 1874, and during much of the latter year was at the head of the government. He resigned the monarchy into the hands of Alfonso XII, in 1875, but con¬ tinued active in political life, and in 1883 was appointed Ambassador to France.

SERRELL, Edward Wellmann, American civil and military engineer: b. 5 Nov. 1826; d. New York City, 25 April 1906. He entered the engineering profession and was employed .on the Erie Railroad, the Central Railroad of New Jer¬ sey, the Panama survey, the Niagara bridge, the Hoosac Tunnel and other large engineering works. He was an assistant to the chief of topographical engineers, United States of America; entered the Federal engineer corps as a colonel in the Civil War; was at the capture of Fort Wagner and devised the <(Swamp Angel® battery that shelled Charleston, S. C. He became chief engineer for the Department of the South, and was in 126 actions, being brevetted brigadier-general. He suggested im¬ provements in guns and gun-carriages, and issued some 50 reports on railroads and bridges.

SERRES, Dominic, Engish marine artist: b. Auch, Gascony, 1722; d. London, 1793. He is said to have been a nephew of the archbishop of Rheims and was intended for the Church, but this not suiting his taste he ran away from home and became a sailor, eventually becoming master of a Spanish trading vessel. Being taken prisoner by a British warship, he was carried to England, where he afterward resided. Having had some instruction in drawing, he began life in his adopted country as a painter of naval pieces, for which the wars of the period fur¬ nished subjects. Serres became a member of the Incorporated Society of Artists in 1765 and exhibited with them for two years. On the establishment of the Royal Academy in 1768 he was chosen one of the foundation members. Among the pictures exhibited by Serres at the

Royal Academy were (The Siege at Fort Royal, Martinique) (1769), and (The Engagement be¬ tween the Serapis ana the Countess of Scar¬

borough with Paul Jones and his Squadron (1780). In 1792 he was appointed librarian to the academy, and also marine painter to George III.*

SERRES, John Thomas, English marine artist: b. London, December 1759; d. there, 28 Dec. 1825. He was the elder son of Dominic Serres (q.v.), and followed his father's profes¬ sion. In 1780 he began to exhibit at the Royal Academy. In 1790 he went to Italy to further study his art. In 1793 he succeeded his father as marine painter to the king and was also ap¬ pointed marine draftsman to the Admiralty. In 1801 he published a translation of (The Little Sea-Torch, a guide for coasting ships, and in 1805 his (Liber Nauticus,* or instructor in the art of marine drawing. He had married in 1791, and although legally separated from his wife in 1804, her pretensions to be the Princess Oliver of Cumberland involved him in many difficul¬ ties throughout the latter part of his career.*

SERTORIUS, ser-to'ri-us, Quintus, Ro¬ man general: b. Nursia, Italy, about the end of the 2d century b.c. ; d. Asia Minor, 72 b.c. He served with distinction under Marius against the Teutones and in Spain, and held the office of quaestor in Cisalpine Gaul, but becoming em¬ broiled in a quarrel with Marius, who had opposed his election as consul, he fled to Spain, where he collected a force to oppose the army of subjugation sent by Sulla to subdue that country. But the means of Sertorius were unequal to the conflict, and embarking at New Carthage he passed into Africa and successfully commanded the subjects of Mauritania, who were in revolt against their king. This success gained him the confidence oi the Lusitanians, who placed him at the head of the large force yyith which they were opposing Sulla, and Ser¬ torius withstood for a number of years a much superior force of Romans successively com¬ manded by Annius, Metallus Pius and Pompey. But Sertorius loved Rome and fought with reluctance against its forces. He, therefore, now accepted the offer of Mithridates, 3,000 talents and 40 ships of war, to ally himself with him in an effort to recover Bithynia and Cap¬ padocia. Sertorius received the sum and was making preparations to push the war, when he was slain through the treachery of Perperna, who had joined him two years before and who now assassinated him at a feast.

SERUM THERAPY, a mode of treatment of disease by means of the modified blood serum of man or other animal. It is one of the subdivisions of therapeutics (q.v.) and in its more scientific details is of distinctly modern development. In its early and crude forms, however, serum therapy is of very great an¬ tiquity. Serum therapy is employed both for its protective power as well as for its curative aid. Inasmuch as the gradual growth of knowl¬ edge concerning the protective power of blood serum has been in large part an offshoot of the study of bacterial poisons it is usual at the present time to include under the study of serum therapy a number of

related subjects — particularly the effects of bacteria toxins in disease, hence they will be included in this ac¬

count. It is related that King Mithridates knew that by taking small doses of snake poison he might render himself immune to larger doses and in this old, well-recognized principle one sees the early shadowings of the principle of isotherapy — the principle now so fully recog¬ nized that after all the body tissues are the best defense against infectious diseases. The exact details of all the protective processes are not as yet known, but enough have been dis¬ covered to place serum therapy on a sound basis. It has been known for a long time that many infectious diseases rarely attack a per¬ son a second time. This is characteristically true, for instance, in measles, scarlet fever and whooping cough. It is less true for diphtheria, for typhoid fever, for pneumonia. When the discovery of bacteria made it evident that many of these diseases were due to these low plants, it was then shown that injections of the bac¬ teria caused the disease and that a certain grade of immunity was produced- Following this it was learned that it was not necessary to inject the bacteria themselves to get symp¬ toms of the disease, but that the injection of the filtered products of their growth, that is, their toxins, might cause the same phenomena, and finally it was shown that as a result of the injections, either of the bacteria, or of their dead bodies, or of their filtered toxins, certain changes took place in the blood and that new substances were formed in the blood which in different ways counteracted the effects of the injections; finally it was a logical step to de¬ velop these anti-bodies — as they have been called — in the blood serum of another animal and use this serum in the treatment of the par¬ ticular disease in man. This is the simple ex¬ planation as applied in the serum therapy, say of diphtheria. After the success of the anti- diphtheritic serum became established it was thought that all of the infectious diseases would be immediately conquered by an application of the same principle but in practically all in¬ stances it was found that whereas the principle worked out very definitely for diphtheria, it did not apply to other infectious diseases as di¬ rectly, and the results while at times seem¬ ingly excellent, at other times were very disap¬ pointing. This disparity between the good suc¬ cess in diphtheria with antitoxic sera and the lack of results in other infections served to draw attention to the fact that the protective mechanisms in the blood serum were much more complicated than was at first thought. A new line of study was opened when it was shown that in some instances following the use of protective sera, the bodies of injected bacteria resulted from the use of the serum. Thus bac¬ teriolysis were found to be destroyed, that is, in addition to a chemical antidote, antitoxic serum, a bacteria-destroying serum became a possibil¬ ity. It is highly probable that in tuberculosis this bacteriolytic action of the blood serum is constantly at work. At about the same time, or even previously, the

peculiar power that certain blood sera possessed in agglutinating or causing bacteria to clump up and hang to¬ gether was observed in typhoid fever. This led to the discovery that certain specific sub¬ stances, called agglutinins, were present in cer¬ tain instances and that these agglutinins were protective devices elaborated by the body in

its struggle with infectious micro-organisms. This peculiar property of agglutinating bac¬ teria has developed one of the most reliable of tests — the so-called Widal reaction for the detection of typhoid fever. Thus far practical agglutinating sera have not been devised. Ag¬ glutination seems to be an active factor in immunity rather than a passive one. As shown in our article on Immunity two distinct phases are present, an active and a passive immunity, and at the present time it is the endeavor of serum therapy to bring into defensive action as many of the factors as possible. Thus by in¬ jecting into the human body living bacteria, which have had their virulence modified, either by growing them in oxygen or by attenuation through growth in certain animals, or by sub¬ jection to high temperatures, or by growth in weak antiseptic media, a certain type of active immunity may be conferred. This principle is made use of in Haffkine's anti-cholera injec¬ tions. In the sera used in combating the plague and in immunization against typhoid, injec¬ tions of the dead bodies of bacteria are prac¬ tised. Finally active immunity may be in¬ duced by the injections of filtered bacterial toxins. These three types of treatment apply the principle of prevention, however. They are meant to so enhance the protective agencies of the blood serum that infection shall not take place. They are not in any sense of particular service after the disease has once begun. They are only the first stages in the development of a curative blood serum. As illustrations of these methods the following may be mentioned :

(1) Pasteur's preventive inoculations against anthrax in sheep — highly successful. The im¬ munity lasts about a year (see Anthrax).

(2) Jenner's vaccination against smallpox (see Smallpox and Vaccination).
(3) Haffkine's anti-cholera inoculations. Large bodies of men in India have been inoculated first by an at¬ tenuated virus, then by a strong virus. The results thus far are not conclusive, but they are encouraging (see Cholera).
(4) Haff¬ kine's anti-plague inoculations. (See Plague, Bubonic). In this the dead bacteria of the plague and their toxins are injected. These are prepared in a specified manner. Accord¬ ing to recent reports of the Indian Commis¬ sion the results are highly satisfactory, but better methods for standardizing the dosage are desirable. Other methods of combating the

plague after .it has attacked the body are in vogue. These belong to the section on passive immunity modes of treatment. Yersin and L.ustig have developed these sera. (5) Wright's anti-typhoid inoculations. In these dead bac¬ teria and their toxins are also used. The re¬ sults reported from time to time are encourag¬ ing. In India of 4,502 soldiers inoculated only about 1 per cent contracted the disease, whereas of 25,000 uninoculated soldiers in the same station 2.5 per cent contracted the disease. In the Spanish War typhoid fever was a scourge, in the recent World War the use of anti¬ typhoid vaccinations practically wiped out the disease, as effectively as the smallpox vaccina¬ tions wiped out that disease. (See Typhoid Fever). (6) Pasteur's method of treatment of hydrophobia is an application of these same principles. In this the body is slowly . im¬ munized by using modified virus grown in a special medium, the spinal cord of dogs or rab¬

bits, and before the actual infection takes place, immunity is effected during the incuba¬ tion period of the disease. (See Hydro¬ phobia). (7) Maragliano's anti-tuberculosis vaccination. This is one of the recent (1904) efforts to confer immunity in this dread disease. The investigator after a number of years of experiment both in labora¬ tories and in hospitals believes that it is pos¬ sible to produce a specific therapy for tuber¬ culosis. He has been able to immunize lower animals against the disease and his methods offer much hope for successful human immuni¬ zation. The main principle of Maragliano's therapy is to create a peripheral focus of tuber¬ culosis inflammation without living tubercle bacilli and bring about by this means the ac¬ tive production of defensive materials. These defensive materials are antitoxins, bacteriolysins and agglutinins. It is yet too early to pro¬ nounce upon Maragliano's success, but his studies have served to reawaken a keen interest in the serum treatment of this lisease which by reason of many failures had almost become despondent. The good work done by Trudeau in this country long ago began to bear fruit under many different forms, although as yet no secure immunization against tuberculosis has been accomplished. Anti-meninococcus serum for cerebro-spinal meningitis has been effec¬ tive and a possible serum for poliomyelitis is now being perfected (1919). It is needless to point out that all of these advances have come through the honest workers in the medical pro¬ fession. Secret commercial enterprises are no¬ toriously unreliable and border on quackery if not criminality. All of the methods which have just been enumerated are prophylactic rather than curative. They seek to prevent the diseases in question. The use of antitoxic and anti¬ bacterial sera — serum therapy in the narrow sense — is meant to be distinctly curative of the conditions after infection has definitely taken place. Technically speaking these sera bring about what is known as passive immunity. At the present time, two distinct kinds of sera are being used. (1) Antitoxic sera and (2) Anti-bacterial sera. In both of these anti-bodies

are developed in the serum of another animal. (1) The antitoxic sera are the most promising — that for diphtheria (q.v.) having been proven to be the most efficient. Concerning its value there is at the present time almost no doubt A great reduction in the mortality of diphtheria has resulted since the beginning of its use by Behring in October 1894. Anti-diphtheritic serum is developed in the horse. The process of manufacture is described elsewhere. It is important that in practice the serum should be used early in the disease, as it has been shown that the mortality is only about 7 per cent when treatment has been begun on the first or second day, while after the fifth day it seems to be of little service. The amount to be given is very difficult to determine. The other most import¬ ant antisera are for streptococcus poisoning (blood poisoning), for tetanus, for plague, for pneumonia and for snake bite. Others may in time be developed. In the treatment of acute tetanus (lockjaw), the results have not yet proven absolutely satisfactory; some patients have seemed to be benefited, others not. Two sera are in use. (1) Behring and Roux; (2) Tizzoni. It seems that the latter serum is the

more successful. Some have ascribed this to a diminished virulence of the tetanus organism in Italy. A serious bar to a successful therapy is present in this disease in the great resistance shown by the nerve-cells to the diffusion of the serum. To obviate this, intraspinal and introcranial injections have been practised. The results have not yet proven entirely satis¬ factory.

The anti-streptococcic sera are in the experi¬ mental stage only. Just why results have not been obtained is not yet clear, but there are many different kinds of these streptococci and it may be that each form has its own par¬ ticular type of poison that can be counteracted only by a serum developed with a similar form. The subject is slowly emerging from a highly technical condition and better results may be hoped for. Very striking effects have been ob¬ tained from some of the. anti-venom sera, par¬ ticularly in treating the cobra poisoning, by Calmette's serum, but the subject is still in the experimental stage. Anti-pneumococcic sera are beginning to be available. These will consti¬ tute a great blessing when they finally are evolved. The natural history of pneumonia and the known characters of the various types of pneumococci offer considerable hope for conquering this dread disease. Certain types of pneumonia are amenable to their use with suc¬ cess.

True bacteriolytic sera have not yet been devised as specific means of therapy. Such sera, as Yersin's anti-plague serum, which have been made,

are thought to act partly as anti¬ toxic, partly bacteriolytic sera, but all of the details are not yet available. Very recently the suggestion has come from Ehr¬ lich that immunity to protozoan diseases is possible. Summarizing the results then of serum therapy it may be said that (A) active immunity can be imparted with great hope of success in smallpox, rabies and anthrax, in animals; in cholera, typhoid, plague. That curative antisera are of positive value in diphtheria and snakebite, and that hopeful re¬ sults have been obtained in tetanus, plague dysentery, pneumonia, blood-poisoning (strepto¬ coccus), meningitis, poliomyelitis, some forms of streptococcus poisons. Further studies may bring more into both the hopeful and positive class. See Bacteria; Bacteriolytic; Im¬ munity; Infection; Pathology; Toxin and Anti-toxin ; Toxicology.

Bibliography. — Wassermann, ffmmune Sera5 (1904) ; Waldheim, (Die Serum-Bakter- ientoxin and Organ Praparate5 (1901) ; Ency¬ clopedia Medica Article, therapeutics — Serum Therapy5 ; Stedman, (Reference Handbook of Medical Sciences5 ; Zinser, immunity5 ; Vau¬ ghan, (Immune Sera,5 in special journals de¬ voted to the subject, the (Journal of Immunol¬ ogy5 being one of the most recent.

Smith Ely Jelliffe,

Editor (Journal of Nervous and Mental Dis¬ eases. 5

SERVAL, a large African wildcat (Felis serval), yellowish in color, long-legged and thickly spotted with blackish, which also ap¬ pears as bars on the legs and rings around the tail. It may exceed three feet in length, be¬ sides 15 inches ,of tail. Its fur is highly valued for its beauty. A smaller species or variety

(F . servalina) is called by Mivart the servaline cat. Consult Mivart, (The Cat5 (1892).

SERVANTS. See Family Law.

SERVANTS OF MARY. See Orders, Religious.

SERVETUS, ser-ve'tus, Michael (properly MIGUEL SERVETE), Spanish scholar: b. Tudela in Navarre, 1511; d. Geneva, 27 Oct. 1553. He was the son of a notary, who sent him to Toulouse for the study of the civil law. Excited by the discussions of the Reformers in that city, he began to give his attention to theology, and having formed views of the Trinity antagonistic to the orthodox doctrine, removed to Germany and there printed a tract, entitled (De Trinitatis Erroribus5 (1531), which production was followed next year by his (Dialogorum de Trinitate Libri Duo.5 But he found that the expression of his opinions was obnoxious in Germany, and made his escape to France, under the name of Michael of Villa Nueva. He engaged for some time with the Frellons, book-sellers of Lyons, as corrector of the press, then went to Paris, where he studied physic, and graduated as doctor. At Paris Servetus met Calvin for the first time, and after several meetings an arrangement was made for a theological discussion between them, but Servetus failed to appear. Soon after he quarreled with the medical faculty at Paris, and quitted the city (1538). He first repaired to Charlieu, near Lyons, where he practised three years. In 1538 Servetus published his matured theological system, without his name, under the title of ˆhristianismi Restitutio.5 The magistrates of Vienna ascertained the name of the author, and Servetus was committed to prison, whence he contrived to escape. Pur¬ posing to proceed to Naples he took his way through Geneva, where he was apprehended by the magistrates on a charge of blasphemy and heresy. In order to ensure his condemnation his various writings were sifted for accusations. The magistrates of Geneva were, however, aware that many eyes were on them in respect to this extraordinary treatment of a person who was neither a subject nor a resident, but, prop¬ erly speaking, a traveler kidnapped in his pas¬ sage. They thought proper, therefore, to con¬ sult the magistrates of all the Protestant Swiss cantons, who, referring the matter to their divines, the latter unanimously declared for his punishment, Calvin being especially urgent and emphatic as to the necessity of putting him to death. As he refused to retract his opinions, he was condemned to the flames, which sentence was carried out. Servetus is numbered among the anatomists who made the nearest approach to the doctrine of the circulation of the blood, as appears from a passage in his destitution Christianismi.5

SERVIA. See Serbia.

SERVIAN LANGUAGE AND LITERA¬ TURE. See Serbian Language and Serbian Literature.

SERVICE-BERRY, one of the common

names applied to the rosaceous genus of shrubs or small trees Amelanchier (q.v.). There are several species in the north temperate zone, the American ones differing chiefly in habit and in foliage. The leaves are alternate and simple,

either toothed or entire, and the five-parted flowers have delicate white petals and are solitary, or more usually in racemes, succeeded by fruits like tiny purplish apples or pears. The species are generally small shrubs, but the A. canadensis and A. botryapium, the shadbushes and juneberries of the eastern United States, occasionally arrive at the dignity of small trees, with hard brown wood. These are the first shrubs to bloom in the East (while the shad are running), and cover themselves with feathery elongated tassels of fugacious petals, while the leaves are still folded. The haw-like fruits, of somewhat insipid flavor, seldom reach ma¬ turity, as they should in June, for then the birds are too fond of them to wait for their ripening. This circumstance militates against the proposed cultivation of the juneberry.

A. alnifolia is the well-known service-berry of western America, frequently mentioned by explorers of the Rocky Mountain region. The purple, rich, although insipidly sweet, berries are about the size of a pea, with a large mucilag¬ inous seeds. They form a favorite food of the aborigines, who cook them or dry them, and add them to dried meat, to flavor pem- mican. They grow upon bushes 2 to 12 feet high, with glabrous thick alder-like leaves, nearly orbicular and coarsely toothed. The wood itself is very hard and tough and is used by the Indians for arrows and pipe-stems.

The fruit of the white beam-tree (Sorbus aria) is also called service-berry. See also Amelanchier.

SERVICE MEN OF THE SPANISH- AMERICAN WAR, an association organized at Lexington, Ky., 5 Nov. 1898. The founders of the society made choice of the designation (

SERVICE-TREE, a round-headed, slow- growing European tree (Sorbus domestica) of the Rosacece, attaining a height of perhaps 60 feet. When without flowers or fruit, it is easily confounded with the ash, having pinnate leaves ; but the glutinous winter buds help to identify it. The small whitish flowers are numerous, and gathered in panicles at the end of the branches, being succeeded by small rounded or pear-shaped fruit, which is

only edible when in a state of incipient decay, being astringent while unripe. The wood is hard, solid and fine-grained, and takes a high polish. It is much in demand for fine cabinet making, for turning and especially for the screws, of wine presses; and is very dear. The service- tree is occasionally cultivated.

SERVISS, Garrett Putnam, American au¬ thor and journalist: b. Sharon Springs, N. Y., 24 March 1851. He was graduated from Cornell University in 1872, and from Columbia Law School in 1874. He was editorial writer on the New York Sun until 1892, and has since lec¬ tured upon history and astronomy. Among his

published works are (Astronomy with an Opera Glass' (1888) ; (The Conquest of Mars' (1898) ; (Other Worlds' (1902) ; (The Moon' (1907) ; (Astronomy with the Naked Eye'

(1908) ; (Curiosities of the Sky' (1902) ;

(Round the Year with the Stars' (1910) ; (The Moon Maiden' (1915).

SERVITES. See Orders, Religious.

SERVITUDE, the state or condition of a serf, slave or bondman ; state of voluntary or involuntary subjection bo a master or employer; service; slavery; bondage; position in life of a servant; — hence, a state or condition of slavish or helpless dependence ; as, marriage with rich and ugly old women is splendid servitude. In civil law, the right to the use of a thing, with¬ out property in the same, for all or for some particular purposes. It consists either in the right to do some act, as to gather fruit from the estate, or to prevent the owner of the prop¬ erty from doing certain acts, as building walls beyond a certain height, blocking up a window, etc.*

SERVIUS, Honoratus Maurus, Roman grammarian. He lived at Rome toward the 4th century a.d., and wrote a commentary on the Grammar of Donatus ; some lesser grammatical brochures ; and a commentary on the poems of Virgil which an unknown author enlarged and enriched with notes of an antiquarian, his¬ torical and mythological character. Consult Thilo and Hagen, (Servii Honorati Opera'

(1878).

SERVIUS TULLIUS, ser'vi-us tul'i-us, sixth king of Rome : d. 534 b.c. He was the son of a slave, but traditions

SERVUS SERVORUM DEI (servant of the servants of God), a title which

the popes give themselves. It was used by the Roman pontiffs at an early period, although Paulus

Diaconus states that Gregory the Great (590- 604) was the first to adopt it.

SESAME, a rough-hairy, gummy annual plant (Sesamum indicum) about two feet high, with petiolate, ovate-lancoolate leaves, opposite below and alternate above, slightly toothed, and mucilaginous. The flowers are solitary in the axils, pale or rose-colored, five-parted, with irregular-lipped corolla,, having the tube curved downward and dilated above the oblique base. Sesame has been known from ancient times, originating in the East, where it is cultivated fior the sake of its black or white seeds. It is easily grown, does not object to poor soil and has even been introduced to gardens in Amer¬ ica, for the sake of the leaves, which in infusion are employed as a demulcent medicine for in¬ fantile dysentery. The plant has run wild in the Southern States.

The seeds are very tiny, but are sweet and oleaginous, and are much used for food by Ori¬ ental peoples, and are imported into Europe for crushing. They will yield half of their weight in oil, which is yellow, limpid, inodorous and keeps for years without becoming rancid. It is of great economic value, second only to cocoanut oil in the variety of its uses, and can be em¬ ployed instead of olive oil in very many ways, as for culinary purposes, food, medicine (having a laxative effect), cosmetic, illumination, lubri¬ cation, soap-making, etc. It is also employed as an adulterant for olive-oil, but is itself adul¬ terated with peanut-oil. It is known as bene or benne and as gingil-oil. The cake left after the oil has been expressed forms a food for the poorer classes, and is a good food for cattle.

SESAMOID BONES, certain rounded bodies, at first cartilaginous and then bony, found in the tendons of muscles. They derive their name from their resemblance to sesame. The patella or knee-cap is a sesamoid bone. Another is developed in the upper joint ‘ of the thumb, and at the corresponding joint of the great toe, these increasing the leverage of the short flexor muscles of the thumb and great toe respectively. In the great majority of mam¬ mals sesamoid bones are much more numerous than in man.

SESHA, sa’sha, an imaginary serpent which, when Goiled up, is the Hindu emblem for immortality. It is represented in Hindu mythology as having 1,000 heads, on one of which the world rests, and Vishnu reclines on this

immense reptile in the primaeval waters.

SESOSTRIS, se-sos'tris, the name given by Greek writers to a king of Egypt, about whose identity there is much controversy, while it seems certain that the achievements attributed by the Greeks to Sesostris were the deeds of a number of Egyptian rulers. By many Sesostris is believed to be identical with Rameses II, the son of Seti (the Sethos of Manetho), and the third king of the 19th dynasty. The name of Sesostris is explained as a corruption of Ses- tesura, the popular appellation of this Rameses, or of Sethosis (written by Pliny Sesothis), meaning son of Sethos, by which name the same monarch is designated in Manetho. Others think that the Greek Sesotris may be a corrup¬ tion of Secortesen or some similar form, which is the name of one king of the 3d dynasty and three others of the 12th. The Sesortesen of

the 3d dynasty is called Sesostris by Aristotle. The identification of Sesostris with Rameses II has the support iof Champollion, Salvolini and others, but is combated by Bunsen on the ground that some of the most striking achieve¬ ments attributed by Herodotus and Diodorus to Sesostris do not belong to that Rameses. Such are the victorious expeditions into Nubia and Thrace, the immense development under him of the Egyptian navy, the division of the land and its subjection to heavy burdens. But it is generally admitted, as before stated, that the ex¬ ploits of various monarchs were united by the Greeks in their accounts of the reign of Sesos¬ tris, which contain a number of fables in addi¬ tion, so that it is needless to seek for complete correspondence between these accounts and the monumental records of any single reign. Many of the most remarkable deeds of Sesostris may be assigned with great probability to Rameses III, the founder of the 20th dynasty and the restorer of the power and glory of Egypt. He triumphed over the confederations formed against him by various Libyan tribes ; annihilated by a great victory gained in north¬ ern Syria a league of Hittites, Philistines and other Canaanitish peoples, and of tribes in¬ habiting the isles of the Mediterranean, in which sea he maintained a large fleet to sup¬ port his operations on land. Consult Bridge, E. A. T. W., (A History of Egypt (New York 1902) ; Sethe,*

SESSIONS, Court of. See Court.

SESSUM.S, Davis, American Protestant Episcopal bishop: b. Houston, Tex., 7 July 1858. He was educated at the University of the South, Sewanee, Tenn., took orders in 1882, and became rector of Grace Church, Galveston, Tex. He was assistant and rector of Calvar}' Church, Memphis, Tenn., in 1883-87; rector at Christ Church, New Orleans, La., in 1887-91, and in the latter year was consecrated bishop of Louisiana.

SESTERTIUS, an ancient Roman silver coin worth 2l/i asses (hence the name sesqui- tertius, the third a half). The sestertius was the fourth part of a denarius, and when in later times the weight of the ass was reduced, and 16 asses were reckoned to a denarius, the sestertius still retained the same proportion to the latter coin, and thus became equal to four asses. The value iof the sestertius, therefore, varied with that of the denarius. About the close of the republic, when the denarius is cal¬ culated to have been worth about 17 cents, the sestertius would be worth 5 cents. The ses¬ tertius was the unit most commonly employed by the Romans in reckoning large sums of money. For sums below 1,000,000 sestertia, the ordinary cardinal numerals were used with sestertii or sestertia, as the case might be; but if the sum amounted to 1,000,000 or more a numeral in ies, after which centena rnillia (100,000) had to be understood, was connected with sestertium (for example, quadragies sestertium is 4,000,000 of sestertii, that is, quadragies centena rnillia sestertiorum nummorum). Sometimes the numeral adverb was used alone, and decies ei dedit signifies decies sestertium, that is, decies centena rnillia sestertiorum, or 1,000,000. The sestertius was often expressed by the symbol HS, which is

explained as a corruption either of IIS, that is, II, the numeral two, and S for semis, half of LLS, or libra libra semis, and as having been originally equivalent to libra or pound.

SESTINI, sas-te'ne, Domenico, Italian nu¬ mismatist : b. Florence, 1750; d. there, 1832. He was educated at the school of San Marco. In 1774 he left his native city and went to Sicily, where he received from Prince Biscari the com¬ mission to arrange his museum at Catania, and from this time he applied himself exclusively to numismatic studies. He published numerous books, chief among which was his (Systema Geographicum Numismatum in 13 folio vol¬ umes.*

SESTO, sas'to, Cesare da (Cesare da Milano), Italian painter: b. Sesto, near Milan, about 1480 ; d. Milan, about 1524. He was prob¬ ably a pupil, certainly an imitator, of Leonardo, and a picture of his in the Prado, Madrid, is put down by Madrazo as a copy of that master's (Virgin and Child. J (La Vierge aux Balances1 in the Louvre and a (Holy Family* in the col¬ lection of Lord Monson, formerly thought to be by da Vinci, are now attributed to Cesare. He was on friendly terms with Raphael at Rome, and reproduced some of the qualities of that master's style. The mingled influence of da Vinci and Raphael is apparent in his Adora¬ tion of the Kings* at the Naples Museum. Other pictures of his are (Baptism of*

Christ, Scotti Gallery, Milan; (Madonna with St. John,* Melzi Collection, Milan; and a (Madonna* in the Brera.*

SETCHELL, William Albert, American botanist: b. Norwich, Conn., 15 April 1864. He was graduated at Yale University in 1887 and took his Ph.D. at Harvard University in 1890. He was instructor in biology at Yale in 1891-95 and instructor in botany at the Marine Biologi¬ cal Laboratory at Woods Hole, Mass., in 1890- 95. Since 1895 he has been professor of botany at the University of California. Author of laboratory Practice for Beginners in Botany

(1897).

SETHITES, a sect in the 2d century that worshipped Seth, the son of Adam, as the son of God, and maintained that he had reappeared cn earth in the person of Jesus Christ.

SETHOS I, se'thos, or SETI, se'ti, Egyp¬ tian king, the second Pharaoh of the 19th dy¬ nasty; which lasted from 1462 to 1288 b.c. He was one of the shepherd race or Hyksos in the eastern part of the Delta. Distinguished for magnificence, he built the temples of Osiris at Abydos, and the hall of columns at Karnak. He established by arms the power of Egypt over a large part of western Asia.

SETON, se'ton, Eliza Ann Bayley, Ameri¬ can philanthropist, founder of the order of Sis¬ ters of Charity of Saint Vincent de Paul in the United States: b. New York, 28 Aug. 1774; d. Emmittsburg, Md., 4 Jan. 1821. She was mar¬ ried to William Seton about 1794 and after his death in 1804 she was received into the Roman Catholic Church the next year, and on 22 June 1809 established at Emmittsburg, Md., a com¬ munity called by her Saint Joseph's Sisterhood. In 1810 the rules of the French sisters were adopted, with modifications suited to American conditions. The society grew and prospered, and in 1850 a union with the Paris society was

effected. In 1846 the New York community be¬ came independent of the original American or¬ ganization. For statistics, consult the article on the society. Consult de Barbary, (Vie (1868) ; O'Gorman, (A History of the Catholic Church in the United States* (1895).*

SETON, Ernest Thompson, American au¬ thor, for some time known as Seton-Thomp- son : b. South Shields, Durham, England, 14 Aug. 1860. After a brief course at the Royal Academy, London, he spent three years in zoological study on the Assiniboine in Manitoba, published works on the (Birds of Manitoba and (Mammals of Manitoba,* was made government*

naturalist of the province and executed for the (Century Dictionary more than 1,000 drawings of animals and birds. In 1890 he became a pupil of Mosler in Paris, whither he returned in 1894 to study with Ferrier, Bougereau and Gerome. He exhibited at the Salon several drawings and paintings of wolves, his particular subjects. Among his much-read books are cWild Animals I Have Known* (1898) ; (The Trail of the Sandhill Stag* (1899) ; (The Biography of a Grizzly* (1900) ; (Lives of the Hunted* (1901) ; (Two Little Savages* (1903) ; (Woodmyth and Fable* (1904) ; Animal He¬ roes* (1905) ; (Life Histories of Northern Ani¬ mals* (1909) ; (Rolf in the Woods* (1911) ; Arctic Prairies* (1911) ; (Book of Wood¬ craft* (1911); (Wild Animals at Home* (1913) ; (Wild Animals' Ways* (1916) ; (Woodcraft Boys* (1917) ; (Sign Talk* (1918). In 1902 he founded the Woodcraft League which was the precursor and in many respects the father of all the present scouting organiza¬ tions. It is now confined chiefly to America but is of great and growing extent.*

*SETON, Robert, American Roman Cath¬ olic archbishop: b. New York, 28 Aug. 1839, a member and later head of the ancient Scottish family of Setons of Parbroath. He was gradu¬ ated from the Ecclesiastical Academy in Rome in 1867, and having previously been raised to the rank of private chamberlain to Pope Pius IX, was the same year made prothonotary apostolic, later becoming dean of all the mon¬ signori in the United States. He was rector of Saint Joseph's Church, Jersey City, N. J., from 1876-1902, in the latter year leaving for Rome. He was a lecturer at the Catholic University in Washington and at Seton Hall College, New Jersey, and in 1903 was created archbishop of Heliopolis. Under the pen-name of ((Fyvie** he was for some time Rome correspondent for the New York Times. He is the author of (Mem¬ oir, Letters and Journal of Elizabeth Seton* (1869) ; (Roman Essays* (1882) ; (The Dignity of Labor* 1893) ; An Old Family* (1899).*

SETON, a skein of silk, cotton, etc., passed under the true skin and the cellular tissue be¬ neath, in order to maintain an artificial issue. The name, which is derived from the Latin sceta, a bristle, stiff coarse hair, because hair was originally used for the purpose, is also given to the issue itself. To insert a seton the surgeon takes a fold of the skin between his fingers and makes an incision at the base either with a knife or with a seton needle. In the former case the seton must be inserted by means of a probe, but when a seton-needle is used that instrument carries the seton along with it. When the seton is inserted the wound

is not very tightly bandaged and allowed to remain untouched until suppuration has set in, usually the third or fourth day. After that the wound is dressed with fresh linen regularly once or twice a day, and when the seton has became hard and stiff a new one is inserted by attaching one end of the new one to one end of the old, and then extracting the latter, so that the fresh one is dragged into its place.

SETON HALL COLLEGE, in South Orange, N. J., founded in 1856 by James Roose¬ velt Bayley (q.v.), then bishop of Newark. It was originally in Madison, N. J., but was re¬ moved to South Orange in 1860. In 1861 it was incorporated by the legislature of New Jersey. It was named in memory of Ann Eliza¬ beth Seton (q.v.). The first president was Bernard J. McQuaid, later bishop of Rochester, and the second Michael A. Corrigan (q.v.), afterward archbishop of New York. In 1865 the college building was enlarged, and on 27 Jan. 1866 the beautiful marble edifice was de¬ stroyed by fire. It was rebuilt and ready for occupancy in 1867. The college grounds contain 75 acres and the number of buildings is nine. The government is vested in a board of 13 trus¬ tees, of which the bishop of Newark is a mem¬ ber and president ex-officio. There are two courses of study, the classical and scientific. The classical course leads to the degree of bachelor of arts; the scientific course to bachelor of science. The courses of study are registered by the board of regents of the University of New York State, hence the students graduating may have entrance to the professional schools of New York. A high school, preparatory for the college, is maintained in connection with the college. Courses of lectures on literary and scientific subjects are established for the pupils, and the public is admitted free of charge. The library, which -is in a building of its own, contains approximately 40,000 volumes. The college offers three full scholarships in the classical course, granted to worthy applicants by a competitive examination ; they entitle the holders to board and tuition until graduated, and there is a fund to assist worthy students. The annual income is over $90,000. The faculty numbers 20 instructors and the average annual attendance of students reaches nearly 300.

SETTER, a breed of dogs, named from their former habit of crouching or ˆsetting," on observing the game which they are trained to hunt. In modern days, however, these dogs remain erect on coming up with the quarry, and point their nose at it as does the pointer. For the ˆpoints® of the various kinds of Ameri¬ can setters, see Dog.

SETTIGNANO, sat-ten-ya'nd, Desiderio da. See Desiderio da Settignano.

SETTLEMENTS, Social. See Social

and University Settlements.

SETTLERS AND DEFENDERS OF AMERICA, The, an association organized in 1899 to stimulate geographical, biographical and historical research, to publish patriotic manu¬ scripts and records and to collect colonial and Revolutionary relics. The general offices of the society are in New York.

SEVANGA, sye-van'ga. See Gokcha, a lake.

SEVEN, a number regarded by many na¬ tions as especially sacred, mystical and symboli¬ cal. In the Bible the work of creation having been completed in six days, the Creator rested on the seventh. The three Regalim or pilgrim festival of the Hebrews (the Passover, the Festival of Weeks and the Feast of the Tab¬ ernacles) lasted each seven days, and between Passover and the Festival of Weeks was an interval of seven weeks. Egypt's seven years of plenty are succeeded by seven years of dearth; for seven days the waters of Egypt were turned into blood. The seventh year was a sabbatical year and the year following seven weeks of years was the year of jubilee. The golden candlestick in Solomon's temple had seven lamps. In the New Testament occur many groups of seven, as, the seven churches of Asia, seven stars, seven trumpets, seven spirits, the seven horns and seven eyes of the lamb; all these in the Apocalypse. Among the Greeks the number seven was sacred to Apollo and to Dionysos ; and it held a conspicuous place in the teaching of Pythagoras, who gave it many distinctive appellations. The sacra¬ ments of the Roman Catholic Church are seven, and also the orders of the ministry in the same church, namely, four minor and three major or sacred orders. Various reasons have been given for the peculiar regard had for this num¬ ber, such as that seven is a symbol of com¬ pleteness, being compounded of three and four, perfect numbers, they being representable in space by the triangle and the square.

SEVEN CHAMPIONS OF CHRISTEN¬ DOM, The, a romance of chivalry, by Richard Johnson, entered on the (Stationers' Register J in 1596. A second part appeared in 1608 and a third in 1616. In it are recounted the exploits of Saint George of England, Saint Denis of France, Saint James of Spain, Saint Anthony of Italy, Saint Andrew of Scotland, Saint Patrick of Ireland and Saint David of Wales.

SEVEN CHURCHES OF ASIA, The, a

collective name applied to the churches of Ephesus, Smyrna, Pergamos, Thyatira, Sardis, Philadelphia and Laodicea (Rev. i, 11).

SEVEN CITIES, The, a name applied to

Egypt, Jerusalem, Babylon, Athens, Rome, Con¬ stantinople and either

London or Paris. They are often grouped under this title, as embody¬ ing wealth, antiquity, greatness and magnifi¬ cence.

SEVEN DAYS' BATTLES, a series of battles which began 25 June 1862 by the advance of a part of General McClellan's army, with a view to securing a more advantageous posi¬ tion for a general advance upon Richmond. McClellan's army, numbering 92,500 men, was within a few miles of the city, which was de¬ fended by General Lee with an army, includ¬ ing Jackson's command, of 80,762 men. The advance brought on the battle of Oak Grove (q.v.), in which the loss was moderate and with no particular advantage to either side. On the next day McClellan was thrown upon the defensive by the approach of ˆStonewall® Jackson toward his right flank beyond the Chickahominy and by Lee's movement upon it. Lee threw the three strong divisions of A. P. Hill, Longstreet and D. H. Hill across the Chickahominy to co-operate with Jackson, but,

without waiting for him to get up, attacked General McCall's division of Pennsylvania Re¬ serves at Mechanicville and Beaver Dam Creek, and was finally repulsed with great loss. On the 27th McCall was withdrawn, Jackson made collection with Lee and the combined Confederate forces attacked Fitz-John Porter's corps and McCall's division, later reinforced by Slocum's division, at Gaines' Mill (q.v.), the result being a bad defeat for the Union forces, Lee's losses, however, in killed and wounded, being about double that of Porter. Porter retreated across the Chickahominy and McClellan started on his retreat or change of base to James River. Lee pursued, and on the 29th fought the two battles of Peach Orchard and Savage Station (qq.v.), both of which were drawn battles, although in both cases the Union troops withdrew from the field to continue the retreat which they had successfully covered. On the 30th, part of the Union army and nearly all Lee's army fought the bloody battle of Glendale (q.v.), the Union army holding the ground un¬ til after dark, covering the passage of the trains and defeating all of Lee's persistent efforts to break and destroy it. The last of the seven days' battles was fought at Malvern Hill (q.v.) 1 July, resulting in a bloody repulse for Lee, and that night the Army of the Po¬ tomac withdrew to Harrison's Landing on James River. <(General Lee's plans in the Seven Days' fight,® says General Longstreet, (

SEVEN GIFTS OF THE HOLY GHOST: Wisdom, understanding, counsel,

fortitude, knowledge, piety and the. fear. of the Lord. They are enumerated in Isaiah xi, 2, as rendered in the Septuagint, the Latin Vulgate and their

versions : in the Douai English version the passage reads : ((The Spirit of the Lord will rest upon him ; the spirit of wisdom and under¬ standing, the spirit of counsel and strength, the spirit of knowledge and piety, and. the spirit of the fear of the Lord will fill him.® With this the Authorized Version agrees save that after ((knowledge,® this only follows <(and of the fear of the Lord® ; and the Hebrew, too, has nothing answering to ((piety.®

SEVEN-HILLED CITY, a name applied to Rome.

SEVEN HUNTERS, The. See Flannan Islands.

SEVEN LAMPS OF ARCHITECTURE, The, a treatise on architecture by John Ruskin, published in 1847. In this book architecture is regarded as the revealing medium or lamp, through which flame a people's passions and which embodies their life, history and re¬ ligious faith, in temple, palace and home. The first lamp is <(Sacrifice,® next comes the ((Lamp of Truth,® the third and fourth lamps are those of <(Power® and (

(

SEVEN PINES, Battle of. See Fair Oaks, Battle of.

SEVEN SAGES. See Seven Wise Men.

SEVEN SEAS, The, by Rudyard Kipling, a collection of verse containing several of the author's most vigorous and characteristic poems, was originally published as a separate volume in November 1896. It has also been included, under the same name as a subtitle, in a larger and more comprehensive collection, entitled (Verses.) While (The Seven Seas* is not lim¬ ited in range, containing, as it does, poems on many themes — virile songs in stirring rhythms, such as (The Last Chantey,* striking character portraits like that of the grim old shipowner of The Mary Gloster and of (the dour Scots engineer* of (McAndrew's Hymn* and (The Last Rhyme of True Thomas* and other lyrics and ballads of a high order — still, the dom¬ inant note, sounded especially in (A Song of the English,* is a fervent, almost religious be¬ lief in Britain's world supremacy — what Paul Elmer More calls the poet's (

Arthur Guiterman.

SEVEN SLEEPERS, a Christian legend dating from the times of persecution under the empire. According to the story, in the reign of Emperor Decius, when the Christians were persecuted, it is said that seven, noble youths of

Ephesus concealed themselves in a neighbor¬ ing cavern, the entrance of which was closed by order of the emperor. The persecuted youths immediately fell into a deep slumber, from which they were accidentally awakened in the reign of Theodosius II, after the lapse of about two centuries. Pressed with hunger after their long fast, they sent one of their number to the city to purchase bread. He was aston¬ ished to see crosses erected all over the city and his own antiquated dress and obsolete lan¬ guage confounded the baker, to whom he offered an old medal in payment for bread. Suspected of having found a secret treasure, he was carried before the judge, to whom he related his miraculous story. The bishop of Ephesus, the magistrates and the emperor him-

self, hastened to the cave and found the sleep¬ ers still bearing the bloom of youth. They re¬ lated their story to the multitudes, gave them their benediction and expired.

SEVEN STARS. See Pleiades.

SEVEN-UP, a game of cards, sometimes called ((all fours® from the four points (high, low, jack and game) that are at stake.

SEVEN WEEKS' WAR, the Austro- Prussian War of 1866, which grew indirectly out of the long-continued rivalry of the Prus¬ sian and Austrian nations and was finally pre¬ cipitated by the Schleswig-Holstein controversy. Prussia's support came from the majority of North German states and from Italy, while the South German states and Nassau, Frank¬ fort, Hanover, etc., gave their assistance to Austria. Under Moltke the Prussians won vic¬ tories in rapid succession, and in an astonish¬ ingly short period had outfought the Austrians, who met their final defeat in the battle of Koniggratz or Sadowa, 3 July after only about seven weeks of actual fighting. The negotia¬ tions at Nikolsburg, 26 July, were confirmed by the Peace of Prague and other acts of formal settlement, and the prestige of Prussia, greatly increased, was made dominant in the Franco- German War which soon followed. See Aus¬ tria-Hungary; Germany; Prussia.

SEVEN WISE MASTERS, a collection of tales which originated in the East. The plot connecting the tales is the following; A king's son, who had been instructed in all branches of knowledge by seven wise masters, finds by the study of the stars that he is in danger of meeting his death if he utters a word within seven days. At the very beginning of this period his stepmother urges her husband to put his son to death, at the same time telling him a

story calculated to induce him to do so. The king is just about to act on this advice when one of the seven wise masters obtains a day's respite for the prince by telling a tale, the moral of which counteracts that of the stepmother. On each of the following six days during which the prince's danger binds him to silence, the stepmother renews her solicitations to the king to have the prince put to death, on each occasion supporting her ad¬ vice by a fresh story, but the effect of the step¬ mother's tales is always counteracted by an¬ other told by one of the seven wise masters, until the expiration of the seven days enables the prince to reveal the designs of his step¬ mother. The date and circumstances of the origin of this collection of tales are unknown. The plot of the work is in fact found in Bud¬ dhist literature, not as a fable but as a real event, but no Indian original of the collection of tales has been discovered. The tales were without doubt introduced into the West through the Crusades, since which the collection has been translated into almost all Western lan¬ guages.

SEVEN WISE MEN, or SEVEN SAGES, OF GREECE, the collective designa¬ tion of seven ancient philosophers and sages, namely, Solon of Athens, Thales of Miletus, Pittacus of Mitylene, Bias of Priene, Chilon of Sparta, Cleobulus of Lindus and Periander of Corinth ; they all lived between 620 and 548 B.C.

SEVEN WONDERS OF THE WORLD.

Within the sovereignty of Turkish soil, as it stood at the beginning of the European War of 1914, were included six of the original Wonders of the World, about which so much has been written, until it is hard to distinguish between history and fable. The exception was the Colossus of Rhodes which stood on Greek territory. Of all these wonderful creations only two survive and in a more or less damaged state — the vocal Memnon and the Pyramids. The former term is applied to one of the two colossal statues, each nearly 70 feet high, of Amenophis III, near Thebes, two of which still remain. In the case of the more northerly of these, partly overthrown by an earthquake (27 b.c.), it was noticed that at early morn it gave forth a curious sound, resembling a cry, which was supposed to be the response of Memnon, son of the Dawn or Eos, to his mother, and formed the subject of varied interpretation by ancient sages and modern writers in folk¬ lore. But early travelers, who heard the sound, never solved the mystery, which was simple enough — it was merely the passage of air through the pores of the broken reddish sand¬ stone, due to the change of temperature at sunrise. Not the first or last of ancient miracles to be as easily solved after ages of wonder¬ ment. But the musical sounds are no longer heard since Septimus Severus repaired the breach in the sandstone. More useful was the second wonder — the lighthouse or Pharos, built by Ptolemy Philadelphus (200 b.c.). It was erected on a long narrow rock in the harbor of Alexandria, a

mile off shore, and was inscribed <(King Ptolemy to the gods, the saviors, for the benefit of sailors.® Many tra¬ ditional details of doubtful authenticity have come down to us as to its height, surpassing the loftiest of pyramids, the mirrors employed as reflectors, the fire kept burning nightly at its top, and the architect's scheme for immortaliz¬ ing his name by cutting it in the structure and covering the huge letters with plaster. Long before our modern school gardens, Nebuchad¬ nezzar reared the Hanging Gardens of Baby¬ lon for his wife's pleasure. They consisted of a series of five terraces of sun-dried brick and were raised each 50 feet above the other, to the height of 250 feet. The labor of thou¬ sands of slaves was conscripted in its con¬ struction. A winding stair led to the queen's paradise on top, the terraces were exquisite gardens with the rarest and most beautiful plants. There were flowery fountains, tame animals disported at ease through the meadows, and the structure became one of the ancient world's wonders. Next comes the magnificent Temple of Diana at Ephesus, scene of orgies as well as of worship, and set on fire by Erathosthenes, who sought thereby to gain re¬ nown. Rebuilt by the Ephesians, after declin¬ ing Alexander's aid, it surpassed the glories of the original fane, with its main altar by Praxiteles, its columns of porticoes 60 feet in height, its length 405, its width 220 feet, all of white marble, . elaborately adorned with gold and filled with statues and works of art. First despoiled by Nero, it was destroyed by the Goths. A widow's tender thought of her husband supplied one of the wonders. Upon the death of Mausolus, king of Caria, his

widow, who died of grief 350 b.c., built his tomb, which must have been of rare magnifi¬ cence to have given its name Mausoleum to ornate graves of the dead to our day.

The pyramids of Egypt still survive as wonders. These tombs of the Pharaohs, marred by age and partly destroyed by earthquakes, arouse no less wonderment, while countless vol¬ umes have been written on their origin and history, with curious speculation as to the uses for which they were designed. The masonry of the great Pyramid of Cheops, as it is termed, has been worn out at top by time, and the sides, which once were smoothly slanting, now form a series of steps, due also to time and the elements. The legend of the Colossus straddling, the harbor of Rhodes with its legs, is very picturesque but it had no other basis than popular fancy. It was in reality a huge bronze image of Apollo, about the height of New Yorks Statue of Liberty, 105 feet. Erected about 200 b.c. on the shore at the en¬ trance to the harbor of Rhodes, it was over¬ thrown by an

earthquake, its fragments in later decades being bought and carried away on camels by traders of the time, ready as to¬ day to barter in junk. How many modern wonders of art, science and invention are likely to survive a thousand years and more, when fame to-day is as rapidly lost as it is acquired and miracles of achievement occur so often that they have ceased to be miracles?

SEVEN YEARS' WAR, a war between Prussia and other European powers (1756-63). By the treaties of peace concluded at Breslau 28 July 1742, and at Dresden 25 Dec. 1745, Maria Theresa of Austria ceded to King Frederick II six principalities of Silesia and the county of Glatz. In the hope of recovering them she con¬ cluded an alliance with Elizabeth, empress of Russia, brought over to her cause the king of Poland and elector of Saxony, Augustus III, and attempted to form a closer union with France. Meanwhile a dispute had arisen be¬ tween Great Britain and France relating to their American boundary, and it broke out in 1755 into open hostilities. The king of England concluded an alliance with Prussia; and some months after France made a league with the court of Vienna. All the proceedings of the Russian, Austrian and Saxon courts were dis¬ covered to Frederick, who resolved to anticipate his enemies. In August 1756, he invaded Sax¬ ony, occupied the capital, which had been de¬ serted by the court, Leipzig, Wittenberg and Dresden ; took possession of the documents necessary to justify his conduct which he found in the archives of the cabinet in the last city, and invested the Saxon army in their fortified camp at Pirna. Meanwhile Field-Marshal Browne advanced from Bohemia with an army to liberate Saxony; but Frederick was able to check his advance, and the Saxons, 14,000 strong, were forced to surrender 15 October. The inferior officers and common soldiers were compelled to enter the Prussian service; but they soon deserted, making their escape to Poland, where the Saxon court resided during the whole war. Such was the end of the first campaign, and the Prussians, remained through the winter in Saxony and Silesia. Frederick's invasion of Saxony was pronounced to be a violation of the Treaty of Westphalia, and

France, as one of the guarantors of that treaty, now took part in the struggle. Sweden and Russia adopted a similar course. In the diet at Ralisbon, held in January 1757, war was also declared on the part of the empire against Prussia.

Thus in 1757 Austria, Russia, France, Sweden and the German empire were in arms against Frederick, while he had no ally but England and a few German states (Brunswick, Hesse- Cassel and Gotha, besides, of course, Hanover). In. order to be again beforehand with his ene¬ mies, Frederick (April 1757) marched into Bohemia, and on the 6th of May a bloody battle was fought at Prague, in which the Prussians conquered, but

lost their distinguished general, Schwerin. The greatest part of the vanquished Austrian army threw itself into the city of Prague, to which the king immediately laid siege. But the defeat of Frederick by the Austrians under Daun, at Kollin, in the follow¬ ing month, 18 June, deprived the former of all his advantages. He was forced to raise the siege of Prague, and to retreat to Saxony and Lusatia. Little more than a month later, 26 July, the Duke of Cumberland, commanding the German allies of Frederick, was defeated at Hastenbeck on the Weser, in the south of Han¬ over, by the more numerous army of the French ; whereupon the victors made preparations for taking, up winter quarters with the imperial army in Saxony. The two armies had already united and advanced as far as the Saale, the French under the command of the incapable Prince Soubise, a favorite of the Marquise de Pompadour, when Frederick marched against them, and fought at Rossbach, a village between Merseburg and Weissenfels, that memorable battle, in which both the French and the impe¬ rial armies were defeated, and found safety only in a hasty flight 5 November. The defeated armies retired into winter quarters at a distance, and the possession of Saxony was secured to the king. Upon this Frederick hurried back to Silesia, which was now occupied by the. Aus¬ trians. With a small army, fatigued with a long march, he defeated at Leuthen a force twice as great, under Daun, 5 December. By this victory Frederick recovered Silesia, and he was now more formidable to his foes than ever; for not only had he been victorious himself, but while he had been thus occupied in the south and west his general Lehwald had successfully re¬ pelled the Swedes and Russians on the north and east.

The third campaign was opened in February 1758, by Ferdinand, Duke of Brunswick, who was now at the head of the allied armies, in the place of the Duke of Cumberland, and opposed the French in Lower Saxony and Westphalia. His nephew, the hereditary prince, afterward Duke of Brunswick, Charles William Ferdi¬ nand, commanded under him. Duke Ferdinand made himself master of the Weser, expelled the French, under Clermont, from Lower Saxony and Westphalia, and defeated them 23 June at Krefeld. He then returned over the Rhine to Hesse, where Soubise was stationed with a French army, and whither Clermont followed him. Ferdinand, in the meanwhile strengthened by 12,000 British troops, forced the two hostile bodies to retire over the Main and the Rhine, where they went into winter quarters. Mean-

while the Russians, under Bestucheff, had ad¬ vanced as far as the Oder; and subsequently Fermor, who superseded Bestucheff, occupied cast

Prussia, and then moved into Branden¬ burg, spreading devastation on his way. At this juncture Frederick made a masterly march to the Oder, and toward the end of August en¬ gaged the Russians at Zorndorf, in the north of Brandenburg, where he gained a sanguinary victory, which forced the Russians to retreat to Poland. After this he again turned his atten¬ tion to Saxony, where his brother Prince Henry was no longer able to resist the Austrians. He encamped at Hochkirch, but .here he was sur¬ prised by Daun in the night of 14 October and suffered a total defeat. He nevertheless suc¬ ceeded with the remains of his army in effect¬ ing a junction with his brother, after which he again drove the enemy out of Silesia and Sax¬ ony. At the close of the campaign the king saw all his dominions except Prussia proper free from the enemy. In France there was a gen¬ eral wish for peace; but Louis XV and his mis¬ tress, the Marchioness de Pompadour, were bent on continuing the war. A new alliance was therefore concluded with Austria 30 Dec. 1758. Frederick, however, had also obtained a new treaty with Great Britain, which promised him a large yearly subsidy. Yet he determined in the coming campaign to act with his main army as much as possible on the defensive and to com¬ mit aggressive movements to detached corps.

The campaign was opened in March 1759, Prince Henry marching into Bohemia, where he dispersed the hostile forces, and captured im¬ mense quantities of military stores. He then entered Franconia, and put the inactive imperial forces to flight. At the same time the Prussian general Dohna drove back the Swedes once more to Stralsund, and managed to keep the Russians for a time in check. But when the Russians pressed forward in ever-increasing numbers under Soltikoff, Dohna found himself obliged to give way. Frederick then gave his command to General Wedel, who received orders to prevent the junction between the Russians and Austrians at all costs, and accordingly on 23 July attacked the Russians at Kay, near Ziillichau, in the east of Brandenburg. His at¬ tack was unsuccessful, and the Russians after their victory advanced to Frankfort-on-the- Oder. Frederick now hastened in person to his electoral dominions, and on 12 August at¬ tacked the Russians at Kunersdorf, near Frank¬ fort, and had already defeated them when the victory was snatched from him by the Austrians, under Laudon, who inflicted on him a defeat such as he had never before sustained. The Russians purchased their victory dearly, and they made no use of it. Yet Frederick's posi¬ tion was extremely dangerous ; indeed, he began to apprehend an unfortunate issue of the war. The Russians were victorious in his hereditary states ; Daun was in Lusatia with a large army, and Saxony was overrun by the imperial troops. The Austrians and Russians wished to unite, but Prince Henry deprived the former of their magazines, and thus obliged them to retreat; and Frederick anticipated the Russians in their march to Silesia, and compelled them to

retire to Poland. In the west Frederick's allies had been more successful. They had, indeed, been able to do but little at the beginning of the cam¬ paign. The French had taken Frankfort-on-

the-Main by surprise during the winter, and the plan for recovering the city was frustrated by the failure of the attack on Bergen 13 April. But 1 August, Ferdinand gained a decisive victory at Minden over the French troops under Contades and Broglio. On the same day the hereditary Prince of Brunswick likewise de¬ feated the French at Gohfeld, and they were driven over the Lahn on one side and over the Rhine on the other. The Swedes also, who, after the battle of Kunersdorf, when Prussian Pomerania was destitute of troops, invaded that country, were driven by Manteuffel and Platen under the cannon of Stralsund. Thus, in spite of all his mishaps, Frederick's fortunes were still in the ascendant at the end of the campaign.

The campaign of 1760 seemed at first to for- bode ill success to Frederick. While he himself was engaged in Saxony, the brave General Fou- que suffered a defeat in Silesia, in consequence of which the Austrians occupied the whole land. Frederick thereupon gave up Saxony in order to recover Silesia. With 30,000 Prussians he marched into that province, and intrenched him¬ self at Liegnitz. Here on 15 August he de¬ feated Laudon, and thereby effected his purpose of recovering Silesia, but he was unable to pre¬ vent Austrian and Russian troops from break¬ ing into Brandenburg and laying waste his hereditary dominions. Frederick hastened thither to cut off the enemy, but not finding them there he returned to Saxony, where the im¬ perial forces were stationed, and Daun and Lascy had united. At Torgau, on the Elbe, he attacked the enemy 3. November, defeated them in a bloody engagement, and then went into winter quarters in Saxony. The Russians were also forced to raise the siege of Colberg and to retire to Poland. The allied forces, under Fer¬ dinand of Brunswick, defeated the French 31 July at Marburg; but the latter remained in Hesse.

In the opening of the next campaign 11 Feb. 1761 Ferdinand attacked the French in their quarters; they fle-d, losing many of their fortifi¬ cations and magazines. A corps of French and Saxon troops was defeated 14 February at Langensalza ; but the allies were obliged to raise the siege of Ziegenhain, Marburg and Cassel with loss, and the French once more became masters of all Hesse, and had an unobstructed passage to Hanover. The proposals of peace now made by Britain and Prussia were not ac¬ cepted, and Frederick endeavored to protect Silesia against the Austrians and Russians, who had united in August at Striegau. He and his allies, however, met with reverses at Schweid- nitz, Colberg and elsewhere, and despite some successes (as at Villingshausen) Frederick felt himself in a desperate condition. But at the very time when Frederick's distress was great¬ est, Elizabeth, the empress of Russia, died 5 Jan. 1762, and her

successor, Peter III, concluded with him 5 May the Peace of Saint Petersburg. Sweden likewise made peace with Prussia, and the Russian emperor sent a body of troops to aid the Prussians. But the emperor's early death broke the alliance with Frederick, and his successor, Catharine II, recalled the Russian troops from the Prussian service. Frederick, however, was delivered from one dangerous enemy, and had gained an important prepon¬ derance of strength over the rest. After recov¬ ering Schweidnitz and providing for the defense

of Silesia, he marched to Saxony. On 29 Octo¬ ber an important victory was gained over the Austrian and imperial troops at Freiberg, and the king now concluded an armistice with the Austrians ; but it related only to Saxony and Silesia. Under Duke Ferdinand and the heredi¬ tary prince of Brunswick the allies then began unsuccessfully, the campaign of 1762 against the French; but the latter were defeated 24 June at Wilhelmsthal, and driven from their fortified camp at Cassel. Cassel itself was besieged, and 1 November surrendered to the allies. Two days after this the preliminaries of peace between Britain and France were signed, and the peace itself was confirmed at Paris 10 Feb. 1763. After a short negotiation Frederick concluded a peace with Austria and Saxony at Hubertsburg, 15 February, by which each power received again all the territories it had pos¬ sessed before the war. The simultaneous struggle between Great Britain and France in North America and India ended in favor of the former. See Canada; Frederick II; Maria Theresa; Pitt, William.

Bibliography. — Arneth, (Maria Theresa und der siebenjaehrige Krieg) (Vienna 1876) ; Bernhardi, (Friedrich der Grosse als Feldherr (Berlin 1881) ; Carlyle, T., (Life of Frederick the Great) (New York 1899) ; Corbett, J. S., (England in the Seven Years' War (2 vols., London 1907) ; Frederick II, (Histoire de la Guerre de sept ans} (1794-1801) ; Lloyd, his¬ tory of the Seven Years' War> (1781—90) ; Longman, F. W., (Frederick the Great and the Seven Years' War) (London 1888) ; Masslow-ski, (Die Russische Armee im siebenjaehrigen Kriege) (Berlin 1893) ; Schafer, (Geschichte des siebenjahrigen Krieges) (Berlin 1867-74) ; Von Ranke, (Der Ursprung des siebenjahrigen Krieges) (Leipzig 1871) ; Vast, (Guerre de sept ans) with bibliography in Lavisse and Ram- baud; (Histoire generale du IVme siecle a nos jours) (Vol. VII; Paris 1893-1900).*

SEVENTEEN- YEAR LOCUST, or CI¬ CADA. This insect (Cicada septendecim) is black, marked with bright orange and a white spot on the head just behind the eyes. There are four glassy wings and the eyes are red.

The length is about one and one-half inches. When the insect emerges from the ground after its 17 years' burial it ascends a tree trunk or other convenient object and works its body rapidly backward and forward, breaking the pupal skin, from which the winged imago emerges. The cicadas pair at once. They then congregate on the branches of the trees in suf¬ ficient numbers to bend and at times break them by their weight. The woods and or¬ chards resound with the din of the drums from morning to night.

The females lay the eggs in the twigs and small branches of trees. They repeatedly thrust the ovipositor obliquely into the bark and wood in the direction of the fibres, at the same time putting in motion the lateral saws which de¬ tach little splinters of wood and make a fibrous lid over the whole. In each fissure made by the piercer the female deposits from 10 to 20 eggs in pairs. It takes her a quarter of an hour to prepare one nest and fill it with eggs, and she usually makes between 15 to 20 fissures in one limb. She lays between 400 and 500 eggs and then soon dies. Six weeks later the eggs

hatch. The young when it bursts the shell is grublike in form and has six legs, the first pair of which are large and claw-like, and the mouth is provided with a suctorial proboscis. After being hatched the young deliberately loosen their hold on the limb and fall to the earth. They instantly dig their way into the ground where they seek out the tender roots of plants. These they pierce with their beaks and draw out the vegetable juices which constitute their sole nourishment. They remain in the larval state for about 17 years, when they are full grown, pass into the pupal state, in which they remain but a few days, seek the surface of the ground and transform.

When a brood of cicadas is expected, no young trees should be set out for a year or two prior. The older trees are frequently able by their strength to live through the attacks. Ex¬ tremely valuable shrubs and trees may be saved by being completely covered with mosquito netting, thus preventing the deposit of eggs.

For a record of broods, see Cicada; and for the musical apparatus, etc., see Orthopiera.

SEVENTH DAY ADVENTISTS. See

Adventists.

SEVENTEENTH CENTURY. This was a century of bitter political dissension, religious wars and ever-recurring turmoil of many kinds

throughout Europe. The Huguenot wars in France during the first 30 years, the Thirty Years' War in Germany (1618-48) and the frequent wars of France with nearly all her neighbors under Louis XIV in the latter half of the century make it forever notorious. Eng¬ land put King Charles I to death (1649), was ruled by Cromwell for some 10 years, restored the Stuarts (1660) only to banish them in the person of James II (1688) when his Catho¬ licity offended the realm, so as to place his Protestant daughter Mary, with her consort. Prince William of Orange, on the throne. This furnished the occasion for the drawing up 'of the Declaration of Rights, which the king and queen as all subsequent English sovereigns had to guarantee before their coronation, so that the Revolution of 1688 well deserves its title of ˆglorious® as a landmark in the progress of constitutional government.

The romantic career of Sir Walter Raleigh (1552-1618) closed tragically. As a favorite of Queen Elizabeth he went on expeditions to America, tried to found a colony in Virginia, named by him after the ((virgin queen,® and was one of the gentlemen adventurers of the later 16th century, well known by everyone. He lost favor in King James' time, was accused of tak¬ ing part in a conspiracy against the king, for which he was imprisoned in the Tower for some 13 years, and finally, having failed in an expedition to America, was beheaded. During his long confinement he relieved the tedium of prison life by writing a (History of the World, > of no value as history, but an interesting ex¬ ample of the prose and mode of thought of the time. Raleigh will always be remembered for having introduced the potato into Ireland and the use of tobacco into England. The use of tobacco was condemned by Church and State and bitterly denounced by King James I, who wrote a book against it, but spread all the faster, apparently, for that. It was supposed to be the secret of the health and vigor of the

Indians, the significance of their life in the open and their simple food being missed. To¬ bacco was destined to become the most popular of narcotics, almost universal in use. Only the American Indians used it in the 15th century; now it is used everywhere throughout civiliza¬ tion. This century saw also the introduction of coffee into Europe as well as of tea. Coffee houses became popular social centres, and tea was served in them in the latter half of the century with and without alcoholic additions. The two exotic plants and their products were destined to revolutionize social usages in many ways, and their use has gone on increas¬ ing in spite of medical and other warnings with regard to possible dangers.

The Jacobean period, named after James I (king 1603-28), who had been James VI of Scotland, the son of Mary Queen of Scots, contains Shakespeare's mature work — (Ham¬ letˆ the Roman plays, ˆear,5 (Macbeth) and (Henry VHP — a number of the plays of Ben Jonsori, besides all of the dramatic product of Beaumont and Fletcher and Massinger, with most of the work of Shirley and Davenant. The latter part of the century had Dryden, Con¬ greve and Wycherley. The Jacobean was fol¬ lowed by a period of Puritan literature, the supreme products of which are Milton's Para¬ dise Lost,5 the greatest epic in English, and Bunyan's (Pilgrim's Progress, 5 the greatest English allegory, both with a high place in world literature. Milton succeeded admirably in his revival of the classic drama in dam¬ son Agonistes,5 but it is his shorter poems that reveal his greatness as a poet. Bunyan, a wandering tinker, confined to Bedford jail for 12 years, found the time to write his allegory, a marvelous bit of English prose and of Puri¬ tanic philosophy. He was so full of the Scriptures that his book breathes their very style. The subsequent reaction against Puri¬ tanism gave rise to the licentious Restoration drama. Even Dryden allowed his work to be tinged by the license of the time. His poetry is the greatest of the period and perhaps the greatest for two centuries after.

After Shakespeare's plays, the most impor¬ tant landmark in English literature of this cen¬ tury is the King James version of the Bible (1611). Done by a group of scholars into the virile English of the time, under the influence of the still living Elizabethan tradition, this translation fixed the language, prose and verse, for all the after time. It has had the strongest influence on nearly all the English writers, though more particularly writers of prose, and still remains what may be called the best English.

The man of the period most famous in the aftertime was Lord Bacon (Baron Verulam), Lord Chancellor of England. His (Novum Organum5 with its discussion of the inductive method brought him fame. It is recognized now that he was only one of a group of men about this time, many before him, who em¬ phasized the value of induction in science. Some of the greatest discoveries of our modern sciences were made by the inductive method before and after Bacon's time by men who knew nothing of Bacon. Telesio stated fully the inductive method 100 years before Bacon; his great namesake Roger Bacon, as well as Albertus Magnus, Nicholas of Cusa and many

others employed it before the Middle Ages closed, and Copernicus Versalius, Eustachius, Leonardo da Vinci, Caesalpinus and many others had used the method of observation and ex¬ periment in the 16th century, and Gilbert and Galileo, Bacon's contemporaries, used it very successfully but quite independent of his in¬ fluence. Bacon's modern fame is founded on the claim that he was the author of Shakes¬ peare's plays. This

((Baconian theory,® as it is called, owes its vogue to one Delia Bacon, who claimed to be a descendant of the Lord Chan¬ cellor, and who first made the claim for him some 250 years after Shakespeare's death. The year after she was adjudged insane and never afterward recovered her sanity. The theory was not an invention of hers, as the curious delusions of the insane seldom are, but the chance suggestion of a writer on travel in Mexico who threw out the hint that it must have been a learned man who wrote Shakes¬ peare's plays.

The literature of the century opened with Shakespeare's (Hamlet, 5 cmore written about than any man that ever lived® (Furness) and (Don Quixote,5 <(incomparably the best novel ever written® (Macaulay). The Spanish prom¬ ise was well fulfilled. Cervantes' short stories have been declared the best of their kind. Spain excelled, however, in dramatic literature. Calderon has been compared to Shakespeare (Russel Lowell). Lope de Vega (1560-1635), ((a prodigy of nature,® wrote more plays than any other man that ever lived. His plots at least deeply influenced writers in other coun¬ tries. Alarcon, an American by birth, and Tirso de Molina, the creator of the world-type Don Juan, whose biography has been re-created in our day, for he wrote under a pseudonym, are other Spanish dramatic writers with a place in world literature. In history (Mariana), in philosophy (Suarez), in ascetics (Rodriguez) as well as in theology (Molina) and grammar (Alvarez), the Spanish writers of this period, are famous and their works have been repub¬ lished many times.

The century contains the <(Golden Period® of French literature. Richelieu founded the French Academy (1635), and this gave a great impetus to the cultivation of the French lan¬ guage. Louis XIV was most liberal in his pat¬ ronage of Frenchmen of letters, and his was a real Augustan Age, with a great many of the literary men of the time ready to sing the praises of the king because of his generous patronage. The political glory of Louis' reign and the many French victories in war stimu¬ lated the French imagination with magnificent literary results. France's crowning prestige in this period made the French literature of very far-reaching influence. Latin gradually ceased at this time to be used as a common language in diplomatic and scientific circles. French re¬ placed it, so that everyone in Europe who had any pretensions to education knew French be¬ sides his mother tongue, and was interested in French literature. It is not surprising, then, that under the stimulus of a world audience every mode of French literature developed in wonderful fashion. Corneille, Racine and Moliere are the great dramatic poets, worthy of a place beside the dramatists of any other time or country; Descartes and Pascal, the philosophical writers who have deeply in-

fluenced all the succeeding generations ; Boileau and La Fontaine the poets, still widely read after nearly three centuries ; Bossuet, Bourda- loue and Flechier the orators, among the greatest of history; La Rochefoucauld and La Bruyere as moralists are still living forces, and La Rochefoucauld is almost more quoted than any author since his time. Fenelon has a place by himself and it is very high. The period also saw the development of a school of romance, mainly of women writers. Madame de Sevigne wrote French prose while coteries of immortal French literary ladies made lit¬ erature a fashion, though little o*f their work has survived. Mademoiselle de Scudery's writings had an immense vogue and probably suggested the comic romance of Scarron and some other romantic developments. Madame de la Fayette wrote in the (Princess of Treves,) a story that anticipates our modern fiction in many ways.

Three philosophers who have notably af¬ fected human thinking ever since wrote at that time. Descartes (1596-1650), who probably has influenced modern philosophy more deeply than any other, was distinguished as a mathemati¬ cian, but put that aside to spend 20 years in retirement in Holland (near Leyden) elaborat¬ ing his system of philosophy. He began by doubting everything, even his own existence, but his <(I think, therefore, I am,® became for him the foundation of certitude. Spinoza (1632-77) was the greatest modern expounder of Pantheism. He was descended from Por¬ tuguese Jews and made his living as a lens- grinder in Amsterdam. His metaphysical spec¬ ulations were founded on Descartes, who had gone into philosophic retirement not far from where Spinoza also retired when he gave up his occupation to write out his Pantheistic theories. Pascal (1623-62) was like Des¬ cartes, first a mathematician and then a phi¬ losopher. He is famous for his prose style. He died before his magnum opus , an apology for Christianity, was completed. All that we have of it is the ˆensees,* thoughts on great sub¬ jects.

The century proved a great period in the history of mathematics. Kepler succeeded Tycho Brahe as mathematician-astronomer to the Emperor Rudolph (1602). In working out Tycho's observations he deduced the great laws that bear his name. Galileo's discoveries opened further occasions for mathematics. Cassini's tables of the motions of Jupiter's moons led to his invitation to the observatory in Paris, and the Cassinis continued for genera¬ tions as successful workers in astronomy and mathematics. Descartes and Pascal graduated from mathematics into philosophy and carried the modes of their previous discipline into the new sphere of thought. The Bernoullis, Jacques and Jean were followed in succeeding generations, like the Cassinis, by great mathe¬ maticians. Jacques Bernoulli (1654-1705) solved the isoperimetrical problem and discov¬

ered the properties of the logarithmic spiral. The two greatest mathematicians of the century are Leibnitz (1646-1716) and Newton (1642- 1727). Leibnitz was the inventor of the dif¬ ferential and integral calculus (independently discovered by Newton), and was also a writer of influence on philosophy. Newton's astro¬

nomical mathematics, depending on the deter¬ mination of the length of a degree on the earth's surface by Picard in Paris (1671), made him famous. His (Principia Mathematica) was presented to the Royal Society (1686) and published the following year.

The name of the period around which ever- recurring controversy has centred is that of Galileo (1564-1642) the physicist-astronomer. He invented the thermometer, discovered the isochronism of the pendulum and the hydro¬ static balance and the barometer. His great invention was the telescope, with which he dis¬ covered Jupiter's moons (1610). For teach¬ ing in opposition to all the mathematicians and astronomers of his time that the Copernican theory is the only tenable doctrine of the heavens though his reasons for it have all since been contradicted, and Copernicanism is now held on entirely other grounds. Galileo was compelled by the Inquisition to abjure his Copernican teaching in 1633. He was dis¬ ciplined but not imprisoned, and prominent ec¬ clesiastics continued to be his friends. <(His long life considered as a whole was one of the most serene and enviable in the history of science® (Bertrand, Perpetual Secretary Paris Academy of Science). His trial at Rome has been taken as the symbol of Church opposition to science, but as it is practically the only case in some six centuries, Cardinal Newman empha¬ sized the fact that it had just the opposite sig¬ nificance, and was the exception which proved the rule of Church relations to science as favorable. Galileo himself continued to be a faithful and even devout Catholic.

The century stands out in the history of art, with two of the greatest artists of all time — Rembrandt (1607-69) and Velasquez (1599— 1660). Admiration for the work of these men has grown ever since. A series of great paint¬ ers, besides Rembrandt in the Netherlands and the contemporaries of Velasquez in Spain, are noteworthy. Rubens (1577-1640) did his best work in this century, and his pupil Van Dyke (1599-1641) belongs entirely to it. His greatest work was done in the fourth decade of the cen¬ tury in England. Ruysdael, Hobbema, Paul Potter, Vermeer, Teniers and others maintained the primacy of the Netherlands in painting dur¬ ing this century. Besides Velasquez there were in Spain many who reached distinction and that distinction has grown in recent years. The best known among them are Zurbaran, Murillo and Ribera. In France, though the French were un¬ der the influence of the Italians, such names as Nicolas Poussin and Claude (Lorrain) are for¬ ever

famous.

Sweden came to occupy a very important place in European politics during this century. King Gustav Adolf (Gustavus Adolphus) in¬ tervened in the Thirty Years' War to prevent the further aggrandizement of the Hapsburgs. The Swedes looked upon the Baltic as a Swe¬ dish lake and their supremacy seemed imperiled. After the fall of Magdeburg, 1631, when that city was stormed by Tilly and given up to pil¬ lage, the Protestant princes of Germany, alarmed, united with the Swedish king. Tilly was defeated at Breitenfeld (Leipzig) 1631, and again the following year, when he was fatally wounded. The emperor had to turn to Wallen¬ stein, who had been in disgrace. Under him a

battle was fought with the Swedes at Luetzen in Saxony, which the Swedes won, but at the fatal price of their king. Wallenstein fell un¬ der the suspicion of the emperor who caused him to be assassinated (1634). After this the later part of the Thirty Years' War became a political struggle between the house of Bour¬ bon and the house of Austria, though for a time it had seemed to be a war on religious grounds between Catholics and Protestants. The Treaty of Westphalia, which ended the war, established the principles of balance of power in Europe, which has been the source of so much disaffection and so many wars since.

On the death of Gustavus Adolphus, his daughter Christina, but six years old, succeeded under a regency. At the age of 18 she assumed the government, at once concluded the war with Denmark and hastened the conclusion of the Thirty Years' War in Germany. She had the genius of her father but applied it to peace, and all his virtues and some of his faults. She patronized literature and philosophy, brought Descartes to Sweden and tried to bring order out of the chaos at home and abroad. Dissatis¬ fied, she secured the election of her cousin Charles Gustavus as her successor, abdicated in 1654 and embraced the Roman Catholic faith. She settled in Rome, where she became the patroness of letters and science and collected a great library which was afterward incorporated with that of the Vatican.

The beginning of the century saw a series of contradictory movements begin. The Jesuits established their Reductions in Paraguay, where a solution of the social problems of life for savage peoples was probably best presented in history. About the same time the Roman¬ offs became tsars of Russia to continue absolu¬ tism until well on in the 20th century. In 1620 slavery was introduced by the sale of African negroes in Virginia and the

Pilgrims landed on Plymouth Rock.

France became the dominant power in Eu¬ rope during this century. This was largely due to the genius of Richelieu, but also to his al¬ most complete disregard for any law, human or divine, that opposed his ambitions for his coun¬ try. He intrigued with Protestants when that suited his purpose, was the champion of Cath¬ olicism on occasion, oppressed the nation at home and schemed abroad — the type of states¬ man praised because he put the state above every other consideration. He aimed to make the power of France supreme in Europe and to make the king absolute in France. By intrigue, by diplomacy, by every other means, he suc¬ ceeded in these ambitious projects. He crushed the Huguenots, suppressed the aristocracy and wiped out the local assemblies and courts with their old privileges. He did not live to see France the leading power of Europe, but his policy carried out, proved successful in the hands of others. When Louis XIII died, his son Louis XIV was but five years of age. He reigned 68 years. It looked as though, under a child ruler, France might lose her prestige, but Cardinal Mazarin continued Richelieu's policies, loading France with the taxes that eventually brought the Revolution in its train, to do so. When Mazarin died, Louis at 23 at once took the government into his own hands. For more than 50 years he was his own Prime Minister and gave attention to every detail. He waged

four great wars, three of them in this century — that about the Spanish Netherlands (1657— 68), that of the Protestant Netherlands (1672— 78), that of the League of Augsburg (1688-97). He succeeded in extending his rule over certain Flemish towns, but his war with Holland proved a failure, the sturdy Dutch cutting the dikes, flooding their country, making the French army useless and driving the French fleet from the seas. Louis seized the free town of Strass- burg (1681) without provocation and thus ex¬ tended his kingdom to the Rhine. He revoked the Edict of Nantes which guaranteed religious freedom to the French Protestants, but only succeeded in depriving France of many worthy citizens, some of whom sought refuge in Amer¬ ica to be sturdy upholders of liberty, and others in the Transvaal and the Orange Free State to be the backbone of independence there. A League of Nations was formed against Louis, embracing not only the Protestant countries, of England, Holland and Sweden, but also most of the Catholic powers of Europe, including Spain and the emperor. The war lasted 11 years. The French made important conquests but were unable to hold them and laid them waste. At the end of the war, all parties gave up the territory they had won, though Louis succeeded in retaining Strassburg.*

The most interesting character of the cen¬ tury is Oliver Cromwell. The son of a simple country gentleman, educated at Cambridge, he was returned by

his university to the Short and Long Parliaments. He became captain of a Parliamentary company of horse in 1642, and then colonel. He organized a regiment which, on account of its invincible courage, was known as the Ironsides. He was a prominent member of the High Court that signed the death war¬ rant of Charles I. His position in the army gave him a controlling voice in the government, and after his expedition to Ireland (1649), he was made commander-in-chief. Later, defeat¬ ing the Scotch (1651), and expelling the Rump Parliament, he was made Lord Protector of the Commonwealth (1653). He ruled practi¬ cally alone. He was a benevolent autocrat who labored (

he was succeeded as Lord Protector by his son Richard, timid and without resolution, who yielded to the disaffection of the army and re¬ signed his office the next year. Anarchy seemed in prospect, but General Monk, commander of the army in Scotland, took control and the Long Parliament restored the Stuarts in the person of the son of Charles I. Charles II was received with the heartiest of welcomes. His reign saw a long reaction against the gloomy Puritanism of the preceding generation, during which morality sank to a low ebb, the drama declined, women appeared as actresses and literature became a pander. England suf¬ fered severely from plague (1665) and the great fire in London (1666) wiped out most of the town but gave opportunity for recon¬ struction, with widened streets and created much more healthful conditions. Sir Christopher Wren was put in charge of the reconstruction and built a number of handsome buildings. Great dread existed lest Roman Catholics gain any power in England and the announcement of the discovery of a Popish plot (1678) to kill all Protestants, beginning with the king and Parliament, caused great excitement. In¬ formers came forward to testify and Titus Oates particularly gained notoriety. Many Catholics, convicted on the testimony of per¬ jured witnesses, were condemned. The re¬ vulsion of feeling over the injustice done led to the Habeas Corpus Act (1679) which has stood ever since as the safeguard of personal liberty all over the English-speaking world.

The hero of the century is John Sobieski, the brave king of Poland (1629-96). He had risen by merit to the command of the Polish army when Poland was the most important country in central Europe and had been espe¬ cially successful against the Cossacks and Tartars, encroaching on the frontiers. Later, when the Turks invaded Poland, he won sev¬ eral battles from them and his crowning victory of Chocim cost them 20,000 men and many guns. He became a national hero and was unani¬ mously

elected king (1674). His reign was occupied in battling with the Turks. Finding it vain to attack the Poles, the Turks turned against Austria, laid siege to Vienna, from which the Emperor Leopold fled, after implor¬ ing Sobieski's help. In spite of political rea¬ sons to the contrary and Louis XIV's counsel against it, Sobieski at once went to the rescue and with an army of scarcely more than 75,000 men, defeated some 300,000 Turks and saved Vienna. The victory was largely due to the prestige of Sobieski's name, for the Turks stood their ground until they heard that (

What has been called the political revolu¬ tion of modern times begins after the peace of Westphalia (1648). For the next century and a half the seeds of political disaffection grew to reach fruition in the French Revolution (1789). The revolutionary spirit was fostered by the frequent wars of the time, so many of them undertaken merely for the benefit of par¬ ticular reigning families, that the period has been called in history the ((era of dynastic wars.® The culmination of arbitrary power centred in one man was reached in Louis XIV of France, who may not have used the expres¬ sion attributed to him often ((L'Ltat c'est moi —

I am the state,® — but his career exemplified that motto. Since Henry VIII's time, the di¬ vine right of a monarch in England had be¬ come more explicit and was formally claimed by James I and the Stuarts after him. The second halt of the 17th century brought with it the beginning of the reaction against this exaggera¬ tion of the place of royal authority and thor¬ oughly prepared for the revolutionary move¬ ments of ihe next century.

With the beginning of this century, English America comes into history. The settlement of Jamestown, Virginia (1607); of the Pilgrims in Massachusetts (1620) ; of the Dutch in New York (1621) ; of the Swedes in New Jersey (1633) ; of Lord Baltimore and his colony in Maryland (1634) and of the Quakers in Pennsylvania (1681), are the important events of this period. All of the colonies suffered much from the Indians except Pennsylvania, where William Penn paid them for their land and always treated them fairly. Most of the colonies developed slowly but by the beginning of the 18th century, had begun to show some signs of the power they were to be. Unfortu¬ nately the colonists brought with them all the prejudices of their former European environ¬ ment. Even those who had been driven from Europe by religious persecutions refused to per¬ mit religious liberty in America. Only the Quakers in Philadelphia allowed freedom of worship. As a result, Philadelphia, though latest founded and situated far from the sea, soon became the largest city of the colonies and the centre of their cultural and commercial life. Massachusetts grew very rapidly, receiving some 20,000 immigrants before the middle of the century, and Harvard College, the first col¬ legiate institution in English America until the 18th century,

was founded in 1638. The first book printed in the English colonies was the Massachusetts Bay Psalm Book (1639).

The great social worker of the century, the type of social reformer that was to come, is Vincent de Paul (b. 1576; d. 1660), perhaps the greatest benefactor of the poor that ever lived. Ordained priest at 25, he was captured by Turkish pirates shortly afterward and sold in Tunis as a slave. After two years, he escaped with his master, a renegade Christian, whom he brought back to his religion. After this ex¬ perience, the one ambition of his life was to do good to those in need. The poor in the country places in France were sadly neglected — little better than slaves on the land. He or¬ ganized missions and conferences of charity for their benefit. By his enthusiastic and yet thoroughly practical ways, he won to his aid a number of distinguished patrons. Then he took up the care of the convicts in the galleys. While on land, they were crowded, in chains, in damp dungeons, their only food black bread and water, and they were covered with vermin and ulcers. He went among them, bringing them food, medicines and, above all, human solace. Nothing was repulsive to him and he dressed the ugliest of wounds. He began his work in Paris and when it attracted the attention of the king, Louis XIII, and he was appointed Royal Almoner, he took advantage of the position to visit Marseilles and Bordeaux. In each place a hospital was erected for the convicts. Their moral regeneration was even more his care than their physical improvement. He recognized the

need of special training for the assistants in such social work for the missions and charities, and so he established an association for this purpose. He gathered around him as an auxili¬ ary a number of ladies of the nobility of France, organized as the Ladies of Charity. Through them he collected immense sums of money which were distributed to the poor. Foundling children were his special care, par¬ ticularly after he discovered that sometimes they were deliberately deformed by scoundrels who thus appealed to public pity. The mu¬ nicipal asylum for foundlings was little better than a place for them to die. The 1 7th century was a time of war, with poverty rife, and the children suffering above all, so Vincent next organized the Daughters of Charity, young women who were willing to devote their lives to social service. This foundation still exists as the well-known Sisters of Charity, all over the world. Poverty became so bitter that Vincent had to organize for the shelter and employment of some 40,000 unemployed near and around Paris. His reputation and prestige enabled him to get the needed help. The king granted the lands of the Salpetriere for a hospital and lodgings. In what is known as the French Period of the

Thirty Years' War, the war zone, as in our own time, was in Lorraine, Franche- Comte and Champagne, around Metz, Toul and Verdun, for nearly 25 years. Vincent came to the assistance of the poor people there, secured hundreds of thousands of dollars at a time when money was worth five or six times as much as now. He established a periodical, Le Magasin Charitable, in order to publish ac¬ counts of what was done, to call attention to special needs, and touch the hearts of others by letters received from those helped. He founded a series of public kitchens to feed the poor, and also to instruct them how to prepare their food economically and advantageously. He himself gave minute instructions as to the quantity of fat, butter, vegetables and bread people should use and the mode of preparing the soup. He founded societies to bury the dead and clear away dirt to prevent disease. These were under the Sisters of Charity. He distributed seeds so that the war-stricken peo¬ ple might prepare their harvest. The triumph of his charity is the foundation of a special or¬ ganization for the relief of the impoverished nobility. In the midst of all this work, he lived to be 85 years of age and wrote some 30,000 important letters, all of them without exception for some good purpose for others.

James J. Walsh,

Author of cThe Thirteenth, Greatest of Cen¬ turies.

Principal Events of the Seventeenth Century.

1603. Queen Elizabeth of England dies. Union of Scotland

and England under James I.

1605. The English gunpowder plot.

1607. Hudson's Bay discovered by Hendrik Hudson.

1608. Galileo with a telescope observes the satellites of

Jupiter.

1610. Assassination of Henry IV, king of France.

1614. Logarithms invented by Napier.

1618. Manchus invade China.

1619. Harvey discovers the circulation of the blood.

1620. Voyage of the Mayflower. The Pilgrims land at

Plymouth Rock. Slavery introduced in Virginia. 1625. Charles I of England begins to reign.

1627. Siege of Rochelle. Torricelli invents the barometer.

Drabellius invents the thermometer.

1629. Cardinal Richelieu becomes Prime Minister of France.

1631. Battle of Leipzig.

1632. Death of Gustavus Adolphus at the battle of Lutzen.

1641. The Irish rebellion and massacre of Protestants.

1642. Civil war begins in England. Battle of Edgehill.

1643. Louis XIV of France begins to reign. Wars of the

Fronde.

1644. Cromwell's victory at Marston Moor over the English

royalist forces. The Chinese Ming dynasty over¬ thrown and the Manchu rule established.

1645. Complete defeat at Naseby of King Charles of England.

1648. End of Thirty Years' War.

1649. Charles I of England beheaded.

1653. Cromwell becomes lord protector of England.

1660. The English restoration. Charles II becomes king of Great Britain. Death of the great social reformer of the century, Vincent de Paul.

1665. The great plague of London in which 68,000 persons

died.

1666. The great fire of London which in three days de¬

stroyed 13,000 houses.

1667. French invade the Netherlands.

1668. The peace of Aix-la-Chapelle.

1678. The habeas corpus act passed in England.

1683. The Turks capture Vienna.

1685. James II becomes king of Great Britain. The New- tonean philosophy first published. Revocation of the edict of Nantes.

1688. War of the Spanish succession. Revolution in Great

Britain. James II abdicates

1689. Peter the Great becomes tsar of Russia. William and

Mary crowned rulers of Great Britain.

1690. The Battle of the Boyne.

1692. The Massacre of Glencoe.

1697. Charles XII becomes king of Sweden. The peace of Ryswick.

1700. The grandson of Louis XIV of France succeeds to the Spanish throne.

SEVENTH CENTURY. The outstanding

events of this century centre around the rise of Mohammedanism or Islam (submission to God). From a small town in Arabia it spread over Asia to the Indus, through northern Africa, then to Spain and across the Pyrenees into southern France within a century. Mo¬ hammed, born at Mecca in Arabia, was a camel driver. He was a young man who was brought in contact with many different peoples, and earlier had been a watcher of flocks by night when men are tempted to think deeply about the relations of man to the universe. The Arabs and the Hebrews are the two most im¬ portant branches of the Semitic race, to whom the world owes so much of thought with re¬ gard to religion. Mohammed passed through a series of mental struggles, and though unable to read and write declared that the angel Gabriel came to him in sleep and made a series of revelations so that he thought of himself as a messenger of God. These revelations became the Koran. He lived in retirement, teaching, but making few disciples especially in Mecca, though his doctrines were carried to Medina where they attracted a number of converts. The Meccans, fearing that his new teaching would disturb popular feeling toward their Holy City where was the Kaaba (the cube stone around which centred the idolatrous worship of the Arabs), rose against him arid he fled to Medina. This flight (622) hegira (Arabic) was adopted as the beginning of a new era from which Mohammedan history still reckons. At Mecca, Mohammed had only preached, but at

Medina he became a ruler and lawgiver. After a time he led his troops to the capture of Mecca, and Islam as a conquering religious empire began its history. Ten years after the hegira Mohammed died, but his teaching and the kingdom which he had founded lived on. At first his doctrines were scarcely more than Judaism with a slight admixture of Christianity adapted for the Arabs. His first disciples were

instructed to turn toward Jerusalem to pray, but later Mecca was substituted, and Judaism and Mohammedanism definitely parted.

The spread of Mohammedanism is a mystery until it is realized that it represents the religious motives which animated a .series of barbarous tribes in their national efflorescence. The Arabians discovered their power just when the Roman Empire was reaching a depth of de¬ cadence that made it a ready victim. Moham¬ med taught that man's life was fated, pre¬ destined to good or evil from all eternity, but that death for the cause of Mohammedanism was an assurance of heaven. Fanatic fatalism made indomitable warriors of the Arabs and a series of commanders arose who led armies in all directions that soon gave wide extension to Mohammedanism. The interior of Arabia was conquered, and the whole Arab nation united in six years, Syria was overcome and all the Byzantine Greeks, Damascus was taken and the victory of Yermuk in Palestine completed the conquest (636). Jerusalem opened its gates to the Caliph Omar, and finally Antioch, the great capital of Syria, surrendered (638). The army directed toward Mesopotamia was equally suc¬ cessful. Persia was defeated in a great battle at Kadesia which lasted three days and in which 150,000 Persian soldiers were overcome by 30,000 Arabs. Ctesiphon fell into their hands, Ispahan was captured and Persepolis sacked, and by the middle of the 7th century Khorasaan became subject to the Arabs. Egypt suffered the same fate. Alexandria was seized about 646, and clever advantage was taken of the dis¬ affection on the part of the Copts, or natives, toward their Greek rulers whom they consid¬ ered foreigners and heretics. Amru or Amer, the Arab general in command in Egypt, proved himself a statesman as well as a leader of armies, and as he gave the country a much bet¬ ter rule than it had had under the Eastern Empire, he won the people. The story that either he or the Caliph Omar ordered that the great library at Alexandria should be burned is probably without foundation. Amru pro¬ posed to connect the Nile and the Red Sea by canal but the project was abandoned for fear of opening to the unbelievers a way to the sacred cities of Arabia.

In spite of divisions among the rulers, the spread of Mohammedanism continued under the Ommiads, the first of whom, who became ruler in 661, was Moawiyah, the descendant of Omayya, founder of a well-known Arab family. The Ommiads succeeded Ali, Mohammed's son- in-law, the husband of his daughter Fatima, and occupied the throne for some 90 years until 750 a.d. The last of these Ommiads escaped to Spain and founded the Caliphate of Cordova, where the family ruled for nearly 300 years. Under the Ommiads, Damascus became the capital of the Mussulman Empire. By 672 their power had become so firmly fixed that they attacked even Constantinople itself by land and sea, and the capital of the Greek Empire was only saved by the use of Greek fire, an inven¬ tion of a Syrian, which caused havoc among the wooden vessels of the Mohammedans be¬ cause water would not quench it but actually caused it to burn more fiercely. Having spread over northern Africa, the Mohammedans were ready at the beginning of the 8th century to cross over into Spain and to begin the series

of attacks on civilization from the West which so often put it to the hazard. The followers of the religion of the camel driver of Mecca threatened at one time to overrun and rule the world. Their war cry, <(God is God and Mo¬ hammed is His Prophet,® came to be the terror of Christians everywhere. Mohammedan pi¬ rates made the Mediterranean itself, and even many of the larger coast cities, places of terror because of their rage. The contradictions in the Koran, the emphasis on the sensual rewards that the faithful were to enjoy in the hereafter, the denial of the moral freedom of man, all these did not prevent the spread of the doc¬ trine.

The Mohammedans were in close touch with the Grecian culture in the Eastern countries, and as ever in history ((captive Greece led its captor captive.® The Saracens, children of the desert as they called themselves, were in the course of two generations of close contact with the Greek cities of Asia Minor, deeply influ¬ enced and reached a stage of high intellectual development. They often were more highly civilized in the intellectual sense of the term than the Germanic conquerors of the Roman Empire with whom they came in contact in the West. For some centuries the Arabs carried on the Greek tradition and represented the highest culture in the world. They accom¬ plished little that was progressive, though the (Arabian Nights and some of their poetry are eminently original contributions to world litera¬ ture. The Arabs by a curious contradiction consonant, however, with their Semitic charac¬ ter, possessed the two opposite qualities, the mystic and the practical. They accomplished much more in science than in literature. The number of words of Arabic origin used in the sciences demonstrate this. Alchemy, alcohol, alembic, . algebra, almanac are but a few ex¬ amples in <(a.® They had the advantage of clpse touch with the work of the Greeks in science, and this enabled them*

to out-distance the Western Europeans. Their great cities — Bagdad, Cairo and Cordova — were centres of learning as well as of world commerce. They developed an attractive style of architecture and were the intellectual leaders of mankind in the mid-mediaeval period. They added much less to what they had learned from the Greeks than has been thought, and their reputation for great advances in medicine and surgery has been rudely disturbed by modern studies in medical history. Their religious prejudices hampered the development of anatomy and of surgery, and their oriental tendencies led to unfortunate polypharmacy. Arabian physicians developed what, from the number of ingredients, came to be known as calendar prescriptions. Modern medicine had its real beginning when Arabic influence declined and when Graecisms and not Arabisms are to be found in the medi¬ cal writers.

The intellectual light of the century in the West is Isidore (560-636), who became arch¬ bishop of Seville 599. His influence was far- reaching. He presided over the Fourth Coun¬ cil of Toledo (633) and to him are attributed most of its decrees. All bishops were required to establish seminaries, the study of Greek and Hebrew as well as the liberal arts was pre¬ scribed, and interest in law and medicine en¬ couraged. The Arabs are usually set down as

introducing Aristotle into Spain, but Isidore had done that long before. He wrote the first summci of knowledge, and his work was used as a textbook during most of the Middle Ages, and was printed no less than 10 times between 1470 and 1529, some thousand years after his time. It contains information almost in the same form as the modern encyclopedia. There is much more insistence on religious questions than in our time. Isidore quotes 154 authors, Christian and pagan. His information is well ordered, so that no wonder it attracted atten¬ tion. Many editions (Berlin 1894). The eighth Council of Toledo showed its critical appreciation by declaring him ((the extraordinary doctor, the latest ornament of the Church, the most learned man of the latter ages, always to be named with reverence.® Isidore's works are the touchstone by which the human interests of this century may be judged.

A great educator of the time was Colum- banus, the Irish abbot of Bobbio in Italy, who died there in 615. At the end of the 6th cen¬ tury he had come over to France (probably 585) with 12 companions, three of whom, Saint Attala, Saint Gall and Columbanus the Younger are well known in history. He established the celebrated abbey of Luxeuil, after having

founded the abbey of Annegray in the Vosges, but even two monasteries did not suffice for the numbers who came to join him and a third had to be established at Fountains. He deprecated the conduct of Queen Brunehilde, who strove to counteract his influence by introducing religious elements into their differences. The question of the Celtic observance of Easter and of the Celtic, that is the anterior instead of the poll tonsure was brought up. To avoid contention that might give scandal, Columbanus thought it bet¬ ter to leave France for Italy. On his way he left Saint Gall to found the monastery called after him in Switzerland, while he himself, having been given by the king of the Lombardi a tract of land known as Bobbio between Milan and Genoa, erected early in the 7th century the celebrated abbey which for centuries was a stronghold of orthodoxy in northern Italy.

The beginning of the century saw the climax and sad end of the career of a great woman, Brunehilde or Brunehaut (the brunette), daughter of Athanagild, king of the Visigoths, who married Sigebert, king of Austrasia (561). She was intensely ambitious, both for her hus¬ band and herself, and of indomitable energy. She did great good by introducing the prin¬ ciples of Roman law which had ruled at the court of her father among the Austrasians. Unfortunately her ambition incited a series of wars between her husband and his brother, in the midst of which her husband was treacher¬ ously killed. She became regent for her minor son, but her reign was the beginning of the downfall of the Merovingian dynasty, for mayors of the palace are now mentioned for the first time as exercising power, and the growth of their influence in succeeding reigns finally brought about an end of the ruling house toward the end of the century. Brunehilde was learned as well as ambitious, and deeply intent on securing for her people all the benefits of civilization. She ruled over two-thirds of Gaul

better perhaps than it had ever been governed before. She had roads constructed to facilitate intercourse and commerce, was a patroness of education and the arts, and destroyed whatever remained of idolatry among the people. She built a number of monasteries, partly for edu¬ cational reasons and partly for the facilities they provided for the solution of social problems in country places. To her is attributed the foun¬ dation of one of the very early French hospi¬ tals at Hautonne. Dagobert, in the first half of the 7th century, is said to have founded a hospital in Paris. Haeser places the foundation of the Hotel Dieu shortly after the middle of this century. Brunehilde's ambition, however, finally overreached itself and brought her to an ignominious fall. Pope Gregory I, the Great, had written to congratulate her on all that she was doing for Christian civilization, but when she endeavored to maintain her position as ruler by encouraging her grandson in licen¬ tiousness so that she might have more power over him, Saint Columbanus reproached her with it, and though he was driven from his monastery of Luxeuil on pretense of heretical tendencies, the clergy

became exasperated, and finally the whole kingdom became disaffected, and offered to recognize Lothair II, if he would relieve them of Brunehilde's rule. He marched against her and she was abandoned by her army on the banks of the Aisne where with her four grandsons she fell into the hands of Lothair, who had the four princes put to death and bound Brunehilde at the age of 80 to the tail of a wild horse who dashed her to pieces as he ran away (613).

The climax of Merovingian power was reached in the reign of Dagobert I (602-638), who secured the Franks a preponderance in western Europe. Dagobert put down the Wens, organized the Saxons to resist the encroach¬ ment of the Slavs on Thuringia and delivered Bavaria from the Bulgarians who were ravag¬ ing that country. Finally he became the master of practically all Gaul, and strengthened his position as ruler by restraining the nobles, pre¬ venting abuses and violence, and going through the country to give audience to great and small. He improved the laws, favored commerce at home and abroad, formed an alliance with the Lombards of Italy and the Visigoths of Spain and sent ambassa¬ dors to Heraclius the Eastern Emperor. He encouraged art and the arts and crafts, and some of the jewelry of the Merovingian times recently excavated show us how high was the taste of the period.

The great master in the industrial arts was the famous Saint Elois or Eligius (588-659) who was a goldsmith but afterward became the bishop of Noyon. He was a favorite of Dago¬ bert, who went to him for counsel in the foun¬ dation of churches and monasteries and in the distribution of alms to the poor. Around Saint Eligius' name a 19th century controversy de¬ veloped because Mosheim, the German church historian (18th century), had quoted from one of his sermons expressions which seemed to indicate that the essence of Christianity at that time consisted in the paying of church fees. As a matter of fact, the sermon from which h quotation was taken shows that Saint Eligius in¬ sisted on all the highest virtues of Christianity. He is himself a fine type of the sincere church-

man, devoting himself and all his faculties to the benefit of Christianity.

The great struggle in France between the kings and the higher nobility, which was to continue for so many centuries to hamper national progress, may be traced in its begin¬ nings to this time. The question of the limita¬ tion of land grants to the length of the life of the grantee so that each king on his acces¬ sion might revoke such grants except on as¬ surance of the continued loyalty of the possess¬ ors of the land, was one of the factors which made for the establishment of feudalism some¬ what later in history, though its earliest mani¬ festations can be noted at this time. The weak¬ ness of the Merovingian monarchs only com¬ plicated the problem and gave the nobles oppor¬ tunity to entrench themselves in their pos¬ sessions.

The great ruler of this century is Heraclius, the Eastern Emperor (575-641). He was the son of Heraclius, governor of Africa, and suc¬ ceeded to the imperial throne through a con¬ spiracy between his father and Crispus, the son-in-law of the Emperor Phocas. He proved for many years just the ruler that was needed for the Eastern empire. Under Justinian the armies of that emperor had succeeded in re¬ conquering Italy and Africa, and re-establish¬ ing the empire in something of its old-time prestige. Barbarous nations had been encroach¬ ing more and more on the frontiers of the em¬ pire, and the Avars from the North and the Persians made serious inroads. Heraclius set up the Croats and Serbs in lllyricum as a bar¬ rier against the Avars, but he himself led his armies against the Persians, and after many strenuous campaigns in the third decade of the century he annihilated Persian power and re¬ established the Imperial dominion. This hard task had only just been completed, however, when the Mohammedans began their inroads, and Heraclius had to see his recent Eastern conquests fall under the dominion of this new power in the East, which was to prove so serious an enemy to the Eastern empire and finally bring about its fall.

All during this century the existence of the Exarchate of Ravenna (instituted 568, ended by the Lombards 752) acted as a conservative element in Western civilization. The beauti¬ ful architecture and interior decoration of the churches and palaces in Ravenna preserved a taste for the beautiful and an appreciation of art. Its presence kept alive the imperial idea and principle in the minds of Westerners who would probably have lost sight of it if they had only Constantinople in the East to think of. It conserved the idea of a Roman empire and so prepared the way for Charlemagne's dominion and for the feeling of solidarity to some extent among the Western nations. The presence of the Exarch at Vienna accom¬

plished much for peace in Italy and gave some opportunity at least for the cultivation of the arts of civilization instead of utter devotion to the art of war. Under a great ruler like Heraclius the influence of the Greek or Byzan¬ tine empire in the West was deeply felt. The maintenance of a strong Greek imperial out¬ post at Ravenna warded off to a great extent the Slavic races of eastern Europe from in¬ vading the South until Christianity had come to modify in some respects their barbarism.

Two immortal names are associated with the abbey of Whitby as it has come to be known, though its original name was Streon- shalh (Saxon), founded in this century. (The existing remains date from the 12th century). Hilda or Hild, the abbess, and Caedmon, the poet, were here in the second half of the century. Hilda (614-680) is noteworthy as the foundress and, after the Celtic tradition, the head of a monastery in which there were both men and women. She was of royal descent and had been abbess of Hartlepool (649). Caedmon was a stableman at Whitby, who, ashamed of the fact that he could not respond to the request for a song which was customary at the abbey dinners on high festival days — the custom of thus entertaining themselves at this time is noteworthy — retired to the stable and there was commanded in a dream <(to sing the beginning of created things® (Bede). In the morning he remembered his dream and his poetical gift was fostered by Hilda until he produced his great poem of (Creationˆ a metri¬ cal paraphrase of the Old Testament, the first monument of English literature. It is said to have (influenced Milton deeply. Another great abbey, that of Glastonbury, was re¬ founded in this century. It became a centre of the intellectual and spiritual life of the time. Around it gathered the legends of the visit of Joseph of Arimathea to England, whose staff planted became the famous Glastonbury thorn which blooms every Christmas eve, as well as of the legends connected with King Arthur who is supposed to be buried here on the Isle of Avalon (Isle of Souls or Land of the Blessed). Glastonbury and Whitby contin¬ ued to be important religious and educational in¬ stitutions until the time of Henry VIII. There are very old traditions which would place the foundations of Cambridge and Oxford in this century, especially the former, and while false in formal fact, there is an element of truth in them because of the great interest which this century evinced in educational foundations of various kinds and which seems to have touched also the immediate neighborhoods where are now the great English universities.

James J. Walsh,

Author of (The Thirteenth Greatest of Centuries?

Principal Events of the Seventh Century.

602. Dagobert began his reign in western Europe.

610. Mohammed began to preach at Mecca.

613. Brunehilde, queen of Austrasia, was brutally put to death by Lothair II.

614. Persians captured Damascus and Jerusalem.

626. Persians besieged Constantinople.

627. Li-Chimin, son of the founder of the Tang dynasty, ascended the throne of China and assumed the name of T'ait-ning.

631. Nestorian Christian missionaries visited China.

632. Death of Mohammed.

634. The Arabs occupied Damascus.

636. The victory of Yermuk completed the Arab conquest of Syria.

637. Jerusalem surrendered to the Arabs.

638. Persian power was overthrown at the battle of Kadesia.

639. The Arabs invaded Egypt.

641. Death of Heraclius, the Eastern Emperor.

643. Theodosius, emperor of Constantinople, and the king of Persia, sent envoys to the emperor of China with gifts of rubies and emeralds. Chinese civilization reached its climax.

646. Arabs captured and occupied Alexandria.

672. Arabs began a seven years' siege of Constantinople. Their first attacks were foiled by Greek fire which de¬ stroyed their ships.

680. Caedmon, the Anglo-Saxon poet-author of the 'Crea¬ tion,' died.

692. Arabs destroyed Carthage.

SEVENTH DAY BAPTISTS. See Bap¬ tists, Seventh Day.

SEVERINUS, sev-er-e'nus, Saint, the Apostle of Norica: b. either in northern Africa or southern Italy; d. Jan. 482. After the death of Attila in the 5th century he journeyed through the territory along the Danube, preach¬ ing Christianity, and through his courage and good work gained great influence over the people and made many converts. After his death his body was taken into Italy by Lucillus, one of his followers, and found its final rest¬ ing place on a small island near Naples.

SEVERN, sev'ern, Joseph, English artist: b. Hoxton, 7 Dec. 1793; d. Rome, Italy, 3 Aug. 1879. He was self-taught and won, after great struggles, the Royal Academy historical paint¬ ing prize in 1818. Early in life he formed a friendship for the poet Keats, for which he is chiefly noted; in 1820 accompanying the poet to Italy, and caring for him there until Keats' death the following year. He painted several portraits of Keats. In 1821 Severn exhibited (The Death of Alcibiades5 at the Royal Academy and won a traveling pension. He subsequently served as British and as Italian consul at Rome, where he lived until his death, devoting his time chiefly to the painting of miniatures. He wrote some, but his literary work is of no importance. He was buried near his poet-friend. His best- known pictures are the (Roman Beggar5 ; (Specter Ship,5 and his work on the altar of Saint Paul's Church, Rome. Consult Sharp, (Life, Friendships and Letters of Joseph Severn5 (1892).

SEVERN, England, the second river in •size and most important in the country, rises at Maes Hafren in Montgomery County, and after a winding course of about 200 miles falls into the Bristol Channel. The Vyrnwy enters the Severn on the Shropshire borders, the Wye, below Chepstow and the Lower Avon about eight miles below Bristol. At Welshpool the Severn begins to be navigable, about 178 miles above its mouth. Near Gloucester it branches forming the Isle of Alney. It is a great tidal river, with a remarkable eager or bore; ves¬ sels of 400 tons can ascend as far as Worcester. Below Gloucester navigation is impeded, and its low banks at this point cause frequent inundations. A railway tunnel (four and one- half miles) passes under the estuary near the Wye.

SEVERO, sa-va'rd, or NORTHEAST CAPE. See Chelyuskin, Cape.

SEVERUS, se-ve'rus, Alexander. See

Alexander Severus.

.SEVERUS, Lucius Septimius, Roman em¬ peror: b. near Leptis, Magna,

Africa. 146 a.d. ; d. York, Britain, 211 a.d. After the murder of Pertinax, in March 193 he was proclaimed em¬ peror by his troops at Carnuntum. Thereupon he marched to Rome to crush the partisans of Didius Julianus, who had meanwhile purchased the imperial purple from the Praetorians. On his approach Julian was deserted and assassi¬ nated by his own soldiers. In professing that he had assumed the purple only to revenge the death of the virtuous Pertinax, Severus gained many adherents and was enabled to banish the Praetorians. But while he was victorious at Rome, Pescennius Niger was in the East at

the head of a powerful army, by which he also had been called to the purple. Getting rid of the rivalry of Albinus by conferring upon him the title of Caesar, Severus at once directed his arms against this eastern competitor. On the plains of Issus, Niger was totally ruined by the loss of 20,000 men (194). After devastating some territory beyond the Euphrates, Severus took Byzantium, which had shut her gates against him, but only after a protracted siege (196) ; and he then returned to Rome, resolved to destroy Albinus. He attempted to assassi¬ nate him by his emissaries, but when this failed, Severus had recourse to arms, and defeated Albinus near Lyons (197). After returning to Rome Severus marched into the East to repel an invasion of the Parthians; made himself master of Seleucia, Babylon and Ctesiphon, and advanced far into the Parthian territories. From Parthia he marched toward the more southern provinces of Asia and entered Alex¬ andria. A rebellion in northern Britain called him away again in 208. After penetrating to the far north of Caledonia, and losing a vast number of men, he returned southward and rebuilt or repaired the wall of Hadrian across the island from the Tyne to the Solway Firth. The jurist, Paprianus, flourished during his reign and introduced improvements in the administration of justice. Consult Platnauer, M., (The Life and Reign of the Emperor Lucius Septimius Severus5 (Oxford 1918).

SEVERUS, Wall of. See Hadrian's Wall.

SEVIER, se-ver', John, American pioneer : b. Rockingham County, Va., 23 Sept. 1745; d. near Fort Decatur, Ga., 24 Sept. 1815. Hav¬ ing founded the town of Newmarket, Shenan¬ doah County, Va., and there become a cele¬ brated Indian fighter, he served as captain in the Virginia line during Lord Dunmore's War (1774; see Colonial Wars in America). He had removed in 1772 to the Watauga colony on the western slope of the Alleghanies and been, next to John Robertson (q.v.), the most prom¬ inent of the settlers. Now, at the beginning of the Revolution, he drafted a memorial to the legislature of North Carolina, requesting an¬ nexation to that colony, and as a result all of the present Tennessee was made a county of North Carolina and known as Washington dis¬ trict. He served in the North Carolina legis¬ lature and was appointed district judge at Wa¬

tauga. Elected colonel of the trans-Alleghany forces, he commanded in many Indian fights, distinguishing himself at Boyd's Creek (1779) and King's Mountain (1780). After the war, North Carolina found that the retention of the large section now known as Tennessee would entail obligations for a corresponding portion of the Federal debt and, therefore, the tract was made over to the central government. The settlers then determined to organize an inde¬ pendent State and regularly apply for admis¬ sion to the Union. At a convention held 23 Aug. 1784 Sevier was elected governor of the new State of Franklin, as it was called. North Carolina now recognized its mistake and granted Watauga a Superior Court, besides or¬ ganizing the militia troops into a brigade with Sevier as brigadier. But Sevier entered office as governor 1 March 1785, reorganized the mili¬ tary, established a Superior Court and con-

eluded treaties with the Cherokees. In 1787 Governor Caswall of North Carolina declared the Franklin government a revolt, subdued it by force of arms, imprisoned Sevier and ceded the region to the Federal government. Sevier was afterward made brigadier-general of forces in the territory south of the Ohio, in 1790 elected as first representative of Congress from the Mississippi Valley, and in 1796 was elected governor of the new State of Tennessee, serv¬ ing three successive terms. In 1803 he was re¬ elected and again served three terms consecu¬ tively. He was chosen to Congress in 1811 and returned for a third term. Consult Gilmore, (Rear-Guard of the Revolution, and*

(1887).

SEVIER, a salt lake in Millard County, in Utah, just west of the Beaver River Range, in lat. 30° N., long. 130° 10′ W., and at an altitude of 4,000 feet. Sevier River enters it on the north and it has no apparent outlet. The water lines of the valley surrounding the lake show that at one time it was of considerable extent and was a part of Lake Bonneville (q.v.), together with Great Salt Lake, Lake Lakeshore and other bodies of salt water in the vicinity. In 1872 Sevier Lake was 28 miles long, 10 miles wide and had a surface area of 188 square miles. For over 30 years the waters of Sevier River have been used for irrigation, and so great is the quantity now used for this purpose that during the summer months the bed of the lake is almost dry and the salts have been precipitated so as to form a crust over the lake bottom. This crust is composed of about three-fourths sodium chloride and the other fourth is nearly all magnesium sulphate and sodium sulphate. The crust is estimated to be about 1,500,000,000 tons. The only

animal life found in the lake are Artemia, a species of brown shrimp and the larvae of some insects. Fishes entering the lake from the river are poi¬ soned by the strong brine.

S12VIGN1S, Marie de Rabutin-Chantal,

ma-re de ra-bii-taii shan-tal sa-ven-ya, Mar¬ quise de, French writer: b. Paris, France, 5 Feb. 1626; d. Grignan, Drome, France, 17 April 1696. She was the daughter of Baron de Chantal, was left an orphan in 1633, and brought up by her maternal grandparents, and by her uncle, the Abbe of Livry. She was married in 1644 to the Marquis Henri de Sevigne, who was killed in a duel in 1651, leaving her the mother of a son and a daughter. Though gifted with wealth, beauty, talent and high social position, she made no second marriage, but devoted herself to the education of her children, and to reading, meanwhile moving as one of the most brilliant members of the literary circle of the Hotel Rambouillet. She was devotedly attached to her daughter, who was married in 1669 to the Comte de Grignan, and shortly afterward accompanied him to Provenge, where he had been appointed lieu¬ tenant-governor. This separation resulted in the voluminous correspondence, which, while not intended for publication, has since been given to the world, and has made the writer famous, the letters being models of literary style and of great historical value. They cover a period of only about seven years, as after 1687 Madame de Sevigne was rarely separated

from her daughter, who died in 1694. The cor¬ respondence abounds in delightful gossip, witty anecdote, clever remarks on men and topics of the day, and graceful delineation of the pleas¬ ures and gaieties of Parisian society. They mirror the life of the woman who was in turn the noted beauty of the court, the brilliant wit of the Hotel Rambouillet, the religious devotee, the woman of business, endeavoring to make her income meet the demands placed upon it by her extravagant son, the appreciative student of Virgil, Montaigne, Moliere, Pascal, Arnauld, Quintilian, Tacitus and Corneille, and always the devoted mother, deploring the enforced sep¬ aration from her daughter. They fill 14 large volumes, and were first published in 1726. Suc¬ cessive editions have appeared at intervals, the best being that of Monmerque in the (Grands Ecrivains) series (14 vols., 1862-66), completed by the (Lettres Inedites of Capmas) (2 vols., 1872). Consult Walckenaer, (Memoires touch- ant la Vie et les Ecrits de Madame de Se¬ vigne (1842) ; Combes, (Madame de Sevigne historienne) (1885) ; Saporta, (La famille de Madame de Sevigne en province) ‘ (1889).*

SEVILLE, sev’il or se-vil’, or SEVILLA,

sa-vel’ya, Spain, (1) capital of the province of the ‘Same name, on the east

bank of the Guadalquivir, 62 miles northeast of Cadiz. The principal buildings are grouped around or near the Plaza del Triunfo. The great Gothic cathedral, which ranks next to Saint Peter's at Rome, was built (1401-1519) on the site of a Moorish mosque, and comprises a profusion of works of art and historical treasure, paintings by Murillo, De Vargas, etc., gilt and colored wood carvings by Dancart (1482), fine sculp¬ tures and superb metal work, costly and curious statues and reliquaries, a large organ, and above all the delicate Moorish stone and marble tracery which decorates the interior. In the nave are the tombs of Fredinand III and of Ferdinand, the son of Columbus. The approach is made by a high flight of steps, and the cathe¬ dral is surrounded by the shafts of 100 antique columns. The east and north portals contain respectively some fine sculpture and bronze doorways. The immense clustered pillars, the magnificent stained glass by Flemish artists, and the Giralda (q.v.) or Bell Tower (the finest in Europe) are interesting features. North of the cathedral is the Patro de los Naranjos, with the library of Columbus — containing some valuable works and manuscripts — and the original Moorish fountain. The Alcazar is the chief specimen of Moorish arthitecture in Seville, and only second to the Alhambra in beauty and in¬ terest. It was founded in 1181, was the Arabian royal palace and was surrounded by walls and towers. Its most conspicuous features are the fagade, the hall of ambassadors, and the patro de las munecas. In the rear are beautiful gar¬ dens. The Exchange contains many historical documents. The Ayuntamiento or city hall is a fine specimen of the Renaissance, between the Plaza de la Constitucion and the Palaz de San Fernando. Adjoining is the Audiencia or Court of Justice. The other noteworthy buildings are the Casa de Pilatos (15th century), with a fine colonnade and courtyard and the Casa de las Duenas, with numerous courtyards and nine fountains. The remarkable churches include Omnium Sanctorum, San Marcos, Santa Maria

*la Blanca (an ancient synagogue), and La Caribad (the latter containing several chef d'ceuvrcs by Murillo and J. de Valdes Leal. Many of the churches, in themselves uninterest¬ ing, contain masterpieces of sculpture and paint¬ ing. The Museum contains works of art of ines¬ timable value, representing the School of Seville (16th and 17th centuries). Other notable build¬ ings include the University (1254) (1567), for¬ merly a convent; the archbishop's palace; the * royal cigar factory, (*

(2) The province has an area of 5,428 square miles, and forms a part of Andalusia. The summits of the Sierra Morina rise at the north to a high

elevation ; south, the surface is low and fertile. The Guadalquivir is the principal river, and its affluents are the Genii, the Guadira, and the Guadalimar. The province is exceed¬ ingly fertile and produces all cereals and vege¬ tables. The exports include tobacco, leather, paper, chocolate, silk and woolen goods, glass, soap and pottery. The chief European domes¬ tic animals are abundant, and in the higher dis¬ tricts occur copper, silver, lead, iron, coal, and salt mines, besides chalk and marble. Trade has developed rapidly by the building of rail¬ ways in recent times. Four senators and twelve deputies represent the province in the Cortes. The chief towns are Seville (q.v.), Carmona, Constantina, Ecija, Lebrija, Marchena, Moron de la Frontera, Osuna and Utrera. Pop. about

613,000.

SEVRES, savr, France, in the department of Seine-et-Oise, on the Seine, lies about 10 miles southwest of Paris, and an equal distance from Versailles. Its celebrated porcelain manu¬ factory, founded at Vincennes in 1745 and re¬ moved to Sevres in 1756, was purchased by Louis XV, 1760. In 1876 the old and dilapidated buildings were replaced by a new structure, erected in the park of Saint Cloud. The Porcelain Museum contains numerous articles of china collected from all over the world, which represent every age and clime. A tech¬ nical School of Mosaics was established here in 1875. Besides the celebrated Sevres vases, painted glass and mosaics are made. In the artistic pottery the pate-sur-pate (or layers) method is used — original to this manufactory. The general effect is that of a cameo, though possessing greater delicacy and rich coloring. (See Ceramics; Porcelain). Sevres has other manufactures of shawls, cordage, leather and chemicals. It was occupied by the German troops in 1870, bombarded by the French a few weeks later, and attacked by the troops of the Commune in 1871. Pop. about 8,500.

SEVRES PORCELAIN. See Porcelain.

SEWAGE. See Sanitary Engineering; Wastes, City, Disposal of; Garbage.

SEWALL, su'al, Frank, American Sweden- borgian clergyman : b. Bath, Me., 24 Sept. 1837; d. 7 Dec. 1915. He was graduated from Bowdoin in 1858, studied at the universities of Tubingen and Berlin, and afterward engaged in pastoral work in Ohio. He was president of Urbana University, Ohio, for 16 years, was engaged as a pastor in Glasgow. Scotland, for some time, and after 1890 was engaged at Washington, D. C. He wrote many books of a denominational and religious character, and translated with much success from French and Italian poetry. His works include

(1869) ; (The New Metaphysics5 (1888) ; trans¬ lations, (Poems of

Giosue Carducci5 (1892) ; and 'Sonnets of J. M. de Heredia5 (1900) ;

(Swedenborg and Modern Idealism5 (1902);

(Reason in Belief5 (1906), etc.

SEWALL, Jonathan Mitchell, American poet: b. Salem, Mass., 1748; d. Portsmouth, N. H., 29 March 1808. He studied at Harvard, was for a time in trade, but took up the law, practised in Grafton County, N. H., and be¬ came register of probate there in 1774. His songs and verses appeared widely in American newspapers in the Revolutionary time, 'War and Washington5 being among those familiar to the army. Probably a good share of his poetry was, like 'On Independence,5 of the "pompous, rhetorical, and truly ligneous variety.55 But he wrote for a performance of Addison's (Cato 5 at Portsmouth (1788), an epilogue, the concluding two lines of which are frequently quoted :

"No pent-up Utica contracts your powers;

But the whole boundless continent is yours!"

Sewall was a Federalist, and a <(wit55 of the time. A volume of his 'Poems5 containing paraphrases of Ossian and of Washington's 'Farewell Address5 appeared in 1801.

SEWALL, May Wright, American edu¬ cator: b. Milwaukee, Wis., 27 May 1844; d.

J.Z July 1920. Graduated from the Northwestern University, Watertown, Wis., in 1866, and was married to Theodore Lovett Sewall (d. 1895) in 1880. She became prominently connected with various woman suffrage associations, lectured extensively on woman suffrage, and served as delegate to numerous congresses in connection with that movement. She was identified as a manager of the Columbian Ex¬ position at Chicago in 1893 ; was appointed by President McKinley commissioner to the Paris Exposition and its congresses in 1900; and was associated in 1915 with the Panama- Pacific Exposition. She was principal of the Girls' Classical School founded in Indianapolis by her husband until she retired into private life. She published various articles on literary and reform subjects, besides (Historical Re¬ sume of the World's Congress of Repre¬ sentative Women)

and 'Women, World War, and Permanent Peace (1916).*

SEWALL, Samuel, American jurist: b Bishopstoke, Hampshire, England, 28 March 1652; d. Boston, Mass., 1 Jan. 1730. He was graduated from Harvard in 1671, was ordained to the ministry, but was "diverted into a prosperous and benign secular career,® started a printing-press at Boston, and entered public life as a member of the board of assistants. In 1692 he was made a member of the council and judge of the Probate Court, and in the latter capacity joined in the sentence of con¬ demnation against witches at the time of the historic delusion. When he had realized his error he made in 1697 a public confession in church, and afterward spent therefor one day annually in fasting and prayer. He was ap¬ pointed judge of the Supreme Court of Massa¬ chusetts, and from 1718 until his retirement in 1728 was its chief justice. He was possibly the first in America to attack negro slavery, pub¬ lishing on the subject 'The Selling of Joseph) (1700), a three-page tract of much eloquence. But he is best known for his diary, a garrulous detail of every sort of minutise, comparable in this sort to Pepys or Evelyn, and extending from 1674 to 1729. It naturally affords a

most valuable source for the political and

social history of the colony. In fact, "we

have (Chamberlain) no other book like it.® Tyler calls Sewall "great by almost every mea¬ sure of greatness.® The diary was printed in volume V of the fifth series of the 'Col¬

*lections * of the Massachusetts Historical Society.*

SEWARD, su'ard, Anna, English poet: b. Eyam, Derbyshire, 1747; d. Lichfield, 25 March 1809. She was a daughter of Thomas Seward, canon of Lichfield, and was known as "the swan of Lichfield.® Some of her earlier poeti¬ cal efforts were an 'Elegy on the Death of Mr. Garrick and an 'Ode on Ignorance.* Her literary aspirations were fostered by her fellow- townsman, Dr. Erasmus Darwin, of whom she later wrote a 'Memoir* (1804). Her greater success was achieved with a 'Monody on the Death of the Unfortunate Major Andre* (1781), and an elegiac poem on 'Captain Cook* (1807). Horace Walpole declared she had "no imagination, no novelty,® and Miss Mitford spoke of her as "all tinkling and tinsel — a sort of Dr. Darwin in petticoats.® Her poems were VOL 24 — 40*

published in 1810 with a memoir by Sir Walter Scott.

SEWARD, Clarence Armstrong, Ameri¬ can lawyer and politician, nephew

of W. H. Seward (q.v.) : b. New York, 7 Oct. 1828; d. Geneva, N. Y., 24 July 1897. . He was gradu¬ ated at Hobart College in 1848, studied law and practised in New York after 1854. He was judge-advocate-general of New York State in 1856-60; and served as Acting Assistant Sec¬ retary of State of the United States after the attempted assassination of Secretary of State Seward in 1865. He was active in the creation of the State of West Virginia; and assisted Judge Blatchford in preparing 'New York Civil and Criminal Justice) (1850).

SEWARD, Frederick William, American lawyer, son of W. H. Seward (q.v.) : b. Au¬ burn, N. Y., 8 July 1830; d. 1915. He was grad¬ uated from Union College in 1849, admitted to the bar in 1851 and for 10 years was one of the editors and owners of the Albany Evening Journal. In 1861 he was sent to apprize Lincoln of the plot to assassinate him in Baltimore, served as Assistant Secretary of State in 1861— 69 and in 1877-81, and narrowly escaped death in defending his father from an assault, 14 April 1865. He went with Admiral Porter on the special mission to negotiate the treaties with West Indies in 1867, assisted in the purchase of Alaska, and in the negotiations for Pago-Pago Harbor, Samoa. He was a member of the New York legislature in 1875, State commissioner at the Yorktown Centennial Celebration in 1881 and in 1900 became president of the Sagaponack Realty Company. He published 'Life and Let¬ ters of William H. Seward) (1891) ; 'A West Indian Cruise) (1894), and numerous articles in reviews and magazines.

SEWARD, George Frederick, American diplomat, nephew of W. H. Seward (q.v.) : b. Florida, N. Y., 8 Nov. 1840; d. 1910. He was educated at Union College, and in 1861 was ap¬ pointed United States consul to Shanghai, China, where he remained until 1876, serving as consul-general from 1863. In 1876-80 he was Minister to China, but was recalled in the last-named year in consequence of refusing to undertake the negotiation of a treaty to restrict Chinese immigration. During his residence in China he was active in suppressing riots and in reducing piracy. He was vice-president of the North China branch of the Royal Asiatic So¬ ciety after 1887, and after 1893 was president of the New York Fidelity and Casualty Com¬ pany. He published 'Chinese Immigration in Its Social and Economic Aspects) (1881) ; 'Di¬ gest of System of Taxation of New York (1902), etc.*

SEWARD, William Henry, American statesman : b. Florida, Orange County, N. Y., 16 May 1801 ; d. Auburn, Cayuga County, N. Y., 10 Oct. 1872. He was graduated from Union College (1820), and having studied for the law, began practising at Auburn in 1823, but soon indicated a decided bent for politics, which grad¬ ually drew him away from the legal profession. In 1830 he was elected as an anti-Masonic can¬ didate to a

seat in the New York senate, and from that date he was, with few intervals, in one form or another, an effective and prominent leader in the councils that framed the policy

both in his own Stale and of the nation. In 1838 he was elected first Whig governor of New York by a majority of 10,421. Though his ad¬ ministration was rendered peculiarly difficult by the internal dissensions of his party, it was marked by wise measures of reform, which definitely added to Whig strength in the State. During his term many of the disabilities of for¬ eigners were removed, the anti-rent troubles were adjusted, the natural history and geolog¬ ical survey of the State was commenced, the State museum of natural history was estab¬ lished and a bill was passed securing for fugi¬ tive slaves a trial by jury with counsel fur¬ nished by the State. He was re-elected in 1840. From 1843 to 1849 he was occupied largely with professional practice, though he delivered sev¬ eral addresses on political and other topics, among them one on the life and character of O'Connell, which is accounted one of his hap¬ piest oratorical efforts. He was elected in 1849 to the Senate, and there attained great influence as both a party leader and an adviser of Presi¬ dent Taylor. In a speech of 11 March 1850 in favor of the admission of California, he spoke of the exclusion of slavery from all new States as demanded by ttthe higher law,® a phrase which greatly offended Southern Demo¬ crats, and was made one of the battle cries of Abolition. Upon Fillmore's accession, Seward strongly opposed that President's pro-slavery attitude, though this was accepted by many Whigs in Congress. Having been re-elected senator in 1855, he took a leading part in the discussion immediately antecedent to the Re¬ bellion. In an address at Rochester, N. Y., in October 1858, he made reference to the ((irre- pressi'ble conflict® whose outcome must make the United States a nation either all of free labor or all of slave. In 1856 and again in 1860 he was the most prominent Republican candidate for the Presidential nomination, re¬ ceiving on the first ballot at the Chicago con¬ vention in 1860 173 votes as against 102 for Lincoln, who was eventually chosen. Seward, however, spoke for Lincoln in the West and East, and was made Secretary of State. This post he filled with notable efficiency, particularly in connection with the foreign relations of the government. He reorganized the diplomatic service, and by his able dispatches and the in¬ structions furnished to representatives abroad retained the confidence of Europe, which had been ready to grant recognition and support to the Confederacy. A famous incident of his

secretaryship was the correspondence with Great Britain apropos of the (

to defer the decision to a more favorable time. Before the close of the Civil War he intimated to the French government the irritation felt in the United States in regard to its armed inter¬ vention in Mexico. Many dispatches on this subject were sent during 1865 and 1866, which gradually became more urgent, until the French forces were withdrawn and the Mexican Empire fell. Seward supported Lincoln's proclamation liberating the slaves in all localities in rebellion, and three years later announced by proclama¬ tion the abolition of slavery throughout the Union by constitutional amendment. In the spring of 1865 Mr. Seward was thrown from his carriage, and his arm and jaw were frac¬ tured. While he was confined to his couch with these injuries President Lincoln was mur¬ dered and on the same evening, 14 April, one of the conspirators gained access to the cham¬ ber of the Secretary, inflicted severe wounds with a knife in his face and neck, and struck down his son, Frederick W., who came to his rescue. He negotiated treaties for the pur¬ chase of the Danish West India Islands and the Bay of Samoa, which failed of approval by the Senate, and made a treaty with Colom¬ bia to secure American control of the Isthmus of Panama, which had a similar fate. Seward sustained the reconstruction policy of President Johnson, and thereby alienated the more power¬ ful section of the Republican party and sub¬ jected himself to bitter censure and ungenerous imputations. He opposed the impeachment of the President in 1868, and supported General Grant for the Presidency in the same year. He retired in March 1869, afterward visited Alaska and made a tour of the world in 1870. He negotiated the purchase of Alaska from Russia. He published a (Life) of J. Q. Adams (1849). An edition of his

SEWARD, Alaska, town on Resurrection Bay, Kenai Peninsula, off the Gulf of Alaska, 340 miles south of Fairbanks, and the southern terminal of the Alaska Northern Railroad. It is important as a winter railroad headquarters. Pop. 1,100.

SEWARD, Neb., city, county-seat of Sew¬ ard County, on the Big Blue River, and on the Chicago, Burlington and Quincy and the Chi¬ cago and Northwestern railroads, about 26 miles west by north of Lincoln, the capital of the State. It is in an agricultural and stock- raising region, in which wheat and corn are the chief farm products. The city has flour mills, grain elevators, stock yards and creameries. There is a large trade in grain and livestock Pop. (1920) 2,368.

SEWARD PENINSULA. See Alaska.

SEWELL, Jonathan, Canadian jurist: b.

Cambridge, Mass., 1766; d. 1839. He was edu-

HON. WILLIAM H. SEWARD

liKtV.-

.

. •

■

■

cated at Bristol, England, and in 1785 he set¬ tled in Canada. He studied law, was called to the bar in 1789 and engaged in practice at Quebec. He was appointed solicitor-general in 1793, and in 1795 became attorney-general and judge of the Court of Vice-Admiralty. In 1808- 38 he was chief justice of Lower Canada. He made the decision concerning the disputed boundaries of Ontario, in 1818.r He was presi¬ dent of the executive council In 1808-29; and from 1809 he was speaker of the legislative council. He is said to have made the original proposal for the Canadian federation while in England in 1814. Author of (Plan for the Gen¬ eral Federal Union of the British Provinces in North America) (1815) ; (Essay on the Judicial History of French Law so Far as it Relates to the Law of the Province of Lower Canada)

(1824).

SEWELL, Robert van Vorst, American artist: b. New York, 1860. He was graduated at Columbia University in 1883, and studied art under Boulanger and Lefebvre in Paris. He was awarded the Hallgarten prize of the Na¬ tional Academy of Design in 1888. He special¬ ized in mural decoration. Among his works are the mural painting (The Canterbury Pil¬ grims > in the great hall at Georgian Court, Lakewood; and (The Story of Psyche, > a series of lunette decorations in the palmroom at the Saint Regis Hotel, New York.

SEWELL, William Joyce, American statesman : b. Castlebar, Ireland, 6 Dec. 1835 ; d. Camden, N. J., 27 Dec. 1901. He came to the United States in 1851, served as a sailor for a time and later engaged in business. He com¬ manded a brigade at Chancellorsville, where he led a brilliant charge

and was badly wounded. He was wounded also at Gettysburg, and served creditably on other battlefields. At the close of the war he was brevetted. brigadier-general and major-general. He was interested in rail¬ road affairs after the war; was elected to the New Jersey senate in 1872, and was president of that body in 1876, 1879 and 1880. He was United States Senator from New Jersey in 1881—87 and 1895-1901. In 1899 he became major-general of the New Jersey National Guard.

.SEWELLEL, a terrestrial rodent (Haplo – don rufus) which is formed into a family by it¬ self, and regarded as a connecting link between beavers and squirrels. It is represented by a single species (H . rufus), restricted to ((a small area on the west coast of North America, in Washington, Oregon and California.® The aborigines called it <(Showt'l® or <(Sewellel ,® the trappers the ((Boomer)) or ((Mountain Beaver.® The animal is plump, with broad head, short limbs and hardly any tail; measures about a foot in length; and has a brownish color. It lives socially in colonies, burrows underground and lives on vegetable matter. It dwells in wet places in which the vegetation is rank and dense. For its winter store it collects great quantities of woody plants and ferns, which it dries thoroughly in the sun before putting in storage for the winter. As a connecting link Haplodon is of- much interest to naturalists, while the Indians use its skin and also its flesh.

SEWERAGE. See Sanitary Engineer¬ ing.

SEWICKLEY, Pa., borough in Allegheny County, on the north bank of the Ohio River, 14 miles northwest of Pittsburgh, and on the Pennsylvania Railroad. It is chiefly residential in character as a suburb of Pittsburgh, and is patronized as a summer resort. There are natural gas and petroleum in the district. The borough has a high school, library and hospital. Pop. (1920) 4,955.

SEWING MACHINES. On 17 July 1790 Thomas Saint, an English cabinet-maker, se¬ cured a patent on a machine to be used for <(quilting, stitching and sewing, making shoes and other articles.® The patent was for some sort of a machine connected with boot-making, and the specifications and drawings of the patent comprised, among other things, a crude stitching device for forming a chain-stitch. This patent was discovered a few years ago by a searcher among the ancient archives of the British Patent Office, where it had lain un¬ noticed for well-nigh a century, no attempt, so for as is known, having ever been made to in¬ troduce into practical use the mechanisms de¬ scribed in the patent. Between 1790 and 1841 several parties obtained patents for stitching devices, making the tambour and chain-stitches, none of which was commercially successful, one of the fatal defects in each being the fact that the cloth had to be fed by hand. When,

in 1841, Newton and Archbold patented in Eng¬ land a needle with an eye near the point, in connection with a glove-stitching machine and which is essentially the same needle now in use by all sewing-machine manufacturers, one of the greatest difficulties that had theretofore stood in the way of making the sewing machine a practical success was overcome. In 1818 a sewing machine which made a back-stitch was invented by the Rev. John Adams Dodge, of Monkton, Vt., but was neither patented nor manufactured for sale. The first sewing ma¬ chine put into operation was patented in France, in 1830, by Barthlemy Thimonnier, and though it was rudely made of wood, nearly 100 of them were collected in a factory used in the manufacture of clothing for the French army. The entire plant was later destroyed by a mob. In 1848 Thimonnier put another machine on the market and on 3 Sept. 1850 took out a patent in the United States. These later ma¬ chines were made of metal.

A machine having a needle with an eye near the point attached to the end of the vibrat¬ ing arm was invented and manufactured in 1832-34, in New York, by a machinist named Walter Hunt. This machine was a lock-stitch and used two continuous threads. Hunt sold his idea to a blacksmith named Arrowsmith and through him the combination of the two threads and the needle with the eye near the point became public property. In 1853 Hunt endeavored to patent his idea, but it had been covered by a patent to Elias Howe in 1846. In 1842 a machine for sewing leather and various other heavy materials was invented by J. J. Greenough but this did not become gen¬ erally used. In 1843 a machine somewhat similar to the Greenough machine was in¬ vented by George H. Corliss. This had an automatic feed and the needles, of which there were two, were run horizontally through the goods to be sewed. Numerous other inven¬ tions were made between the years 1849 to

1851, the most important of these being the machine for the manufacture of clothing made by Lerow and Blodgett. This had a curved shuttle, ajustable feed and automatic tension and the baster-plate consisted of a circular hoop studded with pins. The next invention patented that covers a fundamental and important feat¬ ure was that of John Bachelder, patented 8 May 1849. Bachelder's machine was the first to embody the horizontal table with a con¬ tinuous feeding device that would sew any length of seam. His invention consisted of an endless leather belt set with small steel points projecting through the horizontal table and penetrating the material to be sewed, carry¬ ing it along intermittently at a proper time to meet the action of the needle.

Elias Howe, Jr., began his experiments in 1843 and secured his first patents 10 Sept. 1846. Howe's principal improvements were the shut¬ tle, producing the lock-stitch, and the feed mo¬ tion. Later, Howe made other improvements, but the machine bearing his name was not patented until 1857. Howe's invention con¬ sisted of the combination of the eye-pointed needle with a shuttle for forming a stitch and an intermittent feed for holding and carrying the material forward as each stitch is formed. The mechanical device for the feed was called the ((baster-plate,® and the length of the seam sewed at one operation was determined by the length of this plate. The material to be sewed was hung by pins to the ˆbaster-plate® in an upright position and if the seam to be sewed was of greater length than the plate it was necessary to rehang it on the plate, which was moved back to position in the same manner as a log is carried back and forth in a saw-mill.

In 1847 Allen B. Wilson, then working as a journeyman cabinet-maker in Adrian, Mich., conceived the idea of a sewing machine, al¬ though he had never heard of one. He did not complete full drawings of his machine until the latter part of 1848. Early in 1849 he deter¬ mined to build a model, and began, on 3 Feb. 1849, the construction of his first machine, which he completed in about 60 days. Having been compelled, by lack of means, to construct every part of the machine himself, the iron and steel as well as the wood, although he was not a practical machinist and lacked suitable tools for the metal work, the machine was consequently of imperfect construction and could not illustrate in the best manner the principles of his invention. It worked, how¬ ever, and with it were made dress waists and other articles that severely tested its capacity. This machine made the lock-stitch, the lower thread being carried by a double-ended shuttle. The machine contained the first automatic feed movement ever produced and was the first that could sew curved seams or turn a sharp angle. Without such a device, the machine would have been a practical failure, as Howe's really was, and as well all others until Mr. Wilson's in¬ ventions. His first device was what is known as the ((two-motion feed,® to distinguish it from his Mour-motion feed,® a still more effective device afterward invented by him. The <(two- motion feed® consisted of a horizontally recip¬ rocating tooth surface (the pitch of the teeth being forward) engaging the material at all times, and while the needle was in the material moving back to take a new stroke. A patent

on this machine was granted Mr. Wilson on 12 Nov. 1850. Wilson had, while in New York, come into contact with a Mr. Wheeler who had invented the revolving hook for handling the upper thread below the plate and forming the stitch. He constructed a model of a machine containing a rotary hook and reciprocating bobbin, gave all his energies to perfecting the new machine and obtained a patent for it 12 Aug. 1851. Joined by Newton

the three men formed the firm of Wheeler and Wilson.

It is a remarkable coincidence that on the same day a patent was granted to Isaac M. Singer for his first machine. The main features of the Singer machine were its straight needle, working at the extremity of a stationary overhanging arm, and its feed, consisting of a roughened wheel. A straight shaft in the overhanging arm im¬ parted the motion to the needle, and the shuttle was driven in its race below the feed table by a mechanism deriving its motion from the shaft by means of toothed gearing. -The feed consisted of an iron wheel with a corrugated surface, the top of which was slightly elevated above the level surface of the table. By an intermittent motion the feed carried the cloth forward between stitches without injury to the fabric. This device permitted the cloth to be turned in any direction by the operator while sewing, which was impossible with the styles of feed which perforated the goods. The ma¬ terial was held in place by a presser foot along¬ side the needle. This presser foot embraced an important feature possessed by no other sewing machine up to that time — the yielding spring, which would permit of passage over seams, and adjust itself automatically to any thickness of cloth. It was claimed that this was an improvement over Mr. Wilson's first feed, in that there was no backward motion while in contact with the cloth. It had, however, the disadvantage of touching the cloth only on a small portion of its periphery — theoretically at only a point, and practically only a little more. It was claimed by Messrs. Wheeler and Wilson to be really an infringement of Wilson's patent, the principle of which was the holding of the cloth between a roughened or toothed surface on the under side and a smooth surface touching it with an intermittent motion, permitting the turning of the cloth in either direction while the machine was in motion; and this claim was sustained by the court.

On 19 Dec. 1854, a patent was issued for Mr. Wilson's celebrated <(four-motion feed,® so called from the peculiarity of the device by which the flat-toothed surface of the feed, being in contact with the cloth, is moved for¬ ward, carrying the cloth with it; then drops out of contact with the cloth, is moved back¬ ward and then rises up against the cloth and is again ready for the first motion. This de¬ vice solved the problem of a thoroughly prac¬ tical and effective feed, and was soon generally adopted and has become the feed motion of all makes of sewing machines. This feed motion, although it was not patented until this late date, had been long previously invented by Mr. Wilson, and was described in his applica¬ tion for a patent in 1851, but the claim was not pursued for the reason that he believed at the time that he had been anticipated by W. O. Grover, of the firm of Grover and Baker. It

was ascertained afterward, however, that Mr. Wilson was really prior in the invention, and, without contest on the part of Mr. Grover, the patent was granted to Mr. Wilson. This ma¬ chine was invented by Grover and Baker on 11 Feb. 1851 and had a double-loop stitch made by a combination of a circular recipro¬ cating under needle and a curved upper needle with an eye near the point. This eliminated both shuttle and bobbin and rendered it possi¬ ble for the upper and under threads to be taken from commercial spools. These ma¬ chines, though once popular, are not now manu¬ factured.

In 1855 litigation arose involving the three principal sewing-machine companies then in existence, each claiming that the others were infringing upon certain of their patent rights, and numerous suits were instituted, more par¬ ticularly by Howe, whose patents were so skil¬ fully drawn that he claimed all others were infringements.

In 1856 the three principal sewing-machine companies — Wheeler and Wilson, Singer and the Grover and Baker — formed a combination. It was contracted by the three companies and Mr. Howe that they would stop their litigation, and, with a fair payment to each other and to Mr. Howe for special rights, would carry on the business with only honorable competition. They finally agreed to license any responsible person who should propose to engage in the manufacture of a good machine on the pay¬ ment of a royalty, which for several years was $3 on a machine.

The next machine to be put on the market was the Willcox and Gibbs. This machine, which had a rotating hook for using a single thread to make the twisted loop-stitch, was first patented in June 1857 by James E. H. Gibbs, a farmer of Midpoint, Va. Later James Willcox, of Philadelphia, added some further improvements, and the machine then became known as the Willcox and Gibbs. Several years afterward an automatic tension was placed on this machine by Charles H. Willcox.

While the manufacture of machines for the home has been developing and progressing, those for manufacturing purposes have in no less a degree been brought to a state bordering on perfection. The most recent development is the oscillating shuttle machine of the Singer Company which makes up to 50 stitches per second with scarcely any apparent friction. The single thread chain-stitch machine is faster than the double thread lock-stitch, making up to 4,000 stitches per minute. There are now machines for making — or which have special attachments for making — every conceivable article of clothing, upholstery, embroidery, leather goods, etc. We have the button-hole, the button-sewer, the French-knot, the faggot¬

ing, feather-stitching, hemstitch, side and box- plaiters, corset machines ; the cylinder for seam work on sleeves, trousers, bootlegs, leather buckets, etc. ; machines for embroidery, smock¬ ing, carpet, awnings, tents, etc. ; the single and double-needle machines and those with four, six and eight needles for glove work, special machines for overalls, sail-making, flag-making and a host of others too numerous to mention. A special class known as high-speed machines is used in factories where clothing is made in

quantity. They are run by individual dynamos. Many of the machines may be used for several different purposes by simply changing the style of feed motion, presser foot, needle, etc., while the other parts of the mechanism remain sub¬ stantially the same. There have been several thousand patents granted on sewing machine appliances and attachments.

The production of sewing machines has be¬ come a wonderful industry in the United States, which leads the world in their manufacture. In 1914 there were 46 concerns engaged in the industry, capitalized at $34,446,624; employing 14,308 wage-earners, with wages of $8,860,843; cost of material used, $7,359,664; and the value of their production was $21,391,917. Besides these there were 4 establishments making sew¬ ing-machines cases, with an invested capital of $6,425,153 and employing 3,699 hands; produc¬ ing goods annually to the value of $5,845,663. In the same year the exports of sewing ma¬ chines with and without cases amounted to $8,658,762. Consult Hasluck, P. N., (Sewing Machines: Their Construction, Adjustment and Repair) (London 1905).

SEX IN PLANTS. See Plants, Sex In.

SEXAGESIMA (seks-a-jes'i-ma) SUN¬ DAY, the second Sunday before Lent. See Quinquagesima.

SEXTANT, a portable instrument for measuring the altitudes of the heavenly bodies above the horizon, or their angular distance as seen in the sky. It was invented independently by Thomas Godfrey, of Philadelphia, and Cap¬ tain Hadley of the British navy, about 1730. The principles on which it works will be seen by a study of Fig. 1. C is a plain flat mirror, of which the polished side is turned downward

and toward the left. H is a flat plate of pol¬ ished glass through which an eye placed at E may view a distant object in the direction K by light coming through it in the direction of the dotted lines. Light emanating from another object O or P and falling on the mirror C will, where the mirror is properly directed, be re¬ flected along the line CH and, in striking the glass plate H, a certain portion of it will be reflected in the direction HE, so that the ob¬

server with his eye at E will see both the objects K and O or P in coincidence. If the mirror C is set parallel to H as in the figure, the rays KE and OC will be parallel, and may, therefore, be considered as emanating from the same object at an infinite distance.

Thus the eye will see two images in the mirror as if together. But if the mirror C be moved into a different direction, that shown by the dotted line AB for example, the direction of the ray, the direction of the line PC, the rays along which are reflected to H, will deviate from OC by double the angle through which the mirror has turned. This doubling is caused by the fact that the angles of incidence and reflection are both changed by the motion of C. It follows that if the observer can measure the angle between the mirror C and H, doubling this angle will five him the difference of direction between the rays coming from K and from P.

The sextant is used to measure this angle. The essential parts of it are shown in Fig. 2. The part ABC consists of the arc AB round C as a centre and firmly fastened by the radii CB and CA which are again firmly connected by a framework not shown in the figure. To this framework is attached the fixed plate of glass H, of which the lower half is silver while the upper half is transparent. T is a telescope, also firmly fixed to the frame, through which the eye looking in at E may see a distant object through the transparent portion of the mirror, and at the same time see any other object by the light reflected from the silvered part. The arc AB is graduated to degrees and frac¬ tions as shown by the figures. Owing to the doubling of the angle, the measures on the arc BA are also double. That is to say, this arc is only 60 degrees in length, but is divided into 120 degrees, so as to show the actual altitude of the object observed.

RM is a movable arm carrying a mirror C called the index glass, fixed to it perpendicularly at its upper end. The arm revolves around C as a centre. At its lower end there is an index mark and vernier by which the position of the arm with respect to the graduations on the arc may be determined.

The altitude of a heavenly body at C is then measured by the observer taking the instru¬ ment in his hand and holding it in a vertical position, with the telescope ET horizontal, so that the sea horizon may be seen through the transparent part of the horizon glass H. The

observer facing in the vertical plane of the sun or other object then turns

the arm RM around the centre C until he brings the sun into sight, through its rays being reflected first from C and then from H. When the limb of the sun is thus made to coincide with the horizon, the angle through which the arm RM has moved from parallelism is shown by the position of the index on the graduated arc BA, which is then determined by the vernier.

In ordinary use the navigator never has to measure angles exceeding 90 degrees. In this case the arc BA need only to be 45 degrees in actual length. The instrument is then called a quadrant. This was the original form used by Hadley.

For very accurate use the arc is extended down so as to form a complete circle. A spe¬ cial device is employed to bring about the proper reflection of the light; but the reflecting circle, as the instrument is called, is too com¬ plicated to admit of common use by the navigator.

Simon Newcomb.

SEXTET (from Lat. sextus, sixth). In music, a composition for six voices or instru¬ ments, or for voices with instrumental accom¬ paniment. Instrumental sextets are generally compositions in sonata form.

SEXTON, Alexander Humboldt, English metallurgist: b. London, 11 Sept. 1853. He was educated at the Royal School of Mines, London, the Royal College of Science, Dublin, and at the universities of Glasgow and Edin¬ burgh. He was lecturer on chemistry and metallurgy at the Manchester Technical School in 1882-84; and from 1884 until 1909, when he retired, he was professor of metallurgy at the University of Glasgow and at the West of Scotland Iron and Steel Institute. Author of (Elementary Chemistry) ; (Fuel and Refractory Materials) ;

SEXTON, Frederick Henry, Canadian

engineer and educator: b. New Boston, N. H., 9 June 1879. He was educated at the Massa¬ chusetts Institute of Technology and was pro¬ fessor of metallurgy there in 1901-02. He was assistant professor of mining and metallurgy at Dalhousie University, Halifax, Nova Scotia, in 1903-07 ; and since 1907 has been president of the Nova Scotia Technical College. Since 1916 he has also had charge of the vocational train¬ ing school, for returned soldiers of the Quebec and Maritime provinces. He is author of many technical papers.

SEXTON, a church officer whose duties consist in taking care of the church generally, to which used to be added the duty of digging and filling up graves in the churchyard, when the church had a cemetery attached to it. In the United States the sexton is also very often an undertaker, and thus

continues in a form different from the old-time sexton, to attend to the interment of church members. The term sacristan, of which sexton is a corruption, ap¬ plies more particularly to an official in the Roman Catholic and Anglican churches, who has charge of the sacristy and its contents, and of the vestments worn during the service. He occupies a considerably higher rank than the

ordinary sexton, and in English cathedrals is often a minor canon

SEXTUS (surnamed Empiricus, from his belonging to the empiric school of medicine) was a sceptic who flourished in the first half of the 3d century. He was a Greek by birth, and lived at Alexandria and Rome. Scepticism appears in his writings in the most perfect state which it reached in ancient times. (See Scep¬ ticism). We have two works by him, written in the Greek language, and they are the source of our knowledge of the Greek sceptical phi¬ losophy. One of them entitled (Outlines of Pyrrhonism) in three books, explains the method of Pyrrho; the other, entitled (Against the Mathematicians^ is an attempt to apply that method to all the prevailing philosophical systems and other branches of knowledge. Consult the edition of his works by J. A. Fabri- cius (Leipzig 1718) and by Bekker (Berlin 1842) ; also Brochard, (Les sceptiques grecs) (Paris 1887) ; Christ-Schmid, (Geschichte der griechischen Literatur (Vol. II, pt. 2, Munich 1913) and Pattrick, (Sextus Empiricus and the Greek Sceptics) (Cambridge 1899).*

SEXUAL SELECTION, a term invented by Darwin to denote a special phase of natural selection, depending on a competition between rival males, in which a premium is set on those qualities which favor their possessors in secur¬ ing mates. This competition takes two forms : On the one hand, rival mates, for instance, stags or gamecocks, fight with one another and the conquerors have naturally the preference in mating; on the other hand, rival males some¬ times seem to vie with one another in displaying their attractive qualities before their desired mates, who, according to Darwin, choose those that please them best. Darwin gives the follow¬ ing summary of his theory:

“ It has been shown that the largest number of vigorous offsprings will be reared from the pairing of the strongest and best-formed males, victorious in contests over other males, with the most vigorous and best-nourished females, which are the first to breed in the spring. If such females select the more attractive and, at the same time, . vigorous males, they will rear a

larger number of offspring than the retarded females, which must pair with the less vigorous and less attractive males. So it will be if the more vigorous males select the more attractive and, at the same time, healthy and vigorous females; and this will especially hold good if the male defends the female, and aids in providing food for the young. The advantage thus gained by the more vigorous pairs in rearing a larger number of offspring has apparently sufficed to render sexual selection efficient."

In regard to the second aspect of sexual selection, in which the females are believed to exercise some choice, giving the preference to those suitors which have brighter colors, more graceful forms, sweeter voices or greater charms of some kind, there is no little difference of opinion. Darwin indeed believed strongly in the female's choice and referred to this process of selection many of the qualities which dis¬ tinguish male animals. The females <(have by a long selection of the more attractive males added to their beauty or other attractive quali¬ ties.® On the other hand, Alfred Russel Wal¬ lace maintains a very different position. «There is,® he says, ((a total absence of any evidence that the females admire or even notice the dis¬ play of the males. Among butterflies there is literally not one particle of evidence that the female is influenced by color or even that she has any power of choice, while there is much

direct evidence to the contrary.® Against this, G. W. and E. G. Peckham, in their careful es¬ say on sexual selection in spiders, state that they have in the Attidce ˆconclusive evidence that the females pay close attention to the love dances of the males and also that they have not only the power, but the will, to exercise a choice among the suitors for their favor.® Some ob¬ servers of birds are also confident that the females choose the more musical or otherwise attractive males. But again Wallace maintains that the fact that every male bird finds a mate (

The theory of sexual selection is of consid¬ erable importance in a general theory of evolu¬ tion. This may be illustrated in reference to the bright plumage of many birds. If we postulate successive crops of variations (which cannot at present be completely rationalized), if we acknowledge that there is really <(prefer- ential mating® among birds (which is not read¬ ily proved or disproved), if we believe that the females are sensitive to the slight excel¬ lences which distinguish one suitor from an¬ other and that their choice of mates is deter¬ mined by these excellences (which Wallace em¬ phatically denies), then we may say that the greater brightness of male birds may have been evolved by sexual selection. This was Darwin's opinion. The brighter males succeeded better than their rivals in the art of courtship ; the variations which gave them success were trans¬ mitted to the offspring; gradually the qualities were established and enhanced as secondary sexual characters of the species. But Wallace

interpreted the facts quite otherwise. The relatively plain plumage of the female birds was due to natural selection, eliminating those whose conspicuousness during incubation was fatal, fostering those whose coloring was pro¬ tective. Just as Daines Barrington, a natural¬ ist, still remembered as the correspondent of Gilbert White, suggested (1773) that singing birds were small and hen birds mute for safety's sake, so Wallace maintained that female birds had forfeited brightness as a ransom for life.

The doubts and difficulties arouse scepticism as to the thoroughness of the explanations of secondary sexual characters suggested either by Darwin or by Wallace. It is not surprising, therefore, to find Mivart's explanation of the beauty of males as the direct expression of an internal force, or Mantegazza's hints as to physi¬ ological explanation of the sexual divergence, or Brook's reference to ((something within the animal which determines that the male should lead and the female follow in the evolution of new breeds.® Geddes advanced further, en¬ deavoring to interpret the secondary sexual characters as outcrops of the relative prepon¬ derance of anabolism and katabolism character¬ istic of females and males respectively. Gay coloring — sometimes at least due to pigmented waste products — is regarded as a characteristic expression of the predominantly katabolic or male sex and quiet plainness is equally natural to the more anabolic females. But this theory, which seeks to rationalize the variations which Darwin simplv postulated, is by no means in¬ consistent with a recognition of sexual selection as an accelerant directive process in the evolu-

tion of male brightness, or of natural selection as a retardative directive process eliminating disadvantageous^ conspicuous females.

*Wallace in his later works advanced toward a rational interpretation of the variations which he was previously content to postulate as facts. For he says that ((ornament is the natural out¬ come and direct product of superabundant health and vigor,** and is <(due to the general laws of growth and development.® It seems to some that this mode of interpreting charac¬ ters is of far-reaching importance and that it affects not only the theory of sexual selection but that of natural selection as well.*

To sum up, the problems involved in sexual selection are (1) what physiological conditions explain the secondary sexual characters which so often distinguish males and females; (2) to what extent and in what degree of refinement does preferential mating occur ; and (3) to what extent has

sexual selection guided the differen¬ tiation of the sexes alike in distinctive qualities and in aesthetic sensitiveness? Before these problems can be adequately solved many more facts must be accumulated.

Bibliography. — Bateson, W., (Mendel's Principles of Heredity) (London 1909) ; Cope, E. D., (Origin of the Fittest (London 1887) ; Cunningham, J. T., (Sexual Dimorphism (Lon¬ don 1900) ; Darwin, C., (Origin of Species) (new ed., London 1906) ; id., (Descent of Man and Selection in Relation to Sex) (new ed., New York 1909) ; Dewer and Finn, (The Mak¬ ing of Species1* (New York 1909) ; Geddes, P., and Thomson, J. A., (The Evolution of the Sex) (2d cd., London 1901) ; Lock, R. H., de¬ cent Progress in the Study of Variation, Hered¬ ity and Evolution) (London 1906) ; Osborn, H. F., (From the Greeks to Darwin* (New York 1894) ; Peckham, G. W. and E. G.,*

SEYCHELLES, sa-shel', a group of islands in the Indian Ocean, belonging to Great Britain. Their formation is peculiar, as they are the only tropical islands of granite struc¬ ture. The archipelago comprises 80 islands, rising precipitously from the water to a height of 2,998 feet in the largest of the group, Mahe, which has an area of SSl/2 square miles. Smaller islands of the group are Praslin, Silhouette, La Digue, Curiense and Felicite. Formerly the group was administered from Mauritius but in 1888 the office of administrator was created, an executive council of two ex officio members and one nominated member was appointed and a legislative council of six members. In 1915 the revenue was $127,000, the expenditure $155,- 500 and the debt $60,000. Exports in 1915 were valued at $462,340 and imports at $280,000. Mahe is central and, with a few of the others,

is inhabited. The white sandy beaches are en¬ closed by coral reefs. The soil is fertile, the climate temperate. There are many brooks and streams. The islands are covered with verdure (enormous ferns, sensitive plants and palms grow) and valuable woods, adapted to cabinet work or shipbuilding. Vanilla, coffee, cocoa, spices, tobacco, corn, tropical fruits and vege¬ tables are grown. The exports are the fibres, nuts and oil of the cocoanut palm ; vanilla, soap, tobacco, tortoise-shell and vacoa bags. The imports are cotton, coal, wine, coffee and cotton goods. Coco-de-mer (q.v.) is peculiar to Praslin. Enormous tortoises of the edible sort are common. The adjacent seas contain numerous fish, some of gorgeous colors. The inhabitants construct their homes of a species of coral which glistens like marble and is hewn into massive blocks. The chief harbor is Port Victoria, on Mahe Island. There is much land suitable to, but not as yet under, cultivation. The Seychelles were discovered by the Portu¬ guese and first colonized by the French (1743), of whom the present inhabitants are descend¬ ants. The British captured the islands in 1794 and at the peace of 1814 they were ceded to them. Pop. about 24,000. Consult Belcher, E.,

(Account of the Seychelles ; Fauvel, A. A., bibliographies des Seychelles* (1908) ; Gardi¬ ner, J. S., (The Seychelles* ; Hartman, Mad¬ agascar und die Inseln Seschellen* (Leipzig*

1886).

SEYCHELLES COCOANUT, a palm

(Lodoicea sechellarum) , peculiar to the Sey¬ chelles Islands, sometimes 100 feet high, crowned by immense palmate leaves, which make good material for hat plaiting and basketry, and when mature are used for house partitions and for thatching. The fruits are gigantic in size, sometimes weighing as much as 50 pounds and were anciently supposed to grow on submarine palms, since they were found only when washed ashore on Asiatic coasts. This circumstance caused many superstitions to arise, especially that they were a powerful cure for snake poison, and they, therefore, com¬ manded high prices in the East and were called coco-der-mer, sea, double or Maidive cocoanuts. There are from one to four stony nuts in a husk, each being deeply lobed at each end. This floating apparently double nut may have given rise to the types of twin boats. The unripe fruit is edible and the hard black shell of the nuts is carved into ornaments and fakers' drink¬ ing cups. See Palms.

SEYFFARTH, zi'fart', Gustave, Ameri¬ can educator and Egyptologist: b. Uebigau, Saxony, 13 July 1796; d. New York, 17 Nov. 1885. > He was educated at the University of Leipzig and under Champollion in Paris. ~ He was professor of Oriental archaeology at the University of Leipzig in 1825-55, afterward emigrating to the United States. He was pro¬ fessor of archaeology and exegesis at the Con¬ cordia Lutheran Theological Seminary, Saint Louis, in 1855-71. He then retired and lived in New York. He was a lifelong student of Eygptology and made many translations. Au¬ thor of lDe Sonis literarum graecarum turn genuinis turn adoptivis libri duo (1823) ; (Systema Astronomiae zEgyptiaceae* (1833) ; (Theologische Schriften der Alten Aegypter* (1855) ; (Summary of Recent Discoveries in*

Bible Chronology) (1857) ; (Chronologia Vet- erum) (1871), etc.

SEYMOUR, se'mor, a noble English family of Norman origin. Their name is corrupted from Saint Maur, their seat in Normandy. They acquired lands in Monmouthshire in the beginning of the 13th century and early in the 15th century added to these estates others in Somersetshire. The first

member to become conspicuous was Sir John Seymour, the father of the third wife of Henry VIII and of Edward Seymour, protector of the realm of England during the minority of Edward VI, whose uncle he was. He commanded in a maritime expedi¬ tion against the Scots in 1544, when he landed a body of troops at Leith and set fire to the city of Edinburgh. By the will of Henry he was nominated one of the council of regency during the minority of Edward VI ; but, not content with his share of power, he procured himself to be appointed governor of the king and protector of the kingdom (January 1547). In the month following he obtained the post of lord-treasurer, was created first Duke of Somerset and made earl-marshal. The same year he headed an army, with which he in¬ vaded Scotland, and after having gained the vic¬ tory of Musselburgh returned in triumph to England. His success excited the jealousy of the Earl of Warwick and others, who procured his confinement in the Tower. Six months after he obtained a full pardon from the king and was ostensibly reconciled to his adversary, Lord Warwick. The reconciliation was prob¬ ably insincere, as Warwick caused Somerset to be again arrested, in October 1551, on the charge of treasonable designs. He was tried, found guilty, attainted and beheaded on Tower Hill in January 1552. His eldest son by his second wife was created by Elizabeth, Earl of Hertford. The Earl of Hertford under Charles II having distinguished himself in support of the royal cause during the Parliamentary war obtained in his favor the revival of the title of Duke of Somerset and took his seat in the House of Lords as second duke in 1660. On the extinction of his line the descendants of the first Duke of Somerset by his first wife claimed the title and on the advice of the attorney-gen¬ eral that claim was pronounced good by the House of Lords, in which body the descendants of that claimant still hold a place. Consult Locke, A. A., (The Seymour Family) (Lon¬ don 1911) and St. Maur, R. H., (Annals of the Seymours > (ib. 1902).

SEYMOUR, George Franklin, American

Protestant Episcopal bishop: b. New York, 5 Jan. 1829; d. Springfield, Ill., 8 Dec. 1906. He was graduated from Columbia in 1850, from the General Theological Seminary in 1854 and ordained in the priesthood in 1855. He held various charges in New York State, founded Saint Stephen's College at Annandale, N. Y., in 1855 and was its warden until 1861. In 1865-79 he was professor of ecclesiastical his¬ tory at the General Theological Seminary, of which he was also dean in 1875-79, and in 1878 he was consecrated first bishop of Springfield. In 1897 he represented his church at the Con¬ gress of Old Catholics at Vienna. He pub¬ lished (What is Modern Romanism> (1885); (Marriage and Divorce) (1893) ; (The Church

*Idea of the Family > (1899) ; (Sacraments and Principles of the Church**

(1903), etc.

SEYMOUR, Horatio, American statesman : b. Pompey Hill, Onondaga County, N. Y., 31 May 1810; d. Utica, N. Y., 12 Feb. 1886. He was educated at Geneva Academy (now Hobart College) and at a military school at Middle- town, Conn. ; studied law at Utica and was ad¬ mitted to the bar in 1832. In 1833 he became military secretary to Governor Marcy and held the position six years. He was elected to the State assembly by the Democrats of Oneida County in 1841 ; was mayor of Utica in 1842 ; re-entered the assembly in 1843 where, as chair¬ man of the committee on canals, he outlined the policy subsequently followed by the State. He was chosen speaker in 1845 and nominated for governor in 1850, was defeated by Wash¬ ington Hunt, but in 1852 was elected by a large majority. During his term a prohibition law was passed by the legislature and was vetoed by him as. unconstitutional. The strong temper¬ ance sentiment prevalent at the time made his act very unpopular. During the term of his successor the vetoed law was again passed by the legislature, but was declared unconstitutional by the Court of Appeals. He was again elected governor in 1862 and made an unequivocal declaration in favor of the supremacy of the Constitution and the restoration of the Union, though he denied that the war was the unavoid¬ able result of slavery, or that slavery should be abolished in order to restore the Union. In July 1863 serious riots broke out in New York, involving loss of life and destruction of prop¬ erty. These were caused by the draft-law which discriminated against New York City in the allotment of quotas. The governor's complaint to the President secured an investigation which resulted in procuring a correction of the errors of the enrolment. In 1868 he was nominated for the Presidency, but was defeated by Ulysses S. Grant, receiving 80 electoral votes to the 214 cast for Grant. Consult Croly, (Seymour and Blair: Their Lives and Services) (New York 1868) ; Hartley, (Horatio Seymour > (Utica 1886).

SEYMOUR, Lady Jane, queen of Eng¬ land: b. England, about 1509; d. Hampton, 24 Oct. 1537. She was the eldest child of Sir John Seymour and sister of Edward, Duke of Somerset and Protector of England. She be¬ came the third wife of Henry VIII (q.v.) and the mother of Edward VI (q.v.). She was the first maid of honor to Anne Boleyn, whom she supplanted in 1536, and favored the Prot¬ estant Reformation. Consult Hume, Martin, (The Wives of Henry the Eighth and the Parts They Played in History) (Edinburgh 1905).

SEYMOUR, Thomas Day, American clas¬ sical scholar: b. Hudson, Ohio, 1 April 1848; d. 31 Dec. 1907. He was graduated at the West¬ ern Reserve College in 1870 and later studied at the Universities of Leipzig and Berlin. He was professor of Greek at Western Reserve College in 1872-80;

and chairman of the man¬ aging committee of the American School of Classical Studies, Athens, Greece, in 1887-1901. He edited the (College Series of Greek au¬ thors and was American coeditor of Classical Reviews. Author of Selected Odes of Pindar> (1882) ; Untroduction to the Language and Verse of Homer) (1885); Untroduction and*

Vocabulary to School Odyssey, Eight Books (1897); (School Iliad, Six Books > (1889-1901), etc.*

SEYMOUR, Thomas Hart, American leg¬ islator and diplomat: b. Hartford, Conn., 1808; d. there, 3 Sept. 1868. He was educated at a military academy at Middletown, Conn., became a lawyer at Hartford and was editor of The Jeffersonian Democrat in 1837. He was a mem¬ ber of Congress in 1843-45, served through the Mexican War, rising to the rank of colonel, and in 1850-53 was governor of Connecticut. He was Presidential elector in 1852 ; was United States Minister to Russia in 1853-57 and dur¬ ing the Civil War acted as leader of the Con¬ necticut Peace Democrats, in which connection he lost much of his popularity. In 1862 the State senate voted that his portrait, with that of Isaac Toucey, should be removed from the chamber till the comptroller should be satisfied of his loyalty. In 1863 he was again a candi¬ date for governor but was defeated by W. A. Buckingham after an exciting contest.

SEYMOUR, Truman, American soldier: b. Burlington, Vt., 25 Sept. 1824; d. Florence, Italy, 30 Oct. 1891. He was graduated from West Point in 1846, fought in the Mexican War and was brevetted captain. In 1850-53 he was assistant instructor at West Point, served in the Seminole War of 1856-58, and under Major Anderson at the defense of Fort Sumter in 1861, receiving the brevet of major in recognition of ins services. He became chief of artillery in McCall's division of the Army of the Potomac in 1862 and was commissioned brigadier-general of volunteers. He was engaged in the Virginia and Maryland campaigns, was in command of a division at Malvern Hill, Manassas, South Mountain and Antietam, receiving rank of brevet colonel. As chief of staff to the com¬ manding general of the Department of the South in 1863 he led a division on Folly Island, took part in the attack on Morris Island and commanded the unsuccessful assault of Fort Wagner on 18 July, in which he was severely wounded. He commanded a brigade in -the battle of the Wilderness, was taken prisoner, and after his exchange in the following August was in command of a division in the Shenan¬ doah Valley, and was engaged in the operations around Petersburgh until the close of the war. He was

present at Lee's surrender. He was brevetted major-general of volunteers and brig¬ adier-general in the regular army, and in 1865 was mustered out of the volunteer service. He became major of artillery in 1866 and served in command of various forts until his retirement in 1876. After his retirement he resided in Europe, mostly in Florence.

SEYMOUR, Conn., town in New Haven County, near the junction of Bladen, Little and Naugatuck rivers, and on the New York, New Haven and Hartford Railroad, nine miles northwest of New Haven. Seymour is one of tlie oldest towns of Connecticut. The manu¬ facturing of woolen goods was begun here the last of the 18th century. In 1803 Gen. David Humphreys (who was the first to bring merino sheep into the United States) bought the woolen mill and enlarged it to what was then called a large factory. In 1836 the place was incorpo¬ rated under the name of Humphreysville, and in 1850 it was incorporated as a town under its

present name. The chief manufactures are woolen goods, mechanics' tools, agricultural im¬ plements, nails, pins, paper, submarine cables, fountain pens, bicycle parts and rubber. There are five churches, a high school, public graded schools, private schools and a public library. Pop. 6,781. Consult Sharpe, (History of Sey¬ mour J (Seymour 1902).

SEYMOUR, Ind., city in Jackson County, on the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Baltimore and Ohio Southwestern, the Chicago, Terre Haute and Southeastern, I. P. S. Traction Company and I. and I. Trac¬ tion Railway Company, about 60 miles south of Indianapolis and 50 miles north of Louisville, Ky. It is an agricultural and stock-raising region and has considerable manufacturing in¬ terests. The chief industrial establishments are woolen mills, grain cradle and tool factory, large flour mills, hominy mill, chair factories, fur¬ niture factory, several commercial printing plants, harness factories, carriage factory, shirt factory, planing mills and other woodworking establishments, ice and cold storage plant, ice cream plant, bottling works and creamery. This being a division of the Baltimore and Ohio Southwestern, a great many railroad people are employed and live here. There are 11 churches, four ward public schools, Shields High School, Catholic and Lutheran parochial schools, two national banks, capital $100,000 each, and one trust company, capital $60,000. Pop. 7,348.

SFAX, sfiiks, Tunis, a town on the east coast, on the Gulf of Cabes, opposite Kerkenna Island. It is strongly fortified and surrounded by gardens and villas. The European, Arab and French portions are the three distinct divisions of the town. The first modern, the second — in the central portion — walled and entered by two gates; the third, a camp. Sfax is an im¬ portant seaport, with a considerable trade in dates, olive-oil, wool, fruits,

sponges, grasses, etc. ; cotton, woolen and silk goods are manu¬ factured. A safe harbor and a railway connect¬ ing with the interior are modern features. The harbor is provided with a repair dock and slips for fitting and repairing the sponge and fishing vessels. Sfax was occupied in the 12th century by the Sicilians, and in the 16th century, for a brief period, by the Spaniards. One of the principal events of the conquest of Tunis by the French was the bombardment of the town in 1881. Pop. 45,000.

SFORZA, sfort'sa, a celebrated Italian house, which played an important part in the 15th and 16th centuries, gave six sovereigns to Milan and formed alliances with most of the princely houses of Europe. The founder of the house was a peasant of Cotignola in Ro¬ magna, Giacomuzzo (Giacomo or Jacopo Muzio) Attendolo: b. Cotignola, in the Romagna, 10 June 1369; d. 4 Jan. 1424, whose skill and courage made him one of the most powerful condottieri of Italy. His surname of Sforza (the forcer), which vouches for his great strength, he is said to have received from Al- berigo Barbiano, the true founder of the con- dottiere mode of warfare in Italy. He served in the wars in the papal states, in Tuscany and in Naples, and died as Grandconstable of Naples. His son Francesco: b. 25 July 1401; d. Milan, 8 March 1466, received the command of

the Milanese forces in the war against Venice. In 1447 he laid claim to the states of Milan in virtue of his wife, although she was only the natural daughter of the last duke, and to en¬ force his claim concluded a treaty with Venice, and advanced against Milan. He laid siege to the city in 1449, and on 3 March 1450 it was forced by famine to surrender. His son Galeazzo Maria: b. 24 Jan. 1444; d. 26 Dec. 1476, a barbarian and a voluptuary, was mur¬ dered by conspirators. The son of Galeazzo, Giovanni Galeazzo: b. 1468; d. 1494, never actually ruled. Till 1480 he was subject to the guardianship of his mother and her minister, Checco Simonetta. The latter was then be¬ headed by his uncle Lodovico, surnamed the Moor, in 1481. Lodovico then assumed the government himself and kept his nephew virtually a prisoner in the castle of Pavia. At a subsequent period he joined the league against France, and was on that account deposed by Louis XII (1500). He was taken to France where he died. His son Massimiliano : b. 1491 ; d. 1530, once more drove the French from his territories by the aid of the Swiss, but in consequence of the battle of Marignano was obliged to cede his dominions to Francis I (1515) in consideration of a pension. The re¬ mainder of his life was spent in France. Francis was afterward driven from Italy by the Empenor Charles V, who invested Francesco: b. 1492; d. 24 Oct. 1535, brother of

Maximilian, with the duchy of Milan in 1522. On the death of Francesco in 1535 Charles V conferred the duchy on his son Philip II, king of Spain. Consult Ady, C. M., (History of Milan under the Sforza) (New York 1907) ; Corio, (Historia di Milane) (1565) ; Verri, (Storia di Milane) (1851) ; Hallam, (View of the State of Europe during the Middle Ages) (1818) ; Magenta, (Gli Visconti e gli Sforza) (Milan 1883).

SGAMBATI, zgam-ba'te, Giovanni, Italian musician : b. Rome, 28 May 1843 ; d. 14 Dec. 1914. He studied at Trevi, Umbria, and in 1860 removed to Rome. There he gained the friendship of Liszt, whose teaching and in¬ fluence were of inestimable benefit to him. He became known as a conductor, composer and pianist, and as an interpreter of German music in Italy. He was professor of pianoforte at the Academy of Saint Cecelia from 1877 ; and in 1897 he founded the Nuova Societa Musicale Romana. His pianoforte pieces won wide suc¬ cess and he also composed a requiem mass, three symphonies, several concertos, overtures and organ pieces.

SGANARELLE, zga'na'rel', a comic char¬ acter in ancient comedies, frequently used by Moliere, with whose plays he is generally as¬ sociated. He is introduced by Moliere in (Siganarelle, ou le cocu imaginaire) (1660). He appears also in (Don Juan, ou le festin de Pierre) (he is Leporello in the opera (Don Giovanni5); and in (L'Amour d'medicin5 ;

SGRAFFITO (sgraf-fe'to) DECORA¬ TION, that which is produced by means of Scoring or scratching on a comparatively soft surface. It is like engraving in all respects except in the relative hardness of the material

and the delicacy or the work. There is only one peculiarity in it which is different in nature from the effect produced by engraving, and that is the producing of color effects by scratching through an outer surface so as to show an inner surface of a different hue or tint. Even in this respect it is like a very delicate art of incision, namely, the Japanese method of cut¬ ting through different layers of colored lacquer so as to produce decorative patterns. It is also in this respect like the art of cameo-cutting when applied to onyx in layers of black and white, or a similar stratified material.

Sgraffito decoration, in the usual sense, is of two kinds : first, that which is applied to plaster surfaces, as of the outer faces of walls; and, secondly, to clay surfaces, as where an earthen pot is scored with a hard point before it is fired. In both of these departments sgraffito decoration is one of the earliest meth¬ ods applied; and in pottery we have in our museums pieces of prehistoric and primitive work of great interest, while also the art seems one never wholly abandoned when pottery is made cheaply and quickly by people who care for decorative effect. The sgraffito decoration of plaster walls is, however, limited in appli¬ cation to a few epochs of European

history. It has never been out of use in Italy since the Middle Ages, and occasionally a new building, even of some pretensions, is adorned in this way, or a monument of the past is carefully re¬ stored, with its sgraffito decoration repaired and completed. In the northern lands of Europe the severity of the weather is a partial check on the employment of the art; but the main reason for its neglect is the modern desire for smooth¬ ness, finish and completeness of all sorts, with which the sgraffito process may be thought to be inconsistent. It is clear that a house faced with brown plaster which is deeply scored to show line of black and white plaster from be¬ low will not meet the requirements of a com¬ munity respecting nothing which has not the look of expense and deliberation. The effects, however, are very spirited and artistic, and it is a pity that the process is not used for inex¬ pensive building. Consult Opitz, (Sgraffito5

(1891).

SHABATZ, sha'bats, SHABATS, or SA-

BAC, Jugo-Slavia, town, capital of the Drina department, on the river Save, 35 miles west of Belgrade. It has a castle dating from 1470, is the seat of a bishop, of the district pre¬ fecture and of a tribunal. The town is the commercial centre of the surrounding country, and exports honey, prunes, grain, cattle and hogs. It suffered considerably as the scene of active fighting in the European War. Pop.

12,072.

SHABUOTH, a Jewish feast, known also as the Festival of the Weeks; the most joyous of all the ancient Hebrew holidays. It was originally called the Feast of the Barley.

SHACKLETON, shak'l-ton, Sir Ernest Henry, British naval officer and Antarctic ex¬ plorer: b. Kilkee, Ireland, 15 Feb. 1874. He was educated at Dulwich College, served in the merchant marine and was a lieutenant in the Royal Navy Reserve. He was third lieutenant under R. F. Scott in the National Antarctic Ex¬ pedition in 1901-04, and with Scott reached lat.

82° 17', the farthest point south then touched. He was secretary and treasurer of the Royal Scottish Geographical Society in 1903-06. In 1907-09 he commanded the British Antarctic Expedition, and succeeded in reaching lat. 88° 23′ S., 9 Jan. 1909, establishing a new rec¬ ord. He also ascended Mount Erebus, 13,120 feet high, and reached the south magnetic

pole 16 Jan. 1909, determining its position as lat. 72° 25', long. 154° E. He headed a third expe¬ dition in 1914-16, crossing Antarctic from Coat's Land to Mac Murdo Sound and making valuable geologic and scientific surveys. He was awarded the special gold medal of the Royal Geographical Society, the King's Polar medal with two bars, and gold medals from the Royal Scottish Geographical Society as well as from the geographical societies of Den¬ mark, Belgium, France, Antwerp, Italy, Amer¬ ica, Paris and Russia. He was knighted in 1909 and is an officer of the Legion of Honor. Author of (Heart of the Antarctic (1909) ; (Diary of a Troopships

SHACKLETON, Robert, American writer: b. Wisconsin, 26 Dec. 1860. He studied law in Michigan, was admitted to the bar in Ohio, fol¬ lowed journalism in New York for five years, was in Philadelphia as associate editor of The Saturday Evening Post for two years. He is the author of (Toomey and Others) (1900) ; (Many Waters) (1902); (The Great Adven¬ turer) (1904) ; (The Quest of the Colonial) (with Elizabeth Shackleton, 1907) ; (Adven¬ tures in Home-Making) (1910) ; (A Living Without a Boss) (1911); (Unvisited Places of Old Europe) (1913) ; (The Charm of the Antique (with Elizabeth Shackleton, 1915) ; cFour on a Tour in England) (1915) ; (Life of Russell H. ConwelP (1916) ; (The Book of Boston) (1916).

SHAD, the popular name of three recog¬ nized anadronous fishes of the genus Clupea, viz., the Allis, or European shad; the Amer¬ ican shad, clupea sapidissima ; and the Twaite shad, clupea finta. To these should be added a fourth, recently discovered to be distinct, to the Gulf States. This genus is closely allied to the alewives (Pamolobus) , from which it is distinguished by the very deep head, particu¬ larly the cheeks, and by having the upper jaw compressed and grooved to receive the tip of the lower. The American Atlantic shad is the largest of the herrings found in this country, the female exceeding the male and generally weighing at the spawning age three to six pounds, though larger ones are taken. On the Pacific Coast, where the shad has been intro¬ duced and established, it reaches a greater weight. The body is deep and compressed, especially on the belly, where the scales and their supporting bones form a series of serra¬ tions ; the scales are large and very easily de¬ tached; the mouth toothless and the gill-rakers long and numerous. The numerous slender, pin-like bones, which are such an annoyance at the table, are chiefly several series of inter¬ muscular bones which support the muscle seg¬ ments above the ribs. There is a narrow lat¬ eral strip of dark muscle.

The northern limit of the shad's range is the Gulf of Saint Lawrence, south of which it enters all of the rivers of the Atlantic seaboard unless prevented by some obstruction. Intro¬

duced into the Sacramento River by the Cali¬ fornia and United States fish commissions in 1871-80, it has now become abundant on the Pacific Coast from Monterey Bay to Alaska. Concerning the habits of the shad during the greater part of its existence in the sea, very little is definitely known. Apparently, from the fact that they are taken frequently with mack¬ erel and other fishes near the coasts, they do not depart very far from the shores. Their structure indicates that they swim near the sur¬ face, strain through their gill-rakers the water taken in by the mouth, and retain the minute life which it contains. This food appears, from what few stomach examinations have been made, to consist chiefly of minute crustaceans. Their movements are controlled largely by the temperature of the water and, although the an¬ nual migration from the sea to the rivers is solely for the purpose of reproduction, it takes place when the temperature of the water lies between 56° and 66°, and is hastened or re¬ tarded accordingly by warm or cold seasons. The movement of the schools begins in Novem¬ ber and ends in March in the Saint John's River and progresses regularly from south, northward, as the season advances, the chief runs in the Potomac occurring in April, in the Delaware in April and May and in the Ken¬ nebec in May and June. During the earlier weeks of the migration males predominate, dur¬ ing the later, females. The eggs may be de¬ posited anywhere above brackish water, at the mouths of creeks of high up the rivers. No nest is formed or other care given the eggs; the spawn and milt are simply ejected in inter¬ mingling streams as the male and female fish swim side by side about the time of sunset. The fertilized eggs are about one-eighth of an inch in diameter with a water space beneath the egg membrane and, being heavy, sink to the bottom. From 30,000 to 100,000 eggs are taken artificially from each female, but the natural yield is much greater. After spawning, the fish which are lean and starved begin to feed and move sea-ward. The young shad remain in the rivers much longer and do not finally enter the bays and coastal waters until the temperature of the river water approaches 40° when, in No¬ vember, they are about three inches long. They remain in the sea for three or four years until mature, though a few immature ones often enter the rivers in the spring with herrings or shad, and they have been found on several oc¬ casions in shallow bays along the coast. Be¬ sides man, the shad has many enemies, and the destruction of the eggs and young by preda¬ ceous fishes, and especially by eels, is enormous. Because of this fact and the added one that shad can be caught only before and during the spawning season, and for various other reasons, the shad fisheries had greatly declined and in some places had even been abandoned during the seventies.

To remedy this the United States Fish Com¬ mission took up the problem of the artificial propagation of shad and succeeded so well that the fisheries have not only been saved, but greatly extended and at the present time are

dependent on this means of maintaining the abundance of this fish. The chief advantage of artificial over natural propagation lies in the much larger percentage of eggs fertilized and

hatched. In its perfect state the method is very simple but exact. The spawn-takers enter the boats as the nets are drawn and select and strip with great precision the ripe males and females, the milt being squirted over a layer of eggs in the bottom of a moist pan, after which a small quantity of water is added and the whole gently agitated. The surplus milt is then washed away and eggs carefully washed and cleaned. As the eggs are heavier than the water they are now hatched in a closed McDonald or siphon jar, to which a stream of fresh water is admitted through a glass tube running to the bottom, and the overflow drawn off at the top, thus con¬ stantly moving the eggs. They begin to hatch in about a week, though the time varies with the temperature, and as the young fry and nearly hatched eggs rise to the surface they are drawn off automatically at the outlet into larger vessels. With careful attention to details the fry are distributed to the various creeks and rivers a few days after hatching, in some cases the special cars devised for carrying young fish being employed for their transportation. They may, however, be readily reared in ponds, and many have been thus kept for months or even a year before being liberated. The shad¬ hatching work at one time reached enormous proportions. In 1900, for example, the United States Fish Commission hatched and distrib¬ uted 241,056,000 fry; but in the fiscal year 1916—17 the distribution fell to 77,946,000 fry.

The great estimation in which the shad is held as a food-fish led to the development of this fishery so that it is exceeded in value only by that of the cod and salmon. The fisheries at¬ tained their greatest extent in Delaware Bay and river, Chesapeake Bay and tributaries and the North Carolina sounds. By 1916 the sup¬ ply had become imperiled by unrestricted fish¬ ing and by obstructions and pollutions. In the Hudson, formerly one of the leading shad streams, the catch decreased from 588,898 in number in 1896 to 9,287 in 1916; in the Chesa¬ peake region, from over 7,000,000 pounds in 1890 and 3,252,000 in 1909, to 1,454,535 in 1915; in Virginia, from 11,500,000 pounds in 1897 to 4,714,124 in 1915. In 1915 these fisheries were operated on a capital of $1,528,824, and the value of their products was $1,155,670. With the exception of a few pickled and salted the entire catch of shad is consumed fresh. In the sounds, bays and estuaries many are taken in pound nets and weirs, but in the rivers above their mouths gill nets and seines are the chief

means of capture. Some of the great seines in use on the Potomac and Delaware rivers are more than a mile in length and are hauled by means of donkey engines.

Two species of shad are found in Europe, the common or allis shad (Alosa vulgaris) and the twaite shad (A. finta). The common shad inhabits the sea near the mouths of large rivers, and in the spring ascends them for the purpose of depositing its spawn in the shallow water about their sources. The young fry remain for a season in the waters which gave them birth, but on the approach of cold weather descend the rivers and take refuge in the ocean. The old ones likewise return, and at this time are emaciated and unfit for food. Its color is a dark blue above, with brown and greenish lus¬ tres, the under parts being white. The twaite

shad is about a half less than the common spe¬ cies, and weighs on an average about two pounds.

Bibliography. — • Goode, (The Fisheries In¬ dustries of the United States5 (Washington 1884-87) ; Stevenson, (The Shad Fisheries of the Atlantic Coast,5 Report United States Fish Commission (Washington 1899) ; Brice, (A Manual of Fish Culture5 (Washington 1897) ; Cunningham, Marketable Marine Fishes5 (New York 1896) ; and the Annual Reports of the United States Bureau of Fisheries. See Clupeidˆe; Herring.

SHAD-BUSH. See Amelanchier.

SHAD-FLY, a May-fly (q.v.).

SHAD-WAITER. See Whitefishes.

SHADDOCK, a small tree (Citrus de- cumana) of the order Rutacece. It is a native of the Malay Archipelago, whence it has been introduced into India, the West Indies, Florida, California and other warm climates for its fruits. It is a small tree about 25 feet tall, with large ovate leaves, large white flowers and light yellow or pink fruits, with sweet or acid pale yellow or reddish pulp, arranged in sections like those of the orange. In some horticultural varieties the fruits are more than six inches in diameter and weigh more than 10 pounds. The true shaddocks are pear-shaped and are seldom found in the northern markets, since the round fruited kinds or "pomelos55 are in Amer¬ ica considered more valuable for shipping. The name "grape-fruit55 is often applied to the shad¬ dock because it is produced in clusters some¬ what resembling grapes. Other popular names are forbidden fruit, fruit of paradise, pumelo, pompelos and variations of spelling. The tree is somewhat larger than its relative, the orange, and is planted about 30 feet apart. It is found to be most satisfactory when budded upon its own stock, or that of the sour or sweet orange, the first being preferred by many growers. It is considered more tender than the orange and in the United States is grown only in the lower part of the Florida Peninsula and warmer Cali¬ fornia. The cultivation, fertilization and man¬ agement are practically the same with the above exceptions to those of the orange and lemon (qq.v.).

*SHADOOF, an ancient Egyptian contriv¬ ance for raising water. It is extensively in use in the East for drawing water for irrigation purposes, and its prototype is found in use in the South in the United States, where it is employed to draw water from the open "sur- face55 wells. The machine consists of a cross¬ bar on two uprights ; suspended on this hori¬ zontal bar is a long rod or branch of a tree, * so fixed as to work as on a fulcrum, the long end or lever pointing upward and over the water, usually a river or stream, and the short end behind the bar and nearest the ground. On the short end is affixed a weight of rock or dried mud, to act as a counterpoise to the long end. From the end of the long portion a bucket is suspended. When not in use the shadoof naturally rests with the short weighted end next to the ground and the long end, with dependent bucket, in the air. When it is desired to draw water the bucket is pulled down (by a rope attached to the long end) and is dipped under the water; on account of the weight at*

the other end it is now easy to tip the shadoof, again bringing the bucket into the air where it can be poured into any object on the bank desired —

often a hole, from which a runnel conveys the water to irrigation ditches. Sha¬ doofs are often made two or more, side by side, or a succession of them along the bank to be used at different stages of the water.

SHADOW, the darkness caused by the in¬ terposition of an opaque substance between a luminous point or body and the place upon which the shadow is thrown. When the sub¬ stance that cast's the shadow is in open space, the form of the shadow is that of a section of the substance made at right angles to the direc¬ tion of the ray of light. When the body casting the shadow is larger than that which emits the light the shadow goes on constantly increasing in diameter the further it goes ; when it is of the same size with the latter, the shadow is unlimited in length, but always remains of the same diameter; and when it is smaller the shadow gradually diminishes to a point, where it terminates. The intensity of the shadow de¬ pends upon the degree of transparency, trans- lucency or opaqueness possessed by the sub¬ stance interposed between the point of light and the place on which a shadow is cast.

SHADOW PLAY, or SHADOW PAN¬ TOMIME, a theatrical performance acted by puppets or persons, whose shadows are thrown upon a screen by means of a light placed back of the performers. The idea is of great antiquity and is thought to have originated in China. It has long been a favored entertain¬ ment in Japan, the Malay Archipelago, through¬ out southern and western Asia, Egypt and eastern Europe. It was introduced in France in the 18th century, and like the puppet shows and pantomimes, became popular as an enter¬ tainment for children. It is revived from time to time, usually in vaudeville or cabaret acts.

SHADWELL, Charles Lancelot, English lawyer and author : b. London, England, 16 Dec. 1840. He was educated at Christ Church, Oxford, was called to the bar of Lincoln's Inn in 1872. From 1905 to 1914 he was provost of Oriel College and is a late Fellow of Win¬ chester College, and has published (The Laudian Statutes) (1888) ; (History of Oriel College) (1891); (The Earthly Paradise) (1899); (Regis- trum Orielense (2 vols., 1893-1902) ; (The Purgatory of Dante Translated in English Verse) (1892) ; (University and College Es¬ tates Acts) (1898). He edited Pater's (Greek Studies) (1895) ; Miscellaneous Studies) (1895) ; and (Gaston Latour) (1896).*

SHADWELL, Thomas, English dramatist and poet laureate: b. Stanton Hall, Norfolk, about 1640; d. London, 19 Nov. 1692. He was educated at Cambridge and subsequently studied law. His comedy, (The Sullen Lovers (1668), was successful and he thereafter devoted him¬ self to literature. He wrote 17 plays, the most of them modeled on the style of Ben Jonson, which caricatured with genuine humor, though somewhat coarsely, various*

*eccentricities in the manners of the day. After the Revolution he became, in 1688, poet laureate and royal histori¬ ographer, succeeding Dryden and thereby in¬ curring the enmity of that poet, who made him the hero of his clever satire, (MacFlecknoe.**

His death was supposed to be due to an over¬ dose of opium. His poetry was of little merit, but his dramatic pieces, though of only tem¬ porary reputation, were much lauded in their day. They include (The Virtuoso) (1676) ; Lancashire Witches) (1682) ; (Volunteers, or the Stock-jobbers) (1693), etc. His collected

SHAFFNER, Taliaferro Preston, Ameri¬ can inventor: b. Smithfield, Va., 1818; d. Troy, N. Y., 11 Dec. 1881. He studied law and was admitted to the bar, but practised little, his at¬ tention being largely absorbed by inventions. In the early days of the telegraph he was an associate of Samuel F. B. Morse. He built the line from Louisville, Ky., to New Orleans and that from Saint Louis to Jefferson City in 1851, and held office in various telegraph companies. He projected a North Atlantic cable that should touch Labrador, Greenland and Iceland, and secured a number of patents for the use of high explosives in blasting. During the Dano-Prus-sian War of 1861 he was in the service of Denmark. He published the (Telegraph Com¬ panion : devoted to the Science and Art of the Morse American Telegraph1 (1855) ;*

SHAFROTH, shaf'roth, John Franklin,

American lawyer, governor and senator : b. Fayette, Mo., 9 June 1854. He was graduated at the University of Michigan in 1875 and was admitted to the bar in 1876. He engaged in practice in Fayette until 1879, then removed to Denver, Colo., where he has since practised. He served in Congress in 1895-1905, was gov¬ ernor of Colorado in 1909-13, and in 1913—19 was United States senator.

SHAFTER, shaf'ter, William Rufus,

American military officer : b. Galesburg, Mich., 16 Oct. 1835; d. near Bakersfield, Cal., 12 Nov. 1906. At first a farmer, on the outbreak of the Civil War he entered the Seventh Michigan In¬ fantry. He participated in the battles of Fair Oaks, Savage Station, Glendale and Malvern Hill; was appointed major 5 Sept. 1862; was taken prisoner at Thompson's Station, Tenn., in March 1863 and exchanged in May of the same year; was made lieutenant-colonel 5 June 1863 and became colonel of the 17th United States colored troops 19 April 1864; brevet brigadier- general of volunteers for gallant and meritori¬ ous services during the war; and was mus¬ tered out of the volunteer service 2 Nov. 1865. He entered the regular army and

became lieu¬ tenant-colonel of the 41st Infantry 26 Jan. 1867; assigned to the 24th Infantry 14 April 1869; colonel of First Infantry 4 March 1879; and brigadier-general 3 May 1897. On the breaking out of the Spanish-American War he was given command of the army mobilized for the inva¬ sion of Cuba; his first decisive move was the landing of 16,000 men at Daiquiri, Cuba, on 21 June 1898, in about 12 hours without an acci¬ dent. He conducted the military operations resulting in the surrender of Santiago de Cuba.

After the war he commanded the department of California and Columbia in 1899-1901, and was retired 3 June 1901. Consult the biography by Charles A. Weissert (1916).

SHAFTESBURY, shafts'bu-ri, Anthony Ashley Cooper, 1st Earl of, English states¬ man : b. Wimborne Saint Giles, Dorsetshire, 22 July 1621; d. Amsterdam, 21 Jan. 1683. He entered Exeter College, Oxford, whence he re¬ moved to Lincoln's Inn, with a view to the study of law ; but was chosen representative for Tewkesbury in 1640. At the commence¬ ment of the civil war he sided with the king's party, though he appeared to deem mutual con¬ cession necessary. Finding himself in conse¬ quence of this opinion distrusted by the court he went over to the Parliament, from which he received the command of the parliamentary forces in Dorsetshire. When Cromwell turned out the Long Parliament, Sir Anthony was one of the members of the convention which suc¬ ceeded. He was, nevertheless, a subscriber to the protestation which charged the Protector with arbitrary government, though this fact did not prevent him from becoming one of his privy council. After the deposition of Richard Cromwell he was privately engaged in a plan for the restoration of Charles II, which he subsequently aided with all his influence. He was one of the 12 members of the convention of 1660 who carried the invitation to the king, and was soon after made a privy councilor and a commissioner for the trial of the regicides. In 1661 he was raised to the peerage by the title of Baron Ashley, and appointed chancellor of the exchequer and a lord of the treasury. Yet he gave his strenuous opposition to two of the leading measures favored by the Crown, the Corporation Act in 1661 and the Act of Uniformity in 1662. Afterward his conduct changed and he was one of the members of the obnoxious Cabal (q.v.). He supported the Dutch war and issued illegal writs for the elec¬ tion of members of Parliament during a recess, and in 1673 supported the Test Act. In 1672 he was created Earl of Shaftesbury and Lord High Chancellor. His conduct on the bench was able and impartial. He had not, however, been a whole year in office when the seals

were taken from him, probably through the influence of the Duke of York; and from that moment he be¬ came one of the most powerful leaders of the opposition. He made use of the Popish plot to force out the Earl of Danby's administration (1678) and produce the formation of a new one, in which he was himself made president of the council April 1679. Amid many violent party proceedings which followed the Habeas Corpus Act was passed. He remained in the adminis¬ tration only until October. In his hostility to the Duke of York, Shaftesbury is now supposed to have entered into connection with the Duke of Monmouth, with the view of supporting his claims to the Crown, a circumstance which gave rise to Dryden's satire of (Absalom and AchitophelP In consequence of this suspected design Shaftesbury was once more committed to the Tower and tried for high treason; but the grand jury before whom the bill of indict¬ ment was laid ignored it. Not long after this acquittal the earl withdrew to Holland, where he died. He was highly accomplished and easily the greatest politician and governor of parties

in his time in England. Consult the biographies by W. D. Christie (London 1871) and H. D. Traill (ib. 1886) ; also Macaulay's (History y

(1848-55).

SHAFTESBURY, Anthony Ashley Cooper, 3d Earl of, English moral philos¬ opher: b. London, 26 Feb. 1671; d. Naples, 15 Feb. 1713. He was gransdon of the preceding. After travel in Germany, France and Italy, he became (1695) the representative in Parliament of Poole, in Dorsetshire, and distinguished him¬ self while in Parliament by his support of measures favorable to public liberty. In 1698 he gave up his seat, and visiting Holland in the assumed character of a student of physic, he prosecuted his studies, and became intimately acquainted with Bayle, Le Clerc and other literary men. In 1709 he published an (Essay on the Freedom of Wit and Humor, > an (Inquiry Concerning Virtue or Merit, J and (The Moral¬ ist, a Philosophical Rhapsody, being an elo¬ quent defense of the doctrine of a Deity and providence. His (Sensus Communis, * and his (Soliloquy, or Advice to an Author,) followed in 1710. At the time of his death he was en¬ gaged in a work on the (Arts of Design.) His works were collected and published together, under the title of Characteristics .of Men, Manners, Opinions, and Times) (1711; rev. ed. 1714). A new edition by Hatch began to ap¬ pear in 1870, but was never finished. As a writer he is remarkable for the elegance but also for the excessive artificiality of his style. In all his works Lord Shaftesbury appears a zealous advocate for liberty, and a firm believer in the fundamental doctrines of natural reli¬ gion; but, although he professed a respect for Christianity, he was doubtless sceptical in re¬ gard to revelation. (See Charact* istics). Consult the works by Spicker (1872) ; von Gizycki (1876) ; Fowler, (Shaftesbury and*

Hutcheson (1882) ; also Rand, (Unpublished Letters and Philosophical Regimen of the 3d Earl of Shaftesbury* (1900) ; Leslie Stephen (Essays on Free Thinking and Plain Speaking) (new ed., New York 1905).*

SHAFTESBURY, Anthony Ashley Cooper, 7th Earl of, English philanthropist; b. London, 28 April 1801 ; d. Folkestone, Kent, 1 Oct. 1885. He was educated at Harrow and Oxford, and sat in the House of Commons dur¬ ing most of the period from 1826 to 1851, as member successively for Woodstock, Dor¬ chester, Dorsetshire and Bath, but in the latter year succeeded to the peerage. He supported the administrations of Liverpool and Canning, and in 1828 he was appointed a commissioner of the board of control. Six years later he became a lord of the admiralty under Sir Robert Peel, From 1828, when he was appointed a member of a committee of inquiry into the treatment of lunatics, he constantly strove to improve the lunacy laws and administration ; and it is largely due to his efforts that most of the worst abuses were removed. But his name must ever be chiefly associated with his noble and successful efforts to improve the condition of factory workers. About 1833 he first proposed the limitation of their working-day to 10 hours, and in spite of opposition his proposal became law in 1847. In 1842 an act was passed under

his direction for the improvement

Though a Conservative, he supported the repeal of the corn-laws. For 39 years he acted as chairman of the Ragged School Union, and he was also identified with various movements for securing better house accommodation for the working classes. He was president of the Bible Society, of the Pastoral Aid Society, of the Protestant Alliance and of other religious organizations. He was very popular with the masses of the population. He was an ardent evangelical in religious matters, and opposed to rationalistic beliefs and ritualistic practices. He published a volume of (3 vols., London 1886) ; Walpole, Sir Spencer, (Studies in Biography } (New .York 1907).

SHAG, a cormorant, epecially the Phala- crocorax corbo.

SHAGREEN, a kind of grained leather, of a close and solid substance, used for forming covers for cases, etc., which easily receives different colors. It is prepared in the East from the skins of wild asses, horses and camels. The most common color is sea-green (given by means of copper-filings and a solution of sal-ammoniac) ; but blue, red, black and other colors are also

given it. Shagreen is also made of the skins of the sea-otter, seal, shark, etc. Consult Watt, A., (Leather Manufacture> (London 1906).

SHAH, the title given by western writers to the sovereign of Persia ; in his own country he is known by the compound title Padishah. It is also used in other countries of central and southern Asia, and signifies a sovereign prince or king.

SHAH ALUM (Alam, Alem) II, em¬ peror of Delhi: b. 1728; d. 1806. He was the last of the Mogul emperors to exercise even a nominal independence and ascended the throne in 1759. For 12 years he was exiled and he fi¬ nally, in the endeavor to strengthen his author¬ ity over his empire, sought British friendship and granted to them Bengal, Bahar and Oressa in exchange for the city and district of Allahabad. He put himself under the power of the Mah- rattas in 1771, but in 1788 Delhi was seized by the Mohammedan rebel, Ghulam Kadir, who put out the emperor's eyes. From 1803-06, under the protection of Lord Lake, who had defeated the Mahrattas, Shah Alum enjoyed a period of comparative affluence, thus peacefully ending his long and wretched reign.

SHAH JEHAN, je-han, or SHAH JA- HAN, Mogul emperor of Delhi: b. about 1592; d. 1666. He was fifth of the dynasty and in his youth was repeatedly in revolt against his father, Johangir, upon whose death in 1627 he succeeded to the throne. His reign saw the Mogul empire at the height of its wealth and glory. He destroyed the kingdom of Ahmad- nagar in 1636; and while he lost Kandahar to the Persians in 1653, he waged successful war against the Deccan princes in 1655. In 1658, when ill, he was seized by his son, Aurang-Zeb, and imprisoned the remainder of his life. His reign was distinguished further for its remark¬ able achievements in architecture. He built the

Taj Mahal at Agra as a tomb for his wife, Mumtaz Mahal ; the pearl mosque at Agra ; the palace and great mosque at Delhi, which city he founded; and also built the celebrated Pea¬ cock Throne, the value of which has been esti¬ mated at $30,000,000.

SHAH NAMEH, na'rne («Book 9f the Kings®). This Persian national epic is one of the masterworks in the world's literature. It is by Firdusi, the greatest of the Persian poets, who spent 30 years of his life in composing it. It consists of some 60,000 rhymed couplets and is a fanciful chronicle of Iran, for to call it a history would be misleading. It is full of imaginative conceits, many of them wild, ex¬ travagant and without any basis of fact. How¬ ever, what Firdusi (whose real name was a long and quite different ione, Firdusi being an honorary appellation) sets out to do is to trace the varying fortunes of Persia, from its remotest and wholly legendary

beginnings to his own time, almost. And this task, viewing him solely as a poet, he undoubtedly accom¬ plished admirably. When he undertook it he was living at the court of the great Sultan Mahmoud Ghazni, about a.d. 1000. Poetically the legendary lore dispensed by the author is quite attractive and stirring, and his account of the glorious reign of King Jamsheed — the golden age of Persian tradition — is eloquent and enticing. So, too, is his story ,of the doings of the likewise mythical Khayanian dynasty and down to the days of Zerdusht (Zoroaster), where he first begins to touch on historical fact, to the first downfall and conquest of Persia under Alexander the Great, and to the even worse fate overtaking it when the Arabs destroyed the throne of the mighty Sassanides, and the national creed of the country, and forced Islam upon the Persians. It is of in¬ terest to note that the entrancing tale of the legendary Persian hero, Rustem, as given by Firdusi in his poem, is in most respects a striking parallel to that of the Germanic hero, Siegfried, the Norse Sigurd. Very wide latitude must be granted the poet in unwinding his long tale, and his departures from historic truths; his anachronisms are frequently glaring. These however, have all been more than condoned by his Persian audiences, as they are owing for the most part to Firdusi's intense nationalism. Besides, the Persian of every age has harbored a deep-rooted disdain for plain, sober fact. And looking at the Shah Nameh purely as a work of art, as a creation of the poet's fancy, this epic lay must be given a very high place in world literature. There is, to mention its chief merits, a sustained fire of diction, an untiring play of imagery and brilliant metaphor, a sweet euphony and sonorousness, a wealth of realistic detail, a daring fancy and an unflagging power of description which, take it all in all, are per¬ haps unrivaled in any other tongue. And these undeniable traits of Firdusi's epos far outweigh its defects. Throughout he does not even ser¬ iously attempt to be a real historian, to apportion justly praise and blame, to tell the truth. But he is and remains from first to last a poet, who <(in a golden clime was born, with golden stars above.® And as the Persian loves to revel in poetic fancy, it is small w-onder that the Shah Nameh has become one of his dearest treasures, all educated Persians even to-day being able to

recite whole pages of the poem. As to trans¬ lations, abridgments, etc., the best translation of the Shah Nameh is a complete French one, done by Jules Mohl under the title of (Le Livre des Rois) (7 vols., Paris 1 876-78 5 ; an excellent abridgment of it in English is by James Atkinston, (Shah Nameh) (reprinted in the Chandos Series, New York 1886) ; there are also spirited versified selections from it in Robinson's (Persian Poetry for English Read-

ers) (Glasgow 1883). Consult also Browne (A Literary History of Persia5 (New York

1902-06).

Wolf von Schierbrand.

SHAHAN, sha'an, Thomas Joseph, Ameri¬ can Roman Catholic bishop and educator : b. Manchester, N. H., 11 Sept. 1857. He was educated at the Montreal College ; the American College, Rome ; the Roman Seminary, and at the University of Berlin. He was ordained priest in 1882; was chancellor and secretary of the diocese of Hartford in 1883-88; became professor of church history and patrology at the Catholic University of America in 1891, and since 1909 has been rector there. He was created domestic prelate of the Pontifical Court, Rome, with rank of monsignor, in 1909, and was consecrated titular bishop of Ger- manicopolis 15 Nov. 1914. He is a contributor to the leading Roman Catholic magazines ; edited the Catholic University Bulletin in 1895— 1909; and was associate editor of the (Catholic Encyclopedia5 in 1905-15. Author of (The Blessed Virgin in the Catacombs5 (1892); ˆhe Beginnings of Christianity5 (1903) ;*

(Saint Patrick in History5 (1905), etc.

SHAHAPTIAN (sha-hap'te-an) IN¬ DIANS, a linguistic stock of North American Indians, the name of which is adapted from the Kootenay name of the Nez Perces, one of its principal tribes. The divisions of the stock occupied a large section of the country along the Columbia and its tributaries in what is now northeastern Oregon, southeastern Washington, and southwestern Idaho, extending from about long. 114° 30′ to 121°, and between lat. 44° and 46°. Their western boundary was the Cascade Mountains; their westernmost bands, the Kli- kitat on the north, the Tyigh and Warm Springs on the south, enveloping for a short distance the Chinookan territory along the Columbia which extended to the Dalles. Shahaptian tribes extended along the tributaries of the Columbia for a considerable distance, especially along Snake River, their eastern boundary being interrupted by the Bitter-root Mountains. The customs and habits of the tribes com¬ posing the stock were fairly homogeneous, the family organization was loose, and the clan system did not prevail. They subsisted chiefly on salmon and on roots and berries, and after the introduction of the horse did more or less hunting. Agriculture was not engaged in, and the villages were of temporary character owing to the necessity of frequently shifting residence in search of food. With the excep¬ tion of the outbreak of the Nez Perces under Chief Joseph in 1877, due to the failure of the government to fulfil its treaty .obligations with the Indians, the Shahaptain tribes haye been generally peaceful. The principal tribes _ or bands of the

stock, with their present location,

are Yakima. 2,311 under Yakima agency, Washington, and perhaps 300 not under an agent; Nez Perce (Chopunnish) , 1,567 under Nez Perce agency, Idaho, and 126 under Col¬ ville agency, Washington, total 1,693; Klikitat, about 165 under Yakima agency, Washington; Paloos, unknown number under same agency; Tenaino, 70 under Warm Springs agency, Oregon; Tyigh, about 430 under same agency; Umatilla, 184 under Umatilla agency, Oregon ; Wallawalla, 525 under same agency; Tukspush or John Day Indians, about 60 under Warm Springs agency.

shAhjehAnpur, sha-je-han'poor, In¬ dia, chief town and administrative headquarters of a district, 100 miles northwest of Lucknow. Some fine mosques and the ruins of an ancient castle are its most interesting architectural features. Its chief industries are agriculture, sugar refining, and distilling, and the export trade consists of sugar, pulses and cereals. The town was founded in 1647 by the Mogul emperor, whose name it bears. In the mutiny of 1857-58 it was one of the active seats of the rebellion. Pop. 71,778.

shAhrastanI, sha'ras-ta'ne (AbuY- Fath Mohammed ibn 'abd al Karim al SharastanI), Arabian theologian: b. Sha- rastan, Korasan, 1071 P—1086? ; d. there 1153. He studied at Jurjanlyah and Nishapur, devot¬ ing himself especially to Ash'arite theology. In 1116 he went on pilgrimage, and returning re¬ mained three years in Bagdad, reaching home in 1120. His chief work is the (Kitab ul Milal wan-Nihal,5 a painstaking and well-arranged study of the religious sects and philosophical schools known to him. The work first dis¬ cusses the five races of the world and the basis of the religion and theories of each. His ac¬ count of the many Mohammedan sects is particularly full and valuable ; and he deals also with Christianity, Judaism, the pre- Islamic Arabs, the Greek philosophers and with heathen beliefs. The work was published by Cureton, W., (Rook of Religious and Philo¬ sophical Sects5 (London, 2 vols., 1846) ; and by Haarbrucker, T., (Halle, 2 vols., 1850-

51).

SHAIRP, sharp, John Campbell, Scottish poet and miscellaneous writer; b. Houston, West Lothian, 30 July 1819; d. Ormsary, Argyll¬ shire, 18 Sept. 1885. He was educated at Glas¬ gow University and Balliol College, Oxford, and after a term as assistant-master at Rugby was appointed

assistant professor of Latin at Saint Andrews in 1857 and professor in 1861. In 1868 he was made principal, and thereafter was generally known as <(Principal55 Shairp. From 1877 he also held the chair of poetry at Oxford. As a critic and expositor Shairp was markedly illuminating and careful. His works consist of (Kilmahoe, a Highland Pastoral, and other Poems5 (1864) ; (Studies in Poetry and Philosophy, including essays on Wordsworth. Coleridge and Keble, which furnish some of the best of his writings (1868; 4th ed., 1886) ; (Culture and Religion5 (1870) ; (Life and Let¬ ters of J. D. Forbes5 (1873), with Tait; Noetic Interpretation of Nature5 (1877); 'Burns5 (1879); 'Aspects of Poetry5 (1881). Post¬ humous collections are (Sketches in History and Poetry5 (1887), edited by Veitch; and

(Glen Desseray and other Poems) (1888), edited by Pelgrave. Consult Knight, W. A., Princi¬ pal Shairp and his Friends) (London 1888) ; Sellars, Portraits of Friends> (1889) ; and the article by Dean Boyle in the Guardian for 30 Sept. 1885.

SHAKERS, the common name of the United Society of True Believers in Christ's Second Appearing. The name originated in the somewhat violent and irregular motions — leap¬ ing, shouting, etc., which were once a part of their worship, but which are so no longer, the motions of the Shakers at worship in these days being uniform and regular, and without sensational features. Although originating in England the sect is wholly American, and presents in its several communities an interest¬ ing example of thrift, industry and good morals.

The founder of the Shaker sect was Ann Lee, born at Manchester, England, in 1736. Her father was a blacksmith, and she became at an early age the wife of a blacksmith. She was converted in 1758 by the preaching of Jane Wardlaw, a member of the Society of Friends, who exhorted the people to repent of their sins, declaring that the end of all things was at hand, that Christ was about to reign, and that his second appearance would be in a woman's form. Ann Lee also preached, and was put in prison at Manchester on a charge of disturbing the public peace. When released she began preach¬ ing again, and announced that the Lord Jesus had stood before her in prison, and had be¬ come one with her in form and spirit. She called herself <(Ann the Word,® but her follow¬ ers gave her the title of <(Mother Ann.® She was persecuted and annoyed to such a degree that she emigrated to America wTith seven companions, and formed the first Shaker set¬ tlement at Watervliet, near Albany, N. Y. Here she also

endured imprisonment with some of her followers who refused to bear arms in the War of Independence, on the ground that it was against their principles to serve as sol¬ diers. Ann Lee died 8 Sept. 1784, having witnessed the founding of two new Shaker communities, one at Hancock, the other on Mount Lebanon, New Lebanon, N. Y., the first Shaker meeting house being established in the year following her death, at Mount Lebanon, which is still the most flourishing of the Shaker communities. Joseph Meacham, one of Ann Lee's successors, gave to the Shakers their effective organization, which combines thorough business methods with strict adherence to the principles of their faith. There is no marriage, the two sexes occupying rooms in separate parts of houses, and when married couples join the society, they regard each other as brothers and sisters only. The men do the work of farm and garden, factory and shop, and some widely extended industries owe their origin to the in¬ ventive ability of the Shakers. The women cook and attend to the housework, every room being a model of cleanliness. They do much of the tailoring and repairing; prepare seeds and medicines for market, and make butter and cheese. Everybody is occupied, and there is no room or attraction for drones.

Alcoholic liquors are known only as a medi¬ cine, and good health is so general that there is but little need for medicine of any kind. The use of tobacco is tabooed, and the diet,

while both generous and varied, does not in¬ clude flesh-meat or fish. The fact that Shakers live, as a rule, to an advanced age, and enjoy excellent health, is adduced in favor of absti¬ nence from meat. It is also noted as significant that none of the Shakers suffer trom cancer.

The Shaker belief agrees in certain respects with that of the Quakers, from whom the original Shakers were an offshoot. They give due respect to the civil law, but they reject ecclesiastical supremacy and military service. Members of the sect who had previously served as soldiers have refused to accept pensions after joining the Shaker community, and it was largely, if not chiefly on evidence of this fact that President Lincoln ordered the release of Shakers who had been imprisoned for refusing to serve, when drafted for the Civil War. The sum saved to the government in the refusal to accept pensions would have more than paid for substitutes for the Shakers wdio had been drafted.

The Shakers believe that God is king; that the sin of Adam is atoned, and that man is free of all errors except his own; that every human being wall be saved, and that the earth is heaven, now soiled and stained, but ready to be brightened by love and labor. They believe in the immediate revelations of the Holy Ghost, and they regard angels and other spirits as maintaining companionship and intercourse with those who have been

purified and exalted by the gifts of grace. Shakers believe that at death they merely throw off the bodily garment, and change the form of their existence, but no more. They expect no resurrection of the body, the spirit, when it has left the mortal frame being done with it.

The Shakers are steadily diminishing in numbers. At its greatest their membership was 4,869; and it is now less than 1,000, in 17 societies, distributed over the States of New York, Massachusetts, New Hampshire, Maine, Connecticut, Ohio and Kentucky.

Bibliography. — Blinn, (Concise History of the Shakers (1894) ; Eads, H. L., (Shaker Theology * (Albany 1879) ; Evans, F. W., (Shaker's Compendium* (New York 1859) ; Green and Wells, (Summary View of the Millennial Church * (Albany 1848) ; Hinds, W. A., (American Communities) (Chicago 1908) ; Ely, R. T., (The Labor Movement in America> (new ed.. New York 1905) ; Nordhoff, C., (The Communistic Societies of the United States* (ib. 1875).*

SHAKESPEARE, William, English dra¬ matic poet : b. Stratford-on-Avon, Warwick¬ shire, in April (?) 1564; d. there, 23 April 1616. About a century ago, George Steevens, one of the most eminent Shakespearian editors and critics of that period, wrote thus : (

from theatrical life, with a competency, to Stratford; and the date of his death, which took place upon the anniversary of his birth, 1616. »

If this were strictly true, however, it should be understood that there is nothing exceptional in it, though certain writers who deny that Shakespeare wrote the works ascribed to him have laid much stress upon it. The biographies oi the great majority of literary men of that time, especially the dramatists, are as meagre as Shakespeare's. In the latest sketch of the lives of Beaumont and Fletcher (in the (Mer- maid) series of English dramatic writers) the editor says : ((Beaumont and Fletcher, though not of obscure origin, like the greater number of their fellow dramatists, yet afford no excep¬ tion to the general rule in the obscurity that surrounds their lives.® The volume of the same series devoted to Webster and Tourneur begins thus: ((Nothing is known about the lives of John Webster and Cyril Tourneur. We are ignorant where they were born and when they died,® etc. The history of Marlowe, Massinger, and other prominent dramatists of the period is much the same, as reference to their names in the present work will show.

This is also true, as already intimated, of great authors other than playwrights. Pro¬ fessor Hales begins his biographical sketch of Spenser (

poet is determined by inference. The circum¬ stances in which each died are a matter of con¬ troversy. What sure information we have of the lives of each one is scanty and interrupted.®

These quotations might be multiplied if space permitted. It is clear, therefore, that no theory or argument, concerning the authenticity of the works of Shakespeare can be based upon the lack of information concerning the man.

Our positive knowledge of Shakespeare's personal history, however, is by no means so limited as Steevens and Tennyson represent. The investigations of the last 50 or 60 years in municipal, theatrical and other records, in the literature of the Elizabethan and succeeding periods, and in other sources of information, have brought to light a multitude of indisputable facts concerning the man and his works.

Unfortunately, the first biography of Shake¬ speare worthy of the name was not written until 1709, or nearly a centurv after his death, being prepared by Nicholas Rowe as an intro¬ duction to his edition of the poet's works. It was based mainly upon the researches of Bet¬ terton, the actor, who a few years earlier had visited Stratford for the express purpose of ascertaining what could be learned there about the personal history of the dramatist He com¬ municated the results of his investigations to Rowe, to whom we are indebted for the pres¬ ervation of these and other fragments of in¬ formation which otherwise would have been lost. Rowe appears to have exercised great caution in dealing with his materials, discrim¬ inating carefully between what he regarded as established fact and as doubtful tradition.. A few errors have been detected in the minor details that he gives, but the more important

particulars have been verified by later re¬ searches.

For almost a century after the appearance of Rowe's

Of the many contributions to Shakespearean biography since the time of Malone, the most important have been made by Mr. Halliwell- Phillipps, who, between 1850 and his death in 1889, continued the examination of the ancient records and documents likely to throw light upon the subject, and printed the results in successive publications and finally in the monu¬ mental work in two royal octavo volumes which he modestly entitled (Outlines of the Life of Shakespeare, the 9th edition of which was issued in 1890. Mr. Sidney Lee's (Life of Shakespeare* (1898) is the most*

noteworthy of the other biographies published in the last half- century.

Of Tennyson's ((five facts® the first is a mere conjecture. William Shakespeare was baptized, as the parish record proves, on 26 April (O. S.), but the date of his birth is not known. It has been assumed that it was 23 April (3 May by the New Style calendar) because babies were often baptized three days after birth. The only other evidence bearing on the case is the in¬ scription on the poet's monument at Stratford, which tells us that he died 23 April 1616, in the 53d year of his age. If he died on the anni¬ versary of his birth, it might be said, according to the usage of the time, that he was in his 53d year; but the inscription proves nothing ex¬ cept that he could not have been born later than 23 April 1564.

John Shakespeare, the poet's father, was of the yeoman class, and had been a farmer in a neighboring village before he came to Stratford about 1553, and adopted the trade of a ((glover,® dealing also in wool and agricultural produce, with which his former occupation made him familiar. His ability and public spirit are shown by his rapid success in business, which soon enabled him to buy two houses in Strat¬ ford, and by his rising through the lower grades of office to that of high bailiff, or mayor, of the town in 1568. His wife, Mary Arden, belonged to a minor branch of an old Warwickshire family, and inherited a considerable estate from her father.

John and Mary Shakespeare had four sons and four daughters. William was the third child, but the eldest son. Of his early years nothing is known, but it is probable that at the age of seven (the earliest at which he could be admitted) he entered the Stratford Grammar

School, an ancient institution which, after being closed for some years on account of the disso¬ lution of the local Guild, on whose revenues it was dependent, by Henry VIII in 1547, was re-established by Edward VI in 1553 as ((The King's New School of Stratford-upon-Avon.® The masters of the school in the poet's boyhood were university men of good scholarship. The studies were mainly Latin, with writing and arithmetic, and possibly a little Greek, which was sometimes taught in the grammar schools at that time. Ben Jonson credits Shakespeare with ((small Latin and less Greek® ; and we may be quite certain that the boy had no regular schooling except what he got at Stratford. It is evident from his works that he had not the learning which a few of the critics have as¬ cribed to him. His quotations from Latin lit¬ erature are such as a schoolboy might make from Virgil, Ovid and the other authors he had studied; and his allusions to

classical his¬ tory and mythology are mostly from the same sources, or from the familiar stock in English books of the period. The historical materials of his plays are evidently from a very limited number of English authorities, like Holinshed's and North's

It should be understood that the notion that Shakespeare was a learned man is of com¬ paratively modern date. In the reference to the dramatist in the literature of his day and for a century after his death (as carefully col¬ lected by the New Shakspere Society of Lon¬ don) there is no hint of it, while expressions of the contrary opinion are frequent. John Hales of Eton, writing before 1633, and re¬ ferring to a conversation concerning Shake¬ speare in which Sir John Suckling, Sir William Davenant, Ben Jonson and he himself were engaged, says that, ((hearing Ben frequently re¬ proaching him [Shakespeare] with the want of learning and ignorance of the ancients,® he JTiales] Hold him that, if Mr. Shakespeare had not read the ancients, he had likewise not stolen anything from them (a fault the other made no conscience of), and that, if he would pro¬ duce any one topic finely treated by any of them, he would undertake to find something upon the same subject at least as well written by Shakespeare.® Jasper Mayne, writing in 1637, mentions Shakespeare among the dram¬ atists, who did their work ((without Latin helps.® H. Ramsay, also in 1637, complimenting Ben Jonson for his knowledge of Latin and Greek, says that he

" could command

That which your Shakespeare could scarce understand."

Leonard Digges, in the verses prefixed to the 1640 edition of Shakespeare's (Poems,) com¬ pliments him for his ((Art without art, un¬ paralleled as yet,® and adds that he borrows nothing from Greek or Latin; yet, as he says, Shakespeare's (Julius Caesar ravished the audi¬ ence,*

" When some new day they would not brook a line

Of tedious (though well labour'd) Catiline;"

and ((

The learned Fuller, in his (Worthies (prob¬ ably written about 1642). says of Shakespeare;*

<(He was an eminent instance of the truth of that rule, Poeta non fit, sed nascitur; one is not made but born a poet. Indeed his learning was very little; . . . nature itself was all the art which was used on him.® Then follows the familiar passage about <(the wit combats be¬ tween him and

Ben Jonson, which two I behold like a Spanish great galleon and an English man-of-war. Master Jonson (like the former) was built far higher in learning; solid but slow in his performances : Shakespeare, with the English man-of-war, lesser in bulk but lighter in sailing, could turn with all tides, tack about, and take advantage of all winds, by the quick¬ ness of his wit and invention.®

Lady Margaret Cavendish, in the (General Prologue) to her (Plays (1662), after praising Ben Jonson, says:*

" Yet gentle Shakespeare had a fluent wit,

Although less learning, yet full well he writ;

For all his plays were writ by Nature's light, etc."

Dryden, in his (Essav on Dramatic Poesy (1668), says of Shakespeare: ((Those who ac¬ cuse him to have wanted learning, give him the greater commendation ; he needed not the spectacles of books to read Nature; he looked inwards and found her there.®*

The same great critic, in a prologue to Shakespeare's (Julius Caesar) in 1672, says of the author of the play:

" So in this Caesar which to-day you see,

Tully ne'er spoke as he makes Antony.

Those then that tax his learning are to blame;

He knew the thing, but did not know the name.

Great Jonson did that ignorance adore,

And tho' he envied much, admired him more."

Writing again in prose, he alludes to Shake¬ speare as <(wanting that learning and care which Jonson had.®

Gerard Langbaine, in his (Account of the English Dramatic Poets1 (1691), says that Shakespeare ((was as much a stranger to French as Latin,® and that ((' t is agreed that his learn¬ ing was not extraordinary® ; and yet he ranks (*

These quotations might be multiplied, but enough have been given to show what was the universal opinion of the best critical judges in the 17th century concerning Shakespeare's lack of learning. Nature, or genius, they

all agree, more than made up for the deficiency.

The single slight hint of the opposite opinion in writers of the 17th century is in an (Address by Nahum Tate (noted for his bad ((new- modelling® of and other plays of Shake¬ speare), printed in 1680. He says: ((What I have said concerning the necessity of learning to make a complete poet may seem inconsistent with my reverence for our Shakespeare. I con¬ fess I could never get a true account of his learning, and am apt to think it more than common report allows him. But, however, it fared with our author for book-learning, it is evident that no man was better studied in men and things, the most useful knowledge for a dramatic writer.® We see that Tate had failed in his endeavor to find proof of Shakespeare's learning, thus indirectly confirming the unani¬ mous testimony of the critics of that time to the contrary.*

About the middle of the 18th century, John Upton, the elder George Coleman and a few

other critics took the ground that certain pas¬ sages in the plays indicated an acquaintance with Greek, Latin and later foreign authors whose works had not been translated into Eng¬ lish when Shakespeare wrote ; but they were completely refuted by Richard Farmer, in his famous (Essay on the Learning of Shake- peare, published in 1766. Dr. Warton refers to it as <(a work by which an end is put forever to the dispute concerning the learning of Shake¬ speare. It did settle the question until the Baconian heretics revived it and made it the corner-stone of their theory.*

Shakespeare's real education, as Tate inti¬ mates, was in the study of <(men and things.® His early years were spent in the heart of rural England, where he became familiar with woodland scenery and life, and imbibed the love of nature which is one of his most marked characteristics. There also he got the minute knowledge of the practical side of country life which has furnished material for many volumes on the plant-lore and garden-craft illustrated in his works, and on his familiarity with hawk¬ ing, hunting, fishing and the habits of English birds and animals. Warwickshire was, more¬ over, rich in historical associations. The cas¬ tles of Kenilworth and Warwick had been centres of political and military interest during the civil wars of the 13th and 15th centuries. Queen Elizabeth's famous visit to the Earl of Leicester at Kenilworth occurred in

1575, when Shakespeare was 11, and his father, who was then a magistrate at Stratford, may have taken the boy with him to see something of the pageant which attracted throngs of visitors from all the region roundabout. The legendary and romantic lore of the district, in which the redoubtable Guy of Warwick was the chief hero, must also have stirred and stimulated the poet's youthful imagination. Coventry, in the same county, was renowned for its old re¬ ligious plays, which were not entirely sup¬ pressed until 1580; and traveling companies of players visited Stratford when he was five years old and frequently during his boyhood and youth. He must have witnessed these local performances, if not some of those at Coventry, and we can imagine how they developed his taste and love for the drama. The training in the grammar school was an insignificant part of his early education compared with what he got outside of its ancient walls.

It is not improbable that he left school when he was 13. About that time his father's fortunes were declining, probably on account of the general depression in trade, and he may have needed the boy's help in his business or have found other work for him. An improb¬ able tradition says that he was bound appren¬ tice to a butcher, but later ran away to London. According to another tradition, he was an at¬ torney's clerk for a time; and the knowledge of law shown in his works has led Lord Camp¬ bell and other professional critics to give credit to this story. Judge Allen, however, in his (Notes on the Bacon-Shakespeare Question) (Boston 1900), has shown that similar familiar¬ ity with legal technicalities appears in the works of contemporary dramatists, and that Shakespeare often makes mistakes in these matters which no lawyer or student of law could be guilty of.

Shakespeare's marriage, when he was be¬

tween 18 and 19, is the next fact in his history of which we have positive proof. The bride, Ann Hathaway, was about eight years older. She was the daughter of a farmer in the neighboring village of Shottery, and the house in which her father, Richard Hathaway, is supposed to have lived, was bought in 1892, as Shakespeare's birthplace in Stratford had been bought in 1848, for preservation in memory of the poet. The marriage probably took place early in December 1582, a bond, authorizing it ((with once asking of the bans® being still ex¬ tant in the Episcopal archives of Worcester, the diocese in which the parties resided. The bond bears the date of 28 Nov. 1582, but no record of the marriage, which was doubtless in one of the neighboring villages, has survived the risks to which English parish registers were often exposed. A daughter was born to the pair the next May, her baptism with the name Susanna being recorded at Stratford on Sun¬ day, 26 May 1583. Twin children, Hamnet and Judith, were baptized, 2 Feb. 1585, about two months before their father was 21.

The marriage had evidently been a hurried one, urged on by the relatives of the bride, but apparently not favored by those of the bride¬ groom, who could not honorably avoid it, and seem not to have been inclined to do so. Some biographers believe that the couple had been formally betrothed some months before the marriage, according to the custom of the time, and this is by no means improbable. The be¬ trothal was then a legal ceremony, consisting in the interchange of rings, kissing and joining hands, in the presence of witnesses and often before a priest. Violation of the contract was punished by the ecclesiastical law with excom¬ munication ; and the betrothal was a legal bar to marriage with another person, except by the joint consent of the parties. In Shakespeare's time, at least among the common people, it was often regarded as conferring the rights and privileges of the more formal union that was to follow; but later in the century the Church authorities condemned this license. There may have been such a pre-contract, or betrothal, in the case of William and Ann. In the absence of any positive testimony to the contrary, it is no more than fair to allow them the benefit of the doubt.

It is an interesting fact that this ancient betrothal is introduced by Shakespeare in at least seven of his plays, — (The Two Gentlemen of Verona, > (The Taming of the Shrew, J ˆTwelfth Night, > (The Winter's Tale) (twice), (Much Ado, (Measure for Measure, } and (King JohnC In (Twelfth Night, } Olivia, who has been betrothed to Sebastian, supposing him to be the disguised Viola, addresses the latter as <(husband,® and justifies herself by appeal¬ ing to the priest before whom the ceremony had been performed, with the understanding that it was to be kept secret until the marriage should take place. Similarly, Robert Arden, the poet's maternal grandfather, in a legal document, calls his daughter Agnes the wife (uxor) of the man to whom she was married three months later.*

Of Shakespeare's life after his marriage until he went to London nothing further is known. How he managed to support his family we cannot guess. He could have little or no assistance from his father, who, in his re-

duced circumstances, could barely take care of his own household in which there were now four younger children. William soon decided to leave his wife and babes in Stratford — or perhaps at Shottery with Mrs. Hathaway, then a widow with a comfortable house and income — and to try his fortune in London. The pre¬ cise date of this move is uncertain, but it was probably in the latter part of 1585 or early in 1586. He came of age in 1585, and that fact may have influenced him in making the ven¬ ture.

Tradition says that about this time he was caught in deer-stealing on Sir Thomas Lucy's estate, and that his departure for the metropolis was prompted or hastened by the prosecution that followed the offense. That the poaching tradition was founded on fact is quite certain from the evidence in (2 Henry IV) and the (Merry Wives of Windsor > that Lucy is caricatured as Justice Shallow. The (

What Shakespeare found to do on his ar¬ rival in London we do not know. The tradi¬ tion that at first he held horses at the door of the theatre, said to have originated with Sir William Davenant, is not improbable, as it was then common for gentlemen to go to the theatre on horseback. We know that somehow the young man soon got into one of the two playhouses then established in London — the Theatre and the Curtain — where he doubtless had to begin in some humble capacity. Accord¬ ing to tradition, he was first employed as a <(prompter's attendant, whose duty it was to give the performers notice to be ready to enter® on the stage. Soon, however, his abili¬ ties must have been recognized, and he began his career of an actor in small parts, gradually working his way up to a better position in the company.

If he went to London in 1585, seven years elapsed before we have any positive informa¬ tion about him, or even any tradition worth mentioning except that of his holding horses at the door of the theatre and his first employ¬ ment inside as <(call-boy.® At length, in 1592, we hear about him through a contemporary playwright, Robert Greene, who died in the autumn of that year, leaving a little book, (Greens Groatsworth of Wit, bought with a Million of Repentance, > to be published after his decease. After referring to some of his fellow dramatists, Greene says of the actors : (an old play in which Greene is supposed to have had a share and which was revised by

Shakespeare. In December 1592, Henry Chet- tle, who had published Greene's pamphlet for him, brought out his own (Kind Harts Dreame) in which he apologizes for Greene's sneer at Shakespeare and adds: (

Little is known of the poet's personal his¬ tory from this time until 1600. In 1596 his son Hamnet died, and was buried (11 August) at Stratford. Early in 1597 he bought New Place, a mansion with an acre of land in the best part of Stratford, and later added other lands to the estate. In 1596 John Shake¬ speare, doubtless by his son's advice, made ap¬ plication to the College of Heralds for a coat- of-arms ; but the negotiations not being con¬ cluded at that time, they were renewed in 1599, when the petition was granted.

John had asked that he and his son might be allowed to quarter on the

coat the arms of the Ardens of Wilmecote, his wife's family; but the heralds substituted the arms of the Ardens of Alvanley in Cheshire, apparently because those belonged to a younger branch of the family, from which Mary Arden was de¬ scended.

Shakespeare repaired New Place, which was in a dilapidated condition when he bought it. We find evidence also that he assisted in restoring the fortunes of his father and at¬ tempted to regain certain real estate belonging to his mother which had been forfeited through complications due to a mortgage.

The earliest definite notice of Shakespeare's appearance on the stage is of his having been a player in two comedies acted before Elizabeth at Greenwich Palace in December 1594. Ac¬ cording to the official records <(William Kempe, William Shakespeare and Richard Burbage® then received £13 6s. 8 d. as payment, with £6 13ˆ. 4 d. in addition ftby waye of her Majesties rewarde® — that is, as a perquisite.

Other performances before Elizabeth were in 1596, twice during the Christmas holidays, at Whitehall; at Richmond Palace on Twelfth Night and Shrove Tuesday, 1600; and at White¬ hall, 26 December the same year. At Christmas time, 1601-02, the company played four times at Whitehall ; and at Richmond, 2 Feb. 1603 — the last occasion on which they could have ap¬ peared before Elizabeth, as she died 24 March

1603.

Shakespeare's income from acting was much greater than from authorship. From the for¬ mer source before 1599 it was probably £100 a year, to which the perquisites from perform¬ ances at court might add £15 or more. During the same period the prices for a play ranged from £6 to £15. His receipts from revising and writing plays up to 1599 probably did not exceed £20 a year, making his entire income about £135, equal to from seven to 10 timet as much in modern money. From the quarto edi¬ tions of his plays, all of which were piratical, he received nothing; but from the editions of his

I

poems — the only works printed under his own control — he may have got something, but we have no means of estimating the amount.

When the Burbages built the Globe Theatre in 1599, they leased shares in it for 25 years to (

In 1602 Shakespeare bought 107 acres of land near Stratford for £320, and the same year he bought a cottage and garden near New Place. These investments, and his dealings in agricultural produce of which we have docu¬ mentary evidence, were additional sources of income.

According to Rowe, the poet once received a gift of £1,000 from his generous patron, the Earl of Southampton. There can be little doubt that the amount is exaggerated, but the Earl, who is known to have been so liberal to others, can hardly have omitted to make some substantial acknowledgement of the tribute paid him in the dedications of (Venus and Adonis) and ˆucreceP

In May 1602, almost immediately after he t came to the throne, King James granted a license to Shakespeare and his company to play in London and the provinces. They performed not infrequently afterward at court, as the rec¬ ords show; and on 15 March 1604, when James made his formal passage from the Tower to Westminster, Shakespeare and the eight other actors to whom the royal license had been granted in 1603, marched in the royal train, and each was presented with four and a half yards of scarlet cloth, the usual dress-allow¬ ance of actors belonging to the royal house¬ hold. We have little positive information of the parts played by Shakespeare himself. It is reported that he took that of Adam in (As You Like It, > and, according to Rowe, he acted (in 1598.' In the list of ((the principall actors in all these playes® prefixed to the Folio of 1623, his name is also placed first, but perhaps only because he was the author of the plays. There is no evidence that he ever gained high rank as an actor.

In July 1605 Shakespeare paid £440 for the unexpired term (31 years) of the moiety of a lease of the tithes of Stratford, Old Stratford, Bishopton and Welcombe. It appears to have been a good investment, for his son-in-law, Dr. John Hall, in August 1624, disposed of his in¬ terest in the remainder of the lease for £400 or only £40 less than it cost Shakespeare 19 years before. The lease had now only 12 years to run, but the officers of the Stratford Corporation who bought it appear to

have regarded it as a judicious investment at £400.

On 5 June 1607 the poet's elder daughter Susanna, then 24 years of age, was married to Dr. John Hall, a physician who had a large practice among the good people of Stratford and the adjacent country. He was several times called to, attend the Earl and Countess of Northampton, at Ludlow Castle, more than 40 miles off. His medical case-book, written in Latin,

was translated and published in London (1657) after his death, and was reprinted in 1679 and 1683. Though an earnest Puritan, he was none the less popular with those who were bitterly opposed to the sect.

Shakespeare's brother Edmund died in Lon¬ don, in December 1607, and was buried in Saint Saviour's Church, Southwark. He is described in the parish register as ((a player,® and had probably come to London and entered the Globe Theatre through his brother's influence, but no notice of him as an actor has been discov¬ ered.

Elizabeth, the only child of the Halls, was baptized 21 Feb. 1608. The poet thus became a grandfather about two months before he was 44. She was married in 1626 to Thomas Nash, a citizen of Stratford, who died in 1647. Two years later she married Sir John Barnard of Abington Manor, near Northampton. She had no children by either husband. The last of the poet's lineal descendants, she was buried at Abington, 17 Feb. 1669, but no monument marks her grave. In September 1608, Shake¬ speare's mother died, her burial being recorded on the 9th of the month. Her husband, John Shakespeare, had died seven years earlier, the record of his burial being dated 8 Sept. 1601. He left no will and his son William inherited the Henley Street birthplace. Shakespeare's brother Gilbert (baptized 16 Oct. 1566) was buried 3 Feb. 1612, the record, by a clerical error, calling him <(adolescens,® though he was 45 years old. In February 1613, Richard, his last surviving brother (baptized 11 March 1574), also died. Joan (baptized 11 April 1569) was the only child of John and Mary Shakespeare now remaining. She married Wil¬ liam Hart, who died in April 1616, his burial taking place on the 1 7th, eight days before that of the poet. Joan outlived her husband and brother 30 years.

In 1610 Shakespeare bought 20 acres of pasture land, adding them to the 107 acres ac¬ quired in 1602 ; and in March 1613 he made what appears to have been his last investment in real estate by the purchase of a house in London, near the Blackfriars Theatre. He paid £140 for it, and soon leased it to one John Robinson, who had been one of the opponents to the establishment of the theatre.

It was probably as early as 1611 that Shake¬ speare returned to Stratford and took up his residence at New Place. In that year his name appears on a list of Stratford citizens who were raising money to promote a Parliament bill ((for the better repair of highways.® In the spring of 1614 a Puritan preacher, invited to the town by the corporation, was hospitably entertained at New Place, perhaps through the influence of Dr. Hall, who may have been living with his father-in-law at the time. In the town records we read: (

one quart of claret wine given to a preacher at the New Place, xx. d.®

In the autumn of 1614 an attempt was made by William Combe, the squire of Welcombe, to enclose a considerable area of the common fields near the town. The project was opposed by the corporation as detrimental to the agricultural interests of the town and tending tg diminish the tithes. Shakespeare, as we have seen, was interested in the tithes, but it would appear that he was finally led to favor the scheme by Combe, who guaranteed that he should suffer no pecuniary loss. There is no evidence, how¬ ever, that he took any active part in promoting the enclosures, which were ultimately thwarted by legal injunction in March 1615.

In February 1616, Judith, the poet's younger daughter, was married to Thomas Quiney, who was nearly four years her junior. He was then in business as a vintner, and patronized by the corporation. In 1617 he was elected a burgess, and from 1621 to 1623 held the office of chamberlain. Later his business was less prosperous, and in 1652 he removed to London, where he died a few years afterward. He had three sons, two of whom died in infancy and the third at the age of 20. Judith Quiney lived to be 76, surviving all her family except her aunt, Joan Hart, and her niece, Elizabeth Barnard.

Shakespeare's health seems to have been failing at the time of Judith's marriage. He had made his will in the latter part of January 1616, as erasures in the document indicate; but for some reason it was not engrossed and signed at that time. In April the condition of the poet seems to have become suddenly worse, and the rough draft of the will, after a few alterations and interlineations, was signed with¬ out waiting for a clean transcript of it.

There is no mention of his wife in the will except the interlined bequest of the (

The funeral of ((Will Shakespeare, gent.,® as the parish register informs us, occurred 25 April 1616. His grave is in the chancel of the parish church, the legal place for the interment of the owners of the tithes. It is covered with a stone bearing the inscription :

" Good trend, for Jesus sake forbeare To digg the dust encloased heare;

Bleste be the man that spares thes stones,

And curst be he that moves my bones."

It was not until about 70 years after his death that these lines were ascribed to Shake¬ speare. Neither Dugdale, in 1656, nor Rowe, in 1709, when referring to the tomb, attribute them to him. If he desired that something to the same effect should be put upon the stone, it was doubtless from fear that his bones might some day be removed to the ancient charnel house that then adjoined the church but was afterward demolished.

The monument to the poet on the chancel wall was erected before 1623. The life-sized bust is supposed to have been copied from a posthumous cast, of his face. It is poor as a work of art, but it must have been accepted by his surviving relatives as a tolerably good por¬ trait. It bears a general resemblance to the only other portrait the authenticity of which is established — the engraving in the Folio of 1623, the execution of which is equally bad.

A painted portrait in the Shakespeare Memorial Gallery at Stratford is believed by many to be the original of that engraving, but others think it was copied from the engraving. The so- called Ely House portrait, according to some critics, was the basis of the engraving. There are many other alleged portraits, but their his¬ tory is more or less doubtful.

The order in which Shakespeare's works were written has been the subject of much dis¬ cussion and dispute, but is now approximately settled. If he wrote the repulsive tragedy of (Titus Andronicus, it was probably as early • as 1590; but the critics generally agree that it was an old play slightly retouched by him about that time. The three parts of (Henry VP are quite certainly other plays upon which he worked in the same way during his dra¬ matic apprenticeship, the second and third parts having a considerably larger share of his work than the first part. When he attempted wholly original work, it was in comedy, and (Love's Labour's Lost) was the play. The first version must have been written as early as 1591, the present one, printed in 1598, having been, as the title-page states, (and (The Comedy of Errors) soon followed, to¬ gether with the first draft of (Romeo and Juliet, > which was afterward revised and en¬ larged. (Richard III, J which naturally follows the trilogy of (Henry VI, > appears, on the whole, to be entirely Shakespeare's, and was probably written in 1592 or 1593, and (Richard IP soon afterward, though the earliest extant editions of both plays date only from 1597. (A Midsummer Night's Dream* belongs in the group of early comedies, but was the last of the series, being generally ascribed to 1594.*

(Venus and Adonis) appeared in 1593, and the poet, in the dedication to the Earl of Southampton, calls it ((the first heir of my in¬ vention,® or

imagination ; but this seems to mean that it was his first literary production, plays in that day not being regarded as litera¬ ture properly so called. The poem was pub¬ lished in 1593 and ran through at least 12 edi¬ tions in the next 16 years. 'Lucrece, also dedi¬ cated to Southampton, was published in 1594*

and was almost as popular, eight editions being extant.

During the next six years (1595-1600) the poet completed the series of English historical plays (except (Henry VHP), the order ap¬ parently being (King John5 (1595), 1 and 2 (Henry IV> (1596, 1597) and (Henry V> (1598). (The Merry Wives of Windsor,5 said to have been written at the request of Eliza¬ beth, probably came between (2 Henry IV5 and (Henry V.5 (The Merchant of Venice,5 writ¬ ten in 1596 or 1597, together with all the plays mentioned above, except (Henry VI,5 is in¬ cluded in a list of Shakespeare's dramas in Francis Meres's (Palladis Tamia,5 published in September 1598. (The Taming of the Shrew5 (based upon the anonymous (Taming of a Shrew,5 printed in 1594), though not mentioned by Meres, was probably produced in 1597, at the latest. Meres ascribes to Shakespeare a play entitled (Love's Labour's Won,5 which may be the (Taming of the Shrew,5 though many critics believe it to be an early form of (All's Well that Ends Well.5

Between 1598 and 1600 the three brilliant comedies, (As You Like It,5 (Much Ado About Nothing5 and (Twelfth Night5 were written, but in what order is uncertain. (Julius Caesar5 belongs to the same period. These plays were followed by (All's Well that Ends Well, 5 Meas¬ ure for Measure5 and (Trolius and Cressida,5 the dates of all which are more or less doubtful; but these plays, which are comedies only in not having a tragic ending, seem to form a natural group, leading up to the period of the great tragedies, if not partly belonging to it. Cam¬ let5 introduces the latter group, the earliest quarto edition having been printed in 1603. It was followed in 1604 by a second quarto, de¬ scribed as "newly imprinted and enlarged to almost as much again as it was.55 (Othello 5 was probably a new play when it was per¬ formed before King James in November 1604. (Macbeth 5 is generally dated in 1606 or 1607, and

The tragedies were followed by a group of three plays which have been aptly called "Ro¬ mances55 : (Cymbeline,5 (The Winter's Tale5 and (The Tempest5 ; all written in 1609-11, and not improbably in the order mentioned. Camp¬ bell, the poet, believed that (The Tempest5 was the last

of the plays, James Russell Lowell ex¬ pressed the same opinion, and many critics agree with them, but some think that

Besides the plays of mixed or doubtful au¬ thorship belonging to Shakespeare's earliest period and (The Taming of the Shrew,5 there are several others of later date which appear to have a similar history: (Timon of Athens,5 (Pericles5 and VIII.5 Shakespeare's share in all of them is indisputable, but the critics disagree in explaining the divided au¬ thorship. The most plausible theory is that all three were begun by Shakespeare, but for some unknown reason were laid aside or left un¬ finished and afterward completed by others. In the case of (Timon5 it is neither known nor suspected who the other author was. In Per¬ icles5 it was undoubtedly George Wilkins who in 1608 (a year after the play was first printed)

published a novel avowedly based upon it. The first two acts of the play appear to be his, but some believe that the later prose scenes and the Gower prologues are by a third hand. Large portions of (Henry VIII5 are evidently by John Fletcher, some of whose metrical pecu¬ liarities are unmistakable. The rest has been ascribed by one or two critics to Massinger, but there can be little doubt that it is Shakes¬ peare's. ,

(The Two Noble Kinsmen5 is another play which some excellent critics believe to be partly Shakespeare's. The title-page of the earliest edition (1634) ascribes it to "the memorable Worthies of their time: Mr. John Fletcher and Mr. William Shakespeare.55 Fletcher's hand in it is obvious, but it is uncertain who was the other author. The anonymous play of (Edward III5 is ascribed to Shakespeare by certain Ger¬ man critics, and some in England believe that portions of it are his, but it is extremely im¬ probable that he wrote a line of it. Sundry other plays were ascribed to him in his life¬ time or afterward, but without authority or warrant.

The (Sonnets5 of Shakespeare were first published in 1609, but Meres in 1598 refers to his "sugred sonnets among his private friends,55 and two of them were printed in (The Pas¬ sionate Pilgrim,5 a piratical collection of verse, in 1599. It is probable that the majority of them were written between 1597 and 1601, but some may be of later date. (A Lover's Com¬ plaint,5 printed with the (Sonnets5 in 1609, is undoubtedly Shakespeare's. It is in the same stanza as (Lucrece,5 ard internal evidence in¬ dicates that it was somewhat later than that poem. (The Phoenix and the Turtle5 must have been written before 1601, when it was printed as Shakespeare's in a volume with Chester's (Love's Martyr5 and poems by Marston, Chap¬ man, Ben Jonson and others. In (The Pas¬ sionate Pilgrim,5 besides the two sonnets men¬ tioned above and two lyrics from (Love's Labour's Lost,5 several other poems are attrib¬ uted to Shakespeare and printed in the modern editions of his works, but some of them are known to belong to

other authors, and it is very doubtful whether any of the rest are his.

No collected edition of Shakespeare's plays appeared until seven years after his death, when the "first folio,55 or the "folio of 1623, 55 was published. It was nominally edited by two of his friends and fellow-actors, John Heming (or Hemings) and Henry Condell, and contained 36 of the plays included in modern editions, 'Pericles5 being omitted. Sixteen of the plays had been already published in quarto form, the other 20 were printed for the first time. The book evidently had no editing worthy of the name. Heming and Condell did little except to furnish the publishers with the best copies of the plays they could get; and these were partly manuscripts and partly early quartos, all of which had been used in the theatre by the actors in learning their parts. This is evident from the fact that in many instances names of actors are inserted at the beginning of speeches and in stage-directions instead of those of the dramatis persona. Every conceivable form of typographical corruption and perversion abounds. It is estimated that at least 20,000 "readings55 occur that are clearly wrong or highly suspicious, to say nothing of a far greater

number of minor misprints and mispointings. Verse is often printed as prose and prose as verse. Stage-directions and text are often con¬ founded. Words and phrases from foreign lan¬ guages are almost invariably corrupted, some¬ times to such a degree that critics cannot decide whether they are Latin, French or Spanish. Some plays are divided into acts and scenes, some only into acts, some not at all, and the division is often confused or inaccurate. In face of all these facts the Baconian heretics claim that the folio was edited by Bacon, the plays being carefully revised, corrected and printed when he had abundant leisure for seeing them through the press.

The second folio (1632) was a reprint of the first, with few changes for the better and some for the worse. The third appeared in 1663, and was reprinted in 1664, with the addi¬ tion of

No other collected edition appeared until 1709, when Rowe's, based on the fourth folio, was published. The poems were first included in the second edition (1714). Of the other com¬ plete editions in the 18th century and the early part of the 19th, the most important were Pope's (1723-25), Theobald's (1733), Hanmer's (1744), Warburton's (1747), Johnson's (1765), Capell's (1768), Steevens's revision of Johnson's (1773), Malone's (1790), Steevens', with Boy- dell's illustrations (1791-1802),

Reed's (1803), Chalmers' (1805) and the (Variorum of 1821, edited by James Boswell from a corrected proof left by Malone. Some of these were reprinted more than once.*

Since 1821 editions, commentaries and criti¬ cal and illustrative works on Shakespeare have so enormously multiplied that a list of them, even in the most concise form, cannot be added here. For the bibliography of the subject the reader may be referred to Lowndes's (Library ManuaP (Bohn's ed.) ; Franz Thimm's (Shake- speariana) (1864 and 1871) ; and the (Shake- speariana) (3,680 titles) of the (British Mu¬ seum Catalogue > (published separately in 1897).

The first complete American edition of Shakespeare (with life, glossary and notes by Dr. Johnson) was published in eight volumes in 1795-96, at Philadelphia. The first Boston edition (including only the plays) was in eight volumes (1802-04). Three editions of this ap¬ peared, each reset, stereotyping being then un¬ known. An edition of 17 volumes was brought out in Philadelphia in 1809, and one in seven volumes (edited by O. W. B. Peabody, though his name does not appear in it) in Boston in 1836. Reprints of Reed's text had been issued there in 1813 and 1814. An edition of the plays in 10 volumes (Reed's text) was pub¬ lished in New York in 1821 and again in 1824. The first critical, thoroughly annotated and illustrated American edition was G. C. Ver- planck's (3 vols., New York 1844-47). Of more recent editions the only one that can be men¬ tioned here is Horace Howard Furness's (New Variorum (the first since 1821, and on a far larger scale), of which 12 volumes have now (1904) been published. This country has also produced the first Concordance to the*

(Mrs. H. H. Furness's, 1874) and the best Concordance to the Complete Works (John Bartlett's, 1895). The first critical work on the plays from a feminine pen was (Shakespeare Illustrated (3 vols., London 1753-54), by Mrs. Charlotte Lennox (1720-1804), who was born in New York, where her father, Col. James Ramsay, was lieutenant-governor. From the age of 15 she lived in England. The dedication of this work to the Earl of Orrery was written by Dr. Johnson. See Shakespeare's Sonnets; and separate articles on the principal plays.*

*William J. Rolfe, Author of (Life of Shakespeare .**

SHAKESPEARE, Authorship of. In the

history of controversy over the authorship or the authenticity of writings two debates during the last 100 years have risen into special prominence — that relating to the Homeric poems and that which concerns the works com¬ monly attributed to William Shakespeare. F. A. Wolf (q.v.), in his

Prolegomena ad Ho- merum) (1795), essayed to demonstrate that the Homeric poems were not the work of any one man, but a compilation of rhapsodies com¬ posed by different minstrels and sung in the pub¬ lic assemblies while yet the art of writing was little known. Before this formidable attack upon the Homeric authorship there had been wide disagreement among critics upon various questions regarding the poems, including the probable date of their composition. Obscuri¬ ties in respect to these matters are referred mainly to the lack of biographical materials re¬ lating to Homer himself. In this particular the case of Shakespeare is involved in almost equal difficulty, although it is not yet 300 years since the reputed dramatist's death. To many it seems scarcely less wonderful that the man who wrote the plays and poems known as Shakespeare's could have remained so far hid¬ den from the world, despite its eager search for him, than that those writings should be the pro¬ duction of a person so obscure. When Hume declared miracles impossible because improb¬ able, Whately, by a mock chronicle, reduced Napoleon to non-entity. But the non-existence of Shakespeare is not asserted in the contro¬ versy. They who dispute his authorship base their denial mainly upon antecedent improbabil¬ ity, as Hume did his argument against miracles. Indeed one conspicuous champion of Shakes- pears asks : ((Why is it not the simplest plan to let Shakespeare stand as a simple miracle ? ® regarding him as <(a much simpler miracle than he would be if any of the current explanations of him were accepted.® Critical inquiry, how¬ ever, still seeks and will seek a cause equal to the effect, a man or men adequate to the result to be accounted for.

Although this authorship controversy, in va¬ rious phases, had earlier beginnings, it assumed its most definite character about the middle of the 19th century, since when, as Brandes com¬ plains, the great name of Shakespeare has been <(besmirched by American and European imbe¬ cility.® <(A troop of less than half-educated people,® he declares, <(have put forth the doc¬ trine that Shakespeare lent his name to a body of poetry with which he had really nothing to do — which he could not have understood, much less have written? Brandes ((William Shakespeare (1899) cites W. H. Wyman's*

'Bibliography of the Bacon-Shakespeare Con¬ troversy } (1884), showing that ((there had been published up to that date 255 books, pamphlets and essays as to the authorship of Shakes¬ peare's plays. In America 161 treatises of considerable bulk had been devoted to the question, and in England 69. Of these, 73 were decidedly opposed to Shakespeare's au¬

thorship, while 65 left the question undeter¬ mined. In other words, out of 161 books, only 23 were in favor of Shakespeare. And since then the proportion has no doubt remained much the same.®

The anti-Shakespearian view consists of two main theories, that of a composite or a ˆsyndicate® authorship, and that of a single authorship. If the latter be regarded as in¬ volving almost a miracle, the other, it has been declared, suggests a combination of miracles. If there was great collaboration there must have been also one master genius whose pri¬ macy reduced all partnership to practical insig¬ nificance. Yet that there was partnership is evident from the discoveries of critics who show where different hands have set their marks in the plays and poems called Shakes¬ peare's.

The view of single authorship, other than Shakespeare's, as mainly held, is known as the Baconian theory. The earliest recorded sur¬ mise that the real author of the Shakespearian writings was Francis Bacon appears to have been that of <(a Mr. William Smith,® in a pri¬ vately-printed letter to Lord Ellesmere (1856), basing his opinion on Shakespeare's obvious incapability of producing the works attributed to him, and on the manifold qualifications of Bacon. About the same time Delia Salter Bacon, an American woman, gave a more con¬ siderable form to this theory (((delusion,® Brandes calls it) in a number of magazine articles, succeeded by a volume, (The Philos¬ ophy of the Plays of Shakespeare Unfolded) (1857), in which she set forth the deficiencies of the ˆStratford butcher-boy® and <(poacher® in contrast to the attainments of Bacon, to whom she assigned the principal part in the authorship of the plays. She was followed by Nathaniel Holmes, an American jurist and a writer of much literary skill, in a work, (The Authorship of Shakespeare) (1866, 1886), vig¬ orously supporting the Baconian theory, and giving increased importance to the discussion. Meanwhile a new phase of the subject began to appear in alleged discoveries of a cipher in the plays embodying a confession of his au¬ thorship by Bacon himself. This line of inves¬ tigation was followed by Ignatius Donnelly, an American lawyer and politician, in what Brandes calls (

traditional authorship, in (Wit, Humor and Shakespeare) (1876), as follows: ((The plays are too great, and out of all proportion to the obscurity which rests upon Shakespeare's life, and to the insignificance of his contemporary fame. They are filled with all kinds of classi¬ cal allusion, professional information, legal, medical, horticultural, scientific, to an extent which an obscure play-actor could not possibly comprise within the limits of his ragged and scanty education. The plays contain remark¬ able parallelisms with passages in Bacon's works, and coincidences of thought and ex¬ pression.® This is perhaps as fair a

summary as could be made in so few words; but the Baconians multiply instances and arguments with great extension and cumulative force, find¬ ing in Bacon's (Promus) especially, but also in many places throughout his writings, words and passages which they cite in proof.

Among suggesters and advocates of the <(syndicate® theory is Appleton Morgan of New York, who in his work (The Shakespearean Myth) (1880), advanced the view that the plays were jointly produced by at least two men, one a poet and dramatist, the other a busi¬ ness man connected with a theatre; and in later writings this author has amplified this conjec¬ ture, which has also been elaborated by <(A Cambridge Graduate® in a volume entitled (Is It Shakespeare ?) (1903). It is likewise set forth by William H. Edwards in (Shaksper not Shakespeare) (1900). <(It is enough for me,® he says, ((to prove that William Shaksper did not write these plays. Who did, I know not, and offer no suggestions: but when the venerable Shakespeare image has tumbled, and the critics have a little time to clear their eyes of dust and cobwebs, the real authors may be discovered — authors, for I believe there were several associates who wrote under the as¬ sumed name of (William Shakespeare. } ®

Toward all this anti-Shakespearian argu¬ ment the general attitude of writers on the other side has been that of ridicule and con¬ tempt. The persistence of the unorthodox, however, has compelled, in the interest of the Shakespeare cause, as well as in that of free scholarship and fair investigation, a more seri¬ ous attention on the part of those who would uphold the traditional view. The burden of proof thus far is on the unorthodox, and of necessity their proofs hitherto are chiefly nega¬ tive. But so too are the arguments of their opponents, who, at least with respect to Bacon, can do little more than set one great improb¬ ability against another, adducing also whatever they can of a positive nature from scanty docu¬ mentary sources, the witness of Shakespeare's contemporaries, oral tradition, and the like. The consensus of Shakespearians on the con¬ servative side finds in these evidences probabil¬ ities at least in which they are content to rest until overcome by resistless demonstration. To the Baconians their answer is perhaps suffi¬ ciently conveyed in the conclusion of Sidney Lee in his (Life of William Shakespeare) (1898) : <(The abundance of contemporary evi¬ dence attesting Shakespeare's responsibility for the works published under his name gives the Baconian theory no rational right to a hearing; while such authentic examples of Bacon's effort to write verse as survive prove beyond all pos¬ sibility of contradiction that, great as he was as

a prose-writer and a philosopher, he was inca¬ pable of penning any of the poetry assigned to Shakespeare.® And yet, in view of all that has followed from the work of Delia Bacon, it seems proper to repeat Emerson's remark, that she opened this question ((so that it can never again be closed,® at least until positive proofs on one side or the other shall be produced. Meanwhile a liberal spirit of investigation can hardly deprecate the controversy which has already thrown so many side lights upon th,e Shakespearian literature and tradition. Besides the above works cited, of which Wyman's (Bibliography } is especially important as a source of reference, a few of the more recent writings on the subject may be mentioned.

Bibliography. — White, (Studies in Shakes- peare) (1886) ; iStopes, (The Bacon-Shakes- peare Question Answered > (1889) ; Owen, (Sir Francis Bacon's Cipher Story Discovered and Deciphered y (1893-94) ; Reed, (Bacon vs. Shakespeare: a Brief for the Plaintiff } (7th ed., 1897) ; (Bacon and Shakespeare Parallel- isms) (1902) ; Francis Bacon Our Shake- speare (1902) ; Allen, (Notes on the Bacon- Shakespeare Question) (1900) ; Bayley, (The Tragedy of Sir Francis Bacon: an Appeal for further Investigation and Research (1902) ; Crawford, (The Bacon-Shakespeare Question) (in (Notes and Queries, > series 9, Vols. IX- XI, 1902-03) ; Gallup, (The Bi-literal Cypher of Sir Francis Bacon> (1902) ; Mallock, (Last Words on Mrs. Gallup's Alleged Cypher (in Nineteenth Century and After, Vol. LIV, pp. 55—71, 1902) ; (A New Light on the Bacon- Shakespeare Cypher) (1902) ; (New Facts re¬ lating to the Bacon-Shakespeare Question > (in the Pall Mall Magazine, Vol. XXIX, pp. 77-89; 215-228, 1903) ; Lang, (Mrs Gallup and Francis Bacon) (in Monthly Review, Vol. II, pp. i46- 162; 1902); Webb, (The Mystery of William Shakespeare: a Summary of Evidence) (1902) ; Boubee, (Shakespeare ou Bacon V (1903) ; the various writings on the subject by Edwin Bor- mann, published in Leipzig (1895-1903) ; and the publications of the Bacon Society. The latest work is entitled (The Greatest of Lit¬ erary Problems,* which is a history of every phase of the controversy, and contains a bibli¬ ography covering works in every European country (Boston 1915).*

SHAKESPEARE SOCIETIES. The first Shakespeare society was founded in 1841, in London, and before its dissolution in 1853, had published 48 volumes. A new English Shake¬ speare society was organized in 1874, and the German Shakespeare Society was founded at Weimar in 1864. In the United States the Shakespeare Society of New York was organ¬ ized in 1885. The latter has published the (Bankside Shakespeare) (20 vols., 1888-92) and (The Bankside Restoration Shakespeare) (1907). The Shakespeare Association was founded in London in 1914 and Mr. Israel Gollancz was chosen first president. The pub¬ lications of the various societies have done much for Shakespearean scholarship through verse

texts and publishing the text of the quartos alongside the texts of the early folios.

SHAKESPEARE'S SONNETS. The

Sonnets of Shakespeare were published in 1609, in a small quarto volume which is gener¬ ally thought to have been ((piratical,® that is,

to have been issued without the author's con¬ sent. The circulation of poems in manuscript form was a common matter in the Elizabethan age, and there is direct evidence that it had been taking place in the case of these sonnets ; for Francis Meres, in a little work called (Palladis Tamia, published 1598, observed: ((As the soul of Euphorbus was thought to live in Pythagoras, so the sweet witty soul of Ovid lives in mellifluous and honey-tongued Shakespeare, witness his (Venus and Adonis, * his (Lucrece,* and his sugared Sonnets among his private friends.® In the following year, 1599, two of the sonnets were published in the piratical compilation called (The Passionate Pilgrim. * For these and other reasons it is assumed that a good part of Shakespeare's Sonnets had been written a considerable time before the publication of the volume of 1609; but as to the period of his life most likely to be represented by them, there is no general agreement. Some critics regard them as early compositions, largely completed by 1594-96; others as having been written largely in the period 1598-1603 ; while still others assume, in the absence of definite evidence, that they may have been produced at intervals throughout Shakespeare's literary life. It is agreed, how¬ ever, that few are to be attributed to his later period, that is, after 1603.*

The Sonnets are 154 in number, and are written in the form sometimes called <(English® to distinguish it from the more orthodox (

had prepared them for the press. Hence the only evidence as to the unity of the series is internal ; and many critics find themselves able to read it as a connected story, while to others it seems to be a mere miscellany, though con¬ taining many pairs, trios, and perhaps larger groups of sonnets intended to be read con¬ nectedly. The weight of opinion may be said to be that there is a certain unity in the col¬ lection, suggestive of the view that the great part of the sonnets have to do with the same persons and events, but that there is no com¬ plete continuity such as would result from an authoritative arrangement either for narrative or lyrical ends. As a result of this uncer¬ tainty regarding the arrangement of the Son¬ nets, they have

been rearranged by many editors and critics, in accordance with indi¬ vidual theories. Perhaps the most plausible and useful of these rearrangements is that of C. M. Walsh, in his edition of 1908; this is based not on any constructive theory, but on the effort to group the sonnets according to internal evidence as to content and style, and therefore errs — -if at all — in the direction of an unnecessary breaking up of possible sequences.

The opening sonnets, as they stand in the volume of 1609, are addressed to a young man, apparently oi good family and striking per¬ sonal charms and gifts, who is urged by the poet to marry in order that he may beget chil¬ dren to perpetuate his qualities and so, in a sense, overcome the ravages of time and death. Many of the following sonnets ap¬ parently either refer to or are addressed to the same young gentleman, and it is possible to read every one of them, up to and including the 126th, as having reference to this person, — though many of the number, if standing by themselves, would be assumed to be addressed to beautiful women. For this reason Sonnets 1-126 are frequently called the First Series, and it is assumed that they came into the pub¬ lisher's hands as a body. Moreover, the son¬ nets from 127 to 152 inclusive have chiefly to do with a woman, dark of complexion and dark of character, and all of these can be read as concerned with this theme; hence this group is frequently called the Second Series. (Sonnets 153 and 154 admittedly stand quite by them¬ selves as mere literary exercises.) A link be¬ tween the two "series® is found in the fact that Sonnets 40-42 on the one hand, and 133-136 on the other, appear to refer to the same event, namely, an intrigue between the beautiful young man and the dark woman, in which it would seem that both proved untrue to their poet friend. Sonnet 144 may be viewed as the more definite key to this triangle; it is the famous poem in which the writer speaks of having "two loves® :

" The better angel is a man right fair,

The worser spirit a woman colour'd ill."

•

Obviously, this group of sonnets raises with peculiar interest the question which attaches in some form to most of the sonnet sequences, — how far the writer speaks literally of him¬ self, that is autobiographically, how far con¬ ventionally or imaginatively. Students of Shakespeare's Sonnets have differed widely, sometimes bitterly, on this question, and all

possible answers to it may be found, ranging from the extreme view that the story is a wholly imaginative one, with no more reference to

Shakespeare's personal life than that of Romeo or Othello, to the opposite extreme, that we have in his Sonnets a perfectly clear and definite record of his friendship for an attractive but faithless young man and a repul¬ sive yet strangely fascinating woman. The interpreters of the latter sort have also made strenuous efforts to identify the persons con¬ cerned ; a number of them, in particular, having determined that the young man friend is Henry Wriothesley, Earl of Southampton, others being equally certain that he is William Herbert, Earl of Pembroke. The dispute is complicated by the curious circumstance that the publisher of the Sonnets dedicated them to a "Mr. W.H.,® whom he called their "only begetter,® and it has been assumed that this should give a clue to the person addressed in the "First Series.® All these matters are still in debate, and there is no reason to expect any unquestioned solu¬ tion. In general, modern criticism tends to agree on the view that a good part of these sonnets, including those concerned with the intrigue with the dark woman, were of definite personal significance (chiefly because, if Shakespeare had set out to tell an imaginative tale, he would have done it better and more clearly than he has told this one), but at the same time that they represent conventional moods and manners familiar to Shakespeare's contemporaries, and are therefore not to be taken so seriously by students of his life as many have done. It is certain that none of the attempted identifications has been proved.

The disputes concerning the arrangement and the biographic significance of the Sonnets have tended to obscure the question of their poetic qualities. In general, here as with Renaissance poetry as a whole, it is necessary to distinguish between qualities peculiar to that age and those of permanently vital char¬ acter. Chief among the former group is Shakespeare's use of the "conceit,® — that is, the ingenious elaboration of a verbal or imaginative figure, — a habit common to most of the Renaissance lyrists, and consonant with Shakespeare's taste, especially in his more im¬ mature periods. Notable examples of this are to be found in Sonnets 8, 24, 43, 46-47, 99, 132, 135-136 and 145. As a lyrical method this is of course opposed to the canons of modern taste, and in the 18th century, when criticism was disposed to deal with special severity with Renaissance ingenuities, the poems of Shakes¬ peare suffered a corresponding depreciation ; Steevens, one of the leading editors of the plays, refused to admit them to his edition of the Works of Shakespeare, saying that no Act of Parliament would compel readers for the Sonnets. On the other hand, it is now univer¬ sally admitted that in many of these sonnets we have unsurpassed examples of the power of lyrical poetry to express personal feeling in concentrated form. In particular, they deal with the theme of the struggle of human love and beauty against the arch-enemies Time and Death — now representing these enemies as triumphant, now finding in poetry a means of overcoming them, but chiefly finding such a means in the

unconquerable power of love.

From this standpoint Sonnet 116 may be viewed as the climax of the collection :

“ Love alters not with his brief hours and weeks,

But bears it out even to the edge of doom.”

Other sonnets of importance for their content or lyrical beauty are 18, 29, 30, 31, 52, 55, 60

64, 71, 73, 74, 90, 97, 102, 106, 129, 146.

The most extensive discussion of the Son¬ nets, for the general reader, is found in Sidney Lee’s (Life of Shakespeare) ; it represents a rather extreme position on behalf of the con¬ ventional as distinguished from the personal interpretation. Among the convenient editions are those of Beeching (1904), Walsh (1908), Rolfe (1905), and that in the (Tudor Shakespeare5 (1913) ; for criticism, see the in¬ troductions in all these. The original text of the Sonnets is reproduced in the edition in the (First Folio Shakespeare5 (1912) ; and a com¬ plete apparatus, including the history of the criticism of the Sonnets, is in the variorum edition of R. M. Alden (1916).

Raymond M. Alden,

Professor of English , Leland Stanford U niversity.

SHAKTAS. See Religious Sects.

SHALE, a sedimentary rock made up largely of compacted clay with admixture of other finely ground rock material, and splitting into thin layers parallel to the bed¬ ding plane. In the typical shales the rock splits with a conchoidal or shelly fracture, the surface being marked by wide shallow depressions rather than by absolute smooth¬ ness. In composition, shales may be purely argillaceous, but they are generally more or less silicious, calcareous, ferruginous or car¬ bonaceous, according to the material admixed with the clay. The carbonaceous shales are often used for the manufacture of oil or gas, some of them being so rich in carbon as

to burn with a bright flame. These are called oil shales, or kerosene shales. Alum shales are clay shales rich in iron pyrites which on decompos¬ ing permits the formation of sulphuric acid, which in turn reacts upon the clay shale with the formation of alum. Calcareous shales are largely used in the manufacture of Portland cement.

SHALER, sha'ler, Alexander, American soldier: b. Haddam, Conn., 19 March 1827; d. 1911. He was educated in private schools and graduated from Brainard Academy in 1844. In 1845 he joined the Washington Grays (later known as Eighth regiment New York State militia) and transferred to the Seventh regiment in 1848, becoming major of that regiment in 1860. He was commissioned lieutenant-colonel of the 65th New York Volunteers on the outbreak of the Civil War, and became colonel in 1862, com¬ manding the military prison at Johnson's Island, Ohio, during the winter of 1863-64. He served with the Army .of the Potomac, participating in all its battles, until 6 May 1864, when he was taken prisoner at the battle of the Wilderness, and was held in Charleston, S. C., during the summer of that year. After his exchange he commanded a division in the Seventh corps and the post of Duval's Bluffs, Ark., serving in the Southwest until he was mustered out 24 Aug. 1865. He was commissioned brigadier- general of volunteers in 1863, and brevetted

major-general of volunteers in 1865. From 1867 until 1870 he was president of the board of commissioners of the Metropolitan fire de¬ partment, and commissioner of the fire depart¬ ment of New York 1870-73. He was consulting engineer to the Chicago board of police and fire 1874-75, being charged with the reorganiza¬ tion and instruction of the fire department of that city. From 1867 till 1886 he was major- general of the first division of the National Guard of the State of New York, and was an organizer and president of the National Rifle Association of the United States. While a member of the board for the purchase of sites for armories he was accused of bribery, but although he was tried twice the jury disagreed each time. General Shaler published a (Manual of Arms for Light Infantry Using the Rifle Musket5 (New York 1861).

SHALER, Nathaniel Southgate, American geologist: b. Newport, Ky., 20 Feb. 1841; d. Cambridge, Mass., 10 April 1906. He was graduated from the Lawrence Scientific School, Harvard, in 1862, served in the Union army as an artillery officer, and then returned to the Lawrence School, where he was assistant and instructor in geology and zoology He accepted the chair of palaeontology at Harvard in 1868, was transferred in 1887 to that of geology, and he was dean of the Lawrence School from 1891. In 1873-80 he was in charge of the Kentucky geological survey, and from 1884 was director of the Atlantic division of the United States geological survey. He was commissioner of agriculture for the State of Massachusetts

at different times, was president of the Geological Society of America in 1895 ; and besides numer¬ ous reports for the United States geological survey published (Kentucky Geological Reports and Memoirs5 (7 vols., 1876-82) ; (The Story of Our Continent5 (1892) ; (The Interpretation of Nature5 (1893) ; (The United States of America5 (2 vols., 1894); (The Individual: Study of Life and Death5 (1900) ; (The Citi¬ zen : A Study of the Individual and the Govern¬ ment5 (1904) ; (The Neighbor5 (1904) ; (Man and the Earth5 (1905). Consult (The Auto¬ biography of Nathaniel Southgate Shaler,5 with a memoir by his wife (New York 1909), etc.

SHALLOON, a light woolen textile said to derive its name from Chalons in France, where it was originally manufactured.

SHALLOP, a light fishing-vessel with two masts and carrying lug or fore-and-aft sails ; also a small boat for one or two oarsmen.

SHALLOT, or ESCHALLOT, a peren¬ nial bulbous plant (Allium ascalonicum) of the order Liliacece. The bulbs are seldom two inches long and an inch in diameter. They send up hollow small leaves which are often used for mixing with salads and dressings, or are eaten alone. The bulbs are also similarly used. They are planted in early spring in rich soil about four inches apart, in rows 15 to 18 inches apart, and kept cleanly cultivated throughout the season. The leaves may be cut at any time and the bulbs taken up in autumn, dried like onions or garlic, and kept in a dry, cool place. From two to six bulbs are usually produced by each bulb planted. In the South they are generally planted in the autumn and even in the North they may be left in the

ground over winter. They are less grown in the United States than in Europe.

SHALMANESER, shal-ma-ne'zer, third of his name, the Assyrian king, who in 853 b.c. defeated Benhadad with his ally, Ahab, king of Israel, at Karkar, the Biblical Kir- haraseth (2 Kings iii, 25), on the Orontes. Shalmaneser did not gain a decisive victory over his foes, as he was unable to proceed to Damascus and to wage war against his other enemies ; he was worsted in battle by the Chaldians of Armenia. See Ahab Assyria.

SHAMANISM, a vague term used by ex¬ plorers of Siberia in the 18th and 19th cen¬ turies to designate not a specific religion but a form of savage magic or science, by which physical nature was believed to be brought under the control of man. It prevails among Turanian and Mongolian tribes and American Indians, and blends with their varied religious beliefs and customs. Shamanism rests for its basis on the animistic view of nature. Animism teaches that primitive and savage man views the world as pervaded by spiritual forces. Fairies, goblins, ghosts and demons hover about him waking or sleeping ; they are the cause of his mishaps, losses, pains. Mountains, woods, forests, rivers, lakes are conceived to possess spirits, and to be living, thinking, will¬ ing, passionful beings like himself. In respect to these, man is in a state of helplessness. The shaman by appropriate words and acts uses his power to shield man and envelops him

*in a kind of protective armor so that the evil spirits become inactive or inoffensive. His role is that of antagonist to the spirits and of guardian to ordinary man. The Eskimos believe all the affairs of life are under the control of malignant spirits who are everywhere. These minor spirits are subject to the great spirit Tung-Ak, yet must be propitiated. The * shaman alone is supposed to be able to deal with the great spirit, though not superior to him. The main principle of Shamanism is the attempt to control physical nature. Hence the term embraces the various methods by which the spirits can be brought near or driven away. The belief that the shaman practises this magic art is universal among savages. To this art nothing seems impassible; it inti¬ mately affects their conduct and is reflected in their myths. In some cases initiation is re¬ quired. .Thus with the Navajo and Ojibwas they who have successfully passed through the four degrees of the medewin are called mede, and are considered competent to foresee and prophesy, to cure diseases and to prolong life, to make fetishes and to aid others in attaining desires not to be realized in any other way. They who have received instruction in .one or two degrees usually practise a specialty, e.g., making rain, finding game, curing diseases, For this women are eligible. Most commonly the shaman is a man. Among the Yakuts, the Carib tribes and in northern California there are female as well as male shamans; and in some cases male shamans have to assume women's dress. Every Maori warrior is a shaman. In Samoa there is no regular caste, but in other Polynesian groups the shaman is the exclusive privilege of an hereditary class of nobles. In the practice of his art the shaman*

is regarded as (1) a healer, hence the term (

Shamanism is closely akin to fetishism, and at times it is difficult to tell whether the practices in vogue among certain peoples should be referred to the one or to the other. Both spring from Animism; both are systems of savage magic or science and have certain rites in common. Yet the differences consist in the belief that in fetishism the magic power resides in the instrument or in particular sub¬ stances and passes into (ib. 1887) ; Keane, (The World's Peoples) (New York 1908) ; Furlong, (The Faiths (of Man (London 1906) ; Journal of American Folklore (January 1908) ; Tumholtz, C., (Unknown Mexico) (New York 1902) ; Tylor, (Primitive Culture) (2d ed., New York 1889).*

SHAMASH, or SAMAS, the sun god of Babylonia and Assyria. Inscriptions designate him as the offspring of Sin, the moon god, the moon power in the earlier, nomadic times being

the dominant deity. With the development of agriculture the importance of the sun god grew and he became one of a triad with Sin, the moon god, and Ishtar, the earth god. To Shamash were attributed powers of justice and right, evil being supposed to flee before the power of light, and he was likewise the god of healing. His wife was A, Aa, Or Ai, and in inscriptions is the ((lady of mankind® and the <(lady of the countries.® His children were Kettu (justice) and Mesharu (right), al¬ though these are also referred to with other minor sun gods, such as Bunene, as servitors of Shamash. Ninib, ihe sun god of the morn¬ ing and of spring, and Nergal, god of moon and summer, however, retained their powers under the headship of Shamash. The principal places of worship were Sippara, the Sephar- vaim of the Bible ; and Larsa, the modern Senkereh ; the sanctuary in both cities being called E-barra or E-babbara, <(the shining house.® Other temples of his worship were built at Babylon, Ur, Nippur and Nineveh.

SHAMOKIN, sha-mo'km, Pa., borough in Northumberland County, on the Philadelphia and Reading and Pennsylvania railroads, about 45 miles north by east of Harrisburg, the capi¬ tal of the State. It was settled in 1835 by peo¬ ple employed in developing the coal mines. It was incorporated as a borough in 1864. It is the industrial and commercial centre of a re¬ gion rich in anthracite coal. The chief indus¬ trial establishments are foundries, machine shops, silk and knitting and planing mills, flour mills, brickyards, and a large number of the inhabitants of the bor.ough are employed in the mines in the vicinit}. The borough has an extensive trade in coal and in iron products and in knit goods. There are several churches, free high schools, public and parish schools, and a public library. The banks, national and State, have a combined capital of over $500,000. The government is vested in a chief burgess and a council. The majority of the inhab¬ itants are native horn, but there are a number from Wales, Poland, Hungary and Germany, also from England, Ireland and Scotland. Pop.

(1920) 21,204.

SHAMROCK, a name derived from the Irish seamrog, meaning ˆtrefoil,® and applied to various trifoliate plants native to Ireland, and even to the water-cress (which is not three- parted). Each is said to be the plant picked by Saint Patrick as a symbol to illustrate the doctrine of the Trinity. The Shamrock is worn on Saint Patrick's Day, 17th of March, and has come to be regarded as the national plant of Ireland. The black medic (Medicago lupulina), Oxalis acetosella, various clovers, such as the common red clover (Trifolium pra- tcnse), a trailing hop-clover, with small leaves and yellow heads (Timinus), and the common low, white clover (T. repens), are widely sold as the <(true® shamrock, and exported in large quantities

to the United States and other coun¬ tries, where Irishmen make a custom of wear¬ ing the sprays on Saint Patrick's day as a re¬ minder of home associations.

SHAN-HAI-KWAN, shan-hl-kwan, China, a town in the province of Chi-li, situated on the Gulf of Liao-tung, on the Manchurian bound¬ ary, and at the point where the Great Wall

reaches the sea. It is a station on the North¬ ern Railroad, and a point of great strategic im¬ portance. Being a Chinese garrison town, it was occupied during the Boxer troubles of 1901 by troops of the allied Powers. It con¬ sists of the inner town devoted to trade, the eastern town, which is occupied by officials and troops, and the western town which is occupied by tradespeople and troops. It has large rail¬ road repair shops. Pop. 30,000.

*SHAN-SI, shan -se, China, an inland north¬ ern province, bounded east by Chi-li and. Hen- nan, south by Hu-nan, west by Shen-si, and north by Mongolia and the Great Wall; area, 81,830 square miles. Its rugged surface con¬ trasts strikingly with the level tracts in some of the surrounding provinces, although the low¬ land parts of it are represented as being well cultivated and terraced. The rivers, which are almost all tributaries of the Hwang-ho or Yel¬ low River, are numerous, but not large. The Fen-ho, the largest of these streams, is about 300 miles long and falls into the Yellow River near the southwest corner of *the province, after draining the central part. The north contains some of the favorite hunting grounds of the wealthier Chinese, and the inhabitants find sources of wealth in the coal, iron, cinnabar, copper, marble, lapislazuli, jaspar, salt and other minerals, which it affords. The principal grains are wheat and millet, besides a great variety of vegetables, with grapes and other fruits. To¬ bacco is cultivated in the southern half of the province. Besides Tai-yuan, the capital, there are several populous towns in the province. This province is the original seat of the Chinese people and many of the events recorded in their ancient annals occurred within its borders. Pop. 12,200,500.*

SHAN (shan) STATES, Indo-China, a series of petty states on the east of Burma and north of Siam, occupying an area not well, defined. The northern part of the Shan coun¬ try comprises the North and South Shan states, belonging to British Burma, and the southern part, the Laos or Siamese Shan states belonging to Siam. The Shans are descendants of an aboriginal race from the mountains on the western borders of China and are closely allied to the Laos and the Siamese. They are an indolent, laughter-loving people, fond of gambling and cock-fighting, not unwarlike, though orderly and fairly trustworthy; the women have great influence and

enjoy equal freedom with the men. Slavery, however, ex¬ ists, but in a mild form, and serfdom is gen¬ eral. While the chief employment is agricul¬ ture, there are noted manufacturers of chased work in gold and silver. The rule of the native chiefs is generally just and mild, and taxation is light. Buddhism is the dominant religion, though it is mingled with many superstitious practices. See Laos ; Lolos and Siam.

SHAN-TUNG, shan-toong', China, a north¬ ern maritime province bounded north and west by Chi-li, southwest by the Gulf of Pe-chi-li and the Yellow Sea, and south by Kiang-su and Hu-nan ; area, 55,970 square miles. The climate is very bracing; the rainfall extends from April to September. The greater por¬ tion of this province is level, but the peninsular parts of it are hilly. The shores are generally bold and full of indentations, some of which

are excellent harbors. Wei-hai-wei leased to the British, Kiao-chau, formerly leased to Ger¬ many, and the native towns Teng-chau and Chi-fu are the only important seaport towns along the entire coast. The province is inter¬ sected by several rivers. The only large one flowing direct to the sea is the Yellow River or Hwang-ho, which, after traversing the province in a northeast direction, flows into the Gulf of Pe-chi-li. The inland navigation is augmented by the grand canal which traverses the west part of the province northwest to southeast, affording great trading advantages, and the transit trade is extensive. Drugs and vast quantities of vegetables are exported, and felt caps, carpets and some coarse hempen cloths are manufactured. Pongee silk and straw-braid are exported in large quantities. The province is over-peopled, and the great proportion of the people are poor; still they appear to be contented and attach peculiar im¬ portance to this province, on account of its being the birthplace of Confucius and his dis¬ ciple, Mencius, and also because it contains the Tai-shan, or Great Mount, which forms a . favorite resort of devotees from amazing dis¬ tances. Its capital is Tsi-nan. Pop. 25,810,000.

By a convention signed 6 March 1898 Ger¬ many obtained the so-called Kiao-Chau conces¬ sion, giving her special privileges in a belt 33 miles wide running around Kiao-Chau Bay, which included the right to move troops, but with the specification that the territory in this zone was still under Chinese sovereignty. It also gave to Germany the Treaty Port of Tsing-tao where fortifications were erected and the Germans enjoyed extraterritorial im¬ munity from Chinese interference. It also con¬ ferred the right to grant concessions for two railways in Shantung province

(afterward ex¬ tended) and a railway zone 20 miles wide in which mining operations could be carried on under German direction and by German capital. Under the terms of this treaty Tsing-tao was built and fortified, the Tsing-tao-Tsinan Rail¬ way was constructed and mining operations were started. Shantung was looked upon as Germany's sphere of influence. In 1914 Japan declared war upon Germany and announced that she would support Great Britain's inter¬ ests by taking Tsing-tao. Yuan Shih-kai of¬ fered to bring China in as an ally and take it but was dissuaded. A Japanese fleet block¬ aded the German treaty port, supported by British and French vessels and a Japanese military force approached Tsing-tao overland from Lungkow and with a small British con¬ tingent, besieged it. After a short struggle the Germans surrendered and the Japanese ex¬ peditionary force occupied the place. In 1915 21 demands were presented to China, secretly, and were discussed in conferences, at which the Japanese permitted no minutes to be taken. The Chinese were forced, to agree that they would abide by any decision reached between Japan and Germany at the Peace Conference. In 1917 before America and China entered the war, Japan extracted from Great Britain, and later from France and Italy, a pledge that. she would be supported in her claim upon Tsing- tao at the Peace Conference. Already in 1914 Japan had announced that she proposed to re¬ turn Kiao-Chau to China with full sovereignty.

VOL. 24 — 42

The entry of China in the war against Ger¬ many completely altered the status of the Shantung question, of which the disposition now clearly was a question between China and Germany and not as before between Germany and Japan. The latter apparently saw the weak¬ ness of her position and in September 1918 negotiated a secret agreement with Tsao Ju- lin, who acted without the knowledge of Parlia¬ ment or the Cabinet. By this agreement Japan came into possession of Germany's former claim upon projected Shantung railways. This was the status of the Shantung question when the Peace Conference began its sessions in Paris. Japan was armed with five treaties and agreements. Faced with these documents the representatives of the great nations at the Conference, instead of ignoring or tearing up the documents, gave Japan's claims the fol¬ lowing consideration in the final draft of the terms submitted to Germany:

" Germany cedes to Japan all rights, titles, and privileges, notably as to Kiao-Chau, and the railroads, mines and cables acquired by her treaty with China of 6 March 1898, and by other agreements as to Shantung.

"All German rights to the railroad from Tsing-tao to Tsinanfu, including all facilities and mining rights and rights of exploitation, pass equally to Japan and the cables from Tsing-tao to Shanghai and Chefoo, the cables free of

all charges; all German state property, movable and im¬ movable, in Kiao-Chau is acquired by Japan free of all charges."

This award to Japan aroused the Chinese nation as nothing else had done in their his¬ tory. It also caused hostile comment in the United States, many Senators being reluctant to vote for the ratification of the treaty with this provision included. Japan announced once more that she would return the province to China, but no date was specified for the ful¬ filment of this promise. See War, European — Peace Conference.

SHANGHAI, shang-hi', China, a seaport city, the most important of the Chinese treaty ports, one of the five opened to foreign com¬ merce in 1843, in the province of Kiang-su, near the junction of the Hwang-pu and the Wu-sung rivers, 12 miles from the mouth of the Yang-tse-kiang and 150 miles southeast of Nanking. Old Shanghai, or the Chinese city, is surrounded by a wall 24 feet high, pierced by six gates and enclosing an area of about two square miles. The streets are narrow and dirty and the buildings, low and crowded ; modern sanitation and other improvements are being introduced gradually. The principal buildings are the Wei-Kwan, a commercial tri¬ bunal ; a temple dedicated to the goddess of the seas ; the Hall of Benevolence and other charitable institutions ; a medical college, and the city prison. The foreign settlement is quite distinct in its boundaries, government and commerce. It stands on the left bank of the Hwang-pu, below the walled city from which it is separated by a moat, spanned by several bridges. Two creeks divide the settlement into three sections, the upper being the French concession; the central, the British, and the lower, the American. They are held at a low rental from the Chinese government under a code of regulations drawn up by the treaty powers.

The British section is the most valuable, and the consulates of all the other nations are situ¬ ated there, except the French and American. A

municipal council is elected by the foreign rent¬ ers of the English and American quarters, and another by the French, whose quarter is sep¬ arately administered. The subjects and citi¬ zens of each nationality are under the protec¬ tion of their respective consuls and amenable to the jurisdiction of their courts; or, where the person has no consul to appeal to, he is amenable to the Chinese authorities. Chinese in foreign employ are exempt from imperial jurisdiction. Great improvements have recently been carried out, new roads being made, larger and more substantial buildings erected, includ¬ ing fine villas, etc.

Along the bank of the Hwang-pu extends a wide ®bund® or quay, with a bulwark of stone and numerous stone jetties, for landing and loading cargo; while the path forms a prome¬ nade for the residents from 50 to 80 feet wide. It extends for one mile in length and contains spacious houses surrounded with gardens; the lower stories being often used as stores (go-downs) and counting-houses, the upper as resi¬ dences.

The chief mission establishments in China are at Shanghai. That of the London Mission¬ ary Society has a printing office for publishing religious works in Chinese, from which was issued in one year 500,000 copies of the New Testament for gratuitous distribution, or at a small charge. Connected with the mission is a hospital for the gratuitous care of native patients, under the charge of a medical mis¬ sionary, where many thousands attend during the year. The American Presbyterian Mission not only print in Chinese, but manufacture the metallic types. There is an extensive mission, also, under the auspices of the French Societe de la Propagation de la Foi, where the mis¬ sionaries conform to the dress and manners of the Chinese, with an extensive establishment near the walled city, having a cathedral within its precincts, capable of accommodating 3,000 people. Besides this the French have a hand¬ some church in their concession. In the British concession there is an English church, with sev¬ eral chapels and meeting-houses scattered over the other parts of the settlement. Here also is a public library and a branch of the Royal Asiatic Society. Cotton spinning and ship¬ building are among the chief industries of Shanghai, and there are silk filatures, flour, rice and paper mills, furniture and piano works, packing-houses, ginning factories, etc.

The port of Shanghai extends from the upper limb of the Hwang-pu, below the native shipping, to Wu-sung. a distance of 12 miles, connected by rail, and of which the anchorage for foreign vessels extends for four miles be¬ low the settlement. The anchorage is divided into sections, defining the foreign from the Chinese boundary, where all the vessels are anchored abreast and lettered according to their position, steamers being separated from sailing ships. A foreign harbor-master is appointed by the Chinese authorities, who retain com¬ plete control over the conservancy of the har¬ bor and its entrance and collect all shipping dues, duties on imports and exports, etc., through the foreign maritime customs. Shang¬ hai has water communication with about a third of China and its trade has become very ex¬ tensive, the port being connected with a sys¬ tem of steamship lines which carry cargo and

passengers to and from all parts of the world. The largest trade is with Great Britain and her dependencies, but Japan, the United States, Germany and Russia are increasing their share. The gross value of foreign imports in 1914 was $166,774,094, the great bulk of which repre¬ sented goods re-

exported to other ports. The exports to foreign countries for the same year were valued at $103,236,774. The chief foreign imports are opium, cotton yarns and piece goods, metals, kerosene oil, coal and sugar ; and the leading exports are raw silk and silk piece goods, tea, raw cotton, hides and native cloths. A considerable share of the coasting trade is in British hands, and both in the home and foreign trade steamers are chiefly em¬ ployed. In 1914, 18,950,918 tons of foreign shipping entered and cleared the port, of which 40 per cent were British ; besides this the native shipping entered and cleared amounted to 2,101,430 tons. Pop. 650,000; the foreign population is 13,436, of whom 4,465 are British, 3,361 Japanese, 941 American and 330 French.

SHANGHAI, a breed of fowls. See Poultry.

SHANKLIN, William Arnold, American

Methodist Episcopal clergyman and university president: b. Carrollton, Mo., 18 April 1862. He was graduated at Hamilton College in 1883, and took his S.T.B. at Garrett Biblical Institute in 1891. He was ordained • in the Methodist Episcopal ministry in 1889, and held pastorates in Kansas, Washington, Iowa and Pennsylvania in 1887-1905. He was president of Upper Iowa University in 1905-09, and has since been presi¬ dent of the Wesleyan University.

SHANKS, William Franklin Gore, Amer¬ ican journalist: b. Shelbyville, Ky., 20 April 1837 ; d. Hamilton, Bermuda, 22 Feb. 1905. He was a war correspondent for the New York Herald during the Civil War, afterward an editorial writer on that and other New York papers and was managing editor of Harper's Weekly, 1867-69. While city editor of the Tribune he was imprisoned for contempt of court for refusal to divulge the name of the writer of an article in the paper, taking the ground that he was a privileged witness. After his release he brought charges against District Attorney Winchester Britton, who was removed by Governor Dix. In 1880, he instituted suit, for the first time in the United States, against the vendor of a libel, recovering two judgments, and the Court of Appeals sustained the legal point at issue. In 1885 he organized the Na¬ tional Press Intelligence Company. He is the author of (Personal Recollections of Distin¬ guished Generals) (1865) ; (A Noble Trea¬ sonˆ a tragedy (1876) and (The Ring Master.

SHANLY, Walter, Canadian railway engineer and legislator : b. Stradbally, Queen's County, Ireland, 11 Oct. 1819; d. 1901. He studied civil engineering and in 1837 emigrated to Canada. He was resident engineer of the Beauharnois and Welland canals in 1843ˆ-8; of the Northern New York Railroad in 1848-51; and chief engineer of the Ottawa and Prescott

Railway in 1851-53. In 1853 he became chief engineer of the western division of the Grand Trunk Railroad and he was its general manager in 1857-62. In 1869-75 he was engaged in build¬ ing the Hoosac Mountain Tunnel in Massachu¬ setts, the greatest achievement of his career.

He was chief engineer of the Canada Atlantic Railway in 1879-85, and thereafter was its con¬ sulting engineer. He was a member of the Canadian Assembly in 1863-67, and after the confederation served in the Dominion Parlia¬ ment in 1867-72 and in 1885-90.

SHANNON, shan'on, Wilson, American politician : b. Belmont County, Ohio, 24 Feb. 1802; d. Lawrence, Kan., 30 Aug. 1877. He had a collegiate and law training and began prac¬ tice at St. Clairsville, Ohio. In 1832 he became attorney for Belmont County, and in 1838 Dem¬ ocratic governor of the State. After the interim of one term he was re-elected in 1842. During 1844-45, until the suspension of diplomatic rela¬ tions, he was Minister to Mexico by appoint¬ ment of President Tyler; and after his return he practised law in Cincinnati. He was elected to Congress in 1852, where he served on the committee on foreign affairs. In 1855 he was appointed by President Pierce to succeed An¬ drew H. Reeder as governor of Kansas. The contests of the pro- and anti-slaverv factions among the people to gain possession of the legis¬ lature made the post an exceedingly onerous one, especially for one who endeavored to ad¬ minister affairs impartially. He resigned in August of the following year. After the polit¬ ical troubles of Kansas had subsided he re¬ turned to the State to reside.

SHANNON, a river in Ireland, the largest in the United Kingdom; rises at the foot of the Cuilcagh Mountains, in the northwest of County Cavan, flows west, southwest, through Lough Allen, then takes an irregular course, generally south, to Lough Rea, then southwest to Lough Derg, then south to Limerick where it becomes a tidal stream. From here on to its mouth are several expansions and it enters the ocean by a broad estuary. The various lakes through which it passes are in part real lake basins and partly river expansions. The total length is 254 miles. By means of improvements which cost about $5,000,000, the river has been made navigable from Lough Allen to Limerick, and the Grand and Royal canals, which connect the river with Dublin, have increased its com¬ mercial importance. Vessels of 1,000 tons ascend it as far as Limerick, and vessels of lighter draught as far as Athlone. Consult Harvey (The Shannon and Its Lakes) (London 1896).

SHANNON, The. See Chesapeake and Shannon, Battle of.

SHARI, sha're, a large river in Central Africa, which enters the south side of Lake Tchad by several mouths after a course of about 700 miles from the southeast. It drains Central Sudan and in its lower course marks the bound¬ ary between Bagirmi and Cameroon. It is navigable to Gulfei. See Tchad. Lake.

SHARKS, an extensive group of elasmo- branch fishes of the order Selachii, in which the claspers are complex in structure and the pec¬ toral fins supported on the shoulder-girdle by three basal axial cartilages which may be more or less subdivided, and which bear the cartilag¬ inous fin rays chiefly or exclusively on one side. The external parts of the fins are supported by delicate horn-fibres or actinotrichia. From the rays and skates the sharks are distinguished by the position of the branchial clefts, which are always lateral, by the fan-shaped pectoral fins, and by the shape of the body, which is almost

always elongated, rounded and tapering to the strongly heterocercal tail.

*The sharks breathe by gill-sacs or pouches, which open externally on the neck by gill-slits, of which there are five to seven pairs. Water may also be admitted to the gills through the spiracles, a pair of openings on the upper side of the head representing an anterior pair of gill-slits which are never large and often absent. The mouth exists on the under surface of the head, a conformation compelling some of these fishes to turn on their backs to bite conveniently objects at the surface. The skin is usually pro¬ vided with small tooth-like granules in the form of placoid scales ; and is used under the name of shagreen, in the manufacture of various arti¬ cles, such as purses, spectacle-cases, or as a substitute for sandpaper. The eggs may be laid in capsules or cases of horny material, within which the embryos are protected, the egg-cases being moored or fastened by filaments to rocks or fixed objects, and the young form escaping in due time from its covering. The egg-cases of dog-fishes are frequently cast up on the shores, and receive the fanciful or popular name of ˆmermaids'-purses,® ˆsea-purses,** and the like. The majority of the sharks are, however, viviparous and in some the embryos are nour¬ ished by means of placenta-like structures. The skeleton never attains a high degree of perfec¬ tion, but is chiefly cartilaginous. The skull ex¬ hibits no indications of divisions into distinct cranial bones, although the jaws are well de¬ veloped and calcified. The intestine is pro¬ vided with a spiral valve which serves to increase the area over which the food has to pass, and the base of the aorta contains rows of valves.*

The species of sharks are numerous and so varied in structure that the

living forms alone have been arranged in about 20 families. With the single exception of Eulamia nicaraguensis, which inhabits lake Nicaragua, all are marine, only a few occasionally entering the large rivers of India. Owing to their active, roving habits, most of them are widely distributed. With per¬ haps half a dozen exceptions all sharks are strictly carnivorous and predaceous, and be¬ cause of their ferocity several of the large species are justly feared. A few of the most noteworthy species are the following:

Species of Sharks. — The white shark or man-eater (Carcharodon carcharias) is white below and brown on the upper parts. It is probably the best known of the sharks, and is found in most seas. (See Man-eater). The blue shark (Carcharinus glancus) , also known as man-eater, is slaty-blue on the upper, and white on the under parts. It may attain a length of 20 feet or more, and is exceedingly destructive to shoals of food-fishes, pursuing its prey even into the fishermen's nets. Both of these occur occasionally on our coasts, where the dusky shark (C . obscurns) closely related to the last, but smaller, is very common. The thresher shark (Alopias vulpes), is known by the exceedingly elongated upper tail-lobe, which the fish uses after the fashion of a powerful flail when it attacks a school of fish. .It feeds chiefly on fishes, and occasionally visits our coasts. The average length varies from 12 to 15 feet. A very common small species along the Atlantic Coast is the sand shark (Carcharias littoralis), which has very acute teeth mostly provided at the base with one or two cusps. The

hammer-headed shark (q.v.) is at once recog¬ nized by the lateral elongation of the head to form a hammer-like structure. The porbeagle shark (Lanina cornubica) may attain a length of six feet, and is grayish-black. It has slender, very acute teeth and is quite a common visitor to our coasts, where it is also known as the mackerel-shark. The basking-shark (Cetor – hinus maximus) attains a length of from 30 to 36 feet, being the largest of all sharks, and is found around our coasts but is chiefly an Arctic species. The name is derived from its habit of lying motionless on the surface of the water in the sun, often in schools. It is sluggish and, in spite of its huge size, harmless and feeds on fish. The head and teeth are small, the dorsal fin very large and the gill-slits long. The Greenland, northern, or sleeper shark (Somni – osus microcephalns) attains a length of 18 feet, and is brown, shaded with deep blue. It feeds upon the carcasses of whales, even attacks living whales, and is chiefly found in the Arctic seas. The spinous shark (Echinorhinus spinosus) is so named from the presence of the spiny scales scattered over its integument. The average length is seven or eight feet. It is common on the Atlantic coasts of Europe and Africa, and

has been taken once on Cape Cod.

Of the dog-fishes (q.v.) may be mentioned the smooth dog (Galeus canis), and the picked dog-fish (Squalus acanthias). Two very re¬ markable sharks representing groups now nearly extinct are the Port Jackson shark (see Ces- tracion) and the frilled shark (Chlamydose – lache anguineus). The former is remarkable for the pavement-like teeth and stout fin-spines and the latter for its eel-shaped body, diphy- cercal tail, frilled gill-clefts and prominently lobed teeth. The former occurs in Australian, the latter in Japanese waters. Another very recent discovery in the latter region is Mitsuku- rina owstoni, unique among living sharks in its prolonged snout and protruding mouth. The sawsharks (Pristiophorida) , which bear a doubly serrate process on the snout like the saw¬ fishes (q.v.), are otherwise shark-like; and the angel-sharks (Squatinidtz) , with much flat¬ tened bodies, lead to the skates and rays.

The varieties of extinct sharks are still more numerous and vary from the delicate little acan- thodians, only a few inches long, of the Carbon¬ iferous, to the huge Tertiary carcharodons, whose five-inch teeth indicate a length of 75 feet. Many of the Palaeozoic sharks were of types very different from any now living.

Usefulness. — The liver of some sharks con¬ tains a large quantity of oil, and they are ac¬ cordingly caught in great numbers in some places, and the oil extracted. Shark-fishing con¬ stitutes an industry of some importance on the coast of Russian Lapland and the northern por¬ tion of Norway. Those caught here are chiefly the basking shark and the Greenland shark. The Norwegians employ decked vessels of 20 to 30 tons burden, which carry on the fishery as much as 100 or 150 miles from land, at depths of 250 to 300 fathoms. These vessels carry five or six men. On the coast of Norway, farther to the south, other species of sharks are also caught. In order to attract the sharks the fishermen take an old barrel pierced with sev¬ eral holes, pour oil or grease into it and sink it to the bottom with stones. The oil or grease

escapes slowly, and is carried by the currents to a distance, thus attracting the keen-scented fishes to the place where the boat is stationed. Here they are caught by hooks baited with salted seal's flesh and fastened to the end of strong chains. When a shark is hooked three of the men haul in the chain, while a fourth stands ready with a mallet, weighing about 20 pounds, to stun the fish when its head appears.

The fisheries of China, India and Africa, which have for their object the white shark and other large species for the purpose of supplying the sharks-fin trade of China, are also of great value, and capture annually a total of

not less than 100,000 sharks. In the United States shark fisheries have never been developed extensively, practically the only one worthy of mention be¬ ing the dogfish industry of New England and particularly of Maine, where the livers of the spiny or picked dogfish are tried for oil and the flesh ground into a poultry food. Dogfish oil is used by curriers and as an adulterant of cod- liver oil. In Europe the dogfish fisheries are far more extensive and, besides the oil secured from the livers, the flesh yields an extract which for nutritive properties compares favorably with extract of beef, and is generally edible and likable.

Bibliography. — Jordan and Evermann, (Fishes of North and Middle America) (Washington 1896) ; Goode and Bean, (Oceanic Ichthyology (Washington 1895) ; Goode, fisheries Industries of the United States) (Washington 1884) ; Dean, (Fishes, Living and Fossil* (New York 1895) ; Kingsley, (Standard Natural History* (Vol. Ill, Boston 1885) ; Gunther, introduction to the Study of Fishes> (Edinburgh 1880) ; Woodward, (Vertebrate Paleontology) (Cambridge 1898) ; Zittel, K. A. v., (Textbook of Paleontology * (2 vols., trans. by Eastman, C. R., New York 1903).*

SHARON, Shar'on, Pa., borough in Mercer County, on the Shenango River and on the Pennsylvania, the Erie and the Lake Shore and Michigan Southern railroads, about 40 miles south-southwest of Meadville and near the Ohio boundary. It is in a coal-mining and iron ore region, and its chief industries are connected wit.h the mining and shipping of coal and of iron and steel products. The principal industrial establishments are furnaces, rolling mills, foundries, nail factories, machine shops, tile and brick works, boiler works, a brewery, a planing mill and a furniture factory. There are also manufactured a large amount of brass and steel products, explosives, spokes, stoves and lumber products. The stone quarries, in the vicinity, furnish employment to a number and contribute to the prosperity of Sharon. The principal public buildings are the business blocks, churches and schools. The educational institutions are Hall Institute (Baptist), founded in 1888, Saint Scholastica Academy (Roman Catholic), a high school, public schools, parish schools, a public school library, founded in 1877 and several private schools. Pop. (1920) 21,747. y

SHARON, Palestine, in biblical geography a plain on the Mediterranean coast of the coun¬ try, reaching inland to the hills and from Joppa to Caesarea. It was originally of great fertility, with forests and rich vegetation, and is still excellent pasture ground. The beauty

of the district was generally recognized (Isaiah xxxv, 2), and its roses in the Song of Solo¬ mon (ii, 1). The herds of David are men¬ tioned as grazing there (1 C'hron. xxvii, 29).

SHARON SPRINGS, N. Y., village in Schoharie County, on the Delaware and Hud¬ son Railroad, about 50 miles west by north of Albany. It is in a valley about 1,100 feet above the sea. It is a famous summer resort on account of its picturesque location and its four noted mineral springs, a white sulphur, blue sulphur, a magnesia and a chalybeate. It was incorporated in 1871. Pop. about 800; in the summer season, about 10,000.

SHARP, Abraham, English mathematician: b. Little Horton, 1651 ; d. Yorkshire, 15 July 1742. Having studied and taught mathematics in Liverpool, he was employed by John Flam¬ steed in the Greenwich Observatory and made for him, in 1688-89, Flamsteed's first successful instrument, a mural arc. Afterward he taught mathematics in London and subsequently re¬ tired to Ltttle Horton, where he devoted himself to mathematics and to making astronomical and calculation instruments, and is said to have been the first Englishman to make these accu¬ rately. He published a book of logarithms, the first of its kind, was a joint author with Cros- thwait of (The British Catalogue) and plotted a number of important astronomical maps. Consult Cudworth, W., Rife and Correspond¬ ence of Abraham Sharp) (Bradford 1889).

SHARP, Becky, the leading character in Thackeray's novel, (Vanity Fair (1847). In the notes contributed by Thackeray's daughter, Mrs. Ritchie, to the (Biographical Edition) of Thackeray's works, she makes the statement that she once saw the lady who was supposed to have unconsciously sat for the portrait of Rebecca Sharp. Literary gossip contains a story, current for a time, that Becky was the portrait of Charlotte Bronte and that Miss Bronte retaliated by drawing Thackeray as Rochester in (Jane Eyre.* The character has been incorporated into a drama by J. M. Barrie in 1893 ; by Langdon Mitchell and by Robert Hitchens and Cosmo Gordon Lennox in 1901.*

SHARP, Dallas Lore, American author and educator : b. Haleyville, N. J., 13 Dec. 1870. He was graduated at Brown University in 1895 and at the Boston University School of Theology in 1899. He was ordained in the Methodist Epis¬ copal ministry in 1895 and held pastorates in Massachusetts in 1896-99. He has been asso¬ ciated with the faculty of the Boston Univer¬ sity since 1899 and since 1909 has been pro¬ fessor of English there. He was associate editor of the Youth's Companion in 1902-03. Author of (Wild Life Near Home> (1901);

SHARP, Granville, English abolitionist: b. Durham, 10 Nov. 1735; d. London, 6 July 1813. He studied law, but abandoned it to ac¬ cept a place in the ordnance office. He was the patron of the slave Somerset, whom he found in the streets of London in 1769, having been turned away by his master because of illness. Sharp placed him in a hospital, and on his recovery procured employment for him. Two

years later Somerset was claimed by his master, arrested and imprisoned, whereupon Sharp summoned them both before the lord mayor, who discharged the slave. The master still re¬ fusing to release him, Sharp brought the case before the court of the King's Bench, which resulted in the famous decision against the legality of slavery in England in 1772. In 1777 he resigned from the ordnance office because of his disapproval of the American War, and devoted himself there¬ after to philanthropy, particularly to the over¬ throw of slavery. He was chairman of the meeting which in 1787 formed the Association for the Abolition of Slavery and was one of the founders of the Negro colony at Sierra Leone. He was also an advocate of parliamen¬ tary reform, opposed dueling and favored the extension of privileges to Ireland. He wrote 61 pamphlets in reference to the causes to which he devoted his life, among which are Repre¬ sentation of the Dangerous Tendency of Tol¬ erating Slavery in England (1772) ; (Treatise on Duelling) ; (Account of the English Polity of Congregational Courts (1786), etc. His bi¬ ography was written by Prince Hoare (London 1820) and by Charles Stuart (1836).*

SHARP, James, Scottish ecclesiastic: b. Castle of Banff, 4 May 1613 ; d. Magus Muir, Saint Andrews, 3 May 1679. He was educated at the University of Aberdeen and was ap¬ pointed regent there, where his conduct won him the friendship of the clergy. He held a professorship in Saint Leonard's College, Saint Andrews, and was then appointed Minister at Crail, Fifeshire. In 1656 he was a representa¬ tive from the Presbytery to Cromwell, and he managed this mission so well that he was sent in 1660 to Monk and to Charles II. He treach¬ erously agreed to help Monk restore Episco¬ pacy in Scotland, but the time for this coup not being ripe he played the double part of friend to his constituents and tool of Monk. When Parliament established Episcopacy in 1661 Sharp benefited from both parties, being appointed professor of theology in Saint Mary's College, Saint Andrews and king's chaplain for Scotland. He now completely went over to the king's party, was consecrated archbishop of Saint Andrews and primate of Scotland. In 1663 he secured the establishment of a high court commission, in which he took precedence of the chancellor, and the odious persecutions of the Resolutioners by this court, especially the cruelties it inflicted after the uprising in Pent- land, made Sharp an object of intense hatred throughout the country, a hatred shared by the king and court, whose tool he was regarded. Falling by accident into the hands of a party

of his enemies in 1679, he was dragged from the coach in which he was riding with his daughter and was beaten to death. Consult Dodds, James, (Fifty Years' Struggle of the Scottish Covenant (London 1860) ; Stephen, Thomas, Rife and Times of Archbishop Sharp* (ib. 1839); (The Lauderdale Papers* (Camden Society Publications, ib. 1885).*

SHARP, William, Scottish writer: b. Pais¬ ley, 12 Sept. 1856; d. Sicily, 13 Dec. 1905. He was educated at the University of Glasgow, after which he made a voyage to Australia. In 1879 he settled in London, where he knew Philip Bourke Marston and Dante Gabriel Ros¬ setti, whose lives he later wrote. He was a

critic of art and literature and an industrious editor. In the latter capacity he projected the Canterbury Poets) and the (Somnets of the Century.) His early life in the west highlands of Scotland probably confirmed his taste for Celtic literature and among his works is a col¬ lection made with the assistance of his wife called Cyra Celtica.5 In verse he published (The Human Inheritance> (1882) ; (Earth's

Voices> (1884); (Romantic Ballads and Poems of Fantasy) (1886) ; (Sospiri di Roma5 (1891) ; (Flower o' the Vine5 (1894) ; (Sospiri d'ltalia5 (1904). His fiction includes Children of To¬ morrow5 (1890); (Madge o' the Pool5; (Wives in Exile5 (1898); (Silence Farm5 (1899). He wrote, also, the biographies of Shelley, Heine and Browning and 'Literary Essays5; Creek Studies5 (1903-04). Two volumes of his critical work appeared in 1912 and in 1909-11 appeared a complete edition of his works (7 vols.). Consult the 'Memoir5 by his wife, Elizabeth A. Sharp (2 vols., London 1912). See Macleod, Fiona.

SHARP-SHIN, a small hen-hawk (q.v.).

SHARP-SHOOTERS, the name formerly given to the best shots of a company, who were armed with rifles and took aim in firing. They are superseded by the better arms and more complete organization of modern armies. According to the United States army regula¬ tions, a sharpshooter is a grade of rifleman next below that of expert rifleman. He wears a silver badge, consisting of a pin and cross, on the left breast of the coat. Consult 'Small Arms Firing Manual, United States Army.5

SHARP-TAILED GROUSE, the northern prairie-chicken (q.v.), a grouse (Pedioecetes phasianellus) , which has the general habits of the pinnated grouse, but differs among other features in lacking the neck-tufts, in the

characteristic form of the tail, in which the central pair of quills are soft, parallel-edged and square-tipped, projecting an inch or two beyond the next pair. It is somewhat more fond of brushy places and flies more than does the pinnated grouse, which is steadily encroach¬ ing on its northwestern habitat.

SHARPE, Samuel, English Egyptologist, Bible translator and banker : b. London, 8 March 1799; d. there, 28 July 1881. He entered the banking business of his uncles in 1814, became a partner in 1824 and continued in busi¬ ness successfully until his retirement in 1861. He was deeply interested in archaeological re¬ search and published many works on Egyptol¬ ogy, as well as making translations of the Bible which were characterized by a nice discrimina¬ tion. Author of 'The Early History of Egypt5 (1836); ˆEgyptian Inscriptions5 (1837); (Vo¬ cabulary of Egyptian Hieroglyphics5 (1837); 'The History of Egypt Under the Ptolomies5 (1838) ; 'The New Testament Translated5 (1840) ; (The History of Egypt from the Earliest Times till a.d. 6405 (1846) ; 'The He¬ brew Scriptures Translated5 (1865); 'A Short Hebrew Grammar Without Points5 (1877) ; 'Inquiry into the Age of the Moabite Stone5 (1879), etc.

SHARPLES, shar'p'lz, Stephen Paschall,

American chemist: b. West Chester, Pa., 21 April 1842. He was graduated at Harvard in 1866, and in 1875-93 was professor of chem¬ istry at the Boston Dental College. He has

been a consulting chemist since 1872, and in 1885-1902 he was inspector and assayer of liquors for Massachusetts. He is the editor of the Genealogical Magazine. Author of Chem¬ ical Tables5 (1866).

SHARPLESS, Isaac, American educator: b. Chester County, Pa., 16 Dec. 1848; d. 16 Jan. 1920. He was graduated from the Lawrence Scientific School, Harvard, in 1873, was instruc¬ tor in mathematics at Haverford College in 1875 – 79, occupied the chair of mathematics and as¬ tronomy there in 1879-85, was dean in 1885-87 after which he was president of the college. He wrote textbooks of astronomy and geometry and also published 'English Education5 (in In¬ ternational Education Series, 1892) ; 'A Quaker Experiment in Government5 (1898) ; (Two Cen¬ turies of Pennsylvania History5 (1900) ; (The American College5 (1915), etc. He received honorary degrees as follows: Sc.D. from UniJ versity of Pennsylvania, L. H. D. from Hobart College, LL.D. from Swarthmore College and from Harvard University. He was a member of the council of the Historical Society of Pennsylvania.

SHARPLESS, James, American artist: b. England, 1751; d. New York, 26

Feb. 1811. He began his artistic career in the United States in 1794 with a series of pastel portraits for which some of the most eminent men of the day gave him sittings, and there are still extant by him portraits of Washington, Jefferson, Hamilton, Monroe, De Witt Clinton, Burr, etc. These are treasured in the National Museum at Phila¬ delphia, where they were placed, 40 in all, in 1876. He was also interested in mechanics and in the first volume of the 'Medical and Philo¬ sophical Register5 (1811) is a paper by him on steam-carriages. He is buried in the church¬ yard of Saint Peter's, Barclay street, New York.

SHARPS, Christian, American inventor : b. New Jersey, 1811; a. Vernon, Conn., 13 March 1874. He developed a taste for me¬ chanics at an early age and practically devoted his life to invention. He was the originator of many ingenious implements, but none of these gave him such fame and remuneration as the breech-loading rifle which bears his name. In 1854 he removed to Hartford, Conn., to super¬ intend the manufacture of this rifle, and he subsequently invented other firearms of great value and patented many ingenious implements of various kinds.

SHARPSBURG, Md., a village in Wash¬ ington County, beautifully situated in a narrow valley, 12 miles south of Hagerstown, about the same distance north of Harper's Ferry and three miles east of Shepherdstown, on the Poto¬ mac. It has no manufactures, but is surrounded by a fine farming country, the chief products of which are corn, wheat, hay, apples, peaches and other fruits. It is chiefly noted as the scene of the battle of Antietam (q.v.) or Sharpsburg, fought, on the outskirts of the village, 17 Sept. 1862, in which more men were killed and wounded than on any other day of the Civil War. Pop. 1,100.

SHARPSBURG, Pa., borough in Allegheny County, on the Allegheny River and on the Pittsburgh and Cincinnati, Chicago and Saint Louis and the Pennsylvania railroads, six miles northeast of Pittsburgh. It is in a coal-mining

region. The chief industrial establishments are foundries, blast furnaces, rolling mills, machine shops, bottle works, planing mills, hair, felt and lubricating oil works, wire and brick works. Other manufactures are oil cans, varnish and japan, chemicals, coal-mining tools and oil-well machinery. It has large coal yards and exports annually a large amount of coal and of steel and iron products. It 'has a high school, public and parish elementary schools and a public library. Pop. 8,921.

SHARPSBURG (Md.), Battle of. See

Antietam, Battle of.

SHARPSHOOTER, popular name in southern United States for any of several hemipterous insects which puncture the imma¬ ture cotton bolls, causing them to wilt or rot. Of these the Homalodisca coagulata is the most common. The Mexican boll-weevil is likewise known by the name in some parts of Texas.

SHARSWOOD, sharz'wud, George, Amer¬ ican jurist: b. Philadelphia, Pa., 7 July 1810; d. there, 28 May 1883. He was graduated at the University of Pennsylvania in 1828 and was admitted to the bar in 1831. He served in the State legislature in 1837-38 and in 1842-43, and in 1845 was appointed judge of the District Court of Philadelphia, becoming president of that court in 1848. In 1848 he was appointed to the bench of the Supreme Court of Pennsyl¬ vania, of which he was chief justice from 1878 until he retired in 1882. He ranked as one of the most eminent jurists in the State. He was professor of law at the University of Pennsyl¬ vania in 1850-67. He brought out editions of many English law textbooks, of which the most famous was (Sharswood's Blackstone's Com- mentaries> (1859). He was author of Profes¬ sional Ethics) (1854) ; Popular Lectures on Common Law) (1856) ; Pectures on Commer¬ cial Law) (1859), etc.

SHASTA, Mount, a peak of the Sierra Nevada range in Siskiyou County in California. It is of volcanic origin, about 14,350 feet above sea-level, and on its summit are three glaciers, one of which, Whitney, is three miles long. On the slope and near the base are large trees, some 300 feet high. The mountain is conical in form and has been a dormant volcano for a long period. Consult Muir, (The Mountains of Cali- fornia) (New York 1911).

SHASTA (shas'ta) INDIANS, probably from tsasdi, ˆthree,® referring to a triple-peak mountain. A group of small tribes forming the Sastean linguistic stock of American Indians, formerly occupying the territory drained by Klamath River and its tributaries from the western base of the Cascade range to the point where the Klamath flows through a ridge of hills east of Happy Camp, in northern Cali¬ fornia and extending over the Siskiyou Moun¬ tains in Oregon as far as the confluence of Stewart and Rogue Rivers. They consisted of two divisions, marked by slightly divergent dialects, one comprising the Iruwaitsu, Kam- matwa and Kikatsik; the other the Chimelakwc and Katiru. They have practically lost their native customs through contact with civilization, but they were a sedentary people, living in rectangular, semi-subterranean plank houses, and subsisting chiefly on salmon and other fish, acorns, roots and seeds. They made basket

caps (which the women wore), as well as small food baskets and a rude form of dug-out canoe. They rapidly succumbed to the encroachments of civilization, and while the tribes composing the stock were never populous, their total num¬ ber at present is about 1,500, most of whom are on the Siletz Reservation in Oregon. Mount Shasta derives its name from these Indians. Consult Dixon, R. B., (The Shasta) (in Ameri¬ can Museum of Natural History Bulletin, Vol. XVII, New York 1907).

SHATTUCK, shat'uk, Frederick Cheever,

American physician, brother of G. B. Shattuck (q.v.) : b. Boston, Mass., 1 Nov. 1847. He was graduated at Harvard University in 1868 and took his M.D. there in 1873. He engaged in practice in Boston in 1875, was connected with the faculty at Harvard from 1879, and from 1888 he was Jackson professor of clinical medi¬ cine there. He became professor emeritus in 1912, at the same time retiring from practice. He has been an overseer of Harvard since 1913 and is a retired lieutenant in the United States Army Medical Reserve Corps. Author of many papers in medical journals.

SHATTUCK, George Brune, American physician and editor : b. Boston, Mass., 18 Aug. 1844. He was graduated at Harvard in 1863 and took his M.D. there in 1869. He was en¬ gaged in practice in Boston in 1869-1911, when he retired. He edited the Boston Medical and Surgical Journal in 1881-1911. At the time of his retirement he was senior physician to the Boston City Hospital. He was an overseer of Harvard in 1890-1901 and in 1903-12.

SHATTUCK SCHOOL, The, a noted col¬ lege preparatory shod at Faribault, Minn., or¬ ganized in 1865 and controlled by the Protest¬ ant Episcopal Church. The corporate name of the Shattuck School and the Seabury Divinity School, which is also at Faribault, is the ((Bishop Seabury Mission.® The school has 19 instruc¬ tors and 250 students. The school course is divided into five forms of one year each, and the establishment is managed on the house sys¬ tem. Military drill is obligatory, and there is a cadet corps with four companies, and an artillery platoon with two detachments. The principal buildings connected with the school are the chapel, Shumway, Morgan, Smyser, Whipple and S. S. Johnson halls. The school was named in honor of one of its earliest bene¬ factors, Dr. George Shattuck, the founder of Saint Paul's School, Concord, N. H., and its head master from 1867 has been the Rev. James Dobbin. Since its organization the school has graduated over 2,000 students. Consult Adams, (Some Famous American Schools> (1903).

SHAUGHNESSY, sha'ne-si, Thomas George, 1st Baron of Montreal,

Canadian railway president : b. Milwaukee, Wis., 6 Oct. 1853. In 1868-82 he was connected with the Milwaukee and Saint Paul and the Chicago, Milwaukee and Saint Paul railroads, in which time he gained a mastery of railroad manage¬ ment. He became purchasing agent of the Canadian Pacific Railway in 1882, later was assistant general manager and is now presi¬ dent of the Canadian Pacific Railway and all its associated companies. He accomplished an important share in the development of Canada and his services were recognized by a knight-

hood in 1901, while in 1916 he was created Baron Shaughnessy of Montreal.

SHAW, sha, Albert, American editor and political economist : b. Shandon, Butler County, Ohio, 23 July 1857. He was graduated from Iowa College, Grinnell, Iowa, in 1879, took a post-graduate course in constitutional history and economic science there, and in 1881 began a Gourse in history and political science at Johns Hopkins, taking the degree of Ph.D. in 1884. In 1883-88 and again in 1889-90 he was on the editorial staff .of the Minneapolis Tribune, in 1888-89 he studied in Europe and in 1891 estab¬ lished the American Review of Reviews, which he has since edited. In 1884 he published (Icaria, a Chapter in the History of Com¬ munism, 5 which was translated into German. His other works include (Co-operation in the Northwest5 (1888) ; (Local Government in

Illinois5 (1883) ; (Municipal Government in Great Britain5 (1895), and (Municipal Govern¬ ment in Europe5 (1895). The last two men¬ tioned gave him a recognized standing as an au¬ thority on questions of municipal government, and he has since written many magazine arti¬ cles on economic, especially municipal, sub¬ jects. Other works are (The Business Career in its Public Relations5 (1905) ; (Political

Problems of American Development5 (1907) ; (The Outlook of the Average Man5 (1907); (Cartoon History of Roosevelt's Career5

(1910).

SHAW, Anna Howard, American woman suffrage leader, minister and physician: b. New- castle-on-Tyne, England, 14 Feb. 1847; d. Moy- lan, Pa., 2 July 1919. She came to the United States at the age of four, studied at Albion College, Michigan in 1872-75, was graduated at the Boston University .of Theology in 1878 and took her M.D. at Boston University in 1885. She was granted a local preacher's license by the district conference

of the Methodist Episcopal Church, and paid the expenses of her education by preaching and lecturing. She was pastor of the Methodist Episcopal Church at Hingham, Mass., in 1878, and at East Dennis in 1878-85. She was, however, refused ordina¬ tion by the New England Conference because of her sex, and the decision was confirmed by the General Conference at Cincinnati in 1880. She was ordained in the Protestant Methodist Church 12 Oct. 1880, the first woman ordained by that denomination. In 1885 she resigned her pulpit to lecture for the Massachusetts Woman Suffrage Association. She was national super¬ intendent of franchise for the Women's Chris¬ tian Temperance Union in 1886-92; and in her connection with the National American Woman Suffrage Association she was national lecturer in 1886-1904; vice-president-at-large in 1892- 1904; president in 1904-15; and thereafter was honorary president. To her courage, initiative, resourcefulness and sound reasoning may be credited much of the success of the woman suffrage movement, the constitutional amend¬ ment for which was passed by Congress shortly before her death. She was in her lifetime the recipient of world-wide honors, had spoken in every State in the Union, before most of the State legislatures, before the committees of both houses of Congress; as well as being the first woman to speak in Gustav Vasa Cathedral, the State Church of Sweden, and the first

ordained woman to preach at the universities of Copenhagen, Berlin, Christiania, London and Amsterdam. She was chairman of the Woman's Committee .of the Council of National Defense from 1917, and received the dis¬ tinguished service cross for her services in the European War.

SHAW, Byam, English artist: b. Madras, India, 13 Nov. 1872. In '1878 he went with his family to England, and received his art educa¬ tion at the Saint John's Wood School of Art and the Royal Academy Art Schools (1890-92). In 1892 he began work as an illustrator, and gradually attained success in this line, first painting (Rose Marie,5 being exhibited in 1893. His work was received with favor by art critics and became immediately popular as well. It is marked by individuality, fertility of imagination and brilliant coloring. His other pictures include (Silent Moon5 (1894) ; (Whither? 5 (1896) ; (Love's Baubles5 (1897) ;

SHAW, George Bernard, Irish dramatist and critic: b. Dublin, 26 July 1856. He went to London in 1876, engaged in socialistic agita¬ tion, and in 1884 became one of the founders of the Fabian Society. To the volume of (Fabian Essays in Socialism5 (1889) he contributed (The Basis of Socialism and (The Transition to Social Democracy.5 During 1886-94 he wrote musical and art criticisms f.or the World, Truth and the Star. In 1895-96 he con¬ tributed dramatic criticism to the Saturday Re¬ view, and arrested attention by the vigor and severity of his judgments. In 1892*

his first play, (Widower's Houses,5 was produced at the Independent Theatre, and was published as Volume I of the Independent Theatre series of plays. Between 1880 and 1883 he published several novels, such as

(The Music-Cure> (1914) ; (0'Flaherty, V. C.> ; (The Inca of Persalem) (1915) ; (Augustus does His Bit) (1910); heartbreak House) (1917). Other works include 'The Sanity of Art} (1895) ; 'The Common Sense of Munici¬ pal Trading > (1904); Socialism and Superior Brains) (1910) ; 'Common Sense about the War) (1914) ; besides numerous contributions to syndicate journalism. He is fearless, vigor¬ ous and witty, a master of irony, unhampered by the traditions either of the theatre or of literature, his style having that ephemeral bril¬ liance without permanent quality which pleases the passing popular fancy. As a dramatist he is resourceful in effective situations; but his plays appeal to a limited public. (See Candida; Man and Superman). Consult his preface, 'Mainly About Myself, > to Volume I of 'Plays Pleasant and Unpleasant* for statement of his point of view; Burton, R., 'Bernard Shaw; The Man and the Mask* (1916).

SHAW, Henry Wheeler, "Josh Billings,® American humorist: b. Lanesborough, Mass., 21 April 1818; d. Monterey, Cal., 14 Oct. 1885. He entered Hamilton College in 1832, but re¬ mained only one year. He then went to the West to pursue a number of occupations offered by the primitive frontier life, but re¬ turned to the East in 1858, and became an auctioneer at Poughkeepsie. He contributed humerous articles to a local paper under the signature of "Josh Billings,® but his writings failed to attract much attention until he em¬ ployed a style of phonetic spelling resembling his homely method of pronunciation. His first book, 'Sayings of "Josh Billings®) 1866, had an enormous success. For many years he con¬ tributed to the New York Weekly. His most successful literary venture was a travesty on the 'Old Farmer's Almanac, * published for many years by the Thomas family, "'Josh Billings Farmers' Allminax.® ; Over 200,000 copies were sold within two years of its ap¬ pearance in 1870. In 1863 he began to give public lectures, which consisted of detached bits of homely philosophy, usually pointing a moral. The delivery having an inimitable strain of drollery made him a great popular success. He published 'Every Boddy's Friend * (1876) ;

'J,osh Billings' Complete Works* (1876) ; 'Josh Billings' Trump Kards> (1877) ; 'Josh Bill¬ ings' Spice-Box) (1881). Consult the 'Life) by F. S. Smith (New York 1883).

SHAW, John, American naval officer : b. Mount Mellick, Queen's County, Ireland, 1773; d. Philadelphia, Pa., 17 Sept. 1823. After serv¬ ing on American merchant ships he commanded the schooner Enterprise of the United States navy, and in December 1799 started on an eight months' cruise, during which he engaged in five actions with the French, recapturing 11 Amer¬ ican prizes and taking five French privateers. In one hour's combat he forced the Flambeau, a French vessel of 100 men and 14 guns, to surrender after half of her men were killed or crippled, while the Enterprise had sustained a loss of but 10. Shaw was raised to the rank of captain; in 1811 he directed the defenses of New Orleans, La., and in 1813 commanded the naval force which recaptured Mobile, Ala. ; in 1814 while in charge of a squadron he was blockaded by the enemy in the Thames River between New London and Norwich, Conn., sub¬

sequently seeing other service both at home and abroad.

SHAW, John Balcom, American Presby¬ terian clergyman, educator and author; b. Bell- port, N. Y., 12 May 1860. He was graduated at Lafayette College in 1885, at the Union Theological Seminary in 1888 and was or¬ dained in that year. He held pastorates in New York, Chicago and Los Angeles in 1888- 1915, and has since been president of the Elmira College for Women. Author of 'Four Great Questions) (1898) ; 'The Difficult Life (1903) ; 'Vision and Service) (1907) ; 'The Angel in the Sun* (1914), etc.*

SHAW, John William, American Catholic archbishop: b. Mobile, Ala., 12 Dec. 1863. He was educated at the academy of the Brothers of the Sacred Heart, Mobile, at Saint Finian's Seminary, Navan, Ireland, the University of the Propaganda and the North American Col¬ lege, Rome. He was ordained to the Roman Catholic priesthood1 on 26 May 1888. In 1888-89 Father Shaw was assistant at the cathedral of Mobile; in 1889-91 assistant and missionary at Saint Peter's Church, Montgomery, Ala., and in 1891-1910 was rector of the cathedral at Mobile and chancellor of the diocese. On 7 Feb. 1910 he was appointed coadjutor bishop of San Antonio, Tex., succeeding to the see, 11 March 1911. On 25 Jan. 1918 he was appointed archbishop of New Orleans.

SHAW, Lemuel, American jurist: b. Barn¬ stable, Mass., 9 Jan. 1781 ; d. Boston, Mass., 30 March 1861. He was graduated at Harvard University in 1800 and became prominent in the practice of law in Boston. He sat in the Massa¬ chusetts house of representatives and senate, 1811-16 and in 1819, and in the State senate 1821-22 and 1828-29, and was a member of the State Constitutional Convention of 1820. As chief justice of the Massachusetts Supreme Court, 1830-60, he won a high reputation as a jurist. His publications include addresses and orations. He was a Fellow of the American Academy of Arts and Sciences ; a member of the

Massachusetts and New England Historical Societies and of various local clubs, and a trus¬ tee of the Boston Library and Humane socie¬ ties. He translated from the French the 'Civil and Military Transactions of Bonaparte. His judicial decisions comprise nearly 50 volumes.

SHAW, Leslie Mortier, American lawyer and politician: b. Morristown, Vt., 2 Nov. 1848. He was graduated from Cornell College, Mount Vernon, Iowa, in 1874, and from the Iowa Col¬ lege of Law in 1876; was admitted to the bar and established a law practice in Denison, Iowa. He was also prominent in local financial circles, and became president of the bank of Denison, and of the bank of Manilla, Iowa. He oc¬ casionally took part in the campaign work of the Republican party, but did not become promi¬ nent until the campaign of 1896, when his strong advocacy of the gold standard, his skil¬ ful handling of statistics and keen arguments in public speaking won him a wide reputation, and he was called upon to speak in many dif¬ ferent sections of the country. His effective work on the Republican side in the free silver campaign of 1896, speaking an average of five hours a day some weeks and as high as seven hours for several consecutive days, led to his

nomination and election the following year as governor of Iowa. He was re-elected two years later, doubling his plurality and multiplying his majority by four. He declined a third nomina¬ tion. In 1898 he was president of the Interna¬ tional Monetary Congress at Indianapolis. At the end of his second term as governor he be¬ came Secretary of the Treasury in President Roosevelt's Cabinet and held that position a little over five years — the longest term in that office since 1841. He resigned in 1902 and was engaged in banking in New York and Phila¬ delphia until 1913 when he retired. Since then he has lectured occasionally, and frequently en¬ gaged in joint debates on both economic and social questions. He has divided his residence between New York City and San Diego, Cal.

SHAW, Richard Norman, English archi¬ tect: b. Edinburgh, 7 May 1831; d. 1912. He was educated at Edinburgh where he practised as an architect, being chiefly engaged in the erection of dwelling-houses. He published (Sketches from the Continent (1858) ; and (with T. G. Jackson) Architecture, a Profes¬ sion or an Art) (1891). He was very success¬ ful in planning substantial houses of a plain yet elegant elevation, and to his brick structures of this sort he has imparted a certain dignity and charm which lends to them the personal stamp of good taste a host of followers have imitated, but rarely attained. In 1872 he was made associate, and in

1877 member, of the Royal Academy. He retired in 1901.

SHAW, Robert Gould, American soldier: b. Boston, Mass., 10 Oct. 1837 ; d. Fort Wagner, Charleston Harbor, S. C., 18 July 1863. He studied at Harvard, entered a New York count¬ ing-room, enlisted in the 7th New York regi¬ ment at the outbreak of the Civil War, and was promoted captain (1862). In 1863 he was made colonel of the 54th Massachusetts, the first negro regiment sent from the free States. The regiment left Boston for the front 28 May, acquitted itself satisfactorily in a skirmish on James' Island, near Charleston, S. C., 16 July, and on 18 July participated with distinction in the desperate attack on Fort Wagner (q.v.). Shaw was killed while leading his troops. The well-known Shaw memorial by Saint Gaudens was placed in 1897 on Boston Common. Bos¬ ton has also a bust of this brave officer by Edmonia Lewis. Consult Higginson, (Harvard Memorial Biographies5 (Vol. II, Boston 1866) ; and Teamoh, R. T., (Sketch of the Life and Death of R. G. Shaw5 (Boston 1904).

SHAW, Sir William Napier, English phys¬ icist : b. 4 March 1854. He was educated at Emmanuel College, Cambridge, and at the Uni¬ versity of Berlin, was elected Fellow of Emman¬ uel College 1877 and was senior tutor there 1890-99. From 1897 to 1905 he was a member of the Meteorological Council and in the latter year was made director of the Meteorological Office. He was knighted in 1915. He has pub¬ lished important papers on Electrolysis5 ; (The Pyrometer5 ; (Meteorology5 and with R. T. Glazebrook, (A Text-book of Practical Physics5 (1884) ; Air Currents and the Laws of Venti¬ lation5 (1907) ; (Forecasting Weather5 (1911), etc.

SHAW UNIVERSITY, an institution for the education of the colored race at Raleigh,

N. C. It was founded under the auspices of the American Baptist Home Mission Society pri¬ marily for the education of colored preachers for the Baptist ministry. Henry Martin Tupper, D.D., was appointed president, and organized the first classes in 1865, in a negro cabin on the outskirts of the city; in March 1866 was formed the first class for colored women, and thence¬ forth the school has been for both sexes. In 1870 the present campus, including a whole city block, was purchased for $15,000; the buildings were put up with brick made by the students. The university obtained a charter from the State legislature in 1875. The organization of the university includes the Normal, Collegiate Scientific and Industrial departments, the Theo¬ logical School, the Missionary Training School, the Leonard Schools of Medicine and Pharmacy and the Law School. The collegiate department includes a preparatory course of two years ; the regular college course is four years ; the de¬ grees of A.B. and B.S. are

conferred. Music is a part of the curriculum. The course in the medical school occupies four years ; the Leonard Medical Hospital is a part of the university. Industrial training and work has been a feature from the first; each student is required to do some kind of manual work, and training is given in carpentering, cabinet, bent iron and machine- shop work, mechanical drawing, architecture and blacksmithing, sewing, dressmaking, launder¬ ing and domestic science. There is also a sum¬ mer school and a night school (established 1899). The most important buildings include Estey Hall, Show Hall, the chapel, the medical dormitory, administration building, industrial building, laundry, Leonard Medical building, Hall of Pharmacy, hospital, Missionary Train¬ ing building. The valuation of all property is $167,000. The tuition fees are small, and the institution is supported partially by the Amer¬ ican Baptist Home Mission Society. The uni¬ versity occupies a leading place in the work of the education of the colored race, and has won the respect of the Southern people. It is unable to meet the demands made upon it, and is obliged to refuse admission to many students. The students in 1917 numbered 366, the faculty

27.

SHAWINIGAN FALLS, sha'in-i-gan, or SHAWENEGAN FALLS, Canada, town in Saint Maurice County, province of Quebec, on the Saint Maurice River, 70 miles northeast of Montreal, and on the Canadian Pacific and the Canadian Northern and Quebec railways. The falls nearby are 165 feet high and furnish abundant watej power for manufactures, which include paper, carbide and aluminum. The town has a college, convent and hospital. It was in¬ corporated in 1909. Pop. 4,265.

SHAWL, a cloth worn loosely over the shoulders, among civilized nations, chiefly by women, but in semi-civilized and barbarous peo¬ ples by both sexes. Shawls, on account of their simplicity, are ancient garments. They are men¬ tioned by very old writers and are thought to be alluded to in the Bible (Ezek. xxvii). The most ancient shawls, as well as the finest are made in Cashmere, where the manufacture has been carried on in the same method for centuries, even the patterns of the shawls changing but little. The material is a very fine yarn made from the under wool of the shawl-goat of Tibet.

The yarn, known as pashmina, which is in reality a fine thread, commands a high price in the market, from $9 to $12 a pound. The dyes used are permanent. The patterns of the shawls are produced by weaving, and by

em¬ broidery. Where the design is to be embroid¬ ered the ground of the shawl is of a plain pashmina fabric. Very primitive looms are em¬ ployed. Three or four men • sometimes work at one loom, and for some of the finer shawls a year's time is necessary. The more ordinary shawls are produced about five a year, to each loom. Sometimes these shawls are woven in separate portions, and afterward joined to¬ gether with great skill. Cashmere shawls sell as low as $70 or $80, but one of a first-class pattern and coloring will cost $1,200 to $1,500. Such a shawl will weigh about seven pounds and the texture will be very fine and close and the design intricate. About $150 will represent the cost of the materials used, $750 the labor expended and $600 the duty to be paid and other expenses. In the Punjab of India in¬ ferior shawls are manufactured at Nurpur, Amritsar and also in Kerman, Persia, the art having been carried over from Cashmere. The fine pashmina is mixed with the coarser goat's wool, called kaork. The finest shawls in Persia are also made of silk to resemble Cashmere shawls.

The production of shawls was until recent years a very important manufacture in France, and gave occupation to many in Paris, who not only furnished designs for those woven in their own country — chiefly at Paris, Lyons and Nimes — but also for shawl-manufacturers in England and Austria, and even for some woven in Cashmere. In 1867 it was estimated that the annual value of the French shawl trade amounted to nearly a million pounds sterling. At Paisley in Scotland, where for many years previous to 1860 the manufacture of shawls was of great importance, the trade originated in the beginning of the 19th century, and at its height occupied 8,000 looms. They were made of silk, wool or cotton, either separately or in combina¬ tion; but the best-known class of Paisley shawls was manufactured of fine wool imitating Cashmere designs. Soon after the middle of the century the manufacture began to decline and has now ceased. Tartan shawls, however, chiefly of small size, for indoor or occasional wear, are still made at several places in Scot¬ land.

SHAWNEE, sha-ne', Okla., the metropolis of Pottawatomie County, situated in the ((Heart of Oklahoma® on the north bank of the North Canadian River, on the Chicago, Rock Island and Pacific, the Atchison, Topeka and Sante Fe and the Missouri, Kansas and Texas railways. The city has an altitude of 1,006 feet. Shawnee is the centre of a fertile and productive agri¬ cultural section of large extent, producing a large diversification of crops. The business interests of the city are large and constantly growing. The industries include flour mills, cotton oil mill, cotton compress and gins, large garment factory, foundry and machine shops, cigar factories, mattress factories, whole¬ sale grocery houses and produce houses. The retail trade exceeds $3,000,000 annually and the city has a large jobbing business. The shops of the Rock Island and the Santa Fe

are lo¬

cated here and the Missouri, Kansas and Texas maintains a freight terminal. The factory and railroad employees number 1,500, and the annual payroll exceeds $3,000,000. Shawnee has five banks with combined resources of $6,204,254 and deposits of $4,737,780.75 on their March 1919 statements. The postal receipts for the past year were $61,384. The city has a modem school system with eight ward and one modern high school building. There are 3,732 pupils in public schools and the Baptist State Uni¬ versity and the Catholic University are located here with good enrolments. All religious de¬ nominations are represented with substantial buildings, there is a Carnegie public library and many acres of public parks. The city is under the charter form of government, electing a mayor, six councilmen and a city treasurer. All other officers are appointed by the mayor and confirmed by the council. The city has expended more than $800,000 for permanent municipal improvements, and is interested in the best and most modern civic developments. A complete sewer system ramifies the entire city. The government census in 1910 was 12,000 and the government census of 1920 gave 15,348 popu¬ lation.

SHAWNEE INDIANS (contracted from the Algonquian Shawanogi, ˆsoutherners®), an important tribe of the Algonquian stock of North American Indians, who, according to the best evidence, were originally an offshoot from the Lenape or Delawares, which migrated south¬ ward, hence their popular name. It is believed that they entered the present limits of the United States from the territory north of the Great Lakes via the lower peninsula of Mich¬ igan, various bands or divisions settling in southern Illinois, southern Ohio and (the larger part) on Cumberland River. A portion of the latter drifted southeastward to the headwaters of the Savannah, where they came in contact with the Cherokees and Catawbas, who forced them northward into Pennsylvania by 1707, while those remaining on Cumberland River were driven away by combined Cherokees and Chicka- saws. They were first mentioned under the name Ouchaouanag, in 1648, as living to the westward of Lake Huron ; later in the century they were found by La Salle in northern Illinois, while others were settled along the Ohio and the Cumberland, and indeed had extended into Maryland, Virginia and Pennsylvania, and even as far south as Mobile, Ala., in the country of the Creeks. They were at war with numerous tribes at various periods, as well as with the French, and later with the United States, from the beginning of the French and Indian War until about 1795, during which time they had concentrated north of the Ohio River. Anthony Wayne's victory, followed by the Treaty of Greenville in 1795, terminated the hostilities of the Indians of the Ohio Valley region, a con¬ siderable part of the Shawnees moving to Mis¬ souri, within Spanish territory, while a few years later others migrated to White River,

Ind., on invitation of the Delawares. Early in the 19th century, Tenskwatawa, the (

volvcd so many of the Western tribes beginning with 1890. The Prophet gathered many ad¬ herents from far and wide, who established themselves at the mouth of Tippecanoe River, Indiana. To overcome their hostile demonstra¬ tions, General Harrison in 1811 led an expedi¬ tion against them, resulting in the defeat of the Indians in the celebrated battle of Tippe¬ canoe and the destruction of their settlement, while the tragic death of Tecumseh, their recog¬ nized leader, in the following year, tended to break their hostile spirit. The Shawnees of Missouri sold their lands to the government in 1825 and were assigned to a reservation in Kansas, but meanwhile a large number of them had departed for Texas where they settled on the headwaters of Sabine River until driven out in 1850. In 1831 the Ohio Shawnees ceded their lands to the United States and joined their kindred in Kansas, and in 1845 a large part of these Kansas Shawnees moved to the Canadian River in Indian Territory, where they have since been officially known as Absentee Shaw¬ nees. In 1867 the mixed Shawnees and Senecas who had moved from Ohio to Kansas about 1831, also migrated to Indian Territory, where they became known as Eastern Shawnees, and in the meantime the rest of the tribe joined the Cherokees in Indian Territory, with whom they are now incorporated. The Shawnees known as Black Bob's band are those who at first re¬ fused to move from Kansas with the others. There are also Shawnees among the Tuscaroras in New York, and others are incorporated among the Teton Sioux, while in 1840 a num¬ ber of the tribe accompanied a party of trap¬ pers to the Tulare Valley of California.

The Shawnees were early described as of good stature, an active, sensible, cheerful peo¬ ple, full of laughter and drollery, courageous, high-spirited and manly, yet (

Bibliography. — Denny, E., (Military Jour¬ nal (1860) ; Drake, B., (Life of Tecumseh) (1855) ; Eggleston, E., (Tecumseh and the Shawnee Prophet* (New York 1878) ; Hodge, F. W., (Handbookof American Indians1* (Wash¬ ington 1907-10) ; Jones, D., (A Journal of Two Visits Made to Some Nations of Indians on the West Side of the River Ohio in the Years 1772 and 1773) (New York 1865) ; Mooney, J., (Ghost-dance Religion * (Washington 1896) ; Post, C. F., Two Journals of Western Tours) (1759); Thomson, C., (Causes of the Aliena¬*

tion of the Delaware and Shawnee Indians from British Interests> (Philadelphia 1759).

F. W. Hodge,

Museum of the American Indian, Heye Foun¬ dation, New York.

SHAYA ROOT, the root, or the plant it¬ self, of Oldenlandia umbellata, of the madder family, and sometimes called Indian madder. It is a slender branching annual, with narrow opposite leaves, and small flowers in panicles. It grows wild, and is also cultivated, on the Coromandel coast, the outer bark of its roots yielding the well-known durable red-dye seen in Indian cotton goods. The leaves have been used as an expectorant in native medicine.

SHAYS, shaz, Daniel, American soldier, leader of the <(Shays' Rebellion® in Massachu¬ setts : b. Hopkinton, Mass., 1747; d. Sparta, N. Y., 29 Sept. 1825. He is first heard of as an ensign at Bunker (Breed's) Hill, was made captain 1 Jan. 1777 and resigned from the serv¬ ice. There is testimony that he was a good soldier. The rebellion of 1786-87, in which he was the directing figure, arose from a spirit of unrest and lawlessness then generally on the increase in the country, but more particularly from special reasons for dissatisfaction in Massachusetts. Among these were the waste¬ fulness in the costs of litigation, the high sal¬ aries attached to public offices, and above all the exorbitant land taxation. The time was one of financial depression, and Governor Bow- doin in his endeavors to sustain the credit and diminish the debt of the State undoubtedly caused heavy burdens to fall upon poorer citi¬ zens inland. Sheriffs' and County Courts were kept busy. In the fall of 1786 five or six hundred malcontents, under command of Shays, gathered at Springfield, the purpose being to overawe the Supreme Court about to sit there and prevent the finding of indictments. After a three days' session the court adjourned. In November, when the Court of General Sessions attempted to sit at Worcester, Shays filled the courtroom with an armed force and no court could be held. Washington was deeply alarmed at the reports of these early successes of the insurgents. ((It was but the other day,® said he, (

proclaimed. Shays removed to Vermont, was pardoned and went thence to Sparta, N. Y., where he obtained a pension for his Revolu¬ tionary services. Consult McMaster, (History of the People of the United States (Vol. I, 1883) ; Minot, (History of the Insurrections in Massachusetts in*

1786 and the Rebellion Con¬ sequent Thereon) (Boston 1810) ; Holland, (History of Western Massachusetts) (Spring- field 1855) ; New England Magazine (new series, Vol. XXIII, No. 5, January 1901) ; (Reminiscences of Shays' Rebellion) ; Rivers, (Captain Shays. >

SHAYS' REBELLION. See Shays, Dan¬ iel.

SHE, a romance by Rider Haggard (1887), a young Englishman goes to Africa to avenge the death of an Egyptian ancestor, whose strange history has come down to him in an old manuscript. The ancestor, a priest of Isis, had been slain by an immortal white sorceress somewhere in Africa. The sorceress, ˆShe,® and the Englishman finally meet, recognize a mysterious bond between them and, at the climax of the story, visit a place where burns a mysterious fire which gives thousands of years of life, loveliness, strength and wisdom or else swift death. ((She® for the second time passes into the flame and is instantly con¬ sumed.

SHE-OAK, any one of the small trees or shrubs of the peculiar genus (Casuarina) of oaks, native to the East Indies and Australia. Although closely related to oaks and walnuts, the she-oak has no true leaves, substituting whorls of long drooping, slender deciduous branchlets and is said to resemble both Scotch firs and giant horsetails, in its wide-spreading top. It casts but little shadow. The branchlets are acidulous in taste and are liTced by cattle. A small and round fruit is called the she-oak apple and is of bitter taste and used to flavor beer. The wood of the she-oak is extremely hard, makes excellent fuel and is valuable for woodworking; in some species it is reddish, with light and dark streaks, and is called beef- wood. The Australians make boomerangs and other weapons out of its roots. Casuarina stricta is the species known as coast she-oak, or sometimes as he-oak; the forest or erect she-oak is C. suberosa and the desert one is C. glauca.

SHE STOOPS TO CONQUER. Though he was thoroughly a child of his time, it was Goldsmith's peculiar genius that he went to life for his influences rather than to books. The central feature of (She Stoops to Conquer has some resemblances with Farquhar's (The Beaux' Stratagem,* but its veritable source was undoubtedly an episode in the youthful career of Oliver himself.*

*If in the theatre Goldsmith seems to have been more of a reformer than elsewhere the reason is not far to seek. The. refinements of that sentimental comedy which in his day con¬ trolled the stage were repugnant to him as an instinctive artist. Before his playwriting days Goldsmith had ridiculed ((genteel comedy® and in the How® passages of (The Good-Natured Man> had resolutely entered the lists against, it. (She Stoops to Conquer**

is the author's sec¬ ond and more successful play. Less artificial

than the comedy of manners, to which general class it belongs, it has more of Fielding in it than of Congreve. No one but Goldsmith could have given such a view of a country house. And even the London characters are freshly viewed. Their city manners are crossed with the forthrightness of nature. Raillery and repartee dwindle in importance before char¬ acter and atmosphere. The difference between Goldsmith and Sheridan was that the former knew life whereas the latter knew only the stage. Squire Hardcastle is drawn without a stroke of over-elaboration. Less sportive than Tony he digs as deeply into the memory; but Tony and his mother linger as something more than caricatures. Kate Hardcastle is as much a product of observation as Millamant of (The Way of the World) is a product of thought and Maria of (The School for Scandal is a prod¬ uct of the stage. It is the veritableness of the atmosphere of the play that saves it from, what the plot would make it, sheer farce. Goldsmith was not fortunate in his relation¬ ships with Colman and Garrick, the two mo¬ nopolists of the theatre of his day. Yet upon its performance by Colman at Covent Garden Theatre, 15 March 1773, (She Stoops to Con¬ querˆ ˆsucceeded prodigiously® (Walpole). It holds the stage in frequent revivals to this day. Editions: Masson, D., Globe edition (1869) ; Dobson, A., ed., Belles Lettres Series (1905) ; Temple Dramatists (1900) ; Everyman's Li¬ brary (Vol. 415). Consult Forster, (Life and Adventures of Oliver Gˆdsmith* (1848) ; Dob¬ son, A., (Memoir * (1899) ; (Cambridge His¬ tory of English Literature.)*

Thomas H. Dickinson.

SHEA, sha, John Dawson Gilmary, Amer¬ ican historian: b. New York, 22 July 1824; d. Elizabeth, N. J., 22 Feb. 1892. His father was principal of the Columbia College Grammar School where he gained his education, and subsequently he studied law and was admitted to the bar in 1846. He soon turned to litera¬ ture, was connected in an editorial capacity with Frank Leslie's publishing house and later edited the Catholic News. But for many years his attention was given to historical research in preparation of his (History of the Catholic Church in the United States, the fourth volume of which was in process of publication at the time of his death. He was connected with many historical societies in America and Europe and was the first president of the Catholic Histori¬ cal Society of the United States. His published works include (The Discovery and Exploration cf the Mississippi Valley> (1853) ; (History of the French and Spanish Missions among the Indian Tribes of the United States) (1854) ; (The Catholic Church in Colonial Days) (1883) ; (The Hierarchy of the Catholic Church in the United States) (1886) ; (Early Voyages Up and Down the Mississippi (1862) ; (Novum Belgium, An Account of the New Netherlands in*

1643-44) (1862) ; (The Operations of the French Fleet under Count de Grasse) (1864) ;

SHEAFFE, shef, Sir Roger Hale, Cana¬ dian general and administrator : b. Boston, Mass., 15 July 1763; d. Edinburgh, Scotland, 17 July 1851. He was appointed ensign in the

British army in 1778 and was promoted lieu¬ tenant in 1780. He served in Ireland in 1 781— 87 and in Canada in 1787-97, attaining rank of lieutenant-colonel in 1789. He was on duty in Holland in 1789 and accompanied the expedi¬ tion to the Baltic in 1801. He returned to duty in Canada in 1802, reached the rank of major- general in 1811 and was on leave for a year. He was again on active duty in 1812-13, and on 13 Oct. 1812 he recaptured Queenstown from the United States troops. He retained com¬ mand of the British forces and administered the government of Upper Canada until 1813. He was knighted in 1813, and in 1838 he was nominated general.

SHEAR, Cornelius Lott, American plant pathologist: b. Coeymans Hollow, N. Y., 26 March 1865. He was graduated at the New York State Normal School at Albany in 1888, at the University of Nebraska in 1897, and took his Ph.D. at George Washington Uni¬ versity in 1906, studying also at the universi¬ ties of Munich, Berlin, Leyden and London. From 1895 he was connected with the United States Department of Agriculture where since 1902 he has been plant pathologist. He was editor of the Asa Gray Bulletin in 1898-1900; associate editor of the Plant World in 1900-05, and since 1911 has edited Phytopathology.

SHEARD, sherd, Charles, Canadian physi¬ cian: b. Toronto, Ontario, 15 Feb. 1857. He was educated at the Upper Canada College and at Toronto University, and subsequently practised at Toronto. .He was medical health officer of Toronto in 1893-1910; chairman of the provincial board of health in 1909, and in 1902 he was president of the Canadian Medi¬ cal Association.

SHEARD, sherd, T. F. M., English painter: b. Oxford, 16 Dec. 1866. After his graduation in 1889 he went to Paris and studied painting under Courtois, Rixens, Lefebre and Rigolot. He has since then exhibited at the Salon, Royal Academy and the Royal Insti¬ tute of Water Color Painters. He was awarded a bronze medal at the Paris Exhibi¬ tion of 1900. Since

1915 he has been professor of art at Queen's College, London. He is fond of Eastern subjects, and scenery flooded with sunlight, and among his paintings of this char¬ acter are (A Market Morning in a City of the Sahara) ; (An Arab Blacksmith* ; (An Arab Fete* ; (Desert Tribesmen Returning from a Raid,* etc. Among* his scenes of English peasant life may be mentioned (Birds of a Feather) ; (The Outcast* ; Parted5 ; (The Price of Victory) ; (Hull Docks* ; (End of the Day* ; etc.

SHEARMAN, sher'man, Thomas Gaskell,

American lawyer: b. Birmingham, England, 25 Nov. 1834; d. Brooklyn, 29 Sept. 1900. At nine he came to America with his parents and in 1857 took up his residence in Brooklyn. He was ad¬ mitted to the bar in 1859, and in 1868 formed a partnership with David Dudley Field. Later John W. Stirling entered the firm which was continued after 1873 by Shearman and Stirling. This firm defended Jay Gould in suits resulting from the gold panic of 1869, and Henry Ward Beecher in the suit brought against him by Theodore Tilton. Shearman was an advocate of absolute free trade and a vigorous propagandist of Henry George's single tax theories. From

early years he contributed to legal literature and was joint author of (Tillinghast and Shearman's Practice, Pleadings and Forms) (1861-65) and (Shearman and Redfield on Negligence) (1869). He prepared for the commissioners of the New York code the (Book of Forms) (1861) and the major part of the Civil Code relating to ob¬ ligations (1865). He also published (Talks on Free Trade) (1881) ; (Pauper Labor of Eu- rope) (1885) ; distribution of WealtfP (1887) ; (Owners of the United States) (1889) ; (The Coming Billionaire) (1890) ; (Crooked Taxa¬ tion (1891) ; (Taxation of Personal Property) (1895); (Natural Taxation (1895; 3d ed.,

1898).

SHEARS. See Cutlery; Hardware In¬ dustry in America.

SHEARWATER, a sea-bird which skims close to the surface of the water in search of fishes and floating animal matter upon which it feeds. The shearwaters are larger than the pet¬ rels and differ from both them and the fulmars in their long, slender bills, both mandibles of which are hooked at the end, and by the short broad nostril-tubes. The wings are long and narrow and the tail rounded or wedge-shaped, never forked. In habits they generally resem¬ ble the petrels (q.v.). Ten species are recorded as occurring on the North American coast, the best known being the common shearwater (Puf¬ fin major) and the sooty shearwater (P. strick- landij. Sailors call these birds ˆmutton-birds,® because of the excessive fatness of the young which are good eating and the search for which has nearly

exterminated the once common Brit¬ ish species (P . brevicaudus) . Consult Newton, dictionary of Birds1 (New York 1896).*

SHEATH-BILL, a family of limicoline

birds (Chionididce) belonging to the order re¬ lated to the plovers. The wings are long and pointed, the tail being of moderate size. The bill is short and stout, compressed, strongly arched at its tip and provided at the base with a horny sheath which protects the nostrils. The tarsi are short and stout. The white sheath-bill or kelp-pigeon (Chionis alba) is the best-known species. It inhabits the shores of the islands off the southern end of South America. Its color is pure white, the legs reddish-black and its average length 15 inches. These birds feed on mollusks, carrion, fishes, Crustacea, sea¬ weeds and other food which they can pick up on the seashores. On land they much resemble pigeons, but when flying in flocks at sea are gull-like in aspect. Cook in his (Third Voyage) says its flesh is equal to duck, but other ac¬ counts represent the flesh as very unpalatable, probably on account of the bird's food. An¬ other species was made known in 1842 by Dr. Hartlaub, one smaller than the Chionis alba, with similar plumage, but having the bill and bare skin of the face black and the legs much darker. The sealers of Kerguelen Land call it the sore-eyed pigeon, from its prominent fleshy orbit.

SHEBA, she'ba, or SABA', Arabia, the ancient capital of Arabia Felix. Its site has not been determined, but it was a great commercial centre of the Semitic tribes. The Sabaeans car¬ ried on an extensive trade with India, Europe, Egypt and Syria, in frankincense, gold, ivory, ebony, fine textiles and sweet spices, and for

this purpose had depots in northern Arabia and Ethiopia. 4 heir wealth became famous in the Orient and their queen paid a visit to Solomon with rich gifts, as cited in the Scriptures. They worshipped natural objects, especially the sun and moon. In the 8th century they were sub¬ ject to the Assyrians; in 24 b.c. the Romans sent an unsuccessful expedition into their terri¬ tory and in the 2d, 4th and 6th centuries they became subject to the Ethiopians. Consult Glaser, (Geschichte und Geographic Arabiens) (Berlin 1890) and Gunkel, ˆGenesis (3d ed., Gottingen 1910).*

SHEBOYGAN, she-boi'gan, Wis., city, county-seat of Sheboygan County, situated on Lake Michigan at the mouth of the Sheboygan River and on the Chicago and Northwestern Railroad, 52 miles north of Milwaukee. It has a

good harbor and steamer connection with all the principal lake ports ; a regular line of freight and passenger steamers ply between the city and the other ports on the west shore of Lake Michigan all the year. An interurban electric line connects the city with Milwaukee and the City Electric operates an interurban line to Plymouth and Elkhart. The first settlement was made in 1836. The place was incorporated as a village in 1846 and in 1853 was chartered as a city. Sheboygan is the industrial and com¬ mercial centre for a large and fertile agricul¬ tural region. The chief industrial establish¬ ments are seven chair factories, 12 furniture factories, one piano factory, two toy factories, two tanneries, three shoe factories, three enameled-ware works, three carriage factories, one auto-truck factory, foundries and ma¬ chine shops, lime-kilns and brick manufac¬ tories, boiler shops, storage warehouse for cheese, etc. The number of industrial estab¬ lishments is 132; number of persons engaged in manufactures, 8,056; primary horse power, 13,785; capital invested, $21,481,000; services, $4,358,000; salaries $988,000; value of products, $17,509,000. There are four State banks with a total capitalization of about $950,000 and over $7,000,000 in deposits. The principal public buildings are a government building, county courthouse, city hall and other municipal build¬ ings, churches and schools. There are six pub¬ lic parks; in one of them is an artesian well, the waters of which contain considerable min¬ eral salts. There are 29 churches and an asylum for the chronic insane, a city almshouse, a home for the friendless, a sanitarium and a hospital. The educational institutions are a day school for the deaf, a high school, an in¬ dustrial school, public and parish elementary schools and a public school library containing about 5,000 volumes and a public library which in 1915 contained 15,079 bound volumes. Pop.

(1920) 30,995.

SHECHINAH. See Shekinah.

S H E D D , shed, William Greenough Thayer, American theologian : b. Acton, Mass., 21 June 1820; d. New York, 17 Nov. 1894. He was graduated from the University of Vermont in 1839, from Andover Theological Seminary in 1843 and in 1844ˆ5 was pastor of the Congre¬ gational church in Brandon; Vt. He was pro¬ fessor of English literature in the University of Vermont in 1845-52, of sacred rhetoric and pas¬ toral theology at Auburn Theological Seminary in 1852-53 and of ecclesiastical history and lec¬

turer on pastoral theology at Andover in 1853— 62. He acted as assistant pastor at the Brick (Presbyterian) Church, New York, in 1862-63. was appointed to the chair of Biblical literature at Union Theological Seminary, New York, in 1863, and in 1874 was transferred to that of systematic

theology,, which he occupied until 1890. His publications include (The Method and Influence of Theological Studies) (1845) ; (The True Nature of the Beautiful and its In¬ fluence upon Culture) (1851) ; (The Nature and Importance of Natural Rhetoric) (1851) ; lec¬ tures on the Philosophy of History) (1856); (A History of Christian Doctrine) (1863) ; (Homilectics and Pastoral Theology) (1867) ; (Sermons to the Natural Man) (1871) ; theo¬ logical Essays (1877) ; (Literary Essays) (1878) ; Commentary on St. Paul's Epistle to the Romans* (1879) ; (Sermons to the Spir¬ itual Man> (1884) ; (Doctrine of Endless Pun¬ ishment (1885) ; (Dogmatic Theology) (1889— 94) ; the Proposed Revision of the Westmin¬ ster Standards* (1890), etc. He also published (Eloquence a Virtue, or Outlines of a Syste¬ matic Rhetoric) (1850), a translation from the German of Dr. Francis Theremin; (A Manual of Church History) in two volumes, translated from the German of Heinrich Ernst Ferdinand Guericke (1857) ; edited seven volumes of Cole¬ ridge's works, with Untroductory Essays) (1853) ; the Confession of Saint Augustine,* with introductory essay (1860) ; and wrote in¬ troductions to Asbury's translation of Acker¬ man's the Christian Element in Plato and the Platonic Philosophy> (1860) and to McCosh's Untuition of the Mind* (1864).*

SHEE, she, Sir Martin Archer, English painter: b. Dublin, 23 Dec. 1770; d. Brighton, England, 13 Aug. 1850. He was introduced in 1788 to Sir Joshua Reynolds by Edmund Burke, and in the same year became a pupil in the Royal Academy, to the exhibition of which he contributed his first picture in 1789. Although by no means the best portrait painter of his time, he was, with one or two exceptions, the most fashionable. In 1800 he was chosen a member of the Royal Academy, and in 1830, on the death of Sir Thomas Lawrence, he was elected presi¬ dent and knighted. He also aspired to literary distinction and in 1805 and 1809 published two parts of a poem entitled (Rhymes on Art, in 1814 (The Commemoration of Sir Joshua Rey¬ nolds, and other Poems,* which called forth the raise of Byron, in his (English Bards and cotch Reviewers* :*

"And here let Shee and genius find a place.

Whose pen and pencil yield an equal grace;

While honors, doubly merited, attend The poet's rival, but the painter's friend."

Among his portraits are those of William IV and Queen Victoria ; all his work is pleasing, but there is an unpleasant tendency to unnatural redness in his flesh tints. -The National Por¬ trait Gallery contains numerous examples of his works.

SHEEDY, Rev. Morgan M., author, lec¬ turer, priest: b. Liscarroll, County Cork, Ire¬ land, 8 Oct. 1853. He was the son of Michael and Mary (Madden) Sheedy; on maternal side, member of a family which has given many priests and distinguished writers to the world. He was educated at Saint Colman's College, Fermoy, and at the College of Maynooth ; re¬ ceived degree of LL.D from Notre Dame Uni-

versity, Indiana, and Mount Saint Mary's, Mary¬ land. Ordained in the Pittsburgh Cathedral by the late Bishop Tuigg, 23 Sept. 1876; assigned as professor of theology and history at Saint Michael's Seminary, where he continued until the institution was closed. First president of the Catholic Summer School of America and di¬ rector of the Reading Circle Union ; vice-presi¬ dent of the Catholic Total Abstinence Union for four years. Founder of the Pittsburgh Polytechnic Society, He lectured for the Acad¬ emy of Science at the Champlain Summer School and the first session of the Catholic Win¬ ter School in New Orleans. At present per¬ manent rector of Saint John's Church, Altoona, Pa. Editor of The Quarterly and a frequent contributor to the Catholic press and magazines, the Catholic World , The American Ecclesiasti¬ cal Review, etc. Author of (Briefs for Our Times' ; (Social Problems) (dealing with the labor question) ; (Christian Unity, ' etc.

SHEEHAN, she'an, Patrick Augustine,

Irish Roman Catholic canon and novelist : b. Mallow, County Cork, 17 March 1852; d. 6 Oct. 1913. He was educated at Maynooth College and was ordained in 1875. He held various cu¬ racies until 1895 when he became parish priest of Doneraile, and in 1903 he became also canon of Cloyne. He was known as a writer of es¬ says, poems and novels, all of which are char¬ acterized by an intimate knowledge of Irish life and permeated with a strong Roman Cath¬ olic bias. Author of (Under the Cedars and Stars) (1903) ; (The Triumph of Failure' (1899) ; (My New Curate' (1900) ; (Early Es¬ says and Lectures' (1906) ; (The Blindness of the Rev. Dr. Gray' (1909) ; (The Queen's Fil¬ let' (1911) ; (Graves at Kilamorna' (1915), etc.

SHEEP. The sheep (genus Ovis) belongs to the family of ruminants termed Bovidae, of which the ox (Bos) is a typical representative. Other animals such as the goat, musk-oxen, chamois and antelope belong to the same family but the sheep represents a distinct genus for which the name Ovis has been adopted, and, as a species, the domesticated sheep has been given

the name Ovis aries.

Sex and Age Names. — The male sheep is known as a ram or buck. The term buck, how¬ ever, is not regarded as good usage, but it is al¬ most universally applied to male sheep in the western part of the United States. The female sheep is known as a ezve and the unsexed male as a wether. From birth until the age of 12 months is attained the young of sheep are called lambs; from 12 to 24 months of age they are called yearlings ; from 24 to 36 months, two- year olds, et cetera.

How to Determine the Age of Sheep. —

Until sheep become four years old their age can be approximated by their teeth. The temporary or lamb teeth, 20 in number, are small ; the permanent teeth, of which there are 32, are broader and longer. As a rule the two tempo¬ rary teeth in the middle of the front part of the lower jaw are replaced by permanent teeth when the animal is about 12 months old and two more appear each year until at four years of age all of the front teeth are permanent, making what is called a full mouth. Therefore, a sheep showing two broad teeth in front is called a yearling; one showing four broad teeth, a two- year old; one showing six such teeth, a three-

year old. Beyond the fourth year it is not pos¬ sible to approximate age except in a very gen¬ eral way, but the teeth of a very old sheep are likely to be spread apart, missing or they may be worn down short. Other indications of ad¬ vanced age are a sunken appearance over the eyes, comparatively short wool that is more or less uneven in length and a tendency toward emaciation.

Habits. — Sheep are ruminants and while they are fond of concentrated feeds they must have bulky feeds such as grass and hay. They eat all of the grasses except the very coarsest varieties and they are very fond of the culti¬ vated leguminous plants. They eat most of the weeds common to the farms and ranges of the United States and they will feed on young tree-growth more than any other domestic animal in America except goats.

Sheep like an extensive range and compara¬ tively short herbage. Because of their mobile lips and sharp incisor teeth they are structurally adapted to feeding on short grass. They enjoy changing from old to new pastures and they delight in feeding on the high places more than they do on the low places in their pastures. Sheep are able to exist without water longer than most domestic animals, but nevertheless they should have free access to it. Even in cold weather they will drink from two to four quarts daily. They prefer running water to still water.

In seeking a bedding-place sheep prefer rela¬ tively high ground where there is good air and water drainage. It is only in the severest peri¬ ods of storm that they abandon such a place for a lower, wind-protected location. Young sheep seek high places more readily than do older ones ; yearlings will feed high up on a hillside more readily than old ewes.

Breeding Habits. — Most domesticated breeds produce offspring but once a year. In the United States the mating is in the autumn, because it is at this time that the nights turn cool and this seems to have a marked influence in causing the ewes to come in heat (oestrus). The normal gestation period for ewes is about 146 days. Ewes commonly give birth to one or to two lambs. Occasionally triplets are born and in rare instances four or more. But since the female sheep has only two teats, breeders do not desire more than two lambs to each ewe.

Gregariousness. — All sheep possess the flocking instinct, but it is more pronounced in some breeds than in others. This instinct is of great importance in regions where sheep are herded on rough unfenced range, and a breed of sheep must be kept that possesses it in the most marked degree. When a sheep is sepa¬ rated from the flock it is an indication that it is either lost, ill or injured.

Closely associated with the gregarious in¬ stinct is the instinct to follow a leader. < (Where one sheep goes all others will follow" is liter- aly true even though it involves a long leap or a plunge into the water.

No other domestic animal is so timid and so unable to defend itself as the sheep. On this account it is a subject of prey for such ani¬ mals as the wolf, coyote, dog, bobcat and mountain lion. In all countries where sheep are kept there are predatory animals of the canine and feline groups that harass sheepmen by the attacks they make upon their flocks.

Types. — Sheep were probably first domesti

cated on the high, treeless plateaus and moun¬ tains of Turkestan, Asia, but they have been adapted to all sorts of climatic conditions and to all types of soil. Under the influence of not only soil and climatic conditions but of eco¬ nomic and social conditions as well, different types of sheep have been developed. At the present time most of the improved sheep may be roughly grouped under two types ; one known as the fine wool type, the other as the mutton type. As these type names infer, there are sheep that have been developed primarily for their wool and others primarily for their

mut¬ ton. In certain restricted areas of the world, notably in Europe and Asia, emphasis has been placed on the dairy qualities of sheep and in Asia there are types whose value depends chiefly upon the fur-like nature of their hairy cover¬ ing, the lambskins of which yield what are known as the Persian, Astrakan, Broadtail and Krimmer furs.

The wool type of sheep was developed in Spain and it is known the world over as the Merino. For a long time Spain denied these sheep to the remainder of the world, but at the close of the Napoleonic wars she was no longer able to retain her monopoly on them and they were rapidly distributed in other coun¬ tries. Before this time, however, the king of Spain gave permission for some of these sheep to be sent to a few other European countries and Saxony in Germany had demonstrated that they could be successively raised outside of their native home. Consequently there was great demand for them when they became avail¬ able to all countries. Germany, the United States and Australia specialized in them and made them better than they had been at home.

In the United States, the Merino was first called the Spanish Merino. But various strains that had been kept separate and distinct in the native home were mingled in America. This together with different ideals in breeding soon resulted in a modified type which was first called the Vermont Merino and later the Ameri¬ can Merino.

American Merino breeders aimed at great weight and fineness of fleece. In order to get weight, large wrinkles and folds were developed in the skin. A maximum density of wool fibres on the surface of the skin was sought after; an attempt was made to grow wool on all parts of the body and on the face and legs as well and the greatest amount possible of yolk (a combination of the perspiratory and fatty secre¬ tions from the skin) was secured. Very little attention was given to mutton properties.

This kind of sheep satisfied earlier condi¬ tions in the United States because wool was almost the sole product from flocks in regions west of the Alleghany Mountains. There was no object in producing mutton, for transporta¬ tion facilities were undeveloped. If they had been developed the population of the country was too small to justify a large production of mutton and facilities for exportation were in¬ adequate. This situation, together with the fact that no other sheep has the gregarious instinct so intensely developed and hence is not as suitable as the Merino on expansive, un¬ fenced ranges, explains why the Merino has always been the popular sheep in new countries and why they were adopted not only by the VOL. 24 — 43

United States, but also by New Zealand, ■ Australia, the Argentine and South Africa.

But as demand for mutton increased in the United States because of the increase in popu¬ lation and as transportation developed so that this demand could be met, changes became necessary in Merino breeding. There was also a change in the style of cloth which demanded the production of longer wool — a wool at least two and one-half inches in length so that it could be spun into worsteds. As a result strains were developed that grew longer wool and produced more meat.

At present there are three types of Ameri¬ can Merinos known as the A, B and C types. The A type is extreme in skin folds and wrinkles, density of fleece and yolk in the wool. It is what might be called an ultra wool type. The C type or Delaine is almost free from folds and wrinkles, and its wool is not so dense, has less yolk and is longer than that of the A type. It is wider, thicker and heavier and altogether much more suitable for mutton than the A type. In practically all respects, the B type is intermediate

between the A and C types. Most Merino rams have horns, but the ewes are hornless. Rams weigh from 130 pounds to 200 pounds and their weight of fleece in the grease (i.e., weight just as it comes from the sheep) ranges from 25 pounds or more in the A type to 15 pounds or more in the C type. Ewes weigh from 90 to 150 pounds and they shear from 15 pounds up in the A type to 10 pounds up in the C type.

Australian Merinos differ from American Merinos mainly in the nature of their wool. The Australian breeders have bred for long, fine wool and not for excessive yolk as have the American breeders, who have specialized in the A and B types.

In 1786 the French government began grow¬ ing Merinos, having for its object a combina¬ tion of mutton and wool. A number of years later some of these sheep were taken to Ger¬ many. In both countries a large, thick sheep was developed. Importations were brought to the United States as early as 1840 but they did not attain popularity until toward the close of the century. They are now known as the Ram- bouillet, and in the United States they out¬ number all other Merinos combined. Rams weigh from 225 to 250 pounds; ewes from 140 to 170 pounds. Rams yield from 15 to 25 pounds of grease wool; ewes from 10 to 18 pounds.

The Mutton Type. — England is the native home of the mutton type of sheep. This type was intensely developed by Robert Bakewell who began his work about 1760. Prior to his time there were two general types of sheep in England. One of these was a large, coarse sheep that grew long, coarse wool and yielded a fleece weighing from 7 to 12 pounds. These sheep were kept principally on the low fertile lands of Lincoln, Leicester and on the hills of Gloucester. It was with these sheep that Bake¬ well accomplished his work and he founded the breed known as the English Leicester.

The other type common to England was much smaller, better able to travel, and was suited to the hills and lighter soils. It produced short, rather fine wool and yielded fleeces weighing from two to five pounds.

Following Bakewell, there was a great era of mutton improvement brought about by care¬ ful selection in some cases, by crossing and selection in oihers. From the lowland sheep the Longwool mutton breeds have been de¬ veloped, namely, the Leicester, Cotswold, Lin¬ coln, Romney Marsh and others.

All of the long wool breeds strongly re¬ semble each other ; they are large,

up-standing sheep with white faces and legs. Their wool is coarse and long, ranging from 8 inches in Leicesters to more than 12 in Lincolns.

From the smaller, lighter shearing type, the medium wool mutton breeds have come. In this group the most prominent in America are the Down breeds such as the Southdown, Shrop¬ shire, Hampshire, Suffolk and Oxford Down. The Oxford Down, however, is a cross be¬ tween the Hampshire, a medium wooled breed, and the Cotswold, a long wooled sheep. The Down breeds have dark faces and legs — the darkest being the very deep brown of the Hampshire and Suffolk, and the lightest, the light grayish brown of the Southdown. The Southdown is regarded as the best improved breed in mutton qualities, but in this respect it is closely approached by the other Down breeds. Of the Down breeds, the Southdown has the shortest, lightest fleece, while the Oxford Down has the longest fleece.

There are numerous other medium wool breeds, the most prominent in the United States being the Dorset Horn and Cheviot, which differ from the Down breeds in that they have white faces and legs. Both the males and females have horns in the Dorset Horn breed.

Approximate Body and Fleece Weights of the Mutton Breeds Prominent in the United States.

BREED

Body weight

Weight

of fleece,

Longwools

Rams

Ewes

pounds

Leicester .

.... 250

185

12

Cotswold .

.... 300

200

14

Lincoln .

. . . . 325

225

15

Romney Marsh .

.... 275

200

12

Medium wools

Southdown .

.... 185

145

7

Shropshire .

.... 225

170

9

Suffolk .

.... 250

180

8

Hampshire .

. . . . 275

200

9

Oxford Down .

.... 285

200

11

Dorset Horn .

. . . . 275

190

7

Cheviot .

.... 175

140

7

When refrigeration and transportation de¬ veloped to the point where it was possible to ship sheep or their carcasses from outlying points to the centres of dense population there arose a demand for the mutton breeds in all countries where improved flock husbandry is practised. In some regions the mutton breeds have replaced the Merinos, but in many others where some Merino blood is indispensable, they have been crossed with the Merino to effect mutton improvement. Breeders in New Zea¬ land by crossing the Longwool breeds on the Merino secure a blend that represented what was needed. Then they bred the cross-bred animals together and thereby in time fixed a new type which is known as the Corriedale. Some of these sheep have been imported to the United States, and crosses between the Long- wools and Rambouillets are being made in this

country with a view to producing a desirable type of sheep for the intermountain region.

Types of Sheep Raising. — There are two general types of sheep raising. One involves keeping relatively large numbers on an ex¬ tensive range ; the other in keeping compara¬ tively small flocks on farms where diversified agriculture is practised.

The first, generally known as the range method, is followed in the intermountain regions of the United States and Canada, in South America, South Africa, Australia, New Zea¬ land and parts of Asia. Under this method in the United States the sheep are kept in the care of a herder on unenclosed land in bands con¬ taining from 1,500 to 3,000 head. The herder requires the whole or part time assistance of a camp tender, whose duty it is to get provisions, and move camp after selecting a new site where there is sufficient pasture ; he also assists in cooking, and in counting the sheep. In winter the sheep are kept on the semi-arid plains; in spring and fall in the foot-hills, and in the summer in the national forests on the moun¬ tains. It is now customary to supplement the feed on the plains with grain and hay during severe periods in winter. All of the hay and some of the grain are grown on dry farms and irrigated land in the West. The remainder of the grain is shipped in from the Middle West and South. Australia and New Zealand have modified the range method by fencing in vast areas of land. As a result the sheep do not require a herder; they can feed according to their own inclination and hence thrive better than do sheep under a herder's care.

The keeping of small flocks on farms, known as the farm flock method, is practised in the central and eastern parts of the United States, eastern Canada, Great Britain and various other European countries. Flocks vary in size from a few head up to several hundred. As a rule farm flocks share their pastures with other classes of livestock, but in England they are often fed on quick-growing forages between hurdles. This constitutes an intensive method of handling and results in rapid growth, high finish and altogether a very superior mutton product.

Farm flocks are usually kept in regions where the climate is variable and hence special provision has to be made for feeding in winter and for sheltering in rainy and cold weather. Stored grain and roughages must be provided for. Of the grains, oats, corn, kaffir, barley and speltz are all suitable, but every¬ thing considered, oats are regarded the best for all but fattening sheep. The legume hays such as clover, alfalfa and soy beans are the best roughages, but good use can be made of corn silage and corn stover. In fact corn silage sup¬ plements splendidly with the legume hays. Some use can be made of oat and wheat straw as roughages, but they

should be used in connec¬ tion with the legume hays.

In northern United States, Canada and Great Britain, roots, such as Swedish turnips and Mangel wurtzels, are extensively used as feed for sheep. Being succulent they are valu¬ able as a supplement to grain and hay.

Sheep require shelter chiefly as a protection from precipitous weather. Exposure to cold rains is especially damaging to them, particu-

larly if their wool becomes wet to the skin. Shelter is also needed if the weather is cold when the lambs are born.

Lambs are decidedly more popular than sheep as a meat product in the United States. The lambs are sold when they are from 4 to 10 months old and at live weights ranging from 65 to 90 pounds. Lambs are popular be¬ cause they are toothsome and yield the size of chops' and roasts most desired by American consumers.

From the standpoint of numbers and im¬ proved methods of breeding and feeding, the leading sheep countries of the world are Australia, New Zealand, United States, Argen¬ tine, South Africa and Great Britain. There are a great many sheep in Europe and Asia, but outside of a few European countries they are not well improved.

Bibliography. — Armatage, G., (The Sheep : Its Varieties and Management in Health and Disease) (London 1893) ; Austin, M. H., (The Flock) (Boston 1906) ; Bowman, F. H., Structure of the Wool Fibre) (New York 1908); Clarke, W. J., (Modern Sheep: Breeds and Management (Chicago 1907) ; Craig, J. A., (Sheep Farming in America) (New York 1913) ; Doane, D. H., (Sheep Feeding and Farm Management (Boston 1912) ; Gibson, (History and Present State of the Sheep Breeding Industry in the Argentine Republic 5 (Buenos Aires 1893) ; Kleinheinz, F., (Sheep Management (Madison, Wis., 1911) ; McIv.or, (History and Development of Sheep Farming from Antiquity to Modern Times) (Sydney 1893) ; Plumb, C. S., (Types and Breeds of Farm Animals) (New York 1906) ; Rushworth, W. A., (The Sheep: a Historical and Sta¬ tistical Description (Buffalo 1899) ; Salmon and others, (History and Present Condition of the Sheep Industry of the United States0 (Washington 1892) ; Shaw, T., < Management and Feeding iof Sheep5 (New York 1914) ; Spooner, W. C., (History, Structure, Economy, and Diseases of the Sheep) (4th ed., London 1878) ; Stewart, H.,

W. C. Coffey,

Professor of Sheep Husbandry, University of Illinois.

SHEEP, Mountain, a general term for the wild sheep of the world, which collectively form a group of romantic interest, and scientific im¬ portance. Excepting their perpetual rivals, the wild goats and ibexes, they are, of all land ani¬ mals, the boldest and most active rock climbers, and the most partial to mountain scenery. Wherever found, they inhabit the highest and most rugged and picturesque situations. Strange as it may appear, the haunts of the Rocky Mountain big-horn include not only our loftiest mountain ranges and many wild tracts of ((bad

lands,0 but also the rocky walls of the great abyss known as the Grand Canon of the Colo¬ rado. It is not strange, therefore, that all big- game hunters who love grand scenery find great fascination in the chase of wild sheep. No man worthy of the name of sportsman ever kills a ewe, but the head of an old ram, adorned with massive circling horns, won by dangerous mountain climbing and fair stalking, is a trophy of which any man may justly be proud.

It seems highly probable that the first wild sheep were developed in south-central Asia, in the region of the Altai Mountains, western Mon¬ golia. At all events, the favorable conditions there obtaining have developed the great Si¬ berian argali (Ovis amnion), whose enormous horns are a perpetual wonder to all who behold them. Near by in the Siar Mountains is found the Siar mountain-sheep. A comparatively short distance southward in Tibet is the Marco Polo sheep (Ovis poll), characterized by the enor¬ mous spread of its horns. A pair of horns of Ovis poli owned by Lord Roberts has a spread between tips of 54ˆ4 inches, and the longest horn measures 75 inches in length on the front curve. Southward of the range of the Ovis poli, in northern India, occurs the Punjab wild sheep, and the beautiful burrhel or blue sheep, both of them small species. Southwestward of Asia only two wild sheep are found, the small but handsomely colored mouflon of Corsica and Sardinia, and the large Barbary wild sheep or aoudad of the mountains of the Barbary states of North Africa. Northward from the home of Ovis amnion we find the Kamchatkan sheep, a species with horns like our white sheep, but otherwise exhibiting a strong resemblance to our big-horn. And this brings us to Bering Strait.

North America contains a really fine series of mountain-sheep species almost covering the mountainous regions of Alaska, and extending down the Rocky Mountain system to the region of Lake Santa Maria (lat. 30°) in northern Mexico. In addition to this, a species known as Nelson's mountain sheep branches off in south¬ western Nevada, extends through southern

Cali¬ fornia and on down the peninsula of Lower California for two-thirds of its length. The total area of North America inhabited by mountain sheep is about 3,500 miles long from north to south, and its greatest width from east to west, which is found in Alaska, is more than 1,000 miles. Of North American moun¬ tain-sheep, there are three conspicuous and well- marked types, and three offshoots. When dia¬ grammed in a manner calculated to appeal to ihe eyes they stand as follows:

TYPES OFFSHOOTS

Big-Horn \ Nelson's Sheep (Ovis nelsoni)

(Ovis canadensis) | Mexican Sheep (Ovis mexicanus)

Black Sheep (Ovis stonei)

White Sheep (Fannin's Sheep (Ovis fannini).

(Ovis dalli) I

The Rocky Mountain big-horn (q.v.) has been known since 1803, and is our most widely known species. All the others are of recent ap¬ pearance, only the white sheep dating back as far as 1884. The range of the big-horn extends from lat. 55° and long. 120° to San Francisco Mountain, Arizona. It embraces the whole main range of the Rockies between those points,

and also includes the Fraser River country, one locality in northern Washington, two in eastern Oregon, the counties of Custer and Dawson in Montana, the Black Hills and Bighorn Moun¬ tains of Wyoming, four localities in Utah, and the Grand Canon of the Colorado.

*This is the largest and heaviest species of our Ovis, and carries the most massive horns. It reaches its maximum development in the main range of the Rocky Mountains in western Alberta. A large ram stands 40 inches in height at the shoulders and weighs about 325 pounds. Horns that measure 16 inches in basal circumference may justly be called very large. The largest and longest on record measured 18*4 inches in basal circumference, and 52ˆ4 inches in length on outer curve, but the genu¬ ineness of this pair of horns is now doubted. One of the largest pairs in existence measures \6j/2 inches in basal circumference, 40ˆ2 inches in length and weighs 38 pounds. Apparently the horns of a mountain-sheep grow as long as the wearer survives in a healthy condition.*

Wild sheep are not covered with wool like domestic sheep. Next to the skin is a coat of fine woolly hair, which is for warmth ; but through this grows a coat of long, coarse hairs, large in diameter, pithy within and easily broken. This does duty as a rain-coat, and it also gives the animal its distinctive color. In summer, or late spring, when the old pelage is shed, the new coat is only half an inch in length, and the wild sheep stands forth fully sheared by the hand of nature. At that season the skin is worthless as a trophy. Mountain- sheep are at their best in October, November and December, and should be hunted at no other time. The lambs are born in May, and usually there is but one at a birth. Owing to the prac¬ tical impossibility of keeping mountain-sheep of any American species alive in captivity, any¬ where east of the Great Plains until they reach full maturity, our members of the genus Ovis are but little known to the general public, and consequently are quite unappreciated at their true value.

*The white mountain-sheep of Alaska was not introduced to the world until 1884. It inhabits nearly all the mountainous regions of Alaska except the Alaska Peninsula, the valley of the Kuskoquim and the lower valley of the Yukon. Until recently it has been quite abundant on the Kenai Peninsula and around the head of Cook Inlet. This animal is. all over pure white, and its winter pelage is long and abundant. It is smaller than the big-horn, and its horns never exceed 15*4 inches in circumference. North¬ ward its range extends almost to the Arctic Ocean, and its southern limit is found at lat. 58°. In 1901, the New York Zoological Society sent a collector to Cook Inlet to capture newly- born lambs of this species, and bring them to New York, for acclimatization in the Zoological Park. Three lambs were captured, but they proved to be such delicate feeders that all died within a few days of their capture.*

The black mountain-sheep was discovered in 1896 in northern British Columbia, and good representatives of this species are to be seen in the museums of New York, Chicago and Wash¬ ington. The size of the black sheep is the same as that of Ovis dalli. The species is character¬ ized by the wide spread of its horns, and the

very dark color of its pelage, all except the white of the rump-patch and the abdomen. So far as known the range of this species is very circumscribed, for it has not been reported out¬ side of a small area in northern British Columbia.

Fannin's mountain-sheep, often called the ((saddle-backed sheep,® was discovered on the Klondike River near Dawson City in 1900. It is an offshoot of the white sheep, and may possibly be the result of cross-breeding between that species and the black sheep. Its back, sides and tail are bluish gray, and a brown band ex¬ tends down the front of each leg;*

but all other parts of the animal are pure white. Its horns are like those of the white sheep. But little is known of the range of this species.

The Mexican sheep and Nelson's sheep are both offshoots of the big-horn. They are short- haired and large-horned, and their prevailing color is pale salmon gray.

Wherever they are not fully protected by law, all species of American mountain-sheep are sought for and killed, by hunters for sport, and by natives for food. The total number remain¬ ing is small, and it is impossible for the sur¬ vivors to be protected too rigidly. The big¬ horn quickly learns the value of protection, and the herd in the Yellowstone Park has rapidly increased and become so tame that it permits visitors to approach within 30 paces. Con¬ sult Baillie-Grohman, (Camps in the Rockies5 (London 1882) ; Grinnell, G. B., (Hunting at High Altitudes5 (New York 1913) ; Hornaday, W. T., (Campfires on Desert and Lava5 (New York 1908) ; id., (Our Vanishing Wild Life5 (New York 1913) ; Lyddeker, (Wild Oxen, Sheep and Goats5 (London 1898); id., (Fifteen Years' Sport and Life in Western America5 (London 1900) ; id., (The Sheep and Its Cousins5 (London 1912); Mayer (ed.), (Sport With Gun and Rod5 (New York 1883) ; Roose¬ velt, T., (Hunting Trips of a Ranchman5 (New York 1885) ; Stebbing, E. P., (Stalks in the Himalaya5 (London 1912) ; Whitney, C., and others, (Musk-Ox, Bison, Sheep and Goats5 (New York 1904).

SHEEP-BOT, a bot-fly (q.v.) whose mag¬ gots produce the disease of sheep called <(grub in the head.55 See Sheep.

SHEEP-DOG. See Collie; Dog.

SHEEP-EATERS. See Shoshonean In¬ dians.

SHEEP-LAUREL, or LAMB-KILL, the

Kalmia or mountain-laurel (q.v.), which is poisonous to lambs and other small animals.

SHEEP TICK, or LOUSE. See Sheep.

SHEEPSHEAD, the name of an important food fish (Archosargus probatocephalus) of the family Sparida. It is a stout, deep-bodied fish, with seven or eight vertical dark bands, and may attain a length of 2 1/2 feet and a weight of 15 pounds. It receives its name from the resemblance of its teeth to those of a sheep, having incisor-like ones in the front of the mouth and molars behind. It is found along the coast from Cape Cod to Texas and is abundant locally and especially southward wherever the

conditions are favorable. Like the drumfish, the sheepshead feeds chiefly upon hard-shelled mollusks and crustaceans, and large numbers congregate where such food is

plentiful and often prove destructive to oyster- beds. For boiling and similar methods of cooking it is considered superior to any fish in our waters, and consequently has a considerable commercial importance. The sheepshead is also a great favorite with anglers, many of whom are attracted to Florida fishing grounds , in its pursuit. They are captured on extra stout lines and hooks baited with clam or soft-shelled crab and usually make a gallant fight before being finally landed in the boat. The fresh¬ water drumfish (q.v.) is also called sheepshead. Consult Jordan, D. S., (American Food and Game Fishes. }

SHEEPSWOOL. See Sponge.

SHEERNESS, sher-nes, England, a sea¬ port and garrison town in the county of Kent, on the Medway River where it joins the Thames, 35 miles southeast of London. It is strongly fortified and has an excellent harbor. There are spacious dock-yards, used for making repairs, and which employ very many hands. The barracks accommodate several thousand soldiers and sailors. Sheerness-on-Sea is the modern town bordering the shore ; the other divisions are Marinetown (a summer bathing resort), Miletown and Bankstown. Sheerness has a fine beach, broad esplanades and splendid bathing and boating. Charles II established the first dockyard here. In 1667 the town was captured by the Dutch admiral De Puyster. Pop. 17,500.

SHEERS, an engine used for hoisting masts and spars in shipbuilding and rigging. It consists of two or more poles or spars fas¬ tened together near the top and having their lower ends apart, somewhat in the shape of a narrow A. The apparatus is raised on a slant and is steadied by guy ropes, the base being fastened to the dock or ship on which it is used. From the top depends the tackle necessary for hoisting. Sheers are used on ships, docks and about shipyards for lifting heavy weights, guns, boilers or other machinery, spars and masts. When a mast is to be stepped or to be taken out, the sheers are mounted straddling the ship with the two base ends lashed to the deck on either side and the whole structure slanting so that its top is over the mast to be lifted or over the place into which it is to be dropped. Sheers used to be mounted on an old hulk or a ship cut down at one side so as to receive them; such vessels were called sheer hulks. They are little used in modern shipbuilding, their work being performed by

permanent sheers on the docks or by the electrical cranes in the ship¬ yards.

SHEET, generally speaking, a broad, flat surface ; specifically a large stretch of water or ice ; a large flat portion of some substance whose thickness is insignificant compared to its length and breadth, as a sheet of metal, of cardboard, etc. ; a large rectangular piece of linen or like material used to cover the body during sleep, and thus a portion of the cloth¬ ing of a bed; as applied to stationery, a large piece of paper either folded or unfolded; nauti¬ cal, a sail, also the rope attached to the clew of a sail. There are some substances to which the name sheet is not applied. Thus we speak of a board and not of a sheet of wood, no mat¬ ter how broad, flat and thin it is; we do not speak of a level field as a sheet of ground,

although we would speak of a pond in the field as a sheet of water; neither do we say a sheet of glass (except rarely) but a pane. The compound sheet-glass, however, is commonly used. As applied to paper sheets follow two nomenclatures. Blank sheets of the station¬ ers' trade are known by arbitrary names given to certain sizes, such as cap, legal cap, royal, demi-royal. But printed sheets are denoted, as to size, by an ancient system of Latin nomen¬ clature, based on the number of folds required to bring to that size a sheet of certain dimen¬ sions. Thus a quarto is a sheet made of four folds, an octavo of .eight, a duodecimo of 12, etc. (See Book). From this idea of a folded, printed piece of paper a newspaper is often called a sheet, so, also, the leaves of books before bound, when the book is said to be <(in sheets.® A sail is called a sheet because it is made from a sheet of canvas and because it is broad, flat and thin. The rope called a sheet (abbreviated from sheet-rope) is used to hold a sail tight, extended against the wind, or to haul it around and change its position. This sheet is sometimes a chain.

SHEFFIELD, shef'eld, Joseph Earle,

American merchant and philanthropist : b. Southport, Conn., 19 June 1793; d. New Haven, Conn., 16 Feb. 1882. In 1813 he became a part¬ ner in a New York mercantile house, but subse¬ quently removed to Mobile, Ala., where he acquired large interests in the cotton trade. From 1835 he was resident at New Haven, where he helped to obtain the charter for the New York and New Haven Railway, visiting London to secure the co-operation of capital¬ ists. He also built the Chicago and Rock Island line. By his gifts and bequests of more than $950,000 the scientific department of Yale, since known as the Sheffield Scientific School, was reorganized and enlarged. See Yale Univer¬ sity.

SHEFFIELD, Ala., city in Colbert County, on the Tennessee River and on the Louisville and Nashville, the Northern Alabama and the Southern railroads, about two miles west of Tuscumbia (q.v.), the county-seat, and opposite Florence. Sheffield is one of the new cities of the South, founded in 1884 as a result of the great manufacturing movement. It is in an agricultural region in which there are large deposits of iron ore. There are five large blast furnaces, machine shops, cotton gins, cotton compresses and a grist-mill. There are several churches, a high school, public graded schools and several private schools. Pop. (1920) 6,682.

SHEFFIELD, England, city in the county of York, West Riding, at the junction of the Sheaf and the Don rivers, on several slopes surrounded by wooded hills. The suburbs are attractively built, with many terraces and ele¬ gant residences. There are a great number of churches, chief of which is the parish church erected under the reign of Henry I, which con¬ tains some interesting 'monuments ; Saint Paul's, a good specimen of the Grecian; Saint James'; Saint George's; Saint Philip's and Saint Mary's, having exterior ornamentations of gargoyles, etc., and a graceful interior with a lofty and richly groined roof. The other buildings in¬ clude the town-hall, council hall and municipal offices, Corn Exchange, Norfolk Market, Thea¬ tre Royal, Athenaeum, libraries, association

halls, Mechanics' Institute, Albert Hall, Music Hall, Saint George's Museum, the Mappin Art Gallery and various others. The barracks are surrounded by extensive grounds. There are numerous hospitals and several monuments. Of educational and literary institutions the principal are Firth College; Wesley Ranmoor Methodist and People's College; grammar-school, public schools, art school, technical school ; literary and philosophical institutions and museums. The University of Sheffield was founded in 1905 and is attended by over 1,500 students. The town enjoys all modern im¬ provements. There are extensive botanical gardens. The Sheffield cutlery is celebrated, and all its manufactures of steel are famous, including heavy steel branches, such as armor plates, rail, large castings for engines, steel for rifles, etc. The other industries include the manufacture of optical instruments, iron and brass foundries, various mills, etc., besides sil¬ ver plating, bicycles, cabinet-work, tanning, etc. Sheffield was in early times a Roman station and was an incorporated town under the Anglo-Saxons. In the 14th century it was already noted for its cutlery. Its history is also connected with the persecutions in the Nether¬ lands, having been the refuge of victims suffer¬ ing persecution under the Duke of Alva, who introduced their mechanical skill into the coun¬ try. It developed rapidly in

the 19th century, and became one of the greatest manufacturing cities of England. It was the first city of Eng¬ land to operate its street railway system. The electric-lighting and power plant, markets, arti¬ sans' dwellings, baths, free libraries, are also owned by the municipality. It sends five mem¬ bers to Parliament. Pop. 454,632. Consult Gatty, Sheffield, Past and Present1 (London*

1873).

SHEFFIELD PLATE. Of late years there has been a great interest in old Sheffield plate, which is now practically a lost art. Col¬ lectors pay large sums for specimens, which, a couple of decades ago, could be purchased for the proverbial ((song.® Some connoisseurs pre¬ fer the peculiar lustrous quality that the mixture of copper and silver gives to silver itself ; others are charmed by the models produced in this special ware. Notwithstanding the fact that many old families possess a few specimens of Sheffield plate, comparatively few persons know much about it, for the question has been little studied. At the present moment the col¬ lecting of Sheffield Plate has become some¬ thing of a fad and ˆantique® shops tempt the buyer with real and spurious articles.

Old Sheffield Plate is a term used to de¬ scribe articles of flat or hollow ware for table or domestic use made of copper coated with silver by fusion. In Sheffield Plated Ware the silver was laid on both sides of a sheet of copper, something like a sandwich with the copper in the middle, and the two metals, united by fusion, were then hardened by pressure be¬ tween rollers. Hence its old name of <(Copper Rolled Plate,® which describes it exactly. Shef¬ field Plate appears as a new invention in Eng¬ land in the year 1742; but it is more than likely it was a rediscovered process, for the art of imitating silver had reached a state of excellence in the 15th century. The art of imitating gold and silver was known to ancient nations. Assyrians, Egyptians and Hebrews

were most skilful in the use of metals and in fine wire-work. The Romans left definite in¬ structions regarding the application of gold and silver to articles of tin or copper and cop¬ per vessels coated with silver have been found at Herculaneum. The ancient Mexicans and Peruvians also made imitations of gold and silver and articles have been found in Peru that are silver plated on copper by a process very like that of Sheffield plating — the two metals having been amalgamated by heat. Shef¬ field Plate, or, to speak more correctly, Sheffield Plated Ware, dates from about 1743 and lasted for 100 years until it was superseded by electro¬ plating about 1840. Sheffield in the reign of Queen Elizabeth was famed for its cutlery and also the fine parks, gardens and country- seats in its vicinity. Sheffield is now a place full of dirt and smoke, caused by the factories and iron and

steel works. In 1742 Thomas Bolsover, a mechanic, was repairing the handle of a knife, which was composed partly of silver and partly of copper, when he accidentally fused the two metals. This showed him that it was possible to coat copper with silver in such a way as to form a cheap and durable metal presenting an exterior of silver only. He im¬ mediately began to manufacture articles of this kind (copper plated with silver), but he con¬ fined his efforts to small objects, such as but¬ tons, snuff-boxes and other light and small articles. Then Joseph Hancock took up the business and began to imitate the finest and most richly embossed plate. Thus every kind of domestic article that had decorated the side¬ board and buffet, which until then had been made of wrought silver only, was imitated in copper Rolled Plate.

Naturally, the new process was hailed with delight by the middle class, for it was possible now for people of ordinary means to have shining Sheffield Plated Ware who had hereto¬ fore contented themselves with pewter. The trade developed to such an extent that it was difficult to fill the orders that came from all parts of England and her colonies. The new process was also carried to Birmingham, Lon¬ don, Nottingham, Scotland and Ireland. Dub¬ lin became quite a centre for the new manufac¬ ture. Sheffield plate was also made in America.

The Sheffield manufacturers produced tea- urns, coffee and tea-pots, tea-kettles and lamps, epergnes, tankards and measures of all sizes, jugs, cups, goblets, tumblers, candlesticks, can¬ delabra with branches, cruet frames, water and platter plates and dishes, dish-rims, crosses, tea- trays and waiters, bottle-stands, writing-stands, tureens, ladles, spoons, scallop-shells, canisters, mustard-pots, argyles, snuffer-trays, wine-fun¬ nels (round and oval), salt-cellars, bottle-labels, decanter-labels, cream-labels, bread and sugar baskets, skewers, lemon-strainers, cheese-toast¬ ers, chocolate pots, saucepans, stewpans, snuff¬ boxes, bridle bits, stirrups, buckets, spurs, knife and fork handles, buttons for saddles and many other small articles.

Horace Walpole, writing in 1760, says: <(As I went to Lord Stafford's I passed through Sheffield. One man there has discovered the art of plating copper with silver. I bought a pair of candlesticks for two guineas ; they are quite pretty.® Classification is difficult because the dealers have, unfortunately, divided up Sheffield in a way rather misleading to the

historian and art-critic. Dealers have named the first examples of Sheffield <(Queen Anne,® which is absurd, because Sheffield plated ware began in

the reign of George II. However, as dealers' names appear in catalogues of auction sales, etc., it is well to understand that what they mean by Queen Anne is applied to de¬ signs of the Queen Anne type, rather short and squat models in which the gadroon is the chief ornament. Dealers divide Sheffield plated ware into five periods: (1) Queen Anne; (2) early Georgian; (3) late Georgian ; (4) Empire; and (5) Late. Sheffield Plated Ware followed all the styles that the silversmith introduced. Con¬ sequently the early and late Georgian show Louis XV and Chippendale styles and Louis XVI designs. The third period, from 1770 to 1785, is the most attractive of all because of the delicate and slender oval and the charming style of Adam, Heppelwhite and Sheraton ornamen¬ tation. Next comes the Empire style; and, finally, the last period, which, is ornate and florid ; but not by any means to be despised, be¬ cause very splendid things were produced. The wire-work dates from 1790 to 1810. The per¬ forated pieces come later. As a rule, the bor¬ ders are of solid silver. In the earliest pieces the edge consists of a solid silver thread, or several threads; then comes the gadroon (or fluted) edge ; then the gadroon and shell ; and then the florid. Sheffield Plated Ware was often beautifully engraved.

Collectors should notice the difference be¬ tween "Old Sheffield Plated Ware® which is silver-plated copper, and modern Sheffield Plated Ware, which is copper electro-plated. Counterfeit articles are made of copper and electro-plated.

Two or three points form a good test of the genuineness of old Sheffield Plate. One is the presence of embossed relief work of solid silver on all ornamented articles. Another test is the bands or narrow strips of silver to be found wrapped round the edges and under the mounts, which are put there to conceal the joints and bare edges of the copper. Another reliable test is the inlaid shield.

Nothing was hall-marked until 1784. Manu¬ facturers also had special devices, viz., W. and G. Sissons, a bell; Watson, an open hand; Fen¬ ton Creswick and Company, crossed arrows; Boulton Bingham, ball and horseshoe; Walker Knowles and Company, ball and cross; Daniel Hoyle and Company, pineapple; Wilkinson and Company, cross keys, and so on. The chief authority is Bradbury's (History of Old Shef¬ field Plate (London 1912). Consult also Veitch, H. N., Sheffield Plate* (London 1908) ; and Wylie, Bertie, Sheffield Plate* (London and New York 1907).*

Esther Singleton.

SHEFFIELD SCIENTIFIC SCHOOL,

a department of Yale University. See Yale University.

SHEIK, shek, an Arabic word signifying an aged man or elder, is used generally as a title of reverence and has come to acquire a great variety of significations. Among the Bedouins and other migratory tribes where patriarchal government prevails, the head of every tribe is called a sheik. The superiors of the Mohammedan religious or monastic orders are called sheiks. The chief mufti is called

sheik-ul-islam. In general the title is given to learned men, and by a wider extension is used as a common title of courtesy, like Mr.

SHEIL, shel, Richard Lalor, Irish orator, dramatist and politician: b. Drumdowney, 17 Aug. 1791; d. Florence, Italy, 25 May 1851. He was educated at Stonyhurst College and Trinity College, Dublin, studied law at Lincoln's Inn and was called to the bar in 1814. His progress in his practice was slow and he turned to dra¬ matic writing, having already produced a mod¬ erately successful drama, Adelaide5 (1814). A tragedy, (The Apostate, was produced in 1817, and ran through the season. He produced (Bellamira, or the Fall of Tunis* (1818) ; (Evadne) (1819); (The Huguenot* (1822), and with John Banim, 'Damon and Pythias.* Of these 'Evadne* is considered the best. He next joined with Curran in contributing to the New Monthly Magazine the 'Sketches of the Irish Bar.* In 1825 he visited London with O'Con¬ nell, O'Gorman and others to protest against the bill that had been introduced for the sup¬ pression of the Catholic Association, and dur¬ ing the progress of the agitation continuing until 1829 spoke many times in public meetings in Ireland in behalf of the Irish cause. When emancipation was finally secured, Sheil moved the dissolution of the Catholic Association. In 1830 he entered Parliament from Milbourne Port in Dorset, sat for County Louth in 1831 and in 1833 was member of the first reformed Parliament for Count}'- Tipperary. He gradually withdrew from a close identification with the Irish cause and turned his attention more to the foreign policies of the empire. Shortly after the accession of William IV he became commissioner of Greenwich Hospital, but later exchanged this post for the vice-presidency of the Board of Trade. In 1846 he was appointed master of the mint and his inability to move in the relief of the famine in Ireland, though not thoroughly understood in that country, yet diminished his popularity. His last appoint¬ ment was that of Minister to the court of Tus¬ cany in 1850. He was brilliant in Parliamentary speaking, though he lacked spontaneousness, and carefully prepared each address. Of his forensic speeches that delivered as counsel for John O'Connell at the "monster trials® in Dublin in 1844 is accounted his best. His (Speeches) was edited by McNevin (Dublin 1845). Consult McCullagh, W. T., 'Memoirs of Richard Lalor SheiP (London 1855).*

SHEKEL, a unit of weight supposed to have been first used in Babylonia

and afterward by the Jews and other peoples; also a coin used by the Jews and thought to have been intro¬ duced by Simon Maccabaeus. The weight was reckoned' as one-sixtieth part of a maneh, and afterward was revised by the Phoenicians to be one-fiftieth part of a maneh (then called mina). It is probable that the shekel, with other meas¬ ures of weight, underwent much revision as to size, shape and weight. Phoenician shekels are found in the following weights : 234 grains (Troy), 224 grains, 218 grains, 208 grains. The Assyrian shekel was of 129 grains; their double shekel of 258 grains. The Jewish shekel was of 218 grains.

The use of the shekel as money among the ancient Hebrews is popularly supposed to date with Simon Maccabaeus, to whom was given

*(1 Mac. xv, 5) the power ((London 1881) ; Reinach, T., (Jewish Coins**

(1903).

SHEKINAH, she-ki'na, a post-Biblical ab¬ stract term, signifying <(he who dwells,® from the Biblical Shakan, to dwell, employed as a substitute for God to avoid certain anthropo¬ morphic words in the Bible. It is used par¬ ticularly in such passages where God is men¬ tioned as dwelling either in the tabernacle or among the people, to express the majesty of the divine presence. It was used primarily to soften terms applied to God and to prevent by a kind of periphrasis false views as to His mani¬ festations in the popular mind. At the root of its employment was the innate antagonism of the Israelite to any materialistic conception of the divine. It is found most frequently in the Targumim or Aramaic paraphrases of the Old Testament, written when Hebrew had ceased to lie the popular language.

A few illustrations will make the usage clear. The Targum of Onkelos renders the sentence (Ex. xxix, 45) (

As to the nature of the word, it sprang into usage in a polemical era. Rabbinical opinions have not been unanimous. Schechter seems to ■ regard as unfortunate the attempts of the rabbis to allegorize in the days of other and more aggressive philosophies. ((What to and rabbis

SHELBURNE

A

*was a simple adjective, a reverential expression, or a poetical metaphor turned into the hands of the Hellenists into a new deity an aeon, or a distinct Emanation,® as he writes in (Some Aspects of Rabbinic Theology**

(p. 43). In later centuries Maimonides in his (Guide to the Perplexed, which sought to interpret the law of Moses by the logic of Aristotle or to co¬ ordinate both philosophies, considered the Shekinah as a distinct entity, a light proved to be intermediary between God and the world. On the other hand, Nachmanides deemed it the essence of God manifested in a distinct form. An attempt has been made by Weber to differentiate the Talmudic from the Targumic conception of the Shekinah but without success. The difficulty of an exact definition is due not only to the fact that diverse ideas have been associated with it, but to the circum¬ stance that in rabbinical literature, extending over many centuries, the utmost freedom of opinion is exercised and full citations must be given to understand aright their views. In their homiletical interpretations in particular the rabbis were rich and na'ive in fancy.*

Bibliography. — Bahr, (Symbolik des Mo- saischen Cultus) ; Etheridge, (The Targums on the Pentateuch; Schechter, (Some Aspects of Rabbinic Judaism * ; Schiirer, (History of the Jewish People> ; Taylor, (Sayings of the Jewish Fathers* (3d ed., p. 43) ; Weber, (Jiidische Theologie.**

Abram S. Isaacs.

SHELBURNE, shel'bern, William Petty

Fitzmaurice, Lord, 1st Marquis of Lansdowne : b. Dublin, 20 May 1737 ; d. London, 7 May 1805. He entered Oxford, but two years later left the university and entered the army. While engaged in the campaign in Germany he was returned to the House of Commons for High Wycombe in 1760, and was re-elected in the following year. He was also elected to the Irish Parliament, but he never sat in either body, for the death of his father in 1761 elevated him to the House of Lords. He was frequently employed by Butte as a negotiator in political combinations and on 30 April 1763 he became president of the Board of Trade and Foreign Plantations with a seat in the Cabinet; but his speech in the debate on the proceedings against Wilkes caused his dismissal from his staff ap¬ pointment. In April 1764 he took his seat in the Irish House of Lords as Earl of Shelburne, and in 1766 took a leading part in the English Parliament in the repeal of the Stamp Act. Under Pitt he became Secretary of State for the Southern Department (23 July 1766), and in the following month the entire control of the administration of the colonies was placed in his hands. Lie endeavored to pursue a con¬ ciliatory policy toward the American colonies, but in this was thwarted by his colleagues, and in January 168 was superseded by Lord Hills¬ borough. He stood alone with Chatham against coercing the American colonies, but his op¬ position was unavailing. In his Parliamentary speeches, many of which became famous, he always opposed the coercive measures of Lord North's ministry, recommended

measures for ending the hostilities in America, but declared he would never consent to the acknowledgment of American independence. When Lord North resigned in March 1782 Shelburne declined the

king's invitation to form a new ministry, but acted as intermediary in pressing the post upon Rockingham. In the Cabinet formed by the latter he became Secretary of State for Home Affairs, and tried to introduce several economic reforms. Rockingham's death occurred in July of that year and Shelburne accepted the duty of forming a government. In this ministry Wil¬ liam Pitt, then only 23, became Chancellor of the Exchequer. In the debate on the change of ministry Shelburne declared that he still ad¬ hered to all the constitutional ideas that he had imbibed from his master in politics, Lord Chat¬ ham, and that he had not altered his opinion concerning American independence ; but dur¬ ing the negotiations of the Peace of Paris he was reluctantly led to agree to the con¬ cession. The coalition of North and Fox against his government led to his resignation 24 Feb. 1783. In December 1784 he became Mar¬ quis of Lansdowne in the English peerage. He was one of the most hated men of his time, a circumstance probably due to his independent spirit in party politics and his supercilious man¬ ners. Yet many of his views were more en¬ lightened than his times. He advocated Parlia¬ mentary and economic reform, Catholic eman¬ cipation and religious equality and free trade. Disraeli said he was (

SHELBURNE, Canada, capital of Shel¬ burne County, Nova Scotia, a seaport town on the southwest coast at the head of a deep and capacious bay, forming one of the safest har¬ bors of the province, 140 miles southwest of Halifax. Shelburne is a station on the Inter¬ colonial Railway system and has an important maritime and transit trade. Ship-repairing docks and ironworks are the chief industrial establishments, and its fisheries are valuable. The Roseway River supplies abundant water¬ power. The entrance to the harbor is marked by a lighthouse on McNutt's Island; it ex¬ hibits two lights, the highest 120 feet above the sea. After the American Revolution the popu¬ lation of Shelburne was increased to about 12,000 by the advent of United Empire Loyal¬ ists. It has since declined in importance.

SHELBY, Isaac, American soldier: b. North Mountain, Md., 11 Dec. 1750; d. Trav¬ eller's Rest, Lincoln County, Ky., 18 July 1826. He became a surveyor and in 1771 removed to Tennessee. In 1774 he was appointed

lieutenant in the company of his father, Gen. Evan Shelby, fought at the battle of Point Pleasant and re¬ mained in command of the fort there until 1775. He was engaged at the battle of Long Island flats where his valor won the day, became com¬ missary of the frontier in 1777 with rank as captain, in the succeeding year was promoted colonel, and also served as a member of the Virginia house of delegates in that year. He planned the important action at King's Moun¬ tain in 1780, served under Marion in 1781 and under Greene in 1781-82, and was a member of the North Carolina legislature in those years. He was a member of the Constitutional Con¬

vention in 1791 and was elected the first gov¬ ernor of Kentucky in 1792, served until 1796 and again in 1812-16. He. recruited and led 4,000 men to the relief of General Harrison in Canada in the War of 1812, receiving a gold medal from Congress for his services. He declined the office of Secretary of War in 1817 and afterward lived in retirement, though he acted as commissioner with General Jackson in negotiating the treaty with the Chickasaw Indians in 1818. Nine counties in the Southern and Western States are named in his honor, as is also a college at Shelbyville, Ky.

SHELBYVILLE, Ill., city, capital of Shelby County, on the Kaskaskia River and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Chicago and Eastern Illinois railroads, about 45 miles southeast of Spring- field and 33 miles south by east of Decatur. It is in a fertile agricultural region in which considerable attention is given to stock-raising, lumbering and coal-mining. The chief manu¬ facturing establishments are flour-mills, foundry, lumber-mills, agricultural implement works, gasoline engine manufactories, a woolen- mill and creameries. There is considerable trade in farm and dairy products, livestock and coal. Pop. 3,590.

SHELBYVILLE, Ind, city, county-seat of Shelby County, on the Big Blue River and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Pittsburgh, Cincinnati, Chicago and Saint Louis railroads, about 26 miles southwest of Indianapolis and 90 miles north of Louisville, Ky. It is in an agricultural and stock-raising region. The chief manufacturing establishments are 18 furniture factories, flour¬ mills, creameries, barrel factories, lumber and planing-mills, paper products mill, glove fac¬ tory and fireless-cooker plant. It is the com¬ mercial and industrial centre for Shelby County and has considerable trade in farm and dairy products, livestock and manufactures. There are 12 churches, 10 public schools and one parish school and a public library. The three national banks have a combined capital of $300,000; there are several building and loan associations and one private bank. The city has had a steady growth, mainly due to the general development of the surrounding country. Pop. (1920) 9,701.

SHELBYVILLE, Ky., city, county-seat of Shelby County, on the Southern and the Louis¬ ville and Nashville, and the Chesapeake and Ohio railroads, about 28 miles east of Louis¬ ville and 21 miles west of Frankfort. It is in an agricultural and stock-raising region. Shelby County is known as the Jersey Isle of America, on account of the large ijumber of blooded Jersey cattle. Large quantities of tobacco in the vicinity are prepared for market and shipped from Shelbyville. It has a flour-mill, creameries, machine shops and cigar factories. The educational institutions are a high school, elementary schools, Science Hall School for Girls, Stuart Female College, founded in 1839, Shelbyville Academy for Boys, opened in 1881. Five banks have a combined capital of $425,000. The government is vested in a mayor and a common council. A sum of $85,000 will be expended by the government in a new post- office building. Shelbyville is one of the richest

counties in the State — has over 400 miles of macadamized roads. Pop. (1920) 3,760.

SHELBYVILLE, Tenn., town, county-seat of Bedford County, on the Duck River and on the Nashville, Chattanooga and Saint Louis Railroad, about 65 miles south by east of Nash¬ ville. In June 1863 the town was the scene of military operations and during the greater part of the Civil War Shelbyville and vicinity were scenes of many skirmishes. It is in an agri¬ cultural and lumbering region and in the vicin¬ ity are several varieties of good building stone. The chief manufacturing establishments are foundries, machine shops, lumber and planing mills, a large lead-pencil factory, cotton and woolen mills and a flour mill. The chief prod¬ ucts shipped are pencil-cedar, telegraph and telephone poles, grain and mules. There are six churches, graded public schools and the Shelbyville Female College, founded in 1853. Pop. about 3,000.

SHELD-DRAKE, or SHELDRAKE, a

sea-duck (Tadorna cornuta) of the cooler parts of the Old World, which frequents sandy shores and makes its nest in burrows in sand-dunes, earthen cliffs, old rabbit-warrens, etc. It is of large size and very handsome plumage ; head and upper neck dark, glossy green, broad white collar below, with a broader band of bright bay extends from the back across the breast. It is somewhat larger than an ordinary duck and the female is smaller and less brilliantly colored. In the Frisian Islands and some other parts of the world the people provide it with acceptable artificial breeding-

burrows and take a portion of its eggs and down, so making an annual profit from the arrangement. Several other species of the same genus are found throughout Africa, southeastern Asia and Malaya, one of which is well known in India as the Brahming duck. Much ornithological interest attaches to these birds and the name itself is a matter of curious speculation, for which see Newton, "Dic¬ tionary of Birds5 (New York 1896).

SHELDON, Charles Monroe, American Congregational clergyman and author: b. Wells- ville, N. Y., 26 Feb. 1857. He was graduated from Brown University in 1883, from the Andover Theological Seminary in 1886, was ordained in 1886 to the Congregational ministry and in 1889 became pastor of the Central Con¬ gregational Church of Topeka, Kan. In 1900 he attracted considerable attention by his con¬ nection with the Topeka Capital, of which he took entire charge for one week, and which he published as a distinctively Christian daily after principles enunciated in his book, (In His Steps5 (1896), a work of excellent intention, but no literary importance, which was sold very extensively. Among other volumes by him are (Robert Hardy's Seven Days) (1892) ; Mal¬ colm Kirk> (1897); (The Wheels of the Machine5 (1901) ; (The Narrow Gate5 (1902) ; (The Heart of the World5 (1904) ; (Richard Bruce,5

(In His Steps,5 (

translated into 24 langauges and published by 100 different publishers who have sold 20,000,- 000 copies, with no pecuniary benefit to the au¬ thor as the book was not copyrighted. In 1912 Mr. Sheldon resigned his pastorate of Central Congregational Church and became <(Minister at Large.55 In 1915 he was recalled as pastor, and is now (1916) serving in that capacity.

SHELDON, Edward Brewster, American dramatist: b. Chicago, 14 Jan. 1886. He was graduated at Harvard University in 1907, and took his A.M. there in 1908. His first play,

(Salvation Nell5 (1908), in which Mrs. Minnie Maddern Fiske starred, was written while he was pursuing post-graduate studies at Harvard. Author of (The Nigger5 (1909) ; (The Boss5 (1912); (The High Road5 (1912); (Romance5 (1913) ; (The Song of Songs5 (1914) ; har¬ den of Paradise5 (1915), etc.

SHELDON, Edward Stevens, American philologist: b. Waterville, Me., 21 Nov. 1851. He was graduated at Harvard University in 1872, and later studied at the universities of Berlin, Paris and Leipzig. From 1877 he was connected with the modern languages and Romance philology departments

at Harvard, and since 1894 he has been professor of Romance philology there. Author of (A Short German Grammar5 (1879), and joint author of (Con- cordanza delle opere italiane in porsa e del canzioniere di Dante Alighieri5 (1905).

SHELDON, Henry Clay, American Meth¬ odist Episcopal theologian and educator : b. Martinsburg, N. Y., 12 March 1845. He was graduated at Yale University in 1867 and at the Boston University School of Theology in 1871, was ordained and served as a pastor in 1871-74. He was professor of historic theology at the Boston University School of Theology in 1875-95, and thereafter was professor of sys¬ tematic theology there. Author of (History of Christian Doctrine5 (2 vols., 1886 ; 4th ed., 1906) ; (History of the Christian Church5 (5 vols., 1894) ; (A History of Unbelief in the Nineteenth Century5 (1907);

SHELDON, Lionel Allen, American law¬ yer: b. Otsego County, N. Y., 30 Aug. 1831; d. 17 Jan. 1917. After studying at Oberlin College he was admitted to the bar in 1851, and began practice in Elyria, Ohio. In 1856 he was a delegate to the Philadelphia Re¬ publican Convention and there supported John C. Fremont as its nominee for President. In 1861 he was commissioned a brigadier-general of militia, and in that capacity raised many re¬ cruits for the Union army. He was made colonel of the 42d Ohio Infantry in 1862 ; won distinction in the battles of Chickasaw Bayou and Arkansas Post; and took part in the cap¬ ture iof Vicksburg. He was brevetted brigadier- general of volunteers in 1865. After the war he removed to New Orleans, where he prac¬ tised law; was a Republican member of Con¬ gress in 1869-75; and governor of New Mexico in 1881-85.

SHELDON, Samuel, American electrical engineer: b. Middlebury, Vt., 1862. He was graduated at Middlebury College in 1885, and from the University ot Wurzburg in 1888. He was assistant in physics at Harvard University

in 1888-89, and since 1889 has been professor of physics and electrical engineering at the Brooklyn Institute of Arts and Sciences. In 1903 he was appointed an expert in the Swiss department of justice and police. Author of (Dynamo Electric Machinery) (1900; 9th ed., 1915) ; and joint author of Alternating Cur¬ rent Machines) (1902; 9th ed., 1911), and

(Electric Traction and Transmission Engineer¬ ing (1911).*

SHELIFF RIVER (French Chcliff, shal- ef), Algeria, a river rising on the Atlas Range and flowing north into the Mediterranean Sea, which it enters near Mostaganem. It traverses the great central plateau, and then flows for a considerable distance westward, parallel with the coast, through a fertile longitudinal valley between the two coast ranges. It is 400 miles long, and the largest river in the colony.

SHELL. See Projectiles.

SHELL, the external limy, chitinous or silicious integument or covering of such inverte¬ brate animals as form a hard exoskeleton; or some structure resembling the armor of a mol- lusk. Thus, broadly, the term applies to the protective envelope of eggs ; the tests of foraminifers, polyzoans and echinoderms, the living tubes of annelids, the exoskeletal integu¬ ments of the crustaceans, the shards of beetles, and the egg-pouches and cuttle-bone of the argonauts and calamaries, as well as to the hard armor, or "shells" proper, brachiopods of mussels and snails. Whatever its form or ho¬ mology, it serves the purpose of support and protection. The characteristic structure of the exoskeleton, tests and other "shells" of the invertebrates mentioned above are given in the articles on Foraminifera, Ec hi noderm at a, etc. ; and the present treatise may be restricted to the shells of the Mollusca.

The shells of mollusks vary from entire ab¬ sence, or a merely rudimentary condition, to highly elaborate and ornamental examples ; and from almost microscopic minuteness and deli¬ cacy to massive structures completely envelop¬ ing and protecting the animal and weighing sev¬ eral hundred pounds. All are composed mainly of carbonate of lime, which in some cases, as the hard shells of the cameo-strombs, amounts to 99 per cent, while in others as much as 10 per cent may consist of other earthy salts, and a small amount of organic material called "conchiiolin," which disappears as shells dry out after the death of their occupants. Various views have been held as to the formation of the shell, but it is plain that the mantle-margin is the principal agent in its deposition ; accidental holes and breaks will be repaired elsewhere, and even the foot may secrete shelly matter, but regularly this is the function of the epithelial cells along the edge of the mantle, to separate the carbonate .of lime from the blood and throw it out, where it crystallizes and cements itself into the required form as it exudes. This deposition is not continuous, but takes place at more or l.ess regular periods or seasons, annually or semi-annually, alternating with seasons of rest. The additions to the shell made during each period of activity are often indicated by a thickened line forming a raised and more or less knobbed or irregular ridge called a varix. "The various details

of sculpture on the exterior surface of the shell — the striae, knobs,

nodules, imbrications, spines and other forms of ornamentation are all the product of similar and corresponding irreg¬ ularities in the mantle margin and have all been originally situated on the lip. Spines, for example, those of Murex and Pteroceras, are first formed as a hollow thorn, cleft down its lower side, and are afterward filled in with solid matter as the mantle-edge withdraws. What purpose is served by the extreme elaboration of these spiny processes in some cases, can hardly be considered as satisfactorily ascertained. Pos¬ sibly they are a form of sculptural development which is, in the main, protective, and secures to its owners immunity from the attacks of preda¬ tory fishes." (Cooke, (Mollusca,) p. 256).

Three principal varieties of texture are per¬ ceptible in molluscan shells. The porcellanous shells of gastropods consist of three layers, which consist of thin plates, placed side by side, the direction of the planes of these laminae being different in the different layers. Thus the plates may lie transversely in the central layer and horizontally in the others, or longitud¬ inally in the middle and crosswise in the outer and inner layers. The nacreous shells form the second variety made up of numerous closely packed layers, the edges of which exhibit undu¬ lations of their surfaces. The lustre and pris¬ matic hues of nacre are due to the minute striae on the surface which break up and refract the light. (See Pearl). It is interesting to note that the nacreous type of shell occurs largely among mollusks which now represent very an¬ cient forms. The fibrous shells are composed simply of successive laminae or layers of pris¬ matic cells. In their living state shells are cov¬ ered externally by a layer of animal matter, known as the periostracum, or epidermis, well seen in the fresh-water mussels, for example. This layer may, however, be so delicate as to be almost invisible to ordinary observation. The colors of shells are due to pigment deposited in the course of their growth from pigment cells situated along the mantle-margin. When the valves or pieces of which a shell is composed are equal in size the shell is denominated equi- valve; if more developed to one side of the middle line than to the other it is termed in¬ equilateral. The prominent point of the shell is the umbo or beak ; this always points in the di¬ rection of the mouth, and hence the part on which the mouth is situated is termed anterior ; the opposite posterior. The part where the hinge is situated is the dorsal or upper border; the border opposite to this or that by which the shell opens, the ventral side or base. The length of a bivalve shell is measured from its anterior to its posterior margin; and its breadth from the dorsal to the ventral border. The shells of bivalved mollusks (pelecypods) are shut or drawn together by the action of either one or two adductor muscles. The impressions or "scars" of these muscles may generally be per¬ ceived on the interior of the shells, but in some cases (as in oysters) only a single adductor muscle is developed, this latter representing the posterior muscle of those forms possessing two. The

forms with single muscles are named Monomyaria, those with two being termed Dimyaria. These shells are opened not by mus¬ cular action but by that of ligaments situated at

the hinge, one of which (the external ligament) is put on the stretch when the shell is closed, and opens the shell in virtue of its elasticity. The internal ligament is situated within the hinge, and usually in pits or depressions of the shell. This latter is also compressed when the shell is closed, and aids in opening the shell by its elasticity. The hinge may be curved or straight, and may exhibit sets of teeth springing from one valve and fitting into sockets on the opposite valve of the shell.

In gastropods the shell- is typically a spiral univalve ; and we may conceive of a simple conical shell (such as that of the limpet) being converted into a spiral form by supposing it to be first long drawn out, and then twisted upon itself from above downward, either to the right or left side. The apex of the gastropod shell is usually more or less oblique in position. The coils or whorls of the spiral shell may either be separated (as in Vermetus) or contiguous, and in close contact. Sometimes the whorls lie in one and the same plane, being coiled round a central axis (as in the fresh-water Planorbis), and then the shell is named discoidal. But gen¬ erally the gastropod shell shows the whorls to be wound in an oblique manner, so as to form a true spiral and shells with this conformation may, therefore, be named trochoid, turreted, tur¬ binate, etc. An ordinary gastropod (or snail) shell shows the whorls wound round a central axis or columella ; the nucleus or apex being formed by the shell of embryonic life, and the largest or terminal whorl (body whorl) show¬ ing the mouth or aperture, which may exhibit various dentations of its margins. When the columella or axis of the shell is hollowed, and opens below at the mouth-aperture, the opening is named the umbilicus ; but it may also be solid and imperforate. If the aperture or mouth of the shell is notched for the passage of one or more siphons, the shell is said to be siphonos- tomatous. If, on the contrary, its margin is un¬ broken and entire, the shell is holostomatous.

The shells of Pteropoda are generally of deli¬ cate glassy structure, and consist either of a dorsal and ventral or united plate, or of a spiral shell. In some extinct forms (for example, Conularia) of Pteropoda the shell was of large size and of quadrate shape.

The Cephalopoda or cuttlefishes possess (as in the Tetrabranchiata; see Nautilus) external many-chambered shells, or, as in ordinary cases,

internal shells, which may be destitute of cham¬ bers, or chambered as in the extinct Belemnites or in the existing Spirula. In the argonaut (q.v.), the shell is external, but single-cham¬ bered; and is, moreover, not a true shell, but a foot-secretion of the female only, formed not by the mantle but by two of the feet or arms, which are specially expanded and modified for this office; and the office of which is the safety of the developing eggs.

SHELL, Its Industrial Uses. It may sur¬ prise some to learn that shells rank among the principal ˆfishery® products of the world. This refers to those used for industrial purposes and not to the large supplies for mu¬ seum and cabinet collections. In London the sales of pearl shells or mother-of-pearl amount to about $4,000,000 each year, and the annual imports of this material into the United States before the war exceeded $1,000,000 in value.

The shells caught in this country aggregate about 1,000,000 tons annually. The economic utilization of these is more diversified than is generally supposed, giving employment to many thousands of persons, and constantly increasing in importance. The most valuable item in shell production is mother-of-pearl. The most im¬ portant is the pearl oyster found in many inshore tropical waters of both continents. The shells vary greatly in color and iridescence, but three general classes are recognized, namely, white or silver-lipped, yellow or golden-edged and smoky or black-edged; the last yielding the so-called (

The white shell has the silvery lining uni¬ form over the surface, and as it may be cut up to greater advantage, it is the most valuable. When black pearl buttons are fashionable, the black-edged shell sells almost as high as the best white shell. A fair valuation of mother- of-pearl shells is $40 per ton, though the choicest sell for upward of $1,500 per ton.

During recent years large quantities of low- grade pearl shell have been secured from the fresh-water mussels of the United States. These occur principally in the Mississippi River from Prairie du Chien, Wis., to Quincy, Ill., and to a much less extent in adjoining waters. Though their utilization originated so recently as 1891, the present annual product is very large, exceed¬ ing 20,000 tons during certain years. The value is much less than that of choice pearl shell, selling usually for less than $25 per ton.

Many univalve shells are sufficiently nacreous and iridescent to be used as mother-of-pearl, especially abalones, top-shells, ((green snail® shells, etc. In variety and intensity of coloring the pearly lamina of some of these exceeds that of the pearl oyster. However, the coloring is not so harmonious nor is the shell so thick and flat as in the pearl oyster, consequently they are not desirable for many purposes for which the latter

are employed.

Mother-of-pearl is used in the manufacture of a great variety of articles for which it is peculiarly adapted by reason of its hardness and beauty. Most important of these are buttons, knife handles, parasol handles, buckles, penhold¬ ers, pistol stocks, etc. It is also used for inlaying and for covering opera glasses, card cases, etc. In the aggregate a very large number of persons are given employment in working up this ma¬ terial. Formerly the business was centred at Birmingham, England, and Vienna, Austria, 4,000 persons being thus employed at the former place a few years ago ; but it has gradually ex¬ tended to other localities, especially in France and the United States. It is claimed that about 8,000 persons are employed in working pearl shell in Austria, 5,000 in England, 4,000 in France, 3,500 in America, and many in various other countries. The manufacture of pearl but¬ tons in this country from domestic shells dates from 1891 and is already of very great extent, the 60 factories giving employment to about 2,500 persons and using 12,000 tons of shells annually, yielding about 600,000,000 buttons.

Pearl shell is much used for inlaying, es¬ pecially of musical instruments, jewelry boxes, domestic furniture, church vestments, etc. Artis¬ tic work of this nature is done in the United States as well as in Europe and Asia. The shell is cut in simple patterns and is also used

OYSTER

MAGINE

CLAM

RAZOR

HELMET

MUSSEL

PHEASANT

POINTED

TOP

ABALONE

TRITON

COWRY

COURT

VOLUTE

TURBAN

PAINTED

HELIX

PAINTED >

THORNY

OYSTER

SPINDLE

COPYRIGHT, 1913, BY F. E. WRICHT.

in floral and in arabesque designs. For this purpose the brilliantly colored abalone shell is used with beautiful effect, especially when com¬ bined with white shell. Some very elaborate work of this nature is done. A mandolin re¬ cently exhibited in this country contained more than 2,000 pieces of four different kinds of shell, and 225 days' work were expended in cutting and finishing the pieces, the whole representing an investment of $1,500. Some years ago there was exhibited in New York a piano, the entire keyboard of which was of pearl. The body of the keys was of ordinary white shell and the flats and sharps were of green abalone, the effect being extremely rich and pleasing.

The most abundant shells in America are those of oysters and clams, especially the former. The product of these approximates 40,000,000 bushels annually and the purposes to which they are applied are numerous. The most im¬ portant use is in road-making. At various points on the Atlantic seaboard, and particularly in the Chesapeake and the Delaware bay regions, many miles of good roads have been made of this material. It is estimated that 3,000 miles of roads on the Atlantic Coast have been sur¬ faced with shells. Connecticut, Long Island, southern New Jersey, Delaware, Maryland, Virginia, North Carolina and Lousiana con¬ tain many excellent examples of oyster shell roads. To cover a road 16 feet

wide to a depth of 15 inches in the middle and eight inches at the sides requires about 30,000 bushels of shells per mile, costing on an average of four cents per bushel or a total of $1,200 per mile. To keep such a road in good repair requires about 2,500 bushels of shells per mile annually at a cost of about $100. Though they constitute the cheapest and most convenient material in the sections where they are commonly used, shells are not wholly satisfactory for road material owing to their rapid wear and the spreading of objectionable lime dust.

Oyster shells have been largely employed as ballast for beds of railroads. While not nearly so durable or steady as rock, they answer the purpose fairly well and are the most con¬ venient and economical material in many lo¬ calities. Examples of their use for this pur¬ pose occur on many of the railroads in Mary¬ land, Virginia and Lousiana.

Oyster shells have been extensively used as a source of 'lime, especially for agricultural pur¬ poses, as well as in masonry. Most of the brick buildings erected in colonial times were solidified with shell lime. Owing to its tendency to absorb moisture and thus make the houses damp its use for this purpose was abandoned soon after the discovery of limestone in abundance. The quantity of burned oyster shells spread on farming lands amounts to fnany thousands of tons annually. These shells are also crushed into small particles and fed to chickens to im¬ prove their digestion and their egg laving. This use is increasing in popularity. Oyster shells are also employed in the manufacture of certain special grades of steel owing to their large content of carbon.

A somewhat recent use for shells in America is for spreading on private oyster grounds for the purpose of obtaining a "set® of young oysters. When the extremely small ' oysters hatch from the floating eggs and sink to the

bottom it is important that they find a clean substance for attachment, otherwise they are readily smothered. It is estimated that 4,000,- 000 bushels of oyster shells are used annually for this purpose, mostly in the waters of New York, Connecticut and Virginia. They are spread immediately before the spawning season, usually in June in the Chesapeake region and in July in Long Island Sound.

Several other varieties of shells are used for ((spat collecting,® especially "jingles® (Anomia ophippium), "quarterdecks® (Crepidula forni- cata) and scallops (Pecten irradians). These are obtained mostly from Peconic Bay at the east end of Long Island where several hun¬ dred thousand bushels of mixed shells are dredged annually to be marketed in the oyster planting regions of New York and Connecticut. They are considered superior to oyster shells for "clutch,® owing to the fact that they are

smaller and only a few young oysters "set® on each, thus avoiding the crowding which occurs when large shells are used. Another reason for their preference is that they are easily broken and disintegrated and so do not en¬ cumber the ground after serving as "spat col¬ lectors.®

Large quantities of shells are used for orna¬ mental purposes. Especially prominent among these are the abalone or ear shells obtained from Califoria, Japan and various other coun¬ tries. About 500 tons of abalone shells are gathered annually on the Pacific Coast of Amer¬ ica, worth about $40,000. This product, how¬ ever, is only one-fourth or one-third as large as it was 20 years ago. When cleaned and polished the highly iridescent green, red and pearly white colors are exquisite and make these shells beautifully ornamental. Much skill is exercised in polishing in order to produce the best effects. Some of the abalone shells are of such shape and coloring that it is possible in grinding to produce a perfect cross of black against a pearly white background ; these meet with ready sale, the purchasers usually assum¬ ing that the cross appeared on the shell in nature.

The large green conch or fountain shell ob¬ tained on the Florida coast, the West Indies, etc., is much used for ornament. The graceful curves and the delicate tints of lovely pink color make it one of the most attractive of all shells. It is much used in making brooches, earrings, etc., and in the form of beads in imitation of pink coral and pink pearls. Large quantities of conches have been pulverized and used in porce¬ lain manufacture.

The pectens or scallop shells have long been admired owing to their beauty of form. Dur¬ ing the Middle Ages pilgrims ornamented their clothing with them, as an indication, doubtless, of having crossed the sea to the Holy Shrine in Palestine, and for this reason they were known as "pilgrim shells.® To commemorate that event they were preserved in the heraldic devices of many families whose ancestors had performed that journey. Scallop shells were formerly much used by cooks for holding foods, hence the name "scalloped oysters.®

The popularity of shells for personal orna¬ mentation has resulted in their use as currency or standard of value among many primitive peo¬ ples. A well-known example of this is the wampum of the North American aborigines,

made from the quahog or hard clam shell, so numerous on the Atlantic

Coast. Somewhat less extensive was the use of the tooth shell or Dentalium on the northwest coast, and of the ab- alone on the California coast. Even at the present time in many parts of Africa and to a less extent in British India species of the cowry family are used as currency. In some seasons eight or 10 vessels carry cargoes of the money cowry (Cyprea moneta) to the west coast of Africa, where they are exchanged for palm oil and other products.

The window-glass shell (Placuna placenta), found in the Pacific and Indian oceans, and es¬ pecially among the Philippine Islands, has an almost flat bivalve shell, six or eight inches in length. The inside of this shell is glazed over and has a subdued pearly lustre. It is so thin and transparent that print can be read through it, and it is used as a substitute for glass in windows, admitting a soft, mellow light into the room. It is commonly used in the Philippines in windows of residences, etc.

The giant clam (Tridacna) yields the largest and heaviest shells in existencf single pairs weighing over 500 pounds in some instances. These are much used for ornaments, especially for fountain basins and for benetiers or holy- water fonts. They are found in many tropical waters, and especially on the pearling grounds, where they are a source of danger to divers. A beautiful pair of these shells are used as benetiers in the church of Saint Sulpice in Paris. This pair is said to have been a gift of the republic of Venice to Francis I.

The most artistic use of shells is in the formation of cameos, which are cut from uni¬ valve shells made up of laminae of different colors. The middle lamina, which is usually white, forms the body of the figure in bas- relief, and the dark inner layer forms the ground. The outer or superficial layer is en¬ tirely removed, or it may be used to give a varied appearance to the surface of the design.

Of the several varieties of shells employed in cameo cutting, the black helmet (Cassis tnberosa) is the most valuable. This occurs in the West Indies and to a less extent on the American coast south of Cape Hatteras. It has a blackish inner coat and the cameo cut from it shows white upon the onyx ground, varying from dark claret to much lighter shades, pro¬ ducing effective results. This shell is ordinarily 12 inches in length, and usually five brooches of average size and several smaller articles may be cut from each one. The bull's mouth (C. rufa) is also popular ; it has a red inner coat and a sardonyx ground. The horned helmet (C. cornuta) gives white upon an orange yellow background. The laminae of this shell are apt to separate, making it disagreeable to work. The queen conch is also used to a considerable extent; the ground color is brilliant pink, which is somewhat evanescent on exposure to light. An attractive method of using this shell is

to incise the bas-relief in the pink layer, using the white as the background, thus reversing the usual method.

Shell cameo figures consist of copies of an¬ tiques, original designs and portraits. Some¬ times an entire shell — especially of the black helmet variety — is used, and either a small figure is cut on the face of the shell or the entire surface is covered. In the latter case

the principal design is in the centre and around it are such minor designs as the fancy of the artist dictates. Some of these sell very high, and hundreds and even thousands of dollars are secured for a single carved shell. One ex¬ hibited in this country by a Naples artist repre¬ sented two years' work. See Cameos.

SHELL CAMEOS. The ordinary medium used on which to carve cameos (see Cameos) was the kinds of quartz having layers of dif¬ ferent colors, such as the onyx. They afforded a hard, durable substance which, when carved, maintained the sharpness of line. Shells such as those of the mollusks, conches, etc., were more or less utilized, probably on account of the ease of graving art effects on their softer body, but the ease of manipulation gained was at the cost of their durability. Few specimens of ancient shell cameos come down to us. Most of our earlier examples date from the 15th and 16th centuries. So the question whether ancient shell cameos were few or whether they are scarce now through being discarded when their beauty was marred by age remains open. An artistically carved Triducna squamata shell is in the British Museum, London, claimed to be of Phoenician workmanship (6th or 7th century B.C.).

History. — By the 16th century Italian and French carvers vied with each other in pro¬ ducing artistic cameo effects on shells ; there was a good demand for them. These Renais¬ sance pieces are found on such helmet-shaped (cassis) conches as the Cassis rufa ((

Examples. — Some of the finest specimens of shell cameo art to be found in the Morgan Collection donated to the American Museum of Natural History, New York City. Four mag¬ nificent examples are given in our illustrations ; they are depictions of such subjects as a copy of Guido Reni's

SHELL CAMEOS

SHELL CAMEOS

1 Diana of Actaeon

By permission of American Museum of Natural History, New York

after an Italian conception ; Phoebus in his biga (chariot) ; an engraved nautilus shell dis¬ playing legends, prayers and emblems. In the British Museum also are a number of fine speci¬ mens of this art. Cyril Davenport, in his work (Cameos® (London 1900), gives good illustra¬ tions of two white and gray cameos depicting respectively ((Ganymede and an Eagle® and "Hercules killing Cacus,® both of 16th century Italian origin; a "Centaur® cut in Cyprcea shell of the same date and origin, and a male por¬ trait mounted as a pendant attributed as the others.

Technique. — In the May 1913 issue of the American Museum Journal, New York, L. P. Gratacap, curator, gives a clear description of the technique of shell cameo carving. But few of a number of shells are of value for this purpose, those showing dullness, weakness or turbidity or having speckled under surface of the upper layer are rejected. Thinness of the back layer causes the artist to discard such. Having selected a shell, a tin wheel, assisted with water or emery powder, cuts the object into pieces and the best, from the point of view of color and texture, are selected for opera¬ tion. The design to be carved is chosen ac¬ cording to its adaptation in size and treatment ; the thickness of the layers and other qualifi¬ cations of the specimen point to the degree of boldness of the execution permissible. In the execution of large chef-d' oeuvres the entire shell surface is sometimes covered with the design. Next the artist prepares the surface by eliminating all imperfections such as discolora¬ tion, roughness of surface, etc. The outer edge of the cameo is next produced, in oval, square or oblong form, with the aid of a small grind¬ stone whose lower part revolves in a trough of water (grinding is less liable to split or splinter the tender layers of the shell than sawing). A handle is now cemented to the shell with a mixture of tar, resin and brick- dust, wetted paper being used to cover the shell's back. After fixing the handle in the wooden ((chancery® of a notched board the shell's surface is cleaned and a drawing of the subject penciled in. In the work of carving 10 graving tools (burins, etc.), of different sizes are used. With the carving finished the background is planished with boxwood bur¬ nishers, working in pumice and oil first, then in rotten stone moistened with a little sulphuric acid (oil of vitriol). The polishing deepens the color tones as well as creating a glaze that adds distinction to the relief work. The bur¬ nishing process has to be quickly followed by an active cleaning off of the acid with a damp¬ ened cotton wad so as to hinder its chemical action from eating into the substance of the shell, thereby creating pittings and unevenness to mar the

whole performance. In the more highly talented work a minuteness of detail and almost microscopic expertness are some¬ times displayed by the artist that almost equals that to be found in the cameo carvings done in the hard gemstones.

Clement W. Coumbe.

SHELL GAME. See Thimble Rig.

SHELL-IBIS, or SHELL or SNAIL EATER, names for the open-bill (q.v.). It is not an ibis, but a stork, and feeds principally

on snails and fresh-water mussels. See Open- bill.

SHELL MONEY. See Wampum.

SHELL-SAND. Sand consisting in great part of fragments of shells comminuted by the beating of the waves (see Sand), and often containing a small proportion of organic matter. It is a very useful manure, particularly for clay soils, heavy loams and newly-reclaimed bogs. It is also advantageously applied to any soil deficient in lime. It neutralizes the organic acids which abound in peat, and forms with them compounds which serve as food for plants. Great deposits of shell-sand are found on the coasts of Devonshire and Cornwall, and are of much value in the agriculture of that district. Shell-sand is also found on many other parts of the European coasts, and is much used as a manure in the maritime districts of France, especially Bretagne and Normandy. It abounds upon the coast of Florida and the Gulf of Mex¬ ico and in some places has been compacted and cemented into the rocky substance called co¬ quina, and often used as a building-stone.

SHELLABARGER, Samuel, American lawyer and politician : b. Clarke County, Ohio, 10 Dec. 1817 ; d. Washington, D. C., 6 Aug. 1896. He was graduated from Miami Uni¬ versity, Oxford, Ohio, in 1842, and was ad¬ mitted to the bar in 1847. In 1851 he was elected to the Ohio State legislature, and was a member of Congress in 1861-63, 1865-69, and 1871-73. In 1871 he introduced what was known as the "Ku Klux Law.® In 1869-71 he was Minister to Portugal, and after his last term in Congress he was appointed a member of the Civil Service Commission, but devoted himself to the practice of law in Washington. See United States — Reconstruction.

SHELLEY, shel'i, Harry Rowe, American organist and composer: b. New Haven, Conn., 8 June 1858. He studied music at Yale under Professor Stoeckel and afterwards Dudley Buck, Vogrich and Dvorak. After completing his musical education in Paris and London, he began his career

as professional church or¬ ganist and since 1899 has been engaged at the Fifth Avenue Baptist Church, New York. He has composed many songs, anthems and organ pieces, and his sustained compositions include two sacred cantatas; a lyric music drama, Bo¬ rneo and Juliet ; a lyrical intermezzo, (Santa Claus) ; a (Symphony in E major0 ;*

SHELLEY, Mary Wollstonecraft Godwin,

English writer: b. London, 30 Aug. 1797; d. there, 21 Feb. 1857. She was the daughter of William Godwin and Mary Wollstonecraft. In 1814 she eloped with the poet Shelley to Swit¬ zerland, and after the death of his wife, Har¬ riet Westbrooke, was married to him. While traveling with him she composed her famous romance of (Frankenstein } (1818), which ex¬ cited an immense sensation. After her hus¬ band's death she devoted herself much to liter¬ ary work, producing

an edition of Shelley's poetical works and mis¬ cellaneous writings. (See Frankenstein). Con¬ sult Marshall, Mrs. Julian, (Life of Mary Woll-stonecraft Shelley > (London 1889).

SHELLEY, Percy Bysshe,ˆ English poet: b. Field Place, near Horsham, Sussex, 4 Aug. 1792; d. by drowning in the Bay of Spezzia, on or after 8 July 1822. He was the eldest son of Timothy, afterward Sir Timothy, Shelley, a not over-intelligent country gentleman, and grand¬ son of Sir Bysshe Shelley, who was something of an adventurer, handsome, clever and grace¬ less. His mother, Elizabeth Pilford, seems to have handed on to him her beauty and her fond¬ ness for writing. After some tutoring he was sent to Sion House Academy, at Brentford, a middle class school, where his shyness and deli¬ cacy exposed him to brutal bullying. His biog¬ raphers seem right in dating from this period his hatred of tyranny and resistance to all forms of oppression. He seems also to have developed his faculty for musing, for scientific specula¬ tion and for wide reading, especially at this time in the wild romances of Mrs. Radcliffe and others of her class. On 29 July 1804 he entered Eton where he remained for five years, developing along the lines just described. His tutors were not calculated to inspire his re¬ spect and thus could do little or nothing to check his extravagant and abnormal tendencies ; nor could the outrageous fagging to which he was subjected fail to be deleterious to so sensi¬ tive an organization as his. He was nicknamed <(Mad Shelley,® lived as much apart as he could, dabbled in chemistry, haunted romantic spots, read widely — acquiring a taste for the classics, — and found some consolation in the society of Dr.

James Lind (later represented as the hermit in (The Revolt of Islam and as Zona- ras in (Prince Athanase*), an elderly physi¬ cian of scientific and eccentric tastes, who was apparently more sympathetic than discreet in his relations with a youth in need of guidance. As was natural, the precocious boy soon began writing and before he was 17 had com¬ posed a Radcliffian romance, (Zastrozzi,* as well as some immature poetry — e.g., parts of the (Wandering Jew* written in conjunction with his cousin and future biographer, Thomas Med- win, who had also been with him at Sion House. Perhaps more important for his future was his interest in serious writers both practical and theoretical, Franklin, Pliny, Condorcet, who strengthened his native bent toward inquiry and were in part responsible for his early abandon¬ ment of religious orthodoxy.*

Shelley left Eton, with somewhat unex¬ plained abruptness, in the summer of 1809; he matriculated at University College, Oxford, 10 April 1810. From the amount he published in the latter year it would seem that he spent much of the interim in writing, and it is known that he had a love affair with a cousin, Harriet Grove. At Oxford he formed a friendship with the able, rather cynical Thomas Jefferson Hogg, and was encouraged in his wholesale recalci¬ trancy. The university was little hospitable to advanced ideas, and when Shelley sent to bishops and heads of colleges, copies of his syllabus of arguments demonstrating (The Ne¬ cessity of Atheism,® it was small wonder, though a great pity, that, on his failure to answer their questions, the authorities should have handed him a sentence of expulsion al¬

ready signed and sealed. (25 March 1811). Hogg protested and was also expelled.

The offending pamphlet was Shelley's sixth publication, and he still lacked several months of being 20. In 1810 he had published — how, is something of a mystery — cZastrozzi} ; Oriental Poetry by Victor and Cazire) (written in conjunction with his sister Eliza¬ beth, withdrawn on the ground that she had borrowed from (III); and (Saint Irvyne; or, the Rosicrucian, another Radcliffian ro¬ mance. It is needless to say that these produc¬ tions are devoid of intrinsic merit. His fifth publication was (A Political View of the Exist¬ ing State of Things, * issued anonymously at Oxford for the benefit of Peter Finerty, a pris¬ oner for libel. This has entirely disappeared.*

Shelley left Oxford with mingled regret and indignation and took lodgings in London. His affair with his cousin Harriet Grove had been broken off, and he was soon involved in the most unhappy entanglement of his much en¬ tangled life. Not being permitted to come home unless he would break with Hogg and refusing to do this, he found himself adrift in London, and

fate brought him in contact with a friend of his sister Elizabeth's, Harriet Westbrook, the pretty daughter of a retired hotel-keeper. She was romantic and fancied herself persecuted by her family; Shelley was also romantic, and per¬ secuted, and quixotic, and inflammable. When he went out of town in July 1811 she wrote him pitiful letters, which so worked upon his feel¬ ings that he returned to London, ran away with her and married her at Edinburgh at the end of August. How far the girl's relatives con¬ nived at the capture of the baronet's son can¬ not be ascertained. Naturally the Shelleys were indignant, and cut off the madcap's allowance; but Mr. Westbrook allowed them £200 a year, and finally Shelley's father contributed the same amount.

It is unnecessary to detail their movements at this juncture save to say that they spent some months at Keswick near Southey and then, Shelley being inspired by the theories of Wil¬ liam Godwin (q.v.), they went over to Ireland to attempt to redress the wrongs of the long- suffering people. They were accompanied by Harriet's sister, Eliza Westbrook, whose pres¬ ence grew distasteful to Shelley, and they re¬ mained only about two months, since the Irish did not respond enthusiastically to Shelley's pamphlets. He was merely a visionary a little ahead of his times, for Catholic emancipation came peacefully not so many years after his death. When he returned to England, he ex¬ cited the attention of the government by revo¬ lutionary writings, but he was not molested. Believing, however, that an attempt had been made to assassinate him, he returned with his wife and sister-in-law to Ireland, and then he went with Harriet to London, where their first child was born (June 1813). About this time he printed privately his nebulous poem of free- thought (Queen Mab, accompanied by notes and a ˆvindication® of vegetarianism to which he had become a convert. Eight years later a pirated edition brought (Queen Mab* into no¬ toriety, much to its author's disgust. A dia-*

• '

• '

.

.

logue pamphlet, (1814), followed, bringing his publications up to the number of 14. Meanwhile he and Harriet had become estranged, partly no doubt from natural incompatibility, partly from Shel¬ ley's instability, to

use no stronger term. Critics and readers will probably never agree to the exact distribution of responsibility between the unfortunate pair ; but it seems manifest that admiration for Shelley's genius has unduly in¬ fluenced many of his biographers in their treat¬ ment of the matter. He met Mary, the daugh¬ ter of William and Mary Wollstonecraft God¬ win, and, as before with Harriet, found an attractive girl pining for sympathy at a time when he himself stood in need of it. She was a much more congenial partner for him than the inkeeper's daughter, to whom he had just been remarried according to the rites of the Church of England, and after Harriet made the mistake of leaving him and going with her child to her father's at Bath, he lost little time in persuading his new 17-year-old friend to elope with him.

They left England on 28 July 1814 taking with them Jane (Claire) Clairmont, a daughter of Godwin's second wife by a former marriage. They spent some time in Switzerland and then, after some financial difficulties, returned to Eng¬ land in September. Their experiences were later recounted by Mary Shelley in (The His¬ tory of a Six Weeks' Tour) (1817). Mean¬ while Shelley had made Harriet the astounding proposition that she should live with him and Mary, and after his return to England he saw her and the son she had borne him during their separation. No reconciliation was affected, however, and Shelley naturally found himself cut off from all his former sources of income. The death of his grandfather early in 1815 in¬ duced his father to allow him £1,000 a year in order to guard against his encumbering the family estate. He settled £200 a year on Har¬ riet, took a house near Windsor Forest wrote (1816, a poem still immature in thought, but indicating a great advance in his command of poetic technic), and studied the classics. In May 1816 he went again to Swit¬ zerland with Mary and Jane Clairmont, and there he came under Byron's (q.v.) sway, ex¬ erting in his turn a strong influence upon his new friend. The autumn found Shelley back in England established at Great Marlow. Here, in December 1816, he learned of Harriet's sui¬ cide in the Serpentine. The immediate causes of the act are obscure; but, whether or not the charges that have been made against Har¬ riet's morals during the closing months of her life are fully or partially justified, it seems absurd to acquit Shelley of all responsibility for her tragic fate.

He was now free to marry Mary Godwin (30 Dec. 1816) but the law would not allow him to recover the control of his two children by Harriet. Shelley resented Lord Eldon's decision, with some justice so far as the man¬ agement of their education was concerned; yet he had certainly so conducted himself as to make the Chancellor's decision seem equitable to most people at the time. Meanwhile a son, William, had been born to him and Mary, Leigh Hunt had become a friend, and Keats an ac¬ quaintance, and the elaborate narrative and allegorical poem (Laon and Cythna) had

been

begun. Two political tracts were also published and, true to the humanitarian principles that always actuated his conduct, even when its ef¬ fects were deleterious to others, Shelley min¬ istered to the sick and needy around him. His charity seemed boundless, and during his visi¬ tations he contracted a bad case of ophthalmia. His health had been otherwise poor and, as for many reasons England was not a congenial dwelling-place, he determined to go to Italy. He left England with his family, and by the end of March 1818 was at Turin. Two months previously Ollier had reissued under the title of (The Revolt of Islam, } the long poem, which on its first appearance, had been entitled (Laon and Cythna.* The relationship between the hero and heroine had been too close to suit any save the most emancipated readers, and Shelley had reluctantly made a few alterations, in the interest not so much of conventionality and the success of the poem as a plea for the cause of oppressed peoples. No changes could make so long and misty a performance popular ; but lovers of poetry will always find (The Revolt of Islam) incomparable for its glowing pic¬ tures and its exquisite melodies. Both in its merits and in its refects it reflects as though it were a mirror, its author's unique, attractive, yet singularly incomplete and unbalanced genius.

The first months in Italy were spent at Lake Como, Milan and the Baths of Lucca, and saw the completion of the romantic poem (Rosalind and Helen) and the translation of Plato's Symposium. > Then Shelley with Jane Clair¬ mont took a disagreeable journey to Venice to see Byron with regard to Miss Clairmont's ille¬ gitimate daughter Allegra. (See Byron). The poem (Julian and Maddalo> commemorates some features of the visit. Byron loaned Shel¬ ley a villa at Este, and the latter at once sent for his family. A few weeks later Mary's sec¬ ond child, Clara, died at Venice. Returning to Este, Shelley began (Prometheus Unbound> and, charmed by the scenery, wrote the first draft of his beautiful (Lines Written Among the Euganean Hills. > The winter of 1818—19 was spent at Naples, which inspired, among other things, the < Lines Written in Dejection, > and a magnificent ode to the beautiful and op¬ pressed city. He also wrote to his friend, Thomas Love Peacock, letters justly famous for their powers of description and admirable prose style. The spring of 1819 found him settled in Rome hard at work upon what is often re¬ garded as his greatest achievement, the aspir¬ ing but somewhat nebulous lyrical drama, (Prometheus Unbound,) published in 1820. Im¬ mediately after this he wrote the much more realistic tragedy entitled (The Cencip probably the least subjective of his works, which was composed and published at Leghorn in 1819. Shortly before he left Rome in the summer, his son

William sickened and died. The well- nigh heart-broken parents retired to Leghorn and then to Florence, where another son, after¬ ward Sir Percy Florence Shelley, was born. Here in October Shelley wrote that splendid poem, probably the most nobly imaginative of all his lyrics, the (Ode tp the West Wind, as well as two of his less successful, posthumously published poems, the parody (Peter Bell the Third* and (The Masque of Anarchy,* in¬ spired respectively by Wordsworth's famous*

poem and by the infamous Manchester Mas¬ sacre.

The beginning of 1820 saw the wanderers established at Pisa, where Shelley's health be¬ gan to improve. Several English friends, the Gisbornes and the Williams, and later Lord Byron and the traveler, Trelawny, added to the attractions of the place and stimulated Shel¬ ley's genius, if not to the production of any elaborate poems of consequence save (Adonais) and (Hellasˆ at least to the writing of some of his most beautiful lyrics and charmingly fa¬ miliar pieces. Among the poems of 1820 were the (Epistle to Maria Gisborne, the fantastic (Witch of Atlas, * the exquisite Sensitive Plant,* and those matchless lyrics of their kind, (The Cloud* and the (Ode to a Skylark.* The chief productions of 1821 were the Pla¬ tonic (Epipsychidion,* the final form of which was inspired by an idealistic passion Shelley conceived for Emilia Viviani, an Italian girl confined in a convent against her will, the de¬ lightful and eloquent (Defence of Poetry) (in prose), the immortal elegy on Keats,*

In 1822 Shelly began a drama on Charles I, but did his best work on translations from (Faust and Calderon's (Magico Prodigioso) and on the highly imaginative (Triumph of Life,* unfortunately left incomplete. In April the Shelleys went with the Williamses to Lerici, and there the friends passed an ideal time until the arrival of the Hunts drew the kind-hearted Shelley early in July to Leghorn and Pisa to look after their comfort. On 8 July he be¬ gan his return journey with Williams in the yacht Ariel, which they owned jointly. Tre¬ lawny watched them sail away, saw a squall come up and, when it was over, could catch sight of them no more. His suspicions that all was not well were allayed for a time; but, as the days passed, every one interested in the two voyagers lost hope. On 18 July Shelley's body — if the copies of Sophocles and Keats found in the pockets definitely marked it as his — was washed ashore near Via Reggio. It was first buried in the sand, then cremated — save the heart which would not burn — and the ashes*

were buried in the Protestant cemetery at Rome (7 Dec. 1822) under the pyramid of Caius Cestius and near the grave of Keats. There seems to be little reason to credit the notion that the yacht was designedly run down.

Shelley is said to have been tall and slender, very youthful in appearance, with a fair com¬ plexion and dark blue eyes full of artless won¬ der. Trelawny at first sight almost took him for a girl. His receptivity, gentleness, charity and other exquisite traits suggest the woman as did his appearance; but his fiery hatred of oppression and shams, his calm defiance of public obloquy, his power to charm men of the world forbid us to regard him as in any sense effeminate. In his writings no less than in his character and in his appearance this blending of essentially manly and essentially womanly char¬ acteristics is perceptible. His ideals were pas¬ sive rather than active ; his most indisputably successful poems are in theme and tone ex¬ pressions of longing, weakness, pain and sad¬ ness; his best descriptive passages are hazy; his verse is fluid and melodious rather than deeply harmonious. On the other hand, he has had the power to inspire strong souls with his ideals; more than any other of our poets he has caught the Greek secret of endowing with life mythical figures and conceptions ; he was a scholar, a critic, a man of taste and a prose- writer of no mean order; his genius was varied and copious beyond that of most of his contem¬ poraries. With regard to his final rank in Eng¬ lish literature no consensus of opinion seems at¬ tainable. While the public indifference that de¬ pressed him in his own day has long been over¬ come, he has never attained true popularity either at home or abroad, and his critics are only too likely to become his worshippers or else to display too openly a feeling of hostility toward his life and works. He is still too much the idol of advanced spirits and of people who are inclined to be a trifle exquisite in their lit¬ erary tastes and somewhat supercilious with re¬ gard to the tastes of others. His position as a great poet is scarcely open to question, but his position as a genuine classic in the fullest sense of the term Js surely doubtful so long as Mat¬ thew Arnold and other qualified critics dissent from the praise of his ideals, the defense cf his conduct, and the enthusiasm for his elaborate poems such as (Prometheus Unbound) to be encountered in extravagant measure in the books and essays of his admirers. Perhaps it is safe to conclude that, while his conduct must be censured in many particulars, his character must be pronounced singularly winning and lovable, and, that, while his elaborate poems, though wonderful, are not sustained works of art, his genius as a lyrical poet is in range and quality unique and extraordinarily high. See Adonais ; Cenci, The; Ode to the West Wind; Prometheus Unbound; Queen Mab; To a Skylark.

Bibliography.— Various volumes of Shel¬ ley's poems, imperfect and in some cases pirated, helped to spread his small reputation until 1839, when

Mrs. Shelley published an edition of his works in four volumes. Many important poems and letters have since been published — e. g., in Richard Garnett's Relics of Shelley (1862). The most complete edition of the works in verse and prose is that by H. B. Forman (8 vols 1876-80). There are good editions of the*

*poetry — in several volumes — by Forman (the new 'Aldine, * 1892), G. E. Woodberry, and others also in one volume by Dowden ((Globed, Woodberry (American 'Cam- bridge)) , and T. Hutchinson ('Oxford,* 1904 — tiie latest and most complete). The prose works were edited by R. H. Shepherd in 1888 (2 vols.). The authoritative biography is that by Edward Dowden (2 vols., 1886) — too plainly the work of an advocate, as J. C. Jeaffreson's (The Real Shelley * (2 vols., 1885) is the work of a prosecutor. Two good short biographies are those by J. A. Symonds ((English Men of Letters,* 1878) and William Sharp ((Great Writers,) 1887 with a bibliography). Consult also works by F. Rabbe, H. S. Salt, and others and, of course, the earlier lives by Medwin (1847) and Hogg (1858), Trelawny's Recol¬ lections of Shelley and Byron,* Leigh Hunt's 'Autobiography,* and other books of this de¬ voted friend, etc. Of critical essays there is a large number and variety — see especially those by Matthew Arnold, Walter Bagehot, Dowden, Garnett, Leslie Stephen and Woodberry. For bibliography consult Forman's 'Shelley Li¬ brary.)*

William P. Trent,

Professor of English Literature, Columbia

U niversity.

*SHELLEY'S CASE, Rule in, a rule de¬ clared by the courts of England late in the 16th century. By this rule when an estate of freehold is acquired by gift or purchase by an ancestor, with remainder to his heirs or the heirs of his body, the word "heirs** is a word of limitation and not of purchase; that is, the ancestor takes the estate in fee or in tail, ac¬ cording to circumstances, and the heirs take nothing. The rule has been repealed or amended by statute in most jurisdictions in the United States, so that the heirs take the re¬ mainder.*

SHELTER ISLAND, N. Y., island and township, Suffolk county : situated at the eastern end of Long Island between Peconic and Gardiner's bays ;

length, eight miles ; width, four. It is connected with the mainland and the Long Island Railroad by ferry to Green- port. The island was originally owned by the Manhasset Indians; was acquired by Lord Sterling, and during colonial times belonged to the jurisdiction of Connecticut. The coast line is irregular and deeply indented with small bays and inlets, affording good harbors for yachts and small craft; there are excellent facilities for pleasure boating and fishing, and the island is a popular summer resort. The New York Yacht Club has a station on the northern coast. Pop. 1,200.

SHELTON, Don Odell, American evangel¬ ist and editor: b. Odessa, N. Y., 5 May 1867. He was secretary of the East Side Branch of the Young Men's Christian Association in New York in 1889-99, and in 1906 became president of the National Bible Institute, New York. He founded the Bible To-day, and in 1909 became editor of the Message. Author of 'Personal Work and the Personal Worker) (1896); 'Public Use of the Bible) (1898); 'Christianize America) (1903) ; 'Chapters on the Lord's Faithfulness) ; 'The Prayer that Changes Things (1915), etc.*

SHELTON, Conn., borough in Fairfie'd County, on the Housatonic River, 10 miles weH of New Llaven, and on the New York, New Haven and Hartford Railroad. There are manufactures of pianos, silverware, paper, paper boxes, brass and pins. Pop. 4,807.

SHEM, the eldest son of Noah; according to the Mosaic account, he is the father of all the nations that inhabited southwestern Asia (Gen. x, 21-31), a territory inclusive of Syria Chaldaea, parts of Assyria, of Persia, and of the Arabian peninsula. Hence the inhabitants are called Semites, and their language and civilization styled .Semitic. See Semitic Lan¬ guages, and consult Budde, 'Die biblische Urgeschichte) (Giessen 1883) ; and the com¬ mentaries on Genesis by Skinner (1910) and Ryle (1914).

SHEMAKHA, she-ma-ka/, town in the district of Transcaucasia, on the Zagolovai, about 63 miles northwest of Baku. It is situ¬ ated in the midst of mountains, on verdant slopes and was once a commercial centre. It has, however, suffered from earthquakes, and one in 1902 almost destroyed it. Silk manufac¬ ture is the chief industry. Shemakha's history from 1712 was one of almost continuous war¬ fare; it was captured and occupied in turn by various Persian, Turkish and Russian com¬ manders. On Ptolemy's map it is set down as Kamachia. Pop. 23,000.

SHEN-SI, shen-se, China, a northern in¬ terior province, bounded on the north by the Great Wall, which divides it from Mongolia, on the east by Shan-si and Hunan, on the south¬ east by Hu-peh, on the south by Sze-chuen, and on the west by Kan-su; area, 75,270 square miles. It is traversed by the Pehling range, separating the basins of the Hwang-ho and

Yang-tse or Yellow and Great rivers; is well watered, chiefly by the Wei-ho, Loh and Wu- ting; produces good crops of wheat, millet, and cotton, maize, rape seed, opium, hemp, and tobacco, rears great numbers of horses, cattle, goats and sheep; and has mines of iron, copper, lead, coal and gold. These, with rhubarb, musk and wax, are the chief exports. The capital of the province is Sing an fu. Pop.

8,450,200.

SHENANDOAH, shen-an-dd'a, Iowa, city in Page County, on Nishnabotna River, 110 miles southwest of Des Moines, on the Chicago, Burlington and Quincy, the Wabash, and the Keokuk and Western railroads. The Western Normal College is located here as is the World's Missionary Training School. There are seed firms, nurseries, packing industries, and manufactures of wagons, plows, brick, tile, knit goods, flour and cigars. Pop. (1920) 5,255.

SHENANDOAH, Pa., borough in Schuyl¬ kill County; on the Pennsylvania, the Phila¬ delphia and Reading, and the Lehigh Valley railroads; about 100 miles northwest of Phila¬ delphia and 12 miles north by east of Pottsville, the county-seat. The place was settled about 1850 by William Kelley, but was not laid out ars a city until 1862 ; in 1866 it was incorporated as a borough. It is the commercial and indus¬ trial centre of a region rich in anthracite coal; six large collieries are within the limits of the borough, and a number of other large collieries are within a one-mile radius. The chief in¬ dustries of the place are connected with the

mining and shipping of coal ; machine shops, mining-tool works and foundries are among the manufactories. Other manufacturing estab¬ lishments are hat and cap factories, brewery and printing establishments. There are several churches, representing the different denomina¬ tions, public schools, parish schools and a pub¬ lic library. There are also national banks, sav¬ ings bank and building and loan associations. The government is administered by a chief burgess and a council of 15 members chosen at popular election. Pop. (1920) 24,726.

SHENANDOAH, a river in Virginia which has its source in Augusta County, and flows northeast, on the west side of and nearly parallel to the Blue Ridge. It enters the Poto¬ mac at Harper's Ferry, W. Va. Its total length is about 170 miles. It flows rapidly over nearly all its course and furnishes extensive water power which is used for manufacturing and has

contributed greatly toward the industrial pros¬ perity of the valley. The valley of the Shenan¬ doah was the scene of many stirring engage¬ ments of the Civil War.

SHENANDOAH, The, a ship named after the Shenandoah River, Virginia, bought by the Confederate States during the American War of the Confederacy and placed in commission as a privateer during the last year of that war. The Shenandoah was built in Glasgow in 1863 ; she was intended for the far Eastern trade but was purchased by the Confederates in 1864 and in October of that year was commissioned as a privateer. The ship, named the Sea King , had sailed from London for Madeira, where she received her privateersman's crew, composed mostly of officers from the Sumter, the Ala¬ bama, then destroyed, and the Georgia, and common sailors, under the command of Capt. James I. Waddell. The Shenandoah sailed from Madeira and circumnavigated the globe, via Melbourne, being the only Confederate ves¬ sel to do so. In the course of her career she captured or destroyed 39 of the enemy's vessels, valued in the aggregate at about $2,000,000. Her last action, the last hostility of the war, was on 28 June 1865, about three months after the war had ended, when the Shenandoah ap¬ peared among the American whalers near the Bering Straits and captured 10 vessels before nightfall. On 2 August Captain Waddell learned from an English bark of Lee's sur¬ render, five months before. He sailed at once to Liverpool and delivered his ship to the British man-of-war Donegal, never having been captured nor defeated in his entire career. The British government released all of the crew not British-born and turned the vessel over to the American consul.

SHENANDOAH MOUNTAINS, a range in Virginia, belonging to the Alleghanies, ex¬ tending northeast and southwest, and forming the western boundary of the Shenandoah Valley.

SHENANDOAH VALLEY, Va., between the Shenandoah Mountains on the west and the Blue Ridge Mountains on the east. It is noted for its beautiful scenery and the variety and beauty of its vegetation. The large forests found here contain chestnut, hickory, oak and other hardwood trees. The valley acquired a world-wide fame during the Civil War, when

it was the scene of many encounters. In 1862 took place here the campaign of «Stone- wall® Jackson (q.v.), and in 1864 it was the scene of the campaigning of Philip Henry Sheridan (q.v.).

SHENANDOAH VALLEY, Military Op¬ erations in. At the beginning of the Civil War the Shenandoah Valley was the garden spot of Virginia, full of grain and hay and teem¬ ing with livestock and other supplies essential to the Confederates. It became the beaten track and alternately the camping-

ground of both armies, witnessed much brilliant strategy and many hard-fought battles, and at the close of the war was a scene of desolation. Its topography favored the Confederates, since, as covered on the east by the Blue Ridge, it was the easiest route for threatening Washing¬ ton and the most direct route for their armies to move into Maryland and Pennsylvania.

1861. — Virginia passed an ordinance of se¬ cession on 17 April, and the next night State troops moving, without authority of the gov¬ ernor, from Staunton and other points in the valley, seized Harper's Ferry, with its arsenal, armory and munitions of war, the small United States guard abandoning the place and retreat¬ ing to Carlisle, Pa. The town was speedily oc¬ cupied by several Virginia regiments, and Col. T. J. Jackson put in command. Jackson was relieved by Gen. J. E. Johnston, 23 May. Upon the dash of Col. Lew Wallace on Romney (q.v.), 13 June, and the approach of Gen. R. Patterson from Chambersburg to Williamsport, threatening his position, Johnston, 15 June, burned all the bridges of the Potomac from Harper's Ferry northward to Williamsport, abandoned Harper's Ferry and fell back to Winchester. On 2 July Patterson crossed the Potomac at Williamsport, occupied Martins- burg and, under General Scott's order, threat¬ ened Johnston at Winchester, to hold him there, while General McDowell advanced on General Beauregard at Bull Run; but, 18 July, Johnston eluded Patterson and with 9,000 men marched through Ashby's Gap to Piedmont and took cars for Manassas. The Union occupation of the lower valley was brief ; Patterson, after Johnston had left the front, fell back to Har¬ per's Ferry, where 25 July he was relieved by General Banks, when the Union troops, save a small guard at Harper's Ferry, were withdrawn to the Maryland side of the Potomac. Late in October ˆStonewall® Jackson was assigned to the command of the Confederate forces in the lower valley, with headquarters at Win¬ chester, and was reinforced by Loring's divi¬ sion from West Virginia. Jackson swept the few Union outposts from the fringes of the valley, broke the Baltimore and Ohio Railroad and Chesapeake and Ohio Canal in several places, as far westward as Hancock, and 10 Jan. 1862 drove the Union forces from Rom¬ ney and occupied it with Loring's division. By order of the Confederate Secretary of War, 31 January, Loring was withdrawn from Romney to Winchester, where Jackson remained dur¬ ing the rest of the winter, the Union forces again occupying Romney on 7 Feb. 1862, demonstrating on Winchester and sending ex¬ peditions southward to bring in cattle.

1862. — -Active operations began in the valley late in February by the movement of two Union

divisions across the Potomac at Harper's Ferry and an advance on Winchester, near which Lander's division from Romney and the south branch of the Potomac joined the column. Manassas and Centreville were evacuated by Johnston on 8 and 9 March, and Jackson, with his 5,000 men, under Johnston's order, aban¬ doned Winchester on the night of the 11th, as he was on the eve of giving battle to Gen¬ eral Banks, and fell back up the valley 42 miles to Mount Jackson, followed by Shields' (form¬ erly Lander's) division of Banks' corps. On the 20th Shields moved back to Winchester, fol¬ lowed by Jackson. Informed on the march that part of Banks' corps was being sent from the valley to reinforce McClellan east of the Blue Ridge, Jackson, in order to detain it in the val¬ ley, pressed Shields closely, skirmished with him on the evening of the 22d, and next day brought him to battle at Kernstown (q.v.), less than four miles south of Winchester, and being de¬ feated, again retreated up the valley. His ac¬ tion had the desired effect ; Williams' division, which was on the march through Snicker's Gap of the Blue Ridge, was recalled and Banks again pursued Jackson up the valley as far as Harrisonburg, 66 miles from Winchester. Jack- son fell back to Swift Run Gap, in the Blue Ridge, on the road from Harrisonburg to Gor- donsville, where he watched an opportunity to strike Banks in flank and rear should he ad¬ vance from Harrisonburg to Staunton. Under President Lincoln's order Banks fell back to Strasburg, and Fremont, commanding a corps, was ordered to move from Franklin and Monterey to co-operate with Banks in an ad¬ vance on Staunton. Jackson, informed of Fre¬ mont's advance, made a rapid movement from Swift Run Gap to Staunton and, pushing through that place on 5 May, engaged Fre¬ mont's advance, under Generals Schenck and Milroy, on the 8th, and in a hard-fought battle checked it, Schenck falling back to Franklin. (See McDowell, Irvin). Jackson followed to Franklin, found Schenck too strongly posted to attack and on the 12th began his re¬ turn march to the valley to attack Banks. On the 19th he started from Mount Solon, near Harrisonburg, on the 21st crossed the Massa- nutton Mountains from New Market to Luray, and, joined by Ewell's division, swept down the Luray Valley, with over 16,000 men and 48 guns, defeated Colonel Kenly's command of 900 men at Front Royal (q.v.), 23 May, and pursuing, captured the most of it. This movement turned Banks' fortified position at Strasburg, and on the morning of the 24th Banks retreated north¬ ward on the valley pike, was struck in flank by Jackson at Middletown and Newtown, but foiled his efforts to intercept him, and after a running fight from Middletown to Winchester, halted on the night of the 24th at Winchester to give battle. On the morning of the 25th Jackson attacked Banks, who had about 7,000 men, defeated him and droye him across the Potomac at Williamsport. (See Winchester, Battle of). Jackson halted his main body a few miles beyond Winchester, but the cavalry followed Banks to the river. On the 28th Jack- son sent part of his

force toward Harper's Ferry, which made a demonstration, as though intending to force the position and cross into Maryland. Meanwhile Fremont and McDowell, moving respectively from Franklin on the west

and Fredericksburg on the east, were converging on Strasburg, in Jackson's rear, to cut him off, upon which he abandoned his demonstration on Harper's Ferry and, starting from Winchester early in the morning of the 31st, by a rapid march slipped through the net prepared for him and arrived at Strasburg 1 June, Fremont's skirmishers being within a mile of the road over which he passed. Next day Fremont gave a stern chase on the valley pike, and Shields' divi¬ sion, now of McDowell's corps, marching by Luray Valley, endeavored to reach Jackson's rear or strike him in flank. Fremont pressed his rear closely in many sharp encounters, driv¬ ing him steadily through Woodstock, Edenburg and Mount Jackson; but Jackson, avoiding a general engagement, when arriving at Harrison¬ burg, sent his sick and wounded to Staunton, and 6 June, turning to the left, marched toward Port Republic. Later in the day his rear guard had an encounter with Fremont's advance near Harrisonburg (q.v.), in which Gen. Turner Ashby, a gallant Confederate cavalry com¬ mander, was killed, and the result of which was that Fremont's advance was repulsed. Fremont advanced in force from Harrisonburg on the morning of the 8th, and at Cross Keys (q.v.) was met by Jackson, who, after a severe fight, repulsed him. Leaving Ewell's division to re¬ sist Fremont, should he renew the fight next morning, Jackson marched the rest of his army to Port Republic to meet Shields, who was moving up Luray Valley, and whose advance, under Colonel Carroll, had dashed into Port Republic on the morning of the 8th, was driven out and joined later in the day by a brigade under Col. E. B. Tyler. Jackson attacked the two brigades of Tyler on the morning of the 9th, and at first was repulsed, but finally, on being reinforced, after a hard fight, drove Tyler from the field and back into Conrad's Store, on the other two brigades of Shields' division. (See Port Republic, Battle of). Ewell had been recalled from Fremont's front, the bridge over the South Branch destroyed, thus checking Fremont's pursuit, and that night Jackson marched to Brown's Gap in the Blue Ridge. Fremont and Shields were ordered to cease pur¬ suit and fall back, the former to Middletown to join Sigel and Banks, who had advanced from Harper's Ferry and Williamsport, the latter to join his corps at Fredericksburg. The Valley campaign of 1862 established Jackson's fame as a soldier. From the date of his arrival at Staunton, 5 May, to the battle of Port Republic was 35 days, during which he had marched about 300 miles, fighting four battles and en¬ gaging in many other encounters, and with 16,000 men had kept 60,000 Union troops em¬ ployed, and paralyzed McClellan's campaign against Richmond. On 17 June Jackson stole quietly away from Brown's Gap to

join Lee on the Chickahominy. Munford's cavalry bri¬ gade and a few infantry were left in the valley to demonstrate in the direction of Strasburg, and Munford was soon relieved by Robertson's brigade, which took post at Harrisonburg and New Market. When General Pope, 27 June, took command of the Army of Virginia, formed by the corps of Fremont, Banks and McDowell, he withdrew Fremont and Banks from the valley to the east of the Blue Ridge, leaving garrisons of a small brigade each at Winchester, Martinsburg and Harper's Ferry

to cover the Baltimore and Ohio Railroad. Throughout July and August 1862 the valley enjoyed comparative quiet. In August Lee advanced upon Pope and drove him back to the defenses of Washington, then crossed the Potomac into Maryland by a route east of the Blue Ridge. Upon arriving at Frederick and finding, contrary to his expectations, that Mar- tinsburg, Winchester and Harper's Ferry were still held by Union troops, interposing on his proposed line of supply through the Shenandoah Valley and interfering with his intended move¬ ment into Pennsylvania, Lee on 10 Septem¬ ber sent Jackson across the Potomac at Wil¬ liamsport to clear the valley of Union troops and capture those at Harper's Ferry. Win¬ chester had already been abandoned; General White was driven from Martinsburg to Har¬ per's Ferry on the 11th, and on the morning of the 15th Harper's Ferry surrendered and the entire valley was once more in Confederate pos¬ session. When Lee withdrew across the Poto¬ mac, after the battle of Antietam, he halted a month on the Opequon and near Winchester ; but when McClellan began crossing the Potomac at Berlin, on 25 October, and moved along the east foot of the Blue Ridge, Lee set his troops in motion up the valley, contesting with Mc¬ Clellan possession of the passes leading into the valley, and marching Longstreet's corps through Chester Gap to Culpeper Court House, left Jackson's corps in the valley, near Winchester, with one division at Chester Gap. McClellan was relieved from command of the Army of the Potomac 7 November, and Burnside, who suc¬ ceeded him, marched from Fredericksburg, and when his advance appeared before that place on the 17th, Jackson withdrew from the valley by way of Swift Run Gap, and joined Lee at Fredericksburg, leaving in the valley a strong brigade of cavalry, supported by a small force of infantry. Union forces now crossed the Potomac and the Confederates were pushed up the valley to New Market, and again the Union troops occupied the lower valley, holding Win¬ chester, Martinsburg and Romney, with out¬ posts at Strasburg, and scouting up the valley of the South branch as far as Monterey. Under cover of this occupation the Baltimore and Ohio Railroad was repaired.

1863. — Active operations in the valley began this year by a Confederate raid from near Staunton to destroy the Baltimore and Ohio Railroad west of New Creek, which resulted in several encounters, and was partially success¬ ful, many bridges being burned and the road broken in places as far westward as Clarks¬ burg, W. Va. While these movements were in progress Lee defeated Hooker at Chancellors- ville, after which he immediately began prep¬ arations for his second invasion of Maryland which culminated in the battle of Gettysburg, and chose the route through the Shenandoah Valley, which offered a safe line of opera¬ tions, and was held by Union troops not suffi¬ cient in number to present a serious obstacle. General Milroy, with about 9,000 men, occu¬ pied Winchester, with a brigade in observation at Berryville ; General Kelley, with 10,000 men, was at Harper's Ferry; and a detachment of 1,200 men and a battery under Colonel B. F. Smith, at Martinsburg. There were outposts at Romney and also toward Strasburg and Front Royal watching the Confederate cavalry and

infantry under General Jenkins in the upper valley. Lee began his movement 7 June by ordering General Imboden, then near Monterey, to move on Romney, by way of the South branch of the Potomac, and directing Jenkins, with his brigade of cavalry, to march down the valley and concentrate at Strasburg or Front Royal, to co-operate with the advance of the army. Ewell's corps, leaving Brandy Station on 10 June, passed through Chester Gap and, marching by way of Front Royal arrived at Cedarville on the evening of the 12th, where Ewell detached Jenkins' cavalry brigade and Rhodes' division of infantry to capture Mac- Reynolds' brigade at Berryville; but Mac- Reynolds, discovering their approach, withdrew to Winchester, which he reached by a round¬ about way, on the 13th. Rhodes and Jenkins, avoiding Winchester, pushed on to Martins¬ burg and, on the 14th, drove Smith and his battery from the place, capturing five guns of the battery that were retiring on the Williams¬ port road. Smith and his infantry escaped by crossing the Potomac at Shepherdstown Ford and moving to Maryland Heights. Meanwhile Ewell, with the two divisions of Early and Edward Johnson, marched direct on Win¬ chester, surrounded and captured most of Mil- roy's command on the 15th; after a hard fight, part of those who escaped reached Harper's Ferry and part crossed the Potomac at Han¬ cock. (See Winchester, Military Operations at and Near). On the 15th Early crossed the Potomac at Williamsport and Shep¬ herdstown Ford, and occupied Hagerstown and Sharpsburg. On the 17th the gar¬ rison at Harper's Ferry was withdrawn to Maryland Heights. Imboden had driven the Union troops from Romney and collected a large herd of cattle, and once more the Valley of the Shenandoah was cleared of Union troops. Lee reported that as the result of these oper¬ ations Ewell had captured 4,000 prisoners, with their arms, 28

guns, 11 colors, 300 loaded wagons, with their teams and a considerable quantity of stores of all descriptions. After Gettysburg, Lee recrossed the Potomac at Wil¬ liamsport on the night of 13 July and marched to Winchester and Bunker Hill. When Meade crossed the Potomac south of Harper's Ferry, Longstreet's corps moved up the valley, crossed the Blue Ridge at Chester Gap and marched to Culpeper Court House, where it arrived on the 24th. A. P. Hill's corps followed by the same route, and Ewell's after pursuing Kelley's Union troops west of Martinsburg, found Chester Gap and Manassas Gap held by Meade, who was marching along the east side of the Blue Ridge, and crossing higher up, at Thornton's Gap, joined the army at Culpeper. (See Manassas Gap, Engagement at). Again the lower val¬ ley was reoccupied by Union troops, and re¬ mained in their possession at the opening of the campaign of 1864. Late in the year General Early was put in command of two infantry brigades and some cavalry to hold the upper valley, annoy the Union forces at Winchester, to collect and bring away everything useful to the Union troops or his own, and especially to buy or seize cattle, horses, sheep and hogs, in which the lower valley and that of the South branch abounded. His instructions to do this were carried out to the letter, and the wintei of 1863-64 witnessed a most remarkable for-

aging campaign, in which the lower valley and that of the South branch were stripped of thousands of animals. These foraging parties brought on many collisions between the oppos¬ ing troops.

1864. — In the general movement planned by Grant for the armies under his com¬ mand in May 1864, General Sigel, who had command in the Shenandoah Valley, was to advance from Harper's Ferry and Winchester up the valley, seize the rich stores of grain, and form a junction with General Crook, who, with cavalry, infantry and artillery was to march from the mouth of Gauley River, West Virginia, to destroy the Virginia and Tennessee Railroad and reinforce Sigel at Staunton, for a movement on Lynchburg. Sigel had about 24,000 men in his command, most of them guarding the railroad from the Monocacy and Harper's Ferry to Parkersburg and Wheeling. He concentrated part of them at Winchester, ordered his cavalry to Cedar Creek and Stras- burg and, starting from Winchester 9 May, with 5,500 infantry and artillery, 1,000 cavalry and 28 guns, moved up the Valley. His cav¬ alry had several mishaps and was badly pun¬ ished and, after a severe defeat of his command by General Breckinridge at New Market, 15 May, he retreated to Cedar Creek. General Hunter relieved him on the 21st and, being re¬ inforced to 8,500

men, advanced upon Gen. W. E. Jones at Piedmont, defeated him there 5 June, and next day occupied Staunton. (See Piedmont, Battle of). At Staunton, Hunter was joined by Crook and Averell; he began the work of destruction, thoroughly and quickly completed it, and on the 7th marched on Lynch¬ burg, which he failed to take. He was driven westward by Early, who, with his corps of 8,000 men, had been sent by Lee, 12 June, from Gaines' Mill to expel Hunter from the valley and, if possible, destroy him, and then to threaten Washington. It may here be stated that Hunter, Crook and Averell marched to the Kanawha, and thus left the valley open to Early. On 23 June Early began his return march from the pursuit of Hunter, and reached Staunton on the 27th. He had been joined by Breckinridge's division of infantry, and Mc- Causland's brigade of cavalry. On the 29th he sent the greater part of his cavalry to destroy the bridges of the Baltimore and Ohio Rail¬ road, and with his main body pushed down the valley turnpike, reaching Winchester 2 July. After driving all the Union troops from the lower valley and destroying as much as possible of the railroad and canal, he crossed the Poto¬ mac at Shepherdstown, demonstrated on Mary¬ land Heights (q.v.), and marching through Frederick, defeated Gen. Lew Wallace at Monocacy (q.v.) 9 July, and then marched on Washington. Failing to take Washington by surprise, as he had hoped to do, he retraced his steps, recrossed the Potomac at White's Ford on the 14th, and resting two days near Leesburg, moved on the morning of the 16th for the Shenandoah Valley by way of Snicker's Gap in the Blue Ridge; crossed the Shenan¬ doah River at Snicker's Ferry, and on the 17th took up a position near Berryville. Meanwhile Hunter and Crook, who had retreated from Lynchburg to the Kanawha, had come by steamboat and railroad and joined the forces at Harper's Ferry, and on the 18th and 19th

engaged Early at Snicker's Ferry and Berry's Ferry without success. During the 19th Early learnt that Averell's division of cavalry, which also had come from the west, was march¬ ing from Martinsburg toward Winchester, threatening his rear, whereupon, during the night, he began a retreat to Strasburg. Averell defeated Ramseur's division at Stephenson's Depot on the 20th, which caused Early to move back with one division from Newtown to Win¬ chester; but being threatened by the Union ad¬ vance from Berryville, he again fell back to Newtown, and on the 21st concentrated his in¬ fantry near Middletown. Next day he fell back beyond Cedar Creek and covered all the roads from Winchester. Crook and Averell united their forces at Kernstown, and on the morning of the 24th Early again moved on Win¬ chester, attacked Crook and drove him back, pursuing beyond Winchester. (See Kerns¬ town, Second Battle of). Early continued the pursuit next day to Bunker Hill, Crook and Averell recrossing the Potomac. On the 26th Early marched to Martinsburg (q.v.), and de¬ voted the 27th and 28th to the destruction of the railroad ; and on the

29th McCausland crossed the Potomac on his noted raid to Chambersburg, Pa. (q.v.). Early remained at Mar tinsburg and Bunker Hill until 3 August, send ing expeditions into Maryland by Williamsport and Shepherdstown fords to Hagerstown and Sharpsburg, collecting horses, cattle and other supplies, then, recrossing the Potomac on the 6th, concentrated at Bunker Hill on the 7th.*

Grant had been annoyed and disturbed by these Confederate irruptions and operations in the valley, and had come to the decision that it should be made untenable for either army and had framed instructions for Hunter to drive the Confederates from it and make it a waste, where no army could live. Hunter yielded the command to Sheridan, who took it 7 August and proceeded to carry out Grant's instructions. On the morning, of the 10th Sheridan marched his army from Halltown, near Harper's Ferry, toward Early's line of communication, upon which Early abandoned Winchester on the 11th and fell back to Cedar Creek, followed by Sheridan next day. At Cedar Creek Early received reinforcements — • a division of infantry, two brigades of cavalry, and a battalion of artillery from Lee's army, all under command of Gen. R. H. Anderson — and resumed the offensive so aggressively with his cavalry, bringing on several sharp encoun¬ ters, that Sheridan withdrew his infantry on the night of the 16th, his cavalry following next day, driving all the livestock in that part of the valley before it, and burning the grain from Cedar Creek to Berryville, near which Sheridan had taken position. Early pursued Sheridan on the morning of the 17th, struck and routed part of his command near Winchester, drove it through the town, and on the 21st moved with his whole army to attack Sheridan at Berry¬ ville. That night Sheridan, after some sharp encounters with Early's advance, fell back to Halltown. For three days Early demon¬ strated on Sheridan's position, then, leaving one division in front of Sheridan, marched on the 25th, with four divisions and his cavalry, to Lee Town and toward Sheperdstown, his cav¬ alry pushing on to Williamsport. Beyond Lee Town, Early met and engaged Torbert's cavalry

and drove it back to Shepherdstown. (See Shepherdstown, Engagements at). Early re¬ mained that night at Shepherdstown, where he was joined next day by his cavalry, which had demonstrated on Williamsport, and the com¬ mand returned to Winchester. On 28 August Sheridan advanced his infantry to Charlestown. Merritt's cavalry division, going by way of Lee Town, drove the Confederate cavalry from that place to Smithfield and across the Opequon. Next day Early drove Merritt back through Smithfield, but was checked and driven back himself across the Opequon by a division

of Sheridan's infantry. (See Smithfield, En¬ gagement at and Near). There were now several minor encounters and counter demonstrations, and on the morning of 19 September Sheridan crossed the Opequon and in a hard-fought battle defeated Early, who retreated to Newtown and Fisher's Hill, near Strasburg. (See Opequon, Battle of the). Sheridan followed on the 20th, and on the 21st again defeated Early at Fisher's Hill (q.v.), pursuing his retreating troops during the night and next day to Mount Jackson. Beyond New Market, Early aban¬ doned the valley pike and took a road leading to Port Republic. Sheridan, not having his cavalry with him, halted until it came up on the 25th, when it advanced to Staunton and Waynesborough , destroying the railroad be¬ tween the two places, but, being threatened in flank and rear by Early, fell back, burning mills, storehouses, barns, grain and forage, driving before them all livestock and devas¬ tating the whole width of the valley from Staunton northward. On the return march Sheridan's cavalry was harassed by that of the Confederates, who were turned upon and routed at Tom's Brook, 9 October, when Sheri¬ dan resumed his march down the valley, halt¬ ing on the 10th on the north side of Cedar Creek. Early had followed, and on the morn¬ ing of 19 October fell upon Sheridan's army and drove it back in some disorder, but it was rallied near Middletown and, resuming the of¬ fensive, defeated Early, who retreated to New Market. (See Cedar Creek, Battle of). This practically ended the valley campaign of 1864. There were numerous raids and cavalry encounters, but no general movements or heavy engagements. Early remained in the vicinity of New Market until 16 December, when he fell back to near Staunton, and Sheridan went into winter quarters at Kernstown. Between the two there was no subsistence for man or beast; the valley had been desolated. One of Early's staff records in his diary that from the time of Early's appearance in the valley late in June till the middle of November he had marched 1,670 miles and had 75 battles and skirmishes.

1865. — During the winter the greater part of Early's command was sent to Lee at Peters¬ burg, leaving Early a very small force of in¬ fantry and cavalry. On 27 February Sheridan, with two well-equipped divisions of cavalry of 5,000 men each, started from Winchester on the last campaign up the Shenandoah Valley, and with but little opposition reached Staunton, Early falling back to Waynesborough. The work of destruction at Staunton was completed, and Early was followed to Waynesborough, where 2 March his command of 1,800 men was defeated and dispersed, most of them being

captured, with all their colors, 11 guns and train. (See Waynesboro, Battle of). Sheri¬ dan then moved unmolested to the Vir¬ ginia Central Railroad, which he destroyed for miles, and marched to White House, on the Pamunkey River, where he arrived 19 March, and then moved to join

Grant's army before Petersburg.

There is no area upon which the armies con¬ tended that witnessed more brilliant strategy, fertility of resource, more rapid and exhaust¬ ing marches, and more gallant fighting than that enclosed by the Alleghany Mountains and the Blue Ridge; there was no other section of the country whose inhabitants suffered more than did those of the Shenandoah Valley. Consult 'Official Records, > Vols. II, V, XI, XII, XIX, XXI, XXV, XXVII, XXIX, XXXVII, XLII, XLIII, XLVI, LI; Allan, 'Jackson's Valley Campaign ; Ashby, T. A., 'The Valley Campaigns* (New York 1914) ; Buffum, F. H., (Sheridan's Veterans) (Boston 1883-86) ; Early, (The Last Year of the War for Independence1* ; Kellogg, S. C., (The Shen¬ andoah Valley and Virginia, 1861—65 > (New York 1903) ; Hotchkiss and Allan, (The Battle- Fields of Virginia) (New York 1867) ; Pond, G. E., 'The Shenandoah Valley in 1864* (New York 1883) ; Sheridan, 'Personal Memoirs,) Vol. II; The Century Company's (Battles and Leaders of the Civil War,* Vols. I, II, III, IV.*

E. A. Carman.

SHENG-KING, shen-king', or LIAO TUNG, lyo-toong', Manchuria, the southern¬ most province, stretching into the Yellow Sea between the gulf of Liao Tung and Korea Bay, has an area of 55,000 square miles, a pleasant climate, and is generally fertile. Pop. 5,500,000. The southern portion of the province is known as the Liao Tung Peninsula; at the extremity is Port Arthur (q.v.) taken by Japan in the war of 1894-95, but retroceded to China on the payment of 30,000,000 taels ($21,300,000). In 1898, however, the Chinese leased it and ad¬ jacent territory including Talienwan or Dalny, to Russia. Consequent on the Boxer troubles of 1901 Russia occupied the whole of Man¬ churia, and rapidly proceeded to colonize it. This procedure was interrupted by the Russo- Japanese war of 1904. See Manchuria.

SHENSHIN, Afanasy Afanasevich. See

Fet, Afanasy Afanasevich.

SHEN.STONE, William, English poet and landscape-gardener: b. Halesowen, then Shrop¬ shire, now Worcestershire, November 1714; d. there, 11 Feb. 1763. He was educated at Ox¬ ford, and intended entering a profession, but after inheriting his father's estate, Leasowes, lived in retirement upon it, devoting his life to its embellishment and fco writing poetry, much of which was very popular, though little of it is now remembered. Among his poems are (The Schoolmistress) (1742); 'Pastoral Ballad> (1743) ; and the stanzas 'Written in an Inn. His complete works*

were published in three volumes by Robert Dodsley (1764-69), and an edition of his poems with a memoir by Gilfillan appeared at Edinburgh in 1854. Consult Beers, H. A., 'History ,of English Romanticism in the Eighteenth Century (New York 1899).*

SHEOL, she'o-l, a Hebrew word signifying the place of the dead. Wherever it occurs in

the Hebrew text it is rendered in the authorized English version by ((grave» or by "hell,® or by ((pit-w In the revised version ˆSheol® is gen¬ erally left untranslated in the text, while ((grave» is put in the margin. (See Hades; Hell). Consult Jastrow, M. (in American Journal of Semitic Languages, Vol. XIV, Chicago 1898) ; Jensen (Die Kosmologie der BabylonieU (Strassburg 1890) ; Schroder, (Die Keilinschriften und der alte Testament (Ber¬ lin 1902).

SHEPARD, Charles Upham, American mineralogist: b. Little Compton, R. I,, 29 June 1804; d. Charleston, S. C., 1 May 1886. He was graduated from Amherst in 1824 and made a special study of botany and mineralogy in the following year. He was lecturer on natural his¬ tory at Yale in 1830-47, occupied the chair of chemistry at the Medical College of South Caro¬ lina in 1854-61 and resumed it a few years after the Civil War. He was professor of chemistry and natural history at Amherst in 1845-52, and from 1852-77 was lecturer on natural history, after which he was made pro¬ fessor emeritus. His investigations resulted in the discovery of a new species of microlite in in 1835, of warwickite in 1838, and .of danburite in 1839, and he was also the discoverer of valuable deposits of phosphate of lime near Charleston which have proved of great value to agriculture, and their use in the manufacture of superphosphate fertilizers has made an im¬ portant addition to the chemical industries of South Carolina. His collection of minerals was at one time the best in the country, but was unfortunately partially destroyed by fire three ears after its purchase by Amherst in 1877. n addition to his numerous scientific papers his publications include (Report on the Geo¬ logical Survey of Connecticut (1837) ; trea¬ tise on Mineralogy) (1855), etc.

SHEPARD, Edward Morse, American lawyer: b. New York, 1850; d. 28 July 1911. He was graduated from the College of the City of New York in 1869, studied law and was ad¬ mitted to the bar. He established a practice in Brooklyn, and was an active member of the Democratic party there, being one of the organizers of the Young Men's Democratic Club of

Brooklyn. He held no public office except as member of the civil service commis¬ sion of the city in 1883-85, and chairman of that commission in 1888-90. In 1884-85 he was a State forestry commissioner, and was the author of the commission's report for that year. In 1901 he was the regular Democratic nominee for mayor of Greater New York, but was defeated by Seth Low. For several years he was counsel f.or the New York Rapid Tran¬ sit Commission, and resigned that position in March 1904 to become general counsel for the Pennsylvania Railroad. He wrote (Martin Van Buren) (in American Statesmen Series; rev. ed., 1900) ; (Dishonor in American Public Life) (1882) ; (The Work .of a Social Teacher)

(1884).

SHEPARD, Helen Miller (Gould), Amer¬ ican philanthropist: b. New York, 20 June 1868. She is a daughter of the late Jay Gould (q.v.), and has achieved an extended fame through her benefactions for charitable and educational uses. At the opening of the war with Spain she not only contributed $100,000 to the United

States government, but was active in the Wo¬ man's National War Relief Association, to which she was a generous contributor. Among other notable gifts of hers are the library of New York University; $50,000 to the naval branch of the Young Men's Christian Associa¬ tion of Brooklyn; and $100,000 to New York University, for a Hall of Fame for Great Americans, in 1900. She married Finley John¬ son Shepard 22 Jan. 1913; is a member of the board of the Russell Sage Foundation and of the national board Y. W. C. A.

SHEPARD, Thomas, English Puritan di¬ vine: b. Towcester Northamptonshire, 5 Nov. 1604; d. Boston, Mass., 25 Aug. 1649. He was graduated at Emmanuel College, Cambridge, in 1623, and after taking his A.M. there in 1627 he became a preacher at Earles-Golne. His practices, however, displeased Bishop Laud and he was forbidden to preach within the diocese of London. He was later chaplain to Sir Richard Darly in Yorkshire, and after¬ ward was called to the ministry at Heddon Northumberland. Through his non-conformity he was again silenced, this time by Archbishop Neile. He went to Boston in 1635, and was ordained pastor at Newton, now Cambridge. He was active in founding Harvard College and secured its location at Cambridge. He was also instrumental in establishing an Indian Mis¬ sion. His religious writings attained a con¬ siderable reputation. Author of (The Sincere Convert > (1641) ; (The Sound Believer>

(1645) ; (Theses Sabbaticae) (1649), etc.

SHEPARD, William, American soldier: b. Boston, Mass., 1 Dec. 1737; d. Westfield, Mass., 11 Nov. 1817. He enlisted in the pro¬ vincial army at the outbreak of the French and Indian War and served until 1763, participating in the battles of Fort William Henry and Crown Point and attaining rank as captain. He en¬ tered the Continental service at the beginning of the American Revolution, became colonel in 1777 and served until the close of the war. He was engaged in 22 battles and won a high repu¬ tation for his courage and ability. In 1788-90 he was a member of the executive council and as brigadier-general in command of the militia he defended the arsenal in Springfield at the time of Shays' Rebellion in 1786. He was after¬ ward promoted major-general of militia and in 1797-1803 served as member of Congress.

SHEPHARD, Elliot Fitch, American law¬ yer and journalist: b. Jamestown, N. Y., 25 July 1833 ; d. New York, 24 March 1893. He was graduated at the University of the City of New York in 1855 and was admitted to the Bar in 1858, afterward engaging in practice in New York. At the outbreak of the Civil War he was appointed aide-de-camp to Governor Morgan, with rank of colonel, and was assigned to recruiting service. He raised the 51st New York Volunteers, known as Shephard's Rifles, and was instrumental in enlisting a total of about 50,000 men. He founded the New York Bar Association in 1876 and remained in prac¬ tice in New York until 1884. He bought the Mail and Express, New York, in 1888, there¬ after editing it. He bitterly opposed Sunday traffic and travel and as owner of the Fifth Avenue stage line refused to permit its opera¬ tion on Sunday.

SHEPHEARD'S CALENDAR, The.

(The Shepheard's Calendar0 was published anonymously in 1579, with a dedication ((To the noble and vertuous gentleman most worthy of all titles both of learning and chevalrie, M. Philip Sidney.® The book consists of 12 ec¬ logues, each eclogue accompanied by a com¬ mentary or glossary that gives the argument and the meaning of unusual words; and pur¬ ports to be written by E. K., a friend of the poet's identified by some scholars with Edmund Kirke, a college-mate of Spenser's, and by others with Spenser himself. The whole is introduced by a ((General Argument® and an epistle to Master Gabriel Harvey of Cambridge. The (Calendar> was an immediate success. It went through five, editions during Spenser's lifetime, the first in 1579, and then in 1581, 1586, 1591, 1597; and was regarded as one of the high-water marks of English poetry. (The Shepheard's Calendar5 is descended from many sources. From the eclogue end its

origins were in Theocritus most of all, and to varying de¬ grees in Bion, Vergil, Petrarch and Bocaccio, Mantuan, Sannazaro and Marot. In metres and rhythms, of which Spenser attempts a wide variety, his main sources are Chaucer in par¬ ticular, Surrey, Marot, and the old ballads. The language of the book marks Spenser as a daring innovator in poetic diction. It consists of words and forms from Lancashire and other dialects, of colloquialisms, old literary words, obsolete expressions, the best of contemporary poetic diction, and coinages in words and in forms, often happy, sometimes far-fetched, of Spen¬ ser's own.

The single eclogues employ the traditional devices : the monologues, the two- and three- part. dialogues, the singing contests and the stories. The scheme of an eclogue to the month, following the general plan of country almanacs was original. But this .motive is followed only indifferently; in October not at all, quite fully in the January, February, Novem¬ ber and December divisions. In like manner the romance of Colin's love for Rosalynd also runs through some of the eclogues and is absent from others. The two motives combine to make the framework of the poem.

There is probably no one book in English that looks in so many poetic directions as (The Shepheard's Calendar.5 It is the work of a young writer possessed of enthusiasm, the splendor and excitement of the Renaissance, wide taste and reading, and one of the supreme lyrical gifts in all poetry for tone, rhythm, ornament and the enveloping glamor of a beau¬ tiful and rare spirit and mentality. Most of Spenser's later work finds its beginnings in the (Calendar5 ; and though he progressed far be¬ yond it in every way, in profundity of content, in rhythm and imagery, the progression was in almost every case directly from the qualities of his first work. As the poet's poet, which he undoubtedly is, Spenser stands from the first revealed. In (The Shepheard's Calendar5 lovers of Milton will find many of his qualities predicted, and to a varying extent the same is true of Shakespeare, Keats, Chatterton, Blake, Coleridge, Wordsworth and Tennyson, to men¬ tion only a few of Spenser's debtors.

Stark Young.

SHEPHERD, Francis John, Canadian physician: b. Cavagnol, Quebec, 25 Nov. 1851

He was graduated M.D. at McGill University in 1873 and later studied in England, France, Germany and Austria. He was associated with the medical faculty at McGill from 1875 and from 1883 was professor of anatomy there, becoming dean of the medical faculty in 1908. From 1883 he was senior surgeon of the Mon¬ treal General Hospital. He was president of the Canadian Medical Association in 1901. He is joint author

of (American Text-Book of Surgery5 (1892); (Retrospect of Surgery5 (3 vols., 188H94) and editor of (Robert Craik's Addresses5 (1907).

SHEPHERD, William Robert, American historian and educator: b. Charleston, S. C., 12 June 1871. He was graduated at Columbia University in 1893 and later studied at . the universities of Berlin and Madrid. He was a member of the faculty at Columbia from 1902 and from 1912 was professor of history there. He has specialized in United States colonial history and in that of Latin America. He is honorary professor of the University of Chile. Author of (History of Proprietary Government in Pennsylvania5 (1896) ; (Battle of Harlem Heights5 (1898) ; lThe Cession of Louisiana to Spain5 (1904) ; (Passing of New Amsterdam5 (1912) ; (Central and South America5 (1914) ; (Latin America5 (1914) ; (Expansion of Europe5 (1915) ; (Commonsense in Foreign Policy5 (1917), etc.

SHEPHERD OF HERMAS. See Hermas, Shepherd of.

SHEPHERD KINGS. See Hyksos.

SHEPHERD'S PURSE, a small crucifer¬ ous weed (Capsella bursa-pastoris) . It has rosettes of lobed. or pinnatified leaves, a short stem, branching into spreading pedicels carry¬ ing racemes of small white flowers, rapidly suc¬ ceeded by triangularly heart-shaped capsules, which have suggested this name and also those of mother's, heart, case-weed, shepherd's bag, etc., by their resemblance to ancient wallets. Originally European, this plant has been natur¬ alized throughout the temperate regions, bloom¬ ing during the entire year, and was formerly used as an anti-scorbutic and in hsematura.

SHEPHERDSTOWN, W. Va., town in Jefferson County, on the Potomac River and on the Norfolk and Western Railroad, about 65 miles west of Washington, D. C, and 10 miles above Harper's Ferry. It was settled in 1732; but there is good reason to believe a set¬ tlement was made as early as 1718 by German colonists from Pennsylvania. In 1762 it was incorporated as a town; first called Mecklen¬ burg and afterward changed to Shepherdstown. It is in an agricultural region. The chief manu¬ factory is a knitting factory. Other industrial establishments are a flour mill, machine shop and cement-works. There are several churches, some, of which are exclusively for the colored inhabitants. The educational institutions are Shepherd College, 'State Normal School and graded . public schools. The government is vested in a mayor, recorder and a council of five members, elected annually. Pop. 1,276.

SHEPHERDSTOWN, Engagements at and Near. Situated in a great bend of

the Potomac, nine miles east of Martinsburg and on one of the principal routes from the Shen¬ andoah Valley to Maryland, Shepherdstown, W. Va., was the scene of much activity during

SHEPHERDSTOWN FORD, ENGAGEMENT AT

the Civil War. Both armies, at various times, crossed the Potomac at a ford about one mile below the town, which was used by the Con¬ federates when they withdrew from the Antie- tam battlefield, 18— 19 Sept. 1862, and by a great part of Lee's infantry when they marched to Gettysburg in June 1863. On 25 Sept. 1862 General Pleasonton's cavalry division crossed the ford on a reconnaissance toward Martins- burg and a few miles beyond Shepherdstown encountered the Confederates in some force, and was checked after capturing a few men. Again (1 Oct. 1862) Pleasonton crossed the river, with 500 cavalry and a battery of six guns, drove the Ninth Virginia cavalry from Shepherdstown and pursued it across the Ope¬ quon and into Martinsburg, where he encoun¬ tered the rest of Col. W. H. F. Lee's brigade and a battery, both of which were driven from the place. Pleasonton remained in the town until 5 p.m., when he started on his return march, followed by Confederate cavalry and two guns, with whom about dark he had an encounter when within a mile of Shepherdstown, after which he recrossed the Potomac. The loss was slight on both sides. On 16 Oct. 1862 in co-pperation with General Hancock's division, which advanced from Harper's Ferry toward Charlestown and Winchester, General Hum¬ phreys, with about 500 cavalry, 6,000 infantry and six guns, marched from Sharpsburg, crossed Shepherdstown Ford at 4 a.m., and moved toward Smithfield on a reconnaissance. A mile out of Shepherdstown his advance was contested by Fitzhugh Lee's cavalry brigade and two guns. Lee was driven beyond Kearneys¬ ville, where he was reinforced by cavalry and a brigade of infantry, but was driven back, and Humphreys went into bivouac. The latter re¬ sumed his march on the morning of the 17th, and one and a half miles beyond Kearneysville came upon Lee in a strong position. Not de¬ siring to bring on an engagement, and having his cavalry make a dash on Smithfield, which was found occupied by Confederate cavalry, Humphreys returned to Sharpsburg by the way he had gone out, followed by cavalry and artil¬ lery as far as Shepherdstown.

After his Gettysburg campaign, Lee re¬ crossed the Potomac at Williamsport 14 July 1863. On that day, to watch his movements, General Gregg's cavalry division was sent across the Potomac at Harper's Ferry, and on the 15th marched to Shepherdstown, driving some cavalry from the town that evening and en¬ camping nearby. On the 16th, about 1 p.m.,

Gregg's advance near Kearneysville was at¬ tacked by Fitzhugh Lee, with his own and Chambliss' brigade, supported by Jenkins' brigade. Gregg was gradually driven back upon his guns, when he rallied his command, and the sharp engagement was continued, last¬ ing until dark, both sides dismounted. This engagement was on the Boteler farm, about a mile from town. During the early morning Gregg fell back to Harper's Ferry, with a loss of 70 killed, wounded and missing as the result of his fight on the 16th. The Confederate loss was 106.

On 21 Aug. 1864 Sheridan fell back from the line of the Opequon to Halltown, near Harper's Ferry, the cavalry, under General Torbert, being moved to his right at and near Shepherdstown. General Early demonstrated

on the position at Llalltown for three days, and on the 25th with the four infantry divisions of Rodes, Ramseur, Gordon and Wharton, with their artillery, moved northward toward Shepherdstown, his cavalry at the same time moving on Williamsport to keep up the im¬ pression of an invasion of Maryland and Penn¬ sylvania. Between Lee Town, seven miles southwest of Shepherdstown and Kearneys¬ ville, Early came upon Merritt's and Wilson's cavalry divisions, under Torbert, who had marched from Shepherdstown and Duffield's that morning on a reconnaissance to Lee Town. Torbert promptly attacked Wharton's division, Early advanced and drove it back in confusion nearly a mile. Early brought up the rest of his Gommand, and after a short and sharp con¬ test in which artillery was freely used, Tor¬ bert ordered his two divisions to fall back, Wilson's by the route it had come, and Merritt's by the direct road to Shepherdstown. Merritt was followed so closely by Early that when near Shepherdstown on the Charlestown road, Custer's brigade was ordered out to repel the advance, in which it succeeded, driving it back; but it was in turn struck in flank and rear by Gordon's division, which had marched across the country. Devin's brigade was sent to Cus ter's relief, and engaged Gordon. Custer was cut off and, after a sharp fight, made his escape by crossing the Shepherdstown Ford into Maryland. It was now dark; Merritt rejoined Wilson and both joined Sheridan. The loss was considerable on both' sides. Early en¬ camped near Shepherdstown, and next day moved back across the Opequon, and on the 27th to Bunker Hill. (See Civil War in America). Consult Dandridge, Mrs. D., his¬ toric Shepherdstown* (Charlottesville, Va.,*

1910).

E. A. Carman.

SHEPHERDSTOWN (Boteler's) FORD Engagement at. General Lee withdrew from the field of Antietam during the night of 18 Sept. 1862 and

recrossed the Potomac into Vir¬ ginia by the Shepherdstown or Boteler's Ford, one mile below Shepherdstown and about two and one-half miles from Sharpsburg. Leaving some artillery and two small infantry brigades at the ford to hold McClellan in check, he marched his army for the Opequon. On the morning of the 19th Pleasonton's cavalry fol¬ lowed Lee to the Potomac, and in the evening detachments of the Fifth corps forded the river, drove away the Confederate infantry, and seized some of the artillery. To ascertain how far Lee had retreated, General Porter was author¬ ized by McCldlan to send a reconnaissance be¬ yond the Potomac on the morning of the 20th, and Porter ordered over the divisions of Gen¬ erals Morell and Sykes. Before daylight two regiments crossed with spare horses, secured three guns that had been taken the night be¬ fore, and took them to the Maryland side. At 8 o'clock Sykes crossed the river with Lovell's brigade of regulars and pushed out a mile on the Charlestown road, when he discovered the Confederates in force, upon which Lovell fell back, skirmishing, to the heights near the river, and Warren's small brigade of two regiments formed on his left. The Confederates encoun¬ tered were Gen. A. P. Hill's division of six brigades, supported by three brigades under

General Early, all sent back by Lee when he heard that the Union advance had crossed the river. Hill's skirmishers had slowly pressed back Lovell, and meanwhile Barnes' brigade of Morefll's division had crossed the river, under orders to go on the road to Shepherdstown ; but Sykes ordered it straight to the top of a high steep bluff on the river bank to connect with Lovell's right. Before Barnes' brigade had all taken position Sykes came to the conclusion that he was too largely outnumbered to remain on that side of the river, and ordered the troops to recross, which was done by the left in good order, under cover of a heavy artillery fire from the Union batteries on the Maryland side; but the withdrawal on the right was not ac¬ complished without disaster. The 118th Penn¬ sylvania or ˆCorn-Exchange® regiment, 737 officers and men, had ascended the high bluff, and was not fairly in position when it was at¬ tacked by five brigades of A. P. Hill's division. It made a good fight, but was attacked on both flanks and in front, Colonel Prevost was wounded, and it was driven in disorder over the precipitous rocky bluff, many being killed and wounded in falling to the roadway below. The men began to cross the river, and the Confed¬ erates, advancing to the bluff, fired upon them as they were struggling to regain the opposite shore. Some were killed in the water; some were drowned; others, who took refuge in old lime-kilns on the bank of the river, were killed or wounded by careless firing of the Union bat¬ teries; and some surrendered. In this disastrous affair the regiment lost 53 killed, 10

*wounded, and 105 missing, or 269 out of a total brigade loss of 317. A. P. Hill's loss was 30 killed and 231 wounded. The Union loss on the 19th and 20th was 71 killed, 161 wounded and 131 miss¬ ing; the Confederate loss, 33 killled and 252 wounded. After the engagement of the 20th A. P. Hill and Early marched from the field and joined the main body of the army, which bivouacked that night on the Opequon near Martinsburg. Consult (Official Records) (Vol. XIX) ; Smith, (History of the 118th Pennsyl¬ vania Volunteers.**

E. A. Carman.

SHEPLEY, shep'li George Foster, Ameri¬ can soldier and jurist: b. Saco, Me., 1 Jan. 1819; d. Portland, Me., 20 July 1878. He was graduated from Dartmouth in 1837, from the Dana Law School at Cambridge in 1839, and admitted to the bar in 1840. He settled in Port¬ land in 1844, where he established a large prac¬ tice and in 1848-49 and in 1853-61 he was United States attorney for Maine. In 1861 he was commissioned colonel of volunteers in the Union army, participated in General Butler's expedition against New Orleans, commanded as acting brigadier-general at Ship Island, and after the capture of New Orleans was appointed military commandant, acting mayor, and was in charge of the defenses of the city until 1862 when he was appointed military governor of Louisiana and commissioned brigadier-general of volunteers. He commanded the military dis¬ trict of Virginia and North Carolina in 1864, was with the army of the James in 1864-65, and entered Richmond 3 Aprill 1865. He was ap¬ pointed military governor of the city and held the command until June when he resigned and resumed his law practice. From 1869 until his

death he served as United States circuit judge of the First Judicial Court of Maine. His de¬ cisions appear in Holmes'

SHEPPARD, Edmund Ernest, Canadian journalist: b. South Dorchester, Ontario, 29 Sept. 1855. He was educated at Bethany CoL lege, West Virginia, and engaged in journalism in the southern United States. After his re¬ turn to Canada he was editor of the Saint Thomas Journal in 1881-83 ; editor-in-chief of the Toronto News in 1883-87 ; of the Toronto Saturday Night, which he founded, in 1887- 1906; and editor-in-chief and owner of the Toronto Star in 1895-97. He represented the Dominion government on a commercial mission to Central and South America in 1897. Author of several novels,

SHEPPARD, John (Jack), English crimi¬ nal: b Stepney, Dec. 1702; d. Tyburn, 16 Nov. 1724. He was brought up in the workhouse of Bishopsgate, his father having died the year after his birth. He was apprenticed to a car¬ penter, but falling in with bad company de¬ serted

his master and took to a life of thieving. He was first brought up in court in 1723 as a runaway apprentice, but having secured his re¬ lease, he thenceforth, as he confessed, fell to robbing almost everyone that stood in his way. Having offended Jonathan Wild, a broker of stolen goods and informer against thieves, his capture was effected 23 July 1724. He was tried at the Old Bailey and condemned to death, but before his execution was effected he escaped from prison twice. He was hanged at Tyburn in the presence, it is said, of oyer 200,000 people. He was celebrated by all the journals and chap- books, and even by the divines, who exhorted their flocks to emulate him in a spiritual sense. Plays have been constructed around his person¬ ality and Harrison Ainsworth made him the hero of his novel (Jack Sheppard) (1839).

SHEPPARD, Morris, American politician: b. Wheatville, Morris County, Tex., 28 May 1875. In 1895 he was graduated at the Uni¬ versity of Texas and subsequently studied at Yale. In 1898-99 he practised at Pittsburg, Tex., arud since 1899 at Texarkana. On 15 Nov. 1902 he was elected to the 57th Congress for the unexpired term (1902-03) of his father. Mr. Sheppard was re-elected to the 58th, 59th, 60th, 61st and 62d Congresses (1903-13) from the first Texas district. On 29 Jan. 1913 he was elected United States senator for the unexpired term (ending 4 March 1913) of Joseph W. Bailey, and on the same day was elected for the term 1913-19. He was re-elected to the Senate in 1919.

SHERATON, sher'a-ton, Thomas, English furniture designer and cabinet-maker : b. Stock¬ ton-on-Tees, 1751 ; d. London, 22 Oct. 1806. He was apprenticed to a cabinet-maker and was self-taught in drawing and geometry. He set¬ tled in Soho square, London, about 1790 and there began the publication of the books of furniture designs which place him in the front ranks of English furniture designers. He ap¬ pears to have had a small shop, but very little of his work is known to be in existence. He made a scanty Jiving through the sale of his books, by teaching drawing, occasional preach¬ ing in Baptist chapels, and the publication of a number of religious books. He failed to

achieve personal success, his talents and tastes being too much diversified and untrained for concentrated endeavor. His furniture designs, however, had a far-reaching influence, as they were widely copied, and they remain unexcelled as models of exquisite taste and simplicity. His designs showed the square, tapering leg, simple lines and quiet ornament, marquetry be¬ ing almost the only decoration he used. He used satinwood to a marked

extent, and when he employed carvings they were of a flat description. His theory was that beauty in furniture lies in utility worked out through sound lines of construction. His later work shows an unfortunate departure from the rules laid down at the beginning of his career, his natural inventiveness being tempted by the vogue of the French Empire. In these he de¬ parted from his oldtime beauty and simplicity of line, and his influence is responsible for much of the grotesque carvings and ugly de¬ signs of the succeeding period. His name, however, is inseparably connected with his early designs. His books of designs are (The Cabi¬ net Maker and Upholsterer's Drawing Book) (111 plates, 1791; 2d ed., 119 plates, 1793-96; 3d ed., 122 plates, 1802) ; (The Cabinet Diction- ary> (1803); (The Cabinet Maker and Artist's Encyclopedia) (30 parts, 1804-06). The last work was planned in 125 parts, of which but 30 were completed when he died.

SHERBROOKE, sher'bruk, Sir John Coape, English soldier: b. England 1764; d. Calverton, Nottinghamshire, 14 Feb. 1830. He was commissioned ensign in the army in 1780, served in Nova Scotia in 1784-85 and in 1796-1800 was on duty in India and South Africa. He was sent to Egypt to negotiate a treaty with the Beys in 1807, and in 1808 was in temporary command of all the troops in Sicily. He later served in Portugal, was sec¬ ond in command to Wellesley in the campaign of 1809, and was awarded a medal for gallant conduct at Talavera. In 1811 he became lieu¬ tenant-general and was appointed governor- general of Nova Scotia. He led a naval ex¬ pedition to Maine in 1814 and captured some places on the Penobscot River. In 1816 he be¬ came captain-general and governor-in-chief of Canada. He resigned in 1818 in consequence of a paralytic stroke and lived the remainder of his life in retirement. Consult dictionary of National Biography > (London 1897).

SHERBROOKE, Robert Lowe, Viscount. See Lowe, Robert.

SHERBROOKE, Canada, city, port and capital of Sherbrooke County, Quebec, on the Canadian Pacific, Grand Trunk, Boston and Maine and Quebec Central railways ; 101 miles east of Montreal. The city is built on both sides of the Magog River at its junction with the Saint Francis and both rivers are crossed by fine bridges and afford abundant water power for manufacturing. The most import¬ ant industry is the manufacture of woolen cloth, one mill employing over 1,000 persons; other manufactures are paper, cotton goods, carpets, clothing, foundry products, machinery, axes, bobbins, electrical supplies and cigars, and there are breweries, tanneries and flour and lumber mills. Copper, asbestos and chrome iron ore are mined in the vicinity. The local trade is important and lumber, paper pulp, as¬

bestos, copper and lime are exported to the United States. It is the seat of a Roman Catholic bishop, and has fine county buildings, post-office building, several churches, an acad¬ emy, good schools, banks and daily, semi¬ weekly and weekly newspapers. Pop. about

17,000.

SHERIDAN, Philip Henry, American soldier: b. Albany, N. Y., 6 March 1831; d. Nonquitt, Mass., 5 Aug. 1888. He was gradu¬ ated at the United States Military Academy in 1853. He served in the 3d and 4th infantry regiments in the West until May 1861, when he was appointed captain in the 13th infantry. In December 1861 he was made quartermaster and commissary of the Union army in south¬ western Missouri. He was Halleck's quar¬ termaster during the Corinth campaign in 1862. In May 1862 he was appointed colonel of the 2d Michigan cavalry and was made brigadier- general of volunteers in July. He served with distinction in the battles of Perryville and Stone River (qq.v.), and was made major- general of volunteers 31 Dec. 1862. In 1863 he distinguished himself in the bloody battle of Chickamauga (q.v.), and also bore an im¬ portant part in the battle of Chattanooga (q.v.), where he attracted the attention of General Grant, who, when he assumed command in Virginia, had Sheridan transferred (April 1864) to the Army of the Potomac as com¬ mander of the cavalry corps. Sheridan was actively engaged in the battles of the Wilder¬ ness, Spottsylvania Court House, Cold Harbor (qq.v.), etc. From 9-25 May 1864 he raided the Confederate communications around Rich¬ mond, destroying 10 miles of track on three important railroads, cutting the telegraph wires, capturing several trains and causing much alarm in the Confederate capital. On 28 May he fought the battle of Hawes' Shop (q.v.) and 11 June that of Trevilian's Station. Nearly every day in May, June and July Sheridan's cavalry was engaged with the Confederate troops or raiding their communications. On 7 Aug. 1864 he wqs placed in command of the Army of the Shenandoah with instructions to clear the Confederates out of the valley. He defeated Early at Winchester (q.v.) 19 Septem¬ ber, and at Fisher's Hill 22 September and was rewarded by being made a brigadier-general in the regular army. After the battle of Fisher's Hill he laid waste the Shenandoah Valley. Practically everything destructible was de¬ stroyed and the horses, cattle and sheep were driven out. His object in devastating the coun¬ try was to prevent future expeditions by the Confederates up the valley by destroying the means of subsistence. The non-combatants were reduced to the verge of starvation, and Sheridan has been much censured for his course. On 19 Oct. 1864 his army was sur¬ prised and routed in the battle of Cedar Creek (q.v.) by Early, who neglected to pursue. Sheridan, who was 20 miles away when the battle began, made his famous ride, rallied his demoralized troops, returned and decisively de¬ feated the army of Early. On 8 Nov. 1864 Sheridan was

made major-general in the regu¬ lar army. From 27 Feb. to 24 March 1865 he made a raid from Winchester to Petersburg, cutting three railroads, two canals, telegraph wires, destroying supplies, and leaving only one line of railroad by which supplies could

be brought to Lee's army. During this raid he defeated Early again at Waynesborough (q.v.). At Five Forks (q.v.) 1 April Sheridan turned Lee's flank, forcing him to evacuate Petersburg and begin the retreat to Appomattox.. In the pursuit of Lee, Sheridan took a leading part, and when he had placed his army squarely across the Confederate line of march at Appo¬ mattox Court House the surrender took place (9 April).

From May 1865 to March 1867 Sheridan com¬ manded the Military Division (later Depart¬ ment) of the Gulf. His strong force on the Mexican border encouraged the Liberals and forced the French to withdraw their support from Maximilian. In his (Personal Memoirs) Sheridan states that material assistance was secretly given by the United States authorities to the Liberal army under Juarez, 30,000 mus¬ kets at one time being sent to the latter from the United States arsenal at Baton Rouge. After the passage of the reconstruction acts, in March 1867, Sheridan was placed in command of the fifth Military District, consisting of Louisiana and Texas, with headquarters at New Orleans. His career as military governor was a stormy one. He was in favor of radical measures in dealing with the conquered South¬ erners, and in the troubles that arose in his dis¬ trict he was supported by General Grant and opposed by President Johnson, who sent sev¬ eral messengers to him in the endeavor to influ¬ ence him to a more moderate course. Sheridan, believing that severe measures were necessary, refused to conform to the suggestions of the President's agents, and Johnson, after Sheri¬ dan's wholesale removal of civil officers, re¬ lieved him from command of the Fifth Military District in September 1867. General Grant strenuously protested, but Johnson was firm and Sheridan was transferred to the Depart¬ ment of the Missouri. In 1869, when General Grant became President, Sheridan was made lieutenant-general. In 1870-71 he was with the German armies observing the campaigns of the Franco-German war; in 1875 was again sent to New Orleans on account of the political riots in that city; in 1878 commanded the West¬ ern and Southwestern Military Divisions ; in 1883 succeeded Sherman as commander-in¬ chief of the army; and in 1888 was made gen¬ eral. In person, General Sheridan was short and stout, with rather harsh features. In man¬ ner he was gruff, but not unkind. He was trusted by his soldiers, who called him (

Consult Sheridan, (Personal Memoirs) (1888); Davies, (General Sheridan) (1895); Newhall,

Walter L. Fleming,

Professor of History, Vanderbilt University.

SHERIDAN, Richard Brinsley, English

dramatist, orator and statesman : b. Dublin, Ireland, 30 October 1751; d. London, 7 July 1816. His father, Thomas Sheridan, was an actor; his mother was a dramatist and novelist.

At the age of seven he was taken to London. From 1762 to 1768 he attended Harrow school, where, in collaboration with a fellow-pupil named Halhed, he wrote a farce called (Jupi- terP In 1771 he moved to Bath, where he learned at first hand the foibles of the fashion¬ able world. Among the people that he met was the eminent composer, Thomas Linley. Linley's daughter, well-known as a singer, was a lovely and coquettish girl with many ad¬ mirers. To shield her from the persecutions of a Major Mathews, Sheridan arranged to es¬ cort her to a French convent. Near Calais he became secretly married to her; his age was 21 and hers 18. Linley brought them back to Bath and separated them. After his return, Sheridan fought two duels with Mathews, dis¬ arming his opponent the first time and being himself seriously wounded the second. On 13 April 1773, he married Miss Linley openly.

*At a very early age he began writing for the theatre. On 17 January 1775, his farce- comedy, (The Rivals,) was produced at Co¬ vent Garden. It failed and was withdrawn. In a revised form it reappeared on 28 January, and is still being played. His farce, (Saint Patrick's DayP was first acted on 2 May 1775. It was followed on 21 Nov. 1775, by (T*he Duenna, } a comic-opera, whose great success eclipsed the popularity of Gay's (Beggar's Opera. > In 1776 he succeeded Garrick as manager of the Theatre Royal, Drury Lane. He was careless in business, but his personal popularity atoned for his practical shortcom¬ ings. He produced a revision of Vanbrugh's (RelapseP called (A Trip to Scarboroughp 24 Feb. 1777. On 8 May 1777, he presented at Drury Lane one of the greatest comedies of all time, (The School for ScandalP He was then only 25. A farce called (The CriticP in which he satirized his jealous rival, Cumber¬ land, was performed 29 Oct 1779. This prac¬ tically closed his career as a dramatist; though on 24 May 1799, he produced (PizarroP a melo¬ drama adapted from the German of Kotzebue.*

His gaiety and talent made him a great favorite in society. On 12 Sept.

1780 he was elected to the Commons for Stafford, and began a remarkable parliamentary career. He developed wondrous power as an orator, and was unexcelled for brilliancy and eloquence. He was conspicuous in the impeachment of Warren Hastings. On 7 Feb. 1787 his great speech before the House of Commons, relating to the Princesses of Oude, held his auditors enthralled for five hours and a half. Hardly less effective was his speech at the arraignment of Hastings in Westminster Hall, June 1788. Throughout his public career he maintained the reputation of a pure and independent statesman.

His wife died 1792; and on 27 April 1795 he married Esther Jane Ogle. His income from Drury Lane averaged £10,000; but he often overdrew his resources to lead a dazzling social life. From 1791 to 1794 the Theatre Royal was rebuilt at ruinous expense to Sheri¬ dan; and the destruction of the new house by fire in 1809 involved him in serious financial difficulties. In 1812 he failed of re-election to Parliament; and in August 1813 he was ar¬ rested for debt. His health, weakened by social dissipations, failed rapidly; and he died

GENERAL P. H. SHERIDAN

•

a 1 I

SHERIDAN

SHERMAN

703

almost in want. He was buried in Westmin¬ ster Abbey. (See The Rivals; School for Scandal). Consult Rae, Fraser, (Sheridan, a Biography ; Matthews, Brander, ˆIntroduction to Sheridan's comedies> ; Oliphant, Mrs. M., (Sheridan J (New York 1883) ; Sichel, W. S., (Sheridan } (from new and original material including a manuscript diary by Georgiana, Duchess of Devonshire, Boston 1909).*

Clayton Hamilton,

Sometime Tutor in English, Columbia Uni¬ versity.

SHERIDAN, Thomas, Irish clergyman, grandfather of Richard B. Sheridan (q.v.) : b. County Cavan, Ireland, about 1684; d. Dublin, Ireland, 10 Sept. 1738. He was educated at Trinity College, Dublin; was at one time chap¬ lain to the lord lieutenant and later secured a living through Dean Swift, of

whom he was a close friend. He was noted for his wit and his gay carelessness, though his extravagance had reduced him to direst poverty. He wrote (The Art of Punning, translated Persius in prose and Sophocles' (Philoctetes* in verse. His son Thomas, elocutionist, father of Richard B. Sheridan, the dramatist (q.v.) ; b. near Dublin, Ireland, 1721 ; d. Margate, Kent, 14 Aug. 1788. He was educated at Trinity College, Dublin, became an actor and theatre manager and after¬ ward was successful as a lecturer and teacher of elocution. He published lectures on the Art of Reading* (1775) ; dictionary of the English Language) (1780) ; (Life of Dean Swift) (1784), etc.*

SHERIDAN, Wyo., city and county-seat of Sheridan County, near the northern border of the State, 285 miles northwest of Cheyenne, on the Chicago, Burlington and Quincy Rail¬ road. In this vicinity occurred three notable Indian battles, that at Wolf Creek under Gen¬ eral Connor in 1865 ; the Fetterman fight on Massacre Hill in 1866, when all the whites were slain ; and the Great Wagon Box fight in 1867. The place was settled in 1882 and incorporated in 1884. The State Hospital is located here. There are coal mines in the vicinity and the surrounding district is devoted to agriculture. Pop. (1920) 9,175.

SHERIF, sha-ref, an Arabic title equivalent to noble. It is borne by the descendants of Mohammed, and descends both in the male and female line. Those who possess this rank are distinguished by green turbans and veils, green being the color of the Prophet. In India they are called Seyyed.

SHERIFF, an officer who represents the executive power of a county in the United States and is elected either by the legislature or the citizens. The requirements are con¬ trolled by statute, but usually they are that the person so elected must be over 21, a citizen of the United States and a resident of the county that he represents. Power to fill a vacancy oc¬ curring in the office of sheriff is regulated by statute. The sheriff is required to take a pre¬ scribed oath in order to qualify, and to furnish a bond for the faithful discharge of the duties of his office. The sheriff in person or by deputy executes civil and criminal process throughout the county; has charge of the prisoners, at¬ tends court and keeps the peace. His judicial authority is generally confined to ascertaining damages on writs of inquiry. 'He is not liable

for any errors in acting in a judicial capacity — the office is almost exclusively ministerial. A sheriff has the right, when it is reasonably necessary, to lawfully summon any citizen for assistance in the execution of his duty, and one failing to obey the summons is liable to in¬ dictment ; he has also the right to appoint gen¬ eral or special deputies in such manner as may be prescribed iby his jurisdiction; but the sheriff cannot

delegate his authority to ap¬ point a deputy. The sheriff is liable for all damages caused by any wrongful act of his office, and may be criminally liable for a wilful breach of his duty, if a corrupt motive is shown. A sheriff's sale is one conducted by a sheriff, or by a person by him deputized, of property held under proper authority.

SHERLOCK HOLMES, Adventures of,

a collection of stories by Sir A. Conan Doyle (q.v.), in each of which Holmes figures as a scientific amateur detective of remarkable skill. He is enslaved to cocaine and in manner is brusque and eccentric ; but by a method of a posteriori reasoning, applied to apparently un¬ important facts of common life, he is enabled to uncover most remote and disconnected causes. The tales are full of bizarre and often grew- some details; the principal characters, Holmes and his friend Dr. Watson, appear to have been suggested to the author by Poe's Mur¬ ders in the Rue Morgue. The first series appeared in the Strand Magazine , London, and in book form in 1891.*

SHERMAN, Frank Dempster, American poet: b. Peekskill, N. Y., 6 May 1860; d. 19 Sept. 1916. He was graduated from Columbia in 1884 and subsequently studied at Harvard. For many years he was a professor of graphics at Columbia. He published (Madrigals and Catches) (1887) ; (Lyrics for a Lute) (1890) ; (Little Folk Lyrics) (1892) ; (Lyrics of Joy) (1904) ; (A Southern Flight (with Clinton Scollard, 1906) ; also several volumes of Sher¬ man Family history.*

SHERMAN, Henry Clapp, American

chemist: b. Ashgrove, Va., 16 Oct. 1875. He was graduated at Maryland Agricultural Col¬ lege in 1893 and took his Ph.D. at Columbia University in 1897. He was investigator of nutrition for the United States Department of Agriculture in 1898-99; from 1897 was con¬ nected with the faculty at Columbia University, where he became professor of organic chem¬ istry in 1907 ; and was head of the department of economy and food nutrition at Teachers' College 1909. He has been research member of Carnegie Institute since 1912. In 1915 he was major and member of the American Red Cross Mission to Russia. He edited the School of Mines Quarterly in 1906-09 and is author of (Method of Organic Analysis) (1905; 2d ed., 1912) ; (Chemistry of Food and Nutrition) (1911; 2d ed., 1916) ; (Food Products) (1914) ; etc.

SHERMAN, James Schoolcraft, American politician and vice-president of the United States: b. New Hartford, N. Y., 24 Oct. 1855; d. Utica, N. Y., 30 Oct. 1912. He was gradu¬ ated at Hamilton College in 1878, was ad¬ mitted to the bar in 1880, and engaged in practice in Utica. He was mayor of Utica in 1884-85 and served in Congress in 1887—91 and 1893-1909. He was for many years promi-

nent in the affairs of the Republican party, was chairman of the Republican State Con¬ vention in 1895, 1900 and 1908, and in 1906 he was chairman of the Republican National Congressional Committee. He was elected vice-president of the United States in 1908, but died before the expiration of his term of office. He was renominated for the vice¬ presidency in 1912, but died a few days preced¬ ing the election. He was a trustee of Hamilton College.

SHERMAN, John, American statesman : b. Lancaster, Ohio, 10 May 1823; d. Washing¬ ton, D. C., 22 Oct. 1900. He was the eighth child in a family of 11, being the junior by three years of his brother Gen. William Te- cumseh Sherman (q.v.). He attended about two years at Homer Academy, Lancaster, Pa., between 1835—37. After having secured an ir¬ regular and not very complete general educa¬ tion, he studied law and was admitted to the bar at 21. In 1848 he was a delegate to the National Whig convention at Philadelphia. In the same year he married and established a mill for lumber work, which he carried on to¬ gether with his law practice. He was president of the first Republican convention in Ohio, held at Columbus, 13 July 1855, which nomi¬ nated Salmon P. Chase for governor. In 1855 he was elected a member of the 34th Congress. He took

a prominent part in the proceedings of the House ; was on the Committee of Inquiry sent to Kansas, and wrote the report of its investigations. He was prominently identified with the support of all measures for the pros¬ ecution of the Civil War; defended the pro¬ tective tariff, and the refunding of the National debt. He was a member of the committee that visited Louisiana to supervise the counting of the returns iof that State, and a member of the Electoral Commission. In Congress, Mr. Sher¬ man quickly demonstrated his exceptional power as a master of finance. He watched carefully the appropriation bills, speedily extended the credit of the government, and provided for its future support. When Salmon P. Chase re¬ signed the United States senatorship from Ohio to enter the Cabinet of President Lincoln, as Secretary of the Treasury, Mr. Sherman was elected his successor and took his seat 4 March 1861. In 1881 he was re-elected to the Senate, where he remained until 1897, when he was ap¬ pointed Secretary of State by President McKin¬ ley. He resigned that office, however, in 1898, on account of failing health. He was a candidate for the Presidential nominations in 1884 and 1888. Among his publications are (Selected Speeches and Reports on Finance and Taxa¬ tion (1879) ; and (Recollections of Forty Years in the House, Senate, and Cabinet (1893). From 1860 to 1900, , there, was scarcely a great financial measure with which the name of John Sherman was not connected. Among these were the making of United States treas¬ ury notes legal tender, the enacting iof the na¬ tional banking bill, the refunding act of 1870, and the resumption of specie payments. The detailed record of measures by which the legal tender notes of the government reached par, and by which specie resumption became an ac¬ complished fact at the time fixed for it, exhibits the man under whose leadership this was done as a financier of the highest order.*

*Consult (The Sherman Letters: Correspondence between General and Senator Sherman from 1837 to 1891 * (ed. by Rachel S. Thorndike, New York 1894) ; Atkinson, E., < Senator*

Sherman's Fallacies; or, Honesty the best policy) (Boston 1868) ; Burton, T. E., (John Sherman (New York 1906) ; Walker, A. H., (History of the Sherman Law*

SHERMAN, Lawrence Yates, American

lawyer and senator: b. Miami County, Ohio, 8 Nov. 1856. He was graduated at McKendree College, Illinois, in 1882, was admitted to the bar and engaged in practice. He was judge of McDonough County in 1886-90; served in the Illinois legislature in 1897-1905, being speaker in 1899-1903, and leader of the Republican party in his State; and in 1905-09 he was lieu¬ tenant-governor of Illinois. He was president of the

United States Board of Charities in 1909-13. He was sent to the United States Senate in 1912 to finish the unexpired term of William Lorimer, and was afterward elected for the term 1915-21.

SHERMAN, Roger, American legislator: b. Newton, Mass., 19 A.pril 1721 ; d. New Haven, Conn., 23 July 1793. He was ap¬ prenticed to a shoemaker when a child, but in 1743 he removed to New Milford, Conn., where he was engaged with his brother in keeping a small store. He studied law, politics and mathematics without a teacher, was appointed surveyor for his county in 1745 and for several years made the astronomical observations for an almanac published in New York. In 1754 he was admitted to the bar, served for several terms in the provincial assembly, and in 1761 removed to New Haven, Conn. He became judge of the Court of Common Pleas there in 1765 and served in that position and as judge of the Superior Court for 23 years. He was assistant governor in 1766-85, treasurer of Yale College in 1766-76, and a member of Con¬ gress from 1774 — 91, when he was elected sen¬ ator in which capacity he served the remainder of his life. He was one of the committee of five to draft the Declaration of Independence which he afterward signed, was an active mem¬ ber of various war and ordnance committees, served on the treasury board and in 1777 was one of the framers of the original Articles of Confederation. He assisted in the codification of the laws of Connecticut, was a delegate to the Federal Constitutional Convention in 1787, where he played a prominent part, and from 1784 until his death was mayor of New Haven.

SHERMAN, William Tecumseh, Ameri¬ can soldier: b. Lancaster, Ohio, 8 Feb. 1820; d. New York, 14 Feb. 1891; son of Judge Charles R. Sherman. His father died when he was about nine years old, and he was brought up in the family of Hon. Thomas Ewing, who procured for him an appointment as cadet at the United States Military Academy, West Point. He is described as having been at the time a tall, slim, Loose-jointed lad, with red hair, fair, burned skin and piercing black eyes. In July 1840 he was graduated from the academy and appointed second lieutenant in the Third artillery, and first lieutenant Nov. 1841. He served in Florida until 1842, and was afterward in garrison at Fort Moultrie, S. C.

At the first rumor of war with Mexico he showed great impatience to be sent to Texas, but the War Department, instead, ordered him to California. The voyage appears to have made him strongly in favor of an interoceanic canal. He served in California as acting as¬ sistant adjutant-general of the

department until February 1849, when he was transferred to similar duty on the staff of Gen. Persifor F. Smith who commanded the division of the Pacific. Having been ordered to New York as bearer of dispatches, he was married in Janu¬ ary 1850 to Ellen Boyle, daughter of his foster- father, Hon. Thomas Ewing, then Secretary of the Interior.

In September 1850 Sherman was transferred to the commissary department with the rank of captain and stationed at Saint Louis and New Orleans. Shortly after his arrival at New Orleans he received notice of his appoint¬ ment as partner in the banking firm of Lucas and Turner, a branch of Lucas and Simonds, of Saint Louis. Feeling that he could do better in business than in the army, he obtained a six months' leave (of absence and started for California to represent the house. When the leave of absence expired he resigned from the army. Sherman at this time saw the danger of the slavery issue. <(Unless people both North and South,® he wrote in August 1856, Hearn more moderation we'll see sights in the way of civil war.®

Sherman removed to New York in 1857, and to Leavenworth, Kan., in 1858, where he prac¬ tised law until July 1859, when he was elected superintendent of the proposed military academy in Louisiana. The institution was opened 1 Jan. 1860, as the Louisiana State Seminary of Learning and Military Academy, and Sherman remained its superintendent until 18 Jan. 1861, when he wrote to the governor asking to be relieved the moment the State determined to secede. His request having been granted, he went to Saint Louis in February 1861 and was for a short time president of a Saint Louis railroad company. While hold¬ ing this place he was deeply interested in the approaching struggle between North and South, making valuable suggestions, some of which were shown by his brother, John Sher¬ man, then in Congress, to Secretary of War Cameron. <(On the necessity of maintaining a government, and that government the old con¬ stitutional one,® he declared, (

In May 1861 Sherman was appointed colonel of the 13th regular infantry, and 30 June he assumed command of a brigade of McDowell's army. He took an honorable part in the first battle of Bull Run ; on 3 August received his commission as brigadier-general of volunteers, dating from 17 May, and 24 August was ordered to duty in the Department of the Cumberland, under Gen. Robert Anderson, whom he suc¬ ceeded in command of the department 8 Oc¬ tober. On the 26th of the same month he wrote that Ho accomplish the only purpose for which Kentucky can be used there should be a force here of 200,000 men.® In November Sherman, who was severely criticized by many for his assertions as to the number of men needed for the war in his section, was relieved vol. 24 — 45

of his command and sent to Missouri. After a short leave at home he was employed for a time as commander of the camp of instruction at Benton Barracks, near Saint Louis. In February 1862 he was transferred to Paducah, Ky., where he organized the division which he subsequently commanded at Shiloh. In this hard-fought, two-days' conflict Sherman was severely wounded, and Grant declared that <(to his individual efforts I am indebted for the suc¬ cess of that battle.® Sherman was commis¬ sioned major-general of volunteers, 1 May, and in the same month compelled the Confed¬ erates to evacuate Corinth, which was followed, in July, by the occupation of Memphis. His cam¬ paign against Vicksburg proved unfortunate. He was defeated and driven back to Chickasaw Bayou, but afterward rendered effective aid to Grant in the operations which resulted in the surrender of Vicksburg.

Sherman was made a brigadier-general of the regular army in July 1863. After the fall of Vicksburg and Port Hudson the Western armies lay comparatively idle for a time, and early in the autumn Sherman was occupied in rebuilding the Memphis and Charleston railroad to the East, that the armies might draw sup¬ plies by that route. While engaged on this work he was ordered to cross the Tennessee and march eastward. The battle of Chattanooga, in which he distinguished himself, followed, and he was next sent to the relief of Burnside, besieged by the Confederates in Knoxville. Sherman forced Longstreet to raise the siege 5 Dec. 1863. After a few weeks in winter quarters in northern Alabama, Sherman in January 1864 made a raid across the State of Mississippi from Jackson to Meridian and back again, doing a vast amount of damage to rail¬ ways, Confederate property and the country at large. Grant being invited to take unhampered command of the military forces of the United States and to repeat, if possible, in the East, the successes which had attended his career in the West, assigned Sherman to the command of the Military Division of the Mississippi, including the Departments of the Ohio, the Tennessee, the Cumberland, and the Arkansas, with temporary headquarters at Nashville, and with orders to move on Atlanta. With an army of about 100,000 men Sherman invaded Georgia. He was opposed by Gen. Joseph E. Johnston, with about 45,000 Confederates in excellent spirit and discipline, but poorly provided with munitions of war, as compared with the Union forces. Johnston engaged Sherman's army at Dalton, Resaca, Cassville, Dallas and Kenesaw Mountain. At the last-named place, 27 June, the Confederates, owing to the shortness of artillery ammunition, reserved their cannon for the final charge of the Union troops, re¬ ceiving them with a destructive fire which won the day for the South.

Sherman's progress, however, could not be stayed, and the Richmond government, believ¬ ing that Johnston was not doing all that oould be done with the men at his command, relieved him and put Hood in his place.

Sharp battles followed in the vicinity of Atlanta, and at length Hood was compelled to evacuate the city during the night of 1 September. Sherman issued an order that all the inhabitants should leave Atlanta, going North or South as they

saw fit, and offered transportation to that end. Mayor Calhoun and other citizens appealed in vain to have the order recalled. ((You cannot qualify war in harsher terms than I will,® an¬ swered Sherman, ((war is cruelty and you cannot refine it.® The order was carried out and approved by the authorities at Washington. Sherman gave as his reasons to his military superiors that he wanted all the houses for military and storage purposes, and did not wish to be burdened with the care of the inhabitants.

Sherman became convinced, after a series of indecisive operations against Hood, that the aim of the latter was to draw him out of Georgia. He determined on marching to the sea, cutting a swath of devastation through the heart of the Confederacy and destroying, as far as possible, the sources of Confederate supplies. Grant fully approved of the plan, and Sherman, after burning Atlanta, breaking up the railway, and sending a part of his army to reinforce Thomas at Nashville, started with about 70,000 men on his memorable march. He ordered his troops to forage liberally on the country and although foraging was supposed to be done by regular details only, it was, in fact, carried on practically without restriction, and the devastation along the line of march was most complete. The Confederates had vir¬ tually no force to oppose Sherman's advance and when the governors of Alabama, South Carolina and Georgia were appealed to from Richmond, the first mentioned replied that none but cripples, women and children, and very old men were left in the State. Sherman entered Savannah 23 December, having lost on his march from Atlanta, 103 killed, 428 wounded and 278 missing. Congress, 10 Jan. 1865, tendered the thanks of the people of the United States to Sherman and his command. He moved northward 1 February and occupied Columbia 17 February, the place being destroyed by a conflagration for which Sherman always claimed that he was not responsible.

General Johnston was recalled to command by the chiefs of the sinking Confederacy, and after several desperate encounters, Sherman and Johnston met at Durham Station, N. C., 18 April. The terms agreed upon were most liberal to the Confederates allowing them to deposit their arms at their State capitals, and providing for the recognition of their State governments. The terms were made subject to the approval .of superior

authority, and a suspension of hostilities was agreed upon to obtain that consent, 48 hours' notice to be given by either side before resuming hostilities. Lin¬ coln had been murdered ; there was a vindictive feeling toward the South at Washington, and Johnson and his Cabinet wholly disapproved Sherman's arrangement, and ordered Grant to take charge of Sherman's command. Grant, always generous in his recognition of Sherman's merits went to Raleigh, as directed, but left to Sherman the honor of receiving Johnston's surrender on the same terms as those granted to Lee. Sherman keenly felt what he regarded as unjust treatment on this occasion by Secre¬ tary of War Stanton and declined publicly to take Stanton's proffered hand at the great army review in Washington 24 May 1865.

Sherman was appointed to command the

military division of the Mississippi 27 June 1865; promoted to lieutenant-general 25 July 1866, and assigned in August to the Military Division of the Missouri. On the accession of Grant to the Presidency, Sherman succeeded to the command of the army as general. About this time he wrote ((I do think some political power might be given to the young men who served in the rebel army, for they are a better class than the adventurers who have gone South purely for office.® Sherman retired 8 Feb. 1884, taking, to the last, an active interest in public affairs. A splendid equestrian statue, by Saint Gaudens, presenting Sherman in char¬ acteristic attitude as when he rode at the head of his army, was unveiled at the Siouthеastern entrance of Central Park, New York, in 1903, and another handsome equestrian statue of the great general was dedicated in Washington the same year, President Roosevelt taking part in the ceremonies. The Washington statue stands on the spot whence Sherman reviewed the grand march of the Union army in 1865.

Bibliography. — (Sherman's own account of his march through Georgia) (New York 1865) ; (Sherman as College President: a collection of letters, documents, > etc. (ed. W. L. Fleming, Cleveland, O., 1912) ; Memoirs5 autobiography, (New York 1875) ; Boynton, H. V., (Sherman's Historical Raid) (Cincinnati 1875) ; biog¬ raphies by W. F. Johnson > (Philadelphia 1893) ; (Gen. Force> (New York 1899) ; Dye, J. S., in < History of the Plots and Crimes of the Great Conspiracy > (New York 1866) ; Chase, G. M., (Personal Recollections of Lin¬ coln, Grant and Sherman) (Council Bluffs, Iowa, 1914) ; Chase, E.,

SHERMAN, Tex., city, county-seat of Grayson County, on the Houston and Texas Central Railway, on the Missouri, Kansas and Texas Railway of Texas; Saint Louis and Southwestern Railway; Missouri, Oklahoma arid Gulf Railway; Saint Louis and San Francisco Railway; Texas and Pacific

Railway and the Texas Traction Company; 12 miles south of the Red River and 728 feet above the sea. Sherman is in the Red River Valley and is the home of the Red River Valley Fair, said to be the largest free fair in America. The northern half of Grayson is sandy loam, and from it large quantities of fruit and vege¬ tables are raised and shipped, while the southern half is of the black waxy type, especially suited for cotton and grain farming. The breeding of registered horses, cattle and hogs is practised extensively and with profit in all parts of the county. The city is the most accessible point in north Texas having 108 passenger trains, mterurban and motor cars over the railroad lines in and out daily. There are 350 miles of piked highways in Grayson County which radiate out of Sherman. One of the greatest Oklahoma oil fields is just across the Red River from Grayson County. As one of the leading manufacturing cities of Texas, Sherman turns out $25,691,000 worth of goods per year. Among the products manufactured

are cigars, candy, medicines, overalls, cot¬ ton duck, creamery butter, and more grains, cotton and oil products than any other point in Texas. The laundries of the city are said to cover a larger area of outside business than those of any other State. The educa¬ tional institutions are the Austin College, State Presbyterian College for boys, Kidd-Key Col¬ lege and Conservatory of Music, Saint Joseph's Academy, Catholic School for girls and the Sherman Business College. Sherman has also an excellent public school system for both races; and $100,000 bonds are being issued to add to the present high school. There are two hospitals, Saint Vincent's Sanitarium and the Sherman Hospital, both being well-equipped institutions. There has recently been left to Sherman $100,000 by Wilson N. Jones, former governor of Oklahoma, for the purpose of pro¬ viding hospital facilities for the sick poor. Among the public buildings of note are the Federal building, the Carnegie library, the Sherman Hall at the Austin College and the Y. M. C. A. building. The combined assets of the banks of Sherman total $9,562,364. Council- commission-manager form of government was adopted in 1915 and is proving very successful. Pop. about 15,000.

SHERMAN ACT, an act of the United States Congress, approved 14 July 1890. It was the culmination of a long disagreement between the two houses over a financial policy, neither si-de being disposed to yield. This bill was supported by Senator Sherman and others as a compromise measure. It instructed the Secre¬ tary of the Treasury to buy silver bullion to the amount of 4,500,000 ounces a month, and to issue treasury notes in

payment. Though the bill was approved, the financial policy continued to be a disturbing question and arguments favoring a repeal were presented at almost every opportunity. The business depression of the summer of 1893 was alleged to be a conse¬ quence of the bill, and President Cleveland sum¬ moned Congress to convene in special session, 7 August. A bill to repeal the silver-purchas¬ ing proviso of the Sherman Act passed the House 28 August. In the Senate, the Voorhees bill was presented as a substitute, its provisions being a repeal of the silver-purchasing clause, but affirming bimetallism as a national policy. After a protracted contest the Voorhees bill passed the Senate 30 October. It was con¬ curred in by the House 1 November, and the President approved it the same day.

SHERRILL, Charles Hitchcock, Ameri¬ can lawyer: b. Washington, 13 April 1867. He received his education at Yale, being admitted to the bar in 1891. In 1909 he became United States Minister to Argentina, but, although later offered the ambassadorship to Japan, ill-health forced him to refuse the post, and in 1912 he resumed the practice of law. He became ad¬ jutant-general of New York State a few years later. He is the author of (Stained Glass Tours in France) (1908) ; (Stained Glass Tours in England) (1909) ; (French Memories of 18th Century America) (1915) ; Modernizing of the Monroe Doctrine) (1916).

SHERRY, a favorite Spanish wine, so called because chiefly produced in the neighbor¬ hood of Xeres de la Frontera, near Cadiz, in Andalusia, Spain. Unlike many of the French

wines, the manufacture of sherry is carried on chiefly by a few large concerns. The industry has principally passed to French and British proprietors, who have greatly improved the manufacture and have bettered the grade of commercial sherries. The best soil consists chiefly of carbonate of lime, with a small ad¬ mixture of silex and clay, and occasionally magnesia. Red and white grapes are used in¬ discriminately. When ripe and gathered they are spread on mats, and left to dry for two or three days; they are then freed from the stalks, and the rotten or unripe berries rejected. Be¬ ing now introduced into vats, with a layer of burned gypsum on the surface, they are trod¬ den by peasants with wooden shoes. The juice is collected in casks, in which the fermentation is allowed to take place, continuing generally from October till the beginning or middle of December. The wines are then racked from the lees, and those intended for exportation re¬ ceive additions of brandy, seldom more than three or four gallons to the butt. The new wine is harsh and fiery, but mellows by being allowed to remain in the wood four or five years, though 15 or 20 years are required to perfect its flavor. Sometimes bitter almonds are infused to give the wine a nutty flavor. The dry sherry, that which is least sweet, is the most esteemed. The finest variety of sherry is the Manzanilla sherry, the

excellent qualities of which are determined by the nature of the soil and the lay of the district in which it is grown ; Amontillado and Montilla sherries and Vino de Pasta are also highly esteemed. The sherry wines are shipped for the most part at Cadiz, and are principally exported to England. No wine is more largely imitated and adul¬ terated than sherry. See Liquor and the Liquor Traffic ; Wine and Wine Making.

SHERWOOD, William Hall, American pianist: b. Lyons, N. Y., 31 Jan. 1854; d. Chicago, Ill., 7 Jan. 1911. He appeared in concerts at the age of nine years and later studied under William Mason. In 1871-76 he studied in Europe under Kullak, Richter, Dop¬ pler and Weitzman. He appeared as a per¬ former at the Beethoven Festival at Berlin and with Liszt at Weimar and received flattering offers to remain abroad. He returned to the United States in 1876 and settled in Boston teaching music at the New England Conserva¬ tory, and after 1889 he lived in Chicago, where he was head of the Chicago Conservatory until 1897 ; he then resigned to establish the Sher¬ wood Piano School. He was widely known as a concert pianist, and gave recitals in all the larger cities of the United States.

SHERWOOD FOREST, an ancient forest in the west of Nottinghamshire, England, in a hilly district between Nottingham and Worksop. The tract covered about 200 square miles and was formerly a royal forest, famous as the scene of the exploits of Robin Hood and his merry men, many legends of whom are yet to be heard in the surrounding country, Only a small portion of the forest, near Rotterham, still remains. The rest of the country it once covered is now occupied by country-seats and private parks, and is for the most part bare of trees. The town of Mansfield and several vil¬ lages are within the ancient bounds, which were about 25 miles from north to south and six to

eight miles from east to west. Consult works by Sissons (1888) and White, R., 1875.

SHETLAND, or ZETLAND, Scotland, a county embracing the group of more than 100 islands, islets and skerries northeast of Ork¬ ney, of which 27 are inhabited. They form the northernmost county of Scotland; the capital, Lerwick, is 116 miles northeast of Kirkwall, 300 miles north by east of Edinburgh, and 223 miles west of Bergen, Norway. The islands extend 70 miles and 36 miles in extreme breadth. They contain 566 square miles, and the largest are Mainland, Yell, Unst, Fetlar, Bressay, Whal- say and Foula. Mainland contains about two- thirds of the entire acreage; its

surface is hilly with indented coast line and interspersed by numerous lochs. Ronas Hill (1,475 feet) is the highest point in the northwest of Mainland: The Sneug (1,372 feet), in Foula, is next in height. The coasts of the whole group are bold and rocky, presenting some fine landscape. Peat moss covers much of the surface, and some cereal crops and vegetables are grown. The pastures cover about 43,000 acres. Domes¬ tic animals are reared — the small Shetland ponies are well known — but the chief industry consists in the herring fisheries. The manufac¬ tures are mainly woolens. The capital, Ler¬ wick, is on Bressay Sound, and Scalloway, the largest village, — both in Mainland. The ex¬ ports are fish, oil, cattle, horses, eggs and gloves. There are 61 public schools, church schools and several schools for superior education. The in¬ habitants are of Norse extraction and were for several centuries under Scandinavian sover¬ eignties. Norse was still spoken in Foula at the end of the 18th century. Since 1468 the islands have belonged to Scotland. There are numerous antiquities which are highly inter¬ esting, including brochs, standing-stones, tu¬ muli and the ruins of a Roman camp on Fetlar Island. Pop. about 28,000.

SHEWBREAD, sho'bred, the 12 unleav¬ ened loaves placed upon a table in the outer de¬ partment of the Jewish sanctuary. The number 12 represented the 12 tribes. The loaves were placed in two piles, one above another, and were changed every Sabbath day by the priests. The removed bread became the property of the priests, who alone had a right to eat of it, and only in the holy place. In cases of emergency, however, they incurred no blame by giving it to persons who were in a state of ceremonial purity, as in the instance of David and his men (1 Sam. xxi, 4-6; Matt, xii, 4).

SHIAHS, she'as. See Religious Sects; Shiites.

SHIBBOLETH, a word which on a certain

occasion served as a test to distinguish Ephraim- ites from Gibeonites. Jephtha's men, Gibe- onites, held the ford of Jordan, with orders to suffer no Ephraimite to cross over. When chal¬ lenged with the question (

the etymologica. meaning of the Hebrew word .shibboleth: (

SHIBUSAWA, she'boo-sa'wa, Ei-ichi, Baron, Japanese banker: b. Saitama prefec¬ ture, 2 Feb. 1840. He entered government service at Tokio under the Tokugawa Sho- gunate when still a youth, and traveled in Europe in 1867-68 as companion to one of the Tokugawa princes. Upon the establishment of the Imperial government in 1869 he was ap¬ pointed to a high office in the Treasury, but resigned in 1873 because of a disagreement con¬ cerning the fixing of expenditures for the gov¬ ernment departments,

and held no other gov¬ ernment position, despite frequent offers. He founded the first national bank, known as the First Bank, in 1873, and became a power in the Japanese financial world. He established a commercial training school, out of which grew the Tokio Higher Commercial School; inaugu¬ rated the Tokio Chamber of Commerce in 1878, and served as its chairman until 1905, when illness forced his retirement from busi¬ ness. He returned to active life for a short time after the Russo-Japanese War. He first visited the United States in 1902, and re-visited it in 1909 and 1915. For his many public serv¬ ices he was created baron in 1900.

SHIELD, sheld, William, English com¬ poser: b. Swalwall, Durham, 5 March 1748; d. London, 25 Jan. 1829. The son of a singing master, he early studied music and composed anthems that were sung in Durham cathedral. His earliest sustained work was a comic opera, (The Flitch of Bacon) (1778), and having been appointed composer to Covent Garden (1778- 97) he produced several other works, including (1783) ; (The Poor Soldier (1784) ; (The Woodman) (1792) ; Two Faces Under a Hood* (1807). But he is best known by his songs, among which are (The Heaving of the Lead) ; (The Arethusa) ; (The Thorn) ; (0 bring me wine* ; (The Ploughboy) ; and (The Wolf.* The tune of (Auld Lang Syne,* as now sung, was introduced into his (Rosina* ; the authorship of (Coming through the Rye) has also been claimed for Shield. Among his literary works are (An Introduction to Har- mony) (1817) ; and (Rudiments of Thorough Bass.* In 1817 Shield was appointed (Master of the King's Musick.* His productions com¬ prise upwards of 30 dramatic pieces, several collections of glees, ballads, trios, etc. He is buried in the south cloister of Westminster Abbey. Consult dictionary of National Biog¬ raphy * (Vol. 52, London 1897) ; Grove's dic¬ tionary of Music* (ib. 1911) ; Robinson, J., (Life of William Shield) (Newcastle 1891).*

SHIELDS, sheldz, Charles Woodruff,

American educator: b. New Albany, Ind., 4 April 1825; d. Newport, R. I., 26 Aug. 1904. He was graduated from Princeton in 1844, from the Theological Seminary there in 1847, was ordained in the Presbyterian ministry and served in charge of pastorates at Hempstead, L. I., in 1849-50, and in Philadelphia in 1860- 65. He later occupied the chair of harmony of science and revealed religion at Princeton. His publications include (The Presbyterian Book of Common Prayer according to the Revision of the Westminster Divines) (1864) ; (Religion and Science in Relation to Philosophy (1875) ; (The Order of the Scicnces) (1882) ; (The*

United Church of the United States* (1896) ; (The Scientific Evidences of Revealed Reli- gion) (1900), etc.

SHIELDS, James, American military officer: b. Dungannon, Ireland, 1810; d. Ot¬ tumwa, Iowa, 1 June 1879. He came to the United States in 1826 and entering the army subsequently served through the Mexican War and for bravery in the battles of Cerro Gordo and Chapultepec was brevetted major-general. He was United States senator from Illinois in 1849 and from Minnesota in 1857. During the Civil War he especially distinguished himself by defeating <(Stonewall® Jackson at Winches¬ ter, 23 March 1862. He was defeated at Port Republic 9 June 1862 and resigned his commis¬ sion in 1863.

SHIELDS, John Knight, American lawyer, jurist and senator: b. Clinchdale, Tenn., 15 Aug. 1858. He was privately educated and was admitted to the bar in 1879, practising thereafter at Knoxville, Tenn. He became as¬ sociate justice of the Supreme Court of Ten¬ nessee in 1902, and was chief justice of that court in 1910-13. He was elected to the United States Senate in 1913 and was re-elected for the term 1919-25.

SHIELDS, England, the urban aggregation of North and South Shields, two separate mu¬ nicipalities and important seaports in Northum¬ berland and Durham respectively, on opposite banks of the Tyne, near its mouth in the North Sea. The port of Shields, formed by an expan¬ sion of the river into a wide bay, has been greatly improved and deepened by dredging and the construction of piers, and accommodates vessels of any size at their quays. There is a very extensive trade, particularly in coal, of which more than 2,500,000 tons were shipped a year before the war.

North Shields, on the north bank of the Tyne, forms part of the municipality and par¬ liamentary borough of Tynemouth (q.v.) to¬ gether with three small townships. It extends about one mile along the river, and consists of an old and a modern portion, the former with narrow streets and lanes, and the latter with spacious streets and squares. The township extends up the river to Willington, and includes Northumberland Dock and Albert Edward Dock. The chief industrial establishments are shipbuilding yards, saltworks, iron foundries, marine-engine works, and electrical works. Fishing is largely carried on, and much fish is sent to many parts of England. Pop. 59,000.

South Shields, opposite North Shields, communicates with the latter by steam-ferries. The Saint Hilda coal-mine in the town was opened in 1810. The old part of the town con¬ sists of long narrow streets running parallel

to the river ; but the modern part, immediately be¬ hind, occupies a higher site and possesses many handsome buildings. The public institutions include a town hall, police buildings (1893), a custom-house, free library and museum, in¬ firmary, fever hospital, public baths and wash¬ houses ; nautical college, national and other schools and several benevolent endowments. The harbor is lined with ship and boat yards and factories. The chief industries are coal-mining and coal shipments, shipbuilding and ship-re¬ pairing, marine-engine and boiler-making, and the manufacture of glass, earthenware, chain-

cables, rope and anchors. Coal is shipped prin¬ cipally at the Tyre docks, area, 50 acres, belong¬ ing to the North-Eastern Railway Company. The first lifeboat was built in South Shields and put to sea 30 Jan. 1790. A stone pier a mile long has .been constructed at the mouth of the harbor. Pop. 108,647.

SHIELDS. Weapons of defense held be¬ fore the bearer to protect against blows or pro¬ jectiles. The shield has been probably univer¬ sally used by all nations and tribes from that early period when the human being needed an outdoor defense. The early Greeks had their circular shield (as pis) of leather or felt, and the sakos or oval shield. The ancient descrip¬ tions show how these shields were beautified, as the metal one of Achilles made by Hephais- tos (according to Homer) with its embossed scenes, that of Heracles in Hesiod's descrip¬ tion. Often they had individual badges painted on them (forerunners of the knights' heraldic shields), a custom borrowed from the Persians. The Romans, Diodorus says, at first used square shields, then the aspis, and later the large circular iron clypeus and the four cor¬ nered four-foot-long scutum, of wood. Later the light circular parma of leather was used by the velites. Old Roman bas-reliefs show us also hexagonal shields. The shields of the Gauls (pavoises) were so great they crossed rivers in them. The shield of the crusaders was pointed (heater- shape). The English buckler and the Scotch targe are old subjects for painters and poets. The shields of the knights or of heraldry are very varied in form changing with the different periods and meth¬ ods of combat. The <(heater® shape was in use in the 12th, 13th and 14th centuries; in the 14th century the sides often ran parallel, the top was still a straight line but the bottom was almost a half round. Then the tilting shields began to appear and indentations were made in the side (termed touches®) to allow for the pas¬ sage of the lance, these were very much smaller than the triangular shield of the warrior on foot. But the actual shield of the knight soon passed into the art of heraldry, to be known generally as a scutcheon, and assumed fantas¬ tic shapes that were never seen in combats ; even the distaff (woman) side of the <(house® receiving a shield of <(lozenge® (diamond) form. A very natural evolution from the dec¬ orative shield of heraldry was that to the shield as an accessory in

ornament, when it took the place of the cartouche. In the decorative arts the shields are endless in form, their decorative curling and curving straps being derived from the metalworkers' beaten cartouches worked up to ornament the gates and doors of the differ¬ ent periods. Perhaps the most extravagantly decorative shield forms are those of the Renais¬ sance, baroque, and rococo periods. Shields have been much utilized as a motif by artists in their decorative (ftrophy® groupings, and to the present day there is no more favored device in every branch of Art, including architecture, than the shield form.

Clement W. Coumbe, Technical Art Expert.

SHIITES, she'its, or SHIAH, that sect or party of Mohammedans who assert the rights of Ali (q.v.), the son-in-law of the Prophet, and his descendants to be the true line of

Caliphs, as opposed to the Sunni or Sunnites (q.v.), who uphold the succession of the Caliphs Abu Bekr. The divergence — not un¬ mixed with animosity — that exists between the two sects is similar to that of Protestants and Roman Catholics of former times, . and con¬ stitutes even to-day the weakest point in the armor of Islam. The Persians and most of the Moslems in India are Shiites, while the Turks and many Arabs adhere mainly to the Sunni faction. The Persians adopted the Shiah doctrines in 1500, since when they have been the national law and religion of that country. Yet neither creed is pure and un¬ adulterated, for each is again subdivided into smaller schisms. (See Hasan and Husain; Mohammed; Ommiads). Consult Muir, W., (The Life of Mohammed) and (The Caliphate5 (London).

SHIKARPUR, shik-ar-poor', India, (1) a former district in Sind, Bombay, comprising the four subdivisions of Rohri, Sukkur, Lar- kana and Mehar. The two first now form the Sukkur district and the other two (since 1901) the district of Larkana. (2) A subdivision of the Sukkur district (see above), composed of the Shikarpur, Naushahro Abro and Sukkur talukas or departments. (3) Shikarpur Taluka of Sukkur district, Sind, Bombay, has an area of 492 square miles and a population of about 110,000. It contains one town, Shikarpur (see below) and 88 villages. (4) Town, headquart¬ ers of the taluka of the same name in Sukkur district, stands in a tract of low-lying country which is annually flooded by canals from the Indus (18 miles west). The soil is rich, pro¬ ducing grain and fruit. Its buildings have been much improved in recent years. There is a famous

bazaar with a flourishing trade, owing to the town's position on one of the great routes from Sind to Khorassan via the Bolan Pass. There are 17 government schools — one high school, 12 for boys and four for girls (two each for Hindus and Mohammedans), and sev¬ eral private schools (one English). The prin¬ cipal manufactures are carpets and coarse cot¬ tons ; the more important exports are indigo, metals, henna, spices, groceries, opium, horse¬ cloths, dry grains and silks. Since the Munic¬ ipal Act of 1855 great sanitary improvements have been effected. Pop. 53,944, about one- third Mohammedans and the rest Hindus. (5) Shikarpur Taluk, the northern department of Shimogo district, Mysore ; area, 429 square miles; pop. about 70,000. The jungle harbors tigers, leopards and other wild animals. The headquarters is also named (6) Shikarpur Town; pop. 5,568. (7) A town in the district

of Bulandshahr, United Provinces; pop. about 13,000. The American Methodists maintain a branch mission here.

SHILKA, shil'ka, a river of Asia, in east¬ ern Siberia, rises among the Yablonoi Moun¬ tains and is one of the two rivers (the other is the Argun) which by their union form the Amur, into which it empties at a point beyond Ust Strelka. The Shilka flows from Mount Kentai in the Khan-ula range (Chinese Mon¬ golia) mostly through Russian territory, be¬ fore reaching which it is known as the Onon. It is about 320 miles long and navigable about one-half of the year. In winter its frozen bed is utilized as a highway. Sretensk is an im¬

portant station on the river for vessels going to Khabarovsk. It is a terminus of the Trans- Siberian Railway and the starting point of Rus¬ sian expeditions to the Lower Amur.

SHILLABER, shil'a-ber, Benjamin Pen- hallow, <(Mrs. Partington,55 American humor¬ ist: b. Portsmouth, N. H., 12 July 1814; d. Chelsea, Mass., 25 Nov. 1890. After a brief secondary schooling and training in a local printer's office, he went to Boston, where he followed his trade in several newspaper offices, with the interruption of a year's visit to British Guiana. Then he began journalistic work. Achieving from the first (1847) a great suc¬ cess with his (Sayings of Mrs. Partington,5 whose homely wisdom is closely allied to that of the Widow Bedott. In Boston he was suc¬ cessively an editor of the Post and editor-in- chief of the Carpet-Bag, a humorous publi¬ cation of short-lived fame, and of the Satur¬ day Evening Gazette (1856-66). Shillaber's work was not, as one critic has phrased it, (

SHILLELAGH, shi-la'la, the cudgel of blackthorn or oak carried by the conventional Irishman, with which he is supposed to delight to play on the

heads of his friends on occa¬ sion. The name is borrowed from the once famous oak forest of Shillelagh in the south¬ west corner of County Wicklow, 17 miles south¬ west of Aughrim. There are about 12 ways of spelling this word.

SHILLING, the name of an English silver coin and money of account since the Norman Conquest, of the value of 12 pence, or the 20th part of a sovereign or pound sterling; and equivalent in the United States to about 24pj cents. In the United States, a denomination of money formerly in use, differing in value rela¬ tively to the dollar in different States, but below that of the English shilling with a correspond¬ ing value for the penny and the pound. An exhaustive history of the shilling may be found in the great Oxford Dictionary of Sir J. A. H. Murray (1888 et seq.).

SHILOH, shi'lo, (1) Palestine, occupied the summit of a high mountain north of Bethel. Its modern name is Seilun. The Ark of the Covenant or Tabernacle (q.v.) rested here from the time of Joshua to that of Eli, when it was carried away by the Philistines. Prior to this Shiloh was the religious seat of the Israel¬ ites and a great feast was held annually. The phrase of the Scriptures, <(until Shiloh come,55 has received considerable attention from theo¬ logians, and its accepted interpretation is — <(until Christ come,55 or <(until rest come.55 A small village site, 20 miles north of Jerusalem, is identified with the ancient Shiloh. (2) A set¬ tlement in Cape Colony, South Africa, in the district of Queenstown, 60 miles northwest by west of King William's Town. (3) There is

one village of this name in Alaska and there are 16 in the United States.

SHILOH, shi'lo (Tenn.), Battle of. This engagement, known also as Pittsburgh Landing, was fought 6-7 April 1862, between the Union forces of General Grant, commanding the Army of the Tennessee, and of General Buell, com¬ manding the Army of the Ohio — the latter arriving the night of the first day — and the Confederate Army of the Mississippi under Gen. A. Sidney Johnston, with Gen. P. G. T. Beauregard second in command.*

After the battles of Mill Springs and Fort Donelson (qq.v.) Johnston withdrew from Kentucky and Tennessee to the line of the Memphis and Charleston Railroad, and soon after concentrated his army at Corinth, Miss. The Union forces were sent up the Tennessee River under Gen. C. F. Smith, Grant having been ordered by General Halleck to remain at Fort Henry (q.v.), Gen. W. T. Sherman, com¬ manding the advance and

seeking to cut the railroad, finding the country above Pittsburgh Landing under water, fell back to that point, and recommended its occupation to General Smith, who had remained at Savannah. Sher¬ man established his division 19 March at Shiloh Church, about two and a half miles back from the Landing, General Hurlbut's division having been encamped one mile out from the river. Grant, having been restored to command, reached Savannah 17 March and sent Mcder- nand's and C. F. Smith's division under W. H. L. Wallace to Pittsburgh. Prentiss' division fol¬ lowed later. Little or no attention was paid to lines of battle or reserves, both Grant and Sherman looking upon the concentration as preparatory to an advance upon Corinth. Gen. Lew Wallace's division was established at Crump's Landing, some six miles below, where, as Grant explained to Halleck, he had a good toad which would enable him <(to form a junc¬ tion with the main column, . . . six or seven miles before reaching Corinth.®

In regard to this move, Halleck, 20 March, telegraphed : <(By all means keep your forces together until you connect with General Buell, and wait till you are properly fortified and receive orders.® No attention was paid to this direction as to fortifying, and neither abatis nor rifle-pits were constructed, nor timber felled. Grant in his (Memoirs) says of this, ((When all reinforcements should have arrived I ex¬ pected to take the initiative by marching on Corinth, and had no expectation of needing fortifications, though this subject was taken into consideration.® The further reason given by Grant was that the proper line for fortifying was in rear of the camps as they ran, and could not be easily supplied with water. Sher¬ man, in his (Memoirsˆ writes: ((We did not fortify our camps against an attack, because we had no orders to do so, and because such a course would have made our raw men timid® ; and in a court-martial case he testified: (says: <(The fact is, I regarded the campaign we were en¬ gaged in as an offensive one, and had no idea that the enemy would leave strong intrench- ments to take the initiative when he knew he would be attacked where he was if he remained,®

General Nelson, the advance of Buell on the march from Columbia, telegraphed Grant on 3 April that he could be at Savannah 5 April, and in reply was informed Friday, 4 April, that he need not hurry, as boats could not be ready to take him to Pittsburgh until the 8th. The same day Grant notified General Prentiss : (

There had been a considerable show of Con¬ federate cavalry several miles to the front 4 April, but on the 5th Sherman wrote Grant : <(A11 is quiet along my lines now. We are in the act of exchanging cavalry according to your order. The enemy has cavalry in our front, and I think there are two regiments and one battery six miles out.® The same day one of his regiments had been engaged under his orders in cutting a road and bridging

a creek in his front for the advance on Corinth. Later in the day Sherman wrote Grant : <(I have no

doubt that nothing will occur to-day more than some picket-firing,® and that he did not ((appre- hend anything like an attack® on his position. The same day, after Sherman's report from the front, Grant, who had gone back to Savan¬ nah for the night, telegraphed Halleck: <(I have scarcely the faintest idea of an attack (general one) being made upon us, but will be prepared should such a thing take place. General Nel¬ son's division has arrived. The other two of General Buell's column will arrive to-morrow and next day. It is my present intention to send them to Hamburg, some four miles above Pitts¬ burgh, when they all get here. From that point to Corinth the road is good, and a junction can be formed with the troops from Pittsburgh at almost any point.® Grant, the same day, tele¬ graphed Buell : ((The enemy at and near Cor¬ inth are probably from 60,000 to 80,000.®

At the very time of these various inter¬ changes of opinion Hardee's corps was in line of battle within a mile and a half of Sherman's headquarters, having deployed in this position at 10 a.m., 5 April, with General Bragg's corps forming as a second line, and Polk's and Breck¬ inridge's corps, the rear of Johnston's army, closing up. The Confederate army had marched from Corinth the morning of 3 April, expecting to attack Saturday morning, the 5th, but a heavy storm and other causes delayed so that the attack was postponed till Sunday morn¬ ing, the 6th. Such was the situation Saturday night in the Union camps. While there was a very general feeling among the pickets and

many subordinate officers that the enemy was near in considerable force, it was discredited by Sherman, and so the usual precautionary orders were not given to medical, ordnance, quarter¬ master, or commissary officers, or to the troops, and no one had any official intimation that a battle was impending, or knew that Johnston's entire army was close to their front awaiting daylight to attack. There had been some strengthening of pickets, but nothing was done which even the suspected presence of the Con¬ federate army would have called for.

General Prentiss, after the war, in the first public utterance on the question of surprise, said: ((In reference to the still general inquiry, (Was our army surprised at Shiloh V I can only reply for myself that I had not the slight¬ est idea that a general engagement was to be fought that day.® He said

further : <(We were not prepared on the 6th of April® ; but (

Gen. Andrew Hickenlooper, now one of the principal officers of the Society of the Army of the Tennessee, an officer of note in Grant's army throughout the war, and a strong friend of Grant and Sherman ever after, commanded a battery in Prentiss' division at Shiloh. In the course of an exhaustive review of the battle he says of the general situation : <(There had been no order or system in camping; no relation of one command to another ; no defined front or known rear, except an impassable river. There was no common directing head or superior offi¬ cer beyond the rank of division commander placed on the firing line, whom all would recog¬ nize and promptly obey.® . . . ((The night be¬ fore had been passed by the Union troops in merry-making until the camp sank into a peace¬ ful slumber, from which they were aroused by the roar of musketry and the booming of the guns of the Fifth Battery.® As to the early hours of the day of battle, he observes : ((The bugle's cheery notes aroused the camp at the dawn of day; breakfast was over, and all was ready for an early morning drill, when the faint reports of distant picket-shots were heard and then came the pattering fire of the reserves, . . . followed by volleys on the right that told of swiftly approaching danger.® The pickets of Prentiss were the first to encounter the Con¬ federate advance, and being strongly reinforced, they attacked Hardee's oncoming line. The lat¬ ter pushed rapidly forward and thrust strong flanking forces into the wide gaps on Prentiss' flanks, thus turning both, as well as Sherman's left, and the right of Stuart — Sherman's iso¬ lated brigade.

Sherman's brigades formed on their color¬ line. a portion of the troops being called from their breakfast for the purpose. They advanced between 200 and 300 yards, met the enemy in force and checked his advance for a time, Sher¬ man meantime sending to McClernand for a battalion of cavalry to join one of his ((for the purpose of discovering the strength and design of the enemy.® It was not until 8 o'clock, however, that Sherman became convinced that it was an attack in force. He thus fixes the time in his official report: ((About 8 a.m. I saw the glistening bayonets of heavy masses of infantry to our left front in the woods be¬ yond the small stream alluded to, and became satisfied for the first time that the enemy de¬

signed a determined attack on our whole camp.® At 10 o'clock most of the advanced Union camps were in the hands of the enemy. There had been no time to strike tents or remove stores or private baggage. Sherman relates that two of his horses were killed at the picket- rope, and that he found them still tied there when the camps were recovered the next day.

In spite of this general surprise and of the tremendous onslaught of solidly formed bat¬ tle-lines, there was throughout the day much stubborn and

even remarkable fighting, in which Sherman, Prentiss, McClernand and Hurlbut were personally conspicuous. After the battle began, Sherman's conduct was beyond praise. There were probably 20,000 men in regiments that maintained their shattered organizations, and in broken groups, in batteries, and in mixed forces rallied by brave officers and men, which, together, without special regard to lines, held with desperate courage against the enveloping enemy. Many of them were killed or wounded before the day ended. But nothing could per¬ manently resist the well-ordered Confederate movement. Grant wrote that when he met Buell at the Landing, which was at 1 p.m., ((there prob¬ ably were as many as four or five thousand stragglers lying under cover of the river bluff, panic-stricken, most of whom would have been shot where they lay, without resistance, before they would have taken muskets and marched to the front to protect themselves.®

As the day advanced, the Union line was fast disintegrating. Sherman, testifying under oath at a subsequent trial, said that <(at least 10,000 ran away.® Prentiss' division was sur¬ rendered and captured soon after 5 p.m., having fought and maintained its organization to the last, and given the best illustration of pluck, endurance, and persistence in fighting that the history of the first day affords. Sherman's organization was destroyed, and he, with a small force of his own, was fighting stubbornly with McClernand, whose organization, though much broken, was still maintained. About 2 p. m. Johnston was wounded, and died in half an hour. The transfer of command to General Beauregard caused a lull in the fight, and a de¬ lay in movement, but at 5 the Union line had been forced back into a corner between the Tennessee River and Snake Creek, an area which included the landing. Here the line pre¬ sented a front of about a mile and a half to the enemy. Just as an assault on this posi¬ tion was being delivered at the right of the Confederate lines, Ammen's brigade of Nelson's division of Buell's army, which had marched from Savannah through the swamps, was fer¬ ried across the river, and two regiments ad¬ vanced and opened fire upon the right regi¬ ments of the enemy, which, in charging for¬ ward, had nearly reached the landing. The assault was checked without severe fighting, but the arrival of fresh troops thus became known, and the Confederate attack ended for the day. At this time Grant's line in front of the landing was held by the broken organization of Hurlbut, W. H. L. Wallace, McClernand and Sherman. There were portions of various or¬ ganizations available within the protected area, and Lew Wallace arrived during the night with 5,000 men. Buell himself had arrived at 1 p. m., and spent the afternoon in learning conditions and studying the ground, and the night in

posting his troops. Nelson's division was fer¬ ried over at night, and advanced on the left; Crittenden's, as the steamers brought it from Savannah, was placed on Nelson's right. Two brigades of McCook's division, which followed Crittenden up the river, were established still further to the right. The Union gunboats Tyler and Lexington anchored off the ravine next above the landing, and near the close of the first day's fight, fired effectively upon the Con¬ federate right flank and front, as the Union line was forced back toward the river. These boats continued their heavy shelling at intervals dur¬ ing the night, to the great discomfiture of the Confederate camps.

The battle of Monday, 7th, was opened under Buell's orders and direction. His left and centre advanced and became engaged with the enemy's pickets immediately after daylight, and encountered their main line at 6 a.m. Mc¬ Cook's two brigades moved at once into action, and were established still further to the right. The Army of the Ohio pressed steadily for¬ ward, and at 4 p.m. had possession of the camps of Stuart, Prentiss and a part of McClernand's. Two brigades of T. J. Wood's division arrived as the battle was ending, but only one reached the front. The action closed soon after 4, Buell's forces at that time covering two miles of the battle line (nearly three quarters of it, extending as it did to the left of Lew Wallace's division), and becoming hotly engaged there, in co-operation with Wallace's left regiment. Wal¬ lace, at the close of the battle, held the front of the Army of the Tennessee, McClernand, Sherman and Hurlbut being warmly engaged at the close in connection with the left of Wal¬ lace, and the right of McCook. About 5 p.m. the Army of the Tennessee reoccupied its former camps.

When Buell first advanced he was joined by Col. J. M. Tuttle of W. H. L Wallace's second division, who gathered up about 1,000 men of his own command, rallied many more from fragments about his bivouac, and without orders proceeded to Buell's lines, reported to him, and fought with him through the day. At day¬ light Grant gave Sherman orders to advance on the right. He thereupon sent his staff officers, to collect his men and moved forward about 7 a.m. At 9 o'clock Hurlbut moved under Grant's orders to support McClernand, who with Sher¬ man, was then engaged near his former camp» Lew Wallace had advanced earlier and held the right of Grant's army. This division finally swung around upon the ground originally occu¬ pied by Sherman's camps, there coming in con¬ tact with the right of McCook of Buell's line. Here the battle ended.

The division commanders of Grant's army were J. A. McClernand, W. H. L. Wallace, Lew Wallace, S. A. Hurlbut, W. T. Sherman, and B. M. Prentiss. Buell's divisions on the field were A. McD. McCook, William

Nelson, Thomas L. Crittenden and T. J. Wood. The division commanders of Johnston's army were: of Polk's corps, C. Clark and B. F. CHeatham ; of Bragg's corps, D. Ruggles and J. M. Withers; of Hardee's corps, T. C. Hindman, P. R. Cle¬ burne and S. A. M. Wood; reserve corps, J. C. Breckinridge. The best estimates of strength give Grant 33,000 at the opening of the battle, and Lew Wallace's reinforcement for the sec¬ ond day 5,000. The official reports give John¬

ston's strength at 39,000 to 40,000. The losses of Grant's army were 1,513 killed, 6,601 wounded and 2,830 missing; total, 10,944. Buell lost 241 killed, 1,807 wounded and 55 missing; total, 2,103. Total Union loss, 13,047. The Confederate loss was 1,723 killed, 8,012 wounded and 959 missing; total, 10,694. Con¬ sult Official Records) (Vol. X, LII, Part I) ; Grant, (Personal Memoirs> (Vol. I) ; Sher¬ man, (Memoirs) (Vol. I) ; Van Horne, his¬ tory of the Army of the Cumberland) (Vol. I); Shiloh Battlefield Commission: (The 77th Pennsylvania at Shiloh) (Hist, of the Reg. by J. Obreiterj and (The Battle of Shiloh) (D. W. Reed, Harrisburg 1905) ; Rich, J. W., (The Battle of Shiloh) (Iowa City 1911). See also Bibliography under Civil War in America.

H. V. Boynton, Late General, U. S. Army.

SHIMODA, sheWda, or SIMODA,

Japan, a seaport town on the island of Hondo, at the western entrance of the Gulf of Yeddo, 80 miles southwest of Tokio. It was nearly destroyed by an earthquake and tidal wave in 1854, but was rebuilt, and since 1857, when the Dutch treaty was signed, it has been a free port for foreign commerce. A daily steamer service runs between this port and Tokio in summer. Pop. 5,000.

SHIMONOSEKI, and MOJI, she-mo-no- sek'e, mo'je, the former originally called Akamagaseki, now popularly known as Bakan : a fortified town, seaport and railway terminus of Japan, at the southwestern extremity of Honshu (the Main Island), situated in 130° 56′ E. long., 33° 57′ 30″ N. lat. on the northern coast of the Shimonoseki Straits. Together with Moji, on the opposite coast, the town holds the key of the western gateway of the Inland Sea The town extends four miles from east to west and has extensive docks where much Japanese and foreign shipping is cleared, though its trade is not so large as that of Moji. Shimonoseki is famous in Japanese history for the sea-fight in 1185, by which the Taira Clan was exterminated by the Minamoto Clan. Here also took place a bombardment of the forts, 5-8 Sept. 1864, by a united squadron of American, British, French and Dutch warships, which landed marines and seized the batteries The situation arose through the action of the Daimyo of Choshu (in whose

territory the town lay), in attempting to keep foreigners away by repeatedly firing on foreign ships that passed his batteries on the coast. The Ameri¬ can steamer Pembroke was fired upon 25 June 1863; on 16 July United States steamship Wyoming destroyed two vessels and attacked the batteries in retaliation. When the combined squadrons (17 ves¬ sels) of the four powers brought the Daimyo to terms, the latter agreed to abstain from future hostilities, and thenceforth to supply foreigners with provisions. The Shogun (Com¬ mander-in-chief, a feudal office abolished in 1868) was obliged to pay an indemnity of $3,000,000, of which amount the United States re¬ ceived $785,000. The American government re¬ turned this sum to Japan in 1883, but without interest. After the Restoration in 1868 Shimo¬ noseki rose in prosperity owing to its geographi¬ cal situation. The treaty of peace which ended the Chino- Japanese War of 1894 was signed

here 17 April 1895 (ratified 8 May) by Marquis Ito, Japanese premier, and Li Hung Chang for China. Pop. 58,300.

Moji is usually coupled with Shimonoseki as their interests in shipping are indentical. The latter is under the jurisdiction of Yama- guchi, 51 miles away; Moji under that of Fukuoka, 47 miles away. The foreign mer¬ chants and shipping agents have their offices on the side best suited to their convenience, but the principal Japanese banks and shipping offices are at Moji. That town became important in 1887 when the Kyushu Railway made it the terminal. It is entirely open to general foreign trade. Pop. about 56,000.

SHIN-PLASTER, a bank-note, especially one of a low denomination; a piece of paper money. The term is derived from an old sol¬ dier having used a quantity of worthless paper currency as plasters for a wounded leg. See Money, Paper.

SHINER, one of various small silvery fishes of the family Cyprinidce, found in all streams from New England to Kansas and Louisiana, especially in those choked with weeds. They are the object of childish angling expeditions, and sometimes are large enough to be cooked, but should be eaten at once, as the flesh spoils quickly. (See Dace; Minnow). The moon-fish (Vomer setipennis) is sometimes called blunt-nosed shiner.

SHINGLE. A shingle is a flat, tapered piece of wood used as a roof covering or for the siding of houses and bungalows. Dating back to the earliest American settlements, the wooden shingle has been used as a roof cover¬

ing, and only in comparatively recent years has any other roofing material been used by the people of the United States and Canada. Until the latter part of the 19th century the shingles were cut from the nearest woods at hand that best answered the purpose. The earliest set¬ tlers on the Atlantic Coast used principally the wood of the White Pine and the Virginia Cedar. As they were made by hand, such woods were selected as possessed a straight grain, split easily and possessed a considerable degree of durability. In the southern part of United States, Cypress is largely used for shingles.

The rapid development of the United States, however, called for large quantities of wood for other construction purposes, and gradually the supply of woods suitable tor the manufacture of shingles became exhausted to such a point that woods of more abundant supply were sought. On the Northwest Pacific Coast was found the Western Red Cedar in practically in¬ exhaustible supply, and it was discovered that this species had been used on the Pacific Coast for shingles since the time of the earliest settlements there.

Development of transcontinental railroads made available shingles sawn from this species over almost the whole of North America and to-day 85 per cent of the shingles manufactured are sawn from this wood. Due to its large use in the manufacture of shingles, Western Red Cedar (Thuja plicata) is also commercially known as <(shingle wood.®

At the present time, California Redwood, Southern Cypress, Eastern White Cedar and the Western Red Cedar constitute about 99 per

cent of the supply for wooden shingles, but the latter is by far the best known, and most widely used.

On the warm moist slope of the Cascade Mountain Range in Washington, Oregon and the Province of British Columbia, the Western Red Cedar tree is found in great abundance, and in this locality it attains its maximum growth and size. Trees of from 12 to 16 feet in diameter, measured 4J4 feet from the ground, are not uncommon. Under average growing conditions, when this tree is mature it will have a clear bole of from 50 to 100 feet. No other American wood is better adapted to the re¬ quirements of a wooden shingle than Western Red Cedar. The supply is sufficient to meet all demand. It is durable in the extreme. It is quite easily worked. It has an extremely straight-grain. It is light in weight. It has an oil peculiar to this wood alone that renders it quite immune from the ravages of fungi and insects.

The timber is removed from the woods in either log or "bolt® form. At the shingle mill the timber is cut into the length of shingle de¬ sired and is then

usually barked and cut into blocks small enough to be handled with ease. The resulting blocks are then placed in a shingle machine, which automatically cuts off the tapered shingles. Any defects are then trimmed off and the shingles cut into the most desirable widths. The shingles are then dropped into large bins, from which they are packed. To expedite seasoning and to reduce the weight for transportation purposes, after packing the shingles are put through a dry kiln, where they are dried for from 7 to 10 days, at the end of which time they are ready for shipment.

Cedar shingles are cut in two standard lengths, 16 and 18 inches. Each lengthed shingle is packed in two standard thicknesses. For the 16-inch shingles, these thicknesses are five-to-two and six-to-two, meaning five shingles at their butts will measure two inches, and six shingles at their butts will measure two inches, respectively. For the 18-inch shingles, these thicknesses are five-to-two-and-one-quarter and five to two. The most common grades for the 16-inch shingles are "Extra Clear® and "Extra Star-A-Star® ; for the 18-inch shingles "Per¬ fections® and "Eurekas.®

There are many striking examples of long life peculiar to the roofs of homes covered with Red Cedar shingles. "Lowland,® the magnifi¬ cent mansion of the late George Abbot James, at Nahant, Mass., was built and roofed with Red Cedar shingles in 1872 and is found to be in perfect state of preservation. The old Block House built at Fort Borst in 1845 was roofed with Red Cedar "shakes® (split shingles) and is still in an excellent state of preservation. Many of the pioneer homes of the Northwest that were covered with Red Cedar shingles are yet in service.

Logs of Western Red Cedar have been fre¬ quently found in the forests of the Pacific Northwest, over which trees have grown, that have been found by counting their annual growth rings to be over 800 years old. In every instance the logs have been found to be in a perfect state of preservation.

Due to ihe abundance of timber supply, and the comparatively small amount of capital neces-

sary to finance the manufacture of shingles, there have been a very large number of shingle mills constructed. It has been estimated that in excess of 400 shingle mills were in opera¬ tion in 1908. This has constituted an over capacity, which has been a very material factor in causing a depressed condition in the shingle industry, but a gradual evolution of the timber into fewer hands, the construction of fewer mills, but of larger capacity, is

resulting in a stabilization of the shingle industry and the placing of this industry upon a sound economic basis, and the making possible of guaranteed quality.

SHINGLES, an acute disease {herpes zoster) characterized by an eruption of vesi¬ cles on an inflamed surface of skin. The name is derivatively related to cingle, a belt or girdle. Shingles occurs most frequently in children and young adults between the ages of 4 and 20. In children it is more liable to appear during or after other diseases, such as whooping-cough and diarrhoea. In adults various debilitating causes seem to predispose to its attack, espe¬ cially paralysis of the insane, cerebro-spinal meningitis and the arsenic habit. The actual causation of the disease is unknown. The eruption consists of red spots and small vesi¬ cles which are mostly disposed round one side of the body, like a half belt. In rare cases it encircles the body. It has an obscurely nerv¬ ous character, occurs in the course of a nerve, and is preceded by stinging neuralgic pains, also by languor, lassitude, loss of appetite, shiver- ings, headache, nausea, quickened pulse, etc., after which the eruption appears in irregular patches. The vesicles become enlarged to the size of small pearls in 24 to 36 hours, and fresh clusters occur for three or four days, complet¬ ing the belt-like appearance. As the eruption recedes by the fifth or sixth day, the vesicles become white and opaque, and the red margins become livid or purple. Sometimes the vesi¬ cles burst, and several of the patches run to¬ gether, forming irritable sores, discharging a thin serous fluid, which concretes and forms a crust, that falls off as the parts beneath heal. The disease is not contagious. It may be pro¬ duced by sudden exposure to cold after violent exercise, and sometimes follows acute affections of the respiratory organs. A similar eruption may appear on the lips and chin in a common cold. No known remedy given internally has a specific beneficial effect in shingles. The treatment consists in gentle laxatives, and in rectifying any derangement of the system; but the disease must be allowed to run its course, although the irritation can be diminished by local application. In the severer forms sulphur ointment is recommended.

SHINN, Everett, American artist: b. Woodstown, N. J., 6 Nov. 1873. He studied at the Philadelphia Academy of Fine Arts and in Paris. He is known for his pastels and mural decorations, and as a magazine illustra¬ tor. He painted the mural decorations at the Belasco and Stuyvesant theatres, New York, and at Trenton City Hall.

SHINN, Florence Scovel, American illus¬ trator, wife of E. Shinn (q.v.), to whom she was married in 1898: b. Camden, N. J., late 19th century. She studied at the Pennsylvania Academy of Fine Arts, and became well known

for her book illustrations, which include (Mrs. Wiggs of the Cabbage

Patchy (Lovey Mary, and 'Coniston.*

SHINNECOCK, shin'e-kok, a bay on the south shore of Long Island (q.v.). It indents Suffolk county for about 12 miles, and at the entrance is a long, narrow sand-bar. Nearby is the land owned by the Shinnecock Indians.

SHINNECOCK INDIANS, an Algon- quian tribe of Long Island, N. Y., formerly oc¬ cupying the southern coast from Shinnecock Bay to Montauk peninsula. Many of them early joined the Brotherton Indians, and the 143 that remain (1919) on their reservation of about 400 acres, three miles west of Southamp¬ ton, have intermarried with negroes until their aboriginal character has been almost obliterated. (See Indians, American). Consult Hodge, F. W. (ed.), (Handbook of American In¬

dians (2 vols., Government Printing Office, Washington 1907-10).*

SHINTO (spirit-way), the primitive folk- faith of the Japanese, was a typical barbarian religion composed of nature-worship and an¬ cestor- (including hero) worship. Chinese cul¬ ture, filtering into Japan through Korea, brought with it Confucianism about the 4th century a.d., and Buddhism in the 6th; and these two made with Shinto a religious com¬ pound in Japan similar to that which they made with Taoism (see Taoism) in China, ex¬ cept that Shinto was nearly absorbed by Budd¬ hism, until its resuscitation, from the 18th cen¬ tury onwards. This culminated in its reinstate¬ ment in pure form as state religion at the Japa¬ nese revolution in 1868, only, however, some years later to be disestablished and declared not a religion, but a state ceremony. Under the influence of modern education, its cult is rapidly declining. This immigrant Chinese cul¬ ture also made possible commitment to writing of the Shinto myths and legends, 712 a.d., into the Kojiki, (< Ancient Records,® and of the Shinto rituals, 927 a.d., into the Yengishiki, <(Ceremonial Law® ; recording their barbarian traits in a naive, unexpurgated form which aptly exemplifies the rise of religion in both creed and cult.

The Japanese theory of origins begins its myths with Izanagi, (

through six generations to O-Kuni-Nushi, a moon-god who with his son. Koto-Shiro-Nushi, are now popular as gods of wealth, under the names of Daikoku and Ebisu. The former is seated on rice bales, the latter holds a fish, these being the staple foods in Japan.

In accordance with the evolution of religion, the Kojiki now passes from the

origin of its gods in myth to the origin of its rulers and priests in legend, and of course secures author¬ ity for the latter by derivation of them from the former. Thus the Kojiki relates how Ama- terasu produced by magic a son, Ho-Mimi, whose begotten son, Ninigi, at her command, descended from Heaven with a retinue of no¬ bles and priests, deposed O-Kuni-Nushi, and founded that Imperial Dynasty which still after two millennia rules in Japan, ((in lineal succes¬ sion unbroken for ages eternal.® The Imperial Oath, prefaced to the Constitution of Japan, promulgated in 1890, appeals to the ˆImperial Founder of our House,® namely, Jimmu Tenno, greatgrandson of Ninigi, who was in turn supposititious ˆsovereign grandchild® of Ama- terasu-O-Mi-Kami. The <(Heaven® from which Ninigi, with his nobles and priests, really de¬ scended was Korea, as the Kojiki naively im¬ plies and as certain monuments show.

After his abdication and death, O-Kuni- Nushi became (according to his Kyushu con¬ queror) as ((Great Deity of Miwa,® ruler of the ˆinvisible,® by which was meant the world of thought and secret action which escapes the notice of the earthly ruler. The tutelary gods of every province must report at O-Kuni- Nushi's shrine in Izumo every October (hence called everywhere except in Izumo the ((godless month®) upon the condition of each individual's soul. O-Kuni-Nushi then punishes or rewards by means of the natural good and evil that be¬ fall men. Later he became a ruler of the dead. The mythical element in the Kojiki now de¬ creases and legend passes into annals which close in the 5th century a.d.

The ancestor and hero worship of Shinto was absorbed by Buddhism, since the latter pro¬ fessed especial knowledge about the future life; though each district managed to retain an Uji- gami, Clan god, to whom infants were pre¬ sented for adoption and naming.- Hero wor¬ ship is maintained mostly in these Ryobu, (

The Yengishiki, <(Ceremonial Law,® com¬ piled 927 a.d., from much older sources, is a worthy companion to the Kojiki. It contains 27 rituals, which consist, not of free petitions, but of statements of the grounds upon which the offerings, which are the essential thing, are made, namely the reception of some natural

good. The famous Obarsi, performed for the whole nation 30 June and 31 December, affords a single exception to this quest for nat¬ ural good. The Kagura is a popular occa¬ sional ceremony, a peace offering of food, music and dancing made to any deity by the temple attendants — usually the daughters of the resident priest — at the request and expense of any worshipper. The priests marry, their of¬ fice is hereditary, but may at any time be aban¬ doned, and distinctive dress is worn only when they are officiating. They make no claims to personal sanctity or authority.

The infrequent preaching of the priests al¬ ways appeals to the examples of the gods, and for positive rules to the laws of that Tenshi Sama who rules by divine right. As for the rest of conduct, ((Human beings, having been produced by the spirit of the two Creative Dei¬ ties, are naturally endowed with knowledge of what they ought to do and what they ought to refrain from. It is unnecessary for them to trouble their heads with systems of morality.® — N. Matoori. The Kurozumi, a sect founded a century ago, and now having about a million adherents, practises mental healing by various rites, and by accord with two commandments : Thou shalt not be without a constantly believ¬ ing heart. Thou shalt not yield to anger nor grief.

*Bibliography. — Chamberlain, B. H., (The Kojiki } (being Supplement to Vol. X in Trans¬ actions of the Asiatic Society of Japan, 1882) ; Satow, E., article in the Westminster Review (July 1878) ; (Ancient Japanese Rituals**

(in Transactions of the Asiatic Society of Japan (Vol. VII, Part 2) ; (Revival of Pure Shinto) (ib., appendix to Vol. Ill) ; Aston, W. G., (Shinto) (1905).

Edmund Buckley.

SHIP. A ship is a large boat, or vessel, intended for navigating the ocean. Technically a ship is a vessel carrying not fewer than three masts rigged with square sails. In the present day ships are of two kinds, sail and steam. For a history of the former see the article Sailing Vessels, and for a historical sketch of steam¬ ships, see' the. article Steam Vessels. A de¬ tailed description of vessels used in naval war¬ fare will be found under the title Warships.

A ship has three principal dimensions : length, beam and depth. Length is the straight- line horizontal distance from bow to stern. It is officially measured on the upper side of the upper deck of vessels having less than three decks, and on the second deck above the keel on all other ships; the beginning point being the inside of the inner plank at the side of the stem and reaching to the inside of the planking at the midship stern timber; deducting the amount of rake of the stern timber in the thickness of the deck, and one-third of the fore-and-aft round into the beam. The ((beam® is the horizontal distance amidships taken at right angles to the length. Officially it is measured from inside to inside of the planking on the under side of the measurement deck. The depth is the vertical distance from the un¬ der side of the beams of the deck of measure¬ ment to the keelson. That part of the depth of a ship below the water-level is called the draught ; that part above the water-level is termed the freeboard. The draught and

free¬ board vary according to the weight of cargo

carried, the draught being more and the free¬ board less when the weight is greater.

The principal requirements of a ship are buoyancy, stability, strength, capacity and speed. The buoyancy of a vessel depends upon its ability to displace a greater weight of water than the weight of the materials of which it is built. The weight of water (in tons) thus dis¬ placed is called the displacement of the ship ; and as salt water is heavier bulk for bulk than fresh water, with the same load a ship will ride higher in salt water than in fresh. The centre of buoyancy is equivalent to the centre of grav¬ ity of the mass of water displaced by the ship. When the ship is at rest in placid water it is located at a point in the vertical line passing through the centre of gravity of the ship. It is the point at which the pressure of the water in which the ship floats is theoretically centred — as the force of buoyancy. This force, how¬ ever, acts not at the centre of buoyancy, but vertically upward through that centre. As the ship rolls under the action of waves or of wind the centre of buoyancy shifts. In Fig. 1, the continuous lines show a sectional diagram

Fig. 1.

(amidships) of the vessel at rest in placid water: the dotted lines show the vessel heeled over by wind and wave. The centre of buoy¬ ancy has swung from B to B' ; the centre of gravity moves to G'. XB' shows the position of the force of buoyancy, and G'Z the force moving to right the ship to an even keel. Sta¬ bility is that quality of a ship by virtue of which it resists overturning. The nearer the centre of gravity of the ship can be brought down (in the loading) to the centre of buoy¬ ancy, the more stable the ship — that is, the greater the force which must be applied to raise the centre of buoyancy above the centre of gravity and cause an overthrow. In other words the stability of a ship depends upon the relative positions of the centre of gravity and the centre of buoyancy. The centre of gravity is discovered by a calculation of the various weights making up the ship's total displacement. A similar series of calculations based on the form, or proposed form of the ship will de¬ termine the position of the centre of buoyancy. A graphic method of arriving at the same re¬ sult consists of cutting from cardboard a series of cross-sections of the ship drawn to scale and gluing them together with their centre lines and load-water lines matching as in Fig.

2. Several groups of these cross-sections are made, one for each angle of rolling. Equi¬ distant parallel lines are drawn across each model, representing the position of the vessel with different loadings. The divisions are cut

off in succession from the top line, and the re¬ mainder after each cutting is carefully weighed and recorded for purposes of comparison. Be¬ fore each cutting the combination of cross-sec¬ tions is suspended from a nail, allowing it to hang freely, and a plumb-line hung from the same point of support. The model is hung first from one corner and then from the other — as shown in Fig. 3, where PL represents the plumb-line in the first suspension, and its trace in the second suspension, QR the position of the plumb-line in the second suspension, and B the centre of buoyancy found by their inter¬ section. From B a line is projected vertically upward — that is at right angles to the water¬ line to which the ship is assumed to roll. The extension of that line until it meets the centre line GK of the ship's molded form gives the point M, known as the metacentre. In discuss¬ ing the principles of flotation, the ship is often considered a pendulum whose point of suspen¬ sion is at the metacentre. The higher this point is above the centre of gravity (G), the more stable the ship. As M is made by the molding or the loading to approach G, stabil¬ ity diminishes, and when M passes below G the equilibrium is unstable, and overturning is imminent. The horizontal distance (GZ) from

the centre of gravity to the vertical line pass¬ ing through the centre of buoyancy and the metacentre represents the force operating to right the vessel ; that is, when the lines of the model are drawn to a standard scale.

Finding the centre of gravity is a much more complicated process. The necessary cal¬ culations are too extended to be reproduced here and the reader is referred to technical works on shipbuilding for intensive study of the problem. A mechanical method is often employed and when extreme care is exercised the results are sufficiently accurate to serve every practical purpose. The (< light® ship — that is, with all its stores and equipment on board, but without cargo — is subjected to what is known as the ˆinclining experiment.® The ship is heeled over from an upright posi¬ tion by the moving of a weight from one side to the other. The trial must be made in per¬ fectly calm weather, in placid water, and the weight should be large enough to roll the ves¬ sel through an arc of at least two degrees. For a large liner, say of 70 feet beam, a weight of 10 tons is required. Pig iron is commonly used. A long plumb-line is suspended inside of the ship and its

deflections marked. The metacentre having been previously determined by the finding of the centre of buoyancy, the remainder is easy.

Trim, as applied to a ship, is allied to its stability. The term signifies the condition of draught as related to its length. For example, if the draught forward is one foot less than the draught aft, the vessel is said to have a trim of one foot by the stern. A trim by the head would mean that the draught forward was the deeper.

Strength of structure is necessary to with¬ stand the strains to which the ship is subjected by wind and waves. In order to calculate these strains the vessel is regarded as a girder supporting the various weights of cargo, en¬ gines, coal, etc., acting downward; and also acted upon by the lifting strain of buoyancy acting upward. This girder is studied in two situations : First, as lying across the trough between two waves, supported at each end by deep water with its large lifting strain and by shallow water with very little supporting power at the middle: this is called the ((sag- ging® strain. The other critical position is that where the middle of the ship's length is sup¬ ported by the deep water of the crest of a wave and both ends are in shallow water: this is called the ((hogging® strain. These two con¬ ditions are illustrated at A and B respectively in Fig. 4. The strength of the ship proper

is thus quite distinct in meaning from the local strength of various parts designed for certain purposes, as for the distribution of the weight of the engines, the thrust of the propeller, the supports for hoisting cranes, and the like.

The capacity of a ship is her power of car¬ rying stores and cargo, together with crew and passengers. The greater this capacity is in pro¬

portion to the size, and the greater the speed of the vessel, the greater is her utility. The more lightly a vessel is built the greater will be her capacity for her size ; but the lightness of a vessel is limited by the need of strength to re¬ sist strain. Capacity is also to some extent de¬ pendent on form, and the form which is most conducive to high speed is not necessarily that which gives the greatest capacity for stowage. The speed of a vessel, as also facility of evolu¬ tion or promptitude in obeying her helm, de¬ pends on the due proportion of her parts. Given an equal engine power, the speed of a vessel is dependent upon its underwater out¬ lines. In a general way it may be said that the sharper the bows the more easily the resistance of the water is overcome ; and long, gentle, horizontal curves are speedier than a straight, chisel-shaped form. Bevelling-up the bows from the keel to the deck tends to an increase of speed in two ways : it lowers the initial re¬ sistance of the water and causes a tendency of the bow to rise and ride

upon the water, thereby diminishing the draught. Bevelling-up the stern is also of advantage, provided the taper¬ ing of the body of the ship does not begin too far forward. If begun at the midship section and curved in gently running lines aft, the speed will be increased. A similar result will be secured by curving the bottom of the ship gently upward from amidships toward the stern. The midship cross-section whose water surface most nearly approaches the semi-circle is the speediest. However, on account of its lack of stability and the very objectionable tendency to roll, it is used only when speed is the chief consideration. Figure 5 shows in diagram¬

Fig. 5.

matic form the shape and water-line found to be speediest under any given propulsion, the length being from 7 to 10 times the beam. It is common in swift river steamers, but is not used for cargo vessels, as it lacks in profitable carrying capacity. The midship section of the cargo ship is on the lines shown in Fig. 1.

Construction. — In designing a ship the mid¬ ship area is computed and a midship section made from which the proportions of the other parts of the ship are calculated. The whole plan of the ship is then drawn in three related sectional plans, called the sheer-plan, the body- plan and the half-breadth plan. The sheer-plan is a projection on a vertical longitudinal plane dividing the ship on its centre line into two parts and gives a complete view of the side, representing the length, depth, rake of the stem and stern, with the wales, water-lines, decks, ports, masts and channels. The body-plan is a projection of the largest vertical and athwart- ship section, showing the breadth and having described upon it every timber composing the

frame of the ship, those running forward from the place of greatest breadth being described on the right hand, those running aft on the left of the centre line. The half-breadth plan shows the half-ship lengthwise as seen from above. The water-lines are drawn on the sheer- plan as parallel straight lines; they are dotted in or drawn in blue ink on the half-breadth plan, and show the width and horizontal curves of the hull at different levels corresponding with the water-lines in the sheer-plan. Half¬ models of the vessel are also made. These are constructed of thin strips of wood laid hori¬ zontally on each other, which represent the parallel water-lines, and can be taken apart to serve as models for the full-sized drawing. When the plans are complete full-sized draw¬ ings are traced in chalk on the floor of a room called the mold-loft, which is usually of a length equal to half that

of the largest ship, in addi¬ tion to the whole height of her hull. This op¬ eration is called^ laying off the ship. It supplies the workmen with the exact shape and position of that which constitutes what is called the frame of the ship. Pine models are then made of the different parts. The material formerly used in ship construction was timber, but this is now superseded by iron, and iron again is being in most cases replaced by steel. Wood is rarely used except for the smaller sea-going

- – 0.

Midship section of wooden vessel: A, keel; B, keelson; C, false keel; D, floor; EE, futtocks; F, top-timber; G, lengthening piece; HH, wales; I, diminishing planks; K, bottom planks; L, garboard strakes; M, beam; N, deck; O, shelf; P, waterway; Q, spirketting; R, clamps; S, knees; T, side keelsons; V, limber strakes; W, rough-tree rail; X, mast.

vessels, coasting craft and small yachts and boats. In the haste to replace the shipping lost by the German submarine warfare the building of wooden ships was extensively revived. The materials commonly used for wooden vessels are oak, teak, cedar, pine, beech, elm and many others, some being more suitable for one pur¬ pose, and some for another. In forming the separate pieces of the frame, which is techni¬ cally called the conversion of the timber, the principal points to be studied are the use of the proper wood to give the requisite strength, rigidity, elasticity or toughness to each part;

the selection of pieces from which the most important parts can be cut in the most perfect manner, and all the frame made as strong and free from faults as possible ; and lastly, the economical use of timber. The last object is often found to be practically antago¬ nistic to the others, for though a small gain which sacrifices the efficiency of a costly ma¬ chine can never be dreamed of as economy, it is not always easy to hit the exact mean between waste of material and sacrifice of efficiency; and when a low prime cost is an object, false economy is often practised deliberately. It is one of the advantages of the use of iron that the cost of material can be more exactly pro¬ portioned to the degree of efficiency it is de¬ signed to secure.

Keel and Frame. — The keel is usually made of elm, which is tough and not easily injured by water and is very suitable for receiving the numerous fastenings necessary to fit the other parts into it. In large vessels the keel is usually made of several pieces of timber scarfed to¬ gether. The keel is not perfectly horizontal, but deeper at the stern than the bow, which gives the ship greater steadiness and freedom of motion. Below the keel is placed the false keel, of elm four to five inches thick, which protects the true keel from abrasion and gives greater steadiness to the ship. At both ends of the keel is

placed the deadwood, which, cut into a curvilinear form at its upper surface, forms the line of the bottom of the ship's body. The stem and stern posts are set up at each extremity. The stem post is curved at its lower extremity. In a large ship it is divided into three pieces, called upper, lower and mid¬ dle. The scarf which unites the stem post with the keel is called the boxing. The stern post is, if possible, made of one piece of oak, so as to have greater strength to support the rudder. It is inserted into the keel by tenons and mor¬ tices. The frame of the ship consists of floors, cross-pieces, futtocks and top timbers. The floor timbers are placed across the keel per¬ pendicularly to its length, the upper surface of the keel and deadwood being cut to receive them. They are fastened in various manners. The timbers which join the floor are called the first futtocks. Other floors and futtocks are placed upon the first to complete the frame. The timbers of the frame below the surface of the water are curvilinear, above it nearly recti¬ linear. The distance between the frames is called room and space. Upon this the relative weight and strength of the ship greatly depend. The stemson is worked in as a support to the stem ; the keelson, placed above the keels, serves to secure the floor timber and is scarfed to the stemson and sternson, which latter is bolted to the stern post. The beams which sup¬ port the decks are received on longitudinal ribs called shelves, which form part of the frame, and above which are the waterways. The frame being completed, the skin or planking is applied the vessel being first set upright and plumbed to ascertain that her frame is duly proportioned. The outer planking of a large vessel of oak is three to six inches thick. It is fastened to the ribs by bolts and trenails or by plugs of oak tightened by wedges. The decks of a ship are not completely flat, but are set to the segment of a large circle, which en¬ ables them to throw off the water. The holes*

for carrying away the water are called scup¬ pers. The seams of the outer planking of a wooden vessel are made watertight by caulking. This is forcing oakum (see Oakum), by means of sharp iron wedges called caulking irons, into the seams of the planking, which are forced

“ **

i ‘

*1. *

open, by reaming irons. The seams are then payed with melted pitch. The

decks are also caulked with oakum.

Iron and Steel. — For shipbuilding purposes iron and steel have been found by experience to be greatly superior to wood. An iron vessel is lighter than a wooden one of the same size, and with iron an equal strength may be obtained with less weight. Iron is also far more man¬ ageable than wood, as it can be bent with ease into any required shape. Steel is a still lighter material than iron. The same names for the different parts are generally retained in building with iron or steel, though they have little cor¬ respondence with the parts of a wooden vessel except in position. A diagram of half the mid¬ ship section of a modern steel vessel is shown in Fig. 7. The keel is of far less import¬ ance than in wooden ships, and does not as in them hold the position of foundation or ((back- bone® to the whole Structure, since an iron ves¬ sel is designed to be mutually supporting throughout. An iron ship, in fact, resembles a tubular iron bridge, closed at both ends, and the deck is of as much importance as the bot¬ tom to the strength of the whole. The keel is constructed of plates riveted together, and some¬ times is made hollow. From it, and riveted to it on either side, rise the ribs, which are girders built up of plates, and to the ribs on the outside is fastened the plating. The plating consists of sheets of metal one inch or more in thickness, overlapping each other at the edges, where they

are riveted together at intervals of three and one-fourth to four inches. The plates vary in thickness according to position and strength re¬ quired. Figure 8 shows the lines of plating as laid out on a body plan. There may be an inner skin of plating as well as an outer, and this of course adds to the strength and safety of the vessel. The ribs are tied together and at the same time held rigidly in place by means of iron, which support the deck or decks. The decks consist of wooden planking with thin metal plates below. In the finer class of ships there are water-tight partitions or bulk-heads of iron stretching across the vessel from side to side and from keel to deck, with water-tight doors in them, so that if in case of an accident the water gets into one of them the rest may keep the ship afloat.

Fabricated Ships. — The term ˆfabricated ship® signifies a type of steel vessel on which the punching and shaping of plates and ((shapes® and a part of the assembling and rivetting is done in a shop ordinarily employed in struc¬ tural iron work; as, for instance, bridge build¬ ing, or steel frames for skyscrapers. This plan, a strictly American idea put into operation dur¬ ing the Great War, and adopted at once by most of the shipbuilding nations, has the great advantage of utilizing the expert knowledge of steels and the superior special equipment of the steel worker's shop for the manufacture of parts amounting to about 80 per cent of the weight of steel in a vessel. It has been found practicable to make the entire

centre body of the ship in this way, leaving only the bow and stern to be fabricated in the shipyards. The result has been that about 40 per cent of the time of the expert shipwright has been saved for work that only he could do, and the yearly output of the shipyards of the country has been increased proportionately.

Launching. — The 'launching of a vessel is a delicate operation, and, as marking the com¬ pletion of the most important labors of the

Fig. 8c

shipbuilder, is usually made the occasion of a public exhibition and celebration. Two paral¬ lel inclined platforms of solid timber are laid one on each side of the keel, at the distance of a few feet from it and extending from the stem

as far below the stern as can be reached at low water. In this position they are carefully and firmly blocked and supported throughout their length. This double platform is called the ways. Upon it a second system of timber is loosely laid, and well greased between. The space from these last to the ship's bottom is everywhere filled with wedges of soft wood fashioned to its curves. The whole is called the cradle. The extremities of the cradle at the bow and stern are bound tightly across the keel with chains or ropes, and it is further kept from spreading by stout moldings, which overlap the outer edges of the ways. When the rising tide has reached well up the ways the wedges are simultaneously driven on every side, and the ship is raised from the blocks on which she has hitherto rested, and made to repose entirely on the cradle. The shores are all removed ex¬ cept the two spurs or dog-shores near the stem and when the proper moment has arrived these are also knocked away by falling weights, the rope holding up which is cut when all is ready. The vessel, now abandoned to her weight and encouraged by the yielding of the grease, begins slowly sliding along the inclined plane; her motion becomes at each moment more and more rapid until finally the noble fabric has aban¬ doned its union with the land and entered upon its destined element.

Masts and Spars. — There are various rules for sparring sailing ships, all founded upon their length and breadth, which are the main elements of stability. It may be sufficient to name one simple rule for the length of the main mast, this being the prime mover; deduct one-twelfth from the vessel's extreme breadth, multiply the result by two ; this will give height of mast

from deck. The topmast may be three- fifths of the lower mast, the main yard seven- eighths of the same, and so on upward. The foremast may equal seven-eighths of the main, with upper masts and yards in proportion. The mizzen mast, if stepped on the keelson, is five- sixths of the main mast. The best rules on this subject are perhaps found in tables ac¬ curately prepared, in which the lengths of the masts are given in fractions of the ship's breadth and those of the yards in fractions of the length. For the rest, it will be in most cases necessary to modify any given rule, in all in¬ stances, with immediate reference to the par¬ ticular model of the ship and to the uses for which she is destined. It would be an advan¬ tageous improvement in merchant ships, not sparred to the extent of their capacity, to make the fore and main masts in all cases of equal dimensions. With improved appearance they would have all the respective spars and sails, except the courses, answering equally for both masts. This would enable them to go to sea with fewer spare ones, or to derive more ad¬ vantage from the usual number. In small ships all the spars are of single sticks of pine timber, which, for equal contents, are always stronger ; but for ships above. 600 or 700 tons it is im¬ possible to procure single trees sufficiently large and then it becomes necessary to resort to made masts (so-called), which are of oak and pine, very artificially put together and bound with stout hoops of iron. Hollow-iron masts are also frequently used.

Rigging. — Many large vessels are fitted with

four masts, some with five. The standing and part of the running rigging are formed of wire rope. The masts and bowsprit of a ship are not abandoned to their own unsupported strength, but require to be sustained by the standing rigging. This consists, for the bowsprit, of gammoning and bob-stays, confining it down to the stem; and shrouds, which sustain the immense lateral pressure which it endures when on a wind. The jib-boom and flying jib-boom are in like manner supported by means of mar¬ tingales and guys. The foremast is supported by three or four pairs of shrouds on either side and by two stays led forward to the bowsprit. The foretop mast is supported by shrouds set¬ ting up in the top, back-stays descending to the channels (broad pieces of planks fixed edge¬ wise to the outside of the vessel for spreading the lower rigging), and stays leading to the bow¬ sprit end. The top-gallant and royal masts have also their shrouds setting up through the cross- trees, their backstays descending to the chan¬ nels and their stays leading to the jib and flying jib-booms. In like manner are the main and mizzen masts supported, except that the main¬ stays set up on deck beside the heel of the bow¬ sprit, the main-top-mast-stays at the head of the foremast, the main-top-gallant-stay to the fore-top-mast-head and main-royal-stay to the fore-top-gallant-mast-head. The mizzen-stay

also sets up beside the mainmast and the same in ascending. The running rigging consists of the tacks and sheets that serve to spread the sails, the halyards, traces, lifts, clewlines and all other ropes used in making, taking in or manoeuvring the sails.

Sails. — The sails of a ship are square sails bent to the yards and fore-and-aft sails tra¬ versing on stays or bent to gaffs. Let us de¬ scribe an entire suit, beginning forward. On the extremity of the bowsprit is the flying jib, a three-cornered sail, which goes from the end of its boom upward along its stay, leading to the fore-top-gallant-mast-head and confined to the stay by rings of wood or iron, called hanks. The jib, which leads from its boom to the fore¬ top-mast-head, is of similar form and so is the fore-top-mast-stay-sail, running from the bow¬ sprit end toward the masthead. On the fore¬ mast we have the foresail, bent to the foreyard and spread at the foot by means of tacks and sheets; above it, the fore-top-sail, bent to the top-sail-yard, by means of which it is hoisted aloft, while its lower corners are spread to the extremities of the foreyard; next the top-gal¬ lant-sail, bent to its yard and sheeting home to the top-sail-yard, and so with the royal and sky sail. Double top-sails and top-gallant-sails are now much in use, that is to say, these sails are practically made each into two sails, which gives greater ease in handling. All these sails are turned at pleasure, to be presented to the wind, by means of braces attached to their yard¬ arm, and leading to the mainmast. The main¬ mast is furnished with a similar suit of sails, somewhat larger; the mizzen, also, though smaller than either, instead of a square sail on the lower mast, it has a gaff sail, hoisting up and down abaft the mast. Some ships have sim¬ ilar gaff sails on the fore and main masts, which are found of great use in gales of wind as a substitute for storm staysails. Most carry also light staysails between the masts ; but they are

very troublesome and worse than useless. Stud¬ ding sails extended on special spars outside the square sails when going large are very useful. The perfection of equipping a ship with spars, rigging and sails, consists in so disposing them, that, in a whole-sail breeze, the centre of effort of all the sails will be in the same line with the ship's centre of rotation ; or that the efforts of the forward and after sails to turn the ship will be so exactly balanced as not to require any continued assistance from the rudder in either direction ; for this, while it impedes her prog¬ ress, does not leave the entire force of the rudder disposable when necessary to turn. Of the two evils, however, seamen have more patience with a ship disposed to approach the wind than with one needing the continued action of the helm

to keep her from falling off.

Cargo and Ballast. — When the articles in a ship's cargo are heavy and light, the heavier are placed nearest the bottom, to increase the ship's stability. When, however, all are heavy, there may be danger of making a ship too stiff ; so that, not being balanced, she will roll vio¬ lently, and, perchance, risk the fracture of a mast, or even spring a leak. To obviate this danger the cargo should be raised ; if iron, some should be stowed between decks; if coal or salt, it may be heaped up in the centre, taking care to secure it against shifting, should the ship be knocked down by a sea or squall. Heavy articles should never be placed toward the ex¬ tremities, lest they promote pitching. The cargo and the ship should be considered as one in¬ tegral whole, every precaution being taken in loading to preserve the proper relations be¬ tween the centre of gravity and the centre of buoyancy. In all cases care must be taken to preserve the trim of the ship — that just pro¬ portion between her draft forward and aft which the estimate of the builder, or, when a voyage has been made, experience itself, has determined to be most favorable to rapid sail¬ ing. See also Navigation; Shipbuilding. '

Bibliography. — Attwood, E. L., and Cooper,

I. C. G., (A Textbook of Laying Off) (Lon¬ don 1914) ; Carmichael, A. W., Practical Ship Production (New York 1919) ; Curtis, W. H., (The Elements of Wood Ship Construction (London 1919) ; Desmond, C., (Wooden Ship Building> (New York 1919) ; Holms, A. C., Practical Shipbuilding) (2 vols., London 1917) ; Hughes, C. H., (Hanabook of Ship Calculation, Construction and Operation) (New York 1917) ; MacBride, J. D.,

SHIP IN ART AND SYMBOLISM. As

symbol of the State a ship has been used from very distant times; as such it is depicted as steered by its statesmen through the shoals, rocks and storms of internal troubles, false policies and the machinations of enemy countries. In Christian symbolism also the ship takes the same significance. It was de¬ picted riding in safety amidst storms as em¬ blematic of the Church in the early days sur¬ viving the direst persecutions. Frequently the mast and yard-arm are used to signify the Cross and the peak of the mast is surmounted

by a dove or the sacred monogram. The sym¬ bol iof the ship is dilated on by early Christian writers, as Saint Clement of Alexandria. In the Catacombs hanging lamps have been dis¬ covered in the form of masted ships, and the design appears frequently on the Catacomb walls. Sometimes

the ark of Noah takes the place of the masted ship. Often, however, in ancient times, as at present, the ship is intro¬ duced as an emblem of maritime power. In ecclesiastical art a ship has been pictured in the hands of Saint Jude; Saint Ursula has been depicted with a ship near her, or as landing from a ship ; Saint Melanius has been portrayed as lying dead

Clement W. Coumbe.

SHIP CANALS. Great ship canals across isthmuses or peninsulas, to make shorter sea routes or avoid storm passages, or surmount falls, or to make seaports of inland cities, have been the speculations of dreamers for ages ; but the developed and hurried commerce of this age has made some of them imperative. The ship canals of the world are 11 in number, as follows :

1. The Suez Canal (q.v.), begun in 1859 and completed in 1869.

2. The Cronstadt and Saint Petersburg Canal, begun in 1877 and completed in 1890.

3. The Corinth Canal, begun in 1884 and completed in 1893.

4. The Manchester Ship Canal, completed in

1894.

5. The Kiel Canal (q.v.), connecting the Baltic and North seas, completed in 1895. En¬ larged 1906-14.

6. The Elbe and Trave Canal, connecting the North Sea and Baltic, opened in 1900.

7. The Welland Canal, connecting Lake Erie with Lake Ontario. See Canadian Canals.

8 and 9. The two canals, United States and Canadian, respectively, connecting Lake Su¬ perior with Lake Huron.

10. The Panama Canal.

11. The Cape Cod Canal.

The canal connecting the Bay of Cronstadt with Saint Petersburg is described as a work of great strategic and commercial importance to Russia. The canal and sailing course in the Bay of Cronstadt are about 16 miles long, the canal proper being about 6 miles and the bay channel about 10 miles, and they together extend from Cronstadt, on the Gulf of Finland,

to Saint Petersburg. The canal was opened in 1890 with a navigable depth of 20ˆ4 feet, the original depth having been about 9 feet; the width ranges from 220 to 350 feet. The total cost is estimated at about $10,000,000.

The next of the great ship canals connecting bodies of salt water in the order of date of con¬ struction is the Corinth Canal, which connects

*the Gulf of Corinth with the Gulf of 2Egina. The canal reduces the distance from Adriatic ports about 175 miles and from Mediterranean ports about 100 miles. Its length is about four miles, a part of which was cut through granite soft rock and the remainder through soil. There are no locks, as is also the case in both the Suez and Cronstadt canals, already described. The width of the canal is 72 feet at bottom and the depth 26*4 feet. The work was begun in 1884 and completed in 1893 at a cost of about $5,000,000. The average tolls are 18 cents per ton and 20 cents per passenger.*

The Manchester Ship Canal, which connects Manchester, England, with the Mersey River, Liverpool, and the Altantic Ocean, was begun 11 Nov. 1887 and opened for traffic 1 Jan. 1894. The length of the canal is 35ˆ4 miles, the total rise from the water level to Manchester being 60 feet, which is divided between four sets of locks, giving an average to each of 15 feet. The minimum width is 120 feet at the bottom and averages 175 feet at the water level, though in places the width is extended to 230 feet. The minimum depth is 26 feet, and the time required for navigating the canal from five to eight hours. The total amount of excavation in the canal and docks was about 45,000,000 cubic jards, of which about one-fourth was sandstone rock. The lock gates are operated by hydraulic power; railways and bridges crossing the route of the canal have been raised to give a height of 75 feet to vessels traversing the canal, and an ordinary canal whose route it crosses is carried across by a springing aqueduct com¬ posed of an iron caisson resting upon a pivot pier. Cost, $75,000,000.

Two canals connect the Baltic and North seas through Germany, the first, known as the Kaiser Wilhelm Canal, having been completed in 1895 and constructed largely for military and naval purposes, but proving also of great value to general mercantile traffic. Work upon the Kaiser Wilhelm Canal was begun in 1887, and completed in 1895. The total excavation amounted to about 100,000,000 cubic yards, and the cost about $40,000,000. See Kaiser Wil¬ helm Canal.

The Marseilles-Rhone Canal was begun in April 1911. It is about 50 miles

long. For the first three miles out of Marseilles it is hardly a canal, properly speaking, being located off shore. It then turns sharply, and a tunnel of four and one-half miles passes under the moun¬ tain ridge near the shore; it next proceeds by the easiest overland route to the Rhone at Arles.

Three ship canals intended to give contin¬ uous passage to vessels from the head of Lake Superior to Lake Ontario and the Saint Law¬ rence River are the Welland Canal, originally constructed in 1833 and enlarged in 1871 and 1900 (see Canadian Canals) ; the Saint Mary's Falls Canal at Sault Sainte Marie, Mich., opened in 1855 and enlarged in 1881 and 1896; and the Canadian canal at Saint Mary's River, opened m 1895. In point of importance, meas¬ ured at least by the present use, the canals at the Saint Mary's River by far surpass that of the Welland Canal, the number of vessels pass¬ ing through the canals at the Saint Mary's River being eight times as great as the number passing through the Welland, and the tonnage of the former being nearly 40 times as great as that of the latter. The traffic is, in fact, heavier

than that through the Suez Canal, being about two and a half times as much. One of the im¬ portant products of the Lake Superior region, iron ore, is chiefly used in the section contig¬ uous to Lake Erie, and a large proportion of the grain coming from Lake Superior passes from Buffalo to the Atlantic Coast by way of the Erie Canal and railroads centring at Buffalo. The most important article in the westward shipments through the Sault Sainte Marie canals — coal — originates in the ter¬ ritory contiguous to Lake Erie. These condi¬ tions largely account for the fact that the num¬ ber and tonnage of vessels passing the Saint Mary's River canal so greatly exceed those of the Welland Canal. During the season of 1915, from April to December, 21,233 vessels, with a total tonnage of nearly 50,000,000, passed through both these canals, 16,910 using the American and 4,323 vessels using the Canadian. In 1907 work was begun on enlarging the lock of the American canal, which is now almost completed, being opened for traffic in 1914. It is 80 feet wide and 1,350 feet between gates, the masonry being 1,750 feet in length. It can ac¬ commodate two of the biggest lake steamers at once and be filled or emptied within six minutes.

The Cape Cod Canal is of recent construc¬ tion ; it was begun in 1909 and opened to traffic 1 Aug. 1914, to vessels drawing only 18 feet of water, but since 1 Oct. 1915 vessels of 20 feet draught have been able to pass through. It connects Barnstable Bay with Buzzard's Bay, Mass., thus saving the coastwise shipping the dangerous navigation around Cape Cod. The canal is 12 miles long, sea-level in construction and has a minimum depth of 30 feet. Up to the end of 1915 over 9,000 vessels had passed through, including a number of gunboats and submarines of the United States navy.

Electric illumination from one end of the canal to the other makes night navigation possible. The tolls range from $3 for motor boats to $70 for larger freight steamers.

In 1915 the State legislature of New Jersey authorized the State Board of Commerce and Navigation to continue a survey for a canal from Bordentown, on the Delaware River, to Morgan on Raritan Bay, to be 33 miles in length and to cost $45,000,000, as estimated in 1911. This project is in connection with the Federal plan involving a series of inland water¬ ways running down the coast out of range of the guns of warships that might attempt to blockade the coast. On 3 March 1905 Congress passed a River and Harbors Act, which au¬ thorized a survey <(for the construction of a continuous waterway, inland where practicable, from Boston to Beaufort, N. C.,}) the minimum depth of which was to be 25 feet, suitable for army, navy and commercial purposes. In 1912 Congress made an appropriation, in continuance of this project, for the purchase of the old Albemarle and Chesapeake Canal and its im¬ provements. In 1913 General Bixby, chief of engineers, had prepared a detailed plan with estimates for the contemplated waterway, in¬ volving a total cost of $30,000,000.

SHIP-FEVER. See Typhus Fever.

SHIP-MONEY, a tax which had much to do with provoking the rebellion which cost Charles I his head. It was customary in Eng¬ land in times of extraordinary peril for the

sovereign to call upon the seaports and mari¬ time counties to supply ships-of-war for the national defense. The ships which took part in the defeat of the Spanish Armada were ob¬ tained in this way. No such peril existed when Charles I, in October 1634, ordered the magis¬ trates of London and other seaport towns to provide ships-of-war, and also empowered the magistrates to levy a tax for that purpose. Resistance to the levy was met by further decrees, extending the tax to the whole king¬ dom, and directing that every landholder and other inhabitant be assessed according to his means, and the tax collected by distress if necessary. When John Hampden refused to pay the tax, and was brought to trial, the judges decided, eight to four, in favor of the Crown. One of the early acts of the Long Parliament in 1640 was to declare the ship- money tax illegal and no attempt has since been made to collect ship-money in England.

SHIP RAILWAY, a railroad for trans¬ porting vessels from one body of water to an¬ other. Capt. J. B. Eads' plan for the Tehuan¬ tepec Ship Railway across the isthmus between North and South America, in Mexican ter¬ ritory, attracted great attention, though it was never constructed. It consisted essentially of a series iof some 8 or 10 tracks, having a carrying car or cradle of some five sections, with altogether 1,000 wheels. Calculated for a vessel of 10,000 tons, this would not give a pressure so great as that of an ordinary loco¬ motive. A ship-railway is in operation by the Canadian government between Chignecto Bay, in the Bay of Fundy, across the isthmus to Northumberland Straits, a distance of 17 miles. This enables vessels to go from Prince Edward Island to Saint John, New Brunswick, in 12 hours, and greatly facilitates the transport of grain in bulk from the lake ports to New Brunswick. The vessels are raised by hy¬ draulic pressure a height of 40 feet to the level of the railway, and placed on a double track 18 feet from centre to centre. The flexible car system of ship-railway invented by William Smith, harbor engineer of Aberdeen, Scotland, is designed to allow the use of ordinary rail¬ way gradients. The car is in sections, each carried on a compound bogie running on parallel lines. Vertical and lateral flexibility are secured, and the ship is sustained on the car bv water cushions, so that it is virtually kept floating. The ship is raised onto the cars by means of a submerged shipway enclosed within a wet dock.

SHIP REGISTRY ACT approved 18 Aug. 1914, provided for the admission of foreign- built ships to American registry for foreign trade, and for other purposes. In section 5 of the act entitled cAn act to provide for the opening, maintenance, protection and operation of the Panama Canal and the sanitation and government of the Canal Zone, the words ((not more than five years old at the time they apply for registry, » were repealed. The Presi¬ dent of the United States was authorized, whenever in his discretion the needs of foreign commerce may require, to suspend by order, so far and for such length of time as might be desirable, the provisions of law prescribing that all the watch officers of vessels of the United*

States registered for foreign trade should be citizens of the United States. Under similar conditions the President was also authorized to suspend the provisions of the law requiring survey, inspection and measurement by officers of the United States of foreign-built vessels admitted to American registry under this act.

SHIP RIGGING. The many special terms used to designate the various parts of the stand¬ ing and running rigging in the days of the sail¬ ing vessel are given below :

The Standing Rigging.

Bobstay.

Bowsprit-shroud. Martingale-stay .

Jib-boom guys.

Fore-stays.

Fore-topmast stays. Inner-jib stay.

Outer-jib stay.

Flying-jib stay.

Fore-royal stay.

Fore- rigging.

Fore-topmast rigging. Fore-topgallant rigging. Fore-eap back-stay. Fore-topmast back-stays. Fore-topgallant back-stays. Fore-royal back-stay. Fore-lift.

Fore-topsail lift. Fore-topgallant lift. Fore-royal lift.

Main-stays.

Main-topmast stays. Main-topgallant stays. Main-royal stays. Main-rigging.

Main-topmast rigging. Main-topgallant rigging. Main-cap back stay. Main-topmast back-stays.

Main-topgallant back-stays. Main-royal back-stays. Main-lift.

Main-topsail lift. Main-topgallant lift. Main-royal lift.

Mizzen- stays.

Mizzen-topmast stays. Mizzen-topgallant stay. Mizzen-royal stay. Mizzen-rigging. Mizzen-topmast rigging. Mizzen-topgallant rigging. Mizzen-cap back-stay. Mizzen-topmast back-stays. Mizzen-topgallant back¬ stays.

Mizzen-royal back-stays. Crossjack lift.

Mizzen-topsail lift. Mizzen-topgallant lift. Mizzen-royal lift.

Jigger-stays.

Jigger-middle stay. Jigger-topmast stay. Jigger-topgallant stay. Jigger-

rigging.

Jigger-topmast rigging. Jigger-topmast back-stays. Jigger-topgallant back-stays.

The Running Rigging.

Fore-tack.

Fore-sheet.

Fore clew-garnet.

Fore-braces.

Fore lower topsail sheet. Fore lower topsail clew-lines. Fore lower topsail braces. Fore upper topsail sheets. Fore upper topsail clew-lines. Fore upper topsail braces. • Fore lower topgallant sheet. Fore lower topgallant clew¬ lines.

Fore lower topgallant braces. Fore upper topgallant sheet. Fore upper topgallant clew¬ lines.

Fore upper topgallant braces. Fore-royal sheet..

Fore-royal clew-lines. Fore-royal braces.

Fore-topsail halyards. Fore-topgallant halyards. Fore-royal halyards. Fore-signal halyards.

Fore reef-tackles.

Fore topsail reef-tackles. Main-tack.

Main-sheet.

Main clew-garnet.

Main-brace.

Main lower topsail sheet. Main lower topsail clew-lines. Main lower topsail brace. Main upper topsail sheet. Main upper topsail clew¬ lines.

Main upper topsail braces. Main lower topgallant sheet. Main lower topgallant clew¬ lines.

Main lower topgallant braces. Main upper topgallant sheet. Main upper

topgallant clew¬ lines.

Main upper topgallant brace. Main-royal sheet.

Main-royal clew-lines.

Mˆm-royai braces. Main-topsail halyards. Main-topgallant halyards. Main-royal halyards.

Main signal-halyards.

Main reef-tackles. Main-topsail reef-tackles. Cross jack tack.

Crossjack sheet.

Crossjack clew-garnet.

Cross jack braces.

Mizzen lower topsail clew¬ lines.

Mizzen lower topsail braces. Mizzen upper topsail sheet. Mizzen upper topsail clew¬ lines.

Mizzen upper topsail braces. Mizzen lower topgallant sheet.

Mizzen lower topgallant clew¬ lines. »

lower

topgallant

upper topgallant upper topgallant

topgallant

Mizzen braces.

Mizzen sheet.

Mizzen clew-lines Mizzen upper braces.

Mizzen-royal sheet. Mizzen-royal clew-lines. Mizzen-royal braces. Mizzen-topsail halyards. Mizzen-topgallant halyards. Mizzen-royal halyards. Mizzen-signal halyards. Crossjack reef -tackles. Mizzen-topsail reef -tackles. Jigger peak-halyards.

Jigger brails.

Jigger gaff-topsail sheet. Ensign halyards.

British ensign.

Gaff-topsail halyards.

Vangs or Vanes.

Jigger out haul.

Boom topping lift.

SHIPBUILDING INDUSTRY AND CONSTRUCTION

725

The Running Rigging — continued.

Boom guys. Mizzen-topgallant stay-sail

Boom sheet. sheet.

Flying-jib sheet. Mizzen-royal stay-sail sheet.

Outer-jib sheet. Jigger stay-sail sheet.

Inner-jib sheet. _ Jigger-topmast stay-sail

Fore-topmast stay-sail sheet. sheet.

Fore-bowline. Jigger-topgallant stay-sail

Main-topmast stay-sail sheet. sheet.

Main topgallant stay-sail Reef points.

sheet. Fore-buntlines.

Main-royal stay-sail sheet. Main-buntlines. Mizzen-topmast stay-sail Crossjack buntlines, sheet.

SHIPBUILDING INDUSTRY AND CONSTRUCTION. The earliest history of shipbuilding and the development of the sailing ship and the steam ship will be found under the titles Sailing Vessels; Steam Vessels.

United States. — In the United States ship¬ building began with the Virginia, launched in 1607 at the mouth of the Kennebeck River, by the Popham colony. This little vessel was of the type of the English pinnace,

and though of but 30 tons, it several times made the crossing of the Atlantic in safety. The first decked-over vessel built in America was the Onrnst, launched in 1614 at New Amsterdam. In 1621 the Blessing of the Bay, launched at Medford, Massachusetts, was the first of the unnumbered fleet which from that time forward slipped one by one down the ways of the colony's many shipyards into the waters of Massachusetts.

The most conspicuous advance in that period was Dominie Peters's ((great ship® of 300 tons, launched at Salem in 1641. This notable ves¬ sel exceeded the famous Mayflower by 120 tons, and set the pace not only for the shipbuilders of the New World, but for the Old World as well, where few vessels so large had been equal to this product of a mere colony scarce 20 years old.

By 1676 the ports of Massachusetts had 30 ocean-going vessels of between 100 and 250 tons, besides some 700 smaller vessels engaged in the coasting trade. In 1700 Boston was the home port of 194 ocean ships, while New York boasted but 124. In the 40-year period from 1674 to 1714 the Massachusetts records show the launching of more than 1,000 ships for the American merchant fleet, and 240 others which were sold abroad to foreign owners. The great abundance of the finest ship timber in the American forests — oak, white pine, and pitch pine — gave particular impetus to American shipyards, for English forests had begun to ' show serious depletion ; and many shiploads of American shipbuilding timber were sent an¬ nually to British shipyards from the ports of Maine and New Hampshire.

While Massachusetts and New York had been the pioneers in American shipbuilding, the other colonies had speedily followed the example; in the Earl of Sheffield's Obser¬

Number

Aggregate Average

COLONY

built

tonnage

tonnage

Massachusetts .

. 137

8,013

60

New Hampshire .

. 45

2,452

55

Connecticut .

. 50

1 ,542

31

Pennsylvania .

. 22

1,469

67

Rhode Island .

. 39

1,428

37

Maryland .

. 20

1,344

65

Virginia .

. 27

1,269

47

New York .

. 19

955

50

South Carolina .

. 12

789

65

North Carolina .

. 12

607

50

New Jersey .

4

83

20

Georgia .

. 2

50

25

vations on the Commerce of the American States | (London 1783), a record of American shipbuilding for the year 1769 shows the num¬ ber of ships built in that year by each Colony, and their aggregate tonnage in preceding table.

By 1770 Massachusetts was building half the total number of ships constructed in America.

In 1791 Alexander Hamilton, as Secretary of the Treasury, reported that the American merchant marine aggregated 476,274 tons. In 1800 the record for the year was 995 ships, with a combined tonnage of 106,000 tons. Shipbuild¬ ing industry in the United States reached its . apex in 1855, the launching in that year number¬ ing 2,027 vessels, and the sales abroad amounted to 65,887 tons, chiefly added to the British marine. The threat of withdrawal of mail sub¬ sidies by Congress had its effect in diminishing shipbuilding, as the best class of American ves¬ sels could not be run without them. When the threat became a fact in 1858 the doom of the American lines was sealed and the carriage of the American mails was transferred to the heavily subsidized ships of Great Britain. See Merchant Marine of the LTnited States.

Shipbuilding on the inland waters of the country began in 1800 when the Saint Clair , of 110 tons, was launched at Marietta, Ohio, and the Monongahela Farmer, of 250 tons, was launched at Elizabeth, Pa. These were both full-rigged ships and set sail on the Ohio for the Gulf and thenceforward belonged to the ocean fleet. The Louisiana, of 300 tons, launched in 1804 at Pittsburgh, was the most notable of the ships built in those days in the interior.

The change from wood to iron in ship con¬ struction about the middle of the 19th century, was followed by the revolutionary methods of steel shipbuilding, and by 1890 steel had dis¬ placed iron in the shipyards of Great Britain and the United States. American shipbuilding under the era of steel reached its perfection in 1892 and 1896, when the Saint Louis and the Saint Paul, two ocean liners, were built by the Cramp Company. These vessels were con¬ structed entirely of domestic material, thus marking a new era in American shipbuilding.

Steel-Schooners. — The use of steel in the construction of the modern passenger steam¬ ships (see Steam Vessels) and of the modern naval vessel (see Warships) developed the steel freighter, the merchant schooner with four, five, six or seven masts. Indeed the de¬ velopment of the multi-masted merchant schooner, which has advanced with such rapid strides during the past few years, is one of the most remarkable features in the shipbuilding industry of the Atlantic coast. The fore-and- aft schooner has always been a favorite type of ship in the American merchant trade, whether coasting or deep-sea, and the great breadth of hull and length of spars of such craft have rendered them an easily recognized type the world over. As compared with the square-rigged vessels of the schooner, brig, brigantine, or bark type, the American fore-and- after has the advantage of being a better craft

when sailing close-hauled and of requiring fewer men to man it. In an earlier day of the development of our merchant marine . in the coasting trade, the two-masted schooner was the common type; then came the three-masted schooner, and this was followed by vessels of four, five., six and now seven masts. The

carrying capacity of these schooners, the largest of which are engaged almost entirely in the coal-carrying trade, is exceedingly large. Thus, the five-masted schooner is 318 feet in length, 44 feet beam, and 2\]/2 feet in depth. The ves¬ sel will, carry 4,000 tons of coal on her maxi¬ mum draft. A six-masted schooner is 330 feet in length, 48 feet in beam, and has 22 feet depth of hold. On her maximum draft of 24 feet she will carry 5,500 tons of cargo. Her lower masts are each 116 feet in length, and her topmasts 58 feet.

The seven-masted steel schooner of modern build has a bar keel of forged steel three and one-half inches in width by 12 inches in depth, which extends from stem to sternpost. There is a cellular double bottom with a continuous, single, vertical, keel plate weighing 22.5 pounds to the square foot. The upper bilge-strake is of 2824-pound plate for two-thirds of the length. The middle bilge-strake is of 30 pounds weight for the same distance and the lower bilge-strake 25 pounds. The bottom strake is of 20-pound plate, while the garboard strake is of 29-pound plate for two-thirds of the length. All of the plating reduces to 1824 pounds at the ends of the vessel, except in the case of the garboard strake, which will reduce to 25 pounds at the ends. There are three com¬ plete decks, which are of steel plating, the upper deck, forecastle and poop-deck being wood- covered. A collision bulkhead is worked in at a suitable distance from the stem. The lower masts throughout the vessel are built of steel, with lapped edges, flush butts, and stiffening angles extending inside for the full length. The plates are single-riveted at the edges and double- riveted at the butts. The plating is double and stiffening double at the mast-partners and at the hounds. The masts are all 135 feet in length from the mast step to the top of the upper band, and they have a uniform diameter throughout of 32 inches. The topmasts are of Oregon pine. They are 58 feet in length over all, tapering from 18 inches in diameter to 10 inches, except the foremast, which is 64 feet in length and 20 inches at its point of greatest diameter. The booms of the first five masts -are 45 feet in length by 14 inches in diameter, the spanker boom being 75 feet in length by 18 inches in diameter. The total sail area of the lower sails and topsails is 40,617 square feet. All of the standing rigging, and in special cases the run¬ ning rigging for the lower

sails, are of a high quality of wire rope. Although this vessel is propelled entirely by sails, she carries quite a considerable instalment of machinery, including one 9-inch by 10-inch Hyde double-cylinder ship engine, and five 6-inch by 8-inch Hyde hoist¬ ing engines. There are two vertical boilers 56 inches in diameter by 90 inches high, one in the forward house and one in the after house. The boilers were built for a working pressure of 100 pounds to the square inch. There are two 8-inch by 4-inch by 6-inch duplex pumps and two direct-acting steam pumps, with steam and water cylinder, each 12 inches in diameter by 12 inches stroke. As the result of the installa¬ tion of steam power on board for the purpose of hoisting anchors and sails the number of hands necessary to work this large vessel is con¬ siderably reduced, the total number required being only 19 men. The total cost of the ves¬ sel delivered was about $250,000.

*.Steel Steamships. — The modern ocean liner for freight and passengers, as built of steel, has a length over all of 630 feet; breadth, 73 feet 6 inches ; molded depth from keel to upper deck, 56 feet. On a draft of 33 feet the dis¬ placement is 33,000 tons, and on a maximum draft of 36*4 feet, to which the vessel can be loaded whenever the depth of the harbors will admit of it, the displacement will be 37,000 tons. The space occupied by machinery is the smallest practicable, so that space for cargo may be as large as possible. In order that cargo may be readily stowed, the ordinary type of hold pillar has been dispensed with, and large box¬ shaped columns are fitted, supporting heavy girders which run longitudinally under the trans¬ verse beams which carry the decks. These columns are widely spaced, and in some cases only one is fitted in a hold, whereas by the older method 10 pillars would be required. A longi¬ tudinal bulkhead is fitted the whole length of the ship ; this divides each hold into two sepa¬ rate compartments, and, therefore, the hatches are fitted in pairs, one to each hold. Some of the hatches are so large that bulky freight, such as a locomotive or freight car, or large marine or land boilers, can be lowered directly into the hold. Every hatch can be loaded or discharged simultaneously if desired. The cargo-handling plant on such a vessel is very complete, and designed so as to cut down the number of men to a minimum. Two winches and two booms are fitted to handle cargo at each hatch. The booms, 34 in number, are built of steel. Two heavy booms are fitted to lift weights of from 30 to 50 tons. The winches for cargo handling are 34 in number, all electrically operated. One hold in the ship is devoted to carrying frozen meat, and is completely insulated ; its capacity being about 2,500 tons. The insulation is so arranged that ordinary cargo can be carried on return trip. The coal bunkers are located above the boilers ; the ends of the bunkers being in¬ clined in such a manner that the bulk of the coal will gravitate through chutes and be de¬ posited on the firing platform. The capacity of the permanent bunker is over 4,000 tons, and a reserve*

bunker is fitted contiguous to the boiler room, having a capacity for about 2,000 tons of coal. The boilers have a working pressure of 260 pounds per square inch. They will sup¬ ply steam to two main engines of the triple¬ expansion type, arranged side by side, work¬ ing separate shafts. The propeller wheels are 20 feet in diameter, and revolve 78 times per minute. The horse power of the engines would be about 10,000, and will drive the ship at a speed of about 14 knots per hour. To realize the great size of the ship, one must but reca¬ pitulate the various decks, platforms, etc., from the keel to the top-most bridge. First there is the outer bottom of the ship ; 6 feet above that is the inner bottom or floor; then within the molded or plated structure of the vessel are the orlop, lower, between, main, and upper decks. All of these decks are of steel plating, and the whole structure of the ship from the bottom to the upper deck is 56 feet in height, the upper deck running in an unbroken sweep the whole 630 feet length of the vessel. Above the upper deck are the promenade deck, the upper promenade deck, and the boat deck, this last being about 80 feet above the keel, while eight

SHIPBUILDING

Launching the steel cargo vessel ' Pipestone County " at Hog Island shipyard*

SHIPBUILDING

Copyright, Underwood & Underwood, New York

1 Wooden vessel being built at a Canadian shipyard. " Ribs " all in place on the keel

2 Building dummy ships to teach shipbuilders their trade. Steel plates are being hoisted into place for instruction purposes at the school for shipbuilders at the Hog Island shipyard

feet above this, or 88 feet above the keel, is the captain's bridge. Now, since the vessel at her lightest draft draws 17 feet of water, the captain's bridge, when the vessel is running light, will be over 70 feet above the water, and the passengers on the topmost tipper deck will be between 60 and 70 feet above the water. See Ship.

The United States Shipping Board. — When the United States entered the World War in 1917 the preponderant demand of the army was for ships to transport men and materials to Europe. The United States Shipping Board

was formed to control generally the increase and operation of the necessary ocean-going fleet, and this board established as a subsidiary the Emergency Fleet Corporation. The govern¬ ment advanced $50,000,000 capital to the latter body, taking the entire issue of stock to that amount. The duty laid upon the corporation was the providing of the largest possible ship tonnage in the shortest possible time. It began its labors by taking over a large number of the existing shipyards of the country and entering upon the construction of new ones in all sec¬ tions of the country whence ships could be brought to deep water. Besides these activities the structural steel works everywhere were set to work fabricating parts of ships which were later to be assembled at the shipyards. In August 1918 the corporation had under its con¬ trol more than 200 shipyards, half of which it had built. These were distributed over 27 different States, and aggregated nearly 900 ways with a maximum capacity for fabricated ships of 5,400 ships per annum. The actual output was held down to about half of this figure owing to inability to get materials fast enough, and the necessity of training the large forces of unskilled labor. Advantage was taken also of yards formerly in use for the building of wooden ships, especially in the South and on the Pacific. Coast, where ship timber was plentiful and within easy reach.

The largest of these new yards was that at Hog Island near Philadelphia where nearly 30,000 men were employed. Efforts were made to celebrate the Fourth of July 1918 by the launching of 100 ships throughout the country. While the goal was not quite reached, more than 90 ships were actually sent into the water on that day. As an instance of the remarkable efficiency attained in some yards the Tuckahoe may be cited. This vessel was a 5,500-ton steel collier of the fabricated type, and was erected in 27 days at a Camden (N.J.) shipyard. On the 40th day from the date the keel was laid this vessel put to sea with a full cargo.

At the yards on the Great Lakes the possible size to which ocean-going ships might be built was limited by the size of the locks in the Welland Canal to a length of not more than 261 feet and a beam not exceeding 42/ feet. These limitations were overcome in part by building a ship in two sections and assembling the parts when they reached tidewater in the Saint Lawrence. However, the width of the ship inexorably held them down to a limited length, not exceeding 350 feet and limited the tonnage to about 6,000 tons.*

The work accomplished by the United States Shipping Board is best comprehended by com¬ paring the present tonnage of the American

merchant marine with that existing immediately previous to the outbreak of the war. In June 1914 the total gross tonnage under the United States' flag, including the coastwise shipping and the fleet on the Great Lakes was

4,287,000 tons. In 1920 the gross tonnage was 12/06,123 tons, an increase of 283 per cent. The larger part of this increase has been in ocean-going vessels. The steam tonnage of the United States is now about 25 per cent of the entire tonnage of the world.

At the close of August 1919 the Shipping Board reported the delivery of 899 steel steam¬ ships, of 5,733,622 deadweight tons ; 378 wooden steamships of 1,339,103 deadweight tons; and 15 composite ships of 32,500 deadweight tons — a total of 1,292 ships aggregating a dead¬ weight tonnage of 7,125,225 tons. There were fitting out in wet basins 408 steamships aggre¬ gating 1,9/0,000 deadweight tons. There were on the ways in the several yards under the board's control 497 ships, aggregating 3,286,105 deadweight tons, and 227 steel steamships of a combined tonnage of 1,476,610 tons are still under contract but have not been begun.

At the close of August 1919 the Shipping Board had a total fleet of 1,280 ships under its control, with a combined tonnage of 7,706,400 deadweight tons. See, also, American Ship¬ building; Naval Architecture.

Ship Construction. — As the first step in the building of a ship is the designing of it, the use to which it is to be put must first be decided on. What cargo is it to carry and how much? And what speed is desired? The answer to these questions will go far to deter¬ mining the ship's dimensions — length, beam and depth — and to a large extent the shape or "lines" of the under-water body and the horse power of its propelling machinery. The avail¬ able depth of water in the harbors the ship is designed to visit is another controlling factor.

As the dimensions of the ship are not known, a trial design is first calculated upon the basis of the tonnage required; say, for example, 10,000 tons. The designer makes a calculation of a hull which will afford the space for 10,000 deadweight tons. The displacement of the completed ship will be the deadweight tonnage plus the weight of a hull to contain it. From experience and experiment is has been found that about 64-100ths of the whole carrying ca¬ pacity (including engines, fuel, stores, etc.) must be added for the vessel itself. The ship carrying 10,000 tons will, therefore, have a displacement of about 16,400 tons. It devolves then upon the designer to determine length, beam and depth for his vessel from this total displacement. Into this problem enters first, if at all, the available depth of water in the harbors where the ship will trade. The shal¬ lower the possible draught, the greater, rela¬ tively, the beam. Aside from this the desired speed determines the proportion of length to breadth. The longer the ship — and the nar¬ rower — 'the speedier will she move for the same engine power. A trim underwater body with long gently flowing curves will require

less horse power for a given speed than a body which is full and roomy well up to the bow and back to the stern.

For all of these calculations "constants" and "coefficients" are available to the constructor,

and his ship of 16,000 tons will, in ordinary course, figure out a length of between 450 and 470 feet and a beam of 55 to 60 feet, a draught of 25 to 28 feet, with a total depth of about 40 feet. With engines of 4,000 horse power this vessel should show a speed of about 12 knots.

In the planning of the ship the established rules of the several "Lloyds® and classification committees must be strictly adhered to in order that the vessel may be duly registered.

The chief factor in the hull of the ship is the shell plating. All other constructive parts of the ship, that is, the framing, are to be con¬ sidered as practically the support and stiffening of the shell. In a large vessel the pressure of the water upon its exterior shell is enormous, the tendency being to cause a collapse. This pressure is tremendously increased by the vio¬ lent blows of storm waves, and from the pitch¬ ing and rolling sustained in rough water. Herein lies the demand for the knowledge of the skilled engineer, that the metal of which the ship is constructed shall be so disposed as to afford abundant strength and resistance to every possible stress and strain from without. Another series of strains arises from the load carried by the vessel, and acting from within, of great magnitude when the waves are high and the ship is subjected to a hogging strain when lying across the crest of a great wave, or to a sagging strain when lying across the trough between two waves. It is customary to regard the ship as a section of a tubular bridge, so far as the amidship's part is con¬ cerned. The ends of the vessel from their wedge-shaped construction are from that con¬ dition relatively stronger and may safely be more lightly built. The art of the shipbuilder is in the skilful adjustment of material to its purpose, so disposing it as to afford abundant strength, without interfering with generous cargo capacity.

In the more recent development of ship con¬ struction the system most approved is the longi¬ tudinal, as opposed to the transverse ; the former having the advantage of stiffening the plating against transverse buckling as well as against fore-and-aft compression, a feat not attained by the transverse method of construc¬ tion except by an undue and undesirable

thickness of the plating and a close placing of the side frames — thus adding unprofitable weight and diminishing cargo space.

The division of the hull into watertight com¬ partments is a feature of present shipbuilding regarded as indispensable, particularly as re¬ gards the "collision bulkhead,® placed near the bow, to keep out the sea in case the bow is broken by collision. The requirements of the Lloyds associations are that the compart¬ ments shall be of such a limited size that the vessel may still float safely if two of them are breached. This provision demands at least eight transverse bulkheads in the ordinary passenger liner. The compartments are connected by water-tight sliding doors which are operated by compressed air from the bridge, in case of emergency.

Given the hull, the remaining problem is its propulsion. A certain model of hull will be found to have a definite economic speed. Above this speed the engines labor without corre¬

sponding effect. This economic speed can be very closely calculated by the shipbuilder from the under-water lines of his model for the load of cargo it is to carry. He is thus able to decide upon the size of the propeller or pro¬ pellers needed — their diameter and pitch, and the number of revolutions they must make per minute to drive the ship at the desired rate. Engines powerful enough to turn the propeller easily and without strain the calculated num¬ ber of revolutions may then be designed. One more problem remains, that of so attaching the engines to the ship that they actually form an integral part of its construction. The whole problem of propulsion is one of delicate ad¬ justment. The engine will run best at a certain speed, and the vessel will run best at a certain speed. The closer these two conditions can be matched, the more successful and the more durable the ship. In most vessels nothing better than a compromise is reached. The in¬ stances in which hull and engines are really mated are so rare as to excite admiration — and incidentally to mark the possibilities to be achieved.

The reciprocating engine is of satisfactory efficiency for moderate speeds, ranging up to 0.88 for triple expansion and 0.92 for quad¬ ruple expansion engines. The latter are more economical of fuel, but require so much more engine room that little if any advantage is gained on the average voyage. The steam tur¬ bine is equal in efficiency to the quadruple ex¬ pansion reciprocating engine, and does equal work with considerably less fuel, but, as it cannot be run astern, a second turbine must be provided for this purpose, or a transformer employed. Furthermore the turbine is of great efficiency only at high speeds — too high to allow of its being connected directly to the pro¬ peller shaft. A combination of reciprocating engines and the turbine has worked well, where the turbine has been of the

low pressure type and runs by the exhaust steam of the recipro¬ cating cylinders. With triple screws on large vessels (20,000 tons and upward) the two wing shafts are operated by reciprocating en¬ gines and the centre shaft by the turbine. Turbines of the high speed type are success¬ fully utilized when employed to run electric generators which, in turn, operate the shafts by electric drive.

It is quite impossible in the limits of space available in this work to even touch upon the multitudinous details of practical ship con¬ struction. For this information the student is referred to the excellent and complete treatises named below. See Ship; Shipbuilding Terms.

Bibliography.— Baker, G. S., 'Ship Form, Resistance and Screw Propulsion) (New York

1915) ; Biles, J. H., (The Design and Construc¬ tion of Ships' (2 vols., London 1919) ; Holms, A. C., 'Practical Shipbuilding) (2 vols., London

1916) ; Kelly, R. W., and Allen, F. J.,

1908).

SHIP-SAILING. See Navigation.

SHIPIBO, she-pe'bo, South American Indian tribe of Panoan stock, living in the forested regions of the upper Ucayali River, Peru. Their existence was reported by Fran¬ ciscan missionaries who visited them in 1651, but a mission established for them in 1764 was, after a brief period of success, massacred in 1767, and the Shipibos have since rarely come in contact with the whites. They are great wanderers with no fixed places of migration, and are skilled boatmen and fishermen.

SHIPKA PASS, Balkan Peninsula, extends between Bulgaria and the territory formerly known as Eastern Rumelia, since 1885 incorpo¬ rated with Bulgaria, at a height of 4,600 feet above sea-level, and is 87 miles distant from Rustchuk and 50 miles northeast of Philippo- polis. In the hot fight between the Russians and Turks, 1877, the Russians held the position and Suleiman Pasha lost 20,000 men in his attempt to take Fort Nicholas, on the summit of the pass, 21-26 Aug. and 9-17 Sept. 1877;

SHIPLEY, England, a town of Yorkshire (West Riding), lies three miles north-north¬ west of Bradford, on the river Aire. The large parish church

(of Saint Paul is a fine modern Gothic specimen. The principal industry is the manufacture of woolens and cloths, and the quarrying of stone. Pop. 27,700.

SHIPPEN, William, American surgeon : b. Philadelphia, Pa. 16 Oct. 1736; d. Ger¬ mantown, Pa., 11 July 1808. He was grad¬ uated at Princeton in 1754, took his M.D. at the University of Edinburgh in 1761 and en¬ gaged in practice at Philadelphia in 1762. He began the first series of lectures on anatomy given in America, at Philadelphia, in 1762, and in 1765 became professor of anatomy and sur¬ gery at the newly-established medical school at the College of Philadelphia; from 1780 until he retired in 1806 he was professor of anatomy, surgery and obstetrics at the University of Pennsylvania. In 1777-81 he was director- general of the military hospitals of the United States.

SHIPPENSBURG, Pa., borough in Cum¬ berland County, 38 miles southwest of Harris¬ burg, on the Cumberland Valley, the Western Maryland and the Philadelphia and Reading railroads. The borough was settled in 1750. The Cumberland Valley State Normal School is located here. Industries include railroad machine shops and manufactures of clothing, hosiery and furniture. Pop. (1920) 4,372.

SHIPPIGAN, ship-i -gan', Canada, a sea¬ port town of Gloucester County, New Bruns¬ wick at the southeastern entrance to Chaleur Bay, opposite Shippigan Island, 70 miles east of Bathurst. It is a terminus

SHIPPING, Law of. See Maritime Law.

SHIPPING ARTICLES. See Seaman.

SHIPPING AND SHIPBUILDING TERMS. The more common terms used in shipbuilding have been gathered here for the

convenience of the student who wishes to read the articles on ship and shipbuilding.

Abaft. — Behind, at the rear; as, abaft the beam, that is somewhat within a semi-circle to the rear of a vessel's beam. See Beam in this article.

Aft. — At, near or toward the stem of a vessel.

After Perpendicular. — A vertical straight lines

directly aft of the rudder post.

Anchor. — A heavy steel or iron instrument, attached by a chain or hawser

at the bow of a vessel, for dropping tO' the bottom and holding a ship that is not tied to a dock. It usually has a ring or shackle in the head, a longitudinal shank, and a cross arm ending in flukes. See Sea-Anchor in this article.

Athwartship. — Across the ship, at right angles to the keel.

Ballast. — Any weight or weights, as sea water, coal, ig iron; etc., placed in the lower part of a vessel to help keep er upright. A vessel without cargo usually requires ballast to prevent her being top-heavy.

Bark.— A two-masted vessel square rigged on the foremast and sloop-rigged aft.

Beam. — An athwartship member supporting a portion of a deck; also an imaginary line at right angles to the keel; also the width of a ship; also a straight steel framing member as an I-beam.

Below. — To make a rope fast by turning it around a cleat.

Below. — Any part of a ship below a deck; the equivalent of the landsman's " down stairs."

Berth. — A bunk or bed as for a sailor; also a place for a ship to lie.

Bilge. — The slightly rounded or Hattish portion of a snip's hull, between the side and the bottom; the bulge or degree of curvature from the flat, used with reference to either the inside or outside of the hull.

Bilge Keel. — One of a pair of miniature keels placed on the bilge of a hull. In a steel ship it is a fore and aft plate riveted to the shell. It serves to resist rolling, making the ship steadier in a rough sea.

Bitts. — Formerly, a pair of posts, now a heavy steel casting with uprights fitted to the weather deck of a vessel for attaching the mooring lines or hawsers, as towing-bitts, mooring bitts.

Block. — A casing or shell having holes through which ropes are passed to change the angle of direction; especially the form called in full, a pulley-block, having one or more grooved wheels or pulleys within the casing or block. A hook or ring is usually added for attachment, and the device is the most common form of making a turn in hoisting ropes or securing increased leverage by means of different sizes of pulleys or sheaves. Compare Deadeye in this article.

Bobstay. — A stay holding the bowsprit down to the stem.

Boom. — A long, round, heavy spar, pivoted at the lower end, as for hoisting cargo, or holding the foot of a fore and aft sail.

Boss. — An enlargement or curved swelling portion of a ship's hull at the point where a propeller shaft passes through.

Bow. — The forward part of a ship, also called the bows.

Bridge. — A platform placed athwartship above the weather deck, for the accommodation of the officers who navigate a ship.

Brig. — A two-masted vessel, square-rigged.

Bulkhead. — One of various vertical partitions in a ship's hull, either fore and aft or athwartships.

Bulwark. — The raised side of a ship above the weather deck, topped by a

rail.

Bunker. — A compartment low down in the hull for carrying coal or other fuel. In warships the bunkers are usually positioned so as to cover and protect the machinery or magazines.

Buoyancy. — Ability to float; also the resulting upward pressure of water on a floating body.

Calking. — Making tight a seam between planks, as by filling with oakum, hence tightening up any joint so as to be water-tight.

Camber. — A slight upward bend, especially in a timber lying athwartship; the curvature measured athwartship of deck, also called " round up."

Cant. — Something set at a slope or angle, as the cant frames — sloping ribs where a vessel's body narrows toward the bow or stem.

Capstan. — An upright windlass adapted to heaving in lines.

Carline. — Any short fore-and-aft timber for connecting beams, or the like, as a mast carline, abutting against a mast.

Caulking. — Closing a seam in a vessel with oakum and a chisel.

Centreboard. — A vertical board or plate pivoted to swing in a well extending through a boat's bottom, as a form of drop-keel.

Centre Line. — The fore and aft middle line of a vessel from stem to stern.

Chinsing. — A rough form of caulking.

Chock. — Originally, a block as one back of the poops, to

keep the cradle in position; now usually a heavy fitting or casting through which ropes or hawsers, may be led.

Cleat. — A heavy iron fitting attached to the deck, having a fore and aft arm around which a rope may be wound.

Clew. — The lower corner of a square sail, or the aft lower comer of a fore-and-aft sail. Also a metal fastening or eye worked into the corner, for tying a rope.

Coaming. — The vertical edge of a hatchway or skylight; a low curb to keep out the water.

Coffer Dam. — The space between two bulkheads when placed close together; also a temporary enclosed dam.

Cradle. — A heavy framework for supporting a vessel, as in dry dock.

Crosstrees. — Beams placed athwartships at the head of a mast.

Cutwater. — A sharp-edged projection set in front of a vessel's stem where it cuts the water-line.

Davits. — Heavy vertical pillars with the upper ends bent to a curve, between which a boat is supported and swung on deck. The boat is loaded on the deck, and then the davits are turned so that the boat hangs overboard, when it may be lowered to the water.

Deadeye. — A block with holes through which ropes are run after the manner of a pulley block, but without sheave or pulley.

Deadlight. — A shutter for a cabin window or porthole.

Deck. — The floor of one of the levels of a vessel; also the space between such levels. The upper deck is the weather deck. Other decks are called berth-deck, half-deck, hurri¬ cane-deck, main deck, mess deck, orlop deck (just below the berth-deck), poop-deck, spar-deck, turtle-deck (an upper deck curved like a turtle's back), and wing-deck (one hanging over a paddle-box).

Displacement. — The total weight of the water displaced by a ship when afloat, equaling the ship's gross weight with its load.

Double Bottom. — A vessel's bottom made in two thicknesses with a space between, leaving compartments which are used for ballast, water-tanks, fuel, oil, etc.

Draft. — The depth of water that a vessel draws, measured vertically from the lowest points of the hull to the surface of the water.

Drag. — The distance which one end of a vessel's keel is above the other end, when she is not on an even keel, so called because this creates resistance or drag in going through the water.

Dry Dock. — A dock into which a vessel may be floated, and then by removing the water leave the interior dry for repairing.

Dunnage. — Heavy pieces of wood or the like used to prevent cargo from rolling or shifting its position.

Even Keel. — Level keel, said of a vessel lying normally level in the water.

Fair Lead. — The lead of a rope in a direction that will not permit it to foul or be subject to excessive friction: also a small fitting for changing the direction of a rope without causing too much friction.

Fake. — A single turn or coil of a line, rope or cable.

Fall. — A hoisting rope depending from a block or tackle.

Fender. — A shield-like device for hanging on a vessel's hull at the water-line, to receive the shock of contact with a dock, pier, etc.

Fore. — At, near or toward the bow, as fore-deck, fore¬ hook (a V-brace in a vessel's bow), foreship (the bows), fore-yard (the lowest yard of a foremast).

Fore and Aft. — Extending or situated longitudinally of a vessel; in line with the keel.

Forecastle. — The forward upper part of the hull, or a compartment there; usually the quarters for the crew.

Forward. — The locality at, near or toward the bow.

Framing. — The framework or stiffening members; the skeleton of a ship.

Freeboard. — The part of a vessel's side that is free and clear when she is loaded, measured as the vertical distance from the upper water-tight deck or top of the bulwarks to the load water line.

Futtock. — A foot-hook or curved timber in the frame of a wooden ship, extending from a floor-timber or cross¬ timber upward.

Futtock-Plate. — An iron plate on a mast head for holding the dead-eyes of the futtock-shrouds.

Futtock-Shrouds.— Short shrouds at the junction of a mast with its topmast.

Galley. — The place where the cooking is done on a vessel ; the kitchen.

Gangway. — A passageway or opening in the bulwarks for use in boarding a ship.

Gant-line or Girt-line. — A temporary rigging of a rope through a block at the masthead.

Garboard Strake. — The streak of shell plating next to the keel: also called sand strake.

Garnet. — A tackle or purchase, as the clew-garnet.

Gasket. A furling line tapered for use on a yard or boom.

• • A. support for a compass or other object which

it is desired to maintain in level position, often made in pairs, and permitting the object supported to swing level regardless of a ship's rolling or pitching.

Gross Tonnage.— Total carrying capacity; technically, a figure obtained by dividing the total volume of the ship- in cubic feet, by 100.

Gunwale. — The side of a ship at the edge of the weather deck; specifically, the upper wale of planking or plating cover¬ ing the upper end of the framing, just below the bulwarks

*Halliard or Halyard. — A light rope for hoisting a Sciil yard etc**

Hatch. — A large opening through a deck, as for taking in cargo.

Hawse. — The locality of the hawse-holes m a vessel; also the position of the mooring cables; and the space between a vessel and her anchor. The hawse-hole is a hole in a vessel's side for the passage of a hawser, and when not in use is elosed with a hawse-plug. A hawse-pipe is a large fitting attached to the bow through which the anchor chain passes.

Hawser. — A large rope, 5 to io inches in circumference, usually made left-handed with nine strands.

Head. — The forward or upper end of a vessel, mast, etc.

Heel. — The hindermost part of a vessel, keel, mast, etc.

Helm. — The tiller; also, the tiller and rudder mechanism collectively; also the direction in which the tiller is turned, being opposite to the rudder's position.

Hogging. — Bending strain lengthwise of a ship, tending to allow the bow and stern to settle lower than the section amidships. See Sagging in this article.

Hold. — The space below the lowest deck; the main compartment in the lower part of a vessel, for carrying cargo.

Hounds. — A pair of projections at a masthead, for sup¬ porting the top trestletrees and rigging.

Hull. — The body of a ship or vessel; the framing as covered with planking or plating. The term is sometimes used to include the decks.

Inboard. — All inside a ship, toward the centre line.

Intercostal. — A space between the ribs.

Jackstaff. — A short flagstaff, as on the bowsprit, for flying the jack. '

Keel. — The main lower, longitudinal member of a vessel's frame, the first part laid on the ways, originally a very heavy beam, now a series of plates riveted together, and extending from stem to stem along the central line of a ship's bottom.

Keelson. — A beam or stringer, extending over or along a keel; an auxiliary or strengthening keel-piece.

Knightheads. — A pair of uprights supporting the bowsprit on either side.

Launching. — The sliding of a ship or boat from the launching ways on which she is constructed, into the water. Vessels are usually launched stern first, but occasionally sideways. During launching the weight of the hull is borne by the sliding ways, which are attached to the hull and slide with it down the ground ways. Much of the con¬ struction of the upper works, decoration, etc., is completed after the ship is floated. The term launch is also applied to ship's boat with sloop-sail or motor; also to a pleasure boat, as a naphtha launch.

Length. — Properly the extreme longitudinal dimension of a vessel: in practice, restricted to " between perpen¬ diculars," the length from the stem to the after perpendicular or stem post, except when expressed as " length over all," when it is measured from the forward end of the stem to the aft of' the stern.

Lines. — The shape or contour of a vessel, as shown on the plans. When drawn full size on the floor of a mold loft, the templates may be made directly from tnem.

Longitudinal. — That which extends fore and aft, especially a vertical member running practically parallel with the centre vertical keel througfi a

double bottom.

Meta centre. — The centre of gravity of a vessel, vertically in line with the centre of buoyancy where the vessel is upright. The higher it is above the centre of gravity, the more stable is the vessel.

Magazine. — A compartment or storage room on a vessel of war for safe storage of the ammunition.

Marline. — A two-stranded cord or small rope for working or winding around large ropes or cables, as in splicing.

Martingale. — A vertical spar under the bowsprit, a dolphin-striker; also a lower stay for a jib-boom.

Mast. — A long stick of timber or steel, placed nearly upright in the centre line of a ship, originally for carrying sails, on steamships serving for a variety of other purposes. Large masts are built up of pieces, and stepped directly on the keelson. It is common to give them a slight rake toward the stern. The principal parts of a mast are named the head (or masthead), hounding (a projection at the head to sup¬ port trestle trees and rigging), housing (a hollow in a lower mast to receive a top-mast), neck and heel. A military mast is a stout upright structure carrying one or more turrets for firing small guns, and protected observation towers. The United States navy military masts are com¬ monly made of rods arranged in open work, so constructed that they may be shot through and through frequently with¬ out falling.

Midship. — At the middle of a ship's length: also written amidship.

Mooring.— Securing a ship so that she is not only anchored or tied, but unable to swing with the tide or cur-

rent, called also permanent mooring. In a less restricted sense, securing a ship with two anchors so that she cannot swing much.

Mould Loft. — A cargo loft in which the larger parts and framing of a vessel are laid out to full size.

Net Tonnage. — Actual available tonnage, calculated by making deduction from the gross tonnage to allow for space not available for cargo.

Oakum. — Hemp fibre for filling seams, especially that obtained by untwisting and breaking up old ropes. ‘

Outboard. — Away from the centre line, toward the side of a ship.

Outrigger. — A long float braced on one side of a canoe to give stability. Also a bracket built out from the side of a boat to hold a rowlock. Also any boom or spar braced outboard for some special purpose.

Overhang.— Any portion of the hull or superstructure of a vessel outside a line drawn vertically from the water¬ line.

Panting. — The in and out movement of shell-plating under the influence of varying temperature, strains, etc.

Pillar. — A column or stanchion, as for supporting the deck.

Pintle. — A fitting or pivoted pin on the rudder, turning on a gudgeon.

Poop.— The after, upper portion of the hull of a vessel where the steering gear is commonly located. The poop deck is a short deck sometimes placed above the aft part of a spar deck.

Port. — The left hand side of a vessel, when facing for¬ ward, opposed to starboard. Also an annular opening in the hull, or a porthole.

Propeller. — A device of angular blades, arranged to balance each other and rotate rapidly in the water, driving a vessel on the principle of a screw. It has almost wholly superseded the paddle-wheel because it is mechanically superior.

Pungy. — A flat-bottomed sailboat, narrow and sharp- bowed, an

Punt. — A flat-bottomed, square-ended, small fishing or pleasure boat, for use in shallow water, propelled by pushing it along with a pole. Hence the verb, to punt, or push along such a boat. Small barges on English canals that are propelled in the same way also bear the name.

Purchase. — A device for giving a leverage or turn with a rope, as a deadeye and rope, or a pulley and tackle. A double purchase is a rope rove through two single blocks and is also called a double whip. A twofold purchase con¬ sists of two double blocks, with ropes arranged to pull op¬ positely and thus balance. A threefold purchase employs two three-sheaved blocks.

Quarter. — That part of the side of a vessel’s stern that is aft of the main

chains; also the part of a yard that is out¬ side the slings.

Quarter Deck. — That portion of the weather deck nearest the stern, between the poop and the mainmast. It is reserved for officers' use.

Quarter Gallery. — A balcony built on a vessel's quarter, often containing a washroom.

Rail. — The balustrade on the upper edge of the bul¬ wark.

Rake. — Inclination from the perpendicular: applied especially to the degree of backward inclination of a vessel's masts or funnels. A craft is said to be raking when her masts or funnels have a more than ordinary lean away from the upright.

Ratline. — A small cross-rope between the shrouds equivalent to the " rung " of a ladder.

Rig. — The style of arrangement of the ropes, sails, spars, etc., of a vessel: frequently used in compound words, as ship-rig, yacht-rig, sloop-rig, etc.

Rigging. — The cordage or wire rope equipment of a vessel. The permanent ropes are called standing rigging and the movable ones running rigging.

Rise. — Increase of elevation; higher position.

Rise of Bottom. — Tne amount tnat the flat portion of a ship's bottom is elevated above the horizontal from the keel to the side of the ship.

Roll. — The motion of a vessel from side to side, causing an alternate raising and lowering of each side of the decks.

Rudder. — A flat, approximately triangular structure, swinging from an upright hinged support at a vessel's stern so that all or most of the blade is under water. It is sur¬ mounted by a tiller fixed horizontally through the head, and is used for steering. The rudder of a large vessel has a complicated steering gear, power operated, and directed from a wheelhouse.

Rudder Post. — A heavy vertical post at the after end of the stern frame, which supports the rudder.

Rudder Stop. — A fitting to limit the swing of the rudder.

Sagging. — A straining of the ship that tends to make the middle portion lower than the bow and stern; opposed to hogging. .

Samson Post. — A heavy vertical post or stanchion from which a boom may be swung for handling cargo.

Schooner, — A two-masted vessel with fore and aft rigged sails.

Scuppers. — Holes in a vessel's side for the deck water to run off; hence, a drain from the edge of a deck, discharging overboard.

Sea Anchor. — A float, as of broken spars, lashed to¬ gether and thrown out to windward from a disabled vessel to serve as a drag, that it may ride out a gale.

Shackle. — A form of ring for locking a porthole.

Shaft. — A very heavy, long cylindrical steel forging for connecting the engine with the paddle-wheel or propeller.

Shaft Tunnel. — In a modern steamship, an enclosed alley-way containing the shaft, and running fore and aft from the engine-room to the after peak tank.

Sheave. — A pulley-wheel as used in a block for turning a rope. The word is primarily used for the grooved wheel, but the entire pulley-block is sometimes called a sheave.

Sheer. — Fore and aft rise of the deck lines giving curva¬ ture to the deck.

Sheer Plan. — A side elevation of a ship's form.

Sheer Strake. — The upper strake of the main shell plating, just below the bulwarks.

Sheet. — A sail or piece of sail-cloth. Also one of the lower comer ropes of a sail, used for sheeting or stretching the clews.

Sheet-Anchor. — An emergency anchor, usually hung on either side of the waist of a ship.

Shell Plating. — The steel plating forming the outer skin of the hull.

Ship. — A square-rigged sailing vessel, of three of more masts; also, a large steam-driven craft; popularly, any large floating craft.

Shrouds. — Two or more stout ropes, often of wire, from a masthead to the rim or side of a ship, constituting a part of the standing rigging, and being supplied with ratlines serving as a rope-ladder for ascending and descending. The stay ropes or chains of a topmast or bowsprit are also

sometimes termed shrouds. See Futtock-Shrouds in this article.

Skids. — Parallel timbers for protecting the side of a vessel when hoisting in cargo, etc. They are used also as dunnage.

Sling. — A stout rope or chain, for suspending a lower yard or gaff.

Sloop. — A fore and-aft rigged vessel with one mast.

Snubbing-Post. — A post or pile at a pier or wharf, around which a cable can be turned, to check the motion of a vessel in landing.

Spar. — Any round timber for supporting a sail or sails, as a mast, yard, boom, etc.

Spar Deck. — The deck on which spars are stored, being the upper deck, and including usually both quarter deck and forecastle.

Sprit. — A light spar set diagonally upward from a mast to support the outer comer of a fore-and-aft sail, termed a spritsail. By this arrangement a higher sail may be carried than can be swung from the mast direct.

Stability. — The tendency of a ship to remain upright, resisting rolling and pitching.

Stanchion. — An upright post or supporting pillar, on a vessel.

Starboard. — The right hand side of a vessel when facing forward: opposed to port.

Stay. — A rope used as a tension piece to support or brace a spar.

Stealer. — A strake of shell plating that does not extend all the distance to the bow or stern.

Stem. — A nearly vertical member forming the extreme bow of a ship, formerly a very heavy timber continuation of the keelson, now a stout forging or casting running from the keel to the forecastle deck.

Stemson. — A curved timber or supporting member back of the stem, resting on the keelson.

Stern. — The after end of a vessel's hull.

Stern Frame. — A large casting attached to the after end of the keel to form the ship's stem. It holds the rudder post and propeller post, and has an aperture for the propeller shaft.

Sternson. — A curved timber or supporting member on the sternpost, being practically an upright continuation of the keelson.

Strake. — (The word is a corruption of streak). A fore- and-aft course or streak of shell or other plating.

Stringer. — A fore-and-aft continuous member, for giving greater stiffening.

Tackle. — A set of ropes, pulley-blocks, hooks, etc., constituting a hoisting equipment, as a yard-tackle.

Taffrail. — A rail around a vessel's stern: formerly spelled tafferel, from the Dutch tafereel (table) applied to the upper surface of a high stern.

Tank Top. — The inner thickness of a ship's double bottom, as considered from the inside.

Tholes. — A pair of pins for keeping an oar in position where it crosses a boat's gunwale.

Thrust-Block. — A heavy bearing for receiving the thrust or pressure of a propeller-shaft.

Tie Plate. — A single course of plating run fore and aft under the beams of a wooden deck to strengthen the structure.

Tiller. — The arm attached horizontally to a rudder head for operating the rudder.

Transom. — The aftermost transverse frame in a ship.

Transverse Frame. — An athwartship member of a ship's framing placed approximately vertical and resembling a r^-

Trend. — Angular direction, as of a cable with the keel¬ line, or of an anchor-shank where it joins the arms.

Trestletrees. — A pair of timbers set at right angles to a lower mast, to support the top members.

Trim. — Fit position for sailing, on even keel, with ballast, etc., properly adjusted.

Tumble Home. — An inboard sloping of a vessel's side above the line of greatest beam.

Upper Deck. — The highest complete deck.

Vertical Keel. — A row of plating extending vertically along the centre of a flat plate keel. Also called centre keelson.

Waist. — The central section of a ship, between the quarter deck and the forecastle.

Warping. — The shifting of a floating vessel to a new position by means of a cable, (often called a warp) attached to a pile.

Water Line. — The lowest visible part of a ship's hull when in the water; hence, a line corresponding with such level, as the load water-line, light water-line.

Weather Deck. — A deck exposed to the weather having no overhead protection.

Well. — A compartment or boxed-in space low down in a vessel's hull, as for enclosing a pump, a propeller-shaft or for holding water, etc.

Winch. — Originally, a windlass, now a small hoisting engine.

Yard. — A spar for carrying sail, set athwartship, and the principal member of a square rig. It is nearly cylindrical, but tapers slightly toward the ends. When set obliquely, it is a lateen yard.

Yard-Arm. — The tip of a yard, of historical interest as the proper place from which to hang a pirate.

SHIPPING SUBSIDIES, in the broader economic sense, any bounty paid by a govern¬ ment with the object of encouraging the build¬ ing and navigation of merchant ships. Under this definition would be included, and rightly so, the postal Subventions® paid by many govern¬ ments for regular mail service between home and foreign ports, for the largest effect of such service is the development and maintenance of a merchant marine.

Subsidies to shipping have been classified as direct and indirect : the first where money is paid to the shipowners ; the second where they are favored in other ways. Direct subsidies have been granted by various nations and at various times upon five different basic plans, as follows: (1) on the number of days of actual sailing in the year; (2) on the year's mileage; (3) on the tonnage of the vessels engaged in the trade ; (4) on the tonnage as modified

by speed; (5) on a scale in which tonnage, speed and the amount of cargo actually carried in the year are controlling factors. Indirect subsidies are of great variety, including government loans at low interest to shipbuilders; free registry; bounties to certain industries which produce export goods ; remission or reimbursement of canal and port dues ; restriction of coastal trade to domestic shipping, etc.

Most of the maritime nations have adopted the principle of shipping subsidies. France has given the most money, but without the in¬ crease in her merchant marine that such ex¬ penditure might be expected to induce. At the beginning of the European War, Japan was paying out in subsidies annually about $7,000,- 000; and Japan's merchant fleet has grown and prospered exceedingly, but so many other fac¬ tors are to be considered that it is an open ques¬ tion whether the system of subsidies is to be given the credit. On the other hand, Great Britain has built up by far the largest of all national merchant marines without subsidies. The methods employed by the several countries

in recent years in fostering their merchant fleets are arranged below in alphabetical order.

Austria. — Trade bounties; depreciation boun¬ ties; naval bounties; exemption from trade and income taxes; mail subventions; reimburse¬ ments of Suez Canal dues.

Belgium. — Before the war subsidies were granted to German steamship lines to prevent them from forsaking the port of Antwerp. In June 1916 the government entered into agree¬ ment with the Royal Belgium Lloyd under which it guarantees interest on loans and mort¬ gages to the extent of 100,000,000 francs in aid of the establishment of a Belgian merchant marine independent of all foreign influence.

Denmark grants an annual subsidy to one steamship company operating a line to British ports. There is a reimbursement to shipbuild¬ ers of 2 per cent of the duties collected on materials actually used in domestic shipyards. Postal subventions are small.

France. — Construction bounties per gross registered ton, and in case of the installation of new machinery, an allowance based on the weight of the new work, navigation bounties to steamships not above 3,000 tons and having a speed not less than 10 knots, and to sailing ves¬ sels; postal subventions to colonial lines, based on regular service carried on by vessels of stated speed. The French government has re¬ cently voted a fund of 160,000,000 francs for loans to shipbuilders to aid in rebuilding the ships lost in the war.

Germany. — Yearly, mileage and speed sub¬ sidies to ships built of German materials in German shipyards, and special subsidies to lines running to North and South American ports and to East Africa. Indirect aid was given by preferential rates on government-owned rail¬ ways and through the control of emigration, which was turned to the German lines.

Great Britain. — No direct subsidies ; mod¬ erate mail subventions are granted to lines operating under postal contracts.

Holland. — Lower rates of duty assessed on imports brought in on Dutch ships ; annual pos¬ tal and colonial subventions.

Italy. — For years it has refunded to steam¬ ers the sums paid for Suez and Corinth Canal dues and has paid bounties on all coal brought from beyond Gibraltar; a mileage subsidy to Italian-owned vessels operating in the Mediter¬ ranean and beyond Suez. Besides the regular postal subventions, a speed bounty is paid to all ships of 16 knots or above. Since 1914 ship¬ building materials have been on the free list and a bonus has been granted to shipbuilders. Re¬ cent laws exempt Italian subjects from tax for three years on steel vessels purchased and for four years on those built in Italy. Brazil con¬ tributes an annual subsidy to Italian lines touch¬ ing her ports, with the object of encouraging Italian immigration to the coffee districts.

Japan. — Reserves coasting trade to Japan¬ ese ships operated by Japanese companies; ship¬ building bounties and navigation bounties; special subsidies to speedy vessels to Pacific Coast ports and to South American ports and to a line using the Panama Canal with a New York terminus.

Norway.— Reimbursement of import duties paid on foreign materials actually used in Nor¬ wegian shipyards for building or repair; sub¬ sidies to Norwegian steamship companies

maintaining service on non-paying routes; sub¬ sidies to vessels in the coasting trade ; mail subventions ; tonnage refund on vessels built in Norwegian yards of Norwegian materials.

Russia. — Reservation of coasting trade to Russian vessels; loans to steamship companies; exemption from customs charges to ocean¬ going vessels owned by Russians; bounties on ocean liners and inland river steamers; reim¬ bursement of Suez Canal dues.

Spain. — Navigation bounties to Spanish ships manned by Spanish crews, based on actual mileage per ton gross; construction subsidies per gross registered ton, with an ad¬ ditional 10 per cent for each knot of speed above 14; postal subventions; a levy of one- third the bounty in case a Spanish vessel was sold abroad.

Sweden. — Refund of duties paid on con¬ struction and repair material used in Swedish shipyards ; loans to steamship companies at low rates of interest ; mail subventions. A new policy under discussion providing direct sub¬ sidies (1918).

United States. — Coasting trade reserved to American ships ; heavy mail subventions. The government program as to ships built during the war and subsequently in government yards is laid down in the Mer¬ chant Marine Act of 5 June 1920 the chief provisions of which are given below in this article.

In the United States the first act author¬ izing postal subventions was that of 3 March 1845. Power was given to the Postmaster- General to make contracts for payments of specified rates on weight of mail carried to foreign ports — 24 cents per half ounce for ports 3,000 miles distant; 10 cents per half ounce to Mexico and the West Indies. In 1847 a contract was made with the Ocean Steam Navigation Company for a mail service between New York and Bremen and Havre. The com¬ pany was to receive $100,000 for six return voyages to Bremen per year and $75,000 for six voyages to Havre. In 1850 the Collins Line, plying to Liverpool, agreed to accept $19,250 per voyage, making 20 voyages a year. A number of similar contracts were made about the same time, but in 1858 the granting of mail subventions was abandoned and vessels carry¬ ing the mails were allowed only the sea postage plus the inland postage on mails carried. Pos¬ tal subventions were allowed to lines running between New York and Rio de Janeiro and between the Pacific Coast and China, but were discontinued in 1875 after running 10 years. In 1891 a law was enacted authorizing the Postmaster-General to make contracts with American shipowners for carrying the mails between American and foreign ports. Steam¬ ships were placed in four classes : iron and steel vessels of not less than 8,000 tons with a speed of 20 knots per hour; iron and steel vessels of not less than 5,000 tons, with a speed of 16 knots; iron and steel ships of not less than 2,500 tons and a speed of 14 knots ; iron steel and wooden ships of not less than 1,500 tons and a speed of 12 knots. This law is still in force, so far as it does not conflict with the Act of 1920. The requirement is that contracts be let to the lowest bidder who is qualified to perform them.

In spite of the persistent agitation of the shipping interests a general objection to all ship subsidies has prevailed in this country. In 1905 the

total tonnage of the United States engaged in foreign trade was only 943,750 as contrasted with 2,496,894 tons in 1861. In 1920 the tonnage as a result of the war had increased to 12,- 406,000 tons. Since 1840 the United Kingdom has granted liberal subventions for carrying the mails, while in America no action was taken until 1891. The Merchant Marine Act of 5 June 1920 recognizes in part the principle of subsidies. It removed limitations on the rates of mail subsidies, leaving their final determina¬ tion in the hands of the United States Shipping Board and the Postmaster General within the limits, however, of their respective appropria¬ tions by Congress. The Shipping Board may use, out of its revenues, $25,000,000 a year, for five years, as loans at interest to American steamship builders, advancing not more than two-thirds of the cost of construction. A sec¬ tion provides also that the net income, for 10 years of American-owned ships in foreign trade, is exempt from the income, tax provided the owner invests the sum of his war-profits and excess-profits taxes in building new ships.

SHIPPING OF THE WORLD. When the Great War broke out in 1914, the world's shipping had reached its greatest known pro¬ portions. The year 1913 had been a record year in shipbuilding with nearly all the mari¬ time nations. Great Britain had launched 641 steamers aggregating 1,919,578 tons and 47 sailing vessels aggregating 12,575 tons, the highest figure ever recorded for a year's output of tonnage in that country. Not all of this tonnage went to swell the numbers of the British fleet. Holland bought 89,992 tons; Nor¬ way, 54,111 tons; Greece, 39,999 tons; the Brit¬ ish colonies, 37,118 tons, and Russia, 31,217 tons. With the exception of the United States, whose output of shipping for the year fell short of her 1912 figures by some 8,000 tons (due to a decrease of 42,000 tons in the yards of the Great Lakes), and slight decreases from pre¬ vious record figures in France and Japan, all the other shipbuilding countries made substan¬ tial gains over their previous records. During 1913, then, the new ships launched had added 3,188,578 tons in steamers and 144,304 tons in sailing vessels to the world's grand fleet. The previous high record had been 2,919,763 tons (steam and sail combined) in 1906, and the average yearly addition to the world's fleet for 20 years past had been 2,341,500 tons. How¬ ever, the yearly additions were not all clear gain. The losses in 1913 from collision, burn¬ ing, foundering, wrecks, missing and abandon¬ ment at sea, together with those of vessels broken up as unseaworthy, amounted to 499,000 tons of steam vessels and 183,000 tons of sailing vessels, so that the net addition to the world's shipping in 1913 was 2,690,000 tons of steamers, and there was a net loss of 39,000 tons of sailing craft. This figure was very small by comparison with the losses of other years. In 1910 the tonnage lost amounted to 947,690 tons, and the average annual loss for 20 years had been 765,000 tons.

For a long period of years the tendency in the world's grand fleet has been

an increase of steam vessels and a decrease of sailing vessels. The one exception has been Finland, whose

persistent building of sailing ships has pre¬ vented any notable decrease in the sailing ton¬ nage in Russia's shipping. Norway's sailing tonnage has been declining since 1890; Sweden's since 1880; Denmark's since 1880; Germany's since 1880; Holland's since 1860; France's since 1860; Italy's since 1870; Austria-Hun¬ gary's since 1870; Greece's since 1870. In the case of the United Kingdom the date was 1870 and for the United States 1861. Not to go farther back than 1900, the percentage of sail¬ ing vessels in the world's grand fleet was 23 per cent; in 1915 it had been fallen to 7 per cent.

The world's shipping on 30 June 1914, as recorded by the French Bureau Veritas, totaled 17,135 steamers of 100 tons or over, aggregating 23,840,675 net tons; and 21,924 sailing vessels of 50 tons and upward, aggregating 5,629,94 2 net tons: a grand total of 29,470,637 net tons — also recorded as 45,273,783 gross tons, a figure also of no small importance, as the sinkings by submarines are reported on the basis of the gross tonnage; the net tonnage being the vital figure in the carrying capacity of the grand fleet.

Table A, showing the distribution of 99.7 per cent of the world's grand fleet, was com¬ piled from the records of the Bureau Veritas. The 26 countries named are arranged in the order of their steam tonnage. Only steam ves¬ sels of 100 net tons and over and only the sail¬ ing vessels of 50 net tons and upward have been counted. Many highly interesting facts appear from the figures in the table, among them the very large tonnage in sailing vessels, both actual and comparative, owned in the United States in the year cited. Though Great Britain shows a much larger number of such craft, their tonnage averages only 190 tons as against 420 tons for the United States vessels. Nor¬ way's sailing fleet is notable in showing the

Table A. — Shipping of Principal Nations, 30 June 1914.

Steam vessels

Sailing vessels

Num¬

ber

Net

tonnage

Num¬

ber

Net

tonnage

Great Britain .

6,594

10,785,503

4,945

935,467

Germany .

1,510

2,852,797

1,041

426,919

United States .

1,103

1,481,849

2,993

1,214,974

Norway .

1,266

1,108,504

861

600,714

Prance .

692

1,013,847

877

434,289

Japan .

803

953,117

1,308

167,119

Italy .

537

786,234

934

279,366

Netherlands .

451

782,663

419

48,069

Sweden .

940

641,347

1,117

162,289

Austria-Hungary ….

345

615,554

127

11,538

Russia .

622

543,475

3,412

559,914

Spain .

438

510,000

249

30,897

Greece .

342

448,857

808

142,585

Denmark .

470

429,337

615

78,514

Belgium .

132

203,311

16

11,639

Brazil .

257

174,295

303

67,791

Argentine Republic . .

147

98,571

175

52,277

Turkey .

96

67,637

985

208,751

China .

66

65,045

2

439

Chile .

66

60,694

82

47,954

Portugal .

61

51,531

252

42,413

Cuba .

41

34,969

113

11,095

Uruguay .

30

26,247

56

24,632

Rumania .

22

26,194

22

3,567

Mexico .

30

22,095

47

8,512

Peru .

12

i

17,370

58

31,390

largest average tonnage in the table — 750 tons ; Belgium following with 730 tons and Peru third on that score, with 540 tons. The largest average tonnage for steam vessels is shown by Germany — 1,880 tons; followed by Austria- Hungary, 1,800 tons; Netherlands, 1,740 tons, and Great Britain, 1,640 tons.

With the breaking out of the war in July 1914 the destruction by war vessels of the mer¬ chant fleets of the belligerents began, and this destruction on the part of Germany and her allies was soon extended to include the ship¬ ping of neutrals carrying contraband, few at¬ tempts being made to capture them. In Feb¬ ruary 1917 the German government declared promiscuous war on all merchant vessels of whatever country found in certain specified areas of the open sea. This condition had al¬

ready prevailed in some waters for several months previous to the declaration, and many vessels were sunk outside of the forbidden areas, and even those bearing safe conduct from Germany and in the so-called ((saf e)} channels met the same fate. The records of losses from these causes stop with April 1917, at which time the British government ceased the publi¬ cation of tonnage lost, and gave thenceforth only the number of vessels lost from week to week. A carefully worked-out summary of the losses by mine and submarine from 8 Aug. 1914 to 26 April 1917 shows a total of close to 5,740,000 tons, of which 1,653,654 tons belonged to neutral nations. Of the neutrals, Norway had suffered the most, losing 436 vessels, aggre¬ gating 987,816 tons ; Holland came next, with a loss of 76 vessels of 148,921 tons. Greece lost 60 ships aggregating 147,923 tons, and Den¬ mark 114 ships, aggregating 123,385 tons.

Table B is introduced to show by the latest complete figures available the condition of the world's shipping at the date given, as it is com¬ piled from records of the Bureau Veritas. The

Table B. — Shipping of Principal Nations, 30

June 1917.

Steam vessels

Sailing vessels

Num¬

ber

Net

tonnage

Num¬

ber

Net

tonnage

Great Britain .

6,673

11,921,245

4,975

731,019

Germany .

1,074

2,133,040

1,103

365,232

United States .

1,309

2,053,284

1,851

930,814

Norway .

1,427

1,363,358

734

494,224

Japan .

932

1,140,767

1,493

191,867

France .

681

1,028,655

775

386,828

Italy .

598

1,025,071

949

243,235

Netherlands .

475

898,783

448

49,513

Russia .

653

607,211

3,554

583 , 659

Sweden .

826

617,362

901

138,891

Spain .

421

489,147

234

29,3ˆ8

Austria-Hungary ….

282

486,835

91

7,084

Denmark .

483

461,920

634

88,280

Greece .

321

430, 193

585

106,997

Portugal .

128

192,860

217

46,379

Brazil . ; .

240

158,745

79

13,292

Belgium .

102

153,791

6

7,350

Argentine Republic . .

135

91,109

49

16,256

China .

70

60,824

7

865

Chile .

65

54,438

32

24,695

Rumania .

29

43 , 233

3

551

Turkey .

69

41,346

963

199,867

Mexico .

24

20,048

16

2,483

Cuba .

27

17,460

143

14,533

Peru .

11

14,681

40

20,254

Uruguay .

19

11,651

48

23,163

SHIPS -SHIR ALI KHAN

showing is that after three years of the most destructive warfare the world has ever seen, the world's grand fleet consisted of 17,135 steamers aggregating 25,550,159 net tons, and 19,985 sailing vessels aggregating 4,731,707 tons. At their face these figures seem to show the same number of steamers and a gain of 1,710- 484 tons of steam tonnage; and a loss of 1,939 in the number of sailing vessels, with a loss of 898,235 tons of sailing tonnage. This is not quite in accordance with the facts. Many of the sailing vessels apparently lost have been fitted with steam or gasoline engines and have thus passed into the class of ˆsteamers.® In taking account of the world's tonnage it is to be remembered that under normal conditions the yearly addition to the grand fleet would have been the average previously quoted — 2- 341,500 tons per year. In three years the total addition would have been 7,024,500 tons, instead of the showing for 30 June 1917 of a net gain of 812,249 tons — revealing a net loss due to the war of 6,212,251 tons; a figure not very far removed from the actual losses recorded up to 26 April of that year.

A studious comparison of the two tables shows losses in steam tonnage by Germany, Sweden, Austria-Hungary, Spain, Greece, Bel¬ gium, Brazil,

Argentine Republic, China, Chile, Turkey, Cuba, Uruguay, Mexico and Peru; and gains by Great Britain, United States, Nor¬ way, Japan, France, Italy, Netherlands, Rus¬ sia, Denmark, Portugal and Rumania. With the exception of Germany, Austria-Hungary and Turkey, whose losses represent vessels seized by belligerents, or, in the case of Turkey, by destruction in warfare, the apparent losses do not show destruction but indicate sales of ship¬ ping to the principal allies fighting against the Central Powers. The large reduction of the sailing tonnage of the United States is ac¬ counted for by the installation of power, plac¬ ing them in the steamer class. Another very large factor to be considered in making com¬ parisons is that the allied nations opposing the Central Powers withdrew from their mer¬ chant fleets a prodigious amount of tonnage for military purposes, and this does not appear in the columns of these tables. Of Germany's and Austria-Hungary's ships in foreign ports many were seized, at a loss to them of not less than 1,000,000 tons. The United States alone took over 636,036 tons. Figures issued by the United States Shipping Board in March 1919 place the world's steam tonnage at 37,010,000 gross tons; the net loss due to the war at 4,245,000 gross tons — which includes 1,000,000 tons as ˆabandoned® ; and the further loss of the increase to have been nor¬ mally expected, at 12,000,000 tons : making the world shortage attributable to the war, 16,245,- 000 tons on the date cited.

When the armistice was signed 11 Nov. 1918 the United States had a merchant marine of 1,366 steamers aggregating 4,685,263 gross tons, and 747 sailing vessels aggregating 829,- 919 gross tons; a combined total of 5,515,182 gross tons, as compared with 2,696,763 tons in 1914 — a gain of over 125 per cent. From such figures as are available Table C has been com¬ piled showing the. losses, replacements, and ex¬ isting merchant tonnage in June 1920 of the principal maritime countries of the world. See Merchant Marine of the United States.

Table C. — War Losses, Replacements and Merchant Tonnage of the World, 30 June 1920. (Lloyd's Register 1920-21).

COUNTRIES

Tosses

(tons)

Replace¬

ments

(tons)

1920

tonnage

Great Britain .

7 , 743 , 746

4,900,000

20,582,652

United States .

383,987

4,100,000

16,049,289

Germany .

2,706,000

950 , 000

672,671

Japan .

127,470

885 , 000

2,995,878

Netherlands .

199,975

560,000

1,793,396

Norway .

1,178,335

775,000

2,219,388

France .

907,168

425,000

3,245,194

Italy .

854,124

375,000

2,242,393

Spain .

167,693

250 , 000

997,030

Sweden .

201,733

70,000

1,072,925

A ii stria -Hi in gar v .

390,000

75 , 000

Denmark .

239,922

95 , 000

803, 41 i

Russia and Finland. . .

183,852

25,000

701,236

Brazil .

25 , 464

240,000

497,860

Chile .

10,000

320,000

103,788

Greece .

337,545

530,261

Portugal .

92,382

230,000

275,265

Argentina .

4,275

64 , 000

150,023

Belgium .

166,000

415,112

China .

15,000

40,000

142,834

Cuba .

10,000

30,000

53,439

Mexico .

5,000

37,000

Uruguay .

6,889

40 , 000

63,837

Peru .

1,419

43,000

88,962

Turkey .

60 , 000

Rumania .

3,688

74,549

Richard Ferris.

SHIPS, Registration of. See Maritime Law.

SHIPS THAT PASS IN THE NIGHT,

the title of a widely-read story by Beatrice Harraden. It achieved notoriety when it was published in 1894 to some extent, very possibly on account of its taking title. The scene is laid in a Swiss winter resort for consumptives.

SHIPTON, ship'ton, Mother, an English prophetess about whose existence there seems to be no certainty, while there is no doubt that many of the sayings attributed to her were fabricated by others. According to S. Baker, who published Mother Shipton's pretended prophecies in 1797, she was born near Knares- borough, Yorkshire, in July 1488, and baptized as Ursula Southiel. She died, according to the same authority, at over 70 years of age, but it was not until 1641 that a pamphlet ap¬ peared containing some of her alleged predic¬ tions. In 1645 all her prophecies were consid¬ ered as having been fulfilled. In 1862 a pre¬ diction was made, with Mother Shipton's name appended to it, that the world would come to an end in 1881. It caused some excitement among the ignorant.

SHIPWORM. See Teredo.

SHIPWRECKS. See Disasters of the World, Notable.

SHIR ALI KHAN, sher a'le khan, Amir of Afghanistan: b. about 1825; d. Mazar-i- Sherif, 21 Feb. 1879. He was the younger son by a favorite wife of Dost Mohammed and was nominated successor to the throne to the exclusion of Mohammed Afzal Khan, the eldest son by another wife. Dost Mohammed died in 1863 and a fratricidal war ensued to determine the succession. In December 1863 Shir Ali secured the recognition of the British govern¬ ment to his succession, and in the contest that followed Mohammed Afzal was taken prisoner. The brother and son of the latter, who retained possession of Afghan-Turkestan, renewed the war and in a battle which took place in May

1866 the majority of Shir Ali's troops deserted to the enemy. For the next three years Shir Ali's fortunes ebbed and flowed and at times he seemed likely to lose his throne forever. In 1869, however, with the recognition of the British he was fully established on the throne at Kabul. In 1877 he became estranged from the British government, and refused to receive a 'British mission at Kabul. At the same time he made overtures to Russia and received her mission, while relations between Russia and Great Britain were strained. The British mis¬ sion being a second time repulsed, war was declared and the British invaded Afghanistan. Shir Ali fled at the approach of the British and determined upon making personal appeal at Petrograd for an alliance against the British. The Russian government sent him messages de¬ clining to enter into any such alliance, but he persisted in his journey until he had crossed the Russian frontier, where he died suddenly. See Afghanistan.

SHIRAS, shl'ras, George, Jr., American jurist: b. Pittsburgh, Pa., 26 Jan. 1832. He was graduated from Yale in 1853 and from the Yale Law School the next year. Received the degree of LL.D. from Yale in 1883. Ad¬ mitted to the bar in his native city in 1856 he practised there until in July 1892 he was ap¬ pointed associate justice of the United States Supreme Court. Retired 1 March 1903 on age limit.

SHIRAZ, she'raz, Persia, capital of the province of Fars, lies in a high valley, 220 miles southwest of Ispahan, and is reached by lofty passes. It lies in a broad plain, 115 miles east-northeast of Bushire and 35 miles southwest of the ancient Persepolis, the ruins of which still exist. Its nearest point is Kodi- jan. It is much praised in Persian poetry for its climate, its wine and rose-gardens. The city, with thousands of the inhabitants, was nearly destroyed for the third time in its his¬ tory in 1853 by earthquake. The town now re¬ built contains mosques, a bazar, but nothing noteworthy; the suburbs are more attractive. At the north are the tombs «of the celebrated poets Hafiz and Sadi, both natives of the town. It is a centre of trade, due to its position on the commercial routes leading from the port of Bushire. Shiraz is famous for its wines and inlaid work of wood and metals. It has exten¬ sive manufactures of silk and cotton, firearms, cutlery, glass, pottery, swords, etc. Pop. 40,000.

SHIRE, she'ra, East Africa, a river in the southeastern part of the continent. It rises in Lake Nyassa, and, after a course of 370 miles, flows into the Zambesi. It is navigable except where interrupted for 35 miles by the Murchi¬ son cataract and rapids, which have a fall of 1,200 feet. It flows through a rich agricultural country and has become an important com¬ mercial route to the lakes region. The Shire Highlands are included

in Nyasaland. There are several Scotch and English missions and settlements in the Shire country. Cotton and grain are the chief products. The Shire was discovered by Livingstone (1858-63), and the district was annexed as British territory in 1889. Consult Buchanan, J., (The Shire Highlands) (1885).

SHIRE, slier or shir, in the United States the more modern term county replaces this

older name. Shire is an English term, still in general use in England, Wales and Scotland, although superseded by the modern form in most places; thus Derbyshire, Glamorganshire and Renfrewshire are ˆcounties.® In the United States counties are the first division of the State and township the next. The use of the word shire in the States has no significance as to division ; it is merely a portion of a name. Thus we have the ((county of Yorkshire.® But in England this is different. The suffix < (shire® so used is in itself an indication that the division is a county.

There have been stated different periods at which, it is said, England was divided into shires. It is probable that all such statements are incorrect, and that although there exists in England a system of subdivisions known as shires, the country perhaps never was con¬ sciously so divided. If it be remembered that the Saxon people were a collection of clans and that these clans were divided into families, two or three large families to the clan, the seeming inconsistency of the above statement is ex¬ plained. The head of the family was the supreme law-giver in the family. He himself was under the leadership of the head of the clan, or tribal community. These tribal com¬ munities united to form what is known as hundreds, and the hundreds united to form shires. Thus the country instead of being divided into shires was formed by the union of many separate shires, each .of which was, practically, an independent kingdom. Some of these small districts still exist — Norhamshire in Northumberland and Richmondshire in York¬ shire. It was after this union of shires under one national head, not a spontaneous process, but one of slow and at times retrogradal growth, that the shire took its position as a subordinate part of the kingdom. As such it had at its head the shire-reeves, whence the modern sheriff. The shire-reeve preceding the Norman Conquest was one of the two heads of the shire organizations, the other being the ealdorman (or earl), whence comes our modern alderman. The ealdorman seemed to represent the old (Organization and dignity of the shire when it was an independent kingdom ; he shared certain offices with the bishop. But the shire-reeve was more particularly the representative of the king, and after the Norman Conquest he became purely a royal officer, with his importance con¬ siderably curtailed. He held the sheriff's tourn, an annual court to which came the vassals of the king. The appeal from this court was to the king

himself, and from this appeal came the growth of the King's Court, in its three branches of King's Bench, Common Pleas and Exche¬ quer. This court assessed taxes, also, and thus the sheriff became the financial head of the shire; to the Sheriff's Court, too, fell the elec¬ tion of knights of the shire, thus giving it the function of an assembly for the choice of shire representatives. From the time of the Plantag- enet accession to the throne the importance of the shire organization decreased, the sheriff now being merely an aid to the County Court (q.v.). (See County; Feudal System). Con¬ sult J. R. Green's (History of the English People,* Vol. I (1870-82) ; (Conquest of Eng- land) (1884) ; (The Making of England* (1885) ; Freeman's (Norman Conquest,* Vol. I, chs. ii-iv (1870).

SHIRLAW, sher'la, Walter, American painter: b. Paisley, Scotland, 6 Aug. 1838; d. Madrid, 1909. He was brought to the United States in his second year, and began his artistic career in early manhood as a bank-note en¬ graver. He exhibited for the first time in the National Academy of Design in 1861. After a course of seven years' study in Munich (1870- 78) he adopted genre-painting as his specialty, and also accomplished a great deal of work in decoration and book and magazine illustration. He was one of the founders and the first presi¬ dent of the Society of American Artists, and in 1888 he became a National Academician. A memorial exhibition of 200 of his works was held in New York and other cities in 1911.

SHIRLEY, sher'li, James, English drama¬ tist : b. London, 18 Sept. 1596; d. there, 29 Oct. 1666. He was educated at Oxford and Cam¬ bridge, and, having taken holy orders, obtained a curacy near Saint Albans. He soon after¬ ward went over to the Church of Rome. Then he removed to London, became a writer for the stage and acquired a reputation which caused him to be taken into the service of Queen Henrietta Maria. His first comedy was licensed in 1625, and from that date he produced many plays in rapid succession. In 1636 he went to Ireland to assist Ogilby in the management of the new theatre at Dublin. After his return, probably early in 1640, he wrote much, and was conceded the foremost of English play¬ wrights. He died (of exposure during the great fire. He was last of the notable series of Elizabethan and Jacobean playwrights; and his works, while frequently thin in plot and loosely constructed, are clever, suave and abounding in fancy. Besides 37 tragedies and comedies, he published a volume of poems. His best dramas are the tragedies (The Traitor,) (The Royal Master} and (The Cardinal, } and the comedies (Hyde Park,* (The Ball,* (The Gamester* and (The Imposture. * The best edition of his dramatic works is that by Gifford and Dyce (1833). Consult Wood,

(Athen3e Oxonienses, (ed. Bliss; 1817); Ward, (History of English Dramatic Literature) (1875) ; Forsythe, R. S.,*

(Relations of Shirley's Plays to the Elizabethan Drama) (New York 1914) ; Nason, A. H.,

(James Shirley, Dramatist: A Biographical and Critical Study) (New York 1915) ; Parlin, H. T., (A Study in Shirley's Comedies of Lon¬ don Life (University of Texas 1914).*

SHIRLEY, William, American colonial governor: b. Preston, Sussex, 1693; d. Roxbury, Mass., 24 March 1771. He studied law and in 1731 came to America, settled in Boston, Mass., and there engaged in that profession. He was royal governor of Massachusetts in 1741-45, planned the successful expedition against Cape Breton in 1745, and in 1745-53 was in England, after which he returned to Massachusetts as governor. He made a treaty with the Eastern Indians in 1754, explored the Kennebec River, and erected several forts on its banks, and at the outbreak of the French War in 1755 was commander-in-chief of the British forces in North America. He planned the expedition of General Prideaux against Niagara and accom¬ panied it as far as Oswego, but was superseded in his military command and in his governor¬ ship in 1756. He was later appointed governor of the Bahamas, a post he resigned in 1770, and

then returned to Massachusetts, where he lived in retirement the remainder of his life. He wrote (Electra, a tragedy; (Bertha,* a masque; 'The Siege of Louisburg) (1745) ; (Conduct of Gen. William Shirley Briefly Stated) (1758), etc. Consult Correspondence of William Shirley) (New York 1912).*

SHIRLEY, a novel by Charlotte Bronte, published in 1849. The scene is laid in the \orkshire country, with which the author had been acquainted from childhood. The heroine, Shirley, was drawn from her own sister Emily. The book is richer in portrayal of character than in striking incident.

SHIRREFF, shir'ef, Emily Anne Eliza,

English pioneer educator of women: b. 3 Nov. 1814; d. London, 20 March 1897. She was a daughter of Rear-Admiral Shirreff and with her sister Maria — afterward Mrs. William Grey — received an excellent education, espe¬ cially in languages and history. The inadequacy of educational facilities for women impressed the sisters deeply and their first efforts to im¬ prove matters lay through the publication of several books _ of which they were joint au¬ thors. These include (Letters from Spain and Barbary)

(1835 or 1836) ; (Passion and Prin¬ ciple, } a novel (1841) ; (Thoughts on Self- Culture, Addressed to Women (1850). Miss Shirreff was a staunch supporter of the move¬ ment to establish Girton College, and was hon¬ orary mistress there in 1870, as well as being a member of the executive committee until her death. With her sister she founded the Na¬ tional Union for Improving the Education of Women of all Classes out of which in 1877 came the college for women now known as the Maria Grey Training College. She was an advocate of the Froebel system, concerning which she wrote several pamphlets. She was also author of Hntellectual Education and its Influence on the Character and Happiness of Women) (1858).*

SHISHAK, shl'shak, Egyptian king, the Sheshenk I of the monuments, and the first sovereign of the Bubastite or Libyan dynasty. Shishak I rose to the throne from being com¬ mander of the powerful Libyan mercenaries ; to him Jeroboam fled for protection when he fell under the suspicion of Solomon (1 Kings xi, 40) ; and in the fifth year of Rehoboam he invaded Judah, whose fenced cities he took one after another until he arrived at Jerusalem which, according to the statements of Josephus, fell without a struggle. (Compare 2 Chron. xiii, 1-10). Shishak pillaged the temple and the king's palace, carrying off the treasures ac¬ cumulated in the reigns of Solomon and David, and reducing Judah to the position of a tribu¬ tary kingdom. He ascended the throne of Egypt about 980 b.c. and reigned at least 21 years. On the southern wall of the great temple of Karnak, in Upper Egypt, is a record of the conquests of Shishak and of the coun¬ tries ruled by him. On this are four rows of prisoners. Each figure has his arms tied be¬ hind him, and a rope around his neck, and Shishak, a colossal figure, leads them by a string, meanwhile branishing a weapon. In the lists of his conquests during the expedition in which Judah was subjected to his rule we find the names of cities in both the kingdoms of

Israel and Judah and of several Arabian tribes to the south of Palestine. Among those of the cities which can be recognized in these lists are Rabboth, Taanach, Sunem, Rehob, Hap- haraim Adoraim, Mahanaim, Gibeon, Beth- Horon, Kedemoth, Ajalon, Megiddo and Judah Maluk, (

SHITTIM WOOD. See Kittim.

SHIVAISM, the religion of the Shivaites, or worshippers of Shiva or Siva, an ancient Dravidian divinity of southern India. His proper name was Mahadewa, (

SHIVELY, Benjamin Franklin, American lawyer and senator; b. Saint Joseph County, Ind., 20 March 1857; d. 14 March 1916. He was graduated at the University of Michigan in 1886, and engaged in law practice at South Bend, Ind. He served in Congress in 1884-85 and in 1887-93. He was elected to the United States Senate lor the term 1909-15 but died be¬ fore its expiration.

SHOA, sho'a, Abyssinia, northeast Africa, an important southern province, before 1889 a separate kingdom, with ill-defined boundaries. It consists of a series of plateaus at 3,000 feet above sea-level, traversed by mountain chains, which,, in the culminating point, Mount Metatite, near Ankobar, have a height of 10,700 feet. Its east portion, called Eflfat, has a less elevated and more generally sloping surface, which is highly cultivated, and yields good crops of grain, chiefly wheat and barley. Cotton also is extensively cultivated. The higher plateaus are devoted to pasture. Among indigenous trees is the Juni- perus excelsa, which in the course of a century attains a height of 160 feet, with a diameter at the base of four to five feet. The exports of the province comprise grain and large quantities of a durable cotton cloth, and to these may be added, as articles of trade, coffee, gold-dust, ivory, gums and spices, ostrich feathers, hides, dye-woods, medicinal plants, etc. The present capital is Adis Abeba, but the chief town is Ankobar. Christianity was introduced as early as the 3d century, and is still professed by a large number of the inhabitants, though in a degenerate form. Pop. estimated at 2,500,000 of whom about 1,000,000 are Christians and the rest chiefly Mohammedans.

SHOALS, Isles of. See Isles of Shoals.

SHOCK, a sudden vital depression of the body usually due to sudden derangement of the functions of the nervous system, and generally accompanied by a dilatation of the blood-vessels of the surface of the body and a marked de¬ crease in blood-pressure. Such a condition may be brought about by both physically or psychic¬ ally acting causes. A blow, a fall, a haemor¬ rhage, an operation, sudden fright, an appall¬ ing sight, a heartrending cry, sudden finan¬ cial loss or great and sudden bereavement are among the many causes constantly acting to bring about such a condition. The symptoms of shock vary greatly according to the type of cause and the individuality of the patient. Sometimes the symptoms begin at once; under other circumstances the results may be delayed f or a long period. A very severe form of shock is spoken of as surgical shock. This usually re¬ sults from serious operations which involve nervous structures, take much time, and large quantities of anaesthetic. A condition closely resembling surgical shock may follow the severe haemorrhage of placenta praevia, ectopic preg¬ nancy, or other form of internal haemorrhage. (See Bleeding). Special types of shock develop from the violent action of heavy

explosions in war. These affect the central nervous system and were extremely frequent in the Great War of 1914—18. The symptoms of shock are very characteristic. The face usually becomes blanched and pale, the body becomes cold and is covered with clammy perspiration, the hands and feet usually become icy, the brain seems to be in a whirl, and consciousness is lost or much clouded. The pulse is usually quickened; the arteries at the wrist are soft and easily com¬ pressed ; the breathing is usually rapid and shallow, labored, and at times irregular. The eyes are often sunken and listless, and the tem¬ perature of the body is diminished one or two degrees. The most important single factor in pure shock of the type described is the sudden fall in blood-pressure. This is thought to be due to purely nervous causes, the most potent one of which is paralysis of the sympathetic nervous fibres. This causes sudden dilatation of the blood-vessels, loss of tone of the vessel- walls, with loss of blood-pressure; hence the symptoms, and oftentimes the resultant death. The action in the sympathetic nervous system is largely due to the implication of the supra¬ renal glands, and other glands of internal secretion. Sometimes the symptoms of shock are much less severe. There is temporary faintness, slight pallor and a feeling of nausea, and the attack passes off. Between this slight shock and the shock that results from the pugilist's ((solar-plexus® blow, 'that may bring death, every variety of change may be noted. In severe accidents many patients, while not suffering from physical injury, are often pros¬ trated and develop true railroad shock, or traumatic neurasthenia. (See Neurasthenia). Psychical shock may induce neurasthenia; it may be a potent cause of mental disease; or it may even cause death. The influence of shock upon pregnant women is of great import¬ ance. Shock in such circumstances may bring about miscarriage, or cause malformations of the foetus. Mild cases of shock are recovered from without aid. A stage of reaction sets in, the patient becomes warmer, the blood-vessels

regain their tone, and equilibrium is restored. More severe attacks require hot-water applica¬ tions to the extremities, hot tea or coffee by mouth, alcoholic stimulants, or even ergot or adrenalin. Massage and heat, and sometimes rectal injections of plain hot (110°-115° F.) water, or hot salt water (1 teaspoonful of salt to pint of water) are very useful in extreme cases.

SHOCK ABSORBERS. Even when vehi¬ cle springs have been carefully selected with due regard to the loads they are to carry, it is difficult to provide against the many variations in loads and speed that necessarily

obtain under conditions of actual service. In automobiles especially it is found that a car which rides easily on good roads often proves decidedly un¬ comfortable on rough roads because the light springs cause the riders to be jostled about at any but the slowest rate of speed. To aid the springs and effect a compromise, shock absorbers have been devised. They are of various de¬ signs and are all intended to supplement the action of the vehicle springs. Two general di¬ visions of absorbers may be noted, however, those which receive shocks caused by a sudden deflection of the spring and those which merely check excessive motion of the spring by what may be considered a variety of brake action. A very simple form of absorber is a rubber pad carried by a clip and attached at the centre of the spring, where on the chassis is fixed a bolt or bracket which, upon the sudden deflection of the spring, rests the frame and load upon the rubber buffer or pad. Another form of ab¬ sorber is the auxiliary spring, usually a spiral, and designed to operate in conjunction with the main springs. Its function is to retard exces¬ sive motion of the latter. Absorbers of the brake action type consist usually of a pair of levers hinged together at one end and the other end attached to chassis and spring, respectively. A variety of this form has a cup and cam hinge, with steel springs inserted in the cup and push¬ ing against the cam. Other designs of absorber consist of cylinders filled with oil and fitted with a piston and plunger rod. One member of these cylinder absorbers is of course attached to the frame or chassis while the other is at¬ tached to the axle. The piston acts as a check to any rapid movement of the plunger rod.

SHOE. See Boots and Shoes; Shoe In¬ dustry in the United States.

SHOE-BILLED STORK, or WHALE- HEAD, a large stork (Balceniceps rex) found on the White Nile. It is brownish-gray with black wings, tail and feet, the head is slightly crested, the bill short, broad and deep, with the tip hooked and mottled dusky and yellow. These birds, also known as ((boat-bills,)) live in flocks in swampy woods and morasses, and feed upon all kinds of small reptiles, frogs, fish, mol- lusks and carrion. Although they perch upon trees, the nest is on the ground, a slight lining of grass, etc., in a slight hollow. The eggs are white and from 2 to 10 in number.

SHOE INDUSTRY IN THE UNITED STATES. History. — Shoes were brought to America by the first settlers, as part of their equipment. The Indians wore moccasins, and the white men adopted them until Thomas Beard, a shoemaker of Saint Martin's lane, London, came to Massachusetts Bay colony in

1629, bringing a supply of leather as well as a kit of tools, and became the first shoemaker on record in the colonies. As the colonies grew, other shoemakers came, and Johnson, in his (Wonder Working Providence, >

speaks of the shoe trade in 1654 as among the industries ((enriching themselves very much.® Many early settlers, being jacks of all trades, made their own shoes. Some raised the cattle and tanned the leather, of which their shoes were made. In New England, shoemakers tramped from settlement to settlement, making and mending shoes, and accepting board and lodging as part pay. In the larger towns, shoemakers set up regular shops. The shoemakers ˆinhabiting and housekeeping in Boston" were authorized to in¬ corporate by the General Court of the Bay colony, and to enforce rules for the good of their trade. However, the Court provided that there should be no unlawful combination <(for enhancing the prices of shoes or wages whereby the people suffer.® The Court also provided that no butcher should make leather, that no tanner should make shoes and that no shoe¬ maker should tan leather. It forbade the use of false and deceitful mixtures in making leather. Also it forbade the wearing of ex¬ travagant styles in footwear by persons of mean estate. Government regulation of the footwear industry during the war 1914-18 was mild com¬ pared to the government regulation during colonial times. The shoe industry flourished, as the colonies grew. But it was not strong enough to provide footwear for the soldiers of the Revolution, and Washington's troops left the bloody footprints of their bare feet in the snows of Valley Forge. John Adam Dagyr, a soldier of the Revolution, and a shoemaker, too, imported fine shoes from London and Paris, and studied them until he learned how to make shoes as good. He freely taught his skill to others. The newspapers spoke of him as ((The Celebrated Shoemaker of Essex.® They ad¬ vised their readers to buy fine shoes made in America, instead of importing them from Lon¬ don and Paris.

After the Revolution, Congress put a pro¬ tective tariff on shoes, and the tariff, with varying rates of duty, was kept in force until the present tariff bill, which put shoes on the free list, was adopted. The early 19th century was a golden era in the shoe industry. Shoe¬ makers worked in little shops by their homes. The shops were called ((ten footers® because they were 10 feet square. One of them is a permanent exhibit at the Essex Institute in Salem. The shoemakers read as they worked, or talked with visitors. Roger Sherman, a United States senator, who ((never said fool¬ ish word,® got his education by studying from books opened by his side as he made shoes. Henry Wilson, <(The Natick Cobbler® who be¬ came Vice-President, got his first lessons in debate by discussing topics of the day with visitors at his little shop in Natick, Mass. Often, the minister was a Monday morning visitor at the shoe shop, and the Sunday sermon was discussed. A Bible was kept in many a shop. In large shops, the shoemakers often sang together. In small towns, men farmed in summer and made shoes in winter. Manufac¬ turers of the cities sent cases of shoes in express wagons to the farmer shoemakers.

The kit of shoemakers of hand method days

consisted of a lap stone, a flat face hammer, awls, waxed ends, knives, rub sticks, a piece of sharkskin, used as is sandpaper to-day for buffing leather, and a bottle of blacking and other small equipment. Each shoemaker had his own kit of tools and ((seat® on which he worked and kept his tools by his side. Some used their tools and seats for a lifetime. The pay was small and the employment irregular. A dollar a day was high pay. At one period, in Lynn, shoemakers were paid in orders on the union store, exchanging their orders each Satur¬ day for flour, molasses, salt fish and other neces¬ sities. The uppers of many shoes were stitched by women who worked at home. (

The change from hand to machine methods in shoemaking makes a marvelous chapter in American industrial history. Thomas Blanch¬ ard, a Yankee mechanical genius, was chal¬ lenged to make a machine to turn gun stocks. He did it. The machine was adapted to mak¬ ing shoe lasts. So it became possible to make thousands of lasts by machinery, where only one could be made by hand. The lasts were refined, and multiplied in style, and standardized in sizes, until there is the thousand and one varie¬ ties of to-day. Elias Howe, a struggling young machinist, invented the sewing machine. John Brooks Nichols, a Lynn shoemaker, adapted it to the sewing of uppers of shoes. Women ceased to ((bind shoes® at home, or sew the uppers with needle and thread in hand. The machine does the work, stitching shoes a hun¬ dred times faster than could the most skilful <(binder® and doing it better, too.

Lyman Blake, a South Abington, Mass., shoemaker, invented the McKay machine for sewing soles of shoes just before the Civil War. He worked on it nights, after doing a day's work in the factory. He realized that he didn't have the business ability to put his machine on the market. So he sold it for $70,000 to Col. Gordon McKay. When Blake asked Congress for an extension of his patents, he estimated that his machine had saved to the shoe trade

$13,979,724.30.

This McKay machine revolutionized the shoe industry. The shoemakers who worked by hand in little shops at home could not compete against the machine. Factories were established and equipped with, machinery. Shoemakers came from little shops to work in the factories. Machinery was

invented and developed to sup¬ plement the McKay machine for sewing soles and for stitching uppers. One by one the hand workers gave place to the machine operators. Sixty different kinds of machines are used in an average factory at present, and one factory has 137 different kinds of machines which it uses in making a single pair of shoes.

Sidney W. Winslow and others consolidated the several important shoe machinery com¬ panies into the United Shoe Machinery Com¬ pany in 1899. It established a system of leasing machinery. Manufacturers pay so much royalty for each pair of shoes made on its chief ma¬ chines. They buy outright the supplementary machines, which are used in preparing a shoe for the chief machine, such as a welt sewing machine, or to finish the shoe after it is sewed.

The company makes 25,000 machines a year and 21,000,000 parts. It has its ma¬ chines in 98 per cent of the shoe shops of the country. It has strong branches abroad, in Europe, South America, Australia and even in Asia and Africa. The methods of the company have been the subject of much discussion in the past few years. The government prosecuted it, 12 Dec. 1911, for violation of the Sherman Anti- Trust Law. The charge was maintaining a monopoly of the shoe machinery industry. After various court actions, covering a period of seven years, the United States Supreme Court handed down a verdict that the company did not violate the Sherman law. The verdict says: <(It is impossible to believe, and the court below refused to find, that the great business of the United Shoe Machinery Company has been built up by the coercion of its customers, and that its machinery has been installed in most of the large factories of the country by the exercise of power, even that of patents. The installations could have no other incentive than the excel¬ lence of the machines and the advantage of their use, the conditions imposed having ade¬ quate compensation, and not offensive to the letter and the policy of the law.®

There is still pending in the courts a suit against the United Shoe Machinery Company for violation of the Clayton law, which forbids a <(tying clause,® or clause in leases which re¬ quire that one machine shall be used in con¬ junction with another. This suit was brought in October 1915.

Production. — Through the development of machinery and the factory system, the produc¬ tion of shoes has been multiplied, wages in¬ creased, conditions of labor elevated and shoes improved. Wages have increased from $5 or $6 a week to $5 or $6 a day, and skilled workers get more. Tuberculosis, a sickness common among shoemakers who sat on • their benches and stooped over their work, is no more an affliction common among shoemakers. Peo¬ ple generally get better looking, better fitting and better wearing shoes than ever they had ■before.

In the shoe manufacturing industry, there are, according to the United States census for 1914, 1,355 establishments. They make 292,- 666,468 pairs of shoes annually. The shoes are worth $501,760,000. They employ 191,- 555 persons, and paying them $105,695,000 an¬ nually in wages. They use 100,232 horse power for driving their machinery.

New England makes about half of the shoes of the country. The business has grown rapidly in the West in the past generation. Saint Louis claims to rival Boston as the greatest shoe centre of the world. Brocton leads in men's shoes, Lynn in women's shoes and Haverhill in fine slippers. Brooklyn and Philadelphia are noted for their fine shoes. Manchester, N. H., Auburn, Me., Rochester, N. Y., Cincinnati, Ohio, Chicago, Ill., Endicott, N. Y., and Mil¬ waukee, Wis., are among the big shoe-making centres.

The old-time shoemaker, who worked in a little shop, made a case of shoes a week, or 6 pairs. The custom shoemaker made any sort of shoes his customers desired, for men, women or children. The shops of to-day specialize, one making men's shoes only, one making women's

shoes only and one making children's only. Specialization is the secret of much of the American progress of the American shoe trade. Some shops carry it so far that they make just one grade of shoes, over just one last.

A small s'hop of to-day makes from 100 to 500 pairs of shoes daily. A medium-size shop makes from 1,000 to 5,000 pairs daily, a big shop makes from 5,000 to 10,000 pairs. A com¬ pany with several shops makes from 10,000 to 25,000 pairs, and one great concern is credited with a production of 75,000 pairs of shoes daily. The American people average three pairs of shoes per capita per year, and spend about $1,000,000,000 a year for their footwear. Shoes are distributed in the United States through 50,000 retail stores.

Export. — Development of export trade in boots and shoes followed close upon the de¬ velopment of the American shoe factory sys¬ tem. Exports of shoes amounted to $419,000 in 1870. That was when machines were com¬ paratively new, and machine-equipped shops made only a few shoes. In 1900 exports of shoes amounted to $4,000,000. Then all shops were machine equipped, and were able to pro¬ duce more shoes than the home markets con¬ sumed. Exports to Cuba increased rapidly after the Spanish-American War. Cuba is the best customer that American manufacturers have among foreign nations. Exports to South American countries began to

increase after the completion of the Panama Canal. They in¬ creased enormously during the World War. For 1916 they amounted to 19,400,000 pairs, worth $42,500,000. Many of these shoes were for the armies of France and Italv. A new rise in exports is expected after the world gets readjusted to a peace basis.

Styles. — Styles in footwear have changed much, as people changed their activities. Puri¬ tans wore plain, square-toe shoes with buckles. Cavaliers wore great boots. People walked much, until railroads came, and necessarily wore stout footwear. Men of the colonial and early Revolutionary period wore small clothes, long stockings and low shoes with buckles. Jefferson provoked bitter criticism when, as President, he first put on pantaloons and lace shoes. Women had one pair of coarse shoes for week day wear and a pair of fine kid shoes for Sunday best. Farmers wore knee high boots of heavy cowhide leather. A century ago New England manufacturers made many ((stogas® or coarse brogans, for the slaves of the South. In pioneer towns it was a not un¬ common practice for a thrifty farmer and his family to walk barefooted to town, carrying their shoes in their hands, and stop at the edge of the town to put on their shoes, and then walk in them to church. In grandmothers' time, serge Congress boots were common. They had uppers of cloth, with elastic gorings in the sides. Men wore Congress shoes, too. Chil¬ dren's shoes were crude. In shoemaking fami¬ lies, father's old boots were cut apart and were made over into shoes for the children. As the production of shoes multiplied, and the wealth of the people increased, a greater variety of shoes was produced, and people had at their command work shoes, dress shoes, dancing slippers, comfort shoes, fireside slippers, storm boots, fishing boots, baseball shoes, nurses' shoes and other kinds. Indeed, there is now a

special kind of shoe for almost every employ¬ ment or pastime.

Toward the close of the last century, a fashion of

As standards of shoes have advanced through improvements in manufacture, there has also been improvement in the methods of taking care of shoes. The business of making shoe blackings is extensive. The business of black¬ ing shoes is larger to-day than was the busi¬ ness of making shoes a century ago. Also, ma¬ chinery for repairing shoes has been developed, and the modern repair shop established in every neighborhood. Now, according to estimates, 100,000,000 pairs of shoes are repaired annually, and the repairing business totals to $300,000,000 annually.

Rubber. — Rubber footwear is comparatively modern. Early colonists wore snow shoes, or clogs and pattens, the latter being wooden soles which were

strapped to the feet, over the regu¬ lar shoes. The first rubber shoes, which appeared about a century ago, were called <(gum shoes.® They were made of pure rubber. They froze and cracked in cold weather, and they melted and stuck together in hot weather. It was not until Goodyear discovered his process of vul¬ canizing rubber that rubber footwear became practicable. The making of rubber footwear flourishes in Massachusetts, Rhode Island and Connecticut. Besides making storm footwear, commonly called ((rubbers,® the rubber shoe companies produce millions of pairs of sport and street shoes, called <(sneakers.® Rubber heels are made by the millions and during the last few years, the manufacture and wear of soles of rubber and fibre has increased rapidly. See Boots and Shoes ; Leather, Manufac¬ ture and Uses of; Leather and Shoe-Trade Technical Terms.

Fred A. Gannon.

SHOEMAKER, Michael Myers, Ameri¬ can author and traveler : b. Covington, Ky., 26 June 1853. He studied at Cornell University and since 1874 has traveled extensively over the greater part of the world, making special anthropological studies. He has published (Eastward to the Land of the Morning) (1893) ; kingdom of the White Woman) (1894); (Sealed Provinces of the Tsar5 (1895) ; (Quaint Corners of Ancient Empires5 (1899) ; (Palaces and Prisons of Mary, Queen of Scots5 (1901) ; (The Great Siberian Railway5 (1903) ; (Heart of the Orient5 (1904) ; (Winged Wheels in F ranee5 (1906) ; (Wanderings in Ireland5 and Uslam Lands5 (1910) ; (Indian Pages and Pic¬ tures5 (1912), etc.

SHOGUN, sho-goon, the highest officer in the Japanese government during the con¬ tinuance of the feudal system. He was orig¬ inally a purely military official, commander- in-chief of the army and first vassal to the emperor. The office became hereditary, and the Shoguns gradually acquired nearly all the real powers of government, leaving only the

title of royalty to the emperor. The latter re¬ sided at Kioto while the Shogun held court at Yedo (Tokio) whence he ruled in the em¬ peror's name as his major-domo. The shogunate was abolished in 1868. See Japan, History.

SHOLOM ALEICHEM. See Rabinowitz, Solomon.

SHONTS, Theodore Perry, American rail¬ road official: b. Crawford County, Pa., 5 May 1856; d. New York, 21 Sept. 1919. He was graduated at Monmouth College in 1876 and for a time practised law, but soon

became interested in railroad construction. He was in charge of the construction of part of the Iowa Central Railroad and afterward built and was controlling owner of the Missouri, Iowa and Nebraska Railroad. He also gained con¬ trol of the Toledo, Saint Louis and Western Railroad. In 1905-07 he was chairman of the Isthmian Canal Commission, to which post he was appointed by President Roosevelt. He was president of the Interborough Metropoli¬ tan Railroad of New York 1907-19, and president and director in many important rail¬ road and trust companies.

SHOOTER ISLAND, an island in New¬ ark Bay, separated by a narrow channel from Staten Island, N. Y., one mile east of Eliza¬ beth, N. J. It is chiefly noted for its large shipbuilding plant.

SHOOTING STARS, are small bodies that enter the earth's atmosphere from without and, being intensely heated by impact with the air, are consumed before reaching the ground. They ' probably vary greatly in size, but it is believed that the vast majority do not exceed a few grains in weight. A few may be seen on any clear night, and the number entering the atmosphere every 24 hours has been esti¬ mated by Professor Newton at not less than 15,000,000. Most of them are no brighter than ordinary stars, but some rival the brightest planets in luminosity. They seem to leave shin¬ ing trails behind them, which are perhaps sometimes due to persistence of vision. But the larger ones, resembling brilliant fireballs, leave trails which sometimes remain visible for many minutes. Besides the true shooting stars there are certain massive, meteoric bodies which sometimes reach the earth's surface; these are called meteorites and will be found described under a separate heading. (See Meteorites).

Shooting stars before encountering the earth are invisible to us, traveling in their own orbits about the sun. The moment they strike the atmosphere their kinetic energy begins to be transformed into heat, and they become visible at an elevation of from 75 to 100 miles, where the air is more rarefied than under the exhausted receiver of an air-pump. This rare¬ faction of the upper air does not, however, save them from the effects of their impact with the atmospheric molecules. Sir William Thomson (Lord Kelvin) has shown that the effect of the friction of the air upon a particle is the same as if the latter was enveloped in a blowpipe flame having a temperature of many thousands of degrees, and the degree of temperature thus developed does not depend upon the den¬ sity of the medium, but is as great in rare as in dense air. Under these circumstances small particles may be consumed in a fraction of a second. Even if shooting stars, instead of mov¬

ing independently about the sun, stood fast in space to be encountered by the earth in its annual flight round the sun, their fate would be similar, for

the velocity of the earth in its orbit is nearly 19 miles per second, and Pro¬ fessor Newcomb has pointed out that the rise of temperature produced by the impact of our atmosphere with a meteoroid at rest would be nearly 600,000 degrees! But before such a degree of temperature is actually attained the shooting star, even though composed of the most solid metal, must be burned up or volatil¬ ized with an immense evolution of light and heat. This accounts for the visibility, at the height of 50 to 100 miles, of particles whose mass may not exceed a single grain.

The height of a bright shooting star may be ascertained by comparing observations of its apparent track among the stars made simul¬ taneously from two points on the earth's sur¬ face, a number of miles apart. Each observer sees it projected in a different direction, and the fixity of the star-marked background of the sky across which it moves affords the means of determining the angle between the lines of sight of the two observers. This gives the parallax, and, the length of the base line be¬ tween the observers being known, its distance and elevation can thence be calculated. It is probable that all shooting stars are entirely consumed by the time they have descended to within 40 or 50 miles of the earth's surface; it cannot be doubted, however, that after floating in the air for perhaps a very long time in the form of impalpable dust, their material finally settles down and comes to rest upon the earth. But the quantity of this is so minute that it would be hopeless to search for it upon ihe soil and lands of the earth. Nordenskiold, by melting many tons of polar snows and filtering the water, found a residuum of minute globules of oxide and sulphide of iron, and similar particles have been found by dredg¬ ing at great depths in the sea. Altogether it is certain that the mass of our earth is being continually increased in this way, but its growth is excessively slow. If we assume that 20,000,- 000 shooting stars fall daily (probably a rea¬ sonable estimate), and that the average weight is one-fourth of an ounce, a simple computa¬ tion shows that there will be thus added to our earth no less than 50,000 tons in each year. At this rate some 800,000,000 years will be re¬ quired for the deposition of a layer one inch in thickness over the entire earth's surface. It is an important astronomical consideration that this must diminish the rate of rotation of the earth and thus produce a secular length¬ ening of the day. The action of the tides also tends to lengthen our fundamental unit of time, while the slow shrinking of the earth shortens it; whether the combined effect of all causes is an actual quickening or a slackening of the earth's rotation we do not know. No method of investigation yet devised has been sufficiently refined to detect any change during historic time.

In addition to the sporadic shooting stars which may be seen on any dark night, darting in various directions across the heavens, these bodies occasionally appear in showers, when the sky seems to be filled with flying

sparks of fire all radiating from some fixed point among the constellations. These showers are caused by

the earth encountering streams of particles trav¬ eling in elliptical orbits about the sun.

Scientific study of the orbits of shooting stars began after the occurrence of the most brilliant meteoric- shower on record, that of 13 Nov. 1833. This spectacle, which excited the greatest interest among all beholders and was looked upon with consternation by the ignorant, many of whom thought that the end of the world had come, was witnessed generally throughout North America, which happened to be the part of the earth then facing the meteoric storm. Hundreds of thousands of shooting stars fell in the course of two or three hours. Some observers compared their number to the flakes of a snowstorm, or to the raindrops in a shower. The more observant spectators noticed that all the meteors appeared to radiate from a fixed point in the constellation Leo. Tracing their trails backward it was seen that they came together at that point, like the ribs of an opened umbrella meeting about its central stick. This peculiarity is now known to char¬ acterize all showers, although when the number of shooting stars is not very great the ribbed appearance produced by the convergence of their trails around the starting point is not so conspicuous. The common centre from which they appear to radiate is called the radiant point, and the determination of its exact loca¬ tion among the stars is of the first importance in ascertaining the actual path of the particles in space outside the earth. A considerable num¬ ber of such radiant points are now known, each different swarm whose orbit happens to inter¬ sect the orbit of the earth having its own radiant, the position of which depends upon the situation of its orbit with reference to the earth.

The explanation of the radiant point de¬ pends simply on the laws of perspective. The particles are traveling in parallel paths in a broad cylindrical column, which may envelop the whole earth. When they become visible by striking the air, the observer, looking in the direction from which they approach, sees those that are coming straight toward him as bright points, which grow rapidly larger and then sud¬ denly disappear when they are consumed. Others which, if they reached the earth, would strike to the right or left, or in front of or be¬ hind him, appear to diverge in all directions. The same effect is visible when snowflakes are falling vertically on a calm day. Looking straight upward in the midst of the shower of flakes the observer sees them apparently diverg¬ ing toward every point of

the compass, with the exception of the few that fall straight into his eyes.

Immediately after the great display of 1833 Prof. Denison Olmsted of Yale College announced that what had occurred was an encounter by the earth with a vast swarm of particles moving around the sun. The probability that such an encounter was a recurrent phenom¬ enon suggested itself. It was also observed that there were other, less brilliant, showers at different times of the year, notably the annual display on 10 August, having its radiant point in the constellation Perseus. George Adolf Erman, a German physicist and mathematician, about 1839, clearly showed how the orbits of the swarms causing such showers could be determined, but it was not until Prof. Hubert

A. Newton of Yale College took up the inquiry in 1864 that the final solution of the problem was begun. Professor Newton, by a careful dis¬ cussion of ancient records, demonstrated that ever since the 10th century of our era there had been recurrent showers in the autumn at an average interval of 33% years. Sometimes the interval was 34 years and sometimes only 32 years, or less, but the mean was 33%. Upon this basis a return of the shower was predicted for 1866 or 1867.

There had been a gradual change in the date of the showers, which, beginning with 13 October in the year 902, had become 13 No¬ vember in 1833, but this could be accounted for by planetary attractions shifting the position of the orbit so that its point of intersection with the orbit of the earth moved forward along the latter about a degree and a half in a century.

It had also been observed that usually there was a considerable display a year before or a year after the principal shower. The evident explanation of this was that, instead of being concentrated at one point on their orbit, the particles were strung along in a column of sufficient length to occupy at least two years in crossing the point of intersection with the path of the earth, so that the latter after meet¬ ing them once could complete its annual cir¬ cuit and arrive again at the crossing place be¬ fore the whole column had passed.

The question remained, what was the length of the orbit of the shooting-star particles or how long a time did they require to make a single journey round the sun and return to their meeting place with the earth? Professor Newton's computations showed that there were five different orbits, any one of which would be consistent with the observed facts. The test by which the real orbit could be selected from the five possible orbits depended on the per¬ turbing action of the planets, already referred to, and the application of this test would re¬ quire long and laborious mathematical work.

Before this work had been done a pre¬ dicted return of the phenomenon occurred, with a notable shower in November 1866, fol¬ lowed by a second display the next year. On neither occasion was the spectacle equal to that of 1833. Prof. John Couch Adams of Cambridge University, England, now took up the work of Gomputing the planetary perturba¬ tions, and he showed that the period of 33% .years must be the true one because it alone satisfied all the conditions of the problem. This period, it will be seen, corresponds exactly with the mean interval between the showers. The orbit is a long ellipse, its inner end being a little nearer the sun than the earth is, its outer end beyond the orbit of Uranus.

The period and orbit of the November shooting stars having thus been determined, their next return, in 1899 or 1900, was eagerly awaited. Before the time arrived, however, astronomers had begun to foresee the prob¬ ability of a disappointment. Dr. G. Johnstone Stoney and Mr. A. M. Downing had cal¬ culated the perturbative effect of Jupiter and Saturn upon the swarm, the action of these planets having been particularly effective after 1867, and had pointed out that the result must have been a swerving inward of the orbit of the swarm, so that it could no longer intersect

the earth's orbit at the old meeting point. The event justified these calculations, for, although a considerable number of shooting stars were seen in 1899 and 1900, there was no such dis¬ play as would have occurred had the earth plunged through the main stream.

The orbit of the August shooting stars or Perseids was also calculated, and this was found to be a still larger ellipse, extending at its most distant point far beyond the orbit of Neptune. In this case the showers occur an¬ nually, every time the earth crosses the orbit. This is due, as Erman showed, to the particles having become spread entirely around their orbit in a closed ring, Sto that they are con¬ tinually passing the point of intersection with the orbit of the earth. A few of the November shooting stars are seen nearly every year, showing that some of them also have been scattered along the entire circuit of the orbit, although the greater number, in this case, are still collected in a swarm, confined to a rela¬ tively small part, one-tenth or one-fifteenth, of the entire length of the orbit.

The next step was the discovery of an inti¬ mate relationship between shooting stars and comets. In 1867 Giovanni Schiaparelli of Milan showed that the August swarm travels in the

nature. A comet known as Biela's, which had split in two in 1846, failed to return when due in 1872, but on the night of 27 November of that year, when the earth was passing close to the orbit of the missing comet, a new and brilliant shower, with its radiant point in Andromeda, made its appearance. This was seen again in 1885 and 1892. The orbit coincides with that of the lost comet of Biela. The interval between the displays is seven years, but owing to planetary perturbation the date of appear¬ ance in 1892 had fallen back from 27 Novem¬ ber to 23 November. They were not seen in

1899.

About a hundred shooting-star swarms have now been recognized, most of them furnishing very inconspicuous displays, and at least half a dozen of these have been shown to travel in the paths of comets. In the table below are given the elements of the orbits of the three greatest swarms known to be connected with comets, compared with the elements of the orbits of the comets concerned.

Following is a list of the principal showers with the positions of their radiant points and the dates of their maximum displays. The names are derived from the constellations in which the radiants are situated:

Principal Shooting-Star Showers.

NAME

Quadrantids. . . Lyrids ……..

Eta Aquarids. . Delta Aquarids

Perseids .

Orionids .

Leonids .

Andromids …. Geminids, .

Radiant

Maximum

Motion and train

Right

Declen-

ascension

‘sion

15 H.t 19 M.

N.

53°

Jan.

2

Swift; long paths.

17

59

N.

33°

April

20

Swift.

22

30

S.

2°

May

2

Swift; streaks.

22

38

S.

11°

July

28

Slow; long.

3

4

N.

57°

Aug.

10

Swift; streaks.

6

8

N.

15°

Oct.

19

Swift; streaks.

10

0

N.

23°

Nov.

15

Swift; streaks.

1

41

N.

43°

Nov.

19

Very slow; trains.

7

12

N.

33°

Dec,

12

Swift; short.

same path as that of a bright comet known as Tuttle's, which was discovered in 1862. Shortly after this announcement, and while it was still under discussion, Leverrier published a revised orbit of the November, or Leonid, swarm and almost simultaneously Oppolzer published an or¬ bit of Tempel's comet, which had appeared in 1866. Examination showed that these two orbits were practically identical, thus seconding Schia¬ parelli's conclusion with regard to the August shooting stars by furnishing proof that the No¬ vember swarms also traveled in a comet's track. In 1872 there came a third discovery of the same

These showers occur annually and some of them continue for several nights in succession, the position of the radiant slowly shifting in the meantime with the change in the direction of the earth's motion in its orbit. The

Perseids last for no less than five weeks.

Some have supposed that all known swarms are composed of the scattered debris of comets which have been broken up by the tide-pro¬ ducing action of the sun, but this is not yet certain. The amount of disintegration suf¬ fered by a comet depends upon the number of its trips round the sun, so that the longer it

Elements of Orbits of Three Greatest Shooting-Star Swarms.

ELEMENTS

Perseids

Tuttle's

Comet

Leonids

Tempel's

Comet

Andromids

Biela's Comet

Longitude of node .

Inclination of orbit .

Longitude of perihelion . Perihelion distance …. Direction of motion ….

138° 16′

64° 3′

343° 38′

0.9643

retrograde

137° 27′

66° 25′

344° 41′

0.9626

retrograde

231° 28′

16° 46′

57° 33′

0.9047

retrograde

231° 26′

17° 18′

60° 28′

0.9054

retrograde

246° 0′

12° 0′

110° V

0.8472

direct

246° 0′

12° 33′ 109° 25′

0.8606

direct

SHORE — SHORE LINE

745

has revolved in an orbit having a short peri¬ helion distance the more widely its particles may be scattered along its track. Since the Leonids still form a somewhat compact swarm, while the Perseids are scattered in a complete ring, it has been assumed that the former are later comers in the solar system (or at least later comers into the near neighborhood of the sun) than the Perseids. Leverrier tried to fix the date of their first appearance by show¬ ing that Tempebs comet, with which the Leonids are related, must have suffered pertur¬ bations from a near approach to the planet Uranus in the year 126 a.d., which may have changed its orbit from a very large ellipse, having a perihelion point almost as distant as the orbit of Jupiter, to a smaller ellipse cor¬ responding with the present path pursued by the comet and the particles of the November swarm.

Eric Doolittle,

Director Flower Astronomical Observatory,

University of Pennsylvania.

SHORE, Jane, mistress of Edward IV : b. London; d. there, 1527. She was remarkable for her beauty and cultivated mind. Her in¬ fluence with Edward was never exercised but for the benefit of others. (See Edward IV). Richard III, partly to revive among the citi¬ zens the memory of the licentiousness of his brother, whom he accused of being ((the chief abettor of that witch Shore,® determined to expose her to public ignominy by accusing her of witchcraft. He was unable to effect his pur¬ pose but directed her to be tried for adultery by the Spiritual Court, which condemned her to do public penance in a white shift at Saint Paul's. She was reduced to poverty, and ap¬ pears to have died in 1526 or 1527. Her story appears in literature in Shakespeare's (Richard IIP ; in a tragedy (Jane Shore, by Rowe, in many old English ballads, and it has been in¬ troduced upon the French stage.*

SHORE-BIRDS, the sportsman's name for that large group of limicoline birds, as plover, sandpipers, curlew, phalarope, oyster-catcher, etc. (qq.v.), which are to be found along the beaches of the sea or other large bodies of water, where they seek their food at the edge of the waves. Shore-bird shooting is an amuse¬ ment of the autumn and early spring, when these birds are migrating between the South and the far northern breeding-places to which most of them resort in summer, and is usually carried on by the aid of stationary decoys, and calls for skill and patience. Consult Coues, E., (Birds of the NorthwesP (Washington 1874) ; Elliott, D. G., (North American Shore Birds (New York 1898) ; Job, H. K., (Among the Water FowP (New York 1902) ; Seebohm, Geographical Distribution of the Family Charadriidae) (London 1887).*

SHORE-LARK, a small bird (Otocoris alpestris), a native of the north of America, Europe and Asia. Within the United States it is found in winter as far south as North Caro¬ lina and Illinois. The adult male is about seven inches long; in summer, lores, cheeks, gorget and band on top of head, ending in erectile tufts, black ; nape, mantle and upper tail coverts pinkish-brown, white beneath. The eastern or typical shore-lark breeds along the northern

border of the United States and in British America. In winter it migrates southward in flocks, which frequent open fields and the sea¬ side meadows. In the western and interior parts of the United States numerous distinct varie¬ ties occur, some of which breed in the moun¬ tains within our borders. They range as far south as Texas and Mexico. The shore-larks are closely related to the famous skylark of Europe. They nest in a depression in the ground and lay four or five eggs — French white, mottled with dull olive-green or yellow¬ ish-brown, but very variable. Nesting begins very early in the spring and several broods may be raised.

SHORE LINE, the dividing line between land and water in rivers, lakes or oceans. Shore lines are continually being modified by wave work, especially on the larger bodies of water. Waves strike blows averaging several hundred pounds per square foot and, armed with sand and gravel, are powerful agents of erosion. They undermine cliffs and carve out sea caves. In many places, especially along the chalk cliffs of England and France, where the rocks are soft, Goasts are worn back at an average rate of several feet a year. The is¬ land of Heligoland, which in the year 800 a.d. had a circumference of 120 miles, to-day has a circumference of only three miles, and would probably be worn completely away, were it not for artificial protection.

The material thus worn away builds beaches. Where the debris is coarse, bowlder or shingle beaches result ; where finer, sand beaches are formed. Much sand is drifted parallel to the coast line by shore or littoral currents (q.v), and where it drifts past some bend in the coast, the beach is prolonged into a spit extend¬ ing past the bend out into deep water. Due to the constant action of waves and tides the ends of spits are often curved into hooks, as at Sandy Hook. If a spit or hook grows out so that it connects an island to the mainland, a tied-island results. On low, flat, gently sloping coasts, the waves break some distance from shore. At this point sand is heaped up by the action of waves and undertow, and an off¬ shore or barrier beach is formed. Between it and the mainland is a lagoon or salt marsh, which gradually fills with decaying vegetation and wash from the land, and here peat (q.v.) beds are often formed. Off the mouths of large rivers, deltas (q.v.) are built extensive mud flats or tidal flats occur.

Shore lines are profoundly modified by changes of level. Because the ocean bottom is smooth, the uplift forms long straight coasts, known as coasts of emergence. Along such coasts abandoned beaches and wave-cut cliffs may be seen well above water-level, testifying to recent uplift. Such beaches are numerous on the coast of California. When lakes are drained or dry up, such abandoned beaches are also common, as around the old shore line of Great Salt Lake (q.v.). On the other hand, when a coast sinks, or is drowned or sub¬ merged as it is usually called, the sea enters the river valleys, forming long, narrow and often branching bays, like Chesapeake Bay. The tops of former hills may become offshore islands, as has happened at many points along the coast of Maine. Drowned shores afford the best har-

hors. The famous Inside Passage to Alaska is the result of deep drowning of a very moun¬ tainous coast. See Ocean; Lake; and the sections on Oceans, Lakes and Diastrophism in the article on Geology.

SHOREDITCH, .England, a metropolitan and Parliamentary borough of London, directly north of the city. Area, 658 acres. The dis¬ trict is an extremely poor and crowded (one, in which cabinet-making and chain-making are among the principal industries. The borough returns two members to the House of Com¬ mons. Pop. about 111,390. Consult Ellis, (History and Antiquities of the Parish of St. Leonard Shoreditch and Liberty of Norton Folgate> (1798).

SHORE Y, short, Paul, American educa¬ tor ; • b. Davenport, Iowa, 3 Aug. 1857. He was graduated from Harvard University in 1878, and was admitted to the Chicago bar in 1880. He was professor of Greek at Bryn Mawr Col¬ lege 1885-92, resigning in the latter year to fill a similar chair at the University of Chicago. He was professor in the American School of Classical Studies at Athens 1901-02, and was appointed by Columbia University Roosevelt professor in the University of Berlin 1913-14. He was managing editor of, and a contributor to, Classical Philology from 1908. He published Ne Platonis Idearum Doctrina> (1884) ; (The Idea of Good in Plato's Republic (1895) ; (The Odes and Epodes of Horace) (1898; re¬ vised ed. with Laing, 1910).

SHORT BALLOT. See Ballot.

SHORT-CIRCUIT. See Electrical Terms.

SHORT-EARED OWL, a small, nearly cosmopolitan owl (Asio

accipitrinus) , so called because its ear-tufts are inconspicuous as com¬ pared with those of its relative, the long-eared owl (A . wits onianus) . It is buffy, whitish, striped with dark brown, and 15 inches in total length. Its habits are those

SHORT LOAN AND COMMERCIAL BILLS. See Banks and Banking — Inter¬ national Banking.

SHORTER, Clement King, English edi¬ tor: b. London, 19 July 1857. He was in the Civil Service from 1877 to 1890, when he began editorial work and became editor of the Illus¬ trated London News from 1891 to 1900; founded The Sketch (1893) for the same com¬ pany and edited it for seven years; also during the same period editing the English Illustrated Magazine. After 1900 he became editor of The Sphere. Outside his editorial work his Bronte studies are notable contributions to Eng¬ lish literature and include (Charlotte Bronte and her Circle> (1896) ; Charlotte Bronte and her Sisters) (1905); (The Brontes: Life and Letters) (2 vols., 1907) ; among his other works are (Sixty Years of Victorian Literature) (1897); Ummortal Memories5 (1907); Napo¬ leon in his own Defence5 (1910) ; (George Borrow and his Circle5 (1913), etc.

SHORTER CATECHISM, a catechism extensively used by English-speaking Presby¬ terians throughout the world, and which was framed during the time of the English Com¬ monwealth. A committee of assembly was ap¬

pointed 5 Aug. 1847 to prepare the Shorter Catechism, which was presented to the English Parliament 26 November, that year, and was ordered to be printed by vote of Parliament, 16 April 1648. The Scotch general assembly adopted the catechism 16 July 1648, and the Scotch Parliament the following February rati¬ fied this action. See Cathechism.

SHORTHAND has often been defined as the art of writing as fast as a man speaks. The Standard Dictionary definition is better : Shorthand — any system of handwriting that reduces the number of muscular movements required to present words and sentences in graphic outline . . . opposed to longhand.

The former definition applies with accuracy only to the most highly developed phase of shorthand — verbatim reporting — applies with much less force to the enormously larger field of business office stenography and ignores the largest and most important potential field of shorthand — shorthand for general personal (non-professional) use.

Four Principal Characteristics. — The short¬ ness of shorthand as compared with longhand is due to four principal factors:

1. Shorthand writes by sound, ignoring the eccentricities of common spelling. This feature alone would, even though each letter of short¬ hand averaged as long as the letters of long- hand, save 15 per cent of time and effort directly, by eliminating superfluous letters, and still more indirectly, by eliminating the mental hesitation involved in following the inconsist¬ encies of common spelling.

2. Shorthand uses for its basic alphabet the simplest signs which its inventor can devise or adapt — seldom averaging more than 1.1 strokes per letter, as compared with about four strokes per letter for longhand as usually analyzed. This feature alone does not, as might first appear, save as much as 75 per cent of. the labor of writing, for the letters of longhand are so devised as to join with each other in any order with no appreciable modification of form, direction or position relative to the line of writ¬ ing — a condition conducive to the highest speed of automatic action and impossible to duplicate fully in any shorthand.

3. Shorthand, by various devices such as the position of strokes relative to the line of writ¬ ing or to each other, or modifications of length or shading, or initial or final circles, hooks or loops, known as appendages, gives to a single stroke a multiple significance, so that in Pit- manic shorthand, for example, the sign ex¬ presses or implies by logically related rules every one of the six consonants of the word sprints in their proper order.

4. Shorthand abbreviates words or phrases much as in longhand, expressing or implying only so many of the sounds as will serve to identify the words written. This is carried to a high degree requiring careful memorization in certain forms for common words, known as wordsigns, and is sometimes carried still further by arbitrary or exceptional use of dots or ticks for particular words, such outlines being known as arbitraries.

Number of Systems. — In the absence of fixed standards of measurement or clear deter¬ mination of fundamental principles (see Short¬ hand, Science of) more than a thousand dif-

ferent systems of shorthand have been pub¬ lished for English alone — a confusion unpar¬ alleled since Babel. Fortunately at least nine- tenths of these are of historic interest only to¬ day, while the remainder may be grouped in a comparatively few more or less well-defined classes

Three Distinct Styles. — No intelligent answer can be given to the first question of the layman : ((Which is the best system of short¬ hand?®

without recognizing that there are three distinct broadly marked fields of shorthand use which may be designated as reporting, business and personal — related, to be sure, but each with its own peculiar problems.

A reporting style of shorthand must use all practicable shorthand devices to their fullest extent with effective (legible) speed, the para¬ mount consideration, attaining a speed from 150 words per minute up to the highest yet achieved, between 280 and 300 words per min¬ ute. Such a style will be used for court report¬ ing, legislative reporting, speeches, conventions and in general all verbatim reporting pur¬ poses, where the speaker ignores the reporter. Mastery of a reporting style requires long and arduous professional training extending over a period of several years, and commands rewards proportionate to the effort required. The most competent estimates place the total number of verbatim reporters in the United States under

5,000.

A business style of shorthand must use abbreviating devices to some extent but must maintain positive legibility and reasonable sim¬ plicity even at the expense of speed, attaining speeds from 90 to 150 words per minute. Such a style will be used chiefly for business office dictation of correspondence, numerically much the largest field of shorthand to-day. Reason¬ able mastery of a business style is afforded by the average six months' business school course involving about 300 hours' study. Though the 1910 census shows only about 330,000 profes¬ sional users of shorthand or typewriting, there are undoubtedly to-day (1919) at least 500,000 stenographers or business style shorthand writ¬ ers in the United States.

A personal style of shorthand must make phonetic correctness and completeness and sim¬ plicity the paramount considerations, attaining speeds from 60 to 100 words per minute. Such a style will be used for personal correspond¬ ence, by professional writers or speakers for original composition, for lecture notes, ab¬ stracts, memoranda and potentially for all purposes of longhand. No system not particu¬ larly designed for such personal style use can be mastered to the point of even 60 words per minute speed in less than 100 hours by the aver¬ age student. Considering the enormous poten¬ tial value of shorthand for general personal use — the goal and vision of shorthand inven¬ tors for centuries — the number of personal style, non-professional, shorthand writers is pitifully small — a condition for which the futile effort to make business style and report¬ ing style shorthand systems serve this distinc¬ tive field is chiefly responsible. Each of these three styles has its own problems and its own field, and in each field at the present time a fundamentally different type of system is most prominent,

Reporting. — In the reporting field to-day Pitmanic shorthand is dominant, despite the most strenuous efforts of competing systems of other types. A recent census of the National Shorthand Reporters' Association indicates that 91 per cent of its membership write some form of Pitmanic shorthand.

Business. — In the business field an en¬ tirely different type of system, often miscalled "script® shorthand, of which the principal American representative is Gregg shorthand, has recently achieved a marked predominance. A recent questionnaire sent out by the National Educational Association to over 11,000 schools, and eliciting over 3,000 replies, indicates that 67 per' cent of all schools, public or private, teaching shorthand (which in at least 99 per cent of all cases means business style short¬ hand) are teaching Gregg shorthand.

Personal. — In the personal style field no accurate statistics are possible, largely owing to the lack of true personal style systems The nearest approach to a distinctive and rational personal style system in the past was Lindsley's Takigrafy, which attained con¬ siderable prominence during the last one-third of the 19th century, but has to-day largely dis¬ appeared. The only system alive to-day particu¬ larly designed to meet the exacting but little understood requirements of general personal use, in accord with the science of shorthand, is Personal Shorthand (Dewey), which is still too new to justify further comment at this time.

Pitmanic Shorthand Characteristics. — All Pitmanic shorthand is based on the original invention and subsequent modifications of Sir Isaac Pitman (1813-97), justly styled the father of modern shorthand. The distinctive characteristics of all Pitmanic systems include (see also comparative alphabets and specimens following) :

(1) Detached vowel-group signs which are distinguished by the position in which they are written relative to the consonant stems. (2) A primary consonant alphabet of 24 stems, of which 21 are alike in all Pitmanic systems, composed of straight lines and circular curves, written on four different slopes and of two thicknesses (shading), but of one uniform length. (3) A secondary consonant alphabet of appendages, circles, hooks and loops, used under various conditions for alternative expres¬ sion of the more common consonants, supple¬ mented by further devices such as writing con¬ sonant stems one-half or double their normal length to imply other additional consonants, or writing outlines above, on or below the nor¬ mal line of writing to indicate that an omitted vowel is one of a particular group.

Pitmanic Variations. — Of the many variant forms of Pitmanic shorthand which have been published, the Benn Pitman, Graham, Isaac Pit¬ man and

Munson are the most important in the United States, ranking in that order of numer¬ ical strength. In Great Britain, under more stringent copyright protection, the parent Isaac Pitman system is dominant, but in this country it is altogether secondary to the dominant Benn Pitman and closely related Graham.

The principal differences between the lead¬ ing Pitmanic systems are: (1) Three conso-

nants, w y h, which are written : Benn Pitman, Graham (S' , Isaac Pitman S' S'h

Munson f ˆ (2) The relative positions

of two pair of the dot vowels which are written

Benn Pitman,

'1

**1*

.1 .1

Graham,

1

i

i

a a

Isaac Pitman, Munson,

•|

1

.1 J

a

a

i I

(3) Various minor details, especially with re¬ gard to the writing of small and large hooks on consonant stems.

Gregg Shorthand Characteristics. — The

distinctive characteristics of Gregg shorthand include: (1) Joined vowel-group signs which are distinguished by detached diacritic marks ;

(2) A consonant alphabet composed of straight lines and elliptic curves, written on only two slopes and of only one thickness (non-shading) ; but of three lengths. (3) Conspicuous absence of those compound consonant devices which add complication on the one hand and power on the other in Pitmanic shorthand.

Personal Shorthand Characteristics. — The distinctive characteristics of personal shorthand include: (1) Joined vowel signs explicit with¬ out further distinction ; (2) a consonant alpha¬ bet of straight lines and curves, written on four slopes, of two thicknesses (shading), and of one length; (3) compound consonant signs de¬ signed and used primarily for the true conso¬ nant compounds of English, especially those which occur before the vowel of their syllable.

Comparative Alphabets. — The table follow¬ ing gives the basic alphabets of the three sys¬ tems reviewed as most representative of the three styles of shorthand to be distinguished. The sounds of the shorthand signs are keyed by the N E A alphabet (see Phonetics), used as Key 1 of the New Standard Dictionary and its abridgments, the only phonetic key suitable for general popular use in English. (1) Benn Pitman Phonography; (2) Gregg Shorthand;*

(3) Personal Shorthand.

1

\ \

i

i

2

r r

/

.. _ ”

3

i i

-

\

\

P b

t

d

k

g

1

(

<

)

)

J J

/

/

2

>)

r >

/ < ■ j-

t)

A A

/ A

/ /

!

3

i)

f

(

V. V.

£ v

h

d

s

z

S 3

•

J

r D f s

2

3

1

2

3

.1

0

V

a

r / y

m r 1

e

w y

O ° 0 o o

• • / «

*V <■ C – r**

a e § i I

1

2

§

J J

• n

• /

u Q

a 1 1 J J

*2 o * f $*

*3 v r “ k **

d e ii ai

Comparative Specimens. — The specimens following give a familiar selection, the Lord’s Prayer (Matt, vi, 9-13), in the reporting style of Benn

Pitman Phonography, the busi¬ ness style of Gregg Shorthand, and the per¬ sonal style of Personal Shorthand.

Benn Pitman Phonography reporting style

___ „ 4 rv, L

.

Gregg Shorthand business style

C

Personal Shorthand personal style

ˆIU.

v. iJ\ — „ , 4,

*• * ‘ — ‘ 5 N —■ • t — r. S*

T l_ . – PS ˆ ˆ

l> =

. lˆ- . S ‘) V , —

The best system of shorthand or the best style of a particular system is that style or system which best meets the requirements of the writer. The shortness and complexity of

**The type actually used to key the shorthand alphabets below is a simplification of the N E A alphabet by ths author in harmony with shorthand practice,*

SHORTHAND, HISTORY OF

749

a true reporting style is altogether unsuitable for general personal use. The simplicity and fulness of a true personal style is altogether impossible for reporting practice. The unsuit¬ ability of a business style for reporting or personal use differs nowise in kind but only in degree.

Godfrey Dewey,

New York State Shorthand Reporters’ Asso¬ ciation.

SHORTHAND, History of. The early history of this art is closely allied with palaeog¬ raphy, and it has been traced into the mists of antiquity. Antiquarians have tried to connect it with hieroglyphics and to show that it was used more than 1,000 years before Christ by the Persians, Egyptians and Hebrews. Abbre¬ viated writing, to take down lectures and also for the preservation of poems recited at the Pythean, Nemean and Olympic games, was practised by the early Greeks, and there are specimens of ancient Greek notce, or shorthand, in the Vatican Library, at Rome, the Biblio-theque Nationale, at Paris, and the British Museum.

Ancient History. — The definite existence of shorthand reporting dates in the century pre¬ ceding the Christian era. Tiro, the accom¬ plished freedman and amanuensis of Cicero, was in 63 b.c. the first known practitioner of the art. He reported speeches of his master, which were afterward revised by the orator; and as notce Tironiance became the established name for shorthand writing its invention was subsequently ascribed to him. At that period Rome was drawing from Greece her stores of learning and art, and Tiro's system was prob¬ ably an adaptation from the Greek. Plutarch informs us in his life of Cato the Younger that Cicero distributed notarii (shorthand reporters) in various parts of the Senate House on the occasion of the vote as to the fate of Catiline, the chief purpose being to take down the speeches of Caesar and Cato. The text of those speeches may be given by Sallust in his history of the Catilinian conspiracy, chapters 51-53, or the historian may have followed the example of Thucydides and embodied in them his con¬ ception of the character and policy of the two foremost senators. Maecenas, the famous statesman, courtier and patron of literature, introduced some improvements in shorthand, and, according to Dion Cassius, instructed many in the art through his freedman Aquila. Sen¬ eca afterward increased the number of nota¬ tions to a total of 5,000. Scalinger made a col¬ lection of the notes of Tiro, Seneca and others, which is appended to the great work of Janus Gruterus, published at Heidelberg, in 1603.

An illustrious German scholar, Ulrich, in 1817 analyzed the Tironian notes and his analy¬ sis shows that Roman shorthand, though a strain on the memory, answered the practical purposes of stenography quite as well as the systems in vogue in the early part of the 19th century, such, for example, as the one sketched by Charles Dickens from his own experience in the 38th chapter of (David CopperfieldP We are informed by Suetonius that the Emperor Augustus taught the art to his grandchildren and that the Emperor Titus was a skilful stenographer. Martial, who lived in the time of Nero, has left an epigram upon a shorthand

writer: Currant verba licet , manus est velocior illis. Among ancient papyri discovered 100 miles south of Cairo in 1903 by Professors Grenfell and

Hunt, there is a contract with a writer of tachygraphy, made 137 a.b., whereby a slave boy was to be taught shorthand for 120 drachmae ($24) ; 40 drachmae were to be paid down, 40 more on satisfactory evidence of the progress of the boy and the last 40 when he had become proficient.

Shorthand seems to have been much used by the early Christians. It is supposed that Saint Paul dictated to amanuenses several of his epistles, notably that to the Colossians, where Tychicus acted as shorthand writer and Ones- imus as transcriber. We know that Origen in the 3d century was assisted in the preparation of his Commentaries on the Scriptures) by clerks who wrote in shorthand from his dicta¬ tion. Saint Augustine refers to an episcopal as¬ semblage held at Carthage late in the 4th cen¬ tury, at which eight stenographers were em¬ ployed in relays of two. About the same period the poet Ausonius praised a youth who could write faster than his master could dictate, and, with poetic license, even faster than he could think; and in another poem expressed his ad¬ miration of the skill of the stenographers of the time. Charlemagne, king of the Franks for 46 years and likewise Roman emperor dur¬ ing the 14 years preceding his death in 814, pos¬ sessing an amount of learning unusual in his age, endeavored to become proficient in writing Tironian notes. But the lingua Latina was fast giving place to the lingua Romana, from which the modern Romanic languages of Europe sprang. At the Council of Rheims in 813, priests were admonished to address the, people in the rustic tongue. Nor was a knowledge of the art confined to the Western civilization. A translation by Professor Fliigel, of Dresden, from the Arabic, narrates how a Chinese in 923 a.d., who had acquired Arabic speech and writing in less than five months, took down in shorthand from the lips of his teachers 16 books of Galen.

Modern History. — The first modern short¬ hand work was printed in London in 1588 and dedicated by its author, Dr. Timothy Bright, to Queen Elizabeth. The first French publica¬ tion, that of Jacques Cossard, appeared in 1651. The oldest German system was published in 1679. Gurney's is the oldest living system of English shorthand. It was first issued by Ma¬ son in 1672 and improved by Thomas Gurney in 1750. Taylor's system appeared in 1786, sub¬ sequent editions of which bore the name of Odell, Harding and so on. This system has a remarkable history of successful adaptation to Continental languages. Bertin adapted it to the French and Danzar in 1801 adapted it to the German language. Marti's tachygraphy was an adaptation of Taylor's alphabet to the Spanish language and was first published in 1800. By a royal ordinance in 1802 a chair for shorthand was established in the university at Madrid and Marti named as professor. The cortes of Ca¬ diz first had an official shorthand report of its proceedings in 1810. Marti's tachygraphy was in 1828 applied to the Italian language by his son, who also adapted it to the Portuguese.

Pereira had also, early in the century, adapted Taylor's alphabet to the Portuguese. The intro-

duction of shorthand into Mexico and the coun¬ tries of South America followed these adapta¬ tions. Amanti, an Italian, adapted Taylor's shorthand to his own language and as modified by Delpino it is now used by the official corps of the Chamber of Deputies. The three pre¬ vailing French systems are those of Prevost, Duploye and Prepean, the first named being a modification of Taylor. It is estimated that the bibliography of shorthand comprises 16,000 vol¬ umes, exclusive of reissues or editions. A valuable contribution to the English branch of this subject has been made by Julius Ensign Rockwell, published by the government as Circular of Information No. 2, Bureau of Education, Washington (1884), and Circular No. 1 (1893). The latter contains a repro¬ duction of 112 English shorthand alphabets, extending from the first alphabetic system, that of Willis, in 1602, to the Duployan method adapted by Pernin in 1882. In 1888 (Light Line Phonography, > issued later as < Gregg Short¬ hand^ was introduced.

A court of law in England in 1740 took the initial step in appointing an official shorthand writer. The next instance of the public recogni¬ tion of shorthand in that country occurred in 1789, when the House of Commons, during the trial of Warren Hastings, called the shorthand writer to the bar and required him to read from his notes the exact words used by Mr. Burke, and thereupon resolved that Mr. Burke had exceeded his instructions in accusing Sir Elijah Impey of murder. The publication of Hansard's Debates was begun in 1803 and has become a general system of reports of representative bodies in Great Britain and her colonies. It is compiled from newspaper reports, supplemented by special reports. This system is closely fol¬ lowed in some of the colonies, as in New Zealand, while a method similar to that pur¬ sued by our national legislature has been adopted by the Canadian Parliament. The Hansard's report is semi-official, the speeches being submitted to members for revision and it is subsidized by the House of Commons. The official shorthand writing for the British Parliament is confined to the committee re¬ porting, in which Pitman's and Gurney's sys¬ tems have long had governmental recognition.

A census taken in 1914 of the systems of shorthand used in the Press Gallery of the British Parliament showed that out of 137 writers 128 wrote the Pitman system, 4 the Taylor system, 2 the Gurney system and 3 the Sloan-Duployan system.

The American colonies were not far behind the mother country in the use of shorthand. The Virginia Convention of 1788, called to de¬ liberate on the ratification of the Constitution of the United States, was reported in shorthand in a meritorious manner by David Robertson, of Petersburg, Va., and in 1903 the National Shorthand Reporters' Association of the United States erected a tablet in Saint Augustine's Church, Philadelphia, to the memory of Thomas Lloyd, the official reporter of the National House of Representatives, 1st session 1st Con¬ gress. This tablet bears the following inscrip¬ tion :

Caplin Thomas Lloyd, Author, Soldier, Patriot.

The father of American shorthand reporting.

14 August 1756— 19 January 1827.

In 1834 Franz Xavier Gabelsberger, secre¬ tary to the Ministry in Bavaria, brought out his invention and in 1837 Isaac Pitman, of Bath, England, gave to the world the first edition of phonography or sound hand. Gabels-berger's system, with adaoatation, has been widely introduced in Austra-Mungary, Switzer¬ land, Russia, Denmark, Norway, Sweden, Fin¬ land, Poland, Holland, Belgium, Serbia and Rumania, although in some of these countries modifications of the Stolzean method predom¬ inate. Wilhelm Stolze published his system in 1841 and it is used in the Prussian Chamber, which is the sole exception to the official use of Gabelsberger's shorthand in Germany. In Rus¬ sia a translation of Gabelsberger is officially em¬ ployed in the imperial Senate, the Court of Cassation and other law courts. There was, of course, a gradual development of the art down to Isaac Pitman's invention. Dr. Bright's system was cumbrous and followed the vertical style of Chinese writing; but he indicated a present particle by two final dots just as Isaac Pitman nearly three centuries afterward de¬ noted it by one.

Phonetics. — The phonetic principle was first applied to English shorthand by John Willis, in 1602, and it was further developed from time to time; but it remained for Isaac Pitman to make it a complete basis ; in other words, to invent phonography or sound hand. As there are in the English language 43 distinct sounds, represented by 26 letters, Isaac Pitman adopted an extended alphabet by which consonants are indicated by simple geometrical strokes, straight or curved, the light sounds denoted by light strokes and the heavy ones by corresponding heavy strokes. The leading heavy vowels are represented by six heavy dots and a like num¬ ber of heavy dashes, placed at the beginning, middle or end of the strokes and before or after as they precede or follow the consonants. The same course is followed with the light vowels. Diphthongs are provided for by a

combination of dash forms and by a small semi¬ circle differently formed and placed in differ¬ ent positions. Circles, hooks and loops are em¬ ployed in distinct offices. As an illustration, the word bought is composed of three sounds rep¬ resented by six letters. It is spelled phonetically b aw t, and in phonography it is written with two straight strokes joined, one sloping and the other perpendicular and a disjoined dash. In rapid writing the dash is omitted, as an im¬ portant feature of the art in reporting is the use of consonant outlines, omitting vowels. It follows that shorthand is more readily adapted to a consonantal than a vowel language and for this reason French is easy and Japanese diffi¬ cult. In every case, however, many brief forms, more or less arbitrary, are used for words of frequent occurrence.

Pitman System.— As has been stated, ver¬ batim reporting in the English-speaking world dates from the invention of phonography by Sir Isaac Pitman. In recognition of his eminent service, the honor of knighthood was conferred on him by Queen Victoria. Ther.e was a cele¬ bration in London in 1887 known as the Golden Jubilee of Phonography, in which an array of talent was displayed which came as a surprise to men of letters on both sides of the Atlantic, who were unaware of the accomplishments nec-

essary to make the career of a shorthand re¬ porter successful. Sir Isaac died in 1897, after having witnessed the introduction of phonog¬ raphy into every land that Anglo-Saxon civili¬ zation has penetrated. The inventor received great aid from his brothers, but that of his youngest brother was conspicuous and Ameri¬ can. Benn Pitman came to the United States in 1853 and established in 'Cincinnati a phono¬ graphic institute and a publishing house, which are still in successful operation. For many years Pitman had an able associate in the person of Jerome B. Howard. In 1903 Benn Pitman having spent 50 years in the dis¬ semination and development in the United States of his brother's invention, the National Shorthand Association, which met in Cincin¬ nati, made an appropriate celebration of the golden jubilee of his labors.

The followvving is the complete alphabet of the Isaac Pitman system as presented in (

The Phonographic Alphabet.

(BY ISAAC PITMAN.)

CONSONANTS.

EXPLODENTS.

CONTINUANTS.

*p *

*B *

F

V.

V

V.

T |

D |

TH

(

TH

(

. CH /

J /

S

)

Z

)

K —

G —

SH

J

ZH

J

nasals.

M —

N —

NG w

LIQUIDS.

COALESCENTS. W LONG.

L f

Ycr VOWELS

R ^ ^

ASPIRATE. H cr" J SHORT.

I.

AH

•

as in t ah

a

I

as in

pat

2.

EH

■

99

t ay

e

•1

99

p^t

3-

EE

•

99

tea

V

l

.1

99

p/t

I.

AW

99

taw

V

o

“1

99

n^t

2.

OH

-

99

toe

V

u

“1

99

n«t

3-

OO

99

too

V V J

OO

J

99

ioot

DIPHTHONGS. v|

[A

OW

1 OI

J U

To these brief elementary signs, which rep¬ resent every distinct elementary sound in Eng¬ lish, are added abbreviating adjuncts and prin¬ ciples that enable the hand to keep pace with thought. When Isaac Pitman invented his shorthand alphabet and with the assistance of distinguished educators and practitioners im¬ proved it, he had a three-fold object in view:

1. To give those who had memoranda to make, a more elementary method of writing, plain, simple, easily acquired in a few weeks, and capable of being executed at the rate of 50 or 60 words a minute.

2. To develop a style of writing for the use of business men, ministers, physicians, authors, scientific investigators, and others who would acquire through a few months' study the ability to write 100 words per minute, with the ease of speech and the legibility of print.

3. To establish a system of reporting for those who sought to record the eloquent orations of public speakers at the rate of 300 words a minute when required.

How well the inventor succeeded in his real¬ ization of these first two resolves may be seen in the representation in the next column and the history of the dissemination of the art proves that this third has also been crowned with suc¬ cess.

Pitman's phonography has not only been suc¬ cessfully adapted to such languages as the Span¬ ish and Dutch, but even to the Malagasy for official used in Madagascar, and in 1902 Edward Gantlett made an adaptation to the Japanese language under the title (Phonographica Japonica. In Japan and China a method of tachygraphy is generally employed. The sepa¬ rate marks which united form a character in ordinary writing are made by a single stroke of the pen, the contours being traced regardless of details. In India, Navina, of the Punjab Uni¬ versity, invented an alphabet of new Hindu characters, which is said to form the basis of a rapid and legible system of shortland. Other systems, based on Isaac Pitman's, have been introduced in the United States by Elias Long- ley, Andrew J. Graham and James E. Munson. Mr. Graham brought out the first edition of his (Standard Phonography > in 1858.*

Specimen of Isaac Pitman Shorthand.

"jt Q ~ 1 f '

*^ * V ^ u i , J_.*

*q ° V v * '*

3 % V N – ”

• - • V

” I wish every man had such an education — every young man especially. And if either of my sons had lived, and I had trained him, as I should have tried to do, to be a great and good farmer, I should have wanted to send him at least six months to a Business School, to give him the aptitude and habits and forms of a thorough Business Man.”

Horae e Greeley.

Official Use. — The enlarged use of short¬ hand, owing to the demands of State legisla¬ tures, courts and the business world, is well known. The National Shorthand Reporters' Association has an executive committee com¬ posed of reporters from 35 States, 2 Terri¬ tories and the District of Columbia. (See Shorthand Standardization). The Senate of the United States in 1848 made a contract for a verbatim report of its debates and pro¬ ceedings and the same course was adopted by the House of Representatives in the following year. Before 1848 the Congressional Globe contained an abstract of the debates and such speeches in full as members wrote or had spe¬ cially reported. In 1873 Congress adopted the existing method and transferred the official pub¬ lication of the proceedings from private con¬ tract to the government printing office. By this method each house employs a corps of five

reporters, the Senate paying to its corps $25,000 a year and the reporters of the House re¬ ceiving $5,000 a year each. In addition, the House of Representatives employs a corps of official reporters of committees.

Shorthand has reached the highest possible development in every country where a parlia¬ mentary form of government has obtained. Turkey possessed no system of shorthand until her accession to the list of constitutional states, brought about by the reform movement of 1876. The Turkish Parliament met in 1877 and much difficulty was found in securing reports. Stenographers were employed to translate on the spot into French the speeches delivered in Turkish, but in this work the note-takers failed. The speakers were then required to reduce their remarks to writing before delivery; but it was found that such a rule could not 'be applied to a deliberative body. Efforts were then made to invent a stenographic machine, but this proved a failure there as elsewhere. Gabels- berger's system subsequently was translated into Turkish by Grunbaum.

The Continental countries of Europe, Great Britain and the United States now make in¬ struction in shorthand a material and essential part of education.

Clarence A. Pitman.

SHORTHAND, Science of. Shorthand Empiric. — Modern shorthand has developed from the earliest times down almost to the present day (1919), wholly as an empiric art, lacking those standards of measurement and accompanying definition of terms which consti¬ tute the first essential of any science — a strik¬ ing anomaly in this scientific age.

Resultant Confusion. — As a direct conse¬ quence of this condition more than a thousand different systems of shorthand have been pub¬ lished for English alone, which for longhand has in effect but one. No less striking is the fact that those systems most prominent in the United States to-day differ not only in their specific alphabets and outlines and minor rules but also in their most fundamental conceptions of the nature and use of shorthand material • — differences as marked as though the steam railroads of the country should run on one rail or three while the electric rapid transit of the cities ran on two.

Controversial Data. — This lack of recog¬ nition of scientific principles which, recog¬ nized or not, must underlie the practice of any useful art, has developed an immense mass of Controversial literature, in which system A is compared with systems B and C, or system X with systems Y and Z, always to the latter's disadvantage — each document conclusive and final in itself, but each directly and irreconcil¬ ably contradictory to the other. The inevitable result of this futile recrimination has been to increase rather than decrease confusion and strife, and to make organized scientific prog¬ ress impossible.

Efforts to Formulate Science. — Various attempts have been made in the past to deter¬ mine the basic principles which, systematically related, constitute the science of shorthand as distinct from the practice of the art. Of these, the most noteworthy was the formation of The Shorthand Society in London in 1881, With the avowed purpose of ((the study of the

science and literature of shorthand and ihe investigation and discussion of the principles which should govern the construction of sys¬ tems of shorthand and abbreviated longhand, adapted, if possible, for general use.® The transactions of this society (59 numbers of the magazine Shorthand) , which lasted for a dozen years till disrupted by the factional strife of system partisans, contain many sincere efforts to establish such basic general principles of shorthand — unfortunately in most cases too

specific in their application to particular types of systems to have the general value for which they strove.

The outstanding feature of the society's ef¬ forts is undoubtedly the work of Edwin Guest, 1836-1919) which reached the point of pro¬ pounding and roughly grouping 49 genuinely single and separate propositions and definitions under the general head of ((Shorthand princi¬ ples worthy of general acceptation,® before further organized progress was suspended by the disintegration of the society.

Equally able and sincere though less de¬ tailed is the notable paper of Prof. J. D. Everett, ((On the principles that govern the con¬ struction of a system of shorthand,® read be¬ fore the 1887 International Shorthand Congress at London. Various other statements have been put forth in the name of shorthand science, but with rare and fragmentary exceptions they prove on examination to be at best a list of un¬ substantiated personal opinions, at worst a cata- logue of personal prejudices.*

Science of Shorthand. — The science of shorthand, presented before the 1918 convention of the New York State Shorthand Reporters Association, the oldest shorthand organization of America, as a part of the work of the Com¬ mittee on Shorthand Standards marks the first systematically comprehensive formulation of the fundamental principles of shorthand science. It is an attempt to classify, define and where necessary discuss the single separate factors involved in the construction of any shorthand system, so far as they could be ascertained by reading, conference or original research ; with out regard to their bearing on any particular system past, present or future. Although neces¬ sarily neither complete nor final it may be con¬ sidered substantially correct as far as it goes and sufficiently complete to be accepted as a guide.

Structure. — The propositions of the science are classified under seven heads : 0 General

considerations; 1 Phonetic or sounds; 2 Geomet¬ ric or signs; 2:1 Assignment of signs to sounds ; 3 Manual of writing ; 4 Visual or reading; 5 Mental or remembering.

Each main head is subdivided into three classes: (a) Axioms and definitions — which should involve no scientific controversy at the present time; (b) Canons — which are consid¬ ered proven or demonstrable but recognized as still subject to controversy in greater or less degree; (c) Theorems — put forward rather for discussion and investigation than for im¬ mediate acceptance.

The direct work of the science has been supplemented by extensive researches giving the relative frequency of every sound and the com¬ moner syllables and words of English, and is being further supplemented by various experi¬ mental data on the relative facility of the possi-

Me signs and sign combinations of shorthand writing and their relation to penmanship technique. Much more remains to be done, but the work is going forward under the direction of the leading State and national associations.

Limitations. — Students of shorthand science will be struck by the absence from the science of any specific pronouncement on such leading questions of shorthand as : Whether to shade or not to shade stems; Whether to write stems on two, three or four distinct slopes ; Whether to use the appendages for primary representa¬ tion of vowels or for secondary representation of consonants. This is because such questions are not single separate factors of any shorthand problem, but are each a complex of a dozen or more important and inter-related factors, so that to pass judgment on such decisions would easily become dogmatic and enormously re¬ strict the scope and usefulness of the science.

Purpose. — The purpose of the science of shorthand is to provide those standards of measurement and their accompanying defini¬ tion of terms essential to scientific shorthand progress ; to be used analytically to determine the strength or weakness of existing systems, or synthetically to determine the construction of future shorthand systems.

Specific Propositions. — A few of the more important propositions of the science, illustra¬ tive of the plan and scope, are given below. The complete series to date (1919) is accessi¬ ble in the 1918 Proceedings of the New York State Shorthand Reporters Association. The first figure of each number refers to the main head noted above, the letter to the sub-class. The second figure is a serial number in each sub-class, for convenient reference.

0 a 4. No system of shorthand can con¬ ceivably be best in every important point, for several of the most important basic features are mutually incompatible. "Every fair minded person who has paid any attention to the rela¬ tive merits of different systems, or who has himself tried his hand at system-making, knows that the best result can only be attained by judicious compromise. One advantage cannot be obtained in its highest degree without the sacrifice of other advantages, and no sound

judgment can be arrived at by setting up one particular point of superiority as the sole test of excellence.® (Everett).

0 b 8. ((Time, not space, is the proper meas¬ ure of brevity.® (Guest).

1 a 1. The total number of different sounds in spoken English can no more be determined than the total number of different colors in the spectrum, and for the same reason — that they blend into one another by imperceptible degrees or shades.

1 a 2. A minimum number of sounds neces¬ sary to be distinguished for phonetic writing of English may be and has been conclusively de¬ termined. This minimum number is 40, count¬ ing diphthongs. (See table of comparative al¬ phabets under Shorthand).

2 a 1. The simplest conceivable material for graphic purposes is composed of right lines and arcs of simple curves, whether of circular, ellip¬ tic or other assumed origin.

2 a 6. The principal material for modifying or supplementing the simplest straight and curved stems consists of circles, hooks and loops, small and large, initial and final, and, in

the case of straight stems particularly, right and left.

2:1 a 2. Latham's second law: ((2 That sounds within a determined degree of likeness be represented by signs within a determined degree of likeness ; whilst sounds beyond a cer¬ tain degree of likeness be represented by dis¬ tinct and different signs, and that uniformly .®

2:1 b 1. (Assignment of signs to sounds in a simple shorthand for general use). Must not suggest by geometric similarities phonetic relations contrary to fact.

3 a 2. The relative ease of the various strokes which are possible material for short¬ hand writing will be profoundly affected by the muscles chosen to perform the principal effort and control of writing, and by the position of holding the pen or pencil. It is therefore essen¬ tial that instructions for pen position and mus¬ cles to be used be adapted to each other, and to the genius of the system to be written; or, conversely, that in the construction of a short¬ hand system these points be determined in ad¬ vance of its analysis of other data.

3 a 4. Other things being equal, a shorthand which employs symbols of

only one length, one thickness or one position, will be more facile than a system employing symbols of more than one length, thickness or position. In practice observation of all three of these restrictions would make impossible the condition of <(other things being equal.®

4 a 2. Other things being equal, a shorthand which, within the limits of clear distinction, em¬ ploys symbols of more than one length, one thickness or one position, will be more legible than a system employing symbols of only one length, thickness or position.

5 a 1. ((Rules should be simple, compre¬ hensive, logical, and as nearly as possible free from exceptions.® (Guest).

5 a 2. The less of a word or phrase is ex¬ pressed or implied the more of it must be re¬ membered.

5 a 6. Arbitrary abbreviations are always objectionable, but are least objectionable in words of most frequent occurrence; for the double reason that their economy is so much the more valuable, and their meaning so much the more readily remembered.

5 b 2. Words are most readily recognized by their first elements, next by their last ele¬ ments and least by their middle elements.

Thoughful consideration of these and simi¬ lar factors, studying their inter-relations and weighing their relative importance for the par¬ ticular purpose in view, will go far toward as¬ suring a more rational and constructive devel¬ opment and progress for the shorthand of the future.

Godfrey Dewey,

New York State Shorthand Reporters' Asso¬ ciation.

SHORTHAND STANDARDIZATION.

In 1909 the National Shorthand Reporters Association appointed a committee ((to stand¬ ardize verbatim shorthand reporting, putting it on a thoroughly scientific basis.® This commit¬ tee, accepting as a starting point those signs and principles common to all Pitmanic short¬ hand systems, has given 10 years of arduous and unremunerated toil by some of the best re¬ porters of the United States and Canada to

comparison and selection of reporting expe¬ dients and word and phrase outlines, in the effort to make of Pitmanic shorthand the most perfect instrument yet devised for the purposes of the verbatim reporter. It is hoped that the results of the committee's labors, now nearing completion along this particular line, may be made available in the near future (1919) by publication under the auspices of the associa¬ tion.

SHORTHORN, a breed of cattle. See

Ox.

SHORTHOUSE, Joseph Henry, English manufacturer and author: b. Birmingham, 9 Sept. 1834; d. London, 4 March 1903. After a secondary education at Tottenham, he be¬ came a manufacturer of sulphuric acid at Birmingham, but soon found his calling in litera¬ ture, and privately printed a half-mystical work of 'fiction, (John Inglesant. This was pub¬ lished in 1881, was much talked of and gained a solid success. Other works of his, such as (The Little Schoolmaster Mark* (1883-84) and (Sir PercivaP (1886), did not encounter a similar acceptance, but are greatly prized by thoughtful readers. Besides his fiction he wrote an essay on (The Platonism of Wordsworth* (1882). See John Inglesant.*

*SHORTIA, a genus of plants of the Dia- pensia family, containing two species, one (S. uni flora), in Japan, and the other a very local plant, in the Alleghany Mountains. The latter species (Shortia galacifolia) , is an interesting plant, historically, being closely associated with Dr. Asa Gray. When in Paris in 1839, Dr. Gray saw an unnamed specimen, with only leaves and fruit, in the herbarium of the elder Michaux, who stated that he had collected it in 1788, in the high mountains of Carolina. Dr. Gray afterward searched for it in that region, but was unsuccessful. He, however, described this plant, <(with the habit of pyrola and the foliage of galax,** and named it in honor of Dr. C. W. Short. The Shortia was afterward found (1877), although not in the locality mentioned by Michaux, but was in flower and was sent to Dr. Gray to verify his classification. In 1886, almost 100 years after it was first seen, and after much laborious searching, the Shortia was rediscovered by Dr, Sargent, in practically the identical region visited by Michaux. Later still it was found in such quantities that it was transplanted, and this once unknown flower is now becoming a common plant in horticulture. It has a creep¬ ing rootstock, a large tuft of long-petioled, ever¬ green leaves, with brownish stains, thin and serrate and shaped very like the galax leaves used in floral decorations. There are several1 flower scapes, some six inches tall, bearing soli¬ tary nodding, five-parted, bell-shaped flowers an inch long and wide, with white-fringed petals, blooming in the early spring.*

SHORTSIGHTEDNESS. See Vision,

Defects of.

SHORTT, Adam, Canadian political econoˆ- mist : b. of Scottish parentage, near London,. Ontario, 24 Nov. 1859. He was educated at the universities of Queen's (Kingston, Ontario), Edinburgh and Glasgow, and on his return to' Canada became an assistant in philosophy at Queen's University, and after the establishment

of the Macdonald chair of political science at Queen's was appointed to fill it. He became Dominion Civil Service Commissioner in 1908 and was created C.M.A. in 1911. He made a close study of Canadian economic problems as well as of English and French Colonial policies, and pub¬ lished in the Journal of the Canadian Bankers' Association a series of papers on the (History of Canadian Currency and (Banking and Ex¬ changed His other writings include < Imperial Preferential Trade, from a Canadian Point of View) (1904) ; (Report on Railway Taxation for the Ontario Government * (1904) ; docu¬ ments Relating to the Constitutional History of Canada, 1759-6D (1907) ;*

SHOSHONE (sho-sho'ne) FALLS, a waterfall of the Snake River (q.v.), in the south of Idaho, about 30 miles south of Sho¬ shone. Above the falls proper, the canon is about 750 feet wide and 1,200 feet deep. The waters are deep and flow with scarcely a ripple until the rapids are reached, when the water spreads out fan-like and drops over numerous precipices, some 50 feet in height, then, as it were, gathers its entire volume and plunges over a precipice 210 feet in height. Below this fall the canon is about 1,000 feet in depth. Four miles higher up are the Little Shoshone Falls, a broken cataract of 182 feet.

SHOSHONEAN INDIANS (adapted

from Shoshoni, an important Shoshonean tribe, whose name is probably an opprobrious Siouan epithet), a linguistic stock of American aborigines which formerly occupied a large part of the great interior basin of the United States. On the north, Shoshonean tribes extended far into Oregon, where Shahaptian territory was met. On the northeast the eastern limits of the pristine habitat of the Shoshonean tribes are unknown ; the narrative of Lewis and Clark asserts that the Shoshoni bands encountered on Jefferson River, whose summer home was on the headwaters of the Columbia, formerly lived, within their own recollection, in the plains east of the Rocky Mountains, whence they were driven to their mountain retreats by the Min-itari (Atsina), who had obtained firearms, and much of whose territory was formerly occupied by Shoshonean tribes. Later a division of the

Bannock held the finest portion of southwestern Montana, whence they were apparently being pushed westward across the mountains by Blackfeet. On the east the Tukuarika, or Sheepeaters, held the Yellowstone Park coun¬ try, while the Washaki occupied- southwestern Wyoming. Nearly the entire mountainous part of Colorado was held by the several Ute bands, including the northern drainage of the San Juan in the southeast and extending into northeast¬ ern New Mexico. The Comanche division of the stock extended farther eastward than any other, but with the exception of the Penetehka band, this important and warlike tribe did not make its appearance in the southern plains until the beginning of the 18th century, although they later extended their raids throughout the greater part of Texas and far into Mexico. On the south, Shoshonean tribes were limited generally to Colorado River in Arizona and California ; the Chemehuevi occupied both banks of that stream above and below Bill Williams

Fork, and the Kaibabs, Shivwits and Kwaiantik- wokets (Paiute divisions) occupied northwest¬ ern Arizona and southwestern Utah. The pueblo-dwelling Hopi or Moki occupied seven villages in northeastern Arizona in the middle of the 16th century, some of which were subse¬ quently abandoned and new ones established, and about the close of the 17th century Tewa Indians of Tanoan stock from the Rio Grande established the pueblo of Hano among the Hopi (see Tusayan). In the southwest, Shoshonean tribes had pressed across California, occupying a wide belt of country to the Pacific. In their extension northward they had reached as far as Tulare Lake, from which territory they had apparently dispossessed Mariposan tribes. A little farther northward they had crossed the Sierras and occupied the heads of San Joaquin and Kings rivers ; they also occupied nearly the whole of Nevada, and the entire southeastern part of Oregon was likewise inhabited by tribes of Shoshonean extraction.

Owing to the vast extent of country occu¬ pied by these tribes, which ranged from tim¬ bered mountains to desert plains, with great dif¬ ference in climatic conditions, their habits and customs greatly varied. The northern and east¬ ern members of the stock — the Bannock, Shoshoni, Ute and Comanche — were hunting Indians, living in tepis and subsisting almost entirely on large game, including the buffalo; but of these tribes only the Comanche were essentially <(Buffalo Indians.® Most of the western tribes of the stock, notably the Piute, inhabited in the main an inhospitable desert region which afforded scant subsistence in the way of seeds, berries, roots, fish and small game. The necessity of digging roots for food early earned for them the sobriquet ˆDiggers,® a name still applied to the Piutes

*and their relatives in eastern California, western Nevada and western Utah, particularly those not under official control. Living in rude brush shelters or sometimes even in holes in the ground, and subsisting on the meagre natural products of the desert, these Indians have been regarded * as, in some respects, among the lowest in the culture scale of the tribes of the United States, although some of the Piute divisions and the Chemehuevi practise agriculture to some ex¬ tent. The Hopi or Moki, whose country in northeastern Arizona was the province of Tusayan (see Tusayan) of the early Spaniards, are much farther advanced than any of the Shoshonean tribes, due probably to a large in¬ fusion of eastern Pueblo and other foreign blood; they live in permanent adobe houses, have a highly developed social and religious system, successfully cultivate the sandy soil and have earned just renown as potters, weavers and basket-makers.*

Owing to the fact that various Shoshonean tribes have been long in contact with the white races and that they had themselves advanced pretty well along the road to civilization before the system of Indian reservations came into vogue, many of the Shoshoneans have never been placed on reservations, and their modern descendants have so identified themselves with the life of the nation that it is difficult to make clear their tribal relationship. This is especially so of the Piute and the Pueblo dwellers in general. An estimate of Shoshoneans place them at over 21,000, distributed as follows:

Bannock 600, Chemehuevi 500, Comanche 1,500, Hopi 2,000, Towa 1,200, Piute 7,000, Shoshoni 3,300, Tobikhar 2,300, Ute 2,600. This estimate does not include very small tribal remnants, numbering about 100 or less. The modern scienti¬ fic view of the Shoshoneans is to consider them a part of a still larger family which in¬ cludes the Aztecs and related tribes of Mexico. For a description of the various tribal divisions of the Shoshoneans, see Pueblo; Bannock; Comanche; Ute; Cliff Dwellers.

Bibliography. — Bancroft, H. H., (Native Races ; Kroebler, A. L., (Shoshonean Dialects of California) (Berkeley 1907) ; Latham, R. G., languages of the Oregon Territory) (Edin¬ burgh 1848) ;*

SHOT. See Projectiles.

SHOTGUN, a small-arm with smooth bore, used for firing a charge of small shot in hunt¬ ing wild fowl and small animals. It may have one barrel or two, and is called accordingly single-barreled or double-barreled. Two other types are recognized : the muzzle-loader and the breech-loader. The former type is no longer manufactured, but many such fire¬ arms of the olden time are still in existence, and hold their own in accuracy and effective¬ ness with the most carefully made modern weapons of this class.

The forerunner of the shotgun was the old- time blunderbuss, with its spreading wide¬ mouthed barrel devised to scatter its handful of miscellaneous missiles over as large an area as possible, with still enough striking force in them to accomplish its purpose. It had a range of about 100 feet. The shotgun of to-day has but little longer range (40 yards) but delivers its charge in a more condensed group and with the expenditure of considerably less powder.

The principal parts of a shotgun are the barrel, the frame and the stock. The necessity of having a barrel sufficiently strong to with¬ stand the force of the powder explosion and at the same time provide a weapon not too great in weight to be comfortably carried about for a day's sport led to an ingenious plan by which the force released might be controlled by the greater lengthwise resistance of the fibres in a rolled bar. Wrought iron and steel strips were laid alternately and twisted together, and then wound in a close spiral around a rod-like man¬ drel. This spiral was then heated and welded into a solid tube, which was afterward bored out as to the inside and turned, (

brought the weapon to an adequate mass, but afforded the huntsman the opportunity of a second shot.

Following the invention of breech-loading mechanism for rifles, this improvement was adapted to the shotgun by the device of ˆbreaking® the barrels on a hinge-joint at the frame, so that the open butt of the barrel was presented for the insertion of the cartridge. The leaking of the gases of explosion, how¬ ever, called for further improvement, and this was secured by the invention of an expanding shell for the cartridge. The force of the exploding powder automatically expands this shell so snugly into the breech chamber that all leakage of gas is prevented.

The next advance, the hammerless gun, was also the result of an improvement of the car¬ tridge so that a centre pin could be used to explode the charge. The rim-fire cartridge thereupon disappeared and with it the project¬ ing hammers.

Another important improvement of the shot¬ gun had progressed contemporaneously with those already noticed; the introduction of the choke bore. While choke-boring had been in¬ vented as early as 1781, it was not definitely adopted until 1866. It consisted in contracting the gun-barrel slightly near the muzzle for the last few inches of its length — in

some cases for five to eight inches, in other makes for two or three inches. Some gun manufacturers taper the choke to a conical form ; others in¬ troduce a shoulder with gently rounding curves a few inches from the mouth; and there are several modifications of these practices. In the straight-barreled or non-choking gun only 30 per cent of the shot in the charge reach a tar¬ get 30 inches in diameter at a distance of 40 yards. With the choke-bore barrel (other things being equal) 70 per cent of the shot is delivered upon the 30-inch circle. The expla¬ nations of this result have been many, but the one generally accepted is that the choke mo¬ mentarily holds back the wad, and with it the forcibly expanding gases which otherwise have a tendency to scatter the shot laterally just as they leave the muzzle. Gun barrels are made <(full-choke® or <(modified choke.® In a 12-gauge gun the bore is 0.730 inch ; with full-choke the mouth is narrowed to a diameter of 0.695 inch; with modified choke, to 0.716 inch.

The modern gun is of 10, 12 or 16 gauge, double-barreled, breech-loading and hammer¬ less. It may have two triggers, one for each barrel, or but one trigger, a second pull on which fires the second barrel. The pull on the trigger is gauged from three to six pounds, less than three pounds being considered dangerous. The great majority of the Amer¬ ican guns of the present day have barrels of forged steel. The bar from which a barrel is to be made is first rough-bored, then rough-turned on the outside and then straightened by hammering. It is then turned again and ground on a broad-faced stone. The lug is then brazed on. The inside of the barrel is then reamed out several times up to the choke, and this is shaped by special reamers according to the pattern desired. The two barrels selected to be associated in the double-barreled gun are tinned along their adjacent sides and blocks of metal are placed between them to keep them at the proper dis¬

tance apart, the centre lines of the muzzles converging three-sixteenths inch for 30-inch barrels. The ribs are then soldered into the rabbets prepared for them. The stock of the gun is of walnut, Circassian walnut being fa¬ vored for fine guns. The frame is of steel and serves to connect the barrels to the stock as well as to house the lock mechanism. The gun may also be a repeater, firing several shots in quick succession from a magazine lying under the barrels. A well-made gun of 12-gauge will weigh from five and one-half to seven pounds, depending upon the work expected from it.

Military Shotgun. — The military shotgun used by the American army in the Great War for night expeditions in <(No Man's Land® and in clearing up trenches has a barrel 20 inches in length and carries a bayonet. It is of the repeating type, firing six times before reloading. The charge is of nine buckshot, and its shoot¬ ing qualities are exceptional. Upon a life-sized

manikin, at 30 yards all nine of the shot hit the target; at 50 yards the hits ranged from four to eight; at 80 yards, two to four hits; at 100 yards, always one hit and often two.

Bibliography. — Askins, C.,

SHOTWELL, James Thomson, American

historian : b. Strathroy, Ontario, Canada, 6 Aug. 1874. He was graduated at Toronto University in 1898 and took his Ph.D. at the University of Columbia in 1902. He has been connected with the faculty at Columbia since 1900 and since 1907 has been professor of history there. He was assistant general editor of the Encyclo¬ pedia Britannica) in London in 1904-05. He also edited 'Records of Civilization (20 vols.). Author of (Sources and Studies) (3 vols., 1915- lb). He was a member of the American mis¬ sion which accompanied President Wilson to the Peace Conference in Paris in 1919.

SHOULDER-GIRDLE. See Shoulder- joint.

SHOULDER-JOINT, the articulation of the upper arm or humerus with the glenoid cavity of the scapula or shoulder-blade. This joint is an example of the enarthrodial or ball- and-socket joints; the ball-like or rounded head of the humerus working in the shallow cup of the glenoid cavity. The head of the humerus is very large when compared with the glenoid or receiving cavity. The capsule which surrounds and encloses the joint is of very loose nature, but is intimately connected with the muscles which are attached to the head of the humerus. The joint itself is guarded against dislocation or displacement by the strong ligaments sur¬ rounding it, as well as by the tendons of its investing and other muscles; while superiorly the acromion and coracoid processes of the scapula form an arch, together with the coraco- acromial ligament, which further serves to pro¬ tect the joint. The shoulder arch or girdle, also called pectoral arch or girdle, is in vertebrates

— in mammals, none above monotremes (see Monotramata) — usually attached to the ster¬ num ventrally, and to it the fore limbs are articulated. It has only an indirect connection with the vertebral column. Rudimentary or greatly modified in the majority of mammals, this girdle is especially marked in certain groups of birds (see Ornithology). In man the clavicle is completely developed, and with the scapula this forms the bone-structure of the shoulder- girdle, which, relatively, is endowed with su¬ perior strength.

The articulating surfaces of the shoulder- joint are covered with cartilage. The capsular ligament forms the chief ligamentous struct¬ ure. It serves chiefly to support the inner and upper portion of the glenoid ligament, which is fixed around the margin of the cavity of that name. Its function is chiefly that of deepening the cavity by adding to its circumference, and it also protects the bony edge of the cavity. The motions of the shoulder-joint are limited and controlled by the interlocking of the bones, as well as by the tension of the capsule. The biceps muscle, in the relations of its tendons to this joint, subserves several important uses. Primarily, and from its connection with both elbow and shoulder- joints, it brings the move¬ ments of both into harmonious relation; while it strengthens the upper portion of the articular cavity and steadies the head of the humerus, through its relation to the bicipital groove of that bone.

This joint is liable to various diseases and injuries. Local injury may result in inflamma¬ tion, while diseased conditions of constitutional origin may give rise to strumous or scrofulous disorders of the joint, to syphilitic lesions and gouty or rheumatic attacks. Of the accidents to which the joint is liable, dislocations are by far the most frequent, while fractures are not uncommon. Fracture of the acromion process of the scapula, of the coracoid process, of the neck of the shoulder-blade and of the upper part of the humerus are of most common oc¬ currence among these accidents.

SHOVEL-NOSE. See Sturgeon.

SHOVELLER, or SPOONBILL, a fresh¬ water duck (Spatula clypeata), distinguished by the bill being longer than the head and narrowed at its base, while the tip is hooked and broadened and its fringe-like processes are long and slender. The average length of this bird is about 18 or 20 inches. The male has the head and upper neck bright green, and the lower neck white. The scapular feathers are white. The back is brown, the primary wing- feathers blackish-brown. The tip of the wing is pale blue, as also are the wing-coverts. The tail and upper tail-coverts are black. The breast and belly are light brown or chestnut. It feeds on worms, insects, snails, small fishes and vegetable matters and inhabits lake-mar¬ gins and marshy spots .and breeds numerously all over the northern half of North America as well as in northern Europe and Asia, making its nest on the ground.

SHRADY, George Frederick, American surgeon and editor: b. New York, 14 Jan.. 1837 ; d. 30 Nov. 1907. He studied at the College of the City of New York and took his M.D. at the College of Physicians and Surgeons, New York, in' 1858. He was United States acting

assistant surgeon in the Civil War. He was consulting surgeon to the Saint

Francis, the Columbus, the General Memorial and the Health Department hospitals in New York, and was consulting surgeon in attendance upon General Grant in his last illness. He edited the American Medical Times in 1860-64, and in 1866 founded the Medical Record, which he edited until his death.

SHRADY, Henry Merwin, American sculp¬ tor : b. New York, 24 Oct. 1871. He was gradu¬ ated at Columbia (1894), studied law, went into business and, finally taking up sculpture as an amateur, developed himself, without the direc¬ tion of any teacher, into a professional sculptor, being successful in a competition for the exe¬ cution of an equestrian statue in Brooklyn ($50,000) 1901 ; of the (Grant MemoriaP for Washington ($250,000) 1902; while he was sub¬ sequently commissioned by the Holland Society of New York to make an equestrian statue of (William the SilentP His later works include equestrian statues of (General Williams) (De¬ troit) ; (General Lee1 (Chancellorsville, Va.), and a statue of (Jay Cooke) for Duluth, Minn.*

SHRAPNEL. See Projectiles.

SHREVE, sh rev, Henry Miller, American inventor : b. Burlington County, N. J., 21 Oct. 1785; d. Saint Louis, 6 March 1854. Early in life he engaged in navigation on the Western rivers, and in 1815 ascended the Mississippi to Louisville, Ky., in the Enterprise, the first river steamboat. In 1820 he built the Washington of 400 tons burden ; remodeled it in 1824, so as to operate each of the side wheels with a sepa¬ rate engine; invented the snag boat Heliopolis for removing snags from rivers, and in 1829 patented a steam battering ram for harbor defense. In 1826 he was made superintendent of improvements in Western rivers and con¬ tinued in that office till 1841.

SHREVEPORT, La., the second largest city of the State and the seat of government of Caddo Parish, located in the northwestern sec¬ tion of the State, 18 miles from the Texas line and 170 miles east of Dallas, at the head of navigation on the Red River and on eight rail¬ road systems, including the Texas and Pacific, the Saint Louis Southwestern, the Kansas City Southern, the Houston and Shreveport, etc. The city is the centre of a large territory rich in oil, gas and agricultural produce. It con¬ tains the Louisiana State Fair grounds, Saint John's College, Centenary College, Saint Vin¬ cent's Convent, Saint Mary's Convent, Youree Hotel, Charity Hospital, Genevieve Orphanage, post office, city hall, courthouse, schools and churches. There are three national banks, two State banks and two trust companies, with combined capital and surplus of about $3,000,- 000. Parks owned by the city include Princess, Schumpert, Lakeside and Currie Playground. The city has a very large trade in hardware, lumber, groceries

and dry goods. Its industrial establishments include cotton factories and com¬ pressors, foundries, glass and bottle-works, lumber mills, machine shops, silo factory, stave and barrel plant, oil refining, etc. The total trade has an annual value of about $75,000,000. Pop. (1920) 43,874.

SHREW, one of the minute mammals of the family Soricidce and order Insectivora, par¬ ticularly the Common (Sorey vulgaris) and the

Lesser Shrew (S. pygmoens). The former are about the size of a mouse, which it somewhat resembles in the shape of the body, feet and tail, but has the muzzle produced far beyond the lip. The shrews have hairy mouse-like bodies and ordinary feet formed for running, and not for burrowing, as in the allied moles; the eyes and ears are comparatively well de¬ veloped. They live on the ground, though a few are arboreal and others aquatic. The jaws are prolonged and a mobile snout generally exists. There are six upper and four lower incisors, the middle pair of the upper jaw being long and curved. The first lower incisors project horizontally and form with the upper ones a forceps-like structure for the grasping of small insects, which form the larger part of their fare. This family is much the largest one of the Insectivora and the numerous species are found in most parts of the world and present many interesting adaptations.

Within the limits of the United States four genera and about 60 species occur. In the typ¬ ical genus Sorex the ears are large and of nor¬ mal conformation and the feet are not fringed with stiff hairs. The common shrew is a frail little creature less than three inches long with a scantily-haired tail measuring one inch and may readily be distinguished by its prolonged muzzle and by the teeth being colored brown at their tips. It feeds upon insects and their larvae and inhabits dry places, making a nest of leaves and grasses. The young, numbering from five to seven, are born in the spring. These little ani¬ mals are very voracious in their habits and frequently kill and devour one another. Neo- sorex has large feet fringed with stiff hairs and includes the large water shrew, six inches long, as well as several other species. It lives in burrows leading to the water, which it enters in search of snails, etc., upon which it largely feeds. This species is found chiefly in the Rocky Mountain region and central plateau.

Blarina is a characteristically American genus with mole-like fur and the external ear well developed but turned forward in such a manner as to cover the opening and conceal itself among the hair. The short-tailed or mole shrew (B . brevicauda) is the best-known species of shrew in the

eastern United States. It is about four and one-half inches long with a hairy tail measuring one inch. In general habits it resembles Sorex. During the winter it re¬ mains quite active and is frequently found on the surface of or burrowing in the snow. At this season it feeds largely on beechnuts as well as hibernating chrysalids and larvae. It is a bloodthirsty creature and when confined at¬ tacks and devours its own kind as well as mice larger than itself. Like other shrews it has upon the knees and elbows glands, the secre¬ tion of which give it a peculiar and disagreeable odor.

Among interesting exotic species the follow¬ ing may be mentioned : the European and Asi¬ atic water shrew (Crossapus fodiens) attains a total length of from four and one-half to five inches. The fur is of delicate texture and adapted to resist the action of water. A prominent fringe of stiff white hairs is found on the tail as well as the toes of this form, this fringe forming a dis¬ tinctive feature of the species. The teeth are also fewer than in the American water shrew.

The food resembles that of the common shrew, but aquatic larvae and the young of fishes ap¬ pear to form a large part of its nutriment. They are of very active habits, diving and swimming with great facility. The musk-shrew (Croci – dura ccerulea) of India is remarkable for the strong musky odor which emanates from glands situated on the sides of the body. It enters houses at night to feed upon cockroaches. Re¬ sembling the Soricidce are the elephant-shrews (Macroscelidce) . They have the zygoma and auditory bulla developed and the muzzle forms a slender, proboscis-like organ with the nostrils at its tip. The eyes are of moderate size and the ears well developed and covered with hairs. The fore feet are short and possess five toes, while the hind legs and feet are very long and are provided with compressed claw-like nails. The tail is elongated and slender. The ele¬ phant shrews or jumping shrews are confined to Africa. The favorite attitude of these crea¬ tures is a sitting posture, much resembling that of the jerboas and kangaroos, and from the greater length of the hind as compared with the fore limbs they also, like these animals, progress by leaping. They inhabit dry rocky situations, feed on insects and other small Invertebrata and are nocturnal. Consult Dob¬ son, Proceedings Zoological Society) of Lon¬ don (1890) ; Dobson, (Monograph of the Insectivora) (London 1882-90) ; Merriam, (Mammals of the Adirondack Region (New York 1884) ; and Merriam and Miller, (North American Fauna No. 10) (Washington 1895).*

SHREW-MOLE, a large mole (Scalops aquaticus) inhabiting wet meadows and the borders of marshes and streams throughout most of North America. See Mole.

SHREWSBURY, shrooz'bu-rT, England, the county-seat of Shropshire, on

the left bank of the Severn, 42 miles northwest of Birming¬ ham and 163 miles northwest of London. The town is unusually picturesque. The bridges are interesting features, four of them spanning the river, which here takes a winding course around the hills. The streets are narrow and steep and bordered by old frame houses. An archway of the period of James II and two towers of the reign of Edward I are parts of the old castle built by Roger de Montgomery. Saint Mary's, an interesting church of the 10th century; Saint Giles' — dates from the reign of Henry I; — Holy Cross, early Norman, and Saint Alkmonds are the most noteworthy churches. The other public buildings are pub¬ lic halls, museum, free library, market-house — including corn exchange — barracks and Royal Grammar School. The industries in¬ clude glass-staining, agricultural implements, foundries, tobacco, tanning and brewing. Pop. about 30,000.

SHRIKE, or BUTCHER-BIRD, a bird of

the passerine family Laniidoe, and especially of the typical group Laniince ; several other sub¬ families are not represented in North America. The true shrikes have the bill broad at the base, and hooked and toothed at the tip, re¬ sembling the bill of a bird of prey. A dense tuft of bristles surrounds the nostrils and others project from the base of the bill. The feet are small, and, except for the laterally scutellate structure, are of typically passerine type. The shrikes feed chiefly upon insects, reptiles, small

mammals and small birds and their young. About 200 species of shrikes are found in all parts of the world, and four species of Lanius within the United States. Other individual names are the Great Gray Shrike (L. excu-bilor), the Lesser Gray Shrike (L. minor) and the Red-backed Shrike (L. colluris), the latter, like L. septentrionalis, being often called the Nine-killer Shrike. The loggerhead shrike (L. Indovicianus) is the usual summer species of the eastern United States, where it is resident southerly and migratory in the North. These birds are seen usually in pairs flitting about the borders of woods and along fence-rows. The food consists chiefly of insects which the male is said sometimes to impale on thorns. They also attack the young of other birds. The nest is generally built in bushes and is of large size and composed of grass and weeds lined with hair and feathers. The eggs, usually five in number, are white, tinted with green and spot¬ ted with brown of various hues. The logger- head shrike is eight or nine inches long, slate- colored above and plain ashy white below, with a black stripe through the eyes and meeting across the forehead. In the West it is replaced by two sub-species, the" white-rumped and the California shrikes.

The Great Northern shrike (L. borealis) is found in the United States only in winter and breeds in British America. It is 9 to 10 inches long, marked below with numerous fine, wavy, dusky lines and the eye stripe is interrupted on the forehead. The nest is built in trees and the four to six eggs are similar to those of the loggerhead shrike. The song is harsh, but this bird possesses considerable imitative powers. The food consists of mice, shrews, insects and in winter especially of small birds. This species especially has a habit of suspending its prey upon thorns or fence splinters, or in forks of tree-branches. The significance of this re¬ markable habit is not understood. By some it is believed to be a storage of food; by others only an effort at convenience in eating the prey.

Closely related species of shrikes with simi¬ lar habits occur in Europe and more distinct ones in other countries. The Oreccca cristata of Australia lives chiefly on the ground and is noted for its peculiar and somewhat ventrilo- quial song, which begins with low notes and gradually increases in height and power so as to delude the hearer into fancying that the songster has been gradually coming from a great dis¬ tance toward him. It is sometimes called the bell-bird. The piping-crow (q.v.) and the pied crow-shrike (Strepera graculina) , of New South Wales, represent a distinct sub-family. Various other birds have been named ˆshrikes,® of which the most important are the bush- shrikes which belong with the ant-birds in the family Fofmicariidce. Consult Gadow, Cata¬ logue of the Birds of British Museum, } Vol. XV (London 1890) ; Evans, (Birds) (London 1900) ; Newton, A., dictionary of Birds) (New York 1896).

SHRIMP, a small decapod crustacean (see Decapoda; Crustacea) of the genus Cranqon, allied to the lobster, crayfish and prawn. They inhabit sandy coasts and in Europe are caught for market in immense numbers by nets when swimming about near the beach at high tide. The familiar species, C. vulgaris, about two

inches long, greenish-gray dotted with brown, is esteemed as an article of food. A related species (C . frauds comm) is found on the California coast where it has considerable com¬ mercial importance, being gathered and dried by the Chinese. The red color exhibited by shrimps when prepared for the table is the re¬ sult of a chemical change during cooking, they being naturally translucent and colored much like the sand in which they live. A very great number of crustaceans more or less closely re¬ lated to the shrimps live in the sea and a few in fresh water. Consult Stebbing,

SHRINE, the case in which holy relics are kept. Shrines are usually richly ornamented with gold, precious stones and elaborate carv¬ ings. The earliest form of shrines was that of the diminutive model of a Gothic church with high-pitched roof. Some shrines, as that of Saint Alban,

Britain's protomartyr at Saint Al¬ bans, that of Saint Edward the Confessor at Westminster, of Saint Genevieve at Paris, were imposing architectural structures. The shrine of Saint Charles Borromeo in the Duomo of Milan is of beaten silver faced with rock- crystal.

SHROPSHIRE, a breed of sheep (q.v.).

SHROUD, a word derived from the Anglo- Saxon ˆscrud,® a garment, and meaning more especially the winding-sheet in which it was customary to wrap the dead. This custom has been generally abandoned and the dead are buried in ordinary clothing, retaining to the last as far as possible the aspect they presented in life. The shroud has figured in many ghost stories.

SHROUDS, large ropes stretched from the heads of the lower masts to both sides of a ship, where they are fastened to the dead-eyes, which are secured to the channels, to support the masts, and named according to the masts to which they belong, the main, fore and mizzen shrouds.

SHROVETIDE, the three days between the evening of the Saturday before Quinqua- gesima Sunday and the morning of Ash Wed¬ nesday ; so called because anciently people were wont on those days to make confession of their sins and to obtain absolution (to be shriven) in preparation for the season of Lent. The Tuesday of Shrovetide is called Shrove Tues¬ day; its evening was given up to merrymaking and to feasting on pancakes and fritters: hence the name Pancake-Tuesdav or Pancake-night: in French Shrove-Tuesday is Mardi-Gras (q.v.).

SHRUBS are woody-stemmed plants of low stature. They often have several slender main stems and branch close to the ground, retain¬ ing these lateral shoots, which are lignified, and bear fruit repeatedly. The lines of dif¬ ference between herbs and shrubs, and shrubs and trees, are arbitrary and difficult to define exactly. Undershrubs are those perennials which send up from underground stems annual shoots that do not become woody and die off in the autumn as do those of Salvia pratensis. A semi-shrub is practically the shrubby herb, whose yearly shoots become woody only at the base before the next period of vegetation and wither and die off above this. The small shrub is a low or even trailing plant like Deutzia

gracilis and Epigcea re pens. When larger and much branched, the shrub is called a bush ; and when so large as to resemble a tree, as the syringa often is, it becomes arborescent. Some of the shrubs are even climbing plants, like Celastrus scandens, the bittersweet, and certain roses. Like trees, shrubs

may be deciduous or evergreen, and are often thorny. They are apt to grow in almost impenetrable thickets, with interwoven branches, and form fringes of vegetation on forest edges, in swamps, fields and moors. They are extremely useful to the horticulturist for their flowers and for their fruits, often of economic value; and to the landscape gardener, for concealing fences and buildings, and for softening the edges of trees masses.

SHUBRICK, shu'brik, John Templar,

American naval officer : b. Bull's Island, S. C., 12 Sept. 1788; lost at sea in the sloop-of-war Epervier, 1815. He entered the navy as mid¬ shipman in 1806, served on the Chesapeake in her encounter with the Leopard in 1807 and in 1812 was promoted lieutenant. He was as¬ signed to the Constitution, participated in her engagement with the Guerriere in 1812 and was later on the Hornet during her engagement with the Peacock in 1813, receiving medals from Congress for his services. He was second lieu¬ tenant of the President when she was cap¬ tured in 1815 and in the war with Algiers in that year was lieutenant of the Guerriere, the flagship of Commodore Decatur, with whom he was engaged in all the movements against the Barbary powers. Upon the conclusion of peace he was commissioned to bear the treaty to the United States. He sailed in command of the Epervier early in July 1815 and was never again heard from after passing Gibraltar.

SHUBRICK, William Brandford, Ameri¬ can naval officer, brother of John Templar Shu- brick (q.v.) : b. Bull's Island, S. C., 31 Oct. 1790; d. Washington, D. C., 27 May 1874. He entered Harvard in 1805, but was appointed mid¬ shipman in 1806. He attained rank as lieuten¬ ant in 1813, was placed in command of a gun¬ boat in Hampton Roads, was engaged in the de¬ fense of Norfolk and the navy yard at Gos¬ port and later in that year was transferred to the Constitution. He participated in the cap¬ ture of the Cyane and the Levant by that ves¬ sel and was voted a sword by his native State and a medal by Congress in recognition of his services. He sailed around the world in the Washington in 1815-18, the first United States vessel to make that cruise, was appointed com¬ mander in 1820 and served until 1826 in com¬ mand of the navy yards at Charlestown, Mass., and at New York. In 1826 he was appointed to the command of the Lexington, was commis¬ sioned captain in 1831 and in 1838-40 was in command of the West India squadron. He had charge of the Norfolk navy yard in 1840-43, was chief of the bureau of clothing and provi¬ sions for the navy in 1845-46, in the latter year was appointed to command the Pacific squad¬ ron, captured several ports during the Mexican War and in 1852 was appointed to the Light¬ house Board. He was in command of the At¬ lantic Coast squadron for a time in 1853 and then resumed his duties as chairman of the Lighthouse Board, in which post

he remained until his retirement with the exception of 1858-

59, when he was in command of the Brazil squadron and Paraguay expedition. He was retired in 1861, but remained on the Advisory Board until 1870; in 1862 he was commissioned rear-admiral.

SHUCKBURGH, Richard, surgeon in British army, reputed author of (Yankee Doo- dle) : b. about 1705 ; _ d. Schenectady, August 1773. He appeared in America in 1735. In 1737 he was commissioned surgeon to the four independent companies of foot at New York. Tradition says he wrote the original humorous stanzas of (Yankee Doodle) to an old and fa¬ miliar English jig and palmed them off as a famous march-song upon the motley New Eng¬ land volunteers that joined the British regulars at Fort Crailo, near Albany, N. Y., for the ex¬ pedition against Canada during the French and Indian War. A Richard and Mary Shuckburgh baptized a child John at Albany, 15 March 1747. Shuckburgh became interested in the Indians about 1748 and seems to have been in friendly relations with Sir William Johnson, long-time colonial Indian commissioner and who made him secretary of Indian affairs in 1759. Dr. Shuckburgh was then residing at Schenectady and was by turns with the army and under Johnson until August 1773 when his death was announced in the New York Gazette as a ((gen- tleman of very genteel family and of infinite jest and humour.®

SHUFELDT, shoo'felt, Robert Wilson,

surgeon and biologist: b. New York, 1 Dec. 1850. He studied at Cornell University, school of engineering, but withdrew in 1873 to study medicine at Columbian, now George Washington University, where he was graduated in 1876, re¬ ceiving the prize for the best thesis, (6000 ob¬ servations on temperature of children,5 since published. He had seen service early in the Civil War; became surgeon with Generals Mer¬ ritt, Crook and Sheridan in frontier Indian wars 1876-81. He was appointed curator Army Medical Museum, Washington, 1882 ; honorary curator Smithsonian Institution 1895; judge at the World's Fair, Chicago, 1893; honorary member Royal Australasian Ornithological Union and in 1914 elected by that society to be delegate British Association for the Advance¬ ment of Science, Melbourne. He is author of nearly 1,300 titles (10,000 illustrations) to books, memoirs, papers, articles, etc., devoted to ornithology, anatomy and physiology of the ver- tebrata ; osteology of birds, mammals and fishes ; nature study, art, travel, photography, taxidermy, medico-legal studies, medicine and surgery, reptiles, fossil animals, zoological gar¬ dens and their management, psychology, sociol¬ ogy, popular botany, reviews and critiques, etc., with formal works on (The Negro) ; (Studies of the Human Form5 ; (Myology of the Raven5 ; (Chapters on the Natural History of the United States5 ; Osteology of Birds,5 etc.

SHULL, George Harrison, American bot¬ anist : b. Clark County, Ohio, 15 April 1874. He was graduated at Antioch College in 1901 and took his Ph.D. at the University of Chicago in 1904. He was botanical expert at the United States Bureau of Plant Industry in 1902-04; assistant in plant physiology at the University of Chicago in 1903—04 ; botanical investigator at the stations for experimental investigation at Carnegie Institute, Washington, and at Cold

Spring Harbor in 1904—15; and has since been professor of botany and genetics at Princeton University. He is managing editor of Genetics and associate editor of the genetics department of Botanical Abstracts.

SHUMAGIN (sho'ma-gen) ISLANDS, Alaska, a group of islands 'south of the Alaska Peninsula, 150 miles east of its tip and 950 miles southwest of Sitka. They were discovered by Bering in 1741. The island Unga is the head¬ quarters of the Alaskan cod-fishing industry. Fox-farming is projected for several of the islands.

SHUMLA, shoom'la, or SCHUMNA, Bul¬ garia, a town 56 miles west of Varna, sur¬ rounded by the hills of the Balkans. It is by the formation of its surroundings a natural stronghold. A series of outworks, strong re¬ doubts, a citadel and batteries have been added to its defense. Furthermore several roads, mili¬ tary and otherwise, radiating from this point, lend to it additional importance. Much busi¬ ness is transacted around the large square. In¬ teresting features are the mosques; a fine mau¬ soleum (18th century) of the Grand Vizier Djezzar-Hassan-Pasha ; the barracks and the baths. Shumla is the residence of a Greek arch¬ bishop. The railroad station bears the name of ((Shumla Road,® a legacy of the English engi¬ neers who built the line between Rustchuck and Varna. There are important manufactures of copper, silk, leather, clothing and slippers, and an extensive trade. The Russians made three unsuccessful attempts to capture the town; it capitulated, however, in 1878. Pop. 23,000.

SHUNT. See Electrical Terms.

SHURTLEFF, Roswell Morse, American artist: fc>. Rindge, N. H., 14 June 1838; d. 6 Tune 1915. He was graduated at Dartmouth College in 1851 ; worked at lithography and drawing on wood till 1861, when he enlisted with the 99th New York Volunteers, of which he became lieutenant and adjutant. He was the first Union officer wounded and taken prisoner in the war, 19 July 1861, and was not released until after nearly eight months'

im¬ prisonment. Illustration of books and maga¬ zines absorbed his efforts for many years, but he began to paint in 1870 and executed numer¬ ous landscapes in both water and oil, largely transcripts of scenery in the Adirondacks.

SHURTLEFF COLLEGE, located at Al¬ ton, Ill. It was founded by the Baptists and first opened to students in 1827. John M. Peck, the first Baptist Home Missionary to the West, was one of the most active agents in its found¬ ing. The organization includes a preparatory department, a collegiate department and a con¬ servatory of music. There are three regular college courses, leading to the degrees of A.B., B.S., and Ph.B., respectively. All departments are coeducational. The buildings and grounds are valued at $105,221 ; the productive funds amount to $175,908.18 and the annual income amounts to $26,766.26. The library contains 20,000 volumes and the enrolment shows 126 students.

SHUSHWAP, shoo'swop (correctly Se- quapmug) , North American Indian tribe of Salishan stock, living in British Columbia be¬ tween Fraser River and the Rocky Mountain Divide, and between the Quesnelle and Thomp¬

son rivers. They are the most important Salishan tribe of British Columbia, and are neighbors on the north of the Athapascan tribe of Tsilkotin, and on the south of the Salishan tribes of Okanagan, Ntlakyapamuk and Lillooet. They occupy villages which are reservations under the Okanagan and Williams Lake agen¬ cies. They built circular, underground houses, did not follow the clan system and their women were skilled in weaving baskets and matting. Their numbers dwindled to about half after the country was opened by the miners, but are now slightly on the increase. They are for the most part civilized and Christians.

SHUSTER, William Morgan, American lawyer and financial expert : b. Washington, D. C., 23 Feb. 1877. He was' educated at the Columbian (now the George Washington) Uni¬ versity, and in 1899-1906 was in the United States Customs Service in Cuba and in the Philippines. In 1906-09 he was a member of the Philippine Commission and secretary of public instruction in the Philippine Islands. From May 1911 until January 1912 he was Treas¬ urer-General and financial adviser to Persia. He became involved in difficulties through his determined opposition to Russian intrigue in Persia, however, and was forced to resign, the circumstances at the time attracting world-wide attention. He has been connected with the pub¬ lishing house, the Century Company, since 1915. Author of (The Strangling of Persia5 (1912).

SHUSTER, shoos'ter, or SHtiSHTAR,

Persia, in the province of Khuzistan, on the Karun, 250 miles southwest of Ispahan. It is a walled town, defended by a castle. It is favorably situated for commerce. The houses, of stone, are built with two stories under¬ ground. Wandering tribes, which generally camp with their flocks and herds in the vicinity during the winter, add considerably to the popu¬ lation. The inhabitants are noted for their hos¬ pitality. The site of the ancient Susa is not far from Shuster. Pop. about 18,000.

SHUTE, Henry Augustus, American au¬ thor: b. Exeter, N. H., 17 Nov. 1856. He was graduated at Harvard University in 1879, was admitted to the bar in 1882 and from 1883 was police justice at Exeter. He is known for his humorous books, chiefly delineating boy char¬ acter, but written for adults. Author of (The Real Diary of a Real Boy5 (1902) ; (Letters to Beany and Love Letters of Plupy Shute5 (1905); (Real Boys5 (1905); (A Profane and Somewhat Unreliable History of Exeter5 (1907); (A Country Lawyer5 (1911); (Plupy ((the Real Boy55 5 (191 1) ; (The Mis-adventures of Three Good Boys5 (1914) ; (The Youth of Plupy5 (1917) ; (The Lad With the Downy Chin5 (1917), etc.

SHUT-IN SOCIETY, an American or¬ ganization established in order to soften the lot of invalids by supplying various desirable ob¬ jects which might otherwise be unattainable. Local societies, besides supplying their sick members with fruit, flowers, reading material, medicines and nourishing foods, also undertake to supply easy chairs and other helps to con¬ valescence.

SHUTTER, Marion Daniel, American Universalist clergyman : b. New Philadelphia, Ohio, 4 Aug. 1853. He was graduated from the

University of Wooster, Ohio, in 1876, from the Baptist Theological Seminary, Chicago, in 1881, and was ordained in the Baptist ministry. He was in charge of the Olivet Baptist Church, Minneapolis, for some years, but afterward changed his views and became pastor of the First Universalist Church there. He has pub¬ lished (Wit and Humor of the Bible > (1892) ; justice and Mercy) (1894) ; (Applied Evolu¬ tion (1900) ; (The Way the Preachers Pray) (1900) ; (Life of James Harvey Tuttle) (1905) ;

(Report of the Minneapolis Vice Commission (1910), etc.

SHUTTLE, an instrument used by weav¬ ers for shooting or passing the thread of the weft from one side of the web to the other, between the threads of the warp. It is a boat¬ shaped piece of wood which carries a

bobbin or cop containing the yarn of the weft or woof. The shuttle sometimes has wheels to facilitate its motion.

In a sewing machine, the sliding thread- holder which carries the lower thread between the needle and the upper thread, to make a lock stitch. In hydraulic engineering, the gate which opens to allow the water to flow onto a wheel. That side of the wheel which receives the water is known as the shuttle side.

SHUTTLEWORTH, Edward Bucking¬ ham, Canadian bacteriologist and chemist: b. Sheffield, England, 1842. He was educated at Dublin and at the Royal School of Mines, and removing to Toronto, Canada, became identified with the development of the chemical industry there. In 1866 he was one of the founders of the Canadian Pharmaceutical Society which later became the College of Pharmacy, in which Shuttleworth was dean and professor of chem¬ istry in 1882-91. He was also a member of the medical faculties of Victoria and Trinity uni¬ versities, and of the Ontario Medical College for Women. He was city bacteriologist of Toronto for some years prior to his retirement in 1907.

SHYLOCK, a character in Shakespeare's (Merchant of Venice. > He lends Antonio, a merchant of Venice, 3,000 ducats on condition that in the failure to pay in three months the forfeit shall be a pound of the merchant's flesh cut off wherever Shylock chooses. His purpose is defeated by Portia, representing a young law¬ yer equipped with the opinion of Bellario, a learned doctor of Padua. Up to the time of Macklin, who played Shylock in 1741, the part had been always represented by the low come¬ dian, and was given a broadly humorous inter¬ pretation. Macklin invested it with tragic quali¬ ties and represented the Jew as a revengeful, inexorable money lender. In 1814 Edmund Keane presented the part so as to elicit sym¬ pathy for one who was ill-used by circum¬ stances. Modern opinion concurs in that he was the victim of a quibble and that even on the point of his conspiracy against the state his conviction was of doubtful propriety.

SI-KIANG, se-ke-ang', or WEST RIVER,

China, the most important of the streams which unite to form the Canton River. It rises in the province of Kwang-si, and is navigable for ves¬ sels drawing 12 feet 75 miles from the sea. It is also called the Blue River, from the remark¬ able purity and clearness of its waters. By it are conveyed the sugarcanes that grow in the

vicinity, as well as the rafts of timber from the forests of Kwang-si to the markets of Canton.

SIA (se'a) INDIANS, a Pueblo tribe of New Mexico. See Queres.

SIALOGOGUE, any medicine which pro¬ motes the flow of saliva. Such medicines are either vegetable or mineral. The former em¬ brace most of the pungent plants, particularly sorrel, tobacco, pellitory root and mezereon; the latter, several of the metals, when taken constitutionally, especially mercury. The first are called masticatories, because the effect is produced merely by chewing.

SIAM, si-am' or se-am', a country of east¬ ern Asia, on the peninsula of Indo-China, ex¬ tending between 4° and 21° N. lat. and be¬ tween 97° and 106° E. long., lies between French Indo-China on the northeast and east and British Burma on the northwest, with the Gulf of Siam on the south. The greatest length of the country is over 1,000 miles from north to south, and lover 500 miles from east to west; total area, about 200,000 square miles. A natural boundary is the range of mountains extending from north to south along the fron¬ tier of Lower Burma to the Malay Peninsula. There are also mountains to the north, while great fertile plains stretch toward the south, mainly drained by the Menam and its tribu¬ taries. On the 1,700 miles of coast line there are several fine harbors. The most important part of Siam lies in the valley of the Menam, the country of the true Siamese. The bound¬ aries on the Bay of Bengal reach from Burma in a southerly line to the northern frontier of Kelantan and Kedah in the Malay Peninsula in the latitude of about 7° S. The island of Junck Salong, separated from the mainland by the Pak Phra Strait, is rich in tin ore de¬ posits and belongs to Siam. The principal river is the Menam (((mother of waters®), which rises in the mountains and runs a course of 600 miles, being fed by the waters of the Me- ping, the Me-ing, the Me-Wang, the Me-mam- fe and numerous smaller streams. It falls into the Gulf of Siam by three channels 18 miles below Bangkok. The Meklong and the Bangpakong flow into the Gulf of Siam, while the Mekong, the greatest river of the Siam Peninsula, has a great part of its course along Siamese territory, but navigation for vessels of any size is impeded by rapids. This river is usually identified with the Lan-tsan, which rises near Chiamdo in Tibet and flows for 2,800 miles in a generally southward direction to the China Sea, which it enters by several mouths in Cochin China, a country formed by its deltaic deposits. Formerly the Lai Mountains were claimed as the eastern boundary, but in 1893 the French pressed the claims of Annam to the territory between the mountains and the river, and the Siamese were compelled to retire, since when the Mekong forms in great part the boundary between Siam and Indo-China. Other rivers are the Tachin in the west and the Salwin along the northwest boundary. The Menam annually overflows its banks in the plains and covers them with a thick layer of fertile soil, in the same way as the Nile. The plain of the Menam Valley, the adjoining eastern coast and the Korat Plateau (from 400 to 1,000 feet

high)

occupy the greater part of the country. These plains are fringed by hills up to 5,000 feet high. Only the land adjoining the rivers is under cultivation ; a great part of the country is Govered with thick jungle. Geographically Siam falls into three well-defined regions : the mountainous region west and northwest ; the great central plateau extending to the sea on the south ; and Lower Siam, a narrow strip of land from 40 to 100 miles wide and forming the northern part of the Malay Peninsula.

Climate. — A tropical climate prevails in Siam. Though it varies with the latitude and elevation .of its surface, there are but two sea¬ sons — the wet and the dry. The former ex¬ tends from May to October, when the south¬ west trade wind blows; the latter from Novem¬ ber to April, with a continuously clear sky. The annual average temperature is 82° F. The heat increases during February and March, reaching to over 100° in April, the hottest month. The coolest period is between Novem¬ ber and January, when the thermometer often goes down to 62°. Work is suspended during the hot hours of the day. The heaviest rain¬ fall occurs in July and August, which months also are extremely hot. For foreign visitors the climate is unhealthy owing to the many kinds of epidemics, especially malaria, which prevails in the jungle regions. The best months for visiting Siam are between November and January.

Minerals. — Gold is extensively diffused and is obtained in tolerable purity. Copper, iron, – tin, precious stones, coal and nitrate deposits are found in different parts. European gold prospectors have met with little success, owing to climatic and other difficulties. The few gold miines now actually worked are owned by Chinese and are situated chiefly in the Malay Peninsula. Northern Siam formerly produced a considerably quantity of iron, but very little is now extracted ; all that is used in the coun¬ try is imported. The coal is of poor quality. Rubies and sapphires are found in plenty, mainly in the southeast of Chantaburi province. Siamese sapphires enjoy a world-wide reputa¬ tion for excellence. The only large output of mineral is tin, the principal mines for which being those of Puket Island, Takuapa, Panga, Trang and Gherbi on the west coast of the Malay Peninsula, and of Nakon, Rahman, Sritamaraj and Jalar on the east coast. Zinc and antimony are also found east of the Menam.

Vegetation. — Rice and maize are the grains most extensively cultivated in the country. Of the tropical farinaceous roots the Siamese raise the usual

varieties, and among others the sweet- potato. Cocoa and areca palms are numerous, especially the former, in the lower districts, and the oil is extensively exported. No part of the East is more celebrated for the abundance and quality of its fruits. The mango, man- gosteen, litchi, durian, pomegranate, guava, pine¬ apple, and, in short all the fruits of southeast¬ ern Asia, the Indian Islands and tropical Amer¬ ica, are abundant and of exquisite quality. The cultivation of the sugarcane is carried on on an extensive scale. Black pepper of good qual¬ ity, tobacco and cotton of several sorts are largely produced. Sappan-wood is procured extensively from the forests between lat. 10°

and 13°, and in point of quantity it forms one of the most considerable of the Siamese ex¬ ports. Excellent teak-timber abounds in the forests of Upper Siam and is much used in the construction of junks and temples. There is also a large foreign demand for it as timber for shipbuilding.

Animals. — Among carnivorous animals are the tiger and leopard, the bear, otter, the musk- civet, the cat and the dog, both wild and do¬ mestic. The celebrated Laos cats, with light chocolate-colored hair and blue eyes, are a Siamese product. Porcupines, squirrels, rats and mice are common. The orang-utan and other species of apes are abundant. Among the ruminating quadrupeds are found seven species of deer, the sheep, goat, ox and buffalo. The single-horned rhinoceros is met with in unusual numbers and is hunted for its hide and horn, both of which are exported to China. The principal boast of the Siamese, however, is in the high perfection of their elephants, which here attain a size and beauty elsewhere unknown, and are held in high esteem through¬ out India. Ordinary elephants are employed in heavy labor, but the white (really light ashy- gray) elephant, Chang Phenak or Albino ele¬ phant, is a sacred animal and is worshipped as such by all classes of the people; in fact, that worship is now confined to Siam, having died out in India and elsewhere. The well-known Siamese red flag, with a white elephant, was abolished in 1918. Among the birds the water- birds and waders are by far the most numerous; geese, ducks, boobies, cormorants, king-fishers, storks and pelicans are frequent; the forests abound with peacocks, pheasants and pigeons, and in the islands are large flocks of the swal¬ lows that produce the famed edible birds'- nests. Crocodiles, geckoes and other kinds of lizards, tortoises and green- turtles are numer¬ ous, the last of which, as well as their eggs, are in great request among the Siamese as an article of food, and from their sale add not in¬ considerably to the royal revenue. The python serpent attains an immense size and there are many species of snakes. The fish of the Menam are abundant.

Population. — The capital of Siam is Bang¬ kok (q.v.), with a population of nearly 630,000. The first complete census of the country was taken in

1909; the latest available statistics estimate the total population at about 8,500,000, of whom about 500,000 are Chinese. Some au¬ thorities even place the number of Chinese as high as 1,000,000. Besides these and the pure Siamese the inhabitants include Laos, Burmese, Cambodians, Malayans and Annamese. all mem¬ bers of the great Mongolian family. These are generally not temporary sojourners in the land, but fixed residents, in many cases the descend¬ ants of people who settled there centuries ago. They are now hardly distinguishable from the Siamese natives. There are also cross-breeds between these different races and between them and the pure Siamese stock, which is estimated at about 2,000,000 of the entire population. In stature they do not average more than five feet three inches in height; they have a lighter- colored skin than the western Asiatics, but darker than the Chinese. They are inclined to obesity, have large lower limbs and stout, long arms ; yet they are by no means a strong or

robust race. Their faces are broad and flat, with round prominent cheek-bones, a small nose obtusely pointed and rather hollow at the bridge, a large mouth and rather thick lips, the lower jaw long and square at the back, small black eyes, a low forehead and very scanty beard. Their hair is always black, thick, coarse and loose, worn close by both sexes, except from the forehead to the crown, where it is about two inches long and made to stand erect. The children's heads are shaven, even just after birth, except at a small spot near the forehead, where a small tuft of hair is left. As this grows longer it is plaited and fastened with metal pins, which are jeweled among the wealthy. This tuft is shaved off cn reaching the 11th year (adolescence), both in the case of boys and girls, a ceremony which forms an important event in the familv his¬ tory, being performed on an auspicious (as¬ trological) day by some prominent personage in the town or village. In the royal family the king performs this tonsorial operation himself. The customary marriage age is 17 or 18 for young men and 14 to 15 for girls. Weddings are conducted with much pomp and ceremonial. Polygamy is permitted, but the first wife re¬ tains a position of pre-eminence over the others. Monogamy is the custom among the lower orders and especially among those of the upper classes who have received a European educa¬ tion. Disposal of the dead is by cremation, except in the cases of those who have died an unnatural death, within which category the victims of epidemics were formerly included. Immediately after death the body is externally embalmed, placed in a large jar, which is sealed up, and preserved in the house for some months before the cremation takes place in accordance with Buddhist rites. The final ceremony is carried out

amid rejoicing, theatricals and fire¬ works to cheer the soul of the departed.

The dress both of men and women consists of the panting, a yard-wide piece of cloth three yards long, which is wound round the waist so that it hangs down and covers the thighs. Most of this cloth, formerly homespun, is now ma¬ chine-made and imported from Great Britain and India. Silk is used instead of cotton by the wealthy and nobility; the ladies of the court have panungs of seven different colors, one for each day of the week. Those who can afford to wear shoes and stockings ; the ma¬ jority go bare-footed.

The staple foods are rice and fish, with which a small quantity of hot water or tea is taken. The food is placed in dishes on the floor; the family squat around these and eat with their fingers. Spoons, forks and knives are used by the upper classes. Foreign drinks are confined to a very limited circle ; the in¬ toxicating beverage of the people is arak, which is brewed from rice or sugar. Opium is less popular than in China ; it was prohibited in 1838, but is now a government monopoly. To¬ bacco is more commonly used for chewing than smoking. Betel-nut chewing is a habit com¬ mon to all women ; at banquets it takes the place of dessert.

Theatres, moving-picture shows and open- air sports such as kite-flying and football are very popular among the Siamese, who also patronize cock-fighting and fish-fighting ex¬

hibitions in large numbers, at which much bet¬ ting is done in ((backing favorites." Gambling houses and lotteries run by Chinese do a highly-profitable business and contribute large sums to the revenue. The great festival of the year is the birthday of Buddha and lasts three days. It comes about a week after New Year's Day, the latter falling on the first of April. The first day is devoted to feasting, the second to religious exercises, and the third to games, en¬ tertainments and gambling. All the different races in the country participate in this festival. The Ten Nam or (

Religions. — The state religion is Buddhism, to which creed nearly all the people subscribe. Every other faith, however, is welcomed, whether Christianity, Hinduism or Islam. Land is readily granted for the erection of churches, mosques and temples. Religious persecution is not — and never has been — known in Siam. Buddhism was introduced from India between the 5th and 6th centuries a.d. in the form of the so-called Great Vehicle School — such as is now observed in China, Japan and Tibet. Since 1044, when the doctrine of the Small Vehicle School, compiled by King Parakkamabahn of Ceylon, was translated into Siamese, the people finally adopted Southern Buddhism as is also practised in Burma, Cambodia and

Ceylon (see Buddhism). There are about 10,000 monas¬ teries in Siam, with about 300,000 inmates. It is customary for every man to spend some time under monastic discipline, whether in youth, middle or old age. Some stay for a few months, some for several years and others for life. The inmates are graded according to attainments in scholarships. The two great branches of Christianity number many con¬ verts. The Roman Catholic mission began its labors in 1660 and has now about 50 churches in the country. The American Presbyterians also maintain an active mission.

Language.— The Siamese language is based on the Sanskrit, Chinese, Cambodian, Laos and Malay languages. Most of the words are mono¬ syllable and are pronounced, as in Chinese, with different intonations or inflexions of the voice. There are five of these vocal accents, which are indicated by signs. Thus the same word, when pronounced in five different tones, has five different meanings, e.g., the word written song means, according to inflexion, <(envelope," ((to shine," ((to hide," (

Government. — Siam is the only independ¬ ent country on the Indo-China Peninsula; it is an absolute monarchy without a constitution. The king rules with the aid of a Cabinet (Senabodi) made up of nine Ministers, Foreign, Interior, War, Navy, Local Government, Justice, Finance, Education and Agriculture., Most of these offices are held by members of the royal family. Together with other members the coun¬ cil numbers about 40 officials. They are as¬ sisted by British and other foreign advisers.

For administrative purposes the country is di¬ vided into the metropolitan district of Bang¬ kok (Krung Teb) and 17 monton or provinces : (1) Krung Kao, (2) Chantaburi, (3) Surat or Chumporn, (4) Nakorn Chaisri, (5) Nakorn Rajasima or Korat, (6) Nakorn Sawan, (7) Nakorn Sritamara, (8) Patani, (9) Prachinburi, (10) Pitsanulok, (11) Payab, (12) Petchaburi, (13) Puket, (14) Rajaburi, (15) Roi Et, (16) Ubon Rajatani, (17) Udorn. A high com¬ missioner governs each of the provinces and the district by royal authority. Each commis¬ sioner has several subordinate muang gov¬ ernors under him, while tributary districts are ruled by their own chiefs. The financial ad¬ viser to the government is usually a British officer.

Justice. — The judicial system consists of a primary or Muang Court and a higher Monton Court in each province ; the Court of Appeal and the Dika (Supreme) Court sit in Bang¬ kok, where there is also a Court of Foreign Causes, to decide disputes between foreigners and between them and the

natives.

Education. — From early ages a system of elementary education has been conducted in the monasteries by the Buddhist monks. A modern system has been introduced in recent years, which is operative as yet only in the capital, whence a number of students are sent abroad every year. Steps were taken in 1917 to establish a university at Bangkok.

Defense. — Conscription on the European model obtains, but with numerous legal exemp¬ tions, while the uncivilized tribes are not called on to serve. The army consists of 10 divisions, each of two infantry and one cavalry regi¬ ments, two four-gun batteries and an engineer battalion. The peace strength is about 12,000 men. The navy is composed of 25 ships, mainly small gunboats of little fighting value. About 5,000 men are available for service, while some 20,000 are in the reserve. Most of the vessels are Japanese-built.

Communications. — There are state and pri¬ vate railroads in Siam, with a mileage of about 1,300. The former are the North Siam Lines, from Bangkok to Korat; the Eastern Line from Bangkok to Petriu; the River Line, within Bangkok; the Sawankaloke Line, Northern Line and South Siam lines. The private lines are the Paknam Light Railway, Meklong Rail¬ way and the Prabat Line, which was built and is owned by a Siamese. There is little traffic and trains run only in the daytime.

Shipping. — The Siam Navigation Company run two coastwise lines from Bangkok. As most of the towns are on the river, there is a heavy river and canal traffic carried on in native boats. Many foreign vessels enter the port of Bangkok every year, while a Siamese company maintains a regular service between the capital and Hongkong and the southern China ports since 1909.

Commerce and Industries. — Most of the internal trade of Siam is in the hands of Chinese. Foreigners (Europeans) control prac¬ tically the whole foreign trade. Agriculture is the principal industry, and rice the chief prod¬ uct, which is exported in large quantities. For other products, see sections, Minerals; Vegeta¬ tion. The Siamese have made but little progress in the useful arts. House-carpentry, canoe and junk-building, manufacturing pottery and coarse

cutlery, leather-dressing and the construction of musical instruments are their chief mechani¬ cal employments. A few rude hand-looms are in operation, chiefly worked by women, but the fabrics, whether of silk or cotton, are of coarse quality. Their domestic architecture is in an equally rude and backward state — the houses of the lower orders being formed wholly of wood or bamboo, roofed with palm-leaves and mostly raised on

piles, as in the rest of ultra- Gangetic India. Not many houses in the capi¬ tal are built with brick and mortar. Many of their houses, too, are constructed on boats, which abound on the river near Bangkok.

History. — Siam appears to have no place in history prior to 638 a.d., and the credible rec¬ ords go back only to 1350, the date of the foundation of Ayuthia, the old capital, on the Menam, about 60 miles above its mouth. In 1612 an English ship ascended this river as far as Ayuthia, eight years after which the Portuguese sent thither their first missionaries.

In 1689 Constantine Phaulcon, an enterprising Greek, became Prime Minister, and introduced a respect for European customs and notions. Mutual embassies were at this period sent be¬ tween Siam and the court of France, with which Phaulcon intrigued to bring about a revolution. This led to his downfall and death, as well as the expulsion of the French. Con¬ tests for the throne distracted the country from 1690 till 1759; during which interval Alompra, the victorious ruler of Burma, overran the whole valley of the Menam. The country was afterward wrested from the Burmese by Pye- ya-tak or Phyatak, who was of Chinese ex¬ traction, at the head of a number of natives. . He planted himself on the throne and with a view to commerce made Bangkok the metrop¬ olis, instead of Ayuthia. Being a cruel ruler he was murdered by his general, Chakri, who himself seized the throne in 1782 and was the founder of the present reigning dynasty. Maha Mong-Kut, who ascended the throne in 1851 and died in 1868, was a man of science and energy. He was succeeded by King Chulalong- lcorn I, who died 23 Oct. 1910. The present king is Chowfa Maha Vajiravudh (b. 1881). Siam declared war on Germany and Austria on 22 July 1917 and seized all German vessels King in Siamese harbors. All Germans and Austrians were arrested and their businesses closed.

Bibliography.— Anderson, J., < English In¬ tercourse with Siam in the 1 7 th Century5 (London 1890) ; Besso, S., (Siam and China> (ib. 1914) ; Bock, C., (Temples and Elephants5 (ib. 1884) ; Campbell, J. G. D., (Siam in the 20th Century5 (ib. 1902) ; Carter, A. C., (The Kingdom of Siam5 (ib. and New York 1904) ; Clifford, H., (Further India: Exploration in Burma and Siam5 (London 1904) ; Colquhoun,

A. R., (Among the Shans5 (ib. 1885) ; Cort,

M. L.,

(Directory and Chronicle of the Far East> (Hongkong) ; (Directory of Bangkok and Siam5 (Bangkok Times, Annual) ; Elias, F., (The Gorgeous East5 (1913) ; Fournereau, L., (Le Siam ancien5 (2 parts, Paris 1895, 1908) ; Graham, W. A., (Siam: a handbook of prac¬ tical information5

(London 1912) ; Hesse-

Wartegg, E. von, (Das Reich des weissen Ele- fanten> (Leipzig 1899) ; Hosseus, C. C., (Durch Konig Tschulalongkorns Reich: Eine deutsche Siam-Expedition (Stuttgart 1913) ; Lajon- quiere, L. de, (Essai d'inventaire archeologique du Siam) (Commission Archeologique de lTndo-China, Bulletin, 1912) ; Lemire, C., (La France et le Siam: Nos relations de 1662 a

1903) (Saint Etienne 1903) ; Little, A. J., (The Far East5 (London 1905) ; Loti, Pierre,

1904) ; Satow, Sir E. M., (Essay toward a Bibliography of Siam5 (Singapore 1886) ; Smyth, H. W., (Five Years in Siam5 (2 vols., London 1898) ; Sommerville, M., (Siam on the Meinam5 (ib. 1897) ; Thompson, P. A.,

Siamese Language. — Bradley, C. B., the Proximate Source of the Siamese Language5 (Bangkok 1913) ; Cartwright, B. O., hand¬ book of the Siamese Language5 (ib. 1906) and (Siamese-English Dictionary5 (ib. 1907) ; Ewald, L.,

Henri F. Klein,

Editorial Staff of the Americana.

SIAM, Gulf of, East India, a large arm of the China Sea, bounded by the Malay Penin¬ sula on the west, and by Siam and French Indo-China on the east. It is about 400 miles long and 250 miles wide, but very shallow, being nowhere more than 300 feet in depth . The large delta of the Mekong is steadily encroach¬ ing on its waters.

SIAMANG. See Gibbon.

SIAMESE (si-a-mes' or mez') TWINS: b. Bangesau, Siam, 15 April 1811; d. Mount Airy, N. C., 17 Jan. 1874. The name given to two individuals of Chinese extraction, named Chang and Eng, who from the manner of their physiological connection were regarded as ex¬ amples of interior duplicity.55 They grew to be about five feet two inches in height, could walk, run and swim. In April 1829 they were brought to America and exhibited throughout the United States and later in Europe. They finally settled at Mount Airy and lived there until their death.

SIAN-FU, provincial capital of Shensi, N. W. China, often erroneously called Si-ngan- fu, Sin-gan-fu, Hsian-fu ; formerly called Chang-an. Once the important capital of the Tang Dynasty. The city became famous through the discovery in 1625 near the western suburban gate of the ((Nestorian Monument,55 dated 781, a two-ton limestone stela, 10 feet high, with an inscription of more than 2,000 charac¬ ters in Chinese and Syriac (Estrangelo). The inscription tells of the arrival in 635 of Nestorian missionaries from Syria, who were well received by Emperor Taitsung. In 1907 the Danish explorer, Fritz von Holm, set out to try and procure the Tablet for science, but the mandarins at Sian-fu caused the stone to be removed into the Peilin or ((Stone Coppice55 in¬ side the city walls where it would be safe and under roof. The Holm expedition thus preserved the stela for all ages, but it furthermore ob¬ tained a perfect limestone replica of the monu¬ ment, 10 feet high and weighing two tons, which was brought to New York, where it was placed as a loan in the Metropolitan Mu¬ seum of Art. ((Chingchiaopi55 is the Chinese name of the Tablet. Sian-fu was again the capital of China for nine months, in 1900-01, when the late emperor and empress-dowager fled thither from Peking during the Boxer troubles. The population is about 1,000,000.

SIARGAO, se-ar-ga'o, an island of the Philippines, 20 miles from the northest coast of Mindanao; length, 20 miles, north and south; width, 14 miles; area, 176 square miles. It is traversed from north to south by a mountain range, the highest peaks of which are in the south. The northern, southern and western coasts are paralleled by a reef lying three miles off shore; the ports on the coast are reached by natural channels through this reef. The island has seven towns, several hamlets and a con¬ siderable rural popuation.

sibal(5n, se-ba-lon', Philippines, pueblo, province of Antique, island of Panay, on the Sibalon River, six miles from its mouth, 10 miles northeast of San Jose de Buenavi$ta. Pop. 11,680.

SIBBALD'S or BLUE WHALE. See

Whale.

SIBELIUS, se-ba li-us, Jean, Finnish com¬ poser: b. Tavastehus in the government of the same name, 8 Dec. 1865. He studied under Wegelius at Helsingfors, Becker at Berlin, and Goldmark and Fuchs at Vienna. Since 1893 he has been professor at the Institute of Helsing¬ fors. His work as a composer has placed him at the head of living Finnish masters and he is regarded as a worthy successor of the greatest names in the history of Finnish music. He is regarded as the founder of Finnish national music and his work is singularly free from the influence of foreign composers. His

composi¬ tions are strong, passionate, mystic and at times even weird and not easy of comprehension to those unacquainted with Finnish character and history. He is thoroughly imbued with the music of the native folk songs, and while he never definitely follows themes of the folk music he rarely strays away from its influence. Particularly is this noticeable in his use of five-four rhythm and of the repetition of single notes, both characteristic of the native music.

Among his works are symphonies in E and in D; (The Swan Song of Tuonela) ; (Suite Karelia ; (Kuolema) ; (Suite Pelleas and*

*Melisande) ; the Finnish opera (The Maid in the Tower * ; Violin concerto in D, and many songs, symphonic poems, and pieces for piano and orchestra.*

SIBERIA, sl-be'ri-a, a vast district of Rus¬ sia, east of the Ural Mountains and the Caspian Sea, extending uninterruptedly from the Urals eastward across 130° of the meri¬ dian to the Pacific Ocean, thus occupying the whole of northern Asia above lat. 50° N., lying mainly between 46° and 78° N. lat. and 60° and 190° E. long. Siberia is bounded on the north by the Arctic Ocean ; on the east by the Bering Strait, North Pacific Ocean, Sea of Okhotsk and the Sea of Japan; on the west by the Ural Mountains and European Russia; and on the south by an irregular fnontier line of ever 6,000 miles separating it from Persia, Afghanistan and the Chinese territories. Siberia stretches from Orsk for over 4,200 miles northeastward to Cape Vostochni on Bering Strait, and from Cape Severo (Chelyus¬ kin) for about 2,000 miles southward to the Tarbagatai range, with a total area estimated at 4,831,882 square miles, and a population of close on 11,000,000. In superficial area — ac¬ cording to these figures — Siberia has 1,214,209 square miles more than the United States and 1,031,882 square miles more than Europe. Since the extension of the Russian dominions in cen¬ tral Asia a territorial division called Central Asia has been formed partly taken from what was formerly Siberia, partly formed of newly- acquired territory, and comprising the geo¬ graphical regions subdivided into provinces, of northern Caucasia and Trans-Caucasia, forming the Caucasus; area, 181,173 square miles, with a population of nearly 13,000,000; the four provinces of the Steppes, with an area of 710,- 905 square miles and a population of nearly 4,000,000; and the four provinces of Turkestan, area, 420,807 suqare miles, population, 6,613,600, and, finally, the Trans-Caspian provinces, area, 235,120 square miles, population, 535,000. Some authorities give the area of

Trans-Caspia as 214,237 square miles. The total area of Asiatic Russia is approximately 6,294,120 square miles, with a population of about 28,500,000. Siberia, strictly so-called, is, therefore, of much smaller extent than formerly. The administrative divi¬ sions .of the whole territory with their separate population, are exhibited in the table given under Russia (q.v.).

Topography. — So vast a region is naturally of very diversified configuration. Whereas the southwestern part is entirely lowland, the south¬ ern and eastern portions comprise considerable highland tracts. The coast line (19,300 miles) is very extensive, but the Arctic Ocean is ice¬ bound at least 10 months out of the 12 and is almost valueless for oommercial purposes, while the Sea of Okhotsk, on the Pacific, is infested with masses of floating ice and dense fogs dur¬ ing several months of the year. Asiatic Rus¬ sia in the extreme southwest is partly below the level of the ocean, and is drained either into the Caspian, or by the Amu Daria and Sir Daria into the Aral. A large part of this region is desert, and the soil is frequently im¬ pregnated with salt. Taking the meridian of

105° as a line of demarcation, two regions will be formed — a western and an eastern, exhibit¬ ing a very marked difference in the configu¬ ration of their surface. Both regions have their greatest altitude in the south, and may be con¬ sidered as a vast inclined plane, sloping grad¬ ually north to the Arctic Ocean ; but the eastern region is traversed in different directions by several mountain regions, whereas the western region, with the exception of the chain of the Ural on the western, and that of the Altai on the southern frontiers, forms a vast plain, al¬ most unbroken by any greater heights than a few hills and the banks of the rivers which wind across it. This plain, toward the south, has a height of about 2,000 feet above the sea, but toward the north is so near its level as often to become extensively inundated. For convenience of description it has been arranged, according to its productive powers, in four di¬ visions — the steppe or pastoral, the agricultural, the woody, and the moorland or tundra. The steppe, occupying the most elevated part of the plain, extends from the southern frontiers north to lat. 55°; and from the western frontiers, within these limits, east to 'the banks of the Irtish. The greater part of it consists of what is called the Steppe of Ishim, and has a bare and almost sterile surface, often incrusted with salt, but also occasionally covered with a scanty vegetation. The agricultural division extends northward to about lat. 60°. In many parts, where it borders on the steppe, it has much of the same character, and has only occasional tracts which have been or can be advantage¬ ously brought under the plow ; and in many other parts primeval forests are often found. The division thus named under favorable circumstances might furnish subsistence to a very large population; but as yet it is only the more fertile alluvial tracts adjacent to the rivers that have

been brought under anything like regular culture. Within this division, though not properly belonging to it, is the Steppe of Baraba, situated between the Irtish and the Obi. It has a more abundant vegetation than the Steppe of Ishim, which it otherwise re¬ sembles, and in its northern portion is covered with nearly continuous forests of birch and fir, haunted by numerous wild animals, includ¬ ing the beaver. From this the wooded di¬ vision extends northward to lat. 64°, and in parts to 66°, though in the higher latitude the trees are seldom of very vigorous growth. The whole of this division is covered with vast forests of birch and different species of fir and pine. The population, few in numbers, are settled chiefly on the banks of the Obi and Yenisei, and live mainly on game and fish ; the latter, including salmon, sturgeon and herrings, ascending from the sea as far as the confluence of the Tom. Wild animals also are very numerous, and many valuable furs are obtained. The last di¬ vision is that of the moorland or tundra, con¬ sisting of a low monotonous flat covered with moss, and nearly destitute of trees. It extends along the shores of the Arctic Ocean, and has so rigorous a climate that even in summer ice is found a few inches below the surface. Here the reindeer exists in vast herds, both wild and domesticated ; white bears and foxes are also numerous and furnish valuable furs; and the

coasts and mouths of the rivers are frequented by immense shoals of fish and flocks of fowl.

Siberia to the east of long. 105°, forming nearly one-half of the whole territory, has a much more diversified surface than the western region, and owing partly to its general rugged¬ ness and elevation, and partly to the greater severity of its climate, has much less land adapted for agricultural purposes. The Sea of Okhotsk has a bold and rocky shore, and the country behind rises with a steep ascent till a mountain-range is formed, with a general alti¬ tude of nearly 3,000 feet above sea-level. This range, under the name of the Stanovoi Moun¬ tains, runs nearly parallel with the coast till it reaches the frontiers of China, where it takes the name of the Jablonnoi Mountains, and pro¬ ceeding west continues for a long distance to form the boundary between the two empires. It then takes the name of the Mountains of Daouria, and throws out numerous ramifica¬ tions, which, continuing west, throw their arms round Lake Baikal, and cover almost all the south part of the government of Irkutsk. Other ramifications, proceeding north, form the water¬ sheds of the numerous affluents of the right bank of the Lena. On both sides of this river the surface continues elevated, and forms a table-land, the interior of which is still very

imperfectly known. The best portions of eastern Siberia occur in the south of the government of Irkutsk, where, in the lower and more open valleys in the vicinity of Lake Baikal, cultiva¬ tion has been attempted with success, and the oak and hazel, unknown in other parts of Si¬ beria, are found growing freely. In almost the whole of the same government, where the con¬ figuration of the surface does not present in¬ vincible obstacles, all the grains of Europe are grown, and even the mountains and hills are covered during the greater part of the year with good pasture. Still farther north, in the government of Yakutsk, as far as the town of same name, corn is cultivated in patches in the upper vale of the Lena, though the far greater part of it is covered with fir and pine. The north part of eastern Siberia consists of two distinct portions, the one extending from long. 105° E. to the lower valley of the Lena, and the other from that valley east to Bering Sea. The former portion is imperfectly known : the latter, as far as the Kolyma, is traversed from north to south by chains of low hills, separated from each other by wide valleys or open plains, and generally overgrown with stunted larch and birch. In these valleys and plains are numer¬ ous lakes, generally well supplied with fish, and bordered by low banks, on which a rich grassy sward is often seen. To the east of the Kolyma branches from the Stanovoi Moun¬ tains stretch north, and form a series of ranges which frequently rise from 2,000 feet to 3,000 feet. Some of these penetrate to the north coast, and are seen forming precipitous cliffs at Shelagskoi Nos, Cape North, and other head¬ lands. Other ramifications from the Stanovoi _ pursue an opposite course, and traverse the remarkable peninsular of Kamchatka almost centrally to its southern extremity.

Hydrography. — The rivers are numerous and of great magnitude. From the configura¬ tion of the country they almost all flow in a northerly direction, and belong to the basin of

the Arctic Ocean. The chief exceptions are the Anadir and the affluents of the Amur in the east, and the Sir Daria, Amu Daria and other streams in the southwest. The great rivers be¬ longing to the basin of the Arctic Ocean flow for the most part through immense tracts of level country, and hence are remarkable at once for the length of their course, the volume of water which they accumulate from numerous and important affluents, and the few obstacles which they present to a continuous navigation, but these advantages are diminished by the long period during which they are frozen over; though even then they do not cease to be available for traffic, and become, in fact, the great highways of the country. The Obi is one of the largest rivers of the Old World; the length of its course is 2,400 miles, and the area of its basin is 1,224,435 square miles. Among its important affluents, many of them so large as to be entitled to rank as magnificent rivers, are the Irtish, Ishim and Tobol, which, by uniting their streams, more than double its volume; the Tom, Tchulin and Ket. The estuary of the

Obi forms a gulf from 70 miles to 80 miles wide, and about 400 miles long. Large quantities of fish are taken in this river and its tributaries. The Yenisei, the second river in importance, draws its waters from an area of not less than 1,020,000 square miles. It rises in Northern Mongolia and flows north a distance of over 2,000 miles to the Arctic Ocean. Its most important affluents are the Selenga, which, before entering Lake Baikal, drains an area of more than 140,000 square miles ; the Angara, which receives the discharge of the lake, and in the lower part of its course takes the name of Upper Tunguska; the Middle Tunguska, and the Lower Tunguska. The estuary of the Yenisei is about 20 miles wide, and 200 miles long. The Lena has a course of about 2,000 miles, and drains an area of about 800,000 square miles. It rises hardly 20 miles to the west of Lake Baikal, and becomes nav¬ igable at 50 miles from its source. Its principal affluents are the Vitim, which has a course of 700 miles, of which a considerable part is navi¬ gable ; the Olekma, which flows 500 miles through interminable forests ; the Aldan, which drains an extensive tract of table-land between long. 125° and 140° E. ; and the Viliui, which rises in a mountainous district not far from the Lower Tunguska, and flows west for about 600 miles.. The most important of the minor rivers which send their waters directly to the Arctic . Ocean are the Olenek, between the Yenisei and Lena; and to the east of the latter, the Indighirka and Kolyma. The only im¬ portant lakes are those of Baikal, 400 miles long and in places 50 miles wide; the Sea of Aral, and Balkash-Nor or Tenghiz, in the southwest. Numerous other lakes are scattered over the surface, and more especially in the tundras, where whole chains of them, covering extensive tracts, not infrequently occur.

Geology and Minerals.— Granite and crys¬ tal-line schists are found chiefly on the eastern slopes of the Ural Mountains, in the south among the mountain-ranges of the Altai as far north as lat. 57° N., and between long. 85° and 120° E., chiefly in the governments of Tomsk and' Irkutsk, on both sides of the Upper Tun¬ guska and east of the Yenisei; in the upper part

.FADEYEV

ISLAND f

Mldder dort

Cnpc Stcrlegov

M. Edward *Bear Cape . Fern*

ISLAND

PneoBiuanaxiA

Island

. msov ISLAND

*8**ixovaK<-.r.*

ISLANDS I

Island

STOLnOl'OI

\ Island

X^rUeik

.AKE

Dunai Island^ XRAOOon

.IaKHOV

'ISLAND

'JJatotAku ' Strait

C. XI S', lull I

*C*l*ao/o*

ape "Burkin

!/ /

LJttle

Vat Anabar-I

Or.. Nisoi/ayt

*l-ip*v i*

£ rreot>r«ih«nJ ^virvOolctilcTiA T IrlluihnoB r~ i Korepo*»k*

Shdanovskoe

Liitke Bay

Adshlrga

Oavrlga

Tolobkl

ISLANDS

A uanj Tundra

abatova

;• Dolcoi L,

i) ulskaya

Verkhoyansk,

Byslrayaj

■ . ■*« ln > -tak <*

‘ape Nldsklj,

TolljPj Duiovy (

Berezov

.1 .VVI D YU

< c

C. Sb Thaddacji

Tazovtl

■*“A Man i j*

NiUoUkaja’L

••vv.ˆOmckivwkii

ST LAWRENCE ISLAND

*ˆSr. Oj6r(< [Day **

*Cac’**v.»«i» .$***

‘hhH /vN

Yakutsk

1;

Knnien«V

BKIogor)!

Dntova

JJeiewvskvji

>Xariin

Y’oJkav’

*Solikam**

^Ynrovskoyc

■THls t/V’

C-likolokukllX^ }

Blelogolovskoyea r y*

tmsknya

// Kahaoinsku

iJ (ALAND

‘Av« nn- ? Cape Ozerni

K: Ipaslievoj

jTobubkl

>>‘clkan

‘Yarn

XIrensk,

Koivlcva’

,etueh Vol.

Puiaaor.

Islands

lik-iton

JJh" ycr KamchatsK > C. Kamchatka ' O. u / Kamchatka IriotrkVol. W Xc. KronolAi 4oW

■ *Bering 1st*

.COFrtr

CapvXlirabetk

I nrgu/li

vatena Vol.

fmtii

I SAKHALIN

I I LVyl Bay

WiuuVvdc ISLAND

fbiuVj'-ap' Un.lmnmo

Pavlod

Cup® Shipuaski

Viliuchio VoU Jnplno Xoorile Strait

Lake Alta l

Akmolinsk

Jioumrski

lS^6ipinaiiosk

' I

Kurkaralinek

Imikova

[kakal-uto > *

V U.ll.inr« 4

/ Oi/.C Patience \

'I IWii u "Cf lj„v

S 0

jkX'J.T' r

vA-t.ayˆJ

iIOIOA.I,Nˆ»

nussutalf

Serglopol

.Guriev

LAKE

BALKHASH, OR DENZloH

iTsIlsIkay

SkR£(ISt of . S**0S

■l. Perovek

Guch ,'ii

Islam "•Itl l.

Bnrkoo

■ 'fSvlgaJJav • ikolskaya ,

lloW"

3

/Akkci > hl

licrlmo Cap®

Chang I« in tscha i.

KARAS KUM

CapcNamliu

SANDS 4 v,»*c*

Soodioiv

•'V^S N

0_D\ VY" j Yarkand

fjiOKEj

niivnfiar

I'ao-tln'*

Tfchliiomakl Sendai Bag aku Aiima

4dUb A

SS.cS>|liA

CI…I flj

*>xtuov*M&*

I't.)U,nl"^?ftvA

1 ijlll-cllOW

*Khal(unir_*

. InOCKtN Is.

'MIKOiTO

ISLAND

Slilobailu'

IrngrtsSor »

ollacliljo Island

ˆcna OcloiTli is

ganglial

lilngloi

[a Island

Xlrman.

rPf.sf/?rˆutTT,’

rˆr «iiu.fcAˆ

, Oanges Island

Sahar

AbuuMlaoO

Kanirun

Onoip

W I I !6U

M0 J 150 ft ™o° L i7o° M m° N 7 70°

>vv x

O Him

DE LONG

ISLANDS 0) annette Island

Is. on ArE\i- o ‘N’capt

- k Cape Dcreshnlkh

*U, **

AW

SIBERIA

MERCATOR PROJECTION

Rand McNally's New 11 x 14 Map of Siberia Copyright by Rand McNally & Co.

Gaelnol Bay

TCTIANOE

Cape Krcsiovol .cy

*KOLYMA f**

Gulf -if Xpjnotikl

or /V

*< *&**

.ATTvL-cprˆ.

*WˆBt-LDin 1.0ˆ4*ˆ*

>. AwcmitnaY'

■P £uTi

A N '■ '"l b

.y.

■air I.~ . N .s*

/?

S7CPPE

PERSIA

' rv Ispahan jjirjanu

ft '

SIBERIA

769

of the basin of the Middle Tunguska; and in the very eastern extremity of

the country, from long. 165° to the shores of Bering Strait. The volcanic rocks belong mostly to the Tertiary period, and are found chiefly in the south, in connection with the granite and crystalline schists above described. They compose the great mass of the mountain-range which skirts the western shores of Lake Baikal, and are seen in a still more magnificent and interesting form in the mountains which proceed from north to south, nearly through the centre of the Peninsula of Kamchatka, where are several active volcanoes. Palaeozoic rocks, including the rocks belonging partly to the Silurian, partly to the Devonian, and partly to the Carboniferous systems, are developed chiefly in the south, where they occupy a large space in the form of a triangle, the apex of which is at the town of Irkutsk, and the base on the parallel of 60°, between long. 85° and 120° E. Another large development of 'the same rocks is seen on the northwest and north of the Sea of Okhotsk, and to a considerable distance inland. Sec¬ ondary rocks higher in the series than the Carboniferous system commence near the north¬ ern shores of Lake Tenghiz, and stretch north¬ ward, occupying a considerable tract on both sides of the upper valley of the Irtish; a more partial development of the same rocks is seen on the north of the Obi, commencing near the confluence of the Ket, and extending north in a comparatively narrow belt to the sources of the Taz. The most extensive formation in Siberia is the Tertiary, which stretches almost continuously from the last slopes of the Ural Mountains east across the Obi to the valley of the Yenisei; and in other quarters, though more intermingled with earlier formations, covers no inconsiderable portion of the whole surface. The shores of the Arctic Ocean, almost throughout their whole extent, and to a con¬ siderable distance inland, have a deep alluvial covering, remarkable for containing deposits of fossil elephants and other animals in such quan¬ tities that the ivory obtained from them forms an important article of commerce. The minerals of Siberia are evidently of immense value, and though the real extent of surface on which they are found is as yet only roughly guessed at, there cannot be a doubt that the most precious of all the metals exists there in greater abun¬ dance than in any other part of the Old World. Till recently the auriferous deposits were sup¬ posed to be almost confined to the eastern slopes of the Ural Mountains, and to occupy a zone extending over from 5° to 6° of latitude to the north and south of Ekaterinburg; but it has. been discovered that some of the eastern regions, particularly in the governments of Tomsk and Yeniseisk, are highly auriferous, and that a tract larger in area than the whole of France contains gold, not in its alluvia, but in the very matrix of its rocks of palaeozoic schists and limestones, which, when pounded and analyzed, are found to be more or less impregnated with gold. The principal mining districts are those of the Ural already mentioned, the Altai and Nertchinsk, in the basin of the Amur. Besides gold, iron, copper, silver, platinum, lead, tin and zinc are found in greater or less abundance. The other notable

minerals of Siberia are the emerald and topaz, of which there are celebrated mines at

Nertchinsk; salt, found in natural crystals on the banks of lakes, chiefly in the steppes of Ishim and Baraba; jasper and porphyry of great beauty, quarried especially in the valley of the Charysh among the Altai Mountains ; lapis- lazuli, found among the mountains in the vicin¬ ity of Lake Baikal ; diamonds, found occasionally on the eastern slopes of the Ural Mountains; malachite, obtained in greater or less quantity from all the mining districts, containing copper ; and mica, in the form of large plates, exten¬ sively used as a substitute for glass, and found in greatest abundance on the banks of the Vitim.

Climate. — This country is remarkable for its rigor. The isothermal line which skirts the southern coast of Iceland, in proceeding east, descends rapidly till it reaches Petrograd, and then more gradually till it reaches long. 100° E., where it is found in lat. 52°. From this it pro¬ ceeds nearly due east, passing through the southern part of Lake Baikal, the town of Nertchinsk, and the southern extremity of Kamchatka. It thus appears that the southern coast of Iceland, in lat. 63°, has the same mean temperature as eastern Siberia in lat. 52° ; in other words, that in proceeding from west to east the cold increases so much as to make places in the same latitude as Berlin to have a climate nearly as cold as Iceland. In the same manner the line of permanent ground-frost descends in parts of Siberia as far south as lat. 56°, nearly the same as that of Edinburgh; and over the whole country to the east of the Ural Mountains is as low as lat. 60°. Erman found that annually between 17 December and 18 February, and most frequently in the first three weeks of January, cold is experienced ex¬ ceeding 90° F. below the freezing-point; and that for two entire months, or one-sixth part of the whole year, mercury is a solid body. This extreme winter is succeeded by an exceed¬ ingly warm summer. Thaw usually commences on the 1st of April, and the temperature in¬ creases rapidly till it attains its maximum in July. In this month the average height of the thermometer is about 66° F., but it not unfre- quently rises in the shade above 77°. In Ya¬ kutsk, where the cold is severest, notwithstand¬ ing its long and extreme winter, there are 128 days in the year without frost; and within that period several kinds of grain, not excluding wheat, have time to attain maturity ; and in rich alluvial soils often produce a return of fifteen¬ fold.

Manufactures and Commerce. — The man¬ ufactures are limited, and are confined for the most part to a few of the larger towns, where government factories have been established. The more important articles are leather, earth¬ enware, porcelain, glass and hardware. In some places, as at

Telma, large woolen and linen factories employ a considerable number of hands, chiefly exiles, in weaving woolen and linen cloth, and in conducting all the previous processes of preparing the wool, flax, etc. The trade is of considerable extent; and in so far as confined to the produce of the country con¬ sists chiefly of cattle, fish, caviar, furs,, skins and metals. A very important transit trade is also carried on across the country between Russia in Europe and China. From the latter part by far the most important article is tea, both in the dried leaf and in the form of cakes

or bricks. The greater part of the latter is dis¬ posed of to the nomadic tribes, and a very large proportion of the former never passes beyond the limits of Siberia, but is retained for home consumption. Other articles of impor¬ tance from China are coarse cotton stuffs, rhu¬ barb, silks, satins, etc. The chief mart for this trade is the town of Kiachta, and extensive fairs are held at various places. For the in- terior. traffic the rivers naturally furnish the most important conveyance; but when these be¬ come closed with ice other means of conveyance must be resorted to, among which the most characteristic is that of sledges drawn by rein¬ deer or dogs. Great impetus has been given to commerce and colonization generally throughout the region, by the completion of the railway, the longest in the world, connecting the far Orient with Europe. (See Trans-Siberian Railway). The length of railways throughout Asiatic Russia in 1913 was 10,586 miles. A trade by sea has also been opened up between Europe and the rivers Obi and Yenisei.

Ethnology. — The races and tribes scattered over the different parts of Siberia are so nu¬ merous that little more can be done here than to give the names of the more important. The earliest inhabitants were probably the Yenisei¬ ans, who were followed by the Ugro-Samoy- edes; these in their turn were driven out by Turkish tribes, who were ousted by the Mon¬ gols in the 13th century. To-day at least two- thirds of the whole population is Russian, and consists either of voluntary emigrants, who have found it to their interest to settle in the country, or of exiles and their descendants. In regard to the exiles Siberia is merely a penal sttlement, and hence that portion of the popula¬ tion which, as coming from Europe, ought to be the most civilized, is not likely to be the most exemplary. A more unsophisticated, and far more interesting, population is furnished by the indigenous tribes. Beginning at the Ural Moun¬ tains and proceeding eastward we find the Samoyedes in the northwest. Immediately south of these the Ostiaks occupy both sides of the Obi, up to the confluence of the Irtish, the northern part of the steppe of Baraba, and the whole of the

woody region eastward to the banks of the Yenisei. They live by fishing and hunting, and though their physical structure is by no means robust they display both great dex¬ terity and courage in attacking the larger and fiercer animals, both of the land and water. Some of them have embraced Christianity, but the great majority continue addicted to Sha¬ manism. In the south, among the Altai Moun¬ tains, the Kalmucks predominate, but have laid aside a number of the usual peculiarities of their race. They subsist chiefly on the produce of their horses, cattle and sheep, and cultivate a little grain and tobacco. They have some skill in mechanical arts, particularly in the working of iron, and make their own gun¬ powder. Though not Buddhists they are gen¬ erally addicted to other forms of superstition. Among the eastern slopes of the Altai' are several Turkish tribes. The Buriats dwell chiefly on both sides of Lake Biakal, and east¬ ward as far as the Onon. They are of Mongol origin, and closely allied to the natives .of the northern provinces of China both in language and customs. The Tunguzes or Toongooses are the most widely dispersed of all the native

tribes, being found throughout many parts of Siberia from the Arctic shores to the frontiers of China. They are considered the best-formed of the native Siberians, are very expert horse¬ men, and live chiefly by hunting. The Yakuts live intermingled with the Tunguzes, and con¬ fine themselves almost entirely to the rearing of horses and cattle, and the preparation of dairy produce from them. They are of Tartar origin, and not a few of them are nominal converts to Christianity, though the majority, like the Tunguzes, still adhere to Shamanism. The Tchuktches occupy the northeastern por¬ tion of Siberia, and their language proves them to have a common origin with the Eskimos. Some of them spend their time in hunting and fishing, while others are nomadic in their habits. Interesting and valuable information on these tribes was collected by the Morris K. Jesup Expedition which returned to the United States in 1904.

History. — Siberia appears to have been partly conquered by Genghis-Khan and his suc¬ cessors, but did not become known to Europe till 1580, when a Cossack called Yermak Timo- feyew, who had long robbed the vessels which navigated the Volga, finding himself hotly pressed by the Tsar of Moscow, crossed over into Asia with his accomplices. Their number sufficed to form a small army, and their courage soon enabled them to acquire extensive settle¬ ments. These Yermak offered to the tsar on the condition of obtaining pardon. The offer was accepted, and thus Russia for the first time obtained a footing in Asia. The territories thus conquered belonged to the Tartar prince Kut- shum-Khan, and included his residence, which, called by the natives Isker, and by the Cossacks Sibir, has given name to the whole country. The conquests of Yermak were gradually ex¬ tended, till the whole country west of the Obi was subjected to the tsar. In

1604 the town of Tomsk was founded, and became a centre from which new expeditions were fitted out and new conquests made. Private adventurers, instigated chiefly by the hope of plunder, pro¬ ceeded in all directions to the south, where, not without serious reverses, they succeeded in expelling the Kirghiz; and to the east, where they entered the basin of the Lena, subdued the Yakuts, and finally, after passing the Aldan Mountains, reached the Sea of Okhotsk. In the neighborhood of Lake Baikal a formidable resistance was made by the Buriats, but their subjugation was finally completed in 1658. The town of Nertchinsk, which has since become so celebrated for its mines, was then founded, and, two years after, that of Irkutsk. A further extension of conquests to the south brought the adventurers into collision with the Chinese, and both governments taking part in the quarrel, a war, threatening the existence of one or other of the empires, became imminent. It was, how- ver, prevented, partly by the intervention of the Jesuits resident at Peking, and a treaty in • 1689 definitely fixed the boundaries of the two empires. A second treaty in 1727, confirming the former, regulated the commercial inter¬ course and confined it to the two localities of Kiachta and Maimachen. Never has so large a territory been acquired at so little expense. Russia, almost without any expenditure of her own means, and chiefly by the aid of a few Cossack adventurers, in little more than a cen-

tury more than doubled her area. The greater part of it indeed is a frozen inhospitable region, which must always remain comparatively worth¬ less ; but vast tracts possess a climate and soil well adapted for agriculture, and seem destined to become the abodes of a dense population engaged in agriculture, mines and fisheries.

With the building of the Trans-Siberian Railway (1891-99) emigration from Russia to Siberia became easier and was patronized by the government. Whereas in former times the annual influx of new settlers was from 20,000 to 30,000, with the opening of the railway it rose at once to from 150,000 to 200,000. During the Russo-Japanese War it was interrupted, but many Russian peasants who had been called up for military service then first made acquaint¬ ance with Siberia. No sooner was the war over than the wave of emigration rose to an unprecedented height. In 1907 the number amounted to 576,979; in 1908 there were 758,- 812 ; in 1909 there were 707,463. Since then emigration has again declined, maintaining an average of 300,000 per year. The advent of labor and money, and the establishment of new farms has transformed all the old conditions of the country. Even the nomad Kirghiz have been aroused from

their lethargy by the grad¬ ual narrowing of pastures and have taken to plows and reaping-machines. New towns have arisen in Siberia, new industries have started; the Zemstov system was introduced in 1905, while a uniform system of public justice — in place of the existing arbitrary administration of autocratic officials — was instituted in 1897 by order of the ex-Tsar Nicholas. Trial by jury was not conceded but the justices were appointed >by the Crown. The higher tribunals consist of eight circuit courts in the towns of Tomsk, Tobolsk, Chita, Krasnoyarsk, Irkutsk, Yakutsk, Blagovestchensk and Vladivostok, with a court of appeal above these stationed at the capital, Irkutsk (pop. 109,000). A sea route through the Kara Sea to Siberia has in recent years been opened up, chiefly by British enter¬ prise.

Siberia has an unenviable record owing to its famous convict settlements. It was in 1710 that Peter the Great first began exiling incon¬ venient political opponents to the bleak steppes beyond the Urals but it was not till the first quarter of the 19th century that it became a common practice to deport criminals to Siberia in addition to political offenders. In later years a stream of emigration was directed thither and encouraged. While those prisoners who were regarded as dangerous were chained and forced to work in lead mines, those accused of minor offenses (who were frequently accompanied by their families and friends) were permitted to live in comparative freedom, running stores and workshops on their own account. Some European visitors have even brought back stories of female political exiles who had their own pianos and read the latest French novels. The squalid horrors of the convict system are described in numerous travel books and especially in Russian fiction.

The tangled skein of events that developed in Siberia between the period of the Russian Revolution in March 1917 and the summer of 1919 presents a confusing panorama, of which it is only possible as yet to give a more or less

approximate description. In a sense the Si¬ berian imbroglio of 1918-19 was not so much a part of the Great War as a side issue that arose from it and from the Revolution. It may better be described as a civil war accompanied by half¬ hearted experiments in foreign intervention. Beginning as a struggle in favor of the Allies after the military collapse of Russia, it de¬ veloped into a far-flung campaign against Bolshevik rule. In the early stages of the Eu¬ ropean War whole regiments of conscript Slavs — Czechs, Slovaks, Croats and Poles — in the Austro-Hungarian army deserted over to the Russian side. Though living under foreign dominion for centuries, these races had clung tenaciously to their national culture and lan¬ guages. Their sympathies in the war lay with their Slavic kinsmen in Russia as against the Central Powers. Out of these deserters a Czecho-

Slovak division had been formed after the Revolution and incorporated with the Rus¬ sian army. It played a gallant part in the last offensive that Brussilov was able to direct against Austria before Bolshevism succeeded in demoralizing the Russian troops and navy. The Czecho-Slovaks, however, insisted on continu¬ ing the war, and demanded to be sent to France to join the Allies. The Bolshevik rulers were willing that they should leave Russia, and in February 1918 they were granted a passage to Vladivostok; but before their removal could be effected Trotzky had concluded the Brest-Litovsk Treaty with Germany (3 March 1918) and the bulk of the Czecho-Slovaks, some 50,000 at that time in the Ukraine, found them¬ selves in danger of falling into German hands. Refusing to make peace and unable to face the German advance, they decided (after rejecting Austrian overtures to return home and be for¬ given), to retreat over the railroad to Moscow and make their way thence across Siberia, across the Pacific Ocean and America to France. Hunted by the Germans, they fought a four days' battle at Bakhmach, 125 miles northeast of Kiev, defeating them severely. Under tre¬ mendous difficulties they continued their amaz¬ ing journey eastward; they cut their way through and, to prove their loyalty to the gov¬ ernment then in being, surrendered most of their equipment to the Bolsheviki, leaving also hundreds of automobiles and air planes to the Germans. Though betrayed time and again by Bolshevik treachery, their wounded murdered, attacked daily by Red Guards and Austro- German prisoners led by German agents, they at first steadfastly refused to fight against Rus¬ sians and to interfere in Russian politics. After 56 days' of toil and hardships, the vanguard of this modern ((Ten Thousand® completed its (< Anabasis® and reached the Pacific — one of the greatest military achievements in history. Other detachments of Czecho-SLovaks remained in western Siberia and on the road to Arch¬ angel.

On 14 March 1918, Mr. A, J. Balfour pleaded in the House of Commons for Allied assistance in Siberia against the growing menace

friends of Russia and enemies of Germany, to preserve the country from German domination.® The Japanese Foreign Minister, Baron Goto, stated on 1 May that ((Japan must give en¬ couragement, assistance and support to the work of reorganization® in Russia and ((preserve peace in the Far East.® Negotiations were pro¬ gressing between the Allied Powers on the thorny problem of intervention in Siberia.

To return to the Czecho-Slovaks. The Bol- sheviki had promised them a <(safe conduct® and transportation, neither of which materialized. Acting

under German pressure, Trotsky or¬ dered them to be disarmed. This was forcibly attempted in May, when the Czechs resisted and attacked the Bolshevik troops both in Europe and in Siberia, captured several towns on the Volga during June, occupied Samara and ad¬ vanced to Ufa in the Ural region. They seized control of the principal grain routes, thereby cutting off the food supply from Siberia. Scattering the Bolsheviki before them, they fought their way along the Siberian Railway, and by July were in possession of the line from Chelyabinsk in the Urals to Krasnoyarsk, a distance of over 1,300 miles. Meanwhile, a large contingent of Czecho-Slovaks had arrived in Vladivostok, the eastern terminus, from which point they began operating westward to effect a junction with their comrades. The Bolsheviki were driven out of Vladivostok and Irkutsk by the end of June. The Czechs entered the Amur region and occupied several towns, and by the middle of July nearly the whole Trans-Siberian Railway was in their hands. In each of the towns at which they arrived they found a Soviet local government of Workmen's and Soldiers' Delegates, in other words, Bolshevik rule. . Each of these was immediately over¬ thrown, at which task the Moderate Russians or anti-Bolshevists heartily assisted.

After the Bolsheviki had dispersed (in No¬ vember 1917) the Constituent Assembly in Moscow, many of the members made their way into Siberia, where they secretly maintained their organization under the Red rule. The coming of the Czechs gave this group their chance. Its members established the Temporary Siberian government at Omsk on the ruins of Bolshevism in central Siberia in Tune and began to organize a Russian anti-Bolshevist army. Other governments sprang into existence later on: General Horvath, director of the Chinese- Eastern Railway, established a provisional gov¬ ernment at Harbin ; General Semenov founded one in Chita, and Avksentiev created the Ufa Convention, while yet another Siberian govern¬ ment arose at Novo-Nikolayevsk in western Si¬ beria. A branch of the Omsk government was set up in Vladivostok. Before long trouble arose be¬ tween this multitude of ˆindependent govern¬ ments,® each claiming either <(All Russia® or (

for Foreign Affairs, Interior, Finance, Justice, Communications, Munitions, Labor, Commerce, Supplies and Education. Political intrigue soon made its appearance among the central com¬ mittee which threatened to lead to confusion and disintegration when the council of min¬ isters decided to take the authority of the Directorate into its own hands. Soon after his appointment Admiral Kolchak proceeded to the front on a tour of inspection. Just at that time the Czech commander had invited the British 25th Middlesex Battalion to attend the presentation of colors to the Czech regiments at Ekaterinburg in the Urals, and Col. John Ward, an English Labor member of Parlia¬ ment, had accepted for the band and 100 men of his battalion. Railway traveling being a dif¬ ficulty in Siberia, the

admiral's carriage was at¬ tached to the British troop train, and Colonel Ward offered his men as the admiral's escort for the whole trip around the front. Thus it happened that the Russian War Minister inspec¬ ted his troops with no other guards than British soldiers, who duly accompanied him to the front and marched up to the outpost line with the band playing 'Tipperary. The tour ended abruptly at Chelyabinsk; instead of going west to Ufa according to program, the admiral and his escort suddenly turned east at top speed for Omsk. On the road they encountered a special train bearing General Boldereff, who held a long private consultation with Kolchak. On the morning of 17 Nov. 1918 they were back in Omsk, and that same night Avksentiev, two other members and the chief of police myste¬ riously disappeared. Next morning the streets were alive with troops. A batch of officers had spirited the administrators away during the night. There was little doubt that the military party meant shooting. Colonel Ward imme¬ diately wrote a bluntly-worded letter to the ad¬ miral intimating that British public opinion would regard with profound disapproval any attempt to deal with the arrested men except by proper trial. ' Kolchak at once gave the re¬ quired assurances, and two days later the four men were entrained for China under a joint British and Russian guard, and with the train flying the British flag as a precaution. With Boldereff perspicaciously absent and the extreme Socialists arrested there remained but two of the Directorate, Vologodsky and Vinogradov, who promptly resigned their offices and the Directorate became extinct. The council had now to decide whether to retain power itself, which virtually meant a resuscitation of the Siberian government, or to vest it in something or somebody else. The whole procedure was no doubt cut and dried in advance. The council formally assumed the power, fallen upon it by the disappearance of the Directorate, and immediately offered it to Kolchak with the title of "Verkhovnii Pravitel® (Supreme Admin¬ istrator), virtually dictator. Kolchak accepted, thereby completing the coup d'etat.*

Already in April 1918 some British and Japanese marines had been landed at Vladivos¬ tok to maintain order. A Chino- Japanese agree¬ ment (16 May) assured the co-operation of China to combat German penetration in Siberia. Early in August a small British force landed at Vladivostok to co-operate with an American

detachment and a larger Japanese force; active intervention had been decided upon after lengthy negotiations between the Allied Powers. Declarations were formally made by the Amer ican and Japanese governments that the move¬ ment of Allied troops into Siberia was not an*

act of hostility against the Russian people, but an intention to assist them. The Allied force was placed under the command of the Japanese General Otani ; besides those already men¬ tioned, his force consisted of French, Italian, Serbian and Rumanian units. Maj.-Gen. W. S. Graves was in command of the American con¬ tingent, consisting of two regiments from the Philippines. A British plenipotentiary for Siberia was sent from Hongkong. The Bol¬ shevik government declared the Allied interven¬ tion in Siberia to be an act of war against Russia while the Moderates welcomed it as the only feasible measure to crush Bolshevism and to disabuse the Germans of the idea that the road eastward lay open to them. In the fight¬ ing along the Siberian line the Czechs and the Russian White Guards gained numerous suc¬ cesses over the Bolshevist forces. In the Far East, however, the operations of the Allied arm¬ ies did not for some time extend beyond the Amur and Ussuri province north of Vladi¬ vostok. By the middle of August 1918 the situation became complicated. The Czechs held the line from the Urals to Irkutsk; the Allies controlled part of the Ussuri region. Between the two lay a formidable army of Bolsheviki and former Austro-German war prisoners, all well equipped and led mainly by German officers. Other detachments of Czechs, still further west in Russia itself, were hard pressed, while neither the British from the Murmansk ex¬ pedition nor small forces operating from India up through the Caucasus and Transcaspia, were near enough or strong enough to effect a junc¬ tion. Even in Ussuri the Czechs were in peril until the Allies and a Cossack force under Semenov were able to reach them. The Japanese captured Khabarovsk (8 Sept. 1918), the base on the Ussuri Railroad of the Siberian Bolsheviki, who then withdrew to Blagovesht- chensk. They were cleared from the railway between Lake Baikal and Manchuria and com¬ munication was finally established with the Czechs to the west, though it was for some time impossible to relieve the pressure against them. The Bolshevik army indeed grew ever stronger. Americans and Japanese captured Blagoveshtchensk (14,000 prisoners) and Alex- eievsk on 18 September, when 2,000 Austro- Germans surrendered. Most of the fighting, however, was done by the Czechs and Slovaks. A deep and powerful motive lay behind their heroic exploits. Uninterested in Russian internal affairs, they were goaded into opposing the Bolsheviki when the latter openly proclaimed themselves their enemies. They had no desire to upset one Russian regime for another. Their sole aim was the defeat of the Central Powers and the creation of a free and independent Czecho-Slovak state — to liberate their own country. Wherever they appeared the Bolsheviki fled before them and the populations greeted them as friends and liberators, joining them and re-establishing order. The Allied contribu¬ tion in men was small and the area of their operations was limited.

During August 1917 Siberia had received the most distinguished prisoners

recorded in its annals when the deposed tsar, Nicholas II, and his family arrived at Toholsk, nearly 2,000 miles east of Petrograd. About April 1918 they were removed to the Crimea, and subsequently to Ekaterinburg, the capital of the Red Ural, on the eastern slope of the Ural Mountains. That town, which is strongly fortified, is the key to Siberia, through which the great railway enters Siberia, and here the Omsk government had decided to establish the base f.or their operations against the Bolsheviki. The Ural Regional (Bolshevik) Council in Ekaterinburg was se¬ riously threatened early in July 1918 by the approach of Czecho-Slovak forces. At the same time an alleged conspiracy to rescue the tsar was reported to have been discovered. <(In view of this fact,® a Russian official wireless announced, ((the Presidium of the Ural Regional Council decided to shoot the ex-Tsar, Nicholas Romanoff. This decision was carried out on July 16.® The Czechs occupied Ekaterinburg a few weeks later.

A Russian army was being raised by the Omsk government in the autumn of 1918 under General Gaida (a Czech) and organized by Gen¬ eral Diederichs (a Russian). This force, the <(White Guards,® elected its own officers and was permeated with indiscipline. Furthermore, there was a general lack of confidence in the purpose of the Allies to defend Siberia. Con¬ fusion soon arose over the question of authority. German and Bolshevist agents were busy in all Siberian towns. No measures to secure public safety were undertaken owing to lack of co¬ operations between Russians and Czechs. American, British, French, Japanese and Italian troops were now penetrating Siberia proper from the east. On the night of 16 Oct. 1918 the first echelon of the Allied contingent steamed into the station at Zema, in central Siberia, when the train engineer was im¬ mediately held up by armed men and threatened with death if he did not vacate his post and join a strike which had just begun. Colonel John Ward commanded the British force. He instantly took over control of the station, marched a detachment into the town, surrounded the house of the strike leader and arrested him. A proclamation was put up declaring that any workman absent from his post next day would be court-martialed. The troops occupied all the workshops and public buildings during the night, and next morning the strike was over. Armed Bolsheviki surrendered their weapons under penalty of death. This resolute action frustrated a deliberate plan to stop the west¬ ward transport of Allied troops. A continuous stream of refugees from Russia poured into Siberia in search of food, drifting into crowded towns in a deplorable state of destitution. Sporadic fighting continued to the end of the year. In January 1919 an agreement was arrived at in Tokio for joint Allied control of the Siberian and Chinese Eastern railways, to restore the efficiency of those lines by a com¬ mittee of American, British, French, Japanese, Italian and Chinese representatives under the presidency of a Russian. About the same time the

question of command was settled. Admiral Kolchak was to remain dictator and nominal commander-in-chief and the French General

Janin was given supreme control of the opera¬ tions against the Bolsheviki. The British Gen¬ eral Knox was placed in command of the rear. Labor troubles, mainly due to delayed payment of wages, led to numerous strikes throughout Siberia, hampering both administrative and mili¬ tary activity. Colonel Ward was sent on a mission of investigation from town to town and to address the workmen, Kolchak promising to support any ameliorative measures proposed.

After the armistice with Germany (11 Nov. 1918) public interest in Siberia waned; opposi¬ tion grew in America and Great Britain against maintaining troops in Russia. Public opinion in Canada agitated for the return of Canadian troops, of whom about 5,000 were stationed at Vladivostok, but had not been in action against the Bolsheviki. In February these were or¬ dered to be sent home in the spring. Many Czechs, Slovaks and Poles were recalled by their new governments. The Japanese force in Siberia numbered about 73,400 men ; of these, about 14,000 were withdrawn at the end of 1918; some 34,000 more were withdrawn dur¬ ing January and February 1919, leaving about 25,000. This reduction was the result of diplo¬ matic representations by the United States gov¬ ernment that Japan had sent a contingent in excess of the strength provided for by the inter- Allied agreement, which stipulated a force not exceeding 7,000 men for each of the associated powers. The following figures of the Allied forces that had been co-operating in Siberia were announced in the French Chamber on 26 March 1919 by M. Pichon, Foreign Minister; Czecho-Slovaks, 55,000; Japanese, 28,000; Poles, 12,000; Americans, 7,500; Serbs and Ruma¬ nians, each 4,000; Canadians, 4,000; Italians, 2,000; British, 1,600; French, 760: a total of 118,760 men, plus about 92,000 Russians.

During January the Russo-Czech forces lost the city of Ufa and Orenburg to the Bolshe¬ viki, but made some gains at Tobolsk, Sarapol and Kungur. The Siberian army began an of¬ fensive against the Ural front early in March 1919 and captured the towns of Okhansk and Ossa, both southwest of Perm, and Birsk, north of Ufa. On the 16th the Bolshevist Military Bulletin reported, ((Our troops have evacuated Ufa owing to enemy pressure and are retiring along the railway towards Belebei.® At points the Bolsheviki were driven back 20 to 33 miles; masses of panic-stricken prisoners were taken, who reported that from 30 to 60 per cent of their

effectives vanished when ordered to ad¬ vance. The condition of Siberia at this time was one of chaos, misery, starvation, intrigue and bloodshed, ((with the smoldering red terror of Bolshevism awaiting to overwhelm all.® While the greatest shortage prevailed in the cities and plains, the wharves of Vladivostok were piled up with supplies from America — cotton, machinery, guns and railroad material. Most of this had been landed before the Revo¬ lution, and Allied vessels were still pouring in supplies, the distribution of which was hindered by frequent breakdowns on the railway owing to the destruction of tunnels. It was perhaps regrettable that the proposed Allied interven¬ tion, based on the Japanese and Chinese ar¬ mies, had not been allowed to proceed across Siberia on a large scale in the summer of 1918, which might have prevented much bloodshed

and suffering in European Russia. During April-May 1919 the Allies made good progress. Kolchak's forces gained several important points on a front of 100 miles and had estab¬ lished contact with the Allied Archangel line. At Tomsk, 50 miles south of Ufa, a whole regi¬ ment of Bolshevik cavalry went over and imme¬ diately turned their weapons against their for¬ mer comrades. On 4 June 1919 the news leaked out from Omsk that the Siberian armies had passed through a serious crisis within the pre¬ vious three weeks; they had suffered heavy casualties and ((could not hope to overthrow an enemy so vastly stronger . . .® A few days

later came the report that a Bolshevik army of 40,000 to 50,000 men had seized the valuable Lena Goldfields in the province of Irkutsk, a region lying within the sphere of the Kolchak government. The numerous roving bands, of Bolsheviki in the vast spaces of Siberia had never been subdued, and at places remote from the railway were still able to defy the govern¬ ment. For over six months Kolchak had striven in vain to secure the recognition of his government by the Allied Powers. The congress of the Constitutional Democratic party had urged all Russian citizens to unite around Kolchak in the name of the independ¬ ence of Russia. The Jewish community in the city of Tomsk placed 1,000,000 rubles at his dis¬ posal for the army. His government was the only one in Russia approved and recognized by all political parties outside the Bolshevik ring. The Allies, it appears, were still unconvinced as to the political platform of the Kolchak dic¬ tatorship ; on the questions of its probable sur¬ vival and eventual acceptance of the terms laid down in the Peace Treaty. Public opinion in America, Great Britain, France and Italy leaned toward recognition. In their reply to Kolchak's notes on the subject the Council of Four formulated (26 May 1919) eight condi¬ tions upon which they were willing to continue their assistance (consult Current History, New York, July 1919). Kolchak's undertaking of compliance brought the reply from Paris on 12 June that the Allies were ((willing to extend to Admiral Kolchak and his associates the sup¬ port set forth in their original letter.® Colonel Ward,

on his return to England in June, re¬ corded that only the Kolchak government was capable of restoring law and order. Toward the end of July Mr. Roland S. Morris, Amer¬ ican Ambassador to Japan, arrived at Omsk to investigate conditions with regard to the ad¬ ministration. At the same time a financial group in New York arranged to advance a loan of $5,000,000 to the Kolchak government. On 29 July Mr. Winston Churchill stated in the Commons that Kolchak and General Denikin (the latter in South Russia) were engaging 300,000 Bolsheviki and that the former was con¬ tinually retreating. On 1 August Kolchak's army was reported in full retreat, demoralized by war weariness. Kolchak's fall was not long delayed. Chaotic conditions followed in Siberia but the Bolsheviki gradually brought this vast region under their control. Consult Coleman, F., (Japan or Germany: The Inside Story of the Struggle in Siberia) (New York 1918). See Czecho- Slovakia.

Bibliography. — Atkinson, T. W., (Oriental and Western Siberia) (London 1858) ; Aulag-

non, C., (La Siberie Economique' (Paris 1901) ; Baedeker's, 'Russia' ; Beveridge, A. J., (The Russian Advance) (New York 1903) ; Czap- licka, M. A., Aboriginal Siberia) (London 1915) ; Deutsch, L., (Sixteen Years in Siberia) (London 1905) ; Ermolov, G., (Siberia as a Colony) (London 1894) ; Fraser, Sir J. F., (The Real Siberia' (New York 1902) ; Gerrare, W., 'Greater Russia) (London 1902) ; Haviland, M. D., 'A Summer on the Yenisei' (London

1915) ; Hawes, C. H., 'In the Uttermost East) (London 1903) ; Hedin, S., (Through Asia> (1898); Kapherr, E. von, 'Drei Jahre in Si- birien) (Berlin 1914) ; Keane, A. H., 'Asia,' Vol. I (London 1906) ; Kennan, G., 'Siberia and the Exile System' (London 1897) ; Kou- lomzine, A. N. de, 'Le Trans-Siberien' (Paris 1904) ; Krahmer, 'Russland in Asien' (7 vols., Leipzig 1899-1904) ; Krausse, A., (Russia in Asia' (London 1899) ; Kropotkin, P., 'Oro- graphie de la Siberie' (Brussels 1904) ; Lans- dell, H., (Through Siberia) (London 1882-84) ; Legras, J., (Au pays Russe) (Paris 1896) and (En Siberie' (Paris 1899) ; Lubawsky, M., (Historical Geography of Russia' (Moscow 1909) ; Milioukoff, P., 'Essai sur l'Histoire de la Civilisation russe' (Paris 1905) ; Nansen, F., (Through Siberia: The Land of the Future' (London 1914) ; Patkanov, S., 'Essai d'une Statistique et d'une Geographic des Peuples Palaeasiatique de la Siberie' (Saint Petersburg 1903) ; Price, M. G., (Siberia' (London 1912) ; Razumov, N., 'Transbaikalia' (in Russian; Saint Petersburg 1899) ; Ronaldshay, Earl of,

'On the Outskirts of Empire in Asia' (Edin¬ burgh 1904) ; Shoemaker, M. M., (Great Si¬ berian Railway' (London 1903) ; Semenoff, P., (Geographical and Statistical Dictionary of the Russian Empire' (Saint Petersburg 1884) ; Shklovsky, I. W., (In Far North-East Siberia' (London 1916) ; Skrine, F. H., (Expansion of Russia 1815-1900' (London 1915) ; Stadling, J., 'Through Siberia' (London 1901) ; Stolypin and Krivoshein, (Die Kolonisation Sibiriens' (Berlin 1912) ; Swayne, H. G., (Through the Highlands of Siberia' (London 1904) ; Taft, M. L., (Strange Siberia along the Trans-Si¬ berian Railroad } (New York 1911) ; Turner, S., 'Siberia: A Record of Travel, Climbing and Exploration' (London 1906) ; Vladimir, (Russia on the Pacific and the Siberian Railway' (Lon¬ don 1899) ; Wenyon, C., (Four Thousand Miles across Siberia' (London 1909) ; Wiedenfeld, K., 'Sibirien in Kultur und Wirstchaft' (Bonn

1916) ; Windt, H. de, 'The New Siberia' (Lon¬ don 1896) ; Wright, G. F., Asiatic Russia' (New York 1902) ; Wright and Digby, 'Through Siberia' (London 1913) ; Zabel, R., 'Durch die Mandschurei und Si'birien ' (Leipzig 1902).

Henri F. Klein,

Editorial Staff of The Americana.

SIBERIAN RAILWAY. See Trans- Siberian Railway.

SIBLEY, sib'li, Henry Hastings, Ameri¬ can soldier: b. Detroit, Mich., 20 Feb. 1811; d. Saint Paul, Minn., 18 Feb. 1891. He was chosen delegate to Congress from Wisconsin and Minnesota Territories in 1849, representing both in a similar capacity until 1853. He was elected the first governor of Minnesota 1858, and through his personal efforts he successfully brought the Sioux War to a close in 1863. The

later years of his life were occupied with the general educational interests of his State.

SIBLEY, Hiram, American financier: b. North Adams, Mass., 6 Feb. 1807; d. Rochester, N. Y., 12 July 1888. In his early life he worked as shoemaker, and later as journeyman ma¬ chinist in a cotton-factory. In 1843 he estab¬ lished a banking business at Rochester and later was elected sheriff of Monroe County. He was interested in the early experiments in electric telegraph and aided in securing an appropriation from Congress to further the inventions of Samuel F. B. Morse. He combined with other capitalists, among whom was Ezra Cornell, and consolidated the small existing telegraph com¬ panies into the Western Union, which was char¬ tered by the legislatures of New York and

Wisconsin in 1856. He was elected president of the company and held the office for 10 years. In 1861, he began the construction of a trans¬ continental railway that was afterward incor¬ porated with the Eastern systems, making a continuous line from the Atlantic to the Pacific. He projected a telegraphic line with Europe by way of Bering Strait and Siberia and to this end obtained valuable franchises from Russia, but the project was abandoned when the success of the submarine telegraph was assured. After retiring from the telegraph business he engaged in railroading, mining operations and various other industries. He owned large tracts of im¬ proved land and was interested in a seed and nursery business at Rochester. He founded the Sibley College of Mechanical Arts at Cornell University and presented Sibley Hall to the University of Rochester.

SIBLEY COLLEGE, a department of Cornell University. See Cornell University.

SIBONEY, se-bo-na'e, Cuba, a village 10 miles southeast of Santiago de Cuba near which the United States troops disembarked in the Spanish American War. It was the scene of a sharp struggle between the American and Span¬ ish forces 23 June 1898. Four troops of Rough Riders, under Colonels Wood and Roosevelt, were ambushed at this point and 16 Americans were killed. Notwithstanding their surprise and losses the Americans charged up the hill with such intrepidity that the Spaniards abandoned their block-house and fortified position, leaving 40 of their dead behind. The village was found to be infested with yellow fever, and in July was burned to the ground at the request of the medical officers.

SIBONGA, se-bong'a, Philippines, pueblo, province of Cebu, on the east coast, 28 miles west of Cebu, the provincial capital. It is on the coast highway, has a good anchorage, and is open to coastwise trade. Pop. 23,455.

SIBUTU, se-boo'too, an island of the Tawi Tawi group, Sulu Archipelago, Philippines, 30 miles southwest of the island of Tawi Tawi; 18 miles long, two miles wide; area, 36 square miles. The surface is mostly flat, with a conical hill in the centre rising to the height of 500 feet. It is heavily wooded, and the soil is fertile, but there is no agriculture; there is a transient population of Moro and Sulu fisher¬ men and a small village on the southeast coast. This island was found to be nine miles outside the western line of demarcation under the Paris treaty with Spain, and in 1900 was

bought (with Cagayan) by the United States for $100,000.

SIBUYAN, se-boo-yan', an island of the Romblon group, Philippines, the second largest and most eastern island of the group, 50 miles north of Panay; area, 90 square miles. It is very mountainous, the highest peak being Mount Sibuyan (6,424 feet) ; there are three principal rivers, and a number of smaller rivers and streams which furnish excellent drinking water. The island is heavily wooded, and the soil very fertile, but the inhabitants lack thrift and in¬ dustry, and no attempt is made to develop their natural resources. Some rice, vegetables and an inferior quality of tobacco are raised, for home use onlv. Gold is found in the sands of the Nailog River, and a number of the in¬ habitants are engaged in placer mining; trepang and tortoise shells are gathered on the coast. Pop. 18,000.

SIBYL, sib'il, and SIBYLLINE BOOKS.

Certain women supposed to be inspired by a deity were called Sibyls by the Greeks. Re¬ garding their number and their native coun¬ tries ancient writers, Greek and Latin, are greatly at variance. Neither Homer or Herodo¬ tus makes any mention of a Sibyl; but Heraclitus, the philosopher, who was a little earlier than the father of history, mentions one Sibyl. Aristophanes, Plato and the author of a book, (Wonderful Stories, anciently attributed to Aristotle, appear to know of only one Sibyl. Varro, the great Roman polymath, reckons 10 Sibyls, namely the Persic, Delphic, Cumaean (of Cumae in Italy), Erythraean, Samian, Cuman (of Cymae in JEolis), Hellespontic, Phrygain, Libyan and Tiburtine (worshipped at Tibur). These Sibyls lived in different epodes, and, ac¬ cording to Pausanias, the earliest was the Libyan ; he refers the Erythraean Sibyl to the time of the Trojan war; his third Sibyl is the Cumaean (of Italian Cumae), the most celebrated of them all. In the traditional his¬ tory of the Roman kings, she sold to Tarquin the Proud the Sibylline books. First she offered him nine; these refused, she burned three and offered, at the same price, the remain¬ ing six; Tarquin again refused to buy, where¬ upon three others were burned and the last three offered, still at the same price, and were bought by Tarquin. In these books was written the fate of the Roman people and state. They were entrusted to a commission of 15 members, who were to consult them on occasions of pub¬ lic danger, for direction as to the religious observances necessary to avert extraordinary calamities and to expiate prodigies; they were written in Greek hexameter verses, and hence, the commission of the Quindecimviri Sacris Faciundis was always assisted by two Greek interpreters. The books were preserved in a stone chest deposited in the temple of Jupiter Capitolinus and were destroyed by the fire that consumed the temple in the year 83 b.c. To recover the Sibylline prophecies, the Senate seven years after sent ambassadors to Erythrae in the Troad, who brought back thence about*

1,000 verses; other verses were collected in Ilium, Samos, Sicily, Italy and Africa. In addition there came into circulation about this time a great many so-called Sibylline oracles Augustus, 12 a.d., ordered strict search to be made for these, and a great many of the

spurious oracles were burned; the _ authentic Sibylline verses after being subjected to critical revision, were deposited in the temple of the Palatine Apollo : they appear to have been still in existence as late as the year 400. The Fathers and other Christian authors often quote the Sibylline verses as containing prophecies of Christianity: a memorable instance of this is the coupling of Sibylla with David in the first stanza of the Dies Irce — teste David cum Sibylla, witness David with the Sibyl, as both of them prophesying the destruction of the earth by fire: these Sibylline verses were un¬ doubtedly spurious, most of them composed by learned Jews of Alexandria in the century next preceding our era; such of them as have come down to our time have been collected and re¬ peatedly printed. Consult Renan, (Hist. du peuple d'lsrael t. v., 1. iv., ch. 9, (La Sibylle Juive.**

SICARD, sik'ard, Montgomery, American

naval officer: b. Utica, N. Y., 30 Sept. 1836; d. Westernville, N. Y., 14 Sept. 1900. He was appointed acting midshipman in 1851 and rose to be lieutenant in 1860. He was assigned to the Gulf blockading squadron in 1861 and as executive officer on the Oneida was engaged at the bombardment of Forts Jackson and Saint Philip. He assisted in the destruction of the Confederate flotilla in 1862, participated in the passage of the Vicksburg batteries and com¬ manded in the engagement with the Confed¬ erate ram Arkansas in that year. He was in command of the Seneca in both attacks on Fort Fisher and was in charge of the left wing in the naval land assault on that fort 15 Jan. 1865. He was engaged in various commands after the Civil War, was inspector of ordnance at the Boston navyyard in 1880-82. chief of the bureau of ordnance in 1882-90, and in 1894-97 he was successively in command of the Ports¬ mouth and Brooklyn navyyards. He was ap¬ pointed commander-in-chief of the North Atlantic Squadron in 1897 with rank as rear- admiral, but at the outbreak of the Spanish War was placed on sick leave. After partial recovery he asked for active duty and was ap¬ pointed president of the board of strategy. He was retired in 1898 after 47 years of service.

SICARD, se-kar, Roch Ambroise Cucur- ron, educator of the deaf and dumb : b. Fous- seret, near Toulouse, 20 Sept. 1742; d. Paris, 10 May 1822. He was appointed in 1786 di¬ rector of a school established for the training of deaf-mutes by the archbishop of Bordeaux. In 1789 he removed to Paris, and was chosen successor to the Abbe l'Epee as director of the

Paris Institution for Deaf-mutes. He made some important improvements in the system of his predecessor. During the Revolution he narrowly escaped with his life; and having under the Directory become one of the con¬ ductors of the (Annales Religieuses, it was only by concealing himself that he avoided the consequences of a sentence of exile pro¬ nounced against himself and other journalists. On the overthrow of the Directory he re¬ sumed his duties at the school of instruction for the deaf and dumb, and in 1816 he was made member of the Academy. Besides other works, he was the author of (Cours destruc¬ tion , d'un Sourd-muet de Naissance* ; and (Theorie des Signes pour 1'Instruction des*

Sourds-muetsP Consult Berthier, (L'Abbe Sicard) (1875).

SICCA, a weight in India of about 180 grains troy. The sicca rupee, formerly a current coin in India, contained about 176 grains of pure silver, and was equal to about 50 cents.

SICILIAN VESPERS, the name given in history to the massacre of the French at Paler¬ mo, Sicily, on Easter Monday, 30 March 1282, because the first stroke of the vesper bell was the signal agreed upon for the massacre to begin. Charles of Anjou, brother of Louis IX of France, had become master of Naples and Sicily by the defeat and death of King Manfred at the battle of Benevento, and the execution of Conradin, Manfred's nephew, and rightful king, who was only about 16 years of age. Charles treated his Sicilian subjects as a con¬ quered people, and the French garrisons in Pa¬ lermo and other places committed the gravest outrages upon the inhabitants. Women especi¬ ally wrere victims of the brutal soldiery, and the animosity of the Sicilians toward the French became aroused to a high pitch. Meantime Gio¬ vanni di Procida, a nobleman who had been deprived of his estates by Charles for his fidel¬ ity to Manfred, was actively seeking to bring about the expulsion of the French from Sicily. Constantia, a daughter of Manfred, was mar¬ ried to King Peter, of Aragon, and Procida appealed to Peter, and also procured the neces¬ sary means to enable Peter to move against Charles. The Sicilians, encouraged by Procida, and directly inflamed, it is stated, by a gross in¬ sult offered to a young Sicilian bride by a French soldier, planned a general uprising and massacre. At the appointed signal the people of Palermo fell upon the French, sparing neither age nor sex, and cutting off also Sicilian women who were companions of Frenchmen. The number massacred was about 8,000. Mes¬ sina in April followed the example of Palermo, and while Charles was besieging Messina, King Peter landed at Palermo with

10,000 foot-sol¬ diers and 800 men-at-arms. Charles fled to Calabria, and the succession to the crown of Sicily was settled on James, the second son of Peter and Constantia, the ultimate result being the independence of Sicily under Frederick, a brother of James.

SICILIES, sis'i-liz, The Two, a former kingdom of Italy, consisting of Naples and Sicily. After the fall of the Western Roman Empire (476 a.d.) Lower Italy became subject to the Ostrogoths. About the middle of the 6th century Naples and Sicily fell under the power of the Greek emperors. Both countries were subject to one governor, the exarch of Ravenna, who conducted the administration by means of dukes. During the contest between the exarchs and Lombards there sprang up, in the 9th century, several independent duchies, such as Salerno, Capua and Tarento. The most powerful was the Lombard duchy of Benevento. Naples, Amalfi and Gaeta maintained them¬ selves as republics. About the same time the Saracens invaded Calabria from Sicily. They conquered Bari and contended with the Greeks for the possession of Lower Italy, until the Emperor Otho I (967) subjected Benevento to the German Empire. Germans, Greeks and Arabs now struggled for the possession of this

beautiful country. This induced some warlike adventurers, Normans from France, in the 11th century, to try their fortune here. They as¬ sisted the Greek duke Sergius against Prince Pandorf of Capua, and were rewarded with the tract of land on which they founded the town of Aversa. More Normans soon followed. In 1047 the 12 sons of Tancred de Hauteville, a count in Lower Normandy, came in with their followers. Among these brothers Robert Guis- card was the boldest and most artful. He con¬ trived to gain over the peasants and formed out of them his best soldiers. His policy led him to hold Apulia, which he had conquered, as a papal fief (1053) ; and he promised likewise to hold as papal fiefs such tracts as should af¬ terward be subdued by the Normans in Cala¬ bria and Sicily. He then (1060) took the title of Duke of Apulia and Calabria. His young¬ est brother, Count Roger, conquered Sicily in 1072, and, after the death of Count Robert and his sons, united in his own person the whole power of the house of Hauteville. His son and successor, Roger II, completed, after 1101, the conquest of all Lower Italy by subduing Capua, Amalfi and Naples, at that time celebrated com¬ mercial republics. He then received, in 1130, from the Anti-pope Anacletus II, by whom he was solemnly infeoffed, the title of king of Apulia, Calabria and Sicily. Uniting Sicily to his Italian dominions he now called his king¬ dom the kingdom of the Two Sicilies. This union of Naples and Sicily continued 150 years. Each country preserved its existing laws.

In 1268 Charles of Anjou, brother of Louis IX of France, caused the legitimate heir, Con¬ radin of Swabia, to be beheaded. Sicily freed herself

in 1282 from the oppressions of the French by the aid of King Pedro of Aragon, and Naples was now separated from it, Sicily being under the kings of Aragon, while Naples was under the Angevin dynasty. This dynasty was dispossessed in 1442 by Philip V of Ara¬ gon, who bestowed Naples on his natural son Ferdinand.

In 1504 Sicily was again united to Naples under the Spanish crown, and governed by vice¬ roys till 1713, when the Peace of Utrecht again divided the Two Sicilies, Naples falling to Arch¬ duke Charles of Austria, Sicily to Duke Victor Amadeus of Savoy. King Philip V of Spain reconquered Sicily in 1718, at the instigation of Alberoni, but was forced to cede it to Austria in 1720, Savoy receiving Sardinia in exchange, by which means the Two Sicilies became a part of the Austrian dominions. In 1734 the Spanish Infante Don Carlos, son of Philip V, at the head of an army invaded Naples, conquered both the continental and the insular part of the kingdom and was crowned at Palermo in 1735 as Charles IV. This change was sanctioned by the Treaty of Vienna (1783), and till 1860 this line of the Bourbon family maintained posses¬ sion of the Two Sicilies, except for a few years during the Napoleonic period, when Joseph Bonaparte and, Joachim Murat reigned on the mainland as kings of Naples. In 1759, when Charles IV ascended the Spanish throne under the name of Charles III, he conferred the kingdom of the Two Sicilies on his third son, Ferdinand, and decreed at the same time that it should never again be united to the Spanish monarchy. The reign of Ferdinand extended through the stormy period of the French Revo-

lution and the subsequent European commo¬ tions. His successors, Francis I, Ferdinand II (Bomba) and Francis II were despotic tyrants who forced the people into periodic revolt, put down with much severity. In 1860, however, an insurrection broke out in Sicily, and an expedi¬ tion of volunteers from Piedmont and other Italian provinces under Garibaldi sailed from Genoa to the assistance of the insurgents. The result was that the Neapolitan troops were driven from the island. Garibaldi, following up his success, crossed over to the mainland, where he met little or no opposition; Francis II fled from Naples; the strong places in his hands were reduced; and by a popular vote the kingdom of the Two Sicilies ceased to exist as such and became an integral part of the king¬ dom of Italy. See Italy.

SICILY, the largest, most fertile and most populous island in the Mediterranean, belong¬ ing to Italy, was formerly a part of the king¬ dom

of the Two Sicilies (q.v.). It is separated from the mainland of Italy by the deep but narrow Strait of Messina, which is from 2ˆ2 to 14 miles wide and 24 miles long. In shape the island resembles a triangle, hence the Greeks named it Trinacria, the <(three- cornered.® Sicily extends from lat. 36° 38′ to 38° 18′ N.; long. 12° 25′ to 15° 35′ E. From the Saracen period until the beginning of the 19th century the island was divided into three districts, but in 1817 it was divided into the following seven provinces, each with a chief city of the same name : —

PROVINCES

Area in square miles

Population,

1915

Caltanisetta .

1,271

354,288

Catania .

1,907

819,944

Girgenti .

1,175

409,133

Messina .

1,254

537,348

Palermo .

1,927

804,580

Siracusa .

1,433

500,664

Trapani .

968

367,507

Total .

9,935

3 , 793 , 464

Physical Features. — A range of mountains commencing in the northeastern extremity of the island stretches across it taking the name first of the Neptunian and then of the Mado- nian Mountains. The whole range bears a strong resemblance to the branch of the Apen¬ nines which stretches to the southern extremity of Italy and strongly countenances the opinion generally entertained that it was originally con¬ tinuous with it and that Sicily consequently must at one time have been a part of the Euro¬ pean continent. The most remarkable natural feature of Sicily and one of the greatest won¬ ders of the world is Mount Etna (q.v.), which attains a height of 10,874 feet. Compared with this all the other summits of the island are insignificant, the loftiest of them, Calatabellota, Monte Cuccio, Monte Scuderi and Dinnamare over Messina being all between 3,000 and 4,000 feet. The great majority of the mountains have a far less average height. Their sides are gen¬ erally covered with magnificent forests. The rivers and streams are very numerous, and not a few of them of classical celebrity, but

they are individually insignificant, and in sum¬ mer are often almost without water. None of them are navigable. The most deserving of no¬ tice are the Giaretta or Simetus on the east coast, the Salso, Platani, Calatabellota or Isbura and Belice on the south and southwest, and the Termini, Fiume Grande and Pollina on the north. There are no lakes worthy of the name ; the largest is Lentini, not far from the east coast.

Climate. — The climate is excellent and, ex¬ cept in some spots where the air becomes tainted by the effluvia of morasses and stagnant pools, very healthy. The mean temperature in August, the hottest month, is 78° F., and in January, the coldest month, 52°, a difference of only 26°. On the hottest days the thermometer rises to 90° and 92°. The sky in summer is for the most part beautifully clear and serene, but after the autumnal equinox

dews and fogs increase, and rain falls in frequent and heavy showers. The most annoying wind is the southeast or sirocco, which, blowing from the deserts of Africa, is almost intolerable from its stifling heat. Much rain falls in winter, usually com¬ mencing in November, and continuing to fall at intervals, often in very heavy torrents, with vivid lightning and occasional snow-storms, till March, while not infrequently, particularly in the interior, long droughts prevail from April to November, to serious injury of the harvest and vintage.

Geology. — Etna itself, and the large circu¬ lar space of which it forms the centre, extend¬ ing west to Bronte and east to the coast over the whole tract that lies between Catania and Taormina, is covered completely with volcanic products. Granite, with gneiss and mica-schist, has its only large development in the northeast. The Jura-limestone occupies only two small patches; but the series of rocks immediately above the limestone and belonging to the Creta¬ ceous system are so largely developed as to cover at least a half of the whole surface of the island. The rocks of the Tertiary formation occur chiefly in the southeast and the west. The minerals of Sicily are more numerous than val¬ uable. They include argentiferous lead, quick¬ silver, iron, copper and antimony in quantities so limited that few of them are worked: lig¬ nite, bitumen, petroleum and naphtha ; asbes¬ tos, gypsum, emery, alum, rock-salt, nitre, sul¬ phur and a great variety of marbles, agates, amber, chalcedonies and jaspers. The most im¬ portant of all these is sulphur, which has been worked in mines for more than three centuries and about 400,000 tons is exported yearly. There are some 300 of these mines.

Vegetation, etc.— Both the climate and rich soil of the island procure for it both a very large amount and great variety of vegetable products. The hilly regions, presenting alter¬ nately bold crags and undulating slopes, are generally clothed with forests of fine timber, among which the prevailing trees are oak, ash, pine, elm and chestnuts; or covered with pastures, on which numerous flocks and herds are reared. In the lower grounds cultivation is general, and the crops are often remarkable for their luxuriance, though the mode of cul¬ ture is rather unskilful and careless. The most important crops are wheat, maize, barley and lentils or other pulse. Next to grain the most important objects of culture are the vine

and the olive, the orange and the lemon. The produce of the vine is partly dried into raisins but is much more frequently converted into wines of various kinds and generally of rich flavor. Sicily sends out two-thirds of

Italy's wines. Other vegetable products deserving of notice are the mulberry, extensively used in rearing silkworms ; saffron and sumach ; cotton, which has its chief locality near Mazzara; manna obtained by incisions in the bark of a species of ash, various species of fruit, more especially the Indian fig or prickly-pear, on which when in season great numbers of the lower orders subsist, the almond, common fig, date, liquorice-plant and sugarcane. To these might be added a great number of trees and plants valuable for fruit, fibre, medicinal prop¬ erties or the essences extracted from them.

Manufactures, Trade, etc. — The manufac¬ tures, which are not very important, include the ordinary silk, woolen, linen and cotton tissues, for the most part of a coarser descrip¬ tion ; oil-cloths, leather, cordage, glass, earthen¬ ware, etc. Trade suffers much from want of inland communication, but the vast extent of sea-coast and the many valuable products in¬ digenous to the island will in time make it much greater than it is at present. The only occupation for which the Sicilians seem to show any particular predilection is that of fish¬ ing, for which they possess numerous advan¬ tages, the sardine and tunny fisheries along the coast being the finest in the Mediterranean. The most important articles of export are oranges and lemons, wines, essences, sulphur, olive-oil, sumach, silk, liquorice and cream-of- tartar; of imports, colonial produce, cotton and woolen yarn, silk, linen, cotton and woolen goods, hides, hardware, etc. Commerce is mostly in the hands of English and Swiss ; before the war a large part was controlled by German firms. About 1,000 miles of railways are in operation.

Religion, Education, etc. — The Roman Catholic is the established religion and the great body of the people nominally belong to it, though a considerable number of Greeks, who profess the worship of their own church, live in different parts of the island, and more especially in the vicinity of Palermo. Educa¬ tion is much neglected. As late as 1864 up¬ ward of nine-tenths of the population were wholly uneducated. National schools are now, however, everywhere established, and the towns possess commercial and grammar schools. Lower grade education is compulsory. Paler¬ mo, Catania and Messina can even boast of universities, with a student roll (1914) of 1,803, 1,254 and 458 respectively.

History. — According to early tradition the first inhabitants of Sicily were Cyclopes and Lestrygonians, a kind of fabulous beings, who long furnished the poets with ample materials, of which, among others, Virgil has largely availed himself. Certain it is that among its inhabitants, invaders and rulers, Sicanians and Sikelians (Siculi), Phoenicians, Carthaginians, Greeks, Romans and Byzantines, Vandals, Saracens, Normans, French, Germans, Spaniards and Neapolitans have succeeded one another and

none of these successions was without its ac¬ companiments of violence and destruction. In¬ vasions, conquests, tyrannies, exactions, revolts, rebellions, repressions, massacres, pestilences

and famines have been terribly frequent inci¬ dents in the history of the island. To this list must also be added the ravages of earth¬ quakes and volcanic outbursts. Sicanians (Sicani) from Iberia were the earliest known inhabitants of Sicily, who gained such a foot¬ ing in the island as to change its name from Trinacria, which it had hitherto borne, to that of Sicania. The Aryan Siculi, driven from Italy, crossed the straits and having vanquished the Sicanians, gave the island the name which it still bears. After a considerable interval the Greeks began to plant colonies on the coast, and founded a number of towns, of which Syracuse, Agrigentum and Messina became the most celebrated. They were not, however, allowed to remain in undisturbed possession. The island was conquered first by the Cartha¬ ginians and next by the Romans; and on the decline of their empire, it was overrun by the Goths, who retained possession till Belisa-rius expelled them. In the beginning of the 9th century the Saracens became masters and continued so till their expulsion by the Nor¬ mans, who remained long enough in possession to establish the feudal system in all its rigor. For a continuation of the history of Sicily see Sicilies, The Two, and also Italy. Con¬ sult Baedeker's (Southern Italy) ; Baldacci, L., (Descrizione geologica dell' isola di Sicilia } (Rome 1886) ; Bruccoleri, G., (La Sicilia di OggP (Rome 1914) ; Freeman, E. A., (History of Sicily J (4 vols., Oxford 1891-84) ; Hare and Baddeley, (Sicily > (London 1905) ; Holm, (Geschichte Siziliens im AlterthunP (1870-98) ; Macmillan's (Guide to Italy and Sicily 5 (Lon¬ don) ; Wermert, G., (Die Insel Sicilien) (Ber¬ lin 1905).

SICK, Foods for the. That diet is one of the strongest factors in the control as well as in the progress of certain types of disease is practically an axiom to this generation and one appreciated, especially by the nurse upon whom falls the carrying out of the doctor's orders. Strict observance of a regimen prescribed by the physician in charge of a case, with no pam¬ pering of a patient's preferences and no indul¬ gence of a person's own theories, is the stern duty of one who would most fundamentally and materially alter a diseased or abnormal physi¬ cal condition. Very frequently there is in¬ creased demand for food in sickness, too often associated with partial or complete inability to take it or, if it is taken, to digest it prop¬ erly; gastric secretions are almost always per¬ verted in acute or chronic diseases and appe¬ tite and taste, under normal conditions a safe criterion, may have to be disregarded in ab¬ normal circumstances.

Too much care cannot be given to the service of meals during illness. The psychological in¬ fluence exerted upon a healthy person by the manner of

the preparation of food is now proved to be very great as an actual aid to appe¬ tite and digestion, though it has been practically ignored for centuries. How greatly exaggerated this influence would be in illness may be read¬ ily perceived. Therefore, the invalid's tray must be made attractive at any cost of effort or even of time on the part of the nurse; it is her spe¬ cial province, and perhaps the only one in her professional sphere in which she may give play to her aesthetic sensibilities. It is, therefore, not true that a woman without aesthetic sense makes

the best nurse, for this especial reason of at¬ tractive service and for the very potent reason that an invalid with any aesthetic perception (made keener by illness) will need a nurse's sympathy and appreciation of his condition and point of view.

All service should be upon the very best china and linen available, with variation in these if possible; the least novelty or diversion is acceptable, as the strongest people are often reduced by illness to childlike attitudes. A freshly cut flower on a tray adds greatly to its first effect upon a patient and attractive gar¬ nishes to even unattractive dishes may be de¬ vised by a skilful nurse. The color of paps and gruels is not appetizing; the color of beef juice is absolutely revolting to very many; therefore, opaque ware is to be selected for serving such. If a bent tube be used for the patient to take liquids with, much discomfort of sitting up or disgust at seeing what is being taken may be avoided. In quantity the service must be underestimated rather than overesti¬ mated ; sufficient porridge for a day laborer will have little charm for a patient with no appetite. Care must be taken in conveying the tray that nothing upon it be spilled or smeared. Too much stress cannot be put upon these points.

A nurse must know the underlying prin¬ ciples of food values and their chemical com¬ position, as well as the proper preparation of foods of each class to make its essential prop¬ erties best available to the disturbed digestion. She must know that steak or chop slightly broiled is more easily digested than the ((well- done^ variety; that an egg slightly boiled, or one well mixed with air by beating, gives up its albumen with least resistance to the digestive juices. On the other hand, starchy foods must be long subjected to boiling temperature that the starch-cells may be ruptured, and digestion of them, so difficult even in health, be begun for the invalid. Seasoning and especially the handling of the smell of food, is a more import¬ ant point in sick-cooking than under ordinary conditions, and may be used extensively on account of the mild stimulating action of con¬

diments on the gastric juices, as well as for their flavor, although a judicious nurse will not apply this principle to excess. Tea, chocolate, cocoa and coffee may be used with moderation except in certain troubles in which they will be specially forbidden ; they combine slight res¬ torative power with some nutritive value and at least do no harm.

The time of administering food is another important point. In but few instances is sleep to be interrupted for the sake of a meal. The best times are when the patient has been quiet for a while and can be quiet for at least an hour more; that is, undisturbed by visits from doctor or friends, by baths or bedmaking, or anything tending to excitement. If a fever is present the most abuxidant meal of the day should be given when the fever is at its low¬ est, as gastric juices are least active in pres¬ ence of fever.

Food may be selected in some measure with regard to the affected part. Throat and lung troubles demand non-irritating foods, or even those of a soothing character, as flaxseed tea; a disease involving the stomach would demand food the digestion of which is accomplished in

the intestines, as carbohydrates or starches ; and vice-versa. The quantity and total amount are determined by the patient : a suppurative proc¬ ess demands much and frequent feeding, as it uses tissue at an almost unthinkable rate ; the cure of consumption is largely a stuffing process; in some acute illnesses food may be withheld for over 24 hours with great benefit, but the diet must be very carefully guarded when food is resumed. Some of the more im¬ portant foods for the sick are here given, with modes of preparation and some indications of their spheres of usefulness.

Liquid Foods Made of Water. — Used as cooling drinks in fevers.

Lemonade. — This is best prepared by mak¬ ing a syrup of one cup of water and one-half cup of sugar, boiled 5 or 10 minutes. Make the drink as it is needed in the proportions of two tablespoonfuls of syrup to one of lemon- juice and one-half cup of water. Mineral waters may be substituted for plain water, espe- cialv when the stomach is irritable.

Orangeade. — 'Use one and one-half table¬ spoonfuls of the same syrup as for lemonade and the juice of an orange — less if the orange is sweet. Pour over crushed ice.

Grape-juice. — Thoroughly clean one and one-half cups of Concord grapes, add one cud of cold water and cook one and one-half hours in a double boiler. Add one-half cup of sugar, strain and cool.

White grape-juice and ginger ale, half and half, makes a pleasing mixture for many con¬ valescent patients. Cut orange, maraschino cherries and a

sprig of mint give it an attrac¬ tive bouquet.

Irish Moss Lemonade. — Soak one-quarter cup of Irish moss in cold water to cover it; remove this, add two cups of fresh water and cook 20 minutes in a double boiler. Strain and to one-half cup of liquid add sugar and the juice of one lemon.

Flaxseed Lemonade. — Into one pint of boil¬ ing water put two tablespoonfuls of sugar and three of whole flaxseed. Steep one hour; strain and add the juice of a lemon; serve direct from the ice. This is desirable in throat and lung troubles, giving relief as well as affording some nutriment. It is very soothing in ton- silitis.

Potus Imperialis. — To one quart of boil¬ ing water add one-half ounce of cream of tartar, the juice of a lemon and two tablespoon¬ fuls of sifted sugar or strained honey. Cover this until cold. This is a useful drink in fevers if the urine is high-colored or scanty.

Egg-water. — The white of one or two eggs well beaten is to be put into one-half pint of ice-water with a little salt or sugar. This may be given to the weakest patient and will almost invariably be retained, while the albumen will afford necessary nourishment. The water may be flavored with sherry or may be changed to lemonade, orangeade or grape-juice. Almost any fruit-water is refreshing to a patient, espe¬ cially if he is suffering with fever or chronic disease or convalescing. The acids and salts of fruit are valuable food additions, though they may not be relied on to furnish nourish¬ ment to any appreciable extent. Rhubarb drink well prepared is very refreshing and almost always beneficial ; green gooseberries and mul¬ berries afford a variety in their season and all

the juicy berries of summer make good drinks. The liquid for all these should be perfectly clear after straining and never contain any pulp or seeds.

Gum-arabic Drink. — Make with one ounce of gum-arabic to one pint of boiling water, seasoned with two tablespoonfuls of sugar, sherry and the juice of a large lemon.

Bran-tea. — To one pint of wheat bran add one quart of boiling water; keep this hot, but boil less than one hour. Strain and serve with sugar and cream. Corn-tea is made in the same proportions of parched corn ground in a mortar.

Toast-water. — Cut stale bread in one-quar¬ ter-inch slices and dry thoroughly in the oven until crisp and brown. Break into small pieces and add an equal quantity of boiling water ; all this to stand an hour; then season with salt, strain and either chill or reheat. A little wine may be added. This is often beneficial in cases of extreme nausea.

Rice-water. — Wash two tablespoonfuls of rice and add two cups of boiling water. Stick- cinnamon or lemon-peel may also be added. Boil one-half hour, strain and reheat or chill as desired.

Barley-water. — Soak three tablespoonfuls of barley overnight; boil in four cups of cold water for one and one-half hours; strain and season with salt, lemon-juice and sugar. The starch of barley is very beneficial for diminish¬ ing a laxative condition.

Oatmeal-water. — Take one-half cup of fine oatmeal with one quart of boiled water ; set in a warm place for one and one-half hours; strain and cool. It makes an excellent summer drink, is always safe in quantity in the hottest weather and is valuable in diarrhoea of chil¬ dren.

Macaroni-water. — Indian meal or any of the starchy foods may be used for this water in similar ways. Above all, such waters must be made palatable and should be served in a manner that does not betray their weak char¬ acter. By increasing the amount of cereal and by longer boiling, a gruel may be made.

Oatmeal Gruel. — Boil one tablespoonful of oatmeal in one pint of water three-quarters of an hour; strain it and if too thick reduce to desired consistency with boiling water. Season with salt.

Oatmeal Gruel with Milk. — This is made by soaking the oatmeal in water overnight in proportions of half as much cereal as water. Boil an hour in the same water, then blend thoroughly with one pint of boiling milk and boil five minutes more.

Caudle. — Beat one egg to a froth, add a wineglass of sherry and one-half pint of any kind of gruel ; flavor with nutmeg, lemon-peel and sugar.

Gruels are comprised under the head of semi-solids. Discretion must be used in the ad¬ ministration of gruel when symptoms of in¬ flammation are present, since starch in gen¬ eral, and corn or oatmeal gruel in particular, are very heat-productive. Care must always be taken in making gruels to cook them thoroughly, that the starch may be made altogether avail¬ able to a weak digestion. Arrowroot is advis¬ able as an especially digestible gruel and of avail even in the presence of irritation of the stomach.

Mulled Wine. — Soak broken stick-cinnamon and one-half dozen cloves in one-half cup of boiling water for 10 minutes. Strain and add the beaten whites of two eggs and two table¬ spoonfuls of sugar. Into this pour- from a height one cup of sweet wine that has been boiled (but not in tinware). Pour from glass to glass several times to make it light.

Pap. — Thicken one pint of milk with one tablespoonful of flour; cook 10 minutes and beat in the white of an egg if desired. Corn¬ starch, rice-flour and arrowroot are used also in this way as thickening.

Plum Porridge. — Mince 12 raisins and bring them to a boil in one pint of milk; thicken with one teaspoonful of corn-starch in a cold-water paste and boil five minutes ; strain and serve. Raisins impart a fruity taste that gives variety, and they afford the easily-digested fruit-sugar. This is of service in diarrhoea.

Sago-milk. — Take one tablespoonful of pearl sago, wash and soak it overnight in four tablespoonfuls of cold water. Boil the sago with one quart of milk in a double boiler until the sago is dissolved. Sweeten slightly and serve hot or cold.

Treacle Possett. — Boil a cup of milk and stir in one tablespoonful of molasses. Bring this to a boil and strain before serving.

Milk preparations may be provided in great variety and often with the most desirable re¬ sults. The more useful of them are specified below.

Albuminized Milk. — The white of one egg, one-half cup of milk and a pinch of salt are shaken together thoroughly and chilled.

Milk Punch. — To one-half pint of milk add one tablespoonful (or less, according to case and individual) of whiskey, rum, brandy or sherry, sugar and a few gratings of nutmeg. Mix, cover and shake well. The milk may be hot if so desired.

Kumiss. — Dissolve one-third of a yeast-cake in one tablespoonful of lukewarm water ; add this to one quart of warm milk to which one and one-half teaspoonfuls of sugar has been added ; fill strong bottles to the neck and cork them firmly; then invert them and allow them to remain for fermentation at about 80° F. Chill after six or eight hours. Remove the corks with care or draw off the kumiss with a champagne tap.

Sterilized Milk. — Fill perfectly clean pint bottles with milk almost to the top and plug with absorbent cotton ; place all the bottles in a steamer so arranged that they will not touch the bottom or each other. Immerse in cold water to three-fourths their height and bring this bath to the boiling point;

keep it at 170° F. for about 10 minutes. Remove cotton plugs and cork bottles with rubber corks if possible, keeping them in a cool place until used ; then use the milk only once, never offering a second time even to an infant.

Pasteurized Milk. — This is similarly pre¬ pared, but the water is on no account allowed to boil and is kept at 167° F. for 30 to 60 minutes Special pasteurizers are available for this pur¬ pose.

Peptonized Milk. — Mix thoroughly five grains of pancreatic extract and 15 grains of bicarbonate of soda in two tablespoonfuls of water; add one pint of fresh milk and keep warm (about 115° F.) in a covered jar for one-

half hour; then chill the mixture. If the re¬ sulting slightly hitter taste is disagreeable, the preparation may be sweetened. Peptonizing tubes may be bought all prepared for use in this process.

Water and fresh milk, boiled in equal parts, will afford relief in cases of mild exhaustion, being quickly absorbed with the least possible effort. In giving milk to a patient the most important point to observe is very slow admin¬ istration ; it must be eaten rather than drunk, even under normal conditions, and a weak stomach cannot manage its curd in bulk. Lime-water or bicarbonate of soda, added in small quantity to milk in cases of acidity of the stomach, may prevent the formation of curd. In bad cases of nausea milk may be retained if fed by the teaspoon at short intervals. In all cases of milk diet in whole or in part it is safer to pasteurize or sterilize the milk unless one is perfectly sure of its source and its mode of transportation. This would practically ob¬ viate any risk. The change from a solid to a milk diet must be made gradually; also, if the case no longer warrants all liquid, the change back to solid must be gradual, as the digestive system will rebel at sudden alterations in regi¬ men. The amount of milk to be given daily, its modifications and the frequency of administra¬ tion will be regulated by the physician in charge of the case.

Beef preparations are likewise made in many ways, so as to adapt them to different patients in various circumstances. Those described be¬ low will all be found to possess special advan¬ tages.

Beef-tea. — A pound of beef cut from the round or neck is cut into very small pieces, put into an earthen or porcelain pot, covered closely and allowed to soak in one quart of cold water for an hour or two. Heat in the same vessel to the boiling point, then allow the preparation to simmer two

hours, or until the salts and soluble albumen of the beef are quite extracted. Season this and strain it or not, as desired; remove all fat, however, when the tea is served, as the least trace of fat is disgusting to a sick person. A perfectly clear liquid may be ob¬ tained by stirring in the beaten white of an egg and again straining. This beef-tea is stimu¬ lating, but by no means nutritive, as most of the albumens have been precipitated by the heat; so discretion must be used in its adminis¬ tration, since it may excite a weak patient and prevent sleep.

Beef Essence. — Finely mince one pound of lean beef (no fat) ; put into a fruit-jar, cork tightly and set into a kettle of cold water over a slow fire; let it boil three hours, then strain through a sieve and season with salt and ied pepper. Another method of preparing this beef essence, which has some nutritive value in ad¬ dition to the stimulating quality, is to add one pint of cold water to the minced beef in the jar, allow it to macerate for three hours, with occasional stirring, and to simmer in the water bath after it has once come to the boiling-point. Strain as before and wash the remainder with cold water to make the whole measure one pint. Vary the flavor if it is often given by bay-leaf, clove, mace, celery or other aromatic substance.

Peptonized Beef-tea. — To one-half pound of raw lean beef that has been finely minced add 10 grains of pepsin and three drops of

dilute hydrochloric acid. Put in a tumbler, cover with cold water and stand for two hours in a warm place (about 90° F.), stirring frequently. This should always be used the day it is made, although most of the other beef preparations may be kept sterile on ice for some time.

Bouillon and Consomme. — These may be given to a convalescent as usually prepared; they are too stimulating, however, for a weak patient.

Beef-juice. — Broil one-half pound of lean juicy beef over a hot fire, turning frequently, merely to the point of Keating the meat through ; cut the meat into dice, and extract the beef juice with a meat-press or a lemon-squeezer. Heat the extract by setting in a dish of hot water ; never apply enough heat to coagulate the juices, as they would be rendered less di¬ gestible, defeating the express purpose of this preparation. This is highly nutritive. Broiled beef-tea is the same preparation diluted, as the case or individual may require, by hot (not boiling) water.

Frozen Beef-tea. — It is often desirable to administer nourishment as pleasantly as possible in hot weather, or in a case of high fever. Any of the beef-teas given above may be frozen. In small quantities it is most convenient to fill a pound baking-powder tin, or other tin case, two-thirds full, and pack with ice and salt in a small pail ; stir and beat as the

mixture freezes until a consistency of mush is obtained.

Beef-juice and Cereal. — Use one table¬ spoonful of thoroughly cooked oatmeal or other cereal to two tablespoonfuls of boiling water ; add one cup of strong beef-tea ; bring all to the boiling point; season well, and serve with toast or crackers.

Bartholow's Food. — Soak one ounce of sago in one-half pint of milk for 10 minutes. To this add one-half pint of beef-tea, the yolk of an egg, beaten, and seasoning of celery salt. This is considered a complete food.

Scraped Beef Balls. — A small piece of round steak is cut into strips, and the freshly-cut sur¬ face is scraped with a rather dull knife, reserv¬ ing all the soft part of the meat and leaving connective tissue. Form the pulp into balls, using but slight pressure; season with a very little pepper and salt. The balls may be either broiled or cooked in an omelet pan that is sprinkled with salt. Serve on toast, and garnish as prettily as possible to divert attention from the raw appearance of beef. The flavor may be altered, if the patient's digestion allows, by ad¬ ditions of minced celery, chopped almonds or other nuts, butter or egg albumen.

Raw Beef Sandwiches. — Use the raw scraped beef, well seasoned with salt; cover half a slice of bread that is cut very thin and buttered; press down the other half, and serve. The object is to serve this raw beef (as attrac¬ tively as possible) because of its nutritive quali¬ ties ; the. rareness, being often distasteful, must be disguised.

Mutton Broth. — Wipe and clean from skin and fat three pounds of mutton from the neck; cut in small pieces, and put all into a kettle; cover with cold water and bring slowly to boiling-point ; then simmer for more than two hours, or until meat is perfectly tender. Strain, skim and add rice or barley.

Veal Broth. — This may be made with one-

half pound of veal, chopped fine, to one pint of cold water. Prepare in same way as mutton broth.

Chicken Broth. — Select an older fowl for this, as it makes a more nutritious broth. Re¬ move skin and fat; disjoint and break the bones. Cover with cold water in stew-pan, bring to boiling-point slowly, and simmer for several hours. Season with salt and a little pepper when half

done. Strain and remove fat. Rice may be boiled with it at first, and strained out, or it may be added and boiled in the stock.

Chicken Panada. — Chop and rub fine one- quarter pound of the white meat of chicken, raw. Mix with one-half cup of fresh bread crumbs and one-half cup of milk; beat in the whites of two or three eggs. Season and poach in little earthen cups.

Oyster foods have also their peculiar values, and a few of the numerous forms of prepara¬ tion are here given.

Oyster Juice. — Mince with a silver knife one dozen fat oysters, put them into a fruit-jar and stand in hot water for half an hour. Strain the liquid out, skim and season. This may be diluted or served in concentrated form.

Oyster Broth. — Add one-half pint of cold water before putting the jar, as above directed, in the hot bath. Or the broth may be creamed by the addition of flour and milk.

Oyster Soup. — Rub together two table¬ spoonfuls each of flour and butter, and add one pint of hot milk; then drain and add gradually the liquor from one pint of oysters; and when the mixture is brought to a boil add the oysters, which must have been well washed. Cook all together until the oysters begin to grow plump and the edges begin to curl. After seasoning, this must be served instantly with crackers.

Oysters possess a slight nutritive value, and all the nourishment is easily available to a weak digestion, especially if the tough adductor muscle be removed. An irritable stomach will often welcome oysters or clams attractively prepared, and benefit by the nourishment. Clams are much tougher than oysters, and should be given to an invalid only as broth or liquor. Whole raw oysters are frequently served to con¬ valescents.

Clam Broth. — Take as many large clams as desired, and thoroughly wash and scrub them ; put in a kettle with a very small amount of water in proportion, and cook until the shells begin to open. Then strain the liquor off through cheese-cloth, season and dilute if de¬ sired. This may be hot, cold or frozen; it may be kept in this fundamental form for a long time if cooked, and may be varied by flavorings of herbs, or reinforced by pulverized cracker crumbs. By the addition of milk and flour, cream of clams is obtained. The plain broth is very valuable in nausea.

Egg-nog. — This food is made in a number of ways; it is very frequently a staple for in¬ valids of long standing, and a fagging interest in it may be revived by a slight variation. The white and yolk of the egg may be beaten sepa¬ rately or together; the flavoring may be wine, whisky, brandy or, if

alcohols are not desir¬ able, vanilla or some fruit-juices; usually a little nutmeg is added, and always salt where eggs are used. The milk may be hot or cold, or one- half milk and hot water may be used. A good

standard recipe is as follows : one egg, two- thirds cup of milk, one tablespoonful of sugar, two tablespoonfuls of flavoring if it is a wine, one tablespoonful if brandy or whisky, one teaspoonful if vanilla. If the white of the egg is beaten the patient will find it more convenient to drink with a glass tube or straw.

Bonnyclabber. — Skimmed milk which has become thick by standing. It is served in the same dish it has stood in, with whipped cream or white of egg.

Wine Whey. — Scald one cup of milk, add one cup of sherry or port wine and stand five minutes. Strain and sweeten if desired. Whey can also be separated by lemon- juice, vinegar or rennet.

Junket Custard. — Heat lukewarm (not hot) one cup of milk; add two tablespoonfuls of sugar and one teaspoonful of brandy, or one- fourth teaspoonful of vanilla. To this add one- fourth junket tablet dissolved in one teaspoon¬ ful of cold water ; turn into small molds and cool. This may also be frozen, if packed in a small tin box and surrounded with ice and salt.

Egg Custard. — Mix one-half cup of milk, one tablespoonful of sugar and one egg, beaten whole. Put into cups and bake in water.

Caramel Custard. — To the above add enough browned sugar to give color and cara¬ mel taste.

Chocolate Custard. — Add melted chocolate to regular egg-custard recipe.

Bread Jelly. — Toast brown the inside of five slices of stale bread and soak in two quarts of boiling water with a few slices of lemon; later let this boil to a jelly; strain, sweeten and eat it cold. A little gelatin may be added, but is not necessary.

Chicken Jelly. — This is prepared like chicken broth, but the stock is allowed to solidify. If poured into attractive molds the jelly will be pleasing td the patient; or it may be cut into cubes and used as a garnish to other things. Fresh chicken meat may be molded with the jelly if the patient can eat it.

Wine Jelly. — Take one-half box of gelatin (or two tablespoonfuls of granulated), soak 20 minutes in one-half cup of cold water ; dissolve this in one and two-thirds cups boiling water and add one cup of sugar, one cup

of sherry or Madeira, one-third cup of orange-juice and three tablespoonfuls of lemon-juice. Strain, mold and chill.

Lemon Jelly. — Make this with one-half box of gelatin dissolved in one-half cup of water, dissolved in two and one-half cups of boiling water; strain and add one cup of sugar and one-half cup of lemon-juice.

Orange Jelly. — Same as wine jellv, using one and one-half cups of orange-juice and three tablespoonfuls of lemon-juice.

Cider Jelly. — Use cider, dilute or not, in proportion of three and one-half cups of liquid to one-half box of gelatin or two tablespoonfuls.

Gelatins in combination with other things are beneficial to ill persons, though by no means highly nutritious ; a very distinct flavor is neces¬ sary to secure palatability, or even digestibility.

Indian-meal Mush. — Mix one-half cup of Indian meal with one-half teaspoonful of salt and three-fourths cup of milk; stir this into one cup of boiling water and cook three hours in double boiler. Serve with sugar and cream.

Rye-meal Mush. — Mix one-half cup of rye meal with one-half teaspoonful of salt and one- half cup of cold water; add to one and one- fourth cups of boiling water; boil five minutes; then cook in double boiler. Serve with maple syrup if possible or with sugar and cream.

Egyptian Porridge. — Use three tablespoon¬ fuls of lentil flour, mix with salt and one pint, of water to a paste. Boil 10 minutes, constantly stirring. This is nutritive and agreeable.

Mushes. — Of all the other ordinary cereals mushes may be similarly prepared, the special precaution being to cook the cereal a sufficient length of time, always one hour, and longer if the heat is not great. For a weak digestion especially the starch in these preparations must be made soluble and directly available, and the only way of accomplishing this is by thorough cooking. Most of the ordinary cream soups are possible to the invalid ; precaution must be taken, however, to see that they are especially prepared in order that the butter and flour used for thickening this class of soups be not cooked together; for when this fat and starch are mixed it is well-nigh impossible for an impaired digestion to deal with them. When possible, it is well also to have the milk merely heated and not boiled, as boiling detracts from the beneficial results of milk and tends to constipation. The simpler soups in this class, for which recipes can be found in any modern cookbook, are advisable : such as rice soup, potato soup, black or white bean soup, pea soup, creams of celery, corn or asparagus, tapioca soup, bread soup. If well prepared, these soups would be included under semi-solids, as they must be eaten, not drunk, and contain a good deal of nourishment.

Toast. — This must be made of stale bread from which crust has been removed, and slowly browned over a flame until thoroughly crisp.

Dextrinized Bread. — – Stale bread heated in the oven until it has become dark brown.

Torrefied Bread. — Prepared in the same manner as dextrinized, but with greater heat and for a longer time.

Pulled Bread. — Remove all crust from a loaf of loose-textured bread; from the inside portion form strips with forks or fingers, break¬ ing or pressing as little as possible. Put upon a papered pan and bake until of a golden brown color and crisp. Serve with whipped cream.

Care must be taken with bread for invalids that it be thoroughly baked in loaves small enough to warrant complete killing of all yeast. Freshly baked bread is never to be given to a person with even slightly impaired digestion. A loaf should not be cut for 24 hours after bak¬ ing. Very frequently in disease the stomach and small intestine cannot hold or digest food. In such cases the introduction of food into the bowel through the rectum, by means of a David¬ son syringe, is necessary or advisable. Some of the formulae enemata more commonly used are here given :

Nutritive Enemata. — When it is impos¬ sible for the patient to take food as ordinarily, a nutritive enema will be ordered. Special for¬ mulae will probably be given by the physician, but a safe rule is to add to one pint of the foundation liquid (which is usually milk, be¬ cause of its simple, convenient and unirritating character, though only about one-third ab¬ sorbed; but may be beef-tea, mild gruel or

eggs) one tablespoonful of liquor pancreaticus and 30 grains of bicarbonate of soda. Ad¬ minister at once after preparation is added.

Special formulae are given, as they are fre¬ quently ordered by name :

Peptone and milk enema : 60 grams peptone, 250 c.c. milk.

Egg and milk : three eggs, three grams salt, 250 c.c. milk.

Sugar and milk: 60 grams grape-sugar, 250 c.c. milk.

Boas' enema : 250 c.c. milk, yolks of two eggs, pinch of salt, 15 c.c. red wine, 15 grams starch or arrowroot.

Riegel's enema: 250 c.c milk, all of two or three eggs, two or three pinches of salt, 30 c.c. red wine.

Tournier's enema: 140 to 150 c.c. beef-tea or raw beef juice, yolks of six eggs, two salt- spoonfuls salf, 20 to 40 c.c red wine.

Wine may be omitted from any of these formulae.

Leube's Pancreas Enema : Mix 50 grams of pancreas, 150 grams lean meat and 30 grams of fat, all chopped as finely as possible in 150 c.c. lukewarm water. This is an attempt to imitate natural intestinal digestion, is claimed to be un¬ irritating as well as nourishing and is retained well.

Enemata should always be given at body temperature, in bulk not to exceed four to five ounces. They must be introduced as high as possible, and be given very slowly; the patient must lie perfectly quiet for at least an hour

after injection. During 24 hours three or four nutritive enemata and one cleansing enema are sufficient for a patient. Trial is often necessary with various formulae before one is found that can be retained. A very small quantity .of opium added may help to retain them, but is not advisable without a physician's special orders.

Smith Ely Jelliffe, M.D., Formerly Instructor in Therapeutics, Columbia University, Medical Department.

SICK MAN pF EUROPE, The, a term

applied to Turkey in 1854, by the Tsar Nicholas, in a conversation with Sir Hamilton Seymour, the British ambassador at Saint Petersburg. The tsar intimated his opinon that Turkey was sick and dying. He therefore proposed that, to avoid a European war when the demise took place, Russia and Great Britain should come at once to a private arrangement as to the dis¬ posal of the Sick Man's effects. As France was ignored in the arrangement, there was some doubt as to the good faith of the tsar. The British government rejected the proposal, in¬ timated its belief in the recovery of the Sick Man, and soon after fought by his side in the Crimean War.

SICKINGEN, zik'ing-en, Franz von, Ger¬ man soldier and Protestant reformer: b. near Kreuznach, 2 March 1481 ; d. 7 May 1523. From early youth he devoted himself to the military life. The protection of the oppressed was his chief occupation. He assisted many a creditor in procuring what was due him from a powerful debtor. He was the enemy of tyranny, and endeavored on every occasion to repress the despotism of princes and the ar¬ rogance of the priests. Without being a scholar he loved science and protected men of learning

SICKLES

SIDDONS

785

(for instance Reuchlin, whom he defended against the monks of Cologne) ; and in his castle at Ebernburg many persecuted scholars found a safe asylum. He was a friend of the Reformation, and contributed greatly to extend it in the countries which bordered on the Rhine. At last he engaged in a quarrel with Treves, the palatinate, and Hesse, which drew upon him the ban of the empire. He died soon after the surrender of Neustall, one of his castles, having previously received a severe injury from a fall during a sally. Consult the study by Ulmann

(1872).

SICKLES, sik'lz, Daniel Edgar, American soldier: b. New York, 20 Oct. 1823; d. there, 3 May 1914. He was educated at the University of the City of New York, but did not graduate. He began to learn the printer's trade, then turned to the study of law, and was admitted to the bar in 1846. In 1847 he entered the legislature as a Democrat, and in 1853 was appointed corporation counsel for New York. In that year he accompanied James Buchanan to England as secretary of legation. Returning to America in 1855 he was elected to the New York State senate, and two years later became a member of Congress serving until 1861. He was tried for the murder of Philip Barton Key, whom he shot on the street in Washington, D. C., 27 Feb. 1859, on account .of a guilty intimacy with Sickles' wife, and was acquitted, the defense being temporary aberration of mind — the first case in which that plea was set up. Key was United States Attorney for the Dis¬ trict of Columbia and a son of the author of the (Star-Spangled Banner. > At the beginning of the Civil War Sickles raised in New York the Excelsior Brigade of the United States vol¬ unteers, and was commissioned colonel of one of its regiments the 70th New York. In September 1861 he was nominated brigadier-general of volunteers. He participated in the Peninsula campaign (q.v.) and the battle of Antietam, under McClellan, and at Fredericksburg com¬ manded a division. Having been made major- general of volunteers in November 1862 he was given command of the Third corps in February 1863, and bore a distinguished part in the battles of Chancellorsville and Gettysburg (qq.v.) At Chancellorsville he cut .off the enemy's ammuni¬ tion train, and by rallying the retreating artillery gained the first success of the day. At Gettys¬ burg his corps withstood the Confederate as¬ sault on the Federal left, at the Peach Orchard, and Sickles lost a leg in the encounter. He continued in active service until 1865, when he was sent on a private mission to Colombia and other South American countries. He joined the regular army in 1866, and on 2 March 1867 was brevetted brigadier-general f.or bravery at Fredericksburg and major-general for gallant and meritorious service at Gettysburg. For the latter battle, also, he was awarded the Con¬ gressional Medal of Honor 30 years later, 30 Oct. 1897. During the early years of the recon¬ struction of the South he was in command of the military district of the Carolinas, but in 1867 President Johnson relieved him of his command and offered him the mission to the Netherlands, which he declined. On 14 April 1869 he was placed on the retired list of the army with the rank of major-general. From 1869 to 1873 he was United States Minister to

Spain, where he had diplomatic management of the Virginus case; in 1890 was sheriff of New York County, N. Y. ; and in 1892 was again elected to Congress, where he served till 1897. For one year he was president of the

New York State Board of Civil Service Commissioners (1888-89). When the New York Monuments Commission was founded in 1886, Sickles be¬ came its chairman, an office he held for 26 years until, in December 1912, he was deposed on account of a shortage of $27,000. In 1902 he was elected commander of the Medal of Honor Legion. So long ago as 1879 the French Re¬ public had decorated him with the Legion of Honor. After the death of his wife Sickles married again in Spain, 1871.

SICOTTE, se-kot', Louis Victor, Canadian statesman: b. Saint Famille, Quebec, 7 Nov. 1812 ; d. 1889. He was called to the bar in 1838, later establishing himself in practice at Saint Hyacinthe and becoming a leader of the bar. He was a member of the Canadian Par¬ liament in 1852-63; was judge of the Superior Court in 1863-87 ; and in 1862-63 was Attorney- General for Lower Canada in the Macdonald- Sicotte administration. He was a leader of the moderate Reformers.

SIC YON, sish'i-on, Greece, one of the old¬ est, most celebrated and handsome of the an¬ cient cities of the country on the Asopus River, about two miles from its port on the Gulf of Corinth. The city is said to have been founded before 2000 b.c. The site is now occupied by the village of Vasilikon. With adjacent territory the city formed the small state of Sicyonia; at an early period it was ruled by princes, but later became a republic (252 b.c.), and joined the Achaean league formed by Aratus, finally coming under the domination of Rome. Sicyon was especially celebrated for its schools of sculpture and painting. It gave its name to a school .of art which numbered among its disciples Polycletes and Apelles, both natives of Sicyon. The ancient theatre has been ex¬ cavated by the American Archaeological School at Athens.

SIDDHARTHA ((

SIDDONS, sid'onz, Sarah Kemble, English actress: b. Brecon, South Wales, 5 July 1755; d. London, 8 June 1831. (See Kemble Roger). She appeared early on the provincial stage won some local fame at Wolverhampton and Chelt¬ enham, and was secured by Garrick for Drury Lane, where her failure was distinct. After this she acted successively at Birmingham, Man¬ chester, York and Bath, where she opened in her great part of Lady Macbeth, increasing her reputation to such a degree that she was again engaged at Drury Lane. Her reappearance in London took place on 10 Oct. 1782, in the char¬ acter of Isabella in the play of that name, being Garrick's adaptation of Southerne's (Fatal Marriage.) Her success was complete. The public were astonished by her powers, and she

was universally acknowledged to be the first tragic actress of the English stage. She sub¬ sequently visited Dublin and Edinburgh with equal applause. She appeared as Lady Mac¬ beth for the first time in London on 2 Feb. 1785, and in that character was declared perfect by oompetent critics. Christopher North, Haz- litt, Leigh Hunt, Lord Erskine and many others agree in praise of her performances, which were at their best in tragedy, and belonged to the fine old declamatory (sometimes called the <(Kemble55) school. In solemn majesty, pathos and minute finish she surpassed Rachel (q.v.). For 30 years she continued to astonish and enchant the lovers of the drama, and having acquired an ample fortune, and been portrayed by Reynolds as the (Tragic Muse,5 took her leave of the stage in 1812, before an audience which melted into tears on the occasion. She, however, performed subsequently at benefits and gave privately Shakespearian readings. She was seen as Rosalind, Ophelia and Desdemona, with great success; and as Catharine in VIII,) discovered a part nearly as well suited to her as that of Lady Macbeth. Consult the

1886).

SIDE-SADDLE FLOWER. See Sarra-

CENIA.

SIDEREAL CLOCK, a clock regulated to measure sidereal time, reckoned by sidereal days of 23 hours, 56 minutes, 4 seconds mean solar time, which are measured by the interval between two successive passages of any fixed star over the same meridan, and divided into 24 sidereal hours.

SIDEREAL SYSTEM. See Stars.

SIDEREAL TIME, time measured by the apparent motion of the stars. A sidereal day is the time -from the passage of a star across the meridian till its next passage. If the stars are supposed to be absolutely fixed and at an in¬ finite distance, a sidereal day is exactly the period of the revolution of the earth on its axis; the effects of the motions of the stars and the motion of the earth in its orbit are insensible. A sidereal day is the most constant unit of time which we possess; but it appears that it is increasing in duration very slowly. The length of a sidereal day is 23 hours 56 minutes 4.092 seconds. A sidereal year is the exact period of the revolution of the earth round the sun.

SIDERITE, a mineral composed of car¬ bonate of iron, and when pure crystallizing in the rhombohedral system. It then is also known as spathic iron. Another name is chalybite. The faces of the rhombohedral crystals are

commonly curved, and there is a perfect rhombohedral cleavage. Besides this it occurs in botryoidal and in globular form, with a more or less fibrous internal structure. Again it is massive, or coarsely or finely granular.

The hardness is 3.5 to 4; the specific gravity 3.7 to 3.9. It has a vitreous lustre, and is often more or less pearly. The color varies from ash-gray, through yellowish-gray, green¬ ish-gray, to brown and brownish-red ; some¬

times it is white The streak is white. It is commonly translucent or subtranslucent

In composition it is: FeC03. Part of the iron is usually replaced by manganese, and often by magnesium or calcium.

The principal varieties are (a) crystallized, (b) concretionary, in globular form, with fibrous structure, (c) granular, (d) massive, (e) oolitic, and (/) earthy, with a large ad¬ mixture of clay. This latter variety constitutes a large part of the clay in stones of the coal formations.

In the United States siderite occurs at Plymouth, Vt. ; Sterling, Mass.; Roxbury, Conn.; Antwerp, Jefferson County, N. Y., and at the Rossie Iron Mines, Saint Lawrence County, N. Y., and in North Carolina. Also in Pennsylvania, Ohio and other States, chiefly as clay iron stones in the Coal measures.

SIDEWINDER, a local name in Arizona for the horned rattlesnake (Crotalus cornutus) , referring to its sidewise method of progression. See Rattlesnake.

SIDI-BEL-ABBES, se'de-bel-ab-bas', Al¬ geria, a town in the department of Oran, lies 38 miles south of the town of Oran, on the Mekerra River. It is a modern walled town, and occupies a height rising from a fertile healthy and populous plain. Numerous foun¬ tains adorn the town. Esparto grass grows here profusely. There is some trade in hides, alfa, cattle, etc. Pop. 25,000.

SIDIS, si'dis, Boris, American psychologist and psychopathologist : b. government of Kieff, Russia, 12 Oct. 1867. He came to the United States in 1887, was graduated at Harvard Uni¬ versity in 1894 and later pursued post-graduate studies there, taking his Ph.D. in 1897, his M.D. in 1908. He was associate in psychology and psychopathology at the Pathological Institute of the New York State hospitals in 1896-1901 ; in 1901-04 was director of the psychopathological hospital and laboratory of the New York In¬ firmary for Women and Children; and subse¬ quently practised medicine at Boston and at Brookline, Mass. He is also medical director of

the Sidis Psychotherapeutic Institute at Portsmouth, N. H. Author of (The Psychology of Suggestion5 (1898); (Psychopathological

Researches in Mental Disassociations5 (1902) ; Experimental Study of Sleep5 (1909) ; (Philistine and Genius5 (1911) ; (The Psychol¬ ogy of Laughter (1913); (The Foundations of Normal and Abnormal Psychology5 (1914) ; (Causation and Treatment of Psychopathic Diseases5 (1916), etc.*

SIDNEY, sid'nl, Algernon, English states¬ man and republican, son of the 2d earl of Leices¬ ter : b. Penshurst, Kent, 1622 ; d. London, 7 Dec. 1682. He was educated under the super¬ vision of his father, whom he accompanied on his embassies to Denmark and to France. He served in 1642 as captain of a troop of horse in Ireland, and in the civil war espoused the cause of Parliament. He was promoted colonel of horse in 1645, was returned to the Long Parlia¬ ment in 1646 as member for Cardiff, and in 1647 was appointed lieutenant-general of the horse in Ireland and governor of Dublin, but was soon superseded and in 1648-50 was gov¬ ernor of Dover. In 1649 he was appointed one of the commissioners for the trial of Charles I,

but while he attended three of the preliminary meetings he was not present at the trial and did not sign the warrant. He is frequently quoted as approving the measure, and later admitted his justification of it, but his plan, though not exactly clear, seems to have been the deposition of the king by an agreement of both houses. He incurred the enmity of Cromwell by his op¬ position, and during the first three years of the Commonwealth he stood aloof. In 1652, how¬ ever, he was elected a member of the council of state and attended 82 meetings in the four and a half months before the council was dis¬ solved by Cromwell, being particularly occupied with foreign affairs. He protested against the Protectorate of Cromwell and afterward held aloof from public affairs until the restoration of the Long Parliament by the army in 1659, when he resumed his place and was again ap¬ pointed to the council of state. In that year he was sent as a commissioner to negotiate a peace between Sweden and Denmark, and while engaged in this mission the Restoration took place. Aware that his part in the civil troubles could but bring him into disfavor with the royal party, he remained in exile until 1677, when he was given leave to return to settle his private affairs. The excitement attending the exclusion struggle drew Sidney again into politics and he made several unsuccessful at¬ tempts to enter Parliament, although outside of that body he wielded a considerable influence. He vindicated himself from an accusation of being the head of a great non-conformist plot soon after the discovery of the

((popish plot,® but his private letters, though written with great caution, show a deep sympathy for the non¬ conformists and the Scots as well as an invin¬ cible hatred for bishops and Roman Catholics. He was engaged in an intrigue with the French Ambassador through whom he endeavored to persuade Louis XIV to aid the establishment of a republic in England and evidently hoped to gain at least the maintenance of the rights of Parliament. He undoubtedly received pecuniary aid to the extent of 1,000 guineas through the French Ambassador, though he evidently used the money for public purposes. He seems to have taken no part in the armed resistance of Shaftesbury in 1682, but in 1683 he formed one of the <(council of six® in the <(Ryehouse Plot® to organize an insurrection among the Scottish malcontents. He was arrested after its dis¬ covery and sent to the Tower, charged with three overt acts of treason, consisting of con¬ sultations amounting to a conspiracy to levy war against the king; invitation to certain Scots to co-operate with his plans; and of having written a treasonable libel concerning the law¬ fulness of deposing kings. The only witness against him on the first charge was the in¬ famous Lord Howard, the second charge was proven unfounded, and regarding the third though his authorship of the incriminating- paper was undoubted, yet there was nothing to show that it was intended for publication. The law demanded two witnesses for high treason. The notorious Judge Jeffreys accepted the paper as the second witness required by the law, and on this faulty evidence Sidney was sentenced to death. After a fruitless petition to the king he was executed on Tower Hill. His discourses on Government) exhibit great acuteness, are

forcibly written, and contain valuable historical information. They were first printed in 1698, and have been reprinted in 1740, 1751 and 1772. Consult Ewald, A. C., (Life and Times of Algernon Sidney } (1873) ; Meadley, G. W.,

(Memoirs of Algernon Sidney* (1813) ; Van Santvoord, G. V., (Life of Algernon Sidney) (New York 1851) ; dictionary of National Biography* (London 1888).

SIDNEY, Sir Philip, English soldier, statesman and poet: b. Penshurst, Kent, 30 Nov. 1554; d. Arnhem, Netherlands, 17 Oct. 1586. After studying at Oxford and Cambridge he set off on his travels at 18, visited France, Hun¬ gary and Italy. Returning through Germany and Flanders, he arrived in England in 1575. He became a favorite with Queen Elizabeth, who in 1576 sent him on an embassy to Ger¬ many. He had a quarrel with the Earl of Ox¬ ford, but the queen interposed to prevent a duel from taking place. Sidney, displeased at the issue of the affair, then retired to Wilton in Wiltshire, 1580, and amused himself with the composition of his celebrated pastoral romance, (Arcadia. * He married Frances, daughter of Sir

Francis Walsingham, in 1583. That same year he was knighted. About this time he pro¬ jected with Sir Francis Drake an expedition against the Spaniards in America, and he had gone to Plymouth to embark on the undertak¬ ing, when an express mandate from Elizabeth recalled him to court. Her influence also was exerted to prevent him from being elected king of Poland, ˆrefusing,® as Camden says, ((to further his advancement out of fear that she should lose the jewel of her times.® He was subsequently appointed governor of Flushing, and general of the cavalry under his uncle Dud¬ ley, Earl of Leicester, who commanded the forces sent to assist the Dutch against the Spaniards. On 22 Sept. 1586, being at the head of a detachment of the English troops, he fell in with a convoy of the enemy marching to¬ ward Zutphen. In the rash charge of 500 against 3,000, Sidney received a shot in his thigh, which shattered the bone. An incident that occurred as he was being borne off the field illustrates his character. It is thus re¬ corded by Lord Brooke (Fulke Greville) his biographer: (

his death. ((He adorned the paths of love, war, patriotism, religion, all that led through the wide fields of his beautiful, practical chivalry, with the roses and lilies of fragrant, flowery verse.® Edmund Goss. His works, besides the Arcadia, consist of the (Apologie for Poetrie,* later changed to (Defense of Poesie) ; (Astro phel and Stella> ; a collection entitled (Songs and Sonnets, and other poetical pieces. > None of these was published in his lifetime his great contemporary fame being based on the reports of those to whom his manuscripts were com¬ municated. He is best known for his (Ar¬ cadiaˆ one of the earliest specimens of the heroic romance, written in mingled prose and verse, the latter exhibiting various attempts to naturalize the measures of Roman poetry, and for the (Astrophel and Stella) cycle of 108 son¬ nets and 11 songs.*

Bibliography. — Addleshaw, P., (Sir Philip Sidney) (London 1910) ; Arber, E., (ed.)

Philip's (Apologie for Poetrie 1595) (ib. 1912) ; Brunhuber, K., (Sir Philip Sidney's Arcadia und ihre NachlaufeD (Niirnberg 1903) ; Cooke, R. (d. 1593), (The Pedigree of Sir Philip Sid¬ ney > (London 1869) ; Fox Bourne, H. R., (A Memoir of Sir Philip Sidney) (ib. 1862) ; Davis, Mrs. S. M., (The Life and Times of Sir Philip Sidney) (Boston 1859 and 1875) ; Ely, (Chaucer, Spenser and Sidney > (1894) ; Gre- ville, Fulk (1st Lord Brooke, 1554-1628), (Life of the Renowned Sir Philip Sidney) (London 1816; new ed., Oxford 1907) ; Grosart, A. B., (The Complete Poems of Sir

P. Sidney (Lon¬ don 1877) ; Lee, Sir Sidney, (Sir Philip Sidney* (in (Great Englishmen of the 16th Century) series: New York 1904); Marshal, '•Penshurst Castle in the Time of Sir P. Sidney) (1894) ; Symonds, J. A., (Sir Philip Sidney* ((English Men of Letters* series, 1886; New York 1906) ; Wallace, M. W., (The Life of Sir Philip Sidney) (Cambridge, Eng. 1915) ; Miscel¬ laneous Works* (Boston 1863; London 1893).*

SIDNEY LUSKA. See Harland, Henry.

SIDNEY, Ohio, city, county-seat of Shelby County, on the Miami River, the Miami and Erie Canal, and on the Cincinnati, Hamilton and Dayton, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 40 miles north of Dayton and 65 miles west by north of Columbus. It is in an agricultural region, and has considerable manufacturing in¬ terests. The educational institutions are a high school, public and parish elementary schools, two private schools, and a public library. Pop.

(1920) 8,590.

SIDNEY SUSSEX COLLEGE, Cam¬ bridge, England, was founded in 1596 under the will of Lady Frances Sidney, countess-dowager ot Sussex, aunt to Sir Philip Sidney. The charter was granted in 1594 by Queen Elizabeth to Henry Earl of Kent and Sir John Harring¬ ton, the executors. The present society con¬ sists of a Master, 11 Fellows and 36 scholars. There are 10 fellowships, 24 scholarships, and a number of exhibitions. The scholarships and exhibitions connected with the college are : 30 scholarships varying in value from $150 to $250 a year and five exhibitions, besides several prizes. The college was erected on the site of an ancient Franciscan convent. It consists of two courts much defaced by modern alterations.

Oliver Cromwell and Thomas Fuller were members of this college. There are eight church livings in the patronage of the college.

*SIDON, si'don, (Heb. Zidon; Arabian Saida), anciently a city of Phoenicia (q.v.), on the Syrian coast of the Mediterranean, lies mid¬ way between Tyre and Beirut. It is surrounded by a wall with two gates. Its chief interest is historical. It was a wealthy city, with an excel¬ lent harbor and much commercial enterprise, being specially noted for purple dyes. It was watered by the streams of Lebanon, and many allusions to it are found in secular and Scrip¬ tural writings. Sidon was referred to as (The first-born of Canaan * ; Homer alludes to the ingenious Sidonians and their artistic handi¬ work. The town was famous for its manufac¬ tures of glass, linen, purple dye and perfumes. The Sidonians had their own monarch, but it was once subject to Tyre, and later to the Per¬ sians. It passed through many vicissitudes, finally passing over to the Moslems (1291). In the 17th and*

18th centuries it became the seat of French commerce. It is now called Saidi. Interesting sarcophagi have been found here (now in Constantinople). The present town was stormed by the Allies under Napier in 1840. Pop. 15,000; of whom 10,000 are Mo¬ hammedans. See Syria.

SIDRA, Gulf of (ancient Syrtis Major), Tripoli, a wide gulf of the Mediterranean Sea between the main portion of Tripoli and the plateau of Barca. Its coast-line of over 500 miles is beset with shoals and sand-banks, of¬ fering no harbor except Bengazi, at the extreme eastern end. See Syrtis.

SIEBENGEBIRGE, ze'ben-ge-ber'ge (Seven Mountains), Germany, a small chain of mountains near the Rhine, in Rhenish Prussia, 20 miles above Cologne. Above the main range rise seven lofty summits, whence the name. These rugged heights are all crowned with ruins of ancient lordly castles of the 12th cen¬ tury. Olberg is the highest peak (1,522 feet) ; while the Drachenfels (q.v.) is the more inter¬ esting. Cologne Cathedral was built from stones quarried in these Rhenish Mountains. Some of the peaks are ascended by specially built railways. The scenery is romantic and interesting.

SIEBERT, se'bert, Wilbur Henry, Ameri¬ can educator : b. Columbus, Ohio, 30 Aug. 1860. He was graduated at Ohio State University in 1888, from Harvard in 1889 and received his A.M. at Harvard in 1890; studied in Germany in 1890-91, was associate professor of European history at the Ohio State University in 1898- 1902, since which time he has been professor of that branch. He was secretary of the Univer¬ sity Faculty from 1902 to 1906, and acting dean of the College of Arts, Philosophy and Science during 1907-08; also served as lecturer in his¬ tory at Ohio Wesleyan University during the same year. He traveled in Europe in 1909-10. Is a member of numerous learned and other societies. He has published (The Underground Railroad from Slavery to Freedom (1898-99) ; (The Government of Ohio* (1903) ; numerous papers relating to the dispersion of the Amer¬ ican Loyalists, and articles on some other sub¬ jects, including a (Report on Collections of*

*Material in English and European History in the Libraries of the United States.-**

SIEBOLD, ze'bolt, Karl Theodor Ernst von, German physiologist and zoologist: b. Wurzburg, 16 Feb. 1804; d. Munich, 7 April 1885. He studied at Gottingen and Berlin; in 1840 was made professor of physiology at Er¬*

langen, in 1845 at Freiburg and in 1850 at Bres¬ lau. In 1853 he was made professor of physiol¬ ogy and comparative anatomy at Munich, where to his chair were later added duties as profes¬ sor of zoology and director of the zoological and zootomical cabinet. His contributions to scientific research are suggested by the titles of his monographs: (Observationes de Salaman- dris et Tritonibus (1828) ; (Lehrbuch der vergleichenden Anatomie der wirbellosen Tiere) (Eng. trans., (Manual of Comparative Anat¬ omy of the Invertebrates,* 1848) ; (Ueber die Band- und Blasenwiirmer* (1854) ; (Wahre Parthenogenesis bei Schmetterlingen und Bienen) (1856) ; (Beitrage zur Parthenogene¬ sis der Arthopoden* (1871). Consult Hert- wig's memorial address*

SIEBOLD, Philipp Franz von, German physician and traveler: b. Wurzburg, 1796; d. Munich, 1866. He was a son of a pro¬ fessor of medicine at Wurzburg, and there received his education. In 1822 he removed to the Netherlands and became sanitary officer at Batavia, Dutch East Indies. He accompanied the Dutch embassy to Japan in 1823 and re¬ mained there until 1830. He made a second visit in 1859-62. His books upon the Japanese, their language, the flora and fauna of the coun¬ try, etc., did much to make that country known to the world. He published (Nippon, Archiv zur Beschreibung von Japan (1832) ; (Fauna japonica* (1833); cFlora japonica* (1835); bibliotheca Japonica* (1833— 41) ; (Catalogus librorum japonicorum* (1845) ; (Isagoge in bibliothecam japonicam* (1841); (Epitome lin¬ guae japonicse* (1826-53) ; (Florae japonicae familiae naturales* (1851).*

SIEGE. Three important elements are necessary to insure the success of a siege. First, the force of the besiegers must be suffi¬ cient to overcome the besieged in actual com¬ bat, man to man. If this is not the case the besieged, by a sortie, might destroy the oppos¬ ing works, and drive away the besiegers. The second element is, that the place must be in¬ vested ; so that no provisions, reinforcements, or other aliment of war can enter. The third element is, that the besiegers be undisturbed from without. For this it is essential that there shall not be a hostile army in the neigh¬ borhood; or, if there be, that the operations of the besiegers be protected by a covering army able to cope with the enemy's force in the field. The ancients executed gigantic works to pro¬ duce these effects. To complete the investment, they built a high and strong wall around the whole fortress; and to render themselves se¬ cure from without, they built a similar wall facing outwards, beyond their own position. The first was circumvallation, the second con- travallation. It was thus that Caesar fortified himself while besieging Alexia, and maintained 60,000 men within his ring. In modern war¬

fare, it is considered preferable to establish strong posts here and there

round the place, and merely sentries and vedettes between.

The first step toward the reduction of a fortress is to cut off communication of the oc¬ cupants with the outside world. This is done by a rapid movement of a relatively small force followed by reinforcements sufficient to hold a line entirely around the place and beyond the range of its artillery. This line is called the ftLine of Investment,® and the belt of territory immediately outside of it occupied by the in¬ vestment force is called the ((zone of invest¬ ment.® Whether this line must be occupied continuously will depend upon its nature. As much must be actually occupied or commanded as could be used by the besieged for exit or entrance. The line of investment is divided into sections, preferably so chosen that a unit of command can be assigned to each.

Troops assigned to a section of the zone of investment begin at once to reconnoiter it and put it in the best possible state of defense. Artificial or accidental features are prepared and strengthened, intrenchments thrown up where required, communications made and im¬ proved through and between sections and tele¬ graph and telephone lines established around the zone and to headquarters. Every means must be utilized to gain knowledge of the ground inside the zone. The time which must elapse before the siege material can be brought up will permit a great deal of such work to be done.

The real attack or systematic approach is pushed inward from a few points only of the zone of investment, usually one or two. The side on which these approaches are made is determined by the following conditions: (1) The best communication with the base; (2) The best terrain for battery positions and ap¬ proaches under natural cover; (3) The most favorable ground for construction and oper¬ ation of siege railways; (4) The easiest dig¬ ging; (5) The most important consequences of success.

The first condition is usually controlling, unless one of the others is prohibitory. If the zone of investment is favorable and ample siege railway equipment is available, the attack may be conducted from points somewhat removed from the main terminus of the supply line. The main defensive line of an important for¬ tress consists of a series of detached forts. To breach such a line one fort at least, more often two, must be taken, and during the oper¬ ation the fire of the one on each side must be kept down. If two forts are to be reduced, the siege consists of artillery work against four and trench work against the middle two of these. When the front of attack is decided the main engineer park is located out of reach of the defenders' artillery, convenient to the front selected and to the main supply line, and connected with the latter by good communica¬ tions. Here is assembled all the siege mate¬ rial pertaining to engineering operations as fast as it

arrives, to be sorted and arranged in convenient shape for selection and forwarding to the front as required. Sites for the main siege batteries are next selected, at moderately long range from the forts, 2,500 to 4,000 yards, and for intermediate parks near them to con-

tain materials for the construction, repair and supply of batteries. These sites are connected by a belt railroad immediately in their rear, and the belt line is connected with the main park at one or more places.

The complete investing force must be heav¬ ily reinforced, ordinarily about doubled, before siege operations on any considerable scale are undertaken. The additional force is concen¬ trated along the front of attack, mainly toward its centre. This and the investing force along the front of operations are sometimes called siege troops, and the remainder of the invest¬ ing force distinguished as investing troops. The siege force should consist of infantry, engineers and artillery in the proportion ap¬ proximate of 83 per cent, 5 per cent and 12 per cent, respectively, with the proper contingent of the signal and hospital corps and supernumer¬ ary engineers and ordnance officers. The total attacking force ranges from two and one-half to four times the strength of the garrison. The siege artillery is disposed in batteries of four pieces or less, dispersed as much as concentra¬ tion of fire will permit, and sited when possi¬ ble on the reverse slopes of ridges or hills or behind timber, and employs indirect fire almost exclusively. Though batteries are invisible, the high-angle fire of the defense reaches them, as the enemy's artillery systematically searches all reverse slopes within range, and the effect of shells must be localized by artificial cover. An emplacement for each gun is best.

First Parallel. — When the siege batteries have brought the artillery fire of the defense under control, the first attempt to gain ground to the front is made by opening a trench gen¬ erally parallel to the line of investment and, if possible, within 1,200 yards of the enemy's main line. During the day the outposts are advanced to or beyond the proposed line, to permit it to be reconnoitered and its bearings noted. At night the attack is pushed more strongly and the enemy driven in as far as possible for the greater safety of the working parties. As soon as it is dark enough for concealment the tracing is begun. Each party consists of one engineer officer, one non-commissioned officer and a private for each 50 yards of line to be traced. Approaches or zigzag trenches must be traced and dug on the same night with the first par¬ allel, connecting it with cover in the rear. There should be at least three such approaches — at right, left and centre. The tracing of

approaches for simultaneous digging differs in detail but little from that of the parallel. It is more difficult because the line is broken and greater accuracy is required. The digging of approaches under fire differs from ordinary trench work in that it is done progressively from one end and with the men reasonably protected from fire while doing it. Tracing is dispensed with. Approaches are usually called <(saps,):> the operation of digging them ((sap- ping,}) and the skilled men "sappers.® The end at which digging is in progress is called the saphead.

Single Sap. — A party of one non-commis¬ sioned officer and eight sappers in two reliefs work at the saphead. The two leading sappers, Nos. 1 and 2, excavate a trench four and one- half feet deep and just wide enough to work in, throwing the earth to the front of the exposed

side. They are protected in front, or on the end of the trench, by a pile of half-filled sand bags, 50 or 60 in number, piled so as to make a parapet two feet high. The sand bags should be smeared with mud so as to show the color of the soil. No. 1, kneeling or crouching, un¬ dercuts the end breast a few inches and brings down the earth. He steps back and No. 2 takes his place and shovels the loose earth out. No. 1 returns, throws forward as many sand bags as may be necessary to gain ground, using a fork or rolling them over with his hands. He then undercuts again and the operation is re¬ peated. Nos. 3 and 4 widen the trench two feet and raise the parapet, also forming a berm 12 to 13 inches wide. The rate of advance of a sap is only two to four feet an hour. When half a yard has been gained, Nos. 1 and 2 exchange places, and when a yard is gained the other relief comes in. At each change of re¬ liefs the men who were Nos. 3 and 4 on the last tour take 1 and 2. Casualties are made up from the waiting relief. Generally, unless re¬ duced to less than four men, the detachment must work without reinforcement until the regular change of trench relief. A working party of infantry, 25 feet in rear of the sap¬ pers, widens the trench to 10 feet.

Double Sap. — Two parties work parallel to each other, Nos. 1 and 2 leaving a four-foot tongue between them, which is taken out by Nos. 3 and 4. No widening party is required. To prevent enfilade the direction of the trench is changed at right angles as soon as the plung¬ ing fire becomes too annoying. After going 25 to 30 feet laterally, the trench turns again to the front, and, after having advanced sufficiently to form a traverse, turns again to the right until it reaches the original line, when it resumes the main direction.

Second Parallel. — The first infantry position established, a second one well advanced is the next objective. It is called the ((second par¬ allel® and should be 500 or 600 yards from the enemy's works, or about midway in front of the first parallel. It will develop only the work selected for attack

and will thus be shorter than the first. The second parallel, and the ap¬ proaches to it from the first, may be established in a night, like the first parallel and its ap¬ proaches, though this will be the exception. With an alert defense the advance from first to second parallel must be by sap. When the heads of the saps are abreast of each other and on the desired line, they may be turned toward each other and run to a connection, forming the second parallel, though, if possible, the work should be expedited by extending par¬ ties for simultaneous work.

Third Parallel. — 'This is about halfway from the second parallel to the enemy's works and is in most cases the position of assault, though sometimes fourth and even fifth parallels have been found necessary. At this close range at¬ tention is necessary to guard the sapheads, which can be done by machine guns and rifle fire from the second parallel. As the saps ad¬ vance the returns may be lengthened and turned so as to form demi-parallels. This enables a stronger guarding force to be kept under shelter and well advanced to repulse sorties or to take the offensive if opportunity offers.

Simultaneous Work.— The preceding shows

the systematic method of procedure with the least losses. However, if the enemy's artillery is fairly well under control and if the terrain is at all suitable, two or more of the parallels or demi-parallels may be constructed at the same time. This result is obtained by sending working parties at night to the position of the advanced parallel or demi-parallel, and these parties hurriedly construct enough of the par¬ allel to obtain shelter against the enemy's fire. During the day and subsequent nights this parallel is completed and the approaches to it are more quickly constructed because working parties are actively engaged at both ends. It is quite often necessary to construct a fourth and fifth parallel in order to maintain troops near the sapheads and protect the sappers at work.

The developments of the late European War and the methods of conflict in trench warfare due to the advances in science, hand grenades, bombs, obstacles, etc., have brought about important changes in the old methods of siege warfare. The essential difference be¬ tween capture of entrenched places and victory over extended entrenched fronts lies in the fact that the garrison only of the fortress must be subdued while the nation back of an ex¬ tended front well entrenched must be con¬ quered. While the garrison of a fortress still retains numbers, food, ammunition and morale it may be

possible to capture local strong points, but the garrison will not surrender as long as its power of resistance is not broken ; other strong points to the rear will be occupied and the resistance continued. It is thus seen that the real objects of trench warfare are to capture local strong points and to break down the resistance of the enemy, making the fol¬ lowing general principles self-evident :

(1) Advance in the open is impossible against enemy fire superiority.

(2) Advance by open sap work is difficult against enemy artillery fire and almost impossi¬ ble if the enemy has artillery fire superiority.

(3) Advance by mining is effective if the enemy has artillery fire superiority.

(4) An assault against an alert enemy must be preceded by an effective fire of artillery explosive shells to destroy somewhat the enemy trenches and obstacles.

(5) An artillery curtain of fire must be maintained beyond captured enemy trenches in order to assist the successful attackers in

defending the captured trenches against coun¬ ter attack.

The situation on the west front in Europe illustrated the effect of having masses of trained men facing each other on a relatively short line. From the North Sea to the bound¬ ary of Switzerland the battle line extended over a distance of 430 miles. The opposing armies had each constructed triple lines of

trenches, often supplemented in the rear by a double line of underground shelters where the troops in reserve might rest. Many miles of passageways, saps, galleries and zigzags af¬ forded means of communication between the trenches. At a number of points the hostile lines were less than 100 yards apart and grenades of all types were used in great quan¬ tities. There were no flanks to turn, the lines were heavily covered by obstacles, and each side having reserves upon reserves, sapping and mining was freely resorted to in order to gain ground.

The observation of the enemy is of the greatest importance in trench warfare. It should give complete knowledge of all the elements of the hostile line and prompt in¬ formation of any movement of the enemy. It is effected by observation from the ground and observation by aircraft. Observation from the ground is divided into three echelons: (1) ob¬ servation in front of the firing line from small posts and listening posts. (2) Observation on the firing line by sentinels and lookouts. (3) Obersvation in rear of the

firing line, by ar¬ tillery observers, sentinels and lookouts of the shelters.

The location of the lookout posts and ob¬ servatories are determined in accordance with a complete plan for each supporting point or sector of defense. No part of the hostile front should be free from observation and the parts of the front favorable for the attack of the enemy should be specially watched. An ob¬ servatory should be located near the command posts of the commanders of strong points, supporting points and sectors. Those of the last two must have extended views over the whole of the terrain.

During a bombardment, the maintenance of lines of information becomes very difficult, but it must be accomplished by all possible methods, such as: (1) Installing telephone under strong shelters. (2) Using lead-covered cable, buried six feet deep, especially for the

lines connecting the regimental, brigade, divi¬ sion and corps headquarters. (3) Placing rockets in all shelters and observatories where officers or non-commissioned officers are posted. (4) Preparing posts for visual sig¬ naling, safe from bombardment and defiladed from view of the enemy. These posts are constructed in shelters similar to those for searchlights and are provided with horizontal loopholes with openings to the flank or rear.

Battle-field illuminatipn is a necessity where- ever night attacks may be expected. Portable searchlights, both animal and motor drawn, in units up to 36 inches, are now an accepted part of every army. In addition to these powerful lights, trenches are supplied with storage battery or gas reflector lights, star- bombs, rockets and flares, arranged so that they can be put into action instantaneously when an enemy approaches. The entire fore¬ ground and obstacles must be illuminated, leaving the defenders in shadow. If a light is used too close to the defenders' parapet, they themselves are illuminated and the light be¬ comes a source of danger.

The use of asphyxiating gases as an aux¬ iliary, both in attack and defense, was fre¬ quent in the European War, but was confined to operations where the combatants were facing each other in trenches under conditions simi¬ lar to a siege. Chlorine or bromine fumes, or a mixture of the two, were the gase's most commonly employed. Chlorine and bromine cause death through strangulation by effect on the bronchial tubes and if death is avoided a long, slow, bronchial illness ensues. Mustard gas because

of its persistency and effectiveness in low concentrations was used ordinarily, in the European War, to gas large areas. For this purpose accuracy in hitting a given point was not necessary and hence the increase in the dispersion of shots at longer ranges was not taken into account as in the case when it was desired to hit a given point. Likewise the number of guns required to cover a given area was small. The high explosive shell, however, . changes this method of firing. Since it is deadly both as a high explosive and as a gas, it can and will be used against small targets. In. fact, it will be used exactly as high explosive is used, with the single excep¬ tion that care must be taken to allow sufficient time for the gas to disperse if it is desired to occupy the places bombarded with the gas.

Mounting heavy artillery on railway cars has in no small degree affected siege opera¬ tions. The idea of so mounting artillery was not born, of the war with Germany. The idea was originally American, the first authenticated record of such employment being by the Union forces at the siege of Richmond in 1863, when a 13-inch cast-iron mortar was mounted on a reinforced flat car. In 1913 the commanding officer of the defenses of the Potomac recom¬ mended that artillery of various calibre be mounted on railroad platforms, with ammuni¬ tion, range-finding and repair cars making up complete units,, so that this armament could be quickly transported at any time to the place where, most needed. It was then apparent that guns in fixed positions, of whatever calibres, violated the cardinal military principle of mo¬ bility. Of late, railway artillery has come to be as varied in its design as field artillery,

each type of railway mount having certain tactical uses, the three types of cannon used being mortars, howitzers aild guns, The gen¬ eral types of railway mount adopted are those which give the giln all-around fire (360-degree traverse), provide limited traverse for the gUtt and allow no lateral movement for the gun on the carriage, but are used on curved track to give the weapons traverse aim. When war was declared against Germany the guns in the United States available for mounting on rail¬ way cars are shown in the following table :

NUMBER OF GUNS

Size

12 .

96 .

129 .

49 .

6 .

150 (Mortars)

21 .

(7 nches)

7

8

10

12

12

12

14

Length

(i Calibres)

45 35

34

35 50 10 50

The smaller weapons, such as the 7-inch and the 8-inch guns and the 12-inch mortars, were placed on mounts affording 360-de¬ gree traverse. The limited traverse mounts were used for the moderately long-range guns and howitzers. The fixed type of mount was used for long-range guns only, including the sliding railway mounts, such as the American 12-inch and 14-inch sliding mounts and the French Schneider a glissement mounts.

In siege operations, as the result of ex¬ perience, railway artillery is practically con¬ fined to the Barbette, Schneider and Batig- nolles types of gun mounts. The Barbette carriage revolves about a central pintle or axis and turns the gun around with it. In the Schneider railway mount the gun and its car¬ riage are fastened rigidly parallel to the long axis of the railway car. Thus the gun itself, independently of any movement of the car, can be pointed only up and down in a vertical plane, having no traverse or swing from left to right, and vice-versa. In order to give the weapon

traverse for its aim, special railway curved tracks, called epis, are prepared at the position where it is to be fired. The car is then run along the curve until its traverse aim is correct and the vertical aim is achieved by the move¬ ment of the gun itself. In the Batignolles type the gun and cradle are mounted on a so-called top carriage that permits of small changes in horizontal pointing right and left. Thus with the railway artillery of the Batig¬ nolles type, also, track curves, or epis, are neces¬ sary for the accurate aiming. This mount partially cushions the recoil by the movement of the gun itself in the cradle.

While siege operations are largely modi¬ fied by the advent of military aeronautics, the changes are not great because of the limited weight that the largest airship can carry. The effects of the largest bombs are less terrifying and important than those of the enormous num¬ ber of gun projecticles, which are thrown with greater accuracy and usually from guns that cannot be seen by those attacked or besieged.

Edward S. Farrow,

Consulting Military and Civil Engineer.

SIEGE ARTILLERY. See Artillery.

SIEGE GUN. See Artillery; Fortifica¬ tions.

SIEGEN, ze'gen, Ludwig von, German- Dutch inventor: b. Utrecht, 1609; d. Wolfen- biittel, 1680. He was a lieutenant in the Hes¬ sian army and invented the art of mezzotint engraving which was learned from him by Prince Rupert and so introduced into England. His first work was a portrait of Amelia Eliza¬ beth, mother of the landgrave of Hesse (about

1640).

SIEGEN, Germany, Prussia, a town in the province of Westphalia, on the Sieg River, 47 miles east of Cologne by rail. Two castles, belonging to the period of the Prin¬ cipality, are in this town, several Protestant and Catholic churches, a monument to William I and a bronze bust of Bismarck. It has im¬ portant mining and manufacturing interests and is the centre of the mining industry of southern Westphalia. It has large tanneries, foundries, factories for cloth, linen, soap, leather and paper, etc. It is on the line of several railways. There is a school of mining and a real gym¬ nasium. Siegen is supposed to be the birth¬ place of Rubens. Pop. 27,300.

.SIEGFRIED, seg'fred (Ger. zeg'fred). See Nibelungenlied.

SIEMENS, ze'mens, Ernst Werner von,

German engineer and electrician: b. Lenthe, Hanover, 13 Dec. 1816; d. Berlin, 6 Dec. 1892. He entered the Prussian artillery in 1834 and took out his first patent in 1842 for a process of silver and gold electro plating. In 1842 he went to England with his brother, Karl Wil¬ helm, to establish the business known there by the firm name of Siemens Brothers. In 1844 he took charge of the artillery workshops in Berlin. He aided in developing the telegraphic system in Prussia, and discovered the insulating properties of gutta-percha, which is utilized in underground and submarine cables. He left the army in 1849 and devoted his energies to elec¬ trical business, particularly the construction of telegraph apparatus. The first great continental telegraph line, that between Berlin and Frank- fort-on-the-Main, was built by him in 1849, and the firm of Siemens Brothers laid six Atlantic cables. The pneumatic-tube system was in¬ vented by him and also various modifications of self-acting dynamos. In 1886 he gave 500,000 marks to found an institute of physics and technology. He published (Positive Vorschlage zu einem Patentgesetz) (1869); (Gesammelte Abhandlungen und Vortrage' (1881) ; (Wis- senschaftliche und technische Arbeiten (1889- 91) ;

1893).

.SIEMENS, Sir Karl Wilhelm, German-

English physicist and inventor : b. Lenthe, Han¬ over, 4 April 1823; d. London, 19 Nov. 1883. He was educated at the gymnasium at Liibeck, the polytechnic school at Magdeburg and the University of Gottingen. At 19 he became a pupil in the engine works of Count Stolberg, and a year later visited England for the pur¬ pose of introducing a method of electro-plating, the joint invention of his brother Werner and himself. In the same year the brothers invented

a differential governor for steam-engines, and in 1844 he again went to England to patent this invention. From that time he settled in Eng¬ land, becoming naturalized in 1859. Among the many other inventions with which he, in com¬ bination with his brothers, must be credited, are the regenerating gas furnace for metallurgical purposes, the process of making steel and iron direct from ore, which has revolutionized the steel and iron trades, and improvements in the manufacture and laying of telegraph lines. He was elected to the Royal Society in 1862; was one time president of the British Association ; and was knighted in 1883. He published (On the Utilization of Heat and Other Natural Forces) (1878) ; (The Dynamo

Electric Cur¬ rent and its Steadiness) (1881) ; (On the Con¬ servation of Solar Energy' (1883). His Scien¬ tific Works) were edited by E. F. Bamber (1888). Consult Pole, Dr. Rife of Sir Wil¬ liam Siemens) (London 1888) ; dictionary of National Biography) (London 1897) ; The Times (London, 20 Nov. 1883).

SIEMERING, ze'mer-mg, Rudolph, Ger¬ man sculptor: b. Konigsberg, 10 Aug. 1835; d. 23 Jan. 1905. He attended the local Art Academy in youth and afterward became the pupil of Blaser in Berlin. For the decoration of Konigsberg University he furnished medal¬ lion portraits of its learned men. In 1860 he produced his (Penelope' and in 1860 a sitting figure in marble of King Wilhelm for the Ex¬ change in Berlin ; and a terra-cotta statue of Leibnitz for the Academy of Science at Perth, productions remarkable for realistic modeling and imposing expression. In 1871 he executed the masterly relief (Uprising of the People at the Summons of their King' ; and the following year a design for the Goethe monument. His next work was the statue of Frederick the Great for Marienburg. The greatest of his works, however, was the war monument in the market place at Leipzig, (Germany,' as an armed heroine. Worthy also of special notice was the sitting statue of Emperor William I with the four colossal equestrian figures — King Albert of Saxony, Emperor Frederick, Bis¬ marck, Moltke and eight figures of soldiers. He was the author of the colossal equestrian statue of Washington whose pedestal is enriched with reliefs and accessory sculptures. This impress¬ ive monument was unveiled in Fairmount Park, Philadelphia, May 1897. Siemering's group, < Saint Gertrude Hospitably receiving a Travel¬ ing Scholar,' was finished and set upon the Bridge of Saint Gertrude at Berlin in 1896. He was also the author of numerous portrait busts.

SIEMIRADZKI, syem-i-raz'ki, Henryk, Polish painter : b. near Kharkov, Grodno gov¬ ernment, 15 Nov. 1843; d. 1902. He studied art in the Academy of Saint Petersburg and after a sojourn in Munich, fixed his studio in Rome. Among' his best canvases are (Nero's Torches) (1876) now in the National Museum, Cracow; (The Vase or the Slave) (1879); (The Amulet-Seller' (1888) ; (Christ Stilling the Waves'; (The Sword Dance' (1880); (Phryne at Eleusis' (1889), in the Alexander Museum, Petrograd; (Christ with Martha and Mary> (1886). He also decorated with much skill two ceilings in the Netcha'iev Palace of Petrograd and several churches of Cracow and Moscow.

SIENA, se-a'na, or SIENNA, se-en'na, Italy, (1) Capital of a province of

the same name and an archiepiscopal see, 61 miles south of Florence, occupies a lofty site 1,100 feet above sea-level on the southern frontiers of Tuscany. It is enclosed by an Etruscan wall with nine gates, has a strong citadel and is in all respects a typical Italian town ; the Piazza di Vittorio Emanuele is historical. Siena out¬ ranks all the other cities in its art history from the 13th to the 16th centuries (excepting Rome and Florence). This art is largely represented in its public buildings; the fine Gothic cathe¬ dral (13th century) has a remarkable fagade inlaid with marbles of various colors and with profuse decorations, after a design by Pisano. The interior contains a famous pulpit by the same sculptor (1274) ; a mosaic pavement inlaid with biblical scenes and magnificent choir stalls of fine renaissance; 6 paintings by Michelan¬ gelo; bronze statue of John the Baptist, by Donatello; a high-altar by Peruzzi, etc. In the library are the celebrated frescoes by Pinturic- chio and the finely illuminated choir-books, resting on elaborately carved desks. On the south side of the cathedral is the antique marble group of the three graces, found (1460) in the Palazzo Colonna at Rome. Beneath the cathe¬ dral the Church of San Giovanni is enclosed as a crypt. It was formerly a baptistery and con¬ tains some fine baptismal fonts and bronze bas- reliefs. The other most interesting churches are San Domenico, Fontegiusta, Santo Ber¬ nardino, Fonte Gaja, San Agostino, the Col- legiata di Provenzano, etc., all rich in chef d'oeuvres of painting and sculpture by Sienese and other Italian artists. The city contains numerous and splendid palaces, municipal offices and public institutions, including the Palazzi Tolomei (1205) and Buonsignori ; Pal¬ azzo del Governo, containing valuable archives (52,000 manuscripts) ; Palazzo Spanocchi (now post office and telegraph bureau) ; the Loggia dei Nobili (in imitation of the Loggia dei Lanzi at Florence), and the Palazzo Pubblico. The Instituto dei Belli Arti contains a fine collection of paintings ot the early Sienese school, from the dismantled monasteries and modern works ; the Public Library contains 84,- 000 volumes and 5,000 manuscripts ; the Acad¬ emia dei Fisiocritici contains a museum of natural history; the University (1321) has limited facilities and but two faculties ; there are a lyceum, a technical school, a theatre and many prosperous charitable institutions and hospitals. Fonte Gaia, Fontebranda — im¬ mortalized by Dante — and Fonte Nuova are among the beautiful fountains and at the southeast stands the Benedictine convent wMonte-OHveto Maggiore" on the summit of Mount Acorur, with fine frescoes. The Lizza promenade is much frequented. The manu¬ factures are unimportant, weaving being the most essential ; trade consists chiefly in com¬ mon and fine marble, cloth, furniture, silk and velvet.

Its history is somewhat mythical as to origin and of ancient date. From the Etrus¬ cans — its founders — it passed into the hands of the Romans and then to the Lombards. The people rebelled against the rule of the nobles in

the 12th century and warred with Florence in that and the succeeding century and in the 14th century they resigned their

liberties to the Duke of Milan, after many years of internal strife; especially memorable is the strife of 1480, when Pandolfo Petrucci acquired practical control of the state. Later, the city placed itself under the protection of Charles V of Spain, thus acquiring a burden of tyranny, while hoping to be freed from a petty despotism, and became the scene of frequent riot and bloodshed. The Sienese then entered into treaty with France. Finally, after renewed hostilities by Spain and Cosimo I de Medici, Siena was reduced and annexed to Tuscany. In 1859, the city was the first to vote for the monarchy of Victor Em¬ manuel II, which led to the union of the Italian states. Pop. 41,673. Consult Douglas, L., (History of Siena) (New York 1903) ; Gard¬ ner, E. G., (Story of Siena) (London 1913) ; Hutton, Edward, (Siena and Southern Tus¬ cany' (New York 1912) ; Schevill, Ferdinand, (Siena: Story of a Mediaeval Commune> (ib. 1909). The Province of Siena, in the grand duchy of Tuscany, covers an area of 1,471 square miles and is divided into two districts, Montepulciana and Siena. There is an im¬ portant agricultural industry; also an exten¬ sive silk industry. The chief products are wheat, wine and olives. The province is traversed by the Florence-Rome Railway which branches off at Asciano toward Siena. Pop. 244,850.

SIENKIEWICZ, syen-kyeVich, Henryk, Polish novelist: b. Vola Okrzeyska, Siedlce, 4 May 1846. He was educated at the University of Warsaw, published some critical articles in 1869, was for a time editor of Slovo, a journal of Warsaw, and in 1870 sent to press his first work of fiction, (Na Marne,) rendered into English by the official translator, Jeremiah Curtin (q.v.), as (In Vain) (1899). In 1876 he came to the United States, where for a time he remained in California. He traveled also in central Africa in 1891. Among his chief works accessible in English are the following, all by Curtin except where otherwise specified : (The Deluge) (1891) ; (With Fire and Sword' (1893); (Without Dogma' (Young) (1893); (Pan Michael' (1894) ; (Quo Vadis?' (1897), with scene in the Rome of Nero, his best-known book;

SIENNA. A brownish-orange-yellow pig¬ ment consisting of clay colored by iron and manganese oxide.

SIERRA, Justo, Mexican educator and statesman: b. Campeche, 26 Jan. 1848. At the age of 23 he became a lawyer and advocate. After the downfall of President Lerdo, Sierra retired from politics, but soon re-entered pub¬ lic service as a member of the lower branch of the federal congress. In this position his education, oratorical abilities and intense loyalty soon won for him great influence and

prominence. He was called from Europe, where he was serving on an important mission, to become secretary of public instruction. A number of his historical and educational works are used as textbooks in the National Prepar¬ atory School and in other institutions of learning.

SIERRA LEONE, se-er'ra le-6'ne or le-on' (Sp. la-6'na), West Africa, a British colonial territory, consisting of a colony proper and a more extensive protectorate. The colony con¬ sists of the peninsula of Sierra Leone, about 25 miles long and 12 miles broad, of Sherbro Island and a few islets and of all the coast strip between French Guinea and Liberia; total area, about 4,000 square miles. The capital, Freetown, is at the northwest extremity of the peninsula. The protectorate extends inland so as to have French Guinea on the north, Liberia on the east and southeast ; area, about 30,000 square miles. The surface near the shore, though sometimes rocky, is generally flat, but in the interior are many hills and mountains, varying in height from 500 to 3,000 feet. Some parts are low and swampy; most parts are well watered. The soil, of which only a com¬ paratively small portion is under regular cul¬ tivation, is fertile, growing excellent crops of rice, Indian-corn, yams, plantains, pumpkins and cassava. Sugar, coffee, indigo, ginger and cotton also thrive well. The fruits include the boabab, cocoanut, banana, pineapple, orange, lime, guava, papaw, pomegranate, etc. The forests are extensive and the trees in them are often so magnificent as to be converted into canoes capable of containing 100 men. The principal livestock are pigs and goats. Poul¬ try also, particularly guinea-fowls, are very abundant. The fisheries both on the coast and in the rivers are productive. The chief indus¬ trial establishments are those in which the aim-oil is extracted and prepared. Boat- uilding is also carried on to some extent, native cloth is woven, and leather is dressed on a small scale. Trade is carried on chiefly with Great Britain. The total value of im¬ ports for the year 1915 was $6,278,775 ; of ex¬ ports, $6,273,105. The total tonnage of vessels entered and cleared for the same year was 1,635,119 tons, of which 1,520,998 were British. The principal articles of import are cottons, wines and spirits, tobacco, apparel, haberdash¬ ery, flour, salt, etc. ; of exports, palm-kernels, kola-nuts, gum copal, ginger, benniseed, etc. The total revenue in 1915 was $2,522,120, and the expenditure amounted to about $2,733,855, The strongest religious bodies are the Church of England and the Wesleyan Methodists. The number of white inhabitants is only about 700. Education is denominational, but is as¬ sisted by state aid. There are some 112

element¬ ary schools, the number of pupils on the rolls being over 7,000. There is a college at Furah Bay for the education of native ministry, sup¬ ported by the Church Missionary Society and affiliated to Durham University; secondary schools for boys, and for girls at Freetown, a technical school, etc. Sierra Leone was dis¬ covered by the Portuguese in 1463 and first became a British colony in 1787. Soon after, a company was formed with the humane inten¬ tion of making it a home for free negroes, and proving by their means that colonial prod¬

ucts could be raised without slave-labor. In 1800 a grant of the peninsula was made to the company, but in 1807 the company ceded all their rights to the Crown. Since then the posi¬ tion of Sierra Leone has varied at different times. Its affairs are now administered by a governor and an executive council of several official members, with a legislative council. One great obstacle to its prosperity is the deadly nature of its climate, particularly to Europeans; but its progress, though slow, has been steady. The natives can live in comfort with little exertion. Freetown (q.v.) is now a fortified coaling station and centre of trade. A railway runs from Freetown to Pendembu, near the Liberian frontier, a length of 227ˆ4 miles. From Boia Junction, 64 miles from Freetown, a branch line runs to Kamabai, a distance of 104 miles, and a further extension to Baga is contemplated. Pop. 75,572; with protectorate, about 1,400,000.

*Protectorate, The. — * By an order in courn cil of 7 March 1913 all the territories, not being portions of the colony of Sierra Leone, to be¬ tween the sixth and tenth degrees of north lati¬ tude and the tenth and fourteenth degrees of west longitude and beginning at the extreme south¬ erly point of the colony on the Anglo-Liberian boundary were included in the Protectorate of Sierra Leone. The governor and commander- in-chief for the time being of the colony of Sierra Leone is also the governor of the Pro¬ tectorate. Authority is given to the legisla¬ tive council of .Sierra Leone by ordinance, to exercise and provide for giving effect to the powers and jurisdiction acquired by the Crown. The area of the protectorate is 27,000 square miles and the population numbers 1,327,560. The territory is divided into five districts each of which is under a European commission. There are circuit courts in all chief centres of population, also district commissioners' courts, chiefs' courts for native cases and combined courts for small debts and certain misde¬ meanors between natives and non-natives. Im¬ ports comprise, cotton goods, spirits, hardware and tobacco ; exports, palm kernels, kola nuts and palm oil. There are Mohammedan and mis¬ sion schools. There is a government schobl at Bo, for the sons and nominees of native chiefs. It now has 113 pupils.*

Bibliography. — Alldridge, T. J., (The Sher¬ bro and Its Hinterland) (London 1901) ; id., (A Transformed Colony: Sierra Leone' (ib. 1910) ;

Crooks, J. J., (A History of Sierra Leone' (Dublin 1903) ; Ingham, E. G., (Sierra Leone after a Hundred Years' (London 1894) ; Lucas, C. P., historical Geography of the British Colonies' (Oxford 1913) ; Newland, H. O., (Sierra Leone: Its People, Products and Secret Societies' (London 1916) ; Pierson, A. T., (Seven Years in Sierra Leone' (ib. 1897) ; Thomas, N. W., (Anthropological Re¬ port on Sierra Leone' (ib. 1916) ; Wallis, C. B., (The Advance of Our West African Empire' (ib., 1903).

SIERRA MADRE, ma'dra (Sp. ma'thra), (1) A range of mountains in southern Cali¬ fornia, in Los Angeles and adjoining counties on the northeast. (2) A range in the southern part of Wyoming in Carbon County. (3) The range in Mexico which borders the plateau on the west. It is a continuation of the range on

the western border of the Great Salt Lake Basin in the United States. In Mexico, the range is much broken; the peaks, except a few, do not exceed 10,000 feet in height. This range is sometimes called Sierra Madre del Pacifico. In southern Mexico is a range called Sierra Ma¬ dre del Sur. (See Mexico). (4) One of the three principal mountain ranges of the island of Luzon, Philippines. It begins at Caraballo de Baler, in the southeastern part of the province of Nueva Ecija and extends northeast to Cape Engano, the northeast point of the island. A branch of this range called Mamparan starting at Caraballo Sur, in the northern part of Nueva Ecija, extends to the north. The highest peak is Mount Moises.

SIERRA MADRE DEL PACIFICO. See

Sierra Madre.

SIERRA MADRE DEL SUR. See Sierra Madre.

SIERRA MORENA, mo-re'na, Spain, an irregular mountain chain, about 380 miles in extent, which forms the watershed between the Guadiana and Guadalquivir rivers, and extends between the south and the northern boundaries of Andalusia, for which reason it is sometimes known as the Andalusian System. This system consists of three distinct parts. The eastern division through which the railroad and high¬ way pass on the way to Madrid presents a mag¬ nificent landscape. Here is the celebrated pass, Puerto de Despenaperros. The highest sum¬ mits are Cerro Estrella (5,500 feet), in the west, and in Estremadura, the Tudia. On the watershed, between the Murtiga and the Huelva near the source of the Adiel, the water fall is great ; many chestnut trees and cork oaks are found ; also extensive

marble quarries. The range abounds in copper, zinc, quicksilver, iron, etc.

SIERRA NEVADA, a range of mountains in eastern California, separating the interior basin of Nevada from the valley of California. It is in the form of a tilted plateau from 50 to 100 miles wide and extending from northwest to southeast for about 450 miles. In the south it runs westward and is united by Mount San Bernardino with the Coast Range, which runs parallel with the Pacific. It is the source of a multitude of rivers which swell the Sacramento and San Joaquin. Its northern continuation into Oregon is known as the Cascade Range. The crest has an average elevation of over 11,000 feet. The range falls very abruptly on the east along a great fault line and slopes grad¬ ually on the western side. Its rocks consist of schists, slates, granite and diabase covered with volcanic rocks of the Tertiary period. The range was first folded at the close of the Jurassic. The highest peaks are on the eastern margin near the southern end. Mount Whitney, the . highest point in the United States proper, reaches an altitude of 14,502 feet. Other peaks with their altitudes are Fisherman Peak, 14,448 feet; Mount Corcoran, 14,093 feet; Mount Brewer, 13,886 feet; Mount Kaweah, 13,752 feet; Mount Lyell, 13,090 feet. There is per¬ petual snow on the higher points and there are a number of small glaciers. Coniferous forests cover the range to about 8,000 feet and on the west slope are deciduous trees and at a certain elevation above these are found the famous big

trees (Sequoia giqantea). The chief passes are the Truckee, 7,200 feet, and crossed by the Central Pacific; the Beckworth, 5,190 feet; the Walker, 5,320 feet; Tehachapi, 3,830 feet, and crossed by the Southern Pacific. Consult Muir, John, (Mountains of California (New York 1911); id., (My First Summer in the Sierra* (Boston 1911).*

*SIERRA NEVADA, na-vat'ha (Spanish, <(snowy range**), (1) The loftiest mountain range in Spain. It extends east and west through Andalusia and Granada, terminating on the Mediterranean shore, where it forms several promontories. To the east it passes grad¬ ually into the lower plateau regions. It has numerous spurs enclosing deep valleys. Mica slate is its chief constituent, and vegetation is scanty except in the lower valleys. Snow re¬ mains on the peaks the greater part of the year, and there are several permanent glaciers, those on the Veleta being the southernmost in Europe. Its highest peak, Mulahacen (11,678 feet), is covered by perpetual snow; Veleta, next in height, has an elevation of 11,378 feet. These high peaks are penetrated by deep valleys or gorges, with here and there small, icy lakes, of which the Corral de Veleta extends into an immense glacier 8,580 feet high. The loftiest pass is the Collado de Veleta (9,900 feet), where the snow line is from 8,970 to 9,300 feet high.*

sieyes, se-a-yas, Emmanuel Joseph (the

Abbe Sieyes), French statesman: b. Frejus, 3 May 1748; d. Paris, 20 June 1836. He began his studies at the University of Paris, and when the Revolution broke out he took- an active part in furthering its progress, and wrote three pamphlets on the mode in which the three estates were to vote, whereby he was brought into very general and favorable notice. With him originated the idea of a new geographical division of France into departments, arrondis- sements and communes. He also took an active part in the formation of the new consti¬ tution, and was in 1791 member for the depart¬ ment of the Seine. In 1792 he was deputy for the department of the Sarthe ; but generally contented himself with merely recording his vote. During the Reign of Terror he withdrew into the country, but on the downfall of Robes¬ pierre he returned to the convention and took an active part in public measures, more es¬ pecially foreign affairs, conducting several im¬ portant negotiations with other states. In 1798 he went on a mission to Berlin, and suc¬ ceeded in securing the neutrality of Prussia. On his return in 1799 he succeeded Rewbell as a member of the Directory, and shortly after succeeded in displacing three of his colleagues, so as to obtain a majority favorable to his views. He afterward, with the assistance of Fouche, closed the Jacobin Club. This measure made him very obnoxious to the extreme Re¬ publican party, and under the conviction that faction was now to be kept down only by force he began to look out for a military leader. He thought of several, but fixed at last on Bona¬ parte. The revolution of the 18th Brumaire was the result; but Sieyes, who hoped he had onlv obtained a coadjutor, soon learned that he had subjected himself to a master. He did not, however, retire unrewarded, but proved that the simplicity and disinterestedness of which he had boasted were more nominal than real, by

obtaining, along with the title of count, grants of lands and other property to the value of at least $250,000. He wrote (Reconnaissance et exposition des droits de l'homme et du citoyen) (Paris 1789). Consult Boulay, (Theorie con- stitutionelle de Sieyes} (Paris 1836) ; Beau- verger, Edmond de, (Etude sur Sieyes (in (Tableau historique du progres de la ohilosophie politique) (ib. 1858) ; Bigeon, Sieves-* (ib. 1873) ; Cambridge Modern History) (Vol. VIII, New York 1904) ; Neton, A., (Sieyes, 1746-1836, d'apres des documents inedits* (Paris 1900) ; Mignet, F. A. L., (Notices et memoires historiques* (Vol. I, Paris 1843).*

SIFFLEUR, an American ground squirrel, nearly equalling a rabbit in size, common in the Rocky Mountain region. It is so called fiom the loud eerie whistle with which it wakes the echoes of the crags about the lone pastures above timber line, where it makes its home ; it was of great service to the mountain Indians. See Marmot.

SIFFU, sef-foo', or SIBBU, seb-boo', a river of the island of Luzon, Philippines. It rises in the eastern part of the province of Bontoc and flows south and east through the province of Isabela to the Rio Grande de Caga¬ yan ; it is one of the most important tributaries of the Cagayan in Isabela.

SIFTON, Arthur Lewis, Canadian jurist and statesman, brother of Sir C. Sifton (q.v.) : b. Saint John's, Ontario, 26 Oct. 1858. He was educated at Wesley College, Winnipeg, and at Victoria University, Cobourg. He settled in the Northwest Territory in 1875 and in 1883 was called to the bar. He served in the legis¬ lature of the Northwest Territory in 1899-1903; w'as treasurer and commissioner of public works in the ministry of F. W. G. Haultain (q.v.) ; and in 1903-05 he was chief justice of the Supreme Court of the Northwest Terri¬ tory. Upon the establishment in 1905 of the province of Alberta he became chief justice of its Supreme Court, and in 1910-17 he was pre¬ mier of that province.

SIFTON, Sir Clifford, Canadian lawyer and statesman : b. Middlesex County, Ontario, 10 March 1861. He was graduated at Victoria University, Cobourg, in 1880, settled in Mani¬ toba and in 1882 was called to the bar. He sat in the Manitoba legislature in 1888-96, was at¬ torney-general in the Greenway ministry in 1891-96 and in 1896-1911 he was Minister of the Interior in the Laurier administration of Ottawa. His most notable work was in the promotion of immigration to Canada. He was an opponent of separate schools in Manitoba ; and in 1911 left the Laurier Cabinet because of his opposition to the reciprocity treaty then under discussion between the United States and Canada.

SIGEBERT OF GEMBLOUX, sezh'bert' ov zhan'bloo', Belgian mediaeval chronicler: b. Brabant, c. 1030; d. Gembloux, 5 Oct. 1112. He early became a monk in the Benedictine abbey of Gembloux, where, with the exception of a period as a teacher at Metz, he passed all his life in teaching, and writing the works that have perpetuated his name. Chief of these is ˆhronographia, covering history from 381 to 1111 a.d. It appears in (Monumenta Germania historica Scriptores) (Vol. VI, ed. with in-*

trod. by L. C. Bethmann). Other works are (Vita Sigeberti III regis Austrasise, a life of the Frankish King Sigebert III ; (Gesta abbatum Gemblacensiump a history of the early abbots of Gembloux to 1048; and the hagiographical biographies, (Vita Deoderici, Mettersis epis- copi,> a*

life of Bishop Dietrich of Metz, d. 984, who founded Saint Vincent's Abbey in that city; and (Vita Wicberti, a life of Wicbert or Gui- bert, d. 962, who founded the abbey of Gem¬ bloux. Consult Hirsch, S., (De vita et scriptis Sigiberti Gemblacensis) (Berlin 1841) ; Moli- nier, A., (Les Sources de l'histoire de France* (Vols. II and V, Paris 1902-04) ; Wattenbach, W., (Deutschlands Geschichtsquellen* (Vol. II, Berlin 1894).*

SIGEL, se'gel, Franz, American military officer: b. Sinsheim, Baden, 18 Nov. 1824; d. New York, 21 Aug. 1902. He was graduated from the military school at Carlsruhe in 1843 and was commissioned lieutenant in the army, but resigned in 1847. In 1848 he raised a corps of volunteers to serve in the Baden insurrec¬ tion and became commander-in-chief of the revolutionists. Arrested by the Swiss authori¬ ties in 1851 he escaped and in 1852 came to the United States. He settled in New York and conducted there a military magazine Die Revue, removing in 1857 to Saint Louis where he es¬ tablished a similar paper and also engaged in teaching. At the outbreak of the Civil War he organized a regiment for the Federal army and went to the front; participated in the bat¬ tles of Carthage, Dug Springs and Pea Ridge; and in May 1861 was commissioned brigadier-general of volunteers. He was promoted major-general in 1862 and assigned to a corps in the Army of Virginia, which he commanded in the series of operations from Cedar Creek to the second battle of Bull Run. He was ap¬ pointed to command the Western Pennsylvania Reserves in 1863 and in 1864 was transferred to the command of the Department of Western Virginia, successfully defending Maryland Heights against General Early's raid in July 1864, though his force was but 4,000 men against 15,000. He resigned his commission after the war, was editor of the Baltimore Wrecker in 1865-67 and later removed to New York. He was appointed collector of internal revenue in 1871 and elected registrar of New York in the same year. In 1868 he was appointed pension- agent, and later edited the New York Monthly, a German-American publication, and was the author of various essays on military subjects.

SIGERSON, George (pseud. Erionnach), Irish poet, physician, botanist and educator: b. Holy Hill, County Tyrone, about 1839. He was educated at Queen's College, Cork, and later studied in Dublin and Paris. He was professor of botany at the Catholic University, Dublin, and was afterward professor of zoology at University College, Dublin. He exercised a profound influence over the Celtic revival, is an authority on Irish literature and history and has written ably on Irish land tenure, political prisoners and kindred subjects for the Irish¬ man, the Nation (Dublin) and the Harp. He performed a notable service to Irish letters in his translation of Celtic poetry, (The Poets and Poetry of Munster (1860) and (Bards of Gael and GalP (1897; 2d ed., 1907). His own*

verse is well known and is included in the mod¬ ern Irish anthologies.

SIGHING, an act of respiration beginning in an involuntary, often sudden, sometimes prolonged inspiration, in which the diaphragm descends ; the expiratory act which follows, and which constitutes the <(sigh,}) being caused by the recoil of the chest-walls and lungs and by the action of the abdominal muscles. Sighing usually illustrates simple respiration as modified by mental or emotional conditions or by some factor of sensation. During strained attention, as when listening to a thrilling speaker, or wit¬ nessing an exciting scene, the respirations be¬ come very short and quickly recurring, with an occasional long sighing inspiration at intervals.

SIGHT. See Eye; Senses; Vision.

SIGHT, Defects of. See Vision, Defects of.

SIGILLARIA, sij-T-la'ri-a, a genus of fossil plants found in great abundance in the coal measures. The plant occurs in the form of compressed stems attaining a height of 40 to 50 feet, and a breadth of five feet. The stem is seldom found preserved so as to show any structure or even its cylindrical form ; it gener¬ ally occurs as a double layer of coal, showing on the outer surfaces longitudinal furrows due to the arrangement of the leaves on the stem, and at regular intervals the scars produced by the bases of the leaf-stalks. The roots are found preserved in the shale which forms the floor of all coal seams; they were originally supposed to be distinct plants, and have re¬ ceived the generic name of Stigmaria. No foliage of any kind has been found connected with the trunk. Some suppose Sigillarias to be allied to tree-ferns, others to Coniferce. King says that if in imagination we delineate a chan¬ neled stem of any height between 12 and 100 feet, crowned with a pendant fern-like foliage, furnished with wide-spreading fibrilled roots, and growing in some densely-wooded swamp of an ancient Mississippi, we will then have formed a tolerably close restoration of a sigil- laria growing in its true habitat.

SIGISMUND, sij'is-mund (Ger. ze'gis- moont), emperor of Germany, son of Charles IV : b. 14 Feb. 1368; d. Znaim, Moravia, 9 Dec. 1437. He succeeded to the margraviate of Brandenburg on the death of his father, Em¬ peror Charles IV, in 1378, while his brother Wenceslaus, king of Bohemia, succeeded to the throne. By his marriage to Mary, heir of Louis the Great, king of Poland and Hungary, he became heir-apparent to the

throne of these two countries, but on the death of Louis in 1383 the Poles chose Hedwig, Louis' younger daugh¬ ter, for their queen, and the regency of the Hungarian throne was seized by Charles Du- razzo, while Mary was kept in captivity. Sigis- mund rescued her and on the murder of Durazzo was crowned king of Hungary in 1387. His war against the Turks, though supported by the French and German chivalry, resulted in a disastrous defeat at Nicopolis in 1396, and Sigismund was compelled to escape into Greece. On his return to Hungary in 1401 he found his queen dead, his throne occupied by Ladislaus of Naples and his brother Wences¬ laus maintaining with difficulty his throne in Bohemia, having been deposed in Germany. He

was imprisoned by Ladislaus, but escaped, raised a large force and in 1403 succeeded in expelling Ladislaus and subduing the kingdom. In 1411 he was elected emperor of Germany and was crowned Holy Roman emperor at Aix-la-Chapelle in 1414. During the Council of Constance in 1414 he allowed John Huss to be put to death for heresy, an act which resulted in the Hussite War. Wenceslaus died in 1419, but it was not until 1431, when Sigismund signed the compact with the Council of Basel, that the Hussites would permit the acknowledgment of his succession to the Bohemian throne. He was crowned emperor in Milan in 1431, and his coronation was repeated in Rome in 1433. The Luxemburg dynasty became extinct at his death, as he was succeeded by his son-in-law, Albert II of Saxony. Consult Aschbach, J. G., (Ge- schichte Kaiser Siegmunds' (4 vols. Hamburg 1845) ; Main, A., (The Emperor Sigismund) (London 1903) ; Schiff, Otto, (Kaiser Sig¬ munds italienische Politik) (Frankfort 1910) ; Windecke, E., (Denkwurdigkeiten zur Ge- schichte des zeitalten Kaiser Sigmund's (Ber¬ lin 1893).*

SIGISMUND I, surnamed The Great, king of Poland: b. 1 Jan. 1467; d. Cracow, 1 April 1538. He was the youngest son of King Casi- mir IV, and in 1506 succeeded his brother Alexander on the throne of Poland. The war with the Russians, which was urged forward by the Lithuanian prince Michael Glinski, gave him- employment throughout his whole reign. The peace of Poland was also disturbed by inroads of the Tartars and of the Wallachians. On the other hand Poland was increased by the addition of Masovia. By his toleration the Reformation spread in Poland, and Protestant¬ ism became the prevailing religion both in Grand Poland and Polish Prussia. Sigismund, after the death of his wife, Barbara Zapolika, married a daughter of the waywode of Tran¬ sylvania and Bona Sforza of Milan. This marriage was the cause of many misfortunes to the country. The Italian soon secured for herself an influence in the government, sold the public offices and at last placed Piotr Kmita at the head of the administration, which acts contributed to destroy the popularity of the king. Under Sigismund the golden age of ancient Polish literature began.

SIGISMUND II, Augustus, king of Po¬ land: b. 1 Aug. 1520; d. Knyszyn, 14 July 1572. He was son of Sigismund I, and was appointed king in 1529, in the lifetime of his father, and in 1544 obtained the government of Lithuania. His mother, Bona Sforza, allowed him to grow up in luxury and effeminacy that she might be able to continue her influence during the government of her son ; but upon his accession he disappbinted her expectations. When by the revival of ancient laws he proceeded firmly in curtailing the powers of the nobility they en¬ deavored unsuccessfully to depose him. Bona, universally hated, finally quitted Poland with immense treasures for Italy, where she was poisoned by her paramour in 1557. Under Sig¬ ismund the Reformation made great progress in Poland, and many senators, landed pro¬ prietors, bishops and clergy exchanged the Roman Catholic faith for Protestantism. In 1563 Sigismund gave toleration to the different

religious parties, and in 1572, at the Diet of Warsaw, proclaimed universal religious free¬ dom. With his death the Jagellon race be¬ came extinct. See Poland.

SIGISMUND III, or SIGISMUND VASA, king of Poland and Sweden: b. 1566; d. Warsaw, 1632. He was the only son of John III, king of Sweden, and of the Polish princess Catharina, a sister of Augustus Sigis- mund II. After the death of Stephen Bathori he was invited, in 1587, to become king of Poland, and having sworn the Pacta Gonventa was crowned at Cracow. He was a very zeal¬ ous Catholic, and his principal aim was the extension) of the Roman Catholic faith in Poland. On the death of his father, John III, in 1592, he set out for Sweden to take posses¬ sion of the throne to which he had succeeded, and was crowned in 1594. On his return to Poland he was obliged to leave Sweden under the regency of his uncle who ultimately reigned over it as Charles IX. Sigismund's refusal to give up the Swedish crown, of which he became deprived, involved Poland in a disastrous war with Sweden, which lasted for 60 years. Con¬ sult Niemojewski, S., (Memoires) (Lemberg 1899) ; Niemcewicz, J. U., 'History of the Reign of Sigismund IIP (Breslau 1836) ; (Sveriges Historia) (Vol. Ill, Stockholm 1881) ; Rembowski, A., (The Insurrection of ZebrzydowskP (Cracow 1893).

SIGL, ze'gl, Georg, mechanical inventor: b. Breitenfurth, Lower Austria, 1811; d. Vienna, 9 May 1887. He was in youth apprenticed to a locksmith and practised his trade in Bavaria, Wiirttemberg and Switzerland. In 1832 he took employment in the rapid printing press factory of Helwig and

Muller, and in 1837 introduced the manufacture of rapid printing presses into the hand press factory of Dingier in Zwei- briick, and .opened a branch factory of the same sort in Vienna, where he constructed the first rapid lithographic press (1851). Later he manufactured rotary presses, and applied him¬ self to improving the locomotive and other machinery.

SIGMA XI (2ttov6o>v Evvuvec, <(companions in zealous research®), a college honorary society for scientific students, founded at Cornell University in 1886 and now possessing chapters in 30 colleges and schools. It provides for scientific students a society similar to that of Phi Beta Kappa in literature. Its object is to provide meetings for the discussion of the work of its members, promotion of a fraternal feeling among them, the encouragement of original research in pure and applied science and- to aid scientific progress by the publication of material dealing with its development and achievements. The membership includes resi¬ dent professors and instructors, graduates and, in limited numbers, undergraduates who evi¬ dence unusual promise. Honorary member¬ ship is accorded scientists who have achieved important work in either pure or applied science. The badge or insignia is a gold watch pendant in the form of a monogram of the two letters of the Society. Annual conventions are held, each chapter sending three delegates who meet with the council of the Society. The Society was at first averse to extending its organization, but there are now 30 chapters, of which that at Yale University was established

in 1895 and that at Columbia in 1915. The combined membership of the Society is about 10,000, of whom about 2,300 are active mem¬ bers. Since March 1913 the Society has pub¬ lished the Sigma Xi Quarterly. Consult Ward, H. B., (Sigma Xi Quarter Century Record and History, 1886-191 1> (1911).

SIGN LANGUAGES are vehicles of com¬ munication by gestures, principally employed by primitive peoples, such as the American In¬ dians. They are of two kinds, the descriptive and the characteristic or indicative signs. Descriptive signs involve an account, more or less complete, of the Appearance, qualities and uses of an object, .or the circumstances of an event, for the purpose of description or ex¬ planation ; and must, from their nature, be varied, like a painting, only by the point of view from which the objects are described, or the capacity and accuracy of the person that describes. The indicative signs, on the contrary, which are employed in common con¬ versation, are usually mere abbreviations of these, involving a single striking feature of the person, or object, or event; as an elephant is indicated! by its trunk, a flower by its fragrance or a town by a collection of roofs. The signs of persons are usually conventional, and derived from some feature, or mark, or habit but often from an accidental circum¬ stance in dress, etc., which struck the deaf- mute on first seeing the person

and is still referred to when it no longer exists. This form of expression, as developed in certain institutions for deaf-mutes, is of a character which those who value it least admit to surpass speech in the force with which it communi¬ cates the feelings and states of mind. Like painting (as Condillac observes) it has the immense advantage of presenting a group of ideas at once, which lose much of their force and beauty by being detailed in the successive words and artificial arrangements of written language. The eye, the hand, the whole body, speak simultaneously on one subject; the repre¬ sentation changes every moment, and these peculiarities, with the elliptical form of expres¬ sion which is adopted in conversation, give a rapidity to communication by the sign language which, on common subjects among those familiar with it, surpasses that of speech. If we remark the new shades of meaning given to the same words by the varying attitude and general expression of the speaker, and the accuracy with which a nice observer will dis¬ cover, in these signs, the thoughts, and feelings, and intentions, even of one who wishes to conceal them, we shall find reason to believe that they are capable of conveying the most delicate shades of thought. Generic and ab¬ stract terms, as their objects do not exist in nature, have no corresponding terms of equal clearness in the sign language; and the ab¬ breviated manner in which we express relations by conjunctions, prepositions, relatives and in¬ flections, can only be imitated by adopting similar conventional signs, which do not easily fall in with the idiom of the language. In these respects, therefore, the sign language lacks the algebraic brevity and accuracy which are found in artificial languages, and which render these so invaluable as mediums of thought and instruments of philosophical investigation ; at

the same time it is capable of describing what is conveyed by these forms, with an accuracy at least as great as that of words by circum¬ locution and example. It is worthy of remark that the order of expression in the sign lan¬ guage is that which we term inverted – — the subject before the quality, the object before the action and, generally, the thing modified before the modifier. This language, in its elements, is to be found among all nations and has ever been the medium of communication between voyagers and the natives of newly-discovered countries. It is employed by many savage tribes to supply the paucity of expression in their language, or to communicate with other tribes, as has been observed among the Indians of North America. Among the Indians of the western regions of the United States, Major Long found it an organized language employed between tribes who spoke different articulate languages. His account, as well as others given by subsequent inquirers, shows that it cor¬ responds very closely with

that adopted in the school tof Paris ; and a Hawaiian, who visited an American asylum for deaf-mutes, gave a narrative of his life in the sign language, which was perfectly understood by the pupils. As a proof that the sign language does possess a universal character in its cultivated form, a trustworthy authority, who himself acquired it in this form, has asserted that he employed it, or had seen it employed, with success, in communicating with an American Indian, a Hawaiian, a Chinese and the deaf and dumb in various parts .of the United States, in Eng¬ land, Scotland, France, Germany, Switzerland and Italy. Consult Clark, W. P., (The Indian Sign Language) (Washington 1885) ; Mallery, G., (Introduction to the Study of Sign Lan¬ guage among the North American Indians) (Washington 1880) ; id., (A Collection of Gesture Signs, > etc. (ib.) ; id., (Sign Language among North American Indians (1881) ; Roth, W E. (Ethnological Studies . . . Queens¬ land Aborigines) (London 1897).*

SIGNAL CORPS. See Army and Navy Manoeuvres; United States, Army of the.

SIGNAL SERVICE, The. See Meteor¬ ology.

SIGNALS, Naval, the means of transmit¬ ting intelligence at sea by the agency of sight or hearing. These means are divided into three classes : day signals, night signals and day and night signals. The first consist of flags or shapes, moving arms or shapes or the waving of them. The day and night signals used in the United States navy are found in the (General Signal Book) and the (Fleet Drill Book. The first comprises about 7,000 words and sen¬ tences arranged alphabetically and regularly numbered. Resort is had als.o to a vocabulary of about 10,000 conversational terms, to which is added an alphabet and a geographical list of about 11,000 places, each letter and word having its appropriate number. The (Fleet Drill Book) relates to the tactical formations of a fleet or squadron. Every naval vessel having a set of these books, it is only neces¬ sary, in order to signal a message from one ship to another, to indicate the volume and the number in that volume corresponding to the required words or sentences. To do this there are nine rectangular fla,g9 representing the*

digits, one to stand for zero or 10 and three triangular pennants called repeaters, wherewith to duplicate numbers. The lowest flag in the hoist represents the units. In addition there are special flags, comet danger signal, annulling flag, quarantine, convoy flags, etc., also the interrogatory answering, preparatory, numeral, geographical and position pennants. Flags of various colors are available as signals only for a distance but little over three miles. Beyond that long-distance signals are used, such as the semaphore, the collapsing drum or the use of cones, balls and squares — in which the shape takes the place of color. The wire¬ less telegraph and

wireless telephone have dis¬ placed to a great extent the older methods of signaling. Naval signaling according to the international code is mainly effected by flags, either singly or in groups, interpreted in ac¬ cordance with the international code book. The present system is of gradual growth out of the earlier ones devised by Sir Home Popham (1803), Captain Marryat (1817) and others. The .old international code introduced in 1857 was superseded by a new one in 1902. The latter was prepared in consultation with foreign governments and differs from the old mainly in having a complete flag alphabet, and in the substitution of three-flag signals for all the four-flag signals of the 1857 code, except in the names of places and of ships. See Signals and Signaling for a fuller description of the international code and illustrations of its symbols, etc.

Night signals are made by means of lights, rockets or torches. The waving of a lamp or torch approximates the wig wag and sema¬ phore systems. Night signals are also made according to the system .of Lieut. E. W. Very, United States navy, by which fire-balls or stars are shot to a height of about 400 feet. Only two colors are used, red and green, with which any desired signal may be made, a rocket being used to indicate a ship's number and as a signal of execution. Very lights are visible at a distance of 10 miles or more according to the state of the atmosphere. Ardois lamps are much used in the navies of the world — as used by the United States they consist of four pairs of lamps suspended along a cable exending to a masthead. The telegraph code is used, read¬ ing the lights from top downward, the red and white lights corresponding to the dot and dash of the telegraph or the one, two of the wigwag system. The lights are now operated by a key¬ board and a message may be transmitted quite rapidly. White lights are also flashed, long and short flashes indicating the dashes and dots respectively of the telegraphic system. The search light may be used for signaling a ship below the horizon, by reflecting the light on a cloud. Signals have been exchanged in this manner between two ships 60 miles apart. Day and night signals are those transmitted by sound or by wireless telegraph. By long and short blasts of a whistle or double and single strokes of a bell a telegraphic system is pos¬ sible but only for limited distances. Fog- signals are made by firing guns, blowing horns, the steam-whistle and by sounding the ship's bell. Signals of distress are variously made, by hoisting the national colors upside down, by rocket, by blue lights, etc., or by the wireless

telegraph. A famous instance of the use of the last-named method was the wireless call of the sinking Titanic which sent the Carpathia speeding to the

rescue over the intervening miles of water in time to pick up the survivors of that ill-starred vessel. Consult international Code of Signals> (issued by the United States Hydrographic Office, Washington 1914) and instructions for Signaling, United States Navy (ib.).*

SIGNALS, Railway. See Block Signal System.

SIGNALS AND SIGNALING. The

most perfect means for the communication of messages by means of audible or visible signs to distances greater than can be reached by the human voice consists in the use of electricity. The telegraph and the telephone have displaced many old methods of signaling; but until the recent invention of wireless telegraphy the use of electricity required a more or less fixed con¬ nection between the place signaled from and the place signaled to. Flags of various shapes and colors, cones, balls, drums, movable arms or semaphores (as in railways), blasts of sound, flashes of light and other signaling media have been adopted for different purposes.

Marine Signals. — Signaling at sea accord¬ ing to the international code is mainly effected by flags, either singly or in groups, interpreted in accordance with the international code-book. The present system is of gradual growth out of the earlier ones devised by Sir Home Popham (1803), Captain Marryat (1817) and others. The old international code introduced in 1857 was superseded by a new one in 1902. The lat¬ ter was prepared by a committee appointed by the Board of Trade and took its final shape after foreign governments had been consulted. The new code differs from the old one mainly in having a complete flag alphabet and in the substitution of three-flag signals for all the four-flag signals of the 1857 code, except in the names of places and of ships. The 27 flags used in the code comprise the ((code flag,® or

A

J

s

K

t

T

D E

((answering pennant,® hoisted before a code sig¬ nal is given and as a sign that a signal has been understood ; five pennants, denoting the letters C — G ; two burgees, denoting A and B ; and 19 square flags, representing the other letters of the alphabet. The number of three-flag combinations possible with the alphabetic flags is 15,600, thus affording scope for an immense variety of signals of all degrees of importance. PCJ, for instance, means, ((You will find great

difficulty in getting through the ice at – ,®

the place being indicated by a following geo¬ graphical signal. The code flag above two alphabetic flags gives latitudes and longitudes; under two flags, numbers. As already stated, in the new code four-flag signals are not used for general purposes. They may be used, how¬ ever, in spelling words alphabetically; and as there is now a complete alphabet of flags, any word may be spelled in this way, but the code signals, having their own special conventional significations (all given in the code-book), are a means of more rapid communication. There are never more than four flags hoisted at once. When, owing , to distance or the state of the atmosphere, the colors of flags cannot be made out, a system of distant signals must be se¬ lected. There are three systems of these in the code-book, so constructed that any one can be interrupted in terms of the elements of an¬ other, and all three in terms of the flag code. These systems involve respectively the use of (1) cones, balls and drums; (2) balls, square flags, pennants and whefts; and (3) a fixed semaphore. If the shapes are not to be had flags may be substituted; but shapes are more easily read than flags, because the latter flutter. A square flag is equivalent to a cone pointing upward, a pennant to a cone pointing down¬ ward and a wheft (or tied flag) to a drum. The code signals in all these systems denote things or meanings rather than words, and thus they can be interpreted by ships of all nations. The international code of signaling by cones, balls and drums, involves the use of the' fol¬ lowing alphabet :

F G ti I

In the most simple form of two-flag signaling, the code flag is hung up at the masthead or wherever it can be most easily seen, and single flags representing the alphabet are hung suc¬ cessively below. These flags do not bear a let¬ ter, but a design, which is more easily recog¬ nized at a

distance than a letter. Each of the letter flags may be used to represent numerals, A to K standing for 1 to 11, L to S for 22, 33, 34. etc., to 99; T is 100, U is 0, V is 00,

in passing each other or a signal station, com¬ monly signal their name, where from and where bound, number of days out and longitude of their chronometer. Naval vessels, of course, have their private codes, which are carefully guarded during war-time, that their signals may not be understood by the enemy. All offi¬ cers are supposed to have glasses convenient for reading signals, when on active duty. Towing signals are made with a flag in the hand at the

\

\

/

\

T U V W X

W is 000, etc. The letter flags also each stand for a simple message, as follows:

A I am on full speed trial.

B I am taking in (or discharging) explosives.

C Yes.

D No.

E Following flags to be taken as a spelled word.

F . End of word, or pause.

G End of spelled words.

H Stop, or come nearer; something important.

I I have not a clean bill of health.

J I have headway.

K I have stern-board.

L I have infectious disease on board.

M Following flags to be taken as figures.

N Decimal point.

O End of numeral signals.

P I am about to sail; all aboard.

Q Have clean bill of health, but liable to quarantine.

R Do not pass ahead of me.

S I want a pilot.

T Do not overtake me.

U My engines are stopped.

V My engines are going astern.

W All boats are to return to the ship.

X I will pass ahead of you.

Y All ships of the convoy are to rejoin company.

Z I will pass astern of you.

When a ship desires to signal, the method is to first hoist her ensign, with the code flag below. If several vessels are within signaling distance, she gives the signal letters of the vessel she desires to communicate with. To make reply, the other vessel hoists her answer¬ ing pennant at < The first ship then sig¬ nals and holds the signal until the answering ship signals <(Close up.® Hauling down the ensign indicates that she has finished signaling. If the replying vessel cannot make out or un¬ derstand signals, instead of answering <(Close up® she signals OLW or WCX. Friendly ships,

Y Z

gunwale. The distress signals begin with N, as NA, Aground; NB, Cannot save ship — take people off ; NM, Am on fire, etc.

Army and Land Signaling. — For mechan¬ ical signaling the semaphore alphabet is still chiefly used. It can be rendered from signal stations by

fixed semaphores or it can be worked in the field by a man with a flag in each hand. In such case the signal for starting is to cross the flags downward. The semaphore alphabet, as commonly rendered, is shown above.

The signal flags of infantry are valuable in locating companies and regiments when dis¬ persed, as at the close of an engagement. The United States infantry signaling flags are:

FIRST battalion — Co. A, red flag with white square.

Co. B, red flag with blue square.

Co. C, red flag with white diagonal.

Co. D, red flag with blue diagonal.

second battalion — Co. E, white flag with red square.

Co. F, white flag with blue square. Co. G, white flag with red diagonal. Co. H, white flag with blue diagonal.

THIRD BATTALION — Co. I, blue flag with red square.

Co. K, blue flag with white square.

Co. L, blue flag with red diagonal.

Co. M, blue flag with white diagonal.

In the United States infantry, mounted orderlies and some others are required to carry in their kits two standard sets of flags and field glasses for reading them at a distance. Officers carry glasses that they may read sig¬ nals. For heliograph signals, see Heliostat.

Weather Signals. — These have been highly elaborated by the United States Weather Bureau. For signaling forecasts a series of five flags is employed :

No. 1 White

No, 2 Blue

No. 3

White and Blue

No. 4 Black Tri¬ angular.

No. 5

White with black square in centre

The triangular temperature flag is placed above one of the others to indicate warmer, and below for colder weather. For storm signals red flags are employed; if there is a black cen¬ tre a severe storm may be expected. The di¬ rection from which the storm may come is in¬ dicated by triangular pennants as follows : (Shading indicates red).

night are equivalent to beckoning in the day¬ light, meaning, ((This is the best place to land.® See Life-Saving Service, The United States. For Railway Signals, see Block Signal Sys¬ tem ; Semaphore.

SIGNATURES, Doctrine of, a mediaeval theory of medicine, which was carried into prac¬ tice by those who believed that <(God . . .

Whistle blasts as weather signals are used in many localities. There is sounded first a very long blast to attract attention. Then for fair weather, one long blast; rain or snow, two long blasts ; falling temperature, one short blast ; rising temperature, two short blasts ; cold wave, three short blasts. These signals are usually repeated for exactitude.

Miscellaneous Signals.— In many cities fire alarm signals are given by a whistle sys¬ tem, sounding numbers, which can be inter¬ preted by any one having a fire map and key. Such fire map and key are often printed in the local directory. Electric lamps have come to supersede lanterns in many fields of signaling. Different arrangements of red and white lamps can be made to give a great variety of in¬ formation, when used with a code.

Common life-saving signals in the United States are a red light or rocket exhibited to a wreck, indicating that they are seen and help is coming. A red flag by day or a red light at night between the men in the service means ((Haul away.® A white flag or white light swung slowly means (

maketh . . . herbs for the use of men, and

hath not only stamped upon them a distinct form, but also given them particular signatures, whereby a man may read even in legible characters the use of them.® Many names of plants were derived from these (

on account of the fancied semblance of their forked roots to human figures. Even the seeds of ferns, at one time supposed to be invisible, transferred this quality to the possessor of the seeds, who thus himself became invisible; plants resembling the moon in her various stages, as the moon-daisy or the semi-lunate segments of the moonwort (Botrychium lunaria) , were sup¬ posedly able, by involved and alchemistic reason¬ ing, to cure uterine diseases, or were made party to magical performances, such as unshoe¬ ing horses which trod upon them. The root- stock of Solomon's seal (Polygonatum) , when cut transversely, shows certain marks, imagined to represent a seal, which the old herbalists thought pointed to its employment as a styptic for wounds, and they told how the crushed rootstock would shortly take away bruises caused by "women's wilfulness in stumbling upon their hasty husbands' fists.®

SIGNET, in England, one of the royal seals, used in sealing private letters and all such grants as pass the sovereign's hand by bill signed. It is always in the custody of the Secre¬ tary of State for the Home Department.

SIGNORELLI, sen-yo-rel'le, Luca, (Luca d'Egidio di Ventura, called also Luca da Cortona), Italian painter: b. Cortona, 1441; d. Arezzo, 1523. He studied first under Mi tteo da Siena and then under Pietro della Francesca. He began to distinguish himself about 1472, and painted until 1512, or perhaps later. He holds an important place in the history of art as the first who applied anatomical knowledge to paint¬ ing, and thus became the precursor of Michel¬ angelo. Signorelli painted in the Sistine Chapel at Arezzo, Citta di Castello, Cortona, Perugia and Volterra; but his greatest works are the magnificent frescoes in the chapel of the Ma¬ donna di San Brizio in the cathedral of Orvieto. The series comprises the 'History of Anti¬ christ, } the 'Resurrection of the Dead,* 'HelP and 'Paradise.* It was begun by Fra Angelico about 1447, and finished by Signorelli between 1499 and 1504. These frescoes were studied by Canova, and by Michelangelo, who did not disdain to copy some of the figures for his 'Last Judgment.) Among his other works the most worthy of mention are the 'Madonna Enthroned,* the altar-piece of St. Onofrio in the cathedral of Perugia; the 'Adoration of the Magi,* now in the Louvre; the 'Annuncia¬ tionˆ and a 'Madonna,* at Volterra. Signorelli was a man of high character and attained municipal as well as artistic honors. Consult Crutwell, Maude, 'Luca SignorellP (London 1899) ; 'Masters in Art* (Vol. VIII, Boston 1907); Dohme, 'Kunst und Kiinstler* (Eng: trans., 1880) ; Vasari, Giorgio, 'Lives of the Most Eminent Painters, Sculptors and Archi- tects) (English trans., New York and London

1911).

SIGNS AND SIGNBOARDS. The art of

sign painting was known among the Greeks and Romans and specimens of ancient signs have been found at Pompeii and Herculaneum, some¬ times painted, but oftener carved. A bush was the sign of many taverns as late as the reign of James I. During the Middle Ages every trade had its emblem, some of which have sur¬ vived, as the chemist's pestle and mortar, the pawnbroker's three balls and the barber's pole. Besides these trade emblems, every individual

trader might have his own special device : Southey's father, a Bristol linen-draper, for his chose a hare. During the 16th and 1 7th cen¬ turies huge painted signs came greatly into vogue. They were suspended either from pro¬ jecting metal work from a post or an obelisk, or from a sort of miniature triumphal archway, and sometimes cost great sums. These creaking and ponderous signboards proved a source of annoyance, sometimes of positive danger, as when in 1718 one in Fleet street, London, dragged down a house front and killed in its fall four persons. So in 1762-70, under act of Parliament, the London signboards were either wholly removed or at least affixed to the fronts of the houses; and this example was gradually followed throughout the kingdom, though here and there signposts linger or have been restored, even in London. One of the oldest and most interesting signs still existing is the "Red Lion® at Martlesham, Suttolk, Eng¬ land, for it was the figurehead of one of the Dutch fleet defeated off Southwold in 1672; but the history even of vanished signboards has no slight interest. A good many signboards have been painted by great artists, Holbein, Correg¬ gio, Paul Potter, Hogarth, Wilson, Morland, David Cox, "Old® Crome, Sam Bough and Sir J. E. Millais (some of which are still extant). In the United States many old and picturesque signs are still to be found in Eastern cities, particularly in Atlantic Coast towns. Modern signs are made mostly of metal and wirenetting. Elaborate signboards indicating the trade or profession practised by the owner were neces¬ sary in an age when very few could read. With the spread of education among the masses they have become unnecessary. Lettered an¬ nouncements now suffice to call attention to the wares within. Consult Larwood, Jacob, and Hotten, John Camden, 'History of Sign¬ boards (London 1866).*

SIGOURNEY, sig'er-ni, Lydia Huntley,

American author: b. Norwich, Conn., 1 Sept. 1791 ; d. Hartford, Conn., 10 June 1865. She received a good education, showed considerable facility in rhyme at an early age and many of her pieces were published in the

periodicals of the day. For some time before her marriage to Charles Sigourney, in 1819, she had been en¬ gaged in teaching in schools for young ladies. In 1815 she published 'Moral Pieces in Prose and Versed which was quickly followed by other works, most of which enjoyed great popularity. Among her principal poems are 'Traits of the Aborigines of America (1822) ; 'Pocahontas) (1841) ; 'Scenes in my Native Land* (1844) ; 'Voice of Flowers* (1845). Her prose works are mainly biographical, historical, didactic and epistolary. In 1840 she visited Europe, and in 1842 gave some reminiscences of the tour in a volume entitled 'Pleasant Memories of Pleasant Lands.) She has been called the 'American Hemans,* and certainly rivals her English pro¬ totype in copiousness, having, by her own com¬ putation, written 46 works (in whole or in part), and more than 2,000 contributions to about 300 periodicals. Consult the autobio¬ graphic 'Letters of Life* (1866).*

SIGSBEE, sigs'be, Charles Dwight, Amer¬ ican naval officer: b. Albany, N. Y., 16 Jan. 1845. He was appointed to the United States Naval Academy in 1859, was graduated in

1863, was made ensign in that year and for his first two years of service was attached to the Monongahela and the Brooklyn of the West Gulf squadron. He took part in the bombard¬ ments of, and attack on, Fort Fisher, and in the battle of Mobile Bay. In 1868 he attained the grade of lieutenant-commander. Thereafter he was employed in various duties, being at dif¬ ferent times with the Asiatic and North At¬ lantic squadrons; stationed at the Naval Academy 1869-70; in the hydrographic office (1873-74) ; and commander of the coast-sur¬ vey steamer Blake employed in deep-sea ex¬ ploration for the government. The chief por¬ tion of the outfit of the Blake consisted of in¬ ventions or adaptations by Sigsbee, and in recognition of these he received a gold medal at the London International Fisheries Exhibi¬ tion and the decoration of the Red Eagle of Prussia from Emperor William I. Promoted commander in 1882, he was successively on duty at the academy (1882-85) ; commander of the practice-ship Dale (1883-84), and of the Kearsarge on the European station (1885-86) ; and on shore duty (1887-90). In 1890-92 he commanded the training-ship Portsmouth, in 1893 was made chief of the hydrographic office, was made captain 21 March 1897 and on 10 April subsequent assigned to the command of the Maine. The Maine was designed at the Navy Department, built at the New York navy yard, commissioned 17 Sept. 1895 and the most powerful second-class battleship in the LInited States navy. In January 1898 the vessel was ordered to the

port of Havana, Cuba, arriving there 25 January. There it was met by an official Spanish pilot and moored to a mooring- buoy chosen by him. At 9.40 o'clock on the evening of 15 February the Maine was destroyed by an explosion in which the entire forward part of the ship was utterly wrecked. Two officers and 264 of the crew perished. The United States court of inquiry appointed to inquire into the catastrophe found that the ves¬ sel was destroyed by the explosion of a sub¬ marine mine, and that no evidence was obtain¬ able fixing the blame. A Spanish court making a simultaneous investigation reported that the disaster was caused by an internal explosion. It was very generally believed, however, in the United States that the loss of the ship was in some way due to Spanish initiative. Therefore, says Sigsbee in his own narrative, ((although the war which followed was not founded on the destruction of the Maine as a political cause, that disaster was the pivotal event of the con¬ flict.® Sigsbee's wise dispatches at the time did much to suspend any popular demand for im¬ mediate reprisals, while his expert knowledge was of great value to the court of inquiry. He rendered distinguished service during the Span- ish-American War as commander of the con¬ verted liner Saint Paul, with which on 24 May 1898 he captured the collier Restormel, securing Cervera's coal supply, and 22 June defeated the cruiser Isabella II and destroyer Terror off San Juan, Porto Rico. Subsequently he was ordered to command the T exas, in 1900-02 was chief officer of naval intelligence, in 1903 was made commander of the navy yard at League Island, Pa., and promoted rear-admiral. In 1904-05 he was commander of the South At¬ lantic squadron, and in 1905-06 of the second division of the North Atlantic fleet. He retired

16 Jan. 1907. He published (Deep Sea Sound¬ ings and Dredging) (1880), and (The Maine: An Account of Her Destruction in Havana Harbor > (1899).

SIGURD, ze'goord, or SIGURDE, a name famous in Scandinavian mythology. Accord¬ ing to the legend Sigurd, the Siegfried of the Nibelungenlied, is the posthumous son of Sig¬ mund, son of Volsung, a descendant of Odin; is born in the palace of Hialprek, king of Den¬ mark, and grows up into splendid manhood. With his good sword Gram, which had once been wielded by Odin, he slays the dragon, Fafnir, and obtains the golden treasure which it guarded ; by eating the monster's heart he is endowed with a wisdom which enables him to understand the songs of the birds. Riding oft with his spoil he strikes through a lonely heath, in the midst of which is a volume of flame, surrounding a house in which a fair maiden Brenhyldr (Brunhild in the Nibelun¬ genlied), daughter of Atli, lay asleep, never to be wakened until there came a hero brave enough to ride through the fierce flame. Sigurd enters and wakes up Brenhyldr, to whom he plights his troth, and then rides to the palace of Giuki the Niblung, who

wishes Sigurd to marry his daughter Gudrun (Chriemhild). Gudrun's mother gives Sigurd a potion which causes him to forget Brenhyldr, and he marries Gudrun. Her brother Gunnar (Gunther), hav¬ ing determined to marry Brenhyldr, tries vainly to ride through the flames, and so his mother by her magic arts made Sigurd change shapes and arms with Gunnar, and so rescue Brenhyldr. On the bridal bed Sigurd places his sword be¬ tween himself and Brenhyldr, and the following morning he resumes his shape, and hands her over to Gunnar. No sooner is this done than the power of the elixir passes off, and he sees when too late that he has betrayed his first love. After the lapse of years Brenhyldr is told that she was rescued from the flames by Sigurd and not by Gunnar, as she thought; and her love for the hero gives way to wrath and thoughts of vengeance. She urges Gunnar and his brothers to slay him, but as they had already taken an oath not to hurt him, they refuse. They, however, incite their half-brother to do the deed, and Sigurd is killed as he lay sleeping. The death of the hero revives all the love of Brenhyldr, and lying down by his side with the sword Gram between them, she dies broken¬ hearted on his funeral pile. Consult Boer, R. C., (Untersuchungen fiber den Ursprung und die Enwicklung der Nibelungensage) (Halle 1906) ; Abeling, T., (Nibelungenlied) (1907) ; Lichten- berger, H., (Le poeme et le legende des Nibe- lungen) (Paris 1891) ; Paul, H., (Grundriss der germanischen Philologie) (Vol. Ill, Strassburg

1900).

SIGURD SLEMBE, slem'be', a trilogy by Bjornstjerne Bjornson, translated by W. M. Payne. This splendid sagadrama, so deeply impressive and so typically characteristic of Bjornson, was planned by him already in 1858, when he was manager of the National Theatre in Bergen, but not completed until the author's stay in Rome in 1862. The author made a most thorough preparation for this work. Not only did he digest all that is to be found in the sagas about this unrecognized illegitimate son of Magnus Barefoot, king of Norway, but he

followed his hero in all his travels and adven¬ tures around in Europe in the early part of the 12th century. We find the whole spirit of the Middle Ages at the time of the Crusades in the very action, in the psychological exposition, in the tragic solution. Sigurd Slembe is the tragedy of the man whose great gifts and tal¬ ents qualified him for leadership, but of whom his own country would not make use, — a theme which appealed to Bjornson especially at the time when the drama was written. The ethical conflict is the same that the author has treated in some of his earlier novels

and his saga dramas. According to one of Bjornson's letters, it is the conflict, in a man highly gifted by nature, between the craving for self-assertion and the duty to submit one's powers to the demands of a higher and nobler aim. In the first section of the trilogy, (Sigurd's First Flight, > the hero is presented to us, a powerful, handsome youth, full of energy and ambition. But he has no family name. In the opening scene he forces from his mother the confes¬ sion of the name of his father. The poor woman at last reveals that King Magnus was her lover. At last he knows from what race he comes. He breaks away to seek adventures, to make a name and to return to claim the throne of Norway.

In (Sigurd's Second Flight) we find the hero on the coast of the old Norwegian colony .Caithness, Scotland, at the court of the exiled Earl Harold of Orkney. This sickly young man has no ambition and asks no more than that to be at rest among his dreams. But his life is tortured by the wran- glings of his mother and her violent and in¬ triguing sister. The two women seek the aid of the magnificent Norwegian who has arrived in their palace, nobody knows whence. An orphan niece, Audhild, one of Bjornson's finest female creations, falls in love with Sigurd. The young man is eminently successful in his campaign against Orkney. The earl, however, commits suicide and Sigurd rejects the crown which now lies at his hand and passes out to sea again. He tears himself from the arms of Audhild in a scene of extraordinary beauty and passion.

(Sigurd's Return) is the closing play. King Harold Gille, Sigurd's half-brother, is with his court in Bergen. Our hero returns with the same hopes and illusions as when he left. Again, fate is against him. Two of the scenes especially are among the finest ever written by Bjornson, the scene between Sigurd and the Finn girl, and Sigurd's sublime soliloquy : <(The Danes desert me ! The battle is lost ! Here and no further!®

Failure confronts him as the result of all his toil. All avenues of escape are closed upon him. As he stands face to face with the ruin of the edifice he so nearly succeeded in erect¬ ing, all events of his past life come before him. He sees life in its true aspect. All worldly hopes being broken, Sigurd leans his weary head against the bosom of his aged mother while listening to the song of the Crusaders :

Fair is the earth,

Fair is God's heaven,

Fair is the pilgrim-path of the soul

Singing we go

Through the fair realms of earth

Seeking the way to our heavenly goal.

Johan Svendsen's (Sigurd Slembe) is a musi¬ cal illustration of the play. In America only the second section of the trilogy has been per¬ formed. It was in Chicago in 1908. The late Richard Mansfield had planned, after his ven¬ ture with Ibsen's cPeer Gynt,J to have the entire work condensed for a single evening's presentation and himself play the part of the hero.

Gisle Bothne.

SIHOENITE. See Fertilizers.

SIKA, se'ka, the common deer of Japan (Cervus sika), representing a group (subgenus Sika), whose peculiarity is that the antlers have no bez-tine, so that each has usually only four points ; the tail is long proportionately and the ischial white patch is bordered with black. The Japanese deer, abundant in the forests of north¬ ern Japan and China, is of small size, dark brown in color and the greater part of the tail white; but in summer the coat is spotted with white. This, and the similar Formosan and Manchurian deer, are often caught in traps and kept as pets by the people ; and are capable of thriving in European parks. A closely related form is the Caspian deer (C. caspicus) of northern Persia. Consult Lydekker, Richard, (Deer of All Lands) (London 1898).

SIKESTON, siks'tun, Mo., city in Scott County, 125 miles southeast of Saint Louis, on the Saint Louis and San Francisco and the Saint Louis, Iron Mountain and Southern rail¬ roads. It manufactures flour and boxes, and has hoop and heading factories. Pop. 3,227.

SIKHIM, sik'im, or SIKKIM, India, a native state under British protection, situated in the eastern Himalayas between Nepal and Bhutan, and between Tibet and the province of Bengal. Area, 2,818 square miles, and popu¬ lation 87,920. Of these 58,675 are Hindus. Buddhists number 28,915 and there are 285 Christians. It forms part of the south slope of the Himalayas and ranges in altitude from 18,000 feet in the north to 1,000 feet in the south. Its extreme length from north to south is 70 miles and its extreme breadth 50 miles. The climate is accordingly varied, ranging from tropical to alpine. Formerly most of the area was covered with forest, but the greater part below 5,000 feet has in recent years been cleared and cultivated. The chief products are maize and rice, oranges, apples and woolen cloth. A few copper mines are worked. The mountain roads are good, and the route of British trade with central Tibet passes through the state. In 1890 a treaty was signed by the viceroy of India and the Chinese

representative, by which the British protectorate over Sikhim was recog¬ nized by China. The British government has direct and exclusive control over the internal administration and foreign relations. The Ma¬ haraja, after having declined to comply with the conditions, lived for some time under sur¬ veillance in British India, and in 1895 was allowed to return to Sikhim. The Maharaja and the members of the Council carry on the administration, with the assistance of the British political officer stationed at Gangtok. The in¬ habitants are Bhutias, Lepchas and Nepalese, the last named being now the most numerous. Principal towns are Gangtok, the capital, Rhenok, Rangpo, Pakyong, Lachen and Lachung. Lama-

ism is the common form of religion. The gross revenue is about $72,500 annually. Con¬ sult Strahan, c Report on Explorations in Sik- hinP (Dehra Dun 1899) ; Waddell, (Among the Himalayas } ; White, J. Claude, (Sikhim and Bhutan) (London 1909).

SIKHS, seks, the name of a religious sect in British India, which has come in course of time to be virtually also the designation of a race or people. Nanak Shah was the founder of the sect, which worships only one omnipotent and invisible God, and whose tenets reflect the broadest religious philanthropy and toleration. Nanak Shah belonged to the Hindu tribe of the Vedis, and was born in 1469 in the village of Talwandi, now the town of Rajapur, in the province of Lahore. Nanak was a profound thinker, and far in advance of the views which prevailed in his day in any part of the world in relation to liberty of conscience and human brotherhood. His impressions in this regard were largely derived from the works of a Mo¬ hammedan named Kabik with which he became acquainted in his travels. He sought to intro¬ duce simplicity of faith and purity of morals, and to induce Hindus and Mohammedans to live in harmony. He died about 1540, and was buried at Kirtipur, which is, therefore, a place of pilgrimage for the Sikhs. He well deserved the honor in which his memory is held. His life was pure, he absolutely denied any power to perform miracles and he taught his disciples to worship God alone. Although peace between men was an essential part of the Sikh religion, the horrible persecutions to which they were subjected by the Mohammedans forced the Sikhs to become a military people, and under their great leader, Vovind Sinh, they fought so bravely and successfully as to receive the title of Sihns or lions. They wore a blue dress, let their hair grow and were always armed. Govind Sinh also instituted the order of ˆakalis® or ˆimmortals,® in whom to this day rests the supreme direction of religious affairs among the Sikhs. The struggle between Sikhs and Mo¬

hammedans and between independent communi¬ ties of Sikhs continued until Runjeet Singh, the son of Maha-Singh, succeeded in establish¬ ing himself as despotic ruler of the Sikhs, about the close of the 18th century, and made him¬ self master of a territory comprehending the whole Punjab and adjoining districts, with an area of 69,000 square miles. After the death of Runjeet Singh, and while his son, Dhulip Singh, a minor, was the nominal ruler, war broke out between the British and the Sikhs, in 1845. The struggle lasted with varying fortune, and inter¬ vals of temporary submission on the part of the Sikhs, until the decisive battle of 21 Leb. 1849, when the Sikh power was completely broken, their territory being annexed in the following month to the British Empire in India. The Sikhs have since proven faithful friends of the British, and never wavered from their al¬ legiance at the time of the great Mutiny. They are now among the best of the British Indian troops. The Sabijdari are the leisure class of the Sikhs while the lower class are termed the Kesadhari. Their total number is in excess of 3,000,000. See also India; Religious Sects.

Bibliography. — Field, Dorothy, (The Reli¬ gion of the Sikhs) (London 1914) ; Cunning¬ ham, J. D., (History of the Sikhs) (ib. 1903) ;

Hopkins, L. W., (Religions of India) (Boston 1895); Macauliffe, M. A., (The Sikh Religion: Its Gurus, Sacred Writings and Authorsˆ (6 vols., Oxford 1909) ; Rait, Wife and Campaigns of Viscount GouglP (London 1903).

SIKINO, se'ke-nd or se-ke'no (ancient, Sikinos), Greece, an island east of Melos, be¬ longing to the Cyclades. It is 10 miles long by three wide. It has a rugged mountainous sur¬ face, but the soil is fertile. Wine is the staple. Its chief town is situated on the brow of a lofty precipice. In ancient times the island be¬ longed to Athens, and in the Middle Ages to the duchy of Naxos. For centuries it was part of the Turkish dominions in Europe, but its Greek population secured its inclusion in the modern kingdom of Greece.

SIKSIKA, sik'si-ka (ˆBlackfeet,® by which name they are popularly and officially known), an important tribe and confederacy of the Al- gonquian stock of North American Indians, the confederacy comprising the Siksika proper, the Kino or Bloods, and the Piegan. They should not be confounded with the Blackfoot division of the Teton Sioux on Standing Rock Reserva¬ tion, N. D. The early Siksika home was the country north of Lesser Slave Lake, but in the middle of the 18th century they appear to have lived on the west side of Lake Winnipeg, whence they were forced westward by the Crees ; 40 years later the Siksika proper occu¬ pied southern Saskatchewan River, while the Piegan lived on its headwaters, after which time the latter, followed by the Siksika, moved down to the Missouri River. Early in the 19th cen¬ tury the home of the Siksika was northern Montana

and the adjacent part of British Amer¬ ica, extending from the Rockies to the junction of Milk River with the Missouri, and from Musselshell River in Montana to Saskatchewan River in Canada. The component tribes of the confederacy are now gathered on reservations within these limits, the Siksika and the Kino or Bloods being mainly under Canadian rule, while the Piegan, who constitute about half the con¬ federacy, are chiefly in Montana. Both the men and women are tall and well formed; they practised polygamy, and on the death of the husband his wives became the potential wives of his eldest brother, while his property de¬ scended toffiis sons or, if he had none, to his brothers. These Indians were always noted for their warlike character, their hostilities being conducted chiefly against the Cree, Crows, Shoshoni, Kutenai and Flatheads. They re¬ lied mainly on the buffalo for subsistence, their food, clothing, shelter and some of their imple¬ ments and utensils being derived from this use¬ ful animal. They lived in skin tepees and be¬ sides bags and cases of hide or parfleche, made implements and utensils of stone, bone, horn and wood, but no pottery or basketry. Marriage within the gens was prohibited, but this rule is not now strictly observed. Each gens had its chief, and the chiefs of the gentes chose the tribal chief, but the power of the latter was in the main only advisory. The Siksika are nature worshippers, their principal deity being the sun, whose wife is the moon, and whose surviving child is the morning star, while physical objects and forces are minor deities. In the latter part of the 18th century these tribes were estimated

at 12,000, but they lost about a third of their number by smallpox in 1836, and in 1858 aggre¬ gated only about 7,300. The number of Siksika, Bloods and Piegans on reservations in Alberta is now about 3,000, and the population of the Piegans on the Blackfoot Reservation in Mon¬ tana is less than 2,000. Consult Hodge, F. W., (The Indians of North America) (Washington,, D. G, 1906).

SILAGE, or ENSILAGE, green fodder preserved in a succulent state by exclusion of air; where it undergoes certain changes. In the United States Indian corn (Zea mays) is pre¬ eminently the crop for silage, so when other crops are utilized a designatory adjective is prefixed, as clover-silage, etc. Silage may be stored in silos, or air-tight structures, made of wood, brick, stone or concrete reinforced with iron. Square, octagonal and rectangular silos are in use but the round silo is the most common. Until recently lumber has been the cheapest material but concrete has been stead¬ ily gaining in popularity both because of its permanence and its being more air-tight. The cylindrical form is also preferred because it

requires the use of less material, contains less waste space and presents the greatest strength, pressure being distributed equally at all points from the centre. When placed in silos, the fodder is usually cut or shredded into short lengths so that it will occupy less space, incor¬ porate less air and undergo less fermentation than when packed uncut. In Europe grass is frequently stacked in the open or put into clamps or pits without cutting it into lengths. The use of the silo in one form or another dates back to antiquity, the clamp being prob¬ ably the oldest form. About a hundred years ago this method of preserving fodders at¬ tracted attention in Europe and in 1875 Dr. Manly Miles of Michigan, and in 1876 F. Mor¬ ris of Maryland, introduced the system into the United States. Many extravagant claims were advanced in its behalf by early enthusiasts, and lack of knowledge led to numerous failures, so that the progress made was small for some years. In 1882 but 92 farmers could be found who used the silo in the United States. The work of Professors McBryde and King, of the Wisconsin and other agricultural experiment stations, made the position of the silo and silage secure. To-day the livestock and dairy farm is considered incomplete without one.

The size of the silo is important, serious losses occurring from lack of proportion be¬ tween the size of the silo and the amount of silage fed daily. The exposed surface is usu¬ ally too great. The upper layer, if exposed, spoils ; hence about one and two-tenths inches should be fed each day from the whole surface and two inches would be better. A cow will consume 35 to 40 pounds a day, so if a cubic foot weighs 40 pounds, we may allow five to six square feet by two inches thick for each cow a day. Silos less than six feet in diameter are not considered to be practical on account of the friction of the walls preventing the contents from settling properly, because the greater sur¬ face in proportion to bulk means greater per¬ centage of loss. Deep silos are preferable to shallow ones, as a 36-foot silo will store nearly five times the amount that a 12-foot one will, the diameters being equal. King calculates

that the average weight of a cubic foot of silage from a silo 10 feet deep is 18.7 pounds, while the average from one 36 feet deep is 42.8 pounds. All silos should be at least 20 feet deep and 30 feet is better. The pressure of the silage when settling increases with the depth at the rate of 11 pounds a square foot for each foot of depth, hence, at 10 feet down the lat¬ eral pressure is about 110 pounds a square foot; at 20 feet, 220 pounds, and at 30 feet, 330 pounds; therefore, the hoops of a wooden silo and the iron bands in a concrete one should be larger, stronger and closer at the bottom of the silo than at the top, the first one starting six inches from the bottom, the second a foot above the first, increasing the space six inches with each hoop, until near the top they are finally four feet apart.

The crops used for silage include corn, mil¬ let, common red and alsike clover, rye, vetch, oats, pea-vine, sorghum, kaffir corn and alfalfa. The making of silage from several of these crops has scarcely passed the experimental stage. This is not so much because they can¬ not be preserved as because corn has proved so unsatisfactory. The low cost and ease with which heavy crops of corn can be produced ; the slight losses sustained in the silo (2 to 10 per cent), and the few objectionable features that corn silage has, render it the general pur¬ pose crop. The percentage of losses which occurs in drying corn fodder in the field under good conditions is about the same as that at¬ tending its loss when converted into silage. The cost of growing and placing a ton of silage in the silo generally varies between $1.75 and $2.50. The Southern dent varieties produce the heaviest crops, and, if they mature suffi¬ ciently in the district, are generally grown. The best time to cut corn for silage is when the kernels are (

The Average Percentage Composition of

*Corn Silage.**

Per cen

Moisture . 7.11

Ash . 4.76

Nitrogen…... . 1.204

Albumenoid nitrogen . 65

Albumenoids (alb. N. X 6.25) . 4.062

Non-Albuminoids (non-alb. N. X 6.25) . 3.463

Crude fibre . 24.36

Reducing sugars . 0132

Starch . . . 28.00

Other carbohydrates and acids (by difference) . 25.6718

Ether extract . ’ . 2.66

When corn is nearly mature before being siloed it will be more palatable and probably more digestible than if cut while younger or when fully ripe. The digestibility of corn silage and dry fodder corn are about the same,

*Larson and Putney.

both being somewhat less digestible than green fodder.

Silage is pre-eminently a food for the cow, so its use will largely remain with the dairy farmer. Feeding trials with dairy cows show that silage usually gives better results than a corresponding amount of dry fodder. It has been ascertained that the use of silage produces from 4 to 5 per cent more milk and fat per 100 pounds of dry matter feed, due to the silage being more acceptable, and the stalks of corn being cut up in the silage and eaten, instead of rejected as when fed in the form of corn fod¬ der. In feeding great care must be exercised not to leave unconsumed and putrifying silage about the stables as the odor may taint the milk. Several milk-condensing factories for¬ merly refused the milk from silage-fed cows, but proper rules for feeding and also inspec¬ tion have removed the objections of the con- densors. Experts may detect a silage odor or flavor in milk from silage-fed cows, but this is of little import, as such milk, and butter made from it, are now sold to critical customers in cities at high prices. When used for fatten¬ ing cattle, silage produces a more watery car¬ cass than dry fodder. It is a good feed for sheep, being especially useful for ewes with lambs at foot. It is not adapted to pig feeding nor to work horses, but small amounts may be fed to idle horses. Consult King, (Physics of Agriculture) (Madison, Wis., 1899) ; Larson and Putney, (Dairy Cattle Feeding and Man¬ agement (New York 1917).

SILAp, se-la'd, Mexico, a town in the state of Guanajuato, situated on the Mexican Cen¬ tral Railroad, 15 miles southwest of Guana¬ juato. It is the centre of a rich agricultural district, and manufactures cotton and woolen goods. Pop. 14,059.

SILAS MARNER, a brief novel written by George Eliot (Mary Ann Evans) in 1861, has always been one of the most popular as it is among the greatest of its author's works. The scene of the story is laid in the typical English village of Ravelow, at a time <(when the spin¬ ning wheels hummed busily in the farmhouses.® Against a picturesque and realistic background of rural life and custom George Eliot has set the strange and alien figure of the weaver, Silas Marner, who has come hither as an out¬ cast from a narrow religious community in the city, where he has been unjustly convicted of robbery. Utterly broken in spirit, bankrupt of his

simple faith, and cut off from all kindly human interests he becomes a miser, cherish¬ ing the ever-growing heap of his earnings at the loom as the sole object of his starved af¬ fections. When his gold is stolen by the vi¬ cious Dunstan Cass, younger son of the vil¬ lage squire, his life is left utterly barren and he becomes practically insane. At this crisis the abandoned wife of Godfrey Cass, Dunstan's elder brother, perishes in the snow before Mar- ner's hut, and his child, Eppie, is found by Marner and welcomed as a providential gift sent to replace his stolen gold. The theme of the novel is the transformation in Marner's life, the restoration to his simple and affec¬ tionate soul which comes with this substitu¬ tion of a human love, demanding care and sacrifice for the miser's perverted love of gold. Interwoven with the story of Silas is that of

Godfrey Cass, the good-hearted, but weak and badly brought up father of Eppie, who pays for his unwillingness to accept the consequences of his unworthy marriage, by seeing Eppie, now grown to womanhood, adhere to her foster- father even when Godfrey and his second wife, Nancy, at last tell her the truth about her parentage and would gladly welcome her to their childless home. The story is as beautiful as it is significant. The variety of the charac¬ terization, the consummate handling of the nar¬ rative, and the profound moral insight of the author make this novel an unquestioned mas¬ terpiece in English fiction.

James H. Hanford.

SILAY, se-li', Philippines, pueblo or town of Negros Occidental, on Guimaras Strait, 10 miles north of Bacolod. It is a large and prosperous town open to coasting trade, and is a telegraph and military station. Pop. 15,649.

SILCHESTER, sil'ches-ter, England, a vil¬ lage in Hampshire, seven miles north of Ba¬ singstoke, of special archaeological interest. Here are the ruins of Caer Segeint, or Calleva Atrebatum, a Roman town, the main features of which are an amphitheatre, and the city walls, 2,760 yards long. The foundations of a basilica, forum, baths and a temple have also been excavated, and rings, coins, seals, broken pottery in abundance have been found near the surface. Antiquarians have given the place much study. Excavations were begun by Joyce in 1864 but it was not until 1890, when the Society of Antiquaries took up the work, that the excavations were systematically carried out. By 1910 nearly all the ancient town had been uncovered, disclosing very many interest¬ ing remains. All portable objects now repose in the Reading Museum. Consult Haverfield, F., (The Romanization of Roman Britain5 (3d ed., Oxford 1915) and Archceologia (Vols XL, XLVI, LII et seq.), containing plans, illustra¬ tions, etc.

SILENACE.7E, a family of plants, of which the pink, named by botanists in early times Cary- ophyllus, and more recently Dianthus, may be considered as typical. The plants of this family are readily distinguished by their opposite un¬ divided leaves, without stipules, the tumid ar¬ ticulations of the stems and the disposal of the seeds upon a free central placenta, surrounded by several carpellary leaves. Several species are cultivated by florists; a few are used in medicine, and Saponaria officinalis and Lychnis dinrna yield a mucilage resembling soap. The Clove-pink (Dianthus caryophyllus) is the ori¬ gin of all the cultivated varieties of carnations, picotees, bizarres, flakes, etc.

SILENE, a large widely distributed genus of the pink family (Caryophyllacece) , having opposite leaves, and five-merous flowers, with a more or less inflated calyx. The silenes are either annual or perennial and of varying habit and inflorescence. Many species are viscid pubescent as Silene virginica, S. caroliniana, and S. viscosa, the last the catchfly, which is carnivorous to a slight degree and holds its victims by its stickiness. In general, however, the viscid stems prevent crawling insects, such as ants, from stealing honey and both common and generic names refer to this characteristic. Silene nutans and X. noctidora are now natural¬ ized in America and are faded and unattract-

ive in the daytime, blit are in full bloom, with starry white petals at night, attracting night- flying insects by their fragrance. Another naturalized silene, found at the borders of fields, is the .S', vulgaris, a glaucous tall plant, known as bladder campion, cowbells, behen, and spattling or frothy poppy. The first two names refer to the inflated calyx, which is much more conspicuous than the white notched petals protruding from the top, and in fruit is nearly globose, nodding in cymose panicles. It is of papery texture, tinted pale green flushed with rose and is reticulated with delicate veinings. It is said that English peasants have eaten its young shoots, tasting like green peas, instead of asparagus. The moss-campion (S. acaulis), a tufted perennial covered with reddish purple flowers, is common to Arctic regions and moun¬ tains ; the sweet-william catchfly (.S', armeria) , with rose-colored flowers; and the fire pink (S . virginica), whose crimson flowers blaze in southern dry woods, are all cultivated, to which the northern wild pink (5. caroliniana) might well be added, as it has many rose-colored or white flowers in very early spring.

SILENT CHAIN, an improved form of link-belting consisting of a broad band of metal links the ends of which project inward of the belt circuit

forming cog-shaped teeth which engage in a broad-faced toothed gear wheel. This chain belt has the advantage of working perfectly where the pulley shafts are necessarily close together, and are especially adaptable in the transmissions in automobile machinery. They have the additional advan¬ tage of being practically noisless. See Power Transmission.

SILENT PARTNER, called at various times and places a dormant, sleeping or special partner. In commercial phraseology a mem¬ ber of a firm or corporation whose name does not appear publicly in the concern, but who shares the responsibilities and liabilities of the organization. Generally a partner of this sort takes no active part in the management of the business, outside of giving monetary support or receiving his portion of the profits. See Partnership.

.SILENUS, si-len'nus, represented in an¬ cient mythology as the mentor and companion of Bacchus, the god of wine. Silenus, accord¬ ing to the legend, was generally drunk himself. He is sometimes represented as treading out grapes and other times as riding on an ass with the infant Bacchus in his arms. Various legends about him were current in antiquity especially in Asia Minor, where his worship first took concrete form. Consult dictionary of Greek and Roman Mythology) ; and (Gruppe, Otto, (Grieschische Mythologie und Religions- geschichte) (2 vols., Munich 1906).

SILESIA, si-le'shi-a (German Schlesien), a former Bohemian duchy, later divided be¬ tween Prussia and Austria, and under the Peace Treaty of 1919, with a section assigned to Czecho-Slovakia and another for plebiscite.

Prussian Silesia is a province in the south¬ east of the state, length 230 miles, breadth 80 miles; area 15,569 square miles. The region is traversed lengthwise by the great longitudinal valley of the Oder. That river flows from southeast to northwest, and with its numer¬ ous right and left branches drains practically

the whole of its area. To the west of this great valley the surface is taken up by the east¬ ern slope of the Sudetic Mountains with its numerous spurs and minor ranges. East of the Oder the land rises in several more or less isolated and hilly, but not high, plateaus. Nearly nine-tenths of the forests are conifer¬ ous. The region is rich in mineral resources. Its coal deposits are among the richest in Europe. Iron and zinc are mined in large quantities and lead and silver are also found. An average annual production of coal in normal years is 40,000,000 metric tons ; of zinc, 600,000 metric tons, while of iron and lead considerably less quantities are produced. The climate in the lowlands is favorable for agriculture and the

valley of the Oder is very fertile and one of the richest wheat and barley regions in the empire. Oats, rye, buckwheat, potatoes and fruit are also raised in large quantities and there is some viticulture. The textile industry is the most important, next to which follow the metal industries and others depending on mining and quarrying, such as the manufacture of cement, porcelain and glass. Lumbering and the manu¬ facture of paper, beet-sugar, starch and liquors are also important. About 1,600,000 people de¬ pend on agriculture for a livelihood, while 1,750,000 are engaged in industrial occupations. Besides the main Oder there are scarcely any navigable waterways. There are about 2,500 miles of railroad. Pop. about 5,225,962. The capital is Breslau (515,000) which is the prin¬ cipal industrial centre. Silesia sent 35 mem¬ bers to the Reichstag and 65 to the Landtag. Other populous centres are Gorlitz (85,000), Konigshiitte (72,000) and Beuthen and Lieg- nitz (each 67,000). Of thei population 2,960,- 800 are Roman Catholics, 2,199,000 Protestants and 45,000 Jews.

Former Austrian Silesia was a crownland and duchy situated between the southern part of Prussian Silesia and Moravia and bounded on the southeast by Galicia and Hungary. It meas¬ ures 115 miles from northwest to southeast, with a breadth of 20 miles and an area of 1,987 square miles. The northwestern part belongs to the Sudetic Mountains, the southeastern to the Car¬ pathians, and in the middle is the transverse valley of the Oder. The chief mineral products are coal and iron, the coal amounting to about 7,500,000 tons annually. Agriculture is confined to the central lowlands and yields grain, sugar- beets and fruit. The industries are more im¬ portant ; there are machine shops, steam textile mills, beet-sugar factories, distilleries, etc. There is a considerable transit trade in Aus¬ trian wines, salt and also in beef. Pop. 756,949. Of these 639,000 are Roman Catholics and 102,- 000 Protestants. German is spoken by 48 per cent of the people, Polish bv 33 per cent and Czech by 29 per cent. Troppau, the capital, has 31,000 inhabitants. Other cities are Ostrau (22.000), Teschen (22,000) and Bieletz (18,000).

In the 10th century Silesia was incorporated with Poland. In the latter part of the 12th century it was made a separate duchy. In the 13th century the duchy was divided into nu¬ merous principalities. By the middle of the 14th century these had become actual vassals of the Bohemian king, and in 1526 they passed to the house of Hapsburg. In 1675 Frederick Wil¬ liam, of Brandenburg, laid claim to Silesia. The emperor refused to recognize the claim and

the three Silesian wars followed, which ended in 1/63 with the supremacy of Prussia over what later became Prussian Silesia. During the European War, Austrian Silesia was in¬ vaded by the Russian armies. Under the Peace Treaty of 1919, the Czech section of Silesia (area, 1,988 square miles; pop. 756,949) was assigned to the Czecho-Slovak Republic while Upper Silesia was reserved for a plebiscite. In March 1921 a plebiscite was held in Upper Silesia which resulted in a majority for re¬ maining in Germany. The Poles within the area rebelled and civil strife ensued for several months, France conniving with the Polish in¬ surgents and Great Britain leaning to the Ger¬ man side. The warring factions were at last persuaded to suspend hostilities and the ques¬ tion was referred to the Allied Supreme Coun¬ cil. It met in Paris 8-12 Aug. 1921 and, fail¬ ing to agree, referred the question to the Execu¬ tive Council of the League of Nations. The decision of the latter, made public 20 Oct. 1921, divided the plebiscite area in almost equal parts between Poland and Germany and set up administrative machinery «for a new regime to cover a period of 15 years. The dividing line follow^ the Oder from Odenburg to Niebet- schau, thence northeasterly to Hohenlinde ; thence between Rossburg and Birkenheim, it turns northwestward to Lissau. Northwest of the latter place it follows the old German frontier to the latter's junction with the new German-Polish frontier. This line leaves 42 communes to Germany and cedes 40 to P'oland.

A mixed Upper Silesian Commission, com¬ posed equally of Poles, Germans and Upper Silesians, was set un to facilitate administration.

.SILHOUETTE, sil-oo-et', is the represent tation in solid black of the outlines of an ob¬ ject, occasionally with a few assisting lines drawn in white. The name comes from Etienne de Silhouette, French Minister of Finance in 1759. He strove by severe economy to remedy the evils of a war which had just terminated, leaving the country in great ex¬ haustion. At the end of nine months he was obliged to leave his place. During this period all the fashions in Paris took the character of parsimony. Coats without folds were worn ; snuff-boxes were made of plain wood ; and, instead of painted portraits, outlines only were drawn in profile. All these fashions were called d la Silhouette; but the name remained only in case of the profiles.

SILICATES, a great group of minerals, compounds of various elements with silica. The group includes a few important ores, but is chiefly significant as the great group of rock¬ forming minerals. .A discussion of the im¬ portant minerals of this group will be found in the introduction to the article on rocks. See also Feldspar; Amphibole, etc.

SILICIFIED WOOD, a variety of the minerals quartz or opal in which the

mineral has replaced the wood. Opalized wood is wood changed into opal ; petrified wood includes either of the above as well as wood changed into coal (see Paleobotany). According to J. D. Dana the trees now silicified in Arizona seem originally to have flourished on the shores of an inland lake, into which they fell and became water-logged; then they were buried

beneath volcanic material of a highly silicious character which underwent alteration through the action of water setting free more silica than the water could hold in solution. As the wood decayed this silica was deposited in its cells until finally the woody fibre completely disappeared and what was once wood became quartz. As this change took place only particle by particle, the minutest cells of the wood are preserved and may be seen under the micro¬ scope. In the great petrified forests of Arizona, now a government park, there are trunks of trees three or four feet in diameter and over 100 feet in length, completely changed to quartz. Over the whole section are scattered petrified trunks and fragments from the size of a hickory-nut to several feet in diameter. At one place in the park a petrified tree has fallen across a ravine about 50 feet wide, forming a natural bridge. This Arizona petri¬ fied wood has been extensively exhibited and sold under the trade names of ((jasperized wood,® ((agatized wood® and (

SILICIOUS SINTER. See Geyserite.

SILICON, in chemistry, one of the non- metallic elements, symbol Si, atomic weight 28.4. Next to oxygen it is the most abundant element found in the earth. It does not occur in nature in the free state but in combination with oxygen (silica) and with oxygen and various metallic elements as potassium, sodium, aluminium, calcium, etc., in the form of sili¬ cates. Silicon may be prepared by heating a mixture of metallic sodium and the double fluoride of sodium and silicon (Na2SiF6 + Na4“ 6NaF + Si) ; also by action of heat on a mix¬ ture of magnesium and silica (sand). It exists in three allotropic forms, an amorphous brown powder, a graphitoidal and a crystalline variety. The amorphous form is insoluble in all acids except hydrofluoric; it dissolves in potassium hydroxide to form a silicate, and burns in the air at high temperatures to Si02. The crystalline variety is very hard, is but little if at all at¬ tacked by hydrofluoric acid or potassium hy¬ droxide and cannot be burned. Silicon forms compounds with oxygen, sulphur, chlorine and some others but the most important are the oxide Si02 and the salts derived from the various silicic acids.

Silica, Si02, oxide of silicon, occurs very abundantly in nature both in crystalline and amorphous forms. Quartz, a very pure form of silica, crystallizes in six-sided prisms termi¬ nated by six-sided pyramids. The finer crystals of quartz are called rock crystal, while the im¬ perfectly

crystalline varieties occur in a number of forms. Of the cryptocrystalline and amor¬ phous forms we have opal, agate, amethyst, flint, sand, etc. Silica can be obtained in a fine

state by melting sand or a silicate with sodium carbonate whereby a silicate of sodium is formed. This is dissolved in water and hydro¬ chloric acid added. Silicic acid separates in a gelatinous condition. The whole is evaporated to dryness, heated for a time a little above the boiling point of water and then washed with dilute hydrochloric acid. The silica is left behind as a gritty white powder insoluble in water and in most acids. Hydrofluoric acid dissolves it, however, with the formation of silicon tetrafluoride (SiF4). It also dissolves in alkalies to form silicates. Silica is not acted on by heat except that of the oxyhydro- gen blowpipe which fuses it. Silica, generally in the form of sand, is used largely in the preparation of mortar, glass and pottery. In metallurgical operations it is used as a flux with ores containing limestone with which it forms a glassy slag which floats on the molten metal carrying with it many impurities from the ore. Silica forms a number of hydrates which have acid properties and from which a vast number of salts are derived. A great many very complex salts of these silicic acids are found in the earth's crust, the metallic elements being usually sodium, potassium, magnesium, aluminium, calcium and frequently small amounts of other elements. Some of the best known silicates are the minerals feldspar, mica, garnet, talc, meerschaum, etc. Clay is largely

a silicate. See Quartz; Electrochemical Industries.

SILICON CARBIDE. See Electrochem¬ ical Industries.

SILIUS, Titus Catius Italicus, Roman

poet : flourished about 25-101 a.d. At Rome he applied himself to the bar, and became a cele¬ brated orator and advocate. He was consul at the time of Nero's death and incurred some re¬ proach for assisting in that tyrant's prosecu¬ tions, but acquired honor from his conduct in the proconsulate of Asia, assigned to him by Vespasian, from which he retired into private life, and collected books, statues and busts of eminent men. He finally retired to his seat in Campania, where he died. The only work of Silius which has reached modern times is an epic (Punica) in 16 books, written with more diligence than genius. It takes as its theme the Second Punic War, according to Livy and Polybius, and contains occasional splendid pas¬

sages ; the description of the passage of Hanni¬ bal across the Alp§ is particularly admired. There are editions by Drakenborch (1717), Ruperti (Gottingen 1795-98, two vols.), and Bauer (Leipzig 1891-92). Consult 'Butler, H. E., (Post-Augustan Poetry (Oxford 1909) and Schanz, Martin, (Geschichte der romischen Litteratur) (Vol. II, pt. 2, 3d ed., Munich 1913).*

.

*ftc**

■

'

• .

\

\

•

\

)

■4

:>

' »

\

I

Si

Vol. 25, SILK TO SULPH ACID

Americana

y ' '

-

■ ■ .

'

'

- f‘

»

I

I

I

1

rz

THE

ENCYCLOPEDIA

AMERICANA

WAMVjfy

f

I

(1

jr

imˆr

Universal

MgOWLEDGEj

In Thirty Volumes

1922

•k

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YO RK. CH I C AG 0

1

1

\ X

s

I

Copyright, 1920

EY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY ALBANY NEW YORK

JAN I 0 132?

©C1.A654317

ˆ |

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXV

ALEXIS, JOSEPH, A.B., A.M.

Assistant Professor of Germanic Languages and Literatures, University of Nebraska

STORY OF GOSTA BERLING, THE

ARMOUR, J. OGDEN

President of Armour and Company

SLAUGHTER-HOUSE BY-PRODUCTS

BABASINIAN, V. S., Ph.D.

Professor of Chemistry, Lehigh University

STEARIC ACID SULPHANILIC ACID SULPHONAL

BAILEY, WILLIAM L., M.A.

Associate Professor of Political Science, Grinnell College

SOCIAL CENTRES

BARNES, HARRY ELMER, Ph.D.

Professor of History, Clark University, Worcester, Mass.

SOCIAL REFORM PROGRAMS AND MOVEMENTS SPIRIT OF' LAWS, THE

BEAL, W. H., M.E.

United States Department of Agriculture

SOIL

BENTLEY, W. A.

Author of “ Snow and Snow Crystals ”

SNOW

BJERREGAARD, C. H. A.

Librarian, Astor Branch New York Public Library

SUFISM

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

SIMPLE STORY, A

BUCHANAN, MILTON A., B.A., Ph.D.

Professor of Italian and Spanish, University of Toronto

STAR OF SEVILLE, THE

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Uni¬ versity of Wisconsin

STORY OF A BAD BOY, THE

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

SOUTH AMERICA, AMERICAN DIPLO¬ MATIC RELATIONS WITH SPAIN, AMERICAN DIPLOMATIC RE¬ LATIONS WITH

CARMAN, E. A.*

General, United States Army

SNICKER'S FERRY AND BERRY'S FERRY, ENGAGEMENTS AT SOUTH MOUNTAINS, BATTLES OF SPRING HILL, ENGAGEMENT AT SPRINGFIELD (MO.), MILITARY OPERATIONS AT

STONE RIVER OR MURFREESBORO, BATTLE OF

STONEMAN'S MACON RAID STONEMAN'S RAID FROM EAST TENNESSEE INTO SOUTHWESTERN VIRGINIA

STONEMAN'S RAID TN EAST TEN¬ NESSEE, SOUTHWEST VIRGINIA AND WESTERN NORTH CAROLINA STONEMAN'S VIRGINIA RAID STREIGHT'S RAID FROM TUSCUMBIA, ALA

STUART'S RAID TO CHAMBERS- BURG, PA.

STUART'S RIDE AROUND THE ARMY OF THE POTOMAC ON THE CHICKAHOMINY

SUFFOLK (VA.), OPERATIONS AROUND AND SIEGE OF

CARR, W. M.

Member British Iron and Steel Institute, American Foundrymen's

Association, American Society of Testing Materials

STEEL, OPEN HEARTH MANUFAC¬ TURE

CASTLE, WILLLAM E., Ph.D.

Professor of Zoology, Harvard University

STOCK BREEDING

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

SPOROPHYTE, EVOLUTION OF

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

SON OF GIBOYER, THE

CONKLING, WILLIAM H.

Secretary of The Springfield Commercial Association

SPRINGFIELD, ILLINOIS

COUMBE, CLEMENT W.

Editorial Staff of The Americana

SILVERWARE

STERLING

SUBMARINE SIGNALING

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell University

SPINOZA

STOICISM

- Deceased.

CREW, HENRY, Ph.D.

Professor of Physics, Northwestern University

SPECTROSCOPY

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

SMOLLETT, TOBIAS GEORGE STERNE, LAURENCE

DARTON, NELSON H.

United States Geological Survey

SODA, COMMERCIAL PRODUCTION

DEIMEL, RICHARD F., B.S., M.A.

Assistant Professor of Mechanics, Stevens Institute of Technology

STRENGTH OF MATERIALS

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

SMOKE (NOVEL)

DONOVAN, EDWARD F.

New York City

SPANISH LAW

DUNN, WALDO H., M.A., Litt.D.

Professor of English, College of Wooster, Wooster, Ohio

SONG OF MYSELF

EGGERT, CARL E., B.Ph., Ph.D.

When Assistant Professor of German, University of Michigan

SONNETS FROM VENICE

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

SORROWS OF YOUNG WERTHER, THE

ELSBERG, CHARLES A., M.D.

New York City

SPINAL CORD SURGERY

ENGBERG, CARL C.

Executive Dean, the University of Nebraska

STATISTICAL METHOD, THE

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

STRATEGY SUBMARINE MINES

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

STEAM

FINEGAN, THOMAS E., M.A., LL.D.

Superintendent of Public Instruction, State of Pennsylvania; formerly Deputy Commissioner of Education, State of New York •

STATE SYSTEMS OF EDUCATION

FLEMING, WALTER L., B.S., M.S., A.M., Ph.D.

: Professor of History, Vanderbilt University

STEPHENS, ALEXANDER HAMILTON

FLETCHER, J. B., A.B., A.M.

Professor of Comparative Literature, Columbia University

SPENSER, EDMUND

FORD, JEREMIAH D. M., Ph.D.

Smith Professor of French and Spanish Languages, Harvard University

SPANISH LANGUAGE SPANISH LITERATURE

GARNER, JAMES W., Ph.D.

Professor of Political Science, the University of Illinois

SUBMARINE WARFARE

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

SOCIAL CONTRACT, THE

GEDDES, JAMES, Jr., Ph.D.

Professor of Romance Languages, Boston University

STUDENT OF SALAMANCA, THE

GEHRING, ALBERT, A.M.

Author of “ The Appreciation of Music,” etc.

SPANISH MUSIC

GUITERMAN, ARTHUR, B.A.

Author and Critic

SOLDIERS THREE

SONNETS FROM THE PORTUGUESE

HAMILTON, CLAYTON, M.A.

Sometime Tutor in English, Columbia University

STEVENSON, ROBERT LOUIS

HANFORD, JAMES H., A.M., Ph.D.

Associate Professor of English, University of North Carolina

SONGS OF INNOCENCE AND OF EX¬ PERIENCE

HANSEN, J. M.

President, Standard Steel Car Company

STEEL CAR INDUSTRY, THE

HARRY, JOSEPH E., Ph.D.

Author of ” The Greek Tragic Poets,” etc.

SOPHOCLES

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Literature, College of the City of New York

STINDE, JULIUS STIRNER, MAX STRINDBERG, AUGUST SUDERMANN, HERMANN

HAUHART, WILLIAM F., Ph.D.

Assistant Professor of German, University of Michigan

SPITTELER, CARL

HEMMETER, JOHN C., M.D., Ph.D., LL.D.

Professor in Medical Department, University of Maryland, Baltimore

STOMACH

Contributors to Volume XXV — Continued

HESTON, J. W.

President of the State Normal School, Madison, S. D.

SOUTH DAKOTA

HEWITT, J. N. B.

Ethnologist, Smithsonian Institution

SIX NATIONS OF THE IROQUOIS

HOLCOMBE, A. N ., Ph.D.

Department of Government, Harvard University

STATE GOVERNMENT

HORNER, HARLAN H., Ped.D.

Dean of the State College for Teachers, Albany, N. Y.

STATE UNIVERSITIES, THE

HULBURT, RAY G.

Associate Editor of “ Journal of Osteopathy ”

STILL, ANDREW TAYLOR

INGERSOLL, ERNEST

Zoologist and Author

STONE AGE

JACKSON, CLIFTON D.

General Secretary of Springfield Chamber of Commerce

SPRINGFIELD, MASSACHUSETTS

JELLIFFE, SMITH ELY, M.D., Ph.D.

Editor of “ Journal of Nervous and Mental Diseases ”

SPEECH, DEFECTS OF SPINAL CORD STERILITY

KAINS, M. G., B.S., B.S.A., M.S.A.

Horticultural Consultant

SOILING

KLEIN, HENRI F.

Editorial Staff of The Americana

SOVIET

LAIRD, R. A.

Publicity Secretary of Spokane Chamber of Commerce

SPOKANE, WASH.

LANGLEY, S. P.*

Late Secretary of Smithsonian Institution

SMITHSON, JAMES

LAWRENCE, WILLIAM WITHERLE, Ph.D.

Professor of English, Columbia University

SIR GAWAIN AND THE GREEN KNIGHT

McCOOK, HENRY C., D.D.*

Author of “ American Spiders and Their Spinning Work ”

SPIDERS

McEWEN, ERNEST L., M.S., M.D.

Assistant Professor in Dermatology, Rush Medical College, Chicago

SKIN AND SKIN DISEASES

MATHEWS, JOHN ALEXANDER, Sc.D., Ph.D.

President of Halcomb Steel Company, Syracuse, N. Y.

STEEL, ELECTRICAL PROCESSES OF MANUFACTURE

STEEL, EVOLUTION OF STEELMAK¬ ING PROCESSES

STEEL, MANUFACTURE OF CRUCIBLE STEEL, SPECIAL OR ALLOY

MATHEWSON, E. P., B.S.

General Manager, British America Nickel Cor¬ poration, Ltd., Toronto

SULPHIDE COPPER ORES

MEADER, CLARENCE L., A.B.

Professor of Philology, University of Michigan

SPEECH, GENESIS OF, OR THE ORI¬ GIN OF LANGUAGE

MOORE, J. PERCY

University of Pennsylvania

SPONGE

SQUIRREL

STARFISH

MORRISON, J. H.

Author of “ History of American Steam Naviga¬ tion ”

STEAM VESSELS

MUNROE, CHARLES E., S.B., Ph.D.

School of Graduate Studies, George Washington University

SMOKELESS POWDER

NASON, ARTHUR H., Ph.D.

Professor of English, New York University

SOUTHEY, ROBERT

NEWCOMB, SIMON, Ph.D., LL.D., D.Sc.* DOOLITTLE, ERIC, C.E.

Professor of Astronomy and Director Plower Astronomical Observatory, University of Penn¬ sylvania

STARS

PEUGNET, RAMSAY

Secretary of the Silk Association of America

SILK AND THE SILK INDUSTRY

POLLOCK, HORATIO M., M.A., Ph.D.

.Statistician and Editor New York State Hospital Commission

STATISTICS

POST, LOUIS F.

Assistant Secretary of Labor, United States

SINGLETAX

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

SODIUM SOLUTIONS SPECIFIC GRAVITY SPECIFIC HEAT STEREO-CHEMISTRY

- Deceased.

Contributors to Volume XXV — Concluded

ROBINSON, MAURICE H., Ph.D., B.L.

Professor of Economics, University of Illinois

STATE CONTROL

ROWELL, GEORGE W., Jr.

Menominee, Mich.

STEEL TUBING

ROYCE, JO SI AH, Ph.D., LL.D.*

Late Professor of Philosophy, Harvard University

SPENCER, HERBERT

RUBINOW, ISAAC M., Ph.D.

Author of “ Social Insurance,” “ Standards of Health Insurance,” etc.

SOCIAL INSURANCE

SAUVEUR, ALBERT, S.B.

Professor of Metallurgy, Harvard University

STEEL

SCHAMBERG, JAY FRANK. M.D.

Philadelphia, R

SMALLPOX

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Formerly Secretary to American Minister at Teheran, Persia

SLAVIC MYTHOLOGY SPARTACANS

SIMONSON, ARTHUR

Metallurgical Engineer, Philadelphia, Pa.

STEEL, THE BESSEMER PROCESS

SMALL, ALBION W., Ph.D., LL.D.

Head of the Department of Sociology, University of Chicago

SOCIOLOGY

STAGG, HOWARD J.

Metallurgist, Halcomb Steel Company, Syracuse, N. Y.

STEEL, THEORIES OF HARDENING

STOREY, MOORFIELD, A.M.

Author of “ Life of Charles Sumner ”

STANTON, EDWIN McMASTERS

STURGIS, RUSSELL *

Author of ” How to Judge Architecture ”

SPIRE

STAIR

STALL

SULLIVAN, JAMES, Ph.D.

Director of the Division of Archives and History of the University of the State of New York

STUDENT LIFE AND CUSTOMS STUDENT SELF-GOVERNMENT

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni¬ versity

SONG TO DAVID

VAN DOREN, CARL, Ph.D.

Associate in English, Columbia University

SKETCH BOOK, THE

SNOW-BOUND

SONG OF HIAWATHA, THE

SPY, THE

WALSH, JAMES J., M.D., Ph.D., LL.D., Litt.D., Sc.D.

Author of “ The Thirteenth Greatest of Centuries,” etc.

SIXTEENTH CENTURY SIXTH CENTURY SPIRITUAL EXERCISES

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

SPOROZOA

WAXMAN, SAMUEL M.

College of Liberal Arts, Boston University

SILVAS AMERICANAS

WIENER, LEO

Professor of Slavic Languages and Literatures, Harvard University

SLAVIC LANGUAGES STORM, THE

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

SOUL

SUBSTANCE

WILCOX, MARRION, A.B., LL.B.

Co-editor of Encyclopedia of Latin-America

SOUTH AMERICA SPAIN

SPANISH ART

WILLOUGHBY, W. W., Ph.D.

Professor of Political Science, Johns Hopkins University, Baltimore, Md.

STATE

WINCHESTER, CALEB T., L.H.D.

Professor of English Literature, Wesleyan Uni¬ versity

SPECTATOR, THE

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Columbia University

SOHRAB AND RUSTUM

- Deceased.

KEY TO PRONUNCIATION.

a

far, father

n

Span, n, as in canon (can'yon), pihon (pen'yon)

•

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or 6

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

0

book, look

e

her, over: also Fr. e, as in de; eu, as in neuf ; and oeu, as in

oi

oil, soil ; also Ger. eu, as in beutel

boeuf, coeur ; Ger. d (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. sur ,

Ger. Muller

• w

i or 1

him, it

V

of, very

i

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

y

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

'(prime),

"(secondary) accents, to indicate

point, Jean, temps

syllabic stress

'

./ oi r/ r 3KUHoirq • >t

■

r- i,' ti it it ,'o/t <

t

x\o> ,obn

V -1|Vv5 :• n ,}' • C lu ; I:',.-.. ,1: .

. •»! M i: i • > , r

' < • • : i.

ttMV, ii " /S' I' f ilOj'yto

• V, ' '

,

It

ilK'jii >J»i i ircotth iYWb:iˆry>) % , (oOThq)'

sf » i v£ ,ti to j *;.••• j ,vj.

SILK, Artificial. For many years manu¬ facturers sought to produce a material which could be used as a substitute for silk. At the Paris Exposition in 1889 the Comte de Chardonnet exhibited a fibre hav¬ ing characteristics of true silk. This' fibre was produced from cellulose of either cotton or pulp of soft woods, and after going through several processes could be spun and dyed like natural silk thread. Many other experimenters and inventors followed improving and modifying the Chardonnet method. Artificial silk is not so soft to the touch as true silk, nor has it the strength or elasticity. It is used largely for dress

trimmings, hosiery, cheap ribbons and upholsteries; also for insulating electric wires and in the manufacture of incandescent mantles. It is claimed that Joseph Wilson Swann (q.v.) was the first one to attempt the production of artificial silk on a commercial scale. The con¬ sumption of this material in the United States in 1918 amounted to 5,801,221 pounds as com¬ pared to 4,683,543 pounds in 1915.

SILK AND THE SILK INDUSTRY. In

this article it is proposed to trace briefly the his¬ tory of the manufacture of silk, which has been throughout all the past an article of luxury, and which as late as the 3d century of our era commanded a price so great as to be beyond an emperor's wealth to purchase for his empress; but in our day has come to be within the means and ability of the great mas'ses of our people, and a necessity instead of a luxury.

1. History. — Chinese appear to be the first people who applied themselves to sericulture, although some claim for the Tussur silk of India the earliest silk fibre used. The words Seres U9ed by Theophanes and Serinda by Pro¬ copius were in all probability so used to indi¬ cate that part of the East, which was no doubt China, where the silk industry existed at a very remote period. Ptolemy was the first to use the word Seres for China, or rather the north¬ ern part of it, known later as Cathay; and the name is derived from the Chinese name of the silkworm, sze, see or si, in Korean sir, whence the Greek cvp, the silkworm ; orjpeg the people who furnished silk; and orjpiKdv silk. The Latin sericum has been traced direct to the Mongol Sirkeh; and the Serikoth of Isaiah, xix, 9, has been supposed to be silk. From sericum is derived the French soie, and etymo¬ logically connected with it are the German seide, Anglo-Saxon seolc and English silk. Hawae-nan-tze informs us, in a Chinese work

called the (Silkworm Classic,* that Se-ling-shi, the principal queen of Hwang-te (2640 b.c.), was the first to rear silkworms, and the Em¬ peror Hwang-te was induced to make robes and garments from this circumstance. The Chinese historians carry back the cultivation of the mulberry and the breeding of silkworms to the mythic period. If they are to be be¬ lieved, the art of silk-reeling was known in China in the time of Fouh-hi, a century before the date traditionally assigned to the biblical deluge, and Hwang-te's queen did not disdain to share in the labors attending the care of the insect, as well as in those of the loom, the in¬ vention of which seems to be attributed to her and to have

raised her to the position of a tute¬ lary genius with special altars of her own. But whatever the precise date of the discovery, there can be no question of the very high an¬ tiquity of the knowledge of the worm and its product in China. A series of imperial edicts and voluminous literature of practical treatises testify to the importance of the industry and the care that was taken to foster an art which was considered, according to M. de Rosny, <(best fitted to promote the morality of the peo¬ ple and extinguish pauperism in the empire.® The wives of the nobles through successive generations personally attended to the rearing of the silkworms. That this silk was of the mulberry-fed kind is evident from a further extract from the (Silkworm Classic which says that afterward <(When Yu regulated the waters (2200 b.c.) mention is made, in his work on the tribute, of the land adapted for the mul¬ berry tree having been supplied with silkworms, from which time the advantage thereof gradu¬ ally increased.® It is not known whether silk was utilized in India at so early a period as this; but that India learned the art from China is generally believed, although at what period is not known. Aristotle is the first Occidental to give a description of the silkworm, speaking of it as a horned insect, which passed through successive transformations and produced bom- bykia. Four hundred years later Pliny described the silkworm, but he knew nothing of its con¬ nection with the production of silk, which, he affirmed, was a woolly substance, combed from the leaves of trees and spun by the Seres. For 1,200 or 1,500 years after silk fabrics had become known in western Asia and eastern Europe, the prevalent opinion was, that it was either a fleece which grew upon a tree (thus confounding it with cotton), or the fibre from

the inner bark of some tree or shrub; while some, deceived by the glossy and silky fibres of the seed vessels of the Asclepias Syriaca (milk-week), and of the silk-cotton tree (Bom - bax) believed it was the product of one or the other of these. A few had come so near the truth as to conjecture that it was spun by a spider or beetle. So carefully did the Orientals keep their secret that it was not exposed until the 6th century after Christ, when two Nesto- rian monks, who had been engaged in missionary labors in China, solved the mystery, by bring¬ ing to Constantinople a small quantity of silk¬ worm eggs, concealed in the hollow of their palmer staves. The missionaries had observed in China the various processes connected with the rearing of silkworms, the nature of the trees on which they fed, and the preparation of the silk. This occurred in 552 in the reign of Justinian,

who gave every encouragement to the introduction of the valuable insect. At the proper season the eggs were hatched and the caterpillars were fed on the leaves of the wild mulberry tree. The monks continued to super¬ intend at Constantinople the rearing of the insects and the whole process of manufacturing the silk. This knowledge, thus made public, soon spread over the world and though the vast production of silk by the Chinese was not diminished, that of Europe and western Asia was greatly developed in the centuries that followed. Before the introduction of the silk¬ worm in the West and while its culture still remained a Chinese secret the cities of Greece and Syria were compelled to pay so high a price for silk that their fabrics were sold ounce for ounce for their weight in gold.

From Constantinople sericulture spread over the Balkans and the looms of Constantinople, Athens, Thebes, Corinth, etc., were kept busy with the product. The Byzantine silk fabrics became famous and was much used for ec¬ clesiastical purposes, vestments, etc. The By¬ zantine looms declined in the 8th and 9th cen¬ turies, but those of Thebes and other Grecian cities, as also of Syria increased their produc¬ tion and improved their methods of manufac¬ ture. The Greeks maintained their supremacy until the fall of the Eastern Empire in the 12th century; but the Arabs and Saracen princes carried their knowledge of the manufacture into northern Africa, Spain and Portugal and to Sicily. The production of Spain and Sicily was very considerable as early as the 11th century, and when the Normans conquered Sicily a century later they encouraged the silk industry. King Roger, first Norman king of Sicily, in 1146 invaded Greece and took captive a large number of silk-weavers whom he con¬ strained to settle in Palermo and Calabria and to teach his people the Greek methods of silk culture. Venice and Genoa followed Roger's example in the 13th century. Other cities took up the new manufacture and Italy acquired a prominence in the industry which she has never wholly relinquished. About the 13th century silk began to be manufactured in France at Tours and later at Lyons. Not until 1494, how¬ ever, did France engage successfully as a pro¬ ducer of cocoons. Successive rulers of France encouraged the industry but the revocation of the Edict of Nantes was a severe blow as it exiled about 400,000 Huguenots, most of whom were silk-workers. It was long before France

recovered her lost prestige and then it was again wrecked at the Revolution. Under Na¬ poleon I and the Bourbons a stringent tariff did much for the industry in France. The exiled Huguenots tried sericulture in England but without success until 1718 when a new method of throwing was introduced. The manu¬ facture then received

a new impulse and Eng¬ lish silks replaced the French in the European markets. The English industry was ruined by the commercial treaty of 1860 which admitted French silks duty free. Switzerland and Ger¬ many also became competitors of France and are largely engaged in the manufacture of silk. Belgium and Holland have for several centuries engaged in silk production and the velvets and satins of Flanders are quite as old and of as good quality as those of the Italian cities. The manufactured silks of China, Japan and India have a character of their own and for some purposes are in demand. For raw silk production 1913-19 see table on page 6.

1. History of the Industry in the United States. — According to Chinese records the fila¬ ment produced by the silkworm was first suc¬ cessfully woven by Si-ling-Chi, empress of China, in 2700 b.c., but it was not until the 6th century that the art of making silk was intro¬ duced in Europe. In 1609 James I brought the silkworm and the mulberry tree into England and shortly after this the company of Virginia was formed by a group of Englishmen to pro¬ mote the silk industry in the colonies of America.

The first expedition sent to America met with disaster. Four years later a more success¬ ful beginning was made. Influenced by the Crown the Colonial legislatures passed an act requiring 10 mulberry trees to be planted on every hundred acres. There was a fine for neglect of this duty and a premium for every pound of silk produced. But the most strenuous effort amounted to little. With the ascension of a new king to the British throne in 1666 all acts giving bounties for silk or requiring mul¬ berry trees to be planted in Virginia were re¬ pealed, and an interlude occurred in sericulture until the last years of the century when several French Huguenots settled in South Carolina. These were skilled silk workmen and they were in earnest in their endeavor to cultivate it in profitable quantities. At about the same time another colony was formed in the same province which was known for more than a century by the name of Silk Hope.

During the first 35 3ˆears of the 18th cen¬ tury the silk industry was also introduced into Louisiana and Georgia. Silk culture by the colonists, however, had a fitful and uncertain existence. From 1750 to 1772 the period of its greatest activity before the Revolution, the Export of raw silk averaged only 500 pounds per annum, and rarely exceeded 1,000 pounds in a single year.

For many years after the Revolutionary War premiums and bounties for planting mul¬ berry trees and for producing raw silk were

authorized by a number of the States. In December 1825 the subject of silk culture re¬ ceived national attention, a resolution being introduced and referred to the committee on agriculture. This committee reported favorably and directed the Secretary of the Treasury to prepare a manual on the growth and manufac-

ttire of silk. Inquiries for information on the subject were sent out by the Secretary, Mr. Richard Rush, in 1826, and from the replies and other material received a manual was com¬ piled, entitled <(Letter from the Secretary of the Treasury.® Six thousand copies were printed by order of Congress. This document contained 220 pages besides illustrations of machinery.

Such favorable action and the publication by Congress at many subsequent sessions of other documents relating to silk culture, together with the serious consideration of the subject by the congressional committee on manufac¬ ture and the committee on agriculture, en¬ listed general attention. Sericulture gained the public ear. Legislatures of several States passed bills for its encouragement and a most deter¬ mined effort was made to place silk-growing on a paying basis. Silk conventions were held in Maryland, New Jersey, New York and Con¬ necticut. All efforts failed, however, to make sericulture popular in this country. The Amer-

manufacture was conducted in the vicinity of Paterson, N. J., a mill town within easy access of the New York markets, which has grown to be the leading silk-producing city of the United States. Other advantageous centres were found in the coal fields of Pennsylvania where fuel was cheap, and this State now pro¬ duces more manufactured silk than any other State in the Union. The sewing-silk and floss industry has always been confined chiefly to the New England States. In 1860 without the protection of a high tariff the total production of the industry amounted to $6,600,000. At that time importations of manufactured silk were valued at $3,300,000. These have remained nearly constant. The production figures have, however, grown in tremendous proportions and in 1914 reached a total of $254,000,000, while the number of employees rose from 5,000 to 108,000. The following tables of the imports of raw silk, waste silk and cocoons for the years 1914-18 will serve to show the amount of raw material now being consumed by the industry:

United States of America.

Silk Imports Into the

(Reported by the Department of Commerce, Washington, D. C. Foreign Invoice Values Only).

1917-1918

1916-1917

1915-1916

1914-1915

Weight

Value

Weight

Value

Weight

Value

Weight

Value

Raw silk .

Waste silk .

Cocoons .

Pounds

34,846,197

8,583,344

251,447

Dollars

$183,076,241

7,229,176

319,349

Pounds

33,868,885

6,420,482

62,056

Dollars

$156,085,649 4,431 , 164 54,995

Pounds

33,070,902

8,657,322

197,073

Dollars

$119,484,223

4,706,689

142,743

Pounds

26,030,925

4,970,254

51,495

Dollars

$80,531,785 2,563,658 35 , 1 14

ican producer could not compete with the cheap labor of the Orient and Europe, and other lines of industry afforded greater remuneration. The manufacture of silk fabrics, however, has gained great success. In 1810 Rodney and Horatio Hanks erected the first mill on this

continent. The manufacture of silk trimmings of various kinds was begun in 1815 at Philadelphia and ribbons in 1829 at Baltimore. Here, too, the American manufacturer was handicapped by foreign competition and it was not until a protective tariff was enforced that the industry prospered.

In order to provide money to meet the heavy expenses of the government caused by the Civil War, a high import duty was placed on all luxuries, including silk. The duty was made 30 per cent on manufactured silk on 2 March 1861 and in August of the same year was raised to 40 per cent. The tariff was again advanced on 30 June 1864 to 60 per cent, this time not only for revenue but for protection. Following this advance there was an immediate show of activity among those engaged in silk importing to consider the possibilities of manu¬ facturing at home. Those already engaged in the manufacture of silk received a fresh stimulus. In 1872 The Silk Association of America was organized, in New York, to pro¬ mote in all measures the common interest of silk-making in the United States. At the Cen¬ tennial Exposition held in Philadelphia in 1876 American-made silk favorably compared with that of foreign manufacture. Much of the

The Manufacture of Silk. — The filament

spun by the silkworm into a cocoon is so fine that several must be reeled together to produce a thread of sufficient size to handle. This is done in large factories, called filatures. Here the cocoons are placed in basins of hot water near the boiling temperature. Several filaments from as many cocoons as are required for the size of the raw-silk thread desired, are com¬ bined, twisted and reeled into skeins. When the filament from one cocoon has become ex¬ hausted it is replaced by another cocoon and the reeler adjusts the size of the thread by controlling the number of fresh and partially exhausted cocoons which are forming the thread. A single cocoon of good quality may furnish from 400 to 800 yards of reelable fila¬ ment. Asiatic silks reeled by different filatures and different qualities from the same filature are designated by colorful labels called <(chops.® Silk that has been reeled is known as raw silk. The damaged cocoons and the parts of each cocoon which cannot be reeled are known as waste silk. Waste silks are combed and spun into spun silk or silk-schappe yarns.

Silk is imported from Europe and Asia, Japan supplying by far the greater portion. Japanese raw silk is prepared for shipment in books containing from 25 to 30 tightly- rolled skeins. These are packed in bales weighing from 125 to 140 pounds. Chinese silks are packed and shipped in a manner quite similar to Japanese silks. Italian silks are

packed in large bales weighing from 200 pounds upward.

The silk used in the manufacture of silk fabrics may be divided into three general classi¬ fications, as follows: (1) Silk threads as they come from the reeler where several of the cocoon threads have been united into one. (2) Silk known as organzine in which the original threads have been twisted and several of these twisted threads have been united together. (3) Silk known as tram in which threads coming from the reeling machine have been very lightly twisted together.

When silk threads are woven as they come from the reeler, without having been dyed, the natural gum which they contain gives them enough body to make them suitable for weaving. If the threads are dyed before weaving this gum is removed in the dyeing process, and to give the threads strength and cohesion, they are twisted before dyeing. This is the work of the throwster.

Throwing. — The throwing process divides silk into two broad classifications, organzine and tram. Organzine is generally used for the warp or length of the fabric and tram for the filling or width. Silk used for organzine is usually of better quality than silk used for tram as the organzine warp is subjected to more strain in the process of manufacturing.

In throwing organzine, the silk, after soaking, is first wound upon bobbins. It is then a single thread. Each single thread is twisted, usually 16 turns per inch. Two of these twisted threads are doubled together and the resulting thread is twisted in the opposite direction, usually 14 turns per inch. The twisting operations are known as spinning, and unite the filaments into one strong even thread which is suitable for warping. In some cases more than two threads are com¬ bined. In throwing tram, or the material with which the warp is filled, the silk goes through various operations similar to organzine, but because it is to be used as a filling and not subjected to the same continued strain as the warp, it is not as tightly twisted. The twist in tram is from two and one-half to five turns per inch. If the silk is to be dyed before weav¬ ing it must be taken from the bobbins and re¬ turned to skein form. Organzine is reeled into skeins of about 20,000 yards length and tram into skeins of shorter lengths according to the number of threads into which the silk has been doubled. After reeling, short ties or laces are inserted through the skeins at several places to

keep them from tangling and knotting while passing through the dyeing and subsequent op¬ erations prior to weaving. The skeins are finally inspected and put up in large bundles ready for the dyer. There are many variations to the throwing process the most important of which is the making of crepe fabrics. To pre¬ pare silk threads for crepes the twist is greatly increased and runs from 60 to 75 turns per inch. This fabric is woven before being dyed.

Dyeing. — The dyer boils the skeins in soap and water which removes the natural gum from them and leaves them soft and lustrous. They are then rinsed and passed on to the dye vat. After dyeing the skeins are dried and packed for shipment to the weaver.

Weaving. — The silk entering into a woven fabric is known in the manufacturing trade by several names. The silk threads running lengthwise are called the warp and those run¬

ning crosswise which bind the warp to make the fabric are known as the filling or the shot. They are also spoken of as picks.

An ordinary warp may have from 1,000 to 20,000 ends of thread in a yard of width. The process of putting the above number of threads on a beam to be placed into the loom is com¬ monly known as the warping process. The threads are warped in bands of from 300 to 600 at a time, each band running the entire length of the warp, which may vary from 300 to 1,200 yards. When the necessary number of bands have been placed side by side on the roller the warp is then transferred in its entirety of from 1,000 to 15,000 ends to another beam and is placed in the back of the loom. Each indi¬ vidual thread of this warp is passed through the harness in the loom preliminary to being manipulated into the fabric. This process is known as entering the thread. If the loom con¬ tains an old warp which has already been entered in the harness the new warp is simply twisted on thread for thread to the old warp. In preparing filling for use in the loom the filling thread, generally tram, is wound on spools. These spools are placed in what is known as a quilling machine which transfers the silk from the spools to a long, thin cylinder called a quill. A quill when covered with silk is placed into the shuttle. Formerlv the quill of a feather was used for this purpose and hence the name.

The modern power-loom is a strong iron frame, at the back of which is the horizontal beam or roller from which the warp unwinds, and at the front the roller on which the web is wound as it is made. Between the two is the harness which is a series of frames with eyelets, one for every thread, or set of threads, of the warp. In plain or taffeta weaving

the harness frames are in two sets of three frames each, one set of which is up while the other is down. The number can be increased to sev¬ eral frames, all acting independent of each other, for complicated patterns. Between the beam and the harness is the reed, through which the warp threads pass to the take-up roller in front of the loom and between the harness and the web roller, the shuttle and the batten. As the machine revolves the warp threads passing from the beam through the reed, are lifted or depressed by the harness; in the opening made by such lifting or depressing, the shuttle flies across the warp and the batten beats up the thread it leaves and a new woof is added to the fabric. The complications of the fabric reveal themselves as soon as the power is turned on and the actual web begins to appear, close, compact and delicate.

Fancy weaves and patterns necessitating different colors are often woven on what is known as a box-loom. Fabrics vary from single colors to eight colors or more in the filling. This necessitates up to eight or more different shuttles being used for the filling. The con¬ tainers for these shuttles on the loom are known as boxes, hence the term box-loom. In order to form complicated designs, individual warp threads of the loom were in olden times con¬ trolled by hand, the threads being lifted or depressed thus letting the shuttle pass over or under them, forming the weave. This method is still pursued in the making of the famous Goblin tapestry and is probably the best illustra-

tion of old-time weaving. Joseph Marie Jac¬ quard, born in Lyons, France, in 1752, is the inventor of a mechanical device to lift or de¬ press warp threads in making fancy designs, thus doing away with hand manipulation. This is known as the Jacquard machine and when placed on a loom the loom is called a Jacquard loom.

The finished fabric after leaving the loom is inspected for weaving defects, such as loose ends, knots, etc., and is ready to receive its final manipulation before passing into the hands of the consumer. If silk used in manufacture has been dyed before being woven the fabric after leaving the loom need receive but little handling. It is smoothed out on rollers and may or may not receive a certain amount of stiffening. If the article is woven in the gray, it must now be dyed or printed before being used.

Such in brief is the manufacture of broad silks, that is dress goods, tie

silks, shirtings, etc. In 1914 the census reports show a pro¬ duction of over 216,000,000 yards of these goods valued at over $137,000,000. Silk ribbons are made in a similar manner, except that on ac¬ count of their narrowness many ribbons may be woven at one time on the same loom, ac¬ cording to their width. The 1914 production of ribbons was valued at over $38,000,000.

Crepe effects in the finished goods are pro¬ duced by alternating a right- and left-hand highly-twisted thread in the warp and filling the fabric with a lightly-twisted tram. When the woven goods are boiled off and dyed the effect of the alternately-twisted threads will be a puckering up of the fabric and this is known as crepe-de-chine. Similar effects may be produced by running a plain warp and filling this warp with the alternately hard-twisted crepe threads. This necessitates a box-loom. But the warping for this second fabric is very much easier than the warping for the first. To avoid mistakes in handling the wrong threads,

a slightly different tint, such as light blue and pink, is given to the right- and left-hand twisted threads. Hard-twisted threads in both warp and filling produce the georgette crepes.

Silk velvets and plush fabrics were formerly woven over wires so that small loops were formed on the face of the cloth which, upon being cut, made the pile. In modern manufac¬ ture two pieces are woven face to face, a sharp knife traveling between them cutting the pile threads apart. Velvets valued at $8,000,000 and plushes at $10,000,000 were produced in 1914.

Sewing silks and machine silks are tightly- twisted threads of raw silk, while floss and embroidery silks are loosely-twisted threads of raw silk. The production of these materials in 1914 was one and one-half million pounds, valued at nine and one-half million dollars.

The tables that follow indicate the growth of the silk industry in the United States:

Power-Looms and Hand-Looms in the United States.

POWER-LOOMS.

YEAR

Broad

goods

Narrow

fabrics

Total

1874 .

1,189

888

2,077

1875 .

1,428

1,260

2,688

1880 .

3,103

2,218

5,321

1890 .

14,866

5,956

20,822

1900 .

36,825

7,432

44,257

1904 .

50,449

9,609

60,058

1909 .

64 , 836

10,570

75,406

1914 .

73,504

11,554

85,058

HAND-LOOMS.

1874 .

779

728

1,507

1875 .

1,005

809

1,814

1880 .

1,629

1,524

3,153

1890 .

413

1,334

1,747

1900 .

164

9

173

1904 .

Practically none

Comparative Growth of the Silk Industry of the United States.

(The figures for 1880-1914 are United States Census returns for those years.)

PRODUCTION

1875

1880

1890

1900

1904

1909

1914

Piece goods .

$5,446,329

$11,224,895

$22,955,750

$52,152,816

$66,917,762

$107,881,146

$137,719,564

Ribbons .

4,815,485

6,023,100

17,081,447

18,467,1 9

21,890,604

32,744,873

38,201,293

Laces .

199,652

437,000

261,750

803 , 104

745,489

1,350,850

1,328,933

Braids and bindings. . .

383,100

999,685

2,771,382

1,522,565

3, 493,977

4,483,248

3,073,648

Trimmings .

3,961,114

8,306.520

8,544,566

2,295,010

4,124,651

4,674,975

3,341,750

Sewing and twist .

6,420,833

6,783, 855

7,068,213

10,246, 190

10,146,071

10,521,074

9,681,613

Velvets and plushes . . .

3,141,026

4,959,971

4,502,021

6,872,758

18,705,864

Tapestries and uphol-

stery stuff .

3,712,332

1 ,009,835

1,559,982

382,820

840,126

Embroideries .

57,625

112,362

485 , 322

33,500

Other products .

744,668

2,542,625

1,211,325

5,227,800

4,495,675

12,083,373

Total .

$21,226,513

$34,519,723

$69,154,599

$92,725,620

$118,720,719

$173,892,741

$225,009,664

No. of throwing spindles

168,843

262,312

718,360

1,045,304

1,394,020

1,761,758

2,159,271

Spun silk consumed

(pounds) .

150,000

•
•

1,550,291

1,951,201

2,112,972

3,209,309

Raw silk consumed

(pounds) .

1,275,872

2,690,482

6,376,881

9,760,770

11,572,783

17,472,204

22,374,700

Yarn other than silk

(pounds) .

-
-

5,624,960

7,116,728

9,730,769

15,786,354

23,258,455

Consumed in sewing

anH (notinHO

544 470

791 525

1 119 8?5

1 ,465,575

No. of operatives .

18 ! 01 7

31 .337

49,382

65,416

79,601

99,037

108,170

Wages paid .

$6,392,256

$9,146,705

$17,762,441

$20,982,194

$26,767,943

$38,570,085

$47,108,469

Capital invested .

$17,913,858

$19,125,300

$51,007,537

$81 ,082,201

$109,556,621

$152,158,002

$210,071 ,679

♦Indicates “not reported.”

SILK-COTTON TREES

1. Foreign Silk Industry. — In the opening decades of the 9th century the chief silk-pro¬ ducing regions were Syria, Persia,

India, Italy and France. With the opening of trade with China in the middle of the century great quan¬ tities of silk began to arrive in the markets of the world from Shanghai and later from Canton. Japan came into the field as an exporter about 1857 and was soon ' a serious competitor be¬ cause of the high quality of its product. To¬ day China and Japan export only their excess growth of silk, as the great bulk of their native silks are woven and sold in the home market. The same is to a large degree true of other silk-producing countries and regions of Asia. Within the last half-century the world's silk pro¬ duction (calculating only exports from the East, the total production there being unknown) has more than doubled. America is at present the greatest consumer of raw silk, followed at con¬ siderable distance by France. Lyons is the cen¬ tre of the silk trade of France, producing chiefly dress goods. The chief centres of the ribbon trade are Saint Etienne and Saint Chamond. In addition to these there are large

2. The consumption of rav material in nor¬ mal years is approximately 3,250,000 pounds. The Caucasus supplies about 1,000,000 pounds of raw silk to the Russian mills, Moscow is the chief silk-manufacturing centre. Italy, once first in the trade of Europe has fallen to about sixth place as a manufacturing country, using only 2,000,000 pounds annually. As a producer of raw silk of fine quality it still holds a high place, producing about 10,000,000 pounds in normal years. Como, Genoa and Venice are still the chief seats of silk manufactures in Italy. Austria has important silk manufactures, mostly centred in Vienna; it consumes about 1,500,000 pounds of raw silk annually and pro¬ duces about 500,000 pounds of this amount. Hungary produces nearly 1,000,000 pounds an¬ nually, most of which was formerly exported to the mills of Austria. England's silk manu¬ factures have declined since 1860. Manchester, Macclesfield, Middleton, London and Notting¬ ham are the chief centres of the industry there, which consumes annually about 1,700,000 pounds of raw silk. The following table gives the production of raw silk in 1913-19;

Raw Silk Production, Including Tussah Silk.

Seasons 1913-1914 to 1918-1919.

Place

1918-1919

1917-1918

1916-1917

1915-1916

1914-1915

1913-1914

Pounds

Pounds

Pounds

Pounds

Pounds

Pounds

Europe .

Viz:

Italy .

6,967,000

7,154,000

8,977,000

7,087,000

10,671,000

9,337,000

5,942,000

6,217,000

7,963,000

6,349,000

8,951,000

7,804.000

France .

529,000

452,000

485 , 000

286,000

893,000

772,000

Austria .

331,000

331,000

331,000

331,000

666,000

580,000

Spain .

165,000

154,000

198,000

121,000

161,000

181,000

Levant .

J2, 293,000

2,293,000

2,293, 000

2,293,000

3,935,000

5,004,000

Asia (total quantity exported*) .

Viz:

45,719,000

48,026,000

46,725,000

41,152,000

32,240,000

42,874,000

China, Shanghai .

J9, 230, 000

8,563,000

9,240,000

9,836,000

6,604,000

9,975,000

China, Canton .

3,750,000

5,170,000

5,567,000

4,083,000

4,168,000

5,995,000

Japan, Yokohama .

32,485,000

34,050,000

31,724,000

27,013,000

21,358,000

26,650,000

India (estimated) .

254,000

243,000

194,000

220,000

110,000

254,000

Total .

54,979,000

57,473,000

57,995,000

50,534,000

46,846,000

57,215,000

Tussah . .- .

1,540,000

1,534,000

Is 805,000

2,556,000

2,108,000

2,757,000

Grand total .

56,519,000

59,007,000

59,800,000

53,090,000

48,954,000

59,972,000

- The production of raw silk in China is an unknown quantity. t Excludes Tussah silk. X In the absence of

statistics from Austria and the Levant, 1915 production is used as an estimate.

The domestic consumption of raw silk in Japan is estimated to be 25 per cent of the production. The remaining 75 per cent which is exported, being 32,485,000 pounds during the season 1918-1919, would indicate a crop of approximately 43,314,000 pounds.

The domestic consumption of raw silk (including Tussah) in China is estimated to be 55 per cent of the production. The exports from Canton and Shanghai during the season 1918-1919 were 14,520,000 pounds, which would indicate a crop of approx¬ imately 32,267,000 pounds.

Compiled by the Statistical Bureau of The Silk Association of America.

silk mills at Paris, Nimes, Calais, Avignon, Roubaix and Tours. France consumes in nor¬ mal years about 10,000,000 pounds of raw silk and produces less than one-fifth of this amount. Germany consumes about 7,000,000 pounds an¬ nually. The industry there is centred at Cre- feld. Velvet is the principal textile product of the German silk industry, occupying over half the entire number of looms. Other silk manu¬ factures are located at Barmen, Elberfeld and Miihlheim. Switzerland has an important silk trade, consuming about 4,000,000 pounds an¬ nually in normal years. Zurich produces satins, serges and other broad goods. Basel is an important centre of the silk ribbon trade. Silk manufacture received a great impetus in Russia by the enactment of a prohibitive tariff about

Bibliography. — Coles, (Ornament in Euro¬ pean Silks) (London 1899) ; Kelly, (Culture of Mulberry Silkworm) (Bulletin 39, United States Department of Agriculture, Washington 1903) ; Matthews, J. M., (Textile Fibres) (3d ed., New York 1913) ; Sadtler, S. P., hand¬ book of Industrial Organic Chemistry > (Phila¬ delphia 1912) ; Villon, (La Soie) (Paris 1890) ; Verson and Quajat, (I1 filugello e l'arte seri- cola) (Padua 1896).

Ramsay Peugnet,

Secretary of the Silk Association of America.

SILK-COTTON TREES, any one of the

trees belonging to several tropical genera of the family Bombacacece , as Bombax, Ceiba, Erio- dendron, Ochroma and Pachira. They are usually large trees, the greater number native

to Central and South America, with handsome mallow-like flowers, light, soft wood and bark containing bast fibres used for cordage. Those species most entitled to the name are Bombax malabaricum of the East Indies, and Cciba pentandra, of both the Oriental and American tropics. The latter, the silk-cotton tree of the West Indies, is one of the most abundant and largest trees of the Antillean forests, and is either low-branched or tall, with naked trunk and massive

crown lifted high ahove the other trees. When young its trunk and branches are covered with sharp spines, which afterward dis¬ appear. The bark is hard, clean and white, sur¬ rounding a pulpy interior. The trunk is some¬ times 100 feet high, and in well-grown speci¬ mens is without branches for the lower part; but as the tree ages the trunk enlarges near the ground, being sometimes 12 feet in diameter and great buttresses, tall and thin, spring from it on all sides and run out in an undulating fashion, fior perhaps more than 100 feet along the surface of the ground, before finally pene¬ trating the soil and anchoring the tree. These braces are invaluable for bracing the tree against heavy winds. The leaves are glossy, dark green and deciduous. The yellow flowers appear just before the leaves and are followed by great pods whose valves burst open when mature, causing the tree to seem smothered in glistening white thistle down. This is because the seeds are wholly invested in delicate cotton-like fibres, and being very light are carried off by the wind for long distances. Unfortunately, al¬ though closely allied to the cotton plant (Gossypium) these fibres are too short to be woven into textiles, but they are employed for stuffing cushions and other upholstery, and are an important article of trade, under the name “Kapok,® the principal source of supply being Java. The seeds are eaten in some Pacific is¬ lands. Ochroma lagopus is also called down- tree, or cork-wood, on account of its light porous wood.

SILK-WEED. See Asclepias.

SILKWORM-GUT, a substance prepared from the silky secretions of the caterpillars of the ordinary silkworm taken from the insects’ body, and constituting the lustrous and strong line so well known to anglers under the name of “gut.® It is especially sought after because it is invisible in the water. In securing the secretion the worm is placed in vinegar and the incipient cocoon is then taken from it, soaked in water, dried and bleached to a pure white by passing through fumes of sulphur.

SILKWORMS, entomologically, any cater¬ pillar which spins a cocoon of silky fibre; pop¬ ularly, the various species which yield a fibre used commercially. All are caterpillars ,of moths and feed upon foliage of various trees and shrubs. Among the less important species the following are probably best known : The Japanese oak-feeding silk-moth (Bombvx yama- mai) is noted for its green-tinted silk, which is used in Japan and China for embroidery; a close relative (B . peryni), also an oak-feeding insect, is a native of northern China, where its large grayish-brown cocoons are used to a considerable extent for threads and various fabrics. The Chinese also use for the manu¬ facture of a soft fabric the gray silk of an

allied species (B . cynthia), which feeds on the tree of heaven (Ailanthus g lan dal os a) . Since the thread cannot be reeled the silk is obtained by carding methods. So far as known these species have not been extensively employed commercially except in the Orient, though they have been used tentatively in France and other silk-manufacturing countries. The tussur or tusseh moth (Anthercea paphia) spins a hard grayish-white cocoon from which the natives of India, where the species is indigenous, manu¬ facture tussur silk. The Bengalese use the pure white silk of the boro poloo (Bombyx textor) and the yellow silk of the dasee-worm (B. fortunatus) for making a silk cloth which rarely reaches the world's markets because of its in¬ ferior quality. Several North and South Amer¬ ican species yield silk which has not become commercially important. The native silkworms of the United States. Mexico and Central Amer¬ ica have never been properly commercially ex¬ ploited or cultivated; but several varieties possess qualities which would seem to promise success to him who would raise them scien¬ tifically. They are hardy and spin large quanti¬ ties of excellent, strong silk. They feed upon a much larger variety of food than do the silk¬ worms commercially known to the Old World. This comprises the leaves of the oak, apple, maple, hickory, willow, sycamore and many other trees. One of the most promising of these American silkworms (Telea polyphemus) is a large buff-colored moth. The cocoon threads are bound together with a hard gluey matter which has to be softened before un¬ winding can be done. The Tropaeluna, the larva of which feeds on the leaves of several forest trees, is somewhat similar to the fore¬ going and both resemble the Yamanai. Culti¬ vation and proper selection would undoubtedly improve them commercially. The amount of silk they produce is far greater and stronger than is produced by the Chinese silkworm, but the thread cannot be so easily reeled.

The most important and most widely dis¬ seminated species of silkworm is Bombyx mori, which belongs to the family Bombycidae, a native either of northern China or of Bengal. It seems to have been domesticated at a very early date, which is placed by Chinese authori¬ ties at 2600 b.c., when the wife of Emperor Hoang-ti began feeding the caterpillars In 552 two monks brought eggs to Constantinople, superintended experiments in. cultivating the worms and turned the industry over to the Emperor Justinian, by whom it was monopo¬ lized. Neighboring peoples soon took it up, however ; and now many countries, especially those of the Mediterranean region, Persia, India and Arabia, raise silk in commercial quantities.

The commercial silkworm is the larva of a large moth with a short thick body, stout legs and broad white wings crossed by several black

lines or by a pale bar upon the anterior pair. In early summer the females lay from 200 to 500 bluish eggs, about as large as a pin's head, singly upon any convenient surface, gluing them there by a mucilaginous secretion, silky when dry. These do not hatch until the following spring. Then the larvae, about one-quarter of an inch long and yellowish-gray or brownish, begin to feed, and soon consume about their

own weight of foliage daily and increase rapidly in size. When about 10 days old they become lethargic and stop eating until after they have cast their skins. In this operation the old skin bursts near the front and the cater¬ pillar squirms itself out, leaving the old skin attached to the branch or leaf upon which it was stationed. The worms rapidly increase in size immediately after the molt, then steadily diminish as the time for the next molt ap¬ proaches. The process is performed four times before the caterpillar spins its cocoon, which it does when about six weeks old. At this time it is about three inches long and half an inch in diameter, has 12 visible body segments, three pairs of true legs and five pairs of pro-legs. It now ceases to feed, empties its alimentary tract, and seems to shrink in size. The spinning then begins by the insect making first an outer network known as the ˆfloss,® and then wind¬ ing the silk in a continuous thread around its body which continues to decrease in size. The completed cocoon is considerably shorter than the caterpillar itself, being only about one and one-half inches long. The operation of spin¬ ning occupies about five days, during which time the insect usually produces from 2,000 to 3,000 feet of silk, which, when microscopically ex¬ amined, is seen to consist of two blended strands. These are produced by special glands (sericteria) which extend nearly the whole length of the body and terminate in apertures (spinnerets) situated in the mouth. In from 15 to 20 days after the chrysalis has been formed the adult insect emerges, lays its eggs and dies. It has been estimated that there are about 20,- 000 to 40,000 eggs, popularly known as ˆseed® in an ounce. About one (Ounce of eggs will yield 100 pounds of cocoons or nine pounds of raw silk. From 15 to 20 pounds of good mul¬ berry leaves should yield one pound of cocoons ; and a well-grown mulberry tree should yield about 100 pounds of leaves. The amount of space allowed for the caterpillars produced from an ounce of eggs varies from one square yard, immediately after hatching, to ahout 64 square yards when spinning time arrives — each change being double the previous space : 2, 4, 8, 16 and 32.

The food of the caterpillars is preferably the foliage of the white mulberry tree (Morns alba) ; but several other species are employed, notably the Japanese mulberry (M . japonica), the alpine mulberry (M . alpina) , and M. multi- caulis and M. moretti. The osage orange (q.v.) is occasionally used as a substitute, but is said to produce an inferior grade .of silk. The black mulberry (M. nigra) is pbjectionable because it is slow in growth. The caterpillars also thrive upon the leaves of lettuce and some other plants.

In the cultivation of the silkworm the first requisite is an ample supply of foliage. This is usually obtained by growing the mulberry trees far enough apart to give each ample room to develop its branches in all directions, the distance varying from 15 to 40 feet depending upon the variety, method of training, etc. Fre¬ quently the trees are treated much the same as in pollarding (q.v.), except that the branches are cut while small. The eggs having been kept over winter at a temperature of less than 50° F. in a dry circulating atmosphere, are

placed in a room or an incubator in which the temperature is raised gradually to about 73°. In about 10 days the larvae emerge and are cov¬ ered with sheets of perforated paper sprinkled with chopped mulberry leaves, which should be renewed about nine times during the first 24 hours, each time by placing a fresh paper above the soiled one, which should be burned. Paper with larger perforations is necessary as the worms grow. As they approach maturity their appetities become voracious. When ready to spin they should be supplied with brush, straw or other material upon which to form their cocoons and the temperature at this time should be kept about 75° and the humidity close to 65°. At all times scrupulous cleanliness is essential, as also is abundant fresh air. When spinning is completed, no sound is heard inside the oocoon. The cocoons are then sorted according to quality, size and color into nine grades for manufacture, a separate lot being selected for breeding. The sexes are readily recognized, the males being smaller and their cocoons having more pointed ends than those of the females. After grading they are heated to destroy the insects within, whose emergence, if left alive, would break the thread many times. The manufacturing process is then begun.

Where a uniform and favorable temperature is not maintained, where humidity and purity of the air are impaired, and still more, where there is deviation from the strictest cleanliness, silk growers have often experienced serious losses of their caterpillars at all stages of their growth. Purifying the breeding and feeding quarters after each ˆcrop,® and again before the introduction of a new one, are essential.

The walls are whitewashed, the trays sterilized in various ways, and the apartments fumigated with burning sulphur. No detail that will ensure cleanliness throughout the feeding period must be neglected, else the worms may suffer from the diseases which folLow in the wake of neglect. Four of these, called in France pebrine, muscardine, gattine and flacherie, are due to in¬ fectious organisms. For a fifth disease, gras- serie, no ascribable cause has been discovered. Pebrine devastated France to such an extent that by 1847 eggs were all imported from Italy. By 1865 the only safe source of egg-supply was Japan. Pasteur showed that rational methods of cleanliness in the breeding and feeding were the only remedy; the result is that France ex¬ ports over 300,000 ounces of eggs annually. See Silk and Silk Industry.

Bibliography. — Kelly, (Culture of Mul¬ berry Silkworm, *Bulletin 39, Division of Entomology, United States Department of Agriculture (Washington 1903) ; Oliver, G. W., (Mulberry and Other Silkworm Food Plants* (Washington 1907) ; Verson and Quajat, (Ill filugello e l'arte sericola *(Padua 1896) ; Villon, (La Soie* (Paris 1890).

SILL, Edward Rowland, American scholar and poet : b. Windsor, Conn., 29 April 1841 ; d. Cleveland Falls, Ohio, 27 Feb. 1887. He was graduated from Yale in 1861, entered business in California, but returned to the East, and studied at the Harvard Divinity School. His views toward the ministry, however, he soon abandoned ; and he became literary critic on the staff of the New York Evening Mail. Thence he went to Ohio, where he did some teaching,

and to California, where he was made principal of the Oakland high school (1871) and pro¬ fessor of English literature in the University of California. In 1883 he returned to Ohio to devote himself wholly to literary work. Sill did not write readily, nor willingly collect what he had at intervals printed in magazines, particu¬ larly the Atlantic. He won, nevertheless, a re¬ cognition which, if not general, is ample, and a just tribute to real gifts. He wrote with a cer¬ tain terse austerity not, as has been pointed out, unlike Emerson. Indeed, he was, in thought and manner, a later transcendentalist. One of his poems, (The Fool's Prayer, > is the property of every anthology. The posthumous selection, Poems *(1888), contains his best. (Hermione, and Other Poems) appeared in 1899, and in 1900 (The Prose of Edward Rowland Sill, with an Introduction Comprising Some Familiar Let¬ ters. * Consult Parker, W.*

B., (ed.) Poetical Works of Edward Rowland Sill (1906) ; id., Pdward Rowland Sill: His Life and Work* (Boston 1915).

SILL, Joshua Woodrow, American gen¬ eral : b. Chilicothe, Ohio, 6 Dec. 1831 ; d. Mur¬ freesboro, Tenn., 31 Dec. 1862. He was gradu¬ ated from the United States Military Academy in 1853, and was soon called to the academy as assistant professor of ethics, geography and history. He resigned from the army in 1861 and became professor of civil engineering and mathematics in the Brooklyn Polytechnic Insti¬ tute. He commanded a division of the army of Ohio in 1862, and was killed while leading his brigade at the battle of Murfreesboro.

SILL. See Dike.

SILLIMAN, sil'i-man, Benjamin, Amer¬ ican scientist: b. North Stratford (now Trum¬ bull), Conn., 8 Aug. 1779; d. New Haven, Conn., 24 Nov. 1864. He was graduated from Yale in 1796, studied law and was admitted to the bar in 1802, but accepted the chair of chemistry and natural history at Yale in 1802. He went abroad in 1805 to continue his studies, and while in Edinburgh became interested in geology. On his return home he made a geological survey of a part of Connecticut, the first survey of the kind made in the United States, and in 1807 published an account of the celebrated Weston meteorite of 14 Dec. 1807. In 1811 he began a series of experiments with the compound blow¬ pipe, obtained for the first time in the United States the metals sodium and potassium, and discovered in 1822 the fusion of the carbons in the voltaic arc. He founded the American Journal of Science in 1818, acting as its sole editor until 1838, and as senior editor until 1846, opened the Lowell Institute in Boston with a series of lectures on geology in 1838, and in 1840 was elected president of the American Association of Geologists. He resigned his chair at Yale in 1853 and was made professor emeritus, but continued to lecture until 1855 when he retired. He was named by Congress for one of the original members of the National Academy of Sciences in 1863. His publications include (Journal of Travels in England) (1810); (A Tour to Quebec) (1819) ; Plements of Chemistry) (1829); Consistency of Discoveries of Modern Geology with the Sacred History of the Creation and the Deluge) (1837.) ; Narra¬ tion of a visit to Europe in 1851) (1854), etc. Consult Fisher, (Life of Benjamin Silliman*

(2 vols., New York 1866) and Gilman, D. C., Peading American Men of Science> (New York 1910).

SILLIMAN, Benjamin, American chemist, son of the preceding: b. New

Haven, Conn., 4 Dec. 1816; d. there, 14 Jan. 1885. He was graduated from Yale in 1837 and in 1838 be¬ came instructor in chemistry, mineralogy and geology at Yale, was appointed professor of ap¬ plied chemistry in 1846 and in 1854 succeeded his father in the chair of chemistry, a position he occupied until his death. He was one of the founders in 1847 of the Yale Scientific School and was professor of medical chemistry and toxicology in the University of Louisville, Ky., in 1849-54. He was in charge of the depart¬ ments of chemistry, mineralogy and geology at the World's Fair in New York in 1853, was elected one of the original members of the Na¬ tional Academy of Sciences in 1863, and in 1869 became one of the State chemists of Connecticut. He published Pirst Principles of Chemistry) (1846; 2d ed., 1856) ; Principles of Physics) (1854; rev. ed., 1868) ; (American Contributions to Chemistry) (1875), etc. Consult Wright, A. W. (in National Academy of Sciences, Piographical Memoirs,* Vol. VII, Washing¬ ton 1911).

SILLIMANITE, a mineral occurring in long slander crystals and fibrous masses, and composed of silicate of aluminium (silica 36.9, alumina 63.1 = 100). Its crystals belong to the orthorhombic system; its hardness varies from 6 to 7 and its specific gravity from 3.2 to 3.3. The color is various shades of brown, or gray, or greenish. The streak is uncolored and the mineral varies from transparent to translucent. It occurs in gneiss, mica schist and other meta- morphic rocks in Massachusetts, Connecticut, New York, Pennsylvania, Delaware, North Carolina, etc. The name was given in honor of Professor Silliman of New Haven.

SILO, a building for the preservation of green fodder, usually cut fine before storing, and known as silage (q.v.). Originally silos were merely pits dug in the ground and filled with green fodder which was closely covered to exclude the air. From 1875 the silo built above ground af wood, brick, concrete and other per¬ manent materials has come into use and is steadily increasing in numbers. Silos are built on a cement foundation, and most frequently are of wood, which is equally efficient in pre¬ serving silage and while of less permanent character is selected because its initial cost is less. The buildings are air tight, usually of circular shape (the rectangular type permitting the silage to spoil in the corners), are roofed and usually about 30 feet in depth. The greater depth insures the silage packing solidly, excluding the air. The walls are vertical and finished smoothly inside in order that the silage may settle evenly. Openings are pro¬ vided one above another on the side most con¬ venient for feeding so that the contents of the silo are readily reached, but none is required in the top space because of the settling of the silage. Concrete makes an excellent and per¬

manent building, and brick and stone, lined with cement are likewise desirable.

SILOAM SPRINGS, Ark., city in Benton County, 40 miles southwest of Bentonville, on the Kansas City Southern and other railroads.

It is located in a prosperous agricultural region, and has flouring mills, corn and feed mills, ice and storage plant and a large cider and vinegar plant. It has two banks with deposits in ex¬ cess of $1,000,000. The value of the city's tax¬ able property is $800,000. It is the seat of Siloam College and a high school. There are seven churches, a city hospital and a municipal building. Pop. 2,569.

SILOAM, si-16'am, or SILOAH, si-16'a, a pool or tank in Jerusalem, fed by the waters of Gihon and forming part of the ancient water- supply system of the city: a tunrtel of 1,700 feet leads to the pool from the <(fountain of the Virgin.® In 1880 some boys playing in the pool crawled into this ancient tunnel, and one of them noticed a tablet bearing an inscription. That inscription, as deciphered by scholars in 1881, tells of errors of measurement committed by the miners and how they were corrected. In places the inscription is undecipherable, but, line for line, it is rendered thus :

1. Lo the tunnel. Now this is the history of the tunnel.

While yet the miners were plying

1. The pick, each toward his fellow and while there were

yet three cubits to be cut, there was heard the voice

of a man

1. Calling to his fellow, for there was a misdirection * in the

rock on the right hand . . . and on the day

1. Of tunneling through, the cutters smote pick against pick

and there flowed

1. The water from the channel to the pool, 1,200 cubits, and

2. Cubits was the height of the rock above the excavator's

heads.

- Conjectural.

Hezekiah is believed to have built this water- supply system. Scholars are not in agreement as to the date of the inscription, some holding that it dates from a period long subsequent to that of Hezekiah even as late as 200 b.c. Con¬ sult Socin, A., (Die SiloahinschrifV (Freiburg 1899) and Tobler, (Die Siloahquelle und der Oelberg) (Saint-Gall 1852).

SILOXICON. See Electrochemical In¬ dustries.

SILURES, sfl'u-rez, the name of an an¬ cient British tribe which inhabited the district included in the modern counties of Hereford, Radnor, Brecknock, Monmouth and Glamorgan. They were of the earlier Celtic stock, and were among the most warlike of the British tribes. They were subdued by the Romans about 78 a.d. Cserwent was founded by them, but was later Romanized.

SILURIAN, a term applied in 1835 by Sir Roderick Murchison, director-general of the Geological Survey of Great Britain, to those rocks of South Wales (the country of the old Silures), which were formerly included as <(grauwacke® in the Transition System of rocks. The term is also applied to the period during which this system of rocks was laid down, now recognized as the third period of the Paleozoic Era. In the typical region the rocks are divided as follows:

Approx, average thickness (feet)

(6. Ludlow Group . 1,900

Upper Silurian (5. Wenlock Group . 1,600

(4. Llandovery Group . 3 , 000

f 3. Bala and Cardoc Group .... 6 , 000

Lower Silurian (2. Llandeilo Group . 3 , 000

(1 . Arenig Group . 4 , 000

19,500

While Murchison was studying these strata

in South Wales, the renowned Adam Sedgwick studied the rocks of North Wales, making out their true succession, and naming them ˆCam¬ brian,® from the ancient name of the district, Cambria. These were also divided into an upper and lower division, and as the study con¬ tinued year after year, higher and higher strata were added to the top of the Cambrian series. Likewise, in the study of the Silurian strata, Murchison included lower and lower strata, and thus the two systems overlapped. It finally appeared that Murchison's Lower Silu¬ rian and Sedgwick's Upper Cambrian were equivalents, and this gave rise to a long con¬ troversy as to the use of the proper term. This controversy outlived the two principals, and has only recently been settled by the adoption of Lapworth's name (<Ordovician® for the middle series. Thus the term Silurian is restricted to¬ day by most geologists to the Upper Silurian of Murchison.

In North America the following subdivisions are recognized:

Upper Silurian or Cayugan group.

Manlius limestones,

Bertie limestones,

Salina formation.

Middle Silurian or Niagaran group.

Guelph formation,

Lockport dolomites,

Rochester shales,

Clinton formation.

Lower Silurian or Oswegan group.

Medina sandstone,

Oneida conglomerate or sandstone.

Ordovician precedes and Devonian follows the Silurian. The formations are typically ex¬ posed in the State of New York, where the lower members are conglomerates and sand¬ stones, the middle shales, limestones and dolo¬ mites and the upper shales and shaly

lime¬ stones. The formations are best exposed along the Niagara River, where most of them are visible. The aggregate thickness here is 2,100 feet, though the upper member (Manlius) is partially absent. Eastward in New York some strata thin out, while others are absent through erosion. The Silurian strata are well de¬ veloped in Michigan, Ohio, Indiana, Illinois, Wisconsin, Kentucky and Tennessee, though generally much thinner than in New York. They are also more calcareous. In the Ap¬ palachians the Silurian strata are frequently represented by shore deposits. Throughout most of their extent, the strata are richly fossilifer- ous, containing sponges, graptolites, corals, brachiopods, mollusks and triliobites. Fish are also found, but are rare. Toward the end of Silurian time the remarkable crustaceans known as eurvpterids (q.v.) became abundant and con¬ stituted a marked feature of the life.

As a result of the Taconic Revolution, at the close of the Ordovician (q.v.), the seas were much restricted at the beginning of the Silurian, in the United States. During the Clinton coastal swamp conditions prevailed over much of Eastern United States, and great sedimentary beds of iron ore were laid down, from New York to Alabama. These are very extensively mined in New York and at Birmingham, Ala. During mid-Silurian time the interior con¬ tinental sea was very greatly enlarged, and was united with the waters covering parts of Europe, probably by a channel across the

Arctic region. This permitted migration from European seas into central North America, so that we find many Silurian fossils of this region also common in the European localities (Gotland, etc.). The widespread Niagara lime¬ stone was formed in this sea. Migration along an Atlantic coast line between Western Europe and eastern North America also took place in Silurian time, as shown by the similar faunal characteristics of the Silurian beds of Maine arid the island of Anticosti to those of southern England.

In late Silurian time the waters of the in¬ terior sea were entirely enclosed and life be¬ came extinct, the sea water itself becoming highly concentratedj probably under desert con¬ ditions. In this enclosed basin the salt-bearing strata of the Salina formation were laid down, and these now constitute a great commercial source of salt.

Widespread marine formations in Europe show that that continent was also widely covered by shallow seas during the period. A central land mass probably separated a northern and a southern sea. See Geology; Salina Formation ; Salt.

SILURIDˆl. See Catfish.

SILURIST, The. See Vaughan, Henry.

SILVANUS, sil-va'nus. See Mars.

SILVA, sel'va, Jose Asuncion, Colombian poet : b. 1860 ; d. 1896. Though apparently very much of a pessimist, his poems abound in evi¬ dence that his pessimism was to a great extent accidental and unnatural to the poet. He dis¬ plays a deep love of nature, of the beauty of the musical sound of words, and, at times, of the mere joy of living. His nature was deeply poetical, and he suffered from an over-sensi¬ tiveness which helped to embitter his life. This bitterness, which constantly creeps out, accen¬ tuates and gives peculiar vivacity to his pes¬ simism. Silva, who was of an old, wealthy and aristocratic Colombian family, found himself reduced, through the fortunes of revolution, to poverty. As his father had already died, he was forced to support the family. He struggled on against adverse fortune, writing because he needs must write to give expression to his burn¬ ing soul, but unable to find a publisher for his work, and too poor to issue it at his own expense. At the same time he waged an unsuc¬ cessful fight for the recovery of his father's property. Finally he found a publisher in France, and for a time hope ran high, but the vessel bearing the manuscript to Europe was lost at sea. In his later days he became a literary figure in Latin America through his contribu¬ tions to the press; but it was not until after his death that his poems were issued in book-form. Some of his poems like the <Crepusculo,) (Ante la Estatua) (of Bolivar), (E1 Dia de Difuntos* and (Los Nocturnos) are known wherever the Spanish language is spoken. There are few Latin American writers whose work is so hard to translate into a foreign tongue as that of Silva. He has a strange power over the melody of words and a deep and fanciful imagination of a distinctly poetical caste. About his work there is a haunting sense of melody that recalls the best of Poe's poetry; though Silva never displays the weird fancy of the latter's tales. He was original in many ways; his lines are

often as musical as the best in the Spanish tongue. He invented new rhymes, reformed and reshaped old ones, introduced still others from foreign languages and successfully adapted them to the Spanish tongue. His inno¬ vations and his mannerisms were widely imi¬ tated

and had their influence upon the younger generation of Latin-American poets, of which the leaders were Ruben Dario (q.v.) and Jose Santos Chocano. Owing, however, to the peculiarity of his style and his unnatural pes¬ simism, the poetry produced by his imitators has been, for the most part, of rather indifferent quality. But his influence has been decidedly beneficial in leading Latin-American poets to attempt to fit the music of words to the beauty and harmony of poetic thought, and to seek more freedom and flexibility in the use of poetic forms. Consult Blanco Fombona, Jose, (Letras y Letrados de Hispano America) ; Coester, A., (Literary History of Spanish America) (New York 1917) ; La Habana, (Arpas Cubanas) (1904) ; Mityans, A., (Estudio sabre el movimiento cientifico y literario de Cuba) (Habana 1890).

SILVAS AMERICANAS. Although some critics might deny that Andres Bello is the greatest Spanish-American poet, certainly no one will deny that his (Silva to Agriculture in the Torrid Zone) is the greatest poem that Spanish America has yet produced. The other of the two silvas, (Allocution to Poetry,' is fragmentary, one part containing an address to poetry, the other to Colombia. Bello prob¬ ably despaired of completing this poem on the grandiose scale he had planned, and in 1826, three years after the appearance of the frag¬ ments, he published the second silva to agricul¬ ture, more restricted in scope and containing lines taken from the first. A silva is a metri¬ cal composition of lines of seven and eleven syllables, some in free version, others rhyming without fixed rule. Bello's (Silvas) are the most exquisite imitations in Spanish of Virgil's (Georgics) ; the author's style is noble and ethical and he is a finished master of poetic diction. With lofty inspiration Bello urges his compatriots to give up political strife and greed for wealth, and seek peace and happiness in the cultivation of the beautiful exotic vege¬ tation of young America. M. A. Caro's (Poesias de Andres Bello) contains a very good critical introduction. Extracts can be found in Hill's and Morley's (Modern Spanish Lyrics, > which contains an excellent article on Bello.

Samuel M. Waxman.

SILVELA, sel-va'la, Francisco, Spanish statesman and Conservative leader : b. Madrid, 1843; d. 29 May 1905. He studied law and en¬ tering politics became a member of the Cortes in 1869. Ten years later he held the portfolio of Minister of the Interior in the Campos min¬ istry and that of Minister of Justice in 1883— 84. In 1899 he became Prime Minister, which office he held until October 1900, when he was obliged to resign. In 1902 he was again called on to form a cabinet and retired the following year. He was for many years the foremost

lender of the Spanish Conservatives. He was elected to the Royal Spanish Academy and to the academies of fine arts and of history, moral and political sciences.

12

SILVER

SILVER, one of the best known metals, has been in use for a long period, probably since before the beginning of history. It is widely distributed and can be easily extracted from some of its ores.

Physical Properties. — Silver is very malle¬ able and ductile, being surpassed only by gold in these qualities. It is harder than gold, but softer than copper. It can be rolled into sheets 1/1000 inch thick, and silver foil is made thin enough to transmit light. Silver leads all the metals as a conductor of electricity and is second only to gold as a conductor of heat. Its specific gravity is about 10.46; its melting point 960° C, and it can be distilled as a greenish vapor in the electric arc, its boiling point being over 2,000° C. When molten it can absorb oxygen to 22 times its own volume ; this is given off when the metal cools, causing the phe¬ nomenon known as ˆspitting.® This occurs only when the silver is pure and a very small per cent of copper, zinc or bismuth prevents it, as does a layer of some substance having no oxy- dizing action of the molten metal, like powder charcoal or common salt.

Chemical Properties. — Silver alloys read¬ ily with mercury, lead, zinc, gold and copper. The alloy with mercury, known as silver amal¬ gam, is formed in various processes for extract¬ ing silver from ores, mercury being able to extract metallic silver from its compounds with chlorine, bromine and iodine. If such an amal¬ gam be heated above the boiling point of mer¬ cury, the mercury volatilizes, leaving the silver. Lead has the power of extracting silver from its compounds with copper, sulphur, arsenic, antimony and silver salts by the formation of lead-silver alloys, a property of great metallur¬ gical importance in the treatment of silver ores. Alloys of silver and copper are formed in smelting argentiferous copper ores, the silver and copper being subsequently separated by refining. As pure silver is soft and abrades easily, all silver used in coinage or for making silverware is alloyed with copper to give hard¬ ness. The United States silver coinage con¬ tains 900 parts silver and 100 parts copper; British coinage contains 925 parts silver and 75 parts copper.

Silver is not affected by either dry or moist air at ordinary

temperatures, neither is it af¬ fected by caustic alkalies or vegetable acids. It is dissolved by hot, concentrated sulphuric acid and easily dissolved by nitric acid. Sul¬ phuretted hydrogen forms black silver sulphide and to this is due the familiar tarnishing or blackening of silverware, either by articles of food containing sulphur, as eggs, or by the minute percentage of sulphuretted hydrogen contained in city air or the air of rooms when coal gas is used as an illuminant. So-called oxydized silver is silver with a superficial black coating obtained by immersing in potassium sulphide or platinum chloride. Frosted silver has a rough dead surface produced by heating with nitre.

Silver forms three oxides, but none is of any particular importance. Silver chloride (AgCl), readily formed as a curdy white pre¬ cipitate on adding a soluble chloride to an acid solution of a silver salt, is insoluble in acids but readily soluble in ammonia, in potassium cya¬ nide and in sodium hyposulphite and less soluble in a saturated solution of any one of several

chlorides. It is also formed in treating silver ores with common salt. Silver nitrate (AgNOs), formed by dissolving silver in nitric acid, is a white crystalline salt readily soluble in water. Fused and cast into sticks, it is known as lunar caustic and is used in surgery. In solution it is used as a chemical reagent. Silver bromide (AgBr) and silver iodide (Agl) resemble the chloride and like it are used in photography. Silver sulphate (Ag2So.i), a slightly yellow crystalline salt, is readily soluble in hot water but less in cold. Silver sulphide, black, is formed by adding a soluble sulphide to a silver salt.

Silver Ores. — The minerals which, singly or in combination, are mined as silver ores may be divided into three classes : Silver minerals proper, lead silver minerals and lead copper minerals. In the first class come native sil¬ ver cerargyrite, argentite, pyragyite, proustite. Native silver occurs in irregular bunches or thread-like or branching masses, either by itself or associated with other silver ores or with native copper. It adds to the value of an ore body, but rarely occurs in sufficient quantity to be worked for itself. The once famous Silver Islet mine on the north shore of Lake Superior produced splendid specimens of native silver. Cerargyrite, horn silver, is the chloride and contains 75.3 per cent of silver when pure. It occurs, in horn-like masses, of a grayish color which turns black on exposure to light, is so soft that it can be easily cut with a knife and is of common occurrence in what is known as the oxydized zone of mines worked for silver. Rich masses have been taken from the mines at Leadville, Colo., and there are many other mines producing this ore in the West. Larger quantities have come from some Mexican mines, particularly those in

Guanajuato. Embolite, a chlorobromide, Ag(ClBr), bromyrite, the bro¬ mide, and iodyrite, the iodide, resemble horn silver closely and are found associated with it. Argentite, or silver-glance, silver sulphide (AgaS) is the commonest of the silver minerals proper. It is black, has a metallic lustre and cuts easily, though harder than horn-silver. When pure it contains 87.1 per cent of silver. Silver sulphide combines readily with the sul¬ phides of antimony or arsenic, forming double salts. Of these pyrargyrite (3Ag2S.Sb2S3) or ruby silver ore contains 60 per cent of silver, proustite (3AgdS.As2S3) , also called ruby sil¬ ver ore, contains 65.5 per cent ; stephanite (5Ag2SiSb2S3) 68.5 per cent and polybasite (Ag2S.Sb2S3) nominally contains 75.6 per cent silver, but usually part of the silver is replaced by copper and part of the antimony by arsenic. These double sulphides at American silver mines seldom occur in bodies of sufficient size and purity to be worked alone, but are not un¬ common. One or more are found at mines in Montana, Idaho, Utah, Colorado and Arizona. Large masses of pyrargyrite have been taken from mines in the state of Guanajuato, Mex¬ ico. Mention may be made of the mines in the Ruby district of Gunnison County, Colo., and at Silver City, Idaho. The silver ores usually occur in veins or in irregular replace¬ ment deposits formed by hot magmatic waters in the vicinity of igneous intrusions.

Silver being a precious metal a small per cent of it in lead or copper ores makes it the metal of chief value. Even when it is the metal

of lower value a few ounces in a ton of ore means the difference between profit and loss in working a mine. Of the lead-silver ores by far the most important is galena, lead sulphide (PbS). Practically all galena contains silver, the extremes being represented by galena from Carinthia, Austria, containing .05 ounce per ton, and from Idaho, up to 2,040 ounces per ton. In galena the silver is present either as isomorphous silver sulphide or some finely dis¬ seminated silver mineral. In oxydized lead ores, cerussite, etc., the silver is mostly present as chloride. Of the strictly copper silver ores, the most important is tetrahedrite, or gray cop¬ per ore, which is essentially a sulphide of cop¬ per and antimony (4CuS.Sb2Sa), though actually of very varying composition, and the related mineral tennantite (4Cu2S.As2S3), also called gray copper. These minerals are of common occurrence in Gunnison, Clear Creek, Summit and Gilpin counties, Colo. Silver is also found associated with chalcopyrite, chalcocite, bornite and other copper minerals, also with iron pyrite,

zinc blende, hematite and various minerals, all of which may be classed as silver ores when the percentage of silver is enough to make its extraction profitable. To-day the largest part of the world's silver supply comes from mines not worked for silver alone but rather for gold, copper or lead, the silver being a by-product. Thus it happens that the opera¬ tion of many silver-producing mines and the resulting output of silver depend not on the market price of silver but on the price of lead or copper. This is not true, however, of the Cobalt district, Ontario, where silver is the leading metal and cobalt and nickel are by¬ products.

Metallurgy of Silver Ores. — Silver ores as previously noted may be divided into silver ores, proper, silver-lead and silver-copper ores. They may also be divided into (1) free-milling; (2) refractory and (3) smelting ores. The first includes native silver, also the chloride and bromide of silver, the metal being extracted by its forming an amalgam with mercury. In so- called refractory ores, usually silver sulphide with or without the sulphides of arsenic and antimony, the ores are roasted with salt or otherwise treated prior to amalgamation. The smelting ores include particularly silver-lead and silver-copper ores. The oldest of the methods of extracting silver by amalgamation, one still used in Mexico, is the patio process. In this the ore is coarsely crushed by stamps or by a Chilean mill, then transferred to an ar-rastra, a circular space paved with stone, where the ore mixed with water is ground fine under heavy stones drawn around by mules. By the addition of mercury all gold and free silver are extracted. The wet ore is then spread on the patio or amalgamating floor, thoroughly mixed with 3 to 5 per cent of salt, by mules treading it, allowed to stand a few days and then copper sulphate and mercury are added and the ore well trodden for several days, mercury being added from time to time to collect the silver as an amalgam. The chemical reactions which take place are complicated. Finally the mass is washed to remove non-metallic material, the heavy silver amalgam is collected and the mer¬ cury recovered by distillation, leaving the silver. Of the modern amalgamation processes the Washoe was developed for treating the complex

silver-gold ores of the Comstock lode. The ore was broken in a crusher, reduced to pulp by stamps and then transferred to iron pans lour to six feet in diameter, known as amalga¬ mating pans. The pans had a false bottom or die, on which revolved an iron plate, or muller, having cast-iron shoes. The ore pulp, one to three tons, with the necessary amount of salt, copper sulphate and mercury, was heated with a steam coil or by blowing in steam and ground three to five hours. Then the light material was washed away and the amalgam

collected. Vari¬ ous modifications of the Washoe process have been devised and there are still many mills using some form of pan amalgamation, but the extrac¬ tion is usually not very high. Silver chloride is soluble in a saturated soluble solution of salt and more soluble in sodium hyposulphite. Hence processes have been devised which aim to con¬ vert the silver in an ore to a chloride by roast¬ ing with salt, and then remove it by leaching. In the Augustin process the roasted ore is leached with a solution of salt, and in the Rus¬ sell process with sodium hyposulphite and cuprous sodium hyposulphite. Neither process is now in use in the United States.

Smelting, where practicable, has the advan¬ tages of simplicity, speed and often high ex¬ traction as compared with all other methods of treating ores not free-milling. It is the regular method of treating lead-silver and copper-silver ores. Lead ores are smelted in the usual way (see Lead) ; the silver goes into the lead and is recovered by the zinc, or Parkes, process. In the copper ores (see Copper) the silver goes with the copper and may be separated by elec¬ trolytic refining. Gold-silver alloys obtained from milling or smelting ores of many varieties are also treated electrolytically (see Gold). The silver obtained from some silver-lead ores is often purified by cupellation. A small re¬ verberatory furnace with a hearth of bone ash is used. The lead bullion is melted, the lead oxydized to litharge by a jet of air until the silver bath is clear, then the silver is cast in molds forming silver pigs or bars. Many ores carrying silver go to concentrating mills equip¬ ped with jigs, vanners, etc., for separating the ore from the gangue. The concentrates thus obtained are usually smelted.

Silver Producing Districts. — A large pro¬ ducer of silver is the Broken Hill Proprietary Co., of New South Wales, Australia. The once famous Comstock lode mines in Nevada, which produced ore carrying values of two parts gold to three parts silver, are now unimportant, and probably the largest individual silver producer in the United States is the Amalgamated Copper Co., the silver being a by-product of its mines at Butte, Mont. Leadville, Colo., is an import¬ ant silver-producing camp, but the ores are now generally low-grade. Silver Cliff and Aspen, Colo., were noted for their output of high-grade silver ores. In Utah the mines at Park City, notably the Daly West, are large producers of silver, though the ores also contain gold, lead and copper. In Idaho the silver-lead mines of the Coeur d'Alene region produce in the aggre¬ gate much silver. In Mexico the states of Chihuahua, Durango, Guanajuato and Hidalgo all contain important silver-gold or silver-lead mines. The mines of Guanajuato are estimated to have produced one-sixth of the silver of the world and the Valenciana has an established

record of production of 300,000,000 ounces. In South America the once famous mines of Cerro de Pasco in Peru are to be worked again by a New York company, but chiefly for copper. The silver output of the Cerro de Pasco mines from their discovery in 1630 up to 1886 is estimated at 462,250,000 ounces. In Ontario, Canada, the Cobalt District is one of the world's leading silver camps. In Europe, Germany is the most important silver-producing country, the metal coming from the Manusfield copper mines, the silver-lead mines at Mechevnich and the mines of the upper and lower Harz.

The world's production of silver in 1908 amounted to 203,186,370 troy ounces, valued at $108,684,400. Mexico that year led the world in silver production, and Mexico and the United States together produced nearly 70 per cent of the total output. Estimates based on the most reliable information gave the world production of silver for the calendar year, 1917, by coun¬ tries, as follows :

COUNTRY

Ounces,

fine

Value

($0.89525)

North America — United States Canada .

71,740,400

22,151,000

31,214,000

$64,225,593

19,830,683

27,944,333

Mexico .

Total .

125,105,400

$112,000,609

Central American States and W. Indies .

2,369,500

$2,121,295

South America — Argentina . . . Bolivia .

29,000

2.435.200 25 , 000

1.672.200 325 , 000

45 , 000 11,000,000 8,000 3,300

$25,962

2,180,113

22,381

1,497,037

290,956

40,286

9,847,750

7,162

2,955

Brazil .

Chile .

Colombia .

Ecuador .

Peru .

Guiana — British .

Venezuela .

Total .

15,542,700

$13,914,602

Europe — Austria-Hungary .... Great Britain .

1,500,000 86,000 350,000 450,000 282 , 000 500,000 20,000 4,500,000 35,000 400,000

$1,342,875 76,991 313,337 402 , 863 252,461 447,625 17,905 4,028,625 31,334 358,100

Greece .

Italy .

Norway .

Russia .

Serbia .

Spain .

Sweden .

Turkey .

Total .

8,123,000

$7,272,116

Australia — New South Wales. . Queensland .

2,800,000

240,000

29,000

221,800

780,000

$2,506,700

Victoria .

Western Australia .

25,962

198,567

698,295

New Zealand .

Tasmania .

Total .

4,070,800

$3,644,384

Asia — British Tndia .

600,000 63 , 400 28,000 50,000 1,000 6,844,500

$537,150

56,759

25,067

44,763

895

6,127,538

China .

Chosen .

Formosa (Taiwan) .

Indo-China .

Japan .

Total .

7,586,900

$6,792,172

Africa — Belgian Congo

10,300

900

20,000

1,200

212,000

950,000

$9,221

806

17,905

1,074

189,793

850,488

Egypt .

Madagascar .

Portuguese East Africa .

Rhodesia .

Transvaal, Cape Colony and Natal .

West Africa (Gold Coast) ....

Total .

1,194,400

$1,069,287

Total for world .

163,992,700

$146,814,465

With the exception of the years 1895 and 1902 when Mexico first led, the United States led the world in silver production for over 30 years up to 1902. Of the continents North America is easily first, with Europe now second.

The output of the chief silver-producing States of the Union in 1917, according to re¬ liable authorities, was approximately as follows :

Silver

STATE OR TERRITORY

Fine ozs.

Value

Alabama . . .

Alaska .

1,351,100

8,183,200

$1,112,600

Arizona .

6,738,900

California .

1,989,800

1,638, 600

Colorado .

8,163,600

6,722,700

Idaho .

11,683,100

3,300

1,100

9,621,000

2,700

Illinois .

Maryland .

900

Michigan .

686,700

21,100

565,500

Missouri .

17,400

Montana .

13,711,100

11,441,000

1,313,700

2,800

11,291,100

Nevada .

9,421,700

New Mexico .

1,081,800

North Carolina .

2,300

Oregon .

215,700

191,100

99,300

583,200

14,315,300

400

177,600

South Dakota .

157,400

Tennessee .

81 ,800

Texas .

480,300

Utah .

11,788,700

300

Vermont .

Virginia .

9,400

257,000

4,900

16,600

7,700

211,600

Washington .

Wyoming .

4,000

Philippines .

13,700

Total .

74,244 500

$61,139,600

Uses of Silver. — Silver is used for coinage and for ornamental articles, while the chloride, bromide and iodide of silver are of great im¬ portance from their use in photography. Ar¬ ticles plated with silver are in common use, as the cost of plating is small if the film of silver deposited is thin. A solution of the double salt potassium silver chloride(KCN.AgCN) is used, from which the silver is readily deposited. The articles to be plated are thoroughly cleaned, at¬ tached to the negative pole of an electrical cir¬ cuit of low voltage and immersed in the bath, a silver plate being attached to the positive pole. The silver as deposited has a dead surface but is made bright by burnishing after removal from the bath.

In photography silver chloride in a layer of albumen or gelatine is used on the ordinary printing papers; various organic compounds are formed which are changed on exposure to light, and this change is shown by the action of cer¬ tain reducing agents, developers, the resulting image being formed of unknown silver salts sus¬ pended in the gelatine. In bromide prints which are more durable, the image is due to finely divided metallic silver. In the ordinary photo¬ graphic dry plates, silver bromide or iodide is used in a gelatine film, as these salts are more easily affected by light. See Bimetallism ; Coinage; Electrochemical Industries; Cop¬ per; Gold; Lead; Photography.

Bibliography — Clennell, J. E., (The Cya¬ nide Handbook (New York 1910-15) ; Collins, H. F., (The Metallurgy of Lead and Silver) (part 2, London 1902) ; Crane, W. R., (Gold and Silver1 (New York 1908) ; (Egleston, T., ‘The Metallurgy of Silver, Gold and Mercury1

(New York 1887-90) ; Eissler, M., (The Metal¬ lurgy of Argentiferous Lead) (3d ed., London 1896) ; Hofman, H. O., (The Metallurgy of Lead and the Desilverization of Base Bullion' (7th impression. New York 1904) ; id., (Hydro- metallurgy of Silver) (London 1907) ; McGraw, H. A., (Details of Cyanide Practice' (New York 1914) ; Percy, J., (Metallurgy of Silver and Gold' (part 1, London 1880) ; Schnable, C., trans. by Louis H., (Metallurgy' (2 vols., 2d ed., London 1905). For statistics of production con¬ sult The Mineral Industry and the Mineral Re¬ sources of the United States ; for current metal¬ lurgy see the Engineering and Mining Journal and the Proceedings of the American Institute of Mining Engineers.

SILVER, Fulminating. See Explosives ; Fulminates.

SILVER, Refining of. See Electrochem¬ ical Industries.

SILVER AGE, the designation applied to the second mythological period in the history of the world, under the care of Jupiter. It suc¬ ceeded the Golden Age. The phrase is also ap¬ plied to a period of Roman literature succeeding the most brilliant period, and extending from about 14 a.d. to 180 a.d.

SILVER CITY, N. M., city and county- seat of Grant County, 185 miles southwest of Albuquerque, on the Atchison, Topeka and Santa Fe Railroad. The city is important as a health resort, particularly for tubercular cases, and has several private sanitoria. The United States military hospital is at Fort Bayard, nine miles distant. The surrounding country is oc¬ cupied in stock-raising and there are valuable gold, silver, copper, zinc, lead and turquoise mines. The New Mexico Normal School is located here. Pop. (1920) 2,662.

SILVER CREEK, N. Y., town in Chau¬ tauqua County, on Lake Erie, 20 miles south¬ west of Buffalo, and on the Lake Shore and Michigan Southern and the New York, Chicago and Saint Louis railroads. It is situated in a vineyard district, has natural gas and manu¬ factures furniture, ■ United States post office canceling machines and grain-cleansing ma¬ chinery. Pop. 3,260.

SILVER FOX, a glossy black variety of the Canadian red fox (Vulpes fulvus) with a silvery grizzle on the forehead, and on the flanks passing upward to the rump. It is ex¬ tremely rare in the wild state and the fur is very valuable. In Prince Edward Island and elsewhere in

Canada and northern United States great numbers of this species are now bred in enclosures and reared for two years, when they are killed for their fur. See Fur Farming.

SILVER GRAYS. See Whigs.

SILVER QUESTION. See Banks and Banking; Bimetallism; Bryan, William Jen¬ nings; Democratic Party; McKinley, Wil¬ liam ; Money.

SILVER SPRING, Fla., a famous spring in Marion County, 14 miles northeast of Ocala, emptying into Ocklawaha River through Silver Creek Run, a stream nine miles long, of crystal transparency, and of sufficient depth to permit river steamers to navigate to the spring itself. The spring is about 200 feet wide and dis¬

charges daily more than 300,000,000 gallons of water of a uniform temperature of 72.2° F. The water rushes up through fissures in the limestone rock, there being five principal open¬ ings and many of smaller size, and keeps in con¬ stant agitation the bed of white sand. The water is unfit for drinking purposes owing to certain mineral qualities, but is so clear that the bottom of the spring may be seen at depths from 60 to 80 feet. There are several similar springs in Florida, but Silver Spring is most accessible and best known, a railroad running to it in addition to its steamboat connection. The spring is said to have been visited by De Sota, and to have been the <(Fountain of Youth" of Ponce de Leon's search.

SILVER STANDARD. See Bimetallism. SILVER WEDDING. See Weddings. SILVERBERRY. See Oleaster. SILVERING. See Gilding. SILVERINGGLASS. See Mirror.

SILVERMAN, Joseph, American rabbi : b. Cincinnati, Ohio, 25 Aug. 1860. He was graduated at the University of Cincinnati in 1883 and later studied at the Hebrew Union College, where he took his D.D. in 1887. He was ordained in 1884 and was minister to con¬ gregations in Texas in 1884-88. Since 1888 he has been rabbi of Temple Emanu-el, New York. He was president of the Central Con¬ ference of American Rabbis in 1900-03 ; or¬ ganized the Emanu-el Brotherhood ; is a trus¬ tee of Hebrew Union College; and in 1913 was associate editor of the Peace Forum. He contributed to the Encyclopedia Americana' and is author of (Catechism on Judaism'

(1896).

SILVERSIDE, a name given to various small fishes because of their bright silvery color and especially to members of the family

Atherinidce of the order Percesoces. These fishes have the third upper pharyngeal bone enlarged, slender and elongated bodies with rather large, easily detached cycloid scales. The spinous dorsal fin is weak and well separated from the soft dorsal, the ventral fins are on the middle of the abdomen and the pectorals at a high level. Most of them are small carnivorous fishes living in schools in shallow bays of the sea, but a few are fresh-water. They are im¬ portant chiefly as food for other fishes, but several of the larger ones are valued as human food. Fifteen genera and 60 species have been enumerated, most of which are North American. They abound especially in the Gulf of Mexico. Menidia notata is the form best known along the coast of the New England and Middle States, where it abounds. It is a delicate translucent little fish of a greenish color, has a conspicuous lateral silvery band and is found everywhere along the shores in large schools. They may be fried to a crisp and eaten whole like smelts. The brook or lake silverside (Habidesthes sicculus) is found abundantly in ponds and sluggish streams throughout the Mississippi Valley and Southern States, and is often called skipjack. Consult Jordan and Evermann, (Food and Game Fishes' (New York 1903).

SILVERWARE. Frequently termed plate or silver plate. From the nature of the use

to which articles composed of silver are put they are often classified under such heads as ecclesiastical and civil, or ecclesiastical, munici¬ pal and domestic. The usual styles of manipu¬ lation of the metal in producing silverware are hammered or repousse, engraved, chased, enameled, etc.

Antiques. — It was a very frequent condi¬ tion of the troublous early periods of European history that the inhabitants of a castle or small town had to migrate, taking what wealth they had with them. The Roman invaders' generals often carried with them on their campaigns large services of silver for their camp life. Frequently such migratory hordes were at¬ tacked and overwhelmed, and, if time permitted, they hurriedly buried their most valued pos¬ sessions. To such action we owe much treas¬ ure-trove and from the ((finds® we learn to what a marvelous perfection the ancients brought their silver plate. Among the most important discoveries by accident of such hid¬ den wealth are the following: The "Treasure of Bernay,® discovered (1830) at Berthouville, Normandy, contained 69 pieces, weighing about 55

pounds, of beautifully wrought, embossed, decorated silverware. Part belonged to the treasury of a temple of Mercury at Canetum 2,500 years ago. Two ewers (cenochoe) had chased subjects from the (Iliad) and the his¬ tory of Achilles, the Greek hero. One of these pieces contains fine depictions of no less than 42 personages. The collection is in the Bibli- otheque Nationale, Paris. The pieces are of different dates — before the Roman Empire up to the 3d century a.d. Another wonderful buried collection of silverware is the <(Hildesheim Treasure,® now in the Antiquarium Museum, Berlin, discovered in 1868. It consists of 74 pieces ; drinking vessels and table utensils, mostly well preserved and belonging, probably, to the 1st century a.d. The decoration is in Greco-Roman repousse work of the most exqui¬ site description. Replicas of this treasure are in the Metropolitan Museum of Art, New York. Another remarkable silverware discovery was that known as the (<Boscoreale Treasure.® It was discovered in 1895 in a buried Roman villa near Pompeii. The lovely workmanship and design point to the last years of the republic, some to the first years of the empire. It con¬ tains 98 pieces of silverware in beautiful repousse decoration ; cups, vases, phials, shal¬ low dishes, casseroles, spoons, mirrors, etc. A very fertile field of discovery of buried ancient silverware is the Crimea, where a large amount of treasure has been unearthed (mostly now in Petrograd) from burial grounds of the Scyth¬ ians. They date from 2,500 to 3,000 years ago and are of Greek workmanship.

History. — The story of craftsmanship in the precious metals of the Middle Ages is largely one of furnishing of .gold and silver ecclesiastical pieces for the Church and its services. With the growth of wealth of roy¬ alty and nobility from lack of banking facili¬ ties, much of the saving was turned into gold and silversmiths' work. Starting about the 13th century we find the almory containing more precious wares of the family. The cupboard consisted of boards placed on trestles to hold and display the wealth in silver cups and other wares of the family. This easily portable

furniture gave way, in times of peace, to a made-up "dresser® of so many (<stages® or shelves on which to <(dress,® or display, the silver services and show-pieces. With greater refinement arrived the <(sideboard® or "cre- dence® for the same purpose, to be followed by the "buffet.® The number of ((stages® kept in¬ creasing as the wealth in plate grew, till royalty imposed an edict against the extravagance and restricted the number of shelves according to the rank of the owner. B> the 16th century the hoards of plate were enormous. In England Henry' VII left over $10,000,000 worth; the cup¬ board of Henry VIII had seven tiers of plate; and so it was in

other countries, especially Spain. Immense quantities of silver were arriv¬ ing in Europe from conquered Mexico and Peru; the silver mines of Potosi alone had brought to Spain by 1633 no less than 845, 000,- 000 pesos. Italy in her Renaissance brought forth many great artist-goldsmiths (see Gold- smithing) but perhaps, her most noted service of silverwrare is that produced by Benvenuto Cellini. It is in the Pitti Palace, Florence, and consists of 12 tazze, each tazza representing a month in the year. Germany had, in the 16th centuryˆ, centres for gold and silver smithing at Augsburg and Nuremberg. Her taste was run¬ ning to quaint forms and decoration such as cocoanut shell and ostrich shells mounted as cups, other standing cups had bodies of pine¬ apple (ananas) form, others again were studded with hemispherical or pear-shaped protruber- ances. Wentzel Jamnitzer, throwing aside the Gothic, often assumed Renaissance tendencies in his remarkable pieces. Mathias Walbaum and Hans Petzolt gained fame for their silversmiths' work in the 17th century; Dinglinger did fine silver work on table centrepieces, etc., in the 18th century. In France, already in the 13th century, Philippe le Hardi granted his silver¬ smith (argentier) Raoul letters of nobility. The dukes of Burgundy by the 15th century gloried in amassing great collections of gold and silverware. Louis, Duke of Anjou (14th century), had nefs, standing salts, enameled flagons, fountains, coupes, goblets, basins, even kitchenware, of silver. In 1360 the city of Paris presented Jean le Bon with a gift of silver vessels. By the 17th century France had become famous for her articles in the precious metals (see Goldsmithing) and their makers, all pieces to be swallowed up in the melting pot for war purposes. The following century under the regent, Louis XV, Louis XVI and Napoleon, the royal factory of the Gobelins produced magnificent wares in the precious metals. Paul Lamerie, the French silversmith, went to England in 1712 and produced prolifically in London for 40 years. His silver pieces show sober, artistic decoration for a long time, then he gave way to the demand for over¬ elaboration of ornament, later to come under the sedate ruling of the Greek Classic style. Under the brothers Adam silverware underwent a great reform in the 18th century; tea and coffee urns, ewers, sugar bowls, creamers, etc., came under the influence of the Greek art wares being excavated at Pompeii and Hercu¬ laneum. The great rarity of examples of silverware of certain periods is accountable from the fact that warfare, at times, called for all the precious metals available to help out

SPOONS

Above: English Types (17th, 18th and 19th Centuries) Below: German and Dutch Types (17th, 18th and 19th Centuries)

the empty treasuries. In 1521 Francois Premier ordered his subjects to send their silverware to the mint. The (<grande Fonte® under Louis XIV lasted six months (1688-89) and was the most prodigious in destructive power. Great pieces of massive silver furniture as well as table services (the king's treasure alone had cost over 10,000,000 francs and fetched only 3,000,000 francs in coin) were sacrificed. The year 1760 witnessed once more the journey to destruction of France's best plate, and in 1790 came the voluntary (<patriotic fonte.® In the Wars of the Roses in England so much plate was destroyed that examples of silver plate antedating 1500 are very scarce. The Reformation (16th cen¬ tury) swept away all the silverware discover¬ able. Charles I of England, in 1643, to replen¬ ish his empty treasury, ordered that all silver¬ ware be melted down and paid for at five shil¬ lings per ounce; 12 Oxford colleges contributed 1,610 pounds per week, and the gentry 700 pounds each week. Coming down to strictly modern times, we must deplore the fact that 19th century Europe and England in the Vic¬ torian period were in a decadent stage in art work and silverware followed the vulgarized styles. France with her ((nouveau art® and Germany with her ((Jugend® style have strug¬ gled but not succeeded in reaching any admir¬ able stage of art production.

Silverware Products. — Ecclesiastical pieces made of silver or silver-gilt are candle-sticks, censers, incense boats, chalices and patens, pyxes, monstrances, bells, crosses, croziers, acolyte standards bearing candles, ewers, cruets, alms dishes, ablution bowls. The chalice is composed of a bowl (usually hemispherical or slightly elongated), a stem having, half way down, a <(knop® or protuberance, and a flaring foot. While the bowl is nearly always plain (so as to be easily kept clean), the rest of the piece is elaborately ornamental. In the Protest¬ ant Church the communion cup takes the place of the chalice. It is frequently chalice-shaped but more often has the form of a goblet, a tankard or a beaker. The flagons, tankards and beakers found in church plate have fre¬ quently been made for profane use, but as articles of beauty and value have been dedi¬ cated by will to the Church.

Municipal Plate. — Every guild (from gold¬ smiths' to tinsmiths') in Europe has its treas¬ ure of plate which is displayed on the table at ban¬ quets and other civic functions. And the large amount and high quality of the ware found even in obscure towns is often a surprise to

the stranger ; such property is, however, usually the accumulation of centuries of presents made by the wealthy in each generation. Every town hall (Rathshaus or hotel de ville) has a large array of plate services as well as magnificent show pieces. The colleges pride themselves on their great silver and gold services.

Domestic Plate. — Chief pieces used in the last centuries in domestic circles are ewers, beakers, bowls, caudle cups, cruet stands, flagons, hanaps, tankards, monteiths and other punch-bowls, urns, salvers, posnets, trussing cups, porringers, tumblers, goblets, wager cups, tasters, etc. Earliest forms of coffee pots date from 1670 to 1681 ; earliest teapots date from 1717; to such services belong, later, creamers, milk pitchers and sugar bowls. Forks at first had two prongs and were used only for eating vol. 25 — 2

fruit; the four-pronged fork came into use first in 1682. Silver spoons of a highly artistic form ((<keel and disk®) were made in Greco-Roman times. In the study of spoons in the centuries

Bell Salt, dated 1608

Epergne by Wentzel Jamnitzer, (about 9 inches high) in Louvre (Paris) German, showing Renaissance ten¬ dency.

Hour-Glass Salt. 15 th Century.

Steeple Salt, dated 1626.

Cylindrical Salt, dated

1.

Napkin Salt, dated 1664.

is

SILVERWARE

the style of <(knop® or finial of the handle defines the period, besides the changing in shape of the bowl. As to these knop styles, we read in 1446 already of the ˆmaidenhead® spoon ; other varieties follow : Acorn, diamond point, fruitlet, writhen, strawberry, death's head, slipped-in-the-stalk, Puritan, scallop-shell, owl, lion-and-shield, Pudsey, seal-top, capital, baluster, pied-de-biche, etc. The 17th century spoon handle was joined to the bowl in a di¬ minishing prolongation down the back of the bowl ; this is known as the ® rat-

tail® spoon. Early spoon bowls run to (<fig-shape,® then oval, then inclining to be pointed at lower end. Greatly prized of collectors are the souvenir birth-spoons termed ((Apostle® spoons, each ded-

not known; first mention is in 1537. The ((an- nual letter® alphabet has but 20 letters — J, U, W, X, Y, Z are omitted. Since 1560 they have been enclosed in regular heraldic shields of vari¬ ous shapes; before then a line roughly outlining the letter was used. The change to another style alphabet has proceeded regularly every 20 years from 1478 till 1696, when a fresh alpha¬ bet was used. (4) Place-mark of assay town. (5) Maker's mark — enforced, in England, since 1363 required each silversmith to have a mark of his own. Symbols, emblems or initials were used at first; from 1697 to 1720 the first letter of the surname was used alone, but from the latter date to 1739 one or two initials were used indiscriminately. Then the ˆinitials of their

Full Set of Apostle Spoons, in Goldsmiths' Hall, London. Dated 1626.

Only full set of one date known. (1) Saint James the Less. (2) Saint Bartholomew, (3) Saint Peter. (4) Saint Jude. (5) Saint James the Greater. (6) Saint Philip. (7) The " Master." (8) Saint John. (9) Saint Thomas. (10) Saint Matthew. (11) Saint Matthias. (12) Saint Simon Zelotes. (13) Saint Andrew.

icated and having as finial a representation of one of the apostles. Actual pieces of art, fre¬ quently are the nefs (formed, like ships), epergnes, standing salts (hour-glass salts, cyl¬ indrical salts, bell salts, steeple salts, napkin salts, etc.).

<(Hall® and Other Marks. — A very import¬ ant feature to collectors of silverware is the fact that all of it is marked since the 14th cen¬ tury by law. In 1313 Philippe le Bel, king of France, ordered that all gold be stamped with the punch (poingon) of the Goldsmiths' Com¬ pany of Paris. The <(touche de Paris® in this law became the recognized English standard for sterling silver. Edward I, in 1300, had be¬ stowed the privilege of assaying the precious metals to the London Goldsmiths' Company. Punch marks used on English plate are: (1) Standard — a lion passant in England, a lion rampant in Glasgow, a thistle in Edinburgh, a crowned harp in Dublin. (2) Duty mark — head of reigning sovereign (figure of Hibernia in Dublin). This mark was added in 1874 till 1890, when duties were abolished. (3) Date letter (or ((annual® letter). Its starting point is

Christian and surnames® was ordered and con¬ tinued to this day. In

1675 the law enforced that ((all manner of silver vessels be assayed at Goldsmiths' Hall® and be approved by striking each piece with the lion's and leopard's head, crowned, or one of them. From 1697 to 1720 the lion's head erazed and Britannia were used instead of lion's head and lion passant.

Sheffield Plate. — The discovery of the process used in the production of this ware was made by a Sheffield cutler, Thomas Boul- sover (often misspelled Bolsover), in 1742. He found that a layer of silver could be welded to a copper plate by heat and pressure. He ap¬ pears to have made only plated buttons and small ware. Joseph Hancock soon advanced the method into the making of table services and larger pieces. The silver fused to the base metal was standard 925 alloy. This early ware was plated only on one side ; ((double-plating® (on both sides) started some time between 1763 and 1770. To hide the central layer of copper exposed on the edge it was necessary to attach a border or edging. This edging was first produced by placing the copper sides of

SILVERWARE

*** A

1 Hanap, Nuremberg, 1st half of 17th Century

2 Two-handled Loving-cup. London, 1743 t

3 Standing cup, Augsburg, Early 17th Century. In New York Metropolitan Museum of Art

4 Old American Silverware. Pieces by Paul Revere in Exhibition at the Boston Museum of Fine Arts

SILVERWARE

1 Teapots, English Sheffield Plate, 18th Century

2 Salvers, English Sheffield Plate, 19th Century

SILVERWARE

19

two pieces back to back and solder-tinning the edges (1755-85). Cadman then invented the system of soldering on a solid silver edging shaped to fit. The (<edgings® of Sheffield plate are one of its chief

characteristics. Starting with simple silver ware (((thread®) edges or borders, by 1820 highly ornate, heavy, deep relief scroll¬ work and bold designs became vogue. It is the renowned aGeorgian® style The flat-chased large trays and salvers. dating between 1815 and 1830 are probably (if in good condition) more prized than any other pieces of <(01d Sheff® ware. From 1830 to 1840 is the (<transition period® when German silver and other light- colored alloys took the place of copper as a base. The enormous demand for fine Sheffield plate ware in the period is easily conceivable when we remember that the great difference in cost brought fine silver services within the reach of many thousands of the middle classes who had been using pewter and earthenware. The beauty of some of the elaborate creations brought about by the immense and profitable sales made the nobility and gentry converts to its prestige, even royalty took to the majestic epergnes, tea and coffee <(equipages® (consist¬ ing of urns for hot water, tea and coffee) which were more attractive than any solid silverware ever before produced. But the brothers George and Henry Elkington, of Birmingham, invented a method of silver deposition on base metal by electric current. After patient perfection of their process they obtained, in 1840, a patent for the electro-plating process as done at this day. The extremely low price at which base metal pieces could be produced with a precious metal surface of any desired thickness quickly killed the Sheffield plate business and rapidly evolved a great industry.

Colonial Silverware. — Much early silver¬ ware found in the New England States was im¬ ported from France and England. But the sil¬ versmiths of this country grew in number with the increase of wealth of the colonies. Boston and New York were the producers of most of this early American plate, but there were a num¬ ber of workers in silver (strange to say, many of them were blacksmiths as is shown by con¬ temporary documents) in Connecticut who did very fine workmanship in silver vessels as re¬ cent displays of extant 17th and 18th century pieces prove. Philadelphia, Baltimore, Albany and Troy also boasted of their clever silver¬ smiths in those days. Building up a historic out¬ line from researches made recently we are ar¬ riving at many interesting points on colonial sil¬ ver ware and its makers. The earliest Connecti¬ cut silversmith recorded appears to be Job Prince of Milford (born about 1680, died about 1703) ; next comes Rene Grignon (Huguenot), who settled in Norwich before 1708. Daniel Deshon was Grignon's apprentice and went to New London. Cornelius Kierstead was a New Yorker but (about 1722) worked in New Haven, Hartford, New London, Norwalk and Water- bury. John Hull (1624-83) was a wealthy Mas¬ sachusetts silversmith and his ability is

shown in existing communion cups in the First Church of Boston. He became ((Mint master of Massa¬ chusetts® and made silver money for local cir¬ culation, the British coin being almost entirely absent. He set up (1652) a mint in Boston (dis¬ regarding the English Crown's sole right to coin money). Hull got one shilling of every 20

coined. 'The ˆPine-tree® shilling was coined for 30 years and Hull got so wealthy he became a banker as well as silversmith. David Jesse worked in Boston early in the second half of the 17th century — a beaker of his dated 1672 is one of the oldest American pieces existing. Jeremiah Dummer (1645-1718) of Boston has left us a number of pieces. John Cony (1655— 1722) also worked in Boston and had as ap¬ prentice Apollos Rivoire, who came to Boston from Germany. He had a family of 12, of which the noted patriot Paul was third. The latter started work in his father's shop and was but 19 when his father died (1754). Paul Re- vere's (the family name was changed) histori¬ cal career is too well known to repeat here. Many of the Revere pieces exist; 65 pieces ap¬ peared in one Boston exhibition (1906). Un¬ fortunately there is little to prove which signed pieces belong to father or son. One very small salt has the inscription ((The Illustrious Ninety Two,® referring to the 92 members of the house of representatives of Massachusetts who refused their signatures for rescinding the circular letter sent to the sister colonies to all join action. Another piece of historic note is Revere's punch-bowl ordered by the 15 Sons of Liberty, their names encircling its rim. We have the names of numerous New York silver¬ smiths of early days but their wares have dis¬ appeared. Other early silversmiths worth men¬ tion are Beach, Ward, Sargeant, Pitkin and Rogers of Hartford, and Merriman, Gorham, Chittenden, Bradley and Brown of New Haven. By 1715 Connecticut citizens were wealthy enough to be buying coffee and chocolate pots, braziers (forerunners of our chafing dish), elaborate urn-shaped loving cups, porringers, patch boxes, snuff boxes, caudle cups, etc. The early pieces (17th century) were few and simple (both church and domestic), beautiful ware; gradually came the advance to more elaborate forms and a greater variety of articles. One cause of a reduced number of extant pieces was the early 19th century prohibition move¬ ment which melted down drinking vessels to make spoons out of the metal. Modern Ameri¬ can silverware holds its own to the present day compared with that of other lands as has been proven at many World's Fairs. The products of Tiffanys have shown many charming and original creations and the Gorham Company at its Providence shops has made a world-wide reputation with its martele style of ware. This style shows the hammer marks as so many facetted surfaces for lovely reflections.

Bibliography. — Bigelow, F. H., (Historic Silver of the Colonies and Its Makers' (New York 1917) ; Boston Museum of Fine Arts, (American Church Silver of the 17th and 18th Centuries) (Boston 1911) ; Bradbury, F., his¬ tory of Old Sheffield Plate) (London 1911) ; Buck, J. H., (01d Plate: Its Makers and Marks *(New York 1903) ; Chaffers, W., (Hall Marks on Gold and Silver Plate) (London 1872) ; Cripps, W. J., (01d English Plate) (London 1901) ; id., <01d French Plate) (London 1880) ; id., (College and Corporation Plate) (London 1881) ; Curtis, G. M., (Early Silver¬ smiths of Connecticut (Meriden 1911) ; Dyer, W., (Lure of the Antique) (New York 1910) ; Ensko, R., (Makers of Early American Silver * (New York 1915); French, H., <A List of American Silversmiths and Their Marks* (New

York 1917) ; Halsey, R. T. H., (American Silver of the 1 7th and 18th Century Silver¬ smiths' (Boston 1906) ; Hayden, A., (Chats on Silver' (New York 1916) ; Hiersemann, K. W., (Gold und Silber' (Leipzig 1899) ; Holbrook, J. S., (Silver for the Dining. Room; Selected Periods' (Cambridge 1912) ; Hope, W. H. St. J., and Fallow, T. M., (English Chalices and Patens' (in Archceological Journal, London 1887) ; Howard, M., (01d London Silver'

(London 1903) ; Jackson, C. J., (An Illustrated History of English Plate, Ecclesiastical and Secular' (London 1911) ; id., (English Gold¬ smiths and Their Marks' (London 1905) ; Jamestown Ter-Centennial Exposition Cata¬ logue of the Massachusetts Loan Exhibit (Jamestown 1907) ; Jewelers' Circular, (Trade Marks of the Jewelry and Kindred Trades' (New York 1915) ; Jewitt, LI., and St. John, (The Corporation Plate and Insignia of Office of the Cities and Towns of England and Wales' (London 1905) ; Jones, E. A., (01d English Plate of the Emperor of Russia' (London 1909) ; id., (The Old Royal Plate in the Tower of London' (Oxford 1908) ; id., (01d Silver of American Churches' (London 1913) ; id., Catalogue of the Gut¬ man Collection Purchased by Mr. J. P. Mor¬ gan' (London 1907) ; Lowes, E. L., (Chats on Old Silver' (New York 1915) ; Lutschaunig, A., (The Book of Hall Marks' (London 1872) ; Macquoid, P., (The Plate Collector's Guide' (New York 1908) ; Metropolitan Museum of Art, (Catalogue of Silver Used in New York, New Jersey and the South' (New York 1911) ; Pollen, J. H., (Ancient and Modern Gold and Silversmiths' Work in the South Kensington Museum' (London 1878) ; Roth, H. L., Ori¬ ental Silverwork; Malay and Chinese' (Lon¬ don 1910) ; Singleton, E., (01d Silver' (New York 1916) ; Veitch, H. N., Sheffield Plate' (London 1908)

; Watson, B. W., (01d Silver Platers and Their Marks' (Sheffield 1908) ; Westman, H. O., (The Spoon; Primitive, Egyp¬ tian, Mediaeval and Modern' (London 1845) ; Worcester Art Museum, Exhibition of Old Sil¬ ver Owned in Worcester County' (Worcester

1913).

Clement W. Coumbe.

SILVESTER, or SYLVESTER, the name of two popes and an antipope, as follows :

SILVESTER I, Saint. He succeeded Saint Melchiades in 314 and his pontificate lasted till 335. He presided through his dele¬ gate at the Council of Nice and is said to have held a council at Rome to condemn the errors or Anus and others. The story of his having baptized Constantine is pure fiction, as it is known that the latter was baptized by Eusebius at Nicomedia. Many churches were built or completed in his reign. During his pontificate the Arian heresy was at its height, against which Saint Athanasius was the great opponent. Consult Dollinger, (Church History.'

SILVESTER II (Gerbert) : b. Aquitania; d. Rome, May 1003. At an early age he entered the monastery of Saint Gerard, in Aurillac, and after laying a foundation for all the sci¬ ences cultivated in that age he went to Spain to hear the Arabian doctors and was later ap¬ pointed by Hugh Capet preceptor to his son, Robert. Otho III, emperor, who had also been bis pupil, conferred upon him the archbishopric

of Ravenna in 998; and on the death of Gregory V, in 999, procured his election to the papacy, when he took the name of Silvester. He was a great promoter of learning and a proficient in various branches of science himself, his sci¬ entific knowledge procuring for him the repu¬ tation of a magician. He composed a number of works, particularly on arithmetic and geom¬ etry; and with his own hands made a clock, a globe and an astrolabe. Several of his letters on various subjects were printed at Paris in 1611; but the most complete collection has been given by Du Chesne. He was the first French¬ man to ascend the papal chair. Consult the collected edition of his works edited by A. Olleris (Clermont 1867).

SILVESTRE, sel'ves'tr’, Paul Armand,

French author: b. Paris, 11 April 1837; d. Toulouse, 19 Feb. 1901. He studied at the Ecole Polytechnique and in 1870 entered government service in the department of finance, in which he became deputy chief

of the bureau. In 1892 he was appointed inspector of fine arts. He became well known as a poet of the Parnassian School, was an art critic and dramatist of ability; and, in contrast to his other work, a contributor of somewhat licentious tales to Gil Bias and other publications of that order. Author of (verse) (Rimes Neuves et vieilles' (1866) ; (Les Renaissances' (1870) ; (La Chan¬ son ses heures' (1878) ; (Le Chemin des etoiles' (1885) ; (tales) (La Vie pour rire' (1881-83) ; (Gauloiseries Nouvelles' (1888) ; (dramas) <Sappho' (1881); <Henry VIII' (1883); (art criticism) (Le Nu au Salon' (5 vols., 1888-92), etc.

SILYBUM, a genus of composite plants, the best-known species being the holy thistle or lady's milk. Y. marianum is a tall plant with large spreading prickly leaves ; those near the base are pinnatifid, and spotted with white, stained, according to legend1, by drops of the Virgin's milk. It was formerly cultivated in English gardens, not only for ornament, but also for its edible roots, leaves and large, purple heads, surrounded by spiny involucre. It has become naturalized in some parts of eastern North America.

SIMANCAS, se-man'kas, Spain, seven miles southwest of Valladolid, on the Pisuerga, is an old walled town. The ancient castle was con¬ verted into a record hall, where the archives of the kingdom have been preserved since the reign of Philip II (1563). They comprise 30,000,000 state and private documents, and occupy 46 rooms. The town contains a Roman bridge and the remains of Roman fortifications. It has large interests in cereal, fruit and viticul¬ ture in the neighborhood. Pop. 11,000.

SIMBIRSK, sim-bersk', Russia, (1) capi¬ tal of a government of that name, on the Volga, 576 miles by rail southeast of Moscow, is a well-built town. The chief buildings occupy an eminence overlooking the river; the business portion is lower down, and still farther are the quarters of the poor. There are two Greek cathedrals, gymnasia for children of both sexes, several other mixed schools, a sana¬ torium, two public libraries, a good theatre and many flourishing benevolent institutions. There is a public garden on Vyenets Hill, and numer¬ ous private gardens. Fruits are cultivated and

exported. Fishing is one of the chief occupa¬ tions. Trade in corn, potash, wool, fruits, woodenware and manufactured goods is con¬ siderable. As usual in Russian towns, an enor¬ mous business is

transacted at the annual fair. Karamzin was born here. Pop. 64,000. (2) The government of Simbirsk contains an area of 19,110 square miles. Its vast plain is watered by the Volga, and is fertile. The higher nor- tions are at the east. The west is traversed by numerous rivers, and the Sura is the principal stream in this section. Its tributaries are not navigable. The forests of the government are quite extensive ; there are broad pastures, much arable land, a few lakes, and marshes. The climate is very severe, great extremes being the rule. The chief crops are cereals, flax, hemp, tobacco and hay. Fish are abundant. Sulphur, iron ore, salt, ocre, asphalt and building stones are quarried. All kinds of woodenware are made, besides felt goods, nets, ropes, gloves, caps and handkerchiefs. The larger manufac¬ tories include woolen mills, tanneries, glass and starch works, wagon and carriage works and flour mills. The value of industrial output in normal years is over $5,000,000. The exports are grains. Pop. 1,997,400.

SIMCOE, sim'ko, John Graves, first gov¬ ernor of Upper Canada: b. Cotterstock, North¬ amptonshire, England, 25 Feb. 1752; d. Torbay, Devonshire, 26 Oct. 1806. He was educated at Eton and Oxford, and in 1771 entered the army as ensign. He fought throughout the war against the American colonies, and was made a colonel in 1781. Returning to England after Cornwallis' surrender, he entered Parlia¬ ment in 1790 as member for Saint Mawe's, Cornwall; and in 1791 on the division of the Canadas, became the first lieutenant-governor of Upper Canada. He established his capital at Newark (now Niagara) on 8 July 1792 and began his administration with a legislature, of seven members. He encouraged the Loyalists from the independent States to settle in the new country and devoted himself to its agri¬ cultural development and military defense. In 1793 he set about removing the seat of govern¬ ment from Newark to Toronto, which capital he practically founded. In 1794 he was ap¬ pointed commandant of Santo Domingo; but returned to England in 1797, where he was promoted lieutenant-general. In 1806 he was appointed commander-in-chief in India, but was taken ill on the voyage out and obliged to re¬ turn. Consult Scott, D. C., (John Graves Simcoe) (Toronto 1905).

SIMCOE, Canada, town and county-seat of Norfolk County, Ontario, 40 miles southwest of Hamilton, and eight miles north of Lake Erie, on the Grand Trunk and the Wabash railroads. There are manufactures of woolen goods and of <(warping tugs,® the land-and- water boats used in the Canadian- lumber in¬ dustry. Pop. 3,227.

SIMCOE, Lake, Ontario, Canada, a lake situated about midway between Georgian Bay and Lake Ontario. It is about 30 miles long and 18 miles wide, and contains several islands. The banks are densely

wooded, and good white- fish are found in its waters. It discharges into Georgian Bay through the Severn River. Barrie and Orillia, connected with the Canadian railway system, are the chief towns on its

shores. Its shores witnessed the war of exter¬ mination between the Huron and Iroquois.

SIMEON, sim'e-on, the second son of Ja¬ cob and Leah, and ancestor of one of the Twelve Tribes of Israel, which dwelt to the north of the tribe of Judah. When Simeon and his brethren went into Egypt to buy corn, his brother, Joseph, then chief minister of Egypt, but not yet known to his brethren, in¬ sisted on Benjamin, the youngest brother, be¬ ing brought to him, and detained Simeon as a hostage for his forthcoming. Consult Graf, (Der Stamm Simeon) (Meissen 1866) ; Meyer, Edward, (Die Israeliteˆ (Halle 1906) and Steuernagel, (Einwanderung der israelitischen Stamme) (Berlin 1901).

SIMEON STYLITES, sti-li'tez. See Pil¬ lar Saints.

SIMETO, se-ma'td, or GIARETTA, ja-

ret'ta, the largest river of Sicily. It flows west and south of Mount Etna into the Gulf of Catania, is 93 miles long, but unnavigable.

SIMFEROPOL, sim-fer-6'poly', Russia, capital of the government of Taurida, in the Crimea, on an elevated plain at the foot of lofty hills 40 miles northeast of Sebastopol. It consists of an old and a new town — the former poorly built, and occupied chiefly by Tatars, the latter with a handsome square and regular, spacious streets, and has several churches and mosques, a gymnasium and a large civil and military hospital. Under the Tatars it was known as Ak-mechet; in 1736 the Russians captured and burned it. When the Crimea fell to Russia in 1784 the town re¬ ceived its present name. Pop. 69,666.

SIMIID2E, the family which embraces the anthropoid apes. See Ape and the names of the animals there referred.

SIMILARITY. In geometry similar fig¬ ures are those which are mutually angular and have their homologous sides proportional. The homologous sides are those which are adjacent

to the equal angles. Thus the figures ABCD, EFGH are similar if the angle A equals angle E; angle B equals F, angle C equals G, etc., and

BC

— equals

—

EF

FG

which CD which

equals GˆH equals j-jjj

The constant ratio of any two homologous sides of similar figures is called the ratio of similitude of the figures. Triangles which are mutually equiangular are similar. Two tri¬ angles are similar when two angles of the one are equal respectively to two angles of the other ; therefore, a triangle is similar to any tri¬ angle cut off by a line parallel to one of its sides. Triangles which have their homologous sides proportional are similar. Two triangles which have an angle of the one equal to an angle of the other, and the sides about these angles proportional, are similar. Two triangles

which have their sides parallel or perpendicular, each to each, are similar. If two polygons are composed of the same number of triangles, similar each to each and similarly placed, the polygons are similar. In solid geometry, simi¬ lar polyhedrons are those whose corresponding polyhedral angles are equal, and which have the same number of faces, similar each to each, and similarly placed. Any two homologous tetrahedrons are similar. Two similar tetrahe¬ drons are to each other as the cubes of their homologous edges, and two similar polyhedrons are to each other as the cubes of their homologous edges; therefore, similar prisms, or pyramids, are to each other as the cubes of their altitudes and similar polyhedrons are to each other as the cubes of any two homologous lines. Similar cylinders of revolution are those generated by similar rectangles revolving round homologous sides. The lateral areas, and the total areas, of two similar cylinders of revolu¬ tion are to each other as the squares of their altitudes, or as the squares of the radii of their bases. The volumes of similar cylinders of revolution are to each other as the cubes of their altitudes, or as the cubes of their radii. Similar cones of revolution are those generated by

similar right triangles revolving round homologous perpendicular sides. The lateral areas, or the total areas, of two similar cones of revolution are to each other as the squares of their radii, or of their slant heights, or of their altitudes, and the volumes of similar cones of revolution are to each other as the cubes of their altitudes, or as the cubes of the radii of their bases.

SIMILE, a common figure of speech, in which two things which have some strong point or points of resemblance are compared. It differs from metaphor by reason that the re¬ semblance between object and image is stated expressly by means of the words like or as, whereas in the metaphor the resemblance is assumed. Among the most famous similes of masters of literature are “About as much privacy as a goldfish® (Irvin S. Cobb) ; “Winter, like a cold, unapproachable beauty, retains her character until the lawful season of thaw has arrived® (Goncharon) ; (<Hard as a barren stepmothers’ slap® (Lady Gregory) ; “Distant as the dead® (Schiller) ; ((Tedious as a twice told tale® (Homer) ; “Fleeting as the wings of sleep® (Virgil) ; “Black as a crow® (Chaucer) ; “Hooted at like an old tale® (Shakespeare) ; “You look at a star from two motives, because it is luminous and because it is impenetrable. You have at your side a softer radiance and a greater mystery — woman® (VictorHugo). Consult Wilstach Frank J., dictionary of Similes) (6th ed., 1916).

SIMKHOVITCH, sim-ko'vich, Mary Me¬ linda Kingsbury, American social economist, wife of V. G. Simkhovitch (q.v.) : b. Chestnut Hill, Mass., 8 Sept. 1867. She was graduated at Boston University in 1890 and later studied at Radcliffe College and at the universities of Berlin and Columbia. She was married to Dr. Simkhovitch in 1899. She was head worker at the College Settlement, New York, in 1898; at the Friendly Aid House in 1898-1902, and since 1902 has been at Greenwich Village House, New York. In 1907-10 she was adjunct pro¬ fessor at Barnard College, and she was as¬

sociate in social economy at Teacher’s College, Columbia University, in 1910-13. Since 1912 she has lectured at the New York School of Philanthropy.

SIMKHOVITCH, Vladimir Gregorie- vitch, American economist: b. Russia, 1874. He was educated at the universities of Petrograd, Berlin and Halle, taking his Ph.D. at Halle in 1898. He has been professor of economics at Columbia University since 1904. He is a trustee of Greenwich Village House and is author of numerous articles on economics in English, German and Russian, and of (Marxism Versus Socialism) (1913).

SIMLA, India, the chief town of a district of the same name in the Punjab, the most im¬ portant of the hill-resorts and the summer capi¬ tal of the Indian government, about 98 miles north-northeast of Ambala, 7,156 feet above the sea and since 1903 connected by a moun¬ tain railway with the Peninsular Railway sys¬ tem. Simla is situated on a series of wooded hill ridges, covered with deodars, rhododendrons and an innumerable variety of ferns ; com¬ mands a magnificent prospect of the Himalayas, and has an equable temperature that rarely exceeds 70°. The governor-general and the commander-in-chief annually remove hither with their entire staff from Delhi, and go into residence for six months. All the environs are dotted with picturesque villas, and there are churches, schools, hotels, clubs, banks, etc. The chief schools are the Roman Catholic Orphanage for the children of soldiers, on the model of the Lawrence asylums ; the Mayo industrial schools for the orphans of poor civilians; Bishop Cotton's School and the Pun¬ jab Girl's School, both for the higher educa¬ tion of the children of well-to-do Europeans. The district of Simla which is entirely sur¬ rounded by petty native states, has an area of 18 square miles, of which only about 12 are cultivated. The crops are wheat, Indian corn, ginger and poppy. Efforts are being made to grow hops, tea and cinchona. The neighbor¬ ing mountains yield lead, iron and slate. This tract of hill country was acquired by the Brit¬ ish in 1816, as a result of the Gurkha War and has since been augmented by purchase, lapse and exchange. The first house was built in 1819; Lord W. Bentinck was the first gov¬ ernor-general to select it as his summer quarters. Pop., town, 15,000 (winter), 35,000 (summer) : district, 50,000.

SIMMONS, Duane, American physician and missionary: b. Glens Falls, N. Y., 1834; d. 1899. He studied medicine privately and went to Japan as a missionary in 1859, but subse¬ quently entered the Japanese government serv¬ ice. He secured leave of absence in 1862-63 and studied medicine at Berlin, and later did much to improve public health in Japan. He founded the Juzen Hospital in 1869 and established a school for Japanese medical students. Reasons connected with his health caused him to re¬ turn to the United States in 1881, but after 1887 he lived in Japan and devoted himself to the study of Japanese history. His writings on the subject are included in transactions of the Asiatic Society of Japan* (Vol. XIX,

1892).

SIMMONS, Edward Emerson, American painter: b. Concord, Mass., 1852. He was

graduated from Harvard in 1874 and studied art in Paris. Since 1892 he has followed decora¬ tive painting. Among the public buildings con¬ taining his work are the Boston State Capitol, Saint Paul State Capitol, Pierre State Capitol, Criminal Court, New York, Appellate Court, New York, Panama-Pacific Exposition, San Francisco, Library of Congress, Hotel Astoria, New York. He has also decorated the dwellings of J. D. Rockefeller and F. Vanderbilt.

SIMMONS, Franklin, American sculptor: b. Webster, Me., 11 Jan. 1839; d. 1913. He first came into notice in 1865-66, when, at Washington, D. C., he produced several bronze medallions of members of the Cabinet and famous army and navy officers, including Farragut, Porter, Grant, Meade, Sheridan, Sherman, etc. In 1868 he went to Rome, Italy, where he resided for many years. In 1898 he was knighted by the king of Italy. He executed about 100 portrait busts in marble, and about 15 public monuments, including statues of Gen¬ eral Grant, William King and Roger Williams in the National Capitol, Longfellow and Soldiers' monuments at Portland, Me., and nu¬ merous ideal statues, among which are Penelope, Medusa, Seraph Abdiel, Galatea, etc. The Metropolitan Museum of Art contains his (Promised Land.5

SIMMONS, Fumifold McLendel, Ameri¬ can lawyer and statesman: b. Jones County, N. C., 20 Jan. 1854. He was graduated at Trinity College, North Carolina, in 1873, was admitted to the bar in 1875 and afterward practised at New Bern and at Raleigh. He served in Congress in 1887-89; was collector of internal revenue in North Carolina in 1892- 97, and for many years was chairman of the Democratic Executive Committee of North Carolina. Since 1901 he has served con¬ tinuously in the United States Senate and in 1918 was re-elected for the term 1919-25. He was prominent in the struggle for a partial disfranchisement of the Negroes in North Carolina, and was one of the framers of the Underwood-Simmons Tariff Act.

SIMMONS COLLEGE, located at Bos¬ ton, Mass. It was founded in accordance with the will of John Simmons, for the purpose of providing education for women in such branches as will enable them to earn their livelihood. It was chartered in 1899 and opened in 1902. The ˆdepartments of study include household economics, secretarial

course, library course, science courses (including general science, preparing for teaching and medical prepara¬ tory), horticulture and courses in preparation for nursing. The last two were added to the curriculum in the year 1903-04. The full courses are four years in length, but college graduates and others who have had the academic work can complete the technical courses in one or two years. The course in commercial horticul¬ ture can be completed in three years, but a full course of four years is also provided; by ar¬ rangement with the Massachusetts Agricultural College at Amherst, Mass., only the work of the first two years of the horticultural course is done at Simmons College ; the third or the third and fourth years' work is provided for at the Agricultural College. Besides the four years' course in preparation for nursing there is a one year's course, especially intended for

those who have had college work and also a short summer course. Students are allowed to take single studies from the curriculum from any department, provided they are qualified for admission to the college and fitted to take up that particular study. Each department, however, leads to a definite practical occupa¬ tion. There are also evening classes in short¬ hand, typewriting, languages, English, cookery, etc. ; the evening work is not correlated in the same manner as the day work, and is mostly taken by persons occupied during the day who wish to improve themselves in studies relating to their occupations. By an arrangement made with the Boston Cooking School, the property and management of that school was trans¬ ferred to Simmons College, the cooking school being represented by a board of visitors. In accordance with this agreement the college of¬ fers a special one-year course in cookery in place of the former normal course of the cook¬ ing school, and private practice lessons. The funds of the cooking school become a perma¬ nent fund for two scholarships. The college plant comprises Simmons Hall on the Fenway, School for Social Workers, Somerset Street, and eight dormitories. The property of the insti¬ tution is valued at $3,150,000, about 66 per cent of which is an endowment fund. The stu¬ dents, in 1918, numbered 1,046; the faculty numbered 121 ; and the library contained 26,431 volumes. .

.SIMMONS COLLEGE, Texas, a coedu¬ cational institution, founded at Abilene in 1891, under Baptist control. It gives the de¬ gree A.B., and its courses include industrial and manual arts and sciences, and agriculture and stock-raising. It has an endowment fund of about $100,000 and its buildings and equip¬ ment are valued at about $200,000. In 1919 it has 1,035 students, 10 students with the colors and 125 instructors.

SIMMS, simz, William Gilmore, American novelist: b. Charleston, S. C., 17 April 1806; d. there, 11 June 1870. He received a secondary education at Charleston, was a clerk in a chem¬ ical house, but turned first to the law, then to literature, published a volume of (Lyrical and Other Poems5 (1827), and in 1829 became edi¬ tor and a part owner of the Charleston City Gazette, which failing in 1833 carried with it his fortune, and necessitated a busy pen. A few of his poems have clung to the anthologies, but he is best known for his works of fiction. Rarely he ventured, and always with failure, to past times and strange lands; but when he laid his scenes in the South and Southwest he was convincing and vigorous ; in the Georgia gold fields, in the southern battle-fields of the Revo¬ lution, in forest and bayou he conducted bold adventures, described in a manner suggestive of Cooper, though failing in Cooper's constructive skill. (The Yemassee,5 a story of colonial South Carolina, is generally ranked as his best. Before the Civil War he had attained a very considerable reputation, being somewhat read even in Britain and Europe. After the war he found himself out of vogue. He was at one time editor of the Southern Quarterly Re¬ view. Others of his volumes are (Martin Faber5 (1832); (Atalantis5 (1832), a poem; <Castle Dismal5 (1845) ; (Guy Rivers5 (1834) ; <Richard Hurdis5 (1838) ; 'Border Beagles)

(1840) ; short stories (1846) ; (The Partisan) (1835) ; (The Maroon) (1855) ; (Eu- taw> (1856) ; (The Cassique of Kiawah) (1860). (See Yemassee). Consult Trent, William P., <William Gilmore Simms) (Boston 1892) ; Sally, A. S., Jr., (Life of William Gilmore Simms) ; and Wegelin, O., (List of the Separate Writings of W. G. Simms) (New York 1906).

SIMNEL, Lambert, English impostor and pretender to the throne: b. Oxford, about 1472; d. about 1534. While a boy he was trained by a priest, one Richard Symonds, to personate the claims of the York faction early in the reign of Henry VII. In 1487 he gave himself out as Edward, earl of Warwick, son of Clarence, and sole heir of the house of York. He was crowned at Dublin as Edward VI. Supported by troops furnished by malcontent nobles he landed in England, but was defeated a few days later at Stoke. Henry imprisoned Symonds for life, but gave Simnel a place in the scullery and afterward made him falconer. Consult Bush, W., (England Under the Tudors) (London 1895) ; Gairdner, James, (Henry VIP (ib. 1889) ; Vergil, Polydore, (Anglicae His¬ toric the most reliable contemporary account.

SIMOIS, sim'o4s, or DUMBREK SU,

Asia Minor, a river rising in the Kaz Dagh-Ida and emptying into the Scamander or Xanthus, now supposed to be identical with the Mendere. Ancient Troy was partly built upon' its banks, and the peak of Samothrace towers above it. It bordered the battle fields of the Trojan War, sung by Homer and other Grecian poets.

SIMON, Joseph, American pioneer: b. 1712; d. Lancaster, Pa., 24 Jan. 1804. Emi¬ grating to Lancaster about 1740, he engaged in the Indian trade, soon becoming prominent in that line and one of the largest landholders in Pennsylvania, his enterprises extending to the Mississippi, while he had an interest in busi¬ ness in the Indian Territory. He supplied the Continental army with rifles, ammunition, drums, blankets and other supplies. A deed given to him and 11 traders 8 Nov. 1768, still preserved in Independence Hall, Philadelphia, records the Treaty of Fort Stanwix, whereby a tract of land comprising the present State of West Virginia was granted to them by all the tribes of the Six Nations. The grant never passed into the hands of the purchasers, owing to Virginia's resistance and the breaking out of the Revolution. Consult Ellis and Evans, his¬ tory of Lancaster County) ; Markens, (The Hebrews in America) (pp. 78-82) ; Publica¬ tions of the American Historical Society) (Vol. I, pp. 120-122; Vol. IX, pp. 31-32).

SIMON, Joseph, American politician: b. Germany, 1851. He was brought to this country in infancy, and since 1857 has been a resident <of Portland, Ore. Admitted to the bar in 1872, he was elected to the city council in 1877, serving for three years. In 1878 he managed the State campaign for the Republicans, and was chairman of the State central committee in 1880, 1884 and 1886. He was State senator 1880-98, and was elected president of the State senate in 1889, 1891, 1895, 1897 and 1898. He sat in the United States Senate 1898-1903.

SIMON, se-mon, Jules (Jules Francois Simon Suisse), French philosopher and states¬

man : b. Lorient, department of Morbihan, 27 Dec. 1814; d. Paris, 8 June 1896. He was educated at the college of his native town, at Vannes, and in the Ecole Normale, Paris. In 1839 he succeeded Cousin as professor of philosophy in the Sorbonne, but lost this post in 1851 by refusing to take the oath of allegiance to Napoleon III. He was returned to the Constituent Assembly by the department of Cotes-du-Nord in 1848. In 1855-56 he de¬ livered a series of philosophical lectures in sev¬ eral towns of Belgium, and in 1863 he was re¬ turned

to the Chamber of Deputies for a divi¬ sion of the department of the Seine. He strongly opposed the war with Prussia, and after the revolution of 1870 became a member of the provisional government, and was Minister of Education under Thiers from 1871 to 1873. In 1875 he was elected to the Senate, and member of the Academy. In 1876 he became leader of the Republicans, and was Minister of the In¬ terior and Premier until 16 May 1877, when he was dismissed by MacMahon. He was a con¬ sistent advocate of free trade and of liberal principles, and opposed M. Ferry's bill of 1879 for suppressing non-authorized religious bodies. In 1882 he was elected permanent secretary of the Academy of Moral and Political Sciences. He edited various journals, including the Siecle and the Echo Universel. His chief works include (Histoire de l'ecole d'Alexandrie) (2 vols., 1844-45) ; (Le Devoir J (1854) ; (La liberte de conscience) (1857) ; (L'Ouvrierc (1863) ; (1878) ; (Le livre du Petit Citoyen* (1880) ;

(Victor Cousin) (1887) ; (La femme du XXe Siecle *(1891); (Quartre portraits: Lamartine le cardinal Lavigerie Renan, L'Empereur Guillaume IP (1896) ; (Premiers memoires) (1900) ; (Le soir de ma journee* (1902), etc. He also produced excellent editions of the writings of several great French philosophers, including Descartes and Malebranche. Con¬ sult Picot, G., (Jules Simon: notice historique) (1897) ; Seche, Leon, (Figures bretonnes, Jules Simon, sa vie, son ceuvre> (new ed., 1898) and Thieme, Hugo P., (Guide bibliographique de la litterature francaise de 1800 a 1906) (Paris

1907).

SIMON, Richard, Roman Catholic theolo¬ gian and scholar: b. Dieppe, 13 May 1638; d. there, 11 April 1712. He was member of the Oratory in Paris, but soon abandoning the order he spent his life as parish priest in his native town and the publication from time to time of his works alone interrupted the uneventfulness of his career. Yet he must be looked upon as the father of modern Biblical science and he went far beyond the authority of Church tradi¬ tion in handling the origin, authenticity, and interpretation of the Hebrew and Greek Scrip¬ tures. Many of his conclusions aroused much bitter controversy in his day and met with the approval of neither the Roman Catholic nor Protestant reader. Although at one time an object of suspicion by the Church authorities, Simon remained a faithful Catholic and died in the Church. His principal publications were <Histoire critique du Vieux TestamenP (1678) ; (Histoire critique du Nouveau TestamenP

(1693) ; (Histoire critique des principaux com- mentateurs du Nouveau Testament) (1693) ; (Nouvelles Observations sur la texte et les versions du Nouveau Testament (1695). Con¬ sult Bernus, (Richard Simon et son histoire critique du Vieux Testament (1869) ; id., No¬ tice bibliographique sur Richard Simon5 (1882); Cheyne, T. K., (The Founders of Old Testa¬ ment Criticism5 (New York 1893) ; Duff, Archibald, (History of Old Testament Criti¬ cism5 (ib. 1910).

SIMON MACCABEUS, sl'mon mak'a- be'us, Jewish prince and high priest: d. 135 B.c. He was the second of the five sons of the high priest Mattathias, all of whom became famous in their struggle to free the Jews from Syrian domination. When dying Mattathias exhorted his sons to heed the advice of Simon whose abilities he highly regarded. Simon took an important share in the war for liberation pressed against the Syrians by Judah and Jona¬ than, and after the death of Judah and the capture of Jonathan he was elected leader. He completed the fortification of Jerusalem, expelled all the Gentiles from Joppa, and after prevent¬ ing Trypho from entering the country to seize the throne of Syria he sent a deputation to Demetrius II requesting freedom from taxa¬ tion for Judea. Compliance with this request carried with it recognition of the political in¬ dependence of the country and the Jews estab¬ lished a new era, dating by the years of Simon. The leadership was made hereditary in his family, thus founding the Hasmonaean dynasty, and a new mintage of coins was begun. Simon strengthened his position by the capture of the city of Gazara, from which he expelled the pagan population, and in 142 b.c. he subdued the garrison at Akra. His reign lasted seven years and was remarkable for its peace and prosperity. He secured the friendship of Rome and the respect and esteem of other foreign powers, and by his own people was made high priest as well as ruler in 141 b.c. In 136 b.c. the country became again involved in war with Syria, and Simon entrusted the command of his armies to his sons, Judah and John, who were victorious. In 135 b.c. Simon and his sons Judah and Mattathias were slain at a banquet given him by his son-in-law, Ptolemus; and his son, John Hyrcanus I, succeeded to the throne.

SIMON MAGUS, ma'jus, a magician, men¬ tioned in the Acts of the Apostles : b. Sitton in Samaria. He professed to be an aeon of an exalted nature, and called himself the supreme power of God. (See Gnostics). Struck with astonishment at the miracles of the apostles, and at the effect which followed the imposition of hands, he offered them a sum of money to be endued with similar powers. His proposal met with an indignant refusal on the part of Peter; and from the fact

of Simon Magus being the first person who attempted to traffic with money in spiritual functions and endowments, the term simony has been employed to designate such traffic. (See Simony). After this Simon trav¬ eled through the empire making proselytes, tak¬ ing as his companion a Tyrian courtesan, whom he represented as Helen of Troy, and some¬ times as Minerva, calling her at the same time the first intelligence, or mother of all things. Consult Hastings, dictionary of the Bible5 (New York 1902) ; Schmiedel, P. W. (in En¬

cyclopaedia Biblica,5 ib. 1903) and Waitz, H. (in (Real-encyklopadie fur Theologie und Kirche5 (Vol. XVII, Leipzig 1906).

SIMONDS, si'mondz, Frank Herbert,

American journalist and author: b. Concord, Mass., 1878. He was graduated at Harvard University in 1900, having interrupted his uni¬ versity course to serve in the war with Spain in 1898. He was Albany correspondent of the New York Tribune in 1903-05; and of the New York Sun in 1905-08. He returned to New York, as a member of the editorial staff of the Sun in 1908 and became known as a forceful writer on foreign and domestic politics, his ar¬ ticles on the Moroccan crisis and on the Balkan War firmly establishing his reputation. He be¬ came editor of the New York Evening Sun in 1913, and in 1915 transferred his services to the New York Tribune as associate editor in charge of its editorial page. His articles on the European War appeared in part in the American Monthly Review of Reviews. Author of (The Great War — the First Phase5 (1914) ; (The Great War — the Second Phase5 (1915); (They Shall Not Pass5 (1916) ; (Three Years of the Great War5 (1917); (History of the Great War5 (Vol. I, 1917), etc.

SIMONDS, Frederic William, American geologist: b. Charlestown, Mass., 3 July 1853. He was graduated at Cornell University in 1875, and was instructor in geology and palae¬ ontology there 1875-77. He was professor of geology, zoology and botany at the University of North Carolina 1877-81, and of geology and biology at the University of Arkansas 1887-90. Since 1895 he has been professor of geology at the University of Texas. He is a Fellow of the American Association for the Advancement of Science, the Geological Society of America and of the Texas Academy of Science. He has published the (Annual Report of the Geological Survey of Arkansas5 (1891) ; (A Record of the Geology of Texas5 for the decade ending 31 Dec. 1896 (1900) ; (The Minerals and Mineral Localities of Texas5 (1902) ; (The Geography of Texas — Physical and Political5 (1905) ; (The Maury-Simonds Physical Geog¬ raphy5 (1908), and numerous papers in scien¬ tific journals.

SIMONIDES, si-mon'i-dez, Greek lyric poet: b. Island of Ceos, 556; d. about 468 b.c. Invited by Hipparchus, tyrant of Athens, to visit that city, he there met Anacreon and Lasus, Pin¬ dar's master. After the death of Hipparchus he proceeded to Thessaly, where he won the favor of the Aleuads and Scopads, whose vic¬ tories in the games he afterward celebrated. Returning to Athens, in a competition for the best elegy upon those who fell on the field of Marathon, he gained the prize over vEschylus himself. Shortly after this he was invited to the court of Hiero at Syracuse, where he re¬ mained till his death at the age of 90. He ap¬ pears to have been a chief favorite with Hiero in a court adorned by the presence, among others, of Pindar, Bacchylides and 2Eschylus. Poetic conception, pathos and perfect power of expression, in addition to the sweetness which procured for him the surname of Melicertes, are among the chief characteristics of his poetry, though in copiousness, vigor and origi¬ nality he was surpassed by Pindar. He brought the elegy and epigram to a high degree of per-

fection, and in the dithyramb and triumphal ode he particularly distinguished himself. To Simonides belongs the unenviable fame of be¬ ing the first who took money for his. poems. The best editions of his works are Schneidewin's (Simonidis Cei Carminum Reliquiae *(1835.) ; and Bergk's (in his (Poetae Lyrici Graeci,* Leip¬ zig 1843 ; 4th ed., 1882 ; reprint 1914) ; Smyth, H. W., (Greek Melic Poets) (London 1900). Consult Croiset, A. and M., (Abridged History of Greek Literature) (English trans., New York 1904) ; Christ-Schmid, (Geschichte der griechischen Litteratur) (Vol. I, 6th ed., Munich 1912), and Wright, W. C., (Short History of Greek Literature> (New York 1907).

SIMONOSEKI, se-mo-no-sek'e. See Shi-

MONOSEKI.

SIMON'S TOWN, Cape Colony, South Africa, on the west coast of False Bay, about 22 miles from Cape Town, has a safe anchorage and is extensively fortified. There are a large arsenal, dock yards, naval hospitals and a high school. About $12,000,000 have been expended on the docks and dockyards. A railway con¬ nects it with the interior. Its position lends it considerable military and commercial import¬ ance. It has a salubrious climate. Pop. 7,246.

SIMONY (from (Simon Magus, * Acts viii), a transaction by which something sacred or spiritual is given, or received for a pecuni¬ ary compensation, or a temporal benefit. The nature of simony is clearly illustrated in the case of Simon Magus, when it was committed for the first time. Simon was a Samarian, noted for his skill in magic. Attracted by the miracles wrought by the preachers of Chris¬ tianity, he adopted the new faith and was bap¬ tized by Philip. Later, Peter and John came to the East to minister to the new converts. <(Then laid they their hands on them and they received the Holy Ghost.® When Simon saw this, he offered them money, saying: "Give me also this power.® But Peter said unto him : <(Thy money perish with thee, because thou hast thought that the gift of God may be purchased with money.® Simony, later, assumed many forms, but it always implies an exchange of some material thing or temporal benefit for something spiritual, that concerns God, prin¬ cipally, as purchased office, or preferment in the Church. The degree of this affiliation as well as the disposition of those who are guilty of this sin account for its several modifications and fall to the province of theologians. The ecclesiastical penalties imposed for simony, ac¬ cording to its degree of perversity, are excom¬ munication; reservation of absolution for the culprit to the Pope ; suspension of clerics who are guilty of it ; restitution of benefices due to it, and the like. In England, simony has been the subject of secular as well as ecclesiastical legislation, but in the United States it is not a civil offense and there is doubt if it even is an ecclesiastical offense, outside the Catholic and Episcopalian denominations. Consult Philli- more, Sir Walter, (Law of the Church of Eng¬ land } (2d ed., London 1895).

SIMOOM, si-moom', SIMOON, or SA-

MUN (Arabic, samnia, (<hot® and <(poisonous®), a noxious hot wind which blows at the period of the equinoxes in most countries bordering on sandy deserts, especially in certain parts of Asia and Africa, where its temperature has

been known to reach as high as 130°. The intense and parching heat, resembling that of an oven, is derived from the hot sands, which, in the deserts of Africa and Arabia, often be¬ come heated for a depth of some inches to 200° F. This hot sand is whirled up from the earth by the advancing wind, and the whole air is filled with an extremely subtle and penetrat¬ ing dust, the effect of which, if breathed freely, is to induce suffocation. The approach of the simoom is heralded by a thin haze along the horizon, which rapidly becomes more and more dense, till it covers the whole face of the heavens. This is followed by fierce gusts of wind, accompanied with clouds of red and burning

sand, which are whirled round in rapid gyrations, and so swept onward. Sometimes whole caravans are buried in the masses of sand thus carried along. The simoom generally lasts from 6 to 12 hours and sometimes longer. When the wind blows in squalls death is often very suddenly produced by actual suffocation, and is followed by bleeding at the nose and mouth. Persons exposed to it protect them¬ selves by stopping the mouth and nose with handkerchiefs, and the camels instinctively bury their noses in the sand at its approach. The effects of the simoom are felt in the south of Europe, the hot wind produced in Italy being called the sirocco. In Turkey this wind is called the <(samieli ® ; in Guinea and Senegambia a similar wind is called <s'harmattan?') Winds of similar origin and nature exist in Australia and parts of North and South America. In the southeast of Spain a similar wind is known as the solano ; while the krusin, which gener¬ ally last for 50 days to two months, blows from the northeast across Egypt. See Harmattan ; Sirocco and Solano.

SIMPLE STORY, A, the best known of the works of Mrs. Elizabeth (Simpson) Inch- bald, was published in 1791 and was a very suc¬ cessful novel. Written somewhat in the stately style of the 18th century and dwelling consider¬ ably on character and grand manners, it is none the less a touching and in many respects a moving story. Derriforth, a scholar in Catholic orders and later Lord Elmsford, marries his ward, Miss Milner, after a courtship marked by high breeding, misunderstandings, capri¬ ciousness and all but irreconcilable strains of temper. After a happy married life of some years, Lady Elmsford, during the prolonged absence of her husband, elopes with a former lover. Lord Elmsford, a man of stern resolu¬ tion, vows never to see or hear of his wife or their daughter, Mathilda, again. On the early death of Lady Elmsford, the story resolves itself into a tale of the reconciliation of father and daughter through a long period of years, and the final happy settlement of all troubles. The main characters that have been mentioned and those of Miss Woodley and Mr. Sandford, the chaplain, are well conceived and firmly exe¬ cuted. The novel with its strongly emotional cast, is sometimes regarded as the antecedent of that kind of story of which Charlotte Bronte's (Jane Eyre) is the most famous Eng¬ lish representative.

William T. Brewster.

SIMPLICIDENTATA, one of the two di¬ visions of the order of rodents (Rodentia), embracing those with only a single pair of upper

incisors. It includes all of the rodents except the pikas, rabbits and hares, which are duplici- dentate. See Leporidˆe ; Rodentia.

SIMPLICISSIMUS, a German novel, fully titled as (Der abenteuerliche Simplicissimus, Teutsch, das ist; Aie Beschreibung des Lebens eines seltsamen vaganten, genannt Melchoir Sternfels von Fuchsheim) (1668), by Hans Jakol Kristoffel von Grimmelshausen (q.v.), and regarded as the forerunner of modern Ger¬ man novel. (The adventurous German, Sim¬ plicissimus, that is: A Description of the Life of a Remarkable Vagabond named Melchior Sternfels, of Fuchsaim,5 as the translated title reads, is a vivid and realistic story of the Thirty Years' War.

SIMPLICIUS, sim-plish'i-us, a peripatetic philosopher : b. in Cilicia. He was a pupil of Ammonius and Dqmascius, and taught in Alex¬ andria and Athens during the reign of Justin¬ ian. In consequence of the persecutions these philosophers suffered from the decrees of the Christian emperor, seven of them, among whom was Simplicius, sought protection in the court of King Chosroes of Persia. Disappointed in their expectations in the East, they resolved to return, and the Persian king made it one of the articles of a treaty of peace with Justinian, that these philosophers should be exempted from the disqualifications imposed upon all pagans. Among the works of Simplicius are commen¬ taries on Aristotle's ˆategoriae Physicae,5 (De Ccelo,5 and (De Anima,5 and also one on the 'Enchiridion5 of Epictetus. Consult the edition of his works by Schweighauser (Leipzig 1800) ; edition of his commentaries on Aristotle's works by Karsten (1865) and Enk's edition of the 'Enchiridion5* (Vienna 1866).

SIMPLIFIED SPELLING. See Spelling

Reform.

SIMPLON, sim'plon, Fr. san-plon (Ital. Sempione, sem-pe-6'ne), Switzerland, a moun¬ tain of the Lepontine Alps, 11,117 feet high, in the east of the canton of Valais. The road that passes over it was regarded as one of the most celebrated engineering works of the early part of the 19th century, but is decreasing in im¬ portance since the advent of railroads, and the construction of the Simplon .tunnel, affording direct communication between Switzerland, France and Italy. The road commences near Brieg on the Swiss side, and terminates at Domodossola in Piedmont. It was begun in 1800 under the direction of Napoleon, and was completed in 1806. It is 38 miles

long, from 25 to 30 feet wide, is carried across 611 bridges, and through a number of great tunnels, rises to the height of 6,578 feet, and has 20 station houses for travelers. The railway tunnel ' through the mountain from Brieg on the Swiss side to Iselle on the Italian side was com¬ menced in 1898, and the contract called for its completion in five and one-half years, for $13,413,500. Work upon it was completed in 1906. It is 20 kilometres, 12.4 miles, in length, the longest tunnel in the world, and the third, with Mont Cenis and Mont Gotthard, connect- Italy by rail with the adjacent countries. See Tunnels.

SIMPLON TUNNEL, The, an important work of engineering through the Lepontine Alps, designed to afford a better means of com¬

munication between France and Italy. It was commenced in 1898, completed in eight years, and is \2l/2 miles in length. See Tunnels, and consult 'La ferrovia del Sempione) (Rome

1900).

SIMPSON, Edward, American naval offi¬ cer: b. New York, 3 March 1824; d. Washing¬ ton, D. C, 1 Dec. 1888. He was appointed mid¬ shipman in the navy in 1840, was graduated from Annapolis in 1846 and served in the Mexi¬ can war on the steamer Vixen. In 1858-62 he was in charge of the department of naval gun¬ nery at the Naval Academy, commandant of midshipmen in 1862-63 and commanded the monitor Passaic in 1863-64, participating in several engagements. He was commissioned commander in 1865 ; served as fleet-captain of the consolidated Gulf squadron; was present at the fall of Mobile, and received the surrender of the Confederate fleet on Tombigbee River. He became captain in 1870, commodore in 1878 and rear-admiral in 1884. He was retired in 1886, but was president of the United States Naval Institute in 1886-88. He published: (Ordnance and Naval Gunnery5 (1862) ; 'The Naval Mission to Europe5 (2 vols., 1873) ; Re¬ port of the Gun Foundry Board5 (1885) ; 'Modern Ships of War5 (1887) ; etc.

SIMPSON, Sir George, Scottish traveler: b. Loch Broom, Ross-shire, about 1796; d. Lachine, near Montreal, P. Q., 7 Sept. 1860. In 1809-20 he was employed by a London firm in the West India trade, where his ability attracted the attention of the Earl of Selkirk, then head of the Hudson's Bay Company, and in 1820 he was appointed to conduct the affairs of the com¬ pany in America. He united the Hudson's Bay Company and the Northwest Company, and be¬ came successively governor of the Northern de¬ partment, governor-in-chief of Rupert's

Land and general superintendent of the affairs of the Hudson's Bay Company. He planned the expedi¬ tion of his cousin Thomas Simpson in 1836-39, greatly aided other explorers, and in 1841-42 made the overland journey around the world, claiming to be the first traveler to complete the journey. He was knighted in 1841. He pub¬ lished (Narrative of an overland Journey Around the World During the Years 1841-2' (2 vols., 1847). Hopkins, J. C., 'Canada: An Enclopaedia5 (Toronto 1898-1900) and Mac¬ donald, A., 'Peace River: A Canoe Voyage from Hudson's Bay to the Pacific by Sir George Simpson5 (Ottawa 1872).

SIMPSON, Sir James Young, Scottish ob¬ stetrician and developer of anaesthesia: b. Bath¬ gate, Linlithgow, 7 June 1811; d. Edinburgh, 6 May 1870. He entered Edinburgh University at 14 years of age and took his M.D. there in 1832. His brilliant graduation thesis won him the immediate appointment of assistant to Dr. John Thomson, professor of pathology at the University ;' and he also engaged in practice in Edinburgh, in which he was unusually success¬ ful. In 1839, when he was but 29, he was ap¬ pointed professor of midwifery at the uni¬ versity. Of a keenly sympathetic temperament he was from the first deeply interested in the reports from America of the use of sulphuric ether as an anaesthetic and late in the year 1846 he witnessed an operation performed by Robert Lister in which the patient was rendered com¬ pletely unconscious. Simpson soon afterward

made the first trial of it in obstetric practice and upon its proving successful he continued its use and became its enthusiastic advocate. He believed, however, that an improved anaes¬ thetic could be found and in 1847 he established the efficacy of chloroform in this respect, making the first public trial of it in November 1847 at the Edinburgh Infirmary. His advocacy of the use of anaesthetics in obstetric cases aroused from the first a storm of protest not only from the medical profession but on the part of the public and clergy as well. His triumph in its final adoption was materially hastened by the appointment conferred upon him by Queen Victoria in 1846 as her personal surgeon in Scotland and her subsequent treatment by him in childbirth. In 1856 he was awarded the Mon- thyon Prize of the French Academy of Sciences for his achievements in anaesthetics; he was made a member of practically all the European and American medical societies ; and in 1866 he received a baronetcy, the first

awarded a physician in Scotland. He made further not¬ able achievements in gynecology, in which he was far in advance of his time. Much of his phenomenal success is credited to his ability to foresee possibilities, an evidence of which occurs in his graduation thesis, wherein he voiced the hope that in the future physicians might be able to inspect the entire body by the ˆconcentration of electric and other lights;® an advantage later given by the X-Ray. His family declined burial for him in Westminster Abbey, but a bust of him was placed there. A statue was erected in Edinburgh, but his chief monument is the Maternity and Simpson Memorial Hospital at Edinburgh. In the med¬ ical profession he ranks with Harvey, Jenner and Lister. Author of (Obstetric Memoirs and Con¬ tributions > (2 vols., 1855-56) ; (Selected

Gynaecological Works) (1871) ; (Anaesthesia *(1871) ; Clinical Lectures on Diseases of Women* (1872) ; (Archaeological Essays* (2 vols., 1873). A full list of his contributions to medical periodicals is in the index catalogue at the United States Army Surgeon-General's Office Washington, D. C. Consult Duns, J., <Memoirs) (1873).

SIMPSON, Matthew, American Methodist bishop and educator: b. Cadiz, Ohio, 21 June 1811; d. Philadelphia, Pa., 18 June 1884. He studied medicine and was admitted to its prac¬ tice in 1833, but in 1834 closed his office and set out as a Methodist itinerant, filling 33 ap¬ pointments in six weeks' tours. In 1835 he be¬ came pastor of the Liberty Street Church, of Pittsburgh, Pa., and in 1837 vice-president of Allegheny College (Meadville, Pa.), and professor there of natural science. He was elected, in 1839, first president of Indiana As- bury (the present De Pauw) University and undertook his work with three professors and 11 students in the four rooms of a hired build¬ ing. After a successful administration, he re¬ signed in 1858, and became editor of the West¬ ern Christian Advocate , official organ of his Church for the West. In this journal the editor took decided positions on slavery and other subjects of current discussion. He was elected bishop in 1852; and in 1857, when a delegate to the World's Evangelical Alliance at Berlin, preached in the Garnisonkirche, that being the first instance in which an established church in Prussia had been opened to an Eng¬

lish-speaking Evangelical. During the Civil War he was a frequent adviser of President Lincoln. In 1881 he delivered the opening ad¬ dress at the Ecumenical Methodist Conference in London. He was best known for his elo¬ quence, and published a volume of (Lectures on Preaching *(1879). In his own church he had also a considerable reputation as a parliamen¬ tarian and presiding officer. He further pub¬*

lished (Hundred Years of Methodism (1876) ; and Cyclopaedia of Methodism* (5th rev. ed. 1883). A posthumous collection of sermons was edited by George R. Crooks (1885). Of his orations among the best known is that at the funeral of Lincoln. A statue of him was placed in Philadelphia on the edge of Fairmount Park, 2 April 1902. Consult Crooks, George R., (Life of Bishop Matthew Simp- son) (New York 1890).

SIMPSON COLLEGE,' coeducational in¬ stitution of higher education located at Indian- ola, Iowa. It was founded in 1867 by the Des Moines Conference of the Methodist Episcopal Church, from which it derives most of its sup¬ port and patronage. Its organization includes seven departments: (1) college of liberal arts; (2) academy and normal courses; (3) the school of business; (4) the school of short¬ hand and typewriting; (5) the conservatory of music; (6) the school of oratory; (7) the school of art. A summer school is also main¬ tained. The college department offers three courses, classical, philosophical and scientific, leading to the degrees of bachelor of arts, bachelor of philosophy and bachelor of science; these courses are all largely elective, the choice of the student being limited to a certain ex¬ tent by the degree he wishes to obtain. Grad¬ uate work is provided for, leading to the de¬ grees of master of arts, master of philosophy and master of science. Military drill and mili¬ tary science are a part of the curriculum, but are elective, except that drill is required for the men in the first two terms of the fresh¬ man year. The academic department offers three courses in preparation for the three col¬ lege courses; there are two normal courses offered, one of three years, and one of five years, the work of the last two years of the latter course being almost entirely elective. The college is coeducational and there is a dormitory for women on the campus. The students of the different departments maintain a number of literary societies, all of which have their furnished halls. The college athletics are under the control of a joint committee, two members of which are appointed by the faculty, and three by the athletic association. The buildings include College Hall, Science Hall, Ladies' Hall, the administration building, the gymnasia and the Conservatory of Music (erected 1902) ; grounds and buildings in 1918 were valued at about $800,000; the library con¬ tained 11,000 volumes. The productive funds when last reported were $261,340; the annual income was $46,000. The students numbered 600 and the faculty 28.

SIMROCK, zim'rok, Karl Joseph, German poet : b. Bonn, Germany, 28 Aug. 1802 ; d. there, 18 July 1876. He studied at the univer¬ sity of his native city and at Berlin, and in 1826 entered the Prussian civil service, which he was later compelled to leave on account of a revo-

lutionary poem which he had written. His chief claim to fame is founded on his classic modern rendering of the (1827) which has gone through over half a hundred editions. He translated Shakespeare's poems and some of his plays, and published (with Echtermeyer and Henschel) (Quellen des Shakspere) (1831). He also published (Handbuch der deutschen Mythologie) (1853— 55) ; (Deutsche Volksbucher> (1839-67) ; (Hel- denbuch5 (1843-49), illustrative of the heroic traditions of the Teutonic race and his own (Poems 5 (1844). In 1850 he was appointed professor of old German language and litera¬ ture at Bonn, a post which he held till his death. Consult Hocker, N., (Karl Simrock sein Leben und seine Werke) (Leipzig 1877) and Schroder, E., (in (Allgemeine deutsche Biographie)) .

SIMS, simz, George Robert, English poet and dramatist : b. London, 2 Sept. 1847. He was educated at Hanwell College and at Bonn, and since 1874 has been engaged as a journal¬ ist and playwright. His publications include (Dragonet Ballads5 (1879) ; (How the Poor Live) (1883); (Once Upon a Christmas Time5 (1898) ; (Living London) (1902), etc. His plays include {The Lights of London) (1882) ; Two Little Vagabonds) ; (In London Town5 ; (Scarlet Sin.5 Other works are (Social Kalei- doscope) ; (Ten Commandments) ; (Dorcas

Dene, Detective) (1897); (A Blind Marriage5; (The Cry of the Children) ; (The Black Stain) ; (Among My Autographs> ; (For Life — and After) ; (His Wife's Revenge5; (Anna of the Underworld.5 He is joint author of (Lights of London) ; (Harbour Lights) ; (Master and Man5 ; (Faust up to Date5 ; (Member for Slo- cum) ; (Golden Ring) ; (Little Christopher Columbus5 ; (Gray Mare5 ; (The Guardman> ; (The Trumpet Call5 ; (The English Rose) ; Two Little Vagabonds) ; (In Gray Piccadilly) ; (The Elixir of Youth) ; (Romany Rye5 ; cMy Innocent Boy-* ; (Dandy Fifth } ; (Gipsy EarP ; < Golden Ladder5; (Hop o' My Thumb 5 ; (Sleeping Beauty), (Puss in Boots5; (Ever Open Door,5 etc. Consult Archer, W., (English Dramatists of To-Day5 (London 1882).

SIMS, James Marion, American surgeon: b. Lancaster County, S. C., 25 Jan. 1813; d. New York, 13 Nov. 1883. He was graduated from South Carolina College in 1832; studied medicine at Charleston and at Philadelphia, and in 1835 began to practise. He was settled at Montgomery, Ala., during 1840-53, where he became known for his successful operations for strabismus and club-foot. In 1845 he made

known his hypothesis on the cause and proper treatment of trismus nascentium. The effective¬ ness of the treatment was later demonstrated by a long series of experiments. In the same year he began experiments to test a treatment he had conceived for vesico-vaginal fistula, in the course of which he devised the silver suture and several instruments, the chief of which is the duckbill speculum known as the Sims speculum. In 1853 he removed to New York and shortly began a movement for the es¬ tablishment of a hospital for the diseases of women. A temporary structure was built in 1855, and a charter and appropriation were granted by the legislature in 1857 for the per¬ manent institution, built in 1866 on the pavilion

system. Dr. Sims went to Europe in 1861 and performed the operation for vesico-vaginal fistula in the hospitals of London, Paris, Edin¬ burgh and Dublin. In 1862 he settled in Paris and secured a lucrative practice. From 1864 to 1868 he practised in London, and in the latter year returned to America. He was again in Paris in 1870, and was surgeon-in-chief of an Anglo-American ambulance corps that treated both French and German soldiers after the battle of Sedan. In 1872 he was reappointed a member of the board of surgeons of the Woman's Hospital, but resigned in 1874. Among his published works are (Trismus Nascentium5 (1846) ; (Silver Sutures in Sur¬ gery5 (1868) ; (On Intra-Uterine Fibroid Tumors5 (1874) ; (Clinical Notes on Uterine Surgery5 (1865) ; (The Anglo-American Am¬ bulance5 (1870); (Treatise on Ovariotomy5 (1873) ; (History of the Discovery of Anaesthe¬ sia5 ; (The Story of My Life5 (1884). A bronze statue of him is in Bryant Park, New York. Consult Flint, Austin, (In Memoriam James Marion Sims' (New York 1886).

SIMS, Thomas M., American fugitive slave, and subject of a celebrated case under the Fugitive Slave Law. He was born a slave, escaped from his master in Savannah, Ga., in 1851 and succeeded in reaching Boston, Mass. He was arrested there 3 April 1851, and was held under the Fugitive Slave Law. The case aroused the abolitionists of Boston and men such as Wendell Phillips, Theodore Parker, William Lloyd Garrison and Thomas W. Higginson were prominent in the effort made to prevent his return to his master. A writ of habeas corpus was obtained after some difficulty, but was set aside, and Sims was eventually escorted to a ship under armed guard and returned to his master in Savannah. He was afterward taken to Vicksburg, and in 1863 he escaped to Grant's army at Vicksburg. He became a messenger in the Department of Justice, Washington, D. C., in 1877.

SIMS, William Snowden, American vice- admiral : b. Port Hope, Canada, 15 Oct. 1858. He was graduated at the United States Naval

Academy in 1880, and was promoted through the various grades to captain in 1911, rear- admiral 5 Jan. 1917 and vice-admiral 28 May 1917. He served on the North Atlantic, Pacific and China stations, and was naval attache at the American embassies at Paris and Petro- grad in 1897-1900. In 1901-02 he was aide to the commander-in-chief of the Asiatic fleet; in 1902 fleet intelligence officer and inspector of target practice for the Asiatic fleet on board the New York; and in 1908-09 he was naval aide to President Roosevelt. He was com¬ mander of the battleship Minnesota in 1909-11; and in 1911-13 he served on the staff of the Naval War College, Newport, R. I. He com¬ manded the Atlantic torpedo flotilla in 1913-15. He was appointed commandant of the naval station at Narragansett bay and presi¬ dent of the Naval War College at Newport in 1916. After his promotion to rear-admiral in 1917 he was commissioned special naval repre¬ sentative and observer to Great Britain. After the United States declaration of war on Ger¬ many he received command of the United States fleet in European waters, 28 April 1917, his elevation to vice-admiral following on 28

May. He remained in command of the fleet throughout the remainder of the war, and on 23 Feb. 1919, after the withdrawal of the main fleet to home waters was decided upon it was announced by the Navy Department that Vice- Admiral Sims would return to his duties as president of the Naval College, Throughout his career his name was connected with the im¬ provement of naval gunnery and the reform of naval construction ; and he was known as a naval writer and critic. His conduct of the United States fleet in European waters during the country's participation in the European War received the highest praise at home and abroad, and he was the recipient of many honors, among them the British Grand Cross of the Order of Saint Michael and Saint George in 1918, and the British Order of Merit in

1.

SIMS, Winfield Scott, American inventor : b. New York, 6 April 1844; d. 7 Jan. 1918. He received a high-school education, and served during the Civil War in the 37th New Jersey regiment. After the war he devoted himself to electrical experiments. He con¬ structed an electric motor, which propelled a 16-foot boat at the rate of four miles an hour. He was the first to apply electricity to the pro¬ pulsion and guidance of movable torpedoes. He also devised a dynamite boat with

a speed of 18 miles an hour to be used in harbor and coast defense. He was also the inventor of the wireless-dirigible torpedo, of the Sims-Dudley dynamite gun and a dynamite gun for use with dirigible war ships, and an aeroplane dynamite gun.

SIMSBURY, simz'ber-i, Conn., village and township in Hartford County, on the Farming- ton River, 10 miles northwest of Hartford, on the Central New England and the New York, New Haven and Hartford railroads. It has a high school and manufactures safety fuses. Pop. township 2,958.

SIMSON, Robert, Scottish mathematician: b. Ayrshire, 14 Oct. 1687 ; d. Glasgow, 1 Oct. 1768. He was educated at the University of Glasgow, where he became professor of mathe¬ matics in 1711. By the advice of Halley he directed his private studies to the restoration of the ancient geometers. His first labor in this direction was to restore the Porisms of Euclid. In 1735 he published his (Sectionum Conicarum Libri Quinque,* a work intended as an introduction to the study of Apollonius of Perga. The next object of his labor was the (Loci Plani) of Apollonius, which he completed in 1738, but which he did not venture to pub¬ lish till 1749, The restoration of the elements of Euclid was the great object of Dr. Simson's care, and an edition of the (Elements) was pub¬ lished in 1756, a work which has always enjoyed a high character both for precision in the de¬ finitions and accuracy in the demonstrations. The (Sectio Determinata) of Apollonius next occupied his attention, but this work was not published till after his death when it was printed with the (Porisms of Euclid. >

SIMSON, Sampson, American philanthro¬ pist: b. Danbury, Conn., 1780; d. New York, 7 Jan. 1857. He was graduated from Columbia College in 1800, then studied law with Aaron Burr and was admitted to the bar in 1802. His

professional career was brief, and he preferred the leisurely life of a country gentleman in Yonkers, where his estate was extensive. He was founder of the Mount Sinai Hospital of New York, having presented the ground on 28th street, near Eighth avenue, whereon it was first located as "Jews' Hospital.® He also es¬ tablished the still existing "North American Relief Society for Indigent Jews in Jerusalem.®

SIMULTANEOUS EQUATIONS, in

mathematics, two equations are simultaneous when the value of the unknown quantities which enter them are the same in both at the

same time. A group of equations is simultaneous when the value of the unknown quantities is the same in them all at the same time. See Equation.

SIN, any wilful thought, word, deed or omission contrary to the law of God. This definition does not cover Original Sin (q.v.), save in so far as it was Adam's own trans¬ gression : in distinction from original sin all other sins are called actual sins. Offenses against purely human law may be crimes, mis¬ demeanors, etc., and the same may be called sins ; but a sin is not necessarily a crime, no matter how heinous it may be. For example, the most grievous sins may be sins purely of thought or of desire or intention : of these human law cannot take cognizance, and hence they are not crimes or misdemeanors. Sins are variously classed, namely, as of omission and of commission; as against God, our fellow-men or ourselves; as premeditated and unpre¬ meditated; internal and external; mortal and venial. Regarding these several kinds of sin and classifications of sins, theologians of all schools are in agreement, except the last di¬ vision, that of mortal and venial. The divines of the Protestant churches in the time of the Reformation, while admitting a difference among sins so that some would be more heinous than others, looked on all sins alike as mortal; that is, deserving everlasting punishment. Thus Calvin writes : "The sins of believers are venial, not because they do not merit death, but be¬ cause there is no condemnation for those who are in Jesus Christ, their sin not being im¬ puted® ; even the dailv falls of good men make them "liable to the penalty of death before the judgment seat of God® (Calvin, Inot. Chr. iii, 4). In the doctrine of the Roman Catholic Church it is taught that one guilty of sins which in their own nature merit eternal death cannot be in friendship of a holy God; hence a distinction is drawn between sins mortal and sins venial ; mortal sins are against the very end of God's law, which is the love of God, and they deserve everlasting punishment; venial sins, the daily falls of good men, do not annihilate the friendship of the soul with God, and grace is still left whereby the sin may be repaired. Con¬ sult Catechismus Concilii TridentinP ; Hyde, W. D., (Sin and Its Forgiveness) (Boston 1909) ; Orchard, (Modern Theories of Sin> (ib. 1911) ; Mackintosh, R., Christianity and Sin> (New York 1914) ; Tangueray, (Theologie Moralis et Dogmatica) (6 vols., New York 1908 et seq.) ; Tennant, F. R., Concept of Sin) (ib.

1913).

SIN OF JOOST AVELINGH, The, the

first work of "Maarten Maartens® (q.v.) (1890) (J. M. W. van de

Poorten-Schwartz). This

Meyer and fascinating study of human motives” at once gained for its author the attention of critics and reading public.

SINAI, si'na or si'ni, Arabia, a mountain peak rising above the rugged surface of the peninsula which projects between the Red Sea and the Gulf of Suez, on one side, and the Gulf of Akaba on the other. This is the sacred mountain of Biblical fame, where Moses re¬ ceived the stone tablets containing the Ten Commandments. The series of mountains cov¬ ering the entire peninsula consists of three dis¬ tinct mountains, which are known individually as Mounts Serbal, Catharine and Umm Shomer, and also by the general name of Sinai. They are respectively 6,750, 8,540 and 8,000 feet high, and penetrated by narrow, deep valleys and ravines, enclosed by perpendicular walls of rock. The numerous caves were the homes of hermits. The mountains stand out in bold re¬ lief. There have been many controversies as to which peak might be the (<Mountain of the Law,” and Mount Serbal now bears that dis¬ tinction, after much research. At the foot of Mount Musa stands the convent of Saint Catha¬ rine. The rock inscriptions, dating from an early era, are interesting. Consult Beke, dis¬ coveries of Sinai in Arabia and of Midian* (London 1878) ; Gressmann, Hugo, (Mose und seine ZeiD (Berlin 1913) ; Dillmann, C. F. A., die Bucher Exodus und Leviticusˆ (Leipzig 1880) ; Palmer, E. H., (The Desert of the Exodus5 (New York 1872) ; Sayce, A. H., (The Higher Criticism and the Verdict of- the Monu- ments) (London 1894) ; Winckler, Hugo, (Sinai and Horeb) (in (Encyclopaedia Biblica5 (New York 1903).

SINAITIC MANUSCRIPT. See Bible.

SINALOA, se-na-16'a, Mexico, a state bounded on the north by Sonora and Chihuahua, on the east by Chihuahua and Durango, on the south by the territory of Tepic and the Pacific Ocean and on the west by the Gulf of Cali¬ fornia. Area, 33,671 square miles. From the Gulf, the land rises gradually to the Sierra Madre Mountains, the principal range in the state. There are numerous rivers, some of which are navigable. An excellent natural har¬ bor is that of Topolobampo, an important rail¬ way termination. The district of mines (gold, silver, copper, iron and lead) is in the east and the deposits of metals there are regarded as perhaps the most valuable in Mexico ; there, also, the

climate is cool, frosts occur frequently and the rainfall is excessive. The low and hot western belt is devoted to agriculture, the chief products being cereals, cotton, tobacco, sugar¬ cane, coffee and fruits. These crops in normal times yield about $8,000,000 annually, and the cattle industry about $9,000,000 (value of Mexi¬ can ˆdollar," 0.50). The development of Sinaloa and the west coast ,of Mexico generally, which, before the revolution broke out in 1911 had been rapid and solid, has been, since then, retarded by the unsettled state of the Mexican west and northwest coast country. However, a steady improvement toward stability and progress was noticeable in 1918. The three chief ports are Topolobampo, Altata and Mazatlan. Interior communication is furnished by the Sinaloa and Durango Railway, and the Kansas City, Mexican and Orient, and by good wagon roads ; communi¬ cation with other coast states and foreign coun¬

tries, by the Pacific Mail Mexican International, and other steamship lines. The capital of the state is Culiacan, a town of 22,000 inhabitants, connected by rail with the port of Altata. It has a government palace, cathedral, cotton mills and other manufactures. The largest city in the state, and the chief Pacific port of the republic, is Mazatlan (pop. 27,000), which was built on a small peninsula opposite Olas Atlas Bay. Total population of the state, 317,000.

SINCERE BRETHREN. See Religious

Sects.

SINCERITY, Order of. See Orders, Royal.

SINCLAIR, Alexander Maclean, Cana¬ dian Presbyterian clergyman and Gaelic scholar: b. Glen Bard, Nova Scotia, March 1840. He was educated at the Presbyterian College, Hali¬ fax, and was ordained in the Presbyterian min¬ istry in 1866. He held various pastorates until 1907, when he was appointed lecturer on Gaelic language and literature at Dalhousie University. He also gave lectures throughout Nova Scotia. Author of (A Collection of Gaelic Poetry5 (1881) ; Maelic Bards from 1411 to 1715 J

(1890) ; Maelic Bards from 1775 to 1825 J

(1896) ; (Mactalla nan Tur5 (1901) ; (Filidh na coille) (1901), etc.

SINCLAIR, Sir John, Scottish author and agriculturist : b. Thurso Castle, Caithness, Scot¬ land, 10 May 1754; d. Edinburgh, 31 Dec. 1835. He was educated at the universities of Edin¬ burgh, Glasgow and Oxford, was called to the bar in 1775 but did not engage in

practice. He was elected to Parliament in 1780, served with brief interruptions until 1811 and in 1786 was created a baronet. He took an active share in building up the fisheries and in promoting agri¬ cultural interests, founded the Scottish Society of Wool Growers in 1791, and the Board of Agriculture in 1793, acting as the first president of both associations, and in that capacity main¬ tained an extensive correspondence with Gen¬ eral Washington. The most remarkable work of his life was the compiling of the stupendous Statistical Account of Scotland, drawn up from the Communications of the Ministers of the Different Parishes) (21 vols., 1791-99). His other publications include 367 pamphlets and 18 other volumes, among which are (History of the Public Revenue of the British Empire) (3 vols., 1785-89, 3d ed., 1803-04) ; Mode of Health and Longevity 5 (4 vols., 1807) ; Mode of Agri- culture) (1819), etc. Consult Morrespondence of Sir John Sinclair (2 vols., 1831).

SINCLAIR, May, English author: b. Rock Ferry, Cheshire, 19th century. She was educated at Ladies' College, Cheltenham, and became a writer of verse and fiction. Her first striking success was a novel (Divine Fire) (1904), which reached a wide popularity in the United States. Soon after the outbreak of the European War she went to Belgium as a nurse, Author of (Audrey Craven5 (1906) ; (The Judgment of Eve) (1908) ; (The Three Brontes5 (1912) ; (The Return of the Prodigal5 (1914); (A Journal of Impressions in Belgium5 (1915) ; <The Belfry5 (1916) ; (A Defense of Idealism5 (1917) ; (Tree of Heaven5 (1917), etc.

SINCLAIR, Upton, American author and Socialist : b. Baltimore, Md., 20 Sept. 1878. He was graduated at the College of the City of

New York in 1897 and in 1897-1901 was en¬ gaged in special study at Columbia University. He assisted the United States government in¬ spection of the Chicago stockyards in 1906; fiounded the Helicon Home Colony at Engle¬ wood, N. J., in 1906, an experiment in social community living which was terminated by the destruction of the buildings by fire in 1907 ; and was Socialist candidate for Congress from New Jersey in 1906. He founded the Intercollegiate Socialist Society and is a contributor to Physical Culture. His time is now chiefly devoted to literature. Author ,of (Springtime and Harvest *(1901) ; (The Journal of Arthur Stirling) (1903); (The Jungle> (1906); <The Overman) (1907); (The Money-changers) (1908); (The Fasting*

Cure) (1911) ; (Plays of Protest (1911) ; (Damaged Goods) (1913) ; (King CoaP (1917) ; (Jimmie Higgins) (1919), etc.

SINCLAIR, William Macdonald, English Anglican clergyman: b. Leeds, 3 June 1850; d. 5 Dec. 1917. He was educated at Balliol Col¬ lege, Oxford, took holy orders and became ex¬ amining chaplain to the bishop of London, honorary chaplain to the king and in 1889 ap¬ pointed archdeacon of London and canon of Saint Paul's. He retired from London to a country church in 1911. He has written (The Psalms in the Original Rhythm *(1879) ; Wes¬ son on the Gospel of Saint John) (1882) ; (Christ and Our Times* (1894) ; (The Churches and the East) (1898) ; (The Church and the Nonconformists) (1902); (The Authority of Sunday* (1903), etc.

SIND, SINDH, or SCINDE (from sindhu, a collection of waters), British India, an ex¬ tensive territory and division of the province of Bombay, comprising the lower course and delta of the Indus, and bounded on the west and northwest by Baluchistan; northeast by the Punjab; east by Rajputana; and south by the Rann of Cutch and the Arabian Sea; length, north to south, about 380 miles ; greatest breadth, east to west, 280 miles. Area of part under British administration, 46,986 square miles. This with the native state of Khairpur makes a total area of 53,031 square miles. The capital is Hyderabad, the chief port of Karachi, both of which are connected by rail. The seacoast, ex¬ cept at the western extremity (Cape Monza), is very low, being composed of mud-banks de¬ posited from the rivers of the delta, or of low hills of sand blown in from the beach, the whole shore being a dreary swamp, destitute of trees or shrubs, and submerged at spring tides. In the dry season the stiff clay soil, which is strongly impregnated with nitre, bears an abundant crop of gigantic grass, with furze, mimosas and cacti, and affords pasture to nu¬ merous herds of buffaloes. West of the Indus the Hala Mountains approach the river at Sih- wan and come close to the sea at Cape Monza. Between the former place and Karachi, on the northwest mouth of the Indus, is a maze of hills, the highest of which reach an elevation of about 1,500 feet, terminating abruptly on the west bank of the stream. The general appear¬ ance of Sind is that of a jungly wilderness; spotaneous vegetation takes the place of cul¬ tivation.

The climate is dry and sultry. In the upper districts frost is not unknown, and the heat often varies in the 24 hours from 40° to 84°

F. The hot season lasts from March to Sep¬ tember, the cold season lasts from October to March; and the changes from the one to the other are so rapid that spring and autumn are not experienced. Sind

agriculture is still in a primitive state. In those parts under tillage the land yields two crops annually ; the spring crop consisting of wheat, barley, millet, durra, sesa- mum and other oil seeds, hemp, opium and to¬ bacco; the autumn crop <of rice, maize, cotton, sugar and indigo. Rice, wheat and maize form the principal staples, being both extensively used for food and exported. Pulse, pumpkins and other succulent plants are raised, and the date, mango, plantain, pomegranate, lime, citron, tamarind, fig, mulberry, pistachio, melon and grape are among the principal fruits. In moist parts gigantic grasses abound. The wild animals of the country include the tiger, panther, hyena, jackal, wolf, fox, antelope and other kinds of deer, wild ass and wild hog. The domestic animals include camels, buffaloes, horses, sheep and goats. The camels are valuable, both as beasts of burden and as furnishing a rich milk. Their hair is used for making shawls and cloths. The buffaloes are prized for their hides, flesh and milk. From the latter ghee is made. This is an important article of traffic in Indian com¬ merce. Birds are in great variety. Fish form a chief part of the food of the poorer people. Venomous snakes, scorpions and centipedes are common.

The Sindians, a mixed race of Jats and Baluchis, a-re partly of the Hindu and partly the Mohammedan faith. They are well made, and handsome, tall, inclined to corpulence and of dark complexion. The women are noted for their beauty. The Sind language differs little from the Hindi of Upper India, though it is more regular and complete in the inflexions of its nouns and verbs. Baluchi is also much spoken, especially in the districts west of the Indus ; and Persian may be considered as the language of the higher orders. The natives are very ingenious as weavers, turners and artisans, and are specially noted for their skill in the production of wooden lacquer work, famed throughout India. The leading Sind textile fabrics are coarse silk, cotton or mixed cloths. The silk goods are woven from silk imported from China and Persia. Sind imports British manufactured goods, sugar, groceries and spices and raw silk. Its exports comprise rice and other grains, ghee, indigo, potash, dried fish, wool, hides. There is a transit trade with the Punjab, Persia and Afghanistan, which has been improved by the Indus Valley Railway. The harbor of Karachi has been improved at considerable expense, and trade is increasing.

Sind was governed by Hindu rajahs at the time of its invasion by Alexander the Great, but subsequently, after many changes, it became an independent state. It was finally subdued by the Emperor Akbar in 1580 since which period it has always been either nominally or really tributary. In 1739 it fell under the power of Nadir Shah, but on his death it reverted to the imperial sway of Delhi. It was in 1756 pre¬

sented by the Mogul court as a dowry to Timur Shah Derani, king of Kabul, to which country it was, down to its annexation to British India, deemed subordinate. The country, however, was, during the whole of the 18th and the early

part of the 19th century, a scene of almost con¬ stant civil dissension, caused by disputes between the two leading tribes of Baluchis, which led at last to the elevation to power of the Talpur dynasty of the <(Amirs.® The government under these Amirs was a wholly unchecked military despotism, upheld by a feudal soldiery, sup¬ ported by their respective chieftains, and esti¬ mated to have numbered 102,000 men. The hostility displayed by the Amirs of Sind to the British, during and after the operations against the Afghans, led ultimately to its invasion by British troops, and conquest by Sir C. Napier's victory at Miani, 17 Feb. 1843. It was soon af¬ terward annexed to the presidency of Bombay. Pop. about 3,500,000, of which over 2,600,000 are Mohammedans ; 850,000 Hindus ; while the remainder consist of Sikhs, Christians and sev¬ eral native sects. Consult (The Imperial Gazet¬ teer of India) (Oxford 1908) ; Burton, R. F., (Sind Revisited) (London 1886) ; Hughes, (A Gazetteer of the Province of Scinde) (London

1876).

SINDING, Christian, Norwegian com¬ poser, brother of O. L. Sinding (q.v.) : b. Konigsberg, 11 Jan. 1856. He studied under Reinecke at the Leipzig Conservatory in 1874- 77, and later studied at Dresden, Munich and Berlin. He established himself in Christiania as an organist and teacher ; and gained also a reputation as a pianist, and as a composer of music characterized by great elegance and charm. His compositions are for the piano and for stringed instruments, and include the Rondo Infinite for orchestra; Violin Concerto in A; Piano Concerto in D Flat; Quintet in D minor; the opera (Der Heilige Berg* (1910) ; besides several suites, caprices, studies and sonatas, as well as songs and arrangements of folksongs.

SINDING, Otto Ludwig, Norwegian ar¬ tist, brother of the preceding: b. Konigsberg, 20 Dec. 1842; d. Munich, Germany, 12 Nov. 1909. He studied under Eckersberg in Christiania, under Piloty at Munich and under Riefstahl at Carlsruhe. While his work was on the whole much influenced by foreign study, many of his landscape and genre

paintings are typically Norwegian. He also painted marines and reli¬ gious subjects. Among his works are (The Surf* ; (From Reine) (Christiania Gallery); (Struggle at a Peasants' Wedding, > etc.

SINDING, Stefan Abel, Norwegian sculp¬ tor, brother of the preceding: b. Trondhjem, 4 Aug. 1846. He took his Ph.D. at the Uni¬ versity of Christiania, afterward studying sculpture at Christiana and Berlin. He has worked in Paris, Rome and Christiania and is regarded as the foremost sculptor of Norway. His work is highly original and realistic, and is characterized by superb strength and beauty. A collection of his best work was made by Jacobsen and placed in the Ny-Carlsberg Glyp- lothek. Among his works are (The Barbarian Mother *(1882) ; (Man and Woman) (1889) ; (The Valkyrie* (wood, 1882; bronze, 1908); (May *(1910) ; (Joy of Living* (1913) ; <Night) (1916), etc. He has also executed statues of Ole Bull, Ibsen, Bjoransen and one of himself (1916).

SINE, in mathematics, one of the most commonly used trigonometrical ratios of an angle. It is the perpendicular dropped from one end of a circular arc upon the radius of vol. 25 — 3

the other end; or in the case of a triangle a perpendicular from one side of an angle to the other. With the usual notation it is the ratio of the perpendicular to the hypotenuse. The sine of an arc is the sine of the angle sub¬ tended by the arc. The cosine is the base line from the angle to the sine. A sine-curve is a sinusoid; a subversed sine is the cosine in¬ creased by the radius; a versed sine is the radius (or unity) minus the cosine. In plane triangles the sides are to each other as the sines of the opposite angles ; in spherical angles, the sines of the sides are to each other as the sines of the opposite angles. Hence it appears how important the sine is for finding certain parts of triangles, from certain given parts. See Trigonometry.

SINECURE, strictly speaking, an office which has no work attached to it, but generally applied to a political office with liberal salary, and comparatively littje to do. In the United States no office is supposed to be absolutely free from actual service on the part of the in¬ cumbent, but sinecure offices were formerly very numerous in the English public service. They were used to enrich ministers of state and their families; Sir R. Walpole, for example, presented his son Horace to three or four sine¬ cure places which brought him in a large in¬ come. The number of such places has been greatly diminished by modern reforms; the stewardship of the Chiltern Hundreds and some other offices of merely nominal profit are re¬ tained, because by accepting one of them a member of the House of Commons is enabled

to vacate his seat.

SING SING, N. Y. See Ossining, N. Y.

SINGAN-FU, se-ngan'foo, a city of north¬ east China, the capital of the province of Shen-si, near the centre of the province, a few miles south of the Wei-ho River. It lies on one of the principal commercial roads of the empire, and at the head of navigation for large junks on the river. The city is surrounded by well-preserved walls, and contains many ob¬ jects of historic interest. During the 12th cen¬ tury b.c. it was the capital of China, and the Chinese court retired to this city when the allied powers occupied Peking in 1900. For additional information see Sian-fu.

SINGAPORE, sing-ga-por', or SINGA- PUR, East India, a British possession consist¬ ing of a small island and a strongly fortified seaport city, the capital of the Crown colony of the Straits Settlements, off the southern ex¬ tremity of the Malay Peninsula, commanding the eastern entrance to Malacca Strait, the chief route to the Far East.

The municipality was founded in 1819 by the East India Company, through the foresight and good management of Sir Stamford Raffles, to whose memory a fine monument has been erected. Since 1824 it has been the capital of the consolidated governments of Singapore, Penang and Malacca. The city is well-built, has a sea frontage of about six miles and a fine harbor with extensive docks and wharves. It has become the commercial entrepot of southern Asia and the Indian Archipelago, and carries on such extensive transactions that it has been termed ((the Liverpool of the East.® The port is free to vessels of all kinds and nations, without charges on exports and im-

ports, anchorage, etc., only light dues being pay¬ able. Singapore is a coaling station of the British navy, and is defended by forts carrying heavy ordnance, and by submarine mines. The imports from Great Britain comprise cottons fthe largest import), iron, machinery, coals, hardware and various manufactures; the ex¬ ports thither consist of tin, coffee, rice, sugar, nutmegs, mace, sago, tapioca, catechu, gambier, hides, rattans, gutta-percha and numerous sun¬ dries. The imports from the continent of Europe and the United States consist of wines, spirits and liquors, manufactured goods, pro¬ visions, etc., in exchange for similar commodi¬ ties to ’those sent to Britain.

Singapore carries on an extensive trade with Calcutta, Madras and Bombay. The annual value of exports from and imports into Singapore, taken to¬ gether, is $275,000,000 and upwards, being ex¬ ceeded by only three other Asiatic ports. The total tonnage, entered and cleared, exceeds 17,- 500,000 annually. There' are a number of fine buildings, as the governor's palace, the city hall, two cathedrals, a museum and library. There is also a fine public park and botanical gardens. A railway has been constructed from Singapore to Kranji, on the Johore Straits. The city is well supplied with water, but in other respects its sanitary arrangements are backward.

The island of Singapore is of rhomboidal shape, about 27 miles long and 14 miles broad; area, 206 square miles. It is separated from the mainland by a narrow strait two miles to one- half a mile in breadth. Its surface is generally undulating, rising in some parts into round verdure-clad bills, the highest of which, called Bukit-Tima or the Tin-hill, rises 520 feet above the sea. Tin smelting is the chief of the set¬ tlement's industries, more than half of the world's tin product coming from the smelting works of Pulan Brani. The fisheries also are very productive and give employment to a large number of people. The chief cultivated plants include coffee, pineapples and other fruits, cocoanuts, aloes, gambier, pepper, indigo, sugarcane, etc. Fruits and vegetables are grown in immense variety and to great perfec¬ tion. The British settlement dates from 1819 when permission was obtained to build a fac¬ tory on the southern shore of the island. By treaty in 1824 they purchased for 60,000 Spanish dollars and a life annuity to the Sultan of Johore and his resident officer of 24,000 dollars, the sovereignty and fee simple of the island, as well as of all the seas, straits and islands to the extent of 10 geographical miles (11 14 miles) around. The climate is very hot, moist and oppressive. The population is mainly Chinese, with a sprinkling of Malays and East Indians, and about 4,000 whites. Pop. about 235,000, of whom about 193,000 are in the municipality. See Straits Settlements.

SINGER, Isaac Merritt, American in¬ ventor: b. Oswego, N. Y.j 27 Oct. 1811; d. Torquay, England, 23 July 1875. He was a machinist, and having spent years of study on the improvement of sewing machines obtained a patent on a single-thread, chain-stitch ma¬ chine. He established in New York a factory in conjunction with Edward Clarke, a wealthv lawyer, and made a fortune in the manufacture of machines which bore his name. He re¬

sided at Paris and Torquay during the later years of his life. The Singer building is one of the notable edifices of New York, and the Singer tower was at one time the highest office building in the city.

SINGER, Isidore, American Jewish editor and author: b. Weisskirchen, Moravia, Austria, 10 Nov. 1859. He took his Ph.D. at the Uni¬ versity of Vienna in 1884, and studied also at the University of Berlin. He founded and edited Allegemeine Osterreichische Literatnr- seitnng at Vienna in 1884-85 ; and in 1887 he became secretary and librarian to Count Alex¬ andre Foucher de Careil, French Ambassador to Vienna, whom he accompanied to Paris. He was later employed in the Bureau de la Presse of the French Foreign Office, and subsequently founded La Vraie Parole, of which he was editor-in-chief, and made the paper an opponent of the anti-Semitic La Libre Parole. He went to Italy in 1891, and in 1895 came to the United States, where he succeeded in carrying out the project he had made his life work, the pub¬ lication of the (Jewish Encyclopedia) (12 vols., 1901-05), of which he was the originator and managing editor. He also originated the proj- ect of the Unternational Insurance Encyclo- pedia) (Vol. I, 1910) ; and the ˆGerman Clas¬ sics of the XIXth and XXth Centuries> (20 vols., 1913-14) ; and was author of (Berlin, Wein und der Antisemitismus> (1882) ; (Le Prestige de la France en Europe* (1889); (Russia at the Bar of the American People) (1904) ;

(Christ or God?) (1908), etc. He is at present literary editor of Joseph A. Judd and Company, and associate editor of Arts .and Decoration.

SINGHALES, SINGHALESE (sin-ga- lez'), LANGUAGE AND LITERATURE.

Singhalese is the speech of 70 per cent of the native inhabitants of Ceylon. It is an Aryan tongue and nearly allied to Pali, but it con¬ tains many foreign words. For this reason there has been much dispute as to its classifica¬ tion. There is a material difference between the vernacular and the written language. The latter has a copious vocabulary and a regular grammar, and is capable of elegant style. Its alphabet has 50 letters, but these represent only 30 sounds (7 vowels, 23 consonants), belonging to the Singhalese. Modern Singhalese has be¬ come an analytical language very largely, though there are still in evidence traces of its highly inflected ancient condition. In fact the Singhalese verb seems to have been handed down little changed from the synthetic age of the tongue. The other sounds are heard only in Sanskrit words or are indistinguishable. In the Singhalese words occurring in the following illustrations of the grammar of the language the vowels have the values they have in Italian, the consonants, including ch, sh and j have the sounds given to them in English, except that g is always hard, and that the diphonics chh, jh, th, dh, ph and bh stand for sounds peculiar to Singhalese. In Singhalese grammar there are three genders ; nouns masculine end mostly in a, plural o,

an, aru; feminine in i, plural u, varu; neuter in a, u, plural adding val, or dropping the final syllable. Examples: nuvara, city, nuvaraval, cities ; kaduva, sword, kadu, swords. The principal case endings, masculine and feminine, are genitive, ge, ne ; dative, ta, da; accusative, va; ablative, gen, nen. The neuter

asfv ,

a, ->

' m

mw'W.4$S

Jn jf/ * 1V\

/ * Wgg* «

‘iWmm

- 3 ' n|

■ir >

f wt\Mv

1 Street scene in Singapore

2 Malay Court of Justice, Singapore

SINGHARA nut — singletax

35

endings of the above four cases respectively are e, ata, ava, en. Example: manuspaya (Lat. homo), man; giim (Lat. mulier), woman; oluva (Lat-. caput), head; genitive manuspayage,r hominis; gunlge, mulieris; oluvae, capitis; dative, manuspaya, homini, etc. ; accusative, gumva, mulierem, etc. ; ablative, oluven, capite, etc., as above detailed: plural, manuspayo, homines ; alii, capita; manuspayinne, hominum, etc. The adjectives are indeclinable. There are no less than 14 different pronouns of the second person, the use of them being regulated by the rank, both of the speaker and the person ad¬ dressed. The Singhalese literature, which is not very extensive, comprises several original poems of some merit, and an extensive and in¬ teresting series of native chronicles, together with a considerable body of devotional works and other religious writings. The oldest Sin¬

ghalese document extant is a glossary to the commentary on the (Dhammapada) (10th cen¬ tury). The language also contains histories and grammars. The sacred books of the Singhalese, originally written in Pali, and which have been translated into the popular tongue form a con¬ siderable body of literature which is widely read and distributed over most of the island. Con¬ sult Alwiz, Singhalese Hand-Book in Roman Characters *(Colombo 1880) ; Carter, 'English- Singhalese Dictionary * (Colombo 1891) ; Clough, (Singhalese-English Dictionary* (Co¬ lombo 1890) ; Geiger, (Literatur und Sprache der Singhalese^ (Strassburg 1901) ; Gunase- kara, Comprehensive Grammar of the Sin¬ ghalese Language* (Colombo 1891).

SINGHARA NUT, the fruit of a floating aquatic plant Trapa bispinosa. The nut is large, about three-quarters of an inch thick, having normally four spines, two of which are often absent. It has a sweet starchy kernel, which is a staple food of the natives of Cashmere.

SINGING. See Voice and Voice Culture.

SINGLE STANDARD. See Bimetal¬ lism.

SINGLETAX, The, is a name for the so¬ cial reform which Henry George proposed in (Progress and Poverty. * This book was first published in 1879, but the social reform it pro¬ poses had been foreshadowed by its author in his monograph, Cur Land and Land Policy, * published in 1871. He had discussed it, also, in newspaper editorials and magazine articles, and had subjected it to criticism through extensive personal correspondence. Having satisfied himself of the economic and moral soundness and the political feasibility of the reform, he devoted his life, from the beginning of his task of writing (Progress and Poverty *in 1877 until his death in 1897, to popularizing it and to promoting political action in furtherance of its legislative adoption. In the course of this agitation he wrote several additional books only less famous than (Progress and Poverty,* among them being (Social Problems, * (Pro- tection or Free Traded an open letter to Pope Leo XIII on (The Condition of Labor,) (A Perplexed Philosopher (a criticism of Her¬ bert Spencer in certain respects), and a pos¬ thumously published incomplete treatise, (The Science of Political Economy.* In addition he carried his agitational work to the lecture plat¬ form, making two tours of Great Britain and

Ireland, one of Australasia, and several through the United States and Canada. As an editor he advocated the reform first in the San Fran¬ cisco Post (a daily newspaper) and later in the New York Standard (a weekly), both under his own proprietorship ; and as a maga¬ zine

contributor he discussed it in the Popular Science Monthly, the North American Review, the Century Magazine, the Arena, and period¬ icals of similar character in the United States and abroad. His political activities — includ¬ ing two gigantic campaigns for mayor of New York (1886 and 1897), in the latter of which he suddenly died a few days before the elec¬ tion, were inspired and rigidly governed, like his authorship and his editorial work and lec¬ turing, by his devotion to the Singletax.

Coming first into use in 1888, this name is the one now best known in the United States, Canada and Australasia. It had currency in Great Britain for a time, but the more familiar term there has for several years been ˆtaxation of land values.® In Germany the current name is (<Bodenreform.® Numerous other designa¬ tions have been used ; <(land restoration,® <(anti- poverty,® ((free soil,® (<land and labor,® etc. None of them all, however, is satisfactorily de¬ scriptive. Although the reform they designate involves alterations in the prevailing systems of land tenure, it is more than a land-tenure re¬ form; while it would begin (partly for strategic reasons) with land-value taxation, and notwithstanding that (for more substantial reasons) this method may be advocated as a permanency, yet the reform itself has no fiscal limitations ; whereas the tax proposed would be a single tax, the essential character of the reform is neither the tax nor its singleness; and although the reform aims at abolition of involuntary poverty and of exploitation of labor, its fiscal method for attaining these ends is one of its characteristics. To understand the Singletax, therefore, recourse to verbal defini¬ tions of its names will not do. Its essential principles and its distinctive method for their realization in public policy and law, must be taken into account and considered together.

The primary social-utility principle of the Singletax, as formulated by Henry George, is (< association in equality .® This is referred to as the natural law of progress. Without asso¬ ciation progress would be impossible ; without equality of opportunity to live and to earn, the progress which association produces reacts in¬ juriously upon itself and engenders poverty as a social phenomenon.

The secondary social-utility principle of the Singletax proceeds logically from its primary one. Equality of opportunity to live and to earn being inconsistent with monopoly of nat¬ ural resources, equal rights to natural resources (which are comprehended in the economic tech¬ nical term ((land®) is an unescapable condition of social progress without social poverty. It is also imperative as a condition of the social morality that is implied by such phrases as <(the

brotherhood of man,® and which, finding religious expression in the Golden Rule of Christian teaching and ((the Second Great Com¬ mandment® of Christian and Jewish teaching alike, gets political expression through the hu¬ man equality clauses of the American Declara¬ tion of Independence.

Inasmuch, then, as the requirements of social morality and social utility coincide in this respect, the broad basic principle of the Single¬ tax is a co-ordination of social utility and social morality principles. It demands equal rights to land.

But the basic principle of the Singletax is not necessarily inconsistent with individual titles to land. Whatever is socially useful in a public policy that recognizes individual titles may be harmonized in practice with the princi¬ ple of equal rights. Any community could harmonize the two for itself, by socializing the land values within its jurisdiction. Instead of attaching equality of rights to the land directly, it could do so indirectly by socializing such of the profits of the whole area as are fairly at¬ tributable to its superior natural qualities and locational advantages. Nor would this be a difficult matter. Separation of the profits of mere ownership of natural opportunities from the profits of their use is practicable by refer¬ ence to the principle of Ricardo's law of eco¬ nomic rent. This law affords an approximately accurate and substantially fair measure of the difference between the incomes that land users earn, whether they are landowners or not, and incomes or other financial benefits from mere ownership. For it measures with reasonable accuracy the varying financial advantages of natural resources through every gradation, from the zero value of superabundant fertile land at social frontiers to the fabulous values of rich mineral deposits easily accessible to mar¬ kets and the choicest sites for business oper¬ ations in a metropolitan city. These financial advantages, whether estimated as annual values (Or as capital values, are ((land values® in Sin¬ gletax terminology. To socialize land values is, therefore, the Singletax method of securing equality of rights to land without abolishing any of the socially useful attributes of private titles.

Nor need the reform be made abruptly, or through novel modes of land administration, so as to shock a socially useful conservatism or any reasonable sense of social prudence. It can be established by a deviation from present fiscal principles and policies, with hardly any

alteration of present fiscal methods. This is the point at which taxation principles and poli¬ cies enter into the Singeltax. Though consid¬ ered as a fiscal reform alone, the change pro¬ posed would be in the direction of simplicity and greater fairness. It consists in so modify¬ ing real estate taxation as to exempt improve¬ ments, leaving land values to bear the burden. This modification would not of itself socialize all land values, the entire amount of real estate taxation being less annually than annual land values; but besides socializing more land val¬ ues than are socialized now, it would discour¬ age monopoly of idle land by increasing the taxation expense of keeping it idle. And it would encourage the improving of land by les¬ sening taxation expenses of improvement and maintenance. It would, therefore, tend toward the social aims of the Singletax. This tend¬ ency would be accelerated if all personal taxes for revenue were abolished. Taxes for police regulation are not within the purview of the Singletax, though objectionable as being the most unfair and least effective of regulation methods. But with land values as the sole

source of public revenues, industrial activity would be doubly stimulated: first, by freedom from tax burdens; second, by the lowering of capitalized values of natural resources through market gluts of idle land taxed out of useless and obstructive ownership. The second of those causes of industrial stimulation would be progressively intensified by the forcing upon the real estate market of still more and better idle land, consequent upon the necessity, in order to derive public revenues exclusively from land values on a falling market, of increasing the rates of taxation on capitalized land values. This action and reaction — lowering of capital¬ ized values of land by market gluts of idle land, and consequent raising of tax rates — might result in drawing approximately all land values into public treasuries. In that event and so long as the condition continued, land values would be wholly socialized. If, however, any considerable amount remained continuously un¬ socialized, extensions of public functions and further improvements in public service could be made at the expense of land values until their socialization was approximately and per¬ manently complete. To abolish all taxes save upon land values (in itself a beneficial tax re¬ form) is, therefore, the method iof the Single¬ tax for securing all its social objects.

To summarize in inverse order of statement, the singletax is a proposal to (1) abolish all taxation save upon land values, for the pur¬ pose (a) of improving taxation in the direc¬ tion of simplicity and fairness and in the in¬ terest of industry, by (b) exempting produc¬ tion from taxation, and (c) promoting tenden¬ cies toward socialization of land values ; its purpose in aiming to (2) socialize land values being to

secure (3) equal rights to land in har¬ mony with individual possession, and thereby to establish (4) equality of opportunity to live and to earn, impossible under land monopoly but an unescapable condition of progress with¬ out poverty under the law of (5) association in equality, which is a natural law of (a) social utility and (b) social morality.

Objections to the Singletax are too numer¬ ous for complete consideration here. Some are frivolous, some are disingenuous, some proceed from misapprehension; but some are sincere, important and at least apparently reasonable. Most professorial economists are counted among objectors, and the economic atmosphere of the universities seems to be hostile. Yet the objections lack both system and comprehensive¬ ness. Most comprehensive of all, perhaps, are those of Walker's (Land and Its Rent,5 a book which had vogue for a time but is now obso¬ lete. It has been succeeded in university cir¬ cles by a chapter on ((The Single Tax® in Selig- man's ˆEssays on Taxation.5 This chapter, which is limited to the subject in its fiscal as¬ pects, is refuted in chapter XIV of Shearman's Natural Taxation.5

Following is a summary of current objec¬ tions and answers (1) Objection: The Single¬ tax would take private property for public use without compensation. Answer: As land value is attributable not to individual industry but to social progress, and attaches not to in¬ dustrial products, but to natural resources, it is in fairness social property, for which reason the just objection is not to taking land value for public use without compensation to land-

owners, but to allowing its continued appro¬ priation by landowners without compensation to the public. (2) Obj.: The fiscal principle upon which the Singletax rests, that of taxation in proportion to individual benefits derived from government, is false, sound fiscal principles re¬ quiring taxation in proportion to each taxpayer's ability to pay. Ans.: (a) Taxation in proportion to ability to pay is a principle of arbitrary tribute-levying; (b) the sound fiscal prin¬ ciple under democratic government is in proportion to governmental benefits. (3) Obj.: Taxation in proportion to governmental bene¬ fits is impracticable, the benefits being too multifarious and subtle for financial measure¬ ment. Ans.: (a) As land values financially reflect all governmental benefits, taxation of land values is in proportion to benefits; (b) it is, at any rate, in proportion to financial bene¬ fits, which is the crux of

the matter. (4) Obj.: The tax would be shifted from land- owner to tenant in higher rent. Ans.: This is (a) unthinkable with reference to unimproved land, and (b) since unimproved land would glut the market under pressure of burdensome taxation, all land would tend downward in market value. (5) Obj. : Unimproved build¬ ing sites do not need the governmental pro¬ tection that police and fire systems provide and which buildings do need; therefore, upon the principle of taxation according to benefits, building sites rather than buildings should be exempt from taxation for police and fire pro¬ tection. Ans.: As- the value of building sites is higher with police and fire protection than without, and the value of buildings is no higher (probably lower from the greater com¬ petition in building), it is building sites, not buildings, that are benefited financially by fire and police protection, and which, therefore, should bear the financial burden. (6) Obj.: The Singletax would produce public revenues in excess of public needs. Ans.: Probably not, if schools, highways and other public necessaries and conveniences were adequately provided and properly maintained. (7) Obj.: The Singletax would lack elasticity and there¬ fore be unadaptable to balanced budgets. Ans: (a) This possibility of disadvantage would be outweighed by manifest advantages; (b) it might be obviated by estimating public expendi¬ tures after instead of prior to collection of the public revenues out of which they are paid;

(c) estimates of aggregate land values for a fiscal year in advance of expenditures are as trustworthy for budget purposes as estimates of any other taxable values or of all together;

(d) some Canadian municipalities have for sev¬ eral years balanced their budgets under a policy of land value taxation alone, and with apparent satisfaction for they have been legally at lib¬ erty to abandon the policy at the beginning of every fiscal year; (e) the problem of balanced budgets is the same with governments as. with individuals, namely, to balance expenditures and savings in normal circumstances against normal incomes (in emergencies anticipating future income by drafts upon savings and by temporary borrowing), and as land values are essentially social property and therefore the normal income of governments, expenditures in government budgets should balance against land values. (8) Obj.: The Singletax would yield insufficient local revenues for the local

needs of poor communities. Ans.: (a) The land values of every community are sufficient for strictly local needs; (b) the maintenance of local schools, highways, etc., are not prop¬ erly local expenses, these services being neces¬ sary to maintain the standards of State and national life as a whole. (9) Obj.: The Single¬ tax would exempt

investors in labor products while taxing investors in .land values, though both investments increased in value. Ans.: The latter would be taxed because their in¬ vestments are in values that are produced, maintained and increased by the community and which attach to the site of the community, a common heritage the title to which investors hold as a government privilege ; whereas the investments of the former are in products of industry the title to which investors hold from the producers. (10) Obj.: All values are pro¬ duced, maintained and increased by the com¬ munity. Ans.: The statement is not tenable; but irrespective of that, the values of labor products attach to objects of individual production, whereas land values attach to the natural re¬ sources and sites of production and of life. (11) Obj.: Labor products are.no longer ob¬ jects of individual production, individuals be¬ ing unable alone to produce anything in our highly specialized industries. Ans.: This ob¬ jection springs out of confusion of thought, specialized and individual industry not being essentially different, since every specialist con¬ tributes his labor individually so that though millions co-operate to produce, for instance a house, each individual is a housebuilder to the extent of his specialized contribution to the result. (12) Obj.: The Singletax would be class taxation. Ans.: (a) To take by taxa¬ tion for public revenues property that is legally owned by one class but which morally belongs to all, would not be class taxation but common taxation; (b) it is exemption of such property, either in whole or in part, thereby necessitating taxation of legitimate private property, that is class taxation. (13) Obj.: It is impracti¬ cable to distinguish land values from improve¬ ment values. Ans. (a) Not with reference to unimproved land; (b) unimproved land affords a reasonable basis for calculating the land value of neighboring improved land ; (c) the land value of building lots is easily distinguishable with approximate accuracy from the value of their buildings; (d) the value of mineral deposits is easily distinguishable with approximate ac¬ curacy from the value of their operating plants;

(e) the land value of farms is as a rule so low, relatively to their improvement value, that error would usually be negligible; (f) literal accuracy of calculation is no more vital to this fiscal policy than to any other, and (g) un¬ avoidable error would be less unfair to tax¬ payers and less injurious to the community. (14) Obj.: The Singletax would relieve great moneyed interests by placing all governmental expenses upon landowners. Ans.: (a) No land would be taxed unless it were valuable irrespective of its improvements, and (b) valu¬ able land would be taxed only in proportion to its value irrespective of its improvements ; (c) as moneyed interests depend for wealth and social

power not upon mpney literally but upon titles to mineral deposits, natural forests, highways, public utilities, building sites, water powers, extensive areas of farming and

ss

SINGLETAX

grazing land and other legal privileges most of which are land monopolies, they would be more heavily taxed than they are now, while

(d) landowners who are also land users (working farmers, for instance) would be taxed less heavily than now. (15) Obj.: The Singletax would not benefit wage-earners. Ans.: (a) By making the holding of land out of use unprofitable and the use of land profit¬ able the Singletax would stimulate demand for wage-earners, thereby promoting a tendency to steady employment at increasing wages, and (b) by discouraging monopoly of idle land it would tend to make such land common, thereby expanding and maintaining opportuni¬ ties for profitable self-employment. (16) Obj.: To take all land values for public revenue, whether by taxation or otherwise, would be unjust and justice is the prime consideration. Aits.: (a) The Singletax stands or falls by the test of justice; (b) as land is a common herit¬ age which cannot be continuously monopolized without continuous injustice to the landless, irrevocable titles to land are indefensible; (c) as any private titles to land are defensible only upon the ground that social utility requires pri¬ vate possession, land titles are in the nature of public trusts which are violated when possess¬ ors interfere with the best use of the lands they so possess ; (d) such possessors are there¬ fore in justice estopped from objecting to land value taxes that would encourage best use ;

(e) as land values are in the nature of com¬ munity earnings, private ownership of land values cannot in justice be granted in per¬ petuity; (f) as private title to land and private ownership of land values are dependent upon arbitrary governmental grants and not upon moral sanctions, these grants are in justice sub¬ ject at all times to revocation, revision or ex¬ clusive taxation; (g) as it is both impolitic and unjust for governments to tie up their fiscal powers in perpetuity, land titles are at all times subject, both as matter of public policy and as matter of social justice, to taxation in governmental discretion; (h) to assert that land grants cannot justly be revised, revoked or taxed by general rule without compensating grantees or their successors, is in effect to as¬ sert that it cannot justfy be done at all, for just rights to

compensation rest necessarily upon just rights to that for which the compen¬ sation is exacted.

Fiscal measures tending toward the Single¬ tax have been adopted for local purposes in several countries, beginning with New Zealand. This instance dates back to a period just before the publication of Henry George's (Progress and Poverty) but several years after the publi¬ cation of his (Our Land and Land Policy. y It came about under the leadership of Sir George Grey, who subsequently declared himself to be in full sympathy with (Progress and Poverty. > As with nearly all the instances that have followed it, the New Zealand reform was not called the Singletax nor adopted as what would now be so known. But it involved the same principle and in degree the same socializing purpose. This may be said also of the land- value fiscal system which has been adopted for local revenue, purposes by municipality after municipality in New Zealand since 1896 until they aggregate nearly a hundred, including Wellington and Christchurch. It may be said

also of the municipal systems of Australia, in which taxation for local revenues varies from rising percentages on land values to land values exclusively. In the German colony at Kiao- Chou, China, a system of public revenues from land values exclusively was adopted in 1899. Though crude and complex in comparison with the Singletax, this system accords with Single¬ tax principles both fiscal and Siocial. It is sup¬ posed to have suggested the <(unearned increment® taxes of Germany and the preceding local systems of land value taxation in German municipalities that originated in 1893, both of which, also crude and complex in comparison with the Singletax, have Singletax tendencies and somewhat of the Singletax motive. Al¬ though the British measures of 1909 for land value taxation were not Singletax measures dis¬ tinctively, nor at all except in minor degree, they were supported by Singletax organizations and were denounced as Singletax measures by the opposition. Some of the municipalities of Canada have made pronounced advances toward the Singletax as a fiscal reform, Vancouver tak¬ ing the lead in 1905. Although these advances were not made in the Singletax name, they were promoted by Singletax agitation ; and while the tax limits are too low to effect the socializing purposes of the Singletax, its fiscal desirability seems to have been demonstrated by the fact that the municipalities, being free to abandon the system with every recurring fiscal year, nevertheless readopt it annually. In the Scan¬ dinavian countries influential agitations toward the Singletax have been reported, notably in Denmark where a general small farmers' move¬ ment, the ˆCottagers,® has promoted a strong, favorable policy. In South America, especially in Argentina, the singletax appears to have the

support of popular governmental influences ; and much in the revolutionary proposals in Mexico indicates a drift toward Singletax ideals there.

<(Local option® or <(home rule® in taxation — such as is freely allowed to Canadian and Australasian municipalities, and less freely in Germany — has been a favorite method of Sin¬ gletax agitation in the United States since 1889, when it was proposed by Thomas G. Shearman and approved by Henry George. The earliest efforts in its behalf were made in the New York legislature in the early 90's but without success. Among more recent efforts two unsuc¬ cessful referendum campaigns in California (1912 and 1914) are notable. The issue of each was (<home rule® in municipal taxation, but the controversy turned upon the Singletax because it was popularly understood that if ((home rule® were granted it would be followed by Singletax agitations for local revenue purposes. The favorable vote was large on both occasions and larger on the second than on the first. Oregon established <(home rule® in county taxation by referendum in 1910, the popular issue being Singletax; but at the election of 1912 a Single¬ tax referendum for the State was defeated, and the ((home rule® measure adopted two years earlier was repealed before it had gone into practical operation. At the same election Single¬ tax proposals under the (<home rule® provision of 1910 were defeated in three counties — Clack¬ amas, Coos and Multnomah. Colorado, where a county <(home rule® amendment to the con¬ stitution was defeated in 1902, has since estab-

lishcd a <(home rule® system under which four municipal referendums have come off — one in Denver, one in Colorado Springs and two in Pueblo. In Denver and Colorado Springs Sin¬ gletax measures were defeated; in Pueblo one was carried in 1913 but repealed in 1914 before it had gone into practical operation. As early as 1895-96 the question was raised before the people of Delaware on a Singletax amendment to the constitution, but was defeated after an exciting campaign. The people of Missouri voted in 1912 on constitutional amendments es¬ tablishing the Singletax by stages over a period of several years, and defeated them by an enormous majority, the favorable vote being 86,647 in a total of 594,784 throughout the State, and 47,583 in a total of 112,408 in the city of Saint Louis. Singletax referendums in Everett, State of Washington, have resulted fa¬ vorably, but are as yet ineffective under con¬ stitutional

objections. Tax Commissioner Pas- toriza of Houston (Texas) made Singletax innovations by common local consent, as matter of arbitrary administration ; and for fiscal pur¬ poses the system is to some extent in adminis¬ trative operation in the State irrigation districts of California. The earliest distinctive Singletax experiment in the United States was begun at Hyattsville (Md.), a suburb of Washington, D. C. Taking advantage of a State law permitting municipalities to attract industrial enterprises by exempting them for a time from taxation, the Hyattsville council adopted the Singletax for local revenue purposes in 1892, but its action was abrogated by the State courts in 1893 as unconstitutional. Not long after the Hyatts¬ ville experiment a Singletax colony, or enclave, to be located in Alabama on Mobile Bay, was organized in Iowa. Out of its land values this enclave, known as Fairhope, has for nearly 25 years maintained itself and paid the general taxes levied upon its inhabitants. It is man¬ aged more in accordance with land nationaliza¬ tion than Singletax methods, but the principles and purposes of land nationalization and the Singletax are essentially the same. Another enclave, Arden, was established in Delaware in 1900. Since that time a third enclave, Halidon, has been located in Maine, and a fourth, Tahanto, in Massachusetts. There is also a fifth, Free Acres, in New Jersey. Under a ((seoond class cities® law of Pennsylvania the Singletax has in limited degree been in operation in Pittsburgh and Scranton (the Pennsylvania cities of the <(second class®) since 1912. Pursuant to this law, land is as¬ sessed for taxation at full value, while improve¬ ments are assessed at a descending ratio of their value, with the view of ultimately taxing improvement values only half as much as land values. A formidable movement for a similar local revenue law for the city of New York has been held in legislative check by .opposition to it as a Singletax measure. In degree it is so, for if half the value of improvements were exempt, the whole value of land being taxable, the rest of the Singletax proposals, even to the extent of socializing all land values, would, in the phrasing of the Singletax agitation, be (<only a matter of keeping on.® The Joseph Fels fund has been an important factor in the Singletax movement. Beginning in 1909, the late Joseph Fels devoted a large income, in addition to con¬

stant personal service, to Singletax propaganda in the United States, Great Britain, Germany, Denmark and Australasia. He died in 1914, but his widow, Mary Fels, has continued the donations and given her own personal services in place of his. In Great Britain the Fels con¬ tributions are administered through the United Committees for the Taxation of Land Values; in the United States through the Joseph Fels Fund Commission, the work of which is of national scope and fame.

For obvious reasons no attempt has been made to bring this historical outline down to a later date than about the beginning of the World War.

Bibliography. — Besides the Singletax books noted above, reference may be had to Post's (The Taxation of Land Values) for an ana¬ lytical presentation of the subject with illustrative diagrams and answers to typical questions ; to Fillebrown's (A B C of Taxation5 for a con¬ servatively favorable view; to Carver's (Essays in Social Justice) and Hayes's (Introduction to the Study of Sociology, 5 for moderate criticisms along with partial approval; to Nearing's (Income) for a sympathetic consideration of in¬ timately related economic and social phenom¬ ena; to Trowbridge's <Bisocialism) for a tech¬ nical exposition; and to Mathew's (Taxation and the Distribution of Wealthy Mallock's Property and Progress) (for uncompromising opposition), Thackeray's (The Land and the Community5 (historical), Dove's (The Theory of Human Progression,5 Hirsch's (Land Values Taxation in Practice5 (a comprehensive resume to 1908) ; Hirsch's (Democracy versus Social¬ ism5 (a scholarly contrast of Socialism and the Singletax) ; Hurd's Principles of City Land Values,5 Post and Leubuscher's <George- Hewitt Campaign5 (includes controversial cor¬ respondence on the Singletax between Henry George and Abram S. Hewitt) ; Henry George, Jr's. (The Life of Henry George5 ; American Social Science Association's report of ((The Singletax Discussion® at its meeting at Sara¬ toga in 1890, and Henry George's Property in Land5 (a controversy with the Duke of Argyle), and (The Land Question5 (.originally written with special reference to land tenures in Ireland). Young's (History of the Single Tax Movement in the United States5 is a com¬ prehensive and in all important respects a trust¬ worthy narrative, and Miller's (Single Tax Year Book5 describes the progress of the move¬ ment extensively and in much detail from its beginnings in different parts of the world until about the opening of the World War.

Louis F. Post.

SINGLETON, Esther, American author: b. Baltimore, Md., 19th century. She lived in New York after 1887 and was for several years engaged in encyclopedia work. She later be¬ came known as a writer on a wide variety of topics, including music, art, literature and his¬ tory. Author of <A Guide to the Opera5 (1899, 1909) ; (The Furniture of Our Fore¬ fathers5 (2 vols., 1900) ; Pamous Paintings5 (1902) ; (Social New York Under the Georges5 (1902) ; (Great Events of the World's History5 (5 vols., 1903); (Venice5 (1905); (Dutch and Flemish Furniture5 (1907); (Turkey and the Balkan States5 (1908); Pamous

Cathedrals5 (1909) ; (How to Visit the Great Picture Gal-

leries) (1911) ; (Visit to English Cathedrals) (1912); ‘American Historic Homes) (1915);

(Rodin and His Art) (1918), etc.

SINHA, Sir Satyendra Prassano, K. C,

first baron, Indian administrator : b. 1860. Born of humble native parentage in a village of Bengal, Sinha went to England in 1881 to study law at Lincoln’s Inn. He was the first Indian to ((take silk,® i.e., become a king’s counsel, an honor hitherto confined to members of the bar practising in Great Britain. In 1909 Sinha be¬ came a member of the viceroy’s executive council and was the first Indian to hold the office of advocate-general of Bengal. Together with the Indian Maharaja of Bikaner he repre¬ sented India in the Imperial War Conference and in the War Cabinet, 1917-18, and also at the Peace Conference in Paris. On the formation of the new British ministry in January 1919, Sir S. P. Sinha was appointed under-secretary of state for India and a privy councillor, and raised to the peerage in order to represent the India Office in the House of Lords.

SINIGAGLIA, se-ne-ga'lya, Leone, Italian composer: b. Turin, 14 Aug. 1868. He studied under Bolzoni in Turin and later under Mandyczewsky in Vienna, where he received much assistance from associating with musi¬ cians such as Dvorak and Goldmark. Among his compositions are many violin and violincello pieces, songs and female choruses; a set of variations on Schubert’s (Haidenroslein) for oboe and piano; violin concerto in A ; (Rapsodia piedmontese) for violin and ochestra; Romance in A for violin and orchestra, etc.

SINJIRLI, sln-jer'le, Syria, a village in the vilayet of Aleppo, at the foot of Mount Amanus or Giaour Dagh, 30 miles north¬ east of Alexandretta, ancient Iskanderun, on the Mediterranean. It is noted as the site of an ancient Hittite city, excavated under the auspices of the German Orient-Gesellschaft since 1888. The two encircling city walls and the acropolis with three lines of fortifications were disclosed, and numerous Aramaic inscrip¬ tions of great historical value were discovered. One of the most important finds, now in the Berlin Museum, was an inscribed stele, or stem of an arrow, commemorating the victory of Esarhaddon, king of Assyria, in Tammuz (June) 670

b.c., over Tirhakah, king of the Egyptians, who is represented as a negro. Consult Lidzbarski, ‘Nordsemitische. Epi¬ graphˆ (1898) ; Muller, The Contemporary Review (1894).

SINK HOLES, depressions due to solu¬ tion of an underlying soluble rock layer, such as limestone, gypsum or salt. Sometimes they are formed by the enlargement of a joint in limestone, with the consequent slump of the over_ lying soil, forming a nearly circular funnel- shaped depression of small size. Larger sinks, often with steep sides, are caused by the col¬ lapse of the roof of a cave. Sinks several miles in diameter and over a hundred feet deep are common in the Ozark Region and in Kentucky. Streams often flow into sink holes and disap¬ pear, continuing as underground rivers and emerging as very large springs at some lower point. If the underground outlet becomes blocked a sink often becomes the site of a lake. Such was the origin of Alachua Lake in

Florida, a body of water over eight miles long, on which steamers at one time plied. The out¬ let finally opened up again and the lake became drained. Sink holes are also known as swallow holes, and are not to be confused with pot holes and kettle holes (qq.v.).

SINKING FUND. See Debts, Public; National Debts of the World.

SINN FEIN (shin fane, ((ourselves®), an Irish party founded about 1905, whose policy may be described as at once the most extreme and the most moderate form of Nationalism. It is the most moderate because it aims at uniting Irishmen of all creeds and classes on a common platform, or a progressive series of common platforms, for Irish ends. The party, or move¬ ment as it has been termed, aims at the encour¬ agement and support of the industries and the institutions of Ireland, and the revival of the Gaelic tongue as a medium of intercourse among the people of Ireland. Its policy has been summed up by one of its founders as “national self-development through the recogni¬ tion of the duties and rights of citizenship on the part of the individual, and by the aid and support of all movements originating from within Ireland, instinct with national tradition, and not looking outside Ireland for the accom¬ plishments of their aims.® Sinn Fein is simply, then, the Gaelic for ((ourselves,® which, after all, is the working motto of every government and corporation in the modern world. Trusts and tariffs are Sinn Fein applied to the industrial world. The workings of empires and chosen peoples are pure Sinn Fein. The Sinn Fein party regards Ireland as being of right a dis¬ tinct nation and believes in establishing (<in Ireland’s capital a national legislature endowed with the moral authority of the Irish nation.® For

the first 10 years of its life the party's policy was one of passive resistance, as a sub¬ stitute for physical force, and this has meant, in substance, the laying of a boycott on every¬ thing English; the economic reorganization of Ireland by its own people, on a purely Irish basis; the non-recognition of English-made laws; and the non-support of English institu¬ tions in Ireland. It says in effect to the people of Ireland: <(Buy Irish goods because they are not English, and, if you cannot get Irish goods, buy French or German or American goods, or indeed any goods rather than English. Do so as long as England refuses to keep the terms of the Renunciation Act of 1783, in which she laid it down (that the right claimed by the people of Ireland to be bound only by laws enacted by His Majesty and the Parlia¬ ment of that Kingdom is hereby declared to be established, and ascertained for ever, and shall at no time hereafter be questioned or question¬ able. J® Such is the message of Sinn Fein, con¬ sidering the industrial revival as a political weapon.

Sinn Fein recognizes in nationality some¬ thing much more wonderful and even necessary than politics. It holds, however, that nationality must have its political phase and expression, and that no nation ever yet became exuberantly itself, exuberantly a thing of beauty and use in the family of nations, _ unless it was politically free. Its aim as a political organization is con¬ sequently the independence of Ireland, and as a means to that end it proposes the destruction

of the machinery of foreign government in Ireland. Not that it is principally a destruc¬ tive or war policy. Nationalists are anxious for peace, according to Mr. Arthur Griffith, the political thinker of genius who edits Sinn Fein, the party organ, and who originated the Sinn Fein policy in the columns of the United Irish¬ man, but before terms of peace can be discussed, he continues, in a phrase reminiscent of John Mitchel, <(England must take her one hand away from Ireland's throat, and her other hand out of Ireland's pocket.® In other words, let England observe the terms by which she bound herself in the Renunciation Act of 1783, as quoted above. Thus far we have stated in this article what may be termed the official attitude of Sinn Fein during the first decade of its ex¬ istence. In its second decade the movement ap¬ pears to put very little trust in legal and con¬ stitutional arguments, and claims Ireland's right to be a separate and free nation as a right given by God, without troubling about its other as¬ pect as a right confirmed by England. All Sinn Feiners are agreed

to work on a common plat¬ form for the independence of Ireland, the mini¬ mum interpretation of Independence being that which is laid down in the Constitution of 1782 and the Renunciation Act of 1783. Ireland, it declares, must no longer send representatives to the British Parliament to plead to indifferent ears the cause of Irish freedom, since to do so is not only useless in practice, but is an ap¬ parent acquiescence in the terms of the Act of Union. Moreover, it holds that for Irishmen to attend in a foreign Parliament and to take an oath of allegiance to a king, who is no longer the head of a free Irish constitution, but a symbol of foreign conquest, is a lie and an act of national dishonor. Irish politics, ac¬ cording to the Sinn Fein ideal, must not be al¬ lowed to rest on a national falsehood, which in the 19th century did so much to corrupt and confuse the political thought of the country, but must be placed on the far securer base of truth and honor and reason. The movement stands for the building up of truly Irish indus¬ tries, with the production in Ireland of what¬ ever articles Ireland might need, and the stimu¬ lation of foreign commerce ; to this end Sinn Fein urges the establishment of an Irish mer¬ chant marine and an Irish consular service to encourage foreign trade. It advocates also the creation of an Irish civil service, of Irish national courts of law, an Irish national stock exchange, Irish national banks, and the like — all these to be popular Irish institutions, com¬ pletely independent of England. It is one of the objects of Sinn Fein to give the brains and muscle of the country scope and happiness in the service of Ireland. Sinn Fein thus proposes to build up the Irish nation. It has set about organizing a great national passive resistance movement to oppose the British government and British influence at every point of vantage they have gained in the country — fiscal, educational, industrial, legal, literary, dramatic, artistic. Ireland, it says, has too long met England on battlefields which England herself has chosen — • the floor of the House of Commons and the field of war. Let Ireland now choose the place of battle and let it be the Irish school, the Irish factory, the Irish shop, the Irish home, the Irish farm, the Irish church, the Irish theatre,

and Sinn Feiners have no doubt that a new and beautiful individuality will be added to the family of nations. Prominence has been given to the aims and professions of Sinn Fein as a school of nationalism with which the future will have to reckon. It aims at building a nation to include all the races and creeds and ranks that inhabit Ireland. It answers the argument that Ireland is too small and too poor to be an in¬ dependent nation by pointing to such nations as Switzerland, Denmark, Greece, Sweden, Nor¬ way, Rumania of less area, population and revenue.

Taxation

country per head

Denmark . $8.25

W urttemberg . 7.13

Greece . 5.87

Rumania . 5.98

Sweden . 8.37

Norway . 8.11

Switzerland . 687

Ireland . 11.03

Sinn Fein certainly has brought intellect, imagination and constructive ideas into Irish politics to a degree unparalleled since the days of the Young. Irelanders of 1848. It remains to be stated here that the Rebellion of April 1916 was not entirely the work of the Sinn Fein party but the result of the continued preaching of the Fenian doctrines. Up to 1916 Sinn Fein had put forward only one candidate for an Irish constituency and he was over¬ whelmingly defeated. The Irish question was shelved for a time by the British Cabinet. On 27 April 1917 Lloyd George proposed an Irish convention to settle the Irish question, promis¬ ing that if there developed a substantial major¬ ity for Home Rule within the convention his government would legalize the recommendations of that majority. After a year of discussion a plan of Home Rule was adopted and agreed upon by all but 19 Ulster Unionists, and in April 1918 Lloyd George held that the 19 dis¬ senting votes out of 100 showed a lack of sub¬ stantial agreement and stated that Ireland's case would thereafter be treated as a purely British question. On 17 May 1918 Dublin Castle (the centre of the English bureaucracy in Ireland) issued a proclamation declaring the discovery of a vast German plot. Eamonn De Valera, Arthur Griffith and numbers of prominent Sinn Feiners were arrested and sent to England to be confined <(during the King's pleasure.® When several days passed without either arraignment or trial of any of the prisoners, a general demand arose that the government disclose some proof of the alleged German-Sinn Fein plot. Although the Labor party, many Liberals and the Irish Nationalists, and the press demanded that evidence of the plot be produced, the government

remained silent. In this connection, nothing is more significant than the statement of Lord Wim- bourne, former Lord-Lieutenant of Ireland, that throughout his regime he had discovered no sign of the alleged plot and asserting his belief that satisfactory evidence of its existence could not be produced. The Sinn Feiners, men and women, were confined in England until March 1919 without arraignment, without the production of one single piece of evidence against them and were denied the right of counsel. By the end of June 1918 Conscrip-

tion and Home Rule measures were formally abandoned, and the government in Ireland ran its course to the elections of December 1918. The Sinn Fein party went before the electorate on the definite proposition of an independent Irish republic, and the total separation of Ire¬ land from the political system known as the British Empire. At the polls the Sinn Fein victory was overwhelming. Out of 32 coun¬ ties its candidates ran unopposed in 22. In Ulster it carried Donegal, Monaghan and Cavan, and won majorities in Fermanagh and Tyrone, carried a seat in Derry City, the sup¬ posed stronghold of Unionism. It lost only in Down, Derry, Armagh and Antrim. Of 101 members the Sinn Fein elected 73, the National¬ ists seven and the Unionists 21. With this mandate from seven-tenths of the people of Ireland, the Sinn Feiners proceeded to organize their Irish Parliament. On 21 Jan. 1919 the Dail Eireann (Irish Parliament) met in Dublin and called upon the free nations of the world to support the Irish republic by recognizing Ireland's national status. Eamonn De Valera was chosen President of the Irish republic. He, with Arthur Griffith and Count Plunkett, were named commissioners to the Peace Con¬ ference at Paris. Passports being denied them, three Irish-Americans interceded in their be¬ half with the American delegates at Paris but without result. The three Irish-Americans, however, Messrs. Dunne, Ryan and Walsh, were permitted by the British government to visit Ireland. They reported that they found condi¬ tions ˆappalling.® Men were herded in filthy, unsanitary prison dungeons, were compelled to sleep in clothes drenched with cold water, were compelled to attend divine service with hands fastened behind their backs, etc., etc. The pub¬ lication of the report called forth much discus¬ sion, vigorous denials and as vigorous demands for investigation. After a delay of two weeks the Chief Secretary for Ireland made his reply to the charges in Parliament, explaining or denouncing the findings of the report, but its authors insisted upon its truthfulness, and that an impartial committee should be appointed to pass upon the facts of which they

had au¬ thentic evidence. In 1919 De Valera made a lecture tour in the United States explaining the purposes and aims of the Sinn Fein.

Bibliography. — Barker, Ernest, Ureland in the Last Fifty Years) (Oxford 1917) ; Jones, F. P., (History of the Sinn Fein Movement and the Irish Rebellion) (New York 1916) ; Leslie, Shane, (The Irish Issue and its American As¬ pect (New York 1917) ; Lynd, Robert, (Home Life in Ireland> (London 1910) ; Russell, George W., Plunkett, Sir Horace and Quinn, John, (The Irish Home Rule Convention (New York 1917) ; Irish World (issue of 1916, et seq., New York, weekly) ; New York Herald (issues of June 1919) ; Harvey's Weekly (New York 1919) ; America (New York, issues of 1919).

J. B. McDonnell, Editoral Staff of The Americana.

SINNETT, Alfred Percy, English jour¬ nalist and theosophist: b. 18 Jan. 1840. After study at the London University School, he be¬ came connected (1859) with the Globe news¬ paper, later was sub-editor and Header® writer for various dailies in London, and in 1865-68 was at Hongkong, as editor of the Press . On

his return he became an editor of the Standard, took editorial charge of the Pioneer of India, and becoming identified with the Theosophical movement, was made president of the London branch of the society, and wrote: (The Occult World *(1881); ˆEsoteric Buddhism* (1883); (The Growth of the SouP (1896). He edited Broad Views from 1904 to 1907. A play by him, 'Married byDegrees) was produced (1911) in London.

SINON, a character in the Trojan war- story of post-Homeric origin. According to Virgil, he was a follower of Ulysses, allowed himself to be taken prisoner by the Trojans, and persuaded them to drag the colossal wooden horse into their city. Within this structure were concealed all the leading warriors of the Greek army. The night following the admis¬ sion of the horse, Sinon gave the signal to the besiegers, by lighting a beacon, released the heroes from the horse, in which they were im¬ prisoned, and thus brought about the sack of Troy.

SINOPE, si-no'pe (Turkish, Sinub), Asi¬ atic Turkey, a seaport city, capital of a sanjak, situated on the neck of land connecting the rocky penipsula of Cape Sinope, in the Black Sea, with the mainland, 350 miles east-north¬ east of Constantinople. It is enclosed by a wall flanked with towers and defended by a castle and several forts, and is built to a con¬ siderable extent out of the ruins of an ancient Greek

city. Its harbor is the best on the south shores of the Black Sea, and it has a naval arsenal and a shipyard, at which many vessels are built. On 30 Nov. 1853, 18 Russian ships here attacked and destroyed a Turkish flotilla consisting of six frigates, three corvettes and two steamers, manned by about 4,000 men. Sinope is a place of great antiquity. It was the birthplace of Diogenes and the capital of Mithridates the Great. Pop. about 9,000.

SINTER. See Geyserite, Calc-tufa, and Tufa.

SINUB, se-noob'. See Sinope.

SINUS, in anatomy , a cavity of bone or other tissue, especially an air cavity of some size, such as those in the interior of certain bones, the frontal, ethmoid, sphenoid, temporal, superior maxillary, etc. The frontal sinuses are two irregular cavities extending upward and outward from their openings on each side of the nasal spine, between the inner and outer tables of the skull, and separated from one an¬ other by a thin bony septum. They give rise to the prominences above the root of the nose called the superciliary ridges. They are not fully developed till after puberty, and vary con¬ siderably in size, being usually larger in men than in women and young persons. When very much developed they give a receding ap¬ pearance to the forehead. They communicate on each side of the upper part of the nostril by a funnel-shaped opening, which transmits a prolongation of mucous membrane to line their interior. These sinuses are much more highly developed in certain mammals and birds than in man. They extend backward over the top of the skull in the ruminant and some other quadrupeds, and penetrate the cores of the horns in oxen, sheep and a few antelopes. The most remarkable development of air sinuses in

the mammalian class is presented by the ele¬ phant; the intellectual physiognomy of this huge quadruped being caused, as in the owl, not by the actual capacity of the brain case, but by the enormous extent of the pneumatic cellu¬ lar structure between the outer and inner plates of the skull. The sphenoidal sinuses are two large irregular cavities, formed, after the pe¬ riod of childhood, in the body of the sphenoid bone. They communicate with the upper part of the nose, from which they receive a layer of mucous membrane. Like the frontal sinuses, they serve to lessen the weight of the skull and to add to the resonance of the voice. The eth¬ moid sinuses lie in the lateral masses

of the ethmoid bone. They communicate with the cavities of the nose. Their main use is to di¬ minish the weight of the fore part of the skull. That part of the temporal bone which forms the projection behind the ear is termed the mastoid process. The interior of this process is hollowed out with air sinuses which com¬ municate with the tympanum or middle ear, and through it with the nose. The superior maxillary sinus is the largest of the sinuses, and the only one present in the infantile skull. The term sinus is also applied to irregular channels for the transmission of venous blood. SION. See Zion.

SIOUAN, soo'an, a designation derived from the word “Sioux,® and applied to the lin¬ guistic stock or family to which the Sioux In¬ dians belong. The Sioux call themselves Da¬ kota, or Lakota, and the name “Sioux,® given to them by the whites, is said to be derived from an Algonquin word signifying the “snake¬ like ones,® or enemies, a term which their crafty methods of warfare would seem to justify. The family of tribes, of which the Sioux are the best known to Americans of the present day, includes, as principal divisions, the Dako¬ tas or Sioux in the United States, and the Assiniboins in British North America, although both Sioux and Assiniboins occasionally cross the border into adjoining territory. The Sioux division embraces the sub-tribes of Santee, Sisseton, Wahpeton, Yankton, Yanktonnai and Teton, and the last mentioned, whose name means “dwellers on the prairie,® are again sub¬ divided into the Brule Sioux, the Sans Arcs, Blackfeet, Ogalalla, Minneconjou, Onopaw and Unkpapa. To the Sioux nation also belong or belonged the sub-tribes of Omaha, Quapaw or Arkansa, Ponca, Osage and Kansa, Iowa, Oto and Missouri ; also Winnebago, Mandan, Min- netaree or Gros Ventres (which last named includes the Crow Indians), Tutelo, Biloxi, Catawba (or Flathead), Eutaw, Chickoree, Natchez and others, and the Mannahoak, Mon- acau and other tribes, which came into contact with the pioneers of Virginia and North and South Carolina, and are now extinct or repre¬ sented by insignificant remnants.

The Siouan tribes of the East which were not crushed out in conflict with the early set¬ tlers retreated gradually to the Northwest, and made their final stand in that region against advancing civilization. The battle known as the Custer (q.v.) massacre (25 June 1876) was the last important military event of the long conflict, and it was followed by such energetic measures on the part of the United States that organized resistance by the Sioux to the Na¬

tional authority was finally terminated. Sitting Bull (q.v.), the last of the great Indian chief¬ tains who rose above the level of marauders, and were actuated by a sincerely patriotic spirit in their resistance to

white aggression, was killed on 15 Dec. 1890 when his arrest by gov¬ ernment agents was resisted with an attempted rescue. See Indians, American.

SIOUX (soo) CITY, Iowa, county-seat of Woodbury County, on the Missouri River at the mouth of the Big Sioux, and on the Chi¬ cago and Northwestern; Chicago, Minneapolis and Saint Paul; Illinois Central; Chicago, Mil¬ waukee, Saint Paul and Omaha; Chicago, Bur¬ lington and Quincy, and Great Northern Rail¬ ways, 18 lines of these six systems radiating in every direction. It has steamer connection with the Missouri River ports and trolley con¬ nection with suburban villages. It is the com¬ mercial, industrial and livestock centre of western Iowa, northern Nebraska, most of South Dakota and southwestern Minnesota. The residence portions are on high, rolling ground, much of which overlooks the valleys of the Missouri and Floyd rivers, the latter stream flowing through the city. Sioux City was first settled in 1849 and for many years was the outfitting point of all the traffic to the Black Hills, as well as headquarters for the troops engaged in various campaigns against the Indians. Its first railway was the North¬ western, reaching the city in 1868. In earlier years Sioux City attained much fame through its “Corn Palaces,® this annual entertainment being abandoned when the Interstate Live Stock Fair was organized, of which institution it is claimed that it is the largest fair in the United States with neither State nor Federal aid. The government census of 1918 gives 350 manufac¬ turing establishments, with invested capital to the amount of $46,000,000. There were em¬ ployed in the factories 8,500 persons, whose annual wages amounted to $9,800,000; the raw material cost was $40,819,000, and the annual value of products was $85,000,000. Chief among Sioux City’s industries are its six large packing houses, consuming the major portion of the livestock receipts of the sixth largest market in the United States. Other industrial establishments are brick and tile plants, flour and cereal mills, planing mills, soap factories, furniture factories, foundries, steel and iron works, truck and tire factories, stock equipment factories, stock serum plants, overalls, shirt and skirt factories, tent and awning fac¬ tories and creameries producing 12,000,000 pounds of butter annually. Its grain conceins handled more than 50,000,000 bushels of corn, wheat and other cereals in 1918. Sioux City is also a large jobbing centre, its 80 wholesale houses doing a business of approximately $150,000,000 annually in Iowa, Minnesota, Ne¬ braska, South Dakota, North Dakota, Wyoming and Montana. The principal public buildings are the Federal building for the enlargement of which an appropriation of $335,000 was secured in 1915; the Union Station, cost $600,000; Y.

M. C. A. building, $120,000; public library, $100,000; City Hall, $80,000; Court House, $750,000; the Davidson and the Francis office buildings, costing $400,000 each ; Davidson's Grain Exchange building; High School, $550,- 000; two Junior High School buildings;

Saint Joseph's, Samaritan, Saint John's, Ger- maft Lutheran and Saint Vincent's hos¬ pitals. The waterworks, costing $1,250,000, are owned by the municipality; it is debt free and pays an annual profit, which is put back into extensions. The city has 75 miles of con¬ crete paving, with 40 miles of asphalt and block. Sioux City has a public park system of nearly 2,000 acres, the largest 'being Stone park (800 acres) and Riverside park (575 acres), both located along the Big Sioux River. The latter contains the grave of War Eagle, most famous of all the Sioux chieftains. Floyd park sur¬ rounds a massive and beautiful monument to Sergeant Charles Floyd, a member of the Lewis and Clarke expedition, who died there in 1805. The educational institutions, other than a most complete public school system, are Morning- side College (Methodist), opened in 1890; Trinity College for boys (Catholic), founded in 1912; the National Business Training School and several parochial schools. The 18 banks have a combined capital of $3,330,000 with de¬ posits aggregating $46,913,000. Sioux City is the natural centre of a vast and famous agri¬ cultural section, the 100 counties nearest to the city in Iowa, Nebraska and South Dakota pro¬ ducing nearly $600,000,000 in crops and live¬ stock annually, as against $250,000,000 for all the New England States combined, according to the last Federal census. Population (1890)

37,806; (1900), 33,111; (1910), 47,828; (1915), 61,787; (1920), 71,227.

SIOUX FALLS, S. Dak., city, county-seat of Minnehaha County; on the Sioux River, and on the Chicago, Milwaukee and Saint Paul and the Chicago, Saint Paul, Minneapolis and Omaha, the Illinois Central, the Rock Island, Watertown and Sioux Falls and the Great Northern railroads, about eight miles from the Iowa boundary. It was settled in 1856 by the Western Iowa Company of Dubuque, Iowa, but was abandoned the next year. Soon afterward the place was again set¬ tled by eastern homeseekers. It was organized as a village in 1877 and chartered as a city in 1883. In the vicinity are extensive quarries of marble, jasper and other stones. The river here has a fall of about 100 feet in a half mile, forming a series of cascades which furnish ex¬

tensive water power. The city is located in the midst of a rich agricultural community; corn, small grain, hay, livestock and dairy products being the principal sources of wealth. The chief industries are meat packing, manufacture of confectionery, metal culverts, grain bins, sash and cabinet work, crackers, brick, paper boxes, plows and harrows, soft drinks, soap, acetylene gas outfits, cigars, building-stone, pav¬ ing-blocks and crushed rock from the quarries. Three creameries make a great quantity of butter and have built up a good cream, egg and poultry market. Some 4,000 people are em¬ ployed in manufacturing exclusively, turning out products valued in excess of $20,000,000. The city is a strong wholesale and jabbing cen¬ tre, being especially favorable for the distribu¬ tion of agricultural implements and vehicles. Sioux Falls is not only the commercial and in¬ dustrial centre of South Dakota, but enjoys a good trade in southwestern Minnesota and northwestern Iowa. The principal buildings are the State penitentiary, State School for the

Deaf and Dumb, State Children's Home, County Courthouse, Coliseum, municipal build¬ ings and the 30 churches, which include a Roman Catholic and Protestant Episcopal cathedral. The public school system is one of the best in the country, the newer grade schools being of advanced type of construction, built on the one-story, community centre plan. Among the higher institutions of learning are All Saints School for Girls, the Lutheran Nor¬ mal School and Sioux Falls College. The eight banks have a combined capital of $925,000. The government is vested in a three-man commis¬ sion elected for a period of five years, one of the commissioners acting as mayor at a salary of $3,000 per year, and the other two commis¬ sioners at $2,000 per year each. Pop. 25,176.

SIPHON, a bent pipe having the ends ap¬ proximately parallel so that when the short end is sunk in a liquid, the bend may carry the pipe over the higher edge of the containing vessel and the long end of the pipe being then positioned lower than the short end, the liquid may be drained off by gravity, once the flow is started. The reason for this is that when the air is sucked from such siphon the liquid flows in and the larger end containing the greatest weight of liquid starts a flow. The fluid has to rise in the short end or there would be a vacuum. The siphon will not raise water more than 32 feet, because then the weight of water equals the atmospheric pres¬ sure. If there were no weight of atmosphere the phenomenon would not occur. A siphon has to be of moderate diameter, else the suction does not operate fully. A considerably de¬ pressed series of piping in a water main is sometimes termed an inverted siphon as where the Catskill aqueduct passes under the Hudson River.

SIPHONOPHORA, an order of free- swimming polpys (Hydrozoa). All are re¬ markable as forming colonies of zooids, which become differentiated as organs of special func¬ tion, and altogether lose their separate individ¬ uality. They present the most noteworthy in¬ stances of polymorphic colonies known to zo¬ ology and differ greatly in complexity. In the most complex cases the zooids or polyp organs may be divided into about seven types, each differing in form and function but retaining the fundamental polyp structure. These are: (1) pneumatophores or floats; (2) nectocalyces or swimming bells, whose function is to pro¬ pel the colony; (3) gastrozooids, or nutritive polyps, which feed the colony; (4) hydro- phyllia, leaf-like protective polyps; (5 and 6) dactylozooids and tentaculse, offensive polyps armed with numerous stinging cells; (7) gono- zooids or reproductive polyps of different types. The siphonorphores are delicate transparent animals often beautifully colored, and the}' abound in the Gulf Stream and other warm oceanic waters. A familiar example is the Portuguese man- of war (Physalia). Consult Haeckel, (Challenger Reports) (Vol. XXVIII London 1888).

SIPPAR, sip-par', SIPPARA, SEPHAR- VAIM, or ZIMBIR, ancient Babylonian city, on the Euphrates and north of Babylon. It was originally two cities, divided by a canal and designated Sippar and Agade. In time, how¬ ever, the name Agade was lost, but the division

remained, one part of the city being the Sippar of Shamash, the Sun God, and the other the Sip- par of the goddess Annuit. The Old Testament name for it is Sepharvaim. The records of the antediluvian world are supposed to have been buried here by the Chaldean Noah. The tem¬ ple of Shamash was discovered by Hormuzd Rassam in 1881, by whom extensive excava¬ tions were made, and who brought to light nearly 60,000 inscribed tablets. Consult Hor¬ muzd Rassam, (Babylonian Cities> (1881) ; and (Asshur and the Land of Nimrod) (1897) ; Scheil, V., (Memoires Frangais d'Archaeologie Orientale de l'lnstitut de Caire) (1902).

SIQUIJOR, se-ke-hor', Philippines, (1) Pueblo, island of Siquijor, province of Bohol, on the northwest coast of the island. It has a good harbor and is the chief port and principal town of the island. Pop. 11,790. (2) Island,

the second in importance of the province of Bohol, lying southwest of

the island of Bohol, and east of Negros; length from east to west, 17 miles; width 12 miles, area, 126 square miles. The surface is much broken, rising to a cen¬ tral peak, 1,394 feet high. The soil is fertile; tobacco of excellent quality, rice, corn, hemp and chocolate are raised and bartered for wax and cotton ; a coarse variety of hemp cloth is manufactured for export; tortoise shell and sea cucumbers (beche de mer) are gathered in large quantities. Pop. 46,023.

SIR, a term of courtesy, applied without distinction of rank, to all male adults, used especially in the form <(Dear Sir,® in opening a letter. It is also the special title in Great Britain of knights and baronets, and as such is always prefixed to the Christian name. Sire is a term of respect by which kings are ad¬ dressed. The word sir is the same in origin as sire, and is derived from old French senre, and that from senior (Latin, elder), whence also seignior, signor, similar terms of courtesy.

SIR DARIA, ser-dar'ya, Russian Turkestan. See Syr Darya.

SIR GAWAIN AND THE GREEN KNIGHT, generally regarded as the finest of the metrical romances in Middle English. It is usually held to be the work of the author of (The PearP (q.v.), though absolute proof of this is impossible. It was written in the West Midland dialect about 1370, in an elaborate stanzaic form, employing both alliteration and rhyme. The same highly-wrought artistry ap¬ pears in the narrative, with its wealth of de¬ scription and detail. These elements are, how¬ ever, subordinate to a carefully considered plot, which is in brief as follows: A strange knight clad all in green bursts into Arthur's hall at Camelot, and challenges any knight to strike him with the battle-axe, the blow to be re¬ turned by the challenger a year later. Gawain accepts, and severs the champion's head at a blow. After picking up his head, which re¬ minds Gawain of the coming meeting at the Green Chapel, the knight rides away. A year passes. Gawain, on his way to the Green Chapel, is splendidly entertained in a magnifi¬ cent castle. On three successive days the lady of the castle offers her love, but Gawain acts with scrupulous honor toward his host, con¬ cealing nothing from him save a lace given him on the third day, which is to afford pro¬ tection in combat. At the meeting with the

Green Knight, Gawain gets only a slight wound the third time that the axe is raised. The knight thereupon reveals himself as the lord of the castle, and the third blow as a punish¬ ment for the keeping of the lace on the third day. The whole episode was a test, instituted by Morgan the Fay, who wished to test the knights of Arthur and frighten Guinevere. Gawain returns to the court, where all the warriors agree

to wear a green girdle, in re¬ membrance of the adventure.

The immediate source of the poem was undoubtedly a French romance now lost. The different elements in the plot are admirably traced by Kittredge in (A Study of Sir Gawain and the Green KnighP (Cambridge 1916). The whole has been translated, in the original metre, by Miss J. L. Weston, (Romance, Vision and Satire* (Boston 1912).

William Witherle Lawrence.

SIRAJGANJ, se-raj-gunj', or SERAJ- GANJ, India, a town in the district of Pabna, Bengal,, on the Jamuna River, 153 miles north¬ east of Calcutta. The town is six miles from the low water channel of the river, separated by a sandy plain and the river landing-places shift every flood season. Founded about the beginning of the 19th century, it is now one of the chief river marts in Bengal, having risen with the growth of the jute trade. It collects jute, rice, oil-seeds, tobacco, etc., from all the neighboring districts for dispatch to Calcutta and distributes piecegoods, salt, sugar, iron, hardware, etc. The trade is entirely water-borne, 150,000 tons of jute being ex¬ ported annually. A large industry is the weav¬ ing of gunny, or jute cloth for bags, which is exported to the value of $600,000 a year. Pop. about 25,000.

SIREN, (1) in zoology, the mud-eel (Siren lacertina), having a mouth very beaklike, with a few rasplike teeth and tufted gills. It is found in the bayous of the Carolinas, Florida and Texas. (2) A mechanism for producing continuous or musical sounds, and for measuring the number of sound¬ waves or vibrations per second, which pro¬ duce a note of given pitch. In its original form it consists of a disc with a circular row of oblique holes, revolving close to the top-

Siren.

plate of a wind-chest perforated with corre¬ sponding holes of a contrary obliquity, so that the jets of air from the latter passing through the former keep the disc in motion and produce a note corresponding to the rapidity of the coincidences of the holes in the two plates,

the number of coincidences or vibrations in a given time being shown by indices which con¬ nect by toothed wheels with a screw on the

axis of the disc. For steam-siren see Fog- signals.

SIRENIA, an order of aquatic herbivor¬ ous mammals, with almost hairless skin, no hind limbs, the tail flattened horizontally and two teats situated on the chest. The unborn young are covered with a thick fur; and many points of dentition, structure and life history show affinity to the ungulate land mammals. There is much less relationship to the Cetacea within which this group was formerly classified. The order embraces but three recent genera, Manatus, Halicore and Rhytina, the latter now extinct, representing as many families. Be¬ sides these a number of fossil genera are known. Halitherium occurs in Miocene and Pliocene formations; it was of large size, and appears to have been somewhat intermediate in structure between the two living genera and to have possessed rudimentary hind limbs. Con- sut Brandt, Symbol* Sirenologicae) (Saint Petersburg 1868) ; Woodward, (Vertebrate Paleontology > (Cambridge 1898). See Du- gong; Manatee; Sea-Cow.

SIRENIDiE. A family of large newts characterized by three pairs of persistent ex¬ ternal gills, the absence of any trace of hind¬ legs, eyelids or maxillary bones, and of teeth in the jaws (which are covered by horny sheaths). Teeth are found, however, on the vomer. The family is closely related to the Proteidce (q.v.). It contains two genera, of one species each, both inhabiting the South¬ eastern States. These are Siren and Pseudo- branchns. In Siren there are three gill-clefts on each side and four fingers, and the gills atrophy in the course of development, being subsequently regenerated. In the adult Psendo-branchus the gills are functionless and there are only three fingers on each hand, and one pair of gill slits. Siren grows up to the length of 30 inches. See Amphibia; Urodela.

SIRENS, in Greek mythology, the name of several sea-nymphs, who by their singing fascinated and later destroyed those who ap¬ proached their locality which was the sea between the island of Circe and Scylla (q.v.). When Ulysses approached Circe, which was near the northeast coast of Sicily, he stuffed the ears of his companions with wax, while he bound himself to the mast, and so they es¬ caped. The Sirens then threw themselves into the sea, where they became formidable rocks.

SIRIUS, sir'i-us, in astronomy, the bright¬ est star in the heavens, also called the Dog-star, situated in the mouth of the constellation Canis Major. Its magnitude is 1.6, and its distance 8.8 light years. In 1862 it was proved by Alvan G. Clark to be binary, which was be¬ lieved because of disturbances of its proper motion. The companion star is almost a sat¬ ellite, bfing of 10th magnitude, that is render¬ ing about 1 to 21,000 of Sirius light. They revolve in 51 years. See Astronomy.

SIROCCO, a hot, relaxing and oppres¬ sive southeast wind, which blows in Sicily and South Italy. While it continues the atmos¬ phere is obscured by a haze and so great is the languor it occasions that few persons quit

their houses. It is supposed to be the same as the simoom (q.v.), tempered by its passage across the water.

SIRVENTE, sir-vont, a form of recited verse common among the Troubadours and Trouverses. These songs were originally de¬ voted to love, war, praise, etc., and divided into strophes of a peculiar construction. Later they degenerated into satire and reflections on political abuses.

SISAL HEMP, Agave fourcroyoides and sisalana. The growing plants resemble the century plant, though the leaves are more slender and spear-like ; they measure three and one-half to five feet long, and four to five inches wide, the general average being four to four and one-half inches. The prod¬ uct is a structural fibre derived from the older leaves, the first cuttings for fibre being made when the plants are five years old from the date of setting out in the field. The filament is yellowish white, straight, smooth and clean, sisal ranking second to manilla in value as a cordage fibre. It is a native of Yucatari, which furnishes the bulk of the world’s supply, and the Bahamas, and very recently Hawaii has contributed a little. It is found (introduced) in many parts of Mexico proper, throughout the West Indies and in Central and South America. It was introduced into Florida by Perrine, in 1836, and into the Bahamas by Nesbit, in 1845, Yucatan plants

being used, and into Hawaii, from Florida, in 1893. The growth of the plant, experimental or other¬ wise, has been extended to many parts of the world, commercial cultivation having been at¬ tempted in India and on the west coast of Africa.

The commercial supply of the United States is derived mainly from Yucatan. In Florida the plants are found growing semi-wild in small tracts, both on the keys and the east and west coasts of the mainland. Small attempts have been made from time to time to establish an indus¬ try, but it is doubtful if the culture could be made to pay in Florida, especially in competi¬ tion with the vast sisal hemp farms of Yuca¬ tan. The Yucatan industry is centred at Merida, 20 miles south of Progreso, the port of shipment. On the larger farms systems of miniature railways are laid down for the trans¬ portation of the bundles of cut leaves from the fields to the .central factories, where the clean¬ ing or scraping process is effected by power¬ ful machines. The operation consists merely of removing the epidermis and soft cellular tissue, which leaves the fibre clean and white ; it is then dried in the sun and baled for market. Sisal hemp and manila hemp make up the bulk of the hard fibre used for cordage in the United States, the larger portion of the sisal going into binder twine for binding the grain crop, though considerable rope is made from it for inland use.

Consult Special Reports (Nos. 1 and 5) ; Fi¬ bre Investigations, Department of Agriculture ; Scientific American Supplement* (No. 1,837, 2 Aug. 1902) ; Bulletins Royal Gardens, Kew ; Bulletin (No. 4) Hawaiian Agricultural Ex¬ periment Station, Honolulu ; and James M. Rae, (Report on the Fibre Industry of the Ba- hamas) (Nassau 1891). See Bahamas; Cor¬ dage; Fibre; Hemp; Yucatan.

SISCOWET. See Lake Trout.

SISKIN, a European finch (Carduelis spinas), of the Fringilhdce, greenish in general color, with dusky and yellowish markings and the under surface whitish. These birds are usually seen in small flocks, haunting the mar¬ gins of streams, and are much sought after by bird catchers, and when interbred with the canary produce a hybrid progeny with a sweet mellow song. A very similar Canadian bird is known as the pinesiskin ; and the name is some¬ times given to the goldfinch. See Finch.

SISLEY, sis-li, Alfred, French painter: b. Paris, about 1830; d. 1899. He was little known except as a promising pupil of Gleyre, until the Impressionists held their exhibition in 1874, when his boldness and originality were acknowledged. His indebtedness to Corot and even more so to Monet is apparent in all the landscapes which he produced, characterized as these are by poetic charm and remarkable freshness and frankness in color and detail. Among his works may be mentioned (La Seine a Saint Mammes' and (L'Inondation, Marly'

(1876).

SISMONDI, sis-mon'di (Fr. ses-mon-de), Jean Charles Leonard Simonde de, Swiss his¬ torian and political economist : b. Geneva, 9 May 1773; d. near there, 25 June 1842. He had scarcely completed a careful education at the College and the Auditoire of Geneva when the overthrow of the constitution of his native town obliged him to flee with his father to England. On his return, two years after, he was impris¬ oned and lost the greater part of his prop¬ erty by confiscation. Similar persecution fol¬ lowed him even in Tuscany, whither he proceeded in 1795 and where he was hated by the French as an aristocrat and by the Italians as a Frenchman; but at length, on his return to Geneva in 1800 he was allowed to live in quietness and devote himself with the utmost diligence to literary pursuits without declining to bear his part in the discharge of municipal functions. His first published work appeared in 1801 and was entitled tableau de l'Agricul- ture Toscane.' It discards all appearance of theory and abounds in practical details. In 1803 he published a work entitled (De la Ivichesse Commerciale, ou Principes d'Econo- mie Politique applique a la Legislation du Com¬ merce.' This essay was afterward remodeled so as to form the groundwork of his treatise pub¬ lished in 1819 under the title of (Nouveaux Principes d'Economie Politique.' He had be¬ come intimate with Madame de Stael, and in 1805 accompanied her suite on a tour through Italy. The associations thus awakened appear to have called his attention particularly to his¬ tory. The first fruits of his labors in this department appeared in 1807, in the first two volumes of his (Republiques Italiennes,' which ultimately reached 16 volumes, and was not completed till 1818. It was followed by (De la Literature du Midi de l'Europe' (1813, English translation by Roscoe, 1823). His (Histoire des Franqais' (1821-44) occupied the greater part of his remaining life. It was carried to 31 volumes, though reaching no farther than 1750.

SISSOO, or SIS.SUM. See Dalbergia.

SISTER-SERVANTS OF SAINT MAR¬ THA. See Orders, Religious.

SISTERHOOD of the Good Shepherd; Sisterhood of the Holy Child; Sisterhood of the Holy Family; Sisterhood of the Holy Na¬ tivity. See Orders, Religious.

SISTERS, Apostoline; Sisters of the As¬ sumption; Sisters of Atonement; Sisters of Bethany; Sisters of Bon Secours ; Sisters of Charity; Sisters of the Divine Compassion; Sisters of the Faithful Virgin; Sisters of the Holy Child Jesus; Sisters of the Holy Cross; Sisters of the Holy Ghost; Sisters of Sagasse; Sisters of Mercy; Sisters of Misericorde ; Sis¬ ters of Our Lady of Good Counsel; Sisters of Our Lady of Perpetual Help; Sisters of the Poor; Sisters ©f Providence; Sisters of Saint Agnes; Sisters of Saint Ann; Sisters of Saint Augustine; Sisters of Saint Benedict; Sisters of Saint Bridget; Sisters of Saint Dominic; Sisters of Saint Francis; Sisters of Saint John the Baptist; Sisters of Saint John the Evan¬ gelist; Sisters of Saint Joseph; Sisters of Saint Margaret; Sisters of Saint Alary; Sisters of Saint Monica ; Sisters of the Sorrowful Mother ; Sisters of the Transfiguration. See Orders, Religious.

SISTINE CHAPEL. See Vatican, The.

SISTINE MADONNA. See Madonna in

Art.

SISTRUM, a primitive rattle or jingling in¬ strument much used by the ancient Egyp¬ tians in their religious ceremonies, especially in the worship of Isis. It consisted of a thin somewhat lyre¬ shaped metal frame through which passed loosely a number of metal rods, to which rings were sometimes attached.

SISYPHUS, sis'i-fus, a character in Greek mythology, son of .TEolus, and husband of Merope, often quoted as an example of fruitless and recurrent toil. He is related to have been a king of Corinth and to have originated the Isthmian games. He tried to cheat death and gave offense to both Jupiter and Pluto. As a conse¬ quence he was condemned after being returned to the underworld to roll a heavy stone to the top of a hill, on reaching which it would always roll back again ; thus making his punish¬ ment eternal.

SITA, in Hindu mythology, one of the in¬ carnations of Lakshmi, goddess of prosperity, learning and love, and the beautiful wife of Vishnu. Certain holy devotees, having nothing else, gave their own blood as tribute to the tyrant Lanka ; and from this blood Sita came forth, the most perfect and handsome of women. Another myth makes

her the daughter of Janaka, king of Alithila. She is also called Parthivi (earth) and is said not to have been born of women but to have come forth from the furrow where her father was ploughing the earth. Hence the meaning of the word Sita is generally given as ((furrow." She seems to have been a nature goddess of productiveness or fertility. See Sri; Vishnu.

SITATUNGA. See Bushbuck.

SITKA, a tribe of the Koluschan stock of North American Indians, formerly residing on Norton Sound, Alaska, who were driven there¬ from by the Russians to Baranof Island, where

their principal village, Sitka, was established. In 1880-81 they numbered 720, of whom 540 re¬ sided at Sitka; in 1890 their population was 815. In addition to Sitka they had temporary villages at Hot Springs and Indian River.

SITKA (formerly New Archangel), Alaska city, port of entry, capital of the Terri¬ tory, on the west coast of Baranof Island, 57° 30' N. lat., about 1,500 miles north of San Francisco. It was founded in 1799-1800 by Alexander Baranov, the then Russian manager of Russian America. For a time Sitka grew in importance as a trading station and even as a manufac¬ turing town. It was the commercial port not only of Russian America, but 'of the Pacific coast of America. The managers of the in¬ dustries which made Sitka of importance failed in some of their enterprises, and gradually the place dwindled to an Indian village of about 100 log huts. Such the United States forces found it when they took possession 18 Oct. 1867. It is a coaling station for the United States navy and has a number of industries which not only supply the local needs, but which are a means of trade with the neighboring islands. In 1903 there were Russian Orthodox, Presbyterian, Roman Catholic and Protestant Episcopal churches. There were two public graded schools and the Sitka Training School (Presbyterian), an industrial school. In the training and industrial schools, special attention is given to farming and domestic science. Pupils from Sitka attend the Indian School at Carlisle, Pa. Among the places of interest are Saint Michael's Church, built in 1816 by the Russian Orthodox, the hospital and a museum. The rainfall is heavy, 85 inches annually, but the temperature is mild for the locality, the mean for December being 32°. The island has a great variety of trees,

mosses and flowers ; over 300 different kinds of wild flowers have been found here. Pop. about 1,200. See Alaska.

SITTING BULL, Sioux Indian chief: b. Dakota, about 1837; a. 15 Dec. 1890. He was the son of Jumping Bull and the nephew of Four Horns and Hunting-His-Lodge, all Sioux chiefs. He was first named The Sacred Stand, but at 14, having slain and scalped his first enemy, his name was changed to Sitting Bull (in Indian, Tatanka Yotanka). As a young man he showed enmity toward the whites and was repudiated by the more peaceable members of the tribe. During the Civil War he led in massacres of whites in Iowa and Minnesota, and in 1864 was driven by United States troops into the Big Horn country and to the Yellow¬ stone. In 1866 he made a pretense of treating with the government, but the next year was again on the war path, and until 1876 was al¬ most continually engaged in warfare with whites or friendly Indians. That year his band exter¬ minated the force commanded by General Cus¬ ter, sent against them on the Little Big Horn. After the massacre he escaped with his fol¬ lowers into Canada, and there remained until 1879, when to end a precarious existence he accepted the amnesty promised by Gen. N. A. Miles and returned to United States territory. Though submissive he was never friendly to¬ ward the government, and in 1888 influenced the Indians not to sell their lands. During the Messiah craze of 1890 his influence was con¬

sidered dangerous and his arrest was ordered. In the attempt to carry out this order he was killed together with his son, several chiefs and members of the Indian police. See -Siouan.

SIUT, se-oot', or ASYUT, a-se-oot' (an¬ cient, Lycopolis), Upper Egypt. (1) The cap¬ ital of a province of the same name, situated in a fertile district near the left bank of the Nile, 248 miles by rail south of Cairo. The town is about three-quarters of a mile west of the river, where a modern barrage and lock in connection with the great Nile irrigation scheme (see Assouan) was completed in 1902. The main street, running east and west, is about three miles in length. Among the chief buildings are the railway station, the govern¬ ment buildings, a good hospital, public baths, an American Presbyterian mission station, with schools, mosques, bazaars, etc. Plotinus, the great Neo-Platonic philosopher, was born here in 205 a.d. See Assiut. (2) The province, has an area of 768 square miles; pop. about 969,000, giving about 1,262 to the square mile; over 30,000 of the population are nomads.

SIVA, se'va, the third deity in the great triad of Hindu gods. His name signifies in Sanskrit “happy,® (cof good omen,® and he typi¬ fies both destruction and reproduction, but is generally regarded as the

deity in the character of destroyer. His worshippers are called Saivas, and they assign to him the first place in the Trimurti or triad, attributing to him also many attributes which properly belong to the other deities. According to the Saivas, Siva is Time, Justice, Water, the Sun, the De¬ stroyer and the Creator. He is represented in his characters of the god of regeneration and of justice as riding on a white bull. He has five heads ; three eyes — one on his forehead, indicative of his power of contemplation ; two, four, eight or 10 hands; and in the middle of his forehead a crescent. His throat is dark blue; his hair of a light reddish color, thickly matted together and brought over his head so as to project like a horn from his forehead. He wears a garland of human skulls around his neck, and as a second necklace, a serpent; and in his hand holds a trident, surmounted by a skull, and one or two human heads. He is often represented as entirely covered with serpents, which are the emblems of immortality. His weapons are the Khinkhira, of which nothing is known, a bow called Ajakava, a thunderbolt and an axe. He resides on the wonderful Mount Kailasa, the northern peak of the Hima¬ laya. One of his principal attendants is Tandu, a teacher of the arts of dancing and mimicry, whence Siva is the patron of dancers. Siva has more than 1,000 names, which are detailed at length in the 69th chapter of the Siva-Purana. These names are mostly all derived from his at¬ tributes and character. Among the exploits of Siva is recorded his having cut off, in a fit of anger, one of the five heads of Brahma. He likewise beheaded his father-in-law, Daksha, for having offended his wife; but on the interfer¬ ence of the gods he placed a ram's head on the headless trunk.

SIVA-SNAKE, the king cobra. See Hamadryad.

SIVAS, se-vas, or RHUM, Asia Minor, (1) Capital of the vilayet of that name on the Kizil

Irmak, 170 miles southwest of Trebizond, on the site of the ancient Sebastia. It contains some fine ruins of Seljuk art, chief of which are the medresses, or colleges of the 13th cen¬ tury. One of them contains the tomb of Izz-ed- din Kai Kaus I, the founder (1210-19). In the Armenian convent are preserved several relics, among them the throne of Senekherim. The heights (4,420 feet) are crowned by castles, and the general view, including mosques, minarets, colonnades, etc., baths, khans and bazaars, through which wind the narrow streets, is

typically Oriental. There are Armenian churches, American and Jesuit schools and missions, and manufactories. On the route from Bagdad to Diarbeker and Malatiyeh and thence to the Black Sea, it is important com¬ mercially. The chief manufactures are coarse cotton cloth and woolen hose. The inhabitants are Moslems, Armenians and Greeks. Under Diocletian it became an Armenian capital, and was an emporium of wealth under Turkish dominion. In 1172 it was captured by the Seljuk sultan of Rhum. In 1400 when the city was taken by Timur it was a metropolis of 100,000 people; but never recovered from the atrocities perpetrated at that time. In 1895 a cruel massacre of Armenian Christians again decimated its population. Pop. 45,000. (2) Sivas is a large vilayet, and one of

the most important of the country. Its area is 32,300 square miles. It has a productive soil ; the main crops are wheat and barley; fruit orchards and vineyards are extensively culti¬ vated. The forests are extensive, mainly fir, pine, oak and beech. The chief mineral de¬ posits are silver, lead, salt, coal, iron, alum, arsenic and manganese. The exports include grain, flour, textiles, tobacco, opium, wool, car¬ pets and cattle. The principal imports are cot¬ ton manufactures. The climate is salubrious. Pop. 1,090,000.

SIVASH, se-vash', or PUTRID SEA,

Russia, a salt lagoon on the northeast coast of the Crimea. It is separated from the Sea of Azov by a narrow sand bar, is 68 miles long and has an area of over 900 square miles. It is very shallow, and its water is stagnant and very salt.

SIVATHERIUM, a great ungulate mam-' mal, almost as big as an elephant, whose re¬ mains occur in good condition in the Pliocene (Siwalik) deposits of India. After much dis¬ cussion its place has been decided to be with the giraffes, although it has many similarities to such aberrant ((antelopesM as the pronghorn and the saiga. The male had two pairs of horns, supported on bony cores, as in living antelopes, sheep, etc. The front pair of horns (on the frontal bones) were of simple form, while the larger hinder pair (on the parietals) were large, palmated and much like those of a modern moose, but less expansive. Murie has suggested that the sivatherium, like the existing prong- buck, may have shed the sheaths of its horns annually; and this theory may account for the fact that the horn-sheaths have never yet been found in a fossil condition. Vishnutherium and Hydraspotherium are closely allied genera.

SIWAH, se'wa, or SIVA, Egypt, a small oasis 350 miles west-southwest

of Cairo. It lies below sea-level and consists of a valley dotted by several lakes, prairies, palm groves, gardens vol. 25 — 4

and fields, abundantly watered and enclosed by steep hills. It is the easternmost of a small chain of oases, very fertile, has an abundance of dates, melons, olives, pomegranates, grapes, beans, barley, wheat and rice, besides salt. Basket-weaving and agriculture are the chief industries. Artesian wells abound. Agermih is the chief town, built upon steep rocks, and con¬ tains some ruins of temples and deep wells. An Egyptian gate and a large room covered with hieroglyphics are supposed to belong to an an¬ cient royal palace. Here was the famous tem¬ ple of Ammon, at least 2,300 years old. In the vicinity is the Fountain of the Sun, a salty spring. Pop. 3,750. Consult Hohler, T. B., (Report on the Oasis of Siva5 (Cairo 1900).

SIX NATIONS OF THE IROQUOIS, The. The five Iroquois tribes — the Mohawk the Seneca, the Onondaga, the Oneida and the Cayuga — speak dialects of the Iroquoian stock of languages. This stock is merely one of nearly 50 such linguistic groups on the Ameri¬ can continent north of Mexico. This linguis¬ tic classification of languages into stocks does not by any means imply necessarily a com¬ munity of blood descent among the peoples using the several dialects within each several stock, so that homogeneity of blood descent may not be consequently predicated of two peoples speaking dialects of the same stock. In the closing decades of the 16th century these five nations or tribes, or at least the main bodies of them, united in a defensive and offen¬ sive league or confederation under a consti¬ tutional form of government. It was a limited democracy, in which mother-rule was dominant.

The available historical data, although very meagre, make it probable that this act of federa¬ tion was the last of a series of attempts to unite these and also other tribes in a permanent federal union. It may also be gathered from these same sources that the year 1570 a.d. is the approximate date of the founding of this re¬ markable league or confederation of the five Iroquois tribes or nations; the number was in¬ creased to six in the 18th century. At that time and for 200 years after they inhabited the central, the northern and the northeastern re¬ gions of what is to-day New York State.

Early French explorers and writers first called them the Iroquois; but when the exact geo¬ graphic positions of these tribes became better known they named the Mohawk the Lower, and the four other tribes the Upper, Iroquois; but English authors, quite generally, knew them as the Five Nations. But, in 1722, the Tuscarora, a southern tribe,

speaking a dialect of the Iroquoian stock of languages, became officially the sixth tribe of the federation or league of the Iroquois. Thenceforth, these six tribes (Fnations) were usually called the Six Nations of New York Indians, often abbreviated to the Six Nations.

In 1535 a.d. , Capt. Jacques Cartier, while ex¬ ploring the Saint Lawrence River, obtained, from their Huron enemies, meagre but trust¬ worthy information concerning the five Iroquois tribes, under the name ((Troudamani)5 and “Agouionda.® He learned that a state of cruel, desultory warfare existed not only among the five tribes themselves but also between them on the one hand and the Huronian and other allied tribes, then dwelling on the Saint Lawrence, on

the other. When Champlain, in exploring the Saint Lawrence River in the first decades of the 17th century, came in contact with the war-parties of the five tribes of the Iroquois, about 75 years after Cartier’s time, he learned that they had so effectively harassed the Huron tribes who had formerly dwelt on the Saint Lawrence River as to compel them to withdraw to allied peoples then living on the banks of Lake Simcoe or to seek a precarious asylum among neutral tribes elsewhere. But, these Saint Lawrence regions, he found, were in¬ fested with marauding bands of the disrupted and dispossessed Huron peoples and of the tribes of Algonquian speech allied with them. These still stoutly disputed the Iroquois con¬ quest of these territories. The dispossessed Huron tribes were sedentary, only leaving their villages and fields to hunt and to fish at cer¬ tain seasons of the year. In 1622 Champlain attended a peace conference, at which were present Huron, Algonquian and Iroquois diplo¬ mats; it had been convoked for the purpose of bringing to an end a war which had then been waged, it was declared, for <(more than fifty years.® Peace was finally concluded in 1624. But in 1626 these Iroquois tribes were at war with the Mohegan who had a palisade <(op- posite Fort Orange (Albany, N. Y.), on Castle Island.® Although inadvertently aided by the Dutch the Mohegan were defeated, and the Dutch commander and his men killed. It is said that some of the dead, including one or more of the Dutchmen, were eaten by the Iroquois. The peace concluded in 1624 with the Canadian tribes lasted for only about 10 years, for in 1634 these Iroquois tribes, or five nations of Iroquois, inaugurated a far-reach¬ ing policy which enabled them in subsequent years to overrun all Lower Canada and to take the first steps toward the entire subjugation of Upper Canada. The Algonquian tribes inhabit¬ ing the

banks of the Ottawa River were either thrust back inland or entirely dispersed. In 1636 the five tribes or nations of Iroquois be¬ gan a systematic raiding of the four federated Wendat or Huron tribes who lived around the shores of Lake Simcoe. And the complete political destruction of this Huron federation was accomplished during the summer of 1649. Then there followed the defeat and dispersal of the Tionontate or Tobacco Nation (Tribe). And in 1651 these Iroquois tribes attacked and utterly defeated the powerful Neuter Nation, the so-called Attiwendaronk, occupying what is to-day the southern peninsula of Ontario, Canada, and what is to-day western New York State as far as the Genesee River watershed.

These conquests made the five nations or tribes of the Iroquois complete masters of Upper Canada. And as a logical result they extended their sway over the conquered lands, held by' the two tribes last mentioned, in what is to-day the State of Michigan. Then, in 1654-55, the war with the Erie took place; it ended with the complete political destruction of this intrepid people, for many of them became captives and were adopted as citizens of the commonwealth of their conquerors, while others fled to other tribes for asylum. These victories left the hostile tribes in the Susquehanna River Valley the only formidable enemies of the five nations or tribes at this time. Then, in this

region, there was a respite from warfare of about 20 years. In 1676 the Iroquois of the five nations vigorously attacked the Susque¬ hanna tribes, especially the Conestoga ((<Place Of Muddy Water®), who although supported by the Maryland authorities were nevertheless completely defeated and the valley of the Sus¬ quehanna became a highway for troops of Iroquois warriors going to attack the Virginia and Carolina tribes, — the Tutelo, the Sapona, the Achonechy (preferably Occaneechi), the Catawba, the Cherokee and other southern tribes with whom they had already been at war; the Conoy and the Shawnee were also subdued and brought under the dominion of the five nations of the Iroquois league or confederation.

Subsequent to 1680 the five nations of the Iroquois league attacked and defeated the Illi¬ nois tribes, driving some across the Mississippi River. In 1722 the Tuscarora became a sixth tribe or nation of the league or confederation of the Iroquois. Thenceforth these six tribes or nations were usually called the six nations of New York Indians, shortened sometimes to the six nations.

To commend and to secure their rule in the valleys of the Susquehanna and the Ohio rivers these six nations established a vast

colonial policy, in pursuance of which they placed a vice-gerent on the Susquehanna and another on the Ohio to oversee and to advise the subject tribes in purely local affairs and to uphold federal law and to maintain federal rights and to secure justice by the reference of matters affecting these to the federal council at Onon¬ daga.

The vice-gerent on the Susquehanna River was called Swatane by the Iroquois and Shikellamy by the Delawares. Both names signify ((He enlightens us.® The vice-gerent on the Ohio River was named Scarouady by the Iroquois and Monacatuatha by the Dela¬ wares. The Iroquois name signifies ˆBeyond the Sky.® The meaning of the Delaware name is not definitely known. He wras more fre¬ quently, however, mentioned as the Half-king. He lived first at Logstown, but in order to avoid the French influence he withdrew to Aughwick, Pa. It appears from the records 'that there were probably two in succes¬ sion who held this office in the Ohio region. The first notice of such an official occurs in 1728, but of course this was not the historical date of the beginning of this unique native American policy. The so-called French and Indian War in the fifth decade of the 18th cen¬ tury brought this policy to an end. With the defeat of the Mohegan tribes on their eastern border in desultory warfare (1626-40) the Iroquois were finally able, about 1720, to bring the Delawares under subjection. They adopted them into the status of women, which by virtue of the very dominant civil and political position of Iroquoian women in their own social organization was not at all the act of humilia¬ tion that most writers on this matter have hitherto maintained. The position of woman among the Iroquoian peoples was rather one of power and respect, being in some measure superior to that of the warriors and the chiefs.

Champlain was drawn, largely by force of circumstances and ignorance of the spirit of the Iroquois tribes, into committing two costly

blunders which together finally deprived France of her Canadian colonies. The first was his joining a Huron-Algonquian war-party, in 1609, while on its way to raid the territory o'f the five nations of Iroquois. On the shores of the lake which to-day bears his name he met an Iroquois war-party, which he and his allies de¬ feated largely by the strange firearms of the Frenchmen, by which three of the Iroquois chiefs were killed; the second and more serious mistake was

made in 1615, when he led an in¬ vading force of French and Indians into the lands of the five Iroquois nations; he ad¬ vanced into these lands to the region about the present site of Syracuse, N. Y. There he at¬ tacked a palisaded fortification for four days, but after being severely wounded in the knee by an arrow he and his baffled allies — Hurons and Algonquian warriors — were compelled to raise the siege. This unprovoked overt act — the invasion of Iroquois territory by these Frenchmen and Indians — aroused the undying hostility of these five nations of the Iroqouis League against the French. They afterward consistently opposed the French at every step until the close of the French regime in Canada in 1764. Thus, these five, later six, nations became the firm friends of the English who were at that time often at war with the French. But this English alliance finally became the cause of the disruption of the unity of the league as pointed out elsewhere in these pages. The pretentious raids into the Iroquois country by Champlain, De la Barr, Courcelles, Tracy, Frontenac, Denonville and others never greatly embarrassed the activities of these five nations, so that they were never, or at least only tem¬ porarily, prevented from gradually extending their sway south, west and north among the native peoples, their neighbors.

Owing to the fact that the policies of this League of five nations or tribes were formu¬ lated, amended and executed by five tribal com¬ mittees of astute chieftains in the federal coun¬ cil, the league with measurable success was able to weather all these wars and changes. But the war of the American Revolution rup¬ tured the unity of this great institution. Some of the tribes, true to their long-standing alliance with her, espoused the cause of Great Britain, while a small minority, composed chiefly of the Oneida and about one-half of the Tusca- rora with a few from other tribes, remained faithful to the American colonies. This peculiar situation resulted from a decision of the federal council of the league to remain neutral in the impending conflict, as a federa¬ tion, but nevertheless to permit each tribe to choose for itself its own policy in the premises. So that as a result of the defeat of the English people parts of the league may still be found in New York State and in Canada.

The social organizations of the six nations of the Iroquois and their congeners were strik¬ ingly alike, although, naturally, there were note¬ worthy differences in details. On the whole many features of their social organization were not very different from those of like purpose among tribes having a similar social develop¬ ment. But the social organization of the six nations of the Iroquois and their kindred tribes of the Iroquoian linguistic family differed from those of most tribes of other linguistic

stocks in being measurably more complex, more expansive and more cohesive in its parts. A noteworthy difference between it and that of most other tribes is the dominant position and high public responsibility of the women who are mothers. This feature is a remarkable recognition of the nobility and the sacredness of motherhood. The chiefship titles, the lands and their products, and the lodges with their belongings are owned solely by the mothers of these people and these rights and prerogatives are ably administered by these very mothers.

Every candidate for a chiefship is named at a conference of the mothers of the ohwachira (uterine family) owning the title, under the premiership of the Matron of the ohwachira. The selection is then submitted for review and advice to the tribal and to the federal councils respectively. If the nomination is found satis¬ factory it is confirmed, but if it be rejected, the mothers aforesaid must again meet in confer¬ ence in order to make another nomination. If necessary, this course must be repeated until a satisfactory candidate is found. The review is usually perfunctory; of course, the nomination is sometimes rejected, although the mothers naturally will present only such a candidate as they feel will be a credit to their ohwachira. After the institution of the league or federa¬ tion the candidate had to be installed into office by federal officers at a federal condoling and installing assembly. This is a limited democracy in which the suffrage for the nomination of chieftains is confined to the mothers of the community.

In the original structure of the league or federation of the five (later six) nations no military officers were recognized. By amend¬ ment to the original instrument two of the federal chiefs (the one Onondaga and the other Seneca) were also made military officers. But it must be understood that these two officials could perform their military functions only out¬ side of the sessions of the federal council. No federal chief could go on the warpath be¬ fore resigning his federal chiefship, which he might resume on his return, if he was fortunate enough. There were three distinct classes of civil council chiefs among these tribes; they were the clan civil federal chieftains who while members of their local tribal council were at the same time also members constituent of the great federal council of the league or fed¬ eration; and the two classes of clan civil chief¬ tains, — the hereditary (the office but not the person) and the merit (or so-called ˆpine-tree® chief), who were the members constituent of their own tribal council only. But it must be noted that there was no such officer as tribal chief or chief of the tribe as an aggregation of clans known to the league, because the chief¬ tain primarily represented only, the ohwachira

(uterine family) owning his title, the' ohwa¬ chira being a constituent unit, of the clan ; the clan is, therefore, represented in council only by the chiefs of such of its ohwachira as may have chieftaincies. But sometimes there may be a clan in which no ohwachira may own a chiefship title and so it may not have repre¬ sentation in council.

The league or confederation as an institu¬ tion or a form of government was an adapta¬ tion of that of the separate tribes even as that

of the constituent tribes was an evolution of that of the several clans which composed each. Lastly, the government of the clan was an adaptation and expansion of that of the several ohwachiras (uterine families) composing it, and the ohwachira or uterine family, strictly speaking, was composed of the progeny of an ancestral mother and her female descendants, reckoning the line solely through the female blood. Persons of alien blood could be adopted only into such a kinship group. So the clan may be defined as a permanent body of blood kin, socially and politically organized, who de¬ rive actual or fictional descent through the female line only, from a common ancestral mother. It is a fact that the less complex units of kindred surrendered part of their autonomy to the next higher units of organiza¬ tion in such manner that the whole was closely cohesive and interdependent. The institution of a higher kinship unit created new privileges, duties, rights and obligations. This was the principle of organization of the confederation of the said five (later six) Iroquois tribes or nations.

In nautical matters the five (later six) na¬ tions of Iroquois were measurably inferior to the Huron and the Algonquian tribes of Canada. The canoes of the former were con¬ structed of elm bark and were of clumsier workmanship and they were no match for the beautiful birch bark canoes of the latter. So it is found that in most of the canoe fights mentioned in history these Iroquois tribes were usually worsted. After the establishment of the league or confederation the five federated tribes of Iroquois lost no time in making their united power felt. The evidence of this fact is found in the expulsion of the two Wendat (later Huron) tribes from their habitat on the Saint Lawrance River, about the close of the 16th century. When the Dutch traders estab¬ lished themselves at Fort Orange near the present site of Albany, N. Y., these Iroquois tribes

obtained firearms from them and were thereby enabled to extend their conquests over practically all the neighboring tribes, in such manner that their sway was acknowledged from the Tennessee to the Ottawa River and from the Kennebec to the Illinois River and Lake Michigan ; the Chippewa, however, checked their westward advance; the Cherokee and the Catawba and their allies effectually barred their further advance southward, while at the north they were much hampered by the operations and machinations of the French and their native allies. A list of the tribes against whom they raised the hatchet is simply startling. In brief, they attacked more than 28 Algonquian tribes, 12 Iroquoian tribes and at least three Siouan peoples. So that by 1664, when the English displaced the Dutch at Albany, the conquests of the league of the Iroquois or five nations had extended so far that the sway of these tribes was supreme over the native tribes in practically the entire valley of the Saint Law¬ rence River. In 1666 the five nations of the Iroquois league made peace with the French and their native allies who had attacked and burned some of their villages. Both parties to this peace observed it for a long period. The league was organizing to push its conquests

further south and west than they had previously done.

Their wars were waged primarily for the security of their homes and their hunting lands and for the perpetuation of their independence and political life, briefly, for the preservation of their institutions and for the welfare and integ¬ rity of their unique commonwealth.

The French in the latter part of the 17th century made a number of attempts through the Jesuit missionaries to induce the people of the five federated Iroquois tribes to break off their English alliance and to emigrate to Can¬ ada and to come under French jurisdiction. These attempts were so far successful that numbers from the different tribes, chiefly, the Mohawk and Onondaga, left their former alle¬ giances and formed Catholic settlements in Saint Regis, the Bay of Quinte, Oka, Lake of the Two Mountains and Caughnawaga, on the Saint Lawrence River. The tribes of the league, however, made repeated unsuccessful efforts to induce these emigrants to return to their former homes, and so in 1684, after real¬ izing the futility of their efforts, they declared these emigrants traitors to the peoples of the league. The residue of the peoples of the five nations occupied their original habitats until the Sullivan raid in 1779 dislodged them and caused some to seek new homes elsewhere. Those who did not emigrate, live on reserva¬ tions in New York State and those who did, live in Ontario, Canada.

The constructive principles of right and justice, underlying the institution of the league or confederation, defined primarily the rights and the obligations arising from blood kinship and affinity. Their internal and their foreign polity was molded and guided in consonance with these principles. The motive for the in¬ stitution of the league was avowedly to secure universal peace and welfare (Neu Sken'non >) among men by the recognition of the equality of rights and obligations among citizens of their commonwealth and the establishment of righteousness and justice (Ne ” Gdi‘hwi'io) in directing and regulating personal and public conduct by them ; and by the stopping of blood¬ shed through the proscription of the bloodfeud by the tender to the aggrieved family of the prescribed price for the killing of a cotribes¬ man or cotribeswoman ; by abstention from the eating of human flesh ; and, lastly, by the maintenance and the effective exercise of power (Ne" Ga’s‘hasdon"sa’) , not only military strength but also the magic power (the orenda) believed inherent in the forms and words of their ceremonial, social and political activities. The tender by the offender and his family (ohwachira) to the aggrieved family {ohwa- chira) for the homicide of one of its members was 20 strings of wampum — 10 for the dead person and 10 for the forfeited life of the of¬ fender; but, if the victim was a woman, 30 strings were required, as the value of a woman’s life was held to be double that of a man.

The tribes in question were of course seden¬ tary and agricultural, deriving only a portion of their subsistence from their hunting and fishing grounds. Skill and adaptability in lodgebuilding and in the construction of pali¬ saded fortifications were marked characteristics

of these tribes when first encountered. In political organization and statesmanship, in military prowess and in the aptitude to found their institutions on universal principles of right and justice and mercy these five (later six) nations were second to no other native Indian people north of Mexico. The astute diplomats of France and England who at dif¬ ferent times treated with their wily leaders found them their peers and exemplars in state¬ craft. Each tribe was an independent political unit and exercised the rights of local self-government, but in all federal affairs it acted jointly with its confederates through a federal council, composed of chiefs who were

members of both the tribal and the federal councils. Every tribal (i.e., clan) chief was not a federal officer.

Before the great principles of the league or confederation of the five (later six) nations were constructively formulated into a system of interdependent federal institutions the avowed polity of these five (later six) na¬ tions of the Iroquois was a narrow tribalism which naturally regarded and treated all other people as game or as animal pests to be de¬ stroyed for the common good. This harsh, although orthodox, standpoint was not alto¬ gether changed by the universal principles of reconciliation and goodfellowship adopted as the working forces of the institutions of the league or federation by its great founders. So in the warfare of the league or federation prisoners were subjected to the most ferocious cruelty; unadopted women and infant prisoners were at times burned as alleged reprisals for similar treatment by their enemies. Yet, withal, they were not (<a race of rude and savage war¬ riors® but they were <(a kindly and affectionate people, full of keen sympathy for kin and friends in distress, kind and deferential to their women, exceedingly fond of their children,® anxiously striving for the establishment of peace and goodwill, righteousness and justice and mercy, among men, and profoundly imbued with a just reverence for the institutions of their federal commonwealth and for its noted founders and prophet statesmen and states- women.

The religion of these six nations or tribes of the Iroquois like that of all other peoples of this linguistic stock consisted in the recog¬ nition and the worship of unseen forces and beings whose expressions were embodied in all the environing objects and powers and phe¬ nomena and in many fictions of mythopoetic fancy, which, directly or remotely affecting their welfare or causing their illfare, were re¬ garded as anthropic personages, in fact, as man- beings, endowed with human life, volition and peculiar orenda (or magic power, which is the only impersonal concept of their philosophy). Form is the logos or expression of creative spirit. This makes it clear that the people of these tribes were not at all idolators in the usual sense of this much-abused term. This religion, however, placed emphasis on the punctilious performance of the rituals and the strict observance of the customs and ceremo¬ nies upon which these rest, rather than on the¬ ories of morals or ethics as such. Neverthe¬ less, many of their ethical standards express ideals not yet attained by modern culture and civilization. Some have been formulated into

law. The orphan and the poor were not known as such in their polity. The food-supply — even the best of it — typified by a beaver's tail

contained in a bark-bowl (the most delicious morsel known to them) — was made free to every person. The most desirable flesh was of the absolute right of every person who was a citizen of their commonwealth, their state.

In the pantheon of the Iroquois the status and the personal relations of the deities and personages thereof were naturally governed by regulations and customs, derived directly from those prevailing in the social and political or¬ ganizations of the people, and so there is among the chief gods and goddesses of their faith a kinship system identical with the fabric of interrelated duties, obligations and immu¬ nities of the prototype — the kinship system of the people themselves. This is the psychology of the divine institutions of Iroquois faith.

Bibliography. — Cartier, Tacques, (Bref recit et succincte narration d.e la navigation faicte es ysles de Canada-* (Paris 1545; new ed., id., 1863) ; Champlain, Samuel de, Voy¬ ages ; ou journals es deconvertes de la Nouvelle France) (Tomes I— II, Paris 1830) ; id., (CEuvres de Champlain publiees sous le patron¬ age de TUniversite Laval par 1'abbe C. H. Laverdiere5 (2d ed., Tomes I-IV, Paris 1870) ; Hale, H., Hroquois Book of Rites) (Philadel¬ phia 1883) ; Hazard, S., ed., Pennsylvania Archives) (Vols. I-XII, Philadelphia 1852-56; 2d series, Vols. I-XIX, Harrisburg, Pa., 1875- 90) ; Hewitt, J. N. B., ed., /Texts and Manu¬ script Notes on the Iroquois League5 (aggre¬ gating nearly 150,000 Native Words; Archives of the Bureau of American Ethnology, Smith¬ sonian Institution, Washington, D. C.) ; Mor¬ gan, C., and O'Callaghan, E. B., eds., (The Documentary History of the State of New York5 (Vols. I-IV, Albany 1849-51); id.,

(Documents relating to the Colonial History of the State of New York5 (Vols. I-XV, Albany 1853-87) ; Morgan, L. H., Peague of the Ho-de-no-sau-nee, or Iroquois5 (1851; id., New York 1904) ; Pennsylvania State, (Council Minutes5 (Vols. I— III, Philadelphia, Vols. IV- XVI, Harrisburg 1852-53) ; Perrot, N., (Memoire sur les mceures, constumes et relligion des sauvages de l'Amerique Septentrionale5 (Leipzig et Paris 1864) ; Thwaites, R. G., ed., (Jesuit Relations and Allied Documents. Travel and Explorations of the Jesuit Mis¬ sionaries in New France 1610—1791 5 (Vols. I- LXXIII, Cleveland 1896-1901) ; Pelations des Jesuites contenant ce qui s'est passee de plus remarquable dans les missions des peres de la Compagnie de Jesus dans Nouvelle France; embrassant les annees 1611-72* (Tomes I— III, Quebec 1858).

J. N. B. Hewitt,

Ethnologist, Smithsonian Institution.

SIX-PRINCIPLE BAPTISTS. See Bap¬ tists.

SIX-THREE-AND-THREE PLAN. See

Education, Elementary.

SIXTEENTH CENTURY. This century is one of the most important in modern history, first as the terminal phase of the Renaissance, and, second, as the beginning of the religious upheaval called the Reformation, or more re¬ cently ((The Religious Revolt in Germany.® The still living spirit of the Renaissance made the

century a period of great art. Leonardo da Vinci and Raphael died not far apart (1519- 20). The great Venetian painters, the Bel¬ linis, Titian, Tintoretto, Veronese flourished, and such men as Correggio and Botticelli, not to mention a whole host of lesser lights, lived from the preceding century and did some of their best painting which has always been an inspiration. Architecture decayed to some ex¬ tent, but it was in this century that Michel¬ angelo built the great dome of Saint Peter's at Rome, and some <of the finest Italian palaces were planned and constructed. Sculpture under the group of men from Michelangelo and Ben¬ venuto Cellini to John of Bologna, achieved masterpieces that were to be forever famous.

Italy was not alone in this great development of the arts, for such men as Jean Goujon and Germain Pilon were distinguished as sculptors in France, and the chateaux of the Loire are enduring monuments of French architecture and great beginnings of French paintings were made. German painting had Differ and the Holbeins and sculpture the Visschers and Adam Kraft. In Spain, as well as in the Netherlands, there came a fine initiative for the supreme period of their painting which was to follow in the next century. Only England was not touched by the art spirit of the time, though the response in literature in the mag¬ nificent Elizabethan period must be credited to make up for it. While it is not generally realized, the Renaissance evoked a great litera¬ ture as well as a great art in all the countries of Europe. The development of this was some¬ what delayed, and occurs in the 16th much more than the 15th century. It included Ariosto and Tasso as well as Vasari, Machiavelli, Lorenzo de Medici and Benvenuto Cellini in Italy; Marguerite of Navarre and the Pleiades, Ron- sard,

Rabelais and Montaigne in France, Cer¬ vantes and Lope de Vega, with Saint Teresa and the great mystical writers in Spain; and Camoens in Portugal. The culmination of Renaissance literature came in the Elizabethan period in England. Michelangelo, poet as well as artist, died just two months before Shakes¬ peare was born, and the two men are comple¬ ments of each other at the extremes of cultural Europe. The Teutonic countries presented a great development of scholarship though not of original literature.

The art of the 16th century is, however, its greatest chapter. It contains all the work of Raphael, the greater part of that of Michel¬ angelo, not a little of Leonardo da Vinci, most of Titian and all of Tintoretto and Veronese, not to mention a number of men who in any other period would be looked upon as of the very first rank. Raphael has been called the greatest painter of all time and while modern art criticism has discounted that flattery, scarcely any one would be ranked above him. When he died at the age of 37 he had reached distinction as an architect and archaeologist as well as a painter. Narrow specialism was ex¬ tremely rare in the Renaissance and many men did many things well. Titian is one of Raphael's great rivals ; some of his Madonnas are among the most beautiful in the world. Delacroix de¬ clared that he came closest to the spirit of an¬ tiquity. Another great painter of the time whose work is growing in appreciation in our time is

Correggio. Leigh Hunt declared him the most skilful artist since the ancient Greeks in the art of foreshortening. He was master of every technical device in painting and this was a time of fine technique. Tintoretto has been restored to modern estimation by Ruskin. Paolo Cag- liare, known as Veronese, was a master of decoration and no decorative painter has equaled him in the effective use of color. It is easy to trace art decadence in the century but not difficult to understand it, once it is appre¬ ciated that at the beginning Botticelli was doing his famous tondi or rondo, Leonardo-da-Vinci was painting the (Mona Lisa) and Fra Bartolomeo had just come under the influence of the Venetians and the spell of their rich color. It would have been almost impossible to expect that painting could be maintained on any such high level as all this indicates.

The century witnessed the career of the man often declared to have been the finest intellec¬ tual and artistic genius who ever lived, Michel¬ angelo Buonarotti. He is the most distin¬ guished of sculptors since the Greeks. Some of his painting rivals that of the very greatest painters. His decoration of the Sistine Chapel made him forever famous and has been the subject of reverend study ever since. As an

architect he is undoubtedly one of the world's supreme geniuses in construction. Without steel or steam or any mechanical aid except a mule and an inclined plane, he built the great dome of Saint Peter's, one of the architectural wonders of the world. Aleant to be seen as the first object visible in Rome to the travelers who, in the old days,, came over the mountains in carriages or on horseback 20 miles away, it looks more like a work of the Creator than of the creature. This greatest of sculptors, paint¬ ers, architects, has written sonnets that have only been equaled by Dante and Shakespeare and have never been surpassed. In every mode of aesthetic expression, he was a master in the highest sense of the word. After having worked hard all his life, he lived to be nearly 90 in the full possession of his faculties. His personal character is equal to his genius. He was a deeply religious man who all his life had been well known for his thoughtfulness for others. He left a sum of money in his will, the income of which was to be (<given for the love of God to the modest poor.® One of his sonnets is a prayer that he may not let himself become so occupied with the mere trifles of life as to forget that it is a preparation for another. Vittoria Colonna declared that those who ad¬ mire Michelangelo's works admire but the smallest part of him. The artist is often a dis¬ appointment after his works; Michelangelo's personality had just the opposite effect. At the end he declared that (<life, which had been given us without our asking, had wonderful possibili¬ ties of good in it, and death which came un¬ summoned from the same Providential hand could surely not prove less full of blessing.®

The period is famous for its devotion to the arts and crafts. The furniture is noted for its charm of design and fine execution and was often designed by the great artists. Objects for church use were made the most beautiful works of art. A thurible or censor made by a pupil of Leonardo da Vinci sold at auction re¬ cently for some $60,000 because it was thought

to be the most beautiful piece of bronze work of its kind in the world. Candelabra for church and home use, cups, plaques and other articles were made with similar perfection. Some of Benvenuto Cellini's work of this kind is very precious. Artistry was the keynote in every department of life. When Aldus pub¬ lished (1501) his Virgil in italics, the designer of the type Was Francia, the famous painter at Bologna who had designed all Aldus' previous fonts of type. The home beautiful was the special cult of the time. The ladies of the

Renaissance planned charming private apart¬ ments, music-rooms, art galleries and reception- rooms which reflected their personalities and are the most beautiful of their kind ever created. Some of them have been reproduced in modern museums in the hope of stimulat¬ ing emulation. The apartments of Lucrezia Borgia at Ferrara were particularly famous. Landscape architects made the gardens sur¬ rounding these houses beautiful and artists were appealed to to plan details of all kinds so as to be sure that all would be beautiful as Well as useful.

Painting outside of Italy flourished wonder¬ fully and the names of Albrecht Durer and the Holbeins in Germany, of the Clouets, Cousin and Fouquet in France and of Navarete, of Juan Bourgona, of Louis de Vargas and Pablo de Cespedes in Spain, as well as Mabuse, Van Orley, Blondeol and Justus of Ghent in the Netherlands all live in honor among those in¬ terested in the history of art. In sculpture there is a distinct descent from the preceding century, except for some great work of Leonardo da Vinci and Michelangelo, but the sculptures of John of Bologna and Benvenuto Cellini deeply influenced succeeding generations and are greatly admired in our time. In France, Gou¬ jon's reliefs for the Fountain of the Innocents are among the most beautiful works of their kind ever produced. Germain Pilon's group of the Three Graces is a monument to the refined tastes of the time, and to the genius of the sculptor, even though it may show signs of the beginning of decadence. In Germany the great group of figures for the monument of the Emperor Maximilian at Innsbruck, executed early in the 16th century, shows how high were the standards of plastic art everywhere at this time. Saint Sebald's tomb, executed by the Vischers, father and son, at Nuremburg re¬ mains one of the unapproached marvels of a great period. There were many foci of fine artistry in southern Germany during the period.

The Elizabethan Period in English litera¬ ture is, with the art of Italy, the twin triumph of the century. It holds all of Marlowe's writ¬ ing and up to the very flowering of Shakes¬ peare's genius. It has, besides, the poetic beauties of Sidney and Spenser, the marvel¬ ous English of Chapman's translations and the best of Ben Jonson's dramatic work. It is not only the greatest period of literature in English, but one of the greatest periods of world litera¬ ture. The English people were extending their domains beyond the sea. The peril from the Armada had deeply, stirred the English mind and the reaction after the victory gave a great stimulus to thought and writing. As is so often the case when the country was growing in national importance, intellectual genius bloomed also and so C(the spacious times of great Eliza®

furnished a stimulus that was well responded to. A very great period of dramatic literature de¬ veloped quite unexpectedly, continued for a gen¬ eration and then began to decline. By the end of the second generation the inspiration had faded and only conventional work was being done.

This century saw a wonderful outburst of European literature, culminating in the latter part. The Elizabethan period in England was rivaled in other countries. In Portugal Camoens wrote (Os Lusiadas,* the epic story of Portuguese exploration of Africa and Asia and of the foundation of Portugal's In¬ dian empire. Friedrich Schlegel declared it the greatest epic of modern times. In Spain came the beginnings of the careers of Lope de Vega and Cervantes; in France Rabelais, at the be¬ ginning of the century, Montaigne, at the end, did their work; in Italy Ariosto and Tasso. Had Shakespeare visited the Continent as a young man he might have met nearly all of these. The writers of the most humanly in¬ teresting play, (Hamlet, > of the greatest novel ever written, (Don Quixote, } of the greatest modern epic, (Os LusiadasP of the greatest letters (Saint Teresa) and the greatest essays (Montaigne) were all doing their work to¬ gether in the last quarter of this century. Some of them were to accomplish their best work only at the beginning of the next century, but their inspiration came from this.

The cultural development of the Spanish- American countries during the century is one of the surprises of recent historical research. Schools were established in Mexico and Peru during the second quarter of the century and in 1551 the universities of Mexico and Lima received royal charters. During the last quar¬ ter of the century, medical and law departments were organized and these universities had many hundreds of students. The printing press was introduced into Mexico (1536) and the first book printed was (La Escale EspirituaP ((The Ladder of the Spirit }) the following year. Seven printers plied their craft in the century. Professor Bourne of Yale declared that Mexi¬ can scholars before the end of this century ((made distinguished achievements in some branches of science, particularly medicine and surgery, but especially linguistics, history and anthropology.® In the following century there were chairs in all the sciences and ((some of the professors, notwithstanding the vast dis¬ tance, gained the applause of the litterati of Europe. In range of studies, in standard of attainments by the officers, the Mexican institu¬ tions of learning surpassed anything that ex¬ isted in English America until the 19th century.® (Bourne). The university was granted by the Crown an income of about $10,000, so that con¬ sidering the value of money, apart from fees and other sources of

revenue, it had the equiva¬ lent of an income of $100,000 a year in our time.

The most fascinating character of the century whose work has lived on after him and has deeply influenced the after world is Ignatius of Loyola. A Spanish soldier, wounded at the siege of Pamplona by the French in 1521, he had his leg rebroken when it had healed in bad position, bearing the awful pain in those pre¬ anaesthetic days, rather than have his pride annoyed by the deformity. During the en-

forced idleness he read, after exhausting all the romances of chivalry at hand, a life of Christ and lives of various saints, particularly that of Saint Francis of Assisi, and came to the conclusion that life was only worth living when lived in imitation of the God-Man. Amidst many almost incredible difficulties, for more than a dozen years he formed his character by spiritual exercises, took up the study of gram¬ mar in a class with little boys, supported him¬ self by begging as one of the beggar students of the time, and gathered around him at the University of Paris a group of seven men, who in 1534 took their vows with him as members of the Company of Jesus. With true Spanish chivalry, their first object was to win over the Holy Land from the infidels by going to Jerusa¬ lem and converting it. Prevented by war from doing this, they became teachers and mission¬ aries in Italy. Their zeal was so great and yet so reasonable, they were so absolutely unselfish and had a charm that attracted so much atten¬ tion, that they accomplished wonders. The Pope received them with kindness and gave them provisional confirmation of their rule. Pope Paul III had insisted on limiting the number of religious orders because of abuses that had arisen in them, but after reading Ignatius' rule he declared ((the finger of God is here,® gave them the fullest confirmation and in 1543 they were acknowledged as one of the religious orders of the Church.

The Jesuits, thus simply founded, proved to be one of the creations of that great period most far-reaching in influence. By the end of the century they had schools in nearly every country of Europe, with many thousands of pupils. A hundred years later they had some 200,000 pupils. They went as missionaries to China and Japan, Mexico, Peru, Brazil, Para¬ guay and Chile, to Farther India and to the North American Indians. They wrote many thousands of books and their bibliography con¬ tains over 11,000 authors. The list of Bellar-

mine's works fills 50 pages, double column, one of them published in 54 languages. They were discoverers in astronomy, founders in anthro¬ pology and ethnology, writers on every scien¬ tific topic, and Poggendorff has 500 of them in his (Biographical Dictionary of Science.) The last prayer of Ignatius 'was that his order should be persecuted. As Francis Thompson said, (<Most singular bequest that a founder ever transmitted, it has been singularly ful¬ filled.® Suppressed by the Pope in 1773, they survived in Russia, were restored in the early 19th century and there are over 20,000 Jesuits in the world now.

The most disputed character of the century is Martin Luther. Lord Acton once declared his life the most difficult problem in historical writing. The movement initiated by him sep¬ arated the Teutonic peoples from the Pope and then made their monarchs the head of both Church and State (Cujus regio ejus religio). There had been unfortunate abuses within the Church and many felt that these could not be corrected without breaking away from Rome. A number of deeply religious people followed Luther out of the Church for this reason. Po¬ litical motives and the confiscation of the prop¬ erty of the Church and of the religious orders helped the movement. Sweden affords a typical example of this. Most of this property had

been held in truest for the poor and for education. In the religious conflict which followed, social organization for the benefit of the poor and education suffered severely. Fewer universi¬ ties were founded, the attendance was smaller, intellectual life declined (Erasrtitfs), there was less academic freedom (Paulson). Luther,s doctrine of liberty of judgment and personal interpretation of the Scriptures soon ied to a multiplication of sects, each bitterly opposed to the others. Calvin in Switzerland and Knox in Scotland are as difficult to estimate properly as Luther. They too gathered round them many of those in their environment most deeply interested in religion. Rev. Dr. Briggs sug¬ gested that there were other and greater re¬ formers in the century than these popular heroes. He mentioned Sir Thomas More, Erasmus and John Von Staupitz as ((the three irenic spirits . . . the beacons of the greater ref¬ ormation that was impending.® Luther's move¬ ment began a reaction for sadly needed reform in the Church which was directed by the Coun¬ cil of Trent (1545-63). Henry VIII, after having received the title of Defender of The Faith for writing against Lutfier, broke with Rome over the affair of Ann Boleyn and be¬ came by act of Parliament the head of the Church as well as of the State. The Anglican Church as such did not come into existence un¬ til under the boyˆ king, Edward VI (1547-53). Queen Mary (1553-58) restored Catholicism. Anglicanism was firmly established by Eliza¬ beth

(1558-1603).

The Protestant Reformation undoubtedly brought about a great reawakening of personal religion and aroused the clergy to an ampler sense of their duties in leadership with regard to their flocks. Religion had come to be for a great many people a convention, lacking those personal elements of relationship between man and his Creator which foster the spiritual life. The Renaissance served to set the intellect of Europe rather definitely against religion, though its great leaders were exceptions to this and a profound reawakening of the spiritual life of the people was needed. The movement is too close to us even yet to be properly appreciated in its entire significance though the World War has helped to its understanding.

The greatest accomplishment of the century was in exploration and colonization. The ex¬ pedition of Bartholomew Diaz around the Cape of Good Hope to India (1487) and Columbus' discovery of America initiated a great period. The Cabots touched the Ameri¬ can continent at the north and Vespucci at the south just before the century opened. Magellan's vessels sailed around tne world,, though he lost his life on the way. Verrazano, an Italian with a French expedition, sailed along the coast of North America and entered the harbor of New York (1524). By the mid¬ century many of the islands of the Pacific had been discovered, including Australia ; the Por¬ tuguese laid the foundation of their great empire in India, and Pizarro and Cortes had founded the Peruvian and Mexican possessions of the Spanish Crown on the American con¬ tinent. By the end of the century there was free European intercourse with the East and the West and* the riches of both these wealthy portions of the world were pouring into Spain

and Portugal, stimulating an intense national life which gave rise to a great literature in both countries. England was preying upon the commerce, particularly of Spain, enriching her people and preparing to take up colonization for herself at the beginning of the next cen¬ tury.

The century witnessed the foundation of modern music. The greatest genius of it is Palestrina. He is to music what Dante is to literature and art, and whenever he is properly appreciated that generation has a good musical taste. The beginnings of the century's music comes from Flanders. Archadelt, the master of Palestrina, wrote some church music which is still used. Claude Goudimel, another Fleming, influenced his time deeply and as the master of Orlando di Lasso, the

first to co-ordinate words and music so as to harmonize and bring out the meaning of both, influenced all the after¬ time. Other pupils of Goudimel were the brothers Animuccia who created the Oratorio, named in honor of the oratory of Saint Phillip Neri, their great friend, at Rome. Josquin (Josse Despres) in France and Hans Sachs in Germany laid the foundation of modern pop¬ ular song music and foreshadowed many sub¬ sequent developments.

The foundations of the physical sciences were laid broad and deep in this period. The greatest scientific discovery is that of Coperni¬ cus, who revolutionized man's thinking as to the universe more than any other who ever lived. He did not make many observations nor were those he made particularly exact, but he reached a magnificent generalization, the Coper- nican theory, which has come to be the accepted teaching as to the universe. His theory was not acceptable to his generation and practically all the mathematicians and astronomers objected to it. It was not generally accepted until the generation after Galileo in the following cen¬ tury. Copernicus' studies had been made in Italy; it was there, according to tradition, that he first hinted of his theory, and. when he pub¬ lished his book it was dedicated with permis¬ sion to Pope Paul III. Until Galileo's unfor¬ tunate insistence on teaching the theory as ab¬ solute science, there was no hint of opposition. Copernicus' greatest scientific contemporary was Leonardo da Vinci, whose work in science belongs to this century (died 1519). Leonardo discovered capillarity and diffraction, made ob¬ servations on resistance, on density, on the weight of air, on dust figures, on vibrating sur¬ faces and on friction and its effects. Duval has claimed a place for him in the history of the biological sciences for his original obser¬ vations in botany, zoology, palaeontology and physiology. He developed practical engineering, studied the problems of flying and made a series of very practical inventions. He was a zealous dissector and made sketches of his work which, rediscovered in recent years, show clearly that his proposal to write a textbook of human anatomy was quite serious.

The biological sciences developed strikingly, beginning with Vesaliusoe, the ((father of mod¬ ern anatomy,® who wrote a great textbook, mag¬ nificently illustrated, and still one of the bibli- ophilic treasures of medicine. His pupil, Colum¬ bus, working as a papal physician at Rome, dis¬ covered the circulation of the blood in the lungs, and one of his successors in the Papal

University, Caesalpino, described the circula¬ tion of the blood in the body. In the mean¬ time, Servetus, a Spaniard working in Paris, had written a description of the circulation in a theological work on the

Trinity, for which, unfortunately, he was put to death by Calvin at Geneva.

Many other important discoveries were made in Italy at this time. The names of Eustachius, Fallopius, Varolius, Sylvius, are forever enshrined in the history of medicine because of structures named after them which they were the first to describe. After anatomy, botany developed the most and Caesalpinus, the anatomist, is called by Linnaeus (<the first sys¬ tematic botanist.® Many of the universities had botanical gardens of their own and collections of plants for study were made.' The great names in botany are Valerius Cordus, Conrad Gesner and Leonard Fuchsius. Before the end of the century, the calendar was corrected under Pope Gregory XIII to the form we now have and some extremely important de¬ velopments in practical medicine and surgery had been made. Italy was the great Mecca for enthusiastic students of science and Coper¬ nicus, Linacre, Vesalius and Caius in the early part of the century as Harvey later went down there to do special work. Padua was the most famous university of the world and almost no ambitious young university man in another country felt that he could count himself fortu¬ nate unless he had been there.

One of the supremely great men of his¬ tory was Sir Thomas More (beheaded 1535). A close personal friend of King Henry VIII, he was sent on an embassy into the Netherlands (1516), and while there wrote Utopia,* prob¬ ably the most interestingly practical of the books on ideal republics ever written. He had been, before this, one of the group of men, including Erasmus, Linacre and Dean Colet, most prominent in the Renaissance in Eng¬ land. Erasmus thought him one of the great¬ est minds of the time. On the fall of Wolsey, Henry VIII insisted on making More, Lord Chancellor. Wolsey declared him the most suit¬ able to be his successor, but the post was ac¬ cepted not without misgivings on the part of More. His well-known sympathy for the poor and his sterling uprightness of character had made him popular, so that his installation took place (<to the joy and applause of the whole kingdom.® His career fulfilled expectations. He is the only man who ever cleared the docket of the Court of Chancery. More refused to take the Oath of Supremacy, that is, that the king was the head of the Church. Practically all the bishops of England except John Fisher had consented to take the oath by some evasion of conscience, but More persisted in refusing. He was executed for treason going to the scaffold with a joke on his lips. Lord Camp¬ bell ((Lives of the Lord Chancellors)) says, ˆConsidering the splendor of his talent, the greatness of his acquirements and the innocence of his life, we must regard his murder as the blackest crime that has ever been perpetrated

in England under the form of the law.® He adds, ((The mean, sordid, unprincipled chancel¬ lors who succeeded him made the latter half of the reign of Henry VIII the most disgrace¬ ful period in our annals.®

SIXTEENTH CENTURY

The century embraced the careers of a number of women in whom interest has never died. The list includes Vittoria Colonna and Marguerite of Navarre who corresponded with each other, Isabella and Beatrice d'Este, Saint Teresa, Lady Jane Grey, Mary Queen of Scots, Queen Elizabeth, Margaret More, Charitas Pirk- heimer and Angela Merici, not to mention any but those whose lives are still felt. Queen Isa¬ bella of Spain lived on into the century but her work was done mainly and has been treated of in the 15th century. Vittoria Colonna, called the Saint of the Renaissance, was a wonder¬ ful character of fine intelligence and broad edu¬ cation who deeply influenced her own and subsequent generations. She wrote some re¬ ligious poetry that is still republished, but it was her personality that counted. Her deep impression on Michelangelo in his old age, as demonstrated by his sonnets to her, some of the greatest ever written to a woman, reveal her power. The contrast to her would seem to be Lucrezia Borgia, whose name has be¬ come the byword for all that is worst in feminine human nature, but Gregorovius has vindicated her. Her contemporaries deeply loved and respected her. Aldus, the great printer, who knew her well, praises her charity to the poor, her unselfish devotion to the af¬ flicted and her ability as a ruler. Chevalier Bayard, sans peur et sans reproche, declared (<that neither in her time nor for any years be¬ fore has there been such a glorious princess.® When she died at the early age of 40, all of Ferrara, where the last 20 years of her life were spent, followed her body to the tomb as that of a saint. Her popular reputation is a lesson of the fallibility of historical tradi¬ tions without contemporary documents.

Saint Teresa of Spain has been called the greatest of intellectual women. Her works are still issued, edition after edition, in many lan¬ guages. A number of <Lives) of her have been written, even in English in this present century. Cardinal Manning, himself the most practical of men, declared that <(she was one of those sovereign souls that are born from time to time, as if to show what her race was created for at first and to what it is still destined.® The Spaniards call her their Doctor of the Church, and her statue, the only one of a woman, is among the Fathers and Doctors of the Church in Rome, with the title Mater S piritualium. She is the world authority on

mystical theology and an unsurpassed writer of Spanish prose. It has often been said that from behind her convent grill she, more than any other, was the barrier against that divisive religions movement which caused such bitter dissensions in most other countries of Europe, but spared Spain. In striking contrast to her is Marguerite of Navarre, sister of Francis I of France, herself a queen, whose volume of stories, the ˆeptameron,* is still popular in every language, while her poems, (Les Mar¬ guerites de la Reine Marguerite) are known to all lovers of literature. She had an ex¬ tremely beautiful character and radiated the finest influence over her generation. In order to neutralize the evil done bv certain immoral stories current at court in her time, she retold them in literary form, adding morals to them. Like so many good people, she had the idea

that human passions may be influenced for the better by sweet reasonableness. Instead of doing good, her book has done harm. Most people read the stories and not the morals, or when they read both, forget the morals promptly, while the evil suggestions remain.

Mary Queen of Scots is one of the much- disputed characters in history. After 18 years in prison, she was beheaded, at the age of 44. She was crowned queen of Scotland as an in¬ fant on the death of her father, James V (1542). At the age of 16 she was married to the Dauphin of France. Her husband be¬ came king as Francis II of France when she was 17. He died the next year and at 19 Mary returned to try to rule the turbulent Scottish barons. At 25 she was imprisoned and was released for two weeks only, when she threw herself on Elizabeth's mercy, who kept her in prison until her execution. She lived in the most difficult of times, and this brilliant intellectual woman, whose heart sometimes led her astray, is a type of the Renaissance. Her successful rival for the throne of England, for on Queen Mary's death Mary of Scots had claimed the English throne as well as Elizabeth, is a greater genius without heart. She had the discernment to gather around her the men who laid broad and deep the founda¬ tions of modern England, and its colonial em¬ pire. The (<Good Queen Bess® of traditional history has suffered severely from modern historical research. She was a woman of great administrative ability, but of lamentable per¬ sonal character. Prescott say of her, ((she was haughty, arrogant, coarse and irascible, while with these fiercer qualities, she mingled deep dissimulation and strange irresolution. . . . She was desperately selfish, incapable of forgiving, not merely a real injury, but the slightest af¬ front to her vanity, and she was merciless in exacting retribution.® She had her father's Tudor character, but his genius for managing men.

The founder of feminine education in the century was Angela of Merici. A young woman of the lower middle class, of a small town of Italy, she recognized that not only the better class women but all women needed to be edu¬ cated in order to bring up their children prop¬ erly and influence those around them for the best. She established a little community for the teaching of girls. Under her direction this movement spread and she wrote a rule for the women who had come to share her work. In approving this constitution, Pope Paul III said to Saint Ignatius, the founder of the Jesuits, «I have given you, sisters.® The Ursuline schools spread over Italy in a single generation and they had houses in Paris and Bordeaux in the second half of the century. They opened a school in Canada in 1639 and one in New Orleans in 1726. They were the first to offer more than a common-school education for girls, in the northern LTnited States at least, though their house at Charlestown, Mass., was burned do\yn by a mob in 1834. Most of the pupils at the convent at the time were from some of the old Puritan families of New England. The Ursu lines have taken up college work for women in our time very successfully and they have schools all over the world with many thousands of members at work.

SIXTEENTH CENTURY

50

The most important historical event of the 16th century is the battle of Lepanto (1571), which marked the definite defeat of the Turks and put a period to the long fight between Christians and Mohammedans which had been in progress for nearly a thousand years. Pushed out of Spain and halted in the Balkan region, the Mohammedans had gradually acquired do¬ minion in the Mediterranean Sea, had taken Cyprus and almost succeeded in capturing Malta from the Knight Hospitallers who de¬ fended it with a dauntless courage which finally gave them the victory. Something had to be done to stay their progress. Thousands of Christians were being captured every year by Turkish pirates and held as slaves in the cities of the Barbary Coast or even being sold into the East. The Turks were making incursions on coast cities with great destruction and loss of life. Under the inspiration of Pope Pius V, an alliance was formed between the Venetians and Phillip II of Spain, whose commerce had suffered most, and they gathered an immense fleet. Don Juan of Austria, Phillip's half brother, just then the popular military hero of Europe because of his recent success in a crusade against the Moors, was in command. The Christians met the Turkish galleys in the Gulf of Lepanto on the western coast of Greece and utterly defeated them. This broke the

power of the Turks on the sea forever. Though in the next century, the Turks ad¬ vanced as far as Vienna and besieged the city, they were never the real danger to Europe that they had been before Lepanto. Besides the commander-in-chief, the one name now remem¬ bered from the battle is that of Cervantes, the author of (Don Quixote. J He was wounded while bravely fighting, though on the morning of the battle the physicians had ordered him to stay in bed because he was suffering from fever. He was very proud of his wound and liked nothing better than to be known as (<the maimed soldier of Lepanto.® He was after¬ ward captured and sold as a slave among the Mohammedans. This slave making continued, though in ever-decreasing importance, until the young American republic, at the beginning of the 19th century, inflicted severe defeat upon the Mohammedan pirates.

The best-known event of the century, be¬ cause of the endless disputes as to its significance, is the massacre of Saint Bartholomew's Day in Paris, 24 Aug. 1572. A great many Huguenots were murdered under the direction of the gov¬ ernment, with sad disgrace to France. Catherine de'Medici, the widow of Henry II, and the mother of the three kings who succeeded each other rapidly at this time, Francis II, Charles IX and Henry III, is undoubtedly responsible for it. Since Ranke's declaration on the sub¬ ject, most historians have agreed that there was no deliberate premeditation of the massacre. Catherine was angered at Admiral Coligny and in a spirit of revenge resolved to do away with him. Assassination by gov¬ ernmental order was still not repudiated in most countries. Coligny's assassination was attempted 22 August, but failed. In her alarm over the failure, Catherine worked upon the fears of her son, Charles IX, that the Hugue¬ nots might in revenge bring about counter at¬ tacks and had him order a massacre in which

Coligny would surely be included. Only the leaders of the Huguenots were to have been put out of the way, but in the mob spirit that ensued a great many others were killed. Many rich people became victims, their houses being pillaged regardless of their religious opinions. Mezeray declared that to have money or en¬ viable position, avaricious heirs made almost any one a Huguenot at this time. The number of the victims is not known. Ranke estimated that 2,000 fell in Paris and larger estimates than this are undoubted exaggerations. The (Martyrologie des Huguenotsˆ mentions less than 1,000 dead. There had been religious w.ars in France between the Huguenots and Catholics in 1562-63, 1567-68 and 1569-70, and it was hoped that this might put an end to the civil strife, but it only inveterated it. Lyons, Toulouse, Bordeaux and Rouen all had mas¬ sacres later than

Paris, Toulouse 23 Septem¬ ber, Bordeaux, 3 October. The lack of simul¬ taneity shows that the massacre had not been planned but was a sudden decision. Charles IX sent a message to his Ambassadors through¬ out Europe : <(Coligny and his followers were all ready to visit upon us the same fate that we dealt out to them.® The French magistrates ordered thanksgiving every year on 24 August in gratitude for the timely discovery of the con¬ spiracy. The Pope, told that the French king and his family had been saved from a con¬ spiracy, ' ordered thanksgiving, but when he learned the truth he refused to receive the man who had fired on Coligny, saying, ((He is an assassin.®

At the beginning of this century the condi¬ tion of the people generally may be judged from conditions in England a generation be¬ fore Fortesque, Lord High Chancellor, gives a striking picture of the times quite incredible but for his authority. He said ((The inhabitants are rich in gold, silver and in all the necessaries and conveniences of life. They drink no water unless at certain times, upon a religious score, and by way of doing penance. They are fed in great abundance, with all sorts of flesh and fish, of which they have plenty everywhere ; they are clothed throughout in good woollens, their bed¬ ding and other furniture in the house are of wool, and that in great store. They are also well provided with all sorts of household goods and necessary implements for husbandry. Everyone according to his rank, hath all things which conduce to make mind and life easy and happy.® By the end of the 16th century re¬ ligious conflict had sadly disturbed social con¬ ditions. The rights of the people were trampled under foot and the hard won privileges of the Middle Ages were lost. Such social, institutions as the guilds, hospitals and various organiza¬ tions for the care of the needy suffered most. The decline in social service which began in this century reached a climax that brought re¬ action only in the 19th century. Education suf¬ fered almost as severely as social organiza¬ tion for the times were too disturbed, to per¬ mit of proper attention to intellectual matters and religious controversy consumed mental en¬ ergies.

James J. Walsh,

Author of iThe Thirteenth Greatest of Cen¬ turiesˆ ; cThe Century of Columbus (1450- 1550), > etc.

Principal Events of the Sixteenth Century.

1500-01. Portuguese discover Brazil.

1. The island of Saint Helena discovered.
2. Henry VIII of England began to reign.
3. England and Scotland at war. The battle of Flodden. 1517. Martin Luther began the Reformation in Germany.
4. Leonardo da Vinci dies.
5. Raphael dies.
6. Luther at the Diet of Worms. Turks take Belgrade. Henry VIII of England is titled Defender of the Faith by the Pope.
7. Circumnavigation of the world completed by Magellan.
8. Verrazano entered New York Harbor. Holbein the Elder died.
9. Francis I, king of France, taken prisoner at the battle of Pavia.
10. Rome taken and sacked by the French under the Constable of Bourbon.
11. Durer, the renowned German artist, dies.
12. Henry VIII quarrels with the Pope over his refusal to grant a divorce.
13. Henry VIII of England divorces Catherine of Aragon and abolishes papal authority in England.
14. Ignatius Loyola founds the Company of Jesus.
15. Church of England founded. Sir Thomas More beheaded.
16. Printing introduced in Mexico.
17. The Bible printed in English. Monasteries suppressed in England and Wales.
18. Copernicus published his theory of the rotation of the earth round the sun.
19. The Council of Trent began 13 December and lasted 18 years.

20. Socianism sprang up in Italy.

21. Cervantes, the celebrated author of Don Quixote, born. 1551. Universities of Mexico and Lima chartered.

22. Queen Mary restores Roman Catholicism in England. Servetus burned at Geneva. Rabelais dies.

23. Charles V of Germany resigns the crown.

24. Elizabeth becomes queen of England and restores the Protestant Church. France recovers Calais from the English.

25. Presbyterianism established in Scotland.

26. Michelangelo, the most prominent artist of the Renaissance, dies. Shakespeare born. Vesalius, the father of modem anatomy, dies.

27. Puritan party founded in England.

28. The 39 articles of the Church of England formulated. 1568. Mary, Queen of Scots, imprisoned in England. The Reformation introduced in the Netherlands.

29. Benvenuto Cellini, the famous Italian sculptor, dies. Defeat of the Turks at the battle of Lepanto.

30. Massacre of Saint Bartholomew in Paris.

31. Titian dies.

32. Sir Francis Drake sailed around the world. Camoens the great Portuguese poet dies.

33. Pope Gregory adjusts the Julian calendar and ad¬ vances 5 October to 15 October in Catholic countries. 1585. Raleigh established the first English colony in America.

34. Mary Queen of Scots beheaded. Drake destroys 100 sailing ships in Cadiz Bay.

35. The invincible Spanish Armada destroyed by the British. Duke of Guise assassinated.

36. Henry IV of France begins to reign.

37. Battle of Ivry. Jansen, a spectacle maker in Germany, invents the telescope.

38. Watches introduced in England from Germany.

39. Palestrina, founder of modern music, dies.

40. Tyco Brahe defines the obliquity of the ecliptic.

41. Edict of Nantes. Tyrone's rebellion in Ireland.

42. Incorporation of the East India Company.

SIXTH CENTURY. This century was a time of sad confusion and distress, but in the midst of it the first hints of the beginnings of modern Europe as we know it may be traced. The Franks succeeded in establishing them¬ selves under Clovis in a kingdom which em¬ braced a considerable part of what we now call France and Germany. The country was unsettled, and though Clovis and his people were formally converted to Christianity, the process of real Christianization had only just begun. The Vandals, originally a Germanic tribe from the regions near the Baltic Sea, after their invasion of Italy, moved over into Spain and conquered a kingdom there, the word Andalusia being a modification of their name, but they were pushed out of the peninsula by the Suevi and the Visigoths and then estab¬ lished a kingdom in northern Africa. Their

original removal from their homelands on the Baltic had probably been due to the intrusion of Slavonic tribes coming from the east and north of them, who in their progress also dis¬ located the Lombardi (Lombards). These made their way down into Italy and have left their name on the northern portion of it. At the close of this century, the northwestern part of what is now Spain and Portugal was the kingdom of the Suevi, the rest of the peninsula with southwestern France being the kingdom of the Visigoths (West Goths). Northern Italy, Austria and the northwestern Balkan States constituted the kingdom of the Ostrogoths (East- Goths), the Franks held a kingdom stretch¬ ing along the Channel and including northern and eastern France and most of the Netherlands, while the kingdom of Burgundy represented central and eastern France. The Britons of Celtic origin, under separate rulers, occupied southwestern England and what is now known as Brittany in France. These kingdoms of the barbarians were not, as might be supposed, al¬ ways disturbed dominions, for one of the great¬ est rulers of this century is Theodoric of Verona (Dietrich of Bern of the German legends) who ruled the Ostrogoths in Italy

(493-526) and gave that unhappy country, whose fairness attracted the barbarians, its one generation of quiet and prosperity since the death of Marcus Aurelius. Before the 6th century closed, men told of Theodoric's reign in Italy the same story that was told in England of Alfred's time, that law was so well en¬ forced that gold pieces could be left on the highway without being stolen. The kingdom established by him lasted scarce a quarter of a century after his death. It was overthrown by the armies of Justinian, and Italy was once more united with the Eastern Empire 553.

The statesman of the century is Cassiodorus, born in southern Italy about 490, died about 583. He attracted the attention of Theodoric by a panegyric on that monarch who in recog¬ nition appointed him quaestor when he was about 21. Cassiodorus continued to be the coun¬ cillor of that king until his death in 526 and then became praetorian prefect under the regency of Amalswintha. The Goths in Italy were being overcome by the Eastern Empire, however, and Cassiodorus at the age of 50 decided to retire. Some years before Benedict had founded his great monastery at Monte Cassino and follow¬ ing his example Cassiodorus founded a mon¬ astery on his estate at Vivarium. Here he con¬ tinued to write for more than 40 years. He gathered together a large library of books, en¬ couraged the monks in their use, outlined studies and by example as well as precept gave a great impetus to classical scholarship. Having during his public career tried to recon¬ cile the two races, the Goths and the Romans, in his religious retreat he labored with greater success to harmonize the culture of the ancient and the Christian world. He had broad, deep interests in all departments of artistic effort and deeply influenced the music of the time. His work Unstitutiones Musicae) is particularly valuable for the knowledge of the early be¬ ginnings of the music of the Church. With his contemporary Boethius he is the chief ex¬ ponent of the theory of music between an¬ tiquity and the early Middle Ages. The man

of Theodoric' s reign whose personality lived on to affect men deeply is Boethius (475-524). He was the greatest intellectual genius of the period and his writings widely influenced the students of a thousand years until the end of the Middle Ages. He was put to death by Theodoric on a charge of treason, though it seems likely that there were religious motives involved — Theodoric was an Arian — and Boethius is often hailed as a Christian martyr. His (De Consolatione

Philosophy was the most read book of the Middle Ages. It was translated by King Alfred (9th century) and by Chaucer (14th century) and influenced Dante more deeply than any other book except the <Summa) of Aquinas. It has the interest of Marcus Aurelius' <Meditations) and while containing no reference to formal religion was a not unworthy predecessor of Thomas a Kempis.

The greatest ruler of the century is Jus¬ tinian (483-565) surnamed the Great, the By¬ zantine emperor (527-565). His reign was stormy partly from internal dissensions, but mainly because of the incursions of the Per¬ sians who had to be bought off at first (531). His generals surpressed the rebellion at home, though not before Constantinople had suffered severely, and then conquered the Vandal and Ostrogoth kingdoms in Africa and Italy, re¬ storing these countries as provinces of the empire. Belisarius saved the empire by his thorough defeat of the <(Green® party, — the name was adopted from a horse racing faction — at Constantinople in 532, overthrew the African Vandals (534), conquered Sicily (535), southern Italy (537), recaptured Ravenna (540), defeated the Persians (541-542), rescued Constantinople from the Bulgars (549). His victories aroused the jealousy of Justinian and Belisarius was imprisoned for a time, though the story that in old age he was obliged to beg his bread is false. Freeman declared him the greatest of military commanders in history, with Hannibal as his only rival. Belisarius was thoughtful of others in his hour of triumph for his name is connected with the foundation of a hospital at Rome about the middle of this century. Pope Symmachus had set the fashion for such foundations by establishing a hospital in connection with the three most important churches of Rome, Saint Peter's, Saint Paul's and Saint Lawrence's; as all three were situ¬ ated well out of the city proper they presented ideal locations for hospitals. The example thus set was followed in many cities in France and in various places in England, after Saint Au¬ gustine's missionary work began to have its effect.

Even more than as a great ruler Justinian is forever famous as the promulgator of the code of law since usually called by his name. The (Corpus Juris Civilis) (Body of the civil law of Rome) published by him comprised all the law knowledge of the ancient Romans and as we realize now was the most precious legacy of Rome to the world. Justinian deserves be¬ cause of it the title of Haw giver of civilization.®

Justinian's worthy monument and a striking symbol of the creative artistry of the time is the church of Santa Sophia in Constantinople, still standing as unimpeachable evidence of con¬ structive genius and

love of the beautiful. The

church is almost a square (250 by 230 feet), above which there is an enormous dome over 100 feet in diameter. This central dome repre¬ sents the solution of an architectural problem of the greatest difficulty. The church was com¬ pleted under Justinian (537) and Procopius a contemporary declared that the dome had the appearance of being suspended in the air (<by a golden chain from heaven rather than of rest¬ ing upon solid masonry.® The interior decora¬ tion was in richly carved colored marbles, while mosaics covered the wall space left free and adorned the vaulting above. The pavement com¬ posed of jaspar, alabaster, porphyry and serpen¬ tine formed a veritable carpet of many colors. The effect according to a contemporary was that of ((a garden, its lawns enameled with flowers®

. . . ((The altar was a marvel in itself. The mensa was entirely of gold, sparkling with jewels and glowing with enamels. It rested on columns also made of gold, while over it, four columns of silver supported a domed canopy surmounted by a great golden cross. Around the altar hung curtains of wonderful tapestry of silk and gold wherein were depicted Justinian and Theodora venerating Christ and His Mother. At the end of the apse, rose up the patriarchal throne of silver and gold.®

The architect of Santa Sophia was An- themios of Tralles, sometimes said to have been brother of Alexander of Tralles, the author of a well-known treatise on the pathology and therapeutics of internal diseases which was evidently a compilation of material gathered for teaching purposes. It is one of the landmarks of medical history. Alexander says ((The physician should be an inventor and think out new ways and means by which .the cure of the patient's affection and the relief of his symptoms may be brought about.® He took strong ground against the use of many drugs and the rage for operating. The prevention of disease is for him the important part of the physician's duty. Diet, air and water were his great remedies; for consumption he recommended milk, strong nu¬ tritious diet and a sea voyage or a stay at a watering place.

Pope Saint Gregory I the Great (540-604) is one of the important characters in this try¬ ing time around whom the forces of the new life that was to come for Europe gathered. Among his close friends were Saint Augustine whom he sent on a mission to England, though the story of the English boy captives in Rome, C(Angeli non Angli ® — Angles who looked more like angels — is dubious; and Saint Benedict and his sister, Saint Scholastica, who were destined to a very great work, the influence of which was to be felt for many centuries,

even down to our own time. Gregory had been in the Roman civil service as preotor urbanns, but turned to the ecclesiastical state and employed the fortune left him at his father's death to establish a series of monasteries. As Pope (590-604) he restored discipline among the monks and clergy, arranged the Gregorian chant in church music which is still used and was zealous in the spread of Christianity. He wanted to go as a missionary to Britain in earlier life, but was prevented by the Pope who foresaw his higher destiny; later he inspired Augustine with his own zeal. He and Pope Leo I (circa 460) are the great popes

of the transition from ancient to mediaeval Church. Gregory's friend Benedict, known as Nursia from the place of his birth, is the founder of monasticism in the West. He was the son of a Roman noble whose boyhood was spent in Rome where he attended school until he reached the higher studies. At the age of 20, about the year 500, disgusted with the loose life around him, he withdrew from Rome to find a place of peace and recollection. At first he took a servant with him, but he found after a while, that he needed manual labor to keep him in good health. Attracted by his gentleness and by the refuge from the madding crowd around them which his little retreat offered, many others came to join him, until Benedict found that his own peace of mind and heart was sacrificed, so that he fled further to live alone. He learned enough in three years of solitude to make him appreciate how much this retired mode of life might mean to others, for their personal development, and so (when the fame of his gentle saintliness having gone abroad) he was asked to be the head of a monastery, he consented. Here he drew up his famous Rule, which has served as the constitu¬ tion of the Benedictine houses ever since, and which authorities in the history of law hail as a great foundation-stone of modern jurisprudence. His monasteries were arranged to provide op¬ portunities for prayer, recollection, study, be¬ sides such labor as would keep the body in good condition. Men of all classes, even of the nobility and of reigning families, joined his communities and gave the example of laboring with their own hands. They restored the dignity of manual labor which had been under¬ mined by the slave labor which had absorbed all manual work at the end of the Roman Em¬ pire. The monks gave themselves assiduously to the copying of manuscripts of the ancient authors and the exchange of these copies led to the formation of a number of monastic libra¬ ries through which the classics have been pre¬ served for us. Each monastery had a

school attached to it where the boys of the neighbor¬ hood and sometimes even from a distance were taught ; and sons of the nobility often spent some years in these monastic schools. The so¬ lution of the social problems of the country places became the special task of the monas¬ teries.

They were, besides, centres around which there gathered a numerous tenantry who worked the lands of the monasteries, which were mainly gifts and bequests from kings and nobles who realized how much good was being accomplished by the monks, and who hoped thus to make up for evil in their own lives by foundations which would continue to do good. Monasteries, quite contrary to the tradition of ((lazy monks,® of a generation ago, were really hives of busy in¬ dustry. It is only since we have established agricultural schools that the realization has come that the old monasteries represent an an¬ ticipation of these schools (Goodell Presidential Address Massachusetts Agricultural School). For the tenantry were taught how to raise their crops to the best advantage ; good breeds of stock and seeds which would grow to the best advantage under the conditions were provided for them. The monastery itself diked, ditched and drained the territory, often brought water

from a distance for irrigation. It was no wonder that the tradition arose that it was <(happy to live under the crozier,® that is under the rule of an abbot or abbess, for the convents for women shared all of the privileges and ad¬ vantages of the monasteries for men. These monasteries became centres of trade and indus¬ try as well as of education and of letters. They cultivated particularly architecture and the arts of painting and sculpture, but also the minor arts and crafts, so that beautiful wood work and iron work, as well as carving in stone and stained glassmaking, were developed to a high degree, while the convents accomplished similar artistic purposes in lace-making, needle-work, tapestry, book illumination and like occupations.

The Benedictine nuns were founded by the twin sister of Benedict, Scholastica by name, and the nunneries came to be refuges for women who wished to pursue an intellectual and spiritual life, similar to that which the monasteries provided for the men. At all times in history, a certain number of women do not feel the vocation to be wives and mothers and to assume family cares. Some provision must be made for th-em and the failure of such provision brings serious social evils in its train. For centuries these Benedictine nun¬ neries provided an opportunity for these women and besides accomplished wonderful work. Mrs. Putnam (dean of Barnard Col¬ lege) goes so far as to say that the modern college for women has not as yet provided op¬

portunities for the exertion of woman's influ¬ ence equal to those given her by the Benedictine nunneries in the Middle Ages. We know al¬ most nothing of the life of Saint Scholastica, except the famous story told by no jess an authority than Pope Saint Gregory I, that when she came to die and her brother, who was with her, was about to leave, in order to keep his own rule that no one unless compelled should stay out of his monastery over night, Saint Scholastica prayed that he might be kept near her, and a great storm arose which prevented Benedictine from leaving her side until after her passing. Her convents, like the monasteries of Saint Benedictine, are still in existence all over the world, many of them very flourishing and all engaged in good work. The word <(nun,® originally nonna or nanna, was a form of the word <(mother,» because these women who denied themselves personal maternity be¬ came the mothers of the needy all around them.

As the result of the large number of slaves which had accumulated in Roman times, the Middle Ages began with the very serious handi¬ cap of an immense problem of serfdom. Dur¬ ing the first century of the Christian era, when Rome had a population of about 2,000,000, it has been calculated that about 1,200,000 of them were slaves. This state of affairs grew worse with time. The condition was not so bad in country places, but opportunities for becom¬ ing freemen were much commoner in urban than in rural life, though everywhere progres¬ sive individuals were able to secure their free¬ dom in one way or another. The defeats of the barbarous peoples in preceding centuries led to the capture of many prisoners who were made slaves, and these were distributed through¬ out the country places and their descendants were serfs. By this was meant that they were

bound to a condition of service, though their masters were bound also in certain obligations toward them. These serfs went with the land whenever it was transferred, and as the land was divided into manors or villas (Latin for a country estate), they were called villains. This word afterward became villain in our sense of rascal, because serfs who ran away from their masters so often found themselves under the necessity of making their living as best they might, by their wits or even by violence.

The serf belonged to the land but the land owed him a living. In a certain sense,' there¬ fore, he was better off than the lowest classes

have been since the industrial revolution. While some masters were harsh, a great many of them tried to make conditions reasonable for the workers, and persons of special talent and energy who were able to make their own way could usually obtain their freedom. If a serf were absent from his master's domain for a year and a day, the master had no further claim on him. The brighter boys from the country went into the towns, rose from apprentices to membership in the guilds and thus secured their rights as freemen. At this time, no one was supposed to have any rights unless they had been specifically conveyed to him by some authority. This condition of villainage con¬ tinued for centuries, the conditions of it being gradually ameliorated. Villas or manors were transferred by bequest or gift to monasteries or convents and the serfs on these were treated so well that it came to be a tradition that it was good to live on the domains of abbot or abbess. Their children sometimes entered the convents and monasteries and were given the oppor¬ tunity to rise. Some of them became priors or abbots and sometimes bishops, and occasionally the descendant of a serf might be made Lord Chancellor of the kingdom. The presence of all these serfs or slaves to whom the hard manual labor of the time was entrusted made the doing of manual labor by others seem dis¬ graceful, and it was not until the foundation of the monks of the West with the provision of the Benedictine Rule for manual labor by all, that the dignity of labor was restored. It took centuries of Christian effort to bring about a definite improvement in social conditions in this regard.

While Benedict's foundation was gathering strength the 6th century is full of the labors of the Irish monks. Zimmer declared (<The Irish missionaries wrere instructors in every known branch of science of the time, the pioneers who laid the corner stone of Western culture on the continent.® The greatest of them is Columba of Iona (521-597). Scarcely less great is Co- lumbanus of Bobbio, though the work for which he is best known was done in the next century. Columba left Ireland in his 44th year, landing at Iona on the eve of Pentecost 563. From here he began the conversion of the Northern Piets. He wandered far and wide on foot through the land and is said never to have spent an hour without study, prayer, writing or some similar occupation. He himself transcribed many books. In spite of incessant labors, fast¬ ing and vigils, sleeping his scanty sleep often on a stone pillow, like so many other of the in¬ tensely hard workers of human history, Columba lived to the round old age of nearly

1. He was not only a great missionary saint who won a whole kingdom to Christ, but he was (<a statesman, a scholar, a poet, the founder of numerous churches and monasteries when

monasteries corresponded to our colleges, and his name is dear to Scotsmen and Irishmen alike.® To him we owe a famous decision as to books that the owner of an original had the right over the copies, for ((to every cow its calf,® which represents the basis of copyright.

The end of the century witnessed the instal¬ lation of Saint Augustine (Austin) as arch¬ bishop of Canterbury (598). He was a Roman who became a monk and a personal friend of Pope Gregory the Great. In his desire to carry out a great' missionary project among the Angles, or English, — the Britons had Chris¬ tianity before this, — Gregory sent Augustine to England and gave him jurisdiction over all the bishops on the island. His mission was emi¬ nently successful. Aethelbert the king, who had married the daughter of Charibert of Paris with the condition that she should be allowed to exercise her Christian religion freely, was con¬ verted and his people soon followed him. Quite contrary to the spirit sometimes displayed, Bede tells us that it was part of the king's policy <(to compel no man to embrace Christianity.® On Christmas Day 597 more than 10,000 per¬ sons were baptized by the first archbishop of the English. England was thus placed once more in touch with Roman culture. ((The civilization, art, letters, which had fled before the sword of the English conquerors returned with the Christian faith.® (Green).

When Augustine landed he brought with him Roman customs and as certain traditions had grown up in the British and Celtic churches not in accord with those of Rome, particularly as to the date of Easter and the form of ton- sure, jealous rivalry ensued and it seemed for a time as though there might be actual division. A synod was called at Whitby (7th century) and through the influence of the king the dis¬ pute was brought to an end and England was won to the Roman side.

The characters of the men among whom Columba and Augustine had to do their mis¬ sionary work is well illustrated in the poem known as (Beowulf' the first English epic which was written probably some time toward the end of this century. Beowulf was a kins¬ man of Hygelac who appears in Gregory of Tours' Gesta Regum Francorum. He lived in the early part of this century and the myths that gathered around Beowulf's name were probably put into nearly the form in which we now have them in immediately succeeding generations and represent our earliest Old English literature. The epic is pagan and bar¬ baric, full of the lust of blood, and yet it has a stirring appeal to deep human interests that ac¬ counts for its survival. The prose writers of this first century of the Middle Ages whose works have come down to us are more numer¬ ous than might be thought.

Procopius, a Roman historian, is often spoken of as the last of the classic writers. The end of the century saw such well-known historians as Gregory of Tours, the father of French history, Gildas the first British historian, Evagrius ecclesiastical

historian, and Cassiodorus of Ravenna, the min¬ ister of Theodoric.

James J. Walsh,

Author of i The Thirteenth Greatest of Cen¬ turies. >

Principal Events of the Sixth Century.

1. Clovis, king of the Franks, makes Paris his capital.
2. Hygelac, the Danish hero of the “ Beowulf ” epic, killed by Franks in a naval battle.
3. Boethius, author of the “ Consolations of Philosophy,” put to death by Theodoric.
4. An earthquake destroys Antioch.
5. Death of Theodoric, king of the Ostrogoths.
6. The Justinian Code published.
7. Belisarius defeats the Persians.
8. Belisarius overthrows the “ Green ” party at Con¬ stantinople.
9. Belisarius defeats the African Vandals.
10. Belisarius conquers Sicily.
11. Belisarius captures Rome and occupies southern Italy.
12. The church of Saint Sophia at Constantinople com¬ pleted.

541-542. Belisarius defeats the Persians.

1. Justinian invites the German Longobards or Lombards to Italy to

aid him against the Ostrogoths.

549 Belisarius rescues Constantinople from the Bulgars.

1. Huns and Slavs invade Italy.
2. The silkworm introduced into Europe.
3. Greek domination supreme throughout Italy.
4. Earthquake devastates Constantinople.
5. Columba leaves Ireland and lands at Iona.
6. Justinian the Great dies..
7. Procopius, the Roman historian, dies.
8. Lombards occupy northern Italy, and Greek rule is con¬ fined to southern Italy.
9. Birth of Mohammed.
10. Gildes, the first British historian, dies..
11. War between the Byzantines and Persians.
12. Cassiodorus of Ravenna, the former minister of Theo¬ doric, dies.
13. Gregory the Great became Pope.
14. Gregory of Tours, the father of French history, dies.
15. Columba of Iona dies. On Christmas Day 10,000 per¬ sons were baptized by Saint Augustine.
16. Saint Augustine becomes archbishop of Canterbury.
17. Pope Gregory the Great institutes Church reform.
18. Evagrius, ecclesiastical historian, dies.

SIXTUS, siks'tus, the name of five popes,

as follows :

SIXTUS I, Saint (also written Xystus). He succeeded Alexander I, about

119, and suf¬ fered martyrdom about 127, after 10 years rule.

SIXTUS II, Saint: d. 258. He succeeded Stephen I in 257, and according to some ac¬ counts was an Athenian philosopher before professing Christianity. He was martyred dur¬ ing the persecution of the Christians by Vale¬ rian, and is the Xytsus commemorated in the Canon of the Mass.

SIXTUS III, Saint: d. 440. He succeeded Celestine I in 432. He was active in attempt¬ ing to reconcile the disputes existing in the Eastern Church, particularly in the case of Cyril, bishop of Alexandria, and John of An¬ tioch. Several letters by him with regard to those controversies are extant. He was a mu¬ nificent patron of learning, and is stated to have left a large sum to be expended in the adornment of ecclesiastical structures.

SIXTUS IV (Francesco della Rovere, fran-ches'ko del'la ro-va'ra) : b. Savona, 21 July 1414; d. 12 Aug. 1484. He was the son of a Genoese fisherman, and entered the Franciscan order, where his learning and eloquence soon attracted attention. His abilities secured him the chair of divinity at Padua and other Ital¬ ian universities, and he also became general of his order. He was made cardinal by Paul II, whom he succeeded in 1471 through the influ¬ ence, it was supposed, of Cardinal Bessarion, whose close friend he was. He was an en¬

lightened patron of art and during his oc¬ cupancy of the papal chair the Sis-tine Bridge was erected and the famous Sistine Chapel. Many of his relatives were advanced to high places of profit by him, and for this and certain acts of treachery he was much criticised, but R. Urban Butler states, in (The Catholic En¬ cyclopediaˆ ((the gross accusations brought against him by his enemy Infessura have no foundation.® He reformed the papal coinage and did much to improve and beautify Rome.

SIXTUS V (Felix Peretti, fa'leks pa- ret'te) : b. near Montalto, 13 Dec. 1521 ; d. Rome, 27 Aug. 1590. His boyhood was spent as a swineherd ; but, giving early indications of an aspiring disposition, he was admitted to the Franciscan order in 1534, and received the usual strict education and instruction of the monasteries. In 1544 he gave instruction in the canon law at Rimini, and in 1546 at Siena. In 1548 he was made priest, doctor of divinity and superintendent of the monastic school of Siena. In 1556 he removed to Venice, where he was appointed superintendent of the Franciscan school, and afterward inquisitor-general. In 1560 he was recalled from Venice, owing to his severity as inquisitor, and proceeded to Rome, where the Pope

conferred upon him several dignities. Some years later (1565) he attended the papal legate to Spain as the theologian of the embassy, and while here acquainted him¬ self with the policy of the Spanish court. In 1570 he was made cardinal by Pius V. He was elected to the papal see in 1585, and during his five years' administration devoted himself with great vigor to the reform of abuses both civil and ecclesiastical. Under his immediate prede¬ cessors, Pius V and Gregory XIII, the civil disorder was excessive in the states of the Church, crimes had gene unpunished and hordes of brigands infested the whole country. All this was now remedied, stern justice was ad¬ ministered on all hands, the country cleared of robbers and under the security thus produced agriculture, commerce and industry flourished anew. Sixtus founded a new university at Fermo, and new colleges at Rome and Bologna; and embellished Rome with numerous and use¬ ful structures, among others the present build¬ ing of the Vatican Library. He published a new edition of the (Septuagint) in 1587, and one of the (Vulgate,) with improvements, in 1590, besides corrected editions of the Church Fathers. He displayed the same energy in the spiritual administration of the Church, re-estab¬ lished discipline in the religious orders and founded or reformed several congregations <of cardinals and other officers. He fixed the num¬ ber of cardinals at 70. He took a part in most of the great events that then agitated Europe. He encouraged and supported Henry III against the Huguenots, Philip II against England, and Archduke Maximilian when he was a candidate for the Polish crown. The great aim of his foreign policy was the promotion of the cause of Roman Catholicism throughout all Christen¬ dom against Protestantism.

SIZAR, a term used in the University of Cambridge, and at Trinity College, Dublin, to denote a class of students of limited means who usually receive their commons free and are pe¬ cuniarily assisted otherwise. They were origi-

nally required to perform certain duties of a menial character, but this practice has long ago fallen into desuetude. Formerly there was a similar class of students at Oxford called servi¬ tors of battelers.

SIZE, a gelatinous material used to give a glaze to a surface. There are numerous for¬ mulas for its manufacture, differing according to the purpose, cost of ingredients, etc. Gilders use a viscous preparation as a size to hold the gold leaf ; an albuminous printing ink is made to hold

bronze powders; house-painters' size may be prepared from shreds of leather boiled and strained ; papermakers use two kinds, one made from hide cuttings, alum and soap, and a second of rosin and potash ; and the size employed in gilding, japanning, etc., is variously com¬ posed of linseed oil, copal, red leather, litharge, vermillion, etc., with turpentine.

SJOSTEDT, shes'tet, Ernest Adolf, Ca¬ nadian mining and metallurgical engineer and inventor : b. Sweden, 1840. He was graduated at the Royal School of Mines, Stockholm, in 1876, and came to the United States in 1877. He was assistant chemist at the Bethlehem Steel Works, Pennsylvania, in 1877-79, and in 1879— 96 he was connected with the iron-smelting in¬ dustry in Maine, Georgia and Nova Scotia. In

1896 he established himself at Montreal as a designer of roasting furnaces and gas pro¬ ducers ; and in 1898 he became chief metallur¬ gist of the Lake Superior Power Company at Sault Sainte Marie. He invented the Davis- Colby iron-ore roaster; the Sjostedt sulphide roaster; the Sjostedt electric smelting furnaces, and the Sjostedt-James electrolytic process for the separation of copper and nickel.

SKAGEN (ska'gen) CAPE, or THE SKAW, ska, Denmark, the extreme northern point of Jutland. It is a low sand bar or nar¬ row tongue of land and near its extremity is an important lighthouse.

SKAGER RACK, skag-er-rak, or SKAG- ERRAK, the broad channel connecting the North Sea with the Kattegat, and separating Norway from Jutland. It is about 150 miles long and 100 to 125 miles wide. Its southern part is shallow and beset with sand-banks, but it is very deep along the Norwegian coast. Its navigation is dangerous on account of frequent and violent storms.

SKAGWAY, skag'wa, or SKAGUAY,

Alaska, city at the northern end of Chilkat in¬ let, at the head of Lynn Canal. It is at the entrance to White Pass and near Chilkoot Pass, about 270 miles north of Sitka. It is on the White Pass and Yukon Railroad, which with other railroads and with water routes makes a continuous rail and water route from Skagway to Seward Peninsula. There were trading sta¬ tions in the vicinity, and it may be on the site of the present city, but they were established and abandoned to suit the needs of the traders. The settlement of the present city began in

1897 when a miner from Minneapolis, Minn., opened a wagon road across White Pass from the Canadian gold fields. From a town of tent-cloth dwellings it has become a prosperous little city, with manufactories and stores to meet the demands of a large number of the mining camps of the interior. In 1899 a college was established with Dr. La Motte Gordon,

an Oxford graduate, as president, and with 50 pupils in attendance. There are public schools and Presbyterian, Roman Catholic, Protestant Episcopal and Methodist churches. Pop. about

3,500.

SKALD, skald or skold (in Old Norse Skald, poet), one of the Norse

poets who in primitive times recited long compositions in verse, usually in honor of the great and famous. They were minstrels of a high order, often at¬ tached to the court. The earliest of these skalds was the mythical Starkadh the Old. The fol¬ lowing are the most famous of his successors: Thjodolf, author of (Ynglinga-taP ; and Thor-bjorn the minstrel and author of (Haralds- malF both of whom flourished at the end of the 9th century at the court of Harold of the Bright Hair. In the 10th century lived the Norwegian skald Eyvind who sang the exploits of the famous 'Hakonar-maP ; and the Icelander Egil, who gave his name to the Egils-Saga. More obscure were Hallfredh, Gunlaug, Glum, Eyjolf, etc. The last of the skalds was Skurla who died 1284. Consult Grendal, (Clavis Poetica) (1864) ; Baldisarson, (Islendingadrapa) (edited by Mobius, 1874) ; Wisen, (Carmina Norroena) (1889) ; Anderson, (Norse Mythology) (1875).

SKARPANTO, skar'pan-to, or SCAR-

PANTO. See Carpathos.

SKAT, an intricate game of cards origi¬ nating in Germany about the year 1800. Thirty- two cards are used and three or four persons take part in the game, although but three are active players. The interest is maintained largely by bidding for the privilege of play. Each player holds 10 cards, two being laid aside for the ˆskatP The use of these two cards determines the game. For a complete descrip¬ tion of the game consult Hoffman, (Book of Skat} ; Eichhorn, (American SkatP

SKATE. See Ray.

SKATES AND SKATING. Ice skates are made in many forms, the most common having a metal blade or runner, longer than the foot, with some sort of frame or mechanism for at¬ taching to the shoe. The object is to provide a support on which each foot of the wearer can slide or glide on the ice, this method being by far the most rapid means of travel over a frozen surface by the individual's own exertions. Skating is undoubtedly of great antiquity, as shown by early carvings. It is mentioned in the Icelandic (Edda,> supposed to have been written in the 10th or 11th century. Primitive skates were made by tying smooth bones iof animals to the foot-coverings. The earlier forms were mainly of wood, with a metal runner. This runner was gradually improved until it became a blade of hard steel with a slightly up-curved front. The wooden-bodied skates of the 19th century were universally tied on to the foot with leather straps, passing through slots in the wood. As they were improved a sharp point was placed in the rear of the skate to cut into the shoe-heel and

prevent slipping ; later a screw took the place of the point. Then came the club-skate, all metal, with clamps for gripping the sole of the shoe and a gripping mechanism to engage a steel plate permanently fastened on the heel of the shoe. Fancy skates were made with Long ornamental up-curve of the runner in front. The racers developed a different type with a

long runner, almost straight, though slightly raised above the level in front. This was found so superior that it was adopted by all speed skaters and many amateurs. Finally came the skating boot, a well-made strong boot, with the runner directly attached to the sole. This has been generally adopted by figure skaters and racers.

Skating was developed in the cold countries of the north, both as a pastime and as means of getting about rapidly. In the Netherlands the canals made convenient highways in winter, and have been used by skaters for hundreds of years. The earliest record of a skating club is in Edinburgh, Scotland, in 1642. The British National Skating Association was formed in 1879. The American National Skating Asso¬ ciation was organized in the United States in 1884, and the Canadian Amateur Association in 1886. There are now also the Eastern Amateur Skating Association, the International Skating Club of America and the International Skating Union of America. Matches were held, how¬ ever, long before the time <of these associations. The first recorded English match was in 1823. Newburgh, N. Y., furnished the first American champion skater, Charles June, who was the recognized speed champion for many years. In those days the skaters used a short runner and took long strokes of 10 to 12 yards. All this was changed by the Donohues of Newburgh, regarded as the greatest family <of skaters in the world, having produced three champions. T. Donohue, the elder, first beat all comers and educated his sons to the sport, and J. F. Dono¬ hue and T. Donohue, Jr., in turn took world's records. They developed the long runner skate and the short stroke, and J. F. Donohue at¬ tended the international meet at Amsterdam in 1891, and astonished them by his short quick strokes of six or seven yards, easily beating all contestants.

Figure skating, by some called fancy skating, appears to have had its first great impetus in the London Skating Club founded in 1830. Be¬ coming favorably known as a sport, other clubs were organized in Switzerland and northern Europe, and figure skating became a

popular sport of the well-to-do. In this branch of skat¬ ing there is no attempt at speed, the object be¬ ing first to skim around in loops, cross-cuts, grapevines, two-footed figures and various com¬ bined figures in which one iof more pairs of skaters take part. It might be called the equiva¬ lent of dancing on ice, graceful exercise being the end sought. The British style of figure de¬ mands an upright body, and is considered more graceful than the bending over style, though the latter permits some accomplishments not readily done erect. The plain figures are formed on one skate, the unemployed leg being trailed behind, either straight or slightly bent and used to steer and balance.

Records. — Championship matches have be¬ come common in all of the northern cold coun¬ tries. Both indoor and outdoor tournaments have been held in the United States and Canada for many years. Popular tournament places have been Montreal and Toronto, in Canada, and Minneapolis, Milwaukee, Stamford, Conn., Red Bank, N. J., and Saranac Lake and Newburgh, N. Y., in the United States. The amateur records have often surpassed the professional

records for shorter distances, probably due to the fact that there are few professional racers. The amateur American records are : 100 yards, Morris Wood, 9 3-5 seconds, in 1903 ; 220 yards, Fred J. Robson, 18 seconds, 1911 ; half mile, Ben O'Sicky, 1 minute, 15 3-5 seconds, 1916; one mile, Morris Wood, 2 minutes, 41 1-5 seconds, 1904; five miles, E. Lamy, 14 minutes, 55 seconds, 1910. The world's amateur records are in metres, and from 500 to 10,000 metres, were all taken by O. Mathiesen, of Norway, at various public meets in Europe, between 1910 and 1914, with the following results : 500

metres, 43 7-10 seconds; 1,000 metres, 1 minute, 31 4-5 seconds; 1,500 metres, 2 minutes, 19 1-2 seconds ; 5,000 metres, 8 minutes, 36 3-5 seconds ; 10,000 metres, 17 minutes, 22 6-40 seconds. The professional American records are : 100 yards, John S. Johnson, 9 4-5 seconds, 1893; 200 yards, John S. Johnson, 17 2-5 seconds, 1893; 440 yards, John S. Johnson, 31 3-4 seconds, 1916; half mile, John Nilsson, 1 minute, 16 1-5 seconds, 1897 ; one mile, Arthur Staff, 2 minutes, 35 seconds, 1916; two miles, John Nilsson, 5 minutes, 33 4-5 seconds, 1900; five miles, O. Rudd, 14 minutes, 24 seconds, 1896; 10 miles, John S. Johnson, 31 minutes, 16 1-2 seconds, 1894; 20 miles, John S. Johnson, 1 hour, 6 minutes, 36 2-5 seconds, 1894; 25 miles, John Karlson, 1 hour, 30 minutes, 15 seconds, 1916. All records from 30 miles to 100 miles are held by J. F. Donohue, who at Stamford, Conn., in 1893, made the 100 miles in 7 hours, 11 minutes, 38 1-5 seconds. Consult Browne, G. H., hand¬ book of Figure Skating *(Springfield,*

Mass., 1913) ; Meagher, G. A., Pessons in Skating (1900). See Roller Skate

SKEAT, sket, Walter William, English

scholar and philologist: b. London, 21 Nov. 1835; d. 7 Oct. 1912. He was graduated from Christ College, Cambridge, in 1858, and two years later became a Fellow of his college and curate of East Dereham, in Norfolk. In 1862 he went to Godaiming, in Surrey, as curate. He was appointed a mathematical lecturer of Christ's College in 1864 and since 1878 held the Erlington and Bosworth professorship of Anglo-Saxon in the university. Skeat's work in the philology of the English language, es¬ pecially in its older forms, is of the utmost value and has contributed much to stimulate interest in such studies. His chief original pub¬ lications in this department are (A Moeso-Gothic Glossary *(1868) ; (Etymological Dictionary of the English Language) (1879-84; revised 1910), his most important work; (Concise Etymologi¬ cal Dictionary of the English Language) (1882; new ed., rewritten and rearranged, 1901) ; Principles of English Etymologv) (two series, 1887 and 1891) ; Primer of English Etymology* (1892), smaller work based upon the preced¬ ing, but dealing only with the native element; (The Chaucer Canon, with a Discussion of the Works associated with the name of Geoffrey Chaucer * (1900) ; Place Names of Cambridge-shire) (1901) ; and (Notes on English Etymol¬ ogy > (1901). Among numerous editions of

English texts which he has edited for various societies and publishers may be cited Pancelot of the Laik> (1865); (Havelok the Dane* (1868); (The Vision of William concerning Piers the Plowman * (1886), giving the three texts arallel, with notes, glossary, etc. ;

(2Efric's Lives of Saints> (1882-98); Chatter- ion's 'Poems' (1871); 'The Works of Chau¬ cer' (with notes, glossary, etc., 1894-95; with a supplemental volume of spurious Chaucerian pieces, 1897) ; and 'The Student's Chaucer' (1895). He. founded the English Dialect So¬ ciety in 1873, and was its chief member during the 23 years of its existence. For it he pre¬ pared several provincial glossaries and upon these and other publications of the society the new 'Dialect Dictionary> is based. 'A Stu¬ dent's Pastime' (1896) consists of articles con¬ tributed by him to 'Notes and Queries.' He has also translated Uhland's 'Songs and Bal¬ lads' (1864).

SKEE. See Ski.

SKEED. See Skid.

SKELETON, the more or less hard struc¬ tures, mainly of bony nature, which form the in¬ ternal axis of support of the soft parts in the higher or vertebrate animals. The term is used in comparative anatomy to designate support¬ ing parts not only of internal, but also of ex¬ ternal nature. Anatomists thus speak of an en- doskeleton as proper to the vertebrates, but both vertebrates and invertebrates may have certain hard parts developed on the exterior of their bodies (for example, shell of lobster, scales of fishes, etc.), and to the latter class of struc¬ tures is applied the name exoskeleton. The parts of any endoskeleton may generally, be grouped under the two heads of the spinal or axial skeleton and the appendicular parts. The former includes the skeleton of the head and trunk, the latter that of the limbs. The spinal skeleton involves the consideration of the skull (q.v.), spinal or vertebral column, com¬ posed of its various vertebrae and of the thorax (q.v.) or chest and pelvis (q.v.). The com¬ position of the skull forms a subject of great intricacy and involves many highly technical considerations. The more general characters of the skull are noted in a separate article (see Skull). The vertebrae or component parts of the spine or backbone consist each of a solid piece or body, attached to which are various processes. The spinal arches spring from the posterior part of each vertebra and unite to form the spinous process; the spinal cord itself being protected within the canal formed by the apposition of the arches of the vertebrae. In man seven cervical or neck vertebrae, 12 dorsal and five lumbar vertebrae exist as sep¬ arate bones. The sacrum (q.v.) and coccyx, forming the terminal part of man's spine, are composed of united vertebrae. Thirty-three vertebrae are found in the human foetus normally, but in the adult five of these unite to form the sacrum; while the other four (more or less) form a short tail piece or coccyx, the latter being below the junction with the pelvis. The heavy pelvic bone in man makes a base for the spine and head sockets for the femurs or leg-bones. The ribs in man correspond in number with the dorsal vertebrae. The limbs consist of homologous or corresponding parts and are attached to a series of bones constitut¬ ing the "arch" or support of the fore and hind limbs respectively. The scapulae or shoulder- blades and collar-bones or clavicles constitute the shoulder-girdle (see Shoulder-joint), or arch supporting the fore or upper limb, while

the lower limb is attached to the pelvic arch or pelvis. The upper limb or arm in man con¬ tains 31 bones; the humerus or bone of the upper arm ; the radius and ulna, or bones of the forearm ; the carpal or wrist

bones ; the metacarpal bones, or those of the palm ; and the phalanges, or bones of the fingers. The lower limb or leg in man contains 30 bones : the femur or thigh-bone; the tibia (shin) and fibula or bones of the leg; the tarsal bones or those of the ankle, corresponding to those of the wrist ; the metatarsus or instep ; and the phalanges or bones of the toes. (See the illus¬ tration of the human skeleton under anatomy, Vol. I). The character and appearance of the bones changes materially with advancing years. The bones of a child at birth are soft and in¬ complete. They grow, ossify and fuse together in a most interesting manner, so that the dis¬ sector can judge approximately of the age of an individual by the condition of the bones.

Invertebrates. — Shell fish have exoskeletons or shells composed mainly of lime or flint, which is absorbed and utilized. The corals (q.v.) produce a formation that is their skeleton. The arthropods or snails have a horny little house or exoskeleton, the cuticle forming from the epidermis with an organic base of chitin on which carbonate of lime is deposited. In the lobster, scorpion and many crabs, the skeleton is partly interior. Most mollusks leave shells in which the carbonate of lime occurs along with an organic base of conchiolin ; in the cuttlefish there is a pronounced development of cartilage about the nerve centres of the head, suggesting a basis for a skull.

Vertebrates. — In a primitive vertebrate, as the lancelet (Branchiostoina Lance olatum) , the body is supported by a median dorsal axis ; and, disregarding slight bony supports for the mouth, the pharynx and the median fin, that is the active skeleton or framework. The median dorsal axis, which in the lancelet has not even the solidity of cartilage, is the notochord, a constant characteristic of all skeletons of vertebrates. This notochord may be likened to an elastic rod that in the embryo is formed under the neural canal, consisting of a longi¬ tudinal axis for separating the dorsal nervous tube from the ventral alimentary passage. This notochord in the lancelet, the hog and the young lamprey is an unsegmented rod with a simple sheath. In the adult lamprey there form above the notochord, rudimentary arches of cartilage that maintain the spinal cord. Cartilaginous arches appear both above and below the notochord in the sturgeon, the chimera and the dipnoi, but there are no true vertebrae. These are noted first in the elasmobranch fishes, in which the notochord is more or less constricted by the encroachment of its sheath, and divided into vertebrae. In the bony ganoid fishes, the vertebrae are ossified, as in higher vertebrates. The notochord, therefore, appears a provisional structure or scaffolding around which a backbone can be built. Each verte¬ brae usually consists of the centrum or substan¬ tial body, the

neural arches that form a tube for the spinal cord and meet above in a neural spine, the transverse processes which project and are commonly connected with ribs and the articular processes which bind the vertebrae together into a strong but flexible backbone. Birds and mammals and many reptiles have a

breast bone or sternum, to which the ribs unite ventrally.

The pectoral or shoulder-girdle consists of a dorsal shoulder-blade or scapula, a ventral cora¬ coid with the articulation for the arm or fore¬ leg between them and of a forward growing col¬ lar-bone or clavicle. The pelvic or hip girdle in each side consists of a dorsal ilium, a ventral ischium with the articulation of the leg be¬ tween them, and of a pubic portion. From amphibians upward, the forelimb is a humerus articulating with the girdle, a lower arm com¬ posed of radius and ulna side by side, a wrist or carpus of several elements, a hand with meta¬ carpal bones in the palm, and with fingers com¬ posed of several joints or phalanges. The hind limb consists of a femur articulating from the girdle, a lower leg of tibia and fibula side by side, an ankle region or tarsus of several ele¬ ments, a foot with metatarsal bones in the sole, and with toes of several joints or phalanges. Digits in vertebrates tend to a regular sup¬ pression toward the lower types. The pollex goes first, then the minimus index and annu¬ laris, so that some animals, as the horse, have one digit (the hoof) remaining. In many of the vertebrates the phalanges are more numer¬ ous than in man, as where the hand is modified to form a paddle, notably in the ichthyosauri and the cetacea.

In reptiles the ilium projects rearward, the ischia are often found meeting ventrally, a cartilage or bone projects rearward from the symphysis, supporting the anterior lip of the cloacal orifice, forming a hypoischium. In birds the projection of the ilium is both for¬ ward and rearward and it fuses with the vertebral column in the backbone. No union or symphysis is formed by the ischia and pubes in birds, with the exception of the ostrich and rhea. The ilium in mammals projects forward and symphysis of the ischia and pubes is com¬ mon. In the marsupials and monotremes a portion of the external oblique muscle ossifies to form marsupial bones.

The patella is first noted in the Reptilia, though not common to all. All mammals and birds have this bone excepting a few bats. In the

marsupials it commonly remains in the cartilaginous stage. In birds the fibula is often absent or fuses with the tarsal bones, and no ankle joint remains. In the marsupials the enlarged upper end of the fibula may articulate with the femur. Consult any standard work on anatomy; Reynolds, (The Vertebrate Skele¬ ton > (1897) ; Dwight, Thomas, 'Clinical Atlas) (Philadelphia 1907) ; Fraser, J. S. S., (Anatomy of the Human Skeleton* (1914). See Anat¬ omy; Bone; Osteology; Skull.

SKELTON, John, English poet: b. ap¬ parently in Norfolk, about 1460; d. London, 21 June 1529. He studied at both Oxford and Cambridge, and from both, as well as from the court, he received the laureateship. In 1498 he took holy orders, and subsequently was ap¬ pointed to the benefice of Diss in Norfolk. In an epistle dedicated to him by Erasmus, that writer declared him to be the lumen et decus of British letters. In the pulpit he was re¬ markable for his buffooneries and according to Anthony a Wood was esteemed <(fitter for the stage than for the pew or pulpit.® There were three objects at which he delighted to aim

his satire — the mendicant friars, Lily the gram¬ marian and Cardinal Wolsey. His attacks on Wolsey at length aroused the resentment of that prelate and an order being issued for his apprehension, he took refuge in the sanctuary at Westminster, where the abbot afforded him protection until his death, not long before the fall of Wolsey. His works comprise among others the drama or morality of 'Magnyfy-cence) ; a satire on Wolsey, entitled (Why come ye not to Courte?*; the 'Tunnynge (what is the brewing) of Elynoure Rummynge,* a hu¬ morous picture of low life, and the 'Book of Phylyp Sparrow,* an elegy on the sparrow be¬ longing to the <(goodly maid® Jane Scroope, which was killed by a cat. The last is the most poetical of his pieces. It is said that his own opinion,

Though my ryme he Tagged,

Tatter'd and jagged, . . .

It hath in it some pyth.

is reasonably just. The best edition of his works is by the Rev. Alexander Dyce (1843).

SKENE, sken, Alexander Johnson Chal¬ mers, American physician and pioneer gynecolo¬ gist : b. Fyvie, Aberdeen, Scotland, 17 June 1837 ; d. High Mount, N. Y., 4 July 1900. He came to America in 1856, was graduated at the Uni¬ versity of Michigan in 1861 and at the Long

Island College Hospital in 1864. He was a surgeon in the United States army in 1863-64, and later was engaged in practice in Brooklyn. He was appointed adjunct professor at the Long Island College Hospital in 1864, pro¬ fessor of gynecology there in 1872 and from 1886 he was dean. He was consultant at many hospitals and dispensaries and was notable among the American pioneers in gynecology. He was author of many treatises and text¬ books.

SKENE, William Forbes, Scottish his¬ torian and Celtic scholar: b. Inverie, Inverness- shire, 7 June 1809; d. Edinburgh, 29 Aug. 1892. He was educated at Saint Andrews and Edin¬ burgh Universities. In 1832 he became a writer to the Signet, and was for some 40 years the head of a prominent legal firm. From an early age he devoted his leisure to archaeological and historical research. His chief works include 'The Highlanders of Scotland, their Origin, History and Antiquities) (1837) ; (The Four Ancient Books of Wales) (1868), and 'Celtic Scotland, a History of Ancient Alban * (1876- 80). Besides the above he edited (The Dean of Lismore's Book, with Introduction and Notes) (1861); 'Ancient Gaelic Poetry*; 'Chronicles of the Piets and Scots, and other Early Memorials of Scottish History) (1867) ; and Fordun's (Chronicles of the Scottish Na¬ tion* (1871). In 1881 he was appointed his¬ toriographer royal for Scotland.

SKERRETT, Joseph Salathiel, American

naval officer: b. Chillicothe, Ohio, 18 Jan. 1833; d. Washington, D. C., 31 Dec. 1896. He was ap¬ pointed a midshipman in the navy in 1848 and served with the African squadron engaged in the extermination of the slave trade and was on the Saratoga when she captured the Night¬ ingale, the last of the American slavers, with 1,000 slaves on board. He was promoted lieu¬ tenant-commander in 1862 and as commander of the gunboat Aroostock of the Western Gulf

squadron, successfully attacked the Confederate fortifications at the mouth of the Brazos River, Texas. He was made commander in 1867, and in command of the Portsmouth in 1873 averted the threatened revolution in Honolulu. While in charge of the Richmond of the Asiatic squadron in 1881-84 he settled the trouble in which the United States consul at Samoa had become involved. He was on duty at the Naval Asylum in Philadelphia in 1884-86, commander of the Pacific station in 1892-93 and in 1893 became commander of the Asiatic

squadron.

SKERRYVORE, sker-i-vor', Scotland, a dangerous reef lying about 12 miles southwest from the Isle of Tyree on the west coast of Scotland, in the fairway of vessels making for the Clyde and Mersey. The reef was long a danger to navigation until the completion of the celebrated Skerryvore lighthouse in 1844. The tower designed and erected by Alan Steven¬ son is 137 feet 11 inches in height, 42 feet in diameter at base, decreasing to 16 feet at top. For 26 feet in height the tower is solid. Above the solid the interior is 12 feet in diameter, divided into nine stories, surmounted by a light- room and lantern. Operations were commenced on the rock in 1838 and the light was exhibited in February 1844; it has a range of 18 nautical miles. The apparatus is dioptric revolving, the light attaining its greatest brilliance once in a minute ; the machinery which drives the ap¬ paratus is also employed to toll fog bells. The total cost of the work was $434,885.

SKETCH BOOK, The. <The Sketch

Book of Geoffrey Crayon, Gent,} the -work by which Washington Irving is best known, was published at New York in seven numbers dur¬ ing 1819 and 1820. The collected edition brought out in 1820 in London contained two earlier essays — (Traits of Indian Character) and (Philip of Pokanoket5 — which have been in¬ cluded in all subsequent editions. The entire collection was revised and given its final form in 1848. <(I have preferred,® Irving later ex¬

plained, (and (The Angler) are based upon actual ob¬ servation ; while not without sentimentalism they h?ve still a pleasant faded charm. The charm has not faded from such essays as (Westminster Abbey0 and (Stratford-on-Avon,5 clear, affectionate pictures of honorable places. But Irving is at his best as essayist when, his eye keenly on the object,, he discards sentiment¬ alism and speaks in his natural idiom — humor : this he does in (The Boar's Head Tavern, East- cheapˆ (Little Britain,5 (John Bull,5 and above all in the dainty series recounting the Christ¬ mas ceremonies at Bracebridge Hall. About the whole book there is a delicate flavor of the past which has led some readers to think that

past and present were confused in Irving's mind. The truth, however, is merely that his imagination was highly susceptible to history and tradition, and he was as naturally a maker of legends as a humorist. This is borne out by the tales in (The Sketch Book) : '•The Spectre Bridegroom,5 a merry parody, even to its bungling plot, of the horrific narratives then lately brought from Germany; and the masterpieces of

the volume, (Rip Van Winkle5 and (The Legend of Sleepy Hollow. 5 The cen¬ tral incidents of (Rip5 and the legend5 Irving did not invent; one came from a German, one from an American, source. Yet the two stories are as firmly localized in the Hudson Valley as if they had been founded on indigenous folk legends. Both are ascribed to Diedrich Knick¬ erbocker. Both are mellow and rich in style, kindly and chuckling in humor, happy in char¬ acterization, and picturesque in description ; the plots move with the accomplished ease of per¬ fect leisure, and the landscapes have the golden look of perpetual autumns. Easily the two best short stories in English for the first three decades of the 19th century, they still unques¬ tionably stand, after a hundred years busily given to the development of the short story type, among its undimmed triumphs.

Carl Van Doren.

SKETCHLEY, skech'li, Arthur. See Rose, George.

SKI, or SfKEE, a wooden snow-shoe, or runner of wood, from five to 10 feet long, five inches wide and an inch or more thick at the middle, but thinner toward the ends, and curved up at the front; a ridge or more frequently a slight groove is made longitudinal of the under surface, to resist side slipping. The ski is popularly worn in Norway, Sweden, Lapland, Finland, etc., and has been adopted in other countries for sport. The fastening of the ski to the foot consists of a loop for the toe and a band which passes from this around the heel of the shoe, binding the ski and the foot as firmly as possible, which is necessary in order to steer well, while full freedom is allowed the heel to rise from the ski at every movement. When first putting on the ski, a balancing stick is necessary, and it is indispensable for some time ; the most skilful runners need but a small stick. An ordinary ski runner can maintain a speed of eight to nine miles an hour for quite a length of time as his down hill travel is all coasting. The uphill work is zigzag. The longest race on skis, the distance being nearly 140 miles, was run in less than 22 hours, rests included. A race in Christiana won by a peasant in less than 5 hours covered 32 miles, laid over hilLy ground including all kinds of difficulties calculated to test the competitors’ skill. A Swiss soldier ((skieur® made a record of 25 kilometers in 90 minutes in a rolling country, covering one elevation of 1,550 feet. Leaps of 75 feet are no longer unusual, and more than twice this distance has been recorded. For jumping, a hillside is selected with a large steep slope, and a short rise is built as the place for the leap. As the skiman attains this he stoops and adds his own jumping effort to the force which flings him on into space. He must land on his feet without falling to make a successful jump. The annual

tournaments held in the principal cities of Sweden and

Norway are the great sporting events of the year, the great feature of the sport being the ability to take long flying leaps. These proved so popular that the sport spread to other coun¬ tries, and has been common in the northern United States and Canada. There have been numerous ski tournaments in Montreal and Minnesota ; and the number of runners in the United States has increased to an extent that has warranted the organization of a National Association. Consult Rickmers (New York 1914).

SKIASCOPE, an apparatus for making observations of the influence of the Rontgen rays on a fluorescent screen. A well-known form consists of a tapering light-tight box, pro¬ vided at the narrow end with a closely-fitting open cap of black velvet or other soft dark- colored material into which the face will fit closely and exclude light, and at the other end is fixed the fluorescent screen. On looking through the instrument toward an excited Crookes tube placed near it the screen ex¬ hibits fluorescence where the Rontgen rays are not interfered with by objects sufficiently dense to obstruct their passage. When objects that are opaque to the Rontgen rays, such as glass, bones and most of the metals, are intervened a shadow of them appears on the screen. Thus if the human hand is placed between the tube and the screen the Rontgen rays will penetrate the flesh but be obstructed by the bones, pro¬ ducing a shadow picture of the bones of the hand.

SKID, one of a pair of logs or beams laid lengthwise as a support in rolling logs, barrels or the like. When a line of parallel logs is thus laid to form a roadway along which logs can be hauled, it is termed a skidway. To move logs on it is “skidding.®

SKIDDAW, skid'a, one of the highest mountains of England, in Cumberland, distin¬ guished for its grand and romantic scenery, as well as for the lakes in its different hollows and near its base; height, 3,054 feet. It is three miles north of Keswick.

SKIFF, Frederick James Volney, museum director and exposition authority : b. Chicopee, Mass., 5 Nov. 1851. He engaged in newspaper work in the West and was manager of the Denver Tribune , 1881-85. In 1889 he was ap¬ pointed commissioner of immigration and sta¬ tistics for Colorado. Represented Colorado at the Inter-State

Expositions of Chicago and Saint Louis, 1889-90. In 1890 President Harri¬ son appointed him one of the national com¬ missioners to the World's Columbian Exposi¬ tion; subsequently resigned and was appointed chief of the Department of Mines and Mining and later became deputy director-general. At the close of the Chicago Fair he became director of Field Museum of Natural History, Chicago, which position he has since held. He organ¬ ized the Jury System of the Nashville Exposi¬ tion of 1897 ; was director-in-chief for the United States Commission at the Paris Exposi¬ tion of 1900; was director of exhibits Saint Louis Exposition 1904. President Roosevelt appointed him commissioner-general for the United States to the Japanese Exposition of 1912. In 1911 he accepted position of director-

in-chief of the Panama-Pacific Exposition at San Francisco, 1915.

SKILTON, James A., American lawyer and scientist: d. Brooklyn, N. Y., 4 March 1904. He is best known as the friend of Herbert Spencer, to whom he gave much practical aid, and spent thousands of dollars in the purchase and distribution of Spencer's publications. He was a close friend of Henry Ward Beecher, an active worker in Plymouth Church for 45 years and an able writer on economic conditions and the government of great cities.

SKIMMER, or SCISSORS-BILL, an

American sea-bird (Rhynchops nigra), related to the gulls, and distinguished by the long, thin, knife-like bill. See Shearwater.

SKIMMIA, a Japanese name for genus of evergreen shrubs, of the Rutacece, native to India and Japan, with green branches, alter¬ nate, entire, coriaceous and pellucidly dotted leaves, crowded at the ends of the branches, and small four- to five-merous flowers, in much-branched white and odorless, terminal panicles. 6". japonica and S. fortunei are dwarfed holly¬ like shrubs, not entirely hardy in the northern United States, but valuable for planting in warmer countries, especially in cities, as they are among the best smoke-enduring evergreens. They are also valued for winter gardens, and for Christmas decorations., since they are cov¬ ered with bright red, berry-like fruits, which hang on during the winter, and contrast hand¬ somely with the dark, shining leaves.

SKIMMINGTON (also SKIMMER- TON), a word formerly used in England, in the phrase, "To ride skimmington,® or "To ride the skimmington,® a burlesque procession in rid¬ icule of a man who allowed himself to be hen¬ pecked. The man rode behind the woman,

with his face to the horse's tail.

SKIN-GRAFTING, the surgical procedure of covering over areas of the body denuded of skin with live skin freshly taken from another part of the patient's body or from another in¬ dividual. It may be rendered imperative by the great extent of surfaces so denuded, or by disabling or disfiguring contraction. Reverdin's method consists in applying to the raw clean surface small points of superficial epithelium. From these centres a new skin is formed. Thirsch's method consists in covering the raw surface with strips of surface skin of variable length and width. These quickly adhere to the raw surface and if the operation is successful are taken into the epidermis of the patient. In this manner large surfaces as of burns and old sores have been healed over.

SKIN AND SKIN DISEASES. The

skin is the group of organs which form the outer covering of the body. It may be regarded as an extensive, complex, uninterrupted mem¬ brane, actively functionating, and merging into the mucous membranes at the natural orifices of the body. Beneath it stands in the most intimate structural relationship to the under¬ lying tissues; externally it is exposed to varied and innumerable contacts with the outer world. By reason of this unique position as the boundary of the living organism, the skin has important functions to perform, all of which are contributory to the well-being of the in-

dividual, while some are essential to his con¬ tinued existence.

To the touch the skin in general is approxi¬ mately smooth, soft, supple and movable upon the underlying tissues. In certain localities — those subject to special contacts, as the palms and soles — it is more dense and less pliable than elsewhere. Inspection discloses the pres¬ ence of various surface markings in the form of minute pores and intersecting lines, furrows, and ridges. There is also seen an extensive but variable growth of hair, and at the end of the dorsal portions of the fingers and toes are the horny structures known as the nails. The pores represent the combined openings of the sebaceous glands and the hair-follicles, and as such give exit to the hair-shafts. The lines and furrows of the skin are primarily the product of its elasticity. They are fine, intermediate and coarse. The last type is best

seen about the joints, or upon the palms, where by reason of great latitude of movement, the skin is often thrown into folds ; the other types occur upon those parts less subject to wide range of mo¬ tion. The ridges are best observed upon the palms and soles, appearing in curved and straight, more or less parallel formations, said to be characteristic in each individual. Hair is quite generally distributed over the body surface, though certain parts are free; the amount and quality vary greatly with the loca¬ tion. The nails, though unlike the skin in texture and appearance, are entirely derived from the dermal tissues.

Anatomy of the Skin. — Technically in de¬ scription the term skin includes only the cellu¬ lar and connective-tissue layers, with their blood-vessels and nerves. The highly differen¬ tiated structures which by derivation, function, and position are a part of the skin, as the se¬ baceous and sweat glands, hairs, hair-follicles, and nails, are termed appendages of the skin. From within outward the skin proper is made up of three layers : the subcutaneous tissue or hypoderm ; the corium or true skin, called also the cutis or derma ; and the epidermis, cuticle, or scarfskin. The hypoderm can scarely be considered a distinct layer; it is more prop¬ erly a connecting bond between the body tissues internally and the corium externally. It is loose in texture, and is composed of inter¬ lacing fibrils and bundles of connective tissue, more or less obliquely directed, within the wide meshes of which are deposited masses of fat. This fatty tissue in the hypoderm forms the panniculus adiposus, and to it is due the rounded contour of the well-nourished body. Its dis¬ appearance by absorption following prolonged illness, and in old age, produces angularity of feature and wrinkling of the skin. Besides blood-vessels, lymphatics, and nerves, this layer contains sweat-glands, deep hair-follicles, and special nerve-endings. The corium, cutis, or derma, is made up in general of a more or less dense network of fibrous, and elastic tissue, carrying within it vessels, nerves, glands, hair, and hair-follicles. It is divided into two layers; the pars reticularis and the pars papillaris ; but the dividing line between the two is not clear-cut. The pars reticularis is the layer in contact with the subcutaneous tissue. It is well described by its name — a reticulum of loose connective tissue. The pars papillaris

is relatively much thinner, but more dense than the pars reticularis, and lies external to the latter. It derives its name from the fact that its outermost portion presents innumer¬ able papilla-like projections, which interdigitate with corresponding downward prolongations from the innermost layer of the epidermis. The total number of papillae upon the body surface is enormous; an estimation of approximately 64,000 to the square inch has been made. The curved and parallel

ridges previously mentioned as seen upon the palms are due to an arrange¬ ment of papillae in rows. Each papilla is provided with a vascular loop or a special nerve-ending; rarely both are present. The proportion of the vascular to the nervous variety is about four to one; hence it is that the especially sensitive areas of the skin con¬ tain the greater number of papillae.

The epidermis or cuticle is the portion of the skin intervening between the corium and the external world. Though structurally in most intimate relation with the true skin, by derivation it is totally distinct from it, being developed from the epiblast of the embryo, whereas the corium springs from the meso- blast. As the epidermis is avascular, nourish¬ ment is provided by means of juice-spaces in the deeper portions. The lower cells are there¬ fore soft and succulent, and the extent of the change necessary to transform them into the dry, horny, and flat cells of the skin surface is readily apparent.

For purposes of description the epidermis is divided from within outward into four layers, the stratum mucosum, the stratum granulosum, the stratum lucidum, and the stra¬ tum corneum. The stratum mucosum, called also the rete mucosum or Malpighii, the mucous or prickle layer, consists of several superim¬ posed strata of cells, which fill in the inter- papillary spaces of the corium, and present an undulating, plane surface to the layer next above. The cells in general are rich in protoplasm, have clearly defined nuclei, are columnar and polygonal in shape, becoming flattened as the surface is approached, and are provided with radiating, spine-like, protoplasmic processes or ˆprickles,® which anastomose and interdigitate one with another. A viscid inter¬ cellular cement-substance is present, permeated by channels for the passage of nutritive fluids. The layer of cells in immediate contact with the corium has been aptly termed the stratum germinativum. since it is by multiplication of these that both physiologic exfoliation and pathologic loss of the epidermis are restored. The pigment which gives color to the skin is found in this layer, and nerve fibrils are abundantly present between and within the cells. The stratum granulosum is a narrow band of cells distinguished by the appearance of granules within the cell protoplasm. These are highly refractile, and are composed of keratohyalin, a substance believed by some to be the antecedent of keratin, the horny material in the cells of the skin surface. The stratum lucidum is also narrow, and is made up of more or less flattened cells, with faint nuclei and a homogeneous and lucid-appearing protoplasm. The granules of the preceding layer have totally disappeared, and instead a substance called eleidin is found diffused throughout the cell body. This is re-

garded by some as a solution of the keratohyalin in the cell protoplasm. Others consider it a totally distinct body and not related to the product keratin. The stratum corneum is the most superficial layer. It is relatively thick, and its component cells are flat, dry, horny, and resistant, from the presence of keratin. Nuclei are absent or very faintly outlined. By special treatment the remains of the “prickles® may be detected. A well-grounded assertion has been made that the succulent protoplasmic spicules of the rete, by desiccation and other change, give origin to the keratin of the cor¬ neum. Constant exfoliation of the superficial cells of the skin is in progress, the loss of substance being compensated by growth from below.

The vascular supply of the skin is abun¬ dant. The numerous arterial branches emerg¬ ing from the deeper tissues divide and sub¬ divide to form an intricate horizontal network of vessels in the subcutaneous tissue. A second plexus is formed by division of radicles from the first at about the level of the papillary bases. From these 'arterioles capillary loops extend into the papillae. The distribution of veins and venules for the return of the blood is practically the same as that of the vessels for the arterial flow ; the venous channels, how¬ ever, are considerably larger. For the passage of lymph, juice-spaces and lymph-vessels exist. The former are mere excavations in the inter¬ cellular cement-substance, communicating with one another, and eventually emptying into lymphatic vessels. These latter are channels with definite endothelial walls; they appear first at the bases of the papillae as blind terminals, and by anastomoses from dense plexuses in the corium and subcutaneous tissues. The vessels receive the lymph from the juice-spaces through openings between the vascular endothelia, and eventually discharge their contents into the veins. The lymph which nourishes the epidermis flows from the papillary apices, percolates between the cells of the rete, and returns by way of the interpapillary spaces.

The nerves of the skin are (sensory) medullated and (vegetative) non-medullated. The latter form a dense plexus immediately beneath the rete mucosum ; thence fibrils as¬ cend, penetrating as far as the granular layer, and terminating either within or between the cells of the rete. Special nerves of non- medullated variety, known as vaso-motor nerves, are distributed to the muscle-fibres of the vessel-walls. The medullated nerves are confined to the papillary and subcutaneous layers, and are peculiar in that they terminate in special end-organs.

Three varieties of these are found in man : the corpuscles of Krause, the corpuscles of Meisner, and the Paccinian corpuscles. While these differ in minute struc¬ ture, in general all may be described as round or oval bodies, made up of concentric layers of connective tissue, enclosing the blunt or coiled termination of a nerve which enters at one pole of the mass. The first two kinds are found within and beneath the papillae, especially in sensitive parts, while the Paccinian corpuscles occur in the subcutaneous tissue throughout the body. Trophic nerves are present in the skin, they belong to the vegetative system and are non-medullated. Muscle-fibres of the

smooth or unstriped variety are found in the corium of certain parts, especially the face. The principal muscular structures in the skin, however, are the arrectores pilorum. These are smooth muscle-bundles which arise from the lower portion of the walls of the hair-fol¬ licles and extend obliquely upward to be in¬ serted into the pars papillaris of the corium. Contraction of these muscles produces erection of the hair, or on the glabrous skin the condi¬ tion known as (<goose flesh.® The pigment of the skin resides in the lower cells of the rete mucosum. It appears as black granules of melanin within the cell protoplasm, chiefly about the nuclei. In the dark races the pigment is found in the superficial cells, in some cases even in the corneum. The tint of the skin is also influenced by vascularity. Many theories have been advanced as to the origin of the skin pig¬ ment; it seems most probable that it is derived from the coloring matter of the blood in the corium, and thence carried to the rete by wan¬ dering cells. Two kinds of glands exist in the skin ; the sweat, or sudoriparous glands, and the sebaceous or oil glands. The sweat- glands are found in the hypoderm and lower¬ most portion of the corium. Each consists of a single long tubule, with a blind extremity, coiled many times upon itself to form a round or oval mass, from the upper part of which the excretory duct ascends. This is merely a straight portion of the tube slightly modified; it enters the rete opposite an interpapillary space, and after an irregular and spiral course through the epidermis opens upon the free sur¬ face of the skin, forming the sweat-pore. Be¬ sides the single layer of secretory cells, an in¬ vesting membrane, unstriped muscle fibres and nerve filaments compose the tubule, and many blood-vessels are distributed . in and about the coils. The duct has a lining of several layers of cells, and a more distinct investing mem¬ brane; in the rete these disappear,ˆ and through the corneum no definite lining exists. The sebaceous or oil glands are usually found in connection with the hair-follicles, but may occur where hair is absent, as on the lips. Their seat is the corium ; each consists of one or several, sometimes many, pear-shaped lobules, lined with epithelium

and invested with fibrous tissue. All the lobules open into a common gland-cavity, which in turn discharges into the upper portion of a hair-follicle. The product of the gland, called sebum, is formed by fatty degeneration of the epithelial cells within the lobules ; its extrusion is favored by the con¬ traction of the arrector pilorum, which com¬ presses the gland against -the hair root.

Hairs, though quite generally distributed, are absent on the palms, soles, the dorsum of the last phalanges of the fingers and toes, and the lips. They vary greatly in amount, quality, and distribution, these being influenced by age, sex, climate, racial and individual peculiarities. A separation of hairs into three classes may be made: long hairs, over two inches in length, found on the scalp, axillae, pubes, and bearded portion of the face; bristle hairs, short and stiff, as those comprising the eyebrow and eye¬ lashes ; and downy hairs of lanugo, short, fine and soft, found on parts of the face, the trunk and the extremities. Each hair may be divided into two parts: the shaft, or portion projecting

above the skin surface, and the roots, or part imbedded in the skin. The shaft is made up of the cuticle, a single layer of imbricated cells covering the exterior; the cortex or main body of the hair, composed of spindle-cells, massed into elongated bundles ; and the medulla or pith, of irregular cells containing air-vesicles. The color of hair is due to the presence of granular and diffuse pigment in the cortical sub¬ stance, and to air in the cortex and the medulla. The hair-root is seated within the hair-follicle; its < extremity is expanded into the hair-bulb, which is invaginated by the hair-papillae carry¬ ing a vascular supply. In the hair-root the cells comprising the layers mentioned are softer, and more nearly approach the character of the rete- cells, from which the hair is derived. The hair-follicle is the elongated pouch-like depres¬ sion which receives the hair-root. It is usually obliquely set, and in detail of structure is rather complex. A better understanding of its for¬ mation may be had if it be remembered that the follicle is merely an invagination of the skin-layers ; the outer portion, therefore, is made up of the derma, while the inner layers are furnished by the epidermis. Hence a dermic coat and an epidermic coat are distinguished. Each of these is further divided into layers ; the dermic coat into three, namely an exter¬ nal, fibrous and vascular; a middle, fibrous, possibly muscular in part ; and an internal, thin and hyalin. The epidermic coat has several layers, the

nomenclature of which is not en¬ tirely fixed. These, too, are quite complex in structure and for practical purposes a division without description into the outer root-sheath, the inner root-sheath and the cuticle of the root-sheath will suffice. The first two are by some regarded as a p&rt of the hair proper. These strata are derived entirely from the rete mucosum by differentiation ; the corneum does not enter the follicle beyond the opening of the sebaceous gland.

The horny formations upon the distal por¬ tions of the dorsum of the fingers and toes are strangely unlike the general skin in ' appearance, yet they are derived directly from the cells of the rete mucosum. For description, the nail is divided into two parts : the nail-body, or un¬ covered portion, and the nail-root, or portion imbedded in the tissues. The entire nail rests upon the nail bed or couch. The part beneath the nail-root is known as the matrix. The de¬ pression into which the nail is set posteriorly and laterally is the nail-groove. The skin over- lying the imbedded portions is the nail-fold and the adherent film extending onto the nail- body from the nail-fold is termed the nail-skin. The lunula, the white curved border seen at the base of the nail represents the distal border of the matrix. The tissues beneath the nail are dense and vascular, but are poorly supplied with nerves. The papillae are numerous and their arrangement in rows produces the longitudinal striae seen on the surface of the nail. The hypoderm is devoid of fat and is closely ad¬ herent to the periosteum of the phalanx, thus presenting a solid foundation upon which the nail may rest. Growth takes place from the matrix; although the rete mucosum underlies the entire nail, only the rete-cells of the matrix undergo the transformation into horny nail- substance.

Physiology of the Skin. — The complex his¬ tological structure of the skin and its append¬ ages is necessitated by physiological require¬ ments. As the living encasement of the body, its functions are necessarily related to external and internal factors. Thus it protects the or¬ ganism from harmful influences from without; it provides a sense-organ that is necessary to a correct interpretation of the external world; it contributes largely to the regulation and con¬ servation of body heat ; and it removes from the organism quantities of waste and harmful material. All the dermal structures participate in the protective function of the skin. The connective and adipose tissue of the hypoderm ; the dense fibrous and elastic meshwork of the corium ; and the horny cells of the epidermis, rendered unctuous by glandular secretion, are together admirably adapted to guard the deeper structures from injury by mechanical violence, to prevent undue loss of heat and fluids from within, and to resist the penetrating or destruc¬ tive action of fluids from without. The hair in man,

especially on certain parts, is protective from violence and thermal change, but not to the same degree as in animals ; in them it is obvious that the fur, composed of densely set hairy filaments distributed over the entire body, must act as a potent agent in turning aside harmful encroachments from the exterior, and in conserving body heat. The cutaneous nerves contribute to protection in that the sensibility of the skin may warn the individual of pos¬ sible dangerous contacts, often in time to pre¬ vent harm.

Sensation in the skin is provided for by the presence in abundance of nervous filaments and special nerve end-organs. Although many kinds of sensations are perceived through the skin, the exact part performed by each of the several varieties of nerve terminations is not fully known as yet. By means of the tactile sense the individual is able to judge the shape of an object in contact and the portion of the skin touched by it : he can appreciate its weight and recognize whether it is hot or cold. These varieties of tactile sense — locality sense, pres¬ sure sense and temperature sense — are not resident in one and the same variety of nerve or nerve-termination. Pain has been consid¬ ered an overstimulation of sensory fibres ; ex¬ perimentation, however, seems to show that special nerves are concerned when pain is felt. The skin through perception of pressure and tension, is in part responsible for muscular sense, by means of which the individual is cognizant, without the aid of the eye, of the position of his body with reference to surround¬ ings. Special sensations, as itching, burning, tickling, creeping, etc., are perceived through the skin ; the nerves concerned in their reception and conduction are known chiefly as belonging to the vegetative system.

The skin plays an important role in the reg¬ ulation of bodily temperature. The action of excessive heat from within or without, upon the vasomotor nerves distributed to the blood-ves¬ sels of the skin, causes the latter to dilate. An increased amount of blood is thus brought to the skin, where it is cooled by conduction and radiation and also by evaporation. The latter effect results from the increase of moisture on the skin, following an acceleration of sweat- gland secretion, due to augmented blood-supply.

On the other hand, cold, acting upon the vaso- motors, leads to contraction of the vessels; a diminished amount of blood enters the skin; evaporation is reduced by the checking of sweat secretion ; and

bodily heat is conserved.

The secretory and excretory functions of the skin are carried on by the sebaceous and sweat glands. The product of the former, a fatty, unctuous material, cannot be strictly re¬ garded as a secretion. Its purpose rather is to anoint the hair and skin, thus keeping the lat¬ ter soft and preventing heat loss by evapora¬ tion, and maceration of the epidermis by moisture. The sweat, however, is a true excre¬ tion and as organs for the removal of waste products the sweat-glands are most important. Various estimations have been made of the amount of sweat produced in 24 hours ; the average is probably about one and one-<half pounds. This can be greatly increased by mus¬ cular activity, by high external temperature and by the use of certain drugs; it is obvious, there¬ fore, that considerable material can be removed from the body through the skin, a fact of great importance in the treatment of certain diseases. The sweat itself is about 99 per cent water; the remaining 1 per cent represents a number of complex fatty bodies and mineral salts. It may be alkaline or acid in reaction ; acidity is in part due to admixture of fatty acids from the seba¬ ceous secretion. It has been claimed that the sweat-glands produce no fat, but it is generally accepted now that this is not true, since the secretion in the palm, a part devoid of sebaceous glands, unquestionably contains fatty products.

The skin possesses a respiratory function, but it is comparatively insignificant. Carbonic acid gas is given off and oxygen absorbed, the relative amounts of each as compared with those from the lungs, being 1-220 of the former, and 1-135 of the latter. The interchange probably takes place through the sweat-pores. The skin also exhibits a certain degree of absorptive power. This is but slight in the undamaged skin. If the horny layer be removed, or if the substance be forced into the glandular ducts, absorption may take place readily, especially of certain substances.

Diseases of the Skin. — Abnormal or dis¬ eased conditions of the skin, as of other or¬ gans, are recognized by manifestations called symptoms. These are all referable to one of two categories: subjective symptoms and ob¬ jective symptoms. By the former is meant those which are appreciated only by the patient him¬ self ; by the latter, those which may be de¬ tected by the examining physician. Subjective symptoms in purely cutaneous diseases are, in many instances, wanting; when present they are manifested in some form of abnormal sensa¬ tion, as burning, prickling, tingling, smarting, creeping or itching; in diminished sensibility or anaesthesia; in increased sensibility or hyper- aesthesia ; or in pain, which latter may be burn¬

ing, shooting, boring or aching. Of all subjec¬ tive symptoms, itching or pruritus is most com¬ mon ; it is constantly present in many condi¬ tions, though often in varying degree.

Objective symptoms are vastly more impor¬ tant. To the person afflicted they often seem the visible manifestations of disfiguring, repul¬ sive disease, and their appearance is therefore dreaded ; to the dermatologist they stand for facts and principles which, when aggregated,

constitute the major portion of his special knowledge, and which he must know and under¬ stand most thoroughly if he shall hope to be proficient. Any alteration from the normal in the texture and appearance of the skin is termed a lesion. Lesions are variable in appearance, character and manner of evolution, which fact is the basis of their subdivision into two gen¬ eral classes: elementary or primary lesions; and consecutive or secondary lesions. These terms are self-explanatory; the former are lesions which at their inception present a certain type ; the latter are those which are produced by pro¬ gressive alteration from a previously existing type. The classification is not entirely accurate, however, for under certain conditions a lesion of a primary type may appear as secondary. Briefly described, the objective cutaneous char¬ acters which are considered primary, eight in number, are: (1) Macules (spots or stains), circumscribed alterations in the color of the skin, without elevation or depression of the sur¬ face. They are variable in size, shape, color, dura¬ tion and as to cause of the dvschromia. A familiar example is the ® freckle.® (2) Papules (pimples), small, usually superficial, pinhead to pea-sized, circumscribed, solid elevations of the skin. These, too, differ in size, shape, color, duration and cause. The <(pimples® or papules of acne in young persons, illustrate this type of lesions. (3) Tubercles (nodules), solid, fairly circumscribed, pea-sized, deep-seated elevations, usually persistent in character. These are in reality large papules, or more properly, inter¬ mediate lesions between the papule and the tumor, to be next described. In severe acne tubercles are sometimes found. (4) Tumors, soft or firm, more or less circumscribed eleva¬ tions of the skin, varying in size and shape, and seated deeply, in the corium and subcutaneous tissues. As the papule merges into the tubercle, so the tubercle passes over into the tumor; thus at one extremity of the series stands the pin¬ head-sized papule, at the other, the egg-sized or larger tumor. (5) Wheals, circumscribed, red¬ dish-white^ cedematous elevations of variable size and shape, usually evanescent in character. This form of lesion occurs typically in the con¬ dition known as urticaria (q.v.) or nettle-rash. It is angioneurotic in origin and is always ac¬ companied with subjective symptoms,

especially itching. (6) Vesicles (little blisters), cir¬ cumscribed elevations of the horny layer of the epidermis, pin-point to pea-sized, with limpid, lactescent or sanguinolent contents. This form of lesion may at times be secondary, since it can develop on a previously existing papule, as il¬ lustrated in smallpox. (7) Pustules, pin-point to filbert-sized, circumscribed cutaneous ab¬ scesses, having an epidermal roof-wall. The skin surrounding the base usually shows an in¬ flammatory areola. They are developed very frequently from vesicles, less often from papules. It is, in fact, somewhat questionable to class the pustule as a primary lesion. They are seen commonly in acne. (8) Blebs (large blis¬ ters), irregularly shaped elevations of the epi¬ dermis, varying in size from a pea to a goose egg, containing clear or opaque fluid. This lesion is well illustrated by the blister following a severe burn.

The secondary or consecutive lesions of the skin, six in number, are: (1) Excoriations (abrasions, scratch-marks), variously sized and

shaped areas, representing loss of superficial cutaneous tissue, the result of mechanical vio¬ lence. (2) Fissures, linear cracks or wounds of variable size, involving the epidermis, or the epidermis and corium, due to disease or external injury. These are seen not infrequently in the palms or about the angles of the mouth, when from any cause the parts have become inelastic.

(3) Scales, dry, laminated, masses of epider¬ mis which have separated from the un¬ derlying tissue as the result of some morbid process. They may lie in masses upon the skin, or be constantly exfoliated from the surface. Variations occur in color, consistency and form.

(4) Crusts (scabs), dried, effete masses of ex¬ udation, mixed with epithelial debris, varying in size, shape and color. (5) Ulcers, variously sized and shaped losses of cutaneous substance, the result of preceding disease. In this form of lesion, differences are found in size, outline, depth, condition of floor, margins, etc. A famil¬ iar example is the leg ulcer in old people. (6) Scars, new connective-tissue formations replac¬ ing loss of substance in the corium or deeper tissues.

Besides recognizing the presence and detailed appearance of the lesions upon the skin, the diagnostician must also note their

distribution upon the body surface, their general arrange¬ ment and their configuration when grouped to¬ gether. All these considerations help to eluci¬ date the condition present.

In the etiology of skin diseases many fac¬ tors are operative. For convenience of descrip¬ tion these may be classed as internal causes and external causes. Among internal causes, hered¬ ity may be mentioned first. While not many cutaneous diseases are inherited, the predisposi¬ tion to them may undoubtedly be passed on to the child. This predisposition probably is due to some form of tissue vulnerability to influences which otherwise might not suffice to produce disease. Disorders of internal organs are fre¬ quently effective. Their exact relation to the skin disorder may not be entirely clear; but the joint association of internal and cutaneous dis¬ ease in many instances is too regular and fre¬ quent to be a mere coincidence. Thus, gastro¬ intestinal derangements may produce erythema, eczema or urticaria ; whether these are due to the intestinal disorder or both due to a more primary emotional disturbance is still an open problem; kidney disease may cause an ec¬ zema or pruritus ; diabetes is not infrequently accompanied with boils, carbuncles, gangrene, dermatitis, urticaria or pruritus. Syphilis is attended with many forms of eruption ; gout is frequently associated with eczema or psoriasis, and rheumatism with erythema and purpura. Asthma, eczema and urticaria are often found together. Lastly, emotional derangements may produce an array of functional disturbances in the skin and through reflex action on the vaso¬ motor nerves may be the determining factor in the development of cutaneous lesions. The sex¬ ual system unquestionably exerts an influence on skin diseases. The prevalence of acne in the young, following puberty, is well known, and various cutaneous derangements are associated with physiological crises and pelvic disorders in women. Food may produce skin eruptions. Urticaria is not uncommon after ingestion of shell-fish, cheese or strawberries and the list of skin-irritating articles could be greatly extended.

Eczema, acne and inflammatorv conditions arc greatly influenced by quantitv and kind of food taken. Alcohol in inflammatory lesions is es¬ pecially harmful.

Any of the many types of skin eruptions may develop following the use of certain drugs, the list of which is very extensive. Among those in most common use which may disturb the near tissues and hence the skin, are quinine, belladonna, morphine, arsenic, potassium bro¬ mide and iodide.

Climate may be considered an external fac¬ tor. Warmth and moisture found in tropical and subtropical countries are especially favorable to the growth of certain parasites in the skin. Cold and moisture tend to induce eczematous conditions. Certain diseases are distinctly prev¬ alent in certain countries, but the fact is not always due to climatic influence alone. The sea¬ sons differ also in their effect. Winter aggra¬ vates pruritus, eczema and psoriasis; summer improves them. Light, heat and cold are capable of producing inflammatory conditions. On the other hand, light is distinctly ameliora¬ tive in certain diseases, as psoriasis. Clothing when improper in amount, harsh of quality, poorly fitting, or uncleanly, can give rise to in¬ flammation of the skin. Irritants of various sorts, whether mechanical, chemical or medici¬ nal, can likewise awaken inflammation. Scratch¬ ing and other traumatism are frequent causes of hypersemia and dermatitis. Parasites, both vegetable and animal, are the most important of all external causes. A very large number of cutaneous diseases are traceable to them. Among the more common diseases produced by vegetable organisms are boils, carbuncles, vari¬ ous pus infections and the different forms of ringworm ; by animal parasites, scabies and dermatitis from pediculi.

The number of cutaneous disorders under classification is about 170, but this does not include all tropical diseases. Of this seem¬ ingly large number, many are rare, others are seen but seldom, while a few are very common. Dermatologists have not agreed upon a uniform classification of skin diseases ; their differences, however, largely concern minor distinctions. The following general classes are usually given as a basis for further subdivision: (1) hyper- aemias ; (2) inflammations; (3) hemorrhages; (4) hypertrophies; (5) atrophies; (6) new growths; (7) neuroses; (8) diseases of the appendages; (9) parasitic affections. By some authorities diseases of the appendages are con¬ sidered among the other classes, as inflamma¬ tions, hypertrophies, etc. The difference in the classification, however, is not essential, being rather one of convenience.

Bibliography. — For further discussion of the subject the following authorities, among others, may be consulted: Hartzel, (Diseases of the Skin) (Philadelphia 1917) ; Orms'by, dis¬ eases of the Skin > (ib. 1915) ; Pusey, Prin¬ ciples and Practice of Dermatology) (New York 1917) ; Shamberg, diseases of the Skin and the Eruptive Fevers) (Philadelphia 1915) ; Stelwagen, diseases of the Skin) (ib. 1916) ; Sutton, diseases of the Skin) (Saint Louis

1917).

Ernest L. McEwen, M.S., M.D., Assistant. Professor in Dermatology , Rush Medical College, Chicago .

SKINK, a genus (Scincus) of lizards of the cosmopolitan family Scincidce, characterized by a conical head, with well-developed eyelids, and covered with symmetrical shields. The body is protected by bony plates underlying the scales. No thigh pores exist and in some genera the limbs may be hidden beneath the skin. In the genus Scincus itself the scales are of thin and smooth texture and the tail is rounded and tapering and is unprovided with spines. The body is somewhat spindle-shaped and is flat below. Five toes exist on each foot and the toes are of flattened shape and fringed on the sides. The palate is grooved longitudinally and is provided with teeth. The common skink (Scincus officinalis) occurs in North Africa and in India. It inhabits sandy places and when alarmed burrows swiftly beneath the sand. Its specific name is derived from the fact that for¬ merly it was thought to possess valuable medic¬ inal properties and among savage tribes it is regarded as an antidote to poison. In classic ages its virtues were much reputed and the head and feet of these lizards were imported to Rome in large quantities preserved in white wine. Its color is a variable reddish, marked above with cross bands of darker hue, while below it is of a white color, tinged with silvery lustre. The average length is from six to seven inches. The family is represented in the United States by several genera, of which Emneces is the most prominent and is represented by several well- known species. Consult Holbrook, (North American Herpetology5 (Philadelphia 1848) ; Cope, (Crocodilians, Lizards and Snakes) (Washington 1900) ; Gadow, (Amphibia and Reptiles 5 (New York 1901).

SKINNER, Aaron Nichols, American as¬ tronomer : b. Boston, Mass., 10 Aug. 1845 ; d. 14 Aug. 1919. He was educated at Beloit Col¬ lege, Wis., and at the University of Chicago, was assistant at the Dearborn Observatory, Chicago, in 1867-70, and assistant astronomer at the United States Naval Observatory in 1870— 98. After 1898 he was professor of mathematics in the United States navy. He was retired from active service in 1907 with the rank of commander; he determined the position of 8,824 stars in the zone declination — 14° to — 18° as a contribution to the great star catalogue of the Astronomische Gesellschaft from declination — 23° to + 80° which was pub¬ lished as ((Washington Zone Observations® and also as a ((Zone Catalogue® conducted the ex¬ pedition of the Naval

Observatory to Sumatra to observe the total solar eclipse of 17 May

1.

SKINNER, Charles Rufus, American legis¬ lator and educator: b. New York, 4 Aug. 1844. He was educated at Clinton Liberal Institute, and in 1870-74 he was manager and city editor of the Daily Times , Watertown, N. Y. He served in the New York assembly in 1877-81, and in Congress in 1881-85. He was New York State deputy superintendent of public instruc¬ tion in 1886-92 ; and superintendent in 1895— 1904. He was president of the National Edu¬ cation Association in 1897. In 1906-11 he was assistant appraiser of the port of New York. Author of (New York Question Book5 (1890) ; (Manual of Patriotism for the Schools) (1900) ; (The Bright Side5 (1909), etc.

SKINNER, John, Scottish song writer : b. Balfour, Aberdeenshire, 3 Oct. 1721 ; d. Aber¬ deen, 16 June 1807. He was educated at Mari-schal College, Aberdeen ; taught school for a time; took orders in 1742 in the Scottish Epis¬ copal Church and settled at Longside, Aber¬ deenshire. He suffered during the period of persecution of Jacobite ministers after 1745-46 and in 1753 spent six months in prison for preaching in his own house. He is remembered for his songs, which placed him, in the estima¬ tion of Burns, as one of the foremost of Scot¬ tish song writers. Among these are (Tulloch- gorum) ; (Ewie wi the Crookit Horn5 ; (John o' Badenyon5 ; (The Marquis of Huntly's Reel5 ; (Lizzie Liberty5 ; and (The Old Man's Song.5 His prose included (A Preservative against Presbytery5 (1746); (Dissertation on Job's Prophecy5 (1757) ; (Ecclesiastical History of Scotland5 (1788) ; His (Songs and Poems5 edited by Reid appeared in 1859.

SKINNER, Otis, American actor: b. Cam¬ bridge, Mass., 1858. He made his debut Nov. 1877 as Jim in (Woodleigh5 at the Philadelphia Museum; New York debut at Niblo's Theatre 1879. Assumed important roles with Lawrence Barrett, Augustin Daly and Madame Modjeska. After 1902 he was prominent as a star in plays of varied character under his own management and in conjunction with Charles Frohman.

SKINNER, William, American manufac¬ turer: b. London, England, 1824; d. Holyoke, Mass., 28 Feb. 1902. He came to the United States in 1845 and settled in Northampton, Mass., where he engaged in the silk business. He became a partner in a silk manufacturing firm in 1848 and in 1851 established a business at Williamsburg, Mass. His factories being destroyed by the Mill River flood in 1874, he rebuilt them in the same year at Holyoke. He was actively engaged in

philanthropic work, was a generous benefactor of Vassar, Smith and Holyoke colleges, built a gymnasium for Dwight L. Moody's school in Northfield, Mass., was president of the local city hospital and also of the Manufacturers' Association of Holyoke.

SKINNERS, bands of marauders, adherents to the American cause who infested what was considered neutral ground along the Hudson River in New York State, during the American War of the Revolution. The Skinners carried on a vigorous guerrilla warfare, being opposed by the Cow-boys, as the marauding adherents to the British cause were called. In some in¬ stances the Skinners did serviceable work for the American army, harassing small detach¬ ments of British soldiery, scouting and foraging parties, and acting as scouts for the Americans when occasion demanded. It was a partv of three Skinners who intercepted Andre (q.v.) on his way back to New York, after receiving treasonous papers from Benedict Arnold (q.v.) at West Point. This was the chief service per¬ formed by the Skinners, who, like the Cow¬ boys, operated principally in Westchester County and were not particularly scrupulous as to the party to which their victims belonged.

SKIPPER, a butterfly of the family Hes- peridee. The body is short and thick, head large,, eyes prominent, antennae short, with the knob curved like a hook or bent to one side,

legs six, and the four hindmost shanks armed with two pairs of spurs. Skippers are generally rich brown, marked with yellow spots. The species are quite numerous, and expand from one and one-half to two and one-half inches. They owe their name to their jerky flight. The cheese-mite has also been termed skipper.

SKIRMISHERS are soldiers acting in loose array in front and on the sides of an army, in fighting carried on in an open country. It is the duty of the skirmishers to cover the line of advance of an army and to guard its flanks, so as to protect against surprise by the enemy. The skirmishers usually operate con¬ siderably in advance of the main body, from a mile to five miles, advancing in files of two men, front and rear, with a distance of about six paces between them. Skirmishers fire in¬ dependently and at their own discretion and in modern warfare do not adhere strictly to the rules of the tactics, either as to their disposi¬ tion or as to alternating between the files, in

firing. Skirmishers were frequently used in the United States Civil War to draw on a battle or to cover the movement of the main body in their rear. When attacked by cavalry in open ground the skirmishers are supposed to close up ranks, forming what are known as rally squares. The manual of infantry tactics pro¬ vides that every company of skirmishers shall have a small reserve, whose duty it is to fill vacant places and furnish the line with car¬ tridges, and to relieve the fatigued. In trench fighting the strategy is quite different.

SKIRRET, a hardy perennial umbelliferous plant (Shim sis arum) about four feet high, with pinnate leaves and tiny white flowers in com¬ pound umbels. It is indigenous to Asia, and has been cultivated in rich, moist soil, for its edible, fleshy tubers, which are about as thick as a finger and grow in clusters, united at the base of the stem, and are long, cylindrical, and somewhat jointed. They have a sweetish taste, resembling parsnips, are somewhat floury, and are quite tender, except for a woody core, which must be removed before cooking. It is a winter vegetable, boiled and served like sal¬ sify, but is of minor importance at present.

SKITSUISH. See Salishan Indians.

SKITTLES, a favorite game in England much resembling the American game of Bowls (q.v.). It is played in a covered skittle-alley, usually indoors. From four to nine skittles or large wooden pins about a foot high with flat bottoms are set upright at one end of the alley a foot apart. They are arranged in a square, and one angle of this square is turned toward the player, or thrower, who stands at the other end of the alley, 21 feet away. The thrower uses a large wooden ball, about a foot in diam¬ eter, and which is not always round, which he throws alorfg the floor of the alley with sufficient force to bowl over the pins at the other end ; the thrower is allowed to advance but one step in the act of throwing. The ob¬ ject of the game is to knock down all or as many of the skittles as possible, each throw counting so many points, and the one who makes the greatest number of points in a given number of throws wins the game. The game of skittles was introduced into England under the name of Kails in the 14th century, having been brought over from the French. It is

still popular and has developed in some places under the name of nine-pins, from the number of skittles used. In chess play, skittles is a rapidly played game, without effort at analysis of position.

SKLALLAM. See Salishan Indians.

SKOBELEFF, sko'be-lyef, Mikhail Dimi- trievich, Russian general : b. near Moscow, 29 Sept. 1843; d. Moscow, 7 July 1882. He en¬ tered the army and served in Poland in the sup¬ pression of the insurrection of 1863-64; and later in the campaigns in the Caucasus and in Central Asia. In 1873 he was attached as colonel to General Kaufmann's staff when the city of Khiva was taken, and in 1875 com¬ manded the expedition against Khokand. This province being annexed in 1876 with its name changed to Ferghana, Skobeleff was appointed military governor; but at the outbreak of the Turkish war he hastened to the front, crossing the Danube on horseback. He held no com¬ mission until the second attack on Plevna in 1877 when he led three regiments, but was forced to sacrifice the advantage he had gained for lack of support. Being appointed lieu¬ tenant-general, he commanded the famous 16th division, with whom he turned back the left flank of the Turkish army, capturing 36,000 men, at the passage of the Balkans at Senova after Mirsky and Raditsky had failed. He led the advance upon Adrianople in 1878. His last military exploit was as commander of the ex¬ pedition against the Tekke-Turkomans in 1880- 81 and the conquest of Gok-Tepe on 12 Janu¬ ary. He was promoted to the rank of general after the campaign.

SKODA GUN. See Ordnance. SKOKOMISH. See Salishan Indians.

SKOPTZI, or SKOPTSY, a religious sect founded in Russia in the latter part of the 18th century by Kondratiy Seliwanoff. His follow¬ ers practise castration in the belief that it will purify their souls and render them fit to enter heaven. Since 1869, when their practices were discovered by the Russian government, attempts have been made to suppress the sect by penal measures, but it is still believed to include a number of influential persons in its following. See also Religious Sects.

SKOWHEGAN, skow-he'gan, Me., town, county-seat of Somerset County, on the Kenne¬ bec River, and on a branch of the Main Central Railroad, 33 miles north of Augusta. The first settlement in this vicinity was made in 1792; Skowhegan was at first a part of the town of Canaan, but was separately incorporated in 1823 under the name of Milburn ; in 1836 it was given its present name, which is the ancient Indian name for the place. In 1856 the village of Skowhegan was incorporated. The town of Bloomfield was annexed in 1861. The Kennebec here has a perpendicular fall of 30 feet, and this furnishes excellent water power. The town has an area of 50 square miles and has a fine public park, hospital and courthouse. The in¬ dustries include lumber, pulp, flour and woolen mills, shoe factories, and manufactories of scythes, axes, etc., and oil-cloth. There are several banks and newspapers. The town has a high school, and a public

library (founded 1867). Pop. (1920) 5,981.

SKRINE, John Huntley, English clergy¬ man and author : b. Somerset, England, 4 April 1848. He was educated at Oxford, ordained a priest in the Church of England in 1874, and in 1873-87 was assistant master at Uppingham. He was warden of Trinity College, Glenalmond, in 1888-1902 and in 1897 he was appointed canon of Perth Cathedral. He has published (Margaret of Anjou *(1870) ; (Under Two Queens,* lyrics (1884) ; <A Memory of Edward Thring) (1890) ; (The Queen's Highway, *lyrics of the war (1900) ; (Pastor Agnorum, A Schoolmaster's After-thoughts1* (1901) ; (The Mountain Mother,) sermons (1902), etc.

SKUA, or JiEGERS, a large gull of the

genera Stercorarius and Megalestris, and es¬ pecially of the latter, the former being more often called <(jseger. **They are usually classed as a sub-family of Laridce (q.v.). They are predatory birds, rarely fishing for themselves, and generally pursue smaller gulls and terns, and compel them to drop or disgorge their prey. Only one species of true skua (Megales¬ tris skua) enters the North American fauna and this is rare. The related jaegers are re¬ markable in the possession of a cered bill and a pair of elongated middle tail feathers, though the latter character is less pronounced than in the true jaegers. It is a large, robust bird, espe¬ cially when adult, and is remarkable for its vigorous and varied flight and piratical habits. It breeds in the far north, making a flimsy nest on the ground and lays two or three deeply blotched eggs. This species is more common on northern European coasts and three species of jaegers are also common to the two continents and range even much more widely. They are the pomarine jaeger (Stercorarius pomarinus) , 21 inches long, dusky and mottled above, brown¬ ish-white below; the Arctic or parasitic jaeger (S. parasiticus) , about 20 inches long, occurring under two different plumages,, one entirely sooty, the other with white under parts, and .S', longicaudus, the longtailed jaeger, about 14 inches long, upper part of head black, upper surface brownish-gray, under surface white. The middle tail-feathers in this species pro¬ ject 10 inches, and the bird is called <(marlin-spike** by sailors. Consult Selous (Bird Watch¬ ing* (London 1900).

SKULL, the skeleton of the head; the bony or cartilaginous framework

of the head in vertebrates; a superior expansion of the verte¬ bral column. Its shape differs in various ani¬ mals. In man it is somewhat ovoid, the larger portion being at the top (the dome) ; and the whole is composed of flat and irregular bones — eight bones enclosing the cranial cavity and 14 forming the face. The skull rests and nods upon the first vertebra (atlas). It also rests upon a tooth-like process (odontoid process) of the axis, or second bone of the spinal column, which projects upwards through the atlas and forms a pivot or swivel, upon which the head rotates, the atlas also turning with it. The pre¬ ponderance of the cranial portion of the skull over the face portion is most pronounced in man, because of the higher development of the brain. The cranial portion (cranium) is composed of the occipital, frontal, sphenoid and ethmoid bones, and the two parietal and temporal bones. These bones are united either by sutures (dovetail joints) or beveled edges.

The upper bones of the skull of a baby do not usually unite until months after birth, their condition allowing the brain to grow. The dovetail joints later in life fasten these bones together very firmly. This jointure, together with the strong buttresses in the temporal bones and the tie-beam function of the sphenoid, adapts an adult for carrying considerable weight upon the head without injury. If the upper cranial bones of a baby are united at birth or soon after, the child is usually an imbecile or idiot. The tissue of the flat bones of the skull is arranged in layers ; the outer one was likened by the ancients to wood, the middle one to leather, and the inner one to glass. The cranial cavity contains the brain and proximal portions of the cranial nerves. See Brain ; Cranial Nerves.

The principal opening of the skull is the foramen magnum for the transmission of the beginning of the spinal cord, the spinal ac¬ cessory nerves, and the vertebral arteries. Other openings to the orbits, the interior of the temporal bones, etc., transmit the optic, audit¬ ory, and other nerves, as well as blood-vessels, and are so arranged that these nerves and ves¬ sels are not easily injured.

The bones of the face are the inferior maxil¬ lary, and the vomer, the two nasal, superior maxillary, lacrimal, malar, palate, and inferior turbinated. The inferior maxillary, or .lower jaw, forms the chin (a distinctive feature of man), moves in mastication and speech, and is joined to the temporal bone by a ball-and-socket joint. The lacrimal bones are small bones form¬ ing part of the inner wall of the orbit, one of the principal openings in the face. The malar bones are the cheek-bones. The palate-bones assist in the formation of the outer wall of the nose, the roof of the mouth, and the floor of the orbit. The nasal

bones form the bridge of the nose; the vomer forms part of the septum of the nose, separating one nasal cavity from the other. The superior maxillary bones (maxilla, the jawbone) form the upper jaw and a large part of the roof of the mouth, the outer wall of the nasal fossae, and the floor of the orbit. The inferior turbinated bones ex¬ tend horizontally along the outer wall of the nasal fossae. The principal external openings of the skull in the face portion are the orbits, the mouth, and the nasal opening; in the cranial portion, the foramen magnum, and the external auditory canal. See Anatomy; Head; Me¬ dulla Oblongata; Spine; Spinal Cord.

SKULL-CAP, any one of the labiate genus Scutellaria, bitter herbs, having square stems, simple, opposite leaves, and blue or violet flowers, in terminal or axillary racemes. The flowers have exserted ascending corollas, curved, with arched, upper, and spreading lower lips. The calyx is campanulate, gibbous, and two¬ lipped, the upper one with a crested protuber¬ ance on top, that causes it, when in fruit, to very much resemble an ancient helmet, with the visor down, and to which the common name obviously refers. This skull-cap covers four nutlets, which are ejected by the upspringing of the pedicel, if bent down by an animal, for instance; and it is said that the visor directs these seeds on to the animal's coat, when they escape from between the lips. However, the lid soon falls off. Several species are culti-

vated, as the Siberian (S. baicalensis) , pro¬ ducing during the summer many dark-blue flowers an inch long; and the whole genus is one of the handsomest of the many American mints, excepting (S. galeriulata) , which is not showy. The madwort (5. lateriflora) is a com¬ mon slender herb in wet places, with ovate leaves and violet flowers, and was at one time supposed to be a cure for hydrophobia.

SKUNK, a representative of several genera of small carnivorous mammals of the weasel family (Mystelides) , of which they, with the badgers, constitute the sub-family Melince, characterized by having elongated toes with blunt non-retractile claws and no webs. The true skunks are notorious for the large size of the anal glands, and the offensive odor of their secretion. They are always black, marked by variously arranged and sharply contrasting bands and spots of white, and are exclusively American. Three genera are recognized. Mephitis includes the common typical skunks of relatively large size, with the skull arched above and the face short and truncated. There are 34

teeth with the following formula : i. f, c. p. f, m. The body is elongated, and usually much arched ; the tail long and thickly covered with long, fine hair ; the head small, with thick, blunt snout ; the legs short, and the paws comparatively large, with five in¬ completely divided toes. The power, charac¬ teristic in some degree of all the Mustelidce, of forcibly discharging the fetid secretion of the anal glands is enormously developed. Ten species have been differentiated in North Amer¬ ica ranging throughout the continent, but as they differ little in habit, the common skunk (M . mephitica) may be taken as typical of the whole genus. This species, as now limited, is confined to the Eastern States, where it is ex¬ ceedingly common, particularly in the farming districts of New England. It is about the size of a cat and has fur ot a glossy black; on the forehead is a patch of white diverging into two lines which extend the whole length of the back and meet again in the beautiful bushy tail. The tip of the tail is also white, and, as it is usually carried erect, the white is regarded by some naturalists as a (<warning color.® Thus Belt writes: ((The skunk goes leisurely along, holding up his white tail as a danger flag for none to come within range of its nauseous artillery.® It chiefly frequents high-lying, bushy, or rocky districts and the banks of the rivers, usually remaining concealed in its burrow by day, but emerging at dusk in search of the worms, insects, birds, small mammals, and their young and the eggs of ground birds which form its food. At times it becomes quite de¬ structive to poultry, but offsets this by clear¬ ing out houses of rats and mice.

Its movements are slow and leisurely. It never attempts to run away if pursued, for, feeble and defenseless as it looks, it is most efficiently protected by the possession of a nauseous fluid, the discharge of which neither man nor beast will wittingly provoke. When attacked the skunk turns its back, erects its tail, and, by means of a muscular contraction, ejects the contents of its anal pouches from the protruding orifices of a pair of ducts with a force that carries them to a distance of 10 or 15 feet. So penetrating is the evil ordor of this

fluid that it may sometimes be perceptible a mile off, and so persistent is it that clothes defiled by it can rarely be entirely purified. The fluid will excite severe inflammation of the eyes, and cases are cited of Indians who have thus lost their eyesight. Few carnivorous animals care to attack the skunk, and this immunity results in a life of comparative ease, with a loss of agility and an assumption of corpulency in striking contrast to the slender and active weasels. The skunk is hunted for its fur, which is in considerable demand. During the fall and winter skunk-hunting is an industry of con¬ siderable importance in Maine, and that State alone yields annually between

100,000 and 200,000 skins, most of which are shipped to Philadelphia where they are prepared for ship¬ ment to Paris, chiefly in the guise of <(monkey® skins. Skunk-farming has become established as a regular business in some parts of New England and the Middle States, and is re¬ garded as quite profitable. The animals become used to attendance and rarely annoy by dis¬ charging. They are killed when grown, the bodies used as fertilizer, and the foul smell of the skins removed by heat and smoke. Skunks are trapped, killed with clubs or by means of dogs especially trained to pounce upon them before the fluid can be discharged. Their bodies yield an oil used in making liniments, and the flesh is sometimes eaten and reported as being very sweet and tender.

Skunks usually raise from 6 to 10 kittens in a season. If taken young they are easily tamed and make pretty pets, for they are cleanly in habit and rarely emit their offensive secretion save when provoked. The families remain to¬ gether for about a year, and during the coldest months of winter they all hibernate together in the same burrow. It seems to be fully estab¬ lished that the skunk is affected with a disease similar to canine rabies and that fatal cases of hydrophobia have resulted from the bite of even apparently healthy animals.

The skunks of the genus Spilogale are smaller and differ in the depressed skull, un¬ arched above. The white stripes are more numerous and often incomplete. The 12 de¬ scribed species are mostly confined to the western and southern portions of the United States and tb Mexico. One species, the little striped skunk (S. ringens), is abundant from Florida to Virginia and westward to Mississippi. It is about 14 inches long, with a broad white patch on the forehead, four white parallel dorsal stripes much broken behind, and a white tip to the tail. The third genus (Conepa - tus) has only 32 teeth, one of the upper pre¬ molars being absent, and differs in other re¬ spects from the foregoing. C. mapacito is the typical skunk of South and Central America and this or a closely related species extends through Mexico into Texas. Except that it does not hibernate its habits are essentially like those described for the common skunk. Con¬ sult Coues, (Fur-bearing Animals) (Washing¬ ton 1877) ; Merriam, (North American Fauna, No. 4} (Washington 1890) ; Ingersoll, (Wild Neighbors) (New York 1897) ; Halbrook, F. M., (Skunk Culture for Profit > (Chicago

1915).

SKUNK-CABBAGE, a common plant (S pathyema feetida) of the order of Aracece ,

found in colonies in bogs in eastern North America, and also in Asia. It begins to bloom in winter and the spathes, which are pushed through the mud thus early, are cowl-like, hav¬ ing a twisted point overhanging the orifice; they are fleshy, curiously mottled with purples, greens* and yellows, and protect a round spadix in- which four-merous perfect flowers are imbedded. These are purplish and are the first pollen-bearers to be visited by bees.

SKUPSHTINA, skupsh'ti-na, the national assembly of the Servians. See Servia.

SKY. See Astronomy; Atmosphere; Clouds.

SKY-ROCKET. See Projectiles.

SKYE, ski, Scotland, the largest island of the Inner Hebrides, off the western coast of Inverness, covers an area of 643 square miles. Its longest dimension is 48p2 miles but no point is over five miles from the salt water. Its scenery is celebrated. The deeply indented coast is lined by bold and lofty cliffs or basaltic pillars ; the interior is mountainous moorland, interspersed with lochs. The Cuillin Hills at the south form the highest points of land, Banachdioh being the highest, 3,234 feet, while toward the east, Blavin reaches an elevation of 3,042 feet. The Red Hills (2,403 feet) rise toward the northeast. The acreage under culti¬ vation is very small and there are few trees. The climate is variable and moist. Much of the land consists of pasturage. Sheep and cattle are raised, and fishing is a chief occupation. The famous castles of Armadale, Duntulm and Dunnegan draw many summer visitors. Loch Coirnisg, lauded by Sir Walter Scott in (The Lord of the Isles,5 is a small fresh-water lake near the Bay of Scavaig. Portree, the chief town on the east coast, has a good harbor and is the southern terminus of a steamer line. Seals are sometimes still seen on the most iso¬ lated rocks, and formerly there were walrus. There is a distillery at Carbost, where a well- known brand of whisky is produced. The eastern end of the island is very close to the mainland at two points, where there are ferries. The greatest population was attained in 1841, being 23,082 ; it has since steadily diminished, a recent estimate being 13,000. Gaelic is spoken more than English.

SKYE TERRIER. See Terrier.

SKYLARK, a European lark (Alauda ar- vensis), one of the most

popular European cage birds from the variety and power, rather than the quality, of its song, and the ease with which its health is preserved in captivity. It inhabits all of Europe, many migrating south in winter. The adult male is about seven inches long; crown dark brown with paled edges, forming a crest, upper parts brown, each feather with a spot of darker hue ; throat and upper part of breast grayish-brown, spotted with dark brown, abdomen yellowish-white, deepening into pale brown on the flanks, tail feathers various shades of brown. The female is a little smaller than the male.

The bird is famous wherever English is spoken and English poetry is read, for its flight- song, begun in early spring, and continued all through the summer. When it first rises from the earth, its notes are feeble and interrupted; as it ascends, however, they gradually swell

to their full tone, and long after the bird has reached a height where it is lost to the eye, it still continues to charm the ear with its melody. It mounts perhaps more perpendicularly than any other bird, and by successive springs, and descends in an oblique direction, still chanting its rippling music.

The female forms her nest on the ground within some depression, which serves to hide and shelter it — often in grainfields. She lays four or five dirty white eggs, blotched and spotted with brown; and she generally produces two broods in a year. These prolific birds live on seeds and insects; they are most abundant in the more open and highest cultivated situa¬ tions abounding in grain. In winter they as¬ semble in vast flocks, grow very fat, and are taken in great numbers for the table, especially in the Mediterranean region. Consult Boubote, *Birds of Great Britain) (1907).

SKYROS, ski'ros, Greece, an island of the 2Egean Archipelago, 25 miles northeast of Eu- ropos, and about 100 miles west of the main¬ land of Asia Minor. It is 18 miles long by seven wide. There is a large mountain at either end, Olympus on the north, 1,207 feet, and then a comparatively level isthmus to Kokhila on the south, 2,608 feet. The higher grounds are densely wooded, but Olympus has fertile slopes. The products are wheat, wine, oil and oranges. The raising of livestock — especially goats — is a considerable industry; also a species of small horses. A Greek mon¬ astery occupies the greater part of the modern Skyros. Theseus,, the hero of Athens, died here and his bones were carried to that town when under Kimon the Athenians took Skyros. The only town is also named Skyros and its population is about 4,000.

SLADEN, Douglas (Brook Wheelton), Anglo- Australian author: b. London, 5 Feb. 1856. He was graduated at Trinity Col¬ lege, Oxford, and became professor of history in the University of Sidney. He traveled extensively in Egypt, Sudan, Japan, China, Australia, Canada, United States and southern Europe. He won the Spencer Cup for rifle shooting in 1874 and collected hunting trophies and curios from all over the world. He made extensive com¬ parative studies in architecture during his travels. Among his numerous published works are (Frithjof and Ingebjorg) (1882); Aus¬ tralian Lyrics5 (1882); (Poetry of Exile5 (1883); (A Summer Christmas5 (1884); (In Cornwall and Across the Sea) (1885) ; (Edward the Black Prince) (1886) ; (The Spanish Armada) (1888) ; Australian Ballads and Rhymes5. (1888) ; A Century of Australian Song) (1889); Australian Poets5 (1889); (Lester the Loyalist (1890); (Younger Aus¬ tralian Poets) (1891); (The Japs at Home5 (1892); (On the Cars and Off5 (1895); A Japanese Marriage5 (1895); 'Brittany for Britons5 (1896); 'The Admiral5 (1898); (Trincolox5 (1898) ; 'In Sicily5 (1901) ; flay¬ ing the Game5 (1904); A Sicilian Marriage5 (1905); Carthage and Tunis5 (1906); (The Secrets of the Vatican5 (1907); (Egypt and the English5 (1908); (The Tragedy of the Pyramids5 (1909); (Oriental Cairo5 (1910) * (The Unholy Estate5 (1912); 'The Curse of the Nile5 (1913) ; 'Germany's Great Lie5

(1914) ; (Twenty Years of my Life) (1915) ; (His German Wife *(1915) ; (The Douglas Romance) (1916); (Grace Lorraine) (1917); (In Ruhleben* (1917); (The Shadow of a Great Light* (1917). He has also collaborated with Norman Lorimer, Eustache de Lorey, Mrs. E. N. Humphry, O. M. Potter.

SLAFTER, Edmund Farwell, American historian: b. Norwich, Vt., 30 May 1816. He was graduated from Dartmouth in 1840, took orders in the Episcopal Church and held rector- ates in Massachusetts prior to 1877. He is the author of (Sir William Alexander and American Colonization * (1873) ; (Voyages of the Northmen to America) (1877) ; (John Checkley, or the Evolution of Religious Toler¬ ance in Massachusetts Bay> (1897) ; and other historical books and monographs.

SLAG. See Metallurgy; Smelting.

SLANDER, a false and malicious oral defamation which tends to injure or disgrace the person so defamed. The chief difference between slander and libel is that the latter refers to malicious defamation expressed by writing, printing or illustration. The law draws a wide distinction between the two ac¬ tions. Words are held to be actionable, whether or not special damages are shown to have accrued from the defamation, if they impute a criminal offense against the law ; the having of a contagious disease; or if they are such as would affect one injuriously in his profession or trade. If the words are not so actionable, yet false and malicious, the party aggrieved cannot recover unless able to prove that he has sustained some certain actual loss . therefrom. If the party charged with slander prove that the words complained of are true, no action will lie for defamation, whether or not the words are actionable, for in that event the law holds them to be justifiable. Charging one with having committed perjury has always been regarded as being actionable and in many juris¬ dictions it is so provided by statute. Words which in themselves are not actionable may in reality be so through an allusion to some collateral facts, or through being used and understood in some particular sense and in such cases, when the offensive sense is proved, it is held to be slanderous. Words in themselves slanderous may be accompanied by explanations which deprive them of that character. There are certain kinds of communications which are regarded as privileged and are, therefore, not actionable, as, for example, the statement made in a judicial proceeding, or where one com¬ municates to another a circumstance which he has the right to know relating to a matter of mutual interest ; however, this privilege will not justify slander if malice be shown. Slander does not exist if the injurious words are not uttered within the hearing of a third person. Consult Newell, <Law of Slander and LibeP (1919). See Defamations; Libel.

SLANG (probably of cognate origin with the Norwegian word slengja, meaning <(to fling®), a mode of speaking or writing peculiar to some particular place or calling. The slang of the English tongue corresponds to the French argot and the German Sailversprache or Rotwelsch. The word slang is itself slang in origin : it has nothing, etymologically consid¬ ered, to do with any Gipsy word as has some-

times been asserted. Of obscure origin, its form nevertheless suggests a connection with the English word sling, — in the sense of this latter word as employed in the phrase to sling (that is, to fling) are proache s)y . All colloquial words or phrases which have originated in the rude speech of vagabonds and unlettered classes or belonging in form to the standard speech, which have acquired or have had given them

restricted, capricious, or extravagantly meta¬ phorical meanings, and are, therefore, regarded as vulgar or inelegant, may be considered as slang. Among slang names may be men¬ tioned, in general, that class of words and phrases and senses of words and phrases, more or less artificial and affected in origin or use, which are not recognized as be¬ longing to the standard vocabulary of a tongue into which they have been introduced, and have currency in some section of society either as a means of concealing secrets or as intentionally undignified substitutes for those modes of ex¬ pression employed by persons who have them¬ selves no propriety of speech. Slang is indeed used by persons of every grade of life; it changes with fashion and taste ; and sometimes leaves permanent and recognized additions to language. It consists of words which stand out predominantly even in colloquial speech ; and the very sense of the word slang implies the conception of a standard language, a nor¬ mal form of speech, popularly regarded as cor¬ rect. Slang differs much from dialect, for the latter is a local or provincial form of speech, characterized by some peculiarities of accent, pronunciation or grammatical usage which distinguishes it from standard speech ; and a dialect as much may thus have a slang of its own. It is true, however, that slang shades off into the ordinary colloquial speech and is thus constantly supplying the ordinary spoken language with new words and phrases, but this should be no reason why it should be simply confounded with the colloquial. In truth, slang enters more or less into all collo¬ quial speech and into inferior popular liter¬ ature such as novels, newspapers and political addresses; and is apt to break out even in more careful writing, as witness the criticism of Henry James in his (Notes on Novelists.* It is noteworthy that most slang is euphemistic. It delights in the invention of synonyms for particular words and devises substitutes for others, which well-bred people for a variety of reasons dislike or hesitate to use. Yet it cannot be said that all slang is of necessity vulgar or ungrammatical. For indeed it is generally correct in accidence and syntax and does not disregard phraseological idiom as to its structure; and thus, while slang not infre¬ quently meets censure as vulgar or unidiomatic, the truth is that it meets with disfavor on other than grammatical grounds. The vogue of any particular slang expression is apt to be very brief ; and the constant use of slang tends not only to vulgarize but to limit one's command of language: and here we probably find the rea¬ son why it is held .in disfavor. Further: slang words are not invented or used because they are in any respect better than accepted phraseology, but because they are different. There are two principal characteristics which, taken together, may serve to distinguish what is properly called slang from other varieties of

diction that in some respects resemble it ; and these are : Firstly, slang is a conscious offense against some accepted standard of linguistic propriety.

Secondly, slang words are deliberately sub¬ stituted for words of the vernacular just as the nickname of a person is substituted for that person's name. Nicknames are indeed a kind of slang; and like other slang may be used for the purpose of concealing meaning from the uninitiated hearers.

A mere vulgarism is not slang except¬ ing when it is purposely adopted and in the process acquires an artificial currency among a class of persons to whom it is not native. By ˆvulgarism® may here be understood such col¬ loquial expressions which are rejected as un¬ dignified by speakers of a certain grade in the scale of culture.

Ancient Greek and ancient Latin each had its slang; its argot. See in this connection the plays of Aristophanes, the comedies of Plautus, the satires of Horace, Persius and Juvenal; and especially the surviving, serious fragment of Petronius, known as the 'SatiriconP Likewise every modern European tongue has its quantum of slang. From the 17th century onward it has been more and more difficult to distinguish between English cant of the thieves and vagrants and slang of other classes more or less characterized by disorderly habits of life, such as pugilists, strolling players, professional gamblers — in brief, of all such classes as are addicted to low pleasures and vices. The speci¬ men of the earliest English ((cant® or ((Peddler's French® in Copeland's (The Hyeway to the Spyttel House) (1517) bears characteristics that resemble closely those of the German Rotwelsch of the same period. An example of the latter may be found in the Old High German Liber Vagatorum of 1510; and it is easily seen that the most noteworthy point of difference between Peddler's French and 16th century Germanic Rotwelsch lies in the absence of those Hebrew words from Peddler's French in which Rot¬ welsch abounds. In the English of Hudibras and the literature of England, dating from the 18th century, slang is to be found. A peculiar growth of the 19th century is the so-called back slang, current chiefly among London coster¬ mongers, which is a cryptic jargon formed by pronouncing words backward, as in the phrase, ((eno dnuop and a flah,® for (). Coster-monger's slang is thieves' slang, in which the middle vowel of a word is taken as the initial letter so the other letters or syllables are

added to give it, as it were, a finish ; thus, lock becomes ockler and pitch, itchper. Slang, and cant in particular, as in the phrases <(thieves' cant® or sprinters' slang,® or the cant of any craft or calling, really designates a language within a language, and it is sometimes intended to conceal the thoughts of those who utter it from the uninitiated. There is a slang

attached in this way to nearly every profession and occupation ; and different- classes of society have their slang. Thus there is a slang of commerce, of the army, of the race-track, of the college and school, of the stock exchange, of the prize ring, of the ball field, of politics, and even a slang of art and the ministry. Very often slang adopts technical language to the general use ; its expressions may be per¬ fectly correct as originally used, but they be¬ come slang when used metaphorically. The gaming-table, the turf and all the varieties of (<fast® or ((Bohemian® life, each has its own eccentric vocabulary, and these vocabularies are either identical with or in general character resemble the slang of criminal and vagrant classes.

Some examples of slang may now be noted. A user of slang will characterize a feeble¬ minded or silly person as having a (<screw loose,® a ((slate off,® <(bats in his belfry,® ((off his base,® or as being (<cracked,® <(touched® or ((dotty.® He will call his child or wife a (<kid.® He will say <(rum® for ((queer,® ((gay® for ˆdis¬ solute® and call a watch a ((ticker.® He will say (<corned,® (<pickled,® <(tight,® ((stewed® or (<slued® for intoxicated; and use (<awfully® as substitute for exceedingly. ((Daisy® with him will characterize some person who is charming or some thing which is admirable ; and the user of slang will announce the death of a per¬ son by telling one that someone has ((kicked the bucket,® (<cashed in® or "hopped a twig.® To be angry means that he has "got your goat,® and he will allude to the clergyman present as a ((sky pilot® ; while in a museum he will show you the latest ((pot-boiler,® and in so doing he both names and stigmatizes certain works of art.

A habitual user of slang will likewise borrow words like <(pan out® from the technical lan¬ guage of gold digging or other pursuits of a similar character; he will use the word "four- flusher® from the language of the professional poker-player, and he will use the slang ex¬ pressions ((deal,» <(walk-over® and ((up the flume® in giving an account of business. In his vocabulary of praise and blame one will find expressions such as Gripping,® "swagger,® ((stunning,® (<the cheese,® "rot,® ((poppy-cock® ; and when he is in some difficulty he will be Hn a hole,® "in a box,® "on his beam ends® or ((in the soup.® To extricate himself he will use his head or (<nut,® (<think-

box,® ((brain-pan® or “upper story® ; and will need money or, as he calls it, “dough,® (<mazuma,® “shekels® or ((rhino.® To go in public he will don his (<glad rags® and appear as a <(swell,® (<giddy-boy® or “dude.® In this respect he will resemble the older <(beaux,® (<bucks,® (<exquisites,® (<gallants,® ((sparks® and “blades.® While in the stock exchange one will hear him speak of ((bulls,® <(bears,® “lambs,® “longs® and ((shorts,® and from the side of the prize-ring one will find him awaiting to see a <(knock-out® and always willing to dis¬ approve of a blow ((below the belt® ; and he will be disappointed should one of the pugilists (<throw up the sponge.® One recent contribu¬ tion to the vocabulary of slang is the word (<jazz,» which originated in the southern States, and means, according to a user’s own defini¬ tion, “to mix things up and spread ’em on thick®; in other words, a medley. Thus it ap-

pears that nearly every trade and every pro¬ fession has a slang of its own in the shape of a body of words and expressions that serve as flippant and undignified substitutes for stand¬ ard speech.

The contribution made by foreign languages to English slang, although it is not to be dis¬ regarded, is not to be overrated as to its extent. There are a few words — “boss® from the Dutch baas, dago from the Spanish Diego, spiel and bum from the German, which may be named as of foreign origin. The Romany, or tongue of the Gipsy, gave English the words “cove,® “jockey,® “mug® and (<pal,® which may be considered as slang expressions, and the English phrases, “not half bad® and “a very decent fellow® are, carefully considered, slang expressions and represent the rhetorical figure called meiosis. There are, it is true, words that are no longer slang (“mob,® “humbug® and “tandem® are examples) that were once so considered. America has contributed its quota to the slang of the English tongue ; of such we might name the following expressions, recom¬ mended mainly by their oddity : “scallywag,® “absquatulate,® “skeddaddle,® “vamoose® (from Sp. vdmos, “let us go®) ; and English has also these substitutes for standard usage to char¬ acterize political life — -“mugwumps,® “gerry¬ mander,® “carpet-bagger® ; as well as the older “Rump,® “Bare-bones Parliament,® “Round- head,® “Puritan,® and so on. So politics also has its “slates,® “wire-pulling,® “pipe-laying,® “log-rolling® and “filibustering.® Expressions such as the foregoing, stigmatized at first as pure slang, are often in the end accepted as legitimate; just as have

been the words “poney,® “cob® and the term, “slang® itself.

As the prevailing tendency of words in a language is toward degradation of meaning one of the most frequently recurring needs of Eng¬ lish is that of words of dignified and serious intention to take the place of words which have become vulgar through ignoble use ; and, there¬ fore, it may be believed that while slang has made its contribution to the English language, still that contribution has been, on the whole, small.

Bibliography. — Barrere, Albert, (Argot . ad Slang J (rev. ed., London 1889) ; Barrere and Leland, dictionary of Slang and Cant) (2 vols., ib. 1897) ; Delande’s (Glossaire erotique) (Brussels 1861) ; Farmer, J. S., and Henley, W. E., (Slang and its Analogies > (7 vols., 1890- 1904) ; Kluge, F., (London 1905) ; Dawson, A. H., dictionary of English Slang and Collo- quialisms) (New York 1913) ; Sullivan, J. M., (Criminal Slang) (Boston 1914) ; Sechrist, F. K., (Psychology of Unconventional Language) (Worcester, Mass., 1913) ; Bosson, O. E., (Slang and Cant in Jerome K. Jerome’s Works: A Study *(Cambridge 1911); Ware, J. R., Mass¬ ing English of the Victorian Era* (New York

1909).

SLATE, a clay rock which has been sub¬ jected to compression during mountain-making

processes in the earth’s crust, and which as a result splits readily into thin sheets or cleavage laminae in a direction at right angles to the direction of compression. According to Sorby, cleavage is produced in such rocks by the re¬ arrangement during compression of the plastic particles comprising the original rock mass, in such a manner that their longer axes come to lie perpendicular to the direction of com¬ pression, and that planes of easy fracture were thus produced parallel to the long axes of the particles. This was illustrated by Sorby, with a cube of clay through which mica scales or scales of oxide of iron were sprinkled, which was then subjected to powerful compression and drying. A perfect cleavage at right angles to the line of pressure was produced, and micro¬ scopic examination showed that the mica scales lay in the direction of cleavage. Tyndall found by experiment that cleavage is more perfect in proportion in which the cleaved material is free from foreign particles, such as mica scales, and he considered that cleavage was produced in homogeneous rocks (except the vitreous) by the compression and flattening of the minute discrete granules or particles of which all such matter consists. The structure is changed by the compression from granulous to scaly. Enor¬ mous vertical swelling

of the rock masses re¬ sults through such lateral compression, and this swelling is an important factor in the formation of mountains.

Ordinarily cleavage exists in rocks in a po¬ tential manner only — the rock is cleavable in a certain direction, but no actual separation takes place. This, however, is rapidly developed when the rock mass is exposed to atmospheric influences. Slates are quarried in solid blocks and split up in thin sheets, usually by hammer and chisel after quarrying. The important slate- producing horizons of eastern United States are the Cambrian and Ordovician beds of the Taconic range of eastern New York and its extension in Vermont, and the corresponding formations of Pennsylvania and other regions in the northern Appalachians. In composition slates vary greatly, especially in the proportion of silica. An analysis of common roofing-slate gave the following: Silica, 48; alumina, 25.50; oxide of iron, 11.03; potash, 4.70; magnesia, 1.60; carbon, .30; water, 7.60. Since slate is in reality a structural term, denoting the property of easy splitting so characteristic of roofing slates, rocks of almost any composition may be indexed under this term, provided they show the characteristic slaty cleavage. Thus it has become customary to speak of anthracite slate, in which a considerable percentage of carbo¬ naceous material is present ; whet slates — clay slates, with a large percentage of silica, often nearly pure silica (Novaculytes) ; talc slates and chlorite slates, where those minerals are prominent ; gray-wacke slates, more or less arenaceous and micaceous slates. Roofing slates, however, are the typical slates, and the ones in which the slaty cleavage is best devel¬ oped. The most important localities for these in the United States are Vermont and Penn¬ sylvania.

The slate belt of Pennsylvania first appears in the eastern corner of York County and “then sweeps around in a gradually narrowing curve to the Susquehanna River.® It reappears on the eastern bank of the Susquehanna in Lan-

caster County, but can be traced for a compara¬ tively short distance from the river. While this belt is quite limited in extent, being but six miles long and less than one mile in width, it is nevertheless producing a very high grade prod¬ uct. It is from this belt that the well-known (<Peach Bottom Slate® has come. It has re¬ markable strength and durability, exceedingly fine in grain and texture and the very desirable quality of retaining its original color even after

continuous exposure for many years. It lacks the high degree of fissility, however, that char¬ acterizes other localities. Microscopic study of thin sections from this belt shows, according to Merrill, that the slate is not fragmental in character, but on the other hand is a <(highly carbonaceous, crystalline schist.® This is at¬ tributed to the high degree of metamorphism to which the belt has been subjected. Bangor and West Bangor are the centres of greatest activity. The belt continues for a short dis¬ tance into Maryland where a few smaller cen¬ tres of production are located. Maine follows Vermont with a valuation of $202,325 for 1901. There are five areas of note in the State. One of the two larger belts extends from Franklin County northeastward to Aroostook County, thence northward into New Brunswick. The second passes from the western boundary of Somerset County, in an easterly direction to Houlton, Aroostook County. <(Of the three smaller areas, one is on the Kennebec River, south of Skowhegan and the two others in Washington County, about Baskahegan Lake and near Princeton.® Only portions of the two larger areas produce slate of a medium or high grade.

Colorado, Dakota, Massachusetts, Michigan, Minnesota, New Hampshire, Tennessee, South Carolina, Texas and Virginia are known to contain slate terrains of more or less import¬ ance. Very little effort, however, has been put forth to develop the slate industry in these respective States.

An inspection of the most recent statistics reveals the fact that there are now some 14 productive States in the Union. Pennsyl¬ vania takes the lead, with an annual valuation of $3,609,957 for the production of 1914. Ver¬ mont takes second place with a valuation of $1,414,247 for 1914. The valuation of the slate production of the following States exceeded $70,000; these are Maine, Virginia, New York and Maryland. Arkansas, California, Georgia and New Jersey also yield small amounts. In 1914 the valuation of the total production of the United States was $5,706,787. The latest addi¬ tion to the list of producers is the State of Arkansas.

Export trade in roofing-slate reached its highest mark in 1898 with a valuation of $1,370,- 075. Great Britain was the chief importer of our product at this date. From the above date, however, our exports materially decreased. This was in the main due to the settlement of strikes in the Welsh quarries and the conse¬ quent development of the slate industry in Wales. British Australia and Denmark were also importers of the American product. In 1914 exports had dropped to $139,125.

One of the most remarkable slate belts of this country lies in eastern New York and western Vermont, between the Taconic range

on the east and Lake Champlain and the Hud¬ son on the west, and chiefly between the Hoosic River on the south and the towns .of Benson and Hubbardton, in Vermont, on the north. It attains a maximum length of 68 miles and an average width of about seven miles. The great producing centres lie in Wash¬ ington County, N. Y., and Rutland, Vt.

The slates in this field are green of various shades, purple, variegated, that is, mixed green and purple, red and also black. See Shale; Sedimentary Rocks; Mineral Production of the United States.

A. W. Grabau, Columbia U niversity.

SLATER, John Fox, American philanthro¬ pist: b. Slatersville, R. I., 4 March 1815; d. Norwich, Conn., 7 May 1884. He inherited from his uncle, Samuel Slater (q.v.), the cot¬ ton spinning enterprises which he had founded, and so managed them as to acquire a large for¬ tune. He contributed generously to the estab¬ lishment and maintenance of the Norwich Free Academy and other similar institutions, but is best known for his gift of $1,000,000, forming the <(Slater Fund,® for the education of freed- men in the South. For this benefice Congress voted him a resolution of thanks and a medal. See Slater Fund.

SLATER, Samuel, American manufacturer : b. Belper, Derbyshire, England, 9 June 1768; d. Webster, Mass., 21 April 1835. He had worked under Arkwright and Strutt in the cot¬ ton factories in England and had helped in de¬ vising some of the machinery used there, and hearing that a bounty had been offered in the United States for the introduction of the Ark¬ wright patents, he came to this country deter¬ mined to win it. As the English law forbade the exportation of drawings or models of the English machinery, Slater had to depend en¬ tirely on his memory for the mechanical details. He succeeded in constructing at Pawtucket, R. I„ the first cotton mill in the United States. He afterward established mills at Oxford (now Webster), and in a locality now known as Slatersville, R. I., where a town of 1,850 people depends mainly on the Slater factory.

SLATER, Mo., city in Saline County, 85 miles northeast of Kansas City, on the Chicago and Alton Railroad. It was settled and incor¬ porated in 1878 and received its city charter in 1884. It is situated in a productive agricultural region and has a flour mill and grain elevator. Pop. 3,797.

SLATER FUND, the gift of John Fox Slater, of Norwich, Conn., to the cause of edu¬ cating the negroes of the South, was originally the sum of $1,000,000. The gift was made in 1882, to a board of trustees, who were to hold the principal and expend the interest in promot¬ ing institutions already established on a perma¬ nent basis. In acknowledgment of this philan¬ thropy Congress voted the donor thanks and a medal. By the terms of the gift neither prin¬ cipal nor income is to be expended on buildings or grounds. The fund is expended principally in helping students of, and preparing teachers for, the manual training schools, agricultural and mechanical colleges and technological in¬ stitutions. Rutherford B. Hayes, Dr. D. C. Gilman, Morris K. Jessup, Bishop Potter, Wil-

liam E. Dodge and many other prominent men have served on the board. The fund is as a potential agency in working out the problem of the education of the negro, and $1,000,000 has already been expended. B}' the extraordi¬ nary fidelity and financial ability of the treas¬ urer, the fund, while keeping up annual appro¬ priations, has increased to $1,500,000. Schools established by States, denominations and indi¬ viduals, are helped by annual donations. Among the most prominent are the Hampton Normal and Industrial, the Spelman, the Tus- kegee, and schools at Orangeburg, S. C. ; Ton- galoo, Miss.; Marshall, Tex.; Raleigh, N. C. ; New Orleans, the Meharry Medical College at Nashville, etc.

SLATIN PASHA, sla'ten pa-sha (Rudolf Carl), Austrian soldier: b. Vienna, 1857. In 1874 he undertook a journey to the Sudan, where he made the acquaintance of General Gordon, who, four years later, while Slatin was serving in the Austrian army on the Bosnian frontier, invited the latter to take service with the Egyptian government. In December 1878, at the age of 22, he set out for Khartum. Gor¬ don appointed him successively financial in¬ spector, mudir of Dara, and governor-general of Darfur. In the last-named post he played a prominent fighting part in the struggle against Mahdisrm He fought 27 battles, lost a greater part of his Egyptian army and was finally forced to surrender (1884). For 11 years he was a prisoner of the Mahdi and, later, of the Khalifa, being kept in heavy chains most of the time. After his escape he accompanied the British troops in the campaigns of Don- gola, the Atbara and Omdurman. He was knighted by Queen Victoria in 1898 and was ap¬ pointed inspector-general of the Sudan in 1900, a post he resigned in 1914. The British honors

conferred upon him include the K.C.M.G., C.V.O., K.C.V.O., G.C.V.O., besides the rank of major-general. These distinctions he renounced in December 1914. His African adventures and long captivity are described in his book, (Fire and Sword in the Sudan) (New York 1896). He was a member of the Aus¬ trian peace delegation in Paris, May 1919.

SLATINGTON, Pa., borough in Lehigh County, 5,8 miles northwest of Philadelphia, on the Central of New Jersey, the Lehigh Valley and the Philadelphia and Reading railroads. The scenery is unusually fine. Blue Mountain and Lehigh Gap both being nearby. It was settled in 1738 and was incorporated in 1864. There are slate quarries and manufactures of slate roofing, as well as of machinery, rolling mills products, knit goods and silks. Pop.

4,014.

SLAUGHTER-HOtfSE. See Abattoir.

SLAUGHTER-HOUSE BY-PROD¬ UCTS. From the viewpoint of the general public, fresh meats are perhaps the most im¬ portant item in the whole range of commodities which the individual is ever called upon to buy. Yet, from the viewpoint of packers' profits, the by-products of meat packing long ago out¬ stripped dressed beef, pork and- mutton, as well as pickled meats of all kinds.

The packer to-day makes little or no money on what are known as carcass meats. In the recent years of struggle with ((rising costs® livestock raisers have demanded higher and still

higher prices for cattle, hogs and sheep, not only because the cost of feeds and help have risen, but also on the ground that the quality of their animals, in point of breeding, of finish and tender age of marketing, has constantly im¬ proved.

On the other hand, there has been a de¬ termined resistance on the part of the consumer to the rising cost of steaks, roasts and chops, as well as constant and widespread agitation throughout the country for higher standards of cleanliness, sanitation and efficiency in methods of dressing, refrigeration and distribu¬ tion of meats.

Nearly All Profit Eliminated from Dressed Meat. — Efficient and economical oper¬ ation on a large scale has made it possible for American meat packers to continue in business in spite of increasing cost of livestock, labor, and all material and equipment. They have paid producers the highest prices and have kept their own margin of

profit down to the lowest point consistent with safety. Higher standards of meat products have been maintained as a re¬ sult of United States government inspection.

The producer on the one hand, and the con¬ sumer on the other, have each been so jealous of middleman's profits that the middleman, who in this case is the packer, has been forced al¬ most entirely out from a profit viewpoint. In point of service, however, the packer is still in evidence and the slaughter, dressing, chilling and distribution of these dressed meats are still performed by him.

The outcome of such a situation is that the butcher of to-day regularly pays the packer for the dressed carcass a less amount than the packer paid the farmer for the animal before it was killed, dressed, chilled and shipped.

By-Products Pay Packers' Profits. — It will thus be seen that on carcass meats alone the packer loses money, being obliged to maintain, for the distribution of these profitless perish¬ ables, an elaborate system of branch houses and refrigerator cars.

This is not to say, however, that the packing business as a whole is devoid of profit. Only approximately 55 per cent of the live weight of a steer is represented in the dressed carcass. In the remaining 45 per cent, which is made up of blood, hide, hoofs, horns, bones, hair, intestines, glands and other items of offal, the packer finds opportunity to recoup himself for any loss he may sustain on carcass meats and ensure a fair return upon his whole investment.

In the early days of the meat packing busi¬ ness all of these items, with the exception of hides, were discarded as of no account. They were, at that time, contemptuously referred to as <(the revolting nuisance of packers' waste,® which could not be given away, much less sold, and the expense of getting rid of them by other means ate into the profits which then existed in carcass meats.

First Utilization of By-Products.— In the

decades since the Civil War, but principally since the introduction of mechanical refrigera¬ tion on a large scale, about 1870, a gradual change has been coming over the packing in¬ dustry in this regard. Small quantities of the bones, ears and hide trimmings began to be utilized in the manufacture of glue at the Chicago stock yards as early as 1869. The value of dried blood as an ingredient of fertilizer

was recognized in 1870. The canning of meats by the Appert vacuum process became commer¬ cially successful before 1875, and then the caul or leaf fat about the kidney of steers was found to be especially rich in oleo oil which forms the principal ingredient of oleomargarine to-day.

From that point on, a large volume would be required to enumerate the discoveries and successes wrought by the hundreds of chemists and other scientific and practical men who have devoted years, if not their entire lives, to the exploitation of this promising field.

From Mere Slaughter-Houses to Great Factory Systems. — The gradual development and commercialization of by-products, however, has involved an ever-growing investment in plants, machinery and distribution facilities, and an ever-broadening pay-roll. The business which was once confined to slaughtering and speculating in dry salt and pickled meats, with a small slaughter-house pay-roll in winter only and none whatever for manufacturing and dis¬ tribution, has grown to be almost wholly an enormous manufacturing industry which oc¬ cupies itself the year around at utilizing, in commercial form, all those elements formerly comprehended in what was known as packers' waste.

The hides and pelts of steers and sheep, of course, constitute one of the most valuable by¬ products of the packing business. These are depilated and tanned, usually by the packers themselves, or by auxiliary corporations, and are made into all forms of leather, from shoe soles and belting to the highly finished and brightly colored leathers for book binding and milady’s handbag.

Sharp Refrigeration Saves the Perishables.

— The hearts, livers, sweetbreads, kidneys, brains and ox tails which, within the memory of men still in active life, were given freely to whoever would take them away, the re¬ mainder being dumped regularly into the river or hauled, along with other waste, to the prairie to be buried in trenches, are to-day quickly frozen, packed and transported with the frost on them in summer as well as winter, for re¬ tailing at good prices in distant parts of the United States.

Calves’ Pates Make Gelatine — Pigs’ Feet are Pickled. — Calves’ ears are carefully cleaned and manufactured into edible gelatine. Pigs’ feet are pickled and sold as a relish. The stomach of the steer is put

through an elaborate cleaning, cooking and pickling process and emerges as honey-comb tripe. Much of the blood of the steer, being caught in buckets, is utilized in the making of ˆblutwurst® or blood pudding. Large quantities, however, are also used as an ammoniate in fertilizer and by tan¬ ners in finishing leather. The milts or spleens are mostly sold to the government and other agencies maintaining fish hatcheries as a food for growing fish.

How Oleomargarine is Made. — Great ket¬ tles first boil the suet fat and choice leaf fat which are used in the manufacture of oleo¬ margarine. These fats are reduced to liquid form and are sent down pipes to the presses where the oil is separated. Next comes the salt¬ ing and churning with uncolored butter and pas¬ teurized whole milk. Oleomargarine is known for its purity and nutritive value, as well as the characteristic butter flavor which it possesses.

Oil and Stearin Separated by Pressure.—

When the oleo oil has been pressed from the rendered caul fat of the steer, the hard part of the fat remaining in the press is known as oleo stearin. This, also, is the basis of a com¬ mercial product which is sold to be used in the manufacture of chewing gum, as well as taf¬ fies, penny candies and chocolates.

The coarser and inedible grades of stearin are sold to tanners who use it as a filler in mak¬ ing leather. Inedible grades of lard are pressed to separate the lard oil from the lard stearin. This oil is used in the compounding of lubricat¬ ing oils.

How Intestines are Utilized. — The intes¬ tines of cattle, hogs and sheep are as rigidly classified, graded and devoted to their special purposes as are all other portions of the animal.

A set of hog intestines, for instance, is classi¬ fied into the small casing, the bung and the mid¬ dle gut or chitterling. All intestines are flushed with water and thoroughly cleaned and sterilized inside and out. They are next in¬ flated, assorted according to size, and, if used for sausage casings, are salted down in tierces and kept in cold storage as a regular commodity of trade.

Make Sausage Casings and Violin Strings.

— The wide range in size, shape and appear¬ ance of casings when filled with sausage is be¬ wildering to the uninitiated, yet the variety is not as great as the range of sausages to be con¬ tained in them. Every country on the globe, perhaps, has its peculiar styles and grades

of sausage, beef and pork, fresh and dried, smoked and unsmoked, cooked and raw, seasoned and unseasoned, and so on, ad infinitum. Each of these styles of sausage is quite distinct and necessary to the nationality for whom it is de¬ signed, and the myriad sizes, shapes and appear¬ ances of casings, when filled, are indispensable as an identification of the exact style of sausage which they contain.

Dried bladders are used as containers for putty and certain other dried tissues as gold¬ beaters' skins, snuff containers, covers for per¬ fume bottles and as tissue from which balloon envelopes are made.

From the intestines of the sheep many varie¬ ties of the best violin and other musical strings are made, the traditional cat gut being a mis¬ nomer. Strings for various other purposes are also made, including tennis strings, drum snares, clock cords and surgical ligature.

Novelties Made from Horns, Hoofs and Bones. — The horns and hoofs of cattle are softened by steam, split open and flattened out into plates. From these plates are stamped combs, hairpins, napkin rings, buttons, buckles, knife handles, umbrella handles and other novelties. Black hoofs are also ground up and used as an ammoniate in the manufacture of fertilizer for the use of florists, grape growers and others. The shin bones of cattle are sawed into plates from which pipe bits, but¬ tons, washers, electrical bushings, crochet hooks, chessmen and such articles are made. Soft bones, as well as hide trimmings and sinews, are rich in glue and are devoted to that pur¬ pose, the residue being found valuable in the manufacture of fertilizers. The feet of calves and cattle also yield an article commercially known as neatsfoot oil.

SLAUGHTERHOUSE BYPRODUCTS

1 Curled hair Machine. After the hair has been twisted into ropes for curling and processed, it is untwisted,

separated and carded by these machines <p-

2 Finishing horn hairpins, which have been stamped from horns which have been slit open, heated and flattened out

into plates

'4

SLAUGHTERHOUSE BYPRODUCTS

1 Pepsin Tanks, Armour & Company's Pharmaceutical Laboratory

2 Moving Platform showing carcasses traveling away from observer and coming back in a hanging position on an

overhead rail as seen in the background

SLAUGHTERHOUSE BYPRODUCTS

1 Mechanical mixer working salt into Oleomargarine — the last process preparatory to putting it in cartons

2 Soap in process of seasoning preparatory to cutting up and stamping into cakes

More than 40 Medicinal Agents. — One

of the most important and highly scientific de¬ partments to be considered in relation to the utilization of abattoir by-products is the phar¬ maceutical laboratory. In this department, pep¬ sin in both tablet and liquid form is prepared from the stomach linings of the pig, and rennet, for the use of cheesemakers in the curdling of milk, from the true or fourth stomach of the calf. All told more than 40 medicinal agents are manufactured from the various glands and membranes of cattle, sheep and hogs and sold only through the medical profession, among which, in addition to those already mentioned, are pancreatin, thyroids, benzoinated lard, suprarenals, pituitary liquid and ox gall.

Toilet and Laundry Soaps and Glycerin. — The manufacture of soaps, however, is per¬ haps the most familiar example of abattoir by¬ products in the whole list. Soaps are manu¬ factured in infinite variety and on an enormous scale and Chicago soaps, both laundry and toilet varieties, are attaining a degree of perfection that is marveled at even in France. A by-prod¬ uct of soap making is glycerin, which will be recognized by those who have witnessed the process of soapmaking in their own homes in the clear reddish liquid which remains in the kettle after the solidified soap has been re¬ moved. This glycerin, after being refined, is used as a vehicle in medicinal preparations. Its greatest use, however, is in the

manufacture of dynamite, nitroglycerin and other explosives.

J. Ogden Armour.

SLAUGHTER-HOUSE CASES arose out of laws passed in 1869 by the legislature of the State of Louisiana in an act intended to protect the public health in the city of New Orleans and to that end incorporating The Crescent City Live Stock Landing and Slaughter-house Com¬ pany. The act gives to this company the sole right ((to land, keep or slaughter any cattle, beeves, sheep, swine or other animals . within the city of New Orleans, or at any point or place . . .® on the east or west banks of

the Mississippi River, opposite the corporate limits of the city. Included with this privilege, granted to this company and forbidden to all other persons, was the right to establish wharves for the landing of livestock and to levy wharf¬ age on the stock landed at so much per head. This act was bitterly opposed by the butchers and cattle dealers, and after it went into effect an action was brought in the District Court and an injunction obtained on the ground that the law was unconstitutional ; when the case was tried the court sustained the injunction and made it perpetual, on the ground that it was in opposition to the 14th Amendment of the United States Constitution (q.v.), and to the first and second sections of the State ((Bill of Rights.® In delivering his opinion the judge (Collens) said as follows: ((This law (1) prevents any freedom whatever; (2) walls up many miles of the shores of the river on both sides against an important branch of commerce; (3) vests as it were a private company with an ownership in one of the greatest ports of entry in the United States; (4) gives this company alone the authority to Establish wharves *for vessels bringing livestock into the port of New Orleans; (5) yields it the 'exclusive* right of having one or more stock landings, with the 'exclusive*

privilege of having landed at its wharves and landing places all animals intended for sale or slaughter in the parishes of Orleans and Jef¬ ferson ; (6) authorizes it to determine at what points or places wharves, stock-landings, etc., may be erected; (7) grants it the power of levy¬ ing wharfage not simply on the vessels, accord¬ ing to tonnage and time, but a round sum on the vessels, and a duty of 10 cents per head on large, and 5 cents per head on small beasts landed in this port; and (8) all this is made effective by penal clauses imposing fines, etc.® The judge declared that this was not only against the clauses named, but, surpassing police regulation, was also "a bold and well contrived regulation of commerce, compelling the

coveted trade to flow into the channel, and leave the tribute in the coffers of this private monopoly,® and as such was in violation with both the pro¬ vision in the Federal Constitution giving Con¬ gress the sole power to regulate commerce, and the act of Congress under which the State of Louisiana was admitted into the Union.

This decision, with others, some varying, which had been given in different District Courts, were the next year, 1870, carried into the Su¬ preme Court of the State, and there the case was determined in favor of the defendant cor¬ poration, and all persons enjoined from interfer¬ ing with the privileges granted to it under its charter. The opponents of the company then took the case into the United States Circuit Court, asking for a perpetual restraining in¬ junction against it. This was granted on the sole ground that the act incorporating the com¬ pany was in violation of the 14th Amendment of the Federal Constitution, the court disclaim¬ ing jurisdiction over any other of the issues raised. A writ of error was asked for and ob¬ tained, and on it the case was carried to the United States Supreme Court. Here, after be¬ ing three times argued, a decision was delivered in 1873, recognizing the validity of the act and permitting the exercise of the powers con¬ ferred by it. The decision- of the court on the various issues involved gave the case its great importance. It had been contended, in the first place, that the act was invalid because it created a monopoly, conferring privileges on a few per¬ sons to the exclusion of all others, and depriv¬ ing a numerous class of citizens of the right to follow their usual employment. On this point the court decided that the act was within the police power of the legislature — ((a power in¬ capable of any very exact definition or limita¬ tion.® From the decision upon this point a minority composed of the chief justice and two associate justices dissented. The objection had been urged by the complainants that the act was a violation (1) of the 13th Amendment of the Federal Constitution, by creating a kind of involuntary servitude; and (2) of the 14th Amendment, because it abridged „the privileges and immunities of citizens of the United States, deprived the plaintiffs of their property without due process of law and denied them equal pro¬ tection under the law. The court held that the term “servitude® in the 13th Amendment means personal servitude and that the purpose of the amendment was to guard against a continuance of slavery in any form, and that the amendment had not been violated by the act under discus¬ sion. As regarded the 14th Amendment the court perceived and established the difference

between a citizen of the United States and a citizen of a State; it defined the rights and privileges of these two classes of citizens and held that only a citizen of the United States was placed under the protection of the Constitution by the clause in the 14th Amendment. The court further held that no other clause of the amendment was violated, the act of the legisla¬ ture of Louisiana not being a deprivation of property, nor a denial of the equal protection of the laws, within the meaning of the amendment.

The minority of the court held (1) that the act of the legislature was of itself a step be¬ yond the police powers of the State, and, there¬ fore, was void; (2) that the act was also void under the 14th Amendment since it is in the meaning of that amendment that all acts of a State legislature shall respect the equality of rights of its citizens to follow the ordinary pur¬ suits of life which equality of rights, the minor¬ ity held, had been contravened.

The decisions of this case are considered extremely important because they not only dis¬ cuss the police powers of the States, but be¬ cause of the interpretations of the clauses in the Federal Constitution brought into issue. The case is reported in 16 Wall. 36, Supreme Court reports.

SLAVE COAST, Africa, a name formerly and still sometimes applied to a part of the coast of the Gulf of Guinea, from the mouth of the Niger westward to the river Volta. It is the coast of Togo, Dahomey and part of Ni¬ geria. It received its name from the fact that its ports were the chief centres for the expor¬ tation of slaves.

SLAVE LAKE, Great. See Great Slave Lake.

SLAVE LAKE, Little (or Lesser), Al¬ berta, Canada, a lake in Athabasca Territory, about 270 miles southwest of Lake Athabasca. It is drained by the Lesser Slave River into the Athabasca or Elk River. It is about 60 miles long, and its greatest breadth is about 12 miles. The surface of the lake is 1,890 feet above sea-level.

SLAVERY, an institution, state or condi¬ tion by which certain persons (slaves) are held as the property of other persons (slaveholders) ; also the condition of a human being who is held as the property or chattel of another, who is absolute master of his body and service, sub¬ jecting him wholly to his will and domination. The system is one of great antiquity and was early practised among the Hebrews. It existed among the Assyrians from the earliest recorded times, among the Babylonians, Chinese, Egyp¬ tians and all the ancient peoples. The

primi¬ tive religions appear to have all sanctioned the institution. Slaves were obtained by capture, purchase and by breeding. They were often controlled by whipping, branding and were at times subject to cruel punishments and death at the whim of their masters. The females were used without their consent, and beautiful girls and women were sold often at public auction. The slaves of the ancient Romans were either captives or debtors who were unable to pay. In Rome the slave had originally no rights. He could be put to death for the smallest misdemeanor. Slaves were exceedingly numer¬ ous, and latterly almost monopolized all the various handicrafts and occupations, those of

the clerk, the doctor and the literary man in¬ cluded. In the time of Augustus a single per¬ son is said to have left at his death over 4,000 slaves. Hosts of slaves were employed in the gladiatorial exhibitions. Slave revolts occurred in 134 and 102 b.c. in Sicily, and a revolt in Italy led by the gladiator Spartacus in 73 b.c. was put down with considerable difficulty. Slaves, however, were often set at liberty, and these freedmen were a well-known class in Rome. But it was not until the time of the em¬ pire that any great change took place in the condition of the slaves. Augustus granted the slave a legal status, and Antoninus took away from the masters the power of life and death over their slaves.

The early Christian Church did nothing to suppress slavery, and slavery and the slave- trade continued to exist for 1,000 years in the Christian nations of Europe that arose on the ruins of the Roman Empire. It was not until the 13th century that the severity of slavery began to decline in Europe. The Koran ex¬ pressly permits the Moslems to acquire slaves by conquest, but this method of acquiring slaves was not resorted to until the Crusades. Previous to the Crusades they kept negro slaves imported from Africa. Latterly the Moham¬ medans began to obtain white slaves not only by war but also by purchase, Rome being the centre of the trade. The Mohammedans of the Barbary states also obtained white slaves by piracy in the Mediterranean. The superiority of the white races in war, and the comparative helplessness of African blacks, led to the com¬ mon practice of invading African coasts and capturing men and women during the 16th, 17th and 18th centuries.

After slavery had become largely reduced in Europe, it had a new birth in the American colonies of European origin. The Portuguese were the first to hunt negroes in the interior of Africa for use as slaves in the colonies. The first shipment of negroes to the New World took place in 1503, when the Portuguese landed some in Santo Domingo.

The first shipload of slaves to the United States was landed at Jamestown, Va., in 1619. From that time to the 19th century a traffic in negroes across the Atlantic was carried on by all the Christian co¬ lonial powers. Slavery in the British posses¬ sions was abolished in 1838, £20,000.000 ster¬ ling being paid in compensation to the slave¬ holders; but it was not abolished in her West Indian colonies until 1839, and in India in 1843. Sweden abolished in 1846, France in 1848, Holland in 1859, Brazil in 1871, Porto Rico in 1873 and Cuba in 1880; African protec¬ torates in 1897 and 1901, the Philippines in 1902. Mohammedan countries and Portuguese de¬ pendencies still cling to the institution in 1918.

Slavery must be accepted as one of the stages in the evolution of man toward a recog¬ nition of universal freedom. Early man was wholly selfish and sought to dominate. When a war of conquest was undertaken, the scarcity of valuable goods obtained was compensated for by making slaves and menial workers of the men and household drudges and mistresses of the women. It was a phase of the rule of might, but the institution carried with it the seeds of destruction for the conquerors. The morality of the slave-owners and their sons was undermined and destroyed by the possession of

female slaves, and the position of a wife in the family was lowered and debased by the contamination of the domestic circle. A con¬ siderable progress in slavery in time ruined a nation, as ancient Rome. Not only was degen¬ eracy encouraged among the masters, but in case of a foreign war dissatisfied slaves at home were a serious menace. But as the ma¬ jority of human beings have a kind side to their natures, so very many slave masters were generous and liberal in their treatment of their slaves, not only caring for their general pros¬ perity, but arranging their marriages, and as¬ sisting their religious worship, permitting them to accumulate private funds, often to buy their own freedom. The Athenians had their pub¬ licly owned slaves as well as privately owned, the state often owning those who served pub¬ lic officials or who worked in the temples. In warfare the slaves were used as armor-bearers, workmen, galley-slaves, cooks and sometimes as archers and spearmen. The latter for spe¬ cially meritorious service in war usually earned their freedom.

There were laws in both Greece and Rome for the protection of the slave, these being gradually developed toward the humane and liberal.

In Athens an abused slave could de¬ mand to be sold, and he could not be killed at the whim of his master, even if he slew one of the master's family, but had to be tried by a court. Plato condemned slavery altogether, but Aristotle and other ancient savants ap¬ proved it, believing it beneficial and necessary. In the time of Demosthenes, that orator was moved to speak of the general good treatment of the slaves, and to urge that their enemies would laugh if they knew how happy was the lot of a Grecian slave. While the slaves of Rome did gradually improve their condition and receive better treatment as the centuries rolled on, yet legal measures for their good treatment went much slower than in Greece. The law originally gave the master power of life and death over the slave; he, was denied the right to marry. A slave could be examined as a witness only by the torture, because it was held that he would surely lie if. not tortured. In Rome many slaves were chained at night, and galley-slaves were nearly always chained to their work. They were sometimes driven under the lash to heavy work, as in the mines and fields. In the later history of Rome, how¬ ever, the slaves fared better, and very many were placed in conditions that enabled them to earn their freedom. Some masters sought a safe guardian for their children by promising a slave liberty when they were grown. Other masters found that it was financially profitable to encourage their slaves to buy their freedom, since they became industrious and earned so much that by the time their freedom was pur¬ chased the master had more than enough money from them to buy another and probably younger slave. In the 2d century the Roman law forbade making eunuchs of slaves, stopped the sale of children into slavery and forbade taking an insolvent debtor as a slave. Under Hadrian the master's power to kill his slave was revoked. Later, under certain con¬ ditions the law allowed a slave to bring an action against his master. Justinian punished the rape of a slave as of a free maiden, but he saw no reason for stopping gladiatorial com¬

bats between slaves and wild beasts. During the centuries following the fall of Rome the slavery system of Europe gradually merged into serfdom. See United States, Slavery in the.

SLAVERY IN THE UNITED STATES.

See United States, Slavery in the.

SLAVIC LANGUAGES. The Slavic

languages form a separate group of the Indo- European languages and are more nearly re¬ lated to the Lettish, Lithuanian and Prussian, with

which they are frequently mentioned as the Balto-Slavic languages. Their original habitat before the period of migration in the 4th century and the original tongue from which they have sprung are still a subject of specu¬ lation. The origin of the word (which first makes its appearance among Syrian and Byzantine writers some time before the 9th century is equally undetermined. It certainly is not to be derived from slava, ˆfame® nor from slovo, <(word,® as assumed by some Slavic scholars, but must, with greater probability, be connected with the Low Latin sclavus, <(slave,® since Spanish Goths and Arabs received the great bulk of their slaves and eunuchs from Russia, and ((eunuch® is in Late Greek Kolo- bos, asklabos.

The first Slavic tongue to be fixed by writ¬ ing was the one adopted in the 9th century by the proto-apostles Cyril and Methodius, of the neighborhood of Saloniki, in their missionary work in Pannonia and Moravia, but it is still an unsettled question whether this original speech was Bulgarian or of the Moravian vari¬ ety, hence the multiplicity of names for it, such as ((01d Bulgarian, Old Slovenian, Pannonian.® From the fact that it became the liturgical lan¬ guage for all those Slavs who received their Christianity from Constantinople it is also called (<Church Slavic.® It contains a consider¬ able number of Germanic words and an ex¬ ceedingly large number of Greek words in its vocabulary, especially such as refer to religious matters. In grammatical structure it is more primitive than any other Slavic language pre¬ served to us, for it has an aorist in the verb and a dual both in the noun and the verb, and the earliest documents which have come down to us show unmistakablv the presence of nasal sounds, now quite lost in all but the Polish and an occasional Bulgarian dialect. On account of these ancient characteristics, Church Slavic is put at the basis of Slavic philology, but it would be a mistake to assume that this Church Slavic is the primitive tongue from which the other Slavic languages are derived. (For the further history of Church Slavic see Russian Language) .

The Russian literary tongue contains a greater proportion of Church Slavic elements than any other related language, which is the result of the important part the Church Slavic played in Russia as a means for literary expres¬ sion. The history of the Russian language in modern times is treated separately, but here must be mentioned the fate of the Ruthenian or Little Russian, especially since through the separation of the Ukraine it is 'likely to gain new importance. It is a distinct group of the Russian dialects, which in the 18th century received literary polish under Kotlyarevski, and since produced the great poet Shevchenko

and the storywriter Kvitka-Ovsyanenko. In the 19th century its literary activity was car¬ ried away from the Ukraine, where it had its origin, to Galicia, where at the universities of Lemberg and Czernowitz it was permitted to develop freely. But here it fell under German and Polish influence and almost led to the for¬ mation of a separate language, inaccessible to the Ukrainians, who drew similarly upon the Russian dictionary for its new formations. The Ruthenian papers in the United States, nearly all of them of Ukranian origin, write in a curious mixture of Great and Little Russian. Now the formation of the Ukraine may change the aspect of the literary Ruthenian once more. The modern Bulgarian is phoneti¬ cally very close to the Church Slavic, but grammatically it has departed from it more than any other Slavic language. It has lost practically all declensional forms and thus stands to the others in very much the same re¬ lation that English bears to the other Germanic tongues. The oldest document of the Bulga¬ rian vernacular does not go beyond the 14th century, but it was only in the forties of last century that the first grammar of the spoken tongue was written down by an American, Elias Riggs, after which it was used, at first almost exclusively by American missionaries, in the translation of textbooks. Since then it has fallen, for its vocabulary and style, under the influence of the Russian literature.

The Serbo-Croatian language consists of three dialect groups which are distinguished by the word used for <(what?>:> which is respectively shto, cha and kay. The first, considered to be the most elegant, is found in Serbia, Bosnia, Herzegovina and the Litoral ; the second is spoken in northern Dalmatia, on the islands, in Sofia and the adjoining territory of Croatia; while the third is the vernacular of north¬ western Croatia. The Greek Catholic Serbians used in the Middle Ages the Church Slavic for literary purposes, but this Church Slavic was permeated by Serbian exactly as it was Rus¬ sianized in Russia. Only at the end of the 15th century was the spoken dialect of Ragusa and the Litoral used for literary works, and under the influence of the Italian it reached in the 16th century its highest development and that period is known as the golden age of Serbo-Croatian literature. In the 16th and 17th cen¬ turies, the kay dialect of Croatia gained pre¬ dominance. The literary form of the language remained unsettled until the thirties of the 19th century, when Gaj put the shto dialect of Ra¬ gusa at the base of his diction and called it Illyric, in order not to offend any one by the choice of a local name. Meanwhile the Serbian, Vuk Karadzich, had been using the spoken

Serbian in his writings. At the present time the Serbo-Croatian is divided into the Croatian of the Roman Catholics, written with Latin char¬ acters, and the Serbian of the Greek Catholics, written in a variety of the Russian alphabet. The two literary norms differ in a number of dialectic varieties, but there has been a tendency to bring the two together, at least the Serbian schoolbooks print about one-fourth of Croatian matter, and the Croatians give a similar amount to stories of Serbian authors. The Slovenians of Styria, Carinthia, Carniola and northern Istria, nearly all of them Protestants, have

since the 17th century used their variety of the Serbo-Croatian as a separate literary language, and developed a beautiful literary norm, espe¬ cially in the 19th century under the poet Preshern, out of a dialect of southern Carniola.

Bohemia began to use the spoken language for literary purposes as early as the 12th cen¬ tury, and in the 14th century no other Slavic language could vie with it in wealth of expres¬ sion. John Hus employed it in his theological discussions, and under the influence of the German church poetry a vast number of hymns were written in Bohemian, especially by the Moravian Brethern. There was also a consid¬ erable activity in the poetry of the romantic type, in which it also followed German models. Beginning with the 17th century Bohemian fell into desuetude, but, this time again under the influence of German romanticism, Dobrovsky, the father of Slavic philology, in the beginning of the 19th century resuscitated the older language of the Moravian Brethren and since then it has been used for all literary purposes. Unfortunately Bohemian is in poetry handi¬ capped by its accentuation, because, no matter how long a word may be, its accent, as in the unrelated Hungarian, is always on the first syllable, whereas in Russian, Bulgarian and Serbian it is mobile, but in Serbian there are really four melodic accents, which make the language very harmonious and musical.

In the 19th century the Bohemian dialect of the Slovaks in northern Hungary, for which it is claimed that it is a transitional language between Bohemian and Serbian, evolved a sep¬ arate literature. The writer was fortunate in procuring in 1901 almost a complete set of this rare and quaint literature, amounting to some¬ thing like 1,800 numbers, for the Harvard Li¬ brary.

Slovenian and Slovak appeal to a population of less than 2,000,000 each, which makes their existence precarious. There is, however, another Slavic language, called by the Germans Wendish, and in philology Serbo-Lusatian, spoken in Lusatia by but a few hundred

thou¬ sand people and yet divided into two distinct literatures differing somewhat in their literary norms, that of the Catholics of upper Lusatia and of the Protestants of lower Lusatia. After the Russian, the Polish is the best-developed literary language of the Slavs. It made its appearance in the 14th century, when it fell under Bohemian influence. Like the Bohemian, and unlike the other Slavic languages, Polish appears fixed in form from the beginning. In its vocalism it resembles French on account of its nasal sounds, and Italian on account of its soft consonantal utterance. Many of the con¬ sonants have four shades, which demand the addition of two diacritical marks and the use of z in connection with the Latin alphabet em¬ ployed by it. The accent is nearly always on the penult, as in Italian. At first the literary form fell under the influence of French and Italian humanism, which led to the introduction of a very large Latin vocabulary, while the proximity to Germany led to the popular adoption of an exceedingly large number of German words. Polish literature had its golden age in the 1 7th century but it is only in the 19th century that it developed a rich literature, especially in poetry, that is comparable with those of the

other nations of Europe. The closely allied Kashubian, Slovinzian and Polabian languages of East Prussia and Pomerania have been studied philologically, but they have not risen to literary forms. See articles on the languages of this group — Polish, Russian, etc.

Bibliography. — The leading philological periodical for the study of the Slavic languages in general is Jagic's Archiv fur slavische Philologie, and of late the whole subject of Slavic philology has been treated in the still unfinished work on Slavic philology by Jagic in the Rus¬ sian language. The Comparative Dictionary of the Slavic Languages51 by Miklosich is not satisfactory, and his large Comparative Grammar5 is now superseded by Vondrak's work. For the study of Church Slavic we fall back on Leskien and Vondrak, but the historical evolution of Church Slavic still needs an in¬ vestigation. A large number of Russian mono¬ graphs deals with various aspects <of the Rus¬ sian dialects. The best dictionaries are those of the Academy, barely begun, and Dal's great (Dialect Dictionary.5 The White Russian has been studied by Karski, and we have for it a good dictionary by Nosovich. The Little Rus¬ sian has been similarly studied by Potebnya and Ogonovski, and a large number of other authors. The Bulgarian dialects have been lavishly investigated in a government publica¬ tion

of bulky proportions, especially by Miletich and Tsonev, and the Serbo-Croatian language has since the days of the founder of the science, Vuk Karadzic, been elaborately treated by native and foreign scholars, and of late a Croatian dictionary on a truly grand scale has been published by Broz-Ivekovic. The most accessible dictionary for foreigners is the (Croatian-German and German-Croatian Dic¬ tionary5 by Filipovic. Similar studies exist for the Slovenian and Janezic's (Slovenian-German and German-Slovenian Dictionary5 will be found very useful for the student. Bohemian was early treated by Dobrovsky. Since then there has appeared the excellent historical grammar by Gebauer and his unfortunately unfinished (01d-Bohemian Dictionary.5 The most useful dictionary for the foreigner is Jungmann's. The Slovak has not yet enjoyed a careful study, but the Lower Lusatian has hoth an excellent grammar and dictionary by Mucke, while both dialects are accessible in the similar works by Pfuhl. Even the Kashubian, Slovinzian and Polabian have found careful investigators in Lorentz, Schleicher, Mucke, Mikkola and others. A monumental (Polish-German Dic¬ tionary,5 by Linde, appeared in the beginning of the 19th century before Grimm had planned his German Dictionary. Within the last few years a still larger dictionary of the literary language and a great dialect dictionary has been published by the Cracow Academy of Sciences. The best historical grammar is that by Krynski.

Leo Wiener,

Professor of Slavic Languages and Literatures , Harvard University.

SLAVIC MYTHOLOGY. Of Slavic mythology we cannot obtain a distinct picture, owing to very defective traditions among the peoples of Slav race and perhaps still more be¬ cause of a great scarcity of records. The early history of this whole race is, in fact, shrouded

in darkness, and we do not even definitely know the time of the first arrival of Slavic tribes in Europe. We do know, it is true, that some of them were heard of as early as the 1st or 2d century of the Christian era, but of their man¬ ners and customs, their vernacular and, above all, their creed and worship we know next to nothing at that early time. In some regions of Europe they appear to have preceded the Teutons and to have taken possession of the land, while in others they followed Teutonic tribes, such as the Marcomanni in what is now Bohemia, the Vandals on the Baltic, the Goths and Gepidae after these had started off on their conquering migrations toward the West and South which were at last to end in the destruc¬ tion of the Roman Empire. So far as indica¬ tions go, the bulk of the progenitors of the

Slavic populations of to-day seem to have reached and in a manner settled on European soil by the 5th and 6th centuries of our era. But in their shifting occupation of districts and lands, but vague recollections of the mythology of their race have remained. Of the Southern Slavs (Serbians, Bulgarians, Croatians), the Poles and the Czechs we do not even possess the names of their early gods. Generally speaking, the Slavic creed consisted in a wor¬ ship of the forces of nature. We find dim reminiscences of a <(heaven-god,55 Svarog (the Vedic Varuna), who apparently was acknowl¬ edged more or less by all Slavs. We encounter in the scant records a solar deity, Dazhbog, paid honors to by other tribes under the name of Khors. Fire was worshipped as Ogon (Vedic Agni) and the wind-god as Stribog. With the Northeastern Slavs the chief deity was Perun, the god of thunder and lightning, the Vedic Parjayna, the Teutonic Donar or Thor. The Western Slavs again along the Baltic coast, such as the Obotriti, the Vinds or Wends, etc., paid homage to a god Radegast or Radegost, also named Sviatovit or Svantevit, the three¬ headed and trebly-gifted god Triglaff, of whose images and devotional service detailed descrip¬ tions have been given by ancient writers. These Western Slavs, too, had temples and sacrificial altars, as well as priests, but this does not seem to have been the case with the Slavs of the East. Of inferior gods, on the other hand, or semi-divine beings there still linger memories among all Slavs, such as of the Rusalkas and Vilas (Volos, Veles), wood nymphs and spirits haunting the forests, springs, pastures and lakes, of Kupalo and Garilo, fertilizers of the earth, representatives of the summer sun. The West¬ ern Slavs first accepted Christianity through the Greek monks Cyril and Methodius. Some writers tell of a species of dualism, of a cease¬ less struggle between darkness and light, in which the Slavs put faith. But this legend seems to have been more owing to Christian influences. Of the <(white55 and ((black55 god, Bjelbog and Czernebog, said to have been believed in by the Slavs inhabiting the tract between Oder and Elbe, we know nothing re¬ liable. But that nearly all Slavs put faith in the field and house spirits, including also the Royeniczas and Soyeniczas (goddesses of birth and fate), the Domowyje and Leshiye, the Babavaga of the Russian, is attested sufficiently.

Bibliography. — Afanasieff, A. P., (Poet.

Naturansch. del* Slawen) (3 vols., Moscow 1865-69) ; Jagich, W., (Archiv fur slaw. Philol¬ ogies (Vol. IV, Vienna) ; Hanusz, V., (Die

Wissenschaft des slav. Mythus) (Lemberg 1842) ; Krek, X. F., (Einleitung in die slavische LiteraturgeschP (2d ed., Graz 1887) ; Palacky, F., (Geschichte von Bohmen> (3d ed., 5 vols., Prague 1876-78).

Wolf von Schierbrand,

Formerly Secretary to American Minister at Teheran, Persia.

SLAVONIA, a former territory of Aus¬ tria-Hungary which, with Croatia, constituted the provinces of Croatia and Slavonia, forming part of the possessions of the Hungarian crown. It is bounded on the northeast by Hungary, on the south by Bosnia and part of Serbia and on the west by Croatia and has an area of 3,640 square miles, exclusive of that portion of the military frontier lying between Slavonia and Croatia, which may be regarded as falling within its limits. A branch of the Carniolan Alps, enter¬ ing Slavonia from Croatia on the west, traverses it throughout its whole length, form¬ ing the watershed between the Drave on the north and the Save to the south. The forests are very rich and cover the upper mountain sides on whose lower slopes cultivation is actively carried on. The valleys are extremely fertile ; but there are large swamps created by the frequent inundations of the.river, rendering the climate in parts extremely unhealthy. Agri¬ culture is the most important occupation, the principal products being grain, fruit, flax, hemp and wine, and the leading exports, grain, wine, fruit, cattle, lumber and the celebrated Slivovitz brandy, distilled from plums. The inhabitants are chiefly Serbs and profess for the greater part the Roman Catholic and the Greek Ortho¬ dox faith. The chief town is Eszek. With Croatia it had a national Landtag or Diet and sent representatives to the Hungarian Parlia¬ ment. The population <of Croatia and Slavonia is about 2,600,000.

As part of Illyricum, Slavonia was acquired by the Romans in the reign of Augustus and was incorporated with the province of Pannonia. From the Byzantines it was wrested in the 5th and 6th centuries by the invading Slavic tribes, from which time dates its close union with the country to the west which came to be known as Croatia. The united state was ruled by princes of the Hungarian royal house till the early part of the 16th century, when Slavonia was overrun by the Turks. They were driven out at the end of the following century and the territory was organized on a military basis for the defense of the Austrian frontier. Part of Slavonia was placed under civil administration in 1745, but the military frontier was not done away with until 1873. The two provinces had autonomy for home affairs,

public instruction and justice. At the Jugoslav Convention held in Geneva in November 1918 a national government repre¬ senting all Jugoslav provinces was constituted and Slavonia became a part of the new state. See Jugoslavia; Austria-Hungary; Croatia- Slavonia.

SLAVONIC ENOCH. See Enoch, Books

OF.

SLAVS, slavz, the general designation for a group of peoples inhabiting eastern and cen¬

tral Europe and forming one of the most im¬ portant branches of the Indo-European family of nations. The name is derived from the native term Slovenia, the origin of which is obscure, some connecting is with slovo, word, speech, and others with slava, glory. In support of the former etymology is the fact that the Slavic term for foreigner is nientsy, dumb, marking the differentiation between those whose speech was intelligible to the Slav ear, that is, the Slavs themselves, and those who made use of an incomprehensible tongue. The connection be¬ tween Slav and slave, though supported by the analogy of servus and Serb, is nevertheless merely fanciful. The Slavic group comprises the following nationalities : Russians (includ¬ ing the Great Russians, the Little Russians, or Ruthenians, and the White Russians), Bul¬ garians, Serbo-Croatians, Slovenians, Czechs (comprising the Bohemians, the Moravians and the :Slovaks) , Wends or Sorbs (consisting of the inhabitants of Upper and Lower Lusatia, and Poles with the allied Kashubes). The Polabians, a Slavic people formerly living on the Elbe, have been extinct since the middle of the 18th century. The early history of the Slavs is veiled in obscurity, and only an approximate idea as to their original home is to be obtained. In Pliny and Tacitus the name Venedae (whence the modern Wenden) appears as the designation of a group of non-Germanic tribes living to the northeast of the Carpathian Mountains and ex¬ tending to the shores of the Baltic and the lake country of the Finns. Ptolemy in the 2d century of our era gives a description of the peoples residing between the Vistula and the Don which would undoubtedly tend to connect a part at least of these tribes with the Slav family. Roughly the home of the Slavs in the first centuries of the Christian era may be given as extending from the Vistula and the Carpathians northeastward to the headwaters of the Volga and along that stream to its junction with the Oka, and southeastward to the Bug and Dnieper, comprising thus the southwestern third of the present Russia. South and south¬ east <of the Baltic, however, were the Lithau- nians, a non-Slavic people, though nearest to the Slavs of all Indo-

European stocks. In the 6th century Procopius and Jardanes speak of two great Slavic nations, *he Sclaveni and the Antes, as established on the left bank of the Danube and to the north. From this it would seem that in the 3d or 4th century the Slav peoples be¬ gan to migrate from their homes southward, and westward, under pressure probably of the Baltic tribes to the north. In the 5th century they took possession of the country between the Vistula and the Elbe, left unoccupied by the southward migration of the Germanic Burgun¬ dians, Goths, Suevi, etc. Slav tribes entered Bohemia and Moravia about the same time, while others advanced from beyond the Car¬ pathians and made themselves masters of western Hungary, whence they passed into Styria, Carinthia and Carniola. At the begin¬ ning of the 7th century the Slavs on the Danube crossed into Mcesia and overran Thracia and Macedonia. At the same time Serbs and Croats made their homes in the ancient Illyri¬ cum and Dalmatia. A second great wave of Slav migration, starting from the original home north of the Carpathians, spread east and north,

pushing the Finns before them. Under Scandi¬ navian rulers these tribes became the nucleus of the Russian nation. Of this wide area of con¬ quest they have lost in the process of time the regions of the Oder and the Elbe, Upper Austria and part of Carinthia and Styria, of all of which they were deprived by the Ger¬ mans; large parts of Transylvania and Hungary which fell to Rumanians and Magyars ; and parts of the regions south of the Danube which later passed to the Greeks and the Turks.

The ancient Slavs were almost exclusively an agricultural people, averse to all war, and living in complete tribal independence under a fully developed patriarchal system which at a later time became blended with a communal form of government. They were the latest of all the European peoples to enter the sphere of modern civilization, their religion and their literature being, as compared with the other nations, of recent date. The eastern branch of the Slavs received its civilization and religion from Byzantium, the western Slavs from Rome. Christianity made rapid headway among them in spite of the fact that they seem to have pos¬ sessed a well developed nature-cult about which, however, we possess no definite information. Our materials are limited to the names of vari¬ ous deities worshipped among the northern Slavs, while as to the mythology of the southern branches of the race even such data is wanting. Among the gods of the

Russian Slavs were Pernu, identified by some with Thor, the north¬ ern god of Thunder, Dazbig (the day god), Wolos, Stribog and others. Svintovint or Sviatovit was the great god of the Baltic Slavs (Riigen), and some who maintain that along with their idol-worship the Slavs possessed a belief in a supreme God would assign to Svintovint that role. Grimm erects Svintovint, Pernu and a god named Radegast into a trinity with functions corresponding to the classic Jupiter, Vulcan and Mercury respectively. Other deities worshipped by the Slavs were Prava, the god of justice; Rugevit, of war; Triglaw; Lado and Lada, divinities of order and love; Dievana (Diana), goddess of the woods, and Prija, the Scandinavian Freya. Among the Silesian Slavs the principles of light and darkness were typified by the Bielobog and the Chornobog, the white god and the black god. The mythology of the Slavs was rich in deities of a lower order, in nymphs, naiads and mountain sprites, in goddesses of birth and fate, divinities of the hearth and the field, in evil demons and vampires. The forms of the Sla¬ vonic deities recall to mind those of India. Svintovint was represented as four-headed, Pernu as four-faced, etc. There is some testi¬ mony to a belief entertained by some of the Slavs in the immortality of the soul and a resur¬ rection beyond the grave. Their principal cele¬ brations were the kobiada, a feast held at the beginning of the year, when an interchange of presents was customary; the kupalo, a feast that took place in honor of the sun at the time of the summer solstice; and the trizna, cele¬ brated in honor of the dead. The functions of priest and ruler were combined in the same person.

From available data it is quite a hopeless task to fix, with any degree of certainty, the number of Slavs in Europe. Official statistics — where issued — are not always reliable, and

independent authorities differ widely, even on the question of how many Slav languages there are. It was not until the first quarter of the 19th century that any serious attempt was made to estimate the Slav populations. Schaffarik in 1826 arrived at a total of 55,270,000; in 1842 he made it 78,000,000; basing his calculations on these figures and those of the Russian his¬ torian Pypine, Prof. Louis Leger of the Insti- tut de France struck a total of 79,550,000 in 1868. Zarianko's Russian geography (1891) gave a total of 101,724,000, while Schrader's atlas showed only 97,000,000. M. Niederle. a Bohemian authority, estimated 139,000,000 in 1900, and reduced it to 138,500,000 in 1905. In 1907 a distinguished Russian scholar, M. Florinsky, arrived at 147,146,000 and calculated that, the annual birthrate of the Slav race be¬ ing 1.7 per cent, it would increase by 2,500,000 per year and would in consequence number 186,000,000 in

1915 and 200,000,000 in 1920. Taking such figures as are available, according — in each case — to the last census, we find the Slav population of Russia given as 92,089,733 ; Austria, 16,959,095; Hungary, 5,380,190; Serbia (subjects only) 2,890,602; Bulgaria, 3, 203, 810; Montenegro about 500,000 : a grand total of 121,023,430. Most of these statistics, however, were compiled in 1910 and do not include the German Poles nor the other Slavs residing in Germany, Rumania, Turkey, Great Britain, etc. Only one census has been taken in Russia — in 1897. During 1913 and 1914 there were 1,079,- 677 emigrants to the United States from coun¬ tries in Europe having predominant Slav popu¬ lations, mainly Russia and Austria-Hungary, while between 1911 and 1915 Canada received 144,792 from those countries, and numbers also went to South America In the United States alone there are nearly 4,000,000 Poles, over 2,000,000 Czechs and Slovaks, and some 2,000,- 000 Jugo or Southern Slavs, besides Russians, * Serbs, etc. The European War and the Balkan wars of 1912-13 exacted a heavy toll of Slay blood. The great losses of Russia on the bat¬ tlefields and in the anarchy following the revolution; the casualties among the Slavs of the ill-fated Austro-Hungarian armies; and the practical extermination of Serbia, besides Bul¬ garian and Montenegrin losses, must inevitably exert a seriously weakening influence upon the Slav race and disturb the value of statistics. These factors should be borne in mind with regard to the following table, collected in 1918:

Russians . 100,000, 000

Little Russians . 30 , 000 , 000

Poles . 20,000,000

Czechs and Slovaks . 10, 000 , 000

Slovenes . 1 , 300 , 000

Croats . 2 , 500 , 000

Serbs . 4,000,000

Bulgars . 4,500,000

Total . 172,300,000

Languages. — The Slavic tongues have been the subject of much controversy and varied classification. On this point, as on that of vital statistics, several authorities — themselves Slavs — differ. Josef

Dobrovsky, a learned Czech (d. 1829), counted nine living languages and as many Slav nations in 1822; Schaffarik in 1842 found six languages and 13 dialects; Sreznevsky in 1843 discovered nine and Schleicher in 1865 counted eight. Jagitch made it eight in 1898, while Miklositch and Florinsky

(the latter in 1907) came back to nine. Ac¬ cording to more recent research, however, con¬ sidering the numerous separatist tendencies, the number of Slavic languages has been raised from 11 to 14, without reckoning those which are extinct. According to Niederle there are (1) the Russian group, regarded as two na¬ tions, the Great Russians and the Little Rus¬ sians, the latter including the southern Rus¬ sians, Ukrainians and Ruthenes ; (2) the Polish group; (3) the Lusatian-Serb group, divided into High and Low Lusatian ; (4) the Czech group in Bohemia and Moravia, from which the Slovaks of Hungary are more or less divided 'according to political views; (5) the Slovene group, without separatist tendencies; (6) the Serbo-Croatic group, representing Serbs and Croats; and (7) the solid Bulgarian group, homogeneous except for the Macedonian Slavs, of which some lean to the Bulgarians, some to the Serbs, and others who, until 1913, claimed a separate or Macedonian nationality. Another method of grouping is as follows: (1) Bul¬ garian; (2) Serbo-Croatic; (3) Slovenian (2 and 3 sometimes being given as one group) ; (4) Russian, including Great Russian, Little Russian and White Russian; (5) Czechish with the closely related Slovak; (6) Sorb or Wen- dish; and (7) Polish, Bulgarian, Serbo-Croatian and Russian have sometimes been classified into a Southeastern Slav group as against a West¬ ern group consisting of all the others. To the latter group should be added the extinct Pola- bian. The oldest of the Slavic tongues is the old Church Slavic or Old Bulgarian, which is still the ritual language of the Greek Orthodox Church in Russia, Bulgaria and Serbia. The Slavic languages are marked by a richness of vowel sounds and sibilants and a high degree of inflection, which in the noun possesses seven % cases, and in the verb, in spite of a restricted number of tenses, a large number of modal and effective auxiliaries rendering possible the finest distinctions of meaning. The so-called Cyrillic alphabet is used in the Russian, Bul¬ garian and Serbian, but the Old Church Slavic makes use also of the Glagolitic alphabet (q.v.). The Polish, Croatian, Czech, Slovenian and Sorb employ the Roman characters.

Slavic Music. — Sentiment, which forms so prominent a trait in the

Slav character, renders the members of that race peculiarly subject to the influence of music. In Russia the origins are found in the folk-songs which were greatly influenced by the music of the Church. In the 17th century western influences entered the country and especially the Italian, which lasted well into the 19th century, when we have the use of a national school with the appearance of Glinka (q.v.). The prevailing characteristic of Russian music, whether classic or popular, is an all pervading tone of melancholy which has found its fullest expression, perhaps, in the works of Tschaikowsky. Polish music, in many respects resembling the Russian, differs from the latter in a greater vivacity of movement and spirit. The Bohemian is the third impor¬ tant national school of Slavic music and one which in recent years has surpassed the Polish in productivity and held its own with the Rus¬ sian. For the leading names in Russian music see in addition to those already mentioned, Dargomyzshky ; Balakirev; Borodin; Rim¬

sky-Korsokoff; Rubinstein; Arensici ; Ta- neyeff. For Poland see Chopin ; Moszkow- ski; Paderewski. For Bohemia see Smetana; Dvorak.

Panslavism. — This name was originally given to the agitation carried on by a great party in Russia with the object of uniting the Slav peoples of Europe under Russian rule or influence. The movement originated about 1830, when the Polish revolution aroused Slavic national consciousness ; it received increased strength from the second Polish revolt in 1863. Congresses of Slav representatives from the different European countries were held at Prague in 1848 and Moscow in 1867. Outside of Russia the ideals of Panslavism were favor¬ ably received by the Slavs in Bohemia, Silesia and Croatia-Slavonia, where the members of that race felt their national existence threatened by the repressive policy of the government, Austrian, Hungarian or German as the case might be. Panslavism was largely responsible for the outbreak of the Russo-Turkish War of 1877-78, when Russia entered the lists as the champion of the Balkan Slavs who suffered under the tyranny of Turkish rule. Russia defeated the Turks with the assistance of Ru¬ mania (non-Slav) ; Bulgaria, Serbia and Mon¬ tenegro, Slav nations. Though the Berlin Congress demolished the Treaty of San Ste- fano, the four nations were made practically independent of Turkey, and Russia became the recognized protector of the Balkan Slavs. It must be added, however, that this (<big broth¬ erly^ policy was not unconnected with the old Russian ideal of paving the road to Constanti¬ nople. Moreover, this Balkan policy of Russia ran counter to the interests of the Austro-Hun¬ garian monarchy, also a great Slav power. This antagonism rendered impossible any rap¬ prochement between Russia and Germany, the latter being Austria's

ally. In this may be recognized the seeds of the European War. Nothing short of an absolute renunciation by Russia of her Panslav policy in the Balkans could remove the possibility of an ultimate rup¬ ture with Austria. In course of time, Pan¬ slavism broke out in a direction that was per¬ haps not anticipated by Russia. As the Balkan states grew stronger under the stimulus of national consciousness, fostered by the crea¬ tion of national armies and more or less demo¬ cratic institutions, they gradually realized their ability to shape their own destinies. While fully willing to accept all the advantages which the protection of Russia offered, they were not prepared to fall under Russian dominion. Stambuloff, in Bulgaria, pursued a strong anti-Russian policy, and the Serbs cast longing eyes upon the vision of an independent Greater Serbia including the Austrian provinces of Bosnia-Herzegovina and their nationals in Macedonia — then still Turkish territory. Not improbably, they also counted on the inclusion of Croatia, Slavonia and the Dalmatian coast line after the long-prophesied break-up of the Austro-Hungarian empire. Bulgaria likewise had designs on Macedonia; Bohemia clamored for her ancient rights as a kingdom, and the Poles sought the restoration of their country, partitioned between Russia, Germany and Aus¬ tria — an ambition at all times rigorously sup¬ pressed by those three powers. Russia stood to

lose comparatively little by an all-round fulfil¬ ment of these national aspirations; to Austria- Hungary it meant a dissolution of the mon¬ archy. Hence the general principle may be accepted that Austro-Russian rivalry, plus the conflicting aims of Austria and Serbia, pro¬ vided fully one-half of the direct causes of the European War, and that Germany contributed the other moiety by utilizing this antagonism to further her own ambitions. The situation was thus summarized by President Wilson on 14 June 1917 : <(The war was begun by the mili¬ tary masters of Germany, who proved to be also the masters of Austria-Hungary. . . .

The demands made by Austria upon Serbia were a mere single step in a plan which com¬ passed Europe and Asia. ... It contem¬ plated binding together . . . Czechs, Mag¬ yars, Croats, Serbs, Rumanians . . . Bo¬ hemia . . . the stout little commonwealths

of the Balkans. . . . These people do not wish to be united. . . . They ardently de¬ sired to direct their own affairs, would be sat¬ isfied only by undisputed independence. w

By the summer of 1918 the Panslav move¬ ment had attained gigantic proportions. Though entirely diverted from its original aims of uni¬

fication into a revolutionary scheme of inde¬ pendent separatism, based on nationality, no more appropriate title could be applied to it. A powerful impetus to the cause was the offi¬ cial sympathy extended to its representatives in France, America, Italy and Great Britain. On 22 Jan. 1917 President Wilson declared in favor of an autonomous Poland; the Czecho¬ slovak and Jugo-Slav agitation in the Aus¬ trian Parliament spread throughout the mon¬ archy and was enthusiastically supported by their nationals scattered throughout the allied countries. Already at the beginning of the war thousands of Austrian Slavs — whole regi¬ ments — had gone over to the Russians. Large numbers escaped from the country and joined the Allies in France and Italy. On 6 Jan. 1918 a congress of Czech deputies reasserted their claims at Prague; in April a similar gathering was held at Rome ; disorders spread through¬ out Bohemia and other districts of the mon¬ archy leading to a state of siege around Prague and the establishment of martial law among the Slovenes and Slovaks. On 4 May 1918 the Austrian Reichsrat was abruptly closed by the emperor. Anti-German demonstrations were severely suppressed and thousands interned. Barracks and public buildings were set on fire and German newspaper offices sacked. A Slo¬ vene regiment mutinied and killed its German officers. Czecho-Slovak regiments fought in the Italian army and in Russia against the Bol- sheviki. In New York, Kossovo Day was commemorated on 16 June 1918, attended by thousands of American Slavs.

SLEEP, a state of rest for both body and mind, during which there is partial abeyance of volition and consciousness, with a relaxed condition of the body and a lessened activity of certain of the vital functions. The muscles do less work in the way of voluntary contrac¬ tions, and there is, therefore, a diminution in this feature of their tonicity; the respirations arc less frequent and rhythmical ; occasionally there is a long expiratory pause; the output of carbon dioxide is diminished more than the consumption of oxygen ; the pulse is less fre¬

quent ; the secretions are partially suspended, and the pupils of the eyes are contracted. The whole body is in a state of increased vagus tonus, vagotonia.

Sleep is probably due to a rhythmical cycle habit of millions of years of evolution and is chiefly a tropism reaction to light and tem¬ perature impressions. It has been biologically developed by reason of its value as a resting period for less active energy transformation. All parts of the body require such rest as sleep affords, and share, directly or indirectly, in its benefits, for functional activity without peri¬ ods

of rest results in an undue destruction of the tissues and an excess of poisonous products. The essence of the sleep state is functional rest and nutritive repair. Though the brain is in repose, it nevertheless is in function during sleep just as much as all the rest of the body. This activity is registered in dream activity, some of which remain in consciousness. Gen¬ erally, the more the body can be withdrawn from outside influences the more readily is re¬ freshing sleep obtained. Sometimes pain assists to this end. For example, a man is worried with business cares and has not slept well of late. One evening he has a severe toothache which demands his entire attention. As the pain is relieved he drops off into a quiet sleep and forgets his troubles in unconsciousness.

The amount of sleep needed by different per¬ sons varies with age and condition. The greater part of infancy is generally passed in slumber, which is more profound than that of adults. In middle life from six to eight hours' sleep a day is necessary, though it is reported of Frederick the Great and Napoleon that they slept but three or four hours daily. Old persons fre¬ quently require seven or more hours' sleep, though some live healthfully with but six. Occupation, race, sex, climate and habit have to do with the amount of sleep required. Brain workers, as a class, take less sleep than labor¬ ers. Sleep is sounder and longer in cold climates and among northern races. Women usually take more sleep than men. The influ¬ ence of habit is noticeable when the demand for sleep comes at a definite time, or in the case of those accustomed to sleep amid noisy surroundings, and who cannot readily sleep in a quiet resting-place.

The disorders of sleep may be classified as follows: (1) Absence of sleep — insomnia,

vigilance; (2) imperfect or partial sleep — dreams, sleep-drunkenness, or somnolentia, night-terrors and nightmare; (3) perverted or artificial sleep — somnambulism, hypnotism, mesmerism, trance, somnium ; (4) excessive or frequent drowsiness and sleep — morbid drowsi¬ ness or somnolence, paroxysmal sleep, epileptic sleeping attacks, trance-sleep, carus, cataphora, lethargy — sleeping-sickness of Africa.

The causes of disordered sleep are many, such as brain affections, blood-poisoning, pain, indigestible food, discomfort, produced by un¬ due cold or heat, mental excitement or worry, overfatigue, febrile conditions, sleeping in an uneasy position or with the head too high or too low, too little outdoor exercise, sleeping amid unaccustomed surroundings. The treatment of disturbed sleep sometimes taxes the art of the physician. Mental repose, bodily comfort, a suf¬ ficient

degree of warmth, a certain amount of fatigue, combined with perfect quietude, are

essential. An evening walk, a cup of hot milk or cocoa, or a weak stimulant just before re¬ tiring, massage, counting and verbal repetitions are aids in producing sleep. Hypnotic medi¬ cines should be avoided if possible. Brisk exer¬ cise in the open air, every day if convenient, to the point of tiring, is a good sleep-producer. Consult Powell, L. P., (Art of Natural Sleep) (New York 1908) ; Bruce, H. A., (Sleep and Sleeplessness5 (Boston 1915).

SLEEPER. A heavy timber laid horizon¬ tally at the base of a structure, specifically: (1) A cross-beam or tie supporting the rails of a railroad. (2) In shipbuilding, a heavy floor timber in a ship's bottom. (3) In car¬ pentry and building, any heavy horizontal beam on a ground floor.

SLEEPER-SHARK. See Sharks.

SLEEPING BEAUTY, The,' a fairy tale, probably founded on nature's long sleep in winter. The Earth-goddess falls into a deep sleep, from which she is aroused by the prince, the Sun. We may compare Demeter's search for her lost daughter, Proserpine, in the Greek myth ; and the sleep of Brynhild, stung to her sleep by the sleep-thorn. (The Two Brothers,5 found in an Egyptian papyrus of the 19th Dynasty — the time of Seti II — contains similar incidents. The spindle whose prick causes the long slumber is a counterpart of the arrow that wounds Achilles, the thorn that pricks Sigurd and the mistletoe fatal to Baldur. In (Surya Bai> (from (01d Deccan Days5) the mischief is done by the poisoned nail of a demon. In the Greek myth of Orpheus, Eurydice is stung by the serpent. In a Transylvania variant a maiden spins her golden hair in a cavern, from which she is rescued by a man who undergoes an hour of torture for three nights. The awak¬ ening by a kiss corresponds to Sigurd's rousing Brynhild by his magic sword.

SLEEPING-SICKNESS, a peculiar dis¬ order, also called sleeping-disease, African lethargy, lethargus, negro lethargy and nelavan, endemic, especially in western Africa. It is apparently infectious, occurs mainly among negroes and is said to be very fatal. Investi¬ gations by the English government and by the Liverpool school of tropical medicine show that its prevalence has been exaggerated by

the natives, that it has been confounded with other prevailing diseases which have some of the same symptoms but are distinct affections. The natives in their dread of this malady are ready to assert that a person having enlarged glands, headache and a dry skin, and becoming thin and drowsy, has sleeping-sickness. That the disease prevails at times in certain localities, and is generally fatal, is not disputed, though continued and abnormal sleep has not been present in all cases. M. Christy, in July 1902 found an infected area in a strip of coast-line along the shore of Victoria Nyanza over 100 miles in length, and along the margins of all the islands in the British portion of the Vic¬ toria Nyanza. Cases of the disease discovered back of this area were infected, he believes, at the shore. Nearly all the cases of sleeping- sickness that he saw were in persons who had lived on low swampy ground or near the water- edge, in huts surrounded by banana-plants or forest growth. Compact villages on dry land

with but little surrounding foliage were not seriously infected.

Various theories as to the cause of the dis¬ ease have from time to time been broached. It has been supposed to be due to food-intoxica¬ tion, like pellagra (q.v.), or caused by one of the many animal parasites common in Africa. Disorders of circulation, mental depression, bad and insufficient food, intestinal and blood para¬ sites are predisposing causes. The recent in¬ vestigations of Bruce, Castellani, Christy, Dut¬ ton, -Forde and others show that sleeping-sick¬ ness is probably caused by a parasite, a species of trypanosoma, which is transmitted from the sick to the healthy by a variety of the tsetse-fly. This parasite enters the blood and the cerebro¬ spinal fluid, producing, what is called by the recent investigators, human trypanosomiasis, to distinguish it from the trypanosomiasis which affects horses, fish, etc. The species of tsetse- fly in question inhabits the places where sleep¬ ing-sickness is prevalent, and Sambon believes that this fly is not only a carrier of trypano¬ somes, but acts also as an intermediate host ; and is troublesome to man at certain seasons.

Autopsy in cases of sleeping-sickness shows chronic meningitis, encephalitis, meningomyelitis and trypanosomes in the cerebro-spinal fluid and blood. The symptoms may be divided into three stages, one indefinite, one of tremor and a third stage of intense weakness. ((True sleep is not really a symptom of the disease.® There is at first a disinclination to work or move about. This is followed by headache, pains, especially in the chest, dullness, slowness in answering questions, mumbling and a shuffling gait. Then there are tremors of the tongue and hands; glands may be greatly enlarged (but gland-

enlargement is common among the na¬ tives) ; the pulse varies from 90 to 130; even¬ ing temperature is from 100° to 102° F., with a morning fall of 1°. The patient becomes drowsy, lethargic and very thin and weak, and takes to bed; the temperature falls, coma ap¬ pears and death occurs from convulsions or starvation. The disease usually lasts from four to eight months. The researches of Ehrlich and others have devised chemical drugs, usually containing arsenic, which have resulted in the killing of the parasite in the body and thus in curing this disease. Consult Stedman, Refer¬ ence Handbook of Medical Sciences5 (1917). See Salvarsan.

SLEEPY HOLLOW, the valley of the Pocantico Creek, half a mile north of Tarry- town, Westchester County, N. Y. It is best known as the scene of Washington Irving's (Legend of Sleepy Hollow,5 in which he so vividly describes the quiet scenery of the valley and the quaint customs of the old Dutch set¬ tlers. The Dutch church, built in 1699, and the old mill conspicuous in the (Legend5 are both standing; and in the newer part of the church¬ yard cemetery is Washington Irving's grave. Near the mill is the old Philipse Mansion. Above the cemetery rises a knoll, which in 1779 was fortified by the Continentals, but was never attacked.

«

SLEET, snow or hail either mingled with a fine rain or in a partially melted condition be¬ fore the surface of the earth is reached. Sleet may be produced by the simultaneous precipita¬ tion of snow or hail from a superior, and of

rain from an inferior, stratum of the atmos¬ phere. Its formation is usually due, however, to the partial melting of snow or hail in pas¬ sage through an upper stratum of air above 32° F., and its subsequent refreezing upon traversing a lower stratum whose temperature is below the freezing point.

SLEIGH, a light vehicle on runners usually with shafts or pole for horses, designed for light loads or pleasure travel over frozen snow or ice, or over the bare ground. A heavy vehicle on runners is usually termed a sledge, as the stout traveling carriage mounted on runners, much used in Russia, Canada and other northern countries during winter, instead of wheel-carriages. A very small and light vehicle on

runners for hand use is called a sled.

SLEMMER, slem'er, Adam Jacoby, Amer¬ ican soldier: b. Montgomery County, Pa., 1828; d. Fort Laramie, Kan., 7 Oct. 1868. He was graduated at West Point in 1850, assigned to the artillery, fought in the campaign against the Seminole Indians in Florida, and in 1851-55 was engaged on frontier duty in California. He was assistant professor of geography and history in 1855 at West Point, and of mathematics in 1856-59. In 1860 he was ordered to Florida and was promoted major in 1861, served for a time as inspector-general of the Department of the Ohio, and in 1862 was attached to General Buell's army. He was appointed brigadier-gen¬ eral of volunteers in 1862 and at the battle of Stone River, 31 Dec. 1862, he was severely wounded, incapacitating him from further active service in the war. He was promoted lieutenant- colonel in 1864, and in 1865 was brevetted colonel and brigadier-general in the regular army for gallantry. He was mustered out of the volunteer service in 1865, and assigned to the command of Fort Laramie, Kan.

SLICER, sli'ser, Thomas Roberts, Amer¬ ican Unitarian clergyman : b. Washington, 16 April 1847 ; d. 29 May 1916. He was a Metho¬ dist minister for 10 years, then entered the Unitarian ministry, and in 1897 was made pastor of the Church of All Souls, New York. He is the author of (Doctrine of the Unity of God in the First Three Centuries) (1893); (The Power and Promise of the Liberal Faith) (1900); (Book of Common Worship) ; (The Great Affirmations of Religion) (1900) ; (One World at a Time) (1902) ; (The Way to Hap- piness) (1907); (From Poet to Premier* (1909). He received the honorary degree of doctor of divinity from Brown University in

1.

SLICKENSIDES, a miner's term for the striae, furrows, or polished surfaces covering the walls of fissures, and sometimes the surfaces of bed rock. They result from the friction of two portions of rock moving one against the other under great pressure. The occurrence is com¬ mon, being often found on the walls of faults and joints.

SLIDE-RULE, an instrument for doing various mathematical operations in a me¬ chanical way. It consists of two or more very accurately graduated and numbered pieces of wood or other material, one or more of which slides in a groove in the other. It may be flat or cylindrical. By shifting the movable slide or slides a variety of tedious arithmetical prob-

lems can be conveniently solved. It is almost indispensable to the draftsman and machine designer.

SLIDELL, sli-del', John, American poli¬ tician: b. New York, 1793; d. London, 29 July 1871. He was graduated at Columbia in 1810, studied law, and in 1819 removed to New Or¬ leans. From 1829 to 1833 he served as United States district attorney for Louisiana; was a member of Congress, 1842-45 ; and in 1845 was appointed Minister to Mexico, but was not re¬ ceived by the Mexican government. In 1853 he entered the United States Senate, but resigned when Louisiana seceded in 1861. In September of that year he was appointed as associate of James M. Mason (q.v.), commissioner of the Confederate States to France. The two com¬ missioners ran the blockade of Charleston, S. C., and sailed from Havana on the English steamer Trent. The Trent was overhauled 8 November by Capt. Charles Wilkes (q.v.) with the San Jacinto of the United States navy. The two commissioners were arrested and held for a while as prisoners at Fort Warren in Boston Harbor. The act of Wilkes was disavowed by the United States upon demand of the British government, and 1 Jan. 1862 the commissioners sailed for England. Slidell's mission which, be¬ sides other things, contemplated recognition of the Confederacy by the French government, failed in its object, France refusing to move, either in that matter or in making a commercial convention, without the co-operation of Eng¬ land. He was successful, hawever, in securing a large loan for the Confederate States. After the war Slidell settled in London. See Trent Affair.

SLIDING, in economics, (1) a scale of prices for manufactured goods, which is regu¬ lated by the rise and fall in the price of the raw material. (2) A scale of wages which rises and falls in proportion to the rise or fall in the market value of the goods produced, or some other varying condition.

SLIDING-KEEL. See Centre-board.

SLIEVEN, sle'ven, SLIVEN, or SLIVNO,

Bulgaria, in Rumelia, 70 miles north of Adria- nople, near the famous ((Iron Gate0 defile. It is an industrial town ; the chief manufactures are homespun cloths, attar of roses and black wine for which it is famous. There is an ex¬ tensive trade in homespun cloths and some in silk. A government factory for the making of military uniforms is located here. At the annual fair an extensive business is transacted. Pop. about 26,000.

SLIGO, ' sli'go, Ireland, (1) capital of County Sligo, on a bay of the same name, 110 miles northwest of Dublin, on the Garvogne River. The chief buildings are a Roman Catho¬ lic cathedral, town-hall, lunatic asylum, etc., also an abbey of the 15th century. Its industrial works are corn- and saw-mills and a brewery. The exports are cattle and agricultural produce, especially to Glasgow and Liverpool. Sligo was in early times a walled city with a castle for protection (1242), and its beginning was a Dominican abbey. Nearby is a group of cromlechs. Pop. 10,870.

(2) Sligo is a coast county of Connaught, northwest Ireland, and comprises 707 square miles. The coast bays are numerous, and the

largest are Killala and Sligo Bay. The highest points are Slieve Gamph and the Ox mountains (1,770 feet). Lough's Arrow and Gill are picturesque lakes. The Moy, Owenmore and Garvogne rivers are navigable. Iron is abund¬ ant. Agriculture and stock-raising are the chief occupations. Coarse linen and woolens are manufactured. The principal towns are Sligo, Ballina, Ballymote and Tobercurry. In the county are found ancient caverns, raths, crom¬ lechs, an ancient abbey at Ballysadare and a round tower at Drumcliffe. The population de¬ clines, being 84,083 in 1901 and 79,045 in 1911.

SLIME MOULD. See Fungi.

SLING, a pocket with a stout string or cord tied to each end, for holding temporarily a stone or the like, whirling it around rapidly and then discharging it by releasing suddenly one of the cords. It is a very efficient weapon in the hands of an expert, and was a very gen¬ eral instrument of war among the nations of antiquity. The biblical story of David's vic¬ tory over Goliath with the sling is well-known. The people of the Balearic Islands excelled at the sling and were much employed in the armies of the Romans and Carthaginians. Livy mentions some tribes still more dexterous than these islanders, who discharged stones with so much force that neither buckler nor headpiece could resist them and who hit their mark to a hairbreadth. In the book of Judges (ch. xx) it is recorded that in the town of Gibeah, in the tribe of Benjamin, there were 700 chosen men, left-handed, every one of whom could sling stones at a hair breadth and not miss. They persisted in use up to the 17th century, when they were used to throw hand grenades.

SLINGELANDT, slin' gel-lant, Pieter Cor- nelisz van, Dutch painter : b. Leyden, 20 Oct. 1640; d. there, 7 Nov. 1691. He was a pupil of Gerard Dow and produced portraits and clever genres, generally dealing with subjects relating to the great guilds or to civic life, and notable for life-like expression, true color and atmos¬ phere and suffused with a delightful humor. His principal pictures are (Children Blow¬ ing Bubbles) (in the Uffizi, Florence) ; (The Unmusical Puppy> ; (The Violin Player' ; and <The Singing Lesson.'

SLIP, (1) moistened clay prepared for the decoration of pottery and terra cotta. It is usually colored. See Pottery. (2) A space between piers in which a vessel may lie, as a ferry-slip.

Slippage, in mechanics, the amount or char¬ acter of a slip. A loose joint in a piston-rod might involve a corresponding slippage of the piston, during which motion it would do no useful work. A propeller cannot push a ship as far in the water as its actual travel would indicate theoretically and the difference is the slippage. Allowance made for play is also called slip or slippage.

SLIPPERY ELM. See Elm.

SLIVEN, sle'ven. See Slieven.

SLIVERING MACHINE, one of a class of machines used in match-making, dividing match-cards, forming veneers,, etc. Excelsior and toothpicks are made automatically on slivering machines. For match-making they usually include mechanism for forming the match-heads. For cutting various small wooden

pieces used in joinery, and separating the cards of matches, a gang-saw type of sliverer is employed. In forming strips of veneer, the sheet of veneer is first cut by a stationary knife and then a plunger pushes the veneer down upon the slivering knives.

SLOAN, Charles H., American politician: b. Monticello, Iowa, 2 May 1863. In 1884 he was graduated at the Iowa State Agricultural College; from 1884 to 1887 was superintendent of schools at Fairmont, Neb., was admitted to the bar in 1887 ; practised at Fairmont from 1887 to 1891, and at Geneva, Neb., after 1891. In 1890-94 he served two terms as attorney of Fillmore County and was a member of the Nebraska senate in 1894—96. From 1911 to 1919 he was a member of Congress from the fourth Nebraska district.

SLOANE, slon, Sir Hans, English nat¬ uralist: founder of the British Museum: b. Killileagh, County Down, 16 April 1660; d. Chelsea, 11

Jan. 1753. He studied medicine in London,, Paris and Montpellier, and in 1684 set¬ tled in London for the practice of his profes¬ sion. In 1685 he was admitted a Fellow of the Royal Society, of which he was appointed secretary in 1693 and president in 1727. His (Voyage to the Islands of Madeira, Barbados, Nieves, Saint Christopher's and Jamaica, with the Natural History of the Last' (1707-25) was the result of observations made in the West Indies during his stay as physician to the gov¬ ernor in 1687-89. George I created him a baronet and physician-general to the forces in 1716, and on the accession of George II he was named physician in ordinary to his majesty. See British Museum.

SLOANE, Rush Richard, American lawyer and capitalist : b. Sandusky, Ohio, 18 Sept. 1828. He early entered political life, was twice elected probate judge, was a delegate to the convention which organized the Republican party in 1856 and a prominent member of various political committees and conventions. He was conspicu¬ ous in the abolition movement and was prose¬ cuted by the United States government in 1852 for having defended six runaway slaves, the only person prosecuted for that offense under the Fugitive Slave Act of 1850. He was ap¬ pointed general agent of the Post Office Department by President Lincoln in 1861, assisted in the organization of the ((Cassius M. Clay Brigade" for the protection of Washington in 1861 and served as one of its members. He was mayor of Sandusky 1879-81, built the ((Big Four" Railroad between Springfield and Colum¬ bus, Ohio, was railroad president for 10 years and largely interested in various commercial enterprises.

SLOANE, Thomas O'Conor, American scientist: b. New York, 24 Nov. 1851. He studied at Columbia and was professor of natu¬ ral sciences at Seton Hall College, New Jersey. He invented the self-recording photometer, the first, instrument to record mechanically the il¬ luminating power of gas; described a new process for determining sulphur in illuminating gas and has lectured on scientific topics. He is the author of (Home Experiments in Science' (1888) ; (El.ectricity Simplified' (1891) ; Stand¬ ard Electrical Dictionary' (1892) ; (Liquid Air and the Liquefaction of Gases' (1899), etc.

SLOANE, William Milligan, American historian: b. Richmond, Ohio,

12 Nov. 1850. He was graduated at Columbia in 1868, studied at the universities of Berlin and Leipzig in 1872-76, acting during much of that time as private secretary to George Bancroft, then United States Minister to Berlin. He was pro¬ fessor at Princeton in 1876-96, edited the Princeton Review in 1886-89 and since 1896 has occupied the Seth Low chair of history at Columbia. He has published <Life and Work of J. R. W. Sloane) (1888) ; (Life of James McCosh' (1892) ; (The French War and the Revolution (1893) ; (Life of Napo¬ leon } (4 vols., 1897) ; (The French Revolution and Religious Reform' (1901) ; (Parteiherr- schaft in America' (1913) ; (The Balkans' (1914) ; (Party Government in America' (1915), etc.

SLOAT, slot, John Drake, American ad¬ miral: b. New York, 1780; d. New Brighton, Staten Island, N. Y., 28 Nov. 1867. He was appointed a midshipman in the navy in 1800 but was mustered out in the following year after the passage of the peace establishment act. At the outbreak of the War of 1812 he re-entered the navy as sailing master of the frigate United States, and for gallant conduct in the capture of the British ship Macedonian received a silver medal and the thanks of Congress. He was engaged in the expedition for the suppression of the West Indian pirates in 1823-25, holding chief command after 1824, captured the pirates Palmyra and Colfrecinos and the pirate stronghold Foxhardo in Porto Rico. He was promoted to master-comman¬ dant in 1826, captain in 1837 and in 184CW14 was in charge of the Portsmouth navy yard. He commanded the Pacific squadron in 1844- 46, had charge of the Norfolk navy yard in 1847-51, and then superintended the construc¬ tion of the Stevens battery. He was retired in 1861, but received rank as commodore in 1862 and as rear admiral in 1863.

SLOCUM, slo'kum, Henry Warner, Amer¬ ican soldier : b. Delphi, Onondaga County, N. Y., 24 Sept. 1827 ; d. Brooklyn, N. Y., 14 April 1894. He was graduated at West Point, but resigned his commission and began the prac¬ tice of law. When the Civil War broke out he was commissioned colonel of volunteers in the Union army. He was at the first battle of Bull Run, was made brigadier-general in 1861 and major-general in 1862. He then com¬ manded a corps of the left wing of Sherman's army, which he led on the ((March to the Sea." After the war was over he resigned, resumed the practice of law in Brooklyn and sat in Con¬ gress 1869-73.

SLOCUM, Joshua, American navigator: b. Annapolis County, Nova Scotia, 20 Feb. 1844. He engaged in a seafaring life from early boy¬ hood, studied nautical astronomy and marine architecture, and for many years sailed from the coast of California to points in China,

Japan, Australia and the Spice Islands In 1874 he built a steamer of 90 tons register at Olon- gapo, Subig Bay, Luzon, and in 1892 built at Fairhaven, Mass., the Spray of nine tons regis¬ ter, in which he sailed alone around the world in 1898. He published serially in leading maga¬ zines accounts of his voyages in the Spray and in the Destroyer and has also written (Voyages

of the Liberdale from Brazil to New York' (1891) ; (Voyage of the Destroyer' (1894) ; (Sailing Alone Around the World,' etc.

SLOCUM, William F., American educator : b. Grafton, Mass., 29 July 1851. He was gradu¬ ated at Amherst in 1874, and at Andover Theological Seminary in 1878. He held Con¬ gregational pastorates at Amesbury, Mass., 1878-83, and Baltimore, Md., 1883-88. He sub¬ sequently became president of Colorado College. He has written on sociological subjects.

SLOCUM DISASTER, the burning of the excursion steamboat General Slocum on the East River, 15 July 1904, in which about 1,000 lives were lost. The General Slocum left her pier in the East River with about 1,800 persons on board, most of them members of Saint Mark's Lutheran Church, New York. She had proceeded but a short distance up the river when fire was discovered on board, and in the panic ensuing, as the flames spread rapidly, many passengers threw themselves overboard and were drowned. Delay in beaching the boat was charged,, but it was finally grounded on North Brother Island. Many more lives were lost even than through fire or drowning, owing to the) panic which seized crew as well as pas¬ sengers, and to the fact that the life-preservers were old and worthless. The United States Steamboat Inspection Service placed the number of lives lost at 938, while the New York police estimate was 1,031. Official investigation showed that the steamboat had not been care¬ fully inspected, that the crew was practically untrained for an emergency and that the life-preservers were of absolutely no value through deterioration due to age. The captain, William H. Van Shaick, was in 1906 sentenced by the United States District Court to 10 years' im¬ prisonment on a charge of criminal negligence; but the steamboat company evaded legal respon¬ sibility for the tragedy.

SLOE, or BLACKTHORN, a European shrub (Primus spinosa), from two to 15 feet high, much branched and very spiny. The small, white, rosaceous flowers appear before the leaves, which are alternate, ovate with obtuse tips and finely serrate. The fruit is a globose drupe about as large as a cherry, almost black, with a bloom, and containing a stone slightly flattened and acute on one edge. Its variety, the bullace

(P. insititia), has by some been called a species and is supposed to be one of the plants from which European plums originated. The pits have been found in Swiss lake-dwellings, and the fruits have been used for preserves, for making fictitious port and adulterating the genuine wine and for a black dye. The leaves were an adulterant of tea and the stem furnishes the knobby “blackthorn” stick of Irish fame.

SLOOP. See Ship.

SLOSSON, Edwin Emery, American editor, educator and author : b. Albany, Kan., 7 June 1865. He was graduated at the University of Kansas in 1890 and took his Ph.D. at the Uni¬ versity of Chicago in 1902. He was professor of chemistry at the University of Wyoming in 1891-1903, serving also as chemist of the Wyoming Agricultural Experiment Station. From 1903 he was literary editor of the Inde¬ pendent, New York, of which he was also at various times managing editor. In 1912-14 he

was associate on the faculty of the Columbia University school of journalism. He is a con¬ tributor of literary and scientific articles to magazines and is author of (Great American Universities > (1910) ; (Major Prophets of To¬ day* (1914) ; (Six Major Prophets) (1917), etc.

SLOTH, an edentate mammal of the family Bradypodidce. (See Edentata). The best known are the unau or two-toed sloth (Choloe - pus didactylus) of Brazil and the ai or three¬ toed sloth (Bradypus tridactylus) of northern South America. This family is distinguished by the flat short head, and the elongated legs, furnished with powerful compressed and curved claws. No incisor teeth exist, but simple col¬ umnar molars without enamel are developed. The stomach is somewhat complex. The three¬ toed species are unique among mammals in pos¬ sessing nine cervical vertebrae. The long bones are solid, and destitute of marrow or medullary cavities. Being adapted solely for an arboreal life, the fore-limbs exhibit a much greater length than the hind-limbs, and a powerful muscular organization. The forearm possesses an unusual degree of mobility, the feet being strong and the claws very powerful and perma¬ nently flexed. The usual mode of progression of these animals is to move back downward suspended from the branches of trees, and they are known to sleep in this curious position. On the ground the sloths are entirely out of their element; the feet being jointed in an oblique manner to the limbs, the

palms and soles are thus naturally turned inward, and the claws themselves are bent inward toward the soles of the feet. Three toes exist in this species, and its general color is a brownish gray, with darker tints on the face and limbs. The fur is of very coarse character, and when the ani¬ mals are living in their damp native forests is tinted green from the presence upon it of a minute green plant or alga. The unau, as its specific name implies, has but two toes, and 23 pairs of ribs exist, no mammal possessing a greater number than this. Its average length is about two feet, and its color is a lighter gray than that of the ai. The tail in both species is either wanting, or at the most is rudimentary. The sloths are proverbially sluggish in their movements and are remarkably tenacious of life. They are nocturnal and feed upon leaves and shoots which are secured with the slender prehensile tongue. Generally only the two genera mentioned above are recognized, but by some zoologists the three-toed sloths are subdivided. The number of species is also doubtful. About 15 have been described, all confined to South and Central America. The Megathium and Mylodon (q.v.) were gigantic sloth-like terrestrial mammals, the remains of which are found abundantly in the Pleistocene deposits of North and South America. Consult Flower and Lydekker, (Mammals Living and Extinct* (London 1891) ; Leidy, (Extinct Sloth Tribe of North America) (Washington 1855) ; Bates, H. W., (Naturalist on the Amazon)

(1910).

SLOTH-BEAR, or ASWAIL. See Bears.

SLOTH-LEMUR, or SLOW LEMUR.

See Lemurs.

SLOUGH GRASS. See Fibre.

SLOVAKS, slo-vaks', the name of the Slavic inhabitants of Central Europe, not to be confused with the Slovenes. They are the descendants of the Slavs who setlled on the south of the Carpathians between the Danube and the Theiss, where they maintained them¬ selves for centuries, and in the 9th century formed the nucleus of the great Moravian empire. After the battle of Pressburg, in 907, in which this empire was overthrown by the Magyars, the Slovaks gradually fell under the yoke of the conquerors. At the present day they are scattered over the states of Bohemia, Moravia and Slovakia in the Republic of Czecho-Slovakia where they form the majority of the inhabitants. They are also found in Hungary, and in detached

settlements in Lower Austria, Bukowina and Slavonia. They are a peaceful but rather sluggish people who live mostly upon farms which they cultivate in the most primitive fashion. During the middle of the 7th century they formed a part of Samo's empire, but were subject to the Avars and the Franks. When Moravia came under the domi¬ nation of the Magyars, the southern Slovaks were displaced or assimilated, the Magyars always treating them as an inferior race. In 1848-49 the Slovaks rose against the Magyars when the latter rose against Austria, but the uprising availed them but little as they were handed back to Magyar domination when peace was concluded. The Slovak language is closely related to Czech. The alphabet is founded upon the latter. There are three groups of dialects, distinguished as Western, Central and Eastern. The Slovaks possess in their own dialect a num¬ ber of beautiful songs. There is a gram¬ mar of the language by Victorin (Budapest 1878). The Slovaks number about 2,500,000. Consult Copek, J., (The Slovacs) (New York 1906) ; Seton-Watson, (Racial Problems in Hun¬ gary* (London 1909). See Slavs.

SLOVENES, or SLOVENIANS, the na¬ tive name of the Slavic inhabitants of Styria, Carinthia, Carniola, parts of the Serb-Croat-Slovine state, a narrow strip in the west of Hungary and in Venetian Friuli. By the Ger¬ mans they are often called Wends or Winds. They settled in these districts toward the end of the 6th century, having migrated there from Pannonia. Christianity was introduced among them not later than the 8th century. Their land was incorporated under the name of the Windic March with the empire of Charlemagne. Out of this march were afterward formed the duchies of Styria, Carinthia and Carniola, which fell to Germany and ultimately to Aus¬ tria. Their total number is about 1,300,000. The language of the Slovenians is closelv allied to the Servian. (See Slavs). It possesses some very old and valuable monuments of the Sla¬ vonic tongue. The oldest, which is at the same time the most ancient of all the Slavonic liter¬ ary relics, is the Munich manuscript, of tne date 957-994, written by Bishop Abraham, of Freising, in Bavaria, and consisting of three articles on religious subjects. It is printed in Kopitar's (Glagolitza Clozianus* (Vienna 1836). After a long slumber the dialect was resus¬ citated for literary purposes in the 16th century, when several ecclesiastics brought it to a high state of development. In 1584 Bohoricz pub¬ lished a grammar of the language, and in the

same year there appeared a translation of the whole Bible. The best grammar is that of Kopitar (Laibach 1808). A dictionary by Jarnik and Mark was published in 1832, and collections of popular songs were published by Wraz and by Korytko in 1839. See Slavs.

SLOW-WORM, or BLIND-WORM, a

limbless, snake-like lizard (Anqius fragilis) of Europe which creeps about beneath dead leaves, in rotting logs, etc., in search of insects. It is 15 to 20 inches in length, smoothly scaly, brown striped and perfectly harmless.

SLOWACKI, slo-va'ke, Julius, Polish poet: b. Kremenecz, in Volhynia, 23 Aug. 1809; d. Paris, 3 April 1849. He was educated in the University of Vilna. His first work was the poetic tale <Hugo) ; this was followed by the tragedy (1829) ; the poem (Mnich) (the ; and (Song of the Lithuanian Legion) (1831). The sentiment of Polish nationality finds fullest expression in the dramatic poem (Kordyan) (1834), and in the tragedy (Ma- zeppa. * Slowacki reaches the height of his lyric power in the poem (In Switzerland.* His last great work, left incomplete, was (King Spirit, J which he designed to be a ((legend of the ages® of Polish history See Kordyan.

SLOYD. See Manual Training.

SLUGS. See Snails and Slugs.

SLUICE, in hydraulics , any artificial chan¬ nels of small dimensions, as a frame of timber, stone or concrete, serving to retain and direct the water of a canal, dam, etc., and often to give it vent; also called sluiceway. Hence, an opening; a source of supply; that from which any thing flows ; as, the eyes are the lachrymal sluices of sensibility. The form used in placer mining is a long wooden trough, with longitudi¬ nal cleats in the bottom and occasional cross¬ cleats. Quicksilver being placed in the cleats tends to hold any gold in the dirt that is washed through the sluice.

SMACK, a small vessel rigged as a cutter, sloop or yawl, used in the coasting trade and in fishing.

SMALCALD, smal'kald. or SCHMAL- KALDEN, shmarkal"den, Prussia, a town in the district of Cassel, on the south slope of the Thiiringer Wald, 35 miles south of Muhlhausen. It contains a Gothic church built in the 1 5th century and the Wilhelmsburg Castle, in which there is a collection of antiquities. In the old town-hall the Smalcaldic League was concluded in 1530 and the Smalcaldic Articles signed in 1537 by

the Protestant leaders. The town has several institutions for higher education, and a trade-school for the iron and steel industry is the most important. Pop. 9,529.

SMALKALDIC LEAGUE. See Schmal- kali-ic League.

SMALL, John Kunkel, American botanist: b. Harrisburg, Pa., 31 Jan. 1869. He was grad¬ uated at Franklin and Marshall College in 1892 and took his Ph.D. at Columbia in 1895. He was curator of the herbarium at Columbia Uni¬ versity in 1895-99, and at the New York Botanical Garden in 1899-1906, since when he

has been head curator there. Author of (Shrubs of Florida) (1913); (Flora of the Florida Keys* (1913) ; (Flora of the South Eastern United States) (1913), etc.

SMALL ARMS. Included under this title are the various types of firearms that from their portable form may be classed as hand weapons, as distinguished from ordnance. In their earliest forms, small arms do not differ from cannon except in size. These weapons, dating from the 14th century, were suspended from the neck of the trooper. This cavalry weapon, known as the bombardello, was succeeded by the hand culverin, mounted on a wooden stock, and fired from a rest by a slowmatch. It took two men to fire it and, except for the terror caused by its noise, was a far less effective weapon than the crossbow. The stock and barrel gradually took on a form not unlike the present one, and the slowmatch was fastened to a serpentine or cock on the piece. This was manipulated by a lever or spring, and transferred the fire from a match on the barrel to a flashpan containing powder and situated just under the touchhole. This piece, known as the matchlock, was partly superseded in 1515 by the wheellock, in which the trigger released a clockwork which rotated a grooved metal wheel against a piece of pyrites or flint, thus igniting the priming. The wheellock was too expensive for military purposes, and was con¬ fined to fowling pieces, which it first made reasonably convenient.

The flintlock originated in Spain about 1600, though it did not come into general military use till nearly a century later. The priming was ignited by the contact between a flint held in a frame not unlike the serpentine of the match¬ lock and the cover of the flashpan. The flint¬ lock was the prevailing arm as late as 1840. It was almost invariably muzzleloading, as as¬ sumed the forms of pistol, smooth bore musket and rifle. The rifle dates back almost to the beginning of the history of firearms, and is characterized by helical grooving on the inside of the barrel. This secures against the escape of gas past the

bullet, and gives a predetermined axis of spin to the bullet, thus increasing the accuracy of fire.

In 1807 a Scotch clergyman by the name of Forsyth patented the use of fulminates for the ignition of the charge in firearms. This grad¬ ually came to be adopted in place of the flint¬ lock. The mechanism was much like that of the flintlock : the flint was replaced by a metal hammer, and the flashpan and touchhole by a nipple containing a metal cap of fulminate. The reinvention of the breechloader (for the breechloader in a primitive form is as old as the gun itself) took place soon afterward. The first military rifle was the needlegun of the Prussians, invented by Dreyse in 1839 It was a crude bolt action weapon with very imperfect obturation, as a paper cartridge was used. The French soon followed suit, first with the Ta- batiere and then with the Chassepot. In 1866 the British adopted the Snider rifle, remodeled from the old Enfield. The Martini falling- block rifle was adopted in 1871. In 1872 the Mauser boltaction rifle was made the arm of the German army. This gun is the type of most modern military rifles.

During this period, the ammunition under-

went improvement along with the gun. The round bullet was replaced by one cylindrocomcal in shape, and the cartridge case of paper gave way to one, first of coiled brass, and then of drawn brass. This made escape of gas impos¬ sible and solved the problems which had vexed the inventors of breechloading arms from the 15th century on. The magazine principal grad¬ ually came into use — first in the form of a tube magazine now retained only by the French Lebel — then of a box under the action and finally of a box Loaded with five or six cart¬ ridges at once by a clip or charger. The calibre was then reduced to the neighborhood of .3 inches or less, and a muzzle velocity of over 1,800 feet per second was attained. This was made possible by the invention of the copper- jacketed, non-stripping bullet by Major Rubin of the Swiss army. Soon afterward smokeless powder was introduced, and the military rifle had assumed practicallv all its present features. The Krag-Jorgensen and Springfield mentioned below are typical military arms.

For many years after the arrival of the early colonists, imported weapons were used in America almost exclusively. On the Continent, especially among the Germans, Swiss and French, much attention had

been given to the production of arms of precision and greater progress had been made than in England. The Puritan settlers in New England remained satis¬ fied with their matchlock and flintlock smooth¬ bore arms until the Revolutionary period. Their traditions and training were such that the use of deadly weapons, excepting in cases of defense from enemies and f < or the purpose of obtaining game in order to sustain life, was frowned on as a practice to be discouraged.

It is to the Teutonic settlers of Pennsyl¬ vania that we must turn for the earliest ex¬ amples of typical American weapons. Peter and Heinrich Leman established themselves near Lancaster, Pa., at the beginning of the 18th century and in 1732 were making rifled arms.

Naturally the first rifles produced were of the contemporary German model, short-barreled, ungainly pieces of large bore. They were flint¬ lock, loading from the muzzle, a mallet being necessary in order to start the bullet into the deeply cut rifling, considerable pressure being afterward required in order to seat the bullet down upon the powder charge. The frontiers¬ men appreciated the value of an arm that gave the accuracy of which these weapons were ca¬ pable as compared with smooth-bore muskets.

But such laborious methods of loading were impracticable under conditions of Indian war¬ fare and in the pursuit of dangerous game. So the linen or buckskin patch, impregnated with tallow, was devised to be wrapped about the bullet when loading. This seated readily and the rifles were found to shoot farther and truer than by the previous method. By lengthening the barrel greater accuracy as well as ease of sighting and steadier holding ensued. The barrel was usually from 40 to 45 inches in length, octagonal, and of a bore from 35 to 40 round balls to the pound. The stock was made of maple or walnut extending the full length of the barrel, the ramrod being carried in a slot underneath. A cheekpiecc was fashioned near the breech, also a patch box, and the butt of

the stock terminated in a crescent-shaped plate to be held against the upper arm instead of the shoulder. The locks were generally fitted with single or double set triggers. The stock was intentionally slender and light, the total weight of the rifles being about 10 pounds. Sights were very low on the barrel, consisting of an oval silver blade at the muzzle and at the breech a straight bar with a fine notch, frequently inlaid with a narrow vertical strip of silver. Though the range of these rifles was seldom effective beyond 200 yards, within that distance great precision as well as a flat curve of trajectory was secured, the proportion of the weight of the bullet to the powder charge being

about three to one.

In the Far West a change in model was made in order to adapt the rifle to the conditions of buffalo hunting and use on horseback. A rifle of this type made in Missouri in 1820 has a 34-inch octagonal barrel with a maple stock extending half way to the muzzle. The bore is - slightly over ione-half inch in diameter, and a charge of about 90 grains of powder was used. This arm has double set triggers and weighs about 10ˆ4 pounds.

In the South the standard rifle was of rela¬ tively small bore. Bullets of about 70 to 80 to the pound were found to be sufficient for still hunting the small game of the section, such as wild turkeys and squirrels. Though larger calibres were to be found to a certain extent, the Kentucky smallbore rifle attained a widespread reputation.

The sport of target or turkey shooting from an artificial rest at distances up to 40 rods developed a type of rifle which while very accu¬ rate was useless for field purposes, weighing from 20 to 40 pounds. A bore of from .40 to .60 calibre was customary with an elongated projectile and telescope sights were frequently applied. Carlos Clark of Windsor, Vt., in 1836 adopted the false muzzle for the purpose of preventing wear on the rifling when loading, and it was generally used with this style .of arm.

The first military weapon employed by the United States government was the Charleville musket, the national arm of France, which was brought to this country in large quantities dur¬ ing the Revolutionary War through the influ¬ ence of Marquis de Lafayette. The French model of 1763 served as an example for Amer¬ ican private manufacturers who were en¬ couraged by the government. These muskets were heavy smooth-bore flintlocks taking an ounce ball and fitted with bayonets. In 1795 the government armory at Springfield, Mass., was established and the manufacture of muskets by the government was begun during that year. The Charleville musket as improved in 1797 continued to be the standard type of military weapon. The Harper's Ferry armory was es¬ tablished in 1796, but the fabrication of arms was not begun until 1801. In 1804 rifles were produced there in small quantities. A rifle re¬ sembling the sporting model of the period was brought out at this armory in 1814. It had a half-octagon barrel, short forestock, no bayo¬ net and a curved butt plate, and was adapted to a one-half ounce ball. The Hall rifle issued in 1818 was the first breechloading rifle to be manufactured by the government. It was origi¬ nally a flintlock, but was later changed to a per-

cussion lock arm. In 1822 the muzzleloading principle was still retained in the musket and rifle of that date, issued as a new model. The musket and rifle of the model of 1842 were the first service weapons to be originally made with percussion locks.

During the Civil War a great variety of arms were in use. The percussion principle was ap¬ plied to many of the flintlocks in the possession of the government and the musket and rifles made in the government armories were adapted to that style of ignition. Breechloading rifles and carbines of private manufacture were pur¬ chased in large quantities, several types of re¬ peating arms doing excellent service. Foreign weapons were also used to some extent, espe¬ cially in the Confederate service.

At the close of the war the government deemed it desirable to transform the large num¬ ber of muzzleloading rifles on hand into breech¬ loaders. Many devices for this purpose were submitted to the Ordnance Board and that pre¬ sented by Smoat, a mechanic at the Springfield armory, was adopted, and the rifles were known as the model of 1865. The progress in the development of ammunition resulted in the pro¬ duction of the rim fire cartridge, a great im¬ provement over the powder and ball charge enclosed in paper previously in use. Centre fire cartridges of .58 calibre, the brass shell containing 70 grains of power and 450 of lead, became the standard ammunition for the later rifles of this model. In 1868 the calibre was changed to .50, retaining the same weight of bullet and powder charge.

In 1870 the Ordnance Board recommended for trial from the many rifles submitted to them the Remington, Sharps and Ward-Burton, all taking the regulation .50-calibre cartridge. They wrere all tried in the field, the verdict being that none of them were superior to the Spring-field. A reduction in calibre was recommended, however; resulting in the model of 1873 Spring- field rifle, calibre .45 taking 70 grains of powder and a 405-grain bullet. In 1885 a bullet weigh¬ ing 500 grains was adopted as the standard for this cartridge.

The .45-calibre Lee-Remington, and later the .236-calibre Lee straight pull rifles, both em¬ bodying the bolt mechanism, were adopted for the United States navy.

Flintlock pistols of large calibre and smooth bore were considered an indispensable weapon of defense during the early history of our country, no traveler on horseback or by stage feeling secure unless one of these weapons was in his possession. Accuracy was a secondary consideration, as they were intended to be used only at short range, and hence were frequently loaded with buckshot as well as with single bullets. Duelling pistols were of a different model, the stocks being attached at an extreme angle with the barrel in order to allow the owner to assume the approved duelling position, with the elbow close to the hody. These pistols were made in pairs and they frequently showed a high degree of skill on the part of the makers, being elaborately engraved and inlaid-.

In 1830 Samuel Colt began to devote his attention to developing a pistol with a revolv¬ ing cylinder containing a number of chambers. His efforts were soon crowned with success, and his revolvers gained a wide reputation.

The cylinders were loaded from the muzzle with powder and ball, each chamber containing an independent breechpin adapted to a percus¬ sion cap. These weapons were made with a solid frame. Metallic cartridges added much to their utility. Smith and Wesson brought out a revolver with a hinged frame, allowing the chambers to be exposed for loading and the simultaneous ejecting of the discharged shells. The products of these two firms soon became the models for manufacturers throughout the world.

For hunting rifles the breechloading system came into general use during the period of the Civil War. In the West the Sharps .45-calibre rifle chambered for a cartridge containing from 90 to 120 grains of powder and a 550-grain bullet, paper patched, was the standard buffalo hunter's weapon. These rifles weighed from 11 to 16 pounds and were usually equipped with set triggers.

The magazine principle was making rapid advances at this time. In the Henry rifle, the predecessor of the Winchester, the cartridges were loaded into a tube under the barrel, being forced by a spiral spring into the carrier and thrown into the chamber by the action of the lever forming the trigger guard. The standard cartridge remained the .44—40-200 in both rim and later central fire. In 1870 the express principle attracted the attention of sportsmen, consisting in the use of a large powder charge in proportion to the weight of the bullet in order to obtain a high velocity and increased striking power on large game. The .45-90-300 cartridge was one of a number brought out in response to this demand and adapted to the re¬ peating system of

rifles.

The formation of the National Rifle Asso¬ ciation in 1871 resulted in a series of inter¬ national long-range rifle contests in which the American teams won a majority of the matches both at home and abroad. The weapons used wrere of .44 and .45 calibre with from 90 to 120 grains of powder and paper patched bullets ot from 500 to 550 grains of hardened lead. The limit of weight of these rifles was 10 pounds and the minimum trigger pull three pounds. Great skill was shown in the manufacture of these rifles and the results attained have not been surpassed in accuracy by later develop¬ ments in weapons.

Target shooting as a sport became popular throughout the country as a result of these con¬ tests and, as many clubs were unable to obtain facilities for long-range practice, shooting at 200 yards in the standing position was widely adopted. The large bore rifles and heavy charges in use at the longer ranges were found to be unnecessary and a gradual reduction in calibres took place. For some years the limit of weight remained at 10 pounds. At the Ger- man-American schuetzenfests there were no re¬ strictions as to the weight of the rifle or the trigger pull, and these weapons while imprac¬ ticable in the field were nevertheless superior for their specific purpose. Hence a change in type in offhand weapons has come about and the standard weapon is the ˆschuetzen® model, weighing from 11 to 15 pounds. The .32 and .38 calibres are usually adopted. These rifles are frequently equipped with a palm rest, a rod extending down from the forestock, terminat¬ ing in a knob, enabling the marksman to rest

the left elbow on the hip. A cheekpiece, butt- plate with horns to fit the arm, double set trig¬ gers, an aperture or pin head front sight cov¬ ered with a hood, and a rear elevating vernier sight with a wind-gauge attachment on the tang of the rifle complete the outfit. Telescope sights are increasing in numbers. Lubricated grooved bullets slightly hardened with tin are used, many expert riflemen loading them through a false muzzle, the shell being after¬ ward inserted at the breech. The advantages claimed for this system are the perfect fitting of the bullet to the grooves and the cleaning of the bore as the bullet is forced down through the rifling. Such weapons are capable of plac¬ ing 10 shots in a 2-inch circle at 200 yards from a machine rest.

Target shooting with the pistol and revolver at distances up to 50

yards is a popular sport, encouraged by the United States Revolver Association. The modern single shot target pistol has a 10-inch barrel and is made in cali¬ bres of from .22 to .44, .22-calibre rim fire am¬ munition being generally favored. The accu¬ racy obtainable is surprising, 10 shots having been placed in a 3-inch circle at 50 yards, the weapon being shot in the regulation position with the arm extended, free from artificial support. Revolvers for target purposes are usually of from .32 to .44 calibre, with barrels from six to eight inches in length.

Muzzleloading shotguns both flintlock and percussion were almost exclusively imported from England and the Continent. The products of Joseph Manton were unsurpassed for bal¬ ance, fine shooting qualities and workmanship and served as models for American fowling pieces. Barrels and locks were largely imported, in fact it is only within a comparatively few years that many shotgun barrels have been made in this country. The introduction of the Lefaucheaux breechloading system from France in 1852 marked a great advance over previous inventions. A paper and brass-shell was used with a small percussion cap in the centre of the base of the cartridge, ignited by the blow of the hammer on a brass pin extend¬ ing through the side of the head of each shell, this pin also affording a means for withdrawing the empty case. The barrels were hinged, the breech being opened for the insertion of the shells by means of an under lever. This system formed the basis for most American breech¬ loading actions for double and single guns. Im¬ provements have been made from time to time until to-day the American hammerless ejecting gun operated by a top lever using centre-fire shells is second to none. The various styles of single trigger mechanisms are gaining in popu¬ larity. The repeating shotgun is distinctly American, the mechanism in most cases being operated by the sliding motion of the fore end.

The various types of weapons we have men¬ tioned have been developed during the era of black powder, a propellant which while produc¬ ing remarkably uniform results has changed but slightly in its constituents during the past cen¬ tury.

The introduction of smokeless or nitro pow¬ der has marked a new era in the field of fire¬ arms. Its characteristic features are absence of smoke and fouling, reduced recoil, reduc¬ tion in bulk and the attainment of high veloci¬ ties with relatively low chamber pressures.

In military weapons smokeless powder was at once conceded to possess obvious advantages. During the Spanish-American War smokeless ammunition was made in large quantities for the .45-calibre

Springfield rifle. The Ordnance Board after careful investigation adopted 15 Sept. 1892 the Krag-Jorgensen .30-calibre rifle. This arm is of the bolt-operated type, weighs nine and three-fourths pounds without the bay¬ onet and has a magazine holding five cartridges. The cartridge contains a bullet of 220 grains, consisting of a lead core and a steel jacket, the charge of smokeless powder giving a muzzle velocity of 2,000 feet per second as compared with 1,300 feet for the .45-calibre Springfield. A marked reduction of recoil, a flat curve of trajectory and economy in the weight of am¬ munition, as well as a great gain in rapidity of fire are notable features. A 10-inch twist is required to rotate properly the long bullet.

In 1903 the Ordnance Board adopted a new weapon known as the .30-calibre Springfield. The breech mechanism resembles in many re¬ spects a form of the Mauser-bolt action, which has given excellent satisfaction. The magazine is of the box type and is situated under the receiver. The cartridges are loaded from a clip, the magazine being provided with a cut¬ off so that the weapon may be used as a single loader if desired. Twenty shots have been fired in government tests in 28J6 seconds. The cart¬ ridge has a cannelure cut around the head to engage in the extractor in place of the flange on the Krag-Jorgensen ammunition, allowing the cartridges to lie compactly in the magazine. The 150-grain jacketed bullet is used, the powder charge being increased in order to give a muzzle velocity of 2,700 feet per second. The rifle weighs, without bayonet, 8.69 pounds and is 3.60 feet long. The bayonet adds one pound in weight and 1.33 feet in length. In 1917 a rifle of similar dimensions, taking the same cartridge, but of a British type was adopted for use in the Great War.

The telescope sight is receiving attention for the equipment of military sharpshooters. The hyposcope, a detachable instrument con¬ sisting of a series of mirrors in a tube ex¬ tending below the line of sight, allowing aim to be taken without the body of the soldier being exposed, has recently been placed before the Ordnance Board for adoption.

In hunting rifles the jacketed bullet and smokeless powder have found instant favor. For this purpose the lead core of the bullet is exposed at the point and upon striking game it expands or mushrooms, making a most deadly wound. Though the .30-40 government cartridge with a soft nosed bullet is largely used a number of special cartridges have been designed. The .405 Winchester adapted to their repeating rifles contains a 300-grain bullet, the smokeless powder charge developing a muzzle velocity of 2,204 feet per second and a muzzle energy of 3,235 foot pounds.

The application of smokeless powder to re¬ volver ammunition has resulted in increased efficiency, as an unlimited number of shots may be fired with no perceptible fouling of the bar¬ rel or cylinder and a degree of accuracy main¬ tained which was unattainable in the days of black powder.

Shotgun cartridges are almost exclusively loaded with this propellant and American ma-

chine-made guns are now being produced in weights of from six to seven pounds without the recoil becoming excessive or general effec¬ tiveness being sacrificed. The imported twist barrels have given way to special steel barrels of light weight and great tensile strength.

Automatic firearms have within the past few years attracted much attention. The term automatic literally means an arm that con¬ tinues its acts of loading and firing after the first shot until the ammunition is exhausted. The arm that after firing the first shot per¬ forms the work of ejecting the empty shell, recharges the chamber and leaves the arm ready for the next shot by merely pressing the trigger, is a semi-automatic firearm, but the term automatic has been generally applied to this weapon. There are two systems in vogue at present, that by which a portion of the gas from the explosion is utilized to operate the breech mechanism ; the other, in which the bar¬ rel recedes by the action of the recoil and accomplishes the same result. The latter sys¬ tem has been successfully applied to American repeating pistols which are a marked improve¬ ment over the revolver, as in the latter there is an inevitable escape of the explosive gases between the cylinder and the barrel. Metal- jacketed bullets and smokeless powder are used on these repeating pistols. Small-bore rifles designed on the recoil-operated system are a popular weapon and a repeating semi-automatic shotgun is now before the public. See Machine Gun.

There are many excellent types of firearms in use that seem well adapted for all time, but progress is constantly being made. The au¬ tomatic and semi-automatic weapon will be an important factor in the warfare and sport of the future. See Arms and Armor; Artillery; Ordnance; Gun; Musket, etc.

Bibliography. — Barber, <The Crack Shot5 (New York 1873) ; Chapman, improved Amer¬ ican Rifle5 (New York 1848) ; Cleveland,

(Hints to Riflemen5 (New York 1864) ; Free- mantle, (The Book of the Rifle5 (London 1901) ; Gerrare, (A Bibliography of Guns and Shooting5 (London 1896) ; Gould, (The Mod¬ ern American Pistol and Revolver5 (Boston 1888) ; Gould, (Modern American Rifles5 (Bos¬ ton 1892) ; Gould, (Military Rifle Shooting5 (Lowell 1902) ; Greener, (The Gun5 (London 1835) ; Greener, (Gunnery in 18585 (London 1858) ; Greener, (The Gun and Its Develop¬ ment5 (London 1896) ; Greener, (Sharpshoot- ing for Sport and War5 (London 1900) ; Hud¬ son, (Modern Rifle Shooting from the Ameri¬ can Standpoint5 (New York 1903) ; Kephart, < Early American Rifles in Shooting and Fish¬ ing5 (New York —) ; Leech, Urish Riflemen in America5 (London 1875) ; Marks, (The Evolu¬ tion of Modern Small Arms and Ammunition5 (London 1898) ; Ovemundsen and Robins, ˆRifles and Ammunition5 (London 1915) ; Ord¬ nance Department, United States Army Reports, Washington; Teasdale-Bucknell, (Experts on Guns and Shooting5 (London 1900) ; Tippins, <Modern Rifle Shooting in Peace, War and Sport5 (London 1900) ; United States Cartridge Company, Catalogue of Collection of Fire Arms5 (Lowell 1904) ; Van Dyke, (The Still Hunter5 (New York 1904) ; Walsh, (The Mod¬ ern Sportsman's Gun and Rifle5 (London 1884) ; Weston, (The Rifle Club and Range5

(New York 1879) ; Wilder, (Rifles and Rifle Shooting5 (Boston 1892) ; (Guns, Ammunition and Tackle5 (New York 1904).

SMALLEY, smal'i, George Washburn,

American journalist: b. Franklin, Norfolk County, Mass., 2 June 1833; d. 1916. He was graduated at Yale in 1853, read law, and, having been admitted in 1856 to the bar, practised in Boston until the beginning of the Rebellion, when he became correspondent in the field for the New York Tribune. From No¬ vember 1861 to October 1862 he acted as war correspondent, first in South Carolina, then in Virginia, in the campaigns of the Shenandoah and the Potomac, then was on the editorial staff till 1867, and in that year organized the Tribune's European bureau in London. There he remained in charge of all European corre¬ spondence until 1895, when he returned to the United States as American correspondent of the London Times. His publications are Re¬ view of Bright’s Speeches5 (1868) ; (London Letters5 (1890) ; Studies of Men5 (1895) ; (Anglo-American Memories5 (1911; 2d series,

1912).

SMALLPOX. The date of the origin of smallpox, as is the case with other similar dis¬ eases, has not been definitely established. The

probabilities are that it made its first appear¬ ance in the Orient and was thence introduced into western Europe. A severe epidemic of smallpox is said to have occurred in Iceland in 1241 ; we have no trustworthy record, how¬ ever, of the disease before the 15th century, when it began to appear in Europe. Epidemics became progressively more common in the 16th and 17th centuries and reached their maximum of frequency and extent in the 18th century. For official data concerning the disease in the 17th and 18th centuries we are chiefly indebted to the London Bills of Mortality, which gave a weekly account of burials and christenings, and from 1629 to 1845 the specific causes of death, including smallpox.

It has been estimated that the population of London in 1685 was 530,000. The mortality from smallpox for an average of 10 years from 1681 to 1690 was over three in a thou¬ sand. In most of the years of the century, indeed, the mortality was in the neighborhood of two in a thousand, sometimes more and at other times less. This would mean an aver¬ age of over 1,000 smallpox deaths in London a year. As it has been reckoned that about one in five would die, there were evidently about 5,000 cases of smallpox annually in the English capital.

As will be readily comprehended, smallpox was a great scourge before the days of vac¬ cination ; but a small percentage of people es¬ caped its ravages. Indeed smallpox was as prevalent in the 18th century as measles is at the present time. Haygarth gives an account of an epidemic of smallpox in Chester, Eng¬ land, in 1774, at which time, out of a popula¬ tion of 14,713, 1,202 persons took the disease and 202 died. At the termination of the epi¬ demic there were but 1,060 persons, or 7 per cent of the population, who ‘had never had smallpox. In 1722 smallpox devastated the small English town of Ware, whose popula¬ tion numbered 2,515 souls; of this number there were only 914 persons susceptible to smallpox,

inasmuch as 1,601 had already passed through an attack of the disease. During the epidemic referred to 612 persons were attacked, leaving but 302 individuals in the entire town who had never had smallpox. Eighty-five per cent of the population, therefore, were smallpox sur¬ vivors.

With these official figures in mind, we may be better able to

appreciate the general esti¬ mate of the extent of smallpox given by writers of the day. In 1802 Admiral Berkeley, in a speech before the House of Commons, said: (<It is proved that in this United Kingdom alone 45,000 persons die annually of the small¬ pox; but throughout the world what is it? Not a second is struck by the hand of Time but a victim is sacrificed upon the altar of that most horrible of all disorders, the smallpox.® King Frederick William III of Prussia, in a dispatch dated 1803, stated that 40,000 people succumbed annually to smallpox in his kingdom. The French Minister of the Interior, in reporting on vaccination in 1811, estimated that 150,000 people died in France annually from smallpox; the disease is reported to have destroyed in Russia 2,000,000 lives in a single year. The distinguished mathematician, Daniel Bernouille, writing in 1760 to 1765, calculated that not less than 15,000,000 human beings died of smallpox every 25 years. This would give a yearly aver¬ age of 600,000. Dr. Lettsom estimated that Europe alone claimed 210,000 victims annually. Juncker placed the yearly sacrifice from small¬ pox in Europe at 400,000. When to these figures are added the deaths due to devastating epi¬ demics in Asia, Africa and America, the esti¬ mate of Bernouille does not appear to be over¬ stated.

Smallpox was introduced in the western hemisphere by the Spaniards about 15 years after the discovery of America; in Mexico within a short period 3,500,000 persons are said to have died of the disease. It is alleged that in Mexico, smallpox has exterminated whole tribes of Indians, sparing no one to tell the story of the annihilation. Robertson refers to smallpox among the South American Indians as follows: (<In consequence of this (various calamities), together with the introduction of smallpox, a malady unknown in America and extremely fatal to the natives, the number of people both in New Spain and Peru was so much reduced that in a few years the accounts of their ancient population appeared almost incredible.® Catlin states that of 12,000,000 American Indians, 6,000,000 fell victims of smallpox. Washington Irving's states in the preface, in refer¬ ence to a smallpox epidemic among the In¬ dians in 1837 : ((The Big-Bellied Indians and the Ricarees, lately amounting to 4,000 souls, were reduced to less than the half. The As- siniboins, 9,000 in number . . . are, in the literal sense of the expression, nearly exterminated.®

According to records published by the gov¬ ernment of Denmark, a devastating epidemic of smallpox appeared in Iceland in 1707, which destroyed 18,000 out of the 50,000 inhabitants; 36 per cent of the total population perished. It is stated on good authority that in the Danish

colony of Greenland, in 1734, 6,000 to 7,000 persons perished from smallpox, representing nearly two-thirds of the population. The dis¬ ease was introduced by a Danish ship.

The natives of New England likewise suf¬ fered great losses by smallpox. Robertson writes: (<At the same time, 1631, the smallpox, a distemper fatal to the people of the New World swept such multitudes of the natives that some whole tribes disappeared.® In 1752 Boston had a severe epidemic of this dread disease. The population of Boston at that time was 15,684; of this number 5,998 had previously had smallpox. During the epidemic 5,545 persons contracted the disease in the usual manner and 2,124 took it by inoculation. Eigh¬ teen hundred and forty-three people escaped from the town to avoid the danger of infec¬ tion. There were, therefore, left in the city but 174 people who had never had smallpox. The population at the end of the epidemic prac¬ tically consisted of persons who had survived an attack of this fear-inspiring malady.

Smallpox was essentially a disease of chil¬ dren in former times ; to such an extent was this true that the disease was called Kinds- pocken (childpox or Kindsblattern) . Owing to the pronounced contagiousness of the dis¬ ease and the almost universal susceptibility to it, smallpox was largely contracted during child life, as measles is at the present time. But comparatively few adults contract measles at the present day because they are protected by a previous attack in infancy or childhood. The same conditions obtained with relation to small¬ pox in the days before vaccination. The adult population represented mostly the survivors from smallpox in childhood. It was estimated that less than 6 per cent of persons were naturally insusceptible to the disease. Vac¬ cination has totally changed the age period of smallpox. It is now excessively rare for a successfully vaccinated child under five years of age to die of the smallpox; it is even uncom¬ mon for a successfully vaccinated child under 10 years of age to die of the disease, as was adequately proved in the testimony presented before the British Royal Commission on Vac¬ cination. Smallpox, perhaps more than any other disease, has inspired fear and terror in the popular mind because of its loathsome ap¬ pearance, its extreme contagiousness and its disfiguring consequences. Lord Macaulay, writing of the untimely death from smallpox in 1694 of the young and beautiful Queen Mary of England, gives us a powerful pen picture of the ravages of this pestilence : (<That dis¬ ease over which science has since achieved a succession of glorious and beneficent victories, was then the most terrible of all of the min¬ isters of death. The havoc of the plague has been far more rapid, but the plague has visited our shores only once or twice within living memory; and the smallpox was

always present, filling the churchyards with corpses, tormenting with constant fears all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover.® During certain periods in England, a very large percentage of the people were pock-

marked. Ben Jonson, the Elizabethan dramatist, wrote :

Envious and foule disease, could there not be,

One beaut ie in an age and free from thee.

Not only did the disease destroy life, dis¬ figure and maim, but it was at one time the most common cause of blindness. The early records of the London Asylum for the In¬ digent Blind showed that two-thirds of the inmates had lost their sight as a result of smallpox.

Smallpox was a great scourge before the introduction of vaccination. In London during ihc 18th century it caused one-twelfth of all deaths. Everyone felt that he had to pass through an attack of smallpox at some period of his life. One of Horace Walpole's corre¬ spondents (Wampole's (Letters wrote: (<Poetry is as universally contagious as smallpox : Everyone catches it once in a life time at least, and the sooner the better.® The Germans had a proverb which expressed the same thought : ((From love and smallpox but few remain free.® Most children in London contracted smallpox before the age of seven.

Symptoms. — The patient during the early stages of a classic attack of smallpox suffers from a pronounced chill, followed by sudden fever and severe backache; nausea and vomit¬ ing occur with great frequency, and the latter may persist for several days. Dizziness and general aches and pains are common. In severe cases, there is great weakness and prostration. During this stage, while the symptoms may be most suggestive of smallpox, no positive diagnosis can be made, as the ((grip® and cer¬ tain other infections may imitate the early symptoms of smallpox. Not until the eruption appears can one be absolutely sure of the nature of the disease. Many persons are commonly exposed to smallpox before the diagnosis can be definitely

established.

Eruptive Stage.— About the third day of the illness the fever abates, the pains subside and the patient begins to feel that his illness is at an end. But he is woefully mistaken, for it has hardly begun. At this time the eruption makes its first appearance; it is not formidable at first sight and looks not unlike a multitude of flea-bites on the face, hands and elsewhere. Soon it spreads over the greater part of the body. From day to day the eruption under¬ goes a change ; soon the face is covered with numerous pustules, the features are swollen beyond their normal proportions and the patient disfigured beyond recognition. The fever again rises and acquires the characteristics of blood- poison fever. The patient suffers greatly from the soreness occasioned by. the multitude of pustules present, particularly those on the hands and feet. In severe cases the pustules may reach the enormous number of 30,000 to 40,000. The presence of smallpox sores in the nose and mouth causes great difficulty in breathing and great distress in swallowing.

The Plague of Boils. — At about the end of a fortnight, the patient, if he recovers, has passed through the height of the eruptive process and is led to believe that he is on the road to convalescence. Now a new plague at¬ tacks the unfortunate victim, for he begins to be the subject of boils and abscesses which may number but a half dozen or may reach a

hundred or more. In a proportion of small¬ pox cases, which varies with the severity of the attack, one or both eyes may be damaged, with consequent impairment or loss of vision. An attack of unmodified smallpox runs its course in about five or six weeks. At its conclusion the patient exhibits on his countenance nu¬ merous disfiguring pits and scars which re¬ main throughout his life as a sad reminder of the cruel malady through which he has passed.

Smallpox in its usual form is a terrible disease and there is an almost universal sus¬ ceptibility of the human family to its infection, but there is no malady against which science possesses a surer and more complete safeguard. For that great discovery, the world is indebted to Edward Jenner. Like all other infectious diseases, smallpox varies in severity and fatal¬ ity in different epidemics. One of the most virulent outbreaks occurred after the Franco- Prussian War in 1871 ; this became a veritable pandemic, spreading over the entire civilized world and destroying the lives of hundreds of thousands of persons. In other epidemics the type of the disease may be much less virulent and may be characterized by a lower mortality rate.

Since 1896 there has been widely prevalent in the United States a peculiarly mild type of smallpox which kills only a very small propor¬ tion of those attacked. Hundreds of thousands of such cases have occurred throughout the country. This mild type is doubtless due to the weakness of the infecting germ. Two entirely different types of smallpox have prevailed in America — one the virulent imported variety which destroys the lives of one-quarter of those whom it attacks, and the other the mild type above referred to. An interesting feature of the latter type is that it is not only mild as to mortality but also as to its contagiousness ; practically it attacks only the unvaccinated, while vaccinated persons even if the vaccination dates back 30 or more years are, as a rule, protected against it. The opponents of vaccination point to this mild type of smallpox and say that the disease has lost its terrors. Those who are thoroughly familiar with the subject, however, know that neglect of vaccination may prepare a community for a death-dealing epidemic of the classic type of the disease.

Types of Smallpox. — The most malignant and fatal type of smallpox is that known as hemorrhagic or <(black smallpox.® In this form, the patient is overwhelmed with the poison and succumbs to it before the characteristic erup¬ tion is enabled to appear. Instead of the usual eruption, blood spots occur on the skin and the patient dies in one, two or three days. This malignant type is more prone to occur during virulent epidemics, and appears chiefly in pregnant women, men addicted to alcohol and in those debilitated from various causes.

ˆConfluent smallpox® is a severe form of the disease in which the vesicles and pustules run together and cover extensive areas of the skin surface. In ((discrete smallpox® the pustules are separated by areas of skin free of eruption. The mortality in this type is lower.

When an individual who has been vaccinated some years before exposure to smallpox in¬ fection contracts the disease, the course of the malady is apt to be favorably modified by the vaccination. If the vaccination be recent, he

will in all human probability be immune against infection.

The Mortality of Smallpox in Vaccinated and Unvaccinated Persons. — As years pass, the protective power is prone to wane and after a

number of years may become completely ex¬ hausted. In most instances, some protection is still exerted after many years. The follow¬ ing statistical tables of Welch (Wm. M.) and Schamberg (Jay F.), covering nearly 10,000 cases treated in the Municipal Hospital of Philadelphia between 1870 and 1904, are of interest :

Cases

Deaths

Per cent of

deaths

Vaccinated in infancy — good scars

2,718

167

6.16

Vaccinated in infancy — fair scars .

1,238

146

11.79

Vaccinated in infancy — poor scars

1,673

364

21.75

Total vaccinated cases .

5,629

667

12.02

Unvaccinated .

4,348

1,826

42.00

Total .

9,977

2,503

25.08

It will be seen from this table that only 12 per cent of vaccinated persons died, as against 42 per cent of unvaccinated. It is furthermore shown that the perfection of the vaccination as indicated by the type of vaccinal scar present influences the mortality. Those with good scars representing the results of excellent vac¬ cination had the lowrest fatality rate (a little over 6 per cent).

Treatment of Smallpox. — The treatment of smallpox is eminently preventive: after the disease has once been contracted by an unvac¬ cinated person relatively little of ah effective character can be done ; this consists largely in supporting the strength of the patient until the disease has run its course. The usual prin¬ ciples underlying the treatment of infectious fevers apply to smallpox. Special care is neces¬ sary, however, to protect the eyes from infec¬ tion by frequent cleansings with mild antiseptic solutions, in order to avoid the possibility of destruction of vision.

Thorough and adequate vaccination is a complete safeguard against smallpox. Isolation of the patient, quarantine of those who have been in contact with him and disinfection of the premises after recovery are important sani¬ tary measures. See Vaccination.

Jay Frank Schamberg.

SMALLS, smalz, Robert, American legis¬ lator, formerly a slave: b. Beaufort, S. C., 5 April 1839. He received a limited education. In the capacity of pilot he rendered valuable service to the Union cause during the Civil War and was promoted to the rank of captain there¬ for. During the years immediately following the war he rose to prominence in the Republi¬ can party, and became a member of the South Carolina legislature. He afterward served six terms in the National Congress. He was succes¬ sively appointed collector of the

port of Beau¬ fort, S. C., from 1898.

SMALLWOOD, Charles, Canadian physi¬ cian and meteorologist: b. Birmingham, Eng¬ land, 1812; d. Montreal, Canada, 22 Dec. 1873. He secured a medical education, removed to

Canada in 1853 and engaged in the practice of medicine at Saint Martin's, Isle Jesus. He es¬ tablished a meteorological laboratory which was later described in the Reports of the Smithsonian Institution, and conducted many in¬ teresting observations, among them that of the effect of light on the action of ozone, and of the influence of electricity in plant germination, as well as discovering the activity of atmos¬ pheric electricity in the formation of snow crystals. From 1858 he was professor of meteorology at McGill University, later occupy¬ ing also the chair of astronomy. Through a grant of funds from the government in 1860 he was enabled to purchase magnetic instruments and he begani a series of investigations in 1861. Upon the establishment of the United States signal service system he made arrangements for connections with it in several Canadian cities. He was author of many valuable papers in the Smithsonian Reports and was a con¬ tributor to magazines.

SMALLWOOD, William, American sol¬ dier: b. Kent County, Md., 1732; d. Prince George County, Md., 14 Feb. 1792. He raised a battalion of Maryland troops in 1776, was elected colonel and on 10 July 1776 joined Washington. On 20 August his troops were engaged at the battle of Long Island and bore its brunt from sunrise until its close, leav¬ ing half their number on the field. At White Plains on 18 October they were again in the thickest of the fight. Small¬ wood was promoted brigadier-general for his gallantry. He was engaged at Fort Washington on 16 November, his command again bearing heavy losses, and in 1777 accompanied General Sullivan on his Staten Island expedition. He raised a new battalion of Maryland troops in that year and at the battle of Germantown, 4 Oct. 1777, his command retrieved the day and captured part of the enemy's camp. He was stationed at Wilmington in the winter of 1777-78, captured a British brig laden with provisions and served with Gates in his Southern cam¬ paign. He won the thanks of Congress for conduct at the battle of Camden, and was ap¬ pointed major-general in 1780, but refused to serve under Baron Steuben, though he re¬ mained in the army until 1783. He was elected to Congress in 1785 and in 1785-88 was gover¬ nor of Maryland.

SMALT. See Cobalt.

SMALTITE, <(gray cobalt, }) ((tin-white co¬ balt, w the chief ore of cobalt, is a tin-white to steel-gray, metallic mineral. Essentially it is cobalt diarsenide, CoAs2, but nickel is usually present, and as its percentage increases the mineral graduates m'to chloanthite, the isomor- phous nickel diarsenide. It also generally con¬ tains iron and a small amount of sulphur. It is usually massive, but crystallizes in the isometric system, the crystals showing distinct octahedral cleavage. As the orthorhombic mineral, safflo- rite, has the same composition, smaltite is one of the few illustrations of an isodimorphous mineral. Its hardness is 5.5 to 6; specific gravity 6.2 to 6.5 ; the massive mineral is thus distinguished from the softer and much heavier safflorite. Its color is tin-white to steel-gray; streak grayish-black; lustre metallic; opaque. It is easily fused to a magnetic globule which affords reactions with borax beads, for iron,

cobalt and nickel. Its most noteworthy occur¬ rences are in the silver and copper mines of Saxony, Bohemia and England.

SMART, Christopher, English poet: b. Shipbourne, Kent, 11 April 1722; d. London, 17 May 1771. He was graduated at Cambridge in 1742, but remained there as Fellow of Pem¬ broke until 1747. His early fame as a satirist was supplemented by the accomplishment of more serious work, the most noted of which was his translation of Horace in 1756. His first volume of poems appeared in 1752, but it was not until a half century after his death that he won the distinction for original work in the larger world of letters which still attaches to his name. His (Song to David, * published in 1763, and written, it is said, upon the walls of his cell during his confinement for debt in a house of detention for such offenders, was at first deemed odd and melancholy. In 1820 it was reprinted in the London Magazine, and hailed by Rossetti and others as the greatest poem of the 18th century. Consult Browning, (Parleyings with Certain People of Import¬ ance.) See Song to David.

SMART, William, Scotch political econo¬ mist: b. Renfrewshire, 10 April 1853; d. 1915. He was graduated at the University of Glas¬ gow and entered upon a business career. In 1884 he began to write upon economic subjects, and two years later received a lectureship at the College of Dundee; from 1896-1915 he held the Aclam Smith professorship at the University of Glasgow, and is widely known as the English translator of Bohm-Bawerk's (Positive Theory of Capital *

(1891), and as the editor of Wieser's (Natural Value *(1893). He is the author of (Studies in Economics* (1895) ; (The Distribution of Income *(1899) ; and (Taxation of Land Values and the Single Tax*

(1900).

SMART-WEED, or WATER-PEPPER,

glabrate, annual herbs (Persicaria hydropiper, and other species of the same genus), of the buckwheat family, naturalized from Europe, and found in wet places. They have alternate, lanceolate leaves, with cylindric fringed ocreie, and panicled racemes of small flowers with greenish calyx. They also have a juice, which is not only acrid to the taste, but will inflame tender skin, and has diuretic and, possibly, other medicinal properties.

SMEATON, sme ton, John, English civil engineer: b. Austhorpe, near Leeds, Yorkshire, 8 June 1724; d. there, 28 Oct. 1792. His father was an attorney, and took him to London in 1742, where he attended the courts in West¬ minster Hall; but after discovering his son's disinclination to the profession he yielded, and in 1751 Smeaton began a course of experiments on a machine of his own invention, to measure a ship's way at sea, and made two voyages with Dr. Knight to try the effect of it, and also for the purpose of making experiments on a com¬ pass of his own construction, which was ren¬ dered magnetic by Dr. Knight's artificial magnet. In 1753 he was elected a Fellow of the Royal Society. In 1755 the Eddystone light¬ house was burned down, and Smeaton was en¬ trusted with the task of rebuilding it. Opera¬ tions were begun in August 1756 and completed in October 1759. It stood until 1882, when it was replaced by a new structure. In the year

in which the lighthouse was finished he was awarded the Copley medal of the Royal Society. After this Smeaton was employed on many works of great public utility. He made the river Calder (in Yorkshire) navigable; planned and executed the Forth and Clyde Canal in Scotland, constituting a waterway for traffic passing between the Atlantic and the German Ocean. He was appointed engineer to Rams¬ gate Harbor, and improved it by various opera¬ tions, of which he published an account in 1791. He built a steam-engine at Austhorpe, and made experiments with it to ascertain the power of Newcomen's engine, which he brought to a greater degree of perfection, both in its construction and powers. During many years of his life he was a frequent attendant upon Parliament, where his opinion on various works begun or projected was continually asked. Smea¬ ton spent

much of his leisure in the study of astronomy, for which purpose he fitted up an observatory in his house. Consult his (Reports *(1797) ; Smiles, (Lives of the Engineers*

(1861).

SMEDLEY, William Thomas, American

painter: b. Chester County, Pa., 26 March 1858; d. 26 March 1920. He studied engraving in Philadelphia and painting in the Pennsylvania Academy of Fine Arts; later studied in New York and in Paris under Jean Paul Laurens. Opening a studio in New York in 1880 he be¬ came much sought after as an illustrator of books and periodicals. In 1882 he traveled with the Marquis of Lome through Western and Northwest Canada to obtain drawings for illus¬ trating (Picturesque Canada. *He made a sketching tour around the world in 1890. His work is distinguished by remarkable purity of line, delicacy and power of dramatic expression. Among his oil paintings may be mentioned (An Indiscreet Question* ; (A Thanksgiving Din¬ ner *; and (A Summer Occupation.*

SMELL. See Senses.

SMELLIE, smel'i, William, Scottish author and naturalist: b. Edinburgh, 1740 ; d. there, 24 June 1795. His earliest important work was the compiling of a large part of the first edition of the Encyclopaedia Britannica, *published in 1771. Six years earlier he had gained some prominence in the field of natural history by a (Dissertation on the Sexes in Plants,* in which he opposed the teachings of Linnaeus, and in 1780 he published the first part of his transla¬ tions of Buffon's (Natural History. *In 1790 his own contributions to the subject were edited and published under the title (Philosophy of Natural History.* He was also the author of many other works ; among them were biographies of Hume, Adam Smith and other prominent Englishmen.

SMELT, a genus (Osmerus) of fishes of the family Argentinidce and closely related to the Salmonidce. The body is slender and some¬ what compressed ; the eyes large and round and the under jaw projecting. The American smelt (0 . mordax) is 10 to 11 inches long; the head and body are semi-transparent, with the most brilliant tints of green and silver. It has a strong odor, by many compared to that of violets. It inhabits the sea-coast from the Gulf of Saint Lawrence to Virginia as well as the depths of those lakes, such as Champlain and Memphremagog, which have a sandy bottom,

and in the winter and early spring ascends rivers in great multitudes, for the purpose of depositing its spawn. It is highly esteemed as food owing to its delicate flavor. The smelt fishery is one of considerable and growing im¬ portance and is carried on by means of nets and lines during the winter months. Some of the land-locked varieties in the lakes of Maine are said to excel even the marine fish in flavor. The European smelt (0. eperlanus) is scarcely distinguishable from the American and is the object of an important fishery. The surf smelt (Hypomesus pretiosus) is a related fish about a foot in length, found abundantly on the coasts of California and Oregon and is said to be deliciously flavored. A species of cisco or whitefish (Argyrosomus osmerijorms) , found in the lakes of central New York, is there known as the smelt, which fish it resembles superficially in form and size.

SMELTING. See Blast Furnace.

SMERDIS, smer'dis, the Greek name of the brother of Cambyses, king of Persia. In Persian inscriptions he is known as Bardija. He incurred the envy of Cambyses who was warned in a dream that Smerdis should take from him the throne and was, by the king's command, secretly assassinated. His name was taken by one of the Magi, Gaumata, who won the favor of the people and occupied the throne for seven months. Gaumata in 521 b.c. was recognized by Darius as an impostor and usurper and consequently put to death.

SMET, Peter John de. See De Smet,

Peter John.

SMETANA, sme-ta'na, Frederick, Bohe¬ mian composer : b. Leitomischl, Bohemia, 2 March 1824; d. Prague, 12 May 1884. He was a well-known orchestral leader in Austria and Sweden and was the composer of numerous symphonies and other operatic works. Among them are (Die Brandenburger in Bohmen5 (1866); /Richard IIP; (Mein VaterlancP ; <Triumph-symphonie) (1853).

SMETHWICK, smet'h'Ik, England, a bor¬ ough in Staffordshire, three miles west of Birmingham. It has many machine shops, rivet, screw and tube works, chemical and glass¬ works, iron foundries, etc. It is governed by a mayor, aldermen and council. Within its borders lies the ancient village of Domesday. Pop. about 70,694.

.SMILAX, a filaceous genus, with entire or lobed leaves, often coriaceous and shining, and greenish, dioecious, six-merous flowers

with re¬ curved perianth. The pedicels are gathered in axillary umbels, on .long peduncles, and bear red, purple or black berries. They have stout, long, tuberous rootstocks and woody or her¬ baceous stems that are usually twining and often climbing by tendrils, which are two stipules arising from the sheaths of the petioles. Y. pseudoclima, Y. rotundifolia and others, are the familiar green or cat-briers, that twist them¬ selves into impenetrable thickets, and are, more¬ over, well armed with vicious, strong prickles ; they are interesting in winter, however, on ac¬ count of their long-lingering leaves and bunches of berries. The American carrion-flower (Y. herbacea) has an annual stem that is very ar¬ tistic in young growth, but the tassels of bloom when open in early spring have an insupport¬

able putrid odor. The rootstocks furnish medi¬ cines in several countries; those of several South American species yield china root and sarsaparilla (q.v.).

The smilax used for decoration by florists is an entirely different plant (Myrsiphyllum as- paragoides) raised under glass.

SMILES, Samuel, Scottish writer: b. Had¬ dington, 23 Dec. 1812; d. London, 17 April 1904. He was educated for the medical profession and practised for some years as a surgeon at Leeds, when he became editor of the Leeds Times. In 1845 he became secretary to the Leeds and Thirsk Railway, ˆnd in 1854 to the South- Eastern Railway, from which post he retired in 1866. He is the author of many works on industrial enterprise and other themes, the chief of which are (Life of George Stephen¬ son5 (1857); <Self-Help5 (1859), wdiich at¬ tained a very wide circulation and is the work by which he is best known; (Workmen's Earn¬ ings, Strikes and Wages) (1861) ; (Lives of the Engineers5 (1861 and 1875); ˆIndustrial Biog¬ raphy } (1863) ; (Lives of Boulton and Watt5 (1865); (The Huguenots, their Settlements, Churches, and Industries in England and Ire¬ land } (1867) ; (Character } (1871) ; (The

Huguenots in France after the Revocation of the Edict of Nantes5 (1874) ; thrift5 (1875) ;

(Lives of Thomas Edward5 (1876) ; (Robert Dick* (1878) ; (George Moore, Merchant and Philanthropist5 (1878); (Self-Effort5 (1889);

(Jasmin, the Barber-Poet5 (1891); and (Josiah Wedgwood5 (1894).

SMILEY, smi'li, Albert Keith, American

humanitarian of Quaker descent: b. Vassalboro, Me., 17 March 1828;

d. 2 Feb. 1912. He was graduated at Haverford College in 1849 and was instructor there until 1853. He was en¬ gaged as a school principal in 1853-79. In 1869, with his twin-brother, Alfred, he pur¬ chased a tract of land at Lake Mohonk, Ulster County, N. Y., and in 1870 erected a summer hotel there. The holdings of the estate were gradually increased until they numbered about 5,500 acres. From 1879 Smiley was a mem¬ ber of the United States Board of Indian Commissioners, and from 1882 until 1904 he annually invited to Lake Mohonk as his per¬ sonal guests for four days more than 200 per¬ sons for the purpose of discussing American Indian affairs. After 1904 the affairs of the dependent peoples of the Philippines, Porto Rico and Hawaii were also discussed. From 1894 *he held annual conferences in the interests of international arbitration, to which were in¬ vited more than 300 persons, also his personal guests. With his brother Alfred ne in 1889 purchased another large tract of land at Red¬ lands, Cal., which he made into a park known as the Canon Crest Park, which is kept open to the public. He presented a library costing $71,000 to Redlands. He was a member of the board of trustees of Brown University from 1875, and was an original member of the board of trustees at Bryn Mawr College.

SMILEY, Daniel, American humanitarian, half-brother of A. K. Smiley (q.v.) : b. Vassal¬ boro, Me., 29 Nov. 1855. He was graduated at Haverford College in 1878 and until 1881 was engaged in teaching Latin and Greek at the William Penn Charter School, Philadelphia. He assisted his brother Albert with the man-

agement of the Lake Mohonk summer resort, and from 1882 was connected with the manage¬ ment of the conferences held there. He be¬ came owner of both the Lake Mohonk estate and that at Canon Crest Park, Redlands, Cal., upon the death of his brother in 1912. He is a trustee of Haverhill and Vassar colleges, and of the State Normal School at New Paltz, N. Y. He succeeded his brother on the United States Board of Indian Commissioners in 1912.

SMILEY, Sarah Frances, American au¬ thor: b. Vassalboro, Me., 30 March 1830. She is well known as a religious speaker and writer, is a Biblical scholar and linguist and is the founder and director of the Society for Home Study of the Holy Scriptures and Church History.

She has published (Who is He?) (1868) ; (Fulness of Blessing) (1876) ; (Garden GraitlP (1880), etc.

SMILLIE, smi'li, George Henry, Ameri¬ can painter: b. New York, 29 Dec. 1840. He traveled and studied his profession in Europe and America and many of his works, chiefly landscapes, are to be seen in public and private galleries, American and European, notably c Autumn Afternoon,5 Metropolitan Museum; (Near Ridgefield, Conn.,5 Lotos Club, New York City; (Light and Shadow Along Shored Union League Club, Philadelphia; (On the Merrimack River, 5 (Near Newburyport5 and (At Marblehead Neck,5 London, England. He was a member and for four years treasurer of the American Water Color Society; in 1882 he became a National Academician and was recording secretary and councilman for 10 years of the Academy.

SMILLIE, James D., American painter: b. New York, 16 Jan. 1833; d. 1909. Before be¬ coming a painter he made his reputation as a landscape engraver. He was one of the founders of the American Water Color Society and one of the <(original fellows® of the Painter- Etcher Society of London, England. In 1876 he became a National Academician. He served a term as president of the New York Etching Club, and is well known for his writings on etching.

SMIRKE, smerk, Robert, English painter: b. near Carlisle, in 1751 ; d. London, 5 Jan. 1845. He was originally employed in painting coach panels, but soon proved himself capable of ex¬ celling in a much higl er branch of the art; and before the appearance of Wilkie had no great rival as a genre painter. He was elected a mem¬ ber of the Royal Academy in 1792, the year when Sir Joshua Reynolds died, and gave as his presentation picture (Don Quixote and Saticho.5 A large proportion of his pictures are admirable illustrations of the creation of Cervantes' pen. Among others may be mentioned Sancho's (Audience of the Duchess,5 (Don Quixote ad¬ dressing his Princess Dulcinea,) and the ˆCom¬ bat between Don Quixote and the Giants inter¬ rupted by the Innkeeper.) Among his other works a first place is due to his (Infant Bacchus, > (Psycheˆ the (Angel Justifying

Providence,5 from Parnell's <Hermit) ; the (Gipsy, 5 and the (Fortune-tellers. 5

SMITH, the most common family name. In the early history of the world's industry every worker in metals or every one who ran a forge was called a smith. If he worked silver

or lead he was a whitesmith, if gold a gold¬ smith and if iron a

blacksmith. In course of time John, the smith, came to be known as John Smith, Hans as Hans Schmidt, and so on. Metal working being common, Smiths became numerous, and now every directory has pages of Smiths.

SMITH, Adam, Scottish economist and philosopher: b. Kirkcaldy, Fifeshire, 5 June 1723; d. Edinburgh, 17 July 1790. He studied at the University of Glasgow, where he re¬ mained until 1740, when he went to Balliol Col¬ lege, Oxford. Quitting Oxford, and all views to the Church, which had led him there, in 1748 he settled at Edinburgh, and delivered some courses <of lectures on rhetoric and polite litera¬ ture. In 1751 he was elected professor of logic at Glasgow, and the year following of moral philosophy at the same university. Both in mat¬ ter and manner his lectures were of the highest merit. Those on moral philosophy contained the rudiments of two of his most celebrated publications, of which the first, the (Theory of Moral Sentiments, 5 appeared in 1759, and was most favorably received. His theory makes sympathy the foundation of all our moral senti¬ ments. To this work he afterward added an (Essay on the Origin of Languages5 ; and the elegance and acuteness displayed in these trea¬ tises introduced him to the notice of several emi¬ nent persons, and he was engaged in 1764 to at¬ tend the duke of Buccleuch in his travels. A long residence in France with this nobleman intro¬ duced him to the acquaintance of Turgot, Quesnay, Necker, D'Alembert, Helvetius and Marmontel, to several of whom he was recom¬ mended by David Hume. He returned to Scot¬ land in 1766, and at Kirkcaldy led a life of strict study and retirement for 10 years, the fruit of which was his celebrated (Inquiry into Nature and Causes of the Wealth of Nations) (1776). This work has become a standard classic and may be deemed the formal precursor of the modern sciences of political economy. (See Political Economics). It owed something to French thinkers, but arranged the ideas derived from them in an original fashion. Its basic contention is that national progress is best secured by freedom of private initiative within the bounds of justice. Subsequently he was made commissioner of customs for Scotland, and in 1787 was chosen rector of the Univer¬ sity of Glasgow. A short time before his death he ordered all his manuscripts to be burned, except a few detached essays. Numerous edi¬ tions both of the (Moral Sentiments5 and the (Wealth of Nations5 have been published. Of the former the sixth edition contained consider¬ able additions and corrections. This work was translated into French by the Marquis de Con- dorcet. A volume of additions and corrections to the first two editions of the (Wealth of Nations5 appeared in 1784, and was included in the third edition, published the same year. The best of the

later editions of this standard work are those published under the editorship of Macculloch (with life notes and supplementary dissertations 1828; often reissued), Thorold Rogers (1870), J. S. Nicholson (1884), and Bel¬ fort Bax (1887). The (Wealth of Nations5 has been translated into several European lan¬ guages — into French by Germain Gamier (1802; new ed., 1860); into German by Garve

(1794-96), and by Asher (Stuttgart 1861). (See Wealth of Nations, The). Consult Stewart, (Life of Adam Smith) (4th ed., 1843) ; Mackintosh, < Progress of Ethical Philosophy (in Vol. I of his (Misc. Works, y 1854) ; Rae, (Life of Adam Smith } (1895) ; Graham,

(Scottish Men of Letters in the 18th Century >

(1901).

.SMITH, Sir Albert James, Canadian

statesman: b. Shediac, New Brunswick, 1824; d. 1883. He was called to the bar of New

Brunswick in 1847, served in the New Bruns¬

wick assembly in 1852-67, was a member of the executive council in 1856-63, attorney-general in 1862-63 and premier in 1864-66. He was elec¬ ted to the Dominion Parliament in 1867, and was Minister of Marines and Fisheries in 1873— 78. He was the representative of the Dominion government before the Halifax Fisheries Com¬ mission in 1877. In 1878 he was knighted.

SMITH, Albert William, American me¬ chanical engineer : b. Westmoreland, N. Y., 30 Aug. 1856. He was graduated at Cornell University in 1878, and was assistant professor in mechanical engineering there in 1887-91. In 1891-92 he was professor of machine design at the University of Wisconsin, and in 1892-1904 he was professor of mechanical engineering at Leland Stanford Jr. University. From 1904 he was director of mechanical engineering at Sibley College, Cornell University, where since 1915 he has been dean. Author of (Elementary Machine Design) (1895) ; (Material of Ma-chines1* (1902; 2d ed., 1914), etc.

SMITH, Alexander, Scottish poet and es¬ sayist : b. Kilmarnock, 31 Dec. 1830; d. Wardie, near Granton, 5 Jan. 1867. After a general education, he learned pattern-designing and re¬ moved to Glasgow with the double object of finding employment among its manufacturers and intellectual improvement among its literary society. In 1853 he published his (Life DramaP It was at first enthusiastically received as a poem of the highest order, but a reaction of dissent soon set in headed by Aytoun, who in his burlesque tragedy of <Firmilian) char¬ acterized Smith's production as belonging to the "spasmodic® school with Dobell and P. J. Bailey. In 1854 Smith was appointed secretary of the University of Edinburgh, to which the offices of registrar and secretary to the univer¬ sity council were later added, and the following year produced, with Sydney Dobell, a volume of (Sonnets on the WarP This was followed in 1857 by his (City Poems,* to which suc¬ ceeded his longest and best work, (Edwin of Deira) (1861). He turned his attention seri¬ ously to prose composition,1 and became a regular contributor to leading English maga¬ zines.

SMITH, Alexander, American chemist: b. Edinburgh, Scotland, 11 Sept. 1865. He was educated in Edinburgh and Munich, receiving his Ph.D. at the University of Munich. In 1889-90 he was assistant in chemistry at the University of Edinburgh; from 1890 to 1894 he held the chair of chemistry and mineralogy at Wabash College; 1898-1903, professor and di¬ rector of general and physical chemistry, Uni¬ versity of Chicago. In 1911 he was placed in charge of the department

of chemistry of Columbia University. He has translated sev¬

eral important foreign works on chemistry, and published among others laboratory Outlines of General Chemistry) (1899); 'Teaching of Chemistry and Physics *(1902) ; (Introduction to General Inorganic Chemistry) (1906) ; Gen¬ eral Chemistry tor Colleges* (1908) ; 'Text-Book of Elementary Chemistry * (1914).

SMITH, Alexander Coke, American Meth¬ odist bishop : b. Sumter County, S. C., 16 Sept. 1849; d. Asheville, N. C., 28 Dec. 1906. He was graduated from Wofford College, Spar¬ tanburg, S. C., in 1886, was appointed pro¬ fessor of mental and moral philosophv there and in 1890 was called to the chair of theology at Vanderbilt University. He was elected bishop of the Methodist Episcopal Church South in May 1902.

SMITH, Alfred E., American legislator and statesman: b. New York City, 30 Dec. 1873. He attended the parochial school of Saint James in New York and after graduation took charge of the trucking business of his father. In 1895 Mr. Smith was appointed clerk in the office of the commissioner of jurors, which position he held until his election to the State assembly in 1903 from the then second district of New York City. Re-elected annually to the assembly, he rapidly rose to leadership in that body; in 1911 he became Democratic leader in the assembly; in 1912 was Democratic floor leader; and in 1913 was the unanimous choice of his party for speaker. Mr. Smith was re-elected to the assembly in 1913 and 1914, and in the spring of 1915 was chosen a delegate to the New York State Constitutional Conven¬ tion. In this capacity he received high com¬ mendation from all parties, and Elihu Root, chairman of the convention, pronounced him one of the best informed in the State govern¬ ment within that body. In the assembly Mr. Smith demonstrated unusual ability. During his term of service the insurance investigation had occurred, with its important effect upon the future of State government ; the Aids scandal was largely responsible for the election of Gov¬ ernor Dix; the factory investigation had taken place with Mr. Smith as one of the most active members of the committee. Its findings cul¬ minated in the enactment by the Democratic party while in power of the greatest number of humanitarian laws ever placed on the statute books of New York in a single decade. The struggle for and the passage of the Work¬ men's Compensation Law took place while Mr. Smith was a member of the legislature, as also the great fight for political purity, the elimina¬ tion of graft and of corporation campaign con¬ tributions, resulting in the passage of the Direct Primary Law and the imposition of rigorous penalties for corrupt practices in connection with elections. During

Mr. Smith's term of service in the State legislature he constantly fought for the submission of woman suffrage to the people. In 1915 Mr. Smith was elected sheriff of New York County by a plurality of 46,202. In 1917 he was elected president of the board of aldermen of Greater New York. In each office that he held he received the unquali¬ fied praise and support of the best element of the press and public regardless of politics. His record made him the logical candidate of his party for governor in 1918. At the election of 5 Nov. 1918 he was elected governor of New

York, carrying Greater New York by the larg¬ est plurality ever given a gubernatorial can¬ didate. In the State he received 1,009,936 votes against 994,828 for his opponent, Mr. Whitman. One of his first acts as governor was to appoint a reconstruction commission to deal with the great after-war problems. Among his recom¬ mendations to the legislature of 1919 were a speedy settlement of pressing problems resulting from the war; the necessity of providing for at least optional municipal ownership of public utilities ; providing more liberal home rule for cities ; providing a minimum wage for women ; the passage of health insurance measures for industrial workers ; the amendment of the Workmen's Compensation Law for the purpose of eliminating the direct settlement clause; and the establishment of co-operative conditions be¬ tween the producer and the consumer. He was able to secure the enactment of several of these recommendations, but many of his reme¬ dial measures met defeat in the legislature. The governor allowed liberal appropriations for highway maintenance and repair, and signed the bill providing for equal pay for men and women employea in the school system of the State. Appropriations for the care of the in¬ sane and the feeble-minded during his first year were the largest in the history of the State. In June 1919 he called a special session of the legislature for the purpose of ratifying the woman suffrage amendment to the Federal Constitution.

SMITH, Alfred Holland, American rail¬ road president : b. 1864. He became a messenger boy with the Lake Shore and Michigan Southern Railroad in 1879, was made division superin¬ tendent in 1890, assistant superintendent in 1901 and in 1901-02 he was general superin¬ tendent of the road. He then became associated with the New York Central Railroad, was its general superintendent in 1902-03, general man¬ ager in 1903-12, vice-president in 1906-13, and on 1 Jan. 1914 he was made president of that railroad and its

subsidiary lines. He was ap¬ pointed assistant director-general of railroads by Secretary McAdoo, 29 Dec. 1917, in charge of transportation east of Chicago and north of the Ohio and Potomac rivers; and on 18 Jan. 1918 regional director of Eastern railroads.

SMITH, Andrew Jackson, American army officer : b. Bucks County, Pa., 28 April 1815 ; d Saint Louis, Mo., 30 Jan. 1897. He was gradu¬ ated from the United States Military Academy in 1838, and prior to the Civil War was sta¬ tioned at various army posts on the Western frontier. In 1861 he was promoted to the rank of colonel in command of the second California Cavalry, and in 1862 brigadier-general of volun¬ teers and chief of cavalry of the Department ,of the Missouri. He took part in the siege of Corinth and was also engaged in the campaigns of Vicksburg and Mobile. In 1866 he was re¬ stored to the rank of colonel in the regular army, but three years later resigned and ac¬ cepted the appointment of postmaster of Saint Louis. Ten years later he was again made an officer in the United States army, and placed upon the retired list.

SMITH, Archibald Carey, American naval architect and marine painter: b. New York, 4 Sept. 1837 ; d. 8 Dec. 1911. He received a gram¬ mar school education, studied marine painting

under M. F. H. de Haas, and learned the boat¬ building trade under Robert Fish. In 1860 he built the American sloop Comet, which held the American championship for several years. He built the first iron boat in the United States, the yacht V index, after which he abandoned painting to devote himself entirely to boat de¬ signing and building. He built the yacht Mis¬ chief, also constructed of iron, and the success¬ ful defender of the America's Cup against the Atalanta in 1881. He designed the schooners Iroquois, Elsemarie, Enchantress — winner of the King's Cup ; many yachts, among them the Meteor for the German emperor; motor boats and steamboats.

SMITH, Benjamin Bosworth, American Protestant Episopal bishop: b. Bristol, L. I., 13 June 1794; d. New York, 31 May 1884. He was graduated from Brown University in 1816, took orders in 1818, and in 1820-23 had charge of various churches in Virginia. He was rector of Saint Stephen's Church, Middlebury, Vt., in 1823-28, and from 1830 to 1837 rector of Christ Church, Lexington, Ky. He was consecrated first bishop of Kentucky in 1832, and on the death of Bishop Hopkins in 1868 he became presiding bishop of the Episcopal Church in the United States. He published (Saturday Even¬ ing, or Thoughts on the

Progress tof the Plan of Salvation) (1876), etc.

SMITH, Benjamin Eli, American editor; b. Beirut, Syria, 7 Feb. 1857; d. 1913. He was graduated from Amherst College in 1877, and has been editor of the (Century Dictionary) ; (Century Cyclopedia of Names) ; and < Century AtlasP He has translated Schwegler's his¬ tory of Philosophy *(1879) ; Cicero's (De Amicitia,* (1898).

SMITH, Benjamin Leigh, English Arctic explorer : b. 12 March 1828. He was educated at Cambridge, and was called to the bar in 1856. After acquiring a fortune he became interested in Arctic exploration and made his first voyage in the yacht Samson in 1871, returning with im¬ portant acquisition of facts regarding Spitz- bergen, where he had penetrated to lat. 81° 24'. He made a second and third expedition to Spitz- bergen in 1872-73. By his deep-sea observa¬ tions he established the fact of warm under¬ currents flowing beneath the surface water of the Gulf Stream. In 1880-81 on the steamer Eira he made two trips, the first resulting in important discoveries on and in the neighbor¬ hood of Franz-Josef Land. On the second ex¬ pedition, the Eira was crushed in the ice and sunk 21 Aug. 1881 off Cape Flora. After win¬ tering in that region the crew reached Nova Zembla in August 1882, and were brought home by a relief expedition. He received gold medals from the Paris Geographical Society in 1880 and from Royal Geographical Society in 1881.

SMITH, Buckingham, American historian and philologist: b. Cumberland Island, Ga., 31 Oct. 1810; d. New York, 5 Jan. 1871. He was graduated from the Harvard Law School in 1836, and for several years practised in the courts of Maine, when he took up his residence in Florida. His knowledge of the Mexican lan¬ guage and collections of Indian manuscripts and other relics were acquired during his office as secretary of the United States legation in

Mexico in 1850-52. In 1855-58 he served in a similar capacity the legation at Madrid, and there gathered material of much value regard¬ ing the history of the Spanish-American colo¬ nies. Among his most important works are (Narrative of Hernando de Soto' (1854) ; (A Grammatical Sketch of the Heve Language' (1861) ; (A Grammar of the Pima or Nerome' (1862) ; (An Enquiry into the Authenticity of Documents Concerning the Discovery of North America by Verrazzano> (1864).

SMITH, Charles Alphonso, author, edu¬ cator: b. in Greensboro, N. C., 28 May 1864; professor English, U. S. Naval Academy since 1917. In 1884 he was graduated from David¬ son College, North Carolina, and later pursued graduate work in Johns Hopkins University, where from 1890 to 1893 he was instructor in English. From 1893 to 1902 he was professor of English in Louisiana State University ; from 1902 to 1909 professor of English and dean of the graduate department, University of North Carolina. In 1909 he was elected professor of English literature in the University of Virginia, and about the same time was appointed (for 1909-10) Theodore Roosevelt professor of American history and institutions in the Uni¬ versity of Berlin. He has written several au¬ thoritative works on English grammar, among them (01d English Grammar and Exercise Book) (1896) ; (Elementary English Grammar* (1903), and (Studies in English Syntax' (1906). He served as associate editor of (The World's Orators' (1901), and of the (Library of Southern Literature' (1909).

SMITH, Charles Emory, American jour¬ nalist: b. Mansfield, Conn., Feb. 1842; d. Phila¬ delphia, Pa., January 1908. He was graduated from Union College in 1861, and five years later became the editor of the Albany Express. His connection with the Philadelphia Press dates from 1880, when he was made its editor- in-chief. This office he resigned in 1890 to be¬ come Minister to Russia. In 1898 he was ap¬ pointed Postmaster-General of the United States and continued in the Cabinet until 1901, when he resigned. In 1902 he again assumed the editorship of the Philadelphia Press.

SMITH. Charles Ferguson, American sol¬ dier: b. Philadelphia, Pa., 24 April 1807; d. Sa¬ vannah, Tenn., 25 April 1862. He was grad¬ uated at West Point in 1825 and served there as instructor in tactics and as adjutant and com¬ mandant 1829-45. He commanded a light bat¬ talion in the Mexican War and won distinction in several actions. He subsequently com¬ manded the Red River expedition, served in the Utah expedition and at the beginning of the Civil War was made brigadier-general of volunteers in the Union army. In 1862 he was active in the battle of Fort Donelson and was promoted to major-general of volunteers.

SMITH, Charles Forster, American classi¬ cal scholar and educator: b. Abbeyville County. S. C., 30 June 1852. He was graduated at Wofford College in 1872, later studied at the universities of Harvard and Berlin, and took his Ph. D. at the University of Leipzig in 1881. In 1875-79 he was professor of classics and German at Wofford College, and in 1881-82 professor of Greek and Latin at Williams Col¬ lege. He occupied the chair of modern lan¬

guages at Vanderbilt University in 1882-83, and that of Greek in 1883-94. Since 1894 he has been professor of Greek and classical philology at the University of Wisconsin. He was presi¬ dent of the American Philological Association in 1903. He translated Hertzberg's (History of Greece' (1900) ; edited several volumes of the classics and contributed to the philological jour¬ nals and literary reviews. Author of Remi¬ niscences and Sketches' (1909).

SMITH, Charles Henry, «Bill Arp,'' American humorist: b. Lawrenceville, Ga., 15 June 1826; d. Atlanta, Ga., 24 Aug. 1903. He was graduated at Franklin College, Georgia, 1848, practised law, first at Rome, Ga., and then at Cartersville, and served in the Confederate army throughout the Civil War, becoming major on the staff of the Third Georgia brigade. He was a State senator 1866-68, and was well known as the author of the (<Bill Arp" letters, contributed to the Atlanta Constitution and to (Home and Farm' of Louisville, Ky. He pub¬ lished (Bill Arp's Letters' (1886) ; c Bill Arp's Scrap Book' ; (A Side Show of the Southern Side of the War' ; (Fireside Sketches' (1890) ; (Georgia as Colony and State, 1733-1893' (1890) ; (The Uncivil War from 1861 to Date.'

SMITH, Clement Lawrence, American

Latin scholar and educator : b. Upper Darby, Pa., 13 April 1844; d. 1 July 1909. He was graduated at Haverford College in 1860 and at Harvard University in 1863, later studying at Gottingen University. He was professor of Latin and Greek at Swarthmore College in 1869-70 ; was assistant professor of Latin at Harvard in 1883-1904, professor in 1883-1904, dean in 1882-1901 and dean of the faculty of arts and sciences in 1898-1902. He was director of the American School of Classical Sciences at Rome, Italy, in 1897-98. He edited the (Odes and Epodes of Horace' (1894) in the (College Series of Latin Authors.'

SMITH, David, American naval officer : b. Scotland, 1834 ; d. Washington, D. C., 29 May 1903. Having been brought to America in child¬ hood, he received his education at the Andover Academy and at Harvard University. Just be¬ fore the outbreak of the Civil War he entered the Engineer Corps of the United States navy and took part in many of its later operations. He originated the idea of ventilating warships by the exhaust method, but was more widely known for his invention of an apparatus for testing instruments of precision used in en¬ gineering. He was promoted rear-admiral and retired in 1896, but took part in the Cuban War.

SMITH, David Eugene, American mathe¬ matician and educator : b.

Cortlandt, N. Y., 21 Jan. 1860. He was graduated at Syracuse Uni¬ versity in 1881 and took his Ph.D. there in 1887. He was master of pedagogics at the Michigan State Normal College in 1891-98; principal of the State Normal School, Brock- port, N. Y., in 1898-1901, and has since been professor of mathematics at Teachers' College, Columbia University. He is editor of the Bul¬ letin of the American Mathematical Society, and a contributor to other mathematical periodi¬ cals. He edited De Morgan's (Budget of Para¬ doxes' ; is joint author with G.. Wentworth and with W. W. Brennan of a number of text¬ books; joint author of (A History of Japanese

Mathematics) (1914); joint translator of Klein's (Famous Problems of Geometry *; and of Fink's (History of Mathematics* ; and author of (The Teaching of Arithmetic (1909) ; (The Teaching of Geometry> (1912) ; (Rara Arith- metica) (1907) ; (Topical Practical Arithmetic) (1912), etc.

SMITH, David M., American inventor: b. Hartland, Vt., 1809; d. Springfield, Vt., 10 Nov. 1881. His first patent was secured in 1832, and he began the manufacture of <(awls on the haft.® This awl haft was similar to the one now known as the Aiken awl. He removed to Springfield after representing the town of Gilsum in the New Hampshire legislature for 1840-41. In 1849 he patented in America and England a combination lock that could not be picked. Among his other patents were an improvement on the first iron lathe-dog, a pig-splitting ma¬ chine, two sewing machines, a patent clothes¬ pin, a spring hook and eye and a blanket hook. In all he secured about 60 patents, including newspaper folding machinery.

SMITH, Edgar Fahs, American chemist and educator : b. York, Pa., 23 May 1856. He was graduated at Pennsylvania College in 1874 and took his Ph.D. at the University of Gottingen in 1876. He was professor of chemistry at the University of Pennsylvania in 1888-1911, vice¬ provost there in 1899-1911, and has since been provost. He has made important investigations in electrolytic methods of analysis and atomic weight determinations. He is a member of the National Academy of Sciences, was presi¬ dent of the American Chemical Society in 1898, and of the American Philosophical Society in 1902-06. He translated Richter's Unorganic Chemistry) (3d ed., 1900), and is author of (Electro-Chemical Analysis* (new ed., 1918) ; (Theories of Chemistry) (1913) ; (Chemistry in America> (1914) ; (

Atomic Weights) (1915) ; (James Woodhouse) (1918), etc.

SMITH, Edmund Kirby, American sol¬ dier: b. Saint Augustine, Fla., 16 May 1824; d. Sewanee, Tenn., 28 March 1893. He was grad¬ uated at West Point in 1845, and entered the Mexican campaign as second lieutenant in the Fifth Infantry. He fought at Palo Alto, Resaca de la Palma and Monterey, was brevetted first lieutenant for bravery at Vera Cruz and Cerro Gordo and captain for gallantry at Conteras. During 1849-52 he taught mathematics at West Point. In 1855 he was appointed captain in the second Cavalry, and later engaged in Indian campaigns, reaching the rank of major. He resigned his commission when Florida seceded. In 1861 he was commissioned colonel in the Confederate army, and in the same year was made brigadier-general. Early in the war he served under Gen. J. E. Johnston, and was severely wounded at Bull Run, 21 July 1861. In 1862, having been made major-general, he com¬ manded the Confederate forces in the Cumber¬ land Gap region, led the advance of Bragg's army in the Kentucky campaign, and on 30 August defeated the Federal troops under Gen¬ eral Nelson near Richmond, Ky. His plan in¬ cluded an attack upon Cincinnati, but he with¬ drew toward Frankfort when Bragg failed to come to his support. He was raised to the rank of lieutenant-general, and took part in the bat¬ tles of Perryville and Stone River (q.v.) In 1863 he was placed in command of the depart¬

ment west of the Mississippi, organized the governments of Louisiana, Arkansas, Texas and Indian Territory, and established a vigorous foreign trade by successfully running the blockade at Galveston. In 1864 he operated against Banks in the Red River campaign, and he was the last Confederate general to sur¬ render (26 May 1865). He was president of the Pacific and Atlantic Telegraph Company 1866-68, president of the Western Military Academy 1868-70, chancellor of the University of Nashville 1870-75 and professor of mathe¬ matics in the University of the South, Sewanee, Tenn., from 1875 until his death.

SMITH, Elizabeth Oakes (Prince), Amer¬ ican author, wife of Seba Smith : b. near Port¬ land, Me., 12 Aug. 1806; d. Hollywood, S. C., 15 Nov. 1893. She was an occasional con¬ tributor to the press for nearly 50 years, and was one of the first women to speak upon the lecture platform, from which she advocated equal suffrage for women and other reforms. Her first volume of verse, collected from the periodicals, was published in 1838 under the title (Riches Without Wings. * Her other books which had also a short-lived popularity, include (The Sinless Child and Other Poems *(1843) ; (Stories for Children) (1847) ; (Woman and Her Needs* (1851), and (Jacob Feisler,* a drama (1853).

SMITH, Eli, American Protestant mission¬ ary and scholar: b. Northford, Conn., 13 Sept. 1801; d. Beirut, Syria, 11 Jan. 1857. He was graduated at Yale in 1821 and at Andover Theological . Seminary in 1826. He was or¬ dained that year, and went to Malta to take charge of a missionary printing establishment. He was later connected with the Syrian mission and traveled through Greece, Armenia, Georgia and Persia, with Dr. H. G. O. Dwight, the journey and its reports resulting in the estab¬ lishment of the Armenian and Nestorian mis¬ sions. From 1833 he was stationed at Beirut, and in 1838 and 1852 he made lengthy journeys in Palestine. He was* thoroughly versed in Arabic, and materially assisted in the produc¬ tion of an improved form and font of Arabic type. He made a lifework of his translation of the Bible into Arabic, and when he died had completed translations of the New Testament, the Pentateuch, and part of the prophetical books. The work was finished by Dr. C. V. Van Dyke (New York 1866-67). He was joint author of (Missionary Researches in Armenia) (2 vols., 1833).

SMITH, Ellison DuRant, American sena¬ tor : b. Lynchburg, S. C., 1 Aug. 1866. He was graduated at Wofford College in 1889 and subsequently interested himself in cotton plant¬ ing. He took an active part in securing im¬ proved methods in cotton growing, organized the Farmers' Protective Association, and was instrumental in securing the Boll Weevil Con¬ vention at Shreveport, La., in 1905, becoming field agent of the Southern Cotton Growers' Association, which was the outgrowth of the convention. He served in Congress in 1896- 1900 and was elected to the United States Sen¬ ate in 1908 and in 1914.

SMITH, Erminnie Adelle Platt, American ethnologist: b. Marcellus, N. Y., 26 April 1836; d. Jersey City, N. J., 9 June 1886. She was

educated at Willard Seminary in Troy, but con¬ tinued her studies abroad some years later, and during a residence in Germany was graduated from the School of Mines at Freiburg. In 1878 she was engaged by the Smithsonian Insti¬ tution to make a study of the languages and cus¬ toms of the Iroquois Indians, and devoted the remainder of her life to the investigation of that subject. In order that she might gain the most intimate acquaintance with their customs and institutions she became a member of one of their tribes, the Tuscaroras, and in this way familiar with their legends and ideas and habits in general. She died while her Iroquois-English dictionary was

being printed.

SMITH, Erwin Frink, American plant pathologist: b. Gilbert's Mills, N. Y., 21 Jan. 1854. He was graduated at the University of Michigan in 1886 and took his Sc.D. there in

1. He became expert pathologist of the United States Department of Agriculture in 1889 and later had charge of the laboratory of plant pathology of the Bureau of Plant In¬ dustry. He is a member of the National Acad¬ emy of Sciences, was president of the Society of American Bacteriologists in 1906 and of the Botanical Society of America in 1910. He is a trustee of the Marine Biological Labora¬ tory at Wood's Hole, Mass. He was associate editor of the Centralblatt fiir Bacteriologie; contributed to the (Standard Dictionary } ; is au¬ thor of many scientific papers and of (Bacteria in Relation to Plant Diseases) (3 vols., 1905— 14), etc.

SMITH, Eugene Allen, American geolo¬ gist: b. Autauga County, Ala., 27 Oct. 1841. He was graduated at the State University of Alabama in 1862, later studying at the universi¬ ties of Berlin, Gottingen and Heidelberg and took his Ph.D. at Heidelberg in 1868. He was an officer in the Confederate army in 1862-65 and from 1871 was professor at the University of Alabama. He became State geologist in 1873. In 1913 he served as president of the Geological Society of .America.

SMITH, Francis Henney, American edu¬ cator and soldier: b. Norfolk, Va., 18 Oct. 1812; d. Lexington, Va., 21 March 1890. He was graduated from West Point in 1833 and in 1834 was appointed assistant professor there, but resigned from the army in 1836 and was pro¬ fessor of mathematics at Hampden-Sidney College, Virginia, in 1837-39. On the organiza¬ tion of the Virginia Military Institute at Lex¬ ington, Va., in 1839, he was appointed superin¬ tendent, a position he occupied until January

1890, when he became professor emeritus. Dur¬ ing the Civil War he served as colonel in the Confederate army, was in command of the fort at Craney Island, participated in the defense of Richmond in 1864 and of Lynchburg against General Hunter. After the war he at once set about the reconstruction of the institute build¬ ings which had been destroyed by fire and re¬ sumed his duties there when it was reopened. He published various textbooks on mathematics and also wrote (The Best Methods of Con¬ ducting Common Schools) (1849) ; (College Reform > (1850) ; (Report to the Legislature of Virginia on

Scientific Education in Europe) (1859), etc.

SMITH, Francis Hopkinson, American artist, author and engineer: b. Baltimore, Md.,

23 Oct. 1838; d. 1915. Educated as a mechani¬ cal engineer, he became a contractor and planned and supervised the building of nu¬ merous important works, among them the sea¬ wall around Governor's Island at Tompkins- ville, S. I., the Race Rock lighthouse off New London, Conn., and the foundation for the Statue of Liberty on Bedloe's Island, New York Harbor. But he is also an artist, particularly in water colors and charcoal, earning special praise for his aquarelle sketches of Venice from all viewpoints and under all conditions of at¬ mosphere and light. Again, he is an author, best known for his genial (Colonel Carter of Cartersville) (1891), which was dramatized by Augustus Thomas and arranged by the author for his public readings. Other volumes by him are (A White Umbrella in Mexico) (1881) ; (A Day at LaguerreV (1892) ; (Gondola Days> (1897); (Venice of To-day) (1897); (Caleb West) (1898), and (The Fortunes of Oliver Horn) (1903) ; (At Close Range) (1904) ; ˆKennedy Square *(1911)'; (The Arm-Chair at the Inn* (1912) ; (In Dickens' London) (1914); cFelix O'Day* (1915).

SMITH, Sir Francis Pettit, English in¬ ventor: b. Hythe, England, 9 Feb. 1808; d. South Kensington, 12 Feb. 1874. From boy¬ hood his interest in boats led him to invent many ingenious devices for their propulsion. In 1836, in entire ignorance of the inventions of Ericsson and Stevens, he constructed a model steamboat propelled by a screw below the water line. His patent for this method of propulsion was obtained six weeks before that of Ericsson. The British admiralty, in spite of the opposi¬ tion of the engineering world, assisted in the experiments which resulted in the construction of a larger vessel whose trial trip in October 1839 assured the success of the new propellei and its adoption by the British navy in 1844, five years after Ericsson's construction of the first American steam warship. Consult Wood- croft, (Origin and Progress of Steam Naviga¬ tion (1848) ; Bourne, (Treatise on the Screw Propeller.)

SMITH, Fred B., American evangelist: b. Lone Tree, Iowa, 24 Dec. 1864. He studied at the State University of Iowa, and later en¬ gaged in evangelistic work. In 1898-1913 he was connected with the Young Men's Christian Association, in the service of which he visited the United States army in Cuba in 1898; and traveled throughout the United States in the interests of the association in 1899-1901. He became international secretary in 1910, and was a prominent worker

in the <(Men and Religion Forward Movement® which resulted in the establishment of more than 1,500 new branches of the association. Since 1914 he has been chairman of the Commission of the Interchurch Federation. Author of (Men Wanted *(1911)* • *(A Man's Religion* (1913).

SMITH, Frederick Appleton, American

soldier: b. Craigville, N. Y., 15 May 1849. He graduated from the United States Military Academy in 1873, became a captain in 1890, a major in 1899, a colonel in 1902 and a briga¬ dier-general in 1908. As a young man he served in Indian outbreaks in Arizona and the Dakotas. At the breaking out of the Spanish War he was sent to Cuba, where he commanded in the district of Guanajay. After service in

the Philippines he was ordered to Washington and served on the general staff revising the infantry drill regulations. Thereafter he held several posts East and West and was retired in 1913.

SMITH, Frederick M., son of Joseph Smith and grandson of the founder of the Church of Jesus Christ of Latter-Day Saints, sometimes erroneously called Mormons, was born at Plano, Ill., 21 Jan. 1874 and in 1881 moved with his parents to Lamoni, Iowa, where he grew to manhood. He attended the public schools and was graduated from the Lamoni High School. He was the first graduate of Graceland College, Lamoni, Iowa, and has taken advance work at the University of Iowa, Iowa City; the University of Kansas at Lawrence, Kan. ; finishing at the Clark University at Worcester, Mass. He became affiliated with the Reorganized Church of Jesus Christ of Latter- Day Saints in his boyhood and has occupied some important offices in this organization. For a short time he filled the office of general historian of the Church by appointment and was by ordination elder, counsellor to the local bishop of Lamoni, Iowa, president of a quorum of elders and counsellor to his father, president of the church. His activities have been divided between his school and church work, but now are to be devoted more exclusively to church service. In addition to the above offices he has been a member and for a time president of the board of trustees of Graceland College. Upon the death of his father in December

1914 he, with his cousin, Elbert A. Smith, of Lamoni, were chosen by

the leading au¬ thorities of the Church to preside temporarily. At the next General Conference, held in April

1915 he was chosen to permanently occupy as his father's successor in that office and re¬ ceived ordination to that office at Independence, Mo., 5 May 1915. His cousin was installed as his counsellor.

SMITH, George, English historian and theologian : b. Condurrow, Cornwall, 31 Aug. 1800; d. Camborne, Cornwall, 30 Aug. 1868. He was educated at the British and foreign schools at Falmouth and Plymouth and after¬ ward engaged in the manufacturing business, in which he was notably successful. He was well known as a local preacher of the Wesleyan faith and was a student of ability. Author of Religion of Ancient Britain to the Norman Conquest *(1844 ; 3d ed., 1865); (Sacred An¬ nals > (3 vols., 1847-53) ; < History of Wesleyan Methodism* (3 vols., 1857-61 ; 4th ed., 1865) ; (Life and Reign of David) (1868), etc.

SMITH, George, English Assyriologist : b. London, 26 March 1840 ; d. Aleppo, Asiatic Turkey, 19 Aug. 1876. He was apprenticed to the engraver's trade, but became deeply inter¬ ested in the Oriental explorations of Layard and RawlinsOn and devoted himself in his spare time to the study of Assyrian subjects. His study at the British Museum attracted the at¬ tention of Sir Henry Rawlinson, who permit¬ ted him access to his workroom there, thus materially assisting him. His first notable achievement was the decipherment of a text fixing the date of the tribute paid to Shalman- ezer by Jesu, son of Omri. He later became associated with Rawlinson in the preparation of the third volume of (Cuneiform Inscrip¬

tions of Western Asia, *and in 1867 he was appointed assistant in the Assyriology depart¬ ment at the Museum. In 1871 he published < Annals of Assurbani-poP transliterated and translated, as well as papers on (The Early History of Babylonia* and (The Reading of the Cypriote Inscriptions. *His translation of the Chaldean account of the Deluge was read before the Society of Biblical Archaealogy, 3 Dec. 1872 and brought him immediate fame. Sir Edwin Arnold of the Daily Telegraph sent him to Nineveh in 1873 for the purpose of find¬ ing the missing tablets concerning the Deluge story. Smith secured not only these, but also found the records of the succession and dura¬ tion of the Babylonian dynasties. In 1874 he returned to Nineveh under the direction of the Museum and succeeded in procuring a large number of tablets belonging to the great Solar Epic, of which the Deluge forms the 11th day, as well as other valuable fragments. He pub¬ lished the results of this expedition in Assy¬ rian Discoveries * (1875) ; and (Chaldean Ac¬ count of Genesis * (1876). He set out upon*

his third expedition to Nineveh in March 1876, secured between 2,000 and 3,000 tablets at Bag¬ dad, but at Kouyunjik found himself debarred from excavating owing to the unsettled condi¬ tion of the country. He was stricken with fever at Ikisji and was removed to the British Consulate at Aleppo, where he died. Besides the works already mentioned he was author of (The Phonetic Values of Cuneiform Charac¬ ters } (1871) ; Ancient History from the Mon¬ uments: Assyria) (1875); Ancient History from the Monuments: Babylonia (1877) ; (The History of Sennacherib (1878), etc.

SMITH, George Adam, Scottish theolo¬ gian : b. Calcutta, 19 Oct. 1856. He was edu¬ cated in Edinburgh at the University and at New College, studied also in Tubingen and Leipzig, was minister of Queen's Cross Free Church in 1882-92 and in 1892 was made pro¬ fessor of Old Testament language, literature and theology in the United Free Church Col¬ lege at Glasgow. In 1896 he visited the United States as Percy Turnbull lecturer on Hebrew poetry at the Johns Hopkins University and in 1899 as Lyman Beecher lecturer at Yale Uni¬ versity. His writings in book form are (The Book of Isaiah) (1888-09) ; (The Preaching of the Old Testament to the Age) (1893) ; his¬ torical Geography of the Holy Land* (1894; 7th ed., 1901) ; (The Twelve Prophets) (1896- 97) ; a (Life of Henry Drummond) (1898; 6th ed., 1902), and (Modern Criticism and the Preaching of the Old Testament (1901).

SMITH, George Barnett, English author: b. Ovenden, near Halifax, Yorkshire,, 17 May 1841. In 1864, after a secondary schooling at Halifax, he went to London, where he was employed on the staff of the Globe and the Echo, published a book of verse in 1869, and became a contributor to the leading British re¬ views. Among his further volumes are (Poets and Novelists, *critiques (1875) ; (Shelley*

(1877); a <Life of Bright *(1881); (Victor Hugo* (1885) ; (William I and the German Empire) (1887), and a work on (The United States * (1896-97). He is also an amateur

etcher of some ability.

SMITH, George Murray, English pub¬ lisher: b. London, 19 March 1824; d. Wey-

bridge, Surrey, 6 April 1901. He entered the counting-house of his

father, senior partner of the firm of Smith, Elder and Company, India merchants and publishers, became manager of the publishing department and after his father's death assumed control of the entire business, including banking and the agency of the Over¬ land route to India. He published the works of Charlotte Bronte, Ruskin, Darwin and Thackeray, founded the Cornhill Magazine in 1859 with the latter as editor and contributor, published in it George Eliot's ˆomolaˆ and in 1865 he founded the Pall Mall Gazette with Frederick Greenwood as editor. The banking business was ultimately transferred to other hands, Smith, Elder and Company retaining the publishing interests and continuing to issue the works of the leading English authors. They were publishers for Robert Browning and Mat¬ thew Arnold and were granted the privilege of publishing Queen Victoria's (Leaves from the Journal of Our Life in the Highlands) and (Early Years of the Prince Consort, > as well as Sir Theodore Martin's (Life of the Prince Consort. > Perhaps the most notable achieve¬ ment of Smith's life was the publication of the dictionary of National Biography } (63 vols., 1885-1900) which was followed by a supple¬ ment (3 vols., 1901) to which is prefixed a memoir of the publisher's life by the editor, Sidney Lee.

SMITH, George Otis, American geologist: b. Hogdon, Me., 22 Feb. 1871. He was gradu¬ ated at Colby College in 1893 and took his Ph.D. at Johns Hopkins University in 1896. He was engaged in geological work in Michigan, Utah, Washington and New England from 1893 ; was connected with the United States Geological Survey from 1896, became assistant geologist in 1901, and after serving as geologist iji 1901-07 he became director of the survey. He was president of the Washington Geolog¬ ical Society in 1909, and is author of many papers and reports in connection with his work.

SMITH, George Williamson, American educator : b. Catskill, N. Y., 21 Nov. 1836 He was graduated from Hobart College in 1857, was principal of the Bladensburg Academy, Mary¬ land, in 1858-59, and in 1861-64 was clerk of the Linited States Navy Department while studying theology. He was ordained to the Protestant Episcopal priesthood in 1864, was chaplain in the United States navy in that year and in 1864-65 was acting professor of mathematics at the United States Naval Academy at New¬ port. He was chaplain at the Naval Academy at Annapolis in 1865-68, on the United States steamship Franklin in 1868—71, rector of Grace Church, Jamaica, Long Island, N. Y., in 1872- 81, and of the Church of the Redeemer, Brook¬ lyn, N. Y., in 1881-83; president of Trinity College, Hartford, Conn., 1883-1904; emeritus professor of metaphysics since 1904; and from 1905 associate minister Saint John's Church, Washington.

SMITH, Gerrit, American philanthropist, reformer and statesman b. • Utica, N. Y., 6 March 1797; d. New York, 28 Dec. 1874. He was graduated from Hamilton College in 1818, subsequently devoted himself to the manage¬ ment of his great landed estate in central and northern New York, and was very successful in matters of his business. His credit is indi¬

cated by a well-known anecdote of the financial panic of 1837. In need of ready money, he obtained from John Jacob Astor a loan of $250,000, agreeing to execute mortgages on cer¬ tain tracts of land as security. The mortgages were duly executed, but were not forwarded by the county clerk. Astor had loaned a quarter of a million on the basis of a verbal arrange¬ ment only, and for weeks remained satisfied. To many, Smith was known simply for his wealth and his use of it. During his life he gave away more than $8,000,000. His name was at the head of almost every subscription list of the time. A large portion of his benefi¬ cences fell to various established institutions, but much also to private charities in checks large and small. In 1846 he made a gift of 3,000 deeds, each for from 40 to 60 acres of land, to black and white poor. His efforts thus to further negro colonization in the North were unfortunately not successful, owing in part to the fact that the lands were unsuited to agriculture, but more to the fact that the negroes were as yet unfitted for independent farming. In 1825 Smith became a member of, and generous contributor to, the American Col¬ onization Society, but withdrew from it in 1835 upon becoming convinced that it had nothing at all to do with the promotion of the anti-slavery cause in the United States, and joined the Anti- Slavery Society, of which he was thereafter a leading member. His object was the develop¬ ment of a public opinion that would demand abolition. By extensive correspondence, by fre¬ quent speeches, and by large gifts of money he furthered the movement of which he was, in¬ deed, a most zealous exponent, but perhaps somewhat more genial than many. He assisted in the operation of the ˆunderground railway® ; and he furnished money to John Brown, though not implicated, as was alleged, in the Harper's Ferry attack. In politics Smith of course fol¬ lowed his reformatory views, and had no in¬ terest in party maneuvering. By politicians generally he was naturally considered an (<in- tractable visionary.® He was defeated for the State senate in 1831. Under his leadership the Liberty party was formed at Arcade, Wyoming County, N. Y., 29 Jan. 1840; his idea was that neither of the two great parties was fitted to deal with slavery, but his purpose was general political reform and not simply abolition, as was popularly understood. The party never had great strength, its constituency being neither well organized nor well

directed for party ends. _ By 1860 it was virtually dead. Smith was its candidate for the Presidency in 1848 and 1851. The ˆIndustrial Congress® at Philadelphia nominated him for the Presidency in 1848, the Land Reformers in 1856; both nominations were declined. He was an un¬ successful candidate for governor of New York in 1858 on the Anti-Slavery ticket. In 1853 he was elected to Congress by a plurality as an ˆIndependent.® He served one session and then resigned, after having made several clear and decided speeches, one a powerful attack on the "Nebraska bill® 6 April 1854. During the Civil War he - vigorously supported the gov¬ ernment, but after it, holding that the North was not blameless in the matter of slavery, counseled moderation toward the South, and in . accordance with this view went on the bail-bond of Jefferson Davis with Horace Greeley, and

interceded in behalf of <(Ku-Klux **prisoners at Albany. Subsequently he was active in various measures, among them the assistance of Maz- zini, the Italian patriot. He withdrew from the Presbyterian Church, and built an edifice at Peterboro for a non-sectarian congregation, be¬ fore which he sometimes preached. Smith was much persecuted, like most of those who in a prominent way disregard expediency and cir¬ cumstance. Garrison, often at odds with him, wrote after his death : <(His case is hardly to be paralleled among the benefactors of mankind in this or any other country.® Smith's more important writings are (Speeches in Congress> (1856) ; ˆSermons and Speeches) (1861) ; (The Theologies** (1866) ; (Nature's Theology*

(1867); (Letter from Gerrit Smith to Albert Barnes* (1868). Consult the biography by Frothingham (1878).

SMITH, Gerritt, American composer and organist, grandnephew of the preceding : b. Hagerstown, Md., 11 Dec. 1859; d. 1912. He studied music abroad, was organist in Saint Paul's Cathedral at Buffalo, N. Y., and Saint Peter's Church at Albany, N. Y. From 1885 he was organist of the South Church, Madison avenue, New York, where he gave nearly 300 free recitals. He was professor of music at Union Theological Seminary, honorary presi¬ dent of the Guild of American Organists, and a well-known writer on musical topics, his compositions including over 75 songs and in¬ strumental pieces and the cantata (King David.*

SMITH, Goldwin, English scholar and au¬ thor: b. Reading, Berkshire, 13 Aug. 1823; d. Toronto, 7 June 1910. He was graduated from Oxford (University College) in 1845, became Fellow of his college in 1847, was called in that year to the bar at Lincoln's Inn, in 1850 was made assistant secretary of the royal commis¬ sion on the state of Oxford University, and in 1858-66 was regius professor of modern history at Oxford. His lectures on Cromwell claimed attention and aroused controversy. In 1862-65 he co-operated with Bright in exerting his in¬ fluence in favor of the American Union, by speeches, by signed articles and by anonymous contributions on politics to the Saturday Re¬ view, then very powerful. From 1868 to 1871 he was professor of English and constitutional history in Cornell University, but then removed to Toronto, Canada, where he edited the Cana¬ dian Monthly (1872-74), and founded The By¬ stander (no longer published) and The Week. He was a consistent advocate of the annexation of Canada to the United States, his (Canada and the Canadian Question *(1891) being a valuable hand-book of argument. His (United States : An Outline of Political History 1492- 1871* (JL893) is an excellent work. Among his other volumes are (Lectures on the Study of History *(1861) ; (The Empire* (1863) ; (Irish History and Irish Character *(1863) ; (Three English Statesmen* (Pym, Cromwell, Pitt) (1867) ; (Cowper *QEnglish Men of Letters* 1880) ; (The Moral Crusader, William Lloyd Garrison *(1892) ; (Bay Leaves* (renderings from Latin poets) (1893) ; and (Essays on Ques¬ tions of the Day *(1894; rev. ed. 1904); (My Memory of Gladstone* (1903). In his many contributions to periodicals he was known for his philosophical interpretation of current politi¬ cal and social phenomena. His writings show

great impartiality and literary skill. Consult (Reminiscences *ed. by Haultain, T. A. (New York 1910) ; also Haultain, T. A., (Goldwin Smith: His Life and Opinions* (London 1913).

SMITH, Green Clay, American congress¬ man and Baptist clergyman : b. Richmond, Ky., 2 July 1832; d. Washington, D. C, 29 June 1895. He was graduated from Transylvania University in 1850, and admitted to the bar m 1853. In 1860 he was elected to the Kentucky legislature, but resigned this office to take active part in the Civil War. He was promoted colonel in the Union army in 1862, and briga¬ dier-general of United States volunteers in the following year. Resigning his commission he sat in the 38th and 39th congresses and in 1866 became governor of the Territory of Montana. He retired from political life to study for the ministry in 1869, was pastor of a Baptist church in Frankfort, Ky., and in 1876 the candidate of the Prohibition Party for President of the United States. He was at the time of his death pastor of the Metropoli¬ tan Baptist Church of Washington, D.

C.

SMITH, Gustavus Woolson, American army officer: b. Scott County, Ky., 1 Jan. 1822; d. New York, 23 June 1896. He was graduated from the United States Military Academy in 1842 and assigned to duty at Fort Trumbull, in whose construction he assisted. He was assist¬ ant professor of engineering at West Point from 1844 to 1846, but was transferred to active service in the war with Mexico. He was brevetted captain 20 Aug. 1847, and was en¬ gaged in the siege of the City of Mexico in the following month. In 1861 he entered the Con¬ federate army and at the expiration of the war retired to private life. He published Con¬ federate War Papers *(1883) ; and (Battle of Seven Pines* (1891).

SMITH, Hannah Whitall, American Quaker and philanthropist : b. Philadelphia, 1832; d. 1 May 1911. She was educated at the Quaker school of Miss Longstroth and in 1851 was married to Robert Pearsall Smith, also a Quaker. She conducted Bible classes for women at her home in Philadelphia, which she made a headquarters for various religious projects. In 1873-74, with her husband, she conducted a series of religious meetings in England. In 1888 she removed with her family to England and lived in London- the remainder of her life. She was well known as a speaker on religious and other subjects, and was an ardent worker for temperance and woman suffrage. Author of (The Unselfishness of God *(1903) ; (The Christian's Secret of a Happy Life* (1908), etc.

SMITH, Harry Bache, American plav- wright : b. Buffalo, N. Y., 1860. Before writing for the stage he spent some years as literary and dramatic critic for the newspapers of Chicago. He is the librettist of a number of well-known light operas, the most popular among which are (Robin Hood *; (The Little Corporal*; (The Tar and the Tartar*; (Foxy Quiller* ; (Boccaccio *; (The Viceroy,* etc.

SMITH, Sir Henry Babington, British financial expert: b. Jordan Hill, Renfrewshire, Scotland, 29 Jan. 1863. He was educated at Trinity College, Cambridge. He was private secretary to the Earl of Elgin, Viceroy of India,

in 1894-99; representative of the Treasury at Natal in 1899; government representative on various missions connected with the

postal and telegraph services ; secretary to the Post Office in 1903-09; and in 1909 became president of the National Bank in Turkey. He was a mem¬ ber of the financial mission to the United States in the interests of the Anglo-French loan in 1915; and later in 1915 he was appointed chairman of the Royal Commission on Civil Service.

SMITH, Henry Boynton, American theo¬ logian: b. Portland, Me., 21 Nov. 1815; d. New York, 7 Feb. 1876. He was graduated from Bowdoin in 1834, studied theology at Andover and at Bangor, and subsequently in Halle and Berlin. He became pastor of the Congrega¬ tional church at West Amesbury, Mass., in 1842, but in 1847 accepted the chair of mental and moral philosophy at Amherst. He was professor of church history in Union Theolog¬ ical Seminary, New York, in 1850-55, and occupied the chair of systematic theology there 1855-73, after which he became professor emeritus. He founded the American Theolog¬ ical Review in 1859 and edited it until 1862 when it was merged in the Presbyterian Re- viezv, of which he was editor until 1871. He was the author of (The Relations of Faith and Philosophy' (1849) ; (An Argument for Chris¬ tian Churches) (1857) ; (History of the Church of Christ in Chronological Tables) (1859) ; and edited and partially translated Gieseler's (Church History ' (5 vols., 1859-63) ; trans¬ lated Hagenbach's (History of Christian Doc- trine) (1861-62), etc. Consult (Memoirs,' edited by his wife (1881) ; and the biography by Stearns (1892).

SMITH, Henry Hollingsworth, American

surgeon: b. Philadelphia, Pa., 10 Dec. 1815; d. there, 11 April 1890. He was graduated at the University of Pennsylvannia in 1837, and after¬ ward studied in Europe. He was engaged in practice at Philadelphia, after 1841, was surgeon in several hospitals there, and in 1855-71 he was professor of surgery at the University of Pennsylvania, after which time he was pro¬ fessor emeritus there. He was appointed surgeon-general of Pennsylvania upon the out¬ break of the Civil War, and organized the hospital department of the State. He originated the plan of removing the wounded from the battlefields to the hospitals of Philadelphia, Harrisburg, Reading and other cities, and put into practice the embalming of the dead on the battlefields. After thoroughly organizing the military hospital service of the State he retired in 1862. Author of (System of Operative Surgery' (2 vols., 1852) ; (Practice of Surgery) (2 vols., 1857-63), etc.

SMITH, Henry John Stephen, Irish

mathematician: b. Dublin, 2 Nov. 1826; d. 3 Feb. 1883. He was

graduated from Balliol, Oxford, in 1850, and the same year began to lecture on mathematics there and continued in this lectureship until 1873. In 1860 he was also appointed to the Savilian chair of geometry at Balliol. His development of the theory of num¬ bers placed him among the greatest mathe¬ maticians of his day. He is also known for his demonstrations of a great number of advanced theorems in higher mathematics. His mathe¬ matical papers were collected in 1894 in two

volumes, to which was prefixed a biographical sketch by Charles H. Pearson (q.v.).

SMITH, Henry Preserved, American edu¬ cator: b. Troy, Ohio, 23 Oct, 1847, He was graduated from Amherst in 1869, studied at Lane Theological Seminary, Cincinnati, Ohio, in Berlin and in Leipzig, and In 1864 was ordained in the Presbyterian Church. He oc¬ cupied a chair at the Lane Theological Sem¬ inary in 1877-73, which he resigned because df the charge of heresy brought against him by the Cincinnati Presbytery. He was convicted of the charge by both the Presbytery and the General Synod and thereupon retired from the Presbyterian Church. In 1898 he became pro¬ fessor of biblical literature in Amherst Col¬ lege was received into the Congregational ministry. From 1907 to 1913 he was professor of Old Testament literature and the history of religions in the Meadville (Pa.) Theolog¬ ical School. Since 1913 he has been librarian of Union Theological Seminary, _ New York City. He has published (Inspiration and Inerrancy) (1893) ; (The Bible and Islam' (1897) ; Commentary on the Books of Samuel' (1899); {Old Testament History' (1903); (The Religion of Israel' (1914).

SMITH, Hoke, American statesman: b. Newton, N. C., 2 Sept. 1855. He was edu¬ cated in a preparatory school conducted by his father, Hosea H. Smith, LL.D., at Chapel Hill, and admitted to the bar in 1873. In 1887 he purchased the Atlantic Journal, and was a strong supporter of President Cleveland. In Cleveland's second term he served as Secretary of Interior from 1893-96. In the latter year he was elected governor of Georgia, running on a reform ticket. He was defeated for re-election in 1910, but again elected in 1911. Shortly thereafter he was called to the United States Senate and re-elected in 1915 to serve six years. He has been very active in legis¬ lation, and is regarded as one of the strong men of the Democratic party.

SMITH, Horatio (always called Horace), and James, English authors: b. London, 31 Dec. 1779 and London, 10 Feb, 1775; d. Tun¬ bridge Wells, 12 July 1849, and London, 24 Dec. 1839. James Smith became

solicitor to the board of ordnance, and Horace a stock-broker. Being both of a literary turn, the brothers be¬ came contributors to the Pic Nic newspaper, founded in 1802, and from 1807 to 1810 con¬ tributed numerous papers to the Monthly Mirror, among these the (Imitations of Horace,' which were afterward published sep¬ arately. In 1812 the competition offered by the mangement for the best address to be read at the opening of Drury Lane Theatre, when re¬ built after the fire, suggested to the Smiths the idea of producing a collection of parodies of the most noted writers of the day, under the title (Rejected Addresses.' The work on be¬ ing issued was hailed with the most enthusiastic applause, and rapidly ran through numerous editions. Its popularity still continues great, and deservedly, for few jeux d'esfirit are more happy than the burlesques of the poetry of Wordsworth, Crabbe and Sir Walter Scott (un¬ doubtedly the best ; Scott said of it, ((I certainly must have written this myself, although I for¬ get upon what occasion"), the pompous prose of Johnson, or the bluntness of Cobbett. Jef-

freys said he look the 'Addresses- *to be the "very best imitations, and often of difficult originals, that ever were made. Calverley alone has equaled them. James, satisfied, did no more literary work save a few comic songs and some vers de societe; but Horace set him¬ self to the writing of novels, and produced among others 'Brambletye House* (1826); 'Reuben Apsley *(1827); 'The Moneyed Man* (1841) ; 'Adam Brown* (1843).

SMITH, Isaac Townsend, American banker: b. Boston, 12 March 1813; d. New York city, 30 March 1906. He entered com¬ mercial life as supercargo, making several East India voyages in 1834-38. He afterward settled in New York as merchant and ship owner; then became one of the incorporators and for many years president of the Metropolitan Sav¬ ings Bank. He was during 1878-84 commis¬ sioner of immigration for the State of New York; and acted as presidential elector at the re-election of Abraham Lincoln in 1864. At the opening of commercial relations between Siam and the United States in 1845 he became financial agent for Siam, and served in that capacity or as consul and consul-general at New York till his death.

SMITH, Jacob Hurd, American soldier: b. Jackson, Ohio, 29 Jan. 1840; d. 2 March 1918; graduated at the Collegiate and Commercial In¬ stitute, New Haven. Conn., in 1858, enlisted in the Union army in May 1861 and attained the rank of captain. He afterward served in Indian

frontier warfare and in the war with Spain. He was promoted colonel in 1899, briga¬ dier-general of volunteers in 1900, and received that rank in the regular army on 1901. He held an excellent record in the service, but while in command of the sixth separate brigade in Samar, Philippine Islands, he was alleged to have issued orders of unwarranted severity in the warfare against the Philippine insurgents. He was court-martialed 21 April 1902, and was retired from active service 17 July 1902 with a reprimand from President Roosevelt.

SMITH, James, American legislator and signer of the Declaration of Independence: b. Ireland, about 1720; d. York, Pa., 11 July 1806. He came to America with his father in 1829, and was educated at the College of Phila¬ delphia. He engaged in law practice and surveying at Shippensburg, and later became the only practitioner of law at York, Pa. He took a prominent part in the early revolutionary movement in Pennsylvania, raised the first volunteer company in the State for the purpose of resisting British authority, and- considerably accelerated the patriot movement through his essay 'On the Constitutional Power of Great Britain over the Colonies in America.* He was a delegate to the Pennsylvania Conven¬ tion in January 1775, to the Provincial Con¬ ference in June 1775; and as a member of the Continental Congress, in which he served in 1775-78, he signed the Declaration of Inde¬ pendence. He was a member of the Penn¬ sylvania State Constitutional Convention in 1776, served in the State assembly in 1779, was judge of the High Court of Appeals in 1780, and was appointed brigadier-general of the Penn¬ sylvania volunteers in 1782. He was a friend and staunch supporter of Washington, and

sacrificed his personal fortune in the Revolu¬ tionary cause.

SMITH, James, American pioneer : b. Franklin County, Pa., 1737; d. Washington County, Ky., 1812. He was captured by Indians at the age of 18, was adopted into one of their tribes and was held by them for four years before he escaped. He was leader of the "Black Boys, *a company formed for Indian warfare in 1863; and was a lieutenant under Gen. Henry Bouquet in the expedition against the Ohio Indians in 1764. He was one of the pioneer settlers of Westmoreland County, Ky., in 1768, first accompanying a band of ex¬ plorers into that territory in 1766. He was a member of the Pennsylvania Convention in 1776, and served in the Pennsylvania assembly in 1776-77. He commanded a scouting party against the Indians in the Jerseys in 1777, and later in that year was commissioned colonel in command of the warfare on the frontiers. After 1788 he lived near Paris, Ky., and served for many years in the State legislature. He was author of 'Remarkable Adventures in the Life and Travels of Col. James Smith (1799; new ed. 1870) ; 'A Treatise on the*

Mode and Manner of Indian Warfare (1804).

SMITH, James Argyle, American military officer: b. 1 July 1831 ; d. Jackson, Miss., 6 Dec. 1901. He was graduated from the United States Military Academy in 1853, but at the outbreak of the Civil War joined the Confederate army, and was promoted brigadier-general in 1863. From 1878 to 1882 he was superintendent of education of the State of Mississippi. Eleven years later he was restored to the United States army, and during the next four years was on duty at various army posts in the West.

SMITH, James Francis, American sol¬ dier and judge: b. San Francisco, 28 Jan. 1859. His education was gained at Santa Clara Col¬ lege and Hastings Law School. He was ad¬ mitted to the bar in 1881. He enlisted at the outbreak of the Spanish War and was made colonel of the First California regiment, United States volunteers, joining the first expedition to the Philippine Islands. He participated in the taking of Manila, 13 Aug. 1898, and was made president of the military commission there the following year; he was also a member of the commission that conducted a conference with Aguinaldo. He fought later at Santa Ana, San Pedro Mecati, Pateros and Lagnig, and was commended for gallantry. In April 1899, he was advanced to brigadier-general, and held commands of the department of Visayas, was military governor of the Island of Negros, and (1900) collector of customs for the Philippine Archipelago. Being honorably discharged from the service in 1901 he was appointed justice of the Supreme Court of the Philippine Islands, 17 June 1901. Later he was made governor- general of the islands, but resigned in 1909, and returned to the United States. In 1910 he was made associate justice of the United States Court of Customs Appeals.

SMITH, Jessie Wilcox, American artist : b. Philadelphia, Pa., 19th century. She studied at the Philadelphia Acadetny of Fine Arts and under Howard Pyle at the Drexel Institute. She has been engaged in book and magazine illustrating since 1890 and is well known for her clever and sympathetic delineation of child

life. Her work has appeared in Harpers Maga¬ zine, Scribner's Magazine, Colliers Weekly, the Ladies' Home Journal and other periodicals, as well as in books published by Houghton, Mifflin and Company and by Little, Brown and Com¬ pany. Mention may be made

of the series (The Child's World) ; (The Five Senses5; (Seven Ages of Childhood) ; and her illustrations for the (Mother Goose Rhymes.5

SMITH, John, English soldier and colonist, founder of Virginia: b. Willoughby, Lincoln¬ shire, 1580; d. London, June 1631. In 1596 he enlisted in the French army to fight against Spain, but after the peace in 1598 transferred his services to the insurgents in the Nether¬ lands, and there remained until about 1600. After study of the theory of warfare and practice in the cavalry exercises of the time, he started on a career of marvelous adventure, performing very many exploits, for which his own narra¬ tives are the only authority. Having shipped, he says, from France for Italy, he was thrown overboard as a Protestant, but ultimately was rescued by a pirate, and after receiving a share of booty from a Venetian prize, went through Italy and Dalmatia to Styria, and enlisted in the forces of the Archduke of Austria against the Turks. He places emphasis upon his in¬ genuity in the device of a system of signaling by means of which the imperial army was en¬ abled to communicate with the invested garri¬ son of Limbach and thus raised the siege. After having killed three Turkish champions in a series of duels before the assembled armies, he was at last taken prisoner at Rotenturm, and sold as a slave. But he escaped, and finally got to Morocco, whence he returned in an English warship to England in 1605. Fuller ((Worthies of England5) thought of these (<strange performances® that their scene was <(laid at such a distance they are cheaper cred¬ ited than confuted.® Later investigators al¬ low them some basis of truth. When Smith got back he busied himself in the schemes of colonization in the New World which were being undertaken in consequence of the recent discoveries. An enterprise with which he was identified for a settlement in Guiana fell through, and he then sailed from Blackwall, 19 Dec. 1606 among the 105 emigrants who, under royal patent, were to establish a colony in Virginia. In the passenger-list he is styled a planter. The expedition of three vessels went by way of the West Indies, reached the coast of Virginia on 26 April, and then opened the sealed instructions containing the list of mem¬ bers of the council. Among them was Smith, who was not at first permitted to act because during the voyage for some reason unknown he had been placed under arrest by Captain New¬ port, commander of the fleet. On 13 May 1607 the colonists landed about 50 miles from the mouth of the. river they called the James, at a peninsula on its northern bank, where they built Jamestown. The site was strongly ap¬ proved by Smith, though opposed by Bartholo¬ mew Gosnold, another of the council. From the start Smith was active in the work of the colony, and on 10 June he was admitted to office. Fortifications were built, and then he made

excursions into the surrounding region for food. He proved an excellent leader, and soon became virtually the director of the colony.

During one of his journeys he was taken pris¬ oner by the Indians (December 1607), but later released on promise to furnish a ransom of ((two great guns and a grindstone.® In an interpolation in his (Generalli Historic } (1624), Smith says that it was during this captivity that he was saved from death by Pocahontas (q.v.). Charles Deane (q.v.), the antiquary, in his edition (1860) of Wingfield's discourse,5 was the first to point out that the story was at variance with Smith's narratives in the tracts composing the book when they were published contemporaneously with the events they re¬ corded. But Smith has found many defenders, such as Arber in his memoir in the Encyclo¬ paedia Britannica) (9th ed. 1887) and his edi¬ tion (1884) of Smith's (Works, 5 and Poin¬ dexter in (Captain John Smith and his Critics> (1893). The matter, like Smith's general verac¬ ity, remains an object of controversy. Wing¬ field, the first elected president of the colony, was deposed in September 1607, Smith taking a leading hand in the business. Ratcliffe, the successor, held office a year, and 10 Sept. 1608 Smith was made formal head. He enforced discipline, strove to correct the unthrifty meth¬ ods of the colonists, had them build a church, strengthen the defenses, and make some pro¬ vision for agriculture and fishery. He made two voyages, covering in all, he reckoned, 3,000 miles, about the coasts of Chesapeake Bay, which he mapped with its environs. A new party of colonists arrived in August 1609. Smith refused to surrender the government of the colony, and the newcomers chose Francis West president. Smith's term having later ex¬ pired, George Percy was elected and West made a councillor. About 29 September Smith left for England. He never returned to Jamestown. He left the colony in a most favorable condi¬ tion. In 1614 he made a voyage of explora¬ tion to New England and prepared a map of the coast from the Penobscot to Cape Cod, the first properly to indicate the outline of it. He made two attempts in 1615, being frustrated in the first by a storm and in the second by being taken prisoner by the French. In 1617 he started' again, but bad weather kept him in port, and he retired to London where he made maps and wrote pamphlets. Smith was cer¬ tainly a prominent figure of his time, and what¬ ever his tendency to embellishment and imagi¬ nation as a historian, he really achieved much in Virginia. He was a good example of Eliza¬ bethan versatility, ((bookman, penman, swords¬ man, diplomat, sailor, courtier, orator.® His service to America in the early 17th century remains the greatest part of his career. His most important works are (True Relation5 (1608; ed. by Deane, C., Boston 1867); (Maps of Virginia5

(1612) ; description of New England5 (1616) ; (New England's Trials5 (1620). Consult Arber, E., Complete Works of Captain John Smith5 (Birmingham 1884; London 1895) ; Ashton, J., < Adventures and Discoveries of Captain John Smith5 (New York 1883) ; Bradley, A. G., <Captain John Smith5 (New York 1905) ; Jenks, T., 'Captain John Smith5 (New York 1904) ; Smith, E. B., 'Pocahontas and Captain John Smith5 (Bos¬ ton 1914) ; Warner, C. D., 'Life of Captain John Smith5 (New York 1881); Wertenbaker, T. J., 'Virginia under the Stuarts5 (Princeton 1914). See Jamestown.

SMITH, John Bernhardt, American ento¬ mologist : b. New York, 21 Nov. 1858; d. 12 March 1912. He was admitted to the bar in 1879, but subsequently turned to the study of entomology, and in 1884 was appointed a special agent of the United States Department of Agriculture. He became assistant curator of the United States National Museum in 1886; was appointed State entomologist of New Jer¬ sey in 1888 and from 1889 he was professor of entomology at Rutgers College and ento¬ mologist at the New Jersey Agricultural Ex¬ periment Station. He became widely known in the course of his work in charge of the New Jersey campaign for the extermination of its mosquitoes, for which an appropriation of $350,000 was voted ; and did noteworthy work in connection with the fight against the San Jose scale. Author of (Economic Entomology for Farmer and Fruit Grower) (1896) ; (Our Insect Friends and Enemies) (1909), etc.

SMITH, John Lawrence, American chem¬ ist and physician: b. Charleston, S. C., 17 Dec. 1818; d. Louisville, Ky., 12 Oct. 1883. He was educated at the University of Virginia and the South Carolina Medical College, studied chem¬ istry in Europe with Liebig and Pelouze, and established in 1846 the Medical and Surgical Journal of South Carolina. He was appointed bullion assayer by the State of South Carolina; and in 1846 entered the service of the Turkish government to report upon the cotton culture and the mineral resources of Turkey. He returned to America in 1850 and taught chemistry in the medical department of the University of Louisville 1854-66. He made one of the largest known collections of meteorites, which after his death was acquired by Harvard University. He received decorations from the French, Turkish, and Russian governments ; in 1874 was presi¬ dent of the American Association for the Ad¬ vancement of Science ; in 1877 of the American Chemical Society, and in 1879 succeeded Sir Charles Lyell as corresponding

member of the Academy of Sciences of the Institute of France. The more important of his numerous published papers were issued by him as (Mineralogy and Chemistry, Original Researches) (1873-84).

SMITH, John Talbot, American Roman Catholic clergyman, author and lecturer : b. Saratoga, N. Y., September 1855. He was graduated from Saint Michael's College, To¬ ronto, Canada, 1881 ; missionary in the Adiron- dacks 1881-89, editor of the New York Catho¬ lic Review 1889-92, president of the Catholic Summer School 1905—09, and founded the Catholic Actors' Guild of America 1914. He has published the novels, (A Woman of Cul- ture) (1881); Solitary Island) (1886); (His Honor the Mayor *(1891); (Saranac* (1893); <The Art of Disappearing *(1905); (The Black CardinaP (1914); also (The History of the Ogdensburg Diocese* (1884) ; (The Train¬ ing of a Priest *(1896) ; (Life of Brother Azarias* (1897) ; (History of the Diocese of New York* (1905) ; and two volumes of ser¬ mons.

SMITH, John Walter, American senator: b. Snow Hill, Md., 5 Feb. 1845. He was edu¬ cated at Washington Academy. As a member of the Democratic party he was elected to the Maryland State senate in 1888, serving there

till 1899; in 1894 he was president of the sen¬ ate; and in 1895 chairman of the Democratic State Committee. In 1896 he was nominee for the United States Senate, and 1899-1900 was member of Congress. From 1900-04 he was governor of Maryland, and from 1908-21 was United States Senator.

SMITH, Jonas Waldo, civil engineer : b. Lincoln, Mass., 9 March 1861. His education was obtained at Phillips Academy, Andover, and the Massachusetts Institute of Technology. After serving as chief engineer of the water¬ works of his own town, though barely 17, he assisted in various engineering works connected with water supply, and in 1892 was placed in charge of the Passaic (N. J.) Water Company. Having had successful experience in developing the water supplies of several cities in New Jersey he was in 1903 chosen chief engineer of the aqueduct commissions of New York, and under his direction the plans were worked out for the Catskill water supply, to deliver 500,- 000,000 gallons of water daily in New York city at high pressure. This gigantic work cost about $170,000,000, and was successfully com¬ pleted. See Catskill.

SMITH, Joseph, American Mormon leader : b. Sharon, Windsor County, Vt., 23 Dec. 1805; d. Carthage, Ill., 27 June 1844. In 1820 when living as a farm laborer at Manchester, Ontario (now Wayne)

County, N. Y., at the time of a religious revival he prayed, according to his own account, for guidance, and was told by two heavenly messengers not to join any sect. On 21 Sept. 1823 an angel, that he called Moroni, told him of a book engraved on gold plates and containing the ((fulness of the ever¬ lasting gospel. **He was instructed to dig for the plates in the hill Cumorah, four miles from Palmyra, between that town and Manchester. These plates, the characters on which were in a tongue styled ((reformed Egyptian,** Smith translated by means of interpreters (Urim and Thummim) found with the plates, and with the assistance of amanuenses who received his dictation. Smith received the priesthood of Aaron from John the Baptist and of Melchize- dek from Peter, James and John. On 6 April 1830 the Mormon Church was organized at Fayette, Seneca County, N. Y., and Smith was recognized as the prophet of a new dis¬ pensation. (For subsequent details of Smith's career see Mormons). While residing at Nauvoo, Ill., the feeling against him resulting from religious and political differences, cul¬ minated in his murder by a mob, which broke into the jail at Carthage, where he had been placed for safe-keeping after surrendering for trial upon certain charges preferred against him at the instance of personal enemies, seceders from the Church that he had founded.

SMITH, Joseph (son of Joseph Smith who was instrumental in organizing the Church of Jesus Christ of Latter Day Saints, at Fay¬ ette, New York, 6 April 1830) : b. Kirtland, Ohio, 6 Nov. 1832; d. Independence, Mo., 10 Dec. 1914. He resided with his parents at Kirtland, Ohio, until their removal to Far West, Missouri, in 1838. Within a year after¬ ward when his father was arrested by a drunken militia, this boy was thrust from his father at the point of the bayonet and rudely told that he would see his father no more.

In the winter of 1838-39 he accompanied his mother into Illinois, banished from the State under the edict of Governor Lilburn W. Boggs of Missouri. He and his adopted sister crossed the ice of the Mississippi River at Quincy, Ill., clinging to his mother's skirts while she carried his two younger brothers in her arms. After his father joined the fam¬ ily near Quincy, Ill., they settled at Commerce, subsequently called Nauvoo, Ill. Here he witnessed the years of prosperity of the family, also the severe persecution which resulted in the death of his father at the hands of a mob at Carthage, Ill., 27 June

1844.

At Nauvoo he was reared to manhood and spent his early years honored and respected and was several times trusted by his fellow citizens in the office of justice of peace. On the 6 April 1860 at a conference of the Re¬ organized Church of Jesus Christ of Latter Day Saints held at Amboy, Ill., he was chosen as president of that Church. His presidency of over half a century was exercised with patience and the respect of his people and no breath of suspicion against his moral integrity was ever heard. President Smith was three times married; first in 1856 to Miss Em- maline Griswold who died in 1869, subsequently to Miss Bertha Madison who died in 1896, and then to Miss Ada Clarke who survived him but who has since died. The fruit of these three unions was 17 children, 10 of whom are still living, six sons and four daughters. He died at Independence, Mo., 10 Dec. 1914, honored and respected as a consistent leader and near companion by church associates ; and by fellow citizens as a loyal, upright and valuable citizen of town, county and State. See Reorganized Church of Jesus of Latter Day Saints.

SMITH, Joseph Fielding, American reli¬ gious leader, president of the Church of Jesus Christ of Latter Day Saints, nephew of Joseph Smith (1805ˆ44) : b. Far West, Caldwell County, Mo., 13 Nov. 1838; d. Salt Lake City, Utah, 19 Nov. 1918. His childhood was spent amid persecutions and hardships which finally re¬ sulted in the martyrdom of his uncle and his father at Carthage, Ill., 27 June 1844. In 1846 his mother with her family left her home in Nauvoo, Ill., as an exile, with the majority of the Latter Day Saints, who were driven from their homes. In this exodus, Joseph drove an ox-team to Winter Quarters, on the Missouri river, where the family remained until the spring of 1848, when they continued their journey to the west. From Winter Quarters to Salt Lake Valley, Joseph drove two yoke of oxen attached to a heavy-laden wagon, a distance of more than 1,000 miles, and arrived in the valley 23 Sept. 1848. He was engaged in manual labors 1848-54, and in the last-named year went as a missionary to the Hawaiian Islands, where he remained until 1857, gaining a thorough knowledge of the native tongue. He returned to Utah in 1858 and on 21 March 1858 was ordained to the office of a Seventy, and on 16 October of the same year to the office of a High Priest and member of the High Council of the Salt Lake State. He labored as a missionary in Great Britain 1860- 63 and in 1864 returned to the Hawaiian Islands on his second mission, where he resided until

his return to Utah in 1865. While on his third mission to the Hawaiian Islands, 1885-87, he became acquainted with Prof. L. L. Rice, the

possessor of the original manuscript of the much famed <(Spaulding Story® which many over-zealous anti-((Mormons® have tried in every possible way to connect with the Book of Mormon, and from him he obtained an ex¬ act copy of the manuscript, which being pub¬ lished in book form, effectually disproved the Spaulding theory, according to Pres. James H. Fairchild, of Oberlin College, who com¬ pared the two productions. On 1 July 1866 he was ordained an apostle and was received into the quorum of the Twelve Apostles 6 Oct. 1867. In February 1874 he started on his second mission to Europe, this time to preside over the European mission and to edit the Millennial Star, the Church periodical in England. He remained there until the fall of 1875, when he returned to Utah and was appointed to preside over the Latter Day Saints in Davis County. This position he held until the spring of 1877 when he was again appointed to preside over the European mission, and for the third time left for Great Britain. He traveled in this field, visiting the different branches in England and on the Continent, until the death of Presi¬ dent Brigham Young, 29 Sept. 1877, when he was called home. He was second counsellor to the presidency 1880-1901, and first counsellor April 1901 to 10 Oct. 1901. On the last-named date he was sustained as president of the Church.

President Smith's civic record comprises the offices of territorial legislator, city councillor, and university regent, in all of which he served repeatedly. As a member of the municipal government he was the main mover in securing from heirs of President Brigham Young Lib¬ erty Park and Pioneer Square as public parks for Salt Lake City. He was a member of the House of the Utah legislature 1865, and in 1882 was a member of the legislative council, presiding over it at the latter session. He was also president of the constitutional convention held the same year. He assisted in the organiza¬ tion of Zion's Co-operative Mercantile Institu¬ tion, Zion's Savings Bank and Trust Company, the State Bank of Utah, and the Utah Sugar Company, over all of which he was the presi¬ dent. He was also president of the Consoli¬ dated Wagon and Machine Company and was connected with many other concerns.

In the auxiliary organizations of the Church he was the head of the Young Men's Mutual Improvement Association and the Deseret Sun¬ day School Union, and was senior editor of the Improvement Era and the Juvenile Instruc¬ tor, the official organs of these two organiza¬ tions of young people of the church.

Early in 1904 President Smith was sum¬ moned to Washington to testify before the Senate Committee of Privileges and Elections in the

case of Reed Smoot (q.v.), senator- elect from Utah, upon whose eligibility the committee was called to pass. During a pro¬ longed examination the witness displayed a mental resourcefulness equal to that of his distinguished interrogators.

SMITH, Joshua Toulmin (Toulmin Smith), English author: b. Birmingham, 29 May 1816; d. Lancing, Sussex, 28 April 1869.

JOSEPH F. SMITH

Late President of the Church of Latter-Day Saints

•
•

He entered Lincoln's Inn in 1835 to study tor the bar, but soon turned his attention to litera¬ ture, especially interesting himself in the Scandinavian languages and literature. He lived in the United States, at Detroit, Utica and Boston, in 1837-42, engaged in lecturing and writing. During this period he published his (Discovery of America by the Northmen of the 10th Century' (1839), the first presenta¬ tion in English of the Icelandic sagas, and a work wfhich remains an authority. Returning to England he resumed his legal studies, made a special study of old Saxon law, and was called to the bar in 1849. He became known as a writer not only on legal topics, but on geology, in which field his (Ventriculidae of the Chalk) (1848) is still authoritative, and on sanitary science and mineralogy, as well as being an antiquarian of note. As a powerful and well-informed writer he exerted a wide influence. He edited Parliamentary Remembrance in 1857-65, a weekly report of the proceedings of Parliament amplified by historical com¬ mentaries and illustrations of unique value, but which failing health compelled him to discon¬ tinue. His (English Gilds) (1870) was edited by his daughter and published posthumously.

SMITH, Judson, American Congrega¬ tional clergyman and educator : b. Middlefield, Mass., 28 June 1837; d. Roxbury, Mass., 29 June 1906. He was graduated at Amherst Col¬ lege in 1859, at Oberlin Theological Seminary in 1863 and was ordained in the Congregational Church in 1866. He was professor of Latin at Oberlin in 1866-70; of ecclesiastical history and positive institutions at the Oberlin Theological Seminary in 1870-84; and was also lecturer on modern history at Oberlin in 1875-84, and lecturer on history at Lake Erie

Female Sem¬ inary in 1879-84. He edited the Bibliotheca Sacra in 1882-84, and wTas thereafter associate editor. From 1884 he was foreign secretary of the American Board of Commissioners for Foreign Missions, and he made a visit of in¬ spection to missions in Turkey in 1888 and to those in China in 1898. Author of (Lectures in Church History' (1881) ; (Lectures on Modern History ' (1881).

SMITH, Julia Holmes, American physi¬ cian :■ b. Savannah, Ga., 23 Dec. 1839. She be¬ gan the study of medicine in 1873 at the medical school of the Boston University and graduated from the Chicago Llomoeopathic College in 1877. Since then she has practised in Chicago and contributed to medical literature. Upon appointment by Governor Altgeld she became the first woman trustee of the Uni¬ versity of Illinois. She has been professor of gynecology and dean of the National Medical College; superintendent of the Department of the Northwest, New Orleans Cotton Exposition, 1885, and vice-president Homoeopathic Congress, Columbian Exposition, 1892-93. She organized and was first president of the Woman's Medical Association. She retired from medical prac¬ tice in 1914.

SMITH, Justin Harvey, American writer: b. Boscawen, N. H., 13 Jan. 1857. He was graduated from Dartmouth College in 1877, and became a member of the publishing firm of Ginn and Company. In 1899 he was called to the chair of modern history at Dartmouth, which

he resigned in 1908. Has traveled extensively in North America, Europe, the Near and Far East, northern Africa, etc. He is author of (The Troubadours at Home' (2 vols., 1899) ; (Arnold's March from Cambridge to Quebec) (1903) ; (A Tale of Two Worlds and Five Cen¬ turies' (1903) ; (Our Struggle for the 14th Colony' (2 vols., 1907) ; (The Annexation of Texas' (1911), etc., and numerous magazine articles.

SMITH, Marcus Aurelius, American law¬ yer and senator : b. near Cynthiana, Ky., 24 Jan. 1852. He was graduated at Transylvania University, was admitted to the bar, and in 1881 removed to Arizona where he engaged in the practice of law. He served for 16 years as territorial delegate from Arizona before her admission as a State, and upon her admission he was elected one of her first senators in 1912. He was re-elected in 1914. His work in Congress has been connected with irrigation and reclamation problems.

SMITH, Melancton, American naval offi¬ cer: b. New York, 24 May 1810; d. Green Bay, Wis., 19 July 1893. He entered the navy as midshipman, was commissioned lieutenant in 1837, served in the

Florida war on the Poinsett, and during the Civil War joined Farragut's fleet with the Massachusetts, destroyed the Con¬ federate ram Manassas, and took part in run¬ ning the batteries at Vicksburg, 14 March 1862. He was promoted commodore in 1866 and rear- admiral in 1870, and was commandant at the Brooklyn navy yard 1870-72.

SMITH, Morgan Lewis, American sol¬ dier: b. Oswego, N. Y., 8 March 1822; d. Jer¬ sey City, N. J., 29 Dec. 1874. He removed to New Albany, Ind., in 1843, served for a time in the United States army, andjater engaged in the steamboat business. Upon the outbreak of the Civil War he re-entered the army, raised the Eighth Missouri infantry, and was com¬ missioned its colonel in July 1861. He was in command of a brigade at both Fort Donelson and Shiloh, and in July 1862 he was appointed brigadier-general of volunteers. He later served under Sherman, was severely wounded at Vicksburg in December 1862, but returned to duty in October 1863 and afterward participated in the Atlanta campaign. He was later mili¬ tary commander of Vicksburg, where his firm measures were successful in restoring quiet and order. He resigned from the army in July 1865, and later was United States consul at Honolulu.

SMITH, Munroe, American jurist and po¬ litical scientist : b. Brooklyn, N. Y., 8 Dec. 1854. He was graduated from Amherst in 1874, and from the Columbia Law School in 1877 ; he then studied abroad, receiving the degree of J.U.D. (doctor of laws) from the University of Got¬ tingen. On his return from Germany in 1880 he was appointed instructor in the department of history at Columbia University, in 1883 be¬ came adjunct professor of history, and in 1891 professor of Roman law and comparative juris¬ prudence. He was one of the founders of the (Political Science Quarterly' in 1886, of which he was managing editor until 1913. He has edited Selections from Cicero' in (The .World's Best Books' (1900), and has written (Bismarck and German Unity' (1898; 2d ed., 1911); jurisprudence' (1908); (Military

Strategy versus Diplomacy in Bismarck's Time and Afterward* (1915), and numerous legal and political articles.

SMITH, Nathan, American physician : b. Rehoboth, Mass., 13 Sept. 1762; d. New Haven, Conn., 26 July 1828. He served in the Vermont militia the last year and a half of the Revolu¬ tionary War, and later settled in Vermont. He took up the study of medicine at the age of 24,

and after some years of practice at Cornish, N. H., he entered Harvard University, where he was awarded the degree of M.B. in 1790, the third graduate of the medical department. He established the medical department at Dart¬ mouth College in 1798, and subsequently taught most of its departments. He studied at the University of Edinburgh in 1803, afterward re¬ turning to Dartmouth. From 1813 until his death he was professor of the theory and prac¬ tice of surgery at Yale University. He also lectured at the University of Vermont in 1822- 25, and at Bowdoin College in 1820-25. He greatly aided the betterment of facilities for securing medical education in the United States. His practice extended over four States. He is said to have performed the first operation in America for the extirpation of ovarian tumor, and that of staphylorrhaphy; and his name is connected with an improved method of amputation of the thigh. Author of Prac¬ tical Essays on Typhus* (1824).

SMITH, Nathan Ryno, American surgeon, son of Nathan Smith (q.v.) : b. Concord, N. H., 21 May 1797 ; d. Baltimore, Md., 3 July 1877. He took his M.D. at Yale University in 1820 and in 1824 began the practice of surgery at Burlington, Vt. He was professor of surgery and anatomy at the University of Vermont in 1825-27 ; occupied the chair of surgery at the University of Maryland in 1827-28; was pro¬ fessor of the practice of medicine at the Uni¬ versity of Transylvania in 1828-40; and in 1840-70 was again professor of surgery at the University of Maryland. He invented an in¬ strument rendering the operation of lithotomy safe, and a splint for fractures of the thigh. He contributed numerous articles to the Ameri¬ can Journal of Medicine and was author of (Surgical Anatomy of the Arteries* (1832-35) ; (Treatment of Fractures of the Lower Ex¬ tremities by the Use of the Anterior Suspensory Apparatus) (1867), etc.

SMITH, Percey Franklyn, American mathematician : b. Nyack, N. Y., 21 Aug. 1867. He was graduated at Yale University in 1888, took his Ph.D. there in 1891 and later studied at the universities of Gottingen, Berlin and Paris. He was connected with the Sheffield Scientific School at Yale from 1888 and since 1900 he has been professor of mathematics there. He is editor of the Transactions of the American Mathematical Society, and was joint editor of Elements of Differential Calculus> (1904). Author of (Elementary Calculus *(1902) ; Pour-Place Logarithmic Tables) (1902) ; and joint author of ˆElements of Analytic Geometry) (1905) ; (Theoretical Mechanics* (1910) ; (The New Analytic Geometry) (1912), etc.

SMITH, Richard Penn, American drama¬ tist: b. Philadelphia, 13 March 1799; d. Falls of Schuylkill, Pa., 12 Aug. 1854. He was the

author of numerous plays, 15 of which were produced on the Philadelphia stage. Among them are <Caius Marius, *a tragedy acted by Edwin Forrest in 1831 ; (The Disowned* and <The Deformed, *both presented in London; <The Water Watch* ; (The Venetians, *and <The Actress of Padua.* A selection of his (Miscellaneous Works, *collected by his son, Horace Wemyss Smith, and including a bio¬ graphical sketch, was published in 1856; and <Complete Works* with sketch and memoir was published by his son in 1888 (4 vols.). Con¬ sult Rees, c Dramatic Authors of Philadelphia.)

SMITH, Richard Somers, American edu¬ cator : b. Philadelphia, Pa., 30 Oct. 1813 ; d. Annapolis, Md., 23 Jan. 1877. He was gradu¬ ated from West Point in 1834, served on topo¬ graphical duty and resigned in 1836. He was reappointed to the army in 1840, and became in¬ structor at West Point, which position he held until 1855, when he again resigned, serving successively as professor of mathematics in the Brooklyn Institute of Technology and as a director of Cooper Institute, New York. In 1861 he was appointed to the Federal army for a third time; he served, as major of infantry, until after the battle of Chancellorsville, when he resigned his commission and accepted the presidency of Girard College, Philadelphia. He relinquished this in 1867 ; in 1870 was appointed professor of mathematics at the United States Naval Academy, and in 1873 was transferred to the department of drawing. His publications comprise a (Manual of Topographical Draw- ing) (1853), and (Linear Perspective) (1857).

SMITH, Roswell, American publisher;

b. Lebanon, Conn., 30 March 1829; d New York, 19 April 1892. He purchased Scribner's Monthly, the name of which he changed to the Century in 1881. Securing Dr. J. G. Holland as editor he made a wonderful success, and for many years set the pace for other magazines both in America and abroad. He founded the Century Company, of which he was president until his death in 1892. Under his guidance the company also published Saint Nicholas, a young folks magazine, the < Century Dictionary* and other works.

SMITH, Samuel, American soldier: b. Lan¬ caster, Pa., 27 July 1752; d. Baltimore, Md., 22 April 1839. He was appointed captain in a Maryland regiment at the outbreak of the American Revolution and served until 1779, hav¬ ing been in command of Fort Mifflin when it was bombarded by the British fleet for 42 days in 1777. He resigned his commission in 1779, represented Maryland in Congress, 1793-1803 and 1816-22, and in the United States Senate, 1803-15 and 1822-33, serving much of the time as chairman of the Finance

Committee. As ma¬ jor-general of the State militia he defended Baltimore from mob rule in 1835, and for three years afterward was mayor of that city.

SMITH, Samuel Francis, American Bap¬ tist clergyman and poet: b. Boston, Mass., 21 Oct. 1808; d. there, 16 Nov. 1895. He was graduated from Harvard in 1829, from An¬ dover Theological Seminary in 1832 and was ordained in 1834. He was engaged in various pastorates in 1834—54, at the same time acting as professor of modern languages at Waterville College (Colby University) in 1834-42, and as

editor of the Boston Christian Review in 1842-48. He was editor of the publications of the Baptist Missionary Union in 1854-69, and in 1875-76, 1880-82, he visited the chief mis¬ sionary stations in Europe and Asia. He was famous as the author of (My Country 'Tis of Thee) (1832), which became a national hymn, and he also wrote the hymn (The Morning Light is Breaking at about the same time. His publications include (Lyric Gems) (1843) ; 'The PsalmisD (1843); (Life of Rev. Joseph Grafton' *(1848) ; (History of Newton, Mass.*- (1880) ; (Rambles in Mission Fields) (1884), etc.

SMITH, Samuel Stanhope, American Presbyterian clergyman and college president: b. Pequa, Pa., 16 March 1750; d. Princeton, N. J., 21 Aug. 1819. He was graduated at Princeton University in 1769 and in 1774 was ordained in the Presbyterian ministry. He was the first president of Hampden Sidney College, in 1775-79. He became professor of moral philosophy at Princeton in 1779, and also held the chair of theology from 1783; he was vice- president from 1786, and was president of the university in 1795-1812. He rendered the uni¬ versity invaluable service in its reorganization after the ravages of the Revolution. He was one of the committee which drafted the laws of government for the Presbyterian Church. Author of (Lectures on Moral and Political Philosophy) (2 vols., 1812) ; Comprehensive View of Natural and Revealed Religion)

(1815).

SMITH, Seba, American journalist: b. Buckfield, Me., 14 Sept. 1792; d. Patchogue, L. I., 29 July 1868. He was graduated from Bow- doin College in 1818 and entered the journal¬ istic world as a writer for

the Portland papers. Under the pen name of Maj. Jack Downing, he began a correspondence in the dialect of New England bearing upon the political issues of the day, which was continued for some time, and, having been collected and published in book form in 1833, gained considerable popularity. From 1822 to 1842 he was the editor succes¬ sively of three of the Portland papers, when, having acquired a somewhat wider reputation as a political satirist, he removed to New York, where he wrote for numerous periodicals. His later published works are (1841), a tale of verse; (New Elements of Geometryˆ a parody (1850), and (Way Down East} (1853).

SMITH, Sidney, English clergyman, au¬ thor and wit: b. Woodford, Essex, 3 June 1771 ; d. London, 22 Feb. 1845. He was edu¬ cated at New College, Oxford, of which he be¬ came a Fellow in 1791, and obtained in 1794 the curacy of Netheravon, a village in Salisbury Plain, near Amesbury. In 1796-1801 he was in charge of an Episcopal congregation at Edin¬ burgh and tutor to Michael Hicks Beach. Here he continued for five years, and made the ac¬ quaintance of the most distinguished intellectual men of the day, including more especially that circle of youthful geniuses, composed of such men as Jeffrey, Horner, Walter Scott, Lord Brougham, Leyden and others. Many of them espoused with ardor liberal views in politics and literature, and with the view of disseminating these Smith proposed to his comrades the start¬ ing of a Review, a project entered upon with enthusiasm. Thus commenced in 1802 the

famous Edinburgh Review, of which Jeffrey acted as editor for many years and Smith as one of its raciest and most influential contribu¬ tors. In 1803 Smith removed to London, where he delivered a course of lectures on moral philosophy at the Royal Institution (1804-06), which were extremely popular, and were subse¬ quently published. In 1806, during the reign of the Whig party, he was presented to the living of Fosbrooke,. near York, in 1828 was given a prebend at Bristol and in 1831 was made canon residentiary of Saint Paul's, London. This was the utmost dignity to which he attained in the Church, it being generally believed that but for his Whig views he would have reached a bishop¬ ric. Not long afterward he came prominently forward in a series of pungent epistolary attacks on Lord John Russell, occasioned by his intro¬ duction of a bill into Parliament which ma¬ terially encroached on the rights of deans and chapters. About his last literary effort was the exposure of the fraud perpetrated by the State of Pennsylvania in the repudiation of its pub¬ lic debts. Smith was himself a sufferer by this breach of national faith, and his sarcastic re¬ marks on the subject excited both a little amuse¬ ment in England and not a little indignation in the United States. Another characteristic

pub¬ lication was (Letters on the Subject of Catho¬ lics *(1807-08), which was of influence in secur¬ ing Catholic emancipation. A few years before his death a collected edition of his writings was published under his own superintendence. It has been said, ˆSmith's reputation as an English wit is solid — if that word can be applied to so volatile a quality.® He was one of the greatest of jesters and makers of b on-mots, but remarkable also as a thinker and English stylist. Consult Reid, (Life and Times of Sidney Smith) (1884); also the <Memoir) by Lady Holland; and Duyckwick, (Wit and Wisdom of Sidney Smith* (1856).

SMITH, Sidney Irving, American biolo¬ gist: b. Norway, Me., 18 Feb. 1843. He was graduated at the Sheffield Scientific School, Yale University, in 1867 and became assistant in zoology there. In 1871 he was in charge of the deep water dredging in Lake Superior for the United States Lake Survey, and in 1872 he was engaged in similar work for the United States Coast Survey at Saint George's banks. In 1875-1906 he was professor of comparative anatomy at Yale University, and was afterward professor emeritus. He was associated with the United States Fish Commission in 1871-87 and was elected to the National Academy of Sciences in 1884. He was an authority on American marine invertebrate zoology, and was author of numerous papers on his specialty.

SMITH, Sophia, American philanthropist : b. Hatfield, Mass., 27 Aug. 1796; d. there, 12 June 1870. Her early life was spent in com¬ parative obscurity, but was enlivened by a rather wide range of reading and the acquisition of such desultory knowledge as she could obtain thereby. Having been early impressed with the need of women for opportunities for higher education, it was her privilege to establish the first woman's college in New England by means of a fortune left her by a brother, Austin Smith, in 1861. Smith College (q.v.) was established in Northampton, Mass., in 1875, according to plans outlined by her and by means of funds

bequeathed by her in 1870 for the founding of such an institution.

SMITH, Theobald, American pathologist: b. Albany, N. Y., 31 July 1859. He was graduated at Cornell University in 1881 and took his M.D. at the Albany Medical College in 1883. He was director of the pathological laboratory of the Bureau of Animal Industry, United States Department of Agriculture, in 1884-95, and, was also professor

of bacteriology at Columbian (now George Washington) Uni¬ versity in 1886-95. He was director, pathologi¬ cal laboratory of he Massachusetts Board of Health, 1895-1915; professor of comparative pathology, Harvard University, 1896-1915; di¬ rector, department of animal pathology, Rocke¬ feller Institute, 1915 — . From 1911 he was a member of the consulting board of scientific ex¬ perts, United States Department of Agriculture. He made many important contributions to scientific knowledge. In 1886 he demonstrated the practicability of immunizing man to cholera by injection of the filtered virus of hogs; he discovered the organism of Texas fever in Pyrosoma bigeminum in 1889, and with F. L. Kilborne proved that it was communicated by the tick, Boophilus bovis ; and in 1898 he dis¬ tinguished the difference between the human and bovine tubercle bacilli, his findings being confirmed by Koch in 1900. He was elected to the National Academy of Sciences in 1908. He is author of many scientific papers and reports.

SMITH, Theodore Clarke, American his¬ torian and educator : b. Roxbury, Mass., 18 May 1870. He was graduated at Harvard Uni¬ versity in 1892, took his Ph.D. there in 1896 and later studied at the universities of Paris and Berlin. He was assistant professor of political science at the Ohio University in 1901-03 ; and has since been professor of American history at Williams College. Author of (Liberty and Free Soil Parties of the Northwest (1898) ; (Political Reconstruction (1903) ; (Parties and Slavery) (1908) ; WVars Between England and United States) (1914).

SMITH, Thomas, English scholar and di¬ plomatist: b. Saffron Walden, Essex, 23 Dec. 1513; d. 1577. He studied at Queen's College, Cambridge, became a Fellow there, 1531, and a public lecturer, 1538; he then studied at Padua and on his return became professor of civil law at Cambridge, 1544. During these years he succeeded in changing the English pronunciation of Greek. Under Fdward VI he was knighted, and served as Ambassador to Belgium and France. He lived in retirement during Queen Mary's reign, but under Queen Elizabeth was Ambassador to France, 1562-66; a member of the Privy Council, 1571 ; and Secretary of State, 1572. He wrote, besides two monographs on the Greek and the English languages, an im¬ portant work on the Tudor constitution, called <De Republica AnglorunP (published 1583).

SMITH, Thomas Roger, English consult¬ ing architect. He has been professor of archi¬ tecture in University College, London, from 1879. Among his professional books may be cited (Elphinstone College and the Post Office, Bombay, India. } He has published hand¬ book of

Architectural History,* (Manual of Acoustics. *

SMITH, Thomas Southwood, English re¬ former: b. Martock, Somerset, 21 Dec. 1788; d. Florence, Italy, 10 Dec. 1861. He was edu¬ cated for the Church, but early in his ministerial career among the poor of western England was impressed with the desire for a knowledge of medicine, and the necessity for improving the sanitary conditions of the homes of the people to whom his efforts were directed. He was graduated as a physician in 1812, and in 1820 began to practise in London. In 1825 he was appointed to the London Fever Hospital, and in 1830 published his (Treatise on Fever* which is still regarded as a most able presentation of the subject. His interest in the industrial con¬ ditions of the laboring classes of London led to an inquiry into the subject of child labor which resulted in the passage of a Factory Act and the exclusion of children from work in the mines of Great Britain. He spent much time in investigating epidemics of cholera, yellow fever, and other contagious diseases, and ren¬ dered thereby a great service to medical science.

SMITH, Uriah, American Seventh Day Ad¬ ventist leader: b. West Wilton, N. H., 2 May 1832; d. Battle Creek, Mich., 6 March 1903. He studied at Harvard, became a Seventh Day Adventist and rose to great prominence in that denomination. He became editor of the Ad¬ ventist Review at Rochester, N. Y., in 1853 and removed to Battle Creek in 1855, when the office of this denominational organ was trans¬ ferred to that city. He was at the head of the great denominational publishing house at Battle Creek, a professor of Bible study in the Ad¬ ventist College, and wrote many religious works, which reached a sale of 200,000 copies. Among them are (The United States in the Light of Prophecy *; (Daniel and the Revelation,* which attained a sale of 72,000 copies; (The Sure Foundation.)

SMITH, William, Canadian jurist: b. New York, 25 June 1728; d. Quebec, Canada, 3 Nov. 1793. He was graduated at Yale University in 1745 and was admitted to the bar of New York. He was appointed chief justice of the province of New York in 1763, and became also a mem¬ ber of council in 1767, which post he nominally held until 1782. Upon the outbreak of the Revolution he was held on parole at his estate on the Hudson, but in 1778 he openly espoused the British cause, and in 1783 he went to Eng¬ land with the British troops. He was appointed chief justice of Canada in 1786 and held that office the remainder of his life. He established in Canada the office of constable to replace the use of soldiers in that capacity. Author his¬ tory of the Province of New York from its Discovery in 1732) (1793).

SMITH, William, Canadian historian, son of Chief Justice William Smith (q.v.) : b. New York, 7 Feb. 1769; d. Quebec, Canada, 17 Dec. 1847. He accompanied his father to England in 1783, was educated at a grammar school near Kensington and in 1786 went to Canada with his father. He was soon afterward ap¬ pointed clerk of the Provincial Parliament, served also as master in chancery, and in 1814 he was appointed a member of the executive •council. Author of (History of Canada from its Discovery) (2 vols., 1815).

SMITH, William, English geologist: b. Churchill, Oxfordshire, 23 March 1769; d. Northampton, 28 Aug. 1839. After receiving an irregular education, during the course of which he displayed considerable talent for mathe¬ matics, he in 1787 became an assistant to a land- surveyor. He afterward began to act as a min¬ ing surveyor, and was led from some of his surveys of collieries to the idea of framing a model of the strata of a coal country, composed of the materials of the strata reduced to a scale, and placed in their relative positions to each other. He next began seriously to contemplate the composition of regular and extensive works on the subject of geology, and in 1815 he was able to submit a complete colored map of the strata of England and Wales to the Society of Arts.

SMITH, William Alden, American law¬ yer and senator : b. Dowagiac, Mich., 12 May 1859. He was a page in the Michigan house of representatives, later studied law, and in 1883 was admitted to the bar, afterward engag¬ ing in practice at Grand Rapids. He was active politically; was chairman of the State Repub¬ lican Committee in 1888-92; served in Congress in 1894—1907 ; was elected to the United States Senate in 1906 and was re-elected in 1912. He was chairman of the Congressional Committee to investigate the Titanic disaster in 1912.

SMITH, William Benjamin, mathemati¬ cian and New Testament critic: b. Stanford, Ky., 26 Oct. 1850. In 1871 he was graduated from the Kentucky University and in 1879 from the University of Gottingen. He taught and studied languages and sciences, 1871-76; was professor of mathematics in Central College, Missouri, 1881-85; then went to the University of Missouri, first as professor of physics, 1885— 88, then as professor of mathematics, 1888-93. He was professor of mathematics in Tulane University, 1893-1906; professor of philosophy, same institution, 1906-15; professor emeritus thereafter.

He published the following: Co¬ ordinate Geometry *(1885); Untroductory Mod¬ ern Geometry > (1893) ; 'Infinitesimal Analysis) (1898); dew to Trigonometry* (1899) ; (The Color Line *(1905) (Des vorchristliche Jesus) (1906) ; pamphlets on the tariff and newspaper articles on the gold standard (1892-96) ; 'The Pauline Codices F and G* and other criticisms on the New Testament (1901-05) ; 'The Mer¬ man and the Seraph * (1906) ; and articles on the Bible, Calculus and New Testament prob¬ lems in the Encyclopedia Americana.

SMITH, William Farrar, American sol¬ dier: b. Saint Albans, Vt., 17 Feb. 1824; d. Philadelphia, Pa., 28 Feb. 1903. He was gradu¬ ated from the United States Military Academy in 1845, and was commissioned 2d lieutenant in the Topographical Engineers, and from 1846- 48 was assistant professor of mathematics at the academy. At the beginning of the Civil War he served under General Butler, but later received command of a division of the Army of the Potomac, which participated in the siege of Yorktown and in the battles of Williamsburg, Malvern Hill and Antietam. He also took part in the battles of Fredericksburg (1862) and Gettysburg (1863). In 1863 he was appointed chief engineer of the Army of the Cumberland and planned the battles of Brown's Ferry and Missionary Ridge. At the close of the war he VOL. 25 — 9

resigned from the army and became president of the International Ocean Telegraph Company and of New York board of police.

SMITH, William Henry, American jour¬ nalist: b. Austerlitz, N. Y., 1 Dec. 1833; d. Lake Forest, Ill., 27 July 1896. He turned to news¬ paper work in 1854, being attached to the Cin¬ cinnati Times, first as reporter and later as managing editor. At the beginning of the Civil War he was an editorial writer on the Ga¬ zette, where his pen was active in the support of the government. In 1864-66 he was secretary of state of Ohio, but resigned before the com¬ pletion of his second term and established the Evening Chronicle at Cincinnati. In 1870 he became general manager of the Western Asso¬ ciated Press, and in 1883, at the consolidation of the New York and Western associations, re¬ tained the general managership of the body. Meantime, in 1877, he had been appointed col¬ lector of the port of Chicago, and he was instru¬ mental in introducing customs methods to har¬ monize with the civil service policy of the gov¬ ernment. He published 'The Saint Clair Papers) (1882), a biography of Charles Ham¬ mond and a 'Political History of the United States.) During researches in the British Mu¬ seum he found unpublished letters of Washing¬ ton to Col. Henry Bouquet and detected errors in those published by Jared Sparks. At the time of his death he was engaged on the 'Life and

Administration of President Rutherford B. Hayes, * and since his death has appeared his ‘Political History of Slavery) (1903).

SMITH, William Robertson, Oriental scholar: b. 1846; d. 31 March 1894. He was the son of the Free Church minister at Keig, Aber¬ deenshire ; was educated at Aberdeen Univer¬ sity, where he graduated in ,1865, taking the highest honors. Subsequently he spent some time at the New College, Edinburgh, and con¬ tinued his German studies at Bonn and Got¬ tingen, where his ideas upon scientific research were acquired. Thereafter, from 1868 to 1870 he acted as assistant to Professor Tait, pro¬ fessor of physics in Edinburgh University. In 1870 he was appointed to the chair of Hebrew and New Testament exegesis in the Free Church College at Aberdeen. His free criticism of the Old Testament writings resulted in a charge of heresy, and after prolonged discussion in the Free Church courts, during which his honesty was no less conspicuous than his learning, he was removed from his professorship in 1881. From this period he became associated with Professor Baynes in the editorship of the ‘Encyclopedia Britannica,* and when the latter died he succeeded to the position of editor-in- chief. More than any other writer or re¬ searcher he emphasized the character of human editing and arbitrary rendering that has gone into the Scriptures and become classed as in¬ spired. Meanwhile he had visited Arabia in 1879-80, where he gained an intimate knowl¬ edge of the people and their language, which qualified him to fill the position of professor of Arabic in Cambridge University, to which he was appointed in 1883. Subsequently he became a Fellow of Christ’s College, and in 1886 he was elected university librarian, a post which he exchanged in 1889 for the Adams professorship of Arabic. Probably his most popular works are ‘The Old Testament in the

Jewish Church > (1881) and the (Prophets of Israel* (1882). But he is best known to schol¬ ars as the author of (Kinship and Marriage in Early Arabia) (1885) and his first series of Burnett lectures, (Religion of the Semites: Fundamental Institutions * (1889).

SMITH, William Sooy, American army officer and engineer: b. Tarlton, Ohio, 22 July 1830; d. 4 March 1916. He was graduated from the United States Military Academy in 1853 and assigned to frontier duty. The following year he resigned his commission for more active life, and became assistant engineer of the Illinois Central Railroad. He

practised the profession of an engineer in various cities of the United States until the beginning of the Civil War, when he entered the volunteer service. He was promoted brigadier-general 15 April 1862, and commanded successfully the second division of the Army of the Ohio, the first division of the 16th army corps and the cavalry division of the Department of the Tennessee, but was obliged to retire from active service on account of pro¬ longed illness in 1864. His fame as an engineer rests upon his many improvements of the method of sinking foundations for the security of high buildings and in the use of pneumatic caissons in bridge building. His name is identi¬ fied with the building of the first steel bridge, a structure which spans the Missouri at Glas¬ gow, the construction of the Wangoshanee Lighthouse in the Straits of Mackinac, the Hud¬ son River Tunnel and other bridge and railway work throughout the United States and Canada.

SMITH, William Waugh, American edu¬ cator: b. Warrenton, Va., 12 March 1845; d. 17 Jan. 1912. He served in the Confederate army through the Civil War, and was gradu¬ ated at Randolph:Macon College in 1871. He became professor of languages there in 1878, president in 1886 and chancellor in 1897. He organized the Randolph-Macon System of Col¬ leges and Academies of Virginia, raising large sums of money for the purpose, and also founded the Randolph-Macon Women's Col¬ lege at Lynchburg, Va. Author of (Outlines of Psychology) (1880) ; (A Comparative Chart of Syntax, Latin, Greek, German, French and English * (1882), etc.

SMITH COLLEGE, located at North¬ ampton, Mass. It was founded by Sophia Smith, who bequeathed $393,105 for ((an insti¬ tution of learning for the higher education of young women, with the design to furnish them means and facilities for education equal to those which are afforded in the colleges for young men.® The college was incorporated in 1871 and opened to students in 1875 ; it is unsectarian in its management and instruction. The college confers the three degrees of A.B., M.A., and Ph.D. The course includes a year's work in eight required subjects, including Bible study, a major study consisting of related courses in the junior and senior years, two three-hour courses in the junior and senior years, one of which must be in a department entirely dif¬ ferent from the major study, and free electives to complete the required number of hours. The curriculum includes music and art, and a certain amount of technical work in each department when combined with theoretical courses counts toward the degree. Formerly the departments of music and art were organized as separate

schools, but in 1902 were co-ordinated with the other collegiate studies. The college was among the first to recognize music and art among the qualifications for the degree. A number of scholarships are provided, the largest of which has a fund of $10,000; there are also fellow¬ ships for advanced work in philosophy and psychology, botany and zoology; and the col¬ lege aids in the support of the American women's table at the zoological station at Naples, entitling graduates to appointment to this station. Likewise two tables are main¬ tained at the seaside laboratories for the ad¬ vanced study of zoology and botany. Physical training is required of students, and much in¬ terest is also taken in outdoor sports. The college has a large and beautiful campus, in¬ cluding the botanical gardens; the buildings (in 1904) are College Hall, Seelye Hall, the John M. Greene Hall, Lilly Hall of Science, Chem¬ istry Hall, the Library, the Observatory, Music Hall, the Hellyer Art Gallery, the Alumnae Gymnasium, the Infirmary, the Lyman Plant House, the Botanic Garden, the Students' Build¬ ing, the centre of the students' social life, with a large hall, rooms for clubs, etc., and a reading- room, and 18 dwelling-houses. The library con¬ tains about 70,000 volumes, and the North¬ ampton Public Library and the Forbes Library are also open to students. The productive funds in 1917 amounted to $2,2 42,591, the students numbered 1,946 and the faculty 205. In the European War, Smith College sent a body of students to do reconstruction and canteen work in France; and maintained courses of instruc¬ tion for laboratory assistants, and a two years' course for training assistants, in neurological hospitals for the treatment of nervous debility and shell shock among returned soldiers.

SMITH-LEVER AGRICULTURAL EX¬ TENSION ACT, an act passed by the United States Congress in 1914 to provide extra-mural instruction and to diffuse among the American farmers agricultural information. See Agri¬ cultural Legislation.

SMITH SOUND, a passage of water at the northern extremity of Baffin Bay, between Peary Land, in Greenland, and Ellesmere Land. It leads from Baffin Bay into Kane Basin, a body of water about 110 miles long. Its south¬ ern entrance was discovered by Baffin in 1616. In 1854 it was surveyed by a United States expedition under Dr. Elisha Kent Kane.

SMITHFIELD, a historic square in Lon¬ don, a little north of Newgate and west of Al- dersgate, which was until 1855 the only cattle market in London. It was outside the old city walls and in the 11th century was an open spot where the citizens delighted to promenade. Before the days of Tyburn, Smithfield (now called West Smithfield to

distinguish it from East Smithfield, Tower Hill) was the place of public execution. Here Sir William Wallace and Mortimer, Earl of March, suffered death ; here Walworth, the mayor, stabbed Wat Tyler ; and here Jack Straw was hanged. Tournaments were held on this spot; Edward III celebrated the deeds of Cressy and Poitiers by mimic feats of arms here; and here Richard II gave a three days' tournament to celebrate, his mar¬ riage. A more terrible page of history tells of the murders by way of burning which took place here in the name of religion. Bartholo-

mew Fair, so often mentioned in literature, was held at Smithfield. We find mention of a cat¬ tle market having been held here as far back as 1150. The corporation had official control over the market for above 500 years, dating from 1345.

SMITHFIELD (W. Va.), Engagement at.

This place, near the east bank of the Opequon, on the road from Charlestown to Bunker Hill, W. Va., was the scene of many skirmishes and minor engagements during the Civil War, one of which, at least, deserves to be noted. On 28 Aug. 1864, after General Early had recrossed the Opequon from his engagement at Shep- herdstown (q.v.), General Sheridan advanced his army from Halltown toward Charlestown and the Opequon. General Merritt's cavalry division marched by way of Lee Town, attacked Fitzhugh Lee's cavalry at that place and drove it through the village, back through Smithfield and across the Opequon. Next morning Mer¬ ritt crossed the Opequon and was on his way to attack Early at Bunker Hill, when he was met by Early, with the divisions of Ramseur and Gordon and driven back across the Ope¬ quon. There was an artillery duel across the stream and, the Confederate cavalry crossing, Merritt was driven from Smithfield and two miles beyond, in the direction of Charlestown. Early re-established his cavalry east of the Opequon and marched his infantry back to Bunker Hill. Late in the day Ricketts' division of infantry came to Merritt's assistance and drove the Confederate cavalry from Smithfield and across the Opequon and Merritt resumed his position at the Smithfield bridge. The Union loss was about 35 killed and wounded ; the Confederate loss, 10 killed and 75 wounded.

SMITHSON, James, founder of the Smith¬ sonian Institution at Washington: b. Weston, Super-Mare, Somerset, England, about 1765 ;

d. Genoa, Italy, 27 June 1829. His mother at the time of his birth was the widow of James Macie, a country gentleman of an old family. Smithson describes himself in his final will as ((son to Hugh, first Duke of Northum¬ berland, and Elizabeth, heiress of the Hunger-fords of Studley, niece to Charles the Proud, Duke of Somerset.® Smithson seems himself to have observed no reticence about what he thought the true facts of his birth, but the name of Macie appears to have been imposed upon him from his youth by his parents and his feeling that he must create for himself a posi¬ tion which his birth had denied him is per¬ haps a reason for his subsequent bequest to the United States of the means which founded the institution bearing his name which he had later assumed and which was the family name of Sir Hugh Smithson, the first Duke of Northumberland. It cannot but be supposed that something of this kind was in his mind when he wrote ((My name shall live in the memory of man when the titles of the North- umberlands and the Percys are extinct and for¬ gotten. })

Nothing material is remembered of his life at Oxford, where he entered under the name of Macie as a gentleman commoner in 1782, though he appears to have been partly occupied in chemistry, which was the scientific interest of his later life, and this at a time when the study of physical science was almost unknown in the university. He was graduated at Pembroke

College with the degree of master of arts in 1786 and was admitted as a Fellow of the Royal Society in the following year on the recom¬ mendation of Cavendish and other eminent fellows of the Society. Smithson published in all 27 scientific papers, eight in the Philosophical Transactions between 1791 and 1807, one in the Philosophical Magazine and 18 in Thompson's Annals of Philosophy) between 1819 and 1825.

Prof. F. W. Clarke gives the following view of the value of Smithson's scientific work:

<(To theory Smithson contributed little, if anything; but from a theoretical point of view the tone of his writings is singularly modern. His work was mostly done before Dalton had announced the atomic theory and yet Smithson saw clearly that a law of definite proportions must exist, , although he did not attempt to ac¬ count for it. His ability as a reasoner is best shown in his paper upon the Kirkdale bone cave which Penn had sought to interpret by reference to the Noachian deluge. A clearer and more complete demolition of Penn's views could hardly be written to-day. Smithson was gentle with his adversary, but none the less, thorough for all his moderation. He is not to be classed

among the leaders of scientific thought; but his ability and the usefulness of his contributions to knowledge, cannot be doubted.®

An important ore of zinc was named Smith- sonite after him.

That he held a high place among his con¬ temporaries is evident from the fact that the president of the Royal Society in a necrology for the year 1829 associated the name of Smith- son with those of Wollaston, Young and Davy, saying that ((he was distinguished by the inti¬ mate friendship of Mr. Cavendish and rivaled our most expert chemists in elegant analyses.® He was, then, most noted in this connection, and exhibited an industry the more creditable to him, since he was at this time a man of large means. Of Smithson's later life little is known, but his declining years appear to have been tried by painful infirmities. He lived in these years principally in Paris and Genoa and one gathers from his letters and from the uniform consideration with which he speaks of others and from kind traits which he showed, the impression of an innately gentle nature, but also of a man who was renouncing, not without bit¬ terness, the youthful hope of fame.

Smithson's will, dated from London 23 Oct. 1826, is a brief document leaving his property to a nephew and in the case of the death of the nephew without leaving a child, he adds : (<I then bequeath the whole of my property to the United States of America to found at Washing¬ ton, under the name of the Smithsonian Insti¬ tution, an establishment for the increase and diffusion of knowledge among men.®

The will was proved in the Prerogative Court of Canterbury, the value of the effects being sworn to be not over £120,000, a sum much larger in relative importance at the time than it would be now. The money appears to have come from his mother's family; there is, at least, no indication that any portion whatever of the Smithson bequest was derived from his Northumberland ancestry. It is not definitely ascertained why Smithson made the United States his legatee, in which he is not known to have had any correspondent or friend.

Smithson was buried in the little English cemetery on the heights of San Benigno, the remains and monuments in which are now being removed by the Italian government to another location. The regents of the Smithsonian Insti¬ tution, who had caused a tablet to be erected

to him in the cemetery and in the church, on the removal of the cemetery, appointed one of their number, Dr. Alexander Graham Bell, to bring the remains from Genoa to Washington, where they arrived in the early part of 1904 and were later interred on the grounds of the Smith¬ sonian Institution. Consult Rhees, (James Smithson and His Bequest *(in Vol. XXI, Smithsonian Miscellaneous Collections) ; Lang¬ ley, (James Smithson* in (The Smithsonian In¬ stitution, 1846-1896. The History of Its First Half Century > (1897).

S. P. Langley,

Late Secretary, Smithsonian Institution.

SMITHSONIAN INSTITUTION, The,

an establishment at Washington, founded under a bequest of James Smithson (q.v.), couched in the following terms : ((I bequeath the whole •of my property to the United States of America to found at Washington under the name of the Smithsonian Institution an establishment for the increase and diffusion of knowledge among men.®

In 1835, six years after Smithson's death at Genoa, Italy, the United States legation at London was notified that his estate, amounting in value to about £100,000, was held in posses¬ sion of the accountant general of the British Courts of Chancery. President Jackson, in a message to Congress, dated 17 Dec. 1835, noti¬ fied that body and after considerable debate a bill was passed and approved on the 1st of July 1836, authorizing the President to assert and prosecute the claim of the United States to the legacy, which it is well to note was rela¬ tively of greater purchasing power then than now, being greater than the endowment of any university or college in the country except Harvard at that time. The President selected as agent Richard Rush of Pennsylvania, who proceeded to London and entered a friendly suit in the Courts of Chancery, which was settled in two years. For eight years the matter was discussed in Congress, until on 10 Aug. 1846 an act which had passed both Houses was approved by the President, in terms so broad as to allow for any future development of the institution along any lines of intellectual ad¬ vancement.

System of Administration. — The establish¬ ment consists of the President of the United States, who is the presiding officer ex officio ; the Vice-President, the chief justice of the United States and the members of the Cabinet. In addition to the establishment, there is pro¬ vided a board of regents, by whom the business of the institution

is administered, composed of the Vice-President of the United States, the chief justice of the United States, three mem¬ bers of the Senate, three members of the House of Representatives and six citizens, two of whom must be residents of the District of Columbia, and the other four from States of the Union, but no two from the same State. The senatorial regents are designated by the president of the Senate and those representing the House by the speaker of the House, the others being elected by Congress with the ap¬

proval of the President. There is a secretary to the establishment, who is also secretary to the board of regents. Both the Congressional and citizen regents have been selected from among the most distinguished Americans and the roll of them for 50 years contains the names of many eminent public men and scholars. The regents elect three of their number as an exec¬ utive committee. The presiding officer of the regents is the chancellor and is elected by the board, though the position is customarily held by the chief justice. The secretary of the in¬ stitution, whose office is created by the funda¬ mental act, is elected by the regents and is the executive officer of the institution. He is aided in his work by the assistant secretary, by the heads of the various bureaus of the institution and by a large corps of scientific men.

The institution occupies a building in the Mall, in the square known as the Smithsonian Park. It was planned by James Renwick, was begun in 1847 and completed in 1855.

The first secretary was Joseph Henry, dis¬ tinguished in science for his epoch-making dis¬ coveries. It fell to his lot more than it could to any of his successors to determine what form the institution should take and his (<Programme of Organization,® adopted at the outset by the board of regents as the governing policy, has been found broad enough for all future time. Upon his death he was succeeded in 1878 by Spencer Fullerton Baird, the leading authority on the natural history of America, and the founder of the United States Fish Commission, and upon his death in 1887 Samuel Pierpont Langley was elected, to be succeeded by Charles D. Walcott. The terms of each of these men have been marked by some special feature — Henry developed the system of international exchanges and that of meteorological observa¬ tions, which has since become the Weather Bureau; Baird devoted himself to the develop¬ ment of the Museum, secured the erection of a Museum Building, gave much attention to explorations and, as United States Commis¬ sioner of Fish and Fisheries, secured the con¬ struction of the exploring ship Albatross, which has been of such great advantage to American science. In the

term of Langley, the National Zoolcˆgical Park and the Astrophysical Observa¬ tory were established, and a new building au¬ thorized for .the. National Museum. Langley's special contribution was in the demonstration of mechanical flight by a machine heavier than the air, propelled by its own power. ((Langley Field,® devoted to experiments in aviation, was established near Hampton, Va., as a direct result of his researches. The recent activities of the institution covered geological explora¬ tions in the Canadian Rockies by the present secretary, palaeontological research in the Appa¬ lachian and Ohio valleys by Dr. R. Bossier and Mr. C. Resser, and in Florida by Dr. Sellards and Dr. Hrdlicka. Extensive biological and botanical work was carried on in Cuba, Haiti, the Hawaiian Islands, China, Santo Domingo and Celebes. A botanical station was also es¬ tablished at Jamaica, devoted to the study of West Indian specimens. In 1917 an expedi¬ tion under Collins and Garner left to explore the French Kongo and adjacent territories.

National Research Council.— This body was organized in 1917 and consists of scientists devoted to research. After the declaration of

A«\

d

fi

war by the United States, this council was called upon to co-operate with the Council of National Defense, and several of its committees were given special accommodations under the latter council : notably the committees of chem¬ istry, engineering, medicine, hygiene, physics, agriculture and psychology. A foreign service committee was also organized as a (<direct aid in acquainting investigators in this country with the scientific problems which have been con¬ fronted both in military and industrial pur¬ suits in England and France.®

Objects of the Institution. — The broad purposes of the institution are

named in the words of the founder — ((for the increase and diffusion of knowledge among men.® This was interpreted by Henry in the following words: <(To assist men of science in making original researches, to publish them in a series of volumes, and to give a copy of them to every first-class library on the face of the earth.® It has supplied apparatus, made grants for experiments and furnished information to many thousands of persons. The institution also maintains a table at the biological station at Naples. It initiated, from the income of its own fund, all of the activities imposed upon it by the fundamental act, though as these gradually grew beyond this income, they were greatly aided by appropriations from Congress, through which the various bureaus are at pres¬ ent maintained.

Publications. — There is no restriction as to the subject of publications, and they consist of memoirs upon archaeology, astronomy, eth¬ nology, botany, zoology, geology, palaeontology, meteorology, magnetics, physics, physiology and philology and many other branches of investi¬ gation. They cover the following series: (1)

(Annual Report of the Regents to Congress.' Since 1884 the (Report of the Museum' has been printed in a separate volume, Part II. (2) (The Smithsonian Contributions to Knowl- edge) ; (3) (The Smithsonian Miscellaneous Collection,' 28,000 pages. A (Quarterly Is¬ sue } of this series was begun in 1903. The foregoing publications are maintained at the expense of the original fund; (4) (The Bul¬ letins of the National Museum, ' 52 in num¬ ber, beginning in 1875; (5) (The Proceedings of the National Museum,' beginning in 1878. (6) (The Annual Report of the Bureau of American Ethnology, ' beginning in 1879; (7) (The Bulletin of the Bureau of American Eth- nology) ; (8) (The Annals of the Astrophysical Observatory' ; (9) (Reports of Historical and Patriotic Societies.' In 1897 a royal octavo volume containing the history of the first half century of the institution was published.

Library. — The publications noted above have been, since the beginning, distributed through¬ out the world, mostly to scientific and literary establishments and libraries; and in return the institution has received the publications of like organizations, forming a collection of books which in the departments of publications of learned societies and periodicals is one of the richest in the world. In 1865 the library was deposited with the Library of Congress and is now installed in a special hall upon the second floor of the new Library building. A working library of some 30,000 volumes has gradually grown up in connection with the institution and its dependencies. Much attention was given to

cataloguing and bibliography by the first assist¬ ant secretary of the institution, Charles C. Jewett. Henry likewise was greatly interested in this subject, and it was due to his initiative that the Royal Society of London took up its catalogue of scientific memoirs, which has since developed into the International Catalogue of Scientific Literature. For this latter work the Smithsonian Institution is the representative of the United States. In addition to the main Smithsonian Library, smaller collections are maintained in the various branches of the in¬ stitution and 35 sectional technical libraries in the various offices for the use of the scientific staff.

The collection of objects of art was one of the original purposes of the institution, though it has been to some extent held in abeyance. The valuable collection of prints and art books of George P. Marsh was, however, purchased, and a room devoted to prints and art books is set aside in the Smithsonian building.

National Museum. — The Smithsonian In¬ stitution is the only lawful custodian of <(all objects of art and of foreign and curious re¬ search, and all objects of natural history, plants and geological and mineralogical speci¬ mens belonging, or hereafter to belong, to the United States, which may be in the city of Washington." Out of this provision in the fundamental act there grew the National Mu¬ seum. See LTnited States National Museum.

International Exchanges. — The system of international exchanges, begun in 1850, was de¬ signed for a free interchange of publications between men of science in various parts of the world. It established a body of correspondents which now numbers nearly 44,000, mostly abroad. In 1867 Congress assigned to the insti¬ tution the duty of exchanging for the benefit of the Library of Congress 50 sets (a number since increased to 100) of all government pub¬ lications, and in 1889 a treaty was entered into between the United States and other countries, in which this entire matter of exchange of sci¬ entific and government publications was fixed. This branch of the service, while not having a large space in the public eye, has been of great convenience to scientific men, of use in devel¬ oping the libraries of this country, and indi¬ rectly has stimulated scientific research and publication, since by relieving scientific socie¬ ties and individuals of the expense of exchang¬ ing their own publications, it has set large sums of money free for research. During the war in Europe it became necessary to suspend ship¬ ments to about 10 countries.

Bureau of American Ethnology. — This bu¬ reau is an outgrowth of researches beginning early in the history of the institution, whose first

publication in the series Contributions to Knowledge' was on (Ancient Monuments in the Mississippi Valley,' by Squier and Davis. In its present form the work of the bureau was commenced in 1872 by Maj. J. W. Powell, at the request of the Commissioner of Indian Affairs, who desired trustworthy information concerning the affinities of the Indian tribes. In 1879 the bureau was definitely organized under the direction of the Smithsonian Institu¬ tion, and Major Powell was made director, serving in that capacity until his death in 1902. The bureau has engaged in researches in the languages, habits, customs, tribal organizations,

government, myths and ceremonies of the American Indians, and it is proposed to sum- marize this material in a cyclopedia of Amer¬ ican Indians. It has also issued the voluminous publications already alluded to, which contain information of importance with regard to the political dealings of the United States -govern¬ ment with the Indian tribes. In addition, re¬ searches are conducted among the natives of Hawaii.

Astrophysical Observatory. — The Astro-

physical Observatory was established in 1890 under the immediate direction of the present secretary. It has been devoted, in the main, to researches in regard to that invisible portion of the solar spectrum which lies beyond the limit of the red. This work, first rendered possible by Mr. Langley's invention of the bolometer, has been carried still further, resulting in a great map of the infra-red solar spectrum com¬ pleted in 1899, which extends our knowledge of the spectrum to many times that known to Newton. It is believed that these studies will prove of great practical importance, since they have to do with that region of the spectrum which includes the greater portion of the en¬ ergy of the sun, which through its heat affects climate and crops. Important expeditions were sent out in 1900 and 1901 to observe the total solar eclipses of those years, and especially valuable results were obtained at that of 1900, including photographs of the solar corona of unexampled size and excellence. An expedi¬ tion was planned to enlarge the work of meas¬ uring solar radiation, by establishing a station in South America. Owing to war conditions this has been stationed temporarily at Hump Mountain, N. C. (1917).

National Zoological Park. — The National Zoological Park was

established by Congress in 1890 at the initiative of the present secretary, to secure the preservation of such American animals as are upon the verge of extinction, and also for the pleasure and instruction of the people. The park is situated upon Rock Creek, two miles north of the centre of the city, and has an area of 167 acres, being four times as large as the Zoological Garden at London. It is amply supplied with water, and its surface is of a varied and picturesque character. The col¬ lection comprises 1,225 animals, mostly Ameri¬ can species. A hospital and laboratory were established in 1917.

Summing up what has been said about the Smithsonian Institution, we see that it occupies the exceptional position of a ward of the gov¬ ernment, its regents expending its own income, which is largely supplemented by direct govern¬ ment grants for its museum and other bureaus ; while through its extended system of publica¬ tions, its library and its means for encouraging research and diffusing knowledge, through a body of over 30,000 correspondents abroad and approximately half that number at home, it occupies its actual place in the scientific activi¬ ties of the day.

Consult (The Smithsonian Institution, 1846- 96, the History of its First Half Century, > edited by George Brown Goode; and subsequent Annual Reports.

SMITHSONITE, in mineralogy , native carbonate of zinc (ZnCOa). It crystallizes in rhombohedral system with perfect cleavage, and is found also in reniform botryoidal and

stalactitic masses ; and again granular to com¬ pact massive or earthy. In this latter form it is impure and varies from grayish-white to dark gray-brown, brownish-red or brownish- black, and is known as ((dry bone® by American miners. In the purer forms it has a vitreous lustre inclining to pearly with the color varying from white to grayish, greenish or brownish, a white streak and a translucent to almost trans¬ parent character. Its hardness is 6 per cent the scale, and its specific gravity 4 to 4.45. In the United States it occurs in New Jersey, near Franklin Furnace, Pennsylvania, Wisconsin, Minnesota, Missouri, Arkansas and other States. The name is also sometimes applied to calamite (H-jZmSiOs), which is a yellowish or brownish zinc silicate, and an important ore.

SMITHWORK. See Metal Work.

SMOCK, John Conover, American geol¬ ogist: b. Holmdel, N. J., 21 Sept. 1842. He was graduated at Rutgers College in 1862 and later

studied at the Mining School, Freiburg, and at the University of Berlin. Since 1871 he has been professor of geology at Rutgers. He was connected with the geological survey of New Jersey in 1864-85; was State geologist in 1890-1901 ; and in 1901-15 he was a member of the board of managers of the New Jersey Geological Survey. Author of (The Climate of New Jersey *(1881); (Building Stone in New York* (1888) ; (Geological Survey of New Jersey* (Vols. Ill, IV), etc.

SMOHALLA, shmo'ha'la (correctly Shmo- Qˆla, (<The Preacher®), American Indian prophet and religious leader: b. about 1815; d. 1907. He was of the Sokulk tribe, cognate to the Nez Perces, and living near the Priest Rapids on the Columbia River in eastern Wash¬ ington. He early received religious instruction at a Roman Catholic mission, afterward be¬ came a warrior and about 1850 began to preach. He then wandered away from his people, reached as far south as Mexico and returned through Nevada. He announced upon his re¬ turn that he had been absent in the spirit world and had returned with a message. The Indians were commanded by the Great Spirit to return to their native manner of living, have no dealings with the whites, retain their land and live according to the will of the Great Spirit as revealed by Smohalla, who received such communications while in a trance. The cult became known as the ˆDreamers® and gained a great following, including Chief Joseph and his tribe, the Nez Perces, and eventually became sufficiently strong to inter¬ fere with government reservation rulings. In¬ vestigations were made in 1870 and again in 1884 with a view to keeping the Dreamers within legal bounds.

SMOKE, the exhalation, or visible vapor

that arises from a substance burning. In its more extended sense the word smoke is applied to all the volatile products of combustion, which consist of gaseous exhalations charged with minute portions of carbonaceous matter or soot ; but, as often used in reference to what are called smoke-consuming furnaces, the term is frequently employed to express merely the carbonaceous matter which is held in suspension by the gases. The flames from burning metallic substances are also called smoke. With forced

draft there is a great deal of waste in smoke, and engineers have given great study to the problem of reducing such waste, and wholly consuming the fuel, especially coal. A variety of contrivances, known

as smoke-consumers or smoke-burners, have been introduced for this purpose. (See Smoke Nuisance). When the U-boats began to be dangerous to shipping, navigators turned their attention to means of producing a very thick and heavy smoke, which would screen a vessel from observation, and render it impossible for an enemy to aim with accuracy, not knowing where within the smoke their target was located.

SMOKE (). Although Turgenief usually spent a part of every year in Russia, his home from 1863, the year following the publication of (Fathers and Sons,* was in Baden-Baden until 1870. He was so disap¬ pointed by the harsh criticisms of his novel, by the way it was misunderstood and by the consequent coldness of former friends that he even contemplated abandoning literature. But in 1867 <Smoke) appeared in the Rnssky Vyestnik, again arousing great animosity and bringing against him charges of caricaturing the young generation, and of insulting his own country. Some thought that its satire was an act of revenge. The scene is laid at Baden- Baden, whither come the various characters, always chattering, without, as he expresses it, a single word of sincerity, a single intelligent thought, a single new fact amid all the in¬ coherencies ; with no enthusiasm, no genuine pas¬ sion but pseudo-civic indignation, pseudo-scorn¬ ful indifference. The leading character, Grigory Mikhailovitch Litvinof, of decent family and moderate means, is in Baden awaiting ˆ the arrival of his cousin, Tatyana Petrovna Shestova, who is to be his wife. Litvinof is discovered by a Moscow acquaintance, who insists on introducing him to every Russian in Baden, and this enables Turgenief to indulge in his bitterest satire. Litvinof encounters his former fiancee, Irina Pavlova, now married to General Ratmirof. By the time Tatyana Petrovna arrives, Irina has succeeded in throw¬ ing her malign fascination upon him. He breaks with his cousin, and is ready to elope with Irina, but their plan fails, and he leaves Baden-Baden competely disillusioned. As the train bears him away, the smoke and steam from the engine drift by the window, now hiding the landscape, now giving a glimpse of gray skies and the misty Rhine Valley: ((He was alone in the carriage, with no one to in¬ terrupt him. (Smoke! smoke P he said to him¬ self several times. And suddenly everything seemed to him to be smoke — everything, his own life, everything human, especially every¬ thing Russian. Everything is smoke and steam,) he thought, < everything seemingly goes through constant change ; everywhere there are new forms, phenomenon succeeds phenomenon, but in reality all things are exactly alike ; every¬ thing is rushing to some unknown end and everything vanishes, leaving no trace. . . .w And as he recalls the heated arguments, the futile chatter of his expatriated

fellow-country¬ man, he realizes that his own aspirations and feelings are merely smoke like everything else.

The interest of the story centres on Irina, who is typical of the brilliant unscrupulous man-

chaser, cold and calculating, the Vampire of Society, made so by her environment and by false education. Litvinof is pallid in compari¬ son with Bazanof and not so fresh and charm¬ ing as Arkady. The other characters are in¬ dividual, but none of them is interesting except as illustrating the ebullient Russians of the early sixties. (Smoke) was translated into English under the title (Smoke, or Life at Baden) (anonymous, London 1868) ; by W. F. West from the French version (1873). It is also in the five-volume edition of Turgenief's <Works) (London 1874-75). It is to be found in Mrs. Constance Garnett's complete edition of the works from the Russian in 15 volumes (London 1894-99), and in Miss Isabel Hap- good's version (New York 1904), also from the original. None is very satisfactory as representing the literary perfection of the author's style.

Nathan Haskell Dole.

SMOKE-BALL, a ball filled with a slow- burning composition, that emits a dense smoke, used by the navy to blind an enemy and mislead their fire.

SMOKE NUISANCE. Various measures have been taken both in England and the United States to overcome the evil effects of soft coal smoke, especially in large cities. In 1875 a Public Health Act was passed in England to prevent nuisance from smoke in towns which provided that all fireplaces, furnaces and chim¬ neys (exclusive of the chimneys of a private dwelling) must be so constructed as to consume their smoke, under a penalty not exceeding $25 nor less than $10, on a second conviction $50. Similar laws apply to railway locomo¬ tives and river steamers. In the United States various laws have been passed by State legis¬ latures and ordinances by municipal bodies. But these enactments have only been partially successful. There are many practical difficulties in the way of consuming smoke, but experience has shown that none of them are insuperable. The principle involved is that of mixing air with the combustible vapors and gases gener¬ ated by the action of heat on the fuel, so that by virtue of a due supply of oxygen at the correct temperature they may be made to burn with flame, and become entirely converted into incombustible and invisible vapors and gases. The increased use of gas and electricity tends toward a solution of the problem in cities. Consult Popplewell, (

Consumption of Smoke) ; Mellon, (Smoke Investigation Bulletins* (Pitts¬ burgh 1912, 1913, etc.) ; Barr, W. M., (The Com¬ bustion of Coal and the Prevention of Smoke) (New York 1913).

SMOKE-STACK, a stack or funnel, usu¬ ally of sheet steel, placed on boilers, locomo¬ tives, etc., to carry off the gases .of combustion. Also the tall draft-chimney of a factory, smelter, etc.

SMOKE-TREE, an arborescent shrub (Cotinus , or Rhus cotinus) indigenous to Eu¬ rope, and also called Venetian Sumach ; or the similar American species (Cotinus cotinoides) . They are shapely, tall and much branched and have oval leaves and terminal, large, loose panicles of greenish, polygamus five-parted flowers. These are chiefly abortive, and the

long pedicels become very plumose in fruit, and seem to smother the plants as by smoke, with their feathery soft masses, which are pale green or reddish in hue. The soft orange- colored wood yields a valuable dye-stuff called young fustic, and the leaves of the European species are used in tanning. Other names are the mist-tree and smoke-plant.

SMOKELESS POWDERS are the mod¬ ern explosives which have replaced black gun¬ powder for use as propellents in guns. Such powders are styled smokeless because they give rise to comparatively little smoke when fired. This is due to the fact that the products of their combustion are practically all gaseous at the temperature of explosion. Black gun¬ powder gives rise to much smoke when fired because 57 per cent by weight of the products of its combustion form solid matter on cooling and, therefore, precipitate rapidly out of the atmosphere. While smokelessness or smoke- weakness offers, for many military purposes, the distinct advantage that it permits of a clear atmosphere being maintained during an engage¬ ment ; that it delays the enemy in locating the spot from which a shot was fired; and that such powders do not readily foul the bores of the guns in which they are used, these modern powders possess the still more important ad¬ vantage that weight for weight, they are much more powerful than black gunpowder. In con¬ sequence of this we not only by their use are able to impart higher velocities to our pro¬ jectiles and thus secure flatter trajectories, greater ranges and better penetrations than were before possible, but the soldier or the ammunition wagon now

carries less weight for the same number of rounds of ammunition or a greater number of rounds <of ammunition for the same weight. The earliest experiments with smokeless powder were made by the Eng¬ lish chemist, Howard, in 1800, when he tested the properties of his newly-discovered mercuric fulminate and found that though this violent agent produced little smoke, imparted a low velocity to the projectile and but a slight recoil to the piece, it burst the chamber and demon¬ strated its unfitness to compete with gunpowder as a ballistic agent, though it has found a limited use, when mixed with solid diluents wrhich act as restrainers, in ammunition for parlor rifles, and it is noticeable that when firing this ammunition there is little smoke and a scarcely audible report attending the dis¬ charge.

The next step was taken when, soon after the discovery of guncotton, in 1845, attempts were made to use this material, in its fibrous condition, as a propellent. These experiments were made in Germany, France and England, while a very extended series were carried on by Major Mordecai of the United States army, at the Washington arsenal ; but the material, owing to its fibrous form and the imperfection in its manufacture, proved too brisant and too irregular in action and it was so unstable as to undergo dangerous decomposition in storage so that it was not adopted. The material had, however, been proved to possess so many valu¬ able qualities that it continued to be the subject of study by many chemists and especially Baron von Lenck of Austria and Sir Frederick Abel of England, the latter devising a method of

purification by reducing the guncotton to a pulp or dust. Besides affording a means for the better washing of the guncotton this pulverulent condition permitted of the dust being formed into grains and a patent was issued to Abel jn 1866 for the production of powder by agitating this pulp in a vibrating vessel, with or without a binding material, whereby the pulp was formed into granules of different sizes which were subsequently sorted. The grains thus pro¬ duced were quite soft, easily crushed when dry and readily absorbed water. In 1882 Reid and Johnson of England improved the process by moistening the dried grains with a volatile solvent which on evaporation left the surfaces s.o hardened as to better resist crushing and the absorption of water from the atmosphere. During this time superficially hardened soft grained powders composed of mixtures of dif¬ ferent cellulose nitrates or nitro-lignins to¬ gether with unnitrated material and nitrates such as sodium or barium nitrates came into use as smokeless sporting powders under the names among others of Schultze, E. C., Brackett's, J. D., and American Wood powders. These powders were, from the method of their manufacture,

quite bulky and are, therefore, also classified as bulk powders.

In 1886 Vielle in France produced the first military smokeless powder of the modern class, by gelatinizing a mixture of cellulose nitrates only, or these mixed with barium and potas¬ sium nitrates as oxidants and sodium carbonate as a neutralizer, with ether-alcohol or some other solvent. When the solids and the solvents were intimately mixed and gelatinization was complete the plastic mass was rolled out into sheets, cut into strips and dried, by which a dense powder, which was hardened throughout, was produced. This powder was styled Poudre B when it consisted of cellulose nitrates only or Poudre BN when it consisted of these nitrates mixed writh the .inorganic salts named above. In 1888 Nobel in France discovered that by the aid of camphor or benzine he could effect the solution of as much as 40 per cent of nitro-cotton in nitroglycerin, forming a plastic mass which when rolled out into sheets and dried formed a mass resembling india rubber. This was cut in blocks or strips or flakes and was known as ballistite. As adopted in Italy the plastic mass was squirted through spaghetti machines forming cords which were cut into the desired length and the powder in this form was known as Filite.

In 1889 Abel and Dewar in England made a plastic mass from nitroglycerin, nitro-cotton, guncotton and tannin, dextrine or vaseline, and as it was made up into cords, it was called Cordite. In making this powder the gelatiniza¬ tion was effected by using acetone as a solvent, the mixture being kneaded to a dough in a wa¬ ter- jacketted kneading machine. The gelatin¬ ized mass was compacted in a mold by a prelim¬ inary press, and the mold transferred to a spa¬ ghetti machine, or stuff press, where the explo¬ sive was squirted into strands. As these strands issued they were reeled on bobbins which were placed in the drying house so as to drive off the solvent. When dried the product of 10 pressings was wound from 10 one- strand reels on to one 10-strand reel and then the cordite on six 10-strand reels was wound on

a drum making a cord of 60 strands, which when cut in short lengths formed the 30.5 grains charge for the magazine rifle. For higher calibres the cords as squirted were of larger diameter and were cut into desired lengths as they issued from the stuff press, dried and

made up into bundles or fagots. Cordite is an elastic rubber-like mass with a light to dark brown color. Other nitroglycerin- cellulose nitrate powders are amberite. Maxim's powder, Maxim-Schupphaus powder, Leonard's powder, P. P. G., Peyton's powder and German smokeless powder. These powders differ in the proportions of their ingredients or in containing blended cellulose nitrates, or else castor oil or lycopodium or urea in addition to the other ingredients or they differ in the form of the grain. Thus Maxim perforates his grain, mak¬ ing it a tube, or he makes several longitudinal perforations, getting <(multiperforated grains,® while Gathmann cuts slots in the sides of the multiperforated grain to serve as vent holes through which the gases accumulated in the longitudinal canals may escape, and the breaking up of the grains by the accumulated pressure be prevented.

In 1890 Richard von Freeden of Walsrode, Germany, discovered that gelatinized cellulose nitrate if immersed in water underwent a kind of coagulation and division into small lumps which latter was promoted by stirring, and he based upon this a method of manufacture by which dense small grained powders that are hardened throughout could be produced. This product is known as Walsrode powder. Later Dupont accomplished the same result by throw¬ ing his pulped cellulose nitrate into a churn containing the gelatinizing solvent mixed with a large volume of water and containing potas¬ sium and barium nitrates in solution, and thus produced the Dupont smokeless powder. Sim¬ ilar to these, and likewise used for sporting purposes, are the Oriental and Hazard smoke¬ less powders. In 1890 Charles E. Munroe pointed out that all powders, either gunpowders or smokeless powders made up to that time, consisted of mixtures of different materials, even the straight cellulose nitrate powders being made of mixtures of different nitrogen contents, and he set forth the novel principle of powder making that the finished powder should consist of a single chemical substance in a state ot chemical purity and this was realized in the smokeless powder which he styled Indurite and which was popularly known as United States Naval smokeless powder. As made it consisted only of cellulose nitrate of the highest nitration in an indurated condition and resembled ivory. It was made in the form of flakes for small arms and in the form of macaroni for large calibres. The smokeless powder for the United States navy and army as made to-day consists of cellulose nitrate of medium nitration, gelatinized with ether-alcohol, a small per¬ centage of diphenylamine being incorporated to serve as a stabilizer, the ether-alcohol evaporated and the plastic mass made into perforated cylindrical grains which are trans¬ lucent and the color of amber. Because of the shortage of cotton during the Great War pulp wood was resorted to as a source of

cellulose for smokeless powder, and very satisfactory powder was made from it in the United States and Germany.

Flashless Powder. — When smokeless pow¬ der is fired it gives a much more brilliant flash than ordinary gunpowder does and therefore when discharged after dark the position of a piece may be located by this flash. Because of the superior intensity of sunlight this flash is not ordinarily perceived by the naked eye dur¬ ing daylight but during the Great War light screens have been devised by which to sift out this flash light from the sun light so as to locate the gun. To defeat this chemicals have been introduced into the powder by which to reduce or obscure the flash. The sodium and potas¬ sium resinates were so used but amids and carbonates have been found still more efficient.

Progressive Smokeless Powder. — With in¬ creasing calibres and lengths of guns it be¬ comes of increasing importance to secure a progressive rate of burning of the powder grains so that after the projectile has been moved from its seat it shall be given a con¬ stantly increasing acceleration as it traverses the chase. The powder grains are perforated and their density varied with a view of securing this result but, since with large calibres these are insufficient, the coating of the grains with restraining substances has been resorted to, very good results having been obtained _ with dimethyl-diphenyl-urea which substance is for convenience styled ((Centralite.55

Bibliography. — Longridge, (Smokeless Pow¬ der and Its Influence on Gun Construction5 (1890) ; Moch, (La poudre sans fumee et la tac- tique) (Paris 1890) ; Rigg and Garvie, <Modern Guns and Smokeless Powder5 (1892) ; Pou- teaux, (La poudre sans fumee et les poudres anciennes) (Paris 1893) ; Guttmann, (The Man¬ ufacture of Explosives) (1895) ; Munroe, de¬ velopment of Smokeless Powder5 (1896) ; Ber- nadou, (Smokeless Powder, Nitrocellulose and Theory of the Cellulose Molecule5 (1901) ; Daniel, (Dictionnaire des matieres explosivs5 (Paris 1902) ; Worden, (Nitrocellulose Indus¬ try5 (New York 1911) ; Weaver, <Military Ex¬ plosives5 (New York 1917) ; Marshall, Ex¬ plosives5 (Philadelphia 1917); Guia, (Chimica delle sostanze esplosive5 (Milan 1919).

Charles E. Munroe.

SMOKY HILL RIVER, or SMOKY HILL FORK, the source is in eastern Colo¬ rado and it flows into the State of Kansas through Wallace, Logan, Gove, Trego, Ellis, Russell, Ellsworth, McPherson and Saline counties. About 10 miles west of Abilene unites with the Solomon

River and forms the Kansas River. It is over 500 miles long and traverses a prairie region noted for its fertility.

SMOKY MOUNTAINS, or GREAT SMOKY MOUNTAINS, on the boundary of North Carolina and Tennessee; a part of the Appalachian system, about 50 miles in length and 25 to 50 miles west of Asheville, N. C. The highest peaks are Mount Guyot, 6,636 feet high and Clingman's Peak, 6,660 feet high. This mountain is the scene of one of Mary Noailles Murfree's (q.v.) stories, (The Prophet of the Great Smoky Mountain.5 The region is highly picturesque and nearby towns are favorite winter resorts.

SMOKY QUARTZ, a smoky-yellow to brown and black variety of the mineral quartz. It is often transparent and then yields gems of considerable beauty. Cairngorm (q.v.) is a yel-

lowish variety. Morion is nearly black. The crystalline smoky quartzes include many fa¬ miliar gem stones, as bloodstone, agate, jasper, carnelion, chalcedony, onyx, etc. Magnificent crystals weighing as much as 250 pounds have been found in Switzerland ; very choice crystals, sometimes of large size, occur in Maine, North Carolina, Montana and Colorado.

SMOLENSK, smo-lensk', Russia, (1) Capi¬ tal of Smolensk, on the Dnieper, about 250 miles west southwest of Moscow. It occupies steep slopes, rising from the river's edge and is surrounded on the left bank by a wall; on the right bank by earthworks. A large open square occupies the centre of the town. There is a cathedral of the 17th and 18th centuries, on the site of an earlier structure that was blown up in the Polish siege of 1611; also an episcopal palace, seminary, gymnasium, schools, three public libraries, a museum containing valuable antiquities, theatre and several philo¬ sophical and scientific societies. It has manu¬ factories of linen, leather, hats, carpets and soap. Trade is chiefly in corn and hemp. Smo¬ lensk was an important town in the 9th cen¬ tury; a strong fortress in the 14th century and in 1812 was taken from the Russians by Napoleon and destroyed by fire. Pop. 71,311. (2) The government organized early in the 11th century and a part of Lithuania in the 1 5th century, has been Russian since 1654 and now contains 21,632 square miles. It is largely covered by

forests. The Dnieper River has its headwaters here and there are numerous streams flowing both north and south. Rye and oats are the chief cereals, flax and hemp are grown extensively, also potatoes. The mining of phosphorite is an important industry, and also the manufacture of lumber and paper. Swine are raised. Pop. 2, 050,200.

SMOLENSKY, smo-lyen'ski, or SMO- LENSKIN, Perez, Russian Hebrew author and nationalist : b. Monastyrshchina, govern¬ ment of Mogilov, Russia, 25 Feb. 1842; d. Meran, Austria, 1 Feb. 1885. He early gained a knowledge of modern Russian and Hebrew literature and eventually abandoned orthodox Judaism in favor of Jewish nationalism. He traveled throughout Europe studying the prob¬ lems of the Jews and striving to arouse the people of his race to the desirability of their being united politically. He argued the Messianic era to mean the political and moral emancipation of the Jews. In 1868 he estab¬ lished at Vienna a weekly periodical Ha-Shahar (ˆDaybreak”) in which he expressed his views. He was deeply interested in the colonization of Palestine in 1880 and was bitterly disap¬ pointed at the antagonism manifested toward it by the Alliance Israelite Universelle. He was author of much miscellaneous matter and of several novels dealing with Jewish life, of which the most important is (’Am ’01am) (1873), which contains the outline of the Jew¬ ish Nationalist movement.

SMOLLETT, Tobias George, English novelist: b. near Dumbarton, Scotland, 1721; d. near Leghorn, Italy, 17 Sept. 1771. He be¬ longed to a family of Scotch lairds seated at Bonhill, near Dumbarton, in the picturesque valley of the Leven. His grandfather, Sir James Smollett (1648-1731) represented Dum¬ barton in the old Scots parliament and helped

frame the act of union with England in 1707. The laird’s youngest son, Archibald, weak and improvident, married Barbara Cunningham, a proud and ill-tempered woman with little or no fortune. Of this marriage were born three children, of whom the last, Tobias George, was christened on 19 March 1721. Two years later the boy’s father died, leaving wife and children to the charity of the old knight. After the usual schooling at Dumbarton, the future novelist was apprenticed to John Gor¬ don, a physician and apothecary at Glasgow, and was permitted at the same time to attend lectures at the university, where he seems to have learned his Latin and Greek. In his 18th year he wrote a play called (The Regi¬ cideˆ based like Rossetti’s (King’s Tragedy, > upon the murder of the first James of Scotland.

In 1739, Smollett set out for London, tragedy in pocket, to make his

fortune by litera¬ ture. The play was submitted by Lyttelton, the patron of letters, by whom it was perhaps passed on to Garrick. But it never reached the stage, for which it was ill-adapted, notwith¬ standing the author's loud denunciation of those who thought so. Smollett now entered the navy as a surgeon's mate and took part in the ex¬ pedition under Admiral Vernon against Car- thagena and the sea power of Spain in America. While at Jamaica, he fell in love with a beautiful creole, Nancy Lascelles, daugh¬ ter and heiress of an English planter, whom he married then or after his return to London. In 1744 he settled in Downing street and began the practice of surgery. From time to time he wrote odes and satires. His (Tears of Scot¬ land, } occasioned by the cruelties of the Eng¬ lish at the battle of Culloden, awakened popu¬ lar sympathy for (At the same time appeared Smollett's translation of (Gil Bias.1* A trip to France furnished material for (Peregrine Pickle) (1751), containing attacks so brutal on Lyttelton, Garrick, Akenside and Fielding, that the author modified or cut them away for a second edition.

In 1750 Smollett obtained the degree of M.D., from the University of Aberdeen and tried to establish himself at Bath. Failing in this last attempt to gain patients, he returned to London and took an old Elizabethan man¬ sion at Chelsea. Here, during the next 10 years he performed, single-handed or by the aid of assistants, an enormous amount of work. The mills never stopped grinding. The Ad¬ ventures of Ferdinand Count Fathom* (1753) was succeeded by a translation of (Don Quixote > (1755) and a Compendium of Voy- ages) (1756) in seven volumes. A play called the (Reprisal or the Tars of Old England) Garrick brought out for him at Drury Lane early in 1757. For a complete (History of Eng¬ land in five volumes (1757-58) he required only 14 months. Revised, enlarged and issued in sixpenny parts, Smollett's history threatened

to drive Hume out of the market. Under Smollett's supervision appeared also (The Pres¬ ent State of All Nations) (1764) in eight vol¬ umes and a translation of the entire works of Voltaire. On the founding of the Critical Re¬ view in 1756, he assumed the editorship. For this monthly he wrote many slashing articles, one of which led to a short imprisonment for defamation of character. He also edited The British Magazine, where first appeared as a serial his (Adventures of Sir Launcelot Greaves) (1762). This manner of publication was an innovation. Smollett's work as editor closed with the short-lived

Briton (1762), an organ of the Tory party.

Under the pressure of work and grief for the loss of a daughter, Smollett's health broke down. The years 1762-65 were passed with his wife on the Continent, mainly in southern France and Italy. On his return he published a book of (1766), which, despite Sterne's ridicule of it in the (Sentimental Journey,5 displays much common sense. The <Travels) out of the way, Smollett visited Edinburgh, where his mother was still living, and then went to Glasgow, and the roman¬ tic scenes of his childhood. A brief sojourn at Bath for Christmas (1766) and Smollett was back in London at his desk, writing (The History and Adventures of an Atom5 (1769), a savage satire on English politics since 1754. Completely broken in health after this effort, he hastened to Italy, where he settled in a villa near Leghorn. There he wrote his last novel, (The Expedition of Humphry Clinker5 (1771), based upon his recent tour of England and Scotland and planned, it would seem, while at Bath. He saw it in print but never lived to know of its great reception. He died 17 Sept. 1771 and was buried in the English cemetery at Pisa. Two years after his death appeared his characteristic (Ode to Independence.5 His wife, to whom he was fondly attached, remained at Leghorn, where she died in some distress about 1785.

Smollett was a man of rugged honesty. His irritable temperament, about which so much has been written, showed itself in his books rather than in his intercourse with friends. Visitors at Chelsea were surprised at his ((pol- ished and agreeable manners and the great urbanity of his conversation.55 His cynicism had the saving grace of humor. When he be¬ gan his (History of England,5 he was a Whig; but he turned Tory during the process of com¬ position, as the Whig ministers, on close exam¬ ination, proved to be ((a set of sordid knaves.55 His histories, compendiums and translations, though good narrative, have no further value. As a novelist, he seems, on first sight, to have added nothing to the art of fiction. Instead of beginning with Richardson and Fielding, he went back, as he said himself, to the loose narrative of Le Sage, which admitted of digres¬ sions and episodes, without number. For a consideration, he incorporated into (Peregrine Pickle5 the memoirs of a notorious lady of quality. He held too closely, it is said further, for the highest art, to his own experiences. His best known novels are not much more than autobiographies. All this may be granted. But there is the other side. In his early years, he cultivated verse-satire. Had he come a genera¬ tion or two earlier, he would have been of the

company of Pope and Dryden. Coming after Richardson, he was the founder of the satirical novel. His work has immense scope, for it in¬

cludes men, manners, art and politics at home and abroad. Of his successors, only Disraeli may be compared with him. He wrote our first novel of the sea and is thus a forerunner of Cooper. In (Count Fathom5 may be dis¬ covered the beginnings of the Gothic romance afterward practised by Horace Walpole and Mrs. Radcliffe. And (Humphry Clinker,5 (<the most laughable story,55 said Thackeray, ((that has ever been written since the goodly art of novel-writing began,55 brought into fiction that spirit of fun which later times have associated with Dickens. See Humphry Clinker.

Bibliography. — Among good recent editions of Smollett's works may be cited Saintsbury's (12 vols., London 1895), and Henley's (12 vols., London 1899-1901), both of which have intro¬ ductory essays. The (Works5 with a memoir by the author's friend, Dr. John Moore (8 vols., London 1797) was reissued under the editor¬ ship of J. P. Brown in 1872-73. The most in¬ teresting of recent biographies is the (Life5 by D. Hannay in the (Great Writers Series5 (Lon¬ don 1887). Scott has a notable essay prefixed to Smollett's novels in the (Novelists5 Library5 (London 1821), and Thackeray included him among the (English Humorists.5 The Cam¬ bridge History pf English Literature5 (New York 1913) contains an article by Harold Child, (Fielding and Smollett5 (Vol. X) with a fine bibliography.

Wilbur L. Cross,

Professor of English, Yale University.

SMOOT, Reed, American legislator and Mormon leader: b. Salt Lake City, 10 Jan. 1862. He was educated at Deseret University, Salt Lake City, and at the Brigham Young Acad¬ emy, Provo. He entered business and became prominent in various industrial enterprises in Salt Lake City and Provo. In 1895 he was appointed one of the presidency of the Utah Stake of the Church of Jesus Christ of the Latter Day Saints, and in 1900 an apostle of that Church. In 1903 he was elected to the United States Senate, but his right to a seat there was contested on the ground that as a high official of the Mormon Church he officially sanctioned polygamy in violation of the laws of the State of Utah, and an oath taken by the members of the Mormon hierarchy said to be inconsistent with loyalty to the national gov¬ ernment and Constitution. The Senate by vote decided that he was entitled to take his seat. Since then he has been continuously re-elected. His present term expires in 1927.

SMUGGLING, the practice of violating the revenue laws of a country by importing or ex¬ porting goods upon which duty is payable, with

intent to avoid payment of that duty. It is a general custom in all countries to lay a duty on certain imported goods, while in some rare cases a duty is imposed on certain articles ex¬ ported, as, for instance, some years ago an ex¬ port duty of two shillings per ton was levied on coal from Great Britain. The phase of smuggling most frequently met with is# the secret carrying through the customs of dutiable articles by passengers on ships and trains. Many ingenious methods have been employed to evade the vigilance of revenue officers, fre-

quently with success. Trunks and bags fitted with false bottoms and sides are the common tricks adopted, as well as skilful concealment of contraband on the person. Smuggling is actively carried on over boundaries where the frontier-lines of different countries meet. In such case it is more difficult to detect or prevent illicit importation. Besides introducing taxable goods without payment, smuggling includes the importation of articles that are prohibited from being brought into the country or district. Revenue-cutters are empowered to stop and search any vessel within four leagues of the coast of the United States, while on land any vehicle may be searched, if necessary by force, by authorized officials. Contraband goods thus seized are liable to forfeiture, while a penalty of treble the value of the stock may be imposed. Passengers arriving in the United States are required to make oath as to dutiable articles in their possession. The penalty for defraud¬ ing the customs knowingly or wilfully ranges from a fine not exceeding $5,000 or two years' imprisonment. At the discretion of the court, both penalties may be imposed. The forfeited goods are sold, and the proceeds distributed between the government, the informer (if there is one in the case) and the officer who de¬ tected the offense. Where the owner of seized goods can establish innocence of intent to de¬ fraud, the property may be returned on pay¬ ment of the duty. Smuggling is especially rife in countries where high or protective® tariffs prevail. Under the free trade system in the British Isles smuggling is practically confined to spirits, tobacco and scent. Clothes, books, diamonds, lace, etc., are all admitted free of duty.

SMUTS, General Rt. Hon. Jan Christiaan,

South African statesman and soldier: b. 1870. He was educated for the law at Victoria Col¬ lege, Stellenbosch ; and Cambridge University, England; practised at Cape Town and Johan¬ nesburg and was appointed state attorney of the South African republic in 1898. When

the Boer War broke out in 1899 he had already a great reputation among the South African Dutch, which was enhanced by his conspicuous services to their cause during the war. On the conclusion of peace in 1902 General Smuts was established with General Botha as one of the two recognized leaders of the Transvaal Dutch. The two men worked together, accept¬ ing the Peace of Vereeniging and loyally carry¬ ing on the administration of the Union of South Africa. In the European War, General Smuts commanded the columns of Union troops invad¬ ing German South-West Africa from the South, and in 1916 he took command of the British forces operating in German East Africa. He organized the campaign which broke the Ger¬ man power in Africa and reduced the German commander, von Lettow Vorbeck, to the condi¬ tion of a fugitive. In 1917-18 he represented South Africa in the Imperial War Cabinet in London, and, with General Botha, was a South African delegate at the Peace Conference in Paris. On the death of General Botha in 1919, General Smuts succeeded him as Premier of South Africa.

SMUTS. See Fungi; Dust-Brand.

SMYRNA, smer'na (Turkish. Izmir), Asia Minor, an ancient city and the most important

seaport of Asia Minor, on the west coast of Anatolia, .at the head of the Gulf of Smyrna (a sheltered inlet of the .TEgean Sea extending inward for about 45 miles). A broad quay and artificial harbor, the former traversed by a tramway, borders the sea-front. The city is divided into four quarters — Frank, Turk, Greek and Armenian. The pub¬ lic buildings include the palace of the governor, a large barrack, a number of mosques and sev¬ eral Greek, Armenian, Roman Catholic, and Protestant places of worship, the British con¬ sular chapel, an American and two English churches. There is a British seamen’s hospital here, for which a new building was erected in

1. New waterworks were completed in

2. Smyrna has been for centuries the most important place of trade in the Levant. This trade is carried on partly by shipping, partly by caravans from the interior, and is now supple¬ mented by railways. The chief imports are cotton and woolen manufactured goods ; colo¬ nial goods, mostly coffee and sugar ; iron, coal, hardware goods, leather, timber, glass-ware, butter and margarine, drugs, jute bags, petro¬ leum, etc. The principal exports are raisins, figs, valonia, cereals, tobacco, gum-arabic, opium, carpets, cotton, wool, liquorice, olive-oil. Smyrna has

been frequently injured by earth¬ quakes and has also suffered severely from fire. The climate is variable, and fever (usually of a mild type) is prevalent. There are conflict¬ ing accounts of the origin of this city; the most probable is that which represents it as an 2Eolian colony from Cyme. About 688 b.c. it fell into the hands of the Ionians of Colophon. This earliest city, called by the Greeks Old Smyrna, was situated on the banks of the Meles, on the northeast side of the Hermaean Gulf (now the Gulf of Smyrna). It laid claim to the honor of being the birthplace of Homer, and its coins bore his image. This old city was abandoned and was succeeded by a new town on the southeast side of the gulf (the present site), which was said to have been built by Antigonus, and enlarged and embellished by Lysimachus, both generals of Alexander the Great. It was laid out with great mag¬ nificence, and adorned with several splendid buildings, among which was the Homereum, where the poet was honored as a god. It soon became one of the greatest and most prosperous cities in the world. It was especially favored by the Romans on account of the aid it lent them in the Syrian and Mithridatic. wars. In the civil wars it was taken and partly destroyed by Dolabella, but it soon recovered. It is one of the two among the seven churches in Asia which Saint John addresses without rebuke, and it was the scene of the labors and martyr¬ dom of Polycarp. In the 13th centunr only the ruins of its former splendor were left; but after the Turks became masters of the country it began to _ revive until ;t became the most flourishing city of Asia Minor. As a result of the European War, Smyrna was handed over to Greece as the mandatory by the Peace Confer¬ ence. Greece took charge of the city in May 1919. Pop. about 250,000, fully half being Greeks.

SMYRNA CAMP GROUND, Engage¬ ment at, in the Civil War. On the night of 2 July 1864, Gen. J. E. Johnston abandoned

Marietta for a new position 10 miles south, covering the railroad and his pontoon-bridges, with an advanced position at Smyrna Camp Ground, six miles below Marietta. Sherman pushed forward from Marietta on the morning of the 3d, hoping to catch Johnston before he could get his army across the Chattahoochee, and was much surprised when the head of Thomas' column ran up against strong works at Smyrna Camp Ground, covering the wagon- road and railroad. The

army was deployed, and there was heavy skirmishing. On the 4th General Dodge, commanding the 16th corps, moved out on the Ruff Station road and developed a Confederate position of two intrenched lines, strongly held. Dodge in¬ trenched. At 4 p.m. a charge was made by three regiments of Veatch's division, under Col. E. F. Noyes, and three regiments of Sweeny's division, resulting in the capture of Johnston's first line of works and over 100 prisoners, with a Union loss of 140 killed and wounded, Noyes losing a leg. During the night Johnston aban¬ doned his advanced position and drew back all his army and trains to the intrenched line cov¬ ering the railroad bridge. Sherman closed up against him and was met by a heavy and severe fire, then threw forward both flanks, and by morning of the 6th held possession of the river above for 18 miles, as far as Roswell, and 10 below to the mouth of the Sweet Water. On the 9th Sherman crossed a part of his army over the Chattahoochee, near Roswell, and that night Johnston abandoned his position, crossed to the south side of the Chattahoochee, burned the railroad bridge and his pontoon and trestle bridges and took position in the outer defenses of Atlanta. Consult (Official Records) (Vol. XXXVIII).

SMYTH, Charles Henry, Jr., American geologist: b. Oswego, N. Y., 21 March 1866. He was graduated at Columbia University in 1888, took his Ph.D. there in 1890, and later studied at the University of Heidelberg. He was professor of geology and mineralogy at Hamilton College in 1891-1905, and since 1905 has occupied the chair of geology at Princeton University. He is author of many scientific papers.

SMYTH, smith or smith, Charles Piazzi, English astronomer: b. Naples, 3 Jan. 1819; d. 21 Feb. 1900. He was employed at the observa¬ tory at the Cape of Good Hope (1835—45) ; was astronomer royal for Scotland (1845-88) ; and retired on a pension in 1888. He made a most thorough examination of the great Egyptian pyramid and was led to the conclusion that the structure was raised under direct inspiration of God, and that therein were deposited revelations of the graat truths of physical nature. He wrote (Our Inheritance in the Great Pyramid5 (1864) ; (Life and Work at the Great Pyramid> (1867) ; (Antiquity of Intellectual Man5 (1868), etc.

SMYTH, Egbert Coffin, American Congre¬ gational clergyman and author: b. Brunswick, Me., 24 Aug. 1829 : d. Andover, Mass., 12 April 1904. He was graduated from Bowdoin Col¬ lege in 1848, and from Bangor Theological Seminary in 1853. In 1862—63 he studied in Germany when he was called to Andover as professor of ecclesiastical history, and was for more than 40 years identified with the

growth of Congregationalism. From 1886 to 1892, as editor of the Andover Review he was involved in . a religious controversy with the more orthodox clergymen of the denomination, but was upheld by his colleagues and the pro¬ gressive members of the church at large. He was the author of (The Divinity of Jesus Christ5 (1893) ; (From Lessing to Schleiermacher, or From Rationalism to Faith5 (Boston Lectures 1870), and Unfluence of Jonathan Edwards on the Spiritual Life of New England5 (1901), etc.

SMYTH, Herbert Weir, American classical scholar and educator : b. Wilmington, Del., 8 Aug. 1857. He was graduated at Swarthmore College in 1876, later studied at Harvard Uni¬ versity and took his Ph.D. at the University of Gottingen in 1884. He was professor of Greek at Bryn Mawr in 1888-1901 ; was professor of Greek at Harvard in 1901-02, and has since been Eliot professor of Greek literature there. He was professor in the American School of Classical Studies at Athens in 1899-1900. He edited (Greek Series for Colleges and Schools) (20 vols.). Author of (The Sounds and In¬ flections of Greek Dialect: Ionic' (1894);

(Greek Grammar 5 (1914).

SMYTH, John Paterson, Canadian Angli¬ can clergyman: b. Ireland, about 1856. He was graduated at Trinity College, Dublin, and was ordained a priest in the Church of England in 1881. He was professor of pastoral theology at Trinity College, Dublin, in 1902-07; became canon of Dublin Cathedral in 1907 ; and later went to Canada as rector of Saint George's Church at Montreal. He was appointed canon of Christ Church Cathedral, Montreal, in 1910, and archdeacon in 1914. Author of (Israel's Prophets and Kings) (1906) ; (The Prayer Book) (1908) ; (The Bible in the Making) (1914) ; (God and the War5 (1915) ; (The Men Who Died in Battle) (1915), etc.

SMYTH, Samuel Phillips Newman, Amer¬ ican Congregational clergyman and author, brother of E. C. Smyth (q.v.) : b. Brunswick, Me., 25 June 1843. He was graduated from Bowdoin College in 1863, and at Andover Theo¬ logical Seminary in 1867. He was called to the First Congregational Church of Bangor, Me., and in 1882 to the First Congregational Church of New Haven, Conn. He is the author of (01d Faiths in New Lights5 ; (The Orthodox Theol¬ ogy of To-day5 ; (The Morality of the Old Testament5 ; (Christian Ethics5 ; (Through Science to Faith5 ; and other books.

SMYTHE, Ethel Mary, English composer: b. London, 23 April 1858. She studied at the Leipzig Conservatory and later under Heinrich von

Herzogenberg, and received the degree of Doctor of Music at Durham in 1910. Her early compositions included songs, chamber music, a mass in D which gained for

her recognition as a composer of great ability, a sonata, and other pieces. Her

reputation became firmly established with the production of her first opera, (Fantasio,5 pro¬ duced at Weimar in 1898. She ranks as one ot the leading composers of her time, and probably the first among women composers. Her second opera (Der Wald5 was produced at Dresden in 1901. at London in 1902, and at the Metropolitan Opera House, New York, in 1903. (The Wreckers5 was produced at Leip-

zig in 1906, and (The Boatswain's Mate) (1915) w as produced in London in 1916.

SNAIL-BORE. See Drill.

SNAILS AND SLUGS, names restricted in their original application to gasteropodous mol- lusks typifying the families Helicidcu and Limacidce respectively, but now used in a much wider sense. The terrestrial and fresh-water snails and slugs represent the order Pulmonata, characterized by the presence of a lung-sac for the respiration air formed by a fold of the man¬ tle and opening by a conspicuous pore situated at the mantle border, usually on the left side. They are always asymmetrical, but have the visceral loop of the nervous system straight and the ganglia concentrated in a ring about the oesophagus. All are hermaphroditic, though the structure of the complex genital organs varies greatly. A shell is generally present, though absent or rudimentary in the slugs, and is usually dextral. Except in the brackish water Amphibolidce of New Zealand there is no oper¬ culum. Within the mouth is the jaw, usually single and placed just behind the upper lip, but in some forms there are accessory pieces and in others the jaw is absent. Both the jaws and the teeth on the lingual ribbon or odontophore present an astonishing variety of form which is characteristic of genera and species. With these organs the food, usually vegetable, is cut and rasped. Scarcely any of the Pulmonata are marine, and very few live in . even brack¬ ish water, though a large number inhabit fresh water and some the depths of lakes, from which they never come to the surface to breathe air, but

take water into the lung, which has, there¬ fore, secondarily assumed the function of a gill. The great number of species are arranged in two sub-orders: the Basommatophora, which have non-retractile tentacles with the eyes sit¬ uated at their bases and male and female or¬ gans opening separately, and the Stylommato- phora, with retractile and often invaginable tentacles, two of which bear the eyes at their tips, and the genital orifices generally united. Each suborder includes numerous families, upon the exact number and arrangement of which au¬ thorities are not yet fully agreed.

As examples of the sessile-eyed snails the following may be selected, the generic names employed being in most cases in the less re¬ stricted sense. Melampus lineatns represents the family Auriculidce, and is one of the few marine species, inhabiting the salt marshes along the coast in great numbe_rs. The shell is solid and sub-oval, with a polished surface of a handsome brown color marked with reddish bands. The Limnceidce are the common pond- snails, which have a very delicate fragile shell and the orifice of the lung protected by a special lobe. The species are very numerous and abound everywhere in sluggish fresh waters. Planorbis has the shell rolled in a flat spiral and thicker than usual in the family. A num¬ ber of species are common in the sluggish rivers and streams of the United States, where they may be found attached to stones along v/ith masses of their eggs. Limncea is the type genus and is known by its rather slender, dextrally spiral, delicate shell with a large aperture. L. stagnalis is abundant in ponds, and other species are particularly well repre¬ sented in the northern States and Canada.

Their eggs may be found imbedded in little packets of transparent jelly attached to aquatic plants throughout the summer. During sea¬ sons of drought these and other water snails burrow into the mud or close the aperture of the shell by a membrane formed of secreted mucus. They are strictly vegetarian and make useful and interesting inmates of aquaria. Physa heterostropha is equally common and has similar habits, but the very delicate shell is sinis- tral. Ancylus includes the fresh-water limpets, our species being very small, with flattened con¬ ical shells, which are found attached limpet-like to stones and plants in ponds. This group in¬ cludes no slugs.

The stalked-eyed snails are more numerous and important. Glandina truncata of fresh¬ water swamps of the southern States belongs to the family Testacellida, which are remarkable because of their carnivorous habits and the ab¬ sence of a jaw. This species has a well-de¬ veloped shell, but the related genus Testacella of Europe is a slug, bearing the small disc-like shell at the posterior end of the body. It at¬

tacks and devours earthworms and slugs, but also eats decaying animal matter. The true slugs belong to the family Limacidcz in which the shell, if present, is usually buried in the mantle or else is a plate covering only a small portion of the animal. The visceral hump of the snails is absent or little developed in the slugs. The body is generally oval or oblong, elongated, from one to three inches in length. The creeping disc, or sole of the foot, extends the whole length of the animal, but, like snails, slugs frequently raise their heads and move their tentacles in search of objects above them. They often climb trees, and can lower them¬ selves to the ground by the accumulation of mucus at the extremity of the tail hardening into a thread, and as they crawl they leave a slimy track. They oviposit in moist places in spring and summer, often at roots of grass; the eggs are laid in strings, each in a separate gelatinous envelope. Slugs are found in moist places in the woods, damp cellars, etc., and are especially partial to decaying wood, upon which they in part feed. But their chief food consists of the tender leaves and shoots of plants, and the garden species often inflict considerable damage upon lettuce, celery, etc., but much less in this country than in Europe. They may be checked by sprinkling wood ashes, lime or soot about young and tender plants or in cellars by sprinkling salt about their haunts. They are active at night and conceal themselves by day. During the winter they hibernate. Among the genera are Arion, Agriolimax, Limax and its numerous subdivisions. Several of our com¬ mon garden and cellar species are European importations. Limax maximus is very common and four or five inches long, of an ashy gray color with black stripes and spots. It is some¬ times eaten in England. L. campestris is very common in woods and meadows. It is much smaller and uniform pale gray or brown. Arion fuscus, a European species, has been in¬ troduced into this country in the neighborhood of Boston. The shell is concealed and very imperfect and there is a large triangular mucous pore near the posterior end. The eggs are said to be phosphorescent. Philomycus carolinensis is a large slug found under logs and bark in woods and which is often placed in

a distinct family. There is no trace of a shell and the mantle covers the entire back.

The Helicidce or family of true snails is an immense one, the typical genus alone in its un¬ restricted sense embracing about 6,500 species. They abound in moist places and have very sim¬ ilar habits the world

over. They feed chiefly on vegetable substances, though they are very indiscriminate in their appetite and even devour the dead of their own kind. The mischief which they do to garden crops is too well known ; and gardeners lay down cabbage leaves and the like to attract them, in order that they may be destroyed. Snails delight in warm, moist weather ; in dry weather, their chief time of activity is during the night, and they hide themselves by day; but after rain they come forth at any hour in quest of food. At the ap¬ proach of winter or in very dry weather they close the mouth of the shell with a membrane (epipihragm) , formed by the drying of the mucous substance which they secrete, and be¬ come inactive and torpid. Snails retreat into crevices for the winter, or into holes which they make in the earth, and which are roofed over with earth, dead leaves, etc., agglutinated by secreted mucus. The eggs are deposited in moist earth, the snails often burrowing beneath the surface for this purpose and they have no jelly but only a slightly adhesive covering. Among the most plentiful of our native species are Helix albolabris and H. alternata and the minute Zonites milium (not closely related) found everywhere in damp woods. Several of the large European species have been intro¬ duced. The great vine snail, or edible snail (Helix pomatia), a European species, was con¬ sidered by the ancient Romans one of their table luxuries. In some countries, as Switzerland and parts of France, they still form a consider¬ able article of commerce. Together with H. aspersa, they are fed by thousands in places called ˆescargatoires,® which are made on pur¬ pose for them. Preserved snails are imported into the United States for table use, and the demand has increased sufficiently to induce a few persons to inaugurate the business of rais¬ ing them, particularly in California. On ac¬ count of its large size and gregarious habits the European H. pomatia is best suited to this purpose. Another family of water snails (Paludinidce) belongs to a quite different di¬ vision of the Gasteropoda, the order Prosobran- chiata. In these forms the usually single ctenidium is placed anterior to the heart, and the visceral nervous loop is twisted into a figure 8. The order is a very extensive one, most of the members of which are marine. With the Valvatce, Ampullarice, which are re¬ lated fresh-water forms often placed in distinct families, the species of Paludina and Vivipara have the left ctenidium only and a single kidney and heart auricle. The shell is usually stout, more or less pyriform and has a well-developed operculum. The single pair of non-retractile tentacles bear the eyes upon lobes near their bases and the edge of the mantle forms a pair of short tubes by which water is directed over the gill. The sexes are always separate arid the young are produced alive. Common species are P. integra, P. intertexta ana P. vivipara, which live on the mud at

the bottom of ponds and sluggish streams. They are, at least in part;

carnivorous. Other important fresh-water families are the Pleuroceridce and Melaniidce, including chiefly oviparous forms which have the thick shell variously ornamented with spines and tubercles. Of the numerous forms found in the mountain streams and eastern tributaries of the Mississippi and elsewhere the large and variable Io spinosa is an example.

Bibliography. — Pilsby and Tryon, < Manual of Conchology) (Philadelphia 1878-1904) ; Bin- ney and Gould, (Terrestrial Air-breathing Mol- lusks of the United States) (Boston 1851 to 1859) ; Binney, Bland, Prime and Tryon, (Land and Fresh-water Shells of North America) (Smithsonian Institution, Washington, 1865— 73) ; Cooke, Cambridge Natural History* (Vol. Ill, London 1895) ; and for an excellent popular account Ingersoll, (Wild Life in Orchard and Field) (New York 1903) See Gasteropoda.

SNAKE, or LEWIS (the Shoshone of the Indians), a river which has its rise in the mountains ' of western Wyoming, in two streams, called the North and South Forks. Entering Idaho the river flows southwest, then northwest to the Oregon State boundary, then north, forming the boundary for 100 miles, between Oregon and Idaho to Lewiston, and the boundary between Washington and Idaho for 30 miles. It then turns westward, crosses the southeastern part of Washington and enters Columbia River near lat. 46° 12' N. and long. 119° W. Its length is estimated to be about 1,000 miles. Where the North and South Forks unite the elevation is 4,800 feet and at the mouth, where it enters the Columbia, it is 340 feet. Its course is through a mountainous country, here and there entering plains, winding around seem¬ ingly extinct volcanoes, passing through fertile lands in Washington. It is noted for its won¬ derful canons, and in places for the springs that pour in great abundance from its northern wall. A fine exhibition of cataracts is fur¬ nished at the Thousand Springs near Hager- man, Idaho, between Salmon Falls and the point where the Salmon Falls River enters from the south. The springs in countless num¬ bers issue from rocks far up the faces of nearly vertical precipices. The water does not make the descent in a single leap, but in a series of cascades. It is lashed into foam by contact with the rocks and the beauty of the scene defies description. The Shoshone Falls (q.v.) are among the wonders of the world. Many of the canons of the river are from 1,000 to 3,000 feet in depth and the waters flow rapidly over irregular beds forming long rapids and magnificent cascades. A number of side alcoves, or short, < <blind)) canons, leading off the main canons, owe their existence to great springs.

These side canons receive no surface streams and there is no other explanation of their formation. The springs undermine the rock by removing the soft material on which it rests. The rock falls into the spring and gradually sinks into its soft bed and thus the canons are formed. Often the undermining is on so large a scale that the falling rock be¬ comes a landslide. The water in the streams which the springs form is intensely blue and very clear. Some of them are well stocked with trout, although on the edge of a desert.

SNAKE-BIRD. See Darter.

SNAKE DANCE, a dance of religious character performed by the Moqui Indians, living in Arizona, United States of America. The dance is known to have been performed by this tribe of Indians, in the same manner and in the same place, ever since the middle of the 16th century, when the Spanish explor¬ ers entered this part of America. The rite is particularly revolting in some of its details, which include the bearing of live serpents in the hands and the mouths of the dancers. As many as 100 snakes are used in a dance and each of these is borne by the dancers while dancing, either in his hands or mouth, is then deposited upon the ground, where it is sprinkled with the sacred cornmeal by the In¬ dian squaws, is picked up, held by old men, then by little boys, infants even, and is then de¬ posited in a sacred tent lined with buffalo skin, inside of which a sacred tree is growing. To¬ ward the end of the dance the snakes are taken out of the tent and carried in armfuls by the Indian men, are placed on the ground within a circle of sacred meal in front of a sacred rock. Here to the accompaniment of prayers and chants the serpents are sprinkled with the sacred cornmeal until the whole writhing, wrig¬ gling mass is completely covered by the meal. The dance concludes by the Indian men grasp¬ ing each as many snakes as he can hold and dashing down a steep incline at top speed. At its foot the snakes are liberated, scattered in every direction. The ceremony is described as most revolting. For a full account consult Bourke, J. G-., (Snake-Dance of the Moquis) (1884) ; Hough, W., (The Moki Snake Dance) (Chicago 1898).

SNAKE-DOCTOR, a dragon-fly (q.v.).

SNAKE-EEL, an eel of the large family Ophichthidce, scaleless, and with the extremity of the tail free, that is, not surrounded by a fin. These eels are found abundantly in tropical seas about rocks and coral reefs and are often gayly colored like mursenas, to which they are allied. Consult Jordan and Evermann, (Fishes of North and Middle America) (Washington

1896).

SNAKE-GOURD. See Gourd; Melon.

SNAKE-MELON. See Melon.

S'NAKEROOT, the popular name of nu¬ merous American plants of different species and genera, most of which are, or formerly were, reputed to be efficacious as remedies for snake¬ bites. (For two prominent kinds see Aristolo- chia and Polygala). The black snakeroot (Cimicipuga racemosa) is a common woodland herb, four to eight feet high, with long racemes of white flowers. The white snakeroot is a handsome herb (Eupatorium ageratoides) and belongs to the asters. It has large, coarsely serrated opposite leaves and is also known as white sanicle. The Seneca snakeroot (Poly¬ gala Senega) is of the milkwort family and common in the eastern United States. It has a heavy woody rootstock, several stems grow 6 to 12 inches high, alternating lanceolate leaves and perennial white flowers in spickes. The Brazilian snakeroot (Chiocoeca augustifolio) is a shrub of the madder family, the roots furnish¬ ing an emetic and cathartic assumed to relieve snake-bite. Sampson’s snake-root (Psoralea

melilotoides) is a perennial of the bean family, growing in the southern United States. It is a stimulating tonic. The Canada snakeroot is the wild ginger.

SNAKE-STONE, a porous stone, as a fossil ammonite, or any porous substance, sup¬ posed to cure snake bites. The superstition came, it is believed, from Eastern countries. The stones, which are usually small, are sup¬ posed, when applied to a snake-bite, to absorb the poison, counteract the poisonous effects, or to charm the wound away. Some of the snake- stones used in India seem to be efficacious. Two small snake-stones (about the size of a pea) brought from that country and said to have cured a cobra bite, were found on exam¬ ination to be composed of some vegetable sub¬ stance. Another, which was brought from Cey¬ lon by Sir J. E. Tennent, and which was known to have effected a like cure, was submitted to the examination of Professor Faraday, who fancied it to be a piece of charred bone which had been filled with blood perhaps several times and then carefully charred anew. Ow¬ ing to their absorbent properties such stones, if applied at once, may be of some avail. The superstition is particularly prevalent among the negroes of the southern States and in some portions of England and Scotland where charms made of small stones perforated and strung like beads are hung on cattle to keep away ad¬ ders and to cure any snake-bites.

SNAKE-WOOD, any of various woods and plants. One is the small South American tree (Brosimum aubletii) which has hard, white sapwood surrounding the valuable heart, which seldom exceeds seven inches in thick¬ ness, is reddish and marked with black in such a manner as to suggest hieroglyphics ; the spots have suggested such other names as letter- wood and leopard-wood. It is used for walk¬ ing canes, veneers and cabinet-making. Strych- nos colubrina, a climbing plant of India, like the N. nuxvomica, yields in its bitter roots and wood, a reputed native cure for snake-poison. Colubrina ferruginosa (West Indies), so called, perhaps, from its twisted grain, Plumeria rubra and Cecropia peltata, are also called snake- wood.

SNAKES. See Serpents.

SNAP-DRAGON, cultivated species of the genus Antirrhinum (Scrophulariacece) . A. ma- jus is the common snap-dragon, a pubescent perennial, native to Europe, with linear lanceo¬ late leaves, chiefly alternate and large showy flowers, having irregular gibbous, two-lipped corollas, the lower, three-lobed lip so swollen at the base as to nearly close the throat of the flower and giving an appearance so

like a mouth that it has suggested many descriptive names, such as bulldog's, rabbit's, dog's or toad's mouth ; even the Greek name means ((nose- like.® They are handsome herbs, one to three feet high and have flowers of many shades and markings and are not only cultivated in old- fashioned hardy gardens, but in greenhouses for winter floral trade. The plant is reputed, in folk-lore, to have the power of destroying charms. The Jamaica snap-dragon (Ruellia tuberosa) is of the acanthus family, bears a pretty blue flower and is cultivated in hot¬ houses.

SNAPPERS, a rather numerous assemblage of fishes belonging to the genus Lutjanus and related genera, usually considered as belonging to the family Sparidce (q.v.), but sometimes erected into a distinct family (Lutjanidce) . They have the body more elongated than the typical members of the Sparidce, the teeth little differentiated and never incisor-like, though some are usually enlarged and caniniform and there are always teeth on the vomer. The dor¬ sal fin is continuous, with strong spines and the anal fin has three stout spines. The species of Lutjanus inhabit most warm seas and about 20 are found in our southern waters, some of them attaining importance as food fishes. The red snapper (Lutjanus aya) is a handsome rose-red fish, the young with a black blotch on the side. It attains a length of 2J4 feet and a weight of 25 pounds, and is economically the most important of the group. Through¬ out the West Indian region and in the southern United States it is a great favorite, and is shipped to northern markets also in consider¬ able numbers. The centre of the fishery is Pensacola, from which smacks visit the snapper banks in various parts of the Gulf of Mexico. The gray or mangrove snapper (L. griseus) is another abundant and widely distributed species throughout the same region and sometimes strays northward as far as Cape Cod. It is of a dark green color above and reddish below and is further distinguished from the red snapper by the much lower ventral fin. Being smaller than the latter it is of less commercial importance, but because of its greater abun¬ dance in shallow waters is an even greater favorite with amateur anglers. A third species is the mutton fish (L. analis) . This is a beauti¬ ful fish in life, being olive green above, with red fins and pale blue spots and streaks on the head and sides. It equals the red snapper in size and, like the other species, frequents rocky banks and spawns in summer. It is said to be the most important food fish in Havana. All of the snappers are gamy and are caught chiefly on hand lines, but in Jamaica and other West Indian islands in cane fish-pots

constructed on the principle of lobster-pots. Consult Jordan and Evermann, (American Game and Food Fishes) (New York 1902) ; Jordan, D. S., <Fishes) (New York 1908).

SNAPPING TURTLE, a large fresh¬ water turtle (Chelydra serpentina) , widely dis¬ tributed over the United States. These vora¬ cious creatures grow to a considerable size, a weight of 20 pounds being far from uncommon, and are prized as food. Their popular name is derived from their ferocity in captivity, and their habit of biting or snapping at everything that comes in their way. Called also alligator terrapin and alligator tortoise.

SNARE OF LOVE, Order of the. See

Orders and Decorations (Royal).

SNATCH BLOCK, a single block; that is a block or case carrying a single oulley, in use on ships. It has an opening (notch) in one cheek to receive the bight of a rope. The block is iron-bound, with a swivel hook. The portion of the strap which crosses the opening or snatch in the block is hinged, so as to be laid back when the bight of the rope is to be in¬ serted, as when warping the ship. This saves the trouble of reeving the end of the rope vol 25 — 10

through. Large blocks of this kind are called rouseabout blocks, also viol blocks. Double and triple sheaved blocks are sometimes made with a snatch.

SNAYERS, Peter, Dutch painter: b. Ant¬ werp, 1592; d. Brussels, 1667. His teacher of painting was S. Vranx; he was elected to the Guild of Saint Luke in 1613, and went to Brus¬ sels as court painter in 1628. Of his numerous battle pieces, the majority were painted for the Austrian Court, of which works 12 are now in the Imperial Gallery at Vienna. His other canvases represent cavalry skirmishes, small war scenes, hunting scenes, landscapes, painted with life-like expression and action. His works are found in most public galleries and are especially well represented in Dresden and Madrid, 16 being hung in the Prado.

SNEATH, E. Hershey, American educator and author : b. Mountville, Pa., 7 Aug. 1857. He was graduated at Lebanon Valley Col¬ lege in 1881 and received the degrees : A.B., 1881, A.M., 1885 and LL.D., 1903, Lebanon Valley College; B.D., 1884, and Ph.D., 1889, Yale University. From 1889 lecturer and pro¬ fessor of philosophy; since 1912 he has been professor of the philosophy of religion and re¬

ligious education in Yale University. He or¬ ganized the <Modern Philosophers and the Ethical Series, } and is author of (The Philoso¬ phy of Reid) (1892); (The Ethics of Hobbes) (1898) ; (The Mind of Tennyson *(1900) ; (Philosophy and Poetry * (1904) ; < Wordsworth — Poet of Nature and Poet of Man* (1912). Joint author with Dean Hodges of a manual, (Moral Training in the School and Home.* Organized and is one of the editors of (The Golden Rule Series) (6 vols.) and (The King's Highway Series) (8 vols.) ; the former repre¬ senting a graded system of moral instruction for schools, the latter representing a graded system of moral and religious instruction for the home and school.

SNEEHATTEN, sna'hat-ten (<(snow-cap**) , Norway, the highest point of the Dovrefjeld, situated 80 miles southwest of Trondhjem. It is a snow-capped peak 7,566 feet in altitude.

SNEEZE-WEED, any one of the composite genus Helenium, as H. autumnale, a tall, rank¬ growing sunflower-like plant. It has a few long-rayed yellow heads, with protruding discs appearing in autumn, and is occasionally culti¬ vated, although it is very coarse, with square, winged stems and alternate large punctate en¬ tire or dentate leaves. These and the flowers are bitter, acrid and pungent, and when dried and powdered cause violent sneezing, having been used in materia medica for this purpose. Sneeze-weed is generally avoided by cattle, but animals unfamiliar with, or developing a taste for it, are often poisoned by it. The name is also sometimes applied to the sneeze-wort (q-v.).

SNEEZE-WOOD, a valuable wood, also called nieshout, yielded by the large South African tree Pteroxylon utile of the order Sapindacece, and brought to market in logs sometimes 80 feet long and four feet in diame¬ ter. It is very difficult to work on account of its great hardness, and the dust arising causes much sneezing (whence the name), but it is handsome, with a yellowish grain resembling

sandalwood, durable and avoided by white ants and shipworms.

SNEEZE- WORT, a composite herb (Achil¬ lea ptarmica) with larger and fewer white flowers than has the common yarrow of the same genus and finely serrate linear leaves, which, when dried and pulverized, are said to provoke sneezing. It is a European plant in¬

troduced into America.

SNEEZING. See Nose and Throat, Dis¬ ease of.

SNELL, Henry Bayley, American artist: b. Richmond, England, 29 Sept. 1858. He studied at the Art Students' League, New York, and specializes in the painting of landscapes. He was awarded the gold medal of the Phila¬ delphia Art Club in 1896 and was elected to the National Academy in 1906. Among his landscapes are (Citadel at Quebec) (Albright Gallery, Buffalo) ; (NightfalP (Art Associa¬ tion, Indianapolis) ; (Lake Como) (Metropoli¬ tan Museum, New York) ; (Low Tide) (1907) ; (The Harbor Light> (1913).

SNELLING, Fort, a small town and milL tary post on the right bank of the Mississippi River, in Hennepin County, Minn. The fort was established in 1819 and is situated just above the mouth of the Minnesota River and about six miles southwest of Saint Paul. It is on the Chicago, Milwaukee and Saint Paul Railroad. Fort Snelling is shown in Hum¬ phrey and Abbott's war map of the (Basin of the Mississippi, > etc., prepared for the War De¬ partment of the United States government in

1.

SNICKER'S FERRY AND BERRY'S FERRY, Engagements at, American Civil War. General Early withdrew from the front of Washington on the night of 12 July 1864, recrossed the Potomac at White's Ford on the morning of the 14th, rested that day and the next at Leesburg, and on the 16th marched through Snicker's Gap. On the morning of the 17th he crossed the Shenandoah at Snicker's Ferry and took position near Berryville, Breck¬ inridge's command of two divisions covering Snicker's Ferry and the river above and below, and Rodes' and Ramseur's divisions, the roads to Harper's Ferry. On the 16th General Crook, commanding three small divisions of Union in¬ fantry and one of cavalry, had run into Early's rear, near Purcellville, capturing 50 prisoners and 80 wagons. Under orders of General Wright, commanding the forces pursuing Early, Crook, on the 17th, sent Duffie's division of cav¬ alry and Mulligan's brigade of infantry to Snicker's Gap, which was seized, but upon ap¬ proaching the Ferry Early's well-posted artil¬ lery checked the column. On the 18th the re¬ mainder of Crook's command was pushed through the Gap and Duffie's cavalry was or¬ dered through Ashby's Gap to attack Early's train in flank, it being the impression that Early was retreating up the valley. About 2 p.m. Crook directed Colonel Thoburn, with the two brigades of his own division and one of Duval's, to cross the

Shenandoah at a ford a mile or more below Snicker's and, moving up, uncover it. Here a picket of about 100 men was en¬ countered, which opened fire, but Thoburn's leading brigade dashed across the stream and captured 15 prisoners, from whom it was learned

that Early, with two divisions, was very near, and Thoburn was ordered not to advance, but to await the arrival of the Sixth corps. He had crossed his whole command and formed a defensive line; beyond his right was a force of 1,000 dismounted cavalry of various regi¬ ments, under Lieutenant-Colonel Young, Fourth Pennsylvania Cavalry. It was less than an hour after making these dispositions that Breckin¬ ridge, with the divisions of Gordon and Echols, advanced against his left and centre, and Rodes' division fell upon his right. The dis¬ mounted cavalry broke under Rodes' fire and, despite Young's effort to rally it, retreated across the river, carrying some of the infantry with it. Rodes pressed on, Thoburn changed front to meet him, but his right was forced back and driven across the stream. The left of the line repulsed two or three determined attacks and, under orders, withdrew across the river. The dead and wounded were left on the field. The Union loss was 65 killed, 301 wounded and 56 missing. The Confederate loss was about 300. Duffle, who marched for Ashby's Gap with 2,000 men and artillery, camped near Upperville on the night of the 18th, and next morning drove some cavalry through Ashby's Gap, and with one brigade crossed the Shenandoah at Berry's Ferry, where he was met by Imboden's and McCausland's brigades of cavalry, with two guns, and driven back. Artillery-fire was con¬ tinued by both sides, and at 5 p.m. another effort was made to cross the river. One regi¬ ment charged across and up to the Confederate guns, but was quickly driven back with great loss. At night Duffle fell back to Ashby's Gap. His loss was 56 killed and wounded and 68 missing. The Confederate loss was not over 50. Wright remained at Snicker's Gap on the 19th, and that night Earfy, hearing that General Averell was moving from Martinsburg to Win¬ chester, thus threatening his rear, retreated to¬ ward Strasburg. Wright advanced to Berry¬ ville on the 20th. Consult (Official Records > (Vol. XXXVII) ; Pond, (The Shenandoah Valley in 1864) ; Early, (The Last Year of the War for Independence.)

E. A. Carman.

SNIDER RIFLE, The. See Small Arms.

SNIPE, certain limicoline birds of the fam¬ ily Scolopacidcu. As explained in the article Sandpiper (q.v.) the names snipe and sandpiper are, to a large extent, used interchangeably, many of the

species, more properly designated as sandpipers, having also one or more local names of which snipe forms a part. Besides the woodcock (q.v.), which is closely related, four species properly known as snipes occur in North America. All of these, together with numerous species inhabiting other parts of the world, have the bill very long, much exceeding the head, grooved for its entire length, some¬ what flexible, flattened and expanded at the end and there richly provided with nerves and sense-organs. Because of these peculiarities these birds are enabled to employ the bill at once as a delicate, sensitive probe for exploring the mud deeply, and as a forceps for extracting worms and similar articles of diet which they there detect. The slit of the mouth is almost totally confined to the bill ; the nostrils are rather large and placed very far back, almost

above the eyes and not directly in front of them as in most birds. The typical snipes belong to the genus Gallincigo. Besides exhibiting the characters just enumerated in a high degree of development, this genus has the toes entirely without webbing, the tarsi short, less than the middle toe, the body full and plump, the wings short and rounded, the tail feathers numerous, variable in the different species and cross-barred. There is no noticeable difference in the plumage with season or sex. About 20 species are known, the majority from Eurasia and the others scattered. The only properly North American species is the well-known and favor¬ ite Wilson's snipe (Gallinago delicata), also known as the snipe, jack-snipe, American snipe and, through mistaken identity, as the English snipe. Its length varies from 10 to llyh inches, the smaller birds being females, and its color a mottled mixture of various browns, black and white, giving a dark effect above, white below. There are 16 tail quills. Like most species of the family, it breeds northward, from the ex¬ treme northern United States to beyond the Arctic Circle. Within the United States it is widely distributed, during the spring migrating from March to May, and more abundantly in the fall from September to November. It fre¬ quents open marshes, both fresh and salt, and is consequently chiefly an inland bird, and is plentiful in the central West. In its southward journey it reaches the West Indies and South America, but seems less sensitive to cold than many of its relatives ; and individuals sometimes haunt the vicinity of open springs during the prevalence of severe frosts both in the late fall and early spring. Unlike the bay birds the snipe is mostly solitary and never forms large flocks. Night is its chief season of activity, when it flies and migrates and to a great extent

feeds. The soft ground in its haunts is probed in all directions for worms, insects, larvae and similar creatures which, with snails and slugs, are consumed in great quantities. When flushed it utters a loud, rather harsh note and flies rapidly and very irregularly for 20 or 30 yards before setting a direct course. During the mating and nesting season these birds are much about by day and are said to perform remark¬ able aerial evolutions, often dropping swiftly from a height with a peculiar drumming sound caused by the air rushing through the wings. The nest is a mere depression in the ground lined by a few grasses or leaves, usually in the shelter of a tussock or bush in a bog. The eggs are four and of the pyriform shape usual in the family and grayish-olive tinged with brown and blotched with browns.

The snipe is justly a favorite game-bird and presents qualities which fully test the skill of the sportsman. Its habits and haunts are so easily affected by weather and other conditions that an intimate knowledge of its peculiarities are necessary first to find and then to approach the snipe. On windy, stormy days these birds are extremely wild and their senses are so keen that an unskilled gunner will see only their jerky flight in the distance. On such occasions leave the dog at home and approach the birds from the windward side with a strong-shooting gun. As they always rise toward the wind some good shots may be afforded before the birds get well started. On warm, murky days they lie close and a well-trained setter or spaniel is

necessary to flush them, especially if they be scarce. It is, of course, necessary to work against the wind, but when the dog marks, the gunner will do well to work to windward in order to get a quartering shot when the bird rises. The erratic flight of this bird in starting is very disconcerting to a novice and the best plan is to wait until it has steadied before shooting. As a table bird the snipe stands on a level with any.

Of the genus Macrorhamphus, in which the toes are slightly webbed, the legs more largely naked than in Gallinago, the wings longer and more pointed, and the summer and winter plum¬ ages different, we have two species, M. grisens, the eastern dowitcher, and M. scolopaceus, the western or long-billed dowitcher. The former is known in the summer plumage as the red¬ breasted, the latter as the red-bellied snipe, which, with the differences in the bill and the generic characters, sufficiently distinguishes them. Their habits are similar and their breed¬ ing habits are essentially those of Wilson's snipe. Within the United States they frequent the sea-coasts, flying in

dense but not large flocks and associating with various sandpipers and yellow-legs. Their most distinctive traits are their confiding nature, proficiency as swim¬ mers, swift flight and compact flocking. To the first and last of these is due their destruction in great numbers by bay-bird gunners, with whom they are great favorites.

Among European species of snipes may be mentioned the common or English snipe (G. gallinago) , scarcely distinguishable from Wil¬ son's snipe, except that it has only 14 tail feathers, and the great or solitary snipe (G . major), both of which have appeared as strag¬ glers in North America.

Bibliography. — Baird, Brewer and Ridgway, (Water Birds of North America *(Vol. I, Bos¬ ton 1884); Bonhote, J. L., (Birds of Britain) (London 1907) ; Elliot, (North American Shore Birds* (New York 1895) ; Leffingwell, Shoot¬ ing on Upland Marsh and Stream) (New York 1887) ; Rich, W. H., (Feathered Game of the Northeast (New York 1907) ; Sanford, (Water Fowl Family) (New York 1903).

SNIPE-EEL, a small, slender, scaleless, translucent fish of the deep seas, with jaws prolonged into a slender bill, like a snipe's, the upper mandible somewhat recurved. There are many species, which form the family Nemich- thidce, closely related to typical eels, but little is known of their habits.

SNIPE-FISH, a small fish (Centriscus scolopax) of the Mediterranean and neighbor¬ ing waters, whose snout is prolonged into a tube suggesting a snipe's bill.

SNOQUALMIE RIVER in King County, Washington, drains a part of the west slope of Cascade Mountains east of Seattle and empties into Puget Sound. The falls, with sheer drop of 300 feet, are 25 miles east of Seattle, and are a resort famous for beauty of scenery. The water is largely utilized for power which furnishes electricity for Tacoma and Seattle. The estimated water power of the stream is 100,000 horse power.

SNORING, the act of breathing with a peculiar rough noise in sleep. This noisy mode of respiration is produced by deep inspirations

and expirations through the nose and open mouth, the noise being caused by the vibrations of the soft palate and uvula. The remedy is to

tie a bandage under the jaw and over the head, so as to keep the mouth closed. An examination should be made of the nasal pas¬ sages, which with snorers are usually clogged.

SNORRI STURLASON, snor're stoor'la- son, Icelandic poet and historian : b. Hvamn, 1178; d. 22 Sept. 1241. Tracing his descent from the kings of Norway, he early turned his attention to the history of their doings, and made a collection of sagas entitled the Heims-kringla, or the Ring of the World, in which are interspersed songs from prehistoric times and also a number of poems by the skalds of the kings, whose lives are told by Snorri. It contains a record of the Norwegian kings from the earliest time to the death of Magnus Erlingsson (1177), and was first printed in 1697. It has been translated into several languages. Snorri became chief judge of Iceland, but his ambitious and intriguing character led to his assassination.

SNOUT-BEETLE, any weevil of the family Curculionidce, many of which are pests to growing plants or to stored grain, etc. One of the worst in the United States is the imbricated snout-beetle (Epicosrus imbricatus) which is widespread and attacks garden vegetables and fruits of all sorts, sucking their juices.

SNOW, Francis Huntington, American naturalist: b. Fitchburg, Mass., 29 June 1840; d. 20 Sept. 1908. He was graduated from Wil¬ liams College in 1862 and from Andover Theo¬ logical Seminary in 1866, at which time he was called to the University of Kansas, then estab¬ lished, as professor of mathematics and natural history. In 1886 Snow Hall of Natural History was established in his honor, and in 1890 he was made chancellor of the university and pro¬ fessor of entomology. He was well known in the field of ornithology and meteorology, but especially as the discoverer of a fungus de¬ structive to the chinch bug.

SNOW, Lorenzo, Mormon apostle: b. Man¬ tua, Ohio, 3 April 1814; d. Salt Lake City, Utah, 10 Oct. 1901. He studied at Oberlin College, but was converted to Mormonism through the preaching of Joseph Smith in 1836, and be¬ came a Mormon elder and missionary of the Church of the Latter Day Saints. In 1849 he was proclaimed one of the Twelve Apostles of the Mormon faith, and during the periods be¬ tween the migrations of his people was identified with its attempts at public education. He was the founder of Brigham City, Utah, whose in¬ dustrial system he organized on the co-operative plan. In 1898 he was elected president of the Mormon Church. He translated the Book of Mormon into Italian, and was the author of (The Only Way to be Saved* (1851) ; (The Voice of Joseph) ; and other Mormon books.

SNOW is the water in solution in the at¬ mosphere crystallized into geometrical forms, or congealed by cold into granules or irregular particles. Snow forms usually within the clouds at various heights in the atmosphere, according to the latitude, degree of cold prevailing at a given locality, altitude of clouds, etc. It is produced in great quantity in all latitudes, though it rarely reaches the earth in the tropics

(except on high mountain tops), because the heat of the lower air melts it and converts it into rain. Over the circumpolar region per¬ petual snow covers the earth to the depth of many feet, and on the highland areas it accu¬ mulates to so great a depth that the pressure of the superincumbent mass above causes a grad¬ ual metamorphism in the character of the mass to take place, by which it is converted into glacial ice. Below 80° of latitude for each hemisphere (the general limit of perpetual snow) snow occurs in general in ever decreas¬ ing quantities as the equator is approached, until at 30° it is rarely seen at sea level. Over the northern portion of the temperate zones, and extending equatorward from 80° to about 45°, snow commonly covers the ground continuously during the winter months, and serves a most useful purpose in the econ¬ omy of nature, in protecting vegetation and the earth's surface from the intense cold of winter. Owing to many causes, both meteorological and topographical, the amount of snowfall varies greatly at different localities, even as regards those situated upon the same parallels of lati¬ tude. Upon the tops of high mountains, whether these be situated within the frigid, temperate or tropical zones, snow falls inter¬ mittently throughout each year, and above a certain height upon them, called the snow-line, remains permanently, covering the summits. Owing to local causes, and to varying meteoro¬ logical and other conditions, the snow-line upon mountains varies considerably in height, even as regards mountains situated upon the same parallels of latitude. In general it approxi¬ mates 1,000 feet at 70°, 5,100 at 60°, 6,800 at 50°, 10,200 at 40°, 13,500 at 30°, 15,000 at 20° and 10°, and 16,000 or 17,000 feet at the equator.

Two distinct varieties of snow occur, — the crystalline and the granular. The latter some¬ times occurs as a distinct formation by itself, but more frequently as an accretion deposited by mist, or by clouds laden with minute rain¬ drops, upon the crystalline varieties while these are passing through them on their earthward journey. Those particles wholly of a crystal¬ line character are transparent like glass, vary in size from three-quarters to one-fiftieth of an inch in greater diameter, and fall to earth singly, or bunched together into flakes, accord¬ ing as to whether the temperature and humidity are low or high. In general their size decreases in a certain ratio, with a

decrease in the tem¬ perature of the air, and vice versa. The ma¬ jority exhibit a tendency to divide into six, due to the fact that snow crystals belong to the hexagonal system of crystallization.

The majority of snow crystals assume forms which, by virtue of outline structure or general characteristics, may be grouped into two principal classes, — the columnar and the tabular. Those comprising the former class are all such as appear in the form of hexa¬ gonal columns, long, slender, needle-shaped crystals, or columns tapering at one end. The tabular snow-crystals develop upon an ex¬ tremely thin tabular plane, whether they pos¬ sess open or solid structure, or both combined. These two principal types often combine, tabu¬ lar crystals forming upon one or both ends of the columnar crystals, on a plane perpendicular

FORMS OF SNOW CRYSTALS

to their main axis, and so form compound crystals.

Crystallic growths sometimes take place from minute granular snow, the latter forming the nucleii, from which crystallic additions project or ramify in many planes. During ex¬ treme cold, or when snowfalls emanate wholly from high cirro-stratus clouds, minute sub¬ crystalline varieties often predominate, exhibit¬ ing an imperfect or segmentary semblance to tabular or columnar forms.

The various types of snow crystals do not occur with equal frequency, or form an equal bulk of the total snowfall. The tabular crys¬ tals, and especially those of an open, branchy structure, appear the most frequently, and the others in the following order : tabular crystals possessing solid nuclei ; granular snow, minute irregular sub-crystalline varieties, solid tabular hexagons, columnar crystals, compound crys¬ tals.

The columnar crystals vary much less than do. the tabular ones; such variations as occur being chiefly those relating to their dimensions, rather than their structure or aspect. The com¬ pound crystals exhibit a much greater variety of form and structure. The connecting bar varies greatly in both length and thickness in the same and in different snowfalls. The tab¬ ular crystals attached to one or both ends of the

columnar bar also vary greatly at different times, both as regards size, outline and struc¬ ture, and these variations often apply to the tabular crystals attached to the same bar. Com¬ monly, whenever the connecting bar is ex¬ tremely short, one of the tabular crystals at¬ tached to its ends will greatly exceed the other in size, and as a result the compound crystal (resembling a cuff-button in shape) is practi¬ cally converted, for purposes of descent, into a tiny parachute, the minor tabular crystal as¬ suming the role of parachutist ; and in this order the crystals fall through the air and alight upon the earth.

The most important division into which snow-crystals are divided is the tabular class, and those grouped under this head occur the most frequently, exhibit the greatest beauty and diversity of form, and form by far the larger part of the total snowfall. The varia¬ tions of outline, structure, internal ornamenta¬ tion, etc., of the individual crystals of this class, both in the same and in different snow¬ falls, are all but infinite. No written descrip¬ tion can adequately portray the wondrous beauty, complexity and perfect symmetry of many of them; it far transcends that of the crystals of any other mineral species. They occur in three principal subdivisions, and the frequency of the occurrence of each is in the following order:

(1) Those of a wholly open structure (branchy) ; (2) those possessing nuclei of a close structure surrounded by growths of an open nature; (3) those whose structure is wholly close (solid). Owing to various un¬ favorable conditions, as violent winds and the collisions and fractures due to these, develop¬ ment proceeding while they are in motion (as in falling) or while they are in close juxta¬ position, and to other unknown causes, the majority of the crystals of snow fail to attain perfect symmetry in all their parts. Commonly the nuclei outline a minute star, a hexagon, or

a circle. The number of snow-storms deposit¬ ing large numbers of beautiful and symmetrical crystals at a given locality, in the northern part of the United States, during any one winter, does not usually exceed 16, and may not exceed eight. The great majority of the more perfect and beautiful crystals usually emanate from the clouds of the western, southwestern or north¬ western segments of great storms. In general, similar types of crystals occur in most storms, within corresponding segments of each, due to some law of general distribution. Each cloud- stratum, the high, the low and the interme¬ diate, and the temperatures, air-ipressures, etc., corresponding with each, seem to favor the for¬ mation of a certain type of crystal; the low clouds give large branching crystals ; the high clouds, small, compact ones; the intermediate clouds, medium-sized crystals, in form

a com¬ posite of the low and high types.

The feature of chief interest and importance concerning the internal structure of the crystals is the occurrence therein of minute inclusions of air and air-tubes. These appear by trans¬ mitted light as dark lines or shadings, etc., be¬ cause of the absorption, interference, or refrac¬ tion of the rays of light that strike or pass through them. The beautiful and usually sym¬ metrical arrangement of these air-tubes and compartments impart to this type of crystal its principal charm. These air-inclusions are of great interest, because of the great number of distinct and varied inclusions that often appear within the same and within different individual crystals, and also because it may be assumed that they were not formed in regular progress¬ ive order, but in intermittent order from the nuclei outward, while each new and distinct outgrowth was being added to and arranged upon and around the growing crystals ; and hence they outline the boundaries of each of the many pre-existing shapes the crystals suc¬ cessively assumed in cloudland.

Hundreds of drawings of this variety of snow crystal have been made by various ob¬ servers, among them Dr. Scoresby and James Glaisher of England, Prof. S. Squinahal of Italy, and Mrs. F. E. C'hickering of Port¬ land, Maine. Many of these have been pub¬ lished in textbooks and other publications. More recently the aid of photography has been invoked in securing and perpetuating the like¬ nesses of these beautiful but fleeting forms. During the winter of 1902-03 Dr. Neuhauss of Berlin secured microphotographs of them, and about the same time Herr Sigson of Russia and Dr. Nordenskibld of Stockholm also secured microphotographs. Many of these were pub¬ lished in the Meteorologische Zeitschrift for 1894, in a paper issued by the Geological Soci¬ ety of Stockholm, and also in a book by Dr. G. Heilman, entitled ˆchneekrystalleˆ The pio¬ neer in this work, however, seems to have been W. A. Bentley of Jericho, Vt., who began the photographing of them during the winter of 1885. By the spring of 1904 the microphoto¬ graphs secured by him numbered over 1,100, no two alike. Many of these were published in a publication issued by the United States Weather Bureau, entitled (Studies Among the Snow Crystals, Winter of 1902. } These photo¬ graphic studies, in connection with the meteor¬ ological ones made simultaneously, have greatly

increased our knowledge of these most interest¬ ing crystal forms.

The manner in which the snow crystals form is this: They crystallize in a liquid (the air) of small density, which is often in a state of agitation where the crystals are forming, and whose degree of density, humidity, etc., is ever changing; and usually among a multitude of uncongealed or uncrystallized particles of vapor, called cloud. The commonly accepted theory is that these visible cloud-particles unite to form the true snow-crystals. This is doubt¬ less true, in so far as the granular varieties are concerned, but the true crystalline varieties probably form direct from the invisible water- molecules floating in the air, before these unite to form the vastly larger cloud-particles. It is possible that the cloud-particles are essentially the dross, residue, or excess of moisture left over during the process of crystal-building. A portion, at least, of this residue or excess of moisture ascends, and is congealed in the upper air, into the semblance of minute snow-crystals ; appearing in the form of the cirrus cloud above, and often around all storms of great duration or magnitude. Many occurrences are on rec¬ ord of snowfalls occurring from skies clear or nearly free from visible clouds, and this lends additional weight to this theory. So very light are many of the snow-crystals, especially while they are in a nuclear or uncompleted state, and so strong are the expanding, uprushing air-cur¬ rents within many portions of great storms, that it must be assumed that many crystals are wafted upward, perhaps repeatedly, and ac¬ quire growths at greater altitudes than that wherein the nuclei originated, before they at¬ tain sufficient weight to fall to earth. Doubt¬ less the multitudinous changes of form and structure that many of the crystals undergo within the clouds during growth are due to these many vertical and horizontal flights within the clouds and to the great and ever- changing variety of meteorological and other conditions prevailing therein, each of which im¬ presses its especial condition upon them.

The production and deposition of the snow, occurring, as it does, over so large a portion of the earth’s surface, are phenomena of great magnitude and importance. Snow not only changes the whole aspect of nature but it also serves many useful purposes. It conserves the heat of the earth and protects vegetation from the intense cold of winter and even in northern regions, where deep snows occur, it is not considered a serious impediment to travel or commerce. A track once made, the compacted snow affords an excellent roadbed, over which heavy loads 'of merchandize can be easily and quickly transported on sleighs. But while in the abstract its manifestations are beneficent, in the concrete, some of them are otherwise. Much damage often results from the great inundations caused by the sudden melting of deep

snow over large areas, and its sudden ac¬ cumulation to great depths often causes a tem¬ porary blockade of railroad service and travel in general. A large fall of damp snow or sleet sometimes accumulates so heavily upon tele¬ graph and telephone poles and wires and upon the limbs and smaller trees of the forests, that they break under the great weight. Snow-slides from the steep sides of mountains sometimes

occur and bury and destroy whole villages. Al¬ together the snow fills a most important place in nature's plan. Not only is it beautiful in itself, composed of the most graceful crystal forms that occur in nature, but it plays an im¬ portant part in beautifying earth and sky, for¬ est and mountain.

The measurement of snowfall is often a matter of considerable difficulty, on account of the drifting caused by the winds. Various types of gauges are used to collect the snow¬ fall over a given area and measure the amount of water formed by its melting. Hollow tubes are used to gather and weigh fallen snow so that the total amount of snow over a given area may be estimated. Stakes planted in the ground are also employed for this purpose.

W. A. Bentley,

Author of (Snow and Snow Crystals d

SNOW-BALL. See Guelder Rose.

SNOW-BERRY, a name applied to several white-fruited plants, among them the rubiaceous Chiococca alba of tropical America, a climbing plant with yellow flowers and white berries. It has medicinal properties, and the root, known as calunca-root, was used as a diuretic. The cultivated snow-berry (Symphoricarpus albns) is a small, smooth, much branched shrub of the honeysuckle family, common in North America. It has opposite oval leaves, and inconspicuous rose-colored flowers in racemes, often leafy. While of somewhat sprawling habit, snow- berries are valuable because of their power of increasing rapidly by suckers, and for their ornamental white, pulpy berries, borne in such abundance as to bend down the slender branches, and retained far into the winter. The creeping snow-berry is another northern plant (Chiogenes luspidula) , an evergreen trail¬ ing shrub, found in sphagnum bogs and moun¬ tainous evergreen woods. It is pubescent, with alternate two-ranked ovate leaves, and axillary, small, white flowers, succeeded by somewhat dry white berries. The whole plant has the aromatic taste of sweet birch.

SNOW-BOUND. (Snow-Bound ; a Winter IdyP (1866) was written by Whittier im¬ mediately after the close of the Civil War. The lifting of a great pressure of anxiety left him free to be idyllic, which he could be all the more movingly because of the recent deaths of his mother and sister, deeply-regretted links with the past, which he perpetuates. Few poems unite with so much tenderness, so much accuracy.

(Snow-Bound > can be called nothing less than the classic picture and epitome of rural New England during its golden age. The sturdy, simple family shut in by the December snow storm includes most of the types native to that region: the ((prompt, decisive" father who knows Canada and the sea, and by his ad¬ venturous tales brings half of New England to the winter fireside; the busy mother, full of memories of her own girlhood, of legends of Indian raids, and, still more remote andjvener- able, of Quaker antiquities as recounted in <(painful Sewel's ancient tome" ; the uncle, ((in- nocent of books," who knows the lore of weather and cloud and bird and muskrat in a way which points forward to that village na¬ turalist of genius, Thoreau ; the maiden aunt, sweet, devoted, cherishing the "virgin fancies

ot her heart" ; the schoolmaster, a young Dart¬ mouth student who, adaptable and at ease, brings into this plain neighborhood the love of learning and truth; and finally the guest, the lovely and eccentric woman marked by the touch of wildness, nearly madness, that now and then flashes from beneath the surface of New England sobriety. These Whittier de¬ scribes, and their (Occupations during the week of close embargo, with the fidelity of affection ; while even above his truthfulness to outer fact rises his truthfulness to the deeper spirit of New England, its homeliness, its stability, its aspirations, and its inviolable confidence in high and good things. The style of the poem is limpid and flexible, now Flemish in its un¬ adorned detail, and now radiant with mystical fervor.

Carl VanDoren.

SNOW-BUNTING, or SNOW-FLAKE,

a large bunting (Plectrophenax nivalis), com¬ mon in the northern regions of both hemi¬ spheres, and visiting the United States and cen¬

tral Europe in flocks during the winter. They haunt the open, treeless wilds, and place their nests on the ground or in the crevice of a rock throughout northern regions. Their long hind claws serve to distinguish them from the true buntings, giving them a certain similarity to the larks, which they also resemble in running swiftly and in never perching (see Long- spurs). In winter the plumage of the male is almost or quite pure white. The summer dress exhibits a tawny brown hue, spotted with white, the back darker. The average length is about seven inches. The song is sweet, but faint. The Laplanders account the flesh of these birds a great delicacy; and in Greenland they are caught and dried in great numbers. They subsist largely on seeds.

SNOW-DROP, any one of the 50 or more cultivated varieties of the genus Galanthus (Amaryllidacece) , the most common being the European snow-drop (G . nivalis), famous for its midwinter blooming. They are small, low plants, with bulbous roots, narrow leaves and nodding white flowers, touched with green. The corollas are somewhat bell-shaped, having six segments, the three outer concave and spreading, and the others straight and shorter. Galanthus chvesii is one <of the largest flowered varieties. Although usually very early spring bloomers, giving the bees their first supplies of honey, some varieties appear in the autumn, and were, for a while, rare plants.

SNOW-FLAKE, any one of the species of Leucojum, a genus of the Arnaryllidacece, re¬ sembling the snow-drops, but larger and having the six segments of the perianth equal. They are graceful, nodding flowers, pure white, ex¬ cept where touched with green at the tips of the petals, and are low and bulbous, with narrow leaves. L. vermin blooms soon after the snow¬ drops and crocuses, while L. cestivnm, the sum¬ mer snow-flake, a species of continental Europe, blooms still later, and has several flowers on a stalk. Propagation is by offsets, and these are best removed when the leaves are dry.

SNOW-GOOSE, an Arctic goose (Chen hyberboreus) . See (iEF.se,

SNOW LEOPARD, or OUNCE, a large cat (Felis nncia) of the high mountains and plateaus of central Asia, where it is often found in snowy forests near the limit of timber growth, and rarely descends below 9,000 feet. It feeds on wild and domestic sheep, goats and dogs, but is not feared by the men of the re¬ gion. Mivart points out its special interest as a large feline animal adapted to live in a cold climate, and says : <(It is clothed in a dense long fur, which even forms a short mane. It is four to four and one-half feet long, without the tail, which measures a yard. The fur is of a pale yellowish gray,

with small irregular dark spots on the head, cheeks, back of neck and limbs, and with dark rings on the back and sides. It is whitish beneath, with some large dark spots about the middle of the abdomen. The long bushy tail is surrounded by incom¬ plete black bands." Its fur is one of the most handsome and valuable (yielded by the cat tribe.

SNOW LINE, that line above which there is perpetual snow. In equatorial regions it usually lies at a great elevation, but in polar regions it is very near sea-level. Glaciers form in most regions above snow line. See Glaciers.

SNOW-OWL, a large owl (Nyctea nyctea), a native of the north of Europe, Asia and America. In old birds the plumage is occa¬ sionally pure white, but in younger and most adult birds each feather is tipped with dark brown or black. The length of the adult male is about 20 inches, that of the female four or five inches more. This is one of the largest of the owls, and is at once distinguishable from the great horned owl, the only other species of equal size which occurs commonly in the United States, by the absence of ear-tufts. It breeds altogether north of the United States, and while it is quite capable of enduring the cold of Arctic winters, a larger or smaller number migrate southward, but most irregularly, every winter. During some winters it is very rare, and some¬ times very common in the Middle States, and it may straggle quite to the Gulf Coast. The five to eight large white elliptical eggs are laid in a nest built on the ground in a rocky spot. This is one of the most diurnal of the owls and frequently hunts by day, its prey being hares, grouse, ptarmigan and similar mammals and birds, as well as rats and mice. See Owl.

SNOW PLOW, a machine or implement used to clear snow from roads, tracks and path¬ ways. The simplest form for common high¬ ways consists of boards framed together so as to form a sharp angle, like the letter A in front and spreading out behind to a greater or less width. Being drawn along with the apex in front, the snow is thrown off the boards to the side of the road or path, and thus a free pas¬ sage is opened for traffic. The snow plow in common use on urban street railways consists, roughly, of a heavy car on high trucks ; under¬ neath the floor of the car and before or behind each pair of wheels are huge notary brushes, of cane, wood-fibre, or some stiff material. These brushes are set obliquely across the track, at right angles to each other, and are about two feet or a yard in diameter. When the car is in motion power is supplied (from the same source

as the motive power), and the brushes rotating swiftly sweep the track clear of the snow, which is thrown to either side. This is further removed by means of side drags, or boards obliquely attached to the car and set edge up, on either side, the point of the angle which they make with the body of the car being directed to the front. Snow plows are in common use on the Western and Northern railroads in the United States and Canada. They are of many different patterns, the machinery for such pur¬ pose being improved and revised every year. They are constructed more or less on the same principle, which comprises pairs of rotary blades obliquely set in a drum casing open at the front end, and driven by horizontal shafts, the other ends of which are connected with machinery in the body of the car, from which the driving power is supplied. Such an engine is coupled to the locomotive, from which it draws the steam necessary for the operation of the plow through connecting pipes. Another locomotive is hitched behind to supply the moving power, then comes the train of cars, and, in many cases, behind these another locomotive to help in the pushing. By means of such contrivances the railroads have been enabled to operate through severe snowstorms, cutting through drifts which completely bury their tracks and which before the invention of the snow plow necessitated complete suspension of traffic. Snow plows are now in use on practically all railways in cold climates.

SNOWBIRD, a North American finch of the genus Junco, in which the plumage is not streaked, and the two marginal feathers of the tail are white. They are northern birds, the eastern ones breeding south of the Great Lakes only on the tops of mountains, and the several western species inhabiting Canada or the peaks of the Rocky and Pacific Coast mountains, making their nests on the ground. They ap¬ pear in the middle districts about the time of the first snowfall, and remain as familiar winter residents. The common Junco hyemalis of the United States, east of the Missouri, is six and one-quarter inches long; grayish or dark ashy black all over the head, neck and upper parts, with the breast, belly and under tail coverts, and the first and second external tail feathers white. Western species, such as the Oregon snowbird, exhibit a greater or less amount of chestnut tints in the plumage. They utter sharp chirping notes in winter, but sing prettily dur¬ ing the breeding season. The name is also applied to the brambling and fieldfare or any small bird seen during snowfalls.

SNOWDEN, Ethel, English non-militant woman suffrage leader: b.

19th century. She was married to Philip Snowden (q.v.) in 1905, and became known as one of the more con¬ servative leaders in the movement for woman suffrage. She attended the Woman's Peace Conference at San Francisco in 1915.

SNOWDEN, James Ross, American nu¬ mismatist and government official : b. Chester, Pa., 1810; d. Hulmeville, Pa., 21 March 1878. He was educated at Dickinson College, studied law and engaged in practice at Franklin, Pa. He was speaker of the State legislature in 1842-44; State treasurer in 1845ˆ-7; treasurer of the United States mint in 1847-50, and its

director in 1853-61. He wrote extensively on numismatics and besides many official reports and addresses was author of descriptions of Coin in the United States Mint' (1860) ; (The Mint at Philadelphia' (1861); (The Coins of the Bible and Its Money Terms' (1864), etc.

SNOWDEN, Philip, English Socialist and labor leader: b. Kneighley, Yorkshire, 1864. He was employed in the Civil Service in 1886- 93, afterward engaging in journalism and lec¬ turing. He was elected to the House of Commons in 1906. He was chairman of the Independent Labor Party in 1903-06; was a member of the Royal Commissions on Canals and Waterways and on the Civil Service; and a member of the Central Control Board (liquor traffic). Author of Socialism and Syndicalism' (1915).

SNOWDON, sno'ddn, Wales, a mountain- range in the northern county of Carnarvon¬ shire, extending from the neighborhood of Car¬ digan Bay to that of Conway. It is crowned by five ridges, of which Moel-y-Wyddfa is the highest point in Wales (3,560 feet). The range is steep on the west, but more gradual on the east. It is penetrated by many valleys and streams, the most important of which are the Cwmglas and Cwm-y-Llan. There are some beautiful lakes, which attract many visitors. Bettws-y-Cold is one of the centres of resort. An electric railway to the summit of Snowdon was completed in 1897.

SNOWSHOE, a framework loosely at¬ tached to the shoe or moccasin for giving sup¬ port to the wearer in walking over soft snow, much used by the Northern Indians, the Cana¬ dians, Laplanders and other residents of coun¬ tries where snow remains for long periods. It consists of a frame of bent wood, interlaced with a network of hide or sinews cut into strips. The portion where the ball of the foot would rest is more closely woven than the rest, and is strengthened by a piece of light, tough wood strapped across from side to side. The shape of the snowshoe is elliptical, being rounded in the front and

drawn out to a long blunt neck at the back. Its size is usually three feet or more in length and a foot to a foot and a half in width. This large, flat surface fur¬ nishes a larger plane of resistance to the soft snow and by distributing the weight of the wearer over a larger surface than the foot does, does not break the brittle crust on the top of snow, which makes progress without snow- shoes impossible. In use, the wearer may well encase his feet in moccasins and further pro¬ tect them by wrappings or many pairs of stock¬ ings. This is necessary to prevent the foot from being chafed by the strap, into which the toe is passed. This strap is in the middle of the snowshoe, over the strap of wood, near the front; the heel of the foot is not attached to the snowshoe at all. When the heel is raised in walking, the snowshoe is not lifted, but re¬ mains flat on the ground, then, as the foot is lifted the toe elevates the forward part of the snowshoes and it is dragged along on the snow as the leg advances. Experts can walk on snow- shoes with great rapidity, but there is a swing¬ ing outward motion that must be acquired before the novice can hope to make the shoes serviceable. When there is a light crust on the

snow snowshoes allow the hunter to overtake deer, moose and other hoofed animals, whose pointed feet piercing the crust sink through the snow and make rapid flight impossible. In Canada races on snowshoes have become a regular feature of the winter sports, and records show 100 yards covered in 10 seconds; one mile in from four and a quarter to five minutes; five miles in from 31 to 33 minutes. Snowshoes are frequently highly ornamented and among some of the Indians serve as love tokens. See Ski. Consult for records the re¬ ports of (The Montreal Snowshoe Club.-*

SNUFF, a powder manufactured from to¬ bacco and used for chewing and for inhaling through the nose. For the manufacture of the finest grades of snuff only the choicest por¬ tions of fine leaf are used, but for the ordinary commercial brands the thick, stemmy portions, the mid-rib and scrap tobacco are employed. The making of snuff is one of the most intri¬ cate processes for which the tobacco leaf is used. The peculiar aroma and fragrance in snuff are obtained by a species of fermentation induced in the leaf by packing it, moist, in large quantities and subjecting the mass to a high temperature. Snuff is either moist or dry, the details in manufacture differing only in re¬

gard to the amount of moistening undergone. The moist snuffs are known as rappees, and the dry under various names, the varieties known as Irish, Scotch and sweet snuff being .common. The manufacture of French rappee has been brought to a high degree of excellence by the French government which owns large factories. The tobacco is subjected to two processes of fermentation, whereby aroma and strength are acquired, and the nicotine and organic acids re¬ moved. The leaves and stalks, moistened with salt water (to prevent putrefaction), are pressed into cakes and sliced and left in open chambers for five or six months to ferment and develop aroma, the temperature at times reaching 140° F. After that time the tobacco is ground in mills out of contact with air, in order to pre¬ serve the arorqa, and the powder, rape sec, is after damping conducted to closed wooden chambers to undergo during 10 months the sec¬ ond fermentation, which imparts strength to the snuff. During this fermentation the temperature is kept at from 120° to 130° F. and the snuff is frequently repacked, to ensure uniformity. Finally the snuff is gathered from the ferment¬ ing rooms into one large chamber, where it matures for one month ; it is then ready for stamping into casks. The machinery used in the French factory is almost wholly automatic. Snuff is very commonly adulterated in order to increase its bulk or pungency. During its man¬ ufacture various flavoring sauces and waters are used for dampening both the leaves and the rape sec, and in this way the flavor of the finished snuff is effected. The processes of manufacture occupy about 18 to 20 months, and in this time, by the repeated fermentations, about two-thirds of the nicotine is destroyed, the acids (malic and citric) are destroyed and the acetic acids and bases evolved leave free ammonia in the snuff. This, with the slightly free nicotine and the aromatic pungents, are de¬ sired qualities. The Scotch and other dry snuffs are commonly slightly adulterated with quick¬ lime, which gives the biting, desiccating effect

for which they are peculiar. Snuffs are scented with musk, essences of bergamot, lavender, attar of roses, tonquinbeans, cloves, orange flowers, jasmines, etc.

The practice of snuff-taking was introduced into Europe from America during the 16th cen¬ tury, and during this and the following century became very general throughout the Continent and in England. Its use in England greatly in¬ creased under the reign of William and Anne, and in France under the various Louis. The practice, although almost entirely abandoned by the upper classes to-day, is more widely prev¬ alent than is commonly thought. The consump¬ tion of the drug in the British Isles is said to amount to more than 900 tons annually. In the United States, where the consumption is about 9,500 tons a year, the

chief users are foreign- born. The snuff used in this countrv is all of domestic manufacture, the small amount of French snuff imported not being worth con¬ sidering.

The habit of taking snuff is said to be one of the pleasantest ways of using tobacco. The snuff, pinched up between the thumb and fore¬ finger, is drawn into the nostrils by sharp, deep inhalations. In a few moments it produces a ticklish sensation, which frequently causes sneezing, and is highly gratifying to the user. The habit of ((dipping snuff,® at one time com¬ mon among the poorer classes in the south Atlantic portions of the United States, consisted in holding in the mouth the well-chewed end of a dry twig, which had been dipped into powdered snuff. The habit is still prevalent in some sections.

Snuff-boxes, for retaining small quantities of the powder about the person, are of great vari- etv of shape and material. When snuff-taking was one of the habits of society these boxes were often of much value and beautv of work¬ manship. Gold, silver and precious stones were employed in their manufacture and some of the boxes of crowned heads and of the popes are famous for their workmanship. The ordinary boxes used by the snuff-takers to-day are of horn, papier-mache or lacquered wood and are made largely in France and Germany.

SNYDERS, sni'ders, Franz, Flemish painter: b. Antwerp, 1579; d. there, 19 Aug. 1657. He studied under Brueghel, the younger, and Hendrick van Balen. In 1602 he was elected master of the Guild of Saint Luke. In his early life he painted fruit and flowers. Rubens en¬ gaged him to paint still-life accessories in his pictures, and in turn Rubens often painted the figures for Snyders' canvases. His pictures are found in ail the great galleries of Europe. His masterpiece, (Two Lions Pursuing a Roebuck, > is on exhibition at Munich.

SOANE, son, Sir John, English architect : b. Whitchurch, near Reading, 10 Sept. 1753; d. London, 20 Jan. 1837. He was a mason's son, and was for a time an errand boy, but having gained some architectural knowledge, won first the silver medal (1772) and afterward the gold medal (1776) of the Royal Academy, the latter for a design of a triumphal arch. In 1788 he was appointed architect to the Bank of England, and in 1791 clerk of works to Saint James' Pal¬ ace, the Parliament Houses and other public buildings. He was elected A.R.A. in 1795 and R.A. in 1802 and became professor of archi-

tecture to the Royal Academy in 1806. He was knighted in 1831 and at his death bequeathed his collection of works of art and $130,000 to the nation. The Soane Museum thus formed is housed at 13 Lincoln's Inn Fields, London, and contains antique sculptures, bronzes, gems, models of ancient buildings, a collection of pictures, etc. Consult (Memoir y by Britton (1834). He published plans of (Public and Private Buildings) (1828).

SOANE MUSEUM, The. See Soane, Sir John.

SOAP, a chemical combination of fats and alkali, used as a detergent. The cleansing prop¬ erties of these compounds have been known for a very long time; the manufacture of soap upon a large scale dates only from about 1823, in which year Chevreul published his famous re¬ searches upon the animal fats. The natural fats — palmitin, stearin, olein, etc. — are acid ethers of glycerine. Glycerine is an alcohol containing three atoms of replaceable hydrogen, its formula

is CsHr, (qs. -m the fats ˆese three hydrogen

atoms are replaced by the radicles of various acids, chiefly of palmitic, stearic, margaric and oleic acid, and thus are obtained the glycerides of these fatty acids, or, as they are commonly called, the fats palmitin,

CsHs

(CieH3iO)3

margarin

C3HB

(C18H33O) 3

[0s: stearin > (cSo), [0s;

■ (Cij£b)a [0s; and olein- | O3. If these fats be heated with

caustic alkalis they are decomposed, a union taking place between the particular acid, the radicle of which exists in the fat,. and the alkali while glycerine is at the same time produced ; thus with stearin and caustic potash the re¬ action may be formulated :

(cS&O). (°. + 3KHO = C»g; } 0» + 3C“H-g \ o.

Glycerin, Potassium Stearate,

The salt of the fatty acid so produced (in this instance potassium stearate) is called a soap. Soaps, therefore, may generally be defined as the metallic salts of the higher fatty acids, and the process whereby these salts are produced from the natural fats is called saponification. Al¬ though this includes under the name soap all the metallic salts of the higher fatty acids, yet in common usage the name is limited^ to the sodium and potassium salts of these acfds.

Soaps are also produced by treating certain oils with caustic alkalis ; these oils are of the class known as fixed oils, so-called because they cannot be distilled without decomposing. Oils which may be distilled, as the essential oils and mineral oils, are not available for soap-making.

The essential parts of a soap then are (1) the alkaline metal and (2) the fatty acid which it contains; upon these two the quality of the soap depends. Speaking broadly, two kinds of soap are made for the market : hard soap and soft soap. In the former type, soda is used as the combining alkali ; in the latter, potash.

Materials. — The oils and fats in economic use for the manufacture of soap may be divided for discussion into five groups or alliances: (1) coconut oil and palm-kernel oil; (2) olive oil, olive oil foods, cottonseed oil, peanut oil,

sunflower seed oil and corn oil; (3) tallow, greases and palm oil; (4) castor oil and lin¬ seed oil; (5) red oil and resin. The oils in the first group saponify very quickly at ordinary temperatures upon the addition of cold con¬ centrated caustic soda. During the action great heat is evolved. A larger yield of firm soap is obtained from these oils than from any others. They are, however, rarely used alone, but are added to tallow and cottonseed oil, and this combination results in a superior grade of soap, better than can be made from either of the in¬ gredients alone. Their glycerine content is higher than in any other group, amounting to 12 per cent. The second group is composed chiefly of glycerides of oleic acid. They yield a thin soap, very soluble in water, and make good toilet and textile soaps. The well-known green Castile soap, when pure, is made from olive oil. Their glycerine content is about 10 per cent. The third group are glycerides of (principally) stearin and palmitin, and yield a firm soap of good body, dissolving slowly in water ; much improved by the addition of oils from the first and second groups. The oils of the fourth group saponify readily, yielding highly soluble soaps of a pale brownish color, useful

in mak¬ ing transparent sPaps. The acids of the fifth group combine directly with caustic soda. They are used only in combination with other groups.

In the last few years the process known as hydrogenation has made oils which had been unavailable for soaps a very important factor in the raw materials market, which had been seri¬ ously narrowed by the demand for all edible oils by the manufacturers of oleomargarine and <(nut butter.ˆ By this process oleic acid is con¬ verted into stearic acid by passing a current of hydrogen gas through it in the presence of re¬ duced nickel, while at the temperature of about 550° F. This process is applied chiefly to cheap fish oils — which lose their objectionable odor during the treatment.

Manufacture. — Soap is made generally by one of three processes: (1) that in which the glycerine of the fats is set free and separated out; (2) that in which the glycerine is set free, but not separated; (3) that in which there is di¬ rect saponification and no glycerine is produced. More than 90 per cent of the soap produced is made by the first plan, the by-product glycerine being very valuable. The oils and fats in pre¬ determined proportions are measured into the (<kettle,)) a large cylindrical tank which may be as much as 25 feet in diameter and 30 feet deep. This kettle has an open steam coil in the bottom to supply the heat. Part way up the side is an outlet pipe with a valve through which the crude soap is drawn into the crutcher after the saponification is complete. At the bottom of the kettle is another outlet through which is drawn the watery residue after the soap has been separated out. Following the charging of the kettle with fats a measured por¬ tion of a dilute lye made with caustic soda is run in and the steam turned on, and the con¬ tents of the kettle vigorously boiled. As the soda unites with the fat more lye is added at intervals, care being taken that at no time until the saponification is almost complete shall there be an excess of alkali. When the contents of the kettle appear clear and homogeneous, dry salt is shoveled in. As soap is but sparingly

soluble in brine the action of the salt is to separate the mass in the kettle into two layers, the upper one being of the separated soap and the lower one a mixture of brine, glycerine and excess lye. This step in the process is called “graining® because of the granular appearance of the soap. The amount of salt necessary de¬ pends upon the kind of oil

and fat used as the raw material, some fats requiring much more than others. The salt is added in small instal¬ ments until the separation is complete. After standing several hours the lye is drawn off from the bottom of the kettle and clear water turned in. If the soap is to have an admixture of resin, it is added at this stage. A propor¬ tion of caustic soda is added to remove im¬ purities, and the boiling is renewed, and the soap again becomes a clear mass. It is salted out a second time, and the process repeated, if it seems desirable, with the addition of lye only. The next step in the process is “fitting.® Water is added by degrees and boiling continued until the soap gains the proper appearance, readily recognized by the experienced soap boiler. It is then allowed to settle, which if the batch is large may take four or five days, more or less, according to the raw materials used and the season of the year. The batch is then found to be in four distinct layers: (1) a crust of “fob® or soap froth; (2) the good soap, con¬ taining 63 or 64 per cent of fatty acids; (3) the “nigre® or weak, dark-colored soap, con¬ taining about 33 per cent of fatty acids; (4) watery lye. In making cheap soaps the second layer is run directly into the soap “frames® — casings in which it stands until cold and solid. For a finer grade it is run first into the “crutcher,® a mixing machine, where it may be “filled® by adding sodium carbonate, sodium silicate, sodium borate, naphtha (up to 10 per cent), perfumes and coloring matter. After some hours of crutching it goes to the frames to solidify. Special cooling machines have re¬ cently come into use whereby the cooling proc¬ ess has been reduced from several days in the ordinary frames to two hours, or even less. The device consists in forcing the liquid soap into metal casings the sides of which are con¬ tinually cooled by the passage of currents of cold water. By the turning of a screw the casings are released, and the blocks of soap readily removed. When hard enough the blocks are put through the “slabber,® which divides them into slabs by forcing piano-wire cutters through the mass. They are then cut twice again, lengthwise and crosswise, into calces which are placed on racks to dry. When they have dried out to the proper hardness they go to the presses, where each cake receives definite form and the imprint of the maker. Thence they go to the machine which wraps them preparatory to boxing for the market.

Toilet soaps are usually “milled,® the process beginning with shaving or chipping of the blocks of soap as they come from the frames. These chips are allowed to dry hard, perfume and coloring matter are added and they are then run several times through a mill of rollers which transforms them into thin flakes while perfecting the thorough mixing of the ingre¬ dients begun in the crutcher. When the soap flakes are

entirely homogeneous they go into a machine called the “plodder,® a cylindrical or conical casing in which revolves a longitudinal

screw. The screw forces the soap forward under great pressure and it is finally exuded through a form plate in a continuous bar hav¬ ing the outline of the cake in which it is eventu¬ ally sold. The bar is cut into sections of the proper size and these receive their final shape in a press.

The second process of soap-making, in which the glycerine is set free but not separated, is used in the manufacture of soft soaps. Large quantities of soft soap are used in the textile industry. They are made chiefly of linseed oil, corn oil, whale and fish oils and in the finer grades of olive oil. Special white soaps are made with cocoanut oil and some tallow. As previously noted the lye used in making soft soap is made from caustic potash. The lye is added by degrees as in making hard soap, and the boiling is done with a closed instead of open steam coil. The color of the finished soap depends largely upon the kind of oil used, but to a considerable extent upon the care taken in the making. Good soft soap contains about 43 per cent of fatty acids, 10 per cent of alkali and 47 per cent of water. In some grades a per¬ centage of saponified resin is added, but this is highly objectionable in certain textile soaps, and the practice is, therefore, limited.

The third process, that in which the glycer¬ ine is not formed, is known also as the “cold process.® The soap is not boiled, the oils and alkali being carefully proportioned to form complete neutralization. While this process was formerly restricted to cocoanut oil, it has proved workable with other oils and fats when the lye is made strong. It is required, how¬ ever, that the fats be absolutely clean, as all of the ingredients remain in the soap. The caus¬ tic, also, must be of the highest grade of purity. The fats and oils are warmed to the melting point and a little beyond, and placed in a crutcher, the lye, heated to 80° F., being run in gradually with constant stirring. Replacing a part of the soda lye with potash, up to 20 per cent, improves the soap. When the appearance of the soap indicates that saponification is well established, the soap is run into the frames and left to stand for a week, being covered to pre¬ vent it from cooling too rapidly. This method is very popular with makers of toilet soaps, as it is available for small batches, and does not require the costly equipment of the soap-boiling plants.

Specific Properties. — Silicated soaps are produced by mixing silicate of sodium (soluble glass) with ordinary soap. These soaps are cheaply produced, and have very considerable detergent power.

Toilet soaps are produced by perfuming the best ordinary curd-soap with essential oils, or sometimes by saponifying lard, beef-marrow or oil of sweet almonds with caustic soda-lye, in the cold and perfuming the products. They are preferably made of vegetable oils which lather freely.

Shaving soap is made of cocoanut oil as a base with some stearic acid to give hardness. Both soda and potash lyes are used and gum added to prevent its drying quickly. Glycerine is a common ingredient and often a little sugar.

Castile soap when pure is made of olive oil and a soda lye. It soon becomes very hard, however, and to remedy this cocoanut oil or linseed oil is used in the mixture. The cheaper

grades of Castile soap are made from cotton¬ seed oil.

Light or floatant soap is produced by agitat¬ ing a solution of soap, to which a fifth or sixth part of water has been added, until the lather has risen to a considerable height, and then transferring it to a mold, where it remains until the quality of transparency is fixed.

Transparent soap is prepared by drying ordinary soap, dissolving it in alcohol, allowing the solution to remain at rest so long as any impurities are precipitated, decanting off the alcoholic liquid and evaporating it until it is of such a consistency as to solidify when cooled in metallic molds. Many kinds of transparent soaps are made by the cold process, the trans¬ parency being accomplished by the addition of sugar. Glycerine is often incorporated with transparent soaps for emollient effects, while for disinfecting purposes carbolic acid, coal tar, eucalyptus oil and other substances are added.

Mottled soaps are produced by mixing min¬ eral coloring-matter with the soap during a certain stage of the hardening.

Medicated soaps contain antiseptics, such as carbonic acid, creosote, chloride of potash and sulphur, mixed with ingredients. A soap for the use of taxidermists in preserving skins is produced by the addition of arsenic. . A large industry has developed in this country in scour- ing-soaps, which are produced by the addition of fine sand or pumice-stone to the ordinary soap when in its plastic state.

Soap powders are made by mixing dry sal soda and borax with hot liquid soap, with the addition of a definite proportion of hot water, sufficient to provide the necessary water of crystallization to the soda in its subsequent change. The mixture is stirred constantly until lumps begin to form, when it is piled in trays where the soda completes its crystallization. It is then milled to powder form.

History. — The use of soap is of great an¬ tiquity. A well-equipped soap factory was found by the excavators of Pompeii. Histori¬ cal records of Italy and Spain show that soap was in use in those countries in the 8th century. It was known in France in the 12th century and in England in the late 14th or early 15th century. In 1622 James I granted a monopoly to a soap-maker under which he was allowed to make 3,000 tons a year, and paid $100,000 a year for the privilege. In 1711 a tax of one penny per pound was laid upon the soap pro¬ duced by English soap-makers, and in 1816 this tax was increased to three pence per pound. In 1833 it was reduced to one and one-half pence, and this tax when abolished in 1853 was bringing annually into the British treasury a revenue of more than $5,000,000.

Soap-making in America. — In the Amer¬ ican colonies soap-making was at first largely a household art, the housewife utilizing the fats saved from the dripping-pan to make soft soap for her own use, and also even a sort of hard soap, of a quality, however, that would not suit the housekeeper of to-day.

As early as 1608, on the second ship from England to the Jamestown colony, came a num¬ ber of Germans and Poles, skilled craftsmen, among whom were several proficient in handling fat and soap-ashes. In 1621 soap-ashes for export to England were worth from six to eight shillings per hundredweight, and 50 years later

the settlements now included in Maine and New Hampshire derived their chief wealth from soap-ashes and fat. While there were small soap-boiling establishments in nearly all the large towns by 1795, their aggregate product probably did not exceed $300,000 in value. The discovery by Nicolas Leblanc (q.v.), about 1791, of a process for manufacturing soda on a large scale was utilized some 30 years later, when chemical manufacturers and soap-makers began to avail themselves extensively of the supply of soda thus cheaply afforded.

Among the early establishments of the soap trade one of the largest was that of William Colgate of New York, founded in 1806. Fancy soaps were at this time unknown, and the mak¬ ers of the American product contented them¬ selves with a very common grade of soap;

but so rapid was the advance that by 1835 they were supplying nearly all the home demands and were also heavy exporters, principally to England.

About 1850 American manufacturers were employing substantially the same methods and processes that were used in England. New England was then the principal centre of the manufacture for the United States, although New York and Philadelphia were gaining prom¬ inence. At that time filling materials were practically unknown and ˆsettled® soaps were merely run into the wooden frames and crutched for hours, until rendered thick from cooling, or were finished by boiling down. The material was ladled by hand from the kettles into the frames, or put into buckets or tubs and carried and emptied into the frames. The kettles themselves had cast-iron bottoms, to which a wooden curb was fastened by means of cement. The composition of this cement, which was used to prevent leakage, was re¬ garded at that time as a great trade secret, especially when the cement was capable of pre¬ venting the leakage for some length of time. The waste lye was run off through a pipe reaching through the wooden curb to a point near the bottom of the kettle. The kettles were heated by open fire, and the contents were kept from burning by stirring them with a long iron rod flattened at the end. The lye was made by leaching wood-ashes, since the use of caustic soda had made very slow advances.

While processes and methods were thus, comparatively speaking, at a standstill during the first four decades of the 19th century, the soap industry nevertheless steadily advanced in importance and prepared itself for the wonder¬ ful development that immediately followed the discoveries of Chevrepl. That chemist demon¬ strated the true principles of saponification, and no later improvement, whether in the introduc¬ tion of the steam processes or in the discoveries and uses of the many new vegetable and ani¬ mal oils, has been of greater importance. Of the total soap produced at this time Massachu¬ setts was credited with over one-quarter. Five years later the soap industry had grown to great proportions. The manufacture of fancy soaps had already been begun, and in 1850 was es¬ tablished on an extensive scale. Shaving soap, always in great demand in those days, when beardless faces were the rule, was also greatly improved in this decade, and many other of the common toilet necessities of to-day were either first brought out or developed to comparative

excellence at this time. Soon soap-making was facilitated by the introduction of machinery and now there are specially constructed machines designed and adapted for almost every step in the different processes of manufacture where their introduction has been of advantage. At present American soaps are strong competitors in the markets of the world, and in quality they rivalˆ the best of European production.

The introduction of sapolio marked a new era in the soap business. It was a combination of true soap and scouring substances in such proportions as to increase to the highest point the advantages of each. The Bath brick of the scullery has gone since its advent, and the prin¬ ciple upon which sapolio was established is now utilized in many forms. See Fat Tissue; Sapindaceˆs.

Production.— The 1914 census of manu¬ factures shows that there were in the United States in that year 371 soap-making establish¬ ments, with a combined capital of $92,871,533 and employing an aggregate of 14,172 hands, who earned in the year a total of $8,087,937 in wages. The raw materials used comprised 546,- 289,571 pounds of tallow; 13,225,330 gallons of cocoanut and palm oil; 16,144,786 gallons of cottonseed oil; 123,032,886 pounds of cotton¬ seed roots; 185,310,786 pounds of resin; 55,320 tons of caustic soda, and 140,983 tons of soda ash. The cost of these materials was $88,866,- 786. The output comprised 2,064,228,000 pounds of hard soap — of which 169,926,000 pounds were toilet soap — and 57,002,000 pounds of soft soap. The value of the output was $127,- 942,441. The increase of production in the 10 years since 1904 was 47 per cent, all in the hard-soap product. The industry is centred in New York, Illinois, New Jersey, Ohio and Pennsylvania, which five States make nearly three-fourths of the entire output of the country.

Bibliography. — Brannt, W. T., (The Soap Maker's Hand Book of Materials, Processes and Receipts) (Philadelphia 1912) ; Hurst, G. H., (Textile Soaps and Oils) (London 1914) ; Lamborn, L. L., (Modern Soaps, Candles and Glycerine) (New York 1906) ; Simmons, W. H., (Soap: Its Composition, Manufacture and Properties) (London 1917) ; Wright, C. R. A., (Animal and Vegetable Fixed Oils, Fats, But¬ ters and Waxes . . . and the Manufacture Therefrom of Candles, Soaps, etc.* (London

1903).

SOAP-BERRY, the common name of sev¬ eral species of Sapindus and of the fruits, which are so rich in saponin that they were employed for

the same purposes as alkaline soap, before the days of that article. The Chinese prefer them even yet for cleansing the hair and delicate silks. Certain species of Sapindus yield also an edible pulp, although the seeds are poisonous. One species (Sapindus utilis) has been cultivated in Algeria for its berries, which the trees begin to bear in from 8 to 10 years, and S. mukorossi, another Chinese species, is found in Japanese gardens. Our two United States species have this saponaceous quality also and the berries of S. saponaria, indigenous to tropical America and the West Indies and even growing in Florida, are much used for washing linen, although said to be injurious if employed too frequently. See Soap- Plant.

SOAP BUBBLES, originally a simple ex¬ periment for pleasing children, produced by making water quite soapy and preferably warm and then dipping a clay smoker's pipe or a tube into the water, withdrawing it with a film of soapy solution of water across the aperture or bowl of the pipe. Then by blowing in the tube the bubble is formed and after it attains some size mav be shaken off and float in the air as a spherical balloon if the interior air is warmer than the outer air. A little glycerine in the soap makes them much more durable. Bubbles in their scientific aspect have been studied specially by Plateau, who, by add¬ ing glycerine in a certain proportion to the soap solution, obtained remarkably durable films and bubbles. The spherical form of the ordinary soap bubble is a direct result of the action of surface tension, the geometrical condition being that with given volume the surface must have minimum area. Thus, if two or more soap bubbles are joined, which is an easy matter, the joined surfaces are approximately a flat plane; but in reality the smaller bubble projects or curves slightly into the larger bubble, be¬ cause the smaller the bubble curvature the greater the tension. One bubble may be blown within a larger one and then if gently shaken may chop through so as to hang from the larger bubble in outer contact. It has been demonstrated that this is due to electrification. With a well-soaped wire and thread it is pos¬ sible to open up a soap bubble in the centre and to bring it to a ring form (like a cruller) without breaking. In making this delicate ex¬ periment all dust must be excluded. Consult Boys, C. V., (Soap Bubbles) (in (Romance of Science Series,* London 1900).

SOAP-PLANTS, numerous plants of va¬ rious families that contain a poisonous principle called sapoin, which lathers in water, and is utilized as a detergent, both medically and for laundry purposes. The common soap-wort is the European Saponaria officinalis, often found in America along roadsides and railways, as a weed escaped from gardens. It is a rankly growing, smooth and shining perennial, with

the characteristic, opposite leaves, in this instance broadly oval, and five-merous flowers of the pink family. The obcordate petals are long clawed, with a scale at the base of each blade, ranging in hue from white to bright-rose color, and the dense terminal corymbs would be handsome were they not marred by fading flowers and brown seed-capsules. The thick roots and leaves abound in saponin, and be¬ sides its employment in the laundry, the plant was formerly used as a cure for itch ; it also yields an alterative drug resembling sarsaparilla. The cow-herb (Vaccaria vaccaria) also con¬ tains saponin. Soapbark or quillaia-bark (q.v.) is a stimulant and irritant drug, the brownish-white cortex of Quillaia saponaria, a smooth evergreen tree native to Chile, where its inner bark, reduced to powder, is a substitute for soap. Pithecolobinrn of several species are leguminous trees, one the savonette or shagbark of the West Indies, which yields other soap-barks, in demand for cleaning delicate fabrics. There are also several Chinese trees, which serve the natives for soap, especially valuable in washing silks and the hair. The fruit of Pancovia delaryi of China resembles the soap¬ berry (q.v.), and the pods of Gymnocladus

chinensis, and certain species of Gleditschias, give more substitutes for soap. The refuse or «oil cake® of the seeds of the tea-oil tree (Camellia sasanqua), after the oil has been expressed, is not only employed in washing, but for catching fish. When the seeds or the oil cake are bruised and thrown into water the poisonous saponin stupefies the fish, which rise to the surface and are easily captured.

Amole is a Mexican name covering several plants having saponaceous and cleansing proper¬ ties and utilized by the natives of Mexico and the adjacent regions of the United States. Agave heteracantha is a common example. The California soap-plant, or soap-root (Chloro - galum-pomeridianum) , is a liliaceous plant, with wavy-edged, linear leaves and a tall branching- panicle of many white flowers. The root is a bulb one to four inches in diameter, invested with dark-brown fibres. This bulb is pounded up by the California aborigines, who throw it into pools where fish have no means of escape, stupefying and capturing them. Hot soap-root is used to cleanse and heal old sores as well as in the laundry. There are several other soap- plants, as Zygadeniis fremontii and Leucocri- num montanum in California, and Acacia con- cinna, the soap-nut, the pods of which are used in India as medicines and detergents, especially in hair washing.

SOAPSTONE. See Talc; Mineral Pro¬ duction of the United States.

SOBAIPURI, a former tribe of the Piman stock of North American Indians in the main and tributary valleys of the Rio San Pedro and Rio Santa Cruz and on the Gila between those two streams in southern Arizona. The Jesuit missions of Guevavi Suamca and San Xavier del Bac were established among them in the latter part of the 1 7 th and the early part of the 18th centuries, but owing to the depredations of the Apaches they were forced to abandon their rancherias and to join the Pimas, by whom they were absorbed.

SOBAT (s6-bat') RIVER, Africa, a tribu¬ tary of the White Nile, rising in southwestern Abyssinia, at an elevation of about 7,000 feet, flowing westward and joining the main stream about 450 miles south of Khartum.. It is a wide, deep and rapid stream, bringing down large quantities of sediment of a whitish color, whence, probably, the name of the White Nile. At one point it passes through a canyon 2,000 feet deep, the adjacent mountains rising nearly 4,000 feet above the waters. At the confluence the two rivers meet each other from opposite directions, and the sluggish current of the White Nile is often stemmed and forced back by that of the Sobat, forming a temporary lake.

SOBBING, a convulsive heaving of the breast; heavy sighs attended with weeping. It is essentially a respiratory act, depending im¬ mediately on nervous irritation, and caused by spasmodic movements of the diaphragm or mid¬ riff, but ultimately due to strong emotion, usu¬ ally painful, though often merely hysterical. In sighing the glottis is temporarily closed and thus prevents entrance of air into the lungs.

SOBIESKI, sd-byes'ke. See John III,

SOBIESKI.

SOCAGE, sok'aj, or SOCCAGE, a tenure by any certain and determinate service. Il is of

two sorts — free socage, where the services are not only certain but honorable, and villein soc¬ age, where the services, though certain, are of an humbler nature. It has practically disap¬ peared in the United States by the development of State legislation, but under the English sys¬ tem of land tenure still exists in some quarters. It appears a bad business arrangement between landlord and tenant, as certain service may be performed in lieu of rent, nearly always an irksome condition. It was very common in mediaeval England.

SOCIAL BRETHREN CHURCH, The,

a religious organization formed in 1867 and comprising churches and congregations in Illi¬ nois, Arkansas and Missouri. The Confession of Faith published in 1887 provides for Baptism and the Lord's Supper as in other Evangelical churches. The Church has ordained and li¬ censed ministers and also exhorters, stewards and deacons.

SOCIAL CENTRES. The term social centres is specifically applied to the special in¬ stitutions which have quite recently developed in this country, but in a broader sense com¬ prises also the wider use for social purposes of existing institutions, such as the school and Church.

The movement in either of these forms rep¬ resents a new and important step in the institu¬ tional life of the United States and one of great significance for the future. It is wide¬ spread and powerful in scope, being active in not only the greater cities and the open coun¬ try, where the need for such is more specially apparent, but is gaining strength in the towns and villages. In general, it expresses and em¬ bodies the growth of neighborhood or com¬ munity feeling and furnishes a common focus for the activities which result. The need for such is well-nigh universal and urgent. Already strictly private and commercial enterprises and interests has sought to pre-empt this social field The function is too vital for such to be allowed. The social centre must be public and affiliated with the deepest and soundest interests of our common social life.

The need for such is apparent when it is seen that American life presents a multitude of social centres for the greatest variety of social activities, religious sects, fraternities, clubs and associations of all kinds. Both the activities and the meeting places are multitudinous. The variety of such is one of the most characteristic features of American life. But they tend to disintegrate the neighborhood and the com¬ munity rather than to draw it together, and only to further enhance the already over-de¬ veloped individualism which lies at the base of so many of our problems of social and civic life.

This general condition is, of course, the result of the eclectic composition of our people, gath¬ ered from all the peoples of the earth, of all religions and languages, traditions and habit. Not only so, but the expansion and numerical growth of our population, ever spreading into newT country and building new communities and neighborhoods, with ever coming and going people, has promoted a strong individualism. The break-up of neighborhoods and families, the difficulty of common feeling and interest, alike in the city and open

country, has been

great. The result has been an astonishing variety of social institutions, which have often tended to further increase, or at least to main¬ tain in existence, separative forces.

The early rise and greatly growing number and form of the fraternal organizations in the United States is one evidence of such a condi¬ tion and the need for social linkages. These have now attained a membership of more than 16,000,000 adults, mainly men, thus comprising a very large proportion of our adult male popu¬ lation. They include every variety of type and purpose, and the more important of them are practically universal. Their lodges and halls are local social centres of great importance and usefulness.

To these should be added the college fra¬ ternities and the vast number of miscellaneous social fraternities and clubs, with somewhat similar purpose. These latter do not maintain separate quarters, but, therefore, only the more increase the demand for social centres. All such, including the specific fraternal societies, are distinctly social in purpose and exist for the benefit that comes from fraternity in an individualistic and separatists society.

From an early date the public school has seemed to many to be the most vital embodi¬ ment of the common life of our people. The beginnings of the movement for specific social centres has been closely associated with its peculiar nature and possibilities as such. There are some 280,000 public school buildings (3,000 additional ones each year) and some 12,000 high schools. They are thus practically uni¬ versal, being located at most a few miles, and nearly always not more than as many blocks, from every American home in the land. They are the first public structures erected in new communities and neighborhoods, and are more and more liable to be the best building in the community. They are essentially public, sup¬ ported by public taxation to the amount of nearly $750,000,000 per year. They are the daily gathering centre for nearly 20,000,000 children — ((all the children of all the people® — of from 5 to 18 years of age. The private school has had only a slight development as yet under our conditions. Much that is best in the common feeling and interest of every American county or neighborhood is embodied in the school and educational policy. There are difficulties, indeed, in the

way of making the school into the social centre, but it has always been, and is every day much more, serving as a social centre. The tradition of its wider use is strong, for in the early days in the new com¬ munities it served as church, meeting-house, polling-booth, as well as school and many other social purposes for which with the time special buildings have come into existence.

Nor is the church without its claims to be considered as a social centre in a way not unlike the school. There are some 15,000 Ro¬ man Catholic churches and nearly 175,000 Protestant churches and meeting-houses. Like the school, the church is universal. Its tradi¬ tion as a social centre is longer historically and it has advantages over the former of being an adult association and centre and in appealing to wider range of life-interest. The development of the Sunday school and of week-day meet¬ ings has also greatly extended its capacity and social significance in the last generation. Much

earlier than in the school, the churches saw their social duty and the opportunity for social service in a society like ours. The institutional church was in existence long before any voider use of the school plant was conceived. As a result the church adapted its architecture and arrangements sooner and developed power as a social centre. The greater use of the church plant was also more apparent than even in the case of the school. It is fast becoming a very convenient social centre building, for the Catho¬ lic Church has developed its separate parish- houses for the like purpose. The modern in¬ stitutional church thus serves the need for an auditorium, as well as for the miscellaneous recreative and convivial activities of the com¬ munity. And not only the physical arrange¬ ments but also the current spirit of religious work increasingly tends toward the ideal of social service. It, too, has conceived the pur¬ pose of becoming a neighborhood, or even com¬ munity centre, for social service. Denomina¬ tional divergence is its chief limitation in this relation, but the large unchurched masses of our populations, alike in city, village and open country, give large scope to such purposes. The specific community church of definitely social service methods is becoming increasingly common. Church federation, in various forms, and interdenominational action for many pur¬ poses, are fast rendering the accomplishment of the church's purpose to become a social centre more and more feasible.

More recently the great fraternal orders are making their claim to serve as a social centre. The lodges are broadening their membership in various ways to include women, and the more recently organized ones are showing a strong tendency to be more broadly social in

method rather than strictly secret or narrowly fraternal. Often, too, their halls are in wide and frequent use as the most available place for miscellaneous social gatherings.

Our communities have, it is true, not yet developed the town-hall or civic centre as of the European type. The town-halls of New England and of the North Central States, where its institutional influence has extended, in a minor way often serve this purpose. But for the country in general there is as yet no sign of such a development. The civic centre is probably a long way off in our inst'tutional development, although it may some day crown our efforts toward social centies.

In the open country the grange is the most widespread of social organizations and its thousands of halls, especially in the North and East States, approach somewhat to the char¬ acter of social centres.

So the social settlements, which have been established in various parts of the great cities, with the object of furnishing neighborhood centres, have, in a sense, pioneered the move¬ ment in urban populations. City churches and school administrations have been foremost in the same direction also.

A favoring condition in the creation of urban social centres is the formation of neigh¬ borhoods. Neighborhood business centres have long been in existence in our cities, and social centres of various types are fast developing. In the expansion of our great cities the com¬ munities consolidated retain much of their local feeling. As American life, alike in city and

country, settles down these neighborhood ties will doubtless grow apace.

In the rural districts the passing away of open country life, remote from town and vil¬ lage centres, is rapid. Hundreds of villages are springing up each year in all parts of the coun¬ try — most notably in the isolation of the rural life of the South — and the 10,000 villages al¬ ready existing are now fully realizing their function as social centres for their farm-dis¬ tricts. Moreover, the new means iof communi¬ cation and transportation have brought the farmer closer to his neighborhood centre. The significance of the development of the village in our rural districts cannot be overestimated. For, although, in the case of many of the re¬ cently developed special community

centres, they have been located in the open country, there seems little doubt that the social as well as the business centies of such districts will naturally appear in the villages. This is in¬ creasingly true of the ˆconsolidated schools® and of the ((new rural churches.® More and more the village serves as a locus for the social centres of the rural community.

Such, then, are the more normal, widespread and underlying tendencies making for the de¬ velopment of social centres in American com¬ munities and neighborhoods. Much more spectacular and noteworthy but really much less significant are the many special and local centres that have been established. Special local or personal conditions have here and there favored the appearance and at least tem¬ porary strength of fully developed social cen¬ tres.

Leadership in this more specific movement should be accorded to educational administra¬ tors. E. G. Ward, who developed the school-house social centre in the city of Rochester, may be regarded as the leading pioneer. The voider use of the school plant has become a commonplace among educators in all parts of the country. It has taken many forms, but all in the direction of making the school a (if not the) social centre. More particularly it has involved use of the building for educational purposes in other than schoolhouses. Evenings and week-ends, holidays and vacations, in fact, during fully one-half of the total available time, the schoolhouse has become useful as a social centre. This has all come about in a few dec¬ ades. The conception, too, of the educational function of the school has broadened. It is now used for ((play® as well as ((study,® for <(work® as well as for learning.® It now gives opportunity to those whose school-edu cation has been interrupted, and even for parents to gather that they may keep in touch with the school's work for their children.

This expansion of use and function began with the development of evening schools , es¬ pecially fior the winter months, New York City being a leader. Vocation schools followed, and are largely confined to the summer holi¬ days. Vacation use of the playground is also now common. Another common use of the school is for public lectures and entertainments. Again New York City leads. Schools are also now used as evening recreation centres for young men and women no longer in school. Rochester has been foremost in utilizing the schools as social centres for adults, as men and

women's civic clubs. The various school facili¬ ties, gymnasiums, auditorium, pianos, reading- rooms, useful organized athletics and games for young and old, with folk-dancing, have also been added.

Especially in Philadelphia schools are used as meeting-places for various civic, educational and philanthropic organiza¬ tions. Use of the schools for polling-places is also being rapidly extended and has great possibilities.

New duties and opportunities for the schools as social centres are thus being yearly con¬ ceived and made available. The policy is rapidly extending from the larger centres of leadership to the smallest towns and villages.

The leaders of the country church, in all the denominations, have furthered the movement in this sphere. Notable and successful examples of community rural churches have been created by individual personalities. Especially have the Presbyterian and Methodist Episcopal churches been active in furthering the social service ideal. The most notable ones have been in the open country under especially favoring local conditions. Village churches have frequently seen their future in serving in broader ways the social needs of their community and their rural districts. The redirection of church policy has been not less noteworthy than that of edu¬ cators.

In a few communities strictly social centres, separate from any particular existing institu¬ tion or establishment, have been created. But these are rare and are rather a foretaste of the future of the movement than an ideal to be held out for practically immediate realization. American local life is ready for social centres but not yet for a social centre, unless under very special circumstances. Those who have the movement at heart must rather seek to facilitate widespread and normal tendencies making for the realization of their purpose rather than to artificially create a premature institution.

The movement for the development iof social centres is thus widespread, arising from the need of all classes of our population, and in all types of community. It has affected every type of existing social institution and almost transformed their material equipment, their spirit and method of work. It is the ex¬ pression of and the answer to a most funda¬ mental need of our unique social conditions. It has notable and active leadership and already many specific accomplishments. Few social movements in America are more securely es¬ tablished or making more substantial headway. See Village.

William L. Bailey,

Associate Professor of Political Science, Grin- nell College.

SOCIAL CONTRACT, The. <The Social

Contract was that one iof Rousseau's important works which bore most directly on the con¬ stitution and ordering of states. In 1743 Rousseau had gone to Venice as secretary to M. Montagu and had acquired some slight practical experience of diplomacy and state¬ craft. Some time after he conceived a vague project of composing a treatise along these lines, and about a decade later, after the suc¬ cess of his First Discourse, seems to have set himself to work in earnest on an ambitious

volume, (Political Institutions, > which remained in his mind for years hut which was never finished. The work was probably distasteful to its eloquent and imaginative author because of its abstract and theoretical character and was, therefore, laid aside. As an afterthought he later revised or rewrote a section of his manuscript and published it as <Le Contrat Social *in 1762. This work is, therefore, essen¬ tially .a fragment, and in his own mind and that of his contemporaries was set on a lower plane than his novel (La Nouvelle Heloise) or (Emile,* his treatise on education. It is in this light that it should be regarded to-day.

In writing it Rousseau intended it as ap¬ plicable only to an ideal communal state of about 20,000 inhabitants whose interests and character were homogeneous. He himself warns against attempts to apply it outside this sphere. His theory involves an organic con¬ ception of the state in which sovereignty is represented as the will of the organism. More or less closely attached to this conception are several important assumptions. Government, according to Rousseau, exists by virtue of a tacit agreement with each individual governed. By virtue of this contract every individual agrees to abide by <(the general will.® The individual citizen thus stipulates that on all questions and at all times it is his will that his state shall be governed by the general will. Therefore, even in cases where the particular individual is overruled by the contrary-minded majority he has the satisfaction of knowing that his fundamental principle of government is being maintained. The greatest danger of Rousseau's system lay in the fact that .on this basis he developed a mystical notion that the general will, which in practice is only the will of the greater number, cannot err. He failed, therefore, to put any check on the tyranny of majorities. Much of the radical democratic theorizing of our time, like

that of the recall and referendum, find their beginning in the ‘Social Contract.* Intended, as we have seen, in the first instance to provide an ideal basis for a small city state, in spite of many interest¬ ing suggestions, as a complete or final theory of liberal government on any large scale its doc¬ trines are dangerous. Consult Vaughan, C. E., ‘The Political Writings of Rousseau.)

Christian Gauss.

SOCIAL DEMOCRACY, The. See So¬

cialism.

SOCIAL DEMOCRATIC WORKING¬ MAN’S PARTY. See Socialism.

SOCIAL HYGIENE. See Vice, Regula¬ tion OF.

SOCIAL INSURANCE, a comparatively new term which originated within the last dec¬ ade in Germany (Socialversicherung) and France (assurance social), to cover that field of social or labor legislation, known heretofore as workingmen’s insurance, labor insurance or even industrial insurance. The broadening of the term indicates not only the tendency to extend the methods of workingmen’s insurance over other groups and social classes such as the agri¬ cultural class or lower middle class, but also the desire to draw a clearer line of demarcation be¬ tween this form of insurance and other branches of insurance conducted as a private business.

Though an enormous literature concerning social insurance has grown up in America as well as in Europe, no generally accepted defini¬ tion exists, and the new term is somewhat more difficulty to define than the older term — work¬ ingmen’s insurance. In an official report pub¬ lished by the United States government it is de¬ fined as ((the method of organized relief by which wage earners, or persons similarly situ¬ ated, and their dependents and survivors, be¬ come entitled to specific pecuniary or other benefits, on the occurrence of certain emergen¬ cies.® Dr. Fr. L. Hoffman defines it — “to com¬ prehended efforts, methods and means to pro¬ vide in conformity to insurance principles, a sufficient pecuniary method of wageworkers and others in moderate circumstances as against the economic consequences of industrial acci¬ dents, disease, incapacity for work and finally dependence in old age resulting from sickness, infirmity or even imprudence or personal neg¬ lect. The absence of a generally accepted defi¬ nition results from the comparatively recent origin of the term

and movement. The point of view is gradually gaining ground, however, that the term cannot be described simply on the basis of the groups to be insured, or the dangers against which insurance is provided, but largely on the basis of the methods, and the attitude of organized society, i.e., the state and its govern¬ ment. Thus there exists private insurance operated for profit, and mutual insurance as a form of mutual protection, but in absence of a definite governmental policy mutual insurance is not necessarily social insurance, which latter comes into existence through legislative action. Historically it holds true that social insurance is still largely workmen's insurance. That is ex¬ plained by the fact that modern industrial so¬ ciety is based upon a system of wage labor; that wageworkers exist by sale of their labor and, therefore, depend entirely upon the preser¬ vation of their working capacity. On the other hand they are more exposed to all possible hazards because of the nature of their work and, therefore, are more in need of insurance protection. Finally the workingmen themselves have laid the foundation to social insurance through the development of mutual benefit so¬ cieties through several centuries.

Divisions of Social Insurance. — The fol¬ lowing divisions or branches of social insurance are at present recognized and exist in some countries :

(1) Industrial Accident Insurance or Work¬ ingmen's Compensation; (2) occupational dis¬ eases insurance or compensation; (3) insurance against non-industrial accidents ; (4) general sickness or health insurance; (5) maternity in¬ surance; (6) invalidity insurance; (7) old age insurance; (8) funeral benefits insurance; (9) widows and orphans' pensions or insurance; (10) unemployment insurance.

This classification is based upon the forms of insurance in actual existence. Many efforts of a systematic classification have been made, usually on the basis of the economic or physical hazards involved. Barring vice and crime or general economic inefficiency and low wages, factors of a .general character with which the social insurance method does not concern itself directly, the three conditions which threaten the workingmen's family are: (1) Absence of any

wage-earner through premature death, which may be due to sickness, or industrial or non¬ industrial accident; (2) the physical incapacity of the wage earner to earn, which may be tem¬ porary or permanent,

partial or total, and may be due to old age, sickness or accident ; and (3) the inability of the able-bodied wage-earner to find a sale for his labor power.

By some of the 10 forms of social insurance above mentioned each one of these three causes of destitution can be met, and destitution pre¬ vented by the insurance method of spreading the loss over a larger group, in fact, over the entire community concerned.

The admitted social insurance methods may be classified into four groups or graduations : (1) the establishment of state insurance funds or institutions through which insurance to the workingmen is made cheaper and more attrac¬ tive; (2) substantial subsidy of the working¬ men's insurance by the state offering to pay a part of the premium in further effort to attract the wageworkers; (3) the method of compul¬ sion under which certain groups or classes are required to become insured by virtue of legis¬ lative enactment ; (4) the method of enforced contributions from employers or industry for the benefit of the insured wageworkers.

In some social insurance systems all of these four methods may be combined, while in others only one of the four may be utilized. Modern students, however, seldom feel justified in ap¬ plying the term social insurance unless at least one of these four methods is used, while in popular use the term is being somewhat im¬ properly restricted to the compulsory methods.

Considerable difference of opinion exists whether straight governmental pensions paid out of public funds may be included under the definition of <(social insurance® since they op¬ erate without any consideration of insurance principles or methods. This holds true of old age or invalidity pensions in some European countries and British colonies and widows' and orphans' pensions in many States in America.

Nevertheless textbooks of social insurance usually include these pension systems notwith¬ standing their deviation from insurance prin¬ ciples. Social insurance is not governed by the strict requirement of private insurance science. It emphasizes the (< Assurance® rather than the mathematical accuracy of rates. It merges into what is known in France as <(Prevoyance So- ciale,® in Germany as ((Soziale Fiirsorge® and may be translated as (<social care® of needy individuals.

History. — The origin of social insurance, at least in its modern phase,

is usually credited to Bismarck, and to the acts of 1883 and 1884, by which the German sickness and accident insur¬ ance systems were established. But as a matter of fact, the elements of mutual insurance, em¬ ployers' contributions, state subsidy and even compulsion were well known in Germany and partly in other countries before. The acts of 1883 and 1884 were important, however, as establishing the first national system. From Germany the social compulsory insurance move¬ ment extended to other Germanic countries, and gradually to all other European countries, until perhaps Turkey remained the only country without any, social insurance legislation. The extent, however, to which this branch of social

legislation expanded in each country differs considerably. See Workmen's Compensation ; Health Insurance; Old Age Insurance and Pensions.

The compulsory principle met with consider¬ able opposition outside of Germany and Austria- Hungary for perhaps a quarter of a century. In opposition to it, the Latin countries, Italy, France, Spain and Belgium, experimented with the method of subsidized liberty (liberte as- sistce), i.e., by granting more or less substantial subsidies to stimulate voluntary insurance. The Scandinavian countries showed a tendency to follow the Latin principle. Great Britain re¬ mained indifferent, leaving the problem to the spontaneous efforts of mutual insurance, and the Slavic world neglected this as well as other branches of labor and social legislation. Within the last 8 or 10 years there has taken place a very marked development in the attitude of all Europe to this question of compulsion in social insurance. So many compulsory insur¬ ance systems against sickness, old age, employ¬ ment, etc., were passed between 1909 and 1914, (when the European War put a temporary halt to all constructive social legislation), that it is highly inaccurate to describe the compulsory method as a Germanic method. Compulsory compensation for industrial accidents is fairly universal in Europe, compulsory health insur¬ ance is found in 10 countries, while voluntary subsidized insurance exists in four. France and Sweden have followed Germany's example in establishing compulsory old age insurance. Great Britain marked a very important step in 1911 by establishing at once systems of com¬ pulsory insurance against sickness, invalidity and unemployment. In many countries without a general compulsory system, partial systems for certain industries exist, and in several others many steps have been taken for an estab¬ lishment of compulsory systems, and these were only postponed through the action of the war. Social insurance legislation was perhaps the most important topic of legislation in Europe during the last decade. The entire modern social insurance

movement proceeds from the theory that not only is the individual wage- worker unable to meet the hazards that face him, or the cost of insurance against them, but that also holds true of the wageworkers as a group. Financial assistance is, therefore a very essential principle of social insurance. In regard to industrial accidents the principle is fairly generally recognized that they consti¬ tute a proper charge upon industry, and with a few minor exceptions, industry through the em¬ ployer is made to bear the entire cost. That is also true of occupational diseases wherever they are specifically provided for. Health (or sickness) insurance has developed upon a basis of joint contribution of employers and em¬ ployees in proportions varying in different countries. The more recent enactment added, however the principle of state subsidies so that in the Acts of Norway, Great Britain and some others, the cost is divided between em¬ ployer and employee and the state. In invalid¬ ity and old age insurance this method of con¬ tributions from three sources has been recog¬ nized in the beginning and gradually the ad¬ vantage of distributing the cost between em¬ ployer, employee and the state (or in some

cases the local geographic and administrative unit) are gaining the position of a general social insurance standard.

In favor of such a method the advantages of a wider distribution of the cost are empha¬ sized. It is argued by some students that the same advantages can be achieved in a very much simpler way by putting the total cost at once upon the state. This has expressed itself in the old age pension systems of Great Britain, Denmark, France and some Australian coun¬ tries, in a few maternity pension acts and some 20 mothers' pension acts in the United States. Further extension of this method of gratuitous pensions, at least in some branches, does not appear impossible.

Development in United States. — Interest in social insurance problems in the United States is very recent, and scarcely extends over six or seven years, though of mutual efforts toward insurance of workmen there have been many. Trade unions, fraternal societies, large employing corporations, railroads, municipalities and some other political entities have tried to build up some systems of insurance protection of wageworkers. In a legislative way the prob¬ lem began to attract attention only toward the close of the first decade of the 20th century, when the movement of compensation legislation spread

throughout the country. Though the early acts were declared unconstitutional in 1911 and 1916, 32 States passed accident com¬ pensation acts, and compensation is almost uni¬ versal outside of the black belt. Almost simul¬ taneously with that, from 1913 a very active agi¬ tation for mothers' pensions developed which proved successful in more than 20 States. Old age insurance and pensions have been discussed for some years, and were made the subject of several State investigations with occasional en¬ dorsements of the underlying principles, but as yet without any specific recommendation for immediate action. The unemployment situation of the years 1913 and 1914, especially coming after the establishment of the compulsory un¬ employment insurance system of Great Britain, has stimulated interest in this most difficult branch of social insurance. But the strongest recent development has been in the direction of social health insurance. In 1915 an investigat¬ ing social insurance commission was provided for in California, and in 1916 in Massachusetts, both specializing in the problem of health in¬ surance. The American Association for Labor Legislation has a standing committee on social insurance since 1912, devoting most of its work to health insurance. The first National Con¬ ferences on Social Insurance were held in Chi¬ cago in June 1913, and the second one under the auspices of the United States government in December 1916. The California commission in its report recommended health insurance legislation as the most practical solution of pressing social problems after workmen's com¬ pensation. It advised the adoption of the com¬ pulsory system. Because of the probability of a law of this kind being declared unconstitu¬ tional by the State courts, a constitutional amendment was submitted to the voters in 1918, and meeting with violent opposition from the Christian Scientists and from the commercial insurance companies, was rejected. Up to the beginning of 1919 Massachusetts was the only State which provided vocational training for

industrial cripples as part of its compensation scheme. Eight State legislative commissions were investigating the subject of health insur¬ ance in the winter of 1918-19. Organized labor was pressing more insistently for the enactment of compulsory health legislation. The New York State Federation of Labor placed health insurance first among its demands on legisla¬ tive candidates in 1918. Despite this a reaction¬ ary legislature in the 1919 session defeated all efforts to enact health insurance legislation in New York. Members of the medical profession were opposed to such legislation. The Massa¬ chusetts commission reported in favor of ((sickness prevention® in 1918, but made no very definite recommendations as to methods.

Among the States which have appointed commissions to investigate social insurance problems are Con¬ necticut, Illinois, Ohio, New Hampshire, Penn¬ sylvania and Wisconsin. Compensation and in¬ surance for soldiers and sailors and allowances for their dependents were provided by Federal enactment in 1917. At the close of hostilities in November the government reported that nearly $37,000,000,000 had been taken out in life insurance by our over 4,000,000 men of the army and navy; this was the greatest insurance, for such it is, that the world has witnessed hitherto, since the total amount of life insur¬ ance carried by commercial and other companies is estimated to be $3,000,000,000 less than this amount. It is generally admitted that health insurance of a compulsory character will be the logical development from compensation legis¬ lation.

The effect of social insurance upon the well¬ being of the working masses is recognized by students of economic conditions with hardly any exception's. There are probably some 60,000,000 in Europe who with their depend¬ ents enjoy some one or more forms of social in¬ surance protection. The financial operations of the social insurance systems annually measure many hundreds of millions of dollars, which go to relieve destitution and suffering among wage¬ workers, either in form of pecuniary benefits or medical or similar curative care. A substan¬ tial proportion, probably more than one-half of that amount, is contributed by the employers and the State in virtue of the law. But it is frequently pointed out that of more importance than the mere relief of existing distress is the preventive effect. Accident compensation proved to be an important factor in accident prevention, health and invalidity insurance though a better form of organization of medical, surgical and hospital aid is recognized as a powerful factor for general conservation of life and health. Maternity insurance is advocated because of its effect upon the health of mothers, and also as an additional force in the struggle against ex¬ cessive infant mortality, unemployment insur¬ ance to exercise a salutary effect in prevention of excessive depressions, because it preserves to some extent the purchasing powers of the unemployed wageworkers.

As against these advantageous effects, social insurance is being frequently charged with pro¬ viding a stimulus to malingering. That a cer¬ tain amount of such malingering develops un¬ der social insurance as well as under any other form of insurance is usually admitted, but it is claimed that this evil tendency may be kept in check by appropriate administrative care, and

that it is more than counterbalanced by the salutary results upon the health and happiness of the working class. It is admitted that in no country has social insurance as yet entirely abolished pauperism and destitution, because in no country has this method been developed to its highest capacity, and also because there exists certain factors of destitution not amen¬ able to the social insurance method, but the rapid extension of this method from one coun¬ try to another is pointed to as a sufficient argu¬ ment in favor of the advantages to be derived by the entire country by this method.

Bibliography. — Commons, J. R., and An¬ drews, J. B., Principles of Labor Legislation (New York 1916); Dawson, M. M., and Frankel, Lee K., (Workingmen's Insurance in Europe> (New York 1910) ; Lewis, F. W., (State Insur¬ ance5 (New York 1909) ; Rubinow, I. M., So¬ cial Insurance5 (New York 1913) ; Seager, H. R., Social Insurance5 (New York 1910) ; United States Commissioner of Labor Statistics, 23d Annual Report; (Workmen's Insurance Compensation Systems in Europe5 (2 vols.) ; American Labor Legislation Review (Vols. I-VII, New York 1909-16).

Isaac M. Rubinow,

Author of Social Insurance, Standards of Health Insurance, Standard Accident Table, etc.

SOCIAL LEGISLATION, a general term covering laws enacted for the control of social problems arising through modern conditions of vast industrial enterprises and the changed mode of living arising therefrom. Among them are those governing old age pensions, so¬ cial insurance, workmen's insurance, child labor laws, etc. See Social Insurance, etc.

SOCIAL PSYCHOLOGY. Social psy¬ chology is that branch of psychology which deals with the mind as it is affected by and manifested in relations with other minds. It deals with the behavior of human beings and animals in groups, and the emotions and thoughts which group behavior involves. There is a tendency on the part of certain writers to regard it as the psychology of the group mind or of group behavior, while others would em¬ phasize rather the individual in the group and consider it as dealing with the behavior and experience of individuals when they form part of groups. The former hold that the mind of a group of individuals is a real being; something more than the aggregate of the individual minds which compose it. In

this article we shall take the position of the latter, that all psychology deals with individuals and that social psychol¬ ogy deals with them in their relations to one another.

Social behavior is manifested throughout the animal kingdom (1) in the form of special re¬ sponses to living, that is, moving, stimuli ; (2) in that of special responses to individuals be¬ longing to the same species, in the tendency to form collections of individuals, to respond with aid to sounds of alarm, to imitate the sounds and movements of other animals, and even, in the case of ants and bees, to assume certain special functions in the service of the social group. Certain individual bees, for instance, take upon themselves the work of ventilating the hive by placing themselves near its mouth and rapidly moving their wings. Social be-

havior is manifested also (3) in the sex reac¬ tions of animals, both those connected with mating itself and those concerned in guiding the sexes to each other, through the senses of smell, hearing and sight. It is manifested (4) in parental behavior, where the movements of the parents are adapted to secure the welfare of offspring. From our animal ancestors we in¬ herit all these forms of social behavior as in¬ nate tendencies or instincts. Excellent discus¬ sions of social instincts may be found in Mc- Dougall's (Social Psychology5 and Shand's (The Foundations of Character.5

The social instincts of man, however, differ from those of the lower animals in being ac¬ companied by imaginative sympathy. The so¬ cial behavior of animals shows features which indicate that it is not accompanied by any real¬ ization of the mental state of others. For in¬ stance, an adult wasp engaged in feeding the young, lacking other food to present to a larva, bit off a piece of the larva itself and offered it as food to the larva's mouth. The social be¬ havior of animals is determined wholly by ex¬ ternal stimuli and by the animal's physiological state; that of human beings is determined largely by these, but also by the imaginative in¬ terpretation of other persons' minds. Thus ani¬ mals imitate merely the movements of other ani¬ mals; human beings imitate the mental states of others.

Derived from such animal instincts as the gregarious instinct, the imitative instinct, the fighting instinct, the self-exhibiting instinct, the sex and parental instincts, we have the social emotions, anger, jealously, sex and parental love, and the sentiments such as admiration, con¬ tempt, agreement, vanity and so on. It is pos¬ sible

also to trace the moral sentiments and the religious sentiments to innate roots which are derived from the lower animals. Thus social psychology furnishes the scientific basis of ethics.

The instinct of imitation has been given es¬ pecial prominence by social psychologists. The French sociologist Gabriel Tarde, in his works, (Les lois de l'imitation5 and (La logique so- ciale,5 regarded imitation as the most funda¬ mental phenomenon in sociology. He defined a society as a group of persons who imitate each other, and pointed out that, like undulation in the physical world and heredity in the world of life, imitative currents in society spread in geometrical proportion, are modified by the medium through which they pass and interfere with each other. Out of the interferences of imitative currents inventions arise. E. A. Ross' (Social Psychology5 is based largely on Tarde's teachings. Recently the tendency has been to lay less emphasis upon imitation, but it seems clear that only through imitating other persons are we enabled to understand their mental states and that an innate tendency to imitate is the root of that imaginative sympathy which accompanies social behavior in man.

Another instinct which is of especial import¬ ance to the social psychologist is, obviously, the gregarious instinct. The different types of so¬ cial groups formed by human beings are espe¬ cially interesting to those who regard the mind of a group as an independent entity. We may distinguish groups linked by the sex and pa¬ rental instincts, i.e., families; groups linked by economic necessity, by a common aim, such as

philanthropy or religion, by likeness of external circumstances or situation, and so on. Each type of group has its peculiar features and the mind of an individual differs according to which type of group he is related to at a given time. It is interesting also to study the mental differences between groups, such as the races and the sexes, separated by congenital unlike¬ nesses.

An innate tendency of the first significance to social psychology is suggestibility. It is really the tendency which we all have to carry¬ out ideas into action, but the term usually indi¬ cates this tendency in the case where the ideas are recognized as coming from some other mind. The strongest influence which opposes suggesti¬ bility is the fighting instinct, inherited from the lower animals. Individuals vary greatly in

the degree of their suggestibility; some persons balk at every suggestion coming from others, even though it be in the line of their own de¬ sires, while others are at the mercy of the last person who advises them. Measurement of the suggestibility of a given individual is a task of much practical value in diagnosis. It has been attempted by the method of showing pictures and then questioning the individual about what he has seen. A certain number of the questions relate to details which were not really present in the picture, and the number of such sugges¬ tions that the person accepts is regarded as indi¬ cating the degree of his suggestibility. Binet, in his (La suggestibility developed a number of other simple methods of testing suggestibil¬ ity, especially in children. Every normal per¬ son tends to resist suggestions to a certain de¬ gree. Thus Sidis, in his Psychology of Sug¬ gestionˆ states as the law of normal suggesti¬ bility that it varies inversely with the directness of the suggestion; direct suggestions tend to ex¬ cite the fighting instinct. In certain cases, how¬ ever, even a normal person will accept direct suggestions. The most important conditions of such acceptance are the prestige of the sug- gestor and repetition of the suggestion. Indirect suggestions are suggestions given in such a way that they do not obviously come from another mind; they seem to proceed from the individ¬ ual's own thoughts or from the surroundings. The whole problem of securing the acceptance of suggestions is probably the most practically important part of social psychology. It con¬ fronts the advertiser, the salesman, thq educa¬ tor, the religious and the political leader. The psychology of advertising, for instance, is now a distinct branch of research to which the busi¬ ness world is lending strong financial support and from which it is getting valuable returns.

Under certain conditions suggestibility be¬ comes abnormal in degree, that is, the fighting instinct ceases to oppose it. This usually oc¬ curs when the field of consciousness is nar¬ rowed, so that the criticism which a suggestion ordinarily encounters in the mind of the per¬ son to whom it is made is lacking. The sug¬ gested idea takes entire possession of the at¬ tention, and no reasons for opposing it are con¬ sidered. Such a narrowing of the field of con¬ sciousness, called dissociation, occurs in hysteri¬ cal states, in strong emotions and in the hypnotic trance. Persons thus abnormally suggestible may be dangerous to the community. The ex¬ istence of abnormal suggestibility thus is a fact of which the criminal law must take cognizance.

It is probable, however, that no person other¬ wise thoroughly normal can be hypnotized into the performance of an act of crime. Abnor¬ mally suggestible persons are likely to be men¬ tally defective;

although Breuer claims that the hysterical temperament is found in persons of the highest intellect and character. Goddard, in (The Criminal Imbecile, } records a case of murder apparently due to the abnormal sugges¬ tibility of a feeble-minded person in the hands of another individual.

Abnormal suggestibility is interestingly manifested, even by normal persons, in a psy¬ chological crowd. A mere aggregate of indi¬ viduals, however closely crowded physically, does not constitute a psychological crowd. The individuals must have their attention fixed on a common object. As soon as a number of per¬ sons concentrate their attention in the same di¬ rection, they tend to become abnormally sug¬ gestible. This is due largely to the loss of the normal sense of the criticism of others. A con¬ siderable portion of the criticism with which a person in the normal state opposes a suggestion is derived from his thought of what persons other than the suggestor may think of his con¬ duct. The feeling that others are with us, as in a psychological crowd, obliterates this criti¬ cism ; thus persons in a crowd do what they would never do as isolated individuals. Since the emotions are the experiences which all man¬ kind has in common, while ideas vary greatly from one person to another, an aggregate of persons becomes unified into a psychological crowd more quickly under the influence of emo¬ tions than under that of ideas. The crowd has the characteristics common to all humanity and often displays instincts which are in the normal individual suppressed ; it is incapable of real thought. Since most persons enjoy emotions and dislike to think, most persons enjoy enter¬ ing into psychological crowds. LeBon's (The Crowd) is the classic discussion of the phe¬ nomena of crowd psychology.

The phenomena of the religious life offer a fruitful field for the social psychologist. Reli¬ gion itself, in so far as it concerns the relation of man to a higher personality, is a product of the social instincts, the desire for companion¬ ship and protection and is closely related to the gregarious, parental and sex instincts. In the striking phenomena of sudden conversions we have an interesting illustration of the ultimate effect of suggestions which have been resisted. Their effect has nevertheless been registered in the <(subconscious):> or unconscious regions of the nervous system, and the sudden transforma¬ tion of the individual's life and ideals is due in all probability to their having accumulated suf¬ ficient force to break down the resistance of¬ fered to them by processes in the conscious lev¬ els of the nervous system. Persons of a hys¬ terical temperament, who are subject to disso¬ ciation or splitting of consciousness, are more likely to experience sudden changes of heart and ideals.

Closely related to social psychology, and in¬ deed forming an essential supplement to it, is folk psychology. This is the study of the ori¬ gins of social phenomena, such as social groups, language, religion and art. These origins must, since they lie in a past long preceding the dawn of history, be studied chiefly through the in¬ vestigation of the phenomena of savage life.

It is difficult to say how far these really repre¬ sent primitive levels of culture. In the case of religion, the remarkable longevity of religious rites enables us to trace certain religious ideas back into prehistoric times. The facts point toward the existence, as the earliest known germ of religion, of a prepersonal type of reli¬ gious attitude, marked by rituals designed to use the supernatural power or virtue, the Mana, in various objects and animals which aroused man's awe ; a stage of totemism which preceded belief in gods. In the case of art, a study of savage customs strongly suggests that one group of arts is derived from the dance, which with its power of forming psychological crowds is a great factor in the life of primitive peoples. Music, poetry and the drama are all probably in¬ debted to the dance for their origin. The deco¬ rative arts can be studied almost from their beginnings through the preservation of buried objects and of drawings on the walls of caves. It is more difficult to trace the early history of language than that of either religion or art, owing to the rapid and complicated processes of change which it undergoes, and to the fact that when in a primitive state it is not written. The reader will find interesting material on folk psychology in Thomas' (Source Book of Social Origins, y and in Wundt's (Folk Psychology } (translated by Schaub).

Margaret Floy Washburn, Department of Psychology, V assar College.

SOCIAL REFORM PROGRAMS AND. MOVEMENTS: Their Historical Develop¬ ment.

I. Introduction.

The programs and movements for social reform date back in their origins almost to the dawn of written history. Oppression of certain classes existed in the first historic societies and it is not surprising that some of the earliest literature reflects the growth of discontent among the subject groups. As Professor Selig- man has pointed out, the desire to improve the social environment has ever been the dynamic impulse

back of the evolution of economic doc¬ trines, though it is quite true that theories which have once been the harbingers of prog¬ ress may later be utilized as a bulwark of the existing order. While proposals for the better¬ ment of social conditions have appeared in all ages, they have been most numerous after great social and economic revolutions which have al¬ tered the status of existing classes and have brought an abnormal amount of misery to those whose condition was most seriously affected by the transition. The development of Athens into a commercial empire, the growth of the plutocracy in the Roman Republic, the disinte¬ gration of Roman society in the 4th and 5th cen¬ turies a.d., the breakdown of feudalism and the origin of the national states, the rise of the bourgeoisie following th Commercial Revolu¬ tion, that greatest of all social and economic revolutions — the Industrial Revolution of the late 18th and 19th centuries — and the growth of modern imperialism with the expansion of European civilization throughout the world are well-known examples of social and economic transformations which have produced their ac¬ companying programs of social reform.

II. Social Reform Movements Before the Commercial Revolution.

Though it was not the first social reform program, the earliest scheme for social recon¬ struction which has remained a classic through the ages was the of Plato. Here was proposed a society resting fundamentally upon a social division of labor, being physically perfected by an elaborate plan of eugenics, and governed by the wisest members of the com¬ munity. But even Plato recognized the futility of hoping for the adoption of so rational a social system, and it was marred by another serious defect beyond its utopian flavor on ac¬ count of the fact that it was designed to apply only to the upper classes ; the others would, it was hoped, be reduced to a still more severe and permanent state of subjection. The Gracchi brothers made an attempt to check the growing power of the Roman plutocracy, but the vested interests proved too strong for their efforts. The Apostolic Christians, living in the hope of an imminent return of Christ, developed com¬ munistic tendencies and doctrines, but the spe¬ cial circumstances under which they were con¬ ceived prevented them from having any con¬ siderable significance for the history of social reform programs. While the eschatological conception had been somewhat weakened by the time of the later Patristic period, it was still powerful enough to paralyze any social initia¬ tive. The faithful were warned against undue concern over earthly conditions, lest they thereby forfeit entry into the kingdom of heaven. The poor were

regarded as a part of the divine order who existed for the spiritual edification of the rich alms-givers. The Patris¬ tic outlook, coupled with the static nature of the. caste system which developed as the social basis of feudalism, and the general backward¬ ness of mediaeval civilization made the <(Mid- dle Ages® a period designed to discourage any radical movements in social reform. It should not be forgotten, nevertheless, that the rise of the commun.es and the emancipation of the mediaeval towns involved a considerable amount of radical uprising, while the gilds have fur¬ nished an inspiration for the gild Socialists. Further, the. more radical religious movements of the mediaeval period, associated with the Waldenses, the Albigenses, the Franciscans and the Lollards, carried with them a varying degree of revolt against the social and economic con¬ ditions as well as the religious institutions and practices, of the time. It is probable that of all the mediaeval programs of social reform the most interesting and progressive was that set forth by Pierre Dubois at the opening of the 14th century in his <De Recuperatione Terre Sancte,* with which Mr. Powicke has familiar¬ ized English and American, readers. Again, the discussions of the Conciliar Movement bear, perhaps, some vague relation to the problem of social reform in so far as that is related to the development of representative government. Finally, there came with, the Protestant Refor¬ mation the ominous doctrine that money-making is a Christian virtue.

III. The Commercial Revolution and the

Resulting Social Reform Movements.

While, as Professor Shepherd has insisted, there is need of a greater preciseness of

definition in dealing with the Commercial Revo¬ lution as a phase in modern history, it will suffice for the purposes of this survey to regard it in the conventional manner as the period of discoveries and colonization which began in the late 15th century and lasted for about three centuries in its first phase. With it should be associated its epoch-making reactions upon European civilization in nearly every field. This great transformation brought with it the decline of the feudal order, the rise of the mer¬ chant class in the political as well as the eco¬ nomic field and the gradual development of the modern national state, at first purely dynastic but later becoming more and

more a represen¬ tative if not a democratic institution. At first the new merchant class or bourgeoisie sup¬ ported the kings in their attack upon the feudal nobility, but once the feudal lords had been coerced the middle-class arose against the mon- archs and brought them within the restraints of constitutional limitations upon the royal pre¬ rogative. The social and economic effects were not less distinctive. The manorial system was undermined or completely shattered ; the gild system was weakened or wholly supplanted by the (<domestic system® ; and the above changes profoundly affected all social classes, working its severest effects upon those whose status was reduced by the transformation. In the intel¬ lectual realm the curiosity stimulated by the discoveries led to those great scientific advances in nearly every field for which the 17th century is conspicuous.

The social philosophy which was produced by the Commercial Revolution bore a close re¬ lation to the political, social, economic and in¬ tellectual setting which was created by it. In the field of political theorizing the royal abso¬ lutism was accompanied by the divine-right doctrine, associated with the names of Filmer and others, while the rise of the bourgeoisie against despotism produced as a philosophy of justification the social contract school with their apologies for revolution in the writings of Sydney, Locke, Rousseau ˆnd their followers. The social and economic changes, with their accompanying misery to the lower classes, gave rise to the various ((utopias® which attempted theoretically to construct ideal societies which would embrace none of the evils of existing conditions. This class of writings was best illustrated from widely differing points of view by Sir Thomas More's (Utopia, *Francis Bacon's (New Atlantis,* Tommaso Campa- nella's (City of the Sun, *James Harrington's (Oceana) and Frangois Fenelon's (Telemaque.* The growth of rationalism was especially sig¬ nificant for the development of social reform urograms. While the rationalists were rarely violent political or social revolutionists, never¬ theless, as Professor Robinson has made clear, their very scepticism concerning current views on the nature and significance of natural and social phenomena inevitably led to a critical attitude toward social institutions and the grad¬ ual development of a ((spirit of reform.® Par¬ ticularly important in this respect were the doc¬ trines of the English Deists and their followers among the French Philosophies. Taking their premises from the laws of mechanics governing the natural universe, which had been discovered by Newton and his predecessors, the Deists in¬ sisted that there was a natural order — a regime

of natural laws — which governed the social system as well as the

natural universe and to which social institutions should conform. They held further, in radical contrast to the depress¬ ing theological views of Augustine and Calvin, that man is inherently decent and worthy of study in the effort to improve his earthly en¬ vironment. This doctrine did more than any¬ thing else to remove the obstacles to social self-improvement which were embodied in Augus- tinian eschatology and the predestinarian an¬ thropology of Calvin, and was very effective in producing the growth of a humanitarian spirit. Strangely enough, however, a part of their cosmic and social philosophy became it¬ self a great barrier to social reform when their notion of the (<natural order® was adopted by the adherents of (<economic liberalism® to form the metaphysical basis of their defense of laissez-faire. Finally, it should be remembered that, in spite of the fact that it was designed wholly in the interests of the upper classes, the extensive legislation involved in Mercantilistic commercial regulations furnished a precedent for widespread state activity which might one day be exerted in the behalf of the proletariat.

The French Revolution has long been re¬ garded as a unique and heroic event in human history, but recent analysis has proved it to be but a final phase of the reactions of the Com¬ mercial Revolution upon France. Henry IV, Richelieu and Mazarin, with the aid of the new middle-class, had destroyed the political power of feudalism, but had successfully stifled the growth of representative or democratic institu¬ tions in France. The French Revolution marked that stage of development in which the bourgeoisie ended even the economic and social vestiges of feudalism and terminated irrespon¬ sible royal despotism. The social revolution achieved by the French between 1789 and 1795 consisted mainly in the despoiling of the feudal landlords and the elevation of the middle or business class. The latter not only attained unto political power, but also secured legisla¬ tion giving far greater freedom to business en¬ terprise. No other class profited materially from the Revolution, while the nobility and the clergy were greatly reduced in wealth, power and prestige. The programs of social reform put forth during this movement varied all the way from the advocacy of limited constitutional monarchy by Lafayette and Sieyes to the fan¬ tastic radicalism of the Mountain' and the openly avowed socialistic proposals of Frangois Baboeuf, which might be quite properly classed as akin to the utopias of the preceding century. But in spite of some radical programs of social reform and some mob-violence by the prole¬ tariat, the lower classes, both agrarian and in¬ dustrial, failed to profit to any marked degree through the French Revolution, which was above all a bourgeois movement. For the ele¬ vation of the proletariat in France, three

subse¬ quent revolutions and the growth of modern industrialism were required.

One of the most important and far-reaching effects of the Commercial Revolution upon so¬ cial history was its preparation of Europe for the more sweeping transformation in the Indus¬ trial Revolution. By breaking up the feudal system and agrarian isolation, by stimulating commerce and the growth of capital, by inviting colonial enterprise and the development of for-

eign trade, and by developing constitutional gov¬ ernment to give business liberty and security, the Commercial Revolution paved the way for the coming of the Industrial Revolution. That the latter came first in England is to be ex¬ plained by the fact that England had partici¬ pated most extensively in the Commercial Rev¬ olution, that her industries and natural resources were best adapted to the adoption of a mechani¬ cal system of manufacturing, and that she had developed to the greatest degree of any country in Europe that constitutional and legal protec¬ tion to industrial and commercial enterprise which was indispensable to any extensive expan¬ sion of business.

IV. The Industrial Revolution and the So¬ cial Problems It Created.

It will be quite impossible in the space available to describe the mechanical inventions which constituted the material basis of the Industrial Revolution or even to enumerate all of its diverse results. For this the reader must be referred to the preceding article in this Encyclopedia by Prof. E. L. Bogart on the Industrial Revolution. It will suffice at this place to describe it as that great.economic trans¬ formation which introduced the mechanical era of manufacturing and the improved motive power for transportation and the communica¬ tion of intelligence, together with the great social, political and intellectual changes which accompanied the economic transition. The effects of the Industrial Revolution amount in their totality to modern civilization, but only a few of the more generally recognized re¬ sults can be mentioned here. Through the in¬ troduction of machinery, the minute divi¬ sion of labor and the specialization of indus¬ trial processes there resulted a vast increase in the volume of commodities produced for sale and a great consequent expansion of com¬ merce, leading to that search for new markets which constitutes the

connecting link between the Industrial Revolution and the development of modern national imperialism. The factory system necessitated the congregation of work¬ men into the new industrial cities which now sprang up for the first time and supplanted the agrarian age. The bourgeoisie were greatly increased in numbers and wealth, and evolved into a distinct capitalistic class. A sharp distinc¬ tion now arose between capitalist and laborer, and social and economic relationships passed, as Professor Burgess has pointed out, from a personal to an impersonal basis. The laborer became progressively more and more dependent upon the capitalist and the problem of unem¬ ployment became much more serious. Women and children were introduced as laborers in the new factories to their moral degradation and physical deterioration. The division of in¬ dustrial processes into minute stages made it impossible for the workman to complete the manufacture of any commodity and thereby lessened his interest in its production and created a psychological burden which had hith¬ erto been foreign to industrial processes. The machine technology, as Professor Veblen has explained, brought a psychic and cultural standardization correlated with the mechanical processes of the new order. In the large, however, the Industrial Revolution meant, as

Professor Shotwell has insisted, a transition from an agrarian civilization based on isolation, repetition and stability to the modern order founded upon a dynamic industrialism and the development of world-wide relationships. It has constituted far the greatest transformation in the history of humanity and has produced at least a material progress more notable than the race had yet achieved from its beginnings down to the close of the 18th century.

It was inevitable that so fundamental and sweeping a transformation as this should bring great hardship upon those who suffered most from the transition. Had the proletariat been able to support itself by handicraft trades and by petty agricultural operations their lot would not have been so hard, but at the very time when the mechanical inventions were making handicraft competition impossible an agrarian revolution was taking place in England which ousted the peasantry from their agrarian hold¬ ings. The new merchant princes, desirous of attaining the social prestige of the ancient landed nobility and encouraged by the new agricultural methods which had been intro¬ duced by Tull, Townshend and Bakewell, pro¬ ceeded in the period from 1760 to 1840 to buy up most of the land of England for great estates. The peasantry were bought out or evicted and were compelled to take refuge in the new industrial cities, where they became the helpless victims of the avarice and greed of the parvenu capitalist

manufacturer. Those who remained in the country and tried to com¬ pete with mechanical industry or large-scale agriculture met a fate not less severe than that of those who migrated to the cities. In the cities the great surplus of laborers made wages low and unemployment frequent. The possibility of utilizing the labor of women and children reduced the wages paid to adult males or led to their discharge. All — men, women and children — worked at monotonous labor during excessively long days for starvation wages in dangerous and unsanitary shops amid moral conditions even more deplorable. At night they were herded into cheaply built tene¬ ments even less healthy than the shops. As one writer has expressed it, they Hived the life of a machine while working and at other times that of a beast.® The chimneys of factories and dwellings were swept by very small children under conditions which meant the permanent distortion and dwarfing of their bodies and serious diseases of the respiratory tract, if they were not fortunate enough to meet an early death. In the mines conditions were, if anything, worse than in the factories. Women and small children, as well as men, worked in damp and dark underground pas¬ sages amid vermin and filth for long hours at a stretch at the most severe type of physical labor for a pittance. Whatever one may think of their remedies, there is no doubt that the socialistic analysts of these conditions, such as Marx and Engels, have drawn an accurate pic¬ ture of the horrors of the social conditions during the first stages of the Industrial Revolu¬ tion. It would scarcely be possible to exag¬ gerate them. One must not, however, forget to give due recognition to these early capitalists for their part in building up the industrial civilization of the modern age, probably the

greatest achievement of human genius, even though it threatens at times to develop into a Frankenstein. Further, it is not necessary to assume that all of these early capitalists were fiends to allow such conditions to exist among the working classes. They were usually in little personal contact with conditions and the old business ethics that had governed the gild and domestic systems were wholly inadequate for the new circumstances, while no new sys¬ tem of industrial morality had yet evolved. Nevertheless, it must be remembered that the conditions in the business establishments in the early stages of modern industrialism re¬ sembled what Hobbes imagined the life of man in the state of nature to be, and it is, there¬ fore, not surprising that these evils produced a literature of protest and reform which was un¬ precedented in volume and variety.

The proletariat found it impossible to help themselves out of the serious oppression to which they had succumbed. In no important, country in Europe did they exercise the right of suffrage permanently before 1848, and they played an insignificant part in politics until the last quarter of the 19th century. Labor organizations were forbidden entirely or penalized by unfavorable legislation. Violent opposition to the existing order was made well- nigh impossible by the savage criminal codes of the time which reached their worst form in England where nearly 300 capital crimes were enumerated. Any far-sighted program of self-improvement by the laboring classes through education and enlightenment was impossible of realization, for no comprehen¬ sive system of free public education existed in Europe except in Prussia, which was not vitally affected by the Industrial Revolution until the decade following 1870.

V. Immediate Remedies Proposed by Contem¬ poraries to Solve the Social Problems Created by the Industrial Revolution.

1. Economic Liberalism. — The first great type of reform proposed to meet the new conditions was that which has been designated by recent economic historians as <(economic liberalism,® but which is more generally known as the economic doctrine of laissez-faire, or the political theory of individualism. This body of doctrine cannot be properly appraised un¬ less the historical circumstances surrounding its origin and diffusion are taken into con¬ sideration. It began before the Industrial Revolution as an attack upon the archaic legis¬ lative restrictions which had grown up as a part of the Mercantilists commercial and colonial doctrine, and, in so far as it helped to clear away these obstructions, it contrib¬ uted to the coming of modern industrial so¬ ciety. After the Industrial Revolution had come, however, its later adherents utilized the laissez-faire concepts to defend the new capi¬ talistic order and to prevent, as far as possible, the solution of the grave evils it created through remedial legislation.

The founders of economic liberalism were the group of French writers in the middle of the 18th century, known as the Physiocrats from the work of one of their adherents, Pierre Samuel Dupont de Nemours, entitled Physi¬

ocracy, or the Natural Constitution of that Form of Government most Advantageous to the Human Race* (1767). They took their basic doctrine from the English Deists and the French Philosophies to the effect that the realm of social, political and economic phenomena was

governed by the same natural laws that Newton and his associates had shown to rule the physical universe. They believed that the perfection of all human social institutions could best be realized by making them conform to this natural order, a condition which would most certainly be produced by a regime of unlimited competition. Accordingly, they vigorously advocated the immediate and total abolition of all restrictive legislation and the introduction of an era of laissez-faire indi¬ vidualism. The chief functions of the state were to be the protection of life and property, the erection of public buildings and works, and the promotion of education, so that man might grasp more surely the principles of natural law. Extensive legislation was re¬ garded as dangerous, for it would probably impede the operation of those beneficent natural principles upon which they placed their chief reliance. The Physiocrats contributed views of less significance in their interpretation of social progress in terms of the net product of agriculture and their scheme of a reform in public finance which centered about the notion of a single tax on land. The moving genius among the Physiocrats was Frangois Quesnay (1694-1774), who was ably seconded by Gournay, Mirabeau, Dupont de Nemours, Mercier de la Riviere, Badeau and La Trosne.

The general notions of the Physiocrats con¬ cerning individualism and state inactivity, ex¬ cept in the field of abolishing restrictive legis¬ lation, received the support of the distinguished French economist and statesman, Anne Robert Jacques Turgot (1727 -ˆ81) and of the first great systematic writer on political economy, the Scotchman, Adam Smith (1723— 90). The chief significance of Adam Smith for the history of social reform is that he embodied the laissez-faire thesis in a notable work, (An Inquiry into the Nature and Causes of the Wealth of Nations) (1776), which re¬ ceived so wide a circulation and attracted so extensive a following for Smith's doctrines that the historian Buckle, nearly a century later, regarded this book as the most influential and beneficial one ever written. Aside from his acceptance of the general Physiocratic position on the proper functions of the state, Smith abandoned to a considerable degree the ex¬ cessive Physiocratic laudation of agriculture and emphasized the value of commerce and manufacturing industry. Especially did he re¬ vive the Platonic doctrine of the importance of the division of labor in increasing and im¬ proving productivity, and his emphasis upon the part played by labor in production paved the way for the later views of Ricardo and the Socialists respecting the ((labor theory of value.®

Smith, however, died before the Industrial Revolution had fully developed even in Eng¬ land, and there is good evidence for holding that he did not even foresee the course of this transformation, much

less stand out as an apologist of the new capitalist class. But his

doctrines were of a sort which fitted in ad¬ mirably with the policy of non-interference which the capitalist manufacturers desired to have prevail, in order that they, if not their employees, might enjoy the ((blessings of the perfect freedom of contract.® Therefore, his notions were expanded and utilized by the middle class and sympathetic economists to furnish an authoritative theoretical opposition to social legislation designed to advance the interests of the industrial proletariat.

The most extensive development of his con¬ cepts naturally took place in England where he had written and where that industrialism which was most congenial to his views was the furthest advanced, but he was honored by reverent disciples in every important European state and in the United States. His most dis¬ tinguished English disciples were Thomas Robert Malthus (1766-1834) ; David Ricardo (1772-1823); James Mill (1773-1836) ; John Ramsay McCulloch (1789-1864), and William Nassau Senior (1790-1864). The one thing which, in particular, distinguished the doc¬ trines of Smith from those of his disciples was his greater optimism, a difference which may be explained by the great change in the economic environment in the interval which had elapsed. While the central importance of these writers was their elaboration of the in¬ dividualistic hypothesis, each contributed some special interpretation of more or less origi¬ nality and] significance. Malthus held that remedial legislation was not only harmful as interfering with the natural order of things, but was also useless as far as any hope of im¬ proving the poorer classes was concerned. He maintained that even though distribution were equalized no permanent good could result, be¬ cause population tends to increase more rapidly than the means of subsistence, and this dis¬ parity between population and available means of support would ultimately be restored and with it would come a return of poverty and misery. Through an excessive birthrate the proletariat created its own misery, and the only hope of permanent relief lay in the artifi¬ cial control and restriction of the birthrate through the postponement of marriage. Ricardo paid particular attention to the subject of dis¬ tribution. From the Physiocratic notion that the wages of agricultural laborers tend toward the minimum of subsistence and Malthus' doc¬ trine of population he derived his famous <(sub- sistence theory of wages.® According to this theory wages tend to that level which

allows the laboring class to exist and perpetuate itself without either increase or decrease ; hence the folly of legislation designed to enlarge the in¬ come of the proletariat, for the resulting in¬ crease of population would prevent any diminu¬ tion of poverty and misery. Further, Ricardo attacked the landlords by maintaining that rent tended to absorb an ever greater share of the social income, and that their interests were op¬ posed to those of all other economic classes. Finally, he laid the basis for the Marxian theory of value by holding that, within certain definite limitations, value is determined by the amount of labor involved in production. James Mill brought into economic liberalism the utilitarian philosophy of Bentham regarding the maximum good for the largest number, which

Mill and his associates confidently believed to be attainable through the operation of the principles of economic liberalism. McCul¬ loch was chiefly a systematizer of the principles of his school and was the most sympathetic member of the group toward the laboring classes, being a supporter of Place and Hume in the attempt to legalize trade-unionism. Senior represented the final and most extreme stage of economic liberalism through his attempt to perfect economics as a purely abstract and ob¬ jective science and by his ardent opposition to even the mildest form of legislation beneficial to the laboring classes. While most of these writers took little active part in politics, their ideal (<of perfect competition for the em¬ ployers and subjection for the workers® was eagerly adopted by Cobden, Bright and other members of the <(Manchester School® and the Liberal party in their effort to reduce the power and privileges of the landed aristocracy and to enforce and perpetuate the servile and helpless status of the laborers. Further, their notions were widely popularized, and their gen¬ eral views were as much the order of polite conversation in British parlors as the Rous- seauean notions of the state of nature had been in the French salons of a half century before.

In France the doctrines of the later version of economic liberalism were espoused by a number of economists, the most notable of whom were Jean Baptiste Say (1767-1832) and Frederic Bastiat (1801-50). Say's position was very similar to that of Senior. He maintained that political economy was purely a descriptive science and not in any way a practical art. The economist should simply study and for¬ mulate economic laws and should never usurp the functions of the statesman. Reversing the position of the Physiocrats, he laid greatest stress upon the productivity of manufacturing, and he was the most enthusiastic of all the eulogists of the new era of mechanical in¬ dustry. He was the French bourgeois economist of the period as Guizot was the statesman of this group. Bastiat revived the optimism of Adam Smith

and, as an ardent admirer of Cobden, devoted his attention chiefly to an advocacy of free trade. The func¬ tion of the state, he held, was solely to main¬ tain ((order, security and justice.® So obsessed were Say and Bastiat over the importance of the manufacturing and commercial classes that many of their less scientific followers came to deny that poverty or misery existed.

In Germany economic liberalism was de¬ fended by Johann Heinrich von Thiinen (1783— 1850) and Karl Heinrich Rau (1792-1870), while in America Henry C. Carey (1793-1879) first introduced the classical political economy, though he differed from Smith's later support¬ ers by reviving the optimism of Smith and at¬ tacking the pessimism of Malthus. Moreover, he advocated national protectionism in contrast to the free trade doctrines of the others of the school.

Though it will be evident that economic liberalism was as distinctly a capitalistic move¬ ment as socialism has been a proletarian agita¬ tion — that, as Cliffe Leslie expressed it, (<they created a science for wealth rather than a science of wealth® — nevertheless it cannot be

denied that their efforts accomplished much that was good. Before rational state-activity to solve the problems created by the Industrial Revolution could begin in an effective manner it was necessary that the antique rubbish of Mercantilism should be cleared away and this was the great contribution of the economic liberals and their political adherents, even though they offset much of the value of their destructive efforts by obstruction of subse¬ quent progressive legislation. It should also be pointed out in passing that the economic liberals were aided by the contemporary philosophy of Romanticism, with its denial of the possibility of artificially accelerating the rate of political progress, and by the political individualism which had been set forth by Wil¬ helm von Humboldt, and was later taken by John Stuart Mill in his earlier days and by Herbert Spencer. In England the more notable practical effects of economic liberalism were the growth of free trade, associated with the work of Huskisson, Cobden, Bright, Peel and Gladstone; the abolition of such archaic politi¬ cal restrictions as the Test and Corporation Acts; the increase of the political powers of the middle class in the central and local gov¬ ernment by the reform bills of 1832 and 1835 ; the abolition of slavery in the colonies through the efforts of Wilberforce and Buxton ; the re¬ peal of the savage criminal code as a result of the work of

Romilly, Mackintosh, Buxton and Peel ; the development of a policy of pre¬ ventive treatment in the handling of the prob¬ lem of poor relief which was evident in the notable Poor Law of 1834; and the first antic¬ ipation of a more liberal policy of imperial government through the leadership of Lord Durham and others. In France serfdom and the gild monopolies were abolished before the close of the 18th century; Guizot directed the Orleanist regime solely in the interests of the capitalists ; and Bastiat's doctrines were able to win Napoleon III for free trade. In Prussia, Stein and Hardenburg were able to secure legislation looking toward the complete aboli¬ tion of serfdom and gild monopolies and the development of municipal self-government. Following 1819 a more liberal economic and commercial policy was embodied in the famous Zollverein, the work of Maassen, Billow, Eich-liorn and Von Motz. Most of the other Ger¬ man states followed Prussia in this liberalizing policy, and some, like Baden, quite outdistanced her in this respect. It will be apparent, how¬ ever, that none of this legislation materially benefited the proletariat. Indeed, some of the legislation of this period was specifically de¬ signed to paralyze all efforts of the laborers at self-improvement and the agitators for the abolition of negro slavery in the colonies passed by unnoticed a far worse type of slavery which existed at home among their own countrymen. Such a body of doctrine could not endure long unchallenged in the face of the growth of modern industrialism and the increasing misery of the proletariat.

1. English Philosophical Radicalism and Utilitarianism. — - Utilitarianism, a term used by Jeremy Bentham and given currency by John Stuart Mill, is the designation usually applied to the school of writers headed by Bentham (1748-1832) and including, among others,

James Mill, George Grote, John Austin, Alexander Bain and John Stuart Mill. They represented primarily the spirit and tenets of economic liberalism in the field of political theory, and their work constituted the only significant contribution of England to this field between the time of Burke and that of Spencer. Essentially, they were a further development of that philosophical radicalism in England which grew out of English sympathy with the French Revolution, and was represented by William Godwin,. Thomas Paine, William Cobbett, Francis Place and that group of literary men, such as Shelly, Byron and Words¬ worth, with whose works and ideas Mr. Brails- ford has recently made English readers famil¬ iar. This group stood in direct opposition to the satisfaction which Blackstone and Burke expressed over the alleged perfection of British institutions and maintained the necessity of radical changes in the direction of eliminat¬ ing archaic

laws, institutions and practices. In his earlier years Bentham might have been logically classed with this group, for his first notable work — (A Fragment on Government (1776) — was a violent attack upon the com¬ placency of Blackstone. But he gradually de¬ veloped a general philosophy of reform and thus remolded radicalism into utilitarianism. His doctrines were based upon the hedonistic psychology, which had been anticipated by Machiavelli, Hobbes and Helvetius, and upon the ethical slogan of ((the greatest happiness for the greatest number® — a principle earlier enunciated but not greatly developed by Hutcheson, Beccaria and Priestley. Institutions were to be judged according to their contribu¬ tions to the attainments of this <(greatest happi¬ ness.® His practical program of reform, however, indicated that, like the economic liberals, he re¬ garded unrestricted competition and enlightened self-interest as the chief avenues through which his utilitarian program could be realized. His chief concern was with the abolition of restric¬ tive legislation, but he did urge some positive reforms, such as education of the masses, the extension of savings institutions, public health legislation and prison reform. Further, though Bentham and his immediate followers might seem to have regarded the ((greatest good to the greatest number® as best attainable through conferring ((the greatest amount of goods upon the business classes,® his terminology was one which, if honestly interpreted, was excellently adapted to serving as a basis for urging a large amount of positive remedial legislation in the behalf of the proletariat. In this way the utilitarian premises later became an important force supporting constructive social legislation. In fact, this evolution of utilitarianism is evi¬ dent even within the circle of its own ad¬ herents, for John Stuart Mill eventually evolved from an exponent of marked individualism into a vigorous exponent of social legislation in the interest of the laboring classes and a not unappreciative student of distinctly socialistic proposals. Probably the only im¬ portant achievement of this group in the way of aiding the lower classes was the work of Francis Place and Joseph Hume in securing the temporary legalization of trade-unionism, but they made important contributions to securing that abolition of obstructive legisla-

tion which was described above in connection with the practical results of economic liberalism.

1. The Rise of Distinct Forms of Oppo¬ sition to the Individualism

of Economic Liberalism. — A. The Criticism of Economists. — There were a number of theoretical difficulties in economic liberalism which would naturally attract the opposition of political economists. While Smith had actually assumed to be more concerned with the wealth of a ˆnation® than of a class, it is, nevertheless, true that his fol¬ lowers seemed to be chiefly concerned with the wealth of the new business class rather than with the problem of increasing the prosperity of the entire nation. This brought upon the school the criticism of economists who presented a national or social theory of wealth and main¬ tained that the increase of the wealth of in¬ dividuals or classes was no safe criterion for judging of the value of an economic, social or political policy to the state or society. This was the point of view especially of the English¬ man, Lord Lauderdale (1759-1839), and the Scotch-Canadian, John Rae (1786-1873). The position of the economic liberals generally and of Senior and Say, in particular, that the economist must maintain his science as a purely abstract and descriptive discipline and severely refrain from advocating any policy of state- manship or social reform was vigorously at¬ tacked by Rae and by Jean Charles Leonard de Sismondi (1773-1842). Sismondi was the most distinguished and effective exponent in his age of the notion that economics has a distinct function in promoting general prosperity and social reform, a point of view since urged with vigor by economists like Schmoller, Gide, Webb, Hobson, Fisher, Fetter and Seager. He saw clearly that economics should be intimately concerned with the prob¬ lems of practical statesmanship and applied sociology and, more than any other writer of his time, he foreshadowed modern social eco¬ nomics. Moreover, his practical program of reform embraced most of what is now included in trade-unionism, factory legislation and social insurance. He was a solitary figure in his age, but his doctrines were later accorded respect, as economics swung back more and more to the social point of view. Again, the economic liberals were internationalists and exponents of free trade. This attitude was attacked by the early nationalistic economists, Adam Hein¬ rich Muller (1779-1829), Frederick List (1 789—1846) and Henry C. Carey (1793-1879). They defended the policy of a national protective tariff to give national self-sufficiency and pros¬ perity. The nation, rather than individuals, classes or human society as a whole, received their special solicitude. They were not, how¬ ever, inflexibly dogmatic in this position and List, in particular, held that after the Indus¬ trial Revolution had become thoroughly estab¬

lished in a country free trade might be bene¬ ficial, but to protect infant industries in the first stages of industrial development a pro¬ tective tariff was indispensable. Finally, the economic liberals erred in the direction of too great an abstraction and absolutism in economic doctrines. They generalized too much from contemporary conditions and were confident in the universal and eternal applicability of their economic laws and theories. This defect was

corrected by the early representatives of the historical school of economics, chiefly Richard Jones (1790-1855), Bruno Hildebrand (1812— 78), Wilhelm Roscher (1817-94), and Karl Knies (1821-98). The predominance of the Germans in this group has led to the practical identification of the historical school with Ger¬ man economists. These writers ridiculed the element of absolutism in the classical economic doctrines and maintained that any set of eco¬ nomic theory could be true only for the society from which the facts or premises were drawn. Therefore, economic theories must change with historical alterations in the economic consti¬ tution o-f societies, and there can be no in¬ variable economic laws nor any valid economic theory which ignores the dynamic element of economic progress and concrete economic facts.

B. Political Opposition and Humanitarianism. — It has been shown that economic liberalism was primarily an economic philosophy and a political program designed in the interest of the capitalists, who, in politics, adhered to the Whig or Liberal party. It was but natural, therefore, that it would be assailed by the party whose economic and political interests were diametrically opposed to the business element, namely, the landed proprietors who made up the bulk of the Tory or Conservative party. The Tories had a number of reasons for dis¬ liking the capitalists. In the first place, there was the social aversion of the aristocrat for what he regarded as the parvenu eager to break into his ranks. Then they felt that the new industrialism had destroyed forever the (<Merrie England® in which the landlords were supreme. Again, they entertained a jealousy of the grow¬ ing political power of the middle class, espe¬ cially after the latter had forced through the Reform Bill of 1832. Finally, the economic interests of the two classes were fundamentally opposed; the Tories desired a continuation of the Corn Laws to keep the price of grain high, while the business class desired their abolition to secure cheap wheat and, therefore, accord¬ ing to the current economic reasoning, cheap labor. The Tories were extremely fortunate in finding a point of attack upon the capitalists which enabled them to cloak their political and economic aims under the mantle of humani¬ tarian sentiments and to entertain some hope

of increasing their political following among the proletariat. This avenue of assault, de¬ cided upon by the Tories, was factory legisla¬ tion which would reduce the prosperity of the manufacturers by compelling them to grant higher wages or shorter hours and introduce better physical conditions and appliances in their factories. Probably too much has been made of this point by recent writers who have followed Arnold Toynbee in emphasizing the political and economic selfishness that motivated the landlord factory reformers. Doubtless many of the leaders in this movement were governed by real humanitarian impulses, but it can at least be said that they were especially favored in finding a line of social reform which harmon¬ ized particularly well with their economic and political interests. The leaders in the earlier stages of this <(Tory social reform® were An¬ thony Ashley Cooper, seventh Earl of Shaftes¬ bury (180H85), Michael Thomas Sadler (1780-1835), Richard Oastler (1789-1861) and

John hidden (1784-1849). They secured the appointment of the investigating commissions that have furnished the present generation with most of their sources of information concern¬ ing the conditions among the laboring classes in England during the first half of the 19th century and obtained much remedial legislation designed to alleviate or eliminate these con¬ ditions. It is impossible in the space available to describe in detail the contents of this legis¬ lation, but its general character can be indi¬ cated. The factory acts of 1802, 1819, 1831, 1833, 1844, 1847, 1850 and several minor laws of the ˆsixties® secured for the laboring classes in practically all factories the 10-hour day, proper factory inspection, safety appliances, better sanitary conditions and a general dis¬ couragement of child labor. Women and chil¬ dren were excluded from mines, and better hours and safety devices provided for in acts of 1842, 1855 and 1872. The distressing evils in the employment of juvenile chimney-sweeps were eliminated by laws of 1834 and 1840. Particularly urged by Ashley were the im¬ portant Factory Act of 1833 and the famous <(Ten-Hour Bill® of 1847. Thus political jealousy and economic rivalry between the upper and middle classes were able to achieve for the bet¬ terment of the proletariat much more than the latter and their sympathizers were able to ob¬ tain for themselves. While Shaftesbury may have been motivated by some genuine humani¬ tarian impulses in his campaign for social re¬ form, it is doubtful if the same can be said for the continuator of his policy, Benjamin Disraeli (1804-81), probably the

most un¬ scrupulous and self-centred politician in Eng¬ lish history. That he thoroughly understood the oppression of the peasantry and the industrial proletariat no reader of his (SybiP can doubt, but little evidence exists that he was touched by any real personal sympathy for the op¬ pressed and much leads one to the conclusion that his advances to the lower classes were founded upon purely partisan and personal motives and ambitions. In part, he continued Shaftesbury's social legislation, but his appeal for the support of the proletariat was primarily political. By the Reform Act of 1867 he ex¬ tended the suffrage to the greater part of the urban laboring class. This type of social re¬ form again appeared in England during the Conservative-Unionist regime, when it was par¬ ticularly associated with the name of Joseph Chamberlain. This benevolent paternalism, born of political rivalry, was confined in its earlier stages chiefly to England, for there alone had the new business class attained to sufficient proportions to attract the organized opposition of the landed interests. It appeared at a later time in other European states, most notably in the case of the Bismarckian social insurance legislation.

C. Early Christian Socialism. — The new capi¬ talism and industrialism and its theoretical apologists among the economic liberals were undeniably associated with materialism and rationalism and this inevitably led to opposi¬ tion from the Churchmen and the ˆfaithful® of all types. While programs of social reform hostile to economic liberalism were put forward by Catholics, High Churchmen, Broad Church¬ men and Dissenters, one unifying purpose runs

through all of their work, namely, the desire to socialize Christianity and thereby to capture social reform for the Church and to attract for religious institutions and practices the in¬ creasing gratitude and favor of the numerous members of the proletarian classes.

In the field of Social Catholicism there were a number of interesting developments, particu¬ larly in France under the Bourbon restoration and the Orleanist monarchy. The movement began as a revival of emotionalism, obscuranti- cism and political reaction in the doctrines of Frangois Rene de Chateaubriand (1768-1848), Louis Gabriel Ambroise de Bonald (1754-1840) and Joseph de Maistre (1753-1821), but the growth of democracy affected Church as well as state in France and the exponents of the religious revival clearly understood that if they vvere to make any headway they would need to liberalize the Catholic standpoint. This was partially achieved by Antoine Frederic Ozanam (1813-53), who founded the Society of Saint Vincent de Paul and linked up Neo-Catholicism with practical philanthropy; by Alphonse de Lamartine (1790-1869), who attempted to con¬ nect the

Catholic movement with the growth of, republican sentiment in France; by Robert de Lamennais (1782-1854), who tried ineffec¬ tively to harmonize Catholicism and the prin¬ ciples of the French Revolution; and by Phil- lippe Joseph Buchez (1796-1865), who adopted the historical viewpoint of the German school of economists, tried to prove the spirit of Christianity to be revolutionary, anticipated the ((gild socialism® of Bishop von Ketteler and Franz Hitze, and advocated a scheme of co¬ operative production and distribution.

The Protestant members of the first im¬ portant group of Christian social reformers have usually been those specifically designated as <(Christian Socialists,® but there seems no doubt that this title could with equal accuracy be extended to the Catholic reformers. The leaders in this movement were chiefly Anglican clergymen of the Broad Church party, though there was some support accorded by the Uni¬ tarians. The most prominent members of the Christian Socialist group in England were John Frederick Denison Maurice (1805-72), Charles Kingsley (1819-75) and Thomas Hughes (1822- 96). Others of influence who adhered to their general point of view were John M. F. Ludlow (1821-1911) and John Lalor (1814-56) . Maurice, conventionally regarded as the founder of the movement in England, was especially interested in promoting the cause of the education of the laboring class. Kingsley analyzed the social problems of his day in powerful sermons and telling books, like (. Alton Locke, > <Yeast) and (Water-Babies.) Like Buchez, he also urged the formation of workingmen's organizations and the institution of co-operative associations. Probably the most enduring contribution of English Christian Socialism to social reform was the further impulse given to the organiza¬ tion of co-operative and profit-sharing socie¬ ties, of which one — the famous Rochedale Pioneers — has endured to the present day. The co-operative movement spread rapidly on the Continent and has developed particularly in Denmark and Belgium. The other important effects of Christian Socialism in this first stage was its aid to the cause of the education of

the proletariat and the arousing of the interest of the Anglican Church in social reform. The impulse to social reform within the Anglican Church originated by the Christian Socialists attracted even members of the High Church party, and the leaders of that obscurantic and emotional reaction — the Oxford Movement — such as Whately, Arnold, Froude, Hurrell, Newman, Keble and Pusey lent their support

to the development of trade-unionism and the betterment of housing conditions among the poor. Finally, even the dissenting sects, par¬ ticularly the Quakers and the newer evangelical organizations, as Dr. Faulkner and Miss Simeral have shown, took a very significant part in agitating for remedial legislation for the poorer classes.

D. The A Esthetic Revolt Against Material¬ ism and Misery. — While the Industrial Revolu¬ tion has produced nearly all the material com¬ forts of modern life and created many new forms of art and beauty as well, there can be no doubt that in its first stages, at least, the new industrialism with its dismal factories, clouds of smoke and filthy tenements was ex¬ tremely ugly and repulsive to the aesthetic tem¬ perament and to humanitarian impulses. There fore, the new order of things and its supporters among the economic liberals received a vigorous attack from those who were the representatives of the literary and artistic standards of the age. This so-called aesthetic revolt against the origins of the modern industrial order was of a rather varied sort, ranging all the way from the purely cultural protest of men like Matthew Arnold to the conversion of leading literary figures like George Sand and William Morris to open socialistic programs. While most of the lead¬ ing figures in art and literature during the second third of the 19th century were repulsed by the new industrial developments, a few can be singled out as the leaders in the aesthetic protest. Among these were Robert Southey (1774-1843), Thomas Carlyle (1795-1881), Samuel Coleridge (1772-1834) ; Charles Dickens (1812-70), Charles Reade (1814-84), John Rus¬ kin (1819-1900), Matthew Arnold (1822-88), William Morris (1834-96), Ralph Waldo Emer¬ son (1803-82), George Sand (Madame Dude- vant) (1804-76) and Leo Tolstoy (1828-1910). Of this group the most important were Carlyle, Ruskin, George Sand and Tolstoy. Carlyle is significant chiefly as a critic of materialism and the economic abstractions of the classical school. He had no constructive program of reform further than a willingness to wait for some unique genius to appear with a ready¬ made solution. Ruskin was as bitter as Carlyle in his criticism of the new industrial society and its ideals, but he offered some solution of the problems through his advocacy of a restora¬ tion of the dignity of labor, the institution of a regime of industrial co-operation, state-educa¬ tion, government workshops and state insurance for the working classes. A part of his program bordered on the gild-socialism of a slightly later period, but he set education above all other types of relief for the situation. George Sand, of a slightly earlier period, imbibed freely the utopian and revolutionary socialism of the “forties® in France, and by her writ¬ ings did much to popularize these notions, in particular the doctrines of Pierre

Leroux. Tolstoy's reform program was espe¬ cially retrogressive and irrational. He advo¬ cated a complete abandonment of the new in¬ dustrialism, a return to an agrarian age and the organization of the agrarian economy ac¬ cording to the principles of the Russian Mir, with its communistic practices considerably ex¬ panded. While one can appreciate the real and valid motives for this revolt of the ˆesthetic temperament against the repulsive features of modern industrial society, this group offered little in the way of workable constructive re¬ forms. Few, except those who went over to socialism, had any real reform program. Only ap insane person could accept the proposal of some of them that society should revert to a pre-industrial Revolution economy where kings lived with less comforts than the average work¬ ingman of to-day. Further, even those who, like Ruskin, had some program to offer were scarcely in line with modern industrial de¬ mocracy, but desired the establishment of some sort of authoritative and benevolent paternalism. In spite of all this, the aesthetic protest was a real contribution to the reform cause, for it effectively insisted that an increase in material gain was no complete justification of a new order of civilization and maintained that modern industrialism must make a place for the realm of the ideal and the aesthetic. The more recent circle of literary critics, of the social order, like Emile Zola, Anatole France, Bernard Shaw, H. G. Wells, John Galsworthy, Maeterlinck and Upton Sinclair differ from most of their predecessors in that, instead of favoring a re¬ turn to a more primitive economy and social order, they are among the most ardent ex¬ ponents of radical social reform. Only a few, enamored with the best of older civilizations and seeing only the darkest phases of the pres¬ ent order, have looked back with longing eyes to a by-gone age. In this class may be put Profs. J. P. Mahaffy and Warde Fowler, Ralph Adams Cram and J. A. Symonds.

E. Utopian Socialism and the Reconstruction of the Social and Economic Environment. — It has already been shown that those extremely radical schemes of social reform, which are con¬ ventionally known as "utopian,® appear in the greatest numbers after some great transition which brings with it an abnormal degree of misery. The Industrial Revolution, the great¬ est of all such transitions and probably the most productive of accompanying misery, natu¬ rally brought forth an unprecedented number of utopian plans for the solution of existing social problems, but all of these programs were more realistic and practical than the somewhat fanciful utopias of the 17th century. In the most fundamental sense utopian socialism of the first half of the 19th century was a revolt against the semi-fatalism of the premises of economic liberalism, which had represented so¬ ciety

as the product of natural laws and forces, had accused the proletariat of being the authors of their own miseries and sorrows and had sharply denied the possibility of improving con¬ ditions artificially through constructive legisla¬ tion. Utopian socialism denied this premise of Romanticism, individualism and economic lib¬ eralism and revived the notions of the French Revolution to the effect that human intelligence and ingenuity were fully equal to the task of

forging a new social and economic order. They held that human nature is primarily the prod¬ uct of the social environment and that, accord- ingly > the solution of the contemporary evils was to be found in the creation of a better set of social institutions and practices. They maintained that man can by rational thought determine his own social system and social re¬ lations, and some, like Fourier, even claimed that man may by well-conceived legislation an¬ ticipate the normal course of social evolution.

The initiator of the utopian schemes of this period is conventionally assumed to be Count Henri de Saint-Simon (1760-1825), though he can be quite as much regarded as the formu- lator of the chief theses of Comtian sociology and a forerunner of Christian Socialism, and though there is no doubt that the other utopias would have appeared out of the surrounding conditions had Saint-Simon never written. Probably Saint-Simon's most important con¬ tribution to social science and ultimately to social reform was his contention that the social problems created by the Industrial Revolution were of so serious a sort that a distinct science of society, or of social reconstruction, must be evolved to deal with them. This goal was at last realized with the foundation of scientific sociology in the works of Auguste Comte, Her¬ bert Spencer and the early Organicists. Saint- Simon's practical program of reform rested upon the reconstruction of society according to two somewhat divergent proposals, namely, the restoration of the practices and principles of primitive Christianity and the handing over of society to the control of a group of industrial experts who would reorganize things in a rational and humanitarian manner. His em¬ phasis on the ability of a purified Christianity to solve current political questions constituted an impulse to the later development of Christian Socialism, while his proposal for a scientific direction of modern industrial society was elaborated by his disciple, Auguste Comte, in the latter's Principles of a Positive Policy.* The disciples of Saint-Simon developed his diverse notions. Enfantin and Bazard em¬

phasized the communistic principles which were to be found in that primitive Christianity which Saint-Simon had so much admired. Leroux defended the notion of the social and moral equality of men and stressed the concept of the essential and desirable solidarity of society and of the interests of all social classes. Comte attempted to systematize the new social science of which Saint-Simon had seen the need. The greatest of the French Utopians was Frangois Marie Charles Fourier (1772-1835). He was one of the most thorough believers in the possibility of reforming mankind through the creation of an ideal social environment. This he believed would be found in an ((apartment- house utopia® — a co-operative community or phalange of some 1,800 individuals. He honed ultimately to see human society reconstituted as a world federation of phalanges, the capital of which was, significantly, to be lo¬ cated at Constantinople. Fourier, wisely, did not plan a society which would wholly abolish all private property or attempt to equalize all classes and individuals, but worked out what he believed to be a proper fractional distribu¬ tion of the social income between labor, capital

and enterprise. While he did not profoundly affect France, no other member of the utopian group attracted so large and sympathetic a following in America and many phalansteries were established in the United States, the most famous of which was Brook Farm, founded and conducted by some of the most noted members of the ((Brahman caste® of New England literary lights. The remaining French utopian reformer was Etienne Cabet (178S— 1856) , whose follow¬ ers established an experimental community first in Texas and later in Nauvoo, Ill. The lead¬ ing English utopian was Robert Owen (1771-1858), who came into the field of utopian theorizing fresh from a practical demonstration of the possibility of establishing an ideal in¬ dustrial community. At the cotton mills in New Lanark he had organized an advanced industrial community, which, at the opening of the 19th century, possessed most of the features which characterize the more progressive indus¬ trial organizations of the present day and which was unique at that time. While Owen gave his support to almost every type of constructive philanthropy which was current in his day, he is known especially for his agitation in the cause of factory legislation and trade-unionism, his vigorous advocacy of industrial co-opera¬ tion and his concrete plan for ideal industrial communities. The latter did not differ markedly from that of Fourier, though each group was to be slightly smaller. Though his plan was adopted in several places in the United States, most notably at New Harmony, Ind., it re¬ sulted in little practical success, and the en¬ during mark which Owen left on social reform consists chiefly in his support of

every means of aiding the solution of existing evils and his emphasis upon the peculiar virtues in co-op¬ eration. But significant as were the premises and the achievements of utopian socialism in emphasizing the ability of society consciously and artificially to solve its own problems, this type of socialism could scarcely lead directly into Marxian socialism. It was too imprac¬ tical and, from the standpoint of the Marxian, it was not sufficiently democratic. The Utopians did not set forth plans designed to aid the proletariat alone, but aimed at a reconstruction of all of society. In a very real sense they were as much the forerunners of modern French <(solidarism® as of Marxian socialism. Between utopian and Marxian socialism there intervened the stage of ((transitional socialism® by which socialism was made a revolutionary and a proletarian movement. More recent echoes of the utopian movement have been William Mor¬ ris' (News from Nowhere) and Edward Bellamy's (Looking Backwards

F. Transitional or Revolutionary Socialism. — The most important figures in the so-called transitional socialism were the Irishman, Wil¬ liam Thompson (1785-1833) ; the Frenchmen, Louis Blanc (1813-82) and Pierre Joseph Proudhon (1809-65), and the Germans, Wil¬ helm Weitling (180S-70), and Ferdinand La¬ Salle (1825-64), though Proudhon played a more prominent part in founding modern . anarchy and Lasalle is equally distinguished as an advocate of state socialism. As far as his practical reform program is concerned, Thompson was a disciple of Robert Owen, but his (Inquiry into the Principles of the Dis-

Iribution of Wealth most Conducive to Human Happiness) (1824) contained a very clear state¬ ment of the famous Marxian postulate of the doctrine of ˆsurplus value.® He maintained that labor produces all value and should get the whole product, but under capitalistic so¬ ciety it is exploited out of a great part of its just income. Louis Blanc was one of the first to insist that the only effective help which the proletariat could expect must come from their own efforts. He believed that the laboring classes would have to triumph through revolu¬ tion, and his post-revolutionary program con¬ sisted in (<social workshops,® which practically meant state support and control of industry according to a democratic plan of organization. In the French Revolution of 1848 his plan was tried, but, as it was operated by his enemies who solely desired to discredit it, the scheme proved a hopeless failure. Proudhon made an especially bitter attack

upon the institution of private property, or rather upon the abuses of private property which then existed. But he was equally critical of the doctrine of com¬ munism. He proposed to base the income of everyone solely upon the amount of labor per¬ formed, the unit value of which was to be equal and uniform among all members of so¬ ciety. He attempted to secure the establish¬ ment of a national banking system founded upon this labor script following the Revolu¬ tion of 1848, but he failed utterly in this. Standing at the opposite pole from Say and Bastiat he is chiefly significant for his effective onslaught upon the abuses of the bourgeois regime. Weitling, a Magdeburg tailor who * later came to the United States, anticipated Marx by a comprehensive and trenchant re¬ view of the evils which modern industrialism had brought to the workingmen and by an eloquent appeal to the proletariat, urging them to rise in their own behalf and overthrow their capitalistic oppressors. Lasalle stressed the fact that the laborers could only escape from bond¬ age through political activity and assumed a leading part in urging and guiding the forma¬ tion of a labor party in Germany. His con¬ crete plan for reform was state workshops much like those proposed by Louis Blanc, but this phase of his doctrines and activity had little subsequent influence. Transitional social¬ ism, thus, in many obvious ways prepared Eu¬ rope for Marxian socialism.

1. Early Philosophical Anarchism. — It might be thought that the economic liberals had attained unto the most perfect apotheosis of the individual, but another contemporary school exceeded them in this respect, namely, the earliest philosophical anarchists. The economic liberals proposed to retain the state for at least the function or preserving life and protecting property, but the anarchists declared for the total abolition of the state and all coercive juristic institutions. The first of this group was William Godwin (1756-1836), whose (In- quiry Concerning Political Justice) (1793) was probably the best example of the adoption of the extreme notions of the French Revolution 'by an English social philosopher. He held that all evils in society result from the detri¬ mental effect of coercive human institutions. He proposed that all collective organizations larger than the parish should be abolished;

that the unequal distribution of wealth should be done away with; that the institution of marriage should be wiped out; that mankind should be free from everything save the moral censure of their associates and thereby made ready for their ultimate perfection through the influence of reason. Proudhon inveighed mightily against the state which he regarded as wholly an institution for exploitation

and op¬ pression. His ideal society was to be founded upon that combination which may be created in metaphysics, but which has never yet been realized as a practical condition, namely, <(the union of order and anarchy.® He believed that if the obligations of contract could be en¬ forced society would function perfectly, but he scarcely comprehended that until human nature has reached a higher state of perfection there can be no certain enforcement of con¬ tractual obligations without the force of the law behind them. While both Godwin and Proudhon had rejected the utility of the state they had stressed the importance of society — of the concept of humanity. It was left for Max Stirner (1805-56) in his (The Ego and His Own) (1844) to exalt the individual above even humanity and society, to assert that the individual constitutes the only extant reality, to maintain that the only limitation upon the rights of the individual is his power to obtain what he desires, and to contend that (<the only right is might.® While these early anarchists were guilty of many excesses of statement and offered no well-reasoned substitute for the state which they proposed to destroy, they did per¬ form a real service in insisting that the state, as long as it was undemocratized, was un¬ justly oppressive and a legitimate object for the suspicion of those who were excluded from participation in it.

1. The Political Revolutions of 1848. — In

the winter and spring of 1848 the masses throughout central, southern and western Eu¬ rope rose in the attempt to secure for them¬ selves freedom from oppression through par¬ ticipation in political activity. In the German slates freedom from political autocracy was desired ; in the Hapsburg realms and in Italy not only political liberty, but also freedom from the social and economic burdens of feudalism were aimed at; in France political participa¬ tion and the overthow of the oppression of the bourgeoisie were the goal; and in England the (<Chartists® hoped to achieve economic better¬ ment and that part in the world of politics which had been denied to them in the Reform Bill of 1832. For various reasons, primarily from a division of the Revolutionists through national, party or economic rivalry, the move¬ ments failed in every country, though the aboli¬ tion of serfdom in the Hapsburg possessions was made a permanent achievement. The fail¬ ure of these political revolts of the masses turned many into a following of economic channels of attack upon the forces of privi¬ lege.

The programs of social reform in the first half of the 19th century had cleared away the archaic obstructions inherent in Mercantilism and had made vigorous assaults upon the suc¬ ceeding regime of

industrialism and economic liberalism from almost every angle, ranging from an aesthetic protest to political and eco-

nomic rivalry. In England some progress had been made toward the beginnings of construc¬ tive factory legislation, but elsewhere little had been achieved along this line. Nowhere were workingmen freely allowed the right of self¬ protection through organization. In no major European country did political democracy exist in 1850. There were few constructive programs of social reform of a concrete or practical nature. Only in Prussia was there any free public education. But, in spite of these early failures to achieve permanent results, the ground was being prepared for the rise of those reform movements which have brought the be¬ ginnings of economic as well as political de¬ mocracy into the modern world.

VI. The Rise of Present-Day Social Theories and Social Reform Programs.

1. The Historical Background. — Before 1850 the new industrial order had thoroughly taken hold only of England but had af¬ fected France to a considerable degree. The other European countries were little affected by the Industrial Revolution until the last third of the century. When the new industrialism came to these states it produced a wider following for the programs of reform. Again, the first half of the century was spent by the proletariat and their champions in groping about feeling their way, in formulating impracticable pro¬ grams and in discovering successful methods of organization and achievement. After 1850 this preliminary training began to bear fruit in successful proletarian movements in both the political and the economic fields. Further, the mad rush for wealth tended to slow down to some degree and even the capitalistic classes became more resigned to the coming of a moderate restriction of their absolute indus¬ trial freedom. Finally, the Darwinian biology made any static outlook upon social and eco¬ nomic problems absurd and ‘preposterous.

2. The Effect of the German Philosophy of the State. — The political philosophy of both economic liberalism and utilitarianism had been built up about the thesis of the pre-eminence of the individual, and the state was looked upon as

merely the ((communal policeman.® Aside from the protection of life and property and the erection of public works the chief function of the state was represented as being the abolition of restrictive legislation previously enacted. The notion of the state as the chief instrument of social reform was wholly repulsive to this school and a new doctrine of the state was es¬ sential before extensive reform legislation could be given a respectable theoretical founda¬ tion. This new theory of the state was found in the doctrines of the German Idealist political philosophers, particularly Hegel. Here was discovered a notion of the state which was wholly reverent, took the community as the starting point of political reasoning and be¬ lieved the individual capable of finding per- ‘ fection only as a member of the state. This view was brought over into England by T. H. Green, F. H. Bradley and Bernard Bosanquet. Prof. Ernest Baker thus summarizes the nature and significance of this transformation in polit¬ ical philosophy: <(Not a modification of the old Benthamite premises, but a new philos¬ ophy was needed; and that philosophy was

3. vol. 25 — 12

provided by the idealist school, of which Green is the greatest representative. That school drew its inspiration immediately from Kant and Hegel, and ultimately from the old Greek philosophy of the city-state. The vital relation between the life of the individual and the life of the community, which alone gives the in¬ dividual worth and significance, because it alone gives him the power of full moral de¬ velopment; the dependence of the individual, for all his rights and for all his liberty, on his membership of the community; the cor¬ relative duty of the community to guarantee to the individual all his rights (in other words all the conditions necessary for his and, therefore, for its own, full moral development) — these were the premises of the new philosophy. That philosophy could satisfy the new needs of social progress, because it refused to worship a supposed individual liberty which was proving destructive to the real liberty of the vast ma¬ jority, and preferred to emphasize the moral well-being and betterment in and through the community. Herein lay, or seemed to lie, a revolution of ideas. Instead of starting from a central individual, to whom the social system is supposed to be adjusted, the idealist starts from a central social system, in which the in¬ dividual must find his appointed orbit of duty.® This nhilosophy laid the foundation for state- activity, but it carried with it certain exaggera¬ tions and dangers which Professors Dewey and Hobhouse have recentlv revealed.

1. The Rise of Scientific Sociology. — The general science of society, or sociology, took its origin, as Professor Small has made clear, from the social conditions and reform programs of the first half of the 19th century, which called for some objective science capable of weighing the merits and detecting the defects in the many plans for social reform. Saint-Simon had recognized the need for such a science and it was founded by his disciple, Auguste Comte, and by Herbert Spencer, though there can be no doubt that the science would sooner or later have come into existence had these men never written. Since their day sociology has at¬ tracted many students and manv schools of sociologists have developed, each embodying some fertile method of approach to the diverse problems with which sociology must concern itself. Comte, Spencer, Giddings, Ward and Hobhouse have developed comprehensive systems of social philosophy; the methodology of the science has been perfected by such men as Le Play, Durkheim, Small, Simmel and the statisticians, such as Quetelet, Jevons, Galton, Pearson, Bowley, Mayo-Smith, Willcox, Chad- dock, Hankins, Durand and others; the bio¬ logical point of approach has been cultivated by the

Organicists like Lilienfeld, Schaeffle, Worms and Roberty and by their more critical successors ; psychological sociology has been advanced by Bagehot. Wallas, Trotter, Tonnies, Tarde, Durkheim, Le Bon, Sighele, Ross, Ellwood, Cooley and Sumner ; the conflict be¬ tween social groups and interests has been dealt with by Gumplowicz, Ratzenhofer, Oppen- heimer, Small and Bentley; the historical mode of approach has attracted Thomas, Hobhouse, Giddings, Westermarck and Durkheim; the significance of geographical factors has been shown by Ratzel, Reclus, Brunhes and Semple;

while close contact with social reform has been made by the scientific students of philanthropy like Webb, Devine and Taylor and a sound basis for social legislation has been formulated by Jethro Brown, Pound, Freund and Lindsay. The attitude of sociologists toward state activity has varied greatly. Comte believed in a thorough program of social reform, but Dar¬ winian biology affected sociology much as New¬ tonian mechanics had affected oolitical and economic thought for two centuries before. Sociologists of individualistic leanings, like Herbert Spencer and William Graham Sumner, interpreted the Darwinian doctrine to mean that social institutions, like the animal organ¬ ism, evolved in a spontaneous and automatic manner and that human efforts could only be harmful — a view similar to that entertained by the Physiocrats toward interference with the <(natural order® of physical and social phenomena. Others, particularly Profs. Lester F. Ward and Leonard T. Hobhouse, have con¬ tended that, while the earliest stages of social evolution are spontaneous, there comes a time when social progress may be artificially con¬ trolled and accelerated by the conscious direc¬ tion of mankind. This dividing line will ap¬ parently be reached when statesmen shall have evolved into sociologists. Most sociologists, following Jevons, have avoided dogmatism on this point and have shown that laissez-faire and state socialism are policies which may each have their virtues in proportion as they are adapted to a given society, but sociologists are more and more coming to leave the individualist point of view and to stand with Ward and Hobhouse in favoring extensive state activity. While it can scarcely be said that every sociolo¬ gist is on that account a talented statesman, it is certain that no scientific program of social reform can be formulated independent of sociological investigations or divorced from sociological principles.

1. The Development of Marxian or ((Scien- tific® Socialism. — The origins of the so-called <(scientific® socialism are generally and correctly associated with the work of Karl Marx (1818— 83) and Friedrich Engels (1820-95). As Prof. Bertrand Russell has well said, ((Socialism as a power in Europe may be said to begin with Marx. It is true that before his time there were Socialist theories, both in England and in France. It is also true that in France, during the Revolution of 1848, Socialism for a brief period acquired considerable influence in the State. But the Socialists who preceded Marx tended to indulge in Utopian dreams and failed to found any strong or stable political party. To Marx, in collaboration with Engels, are due both the formulation of a coherent body of Socialist doctrine, sufficiently true or plausible to dominate the minds of vast numbers of men and the formation of the International Socialist movement, which has continued to grow in all European countries throughout the last 50 years.® It would probably be futile to attempt to indicate all the sources of Marx's views, for he read deeply in all the literature of his age and was in contact with most of the tendencies of his period, but a few of his more conspicu¬ ous obligations may be set down. To Hegel he was indebted for his dialectical system and his faith in state activity; his materialistic

philosophy of history he took from Feuerbach; the labor theory of value was derived from Ricardo and Rodbertus; the doctrine of surplus value was found by Marx in the writings of Thompson ; the notion of a class conflict and of the necessity of a proletarian upheaval was found in the works of Louis Blanc, Proudhon and Weitling; while from Sismondi he re¬ ceived his conviction that the capitalists would be weakened by the progressive concentration of wealth in the hands of a few men of great possessions. The (Communist Manifesto, *a document drawn up by Marx and Engels for the German Communist League in Paris in January 1848, contained the essence of Marxian socialism. This begins with the economic in¬ terpretation of history, the contention that the prevailing systems of the production and dis¬ tribution of wealth determine the accompany¬ ing social and political institutions. Then comes the labor theory of value, the belief that labor produces all value. From this is derived the doctrine of surplus value by pointing to the difference between the total social income and that received by labor. This difference is the surplus value created by labor and out of which it is exploited by the capitalist. Hence there arises the notion of an inevitable and ir¬ reconcilable struggle between the proletariat and the capitalists. This cannot but terminate in the overthrow of the latter, for they are being*

continually weakened by the steady con¬ centration of wealth in the hands of their more powerful representatives, while the proletariat will become progressively stronger through party organization and the obtaining of the suf¬ frage. When they shall have secured a ma¬ jority in the law-making bodies of the several states the proletariat will rise up and expro¬ priate their oppressors and institute the regime of social and economic democracy which Marx predicted but wisely refrained from describing in detail. These doctrines were elaborated with greater thoroughness and in more ponderous and obscure language in the work on (Capital begun by Marx and completed by Engels. The enduring theoretical contributions of Marx are his economic interpretation of history and his extremely effective criticism of the individual¬ istic industrialism of the first half of the 19th century, the latter of which ((cannot but stir into fury any passionate working-class reader, and into unbearable shame any possessor of capital in whom generosity and justice are not wholly extinct.® Few if any of Marx's other major doctrines are now regarded as possessing sub¬ stantial validity.

Marx was also instrumental in establishing socialism as a political force in Europe. The International Workingmen's Association took its origins for a conference of laborers at the London International Exhibition of 1862. It was organized at London two years later and its principles were drawn up by Marx and adopted at the Geneva conference two years afterward. A German wing was started by Wil¬ liam Liebknecht in 1864 and under his leader¬ ship and that of August Bebel, it was developed into the Democratic Workingmen's Association at Eisenach in 1869. In the meantime a Ger¬ man General Workingmen's Association had been organized and its program enunciated by Lasalle in 1863. These two groups coalesced at

Gotha in 1875 and created the German Social Demociatic party. Persecuted by Bismarck from 1878 to 1890 they grew in power until they commanded 110 out of 397 votes in the Reich¬ stag of the old empire and have now captured in a seemingly permanent manner the German government.

The beginnings of the modern French political organization of labor dates back to 1878. Two years later French Marxianism was originated under the leadership of Jules Guesde. But the French socialists for a long time were unable to arrive at the same unity that char¬ acterized the party in Germany. Numerous sects developed and there grew up

much bitter feeling, particularly between the Marxians, led by Guesde, and the Revisionists or Opportunists led by Jean Jaures, the ablest figure in the his¬ tory of modern socialism. An effort to unite these factions failed in 1899, but met with more success in 1905, and the United Socialist party was able to elect 102 out of 602 members of the Chamber of Deputies in 1914, besides 18 mem¬ bers of the allied Independent Socialist party.

The Socialist party organization has made rapid progress in a number of the other chief European countries, notably Austria. Italy and Russia and has reached remarkable strength in some of the lesser states, particularly Finland, Sweden, Denmark and Belgium. In part, this has been the result of the increased strength of the proletariat and, in part, the effect of a moderation of socialistic proposals which has attracted many liberals who refuse to accept Marxian postulates.

1. The English Fabians and the Growth of “Revisionist® Socialism. — In spite of the significance of Marxian socialism in attracting a sufficient following to make it a political and economic movement of the greatest importance, it possessed certain obvious theoretical diffi¬ culties which embarrassed its more thoughtful supporters and gave its enemies a vulnerable point of attack. These weaknesses were chiefly the untenable labor theory of value and the deductions from it, and the refusal of the Marxians to co-operate with existing capital¬ istic governments in securing remedial legisla¬ tion for the proletariat. A program of re¬ form which was not to begin until after a re¬ mote and complete social revolution had been achieved was much less attractive than o.ie which would accept partial amelioration on the road to complete triumph.

This situation was first adequately compre¬ hended by a group of English radicals known as the Fabian Society. They organized out of a general sympathy with socialistic propositions which had been brought before them, in part, by English followers of Marx, like William Morris and H. M. Hyndman, and, in part, by two American radicals, Henry George and Thomas Davidson. The most important mem¬ bers of this group were Sidney Webb, Graham Wallas, Bernard Shaw, Chiozza Money, Ed¬ ward Pease, H. G. Wells and Stewart Head- lam. Thev derived their name from the Roman leader, Fabius, and their resolution to delay their final convictions until the socialistic movement had developed further. They relied chiefly upon the hope of arousing an intellectual movement in favor of radical social reform and their great significance lies in the fact that they repudiated the fatalism of Marx and

came out for “opportunism,® or remedial social legislation through the agency of the existing political organization. They made socialism an evolutionary rather than a revolutionary move¬ ment. They were also less enamored with the internationalism of Marx and laid greater stress upon national progress in social reform.

While the Fabians originated the tenets of “Revisionism® the spread of this movement was due more to the agitation of a German socialist savant, Edouard Bernstein (1850-). Bern¬ stein lived in England during the period of the socialist persecution in Germany and was con¬ verted to the ideas of the Fabians. Returning to Germany in the early “nineties® he began the dissemination of his new convictions and in his work on Evolutionary Socialism* he system¬ atized his principles, which were chiefly a de¬ nial of the Marxian economics, especially the labor theory of value, a declaration for “op¬ portunism® or piece-meal remedial social legis¬ lation, a willingness to co-operate with existing governments and more concessions to the prin¬ ciples of nationalism and patriotism than the Marxians would allow. In other words, he aimed at the practical transformation of social¬ ism from a proletarian party of revolution into a party of radical social reform which could attract the support of non-Marxian liberals. While he was not able to capture the German Socialist party until after the death of Bebel and the elder Liebknecht, the Marxians now constitute a hopeless minority among German socialists and many of the Revisionists have even passed Bernstein in the degree to which they have modified the Marxian doctrine and program. The general history of socialism in every important modern state has been much like that of German socialism; Marxianism has served as the entering propaganda and the growth of the movement has led to the domina¬ tion of Revisionism. Only in Russia, where socialism did not have long enough a period of development to allow the triumph of “oppor¬ tunism,® have the Marxians remained in the majority. The leading Revisionist Socialists have been Jaures in France, Emile Vandervelde in Belgium, Filippo Turati in Italy and Peter Struve and M. Tugan-Baranovsky in Russia. The intellectual leaders of socialism in the United States have also generally capitulated to Revisionism, though the majority of the party clings to Marxian principles. Thus, as socialism has increased in strength it has de¬ veloped moderation. This has been due, in part, to the greater validity and practicality of Revisionism and, in part, to the very growth of socialist power for, as Professor Orth has well put it, “ambition brings power, power brings re¬ sponsibility, responsibility sobers the senses.® Socialism has in this manner been purged of the nightmare of revolution, except in Russia, and while it is undoubtedly increasing in strength almost

everywhere it can no longer frighten any person except the one who opposes the very principle of progress.

1. The Rise and Expansion of State So¬ cialism. — Closely related to the principles and program of Revisionist Socialism and in part contributing to the growth and vitality of the former is the so-called “State Socialism.® The chief difference between them is that state socialism has primarily come from radical bourgeoisie instead of moderate socialists,

though it must be remembered that in some cases, most notably in that of Bismarckian social legislation, state socialism has been used to aid autocracy and check radicalism. The same general program of remedial legislation is proposed by both, though their ultimate goal is slightly different. The Revisionist hopes for an ultimate proletarian state but plans to ease as much as possible the passage of the capitalist over the Jordan of social democracy, while the State Socialist hopes to retain the capitalistic system with great concessions to the laboring classes. State socialism received some consider¬ able impulse from Lasalle, but its chief early leaders were the German, Karl Johann Rodbertus (1805-75), and the Frenchman, Charles Brook Dupont-White (1807-78). More re¬ cently the program of state socialism has re¬ ceived not only the support of statesmen in the German Progressive party, the French Socialist Radical party and the English Liberal party, but also in different degrees from the profes¬ sorial champions of social reform within the capitalistic state, the so-called ˆSocialists of the Chair,® such as Schaeffle, Wagner and Schmol- ler in Germany; Bougie and Gide in France; Webb, Hobson and Hobhouse in England, and Fetter, Fisher, Patten, Seligman and Seager in the United States.

State socialism in actual legislative achieve¬ ment has made the greatest progress in Ger¬ many where there has been enacted an elaborate program of social legislation covering almost every phase of protection to the laboring classes. It has also included the adoption of the state ownership of railroads and other pub¬ lic utilities and a vast amount of municipal socialism. France has made extensive progress in this direction in the latter half of the period of the Third Republic, and Italy, as well, es¬ pecially in the liberal regime since 1900. Aus¬ tria has followed much of the example of Ger¬ many in this movement, while in England, the home of economic liberalism, even the party of Cobden has been converted to state socialism through a process of

change which Professor Hobhouse has clearly explained. Its vigorous leader, David Lloyd George, has secured, in the period since 1905, the adoption of a legislative reform program designed to make Cobden turn in his grave and rivaled in content only by German achievements. In the United States state socialism made scant progress until the <(accident at Buffalo® put Mr. Roosevelt in the Presidential chair. Down to that time the pluto¬ cratic admirers of the philosophy of Cobden and Bright, such as Roscoe Conkling and Mark Hanna, had maintained individualism in a po¬ sition of dominance. While Mr. Roosevelt achieved relatively little in the way of positive remedial legislation, he aroused the spirit of the people in this direction and made possible the very considerable progress in advanced social legislation which has taken place in Mr. Wilson's administration. Of all the enemies of the political postulates of economic liberalism state socialism has to date been the most deadly in practical results.

1. Recent Developments of Christian So¬ cialism. — The growth of social problems and the development of programs of relief have not been without their reaction upon ecclesiastical organizations and policies since 1850. The

Catholic party has been especially active in this matter. In Germany, Adolph Kolping (1813-65) proposed associations of young workingmen for religious as well as economic betterment; Bishop von Ketteler (1811-77), F. C. J. Moufang (1817-90) and Franz Hitze (1851 —) advocated not only social legislation, but also the organization of gild-socialism under Catholic auspices, but with state financial sup¬ port, as the best agency for solving modern industrial evils. The program was designed, in part, to weaken the state, the secular rival of the Church, and, in part, to attract the proletariat to the ecclesiastical authorities. The Catholic party in Germany has been strong¬ est in Bavaria, from which the Center party, always an exponent of social reform, has been chiefly recruited. In Austria, Karl Lueger (1844-1910) adopted the program of the Ger¬ man Catholic gild-socialists and organized the powerful Austrian Christian Socialist party. In France, Frederic LePlay (1806-82) pro¬ posed to solve modern social and economic problems by developing the ((family group® — an organization midway between the old patri¬ archal family and the modern family organiza¬ tion. But much more important than this for social reform was his method of studying social problems, for he is rightly regarded as the real originator of the social survey method of social investigation. Much more influential has been the wTork of Albert de Mun (1841— 1914), who accepted the gild-socialist program and organized the Action Liberale Frangaise, virtually the Catholic socialist party of France. Hilaire

Belloc and the Chestertons have tried without success to organize a similar movement in England. Even the liberal Pope, Leo XIII, in his encyclical, Rerum novarum, sent out in 1891, advocated remedial social legislation for the laboring classes, espoused the program of gild-socialism and maintained the special solicitude of the Catholic Church for the lowly laborer, whether urban or agrarian.

The social impulse has also affected Prot- estanism in recent times. In Germany, the fanatical Hohenzollern court preacher, Stocker, organized what was called a Christian Social Workingmen's party, but which was in reality more Anti-Semitic than either Chris¬ tian or socialist.. Friederich Naumann in the <(nineties® also made an unsuccessful attempt to capture German Protestantism for a radical social reform policy. In France, the Protestants have been noted for their philanthropic organizations, but they have never been strong enough to create a powerful party of social reform. In England, the work of Maurice and Kingsley has been carried on by aggressive Anglicans, like Bishops West- cott and Gore, who founded the Christian Socialist Union in 1889, and like John Neville Figgis, who formulated an elaborate theoretical justification of what might be called ecclesi¬ astical syndicalism. In America Christian Socialism was founded in the late ((eighties® by Josiah Strong, and Profs. Richard T. Ely and George D. Herron and received its most effect¬ ive support from Prof. Walter Rauchenbusch in his famous works, Christianity and the Social Crisis, *and Christianizing the Social Order.* Other adherents to this point of view

have been Professors Francis Peabody of Har¬ vard, C. R. Henderson and Shailer Matthews of Chicago, Harry Ward of Boston, E. L. Earp of Drew and P. A. Parsons of Syracuse. The social point of view has attracted religious radicals as well as conservatives. Indeed, it is probable that the critical adherents to Chris¬ tian doctrines are the most inclined to stress the social phases in Christianity, for with them the social and ethical elements are about all that remains to be saved and expanded.

1. The Newer Anarchism and the At¬ tacks upon the Bourgeois National State. — Modern anarchism is a revolt against the op¬ pressiveness of the agrarian or the capitalistic state. It is most significant that the two leading figures in the development of the modern anarchist movement have been Russians. At a time

when modern industrialism was creating new problems and bringing the necessity of modern democracy nearer to hand, the Russian autocracy tried to maintain a system of gov¬ ernment as mediceval and intolerant as at the time of Peter the Great. Michael Bakunin (1814—76) was the revolutionary propagandist of the two great leaders of modern anarchism. He paid little attention to the problem of the details of the future anarchist state, but re¬ garded his chief task to be the spreading of the propaganda of hatred for the state and the organization of a movement committed to its destruction. To him the state appeared as the great and central engine of human oppression and its elimination seemed the one chief need of the time. Once the state was removed the task of the reconstruction of society on anarchistic principles could safely be left to the future generations. Hence, the work of Bakunin was chiefly the dissemination of the gospel of de¬ struction, his views being most systematically expressed in his (God and the State, J where he maintained loyalty to state and religion to be the chief obstacles to social progress and human liberty. Prince Peter Kropotkin (1842-) is the chief systematic and constructive writer on modern anarchism. According to him the ideal organization of society is the non-coercive com¬ munity without private property and function¬ ing perfectly through the operation of the principle of mutual aid or co-operation. To support his position he has not only made a theoretical defense of his system, but has also executed a thorough historical study of the im¬ portance of the principle of mutual aid from the first animal societies to the present day and has brought forward a wealth of evidence to prove this the chief factor in social evolution, the happy operation of which was terminated by the rise of the modern dynastic and capital¬ istic state, which has created most subsequent evils without in any way contributing to their effective removal. The communistic, co-opera¬ tive and non-political group, then, is the goal of the philosophical anarchist. Human nature hav¬ ing been perverted by political institutions, the removal of the latter will restore the pristine virtues of the race — a notion not far removed from the burden of Rousseau's famous second (Discoursed The anarchistic views have also re¬ ceived the support of such writers as the Rus¬ sian, Leon Metchnikoff, and the Frenchmen, Elisee Reclus and Jean Grave. The economic program of the anarchists is not greatly differ¬

ent from that of the socialists, as far as the in¬ stitution of private

property is concerned, but their political ideals are diametrically opposed. The socialist proposes a vast increase in state activity, while the anarchist desires the complete extinction of political authority and the substi¬ tution of voluntary co-operation. The anarchists have erred in generalizing too much from Rus¬ sian conditions, which have been incomparably worse than in the more democratic states of western Europe. Further, their movement is entirely unadapted to modern conditions. They are either antiquated or greatly ahead of their time. Voluntarily co-operation may have been possible in a small primitive group or it may be practicable in the far distant future when human nature shall have been perfected, but scarcely at the present time when imperfect humanity faces a complexity of problems of unprecedented volume and when the state is more than ever necessary. The anarchists have done good in showing how much oppression has resulted from autocratic states and in stressing the unexploited potentialities of co-operation, but the remedy would seem to lie in the im¬ provement of the state through democracy and decentralization rather than in the extinction of political authority.

1. The Development of Trade-Unionism and Its Relation to Social Reform. — It was

one of the cardinal points of economic liberal¬ ism that perfect freedom of contract should prevail in the economic relations of employer and employee, but in actual practice the freedom was chiefly that of the employer to reject the services of the employee. Where one party to the contract could refrain from participation with equanimity while the other party would be threatened with starvation, there could be neither freedom nor equality of contract; un¬ organized labor was thus wholly at the mercy of the capitalistic employer. On the other hand, if the laborers could combine and withhold the services not merely of one man, but of a large number, the concern of the employer over the failure to make the labor contract could be greatly increased, while the suffering of the employees could be lessened through co-opera¬ tion in bearing the mutual loss. The desire to meet the employer on relatively equal terms has been the central impulse in the development of modern trade-unionism. The question has often been raised as to the relation between the modern trade-unions and the older gild organi¬ zations. It has been shown pretty conclusively that there was no genetic connection between them; in England there was a long hiatus be¬ tween the end of the gilds and the origin of unions, and even on the Continent there is little evidence that trade-unions grew up out of previous gild organizations.

In England, trade-unionism was early pro¬ hibited by the Combination Laws of 1799 and 1800. In 1824 Francis Place and Joseph Hume smuggled an act through Parliament legalizing organization, but this was repealed in the fol¬ lowing year. Owen's attempt to stimulate unionism in the ˆthirties® failed. In the ˆsixties® the cause of unionism was taken up by the so-called <(Junta,® made up of Allen, Applegarth, Coulson, Guile and Odger. By acts of 1871 and 1875 organization and strikes were legalized. Though the reactionaries in the

Taff Vale and the Osborne cases (1901 and 1909) tried to weaken the unions, the Liberal party in legislation following 1905 has practi¬ cally abrogated the effects of these decisions. To-day labor organization is probably the most effective aid to the English urban proletariat. At the outbreak of the World War these unions had about 3,000,000 members. In France, an act of 1864 gave the laborers the right to organize and a later law of 1884 authorized them to strike. Since that time there has been a great increase in the number of unionists, accompa¬ nied by a bitter struggle between those who cling to orthodox methods and those who incline to¬ ward the greater radicalism of the Syndicalist movement. The French labor unions now boast of over 1,000,000 members. In Germany trade- unionism was originally little impeded by oppos¬ ing legislation, but it came under the ban dur¬ ing the anti-socialist campaign from 1878 to 1890. Since then it has been little restricted. Most of the German unionists are organized in Social Democratic or ((Free)) unions, embrac¬ ing about 2,000,000 members. In no other im¬ portant country have the unionists so faithfully maintained the ideals of excellent craftsman¬ ship which were so characteristic of the me¬ diaeval gilds. Trade-unionism has spread to most other European countries, though in many, especially in the Romance nations, it has tended toward ˆSyndicalism.® In the United States extensive labor organization began following the Civil War with the Knights of Labor, an organization which declined after the violent strikes of 1886. Their place was taken by the American Federation of Labor, an organization which now numbers about 4,500,000.

The policies of labor unions have centred about two main avenues of attack upon the capitalists. Matters of immediate interest, such as wage agreements with employers, are ar¬ ranged either by peaceful collective bargaining or by more violent action, such as strikes and

boycotts. For the more general advancement of the status of the proletariat they rely upon the possibility of obtaining legislation favorable to the interests of the laboring classes. Which of these two policies is most stressed varies with different unions and in different countries, but, on the whole, it is probable that the strike policy has predominated. The degree to which the trade-unions have attempted to gain polit¬ ical power has differed widely with time and nation. In Germany, most unionists are mem¬ bers of the Social Democratic party; in France, orthodox unionists tend to affiliate with the socialists, while the radicals who incline toward ˆSyndicalism® eschew all political activity; in England, the unionists have a more or less dis¬ tinct labor party of considerable proportions; in the United States, Samuel Gompers has at¬ tempted to keep the American Federation of Labor out of distinct political activity, though he has several times declared his own prefer¬ ence for candidates at Presidential elections. An accessory but very important feature of trade-unionism has been the development of fraternal and co-operative activities among members.

While the growth of organized labor has been one of the outstanding features of the so¬ cial and economic history of the 19th century it is handicapped by many imperfections. The

attempt to prevent violence through making arbitration of labor disputes compulsory has met with only temporary and local success, most notably in Australasia, though the tendencies seem to be moving in this general direction. Again, many powerful employers and associa¬ tions of employers have even yet so little adjusted their economic orientation to the modern industrial world that they refuse to recognize the validity of the principles or the practices of labor organizations. As a result, the relations between capital and labor are too frequently of the nature of slightly mitigated industrial warfare. Finally, while there can be little doubt that labor organizations have done more than anything else to advance the material interests of the laboring classes in the last half century and have been the most potent factor in promoting industrial democracy, yet trade- unionism is bound to be unsatisfactory to those who do not believe in merely alleviating the misery of the proletariat, but hope to over¬ throw the whole modern capitalistic order. Orthodox trade-unionism aims chiefly to im¬ prove the lot of the laborer within a capitalistic industrial society, but accepts the implied per¬ sistence of this order. Therefore, those who wish the institution of a society controlled by the proletariat and desire to achieve this revo¬ lution by economic means rather than by the political methods of socialism have tended to leave trade-unionism and go over to the more radical labor

movement which has found its greatest strength in ˆSyndicalism.®

1. The Development of Syndicalism and the Radical Labor Movement. — Syndicalism, which originated as a French labor movement and has since spread to other countries, par¬ ticularly Italy and America, is the most recent radical proletarian movement of any significant proportions to develop. Syndicalism resembles socialism in desiring to end the present capital¬ istic economic order; it bears some similarity to trade-unionism in believing that the economic point of attack is most likely to be most effect¬ ive and in using labor organization as the chief instrument for gathering the forces of the pro¬ letariat ; it is like anarchism in desiring the abolition of political forms of control over mankind. It differs from socialism in reject¬ ing the efficacy of political activity and in re¬ fusing to accept state socialism, even in a pro¬ letarian state; it diverges from trade-unionism in favoring, as the unit of organization, the in¬ dustrial rather than the craft union and in aiming to get rid of the capitalistic employer altogether ; and, while bearing a closer relation to anarchism than to socialism, it does not pro¬ pose so thorough an abolition of all existing in¬ stitutions as the anarchist desires, and it seems likely to retain a far greater amount of au- thorative control over the members of the syndicalist society, even though it may try to evade this in theory by refusing to designate such control as governmental or political.

The historical origins of French syndicalism are not difficult to understand. A vigorous theory of the necessity of a class war had come down from Proudhon. The many fac¬ tions into which French socialists had split and the bitter animosity which developed between them weakened the cause of the proletariat, and the socialist cause was further discredited

with the radical laboring element because for¬ mer socialists like Millerand and Briand had been willing, when they entered the French government, to use the forces of the capitalistic state against radical labor revolts. Therefore, there arose a determination among a large num¬ ber of French labor leaders to turn their back upon all political activity, and to distrust polit¬ ical methods of relief whether from state socialism or Marxian revolutionary hopes. At the close of the

<(eighties>) labor exchanges were organized, first in Paris, and later throughout the leading French cities, to act as a general clearing-house for local labor prob¬ lems and policies. In 1892 they established a national organization — the Federation of La¬ bor Exchanges (Federation des Bourses du Travail). This movement was guided by Ferdi¬ nand Pelloutier (1867-1901), a French disciple of communist anarchism. At about the same time another radical labor organization was developing in France. This was the General Confederation of Labor (Confederation Gen- erale du Travail), founded in 1895 by a union of some 700 French local industrial unions or Syndicats, from which the syndicalist move¬ ment gets its name. In 1902 the Federation of Labor Exchanges and the General Confedera¬ tion of Labor united and became the basis of the organized syndicalist movement. The syste¬ matic theorist of French syndicalism is Georges Sorel (1847-) .

The syndicalists eschew any attempt to come to favorable terms with their capitalistic em¬ ployers in any settlement which may be re¬ garded as permanent. They aim frankly and openly at conducting a class war by industrial methods which will sooner or later drive the capitalist from industry and overthrow his po¬ litical bulwark — the modern national state. The unit of organization at which the syndi¬ calists aim is the industrial union, the general organization of all laborers in a given industry, which, it is hoped, will give greater strength and less division of interests than craft union¬ ism. Their method of carrying on the class war is the so-called ((direct action,® the two chief types of which are ˆsabotage® and the ((general strike.® The former is more of a temporary instrument designed to serve until the general strike finally drives the capitalist from the field. It consists in every type of harassing the employer, from serious injury to machinery, to slow and inferior workmanship in production. While some employers might be discouraged and abandon the fight merely as the result of sabotage, a more vigorous method will be needed to deal with the more obdurate capitalists and with the state, and for this pur¬ pose the syndicalists propose to resort to the general strike, which is not merely a suspension of labor to improve local conditions, but a general <(cessation of work, which would place the country in the rigor of death, whose terrible and incalculable consequences would force the government to capitulate at once.® Were the syndicalists successful in destroying the capital¬ istic order they would institute a communistic economic society and a governmental organiza¬ tion based upon the industrial system. As Pro¬ fessor Orth has well expressed it, Syndicalists believe in a local or communal government. Their state is a glorified trade union whose activities are

confined to economic functions,

their nation is a collection of federated com¬ munal trade societies.® They would, then, take government out of the front-door of the state to bring it in by the back-door of industrial regimentation. Of all the radical modern re¬ form movements syndicalism has come the nearest to translating the class war into prac¬ tical concrete action and it is that form of or¬ ganization and procedure into which the capital¬ ists should most hesitate to drive the laboring classes. Aside from its own specific program, syndicalism has attracted a sympathetic study from many who are not willing to accept its whole economic program, but feel that some¬ thing must be done to decentralize the over¬ grown and unwieldy modern national state and to give representative government a more rational basis, through allowing the representa¬ tion of economic interests and classes. Further, many exponents of the more orthodox trade- unionism feel that they would gain greatly by giving up the craft union organization and ac¬ cepting the principles of the industrial union organization. While syndicalism began as dis¬ tinctly a French movement it has spread into other European countries, notably Italy. In the United States it has been adopted by a con¬ siderable group — -the Industrial Workers of the World. From the combined influence of France and the United States syndicalism has built up a considerable following in Great Britain.

1. Gild-Socialism as a Compromise be¬ tween Socialism and Syndicalism.-— The movement generally known as gild-socialism means in its essence an economic decentraliza¬ tion and the solution of the labor problem through the revival of industrial associations like the mediaeval gilds, adapted to the changed conditions of modern industrialism. Such a proposal dates back to the first half of the 19th century, when it was foreshadowed by some of the propositions of the English Christian So¬ cialists and Ruskin. Especially congenial has gild-socialism been to modern Catholic social reformers, like Bishop Ketteler, Franz Hitze, Count de Mun and Hilaire Belloc. It also has been defended in a modified form by the French sociologist fLmile Durkheim, while it has par¬ ticularly attracted the younger British labor leaders, such as Mr. Cole and his associates. In its modern and elaborated form it aims to effect a reconciliation between state socialism and syndicalism. The political control and ad¬ ministration, which represents society as con¬ sumers and which receives the chief atten¬ tion of the socialists, will be retained by the state. The management of industrial affairs, which pertains to society as producers and is represented by syndicalism, will be turned over to gilds or

associations of workingmen, properly federated into national organizations. This will give essential industrial autonomy. Above both political and economic authority will be a joint-committee composed of representatives of the state and the gilds, which will have the final decision on disputed points and on those vital matters which concern the citizens as both pro¬ ducers and consumers. To many, gild-social¬ ism seems the most promising of the modern reform policies and a clever synthesis of two of the most powerful of radical reform pro¬ grams. Others, however, deny the possibility of any real separation of political and indus¬ trial functions. As Prof. Ernest Barker has

expressed it, ((any doctrine of separation of powers, such as Guild-Socialism advocates, is bound to collapse before the simple fact of the vital interdependence of all the activities of the (great society) of to-day. Either the State must go, as Syndicalists seem to advocate, and that means chaos, or the State must remain — and then, if you are to have Socialism, it must be State-Socialism.®

1. Henry George, the Single Tax and Land Nationalization.— The great majority of radical reform programs in recent times have centred about attacks upon the methods of pro¬ duction and distribution of the earnings in man¬ ufacturing industry and commercial enter¬ prises, but these ignored certain sources of mod¬ ern social problems and evident causes of pov¬ erty and misery involved in the unequal and undemocratic methods of landholding. There¬ fore, it was natural that at least one important reform program should revolve about the pro¬ posal to reconstruct the methods of landhold¬ ing to bring them more into harmony with mod¬ ern democratic principles. The leader in this movement was a brilliant and energetic Ameri¬ can, Henry George (1839-97). Living in Cali¬ fornia in the early days of its civic and indus¬ trial development he was struck with the great increase in land values that took place from purely social causes in less than a decade. Com¬ ing to New York the same phenomena attracted his attention in the extreme land values created by social and economic concentration on Man¬ hattan Island. So forcibly was he struck by these facts that he came to regard this increase of real estate values and its absorption by pri¬ vate persons as the chief cause of poverty and misery.

Consequently, he proposed, in his notable work on (Progress and Poverty) (1879), the general abolition of other forms of revenue and the imposition of a so-called <(sin- gle-tax® on land, which would turn into the public treasury the unearned or social incre¬ ment in land values. This process would ulti¬ mately drive the landlord out of existence and pave the way for the democratic nationaliza¬ tion of land. George's theories attracted the greatest amount of interest in England where the evils he attacked were especially prevalent and where the Liberal party found a modified version of his doctrines a fine instrument to be used in attacking their traditional enemies — the Tory or Conservative landlords. Among his followers was the famous scientist, Alfred Rus¬ sel Wallace, but it remained for David Lloyd George to give these doctrines some prelimi¬ nary application in legislation. In the ((small holdings Act® of 1907 and in his budget of 1909 he made a definite attack upon the vested landed interests. At the outbreak of the World War he was preparing a radical program of agrarian reform for Great Britain, but the close of the conflict found him detached from the reform party and sitting at the Peace Conference with two of the most tenacious adherents to agrarian autocracy in England, Arthur J. Balfour and Bonar Law. In the meantime the Bolshevik government in Russia had proceeded to carry through a plan of actual land nationalization, but it would seem that this was much more a product of the peculiar aims of the agrarian So¬ cialist, or Social Revolutionary, party in Rus¬ sia than it was of the direct adoption of the views of Henry George. Most progressive

thinkers differ from Henry George primarily in holding that the single-tax should not be re¬ garded as the sole remedy for modern social problems, though the majority of them would agree that society should in some manner ab¬ sorb these socially created values known as the unearned increment, and all would give him credit for having called attention to the fact that the capitalistic manufacturer or merchant is not wholly responsible for the evils and mis¬ ery of the present order. Much of the vitality of the single tax discussion has, however, been subsequently destroyed by changed economic conditions, particularly the relative decrease in the proportional importance of landed as com¬ pared with other forms of wealth, and the grow¬ ing fluidity and legal elusiveness of the present modes of land-holding.

1. Bourgeois Attempts to Absorb the Radical Proletarian Movements. — It could scarcely be supposed that the middle

class would sit by and idly contemplate the growth of these threatening proletarian programs and movements without attempting to counteract them — without trying, as one thinker has ex¬ pressed it, ((to set a backfire.® Probably the chief instrument which has been used has been state socialism or legislation designed to aid and placate the laboring class, while retaining the essence of the capitalistic system, though it must not be forgotten that much state social¬ ism has been a result of proletarian or land¬ lord attacks upon the middle class. The bour¬ geoisie have hoped to lead the proletariat to trust to the adequacy of the national capitalistic state as an agent for promoting the cause of social reform and the growth of industrial de¬ mocracy. Further, the middle class has con¬ tributed great donations for social relief work and to aid modern scientific philanthropy, in the hope that such measures will both lessen mis¬ ery, and hence the pressure for reform, and will attract the gratitude of those who receive aid. Such benefactions have not been made solely for the reliet of physical privation and suffer¬ ing, but even for the intellectual and recrea¬ tional improvement of the lower classes through libraries, Y. M. C. A. organizations, playgrounds and parks. Then, the more progressive and far-sighted leaders of modern industrialism have developed policies of industrial conciliation designed either to placate the laborers or to get them practically interested in the preservation of the existing order. The best known of such methods are profit-sharing, co-operation, scien¬ tific management and industrial welfare work. Some have even gone so far as to foster the growth of conservative trade-unionism, such as is represented by the American Federation of Labor. Of course, many of the modern capitalists still hold tenaciously with strange fatuity to the attitude of John Bright and de¬ clare for a war to the end with state socialism and industrial democracy. This group can be trusted to decline with rapidity, or, if they show an unexpected tendency to increase, they may safely be left to the tender mercies of syndi¬ calists and I. W. W.'s. Finally, a philosophy has been evolved designed to effect a liberal compromise between capitalism and labor, which has received its chief elaboration in France where it is generally spoken of as the doctrine of solidarism. It takes its origin from the doc¬ trines of Comte, the Positivists and Leroux

regarding the organic unity of human inter¬ ests. It was further elaborated by the sociolo¬ gists of the Organicist school and has recently been expanded by Leon Bourgeois from the legal point of view; by Charles Gide from the standpoint of the progressive economist; by Smile Durkheim as a profound sociologist irv terested in practical social reform; and very recently by the German, Nicolai, from a socio- biological point of approach. This doctrine aims at an honest and thoroughgoing attempt to reform the present order, so as to grant essential economic and social justice to the proletariat while retaining the undoubtedly superior directive and inventive ability of capi¬ talistic enterprise. In its practical program it proposes, on the one hand, an extension of remedial social legislation through state social¬ ism, and, on the other, a great extension of the principle of voluntary co-operation. Its adher¬ ents also generally incline toward some consid¬ erable decentralization of the administrative powers and functions of the modem national state. Some members of the group lean rather distinctly toward gild-socialism and the rep¬ resentation of economic groups and interests. All in all, it is the one program of reform which embraces the interests of both capitalists and proletariat and which is, at the same time, sufficiently honest, disinterested and progressive to entitle it to respectful consideration.

1. The Great War and Policies of Re¬ construction. — The World War at some time in the future will probably be regarded by the historian as having constituted a crisis or a dividing line in the history of modern social reform movements, but it is too early to predict just what the nature of the succeeding re¬ form movement will be. It will doubtless be seen by future historians that back of the struggle of nations was what may have been the beginning of the final struggle between the present social and economic classes — a struggle in which landlord and capitalist united against the common enemy in the proletariat. That the feudal landlord has generally succumbed in the course of the struggle, except in England, is generally conceded. That labor hoped for the equally decisive termination of the modern order of individualistic industrialism is apparent from what is usually taken as the most profound utterance of labor during the war — the report of the sub-committee of the British Labor party on reconstruction. (; with the monstrous inequality of cir¬ cumstances which it produces and the degra¬ dation and brutalization, both moral and spirit¬ ual, resulting therefrom, may, we hope, indeed have received a death blow. With it must go the political system and ideas in which it natu¬ rally found expression.® They expressed the further significant opinion that

<(what has to be reconstructed after the war is not this or that government department, or this or that piece of social machinery; but society itself.® Further, during the struggle, as a result of the necessity of maintaining the production of necessary munitions at the highest level, ab¬

normal concessions had to be made to labor, a situation which did not tend to make the pro¬ letariat particularly inclined to acquiesce in any later restoration of the social and economic status quo ante helium. All countries were com¬ pelled to undertake what in times of peace would have been regarded as alarming steps toward complete state socialism. In Russia, the feudal autocracy was overthrown and there followed the first attempt in history to apply Marxian socialism to the reconstruction of a great state. In Germany, the fall of the Junker- Krupp alliance paved the way for the triumph of Revisionist socialism in the German political system.

The capitalists did not fail to recognize these various challenges to their very existence as a powerful organized class, nor did they hesi¬ tate to take steps to protect their system. Their most effective program was to make patriotism just as far as possible synonomous with rigid adherence to a belief in the sanctity of the capitalistic system and to brand all expressions of proletarian discontent and all plans for radical social reconstruction as products of dis¬ loyalty or vile enemy propaganda. Radical leaders were assassinated or sentenced to long terms of imprisonment for criticisms of ad¬ ministrative policy of a much milder character than were passed by unnoticed when uttered by political opponents who were members of capitalistic parties. Severe espionage laws were passed, which were little utilized to aid the military department, but were widely made use of to silence expressions of social and economic discontent. The close of the conflict left a serious situation — a proletariat deter¬ mined to end an oppressive social and economic order and an organized effort of capitalists to preserve the system to which they owed their economic resources and political prestige. The solution of this problem is what now faces the world with the coming of peace and this solution is bound to be of infinitely greater significance for the history of modern civiliza¬ tion than the redistribution of national bound¬ aries by the Peace Conference. Whether the adjustment will be made in a peaceful manner through a liberal compromise, in which both parties will concede much, or whether it will be made by violence in a bitter class war which cannot but end in the termination of capitalism in a most unfortunate manner, will depend wholly upon the sagacity and statesmanship of those who will lead in the negotiations. What plans of reconstruction will be most used cannot be foreseen. The problem

has called forth a reconsideration of every one of the proposals of the 19th century which have been discussed above, not even excepting a return to the complete individualism of the economic liberals.

A final lesson regarding social reform pro¬ grams has been taught by the World War and that is, as Professor Hobhouse pointed out a number of years ago in his (Democracy and Re¬ action, that the state is bound to be obstructed in effective programs of social reform as long as militarism menaces our civilization. As long as citizens are bowed beneath the burdens of taxation to supply munitions for active warfare or to support vast armaments for <(prepared- ness,® there will never be adequate funds for thoroughgoing schemes of social reconstruc-

tion. A veritable social and economic paradise throughout the western world could have been created out of the funds expended in this war and in a very real sense the final solution of social problems is bound up with the discovery of some method for discouraging or eliminating war.

Bibliographic Note. — There is no ade¬ quate and complete bibliography on this sub¬ ject, though J. B. Peixotto's 'Syllabus of So¬ cial Reform Movements > (University of Cali¬ fornia Press) and F. G. Peabody's 'A Reader's Guide to Social Ethics and Allied Subjects) contain a large number of classified titles. S. P. Orth's 'Socialism and Democracy in Europe,' pp. 273-279, contains a useful list of books. The bibliographies following an elab¬ orate bibliography of social reform is being prepared by Mr. Sasel Ziemand. The chapters of Parts III and IV of F. A. Ogg's (Economic Development of Modern Europe) are full and up-to-date.

The clearest political history of modern Europe is C. D. Hazen's (Europe Since 1815.) The political, economic and social background of modern social reform movements is set forth in C. J. H. Hayes' (Political and Social History of Modern Europe) ; Robinson and Beard's development of Modern Europe'; J. S. Schapiro's (Modern and Contemporary Euro¬ pean History' ; F. A. Ogg's (Economic De¬ velopment of Modern Europe) ; and Max Far- rand's (The Development of the United States. >

The proper intellectual orientation for a study of modern social reform

is to be ob¬ tained from chapter ix of Volume I of Robin¬ son and Beard, the last chapter of Volume II, and the concluding essay of J. H. Robinson's (The New History,' on (The Spirit of Con¬ servatism in the Light of History.' The clear¬ est elementary introductions to the subject are chapter xxi of Volume II of Hayes and the chapter in Schapiro on 'Revolutionary Labor Movements.' The following works would give a fairly complete account of all leading social reform programs: Gide and Rist's 'His¬ tory of Economic Doctrines ' ; Ogg's 'Economic Development of Modern Europe) ; Bertrand Russell's 'Proposed Roads to Freedom,' Part I; L. H. Haney's 'History of Economic Thought' ; S. P. Orth's 'Socialism and Democ¬ racy in Europe) ; E. Barker's 'Political Thought in England from Spencer to the Present Day' ; and F. S. Marvin's 'The Century of Hope.' The third volume of Professor Dunning's 'History of Political Theories > is announced.

The chief social reform programs down to the Industrial Revolution are to be found in W. W. Willoughby's 'Political Theories of the Ancient World' ; W. A. Dunning's 'History of Politi¬ cal Theories,' Volumes I and II; James Bonar's 'Philosophy and Political Economy' ; M. Beer, 'The History of English Socialism' ; W. B. Guthrie's 'Socialism Before the French Revo¬ lution' ; and J. B. Peixotto's 'The French Rev¬ olution and Modern Socialism.' The economic and social background of post-industrial Revol¬ ution reform can be found in J. A. Hobson's 'Evolution of Modern Capitalism' and J. L. and B. Hammond's 'The Village Labourer' ; 'The Town Labourer.' On economic liberalism and utilitarianism good introductory treatments are to be found in Gide and Rist, Haney and W. L. Davidson, 'Political Thought in England:

the Utilitarians.' On the economist's opposition to economic liberalism one should consult Haney and Gide and Rist; on the rise of Tory Socialism in England, Gibbins, H. D. B., 'Ihe English Social Reformers' and Hutchins and Harrison, 'The History of Factory Legisla¬ tion' ; on Christian Socialism, Flint, R., 'The Philosophy of History in France' ; Gibbins, and Seligman, E. R. A., 'Owen and the Christian Socialists,' in the 'Political Science Quarterly,' Volume I ; on the literary and aesthetic revolt, Barker, chapter vii ; on the utopian movement, Gide and Rist, Kirkup, T., 'History of Social¬ ism' ; Noyes, J. H., 'American Socialisms' ; and Hinds, W. A., 'American Communities' ; on transitional socialism, Gide and Rist, Kirkup and Mariott, J. A. R., 'The French Revolution of 1848 in Its Economic Aspects' ; on the rise of modern anarchism, Brailsford, H. N., 'Shelly, Godwin and Their Circle' ; and Zenker, E. V., 'Anarchism' ; and on the political revolutions of 1848, Andrews, C. M., 'Historical Develop¬ ment of Modern Europe,'

Volume I, chapters ix, x.

The nature of the German theory of the state is indicated in chapters i-iii of Barker and in John Dewey's 'German Philosophy and Politics.' The development of sociology is sketched in A. W. Small's 'General Sociology' and L. M. Bristol's 'Social Adaptation.' Marx¬ ian socialism is set forth in Spargo and Arner's 'Elements of Socialism'; Gide and Rist; Kirk¬ up; Russell, chapter i; and K. Kautsky's 'The Social Revolution' ; it is criticized by W. Som- bart, 'Socialism and the Social Movement' ; and Skelton, O. D., 'Socialism, a Critical Analy¬ sis.' The Fabian movement and revisionism are discussed by Edward Pease, 'The History of the Fabian Society' ; and by E. Bernstein, 'Evolu¬ tionary Socialism.' State socialism is described by Ogg in Parts III-IV of his work; and in Hayes, 'BriuHi Social Politics.' Recent Christian Socialism is dealt with in F. S. Nitti's 'Catho¬ lic Socialism'; C. D. Plater's 'Catholic Social Work in Germany' ; Cunningham, W., 'Chris¬ tianity and Social Questions' and 'Christian¬ ity and Politics' ; Figgis, J. N., 'Churches in the Modern State'. Recent anarchism is dealt with by Russell, chapter ii ; by Zenker and by Eltzbacher, P., 'Anarchism.' Trades-unionism is well discussed in Webb, S., 'History of Trade Unionism' and in Orth. Syndicalism is analyzed by Russell, chapter iii, and by Levine, L., 'The Revolutionary Labor Movement in France' and Brissenden, P. F., 'The I. W. W. : A Study, in, American Syndicalism'. Gild- socialism is treated by Cole, G. D. H., 'Self- government in Industry'; 'Social Theory'; 'Chaos and Order in Industry' ; 'Guild Socialism Restated.' For the single tax program consult Henry George's 'Progress and Poverty' di¬ rectly. Solidarism is analyzed by Gide and Rist. The problems of reconstruction are clas-> sified by Lindsey Rogers, 'The Problems of Re¬ construction.' The problems connected with the ending of war are summarized in Duggan, S. P., 'The League of Nations' The Principle and the Practice.' From these introductorv discus¬ sions the student will turn to the detailed mono¬ graphs and the sources, many of which are men¬ tioned in the bibliographies in Peixotto, Hayes, Ogg and Orth.

Harry Elmer Barnes, Professor of History, Clark University.

SOCIAL SCIENCE

SOCIAL SERVICE

SOCIAL SCIENCE, the science that deals with the social condition, the relation and in¬ stitutions which are involved in man's existence and

his well-being as a member of an organ¬ ized community. It concerns itself more es¬ pecially with questions relating to public health, education, labor, punishment of crime, refor¬ mation of criminals, pauperism and the like. Its history is traced in the most ancient of human records, in the sacred books and laws of Babylonia, Egypt, Judea and Greece. The uni¬ versal concepts of modern social science as de¬ veloped by Comte (q.v.), are found in Plato's 'Republic5 and (Laws5 ; in Aristotle's Politics5. It involves gathering of statistics, classifying them and drawing deductions, especially as to the larger question involved. It thus deals with the effect of existing social forces and their result on the general well-being of the community, without directly discussing or ex¬ pounding the theories or examining the prob¬ lems of sociology, of which it may be con¬ sidered a branch. Its study is being taken up in schools for social workers, several of which have received grants from the Sage Founda¬ tion. Consult American Labor Year Book,5 published by the Rand School of Social Science.

SOCIAL SCIENCE ASSOCIATION, American. A society organized for study and research in social problems, founded at Boston in 1865. Annual meetings are held in cities selected at the last preceding meeting. The work of the association is divided into five branches or especial fields as follows : Com¬ munity health, education and art, social econ¬ omy, finance and jurisprudence. The associa¬ tion has a membership of about 1,100, includ¬ ing the most eminent sociologists of America and other countries. Its official organ is the Journal of Social Science, published annually.

SOCIAL SCIENCE, National Associa¬ tion for the Promotion of, The (British), an

organization founded in 1857 for the purpose of study and research in all matters of social service and industrial betterment. In 1864 it absorbed the Association for Promoting the Amendment of the . Law. Yearly migratory meetings are held and transactions published. The society has greatly enlarged its scope from its foundation and now seeks to promote in Britain the initiation and development of the most beneficial and successful forms of social service.

SOCIAL SERVICE, the modern study of people and conditions looking toward the bet¬ terment of mankind; a forward movement deal¬ ing with life, occupations and environments, embracing the observation and investigation of the relations between employers and em¬ ployees, co-operation, labor legislation, hours of work, wages, industrial betterment, child labor, factory sanitation and inspection, safety appliances, improvement of civic and municipal conditions,

civil service, public ownership, the initiative and referendum, tax reform, mar¬ riage and divorce, housing, temperance, pauper¬ ism and crime, defective and delinquent chil¬ dren, education, social settlements, institutional churches and the like.

Social Revolutions. — During the 19th cen¬

tury there took place the two greatest revolu¬ tions in all history — one in the material world, created by the application of natural forces to industry; the other in the world of ideas, pro¬ duced by the application of the scientific method to all processes of investigation. They have radically changed very many social conditions. Thousands of mechanics have lost their posi¬ tions in recent years because they could not readjust themselves to the new methods of in¬ vention. Thousands of business men and manu¬ facturers have been driven into bankruptcy because they could not adapt themselves to the new conditions by more economical methods of production and distribution. Many tens of thousands of men, women and children d'e needlessly in our cities every year because we have not yet learned how to adapt ourselves to the new conditions of urban life.

The process of readjustment is one of ex¬ periment. Each experiment, whether success¬ ful or otherwise, throws a ray of light on the problem of how to do it or how not to do it. Experience signifies nothing unless we trace the relations of cause and effect. The science of statistics, by which facts are so gathered as to embody truth and so interpreted as to afford knowledge, is of recent origin. It is a singular fact that our young republic was the first government in the world to take a census at stated intervals. Ships of state kept no log¬ books. It is small wonder that so many split on the same rocks. Important as it is in social and political science to know precisely where we are, it is even more important to know the direction in which we are moving, for tendency is prophetic, and to establish a line of tendency we must fix more than one point ; hence the value of a base line. Our decennial census dur¬ ing. the 19th century established a base line 100 years long — the first in all history — from which we may measure in the 20th and in each succeeding century. Only in recent years have men learned to gather facts, to sift them and correctly to interpret them, thus creating science. We are only beginning to construct the science of living, which is living in intelli¬ gent obedience to all natural laws ; that is, all the laws which God has established both for the individual and for society.

Existing Evils. — There are many great evils incident to our present stage of industrial and social evolution on which no intelligent lover

of his country and his kind can look with indifference. The widespread hostility, if not open conflict, between organized capital and organized labor does violence to economic and social laws no less than to Christian principles. The reckless and increasing sacrifice of life and limb in American industry calls for such edu¬ cation of public opinion as will demand and enforce effective legislation touching accidents and their prevention. The victories of peace are even more bloody than those of war. There were not so many victims of the Boer War as there were in American industries during the same period. If to casualties on railroads we could add those in the mining, manufactur¬ ing, building and lumber industries, the totals would show a very considerable industrial army killed and a very large industrial army wounded every year.

Our Western industrial progress is attended by considerable evils. It redistributes popula-

tions, compacting masses in the city, creating the tenement-house with its long list of evils, complicating the problems of sanitation and raising the death rate. It assumes the role of Herod and slaughters the innocents, while the children who escape from the factory with their lives are commonly pinched and deformed in body and mind. It creates the popular discon¬ tent which inevitably springs from the multipli¬ cation and popularization of knowledge together with the multiplication and concentration of wealth. It is attended by the organization of capital and labor which are arrayed against each other in hostile camps. Now many of these evils are entirely preventable, though certain to be developed if neglected. They were per¬ mitted to fasten themselves on western Europe and the United States because they were not foreseen. That excuse does not exist for the remainder of the world. With the close of the World War and release of shipping, northern capital, population and energy will flow into South America and inaugurate there an in¬ dustrial revolution. It is already well under way in Russia and Japan and is now beginning in China and India. Unless prevented by in¬ telligent foresight, the evils which have thus far attended the industrial revolution will ac¬ company it round the world and involve the hundreds of millions of these countries in suf¬ ferings as measureless as they will be needless. These peoples are credited with less power of self-restraint than the peoples of Europe and North America and yet we are in a World War, based on a desire for industrial suprem¬ acy. We are, therefore, bound by every obli¬

gation of humanity and religion to safeguard them with our experience and thus forestall preventable evils, which if not thus prevented will be far more disastrous in the Orient than they have been in the Occident.

Many organizations exist for improving con¬ ditions in large cities. These organizations need to know each others' methods and to work to¬ gether. To that end, a National Community Centre Conference is now held annually in the United States, the 1917 gathering in April being attended by delegates from 26 cities.

The Musee Social. — The section of Social Economy in the Paris Exposition of 1889 was peculiarly rich in documents relating to the conditions of labor and to workingmen's institutions. This exhibit made permanent was the origin of the Musee Social. Endowed with adequate funds, it is devoted solely to the pro¬ motion of the study of labor problems and the advancement of concrete measures of labor reform. As regards its organization and pur¬ pose it exemplifies in the field of economic research very much what the Smithsonian In¬ stitution in Washington does in the domain of scientific investigation. Both were founded by private individuals <(for the diffusion of knowl¬ edge among mankinds Both are non-scholastic in the sense of having no regular classes of students and both maintain a corps of experts devoted to original research and to the aid of those making similar inquiries. The Musee constitutes a veritable laboratory for economic research in all fields as far as they relate to concrete labor problems. In the language of its constitution, its object is <(to place gratui¬ tously at the disposition of the public docu¬ ments with collateral information, constitutions

and models of institutions and undertakings having for their aim the improvement of the moral and material situation of the laboring classes.® To carry out this aim the Musee has spared neither pains nor expense in the or¬ ganization of every possible means of obtain¬ ing information concerning labor and labor con¬ ditions in all lands and in facilitating its use by all those interested in matters of social re¬ form. It is well installed in a building owned by it at 5 Rue Las Cases, where it has lecture- rooms, meeting-rooms for the economic and reform societies of Paris, exhibition-rooms for the display of plans, models and accident-pre¬ venting appliances and its carefully selected library. This includes over 15,000 volumes ex¬ clusively devoted to labor and consisting largely of original sources of information, reports and proceedings of societies and social undertakings which are not to be found in ordinary libraries. Its files include records and copies of labor legislation in all countries and of important labor events,

catalogued and under the direc¬ tion of skilled librarians, whose duty it is to help investigators desiring to make use of such material. The Musee, however, is not content with bringing together the results of others' efforts. Each year it sends one or more com¬ missions to investigate particular features of the labor problem in foreign countries. It has thus made detailed investigations of trade unions in Great Britain, labor organizations in the United States, co-operative and credit in¬ stitutions in Italy and the agrarian question in Germany by special delegates sent to those countries. In addition to making these special inquiries, it maintains in foreign countries special correspondents whose duties are to sup¬ ply the Musee with copies of all bills, reports or laws concerning labor matters presented in their respective countries or of privately pub¬ lished works concerning labor, to furnish in¬ formation as called for and to transmit annual reports giving a resume, with documents, of the labor events, legislation and judicial de¬ cisions relating to labor during the year. See Social and University Settlements.

SOCIAL SERVICE, American Institute

of. The League for Social Service of New York City was organized in New York in 1898 by Josiah Strong and William H. Tolman, who became its president and secretary, re¬ spectively. The League, reorganized, enlarged and incorporated, became known in 1902 as the American Institute of Social Service, with head¬ quarters at 287 Fourth avenue, New York. The three functions of the Institute are: (1) To gather from all possible sources facts of every kind which bear on social and industrial betterment. (2) To interpret these facts by ascertaining their causes and effects, thus gain¬ ing their real significance and (3) to dis¬ seminate the resulting knowledge for the edu¬ cation of public opinion, with an educational charter from the Regents of the University of the State of New York.

The work of the Institute is divided into 11 departments: (1) Bureau of Information; (2) Investigation; (3) Illustration; (4) Publica¬ tion; (5) Legislation; (6) Lecture Bureau; (7) Library and Archives; (8) Museum of Security; (9) Personal Study and Research;

SOCIAL SETTLEMENTS — SOCIAL

(10) International Relations; (11) Relations with other Societies.

Ihe American Institute of Social Service is collecting a great mass of facts from Europe, as well as America, which embody experiences of many millions of people, and these facts scientifically interpreted

throw light on many social problems, new and old, and afford prac¬ tical guidance in the conduct of life and in the establishment of right relations between man and man. In response to inquiries, the Insti¬ tute's bureau of information is constantly send¬ ing materials bearing on social and industrial betterment to newspaper men, ministers, stu¬ dents, teachers, authors, legislators and the like. When a corporation desires to improve the condition of its employees, the Institute can furnish facts and photographs showing what is being done along these lines by many of the world's great captains of industry, such as Casimir-Perier of France, Van Marken of Hol¬ land, Cadbury of Birmingham and Lever of Liverpool, describing their improved housing, their sanitation, their hospitals, homes for con¬ valescents, schools, kindergartens, athletic grounds, parks, baths, swimming pools, systems of insurance, old-age pensions and the like. Again, a city desires to improve its municipal housekeeping and would like to learn from Glasgow as a model. It is not necessary for Cincinnati or Chicago to send a committee of investigation to the Scotch metropolis. The Institute can send Glasgow to Cincinnati or Chicago and by means of hundreds of lantern slides show her improved tenements, her street¬ cleaning system, her playgrounds, her out-of- door gymnasia, her hospitals, her park system, etc. A church which is struggling to adapt itself to a changed environment wishes to know how certain problems have been solved. The Institute can give information of scores of churches which have successfully adjusted themselves to new conditions and whose ex¬ perience will probably afford the desired solu¬ tion. The existence of all the States with their separate legislatures affords a vast field for social service by helping all to profit by the experience of each. Most of the great prob¬ lems of all the States are substantially the same, as in the case of pauperism, crime, de¬ fective and delinquent children, the rela¬ tion of labor and capital and the like. Some States are much in advance in one particular, others in another. What if, in each particular, all the States could be brought up to the stand¬ ard of the most advanced State; how would the nation leap forward in civilization? For instance, the experience of several States has demonstrated the value of juvenile courts and of industrial legislation for children. In the natural course of things it takes years for such reforms to reach the more backward States; whereas the Institute, with the necessary funds, could doubtless educate public opinion so as to secure the desired legislation in one-quarter of the time. As President Roosevelt says in a letter to the Institute: ((The possibilities of the Institute are well nigh boundless. It is ap¬ parently proving to be the beginning of a world movement, and is being recognized by the best men of many different countries as a necessity in each and all of these countries in order to facilitate a

readjustment of social relations to

the new conditions created by the modern in¬ dustrial revolution.®

In 1903, Andrew Carnegie (q.v.), the phil¬ anthropist, placed in trust the sum of $2,500,000 for the purpose of beautifying and improving his native town of Dunfermline, Scotland, and the American Institute of Social Service out¬ lined a plan of procedure for this important work. The plan included a regional museum, a district for a <(city beautiful,® a social centre, a department of civics, boys' and girls' flower gardens, children's playgrounds and out-door gymnasia, holiday tours and historic pilgrim¬ ages, '"get-together club® and a system of awards and prizes. The general outline for a city beautiful suggests that somewhere in the confines of the park land should be set aside or which can be built model dwellings of diversified architecture. One house should be set aside as a working model, furnished throughout with all necessaries and as many comforts as are demanded by a modest taste. By means of this model house, clerks, artisans and laborers may be shown how to furnish their homes. Under this plan the social centre should be a building located in the park, easily accessible, so as to be a resort for all the peo¬ ple — children for the most part by day, adults at night and on holidays. It should contain a hall for music, speaking, dancing, flower shows and other entertainments. There should be classrooms for instruction in music and art in its various branches. In a regional museum should be collected the various processes of local industries, in order that the individual workman may get an idea how his part in the process is related to the great industry as a whole. The department of civics is intended to inspire youth and to direct their enthusiasm wisely, so as to raise the tone of their citizen¬ ship. Consult Ogburn, W. F., (Wages in Amer¬ ican Cities) (1917) ; Calhoun, A. W., 'Social History of the American Family0 (1917).

SOCIAL SETTLEMENTS. See Social and University Settlements.

SOCIAL AND UNIVERSITY SETTLE¬ MENTS. Social service is the modern study of people and conditions looking toward the betterment of mankind ; a forward movement dealing with life, occupation and environments, embracing the observation and investigation of the relations between employers and employees, co-operation, labor legislation, hours of work, wages, industrial betterment, child labor, factory sanitation and inspection, safety appliances, im¬ provement of civic and municipal conditions, civil service, public ownership, the

initiative and referendum, tax reform, marriage and divorce, housing, temperance, pauperism and crime, de¬ fective and delinquent children, education, in¬ stitutional churches and the like. The houses or buildings whence all these activities are directed are known as social settlements and the fact that university men were and are prominent in the movement has caused them to be known frequently as university settlements.

The necessity for systematized social service was impressed originally upon the minds of Englishmen, due to the enormous increase in the indigent and submerged class in London and in other large cities of Great Britain, which became apparent soon after the great expansion of the factory system there in the first half of

the 19th century. It was realized that useful a;d along a variety of lines could be best given by men and women actually living among the poor and studying the difficulties besetting them. Among the prominent leaders of the movement in England were Arnold Toynbee, Charles Kingsley, John Ruskin, Thomas Hughes, Dickens, Carlyle, Thomas Arnold, Thomas Hill Green and Edward Dennison. A growing sense of social duty and responsibility actuated these men in calling attention to the many social evils of their period. In 1864 Dennison went to Lon¬ don to live in a poor quarter of the East End. In 1871 Arnold Toynbee gave several addresses before the workingmen's organizations in Lon¬ don and in the provinces. He died in 1883 while still in early manhood. It was Toynbee's spirit and ideas more than any work which he individually accomplished that gave to the set¬ tlement movement its chief characteristics and its abiding sense of social obligation. The work as taken up by Canon Barnett and others im¬ bued with Toynbee's spirit assumed three gen¬ eral forms: (1) Relief through charity and medical attendance; (2) the providing of op¬ portunities of a social and recreative character; (3) the establishment of educational centres for purposes of primary or advanced instruction, including certain phases of culture. In 1860 F. D. Morris established the Workingman's College in London. In 1867 Cambridge Uni¬ versity started its first University Extension scheme. Following this, in 1869, the Charity Organization Society was founded; in 1885 Toynbee Hall was opened by Barnett in East London and in 1887 the Neighborhood Guild, later the University Settlement, was opened in New York City. These initiatory steps were followed by others of a closely allied character in all large cities where the density

of popula¬ tion is sufficient to indicate the need for social service.

The dominant idea in settlement work is that of teaching wage-earners to help them¬ selves. The goal sought is individual develop¬ ment stimulated into being under the guidance of teachers. The element to be eliminated in all these efforts is that of patronage. Social serv¬ ice in the nature of direct gifts of food, fuel, clothing or money must be extended with great discrimination, lest chronic pauperism be en¬ couraged and the already too large class of parasites on the charitable world be increased. In all phases of the work, tact and judgment are required, but these are particularly requisite in dealing with those cases where pride prevents an advertisement of need or forbids the accept¬ ance of unsolicited help. Persons possessed of these qualities and who are capable of advising and preventing the development of acute con¬ ditions in particular cases are of the greatest value in settlement work.

Nature of Settlement Activties. — The work at a centre is laid out into six classes: (1) care of infants; (2) courses for children from six to 14 years of age; (3) course for boys and girls between 14 and 18 years; (4) a course for women of more than 18 years; (5) a course for men of 18 years and upward; and (6) general courses of an advanced nature- In connection with, talks to mothers, ocular demonstrations of the best care of infants and young children are given. Children fit for

kindergarten work receive the benefit of aesthetic culture through colored paper work, music, songs, parties, games, plays, etc. The older children of from six to 14, through physical culture classes, are given opportunities for im¬ proving their general health; they are formed into clubs for the purpose of developing administrative ideals, and encouraging self- help. Their work consists of drawing, sewing, mending, wood-carving, cooking, nature study, musical classes, chorus work, including enter¬ tainments, art exhibits, summer outings, picnics, winter socials and receptions. A late develop¬ ment is the teaching of dancing, which is found to be a most admirable means for the development of grace of body and the powei of acting in concert. Those of 18 years and upward follow a scheme which includes the preservation of health, study and training along technical lines, forms of instruction in classes, lectures, concerts, and various aids to culture, sociability and political breadth of mind. The idea running current through all these courses, designed as they are to meet the requirements of the child, the youth and the adult, is that of inculcating the value of physical health, wage¬ earning and other concomitants of economic welfare, general instruction, an insight into the meaning of aesthetic culture, the value of functions which increase

sociability, the advan¬ tages of clubs and discussions for the purpose of gaining political and other co-operation, and other means of creating a sense of “community interest® and good citizenship.

.Social Service to the Immigrant. — While in the older nations the class among which these activities are exercised is made up of natives, the “submerged tenth® of London, for instance; in America, it is the new-comer, the first generation of the immigrant horde and its children, that call for the labor of the social service workers, and the work required is the adjustment of the lives of these people to their new environment, and especially in giving to the older ones a sense of nationality and citizen¬ ship and a knowledge of the power this gives them. When they fully realize that they can, if they will, choose representatives to properly present their needs, an immense gain is made, and the feeling of class against class, and a belief in dominance of wealth in the govern¬ ment, ideas only too prevalent and not wholly without foundation, will be in a fair way of disappearing. To awaken within the immigrant a consciousness of his power is a moral, as well as an economic necessity, for social de¬ moralization disappears before healthy mental activity.

The religious question is delicate only when misunderstandings arise ; if the expressed object of a centre is to impart religious or ethical principles, a frank acknowledgment is proper. Some settlements operate along definite de¬ nominational lines, so that no misapprehension arise even when proselyting results. Ambiguity in this respect is an injury to the cause.

Administration of Settlements.— A head- worker is the chief of a staff of assistants which are divided into two classes; the first and most important class are the resident workers. 1 he second class are non-resident workers. The head-worker’s duty is that of giving intelligent advice to his assistants, when

they are in doubt as to what course to pursue. The workers in all cases are allowed con¬ siderable latitude as to ways and means of obtaining practical results, but no effort must be spared to avoid friction and to produce an ab¬ solute harmony in all parts of the work.

For the proper administration of activities centred in a settlement, money must be forth¬ coming; though the city itself is the direct

bene¬ factor, it is never the main contributor. The workers must be sufficiently well paid to enable them to live decently wrhile devoting their time to the work. To the non-resident workers no remuneration is given. It is then a necessary part of the work to secure money when there is not a regular income provided by endow¬ ment or contributions. As far as possible the idea of self-support is advanced in all phases of settlement work. The head-worker and his assistants plan along economic as well as cultural lines. A head-worker of strong per¬ sonality and broad mentality with experience and judgment is necessary as supervisor and manager. Diplomacy is a great requisite, particularly in the encouragement of those willing to sacrifice time and labor for humanity's sake, as resident or non-resident workers.

Development of the Settlement Idea. —

From Toynbee Hall in 1885 the settlement idea spread out through the larger centres of population in England until to-day there are about 50 such in the country. In America the Neighborhood Guild of New York was followed soon after by the "College Settlement® and in 1889 Chicago saw the establishment of Hull House, the greatest American settlement. In America there are at present over 100 settle¬ ments doing excellent work in the congested areas of the large cities. The Universite Populaire and the CEuvre de Popincourt in Paris are similar in their educational work to the university settlements. The Ouis Huis of Amsterdam, Holland, is also similar. There is a missionary settlement in Bombay, the ((House of Neighborly Love® in Kioto, Japan, and Kingsley Hall and a French missionary settle¬ ment in Tokio. The movement has spread to Australia, the Toynbee Guild at Sydney being founded by an Oxford man. In America and to a greater extent elsewhere social settlement work can ever be but a palliative in that the fundamental causes of poverty, low wages, etc., are left untouched by the movement. Young college men and women of humanitarian views spend a few years in the work after graduation but leave it for a real career just when their experience would render them valuable aides in the work. By some it is used as a means to acquire the necessary experience in order to qualify for a position in the cor¬ rectional or charitable administration of the State. The recent campaign for Americaniza¬ tion in the United States takes up the work of the social settlement as far as regards the preparation of the foreigner within our shores for citizenship. Even here the motive has not been entirely altruistic nor patriotic but rather the effect of conservatives to stave off the in¬ troduction of governmental principles which to them seem subversive of the present order. A campaign to teach common honesty and fair dealing in the affairs of life especially among

our men of wealth is more needed in America to-day than any campaign against radical move¬ ments, which can never gain a real foothold in our democratic system.

Bibliography. — Addams, Jane, ‘Twenty Years at Hull House' (New York 1910) ; id., ‘Subjective Necessities for Social Settlements) ; ‘Objective Value of Social Settlements' ; Barnett, (Practical Socialism' ; Settlements of University Men in Great Towns' ; Coit, ‘Neighborhood Guilds' (2d ed., London 1892) ; Cole, ‘Motives and Results of the Social Settlement Movement' (Cambridge 1908) ; Montgomery, ‘Bibliography of College, Social, University, and Church Settlements' (Chicago 1905) ; ‘New York Bureau of Labor Statistics Annual Reports' ; Wald, ‘The House in Henry Street' (New York 1915) ; Woods, ‘English Social Movements' (New York 1891) ; files of The Commons, a monthly record, devoted to aspects of life and labor from the social settle¬ ment point of view (Chicago) ; Goodale, ‘Litera¬ ture of Philanthropy' ; Henderson, ‘Social Settlements' ; Knapp, ‘The Universities and the Social Problem' (1895) ; Proceedings of the Twentv-third National Conference of Charities and Correction, ‘Social Settlements and the Labor Question' (Grand Rapids, Mich., 1896).

SOCIAL WAR (Lat. Bellnm Sociale), or MARSIC WAR, a war waged in 90-88 b.c., between Rome and her allies of southern and central Italy, including the Marsi, Peligini, Sam- nites and Lucanians, precipitated by Rome’s re¬ fusal to extend to them the privileges of Roman citizenship. A new Italian republic was established with its capital at Corfinium and its leaders waged successful war against the Roman forces under the generals Marius and Sulla. Rome, however, encompassed the fall of the republic by granting the formerly with¬ held rights as citizens in return for allegiance to the empire. In Greek history there were two Social Wars. (1) In 357 or 358 to 355 b.c. between Athens and her former allies, Cos, Chios, Rhodes and Byzantium. Athens suf¬ fered defeat. (2) In 220-217 b.c. between the Achaean and Aetolian leagues.

SOCIALISM is a word having two dis¬ tinct but related meanings : primarily it is used as the name of a certain philosophy of history and method of interpreting and analyzing social phenomena. In the second place, since this philosophy and method have as one of their principal conclusions that society is evolving toward a co-operative social stage, the word is used to designate a co-operative social organiza¬ tion where the means for the production and distribution of wealth are the collective prop¬ erty of the working class, while the goods which are to be consumed become the private property of the individual workers. The phi¬ losophy of Socialism, as generally accepted by the

socialist parties of the world at the present time, takes as its fundamental hypothesis what has been variously called the materialistic in¬ terpretation of history, historic materialism, or economic determinism. This doctrine is stated as follows in the introduction to the ‘Com¬ munist Manifesto' :

“ In every nistorical epoch the prevailing mode of economic production and exchange, and the social organization necessarily following from it, form the basis upon which is built up, and from which alone can be explained, the political

and intellectual history of that epoch; and consequently the whole history of mankind since the dissolution of primitive til Dal society, holding land in common ownership, has been a history of class struggles, contests between exploiting and exploited, ruling and oppressed classes; the history of these class struggles forms a series of evolution; now-a-days, a stage has been reached where the exploited and oppressed class — the proletariat — cannot attain its emancipation from the sway of the exploiting and ruling class — the bourgeoisie — without at the same time, and once and for all, emancipating society at large from all exploitation, oppression, class-distinctions, and class-struggles.”

It is maintained that the form in which production is carried on in any society con¬ stitutes the fundamental fact which determines all other social institutions. This does not hold that each economic era begins tabula rasa in the field of institutions. Each historical stage in¬ herits its institutions from the previous stage and it can influence, change and reconstruct these or establish new ones alongside of them. These inherited characteristics include customs, laws, ethical standards, public opinion, and in short the whole set of institutions and social psychology which has been built up through¬ out the course of human evolution. The analogy between heredity and environment in biology and in the social organism is here very close. Since the appearance of the institution of private property in the instruments by which wealth is produced and distributed, society has necessarily been divided into two classes ac¬ cording as their members own or do not own these essential for the production of wealth. The struggle of these classes for power consti¬ tutes a large portion of the history of modern times. In the Middle Ages, land being the most essential instrument for the production of wealth, the landlords were the ruling

class and social institutions were determined by them in accord¬ ance with their interests. When the great trans¬ formation of hand tools into factory machinery took place at the close of the 18th and beginning of the 19th century, this machinery of the modern factory became the most essential de¬ ment in the production of wealth, and its own¬ ers became the ruling class.

When the owners of industrial capital had gained their victory they set about establishing a society in accordance with their interests. They formed at this time the class most neces¬ sary to the basic industrial processes of society, since the accumulation and organization of cap¬ ital was the most essential thing at this histori¬ cal period. Later on the capitalist class laid down its function as organizer and director of industry and became simply a share-holding class. Hired wage-workers, including manual laborers, overseers, bosses and superintendents perform all the essential social processes. The capitalist class having handed over its function to the working class, the latter becomes not only the most essential, but the only essential class. The material interests of this class in¬ volve it in continuous struggles with the capital¬ ists. Sooner or later this struggle is transferred to the political field where the laboring class is represented by the Socialist party, having as its object the capture of the powers of govern¬ ment and social control in order that it may use them in the interest of that class.

According to this philosophy the social dy¬ namic which compels advance is the continuous improvement of the processes of production. Every new invention and every improvement in the organization of industry starts in motion a

scries of influences which do not cease until they have reached and affected every institution within the society of which they form the indus¬ trial basis. During the last 100 years mechanical improvements have multiplied many fold the productive power of each individual worker. But the army of unemployed prevent the price of labor power as a whole from rising much above the point necessary to maintain the efficiency of the wage-worker as a producer. Consequently the workers who use these im¬ proved instruments receive but a small fraction of the greatly multiplied product. They have no choice under the present system but to accept these conditions. While production is for sale in the competitive market only the cheapest can continue to produce. If the workers are to produce, and they cannot live without pro¬ ducing, since they have no power of ownership to take from other producers, they must gain access to these highly perfected tools. Hence they compete with one another for the privilege of using them,

and of selling their labor-power to the owners of the tools. They finally accept a wage-contract by which, for the privilege of producing their own wages during the first hour or two of work, they continue at work for many hours more, producing surplus value for the owner of the means of production which they use.

Improvements in production often take other than mechanical forms. The modern trust is, to some extent, to be considered as such an improvement. Socialist writers pointed out over a half century ago the self-destructive character of competition. It was then foreseen that one of the inherent characteristics of large industry was its greater economy as compared with smaller competitors. Consequently the large in¬ dustry tended to eliminate all smaller competi¬ tors within the circle of its market. Improve¬ ments in transportation, communication and storage rapidly extended the circle of the mar¬ ket to national, and for some products, at least, to international dimensions. When, however, there are sufficient plants constructed to more than supply any circle of the market and com¬ petition is reduced to a few industrial units, the wastes of competition and the destructive¬ ness of competitive war become so evident that combination is inevitable. The result is some one of the various forms of combination by which competition is stifled and monopoly es¬ tablished.

The wage-workers seek political victory in order that they may impress their interests upon the social organism and thereby remove the evils under which they suffer at the present time. Since most of the evils (of which they complain spring from the fact that they are debarred from access to natural resources and the in¬ struments for the production and distribution of wealth, their first demand is that such access be freely granted. But free access implies legal ownership and with modern concentrated com¬ plex industry this ownership cannot be indi¬ vidual unless all the evils of the present system are retained. Hence, we have a demand for collective (Ownership.

Thus Socialism as a philosophy is mainly an analysis of capitalism. As an ideal, as a social stage, it presupposes the capitalist system, since that can alone prepare the way for Socialism.

SOCIALISM

1£>3

I his future system, or ideal, is in no sense of the word a scheme whose adoption is asked for by the Socialists. It is simply the next

logical stage in s.ocial evolution. Socialists do not attempt, therefore, to give any details of that future society since all such details will be dependent upon the decision of a majority of the working class of that future time, and upon the stage of industrial development which has been attained when Socialism is ushered in. Since both of these factors are manifestlv im¬ possible of being known at the present time, any attempt to forecast their outcome would be equally impossible. All that can be said is that present tendencies of social development show what must be a few of the general features of the next social stage.

Socialists maintain that the coming society will be preferable to the present one, especially for the working class. With a collective demo¬ cratically managed organization of industry, in which natural resources and the mechanical means for the production and distribution of wealth have their ownership vested in society, and where production is for the direct use of the producers and not for sale, the wastes of the present system will be largely abolished. Among these wastes which will be abolished are advertising, duplication of plants and power, poor utilization of mechanical progress, disad¬ vantageous geographical location of industries, etc. Some of these are already being abolished by the trust method of production. But at the present time the saving accomplished redounds almost wholly to the benefit of the few owners of the trustified industry. In addition to this, Socialists maintain that much greater savings would be made under Socialism by the utiliza¬ tion in productive labor of the energies of whole classes of the population from whose strength and ability society, at present, derives little or no advantage. This would be true, for example, not alone of the present army of the unemployed amounting in the United States to between 1,000,000 and 3,000,000, accord¬ ing to industrial conditions, but also the purely capitalist class whose functions of ownership being performed collectively would enable the members of that class to directly assist in production. By far the larger share of that portion of the population concerned in the protection of individual property rights in what Socialism would make collective prop¬ erty, such as lawyers, judges, police, private watchmen, detectives and the army and navy, could also be changed into productive workers.

Socialists also claim that in a co-operative society the sum total of human happiness would be immensely increased by making the produc¬ tion of goods in itself pleasurable. When profit and the Gompetitive struggle are abolished and productive energies fully utilized there will be a possibility of that leisurely artistic creative ac¬ tivity, which modern psychology and pedagogy agree is capable of furnishing the most intense pleasure and valuable educational training

to the individual worker while, at the same time, pro¬ ducing the best possible goods for the satisfac¬ tion of human needs. It is this phase of Social¬ ism which has always attracted artists and has given rise to the now extensive arts and crafts movement. It is easy to see in this connection that Socialism would offer a much greater field

for the development of individuality than is possible for the great mass of the people to¬ day.

The theory of Socialism is itself a product of evolution, the ideal appearing long before the philosophy of society and the scientific analysis of social relations which make possible the realization of that ideal were worked out. Ever since the days of Plato, and especially since the writing of Sir Thomas More's (Utopia, ' men have dreamed of a society which should be a co¬ operative brotherhood. During the latter part of the 18th and first half of the 19th century, utopian Socialism reached a high degree of de¬ velopment and found numerous illustrious fol¬ lowers. Among these were Fourier, Babceuf, Saint Simon and Cabet in Europe, and a few years later, Greeley, Dana and Nathaniel Haw¬ thorne in America. Robert Owen marked some¬ what of an advance <on this position. While he founded colonies and pictured utopias, he also set forth many ideas that have since become a part of modern scientific socialism. Lassalle, Rodbertus and Weithng in Germany, Colins and De Paepe in Belgium also helped to some de¬ gree to formulate present socialist philosophy while they also partook of a Utopian character. It is with the work of Karl Marx (q.v.) and Friedrich Engels (q.v.), however, that modern Socialism began definitely to take on the forms by which it is known to-day. In 1845 Marx was ordered out of Paris and went to Brussels where he was joined by Engels and where they founded the ((German Working-Men's Asso¬ ciation® with the Deutsche Briisseler Zeitung as its organ. It was while here that they became members of the Communist League and wrote the (Communist Manifesto, } to which reference was previously made.

A philosophical and a political goal pre¬ supposes an organization for propaganda and political activity. The body that is generally looked upon as the ancestor of the present world-wide Socialist organizations is ((The League of the Just,® organized in Paris in 1836. The aims of this organization were, however, very indefinite, and its principal significance lies in its transformation in 1847 into the ((Com- munist League.® This change was brought about through the influence of Marx and En¬ gels. While the Communist League® exercised considerable influence on Continental labor movements during the first two or three years of its existence, yet it was overwhelmed in the

reaction which followed the revolutions of 1848, and by 1853 it had practically disappeared. Its great contribution to Socialism lies in the fact that under its auspices was issued a document that for far-reaching consequences and lasting influence must be considered one of the most remarkable ever written. This was the Com¬ munist Manifesto) drawn up by Marx and En¬ gels as a committee of the Communist League in 1848. This work consists of a summary of the philosophy of Socialism and has been trans¬ lated into almost every known language, and still constitutes the most generally circulated work on Socialism in existence. New editions and translations appear continually throughout the world. The next great step was the organ¬ ization of the International Working-Men's Association (q.v.) at Saint Martin's Hall. Lon¬ don, 8 Sept. 1864. A committee appointed at

this meeting and composed of 50 members representing six nationalities presented a dec¬ laration of principles which was written by Karl Marx and which was unanimously accepted by the organization. Since this declaration has formed the basis of almost countless socialist platforms in different countries since that time it is worth reproduction :

" In consideration that the emancipation of the working class must be accomplished by the working class itself, that the struggle for the emancipation of the working class does not signify a struggle for class privileges and monopolies, but for equal rights and duties, and the abolition of class rule;

That the economic dependence of the working man upon the owner of the tools of production, the sources of life, forms the basis of every kind of servitude, of social misery, of spiritual degradation, and political dependence;

That, therefore, the economic emancipation of the work¬ ing class is the great end to which every political movement must be subordinated as a simple auxiliary;

That all exertions which, up to this time, have been directed toward the attainment of this end have failed on account of the want of solidarity between the various branches of labor in every land, and by reason of the absence of a brotherly bond of unity between the working classes of different countries;

That the emancipation of labor is neither a local nor a national, but a social problem, which embraces all countries in which modem society exists, and whose solution depends upon the practical and theoretical co-operation of the most advanced countries;

That the present awakening of the working class in the industrial countries of Europe gives occasion for a new hope, but at the same time contains a solemn warning not to fall back into old errors, and demands an immediate union of the movements not yet united;

The First International Labor Congress declares that the International Working Men's Association, and all societies and individualities belonging to it, recognize truth, right and morality as the basis of their conduct toward one another and their fellow men, without respect to color, creed, or nationality. This Congress regards it as the duty of man to demand the rights of a man and citizen, not only for nim- self, but for every one who does his duty. No rights without duties; no duties without rights."

At the last European meeting of the <(Inter- national,® anarchistic forces under the leader¬ ship of Bakounin threatened to gain control, and in order to avoid this catastrophe the Socialists who were still in the majority voted to remove the headquarters of the organization from London to New York. There was another purpose in this also. It was felt by Marx and others that since the doctrines of Socialism had been included in various national working-men's movements and had been somewhat systematized by the discussions of the congress, that the time for a great centralized organization was past, and that its disappearance would be the best thing possible.

The next 20 years saw the growth of power¬ ful national Socialist movements, but with no centralized international organization. At the end of that period these parties felt the need of some sort of co-operation and united in the first of a series of International Congresses at Paris, 14 July 1889. The new international was a creation of the national bodies and not a centralized organization having control of branches in various nations. At this first meet¬ ing differences developed so great that two congresses instead of one were held, although some of the delegates participated in the meet¬ ings of both bodies. Two years later, at the Congress of Brussels this breach was at least partially healed and it gradually disappeared. In 1896 the old conflict with anarchistic ele¬ ments arose but was settled by the adoption of a resolution excluding from subsequent con¬ gresses those who repudiate political action. The Congress of Paris, 1900, laid the founda¬ tion of a new permanent international Socialist

organization by the formation of the Inter¬ national Socialist Bureau. This bureau is com¬ posed of permanent delegates from each coun¬ try, the larger nations electing two and the smaller one. A chairman and secretary were also elected and Brussels chosen as the seat of the international secretariat. With the out¬ break of the European War in 1914 Socialism attracted more general attention than at any previous time in its history. Many people had hoped that by concerted action the Socialists of Germany would be able to prevent that country's entering the war. Soon after the declaration of war it was found that practically all of the Socialist parties in the warring coun¬ tries had cast in their lot with their govern¬ ments. For 50 years before the war Socialist congresses and Socialist periodicals had dis¬ cussed the problem of war from every possible standpoint and recognized it and the hostile feeling between nations as the greatest obstacles to the development of a world-wide social democracy. The causes of modern wars, ac¬ cording to a leading American Socialist, are as follows : <(The basic cause is capitalism ; the contributory causes are imperialism, mili¬ tarism, social unrest, international grudges and pseudo-patriotism.® In 1907 the International Socialist Congress was held at Stuttgart and is memorable for the anti-war resolution passed after considerable discussion between Bebel, Jaures, Vandervelde and others. The terms of this resolution named capitalism as the cause of war and stated that the workers of the world are the natural enemies of war. An ad¬ ditional formulation, proposed by Rosa Lux¬ emburg, Lenine and Martoff, is illuminating, in view of subsequent events. It is as follows: ((In case a war should, nevertheless, break out, the Socialists shall take measures to bring about its early termination and strive with all their power to use the economic and political crises created by the war to arouse the masses politically and hasten the overthrow of capitalist class rule.® This threat was incorporated in the Stuttgart resolution and was adopted at the Congress of Basel in 1912. Among the means proposed to avert war were a general international strike, the refusal of money for military supplies and a general anti-military agitation. The International Congress of Co¬ penhagen in 1910 modified somewhat the pro¬ posals of previous congresses and was un¬ doubtedly less anti-militaristic than its predeces¬ sors. An international congress was to meet in Vienna in August 1914 but the outbreak of hostilities prevented its convening. The Inter¬ national Socialist Bureau, with headquarters at Brussels, suspended its activities in July 1914. Vandervelde, chairman of the bureau, became a member of the Belgian government and the bureau was removed to The Hague. Here a conference of Socialists from neutral states (Denmark, Sweden, Holland, Argentina and the United States) was held on 30 July and 1 and 2 Aug. 1914. It passed

resolutions blaming capitalism for the war and advocated free trade and a democratization of power. Socialists from the belligerent countries met for the first time at the Zimmermann (Switzer¬ land) Congress in September 1915. The same representatives met at Kienthal 24-30 April 1916. Much opposition and factionalism fol¬ lowed the proposal to renew the International

and to attempt a discussion of the peace prob¬ lem, in which the German delegates would take part. In 1917 leading Socialists of the world proposed a peace congress to be held at Stock¬ holm. The movement was initiated by the Russian Council of Workmen's and Soldiers' delegates. Immediately the Austrian and Ger¬ man Socialists drew up a peace program in which the main points were ((No annexations, no indemnities.® Much discussion ensued in the Entente countries relative to the granting of passports to delegates to the Stockholm conference. Ultimately passports were refused delegates in France, Great Britain, Italy and the United States. The Stockholm Conference was consequently not fullv representative and while it did not succeed in its peace program, it certainly gave an impulse to the pacifist move¬ ment in the warring countries. The progress of the war and its conclusion gave a great im¬ petus to Socialism, which spread more rapidly than ever before and came into power in sev¬ eral of the larger countries of Europe.

Germany. — Germany for a long time led the Socialist movement of the world in the number of votes, representatives in Parliament, press and literature. On the theoretical side German Socialist thought has often been traced back to Hegel and Fichte. Winkelblech, better known as ftIvarl Mario,® Rodbertus and Weit- ling also developed ideas of collectivism and premises in economics that were later incor¬ porated in Socialist doctrine. It is only with Ferdinand Lassalle, however, that such theories were linked up with an actual working class movement. Lassalle was born at Breslau, 11 April 1825, studied first at the trade school at Leipzig and then took up philology and philos¬ ophy at Breslau and Berlin, passing his exami¬ nations with' distinction. He became involved in the working class revolts of 1848 and came into slight contact with Marx and Engels, although there is little evidence that he was greatlv influenced by them. It was not until 1862 that he delivered his famous lecture on (<The Labor Program,® before an artisans' associ¬ ation in Berlin. The published copies of this lecture were seized by the police and Lassalle was arrested. At his trial

he delivered a speech which was destined to become, under the title Science and the Workingman,® one of the classics of early Socialism. In response to an invitation to address the Leipzig Working¬ men's Association he sent his <(Open Reply Letter,® in which he further explained his program and philosophy. He set forth his ad¬ herence to the Ricardian theory of the iron law of wages, which was later to become a bone of contention in Socialist circles. He urged the formation of productive associations of work¬ ingmen for which he held the state should provide the capital. To secure this end he de¬ clared that <(the working classes must consti¬ tute themselves into an independent political party and must make universal, equal and direct suffrage their watchword. The represen¬ tation of the working classes in the legislative bodies of Germany — that alone can satisfy their legitimate interests in a political sense.® On 19 May 1863 the Congress of Workingmen at Frankfort-on-Main adopted Lassalle's program and four days later the <(Universal German Workingmen's Association,® which was later to develop into the German Social Democracy, was

founded. Lassalle, however, was destined to see small fruits from his work. After a few months of tireless, energetic, eloquent agitation, with apparently small results, he was drawn into a duel on a purely personal matter, was fatally wounded and died 31 Aug. 1864. For a time considerable confusion existed. The In¬ ternational Workingmen's Association, whose organization at London in 1864 has already been described, began to have an influence in Ger¬ many. Wilhelm Liebknecht was its principal worker. Many of the principles of the Marxian economics which had been accepted by the In¬ ternational, were opposed to the doctrines of Lassalle. This was particularly true of the state- assisted productive associations. In 1867 uni¬ versal suffrage was granted for the North Ger¬ man Reichstag and the Socialists polled between 30,000 and 40,000 votes, electing six members, among whom was August Bebel, who never ceased to play a prominent part in German So¬ cialism, and who had been converted by Lieb¬ knecht to the Marxian position and the support of the International In 1869 at Eisenach the Marxian wing organized the (<Sozial Demokrat- ische Arbeiter Partei.® For the next few years the strife between the Eisenachers and the Las- salleans was violent. This, however, did not prevent the rapid growth of Socialism and in 1874 331,670 votes were cast for the Socialist candidates. Three Lassalleans and seven Eisen¬ achers, including Bebel and Liebnecht, both of whom were in prison for alleged treasonable ut¬ terances during the Franco-Prussian War, were elected to the Reichstag. This great success brought down the wrath of the governing pow¬ ers and a period of

persecution began, the first effect of which was to close up the breach be¬ tween the two Socialist parties at the Congress of Gotha in May 1875. This union was fol¬ lowed by a rapid increase in the Socialist vote, which by 1877 had reached nearly 500,000. Meanwhile Bismarck was bending every energy to force repressive measures through the Reichstag. It is probable that he would have failed in this had it not been that two insane persons attempted to assassinate the emperor. Bismarck at once declared that these attacks were inspired by the Socialists, although there was never the slightest evidence to justify this assertion. However, he at once dissolved the Reichstag and by means of the most inflamma¬ tory appeals to public prejudice succeeded in getting a majority subservient to his purposes. A law was forced through which practically out¬ lawed the entire Socialist movement. It prohib¬ ited the formation or existence of organizations which sought by Social Democratic, socialistic or anarchistic movements to subvert the pres¬ ent state and social order. Provision was also made that where even these very stringent mea¬ sures were ineffective, any city could be declared in a (<minor state of siege® in which all public activity was directly controlled by the police. The Socialists at once determined upon a policy of (<shamming dead.® The organ of the Socialist party was transferred to Switzerland and from there circulated in great numbers throughout Germany. The only attempt at public propa¬ ganda within Germany was through the speeches of the Socialist members in the Reichstag. At the first election taking place under this Reign of Terror in 1881, it appeared as if the policy of suppression was succeeding, as the Socialist

vote fell to a little over 300,000. From that time on, however, and in spite of oppression, the party grew by leaps and bounds until in 1890 it polled 1,427,298 votes. It being manifestly im¬ possible to continue to consider a million and a half of voters as outlaws, the Anti-Socialist Law was allowed to lapse in March 1890 and Bismarck was dismissed as Minister. From that

time to the present the Socialist movement has continued to grow.

The method of repression having failed to destroy the Socialist movement the new emperor extended the policy inaugurated by Bismarck when his ((laws of exception® had shown their ineffectiveness and created the extensive system of social legislation for which Germany has become famous. In the application of this

legislation the Socialists and the closely affili¬ ated unions have played a great part.

With the growth of the Social Democratic party to a position of power with a vast num¬ ber of official positions, both governmental and within its own organization, diverse tendencies developed. The officials have tended to form a “right® wing and with them went a consid¬ erable section of the newer voters, especially in South Germany. This section tended to relax much of the old revolutionary position of the party and was largely responsible for the divi¬ sions which took place in regard to the voting of military credits in the period immediately preceding the war. Throughout the war the minority wing under Haase and Ledebour preached international Socialism as of old but the majority under Scheidemann identified themselves more or less with the Imperialists and held out for a peace honorable to Ger¬ many. The minority desired an immediate peace; condemned war in general and named capitalism in all nations as the real enemy. The collapse of the empire in the fall of 1918 proved to be the long-awaited opportunity of the Social¬ ists. Ebert and Scheidemann became the lead-

ers of the new Socialist republic of Germany. See War, European.

Thirty Years’ Growth of the Social Demo¬ cratic Party.

YEAR	Popular vote	Members
1871 . *	124,655	2
1874 .	351,952	9
1877 .	493,288	

12

1878 .

437,158

9

1881 .

311,961

12

1884 .

549 , 990

24

1887 .

763,128

11

1890 .

1,427,298

35

1893 .

1,786,738

44

1898 .

2,107,076

56

1903 .

3,010,771

81

1907 .

3,259,020

43

1912 .

4,250,329

110

France. — France was the home of the Uto¬ pian Socialism. St. Simon, Fourier, Cabet and Louis Blanc were among the early founders of this phase of Socialist thought. As early as 1848 the word Socialism had become familiar in French politics. The Commune, 1871, was largely directed by Socialists. When it fell many of these were exiled or imprisoned. When Socialism became again a recognized political

movement it was split into several factions. These later united into a single party with numerous individuals, who had formerly been Socialists, outside of any party. Some of these have since risen to great prominence in the French government. Such are Aristide Briand, several times Premier, Viviani and Milleyand. Jean Jaures, by far the best known of French Socialists, was assassinated at the outbreak of the European War. He had been the Parli¬ amentary leader of the party for several years. Jules Guesde, one of the founders of the move¬ ment and the foremost French representative of Marxism, entered the War Cabinet, as did also Albert Thomas who became Minister of Muntions and organized the work of manufac¬ turing suppjies for the army. Socialist thought has long had an influence in France far beyond its ever large vote. There have been few cabinets for several years without at least one ex-Socialist included and nearly all these have claimed that their Socialist views are unchanged but have offered some excuse for separation from the organized movement. The electoral strength since the first election is as follows :

Vote

Deputies

1893 .

440,000

751,554

863,159

878,000

1,110,000

1,400,000

32

1898 .

38

1900 .

44

1906 .

54

1910 .

76

1914 .

102

After the invasion of Belgium in 1914 the French Socialists supported their government under the leadership of Jules Guesde. During the progress of the war a small but powerful group developed in opposition to the majority. By the time of the Socialist Congress at Bor¬ deaux in October 1917 this group had impressed its views on a majority of the party and carried through a majority resolution endorsing the Stockholm Conference, declaring for national defense and for participation of Socialists in the government under certain conditions. A minority resolution declared its disapproval of voting credits to the government in any but a war of defense and in favor of a peace with¬ out annexations and without indemnities. France sent three delegates to the Inter- Allied Socialist and Labor Conference of 1918 at which documents were published representing the most constructive note so far struck by the Socialist or labor movements. One of these dealt with the war aims of the Entente, while the other

proposed a program for social re¬ construction which was afterward presented to the Peace Conference at Paris.

Austria. — The diverse nationalities that made up the former Austro-Hungarian Em¬ pire made the work of organizing a united Socialist movement difficult. A branch of the “International® existed in Austria in 1867. In 1869 it organized a demonstration in which 100,000 men marched to the palace in Vienna to demand universal and direct suffrage, free¬ dom of speech and association and liberty of the press. Profuse promises of reform were made by the government while the workers were around the palace, but as soon as they were disbanded the leaders were arrested and a period of brutal suppression which followed

momentarily annihilated the Socialist move¬ ment. The present party, which is an outgrowth of the union movement, was organized at a congress in Vienna in 1888. It began with a demand for an extension of the suffrage and succeeded in gaining a class system, in which the nobility and clergy form one class, the great capitalists the second, small property-owners the third and the wage-workers a fourth, each with equal representation. Even under this system the Socialists succeeded in casting 750,- 000 votes in the fourth class and electing 10 members of the Reichsrath. In January 1907 as a result of a threatened general strike the suffrage in Austria was made universal and direct. In the elections held in May of the same year the Socialists cast 1,041,948 votes and elected 87 representatives. Then came a period of reform parliamentarism which discouraged the workers so that in 1911 although the pop¬ ular vote was slightly increased the number of representatives fell to 82. The party was badly split up with nationalist quarrels and a small faction also split off in opposition to the war.

During the first three years of the war the Austrian Socialists were rendered impotent through the strong militarist policy of the im¬ perial government. By 1918, however, Socialist demonstrations increased ; a <(peace strike® in¬ volving 100,000 in Vienna alone was inaugurated in January. The Socialists protested vigorously against the emperor’s instructions to the Premier on 4 May to take measures to prevent the reassembling of Parliament. The Social-Democratic party on 2 June demanded the as¬ sembling of Parliament and the initiation of steps toward peace. During the summer Bol¬

shevik influences were manifest in several parts of the empire. Revolutionary activity increased and mutiny and desertion were rife in the army. The fall of the empire came on 3 November, a provisional government was organized and a republic proclaimed, which was composed of the moderate wing of the Socialists. In Hun¬ gary a more radical group seized the reins of government and chaos resulted for a time.

Great Britain. — The Socialist movement in Great Britain has always been distinguished from that of the Continent by a greater free: dom from dogma and a greater variety of expression. There has never been one large unified party and Socialist legislation has come through the action of various bodies. The Social Democratic Federation, organized in 1879 and adopting a Marxist platform in 1883, was the first Socialist party. It has gone through many changes and finally merged in the British Socialist party, which split in 1915 on the question of the attitude to be taken toward the war. The Independent Labor party, which has never been distinctly Marxian, was organized in 1893. The Fabian Society, organ¬ ized in 1884, is a body of educated writers and speakers, the tnost prominent of whom is Ber¬ nard Shaw, and which is distinctly anti-Marx¬ ian. The Labor party, which started as the La¬ bor Representation Committee, with representa¬ tives of all the foregoing organizations and also of the unions, is the political expression of the Socialist movement. The total membership of the bodies united in the Labor party in 1912 was given as 1,895,498. Of these 1,858,178 were included in the union membership and 31,237 were members of the various Socialist organi¬

zations. It casts about 1,000,000 votes, and had 40 members in the Parliament which was in session during the war. The Socialists of Great Britain were sharply divided on the war. The Independent Labor party fought against the war until it came, then opposed conscrip¬ tion and worked constantly for peace. Large numbers of its membership were imprisoned for their agitation. The Labor party, while insisting upon its position as a peace party, generally supported the government during the war. The British Socialist party split, with H. M. Hyndman, often called the father of English Socialism, leading the pro-war faction. All sections of the Labor party fought continu¬ ously to protect working-class interests during the war and were almost uniformly successful. At the general election of December the Labor party did not increase its strength, but it was successful in several by-elections held subse¬ quently.

Belgium. — In Belgium there is but one So¬ cialist party, the Parti Ouvrier Beige, which was founded in 1885. For several years the

franchise was very limited and the Socialists were barred from any effective political action. Accordingly the early years of the party were given up to agitation in favor of universal suf¬ frage. This culminated in a series of great demonstrations and finally in a general strike in 1893, which resulted in the granting of uni¬ versal suffrage to all males over the age of 25 years. This was much qualified, for in many elections there is a complex system of plural voting by which those possessing property or special educational qualifications have two or three votes, while the propertyless wage-workers have but one. Yet at the first election in 1894 the Socialist party polled 320,000 votes and elected 28 deputies out of 152. Owing to fu¬ sion with the Liberals at recent elections it is impossible to give the Socialist vote exactly but it is generally estimated at 500,000 for the election of 1914, when 40 Socialist deputies and four senators were elected. The principal characteristic of the Belgian Socialist move¬ ment is the peculiarly close affiliation of the three phases of the working class movement, the co-operative, trade union and political ac¬ tivity. Practically every trade unionist is also a Socialist and a member of some one of the co-operative organizations.

Denmark. — The Socialist movement of Denmark is closely affiliated with the unions, which include 75 per cent of the working class, including rural laborers. A powerful co-opera¬ tive movement among the farmers is also con¬ nected with the Socialist movement, and has made Danish agriculture a model of organi¬ zation. The movement here has shown a steady growth and in 1913 the Socialists polled more votes than any other political party, and 30 per cent of all votes cast. The king asked the Social Democrats to form a government. They refused to do this but agreed to support a rad¬ ical government if pledged to a series of re¬ forms for which the Socialists had been fight¬ ing. These reforms included universal suffrage for all men and women over 25 years of age, direct election of members of Parliament by popular vote and the removal of all right of appointment to office from the king. This agreement was made and the radicals formed a government. But upon the outbreak of the war

an effort was made to postpone these measures. The strong Socialist representation refused to compromise and on 5 June 1915 the suffrage law demanded went into effect, and the other measures were taken up for consideration. The vote of the party from the beginning has been as follows :

1872 .

. 268

1898 .

. 31,872

1876 .

. 1,076

1901 .

. 42,972

1881 .

. 1,689

1903 .

. 55,479

1884 .

. 6,806

1906 .

. 76,612

1887 .

. 8,408

1909 .

. 93,079

1890 .

. 17,232

1910 .

. 98,718

1892 .

. 20,094

1913 .

. 107,365

1895 .

. 24,508

The Socialist strength in the government was impaired at the general elections of April 1918 at which but 39 Socialists were returned members of the Folketing.

Finland. — The Finnish Socialist party was established in 1899 and in 1916 became the first Socialist party to gain an absolute majority of any legislative body, by electing 103 out of the 200 members of the Finnish Diet. Owing to the activity of the Socialists, Finland was the first European country to grant absolute political equality to women, and 24 of the Socialist members of the Diet are women. The vote has increased steadily from 100,000 in 1904 to 286,792 in 1916. The Socialists have organized a powerful co-operative movement with its social centres in each village so that to-day there are more Socialist clubhouses than churches in Finland. In 1917 Finland was declared an independent republic. Civil war broke out in 1918 between the Red (Bol¬ shevik) Guards and the White Guards. The latter favored the Germans, who landed troops for their assistance. A Radical Socialist (Red) government was set up at Viborg in April 1918 and a White Guard government at Vasa. After a turmoil of several months a peaceful revolution was effected in December and the moderate Socialists secured control of the government.

Holland. — The Social Demokratische Ar- beiderspartij of Holland was organized in 1894. A conflict with the anarchists, led by Domela Nieuwenhuis, formerly a Socialist, led to their expulsion from the old ((Socialisten Bond,® which they at one time controlled. The <(Bond® then merged with the regular Socialist party, and the daily paper, Recht voor Allen, founded by Nieuwenhuis, became a Socialist organ. The party grew steadily and in June 1913 cast 144,000 votes and secured 19 seats in Parlia¬ ment. The Socialists then held the balance of power and were invited to join in the forma¬ tion of a ministry but refused. Many import¬ ant municipal positions are also held by Social¬ ists. In the closing months of 1918 the Social¬ ist leader in Parliament, Peter J. Troelsta, criticized the queen and incited

to revolution. Riots and demonstrations were of frequent oc¬ currence due to the high prices of food-stuffs and the general dissatisfaction with the pro¬ nounced German leanings of the queen and her entourage.

Italy. — During the years when the Socialist movements of most of the other nations of Europe were gaining their first foothold the Italian workers were still under the influence of the bourgeois liberalism of Mazzini or of the conspiratcry anarchism of Bakounin. The

present Socialist party was founded at Milan in 1892 and its organization perfected at Genoa in 1892. It received 27,000 votes in the elec¬ tion of 1893. This was followed by a period of oppression under Crispi, during which thou¬ sands of Socialist voters were disfranchised by a so-called revision of the electoral lists. The Crispi ministry was wrecked on the Abyssinian expedition and his successor, Rudini, somewhat relaxed the persecution. In 1900, owing to fu¬ sion with a radical party, 175,000 votes were cast for Socialist candidates. This was the beginning of an internal struggle that ended in 1912 in the expulsion of four of the reform wing who were members of the Chamber of Deputies. One of these, Bissolati, was the most noted orator of the party, and at the outbreak of the war entered the cabinet. The immediate result of the split, and an extension of the right of suffrage, was a most rapid growth of the party. At the election of 1913 the radical wing cast 960,000 votes and elected 59 deputies. The reform wing cast 200,000 and elected 21 deputies. The radical wing stood solid against participation in the war. The reform wing favored intervention and supported the war. A peculiar phase of the Italian movement is its great strength in agricultural sections where it has established powerful co-operative asso¬ ciations that directly operate the farms. See Italy — Italian Socialism.

Norway. — The Social Democratic party was founded in 1887, secured 732 votes in 1894, when it first participated in the elections, and steadily increased that vote until it reached 196,000 in 1915, when 20 Socialists were elected to the Storthing. The party took a decided stand against any form of militarism at its congress in 1915, declaring for disarmament, neutrality and obligatory arbitration. The party has great power in many municipalities, a powerful women's and young people's move¬ ment and is closely affiliated with the unions and co-operatives.

Russia. — Because the Socialist movement, save for a very brief period, was compelled to organize and conduct its campaign in secret, and because of the autocratic character of the government it is

difficult to give specific facts concerning it. Three parties are accorded repre¬ sentation by the International Socialist Con¬ gress — the Social Revolutionary party, the So¬ cial Democratic party and the Group of Toil. The latter is a peasant party, based upon the primitive communism which still prevails in Russian village and rural life. The Social Revolutionary party has adopted more or less terroristic methods which separate it from other Socialist movements. The Social Democratic party is the only one which is strictly com¬ parable with the Socialist parties of other coun¬ tries. The only time that there was an oppor¬ tunity for a test of Socialist strength was in 1907, at the election of the first Duma. Even then there was more or less terrorism on the part of the government. But the Group of Toil at this election sent 116 members to the Duma, and the other two parties combined, 101. Elec¬ tion laws and the suppression of open propa¬ ganda reduced the legislative strength of all these parties to a small fraction of these num¬ bers. It later became almost impossible for a Socialist to be elected or even -to vote. Yet in spite of these laws there were 13 members of

the Socialist group in the fourth Duma, which was in session when the war broke out. All of these refused to vote for the war credits and opposed the war. In revenge the govern¬ ment sent five social Democratic members to Siberia. The Social Democrats continued to spread their Marxian doctrines despite govern¬ ment repression and united other wings of the Socialists to bring about the revolution of March 1917 which put an end to Tsarism. Kerensky, a revolutionary Socialist, became Minister of Justice in the new government. The Social Democratic party issued an appeal to the workers of all countries to unite in putting an end to a war, begun and carried on solely for the benefit of kings and financiers. In June 1917 Lenine, the radical Socialist, attacked the war policy of Kerensky's government. On 7 Nov. 1917 the Bolsheviki revolted under Lenine and seized the government. The Bolshevik government at once proposed a three-month's armistice, and at once set about pub¬ lishing the secret treaties made by the Tsar's government with the Allies. The internal policy of the new radical Socialist government was inaugurated by a series of decrees transfer- ing property. Through many vicissitudes the Bolsheviki remained in power and administered the government upon the basis of extreme Socialism.

Switzerland. — Long the home of exiled revolutionists, one of the

strongholds of the “International,® several of whose congresses were held in Geneva, it was not until 1888 that a Social Democrate party was founded in Switzerland. To be sure, the Griitli Verein, had existed as a political working-class organization of a democratic-radical character since 1838. In 1901 it joined with the Social Democratic party, retaining its autonomy. The vote in 1911 was 120,000. This was increased somewhat in 1914 when 18 Socialists were elected to the National Council. The extensive unemployment due to the war caused a slight falling off in membership in 1915-16. The party maintained its pacifist position through¬ out the war and worked constantly to secure similar action by other parties.

Spain. — At a congress held in Barcelona, June 1870, it was claimed that 40,000 members of the “International® from Spain were repre¬ sented. Owing to the disruptive influence of Bakounin this movement almost completely dis¬ appeared. The present Socialist party was founded in 1879, but was not strong enough to hold a congress until 1888. In 1891 it received 5,000 votes. This vote was regularly increased until in 1910, when a coalition was made with the Liberals, 41,000 votes were polled, and Pablo Iglesias, long the most prominent member of the party, was elected to the Cortes. He was re-elected in 1912, when a further slight increase in the vote was secured.

Sweden. — The propaganda of Socialism was introduced into Sweden in 1881 by August Palm. In 1889, at the first trade unior) con¬ vention held in Sweden, the program of the German Social Democrats was adopted and the unions have ever since formed the back¬ bone of the Socialist movement. The party grew steadily in membership until 1909 when, as the result of the defeat in a general strike, it fell off from 112,693 to 60,813. The growth

then began again and continued until 1915 when it was about 90,000. There have been sharp divisions in the party in recent years. The more radical section wished to conduct an active campaign for a republic which the con¬ servatives opposed. This division climaxed in a split over the attitude of the party on the war. Whether this split will continue after the war cannot now be foretold. An election in 1915 resulted in 265,000 votes for the Socialists, and the election of 87 members of Parliament. This makes the Socialist party the strongest with 86 Conservatives and 45 Liberals in opposition. A powerful young Socialist movement which works with the radical wing is one of the features of the Swedish move¬ ment.

Australia. — The Australian labor move¬ ment has been characterized as Socialism with¬ out phrases® and, while many Socialists would

dispute the characterization, it has a large ele¬ ment of truth. The Labor party, which has a majority in both houses of the federal Parlia¬ ment and in two out of six state legislative assemblies and strong representation in all the others, does not declare for the socialization of industry. Indeed it specifically announces that it does not stand for the socialization of certain industries such as the retail trade. Yet is has gone much further toward the state ownership of industry than any other party and, during the war, went to great lengths in the nationalization of certain branches of the retail trade. The total vote of the Labor party is estimated at about 2,000,000. There is a small orthodox Socialist party in every state which keeps up a sharp criticism of the com¬ promising character of the Labor party. The latter is a direct creation of the union move¬ ment and is controlled more by the union con¬ gresses than by any machinery of its own. During the war the party divided on the ques¬ tion of conscription which was endorsed by many of the leaders, including Premier Hughes, but which was defeated by a referendum. Since most of the opponents of the Labor party were conscriptionists this would indicate that a majority of the Labor party are in favor of a more radical program. This conclusion is drawn from the fact that the radical, more orthodox Socialist wing, fought conscription successfully.

China. — The Socialist movement in China, which had existed in a rather indefinite way for several years, sprung into sudden prominence when its leader, Sun Yat Sen, was elected as the first president of the short-lived republic, the Parliament of which also contained 30 Socialists. At this time the party had a power¬ ful press, a wide spread organization and a program based upon that of international Socialism, modified to meet Chinese conditions. But the movement was manifestly exotic, de¬ pendent largely upon foreign educated students, and went down when the rebellion was crushed by Yuan Shi Kai. It is difficult to tell how much of the movement remains, but there is certainly a strong organization working for Socialism in China.

Japan. — The Japanese movement, which is directly affiliated with the international move¬ ment, has existed since 1899. The government has pursued Socialists with a brutal persecution which culminated in the hanging of 12 in 1910

and the imprisonment of a large number of others. As was natural, persecution drove Anar¬ chists and Socialists together and led to recipro¬ cal violence. In spite of the persecution many of the foremost scholars of Japan have identi¬ fied themselves with the Socialist movement and it maintains a press of considerable im¬ portance in which Socialism is taught indi¬ rectly through discussion of current questions.

There are also strong Socialist movements in Bulgaria, Serbia, Rumania, Greece, Hun¬ gary, Poland, Portugal, Canada, Argentine, Brazil, Chile, South Africa and New Zealand. In fact it is now impossible to name a section of the world where capitalism has reached that Socialism has not followed like a shadow. There have been many compilations of the total Socialist strength. The following, prepared by the information department of the Socialist party of the United States, while not at all points agreeing with the figures given else¬ where, is probably as close an approximation to the situation in 1914 as can be obtained.

Parliament

COUNTRY

Membersnip

Vote Socialist

Total

Argentine .

4,000

48,000

10

120

Australia .

200,000

678,012

66

111

Austria . .

289,524

1,053,627

82

516

Belgium . . .

269,830

483,241

40

186

Bulgaria .

6,000

85 , 489

20

211

Canada .

6,180

15,857

...

• • «

Denmark .

52,000

107,412

36

114

Finland .

51,798

310,503

90

200

France .

63,358

1,398,771

101

597

Germany .

982,850

4,250,399

110

397

Great Britain. . . .

100,000

378,839

42

670

Greece .

1,000

12,000

181

Hungary .

100,000

Italy .

40,000

997,000

79

508

Luxemburg .

4,000

7

53

Netherlands .

20,623

145,588

18

100

New Zealand. . . .

52,000

44,960

4

80

Norway .

43,557

124,594

23

123

Portugal .

3,500

3,308

1

164

Rumania .

2,057

Russia .

168,000

200,000

14

442

Serbia .

3,000

25 , 000

2

166

South Africa . . . .

26,098

7

121

Spain .

40,000

40,791

1

406

Sweden .

70,000

229,339

73

230

Switzerland .

31,384

105,000

15

189

United States.. . .

118,045

931,406

531

Totals .

. • 2,716,649

11,701,291

841

6,416

In addition to the vote and membership figures as given above, there are also Socialist movements in Armenia, Bolivia, Chile, China, Cuba, Iceland, Japan, Newfoundland, Persia, Turkey and Uruguay.

United States. — The industrial condition of the United States prevented the appearance of any strong Socialist movement until within comparatively recent years. The presence of an ever-moving frontier led to a social stratifica¬ tion by geographic stages which was constantly changing and which, therefore, prevented the appearance of any such continuous class struggle as a Socialist philosophy presupposes. The pres¬ ence of free land and the expanding market meant a large opportunity for individual ad¬ vancement, both from the ranks of laborers to capitalist and from small capitalist to large cap¬ italist. The Socialist movement is peculiarly a product of the industrial proletariat, and while the population of the United States remained largely rural such a movement could gain no great strength. Again, the existence of chattel slavery throughout the South, prior to the Civil

Was, created an economic contest between these two forms of industrial organization which overshadowed the still somewhat indistinct con¬ trast between laborers and capitalists. But though these industrial conditions prevented the growth of Socialism in the Eastern sections they gave the greatest encouragement to the growth of a Utopian Socialism, and so it came about that for many years the United States was the experimental ground on which were tested the various theories of European Utopians. These movements are often confounded with latter-day Socialism. They really had practically no connection save that both have the idea of collective production. But the collective produc¬ tion of the colony is to be a scheme worked out in our present society, while the collective pro¬ duction of modern Socialism is simply one phase of the coming social stage. William Weitling came to America in 1849 and succeeded in or¬ ganizing something of a Socialist movement in New York in the years immediately following. His movement, however, was of short duration as was also that of Joseph Weydemeyer, who came shortly after him and who was a personal friend of Marx and Engels. The Civil War wiped out nearly all traces of both of these movements. After the War the influence of the <(International)) extended to America. This in¬

fluence was first seen in the National Labor Union in which William H. Sylvis was the most prominent worker and which practically disap¬ peared with his death in 1869. During the next three years numerous sections of the “Interna¬ tional® were organized throughout the country, and on the removal of the “International® to this country some attempt was made to revive it, but its last convention was held in Phila¬ delphia 15 July 1876, and this convention for¬ mally dissolved the organization. On 4 July 1874 the Social Democratic Workingmen’s party of North America was organized with a rather indefinite Socialist platform. This grew in strength during the next few years and in 1877 the name was changed to the Socialist Labor Party of North America. Following the extensive labor troubles of 1876 and 1877 this party grew into national prominence and suc¬ ceeded in electing minor officials in several States. But it was still too indefinite to pro¬ tect itself from anarchistic influences which crept in and which nearly wrecked the party until finally those influences reached their cli¬ max and their end in the Haymarket incident in Chicago. The work of organization had now to be practically all done over again. In September 1887 the Sixth National Convention of the Socialist Labor party, held at Buffalo, N. Y., took up the work of reorganization. The Socialist elements in the labor movement were still rent with internal feuds, but by 1889 a steady upward growth began to be seen. Meanwhile, certain other movements which have undoubtedly contributed to the strength of Socialism had developed. The Greenback party and the Henry George movement both contained many of the ideas of Socialism and undoubtedly proved a means by which many were led to adopt the Socialist position. In 1892 the Socialists for the first time nominated a Presidential ticket consisting of Simon Wing of Boston, Mass., and Charles H. Matchett of Brooklyn, N. Y.

In 1899 the Socialist Labor party split,

largely over the proper relation to be maintained between the party and the unions. The largest fraction united with the Social Demo¬ cratic party that had sprung up around Eugene V. Debs as a result of the American Railway Union strike in 1894. This union took place at a convention in Indianapolis, July 1901. For four successive elections Eugene V. Debs was the Presidential candidate, polling a steadily increasing vote. The party has also elected many members of State legislatures, two mem¬ bers of Congress and many municipal officers.

The party membership for 1915 was nearly 100,000. The vote of the two parties from their establishment has been as follows :

Socialist Labor

year Socialist Party Party Total

1888 . 2,068 2,068

1890 . 13,704 13,704

1892 . 21,512 21,512

1894 . 30,020 30,020

1896 . 36,275 36,275

1898 . 82,204 82,204

1900 . 96,931 33,405 130,336

1902 . 223,494 53,765 277,257

1904 . 408,230 33,546 441,776

1906 . 331,043 20,265 351,308

1908 . 424,488 14,021 438,509

1910 . 607,674 34,115 641,789

1912 . 901,062 30,344 931,406

1914 . 874,691 21,827 896,518

The Socialist party throughout the war con¬ tinued its ((active and public opposition to the war.® Numerous groups tried without success to modify this opposition. As a result serious defections resulted. Most of the Socialist per¬ iodicals were denied the second-class mailing privileges and many were arrested and im¬ prisoned under the Espionage Act and other war-time laws. In the elections of 1918 So¬ cialist represention was cut down in many in¬ stances through the fusion of the reactionary Republican and Democratic parties. The So¬ cialists who opposed the anti-war activities of the old party formed a separate organization called the Social Democratic League. It sup¬ ported the war on the same bases as the Inter- Adied Socialist and Labor Conference.

Bibliography. — Myers, William Starr, (So¬ cialism and American Ideals) (Princeton 1919) ; Russell, Bertrand A. W., (Proposed Roads to Freedom : Socialism, Anarchism and Syndical¬ istˆ (New York 1919) ; Bronstein, L. D., (((Leon Trotsky®), (The Bolsheviki and World Peace *(New York 1918) ; Spargo, John, (Social Democracy Explained: Theories and Tactics of Modern Socialism* (New York 1918) ; Vander- velde, Emile, (Le socialisme contre l'Etat *(Paris 1918) ; Russell, B. A. W., (Political Ideals* (New York 1917) ; Benson, Allan Louis, Hnviting War to America *(ib. 1916) ; Boudin, Louis B., Socialism and War* (ib. 1916) ; Sellars, Roy W., (The Next Step in Democracy) (ib. 1916) ; Walling, William English, (The Socialism of To-Day *(ib. 1916) ; Humphrey, A. W., (International Socialism and the War* (London 1915) ; Hyndman, Henry Mayers, (The Future of Democracy *(ib. 1915) ; Melvin, Floyd J., Socialism as the Sociological Ideal* (New York 1915) ; Robbins, Edwin C., (So- cialism *(ib. 1915) ; Spargo, J., (Marxian So¬ cialism and Religion* (ib. 1915) ; Walling, W. E., (The Socialists and the War *(ib. 1915) ; Benson, A. L., (Our Dishonest Constitution* (ib. 1914) ; Meader, John R., (Your Pay En¬

velope *(ib. 1914) ; Rosenblatt, Bernard A., (The Social Commonwealth* (ib. 1914) ; Spargo, J., Socialism and Motherhood* (ib.

1914) ; Orth, Samuel Peter, Socialism and Democracy in Europe *(ib. 1913) ; Paton, James S., Progress and Plenty* (Boston 1913) ; Spargo, J., (Socialism *(New York 1913) ; Skelton, Oscar D., Socialism* (Boston 19H) ; Bebel, F. A., (Woman and Socialism *(New York 1910) ; Guyot, Yves, Socialistic Fallacies* (ib. 1910) ; Hillquit, Morris, Socialism in Theory and Practice *(ib. 1909) ; Bliss, William D. P., (A Handbook of Socialism* (ib. 1907) ; Jowett, F. W., (The Socialist and the City *(London 1907) ; Mallock, William H., Social¬ ism* (New York 1907) ; Untermann, Ernest,

(Marxian Economics *(Chicago 1907) ; Bebel, August, (Woman under Socialism* trans. by D. De Leon (New York 1904) ; International Socialist Bureau, P'organisation socialiste et ouvriere en Europe, Amerique, et Asie *(Brus¬ sels 1904) ; Ladoff, Isador, (American Pauper¬ ism* (Chicago 1904) ; Goldstein, David, So¬ cialism: the Nation of Fatherless Children *(Boston 1903) ; Mackail, John W., The Part¬ ing of the Ways* (1903) ; Bax, Ernest Belfort, cThe Ethics of Socialism *(London 1902) ; Sorel, Georges, (La ruine du monde antique* (Paris 1902) ; Bernstein, Eduard, (Zur geschichte und theorie des socialismus *(Berlin 1901) ; Rae, John, Contemporary Socialism* (New York 1901) ; Le Bon, Gustave, (The Psychology of Socialism *(London 1899) ; Vail, Charles H., Principles of Scientific Socialism* (New York 1899) ; id., (Modern Socialism *(ib. 1897) ; Bax, E. B., (The Religion of Socialism* (London 1891) ; Schaffle, A. E. F., (The Quintessence of Socialism *(ib. 1891) ;*

Kauf¬ man, Moritz, Christian Socialism (London 1888) ; Valdegamas, Juan F. M., ˆEssays on Catholicism, Liberalism and Socialism *(Dub¬ lin 1879) ; Stammhammer, J., Pibliographie des Socialismus und Communismus* (Jena 1893- 1909) ; Webb, Sidney,ˆ Socialism in England *(London 1890) ; Jaures, Jean L., C'organisa- tion socialiste de la France* (Paris 1915) ; Howe, F. C., Socialized Germany* (New York

1915) ; Hutchinson, R. H., Che Socialism of New Zealand *(ib. 1916) ; The International Socialist Rcviezv, Le Mouvement Socialiste, The Socialist Review. Bronshtein, L. D., (Trotsky, Leon), Cur Revolution* (New York 1918) ; Spargo, John, (Americanism and Social Democracy *(ib. 1918) ; Hillquit, Morris, (History of Socialism in the United States* (ib. 1903) ; Day, Henry C., Catholic Democ¬ racy, Individualism and Socialism,* with preface by His Eminence Cardinal Bourne (New York

1914).

SOCIALIST PARTY, The. See Social¬ ism.

SOCIETIES, Criminal. To find the origin of the idea that has given the world its criminal associations it would be necessary to conduct the search into the realm of fables, for if there has been a time when bands of outlaws have not levied tribute upon poorly protected property, history is silent upon that point. Modern brains only have comprehended the full possibilities of the co-operative idea as applied to the commis¬ sion of crime, but the earliest applications of the theory, however crude, were probably quite effective. When in the 11th century, Assan-

ben-Sabbah, the (<01d Man of the Mountains,® securely protected in his rocky fortress, in¬ spired and directed the horrible crimes of his great band of devoted, hashish-drunken fol¬ lowers, he taught the world a new truth and presented it with a new word, neither of which have been forgotten. The truth was the first clear demonstration of the fact that when asso¬ ciated crime is well organized and carefully directed, ordinary methods of protection are powerless to cope with it. The word was (<assassin,® the title derived from his own name, which he bestowed upon his band. From that time the criminal association has been too serious a matter to be the inspiration of either song or story. Any attempt to tell the story of the modern criminal society begins with the Camorra and the Mafia, the two most

powerful organizations of the kind the world has ever known. Born and nurtured in Italy, at the dawn of the 19th century, they grew and waxed strong until the one-time clubs of petty crimi¬ nals had become the gigantic octopus which overawed the entire country and threatened to cause the downfall of the government which had so carelessly permitted such development of a lawless course. Efforts have been made, of late, to cast the shadow of uncertainty upon the primary purpose of these societies. It has been suggested that they were originally or¬ ganizations of patriots who had banded together to protest against existing tyrannies. A careful study of the history of the time, however, and a close examination of the earliest works of the associations will prove the fallacy of such a theory. Instead of having a noble past to look upon, these organizations have always been bands of the most heartless criminals, a con¬ stant menace to any government and to all laws.

For some time before the Camorra's time, Italy had been writhing in agony beneath the heels of the most corrupt and incompetent body of officials who ever attempted to rule a nation. The one object of the government was to ex¬ tract as much money as possible from the peo¬ ple and to give absolutely nothing in return. Taxes which were high were collected relent¬ lessly, but little of the money obtained was ex¬ pended for the benefit of those who had been taxed. Governmental works were at a stand¬ still, government officials were unpaid and the immense sums of money which had been ex¬ torted from the people were wasted upon royal favorites. Little by little the corruption in high places permeated the whole fabric of society. Justice became a thing unknown. If suit was brought the richest man won, for there was not a judge in the land who was not willing to sell his decision to the highest bidder. Acting upon the same principle the police became the partners of the criminal. As personal wrong and of¬ fenses against the laws were never punished, crime became rampant. The poor, robbed bv the rich, proceeded to recover from their op¬ pressors by force that which had been taken from them by process of law, and life became a thing of little value.

Then came the French, with their peculiar form of oppressions, which culminated in the theory that a man in prison was a more tracta¬ ble subject than a man at large. In pursuance of this idea thousands of arrests were made, and the men, unconvicted, were left behind the bars.

In a week the poor penal accommodations of the country were taxed to the last limit, but, as the work had only just commenced, castles were seized and turned into prisons. Having arrested their men,

however, the French dis¬ missed them from mind. ((We will watch them to prevent their escape,® they said, <(but we will let the local authorities feed them.® But as the local authorities had too much trouble to raise the indemnities demanded by the con¬ querors to think of bothering themselves about men who were securely locked behind iron bars, prisoners who were not blessed with independ¬ ent means had no other option than to starve. As the natural result the strong commenced to prey upon the weak and anyone who had money was robbed without mercy. Among the prison¬ ers there was one in whose brain lodged the seed of socialism. This man was Antonio Giaperelli, and to him belongs the somewhat doubtful honor of having organized the first society of the Camorra. He had noticed that, while new prisoners were always robbed im¬ mediately upon their arrival, few of the inmates of the prison profited by these robberies, and he suggested a plan providing for the systematic fleecing of all newcomers, the plunder to be shared equally among all the prisoners. The suggestion met with the approval of the ma¬ jority and the scheme worked so well that it was not long before the plan was adopted in every prison in Italy. For a time the organiza¬ tion of the Camorra was thus confined within prison walls, but as the members were released it was suggested that a plan that had worked so well under circumstances in which the oppor¬ tunities for plunder were so meagre might ad¬ vantageously be extended. Up to the year 1828 the word Camorra had no meaning except to those who had made the acquaintance of the society in some prison, but during that year the name was written in letters of blood that made all Italy tremble. One day a merchant in the city of Naples was visited by a stranger who asked him to contribute to the support of the <(Camorra.® Not knowing the man, and never having heard of such an organization, he naturally refused. The visitor insisted and the merchant was finally compelled to eject him from the shop. Other stores were visited, with a like result, and the strange collector disap¬ peared as he had come, unknown to all. The next day Naples had its sensation. When the wife of the first merchant had attempted to waken her husband she had found him dead in bed, and the stiletto that pierced his heart held to his breast a placard on which it was stated that his death was the result of his refusal to assist in the support of the Camorra. A day or two passed, just time enough to allow the story to become generally known, and then another stranger appeared upon the streets of the city. Store after store was visited and the same re¬ quest was made, but this time the words, ((for the Camorra® carried such frightful import that many merchants submitted to the black¬ mail. Some refused, however, and the next morning the murder of another business man warned the people of the

uselessness of their attempt to withstand the demands of the order.

From that day the power of the Camorra be¬ came practically absolute. From city to city its work was extended until its name was heard

with dread in every part of Italy. At regular intervals each storekeeper received a visit from the strange collector and, as death was the pen¬ alty of refusal, the money demanded was usually paid without protest. No one was exempt. Wherever goods were sold or trade of any kind was carried on the importunate collector stood ready to receive his share of the profits. He was permitted to go everywhere. He was at the custom house, where he collected his tolls as conscientiously as if he had been a govern¬ ment agent. If money was deposited he stood by the side of the depositor in the banking house. Nothing escaped him, and when the business day closed he paid his visits to the wine shops, the gaming houses and all dens of vice, for the officials of the society were not partic¬ ular as to the methods used in the making of money so long as they received their share of the spoils.

In this manner was the country terrorized by the operations of a society which had be¬ come more powerful than the government. Several half-hearted attempts were made to suppress it, but as its membership was com¬ posed of persons from every walk of life the blackmail continued, and at last became open highway robbery. Then it was that the streets of the cities became unsafe either by day or night, and the finding of a dead body on the public highway was of such frequent occurrence as to occasion but little comment. The victim had simply refused to pay his tribute to the Camorra.

It was not until 1877, therefore, that any progress was made in the restoration of order. Then United Italy took the matter in hand, and as this crusade was conducted by honest men who were ready to act with energy and deter¬ mination, hundreds of the agents of the associa¬ tion were soon arrested, and, as executions and long imprisonments followed, penalties to which the highest as well as the lowest were sub¬ jected, it was not long before the dreaded Camorra ceased to be dreaded.

While never as powerful an influence for evil as the Camorra, the Mafia was organized upon similar lines, and the fact that it is more

recent makes it of greater interest. Like the parent society its purpose was one of murder, robbery and blackmail. Like the parent society it became stronger than the government in its own country, and, as in the case of the Camorra, was only subdued by the exertion of the au¬ thorities of the United Italy.

There were two factors that played an im¬ portant part in the organization of the Mafia. The first was the presence of numerous bands of outlaws organized as a protest against the non-resident land ownership, which had caused so much poverty and misery in that part of the country. There can be no doubt but that these conditions were about as hopeless as present- day imagination can picture. The Sicilian peas¬ ants had suffered untold miseries at the hands • of the heartless agents of the alien landlord, and the ignorance and natural viciousness of the people could suggest but one way out of the difficulty. Assassination and robbery was the remedy. The other factor was the presence of thousands of bravos, soldiers and courtiers who had lost their occupation when Ferdinand granted the demand for a liberal form of gov¬

ernment. The abolition of the petty courts, of which there had been so many in the Two Sici¬ lies, threw these men out of employment, and, as they cared neither to work nor starve, they naturally thought of brigandage as the one way out of the difficulty. With that idea in view scores of military clubs were formed and these were the cloaks behind which the members com¬ mitted their murders and robberies. It was at this time that Mazzini appeared upon the scene. How much he saw of the patriotic side of the question, how much of the criminal, will never be known. We only know that it was his con¬ structive genius that welded the two factors to¬ gether and that it was to him that we owe the existence of the Mafia. Strange as it may seem the name <(Mafia® is meaningless and the word does not appear in any dictionary of the Italian language. In fact, up to the year 1859 the word itself had not been coined. It was only when Mazzini had gone from club to club, and from outlaw band to outlaw band, forming branches of his secret society that such a title was conceived. Mazzini called his united clubs ((Oblonica,® a name which was derived from two Latin words, ((obelus,® a spit, and <(nico,® I beckon, meaning <(I beckon with a spit,® the latter, of course, being the stiletto with which the society was to do such deadly deeds. To say that Mazzini was thoroughly in sympathy with the horrible work to which the society later devoted itself is to go a step beyond the historical, but its purposes, as expressed in the words, (<Mazzini autorizza furti incindi avvel- enamanti,® meaning, ftMazzini authorizes thefts, arson, poisonings,® gave to the association of criminals its name, the initial

letters of the five words being used to form the new word, «Mafia.»

The extent to which the Mafia had expanded was shown in 1876, when the government was called upon to investigate the abduction of an Englishman named Rose. The sum of $20,000 was demanded, and paid, for his release, and the investigation which followed was so revolt¬ ing in its details that the result was suppressed by the authorities. It had been shown that the money had been divided among many people of various conditions, from the peasantry to the commander of the post, whose gendarmes were supposed to be pursuing the bandits ; the chief of police and detectives of the district, and even the judges of the courts, they having promised immunity in case the abductors should be cap¬ tured. When the government of Italy was noti¬ fied of these facts it took the matter in hand. The corrupt soldiers and officials were sent to another part of the country, being replaced by sturdy and honest regiments from the borders of the Tyrol and the mountains of Switzerland. The new men had no sympathy with crime, no friendship for the criminal. They knew that it was their sole duty to carry out the orders of their superior officers and they performed this duty with a vigor with which even the powerful Mafia could not cope. Whenever or wherever a man was iound who could not give a per¬ fectly clear account of himself, or prove that he had no connection with the murderous society, he was shot on the spot. It has been estimated that no less than 5,000 persons met their death at this time, and while the search must have resulted in the killing of many inno-

cent people, the object of the crusade was ac¬ complished, and the Mafia, after its years of prosperity, was driven into obscurity. During this campaign of extermination, however, hun¬ dreds of the members of the Mafia made their escape, and many ot them came to this country. Rumors to this effect were common at times, but they were not treated seriously until 1890, when the hand of the society was felt in the killing of Chief of Police David C. Hennessey, of New Orleans.

For several years there had existed two rival stevedoring firms in New Orleans, the Pro- venzanos and the Matrangos, which were in competition for the business of discharging and loading the vessels engaged in the Central American trade. The Provenzanos controlled this business for some time, but their services proving unsatisfactory for some reason, the work was transferred to the rival firm. Then the

trouble began. The Provenzanos contended that their services had been dispensed with be¬ cause the shipowners were held in terror by the Matrangos, who had threatened them with the Mafia. The Matrangos, however, denied the imputation, and made counter charges in which the Mafia played an important part. In accordance with his duty the chief of police pro¬ ceeded to look into the matter. Absolutely honest and utterly fearless David Hennessey realized that his discoveries would cost him his life if the society he had unearthed should ever be able to reach him. <(They may get me,® he said to a friend, <(but if they do they will get me in the back,® a prophecy which was realized on the night of 16 Oct. 1890, when he was shot to death on Girod street. The assassins had been concealed in doorways and, after he had passed, had stepped out from their hiding place to rain upon him a perfect fusillade of bullets. He had threatened to exterminate the Mafia and the Mafia had replied by removing him.

The finale to the story is a unique page in American history. Arrests were made, but conviction seemed impossible, and, at last, the people of the city determined to take the matter into their own hands. That there were stiletto societies in New Orleans was no longer a mat¬ ter of doubt. They existed and they threat¬ ened the security of the city. Their members had killed the chief of police and they had threatened to kill others, including Mayor Shakespeare, who had been bold enough to say :

“We owe it to ourselves to see that this blow is the last. We must teach these people a lesson that they will not forget for all time. No community can exist with murder societies in its midst. The societies or the community itself must perisn.”

The blow that followed was one from which the Mafia in this country never recovered. It was not used to that treatment, and, since the New Orleans lynchings, it has not raised its head. Police reports have indicated, however, that it still exists in private, and there are occasional crimes that may be traced to its door, but this dark-cellar existence has little about it to inspire dread, even in the heart of the most timid. Another Italian crim¬ inal society appeared in Turin in 1868. Organ¬ ized for the systematic commission of large criminal affairs, it made a specialty of safe-rob¬ bing, but undertook any promising robbery, and did not hesitate at murder. At one time they

had 200 members. When the public became aroused to extirpate them, few could be lo¬ cated, and it was believed that most of them escaped to the United States. From 1905 to 1909 ftBlack Hand® associations were active in the United States and led to the

assassination in Palermo 13 March 1909 of Joseph Petrosino, a New York detective who had shown especial skill in tracking the criminals.

From time to time organizations, more or less criminal in purpose, have come into exist¬ ence in the United States, and it argues well for the character of the people that their life has invariably been of brief duration. As long as the Ku-klux Klan maintained its original purpose it was unmolested, but when its mem¬ bers resorted to the deeds of violence and bloodshed which made its name the synonym for the most brutal lawlessness, both North and South joined hands to wipe out the organiza¬ tion. See Ku-iclux Klan.

With 12 murders and a countless number of attempted assassinations to its credit Mollie Maguireism terrorized the coal fields of Penn¬ sylvania for more than 20 years. Unlike the Ku-klux Klan, the Molly Maguires were utterly devoid of noble principle. The first lodge was instituted with criminal purpose and from that day until the last Molly murderer was hanged it remained the most thoroughly organized murder society this country has ever known. For years it was the power which ruled in the coal fields. See Molly Maguires.

From the time of its earliest historical rec¬ ord Asia has been at the mercy of its murder societies and other criminal organizations. The dacoits of India, the Hindu thuggee, the khunhuz of northern Asia, all prove that, from one end of the continent to the other, crim¬ inals believe in seeking safety in numbers. The Boxers of China, who are but one of the many criminal wings to the vast secret society system which prevails in that country, have exploited their strength so recently that their horrible work is still fresh in the minds of the civilized races of the world. For absolute corruption, for unalloyed crime, no criminal organization yet known to history can compare to those of China, and some of these associations still flourish, to a certain extent, in every large city in this country under the name of highbinders. One of the most powerful is the Sam Hop, known here as the Chee Kung Tong. The history of the Sam Hop Tong can be traced back more than 250 years. According to tra¬ dition it has existed since the establishment of the Chinese nation. Its organization is said to have been due to divine revelation, and it is known that, in its early days, its character was enirely patriotic. It has always been .a power in the Celestial world. It helped to over¬ throw the Tartar Dynasty, it was the cause of the Tai-ping rebellion, and of the more recent Ko Lo revolution. Many of the most frightful outrages against the missionaries can also be .traced to the Sam Hops. During the two or three centuries of its existence, however, the character of the association has changed. From a patriotic organization, whose only

ob¬ ject was to protest against the outrages of a foreign dynasty, the society has become an association of men banded together solely for purposes of murder, robbery and blackmail. On arriving in this country the Sam Hops or-

ganized under the name of Chinese Masons, and it was not until 1891 that the police acci¬ dentally discovered that the apparently inno¬ cent title was a shield to disguise a criminal association. By this time, however, the Chinese quarter of San Francisco had become a hot-bed of crime and highbinder outrages were of fre¬ quent occurrence in every large city in the country. Victims of the Sam Hops, unwilling to apply for police protection, organized rival tongs. At first the murders had been com¬ mitted only by ones or twos, but finally pitched battles were held on the streets, on which occa¬ sions scores of lives were taken. These mur¬ ders, however, were not the only bad feature of highbinder domination. When the members were not killing each other they were levying blackmail upon merchants and wealthy Chinese, compelling them to pay exorbitant prices for the privilege of being unmolested. They also pursued highway robbery with perfect fearless¬ ness and assumed entire control of the traffic in slave girls. In San Francisco, where they were most bold, the police often declared war against them, but with little success until about 1898, when the Chinese business men took the matter in hand, and, at their request, the Chi¬ nese officials in this country appealed to the home government for assistance. Then a cru¬ sade in earnest was undertaken. The meeting places of the various tongs were found and broken open ; record books and other document¬ ary evidence was seized, and hundreds of ar¬ rests were made. As the punishment which followed these arrests was applied in the Chi¬ nese custom, extending to the relatives of the offenders, those who were still in China being killed and tortured, it was not long before the criminal organizations were driven into com¬ parative obscurity.

The most noxious criminal organizations in the United States have existed in the larger cities, where they have resorted to a higher class of frauds and robberies. Those that have de¬ voted themselves to the open country, on the other hand, have been made up of men of a lower criminal stamp, like our own gangs of outlaws, and have been guilty of murder and robbery with violence. Usually these bands have been composed of young men, under the leadership of the most determined man in the company, as in the case of the Younger and

James gangs, but there have been instances in which even women have been the leaders of such associations of lawbreakers. Louise Bouviers headed a society of 40 men, and the leader of one of the most heartless companies of In¬ dian dacoits was a woman. While such bands of criminals have usually been recruited from the lower walks of life, instances are not want¬ ing in which men of education and social posi¬ tion have resorted to this method of gaining a livelihood. One society of thieves which ter¬ rorized Mayence, in Germany, for several years, was led by an ex-priest, while the <(Habits Noirs,® or evening-dress gang, of Paris, was composed of persons of excellent social stand¬ ing, who had met with financial reverses. In 1837 the authorities of Rome discovered and broke up an organized criminal society, many of the members of which were connected with the noble families of Italy. Among those ar¬ rested were Count Dionisi de Traja and the Countess Angellucci de Traja, as well as sev¬

eral members of the Pope's bodyguard, all of whom had been long esteemed as persons of an exemplary character. France has often been at the mercy of such criminal societies, and there is reason to believe that crime clubs exist at the present time.

In 1849 the Thiberts were disbanded, after they had been successful in pursuing all kinds of criminal operations. This association, which numbered more than 800 members, was com¬ posed of every variety of criminal, all working, in perfect harmony, under one director. What one branch could not do, another accomplished, and there was no phase of crime which could not be undertaken. The disbandment of the Thiberts, however, was the signal for the or¬ ganization of other associations along similar lines, and many of these societies were made up of seemingly harmless folk, men and women who lived in apparent respectability, or mem¬ bers of the same family who pursued their careers of crime under the direction of one of their number. Such a man was Hippolyte Vil- let, the leader of the Lamaire band, whose crimes remained unchecked from 1852 to 1855, when the criminals were exposed, and com¬ pelled to pay the penalty of their murders and robberies on the gallows.

An instance of organized criminal effort was exposed by the police in Paris in 1888. This association, known as the Catusse-Menegant, was one of the greatest of modern bands of criminals, for, while it was under the direction of two men, located in Paris, its lines extended into every part of Europe. Everywhere it had its agents, bands of pickpockets, horse stealers, housebreakers, confidence men and swindlers of every character. In addition to this it operated a banking house in London, through which it was a simple matter to negotiate

its stolen stocks and bonds, or to dispose of its silver and gold. With such facilities the operations of the society were naturally enormous, and were only exposed at last through the clever work of the French detectives, assisted by officers from Scotland Yard. The real leader of the Catusse- Menegant was a man named Chambon, who, under the name of Victor Chevalier, lived with his wife in the Rue Poteau. To all appear¬ ances his sole business was that of conducting a livery stable. His arrest, and that of his lieutenants, was soon followed by confessions which enabled the police to arrest many other members of the association. They were found in all parts of Europe, and in almost every grade of society, but the evidence against them was so complete that nearly all were convicted and sentenced to more or less lengthy terms of imprisonment.

The <(System,® in New York, may be looked upon as the last modern criminal association in America. It was an alliance between certain gangs and gang leaders, with corrupt poli¬ ticians and corrupt members of the police force. It met its death through the ef¬ forts of Charles S. Whitman, then district at¬ torney of New York, who convicted Lieutenant Becker, a high police official, with the murder of a gambler who disobeyed orders. Becker and his agents were electrocuted, Whitman was rewarded by being made governor of New York State, and the system received its death blow.

SOCIETY OF SAINT VINCENT DE PAUL

SOCIETIES FOR ETHICAL CUL¬ TURE. See Ethical Movement and Ethical Societies in America and Abroad

SOCIETY OF AMERICAN ARTISTS,

an association of painters and sculptors in New York City, founded in 1877. Its membership included the leading artists in the country, and during 29 years the society was a considerable factor in the advance of art ideals in the na¬ tion. Nearly all its members being identified with the National Academy of Design, it was considered wise to merge interests and prizes with that organization in 1906, when it became affiliated with Columbia University and the Metropolitan Museum of Arts. See National Academy of Design.

SOCIETY OF THE ATONEMENT.

See Orders, Religious.

SOCIETY OF CAMORRA. See Socie¬ ties, Criminal.

SOCIETY OF THE DIVINE SAVIOUR.

See Orders, Religious.

SOCIETY OF THE DIVINE WORD.

See Orders, Religious.

SOCIETY FOR ELECTRICAL DE¬ VELOPMENT, an association organized in 1912 to carry out in a broad way co-operative electrical development between the various branches of the industry and the larger elec¬ trical companies. The headquarters are at 29 W. 39th street, New York, and the member¬ ship is 1,300.

SOCIETY OF THE EPIPHANY. See

Orders, Religious.

SOCIETY OF THE FAITHFUL COM¬ PANIONS OF JESUS. See Orders, Reli¬ gious.

SOCIETY ISLANDS (Tahiti), South Pacific Ocean, a French dependency, between the Low Islands and the Friendly Islands. This is the largest group of the Leeward Islands, and consists of the principal island of Tahiti (q.v.) or Otaheite, which is about 32 miles long northwest to southeast, and is divided into two peninsulas by an isthmus about three miles broad ; and a great number of comparatively small islands, of which the most deserving of notice are Eimeo or Moorea, Maitea, Tetuaroa, Maiaoiti or Saunders Island, Tahaa or Otaha, Marua or Maupiti, Tubai or Motu-Iti, Hua- heine, Raiatea or Ulietea- and Bora-Bora. The islands are of rugged surface and conical form, encircled by coral reefs. Sharp peaks usually rise midway in the islands from a low band lining the shores and blooming with groves and orchards. The wooded mountainous slopes are intersected with valleys watered by rapid streams often falling in steep cascades over the rocks. The locality is of great geologic interest, the volcanic rocks being exceptional. Coral beds are found high up on the mountain sides and many curious lava formations. The high¬ est point is on Tahiti, 7,349 feet. The scenery is idyllic, especially in Eimeo. The coasts con¬ tain safe and commodious harbors, the best in Polynesia. The climate, though extremely hot and damp, is healthful. Cotton and sugar, sweet potatoes, bread-fruit and taro are grown, and all kinds of tropical fruits — cocoanuts, vanilla and oranges. The exports include these, to¬

gether with trepang, cocoanut fibre and mother- of-pearl. The imports are flour, wine, sugar, coffee, soap, timber and livestock, besides manu¬ factured goods. Prior to their contact with Europeans, the people were na'ive and ingenu¬ ous; thus Captain Cook found them and in¬ terested English missionaries in their welfare, who were successful in Christianizing them. The islands were discovered by a Spanish navigator in 1606 and were visited by English and French travelers and scientists, and finally ceded their independence to the French, becom¬ ing a colony in 1880. The capital and harbor of the group is Peete, on the island of Tahiti. Its chief buildings are a Roman Catholic cathe¬ dral, some schools and an arsenal. The people are of Polynesian extraction and famous as presenting a perfect type of face and form. In 1904 a violent storm brought disaster to the group, depopulating some islands and causing much suffering and destitution. Area, 600 square miles. Pop. about 18,000.

SOCIETY OF JESUS. See Jesuits.

SOCIETY OF THE MAFIA. See Socie¬ ties, Criminal.

SOCIETY OF MARY OF PARIS. See

Orders, Religious.

SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS, an organiza¬ tion founded in 1893 to promote practical and scientific knowledge in the art of shipbuilding and marine engineering and the allied profes¬ sions. In furtherance of this object, annual meetings are held for the reading and discus¬ sion of appropriate papers and for the inter¬ change of professional ideas, thus making it possible to combine the results of experience and research on the part of shipbuilders, ma¬ rine engineers, naval officers, yachtsmen and those skilled in producing the material from which ships are built and equipped. The knowl¬ edge thus obtained is circulated by means of the annual publication of the transactions of the Society. >

The society consists of members, associates, juniors, honorary members and honorary as¬ sociates. The members’ class consists exclu¬ sively of naval architects, marine and mechani¬ cal engineers, including professors of naval architecture or mechanical engineering in col¬ leges of established reputation, who are not under 25 years of age, and who have been en¬ gaged in professional practice in a responsible capacity for at least three years. The society has a total membership of 1,000. The head office is at 29 W. 39th street, New York.

SOCIETY FOR PROMOTION OF USEFUL GIVING. This was founded in New York City in 1912, and has a membership of about 10,000. Its headquarters are at 38 W. 39th street; Mrs. August Belmont is presi¬ dent and Miss W. K. Oliver secretary.

SOCIETY FOR PSYCHICAL RE¬ SEARCH. See Psychical Research.

SOCIETY OF SAINT JOHN THE EVANGELIST. See Orders, Religious.

SOCIETY OF SAINT VINCENT DE

PAUL, a Roman Catholic charitable organiza¬ tion, founded in May 1833, in Paris, by Freder¬ ick Ozanam (q.y.) and seven companions. At their first meeting the object of the society

was outlined and expressed in the few words: (<Our work shall be for the service of God in the persons of the poor, whom we are to visit at their own dwellings and assist by every means in our power.® Frederick Ozanam is considered the founder, as he was the first one who suggested the work. The Saint Simonians had taunted the young men who were advo¬ cates of Roman Catholic doctrines with being talkers only and not workers. At the very next meeting of Ozanam and his friends, Ozanam suggested an organization which should occupy itself (<not with discussions but with good works.®

From a membership of eight in a small room in Paris, in 1833, the society has grown to a membership of thousands with local organiza¬ tions in nearly all parts of the world. The first United States society was formed at Saint Louis in 1845; the New York organization dates from 1846. The members are men from all stations in life. There are numerous auxiliary societies, composed of women, who assist in the regular work of the Saint Vincent de Paul societies. The instructions given by the Pere Bailly at the first meeting created a spirit which is char¬ acteristic of the work of the present. He urged the men not to let their work be a (<mere doling out of alms,® giving only a pittance of money or food, but a medium of moral improvement through personal service. Their education, in¬ telligence, special knowledge of science and their general knowledge of life are placed at the service of those needing assistance.

The total number of Saint Vincent de Paul conferences throughout the world is over 6,000; active members over 100,000; honorary

members, over 100,000. There are now branches in every civilized country on the globe. There are in the United States a general council, and special councils in every archdiocese, besides 800 conferences and over 15,000 members.

Some of the good works in which the mem¬ bers are engaged are visiting the sick and those in trouble; furnishing food and clothing to the needy, procuring employment for those not en¬ gaged in regular work, providing summer coun¬ try homes for poor city children and homes for the homeless. The members visit the jails, pris¬ ons, almshouses and the poor of the parish. Boys' clubs have been established in many cities, and vigorous efforts are made to distribute good literature. Besides the local meetings, State and national meetings are held annually, with delegates from conferences in all parts of the United States, Canada and other countries. All the councils of the world report annually to the council-general, who has his headquarters in Paris, France. Consult (Manual > of the society.

SOCIETY OF TAMMANY, or COLUM¬ BIAN ORDER. See Tammany Society.

SOCINIANS, so-sTn'i-anz. See Religious Sects.

SOCINUS, so-si'nus, Faustus, Italian theo¬ logian ; nephew of Laelius Socinus : b. Siena, 1539; d. Poland, 1604. Having lost his parents while still young his education was neglected. He was obliged to leave Siena from suspicions of his entertaining heretical notions in his 20th year, and retired to Lyons. On the death of his uncle he came into possession of the manu¬ scripts of the latter, by the study of which he

found his former opinions confirmed. He be¬ gan to publish his views at Florence (where he lived 12 years at the court of the grand duke, Francesco de' Medici) in anonymous writings; and he afterward retired to Basel to avoid the persecutions of the Italian inquisition. His opinions were still more fully developed during a residence in Transylvania, and in Poland he had numerous adherents. The Anti-Trinitarian societies, although they agreed with him in some points of doctrine, yet differed so far in others that they would not receive him into their com¬ munion. He formed, however, some small so- cities of followers there, but suffered persecu¬ tion in that country, and the confiscation of his property in Italy. His death was hastened by the brutal treatment of a fanatical Cracovian mob. Those who followed the teachings of Lselius and Faustus were termed Socinians, and their theories persisted, finally culminating in modern Unitarianism.

SOCINUS, Laelius, Italian theologian: b. Siena, 1525; d. Zurich, 1562. He was des¬ tined for the legal profession, in which his father, Mariano, and several others of his an¬ cestors, had gained distinction ; but, moved by the religious discussions which then agitated the greater part of Europe, he abandoned the science of jurisprudence for the study of the Scriptures. In order to prosecute his study thoroughly he mastered the Greek, Hebrew and Arabic languages. In 1546 he was admitted a member of a secret society at Vicenza, which had been formed for the discussion of religious questions. They soon arrived at the conclusion that the doctrine of the Trinity was untenable, and that many of the dogmas of the Catholic Church were repugnant to reason, which they held to be the only court of appeal in matters of religion. The nature of their deliberations having become known the society was broken up, several of its members were arrested and put to death, and others, among whom was Socinus, left the country.

He visited France, England and Holland, and resided for some time in Switzerland, Ger¬ many and Poland, where he found many per¬ sons who were in sympathy with his views. He is the author of (Dialogus inter Calvinum et VaticanumP (De SacramentisP (De Resurrec- tione CorporumP and several unfinished works, which he bequeathed to his nephew, Faustus.

SOCIOLOGY. The following exposition does not attempt to mediate between the numer¬ ous claimants to the name ((Sociology.® It frankly applies the name to the attempts to establish a division of knowledge co-ordinate in dignity with the older social sciences. It indi¬ cates the actual growth and present character of sociology, especially in recent years in the United States, as the subject is understood by such a representative body as The American Sociological Society. (Consult Proceedings, Vols. I-XIII).

Definition. — Sociology is primarily one of the many techniques which make up the equip¬ ment of social science as a whole. In the sec¬ ond place, each of these techniques is a growing body of knowledge arranged and interpreted ac¬ cording to the respective special standards, and each in turn is a more or less explicit body of conclusions about the bearing of the respective findings upon contemporary problems both of

interpretation and of control. Chief among the other techniques for

scientific dealing with social relations are psycholoev, anthropology, ethnology, comparative philology, history, political economy, political science and statistics. The task of social science in gen¬ eral, or the co-operation of these techniques, is to make human phenomena intelligible, and eventually as far as possible controllable. This task involves determination of the norm or norms according to which control should be exercised. The sociological technique is that variant among the social science techniques which proceeds from the perception that, after allowing for their purely physical relations, all human phenomena are functions not only of persons, but of persons whose personality on the one hand expresses itself in part through the formation of groups, and on the other hand is in part produced through the influence of groups. In brief, sociology is that technique which approaches knowledge of human experi¬ ence as a whole through investigation of group- aspects of the phenomena.

In order to understand the place of sociology in the whole apparatus of knowledge, it is necessary to become familiar with the fact that the growth of the ((social sciences® since 1800 has been essentially the evolution of a single scientific method, a method which, while be¬ coming more specialized and diversified on the one hand, is becoming both more unified and more comprehensive on the other. At the same time it is assembling a more and more coherent body of knowledge and interpretation. The outcome has been not that the different divisions of social science are more isolated from one another than in 1800, but that the best work in each is certain to show effects of contact with all. This is not the traditional view. Until recently the almost universal opinion among social scientists was that the 19th century was an era of the development of many independent sciences of human life. It is not an excursus from our subject, therefore, but a necessary introduction to the most mature views of the subject, to dwell at some length upon our radi¬ cal proposition.

History. — The problem of knowledge in the field of social science reduces to this : What is the meaning of human experience, and to what extent have we developed a technique which may be relied upon to ascertain more of that meaning f To explain the origins of sociology, we must answer the question, What has social science in general done toward working out a reliable method of interpreting human experi¬ ence? (Consult Small, (The Meaning of Social Science*)- If this question were answered in full it would include an account of the evolu¬ tion of philosophy and psychology since Locke in England, since Descartes in France, since Wolff in Germany. We may merely summarize to the effect that modern philosophy and psychol¬ ogy have found common ground with all posi¬ tive science

in the commonplace that all con¬ vincing interpretation of experience must be generalization of experiences. To this com¬ monplace we may add the proposition which is not equally trite, which experience is neverthe¬ less steadily enforcing, viz., that valid social science cannot be many; it must be one.

Sociology made its appearance as an Ameri¬

can pursuit in 1883. For several decades Ameri¬ can sociologists consecrated far more ingenuity and passion to propaganda of the conception that sociology is, was and ever shall be an in¬ dependent science, than to search into its actual origins, and to analysis of its necessary inter¬ relations. In this the earlier sociologists ex¬ hibited their intellectual consanguinity with most of their scholastic predecessors and con¬ temporaries. Like so many other zealots for the advancement of knowledge, they proclaimed themselves the high priests of an independent cult, to which independent cult, however, as they often declared in the same breath, all other scientific cults must one day become subordinate. Even now this earlier misconcep¬ tion survives among social scientists, sociologists not excepted. In order therefore to indicate the historical relations between so much of our technique as we have thus far developed and the other techniques for investigating human experience, we must present sociology as it evolved with and out of the totality of 19th century social science.

Until now the thoughts of the vast majority of men about human experience, past or present, have been mostly nebulous, mystical, irresponsible. People in general, even including those who passed as scholars, have been con¬ tent to accept versions of human experience without inquiring closely into the credibility or the sufficiency of the evidence in support of the versions, or into the conclusiveness of the inferences drawn from the evidence. On or about 1800 a movement began to be manifest among European scholars which, like most movements that later prove to be momentous, probably did not at once disclose a large frac¬ tion of its significance to many of its promoters. The date 1800 is selected for symbolic conveni¬ ence. It is at the centre of events which fall within a zone occupying 25 years on either side. From the present outlook the meaning of the movement is more evident than it could have been to the men whose gradual coming-to- consciousness was the making of the movement. We embrace its entire sweep, in all dimensions, from 1800 until now, in the formula: It was a drive toward objectivity. For the purposes of this sketch we may define the term <(objectivity® as requisition that nothing shall be allowed to pass as knowledge until in every conceivable respect it literally reflects reality. Previous to 1800,

except within relatively immediate ranges of experience, that which passed as social science, under whatever name, as a rule pitiably failed to satisfy this standard. Before one- third of the 19th century had passed, European scholars in each of the then conventional di¬ visions of social science had betrayed prophetic discontent with the existing state of knowledge in their fields, and with the current methods of search for more knowledge. They had begun to make out ways and means of making knowl¬ edge within their respective fields both more ample and more accurate. In the light of our experience meanwhile, we are accredited by the facts when we say that this discontent and this resolve presently amounted to a concerted drive toward objectivity in social science. Historians, economists, professors of jurisprudence were not discontented with precisely the same things in their respective divisions of labor, nor with

precisely the same things which were regretted in one another's fields. They did not propose identical means of removing the obstructions of which they were severally conscious. We may anticipate the most obvious conclusions which our survey will impress, however, by pointing out that, in effect if not in professed program, the detached, provincial, unco-or¬ dinated, uncorrelated scholarship in the social science of the year 1800 has become the com¬ paratively* organic scholarship of to-day. Bv organic, in this connection, we mean reciprocally reinforcing. There were counter-marches here and there during the 19th century, toward such specialism and isolation in research as would have threatened to reverse the movement toward objectivity. These counter-marches were not simultaneous in all countries nor in all sciences ; and they did not long continue their drift toward earlier sterility. On the contrary, in spite of all the caste spirit among scholars, social science in its various divisions has become more and more interpenetrating. Since 1800 there has been on the whole an accelerated process of reciprocal assimilation of ideas between all the different departments of knowledge within the range of social science, not to speak of reciprocal modifications be¬ tween physical and social science.

Priority of mention, as promoters of the drive toward objectivity, belongs to the his¬ torians. While consciousness of the past as having been, and as having had some sort of meaning for the present, had been a factor time out of mind in the thinking of both learned and unlearned, that which was accepted as history previous to 1800 was

often more imaginative than authentic. Soon after 1800, the work of devising means of discriminating between false and true, between adequate and inadequate evidence, and so between trustworthy and un¬ trustworthy reconstructions of the past, was in full swing. The technique by which the his¬ torians began to discredit previous credulity soon became known as ˆcritical® methods, or as (1st ed., 1874. Introduction). The conditions named are, first, a certain actual world-unity, such as was realized by the Roman Empire; second, a certain consciousness of spiritual unity, such as was introduced by Christianity; third, the idea of progress; fourth, the idea of freedom. It is somewhat more obvious, on the one hand that modern sociology is inconceivable in the absence of certain additional ideas to which the early 19th century historians gave currency, and on the other hand that the failure of these historians to make the most intensive use of these ideas operated as a challenge to certain thinkers to develop the suggestions until they became tools of the technique called sociology. Thus the conception of continuity in human institutions (Savigny, Roman law in the Middle Ages) ; the conception of the multiplicity of factors operating in historical combination and sequence (Eichhorn, German civic and legal history) ; the necessity of sub¬

jecting alleged historical evidence to the sever¬ est scrutiny (Niebuhr, early Roman_ history) ; the value of documentation as a basis for his¬ torical opinion (Ranke, ecclesiastical and political archives, principally of the Ref¬ ormation and post-Reformation periods). Whether the sociologists have made more or less use, better or worse use of these ideas than the historians did is aside from the present point. The sociologists took over from the historians these ideas and others of more particular types, and employed them in distinc¬ tive ways. As the historians developed critical methods to higher and higher degrees of pre¬ cision, sociologists became aware that the same methods, or equally penetrating methods, must be used for them by historians, or by them¬ selves, whenever the tasks which the sociologists undertook required historical research.

Turning to another antecedent of sociology, if we trace political economy no farther back than the Physiocrats in France, or Adam Smith in England, it antedates these beginnings of critical history. In effect, however, political economy did not become an appreciable driving force in the thrust toward objectivity until the historians were well in the lead. At this point we are considering the development of political economy solely with reference to the question, What relation did political economy have tu the differentiation of sociology? The sub¬ stantial fact in reply to that question is that the economists were the first type of scholars to undertake the task of carrying through a

completely objective analysis of what takes place in a selected human group, and of finding out why it takes place. They did not do this in a completely objective way from the beginning. They tried to, nevertheless. In making the attempt they not only from time to time de¬ vised improvements in their own methods of closing in on their aim, but they struck out suggestions of inquiry into what occurs in other kinds of groups than the economic. Both directly and indirectly they cleared the way for an enlargement of their field of operations in the directions presently followed by the sociol¬ ogists. Just as the economists implicitly raised and tried to answer the question, What are the actual phenomena of cause and effect within the whole range of economic groupings? so a little later the sociologists began to feel the urge of the related questions, What are the actual phenomena of cause and effect through¬ out the whole range of human groupings, in other words throughout the whole range of human society?

In certain respects, as far as it affects sociology, the outcome of the British move toward objectivity associated with the names of Adam Smith, Ricardo and Mai thus is more evident in the German than in the British succession. At the close of the 18th century German thinking about economic relations had reached a dead centre. German ideas had been temporarily stabilized by ˆcameralisms a pecu¬ liar and highly developed body of theory about every phase of action within the state. (Consult Small, (The Cameralists)) . This system of ideas and of practice had been developing since 1555. It did not correspond in its sub¬ divisions with later academic definitions of the social sciences. It started not as general theory

but as formulation of administrative expediency. It set forth with the frank purpose of subor¬ dinating everything within the control of the state to the state's problem of existence. The central question to which cameralism elaborated answers was : The ruler being all-powerful over his territories and his subjects, what policies, and what details of practice in pur¬ suance of the policies must he adopt, in order to make his rule most secure at home, and in order to provide most abundant means of asserting hinjself against other rulers? It would require but little reflection to prepare against surprise at what happened. Under the circumstances of the time, thig question neces¬ sarily led to answers which amounted to pre¬ scribed programs

covering the entire outward life of the subjects of German rulers. It soon became evident to the advisers of those rulers, and to the administrators of their states, that their problem involved not merely physical factors, but that it was a question of training the whole population for all the different sorts of useful work of which human beings are capable. From generation to generation the men who developed cameralistic theory and practice saw more and more clearly that if the rulers of German states were to command abundant resources, they must rule over re¬ sourceful people. This meant that the people must be trained physically, mentally, morally and technically. In the end, therefore, cameral¬ istic theory covered everything in the lives of the citizens, from farm work to religious wor¬ ship. The machinery for administering this theory grew more and more complex. In detail its organization differed in one state from that in another. Its main purpose was everywhere the same, viz., to make the people as amenable as possible to all the discipline necessary to insure maximum performance of all the phys¬ ical, mental and moral processes tributary to the strength of the ruler.

It need not be pointed out that this program involved dealing, from this special point of view, with every sort of activity which has since come under the attention of political science and political economy in their latest forms. In so far as cameralism dealt with economic questions in the later sense, it treated them as matters primarily of the state, not of individuals. German economic theory, there¬ fore, was collectivistic in the highest degree. Only incidentally, and in a wholly subordinate degree, was it individualistic. It was a theory of, for and by the government.

This cameralistic system contained the germs of all subsequent German administrative theory, and suggestions of much that was later devel¬ oped into fundamental economic doctrine. Its centre of attention may be said to have occupied its original prominence only to the time of Sonnenfels (1765). From that date until the third decade of the 19th century there was an interim of barrenness in German economic thinking. This was in spite of the fact that an occasional book of some merit was produced; for example, Biisch, of Hamburg, on the cir¬ culation of money (<Geldumlauf)).

The one point of departure from which it is possible to get a true view of the develop¬ ment of economic theory in Germany is that the first half century of German political econ¬

omy was essentially not German at all ; it was English. This period falls roughly within the dates 1820-70. During all this time the

German economists were unconsciously breaking with all the national precedents for their particular kinds of work, and were trying to do a radically un-German thing. They were first of all doing their best, in their own division of labor, to substitute objectivity for fragmentary knowl¬ edge and premature conclusions, but they were trying to do it in an English way. They were not merely trying to graft an English branch upon a German tree. They were trying to make English roots grow in German soil, and bear more abundant and useful fruits than native stocks. If they had succeeded, the English roots would have driven out German roots. German controlling economic ideas would have changed from collectivistic to individualistic.

This fact goes far toward resolving the con¬ fusion of German economic theorizing between 1820 and 1870. During all this time the eco¬ nomic group of German thinkers were in dead earnest in their drive after objectivity, but the pass-key to their procedure is that the prevailing spirits among them were all the while trying to naturalize strange gods. For the theoretical and practical state-collectivism which reached its culmination in the theory and practice of Fred¬ erick the Great in Prussia and Maria Theresa in Austria, they tried to substitute the so-called theory of (<economic liberalism,® or "economic determinism.® Whichever of these two variants of an identical underlying conception was most prominent in specific cases, it relegated the state very largely to a passive or negative role, and it made individual initiative para¬ mount. In short, the economic theorizing which held the centre of the stage in Germany between 1820 and 1870 was violently un-German in its presuppositions. It was that unfortunate ex¬ cerpt from Adam Smithism which passed by way of Ricardo into circulation as the "science® of political economy; and in German hands its implications were worked out to a degree of refinement never surpassed and hardly equalled in England.

If space permitted, it would be illuminating to cite particulars in which the classical econo¬ mists, both in England and in Germany, by what amounted to a trial and error process, tested every conceivable way of accommodat¬ ing facts to the classical presuppositions. With each variation of the attempt they confirmed convictions which later transformed certain men into sociologists. (For example, List and the entire <(Zollverein® movement, about 1840; the so-called "Historical School,® Roscher, Knies, about 1850; Prince-Smith and the "Man- chesterists® of the Volkswirthschaf tlicher Kon- gress, about 1860; the ˆAustrian School,® Carl Menger, Bohm-Bawerk, about 1870; the profes¬ sorial socialists, or the Ethical School, Schmol- ler, Wagner, Verein fur Socialpolitik, about 1870; the Sociological School,® to be men¬ tioned later, about 1880). As each contending sub-hypothesis

under the leading assumptions failed to vindicate itself as the one missing clue to the mystery of economic relations, the certainty was approaching that some one would see in these failures the fact that economic groups are not effects of single causes but of multiple causation ; that economic

groups do not exist in a vacuum ; that they are affected by some of the same influences which work in other groups, some of which influences are transmitted from other groups to economic groups, and are sometimes more decisive for economic groups than so-called economic fac¬ tors proper. It was a foregone conclusion that when these observations were made on the basis of the experience of economists, they would stimulate someone to experiment with a new apparatus of group-analysis. This prob¬ ability was confirmed in the case of some of the sociologists.

We may indicate this factor in the evolu¬ tion as follows: Judged by subsequent events, and expressed in the most summary form, po¬ litical economy became a forerunner of sociol¬ ogy because, however defined and however conducted, political economy devoted itself more and more effectively to critical analysis of that portion of social phenomena which seemed to the economists to fall within their appropriate field of view. Regardless of the question which had to be reconsidered over and over again, as to the validity of their ideas about their special field, and regardless too of the specific facts which they collected, and of the peculiar doctrines which the various theo¬ rists derived from the facts, by the very refine¬ ments of analysis through which they attempted to get at all the meanings of their phenomena the economists set a pace, and furnished sug¬ gestions for imitation, which could not have remained without influence upon other men who were interested in other species of group phenomena. Simply because the type of human group which forms <(the market,® whether in the most generalized or in the most localized sense, is only one of myriads of types of human groupings, it was only a question of time when there would be imitators of the economists who would devise ways of applying equally search¬ ing analysis to many types of human activities not primarily and immediately, at all events not exclusively and finally activities of the market. This then is the main aspect in which the evolution of economic thinking since 1800 concerns sociology. In a word, it seems to have been necessary that a type of thinkers should have been developed who had become

keen for analysis of the operations of the mar¬ ket; and as we shall observe in the next para¬ graph, another type keen for analysis of men's actions under the political and legal aspects, before a type of scholars could develop with ability to perceive that men are not fully ana¬ lyzed when they have been thought of only under the economic, the political and the legal aspects. In fact, the sociologists were recruited very generally from either the. historical, the economic or the political faculties. Our main thesis at this particular stage of the exposition is that the economists prepared the way for the sociologists, and partly assured their coming, by working out an apparatus for objective ex¬ hibit of economic processes as they really are. In so far as the sociologists derived immedi¬ ately from the economists, it was by cherishing the spirit of group-analysis, and by turning this animus to application upon other than eco¬ nomic groups.

Even before the middle of the 18th century, there were among the cameralists writers who seem to have been almost within sight of the

beginnings of sociology in the present sense. Examples are Gerhard, 1713, and Zincke, 1742. (Consult Small, (The Cameralists,) pp. 175 and 249). The most effective prospecting for a future sociology however was done in Ger¬ many, at about the middle of the 19th century, by a series of political scientists. These men seem to have had very little to do with one another, and we do not know whether they were actuated by impulses received from a common source. Several of them, at all events, hit upon a similar if not an identical problem, and it was in substance the same problem with which the men in Germany, Eng¬ land and the United States who called them¬ selves sociologists began their work 20 or more years later. Von Mohl, one of the most •notable of these pre-sociologists, reviews the movement and furnishes a bibliography of it as it had developed up to 1855. ((Geschichte und Literatur der Staatswissenchaften,) Vol. I, pp. 69-110). Von Mohl is himself typical of this movement at its best, and we may use him as the most available index of its character. The very title of his first chapter affects an American sociologist as a generation ahead of its time. It reads : <(The Sciences of the State and the Sciences of Society® (((Die Staats- wissenschaften und die Gesellschaf tswissen- schaften®). The contents of the chapter con¬ firm the impression of modernness. It turns out that the author was in the bonds of that mystical conception of the state from which the Germans are not yet delivered, and he placed in antithesis with the state an equally mystical concept <(society® ; yet his challenge to analyze the concepts ((state® and (<society® might very well be celebrated as one of the beginnings of sociology. He proceeds after this fashion : (<Only recently have we come to the clear con¬ ception

that the community life of men is by no means exhausted by life in the state, but that between the sphere of the individual per¬ sonality and of the organized unity of popular life there is a collection of intermediate life phenomena which also have community objects as their purpose, which do not have their origin from the state or through it, although they are in existence in it, and that these are of the highest significance for weal and woe. These two areas of thoughts and theories, which for more than two thousand years have seemed to be similar, or at most have been regarded as part and whole, have at length proved them¬ selves to be essentially different, and must also be treated separately, so .that in the future they will exist side by side, as distinguished but coequal divisions of human knowledge. . . .

The science of society must now be founded and developed. In particular its limits with respect to the science of the state must be de¬ termined. This ... not merely for soci¬ ety, but almost as much also for the state and the theory of the state. . . . Of independ¬ ent works about society there is not. a word in the older schools of philosophic writing down to the time of Kant. In this entire literature there is not a single work which has attempted to grasp in their essential nature the life cir¬ cles outside of the purpose and organism of the state, and to think of them as a whole.® Thereupon von Mohl names numerous books and monographs which began to appear after

1797 in Germany, and beginning with Montes¬ quieu in France, which betrayed a certain dis¬ appointing appearance of having seen the need of a <(science of society® in distinction from a science of the state. After noticing the type of writers on society whom he calls (<essential ly not social philosophers but social partisans® (Saint-Simon, Fourier, Robert Owen), and after referring to numerous political theorists who had been approaching the real problem as he saw it, of whom the most notable was Ahrens ((Cour de droit naturel, *1837, and the maturer rendering of his peculiar idea in (Die organische Staatslehre,* 1850), von Mohl at some length outlines his own conception of the needed (<science of society.® This scheme is impossible, and need not be noticed further, except by way of repetition that it was an honest groping after the sociological problem which later emerged. Because of the attention which Americans have given to Treitschke as a prophet of German world-power, more than one kind of interest attaches to the fact that Treitschke's entrance upon his academic career was marked by his publication in 1859 of a

monograph in which he claimed to have given its reductio ad absurduni to von Mohrs argu¬ ment for a new science of society ((Gesell- schaftswissenschaft, ein kritischer Versuch*)- Treitschke discusses particularly the proposals of Ahrens and von Mohl. He asks whether it is really necessary, as such men contend, either completely to reconstruct political sci¬ ence or to create a new doctrine that shall totally displace it. He reaches his reply by in¬ specting in turn the groups which von Mohl had used as illustrations, and as to each of them he reaches virtually the opposite conclu¬ sion to that of von Mohl, viz.. Treatment of this group belongs in political science, and can be adequately provided by political science. With the exception, however, of tribal and ethnic groups, certain economic strata ((<Nahr- Wehr-und-Lehr Stand®), the educated and the uneducated, religious communities, “voluntary associations of all sorts,® and the family, the groups which he considers are so obviously political that with reference to them the con¬ clusion is not surprising. It was easy to show that each of the groups not primarily political has numerous and vital relations to the state. Nor was it difficult to make it appear to friends of an established cult who did not want a rival, that a rival would be superfluous. It was plausible that all the relations of these groups to the state could be treated best by the estab¬ lished ((science of the state® and that facts about these groups which did not interest ((the science of the state® were not worth scientific notice. There is a tone of assurance, therefore, in Treitschke’s manner throughout the mono¬ graph which indicates his belief that he was forever laying the bogy of a <(science of society.® In fact, however, in order to reach his negative conclusion he had advertised the existence of groups which he named and others which he did not name. He had featured facts about these groups which could not be exhausted by political theory. We cannot prove that Treitschke’s influence actually stimulated any¬ one to follow up the study of human groups. It is certain that he did not prevent such study,

and he unconsciously contributed to demonstra¬ tion that it was needed.

While it is impossible, in the present state of our knowledge, to make out precisely how the circuit was at last closed between all these stimuli and the minds of the men who actu¬ ally won a place in social science for a new method of investigation, it is easy to make out the period after which the sociological conti¬ nuity was unbroken. It has been almost undis¬ puted tradition among the sociologists that August Comte, who is supposed to have coined the word, is also the (<founder® of sociology ((Cours de Philosophic Positive, *ed. of 1869, Vol. IV, pp. 185, 263 and 412. 1st ed. published 1839). Herbert Spencer*

began to be acquainted with Comte's philosophy in 1853-54, but he asserted that his only indebtedness to Comte, was (<the indebtedness of antagonism® ((Auto¬ biography, J Vol. I, p. 517). (Preussische Jahr-biicher) (Vol. IV, 1859, p. 279), contains a very intelligent digest of the Comtean system, with the editorial note : ((Our readers will be glad to be informed about a thinker who has hith¬ erto been very little known in Germany.® This note is confirmed by the fact that in the sec¬ tion in which he discusses the lack of analysis of society in French literature, von Mohl men¬ tions Montesquieu and Rousseau, but does not name Comte ((Geschichte und Literatur der Staatswissenschaften I, 76, 1855). It would be profitless to discuss the question whether Spencer in England or Schaffle in Germany would have been as successful as each was in launching a new method if Comte had never written. It is at all events beyond dispute that the publication of Spencer's plea, (Study of Sociology, *beginning in 1872, and the matur¬ ing of his Principles of Sociology,* between the years 1874 and 1885, mark the permanent arrival of sociology in England and the United States. Schaffle's work in four volumes, (Bau und Leben des socialen Korpers *(first vol., 1875, remaining three vols., 1878, 2d ed. 2 vols., 1896) bears a similar relation to sociology in Germany. We had reference above to Schaffle and his followers when we referred to <(the so¬ ciological school® of German economists. In his textbook on political economy, published in 1861, Schaffle had begun to exert a modifying influence, from the standpoint which he afterward located more pre¬ cisely, upon prevailing economic theory. The second edition of this book (1867) and the third (1873) bore the title, (The Societary System of Human Economy) ((Das gesell-schaftliche System der menschlichen Wirth- schaft*). In the light of later developments it reads like the author's involuntary warning of his approaching secession.

This historical survey would be misleading if it left the impression that the impulses which converged at the points just indicated, and which, as we shall see, spread from these points as rapidly expanding programs, were driven exclusively by the scientific interest. It may be that sentimental philanthropic impulses did more than the strictly scientific temper to bring sociology into existence. Here are to be cited men, first, of the Rousseau-Diderot succession, then of the type of St. Simon (1760-1825) and Fourier (1772-1837), in France; such theorists as the Utilitarians, from Bentham to John

Stuart Mill, then such as Robert Owen, Ruskin, Maurice, Kingsley and

Robertson in England ; the socialists of all countries, the advocates of (<social policy® (Verein fiir Social- politik) in Germany; a group of earnest so- called ((social scientists® and especially certain types of philanthropists in the United States, who industriously advocated <(the improvement of social conditions.® Presently the activities of this latter type of people became conclusive proof to other types of people that there was sore need of more searching study into social conditions. This conviction enlisted its quota for sociological research in the scientific sense. (Consult Small, (General Sociology, > pp. 36 sq., and Small, (Fifty Years of Sociology in the United States,* American Journal of Sociology , Vol. XXI, pp. 721-864). For striking evidence of the way in which these philanthropists affected one of the men who later had a con¬ spicuous part in developing general sociology consult Sumner, (What Social Classes Owe to Each Other * (1883).

Description. — Since we have seen how sociology got a name and a place, the question remains, What sort of a thing is this that is so named and placed? The only valid answer is still essentially historical. From the time of Spencer and Schaffle sociology has been more a steadily developing mode of thinking than an entity conforming to a statical de¬ scription. This is almost equally true of the more strictly generalizing type of sociology characterized in our original formula, and of the numerous techniques for concrete applica¬ tion of scientific knowledge which also use the name sociology. Confining ourselves now to the former, the. early sociologists felt a woe- is-me if they did not succeed in getting a vision of human society as a whole. Instead of feeling satisfaction with the conventions of social science, they were impressed with the futility of everything that had been accepted so far as scientific exposition of human ex¬ perience. Comte's dictum that the root of evil in the European world was the ((anarchy of fundamental ideas,® might have been chosen as their slogan. They were convinced that the only way of removing the confusion in men's minds about social relations must be achieve¬ ment of a controlling conception of human society in its entirety. Without apparent hesita¬ tion about the chances of convincing the world, they gave themselves to the task of framing a conception that would be justified by the facts. With differences of detail they believed that human society the world over, past,, present and future, makes up some sort of a unity. They believed that parts of this whole, or in¬ cidents within the operations of this whole, are to be understood only as they are assigned to their actual places and connections subordinate to the whole. All the variations which have be¬ come parts of the main tendency of sociological theory since 1875 have started from some

form of this presumption. At the time when this tendency entered upon its permanent course the most potent reconstructive factor in all science was Darwinian biology. It would have been wonderful if the attempts to visualize society in all its dimensions had not come under this virile influence. In fact, they were not only influenced but they were over¬

influenced. Until well into the 20th century the strength of the sociologists was very largely applied, first, to debate with one another and with social scientists of the older types about classification of the sciences, and about claims between these older possessors and the socio¬ logical intruders to equities in scientific terri¬ tory; second, to elaboration, attack upon and defense of schemes to exhibit the whole¬ ness and the operations of human society as an organism, analogous with biological organisms.

A curious case under the first head is a monograph of 80 pages published in 1903 as a part of the Twentieth Annual Report of the Bureau of American Ethnology. When the monograph was written its author, J. W. Powell, was director of the bureau. The title reads: (Sociology, or The Science of Institu¬ tions.* Major Powell says (p. lx) : <(I classify the sciences of sociology as statistics, eco¬ nomics, civics, histories and ethics, . . . my

purpose being classification only, . . . pleas¬ ure, welfare, justice, expression and opinion are concomitant ; one cannot exist without the other, hence there can be no sociology without estlietology, technology, philology and so- phiologyA

Under the second head, the schemes of Spencer and Schaffle were essentially similar. They were structures purporting to comprehend all societary relationships as analogues of the structure and functions of physical organisms. On the whole, all of the men who approached the problem in the same way (Lilienfeld, Fouil- lee, Isolet, Worms, etc.) merely proposed shad¬ ings of detail in the conception. Although American sociologists as a rule have regarded the conception as more useful pedagogically than scientifically, and although use of bio¬ logical analogies in either sense has rapidly lost favor, progress of sociology toward aca¬ demic recognition, both in Europe and the United States, has been seriously embarrassed by the widely prevalent impression, among other misconceptions, that sociology is merely a name for amateurish dallying with remote and imperfect likenesses between physiological and social relations. While the sociological division in the drive toward objectivity in social science was in danger of exhausting itself in attempts to resolve human experience into

symbolic or literal biology, a powerful corrective was in¬ troduced into American thinking by the publica¬ tion of Lester F. Ward's (Dynamic Sociology > (1883; 2d ed., 1897, identical with the first, except that a new introduction reviews the progress of sociology to date. Ward's ((mental autobiography,® (Glimpses of the Cosmos, * Vol. Ill, pp. 146 sq., contains an illuminating account of the incubation of the book, from 1869, especially of its relations to Comte and Spencer). For nearly a decade the work seemed to have been still-born. Then scattered signs began to appear that it was making its way. Ward was by profession a botanist. He was an unhesitating evolutionist. Combined with the novelty of much in the book, these two facts gave it significance. Herbert Spencer's rendering of evolution, especially as he was understood to carry it out in his sys¬ tem of sociology and in his laissez faire dogmas in politics and economics, went far toward es¬ tablishing the belief that evolutionism and me-

chanical fatalism are identical. Ward was the first physical scientist to get a hearing for the contradictory doctrine that evolution ascended one step in the scale with the differentiation of mind: and that it foreshadows the ultimate control of physical forces by psychic forces. Although the further significance of the book was not recognized at once, it virtually called for the transformation of sociology into social psychology. While Ward's psychological method was impossible, he heartened Ameri¬ can sociologists to assume at once an affirmative answer to the question which has not ceased to embarrass British sociology, as to whether evolution would permit any reckoning upon mental influences at all. In fact, with all their differences of detail, from the time that a few Americans began to call themselves sociologists they were practically of one accord in the belief that the distinctive and decisive trait in human society is that it is somehow or other a play of mental factors. At the same time Ward was a conspicuous illustration of a crudity, not vet entirely outgrown by sociologists, which was common to all the earlier social scientists of the generalizing types. Each of them more or less consciously cherished an ideal of a com¬ plete system of social science, in most cases to be called bv the name of the respective dreamer's division of social science. This version projected a structure of knowledge in which there would be a place for everything of importance in human affairs, and in which every¬ thing of importance would have been fitted into its place ; a scheme of mental architecture which should

faithfully reflect the totality of human experience. Each of the ohilosophies of his¬ tory, Comte's ((positive philosophy,® Spencer's <(synthetic philosophy,® and John Fiske's <(cos- mic philosophy® illustrates the general pro¬ clivity. Ward's system was primarily a cosmic philosophy, and his sociology was a more par¬ ticular account of mundane processes within this entire planetary order. The best con¬ spectus available of American, and to a certain extent of European sociological opinion while this type of thinking had not yet surrendered to influences which were already potent within it, is afforded by a series of papers read at the Saint Louis Congress of Arts and Sciences in 1904. Consult Proceedings, Vol. V, pp. 787- 888; Giddings, ˆConcepts and Methods of So¬ ciology' ; Vincent, (The Development of Soci- ology> ; Ratzenhofer, (The Problems of Sociol- ogy) ; Tonnies, (The Present Problems of Social Structure) ; Ward, (Evolution of Social Structure) ; Thomas, (The Province of Social Psychology' ; Ross, (The Present Problems of Social Psychology.' Practical aspects of so¬ cial theory at the same period are set forth in Vol. VII of the Proceedings.

We have implied that the Saint Louis Con¬ gress marked a stage in the development of sociology. The chief variant which rapidly gained influence in sociological ways of think¬ ing after that point, may be characterized in general as a tendency to diminish attention to structural aspects of social relations and to increase attention to functional phenomena. The predominance of statical views in sociology had always retarded development of dynamic conceptions which were implicit in the more obvious interpretation. In the nature of things

this shifting of emphasis was inevitable from the moment that mental factors in social func¬ tioning began to receive attention. A social psychology was in process of differentiation long before it was recognized as a distinct di¬ vision of labor. The men whose present treat¬ ment of social psychology bears least resem¬ blance to Ward's will scarcely fail to recognize him as the first important American adventurer into this type of inquiry. The first American book which bore upon its title page the phrase <(social psychology" was written by a psychol¬ ogist (J. Mark Baldwin, (Social and Ethical Interpretations,' 1897). Not a few books which at the time of publication were appraised, both by author and public, chiefly with refer¬ ence to some other element in their contents, now appear to have done their best service in stimulating consciousness that there can be no solution of social problems without resolving the mysteries of transmission of mental influ¬ ence. When Simon N. Patten published his (Theory of Social Forces' in 1896, he classed himself as

an economist. He was in fact dis¬ covering himself and disclosing himself as a daring pioneer in social psychology. Giddings' Principles of Sociology' (1896) was accepted chiefly as a proposal in social architecture. The extraordinary attention which it has received all over the world is due fundamentally to the fact that it presented psychological aspects of the problem of society with unusually challeng¬ ing force. (For digest of Giddings' doctrines, and references to his other works, consult Northcott, (The Sociological Theories of Franklin H. Giddings,' American Journal of Sociology, Vol. XXIV, p. 1, 1918). Thomas' brief monograph, (The Scope and Method of Folk Psychology' (American Journal of Soci¬ ology, Vol. I, p. 434, 1896), may be regarded as a prospectus of a division of labor, previ¬ ously organized in Europe, which has had a large share in reshaping the primal conceptions and the methods of sociology. Notable in this connection are Sumner, (Folkways' (1907) ; Thomas, Pace Psychology: Standpoint and Questionnaire, with Peculiar Reference to the Immigrant and the Negro' (American Journal of Sociology, Vol. XVII, p. 725, 1912) ; and Thomas, (Source Book for Social Origins'

(1909).

Meanwhile a tool had been tacitly adopted into our sociological technique which more than any single instrument has tended to stabilize our procedure. It was the use of the concept denoted by the term <(interest," or some equiva¬ lent, as the leading clue to the activities of socii cofnposing groups, or of groups con¬ sidered as correlations of socii. The term ˆvaluation" has certain advantages over the term (<interest" as an expression of the idea. The essential thing is that the motivation of activities in human groups is traced to prefer¬ ences in the minds of people, and that qualita¬ tive and quantitative analysis of these <(inter- ests," ˆvaluations," ˆpreferences," with de¬ termination of their proportions in the partic¬ ular combination in question, has become the crucial operation in social interpretation. This method has been implicit at least as a partial re¬ course in all attempts to explain human nature. It had become more or less systematic in the program of many sociologists before it was

published in the form of an elaborated method. The author who most appropriately marks this stage in the development of sociology is Gus¬ tav Ratzenhofer, at the time of the completion of his work an

officer on the retired list of the Austrian army, with the rank of Feld-Marschall- Lieutenant. Ratzenhofer's life from early years was that of a soldier. As he rose in rank his outlook became more and more politi¬ cal. He was obliged to study the conditions, first and foremost within the empire, then in countries in political relations with the empire, which served as reasons for the existence of Austrian armies. As this experience matured, it crystallized into an ethic, a sociology, and a political philosophy with a strong set toward political science. Ratzenhofer's chief contribu¬ tion to sociology is to be found not in his later books, in which he formulated his more general theory of ethics and sociology, but in the work which is most nearly related to political science, (3 vols., 1893). The author's most important additions to the method exemplified in this work were in the single volume entitled, (Die Sociologische Erkenntnis. Positive Philos¬ ophic des socialen Lebens' (1898). Ratzen¬ hofer's method, so far as contained in these two works, may be described as a psychological sur¬ vey chiefly generalized irom, or illustrated by groups visible in and around the Austrian Em¬ pire. The outstanding peculiarity of the two works, considered as a single essay in sociolog¬ ical methodology, is the relatively large propor¬ tion of concrete material cited in support of the more generalized conclusions. That Rat¬ zenhofer has had so little influence on the Con¬ tinent can be explained only by the traditional attitude of European scholars toward men not of their gild. The most complete account of his method available in English is a digest, with annotations, in Small, (General Sociology, ' pp. 183-396. The tables, (<Typical Interests Within States,® on page 252, and ((Contempo- rary Conflicting Interests in Austria,® page 393, present at a glance the scheme of the inquiry.

It is not improbable that greater changes may occur in the next decade in the character of sociology than in any previous decade. At the present moment it manifests six leading tendencies. The first of these appears as ((Methodology® ; criticism of points of view, working presumptions, attitudes toward other divisions of labor and details of operative programs. Of this tendency the present paper may serve less as an example than as an index. Second, the various forms of ((group psychol¬ ogy.® Of these we may distinguish (a) the line of development from McDougall, (An Introduction to Social Psychology J (1909), to Ellwood's volume with the same title (1917) ; (b) the variety represented by Cooley, (Human Nature and the Social Order' (1902), and 'Social Organization' (1909). Most prolific at the present moment is (c) that variety which generalizes types of group reaction in selected situations from large numbers of historical and contemporary instances. Examples are Ross, 'Social Control' (1901),

the same author's series of papers in American Journal of Sociology, beginning Vol. XXI, p. 433, published in book form under the title 'The Principles of

Sociology' (1919) ; and Cooley, (Social Process' (1918). Third, a tendency for which no name has been generally adopted, but for convenience we may call it social analysis. It is an elabora¬ tion of social psychology through selection of particular social groups or social situations, and study of cause and effect as there presented. <(As a distinctive method it involves the detec¬ tion, description and causal explanation of all the factors entering into the social situation, or de¬ termining the behavior of the group studied. Social analysis is purely scientific in its interest, and is not immediately concerned with social action. Social laws discovered by social analy¬ sis are, however, of value for the determi¬ nation of fundamental policies of social con¬ struction." (Burgess). The most conspicuous example of this method is Thomas and Zna- niecki, (The Polish Peasant.' (Helen Culver Found.) Two of the five volumes announced have appeared (1918). The "methodological note" of 86 pages and the introduction to vol¬ umes I and II mark the line of farthest ad¬ vance at present in plans for this kind of research.

Fourth, Social Survey. It has been said that social analysis is to social survey as research in physics to a civil engineer's orientation. ((The survey arose from the effort to substitute fact for belief as a basis of social action. As a distinctive method the survey involves study, by application of standards determined by ex¬ perts, of the problems, institutions and social agencies of a community, as a basis for formu¬ lation of a constructive policy or program." (Burgess). "It is the application of scientific method to the study and solution of social problems which have specific geographical limits and bearings, plus such a spreading of its facts and recommendations as will make them, as far as possible, the common knowl¬ edge of the community and a force for intelli¬ gent co-ordinated action." (Harrison, Commu¬ nity Action through Surveys,' p. 11, Russell Sage Found.). Social survey is so much more immediately available for practical purposes than either of the foregoing tendencies, that its bibliography deserves special prominence. On the methodological side, in order of publication, Gillin, Application of the Social Survey to Small Communities' (American Sociological Society Proceedings, 1911) ; Riley, Sociology and Social Surveys' (American Journal of Soci¬ ology, Vol. XVII, May 1911) ; Kellogg, Harri¬ son and others, 'Social Surveys' (Russell Sage Found. 1912) ; Elmer, 'Social Surveys of Urban Communities' (1914) ; Park, (The City, Suggestions for the Investigation of Human Behavior in the City Environment' (American Journal of Sociology, Vol. XX,

March 1915) ; Gillin, (Social Survey and its Further Develop¬ ment' (American Statistical Association Pub¬ lications, September 1915) ; Burgess, (The So¬ cial Survey: A Field for Constructive Service' (American Journal of Sociology, Vol. XXI, January 1916) ; Aronovici, 'The Social Survey' (1916); Harrison, (Community Action through Social Surveys' (Russell Sage Foundation 1916). On the operative side: Booth, (Life and Labour of the People in London' (9 vols., 1892- 97); Rowntree, 'Poverty: a Study of Town Life' (1902); Kellogg (Director), 'The Pitts¬ burgh Survey' (6 vols., The Russell Sage

Foundation 1904-14) ; Burns (Director) /Cleve¬ land Education Survey) (25 vols., Cleveland Foundation 1915) ; Harrison (Director), (The Springfield Survey5 (3 vols., Russell Sage Foundation 1918).

Fifth among contemporary variations of so¬ ciology is also without a conventional name. It is most frequently referred to as the case method, or social diagnosis. ((It is the differ¬ ential method of case work, a.s it has developed in family and individual rehabilitation, as car¬ ried on by charitable organizations. As a dis¬ tinctive method, case-study involves determina¬ tion of all the factors present in a given case, so far as is necessary in order to prescribe remedial treatment.55 (Burgess). Consult Richmond, (Social Diagnosis/ Russell Sage Foundation, 1917-

Sixth, concrete programs for amelioration and construction. Charles R. Henderson in¬ cluded all these in the term social technology. In his, mind they were ((social polity55 passing into application. They are sometimes indicated by the more popular phrase social engineering (Earp. (The Social Engineer,5 1911). Discus¬ sion of the movements thus suggested would require a treatise. They have a range from kindergarten to international reconstruction. Like all other technical problems after their kind, they draw at need from the whole extant body of knowledge and apparatus of execution. In so far as colleges and universities have provided instruction about these problems, it has most frequently been scheduled either in the department of economics or of sociology. This assignment obviously corresponds more to academic convenience than to intrinsic rela¬ tionship.

What then is the technique which is now the distinctive equipment of the sociologist? Pri¬ marily it is a collection of categories. First of all, these are categories of rationalization. They are sub-species in the

gradations within the genus of thought forms which reflect human relations in the large. They begin with the most general, such as ((group,55 <(socius,55 ((group structure,55 ((group function,55 <(group forces,55 ((group process,55 ((group interest,55 etc. These most general categories pass into subordinate forms which reflect descending orders of gener¬ ality in observed group phenomena. The scale passes from least specific terms to most specific through categories for rough preliminary class¬ ification of groups. The variations of these are innumerable, because there is no limit to the number of principles which may be made the basis of classification. Thus, for certain pur¬ poses, objectivity is served by analysis of groups strictly on the basis of quantitative classifi¬ cation (Simmel, (Soziologie,5 Chap. II, <(Die quantitative Bestimmtheit der Gruppe.55 Id. ((The Number of Members as Determining the Sociological Form of the Group,55 American Journal of Sociology, Vol. VIII, pp. 1 and 158). For references to all of Simmel's papers on this subject which have been published in English, vid. American Journal of Sociology, Vol. XX, p. 629, note. For other purposes, objectivity is served by applying one or more of the grada¬ tions of categories on the basis of race, industry, religion, culture, politics, language, etc. It is obvious that these less general categories need not necessarily in the first instance be original

with the sociologists. The contrary is probable. They are more likely to be categories worked out by anthropologist, ethnologist, economist, etc., and taken over by the sociologist whenever his problem involves the previous work of other divisions of science. For example, few men within the ranks of the sociologists have exerted more influence upon sociological method than the anthropologist, Lewis Henry .Morgan ((The League of the Iroquois,5 (Ancient So¬ ciety,5 etc.), or the English professor of juris¬ prudence, Sir Henry Maine ((Ancient Law/ 1861; (Village Communities/ 1871 ; <Early His¬ tory of Institutions/ 1875; dissertations on Early Law and Custom/ 1885, etc.). These categories do not of themselves constitute soci¬ ology, any more than the categories <(multi- plicand,55 <(quotient,55 <(cube root,55 constitute mathematics. The uses of the categories con¬ stitute sociology. The technique accordingly involves, second, a body of procedure. This varies, in accordance with the particular char¬ acter of the problem undertaken, from the most abstract dealing with questions of epistemology and methodology to the most concrete questions of juvenile courts or milk supply. The generic factor in common, from one end of this scale to the other, is reference of the problem to its group attachments, instead of treating it as something isolated from the human process as a whole. The technique in¬ volves,

third, control of an enormous accumu¬ lation of knowledge about social reactions. A generation ago it was urged with much perti¬ nence that colleges and universities should not give academic standing to the new claimant ((sociology,55 until it could justify recognition by presenting an organized body of knowledge. Meanwhile the sociologists have accumulated an appalling. volume of insights into social relation¬ ships which had not been noticed by previous scholars. And the search with the new equip¬ ment is hardly begun. It remains true that organization of this knowledge is far from adequate. (Vid. Hayes, Sociology as Ethics/ American Journal of Sociology, Vol. XXIV, p. 289). The most successful attempts to gather sociological results into textbook form are, on the side of social organization and operation, Blackmar and Gillin, (Outlines of Sociology5 (1915) ; on the side of ethical evaluation of social processes, Hayes, (Introduction to the Study of Sociology5 (1915) ; on the side of social psychology, Bogardus, (Essentials of So¬ cial Psychology5 (1918).

In view of the relation which we have in¬ dicated between political science and sociology, it is equally astonishing and unfortunate that for nearly a generation legal institutions were left almost wholly outside the range of Amer¬ ican sociologists' vision. No one without legal training could venture successfully into the field thus neglected, and for a long time sociological methods found no favor with American legal scholars. The situation has notably changed since Roscoe Pound, now Dean of Harvard Law School, became the leading attorney in this country for an attitude toward legal construc¬ tion precisely opposite to that of Savigny in his controversy with Thibaut in 1814. This factor has already had such influence with law facul¬ ties, and among social scientists in general, that quite possibly the most important sociolog-

ical advances in the next generation will pro¬ ceed from the basis of legal study. Consult Pound, (The Scope and Purpose of Sociological Jurisprudence,5 23 Harvard Law Review, 591, 25 Harvard Law Review, 140-489; (The End of Law as Developed in Legal Rules and Doc¬ trines, } 27 Harvard Law Review, , 195; (The End of Law as Developed in Juristic Thought,5 27 Harvard Law Review, 605, 30 Harvard Law Review, 201. Somewhat less technical than the papers of Dean Pound are the three volumes in the Evolution of Law Series, compiled by Pro¬ fessors Kocourek and Wigmore of the North¬ western University Law School, 1918. The sep¬ arate titles are (1)

Sources of Ancient and Primitive Law. (2) Primitive and Ancient Legal Institutions. (3) Formative Influences of Legal Institutions.

To recapitulate : Although the earlier so¬ cial scientists never confessed it in quite this way, it is easy to see now that all of them, including the sociologists, who indulged at all in speculations about the larger aims of science treated the aggregate of human events, past and present, like a collection of structural elements ; and they assumed that the task of social sci¬ ence, their own part of it in particular, was to organize all the miscellaneous events which have filled the career of mankind from the beginning up to the present into a schematic combination, in which each occurrence would have its appropriate place, and in which the relation of each occurrence to every other oc¬ currence would be evident.

We may frankly admit that sociology would not have been born when it was, and its early history would not have been what it was, if this conception of scientific possibility had not stimulated a few men to risk the attempt to realize this conception, which men before them in other branches of science had dismally failed to vindicate. At the same time, we must insist upon the truth that, in this respect, the sociolo¬ gists were merely experimenting with a chimera which had over and over again lured social scientists of all the older types.

But just as the more objective historians of the latest half century have fortified themselves against suspicions of identity with the so-called philosophers of history, so the . sociologists of to-day are more or less consciously and ex¬ plicitly repudiating the conception just indicated, which they or their immediate predecessors un- blushingly published a generation ago. The totality of human experience is too big, too complicated, too unexplorable, to be exhibited by the human mind as a complete and inclusive system of articulated parts, with each event throughout the length and breadth of human ex¬ perience visibly bearing its actual relation to all the other events. The thought of such compre¬ hension as something within the reach of human intelligence can no longer be entertained by a responsible mind. Our ideal at present is discovery of typical, qualitative relationships of antecedent and consequent, of cause and effect, of harmony and disharmony, of stability and instability, of constructiveness and destructive¬ ness, in as many different types of human groups as possible. We entertain hopes of reaching certain quantitative expressions of the same relations, but about these we are much less sanguine. This is on the purely scientific side, antecedent to whatever we may feel au¬

thorized to undertake on the side of social control or social art.

We understand that there are enormous dif¬ ferences in the feasibility of this ideal, depend¬ ent for instance upon the remoteness or near¬ ness in space or time, or upon the simplicity or complexity of the group immediately in question. We believe that from generation to generation men may, and with progressive use of available means for accumulating knowledge of human conditions they will become more sophisticated and competent to control their situation in the interest of increasing develop¬ ment of human capacities. Within recent years the advances of social science in general, and of sociology in particular, have manifested increas¬ ing deference to the conception set forth in this review. Indeed, no account of sociology would be authentic unless it were an exposition of it as a multitude of mental processes con¬ verging toward and operating in accordance with substantially this description.

Bibliography. — Addams, Jane, (Democracy and Social Ethics) (New York 1902) ; id., ‘Newer Ideals of Peace) (ib. 1907) ; id., (The Spirit of Youth and the City Streets5 ; id., ‘Twenty Years at Hull House) (ib. 1910) ; id., (A New Conscience and an Ancient Evil5 (ib. 1911) ; Barth, Paul, ‘Die Philosophic der Ge- schichte als Sociologie) (2d ed., Vol. I, Leipzig 1915) ; Bucher, (Die Entstehung der Volks- wirtschaft5 (Tubingen 1893) ; Dealey, James Q., Sociology: Its Simpler Teachings and Applica¬ tions5 (Boston 1909) ; De Greef, Guillaume, ‘Introduction a la sociologie) (I, Paris 1886; II, ib. 1889) ; id., (La transformation sociale) (Paris 1895) ; Durkheim, Emile, (De la division du travail social 5 (Paris 1893; 3d ed., 1911); Ellwood, C. A., Sociology in Its Psychological Aspects> (New York and London 1903) ; Gum- plowicz, Ludwig, ‘Der Rassenkampf5 (Inns¬ bruck 1883) ; id., ‘Grundriss der Soziologie5 (Vienna 1885) ; ‘Soziologie und Politik) (Leip¬ zig 1892) ; ‘Die soziologische Staatsidee) (Graz 1892) ; Henderson, C. R., (The Social Spirit in America5 (Meadville 1897) ; (Social Elements5 (New York 1898) ; ‘Dependent, Defective and Delinquent Classes5 (Boston 1901) ; ‘Social Duties from the Christian Point of View5 (Chi¬ cago 1909) ; (Industrial Insurance in the United States5 (Chicago and London 1909) ; ‘Social Programs in the West5 (Chicago 1913) ; Hob- house, L. T., ‘Social Evolution and Political Theory5 (New York 1911) ; (The Material Cul¬ ture and Social Institutions of the Simpler Peoples5 (London 1915) ; (Morals in Evolu¬ tion5 (New York 1916) ; Howard, G. E., his¬ tory of Matrimonial Institutions5 (Chicago and London 1904) ; Lippert, (Kulturgeschichte der Menschheit5 (Stuttgart 1886) ; Lubbock, Sir John, ‘Prehistoric Times5 (London 1865) ; id., ‘Origin of Civilization and the Primitive Condition of Man5 (ib. 1870) ; Mackenzie, J. S., ‘An Introduction to Social Philosophy5 (2d ed., New York 1895) ; Revai,

(Grundbedungen der gesellschaftlichen Wohlfahrt5 (Leipzig 1902) ; Ross, Edward A., foundations of Sociology5 (New York 1905) ; ‘Social Psychology5 (New York 1908) ; Tarde, Gabriel, (Les lois de l’imitation5 (Paris 1890—95) ; ‘La logique sociale5 (1895) ; ‘L’opposition universelle5 (1897) ; Todd, A. J., (Theories of Social Progress5 (New York 1918) ; Toennies, (Gemeinschaft und Gesellschaft5 (2d ed., Berlin 1912) ; Ward,

Lester F., (Pure Sociology) (New York 1903) ; id., (Applied Sociology) (Boston 1906).

Albion W. Small,

Head of the Department of Sociology , Uni¬ versity of Chicago.

SOCK, originally a low shoe or slipper, worn by the Greeks and also by the Roman women, who had them highly ornamented. They were likewise worn by comic actors, the buskin, or cothurnus, being used in tragedy; hence sock and buskin are used figuratively as equivalent to comedy and tragedy. Now a short stocking.

SOCORRO, so-kor'ro, Colombia, a town in the province of Santander, 150 miles northeast of Bogota. Its buildings are insignificant; the climate is hot and insalubrious. The manufac¬ tures are cotton goods and straw-plaiting. There is considerable trade in sugar, cotton and indigo. Agriculture is the chief occupa¬ tion of the region. Pop. 12,000.

SOCOTRA, or SOKOTRA, so-ko'tra, an island in the Indian Ocean, belonging to Great Britain, 150 miles northeast of Cape Guardafui. Its area covers 1,382 square miles. It consists of mountains, covered by forests, rising to heights sometimes of 4,500 feet; plateaus almost destitute of vegetation, fertile valleys and coast lands. The climate is warm and very dry. The finest aloes of the world are grown here; also dates. Livestock raising is an im¬ portant industry. The people are a mixed race (negro, Arab and Indian), but present two distinct types. In 1876 the English govern¬ ment entered into a treaty with the ruling sul¬ tan, declaring a suzerainty and in 1886 annexed the island. English and German expeditions have investigated its natural features and ge¬ ology, which is of great interest, being con¬ sidered a fragmental area of an early continent, perhaps a part of Africa; with later intrusions due to volcanic action. Of 47 species of shell found, 44

were indigenous to the island. Tamarida is the principal town. Pop. (est.)

10,000.

SOCRATES, sok'ra-tez, Greek philosopher: b. Athens, in 469 b.c. ; d. 399 b.c. His father, Sophroniscus, was a sculptor, and Socrates him¬ self followed this occupation for a time. His mother, Phaenarete, was a midwife. In his youth he received the education prescribed by the laws, and also made himself acquainted with geometry and astronomy. That he had listened to Anaxagoras or Archelaus is only reported by untrustworthy authorities; Plato accounts for his master's acquaintance with the works of the former by supposing that he had read the work written by that philosopher. According to Xenophon he was familiar with the doctrines of other natural philosophers, although he did not accept them. Plato repre¬ sents Socrates as saying that, while still very young, he met Parmenides, the most important of the Eleatic philosophers, who was then ad¬ vanced in years, as the latter was expounding his doctrines. A material influence on his philosophical development was exercised by the Sophists, to whose discourses he occasion¬ ally listened, and with whom he frequently entered into conversation. Excepting in con¬ nection with his philosophical career, only a few circumstances of his life are known. He

served as a hoplite or heavily armed soldier in the campaign of Potidaea (432-429 b.c.), where he excelled his fellow soldiers in the ease with which he endured the hardships of a winter campaign, distinguished himself by his valor, saved the life of his friend Alcibiades and re¬ signed to that youth the prize of honor which was awarded to his own bravery. He fought at the battle of Delium (424), and according to one account saved the life of Xenophon, while according to another his own retreat was pro¬ tected by Alcibiades. In 422 he marched with Cleon against Amphipolis. On two memorable occasions he came boldly to the front in politi¬ cal life. After the battle of Arginusse (406) 10 naval officers were publicly arraigned for neglecting the sacred duty of burying the slain in consequence of a violent storm. The clamor for their condemnation rose so high that the court wished to proceed in violation of all legal forms; but Socrates, the presiding judge on that day, refused to put the question. He soon after showed that he could withstand tyrants as well as the populace. He was sum¬ moned by the Thirty to proceed with four other persons to Salamis to bring back Leon, an Athenian citizen who had retired thither to escape the cruelty and rapacity of the new government. He alone refused, while the others obeyed the order. He declined taking

further share in public affairs, giving as a reason the warnings of an internal voice, a divine Men¬ tor, of which he was wont to speak.

In the writings of the disciples of Socrates, he appears almost always as a man advanced in years, such as they themselves had known him. With remarkable physical strength and endur¬ ance, he trained himself to coarse fare, scanty clothing, bare feet, and indifference to heat or cold, aiming thus to reduce the number of his wants, as a distant approach to the perfection of the gods, who want nothing. He had a flat nose, thick lips, prominent eyes, bald head, squat figure and ungainly gait, so that Alcibi¬ ades likened him to an uncouthly sculptured Silcnus containing within the images of the gods. He brought into thorough subjection his naturally impetuous appetites and irascible temper and has been called the most illustrious example in history of the moral conscience, and the creator of moral science. But though a sage he was wholly removed from the gloom and constraint of asceticism ; he indeed exem¬ plified the finest Athenian social culture, was a witty as well as a serious disputant, and on festive occasions would drink more wine than any other guest without being overcome. Of his wife Xanthippe, all that has passed into history is that she bore him three sons, that she was an arrant shrew, and that he married and endured her for self-discipline. Among the most distinguished of his companions were Plato, Xenophon, Crito, Euclid of Megara, An- tisthenes, Aristippus, Phaedon, 2Eschines, Cebes and Alcibiades. fbe devoted his life especially to the education of youth and for the accom¬ plishment of this end he relied on cros, love, which, without excluding its sensuous element, he refined and utilized as an instrument in the conduct of souls and the common development of his thoughts and those of his listeners. Soc¬ rates was firmly convinced that he was charged with a special religious mission. He believed he was called by the Deity to strive, by means

:

•

P

of his teaching and life, after a revival of moral feeling, and the laying of a scientific foundation for it. For this reason he had been warned

against participating in public affairs by the internal divine voice already men¬ tioned. Relying, too, like his countrymen, on divine intimations by dreams and oracles, he believed that his mission had been signified to him by these. Aristophanes, in his comedy of (The Clouds* (first represented in 423), at¬ tributes to Socrates not only traits of character and opinions which really belonged to him, but also Anaxagorean doctrines and sophistical tendencies.

In 399 b.c., formal accusation was brought against the philosopher in the following terms : ((Socrates is guilty of crime, first, for not wor¬ shipping the gods the city worships, and for introducing new divinities of his own; next, for corrupting the youth. The penalty due is death.® These are virtually the same charges as laid against him by Aristophanes more than 20 years earlier. His accusers were Meletus, a young dramatic poet, little known, and person¬ ally almost a stranger to Socrates and who is said to have joined in the accusation because he felt himself injured by Socrates' demonstration of the ignorance of poets respecting their art; Anytus, a rich leather-dealer and influential demagogue, who was displeased with the de¬ preciatory judgment of Socrates respecting the Athenian statesmen and politicians ; and Lycon, a public orator, who felt injured by what Soc¬ rates said of the orators. The trial took place before a dikastery, or law-court composed of citizen judges, like our juries, but far more numerous ; the number present on this occasion has been variously set down at 500, 501, 557, and 567. His bold defense, which appeared to his judges as presumptuousness, is preserved by Plato, under the title of the (Apology of Soc¬ rates^ He dwelt on his mission to convict men of their ignorance for their ultimate bene¬ fit; declared himself a public blessing to the Athenians; assuring them if his life was spared he would continue in the same course ; and re¬ garded the approach of death with utter indif¬ ference. To his judges his philosophical reflec¬ tions seemed a violation of those ethical and religious foundations of the Athenian 'State, which the restored democracy was endeavoring to re-establish. The former intimacy of Soc¬ rates with Alcibiades and with the hated tyrant Critias, led to a mistrust of his doctrines and purposes. Yet the condemnation was voted by only a small majority, some read three and others 30. But since after his condemnation he would not acknowledge himself guilty, by expressing an opinion as to the punishment he should receive, but declared himself worthy, on the contrary, of being fed at the Prytaneum as a benefactor of the state, and at last only on the persuasion of his friends agreed to a fine of 30 minae, he was condemned to death by an increase of 80 votes. The execution had to be delayed 30 days, until the return of the sacred ship which had been sent to Delos on the periodical Theoric mission.

Every morn¬ ing his wife and three sons, together with his companions and friends, assembled in his cell, and he conversed with them as he had been wont to do. In his solitary hours he composed a hymn to Apollo and versified several of the fables of ˆsop, his first attempts at poetical

composition. His friends formed projects for his escape and Crito, his old and tried friend, undertook to persuade him to comply with their wishes. He considered it, however, his duty as a citizen to obey the laws, though they were badly administered and would not consent. Early on the morning of the fatal day his wife and friends met in his cell to spend the last hours with him. Xanthippe was much affected, and showed her grief by loud cries; Socrates made a sign to Crito to have her removed, as he wished to spend his last moments in tran¬ quillity. He then talked with his friends, first about his poem, then concerning suicide, and at last on the immortality of the soul. The man¬ ner in which the assembled friends, in the al¬ ternation of joyful admiration and profound grief, lauded him as one who, by the divine appointment, was going to a place where it must fare well with him, if with any one; how he departed from them with the one wish, that in their care for their true welfare they would cherish in their memories all his sayings ; and how he designated the transition to the life beyond death as the true recovery from a state of impurity and disease, is set down in lively and affecting colors by his great disciple Plato, in the dialogue ˆhsedoP The approach of twilight at length admonished them that the hour had come. He took the hemlock cup, calmly and slowly drank the poison. He then walked up and down the apartment, trying to console his weeping friends. When it became difficult to walk he lay down upon his couch, and before his heart ceased to beat he exclaimed: (<(who of all with whom we are acquainted was in death the noblest, in life the wisest and most just.®

In their accounts of the life of Socrates the two principal authorities, Xenophon and Plato, substantially agree, although the Platonic pic¬ ture is sketched with the more delicate pencil. As to their reports of his doctrine, it is first of all undoubtedly true that Plato in his (Dia¬ logues } generally presents his own thoughts through the mouth of Socrates. But in a cer¬ tain sense his (Dialogues) can nevertheless serve as authorities for the Socratic teaching, as the groundwork of the Platonic philosophy is contained in the Socratic, and as it is possi¬ ble, in general, though not in all cases in de¬ tail, to discriminate between the Platonic and Socratic elements. Plato was cautious enough not to be led by his love of idealization too far from historic truth; in some of his compositions he remains almost entirely faithful to it, and in others puts those doctrines which Socrates could not have

professed into the mouth of other philosophers. Xenophon wrote the (Me- morabilia) and the (Symposium } not so much in the spirit of a pure historian as in that of an apologist; but his honorable defense of Socrates demands from us entire confidence in his historic fidelity, so far as his intention is concerned. But it must be acknowledged that as much cannot be said of his intellectual quali¬ fication for an exact and comprehensive under¬ standing of the Socratic philosophy. Xeno¬ phon appears to attribute too unconditionally to Socrates the tendency natural to himself to

connect all scientific activity with a practical purpose, and he thus gives too small a place to the dialectic of Socrates as compared with his ethical teachings. The brief statements of Aristotle respecting the philosophical doctrines of Socrates are very valuable, since they are purely historical, and relate to the most import¬ ant points of his teaching. The previous phil¬ osophies consisted of vague speculations on nature as a whole, combining cosmology, as¬ tronomy, geography, physics, metaphysics, etc. Socrates had given much attention to these subjects and arrived at the conclusion that the knowledge he had gained was of little practical value. Astronomy might have a certain value in navigation and in the measurement of time, and so should be learned to some extent by the pilot and the watchman ; geometry was useful when confined to land-measuring; arith¬ metic might be useful in many of the affairs of daily life, and so on ; but the speculations of; philosophers, from Thales downward, as to the origin of all things out of fire, water, air, etc., he regarded as profitless, nay, as impious even. ((Do these inquirers,® he would ask, ((think that they already know human affairs well enough that they thus begin to meddle with divine? Do they think they shall be able to raise or calm the winds at pleasure, or do they simply seek to gratify vain curiosity?® The gods managed the operations of nature after their own pleasure, and refused to submit them to invariable laws of sequence, such as could be discovered by human study; the only means of knowledge permitted was sacrifice, prayer and the consultation of the oracles. Men's strivings after knowledge should be directed to the human relationships as in¬ volving men's practical concerns. Self-knowl¬ edge, the fulfilment of the requirement of the Delphic Apollo, ((Know thyself,® is the con¬ dition of practical excellence. External goods do not advance their possessor; to want nothing is divine, to want the least possible brings one nearest to divine perfection. Virtue is capable of being taught, and all virtue is in truth only one ; no man is

voluntarily wicked, all wicked¬ ness simply resulting from ignorance. The good is identical with the beautiful and the useful. Cicero's well-known saying that Soc¬ rates called philosophy down from the heavens to earth and introduced it into the cities and houses of men, compelling men to inquire con¬ cerning life and morals and things good and evil, indicates in terms substantially correct the progress of philosophy in Socrates from the cosmology and physics of his predecessors to anthropological ethics. He possessed, however, no complete system of ethical doctrines, but only the living instinct of inquiry, and could, therefore, naturally arrive at definite ethical theorems only in conversation with others. The fundamental thought in his political doc¬ trine is that authority properly belongs to the intelligent — to him who possesses knowledge. The good ruler must be, as it were, a shepherd to those whom he rules ; his business, his ((virtue,® is to make them happy. Socrates did not favor the appointment of officers by popular suffrage and by lot. He defends the belief in the existence of gods on teleological grounds, arguing from the structure of organ¬ ized beings, and founding his reason on the general principle that whatever exists for a

use must be the work of intelligence. The wisdom which is present and rules in all that exists determines all things according to its good pleasure. It is distinguished from the other gods as the ruler and disposer of the universe. The gods, like the human soul, are invisible, but make known their existence un¬ mistakably by their operations.

It is reported that soon after the death of the great philosopher the Athenians regretted their sentence and that to expiate their crime a brazen statue, the work of Lysippus, was dedi¬ cated to his memory. Yet a more general re¬ vulsion of opinion in favor of Socrates seems first to have taken place in consequence of the labors of his scholars. That some of the ac¬ cusers were put to death and others exiled is probably a fable, founded perhaps on the fact that Anytus, banished in all likelihood for politi¬ cal reasons, died in Heraclea, on the Pontus, where in later centuries his tomb was still pointed out. Consult Burnet, J., ((Thales to Plato® in (Greek Philosophy, *Part I (London 1914) ; Forbes, J. T., (Socrates) (New York 1905) ; Gomperz, T., (Greek Thinkers* (New York 1905) ; Hyslop, J. H., (Ethics of the Greek Philosopher (New York 1904) ; More, (<Socrates® in (Shelburne Essays,* 6th series (New York 1909) ; Wright, W. C., (A Short History of Greek Literature) (New York 1907) ; Zeller, E. G., (Socrates and the Socratic Schools) (tr. by Richel, O. J., 3d ed., London

1885).

SOCRATES, Scholasticus, Greek Church historian: b. Constantinople, about 380; d. after 440. Little is known of his life except that he lived in Constantinople and was an advocate. His history, written about 439, em¬ braces the period 306-439, and is written in seven books still in existence. Together with the histories written by Sozeman and Theo- doret it forms one of the three histories of the period extant, and was written before the other two, whose writers were evidently fa¬ miliar with it. While not a history in the ac¬ cepted sense of the word it is nevertheless a valuable source of information for the period it covers. It is not the work of a man of deep learning, nor of astute knowledge of either churcn or state, but it is nevertheless of un¬ questionable honesty and straightforward in character. It was edited by Stephanus (Paris 1544) ; Reading (Cambridge 1720) ; Hussey (Oxford 1853; reissued by Bright, 1878); Oxt ford school edition, after Reading's version (1844). Consult also Geppert, F., (Die Quellen des Kirchen Historikers Socrates Scholasticus)

(1898).

SODA, Commercial Production. Sodium

carbonate in the form of soda ash is the princi¬ pal form in which commercial soda is pro¬ duced although some of it is immediately trans¬ formed into caustic soda. The main source is salt and limestone treated by the Solvay process, but a small amount is made from natural sodium carbonate chiefly from water of Owens Lake in southeastern California. Some is also saved from waste water of pulp and paper mills and a few mills make sodium carbonate by an electrolytic process employing carbon dioxide generated in lime kilns.

Production of soda ash in 1918 was 1,390,- 628 short tons, valued at $35,635,520, or about

SODA NITRE

SODIUM

221

I he same tonnage as in 1917, valued at $38,028,- 000. This does not include the soda ash con¬ verted by the producers into caustic soda or sodium compounds to an amount estimated at 664,000 short tons in 1918 and 482,000 short tons in 1917. The total value of all sodium compounds produced in the United States in 1917 is estimated at $74,000,000. In 1917 eight companies made caustic soda from soda ash (358,081 tons), and 28 companies made 137,663 tons by

reduction of sodium chloride by elec¬ trolysis, in most cases utilizing the chlorine gas liberated. Some of the manufacturers use a part of their product for technical processes of various kinds. Exports of soda ash in 1918 were 119,218 short tons, valued at $7,805,550, sent mostly to Japan, Canada, Argentina, Bra¬ zil, Australia, Cuba and Chile. Considerable soda is imported into the United States, the total value in 1917 being about $74,000. Soda ash is used for making glass, soap, dyestuff, explosives and as washing materials ; sodium compounds have replaced potassium wholly or in part in many technical processes. In 1917 there was sold 174,217 tons of cooking soda or sodium bicarbonate valued at $5,292,374 and 77,939 tons of washing soda valued at $1,698,- 528. Caustic soda is used for making soap, pigments and wood pulp, in purifying oils and fats, in mercerizing cotton, as a general cleanser (lye) and in making dyes and phenol, the latter used for making such explosives as ammonium picrate and lyddite.

N. H. Darton.

SODA NITRE, native sodium nitrate, NaNCU It is a colorless, deliquescent mineral, crystallizing in the rhombohedral system, but usually massive in beds. It occurs near Love¬ lock's, Nev., and near Calico, Cal., and in vast beds in Chile, where it is extensively mined. It is one of the most important fertilizers (q.v.), and is also used in the manufacture of nitre.

SODA WATER, a beverage consisting of water charged with carbon-dioxide gas under pressure, so that it appears aerated. It re¬ ceived its name from the fact that in its early manufacture it was generated from sodium bi¬ carbonate with an acid. It is usually flavored with a sweet syrup of fruit or some chemical substitute, and a great variety of "soft® drinks are compounded and sold at soda fountains, which are common adjuncts of drug stores in the United States.

SODALITE, a widely-distributed rock¬ forming mineral. It is a common constituent of volcanic rocks, especially elaeolite-syenites, in which it occurs in isometric crystals or in grains or massive veins. A sodalite-trachyte abounds in the island of Ischia, near Naples, while fine, white crystals occur in the bombs of Vesuvius. It is best known, however, as a cleavable-mas- sive mineral of rich azure-blue color. It is! found thus at Litchfield, Maine, in Ontario and British Columbia, and is well adapted for use as an ornamental stone. Its hardness is 5.5 to 6; specific gravity 2.14 to 2.34; lustre vitreous or greasy ; composition, aluminum and sodium orthosilicate with sodium chloride.

SODALITE GROUP includes sodalite, hauynite, noselite and lazurite, all minerals crystallizing in the isometric system and of

unusual interest chemically because they are isomorphous compounds of an orthosilicate with the salt of another acid or with a haloid. Their relations to the garnet group have been developed by Brogger.

SODDY, Frederick, English chemist: b. Eastbourne, 2 Sept. 1877. He was educated at Eastbourne College, the University College of Wales, at Merton College, Oxford, and studied under Sir Ernest Rutherford at Mont¬ real and under Sir William Ramsay at Lon¬ don. In 1900-02 he was demonstrator in chem¬ istry at McGill University; lecturer in physical chemistry and radioactivity at Glasgow Univer¬ sity in 1904-14; and has since been professor of chemistry at the University of Aberdeen. He has specialized in the field of radioactivity. He was elected a Fellow of the Royal Society in 1910; and in 1913 he received the Cannizzaro Prize of the Accademia dei Lincei, Rome. Author of (Radioactivity, an Elementary Trea¬ tise from the Standpoint of the Disintegration Theory > (1904) ; (The Interpretation of Ra- dium) (1909) ; (Matter and Energy* (1912) ;

(Chemistry of Radio-elements) (1912-14).

SODEN, Hans Karl Hermann, Baron von, German Protestant theologian : b. Cincinnati, Ohio, 16 Aug. 1852; d. 1914. He was educated at Esslingen, Urach and at the Theological In¬ stitute at Tubingen. He was archdeacon at Chemnitz in 1883-86, and was thereafter pastor at Jerusalemkirche, Berlin. From 1893 he was also associate professor of New Testament exegesis at the University of Berlin. He made a lifework of the collection and comparison of New Testament manuscripts. He wrote (Der Brief des Apostels Paulus an die Philipper- briefe) (1890) ; (Reisebriefe aus Palastrina* (1898); (Die wichtigsten Fragen im Leben Jesu) (1904; 2d ed., 1909) ; (Die Schriften des neuen Testaments) (1904) ; (Urchtistliche Lit- eraturgeschichte) (1905), etc.

SODIUM (from “soda,® which word was used in the Middle Ages to designate alkaline substances in general), a metallic element, first prepared by Davy in 1807, by the electrolysis of molten caustic soda, or sodium hydroxide. In 1808 Gay-Lussac and Thenard showed that the metal can be prepared by reducing the hydroxide with finely divided metallic iron. Brunner, about 1823, obtained metallic sodium by reducing sodi¬ um carbonate with carbon ; and Deville, in 1855, improved Brunner’s process so as to make it commercially practicable for the manufacture of sodium on the large scale. Deville’s method, as

practised in recent times, consists in distilling a mixture of 30 parts of calcined carbonate of sodium, 13 parts of coal and 7 parts of lime ; the reduction taking place at a temperature of about 2,500° F., the metal being given off in the form of a vapor, which is then passed into a condenser and allowed to liquefy and solidify. As thus obtained, sodium contains numerous impurities, most of which may be removed by straining the melted metal through linen under rock oil, at a temperature of about 212° F. Deville's process of manufacture was used al¬ most exclusively until about 1886, when the well- known Castner process came into use. Castner reduced sodium hydroxide by a combination of carbon and iron, prepared by coking a mixture of pitch and finely divided iron; the coked mass

having approximately the composition of Fe2C, and being commonly known as <(carbide of iron,® although it is doubtful if this name is chemically justifiable. The Castner process possesses many practical advantages over that of Deville, and hence it rapidly came into almost universal favor. A considerable quan¬ tity of metallic sodium is now prepared by the direct electrolysis of molten sodium hydroxide, ,or sodium chloride (common salt). Sodium possesses powerful reducing properties, and the metal is used in the preparation of silicon, boron, aluminum and other elements whose re¬ duction by means of carbon is either difficult or impossible. Deville, in fact, developed his method of preparation with the object of using the Stodium that it yielded in the subsequent preparation of metallic aluminum (q.v.) ; and for many years the commercial supply of aluminum was practically all prepared by re¬ ducing aluminum compounds with metallic sodium. Since the development of the Hall process for the manufacture of aluminum by electrolysis, metallic sodium has lost a con¬ siderable part of its former great commercial importance.

Sodium is a silvery-white metal, hard at 0° F., ductile at 32°, wax-like at ordinary tem¬ perature and pasty at 120°. It melts at 20 7° F., and boils at about 1,700°. It oxidizes with great facility, and must be kept under benzene, or petroleum, or some other fluid that is devoid of oxygen, or in a neutral atmosphere of hydrogen, coal gas or some other substance for which it has no affinity. It may be pre¬ pared in the form of lustrous, octahedral crystals, white in color but with a rosy sheen. Like potassium, it dissolves in anhydrous liquid ammonia (NH3), forming a blue solution from which the metal may be again obtained by the evaporation of the solvent. Sodium has a specific

gravity of about 0.98, a specific heat (in the solid form) of 0.273, and a coefficient of linear expansion (Fahrenheit scale) of 0.0000395. At the freezing point of water, the specific electrical resistance of sodium is about one-eighteenth of that of mercury.

Chemically, sodium is a monad. It has the chemical symbol of Na (from “natron,® the Spanish name for native carbonate of sodium), and its atomic weight is 23.00 if 0 = 16, or 22.82 if H = l. It forms a multitude of com¬ pounds, many of which are of great importance in the arts. The chloride of the metal occurs in great abundance in nature, as common salt. (See Salt). Its formula is NaCl, and it is extensively used as a source of sodium in the preparation of other compounds of the metal. Sodium nitrate, NaN03, commonly known as ((Chile saltpetre,® occurs native in large quan¬ tities in Chile, and as it is much cheaper than the native nitrate of potassium, it is used largely in the manufacture of ordinary nitre; chloride of potassium and nitrate of sodium re¬ acting together to form chloride of sodium and nitrate of potassium. (See Nitre). Sodium bromide, NaBr, which is extensively used in medicine as a sedative, is prepared by adding bromine to a solution of pure sodium hydrate, NaOH, till the liquid becomes slightly yellow. It is then evaporated to dryness, and strongly heated to decompose the bromate, NaBrOa, which is formed simultaneously with the

bromide; after which the residue is redissolved and crystallized by evaporation.

Two oxides of sodium are known. Sodium monoxide, Na20, may be prepared in several ways, but it is doubtful if it has yet been obtained in a state of absolute purity. It is formed when metallic sodium is oxidized in dry air or dry oxygen, at ordinary temperatures ; but it is said that some small trace of moisture must be present, in order for the oxidation to pro¬ ceed. This monoxide is a grayish solid, having a powerful affinity for water, with which it com¬ bines to form sodium hydroxide (NaOH), as in¬ dicated by the equation Na20 + H20 = 2NaOH ; the combination being attended by the develop¬ ment of a considerable quantity of heat. The monoxide may also be prepared by heating dry sodium hydroxide with metallic sodium, its form¬ ation in this case being attended by the liberation of hydrogen. Sodium peroxide, Na202 (also called the “dioxide®), is of considerable com¬ mercial importance, lowing to its increasing use as a bleaching agent. It is prepared by passing a stream (of dry air slowly over melted sodium at a temperature of about 570° F., the sodium being thereby converted into a mixture of the monoxide and peroxide. When all the sodium has been oxidized, the air current is replaced by a stream of

dry oxygen gas, which transforms the monoxide that is present into peroxide. Sodium peroxide is soluble in water, but the solution readily decomposes with the formation of sodium hydroxide and the liberation of oxygen, as indicated by the equation

Na202 + H20 = 2NaOH + O'.

The bleaching effect of the peroxide is due to this liberation of oxygen from the aqueous solu¬ tion.

Sodium carbonate, Na2C03, commonly known simply as “soda,® or, in the impure form, as “soda ash,® is one of the most important chem¬ ical substances known. It was formerly pre¬ pared mainly from the ashes of sea-plants, in the same way that carbonate of potassium is obtained from the ashes of land plants; but at the present time it is prepared almost exclu¬ sively by chemical means, from common salt. For many years the only method in use for its manufacture was that invented by Leblanc, dur¬ ing the first French Revolution, in the latter part of the 18th century. In 1838 the “ammonia® process was patented in England, but although this promised to be superior to the method of Leblanc, certain practical difficulties were encountered which proved to be fatal to its success, until they were overcome by E. Solvay, who erected the first commercially suc¬ cessful “ammonia process® plant near Brussels, in 1861, and for whom the process itself has since been named. A certain proportion of the output of sodium carbonate is also manufactured by electrolysis; but the greater part is manu¬ factured by the Solvay process though the Leblanc method is still used to a considerable extent.

Leblanc Process — In the Leblanc method for the manufacture of sodium carbonate there are two successive operations to be performed. The first of these, which is known as the “salt cake® process, has for its object the transforma¬ tion of chloride of sodium into sulphate of sodium. For this purpose the salt (sodium chloride) is heated with sulphuric acid in large

covered iron pans; hydrochloric acid being liberated in the course of the reaction, as indi¬ cated by the equation

2NaCl + H,SCh = Na.SCX + 2HC1.

The hydrochloric acid vapors which are thus generated are passed

through a “scrubbing tow¬ er, w which contains coke or brick, .over which a stream of water is kept running, the hydro¬ chloric acid dissolving in the water, and con¬ stituting an important by-product. The crude sodium sulphate, Na-.SO*, is the “salt-cake® from which this part of the process takes its name. Pure crystallized sodium sulphate* (con¬ taining 10 molecules ot water of crystallization) constitutes the familiar substance known as “Glauber’s salt,® which is used in medicine as a saline purgative. The salt-cake, as obtained by the first operation, is subsequently treated by the (<black ash® process, which is so called on account of the color of the immediate product that it yields. Ten parts of the salt-cake are mixed with 10 of limestone (calcium carbonate) and seven and a half of coke, and the mixture is heated in a reverberatory furnace, technically known as a ((balling furnace.® The carbon of the coal reduces the crude sodium sulphate to the form of sulphide of sodium, Na2S, in ac¬ cordance with the equation

Na.SCh + 2C = Na.S + 2COa ; while the sulphide, thus produced, is converted into sodium carbonate and calcium sulphide (CaS), by the limestone (CaC03), in accord¬ ance with the equation

Na2S + CaCOs = Na2C03 4* CaS.

In practice these two reactions go on to¬ gether, and the final mixture of calcium sul¬ phide, sodium carbonate and such impurities as may be present is the so-called “black-ash,® or crude soda. Calcium sulphide is insoluble in water in the presence of lime, and hence it is easy to separate the sodium carbonate from the mass by solution and subsequent crystallization. “Crystallized soda,® or “washing crystals,® con¬ sists of sodium carbonate crystallized with 10 molecules of water.

The Ammonia (or Solvay) Process. — The

ammonia process for the manufacture of sodium carbonate depends upon the fact that when bicarbonate of ammonia, H(NHi)C03, is added to a solution of common salt (NaCl), bicarbonate of sodium (HNaCOs) and sal ammoniac (NPhCl) are formed, as indicated by the equation

NaCl T H (NH4) C03 = = HNaCOs T h H4CI.

In practice, this operation is carried out by satu¬ rating a solution of common salt with ammonia gas (NH3), and then passing carbon dioxide gas into the solution, under pressure. Bicarbon¬ ate of

ammonium is formed in the solution, but is immediately broken up with the formation of bicarbonate of sodium, as indicated by the foregoing equation. We may, therefore, regard the reaction as taking place directly in accord-

indicated bv the equation NH + *CO* + NaCl + H20 = HNaC03 + NH4CI. The sal ammoniac, being quite soluble, remains in solution; while the bicarbonate of sodium, being relatively insoluble, is obtained in the solid form. The bicarbonate, when dried and strongly heated, gives off carbon dioxide gas and is converted into the normal carbonate, as indicated by the equation

2HNaCOs = Na2C03 + C02 -f HaO;

the carbon dioxide thus freed being again used in the first stage of the process. The sal am¬ moniac that is formed during the process is recovered from solution by evaporation, and the ammonia that it contains is liberated by the ac¬ tion of lime or magnesia. The reaction in the case of magnesia is

2NH4CI 4- MgO = MgCb + 2NH3 + H.O ; the ammonia being used over again, just as the carbon dioxide is. The magnesium chloride, MgCl2, may be thrown away, or it may be re¬ solved, by the action of heat, into magnesia and hydrochloric acid, as indicated by the equa¬ tion

MgCk + H.O = MgO 4- 2HC1 ; the hydrochloric acid so obtained constituting a by-product, just as it does in the Leblanc process.

Sodium carbonate is used in the arts for the greatest variety .0 1 purposes. When a stream of carbon dioxide is passed through a saturated solution of the carbonate, sodium bicarbonate (or hydrogen sodium carbonate), HNaC03, is formed ; and, as has already been stated, the bicarbonate may be again transformed into the carbonate by the action ,of heat. Sodium bi¬ carbonate is qsed in the manufacture of baking powders, in the preparation of effervescing drinks, in medicine and for many other pur¬ poses.

Sodium hydrate, sodium hydroxide or “caustic soda,® may be prepared by boiling lime (calcium hydroxide) with sodium car¬ bonate, the reaction being

Ca(OH)2 4- Na2C03 = CaC03 + 2Na0H. The carbonate of calcium that is formed at the same time is practically insoluble, and by al¬ lowing it to subside, and evaporating the super¬ natant liquid to dryness, sodium hydroxide is obtained in the form of a white fibrous

mass. The hydroxide melts at a red heat, deliquesces in the air, and absorbs carbon dioxide gas even from the air, passing then into the carbonate. Sodium hydroxide is formed when metallic sodium is thrown upon water, the water being decomposed with the liberation of free hydro¬ gen, according to the equation

Na 4- H20 = NaOH 4- H.

The heat developed by this reaction is not in general sufficient to ignite the liberated hydro¬ gen. (Compare Potassium). Sodium hydroxide is intensely alkaline, and large quantities of it are used in the manufacture of soap, in the mercerizing of cotton and for many other pur¬ poses.

Of the remaining compounds of sodium, the borate, silicate, phosphate and hyposulphite may be especially mentioned. Borax, or sodium tetraborate, Naˆ0r + 10H2O, occurs native, the chief supply of the United States now coming from California. (See Borax; Boron). Sodium silicate, Na2Si03, commonly known as “water glass,® is prepared by melting quartz sand with sodium carbonate. It is soluble in water, and is largely used in the manufacture of artificial stone. Three phosphates of sodium are known, phosphoric acid (q.v.) being tribasic. The one which is understood when “sodium phosphate® is mentioned without quali¬ fication is the hydrogen di-sodium phosphate, whose formula is HNaoPCh. Hyposulphite (or thiosulphate) of* sodium, commonly known as “hypo,® has the formula Na2S203 + 5H20, and

is prepared by passing a stream of sulphur dioxide gas through a solution of sodium sul¬ phide and sodium hydroxide, and then crystalliz¬ ing the solution by evaporation. It is extensively used in photography for ˆfixing® negatives and silver prints ; its action depending upon its power of dissolving such parts of the silver salts as have not been reduced by the action .of light, or the developer. ˆHypo® is also used by paper makers as an antichlor, for neutral¬ izing the last traces of the chlorine that may be left in the pulp, after it has been bleached with <(chloride of lime.®

In general, the salts of sodium are closely analogous in all respects to those of potassium, so that for most purposes a salt of either of these metals may be substituted for the cor¬ responding salt of the other

one. Salts of sodium that are volatile in the flame of the Bunsen burner communicate to that flame an intense orange-yellow color, and. when the light from such a flame is examined through the spectroscope, the color is found to be due to a close pair of lines in the orange-yellow region, which coincide with the <(D® lines of the solar spectrum. The light from a flame that is colored by volatile sodium salts is nearly monochro¬ matic, and such flames are, therefore, used in numerous physical experiments, in which the production of light of a single wave-length is desired.

A. D. Risteen,

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

SODIUM, Production of. See Electro¬ chemical Industries.

SODOM, Apple of. See Apple of Sodom.

SODOM AND GOMORRAH, Palestine, the principal of the five cities, Sodom, Gomorrah, Admah, Zeboim and Zoar, described in the book of Genesis as the ((cities of the plain® of Jor¬ dan. According to Gen. xix, they were over¬ thrown on account of the wickedness of their inhabitants, with the exception of Zoar, which was spared at the supplication of Lot. Modern writers are not agreed as to the site of these cities. They have commonly been placed on the south of the Dead Sea, near the Salt Hill of Usdum ; but it appears that this is not in ac¬ cordance with the Scripture narrative, nor with the other references to these cities in the Bible. The site is supposed to be north of the Dead Sea, and visible on the east from a height be¬ tween Bethel and Ai. Sodom and Gomorrah are commonly used in the allegorical or denun¬ ciatory language of the Scriptures as typical ex¬ amples of extremely wicked communities; hence the word sodomy. See also Dead Sea.

SODOMA, 11, el sd-do'ma, Italian painter known also as Giovanni Antonio Bazzi : b. Ver- celli, 1477 ; d. Siena, 1549. He was noted for his religious and historical works. His best- known pictures are the famous frescoes in the Villa Farnesina in Rome. Consult Jansen, (Life of Sodoma) (1870).

SOFIA, so-fe'a, or SOPHIA, Bulgaria, capital of the principality, 310 miles by rail northwest of Constantinople, occupies a plateau of the Balkans. It consists of two distinct sec¬ tions — the old town and the new town built since 1880. The modern town is suggestive of the

French cities; the main streets radiate

from the national palace, and are bordered by stucco-covered houses, and fine government buildings, chief of which are the court of justice, national bank and libraries, war de¬ partment, city hall, consulates and a capacious theatre; and, in the old town, the cathedral and mausoleum of Alexander of Battenberg. There are extensive bazaars and fine baths. On the highest point in the town stand the ruins of an ancient church (and mosque) — Saint Sophia. There are a university for both sexes, with 2,300 students, several churches, a syna¬ gogue. and a monument to Alexander II of Russia, military and other schools, and a public park. ‘ The gypsy quarter lies between the Lion Bridge and the railway station. There is a brisk trade in hides, liquor, corn and wheat. Sofia stands on the ancient site of Ulpia Ser- dica, and was occupied by the Bulgarians in 809; in 1382 it was taken by the Turks; in the crusade of 1443 was sacked by the Poles and Hungarians, and in 1878 was captured by the Russians, the Mohammedans fleeing. It has been frequently plundered and bombarded, but remains prosperous, developing rapidly as cap¬ ital of the Bulgarian principality. Pop. about 105,000; with district, 482,000.

SOFT GRASS, a grass, described as velvet- grass in the article Grasses in the United States (q.v.).

SOFT-SHELLED TURTLES. See

T urtle.

SOFTAS, sof'taz, pupils who study Moham¬ medan law and theology in schools attached to the mosques. They are boarded free of charge, the expense being paid from the reve¬ nue of the mosques, or from donations made for the purpose. If too poor to provide their own clothing or bedding, it is found for them by the charitable, the support of the softas in their studies being a favorite and pious object of Mussulman generosity. The softas are a most conservative class, and almost fatatical in their adherence to the ancient rules of their religion. They refuse to adopt Western ideas or fashions, and they exert a strong reaction¬ ary influence in Turkish affairs. After suffi¬ cient study of the Koran, the Sunna, the Arabic language and other Mohammedan learning, they pass an examination which entitles them to be called Khodjas. The term <(softas® is also applied generally to the ulemas, imams, and others connected with the mosques. See Mohammedanism; Sunna; Sunnites.

SOFT-SHELL BAPTISTS. See Bap¬ tists.

SOIiAR, so'hiir, Arabia, a seaport on the southeastern coast, on the Gulf of Oman, 165 miles northwest of the capital, Muskat. It is a walled town and its chief buildings are a castle and synagogues. There are iron-foun¬ dries and other metal-works, also a consider¬ able weaving industry, and the lands of the vicinity are highly cultivated. As early as the 10th century it was an important centre of trade. In the period extending from the 16th to the 17th century, it was occupied by the Portuguese. Pop. 24,000.

SOHN, zon, Karl Ferdinand, German painter: b. Berlin, 10 Dec. 1805; d. Cologne, 25 Nov. 1867. He studied under Schadow ; was

appointed professor in the Academy of Ditssel- dorf in 1832. Among his most celebrated pic¬ tures are (Rinaldo and Armida> (1827) ;

(Diana and Actaeon *(1833) ; The Judgment of Paris1* and (Romeo and Juliet *(1836) ; (Tasso and the Two Leonoras* (1838).

SOHRAB AND RUSTUM, by Matthew Arnold (published 1853), is perhaps the most important classical English poem since Words¬ worth. Its theme — the combat of a father with his son in ignorance of their kinship — involves central human relations in love and in war, and gives full scope for pathos, tragic irony, and the classical sense of fate. These are conveyed in 891 blank verse lines of clear and measured narrative, with passages of de¬ scription and dialogue, full of sonorous names after the manner of Milton, and of elaborate similes and other reminiscences of Homer and the Greek tragic poets ; so that the focal and universal theme, which even if unembellished would have appealed to all men, is given every means of evoking in instructed readers the peculiarly classical aesthetic effect of modified remembrance and recognition. Yet the poem does not in the least suggest a cento ; its action, which, as an ˆepisode) *or rather epyllion, takes us at once in medias res , carries all off with a masterly epic stride; while perhaps the most celebrated passage — that in which, at the end of the poem, the course of the river Oxus is followed to the sea — is modern in its feeling for the resolution of all human discords in nature's serene disregard of them. Compari¬ son of the narrative structure of (Sohrab and Rustum* with that of the (Shah Nameh, *the original of the story, will show Arnold's de¬ cisive improvements in compactness, in unity, and in economy of means ; comparison with other versions of the same theme, such as the fragmentary Old High German (Hildebrands- lied,* and Mr. W.

B. Yeats' play (On Baile's Strand,* will show the equally decisive superi¬ ority of Arnold's poem in universality and human significance.

Samuel Lee Wolff.

SOIL, a term used to designate the super¬ ficial portion of the earth's surface composed of broken and disintegrated rock mixed with vary¬ ing proportions of decayed and decaying animal and vegetable matter (humus). For the entire mantle of unconsolidated material covering the earth's surface and including the soil Merrill proposes the expressive • name regolith, from pvyoc, a blanket, and 70of, a stone. The soil proper is the upper portion of the regolith. In humid regions as a rule it is easy to trace the gradation from soil proper at the surface through subsoil to the underlying undecom¬ posed rock. The subsoil is distinguished from the surface soil mainly by a smaller percentage of organic matter and greater compactness, the latter being due to the accumulation of finer particles carried down by percolating water (clay subsoil) or to the formation of hardpan resulting from the compacting effect of con¬ tinued cultivation at a uniform depth or to the cementing action of salts formed in the soil (calcerous and alkali hardpan). Hilgard has shown that on account of the absence of the leaching action of water, the soils of arid re¬ gions are often uniform to a great depth, there vol. 25 — 15

being little or no distinction between soil and subsoil, although under irrigation and cultiva¬ tion calcerous and alkali hardpan frequently makes its appearance.

Origin, Formation, and Classification. —

Soils have in the main been derived from the solid rock of the earth's crust through the dis¬ integrating (weathering) and transporting ac¬ tion of various agencies, among which are changes of temperature (heat and frost), mov¬ ing water or ice (glacial action), chemical action of air and water and the influence of animal and vegetable life (including the action of micro-organisms) ; and since some of these agencies are continually at work the properties of soils are constantly being more or less modi¬ fied. Soils are grouped according to the method of their formation into two main classes: (1) Sedentary soils formed by the weathering of rock in situ (residual deposits) or by the ex¬ tensive accumulation of organic matter as in case of marsh or peat soils (comulose de¬ posits) ; and (2) transported soils composed of materials transported from other localities than that in which the soil is found by water, ice (glaciers) or wind. Under residual soils Mer¬ rill includes such as are composed of (<those products of rock

degeneration which are to-day found occupying the sites of the rock masses from which they were derived, and immedi¬ ately overlying such portions as have as yet escaped destruction.** Such soils occur most ex¬ tensively in the United States east of the Mis¬ sissippi River and south of the southern margin of the ice sheets of the Glacial Epoch and are typically exemplified in the usually highly col¬ ored brown, red and yellow ferruginous clay soils of the southern Appalachian region. The cumulose deposits are typically illustrated in the United States in the Dismal Swamp lands or the muck soil of Florida.

The more important examples of transported soils are alluvial soils, familiarly typified in the river bottom lands and deltas like those of the Nile and Mississippi ; ceolian soils composed of materials transported by the wind and typified by the sand dunes of seacoast regions and the characteristic loess of China and other coun¬ tries ; and glacial drift soils due to glacial action. Such drift soils cover a large portion of the northeastern and north central United States and are composed of the debris of disintegrated rocks of various kinds brought down from the north during the glacial period. Besides these main types of soils there are several others of more or less importance in the United States, including the soils composed of fine volcanic ash found in considerable areas in Kansas, Ne¬ braska, Colorado, Montana and other Western States; adobe, a stiff clayey soil distributed in circumscribed areas over a large portion of the arid region of the United States ; gumbo soil, a compact fine silty soil ; and a so-called loess supposed to be of alluvial origin. In practice soils are, as a rule, described simply as gravelly, sandy, loamy, clayey, calcareous, humous or peaty, etc., according to the fineness of the soil particles and the proportions of sand, clay, lime and humus. They are also distinguished as light or heavy, but as so used these terms do not refer to the actual weight of the soil, but rather to the ease with which it is cultivated. Thus sandy soils, which are termed ((light** in an

agricultural sense, are actually heavier than clay soils, which are considered ˆheavy® from an agricultural standpoint.

There are almost innumerable gradations of soil types as regards chemical and physical characteristics, so that a satisfactory classifica¬ tion on this basis is very difficult. The Bureau of Soils of the United States Department of Agriculture, therefore, maps and classifies the

typical soils of the areas it surveys on the basis of the differences in agricultural value as de¬ termined by field observations on ((the character of the soil and its relation to crops and vegeta¬ tion,® supplemented, however, by physical and chemical examinations. Considering the soil mainly as a medium into which plants send their roots and from which they draw a part of their food, it is evident that its agricultural value will depend largely upon the character of the original rocks from which the soil was derived, the degree of fineness to which the ma¬ terial has been reduced, the amount and char¬ acter of the organic admixture, as well as upon the treatment to which the soil has been sub¬ jected and the changes it undergoes under culti¬ vation. The fertility of a soil is, therefore, de¬ termined not only by the store of plant food which it contains, but depends to a large extent upon the chemical, physical and biological proc¬ esses by which this plant food is rendered available to plants. The soil is not only a store¬ house of plant food, but a workshop or labora¬ tory in which this food is being constantly pre¬ pared for the use of plants, and it is the object of cultivation to promote the processes by which this is brought about. Chemical, physical and biological properties and processes are so intimately associated in soil that it is not always possible clearly to distinguish between them. For convenience of discussion, however, it is desirable to consider them separately.

Chemical Composition and Properties of Soils. — Plants derive all of their ash or mineral constituents and a large part of their nitrogen from the soil, and in order that a soil may pro¬ duce plants it must contain these constituents in proper proportion and in assimilable con¬ dition. Nitrogen is one of the largest and most important constituents of plants. The ash con¬ stituents are taken up in comparatively small amounts by plants, but they are none the less essential to their growth. The more import¬ ant mineral elements of plant food include sulphur, phosphorus, potassium, calcium, mag¬ nesium and iron. Apparently sodium, silicon and manganese are also needed by plants. Since the rocks from which soils are derived contain more or less of all the mineral elements it i's not likely that any soil will be entirely lacking in any of those required. Their proportion and availability for assimiliation by the plant may, however, vary so widely as to cause wide differ¬ ences in productiveness. The constituents of soils may be divided into three classes: (1) Active, that is, soluble in water or the root secretions of plants and hence readily available ; (2) latent, that is, not soluble in water or root secretions, and hence not readily available, but becoming so in time through natural agencies, by the application of fertilizers or soil amend¬ ments, such as lime, marl, etc., or as a result of tillage; and (3)

mechanical. The last is by far the largest class, constituting usually from 90 to 95 per cent of the entire mass of the soil,

and chemical analysis shows it to be as a rule mainly silica or sand. Hilgard gives the aver¬ age composition of soils of arid, semiarid and humid regions as determined by ordinary methods of chemical analysis (treatment with strong acids) as follows:

Average Chemical Composition of Soil.

CONSTITUENTS

Humid

region

Semiarid

(transi¬

tion)

region

Arid

region

Per cent

Per cent

Per cent

Insoluble matter .

1. 17

75.04

1. 16

Soluble silica .

4.04

8.46

6.71

Potash .

.21

.33

.67

Soda .

. 14

.32

.35

Lime .

. 13

.70

1.43

Magnesia .

.29

.47

1.27

Iron oxide .

3.88

2.08

5.48

Alumina .

3.66

4.57

7.21

Manganese oxide .

. 13

11

Phosphoric acid .

. 12

.21

. 16

Sulphuric acid .

.05

.02

.06

Humus .

1.22

3.24

1.13

Nitrogen in soil .

(.12)

.22

. 13

It will be observed that the proportions of actual fertilizing constituents — nitrogen, phos¬ phoric acid, potash, lime, etc. — are relatively small. When, however, the amounts per acre are taken into consideration they assume greater importance. An acre of sandy soil to a depth of one foot may be assumed to weigh about 4,000,000 pounds, of loam soil 3,500,000 pounds, of clay soil 3,250,000 pounds. An acre-foot of loam soil of the humid region, having the aver¬ age composition given above, would, therefore, contain 7,350 pounds of potash, 4,550 pounds of lime, 4,200 pounds of phosphoric acid and 4,200 (pounds of nitrogen, amounts sufficient to sup¬ ply the needs of many crops. It should be borne in mind, however, that these are average figures from which there may be wide depart¬ ures even in soils of the same type, and that productiveness of a soil as determined by chem¬ ical composition depends, as already stated, not so much upon the total amounts of the con¬ stituents present as upon their availability for the uses of plants. Ordinarily chemical analysis may show the presence of large amounts of all the necessary fertilizing constituents and still the soil may be unproductive if these con¬ stituents are not in a form in which they may be readily appropriated by the plant. Chemical analysis is capable of showing the presence, absence or marked deficiency of any necessary constituent or the presence of harmful sub¬ stances, but it has not yet reached such a stage of perfection that it can show with absolute certainty the amount of available plant food which a soil contains.

The methods most commonly used for de¬ termining the availability of plant food in soils involve the treatment of the soil with a weak solvent, such as 1 per cent citric acid, fifth- normal nitric acid, carbonated water or am¬ monia chloride solution, which it is assumed approximates the power of plants to utilize the soil constituents. Schloesing, among others, has called attention to the importance of studying the availability of plant food in the soil by means of water extracts, but the Bureau of Soils of the United States Department of Aˆri-

culture applying a method based upon the solubility of the soil constituents in water to a large number of productive and unproductive soils of the United States, reached the conclu¬ sion that <(practically all cultivable soils con¬ tain naturally a nutrient solution which varies within comparatively narrow limits with regard either to composition or concentration and which is usually sufficient for plant growth® and that, therefore, there is no obvious relation between the chemical composition of the soil and solution and the yield of crops. The work of others, however, indicate that the growth of plants in the water extracts of soil closely par¬ allel their growth in the soil from which the extracts are made. The recent development of centrifugal, displacement, or pressure methods of obtaining unaltered or but little changed soil solutions in quantity permits of important investigations on this point not heretofore possible.

The availability of the soil constituents de¬ pends largely upon the extent to which disin¬ tegration has proceeded and the amount of leaching to which the soil has been subjected. Thus in the soils of arid regions in which disin¬ tegration has been going on uninterruptedly for ages with no leaching, the soluble salts are always found in large and often in excessive amounts, as, for example, in the so-called alkali soils, which are simply soils containing an excess of soluble salts accumulated at or near the surface, and which when this excess is removed, dispersed or otherwise rendered in¬ nocuous, are among the most fertile known.

Chemical analysis shows soils to be very variable in composition, and since the processes by which soils are formed and plant food ren¬ dered available are continually going on, fre¬ quent examinations are necessary if accurate knowledge of the chemical properties of a soil at any given time or of the amounts of plant food becoming available during the period of growth of a plant is to be had. While, as already inti¬ mated, chemical analysis must not be taken as an absolute guide to the fertilizer deficiencies and requirements of soils, certain general de¬ ductions have been drawn from soil analyses which may be of practical value if applied with discrimination. For example, German authori¬ ties classify soils on the basis of their chemical analysis as follows : Soils containing less than 0.05 per cent of either nitrogen or phosphoric acid are considered as poor, those containing from 0.05 to 0.1 per cent moderately rich, 0.1 per cent average or normal, from 0.10 to 0.15 per cent good, and above 0.15 per cent rich; soils containing less than 0.05 per cent of potash are classified as poor, from 0.05 to 0.15 per cent moderately rich, from 0.15 to 0.25 per cent average or normal, and over 0.25 per cent rich ; loam soils containing less than 0.1 per cent of lime are classified as poor, from 0.1 to 0.25

per cent moderately rich, from 0.25 to 0.5 per cent average or normal, from 0.5 to 1 per cent good, and over 1 per cent rich ; sandy soils con¬ taining less than 0.05 per cent of lime are clas¬ sified as poor, from 0.5 to 0.1 per cent mod¬ erately rich, from 0.1 to 0.2 per cent average or normal. Over 0.2 per cent of lime is not often found in sandy soils.

The minimum percentages of the different mineral elements in the soils of the United

States which, according to Hilgard, chemical analysis has found to be necessary to the thrifty growth of general crops, may be summarized as follows : Potash may vary widely without ma¬ terial effect but should not as a rule be less than 0.25 per cent. One-tenth per cent of phosphoric acid is adequate and there should not be less than 0.05 per cent of it. The greater the proportions of lime and humus and the less the amount of iron in the soil the smaller the percentage of phosphoric acid re¬ quired. One-tenth per cent of nitrogen is ade¬ quate. Lime should not fall below 0.1 per cent in sandy soils nor 0.6 per cent in heavy clay soils. As a general rule the larger the propor¬ tion of lime present the lower the percentages of potash, phosphoric acid and nitrogen re¬ quired. Magnesia is seldom deficient.* Iron is usually present in abundance. Humus, which modern investigation has shown to be a variable complex of many substances and not a definite compound, may vary widely in amount and nitrogen content. The humus of humid soils usually contains a smaller percentage of nitro¬ gen than that of soils of arid regions. Humus is not only important as a source of supply of nitrogen, but also of other plant food constitu¬ ents — potash, phosphoric acid, lime, etc. Ac¬ cording to Snyder, the proportion of these con¬ stituents combined with humus represents to a large extent the amounts available in the soil.

An important property of soils, which is partly chemical and partly physical, is their absorptive power for fertilizing constituents, which prevents these constituents from being lost in the drainage or dissipated in other ways before the plant can utilize them. Ot the more important fertilizing constituents soils ap¬ parently have the least retentive power for nitrogen (especially in the form of nitrates) and the greatest for. phosphoric acid. Soils ap¬ parently hold lime less tenaciously than potash, since it has been shown that when potassium chloride is added to a soil the potash is retained by the soil and the lime of the soil passes into the drainage in combination with the chlorine.

Physical Properties and Processes. — The physical properties of soils

which are of special importance are color, weight, fineness of divi¬ sion or texture, arrangement of particles or structure, adhesiveness, and relations to heat, gases, water and dissolved solids. The physi¬ cal properties of soils are to such a large extent inherent that the common practice ot selecting soils with special reference to the suitability of their physical properties to the crop to be grown is usually a wise one. Nevertheless good tilth with good water conditions, aeration and tem¬ perature, as well as an adequate supply of plant food, which are so essential to productiveness, may be modified and improved to a considerable extent by proper management, culture and fer¬ tilizing, and with the improved physical condi¬ tions the chemical and biological processes of the soil come effectively into play.

The physical properties of soils depend largely upon the relative proportions of stones, gravel, sand, clay, lime, and organic matter pres¬ ent. Sandy soils are as a rule light colored, dry, warm, of low adhesive power, have little

- According to Loew magnesium salts unaccompanied by a certain proportion of lime exert a toxic effect on plant growth.

absorptive capacity for moisture and fertilizing: matter, and are generally poor. Clayey soils are more adhesive and have a stronger absorp¬ tive power for water and fertilizing matter. They are as a rule wetter, cooler and more dif¬ ficult to work than sandy soils, but are naturally more fertile. Soils containing a considerable amount of humus are dark colored and light in weight and have a strong absorptive power. Hence, humus soils are frequently wet soils. Lime improves the structure of both sandy and clayey soils, hastens the decay of organic mat¬ ter, corrects acidity and promotes nitrification and other beneficial bacterial activities.

• The color of soils is determined in most cases by the proportions of organic matter and oxide of iron they contain and is of little im¬ portance except that it probably affects in some degree the temperature of the soil (see below).

Soils vary widely in weight, as already inti¬ mated. Hall gives the following figures :

Weights per Cubic Foot of Different Kinds

of Soil.

Weight per cubic foot Pounds

Heavy clay . 66.4

Sandy clay . 80.0

Light loam . 76.4

Sandy loam . 76.7

Sandy peat . 49.0

Light sand . 79.2

Texture and Structure of Soils. — The pro¬ ductiveness of a soil depends to a considerable extent upon its texture (fineness of particles) and structure (arrangement of particles). These properties determine largely the circulation of water and gases, the solution and retention of plant food and the growth of roots of plants. Good texture and structure thus enable a poor soil to produce better crops than a more fertile soil of which the texture and structure are not so good. One of the main objects of tillage is to promote better soil texture and structure. These properties are affected to a considerable extent by various fertilizers. For instance, lime has the power of flocculating jhe soil particles and thus renders soils more porous, while sodium nitrate and many other substances have a tendency to puddle the soil, that is, to keep the particles separate and thus prevent the open floccular structure. Soils containing large amounts of clay and other fine particles are most injured by puddling and hence most bene¬ fited by flocculating by means of lime.

Relation of Soils to Heat. — The tempera¬ ture of the surface soil is subject to the same changes as that of the air, but these changes occur more slowly. The variations decrease as the depth increases until they finally disappear. There are several modifying influences affecting the temperature of the soil. The first of these is color. A dark colored soil is usually warmer than a light colored soil. A soil containing much sand or gravel is as a rule warmer than one containing much clay or humus, as already intimated. Soils exposed so as to receive a large amount of the direct rays of the sun are warmer than those not having such exposure. Probably the most important factor determining the temperature of a soil is its water content. A wet soil is cold. Evaporation is a cooling process, and the heat necessary to carry it on

is drawn from the soil, thus lowering its tem¬ perature.

Relation of Soils to Water. — The develop¬ ment of plants is impossible without a sufficient supply of water in the soil at all periods of growth. Water is not only an important con¬ stituent of plant tissue, but it is of the greatest importance as a solvent and carrier of food in the soil and in the plant. A comparatively small part of that taken into the plant is used to build tissue, the larger part passing out through the leaves by transpiration, which is, however, essential to the healthy growth of the plant. It is estimated that for each pound of dry matter produced in the crop from 250 to 500 pounds of water is drawn from the soil. All soils are capable of absorbing and retaining moisture, but the extent to which they do so varies widely, a fact which is of great import¬ ance in determining the mutual adaptability of crops and soils. As a rule the capacity of soils to hold water is proportional to the size of the soil particles, the finer the particles the larger the total surface area of the particles and the greater the capacity for water, although this is not invariably true. King has computed the pore space and surface area of the particles of different kinds of soils as follows:

Pore Space and Surface Area of Particles in Different Kinds of Soil.

KIND OF SOIL

Pore space

Area of sur¬ face per cubic foot of soil

)

Per cent

Sq. ft.

Finest clay soil .

52.9

173,700

Fine clay soil .

48.0

110,500

Loamy clay soil .

49.2

70,500

Loam .

1. 1

46,500

Sandy loam .

38.8

36 , 880

Sandy soil .

32.5

11,000

Coarse sand allows water to run through freely, retaining: relatively little, while fine clay absorbs and retains a large amount. The pro¬ portion of organic matter is also an important factor in determining the water-holding ca¬ pacity of soils, the larger the proportion of or¬ ganic matter the greater the capacity of the soil for holding water. Healthy root development is not possible in a soil saturated with moisture. The most favorable amount of water for plant growth is stated to be from 40 to 75 per cent of that which the soil is capable of holding when completely saturated. Another important factor to be taken into consideration is that soils vary in the readiness with which they give up water to growing plants when the amount becomes limited. Crops can utilize a larger proportion of the water in open, coarse-grained sandy soils than of that in compact fine-grained clay soils. In other words, plants will suffer from drought on compact clay soils containing a proportion of moisture which would be entirely sufficient for their needs on sandy soils. Thus, while sandy soils have a much smaller total storage capacity for water than clay soils, the available water is more nearly equal in the two cases than would at first be supposed. Sachs found that tobacco plants began to wilt when the water content of sandy soil was reduced to 1.5 per cent, of clay

soils to 8 per cent and of sand and humus to 12.3 per cent.

Water exists in soils in three different states, which may be termed hydrostatic, capillary and hygroscopic. Hydrostatic water is that which fills the soil spaces and would drain away if given opportunity. Its upper surface stands at a certain level, which is known as the water table. Capillary (or film) water is that which is capable of rising in the soil or of moving from a more moist to a less moist part of the soil under the influence of surface tension with¬ out regard to the force of gravity. Hygroscopic water is that which closely surrounds the soil particles, but is not affected by gravitv and does not move through the soil under the in¬ fluence of surface tension. Capillarv water is often drawn from the hydrostatic supply and is the most important from the standpoint of plant growth. Hygroscopic water is not ot great value to vegetation. Heinrich found that plants begin to wilt before the water content of soils is reduced to the hygroscopic limit.

Soil water when present in sufficient amount is constantly in motion. In case of rainfall, irrigation or the melting of snows, the moisture sinks into the soil, carrying along with it oxy¬ gen, carbonic acid, nitric acid, ammonia, etc., and rendering plant food available, a part of which may be lost in the drainage if the water supply is excessive. This downward movement or percolation of water due to gravity is most rapid in soils of small retentive power, that is, coarse-grained open soils. Agencies like lime, which flocculate the soil particles and loosen the soil, promote percolation, and those like alkali salts, which tend to compact the soil and puddle its particles, retard it. When the supply of water ceases evaporation commences, and the soil water begins to rise by capillarity, carrying along with it dissolved plant food which ac¬ cumulates in the surface soil within easy reach of the roots of plants. A harmful accumulation of soluble salts (alkali), however, is thus some¬ times brought about in regions of deficient or irregular rainfall.

The capillary properties of soils are of great importance since they determine largely the available water supply of soils. Different soils vary widely as regards the amount of capillary water they retain. Schubler has shown that the water content of a soil is a function of its structure. Coarse sand sometimes retains as little as 15 per cent, while heavy clay loam and soils containing a large amount of humus often retain as much as 50 to 60 per cent. Ordinary loams retain about 40 per cent. As King has pointed out, however, the amount of capillary water actually found in soils in the field are as a rule smaller than the

theoretical amounts that the soils are capable of holding, and are con¬ trolled to a large extent by the depth of the water table, which is constantly fluctuating. The capillary movement of water has been ob¬ served to extend to a depth of seven feet, but declines as the denth of the water table in¬ creases. As a rule the amount of capillary water in the soil decreases from the water table upward toward the surface. In the finer soils the moisture as a rule rises more slowly, but to a greater height than in the coarser. The force, surface tension, which causes water to rise in a soil also produces a lateral movement,

but this is much slower than the other. All movements of water become more rapid as the soil approaches saturation.

Under ordinary conditions moisture is con¬ stantly escaping from the soil by evaporation. Evaporation may be reduced by tillage and mulching which interfere with the capillary rise of moisture in the soil, and by the use of wind¬ breaks which lessen the drying effect of winds. The belief is common that the moisture condi¬ tions of soils may be materially modified by the use of fertilizers, more especially by the appli¬ cation of common salt, but careful observations and experiments on this point have failed to show any decided effect in increasing the water content of soils by ordinary applications of salt and similar substances.

Colloidal substances, in humus, clay and the like, appear to play an important part in soils, influencing especially their absorptive properties. Unfortunately exact knowledge on this point is comparatively limited and not yet sufficient for generalization of much practical significance.

Biological Action in the Soil. — A large and very important part of the changes which go on in soils is due to biological processes, that is, to the actions of living organisms, in¬ cluding the roots of plants, earthworms and other living agencies, but especially the micro¬ organisms, generally grouped under the term bacteria. These play an important part in fix¬ ing the free nitrogen of the air in the soil for the use of plants, in converting the organic nitrogen of soils into readily available forms by the process of nitrification, or in causing a loss of the soil nitrogen by denitrification. They are also active agents in the disintegra¬ tion of rocks and the formation of soils ; and in the formation of acids from organic matter in the soil, thus rendering the application of lime or other neutralizing agents necessary. It is the object of good soil management to so control the conditions of moisture, aeration, temperatures, etc., that the beneficial biological processes are promoted and the harmful re¬ strained.

Bacterial life is suspended or may be de¬ stroyed in very dry soils. Hence the number of bacteria in soils is low after drought and high after rain. Excessive moisture, however, produces conditions (reduced aeration, acidity, etc.) unfavorable to beneficial organisms but favorable to harmful organisms, such as deni¬ trifying bacteria, which cause loss of nitrogen or its conversion into less assimilable forms, and protozoa and similar organisms, which feed on and hence reduce the number of bene¬ ficial organisms. Hence it is very important for bacteriological as well as other reasons that soils should be well drained. Bacterial action is more intense and long-continued in warm soils. Bacteria live but are not active in frozen soils. Like the higher plants they are dor¬ mant in winter but awaken with renewed life and activity in the spring. The prompt¬ ness and vigor with which they awake depends upon and in a measure determines whether a soil is ˆearly" or Hate.® About 25° C. is considered the optimum temperature for the growth of the more important soil organ¬ isms. Beneficial organisms do not as a rule thrive in acid soils, hence such soils should be limed to correct the acidity. Excessive alkali

is also harmful. Soils must be well supplied with organic matter (humus) to furnish the food (energy) required by bacteria, and with a certain amount of phosphate, which is also a necessary food. The activity of soil organ¬ isms is influenced not only by soil conditions but also by the character of the plants grown on the soil. For example, nitrification appears to be more active under corn than under tim¬ othy and mixed grasses, and similar differences have been noted with other crops.

Among the more active and important classes of soil organisms are molds which fix nitrogen, produce ammonia and decompose cel¬ lulose; mycorrhiza, which probably fix nitro¬ gen ; actinomyces , which decompose organic matter; alga, which manufacture food for azotobacter ; protozoa, which prey upon bene¬ ficial organisms ; bacteria, which oxidize carbon, fix and transform nitrogen and make mineral constituents of the soil available. Many or¬ ganisms which cause plant diseases also live in the soil and play an important part in determin¬ ing its productiveness. The destruction of these organisms as well as those that interfere with the growth of beneficial bacteria is of great practical importance from the standpoint of soil sanitation and productiveness. So- called ˆexhausted,® <(tired® or <(sick® soils are very often simply those in which harmful or¬ ganisms

predominate and their productiveness is readily restored by partial sterilization by means of heat, as in the case of the steaming of greenhouse beds, or by the use of volatile antiseptics like carbon bisulphide, toluol and others.

Soil Toxins. — The theory has been advanced that soils are rendered unproductive by the presence of toxic substances excreted by the roots of plants, produced by bacteria or de¬ rived from the decomposition of organic mat¬ ter. According to Russell ((there is no evidence of the presence of soluble toxins in normally aerated soils sufficiently supplied with plant food and with calcium carbonate, but toxins may oc¬ cur on <sour) soils badly aerated and lacking in calcium carbonate, or on other exhausted soils. There is no evidence of any plant excretions conferring toxic properties on the soil, but

. . a growing plant may poison its neigh¬ bour. . . . Soluble bacterio-toxins are not

normal constituents of soils, but must repre¬ sent unusual conditions wherever they occur. But the possibility of the existence of toxins insoluble in water still remains.® Schreiner in his exhaustive study of the organic matter of the soil has isolated a great variety of com¬ pounds some of which have toxic properties.

Exhaustion, Improvement and Reclama¬ tion of Soils. — Soils are said to be exhausted when they no longer yield profitable crops, but strictly speaking there is no such thing as abso¬ lute exhaustion of soils. However, soils de¬ cline in productiveness both as a result of loss of fertilizing constituents from the soil and of deterioration in its physical and biological con¬ dition.

Among the principal causes of loss of soil fertility are (1) the growth and removal of crops without restoring the equivalent of the fertilizing constituents they contain; (2) sur¬ face washing, and (3) leaching. All crops con¬ tain a considerable amount of fertilizing mat¬

ter drawn from the soil, and it is held that if these crops are grown continuously and sold away from the farm without return of an equivalent in manure or fertilizers the soil will in time show a decline in fertility. The harm¬ ful effects of surface washing is a matter of common observation and needs no further dis¬ cussion here. The loss of fertility in the drain¬ age water is generally supposed to be very con¬ siderable, and under certain circumstances this is true, depending upon the character of the soil and the treatment to which it is subjected and the fertilizers applied. <(Leachy® soils part very

quickly with the fertilizing materials ap¬ plied to them unless covered with crops which utilize the fertilizers promptly, and, as already shown, certain fertilizers have a tendency to set some of the soil constituents free and throw them into the drainage water.

While these are all possible sources of loss, it is probably safe to say that under ordinary conditions the chances of loss of any consider¬ able amount of lime, potash or phosphoric acid in the drainage water of soils are very small. As regards the loss of the important and ex¬ pensive fertilizing constituent, nitrogen, how¬ ever, the case is very different. The soil ap¬ pears to have very little affinity for one of the. forms of this element most commonly used as a fertilizer, namely, nitrate of soda, and if it is not quickly taken up by the crop it is likely to pass into the drainage and be lost. Moreover, other less soluble forms of nitrogen are under favor¬ able conditions rapidly converted into nitrates by the process of nitrification, and so may also be lost in the drainage. Deherain has reported experiments in which the loss of nitric nitrogen in the drainage from a bare soil in the course of a year was nearly 180 pounds per acre, while the loss from a soil which was kept covered by a crop was almost insignificant, although fully as large an amount of nitrates was formed in the latter case as in the former. Under unfa¬ vorable soil conditions there may be consider¬ able loss of nitrogen through denitrification.

Unproductiveness due to physical condition may be corrected by a variety of means, includ¬ ing drainage, irrigation, tillage and by a judi¬ cious system of cropping and the proper use of manures and fertilizers.

There are large areas of swamp, marsh or muck soils which prove highly productive when reclaimed. In reclaiming such soils the first essential is thorough drainage. This is not only necessary for the purpose of removing the ex¬ cess of water, but to allow the free circulation of air in the soil, in order that*the poisonous compounds which are usually present may be oxidized and thus rendered harmless, and that the processes of decomposition and nitrification so necessary to render plant food available in this class of soil may be set up. Paring and burning to a depth of 12 to 16 inches as prac¬ tised in Ireland and in European countries, and the liberal use of manures and fertilizers may often be necessary in addition to drainage, since such soils are as a rule deficient in phosphoric acid and potash, and although composed almost entirely of organic matter they are often de¬ ficient in available nitrogen. Lime and the bulky manures often exert a beneficial effect on the texture of the soils, rendering them more porous, and thus improving drainage and

increasing aeration and nitrification. Liberal applications of wood ashes also improve the texture of the soil, correct acidity and favor nitrification, and at the same time furnish pot¬ ash and phosphoric acid. An application of a mixture of kainit or muriate of potash with some cheap phosphate, such as fine-ground Florida phosphate, may be substituted for the ashes. The untreated mineral phosphates have been used with advantage on muck soils, the decomposing organic matter assisting in ren¬ dering the phosphoric acid available.

There are large areas of sandy lands in different parts of the United States which are extremely deficient in plant food, but which prove very valuable for a variety of purposes, but especially for early crops, when they are properly managed. One of the first require¬ ments of such soils is an increase of humus to improve their water-holding capacity. The most effective means which has been found for increasing the humus supply in such soils is the growing and turning under of green crops, preferably leguminous plants, which are nitro¬ gen collectors. Moderate liming has also been found beneficial in many cases.

Methods of Investigation. — Three prin¬ cipal methods are employed in studying the characteristics and requirements of soils, namely, (1) mechanical and chemical analysis; (2) experiments in lysimeters, pits, pots or boxes, and (3) field experiments. The nature of the methods pursued in the chemical inves¬ tigation of soils has already been indicated. The object of mechanical analysis is to separate the soil into particles of different degrees of fineness so that a basis may be secured for judging of the physical properties of the soil. Mechanical analysis as ordinarily practised separates a soil into what is termed skeleton (consisting of coarse particles like gravel and coarse sand larger than 0.5 millimeter in size) and fine earth, which includes all particles passing a sieve with meshes 0.5 millimeter in diameter. The fine earth is further separated into some six different grades, ranging from medium sand with particles 0.25 to 0.5 milli¬ meter in diameter, through fine sand, silt, to clay, the particles of which are less than 0.005 millimeter in diameter. The methods of me¬ chanical analysis which have been employed are of three classes: (1) hydraulic (Hilgard, Schone, Nobel) ; (2) sedimentation (Osborne, Schloesing, Knop), and (3) centrifugal. The methods which have been most commonly used in the United States are modifications either of Osborne's beaker (sedimentation) method or Hilgard's elutriator (hydraulic) method.

The physical examination of a soil also involves determinations of water-holding capacity, . rate of percolation, capillary rise, hygroscopicity, adhesive power, etc., for all of which ingenious methods have been devised.

Soil Surveys. — The soils of the United States have been studied to a considerable ex¬ tent by the agricultural experiment stations, but while the work of the stations on soils has been quite varied and extensive it has not been systematic. The need for systematic and con¬ certed study of soils has, however, been met by the organization and development of the work of the Bureau of Soils of the United States Department of Agriculture, which under¬

takes the survey, mapping and study of soils on a scale never before attempted. In the in¬ auguration of this work <(it was recognized that differences of commercial value could be seen in the field from the character of the soil and from its relation to crops and vegetation; that it was quite possible to map these soil areas independently of the geology of the area or the exact chemical or physical character of the soil ; that the proper course was to construct maps in the field, showing the area and dis¬ tribution of the soil types; to explain as fully as possible from geological considerations the origin of the soil, and to have the soil chemist and physicist study the differences in the soil types.® Note is also made of climatic and economic conditions which may significantly affect the cropping practice. Extensive labor¬ atory investigations supplemental to the field operations are conducted with a view to deter¬ mining the chemical and physical properties of soils, improving methods and working out a more clearly defined classification.

In Germany elaborate soil surveys with ref¬ erence to physical and chemical properties and productive and taxable value of the land have been made under government auspices by the ((Laboratorium fur Bodenkunde® at Berlin. A systematic chemical survey of the soils of Bel¬ gium was undertaken under the direction of the Gembloux Station. In France soil surveys have been undertaken by several of the depart¬ ments, . the soils being mapped with reference to their crop adaptations and fertilizer require¬ ments. In Russia soil surveys have been suc¬ cessfully prosecuted in several of the govern¬ ments, and Japan has made considerable prog¬ ress in work of this character.

Bibliography. — Risler, (Geologie agricole) (Paris 1884-95) ; McConnell, (Elements of Agricultural Geology) (1902) ; Marr, Agricul¬ tural Geology> (1903) ; Shaler, (Twelfth Annual Report United States Geological Survey 1890-91, I, pp. 213-245) ; Merrill, (

Rocks, Rock-weather¬ ing, and Soils *(1906) ; Fream, (Soils and Their Properties) (1895) ; King, (The SoiP (1898) and (Soil Management (1914) ; Hall, (The SoiP (1908) ; Storer, Agricul- ture) (1897) ; Roberts, (The Fertility of the Land* (1897) ; Deherain, (Chimie agric- ole) (Paris 1903) ; Warington, (Physical Properties of Soils) (1900) ; Hilgard, (Soils *(1906) ; Lipman, (Bacteria in Relation to Coun¬ try Life) (1908) ; McConnell, <Soils) (1908) ; Hopkins, (Soil Fertility) (1910) and (The Story of the SoiP (1911) ; Dumont, (La Terre Arable) (1910) ; Mitscherlich, (Boden- kunde) (1913); Lohnis, (Boden-Bakterien und Boden-Fruchtbarkeit* (1914) ; Russell, (Soil Conditions and Plant Growth *(1915) ; Lyon and Fippin, (Soils* (1915) ; Conn, Agri¬ cultural Bacteriology* (1918) ; United States Weather Bureau Bulletins 3, 4, 5, Publications of the Bureau of Soils of the United States De¬ partment of Agriculture, especially Bulletins 75, <(The Organic Constituents of Soils,® and 96, ((Soils of the United States.®

W. H. Beal,

United States Department of Agriculture.

SOIL, Physical Properties of. See Soil. SOIL SURVEY. See Soil.

SOILING, the system of feeding grazing animals, especially cattle, in barns ana other enclosures, with freshly cut green crops grown for the purpose, instead of turning them out to pasture. The practice has its most important application in intensive farming and on small farms as in Europe, but is also practised in other regions where the agricultural resources are undergoing development from extensive to intensive methods. In many parts of Europe the animals are soiled during the whole year, never being allowed to graze at all. In the older parts of America and Australia this is also true to some extent; but generally in these newer countries the practice is combined with pasturing, the animals being usually kept in the barns during the day to reduce annoyance from flies, and turned out to graze at night fall. It is also true in America that the animals are more seldom fed in barns even during summer than in Europe. However, dairy cattle, es¬ pecially in the vicinity of cities, are frequently kept in the stables and fed there the year around with soiling crops, supplemented with hay, grain and other dry feeds. This practice appears to be growing in popularity.

In America soiling first began to attract at¬ tention about 100 years

ago, though not until the middle of the past century did it begin to gain ground rapidly, due mainly to the growth of population and the consequent increase in the values of land, more especially in the north¬ eastern quarter of the United States and ad¬ jacent Canada. Agricultural literature shows that at that time the plants most favored were the taller growing fodder crops such as timothy, red clover, oats, cabbage and various roots, es¬ pecially mangels, turnips and carrots. While all these are more or less popular at the present time millet, rape, sorghum, Kaffin corn, crimson clover, cow peas, soy beans, and alfalfa and combinations of Canada field peas with oats, or barley, and winter vetch with rye have more than supplemented, well nigh supplanted, them in general favor. This is mainly because these crops cover the whole season more completely than the former list and also yield larger quanti¬ ties of fodder on given areas. Especially is this the case with alfalfa which not only may be cut several times, thus yielding heavily, but the green material is notably rich in muscle and milk-forming compounds.

In the Middle West where areas are less restricted than in the East and where natural grasses are abundant, pasturing rather than soiling is the vogue. But even here the newer practice is gaining headway in the vicinity of cities because of its economy and expediency. There as elsewhere a larger number of animals may be sustained by an equal area in pasturage. When the animals are cbnfined the expense of erecting and maintaining fences is eliminated, except for small paddocks. The waste of food due to trampling and defiling with manure is avoided. The animals may always be assured of abundant food. The manure may be evenly distributed, especially when mechanical spreaders are used, thus preventing the too abundant de¬ posits in some parts of the field, the almost en¬ tire lack in others and the irregular distribu¬ tion between these two extremes. Except for the increased labor of handling the food and the manure the system has no serious disad¬

vantage, though it is claimed that animals thrive best where they are allowed exercise; but this may be secured in summer at least by the free¬ dom of a paddock, preferably at night. For this last reason soiling and pasturing are com¬ monly combined in the United States, the pas¬ ture being kept as remote as convenient from the crop fields so the animals may not become restive and be tempted to break through the fences.

Experiments have been tried in soiling and bulletins published by various experiment sta¬ tions, more especially those of the East. The Bureau of Animal Industry of the United States Department of

Agriculture has also issued in¬ formation on this subject.

M. G. Kains, Horticultural Consultant.

SOI.SSONS, swa-son, France, a city in the department of Aisne, 51 miles northeast of Paris on the Aisne River. It is an episcopal see and the old cathedral (12th century) contains a library, with a valuable collection of manu¬ scripts. Here"stands the venerable abbey of Saint Jean des Vignes (1076), where Thomas a Becket sought refuge when exiled ; the Ro¬ manesque church, Saint Peter (12th century) ; Notre Dame and Saint Leger. The chief secu¬ lar buildings are a museum of antiquities and a public library, with 30,000 volumes ; besides a college and two seminaries and a hospital. There are interesting Roman antiquities, includ¬ ing the ruins of a large ‘amphitheatre, coins, mosaics, sculptures and vases. Near the suburb of. Saint Vaast lies the village of Saint Medard, the site of a revered abbey with seven churches, a famous place of pilgrimage. Sois- sons has oil-mills, stocking factories and tan¬ neries and a large trade in grain, flour and beans. The town has been the scene of many important historical events, the battle ground of fierce armies and was largely devastated in the great World War. See War, European.

SOJOURNER TRUTH, American aboli¬ tionist : b. Ulster County, N. Y., about 1775; d. Battle Creek, Mich., 26 Nov. 1883. She was born a slave and received the name of Isabella Hardenberg. That of Sojourner Truth she claimed to have been revealed to her by God as designating her mission in the world. By the act of the New York legislature of 1827 abolish¬ ing slavery in that State she became free and, having gone to New York, was brought to the attention of Susan B. Anthony and other well- known abolitionists and reformers. Encour¬ aged by them, she began her career as a public lecturer, at first upon the slave question and, after the emancipation of her people, as an ad¬ vocate of women’s rights and in the cause of temperance. For many years she endeavored to secure from the government of the United States a grant of public lands for the establish¬ ment of a negro colony.

SOKOLOW, Nahum, Russian Hebrew journalist: b. Wishograd, government of Plock, Russian Poland, 10 Jan. 1859. He early dis¬ played remarkable intellectual gifts and in 1884 after receiving a careful education he became assistant editor of Ha-Zefirah at Warsaw. The publication was later changed to a dailv and he became editor and manager. After the death of the owner, Slonimski, in 1904, he was owner as

well as editor. He was a prolific writer for the Hebrew press and after 1896 was also editor of the Polish weekly Israelita. He is generally regarded as the foremost Hebrew journalist in Russia. He founded the yearbook <Ha-Asif) and its successor, (Sefer ha-Shanah) (1899-1902). After long hesitation he joined the Jewish Nationalist movement. During the European War he made his home temporarily in London. Author of numerous works, among which may be mentioned (Le-Maranan we- Rabanan) (1900) ; (Tochen ha-ZiyonaP (1912), etc. In 1919 he was engaged in completing his only work in English, (History of Zionism? (2 vols.), of which one volume has been pub¬ lished.

SOKOTO, s6-k6'to, Nigeria, Central Africa, (1) the former a capital of the government of the same name, situated on a long ridge, 18 miles east of Warnu, which forms a joint capital. It is surrounded by a wall and is well built in Moorish style. There were at one time important manufactures of muslin, shoes, iron¬ work, etc., and a population of 80,000, but this has now dwindled to 1,500. (2) A semi-depend¬ ent native government, bounded by Sudan on the north, the river Benue on the south and on the east and west by the native kingdoms of Bornu and Gandu, respectively. Its area is about 100,000 square miles. The general relief is flat, but in the province of Adamawa rises to an altitude of 10,000 feet. It is well watered and there are large deposits of excellent iron ore. The ruling race is the Fulah. Their sub¬ jects — the Haussa and various negro tribes — form the population. In 1885 the sultan of Sokoto put his kingdom under the protectorate of Great Britain and granted to the Royal Niger Company the monopoly of trade. In 1902 the British assumed control, and suppressed a re¬ bellion. The principal town is now Kano.

SOL-FA, TONIC SOL- FA, or MOVABLE DOH, SYSTEM, a modern scientific method of classifying, ex¬ plaining and teaching the facts of music, of especial value in the acquisition of the art of sight-singing. The system proceeds on the principle of giving the chief prominence to the fact that there is in reality but one scale in music, which is raised or lowered according to the pitch of the key. The seven notes of the diatonic scale are represented by the solfeggio (q.v.) syllables, or rather modifications of them — Doh, Ray, Me, Fah, Soh, Lah, Te; Doh standing for the keynote in whatever key the music is written. In the early exercises the pupils are accustomed to a scale or dia¬ gram, called the Modulator, representing pictorially the exact intervals of a key, with the semitones in their proper places. In written music only

_ the initial letters of the sol-

Moduiator. ' feggio syllables are used —

ta

m

f1

d1

te

lah

se

soh

fah

me

ray

doh

ti

li

Si

fi

mi

fe

J

d, r, m, f, s, 1, t ; the higher octaves of a given note being distinguished by a1 above, as d1, r1; and the lower by a i or 2 below, mi, m2. The name of the key is prefixed to a tune as its signature, as <(Key A,® <(Key B flat® — the keynote being, in all the major keys, Doh. To indicate rhythm a per¬

pendicular line

precedes the stronger or

louder accent, a colon: the softer accent and, where necessary, a shorter perpendicular

line

the accent of medium force. • A note

immediately following an accent mark is sup¬ posed to occupy the time from that accent to the next. A horizontal line indicates the continu¬ ance of the previous note through another pulse or beat. A dot divides a pulse into equal sub¬ divisions. A dot after a mark of continuance indicates that previous note is to be continued through half that pulse. A comma indicates that the note preceding it fills a quarter of the time from one accent to the next ; a dot and comma together three-quarters. An inverted, comma ‘ is used to denote that the note pre¬ ceding it fills one-third of the time from one ac¬ cent to the next. An unfilled space indicates a rest or pause of the voice. A line below two or more notes signifies that they are to be sung to the same syllable. The following example of the tonic sol-fa shown alongside of the ordi¬ nary notation, illustrates most of the features named.

Krr A.

My Country, ’Tis of Thee.

In modulating into a new key the note through which the transition is taken is indi¬ cated by a combination of the syllabic name which it has in the old key with that which it has in the new — me lah, for example, being conjoined into m’lah, and in writing this note (termed a bridge note) the initial letter of its syllable, as a member of the old key, is placed in small size before and above the initial of the syllable of the new, as ml ds. In the case, however, of an accidental, where the transition is but momentary, a sharpened note changes its syllabic vowel into e, and a flattened note into aw, spelled a, as fah, fe, soh, se, te, ta. In the minor mode lah is the keynote; the sharp sixth is called bay and the sharp seventh se. The signature of the key of A minor is ((Key C® ; lah is A.

The method of teaching is of equal impor¬ tance with the notation itself. For a full ex¬ planation of this system, consult Curwen, (Course of Lessons and Exercises in Tonic Sol-fa. > Its advocates maintain that

it pos¬ sesses advantages over the common system in the facility of its acquisition; the distinctness with which it indicates the keynote and the position of the semitones ; the cheapness with which it is printed; and the manner in which, they say, it explains the proper mental effects of notes in harmony and key-relationship and em-

ploys them in teaching. It has, however, been objected to by others, from its withdrawal of the direct indication of both absolute and relative pitch to the eye which exists in the common notation, from its limited applicability to instrumental music and from its acquirement not being, like that of the ordinary notation, an introduction to the world of musical literature. It presents, however, no barrier, but rather a road to the acquisition of the older notation; and its widespread use and the testimony of the general body of practical teachers are eloquent arguments in its favor.

In the history of music various attempts have been made to introduce a musical nota¬ tion in which the staff with its lines and spaces is dispensed with. Jean Jacques Rousseau sug¬ gested, but afterward discarded, a notation where the notes of the scale were indicated by the Arabic numerals — a principle which is the chief feature of the Cheve system, largely used in France, the time-names of which have been adopted by the Tonic Sol-fa system. The latter system, similar to Rousseau's in its leading fea¬ tures, has been promoted chiefly by the Rev. John. Curwen (q.v.), who obtained his main principles about 1840 from Miss Glover, a teacher at Norwich. It was brought into al¬ most general use in the singing schools of Great Britain and her colonies and later into the United States with moderate success. The London Tonic Sol-fa College was founded in

1.

SOLAN GOOSE, the common gannet

(q.v.).

SOLANACEZE, the nightshade family, an order of plants containing about 1,500 species arranged in 70 genera, mostly herbs and shrubs widely distributed in warm climates, and es¬ pecially in tropical America. They are usually malodorous and are characterized by

alternate, lobed or undivided leaves, monopetalous flow¬ ers of various colors and sizes arranged in various ways — fascicles, cymes, solitary and followed by two- to many-celled fruits with numerous seeds. The order is of wide eco¬ nomic importance, since it contains several leading food-plants, such as the potato, tomato, tobacco, cayenne, red or garden pepper and various weeds and garden plants, as the petunia, jimson-weed, mandrake and others. The typical and foremost genus is Solarium, of which more than 500 species have been described, mostly natives of tropical America. They are smooth, downy or spiny plants with white or blue axil¬ lary flowers borne singly, in cymes, or in fascicles, followed by roundish two-celled ber¬ ries containing many kidney-shaped seeds. The principal species is S. tuberosum, the common potato (q.v.), in which, as in many other mem¬ bers, is found an alkaloid, solanin, reputed to produce unpleasant physiological effects when the plants are eaten to excess. S. melongena, the egg-plant, is another leading food-species. It was formely regarded as noxious ; on which ac¬ count Girarde (1597) entreats his countrymen to eschew it. N. aviculare or laciniatum is the kangaroo apple of Australia and New Zealand, where its fruits are eaten. S. muricantum, the pepino, melon-pear or melon-shrub, yields an edible fruit suggesting an acid-flavored egg¬ plant fruit. It is grown to a small extent in the United States. The fruits of several East

Indian species are eaten either alone or in cur¬ ries, etc. Two European species, S. nigrum, the common nightshade, and N. dulcamara, the bitter-sweet, are common weeds in the United States. The horse nettle (S. carolinense) and N. rostratum are native, spiny weeds. Several species were formerly used in medicine and still are in the Orient. S. saponaceum yields berries which are used as a substitute for soap. Sev¬ eral species, particularly 5\ jasrninoides, the potato vine, and S. seaforthianum, are popular greenhouse plants of easy culture.

SOLANINE (C21H35NO7), a substance ob¬ tained from the Solarium mammosum of the Antilles. It is also found in the berries of the S. nigrum, as well as in the leaves and stems of bittersweet (S. dulcamara). To obtain it am¬ monia is poured into the filtered juice of the berries, when a grayish matter falls down, which is collected on a filter, washed and treated with boiling alcohol. The solanine precipitates from this by evaporation. It is an opaque, white, somewhat pearly-looking powder; with¬ out smell; very bitter; fusible below 100° C. ; decomposable at a higher temperature; insolu¬ ble in water, ether, oil of olives and essence of turpentine ; but very soluble in hot alcohol, from which it crystallizes in slender, silky needles. It combines with acids, forming salts. It is eminently emetic, and even in

small doses is poisonous.

SOLAR CORONA, in astronomy, the por¬ tion of the aureola observed during total eclipses of the sun, which lies outside the re¬ gion of colored prominences. The region of colored prominences is called the chromosphere. See Sun.

SOLAR CYCLE. See Chronology.

SOLAR ENGINE. See Solar Motor.

SOLAR MICROSCOPE, an instrument bv means of which a magnified image of a small transparent object is projected on a screen, the light employed being sunlight. The solar mi¬ croscope is really a magic lantern, in which the microscopic object is affixed to a clear plate, and the light employed bright sunlight reflected into the instrument. The reflector being ad¬ justed throws the sun's rays into a tube set in a window shutter, closed to exclude the light. A double lens focuses the image on a second system of lenses, which throw it upon the screen. See Microscope, Solar.

SOLAR MOTOR, a mechanism for secur¬ ing motive power from the sun. For many years the attention of inventors has been di¬ rected to the question of utilizing the direct rays of the sun as a substitute for coal, wood or other fuel ; large burning-glasses or reflectors being the general form of the various machines. A so-called "burning mirror, » made in France by Villette, was four feet in diameter, and pro¬ duced so intense a heat that, according to the report, it melted cast iron in 16 seconds, prob¬ ably an exaggeration. It was for a long time difficult to build a concave mirror of very large size, but this was finally overcome by having the surface of the concave mirror covered with small pieces of glass, or mirrors, each of which is so placed that the light or reflection from each side is thrown upon the same spot, the sum total, or the amount of heat centralized, being equivalent to the amount reflected by

each glass, mutiplied by the number of mirrors. In Europe the early solar glasses were generally of two kinds; that is, the heat was concentrated in two ways — by reflection from polished con¬ cave mirrors and by refraction through a con¬ vex lens. The earliest use, centuries ago, of such a contrivance was theoretically to dazzle or blind an enemy, metal discs being employed ; but nearly all such

devices failed to be of any practical value. Sir William Herschel experi¬ mented with the sun's heat in Africa; and Captain Ericsson made a number of studies in this direction and exhibited a solar motor in New York in 1884.

Within recent years a successful sun motor has been built at South Pasadena, Cal., and here is an automatic engine run by the heat of the sun. In appearance the motor resembles a huge dish of glass, with a central aperture, and at a distance might be taken for a windmill ; but the dish is a reflector 33 feet in diameter. The inner surface is made up of 1,788 small mir¬ rors, arranged so that they concentrate the sun upon the central or focal point. Here is sus¬ pended the boiler, which is of tubular form and 13 feet long, holding 100 gallons of water, leaving eight cubic feet for steam. The motor is attractive in appearance; built lightly, sup¬ ported by seeming delicate shafts, though in reality strong enough to resist a wind pressure of 100 miles an hour. The reflector must face the sun exactly, and as heavy as it is, weighing tons, it can be easily moved. It stands, after the fashion of the telescope, upon an equatorial mounting, the axis being north and south ; the reflector follows the sun, regulated by a clock, the work being automatic, as, in fact, is every¬ thing about it. The true focus is shown by an indicator, and in about an hour after it is ad¬ justed in bright sunlight the steam gauge will register 150 pounds. The steam is carried from the suspended boiler to the engine in a flexible tube and returns again from the condenser to the boiler in the form of water, so that the boiler is kept automatically full. The engine is oiled automatically, and when the dish is once turned, facing the sun, it runs all day as independent of an engineer as does a windmill, developing about 12 horse power. While the motor is most interesting to engineers, it has not demonstrated the practicability of the sys¬ tem in competition with the ordinary steam engine or electric power brought from a distance.

SOLAR PARALLAX. See Parallax.

SOLAR STAR. See Stars.

SOLAR SYSTEM, that collection of bodies of which the earth on which we dwell is one, and which are distinguished from all other bodies in the universe by having the sun as the centre of their motions. The bodies of this system may be classified as follows:

1. The Sun. — The great central body, shed¬ ding its light and heat on all the other bodies and by its powerful attraction, keeping them in their several orbits. It is the fountain-head of

all life on the earth. It is about 750 times as massive as all the other bodies of the system put together; hence its attractive power on all these bodies. For a full description of this great luminary, see Sun.

2. The Planets. — Bodies which revolve round the sun in elliptic orbits, generally differing

little from circles. The planets are opaque and are, therefore, visible to us only by reflecting the light of the sun. They are divided into two classes, major and minor planets.

The major planets are eight in number; their names, distances and many other particu¬ lars respecting them will be found in the table appended to this article. It will be seen that the most distant, Neptune, is more than 70 times as far from the sun as the nearest, Mercury. An idea of the arrangement of the planets will be gathered from the accompanying plate.

It will be noticed by the plate that there is a gap between the orbits of Mars and Jupiter. This is filled by the second class of planets, called minor planets or asteroids. These bodies are much smaller than the major planets and generally revolve in more eccentric orbits. It is impossible to say exactly how numerous they may be; more than 800 are now known, new ones constantly being discovered, and there may be hundreds, or even thousands, so small that they have not been discovered, and may never be separately recognized. See Asteroids.

1. The Satellites of the Planets. — All the major planets, with the exception of the two inner ones, have one or more smaller bodies revolving round them and accompanying them in their courses round the sun. In this respect each of the planets having satellites may be said to form a solar system in miniature, since the motion of the satellites round the planet is quite similar to that of the latter round the sun. The number of satellites is as follows:

Satellites

The Earth . i

Mars . 2

Jupiter . 9

Saturn . 10

Uranus . 4

Neptune . 1

There are, therefore, 27 satellites now known. The system formed by a planet and its satellites is designated by the name of the planet. Thus we have the Martian System, the Jovian System, the Saturnian System, etc.

1. Comets. — Comets generally revolve in orbits so eccentric that, during the greater part of their course, they are entirely invisible, even to telescopic vision. A few are known to revolve within the orbit of Jupiter, and all that we can observe must have their perihelion not more than two or three times as far as the earth's orbit — otherwise they would be for¬ ever invisible. Their times of revolution vary all the way from three years to unknown thou¬ sands of years. Those having long periods .go far beyond the orbit of Neptune during their course. No limit can be set to their number. Kepler's remark that the heavens may be as full of comets as the sea of fish, though prob¬ ably an exaggeration, is well fitted to give an idea of the possible number of these bodies. It is certain that only an insignificant fraction of the total number has ever been seen by human eye. See Comets.

2. Meteorites or Meteors, which must be countless millions of millions in number, are so minute that we never see them individually except when they strike our atmosphere and form a shooting star. (See Shooting Stars). They may be classed with comets, because the latter are probably of meteoric constitution; perhaps made up of meteors.

1. The Zodiacal Light, which is a great lens¬ shaped cloud of small particles surrounding the sun and extending nearly to the orbit of the planet Mars. This cloud is thickest at the sun, but has a region of reversed curvature within the orbit of Mercury. Its form may be quite closely represented by two ellipsoids of revolu¬ tion, having the centre of the sun for their common centre, the eccentricity of the inner being about 0.25, and the outer having the form of a thin, ellipsoidal sheet, within which the innermost planets are immersed.

A remarkable feature of the solar system is the clear separation of the eight major planets into two groups, equal in numbers, each com¬ prising four planets with distinctive character¬ istics. The inner four, of which our earth is one, are dense and highly compressed solid bodies. The four planets of the outer group are many times more massive than the inner ones, the least massive of all, Uranus, being seven or eight times as weighty as the four inner ones put together. As compared with the inner group, the planets of the outer group are also distinguished by being larger in a yet greater proportion than they are massive. Any one of the inner group would be a small object alongside the smallest of the outer group. A similarity of constitution also seems to mark the outer planets ; it is highly probable that all are surrounded by dense atmospheres — in fact, that each consists of a comparatively small nucleus surrounded by a gaseous envelope with clouds floating in it as they do in our atmos¬ phere.

Possible Unknown Planets. — The excessive motion of the perihelion of Mercury, as well as smaller, but well-defined motions in the node of Venus and the perihelion of Mars, none of which could be accounted for by the disturb¬ ances caused by the attractions of the known bodies of the solar system, long ago led to the suspicion that there might be one, or even a ring of, undiscovered planets revolving about the sun within the orbit of Mercury. Should such planets exist they ought, from time to time, to pass between us and the sun, so as to be visible on the disc of the latter. Several ob¬ servers, studying the sun, have supposed that they saw such objects. But there is no doubt that they were mistaken. For 20 years past the sun has been photographed almost every day, as well as constantly scanned by the telescope, in Europe and in America. No photograph has ever shown, and no really experienced observer has ever seen anything of the sort. Another way of detecting such bodies would be by scan¬ ning the neighborhood of the sun during total eclipses. This has been done at almost every such eclipse, during the last 30 years. More¬ over, in recent times, photography has been called to the aid of the search, especially by the Lick Observatory, in California. In one of the attempts, stars were photographed down to nearly the eighth magnitude; but nothing was ever found except known stars. We may, there¬ fore, regard the non-existence of any visible planet between Mercury and the sun as well proved.

In addition to this, the most interesting dis¬ covery was made by Seeliger in 1906 that the outstanding discrepancies in the motions of the planets can be fully accounted for by the dis¬ turbing pull of the zodiacal light, provided that

we ascribe to this only an almost inconceivable tenuity. It is sufficient to assume that the densest portion has but 2.52 by 10-11 times the density of the sun in order that its mass may be great enough to produce the disturbances observed. Moreover, it is found that on this assumption no new disturbances are introduced into the perturbations of any of the planetary elements of a size great enough to be evident to observation.

The question whether there may be a planet beyond Neptune is not so easily settled. The probable existence of such a body has been in¬ ferred on three grounds: (1) Outstanding dis¬ crepancies in the computed motion of Uranus ; (2) the existence of certain comets, the aphelia of whose orbits lie outside the orbit of Neptune; and (3) the inference, based on the planetesimal theory of the development of the solar system, that the orbit of the outermost planet will not be a nearly circular one. Of these, the first furnishes the most reliable evidence and it alone can serve as a basis for predicting the planet's position and so leading to its discovery, if, indeed, it has an existence. In the course of a century, accurate observations of Uranus will have accumulated throughout the entire circuit of its orbit, and by this time also the motion of Neptune will have been sufficient to indicate the position of the planet. As yet, however, an accurate indication is not possible, and careful search for the body has met with no success. It is inferred that it is from the 12th to the 13th magnitude, with an apparent diameter of perhaps 1"; as it is so far distant from the sun, its motion among the stars is certainly very slow, and all of the circumstances contribute to render its discovery extremely difficult.

The planets are all so distant from us that, to the naked eye, they appear like stars. For the most part the five nearest to us would be classed among the brightest of the stars, Venus and Jupiter being generally brighter than any fixed star. They are also distinguished from the stars by their apparent motions, which may be seen by watching them from night to night. Their apparent situations relatively to the sun are called aspects. The latter are different ac¬ cording to whether the orbit of the planet is inside or outside that of the earth; that is, whether it is an inferior or superior one. A glance at the arrangement of the system will show that the inferior planets, Mercury and Venus, can never be seen in the opposite direc¬ tion from the sun, but only seem to swing back and forth on each side of the sun as they per¬ form their revolutions around this luminary. Their apparent distance east or west from the sun at any time is called their elongation. At the greatest elongation, Venus is about 45 de¬ grees from the sun, and Mercury at different distances, generally ranging between 20 and 30 degrees, according to its position in its

very eccentric orbit. But the superior planets seem to course relatively to the sun all the way round the sky in performing their revolution. When in the opposite direction from the sun they are said to be in opposition. This is the most favorable time for observing them, because they are then nearest to the earth, and their visible hemisphere is fully illuminated. They then rise about the time of sunset, and cross the meridian about midnight.

THE SOLAR SYSTEM

Apparent Sizes of Planets as seen from the Earth, when at their greatest & least distances respectively, as compared with the Sun's disk, represented by the circle A.JB.C.D.

Greatest mag.

.MOON'S COURSE A PHASES

Least mug.

EARTH VENUS

(with Mercury)

JˆDUttO

Scale of o

of Milt *

Apparent Magnitudes of Sun, Moon,

& Planets

'First

quarter

The Planets revolve around the Sun in elliptical orbits, nud arc consequently always varying their distances from him; and their orbital velocity is con¬ tinually increasing or decreasing in virtue of the law, that the Radius Vector describes cquul areas in equal times.

ApMjo,

Table of Orbital Velocities of the Planets ns Compared with Light Si Sound.

Diameters &. Distances of Sun, Aloon,

& Greater Planets

List of Greater Planets

Douuti’s/Comet, 1858

Asteroids.

miles

1,110 per minute

Earth

Aloon

Alercury

Venus

Alars

Jupiter

Saturn

Crunus

Neptune

The relative distances of the Planets from the Sun nre Alercury 3.9. Venu3 7. 2. .Earth 10, Alars 15.2, Jupiter 52.0, Saturn 05.4, Uranus 191.8, Neptune 300.6. The great interval between Mars and Jupiter was long suspected and is now known to be tilled with small planetary bodies. Of these the earliest discovered are named above Alore than 400 have now been discov¬ ered. But these small bodies have little interest except for the Astrono¬ mer.

JuP’vtet

/ The diameter of the Sun Is nearly / 110 times greater than that of the

/ Earth. Its solidity or bulk ic equal / to 1,300,000 globes such as our own,

' or to 500 times the volume of matter

contained in all the planets. Its - mean distance from the Earth Is about 92,000,000 miles, and he is more A than 3,000,000 miles nearer us in winter Ay than in summer. Ay A

Alercury $

Distance of the Aloon

Earth

Distances of Satellites

Alars

Jupiter

Distances of Satellites 5th Satellite

The Solar System consists of 8 principal Planets with a great number of Asteroids occupying the space between Mars and Junplter- Satellites revolve around several of the principal Planets: viz, the Earth, 1; Alars, 2; Jupiter. 5; Saturn. 8; Cranus.4; Neptune, 1. Aluny Comets enter the System, pass urouud the Sun and then recede- again into remote space: of some few of those bodies, the times of return are known,

Distances of Satellites.

8th Sat. distant 2,225.000 miles from Primary

Distances of Satellites _ >.

Uranus H

Icale for Alagnitudes of Plauets & for distances of Satellites from their Primaries,

Distances of Satellites

Neptune **

. 0 50,000 100,000 200,000 300, OuO 400, 0u* 500,000 English Miles

The circular disk A.B.C.'D exhibits the proportional magnitude of the Sun, on the same scale that is used for the magnitudes of the Planet

1st Satellite

Name of Asteroid

Date of Discovery

Name of Discoverer

Period oj ievolutio in Days

Ceres

Pallas

J uno Vesta

1801

1802

1804

1807

Piazzi

Olbers

Harding

Olbers

1081

1082

1592

1320

Name of Planet

Period of Revolution in Days

Inclination

"<

Orbit to the Ecliptic tn 1000

Mercury

33

7° o’ li

Venus

225

3 23 37

Earth

305

1. 0 0

'lira

687

1 51 1

■t ujntor

4,333

1 18 31 ;

Saturn

10,759

2 29 33 !

Uranus

30,038

0 40 21 j

Neptune

00,131

1 46 45 !

Equatorial Diameter in English Miles

Mean Distance from Sun in Eng. Miles

o

800,500

€

2,103

92,900,000

?

3,000

30,000,000

2

7,700

07,200,000

®

7.92T

92,900,000

j

4,230

141,500,000

X

83,200

483,000,000

V

75,000

880,100,000

y

32,000

1,782,000,000

y

85,000

2,792,000,000

Greatest

Least

O

22 .si

11 .10

«

03 20

HO 21

9

W

O

9

1 2

10

o*

4

%

r‘0

32

\

20

11

w

4

V

3

3

RELATIVE POSITIONS, MAGNITUDES, ORBITS, ETC., OF THE HEAVENLY BODIES

, .

• - I

II

•

■

SOLAR TIME — SOLDER

23?

The inferior planets oass by the sun during their apparent swinging from one side to the other. When they pass on our side of the sun they are said to be in inferior conjunction; when beyond the sun, in superior conjunction. These conjunctions take place at fairly regular intervals. The best time to see an inferior planet is in the evening, some time before in¬ ferior conjunction; or in the early morning twilight, some time after it.

The plate shows the most important rela¬ tions existing among the elements of the planets. The elements of the planets are given in the following tables:

to the several European congresses. His most notable works are international Copyright in the Congress of the United States) (1886), and ‘The Copyright Law in Force in the United States in 1900 > (1900).

SOLDANELLA, in botany, a genus of plants of the order Primulacece. They are small herbs, inhabiting the alpine districts of south¬ ern Europe, corola sub-camoanulate, of one cleft and fringed on the

margin. Soldanella alpina having blue flowers, frequenting the hills of Switzerland, is an object of extensive culture in England.

PLANET

Distance from the Sun

Distance from the Earth

Time of revolution

Synodic

revolution

Mean

Greatest

Least

Greatest

Least

round the Sun

Mercury .

Miles

Miles

Miles

Miles

Miles

Mean solar days

Mean solar Days

36,000,000

43,400,000

28,600,000

134,800,000

50,900,000

87.9693

115.887

Venus .

The Earth . . .

67,200,000

92,900,000

141,500,000

67,700,000

94,500,000

154,700,000

66,700,000

91,300,000

128,300,000

161,200,000

24,500,000

224.7008

365.2564

583.920

Mars .

248,600,000

34,500,000

686.7505

779.936

Jupiter .

483,300,000

506,600,000

460,000,000

599,500,000

367,200,000

4332.5800

398.884

Saturn .

886,100,000

935,800,000

836,400,000

1,027,200,000

745,100,000

10759.21

378.093

Uranus .

1,782,000,000

1,864,500,000

1,699,600,000

1 ,956,900,000

1,607,300,000

30686.82

369,656

Neptune .

2,791,600,000

2,817,000,000

2.767,000,000

2,909,100,000

2,675,000,000

60181.11

367.486

PLANET

Time of rotation on axis

Inclination of tne planet’s equator to its orbit

Diame¬

ter

Volume, Earth’s

= 1

Mass, Earth’s

= = 1

Density

Earth’s

= 1

Force of gravity, Earth’s

Bodies fall in second

Apparent diame¬ ter as seen from the Earth

Greatest

Least

H.

M.

S.

' Deg. Min.

Miles

<

Feet

Sec.

Sec.

Mercury .

?

t

3,030

0.056

0.061

1,173

0.439

7.06

12.9

4.6

Venus .

?

?

7,700

0.92

0.82

0.89

0.802

12.90

65.2

9.5

The Earth

23

56

4

23 27

7,918

1 000

1.000

1.000

1.000

16.08

Mars .

24

37

23

24 00

4,230

1. 152

0.105

0.711

0.376

6.05

24.5

3.6

Jupiter .

9

55

37

3 5

86,500

1309.00

317.7

0.242

2.65

42.66

50.0

32.0

Saturn .

10

14

24

26 49

73,000

760.00

94.8

1. 128

1.18

18.99

20.0

14.0

Uranus .

?

?

32,000

69.237

13.518

1. 195

0.754

12.12

1. 1

3.8

Neptune .

?

?

35 , 000

84.955

16.469

0.300

1.142

18.36

2.9

2.7

Simon Newcomb.

SOLAR TIME. See Dial; Sun.

SOLARIO, soia're-o, Andrea da, Italian painter: b. about 1460; d. 1515. He lived in Venice (1490-93) with a brother, Cristoforo, who was an architect and sculptor. His work was modeled after Leonardo da Vinci, and in 1507 he was called to Normandy to execute work offered Da Vinci. His best known works are (Ecce Homo) ; (Repose in Egypt) (1515); (Crucifixion5 (1503); a (Madonna5 and (John the Baptist.5

SOLARIO, Antonio, Italian painter: b. at Civita, about 1380; d. 1455. He studied in Bologna, Venice, Florence and Rome, but prac¬ tised his art mainly in Naples. His chief work consists of 20 large frescoes in the monastep' of Saint Severino. His backgrounds are said to have been superior to his figures.

SOLBERG, Thorvald, American writer: b. Manitowoc, Wis., 22 April 1852. As a mem¬ ber of the staff of the Library of Congress in 1876-89 he became interested in the question of international copyright and was a delegate

SOLDER, sod'er, a fusible alloy of metals employed to join or unite metals. The principle involved is that the molten alloy applied shall partly fuse the metal surfaces, thus creating a metallic union. As a rule, the solder should be easier of fusion than the metal to which it is applied. The solder should also be of or near the same color as the metal. For fine steel, copper and brass work gold or silver may be employed. But, broadly speaking, iron is soldered with copper, and

copper and brass with tin. The most usual solders are the com¬ pound, which are distinguished into two prin¬ cipal classes, hard and soft. Any solder that requires a red heat for melting is termed a hard solder; these are ductile, will bear hammering and are commonly prepared of the same metal as that which is to be soldered, with the addi¬ tion of some other, by which a greater degree of fusibility is obtained, though the addition is not always required to be itself easier of fusion. Under this head comes the hard solder for gold, which is prepared from gold and silver, or gold and copper, or gold, silver and copper. The hard solder for silver is pre¬ pared from equal parts of silver and brass, but

is made better for fusion by the admixture of 1-16 of zinc. The hard solder for brass is ob¬ tained from brass mixed with a sixth or an eighth, or even one-half of zinc, which may also be used for the hard solder of copper. The soft solders, melting below a red heat, are much used in plumbing and tinning; they melt easily, but are usually brittle and, therefore, cannot be hammered. Tin and lead in equal parts make a good soft solder. Of easier fusion is that consisting of bismuth, tin and lead in equal parts. In the operation of soldering, the surfaces of the metal to be joined must be made very clean and applied to each other. It is usual to secure them by a ligature of wire or other device. The solder is laid upon the joint, together with sal-ammoniac and borax or com¬ mon glass, according to the degrees of heat intended. These additions defend the metal from oxidation. Glaziers use resin, and pitch- is sometimes employed. Tin-foil, applied be¬ tween the joints of fine brass work, first moist¬ ened with a strong solution of sal-ammoniac, makes an excellent juncture, care being taken to avoid too much heat. It was at first found very difficult to solder aluminum, but a satis¬ factory solder was found in an alloy of gold, silver and copper, to which some add a little zinc. Soft solder is applied with a soldering iron, or in some cases with a machine as in closing fruit cans. The regular soldering iron has a pointed copper head and a wooden handle. In use the copper head is heated almost to redness and having been carefully cleaned and scraped, it is used to pick up some of the molten solder and apply it to the work. The surface or edges to be soldered must be quite clean and bright and the process is assisted by a flux, as of resin or chloride of zinc. Hard solder is essential for joining steel, iron gun metal, brass, etc., and permits a much stronger joint than soft solder. The process of applying hard solder is often called brazing, from the similar¬ ity of the alloy used to

brass. Common mix¬ tures are copper 60 and zinc 40, for soldering iron ; copper 40 and zinc 60, for copper and hard brass ; silver 30, copper 50 and zinc 20, for soldering silver, brass, gold and some irons. See Alloys; Welding.

SOLDIERS OF FORTUNE. See Mer¬ cenaries.

SOLDIER BEETLE, the name given to the beetle of the tribe Telephoridi, family Malacodermidcz. The larvae generally feed upon plant-lice, catterpillars or other soft-bodied in¬ sects. The most common species in the eastern part of the United States is the Chauliognathus pennsylvanicns, a native of Pennsylvania, which are specially valuable as cross-fertilizers of plants.

SOLDIERS' HOMES, the general name of various institutions in the United States, under national or State control, for the care of sick and disabled soldiers and sailors. These homes were the direct outcome of the Civil War. The Federal institution is known as the National Home for Disabled Volunteer Soldiers and has branches at Dayton, Ohio ; Milwaukee, Wis. ; Togus, Me.; Hampton, Va. ; Leaven¬ worth, Kan. ; Santa Monica, Cal. ; Marion, Ind. ; Danville, Ill. ; Johnson City, Tenn., and Hot Springs, S. D. In 1903 the aggregate number of

inmates was about 27,000; in 1917 it was 32,000. The total number cared for up to and includ¬ ing 1917 is about 200,000.

The requirements for admission are: (1) An honorable discharge from the United States service. (2) Disability which prevents the ap¬ plicant from earning his living by labor. (3) Applicants for admission will be required to stipulate and agree to abide by all the rules and regulations made by the board of managers or by its order; to perform all duties required of them and to obey all the lawful orders of the officers of the Home. Attention is called to the fact that by the law establishing the Home the members are made subject to the Rules and Articles of War and will be governed thereby in the same manner as if they were in the army of the United States. (4) A soldier or sailor must forward with his application for admis¬ sion his discharge paper and when he is a pen¬ sioner, his pension certificate and if he has been a member of a State home, his discharge from that home, before his application will be considered; which papers will be retained at the branch to which the applicant is admitted, to be kept there ft>r him and returned to him when he is discharged. The rule is adopted to prevent the loss of such papers and certifi¬ cates and to hinder fraudulent practices, and no application will be considered unless these papers are sent with it. If the original dis¬ charge does not exist,

a copy of discharge, certified by the War or Navy Department, or by the adjutant-general of the State, must ac¬ company the application.

The United States Soldiers' Home at Wash¬ ington, D. C., receives and maintains discharged soldiers of the regular army. All soldiers who have served 20 years as enlisted men in the army (including volunteer service, if any) and all soldiers of less than 20 years' service who have incurred such disability, by wounds, dis¬ ease or injuries in the line of duty while in the regular army, as unfits them for further service, are entitled to the benefits of the Home. A pensioner who enters the Home may assign his pension, or any part of it, to his child, wife or parent, by filing written notice with the agent who pays him. If not so assigned it is drawn by the treasurer of the Home and held in trust for the pensioner. The board of com¬ missioners consists of the general-in-chief com¬ manding the army, the surgeon-general, the commissary-general, the adjutant-general, the quartermaster-general, the judge-advocate-gen¬ eral and the governor-general of the Home. About 1,500 old soldiers occupied the Home in

1.

There are State homes for disabled volun¬ teer soldiers provided by 27 of the States and New York, New Jersey, Washington and Ne¬ braska each maintain two such homes.

Confederate soldiers' homes have been es¬ tablished in Atlanta, Ga. ; Austin, Tex. ; Beauvoir, Miss. ; Columbia, S. C. ; Hermitage, Tenn.; Higginsville, Mo.; Jacksonville, Fla.; Little Rock, Ark.; Mountain Creek, Ala.; New Orleans, La.; Pewee Valley, Ky. ; Pikesville, Md. ; Raleigh, N. C. ; Richmond, Va. ; Wash¬ ington, D. C. _ There are of course very few veterans remaining to occupy them.

SOLDIERS THREE, by Rudyard Kipling, is thus well described in the title-page of the

original edition, printed in 1888 in Allahabad by the Pioneer Press as Number 1 of A. H. Wheeler and Company's Indian Railway Li¬ brary: 'Soldiers Three. y A Collection of

Stories. Setting forth Certain Passages in the Lives and Adventures of

Privates Terence Mul- vaney, Stanley Ortheris and John Learoyd. Done into type and edited by Rudyard Kipling.

We be Soldiers Three Pardonnez moy, je vous en prie.

Most of these tales are told in the inimitable language of the Irish member of the tri-part¬ nership, Terence Mulvaney, whose humor, philosophy, strength and tenderness immedi¬ ately endeared him to the reading public, and those stories in which the big Irishman plays the leading role, such the (The Taking of Lungtungpen,> (The Incarnation of Krishna Mulvaney) and (The Courting of Dinah Shadd,> are unquestioned favorites ; yet Mulvaney's as¬ sociates, the little cockney, Ortheris, and the gigantic Welshman, Learoyd, are by no means to be slighted and much of the charm of the tales lies in the close friendship that binds the incongruous trio. In his (Views and Re¬ views, J Henry James declares, <(Mulvaney is a creation to be proud of and his two com¬ rades stand as firm on their legs. In spite of Mulvaney's social possibilities, they are all three finished brutes ; but it is precisely in the finish that we delight.® And the Edinburgh Review says, <(Mr. Kipling paints the real man, with his natural blackguardism, softened and re¬ deemed by a rough chivalry, by unexpected gleams of tenderness and by a strong feeling of comradeship toward his brothers in arms.® The revised editions, under the title (Soldiers Three and Military Tales, > contain additional accounts of the adventures of the famous trio, together with other episodes relating to the British army in India, notably (The Man Who Was) and (The Drums of the Fore and AftP

Arthur Guiterman.

SOLE, a European flatfish (Solea vulgaris), one of the most familiar of British food-fishes. The average length is about 12 inches and the weight about 18 ounces and the flesh is very palatable and nutritious. These fishes are usually captured by the trawl-net and some¬ times by the line. They inhabit the shallow waters of sandy coasts and sometimes ascend rivers to spawn. Other species of soles are the lemon sole (S. pegusa), the variegated sole (S . variegata), which has a reddish-brown color marked with darker brown bands, and the solenette or little sole (S. linguatulus) , the average length of which is about five inches. The transparent sole (Achirus pellucidus) of the Pacific Ocean, which wants the pectoral fins, and the zebra sole (S. zebrina) of Japan, are also well-known species. The nearest American representative is a small, closely al¬ lied fish, called hog-choker (Achirus fasciatus), common along the Eastern coast, but not re¬ garded as worth eating.

SOLEMN LEAGUE AND COVENANT, The. A compact entered into in 1643 between England and Scotland for the (<extirpation of popery and prelacy and the preservation of religious liberty® in the two Countries. Two years later it was once more ratified in Scot¬ land. Charles I refused his approval to the

League; but Charles II thought it the better part of discretion to yield to the pressure brought upon him by the Protestant faction, which had already shown itself all powerful; so he took a solemn oath to observe all the provisions of the international covenant, a com¬ promise he had no intention of keeping, and he succeeded in having the Scottish Parlia¬ ment, in 1661, annul the ((Solemn League and Covenant® and absolve the lieges from their obligations to it. Consult Hetherington, his¬ tory of Church of Scotland *; McCrie, (Sketches of Church History.*

SOLENHOFEN. See Solnhofen.

SOLENOID, a primary form of electrical magnet, consisting of a filament, which, when enclosed by a spiral-conducting wire properly positioned with its ends brought to the middle, may become a magnet when engaged by a cur¬ rent; also called solenoid magnet.

SOLENT, England, the western part of the strait of the English Channel separating the Isle of Wight from the mainland. It is 15 miles long and almost three miles wide and forms a safe roadstead. A few miles north of the Neches the navigable channel narrows to three- quarters of a mile. It has been the scene of many famous yacht races.

SOLEY, so'li, James Russell, American naval historian: b. Roxbury, Mass., 1 Oct. 1850; d. New York, 11 Sept. 1911. He was graduated from Harvard in 1870 and in the following year was appointed professor in the Depart¬ ment of English at the United States Naval Academy at Annapolis. He was commissioned a commander in 1882 and stationed at Wash¬ ington, D. C., in charge of the naval library there. From 1885 to 1889 he lectured upon naval history and international law in various Eastern colleges ' and in 1890 was appointed Assistant Secretary of the Navy. In 1893 he resigned this office and took up the practice of law in New York. He edited and conducted the publication of the naval history of the Civil War and is the author of (The Campaigns of the Navy in the Civil War* (1883) ; (The Naval Wars of the United States> ; (Maritime In¬ dustries of America, * etc.

SOLF, Wilhelm, German linguist, economist and statesman : b. Berlin, 5 Oct. 1862. After completing his gymnasium course, he attended the

universities of Berlin and Kiel (where he studied Sanskrit and Comparative Philology), returning in 1887 to Berlin to pursue courses in Hindu, Urdu and Persian, at the Berlin Seminary for Oriental Languages, taking his Ph.D. degree in this field. He later took up the study of law at the University of Jena. He has seen much of the world, chiefly in the service of the German foreign office and colonial office in Calcutta and elsewhere. In 1900 he became governor of Samoa, and late in. 1911 was made Secretary of State for the colonies (Staatssekretdr des Kolonialamts) . Under the Provisional German government which arose at Berlin after the signing of the armistice of 11 Nov. 1918, Solf became Min¬ ister for Foreign Affairs, an appointment which was strongly criticized by the more radical sec¬ tions of the Socialist party by reason of the fact that it was wrong to retain any of the officials of the former German government un-

der the new ˆSocialistic® government. A Berlin message dated 26 Aug. 1919 announced the ap¬ pointment of Dr. Solf as Ambassador of the German Republic to Great Britain. He is the author, in the philological field, of (Die Kagnur- Rezension der Pancagika* (1886).

SOLFAING, sobfa-ing (from sol, fa, in the musical scale), the exercising of the voice upon the syllables do, re, mi, fa, sol, la, si (solmization) used to designate the notes of the diatonic scale. Pieces without text intended for this sort of exercise are called solfeggi. Sometimes this word is applied also to instru¬ mental music, referring to exercises, merely intended to improve the learner in reading notes and hitting intervals. See Sol-fa System ; Solfeggio.

SOLFATARA, the Italian name for a kind of volcanic vent found in various parts of the earth, which, though not in a state of actual eruption, gives out sulphurous gases and vapors. The most notable are found in Italy, in the Antilles, in Mexico, in the interior of Asia and in Java. Probably the best known are those between Rome and Tivoli and that at Pozzuoli, near Naples. This last is an ir¬ regular plain almost surrounded by the walls of an ancient crater. From the crevices rise steam and gases, chiefly sulphuretted hydrogen, mixed with minute quantities of muriatic acid and muriate of ammonia. The cracks and fissures of the rocks abound with sulphur, alum and sulphate of iron. Solfataric action is an important source of commercial sulphur deposits.

SOLFEGGIO, sol-fej'i-o, in music, a vocal exercise, in which the syllables ut (or do), re, mi, fa, sol, la, si — corresponding to C, D, E, F, G, A, B — are used instead of words. Their use as a method of nomenclature originated, as far as the first six are concerned, in the 11th century with Guido Aretinus, who substituted his hexachord system for the old Greek tetra- chords. Observing in the melody of an ancient hymn for the festival of Saint John the Baptist, beginning

Ut queant laxis Fesonare fibris

Mira, gestorum Famuli tuorum

Solve polluti Labii reatum 5'ancte Joannes,

that the notes on which the successive phrases began were identical in order with the sounds of the hexachord, he adopted the syllables to which they were allied in the above stanza as names to represent the degrees of his new scale. When early in the 17th century, the octave was completed by the seventh or ((lead- ing note,® the syllable Si, formed of the initials of ((Sancte Ioannes,® was added ; while Do generally took the place of Ut, as being more easily sung. This illustration of the construc¬ tion of the musical scale by the use of the syllables is called solmization.

SOLFERINO, sol-fe-re'no, Italy, in the province of Mantua and 18 miles northwest of the town of that name. From its commanding position of the Plain of Lombardy, its tower has acquired the title of ((Spy of Italy.® On 24 June 1859 the battle fought here between the Austrians on the one hand and the allied French and Sardinian troops, under Napoleon III, on the other, resulted in the defeat of the

former. In this bloody conflict the Austrians lost 20,000 men, their adversaries 18,000. The population of the village is about 1,500.

SOLICITOR. See Attorney; Barrister.

SOLICITOR-GENERAL, (1) an officer of the British Crown, next in rank to the at¬ torney-general, with whom he is in fact as¬ sociated in the management of the legal busi¬ ness of the Crown and public offices. The solicitor-general of Scotland is one of the Crown-counsel, next in dignity and importance to the lord advocate. (2) In the United States, a Federal official subordinate to the Attorney- General, whose duty it is to fill the latter's place in his absence. He is an appointee of the Presi¬ dent, handles the business of the United States government with the Supreme Court and State courts and receives $10,000 annual salary.

SOLID, in geometry, a magnitude having three dimensions — length, breadth and thick¬ ness. A solid in physics is a body characterized by permanency of form; so much so, that the motion of one of its parts produces motion in the whole. As no materials have been proved absolutely permanent, adhering interminably to one form, there are no solids in the strictest sense; but the term is used of all things that normally retain their shape for a considerable time. We call cold butter solid, but it easily softens and melts. A ball of lead will flow under considerable pressure or with heat. A watch's mainspring is a solid, yet yields to a tiny, force. When a solid piece of metal is strained beyond its limit of elasticity it frac¬ tures. The 13 geometrical forms of Archimedes, including the cube, octahedron, tetrahedron, dodicahedron, etc., are also technically termed solids. Hence a sphere, prism or other regular geometrical figure having magnitude is a solid. See Elasticity; Liquid; Matter.

SOLID-SHOT. See Projectiles. SOLIDAGO. See Golden-Rod.

SOLIDIFICATION, the passage of a sub¬ stance into the solid state, either from a state of solution or fusion, or directly from the gase¬ ous state. The term is usually applied, however, to the transition from the melted state into the solid form, and it is only in this sense that it will be here discussed. Some substances which are stable in the solid form cannot be melted without undergoing decomposition, either par¬ tial or complete; but many others can be con¬ verted into the liquid form by simple heating, passing back into the solid form again when the heat is abstracted. In general, fusion im¬ plies an addition of heat energy, and solidifi¬ cation implies its abstraction. Thus, to freeze one pound of water it is necessary to abstract from it an amount of heat energy that would be sufficient to raise the temperature of a pound of liquid water by about 140 degrees of the Fahren¬ heit scale; and in order to melt the pound of ice a precisely equal quantity of heat energy must be added to it again. All liquids may be divided into two general classes, whose laws of solidification are apparently very different. The first class includes bodies such as wax and glass, which, when they are cooled, pass into the solid state by a transition so gradual that it is impossible to assign any definite temperature at which the transformation can be considered to take place. The other class includes substances

which, like water, do not begin to solidify until they have been cooled

to a certain definite tem¬ perature peculiar to each substance. Solidifica¬ tion then begins at once, and it progresses continually, as the heat is abstracted, the tem¬ perature of the mass remaining unchanged until all of the liquid has been transformed into the solid form. In some cases the solid body that is obtained is crystalline in structure, and in other cases it is amorphous. In general, the temperature or solidification of a substance is identical with the melting point of the same substance ; but in some cases the molten condi¬ tion persists until the mass has been cooled to a temperature materially lower than the tempera¬ ture of fusion. The rare metal known as gal¬ lium, for example, melts at 86° F. ; but when once melted it may be cooled to about 36° F. before it solidifies. This phenomenon — the persistence of the molten condition after the substance has been cooled below the normal melting point — is called surfusion, and it may be regarded as analogous to the supersaturation that is sometimes observed in solutions (q.v.). If a small fragment of solid gallium be added to the molten metal at a temperature below 86° F., solidification at once ensues; and in general it may be said that in any fluid substance in a state of surfusion solidification is at once in¬ duced by the addition of a fragment of the same substance in a solid form. Some sub¬ stances increase in volume when they pass from the molten to the solid state and others de¬ crease. For example, when water solidifies it increases in volume so that the bulk of the ice that is formed is about one-eleventh greater than that of the original water. Bismuth, bronze and a few other metals which give good sharp castings also maintain an increase in vol¬ ume upon solidification. Lead, iron and most metals, on the other hand, decrease in volume when fusing from the liquid to the solid state.

Pressure has a marked influence upon the temperature of solidification; and Dr. James Thomson showed, from theoretical principles, that under great pressures the temperature of solidification is lowered in bodies which ex¬ pand upon solidification, and raised in those in which solidification is accompanied by contrac¬ tion ; this theoretical prediction having been subsequently verified by direct experiment.

SOLIDUNGULA, or PERISSODAC- TYLA, a division of the mammalian order JJngulata (q.v.), represented by the horses, asses, zebras, etc., distinguished primarily by the fact that the feet have each a single well- developed toe only, encased in a broad Hioof.®

SOLIDUS, a Roman coin originally called aureus (q.v.).

SOLINGEN, zo ling-en, Germany, in Prus¬ sia, in the Rhine province,

stands on a hill bordering the Wupper River, 20 miles northeast of Cologne. It has Catholic and Protestant churches, a synagogue, schools of various grades, hospital, electricity and all the conven¬ iences of a modern town. It is a centre of steel and iron industry in Germany. The mu¬ nicipality was established in 1374 and the town became famous for its sword-blades. There are numerous metal manufactories which turn out fine cutlery, copper and brass-ware, sur¬ gical instruments, etc., while several thousand workmen make small articles of cutlery at

home. There are besides paper, linen, cot¬ ton, silk, soap and other factories. Solingen cutlery has been famous since mediaeval times and is supposed to have been introduced by crusaders from Damascus. Pop. 50,000.

SOLIS, Juan Diaz de, hoo-an' de'ath, da so-les', Spanish navigator: b. probably at Le- brija, Spain, about 1470; d. 1516. In 1506 he accompanied the navigator Pinzon in his ex¬ pedition in search of a western passage to India, and upon this voyage touched the shores of Central America and explored the Caribbean Sea as far south as Honduras. In 1508 they reached lat. 40° S. and explored the Bay of Rio de Janeiro. In 1515 he sailed from Spain in command of three vessels with the expectation of making further progress in his quest of the Eastern world, and upon this voyage discovered the Plata, which was originally named for him. He was killed by the Indians upon this voyage.

SOLIS Y RIBADENEIRA, so-les' e re'- va-da'ne'era, Antonio de, Spanish dramatist and historian: b. Alcala de Henares, 18 July 1610; d. 1686. Educated at the University of Salamanca, he there imbibed a strong love for literature and more especially for the stage; and already, at the age of 17, he had written a drama. At 22 he made a success with his play which is still frequently seen in revivals of the Spanish stage. From this time on he continued to produce dramas, most of which met with popular favor. His reputation gained for him the position of royal secretary. This brought him into close connection with the royal family and, in a sense, shaped his life, making him one of the favorite dramatic writ¬ ers of the private court theatre, and conse¬ quently of the theatres of the capital. Solis was a master of intricate plot and characteriza¬ tion, and as such was deservedly popular in his day, and some of the best of his dramas are still played in Spain. His Spanish is excel¬ lent and free from the exaggerated style of his age and his versification is very harmonious. He wrote many dramas, but his greatest work and the one by which he will probably be longest remembered is his (Conquest of Mex¬ icoˆ which is one of the

greatest histories ever written if it be judged from its literary and artistic excellence. Here his Spanish is al¬ most perfect; his style rich, harmonious and beautiful and his handling of his subject is mas¬ terly. Yet his work has one great fault; he sees his whole story through the eyes of the Spanish adventurers and fails to comprehend that the exploited Aztecs had any rights, since Spain was Christian and they heathen. He is, therefore, out of sympathy with the great tragedy of his story, which is probably not strange when the age in which he lived is taken into consideration. Yet this one fault makes it fall short of being as really great a history as it is a literary work. The latter years of his life Solis, who never could suc¬ cessfully manage his pecuniary affairs and who was constantly in debt, retired to a monastery and ceased to write for the stage. Consult any good history of either Spanish or Mexican lit¬ erature. A fair appreciation of his work is to be found in Ticknor's (History of Spanish Lit¬ erature) (New York 1854).

SOLITAIRE, sol-i-tar', (1) a flightless bird (Pezopliaps solitarins), which has be-

come extinct within comparatively recent times. It inhabited the islands of Bourbon and Rod¬ riguez until about 1760. It was related to the dodo (q.v.), and was described by Leguat, a French voyager, who dwelt in the islands in 1691, and who says that the males were of a <cbrown-gray color,® the feet and beak being like a turkey's, but <(more crooked.® He notes that the tail was inconspicuous in size, the hinder parts being rounded ; the neck was straight and the eye black and lively. ((London 1907).

SOLITAIRE, a game played by one per¬ son on a board indented with 33 or 37 hemi¬ spherical hollows, with an equal number of balls. One ball is removed from the board and the empty hollow thus left enables pieces to be captured singly as in draughts. The object of the player is to take all the pieces except one without moving diagonally or over more than two spaces at a time. The name is also applied to several card-games played by one person. They depend usually upon a sys¬ tem of <(building® upward in piles, a "marriage® or bringing together of king and queen freeing the lower cards of a pile for rebuilding. See Cards.

SOLLY, Samuel Edwin, American physi¬ cian : b. London, England, 5

May 1845. He studied medicine in London and practised there until 1874, at which time he came to America and settled in Colorado. He has published (Handbook of Medical Climatology1* ; tuber¬ cular Laryngitis) ; the Influence of Altitude upon the Blood,) etc.

SOLMIZATION. See Solfeggio.

SOLNHOFEN (zoln'ho-fen) BEDS (Solenhofen incorrectly), deposits of a pecu¬ liar character in the Jurassic strata of Bavaria and deriving their name from the town of Solenhofen, near which and Monsheim, Eich- stadt and Hofstetten in the valley of the Altmiihl, they are obtained. They have acquired a world-wide use as lithographic stone. The rock varies from a nearly pure carbonate of lime (over 99 per cent) to one in which a mod¬ erate amount of silica is present. These latter portions are very thin-bedded, often ap¬ pearing to have a slaty structure. All are exceedingly fine and uniform in grain, repre¬ senting the deposits of an impalpable lime-flour or lime-mud in quiet though shallow lagoons surrounded by growing coral reefs. These fine lime-mud rocks (Calcilutytes) are often rendered impure by the admixture of dust blown by the winds from the distant land and settling in the waters of the shallow lagoons. In these layers were imbedded dragon-flies and other insects, which were brought from the lands and whose remains, beautifully preserved, are found to-day in these thinner bedded and more impure layers, together with those of marine as well as other aerial animals. Most note¬

worthy among these latter are the flying rep¬ tiles, Rhamphorhynchus and Pterodactylus, and the primitive bird Archaeopteryx, whose skele¬ ton shows so many reptilian characters as to constitute this animal a veritable connecting link between reptiles and birds. See Litho¬ graphy.

/

SOLOGUB, so-1 o-goob, Feodor, the nom- de-plume of Theodore Kuzmitch Teternikov, Russian poet, novelist and playwright : b. 1863. He was educated at the Teachers' Institute of Petrograd and for several years followed the profession of teaching. In 1894 his story, < Shadows, * published in the Severny Vestnik, proved so popular that he turned to the career of a man of letters. Poems, novels, fables, plays and short stories flowed in rapid succes¬ sion from his pen for over 12 years before he attained his first large measure of success in 1907 with the novel, (The Little Demon. *His creative genius has found its best literary vehicle in the short story; as a stylist he has had few peers, but his scenes are usually laid in the unpromising milieu of the smaller pro¬*

vincial towns of Russia. His (Sweet-Scented Name and Other Stories has been published in English (1915).

SOLOMON: b. probably between 1033 and 993 b.c. ; d. between 980 and 920 b.c. ; the son of David, king of Israel, by Bathsheba, for¬ merly the wife of Uriah, was appointed by David to be his successor in preference to his elder brothers. He ascended the throne between 12 and 14 years of age and reigned 40 years. His age is usually given as 53 at death. By his remarkable judicial decisions, and his comple¬ tion of the political institutions of David, Sol¬ omon gained the respect and admiration of his people; while by the building of the temple, which gave the Hebrew worship a magnificence it had not hitherto possessed, he bound the nations still more strongly to his throne. He put to death Adonijah, Joab, Shimei and others whom he deemed enemies and married a daugh¬ ter of Pharaoh besides women of nearly all the neighboring principalities to increase his influence and prestige. He built up a foreign commerce previously unknown. The wealth of Solomon, accumulated by a prudent use of the treasures inherited from his father; by success¬ ful commerce; by a careful administration of the royal revenues, and by an increase of taxes, — enabled him to meet the expense of erecting the temple, building palaces, cities and fortifi¬ cations and of supporting the extravagance of a luxurious court. He extended his dominions from the Euphrates to the Philistine and Egyp¬ tian borders. He had a trading agreement with King Hiram of Tyre and received rare wood and other articles for the temple. Solo¬ mon chose influential men as his advisers, and himself attained a reputation of being one of the wisest of mankind. His fame was so great that the queen of Sheba traveled 1,500 miles to interview him. Many biblical and profane stories are told of his miraculous powers and prophetic ability. He knew better than to en¬ gage in war, but he maintained a considerable standing army, including 1,200 cavalry and 4,000 armed chariots.

Fortune long seemed to favor this great king, and Israel, in the fulness of its prosperity, scarcely perceived that he was continually be-

coming more despotic. Contrary to the laws of Moses, he admitted foreign women into his harem; and from love of them he was weak enough in his old age to permit the free prac¬ tice of their idolatrous worship, and even to take part in it himself. Toward the close of his reign troubles arose in consequence of these delinquencies, and the

growing discontent, com¬ ing to a head after his death, resulted in the division of the kingdom, which his feeble son Rehoboam could not prevent. The 40 years' reign of Solomon is still celebrated among the Jews for its splendor and its happy tranquillity, as one of the brightest periods of their history. The writings attributed to Solomon are the Book of Proverbs, Ecclesiastes and the Song of Solomon, with the apocryphal book the Wisdom of Solomon ; but modern criticism has decided that only a portion of the Book of Proverbs can be referred to Solomon.

Students of Hebrew and Arabic works ap¬ pear to agree that Solomon is much overrated by the biblical narrative, and that there was nothing in his career to deserve his being placed among the world's great men. Consult Alex¬ ander, (King Solomon) (1897) ; Farrar, (Solo¬ mon J ; Hallock, (Child's History of King Solo- mon) ; Hirsh, E. G., <Solomon) (in (Jewish Encyclopedia,* New York 1907) ; Winter-botham, (Life and Reign of Solomon. *

SOLOMON, Solomon Joseph, English painter: b. London, 16 Sept. 1860. He studied, art at the Royal Academy schools, Munich Academy and the Ecole des Beaux Arts, Paris, and subsequently did much work during his travels in Italy, Spain and Morocco. Among his pictures are Cassandra1 *(1886) ; (Samp- son) (1887); (Niobe* (1888); (The Judgment of Paris) (1890) ; (Echo and Narcissus1* (1894); and many portraits.

SOLOMON, Odes of, a collection of 42 hymns by an unknown author, "Solomon *be¬ ing a pseudonym. They were probably written toward the end of the 1st century, and pos¬ sibly are the work of several writers. They are quoted in the gnostic book of the 3d century, (Pistis Sophia and in the <Institutes) of Lactantius. They were discovered by Dr. J. Rendel Harris in 1908 in a 16th century Syriac manuscript in his possession, which contained also the (Psalms of Solomon1* (q.v.). The manuscript was made from the Greek and was mutilated so that the series begins with a frag¬ ment of the third ode. The first ode, how¬ ever, has been restored from (Pristis Sophia.? While they are undoubtedly of Christian origin they resemble the New Testament only slightly. Many of them are of Jewish atmosphere, which induced Harnack's theory that they were of Jewish origin and were revised early in the Christian era. Opinion generally admits them to be purely Christian, Harris placing most of them between 75 and 100 a.d. In the (Pistis Sophia) they are assumed to be almost wholly derived from the canons of Scripture. Con¬ sult Harris, J. R., (The Odes and Psalms of Solomon *(1909) ; Fleming, J., and Harnack, A., (Ein Jiidischchristliches Psalmbuch* (1910); Conybeare, F. C, (The Odes of Solo¬ mon Montanist* (1911).

SOLOMON, Psalms of, a collection of 18 hymns of Pharisee authorship and unwar¬ rantably credited to Solomon. They were un¬

doubtedly first written in Hebrew, but they are now extant only in Greek manuscripts and in a Syriac transcript from the Greek discovered by Dr. J. R. Harris in 1908. The period of their authorship is fixed at 70-40 b.c. Apparently they were written by two authors, the psalms dealing with the hopes for a Messiah being dissimilar in type to the others in which the Hasmoneans are charged with usurping the throne of David and unrightfully occupying the high-priesthood. The psalms are practically ignored by early Christian writers, but were in good standing in the Jewish Church and were used in the synagogues. Consult Rvle, E. H., and James, A., (Psalms of the Pharisees, com¬ monly called the Psalms of Solomon *(1891) ; Von Gebbart, O., (Die Psalmon Salomos* (1895) ; Harris, J. R., (Odes and Psalms of Solomon* (2d ed., 1911).

SOLOMON, Wisdom of. See Wisdom, Book of.

SOLOMON ISLANDS, Melanesia, a group of islands in the Pacific Ocean, belonging to Great Britain and situated between lat. 5° and 11° S., and between long. 154° and 162° 30' E. It is an irregular chain stretching in a southeast direction from New Pomerania to¬ ward the New Hebrides, 1,000 miles off the northeast coast of Australia. The group con¬ sists of the large islands of Bougainville, Choi- seul, Ysabal, Malaita, New Georgia, Guadal- canar and San Cristoval, arranged in two parallel rows and a large number of small islands. Bougainville, the largest, is 120 miles long and 35 miles wide and the other islands named above are but little smaller. The total area of the group is about 16,950 square miles. Bougainville, Buka and some contiguous islands were governed by Germany up to 1914, when they were captured by an Australian force. The islands are all elongated from northwest to southeast, and mountainous, rising in Bou¬ gainville to a height of 7,760 feet. There are two .active volcanoes and numerous extinct craters and active hot springs. The surrounding waters are beset with coral reefs which make navigation dangerous. All the islands are heavily forested, and vegetation is very luxuri¬ ant. The inhabitants are Melanesians. They have had but little communication with Euro¬ peans and are still savages, practising cannibal¬ ism and polygamy. They cultivate the soil and are very skilful in boat-building and wood carving. Their number is estimated at. 200,000, while the European population is less than 100, mostly missionaries. The chief products of the islands are copra, trepang, pearl, tortoise-shell and sandal wood. The islands were discovered by Mendana in 1564. By the Anglo-German conventions of 1886 and

1899 the protectorate of the islands was divided so that Germany re¬ tained Bougainville and its neighboring islets, while the remaining islands came under the pro¬ tection of Great Britain. By the Peace Treaty promulgated 28 June 1919 Germany was deprived of her portion of the islands, amounting in area to 4,200 square miles, which was placed under Australian administration. Consult Guppy, H. B., (The Solomon Islands *(1887) ; Woodford, C. M., (A Naturalist Among the Head Hunters* (London 1890).

SOLOMON'S SEAL, common liliaceous plants (Polygonatum) arising in copses from

thick, white, fleshy rootstocks. These bear cir¬ cular scars left by each annual stem, upon its decay; by some, these are said to be the <(seals,® while others state that the name refers to the seal-like markings seen when the stem is cut across. The European Polygonatnm multi- florum, and the American P. biflorum are much alike, and P. commutatum chiefly differs by being more glabrate and smaller. The Solo¬ mon's seals are now cultivated especially in wild gardens. They are apt to grow in colonies and have slender, tough stems, bending until nearly horizontal under the weight of the numerous, sessile, broadly lanceolate leaves, which are ar¬ ranged closely, alternately and flatly on either side of the top of the stem. Under this protect¬ ing roof hang bell-like, three-parted flowers, generally in pairs on forked axillary peduncles. They are small, greenish in hue and succeeded by globular berries, very dark blue, with a bloom.

False Solomon's seals or wild spikenard (Vagnera racemosa and V. stellata) are similar liliaceous but less graceful plants. They do not have seals on the roots, are likely to be larger, with pubescent and longer leaves ; and the starry white flowers are gathered in pani¬ cles or racemes at the end of the drooping stems. The berries are either red speckled with purple, or green striped with black. V. racemosa is sold by city florists in its season.

SOLON, so'lon, Athenian law-giver: b. Athens, about 640 b.c. ; d. about 559. He was of a noble family and some of its members were ancestors of Codrus. Solon in early life became a trader, gathering by travel a fund of observa¬ tion and experience, and thus became enrolled among the Seven Wise Men of Greece. His first appearance in

public life was during the contest between Athens and Megara, for the possession of Salamis, a question he decided by quoting a passage of Homer in which Ajax is described as belonging to the Athenian arma¬ ment. He appeared again as a promoter of hostilities against Cirrha in behalf of Delphi, and moved the Amphictyons to declare war. He was made archon about 592 or 594, at a time when the laws, too favorable to the rich, had overburdened the poorer classes to a critical point inviting revolution. His prelimi¬ nary measures consisted of a “disburdening ordinance® intended to alleviate the burdens of the debtor class without doing injustice to the creditor ; a rearrangement of the monetary sys¬ tem, and a measure to control the rate of interest and the acquisition of land. So suc¬ cessful did these reforms prove that he was charged with the remodeling of the constitu¬ tion. He began by abolishing all the laws of Draco, except those relating to homicide, and established the right to citizenship on a basis of property qualification. He divided the peo¬ ple into four classes: (1) Pentacosiomedimni, those having a yearly income of at least 500 medimni (750 bushels) of corn, or metretoe of wine or oil ; (2) Hippeis, Knights, those having 300 medimni; (3) Zeugitae, those possessing a yoke of oxen with 150 medimni; (4) Thetes, workers for wages, those with less than 150 medimni as yearly income. The archons could only be chosen from the first class. Mem¬ bers of the first three classes were alone eligible for responsible offices and with them lay the

election to such offices. The Thetes were in¬ eligible to office, but could vote in the general public assemblies. Solon among other things regulated the levying of taxes and the military service of the citizens. He also established the Council of the Four Hundred. His system tended to reduce debts and give greater oppor¬ tunity to those in the lower classes; his code of laws regulated public and private life. He also reformed the calendar and the system of weights and measures. He regulated and re¬ duced dowries, restricted prostitution, compelled fathers to teach trades to their sons and or¬ dered that at stated periods each citizen must report how he earned his living. The laws he made were inscribed on wooden cylinders and triangular tables and set up in public. He ac¬ knowledged, however, that these laws were not the best conceivable, but the best that the Athenians could be made to accept.

The remainderof his history belongs to the borderland of legend. He is said to have ex¬ acted a pledge from the Athenians that they would not change his laws for 10 years and to have left the state for Egypt, Cyprus and Lydia. He returned to find the old dissensions re¬ newed in a state which was destined in a short time to fall under the tyranny

of Pisistratus. Consult Gilliard, (Queques Reformes de Solon) (Paris 1907) ; Lehmann-Haupt, (Solon of Athens* (Liverpool 1912). See Athens.

SOLOVIEV, s5-l6*-vyef, Vladimir Sergeie- vitch, Russian philosopher and religious writer : b. Moscow, 16 Jan. 1853; d. 31 July 1900. He was the son of the historian Sergei Soloviev and naturally grew up with the companionship of books. A born mystic, he in early youth passed through the stages of scepticism into a profound belief into a creed not clearly de¬ fined, but sufficient for himself. He was gradu¬ ated from the University of Moscow in 1874 with a dissertation on “The Crisis of Philosophy in Western Europe,® and shortly after visited France, Italy, England and Egypt. He was ap¬ pointed to an associate professorship in the University of Saint Petersburg in 1877, which he held till 1881, when his plea for pardon on behalf of the assassin of Alexander II led to his dismissal and brought him into collision with the Holy Synod and its procurator, Pobiedonostseff. For the rest of his life Solo¬ viev engaged in religious and philosophical writing, pouring out a vast variety of volumes with amazing fecundity. He acquired a deep knowledge of Hebrew and defended the Rus¬ sian Jews against official persecution. Some of his works have long been translated and cir¬ culated in France and Germany, where they aroused considerable interest, but English read¬ ers have as yet been unable to learn much about a remarkable man who for a generation exerted a profound religious influence over his country¬ men. His works hardly reveal a master philo¬ sophical thinker; his speculations rather leave the impression of being assimilated, taking over systems imported from the West and restating them in some extreme form, daring but not always original. At the age of 24 he wrote the (Philosophical Principles of Integral Science) ; the (Critique of Exclusive Principle) and (The Justification of Good) are obscure, fragmen¬ tary and discursive — displaying a disability of dissociating religion and morality from truth.

Like Newman, his spiritual pilgrimage led him to embrace the Roman Catholic Church, but there the resemblance ends. Newman was faced with the alternatives of blind belief or limitless unbelief; to Soloviev, belief was a necessity; convinced at the outset of the truth of Chris¬ tianity, it only remained for him to choose the form. His admirers have referred to him as <(the Russian Newman,® <(the Russian John the Baptist® and <(the William James of Russia.® None of

these descriptions is accurate. Solo¬ viev was not a dialectician; his conclusions do not conform to logical rule ; he was truly Slavic in his spiritual mobility or instability; quickly receptive even of inconsistent doctrine, and aspiring after things that were hard or impossible to reconcile. The philosopher be¬ came absorbed in the religious teacher and re¬ former. He labored not only for a reunion between the Orthodox and the Roman Catho¬ lic churches, but for a general religious unity. His encyclopedic variety of literary productions and multifarious propaganda have recently begun to find their way into English ; only his brilliant dialogue on (War and Progress) and (The Justification of the Good) (1919) have been translated. Consult d'Herbigny, M., (Vladimir Soloviev) (London 1918).

SOLSTICE, in astronomy, either of the points in the ecliptic, midway between the equinoxes, at which the sun appears to stop or cease to recede from the equator, either north in summer or south in winter (considered from a northern hemisphere viewpoint). There are two solstices — the summer solstice, the first degree of Cancer, where the sun is about 21 June; and the winter solstice, the first de¬ gree of Capricorn, where the sun is about the 22 December. The time at which the sun is at either of these points also receives the same name.

SOLUTIONS. In chemistry and physics a solution is usually defined as a homogeneous liquid in which two or more chemically dis¬ tinct substances are simultaneously present. Many authorities, however, restrict the term to such homogeneous liquid mixtures as exhibit a definite osmotic pressure (see below). Others extend it so as to make it include gaseous mix¬ tures, and even solid mixtures such as alloys. In the present article we shall adopt the former course, using the term to signify a homogeneous liquid mixture, which is capable of exerting a definite osmotic pressure.

When a solid substance is dissolved in a liquid, the liquid is called the (<solvent,® and the solid is called the ((solute.® When a solution is prepared by mixing two liquids, either one of the liquids may be regarded as the ˆsolvent,® the other then being called the <(solute® ; but it is customary to consider the one which is present in largest amount as the <(solvent.® By way of illustrating these terms, let us suppose that approximately equal masses of water and of anhydrous liquid carbolic acid are shaken up together. The two will not mix freely at ordinary temperatures, but the water will take up a small quantity of the acid, and the acid will similarly take up a small quantity of the water; the mixture subsiding, when the agita¬ tion ceases, into two distinct layers, qarbolic acid preponderating in the lower one, and water in the upper one. The upper layer may then be

regarded as a solution of carbolic acid in water, and the lower as a solution of water in carbolic acid ; carbolic acid being the <(solute® in the upper layer, and the <(solvent® in the lower one. This distinction is evidently an arbitrary one, however, and many cases could be cited in which it would be impossible to assign any rea¬ son for regarding either constituent as the ((solvent,® in preference to the other one. For example, carbolic acid and water dissolve in each other more and more freely as the tem¬ perature rises, until, at temperatures above 183° F., they mix readily in all proportions. If equal masses of these substances were mixed at 185° F., therefore, we could regard either as the solvent, and either as the solute.

When a solid substance is dissolved in a liquid, it sometimes happens that there is no marked evidence of chemical change. In other cases, however, there is a very obvious chemical change. . When ordinary cane sugar is dis¬ solved in water, a syrupy liquid results, from which the sugar may be again obtained in the same chemical condition as at first, by allowing the water to evaporate at a sufficiently low tem¬ perature. If sodium hydroxide, on the other hand, is added to a given mass of hydrochloric acid until the acid is just neutralized, it is impossible to obtain either the acid or the sodium hydroxide by mere evaporation of the solution. Nothing but water passes away in the vapor, and the solid substance that remains behind when the water is all gone is found to be common salt. If we choose to do so, we may regard the mixture of sodium hydroxide and hydrochloric acid as a solution of the hydroxide in the acid ; but since we may prepare iden¬ tically the same ultimate mixture by adding common salt to pure water, it is perhaps more convenient to regard it as a solution of common salt in water. For the present we shall take the latter view, confining our attention solely to those cases of solution in which a solid dis¬ solves in a liquid without any obvious chemical change.

When a solid is added to a liquid for which it has no chemical affinity, it may remain en¬ tirely unaffected. In this case, the solid is said to be ˆinsoluble® in the liquid, and no solution is obtained. If the solid is not insoluble in the given liquid, it gradually disappears when the two are brought together, the part which ceases to be visible passing into the liquid in the dis¬ solved state. In some cases the change is rapid and in others it is slow. It is always accelerated by agitating the solvent. Some solids appear to mix with certain solvents in all proportions; but in general it will be found that if the supply of the solid is sufficient there will come a time when, under the conditions of the experiment, no more of the solid will dissolve. The solu¬ tion is then said to be Saturated.® The quan¬ tity of a given solute that will dissolve in a given solvent depends upon several circum¬ stances, but

most notably upon the temperature of the solvent, nearly all substances being more soluble at high temperatures than at lower ones. If a saturated solution of a substance that is more soluble at high temperatures than at lower ones is warmed, it becomes capable of taking up more of the solute; and if such a saturated solution is cooled, it usually deposits some of the solute, until its degree of concentration be¬ comes reduced to that corresponding to satura-

tion at the lower temperature. It is sometimes possible, however, to cause a solution to retain more of the dissolved solid than corresponds to saturation at a given temperature ; though this “supersaturated® condition is quite unstable. Glauber’s salt (that is, sulphate of sodium crystallized with 10 molecules of water), ex¬ hibits supersaturation in a marked manner. If a saturated solution of this salt be prepared at a certain definite temperature, and then re¬ moved from contact with any particle of the free, undissolved salt, its temperature may be lowered by a considerable amount before crystallization sets in. If the smallest fragment of the solid salt is placed in such a supersatu¬ rated solution, crystallization at once begins, proceeding rapidly until the concentration is reduced to that corresponding to normal satu¬ ration at the temperature at which the experi¬ ment is performed. Pressure appears to in¬ fluence the solubility of a substance to a measur¬ able extent, but the effect of a change of tem¬ perature is, in general, far more marked.

A solution which is far from being satu¬ rated, by reason of the solvent being present in great excess, is said to be “dilute.® The phys¬ ical phenomena manifested by dilute solutions are much more simple than those of solutions that are nearly saturated, in precisely the same way that the phenomena exhibited by an attenu¬ ated gas are simpler than those exhibited by the same gas in a strongly compressed state.

A solution which is not homogeneous throughout with respect to concentration, but which is dilute in some places and approxi¬ mates to saturation in others, tends to become of uniform concentration throughout, by a process known as “diffusion.® This consists in the gradual passage of the. dissolved solid away from those regions in which the concentration is greatest and toward those in which it is least. This tendency was first discovered by Parrot, in 1815. It was experimentally investi¬ gated by Graham (1850), so far as concerns its manifestation in solutions whose internal mo¬ tions are not restricted

in any way; and Fick, in 1855, gave the fundamental mathematical theory of the process. In Fick's theory it was as¬ sumed that the quantity of dissolved salt which diffuses across a given sectional area of the solution in a given time is proportional to the rate of variation of the concentration of the solution per unit of length of the straight line that is perpendicular to the sectional area under consideration. This is entirely analogous to the assumption made by Fourier with regard to the conduction of heat through a solid; and, there¬ fore, Fick was able to apply the results of Fourier's powerful analysis directly to the prob¬ lem of diffusion in liquids. The subject being essentially mathematical in nature, reference must be made, for further particulars, to the works cited at the end of this article.

It was known in the 18th century that if a glass vessel is filled with alcohol and the open¬ ing is tightly covered with a bladder, and the whole is then immersed in water, the contents of the vessel increase so that the bladder is dis¬ tended and sometimes bursts. This is evidently due to the fact that water enters the closed vessel by passing through the more or less porous bladder. In other words, it is a dif¬ fusion phenomenon, which takes place between two parts of a non-homogeneous fluid system,

which are separated from each other by means of a partially permeable partition. The sys¬ tematic study of diffusion phenomena of this kind has led to many interesting and important results. Pfeffer (1877), by improving upon a suggestion due to Traube (1867), prepared dia¬ phragms that were far superior to the bladders used by earlier experimenters ; his method con¬ sisting in forming a precipitate of ferrocyanide of copper within the pores of a cell of porous earthenware. The earthenware, as thus pre¬ pared, was rendered "semi-permeable,® inas¬ much as it would allow of the passage of water through itself, while it would not permit of the passage of any dissolved substance that the water might contain. The porous cell, as thus prepared, was filled with a solution of some sub¬ stance such as sugar or nitre, and was then carefully sealed up, save for one small opening to which a delicate mercury manometer was attached. The prepared cell being then im¬ mersed in a vessel of pure water, it was found that water will enter the cell, until the mercury manometer registers a very considerable pres¬ sure; — a pressure of three atmospheres being observed in the case of a V/2 per cent solution of nitre. The passage of a liquid in this man¬ ner through a membrane or other porous septum is called osmosis (q.v.), and the maxi¬ mum or limiting pressure that is attained when the system arrives at its ultimate condition of equilibrium is called the "osmotic pressure® of the solution. The osmotic pressure produced by any

given solution is found to be propor¬ tional to the concentration of the solution, this relation being surprisingly accurate so long as the solution does not approach too closely to saturation. The osmotic pressure is further found to vary with the temperature of the solu¬ tion.; and the remarkable fact has been brought to light, partly by experiment and partly by theory, that for any given solution of constant concentration, the osmotic pressure is approxi¬ mately proportional to the absolute tempera¬ ture. De Vries has also shown that for non¬ electrolytes (such as solutions of sugar or glycerine in pure water), solutions of different substances possess the same osmotic pressures, provided their temperatures are the same, and they contain the same number of gram- molecules of dissolved substance per unit mass of the solvent. (A “gram-molecule® of any substance is a quantity such that its weight, in grams, is numerically equal to the molecular weight of the substance). It is evident, there¬ fore, that the osmotic pressure of a dilute solu¬ tion follows laws that are closely analogous to those that hold true for attenuated gases. Much of the modern theory of solutions has been built up on this fact; and while some of the reason¬ ing by which students of physical chemistry draw upon the known facts of gaseous ther¬ modynamics for information concerning solu¬ tions appears, to be more or less imperfect, it must be admitted that the known analogies be¬ tween. attenuated gases and dilute, non-elec- trolytic. solutions are highly interesting and suggestive.

Blagden, in 1788, showed that the freezing point of a salt solution is lower than that of pure water by an amount which is nearly pro¬ portional to the concentration of the solution, so long as the solution does not approach too nearly to saturation. Other investigators have

examined this subject from time to time, and especially Raoult (1882), who worked with many different solutes, and with several sol¬ vents. Raoult’s general conclusion was, that in any given solvent the freezing point is low¬ ered by the same amount, by the presence of one gram-molecule of any dissolved substance whatever. This law is somewhat too general, as it has exceptions which cannot be here dis¬ cussed ; but it is sufficiently general and suffi¬ ciently accurate to be of material service in the determination of the molecular weights of sub¬ stances whose percentage compositions are known by other methods. Raoult found also that the boiling point of a solvent is raised by the presence of a dissolved substance, the elevation being here also

proportional to the concentration of the solution, and being, for any one solvent, independent of the nature of the solute, so long as the same number of gram-molecules of the solute are present in every case. This law is also subject to exceptions; but, like the freezing point law, it is very useful. In the determina¬ tion of molecular weights by either of these methods, it must be remembered that the molec¬ ular weight of a substance may be (and indeed often is) different when the substance is con¬ sidered in different physical states. Beckmann, for example, found that the boiling point of carbon disulphide is raised by sulphur by an amount which indicates that the molecule of sulphur contains eight atoms, when that element is dissolved in carbon disulphide ; previous ex¬ periments on the vapor density of sulphur indi¬ cating that in the vaporous condition its mole¬ cule contains six atoms.

In a general way, the ultimate nature of the process of solution is explained by the molecu¬ lar theory of matter (see Molecular Theory) ; but the molecular theory still leaves much to be desired on this score. We are to think of the solid solute as composed of a system of mole¬ cules, held together by the inter-molecular at¬ tractive forces that cause the parts of solids to cohere to one another. When the solute is placed in the solvent, the external attractive force of the solvent upon the superficial molec¬ ular layers of the solute partially neutralizes the internal forces by which these molecules are held in position, and more or less of the mole¬ cules of the solid escape into the solvent. As the concentration of the solution increases, an increasing number of the dissolved molecules will again come within the range of attraction of the undissolved portion of the solute, in such a way as to be caught by the solute, and tem¬ porarily retained as a part of it. Saturation occurs when the number of molecules regained by the solute in this way in any given time be¬ comes equal to the number lost by it in the same time. Saturation being thus determined by the equality of the molecular exchanges that take place in a given time at the surface of the undissolved solute, it is evident that when no free solid is present there can be no such equality of exchanges. Hence the possibility of a ˆsupersaturatedˆ solution. Indefinite super¬ saturation cannot be experimentally realized, however, for in the ceaseless rearrangement of molecules that takes place in a liquid, it occa¬ sionally happens that a certain number of mole¬ cules of the dissolved substance fortuitously come together in such a way as to serve as a nucleus for the deposition of the solid; and

when this occurs, the supersaturated solution spontaneously deposits the excess of solute that it contains.

The molecular condition of the dissolved portion of the solute has been made the subject of much study. When a solute dissolves, its dissolution is almost invariably accompanied by thermal changes, the solution becoming either cooled or heated. By reason of these thermal changes, the phenomena of solutions may be discussed by the aid of the general laws of thermodynamics (q.v.), without making any special hypotheses as to the ultimate molecular nature of the solution. This plan was carried out with great power by Gibbs, in his celebrated paper entitled (On the Equilibrium of Hetero¬ geneous Substances5 (Transactions of the Con¬ necticut Academy of Sciences, October 1875). His paper is so exceedingly general, and so entirely mathematical, that it is very difficult to read ; and hence his methods are not under¬ stood, even yet, as widely as they should be. Van't Hoff and Arrhenius, attracted more to the purely physical side of the question, and desir¬ ing to form (if possible) some sort of a mental image of the actual processes that are going on, have developed a theory regarding the nature of the dissolved solute, which is known as the (<ionic theory,® or as the <(electrolytic dissocia¬ tion theory® ; and it is this theory which is most widely accepted at the present time. It has at least the merit of being suggestive, as well as fruitful in its practical results. There is also a so-called ((hydrate theory® of solutions, in which the solute, in aqueous solutions, is supposed to form a series of definite hydrates with the sol¬ vent; analogous compounds being also formed in non-aqueous solutions. This theory has had many distinguished supporters, among whom the great Russian chemist Mendeleeff may be specially mentioned. In recent years its most devoted apostle is perhaps S. U. Pickering, who has defended it with ingenuity and power. The literature of the hydrate theory is not extensive, however, when compared with that of the ionic theory; and the ionic theory has the decided preference among physical chemists at the pres¬ ent time. A general presentation of the hydrate theory, written by Mr. Pickering, will be found in Watts' dictionary of Chemistry,5 article ˆSolutions II.®

According to the ionic theory of Van't Hoff and Arrhenius, the solute, in a solution, is dis¬ sociated more or less completely into little bodies called (<ions® ; the dissociation being slight or even zero in some cases, and very ex¬ tensive in others. In a solution (such as that of sugar in water) which does not conduct electricity electrolytically, there is little or no <(ionization,® or dissociation of the solute mole¬ cules into ions; while in a salt solution, which does conduct electrolytically, the dissociation is large, and may even be almost complete, when the solution is very dilute. The ions are not necessarily identical with the atoms, although they may be so in

certain cases. When sulphuric acid and water compose the solution, the sul¬ phuric acid is supposed to be partially disso¬ ciated into hydrogen and <(sulphion® (SCh) ; sulphion being a hypothetical <(ion,® supposed to be present in the solution, but being admit¬ tedly incapable of existence in the free state. In the same way, sodium chloride, NaCl, when dissolved, is supposed to be more or less com-

pletely dissociated into the ions Na and Cl. It will be observed, however, that the ions are here atoms of sodium and chlorine, and not mole¬ cules ; the molecules of these substances having the respective formulae Na2 and Cl2, and being, therefore, composed, in each case, of two ions joined together. Here, as in the case of sul- phion, the ions are seen to be incapable of free existence ; because when the sodium and the chlorine are set free, by electrolysis or other¬ wise, it is a molecular aggregate that is ob¬ tained, and not a collection of the free ions. The completeness of the ionization of a solute is affected by various circumstances, but most notably by the degree of concentration of the solution ; and the oroportion of the solute mole¬ cules that are dissociated in any given solution may be numerically determined by various methods, for which the special works on solu¬ tions must be consulted. It is important to observe that ions are entirely different things from ˆelectrons,® the electrons being the ulti¬ mate particles of which the atoms are supposed to be built up, while the ions are either the atoms themselves, or else larger systems com¬ posed of the atoms. (See Electron Theory). The dissociated ions in a solution are supposed to be endowed with electric charges, the two ions into which any given molecule is separated be¬ ing charged oppositely. In the case of sodium chloride, for example, the sodium ion is charged positively and the chlorine ion negatively. Upon the evaporation of the solvent, these ions recombine, their electric charges then neutraliz¬ ing each other, so that the molecule, as a whole, is not electrified. There is no immediate evi¬ dence, in a solution, of the existence, within it, of electrified particles, or ((ions)) ; but if an elec¬ trical stress is excited across the solution, by inserting the electrodes of a galvanic battery at opposite sides of the containing vessel, the pos- tively electrified ions are urged one way, and the negatively electrified ones the other way. Eventually the ions, thus urged along, come in contact with the electrodes themselves, and here the ions discharge their electricities, becoming thereby capable of existing in the free state again, and being, in fact, deposited upon the electrodes, unless prevented by some secondary action within the cell. It will be

observed that electrical conduction through an electrolyte is entirely different (according to the ionic theory) from conduction through solid con¬ ductors like metallic wires. The ions in a solu¬ tion transport their charges bodily and pour them out upon the electrodes. The charge of an ion is supposed to be perfectly definite in mag¬ nitude ; and hence Faraday's law, that electro¬ lytic decomposition is accurately proportional to the total quantity of electricity passing through the electrolyte, is easily understood. It might be even better to state it in the inverse form; namely, that the quantity of electricity conveyed across an electrolytic solution, under a given electric stress, is accurately proportional to the total quantity of matter set free upon the electrodes. In a solution which does not con¬ duct electricity, the reason that it does not conduct is supposed to be, that the molecules of the solute are not dissociated into ions to any important extent, so that they are incapable of being electrically charged, and are, therefore, in¬ capable of acting as conveyors of electricity.

A single example may be given of the appli¬

cation of the molecular theory of solutions to the explanation of chemical equilibrium and mass action. Suppose that m gram-molecules of ethyl alcohol, one gram-molecule of acetic acid and n gram-molecules of water are mixed and the solution is allowed to stand indefinitely. The acetic acid H.C2H3O2, combines with the alcohol, C2H5.OH, to form ethyl acetate, C2H5.C2H3O2, and water, H2O, in accordance with the equation : H.C2H3O2 + C2H5.OH—

C2H5.C2H3O2 + H2O. But the reaction proceeds very slowly, so that several days elapse before a state of approximate equilibrium is attained; and even then the solution will contain free acetic acid and free alcohol, the amounts of these that remain uncombined depending upon the relative quantities of the several constitu¬ ents that were present in the original solution ; — that is, upon m and n. (It is this dependence upon the relative quantities of the reacting sub¬ stances that is understood when we speak of the <(effect of mass® in chemical reactions; or, more briefly, of ((mass action®). Suppose, now, that after a certain time, there have been x gram- molecules of ethyl acetate formed in the course of the reaction. This implies that there have also been x gram-molecules of water formed at the same time, and x gram-molecules, each, of acetic acid and of alcohol destroyed. At the instant contemplated, the number of gram-molecules of each of the several substances present in the solution will, therefore, be as follows: Of alcohol, (m — x) ; of acetic acid, (1 — x) ; of ethyl acetate, x; and of water, (w + jr). The number of actual molecules of alcohol and of acetic acid present in the solu¬ tion at this

time will, therefore, be proportional to (m — x) and to (1 — x), respectively; and hence the number of chance encounters, during one second, between a molecule or acetic acid and one of alcohol will be proportional to the prod¬ uct of these quantities, or to (m — x) (l — x). We may assume that the number of actual com¬ binations taking place under these circum¬ stances will be proportional to this number of encounters, and to a certain (as yet unknown) coefficient of (<affinity® between the two sub¬ stances, which coefficient we will denote by k. The total number of gram-molecules of ethyl acetate formed during the next following sec¬ ond may, therefore, be taken as k(m — x) (1 — x). Now if we had started our experiment by mixing ethyl acetate with pure water, we should have found that the water and the ethyl acetate would combine to form alcohol and free acetic acid, as indicated by reading the foregoing chemical equation from right to left; the reaction, in that case also, proceeding only to a definite point, and then ceasing. In the actual case we must conceive of both of these reactions as going on simultaneously. There being x gram-molecules of ethyl acetate pres¬ ent at the proposed instant, and (n+x) gram- molecules of water, and the (<chemical affinity® of water for ethyl acetate being supposed to be measured by a new coefficient, k' , we con¬ clude, by a process of reasoning entirely anal¬ ogous to that just explained, that in the next following second the number of gram-mole¬ cules of ˆethyl acetate that will be decomposed will be k1 (n+x)x. When equilibrium is finally established, so that ethyl acetate is no longer formed or decomposed (that is, when it is formed and decomposed with equal rapidity),

we have the equation k(m—x) (1— x)= k'(n-\~x)x. By trying the experiment with known initial quantities of acetic acid, alcohol and water, we could ascertain, directly, the value of x, which now represents the number of gram-molecules of ethyl acetate present when equilibrium is attained; and substitution in the foregoing equation would then give us the ratio of k to k' , — that is, it would give us the ratio of the actual chemical affinities that are involved in this reaction. It has been found, in this way, that if we make (initially) m— 1 and n— 0, then when equilibrium is attained, the resulting value of x is 2/$. Substituting this for x, and putting 1 for m and 0 for n, we easily find that k/k'—A. With this value of the ratio of k to k' , we may write the foregoing equa¬ tion in the form 3x2 — (AA-Am +n) xA-Am=0. This is a quadratic equation, and in order to find the final state of equilibrium for any pro¬ portion of alcohol and water to

acetic acid in the original solution, we have merely to substitute for m and n their values as given for the primi¬ tive solution, and then solve for x. The equa¬ tion, being a quadratic, has two roots ; but no trouble need be had on that account, since it is plain that we must accept that root which would give x = 0 when we set w = 0. The results ob¬ tained from this equation by calculation have been compared with the direct results of ex¬ periment, and the agreement has been found to be quite satisfactory. Many other similar prob¬ lems have also been worked out from theoretical principles and the results verified by direct obser¬ vation, and by the introduction of the methods of the differential and integral calculus it has even been found to be possible to follow the course of such reactions from stage to stage, so that the composition of the solution can be known at every instant, and not merely for the state of final equilibrium.

Bibliography. — Arrhenius, (Theories of

Solutions) ; Jones, (The Freezing-Point, Boil¬ ing-Point and Conductivity Methods, } and (The Nature of Solution *; Lehfeldt, (Text-book of . Physical Chemistry * ; Nernst, (Theoretical Chemistry* ; Ostwald, (Solutions) ; Whetham, (Solution and Electrolysis.)

Allan D. Risteen.

SOLVAY, Ernest, Belgian manufacturer; b. Rabeck, near Brussels, 16 April 1838. He was educated at Liege and early engaged in the manufacture of chemicals. He developed the ammonia process for manufacturing soda, es¬ tablished it commercially, and after first manu¬ facturing at Couillet, Belgium, which plant he established in 1863, he extended the industry throughout Europe and America. By 1913 he owned a practical monopoly of the production of the world's supply of soda. He has given liberally of his great fortune to educational and charitable purposes and while suffering material losses through the European War greatly assisted his countrymen during the German invasion. He served in the Belgian Senate in 1893-1900; founded the Ecole de Commerce and the Ecole des Sciences Politiques et Sociales, as well as international institutes of chemistry and sociology, and is president of the Bureau of the International Institute of Bibliography at Brussels. He is a grand officer of the Order of Leopold, honorary member of the Royal Institute of Great Britain and was

awarded the Lavoisier medal of the Institute of France and the grand medal of the University of Paris.

SOLWAY FIRTH, sol'wa ferth, Great Britain, an arm of the Irish Sea separating the county of Cumberland, England, from the southwestern part of Scotland. It extends nearly 40 miles inland, narrowing gradually from a breadth of 20 miles. Its upper part forms the estuary of the Esk. Large areas are left dry at low tide, while the high tide rushes in as a violent bore.

SOLYMAN I, El Kanouni (The Mag¬ nificent), emperor of Turkey, son of Selim I: b. 1493; d. Szigeth, Hungary, 1566. He suc¬ ceeded his father in 1520, crushed a rebellion in Syria in 1521, concluded a treaty of peace with Venice and then inaugurated the first of a long series of wars against Europe. He captured Belgrade in 1521, Rhodes in 1522, defeated the Hungarians with fearful loss at Mohacs in 1526 and mastered Buda in 1529. He then laid siege to Vienna, but met with disastrous defeat. He took Bagdad in 1534, and on condition of an enormous yearly tribute concluded a peace with Venice in 1539 and with Austria in 1547. He made successful war against Kurdistan, con¬ quered Van and Tebriz and part of Georgia in 1548, but in the next year met with continued losses at the hands of Austria, and in 1552 he was defeated with enormous loss in the siege of Erlau. His wars with Persia in 1554 — 55 were disastrous as were also his Hungarian wars of 1558. He attempted to break Spain’s naval power, but met with defeat at Malta in 1565, though he took the Isle of Chios in 1566. He was engaged in a war with Austria when he fell at the siege of Szigeth. His reign saw the zenith and the decline of Ottoman power. He remodeled the code of laws, introduced reforms in the judiciary and in taxation and erected mosques and public buildings which are marvels of Ottoman architecture. He was also a poet and a patron of literature and art. In addi¬ tion to his own superior abilities he was aided by statesmen, generals and naval commanders of unquestionable greatness. His successes came principally in the early years of his reign and though he left his empire with greatly ex¬ tended boundaries it had been much weakened by his long continued wars.

SOLYMAN II, Turkish emperor, son of Sultan Ibrahim; b. 1642; d. Constantinople, Turkey, 1691. He succeeded to the throne on the disposition of his brother, Mahomet IV, in 1687. His life had been spent in the seraglio in the study of the Koran and feeling his in¬ capacity to reign he entrusted the administra¬ tion of the government principally to his grand vizier, Kupruli Zadek Mustapha Pasha, the

Virtuous. His reign saw the defeat of Turkish arms in Hungary and in Serbia, the grand vizier meeting death at the disastrous defeat of Selankemen two months after the death of his master.

SOMA, a sacred plant of India and an in¬ toxicating drink prepared from it, the latter be¬ ing a libation of great importance in the ancient religion of India. The draught is not only an offering to Indra, but in the form haoma is poured upon the ground, at the beginning of a meal, or at the reception of guests, as a drink- offering to the earth. Soma is also a lunar di-

vinity, allied to Indra, the plant having been deified before the separation of the Indo- Iranians, on account of its moon-like swelling and color and because of the maddening effects of its juice. It is, moreover, identified with the Hindus' mythical tree of life that grew in paradise, the juice of which imparted immor¬ tality and which was guarded by spirits. The Rig- Veda refers to this in a hymn:

" We've quaffed the soma bright And are immortal grown We've entered into light,

And all the gods have known."

According to John Fiske, the soma is a plant, connected mythically with lightning. Al¬ though several plants have been called soma, it is generally supposed that Sarcostemma bre- vistigma is the plant indicated. It is a climbing plant, also called moon-plant, of the milk- weed family, with slender jointed stems and succulent pendulous branches, terminated by small umbel¬ like cymes of whitish fragrant blossoms. It has a milky juice. Soma is picked by moon¬ light, taken to a place of sacrifice and crushed between stones; the juice is then strained and allowed to ferment. It is then offered to the gods and afterward drunk by the priests.

SOMALILAND, so-ma'le-land, Africa, a general name applied to the coast region to the southeast of Abyssinia and bordering on the Gulf of Aden and the Indian Ocean as far south as the equator. The region is divided between France, Great Britain and Italy. See French Somaliland; Italian Somaliland; British Empire.

SOMALILAND PROTECTORATE, a

territory on the west coast of Africa under the protection of Great Britain, lying along the Gulf of Aden from about long. 43° to 49° E., and extending from about lat. 11° to 8° N. On the east and southeast it is bounded by Italian Somaliland, on the south and west by Abys¬ sinia and on the northwest by French Somali¬ land. It has an area estimated at nearly 70,000 square miles, lacking in fertility largely on account of a need of natural irrigation. The surface is in great part mountainous. The climate is more healthful in the interior than along the coast where there is more humidity. Among the chief products are sheep, cattle, skins, ostrich feathers, myrrh and incense. The principal ports are Bulhar, Zeila and Berbera, connected by telegraph lines and having wire¬ less telegraph stations. Berbera, the capital, pop. 30,000, has a good harbor and is in winter the scene of considerable commercial activity. The combined imports and exports are valued at about $2,500,000. The protectorate, created in 1884, is administered by a commissioner and commander-in-chief appointed by the colonial office since 1 April 1905. In 1894 the boundary between this protectorate and Italian Somali¬ land was defined. In the spring of 1903 an agitation in this region in favor of the Mad Mullah (q.v.) led to a considerable loss among the British troops and their concentration on the coast. Since 1912 a camel constabulary corps has been effective in checking intertribal fighting. The inhabitants are related to the Abyssinians and Gallas and on account of their nomadic habits there are no accurate statistics of population, which is estimated at about 300,000. Consult Drake-Brockman, R. E.,

(British Somaliland) (London 1912) ; Hamil¬ ton, A., (Somaliland) (London 1911) ; Swayne, H. G. C., Seventeen Trips through Somali¬ land5 (London 1900).

SOMBRERETE, som-bra-ra'te; Mexico, in the state of Zacatecas, 65 miles northwest of the town of that name, in a mountainous dis¬ trict (2,570 metres), rich in silver. Its mines are said to have once contained the richest veins ever known, but are now nearly exhausted. Pop. 11,954.

SOMBRERO (som-bra'ro) ISLAND, West Indies, a small rocky island of the Lee¬ ward Group, about midway between the Virgin Group and Anguilla, resembling in form the Mexican hat or sombrero, whence the name. Its staple products are sugar and molasses, besides pineapples and cocoa. It exported formerly large quantities of phosphate of lime, the de¬ posits of which have been exhausted. Ad¬ ministratively it is attached to the Virgin Islands. The Board of Trade supports a light¬ house on the island.

SOMERS, Sir George, English navigator: b. Lyme Regis, Dorset, 1554; d. Bermuda Islands, 9 Nov. 1611. He took part in a num¬ ber of voyages, notably in those of Sir Walter Raleigh, upon the Spanish seas, and in 1606 en¬ tered into organization of the London or South-Virginia Company for the colonization of the western continent and was afterward created admiral of the fleet bound for Virginia which sailed from Plymouth, 2 June 1609. His ship, the Sea Venture, was separated from the rest of the fleet by a hurricane when half way across the Atlantic, and on 25 July landed at the Bermuda Islands, which were im¬ mediately claimed by him as English possessions and named Virgineola and later the Somers Islands. They were afterward colonized from Virginia. Consult Neill, E. D., (Virginia Com¬ pany of London5 (Albany, N. Y., 1869) ; Doyle,

J. A., (English Colonies in America) (New York 1882-1907) ; Lefroy, (Historye of the Bermudaes or Summer Islands5 (Hakluyt So- . ciety 1882).

SOMERS, John, Lord, English statesman : b. Worcester, 4 March 1652; d. London, 26 April 1716. He was graduated from Oxford and admitted to the bar in 1676. As a prom¬ inent member of the Whig or Country party he was active in the political life of the revo¬ lutionary period. He was chairman of the committee which drafted the Bill of Rights and was the defender of that bill in Parliament. He was engaged as counsel for the Seven Bishops in 1688 and occupied a number of im¬ portant offices during the reigns of James II and William III, being Solicitor-General (1689) ; Attorney-General (1692) ; Lord Keeper (1693) and speaker of the House of Lords in the same year. In 1697 he became Lord Chan¬ cellor of England and was raised to the peer¬ age. Papers for his impeachment were begun in 1700, when he was removed from the chan¬ cellorship. His valuable papers were collected and edited by Sir Walter Scott in 1809-15. Consult Maddock, Henry, (An Account of the Life and Writings of Lord Chancellor Somers5 (London 1812).

SOMERS, Richard, American naval officer: b. Egg Harbor, N. J., 1778; d. 4 Sept. 1804. He

entered the navy in 1798 and was assigned to the frigate United States. In the war with Tripoli he was placed in command of the Nau¬ tilus and for gallant service rendered in that campaign was made

commander. He was killed in a heroic attempt to destroy the Turkish fleet by blowing up his own ship, the Intrepid, in its midst.

SOMERS ISLANDS. See Bermuda Islands.

SOMERSET, Lady Henry (Isabel), Eng¬ lish temperance reformer, daughter of the Earl of Somers: b. 1850; d. London, Eng., 11 March 1921. She -was married to Lord Henry Somerset in 1873 ; was actively interested in various industrial institutions and local mis-> sions ; founded the industrial farm colony for inebriate women at Duxhurst, Surrey, and es¬ tablished and conducted for 15 years a home for training workhouse children and a home for children from the Society for the Preven¬ tion of Cruelty to Children. She was president of the National British Women's Temperance Association and in 1889 was elected president of the World's Women's Christian Temperance Union. She was editor of the Women's Signal and published (Studies in Black and White5; (Our Village Life) and (Beauty and Ashes, 5 a book on reform for women. She frequently visited and lectured in the United States.

SOMERSET, Ky., city and county-seat of Pulaski County, 68 miles south of Lexington, on the Cincinnati, New Orleans and Texas Pacific Railroad. There are railroad shops and manufactures of knit goods, lumber, spokes and staves. Pop. (1920) 4,672.

SOMERSET, Mass., town and village in Bristol County, on the Taunton River, 42 miles south of Boston, and on the New York, New Haven and Hartford Railroad. It has iron works and a stove manufacturing industry. Pop. 3,377.

SOMERSET (Ky.), Engagement at. In

March 1863, Gen. John Pegram, with 1,550 cavalry and three guns, started from East Tennessee on an expedition into eastern Ken¬ tucky to seize beef cattle for the Confederate army. On 22 March he crossed to the north bank of the Cumberland River, by Stigall's Ferry, and making a forced march reached and attacked Danville, on the 24th, driving out Wolford's Union cavalry and pursuing them nearly to the Kentucky River. He then began to collect his cattle in the counties of Lincoln, Boyle and Garrard. On the 26th General Burnside ordered Generals Gillmore and Man- son, who were north of the Kentucky River, to concentrate their forces and attack Pegram, then in the vicinity of Danville. Gillmore crossed the Kentucky River at Hickman's bridge on the 28th and drove Pegram across Dick's River, Pegram burning the bridges to check pursuit. On the same day Manson occu¬

pied Danville and moved to co-operate with Gill¬ more, who was following Pegram toward the Cumberland. Pegram had called in and concen¬ trated his command, and falling back skirmish¬ ing, made a stand in a strong position on Dut¬ ton's Hill, three miles north of Somerset, in order to check the Union pursuit until he could get all his captured cattle across the river, six miles in his rear. Gillmore, with 1,250 mounted

men and six guns, advanced on Pegram's posi¬ tion at daybreak of the 30th and drove his rear¬ guard back upon his main line, which he found strongly posted and resisting firmly. An effort by Pegram to turn Gillmore's right failed and Gillmore, dismounting his men and forming in line, the action began at noon by artillery firing on both sides, which was continued two hours, when Gillmore's men charged to within 30 yards of the Confederate line and it gave way from right to left and could not be rallied until near the town, when order was restored and another position taken and slight works thrown up, about three miles south of Somerset. As night was setting in, no attack was made on this position, Gillmore contenting himself with throwing a few shells and advancing his skirmishers. During the night Pegram re¬ crossed the Cumberland at Stigall's Ferry with 537 of the 750 cattle he had collected. The Union loss in the engagement was about 30 killed and wounded. Pegram reports a loss during his raid of over 200 men. Consult (Official Records5 (Vol. XXIII).

SOMERSWORTH, N. H., city in Straf¬ ford County, on Salmon Falls River, 18 miles northwest of Manchester, on the Boston and Maine Railroad. There are manufactures of cotton goods, yarns, boots, shoes and boxes and also bleaching and dye works. The place was settled in 1729. Pop. (1920) 6,688.

SOMERVILLE, Alexander, Canadian journalist: b. Springfield, East Lothian, Scot¬ land, 15 March 1811; d. Toronto, Canada, 17 June 1885. He enlisted in the Scots Grays at Birmingham on the eve of the Reform riots of 1832. He protested against the orders to the soldiers to rough sharpen their swords in ex¬ pectations of a conflict with the rioters, and later, on another pretext, but in his opinion because of his former action, he was given 100 lashes. He obtained an inquiry, the prin¬ cipals in the affair were reprimanded and a Parliamentary discussion of army discipline fol¬ lowed with the result of a modification of cer¬ tain harsh practices in the army. He served with the British Legion in Spain in 1835 and in 1837 he resigned from the army. In 1839 he was asked to lead an insurrection in Wales, but instead he set to work to prevent it. He was later engaged in journalism and in 1858 he removed to Canada, where he was for a

time editor of the Canadian Illustrated News and he was a contributor to the Spectator and other periodicals. He died in extreme poverty, refusing to the last the assistance of his friends. Author of (Autobiography of a Workingman5 (1848); financial Reform Catechism5 (1849); (The Conservation Science of Nations,5 con¬ taining an account of his army experience (1860) ; (A Narrative of the Fenian Invasion of Canada5 (1860), etc.

.SOMERVILLE, Mary Fairfax, English

mathematician : b. Jedburgh, Scotland, 26 Dec. 1780; d. Naples, Italy, 29 Nov. 1872. She was the daughter of Admiral Fairfax and in 1804 was married to Samuel Grey (d. 1807). It was not, however, until after her 30th year and her marriage to her cousin, William Somer¬ ville, that she began to publish the results of her studies. In 1827 she began the translation of Laplace's (Mechanique Celeste5 and four

years later popularized in England the great work of the astronomer under the title, (The Mechanism of the Heavens) (1831). The book was immediately adopted by the English uni¬ versities and brought her prominently before the scientific world. Her fame, however, did not rest upon this great undertaking alone. In 1834 she published (The Connection of the Physical Sciences,5 a work which was also widely read and in 1848 a treatise upon physi¬ cal geography. The latter half of her life was spent in Italy, where she lived with her children after the death of her husband and where her efforts were devoted to the revision of her earlier books and the writing of her (Molecular and Microscopic Sciences) (1869). The story of her life contained in an autobiographical account entitled (Personal Recollections of Mary Somerville, 5 compiled and edited by her daughter, is a valuable history of her long and useful career.

SOMERVILLE, William, English poet: b. Edstone, Warwickshire, 1677 ; d. 19 July 1742. His most celebrated poem, (The Chased an epic, written in blank verse and published in two volumes in 1734, made a place for him among the 18th century poets. He wrote also a burlesque of rural games entitled <Hobbinol5 (1740) and (Field Sports5 (1742). His poems with a biography are in the collections of John¬ son and Chambers ; a collective edition of his works appearing in 1801. (The Chase5 has been edited separately by G. Gilfillan (Edinburgh

1859).

SOMERVILLE, Mass., city in Middlesex County, on the Mystic River and on the Fitch¬ burg and the Boston and Maine railroads. The Mystic separates the city from Chelsea on the east, Boston is on the southeast boundary and Cambridge on the southwest and west. Several steam railroads and electric lines con¬ nect the city with Boston, Cambridge, Chelsea, Newton and all the nearby towns and cities. It is largely a residential suburb of Boston and has many fine private and public dwellings. Somerville was settled in 1629 and was a part of Charleston until 1842 when it was set off as an independent town. In 1872 it was in¬ corporated as a city. It is built on seven hills, all of which .exist, although street grading has lowered some of them. In 1631 the first vessel built in Massachusetts was launched from Gov¬ ernor Winthrop's (<Ten Hill55 farm on the Mystic. On Quarry Hill, in the centre of one of the public parks, is an old building, once a powder-house, which was built in 1703. Dur¬ ing the Revolutionary period several fortifica¬ tions were built on the hills of Somerville. On Cobble Hill was General Putnam's fortress, another fortification was on Winter Hill, and the <(citadel,55 on Prospect Hill, was where, on 1 Jan. 1776, Washington raised the first colonial union flag. The city has a large amount of manufacturing interests, including slaughtering and meat-packing, cloth bleaching and dyeing, tanning and the manufacture of desks, pic¬ tures and' frames and metal tubing. There are three public parks, a hospital, a home for the aged, in charge of the Little Sisters of the Poor, an insane asylum and a number of other charitable organizations. There are 31 churches and 28 school buildings. The educational in¬

stitutions are English and Latin high schools, public and parish schools, several private busi¬ ness schools and a public library. In educa¬ tional and industrial life Somerville is identi¬ fied with Boston in many ways. The govern¬ ment of Somerville is vested in a mayor elected annually and a unicameral council. Pop. 93,0ˆ1. Consult Samuels, (Somerville, Past and Pres¬ ent5 (Boston 1897), and Hurd, (History of Middlesex County5 (Philadelphia 1890).

SOMERVILLE, N. J., borough and county-seat of Somerset County, on the Rari¬ tan River and on the main line of the Central Railroad of New Jersey, 36 miles southwest of New York, 37 miles from Easton and 64 miles from Philadelphia. It is the trading centre for a large population, has a public library, hospital, two theatres, a courthouse, three banks, a high school, two public schools, eight churches and three weekly papers. It has manufactures of clothing, woolens, iron pipe, stoves, etc. The assessed valuation is $4,820,130. Electric

railroads afford easy ac¬ cess to surrounding districts and to neighbor¬ ing towns. Pop. (1920) 6,718.

SOMME, som, France, (1) a river rising in the department of Aisne, seven miles north¬ east of Saint Quentin, flowing from southeast to northwest and falling into the English Chan¬ nel. Its chief affluents are the Avre and Celle. It is 135 miles long and navigable from Amiens as far as Abbeville (q.v.) for vessels of 300 tons. It has canal connection with the Oise and the Scheldt. (2) The department of Somme in northern France has an area of 2,378 square miles. It consists of highly-cultivated and large, fertile plains and its highest point is at the southwest. Considerable land beyond the sand dunes of the coast has been reclaimed. The river Somme is the principal stream and on it is situated Amiens, the chief town. There are numerous industrial works — foundries, mills for textiles, paper, chemical, soap, lock, beet- sugar and other factories; important fisheries, etc. The exports include raw materials for manufacture, cider, timber, dyes, coal, horses and cattle. It is traversed by several railways. For the account of the engagements at the Somme during the European War, see War, European.

SOMMERVILLE, Maxwell, American

archaeologist: b. Philadelphia, 1 May 1829; d. Paris, France, 6 May 1904. Having spent many years in the collection of precious stones and historical gems, he became an authority upon glyptography and allied subjects and in 1894 was appointed professor of glyptology in the L!niversity of Pennsylvania. He is the author of (Engraved Gems5; <Sands of Sahara5 (1901) ; a monograph entitled (A Buddhist Temple5 (1900), and other works.

SOMNAMBULISM (sleep-walking, also sometimes called noctambulism) , pathologically considered, is caused by persistent, strong, un¬ conscious wishes of the individual which can¬ not be inhibited but which must be carried out without conscious knowledge of the sleeper. The acts are usually clothed in symbolism which mostly veils their real meaning events from the conscious onlooker. It is analogous to the hypnotic or mesmeric state. It is similar to somniloquy or sleep-talking. Hippocrates,

Aristotle and other ancient authors wrote upon it, and Galen is said to

have been a victim to it. uThe mind acts automatically under the dominance of some single idea. Sight, hearing and nearly all the avenues of sense are closed. The sleep-walker avoids obstacles and performs ordinary acts automatically, like an absent- minded man, which in reality he is.® His train of thought is in accordance with his single idea, continuous and logical. Portions of the brain usually involved in the physiological con¬ ditions peculiar to sleep seem to be exempt. The sleeper exerts powers which sleep usually annuls ; the direction of voluntary movements in most trying circumstances is marvelous ; he may be quite deaf to all ordinary auditory impressions; his eyes are usually insensible to light ; they may be closed, partly closed or wide open; the pupils may be widely dilated, contracted or normal. The somnambulist has been known to walk from one part of the house to another, to climb steep roofs or walk along their ridges with ease, to solve intricate mathe¬ matical problems, to write letters or work upon pictures, to attempt murder or suicide, etc. He is roused from this state with difficulty, when he remembers nothing of what has oc¬ curred. t

Somnambulism very frequently is found in certain highly neurotic families. This is prob¬ ably due to imitation from parent to child. It often occurs at about the age of puberty where strong sexual wishes under strong repression, seek symbolic outlets. Usually the somnambulist should not be awakened until he is safely back in bed. To remedy the condition an adequate psychoanalysis should be carried out. It will tend not only to cure the condition, but also aid the individual in the neurosis which is almost an invariable accompaniment or in the making. Consult Jelliffe, (Technique of Phychoanalysis)

(1918).

SOMNATH, sorn-nat', or PATAN, a town on a bay of the Arabian Sea, in Gujarat, 210 miles northwest of Bombay, almost enclosed by a massive wall, flanked by 38 towers. Mag¬ nificent ruins, of which the great temple may be seen at a long distance, mark its former wealth and prosperity. It was one of the orig¬ inal seats of Siva worship in India and has recently again become a favorite place of pil¬ grimage. The town contains many memorials of Krishna, but most of the inhabitants are Moslems, who have erected many mosques. The port of the town is Verawal. Pop. 10,000.

SOMNUS, in Greek mythology, the god of sleep, son of Nox (Night) and twin brother of Mors (Death). He dwelt at the western extremity of the world, where the imagination of early poets placed all awful

beings. Some of the poets describe him as a handsome youth, some as a dull and lazy god, whose dark abode no ray of Phoebus enters. He is sometimes represented with a wreath of poppies ; some¬ times with a horn, in which he carries dreams.

SON OF GIBOYER, The. Emile Augier, the upholder of bourgeois virtues upon the French stage, produced in 1862 his excellent satirical comedy of manners (The Son of Giboyer) ((Le Fils de GiboyeU)- A year earlier, in (Les Effrontes,* he had introduced Giboyer as a hack writer ready to sell his pen

to the highest bidder. In this sequel he made the character of his literary Bohemian more sympathetic, and, instead of attacking financial speculation and money-lust, assailed social cor¬ ruption due to political influence and the at¬ tempts of the middle class to assume the titles of the nobility. Giboyer has been engaged to write a speech for Marechal, the spokesman of the aristocratic party, but no sooner has Marechal got his lesson by heart than the party leaders select another orator. Nothing daunted, Marechal now declaims a radical republican speech prepared by the same facile hand and reflecting Giboyer's true sentiments. The ad¬ dress creates a sensation, and Marechal, sup¬ posing it to be the composition of his young secretary, consents in gratitude to the latter's marriage with his daughter. It emerges, how¬ ever, that the secretary is a natural son and that his father is the disreputable Giboyer, who has taken this means of assisting the youth in secret. Marechal is so far converted to democracy, however, that he interposes no ob¬ jection to this match which he would earlier have disapproved. Even the Marquis d'Au-berive, who has schemed to win pretty Fernande Marechal and her fortune for his nephew, abandons that ambition, and, blessing the lovers, offers to lend the protection of his name to the son oi Giboyer. Although the comedy is old- fashioned in its easy conclusion and its reliance upon coincidences and asides, it sparkles with wit, and, in spite of much that is politically out of date, still lives, thanks to the universality of its satire. It has been translated into Eng¬ lish by Benedict Papot (in Drama, November 1911) and receives full discussion in the French essays upon Augier by Morillot (1901) and Gaillard (1910).

Frank W. Chandler.

SONATA, so-na'ta, a piece of instrumental music intended to express various feelings in different passages, according to the variety of expression of which the instrument is sus¬ ceptible. The sonata usually begins with an allegro or lively passage, followed by an

andante or adagio ; then a minuet with a trio, or a scherzo, and lastly a rondo or presto. Instead of the second, third or last division, variations are also made use of. The older forms of sonata, the word signifying an in¬ strumental composition as distinguished from cantata, were written in two or more divisions and like the modern sonata constituted a com¬ plete musical piece — the passages connected by a common character — and exposition, de¬ velopment and restatement with a conclusion artistically worked out. The sonata was orig¬ inally designed for one instrument only, prin¬ cipally for the violin; afterward for the piano almost exclusively. Subsequently sonatas or double sonatas were composed in which the piano or harpsichord is accompanied by other instruments ; for instance, the violin or flute, horn, clarinet. The expression of the sonata is to be determined by the character of the instrument — a circumstance which modern composers have not sufficiently observed. In sonatas for several instruments the principal instrument is either only assisted (as is the case, for instance, with many sonatas for the pianoforte accompanied by the violincello) , or the instruments alternate, so as to make the

sonata a dialogue of instruments. An easy or short sonata is called sonatina. The most dis¬ tinguished composers of sonatas are Haydn, Beethoven, Mozart, Mendelssohn, dementi, Cramer, Hummel, Weber, Moscheles, Kalk- brenner, Field and Brahms.

SONDERBUND, zon'der-boont, a league formed in 1846 by seven Roman Catholic can¬ tons of Switzerland against the Federal Diet, which had decreed the expulsion of the Jesuits. The Diet voted the Sonderbund illegal 20 July 1847. Freiburg, their stronghold, was captured 13 November, Lucerne 24 November and the Sonderbund was dissolved.

SONG, a little poem intended to be sung; a lyric. The term is applied to either a short poetical or musical composition, but most fre¬ quently to both in union. As a poetical compo¬ sition a song may be defined as a short poem divided into portions of returning measure and turning upon some single thought or feeling.

SONG OF BIRDS. The voice or song of birds results, like that of all higher vertebrates, from the vibration of vocal chords and of a column of air passing through the trachea or windpipe. In birds, however, the

organ of voice is double and consists of an upper and a lower larynx or syrinx, the latter being the organ in which the voice or song is actually produced. The upper larynx is partly bony and partly cartilaginous, is situated at the glottis or open¬ ing of the trachea into the mouth and is of much simpler structure than the larynx of mammals, lacking the vocal chords. Except in the ostrich, American vultures and a few other birds, the syrinx is always developed. It presents great variety in size, form and disposition of parts. Its bony elements consist essentially of modifi¬ cations of the lower rings of the trachea at the point of its bifurcation to form the bronchi and may be tracheal alone, or bronchial alone, or combine elements of both bronchi and trachea. The structure of the upper larynx, apart from experimental demonstration, proves that it is incompetent to produce the song- notes; and its chief office must, therefore, be that of modifying the song. The syrinx of the bird may be compared to <(a reed prefixed to a tube.® Its characteristic structure is the semi-lu¬ nar membrane, which is attached to the upper part of the bony structure known as the trans- versale or pessulus, which bounds the lower end of the windpipe.

This semi-lunar membrane is in fact one of the vocal chords, but a pair of others are formed from folds of the mucous membrane projecting into the interior from the upper bronchial rings and bounding the pair of syringeal glottis later¬ ally. The great distinction existing between the syrinx of singing and of non-singing birds lies in the mobility of these parts and the ar¬ rangement of the muscles. In the true sing¬ ing birds the latter are numerous, distinct and so attached as to produce the tensions or lax¬ ness of the vocal chords upon which the variety of notes depends.

The song of birds, like the notes of most, if not of all, other animals, is in a minor key. Usually the range of song-notes may be com¬ prised within a single octave, but of course these limits may be, and frequently are, greatly

exceeded. The parrots, with a great range of voice and possessing great vocal capabilities, possess an inferior larynx, which differs from that of most other birds in being single in its nature. In the production of the peculiar shrill whistling of parrots the glottis is probably passive or silent — the column of air vibrating as in a flute, where a vibration is communicated by the air and traverses the elastic walls of the tube. Nearly all singing birds belong to the group Oscines and stand at the head of the class in perfection of general organization.

While much has been written in description of the songs of various

species of birds and literature teems with tributes to the ability of feathered songsters and, although many songs have been reduced to words and others written in music, the philosophical side of the subject has been much neglected and a thoroughly com¬ prehensive work is still a desideratum. One fact stands out very clearly, namely, that the vocal efforts of birds bear a close relation to sexual excitement. With many birds true song is confined to the period of mating and incuba¬ tion and is replaced by the ordinary calls of alarm, etc., very soon after the young have hatched. In almost all it reaches its highest ex¬ pression during that period and its effect is then heightened by various accompaniments of gesture, peculiar modes of flight, etc. Among true song-birds great vocal powers are almost confined to the males and are generally sup¬ posed to be the expression of greater vitality or to have resulted through selection by the females for their partners of those most gifted. A view which is gaining ground among zoolo¬ gists is that the distinctive songs of birds are mimetic in origin and some consider that bird language, like human language, is not heredi¬ tary, but is learned anew from their parents by the young of each generation. Given an original exclamatory power of expression this has been given direction and augmented by the imitation of the various sounds of inanimate and animate nature, by which various species of birds were surrounded in their particular environment, just as the same elemental in¬ fluences have been invoked to explain the origin of human language. In sexual selection, in the pleasure derived by a bird from its own music and in the needs for fuller power of expression are supposed to lie the forces effective in its further development.

Besides general works on ornithology, in which are included detailed descriptions of the songs of particular birds, consult Darwin, <The Descent of Man *(Vol. II, New York 1871), and Expression of the Emotions) (New York 1873) ; Witchell, Evolution of Bird Song) (New York 1896) ; Rhoads, (American Nat¬ uralist (1899) ; Jones, (Songs of the War¬ blers * (Oberlin 1900) ; Burroughs, Century Magazine (1898-99) ; (Music of the Wild*

(1910).

SONG TO DAVID, a notable lyrical poem, in 86 stanzas of six lines each, written by Christopher Smart (q.v.), apparently in lucid intervals during his mild madness and pub¬ lished shortly afterward in 1763. It was com¬ paratively neglected ir. its day, but since its resuscitation in 1819 it has been highly praised, and it caused Browning to introduce Smart into his <(Parleyings.® The tradition that it

SONG BIRDS

Nightingale. 2. Robin Redbreast. 3. Blackcap. 4. Shrike. 5. Song Thrush. 6. Starling. 7. Chaffinch. 8. Siskin. 9. Goldfinch. 10. Linnet.

1. Bulfinch. 12. Grossbill. 13. Skylark. I4- Greater Titmouse. 15. Blue Titmouse.

.

was written in charcoal on the walls and scratched with a key on the wainscot of its author s cell can contain but a nucleus of truth. That it is one of the noblest apostrophic poems of the language, full of Smart's piety, to which Di\ Johnson paid tribute, steeped in the sub¬ limity of the Scriptural style and an extraor¬ dinary phenomenon both in the poet's works and in his conventional century is scarcely to-day subject for dispute. Some of the stanzas have a swift carrying or snatching power that makes Browning's reference to Keats and Milton seem a bit awry. Smart is himself, whether or not he was beside himself when he wrote his song to the <(servant of God's holiest charge.® And he was himself in a sense little perceived by his critics. There are poetic, especially lyri¬ cal, elements in his other works that make the (Song to David *a little less inexplicable as the production of ((Kit® Smart than many have found it to be. There is, for example, a stanza in (The Judgment of Midas,* which, with the change of <(Jove® to ((God,® would fit into the (Song* in such a way that few readers would notice the intrusion. This reminds one of what is practically the only serious fault to be dis¬ covered in the poem — one not surprising when we consider Smart's mental condition — that its order, of evolution is not always clear and that it might have been made longer or shorter without obvious loss. A convenient source for the text is G. W. Cooke's (Guide-Book to the . . . Works of Robert Browning) (1901, pp.

87-98).

William P. Trent.

SONG OF HIAWATHA, The. <The Song of Hiawatha, *which Longfellow pub¬ lished in 1855, is the most notable of the many responses to the demand — very strong during the first half of the 19th century — that the myths and legends of the aborigines be made into a truly American poem.*

Characteristically, he took his measure from a European epic, the Finnish <Kalevala,) but the substance was from actual Indian traditions as Longfellow found them in such writers as Catlin, Heckewelder and especially Schoolcraft, whose (Algic Re- searches) (1839) contains an interesting prose version of much of Longfellow's material. The scene of the poem is the southern shore of Lake Superior, among the Ojibways. The ac¬ tion concerns itself with the life of a famous legendary prophet called Manabozho by the Ojibways, and by the Iroquois, Hiawatha (<che makes rivers®), who was said to have taught his people the beneficent arts of peace. Such a personage was of course more congenial to Longfellow than a mere fighter would have been. Hiawatha, though strong and valiant, fights only against the dangerous forces of nature. He clears the river channels, finds out how to cultivate maize, invents picture-writing; he is a gentleman and a true lover. Longfellow therefore had good reasons for selecting the gentler elements of Indian life and thought for his narrative, and it is partly beside the mark to say that (Hiawatha lacks its proper meas¬ ure of savagery. Realistic its setting and per¬ sonages are not, but the naive Indian legends, appealing in their barest form, have been kept fresh by Longfellow's tender sympathy and clear and cheerful, though somewhat facile, style. Fenimore Cooper had given the Indian

once for all his reputation as a crafty warrior. Longfellow added primitive goodness and re¬ ligion to the perennial attributes of the In¬ dian of romance.

Carl Van Doren.

SONG OF MYSELF. The poem in which the American author, Walt Whitman, chose to give an account of himself and his theory of poetic art. The substance of the poem forms, in a remarkable way, Whitman's apologia, and to it everyone must go who wishes to formulate anything like a correct estimate of the man and of his literary aims. It was first published in 1855, without a title; in 1856 as (Walt Whit¬ man, an American* ; as (Walt Whitman) in 1860, and until 1881, when the present title was adopted.

In its final form — for like everything of the author's it was carefully revised — the (Song of Myself *consists of some 52 divisions of unequal length, and of no close or formal connection between parts, the unity of the work resulting from the fact that every part reveals some point of view, some half-realized emo¬ tion, some reflection or some vision of the writer. One is tempted to say of it by way of criticism that it is Walt Whitmanish through and through. It reveals to some degree every¬ one of Whitman's characteristics. The poem shifts at irregular intervals and in surprising ways*

from the cheapest slang to passages of rare poetic beauty. <(I celebrate myself,® says the poet at the outset; ((I loaf and invite my soul ; I lean and loaf at my ease, observing a spear of summer grass.® The contemplation of the grass awakens Whitman's wonder, and forthwith he sets out on a contemplative jour¬ ney that takes in the whole round of creation, every part and feature of which he pronounces good : ((rich, apple-blossom'd earth,® he exult- ingly cries, ((Smile, for your lover comes.® He tells us that as a poet he is only a mouthpiece; his thoughts (<are the thoughts of all men in all ages and lands — they are not original.® <(If,® he continues, <(they are not yours as much as mine, they are nothing or next to nothing.® In consequence, he feels that through him there speak <(rnany long dumb voices,® ((many forbid¬ den voices,® ((voices veiled,® <(voices indecent.® At this point we begin to realize what Whit¬ man was actually trying to do ; and in the light of this apologia we come to understand that he is far more than the merely (<indecent® poet that so many people would have us believe him to be. It takes a great poet to be the mouthpiece of all. Whitman may not have been great enough to compass the task fully, but his efforts are not to be made light of. Whatever else we may do, we must reckon with him. We shall not reckon with him aright until we have first got thoroughly at the heart of this (Song of Myself. To be sure there may be in it much that is self-contradictory; we must remember that Whitman is ((afoot with his vision.® Now and then, from his moun¬ tain heights, he strikes out such a great psalm as that (<Immense have been the preparations for me,® which comes to his lips when he turns on the <(apex of the apices of the stairs® and looks past the phantoms which ((rise after rise® bow behind him until he sees ((afar down the huge first Nothing® from which he took his origin.

256 SONG OF SOLOMON — SONGS OF INNOCENCE AND EXPERIENCE

There is just one thing to do with the (Song of Myself,* and that is to read it. It cannot be summarized; it cannot be paraphrased. It must be taken as it is. When we have said that it breathes in every line <(the wild joys of living,® the songs of a man who has looked upon life in all its phases and has found it good, the spirit of a man who has faith in the Power behind th6 universe, we have said all that we can. ((I am not a bit tamed,® writes the poet in conclusion; (<I am untranslatable;

I sound my barbaric yawp over the roofs of the world ... I stop somewhere, waiting for you.® Those who are going to read Whit¬ man for the first should begin with this poem.

Waldo H. Dunn.

SONG OF SOLOMON. See Canticles.

SONG-SPARROW, a well-known spar¬ row (Melospiza fasciata), found in some one or other of its numerous races in all parts of North America except in the extreme north and south on the eastern side. The song-sparrow may be readily recognized by its thickly streaked plumage, brown above, ashy below, with the brown, black-centred streaks co¬ alescing on the breast into a conspicuous spot. In most parts of the East song-sparrows re¬ main throughout the year, but there is never¬ theless a distinct north and south movement, the winter birds of any given locality being visitors from the North. In New England and most parts of the Middle States they are more plentiful in summer than in winter. During the latter season they associate more or less with flocks of fox-sparrows, white-throated sparrows and other species which frequent thickets along water-courses, but are much less gregarious than they. Their food consists of seeds of various kinds and in summer and autumn of insects and berries. They are chiefly birds of the ground and bushes and are never seen in the high tree-tops. Few birds surpass the song-sparrow in the real melody of their simple song, and few birds require so little of sun¬ shine to start the joyous outburst even in mid¬ winter. They sing in every month of the year, but most persistently and sweetly during the breeding season. The nest, which is built on the ground or in a low bush or evergreen, is a bulky structure of grass, leaves, etc., lined with fine grasses or horse-hair, receives four to five greenish white eggs varied endlessly in the character of the spots and blotches of browns and lavender. Usually two or three broods are raised each season. Other eastern species of the same genus are the Lincoln's sparrow (M . lincolnii) and the swamp-sparrow (M . georgiana) , while, besides the numerous varie¬ ties of the song-sparrow in the West and South¬ west, two distinct species (M . insignis and M. cinerea) occur in Alaska.

SONG-THRUSH, or MAVIS. In the

United States the wood thrush is most con¬ spicuous for its song. The thrush of Great Britain is also called song-thrush, while in Scotland it is known as <(mavis.® Song- thrushes are common throughout the temperate zone in Europe, resembling the American robin in their habits. The eggs are blue, spotted with brown. The male is dark brown, with golden brown tints in its wings. The throat is buff and the underparts yellowish white, flecked with brown.

SONGS OF INNOCENCE AND OF EXPERIENCE. William Blake's < Songs of Innocence) and (Songs of Experience * were originally published as separate volumes, with both text and illustrations beautifully en¬ graved after Blake's special method of relief-etching, in 1789 and 1794 respec¬ tively. They were republished together about 1794 under the title of (Songs of Innocence and of Experience, Showing Contrary States of the Human Soul.* The contemporary sale of the somewhat expensive volumes was very small.

The lyrics in the collection are full of the symbolism which characterizes all of Blake's writings, but they differ from most of his works in their intellegibility and in the more universal character of their appeal. The (Songs of In- nocence) represent the soul untouched by the experience of evil. To Blake the naive and spontaneous consciousness of childhood was the ideal condition of human nature. Mature ex¬ perience brings with it a separation of the spirit from the quickening and joy-giving con¬ tact with the divine sources of its true being. In his mystical philosophy all things are a single essence and of that escence the primary attri¬ bute is love.

" For Mercy, Pity, Peace, and Love,

Is God our Father dear;

And Mercy, Pity, Peace, and Love Is man, his child and care."

Hence life, as seen in the (Songs of Inno¬ cence^ is a continuous manifestation of sym¬ pathy and love in a world of pure joy, where envy, hatred and the consciousness of wrong have no place. Throughout this group the lamb and the child are symbols of innocent happi¬ ness; the shepherd, the nurse, the mother, the angels are the embodiments of all-enfolding love. Directly opposite is the atmosphere of the < Songs of Experienced The two sets of poems are full of correspondences, but in each lyric of the latter group the paradise of inno¬ cence is represented as blighted by the touch of evil. The idea is symbolically expressed in ((The Sick Rose,® where (<the invisible worm,® which cankers the bud, is reason, law, experi¬ ence — the death of happiness and instinctive love. The two sorts of love, one spontaneous and unselfish, the other reasoned and calculat¬ ing, are contrasted in ((The Cloud and the Pebble.® The failing sense of communion with the divine which comes with the mature con¬ sciousness is expressed in the last stanza of ((The Angel® :

" Soon my Angel came again;

I was armed, he came in vain.

For the time of youth was fled And grey hairs were on my head.”

In his emphasis on intuition and emotion and in his exaltation of the child as the true type of a pure humanity, Blake falls in with the cult of the primary instincts of human nature by the followers of Rousseau and anticipates doctrines familiar in the poetry of Words¬ worth. As. a poet he enjoys a more nearly unique position. Sometimes prosaically di¬ dactic, more often wayward and perverse, Blake at times shows himself a lyric genius of exceptional originality and power. The term ((marvelous® best describes the effect of such a poem as (<The Tiger,® with its burning im¬ agery and the on-rushing beat of its rhythm.

Marvelous, too, is the poignancy of <(The Sick Rose" and ((Ah ! Sunflower, Weary of Time.® But the more characteristic note is one of tender simplicity, in such pieces as the ((Intro- duction® to c Songs of Innocence5 and ((The Lamb,® lyrics which have endeared Blake to all lovers of the poetry of childhood. The most convenient edition and the best critical memoir are to be found in Rossetti, W. M., (The Poeti¬ cal Works of William Blake > (Bohn Library). Consult also Symons, Arthur, (William Blake 5 (1907), and the essay by Yeats, W. B., in (Ideas of Good and Evil.5 Bibliography in Cambridge ˆHistory of English Literature) (Vol. XI).

James H. Hanford.

SONNECK, Oscar George Theodore,

American musician, librarian and scholar : b. Jersey City, N. J., 6 Oct. 1873. He was edu¬ cated at the universities of Heidelberg and Munich and at the Sondershausen Conservatory, later studying piano under Kwast and instru¬ mentation under Knorr at Frankfort. He was for a time engaged in research in Italy but in 1899 returned to the United States. He was appointed chief of the division of music at the library of Congress in 1902, which depart¬ ment under his direction has become one of the largest musical libraries in the world. His researches in the history of American music have proved highly valuable. From 1915 he also edited the Musical Quarterly. Author of Classification of Music and the Literature of Music5 (1904) ; (Bibliography of Early Secular American Music) (1905) ; (Early

Concert Life in America5 (1907) ; Catalogue of the Dra¬ matic Music in the Library of Congress5 (1908); (The Star Spangled Banner5 (1914) ; (Early Opera in America5 (1915); (Suum cuique : Essays in Music5 (1916), etc. He is also known as a composer of music.

SONNENSCHEIN, William Swan, Eng¬ lish publisher : b. London, 5 May 1855. He was educated at University College, London, and began the study of medicine. In 1878 he established a publishing business which since 1895 has been conducted as a limited company, under the name of Swan, Sonnenschein and Company, of which he is chairman. He is also joint managing director of George Routledge and Sons, Limited. He has published (The Best Books5 (1887; 5th impression, 1901), a classified dictionary of about 50,000 of the best available books, and (A Reader's Guide to Con¬ temporary Literature5 (1901), a supplement to the foregoing.

SONNET, in poetics: (1) A short poem, song or ballad. (2) Specifically, a short poem of prescribed form restricted to 14 verses ar¬ ranged according to a fixed disposition. The word came from the Italian sonetto, probably derived from the Old French and Provencal sonet, a diminutive of son, which was in turn obtained from the Latin sonus, a sound or musical air. That the sonnet originated in Italy seems now definitely settled, but the manner of its origin remains an object of discussion. D'Ancona ((Poesia Popolare,5 1878) as the re¬ sult of his investigations, believes that it was developed by a combination of two popular stanzas, the strambotto , of eight verses, with a riming-schcme a b a b, etc., and the rispetto, of six verses, with a scheme c d c d, etc. Cesareo, a later student ((La Poesia Siciliana,5 1894), vol. 25 — 17

modifies this view by making the combination one of strambotti, the one of eight verses, the other of six. The beginnings of the sonnet appear to date from the early 13th century. It quickly attained popularity, and various writers attempted elaborations and other changes. Sep- tisyllabic verses were inserted to vary the hendecasyllabic measure, the length of the son¬ net being sometimes thus doubled ; or verses might be appended, constituting a coda or cmda. The simpler arrangement, however, prevailed. At the same time, as to the riming- scheme, in the octave, or portion of eight verses, the arrangement abbaabba replaced that of a b a b, etc., while in the sestet, or portion of six verses, it might be c d e c d e, as well as c d c d, etc. The sonnet was firmly established on this new basis by Francesco Petrarca (Petrarch), and this form has since been gen¬ erally known as the Petrarchan. Boscan intro¬ duced the sonnet into Spain ; Camoens, into Portugal. In France, Marot was the first great maker of sonnets, though it is maintained that this form of poetics was

first introduced by Mellin de Saint-Gelais. The poets of the Pleiade were its chief exponents. In Germany they first appeared in the 16th century, but re¬ ceived their greatest impetus during the Ro¬ mantic period, A. W. Schlegel, Goethe, Heyse, Eichendorf and Redwitz being among the sonnet-makers. Wyatt (q.v.) and Surrey (q.v.) introduced the sonnet into English literature in the middle of the 16th century. In England a modification was employed by Shakespeare, Drayton and others. This modification has been called the simple stanza in contradistinction to the Petrarchan, or compound stanza. The type is abababababcc. The Sheakespearean is distinguished in another way from the Petrarchan; for while the latter formally sepa¬ rated the octave and sestet, the former could not properly be said to have such a division — the arrangement being really three quatrains succeeded by a couplet — and the sense there¬ fore might be continuous. In English the dec¬ asyllabic measure is the one generally used, although the octosyllabic is found. The Shakes¬ pearean type has not been to any extent used, the Petrarchan being regarded as the orthodox or standard. Deviations, as in the case of S. T. Coleridge, (q.v.) are called irregular sonnets or quatorzains ; or, in Charles Lamb's whimsical coinage, (<fourteeners.® Critics point out what is called the Miltonic structure in the Petrarchan sonnet, Milton blending octave and sestet so that there is no pause in rhythm or thought. This modification has by Sharp ((Sonnets of this Century,5 1886) and others been dis¬ tinguished as a separate type. The sonnet should be the vehicle of expression of one thought or idea, and the compactness and unity of the verse-form of course favor this. Hence the sonnet has been much used for what Watts- Dunton has styled "poetized didactics.® The difficulties offered by the sonnet are consider¬ able. The sense of mere ingenuity, except in the case of such facetiae as Milton's (On the Detraction Which Followed Upon My Writing Certain Treatises5 (XI), is necessarily to be avoided. Even a partial list of sonnet-writers in English would require much space. A col¬ lection of British examples, from the Earl of Surre}' to Alexander Smith, was made by J. Dennis (1873). American literature has in the

sonnets of Longfellow (q.v.), notably the series on the (Divine Comedy,* many of the finest specimens in the language.

Bibliography. — Besides the above-mentioned works De Veyriere, (Monographic du Sonnet) (1869-70) ; Tomlinson, (The Sonnet *(1874) ; Welti, (Geschichte des Sonettes in der deutschen Dichtung) (1884);*

Gummere, (Handbook of Poetics) (1885) ; Main, (A Treasury of English Sonnets) (1880) ; Corson, (A Primer of Eng¬ lish Verse (1892); Noble, (The Sonnet in England> (1896) ; Vaganay, (Le Sonnet en Italie et en France au XVIeme Siecle *(1902) ; Herrick, (A Century of Sonnets* (1902) ; Sharp, W., (Sonnets of this Century with a Critical Introduction > (1887).

SONNETS FROM THE PORTU¬ GUESE. (Sonnets from the Portuguese) is the title of a sequence of 44 sonnets on the Italian model, written by Elizabeth Barrett Browning — Elizabeth Barrett, as she then was known — to her fellow-poet and future hus¬ band, Robert Browning. Aside from their nobility of thought and diction, they are note¬ worthy for their bearing upon a great love story that is unique in literary history.

Because she falsely believed herself a hope¬ less invalid and because of the certainty of parental objection, Miss Barrett had rejected Browning's offers of marriage until his ardor overcame her protests. The sonnets, written by her during their secret betrothal, reveal her doubts, her feeling of unworthiness, her gradual yielding, her exaltation in a great and wonder¬ ful love. It was several months after their romantic marriage that she placed the manu¬ script in her husband's hands. Browning, who declared, "I dared not reserve to myself the finest sonnets written in any language since Shakespeare's,® with difficulty persuaded her to give them to the world. The name, (Sonnets From the Portuguese, * invented by him to veil the true origin, was adopted partly because it suggested the love of Catarina and the Portu¬ guese poet, Camoens, and partly because (<my little Portuguese® was a pet name that Brown¬ ing gave his wife. While others have not gone so far in their praise as Browning in his pardon¬ able enthusiasm, the high rank of the sonnets is beyond question ; and Saintsbury has, in fact, said of the fourteenth of the sequence, that it "does not fall far short of Shakespeare's.®

Arthur Guiterman.

SONNETS FROM VENICE. The com¬ mon consent of critics and general readers ranks Platen's (Sonnette aus Venedig> (1825) as the most perfect of their kind in German literature not alone for their faultless construc¬ tion and musical cadence but also for their marvelous reproduction of all the moods in¬ spired by the magic beauty of Venice with its ever-present historical monuments and by a melancholy sympathy for its fallen greatness.

To the original 12 sonnets Platen added five variants, a small number to be chosen from the voluminous writings of the most aristocratic and faultless master of German verse as his contribution to world literature. For Platen the City of Lagoons had a miraculous, mysteri¬ ous, awesome beauty in its ((labyrinth of bridges and canals® from which he took a regretful leave after two months of delight, with feelings akin to those of banished Ovid longing for Rome. The

“Neptunian city where divine honor is paid to winged lions by a glad-hearted people of charm¬ ing idlers, everywhere the monument of fallen greatness, whose horses, captured in the sack of Constantinople, were humbled by the Corsi¬ can’s bridle,® revealed to Platen a wealth of power and gentleness even in its cold unyielding marble where (<art grew from the sea like a gorgeous tulip.® Von Klenze claims Platen as the “first visitor to be keenly alive to the charm of - her Giovanni Bellini ; to show sympathetic comprehension of the church of SS. Giovanni e Paolo and its treasures.® But Platen’s “first love in Venice,® Bellini, gradually found a victorious rival in Titian, whose (Ascension of Mary, *(Peter the Martyr, * and especially (John the Baptist,* incorporated for him the spirit of Venice.

Carl E. Eggert.

SONNINO, son'ne-no', Baron Sidney Constantino, Italian statesman: b. Pisa, 11 March 1847. His father was a wealthy Tuscan of Jewish descent and his mother, nee Georgina Terry, was English. He studied law at the University of Pisa and took his degree in 1865. Llis legal career was short, for he returned his first brief on the ground that the client was entirely in the wrong and the case unworthy of defense. From 1867 to 1871 he served in the diplomatic corps at the Italian legations in Ber¬ lin, Vienna, Paris and Madrid. Returning to private life at the close of the Franco-German War, his financial independence enabled him to devote himself to economic and scientific studies. In the early 70’s he began an ex¬ haustive inquiry into the economic conditions of Sicily in co-operation with Baron Franchetti. The result of their labor was published in two volumes in 1877 under the title of (The Peas¬ ants of Sicily, J a work which attracted con¬ siderable attention. Extending his investiga¬ tions to the southern provinces of the peninsula, Baron Sonnino, still a private citizen, probed the serious conditions of woman and child labor, emigration and industrial backwardness. Many valuable reforms were inaugurated at his instigation. Turning to journalism, he founded the weekly La Rassegna Settimanale in 1878, editing it for several years. In 1882 he con¬ verted the review into a daily paper, La Rassegna, which flourished for many years. He also founded the important Giornale

d’ltalia, of which he is believed to be the p'resent pro¬ prietor. Elected a deputy to Parliament in 1880, he was soon recognized as an authority on finance, agriculture and foreign affairs. In view of what occurred over 30 years later, it is interesting to recall that in 1883 Baron Sonnino complained of the subordinate posi¬ tion of Italy in the Triple Alliance, and advo¬ cated a better understanding with Great Britain. He even hinted that Germany and Austria were playing a double game. His precise criticisms of the then prevailing chaos in national finance led to his appointment as Under Secretary for the Treasury in the second Crispi administra¬ tion. In 1896 he became Finance Minister, in which capacity he laid the foundations of Italy’s economic prosperity. He abolished cor¬ ruption and secret subsidies, purified the ad¬ ministration and became leader of the consti¬ tutional party. He was twice Premier, in 1906 and 1909, for only a short time on each

occasion. Seeking neither popularity nor self- advertisement, he was unable to withstand the political machinations of Giolitti. On the resig¬ nation of the latter in March 1914 Signor Salandra became Premier, and when San Giuliano, the foreign Minister, died in October of that year, Baron Sonnino was called to the Foreign Office. The story of his remarkable diplomatic duel with Count Berchtold, Baron Burian and Prince Biilow between December 1914 and May 1915 is related under Italy and the War (q.v.). With undeviating tenacity of purpose Sonnino resisted the promises, threats and blandishments of the central powers; he broke up the Triple Alliance, restored Italy’s liberty of action and ranged her on the side of the Allies at one of the most critical moments of history.

SONOMETER. See Monochord.

SONORA, so-no'ra, Mexico ; except Chi¬ huahua, the largest state of that republic; bounded on the north by Arizona and New Mexico (United States), on the east by Chi¬ huahua, on the southeast by Sinaloa, on the southwest and west by the Gulf of California, and on the northwest by the territory of Lower California. Area, 76,900 square miles. The mountains of the eastern part of the state are the Sierra Madre and a number of secondary chains. Principal rivers are the Altar (also called Asuncion or San Ignacio), Yaqui, Mayo, Sonora and Matope. The chief port is Guay- mas. In the mountains the climate is cool and occasionally cold ; the flat western districts and the low,

arid coast are hot, the thermometer sometimes recording 119° F. at Guaymas. In (Mexico: a Geographical Sketch* (Bureau American Republics, 1900), <(rain falling from a cloudless and serene sky,® is mentioned as a ˆpeculiarity® of the Sonora coast. The produc¬ tion of minerals in this state is especially note¬ worthy, there being extensive annual exports of silver, lead, gold, copper, coal, antimony, iron, cinnabar and graphite. The soil is fertile, but in many sections requires, and at present lacks, irrigation. The chief products are cereals, tobacco, cotton, sugarcane and fruits. Imports are machinery and agricultural and mining im¬ plements, material for clothing (cotton, linen, wool and silk), wines and liquors, hardware and arms and ammunition. Some of the pearls found in the Gulf of California are sent to European markets ;. otherwise all the foreign trade is with the adjacent States and Terri¬ tories of the American Union. The only rail¬ way in the state runs from Guaymas to Nogales. The latter, being on the boundary-line between Sonora and the United States, is divided by a street into the two towns of Nogales, Mexico, and Nogales, Ariz. The capital of the state is Hermosillo (pop. 14,574), chief town of the rich mining district also called Hermosillo. Here are located the government palace, mint, cathedral and library. Pope Pius VI in 1 779 — 81 created a bishopric including Sonora, Sinaloa and the two Californias. In 1842 Gandara, an ambitious provincial leader, made Sonora the theatre of a civil war. During the war with France (1862-67), interesting campaigns were conducted in the state. Hermosillo, captured 4 May 1866 by the republicans, was retaken by the imperialists; but the French forces were withdrawn from Guaymas in September of the

same year. Less than a decade afterward oc¬ curred the Yaqui War (1885-86). Total popu¬ lation of the state, 275,107.

SONS OF THE AMERICAN REVO¬ LUTION, a patriotic American society, organ¬ ized in New York in April 1889. Its objects are to perpetuate the memory and spirit of the men who achieved American independence by the encouragement of historical research in relation to the Revolution ; the preservation of docu¬ ments, records and relics, and to foster true American patriotism. There are branches of the society in various States. The total mem¬ bership of the society is about 12,500.

SONS OF LIBERTY, an American patri¬ otic association of the colonists called into ex¬ istence by Lord Grenville's Stamp Act. They combined to throw off the allegiance to Great Britain and make America independent. The association began in New York and Connecti¬ cut. The Sons of Liberty joined the Society of Tammany

early in the 19th century. See Tam¬ many Society.

SONS OF THE REVOLUTION, an

American patriotic society organized in New York in 1875 by John Austin Stevens and others. The practical work designed for the society includes the collection and preservation of manuscripts, records and other documents relating to the War of the Revolution. There are branch societies in various States, includ¬ ing California. The membership in 1910 was

7,560.

SONS OF TEMPERANCE. See Tem¬

perance, Sons of.

SONS OF VETERANS, an American pa¬ triotic organization, founded in 1879. Those eligible to membership are all male descend¬ ants, not less than 18 years old, of all soldiers, sailors or marines who served with the Union forces in the Civil War. The insignia con¬ sists of a bronze bar bearing the words (Filii Veteranorum,* from which hangs a red, white and blue ribbon to which is attached a medal¬ lion with the monogram S. V. The background is a wreath over crossed cannons. The mono¬ gram is surmounted by a spread eagle. Mem¬ bership about 60,000. The Daughters of Veterans is a similar organization.

SONTAG, Henrietta, German opera singer: b. Coblenz, Prussia, 13 May 1805 ; d. Mexico, 17 June 1854. She was a favorite of the Ger¬ man operatic stage in her girlhood and later one of the most celebrated singers of Europe. In 1830 she was married to an Italian nobleman and withdrew from public life and to com¬ parative retirement from the stage. In 1852 her husband's fortunes having been greatly altered by political changes, she made a tour through the United States and won fresh laurels by her voice and dramatic talent, but succumbed to an attack of cholera while sing¬ ing in Mexico. Consult Berger, (Beriihmte Frauen1* (Berlin 1904).

SOORD, Alfred Usher, English painter: b. 1867 ; d. Bushey, England, 9 Aug. 1915. His reputation rests mainly on his famous picture (The Lost Sheep, > of which over 300,000 re¬ productions have been sold in the United States and the British Isles. He exhibited frequently at the Royal Academy and the Paris Salon.

Among his sacred subjects were a (Crucifixion } and (The Supper at Emmaus^

SOOTY TERN. See Egg-bird.

SOPHIA, empress of Constantinople, niece of Theodora and wife of Justinus II. She was a beautiful, clever and ambitious woman, and after the accession of Justinian II to the throne in 565 was the real ruler of the country. Her husband's successor, Tiberius II, was chosen by her advice, and after the death of Justinus in 578 she planned to become the wife of Tiberius. Finding her designs frustrated she conspired against him, but her plot being discovered, she was deprived of power and compelled to live the remainder of her life in privacy.

SOPHIA DOROTHEA, wife of George I, king of England and elector of Hanover : b. 15 Sept. 1666; d. Ahlden, Hanover, 23 Nov. 1726. She was the only child of George Wil¬ liam, Duke of Brunswick-Liine-Celle, and in 1682 was married to her cousin, George Louis, then crown prince of Hanover. She had two children, George II of England, and Sophia Dorothea, wife of Frederick William of Prus¬ sia and mother of Frederick the Great. Her life at the court of Hanover was made ex¬ ceedingly wretched by the relatives of her hus¬ band, who himself eventually was turned against her. She was accussed of indiscreet relations with Count Philip Christoph von Konigsmark, and the charges were substantiated by letters later proved forgeries. The count was assas¬ sinated in connection with the affair, and Sophia Dorothea was divorced in 1694. She lived the remainder of her life a prisoner at Ahlden, for which reason she has sometimes been called the <(Princess of Ahlden.® Consult Williams, W. H., (The Love of an Uncrowned Queen y (1900) ; Greenwood, A. D., (Lives of the Hanoverian Queens of England) (1909).

SOPHIOLOGY, so'fi-ol'o'ji, the scientific study of the origin and development of the philosophies of the various races of man. The science constitutes the natural history of science and philosophy from their earliest beginnings in the observations of primitive tribes, and traces their development into the achievements of civilized nations.

SOPHISTS, the designation applied to cer¬ tain schools of philosophers in Greece, which occupied the transition period between the older and ruder cosmical philosophies, and the more refined subsequent systems, which beginning with Socrates, Plato and

Aristotle, were founded primarily on the study of the human mind as the perceiving, thinking, reasoning and knowing subject. In the older systems the direct relation of mind to the objective universe did not receive prominent attention. The hypothesis of a unity in the external variety was assumed without dispute, and a theistic or materialistic interpretation of this unity formulated accord¬ ing to the tendency of the school. In this man¬ ner arose a succession of systems which were agreed in being artificial cosmogonies, unrelated if not hostile to the current traditions of reli¬ gion, and however superior to these current notions as the efforts of great minds to com¬ prehend the relations of things, they were still unable to stand the inevitable criticism of com¬ parison with fact. Of this comparison and criticism the sophists were the exponents, and

its force fell both on philosophy and religion. But none of the sophists were really great men, at least in comparison with those who succeeded them, and they appeared in an age of political decline and social corruption.

The direct services of the sophists to phi¬ losophy appear to have been small and negative. It is too much to attribute to them as a merit the introduction of subjective philosophy. This, as its simultaneous appearance in different schools proves, was no more than a necessity of the period to which they belonged. What chiefly marks the sophists was their incapacity to generalize the subjective element, in conse¬ quence of which they were not philosophers properly so called, but only the critics of a dying philosophy. But the sophists rendered to science and literature, and even indirectly to philosophy, much greater services than as phi¬ losophers they were able to render to philoso¬ phy. They have been not inaptly compared to the French encyclopaedists. They belonged to all the liberal professions; they taught all the usual branches of knowledge. Some of them were distinguished as rhetoricians and gram¬ marians, others as men of science. They fre¬ quently made a profession of universal knowl¬ edge, and though from their overweening esti¬ mate of the newly found subjective element of knowledge they carried this pretension so far as to profess to speak of subjects of which they knew nothing, all their pretensions were not equally frivolous. Rhetoric, to which they naturally gave undue importance, was systemat¬ ically studied by them, and they supplied some of the earliest models of good Greek prose. They are accused, however, particularly the later sophists, of being not only superficial in their attainments, but mercenary, vain-glorious and self-seeking in their aims.

Protagoras of Abdera, the earliest and one of the most important of

the sophists, was con¬ temporary with Socrates, but considerably older; he applied the Heraclitan doctrine of the uni¬ versal flux of all things to the mind, maintained the uncertainty of the existence of the gods and the relativity of all truth. Man, he said, is the measure of all things. That is true for the individual which for the time being he per¬ ceives or feels. Sense and the gratification of sense are the only relations which subsist be¬ tween man and the external world. All opinions are equally true, and contradictories may be affirmed with equal authority. Protagoras is said to have been the first who taught for pay, and though he left his pupils to fix his re¬ muneration according to the amount of benefit they had received, he is said to have become wealthy. Gorgias of Leontini came to Athens in 427 b.c. as an ambassador from his native city. He affected great pomp, and studied to excel in the splendor of his rhetoric. Founding upon Zeno, he took a bolder stand in scepticism (q.v.) than Protagoras. His book was called (Of the Non-Existent or of Nature) ; and his three cardinal propositions were that nothing exists, that if anything exists it cannot be known, that if it could be known it could not be communicated. Gorgias reaches these conclusions by a logical quibble, in which he plays off Heraclitus against the Eleatic school. The scepticism of Gorgias, however, like that of other sophists, as it was founded on a superficial logic, was neither very profound nor

very consistently developed. His successors applied it chiefly in a moral direction, which made Plato call the art of rhetoric as taught by Gorgias a corruption of justice. Hippias of Elis represented the law as a tyrant in com¬ pelling men to act contrary to nature. Thrasymachus made the gratification of desire the natural right of the stronger and might the law of nature. Critias, one of the 30 tyrants, ascribed faith in the gods to the invention of politicians. Prodicus of Ceos taught a moral¬ ity more in accordance with ordinary con¬ ceptions of right. Some of his moral dis¬ courses are preserved and are still admired for the feeling they display. His teaching was. rec¬ ommended by Socrates, and he has sometimes been called his predecessor. Prodicus is said to have been exorbitant in his charges for in¬ struction. He taught rhetoric to Euripides. Consult Grote, G., ˆHistory of Greece) (new ed., New York 1899) ; Schanz, M., (Die Sophisten) (Gottingen 1867) ; and the various histories of ancient philosophy.

SOPHOCLES, sof'6-klez (496-406 b.c.), was born in the deme of Colonus near Athens. His father, Sophillus, was a man of middle rank

and owner of many slaves. Hence he had the means to give his son a good educa¬ tion. Naturally, then, Sophocles was early in¬ troduced to Homer, who has left his impress on all the poet wrote. Music was not neglected. In this branch the young Sophocles was trained by the famous musician, Lamprus. He also frequented the palaestra and won prizes in gymnastic and athletic contests. His beauty and natural grace were exceptional. At the age of 15 he was chosen to lead the chorus that sang the paean of victory of Athenian arms over Oriental despotism. Of the poet's relation to the great philosophers we know nothing; but we may be reasonably sure, from the internal evidence of his works, that his mind was not eager to pry into the unknown. With Voltaire he might have said ((Adorons Dieu sans vouloir percer ses mysteresA

Sophocles was born when Athens was be¬ ginning to rise toward the zenith of her glory and he died in his 90th year, just before her brilliant sun had set. He lived to witness the passing success of Athenian arms at Arginusse, but died before her star was obscured by the cloud of Higospotami. It was the century of Cimon and Pericles, of Phidias and Ictinus. Greece was the centre of the world, Athens the hearthstone of Hellas, the home of art, literature, science. But amid all this unrest, opportunity and glory, Sophocles lived a life of imperturbable placidity. Calm and self- possessed, he dedicated his life to his art. As Browning has well said, his even-balanced soul business could not make dull nor passion wild. Only one cloud cast a momentary shadow over his long and serene life; his son Iophon arraigned him before his deme as incapable of managing property. The old man refuted the charge by reciting the ode he had just com¬ posed on his native Colonus. For public affairs the poet showed no great aptitude. Pericles did not have a very high opinion of his strategic abilities, and the great statesman had an excellent opportunity of judging, for Sophocles was elected to serve with him as a general to conduct the Samian War. The ap¬

pointment, we are told, was due to the suc¬ cess of his (Antigone. J Later he became a colleague of Nicias. He was also a minor priest, and one of the treasurers that managed the tribute paid to Athens by her allies. The poet met Herodotus and composed an ode in honor of the historian. Sophocles was probably also acquainted with a great many other dis¬ tinguished men. There is a wealth of ideas, a sprightly grace and a delicacy of views in his works that could not have developed in any other atmosphere. After the Sicilian re¬ verse he was elected a member of the college of six magistrates created to propose measures of safety. In 411 he was appointed on a com¬ mittee of 30 to modify the constitution ; but he was conservative in politics and

withdrew from all participation in their work when they pro¬ posed to rule without consulting the general assembly.

With his first tetralogy Sophocles competed with Hiischylus for the tragic prize and won (468), although he was only 28 years of age. We are told that when the archon was hesitat¬ ing to draw lots, Cimon, who had just returned from his conquest of Scyrus, entered the theatre and proceeded to pour out a libation to Dionysus, whereupon he and his fellow-gen¬ erals were detained to act as judges. Hence¬ forth Sophocles was master of the stage. He produced on an average one tetralogy every two years. No other tragic poet ever secured a greater number of prizes. Sometimes, in the earlier days, he took the leading part himself. He not only played acceptably the title role of Nausicaa, but he also distinguished himself by his grace in dancing. ˆEschylus died in distant Sicily; Euripides mid the wilds of Macedonia; but Sophocles, though invited by foreign potentates to their splendid courts, lived and died in the city of his birth. Sophocles' man¬ ners were affable and pleasing. His conversa¬ tion was full of that Socratic irony which we find so charming in the dialogues of Plato. Endowed with a serene composure of manner and gifted with gentleness, beauty and intellect, small wonder that his contemporaries believed that the poet was beloved by the gods. After death the Athenians worshipped him as a hero. To the whole Greek world he was known as the Attic Bee. But in the natural sweetness of his temper there was something bitter — a tang which produced the flavor. It was his charm and grace that commended Sophocles especially to the Greeks. He was a more perfect artist than zEschylus and Euripides. The Periclean Age showed a decided preference for him over the other two. In the eyes of the Athenians, Sophocles was next to Homer, unsurpassed in wit, sweetness, discourse, art.

Sophocles found the art-form already developed. But he tempered the tone of tragedy, the material of which he narrowed to the compass of a single play: there is no nexus between the parts of his trilogies. In Sophocles, too, the characterization becomes sharper, and the dialogue moves more briskly, the action be¬ comes more complicated, the meshes of intrigue finer. There is also a marked difference between Sophocles and Hfschylus in the space devoted to the chorus. The lyric simply reflects, no longer bears the piece, though it is still an integral part of the action. But the plot is developed with consummate skill and with the most exact

thoughtfulness. The plot of (CEdipus Rex) is so subtly articulated that each episode, each period, each verse, becomes an indispensable part of the whole. Not even Edgar Allan Poe strove more earnestly for totality of effect. It is this articulation that makes conspicuous the ((irony5) that runs through Sophocles. But it is particularly in the portrayal of character that Sophocles is in advance of .TEschylus. The latter evokes fear, Euripides pity, Sophocles both — and in due proportion. The plot assists in the development of the character. The poet's theme is man. His heroes are ideal, but they show genuinely human traits. The gods are kept in the background. As in ˆEschylus, they control the action, but from a point so high above our horizon that we are not conscious of their domination until we reach the denoue¬ ment. Sophocles was not only a dramatist : he was also a poet. In all Greek poetry there is a strong current of feeling for external nature; but in Sophocles this feeling is always ex¬ quisitely adapted to dramatic effect.

Many innovations were made by Sophocles. He increased the number in the chorus from 12 to 15, developed the parados, introduced a third actor and made great use of stage scenery. Sophocles has his inevitable per¬ fection ; but he is not uniform enough to be faultily faultless. His poetry is never jejune, but succulent, full of sap and marrow; and he is the one consummate master of style, melody, vocabulary and versification, the one poet that always maintains a noble Homeric grace, that never sinks below the calm level of high art. His style is vigorous, but it is also marvelously subtle. No poet better combines severity with variety and sweetness with vigor in his rhythmic measures. He always adapts rhythm to expression. His choral songs are con¬ structed with the skill of a master architect. Of the hundred and more plays which Sophocles wrote seven have come down to us. In (CEdipus Rex5 Sophoclean art reaches its highest point. The ˆTrachiniae5 is the least popular; nevertheless, it is a good play. The (CEdipus at Colonus) is the least dramatic, but its charm and breadth indicate that it is the work of the poet's best years. The earliest extant play is the (Ajax 5 (451). The Antigone' was produced three years later. The <Philoctetes) is one of the latest (409), while the (CEdipus at Colonus5 was brought out (401) by his grandson after the poet's death. The <Electra,) though hard for a modern to appreciate, is the only one on this theme that thoroughly satisfies, the <Chcephori) of ˆEschylus and the <Electra) of Euripides being inferior.

Joseph E. Harry,

Author of cThe Greek Tragic Poets ,5 etc.

SOPHOCLES, Evangelinus Apostolides,

American Greek scholar: b. Tsangaranda, Thessaly, 8 March 1807 ; d. Cambridge, Mass., 17 Dec. 1883. He was educated at Amherst College. In 1842 he became a tutor in Greek at Harvard, and in 1860 professor of ancient and modern Greek there. His chief work, a (Greek Lexicon of the Roman and Byzantine Periods,5 was published in 1870. He wrote also a Greek grammar (1838); (History of the Greek Alphabet (1848) ; (Glossary of Later and Byzantine Greek) (1860), revised as (A Greek

Lexicon of the Roman and Byzantine Periods5

(1870).

SOPHONISBA, Carthagenian lady, daugh¬ ter of Hasdrubal, son of Gisco : d. about 204 b.c. She was early betrothed to Masinissa, a Numidian prince, but in 206 b.c. her father gave her in marriage to Syphax, a rival Numidian prince allied with Carthage. Masi¬ nissa was allied with the Romans, and in the Secpnd Punic War he defeated Syphax and captured Sophonisba. He either married her or was about to do so when Scipio Africanus interposed, fearing that Sophonisba might in¬ fluence him in favor of Carthage, Masinissa's former ally. To save Sophonisba's falling into Roman captivity Masinissa provided her with poison, with which she killed herself. Her story has been the theme of many tragedies, among them those of Nathaniel Lee (1676) ; Thomson (1730); Trissino (1529); Del Car- retto (1502) ; Mariet (1631) ; Corneille (1662) ; Alfieri (1783).

SORA, a bird of olive-brown above striped with black and streaked with white, found in marshes of the Atlantic coasts of the United States. It is a member of the rail family. The species Parzana Carolina, or Carolina rail, fre¬ quents the marshes of the Atlantic Coast in great numbers in the early Fall. It attains a length of about eight inches. During the breed¬ ing season the underparts become a slate gray and the face and throat become black. The bird makes a nest of grass on the ground in its swampy retreat and lays from 7 to 15 eggs, buff colored with brown spots. It breeds from the Middle States north and in winter is most numerous from Virginia southward. See Rail and Rail Shooting.

SORANUS, Greek physician : b. Ephesus and lived in the reign of Trajan and Hadrian, 98-138 a.d. He practised medicine at Alex¬ andria and at Rome, and wrote several medical treatises, as well as a life of Hippocrates which is the main source of our information

concern¬ ing the great physician. The lives of other physicians written by him have been lost. Of his medical treatises two remain in the original, (On Fractures5 (Ideler, J. L., (Physici et Medici Minores,5 Vol. I, 1841) ; and (On Dis¬ eases of Women) (Rose, V., 1882). His most important medical work was (On Acute and Chronic Diseases,5 of which but a few frag¬ ments of the original remain, but of which a Latin translation by Caelius Aurelianus is in existence. Consult Christ, W., (Geschichte der griecheschen Literatur5 (5th ed., 1913).

SORATA, so-ra'ta.. See Illampu.

SORBON, Robert de, French theologian, founder of the Sorbonne : b. Sorbon, 9 Oct. 1201 ; d. Paris, 15 Aug. 1274. He studied for the priesthood, became canon at Cambrai and then through the influence of the Comte d'Artois, was appointed chaplain to King Louis IX. He gained the esteem and patronage of the pious ruler, who aided him in his chief project. This was the foundation of a college, or rather place of study, for students of theol¬ ogy. The result was the establishment of La Sorbonne. Several of his treatises and sermons have survived. Consult Jadart, M., <R. de Sorbon5 (Rheims 1880).

SORBONNE, sor'bon , Paris, France, a celebrated college of Paris, founded in the 13th century at the instigation of Robert de Sorbon (q.v.). The school was erected near the Palais des Thermes, in what is now the Quartier Latin. The name was originally (<La Communaute des pauvres maitres etudiant en theologie® but by popular usage ((La Sorbonne® was substituted. The ancient college was not a place of classes and lectures, but rather a residence hall for students of theology. There were several grades of students : beneficiaries, residents and associates. The administration was entrusted to a principal, a prior, a procurer and a li¬ brarian, all elected at a general assembly. Stu¬ dents of all countries were admitted until the 15th century, when it was opened only to French students. The library grew to such large proportions that in 1841 a separate build¬ ing was erected. The influence of the Renais¬ sance brought about the founding of several chairs in the humanities, particularly in Greek philosophy.

The most important event in the history of the Sorbonne in the 17th century was the recon¬ struction of the buildings by Richelieu, the <(second founder.® Enlarged and well estab¬ lished now, the college

became more than ever before the centre of intellectual activity. It was hostile toward the Reformation and toward the new spirit of scientific inquiry which ani¬ mated the Cartesian school. In its religious doctrine, it remained Jansenistic and conserva¬ tive.

In 1792 the entire school was abolished by decree. It was not revived until 1821, when it was re-established with the three faculties of theology, science and letters. In 1852 the Sorbonne was given to the city of Paris and became incorporated in the university; the Ecole pratique des Hautes Etudes was added in 1868. Some 20 years later, the faculty of religion was dispersed and the Sorbonne, which had led the intellectual religious thought of France for several centuries, became purely secular and scientific in its courses.

The new building was erected in 1889 from the plans of M. Nenot, winner of a((GrandPrix de Rome,® the front of which, on the side of its official entrance, extends 274 feet along the Rue des Ecoles ; then in an irregular oblong of from 700 to more than 800 feet, the building climbs the hill along the Rue Saint Jacques. Incorpo¬ rated in the building is the 17th century church containing the tomb of Cardinal Richelieu. The building has hundreds of lecture-rooms, well fitted for their purpose, and many excellent laboratories.

It serves for the two faculties of letters and sciences of the university. It includes none of the professional scientific schools, which are located in the vicinity. The new Sorbonne also contains the Ecole Nationale des Chartes which has a remarkable library of archives. The professors number more than 100 and the students some 10,000. There are also numerous assistants. Consult Franklin, A. L. A., (La Sorbonne, ses origines, sa biblio- theque, etc. *(Paris 1875) ; Greard, O., (Nos adieux a la vieille Sorbonne) (Paris 1893) ; Rashdall, H., (Universities of Europe in the Middle Ages* (Oxford 1895) ; Agathon, ˆ'Esprit de la nouvelle Sorbonne) (3d ed.,

1911).

SORCERY. See Witchcraft.

SORDELLO, sor-del'lo, Italian poet: b. near Mantua, Italy, about 1200; d. about 1270. He was one of the most celebrated of the early Italian poets who wrote in the style of the earlier troubadours and in their Provencal lan¬ guage. His history is variously narrated. Benvenuto d'lmola, Dante's commentator, de¬ scribes him as a citizen of Mantua, a fine sol¬ dier and a courtier. He lived at the time of Ezzelin of Romano whose sister Cuniza con¬ ceived a violent passion for the

poet. She pursued him, and since he was still deaf to her pleas, and on the instigation of the sus¬ picious Ezzelin resorted to flight, she plotted to have him captured and slain. The story of his life is the subject of Browning's (Sordello, *and is mentioned by Dante in his (Divine Comedy) where he appears in the (Purgatorio) as the type of excessive patriotic pride. His best-known poems are (L'Ensenhamen d'onor,* and the complaint over the death of Blacas, in which the sovereigns of the world are invited to partake of the heart of the brave man. Some 30 of his poems have survived.

SORDELLO, a narrative poem by Robert Browning (q.v.), first published in 1840. It is based on the study of an historical but indefi¬ nite character, Sordello, the most celebrated of the Italian troubadours, b. Mantua, at the be¬ ginning of the 13th century, who owes his fame to the works of later poets from Dante to Browning rather than to the original¬ ity of his adventures or to the excellencies of his verse, chief of which are the didactic poem (L'Ensenhamen d'onor, *some love songs and satires. Like (Paracelsus,* published in 1835, Browning makes his (Sordello * a study in the psychology of genius, illustrating its besetting temptations. Sordello the poet, distracted be¬ tween the demands of idealism and imagina¬ tion and the desire to utter the thoughts of humankind, finally gives up poetry for practical politics and gets into difficulties which can only be solved by his death. Browning is said to have devoted more time to Sordello than to any other work, and probably became so famil¬ iar with the story which he set out to tell that he failed to make allowance for the general reader, for the obscurity generally complained of in his verse reached its climax in < Sordello.* This is owing to the subtlety and intricacy of the psychological expositions as well as to the vagueness with which the story is rather hinted than told. The obscurity of his style and philosophical subtleties, due it is believed to Germanic tendencies inherited from the mater¬ nal grandfather, injured his literary reputation with the reviewers, and it was not surprising that ordinary readers were puzzled and indiffer¬ ent, and that the general recognition of his genius was long delayed by the reputation he acquired for obscurity. Sordello, however, with its powerful analysis of character and appre¬ ciation of the subtler springs of conduct, ex¬ hibited all the qualifications of a great drama¬ tist. Abounding in descriptive passages of genuine poetry, the subtlety and vigor of thought are surprising and justify the fre¬ quent comparisons of higher critics to Shakes¬ peare.

SOREL, so-rel, Albert, French author: b. Honfleur, 13 Aug. 1842; d. 29 June 1906. He

was a correspondent of the academies of Cra¬ cow, Munich, Copenhagen, Stockholm and Ber¬ lin, and of the Royal Historical Society of Lon¬ don ; he was licentiate of law, secretary-general to the president of the Senate, 1876-1902 ; presi¬ dent of the upper commission of national ar¬ chives, vice-president of the commission of diplomatic archives; also, professor at the Free School of Political Sciences. He wrote (Histoire diplomatique de la guerre franco-allemande) (1875) ; (L'Europe et la revolution franqaise) (1885-1904) ; (Etudes de literature et d'histoire) (1882-1901) ; (Madame de StaeP

(1891).

SOREL, Georges, French author: b. Cher¬ bourg, 1847. He was educated at the Ecole Polytechnique, and afterward became a civil engineer with the Department of Bridges and Highways, but resigned from the service in 1872. He was one of the founders of Devenir Sociale, to which he became a contributor, also contrib¬ uting to Le Mouvement Socialiste, and other periodicals. He is a leader of the syndicalist movement and one of the foremost writers on the subject. Author of (Le proces de Socrate) (1889) ; (L'Avenir socialiste des Syndicats) (1900) ; (Saggi di critica del Marxismo) (1903); Reflexion sur la Violence) (1909; Eng. trans., Hulme, T. E., Reflections on Vio¬ lence, > 1912; 2d ed., 1915).

SOREL, Canada, town and county-seat of Richelieu County, Quebec, on the Richelieu River at its confluence with the Saint Law¬ rence at Lake Saint Peter, and on the South Shore and Quebec Southern railways, 45 miles northeast of Montreal. It is built on the site of a 17th century fort, and was formerly called William Henry. It has a good harbor, which is the winter quarters for many of the Saint Law¬ rence River steamboats. It also has extensive ship-building and ship-repairing interests and manufactories of mill machinery, engines, ship stores, plows, leather, stoves, brick and tile, flour and lumber. The trade in grain and farm produce is important. The town is well built, has substantial county and other public build¬ ings, good schools, a number of handsome churches, hotels, banks and weekly newspapers. Pop. about 8,500.

SOREL RIVER. See Richelieu.

SORGHUM, sor'gum, an annual cane-like plant (Holcus sorghum) , resembling Indian corn in general appearance and habit of growth. The sorghums are without ears, and are dis¬ tinguished by heavy heads of small seeds which terminate the stalk. (See Grasses). The cultivated varieties are usually treated as a distinct species by botanists, but some prefer to consider them as derived from a wild species, Holcus halepensis. The sorghums have been known from the remotest periods of history, and the cultivation of sorghum probably had its origin in Africa, where a variety called durra is grown over the whole continent, and is put to a variety of uses; the negroes chew the stem for the sugar, and make alcoholic drinks from the grain. Varieties of sorghum were known in China from a very remote period. The first sweet sorghum seed to reach the United States came from that country; in 1855, and in 1856 from South Africa. The sorghums are remark¬ able for their adaptability to differing conditions of soil and climate, and an almost endless list of

varieties exists, which may be divided into two main groups based upon the character of the sap. Those containing a considerable amount of sugar are classed as saccharine sorghums; those weak in sugar as non-saccharine. The name ˆsorghum" is applied in common use to the saccharine varieties only, while the non¬ saccharine kinds commonly bear the name of their species, as Kaffir corn, durra, etc. The several varieties of the sweet sorghums arc so nearly alike that little distinction is made in treating them as a class. The two leading varieties are the amber and the orange, the former being the favorite in the more northerly latitudes of the United States, and the latter in the South and the Southwest. Sorghum thrives in every part of the United States ex¬ cept in the colder parts of New England and in the higher parts of the Rocky Mountains. At first it was grown exclusively for the manu¬ facture of syrup and sugar, but as its value as a forage crop became known, the area de¬ voted to its cultivation increased rapidly.

Saccharine Sorghums. — The Civil War caused a scarcity of sugar in the United States, and sorghum syrup came into widespread use as a substitute. In 1860, five years after the first seed was introduced from China, 6,749,123 gallons of sorghum syrup were made and con¬ sumed in the United States. In 1870 the produc¬ tion had swelled to 16,050,089 gallons, and in 1880 to 28,444,202 gallons. Since that time the production of sorghum has shown a steady de¬ crease, being only 16,532,382 gallons in 1918. In the manufacture of syrup the stalks are stripped of their leaves after the seed has ripened, and the tops are cut off. The stalks are then cut off close to the ground and passed through heavy rollers to extract the juice, which is then boiled

in shallow pans until a syrup of the de¬ sired consistency is obtained. The greater part of the sorghum now manufactured is a farm product, all of the operations of manufacture being performed on the farm. In 1878 the United States Department of Agriculture took up experiments to ascertain whether sugar could be manufactured profitably from sor¬ ghum. Two objects were aimed at in the experi¬ ments, (1) to discover a cheap process for ex¬ tracting the juice and making the -sugar and (2) to increase the sugar content of the plant. Considerable progress was made along both these lines, and the chemists in charge of the work at one time thought that sorghum would become a competitor of sugarcane as a source of sugar. Attempts were made by capitalists to manufacture sorghum sugar on a commercial scale, but none of these attempts have proved successful. The only satisfactory process of getting the sugar to crystallize properly in¬ volves the use of a large amount of alcohol, which, under present government regulations, is so expensive as to make the process imprac¬ ticable.

Sorghum is valued highly by stockmen as a soiling crop, and makes good summer pastur¬ age for all kinds of stock. Its high sugar con¬ tent gives it an especial value in fattening swine, and it is also an excellent food for sheep. As ensilage it makes good feed, but on account of the difficulty in preventing the development of acidity in the silo, other crops are generally preferred for this purpose. Sorghum is of especial value as a pasturage plant, owing to

the fact that it is at its best in midsummer, when other grasses are generally of the least s<-rv*ce- "1 he heavy yield of hay makes it one of the favorite forage crops. In pasturing, care is necessary on first turning stock upon sor¬ ghum, owing to the danger of bloating.

1 he time for planting sorghum varies ac¬ cording to latitude from the 1st of April to the middle of June. In general the best results are obtained by sowing the seed broadcast or with a drill, as oats or wheat are sown. When in¬ tended for a soiling crop it is sometimes better to sow in rows far enough apart to admit of plowing between the rows. The amount of forage yielded per acre varies according to soil, climate and methods of cultivation, and ranges up to as much as 15 tons of the cured hay. Two or three crops are sometimes harvested in a single year, and as much as 10 tons is sometimes obtained from a single cut¬ ting. Experiments at the Nebraska Experiment Station showed

sorghum to be the heaviest yielder of all the forage crops at that station. It is a deep-feeding plant, and gives better re¬ sults on poor land than does corn, but is more exhausting to the soil. In feeding sorghum the whole plant is usually used. The seed alone has a feeding value of about 90 per cent of that of corn, and is valued highly for poultry, espe¬ cially for laying hens. Bulletin 15 of the De¬ partment of Agriculture compares the composi¬ tion of sorghum seed and corn as follows: Corn (shelled), water 10.9; ash 1.5; fibre 2.1; fat 5.4; protein 10.5; nitrogen-free extract 69.6; sorghum seed, water 12.8; ash 2.1; fibre 2.6; fat 3.6; protein 9.1; nitrogen-free extract 70.0.

Non-saccharine Sorghums. — These exist in many varieties, all with the same general habits of growth, being slow to germinate and requiring a long period to mature seed as com¬ pared with corn. They differ in the length, thickness and strength of the stem, in the num¬ ber and size of the leaves and in the position of the seed-head. The principal varieties are Kaffir corn, Milo maize, durra (doura, dhourra or dhoura), Jerusalem corn and broom corn. All of these varieties except the last are grown principally as feed for stock. The peculiar adaptability of broom corn to the manufacture of brooms and brushes has led it to be devoted entirely to this purpose.

Kaffir corn is the best known of those grown as feed for stock. It was introduced from South Africa about 1884, distributed by the Department of Agriculture and has been found well fitted to the semi-arid regions of the West and Southwest, where corn has never been a reliable crop. It is now extensively cultivated in Oklahoma, western Kansas and other places where lack of moisture gives this crop an advan¬ tage over corn. In appearance Kaffir corn re¬ sembles sorghum, but does not grow so tall. The leaves are large and long, the head is up¬ right and compact, and the seeds vary in color according to variety. Three distinct species have been generally agreed upon — red, white and black-hulled white. The last frequently goes by the name of African millet. Kaffir corn is used chiefly for a fodder crop, is planted ip drills and cultivated like corn or sorghum. Where it is proposed to feed the whole fodder to stock, the crop is cut and shocked as soon as the grain is ripe. Where the heads are to be harvested by themselves various methods of

harvesting are used. The yield is about the same as that of corn grown under the same conditions, except in dry, hot regions, where the Kaffir corn will outyield Indian corn. The crop of fodder produces up to eight tons per acre or more, but the seed has a lower feeding value than corn. The grain has been used as an article of human food, making a meal similar to corn-meal. The acreage of Kaffir corn is

about 266,513 acres, and the yield of grain averages annually about 5,169,113 bushels.

Milo maize closely resembles Kaffir corn, but grows to a greater height. It is marked by a heavy foliage and an abundance of suckers. Owing to the fact that it requires a long period to mature it has been found best adapted to cultivation in the Southern States. Two varie¬ ties are grown in the United States, white and yellow.

Durra differs from Kaffir corn principally in the position of the head, which hangs down¬ ward from the end of the stalk, the culm being recurved just below the panicle. This variety includes Egyptian corn, rice corn, guinea corn, etc. The grain is a favorite poultry-food, and the plant has been extensively cultivated in some parts of the United States for this pur¬ pose. It is also valuable as a forage plant.

Jerusalem corn grows to a height of four to eight feet, but produces less forage than other varieties. The grain yield is large as compared with that of other non-saccharine sorghums, but is hard to save, owing to the fact that the grains are without husks and shatter easily. The head hangs downward on a recurved stalk as in the case of durra.

Broom Corn. — Broom corn is the oldest variety of the non-saccharine sorghums culti¬ vated in the United States. Brooms were made for sale in the United States as early as 1798, and the plant was cultivated for home use for some time previous to this. The usual develop¬ ment of the stems of the seed-cluster adapt it perfectly to the purpose of brooms and brushes, and it is not cultivated for any other purpose, although sometimes fed to stock after the brush has been removed. There are several varieties, whose distinctions depend on the size and coarseness of the plant and the quality of the head. The plants are usually grown in drill rows. The heaviest producers of broom corn are the States of Illinois and Kansas, though considerable quantities are produced in many other States. The American broom corn is su¬ perior to that grown in Europe for purposes of broom manufacture.

Diseases of Sorghum. — Sorghum blight (Bacillus sorghi) is a bacterial disease in which the leaves or leaf sheaths are attacked by small red spots and patches of various shades and sizes. The roots are also subject to attack from the same source, and the vitality of the plant is so affected that it is either stunted or killed. The disease is worse on some varieties than others, but it attacks both the saccharine and the non-saccharine varieties. Of the smuts, Ustil- ago sorghi and U. reiliana are dreaded. The former attacks the grain, causing it to swell up and burst, and the latter attacks the entire head, converting it

into a large black mass which is covered at first by a whitish mem¬ brane. No preventive treatment has been ap¬ plied successfully.

Sorghum Poisoning.— Cases have been fre-

quent, especially in the semi-arid districts, of cattle dying from eating even a little green sorghum, usually a second-growth. Investiga¬ tions carried on by the Nebraska Experiment Station go to show that under some conditions sufficient prussic acid forms in the leaves of the plant to cause the death of an animal. The danger is confined to the feeding of the green plant.

SORITES, s5-ri'tez, in logic , a chain of el¬ liptic syllogisms — of syllogisms in which the conclusion of all except the last is omitted. The syllogisms are stated in a series of proposi¬ tions so linked together that the predicate of each is the subject of the one next following, until a conclusion is formed by bringing together the subject of the first proposition and the predicate of the last. The chain can be carried to any length provided it is perfectly consecu¬ tive, so that each term except the first and the last occurs twice, once as subject and once as predicate. Example of sorites: Every A is B. Every B is C. Every C is D. Every D is E. Therefore, every A is E. The term is also used to designate a fallacy wherein it is argued that since the addition of each single object to a collection of objects does not change the col¬ lection up to a certain point, therefore, such addition can be made indefinitely without chang¬ ing the collection.

SOROCABA, sd-ro-ka'ba, Brazil, a town in the state of Sao Paulo, situated on the railroad, 55 miles west of Sao Paulo. It lies in the midst of a rich agricultural and grazing district, and important fairs for the sale of horses and cat¬ tle are held in the town annually. Pop. of com¬ mune about 17,000.

SOROLLA Y BASTIDA, Joaquin, Span¬ ish artist: b. Valencia, 1863. He studied at the academy at Valencia, and later in Italy and Paris. He achieved wide recognition upon the exhibition of his (Another Margaret) (1892) which was awarded a gold medal by Madrid, and was purchased by the Saint Louis gallery. Thereafter his successes were continuous and remarkable, and he is generally considered the leader of modern Spanish painters. His work includes landscapes, figure paintings and por¬ traits, and is of the impressionistic school.

His exhibit at the Paris Exposition in 1900 was awarded a medal of honor, and after his phe¬ nomenally successful exhibit in Paris in 1906 he was made an officer in the Legion of Honor. His exhibits at London in 1908 and at the His¬ panic Society, New York, in 1909, were also remarkably successful. Among his paintings are (Fishing Boats Return > (Luxembourg, Paris) ; (Sewing the SaiP (gold medals, Mu¬ nich and Vienna) ; (A Sad Inheritance) (church of the Ascension, New York) ; (Swim- mers) (Metropolitan Museum, New York) ; (After the Bath) and (Beaching the Boat) (loaned to the Metropolitan Museum by the Hispanic Society) ; portraits of King Alfonso XIII and of Queen Victoria of Spain (His¬ panic Society, New York), etc. Others of his works are in the Berlin National Gallery, the Venice and Madrid Museums and in private collections in England and America.

SOROSIS, the name of the first professional woman's club established in the United States. Sorosis was founded in 1868 by Mrs. ((Jennie

June® Croly (q.v.) and some of her literary as¬ sociates in New York. Mrs. Croly was for many years the president of the society.

SORREL, SORREL-TREE, SORREL VINE, etc., are the like names of several unre¬ lated plants having acidulous or ((sour® foliage. The field or sheep sorrel is the Rumex aceto- sella, a common pasture weed, naturalized from Europe, with halberd-shaped leaves, impreg¬ nated with oxalic acid, slender panicled ra¬ cemes of delicate dioecious flowers, with six- parted green or reddish calyces. It spreads widely by creeping rootstocks and in late sum¬ mer colors large patches of dry fields and hill¬ sides by its crowded rusty-hued flower stalks and foliage. This species, R. acetosa, and particularly R. scutatus, which is cultivated for the purpose in Europe, are used for salads, soups and as vegetables. They are cooling, diuretic and anti-scorbutic plants. The wood sorrel may be any one of the American species of Oxalis, low pjants with succulent tripartite leaves and obcordate leaflets and pretty soli¬ tary or umbellate five-parted flowers, white, pink or yellow, and with sharply acid sap. In¬ dian sorrel is the roselle, an East Indian mal¬ low (Hibiscus sabdariffa) cultivated in the tropics for its acidulous calyces which are made into refreshing drinks, jellies and tarts. Switch sorrel is Dodonoca viscosa, a widely distributed tropical shrub, with acid and bitter foliage. Climbing sorrel is the shrubby Begonia scan- dens, which climbs by rootlets. The sorrel vine is a low, tendril-bearing climber (Cissus acida) of tropical America. Oxydendum ar- boreum is the sour-wood or sorrel-tree of the southern United States. It is a smooth-barked tree of the heather family, with alternate oval leaves, deciduous and sour in taste. The five- parted cylindrical flowers are in one-sided, slender

racemes and in terminal panicles. They have a honey-like odor, and are food for bees. The capsules are pyramidal, five-valved and a soft, pale green in color. The leaves are occa¬ sionally used to furnish a black dye, and the wood serves for tool-handles, bearings of ma¬ chinery and for turning.

SORREL COOL DRINK. See Hibiscus.

SORRENTO (ancient Surrentum), Italy, in the province of Naples, on the southeast side of the Bay of Naples, seven miles south¬ west of Castellamare. It is built on the steep mountainous slope of a promontory extending into the bay, in one of the most beautiful and fertile regions of Italy, amid orange, lemon, olive and mulberry groves. A roadway fol¬ lowing the coast forms a favorite promenade from the town to Castellamare. Sorrento con¬ tains a few interesting ruins of its ancient splendor belonging to the Augustan period. It is the seat of an archbishop and has a cathedral. Other buildings are a seminary and a school of navigation ; also a monument to Tasso, who was born here. The wine of Sorrento is fa¬ mous. The inlaying of wood and silk-culture; the manufacture of silk, cultivation of fruit, stock-raising and fisheries are the chief occupa¬ tions. It depends, however, mainly upon its attractions as a summer resort, which it owes to a fine climate and picturesque scenery.

SORROWFUL MOTHER, Sisters of the.

See Orders, Religious.

SORROWS OF YOUNG WERTHER,

The ((Die Leiden des jungen Werthers)). ‘Werther’s Leiden,* Goethe’s first novel, was written in Frankfort in 1774, during the so- called storm and stress period. It is divided into two books each consisting of a series of letters by Werther, with some reports by the supposed editor of these letters inserted in the latter half of the second book. The prin¬ cipal character of this novel is a refined, sensi¬ tive youth of artistic temperament, who makes imperative demands upon life from a subjec¬ tive point of view and when disappointed be¬ comes absorbed in himself. This tendency to brood which is dangerous in itself proves fatal in Werther’s case on account of his hopeless love. For his endeavor to overcome the latter by leaving Lotte and starting out on a life of activity fails. He falls a victim to his unalter¬ able

disposition and the unconquerable power of his passion. Such a “leitmotif® character¬ izes (Werther’s Leiden) as a genuine product of the storm and stress movement. But this movement was confined to Germany, and the sweeping success of the novel, which called forth translations, imitations and also parodies in all literary languages must be accounted for by other reasons. It appeared in an age of sentimentalism and met the demand for senti¬ mental elements to a considerable degree. Be¬ sides, great general problems dealing with man and nature, art and religion are presented in a vigorous style, and the portraits of the per¬ sons, especially those of Werther and Lotte, are distinguished by a convincing realism. The most noteworthy of the admirers of Goethe’s (Werther) was Napoleon I.

‘Werther’s Leiden *is closely connected with the life of its author. During Goethe’s stay at Wetzlar, 1772, where the young lawyer was to get practical exnerience at the Supreme Court of the empire, he met and admired Char¬ lotte Buff who was engaged to a young man, Albert Kestner. There is, however, this funda¬ mental difference between Goethe’s life and Werther’s : Goethe did not return to Lotte after he had once left her, and while Werther com¬ plains about the vanishing of his artistic fac¬ ulty, it was his very talent that enabled Goethe to overcome his feelings for Charlotte Buff by giving them artistic form. Thus only the first book is really based on Goethe’s own ex¬ perience while the second is based on the tragic fate of his colleague, Jerusalem, who for rea¬ sons similar to those of Werther committed suicide. Consult edition of Goethe’s works in (Deutsche National-Literatur* (Vol. XVIII 13, pp. 1-134, 1882-98) ; Kestner, A., (Goethe und Werther, Cotta’sche Handbibliothek* ; Gloel, Heinrich, ‘Goethe’s Wetzlarer ZeiP (1911) ; Long, O. W., ‘English and American Imitations of Goethe’s Werter) (Modern Philology, Vol. XIV, No. 4, August 1916.

Ewald Eiserhardt.

SORSOGON, sor-so-gon', Philippines, (1) Pueblo, capital of the province of Sorsogon, Luzon, on Bay of Sorsogon. The bay is 19 miles in length from the town to its entrance and affords one of the best harbors in the Phil¬ ippine Archipelago. Sors.ogon is a port of call for steamers from Manila, and has a consider¬ able export trade, particularly in hemp and copra. In 1840 it suffered from an earthquake

which lasted almost continuously for 35 days ; the churches were destroyed, 17 persons were killed and many injured, and the ground for some distance sank five feet below its former level. Pop. about 15,000. (2) Province of the

island of Luzon, situated in the extreme south¬ eastern end of the peninsula of Luzon, bounded on the north by the province and the Bay of Albay, and on the south by San Bernardino Strait, length from northwest to southeast 47 miles ; greatest width, 40 miles ; area, 755 square miles. The coast line is very irregular; on the northwest coast is the deep indentation of the Bay of Sorsogon; and on the northeast coasr Sogod Bay, an arm of Albay Gulf ; from the extreme northeast shore of the Bay of Sorso¬ gon to the nearest waters of Sogod Bay the distance is but three miles. The mountain sys¬ tem of the province includes a range in the north, forming the boundary line with Albay and another range extending from northeast to southwest, forming the central watershed, but nearer the east coast than the west. In this range is the active volcano of Bulusan, visible for 60 miles at sea. The largest river of the province rises on the western slopes of Bulu¬ san; there are many small tributary streams. There are comparatively few highways, one road connecting Sorsogon with Bacon on the opposite coast. There are several trails, and much coastwise trade in native canoes. The staple products of Sorsogon are hemp and copra (a product of the cocoanut, the form for shipment to be made into oil), and large quan¬ tities of both are exported. Native textiles, cordage, etc., are manufactured from the hemp; and the cultivation and manufacture of hemp, and the cultivation of the cocoanut are the principal industries. . Sorsogon was formerly a district of the province of Albay, and in 1901 was created a province a~d placed under civil government in accordance with the provision of the law of the Philippine Commission. Pop. about 130,000.

SORTES, sor'tez, (Virgilianse, Homericse, Biblicse, etc.), a mode of divination by means of a passage or verse in some poet’s works or in the Bible. One way of practising this kind of divination was to open the book at random and to take whatever passage or verse is touched by the finger as an indication of the fortune of the inquirer. Another way was to select a number of verses from a poet or from one of the books of the Bible, write them on slips of paper, mix these in an urn, draw, one slip at random and from its contents infer good or evil. The Sibylline oracles (see Sibyl) were also employed in this way. Sortes Virgilianae are so called, as being practised with verses from the poet Virgil, Homericae from Homer, and so on. In Persia sortes are determined by resort to the poems of Hafiz. It is said that the Roman Emperor Severus, who reigned from 193 to 211 a.d., found an intimation of his high destiny in that verse of the ZEneid,

Tu regere imperio populos, Romane, memento;

and that the Emperor Gordianus (self-slain after a reign of 36 days)

read his doom in this passage of the same poem :

Ostendunt terns hunc tantum fata, nec ultra Esse sinunt.

Charles I and Lord Falkland tried the Sortes Virgilianae in the Bodleian Library at Oxford and found passages equally ominous to each. The use of the Scripture books for divination still lingers among people of simple faith ; and the obstinate survival of this superstition is due to a strong conviction of the power and watch¬ ful care of an overruling Providence and a be¬ lief in the Bible as an inspired manual of divine guidance : if resort is less often had in these times to the Sortes Biblicse, that may be due to the decaying respect for the mere letter of Scripture.

SOSIOSH, or SAOSHYANT. The prom¬ ised Messiah of the Soshyantos or fire-priests of the early Iranian religion. A son of the seed of Zarathushtra or Zoroaster, thrice parthenogenetically and miraculously rein¬ carnated, he is to be the last of the three great prophets who after 9,000 years are to appear successively at the end of each millennium, until the 12,000 years expire between the creation, the end of the world and the judg¬ ment day. See Zoroaster and related refer¬ ences.

SOTHERN, Edward H., American actor, son of E. A. Sothern (q.v.) : b. New Orleans, 1859. He first appeared with his father in a small part in New York (1879). He starred in (One of Our Girls5 at the Lyceum in New York in 1885. Shortly thereafter he appeared at the head of his own company in such plays as (Lord Chumley,5 (Maister of Woodbarrow,5 ‘Prisoner of Zenda,5 ‘The King’s Musketeers,5 ‘Lovelace,5 (If I were King,5 ‘The Proud Prince,5 and ‘Hamlet> (1900). His interpreta¬ tion of ‘Hamlet5 is modeled somewhat on that of Edwin Booth, is romantic and effective, but at times prone to exaggeration. In 1904 he began to play Shakespearean roles with Julia Marlowe, whom he married in 1911. After his wife retired in 1915, he appeared in the •Two Virtues5 and in several revivals. A year later he announced his own retirement. Consult McKay and Wingate, (Famous Ameri¬ can Actors of To-Day5 (New York 1896) ; Strang, Tamous Actors of the Day in Amer¬ ica5 (Boston 1900) ; Sothern, ‘My Remem¬ brances5 (Scribner's Magazine, New York January 1916 et seq.).

SOTHERN, Edwin Askew, English actor: b. Liverpool, England, 1 Anril 1826; d. Lon¬ don, 21 Jan. 1881. He was educated for the church, but discovered soon that his inclina¬ tions were for the stage. In 1849 he joined a company of strolling players, and soon after¬ ward passed into the stock company of the Theatre Royal, Birmingham. From 1852 he appeared in the United States without attract¬ ing much attention until in 1858 (Our Ameri¬ can Cousin5 was brought out in New York, with Sothern cast for the small part (47 lines) of Lord Dundreary. Sothern built up the character, making it the leading feature of the play, and one with which his name has ever since been connected. He acted other parts, with more or less success, and was al¬ ways popular in America, which he frequently visited. Consult bibliography under Sothern, E. H.

SOU, soo, an old Roman, Gallic and French coin, of gold, silver and copper. In France the

current five centime piece, 20 of which make a franc, are commonly called sous.

SOUARI, or SUWARRO, NUTS, the

seeds of the genus Caryocar (family Caryoca- racece), lofty trees yielding timber prized for its durability and common in British Guiana. C. nuciferum is the chief source of supply of these nuts, having digitate leaves, five- or six- parted, large, magenta-colored flowers and a fruit which is a spherical, hard, woody shell, as large as a child's head, reddish-brown in color and covered with roundish protuberances. It contains fefur seeds, the souari nuts, which are kidney-shaped, about the size of an egg, with a ruddy brown shell, that is very hard but has a satiny lining and encloses a soft, pure white kernel in a brown skin. This rich meat, with its sweet, almond-like flavor, is considered to be the finest of all nuts. A bland oil is ex¬ pressed from the kernels and they are called butter-nuts in the English market, or cream- nuts in the American. Since there is great difficulty in gathering them, on account of the bulk of the trees, the supply is restricted.

SOUBISE, soo-bez, Benjamin de Rohan,

Seigneur de, . French Huguenot soldier: b. Rochelle, France, 1583. He was a son of Rene II, Vicomte Rohan, and a younger brother of the soldier-writer, Henri de Rohan. He served his apprenticeship as a soldier under Maurice of Orange and when the religious wars broke out in 1621 was entrusted with the chief com¬ mand of the west,

while his brother commanded the land forces in the south. In 1625 Soubise made a daring attack on the royalist fleet in the river Balvet and occupied the island of Oleron. He also commanded in the defense of Rochelle, but was unable to save the town and when it fell he fled to England.

SOUDAN, soo-don'. See Sudan.

SOUFFLE, soo-fla', a dish consisting chiefly of the whites of eggs, to which other ingredients (chocolate, cheese, vanilla, orange-flower water, rose water, various essences, etc.) are added, to give consistency, flavor and variety. The ma¬ terials have to be agitated with a whisk until the whole is in a creamy froth, which is then baked in a souffle pan.

SOUFFRIˆRE, La, la soo-fre-ar. See Saint Vincent.

SOUL, in philosophy the basis of the unity of individual consciousness and conduct. The opinions held as to the nature of this basis have naturally varied in accordance with the cur¬ rent views as to unity and explanation. The savage, for example, can find no principle of explanation that is not at once a tangible ob¬ ject and the bearer of human attributes, so that in his eyes the soul becomes a homunculus, a man within the man. The transition from the view of the savage to that of the uneducated man in a civilized community consists at most in the discardance of the grosser material at¬ tributes of the soul, without the loss of any of its anthropomorphic qualities. It requires a certain degree of philosophical sophistica¬ tion to become aware that any explanation of the soul which is to convey real knowledge must not involve the equally complicated notion of a person. The first explanations of the soul which are to be found in Greek philosophy resemble all the explanations of their period in that they

make use of a material principle. This mate¬ rial principle, which is the magnet in the philos¬ ophy of Thales, air in that of Anaximenes, fire in that of Heraclitus and the finer atoms among the Atomists, is considered to be a moving force. Anaxagoras made the first great ad¬ vance in the theory of the soul by isolating the notion of moving force from that of a particular material substance. The Pythagore¬ ans adopted a view which may be regarded as an anticipation of Aristotle, in that they held the soul to be the harmony of the body. In this pre-

Socratic period all the accounts of the soul place a preponderant emphasis on its cog¬ nitive nature.

It is only with Plato that the nature of the soul comes to be the cardinal problem of philos¬ ophy. He assigns to it a place intermediate between not-being and the realm of Ideas. The world-soul is the harmony of “sameness,® that is universality such as pertains to the Ideas and “otherness,®’ or the particularity character¬ istic of the things of sense. The soul of the individual is a less perfect copy of the soul of the universe. The soul is immortal and un¬ created and the universals of our knowledge are but the recollection of what we have learned in a previous life. The soul cannot be de¬ stroyed, for it partakes in the idea of life it¬ self. The body is the prison of the soul and prevents it from returning to its home in the realm of Ideas. Each soul contains three parts — a desiderative, a spirited and a rational. That soul in which the rational preponderates will resume that life of which all souls origi¬ nally partook — the blessed life of a star.

The Aristotelian view of the soul is pecul¬ iarly interesting in that it involves motives which are active in the philosophy of the pres¬ ent day. He places the soul definitely in that category of being corresponding to the Platonic Ideas — the realm of pure forms. The soul is the formal cause of the human body and since the body is an organism, the soul is also the final and efficient cause. In Aristotle’s own language, the soul is the entelechy of the body. Like the Platonic soul, the Aristotelian soul is tripartite. It contains a vegetative part, which superintends the functions of assimilation and propagation and constitutes the entire soul of plants ; an animal soul, characterized by the powers of locomotion and sensation, which sup¬ plements the vegetative soul throughout the animal kingdom and a rational soul, found only in man. The principle of unity connect¬ ing these three faculities is not explained. The question of the oneness of personality \s com¬ plicated by the notion of the soul as an immate¬ rial principle. Aristotle denies immortality to the soul, which he conceives to be created like the body in the act of begetting.

The Stoic psychology is essentially mate¬ rialistic. The soul is nothing but fire or breath uniting the body much as the world-soul of fire unites the world. The soul consists of reason, the power of reproduction, speech and the five senses. Personal identity resides in the reason, but the individual soul is a part of the world-soul. The soul exists after death, though not for an eternity. Epicureanism took over bodily the psychological theory of atom¬ ism. The soul, according to the Epicureans, is made up of the finest fire-like atoms, the movements of which are sensation and thought.

Immortality is completely denied. Lucretius distinguishes two levels of psychical life; the lower, animal anima, and the higher animus, presiding over emotion and cognition. The Neo-Platonists consider intelligence, soul and matter as successive emanations from the One-Soul, is consequently prior to body, and more real than it. This opinion is in the philosophy of the Gnostics combined with the tripartite division of human nature characteristic of the older Platonism. In place of the desiderative part of man, according to the Platonic philos¬ ophy, they put the body; in place of the spirited part, the soul ; in place of the intellectual part, the spirit. Corresponding to the ethical and religious trend of Gnosticism, the highest place is no longer given to reason, but to that new element which enters into the human soul upon conversion. In the later Christian philosophy, the “soul® and “spirit® are fused into a single entity. In Saint Augustine there are found many of the motives which characterize later mediaeval and modern philosophy. The body- soul dualism based on the distinction between thought and extension appears in his philosophy as well as in that of Descartes. He retains the Aristotelian notion of the soul as final cause and disclaims all knowledge of the origin of the soul.

The Scholastic doctrine of the soul is essen¬ tially Aristotelian. In the form held by Saint Thomas and now the official philosophy of the Catholic Church, it consists of the following dogmas: (1) the soul, which is not divided after the fashion indicated by Aristotle, is the form of the body; (2) it is a substance, but is incomplete in the sense that it has a natural fitness for association with a body; (3) it is spiritual and without extension; (4) it is created at a definite moment in the develop¬ ment of the organism. Of course, the scholas¬ tics all maintained the immortality of the soul.

The modern period of philosophical thought is marked by a very important change in the notion of the soul, as has been shown. The scholastic philosophy perpetuated the Aristotel¬ ian concept of the soul as form or entelechy. While it is true that the scholastics regarded the soul as a substance, they considered it, not as merely coequal with matter, but as the organizing factor in the soul-matter complex which constitutes man. The body was thus in a sense subordinated to the soul. On the other hand, in the philosophy of Descartes, soul and body are co-ordinated as respectively the thinking and the extended substances. As a substance is that which possesses attributes, it is quite a different sort of thing from the Aristotelian form, which gives to matter its attributes. The soul substance is of course differentiated into individual souls; but of the nature of this differentiation Descartes says little or nothing. The existence of my indi¬ vidual soul is guaranteed

to me by the famous principle, “I think, therefore I am.®

After the Cartesian dialectic has established the existence of God and the material universe, the next problem is the correlation of the ex¬ periencing soul and the material objects of its experience. This correlation, which according to Descartes is guaranteed by the perfect hon¬ esty of Cod, is supposed to take place in the pineal gland. The Occasionalists go beyond Descartes in that they make the correlation

between the soul and the matter depend on the act of God in each particular case. The cul¬ mination of this trend of thought is to be found in Spinoza, who' maintains that mind and mat¬ ter are not separate substances at all, but merely two among the infinite number of at¬ tributes of the Divine Substance. Another off¬ shoot of Occasionalism is the philosophy of Leibnitz. Instead of a dualism of mind and matter, his philosophy is a pluralism of differ¬ ent soul-substances, which in confused per¬ ception may give the appearance of matter. The correlation between the content of an indi¬ vidual soul and the universe which this content represents is established through an act of God which has pre-established the harmony of the universe. Unlike the continuous divine inter¬ vention of Occasionalism, this act was finished once for all at the creation of the universe.

The rationalistic school of the Continent, as has been shown, ended, so far as the concept of soul is concerned, just about where it began. For Descartes, the Occasionalists, and Leibnitz, the soul is essentially substance ; and even for Spinoza, it is a divine attribute possessing much of the autonomy of a Cartesian sub¬ stance. Like the rationalists, the British em¬ piricists began with a substantial notion of the soul, but unlike the rationalists, they car¬ ried the notion to its absurd logical conclusion and transcended it. Locke considered the soul after the fashion of Descartes, as a substance, as the substratum of ideas. He made it a blank tablet on which the ideas are impressed, but beyond this he did not characterize it. Though he was sure that self-consciousness exists, he made no psychological investigation into its nature. Berkeley for all his incisive criticism of the Lockeian notion of substance in its application to the material world, left the notion of soul untouched. It remained for Hume to do for mind what Berkeley had done for matter and to point out the fact that intro¬ spection alone was unable to reveal a specific soul-entity. Putting this fact side by side with the inability of the notion of a substratum to give a real

explanation of anything, he came to the conclusion that the mind is neither more nor less than the sum total of its states.

Kant, who was awakened by Hume from his ((dogmatic slumber,® was not the least under his influence in the matter of the soul. While he most emphatically asserts that a soul ex¬ ists, he denies that it is immediately accessible to perception. He points out, in the course of his discussion of the paralogisms of rational psychology, that the aprioristic Wolffian psy¬ chology is based on a confusion between the subject, which must exist in some sense or other in every act of consciousness, and the simple, lasting, personal soul. The soul, qua substance, is inaccessible to us, and the entire worth of a dialectical discussion of psycho¬ logical matters lies in the criticism to which it subjects such theories of the soul as material¬ ism or the opinion that we have a direct in¬ tellectual acquaintance with a permanent, per¬ sonal ego. Thus all metaphysical proof of immortality falls to the ground, as likewise does all metaphysical disproof. The immortality of the soul, however, is established as a postulate of the pure practical reason — of the reason as applied to affairs of conduct. The existence of morality requires that there should be a

progress in infinitum of the imperfect human will toward the perfection enjoined by the moral law. Kant's attitude towards the soul may be summed up in the statement that the soul can only be thought by the pure reason, but may be known by the practical reason. This ability of the practical reason to grasp matters that are partly veiled to the pure rea¬ son is known by Kant as the primacy of the practical reason. The Kantian primacy of the practical reason is repeated in the philosophy of the romanticists under the form of volun¬ tarism. Fichte and Schopenhauer both empha¬ size the part played by the will in the constitu¬ tion of the soul. The ego, which is the basis of the entire Fichtean philosophy, is grasped in a voluntary act of intellectual intuition, which exhibits to us the law of duty. The ego is immediately aware of its own free act. For Schopenhauer, as later for Bergson, the intellect is but a schematization of the will, which con¬ stitutes the true nature of the human being as well as of the universe. Hegel agrees with the Kantian refutation of rational psychology, but regards the Kantian antinomies constituting Kant's refutation merely as a few of an indefi¬ nite number of antinomies having their roots in Being itself. Herbart makes the soul one of his undefined primitive concepts. It is simple, absolute and transcends the bounds of space and time. Its only activity is self- preservation and ideas arise when it acts to preserve itself in opposition to another real. Lotze considers that the soul and body inter¬ act and that mind is but the higher, explicit development of what is found in the grossest matter. The philosophy

of Fechner is like¬ wise a panpsychism (q.v.) which makes the entire universe consist in a hierarchy of souls subordinated to the world-soul of God, whose body is Nature.

Among the more interesting of the cur¬ rent views concerning the nature of the soul is that which assimilates the soql to the phe¬ nomena of life in general. While this is the tendency of all vitalists, it reaches the high¬ est degree of metaphysical development in the philosophy of Henri Bergson. Bergson's phi¬ losophy is based on the contrast between two aspects of the universe : between the immedi¬ ately given living time and the atomic space, known only through the analytic powers of the intelligence. The temporal aspect of the universe is identified with the spiritual force of life. Accordingly the true nature of the self is inaccessible to the formal, deadening intellect and can be grasped only through in¬ tuition. In this aspect, as grasped by intuition, it transcends all individuation and personality. It is the same living force which exemplifies it¬ self throughout all nature. Only through the damming of the stream of life by matter does the individual soul arise with its concomitant body. Empirical psychology is of itself unable to transcend the individual soul and see the greater reality that lies behind. The Bergsonian philosophy, that is, points out the limitations of a rational account of the soul and indicates a superrational mode of approach — psychology. As. Bergsonianism treats of matters which it claims are not properly subject to the reason, it is clear that it claims for itself an intuitive basis. Whether the Bergsonian intuition ex¬ ists or not is a sheer question of fact; it is

certain at any rate that there are many who do not feel an intuitive compulsion to accept Bergson's view of the soul.

At present there is a strong tendency to re¬ turn to what is in a sense the Humian view of the soul. James and the American school of Neo-Realism (see Realism) agree to the extent that they consider the soul as the stream of its states and maintain that these states, in a different context and arrangement, form the subject matter of the physical science. This view, similar as it is to that of Hume, marks at once a great advance over that of Hume and a partial revival of Aristotelianism. The stream of states is not a mere fortuitous aggregse of experiences ; A's experiences and B's experiences are each united in a manner totally different from the manner in which some of A's experiences can be united to some of B's. In other words, this theory,

which calls itself neutral monism, makes the soul consist, not merely of certain states which are aggregated, but of a system of states-in-a-peculiar-mode-of- aggregation. The distinction between these alternatives was inadmissible for Hume be¬ cause of his nominalism. On the other hand it may be expressed in Aristotelian languages by calling the mode of aggregation the entel- echy of the stream of states. Like Aristo¬ telianism, neutral monism finds the unity of consciousness in the embodiment of a form or structure or relation, but unlike Aristotelian¬ ism, it maintains that the matter shaped by this form is not the body, but the stream of consciousness itself.

Neutral monism has recently been subjected to a keen and unfavorable criticism by Bertrand Russell. His objections are (1) that introspec¬ tion shows that knowledge does not consist in the entry of an experience into a system of experiences, but in a direct relation to a mind or soul ; (2) that neutral monism cannot ac¬ count for the relation of belief; (3) that the thought of a timeless thing is in time, so that the thing and the thought cannot differ merely in their context; (4) that neutral monism is adapted to explain rather the knowledge of things than that of facts; (5) that there are ((emphatic particulars® such as ((this® and (<P and “now.® It is possible, however, to modify neutral monism so as to avoid much of the force of these objections. To begin with objection (3), it is not essential for neutral monism to maintain that every experience is identical with its object. This much of nominalism is valid, that in much of our thinking, the ultimate ob¬ jects are supplanted by their symbols. There is nothing controverting the principles of neu¬ tral monism in the supposition that in a certain context one experience datum may acquire a vicarious interpretation as another. (See Meaning; Thought). Neither is it in any way impossible or unlikely that the timeless should be presented to us directly. Putting these two possibilities together it is clear that the thought of a timeless thing may be in time just by virtue of the fact that the situation in which the time¬ less thing occurs is symbolized by a complex of similar structure, but consisting of temporal entities. Belief is also explained by the self¬ representative character of experience. A be¬ lief is a situation where a complex of ex¬ periences plays the part of a symbol complex toward another complex with the structure

of which it has not been definitely compared. As to neutral monism and the knowledge of facts, there is no reason why experience should not contain fact-states as well as thing-states. Immediate acquaintance with facts offers no difficulties, while descriptive knowledge is merely such knowledge as is mediated by a symbolism. The objection that introspection conflicts with neutral monism is certainly not

conclusive, as introspection is no more infallible than other varieties of observation. The Rus¬ sellian resolution of a table into an aggregate of aspects or empirical data calls for a philo¬ sophical sophistication which should not be ap¬ palled by the apparently unitary character of the soul. Finally, the distinction between the focus and periphery of attention may be taken as a fact without the assumption of any soul-entity behind it, yet it is quite sufficient to account for the existence of emphatic particulars. See Dualism; Idealism; Monism; Psychology; Realism.

Bibliography. — Consult the bibliography of Psychology, standard works on history of phi¬ losophy, and Bergson, H., (Matiere et Memoire, essai sur la relation du corps avec 1'esprit' (Paris 1896; trans. New York 1911); James, W., (Essays in Radical Empiricism' (New York 1912) ; Royce, J., (The Problems of Christian¬ ity* (London 1913) ; Russell, B. A. W., (On the Nature of Acquaintance) (The Monist, Vol. XXIV, Nos. 1-3, Chicago 1914).

Norbert Wiener.

SOULE, soo-la', Gideon Lane, American educator: b. Freeport, Me., 25 July 1796; d. Exeter, N. H., 28 May 1879. He was a student at Philips Exeter Academy in 1813-16 and was graduated at Bowdoin College in 1818. He was afterward for more than 50 years connected with the Phillips Exeter Academy, of which he was principal in 1838-73. He was chiefly responsible for the great success of the insti¬ tution.

SOULE, Joshua, Methodist Episcopal Church South, bishop: b. Bristol, Me., 1 Aug. 1781 ; d. Nashville, Tenn., 6 March 1867. He began his career as a aboy preacher® at 17, studied indefatigably and acquired a reputation as an opponent of Calvinism, Unitarianism and Universalism. He became presiding elder of the State of Maine in 1804, when but 23; and served on the committee which drafted the constitution of the church in 1813. He be¬ came bishop in 1824, and upon the division of the church in 1845 he went with the Methodist Church South, becoming its senior bishop. He was a man of wide influence. He retired at 72. Consult Dubose, H. M., (Life of Joshua Soule' (1911).

SOULE, Pierre, American statesman: b. Castillon, France, September 1802; d. New Orleans, La., 26 March 1870. He received most of his education at Toulouse, having been interrupted in his studies at Bordeaux by an accusation of complicity in a plot against Louis XVIII, in consequence of which he was obliged to flee. Soon after his pardon in 1824 he was again exiled on account of the pub¬ lication of articles

in his paper The Yellow Dwarf, derogatory to the course of the ministers of Charles X, and took up his resi¬ dence at this time in America. A few years later he was elected to the United States

Senate from Louisiana, and was still later en¬ trusted with the negotiations of the United States government with Spain for the purchase of Cuba. During the Civil War he was a mem¬ ber of Beauregard's staff. At the conclusion of hostilities he took up his law practice in New Orleans.

SOULT, soolt, Nicolas-Jean de Dieu,

marshal of France : b. Saint-Amans-la-Bastide, department of Farn, 29 March 1769; d. Soult- berg, 26 Nov. 1851. He entered the army as a common soldier, but was soon distinguished for gallant conduct and raised from the ranks. In the campaign of the upper Rhine in 1792-94 he was brevetted general of brigade, and in 1799 was made general of division and served with distinction as such under Massena in Switzer¬ land and Italy. He became an ardent champion of Napoleon by whom he was appointed marshal at the beginning of the Empire (1804). His military genius was further proven at Aus- terlitz, where he decided the battle by cutting in two the main body of the Russian troops, and in numerous other battles, the most conspicuous being that of Friedland in the Prussian cam¬ paign in 1807. Upon the fall of Napoleon he was appointed Minister of War by Louis XVIII, but was compelled to resign by the royalist party. He acted as major-general of the army at Waterloo, but was obliged to flee from France at the second Bourbon restoration. Returning in 1819, he was again appointed Minister of War, and in 1839 Minister of Foreign Affairs. In • 1846 he was created grand-marshal of France, and retired to pri¬ vate life. He was created a peer of France and under Louis Philippe was a prominent official. Consult Soult, (Memoires5 (3 vols., Paris 1854) ; Thiers, (History of the Revolu¬ tion and the Empire) ; and Salle, (The Political Life of Marshal Soult5 (1834) ; Dumas, J. B., (Neuf mois de campagne a la suite du marechal Soult5 (Paris 1907).

SOUND. See Acoustics; Vibration.

SOUND, The, or OERESUND, e'ra-

soond, Denmark, the easternmost of the three channels which connect the Kattegat with the Baltic Sea. It separates the Danish island of Zealand from the southern extremity of Sweden. Its length is about 30 miles, and its breadth varies from less than three miles at the northern end, between Elsinore and Hel- singborg, to 16 miles between Copenhagen and Malmo. Its depth varies from four to 20 fathoms. Since the opening of the Kaiser Wilhelm Canal the Sound has lost some of its importance, but is still navigated by numerous vessels Sound duties were formerly levied by Denmark on all ships passing through it, but these were abolished in 1857.

SOUNDINGS, the operation of trying the depth of deep water and the quality of the bot¬ tom, especially by means of a plummet sunk from a ship. In navigation two plummets are used, one called the hand lead, weighing about eight or nine pounds, and the other, the deep- sea lead, weighing from 25 to 30 pounds. (See Lead). The former is used in shallow waters, and the latter at a distance from shore. The nature of the bottom is commonly ascertained by using a piece of tallow stuck upon the base of the deep-sea lead, and thus bringing up sand,

shells, ooze, etc., which adhere to it. The sci¬ entific investigation of the ocean and its bot¬ tom has rendered more perfect sounding appa¬ ratus necessary, and has led to the invention of various contrivances for this purpose. See Ocean.

SOURLAKE, or SOUR LAKE, Texas, city in Hardin County, about 20 miles north¬ west of Beaumont, in an agricultural region and a section rich in oil. For several years Sourlake was a health resort, taking its name from springs which possessed medicinal prop¬ erties. In 1902-03 prospectors began to sink oil test-wTells in the pine forests around the springs, with the result that oil in large quantities was found. So many derricks were erected in rows so closely together, that one portion of the oil¬ field was called the <(Shoestring district.55 Sourlake was at once connected with Beaumont and Port Arthur by pipe lines until such time as its own storage buildings were ready for use. Considerable of the oil is sent direct to refin¬ eries. The first part of the year 1902, Sourlake was a stretch of prairie at the edge of a pine forest; 1903 saw it a village of about 200 in¬ habitants with some visitors to the springs. The census of 1920 gave the population as

3,032.

SOURSOP, the edible fruit of Annona muricata, a small, much-branched, oramental tree, cultivated in the East and West Indies. This

fruit is large, pear-shaped, covered with soft prickles, greenish outside, but containing a white succulent pulp, with an odor suggesting black currants, and a peculiar, but pleasant, sub¬ acid taste.

SOUSA, John Philip, American conductor,

composer and author: b. Washington, D. C., 6 Nov. 1854, son of Antonio and Elizabeth Sousa. At the age of 11 he first appeared in public as violin soloist; at 15 he was teaching harmony; in 1876 he became one of the first violinists in the orchestra conducted by Offen¬ bach when the latter visited America ; later he became conductor for various theatrical and ope¬ ratic companies. In 1880 he was appointed leader of the band of the United States Marine Corps in Washington, serving under Presidents Hayes, Garfield, Arthur, Cleveland and Harrison until 1 Aug. 1892, when he resigned from the United States service to organize the Sousa Band, which has since then made 38 semi-annual tours throughout America, and has visited Eu¬ rope five times, giving a total of more than 10.000 concerts in 1,000 cities, and covering over 700,000 miles of travel. In 1910, beginning in New York on 6 November, he inaugurated a tour of the world, and visited with his band, Europe, Canary Islands, Africa, Tasmania, Australia, New Zealand, Fiji Islands, Hawaiian Islands, British Columbia and toured across the Continent back to New York, returning after 14 months' travel. Since his band was or¬ ganized, he has appeared at the most prominent of the great expositions in this country and in Europe, the last and most important being the Panama-Pacific International Exposition in 1915 in San Francisco. As composer of music he established a <(march style55 of his own which has been recognized the world over, and he has been called the ((March King55 in every country. Some of the best known and most popular of

his productions in this field are (Hail to the Spirit of Liberty/ (Hands Across the Sea/ (The Charlatan/ (The Bride-Elect, > (E1 Capitan/ (King Cotton/ imperial Edward,) (Jack Tar/ (The Diplomat,) (The Free Lance, > (The Fair¬ est .of the Fair/ (The FederalP (From Maine to OregonP (The LambsP (The Pathfinder of Panama, *(The New York HippodromeP etc. He has also written several Suites, including, (Three QuotationsP (Looking UpwardsP /Maidens ThreeP (At the King's CourtP (Last Days of Pompeiip (Dwellers in the Western WorldP (People Who Live in Glass HousesP (Tales of a Traveler/ (The American Maid* and (Impressions at the MoviesP Also, an his¬ torical scene, (Sheridan's

RideP and a sym¬ phonic poem, (The Chariot Race/ He has composed a long list of songs and miscel¬ laneous pieces, and a number of light operas, some of the latter being (The SmugglersP (Desiree/ (The Queen of HeartsP (E1 CapitanP (The Bride-ElectP (The CharlatanP (Chris and the Wonderful LampP (The Free Lance } and (The American MaidP As author, he compiled under the auspices .of the United States government, (National, Patriotic and Typical Airs of all CountriesP wrote the book and lyrics for the opera, (The Bride-ElectP also numerous magazine articles and verses ; and has produced two novels, (The Fifth String) and (Pipetown SandyP With his band he has appeared twice, by command, before King Edward and Queen Alexandra of Eng¬ land, once at Sandringham, and then at Wind¬ sor. On the first occasion he was honored by His Majesty with the decoration of the Victorian Order. He has also received the Grand Diploma of Honor of the Academy of Heinault, Belgium, and has been decorated by the French government with the Palms of Academy, besides making him an Officer of Public Instruction.

SOUSA, so'za, or SOUZA, Martin Al¬ fonso de, Portuguese colonist and governor in South America: b. Braganga, about 1500; d. Lisbon, 21 July 1564. In 1530 Sousa, an army officer, was dispatched in command of a fleet of five sail with a force of 500 to colonize Brazil. The commonly-received statement is that he discovered the bay which is supposed to be the mouth of a river and named Ri.o de Janeiro, 1 Jan. 1531. But there is some doubt as to whether he was in the bay on that date, and there are records of earlier visits by others. On 22 Jan. 1532 he founded at Sao Vicente ihe first Portuguese colony in Brazil. There he introduced the sugarcane, which he had brought from Madreia, and built the first sugarmill in the country. In 1533 he was recalled, and in 1534 made captain of Sao Vicente, whose affairs he continued to administer, though he did not again visit it. He was admiral of the seas of India in 1534-40, and governor of the Portuguese East Indies in 1542-45.

SOUTANE', a close-fitting long coat reach¬ ing to the ankles, which is the distinctive dress of clerics in the Roman Church. See Cassock; Costume, Ecclesiastical.

SOUTH, Sir James, English astronomer: b. London, October 1785; d. there, 19 Oct. 1867. He was educated as a surgeon and gave up a large practice in London to pursue the study of astronomy. In 1816 he fitted up a private ob¬ servatory at his home, and devoted all of his time to astronomical investigation. He was the discoverer with Sir

John Frederick William Herschel of 380 double stars, which were cata¬ logued by them in 1833. • In 1835 he re¬ moved his telescope to France, where he made other important observations. He was knighted for his services in behalf of science in 1830. He was the first president of the Astronomical Society, .of which he was also a founder. Among his important observations were Encke's comet (1828 and 1838); Mauvais' comet (1844), and Vico's (1845).

SOUTH, Robert, English Anglican divine: b. Hackney, 4 Sept. 1634; d. Westminster, 8 July 1716. He was educated at Oxford and after traveling on the Continent took orders in the Church of England in 1658. He was uni¬ versity orator 1660-77, became prebendary of Westminster in 1663, in 1667 was made chap¬ lain to the Duke of York, and in 1670 was appointed canon of Christ Church. In 1676 he accompanied Lawrence Hyde, afterward Earl of Rochester, who went as Ambassador to Poland, and on his return was appointed rector of Islip, Oxfordshire. South's hatred of Roman Catholics was as strong as his contempt for Puritans. He hesitated for some time at the event of the Revolution over the matter of his allegiance but finally adopted the parliamentary fiction that the flight of James was in effect an abdication. In 1693 he entered upon his great controversy with Sherlock, dean of Saint Paul's, occasioned by the latter's (Vindication of the Doctrine of the Trinity) which South answered by his anonymous Animadversions/ full of learning and incisive logic as well as fierce sar¬ casm and petty personalities. To Sherlock's (Defense) South published a rejoinder, (Tri- theism charged upon Dr. Sherlock's new notion of the Trinity } ; and the controversy became the talk and ridicule of the town until the king himself intervened. In 1713 he refused the see of Rochester and the deanery of Westminster. His sermons are masterpieces of clear thought, direct and vigorous in English, sometimes rising to eloquence, often spiced with a wit and sar¬ casm unusual in pulpit utterances, and straining at times the bounds of propriety. His sermons were published by himself in 1679-1715 ; an additional volume in 1717 contained his (Memoirs* and the account of the Polish travels. Modern editions were published in 1823, 1842, 1843, 1845, with the Memoir/ and

1.

SOUTH AFRICA, an ambiguous geo¬ graphical term embracing (a) only British South Africa, or (b) British South Africa plus Portuguese East Africa and that territory formerly known as German South-West Africa. Although the term is generally applied to that part of the continent south of the Zambesi, below the 14th degree of southern longitude, a portion of British South Africa, viz., North- East Rhodesia,

reaches eight degrees further north, to Lake Tanganyika. If we accept that boundary line as the extreme northern limit.

then South Africa would include not only the whole of Portuguese East Africa and a third of German East Africa, but also entire Ger¬ man South-West Africa and three-fourths of Angola. Officially, however, the British terri¬ tory north .of the Zambesi is styled British Central Africa. Leaving out Portuguese possessions, for which see Portugal ; and the former German territories, for which see South-West Africa and East Africa, there remains the subject of this article, British South Africa.

This great territory comprises the Union of South Africa (q.v.), composed by the Cape of Good Hope, Natal, the Transvaal and the Orange Free State, Rhodesia and Northern Rhodesia, the Bechuanaland Protectorate, Swaziland and the native territory of Basuto¬ land. All these will be found under separate heads. Together with Waffish Bay (430 square miles), the area of British South Africa is 1,205,357 square miles, with a population at the last census of 8,102,861, being approxi¬ mately 1,310,027 whites, 6,610,535 natives and 182,299 Asiatics. Geographically it lies be¬ tween 8° and 35° south, and 12° and 36° east. The Belgian Kongo and former German East Africa bound it on the north, the Nyasaland Protectorate and Portuguese East Africa on the east, Angola (Portuguese) and German South-West Africa, now called the South-West Africa Protectorate, on the west. The ex¬ treme length, from the Kongo border to Cape Agulhas, is close on 2,000 miles; greatest breadth, 900 miles. Only Cape Colony and Natal border on the coast, washed in the west by the Atlantic Ocean, and in the south and east by the Indian Ocean. The toal coastline of Cape Colony, from the Orange to the Umzimkulu estuaries, is roughly 1,300 miles ; that of Natal, about 380 miles. Prominent headlands along the coast are Cape Castle, Cape of Good Hope, Danger Point, Cape Agulhas, Cape Saint Francis and Cape Recife, enclosing a number of inlets or exposed road¬ steads — Table Bay, Saint Helena Bay, False Bay, Plettenbergs Bay, Mossel Bay, Saldanha Bay and Algoa Bay. For the most part the coastline is low-lying and inhospitable; the harbors are mostly unprotected and the river- mouths are choked by sand-bars. Behind the seaboard rise ramparts of hills shutting off the interior. In places the mountains, which run parallel to the coast, run down close to the sea, as at Table Bay (3,582 feet high). The highest points are in the southeast, on the

Drakensberg, which in places rises to a height of 10,600 feet. The various ranges almost form a succession of steps leading to the great table-land of the interior. The Transvaal is practically a large plateau from 4,000 to 6,000 feet above sea-level. The High Veld, the high¬ est part of the Transvaal Province has con¬ sequently a healthy and bracing climate. A large part of the interior plateau, of which the northern part includes Rhodesia and Nyasa¬ land, is flat or only diversified by worn remnants of hills. The great Kalahari Desert and other extensive areas are largely or wholly semi-desert or ˆKarroo,® while the most fertile regions lie on the southern and eastern coast-lands. With little interruption a similar ter¬ raced formation extends throughout the south¬

eastern region between Kafirland and the Limpopo. The Lobombo Mountains, a single chain of about 3,000 feet, traverse Zululand, Swaziland and the Transvaal, while the inner and higher escarpments, sweeping round the extremity of the continent from the Orange estuary to the Limpopo, are here continued beyond the Stormberg as the Randberg or Drakenberg range, and reach an altitude up to 10,000 feet. On the outer slope, falling sea¬ ward through a series .of terraces, lie Natal and Zululand. The nucleus of these highlands is formed by the Antelope or Potong Moun¬ tain at the converging point of Basutoland, Natal and the Orange River Free State, and constitutes the main divide between the waters flowing west to the Orange Basin and east to the Indian Ocean. From here the Draken- berg turns northward and culminates in the highest point of the Transvaal, the Mauch- berg, 8,730 feet high. The surface of the Orange Free State is mostly level or gently undulating, with some ridges of hills and numerous isolated, generally flat-topped, emin¬ ences called ˆkopjes,® rarely more than 500 to 700 feet high, though the whole plateau is from 4,000 to 5,000 feet above sea-level. Im¬ mediately north of the Transvaal lies South¬ ern Rhodesia, separated by the Limpopo River, and extending northward to the Zambesi. An elevated region runs through this territory from the source of the Shashi on the west, in a northeasterly direction to the source of the Manyami River, and thence southeastward to the sources of the Pungwe and Odyi. The watershed between the Zambesi and Limpopo drainage areas runs along this elevated back¬ bone in the central and western portions, and between the Zambesi and Sabi farther east. The most famous landmarks of Rhodesia are the great Victoria Falls and the Matoppo Hills, where the founder of the country, Cecil Rhodes, is buried.

The drainage of South Africa is effected by the Orange River flowing into the Atlantic, the Zambesi, Limpopo and .other streams into the Indian Ocean, as well as numerous small streams. Owing to the steep

fall, and the intermittent supply of rain, only the Zambesi is at all available for navigation. That river, which forms a great delta on the coast of Portuguese East Africa, divides Southern Rhodesia from British Central Africa. It is navigable by steamers of light draught from its mouth for 300 miles to the Kebra Basa rapids above Tete; a steamer placed on the river above those rapids has reached the mouth of the Gwai, 600 miles farther and from this point onwards a succession of rapids and two large waterfalls make the river unnavigable for any long distance without a break. The drainage basin of the Orange River is the whole country south of the Witwatersrand enclosed by the escarpment, excepting a small area in Calvinia and Namaqualand. The main stream of that river, which is swelled by many tributaries, rises in the Basuto highlands, and on the coast side of the range countless rivers and torrents struggle through the mountain defiles during the rainy season. But during the greater part of the year when there is no rain many of these rivers are only dry beds. The Vaal River, like the Orange, is not

navigable, but has a more varied course, traversing the hilly country made of pre- Karroo rocks around Parys and Venterskroon, and for a distance of over 230 miles it occupies, together with its affluent the Hart's River and the Orange River, the course of an ancient pre-Karroo valley (Kaap), from Vryburg to Prieska. The Limpopo receives the drainage of the northern and middle Transvaal either by gorges cut back through the escarpment or, higher up its course, by the Magalakwin, Crocodile and other rivers which flow north¬ ward, describing a semi-circle of nearly 1,000 miles between its source below Pretoria and its mouth above Delagoa Bay.

Climate. — The plateau configuration of the country has the effect of maintaining the climate of South Africa with remarkable uni¬ formity. Thus, Salisbury, in Rhodesia, though Within the tropics and 16° nearer the equator, has a mean annual temperature only 2° higher than Cape Town, while the Mossel Bay has practically the same annual temperature as Pretoria and Pietersburg, respectively some 8ˆ2° and 10ˆ4° farther north. The mean range between Cape Town and Salisbury is 62.6° and 64.6° Fahrenheit. The mean daily range in¬ creases from the coast inwards, averaging slightly over 12° F. at the south coast stations and increasing to over 30° F. in Basutoland and parts of the High Veld, where, however, it is mostly between 26° and 28°. The seasons are the reverse of those in the northern hemi¬

sphere, the three warmest months, December- February; the maximum or day temperatures are highest (82.2° F.) in January, and decrease to the lowest (66.3° F.) in June, after which they rise again. The minimum or night tem¬ perature curve falls from its highest value (59.1°F.) in February to its lowest point (39.4° F.) in July. The rainfall varies

enormously, ranging from over 200 inches in the mountainous district of the southwest of the Cape Province to 2.5 inches at Port Nol- loth, and 0.3 at Walfish Bay. In the east of the province the normal annual rainfall is about 62 inches.

Aborigines. — The native races are (1) the yellow-skinned Bushmen and Hottentots, and (2) the various branches of the dark-skinned Bantu. Up to the end of the 18th century the two former races constituted the ˆnative® pop¬ ulation, but these are now practically extinct, as separate races, while the Hottentot stock has contributed largely to the population of mixed European and African blood known officially as ((colored persons.® The Bantus, after more than a century of wars, have been brought with varying completeness under the control of European officials, and having bene¬ fited physically by a modified European system of government, now show a rate of increase slightly higher than that of the European popu¬ lation.

White Peoples. — The original stock of the Boer or Dutch Afrikander people contained a considerable mixture of French blood. The foundation of the predominant white popula¬ tion was laid almost exclusively between 1652 and 1690. The 1687 census showed 573 Euro¬ peans, exclusive of the officials and servants of the Dutch East India Company. Immigration records show that the main elements of this

parent stock were: (1) the discharged soldiers, sailors and other servants of the company who formed the original settlement in 1657; (2) parties of young women from the public or¬ phanages of Holland, sent out by the company in 1685; (3) a community of Huguenot ref¬ ugees ; and (4) a number of Dutch families. The company took drastic measures from the first to prevent the Huguenots from establish¬ ing a separate nationality, and by the middle of the 18th century the French language was forgotten and the refugees incorporated into the Dutch majority, speaking the broken Dutch patois known as the Taal. With the advent of British rule in 1806 arrived an influx of British officials, soldiers, merchants and missionaries, followed, in 1820, by some 5,000 British immigrants. During the next 50 years many thousands more were poured into the country, and English became the

current language over wide areas. Over 2,000 men of the Anglo-German Legion were settled in British Kaffraria; other emigrants came also from central and eastern Europe, and Italy. After the close of the South African War (q.v.) some 2,000 British agricultural settlers were established side by side with the Boer farmers, and employment was found for 3,500 young women, mainly domestic servants, sent from Great Britain by the joint efforts of the government and private organizations.

Religion. — The Dutch Reformed Church and the Third Afrikanshe Gereformeerde Kirk have the largest European membership (700,000 in 1911), the Church of England coming sec¬ ond with some 260,000. Next in strength are the Wesleyans, Presbyterians, Baptists, Congregationalists, Roman Catholics, Lutherans and Jews.

Bibliography. — Barkly, Mrs., (Among Boers and Basutos *(London 1900) ; Bleloch, (The New South Africa } (London 1901) ; Brand, Hon. R. H., (The Union of South Africa) (Oxford 1909) ; Brown, A. S., (Guide to South Africa* (London, annual) ; Bryce, J. (Vis¬ count), Hmpressions of South Africa *(Lon¬ don 1899) ; Bryden, H. A., (The Victorian Era in South Africa* (London 1897) ; Buchan, A., (Rainfall of South Africa *(Cape Town 1897) ; Colquhoun, A., (The Afrikander Land) (Lon¬ don 1906) ; Colvin, I. D., (Romance of South Africa) (Cape Town 1909) ; Cory, G. E., (The Rise of South Africa* (London 1913) ; Ellen- berger, D. F., (History of the Basuto) (Lon¬ don 1912) ; Evans, M. S., (Black and White in South Africa) (London 1911) ; Fyfe, H. H., (South Africa To-Day *(London 1911) ; Gib¬ son, J. V., (London 1903) ; Hertslet, Sir E., (The Map of Africa by Treaty) (London 1897) ; Hutchinson, G. T., (From the Cape to the Zambesi* (London 1905) ; Johnson, J. P., (The Ore Deposits of South Africa) (London 1909) ; Johnston. Sir H. H., <A History of the Colonization of Africa by Alien Races) (London 1899) ; Keane, A. H., (Africa* (Vol. II, South Africa, London 1901) ; Keltie, J. S., (The Partition of Africa) (London 1895) ; Kidd, D., (The Essential Kaf-

fir5 (London 1904) ; Knight, E. F., (South Africa after the War5 (London 1903) ; Knox, A., (The Climate of the Continent of Africa> (Cambridge 1911) ; Lloyd, E., (Three African Chiefs5 (London 1895) ; Lucas, Sir C., his¬ torical Geography of the British Colonies> (Vol. IV, Oxford 1915); MacNab, F., (On Veldt and Farm) (London 1900) ; Markham, Violet, (The South African Scene) (London 1913) ; Mill, H.

R., (The International Geog¬ raphy5 (London 1907) ; Native Races Commit¬ tee, (The South African Natives) (London 1908) ; Ortroz, F. Van, Conventions Interna¬ tionales concernant l'Afrique5 (Brussels 1898) ; (Oxford Survey of the British Empire) (Vol. Ill, Oxford 1914) ; Passarge, S., hie Kalahari (Berlin 1904) ; Pratt, A., (Cape Town 1906) ; Stott, C. H., (Geol¬ ogy of South Africa5 (Cape Town 1909) ; Stow, G. W., 'The Native Races of South Africa) (London 1905) ; Theal, Dr. G. Me., history of South Africa5 (London 1888 —) ; also 'The Yellow and Dark-skinned People of Africa South of the Zambesi5 (London 1910) ; Tilby, A. W., Couth Africa5 (London 1914) ; Whiteside, J., (A New Geography of South Africa5 (Cape Town) ; Williams, G. F., 'The Diamond Mines of South Africa5 (London 1903); Worsfold, W. B., Couth Africa: A Study5 (London 1895) ; also (The Union of South Africa5 (London 1913) ; Wright, H. S., 'Thirty Years in South Africa5 (London 1900) ; Younghusband, F., Couth Africa of To-Day5 (London 1899) : 'British Africa5 (Empire Series, by numerous authors and offi¬ cials, London 1901).

SOUTH AFRICA COMPANY, British.

See British South Africa Company.

SOUTH AFRICAN REPUBLIC. See

Transvaal.

SOUTH AFRICAN WAR, a conflict (1899- 1902) between Great Britain and the South African Republic (Transvaal) and the Orange Free State. A considerable body of the Dutch population of South Africa has never been reconciled to the rule of the British, and rea¬ sonable grounds for discontent have not been wanting. (See Boers). The settlement agreed to by Gladstone's government in 1881 after Majuba Hill (q.v.) — followed in a modified form by that of 1884 — was generally looked upon by the Boers of the Transvaal as a triumph for them. (<Majuba day55 was annually celebrated as commemorating a great event in their history, and this tended to keep alive a spirit of hostility to Great Britain, and perhaps

to foster thoughts of a greater triumph that might be attained in the future. The wars with the natives, continued even after 1884, had made the Boers on the whole a military people, and about 1893 President Kruger (q.v.) began to increase the Transvaal armaments, seeing that nothing but force could ultimately keep the Uitlanders — the non-Boer settlers in the Trans¬ vaal, especially in Johannesburg (q.v.) — from gaining political rights, and that force would also be

necessary to enable him to get rid en¬ tirely of British suzerainty, and to secure, what he had long desired, free access to the coast. The Jameson Raid (see Jameson, Sir Leander Starr), an ill-advised attempt made at the close of 1895 by a handful of British subjects, who invaded the Transvaal with a view to gaining some advantage for the Uitlanders — furnished ground for increasing the warlike equipments of the country, and the gold mines of the Rand (see Witwatersrand) supplied the funds which were spent on rifles, artillery, ammuni¬ tion, etc., all of the newest and best types. These funds had to be provided in great part by the Uitlanders, who, though they bore the bulk of the taxation, and owned a great share of the property in the Transvaal, were excluded from any share in the government, and were treated in a harsh and domineering spirit. Early in 1899 a numerously signed petition from British residents in the Transvaal was forwarded by Sir Alfred (now Lord) Milner (q.v.), the high commissioner, to the home gov¬ ernment, setting forth the grievances of the petitioners, and declaring their position to have become “intolerable.55 It was then arranged, on the invitation of President Steyn (q.v.) of the Orange Free State, that matters should be dis¬ cussed between the high commissioner and President Kruger at the Free State capital, Bloemfontein. The parties held meetings from 31 May to 5 June, but no agreement was reached. President Kruger now submitted to the Transvaal Volksraad a franchise scheme of his own, professedly meeting all legitimate or reasonable claims of the Uitlanders. To this many of his friends gave their approval, though Sir A. Milner thought it came far short of what was required. Then followed more negotiations, which sometimes seemed to give hope of a satisfactory result; but, apart from the franchise question, the claim of the South African Republic to the status of a perfectly independent state still barred the way to a settlement. Meantime the war spirit was ris¬ ing in the Transvaal. On 8 September the British Cabinet decided to raise the garrison in South Africa to a strength sufficient to protect the colonies. On 9 October the South African Republic presented an ultimatum, delivered to the British agent in the Transvaal, for answer within 48 hours, demanded that all matters in dispute should be settled by arbitration or in some other way to be agreed on ; that all troops on the borders of the republic should be in¬ stantly withdrawn; that reinforcements which had arrived in South Africa since 1 June should be removed from South Africa within a rea¬ sonable time; and that the troops then on their way to South Africa should not be landed. War at once followed, the Orange Free State, by a previous arrangement, joining the neigh¬ boring republic.

SOUTH AFRICAN WAR

The war was actually begun by the Boers invading Natal and Cape Colony, Lady¬ smith in the former and Kimberley and Mafe- king in the latter being the places in which the greatest interest was almost immediately cen¬ tred. At the beginning of the struggle the British regular troops in South Africa did not greatly exceed 22,000 in number, about half of them being in Natal under the command of Sir George White, who had his headquarters at Ladysmith. On 20 October the Boers who had invaded northern Natal endeavored to cut off the British camp near Dundee, where General Symons was stationed with about 5,000 men. They were repulsed at Talana Hill, but the British general was mortally wounded; and the following day they were more severely de¬ feated at Eiandslaagte by General Franch's force from Ladysmith. It was necessary, how¬ ever, to withdraw the northern garrison to Ladysmith, and this was done — after the Boers had been beaten off by General White at Riet- fontein. The Boers were now in such force that (with General Joubert as commander-in- chief) Ladysmith was soon completely invested, the railway from the south being seized, as well as the bridge over the Tugela at Colenso. Sev¬ eral naval guns had been brought into Ladysmith before this, which enabled its defenders to reply to the powerful artillery which the Boers had planted on the neighboring heights. Swarm¬ ing down into Natal the invaders overran the country as far as the Mooi River and beyond, and it appeared that they might even attack Maritzburg; but the first army corps of 54,000 men reached South Africa in November, and Gen. Sir Redvers Buller, who had arrived to take supreme command, took under his charge a large portion of this force, and so was able to drive the Boers back and prepare for the relief of Ladysmith. Other divisions of the reinforcements were dispatched inland from Cape Town, Port Elizabeth and East London to aid in checking the Boer advance into Cape Colony, and to open the way to Kimberley. The force which undertook the latter task was under the command of Lord Methuen, while General Gatacre was to operate against the Boers in the Stormberg district of the Cape Colony, French being in command of a British force between the two. Advancing northward, Methuen assumed the offensive, drove the Boers from a strong position at Belmont, de¬ feated them two days after at Enslin, and on 28 November dislodged them from a strong position at the Modder River, which was crossed without opposition. Then followed a series of reverses to the British troops, which cast a gloom over the whole empire.

On 10 December Gatacre attempted a night attack on a body of Boers strongly posted near Stormberg, but after a toilsome night march his

men unexpectedly came upon the enemy's posi¬ tion, which they were unable to capture, and were driven back with heavy loss. On the same day General Methuen had shelled the Boers previously to attacking their position at Magersfontein, where, as at many places after¬ ward, the Boer general De la Rey (q.v.) dis¬ tinguished himself. Early next morning, while marching to the attack in quarter column, and on the point of deploying, tne Highland brigade unexpectedly found itself exposed to a close fire from the Boer trenches and lost very

heavily, the commanding officer, General Wau- chope, being killed. The third and most seri¬ ous reverse took place in Natal. On 15 Decem¬ ber General Buller attempted, by what has been generally regarded as an ill-judged plan, to force his way across the Tugela at Colenso, with the view of relieving Ladysmith. This great mistake consisted in attacking two days earlier than arranged for with White, who re¬ mained inactive in Ladysmith without knowing what was going on outside. It has not been ex¬ plained why Buller did not advise White of the change in his plans. Notwithstanding a display of admirable courage on the side of the British, and certain partial successes, the plan as a Whole entirely failed, the failure being aggravated by casualties in killed, wounded and missing amounting to over 1,100, while 10 superior guns were abandoned to the Boers. The only son of Lord Roberts (q.v.) fell at Colenso.

On receiving the news of General Buller's repulse, the Cabinet decided to send out imme¬ diately the seventh army division already being mobilized, to call up the remainder of the army reserve, to incorporate a new yeomanry force, to allow 12 battalions of militia to volunteer for service abroad, to employ volunteers on active service, and to accept offers of help made by the great colonies. Lord Roberts was in¬ structed to proceed to South Africa as com¬ mander-in-chief, with Lord Kitchener as chief of his staff ; and Col. Hector Macdonald was appointed to succeed General Wauchope in command of the Highland brigade.

When the year 1900 opened, the troops hemmed in at Ladysmith, Kimberley and Mafe- king were holding their own, but at the first place enteric fever had begun to make serious ravages, and to cause much anxiety. In the Cape Colony Methuen was confronted by Gen¬ eral Cronje in a strongly intrenched position; and Gatacre, after falling back from Stormberg, was holding Sterkstroom. French in the Coles- berg district was more actively employed, and succeeded in defeating the Boers in several im¬ portant actions. Lord Roberts and his staff arrived at Cape Town on 10 January, but before anything could be

done by the new commander- in-chief, Buller made another attempt against the Boer position at Colenso (11 January). With this unsuccessful movement is associated the name of Spion Kop, an eminence in the scene of action the seizure and temporary oc¬ cupation of which cost many British lives to no purpose. Yet a third attempt was made to break through to Ladysmith (5 February), Vaal Krantz being a position which figured most prominently on this occasion ; but again the result was only disappointment, to the be¬ sieged force more especially. Meanwhile Roberts had been making plans for more ef¬ fectively dealing with the enemy, and had col¬ lected a strong cavalry force under French between the Orange River and the Modder. While the attention of the Boers under Cronje was drawn off by a movement carried out by Macdonald and the Highland brigade, French advanced rapidly on Kimberley and, in spite of all opposition, reached the place, dispersed the investing troops, and entered the town (16 February)- Cronje at Magersfontein had now allowed himself to get into a difficult position, not fully realizing tbe strength and intentions of the British, and though he tried to escape

eastward toward Bloemfontein, it was too late. He was brought to a halt at Paardeberg, took refuge in the bed of the Modder, where he managed to hold out for a week, but being completely hemmed in, and an attempt at his rescue by General De Wet being defeated, he surrendered to Roberts with over 4,000 men. This was on 27 February, the anniversary of Majuba Hill. Cronje and the rest of the prisoners were sent to Saint Helena. Mean¬ while fresh efforts were being made by Buller for the relief of Ladysmith, and this time with success. After a series of difficult operations, the Boer left was finally turned, and on 28 February Lord Dundonald rode into Ladysmith, being followed by Buller two days later. The garrison was found to be in sore straits for want of food, and had suffered severely from disease as well as from the attacks by which they had been harassed. One of the fiercest of these had been made on 6 January, when the Boers had endeavored to take the town by storm, but were repulsed with heavy loss. On this occasion a position known as Wagon .Hill had been three times captured and recaptured in the course of the day, Gen. Ian Hamilton (q.v.) here greatly distinguishing himself. It has been said that ((the successful defense of Ladysmith was from a military point of view the most valuable achievement of the war, inas¬ much as the loss of a garrison of 12,000 men would have been a graver disaster than any conceivable defeat in the open field ; and, more¬ over, the

fall of Ladysmith was to be the signal for the general rising of the Dutch in the Cape Colony and Natal.® Following on the successes in the west of the Orange Free State came successful operations by the generals in the northern parts of Cape Colony — Gatacre, Clements and Brabant. Bloemfontein now be¬ came Roberts' objective, and after Toubert had vainly attempted to bar his way at Poplar Grove, and again at Driefontein, the British commander entered the capital of the Orange Free State practically without opposition (13 March). Kruger and Steyn fled to the north. The keys of the town were surrendered to Lord Roberts, and the railways being soon re¬ paired, through communication was opened be¬ tween Bloemfontein and Cape Town. The Orange Free State was proclaimed British ter¬ ritory.

There was a long halt at Bloemfontein, and during this period enteric fever proved a ter¬ rible scourge to the British, and the Boers were encouraged to fresh activity. Several mishaps now befell different bodies of British troops, and De Wet proved himself a leader of excep¬ tional ability on the Boer side, while Louis Botha (q.v.) also gained distinction for himself, having succeeded to the chief command on the death of Joubert (27 March). The advance northward from Bloemfontein began on 3 May. The British forces under Gens. Ian Hamilton, French and Pole Carew, with Lord Roberts at their head, often showed a front of 40 miles, and though the enemy repeatedly seemed to threaten a determined stand, no effective re¬ sistance was encountered, either on the Vaal or elsewhere. One after another the Boer posi¬ tions were turned; Botha's troops fled in con¬ fusion from Johannesburg, where the British flag was hoisted on 31 May, and Pretoria, the Transvaal capital, was occupied on 5 June, no

attempt being made by the Boers to hold the forts. General Botha and a considerable body of men retired eastward along the railway in the direction of Komati Poort, near the Portu¬ guese frontier, in which direction President Kruger, Mr. Reitz and other members of the Transvaal government had preceded him. The Boers were followed and beaten at Pienaar's Poort, about 15 miles from Pretoria. Mean¬ while Buller had been advancing northward through Natal, and had entered the Transvaal from that side, driving the Boers before him. On 15 May Dundee and Glencoe were retaken, on the 17th Newcastle, and by the end of the month he was encamped within striking dis¬ tance of Majuba and Laing's Nek, which were strongly held by the enemy. But by a skilful turning movement General Hildyard secured command of the Boer positions, which were at once evacuated. Buller's force had marched 50 miles in six days, and had defeated the Boers in four engagements. His troops were thus put in a position to co-operate with the main army under Lord Roberts, and early in July

the rail¬ way to Pretoria from Durban was open. The number of British troops in South Africa by the middle of the year was about 250,000.

Shortly after the middle of May (1900) news reached England that the Boers had been driven from Mafeking, and that the town had been entered by a British force from the south. The place had been invested from 15 October, when Cronje with a force of some 9,000 men had marched to the attack. It was well sup¬ plied with stores, and this, together with the indomitable energy and fertility of resource shown by Major-General Baden-Powell, who commanded the small garrison, enabled it to hold out against all attempts to capture it. A last attempt to take it had been made on 13 May by Commandant Eloff, a grandson of President Kruger. This not only failed, but the leader and a number of his men were themselves taken prisoners.

In the end of July an important success was gained in the Orange Free State (now called Orange River Colony) by General Hunter, with the aid of Generals Rundle, Clement, Bruce- Hamiliton, Paget and Macdonald. As the result of a combined movement, a force of some 4,000 Boers under Prinsloo was surrounded by the British troops and forced to surrender with guns, horses and wagons, the burghers being sent as prisoners to Ceylon. De Wet, with 2,000 men, escaped, as on various subsequent occasions.

Advancing eastward from the Pretoria dis¬ trict Roberts joined hands with Buller, and from his headquarters at Belfast issued a proc¬ lamation annexing the Transvaal to the British dominions (1 September). Previous to this Buller had forced the Boers from a strong position they had taken up near Machadodorp, and had thus effected the release of a large number of prisoners whom they had taken with them from Pretoria.

On 11 September President Kruger took refuge in Portuguese territory, and many of his compatriots followed his example, or scattered in different directions, having previously de¬ stroyed many of their guns, with vast quantities of ammunition and stores. Lord Roberts re¬ ported that there was nothing left of the Boer armies but a few marauding bands, but this

view of the case proved premature. On 6 October Buller left the army

for England ; on the 20th President Kruger sailed for Europe on board a Dutch man-of-war. Lord Roberts left for home before the end of the year, hand¬ ing over the chief command to Lord Kitchener.

The war had now entered upon what might be called the guerrilla stage, during which the activity and daring of such leaders on the Boer side as Botha and De Wet gave plenty of hard work to the British troops. Looking with com fidence for support from their kinsmen in the Cape Colony and Natal, and still hoping for the intervention of some European power, the Boer leaders planned two enterprises which they thought might yet retrieve their cause. Botha, with some 6,000 men, was to make a sudden dash into Natal and raid the country, if pos¬ sible, all the way down to Durban, while De Wet was to execute a similar movement in the direction of Cape Town. These attempts were made in the early part of 1901. Botha's plan was completely frustrated by a great sweeping movement of General French; the Boers were dispersed with the loss of guns, wagons and immense numbers of cattle and sheep. De Wet fared no better but, like Botha, he himself es¬ caped capture, though losing guns, ammunition and wagons. Marauding bands that had be¬ longed to his force managed, however, to enter the Cape Colony, and for a time gave much trouble, aided and encouraged as they were by their Dutch friends. To checkmate the Boer system of warfare Kitchener resolved to clear the country of food and cattle so as to deprive the Boers of supplies, to protect the railways by chains of blockhouses, to carry similar chains across the country in suitable directions, and to keep the Boers perpetually on the move by mobile columns of British troops. Kitchener's measures, which were found exceedingly effect¬ ive in the long run, included the gathering to¬ gether of great multitudes of Boer women and children into the so-called concentration camps, a measure widely discussed and much con¬ demned in the press of neutral countries.

A discussion regarding terms of peace took place between Lord Kitchener and General Botha on 28 March 1901, but nothing came of it; the gradual wearing down of the Boers went on, and by the end of May they had lost prac¬ tically all their artillery (apart from guns buried in the earth). On 12 July the Free State government and some important papers were captured at Reitz, and President Steyn himself made a narrow escape. On 7 August Kitchener issued a proclamation calling for the surrender of the Boers by 15 September, on pain of the perpetual banishment of the leaders, and of the property of the others being charged with the cost of maintenance of their families in British hands. The Transvaal and Free State leaders had been discussing the advisa¬ bility of giving in, but President Kruger, from Europe, urged

them to continue fighting until their independence was secured. Renewed ac¬ tivity on the part of Botha, De Wet and other Boer leaders followed, and the British met with one or two rather serious mishaps. By the end of the year 1901 there had been put out of action some 53,000 Boers, of whom 40,000 were in concentration camps or were kept in custody in Saint Helena, Ceylon, India, Bermuda or elsewhere. After some great “drives® organ¬

ized by Kitchener and carried out in the early part of 1902, which resulted in the surrender of many burghers, and which owed their suc¬ cess largely to the blockhouse system, nego¬ tiations for peace were at last entered on (23 March), though military operations were not suspended. The Boer leaders were granted facilities for meeting and discussing matters among themselves and with the different com¬ mandoes, and after this had gone on for some time, on 15 May a conference of Boer repre¬ sentatives met at Vereeniging to consider terms of surrender. Among those present were Botha, Beyers, Smuts, De Wet and Delarsy. It was not until the last day of the month, however, that peace was absolutely secured, the surrender being signed at Pretoria by Lords Kitchener and Milner and the chief civil and military represen¬ tatives of the Boers, and the war thus brought to an end. After over two-and-a-half years’ war the whole of South Africa, from Cape Town to the Zambesi, had been added to the British Empire. The main points agreed upon were : that the Boer forces would immediately lay down their arms and hand over all guns, rifles and munitions of war; that burghers in the field outside the Transvaal and Orange River Colony, and all prisoners of war outside South Africa, on declaring their acceptance of the position of subjects of Edward VII, should be brought back to their homes as soon as transport could be provided and their means of subsistence secured ; that no proceedings civil or criminal should be taken against burghers so surrendering or returning, for acts done in con¬ nection with the war, unless as regards acts contrary to the usages of war; the Dutch lan¬ guage to be taught in public schools where parents desire it, and to be allowed in courts of law; the possession of rifles to be allowed to persons requiring them for protection, on taking out a license; military administration to be succeeded as soon as possible by civil ad¬ ministration, and ultimately representative in¬ stitutions and self-government; a sum equal to $15,000,000 to be granted for the purpose of assisting in the restoration of the people to their homes, besides advances on loan free of interest for two years. These terms were practically the same as those rejected by Botha 13 months earlier.

In this struggle there had been engaged on the British side at one time

or another, or sent to the seat of war as reinforcements, from the outbreak of war until the conclusion of peace, 448,435 men of all arms, including 228,171 regu¬ lars, 45,566 militia, 35,520 yeomanry, 19,856 volunteers, 7,273 South African constabulary, 18,229 regular troops from India, 29,000 colonial contingents, 52,414 raised in South Africa. Of these 518 officers and 5,255 men were killed, 1,851 officers and 20,978 men were wounded, 554 officers and 15,617 men died of wounds or dis¬ ease. How many men the Boers had in the field from first to last, including the rebels be¬ longing to Cape Colony and Natal, will probably never be known. The number has been esti¬ mated by competent authorities at 60,000 to 65,000. The Boer casualties have never been definitely ascertained.

Bibliography. — ‘History of the War in South Africa, 1899-1902) (Government publi¬ cation, 2 vols., London 1907) ; (The War in South Africa,* by the Great General Staff, Ber-

lin (Eng. trans., London 1905) ; Amery, L. S., The Times , (History of the War in South Africa) (7 vols., London 1909) ; Botha, P. M., (From Boer to Boer and Englishman5 (Lon¬ don 1900) ; Cappon, J., (Britain’s Title in South Africa) (London 1902) ; Cloete, H., ‘History of the Great Boer Trek and the Origin of the South African Republics) (London 1899) ; Colquhoun, A., (The Afrikander Land) (Lon¬ don 1906) ; Creswicke, L., (South Africa and the Transvaal War5 (7 vols., London 1900-02) ; Cunliffe, F. H. E., ‘History of the Boer War5 (London 1904) ; De Wet, Gen. C., (Three Years’ War5 (London 1902) ; Doyle, Sir A. Conan, (History of the Great Boer War5 (Lon¬ don 1902) ; Fitz Patrick, Sir P., (The Trans¬ vaal from Within1* (London 1899) ; James, Capt. L., (On the Heels of De Wet5 (London 1902) ; Kruger, President, ‘Memoirs of Paul Kruger5 (autobiography; 2 vols., London 1902) ; Leyds, Dr. W. J., (The First Annex¬ ation of the Transvaal5 (London 1906) and ‘The Transvaal Surrender5 (London 1914) ; Mahan, Admiral A. T., (The Story of the War in South Africa5 (New York 1900) ; Nevinson, H. W., (The Diary of a Siege: Ladysmith5 (London 1900) ; Phillips, Sir L., (Transvaal Problems5 (London 1906) ; Viljoen, Gen. B., (My Reminiscences of the Anglo-Boer War5 (London 1902).

SOUTH AMBOY, N. J., borough in Middlesex County, at the mouth of Raritan River and the head of Raritan Bay, and on the Pennsylvania, the Central of New Jersey and the Raritan River railroads, 20 miles

south of Newark. It was founded in 1835 and became a borough in 1888. It is important as a ship¬ ping point for coal, and haˆ terra-cotta works, clay and sand pits and asphalt works. The most notable public building is the borough hall ; and there are two public schools and a Roman Catholic parish school. The govern¬ ment is vested in a mayor and a council of six ; two members of which are elected each vear for a term of three years. Pop. (1920)

7,897.

SOUTH AMERICA, a continent the esti¬ mated area of which is, in round numbers, 7,300,000 square miles with an estimated popu¬ lation of 57,000,000 in 1919. It is joined to Cen¬ tral America by the Isthmus of Darien, the boundary-line between Colombia and the Re¬ public of Panama being taken as its limit on the northwest. The westernmost point on its Pacific Coast is directly south of the peninsula of Florida; both the extreme northerly point, projecting into the Caribbean Sea, and, at the extreme south, the archipelago of Tierra del Fuego, adjoin long. 70° W., which is also the longitude of Cape Cod, Massachusetts. Thus, its Pacific Coast and one-half of its Caribbean Coast lie due south of the Atlantic Coast of the United States. Moreover, only a relatively small part of the great equatorial land-mass between lat. 10° N. and lat. 25° S. is west of longitude 70°. The Atlantic coasts form an enormous angle reaching so far toward the east that sailing distances between Pernambuco and some of the European ports are practically equal to the sailing distance between New York and the same Brazilian city. In reality, then, South America, from the point of view of

inhabitants of the United States, is Southeast¬ ern America.

For the varied purposes of social intercourse and commerce, therefore, its eastern coasts be¬ low the equator are as readily reached from Europe as from the great centres of population in the United States; and before the Great War this virtual equality in geographic situation was converted into marked advantage for Euro¬ peans by the superior facilities for transporta¬ tion and direct intercommunication between Europe and the especially important South American Atlantic ports, to say the least, — an advantage which was accentuated, so far as it concerned the nations of southwestern Europe, by ancient association, force of habit and essen¬ tial community of tradition and language. The results were that a large part of the south¬ eastern continent, while developing distinctively New World characteristics in many ways, still constantly received formative ideals and man¬ ners, culture and its fashions, from West-Euro- pean sources, and of course

bestowed its trade in the same quarter. For studies of other causes which tended to produce similar effects, and for an account of changes wrought during the World War, see Latin America.

Since the war ended, phases of readjustment to changed conditions in foreign relations, or of new developments in time-honored Ameri¬ can connections, have naturally been most in evidence; and of such phases there are three which deserve special mention : First, a move¬ ment the aim of which is to promote the peace and progress of the Western Hemisphere and to confirm Pan-American solidarity (compare Special Memorandum: American Questions and the Monroe Doctrine, issued by the Pan-Ameri¬ can Union, Washington, April 1919) ; second, the admirable quality of the views expressed, and confirmed by resolution, in the First Ameri¬ can Congress of Economic and Commercial Ex¬ pansion, which was held at Montevideo, official representatives from all South American repub¬ lics being in attendance, and which advocated the establishment of colleges or departments of economic expansion in colleges and schools, to the end that (<the study and practical solution of economic problems may be intensified in the effort to cement Pan-Ainerica commercial friendship55 ; third, the actual state of foreign trade as between the United States and South America, an estimate by the National City Bank of New York showing, for the fiscal year 1919, imports from South America gaining about 150 per cent, compared with those of 1914; exports to South America about 225 per cent ; the total trade of the United States with South America, including both imports and exports, which amounted only to $345,000,000 in 1914, being estimated by the same authority at $1,000,000,- 000 in 1919.

The South American republics are Argen¬ tina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. Dependencies of European countries on the mainland are the three Guianas — British, Dutch and French. The Falkland Islands, which are included in the foregoing estimates of area and population, are British. For information in regard to each of the South American coun¬ tries — its area, topography, mineral resources, agriculture, manufactures, weights and meas-

TE < iU.CLG

1 CARIBBEAN

c« < > * W

< ˆN l &

<• <hr

.f SEA O87-,!

C? '&'■ r .* (Br.)

LVA&ESSE**

Margarita I.

.a Guaira cs C*.

a -Jot

- ○ a. , O (B

Ca,,e**‘CZJ < riˆiToil",Q‘ I-c5ˆu~ˆ = ,vTn’ i V.-Al < n.i!AcS # ,Wncelonarˆ ’ ˆfcrS.®iJ»Wrl 0

~I - A ,,Jc*BACAS : 1 """a'ˆ.' .-?:i»ji._

Baruuisiineto ,) f Maturing0 \/~ysyXfrindco

: ' WVl LS*" < y,‘r ? tlr\bena

inSiU»Sr ..?iV

© / Barranca.

P’ˆˆyX-ˆcISSTd Bolivac >

.r

Spain

DAD (Br.)

r >

WUUjiliV. \ monegru ■ -nvvvi m-u— — - s

C. C.rrl.o«»,ˆffiM*q'‘l'-»o?'s4s!B0A *

Baudot TWW1 W t'ˆK h n r-» >t

nevaX

. Buenaventura Cup iba»i(fˆ??S23!ˆ*5i-ˆ •ahia del CTiocoˆyˆ*
ˆ,Zvjy,NEVAOO de V& —

I a"usO«A pAZliSOirS,. “

I /valil.jitiiu 18.045 s - - - _ J~y

Pˆnte Reyeaˆy ˆ ojieivaˆ

jfcajan -

J"~ ˆc') 15,420

% £

l».mt Bolivar,

Paata Maavlar.*ˆ

EsmoraldMIjeaA;. 13;

Punta GaleraMˆ _/ -ˆVˆ*,'I(a8?bN ~ 1

EQUATOR Pedernalesll

Otw aloQ

0 iiiijayuUˆumuGˆ, vi\

PQnto Sta. Elena*ˆˆ JPv"£ i C U A 1. _

r --Azotruea \p

ialiˆ l»

&m»\v 13,- -v __.

W-o& --'vˆO

_ a, , j'-Horjao"" —

Punta Parinn<

Puma I.

G«7/ o/ Guayaquil

v Tuiabez

O

o

D „ i -&1 o h CPatavia ˆAlblnaˆˆVooˆ A*' * J

BJ\ h<rT outch (V/V

""I A

V(7? ˆ ˆsurinam)ˆ6"ˆ

J

~y

Cape Blancc- «*- . , . w. , — - .

p \

Paytaˆo Pitfra ?fj | £ 0 * / Jio

» <3. ✓ Purlipaguas Cˆr‘ y

. . itlpoyaa0/* 0 Moyobaui' - ˆ

V«ˆj LambayeOuel) ' >. SClibta -T ˆ ˆ

T’/fe Ghiclayip' * \ Sara- ,

EteQK ˆPachiza /ˆy acu

l T3 ˆCajanmrca \ - C Pamamavoˆˆ

Ir«Hllo4\V-£vA z\TmCOr>-J.

0

'A .

a- Abingdon

3 1 Bin

& /\ " '

loo

'1V.rg'

111

Mii

Pisco Chincha Ihlav Ni > a

ON THE SAME SCALE.

Cape N _™ -Wj j A— nw.1 """»])tl a

San Juan BautlfltaVcˆ [Chuquibamba'/W, 1

40c

TROPIC OF_CAPRlCORN

o

50

C. Sao Roque

Natal

A Branco ˆ•iParnhyba

Potoslo^ ^°.fS|ce,

ˆ Puna)0Pomabamba

-y\ I. Cotnˆiita

TocopillaV, > Cn.\U]\i, (- li,

cˆa.rXi WˆPf Hs

Meilllonesˆi 0A:tM|m« j> ˆumnimara

- 1 !l:T ! 3HTˆT*.7_

ADtofagaata/b r "a—. . ■€,»?'■. ■? (

itSaUaW

r/WI # "% %>

rˆflNEyADO/DE'C/"^' -'•=

I Pilao Arcadjj-j •

J£ /-O'ltOT

Campo Xargoˆ

i,WA«JiA V"*!!JHtOo>"

:,V.\AN'AL I4

iPRimS , /r if&MW ''-W*** %.'K.dtor

) _/~j ˆ fˆbioora'5 f ZfazaretD (Bahia)

.ts..- 0) ci San Jorge dos Ilheos

ˆRˆictoria 'a Conquista

Taltal

Chan oral de las Animas

-1 2f, 30b (

N,TO" - ' -rfv-

cˆh

... 1 Tucuinind'? V O' O'.

|t PA.

ˆT|eWro del cobre Siyjtijvgo del Esters

Lˆpg R

ˆColonia del'll

A R AˆGrU-AY J y | l.ifirpˆnas

ˆn.,%,% %

guaptf * <*

„ » V V\ > «7t 1 _

Estanislau - "'\ Tibagy '

A;t ilia 'Huyea 7' ' ,~s>

-AsuNClOff Guarapuavaˆ' ˆUrTtibˆJˆˆ =uaP®-

la Serenii?ˆˆˆ

tn

J can Fernandez Is. (To Chile)

? Catamarca (55? oRjoja

Coq uimbo-ZTi/"

o.-ˆAˆG E NT>NE.

Illap? ˆ

twenguo-j=' j.- Q ˆ (f>j %• 's- — . oˆ5v**

Ban Fernando °ˆ> >MAipuCm. 7177765ˆ. •• „ -O BUENOSAl

5 H1.1UUO- ~X S* * 'S Chivilcoy

Constitucion ˆ

Cauquenda o o jjˆ Plrfalo Chi/lanrˆaiy Talcahuano Concencloi

Cabo Frio /

_ _/ _ TROPIC OF CAPRICORNˆ

p i ˆ Florianopolia (PeBterro'y1 ˆ Santa Catiiabina I.

Laguna.

- Y ˆtffoh dos Patos

,Sta. Anna do Librameoto 'j' y /

ˆ iBage o CanguBBU 1

Grande do Sul

taroo

Lagoa Mirim

0

\

V

E PUB LI c

£ = Pv

'Zv

Gulf of San Mat Punta Norte

ˆPuerto JˆadrLny-ˆj \ y > f.r > r.B Pbninbi i

100°

Flores'- > Dolores0 (p,

“.J

‘ˆata 'abo San Antonio'

- Bah ia

Cape Corrientea

10

li

Ancud <

Chiloe I

CofoZ'v. Guaytecas Is.i-- ClIONOS ˆ Abchipel'agoˆ*. u

ˆ Taytao Peninsui

O'J L ˆ

- «« rr*/«V ~ ˆ*o ˆ Port Desire

Campana I-ˆcO y

,5a"iWar,

Welunoton I V h£ˆ 11

Cape Tree Puntas Port Desire (Puerto Descado)

San Julian

Nelsotˆij&\ \Quben Adelaide \ Abciupelaqo V Strait of Magellanˆ 2 Desolation I>ˆ(

Santa Tntz

Clarenci

FALKLA? _ West Falkland.'

12

v

D IS.(Br.)

? East ■ˆFalkland

SOUTH

AMERICA

SCALES

Statute Miles, 405 = 1 Inth.

- o 100 goo 300 400 500 epp

13

Londonderry

B

Hoste U^^^«WOLLASTOM 18,

E 70° » Cape Horn.

A DEL FUE0O

Longitude West from Green,Wich

C.San Diego _ “ ^^Staten I.

IN avarino L _

S0UTH*^l~ GE

Kilometres, G32 •= 1 Inch.

< > 100 200 900 400 500 600 700 800 900 1000

Rand MoNally’a Now 11 * 14 Map of South America. Copyright by Rand McNally 4 Co.

14

60

G

20°

L 328

SOUTH AMERICA

281

ures, money, banks, government (including the judiciary and the departmental, state or pro¬ vincial governments), army and navy, finances (revenues, expenditures and public debt), foreign and domestic commerce, population, im¬ migration, transportation, climate, flora and fauna, educational system , religion, history, literature and art, bibliography, etc. — see the articles devoted to the country in question, to its chief cities and political divisions; also the articles under the general caption Latin America. Important geographic features are described at greater length in separate articles, e.g., Andes, and such features also form a part of the wider

survey in the article America. For lists of standard works on South America, the reader is referred to bibliographies ap¬ pended to the articles mentioned above.

Marrion Wilcox.

SOUTH AMERICA, American Diplo¬ matic Relations with. In 1783 the future in¬ fluence of the new-born American republic upon Spanish America was foreseen by the appre¬ hensive Spanish Prime Minister, Aranda. Three years later Gordoqui, the Spanish Minister to the United States, reported that Americans would probably form an establishment on the Falkland Islands to which many American ves¬ sels had gone fishing in 1784 and 1785.

In 1787 American vessels sailing from Bos¬ ton for the west coast stopped at the island of Juan Fernandez in direct violation of the Spanish restrictive order of 1782 which for¬ bade foreign ships to navigate the South Seas without the permission of Spain. In 1790 other American vessels stopped at the Lobos Islands. Thereafter, in spite of the alarm of Spanish officials, a steadily increasing number of vessels contributed their influence to the development of new ideas along the Pacific Coast. By 1798 Salem merchants began with Cayenne a trade which rapidly pressed east¬ ward along the Brazilian Coast. In 1799 Ameri¬ can trading vessels (from Philadelphia) first reached Montevideo. By 1801 others (from Boston and Providence) first opened direct trade with Buenos Aires. American trade thereafter both with Brazil and with ports of the Plate rapidly increased. In 1803, when Spain complained that American vessels had participated in the fishery of sea dogs on the South American Coast, Secretary Madison, by direction of Jefferson, replied that Spain was not expected to controvert nor interrupt the (<rights of American citizens to navigate and use the seas.®

Through efforts of business men and whalers ideas of republicanism and independence were introduced. As early as 1798 leading Ameri¬ cans were attracted by the schemes of Miranda for inaugurating a revolution in Spanish America. In 1806, even before the British ex¬ pedition of that year against the Plate territory of Buenos Aires, adventurous Americans participated in an ill-timed and unsuccessful expedition against Venezuela which Miranda equipped at New York under the representation that he had the secret sanction of the Ameri¬ can government at Washington.

In the Spanish-American Revolution which began in 1810, the American government took a live interest illustrated in the prompt

appoint¬ ment of consular (or political) agents; but, in

the face of strong suggestions or invitations for ((fraternal alliances which would unite the Americas forever,® it maintained an impartial neutrality, opening its ports equally to both parties and restraining its citizens irom inter¬ fering in favor of either belligerent (although the American agent J. R. Poinsett directed the Chilean army in a successful attack against the Peruvian forces in 1813). In 1815 William Thornton, a friend of the three early Virginian presidents, published a plan which he had ad¬ vocated 15 years earlier, in favor of extending the republican system over all the Americas, and the adjacent islands — 13 sections with dis¬ tinct governments but united by one general government at the (<City of America® on the Isthmus of Darien across which a lock canal was to be constructed from sea to sea. In 1815 President Monroe issued a neutrality proclamation, and in 1817 Congress enacted a neutrality law, which, amended in 1818, estab¬ lished a higher standard of national obligation.

In 1818 President Monroe received a tempt¬ ing proposition for separation of all Spanish America from Spain and the establishment of its freedom under the protection of the United States which under the plan was to extend its territorial limits to the Isthmus of Panama.

Finally, in March 1822, yielding to an obliga¬ tion of duty, President Monroe recommended the recognition of Venezuela, Chile, Colombia and La Plata provinces as independent states — a fact practically admitted by Spanish official negotiation with the insurgents and enforced by the absence of adequate Spanish forces to dispute it. On 17 June he received a regular diplomatic agent from Colombia (Don Manuel Torres). In January 1823, under act ot May 1822, he appointed ministers to Argentina, Chile and Colombia, and in December 1823 issued the famous expression of policy against forcible intervention by a combination of European powers to restore Spanish dominion over the new republics. On 3 Oct. 1824 the American government concluded with Colombia at Bogota the first American treaty with a Latin- American republic — the first of a long series of treaties of amity and commerce with the republics, and containing liberal provisions for the abolition of discriminating duties and remained in operation until 1836. In May 1826, it recognized the in¬ dependence of Peru which had recently been successful in obtaining the surrender of Callao, the last Spanish fortress in South America. In 1825 and thereafter both by direct repre¬ sentation at Madrid and by solicitation of the co-operation of other European powers, it sought to induce Spain to recognize the govern¬ ment of the new republics created from her former provinces and in September 1834 it finally

obtained a decision in favor of negotia¬ tions to that end. In 1825 it recognized the independence of Brazil which had been pro¬ claimed in 1822 and established by force a year later.

Still in fear of Portugal and under a mis¬ apprehension of the meaning of the Monroe Doctrine, Brazil sought an alliance with the United States which secretary Clay cour¬ teously declined. In July 1824 Colombia also inquired whether the United States would agree to enter into a treaty of alliance to save the Americas from a calamity of the despotic system, but Jefferson advised

Monroe to reply that the United States could not protect them without concurrence of Eng¬ land. In 1826 in response to the invitation of Colombia and Mexico, the American govern¬ ment sent delegates to the Panama Congress of American plenipotentiaries called by Bolivar's famous circular of 7 Dec. 1824; but, owing to delay caused by the disapproval of the Ameri¬ can senate, the delegates failed to reach Panama in time for the 'Congress, thus disappointing Latin-American expectations. Whatever plans may have been conceived by the Adams ad¬ ministration for American hegemony of the American continent (as suspected by Canning) were weakened by the publicity which the Panama debate gave to American racial preju¬ dices and by contemporary American protests against the proposed Colombian-Mexican at¬ tack on Cuba. *

In 1825-26, the possible need of a more competent naval force on the west coast (to protect American commerce from possible piracy which might result from the unsettled condition of South American governments) first attracted the attention of the American government to the need of a trans-isthmian pas¬ sage at Panama which was again considered in 1835 (when Charles Biddle without proper au¬ thority of President Jackson went to Panama and obtained a canal concession which his government declined to accept) and finally re¬ sulted in a transit treaty with New Granada in

1.

In 1831 a long dispute with Argentina arose through the American destruction of an establishment which the government of Buenos Aires had made on the Falkland (or Malavinas) Islands, afterward (1833) effectively occupied by Great Britain under a claim of title as¬ serted

and maintained for 60 years. To the un¬ settled shores of these islands American citi¬ zens engaged in whale and seal fisheries had resorted for shelter and necessary supplies without molestation for more than 50 years, and they objected to the seizure of their ves¬ sels in 1831 and imprisonment of crews at Soledad by one Vernet who claimed to act under an indefinite decree issued by Buenos Aires on 10 June 1829. The American govern¬ ment, regarding Vernet's acts as lawless and piratical, promptly asked Buenos Aires for a disavowal and sent a naval vessel which de¬ ported Vernet and his followers to the shores of Uruguay. Following the demand of the Argentina government for reparation, Mr. Bay- lies, the American charge, demanded his pass¬ ports, resulting in a severance of diplomatic relations for several years. In 1841 General Alvear at Washington pressed claims for in¬ demnity which Secretary Webster declared must await the final settlement of the British- Argentine controversy over the right of juris¬ diction to the islands. The long-dormant claim of American liability was revived in 1883-85 and pronounced by the American government as wholly groundless because of the derelict condition of the islands which justified the act of the American naval officer.

After 1840 the increasing importance of closer relations with South America was recognized. As early as December 1842 the American government received information of a proposed Lima Congress of Latin-American

states (Argentina, Peru, Bolivia, New Granada, Brazil and Mexico) to sustain the dominant parties in those states and to oppose the ad¬ vance of the United States on the American continent. In 1845 Argentina and other South American governments were disappointed in their hopes of active interference of the Ameri¬ can government against the Anglo-French blockade of the coast of Buenos Aires, result¬ ing from Brazil's invitation of 1844 for their intervention to protect the independence of Uruguay which had been recognized by a treaty of 1828 signed both by Brazil and by Buenos Aires. The American gov¬ ernment, satisfied with assurances obtained from the British government and appiehensive of no danger from temporary European inter¬ vention, decided to remain neutral. In 1844 for protection of American interests it sent a small fleet which offended the Argentina gov¬ ernment by seizure of vessels of the Argentina squadron — an act which was promptly dis¬ avowed. Later, in March 1846, Secretary Buchanan, stating that the moral influence of the United States was in favor of Argentina, instructed the American Minister at Buenos Aires to report promptly any British-French activities indicating territorial designs. In June 1845 Edward A. Hopkins was appointed "special agent" to Paraguay to obtain

informa¬ tion with a view to possible recognition of its independence, but in 30 March 1846, largely from regard to Argentina, he was peremptorily recalled for exceeding his authority bv his diplomatic negotiations with Paraguay in favor of recognition and by an offer of mediation be¬ tween the governments of Paraguay and Buenos Aires in favor of Paraguay which by league with Corientes against Argentina would have become the ally of England and France in their designs. Fortunately the perplexing ques¬ tion presented to the American government by participation of European powers in La Plata affairs was finally settled by discontinuance of the blockade, first by England and soon there¬ after by France. In 1850 the American Min¬ ister at Buenos Aires in reply to a hypothetical question dispelled the illusion of General Rosas that the United States would aid Argentina to resist France in case of war. In 1846 serious complications were threatened by disturbances at Panama, across which communication be¬ came very important to the United States, and by a projected expedition of General Flores (formerly president of Ecuador) against Ecuador — an expedition which was supposed to have for its purpose the creation of monarchies in the new world. Two vears later, Yenezuela, fearing British designs of annexa¬ tion along the Guiana border as a result of British activities there since 1841, turned to the United States in hope of an alliance. At the same time new dangers of disorders were threatened by a territorial quarrel between Peru and Bolivia.

In order to secure a more satisfactory transit treaty of isthmian transit than the ar¬ rangement which had been negotiated in 1844, the American government concluded a treaty in 1846 providing for equality of use of the transit route for the commerce and citizens of both countries under American guarantee, really establishing an American protectorate

over the isthmus, but for a commercial purpose in which all the world had a common interest, and with expectation of similar guarantees by Great Britain and France. It became effective on 10 June 1848. In 1847 in reply to invitations for protection against the apprehended Flores expedition, Secretary Buchanan reported that Spain through Calderon had disavowed to the American government any part in the proposed expedition — thus indicating her abandonment of intention to encourage similar expeditions and removing a main source for apprehension of serious dangers. Later, in May 1848, he as¬ sured Ecuador (through instructions in opening regular diplomatic relations)

that the American government on every occasion would employ at least all the moral means within its power to discourage and arrest intervention or dictation of European governments in the affairs of in¬ dependent states of this American hemisphere.

The matured Latin American policy of the Polk administration was expressed by Secre¬ tary Buchanan on 1 June 1848 in opening dip¬ lomatic relations with Bolivia, the only inde¬ pendent Latin-American country to which the United States had not previously sent a Min¬ ister. Urging the necessity of the establish¬ ment and maintenance of an American system of policy for protection and security, and em¬ phasizing the fact that ((Liberty cannot be pre¬ served without order,® he especially hoped that Peru in order to prevent future irritation and dissension would agree to cede the port of Arica to Bolivia. Possibly encouraged by President Taylor's expression of the American general policy in 1849, Venezuela in 1851 pro¬ posed that the United States should form an alliance (<or at least take a more decided stand to protect the South American republics.®

In the decade* after 1850, the period of American clipper-ship activity in the Pacific, the American .government actively used diplo¬ macy to secure protection and expansion of commerce with Latin America — at the same time continuing a policy of securing respect for American commerce by enforcement of American claims for injuries to persons and property. Among the most important subjects of diplomatic negotiation besides claims were the conditions of the guano trade on the west coast, the danger of European influence, the opening of South American rivers to foreign commerce and the conditions of transit at Panama.

In 1852, in connection with difficulties re¬ sulting from restrictions on the guano trade, the American government, through Secretary Webster, took steps to protect American inter¬ ests on the detached Lobos Islands which had been visited by American seamen for half a century, but after an investigation of claims of title soon decided through Secretary Everett to yield to the protests of Peru. In 1858, during the Vivanco insurrection in Peru, a diplomatic dispute arose over the rights of American ves¬ sels to obtain guano at the Chinca Islands in connection with the Peruvian seizure of two guano vessels, and resulted in the suspension of diplomatic relations in 1860.

The American acquisition of the Gallipagos Islands from Ecuador, suggested about 1852, was apprehended by Spain, France and Great Britain late in 1854 in connection with an

American draft treaty with Ecuador, which was regarded as establishing an American pro¬ tectorate over the islands which had long been important in connection with American com¬ mercial interests in the Pacific. At that time Ecuador, still apprehensive of the plans of General Flores, urged the necessity of eternal vigilance to prevent vast schemes for European ascendency in South America, and apparently New Granada desired the American government to adopt a more liberal policy of sustaining and protecting the nations of South America. The American Minister (Clay) at Lima, convinced that the United States would be forced by cir¬ cumstances to interfere in the affairs of other states, urged his government to adopt a more effective foreign policy in relations with Span¬ ish America and the establishment of a control¬ ling influence in the western hemisphere. By

1856 there was a decided decline in South American friendliness toward the United States — a decline which resulted largely from the filibustering schemes of William Walker in Central America and which found expression in the ˆContinental Treaty® signed at Santiago de Chile by representatives of Chile, Peru and Ecuador and designed to form a closer rela¬ tionship of all Latin American republics. In

1857 the American Minister (Dana) in Bolivia, desiring to create a better Latin American feeling toward the United States, suggested to his government that the basis of the American fixed policy should be the Monroe Doctrine, nonexpansion southward of the Gulf and treaties of alliance guaranteeing the integrity of Spanish America.

In the opening of South American rivers the American government took an active part through diplomacy. In October 1852, after the defeat of the Argentine dictator (General Rosas) by the governor of Entre Rios, it ob¬ tained the navigation of the Parana and the Uruguay, which were opened to the merchant vessels of all nations by General Urquiza (pro¬ visional director of the Argentine confedera¬ tion), a privilege later confirmed by treaties with the United States, Great Britain and France in July 1853. At the same time it began preparatory negotiations to secure for Ameri¬ can vessels the navigation of the Paraguay River and upper Parana which, after vari¬ ous difficulties resulting in an American naval demonstration, Paraguay was finally induced to grant in 1859 by treaty. Its efforts to ob¬ tain the consent of Brazil to the opening of the Amazon, first contemplated even before 1850, begun in 1851 by instructions to naval officers to explore the river from Peru east¬ ward and report its facilities for navigation and its opportunities for commerce, and in¬ volving a series of negotiations with Peru and Bolivia and with other

countries on the upper waters of the river, reached partial success in

1858 by a treaty with Bolivia guaranteeing the United States access to Bolivian ports on the upper Amazon, and finally attained full success in the Brazilian decree of 1866 declaring the Amazon and its tributaries open to the com¬ merce of all nations. Relations with New Granada concerning the Panama transit route across which an American railroad had been completed in 1855 were especially irritated in 1856 by a riot at Panama, resulting in a series

of claims which were not finally settled until 1866. Following the riot Secretary Marcy, de¬ siring to facilitate and protect the transporta¬ tion of persons and property across the Isthmus, proposed to New Granada a new treaty for lease and cession of a belt of land 20 miles wide from Atlantic to Pacific, and certain is¬ lands in the Bay of Panama for use as naval stations, but New Granada declined to negotiate such a treaty.

During the period of civil war resulting from slavery and secession, the American government had little time to cultivate intimate political, social or commercial intercourse with South American countries. On questions in regard to foreign intervention, it maintained the letter of the Monroe Doctrine, but carefully declined South American invitations or suggestions seek¬ ing American adhesion to an alliance to guar¬ antee the sovereignty of South American states. A difficult question arose in 1862 in regard to protection of the Panama transit route. The American government through Secretary Sew¬ ard recognized American duty at Panama but carefully avoided interference in the internal quarrels of Colombia. The adjustment of claims through conventional arrangements for claims commissions or arbitration, begun be¬ fore 1860 and continued even during the Civil War period, became especially prominent there¬ after and removed many sources of irritation and possible collision. The more important in a period of four decades were negotiations with New Granada (or Colombia) in 1857, 1864 and 1874-75; with Chile in 1858, 1873 and 1892; with Paraguay in 1859 and 1887 ; with Vene¬ zuela in 1859, 1866, 1888 and 1892; with Ecua¬ dor in 1862, 1865 and 1893 (Santos case) ; with Peru in 1863 and 1868; and with Brazil in 1870.

Since 1865 the American government has frequently indicated its

friendly desire for the welfare and peaceful relations of South Amer¬ ican neighbors. When Spain, in a war begun against Peru in 1864, threatened to seize the Chinca Islands, the American government promptly expressed its opposition in a protest to the proposed annexation, although it care¬ fully avoided any actual participation in the war into which it could easily have been drawn by the expectations of Chile and Peru, and stated that American policy did not shield American states from a discharge of their just obligations.

In 1866, when Spain threatened to take per¬ manent possession of the islands as a means of reimbursing the expense of the war through the sale of guano, Secretary Seward secured her withdrawal by a warning that in case of such occupation the United States could not be expected to remain neutral. American medi¬ ation resulted in conferences between repre¬ sentatives of the United States, Spain and the allied republics at Washington, and finally in an armistice (in 1871) which, after consider¬ able delay, eventuated in a treaty of peace. A later controversy between Peru and Chile con¬ cerning expenditures in maintaining the allied naval squadron in this war was arbitrated in 1875 by the American Minister to Chile by con¬ sent of the American government.

Meantime, in October 1866, the American government, although in the interests of peace willing to exercise its good offices to aid in stop¬

ping the unhappy war of La Plata (directed against Paraguay by Brazil, Argentina and the Oriental Republic), declined to adopt sugges¬ tions for a demonstrative action following the Brazilian rejection of the American good offices. In 1871, acting promptly on a report that Ger¬ many had proposed to several European powers the adoption of joint measures to induce Vene¬ zuela to observe her agreements, it declared that the United States would observe with great concern the presentation and enforcement of demands against an American state by such a combination.

In 1881 Secretary of State Blaine planned for the United States to assume the posi¬ tion of sole mediator in international dis¬ putes to which Latin American republics were parties, but his policy was not continued by his successor. In 1881 the American Ministers at Buenos Aires and Santiago de Chile success¬ fully arbitrated a boundary controversy be¬ tween Argentina and Chile. In the same year two special American envoys, sent by Secretary Blaine to secure peace between Chile and Peru and Bolivia, which were at war for possession of the nitrate mines near the junction of their boundaries, were

unfortunately unsuccessful in their efforts and each was regarded as the partisan of the country to which he was sent. Later the experienced Wm. H. Trescot was sent to warn Chile against excessive demands which might induce the United States to secure co-operation of other American powers to coerce her into reasonable moderation.

Acting on this principle of pan-Americanism, Blaine in 1881 sent invitations to all independent American nations to meet for a discussion of arbitration, but these were recalled by his suc¬ cessor who postponed the conference. The American government promptly recognized the new republic of the United States of Brazil, which was proclaimed following a revo¬ lution in the fall of 1889 which resulted in the expulsion of the enlightened Emperor Dom Pedro II and his family on 14 Nov. 1889. In 1893-94 it declined to respect a blockade pro¬ claimed (but later abandoned) by Brazilian naval insurgents against the Brazilian govern¬ ment in the Bay of Rio Janeiro. After having refused to recognize as belligerents the insur¬ gents who claimed to have set up a provisional government at Desterro on the island of Santa Catharina, in January 1894, Admiral Benham, in command of American naval forces and act¬ ing in accord with the decision with naval com¬ manders of German, English, French, Portu¬ guese and Italian naval forces, gave notice and practical evidence of his intention, while not intervening to restrict the operations of either party, to protect all American ships entering the Rio waters, thus inducing the insurgents to abstain from further interference with com¬ merce, and perhaps contributing to the later unconditional surrender of the insurgents (on 13 March 1894). In 1889 the President of the United States was chosen arbitrator in the settlement of the Argentine-Brazilian dispute in regard to Misiones territory and finally, in 1895, made an award in favor of the Brazilian claim — a conscientious decision which was gratefully accepted by both governments.

With the increase in the importance of American foreign trade of the 19th century,

the American government took steps toward drawing the American states into closer rela¬ tions in conformity with the idea of a com¬ munity of interest emphasized so long before by the undefined political bond of union estab¬ lished by the Monroe Doctrine. A compre¬ hensive Pan-American international conference for closer co-

operation, such as had been con¬ templated at Panama in 1824-26 and in later proposals, already partially realized by confer¬ ences at Lima in 1847-48, in 1864 and in 1877- 78, and at Montevideo in 1888-89, planned by Blaine in 1881, was finally realized at Wash¬ ington in 1889, resulting in a better understand¬ ing and in later conferences which further em¬ phasized the idea of a community of American interests. It established at Washington the International Bureau of American Republics (renamed the Pan-American Union by the Fourth Pan-American conference in 1910) which rendered valuable service by its prac¬ tical activities. The second Pan-American congress which mat in Mexico on 22 Oct. 1901, largely through the quiet suggestion of Presi¬ dent McKinley, who tactfully planned to counteract the unfortunate distrust of the United States among Latin Americans, was attended by representatives of all the American republics. Its chief topics of discussion were arbitration and collection of pecuniary claims of citizens of one country against the govern¬ ment of another county. It approved a project for a treaty under which pecuniary claims should be submitted to the international tri¬ bunal of arbitration which had been provided at The Hague. It extended the activities of the International Bureau of American Repub¬ lics, which was also invested with authority to arrange for subsequent congresses. A third Pan-American congress, which met at Rio Janiero, 21 July 1906, was attended by dele¬ gates from all American republics except Haiti and Venezuela. It recommended that the next Hague congress should seek to secure a gen¬ eral arbitration treaty and take steps toward the abolition of the use of force in the collec¬ tion of international debts. The fourth Pan- American congress, which met at Buenos Aires in July-August 1910, discussed compulsory arbi¬ tration of pecuniary claims, sanitation, exten¬ sion of steamer service, patents, trademarks, copyrights and interchange of university pro¬ fessors.

In 1891 a serious difficulty arose between the American government and Chile, with which relations had become somewhat less friendly after 1880 as a result of Secretary Blaine's apparent sympathy with Peru in the War of the Pacific. The decidedly unfriendly feeling created by the American Minister (Patrick Eagan) among the Chilean leaders of the vic¬ torious party in the Chilean revolution of 1891, and increased by the American strict interpre¬ tation of neutral duties in the seizure of the ltatci, later culminated in an assault upon sailors of the American cruiser Baltimore while ashore at Valparaiso in October 1891, resulting in the suspension of diplomatic relations and an American ultimatum (from Secretary Blaine) to which Chile grudgingly yielded by an apology and the payment of $50,000

damages for the families of persons killed and for the wounded.

In 1895 the American government in apply¬ ing the principles of the Monroe Doctrine against Great Britain in the Venezuela-Guiana boundary dispute showed a friendly disposition toward Venezuela which was appreciated else¬ where in South America, in spite of Secretary Olney's extreme interpretation, including the provoking assertion that the American fiat was law on the American continent. Later friendly American acts appeared in striking contrast to the bad conduct of the Venezuelan government. Although the American government did not accept the Venezuelan appeal to intervene in 1902 against the debt-collecting activities of Germany and Great Britain (in which it had been invited to participate but which it did not approve), President Roosevelt firmly resisted the later plans of Germany and was successful in terminating the blockade of Venezuela by securing arbitration of the controversy at The Hague under a protocol signed at Washington on 13 Feb. 1903. This friendly action, to¬ gether with the example of American policy in Cuba contributed much to remove Latin Amer¬ ican suspicions arising from the Spanish-Amer¬ ican War, American negotiations preliminary to the construction of the Panama Canal and various extensions of the Monroe Doctrine which aroused apprehensions. Unfortunately American relations with Venezuela became strained in 1907, under the presidency of Cipriano Castro, by a serious controversy aris¬ ing from certain American asphalt concessions and by the arbitrary expulsion of an American editor of a Venezuelan newspaper. The Ameri¬ can government, seeking adjustment of all asphalt claims, proposed arbitration, which was refused by Castro. It then agreed to a plan of arbitration by separating the claims, as Castro proposed, but to which he later objected (in March 1908), absolutely refusing to arbitrate any of the cases. In June 1908 the American government withdrew its Minister and sus¬ pended diplomatic relations, and two months later offered no objection to the contemplated forcible action of the Netherlands against Castro in return for his conduct against the Dutch islands near the Venezuelan coast. But, when Castro took flight from his troubles, leav¬ ing executive affairs in charge of a more rea¬ sonable official, J. V. Gomez, who sought a restoration of friendly relations, the American government sent to Venezuela a special com¬ missioner, William I. Buchanan, who on 13 Feb. 1909 signed a protocol under which all disputes were satisfactorily settled — two immediately, two within five months and a last remaining one by later adjudication of The Hague.

American relations with Colombia, which before 1860 were largely concerned with prob¬ lems of a transit route across Panama, since the

American Civil War, were largely influ¬ enced by revived American interest in the ques¬ tion of the Panama Canal. In 1868, in accord with the wish of Colombia for certain changes in the treaty of 1846, the American govern¬ ment authorized special negotiations at Bogota, which resulted in a draft treaty embodying the Monroe Doctrine and securing to the United States absolute control of any canal across the isthmus. This new treaty, although approved by Secretary Seward, was rejected by the Senate of Colombia and changed by amend-

ments and alterations which (in February 1869) failed to receive the approval of the American Senate. The attitude of Colombia turned American attention toward the less desirable Nicaragua route and later resulted in an un¬ fortunate period of American-Colombian es¬ trangement and the ˆeconomic® abolition of the American legation at Bogota for several years before 1878, during which (in 1876) Colombia turned to the French for leadership in the canal enterprise. American interest in the problem was revived in 1879 by De Lesseps' suggestion of a joint international guarantee of neutrality for the canal, resulting (in 1880) in an executive declaration of American policy requiring American control of the canal. In 1881 Secretary Blaine initiated diplomatic measures to defeat the French enterprise by premature denouncement of plans for a Euro¬ pean guarantee over the canal, efforts to es¬ tablish closer relations with Latin America and fruitless negotiations with Great Britain for abrogation of the Clayton-Bulwer Treaty of

1.

At the close of the Spanish-American War American interest in a canal at Panama was renewed and increased. In 1901 the first sub¬ stantial step toward the realization of a canal under American control was taken in the nego¬ tiation of the Hay-Pauncefote Treaty, which terminated the Clayton-Bulwer Treaty. In 1902 the second step was taken by an act author¬ izing the purchase of the Panama franchise and unfinished work of the bankrupt French company. The third step — the completion of satisfactory arrangements with Colombia — proved more difficult and unfortunately resulted in strained relations with Colombia from 1903 to 1919. Colombia partly through German in¬ fluence failed to ratify a convention of 22 Jan. 1903 by which the United States for $10,000,000 and an annuity of $250,000 (beginning 1913), obtained the right to construct the canal and to use and control

the canal zone. Panama promptly declared independence from Colombia and was as promptly recognized by the United States which, on 18 Nov. 1903, negotiated with the new republic a treaty similar to that re¬ jected by Colombia, recognizing American con¬ trol over a canal zone 10 miles wide.

President Roosevelt, whose policy in Panama was generally approved, recognized that Co¬ lombia, in spite of her bad faith and her show of resentment against the United States, had a right in equity to compensation. In 1909 Secretary Root negotiated with the Colombian Minister the Root-Cortez Treaty, which provided for recognizing the independence of Panama by Colombia and payment of $25,000,000 (in 10 annual installments) to Colombia by Panama. Colombia, refusing to ratify this treaty, proposed to refer the controversy to The Hague tribunal. The American govern¬ ment, declining this proposal, later made an amicable offer to pay an indemnity of $10,000,- 000, which Colombia refused to accept. Finally, through instructions of Secretary Bryan, the American government authorized the negotia¬ tion of a treaty, signed at Bogota on 7 April 1914, which expressed the regret of the United States for incidents disturbing the friendship of the two countries, favored Colombia by pro¬ visions for readjustment of the Panama bound¬

ary and for certain commercial advantages and obligated the United States to pay to Co¬ lombia an indemnity of $25,000,000. This treaty, ratified by the Colombian Senate, met strong opposition in the American Senate, which in¬ definitely postponed action, especially objecting to any expression which might imply a con¬ fession of improper policy in relation to the Panama revolution. Later, in July 1919, the Senate resumed consideration of the treaty without the objectionable clause. Meantime, a marked increase of friendly interest between the United States and South American coun¬ tries followed an extensive tour of Secretary Elihu Root through those countries in 1906 and later visits of other American statesmen and other influential Americans who contributed much to the elimination of misunderstandings and prejudices and the consequent modification of opinions. In 1910 the American govern¬ ment used its good offices in joint action with Brazil and Argentina to settle a boundary dis¬ pute between Peru and Ecuador in a mediation which resulted in the submission of the con¬ troversy to The Hague. In 1912 its demand of 1909 upon Chile for settlement of the long-exist¬ ing so-called Alsop claim of $1,000,000 (arising in 1879 from the Chilean seizure of Bolivian territory upon which a Chilean firm with Amer¬ ican members had a lien) was arbitrated by King George V whose award allowed about one-third of the original claim and apparently satisfied

both Chilean and American govern¬ ments. In 1909 it secured by mediation the set¬ tlement of a boundary dispute between Panama and Costa Rica. Its influence also restored amicable relations between Argentina and Bo¬ livia. In 1914 it negotiated with Panama a new treaty by which it secured certain advantages, including control of the waters of Colon and Ancon, and surrendered the Savannah which gave Panama city direct communication with other territory of the republic.

In April 1914 in the serious Mexican situa¬ tion which had resulted in severance of diplo¬ matic relations with the United States, the ambassadors of Argentina, Brazil and Chile tendered their mediation, and later together with the ministers of Bolivia, Guatemala and Uruguay were called into consultation by the American government to aid in finding a solu¬ tion to an embarrassing and dangerous difficulty.

Relations steadily improved during the period of the World War in which American example inspired increasing confidence throughout Latin America. In 1919 renewed efforts were taken to restore satisfactory relations with Colombia.

Bibliography. — American Society of In¬ ternational Law, Proceedings of (1914) ; Blakeslee, G. H., (Latin America) (1914) ; Chandler, C. L., Unter-American Acquaint- ances) (1917) ; Crichfield, G. W., (American Supremacy > (1908) ; Hart, A. B., (Monroe

Doctrine) (1916) ; Hunt's Merchants Maga¬ zine (1838-70) ; Johnson, W. F., (America's Foreign Relations *(1916) ; Latane, J. H., (Diplomatic Relations of the U. S. and Spanish America> (1900); Moore, J. B., (In¬ ternational Law Digest* (1916) ; id., (Inter¬ national Arbitrations) (1898) ; Paxson, F. L., (The Independence of the South American Republics) (1903) ; Senate Document Number

474, 63d Congress, 2d session; United States "Foreign Relations" (1870).

James M. Callahan,

Professor of History and Political Science,

West Virginia University.

SOUTH VICTORIA LAND. See Vic¬

toria Land.

.SOOY SMITH, William. See Smith, William Sooy.

SOUTH-AMERICAN LITERATURE.

See Latin- American Literature.

SOUTH AUSTRALIA. See Australia,

South.

SOUTH BEND, Ind., city, county-seat of Saint Joseph County, on Saint Joseph's River near the source of the Kankakee River, and on the Lake Shore and Michigan Southern, the New Jersey, Indiana and Illinois, the Michigan Central, the Saint Joseph, South Bend and Southern, the Terre Haute and Indiana, the Pennsylvania and the Grand Trunk West¬ ern railroads, about 89 miles east of Chicago, 135 miles north of Indianapolis, and six miles south of the Michigan State boundary. It is connected by electric lines with Mishawaka, Elkhart, Goshen, La Porte, Michigan City, Val¬ paraiso and New Carlisle, and Niles, Mich., all of which cities and towns contribute to the prosperity of South Bend. The census of 1910 gives the combined population of these places as 86,000. It was settled in 1824 by Alexis Coquillard. It is in the region traversed early by the missionaries and explorers. Across the northern portion of the city was the old portage from the Saint Joseph to the Kankakee. La Salle visited here in 1679 and later years as he journeyed from the Hakes" to the interior. He founded here an Indian village, the Miami tribe ; but later the Pottawattomis occupied the place. It is in a fertile agricultural region in which stock-raising is given considerable atten¬ tion.

Industries. — The city is the industrial centre for a large portion of Northern Indiana. Some of the manufactures are plows, wagons, auto¬ mobiles and automobile bodies, clover hullers, woolen goods, paper, toys, shirts, sewing ma¬ chine parts, blank-books, bicycles, baking pow¬ der, bluing, bank, bar and office furniture, steam boilers, electrical appliances, street sprinklers, wood and paper boxes, brick, cement, brooms, confectionery, cigars, barrels, culti¬ vators, cutlery, dowels, furniture, feed mills, flour, harness, harrows, machinery, ice, knit underwear, lumber, tombstones, mattresses, proprietary medicines, linseed oil, varnish, pul¬ leys, rubber stamps, sash, blinds, doors, screens, seeders, sheet iron products, steel ranges, mal¬ leable steel castings, spark arresters, mineral waters, steel skeins, fishing

tackle, indurated fibra goods, pharmaceutical goods fonphysicans, cigar boxes, electrotypes, grain drills, roofing, automobiles, watches, etc. Nearly all the South Bend factories work the entire year.

The government census of 1914 gives the number of manufacturing establishments 250, the amount of capital invested $54,148,000, the number of employees in the manufactories, not including members of firms, 14,304, annual wages $9,436,000, cost of material used annually $12,742,000, value of products $31,180,000. The capital invested in the carriage and wagon fac¬

tories is about $20,000,000, and the value of the annual output $10,000,000. The output of the agricultural implements works is about $3,500,000, and of the foundry and machine- shop products $3,500,000. There are over 40 wholesale houses.

Buildings and Parks. — The principal public buildings are the government building, county courthouse and county jail ($40,000), city hall $75,000, Chamber of Commerce, Y. M. C. A. building, Saint Joseph's Hospital, Saint An¬ thony's Convent, the city hospital and two theatres. The public parks embrace 280 acres. There are four playgrounds, one 20-acre play- field and 13 social centres. The water supply comes largely from 62 artesian wells ; there are about 100 miles of water mains.

Churches and Schools.— There are 44 church buildings and 51 church organizations, representing 18 different denominations. The educational institutions are one public high school, 18 public schools, 12 parish schools, Saint Aloysius and Saint Joseph's academies, conservatory of music, /commercial schools, teachers' training school, historical society and a public library. Just outside the limits of the city, in the village of Notre Dame, are the large Roman Catholic schools, the University of Notre Dame (q.v.) for men and Saint Mary's College for women.

Banks and Banking. — The four national banks have a combined capital of $500,000; the County Savings Bank has resources to the amount of $4,500,000, deposits $5,000,000 and a surplus of $250,000. There are six building and loan associations.

Government and Population. — The govern¬ ment is administered under a special charter granted by the legislature which provides for a mayor and a council of 10 members. The mem¬ bers of the council hold office for a term of two years. There are about 20 nationalities repre¬ sented in the city. The various industries and the good wages

attract skilled workmen to South Bend. The principal nationalities, other than the English-speaking races, are Germans, Swedes, Poles, Belgians, Hungarians and Danes. Pop. (1920) 70,983.

SOUTH BERWICK, Me, town, York County, on the Salmon Falls River, and on the Boston and Maine Railroad, 40 miles southwest of Portland. Its chief manufacturing interests include shoe factories, cotton and woolen mills and carriage shops. The town has a public library and is the seat of Berwick Academy, a non-sectarian secondary school chartered in 1791. Pop. about 3,000.

SOUTH BETHLEHEM, beth'le-em, Pa., borough Northampton County, on the Lehigh Valley and the Philadelphia and Rending rail¬ roads, about 12 miles west of Easton, the county- seat, and about 40 miles, in direct line, north of Philadelphia. Electric railroads connect it with Allentown, Bethlehem and other places in the vicinity.

South Bethlehem was settled in 1741 ; but for many years it increased slowly in popula¬ tion and its industries were limited to local needs. Since 1850 the number and magnitude of the industries have increased and the bor¬ ough has grown in proportion. It is in a manu¬ facturing section, where iron ore deposits and, coal fields are convenient and where there are

good transportation facilities. The chief indus¬ trial establishments are iron and steel works, machine shops, foundries, zinc and brass works, wood working factories, knitting mills, silk mills, coke works, ice plant, cigars and furni¬ ture works. The government census of 1914 gives the number of manufacturing establish¬ ments as 43, the amount of capital invested $68,973,000, the number of employees, not own¬ ers 10,892, the total wages $8,279,000, the cost of material used $22,621,000. the value of the product, $40,179,000. It ranks 19 in the State in the value of its manufactured products.

There are 21 churches, Saint Luke’s Hospi¬ tal and one home. The educational institu¬ tions are the Lehigh University, which has 15 large buildings, Bishopthorpe School, an insti¬ tution for girls, a public high school, public and parish elementary schools and public and school libraries. Pop. 23,000.

SOUTH CAROLINA, a South Atlantic State of the United States of America, one of the original 13, and popularly called (<The Palmetto

State,® lies between lat. 32° 4' 30" and 35° 12' N. and between long. 78° 30' and 83° 20' W. Its area is 30,989 square miles, of which 494 square miles is water. The State of North Carolina bounds it on the north; the Savannah River, the eighth river in length in North America, on the southwest and west; the Atlantic Ocean on the south, southeast and east forms the base of an irregularly shaped triangle with its apex resting on the Appalachian Moun¬ tains 200 miles to the north.

Topography. — Coast Region. — The coast region has an area of 1,700 square miles. The average elevation above sea-level is 10 to 15 feet, rarely 25 to 30. South of the Santee River the mainland is bordered by numerous islands, formed from the detritus brought down by the rivers and banked up south of their outlets by the currents and waves of the sea. They are fringed between high and low tide by salt marshes and extensive beds of oysters peculiar to this latitude. The mean rise of the tide in the Savannah River is 6.9 feet, and diminishes eastward to 3.5 feet at the Georgetown entrance. The tides push the fresh water of the streams before them on the flood, 15 to 30 miles inland, and render tide-water irrigation of the rice fields practicable. The salt water rivers sepa¬ rating the islands from each other and from the mainland furnish navigable waters for a length of 400 to 500 miles for steamboats and might, with little work, be converted into a continuous inside passage from one boundary of the State to the other.

The Lower Pine Belt. — Immediately north of the coast region the Lower Pine Belt, with a width varying from 20 to 70 miles, crosses the State from east to west, covering an area of 10,226 miles. These low-level lands bear a strong resemblance to those of the coast. The uplands, the so-called (<pine barrens,® represent the sea islands, the numerous large fresh-water rivers replace the salt rivers and arms of the sea, and the swamps, covering over 2,000 square miles, recall the salt marshes. Eight large rivers conveying all the rainfall of South Caro¬ lina, with a considerable portion of that from North Carolina and Georgia, together with sev¬ eral smaller rivers and innumerable lesser streams, traverse the region. The maximum

elevation, 134 feet, is reached at Branchville, making the fall to tide water in a direct line 2.8 feet per mile. In the extreme west the fall is greater, 5.8 feet a mile; in the Pee Dee section it is less than a foot to the mile. With proper engineering the fall is sufficient to drain the swamps and bring into cultivation what are per¬ haps the most fertile lands in the State.

The Upper Pine Belt. — The Upper Pine Belt, or central cotton region,

lies north of the Lower Pine Belt and south of the Sand and Red Hill region. It covers 6,230 square miles. The ele¬ vation, 130 to 269 feet. There are extensive bodies of very fertile swamps in the rivers, sub¬ ject, however, to occasional overflows, and back swamps equally fertile but needing drainage.

Sand and Red Hills. — A range of sand hills rises from the gentle slope of the Upper Pine Belt and attains an elevation of 500 to 826 feet. It is interrupted by hills and elevated levels of red clay lands. Its northern boundary is the Mall line® of the rivers. It covers 4,061 square miles. Extensive quarries of kaolin clay are worked here; works for the manufacture of porcelain ware from them have been success¬ fully operated, and many thousand tons are annually shipped to the paper manufactories. Fuller's earth is also found. A (<cement gravel® has been much exploited for road material, being shipped by rail to distant points for that use. Roads covered a few inches with it become hard and withstand the weather and much travel. The long slopes of these hills face south, and the short slopes north. The latter are the most fertile. Besides rivers, the large clear swift running creeks, not counting smaller streams and branches, aggregate 1,100 miles in length. Their average fall is 15 to 20 feet to the mile.

Piedmont Region. — The average elevation is 700 feet, rising from 545 at Winnsboro to 989 feet at Greenville. It covers 10,245 square miles. Inexhaustible quantities of building granite of fine quality occur in Fairfield, New¬ berry, Kershaw and other counties. Mica slate is found in Abbeyville and Anderson. The pe¬ culiar soils known as the (<flatwoods® of Abbey¬ ville, and the <(meadow lands® of Union, and also the (<black jack flats® of Chester and York, are due to the weathering of extensive trap dikes in those localities. Lieber wrote in 1859, (<above this line (the Hall line1) most streams have some gold in their sands.® Thirty-one gold mines were opened in the talc slates of Chesterfield, Lancaster, Abbeyville and Edge- field counties. The Dorn Mine (now McCor¬ mick), in the last-named county, has yielded $1,100,000. There were 19 gold mines in the mica slates of Spartanburg, Union and York counties. Gold production is about at its end, only $3,789 worth being produced in 1915. Eight other, chiefly gravel, deposits, are in Greenville and Pickens counties. Argentifer¬ ous galena and copper are found in these mines, bismuth in quantity at Brewer Mine in Chesterfield County; iron in magnetic and specular ores in large quantity at Kings Mountain and elsewhere in Spartanburg and Union counties; limestone in York, Pickens, Spartanburg and Laurens ; in the latter county there are quarries of marble; feldspar in Pickens, Abbeyville, Anderson and Laurens ; barytes on the Air Line Railroad in York; man¬ ganese in abundance and pnritv at the Dorn

SOUTH CAROLINA.

Estimated population 1,625,475

COUNTIES

Pop.

Pop.

34,804 Abbeville .

.D 4

26,995 Horry .

.E 14

41,849 Aiken .

. . Jasper .

...18

. G 7

(Pop. incl. in Hampton

(Pop. incl. in Barn-

and Beaufort Cos.)

well Co.)

27,094 Kershaw .

.C 10

69,568 Anderson .

.C 3

26,650 Lancaster .

. .B 9

18,544 Bamberg .

.G 8

41,550 Laurens .

..0 5

34,209 Barnwell .

.G 7

25,318 Lee .

.D 10

30,355 Beaufort .

. . J 9

32,040 Lexington .

. .E 8

23,487 Berkeley .

.G 12

. McCormick. . . .

. . .E 4

16,634 Calhoun .

(Pop. incl in

Abbe-

88,594 Charleston .

H 12

ville and Edgefield

26,179 Cherokee .

. . A 7

Cos.)

29,425 Chester .

. .B 8

20,596 Marlon .

.D 13

26,301 Chesterfield .

.C 11

31,189 Marlboro .

. C 12

32,188 Clarendon .

E 11

34,586 Newberry .

. D 7

35,390 Colleton .

H 9

27,337 Oconee... .

. . . B 2

36,027 Darlington .

. D 12

55,893 Orangeburg....

...F7

22,615 Dillon .

.C 13

25,422 Pickens .

. . .B 3

17,891 Dorchester .

.G 10

55,143 Richland .

. . D 9

28,281 Edgefield .

. .E 5

20,943 Saluda . . . . .

. . .D 6

29,442 Fairfield .

. .C 8

83,465 Spartanburg...

. . B 5

35,671 Florence .

. D 12

38,472 Sumter .

22,270 Georgetown .

.F 14

29,911 Union .

. . C 7

68,377 Greenville .

. .B 4

37,626 Williamsburg . .

. .F 12

34,225 Greenwood .

. D5

47,718 York .

25,126 Hampton .

. . H 8

Incorporated Cities.

Towns, Villages, Etc.

4,459 Abbeville .

D 4

392 Fort Motte .

...E9

3,911 Aiken .

. .F 6

979 Fountain Inn . . .

.. C 4

1,453 Allendale .

. .G 7

4,767 Gaffney .

. . .A 6

12,266 Anderson .

..03

5,530 Georgetown ....

. .G 13

156 Appleton .

. .G 7

178 Glenn Springs. .

. . .B 6

1,937 Bamberg .

. .G 9

Ill Go van .

. . . G 8

1,324 Barnwell .

. .G 7

284 Gray Court. . . .

. . . C 5

1,995 Batesburg .

. .E 7

630 Greely ville .

. .F 11

2,486 Beaufort .

..19

18,181 Greenville .

...B4

1,652 Belton .

. .C 4

6,614 Greenwood ....

. . . D 4

2,646 Bennettsville . . . .

C 13

1,673 Greer .

...B4

317 Bethune .

.C 10

67 Grover .

. .G 10

196 Bingham .

.C 13

748 Hampton .

1,659 Bishopville .

.D 11

1 90 Harley ville ....

. .G 10

1,119 Blacksburg .

. .A 7

2,365 Hartsville .

..D 11

192 Blackstock .

. .C 8

452 Heath Springs . .

. . C 9

1,278 Blackville .

425 Helena .

. . . D 6

116 Blaney .

. .D 9

319 Hendersonville.

. . ,H 9

228 Blenheim .

.C 13

285 Hickory Grove .

...B 7

577 Bluffton .

. .J 9

266 Hodges .

. . D 5

160 Bolen. Orangeburg F 9

342 Holly Hill .

,.G 10

327 Bowman .

.F 10

1,763 Honea Path . . . .

...C4

50 Bowyer .

.G 10

474 Inman .

. . .A 5

279 Bradley . .

.D 5

267 Irmo . .

. . .D 8

1,471 B ranch ville .

,.G9

894 Iva .

. . .1)3

610 Brunson .

.H 8

54 Jacksonboro . . .

. . H 10

215 Calhoun .

..C3

390 Jefferson .

296 Calhoun Falls . .

..1)4

943 Johnston .

3,569 Camden .

D 10

969 Jonesville .

...B7

421 Cameron .

. .F 9

92 Kelton, Union .

...C7

255 Campobello .

. . A 4

62 Kemper . .

. ,D 14

367 Carlisle .

. .C 7

950 Kershaw .

. .C 10

886 Central .

. B 3

1,372 Kingstree .

345 Chapin .

,D7

199 Kline .

...G8

150 Chappells .

. . D 6

1,074 Lake City .

..E 12

60,734 Charleston .

H 11

592 Lamar .

.Dll

2,873 Cheraw .

.C 12

2,098 Lancaster .

. . .B 9

4,754 Chester .

. .B 8

449 Landrum .

. . .A 5

618 Chesterfield ....

.B 11

1,358 Latta .

.D 13

4,900 Clifton .

. .B 6

4,818 Laurens .

...C6

3,272 Clinton .

. .C 6

980 Leesville .

...E7

780 Clio .

.C 13

162 Lewiedale, Lexing-

1,207 Clover .

. .A 8

ton .

. . .E 8

290 Cokesbury .

.D 5

709 Lexington .

34,611 Columbia .

. .E 9

1,058 Liberty .

. . . B 3

1,228 Conway .

.E 14

341 Lincol n ville. .. .

..Gil

174 Cope .

. .F 9

440 Little Mountain

...D 7

199 Coronaca .

. D5

99 Little Rock. . . .

. .C 13

418 Cottageville ....

. .H 9

168 Livingston .

...F8

1,101 Cowpens .

. .B 6

263 Lodge .

...G9

558 Cross Hill .

.1)6

229 Loris .

.D 15

3,789 Darlington .

.D 11

350 Lowndesville . . .

■ > ,075 Denmark .

. .G 8

343 Lowry ville .

1,757 Dillon .

.C 13

139 Lucknow .

. .D 11

268 DonaTds .

. .C 4

466 Lynchburg .

.D 11

169 Doves ville .

.C 12

187 McBee .

. .C 10

672 Due West .

-D 4

1,628 McColl .

. .C 13

190 Duncan . .

. .B 5

279 McConnells ville

...B8

2,983 Easley . . .

613 McCormick .

237 Eastover .

. .E 9

96 Mallory .

. ,C 13

1,234 Eau Claire, Rich

•

1,854 Manning .

land .

.. D 9

3,844 Marion . ,

. . D 14

190 Ebenezer, York.

. .B 8

473 Maryville, Charles-

1,771 Edgefield .

ton .

. .H 12

113 Edgmoor .

,.B9

751 Mayesville .

315 Ehrhardt .

. .G 8

96 Midway .

...G9

114 Elko .

. .F 7

108 Modoc .

,.E5

367 Ellenton .

• G 6

232 Moncks Corner .

..G 11

540 Elloree .

122 Monetta .

. . .E 7

460 Estill .

1,011 Moultrieville . . . .

.H 12

405 Eutawville .

G 10

264 Mt. Carmel .

. . . D 4

499 Fairfax .

.H 8

1,346 Mt. Pleasant _

. H 12

7,057 Florence .

D 12

150 Mountville .

. . .C 6

115 Foreston .

.F 11

1,832 Mullins .

134 Fork .

D 13

143 Neeses .

204 Fort Lawn .

.B 9

900 New Brookland

...E8

1,616 Fort Mill .

5,028 Newberry .

. .D 7

118

Nichols .

. D 14

109

Smyrna .

... A 7

758

Ninety Six .

. .D6

338

Snelling .

...G7

180

Norris .

. .B 3

21,365

Spartanburg. . .

. . . . B 5

561

North .

,.F8

438

Springfield ....

,...F8

,136

North Augusta . .

. .F 6

957

St. George .

. .G 10

315

Norway .

. .F 8

1,377

St. Matthews . .

...E9

230

Olanta .

.E 12

408

St. Stephen . . . .

..F 12

350

Olar .

. .G 8

678

Summerton. . . .

. .F 11

,906

Orangeburg .

. .F 8

2,355

Summ erville. .

. . .Gil

410

Pacolet .

. .B 6

87

Summit .

. . . E 7

360

Pageland .

.B 10

9,639

Sumter .

. .E 11

157

Pages Mill .

.C 14

523

Swansea .

. . .E 8

197

Parksville .

. .E 5

99

Sycamore .

. . .G §

98

Patrick .

.C 11

225

Tatum .

. .C 13

175

Paxville .

.E 10

1,708

Timmonsville .

. . .D 12

183

Peak .

. . D 7

128

Tirzah .

. . . B 8

822

Pendleton .

. .C 3

255

Townville .

...C3

179

Perry .

. .F 8

257

Trenton .

897

Pickens .

. .B 3

198

Trio .

. . .F 12

424

Pinewood .

.E 10

233

Troy .

. . . E 5

145

Plum Branch. . .

190

Ulmers .

...G7

363

Port Royal .

. . J 9

5,623

Union .

182

Princeton .

. .C 5

97

Vance .

. .F 10

737

Prosperity .

. D7

542

Varn ville .

. . .H 9

205

Reevesville .

.G 10

362

Wagener .

...f 7

177

Reid ville .

. . B 5

1,595

Walhalla .

. . .B 2

245

Richburg .

. .B 8

1,677

Walterboro . . .

330

Ridgeland .

...19

183

Ward .

...E6

505

Ridge Spring. . . .

. .E 7

191

Waterloo .

...C5

300

Ridgeville .

.G 10

370

Wellford .

. . . B 5

370

Ridgeway .

. D 9

1,576

Westminster . .

... .B 2

,216

Rock Hill .

. .B 9

328

West Union . . .

. . .B 2

194

Ruby .

.B 11

107

West ville .

. .C 10

508

Rowesville .

. . .F 9

85

White Rock . . .

...D8

139

Salem .

. .B 3

1,045

Whitmire .

...C7

311

Salley .

1,957

Williamston . . .

,..C4

610

Saluda .

. .D 6

365

Willington . . . .

189

Scotia .

. .H 7

624

Williston .

. . .F 7

308

Scranton .

1,754

Winnsboro . . . .

. . . C 9

458

Sellers .

. D 13

190

Woodford .

. . ,F 8

,313

Seneca .

1,880

Woodruff .

. . .B 6

795

Shandon, Richland D 9

1 250

Yemassee .

. . . H 9

374

Sharon .

. .B 7

2,326

Yorkville .

. . B 8

113

Sieglingville ....

. .G 7

195

Zion .

. D 13

521

Simpsonvllle ....

SOUTH CAROLINA

289

mine, and in Abbeyville, York and Pickens; asbestos in Spartanburg, Laurens, York, Ander¬ son and Pickens ; spinel rubies in Pickens ; tourmaline in York, Edgefield and Laurens; beryl in Edgefield and Laurens; corundum in Laurens ; zircons in Abbeyville and Anderson ; one diamond has been taken from the itacolu- mite in Spartanburg.

Alpine Region. — The Alpine Region occu¬ pies the extreme northwestern corner of Caro¬ lina. It has an average elevation of 1,000 to 1,500 feet; Kings Mountain is 1,692 feet; Paris Mountain, 2,054 feet; Caesar's Head, 3,118 feet; and Mount Pinnacle, 3,426 feet. The mountains here often rise suddenly to their greatest height. The southeastern front of Kings Mountain is 500 feet in perpendicular height, Table Rock is 800 feet vertically above its southeastern terrace. The northwestern slopes descend gradually to¬ ward the Blue Ridge Mountains. There would seem to have been in ages past some great fault or land slip here, producing the long southeast¬ ern incline running down to the sea, and con¬ tinuing under its waters for 100 miles to the Gulf Stream, where the 100-fathom depth sud¬ denly sinks to 1,500 fathoms. The region cov¬ ers 1,281 square miles.

Geology. — Sands, clays, soft limestones and marls more or less unconsolidated characterize the coastal region. They range from the Cre¬ taceous to the Tertiary period. In the Lower Pine Belt outcrops of the Cretaceous rocks are noted in the extreme southeastern corner of the State, and have been traced northward to Mars Bluff and Darlington, where it passes under the Buhrstone of the Eocene. Superim¬ posed on these Cretaceous marls are the San¬ tee marls. They belong to the Eocene and are composed of corals and gigantic oyster shells. Just above tide-water they pass under the Ash¬ ley and Cooper marls, composed of many-cham- bered cells (Foraminifera), sometimes of so fine and compact a structure as to fit them for building purposes. Fragments broken from these marls and rounded by wave action form the phosphate rock of commerce. These nod¬ ules contain 55 to 61 per cent of phosphate of lime and. have been quarried at the depth of one to six feet; they are also found on the bot¬ tom of the rivers, and on sea bottoms from North Carolina to Florida. The remains of the mastodon, elephant, tapir, horse, etc., are found mingled with them. Green sands con¬ taining 4 to 6 per cent of potash in the form of glauconite also occur here. A sandy loam overlays the Santee (Eocene) marls of the Upper Pine Belt. In the northern portion these marls have been petrified and converted into Buhrstone. In the eastern part of the belt are outcrops of the Cretaceous, and occasional islands of Miocene marls. In the Sand and Red Hills region no lime occurs, the Eocene marls having been converted into Buhrstone. The formations bear evidence of being

littoral. Beds of lignite occur in Aiken and Chester¬ field; kaolin and other commercial clays abound in this region. Above the (<fall line" the rocks of the Piedmont country occur in the following order of superposition. On granite rests the gneiss, above them occur islands of greater or less extent of mica talc and clay slates, itacolu- mite and limestones, left from the denudation to which the region lias been subjected for ages.

The rocks and minerals of the Alpine region correspond with those of the Piedmont.

Hydrography. — Three considerable river systems take their rise in these mountains, and make their way southwardly to the sea. The eastern watershed of the Savannah is narrow, as is also the western watershed of the Pee Dee. The intermediate space occupying the larger portion of upper Carolina is crossed by seven rivers, the Saluda, Tyger, Reedy, Pacolet, Broad, Catawba, Wateree, with their numerous affluents uniting to form the Santee River. A line across the State from Augusta, Ga., to Columbia and thence to Cheraw in the east, is known as the <cf all line." On crossing this line the streams pass from the crystalline rocks, the granites and slates of upper Carolina, into the softer strata of the tertiary marls of the low country. Above the Tall line" the average slope of the streams is five feet to the mile, and they are available for the development of water powers to an extent estimated at 1,000,000 horse power. Below the fall eight other rivers, the North and the South Edisto, the Combahee, the Coosawhatchie, Black River, Cooper, Ash¬ ley, Waccamaw, are found with a fall of one to one and one-half feet to the mile. The numer¬ ous creeks, however, that feed these rivers, rising themselves in the elevation of the Sand Hills and Red Hills, have a much more rapid fall. Horse Creek, for instance, emptying into the Savannah below Augusta, furnishes in the length of 10 miles power for the Vaucluse, Graniteville, Langley, Aiken and Clearwater factories, without being fully utilized. The rivers are navigable to the Tall line" for steamboats not exceeding 200 tons burden, and in all there is from 700 to 800 miles of naviga¬ tion above tidewater.

Flora. — The palmetto and the live oak characterize the growth of the coast region, which also produces oranges of superior quality and figs in great abundance. Magnolias also abound from the coast to some distance inland. The swamps are characterized by cypresses, gums and bay trees. The long-leaf pine, water oaks and hickories are common on the uplands near the coast. Hard woods are predominant on the

Piedmont plateau ; deciduous oaks are most common, but birch, beech, ash, black wal¬ nut, maple, sycamore, chestnut and tulips are also plentiful. The mountains have cucumber trees, hemlock, white pine and laurel. Among indigenous species of economic importance are the grape, blackberry, pawpaw, plum, persimmon, crabapple, hazel nut, walnut, pecan, apricot, cherry and pear. Ginseng, bloodroot, hore- hound, redroot, horsemint, wild flax are the commonest medicinal plants, while the flowering varieties are represented by the lilies, roses, violet, golden rod, woodbine, azaleas and jes¬ samines.

Fauna. — Deer, rabbits, squirrels, muskrats, raccoons, opossums, minks, ducks, wild turkeys, quail, snipe and woodcock are the best repre¬ sented of the animals and birds. Foxes, bears, wolves, wildcats are now rare, while within memory panthers have become extinct. There are several varieties of songbirds, including all ordinary varieties. In the bays and rivers are porpoises, whiting, bluefish, seabass, shad, stur¬ geon, mullet, snappers, sheepshead, weakfish, oysters, shrimps and terrapins. In the upper

courses of the rivers are catfish, pike, perch and trout.

Climate. — The mean annual temperature in the coast region is 63° to 65° F. ; summer mean, 74° to 79°; winter 54° to 56° ; .rainfall, 50 to 80 inches. In the Sand and Red Hills region the climate is dry, but it enjoys an abundant rainfall and is well watered. The Alpine region has a distinctly salubrious cli¬ mate. The highest mean temperature (for a week) ever recorded there was 90° F. ; the lowest was 25° F. The mean annual tempera¬ ture there is from 55° to 58° F. • The rainfall is heavy, dewless nights are rare and vegetation is in consequence luxurious. The mean annual temperature for the whole State is about 62° F. ; the mean summer temperature, 79° F., and the mean winter temperature 44° F. The mean annual rainfall is 49 inches; it is well dis¬ tributed and about 17 inches falls during the summer or growing season. Snow is uncom¬ mon in the southern part of the State and usu¬ ally melts as it falls, but in the north snowfalls of several inches are not uncommon. Torna¬ does sometimes sweep over the western part, while at intervals hurricanes from the West Indies ravage the eastern part of the State.

Soils. — In the Piedmont plateau the soil is a mixture of sand and

clay, the result of the dis¬ integration of the rocks of the region. On the hillsides of the river basins is the type of soil which is most common in the State, the deep red clay. The upper part of the coastal plain has a poor, sandy soil of little fertility, but the lower part has a finer sand which is much more fertile. Along the rivers and about the Sea Islands are the swamp muck and clay soils of great fertility.

Mineral Industry. — The minerals worked are phosphate rock, which is found in a belt of about 70 miles from the mouth of the Broad River to the headwaters of the Wando, in Berkeley, Dorchester, Charleston, Colleton and Beaufort counties. In 1915, 83,460 long tons (2,240 pounds), valued at $310,850, were mined. The production is declining in South Carolina. Granite in 1915 was produced to the value of $321,612 and clay products (brick and ((paper clays®) to the value of $379,133. Gold produc¬ tion, once important, has now practically ceased. In 1915 only 183 fine ounces ($3,789) were produced. The State produces also silver, manganese, iron, lime and monazite in small quantities. The value of the total mineral out¬ put (including coal products, sand, etc.) was $1,129,709 in 1915 and $1,414,249 in 1914.

Agriculture. — The settlers in Carolina soon ascertained that its soil and climate were suit¬ able for all the plants of the Old World grow¬ ing from the subtropical to the subarctic regions, besides a most varied flora of its own. They found also extensive pastures supporting numerous herds of wild buffalo, elk and deer. The horses and cattle introduced by the Span¬ iards increased rapidly in numbers. It might have been thought that here were elements favorable for a diversified husbandry. The colonists, however, discovered an agricultural monopoly and an export ((money crop® in rice. It required capital for drainage and irrigation and a thoroughly organized and reliable labor able to resist the malarial influences of the rice swamps. Negro slaves fulfilled these condi¬ tions. English merchants furnished the negroes

and supplies on credit. The English Parlia¬ ment favored the exportation of rice and it became a most profitable crop. When cotton was introduced in the 18th century, as it grew on healthy uplands, and did not require much capital, it was suspected that the small white farmer would undertake its culture. The small farmers, however, did not, except as overseers, take to cotton planting until after the emanci¬ pation of the slaves. The small farmers of both races modeled themselves after the methods of an agriculture that had been successful for nearly two centuries. They confined their en¬ ergies largely to one ((money crop® for export. They worked at it with hired labor, on borrowed money, purchased instead of breeding work ani¬

mals, bought a notable portion of their sup¬ plies and largely of fertilizers.

The Lien Law securing the collection of ad¬ vances made on growing crops, often even be¬ fore they were planted, and the Lien Law re¬ quiring the enclosure of all livestock, leaving lands under crops unenclosed, promoted exist¬ ing tendencies in agriculture. Removing the cost of fencing on lands under crops led to a wide deforestation and careless cultivation.

In 1880 there were 93,864 farms in the State containing 13,457,613 acres, of which only 4,132 acres were improved. In 1890 the number of farms had increased to 115,008, with 13,985,014 acres, of which 5,755,741 acres were improved. There are now (1919) 176,434 farms in the State, covering an area of 13,512,028 acres, of which 6,097,999 acres are improved. Farm property, machinery and livestock had a total value of $84,079,702 in 1880. This value is now well over $400,000,000. About 68 per cent of the area of the State is woodland. The chief cereal crops in 1918 with their acreage and production were : wheat, 205,000 acres, 2,225,000 bushels, valued at $5,863,000; maize, 2,250,000 acres, 38,250,000 bushels, valued at $74,588,000; oats, 500,000 acres, 11,000,000 bushels, valued at $12,980,000; rice, 4,500 acres, 104,000 bushels, value $203,000. Of greater importance in the agricultural life of the State is the cotton crop, to which 3,047,000 acres were planted in 1918, producing 1,500,000 bales of upland variety, valued at $20,700,000. Tobacco in the same year was planted in 86,400 acres and yielded 62,208,000 pounds, valued at $18,662,000. The hay crop of 1918 was taken from 260,000 acres, yielded 286,000 tons, valued at $7,465,000. Pea¬ nuts were planted on 14,000 acres, yielded 630,- 000 bushels, valued at $1,840,000. About 80,000 acres were planted to sweet potatoes, of which 7,600,000 bushels were produced, valued at $10,792,000. Potatoes were planted on 28,000 acres, yielded 2,856,000 bushels, valued at $5,512, - 000. The farm animals in the State 1 Jan. 1919 were 82,000 horses, 194,000 mules, 203,000 milch cows, 244,000 other cattle, 29,000 sheep and 1,056,000 swine. The value of these livestock was $76,577,000.

More than 50 per cent of the farms are negro farms; about 25 per cent of the negro farmers are owners, 50 per cent cash tenants and 25 per cent share tenants. A higher per¬ centage of white farmers are owners. Poultry products amounted to about $2,000,000 in 1918. Honey and beeswax were produced in the same year to the value of $80,000.

Fisheries. — The State has active fisheries, mainly oysters, whiting, shad and sea-bass. The

industry gives employment to about 3,000 per¬ sons and has an invested capital of $125,000. The annual catch rarely exceeds $300,000 in value.

Forest Products. — Yellow pine, also called Southern pine, is the chief lumber resource of the State. The stand of this wood alone is estimated at 3,000 million feet. It is being de¬ pleted at a rapid rate. There are about 450 mills which cut about 750,000 M. F. B. per year. The value of all forest products in 1918 was over $5,000,000. Cypress, oak, locust and other pines are also being exploited.

Manufactures. — Antedating the establish¬ ment of the Patent Office by more than a cen¬ tury, the colonial assembly in 1691 passed an act <(for rewarding ingenious and industrious per¬ sons to essay such machines as may conduce to the better propagation of the produce of this State.® In 1778 tide water power was for the first time utilized in milling for cleaning rice. The machinery of these mills is the model on which this industry (performed before by hand) has since been conducted. A cotton fac¬ tory was established in 1784 at Murray's Ferry, Williamsburg, and one at Statesburg a few years later. The first saw gin — patented by Ogden Holmes and serving as the tvpe of all the short staple cotton gins of the South ever since — was erected in 1795 on Mill Creek, Fairfield County. Mills in the statistics of South Carolina, 1826, states that Mr. Waring operated a small cottonseed-oil mill at Columbia and ((expressed from cotton seed a very good oil.® In addition to this the improved gins operated at these mills have greatly cheapened the cost of ginning, which, together with high prices paid for seed, adds a few cents per pound to the value of lint cotton. The oil is a good edible oil and the by-products, meal and hulls are the cheapest form of stock food and fertilizer.

The manufactured products of South Caro¬ lina, as reported by the recent industrial census, were valued at $138,891,202; its factories gave employment to 71,914 wage-earners, who re¬ ceived $24,173,101 for their services. The capital invested in industry amounted to $203,- 210,875, the cost of materials was $91,008,196, leaving the value added by manufacture $47,- 882,208. The State ranked 31st in the value of products and 25th in the number of wage-

earners employed in manufactures.

The manufacture of cotton goods is the most important manufacturing industry. It gives employment to 64.6 per cent of all wage- earners and its products form 56.5 per cent of the total for all industries. There are only two States — Massachusetts and North Carolina — that exceed this State in the value of cotton manufactures. There are in operation 4,327,178 spindles, or 13.7 per cent of the total in the United States. The industry is fostered by the great cotton crop of the State. Oil, cottonseed and' cake extracting is the second industry and is of course a by-product of the cotton growing and cotton spinning and ginning industries. Fertilizer manufacture is also important.

Of the wage-earners 82.5 per cent are 16 years of age and over, and of this number 19.6 per cent were females. The turpentine and resin industries are declining owing to the ex¬ haustion of suitable timber.

The relative importance of the leading manufacturing industries is shown in the fol¬ lowing table :

INDUSTRY

Number

of

estab¬

lish¬

ments

Average number of wage- earners

Value of products

Cotton goods .

148

46 , 448

$78,446, 145

Oil, cottonseed and cake. .

97

2,037

16,379,858

Fertilizers .

55

2,050

13,824,659

Lumberandtimberproducts

79 3

11,308

11,657,800

Cars and shop construction

9

1,431

2,064,141

Printing and publishing . . .

166

893

1,985,263

Mineral and soda waters . . Foundry and machine shop

113

391

1,541,284

products .

40

515

937,472

Artificial ice .

36

368

818,223

Bread and bakery products

66

286

805 , 602

Hosiery and knit goods . . .

6

771

749,394

Brick, tile, pottery and clays

36

706

589,852

Carriages, wagons, etc .... Gas, illuminating and

18

209

499,591

heating .

12

136

496,225

Flour and grist mills .

37

30

420,629

Marble and stone .

37

283

400,938

Canning and preserving. . .

16

464

345,064

Confectionery .

22

85

226,204

Men’s clothing .

4

116

214,559

Food preparations .

5

16

202,248

Paving materials .

5

245

188,946

Turpentine and resin .

Copper, tin and sheet-iron

35

221

151,801

work .

9

71

121,667

All others .

120

2,834

5,823,637

Total .

1,885

71,914

$138,891,202

Communications. — The Savannah River is an important trade and travel route. Improve¬ ments have rendered it navigable for over 200

miles, from Savannah to Augusta, Ga. The Waccaman is navigable for 50 miles; the Great Pee Dee for 52 miles; the Cooper for 30 miles and the Edisto for 260 miles, while several other streams are navigable for distances up to 13 miles. Charleston, Beaufort and George¬ town are ports of entry. The length of steam railways in the State is 3,824 miles (144 miles of double track) and 113 miles of electric rail¬ way. The chief roads traversing the State are the Southern (1,200 miles), the Atlantic Coast Line (880 miles) and the Seaboard Air Line (370 miles). The assessed value of the rail¬ roads is $45,816,096.

Banks and Banking.— A State bank of South Carolina was established in 1812 and was entirely under State control. It was the reposi¬ tory for all State funds. It went into liquida¬ tion during the Reconstruction period. There are now within the State 55 national banks, capitalized at $7,500,000 and with $22,000,000 on deposit ; 285 State banks, capitalized at $10,500,- 000 and with $10,000,000 on deposit and $50,- 000,000 on loan ; 28 savings banks, with 36,398 depositors, who have to their credit $9,676,647, or $265.05 to each depositor.

Constitution and Government. — From 1670 to 1719 South Carolina was governed under the Carolina provincial charter of 1665. From 1719 to the period of the Revolution it was governed mostly by Crown commission. In 1776, 1778, 1790, 1865, 1868 and 1895 constitu¬ tions were adopted. That of the last-named year has since been several times amended. A constitutional amendment may originate in either house of the legislature; if carried by a

two-thirds vote in both houses it is submitted to the people at the next election following when a favorable majority sends it back to both houses, where it is again put to a vote. A majority vote of both houses is this time suffi¬ cient to make it part of the constitution. The two first steps above given for an amendment are also required to call a convention for the revision of the constitution. A negro majority is carefully guarded against by the constitu¬ tional provisions that voters applying for regis¬ tration after 1898 must be able to read and write any section of the State constitution or must show that they have paid all taxes for the previous year on property appraised at $300 or over. This provision effectively bars illiterate negroes from voting and also all negroes who do not own real or other property assessed by the State at $300 or over. A residence of two years in the

State is required for voting.

Executive. — The governor holds office for two years, is paid $3,000 and is eligible to suc¬ ceed himself. He must be 30 years old, as also the lieutenant-governor, and both must be resi¬ dents of the State for five years. Other ex¬ ecutive officers are the secretary of state, comptroller, state superintendent of education, treasurer, commissioner of agriculture, com¬ merce and industry and the attorney-general. All executive officers are elected for a term of two years and at the same time as the governor.

Legislative. — The State legislature is known as the general assembly. It is composed of a senate of 44 members, elected for four years (half retiring biennially), and a house of rep¬ resentatives of 124 members, elected for two years. Annual sessions are held beginning on the second Tuesday of January.

Judiciary. — The judicial power is vested in a Supreme Court, two Circuit Courts, a Court of Common Pleas with civil jurisdiction and a Court of General Sessions. The Supreme Court has a chief justice and four associates, elected by the general assembly for 10 years. The eight circuit justices are elected by the same body but for a four-year term. Justices of the peace are appointed by the governor.

Local Government. — The county is the unit of local government. It must contain at least one one hundred and twenty-fourth of the population of the State, have property assessed at $1,500,000 or over and be at least 400 miles in extent. The local electors must sanction all civic incorporation by a two-thirds vote.

Miscellaneous Laws and Provisions. — A provision of the constitution is aimed to pre¬ vent lynching, by providing for the removal from office of any officer who permits a prisoner to be seized and lynched, and by making such officer ineligible to hold any office of trust in the State. The county where the lynching occurs is liable in damages of not less than $2,000 to the legal representatives of the person lynched. Divorce is not allowed in any cir¬ cumstances. Hours of labor in cotton and woolen mills are limited to 60 per week, with certain exceptions. No one may hold office under the constitution who denies the existence of the Supreme Being.

Finances. — The State derives its revenue from the general property tax, fees, licenses, phosphate royalties, etc. On 1 Jan. 1918 the balance on hand in the State treasury amounted

to $963,089 ; the receipts in 1918 totaled $5,760,- 234. The expenditures in 1918 amounted to $5,904,786, leaving an unexpended balance on 1 Jan. 1919 of $818,537. On 1 Jan. 1919 the outstanding debt amounted to $5,391,320. The assessed value of real property in 1918 was $208,348,279 ; of personal property, $113,745,256.

Education. — School attendance is not com¬ pulsory, but there are certain restrictions on the employment of illiterate children in fac¬ tories or mines. There are separate schools for white and colored children. There are 14,919 public schools in the State with 407,940 en¬ rolled pupils and 8,680 teachers. The 149 pub¬ lic high schools have 427 teachers and over 8,000 pupils. For the training of teachers there is one public normal school with 67 teachers and 974 students. For higher instruction there is the University of South Carolina, founded at Columbia in 1805, with 43 professors and 385 students. Clemson Agricultural College has 71 professors and 840 students. Allen University (African Methodist Episcopal) for colored students has 17 professors and 631 students. Other higher institutions are Charleston City College, Erskine College (A. R. Presbyt.) and Wofford College (M. E. So.), at Spartanburg. There are several smaller denominational col¬ leges and also eight colleges for women. There is also a college for colored youths, a military academy and a normal and industrial college. The expenditures on public school education in 1917 was $3,887,295.

The State has a higher percentage of il¬ literates than all other States except Louisiana. Of the total population of 10 years of age or over 25.7 per cent were returned as illiterate at the last census. Among whites of native parentage the percentage of illiteracy was 10.5 ; among negroes, 38.7. The State educational system is ruled by a State Board of Education, under which are county superintendents, county boards and comity supervisors.

Population. — The population, according to the 1920 census, was 1,683,724. In 1910 there were 679,557 whites, 835,843 negroes, 65 Asiatics and 331ˆ Indians. The foreign-born population was 6,179, of whom 1,744 were German, 786 Rus¬ sian, 767 Irish and 517 English. Large towns are Charleston with an estimated population of 61,041; Columbia, the State capital, 35,165; Spartanburg, 21,985, and Greenville, 18,574. There were 335.046 males of voting age in 1910 and of these 165,769 were whites.

Religion. — The last religious census re¬ turned 655,933 members of different religious denominations ; the Baptists being strongest with

341,456 members, the Methodists next with 249,169. There were 35,533 Presbyterians, 12,652 Lutherans, 10,317 Roman Catholics and 8,557 Episcopalians.

Charities and Corrections. — The State

maintains several charitable institutions, in¬ cluding a hospital for the insane at Columbia and an asylum for the deaf, dumb and blind. There are besides 9 orphanages, 10 hospitals and 10 homes for adults and children main¬ tained mainly by private charity. A State Board of Charities and Correction was created in 1915. There is a State penitentiary at Columbia, where there is also a reformatory for negro boys. A State farm is located at Boykin and an in¬ dustrial school at Florence.

SOUTH CAROLINA

1 The Capitol Building at Columbia

2 The First Baptist Church, Columbia, where the Ordinance of Secession was passed

■ mJSZ ®

SOUTH CAROLINA

1 The Calhoun Monument, Charleston

2 The Custom House at Charleston

SOUTH CAROLINA

293

History. — The first settlement on the con¬ tinent of North America took place 27 May 1562 on the southeastern extremity of Paris Island in Port Royal Plarbor. A colony of French Huguenots landed there and built a fort, naming it in honor of their king, Charles IX, Carolina (aboriginal name, Chicora). Their ships having returned to France for reinforce¬ ments, a fire broke out, which destroyed their barracks and magazine. In this plight they con¬ structed boats, with the assistance of the In¬ dians, and went back to France. In 1665-69 Charles II, of England, claiming Carolina by reason of the discovery of North America by John Cabot, in 1497, when sailing under a patent from Henry VII. granted all that “tract of ground” in America between the 36th degree and 31st degree north latitude, and to the west as far as

the South Seas (Pacific Ocean) to eight English noblemen as Lords Proprietors. The grant covered about 1,020,000 square miles or more than one-third the area of the present United States, a region since largely peopled from the South Carolina of to-day. The first colony sent out landed in 1670, as the French had, at Port Royal, but removed shortly after to the confluence of the Ashley and Copper rivers, where they founded the city of Charleston. The Proprietary government was conducted under a royal charter and certain "Fundamental Constitutions" drawn for that purpose by the famous metaphysician, John Locke. In order to avoid "erecting a too numerous democracy" Locke designed a territorial aristocracy of land¬ graves, caciques and barons. The colonists, however, insisting upon the clause of the king's charter directing the Lords Proprietors to "gov- ern according to their best discretion by and with the advice, assent and approbation of the Freemen of said territory, or their deputies or delegates," prevented from first to last this aristocracy from taking root in the colony. The Proprietary government, without adaptability to the circumstances and necessities of the colony, promoted endless discussions and dissensions as to the interpretation of the charter and the "Constitutions." A succession of "heats and broils" during 49 years culminated in 1719. The Proprietors expressed their inability to aid the colonists, refused petitions addressed to them on important matters and repealed acts of the assembly laying taxes for the discharge of the public debt and for the freedom of elections. The assembly thereupon voted itself a conven¬ tion and unintimidated by the threat of the Proprietary governor to bombard Charles¬ ton from a British war vessel, elected James Moore governor in the name of the king, and the Royal Government of the Province sup¬ planted that of the Proprietors.

Bancroft and Dana place the highest esti¬ mate of the aborigines south of the Great Lakes and.east of the Mississippi River at 180,000, or one person to four and one-half square miles, a terri¬ tory now supporting a population of 67 to the square mile, or 301 for one Indian. John Law- son 1703 and Governor Glen in 1743 agree in estimating the Indian population of Carolina at about one to eight square miles. They were generally friendly to the colonists except when incited to sudden outbursts of hostility by the Spaniards, the French or the British, and formed a more or less important contingent

in war, as when James Moore in 1702-03 in¬ vaded the Appalachian region with 25 whites and 1,000 Indians and returned with 1,300 cap¬ tives, who were sold into slavery to the northern colonies and the West Indies.

Negro slaves were introduced from the Bar- badoes in 1671 and were counted to be 12,000 in number at the close of the Proprietary rule in 1720. They were instructed in the Christian religion and some of them taught to read. It was required of each white militia man that he should train and arm a negro to accompany him in war. The white population had increased from 391 in 1671 to 9,000 in 1720, living chiefly in proximity to Charleston. While the Indians lived principally on game and fish, cultivating only two plants, corn and tobacco, both exotics, the white colony never suffered for subsistence. They got 30 to 80 bushels of corn from an acre, deer supplying meat; an Indian hunter would for $25 a year furnish a family with 100 to 200 deer, besides wild turkey, fish, etc. The culture of rice was introduced in 1693 and the export of this cereal in 1720 amounted in value to £3,350 sterling. The Proprietors refused in 1674 to send out cattle to the colonists, saying they wanted them to be "planters and not graziers," but seven years later they had so increased that many planters had 700 to 800 head. The assembly had to appoint commis¬ sioners to dispose of unmarked animals, and passed a law for the enclosure of crops, which remained in force until 1882.

As early as 1700 Charleston had a large and lucrative trade with the Indians in furs and hides, extending 1,000 miles into the in¬ terior, and a large export trade in forest prod¬ ucts, timber, pitch, turpentine and provisions to the northern colonies and the West Indies. Religious freedom was secured, while the min¬ isters of the Church of England were sup¬ ported from the public funds. The various Church members stood as follows : Episco¬ palians, 42 per cent; Presbyterians and Hugue¬ nots, 45 per cent; Baptists, 10 per cent; Quakers, 3 per cent. A free public library was estab¬ lished in Charleston in 1700 and a free school in 1710. In 1712 a digest of the English and colonial laws was prepared by Chief Justice Trott. In 1 71 7 a successful war was waged against the pirates infesting Cape Feare and a number of them captured and executed. A duty of £30 a head was laid on the importation of negroes.

George I and George II were nursing fath¬ ers to Carolina. The assembly was convened, all actions at law on account of the change of government were declared void and the judicial proceedings under the provisional administra¬ tion confirmed. Treaties were made with the Indians, who had hitherto stood as independent neighbors and were now constituted allies or subjects. Parishes were laid out and whenever settled by 100 families, they were allowed repre¬ sentation in the assembly. To relieve the bur¬ den on the country people of repairing for the trial of all causes to the general court at Charleston, county and precinct courts were established. Schools were established

in each precinct and £25 levied by the justices to as¬ sist in the yearly support of the teachers, who were required to teach 10 poor children free of charge. Between 1733 and 1774, over 200 tutors,

schoolmasters or schoolmistresses, were en¬ gaged in the province. The king having bought out the Proprietors for £17,500 purchased also the quitrents due them by the colonists and remitted them. Charleston was the extreme southwestern outpost of the British in America. As late as 1741, when the Spanish possessions lay embosomed on the Gulf of Mexico, with Saint Augustine, the oldest fortified place in America, the French claimed all the territory lying west of a line starting from a point north of Charleston, reaching the Appalachian Mountains, running round the headwaters of the Potomac, across the Mohawk and Hudson, down Lake Champlain and by the Sorel River to the Saint Lawrence. With little aid from the mother country, the colonists had stood as the advance guard against the warring Euro¬ peans and held in check the American savages, the African savages imposed upon them, and the pirates. The first settlers had confined themselves to the neighborhood of Charles¬ ton. Now the settlement of Georgia, 1732-34, protected the Western frontier and the in¬ terior of Carolina, received many immigrants, Germans, and after Culloden many Scotch came into the middle section, and, on Braddock's defeat, refugees from Virginia and Pennsyl¬ vania followed in the Piedmont region. Land was granted free of charge for 10 years and after that the annual rental was four shillings sterling for 100 acres. Great Britain imposed restrictions on the commerce and domestic manufactures of her colonies. While this was prejudicial to the more northern colonies, it did not affect an agricultural people like the Carolinians. The restraint imposed by the navigation acts on colonial exports was removed on the export of Carolina rice. The exports of rice and indigo reached £108,750 in 1747. In 1775 the exports of these two commodities alone were valued at £1,000,000 sterling, a third of what the entire trade of the American colo¬ nies was estimated at in 1768. Between 1725 and 1775 the population increased sevenfold. In 1773 Josiah Quincy, writing from Charles¬ ton, says of the city: <(In grandeur, splendor of buildings, equipages, commerce, number of shipping, and, indeed, in almost everything, it far surpasses all I ever saw or expected to see in America.® With the most sincere and loyal attachment to Great Britain, the king and his government, the Carolinians sent their children to England and Scotland to be educated and spoke of the mother country as "home.®

In the midst of this prosperity Carolina was led, step by step, during a period of 11 years, through sympathy with the northern colonies for injuries inflicted on them, to take part against the enforcement by Great Britain of taxation without representation, without desiring or an¬ ticipating the separation from that country, which finally took place. On 28 June 1776, while the congress of the colonies was dis¬ cussing the Declaration of Independence, Colo¬ nel Moultrie, from the Palmetto Fort on Sulli¬ van's Island, repulsed with heavy loss the Eng¬ lish fleet and turned back the expedition of Sir Henry Clinton for the invasion and sub¬ jugation of the South. In the same year Caro¬ lina was the first colony to frame and adopt an independent constitution, but with the pro¬ viso that this constitution is but temporary

((until an accommodation of the unhappy differ¬ ences between the colonies and Great Britain can be obtained.®

In 1778 John Rutledge, governor of the State, declared <(such an accommodation, an event as desirable now as it ever was.® The material injuries to Carolina by the Stamp Act, the duty on tea and the other acts of the gov¬ ernment of George III were slight as com¬ pared with the advantages she enjoyed under English rule, but she had enlisted in no luke¬ warm manner in the struggle on account of the principles of right and justice involved. It was not until after the fall of Charleston in 1780, when the State lay prostrate, that the out¬ rages of the British armies roused to resistance the population from the seaboard to the moun¬ tains. They then flocked to the standards of the partisan leaders, Marion, Sumter, Pickens and others, and so harassed and delayed the northward movement of Cornwallis to join Clinton that Washington and Lafayette were enabled to unite in Virginia and force the Brit¬ ish into Yorktown. There, blockaded by the French fleet under DeGrasse, they were com¬ pelled to surrender and the war virtually termi¬ nated in favor of the Americans. Carolina con¬ tributed $1,205,978 above her quota to this war — only a few thousands less than Massa¬ chusetts, whose war the Revolution was, and who never suffered from invasion — and more than all the other 11 colonies together. One hundred and thirty-seven engagements with the British took place within her borders. In 103 Carolinians alone fought, in 20 others she had assistance and 14, including Camden, were fought by troops from other colonies. ((Left mainly to her own resources,® says Bancroft, <(it was through the depths of wretchedness that her sons were to bring her back to her place in the republic after suffering more, daring more, and achieving more than the men of any other State.®

The eight years of war were followed by eight years of distress and disorganization. The country had heen laid waste, churches burned and industries paralyzed. It was estimated that the British had kidnapped 25,000 slaves and sold them. They plundered the planters' homes. Bancroft says they pillaged of plate alone to the value of £300,000. After the fall of Charles¬ ton there arose a 14-years' dispute between the army and navy engaged in the siege as to their respective shares of the plunder. On 9 Aug. 1787 Carolina ceded to the United States her lands (10,000 square miles), not lying within her present boundaries. On 17 September of the same year she ratified the Constitution of the United States. In 1790 the seat of gov¬ ernment was removed from Charleston to Columbia, in the the centre of the State, and another constitution substituted for that of 1776. An amendment in 1808 fixed the number of representatives at 124, allowing one repre¬ sentative for each 62d part of the white in¬ habitants and one for each 62d part of the taxes raised by the legislature. The senate was to be composed of one member from each election district, except Charleston, which was allowed two. This accentuated the differences already existing between the peoples of the lower and the upper country. The former, being the out¬ growth of the city life of Charleston and the

first settlers, preponderated in wealth. The other, arising from numerous and separate centres of rural settlement, had the larger and more rapidly increasing number of white in¬ habitants.

The first Tariff Act of 1789 imposed an ad valorem duty of 5 per cent on imports (with a few specific duties of 15 per cent) for the support of the Federal government. This was in addition to the taxes raised by each State for its own purposes. It was much higher taxa¬ tion than under the colonial government, which required in ordinary times only a duty of 3 per cent on imports, with an export duty of 3d. on hides. Four years later the tariff was raised to 10 and 20 per cent. Ten years after, duties were increased 2*4 per cent in aid of the Mediterranean Fund against the Barbary Powers. Double war duties, amounting to 25 to 40 per cent, were imposed in 1812. In 1816 a tariff protecting the in¬ dustries, that had been found necessary but deficient during the late war, fixed duties at 25 per cent, to be reduced to 20 per cent in 1820. The Carolina representatives supported this not unreasonable protection. The reduc¬ tion never took place, and at this the Carolina representatives protested. Disregarding their protest, a tariff imposing

12 to 50 per cent duties was passed in 1824. Again, in 1828, with¬ out regard to the complaints of the Carolina farmers, who were being forced to contribute to the manufacturing profits of other States, a tariff raising duties 25 to 50 per cent was enacted. Wearied with unavailing remonstrance, a convention of the people of Carolina was called in 1832, which declared the protective tariff law unconstitutional, null and void. To meet this action of the State, Congress passed the Force Bill in 1833 for the collection of customs. In the same month of the same year Congress passed (<the Clay Compromise Act® for a gradual reduction of duties until 1842, when they should reach a 20 per cent level. This restored tranquillity, although for the sec¬ ond time the promised reduction was never fully realized.

Coincident with the tariff, another and more serious source of disturbance arose. In 1775 slavery extended over North America from Canada to Florida, inclusive. It had been in¬ troduced by Queen Elizabeth, and James II belonged to the Royal African Company for trading in negro slaves. Now it began to be looked upon with horror, as something strange and foreign to human instincts. The New Eng¬ land Anti-Slavery Society was formed in 1832. In less than four years more than 100,000 per¬ sons had joined anti-slavery societies in the Northern and Western States. They demanded of Congress that ((all slaves should be instantly set free without compensation of the owners.® They declared <(we will give the Union for the abolition of slavery.® The lesson was taught far and wide that the slaveholders of the South ((a few arrogant domineering self-constituted aristocracy® were — through the representation allowed them (<in proportion to the number of their slaves® — ruling the work-people of the North and denying their industries the pro¬ tection due from the Federal government. They declared that ((the country must become all free or all slave.® The non-slaveholding whites pf the South were as violently opposed to the

emancipation of the negroes as their brethren of the North were in favor of it. To them it meant industrial, political and social equality with a people in their midst whom they deemed inferior to themselves. They did not ask for aid to their industries through Federal taxation and did not see why Northern manufacturers should. After years of angry discussion along these lines the crisis came — during a period of unprecedented prosperity in Carolina — on the election by the Anti-Slavery party of a President in 1860 by less than a third of the popular vote. It found the peoples North and South solidly arrayed against each other with fatal unanimity. The ((irrepressible conflict® burst into war. The North took the offensive for Federal

domination and patronage and for race equality, freedom and fraternity. They were sustained by the popular sentiment of the European masses. South Carolina and the South rose to a man — with no sympathy or support from without — in defense of State autonomy and white supremacy. From an arms-bearing population of 55,046 in Carolina 44,000 volun¬ teered (most of them not identified with the slave-holding class) in defense of the domestic institutions of the State, its sovereignty and free trade. Utimately 71,088 were mustered in.

Poorly armed, poorly clad, poorly fed, prac¬ tically without pay for more than four years they maintained their cause, losing in battle and by disease 15,638 of their number. The negroes, who, in earlier days, had been enticed away by promises from the Spaniards and had sometimes sided with the Tories and the Brit¬ ish, remained as a rule loyal to their masters in this war, served their families and tilled their fields, while they were absent. The issue was decided by force of arms and numbers and was never submitted to legal adjudication. No indictments for treason, as is usual in rebellions, were made. An export duty was placed on cotton and import duties were increased by the national government. For 12 years negro su¬ premacy was enforced in the State by the Fed¬ eral army. When on 10 April 1877 the Federal guard filed out of the south door of the Capitol at Columbia the negro government collapsed without a struggle. The white citizens quietly resumed the administration of affairs. President Eliot of Harvard, in a speech before the Cen¬ tral Labor Union in Boston February 1904 on the world-wide conflict of labor and capital, sums up the result of this titanic struggle in these words : (<How many things my genera¬ tion thought were decided at Appomattox ; but during the subsequent 40 years it has gradually appeared that hardly anything was settled there except the preservation of the unity of the National territory.® For more than two cen¬ turies, under 10 written constitutions, the State had been governed by a more than usually cen¬ tralized democracy. Opposing a similar cen¬ tralization of functions by the Federal Union, the collision dispersed these functions into smaller and smaller civil divisions ; counties, townships, school districts. The latter, re¬ stricted to an area of 9 to 40 square miles, were endowed with the sovereign power to lay taxes and incur debt. A centrifugal tendency is noticeable, also, in subdivision of farms, and in the establishment of cross-road stores and vil¬ lage banks,

After the withdrawal of troops by President Hayes the whites secured control and white supremacy has since been maintained. In 1886 a property loss of $8,000,000 was caused by a severe earthquake centring about Charleston. Over 1,000 persons perished in a great storm along the coast in 1893. The gubernatorial con¬ test of 1890 was most bitter between the so- called aristocrats and the plebs or Farmers' Alliance. The latter were victorious and elected their candidate, Ben Tillman, to the governor¬ ship. Liquor regulation and legislation caused serious political turmoil from 1893 to 1907 when the State liquor dispensaries were abol¬ ished because of charges of corruption. In 1910 Prohibition was a campaign issue and went down to defeat when Coleman L. Blease was elected governor. Blease was soon involved with the State Supreme Court over judicial nominations, refusing to commission any ju¬ dicial appointees other than his personal friends. About 1911 the governor began to pardon con¬ victs wholesale, and by the end of his second term had considerably depleted the prison popu¬ lation. He also exercised his veto to an ex¬ traordinary degree but very many acts were passed over his veto. Despite considerable op¬ position Blease was re-elected in 1912. On 11 Jan. 1915 Blease disbanded the organized militia and resigned the following day. His successor reversed the order of disbandment. The State voted a majority for Prohibition in 1915. The State is strongly Democratic, having consistently voted a Democratic majority, except during the Reconstruction period, 1866-77, when Republi¬ cans were in power.

Population. — After the Revolutionary War the population of South Carolina was estimated at 104,000 for representation in the Federal Con¬ gress. In 1790 the State ranked seventh; it rose to sixth in 1800-10-20. The decline in rank commencing at the latter date has been con¬ tinuous, and in 1910 the State ranked 26th. In 1790 the density per square mile was 8.3; in 1910 it was 49.7. The foreign-born population was only 4 per cent of the whole in 1900; at that date the State had lost to other States 233,300 persons born in its limits, and had re¬ ceived from all the others 55,216, making a net loss from interstate migration of 178,076. The population in 1910 was 1.515,400.

Governors of South Carolina.

PROPRIETARY PERIOD. 1670-1719.

Sir John Yeamans . 1665

William Sayle . 1669-70

Joseph West (acting) . 1670-72

Sir John Yeamans . 1672-74

Joseph West . . . 1674-82

Joseph Morton . 1682-84

Richard Kyrle . . 1684

Robert Quarry (acting) . 1684-85

Joseph West . 1685

Joseph Morton . 1685-86

James Colleton . 1686-90

Seth Sothell . . 1690-92

Philip Ludwell . 1692-93

Thomas Smith . 1693-94

Joseph Blake (acting) . 1694

John Archdale . 1694-96

Joseph Blake . 1696-1700

James Moore (acting) . 1700-02

Sir Nathaniel Johnson . 1702-10

Edward Tynte . . 1710

Robert Gibbes (acting) . 1710-11

Charles Craven . 1711-16

Robert Daniel (deputy governor) . 1716-17

Robert Johnson 1717-19

ROYAL PERIOD, 1719-76.

James Moore. . 1719-21

Sir Francis Nicholson . 1721-25

Arthur Middleton . 1725-29

Robert Johnson . 1729-35

Thomas Broughton (deputy) . 1735-37

William Bull (lieut.-gov.) . 1737-43

James Glen . 1743-56

William Henry Lyttleton . 1756-60

William Bull, the 2d (lieut.-gov.) . 1760-61

Thomas Boone . . 1761-64

William Bull, the 2d (lieut.-gov.) . 1764-66

Lord Charles Greville Montague . 1766-68

William Bull, the 2d (lieut.-gov.) . 1768

Lord Charles Greville Montague . 1768-69

William Bull, the 2d (lieut.-gov.) . 1769-71

Lord Charles Greville Montague . 1771-73

William Bull, the 2d (lieut.-gov.) . 1773-75

Lord William Campbell . 1775

Henry Laurens (Pres. Council Safety) . 1775-76

STATEHOOD PERIOD, 1776.

John Rutledge .

Rawlins Lowndes .

John Rutledge .

John Matthewes .

Benjamin Guerard .

William Moultrie .

Thomas Pinckney .

Charles Pinckney .

William Moultrie .

Arnoldus Vanderhorst .

Charles Pinckney .

Edward Rutledge .

John Drayton .

James B. Richardson .

Paul Hamilton .

Charles Pinckney .

John Drayton .

Henry Middleton .

Joseph Alston .

David R. Williams .

Andrew Pickens .

John Geddes .

Thomas Bennett .

John L. Wilson .

Richafd I. Manning .

John Taylor .

Stephen D. Miller .

James Hamilton, Jr .

Robert Y. Hayne .

George McDuffie .

Pierce M. Butler .

Patrick Noble .

B. K. Henegan (acting) .

John P. Richardson .

James H. Hammond .

William Aiken .

David Johnson .

Whitemarsh B. Seabrook. . .

John H. Means .

John L. Manning .

James H. Adams .

Robert F. W. Allston .

WTilliam H. Gist .

Francis W. Pickens .

Milledge L. Bonham .

Andrew G. McGrath .

Benjamin F. Perry .

James L. Orr .

Gen. Ed. R. S. Canby .

Robert K. Scott .

Franklin J. Moses .

Daniel H. Chamberlain .

Wade Hampton .

William D. Simpson (acting) Thomas D. Teter (acting). . .

Johnson Hagood .

Hugh S. Thompson . . . .

John C. Sheppard (acting) . .

John P. Richardson .

Benjamin R. Tillman .

John G. Evans . . .

William H. Ellerbe .

Miles B. McSweeney .

Duncan C. Heyward .

Martin F. Ansel .

Coleman L. Blease .

C. A. Smith (acting) .

Richard I. Manning .

Robert A. Cooper .

Dem.-Rep

it

ii

u

a

a

a

a

u

u

a

u

Democrat

U

it

it

tt

a,

u

u

u

u

u

u

a

a

a

a

a

a

Provisional . . Conservative

Military .

Republican . .

it

it

Democrat . . .

ii

ii

ii

it

U

ii

ii

it

it

it

a

u

u

a

1776-78

1778- 79

1779- 82

1782- 83

1783- 85 1785-87 1787-89 1789-92 1 792-94 1 794-96 1796-98 1798-1800 1800-02 1802-04 1804-06 1806-08 1808-10 1810-12 1812-14 1814-16 1816-18 1818-20 1820-22 1822-24 1824-26 1826-28 1828-30 1830-32 1832-34 1834-36 1836-38 1838-40 1840 1840-42 1842-44 1844-46 1846-48 1848-50 1850-52 1852-54 1854-56 1856-58 1858-60 1860-62 1862-64

1864- 65 1865

1865- 68 1868 1868-72 1872-74 1874-76 1876-79

1879- 80 1880

1880- 82 1882-86 1886 1886-90 1890-94 1894-97 1897-99 1899-1903 1903-07 1907-11 1911-15 1915 1915-19 1919

Bibliography. — Annual reports of the vari-

cus administrative departments of the State; Carroll, B. R., (Historical Collections of South Carolina* (2 vols., New York 1836) ; Drayton,

John, ‘Memoirs of the American Revolution Relating to the State of South Carolina) (2 vols., Charleston 1821) ; Gibbes, R. W., (Docu¬ mentary History of the American Revolution (New York 1857) ; (Handbook of South Caro- lina) (Columbia 1907 ; 2d ed., ib. 1908) ; Hewatt, Alexander, (Historical Account of the Rise and Progress of the Colonies of South Carolina and Georgia } (London 1779) ; Hollis, John P., ‘The Early Period of Reconstruction in South Carolina) (Baltimore 1905) ; Houston, David F., (Critical Study of Nullification in South Carolina *(New York 1896) ; McCrady, Ed¬ ward, (South Carolina under the Proprietary Government * (New York 1897) ; id., (South Carolina under the Royal Government (ib. 1899) ; id., (South Carolina in the Revolution* (ib. 1901) ; Meriwether, Colyer, ‘History of Higher Education in South Carolina > (Wash¬ ington 1889) ; Moultrie, William, ‘Memoirs of the American Revolution as far as relates to the States of the Carolinas and Georgia) (2 vols., New York 1802) ; (North Carolina Colo¬ nial Records) (10 vols., Raleigh 1886-90) ; Pike, James S., (The Prostrate State; or South Caro¬ lina under Negro Government * (New York 1874) ; Ramsay, David, (History of South Carolina) (2 vols., Charleston 1809) ; id., his¬ tory of the Revolution in South Carolina) (2 vols., Trenton 1785) ; Ramage, B. J., (Local Government and Free Schools in South Caro- lina) (Baltimore 1883) ; Rhodes, J. F., ‘History of the United States) (5 vols., New York 1893- 1904) ; Herbert, H. A., (Why the Solid South? *(Baltimore 1890) ; Rivers, W. J., ‘History of South Carolina to the Close of the Proprietary Government, 1719* (Charleston 1856) ; Salley, A. S., ‘Narratives of Early Carolina, 1650— 1 70S5 (New York 1911) ; Schafer, W. A., ‘Sectional¬ ism and Representation in South Carolina *(Washington 1911) ; Simus, W. G., ‘Geography of South Carolina)*

(Charleston 1843) ; Smith, W. Roy, .'South Carolina as a Royal Province) (New York 1903) ; 'South Carolina Historical Society Collections) (5 vols., Charleston 1857— 59, ,1887-97) ; Tuomey, Michael, 'Report on the Geology of South Carolina) (Columbia 1848) ; von Holst, Hermann, 'John C. Calhoun (Bos¬ ton 1892) ; Wallace, D. D., 'The Civil Govern¬ ment of South Carolina) (Dallas 1906) ; id., 'Constitutional History of South Carolina, 1 775— 1875 (Abbeville, S. C., 1908) ; Watson, E. J., 'Handbook of South Carolina* (Columbia 1908) ; White, H. A.. 'The Making of South Carolina) (New York 1906) ; Whitney, E. L., 'Government of the Colony of South Carolina) (Baltimore 1896) ; id., 'Bibliography of the Colonial History of South Carolina) (in An¬ nual Report of the American Historical Asso¬ ciation, Washington 1895).

J. B. McDonnell, Editorial Staff of The Americana.

SOUTH CAROLINA INTER-STATE AND WEST INDIAN EXPOSITION, a

commercial and industrial exhibition held at Charleston, S. C., from 1 Dec. 1901 to 1 May 1902, at which exhibits were made from nearly all the Southern States and from the West In¬ dian Islands. The exposition showed the re¬ markable progress made by the South Atlantic States in commerce and industry since the

Civil War. The cost of the exposition was $1,250,000, of which $313,000 was covered by the receipts. The total attendance was 674,086.

SOUTH CAROLINA UNIVERSITY.

See University of South Carolina.

SOUTH DAKOTA, the "Sunshine State,® one of the north central United States located' west of Minnesota and Iowa, north of Ne¬ braska and east of Wyoming. It lies chiefly between the 97th and 104th degrees of longitude and the 43d and 46th degrees of latitude. This gives it an area of 77,615 square miles, being 360 miles wide from east to west and about 225 miles from north to south. It is the 14th State of the Union in respect to area. The word Dakota is of Indian origin and means "leagued or allied.®

Geology and Topography. — South Dakota has very great extremes of altitude and a great variety of topography. Big Stone Lake, in the northeastern part, is its lowest point. This is less than 1,000 feet above sea-level (967), while in the southwestern portion of the State, known as the "Black Hills,® there are elevations which rise to over 7,000 feet. Harney Peak is given at 7,244 feet by best authorities. The

surface also varies from that of level plains, which may be found in the James River Valley and along the Missouri, to high table-lands with gentle undulations, as east of the Mis¬ souri and in smaller areas 'on the summit of the Coteaus. Then there is a region of nar¬ row canons, hundreds of feet in depth, pre¬ senting on a smaller scale the wildness and picturesqueness of the Rocky Mountains, as Elk Creek and Spearfish canons in the Black Hills and the rugged, craggy needles of Harney Peak and vicinity. There are areas in the State where you cannot find a stone the size of an egg for a score of square miles and other sections where rocks and stones may be found, in great abundance — where erosion went on so continuously as to produce barren condi¬ tions. The Bad Lands of White River are a good illustration of this formation. The sur¬ face may be classified as follows: (1) The Black Hills : these are mountainous elevations. — much eroded — dome-shaped peaks pushed up above the horizontal beds that cover the surrounding region (2) the Table Lands: these occupy the region just east of the Mis¬ souri chiefly and were formerly called by the French “Plateau du Coteau du Missouri® ; (3) river valleys, including the present flood plains and also higher terraces, such as the Missouri River, which divides the State in nearly two equal parts, the Cheyenne, White, James and Sioux River valleys; (4) Bad Lands, a limited area in southwestern portion of the State, chiefly along the White River. This area has some unique characteristics. These several divisions require further descrip¬ tion to be appreciated. The Black Hills district has an area of about 5,000 square miles and occupies a prominent position in the south¬ western corner of the State. Their true limits are distinctly marked by a sharp ridge of sandstone from 300 to 600 feet in height. This ridge is separated from the higher mass of hills by a valley from one to three miles in width, known as Red Valley, so named by the Indians from the brick reel soil found there.

From this valley one ascends gradually the outer slope of the hills proper and soon enters an altitude of 4,000 to 5,000 feet. This outer' slope presents great variety of soil formation. It is underlaid by older sedimentary rocks cut in all directions by narrow and deep canons. This feature applies to all the southwestern por¬ tion of the State. From the broken interior edge of this slope (this sedimentary plateau) one descends a bluff and enters a central area, of slates-granite and quartzites formation. These are in many places carved into high ridges and sharp peaks cut by numerous nar¬ row and deep valleys and

ravines and with thickly-set Rocky Mountain pine timber. Toward the south of this elevated plateau Harney Peak rises to 7,244 feet above sea-level and toward the north Terry and Custer peaks attain quite an altitude and present a rugged and interesting surface.

The Table Lands correspond approximately to the early surface of the State. They slope from an altitude of about 3,500 feet along the western boundary eastward to an altitude of 2,000 feet near the northeast corner and to 1,450 feet near the southeast corner. This makes an average slope eastward of about four feet per mile along the northern boundary and less than six feet along the southern boundary. The highlands are eroded into un¬ dulations and traces are present of higher strata which every here and there stand out as buttes and ridges. The region which best illustrates this peculiarity is the northern part of that district lying west of the Missouri River. On the east side of the river these high¬ lands are less prominent and yet may be readily- located. The Bijou Hills, Wessington Hills, Ree Hills, etc., are all of this same formation as are the Choteau Creek Hills and Turkey Ridge in the southern portion of the State. There are three very important valleys crossing the State from north to south. These are the Missouri, the James and Big Sioux. The Min¬ nesota also touches the northern portion of the State where it has an altitude of about 1,000 feet above the sea. The James River Valley is from 60 to 70 miles wide and from 1,200 feet high at about the northern boundary line to 100 feet at the southern line. It has five im¬ portant branches. One extends west from Aberdeen at an altitude of about 1,500 feet, another west from Scotland and the fourth southeast from Marion. The fifth is northeast from Aberdeen and connects this James Valley with the Minnesota. All of these valleys have been very much eroded by glacial movements and are less sharply defined than are the valleys west of the Missouri River. The Missouri River Valley is very narrow, usually less thani three miles in width in South Dakota. Its western tributaries are also marked by narrow canon-like valleys. Examples of this are the Grand, the Cheyenne and White River canons. Along all of these Western rivers may be found a similarity of formation quite unique and pre¬ senting many features of interest to the stu¬ dent of nature. On the extreme eastern side of the State, extending nearly the entire length of the same and forming for nearly 100 miles the eastern boundary, is the big Sioux River Valley. This embraces the best agricultural

soil in the State and is not surpassed in fer¬ tility by any State in the Union.

The Bad Lands. — These have become famous. Their features and

treasures early attracted the hunter and the explorer. The term “bad® has been applied to them because of the difficulty of exploring that region. The most notable “bad lands,® or nuauvaises terres in the State are located between the Cheyenne and White rivers. This whole region is cut up by deep ravines, bounded largely with high continuous clay bluffs. Most of the surface is without useful vegetation. The peaks and bluffs seem to have been carved by erosion out of the white clays, marls and sands of the Tertiary Geological Period. The “Bad Lands® have become widely known, chiefly through the fossil remains they contain. The most fruitful field for this is what is known as Indian Draw, a south branch of the Cheyenne River. Here the stream has eroded a valley five or six miles in width, bounded by steep cliffs over 300 feet high. This valley is studded with an indescrib¬ able labyrinth of buttes, ravines, grassy valleys and dry water courses. Here the light coloredi clays of the Tertiary Period rest directly on the dark Cretaceous shales. In the lower strata of the Tertiary are to be found the best fossil remains. Many of these have found their way into our best European museumˆ and are evi¬ dences of mammoth animals of various types that once inhabited the forests of the State.

Archaeological Remains. — The State also contains interesting archaeological remains. These indicate the occupancy of a prehistoric race of greater industry and intelligence than the Indians later encountered by the white man. One of these is the remains of a strong fort near Pierre. It embraces about 130 acres of ground, is admirably located for strategic pur¬ poses, is laid out with a skill and accuracy that challenges the admiration of modern military engineers. Within this are found remnants of pottery which give evidence of a high degree of skill and artistic sense. Copper instruments, highly tempered, are also found indicating an art now lost to man. The walls of the fortifica¬ tion are very heavy and well constructed, sug¬ gesting an industry and a skill never exhibited by any Indian tribes. There are similar fortifi¬ cations at several other strategic points in the State, such as Chamberlain and Campbell County. Near old Fort Wadsworth, in Mar¬ shall County, are also extensive mounds which army engineers long ago pronounced must be¬ long to a prehistoric race.

Climate and Rainfall. — The State is noted for its abundance of sunshine. The whole eastern slope of the Rocky Mountain Plateau is distinguished for its sunshine and South Dakota is known as the “ Sunshine ® State. No Northern State has fewer cloudy days. The air is dry in winter and a low temperature is endured without much suffering. The Chinook winds from the Pacific warm current modify

the temperature very perceptibly, es¬ pecially in the western part of the State. The temperatures vary from an average of 16° above zero for January (the coldest month) to an average of 72° for July (the warmest month). The growing season varies from 136 days in the Black Hills to 150 days in the southeastern

SOUTH DAKOTA. Estimated population, 698,509

COUNTIES

Pop. 1915

Pon. 1915

231

Armstrong ....

...D8

*7.412

Lyman .

. .F 9

6,736

Aurora .

10,013

McCook .

.F 15

16,061

Beadle .

6,831

McPherson . .

• B 11

1,488

Bennett .

8,328

Marshall ....

.B 14

11,560

Bon Homme . .

. .H 14

*8,724

Meade .

. .D 4

1{)j*344 tfrookings .

. .E 16

*3,427

Mellette .

,.F8

25,969

Brown .

8,007

Miner .

.E 14

6,376

Brule .

37,613

Minnehaha . .

*1,485

Buffalo .

9,686

Moody .

.E 16

5,894

Butte .

10,040

Pennington . .

. .F 3

4,888

Campbell .

...B9

7,641

Perkins .

. .C 4

*14,790 Charles Mix . .

. .G 12

3,648

Potter .

10,670

Clark .

. .D 14

15,660

Roberts .

.B 16

9,214

Clay .

. .H 16

7,377

Sanborn .

.F 13

15,192

Codington .

. .C 15

Shannon. . . .

. .G 4

3,272

Corson .

(Pop. incl.

in

Pine

3,452

Custer .

Ridge and

Rosebud

13,005

Davison .

. .F 13

Ind. Reservations.)

*14,235 Day .

. .C 14

14.977

Spink .

.D 13

8,529

Deuel .

. .D 16

2,251

Stanley .

. .E 8

*1,933

Dewey .

2,004

Sully .

. .D 9

6,639

Douglas .

. .G 13

2,403

Todd .

. .G 8

6,845

Edmunds .

. .C 11

10,262

Tripp .

.G 10

6,027

Fall River . . . .

. . . G 2

14,636

Turner .

G 15

5,265

Faulk .

. .C 11

11,436

Union .

.H 16

10,474

Grant .

. .C 16

5,919

Walworth . . .

. .C 9

11,919

Gregory .

. .G 11

Washabaugh

,.F6

3,553

Haakon .

(Pop. incl.

in

Pine

7,791

Hamlin .

. .D 15

Ridge and

Rosebud

7,286

Hand .

Ind. Reservations.)

6,316

Hanson .

. .F 14

Washington .

. .G 4

4,821

Harding .

...B2

(Pod. incl.

in

Pine

*5,055

Hughes .

...E9

Ridee Indian Reser-

13,095

Hutchinson . . .

. .G 14

vation.)

2,685

Hyde .

..DIO

14,851

Yankton. . . .

.G 15

2,077

J ackson .

. . . F 6

*2,571

Ziebach ....

. .D 6

5,275

Jerauld .

. .F 12

Jones .

. . . F 8

Indian Reservations

(Pop. included in Ly-

1,037

Cheyenne River

. .C 8

man Co.)

485

Crow Creek

• • •

.E 10

11,947

Kingsbury . . . .

. .E 15

Lower Brule .

.E 10

11,865

Lake .

. .E 15

6,315

Pine Ridge. .

. .F 5

17,710

Lawrence .

. . D 2

Rosebud. . . .

13,564

Lincoln .

. .G 16

♦Including Indians.

Incorporated Cities. Towns, Villages, Etc.

,218 Aberdeen .

.C 12

301 Corsica .

..G13

76 Akaska .

. .C 9

120 Cottonwood. . .

. . . .F 6

140 Albee .

.C 17

238 Cresbard .

. . .C 12

477 Alcester .

.H 16

86 Crocker .

. . .C 14

936 Alexandria .

.F 14

416 Custer .

,...F2

394 Alpena .

.E 13

751 Dallas .

103 Altamont .

.D 16

113 Dante .

. . H 13

349 Andover .

.C 14

244 Davis .

. . .G 16

140 Ardmore .

...G 3

3,113 Deadwood . . .

884 Arlington .

.E 16

1,538 Dell Rapids ..

. . .F 16

953 Armour .

.G 13

494 Delmont .

159 Artas .

.B 10

1,014 De Smet .

. . .E 14

586 Artesian .

.E 14

515 Doland .

326 Ashton .

D 13

133 Dolton .

277 Aurora .

.E 16

120 Draper .

525 Avon .

.G 14

108 Dupree .

306 Baltic .

F 16

78 Eagle Butte. .

. . . .C 7

139 Bancroft .

.E 14

743 Eagemont . . .

,101 Belle Fourche ..

. D 1

605 Egan .

,332 Beresford .

.G 16

1,546 Elk Point .

. .H 16

652 Big Stone City. .

.C 16

768 Elkton .

. . . E 16

277 Blunt .

. .E 9

545 Emery .

532 Bonesteel .

.G 11

78 Englewood. . . .

...El

SSfi 'Rnwrllft .

.CIO

232 Erwin .

333 Bradley .

575 Estelline .

. . .D 16

224 Brandt. .

. D 16

308 Ethan .

100 Brentford .

.C 13

968 Eureka .

...B 10

971 Bridgewater . . . .

.F 14

391 Fairfax .

457 Bristol .

,C 14

151 Fairview .

. . .G 16

907 Britton .

.B 14

232 Faith .

114 Broadland .

E 13

458 Faulkton ....

,416 Brookings .

.E 16

1,688 Flandreau . . . .

...E 17

328 Bruce .

E 16

216 Florence .

. . D 15

687 Bryant .

.D 15

673 Fort Pierre. . .

137 Buffalo Gap . . . .

,.F3

428 Frankfort ....

421 Burke .

.G 11

402 Frederick ....

146 Bushnell .

.E 17

725 Freeman .

149 Butler .

.O 14

234 Fulton .

. . F 14

133 Camp Crook. . . .

. .B 2

59 Galena .

511 Canastota .

.F 15

254 Garden City . .

. -D 14

318 Canova .

.F 14

819 Garretson ....

,316 Canton . . . .

.G 16

591 Gary .

103 Carter .

. .G 9

320 Gayville .

555 Carthage .

.E 14

664 Geddes .

537 Castlewood .

.D 16

751 Gettysburg...

...DIO

192 Cavour .

.E 13

139 Glenham .

,109 Centerville .

.G 16

126 Goodwin .

...D16

262 Central City . . . .

,.E2

919 Gregory .

,055 Chamberlain. . . .

.F 11

1,028 Groton .

. . .C 13

228 Chancellor .

G 15

185 Harrisburg . . .

. . .G 16

86 Chelsea .

.C 12

173 Harrold .

...E10

122 Claire City .

.B 15

703 Hartford .

. . .F 15

279 Claremont Brown B 13

256 Hayti .

. . . D 15

,200 Clark .

.D 14

249 Hazel .

...D15

804 Clear Lake .

.D 16

474 Hecla .

...B 13

399 Colman .

.E 16

435 Henry .

...D15

415 Colome .

. G 10

77 Hermosa .

. . . .F 3

522 Colton .

.F 16

391 Herreid .

250 Columbia .

.B 13

445 Herrick .

483 Conde .

.C 13

245 Hetland .

. . .E 15

700 Highmore .

.E 11

96 Ravinia .

.G 13

261 Hitchcock .

.D 13

241 Raymond .

.D 14

301 Hosmer .

.C 11

3,122 Redfield .

.D 13

2,132 Hot Springs . . . .

. .G 2

293 Revillo .

.D 17

180 Hoven .

.C 10

283 Rockham .

.D 12

1,169 Howard .

.F 15

320 Roscoe .

.C 11

435 Hudson .

.G 16

154 Rosholt .

B 16

450 Humboldt .

F 15

150 Roswell .

.F 14

531 Hurley .

.G 15

1,132 Salem .

.F 15

6,012 Huron .

.E 13

1,249 Scotland .

.G 14

702 Ipswich .

.C 11

646 Selby .

,C 10

394 Irene. Clay ....

H 16

182 Seneca .

.C 11

530 Iroquois .

.E 14

211 Sherman .

.F 16

162 Isabel .

,.C7

145 Sinai .

E 16

410 Java .

.C 10

16,499 Sioux Falls .

.F 16

501 Jefferson .

.H 16

1,386 Sisseton .

.B 15

254 Kadoka .

. . F 6

331 South Shore. . . .

.C 16

202 Kennebec .

.F 10

171 South Sioux Falls,

787 Kimball .

.F 12

Minnehaha . . .

.F 16

566 Lake Andes ....

G 13

921 Spearfish .

. .D 2

268 LakeNorden . . .

D 15

572 Spencer .

F 15

862 Lake Preston . . .

.E 15

695 Springfield .

.H 14

278 Lane, Jerauld . .

.E 12

253 St. Lawrence . . .

.E 11

426 Langford .

.B 14

1 1 7 Strandburg .

.C 16

208 Lantry .

. ,C 7

312 Stickney .

.F 13

9,763 Lead .

. .E 2

1,029 Sturgis .

. .E 3

943 Lemmon .

. . B 5

536 Summit .

.C 15

901 Lennox .

.G 16

441 Tabor .

H 14

501 Leola .

.B 12

177 Tea .

■ G 16

301 Lesterville .

H 14

491 Terraville .

.E 2

411 Letcher .

.F 13

238 Timber Lake . . .

. .C 8

149 Lily .

.C 14

148 Tolstoy .

.C 10

428 McIntosh .

. B 7

438 Toronto .

.D 16

3,949 Madison .

.E 15

274 Trent .

.F 17

614 Marion .

.G 15

903 Tripp .

.G 14

453 Mellette .

.C 13

263 Turton .

.C 13

760 Menno .

.G 15

177 Twin Brooks . . .

.C 16

207 Midland .

. . E 7

1,302 Tyndall .

H 14

1,940 Milbank .

C 16

133 Utica .

H 15

956 Miller .

.E 11

372 Valley Springs . .

.F 16

166 Missionhill .

II 15

340 Veblen . .

.B 15

7,785 Mitchell .

.F 13

89 Verdon .

.C 13

1,551 Mobridge .

. C 9

2,376 Vermilion . .

H 15

170 Monroe .

.G 15

484 Viborg .

.G 15

552 Montrose .

.F 15

458 Vienna .

.D 14

127 Morristown ....

. B 6

141 Vilas .

.F 14

288 Mound City. . . .

. B 9

616 Volga .

.E 16

541 Mt. Vernon .

.F 13

333 Volin .

H 15

352 Murdo .

. .E 8

906 Wagner .

.G 13

192 Newark .

. B 14

403 Wakonda . .

H 16

272 Newell .

D 3

128 Wall .

. E 5

119 New Underwood

. . E 4

218 Wallace .

.C 15

128 Nisland .

D 2

102 Ward .

.E 16

282 North ville .

.C 12

8,313 Watertown .

.D 15

174 Nunda .

E 15

879 Waubay .

.C 15

163 Oacoma .

.F 10

1,640 Webster .

.C 14

100 Oelrichs .

. .G 3

350 Wentworth .

.F 15

362 Oldham .

.E 15

526 Wessington ....

.E 12

163 Olivet .

.G 14

1,142 Wessington Spgs

.E 13

251 Onida .

. .D 9

581 White .

.E 16

162 Ortley .

.C 15

504 White Lake ....

.F 12

1,324 Parker .

.G 15

384 White Rock ....

.B 16

1,132 Parkston .

.G 14

295 Whitewood .

. .E 3

301 Peever .

B 16

398 Willow Lake . . .

D 14

404 Philip .

. . E 6

520 Wilmot .

.C 16

320 Pierpont .

.C 14

301 Winfred .

.E 15

3,010 Pierre .

,.E8

923 Winner .

G 10

916 Plankinton .

.F 12

439 Wolsey .

.E 12

939 Platte .

.G 12

1,201 Woonsocket ....

.E 13

238 Pollock .

. .B 9

191 Worthing .

.G 16

355 Presho .

. .F 9

73 Wyandotte,

182 Pukwana .

.F 11

Perkins .

. C 4

324 Ramona .

.E 15

4,771 Yankton .

H 15

4,268 Rapid City .

. .F 3

ior

103

102

12

B

1 _ j

JEE.

o A

Hettinger

^'Linton \

AID

IN

E M M 0\ N

Gallop

Bullock ’Ashcroft

!nJ < J _ oMalnville

Canuiia.k •ˆTlUˆiKnh.giJrˆ “““ ˆ *WOt*“

Ludlow ol “lc“|

Lodge pole

U = U-ˆ

Wishek

M C

’ Ralph0 < r£Lˆ Bratshcrg

Glen«jo|l

Qlenlevit

3)uok .Pleasant Ridge *«•• Cole

_ ' o °WhitedeerVˆT Bullhead

nt Ridge JˆsTiniVJ. ' v-uITA ˆl1®an _ A*/w Mahto

oPc" > ‘k

. ! PasqueJ0"11 Brcck.nrldge

ˆ !Jh a / r h3tD i: tT I ‘

ˆ Cˆlj'lai'ding

Paris

Grand Valley

Twin Buttes O' Grxinri'

Haskell, a / f. = |.

c r u > \ r

, , ;jjs| °q-

Murchl Sofia ? Slim Butteg- °Strool

ro /(Bighi

C -nT

to

D

Hay Stack Butte jj SampoJP-

VVoSfOtt Tliippinor.*'

Castle Rˆck

m

'Lever

Bad' Lands p1

--

Bixby

^^^Lightjcap

70 ~N‘

Claymore

ˆJeffrey

\«#i

Herreid*

CAMPBELL Mound City

T < T

! \ oa kcSi

D I C \ K E V // > *

Ashley

A it7 Barbara Greenway

jc-

Trail City/V

Butterview . Glad Valley \

Longlake

Ellendale,

Forbes/-

i6J > ® »S*L

Vlhunder Butte ˆ X./

B ray ton*

w /V (/oy.

V/j. 'Vfa. -Sj/'J,. fV

Dnlaud

CcMar Canyon -

n' "Butte

Moreau

€#

Fuitli

t Vi

WALWORTH

A*

Did son °

_» Moreau . „

5Ltf*e

Re<1®1,Vi STˆeJ A'1 xcif

Virginia

Rales

©

p o

B

KMg« 0 Caton

lur/sJT>, _ Cooper-,

Taina

r pointy cStoneville

xo view — Laplant

’ "Indian C«&petty8l>ur*

Me PHERˆON

Eureka Leola, ˆ

‘Martel ° o Rueb

ˆ o'Vˆ>vi -

E'D M U N D Sjs«*L-

0.1 V fo>

ˆ jjWarn

_M aˆc . *CNc"* _*sr. C* e)*CL

TTER

°*"fcˆ4u l -

N, ˆ

Btirkme're

/Gorman _

Gaudy ville ° |°Tennls

Kasparo : I Zeiglerl

O'** SiT-e0/' ° . . J

N D

Bailey „ Daplorth

G

Re< fielil

■V

p6I

r |; ”•/

.rsˆ (— jX Smithwidk

Chi Ison

rP”'

fnnia ? J LltLfa / ˆ

. 0 Hepp ner o / v \ —

IR I V \E R

Oclrichs

! Is 1 9 / rj

! SOUTH DAKO

SCALE

!)ReTianccJ\p*'uSse Veg? -LjonvJUe

N Nv O N I

^ '.Mon- vQ /Jt, j. c) . dt,.reon PorCuiin Brennan L

l'".'..l:"1'1 < 1

B E N N E/\T,, T

Martin® . °v

oSt. Francis

v/j frˆ/~

INDIA NˆR E ■

Chadrop

'A,

KuHlivllle SHERI D A .

Statute Miles, 33 1 Tncli.

0 _ 10 20 30 40 50

Rand McNally's New 11 x 14 Map of South Dakota. Copyright by Rand McNally k Co.

ll

Ainsworth

ROW

\Voonsocket vtˆ\St. Marys

B R U L E.jv0

°Red Lake °ˆa Dunlap

E tv* v°v *r

ˆ«a..ap Stickney f |

Coyle o

joujiiniB | _ ˆ_ *i*

iVu,L’U lUU 1.1

Gregory Wheeler (

°Cler.ˆeM°Danton I Q R 9 R Y ˆaTuitle J3utte Coll“a HerrickVi-
_ˆBoQcstrel'

!, Millbor}>"-~wW “Carlock -ˆT

ROCK

E

44°

43

! ANTELOPE I

104“

lor

100 “

to

11

13

98“

14

17 3070

SOUTH DAKOTA

290

part of the State. The moisture comes prin¬ cipally from the Gulf of

Mexico and the At¬ lantic Ocean and is abundant for agricultural purposes over nearly all the cultivated section of the State. The annual rainfall in the eastern half of the State averages little more than 22 inches and in the western half 17 inches. The summer rainfall averages about 15 inches for the entire State during the growing season.

Agriculture. — The chief industry of South Dakota is agriculture, except in the south¬ western portion of the State, where there are extensive gold mines and where mining is the only occupation of importance. The broad fertile prairies are fast being converted into rich fields of various food crops. One can drive for miles with waving fields of grain on both sides of the road as far as his eye will carry and of corn also hedging the way with its green cooling foliage to soften and reduce the sun's heat on July and August days. All varieties of small grain are grown successfully over almost the entire State. Corn is grown best in the Southern and Eastern portions. Yet in the Central part its yield is increasing each year.

Soil cultivation is becoming more general the last decade than ever before. Considerable fall wheat is now sown but spring sowing is still the most common practice. Crop rotation too is just receiving attention and will soon become general for this method is advocated from every source of reliable information. Irrigation is practised to some extent, espe¬ cially in the northwestern part of the State and its advantages are coming to be appreciated more and more each year. The Federal gov¬ ernment has constructed a large dam on the Bellefourche River and this irrigates a large district which is rapidly developing into a prof¬ itable and happy agricultural community. Al¬ falfa finds in South Dakota a suitable soil and appropriate climatic conditions for its best production and harvesting. It is grown in large quantities on both sides of the river but its ultimate home is destined to be the western section of the State. Here this crop finds a natural and leading place in all agricultural cal¬ culations and has been found the most profit¬ able plant that can be grown. Some farmers in this section of the State have sold $100 worth of alfalfa seed per acre in a single season from their alfalfa fields. The statistics presented in this article show what agriculture means to the State of South Dakota and are worth the con¬ sideration of any one desirous of appreciating the opportunities this new State offers settlers and investors.

Agricultural Statistics.

(Information furnished 28 Aug. 1919. Pepartment of

History)

1. Agricultural land outside corporate limits, 1918 . 32 , 898 , 946 acres

1. Agricultural land within corporate limits, 1918 . 151,005 acres

Assessed value of item 1, 1918 . $980,049,605

Assessed value of item 2, 1918 . 7,137,292

Number of farms, shown by 1915 census. . 101 ,224

Acres in farms, 1915 census . 23,820,436

1. Structures on item 1 above mentioned, 1918 . 80,792

Value . $43,995,438

1. Structures on item 2 above mentioned, 1918 . 1,473

Value . $2,087,794

Productions of the State for 1918 and their Value.

		Value
Com .	108,888,000 bu.	$126,310,000
Wheat .	71,305,000 bu.	142,610,000
Oats .	75,816,000 bu.	42,456,000
Barley .	33 , 099 , 000 bu.	24,456,000
Rye .	4,000,000 bu.	5,000,000
Flaxseed .	1,330,000 bu.	4,522,000

Potatoes . 7, 760,000 bu. 7,011,000

Hay . 2,750,000 tons 40,500,000

Vegetables and fruits . 10,000,000

Dairy products . 12,500,000

Poultry products . 12,500, 000

Livestock (sold) . 124,401,000

Minerals . 6,800, 000

Pelts, wool and furs . 3 , 500 , 000

Total value for 1918

$562,495,000

The following table shows what South Dakota sold outside the State for year ending 30 June 1918:

Value

Com, 13,050,000 bushels . $15,138,000

Wheat, 27,917,000 bushels . 55,834,000

Oats, 32,845,000 bushels . 18,433,000

Barley, 20,458,000 bushels . 14,938,000

Rye, 3,245,000 bushels . 4,478,000

Flax, 682 ,000 bushels . 2,318, 000

Horses, 37,860,000 pounds . 3,786,000

Cattle, 579,432,000 pounds . 56,784,000

Sheep, 21,550,000 pounds . 2,047,000

Hogs, 376,737,000 pounds . 61,784,000

Other products . 35 , 000 , 000

Total for 1918 . $270,536,000

Stock Raising. — • Stock raising from the first settlement of the State has been a prominent feature of agricultural enterprise. The vast reaches of prairie uplands bordering the rivers of the State are ideal pasture lands for both cattle and sheep, also horses range on these lands and are grown in profitable numbers. But cattle have from the early days of terri¬ torial times been the favorite animal to produce and market. Many large herds have been de¬ veloped on prairie grass which grows in enor¬ mous quantities fitting cattle for the market without any grain supply whatever. Hogs are in recent years receiving more attention and render excellent returns for the care and feed they require.

Livestock Statistics, 1918.

Horses and mules, one year and under. 101,817 Horses and mules, two to three years. 102 , 776 Horses and mules, over three years. . . 520,397

Stallions and jacks for service . 4 , 462

Cows, all ages . 773,039

Cattle, one year and under . 652,794

Cattle, two to three years . 489,926

Cattle, three years and over . 141 ,890

Sheep, all ages . 533,511

Hogs, all ages . 738,109

$2,861,758 4,611 , 143 42,295,713 1 ,073,362 42,661 ,077 18,439,403 21,728,168 9,134,632 5,440,701 11,952,753

Manufactures. — In 1914, measured by the value of products of its manufacturing indus¬ tries — $24,138,566 — South Dakota ranked 45th among the 48 States comprising continental United States, holding the same rank in re¬ spect to wage-earners, with an average of 3,788 engaged in such industries. In that year there were reported in operation 898 establishments, having an invested capital of $15,059,583 and paying $2,628,152 in wages to 3,788 wage-earners.

The cost of raw materials was $17,079,357 ; the value of products $24,138,566, leaving the value added by manufacture at $7,059,209. The fol¬ lowing table shows the relative importance and strength of the various industries in the State :

INDUSTRY

Num¬ ber of estab¬ lish¬ ments

Num¬ ber of wage- earners

Value of products

Flour and grist mills .

72

255

$5,556,996

Butter .

62

134

2,920,342

Printing and publishing .

379

801

2,135,580

Bread and bakery products. .

88

255

1,256, 121

Cars and shop construction . .

6

579

1,177,759

Lumber and timber .

51

281

860,143

Confectionery .

4

105

545,710

Tobacco and cigars .

40

197

434,028

Gas .

17

80

379,543

Liquors, malt .

4

71

362,128

Mineral and soda waters ....

27

63

225,953

Marble and stone work .

11

29

174,750

Foundry and machine shops.

20

60

169,011

Copper, tin and sheet metal. .

5

24

162,749

All others .

112

854

7,777,75 3

To this list may be added that of the pack¬ ing-house industry. There are several of these in the State, the largest of which is located at Sioux Falls where there are more than a thou¬ sand persons engaged in that industry, one firm having a pay-roll of over $60,000 per month. At Huron the farmers have erected a big pack¬ ing-house. Canning factories are also being established in several sections of the State. One of the largest of these is a corn-canning plant just outside the city of Parkston in Hutchin¬ son County. Here there is an enterprise pro¬ ducing canned corn to the extent of 15,000 to 20,000 cans per year, with a promise of larger production in the near future. The plant is operated but a few days each year when corn is prime for

such a process, hence it does not give constant employment. It is, however, sug¬ gestive of the spirit and enterprise of the peo¬ ple in the State.

Mineral Resources. — These are gold, build¬ ing stones, silver, clays and lead. Gold is the most valuable of these metals and was first discovered in the Black Hills by a soldier with Custer's troops in 1874. The richest deposits of gold are in Northwestern Hills and there is located one of the largest gold mines in the world. The Homestake at Lead yields half a million per month and is famous for its magnitude and scientific operation. South Dakota has large quantities of excellent build¬ ing material and these rank second in value. The Dakota sandstone which outcrops about the edge of Black Hills makes handsome and durable building material. At Dell Rapids and Sioux Falls are large deposits of hard pink quartzite which also makes durable and beauti¬ ful buildings. Deposits of gypsum occur in the hills and quantities of chalk stone are found along the Missouri from Yankton to Chamberlain. This is nearly pure chalk and is suitable for manufacture of Portland cement. Materials for making brick are widely dis¬ tributed over the State.

Gold produced in 1917 was . $7,412,000 00

Silver produced in 1917 was . 193,000 ounces

Finances ; The total assessed valuation of all:

Taxable property in 1918 was . $1,595,544,562 00

Total receipts for State in 1918 were.. 4,653,190 56

School fund invested in 1918 was. ... 16,077,718 63

Bank deposits 30 Sept. 1918 were. . . . 206,496,073 89

Amount expended for public schools 1918

was . . 7,863,316 00

Total cost of maintaining State govern¬ ment 1918 was . 4,001,144 50

Total State debt 20 Nov. 1918 was . 332,136 00

Railway Mileage. — South Dakota has 4,832 miles of railway. Of this the Chicago, Mil¬ waukee and Saint Paul and the Chicago and Northwestern own much the largest amount.

Education. — This important subject receives special consideration from the people of the State. When the State was admitted into the Union, Congress set apart the 16th and 36th section of every township for benefit of the public schools of the State. It also, by act of 18 Feb. 1881, specified that none of the Fed¬ eral lands granted for educational purposes should be sold for less than $10 per acre. This was a wise feature and was incorporated into the South Dakota constitution by those who formulated that important instrument. By ob¬ serving this Federal requirement the school lands have been conserved until they have become valuable and some have been sold recently for more than $100 per acre. The public school fund of the State has grown to large propor¬ tions and was at the close of the fiscal year 1917 $9,268,235.17. The Federal lands granted by Congress to the State for educational, penal and benevolent institutions amounted to 500,000 acres. The different State educational institu¬ tions were given donations from this inheri¬ tance as they were established by the State leg¬ islature. For example, the State University was given 40,000 acres; the State agricultural College 40,000 acres, which with the 120,000 acres given to it direct by Congress, makes its land endowment 160,000 acres. From this source, rent of college land and interest on its endowment fund, the college now receives over $30,000 a year income. The State normals at Madison and Spearfish each received 40,000 acres, and the other State schools as they were established were given a part of the public do¬ main. The public school system is presided over by a State Superintendent of Public In¬ struction, elected by popular vote, whose de¬ partment is composed of a staff of educational experts in charge of the various phases of pub¬ lic school activity. One man is supervisor of rural and consolidated schools, another is in¬ spector of high schools, while others carry on the work of teacher examinations and certifica¬ tion. Very radical changes are now being made in the educational system of the State. Consolidation of rural schools is coming fast and means- much to the present and future child of the State. School activities no longer consist only in mental gymnastics, but include skill in handwork and training for industrial careers as well as for college and the learned professions.

The following statistics and account of dif¬ ferent State educational institutions will en¬ able the reader to estimate somewhat intelli¬ gently what kind of education is offered the youth of the State and how the people view educational interests and results. There are

1 The Famous Hopestake Mine, at Lead City

2 The City of Deadwood

—

■

seven higher institutions of learning maintained by the people of the State. These are State University, State College of Agriculture and Mechanic Arts, State School of Mines and four normal schools.

The State University is located at Vermillion in the southern portion of the State, at the junction of the Vermillion with the Missouri River. The university has seven buildings; a faculty of 60 members and a student body in 1918 of over 600. The organization includes the College of Arts and Sciences, College of Law, College of Music, College of Medicine and College of Engineering.

The State College of Agriculture and Me¬ chanic Arts is located at Brookings in the east¬ ern part of the State only 17 miles from the Minnesota border. The institution has some well defined lines of work assigned to it as fol¬ lows : research and special scientific investiga¬ tion ; instruction along special lines ; agricul¬ tural extension to include farm and home dem¬ onstrations. The work of the institution is carried on in the 10 buildings on the college campus and the large college farm connected with the college also at the several sub-stations operated from the college. These are located as follows : Highmore, Eureka, Cottonwood and Vivian. In 1917 there were 620 students enrolled and a faculty of 75 instructors.

The State School of Mines is located at Rapid City in the western part of the State. There are four buildings on this campus and the legislature in 1919 appropriated $100,000 for a fifth one.

The four normal schools are located as fol¬ lows: Spearfish Normal in northwest section of the State, Lawrence County; Aberdeen Normal in Brown County, north section of the State; Madison Normal in Lake County, the eastern part of the State, and Springfield Nor¬ mal in Bon Homme County, the southeast sec¬ tion of the State. These four normals and the three higher educational institutions of the State are all under one board of management. This board is made up of five men appointed by the governor and confirmed by the senate. Their term of office is six years.

In addition to these higher educational insti¬ tutions supported by

taxation, there are a num¬ ber of denominational institutions, which are growing in favor and influence. Among these are the following: Dakota Wesleyan Univer¬ sity at Mitchell, maintained by the Methodist Church. This institution had, 1918, 225 stu¬ dents and 25 members in the faculty. Huron College, Huron, is maintained by the Presby¬ terian Church, and reported 107 students in 1918 with 22 members of the faculty. Yankton College at Yankton is supported by the Congre¬ gational Church. It reported 133 students in 1918, with 25 members in the faculty. Sioux Falls College at Sioux Falls is supported by the Baptists. It reported an enrolment of 100 students with 12 members in the faculty. The Catholics of the State support a number of schools; also Notre Dame Academy at Mitchell and Presentation Academy at Aberdeen. The Norwegian Lutherans have a Normal School and College at Sioux Falls and also at Canton.

The following educational statistics may serve to further reveal the educational activity of the people in this new State:

Consolidated schools:

Enrolment below high school . 3,623

Enrolment in high school . ., . 782

Independent districts — cities and towns:

Enrolment below high school . 35 ,046

Enrolment in high school . 10,177

Rural districts:

Enrolment below high school . 86,752

Enrolment in high school . 2 , 096

Number of school houses in 1918:

Consolidated districts . 56

Non-accredited high schools . 96

Schools not reporting . 27

Total . 216

Teachers employed, 1919:

Male., . 805

Female . 6,635

Average monthly salary:

Male . $102.39

Female . 68.50

School expenditures, 1918:

Rural districts . $4,231,177.22

Independent districts . 3,180,765.86

Consolidated districts . 451,373.72

Total . $7,863,316.80

The legislative appropriations of 1917, for period of 1917 to 1919, were $1,246,600 general, for higher institutions; $707,570 special, for higher institutions. Out of the two items the Agricultural College received $312,000 from the general fund, and $243,000, special, and the ex¬ periment stations received $8,000.

The census of 1915 gives 3,134 illiterates, or .72 per cent of the population.

Penal and Charitable Institutions. — These are the State Penitentiary, located at Sioux Falls; the State Insane Hospital, located at Yankton; the State Reform School, located at Plankinton ; the School for the Deaf at Sioux Falls, and the School for the Blind at Gary; also the School for Feeble Minded at Redfield. All these are under the Board of Charities and Corrections, composed of three men appointed by the governor and confirmed by the senate.

Religion. — Religious liberty is fully en¬ joyed by the people of South Dakota, and is guaranteed to them by a specific section in the State constitution. Nearly all sects and creeds are represented in the religious organizations of the State, and none are prevented from fol¬ lowing that form of worship they deem most important and helpful.

War Activities. — The people of South Dakota responded promptly and liberally to every demand made upon her for support of the war.

Liberty Bonds Purchased.

First loan . $3,923,000 00

Second loan . 12,864,000 00

Third loan . 31 , 443 , 000 00

Fourth loan . 35 , 642 , 000 00

Fifth loan . 20,500,000 00

Total . $104,372,000 00

Red Cross for year ending 11 Dec. 1918. . . $1 ,649,593 00

Knitted articles, 784,411 (value) . 694,895 10

Refugees garments, 43,606 (value) . 59,516 83

Surgical dressings, 1,556,297 (value) . 101,310 97

Total $2,505,315 90

Red Cross membership in South Dakota,

296,275 (contributed) . 1,950,737 00

Early History — Exploration, Settlement and Development. — When in 1803 France ceded to the United States her possessions in the Northwest, the Territory of North and South Dakota was an unknown and trackless

wilderness inhabited only by wild beasts and savage Indians. A few adventurers such as LeSueur, Trudeau and Loisel had traversed this land to some extent in their traffic with the Indians and in some instances attempted set¬ tlement, but these were soon abandoned. All this region was marked on the maps of those days an ˆunexplored® country. In 1804 Lewis and Clark visited the Territory. Their records show that in August of that year (1804) they camped for three days at Yankton where the Yankton or James River empties into the Missouri. From there they went up the Missouri, exploring that river through the en¬ tire Territory of Dakota, then up the Yellow¬ stone and on to the Pacific. The first white set¬ tlement of record in the State was made on 11 Nov. 1794 in what is now Charles Mix County, by J. B.

Trudeau, but this did not become permanent, neither did the settlement on the Missouri River at Big Bend made in 1797 by Registre Loisel. Fort Pierre was settled in 1817 by Joseph LaFramboise and has remained to this day.

The American Fur Company made incur¬ sions into the Territory as early as 1811. In June 1831 a steamboat built by this fur com¬ pany found its way to Fort Pierre. This was the first steamboat to navigate the upper Missouri and was named the Yellowstone. This greatly accelerated fur trading and other commercial relations with the Indians. The Yellowstone made another trip up the Missouri through South Dakota in 1832 and this time went as far north as the mouth of the Yellow¬ stone River. Among its passengers on this trip was George Catlin, the famous painter and ethnologist. Mr. Catlin spent some time at Fort Pierre during the summer of 1832, study¬ ing the Indian in his primitive life, and again visited the State in 1836, while inspecting the work of the Indians at Pipestone quarry in Western Minnesota. In 1838 Gen. John C. Fremont, the noted pathfinder, explored the eastern portion of the State, taking levels of prominent points and discovering and naming many lakes. The next year (1839) he again visited the State, going by steamboat to Fort Pierre and from there Northeast to Devils Lake, N. D. He was accompanied this time by Joseph N. Nicollet, geographer and astronomer. By 1840 the activity of the American Fur Com¬ pany had decreased the buffalo herds and fur¬ bearing animals of the Dakota Territory, and the fur industry was fast losing its importance in this region. Ten or 12 years more, or by 1855, the fur trade of Dakota was about over and the great buffalo herds of the plains had nearly disappeared. Fort Pierre was sold that year by the American Fur Company to the United States government and thereafter be¬ came a military post. Between the Fort Pierre settlement in 1817 and that of Sioux Falls in 1858 there seems to have been little attention given to the fertile prairies of this great Territory. The settlement at Sioux Falls in 1856 opened the way for rapid and permanent occupation of the rich bottomlands of the Big Sioux River. The next year (1857) the Minne¬ sota legislature chartered the Dakota Land Company, and from that on settlements were made at various places on the eastern side of the State and along the Missouri River.

A territorial government was provided by Congress in 1861, after a long controversy be¬ tween citizens of the Territory and Congres¬ sional representatives from Minnesota, the lat¬ ter claiming that Dakota belonged to and was a part of the Minnesota Territory. Indian war¬ fare interfered very seriously with the settle¬ ment and development of this new land for a number of years. By 1862 there were many settlers established along the Missouri and the Sioux

rivers. During harvest season that year (1862) the Santee Sioux on the Minnesota River took to the warpath and massacred white settlers wherever they could find them. Near Sioux Falls these blood-thirsty savages at¬ tacked and killed Judge Joseph Amidon and his son in the hayfield. This caused terror in the hearts of nearby settlers who left their stock and crop and fled for their lives. At this time the Indians destroyed many homes and large numbers of stock, also grain in abundance just ready for the harvest. Another outbreak oc¬ curred in 1865 when much property was again destroyed and some settlers killed. In 1869 a treaty was signed between the Indians of Dakota Plains and the Federal authorities, but this did not last many years. By June 1876 further outbreaks occurred and the govern¬ ment sent a large force of Federal troops under General Custer to quell the outbreak, but this brave general with some 300 of his men, were killed before peace could be arranged with the Indians. This, however, was about the last of Indian warfare and after that date settlers suffered but little from attacks by Indians.

Government. — South Dakota became a State in 1889. The enabling act was the Federal omnibus bill which admitted into the Union North and South Dakota, Montana and Wash¬ ington. The constitution which was then adopted by the people of South Dakota is re¬ garded as one of the most stable and compre¬ hensive in the United States. As originally adopted it comprised 26 articles which em¬ braced a wide range of subjects pertaining to the rights of citizens and the proper control of State affairs. The usual form of three depart¬ ments, the legislative, executive and judicial, is employed, with the governor authorized to veto such legislation as he may find undesirable. This right, however, is seldom exercised. The legislative power was vested in a senate of 45 members and a house of representatives of 124 members. These may be increased from time to time by legislative enactment. The legislature convenes every two years on the first Tuesday of January and must adjourn at the end of 60 days not including Sundays. Mem¬ bers of the legislature get no salary for their services, but are allowed a per diem of five dol¬ lars during time the legislature is in session and mileage to and from their homes. There is a Supreme Court of five judges elected bv the people, who hold office for six years, and may and do succeed themselves when re-elected by the people at the general biennial election. There are also district judges elected by the people and county judges to deal with probate busi¬ ness of their locality. The constitution was amended in 1918 to give the ballot to all citi¬ zens of the State 21 years of age or over, and to those fully naturalized. This right can be exercised only after residence in the United States five years, of the State one year, the

county 90 days, and the election precinct 30 days. Bone dry prohibition is in force in the State and was obtained by an amendment to the State constitution. This constitution provides for exercise of the Initiative and Referendum. Both are used by the people, but chiefly that of referring important laws to the people for their approval or rejection at the time of the general election. The primary election method of selecting officers is in force and a very general interest is shown in that public function. The people of South Dakota are as a whole patriotic and loyal both to State and national interests. This is indicated by their response to calls for service during the World War.

State Capitol. — The State capitol is at Pierre, on the Missouri River, near the geog¬ raphic centre of the State. The building is completely fireproof. Foundations are of field- stone, the first story of Raindrop sandstone and the superstructure of Bedford limestone. The interior is of brick and reinforced con¬ crete. Dimensions are 287 feet long, 145 feet wide, 165 feet from ground floor to top of lantern on dome. There are four floors. The interior finish is in marble, oak and birch. Decorations are simple but impressive. There are nine large mural paintings, among which is Blashfield's most important creation. The style, furniture, decorations and finish of the building show excellent taste and artistic good sense.

Governors of South Dakota.

Arthur C. Mellette . Republican . 1889-93

Charles H. Sheldon _ " . 1893-97

Andrew E. Lee . Populist . 1897-1901

Charles N. Herreid . Republican . 1901-05

Samuel H. Elrod . " . 1905-07

Coe I. Crawford . " 1907-1909

Robert S. Vessey . " . . 1909-12

Frank M. Byrne . Republican-Progressive. 1913-17

Peter Norbeck . Republican . 1917-21

W. H. McMaster . " . 1921-

Population. — The 1920 census gives the State a population of 636,547. In 1910 it was 583,888. The organized Counties, with popula¬ tion census of 1920, are as follows :

Aurora .

. ... 7,246

Jackson .

... 2,472

Beadle .

_ 19,273

Jerauld .

... 6,338

Bennett .

. ... 1,924

Jones .

... 3,004

Bon Homme .

... 11,940

Kingsbury .

... 12,802

Brookings .

16,119

Lake .

. . . 12,257

Brown .

... 29,509

Lawrence .

. . 13,029

Brule .

... 7,141

Lincoln .

. . 13,893

Buffalo .

... 1,715

Lyman .

... 6,591

Butte. . .

... 6,819

McCook .

... 9,990

Campbell .

... 5,305

McPherson .

... 7,705

Charles Mix .

. . . 16,256

Marshall .

... 9,596

Clark .

... 11,136

Meade .

... 9,367

Clay .

... 9,654

Mellette .

... 3,850

Codington .

... 16,549

Miner .

... 8,560

Corson .

... 7,249

Minnehaha .

. 42,490

Custer .

... 3,907

Moody .

... 9,742

Davison .

... 14,139

Pennington .

. . 12,720

Day .

. . . 15,194

Perkins .

... 7,993

Deuel .

... 8,759

Potter .

... 4,382

Dewey .

... 4,802

Roberts .

16,514

Douglas . . .

... 6,993

Sanborn .

... 7,877

Edmunds .

... 8,336

Shannon .

... 2,003

Fall River .

... 6,985

Spink .

... 15,768

Faulk .

... 6,442

Stanley .

... 2,908

Grant .

... 10,880

Sully .

... 2,831

Gregory .

... 12,700

Todd .

... 2,784

Haakon .

... 4,596

Tripp .

11,970

Hamlin .

. . 8,054

Turner .

. . 14,871

Hand .

... 8,778

Union .

. 11,099

Hanson .

... 6,202

Walworth .

... 8,447

Harding .

... 3,953

Washabaugh .

. 1,166

Hughes .

... 5,711

Washington .

... 1,521

Hutchinson .

... 13,475

Yankton .

... 15,233

Hyde .

... 3,315

Ziebach .

... 3,718

Some of the larger cities of the State are the following with their populations as given in the 1920 Federal census : Sioux Falls, 25,202 ; Aberdeen, 14,537; Watertown, 9,400; Lead, 5,013; Mitchell, 8,478; Yankton, 5,024; Rapid City, 5,777; Madison, 4,144; Brookings, 3,924; Deadwood, 2,403 ; Huron, 8,302 ; Mobridge, 3,517; Pierre, 3,209; Redfield, 2,755; Vermilion, 2,590; Winner, 2,000; Woonsocket, 1,368; Clark, 1,392; Canton, 2,225 ; Flandreau, 1,929; Hot Springs, 2,141 ; Howard, 1,325 ; Milbank, 2,215.

J. W. Heston,

President of the State Normal School, Madison, S. D.

SOUTH DAKOTA, University of, the

State university located at Vermilion. The first territorial legislature of Dakota located the University of Dakota at Vermilion in 1862; nothing further was done toward establishing the institution until 1881, when Congress granted 86,000 acres to Dakota for a university when the Territory should be admitted to the Union as a State; the citizens of Vermilion then erected a building and organized an academic department. This action was ratified by the legislature in 1883, the building accepted as a gift to the Territory and the university in¬ corporated. The first classes were opened in 1883. In 1891 the name was changed to Uni¬ versity of South Dakota. The university is composed of the colleges of arts and sciences, law, music, medicine and1 engineering. The university admits women on equal terms with men. The government is by a board of five regents appointed by the governor and con¬ firmed by the senate for a term of six years. The State geological survey is conducted in connection with the university, as is the State Health Laboratory. The offices and labora¬ tories of the Food and Drug Commission are also located at the university. The income of the university is derived mostly from the Con¬ gressional land grant of 86,000 acres of which it now has control, and from State appropria¬ tions; tuition fees are small; the income in 1914-15 amounted to $220,000. The library in 1916 contained 32,000 volumes, the students numbered 683 and the faculty 60.

SOUTH DAKOTA AGRICULTURAL COLLEGE, the State school of agriculture and technology, situated at Brookings, S. Dak. It was first opened in 1884, and is under the control of the same board of regents as the University of South Dakota (q.v.). It is co¬ educational. Courses are offered in animal- husbandry, agronomy, horticulture, veterinary science, dairying, mechanical, electrical and civil engineering, architecture, domestic science, pharmacy and general science ; in addition to these technical and scientific courses there is a normal course, a business course and a preparatory department. Military drill is also a part of the curriculum. Formerly two courses in agriculture were offered ; now there are several groups under the general heading of agriculture; this course requires work in one language, and includes certain practical studies not before offered, such as stock judging, blacksmithing, horseshoeing, etc. The degree of B.S. is conferred. The college farm and grounds contain 400 acres; in 1901 a new physics and engineering building and a plant breeding building were erected. The income is

derived mostly from State appropriations and from the annual Federal appropriation in ac¬ cordance with the law of 1890. The State agri¬ cultural experiment station, which is connected with the college, receives a separate Federal appropriation.

SOUTH DAKOTA STATE SCHOOL OF MINES located at Rapid City near the famous gold mining region of the Black Hills. Established 1885. Offers courses in mining engineering, metallurgical engineering, civil en¬ gineering, electrical engineering. Well-equipped laboratories and a library of more then 6.000 volumes, chiefly technical. The institution is under control of the State Regents of Educa¬ tion. Its income is derived almost wholly from State appropriations, the tuition fee being only $12 a year.

SOUTH GEORGIA ISLANDS. See

Georgia, South.

SOUTH HADLEY, Mass, town, Hamp¬ shire County, on the Connecticut River, and on the Boston and Maine and the New York, New Haven and Hartford railroads, 14 miles north of Springfield. The town includes the two vil¬ lages of South Hadley and South Hadley Falls. It was first settled in 1726-27, was originally a part of the town of Hadley and was separately incorporated in 1753. The river here has a fall of 40 feet that affords power for manufactur¬ ing; the. first paper mill was established in 1848; the town now contains paper mills, woolen and cotton mills and saw mills. There is a public library, and a public high school ; the town is also the seat of Mount Holyoke College (q.v.). Pop. (1920) 5,527.

SOUTH HAVEN, Mich., city in Van Buren

County, on Lake Michigan, 52 miles southwest of Grand Rapids, and on the Michigan Central and the Kalamazoo, Lake Shore and Chicago railroads. It has an excellent harbor and is a shipping point for fruit. It is patronized as a summer resort, has a fine beach and other at¬ tractions. The surrounding country is largely devoted to fruit raising. Manufactures include lumber, crates, flour, canned goods, pianos and pipe organs. It was settled in 1833 and re¬ ceived its city charter in 1902. Pop. 3,825.

SOUTH HOLLAND. See Netherlands.

SOUTH ISLAND. See New Zealand.

SOUTH KENSINGTON MUSEUM, an

institution in London originated by the Prince Consort in 1852, and under the direction of the Committee of Council of Education. It con¬ tains a rare collection of ancient and modern art as applied to manufactures, a gallery of British art, an extensive collection of water-color paintings, a collection of sculpture, repro¬ ductions of ancient sculptures, Raphael's car¬ toons and an art library. Other departments ■contain collections of substances used for food, and of materials employed in building and con¬ struction. The loan department is a special feature in connection with the institution. There is also a national art training school and schools of science and cookery. In 1899 the name became officially the Victoria and Albert Museum. The present buildings were erected in 1899, and completed and opened in 1909. Catalogues of its collections are available.

SOUTH KENSINGTON, National Art Schools of, London, England, connected with the Victoria and Albert, or (colloquially) South Kensington Museum, in Brompton, south of Hyde Park, are under the direction of the De¬ partment of Science and Art. Their special purpose is to study the application of art to industry. They have the advantage of admis¬ sion to the priceless collections of all kinds in the museum, which are carefully arranged for purposes of instruction. See London.

SOUTH KINGSTOWN, R. I., town,

Washington County, on the southeastern coast, and on the New York, New Haven and Hart¬ ford Railroad. The town of Kingstown was settled and incorporated as early as 1674; it was divided into North Kingstown and South Kingstown in 1723. The colonial assembly met at South Kingstown at various times, and in 1790 the convention called to decide on accepting the United States Constitution met here, but voted to adjourn to Newport. In 1780 South Kingstown was one of the wealthiest towns in the State. The industries include cotton mills and machine shops. Fishing and farming are extensively carried on in the district. Pop.

(1920) 5,181.

SOUTH MILLS, Battle of. In the fore

part of April, 1862, after the capture of Roa¬ noke Island and Newbern, rumors reached General Burnside at the later place that the Confederates were building iron-clad gunboats at Norfolk, Va., with the intention of running them through the Dismal Swamp Canal and Roanoke River to make a descent upon the Union flotilla in Albemarle

and Pamlico sounds. Burnside, in co-operation with Com¬ mander Rowan of the navy, organized an expe¬ dition to move on South Mills, near Camden, destroy the locks of the canal at that point, and the Currituck Canal by blowing up its banks, thus rendering it impossible for the gun¬ boats to come into the sounds. Another object of the movement was to create the impression that the entire Burnside expedition was moving on Norfolk, less than 40 miles distant. The expedition was put under command of Gen. J. L. Reno, who, with the 21st Massachusetts and 51st Pennsylvania, sailed from Newbern to Roanoke, where on 18 April he was joined by Colonel Hawkins' brigade (9th and 89th New York and 6th New Hampshire) with four guns. In all, Reno had about 3,200 men. The trans¬ ports, accompanied by gunboats, sailed up the Pasquotank River, and about midnight of the 18tli Hawkins' brigade began a landing on the east side some four miles below Elizabeth City, which is on the west side. At 3 a.m. of the 19th Hawkins' brigade had been landed and was ordered forward, Reno remaining to bring up the other two regiments, which had been de¬ layed by the grounding of some of the trans¬ ports. Hawkins, misled by a guide, had marched by a circuitous route, and was over¬ taken by Reno, some 12 miles out, and Reno took the advance, Hawkins' fatigued brigade following. After marching about four miles, and when within two miles of South Mills, Reno's advance came under an unexpected fire of artillery and was brought to a halt. Reno pushed his guns into action. Col. A. R. Wright, of the 3d Georgia, 585 strong, some drafted North Carolina militia, a company of

local cavalry, in all about 750 men and four guns, had taken position across the road. His artillery commanded the road, was supported by infantry in a deep ditch, along which rails were piled, with open ground in front and a dense wood in rear. Skirmishers covered both flanks, which were in the woods. After an artillery duel of an hour Reno ordered the 51st Pennsyl¬ vania and then the 21st Massachusetts through the woods on the right to turn the Confederate left, and Hawkins, having come up, was or¬ dered, with the 9th and 89th New York, to follow the two flanking regiments to the right, the 6th New Hampshire being placed on the left of the road to support the artillery. The 51st Pennsylvania and 21st Massachusetts, reaching the Confederate left, opened fire and about the same time the 9th New York, break¬ ing from the woods, made a gallant charge — Reno says an ˆunauthorized and unnecessary® one — over the open ground upon the Confed¬ erate guns, and being met with a severe fire of

canister and musketry, was repulsed, but made a quick rally on the 89th New York, and both went forward to join the 21st Massachusetts, which, with the 51st Pennsylvania, had kept up fire, forcing the Confederates to withdraw their guns and retire a mile, upon support that was coming up. On the left of the road the 6th New Hampshire had made a gradual ad¬ vance to within 200 yards of the right of the 3d Georgia and, pouring in a volley, hastened its retreat. The fight lasted nearly four hours. At 10 p.m. without accomplishing the principal object of his expedition, Reno marched back to his boats, and the troops returned to their stations on Roanoke Island and Newbern. The Union loss was 13 killed, 101 wounded and 13 missing, an aggregate of 127, of which 75 were lost by the 9th New York. The Confederate loss was six killed, 19 wounded and three miss¬ ing. Consult (Official Records) (Vol. IX) ; The Century Company's (Battles and Leaders of the Civil War > (Vol. I).

SOUTH MILWAUKEE, Wis., city in Mil¬ waukee County, eight miles from the heart of Milwaukee, on the Chicago and Northwestern Railroad. It has a high school and a public library. Manufactures include steam shovels, dredges and wreckers, stoves, rakes, chains, baskets and woolen shawls. It received its city charter in 1896. Pop. (1920) 7,598.

SOUTH MOUNTAIN, Battles of. When

General Lee led the Confederate army across the Potomac into Maryland (5 Sept. 1862), east of the Blue Ridge, he expected that the Union troops holding Winchester, Martinsburg and Harper's Ferry would be withdrawn, thus open¬ ing his line of communication through the Shenandoah Valley. Upon his arrival at Fred¬ erick, much to his surprise he found that this had not been done; and as an uninterrupted line of communication through the valley was an absolute necessity for his intended campaign into Pennsylvania, prompt measures were taken to secure it. On the morning of the 10th, Jackson with 14 brigades marched from Fred¬ erick, passed over South Mountain at Turner's Gap, crossed the Potomac at Williamsport, on the 11th, drove the Union garrison at Martins¬ burg into Harper's Ferry, and proceeded to in¬ vest that place from the Virginia side of the Potomac. McLaws, with 10 brigades, crossed the vol. 25 —20

South Mountain at Brownsville Gap, and seiz¬ ing Maryland Heights, invested Harper's Ferry from the Maryland side. Walker's division crossed the Potomac at Point of Rocks and seized Loudoun Heights. (See Harper's Ferry; Maryland Campaign of September 1862). Lee followed Jackson through Turner's Gap; D. H. Hill's division was left

at Boons- boro, to support Stuart's cavalry, which was to hold Turner's Gap and watch McClellan; and with the divisions of D. R. Jones and J. B. Hood, and the reserve artillery, all of Long- street's command, Lee marched to near Hag¬ erstown to await the result of the movement on Harper's Ferry, and the subsequent concentra¬ tion of his widely dispersed command for the movement into Pennsylvania.

The advance of McClellan's army reached Frederick on the 12th. Before noon next day there was found in the abandoned Confederate camp the order, known as ((Order 191,® for the movements of Lee's army for the 10th. The copy was from Lee to D. H. Hill and showed the position of every division of Lee's army, and what it was expected to do, that at the time Jackson, McLaws and Walker were investing Harper's Ferry, and that Lee, with Longstreet and D. H. Hill, was beyond Tur¬ ner's Gap. It was not later than noon when McClellan had this valuable paper placed in his hands, but he did not act promptly upon it. It was not until 3 p.m. that he ordered Pleasonton, then near Middletown, to ascertain whether the Confederates had moved in the direction indi¬ cated in the order. At 3.35 p.m. Cox's division of the Ninth corps was ordered to march from Frederick to Middletown and support Pleason- ton's cavalry in a reconnoissance to Turner's Gap. Pleasonton advanced toward Turner's Gap and found his progress checked by Stuart's cavalry. It was late in the day when McClel¬ lan had come to the decision to relieve the gar¬ rison at Harper's Ferry, and at the same time fall upon and destroy Lee's isolated command at Boonsboro. Franklin's Sixth corps and Couch's division were to move through Cramp- ton's Gap of South Mountain, break the line of investment that McLaws had thrown across Maryland Heights and the foot of Pleasant Valley, thus relieving Miles at Harper's Ferry, and at the same time interpose between Mc¬ Laws and that part of Lee's army at Boons¬ boro and Hagerstown. At the same time Burn¬ side, with the First and Ninth corps, supported by the rest of the army, was to move through Turner's Gap and fall upon Lee, who it was thought had Longstreet and D. H. Hill at Boonsboro. It would have been well had these orders been given early in the afternoon of the 13th and the troops immediately put in motion for the passes of the mountain, but it was not so. The orders were to move next morning; meanwhile Pleasonton was to fire occasionally a few artillery shots, even though no enemy appeared in front, so that Colonel Miles, at Harper's Ferry, would know that the Union army was near.

Battle of Crampton's Gap. — General Frank¬ lin who was at Buckeystown, six miles from Frederick, and between it and the Potomac, marched at 6 a.m. by way of Jefferson, where he halted an

hour for Couch's division to join him from Licksville, but Couch not coming up, he resumed the march and at noon halted two

miles short of Burkittsville, which lay half a mile from the foot of Crampton's Gap. The gap was thought to be strongly held and Frank¬ lin made elaborate preparations to carry it. In fact the gap was held by two small cavalry regiments, part of Mahone's brigade of in¬ fantry and two batteries, in all about 900 men, under Col. T. T. Munford. Semmes' brigade, with five guns, held Brownsville Gap, one mile south of Crampton's and 300 of Semmes' men closely supported Munford's right; so, to meet the attack of Franklin's column of nearly 12,000 men, Munford had 1,200 infantry and dis¬ mounted cavalry posted behind stone fences and houses at the east foot of the gap, with eight guns in position on the winding road about half way up the mountain. It was determined that the position should be carried by assault, General Slocum's division advancing on the right of the road leading through the gap to make the assault, supported by two brigades of General Smith's division moving on the left of the road. It was 3 o'clock before Slocum's division had been formed, in two lines, Bart¬ lett's brigade on the right, Newton's in centre and Torbett's New Jersey brigade on the left. The day was well spent when the order was given to advance and the skirmishers pushing forward drew the fire of the Confederates posted behind the stone fences and houses; which, with the fire from the artillery on the mountain side was so severe, that the advance was suspended until artillery could be brought up to silence that of the Confederates and batter down the stone fences. The artillery was slow in coming up, Smith had not advanced on the left, the men were becoming restive under the hot fire being poured upon them and without waiting for the artillery to come up or Smith to close up on the left, the three brigade com¬ manders after a hurried consultation and with¬ out orders from corps or division commander, ordered a charge, which was gallantly made. The fire poured upon the line was severe and some of the regiments were momentarily shaken, but the stone fences were carried and the Confederates driven up the steep hill, the Union line, much broken, closely following. When nearing the crest of the hill, Cobb's Georgia brigade, which had just come up to support Munford, was encountered in the gap, instantly routed, most of it captured and the Union troops pursued the retreating Confed¬ erates to the west foot of South Mountain, when darkness halted them. The Union loss was 113 killed, 418 wounded and 2 missing. The Confederate loss was 70 killed, 289 wounded and

603 captured or missing. In ad¬ dition they lost four colors, one gun and 700 small arms.

Battle of Turner's Gap. — While Franklin was forcing Crampton's Gap, Burnside, with the First and Ninth corps was severely engaged at Turner's Gap, six miles northeast of Cramp¬ ton's. The engagement was most severe at and south of Fox's Gap, a mile or more south of Turner's, and there was a fierce contest north, but as both was for the possession of the main road, which ran through Turner's Gap, this has given the Union name to the battle — the Confederates call it the battle of Boons- boro. On the night of the 13th Pleasonton, failing to get infantry support, bivouacked in the valley, near the foot of Turner's Gap, and

early in the morning pressed his reconnaissance and soon ascertained that the Confederates were in some force in the Gap. Two batteries of artillery were brought up, and opened fire upon Confederate artillery well up in the Gap; and Cox, whose division had bivouacked near Middletown, advanced a short distance on the main ro'ad, and then with two brigades marched to the left on the old Sharpsburg road to reach the flank of the Confederate position. As he approached Fox's Gap, one mile south of Turner's, he received artillery fire. D. H. Hill, whose five brigades had been halted near Boonsboro, three miles west of Turner's Gap, when informed by Stuart that Pleasonton was advancing, on the 13th sent two brigades and two batteries back to assist Stuart in checking him. At midnight he received an order from Lee to go in person next morning and assist Stuart. When Hill arrived at the gap before sunrise Stuart had gone to Crampton's Gap and Maryland Heights, leaving Garland's and Colquitt's brigades of Hill's command to de¬ fend the gap. It was not long before Hill became aware that Cox was marching on the road to Fox's Gap, held by Colonel Rosser with a regiment of cavalry and two guns. Gar¬ land's brigade was sent to Fox's Gap, Col¬ quitt's retained at Turner's, and Anderson's ordered up from Boonsboro. Garland has not been long in position before Cox appeared and attacked him; and after a severe fight, in which Garland was killed and Lieut. -Col. R. B. Hayes of the 23d Ohio wounded, Garland's brigade was routed, and Cox gained the crest of the mountain, just south of Fox's Gap, but could not seize the gap, for at the moment of his victory G. B. Anderson's brigade came up and formed in front and on his right, covering the road through the gap. Learning from prisoners taken that D. H. Hill, with five brigades, was in his front, and that Lee was hastening from Hagerstown, with Longstreet's command, Cox withdrew his advance parties from the woods into which they had charged, and forming line just under the crest of the ridge, awaited reinforcements. The first rein¬ forcement

was Willcox's division, which came at 2 p. m. and, forming on Cox's right covered the road through Fox's Gap. Meanwhile other Confederate troops had come up and were coming up to form in Cox's front. Hill had called Ripley's and Rodes' brigades from Boonsboro, and thrown Ripley in front of Cox, and Rhodes to a hill north of Turner's Gap. General Lee, leaving Toombs' brigade near Hagerstown, marched back from there with the brigades of G. T. Anderson, Drayton, Kemper, Garnett, Jenkins, Evans and two brigades of Hood's division. After a hot and dusty march of 13 miles, Anderson and Dray¬ ton, first arriving, reached the field at 3 p. m., and were sent to support Hill's troops at Fox's Gap, and Drayton, on the left of the line thus formed, advancing from the woods at the gap, was encountered by Willcox, defeated and driven from the field with great loss, more than half of his brigade being killed, wounded and captured. Heavy skirmishing followed all along the line, Sturgis's division came up and partly relieved Willcox, and near sunset Gen¬ eral Reno came up, with Rodman's division, one of whose brigades, with a battery, was sent to

Cox's extreme left, the other held on the right. Reno rode forward to reconnoiter just to the right of the gap, as Hood's division came up on the Confederate left; there was a scattering fire on both sides ; and Reno, commanding the Ninth corps, was killed. At about the same time the right of the Confederate line charged upon the left of Cox's line, held by Fairchild's brigade and Clark's battery, and their quick repulse ended the engagement at Fox's Gap, with the Confederates still holding the gap. The loss of the Ninth corps in this engagement, which continued from 9 a. m. until after sun¬ set, was 157 killed, 691 wounded and 41 missing. The Confederate loss in Cox's front was about 600 killed and wounded and as many more captured.

During the latter part of Cox's engagement at Fox's Gap, General Hooker became severely engaged north of and at Turner's Gap. At daybreak of the 14th Hooker led the First corps from the Monocacy through Frederick and Middletown to Catoctin Creek, where he halted at 1 p. m. for rest and coffee. Under instructions to attack the heights north of Turner's Gap and create 'a diversion in favor of Cox, he marched by the National road lead¬ ing over Turner's Gap, turned to the right at Bolivar and marching nearly two miles halted and formed line at the eastern base of South Mountain, about 3.30 p.m.; Meade's division on the right, Hatch's on the left, with Rickett's in reserve. Gibbon's brigade of Hatch's division was left on the National road to

advance directly into the gap. In Hooker's front the slopes to the crest of the mountain were very precipitous, rugged and partly wooded, bisected by gorges and small ravines, all presenting difficult ascent to an infantry force, even in the absence of a foe in front. At the time there was a veteran foe in front, well protected by rocks and trees and the numerous stone fences separating the fields. The position to be assaulted was held by the brigades of Rodes, Kemper, Garnett, Evans and Jenkins, all under command of Longstreet. Hooker was very deliberate in his preparations, and it was after 4 p. m. when his line moved forward. Hatch, on the left, made a laborious ascent of the mountain, with frequent halts to draw breath and reform his line; but driving in the Con¬ federate skirmishers, he reached the wooded summit, and after severe fighting, in which he was wounded, succeeded in dislodging the Con¬ federates from the stone fences behind which they had fought, and driving them back to another line. In this he had the assistance of a part of Rickett's division. On Hatch's left Gibbon advanced on the road to the gap, and when near it was checked, after a very stubborn fight, by Colquitt's brigade. It was dark when Hatch and Gibbon ceased fightine, both close up to the gap. On the right Meade's route lay over very broken ground, but cross¬ ing ravines, ascending steep hills and charging stone fences, he drove Rodes' brigade and its support from point to point, as it extended to the left, and finally turning it, swept to the left and reached the highest point iof the moun¬ tain, commanding the summit of the gap, the road through it and the narrow open space around the Mountain House, on which Lee's defeated men were crowded in some disorder.

It was dark when this position had been gained and Hooker rested. He had lost 167 killed, 712 wounded and 44 missing. The total Union loss for the possession of Turner's Gap, in¬ cluding Fox's Gap, was 325 killed, 1,403 wounded and 85 missing; the Confederate loss, 248 killed, 1,013 wounded and 662 missing.

The result of the battle was that Lee aban¬ doned his intended invasion of Pennsylvania and ordered an immediate retreat to Virginia. At 8 p. m. he ordered McLaws to abandon his position during the night and recross the Poto¬ mac near Shepherdstown Ford, leaving that ford for Longstreet's and Hill's commands, and about the same hour sent a dispatch to Tack- son to march up the Virginia side of the Potomac to Shepherdstown Ford, to protect his crossing. These orders to McLaws and Jackson contemplated the abandonment of operations against Harper's Ferry. The trains, reserve artillery and reserve ammunition train, at Hagerstown, were ordered to cross the Potomac at Williamsport, and Toomb's brigade was ordered to march from Hagers¬ town to Sharpsburg. Between 10 and 11 p.m. Lee's

army began its retreat from South Moun¬ tain by way of Boonsboro and Sharpsburg, D. H. Hill leading, with orders to cross the Potomac. While on the march Lee heard that Franklin had carried Crampton's Gap, thus shutting up McLaws in Pleasant Valley, upon which he ordered his column to halt at Keedysville to assist McLaws, who was now ordered to cross Elk Ridge, if possible, and join him at Keedysville or Sharpsburg, or to cross the Potomac at Weverton, below Har¬ per's Ferry. Arriving at Keedysville, he could hear nothing .of McLaws, and at daylight, 15 September, resumed his march for Sharpsburg, still hoping that McLaws could elude Frank¬ lin by crossing Elk Ridge. Before reaching Sharpsburg he heard that Harper's Ferry had fallen, and when across the Antietam he re¬ ceived a dispatch from Jackson stating that he would join him at Sharpsburg, upon which he concluded to give McClellan battle at that place, and immediately made dispositions to contest McClellan's passage of the Antietam, until Jackson, Walker, McLaws and Anderson could join him, by marching up the Virginia side of the Potomac. Consult (Official Rec- ords> (Vols. XIX, LI); <McClellan's Own Story) ; Palfrey, (The Antietam and Fred¬ ericksburg *(New York 1881) ; Allan, (History of the Army of Northern Virginia in 1862) fNew York 1867) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. II). E. A. Carman.

SOUTH NORWALK. See Norwalk.

SOUTH OMAHA, Neb., formerly a city in Douglas County, on the Missouri River, and on the Chicago, Burlington and Quincy, the Chi¬ cago, Rock Island and Pacific, the Missouri Pacific, the Union Pacific and other railroads. It has steamer connection with many of the cities and towns on the Missouri, thus adding to its shipping facilities, especially the oppor¬ tunities for cheap freight transportation. It was chartered as a city in 1885 and incorporated in the city of Omaha in 1915. Pop. about 27,000 at time of its incorporation with Omaha (q.v.).

SOUTH ORANGE, N. J., village in Essex County, on the Rahway River and on the Dela-

ware, Lackawanna and Western Railroad, five miles west of Newark and 15 miles, west of New York. It was first settled in 1680 and was a part of the town of Newark until 1806, when the town of South

Orange was separately in¬ corporated. It is picturesquely situated among the Orange mountains and has many fine resi¬ dences, being a favorite place of residence for New York business men. Though largely a residential village, it has manufactures of hats and gelatin. It contains a handsome town hall (completed 1895), a public library, a public high school and a Roman Catholic parish school. It is also the seat of two private schools for girls and of Seton Hall College (q.v.), a Roman Catholic institution. Pop. (1920) 7,274.

SOUTH PASADENA, Cal., city in Los Angeles County, on the northeastern outskirts of Los Angeles, and on the Atchison, Topeka and Santa Fe Coast Line, the Salt Lake Route and the Southern Pacific railroads. The sur¬ rounding district is engaged in fruit raising and ostrich farming. Pop. (1920) 7,648.

SOUTH POLAR EXPLORATIONS.

See Polar Research.

SOUTH PORTLAND, Me., city in Cum¬ berland County, on Fore River, opposite Port¬ land', with which it is connected by four bridges and by ferry. It is a residential city and has a considerable business as a summer resort. Forts Preble and Williams are located here, each being garrisoned by two companies of coast artillery. The Maine School for Boys is situ¬ ated here. Industries include boat building, flour mills, oil and lead works and railroad machine shops. Pop. (1920) 9,254.

SOUTH RIVER, N. J., borough in Middle¬ sex County, on the South River, 25 miles south¬ west of New York, on the Raritan Railroad. There are extensive deposits of clay and mold¬ ing sands in the vicinity and manufactures in-1 elude bricks, fire proofing materials, handker¬ chiefs, shirts and embroidery. Pop. 6,596.

SOUTH SAINT PAUL, Minn., city in Dakota County, on the west bank of the Mis¬ sissippi River and on the southern outskirts of Saint Paul, on the Chicago, Great Western and the Chicago, Rock Island and Pacific railroads. It is an important livestock market, has exten¬ sive stockyards and a large packing industry. Manufactures include malt, plaster and cement, and there are tanneries, carshops and a foundry. Pop. (1920) 6,860.

SOUTH SEA. See Pacific Ocean.

SOUTH SEA COMPANY, The, a joint-

stock company, which, in consideration of cer¬ tain exclusive

privileges of trading to the South Seas, offered the English government easier terms for the advance or negotiation of loans than could be obtained from the general public. In 1720 the proposal of the company to take over the entire national debt (at this time about $17,500,000) in consideration of receiving annually 5 per cent, was accepted and the com¬ pany promised on return for this privilege (as it was regarded) a premium in their own stock of $35,000,000. Professing to possess extensive sources of revenue the directors held out promises to the public of paying as much as 60 per cent on their shares. It became soon ap¬ parent that such magnificent promises could never be fulfilled and in a few months' time

the collapse came which ruined thousands. Several important cabinet officers were im¬ plicated in the fraud. About one-third of. the original capital was saved, which was divided among the stockholders. Sir Robert Walpole was one of the chief opposers of the scheme. Consult Coxe, W., (Memoirs of Sir Robert Walpole) (London 1802).

SOUTH SEAS. See Pacific Ocean; Polynesia ; Melanesia ; Micronesia.

SOUTH SHETLAND ISLANDS, Ant¬ arctic Ocean, a group of islands situated be¬ tween lat. 61° and 63° 20' S., and between long. 54° and 63° W., off the north coast of Graham Land and 600 miles southeast of Cape Horn. The group consists of 12 larger and numerous smaller islands, which are rocky and mountain¬ ous. They were discovered by the Dutch navi¬ gator Dirk Gerrits in 1599. In 1908 they became a British possession. The seal fisheries are extensive.

SOUTH-WEST AFRICA PROTECTO¬ RATE, the territory known before the Euro¬ pean War as German South-West Africa. Its official designation became ((The Protectorate of South-West Africa in Military Occupation of the Union Forces, }) so named after its conquest by South African forces under General Botha on 15 July 1915. The territory was placed under the administration of the Union of South Africa by the Peace Treaty of May 1919. It includes the region lying between Angola (Por¬ tuguese West Africa) and Cape Colony and ex¬ tending eastward to Bechuanaland. It is com¬ posed of- Ovambo, Damaraland and Great Namaqualand; area, 322,450 square miles; pop. before the war, whites, 14,830, of whom 12,292 were Germans. The natives number about 250,000. The military force, including police, was 3,000 men. The region forms a rough triangular mass, with truncated apex resting on the Orange River and broadening northward; total length, 930 miles, and a mean breadth of 400 miles. Long regarded as an arid sandy waste, it was suddenly proclaimed a German possession in 1884 under the title of Luderitz- land. The claim

was recognized — after some diplomatic negotiations — and the boundaries were fixed by two conventions with Great Britain in 1884 and 1890, and one with Portu¬ gal in 1886. The enclave of Walfish Bay (q.v.) had been annexed by England in 1878 and joined to Cape Colony in 1884. The only other harbors are Ogden, 180 miles off Cape Frio, Sandwich Haven, or Porto do Ilheo, and Angra Pequena Bay; in addition, the Germans constructed a new harbor at Swakopmund. The Namil Desert separates the sea from the inland districts, where farming is carried on. Water is scarce in the country, what rainfall there is being greatest in the north and east, diminish¬ ing toward the south and west, though boring is usually attended with good results. At Tsumeb and other places in the hinterland of Swakop¬ mund copper mining is successfully carried on, while up and down the desert near Angra Pequena diamond mines are worked. The first diamond was discovered in 1908; since then $37,000,000 worth of diamonds have been ex¬ tracted. Neither gold nor coal has yet been found. Windhoek is the capital, via which a railroad connects Swakopmund and Angra Pequena, while another line runs from Wind-

hoek to Tsumeb. The total length of railways in operation in 1913 was 1,305 miles. The Deutsche Kolonial Gesellschaft fur Siidwest Afrika held a concession of the coast lands. (See War, European, Colonial Campaigns; Beyers, Christian Frederick). Consult Calvert, A. F., (The German African Empire) (London 1916), and (South-West Africa During the Ger¬ man Occupation (London 1915); Frobenius, L., (The Voice of Africa) (London 1913) ; Has- sert, K., (Deutschlands Kolonien) (Leipzig • 1910) ; Johnston, Sir H., (The Colonization of Africa) (Cambridge 1899) ; Keltie, J. S., (The Partition of Africa *(London 1895) ; Ko- schitzky, M. V.. (Deutsche Kolonialgeschichte* (Berlin 1888) ; Lewin, E., (The Germans and Africa* (London 1915) ; Schulze, L., (Siidwest- afrika) (Berlin 1910) ; Zimmermann, A., (Geschichte der Deutschen Kolonialpolitik) (Berlin 1914).

S9UTHAMPTON, south-amp’ton or sut’h- hamp'ton, England, an important seaport town, county and Parliamentary borough in Hamp¬ shire, 71 miles southwest of London, on the innermost angle of the Southampton-Water. Other streams almost surround the town, which occupies an acclivity and consists of two dis¬ tinct parts. The walls of the older part, belong¬ ing to the Middle Ages, traverse the centre of the town and divide it from the modern por¬ tion. The gates of this ancient wall are quite remarkable ; Bargate is embattled and machio-

lated and contains in its upper part the Guild Hall. Saint Michael's is an old Norman church with some fine stained glass and delicate traceries and a lofty tower. Domus Dei is an ancient hospital of the 12th century, whose chapel was for some time used by French Protestant refugees. The Royal Victoria Hos¬ pital is about six miles from the town at Netley near the ruins of a celebrated abbey. It was founded by Queen Victoria for soldiers of the foreign service, as well as those nearer home, at a cost of $1,750,000. A medical school is at¬ tached to it, for the preparation of surgeons for the army medical staff ; it is also head¬ quarters for women army-nurses who are trained here for their profession. Other build¬ ings are Holyrood and Saint Mary's churches, the town-hall, custom-house, Watts Memorial Hall, Philharmonic Hall, assembly-rooms, ord¬ nance survey offices, baths, etc. Literary insti¬ tutions include the free library and grammar school (1550); Trade School; Hartley College, founded for the advancement of the natural sciences, archaeology, classical and Oriental literature and connected with the schools of Art and Science at South Kensington ; Poly- technicum, Athenaeum and theatres. The docks are extensive (250 acres) and the harbor one of the finest in the world. The Prince of Wales' dock is the largest single dock extant. There are carriage manufactories, machine works, breweries and distilleries, ship-building and a cattle market. The trade of the port is enormous. The imports are corn, meat, cheese, fruit, coffee, sugar, cattle, wool, hides and wood. The exports are cotton manufactures, leather, hats, hardware, books and clothes. There are fine parks in the town and South¬ ampton Common, nearby, is a large tract which contains the race-track. Southampton was

founded by the Saxons and preserves much of its antique character. Pop. about 120,000. _

SOUTHAMPTON, N. Y., village in Suf¬ folk County, on the south shore of Long Island and on the Atlantic Ocean, 85 miles northeast of New York and on the Long Island Railroad. Its principal occupation is that of a summer re¬ sort. It has excellent fishing and bathing and many beautiful homes. There is a high school and the Rogers Memorial Library. Pop. 2,635.

SOUTHAMPTON INSURRECTION.

See Turner, Nat.

SOUTHARD, sut'h'ard, Samuel Lewis,

American statesman : b. Baskingridge, N. J.. 9 June 1787; d.

Fredericksburg, Va., 26 June 1842. He was graduated from the College of New Jersey in 1804 and was afterward ad¬ mitted to the bar of Virginia. In 1815 he was appointed associate justice of the Supreme Court of New Jersey in which capacity he served until 1821, when he was elected to the United States Senate. In 1823 he was made Secretary of the Navy and in 1829 held the same office in the cabinet of John Quincy Adams. He was appointed attorney-general of New Jersey in 1829 and was elected attorney- general of New Jersey and governor of that State in 1832. He was a member of the United States Senate, 1833-42. His publications include (Reports of the Supreme Court of New Jersey, 1816-20 *(1820) ; 'Centennial Address) (1832) and (Discourse on William Wirt* (1834).

SOUTHBRIDGE, Mass., town in Worces¬ ter County, on the Quinnebaugh River and on the East Thompson branch of the New York, New Haven and Hartford Railroad; about 71 miles southwest of Boston and 21 miles south by west of the city of Worcester. It was settled about 1730 by people from Medfield and included Sturbridge, Charlton and Dudly until 1801. It was incorporated as a poll-parish 28 Feb. 1801, as a town in 1816. The chief manufacturing establishments are optical works, shuttle works, woolen and cotton mills, knife works and print¬ ing works. The town is an industrial and com¬ mercial centre of great importance. The prin¬ cipal public buildings are the town-hall, public library, the Y. M. C. A. building, the churches and schools. There are seven churches, a high school, public and parish schools and a fine pub¬ lic library. The government is administered by annual town meetings. The French Canadian element predominates. Pop. 14,200.

SOUTHCOTT, Joanna, English fanatic: b. Gittisham, Devonshire, April 1750; d. London, 27 Dec. 1814. For many years she was in do¬ mestic service, attending the Established Church, but also going to Wesleyan meetings. In 1791 she joined the Methodists, but in 1792 left them and began to write prophecies in a combination of doggerel verse and incoherent prose. Con¬ verts followed the publication of her tract, 'The Strange Effects of Faith* (1801) ; the elect were to number 144,000 and their certificates for the millennium were drawn up. Joanna professed to interpret dreams and many ab¬ surdities and delusions attended her proceed¬ ings until her death by a brain disease. Her followers split into two minor sects, led re¬ spectively by John Ward and John Wroe. Consult Aikin (Pugh), (Memoirs of Religious

Impostors) (1821) ; Mathias, (The Case of Joanna SouthcottP

SOUTHCOTTIANS. See Southcott,

Joanna ; Religious Sects.

SOUTHDOWN, a breed of sheep (q.v.).

SOUTHEND, or SOUTHEND-ON-SEA,

England, in Essex County, on the Thames, 42 miles east of London. The public buildings are the theatre, church and hall, technical schools and an isolation hospital. The marine park contains 26 acres, a revolving tower, pavilions, promenade piers and pleasure grounds. West- end is an attractive suburb, with many pretty villas. Southend is the chief station of the coast survey and is above all a much-fre¬ quented watering-place — the one nearest Lon¬ don. Its popularity began with a visit by Queen Caroline in 1804. The bathing is excellent. It has a fine pier and esplanade and a lighthouse. German warships bombarded Southend in 1915. Pop. about 60,000.

SOUTHERLAND, William Henry Hud¬ son, American naval officer: b. New York, 10 July 1852. He was graduated at the United States Naval Academy in 1872. As a boy he served as a naval apprentice. He was com¬ mander of the Eagle in the Spanish-American War in 1898, serving on the Cuban coast. He was promoted through the various grades to the rank of rear-admiral 4 May 1910. He com¬ manded the second division of the Pacific fleet in 1911-12; was commander-in-chief of the Pacific fleet in 1912-13; commanded an expeditionary landing force in Nicaragua in August-October 1912 and in 1913-14 he was a member of the General Board. He was retired upon reaching the age limit in 1914.

SOUTHERN BAPTIST THEOLOG¬ ICAL SEMINARY, located at Louisville, Ky. It was established by the Southern Baptists to provide an institution expressly for theological training and was opened in 1859 at Greenville, S. C. During the Civil War it was closed and reopened in 1865 under serious financial diffi¬ culties. In 1877 it was removed to Louisville, but the financial resources were precarious until 1880 when a large donation was received and the success of the institution assured. The course of instruction is divided into the follow¬ ing 10 schools: (1) Biblical introduction; (2) Old Testament interpretation; (3) New Testa¬ ment interpretation; (4) systematic theology; (5) comparative religion and missions; (6) homiletics and

elocution; (7) church history; (8) ethics and sociology ; (9) pastoral theology ; (10) Sunday school pedagogy. Of these schools, four have two departments; the school of Old Testament interpretation includes an English and a Hebrew department, the school of New Testament interpretation an English and a Greek department, the school of sys¬ tematic theology a general course and a depart¬ ment of ˆBiblical theology, the school of church history, junior and senior departments, the He¬ brew, Greek, Biblical theology and senior church history courses are intended for students who have had a higher education, some preparation in Greek being necessary for the Greek course. There are also special courses for advanced work in each department. The degrees con¬ ferred: Th.G. (graduate in theology), Th.B. (bachelor in theology), Th.M. (matter in the¬

ology) and Th.D. (doctor in theology), the last for post-graduate work after the acquirement of the degree of Th.M. The buildings include New York Hall (a dormitory), Norton Hall, the Memorial Library Building and the gym¬ nasium. The library in 1916 contained 25,000 volumes, the students numbered 341 and the faculty 11.

SOUTHERN BAPTISTS, the southern branch of the Baptist Church in the United States, which separated from the main body in May 1845 because of the difficulty of har¬ monizing the different sections on the slavery question. It is governed by the Southern Bap¬ tist Convention and has both Home and For¬ eign Mission boards, and Sunday school Boards, as well as many young people's socie¬ ties. The Foreign Missions Board expends about $300,000 annually, and has about 12,000 native members in Italy, Argentina, Brazil, Mexico, Africa, China and Japan. The Home Missions Board includes within its field Cuba and the insular possessions of the United States. It expends about $200,000 annually. On 1 Jan. 1917 there were 23,692 church organ¬ izations; 2,711,591 members; and 15,946 min- isters. The Sunday schools numbered 18,438, with 159,733 teachers and 1,656,324 pupils.

SOUTHERN BOUNDARY. See Bound¬ aries of the United States.

SOUTHERN CALIFORNIA, University

of, a co-educational institution for higher learn¬ ing opened at Los Angeles in 1880. It has col¬ leges of liberal arts, law, medicine, dentistry, theology, pharmacy, oratory, music and fine arts ; and there is also a preparatory school and a Marine Biological Laboratory at Venice, on the Pacific Ocean, 16 miles distant. Its trustees are elected by the Southern California Con¬ ference of the Methodist Episcopal

Church, but no religious qualifications are required of either students or faculty. The university is situated about three and one-half miles from the heart of Los Angeles. Its grounds and buildings are valued at $600,000, and its library has 26,000 volumes. It had in 1918 4,427 students enrolled, 600 with the colors, and 313 instructors.

SOUTHERN COLLEGE, Birmingham,

the chief educational institution of the Metho¬ dist Episcopal Church in the State of Alabama resulting from the union, in 1918, of the South¬ ern University, situated at Greensboro, Ala., and Birmingham College, situated at Birming¬ ham, Ala. Birmingham being the greater cen¬ tre of population and possessing better trans¬ portation facilities, the whole college interests, except the high school at Greensboro, were centred in the former place. The Southern University was opened in 1859; but it had a difficult time during the Civil War and the re¬ construction period. The State of Alabama was divided into two conferences of the Methodist Church in 1883; but both sections still continued to support the university. How¬ ever, in 1896, the North Alabama Confer¬ ence decided to establish a college for men. The new institution was opened in Birming¬ ham in 1897, upon which the northern con¬ ference surrendered its interest in Southern University. On the union of Birmingham Col¬ lege and Southern University in 1918, the name

of Birmingham Southern College was adopted for the new institution. The college possesses a fine large administration building of brick containing 'a chapel, society halls, offices and recitation-rooms; three buildings for dor¬ mitories ; a gymnasium ; a residence for the president of the college, and a large modern science hall which houses the library, labora¬ tories, storage vault and possesses numerous classrooms. The scheme of the Birmingham Southern College, as formed in 1918, contem¬ plates ultimately erecting in all 23 buildings arranged according to a landscape scheme around a large campus on the highest eleva¬ tion of the college grounds which consist of 63 acres, 40 of which are included in the cam¬ pus. In addition to this Birmingham property the college also owns all the buildings and grounds of the defunct Southern University at Greensborough, together with the endow¬ ments belonging to the latter institution. Birmingham Southern College is administered by a board of trustees consisting of 24 mem¬ bers ; and it has an annual endowment of $20,-

000 from the two church conferences of the State; a productive endowment of $75,000 and a second endowment of $125,000. The college courses lead to two degrees, bachelor of arts and bachelor of science, and the M.A. degree is also conferred.

SOUTHERN CROSS, in astronomy, a constellation of the southern hemisphere, com¬ posed of four stars, one of which is of the first and two of the second magnitude. They form a figure not unlike a cross, especially when seen above the pole, and are the best- known of the southern constellations.

SOUTHERN MINNESOTA, University

of, a co-educationl institution giving normal and business courses, established at Austin by William W. Meiners in 1897. Its president in 1918 was W. W. Meiners, Ph.D., LL.D.

SOUTHERN PACIFIC COMPANY. History. — The late Collis P. Huntington and his associates, who had built the Central Pa¬ cific Railroad, the Pacific end of the first trans¬ continental line, and the Southern Pacific Rail¬ road lines in California, Arizona and New Mexico, and who had secured control of cer¬ tain railways in Texas and Louisiana, extend¬ ing from El Paso; Tex., to New Orleans, La., conceived the idea of forming the Southern Pacific Company in order to ensure perpetuity and harmony in the operation of the respec¬ tive properties as parts of one through line. The Southern Pacific Company was created by a special act of the legislature of the State of Kentucky, approved 17 March 1884. Its charter, which was very broad, authorized it, among ether things, to acquire, by purchase or other¬ wise, stocks, bonds or securities of any com¬ pany, corporation or association, to construct, acquire, own, lease, maintain or operate rail¬ ways, steamship lines, telegraph or any public or private improvements ; and to buy, hold, sell and deal in all kinds of public and private stocks, bonds and securities. This was the first security-holding company organized to carry on extensive work. The organization of the company took place in August 1884, and active operations began on 1 March 1885 when the lease known as the (<Omnibus Lease," went into effect. Under this lease, which included the

lines forming nearly all of the <(Sunset Route" from San Francisco to New Orleans by rail and thence to New York by steamer, together with their lateral lines and branches, the South¬ ern Pacific Company operated all the proper¬ ties as one line, received all revenues and paid all expenses, including rents, taxes and in¬ terest, and divided

the remaining profits, if any, between the parties to the lease on cer¬ tain agreed percentages. This lease was termi¬ nated as to the lines in the State of Texas, in accordance with a statute of that State on 1 July 1889, and was terminated as to the re¬ maining lines on 31 Dec. 1901. Since the termi¬ nation of the Omnibus Lease the lines in Texas and Louisiana have been operated by their own organizations, but the Southern Pacific Com¬ pany has continued to operate the Pacific sys¬ tem lines (which include Central Pacific Rail¬ way, Oregon and California Railroad, Southern Pacific Railroad, Southern Pacific Coast Rail¬ way) under long-term leases. All of such lines, however, together with the ocean-steamship lines plying between New York, New Orleans, Galveston and Havana, have been dealt with as parts of the Southern Pacific "transportation system."

Following its incorporation the Southern Pa¬ cific Company proceeded to acquire the capital stocks of the companies owning the lines which formed its transportation system and on 31 Dec. 1917 owned all but $81,700 of the $349,082,400 of outstanding capital stocks of the companies mentioned in this article under Mileage and Service.

Mileage and Service. — The Southern Pa¬ cific system operates in the States of Louisiana, Texas, New Mexico, Arizona, California, Ore¬ gon, Nevada and Utah. Its transportation sys¬ tem, which extends from New York City, via New Orleans, La., and Galveston, Tex., to San Francisco, Cal., and Portland, Ore., with a line extending from San Francisco, Cal., to Ogden, Utah, was made up, as of 31 Dec. 1917, as follows :

Miles of railway

Miles of water lines

Lines operated by Southern Pacific Com¬ pany under long term leases:

Central Pacific Railway . . .

Oregon and California Railroad. .....

Southern Pacific Railroad. .

Southern Pacific Coast Railway . .

Lines operated by owning companies: Morgan's Louisiana and Texas Railroad

and Steamship Company .

Louisiana Western Railroad. . . . .

Lake Charles and Northern Railroad . Texas and New Orleans Railroad .....

Galveston, Harrisburg and San Antonio

Railway . .

Houston, East and West Texas Railway. Houston and Shreveport Railroad. . . . Houston and Texas Central Railroad. .

Arizona Eastern Railroad .

Iberia and Vermilion Railroad .

Southern Pacific Company's Steamship

2,267

1,214

3,530

107

401

208

73

468

1,361 191 41 948 3 78 21

125

Lines .

Southern Pacific Terminal Company (Dock and wharf facilities at Gal¬ veston, Tex.) .

Less operated jointly by two or more companies .

11,208

43

Total

11,165

4,400

4,525

4,525

312

SOUTHERN PACIFIC COMPANY

The service of the company includes routes as follows: (1) Sunset Route — between San Francisco and Los Angeles, Cal., El Paso, San Antonio and Houston, Tex., and New Orleans, La.; (2) Atlantic and Gulf Steamship Lines — between New Orleans and New York, Gal¬ veston and New York and New Orleans and Havana, Cuba; (3) San Joaquin Valley Line — between San Francisco and Los Angeles, Cal.; (4) Coast Line — between San Francisco and Los Angeles, Cal.; (5) Ogden Route — between San Francisco and Ogden, Utah; (6) Shasta Route — between San Francisco, Sacramento and Portland, Ore.

Operating and Other Income. — The fol¬ lowing tabulation, showing the number of shareholders, the miles of road operated and the results- of operation in 1917, the last year of operation before the property was taken over by the government under the Federal Con¬ trol Act of 21 March 1918, compared with 1886, the first complete calendar year of op¬ eration, gives an idea of the company's growth :

Assets and Liabilities. — The balance sheets of the Southern Pacific Company and its pro¬ prietary companies, translated into ordinary conversational language, show the magnitude of the company's property interests and financial strength: On 31 Dec. 1917 the combined ob¬ ligations (debts) of every description, of the company and its proprietary companies, con¬ sisting of amounts owed to security holders, employees, tradesmen, connecting lines, tax collectors and others (not including $51,874,- 598.08 of accrued depreciation on road, equip¬ ment and miscellaneous physical property) amounted to $1,382,264,737.57. The companies held to meet such obligations assets (property) amounting to $1,685,075,159.29 as follows: (1) Book value of the investment to transporta¬ tion property carried on the books of the com¬ panies

forming the Southern Pacific steam transportation system, consisting of 11.165 miles of first-main track, 561 miles of additional main track, 4,150 miles of 3'ard track and sid¬ ings, 25 ocean steamships, 5 river steamships,

Year ended

31 Dec. 1917

Year ended

31 Dec. 1886

Per cent of increase

Number of shareholders of Southern Pacific Company .

Average miles of road operated .

37,088

11,137

91

4,846

130

Freight revenue .

$132,608,207

$18,668,421 ■

610

Tons carried one mile .

14,803,735,481

1,439,113,580

929

Freight-train miles .

24,550,167

9,616,218

155

Passenger revenue .

$45,380,193

$8. 464, 727

436

Passengers carried one mile .

2,024,390,972

398.031,884

409

Passenger-train miles .

31,085,797

5,953,054

422

Total operating revenues .

$193,971,490

$31,797,882

510

Net revenue from miscellaneous operations, hire of equipment and rentals .

8,080,390

284,797

2,737

Interest and dividends received and other income .

7,248,979

544,535

1,231

Gross income .

$209,300,859

$32,627,214

541

Operating expenses and uncollectible revenues .

$120,672,060

$18,514,656

552

Railway tax accruals .

13,792.176

888,623

1,452

Interest and other deductions .

25,707,206

9,112,941

182

Total deductions .

$160,171,442

$28,516,220

460

Net income .

$49,129,417

$4,110,994

1,095

Per cent of net income on outstanding capital stock of Southern

Pacific Company .

17.65

3.27

439.76

In 1917 after appropriating $978,097 for sinking funds and $16,369,854 for dividends there remained a balance of $31,781,466 which went to swell the surplus of the company.

Capital Stock and Funded Debt. — At 31 Dec. 1917 the capital stock and funded debt were as follows:

Capital Stock:

Southern Pacific Company $272,823,405 Proprietary Companies . . . 349 , 082 , 400

- $621,905,805

Funded Debt:

Southern Pacific Company $206,657,610 Proprietary Companies ... 456,471,651

- $663,129,261

Of the proprietary companies' issues the South¬ ern Pacific Company owns direct or through subsidiaries $349,000,700 of capital stocks and $97,689,590 of funded debt. In addition to these holdings $11,471,000 of proprietary companies' bonds are held in sinking

funds.

18 ferry-boats and car transfers, 10 tugs, 63 barges and 19 other vessels, the whole form¬ ing a transcontinental system extending from New York City, via New Orleans and Gal¬ veston to San Francisco, Cal., and Portland, Ore., with a line extending from Ogden, Utah, to San Francisco, Cal., $983,482,275.20; (2) cash and interest-bearing securities in sinking funds for the redemption of outstanding funded debt, $13,71 1,547.27 ; (3) investments in miscellaneous physical property consisting principally of (a) the California Fuel-Oil Department of South¬ ern Pacific Company with an annual produc¬ tion of about 9,500,000 barrels of oil and an¬ nual gross earnings of approximately $17,000,- 000, and (b) terminal and other real estate ac¬ quired in anticipation of future use, $30,778,- 341.24; (4) investments in affiliated companies, $523,560,538.04; (5) other investments, princi¬ pally securities in outside companies, $24,730,- 955.60; (6) current, deferred and unadjusted assets consisting of :

Cash . $31,733,162 61

Cash assets . 27,319,549 20

Material and supplies. . 24,406,115 91

Deferred assets and un¬ adjusted items . 25,352,67422

- $108,811,501 94

Grand total of assets . $1,685,075,159 29

Vvhich exceeds all debts and obligations, in¬ cluding the outstanding capital stock, by an amount of $302,810,421.72, of which $51,874,- 598.08 represents reserves for accrued deprecia¬ tion and $250,935,823.64 represents an invested surplus which is equivalent to nearly 92 per cent of the outstanding capital stock. In ad¬ dition the companies own 10,978,818 acres of unsold subsidy lands, allocated thus: (a) Central Pacific Railway Company, 7,076,215 acres; (b) Houston and Texas Central Rail¬ road Company, 18,688 -acres ; (c) Southern Pa¬ cific Land Company, 3,883,915 acres; total, 10,978,818 acres; and have a claim against the United States for the value of 2,353,446 acres of unsold lands of the Oregon and California Railroad land grant taken over by the govern¬ ment under Act of Congress

passed 9 June

1.

Union Pacific and Southern Pacific Un¬ merger. — Following the death of the late C. P. Huntington the Union Pacific Railroad Com¬ pany acquired a large block of Southern Pa¬ cific Company stock and this was augmented by later purchases until on 30 June 1912 the Union Pacific owned $126,650,000 out of a total of $272,672,406 of Southern Pacific Com¬ pany stock. Suit was brought by the United States on the ground that the ownership of such stock by the Union Pacific Railroad Com¬ pany was in violation of the Sherman Law and on 2 Dec. 1912 the United States Supreme Court held that the ownership of such stock by the Union Pacific Railroad Company was unlawful and ordered the sale of such stock.

General. — The Southern Pacific Company was one of the pioneers in the use of all-steel equipment, the first all-steel passenger car used on its lines having been placed in service in July 1906. Since that time it has constantly been adding to its steel equipment and for several years has followed the practice of pur¬ chasing only all-steel cars for passenger service and either all-steel or steel underframe cars for freight service. Of the 2,405 passenger- train cars in service at 31 Dec. 1917, 1,096, or 46 per cent, were all steel, and' of the 51,187 freight-train cars in service at the same date 37,515, or 76 per cent, were either all steel or steel underframe.

To secure and maintain the highest stand¬ ard of efficiency and safety of operation the Southern Pacific Company has for many years expended large sums in the substitution of steel cars for wooden cars; in the application of air-brakes, automatic couplers and other safety devices; in the elimination or adequate protection of grade crossings ; and in the in¬ stallation of automatic electric-block signals. As a result of such expenditures for safety devices, and of the unremitting efforts of the company's officers to maintain safe-working methods, the company transported 422,000,000 passengers in the 10 years ending 31 Dec. 1917 with but one fatality in a train accident.

SOUTHERN RAILWAY COMPANY.

The Southern Railway Company was chartered under the laws of Virginia, 1894, as successor to the Richmond and West Point Terminal Railway and Warehouse Company. It operates main lines in Virginia, North Carolina, South Carolina, Georgia, Tennessee, Alabama, Missis¬ sippi, Kentucky, Indiana and Illinois. There are also branches and

spurs in these States, also in the District of Columbia. The lines owned extend 4,341.60 miles; those controlled through the ownership of securities, 1,456.68 miles, and the leased lines, 786.03 miles. The road covers, with its leased lines and trackage rights, practically all points of importance in the South Atlantic and Gulf States.

The Southern Railway, by its ownership of securities, controls the following leased lines : Southern Railway, Carolina division, 755 miles ; Mobile and Birmingham Railroad, 150; Rich¬ mond and Mecklenburg Railway, 3) ; Georgia Midland Railroad, 98; Virginia and Southwest¬ ern Railway, 189; North Carolina Midland Rail¬ road, 54; Elberton Southern Railway, 51. The lines controlled but not leased are : the State LTniversity Railway, 10 miles ; Knoxville and Ohio Railroad, 69; Sievern and Knoxville Rail¬ road, 17; Ensley Southern, 33; Cumberland Railway, 11; Tennessee and Carolina Southern Railway, 30; Roswell Railroad, 13. Other lines leased and trackage rights bring the aggregate length of line controlled by the Southern Railway Company, as above, to 7,102 miles.

Other Lines Acquired. — The Southern Railway Company also controls the Mobile and Ohio Railroad; Alabama Great Southern Rail¬ road, 357 miles; Cincinnati, New Orleans and Texas Pacific Railroad, 336; Georgia Southern and Florida Railway, 391 ; Northern Alabama Railroad, 119. During the fiscal year ended

30 June 1917 the company acquired prac¬ tically all the capital stock of the New Orleans and Northeastern Railroad, extending from New Orleans to Meridian, Miss., 195 miles.

The Alabama Great Southern Railroad is controlled by the Southern Railway Company through ownership of the majority of each class of its capital stock. The Southern Rail¬ way Company controls the Mobile and Ohio Railroad through ownership of more than 73 per cent of its capital stock and about 87 per cent of its general mortgage bonds. The Georgia Southern and Florida Railway Company is controlled through ownership of more than 58 per cent of its capital stock and the entire issue of its first consolidated mort¬ gage bonds. The above companies are operated independently. Other lines in the same class are: Northern Alabama Railway; Atlantic and Yadkin Railway; Blue Ridge, Danville and Western Railroad; Tallulah Falls Railway; Lawrenceville Branch Railroad; Hartwell Rail¬ way; High Point, Randleman, Asheboro and Southern Railroad; Saint Johns River Termi¬ nal, and Yadkin Railroad.

The operating revenues in the year ended

31 Dec. 1917 amounted to $90,716,569, earned by the transportation of 19,886,602 passengers and 37,063,095 tons of freight. The passenger travel averaged 55.99 miles at. 2.183 cents per mile — aggregating in the year 1,11 3,473,875 passenger-miles and $24,303,183. The freight traffic averaged 175.81 miles per ton, at a charge

of 0.897 cents per ton-mile — aggregating in the year, 6,516,208,527 ton-miles and $58,450,- 029. The total operating expenses for the year amounted to $60,113,508 and the total operating income was $26,429,962, of which $14,037,415 was net income. The appropriation for divi¬ dends was $1,500,000 and dor physical better¬ ments, $120,210. The surplus for the year was

$12,417,205. <

The equipment of the road on 31 Dec. 1917 comprised 1,750 locomotives, 626 passenger coaches, 345 baggage, mail and express cars and 49,495 freight cars, of which 18,480 were coal cars.

The entire investment in the road and its equipment was $416,468,542. Other investments of the company amounted to $75,752,539. The total stock outstanding was $180,000,000 and the long-term debt was $253,275,500. The credit balance of the profit and loss account on the date quoted was $43,288,162.

Descriptive. — The Southern Railway with its main artery extends from Washington, D. C., to Atlanta, Ga., where branches extend south¬ ward to Mobile, Ala. ; eastward to Brunswick, Savannah and Charleston ; westward to Chatta¬ nooga, Birmingham and Memphis ; another westward branch also reaching Louisville and Saint Louis ; while other ramifications extend to Harrisburg, Pa., Richmond, Va., and Norfolk, N. C.

SOUTHERNE, Thomas, English play¬ wright and dramatist : b in County Dublin, Ireland, about 1660; d. 26 May 1746. He was educated at Trinity College, Dublin, and entered the Middle Temple at London, but subsequently abandoned law to take up play-writing. His first play was (The Loyal Brother, or The Persian Prince5 (1682) ; this was followed by Hsabella or the Fatal Marriage5 (1694), which was afterward revised by Garrick; (Oroonoko, or The Royal Slave5 (1696), one of the earliest English condemnations of the slave trade; (Sir

Anthony Love, or The Rambling Lady.5

SOUTHERNWOOD, an ornamental and

ordinary herb. See Artemisia.

SOUTHEY, south 'i or suth'i, Caroline Ann Bowles, English poetess, daughter of Capt. Charles Bowles, a retired officer, and second wife of Robert Southey (q.v.), to whom she was married in 1839: b. Lymington, Hamp¬ shire, 6 Dec. 1786; d. there, 20 July 1854. Owing to the death of her mother in 1816 and the loss of her property she was compelled to turn to literature for maintenance and in 1820 sent the manuscript of (Allen Fitzarthur5 to Robert Southey for approval. This led to considerable correspondence between them and finally re¬ sulted in their marriage in 1839. Meanwhile she had written (Tales of the Factories5 (1823) in verse; (Solitary Hours5 (1826) in verse and prose: (Chapters on Churchyards5 (1829), prose tales which gained her wide reputation ; (Selwvn in Search of a Daughter5 (1835) ; (The Birthday5 (1836), etc. She also collaborated with Southey on the poem (Robin Hood,5 which was not, however, completed. After Southey's death she lived in retirement. Her collected poems were published in 1867. For bibliography see Southey, Robert.

SOUTHEY, Robert, English poet-laureate, historian, miscellaneous writer: b. Bristol, Eng¬

land, 12 Aug. 1774; d. Keswick, England, 21 March 1843. His father was Robert Southey, a linen draper; his mother was Margaret Hill, daughter of Edward Hill, gentleman, of Bed- minster. Southey spent most of his boyhood in the care of his mother's half-sister, Miss Elizabeth Tyler of Bath. She gave him access* to the theatre and to books, and, in his 14th year, sent him to Westminster School. There he remained four years ; then, for publishing in the school paper a protest against excessive flogging, he was privately expelled. His moth¬ er's brother, the Rev. Herbert Hill, sent Southey to Oxford. He matriculated at Ballio College, 3 Nov. 1792. In his regular studies he was but little interested ; but he read much and was especially influenced by the stoicism of Epictetus.

Southey's first important literary work, (Joan of Arc,5 an epic in 12 books, he composed during his summer vacation, 1793. He intended it as a tribute to the principles of the French Revolution; but the execution of the Girondins in October of that year cooled his enthusiasm. Then in June 1794 he found a new outlet for his ardor in the scheme of (<pantisocracy55 pro¬ posed to him by Samuel Taylor

Coleridge. For lack of funds their plan for a colony on the banks of the Susquehanna ultimately failed. Southey was glad to accept an invitation from his uncle, the Rev. Herbert Hill, to visit Lisbon. The intended emigration, however, had one per¬ manent effect: Southey had engaged himself to Edith Fricker; Coleridge, to her sister Sara. Before Southey sailed for Lisbon he married Edith, 14 Nov. 1795.

This marriage proved a great steadying in¬ fluence on Southey's life. Returning from the Peninsula early in 1797, he made a serious at¬ tempt to study law, and, finding that he lacked ability in this, transferred his efforts to earning a livelihood with his pen. Within three years, besides much miscellaneous work, he published (Minor Poems5 (1797), completed (Madoc5 and planned (Thalaba5 and a (History of Portugal.5 In 1800 illness drove him again to Portugal, where he gathered material for his (History5 and completed (Thalaba. 5 Recovered in health, he accepted a secretaryship to Isaac Corry, chancellor of the Irish exchequer, <(a foolish office and a good salary55 which he soon re¬ signed. Back in England, he removed in 1803 from Bristol to Keswick. There Coleridge was established in "Greta Hall,55 and of this house! Southey — to enable his wife to be near her sis¬ ter, Sara Coleridge — took one-half. In 1809 he became owner of the entire house and har¬ bored with his own the family that Coleridge had deserted.

Here was Southey's home for life. Here were born all but the first of his seven children. Here he brought together his library of 14,000i volumes. Here he did his work: kept in hand the epics from which he hoped for fame; gath¬ ered materials for that great history of Por¬ tugal destined never to be written ; ground out the translations, histories, biographies and mag¬ azine articles, the glorified hack-work by which he met the growing needs of his own family and that of Coleridge. Pantisocracy, despite the pleadings of Coleridge, Southey had abandoned. But Southey had found a more practical ideal¬ ism : he worked steadily and cheerfully; he met his business engagements punctually; he aided

younger literary aspirants with money and ad¬ vice ; and, although no longer as in youth a revolutionist, he championed in print more than one cause of progress and reform.

His work was not unrecognized. The Quar¬ terly Review, to which,

between 1808 and 1839, he contributed 95 articles, paid him during the latter part of that period £100 for each. In 1813 he was made poet-laureate. In 1820 Ox¬ ford conferred on him the degree of D.C.L. In 1826, without his knowledge, he was elected member of Parliament for Downton ; and, when he protested that he lacked the proper qualifi¬ cation, Sir Robert Inglis promptly proposed that an estate of £300 a year be purchased for him. Southey, averse to public life, declined this offer, as he did that of Sir Robert Peel, in 1835, to make him a baronet. Peel, however, found means to be of use to Southey, for, by a general act for the recognition of distinguished services to literature and science, he obtained for Southey a pension of £300.

The last years of Southey's life were sad. On 2 Oct. 1834 he wrote : ((I have been parted from my wife by something worse than death. Forty years she has been the life of my life; and I have left her this day in a lunatic asy¬ lum.)} In the spring they brought her back to Greta Hall. In the autumn she grew weaker. On 16 Nov. 1835 she <(passed quietly Grom death unto life.5 55 Southey himself, still physi¬ cally strong, was beginning to show mental weakness. In 1839 he married Caroline Bowles, the poetess, a friend of the Southeys for 20 years. Of his condition in 1840, Wordsworth wrote : ((Southey did not recognize me till he was told. Then his eyes flashed for a moment with their former brightness, but he sank into the state in which I had found him, patting with both hands his books affectionately like a child.® He died 21 March 1843.

Southey's literary work falls roughly into two groups : his poetry, for the most part early, before he was 30; his prose, for the most part later. The first group consists chiefly of long narrative poems: (Joan of Arc5 (1796); (1805); (The Curse of Kehama) (1810), and (Roderick, the Last of the Goths) (1814). Legendary or myth¬ ological in subject, these poems embody in an exotic setting — Gothic, Arabian, Hindoo, what¬ not — their author's high-souled ethical ideals. For their setting and their philosophy these poems are worth reading but they are lacking in vital relation to life. Southey's stoicism made expression of lyric emotion unnatural; and he was too sincere to feign. Of the poems that he wrote as laureate — (Carmen Trium¬ phal (1814) ; (The Poet's Pilgrimage to Waterloo) (1816); thq (Ephithalamium) and the (Elegy for the Princess Charlotte) (1817) ; (The Vision of Judgment (1821), and (A Tale of Paraguay5 (1825) — the (elegy5 and the <Tale) are the best. Southey's (Poetical Works collected by himself5 were published at London (10 vols, 1837-38).

His best work, however, was done in prose, notably in his (Life of Nelson) (1813), and his <Life of Wesley5 (1820). His scholarly his¬

tory of Brazil5 (1810—19) is unfortunate in its subject. His ‘History of the Peninsular War5 (1823-32), is defective in its grasp of military movement and has been superseded by that of Sir William Napier. Of his translations of

mediaeval romances, the best is his ‘Chronicle of the Cid5 (1808). Chief among his other prose works are (Omninia5 (1812) ; ‘The Doc¬ tor5 (1834-37) ; (Sir Thomas More, or Collo¬ quies on the Progress and Prospects of So¬ ciety5 (1829); (Life of Cowper5 (1833-37), and ‘Lives of the Admirals, or Naval History of England5 (1833-40). And yet, among all his works, both prose and poetry, Southey will per¬ haps live longest by his nursery classic of (The Three Bears5 and by his verses ‘After Blen¬ heim.5

Southey was not a genius. He is not even to be classed with his friends, Wordsworth, Coleridge and Scott. Byron wrote truly when he said that Southey

“. . . had written much blank verse and blanker prose,

And more of both than anybody knows.”

But Southey was at least a faithful workman and a worthy man. As even Byron admitted, he was for his time (<the only existing entire man of letters.55

Bibliography. — The best brief biography is that by Edward Dowden in the (English Men of Letters5 series (1879). Consult also Southey’s letters, edited in six volumes by Rev. C. C. Southey (1849-50) ; in four volumes by Rev. J. Wood Warter (1856) ; and in the single volume edited by John Dennis (1887) ; Saintsbury, G. E. B., Southey5 (in Cambridge History of English Literature,5 Vol. II, New York 1914).

Arthur H. Nason,

Professor of English, New York University.

SOUTHINGTON, suth'ing-ton, Conn., town in Hartford County, on the New York, New Haven and Hartford Railroad about 25 miles north of New Haven and 18 miles south by west of Hartford. It is on a small stream, Quinnipiac River, which furnishes considerable waterpower. The chief manufacturing estab¬ lishments are hardware works including car¬ riage supplies and drop forgings. Other es- tablisments produce cutlery, ceiling and floor plates, tinmen’s supplies, wood screws, shoe calks and rolling mill. In 1900 there were in Southington 65 manufacturing establish¬ ments, with a capital investment of

$2,783,709; the number of employees, 1,415; the wages paid annually, $627,604; the cost of raw ma¬ terial, $797,102, and the value of the product $1,994,564. The educational institutions are the Lewis High School, the public elementary schools, (<Lincoln School.55 There is a savings bank and one trust company; the combined capital of the banks is $100,000. Pop. 5,085.

SOUTHPORT, England, in Lancashire, a fashionable seaside resort on the northwestern coast, about 18 miles by rail north of Liver¬ pool. There is a fine beach as far as the latter town. The main street terminates in a public park, and the esplanade commands beautiful views of the Welsh Mountains. Attractive features are the Pavilion and Winter Gardens, which include an opera-house and concert-hall ; marine drive and gardens ; Cambridge Hall ; Public Library and Art Gallery; Grecian town- hall ; Victoria Baths, finest and largest in the kingdom; Victoria Schools of Art and Science, and hospital. There are numerous churches and about 200 schools ; the museum stands in the fine botanic gardens. Pop. about 7,500.

SOUTHWARK (South'wark. sometimes suth'erk), a metropolitan and parliamentary borough of central London, on the right bank of the Thames, and is, as its name implies, the! south town. It came under the jurisdiction of the city in 1327. The choir and lady chapel of the Cathedral of Saint Saviour is the best example of early English architecture in Lon¬ don. The poets Gower, Fletcher and Massinger were interred in this church. The Roman Catholic Cathedral of Saint George is an im¬ posing structure. The Metropolitan Taber¬ nacle (associated with Charles Spurgeon) and Guy's Hospital are in the borough. Bankside Theatre, the scene of the first production of Shakespeare's plays, is on the river's bank. Mar- shalsea Prison is no longer in existence. John Harvard, the founder of Harvard College, was born in the Saint Saviour's district, but the house has been demolished. Pop. about 191,- f)07. Consult Besant, (South London) (1899); Boger, (Bygone Southward (1895); Bower, (Sketches of Southwark, Old and New) (1903); Manning and Bray, (History of Sur¬ rey } (1804-05) ; Rendell, (01d Southwark and Its People) (1878) ; Rendell and Norman, (The Inns of Old Southward (1888) ; Thompson,

(Southwark Cathedral: Its History and An¬ tiques } (1907).

SOUTHWELL, Robert, English poet and Catholic martyr: b. Horsham,

Norfolk, about 1561 ; d. Tyburn, 21 Feb. 1595. He was edu¬ cated at Douai and Paris under Jesuit influ¬ ence and was ordained to the priesthood in 1584 In 1586 he returned to England, but owing to the penal laws against Catholics and especially against priests, was obliged to live in the greatest seclusion. In 1589 he became do¬ mestic chaplain to the Countess of Arundel and composed various pieces of prose intended to give comfort and encouragement to his co-re¬ ligionists in their trials. Chief among the objects of his solicitude was the Earl of Arun¬ del, under sentence of death in the Tower. On 20 June 1592 Southwell was arrested for visit¬ ing the house of Richard Bellamy, a Catholic under suspicion. He was many times tortured in order to extort from him confessions that might be used in prosecuting other Catholics; but his only answer was that he was a Jesuit and was prepared to die. In February 1595 he was tried for treason under the statute that prohibited the presence in England of Jesuits or seminary priests. He was hanged, drawn and quartered at Tyburn. Shortly after his execution collections of his poems were pub¬ lished and many subsequent editions have ap¬ peared. A collected edition was edited by Wal¬ ter in 1817 and by Turnbull in 1856. Of his verse the most notable examples are (Saint Peter's Complaint y and the (Burning Babe,* a beautiful Christmas carol, of which there are different modern musical settings. Of his Eng¬ lish prose tracts, (Mary Magdalen's Teares) may be mentioned. His (Complete Poems,) edited by Grosart are published in the (Fuller Worthies Library) (London 1872).

SOUTHWEST TERRITORY, a terri¬ tory of the United States, comprising all the region ceded by North Carolina (now Tennes¬ see) and the narrow strip ceded by South Car¬ olina. This was organized in 1790 as the South¬ west Territory, with institutions resembling

those of the Northwest, except for the admis¬ sion of slavery. With the admission of Ten¬ nessee, in 1796(, and the organization of the Mississippi Territory, in 1798, the Southwest Territory went out of existence.

SOUTHWESTERN BOUNDARY. See

Boundaries of the United States.

SOUTHWESTERN COLLEGE, a co¬ educational institution of higher learning estab¬ lished at Winfield, Kan., in 1886. It is under the control of the Methodist Episcopal Church and gives collegiate, academic, music, business, art and oratory courses. It grants the degree B.A. and is accredited by the State for the granting of teachers'

certificates. In 1918 it had 300 students enrolled, 200 with the colors and 20 teachers.

SOUTHWESTERN LOUISIANA IN¬ DUSTRIAL INSTITUTE, coeducational in¬ stitution at Lafayette, La., founded in 1898 by the State of Louisiana. Its first session began in September 1901. Six courses of study are given, as follows: The academic industrial course, teachers' course, teachers' course in agriculture and farm mechanics' teachers' course in home economics, one-year course in commercial accounting and a one-year course in stenography. A summer term of nine weeks is conducted by the Industrial Institute each year to enable its students in the teacher-train¬ ing courses to continue their work from sum¬ mer to summer while engaged in teaching during the regular session. The institute owns 50 acres of land, of which 25 are in use for the buildings and campus. It also rents about 100 additional acres for the needs of the demonstra¬ tion farm. The buildings and equipment are valued at $175,000. The attendance for 1915— 16 was 372, and there were 29 instructors. Its income in 1915 amounted to $107,749.83, of which $88,750 was contributed by the State.

SOUTHWESTERN UNIVERSITY, lo¬ cated at Georgetown, Tex., established by the five Texas Conferences of the Methodist Epis¬ copal Church, South. The movement for the establishment of the university was begun in 1869, the first session was opened in 1873 and the charter obtained in 1875. The charter rights of Ruterville College, Ruterville, Mc¬ Kenzie College, Clarksville, Wesleyan College, San Augustine and Soule University, Chappell Hill, were transferred to Southwestern Univer¬ sity by order of the conferences and by special acts of the State legislature. Shortly after the establishment of the university, the need of college education for women in the South led to a movement which resulted in the organiza¬ tion of the Ladies' Annex. Originally the An¬ nex was under the charge of the same faculty, but all classes were separate; exception was made in the case of scientific laboratory work. In 1900 the Annex was more closely affiliated with the university, and the women students of the Annex admitted to all college classes with men. The degrees conferred are B.A., B.S., B. Music, M.A., and ALS. The School of Fine Arts offers instruction in art, elocution and music. The campus is in three tracts, the Fit¬ ting School campus, the Annex campus and the College campus. Giddings Hall, a dormi¬ tory for men and five residence cottages are near the Fitting School; a new college building

was completed in 1900 for scientific laboratories and the_ library. The students in 1918 num¬ bered 877, the instruction staff, 34. A library of 30,000 volumes is maintained.

SOUTHWORTH, Emma Dorothy Eliza Nevitte, American novelist: b. Washington, D. C., 26 Dec. 1819 ; d. there, 30 June 1899. In 1840 she was married to Frederick H. South- worth of Utica, N. Y., was thrown upon her own resources two years later and engaged in teaching in Washington in 1844-49. Her first story, (The Irish Refugee/ appeared in the Baltimore Saturday Visitor, and she subse¬ quently wrote for the National Era and the New York Ledger. Her work is characterized by some dramatic power and is still popular with uncritical readers, having been republished abroad and translated into several languages. She was a prolific writer and more than 60 novels were originally issued serially. A uni¬ form edition of her works beginning with Retribution/ including (The Hidden Hand/ which was successfully dramatized, and ending with (The Fatal Secret/ was published in 42 volumes in 1872. Among her later works are (Unknown > (1874) ; (Mother's Secret* (1883) ; (An Exile's Bride> (1887).

SOUTHWORTH, Franklin Chester,

American Unitarian clergyman: b. North Col¬ lins, N. Y„ 15 Oct. 1863. He was graduated from Harvard in 1887 and from the Harvard Divinity School in 1892. From 1887 to 1889 he taught Latin and Greek at Fish's School for Boys in Worcester and at the Adams Academy, in Quincy, Mass. Entering the university he was pastor of the First Unitarian Church, Duluth, Minn., 1892-97, and of the Third Uni¬ tarian Church of Chicago, 1897-99. In 1899 he became secretary of the Western Unitarian Conference, an organization composed of all the Unitarian churches in the Central West, among which he traveled extensively for three years, preaching, lecturing and attending conferences. In 1902 he became president of the Meadville Theological School and professor of practical theology, which position he still holds. In 1909 he gave a series of lectures in Manchester Col¬ lege, Oxford,, England, and gave a number of sermons and addresses at London, Liverpool, Manchester and other English cities. He has three degrees from Harvard, was awarded the degree of doctor of divinity by Buchtel College in 1911 and the degree of doctor of laws by Allegheny College in 1915.

SOUVESTRE, soo-vestr, Emile, French novelist and dramatist: b. Morlaix, 15 April 1806; d. Paris, 5 July 1854. His literary work was an

issue aside from the business of his life, and he was successively clerk, schoolmaster, journalist and in 1848 professor of administra¬ tive style in a civil service school. His (Un philosophe sous les toits) was crowned by the academy in 1851 and in the August following his death his widow received the Lambert prize founded in honor of the memory of the writer who had conferred the highest service. He was the author of (Derniers Bretons) (1835-37), and Royer Breton) (1844), works embodying the folk-lore and natural features of his native province; also (Pierre et Jean *(1842) ; (Confession d'un ouvrier* (1851) and other fictions; besides dramas, works of travel and biographies. His principal contribution

to literature consists in the vivid pictures lie has given of the life and manners of the Bre¬ tons.

.SOVEREIGN. (1) In politics the high¬ est person in a State; applied also adjectively to the highest power in a State, or to a State which exercises supreme or independent authority. Thus the legislature in its various branches is the sovereign power in each State, though the name of sovereign in a limited monarchy is re¬ served for the monarch, and a State which owns no superior is termed a sovereign State. (2) a gold coin, the standard of the English coinage. It exchanges for 20 shillings sterling, or about

$5.

SOVEREIGNTY, in political science the supreme power in a State by which the govern¬ ment is administered. In republics generally it is held that sovereignty resides in the people, but in some countries, like Japan, it is held that it is possessed by the sovereign. Various theories have been advanced as to the origin of sovereignty, some contending that it is the prerogative of the stronger force, others that it is created by divine sanction and still others that it is created by voluntary contract or that it is a property right descending in regular line of succession. Milton and Locke in the 17th century contended that the people were the ultimate source of political authority and the same principle was advanced by the French Revolution. The Declaration of Independence asserted the same doctrine when it declared that ˆgovernments derive their just powers from the consent of the governed/ and in polit¬ ical addresses of the time the principle was frequently enunciated in ail sections of the country that the people had the right to alter their governments whenever and in whatsoever manner they deemed expedient. These prin¬ ciples were embodied in the State constitutions, and even the right of revolution was therein asserted. The doctrine of popular sovereignty is almost universally

accepted in Europe at the present time.

Sovereignty is of two kinds : internal and external. Internal sovereignty includes all governmental powers which a State possesses over its own citizens or foreigners domiciled therein and over private ships on the high seas. External sovereignty includes the right to enter into relations with foreign states, as by treaty or by declaring war.

There has been much contention as to whether each State in the Union is vested with sovereignty or whether it resides solely in the United States. The prevailing view is that the sovereignty of a State is legally limited and, therefore, not absolute, although before the Civil War this view was not at all general.

Internal sovereignty is divided into political sovereignty and legal sovereignty. Political sovereignty is the final supreme power residing in any political society. Legal sovereignty is the power which is in legal control at any specified period. Other distinctions are de facto and de jure sovereignty, the former of which is sovereignty that has been assumed but is obeyed by the citizens, though not resting on a legal basis, and the latter of which is sovereignty founded on law. Some authors refuse to recognize these two distinctions.

A State may have internal sovereignty but

not external sovereignty, as by yielding its right to make war or to negotiate with other States. In international law, however, such States, while subject to other States, are treated as sovereign powers. Under this head are in¬ cluded protectorates and suzerainties.

Some recent writers advocate the elimina¬ tion of the term sovereignty from political science on the ground that it is synonymous with absolutism and should not be applied to the supreme power in any constitutional, Federal or similar government.

SOVIET (pron. savyet'), a Russian word signifying council, advice, harmony, concord; sovietnik = councillor. Under the old regime the Tsar’s Council of Ministers was called the (<Soviet of Ministers,® but the term has been invested with a new meaning since the Russian Revolution of March 1917. The popular or¬ ganizations which then came into existence were called <(Councils of Workmen’s and Soldiers’ Deputies,® bodies which were supposed to be holding things

together under the provisional Government until the election of the Con¬ stituent Assembly could take place; in a sense, they were vigilance committees designed to guard against counter-revolution. The Petro- grad Soviet of 4,000 members was the most important of these, on account of its position in the capital and its influence over the garri¬ son. By degrees the orderly and moderate ele¬ ment was pushed out of this group and the extremists who demanded <(all power to the soviets® became supreme. When the Constituent Assembly eventually met, the Bolshevjki and their allies were in a minority, yet they suc¬ ceeded in breaking up the Assembly and finally came out with their own program, the so- called <(soviet government.® Chaos and disorders paralyzed the upholders of constitutional de¬ mocracy because they lacked both authority and the power to restrain the wild elements. The latter, on the other hand, possessed the Red Guard, a powerful armed mob, while the Soviet leaders — mainly ambitious doctrinnaires — saw in the instrument of their creation a road to fame and power. Soon the Soviet system was invested with intellectual justification as <(a higher type of State® and <(a higher form of democracy® which would ((arouse the masses of the exploited toilers to the task of making new history.® Furthermore, it offered ((to the oppressed toiling masses the opportunity to par¬ ticipate actively in the free construction of a new society.® According to Lenine, the author of these quotations, Soviet rule <(is nothing else than the organized form of the dictatorship of the proletariat.® A loose code of rules govern¬ ing elections to the soviets was framed, but the following classes were disqualified to vote: (<Those who employ others for profit; those who live on incomes not derived from their own work — interest on capital, industrial enter¬ prises or landed property; private business men, agents, middlemen; monks and priests of all denominations ; ex-employees of the old po¬ lice services and members of the Romanoff dynasty; lunatics and criminals.® With village and factory soviets as a base, there arises a vast pyramid of district, cantonal, county and regional soviets, each with its executive soviet. Over and above these stands tlie f(All-Russia Soviet Congress,® which appoints an All-Russian

Central Executive Committee of not more than 200 members, which in turn chooses the Soviet of People's Commissaries — the Ministry. Be¬ ginning with a minimum of three and maximum of 50 members for smaller communities, the maximum for town soviets was fixed at 1,000 members. According to its founders, this sys¬ tem is destined in the future to replace all other forms of government in the world.

For good or ill, a new system of govern¬ ment has appeared in Sovietism. Not a little speculation has been aroused in countries out¬

side of Russia and a considerable number of political thinkers have analyzed the future possi¬ bilities of Soviet rule. The reign of terror and bloodshed which accompanied that rule in Russia may be regarded as an accidental transi¬ tory phase in the history of a country where violent occurrences are no novelties. It is neces¬ sary to separate barbarity and invidious class distinctions from Sovietism itself and to con¬ sider the latter purely as a political experiment of some importance. The essence of the con¬ flict between the Parliamentary and the Soviet systems is whether the basis of representation shall be political or economic, using these words in their narrowest sense. The conception of the Soviet as ultimately representative of the local economic groupings — factories and pro¬ ductive areas — explains the enthusiasm of the neo-Marxians (who admit no politics outside the economic sphere) for the Soviet system, the elements of which they see in the works committees and such like combinations in modern large-scale industry. Some admirers, however, regard the Soviet system as a dual one with parallel political and industrial or¬ ganizations, though it is probable that in prac¬ tice the two branches merge in a single channel, the economic. Here we have only to ask whether a factory's political Soviet would be likely to work independently of its economic Soviet to realize that a separate standpoint is possible only in theory. The Soviet govern¬ ment in Russia claims to be in such close re¬ lations with the proletarian organizations on which it is based that (<at ajl times the greater part of the population joins in the administra¬ tion of the state® and that every worker may initiate in his Soviet a plan for reorganizing his industry which has only to be examined by the Sovets higher up and ratified to become law ! If the Soviet system really fulfilled its claim to instruct the elector by giving him actual administrative experience, this would be a good argument in its favor, but in practice the demagogue and the party man dominate the high Soviets and these in their turn lord it over the lesser bodies. Hence the value of the system as an administrative training school disappears and the machine offers nothing use¬ ful that could not be obtained by Parliamentary government. Many sincere democratically- minded people in other countries have grown dissatisfied with their systems of Parliamentary government and have consequently been half prepared to welcome the Soviet idea as an alternative. Various causes have been advanced as being responsible for diminishing the prestige of Parliaments, such as their remoteness from public opinion, which elects but cannot recall them ; the congestion of legislative business and the difficulty of carrying out necessary reforms;

the party system and the caucus; the corruption arising from personal and corporate pressure and the encroachments of cabinets. The Soviet system professes to remove these defects and also to introduce reforms which seem unattain¬ able under Parliamentary government one of the chief being the creation of small and compact local administrative units to replace the existing large and unwieldy geographical electoral units. Many theorists, indeed, regard the Soviet system not as necessarily an instru¬ ment of proletarian dictatorship, but rather as a federation of local electoral groups, which, guided by intelligence and with toleration, could be transformed into a genuinely democratic form of government. Others, again, vision a possibility of separating the political and in¬ dustrial spheres, while extending to both the means of self-government. In comparing exist¬ ing institutions with visionary alternatives the advocates of the latter not • infrequently fail to foresee the many defects which are not immediately apparent, but must inevitably be expected to arise. In no country have both these systems been fully tried, for Russia has never had real Parliamentary government, and in Bavaria, where a Soviet republic was established in February 1919, the venture lasted only three months when the Moderates came into power. It is difficult to see that the Soviet system can claifh any tangible advantage over its rival, especially as the apex of the Soviet pyramid is far more remote from the individual elector than any Parliament or Congress. Altogether it seems easier and safer to overhaul and im¬ prove the solid machinery of a stable govern¬ ment than to cast it aside in favor of an abstract conception of doubtful value.

Henri F. Klein,

Editorial Staff of The Americana.

SOW-THISTLE, a genus (Sonchus) of herbs of the order Composite. The species, of which there are about 30, are natives of the Old World, but some have become widely naturalized in temperate climates. They have alternate leaves, blue or yellow flowers in heads and beaked seeds crowned by fine white down. The common sow-thistle (S. oleraceus) is an annual which grows about 30 inches tall, has yellow flowers, and is found usually in rich soils. Its young leaves and tender tops are used as a substitute for spinach in northern Europe. The alpine sow-thistle (S . or Lactuca, alpina) is a native of mountainous Europe. It has beautiful blue flowerheads. The beach sow¬ thistle (S. maritimus) grows in saline soils in southern Europe, and is specially attractive be¬ cause of its yellow flower-heads. These species are

sometimes cultivated in gardens.

SOWER, or SAUR, Christopher, Ger-

man-American printer : b. Laasphe, near Mar¬ burg, Germany, 1693; d. Germantown, Pa., 25 Sept. 1758. After a study of medicine at Halle, he came to Philadelphia in 1724, was for a time a farmer in Lancaster County, but in 1731 removed to Germantown, where he acted as an importer of German Bibles and religious works. In 1738 he obtained a printing-press and began the publication in German of a 24-page almanac, which continued to appear until 1798. He began in 1739 Der Hoch-Deutsch Pennsylvanische Geschichtschreiher, a religious and secular magazine, the first periodical in German in the

United States. It was published at first quar¬ terly at three shillings per annum and afterward monthly. He established (1738) the first type- foundry in America, made his own ink for printing and later manufactured his paper and did his binding. In 1743 he published, in Ger¬ man, a Bible of small quarto size, Luther's trans¬ lation, the edition being limited to 1,200 copies of 1,284 pages. With the exception of Eliot's Indian Bible, this was the first Bible printed in the colonies and it was the largest work that had then been attempted. An English Bible was not printed until 1781 • by Robert Aitken at Philadelphia. Sower may have invented cast- iron stoves; he introduced them into general use. Consult Thomas, (History of Printing in America) (1870); Ringwalt, Encyclopaedia of Printing) (1871).

SOY BEAN, a leguminous plant (Glycine his p id a) , sometimes incorrectly called soja bean, native to southeastern Asia. It has been cultivated from ancient times and in some countries, notably Japan, it forms an important article of food. It was introduced into Eng¬ land in 1 790 and into America some years later, where it was first grown principally in the southern States. Its use as a food for man has not become general except in its original home in Asia, and it is only within recent years that its value as a feed for stock has brought it to the attention of the western countries. The soy bean is an annual, two to four feet high. It has branching, hairy stems with trifoliate, hairy leaves. The flowers are inconspicuous, of pale lilac or violet color, and the fruit is a broad, two- to five-seeded pod, covered, like the rest of the plant, with stiff, reddish hairs. The seeds vary in color according to variety. When grown for the seed the crop sometimes yields as high as 40 bushels or more to the acre, but the average is much less. As a forage crop it makes as high as two to three tons of cured hay per acre. The fact that the flowers are self- pollinated gives it an

advantage over many other legumes in introducing it into new regions. (See Dolichos). Innumerable varieties and forms of the soy bean have been developed in the original home of the plant. Several dif¬ ferent varieties have been introduced into the United States, these being distinguished largely according to the shape, size and color of the seed, in the degree of hairiness and in the time required for the plants to reach maturity. The early varieties are preferred when the plant is grown for seed, while the latter give better re¬ sults as forage crops. Some of the advantages claimed for it as a crop are that it is able to gather the food of sustenance in relatively poor land and by its power to assimilate nitrogen from the air to enrich the soil in which it grows. It is relatively sure of producing a crop of seeds very nutritious to livestock, for which it is adapted to use in various forms.

Soy beans require about the same conditions for growth as corn, but have somewhat better powers of resisting drought. The seed is not planted until the ground is thoroughly warm in the spring, and the earlier varieties are grown with fair results by planting after an early grain crop has been harvested. When planted for forage the seed is often sown broadcast, but where a crop of beans is desired it is better to plant in drills. The stage of growth at

which to harvest depends upon the use to be made of the crop. In the United States the soy bean is grown exclusively as a feed for stock, in pasture, as a soiling crop, for hay, or as a green manuring crop. The green feed and hay are excellent for cows in milk. The beans are usually fed in the form of meal and owing to the richness in protein and fats have been found of peculiar value in compounding feed rations. Fed in connection with less concen¬ trated feeds and grains having a lower protein content, results have been obtained that show the soy beans to compare favorably in feeding value with cottonseed meal. The peanut is the only raw vegetable that contains as higji a per¬ centage of digestible protein and fat.

The soy bean is prepared for use as human food in a variety of ways in Japan, where it furnishes the protein that is lacking in a diet of rice. The plant is also grown in Europe and used there to a limited extent as human food. Since the beans contain no starch they are sometimes recommended as food for persons suffering from diabetes; a soy-bean bread has been manufactured for this purpose. Under the name of coffee bean, the soy beans have been placed on the market in America

as a substitute for coffee.

In the United States the soy bean is best adapted to the southern and central States. It is not adapted to the States along the northern border or to the States west of the Rocky Mountains. In those States where it thrives it is especially valuable to soils that have become depleted of their nitrogen. The chemical com¬ position of both bean and fodder adapts it especially to use as a balance ration in connec¬ tion with corn and makes its cultivation de¬ sirable where no other protein feed is available. Consult (Farmer's Bulletin) (Nos. 58, 372, 509, United States Department of Agriculture, Washington 1897-1914).

SOYER, swa-ya, Alexis Benoit, French cook: b. Meaux-en-Brie, 1809; d. England, 5 Aug. 1858. Leaving Paris in 1830, he served the Duke of Cambridge and became the chef of the Reform Club, 1837-50. In 1847 he re¬ ceived an appointment from the government to go to Ireland, which was then suffering from famine, and there he built several kitchens and served food at about half the ordinary cost. In 1855 he went to the Crimea, reorganized the victualing of the hospitals, improved the food of the army and navy and introduced cooking wagons. He was the most famous cook of his time and is immortalized as the Mirololant of Thackeray's (Pendennis.' His writings on cookery were widely read and include (Culinary Relaxations) (1845) ; (Charitable Cookery'

(1847) ; (History of Food in all Ages' (1853) ; (The Shilling Cookery Book' (1854). Consult Volant and Warren, (Memoirs of Alexis Soyer' (London 1858).

SOYESHIMA, Taneomi, Japanese states¬ man : b. Saga, Province of Hizen. At Nagasaki in 1866 he studied under Guido F. Verbeck, an American missionary, giving especial attention to the United States Constitution and the New Testament. In 1868 he became a commissioner for formulating laws and subsequently an im¬ perial councillor. In 1871 he was sent to Siberia to adjust Boundary questions relating to the island of Sakhalin Returning to Japan

he resigned his place in the Cabinet, but was later asked to return to it. On a visit to China in 1876 he was received with high honors by the mandarins by reason of his scholarship and he became private adviser of the emperor.

SPA, spa or spa, Belgium, in the province of Liege, 20 miles southeast of the town of that name, a fashionable watering place, pictur¬ esquely situated, in an undulating country covered by woods and

containing wonderful medicinal springs. There are delightful prom¬ enades in the environs. The casino, bath-house, public squares and hotels are interesting fea¬ tures, besides a new parish church and the Gallery Leopold II, with its museum, music- halls, reading-rooms, etc. Gambling was pro¬ hibited in 1902. The town is renowned for its lacquer ware. There are tanneries, forges and foundries. Spa was early famous as a resort and frequented by Russian and Swedish poten¬ tates. and all the fashionable world. The generic term for mineral baths was thus de¬ rived. The waters are exported to the most distant countries and are efficacious in nervous diseases, anaemic troubles, dyspepsia and general debility. In 1918 the German general head¬ quarters was located at Spa. Here took place the consultations of the general staff preceding the signature of the armistice and from here went forth the delegates appointed to meet Marshal Foch to sue for peace. Pop. 8,357. See War, European.

SPACE, that phase of the world which we express in terms of right and left, forward and backward, up and down, etc. ; the actual experienced system which we are accustomed to handle by means of geometry. Many theories have been held concerning its nature. The an¬ cient views are not at all clear, but until Aristotle, at any rate, the existence of empty space is not recognized and there is a general tendency to subordinate space to matter. The modern theory of space begins with Descartes, who makes extension the distinguishing mark of matter. Spinzoa, though he finds in matter an attribute of God rather than an independent substance, follows Descartes in this respect. Leibnitz does not attribute to space an inde¬ pendent existence, but makes it merely an un¬ clear recognition of the logical relations of the monads. Newton on the other hand, claims an independent existence for space and maintains that position is absolute, not relative. Kant solves the dispute between Leibnitz and Newton by finding in space and time, respec¬ tively, that a priori form of the external and internal senses, so that geometry is independent of experience, yet spatial entities do not exist apart from sense. Among the present views on the subject is the curious one of Bergson, who regards the spatial description of the uni¬ verse as a scientific, intellectual perversion of the temporal flux is directly presented to intui¬ tion.

The old dispute as to whether the idea of space is innate or acquired belongs to a past stage of philosophical discussion and one may take it as an established fact that the empirical status of extension is quite analogous to that of any of the sensory qualities. Just as my experience of this red blotter before me is. preconditioned by the fact that I am so con¬ stituted — unlike some color-blind persons — as

to be able to perceive red, so my experience of space depends on my having a nature fitted to perceive spatial entities. Indeed, it seems that as far as the mere nature of the experience is concerned, there is no reason for dividing qualities into the primary, such as those of space and time and the secondary, of color, sound, etc. The distinguishing characteristics of space reside in its organization rather than in its quality. This organization forms the subject matter of geometry, it is probably dependent in part on the intrinsic nature of the things which are in space and go to make up our spatial experience, but it is unquestionably also in a large measure dependent on the arrange¬ ment which we more or less consciously make of these sense-data, and by the arrangement of the entities of any system a system may be obtained whose formal properties are just about what you choose. Space thus becomes, as Poincare has shown, a more or less pliable tool for scientific description, so that the ques¬ tion, ((What is the structure of space ?55 may almost be translated into ((What spatial struc¬ ture is the simplest and most manageable for purposes of scientific description?" As a con¬ sequence, as the formulae of science do not seem to be markedly simplified by the postula¬ tion of a non-Euclidean space (see Geometry, Non-Euclidean) or of any other spatial struc¬ ture other than that which is familiar to us in our elementary geometry and as this elementary geometry is simpler in its formulae than non- Euclidean geometry or other similar systems, we choose — albeit unconsciously — the struc¬ ture of our space in such a way that it shall be Euclidean. The three-dimensional character of space is likewise due to the fact that a three- dimensional system forms the simplest and most appropriate background to the observed facts of physics and is not, as Kant supposed, an a priori truth. If we should suddenly find masses varying in such a manner as to be susceptible of an easy and direct explanation by a motion perpendicular to our space, the very next work on physics would speak just as confidently of a space of four dimensions as we now speak of a space of three. . A change of a similar nature has taken place in the last few years. (See Relativity, The Principle of). Whereas space and time were formerly con¬ ceived as completely independent dimensions, the present attitude of physics is that a body in unaccelerated motion carries with it, as it were, a space which is essentially distinct from the space with reference to which it is in motion and that distances are not the same when measured with reference to two sets of axes in relative motion. In other words, the system of reference of modern physics cannot be divided into independent spatial and tem¬ poral parts, but constitutes

an essentially homo¬ geneous spatial-temporal manifold, which is a Euclidean four-dimensional space with real minimal lines. See Analytical Metrics.

The problems of the infinitude and the in¬ finite divisibility of space and of unoccupied space are again matters of scientific convenience. It is far simpler for the scientist to have a system of reference which does not depend on the entities which are referred to this system than to be continually hemmed in by the limi¬ tations of matter and the construction of a

system without lacunae from a system which possesses them is no very difficult logical task. Consequently, the space of science is physically independent of its occupation by matter.

The problem of the extension of the world forms the subject matter of one of Kant's antinomies; that of its infinite divisibility is the subject matter of another. Both of these antinomies or paradoxes have a double aspect. Mathematically, they involve the motions of infinite collections and dense series, which have only received a satisfactory logical treatment within the last half-century. The infinitude of space and its infinite divisibility are again merely the results of the scientist's protest against the complications brought into his work by the supposition of a limited space or a space which offers obstacles to repeated division. Thus Kant is both right and wrong when he solves these antinomies by making space and time forms of perceptive experience, not things in themselves. He is right in so far as the infinitude and infinite divisibility of space emanates from ourselves and not from the object, but wrong in that he believes that in¬ finitude and infinite divisibility involve un¬ avoidable contradictions. (See Assemblages, General Theory of; Kant). Consult Berg¬ son, Henri, (Time and Free Will5 (trans. by F. L. Pogson, New York 1910) ; Deichmann, (Das Problem des Raumes in der grieschischen Philosophic bis Aristotles) (Leipzig 1893) ; Mach, (Space and Geometry in the Light of Physiological, Psychological and Physical In- quiry) (trans. by- J. McCormack, Chicago 1906) ; Poincare, Henri, (The Foundations of Science) (trans., New York 1913) ; Robb, A. A., (Theory of Time and Space> (Cambridge 1914) ; Rus¬ sell, B. A. W., (Essay on the Foundations of Geometry5 (Cambridge 1897).

SPACE OF DIMENSIONS. See Hyper- Spaces.

SPADA, spa' da, Leonello, or ESPADA,

Italian painter : b. Bologna, 1576; d. Parma, 1622. He became the pupil of Carrachos and Cesar Baglioni and an intimate friend and imitator of Caravagio whom he considered his master and with whom he traveled. On his master's death he returned to Bologna and spent his latter days at the court of the Duke of Parma. Espada's power developed, when freed from the direct influence of Caravagio removed by the death of the latter. He developed a style until then unknown in painting, in which he showed a surprising mastery of color and of claro-obscurio and displayed creative talent un¬ common even in his day. Among his works (which are well known in European galleries) are (Santo Domingo,5 represented as burning the heretical books (Santo Domingo Church Bosco) ; (San Jeronimo5 (in the same church) ; < Abigail giving provisions to David for the Army5 (in the church of the Madonna della Ghiara, in Reggio); (Judith5 ; Esther5; (The Madonna Crowned5; (The Aurora5 (frescoes and paintings in the same church). In Parma, where Espada was court painter to the duke, he decorated the theatre of the capital in such a fine style that there was none other equal to it in his day, and he left the mark of his genius everywhere throughout the city in the shape of talented paintings, among them being (The Virgin and Saints5 (in Santo Sepulcro) ;

(San Felix5 (in Capuchinos) ; (Christ5 (in Steccata) ; (Piedad5 (in Santa Cataline Col¬ lege) ; (Christ before Pilate) ; (Saint Peter Denying his Master5 ; (Death of John the

Baptist5; <Judith) (in the city art galleries). Espada's paintings are scattered throughout most of the larger cities of Italy and many of them have found their way outside the coun¬ try. Among the best known of those not al¬ ready mentioned are (The Virgin and San Francisco de Asisi5 (in Modena Gallery) ; (Auto-retroto of Espada5 (in Florence gal¬ lery) ; (Christ tied to a Pillar) (in the Naples Museum) ; (The Chastity of Jose5 (Faragina gallery, Genoa) ; (Jesus Crowned with Thorns) ; (David with the Head of Goliath) ; (Cupid Playing with a Leopard) (all in the Dresden Museum) ; (Return of the Prodigal Son5 ; (Death of San Cristobal5 (in the Louvre) ; (Santa Cecilia) (Madrid Museum).

SPADE-FOOT TOAD, a toad (Scaphio - pus holbrookii) , resembling the common toad in general appearance but differing from it so greatly in structure as to be placed in a distinct family (S cap hiop idee) . They have teeth on both the upper jaw and the vomer bone;

the bodies of the vertebrae are cupped in front; the ster¬ num is altogether cartilaginous ; the sacral transverse processes are greatly expanded ; the pupil of the eye vertical and the side of the foot is provided with a plate-like appendage supported by cartilage, from which they take their name. The spade-foot is found through¬ out the eastern United States, but is in most places rare and of very uncertain occurrence, appearing suddenly in great numbers and as suddenly disappearing some seasons and again being entirely absent. It lives in burrows, from which it issues at night or after long-continued rains to feed on insects. Early in the spring it breeds, the eggs being deposited in temporary rain-pools. If the season be a dry one, de¬ velopment of the tadpoles is much quickened by the drying up of the water, but in wet sea¬ sons the larval period is extended. Most re¬ markable is the voice, which is so loud as to astonish all who hear it produced from so small an animal. These toads are very noisy during the period of reproduction, but soon after be¬ come quiet and disappear. Another species (S couchii) is found in Texas and Mexico, five or six more in the latter country and three other species belong to western Europe and the Mediterranean region. Consult Dickerson, (The Frog Book5 (new ed., New York 1914) ; Gadow, Hans, (Amphibia and Reptiles) (in (Cambridge Natural History) Vol. VIII, Lon¬ don 1901).

SPADE GUINEA, an English guinea hav¬ ing a spade-shaped shield bearing the arms on the reverse. They were coined from 1787 to 1799, inclusive.

SPAETH, spath (Philip Friedrich) Adolph (Theodor), American Lutheran clergy¬ man : b. Esslingen, Wiirtemberg, 29 Oct. 1839; d. 2 June 1910. He was graduated from the University of Tubingen, 1861, was called to Zion’s Church, Philadelphia, Pa., in 1864 and was pastor of Saint Johannes German Lutheran Church, Philadelphia, 1867-1910. He was also a professor in the Lutheran Theological Semi¬ nary and was president of the general council of the Evangelical Lutheran Church in North

America, 1880-90. His publications include (Phoebe, the Deaconess) (1885); (Faith and Life as represented by Martin Luther) (1887) ; (Biography of Dr. Charles Porterfield Krauth5

(1898).

SPAGHETTI, spa-get'ti. See Macaroni.

SPAGNA, span'ya, Lo, easel name of Gio¬ vanni di Pietro, Italian painter, active during the first quarter of the 16th century. He was

born in Spain and hence the designation, by which he is generally known, <(The Spaniard.55 He was a pupil of Pietro Perugino, whose name is frequently applied to Spagna's work and a contemporary of Pinturicchio and others of his school. He was a painter of some considerable talent and a contemporary of Raphael, whom he has been accused of imitating. He seems to have been a member of a guild or company of notable painters who worked together, so that it is difficult to distinguish his work from that of his fellows. Very little is known of his life. He lived in Spoleto in 1516, where his masterpiece (The Madonna Enthroned5 was painted. The National Gallery in London con¬ tains his (Agony in the Garden,5 which was formerly attributed to Raphael. Among his notable works are (Coronation of the Virgin5 (at Todi) ; (Nativity5 (in the Vatican) ; (Ma¬ donna5 (in the Louvre) ; (The Nine Muses5 (in the Capitol at Rome) ; altar-pieces and fres¬ coes (at Assisi, Spoleto and neighboring places).

SPAGNOLETTO, span-yo-let'to-, Lo. See Ribera, Jose.

SPAHIS, spa/his, or SIPAHIS, a part of the Turkish cavalry, which is said to have been organized by Amurath I, the founder of the janizaries; but which, since the organization of the Turkish army on the European system, has given place to regular cavalry. The spahis were composed of two classes ; one with red, the other with yellow banners. The usual arms of the spahis were a sabre, a lance, a jereed (a dart about two feet long, which was hurled with great strength and skill) and a second sabre, or rather broad-sword, attached to the saddle. Some of them had bows and arrows and also pistols and carbines; but they made little use of firearms. The French call a body of light cavalry raised in Algeria by the .name of spahis. The name sepoys, given to native troops in India by the British, is the same word.

SPAHR, spar, Charles Barzillai, American publicist and editor: b. Columbus, Ohio, 20 July 1860. He was graduated at Amherst, 1881 and studied later at Leipzig. He was associate editor of the Outlook, 1886-1903 and since February 1904 has been managing editor of Current Literature % He has published several articles on economic topics and is the author of (The Present Distribution of Wealth5 (1896) and (America's Working People5 (1900). Con¬ sult Abbott, Lyman, (One Who Loved His Fel- lowmen5 (New York 1905).

SPAIN (Lat. Hispania, Sp. Espana), a kingdom the territory of which in Europe em¬ braces more than four-fifths of the Iberian Peninsula, the small islands near the coasts, the Balearic Islands and the territory of Llivia, locked in France and separated com¬ pletely from the rest of

Spain; in northern Africa the possessions of Ceuta and Melilla,

the islands of Peregil, Velez de la Gomera, Alhucemas, Alboran and Chafarinas ; off the western coast of Africa, the Canary Islands, and along or near that coast a continental dis¬ trict that, extending at the west of the Desert of Sahara between the capes Bojador and Blanco, is known as the Spanish Sahara and the territory of the Ifni River ; and in the Gulf of Guinea the Islands of Fernando Poo, CorisGO and Annobon, the islets Elobey Grande, Elobey, Pequena, Banie, Leva and Bane, and that part of the African continent denominated Spanish Guinea, on the Muni River. Spain also exercises a protectorate over the African coast from Cape Bojador to the southern frontier of Morocco. Situated in the south¬ western part of Europe and separated from the main body of the European or Eurasian con¬ tinent by the cordillera of the Pyrenees, the peninsular part of Spain extends from lat. 43° 27' 25" N. at Point Estaca de Vares to lat. 35° 59' 50" N. at the south point of Tarifa Island; from long. 3° 20' E. of Greenwich (7° 0' 28" E. of Madrid) at Cape Creus to 9° 15' W. of Greenwich (5° 37' 03" W. of Madrid) at Cape Torinana. Its total area is given as 195,- 000 square miles, approximately, or (by Direccion General del Instituto Geografico y Estadistico, (Resehn Geografica y Estadistica de Espana) (Madrid 1912—14) , 492,247 square kilometers, and its boundaries are : On the north the Cantabrian Sea or Bay of Biscay, France and the republic of Andorra; on the east the Mediterranean Sea ; on the south the same sea, the Strait of Gibraltar and the Atlan¬ tic Ocean ; on the west that ocean and Portugal.

Distinguishing physical characteristics are the high average elevation of the land ahove sea-level and the regularity of the coasts. The ratio of that part of the entire area lying below 1,600 feet to that part uplifted above 1,600 feet is approximately 23 to 36. In other words, more than three-fifths must be regarded as highlands, and the altitude of one-third of the highlands is over 3,200 feet. Excepting Switzerland, Spain is the highest of all European countries (mean altitude of the former 1,300 metres and of the latter 660 metres). It is even true that the mean eleva¬ tion of the cordillera of the Pyrenees is greater than that of the Alps, although the latter has some peaks higher than the former ; and the Sierra Nevada rises into the region of perpetual snows. In the centre of the country is a high region forming a secondary peninsula, so to speak, with a mean altitude of 2,000 feet, known as the meseta. The water-parting is in the eastern half iof the

country as a rule, the Ebro being the only Spanish river with a long course flowing into the Mediterranean. Ex¬ cepting the Ebro Valley, then, the western slope is much more extensive and less abrupt than the eastern ; and communication between the centre and the western littoral is naturally easier than between the centre and the Mediterranean; but Portugal has separated the most accessible maritime zone from the central highlands, and so Spain has kept an extensive littoral without any easy natural communica¬ tion between it and the interior except the val¬ ley of the Guadalquivir. (See Rivers).

The western slope is divided into five un¬ equal bands by four mountain systems which

bound the great valleys of the rivers Duero, Tagus (both mainly Portuguese), Guadiana (the lower course of which partly in Portugal) and Guadalquivir; leaving at the north a narrow band which sends its waters directly to the Cantabrian Sea (Bay of Biscay) and is bounded by that sea on the north and the Cantabrian Mountains on the south. All these cordilleras have a fundamentally east and west direction in Spanish territory, but change abruptly to take a northwest-southeast direction when Portugal is reached, and to some extent create barriers or obstacles con¬ stituting the natural frontier of Portugal — so far as the boundary between the two nations can be regarded as natural, and not purely con¬ ventional.

In spite of the fact that it appears on first view to be characterized by exceptional unity in form and contours, Spain offers in the in¬ terior a great variety of geographical condi¬ tions ; since nature has divided it into isolated regions essentially differing in climate, the geological composition of the soils, the flora, the fauna, and the character, customs and worldly possessions of its inhabitants. As a consequence of the exceptionally diverse geo¬ graphical conditions, there are also marked differences in the density of the population of the several districts. Thus, from the periphery to the centre the density of the population de¬ creases in such a fashion that we can say the inhabitants are distributed in concentric zones of different density, the minimum, with the exception of the arbitrarily located capital, be¬ ing at the centre, which is the part of Spain that nature favors least of all.

Geology. — Extending like a bond of union between Europe and Africa, the Iberian Peninsula makes the impression <of being the least European of the three great Mediter¬ ranean peninsulas: it announces Africa by the massive character of its forms and by the ex¬ istence of

its mighty central meseta. (<It is,® says an authoritative writer in the study by R. Douville, entitled (La Peninsule Iberique, on Espagne) (Heidelberg 1911), (<a world apart, separated from Europe by the high Pyrenean barrier which cannot be surmounted easily except at the two extremities, separated from the Mediterranean world by the different coast ranges that now themselves form the shore and again leave only a narrow strip be¬ tween themselves and the sea® — for example, the Valencian huerta and the plain of Tar¬ ragon. It is indeed possible to give correct ideas of the main structural characteristics of Spain, but, as the same geologist cautions, we possess only relatively few precise notions con¬ cerning the constitution of the zones of its mountain-folds, despite the fact that the stratigraphy of a large number of its natural regions is known in detail, and several of the regions have even become classics for the geological student. Thanks to the labors of Leon Bertrand and Bresson, of the Andalu¬ sian commission, of Nickles and of R. Dou¬ ville, we are beginning to know with some pre¬ cision the structure of the two border chains, the Pyrenean and the Sub-betic or Penibetic, the latter including the Sierra Nevada. The complexity of the corrugations of the ancient rocks of the Cantabrian chain has been brought

to light by Barrois, but as to all that relates to the inequalities of the central portion of the meseta, grouped together by Choffat under the name of the Lusitano-Castilian System, we are still left in uncertainty: their structure and exact age are wholly unknown. Moreover, the Betic chain remains still unexplored, from the structural point of view.

With due recognition of the limitations just indicated we present the following gen¬ eral and brief account, deduced from the facts actually known.

The orientation ot the outcropping strata in the centre and northwest is different from that in the regions of the Pyrenean, Catalonian and Betic ranges. In the centre and north¬ west the outcropping strata — Silurian, for example — are aligned nearly southeast and northwest ; in the Pyrenean Catalonian and Betic chains, on the contrary, the outcroppings in the main follow the direction of the moun¬ tain ridges (chainons) and are oriented approxi¬ mately southeast by east and north-northwest or southwest and northeast. Thus we are dealing with systems of corrugations or folds that are essentially different. The southeast-northwest folds are those of the mighty crystalline and

Paleozoic mass of the Iberian meseta ; the others are those of the bordering chains, the Pyrenean, Catalonian and Betic. These bor¬ dering chains have a nucleus formed, like the meseta, of Crystalline and Paleozoic rocks, but in addition they possess representatives of al¬ most entire sedimentary series. They belong to the zone of Alpine folds ; they have had a geologic history extremely different from that of the meseta; and they also differ among themselves, one from the other, the Pyrenean and Catalonian chains showing distinctly special formations while the Betic chain shows types that are general and seen in the whole Mediterranean zone. The Catalonian chain strongly resembles in almost all respects the Pyrenean ; but it probably formed a part, in some former epoch, of a mighty crystalline mass occupying a portion of the Mediterranean until submerged at an indeterminate period. Similarly, the Betic chain appears to have been partially submerged at the time of those Pliocene movements which accompanied the opening of the Strait of Gibraltar. The meseta is bordered on the south and on the north by two great transverse inequalities, of which the most striking is the fault of the Guadalquivir, at present underlined by the depression in which flows the Guadalquivir River : a gigantic fracture that cut, as with a knife, all the out¬ cropping strata. A happening probably of the same kind was associated with the profound depression of the Ebro Valley. But the mesozoi'c deposits which, at different epochs, have overspread the meseta. now hide all the northeast part of the Guadalquivir fault and the fracture of the value of the Ebro. These deposits are found to be more horizontal as one proceeds farther toward the interior of the peninsula. On the borders of the meseta they are slightly corrugated and form the Sierra del Moncayo and the Montes Universales which mark out the northeast border. The Sierra Morena has no geologic individuality. The de¬ pressions of the Guadalquivir and of the Ebro have been filled with Tertiary sediments; and

the same holds true of the lowest portions of the meseta, the two Castiles. In consequence of a general uplifting movement throughout the meseta, with reference to the level of the sea, the Tertiary sediments upon the meseta have been raised until they form now the high plateaux already described.

Rivers. — The northern slope extends be¬ tween the Bay of Biscay and the Cantabrian Mountains. Here we find a long and narrow zone characterized by heavy rainfall upon ex¬ tremely steep declivities — with the result that its rivers are torrents, without value for navi¬ gation. The eastern slope is divided into three parts, namely, the slope of the eastern Pyrenees, the Ebro Valley and the southeast¬ ern region. In the ‘first part we find the Muga, Llobregat, Ter, Tordera,

Galla and Francoli. In the second part, which embraces almost one-sixth of the area of Spain, we find the Ebro and its affluents, the Zadorra, Ega, Aragon, Gallego, Segre, Cinca, Jalon, Calatayud, Huerva and Guadalupe. In the third part are the Jucar, Vinalopo and Segura. The Ebro, if we may judge from data supplied by his¬ tory, was formerly navigable from its mouth even to Logrono ; but it has suffered important changes, and canalization at two points became necessary. The Carlos Canal was cut through the delta formed by deposits of sand and pro¬ jecting out into the Mediterranean; the Im¬ perial Canal was constructed from a point 40 miles below Zaragoza (Saragossa) to Tudela. The western slope is, from the hydrographic point of view, most important of all, since in this wide zone are found the valleys of the great rivers Mino, Duero, Tajo (Tagus), Guadiana and Guadalquivir. The last-men¬ tioned has always been of highest value for transportation; and in early historical times it was navigable far beyond Seville — even to Cordoba or Montoro. The southern slope is even narrower than the northern, and is the least important of all in a hydrographic sense; the rivers of this slope being characterized by short course and small volume. Here we find emptying into the Mediterranean, the Almeria, Adra, Guadalfeo, Guadalhorce, Guadiaro; and, emptying into the Atlantic, the Guadalete. With a few important exceptions, then, all the rivers of Spain dash, rather than flow, along precipitous beds among deflecting mountains; their character is torrential, their courses sinuous. Consult Becker, J., <E1 Medio Geografico en la Historia de Espana) (B olefin de la Real Sociedad Geografico, Tomo LVIII, Madrid 1916).

Mountains. — The study of Spanish orog¬ raphy concerns itself with the three exterior lines that mark the northern, eastern and south¬ ern slopes, and the other three that extend through the interior. The northern system, in¬ cluding the Cantabrian Cordillera and the Pyrenees, bounds on the north the central meseta and the Ebro Valley. According to the classification of the Geographical Institute of Madrid, this is followed by (2) the Iberian system, formed by mountain-masses which separate the central meseta from the Ebro Valley [on the northeast] and from the Mediterranean slopes; (3) the Central system, generally known as Cordillera Carpeto- Vetonica or Carpetana, which extends through

the centre of the peninsula and separates the mesetas of the two Castiles ; (4) The system of the mountains of Toledo, extending east

and west in the centre of the meseta of New Castile; (5) the Betic Cordillera, between the great central meseta and the depression of the Guadalquivir and formed mainly by the Sierra Morena ; (6) the Penibetic system, which ex¬ tends from Cape Tarifa to the Sierra Nevada, including both, and shuts in the valley of the Betis, or Guadalquivir, on the south.

Climate. — Extending approximately from lat. 36° N. to little less than 44° N., Spain forms a part of the southern region of the temperate zone, and would be endowed with a climate characterized by very distinctly marked seasons were such cosmic traits not greatly modified by various circumstances. We have already mentioned, among the geographical in¬ fluences to which its climate is subject, the great heights and different orientation of its cordilleras and the varied configuration of its. lands — such diversity of natural features of course affecting the atmospheric circulation and in part explaining sudden alternations of winds that are hot and damp with those that are cold and dry. But we must also remember that the north coasts, influenced by the Bay of Biscay, the western by the Atlantic Ocean, the south¬ ern and eastern by the Mediterranean Sea, ex¬ perience particular effects which are far from being the same. Moreover, the influence of the Gulf Stream is felt especially on the northwest coast, and that of the Sahara in the south. It is, therefore, proper to emphasize Spain's climatological diversity : it is not possible to say that a well-defined climate prevails in or throughout any extensive region whatever, since there exist in the country, and sometimes al¬ most side by side, all the mixtures from sub¬ tropical to Alpine. On the plains of New Castile and Estremadura, as in a large part of Andalusia, the climate in summer is rather fiercely torrid ; in all the cordilleras one finds delicious valleys, of benign temperature ; but the lands of Old Castile and Leon are characterized by harsh and prolonged winters. The annual rainfall, greatest in the northwest, especially Santiago, is slightly less at Saint Sebastian and Bilbao; about half as great at Coruna, San Fernando, Caceres and Jaen; less than one-half as great at Malaga, Soria, Burgos, Huesca, Segovia and Barcelona; about one-third, or even less, at Sevilla, Murcia, Valencia, Granada, Alicante, Molina and Madrid; about one-fourth at Leon, Badajoz, Lerida, Cartagena and Valla¬ dolid ; and at Salamanca and Zaragoza the an¬ nual rainfall amounts only to one-fifth or one- sixth of that which makes the Spanish north¬ west a beautiful green country.

Flora. — The diversities of temperature, etc., to which we have invited attention (see Climate) occasion such a variety in the species of vegeta¬ tion as no other country of Europe presents. For this reason

Linnaeus bestowed the title <(India of Europe" upon Spain — which, indeed, in all historical ages has been considered the botanist's land of promise although the growths ot forest and field are checked by the extreme aridity of the meseta. The number of indig¬ enous species positively known to exist in Spain exceeds to-day 7,100, without counting those varieties and forms about which doubt is

still entertained. This wealth becomes even more manifest on comparing it with that of other countries. Thus, if we reckon at 10,000 the number of species of vascular plants in Europe as a whole, about 5,400 of them exist in Spain, 4,225 in France, about 5,000 in Italy, including Sicily, and slightly more than 1,600 in England. Even in the small province of Madrid there are, despite the aridity of its plains, approxi¬ mately 2,000 species. And if we compare the numbers of the exclusive species we shall find that 1,200 endemic species exist in Spain (about 22 per cent of the vasculars) ; in Italy about 300 or about 6 per cent of its flora). In France the strictly indigenous species number about 100 (or, say, somewhat more than 2 per cent). We may estimate very closely the affinity of the Spanish flora with that of other lands as fol¬ lows: Of spontaneous vascular species in Spain 60 per cent are represented also in the other European floras ; 25 per cent are very similar to those of northern Africa; slightly more than 13 per cent Spain possesses in common with Asia; with South America not more than 7ˆ4 per cent; with North America less than 3 per cent; 2ˆ4 per cent with tropical and southern Africa; and with Oceania only about five species per mille.

Fauna. — Like that of all the rest of the Palsearctic-Mediterranean subzone, the fauna of Spain is extensive and extremely varied. A leading work on the crustaceans entitled Ma¬ terials para la Fauna Carcinologica de Espana,* by Sr. Odon de Buen, says that the Mediter¬ ranean region is richer than the ((Celtic)) [north¬ ern and northwestern] in the carcinological fauna. D. Francisco Garcia Sola, in his Menioria prepared for the Central Commission of Fisheries of the Navy Department, calls at¬ tention to the circumstance that the waters of the east and south coasts contain many varie¬ ties of fish for the reason that the Mediter¬ ranean is ((the great natural breeding-place of the Atlantic and perhaps of other more remote seas." The number of specific forms or species of insects in the entire peninsula is reckoned at more than 160,000. The most common reptiles are Vipera latastei, Tropidonotus viperinus, Rhine chis scalaris, Psanimodromus hispanicns and Laccrta muralis. The avifauna includes par¬ ticularly some arctic species in the high moun¬ tains, great numbers of maritime and river- birds, and (in the southeast) several species of vultures and falcons. Mammals are un¬ commonly well represented,

in the Perisodactyl order, by the genus Equus, and by ruminants of the Artiodactyl order. The order of Carni¬ vora is represented by the JJrsus arctos, by Spanish varieties of the genus Canis, the Canis lupus , the Canis vulpes, etc.

Forestry. — The mountains and many tracts of the table-land are in general very scantily supplied with trees and a want of timber, both for fuel and economical purposes, is severely felt in many quarters. The finest forests are on the western offsets of the Pyrenees and in the mountains of Asturias. The more remark¬ able trees are the Spanish chestnut and sev¬ eral varieties of oak, and in particular the cork-oak.

Fisheries. — This industry employs 15,512 boats, of which 791 are steamers, and 88,150 fishermen. The catch in a recent year aggre-

gated 148,978 tons valued at $18,166,650. Cod, sardines and tunny fish are the most important catches. Sardines and fish-preserves are pre¬ pared in 677 factories employing 19,320 work¬ men and having an annual product valued at

$12,634,878.

Agriculture. — It is remarkable that Spain, though one of the most naturally productive, is also one of the least cultivated of the coun¬ tries of Europe. More than a third of the land capable of profitable cultivation is allowed to lie waste, and the system of agriculture pur¬ sued is far behind that of any other European country. The finest agricultural district is Valencia, where both rice and corn are grown far beyond the wants of the actual popula¬ tion, and furnish large supplies to those parts of the interior which are less favorably situ¬ ated. After Valencia, Catalonia, Murcia, and some of the northern provinces, raise the largest quantities of grain. The more impor¬ tant crops are wheat, rice, maize, barley and legumes. The culture of the vine is general, and great quantities of wine are made, both for home consumption and exportation. The demand for the latter is chiefly confined to sherry and the sweet wines of Malaga and Alicante. A considerable part of the grapes grown are dried and exported in this state, especially from the port of Malaga. Nuts, common and pistachio, walnuts and chestnuts grow in such abundance as to form important articles of trade. In the warmer districts the olive, sugarcane and cotton-plant are partially cultivated. Fruits are extremely abundant

and include in addition to apples, pears, cherries, plums, peaches and apricots, the almond, date, fig, orange, citron and pomegranate; and in the lower districts of the south, the pineapple and banana. Hemp and flax are extensively grown in Aragon, and Galicia, and esparto grows in abundance, more especially in Valencia and Murcia, where it is in extensive demand for making ropes, mats, baskets, etc., besides be¬ ing exported. The mulberry thrives well, and is largely cultivated for rearing silkworms in Valencia, Murcia and Granada. Other vege¬ table products are saffron, licorice and barilla. Much of the higher part of the central table¬ land, however, presents a very sterile appear¬ ance, having a thin stony soil and a covering of heath and scanty pasture; still extensive tracts which might be advantageously culti¬ vated are left almost in a state of nature, to be roamed over by cattle, sheep, goats and swine.

Of Spanish soil 88.45 per cent is classed as productive; of this 35.5 per cent is devoted to agriculture and horticulture, 2.5 to vineyards, 2.9 to olives, 22.2 to fruits and 25.3 to native grasses. There are 3,426,083 separate holdings which pay a property tax. The acreage and yield of the chief crops in 1918 was : wheat, 10,348,537 acres, yield 73,868,578 cwts. ; barley, 4,258,892 acres; 39,406,852 cwts.; oats, 1,524,453 acres, 8,846,606 cwts.; rye, 1,839,752 acres, 15,466,774 cwts.; maize, 1,182,742 acres, 12,264,- 502 cwts.; rice, 111,807 acres, 4,152,968 cwts.; beans, 498,385 acres, 4,012,110 cwts.; kidney beans, 794,607 acres, 3,622,040 cwts. ; peas, 138,607 acres, 645,356 cwts.; chick peas, 562,267 acres, 2,334,548 cwts.; tares., 457,165 acres,

1,748,414 cwts.; vetches, 159,472 acres, 996,522 cwts.

In the same year 3,292,925 acres were under vines. The production was 8,400,104,240 pounds of grapes, yielding ordinary red and white wines to the extent of 496,487,596 gallons. About 3,760,000 acres were under olives and yielded 1,986,930 tons of olives and 385,053 tons of oil. The recent live-stock census showed 557,676 horses; 1,042,894 mules; 923,- 996 asses; 3,233,200 cows; 17,227,019 sheep; 4,181,942 goats; 3,929,449 pigs and 5,400 camels (Canary Islands).

Stock Raising. — Among domestic animals the horse, descended from breeds which the Moors had introduced, was long celebrated throughout Europe, but has in recent times de¬ clined in reputation, though Andalusia still boasts of many fine animals. The mule is generally preferred to the horse, both for car¬ riage and draft, and is extensively reared in New Castile. Both it and the ass are gen¬ erally of a very superior description. Horned cattle are generally inferior and not numerous; only in a few districts are cows kept for dairy purposes

; bulls, in great demand for the na¬ tional amusement of bull-fights, are reared in greatest perfection in Andalusia. The favor¬ ite stock is the sheep, a considerable propor¬ tion of which belongs to the celebrated Merino breed, to which almost all the other breeds of Europe are more or less indebted for im¬ provement. Goats also are very numerous, and in their flesh, milk and cheese furnish the favor¬ ite food of the inhabitants. Swine are kept in large herds in some parts of Estremadura and in some of the northern provinces, where they roam at large in the forests. See Agri¬ culture section.

Manufactures, Mining, Commerce, etc. — In

the Middle Ages the manufactures of Spain, particularly along the coasts of the Mediter¬ ranean, were in a flourishing condition and found an extensive demand, particularly in the Levant and other parts of the East. With the expulsion of the Moors the branches which they had specially fostered sunk rapidly into decay and have never been revived. New de¬ mands, however, arose in the West and Spain, as the mother country, reserving to herself the sole supply of the colonies, was able, for that purpose alone, to carry on a number of lucrative manufactures. The loss of these colonies, putting a sudden stop to the demand, was followed by their almost as sudden ex¬ tinction. The circumstances of the country since have been the most unfavorable that can be conceived to the progress of any branch of regular industry and hence the only manu¬ factures of any importance are to be found in a few of the larger towns, especially Barce¬ lona. Spain is comparatively rich in minerals. Iron is plentiful in Huelva, Navarre, Oviedo, Santander, Seville and Vizcaya ; copper in Cordoba, Huelva and Seville; coal in Cordoba, Geronas, Leon, Oviedo and Valencia; zinc in Guipuzcoa, Murcia, Santander and Vizcaya ; cobalt in Oviedo; lead in Almeria Jfien and Murcia; manganese in Huelva, Oviedo and Seville; quicksilver in Ciudad Real and Oviedo; silver in Guadalajara; soda in Burgos and. phos¬ phorus in Caceres and Huelva. Platinum has also been found in small quantities. A recent

industrial census showed 127,556 men, 3,917 women and 20,273 boys and girls under 18 employed in connection with the mining indus¬ tries. In 1917 the total value of the mineral output was $97,692,858, made up as follows :

MINERAL

Quantity produced in metric tons

Value

Anthracite .

324,756

$2,473,373

Asphalt . .

1,817

4,274

Mercury .

18,706

701,064

Sulphur .

84,979

1,580,921

Zinc .

123,486

1,830,286

Copper .

1,901,340

12,295,912

Tin .

77

21,160

Phosphorite .

28,148

137,019

Iron .

5,551,071

7,925,115

Iron pyrites .

376,918

3,898,320

Coal .

5,042,213

48,097,335

Lignite .

637,841

4,690,024

Manganese .

54,474

419,824

Silver .

96

15,654

Lead .

240,368

12,305,766

Argentiferous lead .

13,218

6,592

Salt .

309,413

368,172

Wolfram .

546

328,856

There are large manufactures of cottons, Catalonia being the principal centre of this industry. There were reported at the last in¬ dustrial census, 742 establishments employ¬ ing 68,300 looms and with 2,614,500 spindles. The woolen industry occupies 8,800 looms and 662,000 spindles. There are 144 paper mills and 37 glass-making factories. Corks are also an important product. In a recent year 51,089 tons were manufactured having a value of about $9,000,000.

Imports in 1918 were valued at $121,970,- 385 and the exports $189,585,420. In that year the chief classes of imports and exports were as follows :

CLASS

1918

Imports

Exports

Stone, glassware, pottery.

$5,799,220

$15,042,840

Minerals, metals and

metal goods .

3,998,330

29,692,450

Drugs and chemicals ....

7,236,800

12,262,950

Cotton and cotton manu-

factures . . . .

20,506,420

23,577,800

Other vegetable fibres,

etc .

3,506,220

1 ,909,715

Wool, hair, and their

manufactures .

6,327,680

17,923,785

Silk and silk manufac-

tures .

5,210,655

1,401,495

Paper and paper goods. .

1,704,640

2,984,515

Timber and timber prod-

ucts .

2,668,915

7,102,220

Animals, animal products.

9,934,560

7,302,710

Machinery, vehicles, etc..

11,888,390

4,103,145

Food stuffs, including

grains, sugar, wine, etc.

25,619,315

66,656,980

Miscellaneous .

3,788,025

2,721,200

Gold (bar and coin) .

6,771,740

40,310

Silver .

57,040

1,863,305

Tobacco (special) .

6,795,310

Packing .

157,125

$121 ,970,385

$189,585,420

The value of all wine exported in 1918 was $18,625,685. In 1917 the United States wa,s

the leading country importing goods into Spain with a total value of $155,339,800. In the same year France took more Spanish goods ($117,653,600) than any other country. The United Kingdom was second with $40,413,000 and the United States third with $21,225,600. Cuba, Porto Rico and the Philippines also ($117,653,600) than any other country. The customs receipts and post dues amounted to $23, 935,235 in 1918.

Art. — See Spanish Art.

Language and Literature. — See Spanish Language; Spanish Literature.

Spanish Educational System. — The pres¬ ent Spanish school system dates from 1900. The centres of education are divided into three categories : primary, secondary, or preparatory, and superior, or university. The first is sup¬ plied by the municipalities or by licensed pri¬ vate schools ; the second is directly controlled by the state and consists of institutes and pri¬ vate colleges under governmental supervision. The instruction in the preparatory schools con¬ sists of two sections, arts and sciences, and the baccalaureate is given in these institutions and not in the universities. The third class is made up of the universities, all supported by the state. In the larger cities, moreover, are normal colleges, commercial and language schools and institutions for the primary in¬ struction of adults. The system is well planned and based on good laws but the lack of finances makes even the number of primary schools in¬ adequate in small towns and rural districts. The whole system is under control of the Min¬ ister of Public Instruction and Fine Arts.

Spain is divided into 11 university districts with uniform organization, which are in order of rank : Madrid, Barcelona, Granada, Oviedo, Salamanca, Santiago, Seville, Valencia, Valla¬ dolid, Murcia and Saragossa. The largest is Madrid with more than 6,500 students. At the head of each university is a president who has charge not only of the institution proper, but of all the schools in his district. The

faculties are presided over by deans subordinate to the president. Professors obtain their chairs in competitive examinations held publicly when a vacancy occurs. Besides the 10 universities maintained by the state are three controlled

by religious orders ; but they are not officially recognized and to obtain credit for his work in these institutions a student has to pass the pre¬ scribed examinations in the state universities. In the near future the government is to estab¬ lish another university in the Canary Islands, now a province of Spain.

The government institutes or preparatory schools are grouped in 10 sections Correspond¬ ing to the 10 universities of the state and are further subdivided into provincial or local in¬ stitutes according to their importance.

University instruction embraces the five fac¬ ulties of philosophy and letters, sciences, law, medicine and pharmacy, all of which include several subdivisions. Theology is not now taught in the universities although members of the clergy and religious orders often hold im¬ portant chairs in them. All five faculties tx- ist and the doctorate is conferred only in the Central University of Madrid. Modern lan¬ guages are not taught in the universities but in certain special schools. French is taught in the institutes.

To obtain the doctorate in medicine seven years' study are necessary; this is the longest course. The degree of licentiate is conferred after six years' study in law, five in pharmacy and four in the other faculties. The doctor¬ ate and the licentiate are given in all faculties. These two are the only university degrees. The former is similar to that given in American universities, while the latter is an intermediate stage between the American degree of bach¬ elor and master. The student must needs have attained the age of 16 and received the bacca¬ laureate in arts or sciences before per¬ mitted to enter the universities as a candidate for a degree. The students are divided into two classes: official or free (oficial o libre). The official students must attend classes and stand examinations, somewhat less rigorous than those given to the students of the latter class, who do not attend classes and matriculate only for the examinations at the end of the year. The examinations are both oral and writ¬ ten and a second series have to be passed when the student applies for his degree. This divi¬ sion of

the students into official and free also applies to the institutes of the state. A student may be official or free at his option, or he may be a free student in some subjects and official in others, or free in all subjects and attend the class lectures with the permission of the pro¬ fessor in charge. This arrangement exists for the convenience of the student who receives his instruction from a tutor or who attends an institution conducted by the Church. No dis¬ tinction is made between the sexes in govern¬ mental schools and women have never been re¬ fused admittance to the universities. The number of women taking university courses, however, is negligible and in 1914 there were only some 25 in the University of Madrid.

Certificates signed by the examining board of three professors are given to the student for each subject he passes; the three passing grades are ˆapproved,® (<honorable mention® and ˆexcellent,® and the certificates are marked accordingly. A student who receives (<excel- lent® (sobresaliente) in his subjects is entitled to the remission of part of his fees for the following academic year. All students, official and free, pay about 35 pesetas ($6.65) for each subject in which they are examined. Students particularly successful in their university work are sometimes, but not always, granted gov¬ ernment grants for study abroad. According to a royal decree of 19 Sept. 1913 ((titles which in their respective countries give the holder entrance without examination into the univer¬ sities will be valid in Spain.® Owing to Spain's refusal hitherto to recognize foreign degrees, many thousands of students from Latin Amer¬ ica are studying in other lands. Since 1902 the Spanish government has sent scholars, teachers and professors to foreign countries to study. Since 1910 there has existed a Board of Scientific Research (Junta para ampliacion de estndios), which connects the work done abroad with the organization of new laboratories in Spain, and publishes works showing the results obtained. This board has started the foundation of Halls of Residence for students where an important educational and a certain amount of scientific work is done. This board expends about 800,000 pesetas ($154- 000) per annum, A Hall of Residence for

women students was opened in Madrid in

1.

The government spends about $8,000,000 an¬ nually on its primary school system. There are 26,108 public and 5,669 private schools, the total number of pupils being 2,604,308. There are 58 institutes or middle-grade schools with 52,015 pupils. The 11 universities are attended by 32,683 students. The educational system and fine arts

departments cost the government $15,000,000 in 1918.

Religion. — The state religion is Roman Catholic. The Church is governed by 9 arch¬ bishops and 47 bishops, but two of the former and five of the latter have their dioceses be¬ yond sea. The number of parishes is about 20,498. In 1837 all the convents of monks, with a few exceptions, were suppressed and their revenues, subject to a provision for existing members, confiscated to the state. At the period of extinction the number of convents was 1,940, with 30,906 monks; there are still 790 convents with 9,339 monks and 3,010 with 39,709 nuns. Since the last revolution toleration of all denominations has been decreed. The whole population of Spain is Roman Catholic, except about 30,000 of whom 7,000 are Protes¬ tants and 4,000 Jews, Rationalists, etc. The State supports the clergy of whom there are over 35,000. About $8,000,000 are expended an¬ nually for this purpose. Relations between Church and State are regulated by the Con¬ cordat of 1851.

Army and Navy. — Military service is com¬ pulsory. The total term of service extends over 18 years. According to the law enacted in 1912 this period is divided into : one year, Re- clutas en Caja (recruits in deposit) ; three years, active army (first standing) ; five years, active army (second standing) ; six years, re¬ serve ; and three years, territorial reserve. A general army staff was created in January 1916. For army administrative purpose, Spain is divided into eight territorial districts, each under a captain-general. District one to six inclusive each furnish two divisions, the dis¬ tricts seven and eight, one division. A divi¬ sion comprises two infantry brigades, each con¬ sisting of two regiments of three battalions, one regiment of cavalry, and one regiment of field artillery of six batteries. Batteries have four guns. The peace establishment of the army was fixed at 190,228 men of all ranks for 1918. In addition to the organization out¬ lined above, which would develop a war strength of about 1,400,000, there are the Guardia Civil and the Carabineros. The former is a police force, and the latter a species of coast guard or revenue police. The Guardia has a strength of 18,000 infantry and 2,500 cavalry; the Carabin¬ eros 13,000 infantry and about 500 cavalry. Outside of Spain there are three military dis¬ tricts — Morocco, the Balearic Islands and the Canaries. In the two last-named the forces are recruited from the islanders but in Morocco the troops are Spanish and are always on a war footing. The African (Morocco) estab¬ lishment totals about 70,000 men. The Mauser 275, model of 1893 is the infantry arm. Schneider Canet 14ˆ4 pr. of 19.106 that of the field artillery.

There is a military aviation school at Cuatro Vientos, near Madrid. There are military

wireless stations at Carabanchel (range 540 miles), Barcelona (430 miles), Melilla, Centa, Tetuan, Bilbao, Valencia (of 320 miles each), Almeria, Larache (220 miles each), Mahon (Baleares) and Coruna. The military budget for 1918 aggregated $53,000,000, of which about $20,000,000 was for the Moroccan establish¬ ment.

The old navy was about totally destroyed or captured in the war with the United States, but in recent years naval construction has somewhat reinstated Spain in her old position. The navy at present has three dreadnoughts of 15,460 tons displacement each and are armed with eight 12-inch, 20 4-inch and six smaller rifles, also two torpedo tubes. The horse¬ power of each vessel is 15,500 and the speed 19J/2 knots per hour. There is also one old battleship, the Pelayo of 9,890 tons. There are seven cruisers, totaling 33,000 tons, also 13 destroyers and 24 modern torpedo boats, and a few gunboats. In 1915 a new construction program was inaugurated calling for four cruisers, six destroyers, 28 submarines, three gunboats, 18 coast-defense vessels, submarine mines, repair docks, etc., at a cost of $55,000,- 000 to be completed in six years. Spain has 10 submarines. The strength of the navy in 1918 was fixed at 11,091 sailors, 4,190 marines and 1,662 officers.

Money, Weights and Measures. — By a

decree of the Cortes in 1868 a new monetary system was introduced into Spain, according to which accounts are kept in centesimos and pesetas: 100 centimosˆl peseta = $0.19 ; or one franc. The gold coins are pieces of 100, 50, 25, 20, 10 and 5 pesetas ; the silver coins are pieces of 5, 2, 1 pesetas and 50 centesimos. The bronze coins are pieces of 10, 5, 2 and 1 centimos. The weights and measures are pre¬ cisely the same as those of France, with no other change than a slight one of names, the metre becoming the metro, the litre the litro and so on. The old system is still in use in many places. Its chief weights are the Quin¬ tal = 220.4 pounds; the libra— 1.014 pounds; liquid measures are the arroba = 3ˆ4 gallons for wine and 2% gallons for oil ; the square vara = * 1.09 vara = l yard; dry measure, the fanega = V/2 imperial bushels.

Communications and Shipping. — Trade labors under great disadvantages from the want of proper means of communication. The roads, except the royal roads (c aminos reales), are generally wretched ; the rivers, though numerous, are ill fitted for navigation ; and though in recent times much has been done in constructing railways and tramways, much more is still required. Hence the foreign trade is almost necessarily confined to such articles of raw produce as are raised in greatest abun¬ dance and can be most easily conveyed to a seaport. The length of railways in Spain is 8,993 miles (14,988 kilometres), of which 6,880 miles are of 5.48 foot gauge (1.67 metres) and 2,106 miles of varying gauges, but mostly of 3.28 foot gauge. About seven miles are cogwheel and funicular lines. About 71,000,- 000 passengers were carried in 1917 and 35,500,- 000 tons of merchandise. All roads are in the hands of private companies, but nearly all are subsidized by the government. The receipts of the Post-Office Department in 1916 were

$7,599,760 and the expenses $3,910,655. In that year it handled 190,733,150 letters and post-cards and 280,351,621 printed papers, samples, etc. There are 6,792 post-offices. Spain has 64,832 miles of telegraphs, which in 1916 carried 16,705,945 messages. The system has 2,435 • offices. There are 141 urban telephone systems and 202 interurban circuits, with a total of 48,410 telephone stations. There are 10 wire¬ less stations controlled by a single company.

The Spanish merchant marine consists of 495 steam vessels of 749,548 tons net and 85 sailing vessels of 31,209 tons net. In 1918 there entered with cargoes at Spanish ports 5,857 vessels of 5,060,937 tons and 6,618 vessels in ballast of 3,684,747 tons. In the same year the total clearances were 13,836 vessels of 7,203,843 tons of which 12,595 vessels of 6,700,- 452 tons were with cargoes. Of the vessels entered 9,699 of 5,607,185 tons were Spanish; of the clearances 11,120 of 4,093,436 tons were of Spanish registry.

Government. — Up to 1868 the government of Spain, which was that of a hereditary con¬ stitutional monarchy, was regulated by a con¬ stitution adopted in 1837, and subsequently modified in 1845. After the deposition of Isa¬ bella II a new constitution was drawn up by the Cortes, elected by universal suffrage. This constitution bore date 1 June 1869, and modi¬ fied considerably the previous one. According to it, ((all powers emanate from the nation. The power to make laws resides in the Cortes. The sovereign sanctions and promulgates the laws. The executive power resides in the sov¬ ereign, who exercises it by means of ministers. The tribunals exercise the judicial power.® After the abdication of King Amadeo in Febru¬ ary 1873, Spain

changed its form of govern¬ ment to that of a federative republic, until the proclamation, as king, of Alfonso XII., 31 Dec. 1874, when the constitution of 1869 was again brought into force. A new constitution, however, was proclaimed in 1876, when certain amendments were introduced. According to the enactments at present in force Spain is governed constitutionally, the executive power residing in the king, the legislative in the king and Cortes (or parliament) conjointly. The Cortes consists of two independent bodies or bodies of equal authority, the Senate and the Congress. The members of the Senate form three classes, namely, senators in their own right, not to exceed 80 in number; life senators nominated by the crown, 100 in number ; and elected senators, 180 in number. The senators in their own right include royal princes who have attained their majority; grandees of the kingdom who are in possession of an income of 60,000 pesetas or about $12,000; captains- general in the army, admirals of the navy; the archbishops, the patriarch of the Indies, the presidents of the council of state, the su¬ preme tribunal and several other similar func¬ tionaries. The elective senators are chosen by the corporations of state, such as provincial leg¬ islatures, universities, the ecclesiastical bodies, etc., and the citizens who are the largest payers of state burdens, and this portion of the Senate is renewed by one-half every five years or altogether when the body is dissolved by the sovereign. The Congress or second legislative body, is to comprise at least one deputy to

each 50,000 of the population. The Cortes must meet each year, and its sessions are to be convoked, suspended or closed by the king. No project can become law until after it has been voted in both bodies. Projects of finance . or taxation must be presented to the Congress before being submitted to the Senate. . Voting is compulsory for all males over the age of 25 with a few exceptions. All such voters must be registered on the voting list and must possess full civil rights. Members of Congress must be 25 years of age and are re-eligible indefinitely, the election being held quinquennially. There are 417 deputies. Neither senators nor deputies receive any compensation.

Local Government. — The various provinces and communes are governed by their own municipal laws with local administration. Every commune has its own elected ayunta- miento, consisting of from five to 50 regi- dores or consejales and presided over by the alcalde, who in the larger towns is assisted by several Tenientes Alcaldes. The

entire munici¬ pal government, with power of taxation, is vested in the Ayuntamicntos. Half the mem¬ bers are elected every two years and they appoint the Alcalde from their own body. Members cannot be re-elected until after two years. Each province has its diputacio pro¬ vincial or parliament, whose members are elected by the ayuntamientos, and in which are vested large political powers. It meets an¬ nually, and is permanently represented by the Comision provincial, a committee of its mem¬ bers, appointed every year. Neither the na¬ tional executive nor the Cortes have the right to interfere in the established municipal and provincial administration except in the case of the action of the Diputaciones Provinciales and Ayuntamientos going beyond the locally limited sphere to the injury of the general and per¬ manent interest. Pressure is often brought to bear on local elections by the central govern¬ ment.

Finances. — The revenue, raised chiefly by direct and indirect taxation, stamp-duties, gov¬ ernment monopolies, colonial revenue and in¬ come from state property, amounted in 1919 to 1,648,800,068 pesetas ($329,760,013) and the ex¬ penditure to • 2,065,065,606 pesetas ($413,013,- 121). Of the latter the public debt absorbed $100,663,261, the Ministry of War, $87,232,469, the Ministry of the Interior, $44,000,000 and the Royal Household, $1,840,000. The Na¬ tional Debt of Spain on 1 Jan. 1919 was

$1,884,317,207.

Population. — Formed by amalgamation of races or peoples as distinct as the Iberian, Celt, Phoenician, Greek, Carthaginian, Hebrew, Ro¬ man, Germano-Slav and Arabian, the population of Spain is endowed with characteristics which it is important to consider in connection with the development, or retardation of development, of the country; and that portion of the subject will, accordingly, be taken up in the sec¬ tion History. At present we note the total number of inhabitants (estimate in round num¬ bers for 1917 about 20,376,000) and their dis¬ tribution among the provinces, possessions and chief cities. The following table has been pre¬ pared with great care, but we think it impos¬

sible to achieve more than approximate accuracy in every item.

Number of

Area in

PROVINCES

inhabitants

square miles

Alava .

98,000

1,175

Albacete .

240,000

5,737

Alicante .

Almeria .

500,000

2,185

385,000

3,360

Avila .

212,000

3,042

Badajoz .

620,000

8,451

Baleares .

330,000

1 ,935

Barcelona .

1,164,000

2,968

Burgos .

350,000

5,480

Caceres .

416,000

7,667

Cadiz and Ceuta .

476,000

2,834

Canarias .

450,000

2,807

Castellon .

323,000

2 , 495

Ciudad Real .

400,000

7,620

Cordoba .

506,000

5,299

Coruna .

684,000

3,051

Cuenca . . .* .

276,000

6,636

Gerona .

326,000

2,264

Granada .

• 534,000

4,928

Guadalajara .

213,000

4,676

Guipuzcoa .

237,000

728

duelva .

327,000

3,913

duesca .

249,000

5,848

. aen .

547,000

5,203

..eon .

396,000

5,936

ˆerida .

289,000

4,690

. .vogrono .

189,000

1,946

Lugo .

483,000

3,814

Vladrid .

879,000

3,084

Malaga .

529,000

2,812

Vlurcia .

616,000

4,453

Navarra .

317,000

4,055

Orense .

424,000

2,694

Oviedo .

701,000

4,205

Palencia .

197,000

3,256

Pontevedra .

504,000

1 , 695

Salamanca .

337,000

4,829

Santander .

322,000

2,108

Segovia .

170,000

2,635

Sevilla .

618,000

5 , 42*8

So via .

158,000

3,983

Tarragona .

338,000

2,505

Teruel .

287,000

5,720

Toledo .

427,000

5,919

Valencia .

885,000

4,150

Valladolid .

287,000

2,922

Vizcaya or Biscay .

388,000

836

Zamora .

275,000

4,097

Zaragoza .

Possessions in the Gulf of Guinea. Possessions on north and north¬ west coast of Africa .

450,000

24,000

23,000

6,726

Uncertain

Totals .

20,376,000

194,783

The cities with a population of more than 29,000 each were in 1917: Madrid, 600,000; Barcelona, 588,000; Valencia, 234,000; Sevilla, 159,000; Malaga, 137,000; Murcia, 126, 000; Zaragoza, 112,000; Cartagena, 103,000; Bilbao, 94,000; Valladolid, 72,000; Lorca, 71,000; Palma, 68,000; Cadiz, 68,000; Cordoba, 67,000; San¬ tander, 66,000; Santa Cruz (Canary Islands), 64,000; Las Palmas, 63,000; Jerez, 63,000; Ali¬ cante, 56,000; Jihon, 56,000; Oviedo, 54,000; San Sebastian, 50,000; Almeria, 49,000; Coruna, 48,000; Linares, 39,000; Badajoz, 36,000; Alcoy, 34,000; Vitoria, 33,000; Cgstellon, 33,000; Bur¬ gos, 32,000; Salamanca, 30,000; Pamplona, 30,000; Jaen, 30,000; Huelva, 30,000.

Ethnology. — The inhabitants of Spain con¬ sist chiefly of Spaniards proper, composed of a mixture of ancient aborigines, Romans, Visi¬ goths, Vandals and Suevi ; but partly also of three other distinct races — Basques, occupying the provinces to which they give their name and forming about -fa of the whole population ; Moors who, in the general expulsion of their countrymen, found refuge in several valleys in the kingdom of Granada and the Castiles, and whose descendants, unmingled with the other inhabitants, are still living there to the number of about 60.000; and Gitanos or gypsies,

SPAIN

A group of peasants from the Province of Leon, in their Characteristic Costumes

SPAIN

1 View of the Alhambra and Sierra Nevada Mountains

2 Court of Lions, Alhambra

SPAIN

Cathedral at Seville

The Palace of the Escorial

SPAIN

SPAIN

who arc found diffused over all parts of the 1 eninsula. Ihe Spaniards proper, to whom or}ly ˆ 1S necessary here to advert,, are of middle stature, well formed, of a sallow hue, sharp features, dark hair and keen black eyes. In diet the Spaniards are frugal and tem¬ perate. Their wants being thus comparatively few, are easily satisfied and furnish no strong stimulus to exertion. Indolence accordingly is a prevailing vice, and the highest ambition gen¬ erally felt is to be able to live without doing anything. In their intercourse with strangers they are reserved, taciturn and stand much upon their dignity, afraid apparently of its be¬ ing encroached upon by undue familiarity; but on finding what they conceive to be their true place properly recognized, they lay aside their restraint, form strong attachments and become the most agreeable of companions. With their natural indolence there is a strange mixture of enthusiasm, and when their passions are once roused there are few extravagances or excesses of which they are not capable. In favorable circumstances this part of their char¬ acter has often manifested itself in chivalric exploits.

History. — Spain was known to the Greeks and Romans as Spania, Hispania and Iberia. The most ancient inhabitants of Spain appear to have been the Iberians, who also extended be¬ yond the Pyrenees into Gaul as far as the Rhone. To these afterward were joined cer¬ tain tribes of Celts, who succeeded in making a settlement for themselves

in the country after sanguinary contests with the aborigines. In process of time the two races were amalgamated into one and went under the common appella¬ tion of Celtiberians. These occupied princi¬ pally the high table-land in the centre of the country. The other parts were occupied by tribes of Iberians and Celts who had never in¬ termingled. Pure Iberian tribes, from whom are descended the modern Basques, were to be found in the Pyrenees and on the coasts, while the unmixed Celts inhabited the northwestern corner of the country, corresponding to modern Galicia. The Phoenicians were the first civilized nation who made a descent on the peninsula and founded settlements theie. Somewhat later the Greeks made their appearance, and among other colonies founded Saguntum. But more important than any of these were the colonies established by the Carthaginians. The history of Spain, indeed, only properly begins with the Carthaginian invasion, about 238 b.c. Previous to that almost all that was known of the coun¬ try was the existence of the two commercial states of Tartessus and Gades, both in the west. The former of these, supposed to have been the Tarshish of Scripture, was much visited by Phoenician ships by reason of its mineral wealth. After the First Punic War the Carthaginians began to establish themselves in Spain ; large tracts of territory were brought under their sway by Hamilcar (238-229), and again by Has- drubal (228-221) ; and among the cities founded by them was New Carthage, the modern Car- thagena, which soon became a celebrated em¬ porium. The subjected territory extended as far north as the Iberus (Ebro). Pressed by the Carthaginians, the Greek colonies of Sagun¬ tum and Emporiae applied for aid to the Ro¬ mans, who already had had their jealousy roused by the successes of their great rival. The

Romans interfered, and a treaty was then con¬ cluded between the two great powers, in terms of which the Carthaginians bound themselves not to extend their conquests beyond the Iberus. The city of Saguntum was on the west side of the river, but under Roman protection, and the capture of it by Hannibal in 219 was the imme¬ diate cause of the Second Punic War, which was partly carried on in Spain, and which in 206 caused the total expulsion of the Carthagin¬ ians from the peninsula. The Romans now un¬ dertook the subjugation of the entire country, but in this they did not completely succeed until after a war of about 200 years' duration, in which the exploits of the Lusitanian Viriathus, the heroic resistance and final downfall of Nu- mantia (133), and the temporary independence of a part of the country under the gallant Seto- rius (84-73) form brilliant episodes. The Can¬ tabrians, Asturians and other tribes in the mountains of the north were the last to yield, but were finally

subjugated by Augustus and his generals, and Spain was converted into a Roman province. Previous to this the peninsula had been divided by the Romans into two parts, an eastern and a western, separated from each other by the Iberus, called respectively Hispania Citerior and Hispania Ulterior ; but Augustus made a new division of the country, forming it into three provinces — Tarraconensis, Baetica and Lusitania. Tarraconensis and Lusitania were erected into imperial provinces and admin¬ istered by legates ; while Baetica, which still re¬ mained for a long time a senatorial province, was placed under the authority of a proconsul invested with civil authority only. Until the reign of Antoninus Pius, who granted to all his subjects a uniform constitution and laws, the cities of Spain were ruled by different laws. These and other measures made Spain one of the most flourishing provinces of the empire, and a centre of Roman civilization. Some of the most distinguished Latin writers under the empire were natives of Spain, such as the two Senecas, Lucan, Martial, Quintilian and others. Christianity was early introduced into Spain, and after the conversion of Constantine the Great became the dominant religion there. The disorganization and confusion consequent upon the fall of the Roman Empire facilitated the conquest of the country by the Vandals, who made themselves masters of a part of southern Spain, which from them received the name of Vandalusia (now Andalusia) ; the Suevi, who established themselves in the region now known as Galicia ; and the Alans, who gained posses¬ sion of Lusitania, now Portugal. These, how¬ ever, were soon afterward attacked by the Visi¬ goths, who, after many years' struggle, succeeded in reducing the whole peninsula to their sway. The Vandals of Andalusia, unable to withstand them, withdrew into Africa in 428, and from 467 to 484 the great Euric extended the king¬ dom of the Visigoths by the expulsion of the Romans and gave them their first written laws; while Leovigild in 585 overthrew the kingdom of the Suevi in Galicia. Under Leovigild's suc¬ cessor, Reccared I, the introduction of the Cath¬ olic faith in 586 gave the corrupt Latin language the predominance over the Gothic, and after that time the unity of the Spanish nation was maintained by the Catholic religion and the po¬ litical influence of the clergy. But after re¬ taining the mastery of the country for nearly

two centuries the Visigoths were in their turn conquered by the Arabs or Moors of Africa, who had come across at the invitation of the family of Alaric, the latter being eager to avenge themselves on their countrymen for being passed over in the election of king. King Roderic

fell in the seven days' battle against Tarik at Xeres de la Frontera, in Andalusia, in 711. After that the greatest part of Spain be¬ came a province of the caliphs of Bagdad.

For some years after their conquest of Spain the Moors held it as a dependency of the prov¬ ince of North Africa; but it was afterward (717) governed by emirs appointed by the ca¬ liphs of Damascus. The policy of the Spanish emirs was to extend the Moorish dominion be¬ yond the Pyrenees into Gaul, and the 40 years of their rule was marked by much bloodshed and anarchy, consequent on their disregard of internal affairs. About the year 756 Abd er Rhaman I, the last caliph of the dynasty of the Ommiades, having been driven from Damascus, where he was replaced by the Abassides, suc¬ ceeded in overthrowing the government of the latter in Spain and established the independent caliphate of Cordova, which under Abd er Rha¬ man III and his son Hakkem II, who died in 976, reached its zenith of power and prosperity. After the deposition of Hescham III the cali¬ phate rapidly declined, for when that event took place the various governors of provinces de¬ clared themselves independent and assumed the title of kings. Thus Arabian princes reigned at Saragossa, Toledo, Valencia and Seville, where not only the language but also the manners of the Moors at that time prevailed almost univer¬ sally. Still the free exercise of their religion was allowed to the Christians, and also the re¬ tention of their language, laws and magistrates.

Meantime the Visigoths, who had succeeded in maintaining their independence in the moun¬ tains of Asturia and Galicia, founded under Pelayo in 718 the kingdom of Oviedo. The sec¬ ond successor of Pelayo, Alfonso I the Catho¬ lic, conquered Galicia, with a part of Leon and Castile, and assumed the title of king of the Asturias. The remainder of Leon was con¬ quered by Alfonso III, whose son, Ordono II, transferred his residence to the city of Leon, and called his dominion the kingdom of Leon (914). The kingdom of Navarre came into existence in the 9th century. It formed a part of the Spanish territory of Charlemagne, ob¬ tained by conquest from the Arabs, and extend¬ ing south of the Pyrenees as far as the Ebro. Near the sources of the Ebro and Pisuarga arose even earlier the kingdom of Castile. At first a small republic, consisting of only a few towns, it appears afterward as a country with a considerably enlarged territory, and somewhat later its princes assumed the title of king. In 1037, after the death of the last king of Leon, Ferdinand I of Castile united that kingdom with his own and Castile was henceforth the most powerful Spanish state. Aragon, Galicia, Portugal, Murcia and other states owed their origin to the prevailing custom of dividing a kingdom among the sons of a deceased mon¬ arch. Though frequently at war with each

other the Christian princes generally united against their common foe, the Moors, who were daily becoming less able to cope with them. About the end of the 11th century Mohammed of Cor¬ dova and Seville applied for assistance against

Alfonso VI of Leon and Castile to the Almorav- ides, the founders of the empire of Morocco. In compliance with the request of Mohammed the Almoravides entered Spain and gained some successes over Alfonso ; but they then turned upon Mohammed himself, obliging him to yield them a portion of his territory, and the Almo- ravide sovereign was ultimately acknowledged sole monarch of Mohammedan Spain. The Al¬ moravides, however, were overpowered in their turn by another Mohammedan tribe, the Almo- hades, about the middle of the 12th century. Meanwhile the Christian kings were making still further encroachments on the territory in possession of the Mohammedans, and after the great victory they obtained over, the Almohades on the plains of Tolosa, in the Sierra Morena, in 1212, there remained to the Arabians only the kingdoms of Cordova and Granada, and even these were soon afterward obliged to rec¬ ognize the supremacy of Castile. The two most important Christian states of Spain were Ara¬ gon and Castile, and they ultimately absorbed all the others. Aragon, which had been wrested from the Moors by Sancho III and left as an independent kingdom to his son Ramiro, fell by inheritance in 1131 to the counts of Catalonia and was afterward greatly enlarged under suc¬ cessive kings. Jayme I wrested from the Mos¬ lems the island of Majorca in 1229, and the whole of the kingdom of Valencia in 1239. Pedro III married Constance of Sicily, and not¬ withstanding the opposition of the Pope took possession of that island after the massacre of Sicilian Vespers (see Sicilian Vespers) in 1282. Jayme II effected the conquest of Sar¬ dinia in 1326, and Alfonso V united Naples with his kingdom. Meanwhile the internal affairs of the kingdom had been thrown into confusion through civil dissension resulting from the heavy imposts laid upon the people ; but a rem¬ edy was found jn increasing the power of the Cortes. Aragon was the first Christian state in which the third estate obtained a legal position. The Cortes, consisting of representatives of the nobility, of the clergy and of the towns, re¬ ceived more extensive privileges, and the king could not act in important matters without their consent. On the extinction of the Catalonian line of princes, Ferdinand, infante of Castile, was elected king by the Cortes in 1412, and his descendants ruled over Aragon until, through the marriage of Ferdinand V of Aragon with Isabella of Castile, Christian Spain was consoli¬ dated into one kingdom. Ferdinand I, second son of Sancho, was the first king of Castile in 1033, and as already mentioned joined the king¬

dom of Leon to the crown of Castile. He waged successful war with the Moors, took sev¬ eral towns and exacted tribute from the Mo¬ hammedan king of Toledo. It is to this reign that the greater number of the exploits of the famous Rodriguez Diaz de Bivar, known under the name of Cid, belongs ; and according to Viardot the establishment of the Cortes dates from the same reign. Under Alfonso VI Cas¬ tile acquired an accession of importance through the annexation to it of the crowns of Leon (which had become again disunited), Galicia and Navarre, and above all through the con¬ quest of Toledo and its territory, out of which was formed New Castile. Notwithstanding the success of its arms the country suffered much. Oppressed by taxes and desolated by war it was

far from being in a prosperous condition. Un¬ der Ferdinand III, who ascended the throne in 1217, Cordova, Jaen, Alcala, Seville, Cadiz and other places were wrested from the infidels; and again under his successor, Alfonso X (1252-80), further conquests were made, though some losses were also sustained. To the latter prince is due the introduction of the third estate into the national assemblies, and the adoption of the vernacular for public acts. Alfonso XI (1324— 50), like his predecessors, spent most of his time in warring with the Moors; he gained in 1340 the celebrated battle of Salados and made himself master of Algesiras in 1344. In 1465 Henry IV was deposed by his turbulent vassals and the crown given to Isabella, whose marriage with Ferdinand of Aragon in 1469 led to such important results. The marriage of these two sovereigns did not lead immediately to a com¬ plete coalescence of the two kingdoms, for they retained the separate administration of their re¬ spective dominions. But in concert with their great minister, Cardinal Ximenes, they pro¬ ceeded harmoniously with the work of fusing all the states of Spain, which still differed in religion, customs and laws, into a political and ecclesiastical unity, at the same time seeking to strengthen the royal authority at the expense of the clergy, the aristocracy and the towns. By a severe administration of justice, and by the in¬ stitution of the Santa Hermandad, or Holy Brotherhood — a body of about 2,000 police armed and mounted for the purpose not only of putting down the robberies and violence which everywhere abounded, but also of form¬ ing a check on the power of the nobility — order was established throughout the country. The royal power was moreover strengthened and extended by the establishment of the In¬ quisition (q.v.). Warfare also was carried on by Ferdinand against the Moors of

Granada, which, undertaken in 1481, culminated 10 years later in the reduction of the capital of that kingdom, which surrendered to Ferdinand 25 Nov. 1491. With the fall of Granada fell the Moslem empire in Spain, after having existed nearly seven centuries and a half, and Spain, with the exception of Navarre, was now con¬ solidated into one great kingdom. An order was issued, 30 March 1492, for the expulsion of all Jews who did not submit to be baptized, whereupon nearly the whole race, rather than sacrifice their religion to their worldly interests, left the country. In this sentence of banish¬ ment the Moors were also included and the departure of the industrious Jews and Moors proved a fatal blow to the flourishing com¬ merce of the country, which was further af¬ fected by the discovery of America by Colum¬ bus in 1492, this being the means of withdraw¬ ing much of the activity of the nation from the improvement of the mother-country. While Spain consummated its complete political con¬ solidation at home by the conquest of Navarre, the conquest of Naples by Gonsalvo, and still more the occupation of large portions of North, Central and South America by Spanish generals, soon raised the new kingdom to the front rank of European powers. Ferdinand was succeeded in 1516 by his grandson, Charles I (Charles V of Germany), who permanently united Castile and Aragon. (See Charles V) At the begin¬ ning of his reign serious insurrections broke out in Valencia and Cacti le, where the people

demanded a more liberal constitution ; but they were soon quelled and resulted in the abolition of the principal rights of the towns, the restric¬ tion of the powers of the Cortes and a stronger attachment of the clergy and nobility to the Crown. The victory of the Spaniards at Pavia 24 Feb. 1525, which made Francis I the prisoner of Charles, and the expedition against Tunis and Algiers, extended the fame of the Spanish arms throughout Europe. But these wars to¬ gether with those carried on against the Prot¬ estants of Germany, against the people of Ghent in the Netherlands and against Pope Clement VII in Italy, exhausted the revenues of the country. The immense wealth that flowed in from Mexico, conquered by Cortes in 1518, and from Peru and Chile, conquered by Pizarro and Almagro in 1531, was not sufficient to supply the demands of the royal treasury, and though the taxes were largely increased a heavy debt had to be contracted. With the reign of Philip II (1556-98), the son of Charles, the great monarchy began to decline. Oppression and re¬ ligious intolerance, war and insurrections, occa¬ sioned the loss of the Netherlands and depopu¬ lated the rest of the monarchy; and the con¬ quest of Portugal, which remained united with Spain from 1581 to 1640, could not prevent its decay. England and Holland triumphed over the naval

force of Spain and destroyed her commerce; and Philip died in 1598 a bankrupt. This calamitous period was nevertheless the golden age of literature and art in Spain and the Spanish language and fashions controlled the courts of Europe. Under the reign of the indolent and incapable Philip III (1598-1621) the country took still greater strides toward decay. The Duke of Lerma, his insatiable favorite, in order to augment his own fortune and that of his partisans, squandered in a most scandalous manner the public revenues ; and he struck another blow at the commerce of the country by expelling, in 1609, the last remnants of the Moriscos, to the number of 600,000. Equally damaging to the interests of the coun¬ try was the reign of Philip IV (1621-65), not¬ withstanding some energetic measures taken by Olivarez, the able minister of that monarch. The wars wdiich were carried on in Germany, Italy, the Netherlands and France — the war with the last-named country ending in the loss to Spain of Roussillon — helped to complete the ruin of the country and stirred up revolts in Catalonia, Andalusia and Portugal. The civil war in Catalonia lasted about 10 years and in 1640 Portugal recovered her independence. The son of Philip IV, Charles II (1665-1700), a prince weak alike in mind and body, was obliged, after disastrous wars, to cede to France many places in the Netherlands and Franche Comte. The population of Spain, which had amounted to 11,000,000 in 1688, fell off to about 8,000,000 at the beginning of the 18th century.

Charles II, the last Spanish sovereign of the race of Hapsburg, in his second will made Philip of Anjou, a grandson of his sister, the consort of Louis XIV, sole heir of his dominions, in order to prevent the division of the Spanish monarchy, which had been resolved on in a treaty between England, Holland and France. Louis XIV acknowledged his grandson king, according to the testament ; but the Emperor Leopold I, of the race of Hapsburg, laid claim to the throne, while William III, king of Eng-

land and stadtholder of Holland, was in favor of a division of the monarchy for the sake of preserving the balance of power in Europe. The measures of Louis XIV at length brought on a war with England. Thus began the War of the Spanish Succession, which lasted 12 years and in which the Bourbon, Philip V, after many changes of fortune, succeeded in maintaining himself, by the victories of Berwick and Ven- dome, on the Spanish throne in opposition to Charles of Austria (afterward the Emperor Charles VI). But by the Peace of Utrecht in

1713 he was obliged to resign the Spanish de¬ pendencies in Europe — Naples, Sardinia, Par¬ ma, Milan and the Netherlands to Austria, and Sicily to Savoy. England likewise retained Gibraltar and Minorca, the later of which was restored somewhat later. Under the Bourbons the nation lost its last constitutional rights ; Ara¬ gon, Catalonia and Valencia were treated by Philip as conquered countries. The last diet of the Cortes held in Castile was in 1713 and in Aragon in 1720. Biscay and Navarre alone retained some of their privileges. The ambi¬ tion of Cardinal Alberoni involved Europe for a short time in confusion. Spain in 1735 again obtained possession of the Two Sicilies for the Infant Carlos and of Parma for the Infant Philip in 1748. Ferdinand VI (1746-59) suc¬ ceeded his father, Philip, but being a prey to hypochondria took no active part in the gov¬ ernment. With his stepbrother, Charles III (1759-88), previously king of Naples, an en¬ lightened prince, better days dawned for Spain. Under his reign the Bourbon family compact of 1761 involved Spain, to its injury, in the war between the French and British. The ex¬ peditions against Algiers likewise miscarried, as did the siege of Gibraltar in the war of 1779-83. Yet this did not disturb the course of the internal administration to the improve¬ ment of which men like Aranda, Campomanes, Olavides and Florida Blanca devoted them¬ selves. They provided particularly for the ad¬ vancement of agriculture, the useful arts and commerce, and this had a beneficial effect on the population, which now rapidly increased. The progress in improvement became even more marked during the early part of the reign of Charles IV (1788-1808), who at first pursued the reforming policy of his father; but in 1792, when Florida Blanca was superseded by Godoy as Prime Minister, he fell under the pernicious influence of that favorite. Spain at first entered with zeal into the war against the French Republic; but by the influence of the favorite the discreditable Peace of Basel was concluded, by which Spain resigned Santo Domingo to France, an offensive and defensive alliance with France was entered on (1796) and war declared against Britain. In 1797 the Span¬ ish fleet was defeated near Cape Saint Vincent, Minorca and Trinidad occupied by the Eng¬ lish and all the ports of Spain blockaded. By the Peace of Amiens in 1802 the British were confirmed in their possession of Trinidad. In

1801, at the instigation of France, military op¬ erations were commenced against Portugal, which was obliged to cede the province of Olivenga to Spain at the Peace of Badajoz in

1802, while France raised the Duke of Parma to the dignity of king of Etruria in 1801, Spain in return ceding Louisiana to France. Charles

IV, on the renewal of the war between Britain and France in 1803, having purchased permis¬ sion to remain neutral by a monthly tribute of 6,000,000 francs to Napoleon, the British seized the Spanish galleons and thereby forced Spain to declare war against Britain. The victory of the British at Trafalgar, 21 Oct. 1805, de¬ stroyed its naval power. The misery occasioned by the unfortunate wars carried on by Spain at this time led to the formation of a powerful party against the unscrupulous Godoy, who was mainly instrumental in bringing about these wars. Some feeble efforts were made by him to free Spain from French domination; but the success of Napoleon in his war with Prussia thwarted those and. in terms of the alliance subsisting between Spain and France a requisi¬ tion of Napoleon to dispatched two Spanish armies to Denmark and Tuscany, respectively, had to be complied with. Spain received a further humiliation by the Treaty of Fontaine¬ bleau respecting the division of Portugal, in consequence of which French troops were marched into the country. Toward the end of 1807 large bodies of French troops entered Spain at different points and occupied on one pretense or another some of the strongest fort¬ resses in the north. The entrance of a French army 35,000 strong in March 1808 raised the numbers of French troops in the country to 100,000 and with Murat at their head they now marched on Madrid. Godoy, in despair of his life, counseled the flight of the king and queen to Mexico. The project got wind; the people broke into open insurrection and the reign not only of the favorite but of his master also was at an end. Charles IV abdicated in favor of his son, the Prince of Asturias, who ascended the throne as Ferdinand VII. Ferdi¬ nand made a public entry into Madrid, which had been occupied by Murat, Grand Duke of Berg, the day previous. He informed Napoleon of his assumption of the royal power ; but the emperor caused the whole family to be con¬ veyed to Bayonne. Charles IV, who had re¬ tracted his resignation of the crown, and Ferdi¬ nand VII, the new king, were now both in the hands of Napoleon. Taking advantage, there¬ fore, of the opportunity, he extorted from each of them, as well as from the Infantes Don Carlos and Don Antonio, a resignation of their claims to the Spanish crown. The crown, which had already been refused by his brother Louis, king of Holland, was now offered to another brother, Joseph, the king of Naples, by whom it was accepted. The Council of Castile, the chief political body of Spain, when informed of the treaties of Bayonne, was at length in¬ duced to give a reluctant assent to the accession of Joseph. A junta of 150 Spanish notables which had been summoned to Bayonne accepted a con¬ stitution proposed by Napoleon for Madrid. The Spanish people, who were so little taken into account in these changes, were by no means passive spectators of them. Insurrections had already broken out immediately after the

abdi¬ cation of Charles in May. The people in As¬ turias first took up arms; Aragon, Seville and Badajoz followed. Palafox carried from Ba¬ yonne to Saragossa the order of Ferdinand that the people should arm, and the supreme junta received permission to assemble the Cortes. Revolution broke out everywhere, which

the French were too weak to resist. Moncey retreated to Valencia, and Generals Dupont and Wedel were beaten at Baylen. The junta at Seville had issued a proclamation calling the people to arms and the Council of Castile de¬ creed a levy of 300,000 men. The French squad¬ ron at Cadiz surrendered to the Spaniards and six days later an insurrection broke out in Portugal. On 4 July 1808, the alliance of Great Britain with the Spanish nation was proclaimed and a struggle began, which, whatever opinion may be entertained respectine the conduct of Napoleon, everyone will admit to have brought with it, as far as respected Spain, little but evil. Marshal Bessieres was successful in the battle at Medina del Rio Secco, over General Cuesta ; but the affair at Baylen above men¬ tioned decided the retreat of the French from Madrid, and, 23 August Castanos entered the city. In the meantime Sir Arthur Wellesley (Wellington) had disembarked in Portugal at the head of the British forces and on 21 August gained the first important battle in the Penin¬ sular War, defeating the French under Junot at Vimeiro. On 30 August the convention of Cintra was concluded, by which the French agreed to evacuate Portugal. A central junta under Florida Blanca was organized at Aran- juez toward the end of September; but unity did not prevail in it and the favorable moment was allowed to escape. On 6 November Napo¬ leon reached the Ebro at the head of a large force and by a succession of victories gained by his generals under his direction his way was opened to Madrid, which he entered on 4 December. The central junta now retired to Badajoz and afterward to Seville. The Span¬ iards believed that the success of the French was owing to treachery and this suspicion oc¬ casioned the assassination of more than one of their generals. The French indeed gained many victories and took many fortresses ; but the conquerors remained masters only of the places which they occupied. Everywhere the invading troops were surrounded and harassed by the attacks of the Spanish guerrillas. No line of communication was safe for the French; their means of support failed. In vain did Napo¬ leon, 4 Dec. 1808, abolish the feudal privileges and the Inquisition; in vain did Joseph try every means to win the love of the people; nothing could avail against the hatred of a

Gallic yoke. Austria now declared war and Napoleon was obliged in January 1809 to leave the conduct of the war in the Peninsula to his marshals — a step which the Spaniards con¬ sidered as equal to a victory. During the fol¬ lowing five years the French generals did all that talent and courage could do ; but the charm of Napoleon's presence was wanting and Well¬ ington finally triumphed over them. See Peninsular War.

After Pampeluna had fallen, 31 Oct. 1813, no French soldier was left on the Spanish terri¬ tory except in Barcelona and some other places in Catalonia. Wellington attacked the enemy on the fortified banks of the Nivelle 10 No¬ vember and Soult retreated into the camp of Bayonne. On 26 Feb. 1814 Wellington fought a battle with Soult at Orthez, by which the lat¬ ter was driven from his strong position and obliged to retreat in great disorder to the upper Garonne. Wellington followed the

French under Soult to Toulouse, where the bloody battle of 10 April and the occupation of the place put an end to the war.

The Cortes had already held its first session and had resolved that Ferdinand VII should swear to preserve the constitution before he should be recognized as king. At their invita¬ tion Ferdinand now returned to Spain, but de¬ clared the constitution null and void ; the In¬ quisition was revived, despotism was restored and the greater part of the reforms introduced under Charles III were subsequently annulled. Ferdinand bore down all opposition with a high hand and for six years (1814-20) reigned with absolute power. From 1814 to 1819 there were 25 changes in the ministry, mostly sud¬ den and attended with severities. They were produced by the influence of the camarilla or persons in the personal service of the king. Every attempt to save the state was frustrated by such counsellors and the prestige of Spain was further lowered by the loss of the Ameri¬ can colonies, an attempt to reconquer which only resulted in a miserable failure. On 1 Jan. 1820, a military insurrection under Riego broke out, for the purpose of restoring the constitu¬ tion of 1812. It spread with great rapidity; several generals, as O'Donnell and Freyre, who were dispatched to suppress it, joined the in¬ surgents and Ferdinand, abandoned by his own troops, was obliged to swear to observe the constitution of 1812. Among other reforms the Inquisition was abolished. The Cortes being assembled immediately set themselves to frame such measures as should be calculated to re¬ store tranquillity to the distracted country. But this was a task well nigh impossible under the circumstances. The country was divided into opposing factions — those who favored the restoration of its ancient power and

privileges to the Crown and those, on the other hand, who advocated liberal or ultra-liberal measures, and the measures passed had no effect in allay¬ ing the discontent. Guerrilla bands were or¬ ganized in the provinces in the cause of Church and king and obtained the name of <(armies of the faiths There was even established at Seo d'Urgel in July 1822 what was called (<a regency during the captivity of the king.** The govern¬ ment, however, was powerful enough to dis¬ perse these guerrilla bands and drive the regency into France. In these civil disturbances dreadful atrocities were committed on both sides. In the meantime France, at the Congress of Verona in October 1822, had agreed with the courts of eastern Europe upon an armed inter¬ vention in Spain. The Spanish government was called upon to restore the royal sovereignty and to change the constitution, and when they de¬ clined to comply a French army 100,000 strong, under the Duke of Angouleme, crossed the Pyrenees in the spring of 1823. By means of this force Ferdinand was restored to absolute power and immediately revoked all the decrees passed by the constitutional government be¬ tween March 1820 and October 1823. The In¬ quisition, indeed, was not restored; but the secu¬ lar tribunals supplied its place and performed deeds of vengeance of the most atrocious de¬ scription. The whole Spanish army was now disbanded and its place supplied by the ((army of the faith,)) who plundered and murdered the constitutionalists to their hearts' content. It is

computed that 40,000 constitutionalists, chiefly of the educated classes, were thrown into prison. To restrain the violence of party fury a treaty had been concluded with France, stipulating for the maintenance of a French force of 45,000 men in the country, until the Spanish army could be organized. It was only in 1827 that the French evacuated Spain. The personal moderation of the king toward the constitu¬ tionalists led to the formation of a plot by the absolutists to compel him to abdicate and to raise Don Carlos, his brother, to (he throne (thence their name of Carlistas) . Several in¬ surrections were set on foot by these Carlists, which were attended with numerous executions. In 1830 Ferdinand was persuaded by his wife, Maria Christina, a Neapolitan princess, to abol¬ ish, by the pragmatic sanction of 29 March, the Salic Law of the Bourbon family, which ex¬ cluded the daughters of the king from the throne. In consequence of the abolition of this law the succession passed from Don Car¬ los to Ferdinand's daughter, the Infanta Isabel. Don Carlos and his party protested against this measure, and the death of Ferdinand in 1833

was the signal for civil war. Isabella was at once acknowledged by the leading powers of Europe and proclaimed without opposition in all the midland and southern provinces of Spain. It was otherwise in the north, particu¬ larly in the Basque province; there the in¬ habitants took up arms in behalf of Don Carlos and proclaimed him king, under the title of Charles V. Christina had the joint support of the moderados and the' liberals and in order to attach them to her still more, a royal decree was issued in April 1834 granting a constitution with two chambers. The Carlists, under the command of Zumalacarreguy, were at first suc¬ cessful, but on his death their cause began to decline and the skilful leadership of Cabrera failed to retrieve the fortunes of the party. During this struggle England and France al¬ lowed men to be recruited within their terri¬ tories for the cause of the queen and an army of 10,000 went from England to join the royal troops. The chief of the royalist generals were Espartero and O'Donnell, under whose leader¬ ship the war was brought to an end in 1840. Though the civil war had thus been brought to a successful termination, Spain had by no means been restored to a state of tranquillity. Chris¬ tina failed to satisfy the ultra-liberals and rather than consent to have a colleague in the regency, as it was now thought expedient she should have, resigned 12 Oct. 1840, and sailed for France. In May 1841 the Cortes conferred the office of regent on Espartero and that of guardian to the queen on Arguelles. Espartero seems to have had the good of his country at heart, but he had a most difficult role to play. Every reform which he attempted gave offense to some party and to whatever side he turned he met only with opponents numerous, resolute and influential. Insurrections broke out in vari¬ ous quarters, and Espartero, checked and ham¬ pered on all hands, at last left the country and sailed for England. Queen Isabella was de¬ clared of age by the Cortes in 1843 and hence¬ forth the government was carried on in her name. She was married on 10 Oct. 1845 to her cousin, Don Francisco d'Assiz, her only sister, Louisa, being on the same day married to Louis

Philippe's son, the Duke of Montpensier. The outbreak of the French Revolution of 1848 caused much less commotion in Spain than in several other Continental states. Any revolu¬ tionary movements that took place were easily repressed by Narvaez, a minister of prudence and energy, who was then at the head of the government. Narvaez, however, found no small difficulty in maintaining his position. The court was a mere focus of intrigue and the most important political changes were con¬ stantly threatened to be effected by the most frivolous and contemptible means. Early in 1851 he was compelled to resign, and till 1854 a number of short-lived and weak ministries,

most of which had. reactionary tendencies, suc¬ ceeded each other. At the head of the last of them was Sartorius, whose measures were so unpopular that insurrection broke out in vari¬ ous quarters, and he and his colleagues, after trying in vain to suppress them, were obliged to save themselves by flight on the 17th of July 1854. Espartero, who had some time before leturned to Spain, was now charged with the formation of a government in accordance with the wishes of the nation. Before consenting to undertake this task he made two stipulations — the one that the queen-mother should be exiled, the other that the constituent Cortes should be assembled. On obtaining these concessions he formed a coalition ministry, himself holding the office of President and General O'Donnell that of Minister of War. The coalition ministry did not, however, work harmoniously, and Espar¬ tero, after holding his position with some diffi¬ culty till 14 July 1856, was obliged to give place to another ministry, with O'Donnell at its head, which only existed three months. Narvaez was now called to the head of affairs (October 1856). But in July 1858, O'Donnell was again entrusted with the formation of a ministry, which, being more liberal than the previous ones, endured for a period of five years, during which Spain enjoyed comparative tranquillity. In 1858 Spain shared in the French expedition against Anam, to avenge the persecution of Catholic missionaries and native Christians, which had been going on for a series of years. On 22 Oct. 1859, war was declared against Mo¬ rocco, which, it was alleged, had attacked the Spanish possessions situated on the northern coast of that state. Linder the leadership of O'Donnell it was carried to a successful con¬ clusion and a treaty of peace was signed on 26 April 1860, in terms of which 20,000,000 piastres were paid to the Spaniards by way of indemni¬ fication. These foreign wars led to a consider¬ able increase of the army and navy, promoted peace at home and greatly raised the reputation and influence of Spain abroad. In 1860 an un¬ successful attempt was made to overthrow the government of Isabella by the Count of Monte- molin, the eldest son of Don Carlos, in whose favor the latter had in 1845 abandoned his claim to the Spanish throne. In 1861 Spain joined Britain and France in sending an ex¬ pedition to Mexico to obtain redress of griev¬ ances. The same year Spain resumed possession of her former colony of Santo Domingo. On 18 March the last President of that republic, Santana, issued a proclamation announcing the union of that state with Spain, and on 20 May the queen signed the decree by which the an-

nexation was accepted. In 1863, however, a revolt broke out and after some fighting, which continued into the following year, Spain re¬ linquished the possession once more. A quarrel at this time broke out between Spain and Peru, in consequence of which the Spaniards seized the Chincha Islands by way of material guaran¬ tee ; but in the early part of 1865 the differences between the two governments were adjusted and the Chincha Islands restored to the Peruvian authorities. A more serious rupture took place in the same year with Chile, which led to a war between the twO' countries. The Chileans were supported by Peru, Ecuador and Bolivia ; but Spain had not very much to fear from this combination, though at the same time, as might have been expected, the war procured her little either of honor or profit. A military insurrec¬ tion broke out in Spain toward the end of 1865, under the leadership of General Prim, but he and his adherents were forced to flee before the royal troops. Prim effected his escape to Portugal, but in the following year another at¬ tempt at insurrection was made. On 22 Tune a regiment of artillery, quartered in Madrid, mutinied in their barracks, and after murdering several of their officers marched through the streets of the city calling upon the people to rise in the name of ((Prim and the republic." The active measures, however, of the Prime Minister, Marshal O'Donnell, soon put down the revolt. An equally abortive rising, though on a larger scale, took place in August 1867 in Aragon, Catalonia, Valencia and elsewhere, where bands of armed men made their ap¬ pearance, and were in some instances joined by the mayors of towns and other functionaries. The movement in a short time wholly collapsed, and several persons engaged in it were taken prisoners and executed. But the Revolution of 1868 had a very different issue. The conduct of the queen had alienated all feelings of loyalty in the breasts of her subjects. The forms of the constitution had been abused, and made the machinery of arbitrary and oppressive rule, and the people were weary of a system which re¬ pressed all freedom of thought and rights of conscience, which placed the education of the young in the hands of Jesuits, and under which they had lost all respect for their ministers and all attachment to the Crown. In the month of April insurrectionary movements broke out in Catalonia, and the province was placed in a state of siege. In July several Spanish generals were arrested by the government, and without any form of trial sent into exile. The revolution burst forth in September. On the 17th of that month General Prim arrived at Cadiz, where the exiled generals also arrived two days later, and immediately lent themselves to the move¬ ment. Meanwhile a proclamation had been is¬ sued calling the people to arms. Marshal Ser¬ rano, formerly president of the Senate, placed himself at the head of the movement and the whole of Andalusia

pronounced for the revolu¬ tion. The Spanish ministry resigned, and Gen¬ eral Concha was appointed by the queen presi¬ dent of the council. The Marquis de Novaliches commanded the royal army, and marched upon Cordova, which was occupied by the insurgents. At Burgos a severe conflict took place, which resulted in the royal troops fraternizing with the people. Juntas were established in the dif- vol. 25 — 22

ferent towns, which one after another raised the flag of rebellion. The defeat of Novaliches at Puerta Alcalen and the formation of a pro¬ visory junta at Madrid determined Isabella to flee the country and take refuge in France. Immediately after her flight the fall of the Bourbons was solemnly proclaimed, and one of the first acts of the juntas was to recognize universal suffrage as a principle of the future constitution. Serrano entered Madrid at the head of the revolutionary troops on 3 October and was received with the utmost enthusiasm by the inhabitants. A few days later a pro¬ visional ministry was formed, (<to lead the na¬ tion to liberty, and not allow it to perish in anarchy." Decrees were passed suppressing the Society of the Jesuits, declaring the absolute freedom of primary education, and restoring the liberty of the press. Thus was accomplished with little violence and less bloodshed a revolution which marks one of the most im¬ portant eras in Spanish history. The Cortes of 1868 declared for the monarchical form of government; but it was no easy task to find a prince both able and willing to fill the hazardous post of king. After fruitless nego¬ tiations with several princes, which, in the case of one of them, the Prince of Hohenzollern, led indirectly to the disastrous Franco-German War (q.v.) of 1870, the Crown was at length ac¬ cepted by Amadeus, the second son of Victor Emmanuel, and on 16 Nov. 1870, he was for¬ mally elected as king by the Cortes. Mean¬ while insurrectionary movements in several of the provinces had disturbed the peace of the country, but were forcibly suppressed. The new constitution was promulgated 6 June 1869, and Serrano appointed regent until a king was elected. The two years' reign of Amadeus I failed to give peace to the much disturbed country. Parties were numerous and irrecon¬ cilable. One ministry had to give place to another, each successive change making mat¬ ters worse instead of better. To crown all, in April 1872, the Carlist insurrection, which had been for some time threatening, burst forth. Risings took place simultaneously, under old chiefs of the party, in Aragon, Navarre and the Basque provinces; and bands also rapidly formed in Leon, Castile, and elsewhere. The cry of <(Viva Carlos VII" was heard on all sides. No time was lost by the government in dispatching Marshal Serrano to the scene of action. He succeeded in driving the insurgents before

him, and coming up with the main body on 4 May at Oroquieta defeated them. The check they received was, however, only temporary, as they still kept up a species of guerrilla warfare, and the year 1872 closed amidst widespread con¬ fusion in the provinces, and excitement in the capital itself. <(The Carlists in the north, the federalists in the south, overran the country, exacting contributions, cutting the railways and telegraph wires, inflicting heavy damages upon the state and on private families, putting a stop to all commercial intercourse, undermining local trade, protecting and facilitating smuggling, and obtaining unlimited authority wherever they went" ; and in this state of disorganization the country continued long after all active fighting had ceased. Disaffection in the army added to the strife of parties, and the many opposing manifestations of public opinion at length de-

terrriined the king to resign a crown the wear¬ ing of which had caused him nothing but anxiety and unrest. He accordingly abdicated on 11 Feb. 1873; and immediately thereupon the Cortes, by a majority of votes, declared for a republic, which was officially proclaimed at Madrid on 16 February. This was followed by political complications of the most chaotic de¬ scription, a state of affairs which the Carlists were not slow in taking advantage of. Not only, however, were the Carlists active, but other insurrectionary movements, consequent on the general discontent, combined to complicate the difficulties of the government. On 8 June the form of government, which had been the subject of much dispute, was, by an almost unanimous vote of the Cortes, definitely de¬ clared to be that of a federal republic. The Ministers under it were as short-lived as previ¬ ously. On 21 September Castelar, who at that time was President, was invested with dictatorial powers by a resolution of the Cortes, who voted their own suspension till 3 Jan. 1874. At the expiration of that period matters were in no way improved. Public opinion was wholly dis¬ organized, and the Carlist war had gained formidable dimensions. January 3 saw another revolution of government ; the Cortes had re¬ assembled, and on a motion being made for the approval of Castelar's exercise of authority during the recess it was negatived by a large majority. Castelar at once presented the resig¬ nation of himself and cabinet. As soon as this event was known out of doors, General Pavia, the captain-general of Madrid, at the head of his troops, entered the chamber and forcibly dissolved the Cortes; and having assembled the chiefs of the Revolution of 1868, and leading men of all political parties, justified

his con¬ duct by the urgency of the case, and desired them to form a new coalition ministry. The parties now placed in power, with Serrano at their head, were the same with those who made the Revolution of 1868 and the constitution of 1869. During this new revolution Madrid re¬ mained tranquil ; but in Saragossa, Barcelona and Valencia volunteers were arrayed by the communal authorities against the troops of the government, and barricades were raised. The struggle, however, was of short duration, and soon quelled. Within 10 days after the in¬ auguration of the new government a striking military success, in the capture of Carthagena from the disaffected, came to give it credit. In the north the Carlist War still raged, and be¬ came more and more formidable. Bilbao made a stubborn resistance to the government troops, but ultimately fell, and this success was fol¬ lowed by a few others; but at the battle of Estella, fought on 27 June, the Carlists obtained a signal victory over the republicans, who lost nearly 5,000 men in killed, wounded and prison¬ ers. The Carlists now overran the northeastern provinces, the fortresses only holding out against them. On 15 July, after a terrible bombardment, Cuenca fell into their hands. By the beginning of September the pretender's troops had entered several towns in different parts of Spain, though they had been, for the most part, unable to retain their acquisitions. The tide of success, however, again turned against the Carlists. They met with a signal defeat near Pampeluna on 25 September and

again at Irun on 11 November; but the repub¬ licans failed to follow up their successes or act as if they had any desire to bring the war to a speedy conclusion. Meanwhile another polit¬ ical change was in contemplation. The Al- fonsists, or advocates of the Prince of Asturias, son of the ex-queen, consisting of a large ma¬ jority of the middle and upper class of society, had been working steadily in his interests. On the prince's 17th birthday addresses had been presented to him at Sandhurst, in England, where he was pursuing his military studies as cadet ; and on the last day of the year it was announced that Gen. Martinez Campos, pro¬ claiming Prince Alfonso as king, had entered Valencia with two brigades. On the same day he was proclaimed in Madrid under the title of Alfonso XII. On 9 June 1875, the new king landed at Barcelona and assumed the govern¬ ment of Spain. The Carlist rebellion dragged itself on for more than a year after this event, but with fainter and fainter hopes of success. On 22 Feb. 1876, five battalions of Carlists surrendered at Tolosa to General Campos, and four days later Don Carlos fled to France. On 20 March following the young king made a triumphal entry into Madrid. Spain enjoyed a time of peace until his death in his 29th year, November 1885. His wife, Christina of Austria, was proclaimed regent after the birth in

1886 of her posthumous son, who is now king under the title of Alfonso XIII. Besides her struggles with the Carlists and others at home, Spain had to contend from 1868 to 1878, and again from 1895 onward, against insurgents in Cuba, where rebellion seemed almost the normal state of affairs. The United States intervened in 1898, and war ensued, resulting in the defeat of Spain, the almost complete destruction of her navy and the loss of her American and Asiatic colonies. (See United States, War with Spain). The loss of the protected colonial markets greatly dislocated manufacturing in¬ terests, particularly in Catalonia, where the old separatist tendency is still strong. The year 1901 was marked by serious anti-clerical dis¬ turbances and the Sagasta government took a firm stand against the religious orders. The regency was terminated 17 May 1902 when Alphonse XIII came of age. In May 1906 the king married Princess Ena of Battenberg. In the same year the government sought to estab¬ lish civil marriage and to regulate monastic establishments. Spain secured a rapprochement with France in 1904 by coming to an under¬ standing with the latter in regard to Morocco ; in 1908 both nations handled the Moroccan question in amity. The years 1908-09 were marked by anarchistic activities; a revolution was initiated at Barcelona which was soon sup¬ pressed and its leader, Francisco Ferrer, exe¬ cuted. In 1910-12 many internal reforms were instituted and Spain's relations with the Vatican placed on a more explicit basis. A measure of religious liberty to denominations other than Catholics was also enacted. Spain succeeded in maintaining her neutrality throughout the World War of 1914-18, although the feeling in Spain was sharply divided. The aristocracy and wealthy classes and a militaristic group sided with the Central powers, while the intellectuals and the great majority of the population took the part of France and the Entente. The Carlists

were pro-German and the Republicans pro-Ally. Maura was against neutrality and publicly stated that Spain's interests would be best served by joining the Entente. This stirred the German element to action and a counter-campaign was instituted. The government's position was ren¬ dered most difficult. The Romanones ministry fell early in 1917 and was succeeded by the Prieto ministry which lasted until 9 June 1917, when its fall was brought about 'by a crisis in the army, where a revolutionary movement de¬ veloped. The Dato ministry partially succeeded in settling many of the points at issue and several reforms were instituted in the mode of army appointments,

promotions, etc. The radi¬ cal element demanded Parliamentary reform but met with little success. Strikes and disturbance,, became very numerous throughout the country in June and July 1917 and on 13 August it was announced that the government had decided to declare martial law throughout Spain. Garcia Prieto succeeded Dato as Premier on 3 Nov. 1917 and formed a compromise ministry from several factions in the Cortes. It lasted only a short time, having failed to allay the general dissatisfaction. A new Cortes met on 18 March and a new ministry under Maura was formed. It lasted until 9 Nov. 1918 when Romanones was asked to form a new cabinet. Within eight weeks Prieto was again at the head of affairs and Romanones was Foreign Minister. Great dissatisfaction was manifested with the attitude of the government toward Germany's submarine warfare ; disorder was rife in the industrial regions of the kingdom. The Prieto ministry fell from power on 3 Dec. 1918.

Bibliography. — Altamira y Crevea, Rafael, (Historia de Espana y de la civilizacion es- panola' (4 vols., Barcelona 1900-11) ; id., (Sicologia del pueblo espanoP (Madrid 1902) ; Amicis, E. de, (Spain and the Spaniards) (Eng. trans. by S. R. Yarnall, 2 vols., Philadelphia 1895) ; Blackmar, F. W., (Spanish Institutions of the Southwest' (Baltimore 1891) ; Bofarull y Broca, (Historia critica de Cataluna' (9 vols., Barcelona 1876-78) ; Bernhard and Whishaw, E. M., (Arabic Spain: Sidelights on her His¬ tory and Art' (London 1912) ; Belus, R., (Re-rum Hispanicarum Scriptores Aliquot in Bib¬ liotheca Roberti BelP (3 vols., Frankfort 1579— 81) ; Borrow, G. H., (The Bible in Spain' (latest ed., New York 1908) ; Burke, U. R., (History of Spain from the Earliest Times to the Death of Ferdinand the Catholic) (2d ed., 2 vols., New York 1900) ; Bouchier, E. S., (Spain under the Roman Empire) (Oxford 1914) ; Cambridge Mediaeval History' (2 vols., Cambridge 1911-13) ; Calvert, A. F., (Spain' (2 vols., New York 1911); Castillo, R. del, Gran diccionario geografico de Espana' (4 vols., Barcelona 1892) ; Colmeiro, Miguel, (Enumeracion de las plantas de la peninsula hispano-lusitana e Islas Baleares) (2 vols., Madrid 1885-89) ; id, (Historia de la economia politica en Espana' (2 vols., ib. 1863) ; Chap¬ man and Buck, (Wild Spain> (London 1893) ; id., (Unexplored Spain' (ib. 1911) ; Codera y Zaidin, <Estudios criticos de historia arabe espanola' (Zaragossa 1903) ; Curry, J. L. M., Constitutional Government in Spain' (New Yor£ 1889) ; Clarke, Butler, (Modern Spain, 181 5— 1 898 } (Cambridge 1906); Coxe, W., Mem¬ oirs of the Kings of Spain of the House of

Bourbon' (London 1913) ; Diercks, Gustav, (Das moderne Geistesleben Spaniens : ein Beitrag zur Kenntniss der gegenwartigen Kul-turzustande dieses Landes' (Leipzig 1883) ; Dozy, R. P. A., (Histoire

des Musulmans d'Espagne, 711-1110' (4 vols., ib. 1861); id., (Spanish Islam' (London 1913) ; Ellis, Have¬ lock, (The Soul of Spain' (Boston 1909) ; El¬ liot, F. M., (01d Court Life in Spain' (2 vols., New York 1914) ; Ford, Richard, (Handbook for Travellers' (latest ed., London 1889) ; id., Gatherings from Spain' (new ed., New York 1906) ; Foulche-Delbosc, R., (Bibliographic his- panique' (New York 1909-) ; Gade, John, Cathedrals of Spain' (Boston 1911) ; Galli- chan, C. G., (Moorish Cities in Spain' (New York 1910) ; id., Cathedrals of Southern Spain' (ib. 1913) ; Gams, P. B., (Die Kirchengeschichte von Spanien' (3 vols., Regensburg 1862-79) ; Hare, A. J. C., (Wanderings in Spain' (8th ed., London 1904) ; Hay, John, Castilian Days' (new ed., Boston 1899) ; Hutton, Edward, Cities of Spain' (New York 1906) ; Lady Holland, (Spanish Journal' (ib. 1910) ; Howells, W. D., (Familiar Spanish Travels' (ib. 1913) ; Hidalgo, Dionisio, (Diccionario general de bibliografia espanola' (7 vols., Madrid 1862-81); Hume, Martin A. S., (The Spanish People: Their Origin, Growth and Influence' (New York 1901) ; id., (Spain: Its Greatness and De¬ cay, 1479-1788' (3d ed., ib. 1913) ; id., (Modern Spain, 1788-1898' (2d ed., ib. 1906); Hub¬ bard, Gustave, (Histoire contemporaine de l'Espagne' (6 vols., Paris 1869-83) ; Lafuente y Zamalloa, Modesto, (Historia general de Es¬ pana hasta la muerte de Fernando VII con- tinuada . . . hasta nuestros dias por Juan

Valera' (25 vols., Barcelona 1887-90) ; Lane- Poole, Stanley, (Moors in Spain' (New York 1887) ; Lea, Henry C., (The Moriscos of Spain' (Philadelphia 1901) ; id., (History of the In¬ quisition of Spain' (4 vols., New York 1906- 07) ; ' Mariana, Juan de, (Historia general de Espana' (new ed., 10 vols., Barcelona 1840) ; Madoz, ˆDiccionario geografico historico y esta- distico de las provincias de Espana' (16 vols., Madrid 1846-50); (Espana: sus monumentos y artes, su naturaleza e historia' (21 vols., Bar¬ celona 1884—91) ; (Diccionario enciclopedico his- pano-americano de literatura, ciencias y artes' (28 vols., ib. 1887-1910) ; (Enciclopedia uni¬ versal ilustrada europea-americana' (ib. 1905, et seq.) ; Moses, Bernard, ˆEstablishment of Spanish Rule in America' (New York 1898) ; id., (Spanish Dependencies in South America: An Introduction to the History of their Civili¬ zation' (2 vols., ib. 1914) ; Marvaud, Angel, (La question sociale en Espagne' (Paris 1910) ; id., C'Espagne au XXme siecle : etude pol¬ itique et economique' (Paris 1913) ; Perkins, C. C., Guilders of Spain' (2 vols., New York 1909-11) ; Pi y Margall and Pi y Arsuaga, (His¬ toria de Espana en el siglo XIX' (7 vols., Bar¬ celona 1902) ; Robertson, J. A., (List of Docu¬ ments in Spanish Archives Relating to the His¬ tory of the United States' (Washington 1910) ; Rudy, Charles, Cathedrals of Northern Spain' (Boston 1906) ; Root, W.

J., (Spain and its Colonies' (London 1898) ; Roscher, W. G. F.,

(Spanish Colonial System' (New York 1904) ; Scott, S. P., (History of the Moorish Empire in Europe' (3 vols., Philadelphia 1904) ; Seig-

nobos, Charles, (Political History of Europe since 1814) (New York 1900) ; Shaw, Rafael, (Spain from Within) (New York 1910) ; Wallis, S. T., (Spain: Her Institutions, Politics and Public Men> (Baltimore 1896) ; Watts, H. E., (Christian Recovery of Spain *(New York 1901); Willkomm, H. M., (Grundziige der Pflanzenverbreitung auf der iberischen Halb- inseP (Leipzig 1896); Zurita, . Geronimo, (An- ales de la corona de Aragon* (7 vols., Zara- gossa 1610-14).

Marrion Wilcox,

J. B. McDonnell.

SPAIN, American Diplomatic Relations with. American relations with Spain, which have never been really cordial were largely in¬ fluenced in the beginning by inherited traditions of Anglo-Spanish wars of two centuries.

In the Revolution, Spain withheld from alli¬ ance with the United States and in negotiations for peace planned to restrict the United States to territory east of the Appalachians. After 1783 she still hoped to obtain control of the trans-Appalachian west by restrictions on Amer¬ ican commerce on the lower Mississippi and dis¬ puted with the United States the northern boundary of Florida concerning which the United States had a separate understanding with Great Britain. In 1795, however, she was in¬ duced to grant a deposit of American commerce at New Orleans and to recognize the American contention by agreeing to the northern Florida boundary at 31°.

In the two decades closing in 1815 Spain acted with France in the spoliation of American shipping, especially in the West Indies, result¬ ing in later American claims for compensation. Another source of irritation and diplomatic negotiation arose from the secret transfer of Louisiana to France in 1801 and the later ac¬ quisition from France by the United States in 1803. In 1802 Jefferson offered to guarantee to Spain her trans-Mississippi territory for a cession of the island of New Orleans. After 1803 he claimed West Florida to the Perdido as a part of Louisiana, and by 1806 established a customs district therein in the

face of Spanish protests. In 1810 the American government, under Madison, took possession of all West Florida which had declared its independence, and later extended jurisdiction farther east into territory over which Spain was unable to pre¬ serve order or to perform her international obligations.

In 1814, during the War of 1812 Jackson temporarily occupied Pensacola after driving out a British force which had occupied the place without the consent of the Spanish authorities. Later, in 1818, he again ignored Spanish sover¬ eignty in this region by a defensive invasion which doubtless hastened the completion of negotiations which resulted in a treaty of 1819 (ratified 22 Feb. 1821) providing for ac¬ quisition of Florida by the United States and limits to Spanish western territory by a bound¬ ary established from the Sabine northward to the Red, up the Red to 100° longitude, thence north to the Arkansas and up the Arkansas to its head, thence north to 42° and thence west to the Pacific.

Still another source of friction was the re¬ volt of the Spanish American provinces begin¬

ning in 1810, and resulting in a period of privateering in which American-built vessels illegally participated under the flags of the re¬ volting governments. The American govern¬ ment recognized the revolted provinces as bellig¬ erents and sent special agents to report con¬ ditions, but maintained neutrality. Finally, in March 1822, after the ratification of the Florida treaty, it recognized the independence of four provinces (Mexico, Colombia, Buenos Aires and Chile) and in 1823 issued the Monroe Doctrine to prevent attempts of European powers, acting under the Holy Alliance, to aid Spain in efforts at resubjugation. Later it recognized Central America and Peru and, partly through fear of international complications relating to Cuba and Porto Rico, continued to urge Spain, both di¬ rectly and indirectly through other European powers, to enter into peaceful relations with the new-born republics.

Cuba, whose destiny appeared uncertain, be¬ came the chief subject of diplomatic relations thereafter. A plan of guarantee of Cuba to Spain by the United States and other powers, first suggested by the American Minister (Forsyth) at Madrid early in 1822 as a possible compensation for Spanish recognition of Mexico and Colombia and adoption of a liberal system of commerce, was considered both at Washing¬ ton and London in 1823. For two decades after 1825 American policy practically guaranteed to Spain the possession of the island on condition that it should not be ceded to France or Eng¬

land. In 1840 and 1843 the American govern¬ ment officially assured Spain of the American policy to maintain Spanish occupation of Cuba by American military and naval force against any attempt to wrest the territory from her.

The failure of the new American policy to purchase Cuba by diplomatic negotiations in 1848 was followed by a period of unsuccessful filibustering attempts (aided by lawless, ad¬ venturous Americans) to encourage revolt in the islands, resulting in various complications and new international suspicions. Declining to accede to an Anglo-French proposal of 1851 for joint action to prevent the landing of filibuster¬ ing adventurers in Cuba, and also refusing to become a party to the later proposal of 1852 for a tripartite agreement disclaiming any pur¬ pose to obtain possession of Cuba, the American government under the Pierce administration, through the influence of slavery interests, adopted a S3ˆstematic policy of annexation, illustrated in 1854 by the incidents of t?he Black Warrior episode and the Ostend Manifesto (repudiated by Secretary Marcy) and finally terminated only by the new issues of the Civil War period.

In the American Civil War, relations with Spain were largely concerned with the question of Confederate plans or operations, affecting Cuban neutrality, in relation to the use of the island as a base for enterprises endangering the American Union, and the Spanish occupation of San Domingo which the American government disapproved and which ceased in 1865.

Relations again became strained through conditions affecting American interests in Cuba and consequent diplomatic difficulties re¬ sulting from the Cuban Revolution of 1868-78. In 1869 President Grant contemplated the recog¬ nition of the Cubans as belligerents, and even

favored intervention, but the American gov¬ ernment limited its policy to presentation of complaints and demands and an offer of media¬ tion to arrange a peace on a basis of Cuban independence. Relations reached a dangerous stage late in 1873 through American demands following the Spanish pursuit and capture of the Virginias on the high seas, and the execu¬ tion of her captain and 53 of her crew at Santiago ; but Spain finally yielded enough to secure an adjustment of the case. In November 1875 Secretary Fish, influenced by increasing

difficulties which threatened to draw the United States into a war against Spain, confidentially sounded the chief European governments in re¬ gard to their views on a policy of foreign in¬ tervention in Cuban affairs.

After the pacification of Cuba in 1878, Span¬ ish restrictive commercial regulations remained a continual source of complaint. The American government urged Spain to establish a more liberal government through independence or autonomy, to adopt a more liberal commercial policy and to secure better protection of Ameri¬ can citizens and American property in Cuba. In 1884 and 1886 it obtained promises of the termination of discriminating and retaliatory duties, but the agreements were violated under various pretexts by the Cuban officials. In 1891 it was able to negotiate with Spain a reciprocity schedule under which American commerce was considerably increased in spite of the obstructions of Spanish officials in Cuba.

Three years later, the abrogation of this commercial arrangement injured the Cuban sugar industry and hastened the final devasta¬ ting revolution of Cuba (in 1895), stimulated and aided by a Cuban junta in the United States and placing upon the American government a difficult problem of patrol to prevent filibuster¬ ing while maintaining American rights. In 1896, embarrassed both by Cuban activities in the United States and Spanish treatment of American citizens in Cuba, the American gov¬ ernment, under President Cleveland, made an offer of good offices for mediation which, how¬ ever, was declined. It then gave warning that American forbearance has limits. In 1897, un¬ der President McKinley, it again used efforts to secure a peaceful solution of the difficulties.

Finally, after new sources of irritation cul¬ minating in the incident of the destruction ' of the Maine in Havana Harbor, it actively inter¬ vened in 1898 to terminate the intolerable con¬ ditions of Spanish rule in Cuba and to establish Cuban independence under an American protec¬ torate. The resulting Spanish-American War was closed by peace negotiations through which Spain lost all her colonies in the West Indies and the Far East, and the United States ob¬ tained a stronger strategic position in the Gulf of Mexico and the Caribbean Sea besides the control of islands of the Pacific needed for coaling stations and suitable bases for exercise of a larger American influence in the Far East.

By treaty of 10 Dec. 1898, Spain relinquished sovereignty over Cuba, transferred Porto Rico and Guam as a result of conquest, and ceded

the Philippines for $20,000,000.

A new treaty of friendship and general re¬ lations was concluded in July 1902 (proclaimed 20 April 1903). An international copyright agreement of i895 was restored by interchange

of notes 26 Nov. 1902, and an extradition treaty was concluded in June 1904 and (with a proto¬ col of August 1917) proclaimed 21 May 1908. A commercial agreement for reciprocal tariff concessions, under the Tariff Act of 1897, was signed and exchanged in 1906, terminable in August 1910 by notice of the American govern¬ ment. An arbitration convention was con¬ cluded in April 1908, and extended by agree¬ ment of 1913. A new arbitration treaty was con¬ cluded in September 1914.

Bibliography. — Callahan, J. M., (Cuba and International Relations) (1899) ; Chadwick, F. E., (Relations of the United States with Spain) (1910) ; Hart, A. B., foundations of American Foreign Policy *(1901) ; id., (The Monroe Doc- trine) (1916) ; Latane, J. H., (Diplomatic Re¬ lations of the United States and Spanish Amer¬ ica) (1900) ; Moore, J. B., Unternational Law Digest* (1906).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

SPALDING, Albert, American violinist: b. Chicago, 15 Aug. 1888. He studied under Jean Buitrago in New York, under Chiti at Flor¬ ence and Lefort at Paris. He made his debut at Paris in 1906 and achieved an immediate success. His later tours in France, Germany and England confirmed his reputation as an artist of signal ability. He made his American debut in New York in 1908 and in the course of several seasons' work firmly established him¬ self as a leading American violinist. He made many tours of the United States and Canada and also returned to Europe for a tour which extended through the leading European coun¬ tries and into Egypt. In September 1917 he canceled his engagements for a concert tour of the United States and Canada in order to enter the United States Signal Corps, in which he received rank as lieutenant. Among his com¬ positions are a set of variations for (My Cld Kentucky *Home* and (Concerto quasi fantasia* for piano and violin.

SPALDING, Albert Goodwill, American merchant, baseball player and official : b. Byron, Ill., 2 Sept. 1850; d. 9 Sept. 1915. As pitcher for the Boston Base Ball Club in 1871-75 he was one of the most famous base

ball players of his day, his club retaining the championship for four successive seasons. In 1876-91 he was connected with the National Association Chi¬ cago Club, filling in turn the offices of manager, secretary and president. He also organized the National League. He was one of the founders in 1876 of the firm A. G. Spalding and Brothers, which became widely known as manufacturers of sporting goods. He lived at Point Loma, Cal., as a member of a theosophical colony from 1900 until his death. Author of Amer¬ ica's National Game) (1911).

SPALDING, Frederick Putnam, American

civil engineer : b. Wysox, Pa., 7 April 1857. He was graduated from the School of Civil Engineering of Lehigh University in 1880 and after practising for several years was instruc¬ tor in the university, 1886-88; assistant profes¬ sor of civil engineering at Cornell, 1891-98, and has held a similar professorship in the Uni¬ versity of Missouri since 1900. His publications include (Notcs on Hydraulic Cement) (1893) ; (Text Book on Roads and Pavements) (1894) ;

(Hydraulic Cement, Its Properties, Testing and Use> (1897).

SPALDING, John Franklin, American Protestant Episcopal bishop : b. Belgrade, Me., 25 Aug. 1828; d. Erie, Pa., 9 March 1902. He was graduated from Bowdoin College in 1853, from the General Theological Seminary, New York, in 1857, and was ordained to the priest¬ hood in 1858. He had charge of various par¬ ishes in Maine and Rhode Island in 1859-62 and was rector of Saint Paul's Church, Erie, Pa., in 1862-73. In the year last named he was consecrated first bishop of the missionary dio¬ cese of Colorado. He was an able and forceful organizer and an active promoter of advance¬ ment in education. His publications include (Modern Infidelity' (1862) ; (The Higher Ed¬ ucation of Women' (1886) ; (The Church and its Apostolic Ministry' (1887) ; (The Best Mode of Working a Parish' (1888); (The Threefold Ministry of Christ' (1887) ; (Jesus Christ the Proof of Christianity' (1891), etc.

SPALDING, John Lancaster, Catholic prelate: b. Lebanon, Ky., 2 June 1840; d. Peoria, Ill., 25 Aug. 1916. His preliminary studies were pursued at Saint Mary's, Kentucky, and sub¬ sequently he attended Mount Saint Mary's, Emmitsburg, and Mount Saint Mary's, Cincin¬

nati, afterward entering the American College at Louvain, Belgium, and being there ordained to the priesthood in 1863. He then devoted a year to special studies in Rome, Italy, and hav¬ ing returned to America, was assigned to duty in the cathedral of Louisville, Ky. In 1866 he was accorded the honor of preaching at the Second Plenary Council of Baltimore, a rare privilege for one so young, and despite manv obstacles, he founded in Louisville a parish for negroes. Requested to be the biographer of his illustrious uncle, Archbishop Spalding, who died in 1872, Father Spalding repaired to New York for the purpose, and upon completing his labor of love, became assistant to Father Don¬ nelly at Saint Michael's Church, New York, where he soon established a reputation as a preacher of extraordinary ability, being called thence to the episcopal dignity and consecrated first bishop of Peoria, Ill., in Saint Patrick's Cathedral, New York, 1 May 1877. He was associated with Archbishop Ireland in found¬ ing tfie Catholic Colonization Society, and in him higher Catholic education has had one of its most ardent promoters. Long before the Catholic University at Washington assumed ma¬ terial proportions, it had been conceived in the mind of Bishop Spalding, who was tireless in planning for its foundation ; and the elaborate Catholic educational exhibit at the World's Columbian Exposition in Chicago in 1893, of which he was president, was prepared largely at his instigation. President Roosevelt ap¬ pointed him one of the board of arbitration for the settlement of the great anthracite coal strike in 1902. Columbia University conferred upon him the degree of LL.D., in June 1902. Bishop Spalding was twice stricken with paralysis and failing to recover full vigor resigned his charge 10 Sept. 1908. In 1909 he was made titular archbishop of Scythopolis. His writings are among the most scholarly contributions to American literature, (Education and the Higher Life,' (Things of the Mind,' (Thoughts and Theories of Life and Education,' Oppor¬

tunity and Other Essays,' (Religion, Agnosti¬ cism and Education,' Socialism and Labor and Other Arguments' and Religion and Art, and Other Essays' (1905), being some of the most notable of his works. Bishop Spalding is also the author of poems.

SPALDING, Martin John, American Ro¬ man Catholic archbishop : b. near Lebanon, Ky., 23 May 1810; d. Baltimore, Md., 7 Feb. 1872. He was educated at Saint Joseph's College, Bardstown, Ky., and at Rome, Italy, where he was ordained priest in 1834. He received charge of the cathedral at Bardstown upon his return to America and was also professor of philosophy in the seminary. He was president of Saint Joseph's College, Bardstown, in 1838-40. In 1844 he was appointed vicar- general at Louisville; and in February 1848 he became

coadjutor bishop, while on 10 Sept. 1848 he was consecrated bishop of Lengone in partibus. He founded the American College at Louvain in 1857, and was installed as arch¬ bishop of Baltimore in 1864. Author of (Sketches of the Early Catholic Missions in Kentucky, 1787-1827' (1846); (History of

Protestant Reformation' (2 vols., 1860), etc.

SPALLANZANI, spal-lan-dza/ne, Lazzaro, Italian naturalist: b. Scandiano, 12 Jan. 1729; d. 12 Feb. 1799. He studied at Reggio and after¬ ward ait Bologna, under Laura Bassi, the cele¬ brated woman professor of physics in that place. In 1754 he was appointed teacher of logic, metaphysics and Greek at Reggio. In 1760 he accepted a professorship at Modena and on the reconstruction of the University of Pavia, in 1768, he was appointed to the chair of natural history there and thenceforth de¬ voted himself to experimental researches and published in Italian various works on physiol¬ ogy, which made his name known through Eu¬ rope. Among the subjects which engaged his attention were the phenomena of generation, the functions of respiration, digestion and the circulation of the blood. In opposition to the opinion of Buff on and Needham, he proved that the Infusoria are really endowed with animal life and not merely organic molecules. Among his writings may be cited Experiments on Ani¬ mal Reproduction' (1786) ; on Hnfusory Ani¬ malcules' ; on the (Phenomena of Circulation'; on (Animal and Vegetable Physics' (1780) ; (Transpiration of Plants.'

SPAN, a measure of length, being the dis¬ tance between the tips of the thumb and little finger when the fingers are expanded to their fullest extent. This space averages about nine inches, which accordingly is the fixed measure given to the span. In architecture the term is applied to the width or opening of an arch.

SPAN-WORM. See Measuring- worm.

SPANDAU, span'dow, Germany, in Prus¬ sia, a fortified town of Brandenburg, at the junction of the Spree and Havel, nine miles west-northwest of Berlin and now a suburb of that city. In the Julius tower of the citadel wˆas deposited the reserve war fund of the empire — $30,000,000. The basis of this sum wjas the French indemnity paid in 1871. Here are large foundries and factories for all fire¬ arms, guns and all munitions of wrar, also a garrison of several thousand men. The prin¬ cipal buildings are churches, schools — includ-

ing military schools for the different arms — artillery-construction bureau, factories for gun¬ powder, military and city hospital, etc. The fisheries and timber trade are important, also shipbuilding and horse and pigeon propagation for military purposes. The town was often the residence of the first electors of the house of Hohenzollern, and subsequently passed into Swedish hands — till 1634. In 1806 the French took possession and in 1813 was surrendered to the combined Prussian and Russian forces. Spandau is now the shipping centre for trade between Berlin and Hamburg. Pop. 84,855.

SPANDREL, or SPANDRIL, in archi¬ tecture, an irregular space on a wall bounded by the outer curve of an arch and two lines meeting at right angles, the one drawn per¬ pendicularly from the springing of the arch and the other horizontally from the apex, or by the outer curves of two contiguous arches and a horizontal line above them, or by similar curves of contiguous arches and the line of a larger arch enclosing the other two. This space, an approximate triangle, is excellent for decora¬ tion. It is sometimes decorated with figures in relief, as in the triumphal arches of Rome, or with medallions, as in many buildings of the Renaissance period. The term is also ap¬ plied in engineering to the columns supporting the truss of a certain kind of steel-arched bridge, and also in the construction of a steel- skeleton building to the space between the top of a window and the sill of the next one above.

SPANGENBERG, spang'en-berg, Augus¬ tus Gottlieb, German religionist : b. Kletten- berg, Prussia, 15 July 1704; d. Berthelsdorf, Saxony, 18 Sept. 1792. He studied at Jena, abandoned law for theology, became a lecturer at the university and occasionally preached ; in 1732 was made adjunct of the theological faculty at Halle and in 1733 was dismissed be¬ cause of his doctrinal views. At once he entered the Moravian Church at Herrnhut and labored in Germany, America, the West Indies and England, where he established the Society for the Furtherance of the Gospel among the Heathen. After his consecration as bishop in 1744 he was at the head of the Moravian Church in America until his return to Europe in 1762. On his arrival in Germany he participated in framing the new constitution of the Church, of whose governing board he was the chief member. Among his works are (Idea Fidei FratrunP (1782; Eng. trans. by La Trobe, Exposition of Christian Doctrineˆ 1784) ; and (Leben des Grafen von ZinzendorU (1775; abridged Eng. trans. by Jackson 1838). He also wrote some well-known hymns, such as Eeil'ge Einfalt, Gnadenwunder) (Hymnal No. 432) and (Die Kirche Christi, die Er

geweihP (Hymnal 612). Consult lives by Risler (1794) ; Ledderhose, K. F. (Heidelberg 1846; Eng. trans., London 1855) ; Knapp, G. C. (ed. by Otto Frick, Halle 1884), and Reichel, G. (Tubingen

1906).

SPANIEL, a small shaggy race of dogs, de¬ riving its name from Spain, whence it originally came to Great Britain, and now generally di¬ vided into the two groups — sporting and toy spaniels. The common Afield® spaniel is the type of the group and two breeds of this variety, ˆspringer® and ˆcocker,® are distin¬ guished. The former is a heavy dog used for

beating game in thick coverts. The spaniel has the hair very long in some parts; it is generally white, with large brown, liver-colored or black spots, of irregular shape and size ; the nose is sometimes cleft; the ears are very long and pendulous and covered with long hair. The tail is feathery and waves from side to side when the dog runs. Two famous breeds of springer spaniels are the black Sussex and the larger Clumber breed is also well known. The cocker, whose name recalls its former use in English woodcock shooting, is much smaller than the field spaniel. The best-known breeds of the latter form are the English, Welsh and Devonshire varieties. The smaller, King (or Prince) Charles spaniel, is a small variety of the spaniel, used as a lap-dag. It is sometimes found entirely black, and receives its name from the liking of Charles II for this variety. The Blenheim breed is of smaller size than the King Charles variety, and is bred merely as a pet. Its hair is long and silky, and does not curl; the ears are long, and provided with the same silky hair; the legs are covered with this hair to the toes; and the tail possesses a broad hairy fringe. The water-spaniels are dogs of moderate size, and average about 22 inches in height at the shoulders, and the ears are very long and pendulous. The Japanese pug-nosed spaniel, Maltese and other toy-breeds may be added to this list. See Dog.

SPANISH-AMERICAN ATHENZEUM.

This organization was established in Washing¬ ton, D. C., in 1913 by Bishop Charles Warren Currier, Francisco J. Yanes, Dr. James Brown Scott and J. Moreno Lacalle. Its purpose is to develop and disseminate in the United States interest in the literature and history of Spain and the Spanish-American republics. Monthly meetings are held with programs contributed by diplomats, educators and travelers. One number of its ˆRevista® has been published. Present officers are Guillermo A. Sherwell, of Mexico, president, N. H. Darton, of

Washing¬ ton, vice-president, Dr. Luis Churion of Ven¬ ezuela, second vice-president, Wm. T. Faulk¬ ner, secretary-general. Alfonzo XIII, king of Spain, is the honorary president.

SPANISH-AMERICAN LITERATURE.

See Latin-American Literature.

SPANISH-AMERICAN WAR. See

United States, The War with Spain.

SPANISH-AMERICAN WAR, The Na¬ val and Military Order of, an association or¬ ganized in New York, 2 Feb. 1899. Its objects are to cherish the memories and associations of the war. There are State branch associa¬ tions in Pennsylvania, Massachusetts and Illi¬ nois. The total membership in 1903 was 1,100.

SPANISH ART. At the beginning of any profound study of the greatest of the Spanish paintings, which were those of the 17th century, should stand the fact, the true significance of which has hitherto been overlooked by art critics, that the production of the famous ironwork of Spain trained eye and hand — taught marvelous celerity and certainty of exe¬ cution — through many centuries that preceded the 17th. The Moors had expressed, with iron as a medium, not only their basic principles of design, but also the delicate and elaborate method they applied to the precious metals.

During the Romanesque and early Gothic periods French ironwork also exerted its influ¬ ence in the western peninsula. Afterward, Ital¬ ian Renaissance architecture, as it was inter¬ preted and applied in Spain, gave to the iron¬ worker such an opportunity for the exercise of his talent that he achieved grandeur and architectonic quality in his work, surpassing the attainments of iron-masters in other lands; and, if we are to appreciate the distin¬ guishing characteristics of such pictures as the (Spinners) and the (Meninas,) painted after the manner of an instantaneous photograph, we must remember that the artistic ironworker was generally an expert in other arts as well, and sometimes the ancestor of a painter who thus inherited, as did Velasquez, for example, rapidity with certainty of execu¬ tion, power in combination with delicacy. In this connection we may cite the following char¬ acterization of the Gothic and Renaissance iron¬

work : ((The charm of the Gothic cannot be denied. Produced, as it were, by feverish, powerful blows delivered during the brief mo¬ ment that the mass was glowing hot, it is a sort of solidified impressionism and appeals accordingly. This mediaeval spontaneity, it is true, eluded the more sophisticated Renais¬ sance worker; but not the mediaeval crafts¬ manship. This he retained and added to by his command of newer processes and his greater knowledge of design till he had reduced the mightiest of all metals to an obedience that would have been unbelievable to his predeces¬ sors. (Consult Byne, A., and Stapley, M., (Rejeria of the Spanish Renaissance, > New York 1914, and (Spanish Ironwork, y ib. 1915; also (The Famous Ironwork of Spain* in the Architectural Record , Vol. XXXIX, ib. 1916). We shall again refer to this potent influence when we come to the third and uni¬ versally significant period of Spanish painting.

Painters, Architects and Sculptors. — The attempt to trace clear national lines of devel¬ opment in the Spanish arts has always been regarded — and not without reason — as an ex¬ tremely difficult undertaking. Spanish art is indeed like a river whose current is swollen by many a stream from as many different lands. Nevertheless it has characteristics that are strikingly — often startlingly — individual and distinctive, and these are the characteristics to which we should devote special attention. The difficulty just referred to has been increased and intensified by the undue attention that writers have paid to the numerous foreign ar¬ tists who have been residents in Spain and whose works still remain there : to those for¬ eigners who, in Spain but not sympathetically of Spain, neglected or failed to express, in and through the works of art they created, the Iberianism of the country that sheltered them and employed their talents. It has seemed to us necessary, therefore, to prepare a new list of Spanish painters, architects and sculptors, which should be based upon an independent principle of selection. We omit the names of all who do not seem to be more closely con¬ nected with the Spanish arts than with those of any other country.

Here follows the list, designedly restrained within very narrow limits and presenting the names of painters, architects and sculptors in alphabetical order; Bayeu, F., painter, 17*54-95,

worked at Zaragoza, Madrid, Toledo, etc. ; Becerra, G., sculptor, b. 1520 at Baeza, d. 1570 at Madrid, worked at Burgos, Astorga, Sala¬ manca, etc. ; Berruguete, A., son of the court- painter Pedro, sculptor* architect and painter, c. 1480-1561, worked at Avila, Valladolid, Sala¬ manca and Toledo; Cano, A., painter, sculptor, architect, 1601-67, worked principally at Gran¬ ada and Seville; Churriguera, J.,

architect and sculptor, late 17th century to 1725, worked at Madrid and elsewhere, and was succeeded tw¬ ins sons Geronimo and Nicolas; Espinosa, j. J. de, Valencian painter, 1600-80; Falco, N., Valencian painter, worked c. 1515-76; For- ment, D., sculptor, worked at Huesca and Zara¬ goza, c. 1511-33; Gallegos, F., painter, c. 1465 or 1475-1550, worked at Salamanca and Za¬ mora; Goya, F. de, painter, 1746-1828, worked at Zaragoza, Valencia, Madrid and Bordeaux; Greco, El (see Theotocopuli, D.) ; Hernandez, G., sculptor, 1566-1636, worked at Valladolid and Plasencia; Herrera, F. (el Mozo), painter, 1622-85, worked at Seville and Madrid, and Herrera, F. (el Viejo),, 1576-1656, painter, who also worked at Seville and Madrid ; Herrera, J. de, 1530-97, architect of the Escorial ; Leo- cadio, P. de (San Leocadio), Valencian painter, 16th century; Mazo, J. B. del, Velasquez's son- in-law and pupil, d. 1687 ; Mora, J. de, 1638- 1725, sculptor; Murillo, B. E., painter, 1617-82, worked at Seville; Pacheco, F., 1571-1654, painter, instructor and father-in-law of Velas¬ quez, worked at Seville and Madrid; Pantoja de la Cruz, J., 1551-1610, court painter to Philip II; Ribalta, F., c. 1551-1628, painter, worked at Valencia; Ribera, J. de (Lo Spagno- letto), 1588-1656, painter, worked at Valencia and Naples; Rincon, A. del, c. 1446-1500, court painter to Ferdinand and Isabella; Roe- las, J. de las, 1558-1625, painter, worked at Seville; Sanchez Coello, A., d. 1590, court painter to Charles V and 'Philip II; Sorolla y Bastida, painter, b. Valencia 1863, lives there and in Madrid; Theotocopuli, D., pupil of Ti¬ tian, painter, sculptor, architect, called El Greco because born in Crete at an uncertain date, worked at Toledo and died there at an ad¬ vanced age in 1614; Valdes Leal, J., 1630-91, painter, worked at Seville; Vargas, L. de, 1502— 68, painter, wqrked at Seville; Velasquez (or Velazquez), Diego de Silva, 1599-1660, painter, studied first at Seville, afterward identified with the Spanish court and court-circle of Philip IV at Madrid and elsewhere; Viladomat, A., 1678- 1755, painter, worked at Barcelona and Tarra¬ gona; Zarcillo, F., 1707-48, sculptor, worked at Murcia; Zuloaga, I., painter, b. Eibar, 187Q, lives chiefly at Segovia; Zurbaran, F., 1598- 1662, painter, worked at Seville.

The names of other Spanish artists, whose works exemplify special tendencies rather than the main lines of growth or the distinctive Iber¬ ian characteristics, will be mentioned — with comment whenever that is required to differen¬ tiate their talents — in the following para¬ graphs.

Spanish Painting.— The history of Span¬ ish painting falls into three main periods: First, the period of the Flemish influence; second, the period of the Italian influence; and third, the period in which the Spanish genius <(found itself,® gaining vastly in the power of inde¬

pendent art-expression, and so, with creative art-impulses freed in a measure from bondage

to foreign schools, though never wholly escap¬ ing the tyranny of national institutions, politi¬ cal, religious and social, finally acquired, as we said above, universal significance. About the end of the 15th century or the beginning of the 16th, the works of Antonio del Rincon at Granada and the panels of Fernando Gallegos at Salamanca and Zamora, as well as the easel- paintings and panels of the early Seville paint¬ ers, Juan Sanchez de Castro and Alejo Fer¬ nandez, most clearly proclaim the northern in¬ fluences still triumphant throughout the penin¬ sula, as they had been continuously, except along the northeastern littoral and in the ex¬ treme south, ever since 1435 or 1440. But the irresistible charm of the great Florentine mas¬ ters was presently to be felt in Spain as in western Europe generally. A new world of artistic possibilities was revealed to Spanish art-students voyaging eastward just when Span¬ ish soldiers and merchant-adventurers, year after year sailing westward, were engaged in exploring and conquering the New World of boundless material possibilities; and so, at this point in our study, we come upon a half-cen¬ tury of inspiring, fancy-stirring Spanish ex¬ periences — of a synchronous hazard of new fortunes in art and imperial expansion, in Italy and America. By the middle of the century, or just a little while afterward, the oceans and mountains, the rivers and ((naked lands® had been explored, and that fever of daring ven¬ tures abated. By the middle of the century, or a little before, the methods and aims and almost — not quite — the heart of the Italian Renaissance had also been explored; and by an altogether dramatic coincidence Seville, rather than any other Spanish city, received Italy's new message, and more than the other cities appreciated it,, at the very time when she was receiving at her Tower of Gold all the amazing shipments of America's treasure.

Somewhat before the days of Luis de Var¬ gas, the Italian influence became potent at Se¬ ville, and for more than two generations, or until the close of the useful career of Francisco Pacheco, its control was not seriously contested except by Juan de las Roelas and Francisco Herrera the elder. In central Spain, meanwhile, the successors of Alonso Berruguete strove to pass from hand to hand the torch their distinguished master had kindled at the cinque- cento flame, but here the efforts appear to have lacked continuity and

organization. At the Spanish court the northern tradition was still far from being dislodged: to prove this a glance at scrupulously conservative portraits painted by Alonso Sanchez Coello and Pantoja de la Cruz will be sufficient. Nevertheless the court was already attentive to the appeal of Italian painting — in this instance not the Tus¬ can but the Venetian school. The superb col¬ lection of Venetian pictures at Madrid, begun by Charles V and increased by Philip II, made that appeal, which became a resistless one when it had thus gained the compelling force of pro¬ pinquity.

Now, the Renaissance spirit itself bespoke a freer quest of beauty than had ever before been conceded by Spanish realism ; but the sit¬ uation called for an apostle of freedom — and El Greco came. Domenico Theotocopuli (El Greco), by the independent character of his work at Toledo, by the originality he probably

advocated and certainly exemplified with won¬ derful success, suggested to other painters, as a not unattainable ideal, the expression of per¬ sonality without slavish dependence upon any foreign school whatever in the manner of its expression. As a zealous advocate of religious and social reforms speaks, often overempha¬ sizing his ˆvalues® in order to convince his audience, so El Greco painted, often forgetting mere truth to nature ; but fortunately the early training at Venice gave him that command of color and fluency in narration that are in evi¬ dence even at such moments — perhaps espe¬ cially at such moments. And of course the Venetian training counted in his favor and in favor of the acceptance of his novel theories by many Spaniards. The reason why such ac¬ ceptance had become possible has been plainly stated in the two foregoing paragraphs. In Seville we find at almost the same time the progressive Juan de las Roelas and a bit later that declarant of independence, the elder Her¬ rera, as above intimated. In Valencia the Italianized Francisco Ribalta was the teacher of Jacinto Jeronimo de Espinosa, who dis¬ played independence in the choice of some of his themes. Ribalta also, it is much more im¬ portant to note, was probably the first instruc¬ tor of that exceptional painter whose great talent embraced the best characteristics of both Spain and Italy, Jusepe de Ribera, called Lo Spagnoletto. It is not too much to say that Ribera added constructive reality to Theotoco- puli's inspiring but vague theories and ideals of freedom and the free expression of per¬ sonality. The Toledan has predisposed; now Ribera disposed, showing to all the definite, sure path that led to greatness through the en¬ noblement, not through the abandonment, of the realistic bias — of the national propensity to¬ ward realism. And so we place together the names El Greco and Lo Spagnoletto. The Greek said : ((Find a way.® The Little Span¬ iard

said: ,l(This is the way.® Together, in this sense, they usher in the third period.

Estremadura gave to Spain and the world Francisco Zurbaran, realist, unequaled portrayer of monastic types ; Cordova, a number of naturalistic painters. To the latter school be¬ longed Antonio de Saavedra y Castillo and his pupil Juan de Valdes Leal (afterward identified with the school of Seville). Especially repre¬ sentative of the school of Granada at the be¬ ginning of this period are Alonso Cano (who had previously devoted his attention to sculp¬ ture at Seville) and his two pupils — or, it may be, only his most able immediate suc¬ cessors — Juan de Sevilla and Fray Atanasio, surnamed Bocanegra. But the school of Se¬ ville gave to Spain and to the world Bartolome Esteban Murillo and Diego Velazquez, or Velasquez. (The latter signed his own name — and distinctly enough — in 1650 D.D., that is, Diego de Silva, Velasques. His mother's family name was Velazquez, but he substituted ˆ for the first s at that time).

For our present purpose it is less essential to describe Murillo and Velasquez as the greatest of Spanish painters than to realize how differently they were affected by the 17th century influences at Seville — the new move¬ ment favoring freedom in choice of subject and realism in its treatment, while the old repres¬ sive ecclesiastical policy discouraged such free-

dom. Two striking passages in Mr. Tyler's book (see Bibliography) show that writer's clear apprehension of the dissimilar manifesta¬ tions: "There [in Seville] sat Pacheco, appointed censor by the Inquisition, proclaiming that the one aim of art was to excite men to de¬ votion. . . . Murillo seems to have had a

temperament that naturally expressed itself through pious subjects; thus there was nothing in the air of Seville that made it stifling for him. But what of men like Herrera el Mozo and Valdes Leal? They both had detestable characters and great aptitude, especially the latter; but 17th century Seville, which was so pleasant to Zurbaran and Murillo, drove them to every sort of bitter excess.® And again, the turning-point in the career of the school (,was reached when the twenty-year-old Velazquez went to Madrid. Though his master Pacheco was' a pedant, he seems to have been a friend to art after his own manner, and there were enough painters in the Andalusian

capital to have kept a brilliant school alive, had it not been for the exaggerated atmosphere of devotion that prevailed theie. Whether Velazquez would have become the man we know had he stayed there instead of travelling in Italy is open to grave doubts; at any rate the atmosphere of Seville was too. close for him. He went to court, and those who stayed had to devote themselves to religious subjects or starve. Velazquez was able to paint as he pleased at Madrid.® Professor Carl Justi has made the correct observation that Murillo was originally as essentially a realist as Velazquez; but for the simple reason that he continued to live in a Roman Catholic provincial town and painted for conventual churches, he ((had to represent the subjects that pleased the devout of hi's day, such as the Immaculate Conception, the visions of the monk's cell, the mysteries and ecstasies of asceticism. He could not de¬ vote his entire energy to the reproduction of the mere visual phenomena. He had to depict what was never seen. . . . His artistic

greatness, the secret of his wonderful success, lies in the fact that he recognized the unique character and special charm of the human nature of southern Spain, adapted it to the palette and the brush, and ventured to in¬ troduce it into paintings of religious subjects.® Velasquez, after wrenching himself free from provincialism, discovered in himself the very special powers of another Cristobal Andino, that greatest and most honored 16th century ironworker of Burgos, Seville and Toledo. Let us read' what was written by Bonnat in his preface to Beruete's (Velazquez) (see Biblioa- raphy) : ((The methods which Velazquez em¬ ployed to obtain such startling results are surprisingly simple. Armed with a palette on which only a strictly limited number of colors appear, and with a few long and slender brushes in his hand, he painted in everything at the first touch. The shadows, much simpli¬ fied, are merely rubbed in, and only the high lights are thickly painted ; and the whole, with its fine gradations of tone, is so broadly and rapidly executed, and is so precise in color and proportion, so exact in its values, and so true in drawing, that the illusion is complete and the resulting work a marvel.® Yet it is only proper to say that Bonnat, so far as we

know, had not given thought to the analogue or explanation that we have offered. At Madrid, the contemporaries of Velazquez, forming the Madrid School, were Fray Juan Rizi (1595— 1675); Antonio Pereda (1599-1669); Francisco Rizi (1608-85); Juan Carreno (1614-85), Velasquez's successor as court-painter; Jose Leonardo (1616-56), and Diego Polo (1620- 55). A little later came Juan Antonio Escalante (1630-70) ; Mateo Cerezo (1635-75); Jose Antolmez (1639-76) ; Claudio Ccello (c. 1630 or 1635-93), and Sebastian Munoz (1650—

90). The capital, with its collections of paint¬ ings for study, with its more liberal patronage and interesting life, became the centre of artistic activity by 1625 and retained that pre¬ eminence to the end of the 17th century.

During the greater part of the 18th century Spanish art produced imitations. Senor Beruete y Moret (see Bibliography) even goes so far as to say it produced “nothing but imitations,® then adding that “these imitations were not particularlv happy.® Original talent was tem¬ porarily displaced — that was all; for it was reinstated by Goya (1746-1828) whose works, taken all together, make a remarkably vivid and complete picture of the Spanish life of his day. “In the latter years of the century,® writes Senor Beruete y Moret, “an original artist, Francisco Goya, arose. He cast from him all foreign influence and realized an art of his own which was so genial, so characteristic, and so Spanish that it gave evidence of the renascent artistic spirit of his country.® True, that promise of renascent Iberianism was not quite fulfilled in the works of Jose de Madrazo (1781-1859), Federigo de Madrazo (1815-94), Mariano Fortuny (1839-74), or Jose Villegas, b. 1848; but Sorolla (Joaquin Sorolla y Bastida, b. Valencia, 1863) depicts very brilliantly the sunlit atmosphere of his native province, while Ignacio Zuloaga (b. Eibar, 1870) summons the Spanish people and land¬ scapes to appear on his canvases as though he were a magician. Zuloaga’s talent exemplifies the obligation of Spanish painting to Spanish metalwork. His birthplace, the Basque town of Eibar, is called the “Toledo of the North® because the occupation of its people is to temper and damascene sword-blades and poignards. His great-great-grandfather, Don Bias Zuloaga, was an excellent armorer and a friend of Goya; his grandtather, Eusebio, also a famous armorer, organized and directed the Royal Armory at Madrid; his father, Placido Zuloaga, revived the art of inlaying metals. Consult Frenzi, G. de, (Ignacio Zuloaga> (Rome 1912).

Architecture. — The best single point at which one can subject works of architecture of all the Spanish architectural periods to direct and personal observation is undoubtedly the ancient city of Toledo, since all such periods are represented in its structures, and represented by good examples. But Merida in the southwest possesses the most interesting architectural memorials of the Roman Empire, as Asturia in the north possess those of the Visigoths. During the Roman period imperial public buildings were very numerous in Spain ; and although comparatively few escaped de¬ struction their massive dimensions and char¬ acteristic lines exerted an influence in the

formation of national taste that has never been wholly lost. Again, between 414 and 711 (the Visigothic period) another controlling in¬ fluence was felt; and this is far from being un¬ worthy of our consideration, inasmuch as, among all the hordes that invaded Spain in the 5th century, the Visigoths, natives of Dacia, the modern Rumania, were, as Mr. Tyler says, al¬ ready Christians, and bv far the most advanced in the arts of war and peace. Mr. C. H. Blackall writes (in Sturgis, R., (A Dictionary of Architecture and Buildings, } New York and London 1905) that the invasion of ttie Visigoths appears to have swept away nearly all the architecture of the Roman period, while the conquest by the Moors, in the early part of the 8th century, in its turn obliterated most of the remains of the Visigothic work, except in the north. Then, (<the seat of government being fixed about Madrid, the Renaissance style, which was imported from Italy and fostered by constant intercourse with foreign artists, was naturally at its best on the central plateau.® In the central portion much of the mediaeval work “disappeared to make room for the Renaissance palaces. In the south the Moors found little to preserve when they first entered the kingdom,® and the architectural work that they themselves did was of such manifest value that it was, on the whole, very little disturbed subsequently. We, therefore, find the Gothic and Romanesque chiefly in the north, the Moor¬ ish in the south and the neoclassic along the central plateau.

The mosque at Cordova, the oldest and lar¬ gest Moorish monument in Spain, founded in 785; El Cristo de la Luz at Toledo, and in the same city the Casa de Mesa and the Taller del Moro ; the Giralda tower (1196) at Seville; the Alhambra at Granada — these are familiar examples of Moorish work before the recon¬ quest. The name Mudejar is given to that blending of the Christian and Moorish styles which took place after the reconquest. The Romanesque, introduced toward the end of the 11th century, prevailed throughout the 12th. Examples of this are, beside that famous resort of pilgrims in our own day, the church of Santiago de Compostela (1060-96), — Sant’ Isidro in Leon (1063-1149), San Pedro at Huesca (1100-1241) and the cathedral of Lugo (1129-70). Not long afterward the Gothic was introduced from France, and as examples we may mention the churches of Viruela and of Las Huelgas, the latter built by Ferdinand III about the middle of the 13th century. But the Gothic at first failed to maintain itself as French-Gothic in Spain : it became Spanish-Gothic, actually composite, by the union in the same structure of the new Gothic principles with the Romanesque, or those of a still older period. Such are the churches of Salamanca (1178) and Santa Maria at

Benavente (11 70— 1220). Not before the 13th century could the pure, perfected French cathedral style make an irresistible appeal. It was adopted and magnificently shown then in the cathedrals of Burgos (1221), of Toledo (1227), and of Leon (1250-1305). The cathedral at Seville, largest oi all Gothic churches, was founded at the be¬ ginning of the 15th century. The end of the same century witnessed the erection of build¬ ings of extraordinary originality and picturesque charm which, as Professor Carl

Justi writes, (<mirror that mighty outburst of national feeling which followed in the train of a series of unparalleled events.® Noteworthy among the structures of this group are the facades of San Gregorio and San Pablo at Valladolid and of Santa Cruz at Segovia.

The Renaissance came to Spain almost a century later than to Italy. Here (<the essen¬ tial point of contact was in the domain of decoration ; artistic imagination, accustomed to Mudejar and Gothic ornamentation recog¬ nized in the new style a new class of motives, enlarging its previous range.® An important example is the coro of the cathedral of Cor¬ dova, although this had been begun in 1523 in the Gothic style. So suggestive of works in the precious metals was the new manner of ornamentation that the term Plateresque (from platero, meaning silversmith) was given to it. An honored name among architects at the time was that of Diego de Riano (d. 1533), who de¬ signed the Sevillan city hall and portions of the cathedral ; representatives of a reaction in favor of severity and restraint, advocating the attainment of more stately effects through pro¬ portion alone, without decoration, were Juan de Toledo, who began the Escorial, and Juan de Herrera, who completed that huge late-Renaissance structure. In the 18th century the Churrigueresque, a style peculiar to Spain and Spanish colonies, ran riot (see Churri¬ guera in foregoing list of painters, architects and sculptors) and the canons of classic de¬ sign were disregarded. “Stucco and gilding were lavishly used,® says Sturgis, “and broken pediments, twisted shafts and contorted scrolls abound. The result is, like nearly all Spanish work, highly decorative and not without a cer¬ tain theatrical splendor, but it lacks structural reasonableness. About 1750 a more academic style began to displace the Churrigueresque.® Best of the 18th century “more academic® buildings is the Royal Palace at Madrid, a dignified and well-balanced composition. In the 19th century and thus far in the 20th, eclecti¬ cism has been the rule. It has seemed the part of wisdom, in a country so rich in varied tra¬ ditions of art, to reproduce approved old forms rather than minister to the craving for novelty.

Sculpture. — In the Renaissance period the Italian influence was overwhelming and during many years the marble-cutters of the better class were almost exclusively natives of Italy. This circumstance has occasioned general ac¬ ceptance of the theory that, during earlier and later periods as well, this or that foreign influ¬ ence usurped the place lawfully belonging to original Spanish talent. We shall try to indi¬ cate the correct limitations of such a theory, in the course of a brief review of the main essential facts.

And first we must realize that native works of great merit, such as those of Pedro of Tar¬ ragona in the Tarragon Cathedral, date from 1426, 1434 and so on ; that Bartolome s apostles at the main door of the same cathedral date from 1278; and that the Apostles' Door at the cathedral of Burgos was also executed in the 13th century. In other words, Spain did not wait for the coming of the Italian Renaissance, or for its long-delayed arrival at her shores (end of the 15th century), but on the contrary created ideal figures, portrait statues and what¬ ever was required for the embellishment of

architectural design, long before Italianization prevailed. French influences are evident in some of the sculptures of the 13th and 14th centuries; Netherlandish influences in some of those of the 15th . century. But an art critic should not fail to observe the relatively small number of those sculptures which belong to the schools mentioned and may properly be called foreign products. He will perceive Spanish realism, with its directness and forcefulness of expression, stamping as Iberian the vast ma¬ jority of early sculptures, down to or even be¬ yond the middle of the 1 5th century. Gil de Si- loe, toward the end of that century, produced such sculptures as the monument in honor of Bishop Alonso de Cartagena at Burgos and the well-known works at Palencia and in the Car- tuja de Miraflores. A few years afterward, however, the supremacy of Italian sculpture was recognized. Bartolome Ordonez frankly em¬ ployed Italian assistants, and was working with them at Carrara when he died (1520). Alonso Berruguete, who returned from Italy in the year of Ordonez' death, was a versatile artist whose impulse, on rare occasions, to regain originality led to extravagances ; but his chief work (if we accept Professor Justi's view to this extent) ftshows how deeply he had steeped himself in the spirit of Michelangelo.® Da¬ mian Forment and Diego Morlanes were in¬ spired by Italian and classic ideals.

The period of complete emancipation ar¬ rived when Spanish sculptors chose wood as a convenient substitute for stone — a period or epoch during which was accomplished a revo¬ lution in ecclesiastical taste that is peculiar to Spain. The enthusiasm for figure sculpture grew into a marked predilection for bulk and multiplicity of detail ; and ((one result of this was that stone-carving was practically aban¬ doned, and the artist confined himself almost exclusively to wood (pine, cedar, linden, larch) as a cheaper and more easily worked material. Coloring was not used at first. Now arose those huge retablos which cover a choir-wall reaching up to the vaulting with a Jacob's Ladder of statues. All that had been ex¬ pressed in the 14th and 1 5th centuries by small painted groups and panels was now translated into lifesize statues.® Miguel de Ancheta made a retablo containing 35 statues and groups. Gaspar Becerra was one of the most famous sculptors (in this medium) among Castilians. In Seville, at the beginning of the 1 7 th century, Martinez Montanez, in whose works there is not a trace of the Italian style, or indeed of any other foreign influence, led popular interest in and appreciation of polychrome sculptures, whose art is (<the result of an essentially Span¬ ish attitude of mind, while the sense of form through which it is expressed is probably pecu¬ liar to Seville.® The polychrome figures did not, however, represent the best achievements in this distinctively Spanish phase. Pedro de Mena, a sculptor of Granada in the last half of the 17th century, carved statues and statu¬ ettes that required no paint to enhance veri¬ similitude. The unpainted small wooden fig¬ ures of saints by this artist are remarkably original, as all critics will admit. But they show more than independence of foreign schools : they show such marked superiority that foreign students of art may learn the fine secret of true characterization by visiting the

cathedral at Malaga and copying Mena's sculp¬ ture there.

It seems to us that the story of enfranchised Spanish sculpture — often wholly or in a meas¬ ure free and sometimes lawless, ungovernably Iberian, as in the days of Churriguera and those of Francisco Zarcillo (1707-48), Aris- mendi, and Ron — reaches its true climax when Mena's success is recorded. A classic reaction of no genetic value at the beginning of the last century resembled what took place in France at the same time. The present century wit¬ nesses reassertion of the national tradition, in this art as in the art of painting, and now looks for an exponent of Spanish realism who, as sculptor, -shall stand beside the painter, Ignacio Zuloaga.

Bibliography. — Beruete, A. de, (Velazquez) (London 1906) ; Beruete y Moret, A. de, (The School of Madrid5 (London 1909) ; Byne, A., and

Stapley, M., (Spanish Ironwork5 (New York 1915) ; Calvert, A. F., (Sculpture in

Spain5 (London 1912) ; Contreras, R., ˆstu¬ dio Descriptivo de los Monumentos Arabes de Granada, Sevilla v Cordoba5 (2d ed., Madrid 1878) ; Fatigati, E. S., (Escultura en Madrid5 (Madrid 1912) ; Leroy, M., ed., Materiales y Docmnentos de Arte Espanol (Barcelona 1900-10, and continued under title Materiaux et Doc¬ uments d'Art Espagnol, Barcelona 1913) ; Tyler, R., (Spain: a Study of her Life and Arts5 (London 1909) ; Whishaw, B. and E. M., (Arabic Spain5 (London 1912). See also ref¬ erences in the body of the article.

Marrion Wilcox.

SPANISH BROOM, a leguminous papilio¬ naceous shrub (Spartiu-m junceum), a ((switch plant,® characterized by bunches of rod-like branches, terete, polished and green. The branches are without foliage, serving as organs of assimilation ; or they may have small lancet- shaped leaves, scantily developed and quickly falling. The Spanish broom is native to the Mediterranean shores, where it grows in masses, as may be seen on Gibraltar, on dry and rocky ground. It has been naturalized in tropical America, and cultivated for the termi¬ nal racemes of large pea-like flowers. These are an inch long, golden yellow and very fra¬ grant, with the odor of acacia, and are a favor¬ ite food of bees. They also yield a yellow dye. The tough twigs are used as food for goats, and produce a coarse fibre; the seeds, from linear pubescent pods, are diuretic and tonic and in larger doses emetic and carthartic.

SPANISH ERA. See Epoch.

SPANISH-FLY. See Blister-beetle.

SPANISH FORT, a part of the defenses of the city of Mobile, Ala., during the Civil War ; taken by the Federals 8 April 1865. It consisted of a system of fortifications, rather than a single fort. On 27 March it was in¬ vested by Union troops, A. J. Smith's corps, on the right, and Granger's on the left; a bom¬ bardment was begun 4 April, in which the gun¬ boats on the river joined, and a naval battery on shore rendered service. The Federals in¬ tended to assault the defenses on 9 April ; but on the 8th General Carr found that it was pos¬ sible to place a battery on a wooded crest com¬ manding the fort and that* evening his troops gained the crest, captured 300 yards of the works and, getting their battery into position,.

compelled the Confederates to evacuate. Con- stilt (Battles and Leaders of the Civil War'

(Vol. IV).

SPANISH FOWLS. See Poultry.

SPANISH LANGUAGE, The. Spanish is one of the modern spoken and written forms of Latin, that is, it is a neo-Latin or Romance language. Its motherland is Spain in the Iberian Peninsula. Besides Spanish two sister Romance tongues are in use in the peninsula, viz., in the western part, Portuguese (which is never to be regarded as a dialect of Span¬ ish), and, in the eastern part, Catalan (which has affinities to the Provencal of southern France). In part of northern Spain and in the district of the Pyrenees the native speech is Basque, which has no discernible relationship to its neo-Latin neighbors, Spanish and French, and is thought by some to be a survival of the ancient Iberian language. In Galicia, which occupies the northwestern corner of Spanish territory, the natural idiom is Galician, and it is a dialect of Portuguese. In the Middle Ages both Catalan and Galician had literary mani¬ festations of no little importance. In spite of school influence, which tends to spread the influence of Castilian to their detriment, they continue to be the popular spoken languages of their districts, and Catalan has continued to have its notable writers of both prose and verse down into our own times.

In the strictly Spanish-speaking region three dialectal divisions are marked, viz., (1) Cas- tilian-Andalusian in the centre and south of the land, (2) Leonese-Asturian in the west and north, and (3) Navarro-Aragonese in the northeast and east. Through political import¬ ance and as a result of various other reasons, especially the greater activity of its writers in the earlier period, Castilian soon became the dominant form of Spanish and remains such to-day. The term “Castilian” is often used as the equivalent of “Spanish” to designate both the language and the literature. Some have regarded Andalusian as an individual dialect, but it differs so little from Castilian — one of its most distinctive traits is its assibilation of c (before e and i) and of z, which Castilians pronounce as voiceless interdental th — that there is little need of giving it a place apart. For literary purposes the Navarro-Aragonese and the Leonese-Asturian have never received any extensive or lasting development.

The following may serve to illustrate some of the phonological differences between the two dialects and the standard Castilian. They both have a glide-sound between e and a following vowel, where Castilian has none : leyer, <(to read," Cast., leer; leyal, "loyal," Cast., leal. They both have palatalized ll (the li of Eng¬ lish ((filial " approximates to this sound) where Castilian has a j (a guttural spirant; cf. the Scotch ch in "loch") ; fUlo, "son," Cast., hi jo; ovella, "sheep," Cast., oveja. They both have it where Castilian has ch; dereito, "right," Cast., derecho; muito, "much," Cast., mucho. The both develop diphthongs out of accented Latin short e and 6, where Castilian fails to do so (because of the influence in Castilian of a following palatal): pueyo, "height" ; Cast., poyo ; Latin podium: fuella, "leaf"; Cast., hoja; Latin pi., folia, etc. Leonese changes / after a consonant to r: hranco,

"white," Cast., bianco. Aragonese keeps initial Latin pi and cl where Castilian changes them to ll: plorar, "to weep," Cast., llorar; clamor, "to call," Cast, llamar.

In morphology the dialects have also cer¬ tain traits that distinguish them from Cas¬ tilian. Thus Aragonese tends to create a feminine form in -o for adjectives which are not entitled historically to that ending: dolicnte, "grieving," fern., dolienta, Cast., dolicnte for both genders. Leonese uses fuller forms of the definite articles : el, ela, elos, elas: cf. Cast., el, la, los, las. Leonese has -er infinitives where Castilian has -ir: vivcr, "to live," dizer, "to say," Cast., vivir, decir. Castilian has no separate possessive form for the plural possessive "their," but uses su, sus, which also means "his," "her," etc. ; Aragonese uses lur, lures (cf. French leur, leurs) as a distinctive form for "their."

By colonization and conquest Spanish has been carried to foreign regions. The explorers and settlers took it to the New World, where it is now used by hardly fewer than 50,000,000 of persons in the western continent and ad¬ jacent islands, from Mexico southward. For that matter it is still spoken even in tracts of the United States, e.g., in New Mexico, Cali¬ fornia, Texas, etc. It followed the Spanish flag to the Canaries and the Philippines, with¬ out, however, displacing the aboriginal speech in the Philippines any more than it has done so in the parts of America in which the Indians are numerous. In Spanish America the pro¬ nunciation reveals traits that once existed in Castilian of the 15th and 16th centuries and have since changed in the motherland, and it shows also features of the dialects of the por¬ tions of the peninsula whence the settlers came. But to all intents and purposes, since the dia¬ lectal differences operate for only a restricted number of sounds and the accepted principles of grammar are those of Castilian, the Spanish of Spanish- America is properly enough de¬

nominated by the generic, if somewhat elastic, term of “Castilian,” The expatriated Moors and Jews have taken Spanish to places in northern Africa and in Turkey, where they still speak it in a more or less contaminated form. It is safe to say that in the neighbor¬ hood of 70,000,000 human beings are to-day using Spanish in various parts of the world.

Castilian, the standard form of Spanish, at¬ tained to the dignity of a literary medium by the 12th century, about or soon after the middle of which there appeared the noble epic poem, (E1 Cantar de Mio Cid,’ and the little liturgical play, (E1 Misterio (or Auto) de los Reyes Magos.’ But in legal, ecclesiastical and other documents we can trace its evolution, during some five or six centuries prior to that time, from the popular Latin of the more or less illiterate soldiery and colonists brought to the peninsula as a result of the Roman conquest. By the time of Augustus the conquest had be¬ come an achieved fact, and during the four centuries of peace that followed his reign the Romanization of the land, so thoroughgoing for its institutions and customs, was a practi¬ cally complete process for its speech also. It is dubious that, apart from a very scant number of debatable elements of the lexicon, any ves¬ tiges of the idioms of the original Celtic and

Iberian tribes remain in the Castilian language. Vulgar (popular) Latin is the all-important source of its lexicon, phonology, morphology and syntax. In the course of time its vocabulary has been enriched by accretions from Arabic — brought in by Moorish conquest from 711 on — from other European languages, especially French and Italian, and from the Indian and other native languages of the colonial settlements.

Phonology. — With the invasion of the Germanic barbarians and the fall of Rome, in the early 5th century, political contact with Italy was severed, and the Vulgar Latin of Hispania began to undergo the changes in sound that produced ultimately Castilian in the high plateau of the centre of the peninsula.

In the following statement of facts we are concerned .only with popular developments : words of peculiarly learned use did not neces¬ sarily go through the popular phonological processes.

In the vowel system it is notable that, under the accent, Latin a (long and short), e, l, o, u, were represented in the Vulgar Latin enuncia¬ tion by close variations of the same sounds, i.e, qualitative distinctions, as between open and close utterance, became important for them as for all vowels. Latin i became Vulgar Latin close e also, and Latin u became close o. With their close pronunciations these vowels re¬ mained in Castilian unless affected by some adjoining sound (notable a palatal) : Latin matrem (the oblique case and not the nomina¬ tive is the basis .of the Spanish word), <(mother® ; patrem, <(father)) ; plenum, (<full® ; bibit, <(drinks® ; fllium, <(son® ; formosum, (<beau- tifuP ; latum, <(mud® ; Cast., madre, padre, lleno, bebe, hijo, hermoso, lodo.

Accented Latin e and d diphthongized to ie and ue, in both open and closed syllables : Latin, venit, <(comes® ; ferruni, ((iron® ; movet, ‘'moves® ; fortem, ˆstrong® ; Cast., viene, hierro, mueve, fuerte. This is one of the dis¬ tinctive features of Castilian as compared with the other leading Romance languages, French, Italian and Portuguese; for in these latter the diphthongization occurred not at all (as in Portuguese) or only in open syllables (as in French and Spanish) ; cf. Cast., fuerte, <(strong,® with Ptg. forte, French fort, Italian forte, and Spanish viento, <(wind® from Latin ventum with Ptg., vento, French vent, Italian vento. A following or preceding palatal might prevent the diphthongization of the e and 6 or work further changes in a diphthong already produced from them. The Latin diphthong ce was treated like Latin e, caelum, ((heaven,® Cast., cielo, au like Latin o, aurum, <(gold,® Cast., oro; the few cases of Latin oe present some difficulty. Latin foedum, <(ugly,® Cast., feo, Latin foenum, (<hay,® Cast., hieno.

In the initial position in the word the vowels and diphthongs of Latin leveled away distinctions of quantity and quality and be¬ came simple a, e, i, o, u, which, in some cases 'underwent modification through adjacent vo¬ calic or consonantal influences. In the final unaccented

position the vowels simplified still further to Castilian a, e, o, in truly popular treatment. In the unaccented penult of words stressed on the antepenult the vowel e (Latin i) usually disappeared; in the final unaccented

syllable it could also disappear after con¬ sonant sounds which the genius of the lan¬ guage permits to end a word.

The consonants of Latin have proved more persistent in the initial position in the word than elsewhere; but a characteristic of Cas¬ tilian is the change of / before a vowel (but not before the Castilian diphthong ue) to Old Spanish aspirate h (still written / in the older stages of the language). In modern Castilian the written h is silent, except for a possible slight aspiration before ue : cf . Latin filium, Old Spanish fijo, modern hijo, with fuerte. Initial consonant plus / has yielded palatal ll : Latin clamare, (<to call,® flamma, “flame,® plorare, <(to weep,® Castilian llamar, llama, llorar. Initial r has become a well-trilled sound, and this same sound is rendered by rr between vowels. Another characteristic of Cas¬ tilian is the conversion of both Latin b and Latin v (u in hiatus) to a single bi-labial spirant sound written either b or v: the sound of English v does not exist in Castilian. Latin c before e or i assibilated in Old Spanish to g or z, which now, whether written c or z, mean the interdental sound of English tli in (<thin.® In the intervocalic position a Latin single voiceless consonant is voiced : e.g., t be¬ came d, p became b, c became g (before any vowel but e or i) ; but intervocalic s is always voiceless in modern Spanish. Consonantal combinations between vowels were subject to a variety of changes not easily epitomized, but simplification was the usual process. The doubling of the same consonant is not a feature .of modern Spanish ; it is found only in the cases of cc and nn and both of the c’s and the ns must be uttered, as in faccion, (<fac- tion® and innoble, ((ignoble® ; rr denotes a rein¬ forced r sound, while ll denotes a palatized sound and is not a doubled / in value; h (n with a tilde) means a palatalized n (approxi¬ mately the ny of <(canyon® from Castilian canon). Of the consonants actually final in Latin the commonest were ˆ and t ; of these t was lost, Latin amat, <(loves,® Castilian ama, while s has remained and is very useful as a fiexional sign (it marks the plural of sub¬ stantives and the second person of verbs, Latin pi. partes, ((parts,® Castilian partes; Latin amas, ((thou lovest,® Castilian amas).

Accent. — The stress in the Castilian word may fall on the final syllable, the penult or the antepenult ; occasionally it may fall upon a syllable more than three places removed from the end of the word. All words not stressed on the final or the penult must have a written

accent. Words ending in a consonant except n or s normally stress the last syllable and need no written accent ; those so stressed and ter¬ minating in n or s must have the written accent. Words ending in a vowel or diphthong and stressing the penult need no written accent ; but all words stressing a final vowel or diph¬ thong require the written accent thereon.

Morphology. — For substantives a great simplification has occurred in the passage from Latin to Castilian, in that the six cases of the noun and adjective have been reduced to one in Castilian, and this usually corresponds to the Latin accusative singular and plural. Latin genitive, dative and ablative relations are ren¬ dered by combinations of prepositions with the

single Castilian form ; del hombre, <(of the man," Latin, hominis, etc. In the personal pro¬ nouns there are still certain case distinctions : yo, (<I,® me} "me,® a tnt, ((to me,® etc. There are no neuter nouns in Castilian; the Latin neuters become masculines for the most part, but a few become feminine.

The verb system also shows a reduction of the complex system of Latin inflections, but it still possesses many and varied conjugational forms. The Latin passive voice disappeared ; its place has been taken by periphrases with the passive participle or by a reflexive or other construction. The Latin future indicative tense did not survive ; it was replaced by a new form made by adding the present tense of Castilian haber, ((to have,® to the infinitive of the main verb : amar, (<to love,® plus he, <(I have,® amare, (<I shall love.® Suffixes derived from the imperfect indicative of haber are used simi¬ larly to form a past future (or conditional) on the infinitive of the main verb as a base. Cas¬ tilian perfect tenses are formed by combining tenses of haber, ((to have,® with the past par¬ ticiple of the main verb ; he amado, <(I have loved.® The Latin imperfect subjunctive was lost, but Castilian has two such tenses (ending in -se and -ra in the first singular), of which the one comes from the Latin pluperfect sub¬ junctive and the other from the Latin plu¬ perfect indicative. There is a future subjunc¬ tive, derived from the Latin future perfect indicative and perfect subjunctive; its use has become greatly limited in recent times. Con¬ ventionally we speak of three regular conju¬ gations in Castilian, denoted usually by their infinitive endings, -ar, -er, -ir ; in point of fact the endings of the -er and -ir conjugations are the same

for all except four of their many forms, so that the Latin four conjugations have virtually been cut down to two. A number of verbs are perfectly regular as to their endings but show certain variations in their root vow¬ els ; they form what are known as the radical¬ changing classes. There are no few irregular verbs.

Syntax. — • There are interesting phenomena that might be considered here, but the present purpose may be served by calling attention to one of the most decided peculiarities of the Spanish language, its use of the preposition a, (<to, at,® before a noun denoting a specific per¬ son, higher animal or personified thing and standing in the accusative relation to a verb : (<I see the man® is veo al hombre (literally, <(I see to the man®). The order of words in a Spanish clause is a very elastic matter. In general the English declarative order of sub¬ ject, verb, object, is but little adhered to; in a simple statement of fact the verb or the ob¬ ject may begin the clause, so that inversion is frequent in the language.

Bibliography. — Menendez, Pidal R., (Gra- matica histonca espanoP (4th rev. ed., Madrid 1918) ; Grober, (Grundriss der romanischen Philologies (article, <(Spanische Sprache,® by G. Baist) ; Tomas, T. Navarro, <Manual de pronunciacion espanola) (Madrid 1918) ; Ford, (01d Spanish Readings ' ; Hills and Ford, (Spanish Grammar' ; Hills and Ford, (First Spanish Course.*

Jeremiah D. M. Ford,

Smith Professor of French and Spanish Lan¬ guages , Harvard University.

SPANISH LAW. The system of juris¬ prudence and judicial practice as developed in Spain and later extended to the Spanish West Indies, Central America, Mexico, the Spanish¬ speaking countries of South America and the Philippines. It is one of the oldest systems of law, and as at present constituted is a mixture of Roman, Germanic and Arabic elements, with marked traces of the influence of canon law.

Roman law became dominant in Spain as early as 200 b.c. and retained its supremacy practically until the conquest of the Visigoths, after which the Germanic law coexisted with the Roman law. There were several codifica¬ tions of the law before the year 653. The Arab conquest of the 8th century was an important factor in modifying Spanish law. About 1265 Roman and canon law became prominent. Then succeeded several centuries of struggle for su¬ premacy between the native and the Roman law. The various codes existing at this time

caused great confusion in the positive law, and unsuc¬ cessful attempts were made to simplify it dur¬ ing the reign of Ferdinand and Isabella (1490- 1502). Later the Justinian and canon laws spread rapidly throughout many of the king¬ doms of the peninsula. In 1567 a general code was promulgated. A peculiarity of Span¬ ish legislation is that no code has ever been promulgated to repeal the old codes, and the result has been difficulty in interpreting the existent law.

At the adoption of the constitution of 1876, which is now in force, civil, commercial, crim¬ inal and military law have been incorporated into separate codes. Likewise a judiciary act and codes of civil and criminal procedure have been adopted. In 1910 a commission was ap¬ pointed to revise and recodify the procedural, penal and civil codes and the judiciary laws.

The Spanish civil code was promulgated by decree in 1889, and extended to the colonies later in the same year. It is still in force. This code, which is divided into four books, deals with corporations, the law of persons, marriage, guardianship, law of property, contracts, juris¬ diction, conflict of laws, etc. The subject 'of marriage was formerly left to the canon or ecclesiastical law, but under book one of the code of 1889 civil marriages are permissible, with the important qualification that all persons who profess Catholicism must celebrate the canonical form. The third book of this code provides that no private property shall be taken for public use without due compensation — an exact counterpart of the principle made familiar in the United States by constitutional provi¬ sions. A noticeable feature of the Spanish law in regard to the descent of property and suc¬ cession makes it illegal for a parent to disin¬ herit legitimate children. Two-thirds of the estate is thus reserved. Some criticism has been aimed at the code of 1889, among others that it is incomplete. As instances it is said to contain nothing regarding certain prior laws such as those relating to mines, hunting, fish¬ eries and civil registry. In addition it leaves questionable the relation of non-Castilian legis¬ lations and the customary law to the civil code. With the exception of the subject of marriage this code has only subsidiary force in the prov¬ inces of Aragon, Catalonia, Navarre and the Balearic Isles. The Roman law, civil and canon, is still subsidiary law in Catalonia.

The commercial code, owing to imperative need, antedated the civil code. Spain is said to have produced the first code of mercantile law

in the (<Ordinances of Bilboa® (1737), which spread to America and remained in effect in Mexico until 1884. Spain codified commercial law in 1830. The great commercial develop¬ ment of the country late in the 19th century emphasized the need of reform, and in 1885 a new code went into effect, which later in the same year was extended to Cuba and Porto Rico. Much supplementary legislation has been enacted in late years. The commercial code treats of commerce and registry, commer¬ cial contracts, banking, railroads, insurance, mercantile guaranties, commercial paper, mari¬ time commerce, shipping, insolvency, bank¬ ruptcy, limitation of actions in commercial affairs, etc.

Civil procedure is governed by the act or code of 1881, as amended, and the judiciary act of 1870, as amended in 1882. The code of 1881 in amended form was extended to Porto Rico in 1885 and to the Philippines in 1888. Procedure in commercial cases is governed by the code of civil procedure since commercial courts were abolished in 1868. The code of civil procedure, which is arranged in three books, contains some provisions in conflict with the civil code, which was enacted subsequently. Spanish civil procedure is divided into two classes according to the nature of the ac¬ tion, contentious (ccntenciosa) and voluntary or non-contentious (voluntaria) . Voluntary jurisdiction is used when there is no contention between the parties, but judicial proceedings are necessary to fix legal rights, as in cases of guardianship, administration, adoption and the like. This resembles the non-contentious juris¬ diction of France, Germany and other countries of Europe. A rather remarkable feature of the code is that it provides for arbitration of civil actions out of court. Special provisions are also made in this code for procedure in voluntary jurisdiction in commercial cases.

Notarial law is of more importance than in Great Britain or the United States. Under Spanish law nearly all deeds, contracts and important agreements must be certified by a notary.

Military and naval courts of Spain have ampler powers than in the United States. The military law is governed by the code of military justice promulgated in 1890. Naval jurisdic¬ tion is considered as belonging to the military establishment, but is largely governed by the penal code of admiralty of 1888. There are no separate admiralty courts in Spain for civil cases, the ordinary tribunals having jurisdiction of such suits.

The ancient Spanish codes treated the sub¬ ject of criminal law quite completely. For¬ merly the laws were unusually harsh, but during the

19th century, in keeping with the spirit of the times, many reforms were introduced, some as early as 1812. The present code, authorized by the act of June 1870, made only a few ma¬ terial changes from the code of 1848. Modifi¬ cations of the present code were made in 1876, 1904 and 1908. An amendment of this code was extended to Cuba and Porto Rico in 1879 and to the Philippines in 1886. The Spanish criminal law classifies offenses according to their nature into felonies, crimes and misde¬

meanors. Punishments are classified as afflict¬ ive, correctional, light and accessory. The first class commences with death and includes nu¬ merous forms of imprisonment down to dis¬ qualifications. The second class includes im¬ prisonment and arrest, public censure and suspension from the privilege of holding cer¬ tain offices or pursuing certain callings. The lighter forms of punishment include arrest and private censure. In any of these three classes offenders may also be fined or put under recog¬ nizance. The accessory punishments include payment of costs, civil interdiction and degra¬ dation. Until modern times the system of criminal procedure under the codes was the secret and written procedure, the hampered de¬ fense and torture. This system was reformed by the code or act of 1882, which substituted the accusatory system. This code to date has had few amendments. It was extended after amendment to the Philippines, Cuba and Porto Rico, where it became effective in 1889. Among the most important changes in procedure in Spain in recent years was the re-establishment of the jury in criminal trials in cases of felo¬ nies and some misdemeanors (1888), but it has not been extended to Cuba, Porto Rico or the Philippines; nor is it employed in many of the Mexican states or in the remaining Spanish- American countries. Every trial involving the more serious offenses is commenced by a summario, which resembles the secret investi¬ gation of a grand jury, after which the accused is kept in solitary confinement while an ex parte investigation is made by a judge of the first instance and the state's attorney (fiscal). Pro¬ ceedings based on the constitutional provision prohibiting the detention of accused persons except for just cause somewhat resemble habeas corpus proceedings of the United States and Great Britain.

The judiciary act, comprising 932 articles, supplemented by special statutes, makes pro¬ vision for the various courts. There are three grades of civil courts: Courts of the first in¬ stance, courts of appeal and the Supreme Court, which sits at Madrid. Jury trial is not em¬ ployed in civil cases.

Spanish law differs radically from that of Great Britain and the United States in having no judicial legislation (so-called ((judge-made law®),

the decisions of none of its courts hav¬ ing binding power as precedents.

The official legislation of modern Spain com¬ menced, it may be said, with the convening of the Cortes in 1810, and two years later the first constitution was promulgated. Previous legis¬ lation consisted of edicts of the kings with codes of law authorized by royal decree. The Supreme Court was authorized by the constitu¬ tion of 1812, but it was not finally organized until 1834. An important reform in the crim¬ inal law was made by the act of 1908, relating to conditional sentence, by which, under certain circumstances, sentences may be suspended. Capital punishment still exists, although many efforts have been made to abolish it. Another feature of modern legislation provides in case of wrongful convictions, under certain cir¬ cumstances, that the judges are held civilly liable. In late years Spain has enacted many laws providing for social and economic reform. Among them may be mentioned a workmen's compensation act (1900) ; industrial courts to

adjust differences between employers and em¬ ployees (1908) ; a national institute for old-age pensions (1908) ; regulation of employment of women and children (1900-08); recognizing the right of employers to organize and of em¬ ployees to organize and strike, and fixing pen¬ alties for inciting employees to strike. Other legislation of a similar nature is still (1918) pending.

Edward F. Donovan.

SPANISH LITERATURE. For the sake of convenience the history of Spanish literature as written in the motherland may be regarded as constituting four chronological divisions, namely, the Old Spanish period, extending from the 12th century down to the 16th; the Golden Age, which runs through the 16th and 17th centuries; the period of the 18th century; and the more recent period, which reaches from the beginning of the 19th century to the present moment.

Old Spanish Period. — Heroic tradition in¬ forms the most noble composition that the Middle Ages have bequeathed to Spain, the 'Poema del Cid> (or (Cantar de Mio Cid>). This seems to have taken form by the middle of the 12th century or not long after that date, and as is unfortunately the case with still other notable works of the Old

Spanish period, it is preserved to us in but a single manuscript, which is in a badly garbled condition. Belonging to the 14th century and being, therefore, about a century and a half later than the original composition, this manuscript must not be deemed a faithful transcript of the poet's labors ; in all probability it reflects many of the linguistic and other features of the scribe's own time. As it stands, the document has some 3,700 odd lines. These are usually bound together into stanzas or laisses (to use a term employed to designate a similar ar¬ rangement in Old French epic poetry) of irregular length, with vocalic rhyme or as¬ sonance as the binding principle. In the manu¬ script the lines vary greatly as to the number of syllables that they contain ; some lines are very long, others are very short. As a result there are scholars who consider the poem as having been ametrical in the inception. It is possible, however, to argue that the original document was perfectly metrical and to say that its present metrical irregularity is due to imperfect redaction and to scribal bungling. On the basis of facts derived from internal criti¬ cism and in consonance with a feeling that the true Old Spanish heroic measure was the same that is still seen in the romances or ballads (the oldest of which are heroic in nature), it is not unwarrantable to declare that the author of the (Poema del Cid} used long verses of 14 to 16 syllables each, and that the individual verses broke regularly into half-lines with a verse stress on the seventh syllable in each half-line. Mingling fact and fiction, the <Poema) is a fine epic dealing with the career of a great Castilian hero, who lived in the 11th century, Rodrigo or Ruy Diaz de Bivar, who received the title <(Cid,® <(Lord,® from the Moors. .We see him passing into exile at the behest of his monarch, Alphonso VI of Castile and Leon, engaging in battle with both Moor and Christian, and assuming control of Va¬ lencia, after he has taken it from the Moor.

The element of fiction seems to be the prevail¬ ing one in another document, the (Cronica rimada del CidP apparently of the 14th cen¬ tury. This (termed also the (Rodngo)) is deemed by some a chronicle in verse, while others do not hesitate to call it an epic or at least an aggregation of epic ballads. Its nar¬ rative relates especially to the early life of the hero ; its form exhibits a disturbance of verse conditions no less serious than in the case of the (Poema del CidP A still older hero, the valorous Castilian Count Fernan Gonzalez of the 10th century, is celebrated in a school epic (back of which there was probably a more popular composition) of the 13th century. It is in monorhymed quatrains of alexandrines, — a form of verse which now gained favor for narrative purposes and maintained itself in vogue for

some time — and it is not preserved in its entirety.

Such are the documents regularly cited as examples of Old Spanish epic composition ; no others appear to have survived. But Old Spanish heroic tradition was certainly more ex¬ tensive and treated of still other warriors and their deeds. Whether this was done in poems of some length or only in brief epico-lyric com¬ positions or ballads is a matter under discus¬ sion, but at all events we know that during the Middle Ages the juglares or minstrels of Spain entertained both nobles and commoners with their versified accounts of the exploits of various heroes besides those already men¬ tioned. These versified accounts have passed from view, but the substance of them — with occasional retention of verses of the originals — are found in prosified form in the (Cronica Generalp which was begun at the incentive of King Alphonsus X of Castile in the 13th century, so that this great chronicle is aptly styled a treasure house of Old Spanish heroic tradition. On the basis, then, of material preserved in the (Cronica General* we may assume that older Spain possessed heroic song about the Seven Infantes de Lara; about an Asturian hero, one Bernardo del Carpio ; about certain descendants of Count Fernan Gonzalez ; about Roderick the Goth, whose criminal love is said to have brought on the invasion of Spain by the Moors ; and about Charlemagne, who is alleged to have been a youthful exile in Saracen Spain. It may be stated here that from the 15th century on all the heroic figures enumerated play a part in the rich balladry of Spain that is actually preserved.

The (Oldest known drama in Spanish prob¬ ably came into existence at about the same time as the (Poema del CidP It is a brief mystery play in rather elaborate verse form on the visit of the Magi to Bethlehem, and it seems to derive from a Latin original written in France. But from the 12th century down to the middle of the 15th no other Spanish play has survived ; there is, however, unmis¬ takable evidence that pieces both religious and profane in nature were performed during the interval.

The first Spanish poet known to us by name, Gonzalo de Berceo, made his appearance in the first half of the 13th century. Berceo showed his genuine religious devotion by composing in unpretentious verse (quatrains of monorhymed alexandrines, called cauderna via) lengthy lives

of saints (Saint Dominick of Silos, Saint PEmilianus, etc.), charming miracles of the Virgin ((Milagros de Nuestra Sehora), and kindred works. There, is some reason to ascribe to him a voluminous account in cuaderna via of the deeds of Alexander the Great ((Libro de Alexandre*), which is otherwise anonymous. Anonymous as yet is a poem ((Libro de ApolonicP) on the adventurous career of Apollonius of Tyre. Verse documents of less importance and also of the 13th century in¬ clude a narrative dealing with the Legend of the Good Thief (but improperly called in the manuscripts the (Book of the Three Kings of the East*), a Life of Saint Mary of Egypt ((Vida de Santa Maria Egipciaqua*), a Debate between Body and Soul, and a Debate between Water and Wine, with which is combined the oldest love song in the language. An adher¬ ence to Gallic sources and models is certain for some if not all of these documents.

It was chiefly through the efforts of Alphon- sus X (reigned 1252-84) that Spanish prose composition received its first development. This learned sovereign made his court a centre for scientific and literary activity, and with the co¬ operation of the scholars whom he gathered about him he produced important astronomical, legal and historical compilations. It is a note¬ worthy fact that the king himself gave particu¬ lar attention to the style of the documents thus compiled. Chief among them are the astro¬ nomical tables known since as the Alphonsine Tables; a comprehensive legal digest accom¬ panied by a philosophical and interpretative commentary, the famous (Siete Partidas) ; and the (Cronica General *(or (Cronica de Espana*) cited above. Following the fashion of the day he wrote his lyric verse in the language of Galicia, a form of Portuguese. After the close of the reign of Alphonsus and before the end of the century appeared the (Gran Conquista de Ultramar, J which derives in part from William of Tyre's Latin history of Godfrey of Bouillon's crusade and in part from French and Pr.ovenqal material of a romantic and novel- esque nature. Very soon original prose fiction in Spanish became an actuality with the work entitled the (Caballero Cifar, *and in the first half of the 14th century the short story was consciously and carefully elaborated in the framework of tales due to a prince of the royal blood, Juan Manuel (1282-134 8), a nephew of Alphonsus X. Inspired by the labors of his uncle, whom he admired greatly, the warrior and statesman Juan Manuel found time not only for the composition of the 50 tales in his (Conde Lucanor,* but also for that of much didactic material. Not the least interesting among prose writings of the 13th and 14th cen¬ turies are certain Spanish versions of senten¬ tious material taken from Arabic; from them seems to date the later widespread use of the proverb by the Spaniard.

The first genuine poet — the verse hitherto produced is not of a transcendent quality — comes to view in the person of the wayward cleric, Juan Ruiz, archpriest of Hita, in the first half of the 14th century. Even in the prison to which he was properly condemned for his misdeeds he continued to write lyrics of a spontaneous and self-revelatory sort. He collected them into what he termed capriciously

his (Book of Good Love) ((Libro de Buen Arrior*). While he narrates some of his own scabrous Love affairs, he also displays his knowl¬ edge of Ovidian material and some acquaintance with French works, and he imitates a form of the popular lyric in his mountain-girl songs. The leading work in verse in the latter half of the 14th century is the (Rimado de Palacio) of Pedro Lopez de Ayala, a versatile man, who became Grand Chancellor of Castile. He served under four kings, and reveals his knowledge of affairs in his prose chronicle of their reigns, a work which is one of links in the series of chronicles stretching from (Cronica General * of Alphonsus X down to the appearance of fully elaborated historical works in the age of the Renaissance. The (Rimado de Palacio* is largely satirical in its constitution, inveighing against the vices and defects in all forms of society of his time.

During the long reign of Juan II of Castile, which nearly coincides with the first half of the 15th century, the court was thronged with versi¬ fiers whose methods were principally an imita¬ tion of those .of the Provengal troubadours. These had been welcome visitors in Spain for a couple of centuries before and their themes had been acceptable to high society, especially their theorizing on love. But the re-echoes of their speculation that we find in the ditties of the Spanish poetasters of the 1 5th century are in the main stale and unprofitable, as may be seen in a survey of the examples contained in the collection ((Cancionero de Baena*) made by the court physician and versifier, Juan Baena. In Aragon the Provenqalizing methods also had vogue and they passed over to Italy with the establishment of an Aragonese court at Naples; some of the Spanish compositions written in Italy are assembled in the so-called (Cancioner,o de StunigaP At the Castilian court an alle¬ gorizing tendency, harking back above all to Dante and Boccaccio, was very marked, and the first notes of the coming Renaissance were struck when versions were made of some of the works of classic Latin. Enrique de Villena, an eastern Spaniard, related to the royal houses of hoth Aragon and Castile, was in no few respects an early Spanish humanist. The Castilian Inigo Lopez de Mendoza, Marques de Santillana, was one of the more truly inspired writers of the time ; he shows some appreciation of the popular poetry of his own land, along with an impress of Italian influences; and he used the allegorical forms with somewhat more felicity than most of his contemporaries. The most elaborate employment of allegorical ma¬

chinery was made by Juan de Mena, court his¬ toriographer of Juan II, as may be perceived in his poeim (E1 Laberinto, which also evi¬ dences the Spaniard's interest in the humanistic movement now spreading out from Italy.

While with austerity the inevitableness of death is preached in the stanzas of the Castilian (Dance of Death > ((Danza de la Muerte*), a different view of the perishability of all things mortal is taken by the true poet Jorge Man- rique (1440-78) in his sweet and mournful (CoplasP in which he declares that this mortal existence is but the threshold leading to the real life beyond the grave; gentle resignation is his key-note. From the pen of Gomez Man- rique, the uncle of Jorge, now comes the first

plays in Spanish known to have been com¬ mitted to writing since the appearance of the 12th century mystery play, and they are rather elementary in their make-up. Prose is used for satirical purposes with no little harsh effect by Martinez de Toledo, archpriest of Talavera, in his violent attack on woman, the ˆorbachoP For historical purposes it is employed worthily by Fernan Perez de Guzman, whose character portraits in his (Generaciones y Semblanzas) merit a place of distinction.

The Spanish ballad is one of the most prized manifestations of the national literary spirit. Naturally the earliest of those preserved in print could not precede the setting-up of the press, which appears to have occurred about 1474; only very few have been handed down from antiquity in manuscript form and none of these can antedate the 15th century. The oldest extant among the m,ore than 2,000 ballads are heroic in subject, acclaiming the national heroes whom we have seen figuring in the Old Spanish epics and in accounts embalmed in the (Cronica General. > According to an ingenious theory advocated by some leading Spanish scholars the most ancient among the ballads were simply portions of still older epics about the heroes, the parts of these latter that the people demanded most insistently from the popular entertainers, the juglares, who chanted and recited them ; and the later ballads were modeled on these brief extracts. It has not been demonstrated, however, that ballads, that is, brief epico-lyric narratives, did not exist even as early as the very time of the heroic personages whom those known to us com¬ memorate ; such may have been the fact and they may have been kept alive by oral t'radition

until finally the first broadsheets were turned off from the press in the 15th century. At all events the Spanish ballad lives on with un¬ diminished vitality; from the 16th century trained writers have imitated their form, and wherever people of the Spanish stock are found to-day new ballads are being produced by them. Certainly one of the most important works issued from the press before the end of the 15th century was the first discoverable edi¬ tion of the famous chivalric romance, (Amadis de Gaula,} the parent of a numerous progeny of Amadises, Palmerines and other stories of derring-do that were to keep on appearing down to the beginning of the 17th century, when the (Don Quijote) was to give them their quietus. In some form or other the (Amadis de Gaula) was already in circulation back in the 14th century, for there are refer¬ ences to it in other works of that period. Another noted novel, one actuated by a spirit which we now call naturalistic, was printed at least as early as the opening of the 16th cen¬ tury. This was the <Celestina) .or (Tragicome- dia de Calisto y Melibea,* which is strictly speaking an example of prose fiction in dramatic form.

Golden Age. — Under Charles V Spain attained to the proportions of a world empire, and a glorious development in literature as well as the other arts attended her great growth in political importance. During the preceding reign of Ferdinand and Isabella there were already clear signs of the inauguration of that period of literary splendor, which the Spaniards

term their siglo de oro, for a large measure of the humanistic culture of Italy had been trans¬ mitted to the Iberian Peninsula in the time of the Catholic sovereigns. In poetry a direct influence of Italian literature manifested itself ere the 16th century had proceeded far in its course, f.or through the efforts particularly of Juan Boscan (d. 1542) and Garcilaso de la Vega (1503-36) the various forms utilized by the Italians were imported into Spanish, and the old prosody was enriched by the addition of the 11 syllabled line, the octave, the sonnet, the ode, etc. The labors of these two poets in Spain paralleled in permanent effect those of the Pleiade in France and of Wyat and Surrey in England. Other writers such as Diego Hurtado de Mendoza, Acuna and Cetina helped to acclimate the new forms and pre¬ vailed over more conservative spirits like Castillejo who resisted the innovations.

The flourish of the drama was perhaps the most distinctive feature of the century and a half or more during which the Golden Age of Spanish letters was in full vigor. The patriarch of the Spanish theatre was Juan del Encina, who had already begun to write before the end

of the 15th century and who, like numerous Spanish authors after him, spent some time in Italy. Service in the Spanish campaigns took these men to the land of the Renaissance, where they imbibed the spirit prevailing there. A nomadic soul, Torres Naharro, published at the Aragonese court of Naples, in 1517, a col¬ lection of plays in which prominence is given already to the punctilio (pundonor) , a motive which was to be stressed to an extraordinary degree in the further development of the Spanish drama. Lope de Rueda (d. c. 1565) imitated Italian dramatists very directly in his longer pieces, but attained his real success in the composition of brief oomic interludes (pasos) that brought upon the scene popular characters taken from the life of the time. Rueda was an actor and stage-manager as well as a writer ; since his time the vogue of the short one-act play of humorous and occasionally farcical tendencies has never died out in Spain; it is the genera chico of to-day. With the pieces of Juan de la Cueva (d. c. 1609) the historical drama was introduced and to a cer¬ tain degree he anticipated also the comedia de capa y espada which Lope de Vega was to cultivate with wonderful skill. Cervantes (1547— 1616) essayed with no meed of success the role of the playwright, although two of his longer plays, the (Numancia) and the (Trato de Argel,* are not negligible. But beyond all odds the dominating personality among all Spanish dramatists of the first half of the Golden Age was Lope de Vega (1562-1635), who, inheriting technical details of dramatic composition from his immediate predecessors, applied them with the unerring skill of a dramatic genius. After Lope and until the end of the Golden Age the pre-eminent playwright was Calderon (1600-81). Lope tried his hand at practically every possible f.orm of the drama and reached the height of his fame with his elaboration of the comedy of character and manners (comedia de capa y espada) ; his fertility was prodigious, as he seems to have written no fewer than 1,500 pieces. Calderon was not so markedly successful with the play of

manners, but he charmed his contemporaries as he still pleases posterity with the lyricism that pervades his pieces. He is celebrated most of all for his perfecting of the allegorical and religious drama dealing especially with the virtues of the Eucharist (auto sacramental) . Lope, it should not be forgotten, exercised his talents in many directions and left untried hardly any of the genres ; he will always be classed among the best of Spanish lyric poets. Other dramatists of the siglo de oro of pro¬ nounced merit were Gabriel Tellez (pseudonym, Tirso de Molina; 1571-1648), Guillen de Castro (1569-1631), Ruiz de

Alarcon (d. 1639), Rojas Zorrilla (d. 1660) and Moreto (1618-69).

The dramas of the Golden Age are regularly in verse. In prose the most distinguished achievements took form in the novel and the short story, and a consideration of these at once suggests the name of Cervantes (1547-1616). His (Don Quijote) (First Part, 1605; Second Part, 1615), the most noted work of Spanish belles- lettres and the greatest novel in the history of the world's literature, was begun as a satire upon the methods of the novel of chivalry but remains important as one of the most eminent expositions of the never-ceasing struggle be¬ tween realistic and idealistic impulses in human nature. His (Exemplary Tales) ((Novelas Ejemplares5) set up a model for the shorter form of prose fiction. Before the middle of the 16th century there had been printed the (Lazarillo de Tormes,5 the earliest of the picaroon stories or novels of roguery, which, if not the work of Hurtado de Mendoza, must remain anonymous. Later novels of the type, recounting the wanderings and exploits of a roguish hero, are the (Guzman de Alfarache> of Mato Aleman (d. 1609), the (Picara Jus- tina) (1605), of tJbeda, the of Vicente Espinel (1618). After Cervantes the short story wTas cultivated with some understanding by' Salas Barbadillo, Castillo Solorzano and Maria de Zayas. The pastoral romance was attempted by many writers, even Cervantes and Lope de Vega being of the number, but the highest measure of suc¬ cess in the genre was achieved by Jorge de Montemayor in his (Diana) (c. 1558), and by Gil Polo in his sequel thereto. A solitary but not infelicitous example of the historical novel in the age is the (Guerras Civiles de Granada) of Perez de Hita. True history writing takes the place of the earlier chronicles at this time, above all in the (Historia de Espana) (written originally in Latin) of the Jesuit Mariana (d. 1623), in the accounts of affairs in eastern Spain by Zurita, and in the records of happen¬ ings in the New World by Antonio de Solis (d. 1688), and many others. History was in¬ tentionally mingled with fiction by Antonio de Guevara (d. 1545) in his (Marco Aurelio) and his (Decada de los CesaresC and to him is due also the (Epistolas Familiares,* a work which in translation eventually reached England and is said to have helped to promote an over- refined style of composition there. At least a mention should be made of the prose labors of the religious of the period who wrote many documents of a mystical, devotional and purely theological sort. Prominent among the mystics were Saint Theresa (1515-82), Saint John of

the Cross (d. 1591), Luis de Granada (d. 1588) and Luis de Leon (1527-91). The last named is one of the most attractive of all Spanish lyric poets, and shows his mystical bent in his verse no less than in his prose. Other lyric poets of high rank are Herrera (1534-97) and Rioja

(d. 1659). The epic was essayed after the fashion of the Italians Ariosto and Tasso by many authors, including Lope de Vega and Barahona de Soto, but the only truly meritorious per¬ formance of the kind is the (Araucana) of Alonso de Ercilla (1533-94), dealing with cam¬ paigns against the Indians in South America in which he played a part.

Even at the moment of greatest efflorescence the seeds of ultimate decay were sown in Spanish literature, and chiefly by the poet Luis de Gongora (1561-1627), who deliberately en¬ gaged in the use .of stylistic excesses of many sorts, such as intentional obscurity of expres¬ sion, and the like. He was unfortunately taken as a desirable model by even the most famous writers and hence the spread of the manner called Gongorism (also culteranism or cultism), which, as the 1 7th century wore on, it was deemed absolutely necessary for writers to em¬ ploy in both prose and verse. While Gongorism played with the external form of literature, gradually debasing it, there were other manner¬ ists who purposely juggled with the philosophic idea of concept, and thus added a sinister influ¬ ence. The methods of the Conceptists may be judged by the works, which are nevertheless of substantial merit in certain regards, of the Jes¬ uit Gracian (1601-58).

The 18th Century. — After the death of Calderon (1681) it may be said that a period of decay set in rapidly in the field of letters ; it became well-nigh absolute in the early years of the 18th century. The writers were still many but their aesthetic sense and that of their readers were of a deplorably low order. The advent of the Bourbons with Phillip V, who came to the throne in 1700, led to a large in¬ flux of Frenchmen to the court and a con¬ siderable Frenchifying of fashions. From France there came also the neo-classic methods of her writers, which the critic Ignacio de Luzan (1702-54) recommended to his Spanish fellow-countrymen as providing a panacea for the literary ills of Spain. In his (Poetica) (1737) Luzan paid particular attention to the reform of the Spanish theatre which had fallen into a chaotic condition and he urged the adoption by Spanish playwrights of the three unities and the other leading principles of neo¬ classic restraint which had been in force in France since the 17th century. The ideas of Luzan met with acceptance ; there was some translation of French dramatic pieces and some Spaniards of talent wrote original plays cast in the French classic mold. Among these were N. F. de Moratin (Moratin the Elder, 1737-80), the statesman Jovellanos (d. 1811), and

Moratin, the son (Leandro Fernandez de Moratin, 1760-1828). The greatest of the trio was the last named, who acquired favor with the many by means of his pieces reflecting his veneration for the French

dramatist Moliere, and especially by his two prose plays, (E1 Cafe) and (E1 Si de las Ninas. > A school of poets who gathered about Melendez Valdes, a pro¬ fessor at the University of Salamanca, sought

to subordinate lyric composition to the same principles of neo-classic restraint and, though they succeeded in attaining to some plasticity of form, they did so to the detriment of emo¬ tional expression. In the domain of the versi¬ fied fable a high degree of excellence was reached by Iriarte (1759-91) and Samaniego (1745-81), who were familiar with the work of La Fontaine and of other foreign fabulists as well. With a satirical novel, the (Fray Gerundio) (1758), the Jesuit Isla gained much eclat and also contrived to bring about a re¬ form of the sensational methods of preachers of his day. Isla won notice, furthermore, by his Spanish translation of the (Gil Bias' of the French novelist Lesage, which, in ac¬ cordance with a false assertion of Vol¬ taire, he regarded as a plagiarism of a lost Spanish picaroon romance. The scientific dis¬ coveries of the outside world were com¬ municated to his countrymen by the Benedic¬ tine Feijoo (1726-1829) through the medium of the essays contained in his (Teatro critico' and his (Cartas eruditas y curiosas.' The cultured soldier Jose de Cadalso (1741-82) repeated in his (Cartas Marruecas) the satirical methods utilized by Montesquieu, in his (Let4res per- sanes,' and derived inspiration for his (Noches lugubres' from Young’s (Night Thoughts. ' Ramon de la Cruz (1731-94) showed the uni¬ versal predilection f.or things Gallic in his adaptations of French plays, but he took a unique stand for the age when he produced his sainetes of an entirely native flavor, for they are one-act pieces reproducing the methods of the old paso. Sarmineto, Hervas and Arteaga are notable among the historians, scholars and critics of the period.

The More Recent Period. — Only to a slight degree did the rationalistic spirit of the French 18th century show itself in the workings of the minds of the French writers who have been mentioned thus far as subordinating themselves to the precepts of neo-classicism. But in the leading author of the opening of the 19th cen¬ tury rationalism dominates along with fiery lib¬ eralism. He is Quintana (1772-1857). His en¬ during fame, however, rests more upon the heroic odes in which he, a patriotic Spaniard, assailed the Napoleonic invaders of his land during the War of Independence. With him was associated the priest Gallego (1777-1853), who wrote patriotic odes and elegies of highly plastic form. Though they fought the French¬

man as the enemy of their country, Quintana and Gallego did not disclaim the methods of neo-classicism. These methods still found ac¬ ceptance with the young men who constituted the coterie of writers known as the School of Seville, but in the poetry of the guiding spirits among them, such men as Arjona, Lista, Blanco and Reinoso, there is also evident a respect for the older and purely Spanish literary tradition.

The Romantic movement which had swept Europe outside reached Spain somewhat be¬ lated in the fourth decade of the century. Liberal writers who had fled the land during the despotic rule of Ferdinand VII returned at his death in 1833 and helped efficaciously in spreading the evangel of Romanticism which had come to them in England and France. As understood by them Romanticism was the very

antithesis of Classicism, in that it threw off all restraint and believed in giving unchecked ex¬ pression to the feelings .of the inner man, and, moreover, it sought inspiration in the Christian Middle Ages and not in pagan classic antiquity so favored by the classicists. Martinez de la Rosa (1787-1862), who is in many respects still a votary of Classicism, manifested clear tend¬ encies toward Romanticism in his play (La Conjuracion de Venecia> (1834). A decided victory for the new doctrines was won in 1835 by the performance at Madrid of the play (Don Alvaro' by the Duque de Rivas (1791-1865), who likewise introduced the Romantic spirit into the lyric with his (Faro de Malta,' and into narrative poetry with his (Moro Exposito.' The fervor of Romantic enthusiasm is patent in one of the most transcendentally lyrical of all Spanish poets, Jose de Espronceda (1809- 42), who rose up rebellious to all social and literary convention and proved to be an apt, though not a servile, disciple of Byron, in his longer compositions, the (Estudiante de Salamanca' and the (Diablo Mundo.' The Romantic’s love for mediaeval traditions has full expression in the legends in verse of Jose Zor- rilla (1817-93), who has, besides, achieved widespread popularity with his drama (Don Juan Tenorio.' The Romantic ferment appears but slightly in the pieces of the prolific play¬ wright, Breton de los Herreros (1796-1873), who delighted rather in rendering pictures of living manners. The poetess and dramatist, Gertrudis de Avellaneda (1814-73) alternated Romantic and Classic moods. By the middle of the 19th century the realistic attitude prevailed over the Romantic and has done so ever since both on the boards and in prose fiction. The dramatists Lopez de Ayala (1829-79) and Ta¬ mayo y Bans (1829-98) pictured vividly the cor¬ ruption of manners induced by the exaggerated materialism and positivism of society and the business world. While the historical drama has a brilliant representative in the (Haz de Lena' of Nunez de

Arce (1834-1903), the theatre of recent times has not been marked by the ap¬ pearance of works of great and lasting merit. At the moment, the genero chico (one-act plays frequently farcical of plot) holds sway; still a really artistic endeavor is revealed* in the more ambitious plays of Benavente and the Quintero brothers. Much praise can hardly be accorded to the dramatic attempts of the es¬ sentially novelistic genius, Perez Galdos.

The splendid development given to the novel is the boast of the Spaniard of to-day. Out of essays on local manners as written by Larra, Minano, Mesonero Romanos and Estebanez has grown the regional novel which portrays the life of southern Spain in the works of Fernan Caballero (Cecilia Bohl de Faber, 1796-1877), that of the north and of the capital in the stories of Pereda (1834-95), that of eastern Spain in the novels, often tracts, of Blasco Ibanez, that of her Galicia in the fiction of the Countess Pardo Bazan (b. 1851), that of various places in the narratives of Palacio Valdes, and that of the whole land in the many psychological novels of Perez Galdos. The last named has also cultivated the historical novel with extraordinary skill through four series of stories, each containing 10 novels, which cover the course of national events from

• • t

the reign of Carlos IV down through the mid¬ point of the 19th century. Somewhat of the naturalism of Zola and the de Goncourt broth¬ ers is visible in the productions of one or an¬ other of these authors, but it is not usually carried to morbid extremes. Juan Valera (1824-95) can hardly be associated with the realistic novelists, and yet he is not an idealist; his geniality and sprightly fancy have won him many admirers. The number of the other writers of prose fiction that might be men¬ tioned is simply legion. Perforce mention of them is omitted here, as also of the many prose writers who have gained well-merited praise for their historical and critical labors. Neverthe¬ less, record must be made of the highly cul¬ tured and acute literary critic, the late Menen- dez y Pelayo, and of the brilliant philologist, Menendez Pidal. Notable among the lyricists since the middle of the 19th century are Becquer (1837-70), whose beautiful poems are often pure music, and the cynically but not un¬ pleasantly pessimistic Campoamor. Lyric verse and novels are constantly appearing in un¬ diminished profusion. The events of the World War have provided

scope for the imagination of Blasco Ibanez in his (Cuatro Jinetes del Apocalipsis> and his (Mare Nostrum. > See Amadis de Gaula; Celestina, The; Don Quixote; Poem of the Cid.

Bibliography. — Fitzmaurice-Kelly, (History of Spanish Literature) (best consulted in the second Spanish edition : it has a copious bibliography) ; Ticknor, ˆHistory of Spanish Literature) (antiquated in part, but useful for its analyses of masterpieces ; it does not treat of the greater part of the 19th century) ; Menendez y Pelayo, (Antologia de Poetas Liricos Castellanos) (this treats of the history of Spanish poetry from the earliest times down to the Golden Age in the introductions to its various volumes) ; Cueto, (La Literatura Espanola del Siglo XVIII) ; Blanco Garcia, (La Literatura Espanola en el Siglo XIX } ; Ford, (Main Currents of Spanish Literature.-*

Jeremiah D. M. Ford,

Smith Professor French and Spanish Lan¬ guages, Harvard University.

SPANISH MACKEREL, a mackerel

(Scomtieromorus maculatus), with the body more compressed than that of the common mackerel and the head short and conical. It reaches a length of about 30 inches and is a handsome fish marked on the sides with round golden bronze spots which distinguish it at once from any other fish occurring in our waters. This mackerel is properly a tropical species, but during the summer migrates north¬ ward along the Atlantic Coast, occasionally reaching Cape Cod. It is one of the most graceful and active of fishes, and swims at the surface in schools in pursuit of menhaden, silversides and other smaller fishes, which con¬ stitute its chief diet. The species is very pro¬ lific, each female producing from 300,000 to 1,000,000 of the small buoyant eggs which de¬ velop rapidly and may hatch within a single day. In Chesapeake Bay, which is an import¬ ant spawning ground, the breeding season is June. A favorite game-fish in the south, the Spanish mackerel is commercially of consider¬ able importance, being excellent for table use. It was very little known before the introduc¬

tion of the pound-net into our fisheries. Many mackerel are taken in these nets about Sandy Hook, but the most important fisheries are in Chesapeake Bay, where gill-nets are also em¬ ployed largely in their capture. The sierra (S. regalis) and the silver cero or king-fish (S. cavalla) are related species found in the West Indies and along the coast of the South Atlantic States. Several fish found in southern waters are known as Spanish mackerel, the species to which the name

is applied varying with the locality.

SPANISH MAIN, a name formerly given to the coasts of the Spanish colonies bordering on the Caribbean Sea, and often transferred to the sea itself. In the latter sense it occurs fre¬ quently in connection with the buccaneers. See Buccaneers.

SPANISH MOSS, an epiphytic, pendulous plant (Tillandsia usneoides) of the pineapple family, which is widely distributed throughout tropical America. The soft-hair seeds are carried by the wind to the rough bark of tree- branches, where they lodge and germinate. The stems are very slender, gray and scurfy, some¬ times several feet long, bear scattered leaves which are narrowly linear and have in their axils solitary, regular and perfect three-parted flowers, which are yellow-petaled but incon¬ spicuous. The plants are silvery gray in tone, which accounts for their common name of old man's beard ; and they drape the forests exten¬ sively and mournfully, in contrast with the ever¬ green of pines and live oaks, as far north as the Carolina Coast. They are used after dry¬ ing as packing for articles in boxes, stuffing for cheap mattresses, etc. See Fibre.

SPANISH MUSIC. Spanish art and lit¬ erature are characterized by the short dura¬ tion of their flowering season. Two centuries — from 1500 to 1700 — include almost every¬ thing that is eminently important in these fields. Calderon, Lope de Vega, Cervantes, Velasquez and Murillo, — all belong to this period. It is also the period of Spanish emi¬ nence in music. Indeed, were it not for the * fact that most of the composers who lived at this time developed their activities in Rome instead of their native country, we might even speak of a distinct Spanish school. As it is, the composers in question formed an integral part of what is known as the Roman school of church music, — culminating in the renowned Palestrina. The most important masters of Spanish origin connected with this school were Morales and Vittoria, both living in the 16th century. The former, a writer of great serious¬ ness and elevation of style, was a predecessor of Palestrina in the Papal chapel and probably exercised considerable influence on his musical development. The latter was one of the most prominent successors of the great Roman com¬ poser. Indeed, the names of the two are often linked together, just as the men were intimate friends during their lifetime. Though not quite the equal of Palestrina in technical mas¬ tery and variety of expression, Vittoria has certain qualities of emotional depth and ten¬ derness which are distinctively his own. Other eminent composers of early church music were Escobedo and Guerrero. Since the time of these masters there has been a decline in the cultivation of the musical art, and Spanish

composers have taken but little part in the wonderful developments of opera and instru¬ mental music of the last three centuries. How¬ ever, their country has given the world some of its greatest teachers and reproductive artists, such as Garcia, Malibran, Sarasate and Patti. And in recent years there has been renewed activity in the field of composition which augurs well for the future.

It is to Spain that we owe two instruments which, though not of paramount importance, occupy a characteristic place in the family of musical mechanisms. We refer to the guitar and castanets. And it is to Spain, likewise, that we are indebted for some of the most characteristic dances in existence. Among these we may mention the fandango, bolero, cachucha, jota and seguidilla. The celebrity of these dances is justly deserved, for they are highly picturesque both by reason of the gen¬ eral appearance of the participants and on ac¬ count of the unique nature of their movements, which are full of grace and animation. The accompanying music is generally in triple time and is likewise characteristic, especially in its rhythm. Indeed, the Spanish dance has now settled into a distinct type of composition and is considerably used by composers as a vehicle of expression. We need but refer, in this con¬ nection, to Moszkowski's celebrated dances. All in all, the Spanish dance may be regarded as the most important contribution which has been made by the Iberian Peninsula to the music of to-day.

Albert Gehring.

SPANISH PEAKS, two isolated moun¬ tains which form prominent landmarks in southern Colorado, near the Mexican border. The summit of the higher peak is 13,623 feet above sea-level. It is partly composed of vol¬ canic rocks. The other mountain is 12,720 feet high.

SPANISH REFORMED CHURCH, a

church organization founded in Spain in 1869. The movement originated with the native Span¬ iards, but was assisted by English and Irish Episcopalians, who in 1867 founded the Spanish and Portuguese Church Aid Society. The church of the Redeemer was established at Madrid under its auspices in 1869, and later 10 other churches were established under the name of the Spanish Reformed Church. The first bishop of the church was Juan Bautista Cabrera, who

was consecrated to his office by the archbishop of Dublin in 1887. There are now more than 20 congregations, of which the most important are those at Madrid, Valladolid, Salamanca, Malaga and Seville. The Church is governed by a synod composed of both the clergy and of laymen. Its doctrines follow those of the established creeds with perhaps the greatest similarity to the Episcopal Church.

SPANISH SUCCESSION, War of the.

See Succession Wars.

SPANISH TOWN, or SANTIAGO DE LA VEGA, town in Jamaica, on the Cobre River, 10 miles west of Kingston, with which it is connected by railroad. It is the second town in importance on the island ; was founded by Diego Columbus in 1525 and was formerly the capital ; but the seat of government was moved to Kingston in 1871. Pop. about 8,500.

SPANISH WAR VETERANS, a society

organized by men who took part in the Span- ish-American War. The object of the society, which was incorporated 28 Nov. 1899, is to keep alive the memories of the war with Spain in a patriotic American sense and not with the view of nursing any feeling of international enmity, to promote the best interests of those who took part in the war in the service of the United States and to encourage universal liberty and equal rights and justice. Although the number of killed and wounded in the Spanish War was not large, as compared with other wars in which the United States has been engaged, the character of climate and the season of the Cuban campaign were such as to do permanent injury to thousands of veterans not wounded in battle, while many suffered serious detriment to health who never passed beyond the Southern camps. This society was united in 1904 with the Society of Spanish American War Veterans, the Society of the Service Men of the Spanish War and the Society of the Hispano-Ameri- can War, and is known as the (<United Span¬ ish War Veterans.® It concerns itself with the interests also of those who participated in the Philippine campaign and the Chinese Expedi¬ tion.

SPANISH WAR yETERANS, National Auxiliary of, an association composed of the mothers, wives, sisters and daughters of mem¬ bers of the Society of Spanish War Veterans, also of other women, such as nurses, who ren¬ dered special service during the war in camp or hospital or otherwise.

SPAR, a general name in mineralogy for a crystalline mineral which is not an ore easily cleavable. Thus we have feldspar, comprising both orthoclase and plagioclase ; calcspar or cleavable calcite, with its transparent variety iceland spar; fluor spar or fluorite; satin spar, or fibrous gypsum ; tabular spar, or Wollaston- ite and heavy spar or barite. The term is of German origin.

SPARGO, John, American author : b. Stithians, Cornwall, England, 31 Jan. 1876. He was educated in the public schools and under the University extension courses of Oxford and Cambridge. At the age of 18 he became identi¬ fied with the Socialist movement in England ; he publicly opposed the Boer War and in 1901 came to the United States, where he has been active as Socialistic lecturer, writer and worker. In 1910 Mr. Spargo was United States delegate to the International Socialist and Trade Union Congress, Copenhagen. For several years he served on the national execu¬ tive committee of the Socialist party; was dele¬ gate to all leading conventions of the party; and State chairman of Vermont. In May 1917 soon after the entry of America in the war with Germany, Mr. Spargo resigned from the party because of its unpatriotic attitude toward the war. In 1918 he was made temporary chairman of the National Socialist party organ¬ ized along new lines that year and became di¬ rector of propaganda and of educational activ¬ ities in the new party. Mr. Spargo is a foun¬ der of Prospect House Social Settlement, Yonkers, N. Y., and is a member of the New York Milk Commission and of other philan¬ thropic societies. He has published (The Bitter Cry of the Children) (1906); Socialism, a

Study and Interpretation of Socialist Prin- ciples) (1906; rev. ed., 1909) ; (The Socialists, VVho They Are and What They Stand For) (1906) ; ‘Underfed School Children *(1906) ; (Forces that Make for Socialism in America) (1906) ; Capitalist and Labored (1907) ; (Not Guilty,* a drama (1907) ; (The Common Sense of the Milk Question *(Japanese and other trans¬ lations 1908) ; (The Common Sense of Social ism) (1908) ; (The Socialism of William Mor- ris) (1908); (The Spiritual Significance of Modern Socialism* (1908) ; Socialist Readings for Children) (1909) ; (The Substance of So- cialism > (also Armenian and other transla¬ tions, 1909) ; (Karl Marx, His Life and Work) (1909); (The Marx He Knew *(1909); < Side¬ lights on Contemporary Socialism* (1910) ; dements of Socialism, * with Professor Arner (1911); (Applied

Socialism) (1912); Syn¬ dicalism, Industrial Unionism and Socialism *(1913; various translations); Socialism and Motherhood* (1914); (Marxian Socialism and Religion* (1915) ; Socialism and International- ism) (1917) ; also numerous pamphlets, bro¬ chures and magazine articles on social and economic questions and art. W,ith Samuel Gompers he founded the American Alliance for Labor and Democracy in September 1917.

SPARID.7E, a large family of carnivorous shore-fishes, the porgies, of tropical seas, es¬ pecially abundant in the Mediterranean, Red Sea and West Indian waters. None is of great size. The body is oblong, likely to be elevated, covered with large adherent scales and orna¬ mental colors; the mouth is filled with strong teeth, in which the incisors are prominent. Most of them are excellent food and -many are gamy. Jordan says that about 11 genera and 100 species are counted in the family, about half of which occur in North American waters. These include the scup, porgies, sheepshead and related fishes. Consult Goode, (American Fishes) (New York 1888) ; Jordan and Ever- mann, (Fishes of North and Middle America) (Washington 1898).

SPARKLING WINE. See Wine and Wine Making.

SPARKS, Edwin Erie, college president and American historical writer : b. Licking County, Ohio, 1860. He was graduated from the Ohio State University in 1884 and from the University of Chicago in 1900. He was instructor at Ohio State University 1884-85 ; professor at Pennsylvania State College 1890- 95 ; lecturer before the American Society of University Extension 1893-95 ; professor of American history at the University of Chicago from 1895 to 1908; and since that date president of the Pennsylvania State College. He has published (Expansion of the American People > (1899) ; (The Men Who Made the Nation) (1900) ; Normative Incidents in American Diplomacy *(1902) ; (The United States) in the (Story of the Nations Series) (1903); foundations of National Development* (1907) ; (The Lincoln-Douglas Debates) (1908) ; and many contributions on educational administra¬ tion subjects.

SPARKS, Jared, American scholar and his¬ torian : b. Willington, Tolland County, Conn., 10 May 1789; d. Cambridge, Mass., 14 March 1866. He was graduated from Harvard in 1815, studied theology with Dr. Nathaniel Thayer

from May 1817 to March 1818, was editor of the North American Review, then begun in Boston, and in 1818 entered the Unitarian

min¬ istry. On May 1819 he was ordained pastor of the Unitarian congregation at Baltimore, Md., Dr. W. E. Channing (q.v.) preaching on that occasion the well-known discourse of Uni¬ tarian Christianity. *Sparks did much in Bal¬ timore to promote the growth of the Unitarian faith, instituting there a Unitarian book society and editing the Unitarian Miscellany, a monthly periodical. He resigned in 1823 and from 1823 to 1830 was again editor of the North Ameri¬ can Review, in which he acquired a three- quarter interest. After some periodical con¬ tributions to the economic history of the South, and to Mexican and South American history, he published in 1828 a fife of Ledyard,* the American traveler. In the preparation of this work he first undertook that method of travel and research among original sources in which he was the pioneer in the United States and which he afterward so worthily applied to the study of American history. After long investi¬ gation, including a very wade correspondence and a voyage to Europe for the examination of records in the public offices of London and Paris, he published the well-known (Writings of George Washington, with a Life of the Author, Notes and Illustrations) (1834—37), which remained the standard until partially superseded by W. C. Ford's edition (1889-93). Sparks used the copies of Washington's letters as found in the latter's letter-book. The dis¬ crepancies found to exist between the copies and the originals as preserved refuted the charges at first made to the effect that Sparks had wilfully altered the letters. Sparks' method of editing in general has, however, been discarded. He printed only what he believed of importance, omitting and altering passages as he saw fit. This was largely due to the idea of editorial discretion then observed, and should not be made occasion for disparagement. Whatever may be said of his methods in editing text, Sparks was a really distinguished histori¬ cal scholar and maintained almost invariable as high a level of excellence as was then possible to the historical editor. He also prepared (The Works of Benjamin Franklin) (1836-40) ; <The Library of American Biography *(1st series 1834—38; 2d 1844 48), himself writing seven of the 60 lives ; and Correspondence of the Ameri¬ can Revolution) (1854). He also wrote Re¬ marks on American History * (1837). He was professor of history at Harvard in 1839—49, and president in 1849-53. The standard bi¬ ography is Adams, H. B., (Life and Writings of Jared Sparks* (Boston 1893) ; there is also one by Ellis (1869). Consult also Bassett, J. S., JJared Sparks* in (The Middle Group of American Historians) (New York 1917).

SPARKS, Nev., city in Washoe County, on the Truckee River, three miles east of Reno, and on the Southern Pacific Railroad. It has important railroad shops and ranks as a railroad town. It is closely connected with Reno by car lines. There is a high school and a public

li¬ brary. Pop. (1920) 3,238.

SPARROW, the familiar name of many small birds of the finch family (Fringillidce) , applied loosely to the representatives of a large and varied assemblage of genera. Generally

speaking, sparrows are moderate-sized members of the family which live mostly on or near the ground, whose bills are neither especially short and stout nor angulated in the gape, and which have the sexes similarly colored. About 10 genera and 40 species called sparrows belong to the North American faunas' of which the fol¬ lowing may be mentioned. The white-crowned sparrow (Zonotrichia leucophrys) is about seven inches long, the body stout, and the tail rather long and moderately rounded ; the chin, throat and breast are nearly uniform ashy; the head above black ; median and superciliary stripe pure white ; a narrow black line through and behind the eyes ; back and wing-coverts dark reddish brown with paler margins ; quills and tail darker ; wings with two white bands ; whitish below ; bill reddish orange tipped with brown. It is found from the Atlantic to the Rocky Mountains and from Labrador to Texas, breeding to the north and in the Rocky Moun¬ tains. The notes are mellow and sweet, six or seven in number, the first loud and clear, and then becoming fainter and more plaintive ; eggs light green with brownish mottlings at the larger end. The nest is on the ground or among moss, and the eggs are laid in Labrador from the 1st to the end of June. The flight is low and swift; the migrations are performed mostly by day; the food consists of seeds, berries and insects. It spends its summers in northern Canada and Alaska. The white- throated sparrow or peabody bird (Z. albicollis) has the chin abruptly white; superciliary stripe broad, yellow anteriorly and white behind; median head-stripe white, with a black one on each side, and a broad black streak behind the eye; edge of wing and axillaries yellow; two narrow white bands across wing coverts. It is found in the eastern United States and westward to the Missouri, appearing in the Southern States in November and departing in March to the North. It breeds from the north¬ ern tier of States northward, and its nest, eggs and song resemble those of the last mentioned. This species is very active among hedges and thickets, and is found in flocks with the white- crowned sparrow, than which it is generally more plentiful. These, with two or three addi¬ tional western species of Zonotrichia, are among the largest and most handsome of our sparrows.

The genus Spizella, which differs from the last in its smaller size and longer forked tail, contains three well-known northern species and as many more confined to the western and southern United States. The field sparrow (S. pusiila) is about five and one-half inches long; the bill is reddish; ear coverts, crown and back rufous, the last with blackish streaks; sides of head and neck, and stripe over eyes, ashy; white below, tinged with yellow anteriorly; quills and tail faintly edged with white, and two bands of the same across wing coverts; rump yellow¬ ish brown. It is found in eastern North America as far as the Missouri, remaining in the Southern States during winter, going north in March, and arriving in New England toward the last of April. The song is pleasing, re¬ sembling the trill of a young canary. It is sociable and peaceful, and very prolific, some¬ times raising three broods a year. The nest is of grasses and placed on or near the ground; the eggs usually four or five, whitish, thickly

speckled with reddish brown. It frequents fields and fence rows, and flocks when not breeding. The chipping-sparrow (q.v.) and tree-sparrow belong here. The genus Pas- serella is remarkable for the elongation of the lateral toes and the large size, of the claws, adapting these birds for scratching on the ground. The fox-colored sparrow (P. iliaca), with its several varieties, is our only repre¬ sentative. It is seven inches long, the back is rust brown, margined with ashy, lighter on the head, tail and wing coverts, rufous <on the last two ; white below, streaked with light brown¬ ish red on breast and sides of neck, rufous patch on cheeks. It is found as far west as the Mississippi, preferring the Northern States and going south in winter. It is seen in small flocks in the underwood and along brier-skirted fences and streams. It breeds in British America. The flight is slow, rapid and undulat¬ ing; the song clear, full, sweet and prolonged with many repetitions. The nest is made on the ground or in bushes.

Other important genera are Ammodramus. with 11 species, including the savanna sparrow (A, sandwicliensis) , the yellow-winged grass¬ hopper sparrow (A. passerinus) , the sharp¬ tailed sparrow (A. caudacutus), and the sea¬ side sparrow (A. maritimus), the last two in¬ habitants of salt marshes, Melospiza, including the song sparrows (q.v.) ; Pooccetes, with the vesper sparrow or bay-winged bunting (P. grarnineus) ; and others less well-known. The sparrows of Europe are few in number and belong to the genus Passer. Besides the house sparrow, the European tree- sparrow (P . montanus) has been introduced into this country. There is also an American bird of the same name, also called Canada spar¬ row (Spizella monticola) , which much re¬ sembles the chipping-sparrow, but has a dis¬ tinct dark spot <on the breast and conspicuous white wing-bars. It is a

northern bird, but in the winter is abundant in the United States, flocking in fields and shrubbery.

Consult: Ridgway, (Birds of North and Middle America, *Part I. (Washington 1902) ; Forbush, (Useful Birds and Their Protection issued by the Massachusetts Board of Agri¬ culture (1913) ; and general works on ornitho¬ logy. For the "English** sparrow, see House- sparrow.

SPARROW-HAWK, a small falcon (Falco sparveHus) , common throughout North America and practically cosmopolitan, since scarcely distinguishable species inhabit all quarters of the globe. It is 11 to 12 inches long, and the adult male has the back tawny; wings bluish and black; seven black blotches about the head; tail chestnut, with a broad black band and a narrow terminal one of white ; below white or tawny. The female is more streaky, has the tail tawny with numerous nar¬ row, darker bars ; back and wing-coverts rusty, barred with black. These birds are true falcons (see Falconry), and admirably hold and active. Not infrequently the sparrow-hawk may be seen to attack other and larger birds of prey, its courage extending even to recklessness, while it is also shy and wary. It feeds largely on mice, which it catches with great skill, and also some¬ times seizes young chickens, but its depredations in that direction are of little consequence. It

makes its nest in hollows of trees, the deserted hole of a large woodpecker, or sometimes an abandoned crow's-nest.

SPARROW-OWL, one of the diminutive, brown-streaked owls of the genus Nyctale, of which the saw-whet (q.v.) is a familiar ex¬ ample. The name belongs primarily to Teng- malm's owl of Northern Europe, of which Richardson's own (N . richardsoni) of Canada and Alaska is an American variety. It is bold and strong, and feeds mainly on small birds.

SPARTA, spar'ta, a celebrated city of an¬ cient Greece, the capital of Laconia and of the Spartan state, was situated on the west bank of the river Eurotas, and embraced a circuit of six miles. Sparta was irregularly built, and from this circumstance it is supposed to have got its name, signifying ˆscattered.® It con¬ sisted of five separate quarters, which were not completely surrounded by walls till the time of the Romans. It was the boast of Sparta that her men were her walls.

Among other remark¬ able objects enumerated by Pausanias are the following: the market-place, containing the pub¬ lic buildings, in which the council of the elders held their meetings, and the principal ornament of which was the Persice, a celebrated colon¬ nade, built from the spoils taken from the Persians, its roof being supported by statues of Persians; the theatre, the remains of which constitute the principal ruins of Sparta ; the Choros, or place in which the ephebi executed their dances, adorned with statues of Apollo, Artemis and Leto ; the Leschai, or halls in which the popular assemblies were held, and of which there were two — the Lesche of the Crotanes, near the tombs of the Agides, and the Lesche Poecile; the Temple of Athene Poliou- chos or Chalkioikos (as the goddess was com¬ monly called, from the bronze ornaments of her temple), on a steep hill, to which the Spar¬ tans gave the name of the Acropolis, etc. Sparta was the name of the city during the period of its historical celebrity. Lacedaemon is found in Homer as the name both of the city and the territory, but it afterward dropped out of use, and does not appear to have been re¬ vived till several centuries after Christ. La¬ conia, the district in which Sparta was situated, was the southeastern division of the Pelopon¬ nesus, bounded on the west by Messenia, from which it was separated by the chain of Tayge- tus, on the north by Arcadia and Argolis and on the east and south by the sea. The principal towns in Laconia besides Sparta were Amyclae and Pharis, both situated like Sparta on the west bank of the Eurotas, a little lower down.

The Spartans were the descendants of the Dorians who invaded the Peloponnesus about 80 years after the siege of Troy, and from an early period they conformed to a set of rigor¬ ous institutions aimed at making them a purely warlike nation. These institutions they them¬ selves ascribed to Lycurgus, who, if he was really a historical character, must have lived not later than the 9th century. It is probable that shortly after their settlement in the Peloponnesus the Spartans extended their sway over all the territory of Laconia, the inhabit¬ ants of which they reduced partly to the con¬ dition of Helots and partly to that of Periceci. The former were completely enslaved, bound to the land which they had to till for their

masters, and required to serve the state in war. The latter were free, possessing land of their own, and carrying on trade and practising the arts, both of which pursuits were forbidden to Spartans. The next great wars of Sparta are usually regarded as the direct consequence of their new institutions. They were waged with the Messenians in the 8th and 7th cen¬ turies b.c., and resulted in 668 b.c., in the com¬ plete subjugation of the Messenians, who were either compelled to leave their country or were reduced to the condition of Helots. Wars

were also carried on against their northern neighbors, the Arcadians and the Argives, against both of whom they were successful, and before the close of the 6th century b.c., they not only stood at the head of the states of the Peloponnesus, but were even recognized as the leading people in all Greece. Early in the fol¬ lowing century began the Persian wars, in which Sparta played a conspicuous part, but the details down to the conclusion of the Pelopon¬ nesian War in 404 b.c. belong to the common history of Greece, to which the reader is re¬ ferred. The events of the wars with Persia led to Sparta being supplanted by Athens as the leading state in Greece; hence arose a jealousy between the two cities which ultimately brought on a war, in which the one-half of Greece was divided against the other, and this war, the Peloponnesian, ended in the ascend¬ ency of Sparta and the entire humiliation of her rival. The rivalry of the Spartan general Lysander and the king Pausanias soon after produced a revolution, which delivered the Athenians from the Spartan yoke (403). A little later the Spartans became involved in a war with Persia, by joining Cyrus the Younger in his rebellion against his brother Artaxerxes Mnemon (401). The war was continued even after the failure of the enterprise of Cyrus, and the Persian throne was shaken by the victories of Agesilaus ; but Athens, Thebes, Corinth and some of the Peloponnesian states took this op¬ portunity to declare war against the Lacedae¬ monians. The latter defeated the Thebans at Coronea (394) ; but, on the other hand, the Athenian commander Conon gained a victory over the Spartan fleet at Cnidus. This war, known as the Boeotian or Corinthian War, lasted eight years, and increased the reputation and power of Athens. To break the alliance of Athens with Persia, Sparta, in 387 b.c., con¬ cluded with the latter power the peace known by the name of Antalcidas; and the designs of Sparta became apparent when she occupied, without provocation, the city of Thebes, and introduced an aristocratical constitution there. Pelopidas delivered Thebes, and the celebrated Theban War (378-363) followed, in which Sparta was much enfeebled. During the fol¬ lowing century Sparta steadily declined, al¬ though one. or two isolated attempts were made to restore its former greatness. The principal of these was made by Cleomenes (236-222), but his endeavors failed, because there were then scarcely 700 of Spartan descent, and the majority of these were in a state of beggary. With the rest of Greece Sparta later passed under the dominion of the Romans in 146 b.c.

The Spartans differed from the other Greeks in manners, customs and the constitution of their state. Their kings (two of whom always reigned at once) ruled only through the popular

will, acting as umpires in disputes and com¬ manding the army. The Spartans proper, that is, the descendants of the Dorians, occupying themselves with war and the chase, left all ordinary labor to the Helots, while the class known as Perioeci engaged in commerce and manufactures.

SPARTA, Ill., city in Randolph County, 45 miles southeast of Saint Louis, on the Illinois Southern and the Mobile and Ohio railroads. There are coal mines in the vicinity, and in¬ dustries include railroad repair shops and manufactures of plows and harrows, flour and planing-mill products. Pop. (1920) 3,340.

SPARTA, Wis., city, capital of Monroe County, on the La Crosse River, and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 23 miles northeast of La Crosse. It is a favorite summer resort. It is in an agricultural and fruit-growing region. It has flour and feed mills, machine shops, paper mills and cigar fac¬ tories. The educational institutions are a high school, public and parish elementary schools, and a public library. The city contains several churches and the State School for Dependent Children, and the Hospital for the Insane is a short distance north. The three banks have a combined capital of $100,000. Sparta was first settled in 1851, was incorporated as a village in 1857, and as a city in 1883. It is governed by a mayor and a council of eight, elected bien¬ nially. Pop. (1920) 4,466.

SPARTACANS, or SPARTACIDES, is

the name acquired soon after the going into effect of the armistice accorded Germany in Nov. 1918, by the special followers of Karl Liebknecht (q.v.), leader of the extreme left wing of the German Socialist party, or Inde¬ pendents, notably during the several risings of the latter against the moderate, or majority, Socialists under the leadership of Ebert and Scheidemann, who had formed a composite government from which the Spartacans had withdrawn as not realizing their political and economic ideals. There were several of these organized, or centralized, risings, the more con¬ siderable occurring in January 1919, when in Berlin alone the deaths in the fighting on both sides were computed at sundry thousands, and quite a number of local and insufficiently or¬ ganized ones in various parts of Germany, such as Halle, Brunswick, Leipzig, Dresden, Ham¬ burg, Bremen, Duisburg and other places. The communistic uprising in Munich, on the other hand, which occurred during March and April

1919, does not properly figure under the head of Spartacan undertakings. The name of ˆSpartacan” originated from the pen name of Karl Liebknecht, ˆSpartacus,® which he had adopted while being held prisoner by the former German imperial government during the last two years of the Great War, 1916-18, for his clandestine articles appearing in the press of the left wing of the Socialist party, notably Die Freiheit. The genesis of the Spartacans, however, ought to be traced to the very begin¬ nings of the Great War, to August 1914, when the extreme wing of the great Socialist party in Germany first showed signs of a desire _ to secede from the party as a whole, as being unalterably opposed to the whole war which they deemed as being engineered by capitalis¬

tic and militaristic influences and, therefore, to be condemned in toto. This desire not long after they carried out openly, constituting them¬ selves as a new party in the Reichstag, in oppo¬ sition to all others, and refusing throughout the remainder of the war to vote for supplies and funds to sustain it. When the split took place, out of a total of 108 party members in the Reichstag, 19, subsequently increased to 23, left the Socialist party and called itself the Independent. After the rather tame revolution that ousted the kaiser in the beginning of No¬ vember, 1918, and led to the overturn of the whole imperial regime and the armistice itself, this Independent, or as later denominated, Spartacan, party veered further to radical tenets, becoming, in fact, communistic, even occasionally anarchistic, in its aims and prac¬ tices, and not only leaning to, but affiliating with, the Bolshevist party of Russia. Karl Liebknecht himself aided in this molting proc¬ ess, but was murdered in the streets of Berlin, together with his ablest lieutenant, Rosa Lux¬ emburg (q.v.), before the lull development of that party movement. The adoption of the title of Spartacans has been considered by many a rather curious thing, since the rising of the Roman slaves under Spartacus came to a speedy evil end and left no trace behind it.

Wolf von Schierbrand.

SPARTACUS, spar'ta-kus, Roman insur¬ rectionist: b. Thrace: d. Lucania, 71 b.c. He was captured by the Romans, sold as a slave, and trained as a gladiator at Capua. Here he headed a fight for freedom and succeeded, with 70 comrades, in reaching the crater of Vesu¬ vius, where he was soon joined by other fugi¬ tives. His force quickly grew to large propor¬ tions and he gained several battles. Spartacus now proclaimed the abolition of slavery, and, being joined by the slaves of the South, passed Rome with a victorious army of about 100,000 men and advanced into the region of the Po. His plan was to

lead his army out of Italy and disband it, so that the freed slaves might return to their homes. Despite dissensions and disaffections which arose, he successively met and defeated the two consuls sent against him (72 b.c.) . But the slaves, flushed with success, refused to follow their leader out of Italy and demanded to be led against Rome. Spartacus therefore conducted them into winter quarters at Thurii, where Licinius Crassus was sent against him. Having defeated two legions of that general's command, he broke through the obstacles which Crassus had interposed and marched toward Rome. He was overtaken, however, and owing to the dissensions in his army was defeated. Attempting to cross into Sicily, he was betrayed by Sicilian pirates and a portion of his army was captured by Crassus. With the remainder Spartacus won new vic¬ tories, but in a decisive battle with Crassus on the river Silarus his army was annihilated, Spartacus himself being slain.

SPARTANBURG, S. C., city and county- seat of Spartanburg County, situated at the foot of the Blue Ridge Mountains, on the main line of the Southern Railway, and on the Charleston and Western Carolina, the Carolina, Clinchfield and Ohio, and the Piedmont and Northern railroads, about 1 (X) miles northwest of Columbia. The city is within a few hours

of the great eastern markets and the coal fields of Tennessee, Virginia, West Virginia and Kentucky. It is an agricultural region in which cotton is the principal product. It has an agreeable climate, without extremes. The average annual rainfall is 54 inches and the average temperature 51° F. The educational institutions include Wofford College for Young Men; Converse College for Young Women; Cecil's Business College; several private schools and a first-class public school system. The city is the home of the South Atlantic States Music Festival. It has 100 miles of paved sidewalks and 16 miles of paved streets. The eight city banks have combined resources amounting to $11,400,000; postal receipts in 1917-18 amounted to $338,000, due to the prox¬ imity of Camp Wadsworth, where 125,000 sol¬ diers were trained. The tax valuation of the city is $10,000,000, an increase of 34 per cent since 1915. The city has a fine Y. M. C. A. building, Y. W. C. A., several churches, five hospitals and several cFfis.

Spartanburg County ranks first in South Carolina in invested capital and value of annual products of industrial concerns, nearly all of

which are located in Spartanburg. The aver¬ age cotton crop is 68,000 bales, while 147,000 bales are manufactured. There are 27 mill cor¬ porations operating 36 mills, with 834,000 spin¬ dles and 20,600 looms. The value of the manu¬ factured product is $35,000,000. The capital invested amounts to $14,600,000. The city has excellent hotels, two of which are modern fire¬ proofed structures. The city has adopted the commission form of government. The site of Camp Wadsworth, embracing 1,350 acres with perfect water and sewerage systems, has been purchased from the government and is being offered for suburban homes and industrial de¬ velopment. There is a municipally owned water-system in Spartanburg, with a capacity of 10,000,000 gallons. Pop. (1920, United States Census) 22,638.

.SPARTEINE (derived from the Latin spartum and the Greek andprov , Spanish broom), an alkaloid discovered by Dr. Sten- house in 1851, and obtained from the tops of the broom-plant. It is a thick, colorless, trans¬ parent oil, with a peculiar, unpleasant odor and a very bitter taste. It boils at 288°, is strongly alkaline, slightly soluble in water, very poison¬ ous, and resembles nicotine in its compounds. Its sulphate is used in medicine as a cardiac stimulant.

SPARTEL, spar-tel', Cape, Morocco, Af¬ rica, the northwestern extremity of the conti¬ nent. It is a promontory 1,030 feet high, situ¬ ated at the western entrance to the Strait of Gibraltar.

SPARTINA. See Grasses in the United States.

SPASM, an involuntary, convulsive con¬ traction of a muscle or set of muscles which is of a more or less tonic or prolonged charac¬ ter. When similar involuntary contractions are intermittent or clonic in character they are called convulsions. Convulsions usually imply some disturbance of the motor cortex of the brain. Spasms are generally of purely local origin ; they are cramps. Spasms are sometimes held to be synonymous with tics (q.v.). In this sense it is the more modern distinction to

regard spasm as a local irritant reflex act, con¬ vulsion an involuntary cortical reaction, and tic a muscular movement, originally voluntary, but become involuntary by frequent repetition. The word spasm, however, is used in all three con¬ ditions. Spasms occur in many forms of nerv¬ ous disease, particularly in chorea, hysteria, hic¬ cough, hydrophobia (q.v.), etc. The so-called facial spasm is a form of tic; bronchial asthma is a purely spasmodic affection of the muscular tissues of the bronchi; whooping-cough is largely spasmodic in its character.

SPASMODIC SCHOOL, in literature, a

name applied in England to a group of English poets about the middle of the 19th century, among whom were Philip James Bailey, Syd¬ ney Dobell and Alexander Smith. The name implied the use of an overstrained and unnatu¬ ral sentiment and expression, which sometimes grew out of sheer affectation.

SPAULDING, Rolland Harty, American

public official: b. Townsend Harbor, Mass., 15 March 1873. He was educated at Phillips Academy, Andover ; engaged in the manufac¬ turing business in 1895, and is now member of Jonas Spaulding Sons, manufacturers of leath- erboard, counters, novelties, etc., at Townsend Harbor, Mass., Rochester, North Rochester and Milton, N. H., and Tonawanda. Mr. Spauld¬ ing is also interested in several other manufac¬ turing enterprises. He served as delegate to the Republican National Convention in 1912 and was governor of New Hampshire in 1915-16. In 1918 he was a candidate for United States senator.

SPAVIN, a disease of horses affecting the hock-joint. It occurs under two principal forms. In young, weakly or overworked horses the hock-joint is sometimes distended with dark-colored thickened synovia or joint-oil. This is bog spavin. Fomentations, occasional friction, a laxative diet, and rest should be dili¬ gently tried; and if such remedies prove un¬ successful the swelling must be dressed with strong blistering ointment or fired. The sec¬ ond variety, bone-spavin, is the more common. Toward the inside of the hock, at the head of the shank-bones, or between some of the small bones of the hock, appears a bony enlargement. At first there is tenderness, with heat, swelling, and considerable lameness ; but as the inflam¬ mation in the bone and its investing membrane abates, the lameness may entirely disappear, or but a slight stiffness may remain. In recent and slight cases cold water should be applied continuously; but in serious cases, when the part is swollen and tender, hot fomentations are best. For several days they must be per- severingly employed. When the part is again cool and free from pain an iodide of mercury or fly-blister should be applied, and the animal treated to three months' rest in a small pad-dock, the end of a barn, or a roomy box-stall. In persistent cases firing or setoning usually gives much relief.

SPAWN, the eggs or ova of fishes, frogs and other of the larger aquatic animals. See Egg, and the names of various animals.

SPAWN-EATER, a local name for one of the commonest of brook-

minnows or shiners (q.v.) (Notropis hudsonius), which is likely

to eat the eggs of other fishes.

SPEAKER, one who presides over a de¬ liberative assembly, preserving order, and regu¬ lating the debates ; as, the speaker of the House of Representatives, the speaker of the House of Commons, etc. The Speaker of the House of Representatives is chosen by ballot from among the members upon the assembling of Congress, and occupies that office till the ex¬ piration of the body by adjournment sine die. If an extra session be called there is no new election of speaker, the same officer presiding over the deliberations. The presiding officer in the Senate is styled the president of the Sen¬ ate, and he is not elected by that body, the office being held ex officio by the Vice-President of the United States. The speaker of the House of Representatives exercises large influence on legislation, and representing, as he does, the maj'ority in Congress, he is usually sustained.

The speaker of the British House of Com¬ mons receives a salary of £5,000 a year, with a furnished residence. He is a member of the Privy Council, and ranks after the barons. On vacating his post he receives a pension of £4,000 and is raised to the peerage. The first time a speaker was appointed by this title was in the reign of Edward III, when Sir T. Hun- gerford was elected. On the Continent of Europe the presiding officer of a legislative body is commonly designated by a title mean¬ ing ˆpresident.55 See United States — Speaker oe the House of Representatives.

SPEAKING TRUMPET, a metallic in¬ strument of a somewhat conical form used for conveying the sound of the voice to a distance. The advantage of the conical form is satis¬ factorily explained on the assumption that waves of sound are reflected in the same way as rays of light, the angle of incidence and the angle of reflection being the same; for on this assumption it is evident that waves of sound proceeding from the narrow to the wide end of a truncated cone, from the walls of which they are reflected according to the law referred to, will gradually make smaller angles with the axis of the cone; or in other words, the direc¬ tion of the sound will gradually become more nearly parallel to that axis. A cylindrical tube of uniform diameter has not the same effect, and accordingly is of no use in determining the direction of sound after it leaves the tube, although, as is seen in the

case of speaking tubes used in offices, industrial establishments and private houses, it is of great service in transmitting sound from one extremity to the other. Speaking-trumpets are chiefly used at sea, especially in windy weather, to convey commands from one part of the ship to an¬ other, and sometimes to speak with another ship.

SPEAR, Charles, American philanthropist and author : b. Boston, Mass., 1 May 1801 ; d. Washington, D. C., 18 April 1863. After sev¬ eral years' service as a Universalist minister in Brewster and Rockport, Mass., he settled in Boston, where he became well known by his advocacy of prison reform, and his efforts to secure the adoption of legislative measures for the benefit and reformation of prisoners. He visited penal institutions ; made suggestions for the more humane treatment of convicts, housed many of them when discharged, and was active in securing employment for them and in pro¬

moting their spiritual welfare. He died of an infectious disease contracted in Washington during the Civil War while seeking to amelio¬ rate the condition of prisoners of war. He was a regular contributor to several religious pe¬ riodicals, was editor of (The Prisoner's Friend) (1848-54) ; and was the author of (Names and Titles of Christ5 (1842); (Plea for Discharged Convicts5 (1844) ; (Voices from Prison5

(1849), etc. Consult Catharine Swan Brown, Wife of Charles Spear5 (1888).

SPEAR, Ellis, American soldier and gov¬ ernment official: b. Warren, Me., 15 Oct. 1834; d. 3 April 1917. He was educated at Bow- doin College, graduating in 1858. During the Civil War he served in the national army, ris¬ ing from the grade of a captain of Maine vol¬ unteers to colonel and commanding a regiment in the Army of the Potomac from 1863 to 1865. He was conspicuous as major commander of a brigade at Peebles Farm and was made colonel for his bravery in action. In 1865 he was bre- vetted brigadier-general, became inspector of division, and before the close of the war was given the command of a brigade. At the end of the war he became identified with the United States Patent Office, and became com¬ missioner of patents (1877-78).

SPEAR, James, American manufacturer: b. Mauch Chunk, Pa., 17 Feb. 1827 ; d. Walling¬ ford, Pa., 30 Jan. 1902. He engaged in the manufacture of stoves in Philadelphia, 1848, invented various improvements in heating ap¬ pliances, among them the anti-clinker grate now generally used, and he also invented the first practical car-

heater. He was one of the founders of the Hayes Mechanics Home, a benefactor of various institutions, particularly the University of Pennsylvania, and was ac¬ tively interested in the Blind Men's Home.

SPEAR, Samuel Thayer, American Pres¬ byterian clergyman and author : b. Ballston Spa, N. Y., 4 March 1812; d. Brooklyn, N. Y., 1 April 1891. He studied medicine, graduating in 1833 at the New York College of Physicians and Surgeons, but entered the ministry in 1835, after training at Troy, N. Y. After a pas¬ torate at Lansingburg, N. Y., he was in charge of the South Presbyterian Church of Brooklyn, N. Y., from 1843 to 1871, when he became con¬ nected with the editorial staff of (The Inde¬ pendent. y He was author of several works, including (Religion and State5 (1876) ; and (The Bible Heaven5 (1886).

SPEAR, a weapon of offense, consisting of a wooden shaft or pole varying in length up to eight or nine feet, and provided with a sharp piercing point. The spear may be regarded as the prototype ot the various forms of piercing weapons, such as the arrow, bolt and dart, which are projected from bows, catapults or other engines, and the javelin, assegai and lance, held in or thrown by the hand. The longer and heavier spears and lances are mainly retained in the hand while in use, but there is no absolute distinction, and the throwing of a spear has in all ages been a form of offensive warfare.

In its earliest form the spear would naturally consist of a simple pole of tough wood sharp¬ ened to a point at one extremity, which point might be both formed and hardened by charring

in fire. From this an improvement would con¬ sist in fitting to the shaft a separate spear head of bone, as is still practised among primitive races.

The war lance of the mediaeval knights was 16 feet long; the weapon of modern cavalry regiments known as lancers may be from 8j4 to 11 feet long, usually adorned with a small flag near the head. The Persians at the present day forge spear heads for ornamental purposes only, with two and sometimes three prongs. The modern spears of savage tribes, used equally for hunting and for warlike purposes, are frequently barbed with fish and other bones, and their fighting spears have sometimes poisoned tips. Among civilized communities the

hunting spear continues to be used for fol¬ lowing the wild boar and other large game, while the Cossacks of Russia and various corps in the armies of western Europe are armed with spears or lances, which experience has shown to be efficient weapons for cavalry. The spear was not an ordinary weapon among the North American Indians, who, before the intro¬ duction of the musket among them, used the bow and arrows and the tomahawk.

SPEARFISH, S. Dak., city in Lawrence County, 10 miles northeast of Deadwood, on the Chicago, Burlington and Quincy Railroad. It has a high school and is the seat of a State normal school. The surrounding region is de¬ voted to fruit and stock-raising. There are manufactures of flour and lumber products, a stucco mill and cyanide plant. Pop. 1,254.

SPEARFISH. (1) One of the carp-suck¬ ers (q.v.), a species (carpiodes velifer) of the Mississippi Valley; (2) a large deep-sea, preda¬ tory fish of the warmer parts of the Atlantic allied to the sailfishes (q.v.), and placed in the genus Tetrapturus ; the best-known species is the billfish (A. imperator) , called aguja by Spanish-speaking fishermen.

SPEARMAN, Frank Hamilton, author, b. Buffalo, N. Y., 6 Sept. 1859. He was educated at public and private schools in Ap¬ pleton, Wis., and at Lawrence College. He en¬ gaged for some years in commercial life; then from 1895 devoted himself to literary work. He is the author of (The Nerve of Foley' (1900) ; ˆeld for Orders' (1901) ; (Doctor Bryson' (1902) ; (The Daughter of A Mag¬ nate' (1903) ; (The Close of the Day' (1904) ; (The Strategy of Great Railroads' (1904) ; ˆWhispering Smith' (1906); (Robert Kim¬ berly' (1911) ; (The Mountain Divide' (1912) ; (Merrilie Dawes' (1913) ; (Nan of Music Mountain' (1916), and contributes short stories to magazines and economic articles to reviews.

SPEARMINT, a European labiate herb (Mentha spicata), which has become perfectly naturalized in America, and is often found in damp places. It is about two feet high, smooth, square-stemmed, and spreading by leafy stolons. It bears opposite, lanceolate, sharply serrate, smoothish leaves, and small, two-lipped, purplish flowers in slender verticillate spikes, which are both lateral and terminal, the latter being the longest. Spear-mint is cultivated for its very aromatic foliage, which yields a carminative oil, and was an old-time remedy for flatulence. It is now chiefly employed, with vinegar, as a fitting sauce for roast lamb, and sprigs of it

are the crowning feature of the seductive mint- julep.

SPEARS, sperz, John Randolph, American author and journalist: b. Van Wert, Ohio, 21 April 1850. Among his many publications are (The Gold Diggings of Cape Horn' (1895) ; (The Port of Missing Ships' (1896) ; (The History of Our Navy' (1897) ; (The History of the American Slave Trade' (1900) ; c An¬ thony Wayne' (1903) ; (The History of the Mississippi Valley' (1903).

SPECIAL SESSIONS, Court of. See

Court.

SPECIE (spe'she) CIRCULAR, a treas¬ ury circular drafted by Senator Benton and issued at President Jackson's orders 11 July 1836, which directed that nothing but gold and silver should be received in payment for the public lands. The next Congress passed a bill to rescind this specie circular, but President Jackson killed it by a veto. It was claimed by President Jackson's opponents that the circular contributed greatly to bring about the ruinous financial crisis of 1837.

SPECIE PAYMENTS, in finance, a pay¬ ment in coin or any metallic money; a medium of exchange authorized by the government or State. In modern times specie is largely used by banks as security for paper money in cir¬ culation. In times of financial stringency the amount of coin on hand is inadequate to cover the volume of paper in circulation ; hence arises a temporary condition called suspension of specie payment. When conditions change and finances improve a resumption of specie pay¬ ments generally ensues.

SPECIE RESUMPTION. The resump¬ tion of specie payments after the close of the American Civil War was a subject of long and anxious discussion in Congress and in the press. In 1861 payment in specie was sus¬ pended by the government and by banks throughout the United States, and Congress authorized the issue of United States notes to meet the expenses of the conflict, and to be ac¬ cepted as legal tender for all dues except cus¬ toms. The receipt of specie for customs duties kept the treasury well supplied with gold and silver, and enabled the government to meet obligations payable in coin. After the war, and indeed from the closing scenes of the Confeder¬ acy, the premium on gold gradually fell until it was merely nominal, but the fact that the gov¬ ernment's paper currency was not redeemable on presentation in coin kept that currency from being at par, and tended to unsettle business, and to provoke, or afford an excuse for serious financial crises. The question of resumption was most earnestly agitated after the panic of 1873, and on 14 Jan. 1875 an act was passed by Congress, ordering the resumption of specie payments to

begin on 1 Jan. 1879. The ap¬ proach of that date was attended by great ap¬ prehension in the United States and abroad that the national treasury would be unable to meet the overwhelming demand for specie that many expected to occur. The mints were run far beyond the usual hours coining money to meet possible requirements, and there was much surprise when the appointed date came, and very little currency was presented for redemp¬ tion. The people were satisfied of the gov-

ernment's ability to pay, and gold at once fell to par. "Greenbacks,® as the national currency is called, became the equivalent of gold through¬ out the world, and have ever since maintained that position.

SPECIES, a group of individuals which agree in exhibiting certain distinctive hereditary characters of sufficient importance to render a particular name convenient. When we famil¬ iarly talk of the different "kinds® of plants and animals, we indicate in a rough way the biological ideal of species; and the recognition of raven, jackdaw and rook, as different kinds of crow, corresponds with the scientific distinc¬ tion of these as four different species of the genus Corvus. (See Genus). In manv a case, however, where the distinctive hereditary char¬ acters are less conspicuous, the ordinary ob¬ server may see only one "kind® where the trained naturalist detects many "species.® Moreover, where a naturalist unfamiliar with the details of a particular class of animals might discern only half a dozen distinct species, the specialist might distinguish a score. In fact, the conception of species is entirely rela¬ tive to convenience ; where the "lumpers® think a score of special groups with special names quite sufficient, the "splitters® may think it necessary to distinguish a hundred. Except in cases where the limitations of group from group are very clear, as in the case of the four "kinds® of crow above mentioned, it requires a period of criticism before a satisfactory com¬ promise between the "lumpers® and the "split¬ ters® can be arrived at. And the reason for this is simply that in many cases one species is linked to another by intermediate varieties, and, it may be, also by hybrids.

Collections of definitions of "species® have often been made; and the curious will find a score in Quatref ages' posthumous work, Dar¬ win et ses precurseurs Frangais.* Thus, Lin¬ naeus wrote : "Species tot numeramus quot diversae formae in principio sunt creatae.® Buf- fon defined species as "a constant succession of individuals similar to, and

capable of reproduc¬ ing each other.® De Candolle said that a species was “an assemblage of all those individuals which resemble each other more than they do others, and which are able to reproduce their like, in such a manner that they may be sup¬ posed by analogy to have descended from a single being or a single pair.® Quatrefages’ idea of species is summed up in his statement that it is “an assemblage of individuals more or less resembling one another, wdiich are de¬ scended, or may be regarded as being descended, from a single pair by an uninterrupted succes¬ sion of families.® Miiller says species is a “living form, represented by individual beings, which reappears in the product of generation with certain invariable characters, and is con¬ stantly reproduced by the generative act of similar individuals.® These illustrations may suffice to impress the fact that the invariable nature of species had become firmly fixed on the minds of the older naturalists in former years.

A species, it may safely be concluded, repre¬ sents no immutable, fixed or unvarying group, but a very variable one, differing widely in the extent of its variation in different cases. A species is a relative and subjective conception ; the reality is in the component individuals. See

Evolution, History of; Evolution, Theories of ; Extinction of Species ; Hybridity.

SPECIES, Extinction of. See Extinc¬ tion of Species.

SPECIFIC DUTIES. See Duty.

SPECIFIC GRAVITY. The specific grav¬ ity of a body is the ratio of the mass of that body to the mass of an equal volume of some standard substance which is arbitrarily selected for purposes of reference. In the cases of solids and liquids it is customary to select water as the standard substance ; and water is always understood, in connection with solids and liquids, unless the contrary is explicitly stated. Gases are also sometimes referred to water, but it is much commoner to compare the density of a gas with that of air or hydro¬ gen. The specific gravity of a solid which is not affected by contact with water may be de¬ termined by weighing the solid twice — once while it is surrounded with air, and once while it is submerged in water. The difference be¬ tween the two weights so obtained gives the weight of a mass of water whose volume is equal to that of the solid ; and hence, in order to determine the specific gravity of the solid, it is only necessary to divide the weight as ob¬ served in air by the loss of weight when it is submerged in water. If the solid is soluble in water, or if it is affected by water in any other manner, its specific gravity

must be determined by some indirect method. Many such methods are known. For example, we may replace the water by some other liquid, such as benzene, in which the solid is not soluble, and then per¬ form the experiment precisely as described above. The result so obtained is the specific gravity of the substance with reference to the benzene (or whatever liquid is employed in its place) ; and in order to express the specific gravity of the body with reference to water we have merely to multiply its specific gravity with respect to benzene by the specific gravity of the benzene as compared with water.

The specific gravity of a liquid may be de¬ termined very accurately by means of the “specific gravity bottle.® This is a bottle made of thin glass (so as to be light), and provided with a ground-glass stopper. The weight of the bottle is determined (1) when it is empty, (2) when it is filled with water, and (3) when it is filled with the liquid whose specific gravity is desired. From these data we can easily determine the weight of the water in the bottle, and also that of the second liquid ; and upon dividing the latter by the former we obtain the specific gravity sought. The specific gravity of a liquid may be obtained more ex¬ peditiously (though less accurately) by means of the simple instrument known as the hydrom¬ eter. This consists essentially of a glass bulb (usually cylindrical in shape), provided at its upper end with a graduated stem and weighted at its lower end with shot or- mer¬ cury, so that it will float in an upright position when placed in a liquid sufficiently dense to permit it to float at all. It is evident that such an instrument will be buoyed up more by a dense liquid than by a lighter one; and when the stem at its upper end has once been graduated correctly we have only to place the hydrometer

in the liquid whose specific gravity is desired, and observe the depth to which it sinks, as read from the graduated stem. In Fahrenheit’s form of the instrument there is only one graduation mark on the stem ; but a small pan is pro¬ vided at the top of the hydrometer, and the observation consists in determining what weights must be placed upon this pan in order to cause the instrument to sink to the standard level indicated by the mark on the stem. Hy¬ drometers are often graduated for special pur¬ poses, so that instead of indicating the specific gravity of the liquid in which they are placed, their readings give at once the percentage of alcohol (or of some other substance) that is present. Such instruments are called alcohol¬ ometers, salinometers, lactometers, etc., accord¬ ing to the special kind of liquid f.or whose

investigation they are graduated.

As the density of water varies with the temperature, it is necessary (if we are to have a standard of density that is definite and accu¬ rate enough for scientific purposes) to specify the temperature of the water with which the comparison is made. In England the standard temperature of the water was formerly taken at 62° F. ; but it is now the almost universal practice to make the comparison with water at its temperature of maximum density, or at about 39° F. In the vicinity of this tempera¬ ture, the density of water varies very slowly with the temperature, and hence in comparing the density of a substance with that of water at or near 39° F., it is not essential to observe the temperature of the water with any high degree of precision. It was, indeed, this con¬ venient and practical fact which led to the adoption of 39° F., as the standard temperature of the water.

Following are the specific gravities of vari¬ ous substances, as compared with water at 39° F. ; the temperature of the substances being

Table of Specific Gravities.

Aluminum . 2.68

Antimony, cast . 6.71

Bismuth, cast . 9.82

Brass . 8.5

Copper, drawn . . . 8.88

Diamond . 3.52

Gold, stamped . 19.36

Gold, cast . 19.26

Graphite . 2.3

Melting ice . 0.92

Iron, wrought . 7.79

Iron, cast . 7 . 0 to 7 . 7

Lead, cast . . 11.35

Mercury . 13.596

Phosphorus . 1.83

Platinum . 21.7

Potassium . 0.86

Pyrites, iron . 5.0

Quartz . 2.65

Silver, cast . 10.47

Sodium . 0.97

Steel . 7.82

Sulphur, native . 2.03

Tin, cast . 7.29

Zinc, cast . 7.1

Sulphuric acid . 1.85

Carbon disulphide . . 1.29

Nitric acid. . . 1.56

Chloroform . 1.48

Glycerine . 1.26

Hydrochloric acid . 1.24

Sea- water . 1.025

Olive oil . 0.91

Turpentine . 0.87

Ether (at 70° F.) . 0.72

Alcohol, absolute . :..... . . . 0.79

Bromine (at 32° F.) . 3.19

also supposed to be 39° F., except when other¬ wise specified. It is to be understood that the specific gravity of a solid varies to some extent with the physical condition of the solid. The foregoing values, however, are sufficiently accu¬ rate for general purposes ; and more precise information is given in this encyclopedia, in many cases, in the articles upon the several substances named.

The term specific gravity is not now used as commonly as it formerly was, the density of the substance being spoken of instead; it being understood in such cases that it is the density of the substance relatively to water that is meant, and not its absolute density as expressed in units of mass per unit of volume. In the system of units employed in the United States and in England, this double use of the word density may sometimes lead to confusion. The metric system is now, however, very largely used in scientific work, and here the confusion cannot well occur; for in the metric system the unit of mass (the gramme) is the mass of a cubic centimeter of water at its temperature of maximum density; and hence, in this system, the <(absolute density® of a substance, and its <(density relatively to water,® are one and the same thing.

In the case .of gases the expression specific gravity is. now almost never used ; density hav-- ing practically displaced it. The accurate de¬ termination of the density of a gas is very difficult, and calls for great experimental skill and the finest of apparatus. In the usual method of performing such a determination a pair of glass globes, as nearly identical as possible, are suspended from the respective arms of a delicate balance and weights are added at one end or the .other until perfect equilibrium is attained. One of the globes is then thoroughly exhausted by means of an air-pump, while the other is filled with the gas under examination. The equilibrium of the balance will be destroyed by this process, and if we restore it by adding weights to the arm carrying the exhausted sphere we shall thereby ascertain the weight of the gas in the other sphere. By repeating the experiment with gases of different kinds the weights of equal volumes of these different gases will be ascer¬ tained; and if the various weights so obtained are all divided by the weight as obtained for hydrogen (for example), the quotients will be the densities of the various gases, with respect to hydrogen. The relative densities of some of the more familiar gases are given in the follow¬ ing table, it being understood that the pressure in every case is one atmosphere, and the tem¬ perature 32° F. The relative densities of the gases here given do not change much for con¬ siderable variations of temperature and pres¬ sure; but this constancy is .only approximate, not absolute; and hence, in the interest of accuracy, it is desirable to state (as follows) the

precise conditions under which the table is exact.

According to the experiments of Regnault, a cubic centimeter of hydrogen, at the freez¬ ing point of water and under a pressure of 760 millimeters of mercury at Paris, weighs 0.00008956 grams; and from this fundamental constant it is easy to find the weight, under

Densities of Gases, Relatively, to Hydrogen.

Hydrogen . 1 . 000

Methane (“ marsh gas ”) . 8.118

Ammonia gas (NH3) . . 8.592

Carbon monoxide . . . 13.78

Nitrogen . 14.02

Ethylene (olefiant gas) . 14.18

Air, dry . 14.44

Oxygen . 15.882

Carbon dioxide . 22.08

Cyanogen . 26.01

Sulphur dioxide . 30.54

Chlorine . 34.98

these same conditions, of a cubic centimeter of any of the gases whose densities with re¬ spect to hydrogen are given in the foregoing table.

Consult any standard work on general phys¬ ics.

Allan D. Risteen, Ph.D.

SPECIFIC HEAT. Maxwell defines this expression as follows : ((The specific heat of a body is the ratio of the quantity of heat required to raise (the temperature of) that body one de¬ gree, to the quantity required to raise (the tem¬ perature of) an equal weight of water one

de¬ gree." For most engineering purposes, and for rough calculations of all kinds, this definition is sufficiently accurate. It assumes, however, that the quantity of heat required to raise the tem¬ perature of one pound of water by one degree is the same in all parts of the thermometric scale ; and while this is approximately true, it cannot be admitted when we have to deal with heat-measurements of a high order of precision. We must then define the specific heat of a body as the number of units of heat that must be added to a unit mass of the body, in order to raise the temperature of the body by one de¬ gree ; a unit of heat being simultaneously de¬ fined as the quantity of heat that is required in order to raise the temperature of a unit mass of water by one degree at some particular part of the thermometric scale. Various suggestions have been made as to the particular temperature that the water should have, in the definition of the unit of heat; and different experimenters have used different units, to the great confusion of the subject of heat-measurement in general. There is now a marked tendency toward the general adoption of a temperature of about 15° C. (59° F.) ; so that a unit of heat would be defined (in the metric system) as the quan¬ tity of heat that is required to raise the tem¬ perature of one gram of water from 14.5° C. to 15.5° C. ; and in the familiar English and American system the unit would be similarly defined as the quantity of heat required to raise the temperature of a pound of water from 58.5° F. to 59.5° F. Adopting this definition of the unit of heat, we may speak of the specific heat of water itself ; the specific heat of that fluid at t° C. being the quantity of heat required to raise the temperature of a certain mass of water by one degree at t° C.. divided by the quantity of heat required to raise the temperature of an equal mass of it by one degree at the temper¬ ature 15° C. It is easily seen that it is of the highest importance to the physicist to know precisely how the specific heat of water (as thus defined) varies with the temperature t° ; and it might not unreasonably be assumed that this fundamental matter would earlv have re¬ ceived a satisfactory amount of attention. Such

was not the fact, however. Regnault indeed made an elaborate study of the subject, and published his results in the \enth memoir of his first series (1847). His conclusions were ac¬ cepted for many years, but it is now known that they are incorrect, the data that he gives being even inconsistent among themselves. The gen¬ eral acceptance of Regnault's work on the spe¬ cific heat of water has vitiated many otherwise important researches on the subject of heat; but we are now in possession of data that appear to be very much superior, and the confusion that has prevailed in the past is likely to be avoided in the

future. (With reference to Regnault's work on water, see a letter by J. Macfarlane Gray in Engineering for 9 Jan. 1885, p. 42; also a more extended discussion in the same journal for 12 July 1889, p. 57; also E. H. Grif¬ fiths, Philosophical Magazine, November 1895).

Rowland, in connection with his famous work on the mechanical equivalent of heat (1879), carefully investigated the specific heat of water over a range of temperature extending from 0° C. to about 40° C., and he first showed that in this interval the specific heat of water decreases with rising temperature, attaining a minimum value somewhere about the tempera¬ ture 30° C. (Rowland, <Physical'T,'apers,) p.' 387). Other experimenters have since corrob¬ orated his results ; but it-tvas not until 1902 that a complete series of apparently satisfactory measurements of the specific heat of water from the freezing-point (q.v.) to the boiling-point (q.v.) were published. These are due to H. T. Barnes, of McGill University, Montreal. Mr. Barnes assumes 16° C. as the temperature at which the specific heat is unity (that is, he takes, as his unit of heat, the quantity of heat required to raise the temperature of a gram of water by 1° C., at 16° C.). His results (Philosoph¬ ical Transactions,* A, Vol. 199, p. 149) are as follows :

Specific Heat of Water at Various Tempera¬ tures, in Terms of a Thermal Unit at 16° C. (Barnes).

Temperature	Specific heat	Temperature	Specific heat
5° C.	1 . 0053	55° C.	0.9985
10	1 . 0023	60	

0.9991

15

1 . 0003

65

0.9997

20

0.9990

70

1 . 0004

25

0.9981

75

1.0010

30

0.9976

80

1.0017

35

0.9974

85

1 . 0024

40

0.9974

90

1 . 0030

45

0.9976

95

1 . 0037

50

0.9980

The variation, as will be seen by the table, is quite small, and for many purposes the spe¬ cific heat of water may be taken as unity at all temperatures. This will be assumed to be the case in the illustrations and explanations which follow ; for the corrections which must be made in order to take the actual variation into account are tedious, and their accurate comprehension and application imply a certain knowledge of practical physics which the reader cannot be assumed to possess.

The specific heat of a body which is not affected by contact with water may be deter-

mined by heating the body to a known temper¬ ature, and then immersing it quickly in a defi¬ nite mass of water'whose initial temperature is also known. If we denote the mass of the water by W and that of the body under investigation by My and if Tx is the initial temperature of the water, and T2 that of the body, and if .*S*' is the specific heat of the body and T is the final tem¬ perature that the body and the water have in common, we may calculate the specific heat, S, as follows : The temperature of the water has been raised from Tx to T, and the mass of the water is W pounds, or grams, as the case may be. Then it follows that the number of units of heat that have been absorbed by the water is W(T — Tx). Similarly, the body has cooled from Tz to T , and its mass is M. Hence if the body had a specific heat precisely equal to that of water, we should know that it had given up M(T2 — T) units of heat. Its actual specific heat, however, is S ; and hence it follows, by the definition of specific heat, that the actual quan¬ tity of heat given out by the body is SM (Tz —

T) units. As we shall suppose that the radiation and conduction of heat between the apparatus and outside objects is negligible, it follows that the quantity of heat given out by the body is equal to the quantity absorbed by the water ; that is, we must have the equation W (T — Tx) = =SM(Tz—T)

And from this we easily find W (T — Tx)

S = - -•

M(Tz—T)

In the actual covnduct of an experiment of this kind there are many difficulties to overcome, and many corrections to be estimated and ap¬ plied. There is always more or less communi¬ cation of heat between the apparatus and out¬ side objects, and the heat that is given out by the cooling body warms not only the water, but also the containing vessel, the thermometers and the stirring apparatus.

In determining the specific heat of a body advantage is often taken of the known fact that the quantity of heat required to melt one pound of ice at 32° F. is approximately the same as the quantity of heat required to raise the tempera¬ ture of one pound of water by 140° F. In the application of this fact to the determination of specific heats the body under investigation is surrounded by ice, and the number of units of heat that are given off is determined by observ¬ ing the quantity of ice that is melted, and multiplying that quantity (as expressed in pounds) by 140. Bunsen devised a very delicate apparatus for the execution of this sort of measurement. In his instrument the body to be studied is placed in a cup-shaped depression in a glass vessel that is filled with ice and water, and which is entirely sealed, save for a grad¬ uated capillary tube, one end of which enters the mixture of ice and water, while the other end projects into the air. The quantity of ice that is melted by the heat given off from the body is not directly observed, but is inferred from the change in volume of the ice-and-water mixture, as indicated by the motion of an index drop of mercury in the capillary tube; it being known that ice upon melting contracts by about one- twelfth of its own volume.

The specific heat of a gas is defined in pre¬ cisely the same way as the specific heat of any

other body; but in the case of gases it is neces¬ sary to specify the way in which the change of temperature of the gas takes place. Thus we

may heat a gas while we maintain its pressure constant (permitting the volume to increase as much as it will), or we may heat it while its volume is kept constant (the pressure mean¬ while increasing). The specific heats obtained under these two different conditions are quite different in numerical value, and they are dis¬ tinguished respectively, as the ((specific heat at constant pressure® and the ((specific heat at con¬ stant volume.® The specific heat of a gas at constant pressure may be determined with considerable accuracy by causing a stream of the gas to flow through a calorimeter, so that it ex¬ periences a definite fall in temperature in its transit. The quantity of heat given up by the gas can be made to be very considerable (and hence easily measurable) by continuing the flow for a sufficient time ; and to determine the spe¬ cific heat at constant pressure, we then have merely to divide the total quantity of heat given out by the gas by the total mass of the gas that has been passed through the calorimeter, and again by the fall in temperature that the gas has experienced. The specific heat at constant volume is more difficult to obtain, and it has usually been determined by an indirect method, rather than by direct measurement. It can be determined directly, however, and apparently with considerable precision, by means of the Joly steam calorimeter.

Following are the specific heats of a number of substances ; though it must be remembered that many of them are more or less uncertain, not only because they vary (in the case of solids) from one specimen to another, and from one temperature to another in all substances, but also because in their determination the ther¬ mometric and calorimetric work has unfor¬ tunately not always been beyond reproach.

Table, of Specific Heats.

Aluminum . 0.2122

Antimony . 0.0486

Boron . . 0.252

Bromine (liquid) . 0.1071

Carbon (diamond) . 0.113

Carbon (charcoal) . 0.194

Cooper . 0.0933

Gold . 0.0316

Iron . 0.112

Lead . 0.0315

Magnesium . 0 . 245

Mercury . 0.0335

Nickel . 0.109

Phosphorus . 0.170

Platinum . 0.0323

Silver . 0.0559

Sulphur (freshly melted) . 0.184

Tin (cast) . 0.0559

Zinc . 0.0935

Ice (at 0° F.) . 0.504

Alcohol . . 0.65

Chloroform . 0.235

Ether . 0.54

Carbon disulphide . 0.24

Air . 0. 23 75

Oxygen . 0.2175

Nitrogen . 0.2438

Hydrogen . 3 . 4090

Carbon dioxide . 0.2163

Ammonia gas (NH3) . ■ . 0.508

Methane . 0.593

In the foregoing table the results given for gases are the specific heats at constant pressure.

Consult Ganot, (Elementary Treatise on Physics, *and Preston, (Theory of Heat.*

Allan D. Risteen, Ph.D.

SPECIFIC PERFORMANCE, in equity,

a proceeding to compel the performance of a specific agreement, as the sale of land, when damages would not be an adequate remedy. It is within the discretion of the courts to grant or deny this form of relief, and in their decisions they are guided largely by precedent. It is more commonly decreed in cases of contracts to convey or lease land. Usually it is refused in cases of contracts to convey a chattel unless it is unique and cannot be secured elsewhere. It will not usually be decreed when there is an adequate remedy at law, when it is not reason¬ ably possible, when the complainant has done something inequitable, or when the court cannot enforce or superintend the execution of its decision. Usually specific performance will not be granted in cases of personal services, as those of actors, painters, singers, etc., even if the damages recoverable at law are exceedingly inadequate.

SPECIFICATION, a detailed mention of particulars: (1) In patent law, the applicant’s statement describing the method of construc¬ tion and use of the device presented for patent. The description must be sufficiently clear to enable any person with requisite skill to make the article in question; and in United States law the process as described in the specification becomes a part of the patent, any necessary de¬ tail omitted being cause for invalidation of the patentee’s rights. (2) In architects', builders' or mechanics' contracts, the description attached to the plans detailing the materials to be used, method of construction to be followed, the time permitted for the completion of the work and all other items of information which cannot be set forth in the drawings.

SPECTACLED BEAR, the bear of the South American Andes. See Bear.

SPECTACLES, magnifying glasses made as a pair to be fitted over the eyes to aid the vision, supposed to have been invented by Roger Bacon

in the 13th century, and used to magnify an object or correct some defect in the organs of vision. Spectacles consist generally of two oval or circular lenses mounted in a light metal frame which is made up of the “bows,® “bridge,® and “sides.® The lenses may be bi¬ concave, bi-convex, concavo-convex, etc., though lenses forming segments of a cylinder are used in some cases of astigmatism. In long-sighted persons the defect of the eye is counteracted by convex lgnses, in short-sighted persons by concave lenses. When made with¬ out bows to hold on the ears or hair, and with a spring in the bridge, they are specifically termed eye-glasses, or pince-nez.

Divided or pantascopic spectacles have each lens composed of twio semi-circles of different foci neatly united one above the other ; one half for looking at distant objects, and the other for examining things near the eye. An¬ other kind, called periscopic spectacles, has been contrived in order to allow considerable lati¬ tude of motion to the eyes without fatigue. In such case the concave side of a diverging me¬ niscus lens is placed toward the eye. A mod¬ ern form is made of plain glass with large rims, as of imitation tortoise shell, for protec¬ tion of the eyes against sand, etc., as encoun¬ tered in driving an automobile. Colored lenses of flat glass are employed in spectacles to re¬

lieve the eyes of a glare of light. Wings or “blinders® are sometimes added to keep out the dust. Where two lenses are supplied for each eye they are termed compound spectacles or compound lens spectacles. Ordinary stand¬ ard spectacle lenses are numbered according to the inches of focal distance, a No. 12 involv¬ ing holding a paper at a distance of 12 inches from the eye to get the correct focus and read easily. Astigmatism (q.v.) is so common that spectacles are frequently made to a prescrip¬ tion, each glass being ground to a curve to cor¬ rect the inaccuracy of the eye. Consult Crookes, Preparation of Eye-Preserving Glass for Spectacles) (1914). See Lens; Eye; Vision.

SPECTATOR, The. Tuesday, 12 April 1709, deserves to be remembered as an impor¬ tant date in the history of English literature. For on that day Richard Steele issued the first number of The Tatler. This modest half sheet, issued thrice a week, was in reality the begin¬ ning of English periodical literature. Defoe had founded his Review two years before; but that was a little sheaf of political news and opinions with no charm of literary quality. It was the merit of Steele to perceive the oppor¬ tunity for a new form ot journal which should picture, in entertaining fashion and in a temper of kindly satire, the manners and conduct of contemporary society. He put at

the head of his first number a couplet from Juvenal:

“Whatever men do, or say, or think, or dream

Our motley paper seizes for its theme.”

Addison, it seems, had not been informed of Steele’s project, and did not recognize the hand of his friend until the sixth number. He is supposed to have written the eighteenth paper, but did not join Steele as a regular con¬ tributor until near the close of the year 1709. In the next two years his aid became indispen¬ sable. As Steele himself said, “I fared like a distressed prince who called in a powerful neighbor to his aid, and when I had called him in I could not subsist without him.® On 2 Jan. 1711, The Tatler was brought suddenly to an end, but after an interval of two months was followed by that more famous paper, The Spec¬ tator. The Spectator is usually spoken of as Addison’s; but in fact it was under the joint conduct of Addison and Steele, and the con¬ tributions of the two men were about equal in number.

Yet it is not without good reason that we speak of Addison’s Spectator. Addison’s humor, if less buoyant and convivial than Steele’s, was more subtle, delicate and widely observant. Steele was the typical man about town, who threw himself heartily into the life of the hour; Addison was rather, as he styled himself, a spectator who sat in his arm-chair at Buttons and watched the varied play of life about him with quiet, superior satisfaction. Mr. Spectator is always courteous, refined, ur¬ bane. You feel in his page the charm of man¬ ners and the grace of good society; and if in many of his papers there is a flavor of pretty malice, it is directed against the follies and foibles, the petty meannesses that often hide under outward good breeding. His best papers are doubtless those devoted to this kindly social satire.

Yet it is possible that Addison himself esti-

mated more highly the critical and the ethical essays which usually appeared, the one kind on Fridays and the other on Saturdays. Some of the critical papers, especially the famous series on Milton’s Paradise Lost, have been greatly admired and frequently reprinted. But the reader of to-day will probably not find them of absorbing interest.

Their criticism is purely formal and academic; Addison is trying to prove by Aristotle's rules, that Milton was a great poet. Of all such criticism it may be said that, if the reader knows his Milton, it is needless; if he does not, it is useless. The eth¬ ical and religious papers though perhaps less often mentioned, are some of them rather more entertaining. Addison was the son of a dean and always something of a preacher himself. <(He's a parson in a tie-wig,® said Mandeville. And when the parson in a tie-wig preaches to us from The Spectator's chair of a Saturday, the sermon may sometimes be a little prosy, but it is always wholesome and genuine. It is a calm and winning religion Mr. Addison has to recommend, and he exemplified it himself. It is quite possibly true, as some one has said, that The Tatler and The Spectator did more for English society than all the sermons preached in the Queen Anne time; for they brought religion and morality into fashion.

But most of the humor and the wisdom of The Spectator might have perished had it not been for the perfection of the style in which they were conveyed. Steele wrote as he talked, in rapid, careless fashion; he would not stay for careful elaboration or tedious cor¬ rection. Addison, on the contrary, was careful, even finical in all matters of expression ; but his effort issued in a style simple, suave, ur¬ bane. He succeeded in combining idiomatic ease with perfect finish as no other writer of his time could do, and very few have done since. Everybody remembers the admiring dic¬ tum of Johnson: <(Whoever would attain in English style, familiar but not coarse, elegant but not ostentatious, must give his days and nights to the study of Addison.® The critic to-day may find his thought lacking in depth, and his manner lacking in energy; but few writers have known better how to marry their thought and feeling with perfect phrase.

The immediate success of The Tatler and The Spectator is significant of an important change in English society. For some 50 years there had been growing up in England a great middle class, shrewd, intelligent and rap¬ idly gaining wealth. They owned a great part of the national debt that England had been rap¬ idly piling up ; they were actively interested in politics; they formed the majority of the Whig party that was to rule for nearly a hundred years. It was this class that furnished for the first time in England a large reading public. By the Queen Anne time they were crowded into London, where they were readily accessible to the pamphleteer and journalist. Eighty thousand copies of Defoe's (True Born Eng¬ lishman were sold on the streets of London, and Swift's (Conduct of the Allies) ran through four editions in one week. It was Steele and Addison who first hit upon the new literary form adapted to the wants of such a class of

readers. They were the creators of English popular literature. It was Addison,

especially, who saw that such writing, however familiar or even trivial its themes, is susceptible of that exquisite finish that ensures its per¬ manence. The Spectator had scores of imita¬ tors in the course of the century, the most fa¬ mous of them being The Rambler and The Idler of Samuel Johnson; but none of them equaled their model in variety of theme or charm of treatment. Consult Johnson, Samuel, (Lives of the Poets} ; Courthope, (English Men of Let- ters) ; Stephen, Leslie, dictionary National Biography > ; Thackery, (English Humorists J ;

(Cambridge History of English Literature) (Vol. IX, ch. 2).

Caleb T. Winchester,

Professor of English Literature, Wesleyan University.

.SPECTROMETER, an instrument having a prism in the centre and telescopes for measur¬ ing the angular deviation caused by passing of light through the prism. This determines the degree of refraction of the glass or other sub¬ stance of which the prism is made. A diffraction grating of polished metal or glass closely ruled in parallel lines may be substituted for the prism in some forms of spectroscope. In the most familiar type, a three-sided prism is mounted on a central table and a short tube or telescope reflects the light from an outer mirror to a collimating lens to make a beam in which the light rays all are parallel and directed on the prism. Another tube or telescope is positioned to observe another face of the prism, and this observing telescope has cross wires for noting lines accurately. There being a graduated circle in the central table, it be¬ comes a matter of measurement to observe the difference, if any, at which the parallel rays enter and leave the prism. The angle of the faces of the prism has to be considered in mak¬ ing the calculation. With a diffraction-grating the data can be obtained to calculate the wave¬ length of the light-ray that passes.

SPECTROSCOPE, the instrument em¬ ployed in spectrum analysis. See Spectro¬ scopy.

SPECTROSCOPY. If one observes a Bunsen flame through an ordinary glass prism held close to the eye he will see a succession of colored images of the flame. This series of colored images is called the spectrum of the flame. An instrument, such as the prism, which will separate the various radiations emitted by any source of light, .is

called a spectroscope. Spectroscopy is, therefore, defined as that science which has for its object the determina¬ tion and description of the various radiations which different bodies emit, reflect and absorb. The subject is here treated under seven head¬ ings as follows: (1) Preliminary, concerning the Nature of Light; (2) Sources of Radiation; (3) Separation of Radiations; (4) Methods of Recording Radiations; (5) Comparison and In¬ terpretation of Radiations; (6) Summary of Principles; (7) Bibliography.

1. Nature of Light.— Present views con¬ cerning that form of energy which we call light are based almost wholly upon experimental evi¬ dence furnished by Huygens, Newton, Young and Fresnel. Since light is the subject matter of spectroscopy, it is essential, at the outset, that we should understand the modern theory of light as perfected by these four men. Huygens,

SPECTROSCOPY

Fig. 1 The Rumford spectroheliograph attached to the 40-inch telescope

Fig. 2 The Bruce spectrograph attached to the 40-inch telescope of the Yerkes Observatory, showing accessories, induction coil for producing comparison spectrum, metallic cases for controlling temperature and the three large prisms Fig. 3 Spectrum of Alpha Persei with comparison spectrum of titanium (bright lines above and below)

Fig. 4 Spectrum of Beta Orionis (Rigel) with comparison spectrum of titanium, in an early stage of development, showing lines of few elements, hydrogen, helium and magnesium

Fig. 5 A group of solar prominences about 30,000 miles high, eruptions of calcium vapor containing other elements, photographed through the calcium line H

Photographed by Henry Crew at Northwestern University

CO

•

CO

O

rf-

P

tv

CO

*0

a >

n

P

o

O

p

H

cr

o

P

c

a

3

3

3

o

*— • Q- O

O

P

c

I

Mag

Iron

^3

CO

0

P

0

3'

3

3

fl >

co.

5*

rr

u.

3

5*

3

0

*1

c

3

Cfl

c

3

to

00

o

w

o

3*

cyanogen • Uarbon ” H B

4500 4600 4700 4800 4900

by assuming that light consists of a wave-mo¬ tion in the ether, showed that on simple dynami¬ cal principles, reflection, refraction and the finite velocity of light might be easily explained. He first interpreted for us the physical constant known as the ((refractive index,® suggesting that for any medium it is merely the ratio of the speed of light in air to the speed of light in that medium. To Newton we owe two capital dis¬ coveries concerning the nature of light. In 1669 he demonstrated experimentally that white light contains all the colors of the rainbow, that the simple prismatic colors obtained by analyz¬ ing white light cannot be farther separated into other colors by passing them through prisms, and that color, in general, is merely white light from which has been removed some of its colored constituents. Besides this, Newton established the fact that these luminous dis¬ turbances (which he thought of as moods of easy and of difficult transmission, but which we now call light-waves), are not irregular pulses, as Huygens imagined, but are periodic in char¬ acter. This inference is drawn from the phe¬ nomenon known as (<Newton’s Rings.® We come next to the work of Thomas Young (1 773— 1829) who first demonstrated the fact that, under proper conditions, two rays of light, that is two trains of light-waves, may

interfere in such a manner as to produce darkness. Young's explanation of diffraction, however, proved to be utterly insufficient, and for the phenomenon of polarization he could offer no explanation whatever, for the reason that he conceived light-waves to be longitudinal and not transverse vibrations. To summarize Young's work most 'briefly would be to say that he introduced into optics the principle of in¬ terference — or of (<non-interference,® as sug¬ gested by Michelson, since the principle con¬ sists merely in the fact that of two light rays

Fig. 1.— An "end on" tube. Shows one form of tube recently employed by Michelson, in which the dis¬ charge is viewed from the end, rather than tne side of the tube, and which is known, therefore, as an end on " tube.

meeting at a point each produces its own effect independently of the other. Fresnel (1 788— *1827), in a certain sense, perfected the wave- theory of light by combining the principle of Huygens with the principle of interference and by introducing the idea that light-waves, unlike sound-waves, are transverse disturbances. Evi¬ dence for this view lay in the fact that light can be polarized. We may now summarize the labors of these four men by saying that experi¬ ment seems to indicate that light consists in a transverse wave-motion in a medium which per¬ vades all known space and which we call the ether. In space devoid of ordinary matter light

of any color travels with a speed of approx¬ imately 186,330 miles per second, while in all ordinary matter light travels with less speed, the amount of diminution becoming greater and greater as we pass from the red to the violet.

Bearing in mind this conception of a train of light-waves, we proceed to consider the gen¬ eral method of spectroscopy. The examination of a body by means of the spectroscope includes, in general, four steps. These are :

A. The Production of the Radiations.

B. The Separation of the Radiations.

C. The Recording of the Radiations.

D. The Comparison and Interpretation of the Radiations.

We shall in the following four sections con¬ sider these four steps.

1. Sources of Radiation. — In practice the spectroscopist is limited to two artificial sources, namely, flames and electric currents. Besides these are many natural sources such as light¬ ning, the aurora borealis, meteors, stars, glow¬ worms, etc. ; but the nature and occurrence of these natural phenomena are so far beyond our control that they do not here call for discus¬ sion. Adopting the following classification, we

Sources. .

Natural . . .

Artificial . .

Lightning,

Stars, including the sun, Comets,

Aurorae,

Meteors,

Glowworms,

Flames. . . .

Electric

currents.

[Candle, l Alcohol, j Bunsen,

I Oxy-hydrogen.

| Arc,

\ Brush discharge, { Spark.

now proceed to a description of some par¬ ticular artificial sources.

Candle and Alcohol Flames. — These have mainly a historical interest, as being the first sources in which line spectra were observed. The temperature of the alcohol flame is only roughly known, but is probably not far from 1,300° C. Substances are easily introduced into the flame and the flame itself is fairly colorless. These two qualities combined to make it very useful in the early history of the science.

Bunsen Flame. — The flame which Bunsen devised in 1856 has three marked advantages as a spectroscopic source, namely, it is simple in construction and operation ; its outer mantle is almost totally devoid of any characteristic •spectrum of its own; and it possesses a high temperature. Many measurements of the tem¬ perature of this flame have been made, but there is good reason for believing that nearly all of these are under-estimates. The most re¬ liable measurement is probably that of Weg- gener, at Berlin, who obtained 1,788° C. for the outer mantle. The temperature of the violet mantle is probably about 100° or 200° less ; while the temperature of the inner dark cone ranges from 250° to 500° C. The substance whose spectrum is desired may be introduced into the flame in a great variety of ways. Bun¬ sen used a bead of the material on a platinum wire ; sometimes a piece of asbestos is con¬ venient ; Gouy uses the spray from an atomizer ; Eder and Valenta have employed a platinum wire-gauze wheel to transport the solution from a dish to the flame.

Oxyliydrogen Flame. — This flame is also nearly colorless, has an exceedingly high tern-

perature and gives spectra approximating those obtained in the electric arc. It has been used with great skill by W. N. Hartley.

Electric Arc. — This source has been in com¬ mon use since the invention of the Gramme dynamo, 1876. The arc is generally used in one of two ways, either by drilling holes in the carbon rods and filling these holes with the ma¬ terial whose spectrum is desired, or by making the electrodes directly and entirely out of the substance which is being studied. This latter method is, of course, practicable only in the case of materials which conduct electricity. The temperature of the carbon arc is not accu¬ rately known, but probably lies between 3,500° and 3,900° C. As a spectroscopic source it is admirable in nearly every respect except that in those regions of the spectrum which are most easily studied carbon has a strong spectrum of its own which is always superposed upon that of the substance under investigation. In the case of metals, the easiest method of avoiding this difficulty is to use a rapidly rotating metal disc for one electrode and a metal rod for the other. The incandescent metal vapor thus ob¬ tained yields the purest spectra known.

Electric Spark. — Of all sources of radiation that which is most

generally convenient and most widely used is perhaps the electric spark, obtained by use of an ordinary induction coil. Spark discharges may also be obtained from an electrostatic machine, such as the Wimshurst, from a Tesla coil, or even from a high voltage storage battery. In general the electric spark produces two spectra, namely, the spectrum of the electrodes and the spectrum of the air or other gas between the two electrodes. But, as was discovered by Pliicker in 1858, the spec¬ trum of the electrodes may be avoided by en¬ closing them in a partial vacuum. Under these conditions one gets only the spectrum of. the surrounding gas; so that now the almost uni¬ versal method of studying the spectra of gases is to seal platinum electrodes into a glass tube and then fill the tube under low pressure with the gas to be studied.

The converse problem of getting the spectrum, of the electrodes, without that of the surrounding gas, has been solved by Demarcay, Schuster and Hemsalech, who have proved that practically all the ((air lines® of a spectrum may be eliminated by placing in the discharge circuit a proper amount of inductance. In this manner the discharge is prolonged and is made to re¬ semble that of the arc.

The electrodes are connected in series with an inductance I, and in parallel with a capacity

Fig. 2.— ■ Circuit for spark discharge. Illustrates a typical discharge circuit. T is an induction coil or hign voltage transformer. The primary circuit is operated by a battery, B, or some source of alternating current.

C. Concerning the temperature of the spark very little is known. It has been generally assumed to be very much higher than that of the electric arc : but there is no direct evidence for this view and there is much indirect evidence against it.

1. Separation of Radiations. — Let us sup¬ pose that we now have before us one of the above-mentioned sources whose spectrum it is

Fig. 3. — Prism used for examining a point- or line-source.

[This figure is taken from Crew's ' Elements of Physics,'

published by Macmillan Co., New YorkJ.

desired to examine. The next step will be to separate the rays of various wave-lengths so that we may examine them independently.

The reader may here assume that each different substance introduced into the flame or arc gives a different spectrum, peculiar to itself ; for this is the experimental basis of spectrum analysis. This analysis is usually accomplished either by passing the light through a prism or by allow¬ ing it to fall upon a diffraction grating.

The Prism Spectroscope. — If the source of light be small and if it is necessary to make only a hasty visual examination, the most convenient plan is simply to view the source through a prism, placed immediately in front of the eye, as indicated in Fig. 3.

This is an especially useful method in ob¬ serving the discharge in the capillary portion of a vacuum tube. The chief difficulty in the naked prism is that the source, however small, is generally still so large that the successive colored images formed by the prism will over¬ lap each other, leaving the separation incom¬ plete. To avoid this difficulty a small tele¬ scope — called a collimator — is placed between

Fig. 4. — Diagram of spectroscope.

the prism and the source as ‘shown in Fig. 4. In the principal focus of its objective is placed a narrow, straight slit with movable metal jaws. The source is now placed immediately back of this slit, or the image of the source is focused upon the slit by means of a lens, called the image lens.

When the slit is properly placed and illumi¬ nated the collimator will emit from each point of the slit a beam of nearly parallel light whose

cross-section is equal to the effective aperture of the objective. If now this emergent beam be examined through a prism and the naked eye as before, a series of colored images of the slit will be seen, each appearing to be at an infinite distance from the observer; and if the slit is narrow these images will be sharp and fine and easily separated. But they will not, in general, appear very bright because the aperture of the human eye is too small to ad¬ mit more than a fraction of the emergent beam. Accordingly these colored images, each at an infinite distance, are viewed through a small astronomical telescope, called the view tele¬ scope. This serves to condense the entire beam which emerges from the prism and reduce it to another parallel beam just large enough to fill the aperture of the average human eye.

Pig. 5. — The spectrograph. [This figure is taken from the optical catalogue of Steinheil in Munich, Germany].

When it is desired to photograph a spectrum the view telescope is removed and is replaced by a camera with a photographic objective. Such an instrument is known as a spectrograph and an excellent modern form of it is illus¬ trated in Fig. 5.

When the typical spectroscope, represented in Fig. 4, is provided with a graduated circle, and so arranged that the view telescope and the prism can rotate about the axis of the divided circle, the instrument is known as a spectrom¬ eter, and can be employed for the measure¬ ment of prism-angles and wave-lengths as well as for the examination of spectra. In this type of spectroscope it is nearly always necessary for the sake of good definition to place the prism in such a position that it will produce a minimum deviation in the incident pencil of rays. For it is proved in geometrical optics that a homocentric pencil will remain homo¬ centric after passing through a prism only pro¬ vided the prism is placed in its position of minimum deviation. If the prism be set in any other position the image of a point-source will not be a point, but a line.

Resolving Power of a Prism. — If one had a prism spectroscope which was practically per¬ fect so far as all the optical parts are con¬ cerned, he would yet find that the ability of the prism to separate light-waves of different lengths was subject to still another limitation — a limitation which arises ultimately from the fact that light-waves have an appreciable length. This ability to separate radiations is known as ((resolving power® and is measured by the ratio

— — where dL is the difference of the wave- d (

length and ˆ the mean wave-length of two spec¬

tral lines which can just be resolved by the dispersion piece in question.

Rayleigh has proved that a prism can just resolve two lines when the difference of their refractive indices <*p is given by the following

/t

equation <5/* = = - where /2 and t\ are the

h — h

thickness of glass traversed by the extreme rays on either side of a parallel beam passing through the prism.

If now dp be expressed in terms of di by means of a dispersion formula such as the fol¬ lowing, due to Cauchy, we have

P = A + — , and dp =

2BM

/J

where A and B are constants depending upon the kind of glass employed in the prism.

From these it follows that the resolving power, R, for prism is

p d. _ 2B(t-2 — ti)

di X*

This equation is fundamental in describing the spectroscopic value of a prism. It means that the resolving power varies directly as the width of the prism and inversely as the cube of the wave-length of the light examined. It tells us also just how thick a prism of any given glass must be, at its base, in order to separate two lines having a given difference of wave-length. The prism spectroscope was first effectively used by Fraunhofer (1817-28) ; but it was not until 1859 that Kirchhoff and Bunsen demonstrated the power of the instrument in chemical an¬ alysis, and in a study of the sun's physical condition.

The Grating Spectroscope. — So far as its auxiliary parts are concerned this piece of ap¬ paratus is very like the prism spectroscope : but as regards its essential feature, the dispersing piece, the two instruments are radically differ¬ ent. For the dispersion which is produced by a prism rests ultimately upon the fact that waves of longer length travel through glass at a higher speed than those of shorter length : while the dispersing effect of a grating is due to the fact that when waves of different lengths are forced to pass through a narrow opening, they are all spread out like a fan — diffracted — the longer waves being more spread out, how¬ ever, than the shorter ones. If a gas flame, turned low, or an incandescent electric lamp be examined through a single narrow slit in a vis¬ iting card, a number of spectra will be seen on each side of a central bright image. These have been called, by Fraunhofer, <(spectra of the first class.® They are not used in spectroscopy. If, however, the same source of light be

viewed through two or more fine parallel equidistant slits, placed close together, say less than one- sixty-fourth inch apart, another series of spectra will be observed. These are the combined effect of light passing through several openings ; they are known as ˆspectra of the second class® and are practically the only ones in the grating spectroscope. These narrow equidistant parallel slits were first prepared by Fraunhofer (1821) who formed them by wrapping fine wire over the thread of two parallel screws, then solder¬ ing the wires to the screws and cutting away one entire side of the little cage thus formed. Such a device he called a grating. The modern grating is made by ruling straight lines with a diamond point <?n a flat plate of highly polished

speculum metal. Good gratings have usually from 5,000 to 20,000 lines per inch. Here the light is reflected from the unruled surface be¬ tween two successive furrows made by the diamond; and diffraction occurs exactly as if the light had passed through a narrow aperture of the same width. Such a device is called a reflection grating, and when placed where the prism stands in an ordinary prism spectroscope we have what is called a grating spectroscope.

When a beam of parallel rays emerges from the collimator and falls upon a grating placed with its rulings parallel to the slit of the col¬ limator, part of the light is reflected according to the laws of ordinary reflection and forms, in the focal plane of the view-telescope, what is known as the central image. The remainder of the light, however, is spread out on either side of this central image, the blue light being de¬ viated least and the red light (longest waves) being deviated most. Unlike the prism the grating yields several spectra distributed on each side of the central image.

If monochromatic light be viewed with such an instrument a series of bright lines — sharp maxima — each an image of the slit will be seen distributed on each side of the central image. The image nearest the central one is said to be of the ((first order,® the next of the <(second order,® etc. The properties of these images and of diffraction spectra, in general, are most briefly described by the following three equa¬ tions, which follow directly from the wave the¬ ory of light

(a~\~b) (sin i + sin0) = mA . . . (Eq. A).

Here a + b is the distance between corre¬ sponding points on two consecutive rulings — the so-called grating constant. The angle of incidence is denoted by i; the angle of diffrac¬ tion by 6 ; the order of the spectrum by m and the wave-length by /l . This equation tells us exactly in what position, 0, we must set the view-telescope in order to observe a line of any given wave-length. Conversely it enables us to compute the wave-length when once we know the grating constant and the directions of the incident and diffracted rays.

sin'

,np(a + b)

r

fi(a + b)

. . . (Eq. B).

sim

Here / is the intensity of the spectrum of a monchromatic source of wave-length ˆ in any given direction, produced by a grating which has n lines ruled upon it at a uniform distance, a + b, apart.

/' is the intensity which a single aperture would give in the same direction. The (<given direction® is here defined by fj- whose value is

27T. ... .

sin i + sin 6)

the symbols having the same meaning as in Eq. A.

It is important here to observe that Eq. A. merely defines the direction in which / of Eq. B reaches its principal maxima.

Lord Rayleigh has shown that the resolving power of a grating, R, is defined by the follow¬ ing simple expression :

R = ~ = mN . (Eq. C)

where N is the total number of rulings on the

grating and m is the order of spectrum em¬ ployed.

All of the best gratings of the world up to the present time have been ruled on Rowland's dividing engines at Johns Hopkins University. After Rowland's death, hi 1901, his two ruling engines were not again used until Dr. J. A. Anderson took up this work in 1910. Most of these gratings are ruled with from 5,000 to 20,000 lines per inch ; some of them have a ruled surface six inches in width, thus giving a re¬ solving power of no less than 400,000 in the fourth-order spectrum. Such a resolving power is far in excess of anything attainable with prisms of practicable size. Dr. J. A. Anderson, and others, have recently devoted much atten¬ tion to the problem of securing replicas, or reproductions, of the expensive Rowland grat¬ ings. The attempts thus far are full of prom¬ ise, and if they become wholly successful it will be possible for the physicist and astronomer to secure this fundamentally important part of his apparatus at a cost which will be com¬ paratively only a nominal one.

Concave Grating Spectroscope. — Recent advances in spectroscopy are due in a very large degree to the invention of the concave grating by Rowland in 1883. The distinguishing feat¬ ures of this instrument are that it requires no collimator and no view-telescope, and that it gives spectra which are normal throughout a large range. The ruling is upon a concave spherical mirror of speculum metal, the dis¬ tance between the lines being equal when meas¬ ured along a chord. It was with a spectograph of this type that Rowland and Higgs each pre¬ pared his superb atlas of the solar spectrum. The same kind of grating was also employed by Kayser and Runge in their profound study of the spectra of the elements.

The Echelon Spectroscope. — Measured by resolving power, the Echelon, devised by Mi- chelson in 1898, is still a more effective instru¬ ment. This is essentially a grating with only a few rulings in which the form of the groove is under perfect control. This result is ob¬ tained by using a pile of plane parallel plates of equal thickness, the edge of each plate being slightly displaced over that of its preceding neighbor. The high resolving power is ob¬ tained by use of spectra of high orders, even as high as several thousand. The Echelon is especially adapted to the separation of the close components of a spectral line, as in the case of the Zeeman effect.

The Interferometer. — Another device for separating the close compound of what is or¬ dinarily called a single spectral line is the interferometer, which is also largely due to Michelson. It is this invention which makes it possible to use the wave-length of the red cad¬ mium ray as a standard of length instead of the international metre at Paris ; for Michelson has shown that by the interferometer he

can meas¬ ure wave-lengths with an accuracy of one part in a million.

1. Methods of Recording Radiations. —

Having separated the different lines in any spec¬ trum, the next step, in general, is to record the intensity, position (wave-length) and physical character of each of these. Just how this is accomplished will depend partly upon the por¬ tion of the spectrum under examination and

u

partly upon the purpose of the work. If the physical character of a line be the matter in question, a glance of the eye may be sufficient to determine it, or it may require an elaborate investigation by means of the interferometer, according to the detail and accuracy required. To record the position of a line within one Angstrom unit is ordinarily the work of a few minutes; but to measure a wave-length with an accuracy of 0.01 Angstrom unit demands skill of the highest order and plenty of time. In general, however, it may be said that in the ultra-violet region, say from M,000 to A 1,000 photography is practically the only available means for obtaining a record. In the visible portion, say from A 8,000 to A 4,000 the eye and the photographic plate are each available. By photography Abney has recorded wave¬ lengths as great as 27,000 Angstrom units.

In the infra-red region, that is for wave¬ lengths greater than 8,000, the bolometer, the radiomicrometer, the radiometer and the linear thermopile have all been used to good purpose. Rubens employing a linear thermopile has pushed his measures to A61(000. But photog¬ raphy is probably more used than all other methods put together.

1. Comparison and Interpretation of Radi¬ ations. — Let us suppose that the lines in the spectrum of a certain body have been analyzed and recorded, it may be only for the moment on the retina of the eye, it may be permanently upon a photographic plate. The next step is to apply this information to the purpose for which it was obtained. To this end, the observer gen¬ erally makes one of the five following com¬ parisons :

(a) A comparison of the spectrum in question with itself when the radiation is produced under different conditions. Thus by comparing

the ordinary spectrum of the sodium flame with that of the same flame in a strong magnetic field the Zeeman effect was discovered. By comparing spectra of the same star taken at short intervals of time Pickering discovered a new class of double stars called “ spectro¬ scopic binaries.”

(b) A comparison of the spectrum in question with the spectra of other bodies. Thus a spectrum of iron, placed alongside of solar spectrum of the same scale, convinces one that there are many lines in the two spectra which coincide in position; and that, therefore, iron is probably one con¬ stituent of the sun.

(c) A comparison of the spectrum in question with some spectrum predicted by theory. Thus Keeler established Maxwell’s view of the constitution of Saturn’s rings by comparing the spectrum of these rings with the spectrum predicted by Doppler’s principle.

(d) A comparison of the spectrum in question with the same spectrum recorded in other ways. Thus Lewis com¬ pares the infra-red spectra of sodium as obtained from the photograph, the phosphorograph, the bolometer, the radio- micrometer, with that predicted by Kayser and Runge’s formula.

(e) A comparison of the spectrum in question with a standard scale of wave-lengths, that is, with an ideal spectrum in which each line differs from its nearest neighbor by ex¬ actly one Angstrom unit. The most beautiful examples of this comparison are to be found in the maps of the solar spectrum prepared by Rowland and by Higgs.

Concerning the interpretation of spectra, it must be frankly admitted that this is the most difficult part of the entire subject, demanding as it does wide experience in the laboratory and judgment of the highest order. Apparently no theory is so fanciful but it may find some sup¬ port among the varied and complex phenomena presented by the spectroscope. The science of optics is controlled by a well-established theory, while spectroscopy must still be classed as an almost purely empirical science.

1. Summary of Principles.— There are,

however, some general principles which have been fairly well established. Following are the more important ones :

Spectra of Gases. — The emission spectrum of a gas can be obtained, in general, only by passing an electric current through the gas. The emission spectrum of a gas is practically always a spectrum of bright

lines. The emis¬ sion spectra of solids and liquids are practically always continuous. As illustrating exceptions to this general law may be cited the fact that Paschen using the bolometer has obtained the characteristic radiations of carbonic acid gas heated by streaming through a hot platinum spiral; also the fact that the spectra of gases under very high pressures become nearly con¬ tinuous.

Kirchhoff's Law. — Let us denote by H the amount of radiant energy, say heat or light, of any one wave-length which falls upon a body at temperature t° in one second. Let h denote the energy of the same wave-length which this body absorbs in one second when at the same temperature. The ratio h/H is what Kirchhoff calls the "absorption® of the body, and is de¬ noted by A. A body which absorbs all the heat falling upon it is said to be "absolutely black® ; its absorption is unity. Let us now denote by E the amount of energy of the same wave¬ length which this same body would radiate in one second. This quantity is called the "emis¬ sion® of the body. Now Kirchhoff, in 1859, proved that :

(1) The ratio of the emission to the absorption of any body depends upon the temperature only; and

(2) This ratio is numerically equal to the emission of an absolutely black body at the same temperature.

By means of these two general principles Kirchhoff was enabled to explain the fact that a sodium flame placed between one carbon pole of an electric arc and the slit of the spectroscope will produce two dark absorption lines in the orange of the continuous spectrum exactly where, without the arc, it would produce two bright lines. But what is more important, Kirchhoff succeeded in explaining, on these same principles, the dark lines which Fraunhofer mapped in the spectrum of the sun. The con¬ tinuous part of the solar spectrum is supposed to be due to the bright, underlying layers of the sun, which are under great pressure; while the dark lines — the so-called Fraunhofer lines — are due to absorption of the cooler gases which surround the sun. In the same manner may be explained the dark lines which appear in several classes of stellar spectra.

Doppler's Principle. — If we denote by v the speed with which any radiant source is ap¬ proaching the observer, by V the speed of light, and n the number of waves of length A emitted per second by the source, then it is evident that the n vibrations which the source emits in any one second^ will be distributed over a dis¬ tance numerically equal to V — v. Hence the wave-length of the light, A, which reaches

the observer will be

It is evident, therefore, that the wave-lengths of light coming from a star which is approaching

the observer will be shortened in the ratio V _ v

— — — . In like manner, if a star be receding V

from the spectroscope the wave-lengths will be

V 4- v . . .

increased in the ratio — — — . This principle,

first enunciated by Doppler in 1843, enables the astrophysicist to measure rates of ap¬ proach and recession. Recent work by Frost and Adams shows that the speed of a star in the line of sight can be determined with an error not exceeding one-half mile per second. In like manner the relative motion of the two limbs of the sun and of several of the planets, and hence their periods of rotation, have been determined by the spectroscope. Even in the very faint spiral nebulas, the rotation and the nature of their motions in space can in some cases be found, thus throwing a flood of light on the nature of these bodies and on the pos¬ sible development of stars from them.

Effect of Pressure. — In 1895 it was proved by Humphreys and Mohler, from measurements made in the physical laboratory of Johns Hop¬ kins University, that the wave-length of a line in the spectrum of any element is dependent upon the pressure of the medium surrounding the source. Thus when the cadmium arc is worked under a pressure of 10 atmospheres the cad¬

mium lines are shifted toward the red end of the spectrum about 0.07 of an Angstrom unit. In general, the amount of this shift is toward the red, directly proportional to the wave¬ lengths in any one element, and directly pro¬ portional to the excess of pressure above* one atmosphere.

Effect of Atmosphere Surrounding Source. — It has been shown by Crew, Basquin, Porter and Hartman that the spectrum of an electric arc between two metallic electrodes is very distinctly affected by

surrounding it with an atmosphere other than air. In the case of hydrogen, it has been shown that the lines affected by the hydrogen atmosphere belong to the spark spectrum of the metal. It is also true that the lines which belong to Kayser and Runge's series are not affected by the change from air to hydrogen. It has been suggested that this effect may account for the peculiar spectra of many of the so-called ((hydrogen stars,® that is, stars in which the hydrogen spectrum is very strong.

The Zeeman Effect. — In 1896 Zeeman, then at Leyden, made the capital discovery that if a source of radiation be placed in a magnetic field each individual line in its spectrum will in general become a triplet with the two side components circularly polarized and the mid¬ dle component plane polarized.

Temperature Effects. — - The role which tem¬ perature plays in the production of line spectra is very little understood. It is, at present, im¬ possible to say to what extent the various char¬ acteristics of flame, arc or spark, spectra depend upon temperature, upon chemical action and upon electrical conditions. But in the case of solid bodies, which yield a continuous spectrum, Stefan showed, in 1879, that the total radiation varies as the fourth power of the absolute tem¬ perature. And it has since been established by Wien that, if we denote absolute temperatures

by T, 7 mT = constant and Im = T 5 constant where Am indicates the wave-length at which the radiation is a maximum and Im represents the value of the maximum radiation. These two important laws are merely inferences from a still more general expression which Wien has established.

Lazv of Spectral Series. — Soon after the dis¬ covery was made that there exist in the spectra of the elements certain series of lines distin¬ guished by certain common characteristics, Bal- mer succeeded in devising a single formula which gives, in a very exact manner, the wave¬ length of each of the hydrogen lines known to him at that time. The expression is as follows :

where A0 is a constant and m denotes the nat¬ ural numbers beginning with 3. This for¬ mula has since shown itself competent to de¬ scribe accurately the 29 hydrogen lines which are now known.

In 1888 Kayser and Runge began a remark¬ able study of the arc spectra of many of the more important elements and showed that most of these elements contain one or more series of lines capable of

representation by the fol¬ lowing formula:

A + Bm — 2 Cm A

in which A, B and C are constants for each series, and m denotes the natural numbers be¬ ginning with 3. Each different chemical element has its own different characteristic values for these three constants. This fact is the founda¬ tion of spectrum analysis.

Rydberg has shown that the following ex¬ pression is equally effective in representing the facts :

1 — A | B

A (w- h“)2

where A, B and/ˆ are constants for each series, while A and m have their previous meanings. Thus in the case of Mg, Zn and Cd there are six such series, in each case equivalent to two series of triplets. It is to be hoped that this great advance will be followed some day by a dynamical explanation of the vibrating atom, which will include these two formulae as rigidly derived inferences.

Bibliography. — In the way of general trea¬ tise, consult Kayser, (Handbuch der Spectro- scopie) (Leipzig 1900), as incomparably the most complete and scholarly work in existence. Here may be found references to the literature of every part of the subject. For a complete theory of the plane grating consult Rowland, (Physical Papers.) A most elegant and simple theory of the concave grating is given by Runge in Kayser, (Handbuch der SpectroscopieP On the general theory of the spectroscope consult a series of papers by Wadsworth in the (Astro- physical Journal, > Vol. I et seq. An excellent treatise on stellar spectra is Scheiner, (Astro- nomical Spectroscopy, *translated into English by Frost (1894). Solar spectroscopy is treated by Young in (The Sun) (International Scien¬ tific Scries) and by an important series of papers by Hale running through the (Astro- physical Journal* from its beginning up to 1916. A very large number of additional papers

of value will be found in the 46 volumes of the last-named publication.

Henry Crew,

Professor of Physics, Northwestern University.

SPECTRUM ANALYSIS. See Spectro¬ scopy.

SPECULARITE. See Hematite.

SPECULUM. (1) In optics and astronomy, a polished surface usually made of a metallic al¬ loy that admits a high polish and resists corro¬ sion and formed either flat or curved, for re¬ flecting images. Specula are employed in large telescopes as reflectors. (See Telescope). (2) In medicine and surgery, an instrument for opening a part or passage of the body, especially for dilating an orifice, and intro¬ ducing a reflector, so that in combination with a light the interior can be viewed. It is used to facilitate examinations and operations.

SPECULUM METAL. See Mirror.

SPEDDING, sped'Tng, James, English editor and author : b. Mirehouse, Cumberland, 26 June 1808; d. London, 9 March 1881. He was graduated from Trinity College, Cam¬ bridge, in 1831, was long an honorary Fellow of his college, from 1835 till 1841 was em¬ ployed in the Colonial Office and in 1842 was secretary to Lord Ashburton's mission to the United States for the settlement iof the north¬ west boundary dispute. On the formation of the Civil Service Commission in 1855 he became its secretary. In 1847 he undertook, with the collaboration of R. L. Ellis and D. D. Heath, to prepare a complete edition of Bacon's works ; but the former died while the task was unfinished and the latter .only gave occa¬ sional assistance. The work, therefore, was almost entirely left to Spedding, who com¬ pleted and published his labors in seven vol¬ umes (1857-59). This done, he published (The Life and Letters of Bacon) (1861-74) ; Re¬ views and Discussions, Literary, Political and Philosophical, Not Relating to Bacon *(1879) ; and (Studies in English History* (with J. Gairdner, 1881). Leslie Stephen has called Spedding's Bacon ((an unsurpassable model of thorough and scholarlike editing.® Consult the (Life *by Venables appended to the edition (1881) of (Evenings with a Reviewer,* pri¬ vately printed by Spedding in 1845 and repub¬ lished (London 1881).

SPEE, Maximilian, Count von, German admiral : b. Copenhagen, Denmark, 1861 ; d. off Falkland Islands, 8 Dec. 1914. He was onet of Germany's leading naval strategists and was credited with a prominent part in perfecting the plan by which in case of war the

scattered warships of the German navy were to assemble. The plan went automatically into effect upon the outbreak of the European War, and the command of the fleet thus gathered fell to Von Spee. He surprised and defeated the British squadron under Admiral Cradock off Coronel, Chile, 1 Nov. 1914. He was in turn attacked and his fleet destroyed by a British fleet under Rear-Admiral Sir Frederick Sturdee off Falkland Islands, 8 Dec. 1914. Von Spee went down with his flagship, the Scharnhorst.

SPEECH, the production of articulate sounds by the voice organs; it consists in tones of voice modified by the agency of the tongue,

cheeks, lips and other structures intervening between the glottis and the outer opening of the mouth. The modifications of articulate sounds which may be invented and used by man are almost without limit; the modifica¬ tions actually used in the ordinary speech of all mankind numbers at least a thousand, and a universal language would have to provide symbols representative of that many speech sounds. Nevertheless, the number of distinct sounds in any .one language seldom exceeds 50. In English speech two classes of sounds are produced, known as vowels and consonants. Vowels are pronounced by sounds coming pri¬ marily from the larynx; consonants are formed by sounds due to interruption of the currents .of air in the mouth or passages above the larynx. The name consonant denotes a sound that cannot be produced effectively without the aid of a vowel. The vowels are further dis¬ tinguished by the fact that they can be sounded mutely, or in a whisper. The differences be¬ tween vowel sounds are owing to differences in the dimensions of the space between tongue and palate (mouth cavity) and of the mouth opening, when the vowels are pronounced, as shown in the following table:

Vowel

Sound

a

as

in far

e

as

ei in vein

i

as

in marine

o

as

in cold

u

as

oo in moon

Size of mouth - opening

5

4

3

2

1

Size of mouth- cavity

3 2 1

4

5

Vowels sounds can be prolonged indefi¬ nitely; so may some consonants, as 1, m, n, r, s, z, etc. ; but others as b, p, t, d, k, g hard, cannot be prolonged. Absence of the sense of hearing prevents the perception of sounds and also their imitation — hence persons born deaf are necessarily dumb, but through training such persons may acquire the power of speech. Where dumbness exists without deafness the affection is due to some disorder of the nerve centres. See Language, Science of; Voice and Voice Culture.

SPEECH, Defects of. Speech is an ex¬ tremely complex and intricate

mechanism, and in the normal. adult represents a large number of various factors. Its defects, therefore, are equally complex. In ordinary speech at least three separate types of processes are involved : (1) sensory; (2) motor, and (3) intellectual or associational.

(1) The sensory mechanism of speech in¬ cludes all the avenues by which the idea .of a verbally expressible picture can get into the brain. The eye and the ear are mostly used because with these senses the pictures are most distinct, but touch, smell or other sense, if recognized, may be of use in the faculty of speech. Thus with the sensory portion of the speech-mechanism the intellectual factor must necessarily be joined. One sees the words on a printed page and pronounces them ; but if written in a script to the reader unknown, he can see the characters and yet will not be able to utter the sounds they represent.

(2) The motor side of speech implies (a) the ability to use the muscles of speech and (b) the power of co-ordinating those muscles so as to say the right things. The lips, the

tongue, the larynx, the teeth are the organs mostly used in speech. One may say that in deaf-mutes the hands are organs of speech. The nerves that govern the muscles ordinarily used in speech are the motor cranial nerves, the nuclei of which are located in the medulla oblongata (q.v.) ; but the centre that co-ordi¬ nates their movements with the sensory impres¬ sions which come in through the organs of special sense, as well as with the intellectual concepts concerning the things seen, heard or touched is located in the third frontal convolu¬ tion or Broca's convolution. This is the chief motor centre for speech.

(3) The intellectual factor in speech implies the action of co-ordinating and associational fibres in the human brain that pass from the sensory centres to the motor centres. It is the factor that governs, as it were, the knowledge of what one is saying. One may repeat from the hearing a line of Choctaw, but without understanding it: the intellectual factor is here non-operative. Memory-images of many kinds may be reproduced by appropriate stimuli ; and defects in certain parts of the brain interfering with the bringing out of the memory-images by which a sound is associated with its cause, or an object with its name, occasion certain well-defined disorders of speech. The act of speaking, therefore, requires: (a) the power to think

or to construct an idea; (b) the capacity to recall and to formulate the word or words which express the idea; (c) the ability to artic¬

ulate the sounds in an understandable or con¬ ventional manner.

It is customary to use the word aphasia to denominate true defects of speech. Defects in the incoming sensory tracts, which must modify speech in some respects, are not usually in¬ cluded in this category. In the same manner defects in nervous supply of the muscles of speech, such as paralysis of the tongue, are not termed aphasia. Again, a purely intellectual defect, as in idiocy, whereby speech is seriously affected, is not classed as aphasic. Seglas has divided the disorders of speech into three groups: (1) dylogias, or the disorders of in¬ telligence which affect speech — as seen in idiots, imbeciles, etc.; (2) dysphasias, or true affections of speech (aphasias) — the most in¬ teresting and complicated; (3) the dysarthrias or the disorders of articulation : — such as are seen in stuttering, in the peculiar speech of deaf-mutes, in the speech of bulbar palsies, of facial paralyses, etc.

The aphasias are the defects of speech that involve the association-tracts and the sense- centres and have been most exhaustively stud¬ ied. Speaking generally, the true aphasias may be classed in three broad groups: (1) the receptive or sensory aphasias, which result from some injury to the centres for sense- memories of things heard, seen, smelt, tasted, touched, etc. ; (2) the conduction-aphasias,

which follow injury to the conducting fibres in the brain that pass from a sense-centre to

Chart. — (From Langdon, Aphasia*)•

Receptive or • “ Sensory ”

Conduction, Aphasia “ Associa¬ tional ”

Emissive, or “ Motor ”

Auditory aphasias

Visual aphasias.

Olfactory aphasias .

Gustatory aphasias .

Myotactic aphasias .

Auditory

paraphasia. . .

Visual

paraphasia. . .

Olfactory

paraphasia . . .

Gustatory paraphasia . . .

Myotactic paraphasia . . .

Concept

aphasia .

Spoken .

Written .

Pantomimic . . .

1. Amnesia verbalis (word deafness), the non-recognition of word sounds.

2. Amusia (music deafness), non-recognition of musical sounds.

3. Auditory apraxia (object deafness) , non-recognition of object sounds.

4. Alexia (word blindness), non-recognition of word meanings.

5. Visual apraxia (object blindness), non-recognition of object meanings

or uses.

1. Visual amimia (pantomime blindness), non-recognition of word or panto¬

mime mimicry.

1. Cortical anosmia (smell memory loss), non-recognition of objects by

smell.

1. Cortical agusia (taste memory loss), non-recognition of objects by

taste.

1. Myotactic alexia (word anaesthesia), non-recognition of word movements

by finger or pen.

1. Myotactic amimia (pantomime anaesthesia), non-recognition of mimicry

by toucn.

1. Myotactic apraxia (object anaesthesia), non-recognition of objects felt.

2. Paraphasia verbalis (spoken word forgetfulness), non-recollection of word

sounds.

1. Paramusia (musical sound forgetfulness), non-recollection of musical

sounds.

1. Auditory parapraxia (object sound forgetfulness), non-recollection of

object sounds.

1. Paralexia (word meaning forgetfulness), non-recollection of word

meanings.

1. Visual parapraxia (object meaning forgetfulness), non-recollection of

object meanings.

1. Parosmia (smell memory forgetfulness), non-recollection of smell

meanings.

1. Parageusia (taste memory forgetfulness), non-recollection of taste

meanings.

1. Myotactic parapraxia (object touch forgetfulness), non-recollection of

feel of objects.

1. Myotactic paramimia (pantomime forgetfulness), non-recollection of

mimicry movements.

1. Anomia (name memory loss), non-recognition of names of objects.

2. Paranomia (name forgetfulness), non-recollection of names of objects.

3. Psychic motor aphasia (spoken word construction lost), loss of psychic

spoken word plans.

1. Executive motor aphasia (spoken word utterance loss), loss of spoken

word motor memories.

1. Psychic agraphia (written word construction loss), loss of psychic written

word plans.

1. Executive agraphia (written word utterance loss), loss of written word

motor memories.

1. Psychic amimia (pantomime construction loss), loss of psychic word

mimicry plans.

1. Executive amimia . (pantomime utterance loss), loss of word mimicry

motor memories.

tlie motor centre; (3) emissive or motor apha¬ sia, which is produced by an injury to the motor cortex chiefly of Broca's convolution. Some 30 different types of aphasic disorder of speech are known and may be summarized on the chart here given ; but some of the com¬ moner forms of aphasia may be mentioned. Of the receptive or sensory type, amnesic apha¬ sia, or word-deafness, is one of the most char¬ acteristic. In all of the sensory aphasias there is a loss of comprehension of the words heard or read. In amnesic aphasia the patient hears very distinctly everything that is said, but it might as well be in a foreign tongue, because of the disorder of the centre for word-memory pic¬ tures in the temporal convolution. The patient usually speaks, but makes many lapses, not knowing just what he is saying and on hearing his own speech not understanding it. Many varieties of this defect are known. They should be studied in special monographs (see chart for varieties). In the conduction or association aphasias or paraphasias, the asso¬ ciation-fibres connecting one speech-centre with another are interfered with. Any of the types may be present, but the form most often seen is one in which the tracts between the auditory centres and the motor speech-centre is in¬ volved. Here the patient is aware of the words, knows what they mean and tries to speak, but speaks incorrectly; his path seems to be blocked. The commoner type is motor aphasia. In this Broca's convolution is affected. The patient here sees and hears and compre¬ hends, but is unable to speak the words. He is likewise unable, as a rule, to write the words he sees or hears, and hence suffers from agraphia as well. Many common expressions, as <(yes® and ˆno,® ((good-morning,® *(good bye,® etc., may be retained. The mechanical necessities that underlie many intellectual proc¬ esses are clearly brought out in the study of aphasia ; and in no other manner is the knowl¬ edge driven home how dependent one is on the proper working of certain centres and tracts, as in the study of the defects of speech. Consult Lichtheim, (Aphasia, Brain) (1895) ; Elder, (Aphasia and the Cerebral Speech Mechanism) (1897) ; Bastian, (Aphasia and

Other Speech Defects) (1898) ; Pick, Proceed¬ ings of 10th International Congress) (Paris 1900) ; Dejerine, (Semeiologie des

Maladies Nerveuses) (1902) ; Baldwin, dictionary of Philosophy and Psychology, *article (Speech and its Defects) (1902-04) ; Jelliffe and White, diseases of the Nervous System* (3d ed.,

1919).

Smith Ely Jelliffe, M.D., Editor (Journal of Nervous and Mental Dis¬ eases. *

SPEECH, Figures of, deviations from the usual order of words in a sentence or from their common and literal sense. These devia¬ tions are employed to give vivacity to language in some form or another. Often compara¬ tively primitive languages are rich in bold and imaginative figures of speech. This is because youth is, in language as in races and men, the period of imagination, the time when the human mind works untrammeled by the restraint of the knowledge of the physical laws of nature. The life of primitive man was

filled with images, passions, personal interests, loves and hates. These images he was con¬ tinually creating out of his experiences or his want of experience. The moment he departed from the familiar facts and experiences of his life, his childish, untrained mind began to picture things, conditions and results outside the common. This habit of expressing out of the ordinary feelings and conditions of life by out of the ordinary forms of language has remained with the race in its most advanced stages. These figures of speech have been modified and refined; but for all this they still retain much of the boldness of their primitive origin. As the imagery of the more primitive races is always the expression of thoughts and images vividly in the mind, and as it is never forced, it is generally true to the thought itself and to the image which graph¬ ically presents it. But this is far from being true of the imagery of more advanced races who have borrowed much from the past, often retaining the form after the cause that called it into being has been forgotten. The requi¬ sites of proper figures of speech exact that every comparison should be the result of a real likeness clearly presented in an apparently spontaneous manner. It is a general rule that the more marked the difference between the objects compared the greater the contrast and, therefore, the stronger the effect. As this effect should be practically instantaneous upon those to whom the figure of speech is directed, it follows that, as a general rule, it is best not to specify difference, because these details di¬ vert the mind from the sudden effect desired. Every word that truly belongs to a language possesses a denotative and a connotative sense. The former expresses the meaning and uses which good society has given it ; the latter presents the atmosphere which clings to words, causing them to express thoughts, ideas and associations apart from their ordinary accepted use. Connotation gives us, very often, our must suggestive and beautiful figures of speech and lends to poetry and rhetorical prose much of their attractiveness and grandeur. In treat¬ ing of figures of speech it is customary to divide the subject into figures of resemblance, figures of contrast and figures expressing other relations than either of the above. The figures of resemblance include the simile, metaphor, allegory and personification. Those of con¬ trast

embrace antithesis and epigram. The third classification includes metonymy, synec¬ doche, apostrophe, exclamation, interrogation, hyperbole, climax, irony, vision, euphemism, onomatopoeia, litotes, parallel, allusion and al¬ literation. A simile expresses resemblance be¬ tween things that are different. In the meta¬ phor this comparison is implied but not for¬ mally expressed ; while in the allegory, which is a story couched in symbolical language, the comparison is expressed much more at length than in either the simile <or the metaphor. Personification, on the other hand, attributes life to inanimate things and abstract ideas. By its very boldness it merges the idea of resemblance in the animation of the thing personified. Antithesis, as its name implies, is a figure existing by virtue of the contrast of words employed in a sentence, while an epigram, though based upon contrast, is in-

dined to hide this word-contrast by throwing the force ot the contrast upon some general idea of contrast in the statement or situation. An epigram, which formerly signified an in¬ scription on a monument, has come to have the sense of a brief pointed saying, generally in the nature of a proverb. Metonymy, which literally means the employment of one name for another, is expressed by substituting the container for the thing contained, the sign for the thing signified, the cause for the effect or the effect for the cause ; while synecdoche substitutes a .part for the whole or the whole for a part. Apostrophe, being simply a form of address, is frequently used with other parts of speech, more especially metaphor and per¬ sonification. It addresses the absent as if present and treats the dead as if they were living, and inanimate things as though pos¬ sessed of life. Interrogations are frequently used for rhetorical effect rather than for the purpose of getting an answer, and in this case they form true figures (of speech. In the same way when an exclamation expresses deep feel¬ ing, more especially in a condensed form and unusual order, it presents itself in the form of a figure of speech, because it is so arranged as to powerfully attract the imagination. Hyper¬ bole expresses that things or conditions are better or worse, greater or less than they really are, for the sake of the effect thus pro¬ duced. It is, therefore, historical exaggera¬ tion. A climax presents a series of statements or thoughts in the rising order of their im¬ portance. When they are presented in the decreasing order of their importance the rhe¬ torical figure is termed an anti-climax. Irony conveys a meaning contrary to the one sug¬ gested by the ordinary sense of the statement. Vision, which

frequently accompanies apos¬ trophe and personification, presents scenes as though before the eyes although they are past, or imaginary or absent. Euphemism is the name given to that figure of speech whereby an agreeable presentation is given to something that is in itself disagreeable. Onomatopoeia adapts the sound of words to their use and meaning. When a statement is made by deny¬ ing the opposite of what is affirmed the figure of speech thus employed is called litotes. A parallel is an extended antithesis, which con¬ tinues the comparison of two similar objects, while allusion simpiy refers to some familiar event or expression by way of explanation or illustration. Alliteration, which is frequently called a figure of emphasis, is the repetition of the same initial sound in a succession of words. It is frequently used in poetry; but it was more commonly employed in more primitive days of the art than at present. See Rhetoric.

Bibliography. — Bain, A., (English Compo¬ sition and Rhetoric?. (New York 1887); Bar¬ deen, W. C., (A System of Rhetoric) (ib. 1884) ; Blair, H., (Lectures on Rhetoric and Belles Lettres) (Philadelphia 1793) ; Canby, H. S., (Elements of Composition (New York 1913) ; Clark, J. S., (A Practical Rhetoric) (ib. 1888) ; Gardiner, J. H., (The Eorms of Prose Literature) (ib. 1900) ; Genung, J. F., <Outlines of Rhetoric) (Boston 1893) ; Hill, A. S.. foundations of Rhetoric) (New York 1893) ; (Principles of Rhetoric) (ib. 1895) ;

Lockwood and Emerson, (Composition and Rhetonc) (Boston 1903).

SPEECH, Genesis of, or the Origin of Language.* Of these alternative titles the latter is the broader, since “language® is used of the expressive movements of any part of the body (compare the term Gesture Lan¬ guage), while “speech® is applied only to ex¬ pressive movements of the vocal organs. The term “Genesis® is more appropriate than “ori¬ gin,® because the latter implies that speech proceeded from a condition in which speech did not exist, whereas, go back as far as we may in the evolution of animal life, we shall never find a stage in which all of the essential ele¬ ments of speech are absent. “Genesis® on the other hand suggests the earlier stages of a long and continuous process of development that eventually led to the present highly complex forms of human speech. The phrase “Origin of Languages® sometimes occurs to express the fact that many languages doubtless arose inde¬ pendently in primitive times. The general problem involves two main questions: (1)

What was the genesis of the speech move¬ ments? (2) How did the speech movements come to be expressive of thought, i.e., of sen¬

sations (ideas) and feeling (emotions) ? There is really a third question involved : what is the genesis of the ideas and emotions? While ideas and feelings are thought of not as language but as that which is expressed by lan¬ guage, yet it should be remembered that the sensations of sound, the kinesthetic sensations and the mental pictures written and printed words, all of which are indisputably a part of language, are mental processes of essentially the same type as those other ideas which we usually call thought. As a matter of fact the problem of the genesis of speech has usu¬ ally been confined to the second of the above questions, the other two being left as prelimi¬ nary problems to the physiologist and the psy¬ chologist. As a matter of fact all three' are essentially psychological problems.

It is generally held by psychologists that every emotion and probably every other mental state tends to pass over at once into movement. By virtue of the necessary relationship existing between the mental state and the movement the latter becomes symbolic of the former, i.e., the movement is an expressive movement. The connection between the nervous state and move¬ ment is very ancient, or, at least, has very primi¬ tive antecedents. The simplest monocellular ani¬ mals, Such as the paramecium, which has not even an especially developed nervous system, responds consistently by certain definite move¬ ments to certain definite stimuli, and even plants possess irritability: that is, response to environment by movement, — which movement is less in plants than in animals primarily, as it would seem, because their cell walls are more rigid than those of animals. Movements of the speech organs (and speech organs similar to those of man occur in nearly all the air- breathing animals of higher rank than the am¬ phibians) are under the same kind of nervous control as all other muscular movements. As the movements of all animals and even of plants are primarily life-serving movements, it is natu-

- Note — Before reading this article, section A of the article, Language, Science of, should be studied.

ial to suppose that all movements had their ori¬ gin in responses to environment of such a char¬ acter as to continue the life process. A plant turns to the light, which is the source of the energy by which it makes its food ; the para- mecium swims away from a poisoned area in the water and moves toward its food. Perhaps chemical and mechanical laws account for these movements. In the case of the

lowest animals that possess lungs and a larynx the power of movement is already very highly developed and specialized and under the control of a highly developed nervous system. All animals that possess a larynx make with it movements which produce air vibrations of a frequency within the range that is appreciable through the ear as sound. Birds and quadrupeds pro¬ duce loud and complex sounds which appear to play an important part in lives of these ani¬ mals. Undoubtedly man inherited from his pre-human ancestors the power of producing sounds by the movements of his laryngeal and breathing muscles. The range of sounds which animals are capable of producing with their vocal organs is far greater than has usually been supposed. This fact is fully established in the case of apes, which have been more fully investigated in this respect.

Some scholars have assumed that the coo- ings, gurglings and musical notes made by in¬ fants in such great variety before they learn to speak represent a condition in which primitive man found himself before speech was devel¬ oped. On the contrary these infant cries are doubtless the outcome of a high state of devel¬ opment of the laryngeal muscles and extensive nervous connections which the cmld inherited from his parents in whom the power of speech was, of course, highly developed. It would be valuable to know how an infant's vocal move¬ ments compare in complexity with those of an ape. Phonograph records could be made of both.

Whether the pre-human was capable of using his speech organs for the expression of thought is a question which we can answer to no fuller degree than we can solve the same question in the case of animals. A fundamen¬ tal question is whether animals, and, therefore, pre-humans (creatures higher than existing animals and still lower than man) had the capacity to think. Psychologists who have especially investigated the mental processes of animals believe that the more intelligent ani¬ mals (rats, for example) perform with their brains all the different kinds of processes that men perform, the chief difference between the animals and men being one of relative com¬ plexity rather than one of kind. The question has often been raised as to whether thought antedated language in the evolutionary process or vice-versa. All that seems positively affirm- able on this point is that language (i.e., ex¬ pressive movements) and intellectual life de¬ veloped side by side. Neither preceeded the other. Indeed the two together form one com¬ plex psychophysical process. Ideas and feel¬ ings are as inconceivable without expressive movement as is expressive movement without ideas and feelings to be expressed. We may assume that an animal's movements are a fairly adequate expression of his mental life, just as the more elaborate vocal

movements of man are a fairly adequate expression of his more

complex mental activities. The problem as to how speech movements (and their resulting sounds) gained meaning has been the subject of very extensive discussion. The problem arises from the fact that, while most expressive movements other than speech and not based upon it contain within themselves some element or elements more or less directly related to the meaning and naturally suggestive of it, in the case of speech movements no such relationship exists except in a small group of onomatopo- etic words, in which, however, the relationship is merely secondary, i.e., not between the move¬ ment and the meaning but between the sound (which is a secondary product of the move¬ ment) and the meaning. For example, neither the movements of the vocal organs which form the word (<dog® nor the sounds of the word nor yet the written or printed symbol bear the faintest resemblance to the object signified. Latin cants, German Hand, French chien and Russian sobaka, words entirely different in movement, sound and appearance, and likewise bearing no resemblance to a dog, serve equally well. The connection between the movement and the meaning is purely arbitrary. On the other hand a gesture, such as pointing, is uni¬ versal among men and is intelligible every¬ where. Further, when an Indian puts two fin¬ gers of one hand astride one finger of the other to indicate a man on horseback, or when he puts his hand over his head to signify white man (i.e., one who wears a hat) the connection is still clear.

Various attempts have been made to ac¬ count for this arbitrary (associational) connec¬ tion between movement and meaning. (1) Some scholars bridged the gap by assuming that the Creator implanted the gift of speech in man. This in its literal sense is, of course, absurd. Equally absurd, though not so con¬ spicuously absurd, is (2) another <(fiat® view of the case, which assumes that groups of men came together and by deliberate choice selected certain sounds to express certain meanings. Such an act is conceivable only among men who already possess the power of speech. With more justification (as might superficially ap¬ pear) it has been urged that (3) men imitated characteristic sounds produced by objects in the outside world — the so-called <(bow-wow,® or onomatopoetic theory. More far fetched is the suggestion that men (4) naturally ((rang out® the sound characteristic of an object when struck — the ((ding-dong® theory. Others as¬ sumed that (5) instinctive cries came to be associated with and hence to symbolize the situ¬ ation or object which produced them — ((pooh ! pooh !® theory.

All these theories must be regarded as at¬ tempts to conjecture how

speech might con¬ ceivably have arisen instead of as anything even remotely approaching a scientific demon¬ stration of how speech actually did arise. Against the third theory it may be urged that at best it would account for the origin of but very few words. Furthermore it has been shown that of even this relatively small num¬ ber of words, some have attained an onomato¬ poetic character in comparatively recent times, having arisen by changes of movement from words that formerly had quite different sounds, and hence could not be used to substantiate this theory.

In so far as these theories attempt to assign a method of origin to individual words, they are open to the objection that, while we cannot say positively what type or types of thought were employed during primitive, incipient stages of human or pre-human speech, still in all like¬ lihood in these earlier stages (and this seems to hold true of animals also) man had occasion to express only masses of ideas, whole situa¬ tions as yet unanalyzed into detailed ideas such as are expressed by most modern words. A difficulty of the last theory lies in the relatively small number of emotional cries found in a single individual, unless we include the mean¬ ingless cries of children mentioned above, with the consequent objections. The last theory also assumes the existence of speech sounds before thought, which, as was stated above, is as un¬ tenable as the converse assumption.

In contrast with these five theories a more scientific attempt to explain the arbitrary con¬ nection between speech movements and mean¬ ing regards the former, like other gestures, as worn-down remnants of movements that were previously useful (life serving). F. N. Scott (in Publications of the Modern Language As¬ sociation of America') has called attention to a variety of such movements of the speech or¬ gans, for example, panting, gasping, grunting, sneezing, coughing, choking, etc. The closing of the glottis necessarily precedes all great muscular efforts of the body. The cessation of such effort is followed by its opening. The necessity of breathing during the strain neces¬ sitates gasping. Many such movements occur in typical situations and in accordance with the normal working of the mental processes would soon become closely associated with them.

Movements of the speech organs productive of sound waves occur also in connection with other movements tnat are life serving. Pant¬ ing, for example, follows upon all vigorous exercise. The sounds thus

produced, through association with the movements which produce them and further with the movements which the latter accompany, become also associated with, and hence significant of, the general situation under which they arise. In the cases men¬ tioned the connection between the two groups of concomitant movements is purely physical. There are, however, other groupings, the con¬ nection between which lies in the nervous sys¬ tem. Such secondarily produced movements (whether of the vocal organs or other muscles) are explained by psychologists as due to the ˆoverflow® of exceptionally intense feeling into other nervous channels than those within which they would naturally be supposed to be con¬ fined. Instances of such complexes of move¬ ment occur in animals. This view provides no final explanation, however, because it at once suggests the question why and how the nervous connection between the two movements arose, i.e., why the overflow took originally the pre¬ cise channel which it did.

On the other hand there are sound-produc¬ ing vocal movements which may be instinctive in origin and which are also useful in that they contribute to the survival of the individual and hence of the race. The various calls of animals are of this kind, signifying, as they do, <(dan- ger !" Mood,® etc. Pre-humans doubtless pos¬ sessed such calls. Assuming that these move¬ ments represented in their earlier stages unan¬

alyzed general situations, it is easy to see how- fas mental powers developed in complexity and the consequent analysis of the general situa¬ tions brought specific elements into clearer con¬ sciousness; the specific dominating elements rather than the general complex came to be symbolized by the vocal movements, thus giving origin to expressions more akin in meaning to the majority of existing words.

In general it may be said that the methods of modern science (as applied both in ps}rchol- ogy and in linguistic study) constrain the stu¬ dent of the genesis of speech to confine himself in his search for positive evidence to such lin¬ guistic processes as occur in the experience of people now living. This is the only kind of first-hand evidence which can be fully studied by direct examination and which admits of even approximately exact scientific control. Thus the evolutionary processes which are at present taking place form the only safe criteria from which one may draw inferences as to the con¬ ditions that prevailed in earlier times. Prob¬ ably we shall never be able to reconstruct such primitive conditions in detail ; we will be lim¬ ited to the possession of certain general truths concerning their nature. In all study of this subject furthermore one must be

continually guided by our best contemporary understanding of the mental processes.

Clarence L. Meader,

Professor of Philology , University of Michigan.

SPEED, James, American politician : b. Jefferson County, Ky., 11 March 1812; d. there, 25 June 1887. He was graduated from Saint Joseph's College, Bardstown, Ky., in 1828, studied law at Transylvania University and in 1833 engaged in practice at Louisville, Ky. He was elected to the legislature in 1847 and as State senator in 1861 he took an uncompromis¬ ing stand against the proposed secession of Kentucky. Later he was in charge of recruit¬ ing stations in Kentucky. He was appointed attorney-general by Lincoln in 1864 and con¬ tinued in office until)866 when he resigned to resume his law practice and his professorship in Transylvania University. He served as delegate to the Republican national conventions of 1872-76, but otherwise held no further pub¬ lic office.

SPEED, John, English antiquary : b. Far- ringdon, Cheshire, 1552; d. London, 28 July 1629. He was taught his father's trade of tailoring, and in 1580 was admitted to the free¬ dom of the Merchant Taylor's Company. His earlier occupation aside from the practice of his trade was the drawing of maps, and in 1608-10 he published a series of 54 (Maps of England and Wales.' These reappeared with descriptive texts as Speed's 'Theatre of the Empire of Great Britaine) (1611) and were subsequently issued in several editions. His next work was (The History of Great Britaine Under the Conquests of Ye Romans, Saxons, Danes and Normans, . . . with the Succes¬ sions, Lives, Acts and Issues of the English Monarchs from Julius Caesar to . . King

James.' This work places Speed as the first English historian in distinction from the annal¬ ists and chroniclers of preceding times, but in accuracy the work left much to be desired. He published also 'Genealogies Recorded in Sacred Scripture' ; 'A Cloud of Witnesses

. . . confirming unto us the Truth of the

Histories in God's most Holie Word) (1616).

SPEED, John Gilmer, American journalist: - b. Kentucky, 21 Sept.

1853; d. Morristown, N. J., 2 Feb. 1909. He was graduated from the University of Louisiana in 1869, practised civil engineering for a time, joined the editorial staff of the New York World in 1877, was its man¬ aging editor, 1879-83 and subsequently editor of the American Magazine and Leslie's Weekly. His publications include (A Fall River Inci¬ dent ; (The Gilmers in America, } and (A Deal in Denver.* He also edited a volume of the poems of John Keats.

SPEED. See Mechanics.

SPEED AND SPORTING RECORDS.

See Sports: Their Development, Speed and Record.

SPEEDOMETER, an instrument for in¬ dicating or recording the rate at which a motor vehicle is traveling. It is attached to the dash¬ board, within easy view of the driver, its mechanism being connected with the front wheels of the car. Improved types indicate not only the speed at which the car is traveling, but register the maximum speed reached and the total number of miles traveled.

SPEEDWELL, a genus (Veronica) of annual and perennial herbs and shrubs of the family Scrophnlariacece. The 200 species are mostly natives of the north temperate zone; some, mostly shrubby, are tropical or sub¬ tropical, and others are Australian.' They are found in all kinds of soils, and many are cul¬ tivated in gardens for their beautiful white, blue or pink flowers arranged in axillary or terminal racemes. The taller-growing kinds are used mainly as border plants, the dwarfed in rock-gardens ; the shrubby kinds are ever- blooming in California. Some of the species were formerly reputed medicinal, and some were used as substitutes for tea.

SPEEDWELL, The, a sister ship of the Mayflower, which sailed for Plymouth, but was unseaworthy, and put back to port. See May¬ flower, The.

SPEER, sper, Emory, American jurist: b. Culloden, 3 Sept. 1848; d. 13 Dec. 1918. He served in the Confederate army dur¬ ing 1864-65; was graduated from the Uni¬ versity of Georgia in 1869; studied law, and became solicitor-general of Georgia. He was a member of Congress from Georgia as an inde¬ pendent Democrat, 1879-81 and as Independent 1881-83 ; he was United States attorney, 1883— 85; and was made a United States judge of the Southern District of Georgia in 1885. He was also president of the law department of Mercer University, and an orator of prominence. He is the author of a legal

work on (Removal of Causes from State to United States Courts) (1888), and of (Lectures on the Constitution of the United States.)

SPEER, Robert Elliot, American religious leader and foreign missions secretary: b. Hun¬ tingdon, Pa., 10 Sept. 1867. He was graduated at Princeton University in 1889, later studied at the Theological Seminary there, and since 1891 he has been secretary to the Presbyterian Board of Foreign Missions. He made tours of the foreign missionary fields in China, India, vol. 25 — 25

Japan and Korea in 1896-97; in South America in 1909; and in Japan, China, Siam and the Philippines in 1915. He is widely known in missionary circles as an effective organizer. Author of (Presbyterian Foreign Missions> (1901) ; (Missions and Modern History) (2 vols., 1904) ; Christianity and the Nations *(1910); (South American Problems*; (John's Gospel* (1915), etc.

SPEICHER, Eugene Edward, American artist: b. Buffalo, N. Y., 5 April 1883. He studied at the Albright Art School, Buffalo, at the Art Student's League and the Henri Art School in New York, and later studied for two years in London, Paris, Holland, Italy and Spain. He established himself in New York, where he became prominent among the younger artists as a painter of landscapes and portraits. He was elected an associate of the National Academy of Design in 1913 and received the academy's first Halgarten Prize in 1915. He was also awarded a silver medal at the Panama Exposition in 1915. Among his works are por¬ traits of Miss Helen Appleton (Thomas R. Proctor Prize, National Academy, 1911); Charles Dana Gibson (1913) ; John Nelson Cole (1914); and the landscape (Morning Light * (Metropolitan Museum, New York 1912).

SPEKE, spek, John Hanning, African ex¬ plorer; b. near Uchester, Somerset, 4 May 1827 ; d. near Bath, 15 Sept. 1864. In 1844 he en¬ tered the army and took part in the Sikh War. During his leave of absence he made hunting and exploring expeditions over the Himalayas and through parts of Tibet, collecting many specimens of animals, plants and minerals. In 1854 he accompanied Sir R. F. Burton (q.v.) and party in an expedition to Somaliland. He next served in the Crimean War, and at its close was invited by Burton to join him in an African expedition, to be carried out at the ex¬ pense of the home and Indian governments. In June 1858, Speke and Burton proceeded in¬ land from the east coast, their object being to ascertain the position of the great lakes of the interior, confused accounts of which had been from time to time received from the natives. The great lake Tanganyika (q.v.) wras dis¬ covered, and Burton falling sick, Speke

pro¬ ceeded north and discovered the south end of the Victoria Nyanza (q.v.), which he correctly judged to give birth to the Nile. In 1860 he led another expedition, organized by the Royal Geographical Society, which explored the western and northern margin of the Victoria Lake, and found a river flowing out of the lake, which turned out to be the White Nile. After long delays in Uganda and Unyoro the travelers proceeded northward, and at Gondokoro met Sir Samuel Baker, who was leading an expedi¬ tion southward. Returning home he was killed by the accidental discharge of his gun while out shooting. He published (Journal of the Discovery of the Source of the Nile) (1863) ; and (What Led to the Discovery of the Source of the Nile) (1864).

SPEKE'S ANTELOPE. See Bushbuck.

SPELLING, orthography, the formation of words by means of letters or alphabetic sym¬ bols. In certain languages like Spanish, for instance, the system of representing the sounds of the language by alphabetic symbols is prac-

tically perfect. In other words it is phonetic. In English, on the contrary, the multiplicity of vowel sounds and the composite character of the language itself have, in the course of several centuries of growth and continuous imitations, made of the alphabet a curious com¬ plex and complicated patchwork which is the despair of foreigners who attempt to learn the language. A technically perfect alphabet should have an alphabetic symbol to represent each sound in the language and no symbol should represent more than one sound. Were this the case all the difficulty in spelling would at once disappear. In Spanish schools spelling is not taught because of the regularity of the Span¬ ish alphabet. In Italian also there is very little necessity for the teaching of spelling, for the same reason. But the irregularity of the Eng¬ lish alphabet has placed a heavy burden upon the shoulders of elementary pupils and of foreigners learning the language. Years of study and practice are necessary to acquire a command of English spelling.

The modern English alphabet illustrates vividly the various changes through which the English tongue has passed since the days when the Germanic tribes first began to overrun the British islands. Saxon, Dane, Northman, Norman French, Celt and Latin have con¬ tributed

to make it what it is to-day by giving it vowel and consonantal sounds and modifying those it primitively possessed when Saxon and Celt first met on English soil. The English alphabet has grown up without any attention be¬ ing paid to its development or any effort being made to direct its development or to shape its ends. The result is that English has acquired a great many more alphabetic sounds than it possesses symbols with which to represent them. This, in itself, is bad enough, but the confusion is made all the greater by the fact that sometimes there are two or more symbols to represent the same sound, and that quite frequently compound letters are used to repre¬ sent simple sounds. How complex, confused and confusing is English orthography may be illustrated by presenting the different garbs under which the sound c or k, as in cat or kit presents itself. It is represented by cc as in account; cch. in Bacchus; ck, as in back; cq, as in acquaint ; cu as in biscuit ; Ik, as in talk, chalk; Ike, as in Folkestone; q, as in queen; qu, as in liquor ; que, as in barque, antique ; quh, as in Urquhart; sc, as in viscount; ugh, as in hough ; and x, as in excise, except ; and finally by three combinations of the k symbol, k, as in kite ; ke, as in Burke ; kh, as in khan, making, in all, 19 letters and combinations of letters to represent the same sound. As if these various modes of representing the same simple sounds were not confusing enough, some of the combinations are used to repre¬ sent other sounds. Thus ugh, in cough, repre¬ sents f; ch, in schism is mute, while in schist it is sounded as h. X, in anxious has the force of ksh, and ks, in box. In Kale, Kaiser and words of Greek origin, k has the sound usually attributed to its name, and office which betrays its Greek origin (though it came into English from Latin, where it was also used almost alto¬ gether in the spelling of Greek words). Such irregularities as the foregoing are abundant in English spelling. The original cause of these

irregularities, was prolific of a good crop of changes from the original Saxon forms of the English tongue. These were multiplied by the constant modifications produced by these vari¬ ous language sources acting and reacting upon one another, by the obscuring of full sounds and by the neglecting of others. These changes seem to have been many and to have taken place rapidly between the time of Chaucer and Shakespeare. The evidence of the cause of many of these changes is still to be seen in England and the Lowlands of Scotland to-day in the various rural dialects which sharply dif¬ ferentiate localities.

Printing and Spelling. — When printing was first introduced into Europe there was no standard of spelling, but attempts at spelling invariably conformed more or less to the sound of the word.' As this sound was frequently quite different in different localities the at¬ tempts to represent it phonetically produced widely varying results. A

similar result may be seen to-day in the conscious attempts of certain British writers to reproduce the Low¬ land Scotch, Yorkshire, Cumberland, Devon¬ shire and other dialects and of American dialect writers to present graphically the manners of speaking English of the negro, the various foreigners in the country, the New England, Ohio, Western and Southern dialects. As there is no prescribed standard for the representa¬ tion of these dialects so there is no uniformity of spelling employed by the different dialect writers. This condition represents well the lack of uniformity in spelling among writers of English previous to the introducing of spelling and even for some time afterward. But the multiplicity of books made possible by the in¬ vention of the printing press, the vast reduc¬ tion in the cost of reproduction and the conse¬ quent spread of the printed word from the commercial centres made the imposition of some standard of spelling necessary. Unfortu¬ nately the imposition of this standard came at a time when the English language was still rapidly undergoing phonetic changes, and the standardized spelling made no provision for the modification of itself in conformity with the changes taking place. The Renaissance brought into the English language many foreign words, generally in their native dress, and these in¬ troduced new sounds and letters and combina¬ tions of letters, thus adding to the confusion, which became gradually greater as many of these foreign words, in the mouths of the il¬ literate, were modified in pronunciation while still preserving more or less closely their original spelling. In the course of time these various many-sided influences, syllables and sounds that were pronounced, at an earlier stage of the language, became mute ; but still the rules of printing and custom engendered bv them retained them. These attempts to pro¬ mote a certain arbitrary uniformity and ac¬ curacy, while beneficial, contributed power¬ fully to the increase of the confusion already existing, by failing to provide for the recogni¬ tion of signs becoming mute and of syllables and letters changing their phonetic value. This naturally continued to increase the ambiguity of the phonetic values of the letters of the alphabet and to augment the irregularities in their use. No longer the name or given value of a letter

and its sounds in actual use corresponded. To such an extent has this confusion been carried that there is, at present, not a single letter in the English alphabet that does not represent two or more sound values. The vowels, being the actual voice sounds, are the most irregular in this respect. An analysis of these sounds is most suggestive

of the confusion existing in English phonetics. Thus o has 10 sounds ; a, e, and u have nine each ; i has eight ; while y has two as a vowel and three as a consonant. Were these sounds not duplicated they would represent 48 different vowels ; but they are constantly replacing one another, thus making confusion more confounded to the foreigner who attempts to learn the English language. The confusion in the use of the consonants is great. One of them, c, has six sounds; four, j, s, t and x , have five sounds each ; three, d, g, z, have four each ; six, f, h, l , m, n, q, 'have three each ; and the remaining seven have two each. The confusion in English orthography is still further increased by the presence of a great number of silent letters, some of which, how¬ ever, serve to determine the value of other let¬ ters. There are but 44 sounds in the English language yet they are represented by about 500 symbols and combinations thereof with their various applications.

Phonetic Spelling. — Many attempts have been made at phonetic spelling, and the more scientific of these have come pretty near per¬ fection, the failure to achieve perfection being due, in some cases, to a desire to achieve the practical over the purely scientific and phonetic. The best of these attempts have been made by the writers of methods of shorthand, one of the earliest and most satisfactory of which was that of Isaac Pitman (q.v.), which, with its derivatives, is the most widely used of short¬ hand systems. Pitman furnished an alphabet of 24 consonant and six long and six short vowel sounds, as follows : Consonants, p, b, t, d, ch. j, k, g (in go), f, v, th (in thigh), th in thy) s, z, sh, zh, m, n, ing, 1, r, w, y, h; long vowels a (ah), a (say), e (see), a(all), o, oo ; short vowels, a (that), e (men), i (is), o (not), u (much), u (good). For this purpose Pitman invented a series of new symbols quite distinct from those of the ordinary Roman alphabet, and he added a series of four diphthong sym¬ bols representing the sounds i, ow (naze), oi (bay) and ou (you). These diphthong sym¬ bols and the sh, zh and the two th sounds are but duplications of sounds already expressed by other simple symbols in the Pitman alphabet. The work of Pitman and of some 200 workers in the field of shorthand together with many who have followed in his foot-steps has tended toward the simplification of English spelling to some small degree so far as the actual re¬ forms accomplished. But the work is really greater than it appears, since the moral in¬ fluence and the example of success attained of shorthand writers are already strongly thrown in the balance for radical and effective spelling reform, the demand for which growing slowly but nevertheless surely. See Shorthand; Spelling Reform; Phonetics; International Language.

Bibliography. — Athans, I., (Sounds of the Mother Tongue' (London

1912) ; Dumville, B.,

(Science of Speech' (London 1909) ; Dunstan, A. C., (Englische Phonetik mit Lesestiicken'

(Berlin 1912) ; Ellis, A. J., (Early English Pronunciation' (5 vols., London 1869-89) ; (Plea for Phonetic Spelling' (1856) ; Horn, W., (Untersuchungen zur neuenglischen Lautgeschichte' (Strassburg 1905) ; Jesperson, O., (John Hart's Pronunciation of English' (Heidelberg 1907) ; Jones, D., (Phonetic Tran¬ scriptions of English Prose' (Oxford 1907) ; Pronunciation of English' (Cambridge 1909) ; (Chart of English Speech Sound' (Oxford 1909) ; Lloyd, R. (Northern English' (Leip¬ zig 1908) ; Michaelis and Jones, Phonetic Dictionary of the English Language' (Hanover 1913) ; Montgomery, M., (Types of Standard Spoken English' (Strassburg 1910) ; Rippmann, W., Pounds of Spoken English' (London 1909) ; Specimens of English' (London 1911) ; Spira, T., Pie englische Lautentwicklung nach franzosischen Grammatiker-Zeugnissen' (Strassburg 1912) ; Sweet, H., (History of English Sounds' (London 1888) ; Pounds of English' (Oxford 1908).

SPELLING REFORM, a systematic at¬ tempt to represent phonetically by letters in writing and print the accepted pronunciation of words. Such changes as have been made in any of the languages where the attempt has been made are of a purely tentative order. As was to be expected, in view of the power of the French Academy, the greatest advance to¬ wards a satisfactory and consistent spelling has been made in the French language, but there remains still much to be done before the written word is as indicative of the correct pronunication as is the case of Spanish and Italian. In Spanish, spelling is now absolutely phonetic, and Italian leaves little to be desired in this direction. In Germany the first moves toward improvement were made in 1880, the chief features of which were the omission of superfluous signs, the substitution of / for ph, the determination of the distinction between the hard and soft sounds of s, and changes of such nature. Changes in spelling have been continu¬ ous in the history of the English language, and conscious and deliberate efforts to simplify English spelling began at least as early as 1554. Dr. Johnson's dictionary,' published in 1755, marked the beginning of the era of uniformity. Previous to this, people spelled as they pleased or as they could, sometimes using two or even more forms of the same word in the same paragraph. Shakespeare is known to have spelled his own name in 30 different ways, and other writers of the times previous and after 1755 were hampered by none, or very slight conventional rules, and were free to spell Hike gentlemen," not like pedants. The attempt to reform English spelling, as previously noted, did not begin with

Johnson; his work simply marked the place this reform had reached, and set up a common standard. The reform began very early (1554), and it is really no argument against the most advanced propositions to say we are getting away from the language of Shakespeare and the Bible, for if we compare the orthography of the Bible of 1611 with the Bible of to-day, with whose spellings there is no complaint, as many as 116 changes may be found in one chapter, Psalm evi for in¬ stance. The greatest step forward toward a common-sense system was made by Webster in his (American Dictionary' (1828), but much

as his changes were decried, they were mostly those which had been recommended by others ; as for instance, dropping the Norman French u (to which the English still cling with their inborn hatred of innovation) from favour , honour, colour, etc., changing the French metre, etc., to meter; omitting certain double con¬ sonants, and instead bringing the spelling of certain classes of words into a uniformity of style — thus making mould into mold, to agree with gold, which had been similarly treated, except in rural Ireland where it is still goold (gould). The Spelling Reform Association was formed at an international convention held in Philadelphia in 1876; the English association was established in 1879, and in 1884 certain changes were recommended for adoption by both associations as follows :

1. e. — Drop silent e when fonetically useless, as in live

vineyard, believe, bronze, single, engine, granite eaten, rained, etc.

1. ea. — Drop a from ea having the sound of e, as in

feather, leather, jealous, etc.

Drop e from ea having the sound of a, as in heart, hearken, etc.

1. eau. — For beauty use the old beuty.

2. eo. — Drop o from eo having the sound of e, as in

jeopardy, leopard.

For yeoman write yoman.

1. i. — Drop i from parliament.

2. o. — For o having the sound of u in but, write u,

in above, (abuv), dozen, some (sum), tongue, (tung), etc.

For women restore wimen.

1. ou. — Drop o from ou having the sound of u, as in

journal, nourish, trouble, rough (ruf), tough (tuf), and the like.

1. u. — Drop silent u after g before a, and in native

English words, as guarantee, guard, guess, guest, guild, guilt, etc.

1. ue. — Drop final ue in apologue, catalogue, etc., dema¬

gogue, pedagogue, etc., league, colleague, harangue, tongue, (tung), etc.

1. y. — Spell rhyme rime.

2. Dubl consonants may be simplified.

Final b, d, g, n, r, t, f, l, z, as in ebb, add, egg, inn, purr, butt, bailiff, dull, buzz, etc. (not all, hall).

Medial before another consonant, as battle, ripple, written (writ'n), etc.

Initial unaccented prefixes, and other unac¬ cented syllables, as in abbreviate, accuse, affair, etc., curvetting, traveller, etc.

1. b. — Drop silent b in bomb, crumb, debt, doubt, dumb,

lamb, limb, numb, plumb, subtle, succumb, thumb.

1. c. — Change c back to s in cinder, expence, fierce,

hence, once, peace, scarce, since, source, thence, tierce, whence.

1. ch. — Drop the h of ch in chamomile, choler, cholera,

melancholy, school, stomach.

Change to k ache (ake), anchor (anker).

1. d. — Change d and ed final to t when so pronounced,

as in crossed (crost), looked (lookt), etc., unless the e affects the preceding sound, as in chafed, chanced.

1. g. — Drop g in feign, foreign, sovereign.

2. gh. — Drop h in aghast, burgh, ghost.

Drop gh in haughty, though (tho), through (thru). Change gh to / where it has that sound, as in cough, enough, laughter, tough, etc.

1. 1. — Drop l in could.

2. p. — Drop p in receipt.

3. s. — Drop 5 in aisle, demesne, island.

Change s to z in distinctive words, as in abuse verb, house verb, rise verb, etc.

1. sc, — Drop c in scent, scythe (sithe).

2. tch. — Drop t in catch, pitch, witch, etc.

3. w. — Drop w in whole.

4. ph. — Write / for ph, as in philosophy, sphere, etc.

After 1884 the subject of spelling reform did not attract any general attention for more than 20 years in spite of the publication of periodicals devoted to the propaganda, and the occasional outbreak of some enthusiastic votary, but in 1906 the establishment of the <(Simplified Spelling Board® gave the reform a vigorous

thrust forward. The board recommended for adoption a list of 300 <(simplified spellings® with which to begin the change toward a more scientific literation of the language. This move would probably have attracted no more notice than many of its predecessors, had not Presi¬ dent Roosevelt issued an" executive order, in August 1906, directing the public printer to use all these spellings in the papers sent out by his office. The Congress, however, would not allow these changes to be made in the papers that came to the members from the printer, and in December the order was rescinded. The rather ill-advised exuberance of some of the advocates of the reform has made it an object of temporary ridicule, but the probabilities are that the really great advantages to be gained will be more and more

appreciated, until the work of the reformers produces tangible and en¬ during results. The practice of isolated in¬ dividuals may help, but real reform comes slowly and in accordance with reason and the laws of language. The Simplified Board claims that 380 institutions of higher learning and 456 newspapers and periodicals are now using most of the spellings recommended by the Board.

The character of the simplifications proposed is indicated by the following examples:

1. When ed final is pronounced t, write it simply t, where the change will not suggest an incorrect pronunciation, as askt, fixt, wisht, etc.; reducing a preceding double consonant to a single consonant, as blest, kist, dipt, dropt, stept, etc.; and changing -ced to -st, as pronounsl, rejoist, reverst, etc.; but avoid misleading forms like bakt for baked, deduct or dedust for deduced, etc.

2. Change ph to / when so sounded as alfabet, fonograf, fotograf, sulfur, telefone, telegraf, etc.

3. Drop e final after -Iv and -rv, as delv, twelv, carv, serv, deserv, etc.; also, in the endings -ile, -ine, -ise, -ite, -ive, unstressed pronounced il, in, it, iv, as hostil, textil, anilin, determin, engin, examin, genuin, imagin, practis, promis, definit, favorit, infinit, opposit, activ, comparativ, nativ, positiv, etc.; and at the end of ar(e), hav(e), giv(e), forgiv(e), misgiv(e), liv(e); because its normal use after a single consonant is to show that the preceding vowel is long. Hence it is retained in such words as bare, brave, mile, fine, wise, polite, arrive.

4. When the digraph ea is sounded as in head or as in heart, use the letter that is sounded and omit the other, as helth, hevy, insled, tred, wether, plesant, hart, harth, etc.

5. Substitute e for the digraphs and ligatures ae, a, oe, ce, when not final, as medieval, fenix, cyclopedia, etc.

6. When ch is pronounced c, drop h, except before e, i, and y, as carader, epoc, arcangel, mecanic, monarc, scolar, scool, stomac, tecnical, etc.; but chemist, architect, monarchy, etc.

7. Drop silent h from initial rh, as rapsody, reumatism, rubarb, etc.

8. Reduce ll final, after a short strest vowel, to l, as bil, dol, dril, dwel, fil, ful, fulfil, shal, tel, wil, wilful, etc.

9. Reduce the double final consonants bb, dd, ff, gg, nn, rr, tt, zz, to a single consonant, as eb, ad, od, cuf, eg, bun, bur, whir, net, buz, etc.

10. Drop -me from mme final, as gram, program.

11. Drop -te from ette final, as cigaret, coquet, etiquet, omelet, quartet, etc.

12. Drop silent ue final after g, as catalog, colleag, dialog, Pedagog, synagog, etc.; except when g is preceded by a single long vowel, as in rogue, vague, vogue, etc. Tongue spell tung, Milton's way.

13. For -ough substitute o, u, of, uf, ock, out, or up, accord¬ ing to the sound, as tho, thru, cof, enuf, hock, drout, hiccup, etc. Plough spell plow.

14. Drop silent b final, as crum, lam, lim, num, thum, etc.; except where its omission would suggest an incorrect pronunciation, as tomb, comb, etc.

15. Drop e from ey final unstresst, pronounced like short y final, as abby, barly, chimny, donky, gaily, mony, trolly, vally, whisky, etc.

16. Substitute z for 5 in the verb-suffix -ise, as advertize, civilize, criticize, pauperize, etc.

17. Change re final to -er, as center, fiber, meter, theater, etc.

18. Drop u from our final in words of two or more syllables, as ardor, color, favor, honor, labor, etc.

Bibliography. — Boraston, (Professor Skeat and Spelling Reform) (London 1906) ; Bradley, H., (On the Relations between Spoken and Written Language) (ib., 1913) ; Brunot, F., vLa reforme de l'orthographe5 (Paris 1905) ; Beaunier, A., (Contre la reforme de l'ortho- graphe) (2d ed. ib. 1909) ; d'Albrey, J., (L'Orthographe et l'etymologie5 (ib., 1909) ; Fernald, F. A., (Ingglish az she iz spelt) (New York 1885) ; Lounsbury, T. R., (English

Spelling and Spelling Reform5 (ib., 1909) ; Skeat, W. W., (Problem of

Spelling Reform5 (London 1906) ; Vickroy, T. R., (Fonetic Ticher5 (3 vols., Saint Louis 1880-83) ; Vizetelly, F. H., dictionary of Simplified Spelling> (New York 1915) ; Weeks, R., <The National Education Association Alphabet and the New Spellings of the Simplified Spell¬ ing Board) (ib., 1912) ; Simplified Spelling Bulletin (New York 1909 et seq., quarterly).

SPELMAN, Sir Henry, English antiquary: b. Cougham, Norfolk, about 1562; d. London, 1641. He was graduated at Trinity College, Cambridge, 1583, and then attended Lincoln's Inn. He was a member of Parliament in 1597, high sheriff of Norfolk in 1604 and performed several public services for King James I. He was knighted in 1612 and retired to lifelong study, founding, in 1635. a short-lived Anglo- Saxon readership at Cambridge. His writings include (De non Temerandis Ecclesiis) (1613) ; his colossal work, (Glossarium Archaeologicum,5 of which he published volumes A to L (1626), the remainder being brought out by his son ; and the material for his (History of Sacrilege,5 and his works on (The Councils of the Church5 and (The Tenures of Knight Service) all of which were left incomplete and w.ere posthu¬ mously issued.

SPELTER, in commerce, a name fre¬ quently applied to zinc, and to an impure zinc used in soldering. A mass of junked zinc articles, likely to contain impurities, is com¬ monly classed as spelter.

SPENCE, spens, Catharine Helen, Austra¬ lian novelist: b. Melrose, Scotland, 31 Oct. 1825 ; d. 3 April 1910. Her parents moved to Australia in 1839; and 20 years later she began working for electoral reform in behalf of which she lectured all over Australia and in the United States and Canada. She was a member of the Children's League from 1888 until her death and of numerous other bodies; and from 1878 onward she wrote extensively for the press. Most of her literary work appeared in Fraser's Magazine, Cornhill, Harper's, Melbourne Re¬ view and Victoria Review. For many years she worked as a journalist on the South Austra¬ lia Register; and at the time of her death she was president of the Effective Voting League of South Australia and vice-president of the National Council of Women.

SPENCE, Francis Stephens, Canadian journalist and Prohibitionist: b. Donegal, Ire¬ land, 29 March 1850. He went to Canada as a youth, and was educated at the Toronto Nor¬ mal School. He was for a time engaged in teaching, but from 1882 was active as a journal¬ ist. He edited successively the Canada Citizen, Vanguard, the Ontario Good Templar, and was managing editor of the Pioneer, all publications of moral uplift tendency. He has been active

in general organization work for Prohibition, and in 1886-1907 was secretary of the Ontario branch of the Dominion Prohibition Alliance. In 1911 he became president of the Ontario Municipal Association. Author of (The Facts in the Case) (1896).

SPENCE, Henry Donald Maurice, Eng¬ lish Anglican clergyman and author : b. Lon¬ don, 14 Jan. 1836. He was educated at Cambridge, took orders in the Established Church, and was professor of English literature at Saint David's College, Lampeter, Wales, 1865-70, and rector of Saint Mary de Crypt, Gloucester, 1870-77. He was principal of Glou¬ cester Theological College, 1875-77, vicar of Saint Pancras, London, 1870-86, and dean of Gloucester from the last-named date. Among his many published books are (Dreamland and History) ; (The Church of England: a History for the People) ; (The White Robe of the Churches of the 11th Century5 ; (Christianity) ;

(Secrets of a Great Cathedral.5

SPENCER, spen'ser, Ambrose, American jurist: b. Salisbury, Conn., 13 Dec. 1765; d. Lyons, N. Y., 13 March 1848. He was edu¬ cated at Yale and Harvard universities and was graduated from the latter in 1783. He was ad¬ mitted to the bar in Hudson, N. Y., where he was elected city clerk in 1786. In 1793 he represented Columbia County in the State legis¬ lature; in 1795 and for seven consecutive years was State senator; in 1804 became a justice of the Supreme Court, and in 1819 was promoted to be chief justice, which office he resigned in 1823, and resumed the practice of his profession at Albany. He was for some years mayor of that city, and also represented the Albany dis¬ trict in Congress. In 1844 he presided over the National Whig Convention at Baltimore. His energy, resolution and high legal attain¬ ments left a permanent impress on the constitu¬ tion and institutions of New York.

SPENCER, Claudius Buchanan, American Methodist Episcopal clergyman and editor : h. Fowlerville, Mich., 20 Oct. 1856. He was graduated at the Northwestern University in 1881, and was ordained in the ministry in that year. He held pastorates in Michigan and Colorado in 1881-96; edited the Rocky Moun¬ tain Christian Advocate in 1892-1900; and since 1900 has edited the Central Christian Advocate at Kansas City, Mo. He is prominent as a Prohibitionist and in the general organization work of the Church. Author of (The Blue Flower of Methodism5 (1903) ; (The Layman5 (1912) ; (That They May be One5 (1915), etc.

SPENCER, George John, Earl, English politician and bibliophile : b. Wimbledon, Sur¬ rey, 1 Sept. 1758; d. Althorp, 10 Nov. 1834. He was

educated at Harrow and Cambridge, and was elected member of Parliament for the county of Northampton. In 1783 he became the 2d Earl Spencer. In the House of Lords he voted with the Whigs till the period of the French Revolution, when, with some others of the party, he joined the party of Pitt. In 1794- 1801 he was First Lord oi the Admiralty and in 1806-07 was Secretary of State for the Home Department. Earl Spencer was president of the Roxburghe Club at its origination, and pos¬ sessed the largest and richest private library in the world. The foundation of his library

was laid in 1789, by the purchase of books in all parts of Europe. It was described by Dib- den in (Bibliotheca Spenceriana) (1814). The bulk of this library is now included in the Ry- lands Library, Manchester.

SPENCER, Herbert, philosopher and ex¬ ponent of the modern philosophy of evolution : b. Derby, England, 27 April 1820; d. 8 Dec. 1903. His father was a teacher, a Non-Conform¬ ist, who was for years a Wesleyan, but who afterward seceded from that religious body and remained to the end of his life somewhat in¬ different to outward religious forms, although a deeply religious man. The subsequent tend¬ ency of Spencer's philosophy was indirectly, but in a very potent way, determined by the education that his father gave him during his childhood and early youth. It was an educa¬ tion that decidedly tended to quicken his inter¬ est in the study of nature, and to develop his powers of independent thought and of inquiry into the nature of things. Furthermore, the Non-Conformist atmosphere in which Spencer grew up strongly tended to cultivate in his mind political liberalism of the type then character¬ istic of many of the most progressive English minds. In 1837 Spencer began the study of en¬ gineering under Mr. Charles Fox, the engineer of the London and Birmingham Railway, then recently constructed. Spencer continued his work in the service of the railway, with some interruptions, until 1841. In 1843 he went to London and engaged in contributing to the va¬ rious periodicals, and in somewhat varied ac¬ tivities of a miscellaneous sort, until 1850. In 1842 he wrote a series ot letters to The Non¬ conformist — a newspaper then recently estab¬ lished as an organ of the Dissenters. The let¬ ters dealt with some principles relating to the influence of legislation upon social processes, and began the train of thought which Spencer later developed in his (Social Statics. *The (Social Statics,* his first book, was written be¬

tween 1848 and 1850, and is characterized by the author himself as “a kind of natural his¬ tory-ethics. The work especially maintains the doctrine of the right of the individual, and of the necessity for non-interference on the part of the government. The characteristic of Spencer’s sociological studies at this time, as contrasted with those of other English liberals who were his contemporaries, was the tendency to base the doctrine of non-interference upon very general considerations derived from natu¬ ral history and from the study of natural law in general. Society, like the individual organ¬ ism, is, so Spencer now teaches, the result of a growth, which is subject to determinate natural conditions, which in consequence tends on the whole to results advantageous, in the end, to individuals, while this growth of society cannot be safely interfered with by artificial devices. A generalization of the interests which Spencer thus early expressed led him within the next few years to a study of the processes of growth in nature in their more general aspects. Ac¬ cepting, almost as soon as he distinctly con¬ ceived of it at all, the doctrine that all living forms are the result of natural processes of growth, and are not due to special creation, Spencer was led during the immediate follow¬ ing years to an effort to formulate in general terms the “law of progress,® or of development, which he conceived to be common to all such

processes of growth. In 1854-55 he wrote the first edition of his Principles of Psychology, * in which he endeavored, first, to characterize in a decidedly novel way the nature and proc¬ esses of life in general, and then to apply this general formula to the investigation of the de¬ velopment of mind. Life, Spencer now defines, as a series of changes occurring in an organism in such ways as involve ((a continuous adjust¬ ment of inner relations to outer relations.® The mental processes are then defined as a special accompaniment and result of the adjustment in question. Between 1856 and 1860 Spencer, despite considerable interruption through ill health, published a large number of essays in various periodicals, among which the most im¬ portant are: (1) the four papers which were later brought together in his volume on (Edu¬ cation, } and (2) a number of essays tending toward the final expression of his general formula for evolution. As both bodily and mental development had now come, in Spen¬ cer’s mind, to be conceived as subject to uni¬ versal and common laws, he began to consider the possibility of a system of philosophy in which the general process of evolution should be stated in terms applicable to all kinds of de¬ velopment. The first sketch of this system of philosophy was outlined in 1858; and in 1860 the definitive program of the (System of Synthetic Philosophy) was

written out. The first edition of the (First Principles, *which constituted the first part of this "system,® was prepared between I860 and 1862, and was is¬ sued to subscribers in parts. The second part of the (System of Synthetic Philosophy, * namely, the Principles of Biologv,* was issued between 1862 and 1867. In 1867 Spencer re¬ cast and reissued his (First Principles. *Be¬ tween 1867 and 1870 he developed a new state¬ ment of his Principles of Psychology) as modified by the further development of his doctrine. The Psychology* in its new form was finished by 1872, and formed the third part of the system. The plan of Spencer's system required, next in order, the application of his principles to the study of sociology, an under¬ taking which proved to require a longer time than Spencer had originally contemplated. In 1872-73, at the instance of Spencer's American friend, Prof. E. L. Youmans, Spencer pre¬ pared, as an "extra book® — not a part of the system — a volume for the International Scien¬ tific Series, entitled (The Study of Sociology. *In 1874 the first volume of the Principles of Sociology) began to be issued. For this work Spencer had been making, since 1867, and with the aid of secretaries, the elaborate collections of material which were, in a series of years, published under the title (Descriptive Sociol¬ ogyˆ After completing the first volume of the Principles of Sociology, > Spencer turned for the time to the beginning of what was to be the last division of his system, namely, ethics, and published, in 1879, the data of Ethics.) The succeeding years, until the completion of Spen¬ cer's system in 1900, were principally .devoted to the preparation of the second and third volumes of the Principles of Sociology,* and to the completion of the (Ethics.) The de¬ scriptive Sociology) continued to be issued until 1881 in parts. From time to time throughout the period of the preparation of the synthetic

philosophy Spencer was interrupted for greater or shorter intervals by ill health. But he never¬ theless found time to prepare and to publish a considerable number of essays of a controver¬ sial character, relating to his system and to its critics ; to contribute also to various topics of current discussion ; and his Autobiography,* published in 1904, is still another of the evi¬ dences of his extraordinary productiveness.

The complete list of Spencer's works, pub¬ lished during his lifetime, in the form which they finally assumed, in so far as he regarded them

as worthy of permanent place among his productions, is as follows: First, the (Synthetic Philosophy) itself, consisting of (First Principles) (1 vol.) ; cThe Principles of Biology) (2 vols.) ; (The Principles of Psychology) (2 vols.) ; (The Principles of Sociology) (3 vols.) ; (The Principles of Ethics) (2 vols.). Second, (Essays: Scientific, Political and Speculative, *definitive edition (2 vols.). Third, (Social Statics,* revised edition (1 vol). Fourth, (The Study of Sociology) (1 vol.). Fifth, (Educa- tion) (1vol.). Sixth, <Facts and Comments) (1 vol.). Seventh, (Various Fragments) (1 vol.). Eighth, (The Inadequacy of Natural Selection) (1 vol.). Ninth, (Descriptive Sociology.* The last of these works is, in the main, a collection of material prepared by Spencer's assistants and printed as such, but under Spencer's di¬ rection.

In the most general outlines, what is char¬ acteristic of the philosophy of Spencer may be sketched as follows : In his theory of knowl¬ edge Spencer has many features in common with the classic English empiricism. But this empiricism, in his case, is modified by consid¬ erations due to the doctrine of evolution. Knowledge, namely, as he teaches, arises not merely through the experience of the individ¬ ual, but through the experience of the race so that, in the individual, inherited intellectual tendencies determine the recognition of certain fundamental truths as certain and unquestion¬ able so soon as attention is attracted to the mat¬ ters which these truths express. Thus, mathe¬ matical certainties are based upon a kind of evidence which the individual finds to be abso¬ lute and unquestionable, but which the expe¬ rience of the race has molded into their pres¬ ent forms. In consequence, when we inquire into the foundations of knowledge, we meet with certain assurances, which, in our individ¬ ual cases, are to be tested by what Spencer calls the ((universal postulate,® namely, ((the incon¬ ceivability of the opposite.® That is whatever proposition is such that the experiment of try¬ ing to conceive its opposite to be true persist¬ ently fails is to be regarded as a primal neces¬ sity, and is to be accepted as true. If we ask how the human race came to know this propo¬ sition to be true, the answer is, through the inherited effects of experience. But if we ask why the individual must accept it as true, the answer is, simply because the opposite is incon¬ ceivable. Among the principles thus warranted by the "universal postulate,® the principle of the "persistence of force® is prominent. . The fundamental principles of ethics have a similar foundation.

Since the ultimate source of our knowledge lies in the experience of the race, it is impos¬ sible either by individual observation or by

means of the inherited effects of experience, to fathom the innermost

nature of the real world. We can know only the world as it appears to beings with such an organization as the process of evolution has brought to pass in the case of our race. Any effort to transcend the lim¬ itations thus established leads into the region of what Spencer calls the “Unknowable.® Yet it would be wrong to endeavor to conceive our world as merely a world of phenomena, or of contents of experience, or to accept any form of idealism. For the test of the “inconceivabil¬ ity of the opposite® assures us, as one of the absolute certainties, that a world of genuine reality, transcending all our experience, both exists and is unknowable to us. It is equally impossible to deny (or rationally to doubt) the reality of such a world and to attempt any positive theory as to what its ultimate nature is. Subjective idealism, denying that the un¬ knowable exists at all, is, therefore, according to Spencer, quite unthinkable. But every effort to give a positive account of ultimate reality breaks, down by leading us to unavoidable con¬ tradictions, such as are involved in attempting to conceive the world in its wholeness, as either finite or infinite, as either caused or uncaused, as either absolute or relative, and so forth.

All such epistemological considerations, however, are for Spencer mere preliminaries. His principal philosophical interest lies on the positive side, namely, in the effort to reduce to unity the laws of the “knowable® world, that is, the laws which govern the phenomena of nature. Such a unification depends, first, upon recognizing the “persistence of force® — a term by means of which Spencer denotes the con¬ servation of energy, as he conceives that fact. In practice, however, Spencer’s term “persist¬ ence of force® is applied in more various ways than those which are customary in case of the usual doctrine of the conservation of energy. The “persistence of force,® used as a principle, guarantees us against accepting miracles, against conceiving anything as occurring coun¬ ter to strict natural law, against accepting the doctrine of special creation, and so forth. In brief, the doctrine of the persistence of force gives us a view of what may be called the ana¬ lytic unity of nature, namely, a view of that character which is common to every sort of natural process.

If, however, we turn from the considera¬ tion of this most universal aspect of nature to a study of the various types of natural proc¬ esses which are observable when we consider large masses, or series of natural phenomena, we come hereupon to the principles characteris¬ tic of what may be called the synthetic unity of nature, that is, of that unity which appears when we consider the entire lives of organisms, or the histories of races of living creatures, or the history of planets, of solar systems or, in another realm, of societies. These processes which the persistence of force render possible are of two general types. They

are, namely, either processes of evolution or processes of dissolution. Evolution occurs when great ag¬ gregations, such as have just been mentioned, appear and grow and become organized. The formation of a stellar system, the solidification of a planet, the gradual building up and diversi¬ fication of the earth's crust, the growth of a

race of animals or of plants, the life history of an individual or of a nation — these are proc¬ esses of evolution. Dissolution is the reverse of any of these processes. When an aggregate is disintegrated, dissolved or otherwise de¬ stroyed, when an organization passes away or disappears, we are, therefore, dealing with dis¬ solution.

Evolution is of course the more interesting of these two processes. It possesses, according to Spencer, two characteristic forms, primary evolution and secondary evolution — the latter being based upon the former, but occurring in less frequent instances, although these instan¬ ces are very highly interesting and important. The characteristic of the primary evolutions is that they involve ((an integration of matter and a dissipation of motion.® Such processes occur when masses of matter cool, contract and solid¬ ify — as, for instance, when planets are formed. The processes of secondary evolution are ren¬ dered possible by the fact that some of the bodies subject to primary evolution do not merely contract and solidify, but also pass through a stage or a series of stages of their existence, in which they predominantly possess a "plastic® character. ((Plastic bodies® are such as are sufficiently free from a close coherence of parts to permit of easy change in conse¬ quence of change in their environment, while at the same time these plastic bodies are suffi¬ ciently coherent to retain the traces of dis¬ turbances which have happened to them. Thus, a mountain range, subject to erosion, not only yields in numerous ways to the action of water and of weather, but retains, in a great variety of ways, the traces of such erosions as have oc¬ curred in the past, instead of being swept away at once by a single flood, as a smaller mass might be. Again, a living organism is a plastic body, so full of internal motion, or of stored- up energy, as to be greatly and easily disturbed by its environment, while at the same time it is so far possessed of rigidity in its structure and in its way of responding to external influences, that traces of what has happened to it remain, in great variety, and for a long time, or even throughout the life of the organism. The power of an organism to adjust itself to new conditions, in combination with the power to form and retain habits,

constitutes the basis for all the higher development of life. All such powers depend physically upon the char¬ acteristics of the “plastic bodies,® and the proc¬ ess of organic evolution is altogether to be de¬ scribed as due to the accumulation of such sec¬ ondary evolution as these properties of plastic organisms make possible. Since the brain it¬ self, such as any higher animal possesses, is a plastic body, the result of processes of aggrega¬ tion, and is itself on the way toward a greater solidification (such as occurs in old age), while the brain, during youth and early maturity, is at once extremely sensitive to disturbances and very apt to retain the results of former dis¬ turbance — it follows that the entire evolution of the mind, which so far as the mind is know- able, accompanies the development of the brain, is itself to be described in terms of the proper¬ ties of the plastic bodies.

In consequence of the fact that evolution, so far as it is a process of the knowable world,

is thus a result of “the integration of matter and the dissipation of motion,® and, in case of the secondary evolutions, is a result of the for¬ mation of the plastic bodies, it follows that all evolutionary processes must possess certain common features. The primary evolution, otherwise called “simple evolution,® consists altogether of the formation of “coherent aggre¬ gates,® such as result whenever bodies solidify and part with their internal energies. The secondary evolution, also called “compound,® includes changes that are due to “differences in the circumstances in the different parts of the aggregate.® The most notable result of these internal differences is a “transformation of the homogeneous into the heterogeneous.® Wherever evolution takes place in a plastic body such increasing differentiation is inevitable, the reason being that the traces of previous changes are retained, and are made the basis of increas¬ ing variety, as the traces of new changes are superposed. In the more complex instances of secondary evolution the transition from the ho¬ mogeneous to the heterogeneous is long con¬ tinued and extremely complicated. It is ex¬ hibited not only in the structure of an aggre¬ gate, but in the functions which belong to this aggregate, in case the aggregate is, like a living organism, the seat of a great variety of ener¬ gies. The increasing complication and differ¬ entiation of the functions and habits of a living organism is thus the result of the same kind of process as makes its appearance even in inor¬ ganic nature wherever the results of former changes accumulate in a plastic body. Wher¬ ever integration and increasing heterogeneity are long continued and important, they are also accompanied by an increasing definiteness of structure and function, which Spencer describes as due to the process called by him “segrega¬ tion.® Segregation is

exemplified wherever the outlines of things grow sharper, wherever the like things of the natural world tend to be grouped near together or the unlike things to be kept apart. For certain natural forces, whose presence in the world Spencer exten¬ sively illustrates, are working along with what¬ ever tends to differentiate phenomena and are so working as to tend to sort out, or to segre¬ gate, like and unlike things. Such forces are manifest in the case of -the formation of geo¬ logical strata through sedimentary deposits, and in the case of the grouping together of similar organisms in societies, and in large numbers of other instances. Segregation com¬ bines with differentiation, and with integration, to characterize the whole evolutionary process.

As has just been suggested, Spencer also applies these principles to explain the laws of social structure and function and to describe the evolution of society, and his especial inter¬ est in all these considerations lies in his attempt¬ ing to make clear the unity of the evolutionary processes, whether organic or inorganic.

The application of the evolutionary formula to the study of psychology has already been in general indicated. Mental functions grow in a way that is precisely parallel to the growth of certain organic structures and functions. Con¬ sequently integration, differentiation and segre¬ gation can be traced in mental life as well as in organic life. And in so far as the conditions of mental life are knowable at all, these con-

ditions have to be defined in the terms of the same evolutionary formula which apply to plas¬ tic bodies in general, that is, to their structure and to their functions. In order to apply these considerations to that study of ethical problems which so early interested him and to the de¬ fense of those social doctrines which he so early emphasized, Spencer laid especial stress upon naturalism in ethics, that is, upon the necessity of consulting the natural conditions of organic life in order to define the norms of conduct. Conduct is an evolutionary phenom¬ enon and is to be considered in the light of the general formula for evolution. Conduct, for instance, is a part of the adjustment of the organism to its environment and is to be judged in the light of the laws of that adjust¬ ment. That conduct which secures the most perfect adjustment is at once the most accept¬ able to society, and, by virtue of the conditions under which mind has developed, is in the long run most satisfactory to the individual con¬ cerned. For in case

of the human organism, the adjustment of internal to external con¬ ditions normally occurs in society. Hence such adjustment as keeps the individual in harmony with his social order is conduct of the type favored by evolution. The inherited effects of experience appear in those of our instincts which fit us for harmonious social life. On the other hand, social harmony does not mean social subordination. The goal of social de¬ velopment is a condition of equilibrium in which the individual is as little interfered with by his society as possible, in so far, namely, as interference would involve coercion or re¬ straint. Meanwhile, as this goal is approached, the individual grows increasingly differentiated in his social functions, better adapted to a wider and wider range of social conditions and more definite in his functions.

Notable in Spencer's work has been his at¬ titude toward the problems of past and of con¬ temporaneous religions. The religions of the world are the results of evolutionary processes whose knowable aspect Spencer elaborately dis¬ cusses in his Sociology. > Viewed as to their contents, they have always included efforts to transcend the bounds of human experience, in a word, to transcend the knowable. But in recognizing the existence of an unknowable, the synthetic philosophy, as Spencer maintains, has itself, in a measure, justified one of the deepest religious interests, namely, the interest of finding ourselves in some sort of relation to a power which, inscrutable though it may be, is still ever-present and is the source of all things.

In his (Essays on Education) Spencer has made prominent the importance of the study of natural science and has emphasized the sig¬ nificance of the sort of training which he him¬ self originally received from his father.

In sum, Spencer was one of the leaders of the age in which the modern doctrine of evolu¬ tion came into prominence. In his own devel¬ opment he was, until 1860, when he first be¬ came acquainted with Darwin, substantially independent of other evolutionary thinkers, at least among his contemporaries. Indirectly and somewhat unconsciously, he was influ¬ enced (as Prof. John Dewey has pointed out) by the tradition of 18th century French

philosophy; consciously he was molded by the English liberalism of his time; and less promi¬ nently he was affected by the Kantian epis¬ temology, with its limitation of human knowl¬ edge to the phenomenal world. The Kantian influence was indirect, occurring through Spencer's reading of Hamilton and of Mansel. Spencer's popular influence has been very large — still larger in America than in

England. His most notable undertaking is the effort to formulate the doctrine of evolution in gen¬ eral terms ; as a part of the undertaking, his work in psychology, in sociology and, to a less degree, in educational theory and in ethics, has proved widely influential. Consult Elliott, H., (Herbert Spencer *(New York 1916) ; Hudson, W. H., (Introduction of the Philoso¬ phy of Herbert Spencer* (New York 1894) ; Collins, F. H., (Epitome of the Synthetic Phi¬ losophy (New York 1901) ; Royce, J., ˆHerbert Spencer: an Estimate and Review) (New York 1904 containing also personal reminis¬ cences by James Collier).

Josiah Royce,

Late Professor of Philosophy, Harvard Uni¬ versity.

SPENCER, Jesse Ames, Protestant Epis¬ copal clergyman, author and educator : b. Hyde Park, N. Y., 17 June 1816; d. Passaic, N. J., 2 Sept. 1898. Having graduated from Colum¬ bia University and completed in 1840 a course in theology at the General Theological Semi¬ nary, he entered the ministry, becoming rector of Saint James Church, Goshen, N. Y., where he remained for two years. Later, he became professor of Latin and Oriental languages at Burlington College, 1849-50; accepted the posi¬ tion of editor and secretary of the Episcopal Sunday School Union and Church Book Society, serving from 1851-57 ; for two years, 1863-65, was rector of Saint Paul's Church, Flatbush, L. I., and from 1869-79 was Greek professor in the College of the City of New York and professor emeritus, 1879-81. His most important books were (History of the English Reforma- tion> (1846) ; (History of the United States) (1856-69) ; < Sketch of the History of the Prot¬ estant Episcopal Church in the United States) (1878); (Memorabilia : Recollections of Sixty Years, 1826-86) (1890), etc. He also edited six volumes <of Arnold's series of Greek and Latin textbooks (1846-50), etc. In 1883 the House of Bishops appointed him custodian of the Standard Bible.

SPENCER, John Canfield, American lawyer, son of Ambrose Spencer (q.v.) : b. Hudson, N. Y., 8 Jan. 1788; d. Albany, N. Y., 18 May 1855. He was graduated from Union College in 1806, was private secretary to Gov¬ ernor Tompkins in 1807-09 and in the latter year was admitted to the bar. In 1811 he be¬ came master in chancery, was appointed judge- advocate-general on the northern frontier in 1813 and assistant attorney-general of New York in 1815. He served in Congress in 1817— 19, was a member of the State assembly in 1819-20, acting as speaker in the latter year, and in 1824-28 he was State senator. He was one of the commissioners to revise the statutes of the State of New York and was special attorney-general in the

prosecution of the Masonic murder of William Morgan (q.v.). In 1839-41 he was Secretary of State and Super-

intendent of common schools and in the last- named year was appointed Secretary of War by President Tyler. He was transferred to the Treasury Department in 1843, but resigned in the following year because of his disapproval of the annexation of Texas. He thereupon re¬ sumed his law practice, was afterward a mem¬ ber of various State commissions, was actively instrumental in introducing an improved com¬ mon school system, and the organization of the State asylum for idiots was due largely to his efforts. He edited, with preface and notes, Henry Reeve's translation of Tocqueville's democracy in America) (2 vols., 1838), and was joint author of (Revision of the Statutes of New York) (3 vols., 1846). Consult Proc¬ tor, <Review of John C. Spencer's Legal and Political Career* (1886).

SPENCER, Joseph, American soldier: b. East Haddam, Conn., 1714; d. there, 13 Jan. 1789. He entered the Northern army in 1758, rose to the rank of colonel and in 1775, at the suggestion of Washington, was appointed brigadier-general by Congress He took um¬ brage at the promotion of Gen. Israel Put¬ nam and was about to withdraw from the army but decided to remain and served around Boston until its evacuation. He was then transferred to the defense <of New York, promoted major-general in 1776 and in 1778 he was placed in command in Rhode Island. He assembled his' forces at Providence, and instituted a movement against the British at Newport which failed, resulting in his censure and retirement.

SPENCER, Joseph William Winthrop,

American geologist : b. Dundas, Canada, 26 March 1851. After graduating from McGill University, Montreal, in 1874, where he took first honors in geology and mineralogy, he studied at the University of Gottingen, Ger¬ many, whence he was graduated Ph.D., in 1877. In 1877 he was appointed science master at the Collegiate Institute at Hamilton, Ontario ; in 1880 became vice-president and professor of geology in King's College, Nova Scotia; in 1882 accepted the chair of geology in the Uni¬ versity of Missouri, remaining there till 1887 ; and was State geologist of Georgia from 1888-93. He designed the museum building for the University of Missouri and procured many of the specimens for the geological de¬ partment. In 1893, having come

to New York, he became dissatisfied with the technical pub¬ lications of the experimental stations and in¬ duced the legislature to appropriate $8,000 for university extension of agriculture, the money being placed with Cornell University, part for carrying the Agricultural College to the farmer and part for the Experimental Station. In 1896 he was placed in charge of the depart¬ ment for a farmers' correspondence reading course and later, with the aid of the Depart¬ ment of Public Instruction, succeeded in intro¬ ducing agriculture under the name of (<nature study® into the public schools. In 1905-08 he was special commissioner of the Geological Survey of Canada. He has made extended investigations of glacial geology of the Great Lakes region and Niagara Falls and of the geologic history of the Antilles and Central America. His report on (The Falls of Ni¬

agara } (1907), in which the age .of the falls is stated to be 39,000 years plus or minus 4,000 years, was issued by the Canadian Geological Survey. He has written 'Niagara, Fossils) (1884); (Glacial Erosion in Norway* (1887); (Geological Survey of Southwestern Georgia) (1891) ; (Geological Survey of the Paleozoic Belt of Georgia) (1893) ; (Origin of Niagara Falls and History of the Great Lakes> (1895) ; and many papers in scientific journals, relating to the same subjects.

SPENCER, Platt Roger, American pen¬ man: b. East Fishkill, N. Y., 7 Nov. 1800; d. Geneva, Ohio, 16 May 1864. At 15 he taught his first writing class; and from 1816-21 was employed as a bookkeeper. He then studied law and later became a teacher in the common schools. He was instrumental in the establish¬ ment of business colleges throughout the United States, and published (Spencer and Rice's Sys¬ tem of Business and Ladies' Penmanship *; (Spencerian or Semi-Angular Penmanship.* What is known as Spencerian penmanship de¬ rives its name from him as its exponent.

SPENCER, Sara Andrews, American social reformer : b. Savona, Steuben County, N. Y., 21 Oct. 1837 ; d. 1909. She was gradu¬ ated from the Saint Louis Normal School, 1856, and was married to H. C. Spencer in 1864. Having removed to Washington she with 72 other women attempted to register and vote in 1871 but was refused. She then brought suit which resulted in decisions of the Supreme Court of the District of Columbia and the Supreme Court of the United States that women Gould not vote without local en¬ abling legislation. She was instrumental in the passage of a bill in the District of Columbia, 1873, for the rescue .of outcast girls, and was secretary of the National Woman Suffrage As¬ sociation 1874-81, and president of the Woman

Franchise Association of the District of Colum¬ bia, 1871-76. She has published ‘Problems of the Woman Question) ; (Thirty Lessons in the English Language. *

SPENCER, Sir Walter Baldwin, professor of history at the University of Melbourne : b. Stratford, England, 1860. He was graduated from Oxford and became professor of biology in the University of Melbourne in 1887 and director of the National Museum of Natural History, Geology and Ethnology. He was a member of the Horn Scientific Expedition to central Australia in 1894 and editor of its re¬ ports. With F. I. Gillen, he conducted an ethnological expedition across Australia to the Gulf of Carpentaria in 1902. He was knighted in 1904. He is joint author with Gillen of (The Native Tribes of Central Australia> ; and also of (Northern Tribes of Central Australia) ; and author of ‘Pineal Eye in Lacertilia) ; ‘The Narrative of the Horn Expedition ; ‘Across Australia) (1902); ‘Native Tribes of the Northern Territories of Australia) (1914).

SPENCER, Iowa, city, county-seat of Clay County, on the Little Sioux River, and on the Chicago, Milwaukee and Saint Paul Railroad, 75 miles northwest of Fort Dodge and 80 miles northeast of Sioux City. It is in an agricul¬ tural and stock-raising region. Its chief in¬ dustries are connected with farm and dairy products. It is a railway junction and local

commercial centre. It makes large shipments of corn, wheat, livestock, vegetables and dairy products. There are public elementary schools, a high school, a private commercial school, a library, banks and newspapers. Pop. (1920) 4 ,599 »

SPENCER, Mass., town, one of the county- seats of Worcester County, on the Boston and

Albany Railroad, about 12 miles west of

Worcester. It is in a beautiful region, about 1,000 feet above sea-level and surrounded by farm lands. It was settled in 1717 by Nathaniel

Wood. Originally it was a part of Leicester,

and in 1744 it was made the West Parish of Leicester, and in 1753 was incorporated as a town with the name of Spencer. In 1744 its first church was organized. It is the birthplace of Elias Howe (q.v.), inventor of the sewing machine. It has a large shoe factory, woolen mills, vinegar works and wire works. There are seven churches, the David Prouty high school, public and parish elementary schools, and the Richard Sugden Public Library, opened in 1857. There are several banks and news¬ papers. The government is administered by a board of five selectmen. Pop. (1920) 5,930.

SPENCER GOLF, Australia, a large inlet of the Indian Ocean indenting the south coast of South Australia between Eyre and Yorke Peninsula. Sixty miles wide at the entrance, it widens to nearly 100 miles, and then narrows gradually into a fiord at Fort Augusta, nearly 200 miles inland.

SPENER, spa'ner, Philipp Jakob, German clergyman, ((the father of Pietism® : b. Rap- poltsweiler, upper Alsace, 13 Jan. 1635; d. Ber¬ lin, 5 Feb. 1705. Although called the founder of Pietism (q.v.), which resulted in a salutary reformation within the Lutheran State Church, none of the errors or extravagances which marked the development of the movement can be attributed to Spener. His early training re¬ vealed to him the necessity of a moral and re¬ ligious reformation of the German Church and with a view to the ministry he studied practical Christianity at Strassburg, specialized in philol¬ ogy, history and philosophy, gained his degree of master in 1653, spent a year in Geneva where he was powerfully influenced by Leger and Labadie, studied also at Basel, Tubingen and Lyons, and in 1666 became a pastor at Frankfort-on-the-Main. Pietism developed from meetings at his house at which his ser¬ mons were discussed and the Scriptures were expounded. In 1675 he published his (Pia Desideria, oder herzliches Verlangen nach gottgefalliggr Besserung der wahren evan- gelischen Kirche) or (Earnest Desires for a Re¬ form of the True Evangelical Church. > It em¬ bodied proposals for the restoration of life in the church, chief of which were the serious study of the Scriptures in private meetings, ecclesiola in ecclesia, a smaller church within a church — a heart of spirituality; the universal¬ ity of the Christian priesthood, the laity sharing in the spiritual government of the church; and regeneration or the promotion of personal piety instead of the inculcation of dogmatic beliefs. The work created a deep impression throughout Germany and much offense among orthodox clergymen, the more so that its premises were undeniable. The (Pia Desideria) was followed in 1680 by (Allgemeine Gottes- gelehrtheitP

In 1686 he was appointed first court chaplain at Dresden, but soon offended his patron Elector John George III by his outspoken and uncom¬ promising attitude in the fulfilment of his duties. His criticisms of the immorality of the wealthy classes had previously given offense, but in 1691 the court of Brandenburg was in¬ fluenced to offer him a rectorship and he be¬ came (Konsistorialrat) of Saint Nicholas in Berlin. In a court and government more in¬ clined to rationalism than pietism Spener, how¬ ever, was held in esteem and along lines advocated by him the university of Halle was founded in 1694 and became the centre whence pietism spread. He was a voluminous writer and the movement which he originated owing to the extremes to which some of his followers went was constantly attacked and abused by the orthodox. The theological faculty of Wit¬ tenberg in 1695 condemned as errors 264 prop¬ ositions contained in his writings. Three years before his death he completed (Theologische Bedenken) (4 vols., 1700-02). (Letze Theo- logische _ Bedenken* appeared posthumously with a biographical introduction by C. H. von Canstein (1711). Consult Gruneberg, P., (P. J. Spener> (3 vols., Gottingen 1893-1906) ; Hoss- bach, W., c Philipp Jakob Spener und seine Zeit> (Berlin 1828 ; 3d ed. 1861).

SPENLOVE-SPENLOVE, Frank, Eng¬ lish painter: b. Sterling, Scotland, 1866. At the Paris Salon his (Funerailles dans les Pays Bas) was awarded the gold medal of Paris and pur¬ chased for the Luxembourg (1901). He ex¬ hibited at the Royal Academy for the first time in 1886 and has been represented there every year since. Among his landscapes and genres may be mentioned (After Summer Days) ; (Night's Awakening) ; (Gilded Pastures) ; (Over the Valley) (Avenues of Gold) ; Picardy- *;* The Hurrying Storm } ; (A Winter's Tale — Funeral Blessings, Holland) ; (Unto This Last — The Pilot's FuneraP ; (Too i>ate) ; (Dar- sham Vale) ; (Autumn Glory) ; (The Little

White Cross) ; (Grey of the Morn- *; (In the Shadow of the Church*, etc.

SPENSER, Edmund, English poet: b. Lon¬ don (probably in East Smithfield near the Tower), about 1552; d. Westminster, 16 Jan. 1599. He was the eldest son of Elizabeth (cf. ˆmoretti,* LXXIV) and (perhaps) John Spenser, ((free journeyman® in the (<arte or mysterie of clothmakynge,® in 1566 with one Nicholas Peele, ((sheerman® in Bow Lane. A ((John Spenser, son of John Spenser, gent.,® known to have followed the poet through the same school and college, may have been a younger brother. In the Burnley district of N. E. Lancashire there was a family of Spen¬ sers, among whom the names John, Edmund, Lawrence were common. The poet had a son Lawrence. Edmund also shared in the benefac¬ tions of Dean Nowell,

relative by marriage of the Lancashire Spensers.

This commonplace upcountry stock hardly invited celebration from the ambitious Court poet; but the Spencers of Althorpe, Northamp¬ tonshire, were a kinsfolk to be claimed and pro¬ claimed. And, after 1590 at least, three daugh¬ ters of Sir John Spencer, head of that (<house of auncient fame,® acknowledged and patronized their now famous, if still impecunious connec¬ tion; he in return is profuse with dedication

and complimentary allusion. To one, Elizabeth, Lady Carey, he writes, dedicating (Muiopot- mos) : . I have determined to give my¬

self wholy to you, as quite abandoned from myselfe, and absolutely vowed to your serv¬ ices.® No doubt solely on the strength of this ((platonic® vow, Nashe two years later (1593) assured Lady Carey in his dedication of ˆChrists Tears over Jerusalem* that "Fame's eldest favorite, Maister Spenser, in all his writings he prizeth you.®

To his father's association with the Mer¬ chant Taylors' Company, and to Dean Nowell's help, Spenser apparently owed an excellent edu¬ cation. The recently (1561) founded Merchant Taylors' School offered free tuition to 100 poor boys and the ((free journeyman's® son was doubtless one of these. Later, at Pembroke College, Cambridge, he matriculated 20 May 1569 as a (<sizar,® or student who for certain services was exempted from fees and given board and clothing. Moreover, Dean Nowell's accounts (ed. Grosart, 1877) show several gifts of money from 1569 on; and already in 1569 Spenser was earning money himself. At least, certain sonnets included by Ponsonby in the Complaints- *of 1591 are manifest revisions from a certain (Theatre for Worldlings) of 1569. This was an English translation of a Protestant polemical miscellany by a Flemish refugee physician, John Vander Noodt, resident at Christ Church school, and very likely known to Mulcaster, master of Merchant Taylors' School. Mulcaster's boys were especially trained in Italian and French and young Spen¬ ser may well have been recommended to Vander Noodt for the place. Moreover, Spenser was almost certainly behind Ponsonby in the publi¬ cation of the <Complaints) ; and abundant in¬ ternal evidence makes for the authenticity of the translated sonnets. These are from the (Songe* added to DuBellay's (Antiquitez du Rome, *and Marot's version in sonnets of Petrarch's canzone (Standomi un giorno, solo, alia fenestra.* They

illustrate interestingly the early maturing of the poet's elegiac Puritanism, stately archaic diction, and flexible verse. Though rhymed for the ˆComplaints,* the Bel- lay ((sonnets® of 1569 are in a blank verse better modulated than any other between Surrey and Marlowe.

Spenser took his B.A. at Cambridge 1573; M.A. 1576. Allowances for protracted illnesses indicate delicate health; but he was clearly an eager, if discursive, student. Following Mul¬ caster's lead, he read widely Italian and French literature as well as classic, the older English authors — especially Chaucer and Langland, moral and natural philosophy — especially the hybrid Platonism of the period. Harvey's nick¬ names for him — <(Italianate Seignor,® ((Your French Monsieurship,® etc. — recognize his cosmopolitan tastes. Training and temperament made him sharply partisan for the Puritans, whose leader in the University, Cartwright, was driven from his chair of divinity in 1570.

The young master of arts probably did not seek a fellowship. Had he failed, his friend Harvey was not the man to have kept silence. More poet than scholar, Spenser doubtless, like other needy Elizabethan poets, looked to place and patron and became first, it would seem, tutor or secretary in the family of a lady of

rank in the <(North partes® of England; and was then, upwards of a year later, called by Harvey to Kent <(for his more preferment.®

This (<Gentlewoman of no meane house® in the <(North partes® is the ((Rosalinde® of the ˆhepheards Calendar *; and the poet's pretense of blighted passion implies probably no more than regulation <(loving® gratitude to lady- patron. He was, as she put it, <(her Seignor Pegaso.® Twelve years later, in (Colin Clouts Come Home Againe,* he defends her against the charge of disloyal cruelty by pretty clear intimation that his ((passion® had been but <(Platonic® tribute.

The editor of the Calendar-* says that the name (<Rosalinde® (<being wel ordered, wil be¬ wray the very name of hys love and mis- tresse® ; and the hint may have enlightened a select few. But the possible anagrams — if anagram is meant — of ((Rosalinde® are many; and the <(feigned name® seems too good to be a strict anagram. Solutions have been numerous, but unconvincing. That she was a Lancashire <(lasse® met by the young graduate on a visit to his relatives there, seems unlikely: an ambi¬ tious youth would hardly seek preferment among small farmers in a remote rural corner of Eng¬ land. The asserted Lancashire setting and dialect of the (Shepheards Calendar * are uncritical myths : setting and language are not local,

but literary and composite, artificial rustic (<(Doric®) and conventional (<Arcadian.® Moreover, there is Aubrey's statement, on the asserted authority of John Dryden, that ((Rosalinde® was a ˆkins¬ woman® of Sir Erasmus Dryden's wife, who was a daughter of William Wilkes of Hodnell, Warwickshire, a place not far from the Cots- wold Hills. Whatever difficulties may lie in calling these hills <(North partes,® at least Drayton, in one of his eclogues, set ((Rosalinde® there.

From these ((North partes® Spenser was called to become <(the Southerne shepheardes boye® in Kent. Through the ((shepheard,® ac- ceptedly Sir Philip Sidney, he may presently have been made secretary to Sir Henry Sidney, Lord-Deputy in Ireland. At least, in the (Veue of the Present State of Ireland* (Globe ed., p. 636), Irenaeus, Spenser's general mouthpiece, professes to have witnessed the execution of <(Murrogh O-Brein,® 1 July 1577.

Two years later, 5 Oct. 1579, Spenser appears in the service of Sir Henry's brother-in-law, Leicester, and writing to Harvey from Leices¬ ter House. This letter and another, with Harvey's answers, were published, presumably by Harvey, a year later. They reveal 1579-80 as the poet's annus mirabilis. Brimful of pub¬ lishing projects, eager for literary reforms, re¬ ceived at Court, had (<in some use of familiarity® by such high society as Sidney and Dyer and by pretty women (to sober Harvey's alarm), — before the year-end he had achieved the pro¬ gram of a new poetic school, written its mani¬ festo and outlined his own chief works to come. Among other projects, he informs his some¬ what sceptical friend of a great Continental trip on Leicester's business. Then suddenly, as it seems, all this stops. He arrives in Dublin, 12 Aug. 1580, secretary to the new Lord- Deputy, Lord Grey de Wilton.

Meanwhile, but one of his several finished poems had been printed; and this under a

pseudonym and ostensibly on a friend's re¬ sponsibility. The (Shepheards Calendar,* fin¬ ished before 10 April 1579 — date of the editor's epistle to Harvey, — but not (<entered® until December 5, appeared soon afterward, em¬ bedded in a literary apparatus full of mystifica¬ tions. Secrecy, however open, was in the (<amorist® code. More importantly, the (<theo- logical® eclogues expressed opinions

close to treasonable and preferred unpleasant personal charges. The editor, <(E. K.,® played his part well, being at times clairvoyant of the author's secret meanings, at other times obtuse as <(Ig- naro® himself. He was doubtless Edward Kirke, once with Spenser at Pembroke College; but much of the <(glosse® must have been in¬ spired, if not dictated, by Spenser himself, who, if perhaps ((furre estraunged® in April, was cer¬ tainly in London in October 1579.

The (Shepheards Calendar — *perhaps so- called from a popular almanac, the (Kalenderof Shepherdes) — contains, as its sub-title indicates, <(twelve aeglogues proportionable to the twelve monethes.® It was dedicated to Sir Philip Sid¬ ney. The <(aeglogues® are of the Renaissance courtly type, in no proper sense poems of coun¬ try life. The nature described is <(Arcadian® ; the description decorativej the real appeal per¬ sonal and polemical. Tribute to a past patron, ((Rosalinde,® — to a present patron, Leicester, in the dirge for his kinswoman, <(Dido,® — to a hoped-for patron, the Queen, in the <(laye of Elisa® ; partisan support of Leicester's Puri¬ tanism against Burghley's <(Anglicanism® ; proc¬ lamation of his own Platonist poetics — such are the live interests; the rest, as E. K. says, is "recreative,® little neo-classic idyls in porcelain. Such ((pastoralism® is a poetry, not of nature, but of art, — goldsmith's art for nicety and <(curious felicity® of detail. The (Calendar* is the first English poem which rivals the poetic virtuosity of Renaissance Italy and France.

But <(Immerito® justifies his editor's title of the <(new Poet® in a larger sense. He appears in the (Calendar, *like his master Du Bellay in the (Deffence et Illustration de la Langue Fran- coyse,* as the spokesman of a school of ((new poets® — Sidney, Dyer, Fulke Greville and per¬ haps others — who form an "Areopagus,® in emulation of the ((Pleiade,® to promulgate in England the tenets of Du Bellay's and Ron- sard's poetic reform. The poet is to be "de- fended® as an inspired teacher, born not made, but needing "laboure and learning® fitly to un¬ derstand and to express his high message. By him the common speech must be "ennobled® (illustree) 'by art into a really <(poetic diction,® — inversely to Wordsworth's contention. The new poet's method is to be <(assimilative imita¬ tion® of the classics primarily, but with a judi¬ cious eye to the best among modern and na¬ tional models. Spenser's own pronouncement, (The English Poete, *was not printed; Sidney may have worked it into his own (Defense of Poesie,* the Platonist doctrine of which con¬ curs with Spenser's. The question of "classical® metres was discussed by the "Areopagus,® as it had been by the "Pleiade® ; but the Harvey- Spenser correspondence has exaggerated its im¬ portance for the English school.

Spenser aspired early to be the English “Virgil® — the ((poeta novus ® of his own day — and in 1579 had already begun the epic designed

to follow his <(low-flying® pastoral as the <ˆEneid> followed the (Bucolica. *Such indeed was, as E. K. says, the common aspiration of Renaissance poets. Du Bellay eloquently de¬ manded for France a Hong poeme ® worthy to stand with the (.7Eneid* and the (Orlando Furioso. *For the Renaissance, however, Virgil was more than the poetic historian of the founding of Rome — the ((romanus V er- gilius ® of Petronius ; he was also the moral allegorist of Macrobius and Petrarch, and the unwitting Christian prophet of Dante. Spenser’s first idea was, apparently, to re-express these patriotic, moral and religious motifs in the style of the (Orlando Furioso,* — thus satisfy¬ ing the eclectic ideal of the new school. *In 1579 he sent Harvey a draft of his resulting faerie Queene.* But Harvey was unconvinced by this attempt to “overgo® Ariosto ; and Spenser worked away in silence for 10 years. Of the (Faerie Queene> of 1590 Harvey was loud in praise ; and in fairness, we may presume a radical recasting.

Until Lord Grey’s retirement, August 1582, Spenser was his secretary. By March 1581, he had also purchased from Ludowick Bryskett ap¬ pointment, with right of deputy, as registrar or clerk of the Faculties of the Court of Chancery in Dublin. He began, too, a series of land-speculation, — first buying, to sell immediately Abbey Enniscorthy in County Wexford, and an abbey in New Ross. Next, January 1582, he leased for six years the Dublin residence of the attainted Lord Baltinglass, and secured a “cus- todian® of Newlands in Kildare, property of a relative of Baltinglass. On August 24 he leased for 60j. a year “the dissolved house of Friars Minor of the New Abbey, in the county of Kil¬ dare, with its possessions® ; and resided there at least during 1583-84, when he served as a commissioner of musters for the county. In 1590 his lease of New Abbey was forfeited for non-payment of rent. The Dublin house he used for business convenience ; the conversa¬ tions described in Bryskett’s (Discourse of Civill Life) took place probably in the spring of 1584 or 1585; and Spenser came daily from neighboring Dublin to join in them. Finally, his name appears in the articles, June 1586, for the Munster “undertakers® or colonizers, as lessee of the castle and lands, 3,028 acres, of Kilcolman, in County Cork. Although the pat¬ ent was not passed until 26 Oct. 1591, Spenser must have taken possession by 1588-89, since in that year he reported six English settlers on the estate and also received Raleigh as guest. Rent was fixed at £ 8 13j. Ad. per annum, to be doubled after Michaelmas, 1594; there is record of payment for 1592.

On removal to Kilcolman he resigned, 22 June 1588, the Dublin

clerkship, to purchase, again from Bryskett, clerkship of the Govern¬ ment Council of Munster, — Bryskett, however, apparently reserving a share in the reversion of the office. Spenser, like his master, Chaucer, was a shrewd man of business; but his shrewd¬ ness had its nemesis. Local feeling ran high against the undertakers. On 12 Oct. 1589, Lord Roche of Fermoy, English-born but Irish by sympathies, charged Spenser with unlawful dis¬ possession of certain lands ((by colour of his office and by making of corrupt bargains with certain persons pretending falselie title.® This began a series of petty persecutions by Roche, —

once by “boycott,® making “proclamation® that “none of his people should have any trade or conference with Mr. Spenser or Mr. Piers, or any of their tenants, being English,® — another time, by “fineing® a tenant of his own “for that he received Mr. Spenser in his house as he came from the session at Limerick.® Probably for protest against Roche, as well as on Raleigh’s invitation, Spenser left for London between October 12, when Roche brought suit, and December 1, when the first three books of the (Faerie Queene) were “entered.®

Since, 10 years before, Spenser had boasted of “overgoing® Ariosto, he had grown in knowl¬ edge and experience : Bryskett draws him less poet than' philosopher. Even in 1579, no two literary temperaments could have been more antipathetic than the Platonizing Puritan of Cambridge and London and the Horatianly cynical, witty Ferrarese. After 1580, the Or¬ lando Furioso) remained for Spenser a store¬ house of plot and incident and character in silhouette (cf. R. E. N. Dodge, Publ. Mod. Lang. Assoc. Amer., 1897) ; but for the essential things, — spirit, manner, ideals — Tasso’s (Geru- salemme Liberata* became his intimate model. The later epic better fitted Du Bellay’s ideal in its high seriousness — at once religious, moral, and patriotic, — in its form and manner sensi¬ tively refined, pictoral, and — as the, Renais¬ sance understood the word — classic. Temper¬ amentally, Tasso and Spenser were sympathetic, even — difference of creed notwithstanding — in their sombre religiosity. Elizabeth in 1584 envied the Duke of Ferrara his laureate; Spenser was even then preparing to fill Tasso’s role in England.

The (Faerie Queene> was designed to be an allegory, in 12 books of 12 cantos each, of the “ethike part of philosophy® which concerned private conduct; and a sequel was promised, allegorizing political or

princely conduct. To add the national note, the hero was to be Prince Arthur embodying the private virtues, King Arthur the political. The central motive of this virtual “conduct-book® shows the influence of the most famous “conduct-book® of the age, Castiglione’s (The Courtier.1* Prince Arthur’s mystic love for the dreamed-of Gloriana — the faith whence all his good works spring, — while it has roots in mediaeval romance, is raised to a power for righteousness by the Neo-Platonism to which, as applied to womanly influence, Castiglione, following Bembo, gave international vogue.

Harmonization of Neo-Platonism with Cath¬ olic theology had been a commonplace since Ficino, not to say Origen; Spenser’s idea was to harmonize Neo-Platonism with Puritan theology. His method can be seen in the (Fowre Hymnes *: the first pair, composed in the “greener times® of his youth, superbly voice a nearly pure Neo-Platonism of the type of Benivieni ; the second pair, 1596, somewhat mechanically transpose the theme to the key of Tyndale and Calvin. Following his eclectic method, Spenser in the (Faerie Queene* incorporated other doctrinal items, notably Aristotle’s doctrine of “moderation® and his moral categories, as already modified by Italian commentators into 12. The allegory of the Puritan’s “battle between the Spirit and evil lusts® — error, hypocrisy, pride, despair, — “the chief and principal work of faith, the battle of

the Spirit against the flesh® (the “Old Dragon®), — the comforting by divine Truth (Una) of his soul overcome by Despair, — the necessary mediation of divine Grace (Arthur) — all this is already adumbrated in Tyndale’s (Prologue upon the Epistle of Saint Paul to the Romans* (republished in Works, 1573).

Spenser’s problem was to express this eclec¬ tic system through a romanic narrative itself constructed from many sources — Classic, Me¬ diaeval, Renaissance — the personages of which should represent its categories, and their or¬ dered adventures its dialectic ; and, at the same time, also to “shadow forth,® as through a double veil, the religious, political and contem¬ porary social history of England. No other European poet except Dante had essayed so prodigious a task; and Spenser may have been emulating Dante. But the English poet was infinitely less happy in his medium : the cloudily shifting scenes, monotonous ill-motivated ex¬ ploits, vaguely or externally differentiated characters of popular chivalric fiction offered but a poor substitute for the Tuscan’s accu¬ rately symbolic, yet localizable and tangible other world of nicely discriminated human realities.

The curiously protean poem, however, even in its weakness, was

nicely calculated to con¬ temporary taste. It had something for all, — high if vague doctrine for thinkers, — classical learning and Italianate elegance for scholar and dilettante, — romantic story, graphic picture, piquant gossip for courtier or fine lady ; and the cultivated Elizabethan often united in himself all these moods. Spenser was at once ac¬ claimed supreme poet of his generation. Excep¬ tion may have been taken by some, as by Jonson, to the artificially archaic diction — at¬ tempt on Pleiadiste principles, to dam up current speech at its Chaucerian "well of English un- defyled,® or to the complicated stanza itself probably also from Chaucer — the (Monkes English poet, unless Chaucer, has been in his Tale* stanza capped by an Alexandrine; but no lifetime so undissentingly lauded.

In February 1591 an annual pension of £50 was allotted, a stipend — if paid! — worth sev¬ eral times that of the present Laureate. Spenser was probably disappointed, however, for another reason. On his own testimony (especially, F. Q. VI, xii, 41) and that of contemporaries, his writings had angered all-powerful Burghley. Puritan Leicester's partisan and protege, Spenser had lost no opportunity to attack the policy, as well as by innuendo to insult the character of Leicester's lifelong opponent. No contemporary could have failed to find Burgh¬ ley among the "bigge Bulles of Basan® of the "September® eclogue (1, 124), or in the arraign¬ ment of official "graft® of (Mother Hubberds Tale *(11. 515 ff.), or in the libel of "counsellor® Fox (ib . 11. 1127 ff.), or in the jealously mean- spirited minister of the (Ruines of Time* (11. 447 ff.). From a hostile viewpoint, the cap fitted. Even loyal Harvey later ("Fowre Let¬ ters,® ed. Grosart, I, pp. 164-165), regretted that "Mother Hubberd, in heat of Choller, forget¬ ting the pure sanguine of her sweete Faerie Queene, wilfully overshot her malcontented selfe.® Apparently both (Mother Hubberds Tale *and (The Ruins of Time* were supposed or "cald in againe® (cf. Pref., < Father Hub¬ bards Tales, *1604; John Weever: (Epigrams,*

1599). Burghley, long-suffering with Leicester himself, may well have blocked preferment in England for Leicester's ˆman.® Such seems to be the veiled grievance of (Virgil's Gnat,* Spenser (<(Gnat®) for serving Leicester (((Shep- herd®) against Burghley (<(Snake®) is sent off to Ireland ((<waste wilderness. . . Cimmerian®).

Spenser remained in England until after the beginning of 1591. <Daphnai'da) was dedicated from ((London, this first of January,

1591.® The date is undoubtedly (<New Style.® The lady, Douglas Howard, whose death is lamented, died late in 1590; and the dedication of (Colin Clouts Come Home Againe) to Raleigh ((From my house at Kilcolman, the 27 of December 1591® circumstantially proves Spenser's return. Assumption of a dramatic fiction in the latter dedication (cf. P. W. Long, N. Y. Nation, 1 Nov. 1906) is uncalled for: use of ((New Style® dating is by no means uncommon among liter¬ ary Elizabethans; Gascoigne as early as 1575 appears to have used it side by side with ®01d Style® (cf. J. W. Cunliffe : (Supposes and Jo- casta,) Boston, 1906, p. vi, n. 1) ; Jonson used it mainly; in the (Shepheardes Calendar *and in (Amoretti) IV, Spenser starts the ((new yeare® with January. The ˆaphnaida,* per¬ haps built on the lines of Chaucer's (Boke of the Duchesse,* is itself a (<funeral complaint® set in a <(vision,® and in the falsetto key of hired mourning; its representation of the hapless lady by an heraldic pet lion is a monumental piece of bathos.

A collection, entitled (ComplaintsP ((en- tered® 26 Dec. 1590, appeared 1591. The poems were mostly earlier ones, revised, and were possibly published before. Of the (Ruines of Rome) and (Mother Hubberds Tale) there is a manuscript extant decidedly varying from Ponsonby's text (Brit. Mus. Add. MS. 34064; cf. (Modern Language Notes,* XXII, No. 2). Ponsonby's foreword, accepting responsibility for the volume, and referring to Spenser's <(departure over sea,® would naturally indicate that the collection was (<made up® in the au¬ thor's absence. But Spenser was certainly in England when the book was ((entered® ; and Ponsonby would hardly have ((pirated® from his best client. Doubtless Ponsonby's foreword, like E. K.'s <(glosse,® was a ((blind® to avert pos¬ sible consequences from such plain speaking as the (Complaints) contained.

The common motif of these is that of mediaeval ((tragedy,® — the ever-turning of For¬ tune's wheel and the upsetting of great expecta¬ tions. The theme, modified by the antique notion of ((Fate,® still dominated the Renais¬ sance inmagination, inspiring in England the huge (Mirror for Magistrates, *the <(chronicle- history® plays, and much more, including Van- der Noodt's (Theatre) itself. Too much may, therefore, be inferred as to Spenser's own tem¬ perament from such fashionably melancholy meditations. There is indeed strong personal feeling in them, certainly grief for Sidney and animosity against Burghley, but much is con¬ ventional literary exercise. The (Ruins of Time) follows in scheme the (Ruins of Rome,* translated from Du Bellay; the ˆVisions of the Worlds Vanitie) echo the (Visions) from Du Bellay and Petrarch; (Muiopotmos) is an airier variation on (Virgil's Gnat, *translation of the pseudo-Virgilian <Culex* ; the idea of the (Teares of the Muses) had

already been

developed in Ronsard's (DiaJogue entre les Muses deslogees et Ronsard) and in Harvey's more personal (Musarum Lachrymae) ; (Mother Hubberds Tale) is an adaptation of (Reynart the Foxe) with Renaissance accretions (cf. E. A. Greenlaw, (Mod. Philol.,) Chicago, Jan.

1905).

(Colin Clouts Come Home Againe, *although its dedication is from Ireland, may have been written and disseminated in manuscript while Spenser was still in London. The eclogue is a kind of poetic ((P. P. C.® to the poet's English hosts, — Colin telling his rustic companions about Kilcolman, of the lights — and shadows — of the Court over sea. But <(Hobbinol® (usually Harvey) was certainly in England. The whole piece is a model of subtly modulated compliment, scaling up to the platonic homage to Spenser's royal mistress, then resolving into the minor of the apology for his <(rustic® mis¬ tress. The eclogue was printed with (Astrophel,* 1595.

Shortly after Spenser's return to Kilcolman, he fell in love; and after more than a year of courtship, married 11 June 1594, Elizabeth Boyle, (<cozen® of Richard Boyle, later 1st Earl of Cork. (<Elizabeth's® identity is estab¬ lished from Boyle's memoirs ((Linsmore Pa¬ pers, } ed. Grosart, 1 863-88, in which she appears as mother of Peregrine Spenser and wife of Roger Seckerstone, whom she had married in 1603. In 1613, again a widow, she married Cap¬ tain, later Sir Robert Tynt. The kindlier tone toward Ireland of Spenser's later poetry in¬ dicates domestic happiness.

On 19 Nov. 1594, five months after Spenser's wedding, Ponsonby <(entered® the <(Amoretti and Epithalamion written not long since by Edmund Spenser,® and issued the volume, 1595, ostensibly on his own initiative ; but his vague foreword implies that he had received the man¬ uscript from the author himself. The titular coupling of the two pieces must have suggested their dramatic connection, four little neo-classic idyls serving as a ((recreative® entr'acte. Both describe in identical terms one heroine, stately to haughtiness, rosy-cheeked, golden-haired, blue-eyed. After the traditional sonnet-cycle formula — ((the prologue, hope ; the epilogue, despair® — the (Amoretti *close with a lovers' quarrel, allusion to which may lie in ((the paynes and sorrowes past® of the <Epithalamion) (i. 32). Phrase and conceit are imitative; but — one may go awooing with conventional man¬ ners in a borrowed coat. In form, the schema of <(linked® quatrains compromises*

between the close-knit Italian sonnet and the loose Shake- sperian. The gorgeous (Ephithalamion, re¬ deemed from mere goldsmith's work by its ex¬ uberant feeling, follows not unworthily the Italian canzone. To these two ((goodly orna¬ ments® for his bride, Spenser added a charming pendant in the idyl of Colin piping to his (<coun- trey lasse,® a fourth Grace in the midst of Venus' damsels (F. Q. VI, x).

The <(poet-undertaker® had been having other troubles besides the doubts and delays of his long courtship. He was again sued by Roche, and was dispossessed, by default of ap¬ pearance, 12 Feb. 1595 (N. S.), of three

<(plough lands, parcell of Ballingrote.® To con¬ duct his case he assigned his clerkship of the Munster council to one Nicholas Curteys, who thereafter, ((upon the trust of Lodowick Brys-

kett and Edmund Spenser,® retained the <(poor and troublesome place® until superseded by Richard Boyle, February 1598.

The second three books of the (Faerie Queene) were finished by 1594 (<Amoretti,) LXXX). Spenser must have carried the man¬ uscript to Ponsonby between February 1595, when he appeared against Roche, and 20 Jan. 1596, when the poem was ((entered.® He dedi¬ cates his (Fowre Hymnes) from the Court at Greenwich, 1 Sept. 1596. On November 8 he attended — as his (Prothalamion) for it implies — the double wedding at Essex House between the Earl of Worcester's daughters, Elizabeth and Catherine Somerset, and Essex's friends, Henry Guildford and William Petre.

Now that his old patrons — Sidney, Leices¬ ter, Grey — were all dead, Spenser was courting Sidney's widow's husband, Essex, of whom the (Prothalamion) is principally a panegyric. Meanwhile, the ˆstrophel,* an elegy for Sid¬ ney — with companion-pieces by other hands, — had appeared with (Colin Clouts Come Home AgaineP 1595. One piece, Bryskett's Mourn¬ ing Muse of ThestylisP had been separately ˆentered® 22 Aug. 1587 ; and possibly, the whole series was resurrected for sake of the dedica¬ tion to Lady Essex. Her acceptance of a poem celebrating Sidney's ((amour® with Lady Rich further testifies to the purely ˆplatonic® nature of that ((amour.®

These publications of 1595-96 emphasize the poet's growing worldliness. Sharp-tongued radical moralist gives place to polished

and dis¬ creet court laureate — by assumption if not ap¬ pointment. Nobility for him is rather of caste than of character: <(court and royal citadell® are the great school-maistresse of all courtesy® (F. Q. Ill, vi, 1). Most of his work is (<occa- sional,® even in the later books of the : itself, his mirror is held up less to universal humanity than to the Court ; histori¬ cal and personal allusions multiply, relatively crowding out the moral allegory. Book V is part apologia for Lord Grey, who had died in 1593, part chronicle — often chronique scandaleuse — of national and social affairs <(writ to the me¬ ridian® of Hampton and Greenwich. The libel on Mary of Scots as ((Duessa® brought from King James, 12 Nov. 1596, a demand for legal redress. As art, however, the best of this later work realizes to the full the Italianate Renais¬ sance ideal of sensuous grace (leggiadria) , — brilliant dissolving views drawn in <(an easie running verse with tender feet.®

More touched with abstract thought are the two cantos and a fragment, perhaps part of a book on (Constancy, } and first printed in the folio works, 1609. Influenced by Burno's (La Bestia TrionfanteP <(Nature's® overthrow of <(Mutability® has a touch of pantheism not quite in harmony with the rest of Spenser s frankly patchwork system. The underlying intention may be a side thrust at governmental ((muta- bility® in Irish policy, parallel to the indictment in the (Veue of the Present State of Ireland.* This was first printed by Sir James Ware in 1633, but endorsed by Spenser C(finys 1596,® and ((entered® by Mathew Lownes, 13 April 1598. By implication of the opening- sentence, it was written in England. In the dialogue, Eudoxus, the (<wisely docile,® is convinced by Irenaeus, the <(peace-lover,® that distraught Ireland needs

<(violent medecynes® — Machiavelli's <(medicine fortiy The treatise was disseminated in manu¬ script copies, of which several are extant. Later, early in December 1598, Spenser, a fugitive at Cork, used Tyrone's disastrous uprising as an object-lesson for the Queen of his (VeueP in (A Briefe Note of IrelandP with ((Certaine points to be considered of in the recovery of the Realme of Ireland.® In 1657, ((Hon® Cromwell found in Spenser's sympathetic <Veue) reason for maintaining Spenser's grandson in possession of Kilcolman.

On 30 Sept. 1598, Spenser was made sheriff of Cork. Less than a month later, Tyrone's rebels burned his house over his head; he and his family fled for their lives to Cork. Whether or no was added the horror of ((a little child new born® perishing in the flames, as Jonson told Drummond, the shock and later privations undoubtedly broke the poet's frail constitution. He sailed, December 9, with despatches from

Sir Thomas Norreys, president of Munster, to the Privy Council; delivered these December 24 ; on Saturday, 16 Jan. 1599, died at West¬ minster, — according to Jonson, <(for lake of bread in King Street,® having declined Essex's aid. Jonson may have exaggerated; but con¬ temporaries agree that the circumstances of his death were tragic.

He was given a sumptuous funeral — at Essex's expense, Camden says; and Browne, in (Britannia's Pastorals,* declares that money given by Elizabeth for a monument was mis¬ appropriated. The present monument, restored in 1778, was erected by Anne, Countess of Dor¬ set, in 1620.

The commingling of classic and romantic elements in Spenser's poetry has led — as with the Pleiade — to a curiously fluctuating appre¬ ciation. To his own age another <(Virgil,® Spenser seemed to the "Augustan® age a bar¬ barous ((Goth,® to the Romanticists a genius full of glamor and witchery, to later Realists a brilliant, but uneven, word-painter. Each appreciation was justified from its own view¬ point. Milton valued the <(teacher® ; D'Avenant and Dr. Jonson patronized the evoker of pretty, but distempered, visions. The Jaco- beans — the three Fletchers, Browne, Basse, More, Joseph Beaumont, Bunyan, Cowley — read and imitated Spenser as Jonson recom¬ mended, mostly "for his matter,® writing didac¬ tic allegories in heroic or pastoral vein. Mil- ton and Dryden acknowledged him their spirit¬ ual master. Prior opened a long series of ex¬ ternal imitation in form — verse and archaism. With Thomson's (Castle of Indolence* and <Seasons) begins a richer discipleship, which — sobered by the joint influence of Milton — has lasted to the present day, but culminated in the contemporaries of Wordsworth and Keats. Spenser has amply earned the title of <(poet's poet,® for his own exquisite art, and for the art begot in others : he has been the <(Warwick® of English poets, the poet-maker. His manner has not invited translation : the few German and Italian versions from the (Faerie Queene) are unimportant. For so great a poet his influence has remained singularly national. See Fairy Queen, The; Shepherd's Calendar, The.

Bibliography. — The fullest life of Spenser is by A. B. Grosart (Vol. I, (Complete Works,* 10 vols. but 9 issued, 1882 ff). Grosart un-

earthed much new information; but his enthu¬ siasm often runs away

with his judgment. J. W. Hales (Globe ed., Spenser 1897), and Dictionary of National Biography summarizes as established fact most of Grosart's inferences. The most suggestive studies of Spenser's per¬ sonality as man and poet are by Lowell (1875), R. VJ. Church, (English Men of Letters) (1879), and J. J. Jusserand (A Literary His¬ tory of the English People) (Vol. II, 1906). A composite photograph of the three portraits, each of which is from a different viewpoint, is not unlikely to be near the truth.

A critical edition of Spenser's Works re¬ mains a desideratum. The Globe text is as good as any. H. J. Todd's variorum edition (1805) is the basis for most following annotations through J. P. Collier's (1859). The (Faerie Queene) has been separately annotated by Ralph Church (1758), Burves (1872), K. M. Warren (1897), and others; Books I, II for school use, by G. W. Kitchin (1868) ; Book I more elaborately, by H. M. Percivall (1894) ; (The Shepheards Calendar,* excellently, by C. H. Herford (1895). The first edition of the (Calendar) has been reproduced in facsimile by H. O. Sommer (1890). An (Outline Guide to the Study of Spenser, * by F. I. Carpenter (Chicago 1894), will be found useful.

J. B. Fletcher,

Professor of Comparative Literature in Colum¬ bia University.

SPENSERIAN STANZA. See Spenser,

Edmund.

SPERM-WHALE. See Whale.

SPERMACETI. See Whale.

SPERMATOPHYTES. See Botany; Fungi.

SPERMATOZOON, the male element; one of the flagellated cells developed in the testes (see Testicle) of male animals, and conveyed in their secretion (sperm or semen) to an egg of a female of the same kind, by copulation or otherwise, for the sake of coalescing with (impregnating or fertilizing) that egg, and set¬ ting up the developmental changes which result in the formation of a new living being. The spermatozoa are extremely minute bodies, nearly always motile, usually slender and whiplike, tapering toward one extremity, and commonly with a rounded head at the other ; and are de¬ veloped by a succession of cell-divisions from certain cells in the testicle, called the primitive male cells, similar in character to the

immature ova. It appears an individualized living cell, swimming about in the semen. The manner in which the spermatozoon unites with the ovum is explained in the article Embryology. It was the belief of a school of naturalists of the 17th century, called <(Spermatists,}) that the whole of the resulting being was enfolded in and derived from the spermatozoon ; while an opposing school the ˆOvulists® asserted that in the egg alone was contained the germ of the animal. (See Preformation). Neither was right; the development of a foetus results from a union of both male and female elements. See Cell; Embryology ; and consult authorities mentioned thereunder.

SPERMOPHILE, a ground squirrel of the genus Spermophilus, of which more than 20 species exist in the United States while vol. 25—26

several occur in Europe and Asia. They are rodents of a squirrel-like form. They live in underground burrows, bring forth their young in the burrows, are prolific, and in northern dis¬ tricts they hibernate in the fashion of marmots. They occur in the United States westward from Illinois, and into Mexico and Canada. When they become numerous in cultivated sections they are a troublesome pest, owing to their burrowing habits, although their burrows are not so extensive as those of the prairie dogs. They are commonly, but erroneously, called gophers in western districts ; while in Europe they are known as suslik. The flesh is edible.

SPERRY, Charles Stillman, American rear-admiral : -b. Brooklyn, N. Y., 3 Sept. 1847; d. Washington, D. C., 1 Feb. 1911. He was graduated at the United States Naval Academy in 1866, and was promoted through the vari¬ ous grades to commander 22 June 1896, captain 1 July 1900 and rear-admiral 26 March 1906. He was on ordnance duty at the Brooklyn Navy Yard during the Spanish-American War; was commander of the Y orktown, stationed at Ma¬ nila in 1899 ; and in 1903 was appointed presi¬ dent of the Naval War College at Newport and a member of the General Board. He commanded the Second Squadron of the United States bat¬ tleship fleet in the first lap of its cruise around the world . in 1908-09 and was its commander- in-chief on its departure from San Fran¬ cisco, 7 July 1908, succeeding Rear-Admiral Evans. He was retired 3 Sept. 1909.

SPERRY, Elmer Ambrose, American elec¬ tric engineer : b. Cortland, N. Y., 12 Oct. 1860. He studied -at the Cortland Normal School in 1876-79 and at Cornell University in 1879-80. He founded the Sperry Electric Company in Chicago in 1880, engaging in the manufacture of arc lamps, dynamos and other electrical appli¬ ances. He perfected one of the first arc lamps, and invented the gyrocompass, aeroplane

and ship stabilizers, the highest intensity searchlight (1,500,000,000 candle power), gas engines, fire control apparatus and many special devices for the United States navy. Since 1910 he has been president of the Sperry Gyroscope Company, Brooklyn, N. Y., engaged in manufacturing his own inventions. He has received many prizes and awards for his inventions, both at home and abroad. Since 1915 he has been a member of the Navy Consulting Board.

.SPERRYLITE, an important ore of plati¬ num, consisting of the arsenide Pt As2, contain¬ ing 56.5 per cent of the metal. Occurs at mines in Albany County, Wyoming.

SPESSARTITE, a gem variety of garnet obtained from mines at Amelia, Va.

SPEUSIPPUS, spu-sip'us, Greek philoso¬ pher : b. about 394 b.c. ; d. Athens, 336 b.c. After the death of his uncle Plato, he became head of the Platonic school or Older Academy. Of his philosophical works, in which he taught a doctrine differing but little from Plato's, nothing is left but titles and fragments. He held that nature was not wholly good since wickedness is an essential factor in the progress of humanity.

SPEYER, James, American banker : b. New York, 22 July 1861. He was educated at Frankfort, Germany, and entered his family's •banking-house in that city in 1883. He was

subsequently connected with the Paris and Lon¬ don branches of the firm before returning to New York. He became the head of the family firm of bankers and was an officer in many other banks and trust companies. He was one of the founders of the Provident Loan Com¬ pany and a trustee of Teachers' College, Colum¬ bia University, to which he in 1902 presented the Speyer School. He was actively connected with the defeat of the Tammany Hall organi¬ zation in 1894.

SPEYER, or SPEIER. See Spires.

SPEYERS, Arthur Bayard, American

naval officer: b. New York, 15 Aug. 1846; d. Montreal, province of Quebec, 19 Nov. 1918. He was admitted to the United 'States Naval Academy in 1863, where he remained until six months before the

close of the Civil War in 1865, when he was assigned with other members of his class to duty as acting midshipman on vessels assigned to destroy privateers. At the close of the war he returned to the Naval Academy, where he was graduated in 1868. His first assignment was to the North Atlantic fleet. A year later he was promoted to the rank of ensign and transferred to the Benicia on the Asiatic station. Two years later he was pro¬ moted to master, and while serving on the Kansas in 1874 was commissioned lieutenant. He was made lieutenant-commander in 1895. Soon after the beginning of the Spanish- Amer¬ ican War in 1898 he was assigned to command the Ccesar and took part in bottling up Cervera's fleet in the harbor of Santiago de Cuba. At the close of the war, Commander Speyers was placed in command of the Glacier. -He retired with the rank of rear-admiral, 11 Jan. 1905.

SPEZIA, Italy, city in the province of Genoa, on the Bay of Spezia, 56 miles by rail south of Genoa. It is built near the site of the ancient Roman Lima. It became the chief naval station of Italy in 1861, since which time its size has greatly increased. The harbor is the largest and best in Italy, and its entrance is protected by forts and by submarine embank¬ ments two miles long. It has large shipbuilding works, docks and a marine arsenal, as well as barracks and a hospital. The gulf and the surrounding country are especially beautiful, and the town has a considerable business as a winter resort, and is popular for bathing in the summer. There are exports of oil, pig lead, silver, wine, fruit, flour, marble and sandstone. Pop. (commune) 73,599.

SPHACTERIA, sfak-te'ri-a (the ancient Sphagia), Greece, a narrow island, about two and one-half miles long, lying across the en¬ trance to the Bay of Pylos on the southwestern coast of Messina. It is noted for two famous naval battles which took place off its shores, one in ancient and one in modern times. See Peloponnesian War; Navarino.

SPHAGNUM, a genus of mosses, the only one of the family Sphagnacecc, growing in moist places or bogs, in such quantities as to form a soft, thick carpet, saturated with water, whence their common name of bog-mosses. They are perennials of feathery aspect, growing at the top of the stem from year to year. Some of the numerous lateral branches grow upward, and form tufts at the apices of the stems, while others droop downward and envelope the lower

portion of the stem. Each year one of the side branches grows so strongly as to rival the main head, and thus gives a forked appearance to the plant. The lower end of the stem is con¬ tinually dying away, eventually forming peat, and thus frees the lower ends of the

branches, which thereupon start into independent plants. Special branches, differentiated by structure and color, produce the sexual organs, the two sexes being either on the same plant or sepa¬ rated. The spore-capsules are on short branches and are globular, with a lid. The leaves are small, translucent, and, like the stem, have strata of transparent cells, connected by holes, which are capable of absorbing and retaining much water. This ability to retain water has made the sphagnum moss very valuable to florists, who use it for packing bulbs and flowers, and it forms a large part of the compost employed for growing pitcher-plants and orchids.

SPHALERITE, the commonest ore of

zinc. See Blende.

SPHENE. See Titanite.

SPHERE, a ball or globe, defined in geom¬ etry as a solid bounded by a surface which is everywhere equally distant from a central point. If an arc equal to a semi-circle be made to rotate about the straight line joining its extremities, it will generate in space a spherical surface. Any section of a sphere by a plane will be a circle; when the plane passes through the centre of the circle of the section is a great circle ; any other section is a small circle. A straight line passing through the centre and terminating at the surface is a diameter; a straight line from the centre to the surface is a radius. The surfaces of spheres vary as the squares of their radii. If a spherical surface be cut into rings by a set of parallel planes, the surface of each ring is a zone, and the area of any ring is proportional to the distance between the two planes which determine it, and the area of the ring is to the total area of the spherical surface as the distance between the two planes is to the length of the diameter. The mathematical relationship of things is apparent from the discovery by Archimedes (q.v.) that the surface of a sphere is equal to the curved surface of a circumscribed cylinder, while the volume is precisely two-thirds that of the cylinder. See Trigonometry.

SPHERICAL HARMONICS. See Har¬

monic Analyses.

SPHEROGRAPH, a disc upon which is placed the earth in stereographic projection, the meridian and latitude lines being laid down completely, so that with a ruler and index a navigator may determine angular positions in great-circle sailing. It is also useful in a

variety of problems in spherical geometry.

SPHEROIDAL STATE or CONDI¬ TION, the state of a liquid when it presents spherical phenomena caused by placing it on a very hot surface ; the so-called ((caloric para¬ dox.® Leidenfrost observed that a drop of water placed on a very hot surface assumed a spheroidal shape and did not touch the surface. Boutigny made a more thorough study of the subject, and experimented with various liquids. The limit of temperature of the hot surface is the temperature at which the drop of liquid spreads on it and boils with a hissing noise.

•

Boutigny places the limit for water at 142° C., and at 61° C., for ether. The temperature of a drop of liquid in the spheroidal state is always below that at which the liquid boils, and for this reason the interesting experiment of freezing a small quantity of water on a hot platinum dish may be performed. The dish is heated almost to a white heat, when a small quantity of sul¬ phurous acid is placed upon it, and assumes the spheroidal state; the boiling point of sulphur¬ ous acid is — 10° C., and in the spheroidal state it is a temperature less than 10° C. ; a few drops of water added to the sulphurous acid is immediately frozen, and may be thrown out of the dish, a mass of ice. Substituting nitrous oxide for sulphurous acid, and mercury for water, mercury may be solidified in the same manner.

That the liquid does not touch the surface is made evident in various ways, such as that of making the surface a flat plate and observing that light passes between the spheroid and the plate, or letting a conducting point enter the spheroid from above, and seeing if a current of voltaic electricity will pass between the spheroid and the dish. The temperature of the spheroid is kept low by the rapid evaporation which is going on at its surface; the spheroid is kept from touching the dish by a cushion of •vapor, and this cushion is non-conducting, so that the heat which affects the spheroid is heat radiated from the dish; as soon as the tempera¬ ture of the dish is less than that component to provide a cushion of vapor sufficiently dense to sustain the spheroid completely from contact with it, the spheroid

spreads on the dish and is quickly dissipated by the heat which it now receives by contact. Consult Barker, (Physics) (1893) ; Daniel, (Text-book of the Principles of Physics) (3d ed., 1894) ; Stewart, Element¬ ary Treatise on Heat) (6th ed., 1895).

SPHEROIDAL WEATHERING. See

Exfoliation.

SPHINX, The, a mythological monster variously described but usually with a lion's body, the head and sometimes the breasts of a woman, the wings of a bird and a serpent's tail, supposed to represent some ancient sym¬ bolism. The Egyptians called the sphinix Hu, or Neb (Lord). Its present name is derived from the Greek a<piyˆ, sphinx, <(the binder.® ((strangler ;® from cycyyeiv sphingein, to strangle.

The sphinx, like the obelisk (q.v.), in the mythology of the ancient Egyptians, represented the solor deity, Ra, and they were originally placed, like the obelisks, in pairs at the en¬ trances iof the temples and palaces, not for ornamental -purposes only, but mainly for wor¬ ship. It was emblematical of Har-emˆklu, (<Horus on the Horizon,® the Harmachis of the Greeks, representing the conflict of lights and darkness, the conquest of Horus over Typhon, the slayer of his father, Osiris. The Pharaohs of the Middle Kingdom multiplied their number, and placed rows of them on both sides of the principal avenues leading to the temples and pal¬ aces of Thebes. The avenues of the temple at Karnac were bordered by hundreds of these sphinxes, many of which still remain, headless and disfigured. Those, however, were not only and.ro sphinxes, but of the hieraco and mo- sphinx type.

All nations of antiquity seem to have held

those monstrous beings of various shapes and forms as objects of awe, compelling adoration and worship. The ancient Egyptians believed that the sphinx also represented the Pharaoh who styled himself Se Ra, the son of Ra. Thus, on the pyramidion of the Obelisk of Thothmes III, in Central Park, there is a figure of that Pharaoh paying homage to a sphinx upon a pedestal, which in itself is a representation of the king. In other words, the king is worshipping himself.

The portals of the rising and setting sun were guarded by those lion deities. Even the Bible speaks of the Cherubim, which were placed to guard the entrance of the Garden of Eden. The real meaning 'of cherub, how¬ ever, is still in dispute, but all agree that it was a composite winged being. The prophet Ezekiel describes similar beings

in connection with the Divine Throne. The Assyrian con¬ ceptions of their guardian deities were chiefly represented by human-headed lions or bulls ; eagle-headed human bodies, or vice versa.

The sphinxes of the ancient Egyptians were, as already mentioned, of three different forms, namely, (1) Andro- sphinx, a human-headed lion, symbolizing strength and intelligence; (2) Cn'o-sphinx, a ram-headed lion; (2) Hieraco- sphinx, a hawk-headed lion.

One of the most important relics of ancient Egypt is the colossal human-headed lion, in front of the second pyramid of Gizeh. Even in its present dilapidated state it elicits the won¬ der and admiration of the traveler. The Arabian traveler and historian Abdullatif (1162-1231 A.a)» in his description of the pyramids and sphinx, says : ((At a little more than an arrow's flight from the pyramids is a colossal figure of a head and neck projecting from the earth; the name of the figure is <Abuel-hoP ® which means <(Father of Terrors.® The same authority speaks of it as having ex¬ cited his attention more than all the other marvelous monuments put together that he had seen in Egypt. Everything,® he observes, ((in spite of its enormous size, was in proportion to nature.® (<In a face of such colossal size® he wonders ((how the sculptor could have been able to preserve the exact proportions of every part, seeing that nature presented him with no model of a similar colossus, or anything at all comparable.® (DeSacy's trans., p. 180).

It is at a distance of about 1,800 feet from the Great Pyramid, and is carved from the solid rock upon which it rests. Its dimensions are (Smith's measurements) :

Feet In.

Height of head from bottom of chin to fore¬ head . 19

Horizontal diameter on level of forehead . 23

Circumference at level of forehead . 72

Horizontal diameter near broadest part of head-

gear . 29

Circumference at broadest part of headgear ... 91

Height of neck, 5 feet; horizontal diameter. ... 22

Circumference of neck . . 69

Total height of the monument, according to

Mariette Bey . 65

Ear . 6 5

Nose . 5 10

Mouth . 7 8

Face, in the widest part across the cheek . 13 7

Whole length of body . 140

Outstretched paws . 50

Since Adbullatif's description of its features, the appearance and condition of the sphinx have undergone great changes. The lower part

of the headgear and beard are no more. The features, owing to the iconoclastic propensities of the Kopts and Arabs, are no more ((grace-fully smiling,® as of old ; but have a strange, weird expression, amply justifying the Arabic name ((Abulhol ,® Father of Terrors.

As, regards the dˆte of this monument, Egyptologists do not agree. The latest author¬ ity, Budge ((History of Egypt,* Vol. II, p. 49), assigns the period of the Great Sphinx to probably one of the builders of the Great Pyramids, but <(it is quite possible,® he adds, <(that it may be much older.® Mariette Bey, Maspero and others attribute it to a much more remote antiquity ; to the Hor-shesu, the fol¬ lowers of Horus.'

The Phoenicians and Greeks imported the sphinx from Egypt and reproduced it in various shapes and forms, of all sizes and of different materials. Some have face and breast of a woman, the body of a winged lion and tail of a serpent, and many other varieties, according to the fancy of the artificer and sculptor. These found their way back to Egypt whence they originated, but in different forms.

SPHYGMOGRAPH, sfig'mo-graf, an in¬ strument fc>r recording the movements of the pulse. The first true sphygmograph was the

invention of Vierordt, and has received various improvements. In its most improved form it consists of a small rod which moves vertically up and down, and in s<o doing communicates motion to a thread passing round two horizon¬ tal movable axes, one of which moves a needle that serves as an index, while the other moves a wheel. A pen held in a jointed stalk fol¬ lows the movements of this wheel and records its motions on a strip of paper, which is passed beneath it by clock-work. The record has the appearance of a more or less irregularly un¬ dulating line. At the lower end of the vertical rod is a small plate, rounded on the lower sur¬ face, and when the instrument is in use this plate is brought into contact with the skin above the pulse, which is kept in position by a rest supporting the wrist. Before the instrument is set in full operation the position of the pulse is slightly varied until it is ascertained in what position it gives the strongest impulse to the vertical rod, which is indicated by the index-needle on a graduated scale. Obviously, any other form of recording instrument that measures the pulse-beats may bear the name, and some have been invented, but if the test be made directly of the heart action, the name is scarcely appropriate. One of these latter is the electrocardiograph, which measures the cardiac rhythm by electric reaction on a gal¬ vanometer principle. Consult Sanderson, (Handbook of the Sphygmograph.* See PULSIMETER.

SPICE-BUSH, a tall shrub (Benzoin ben¬ zoin), of the laurel family, frequenting moist woods and the edges of streams. It is con¬ spicuous when leafless on account of its slen¬ der branches and olive-green spotted bark, which has an aromatic odor and taste, sug¬ gesting to the Indians and frontiersmen, its use as a stimulative tea. Very early in spring, the twigs are covered with tufts of honey- scented, tiny flowers, with yellow calyces. They are either polygamous or dioecious, the male

flowers having many stamens, and the females a globose (Ovary and several staminodia. The leaves, which follow, are oval or obovate and short-pointed. The fruits are ripe in late sum¬ mer and are oval drupes, bright red in color, and most disagreeable in flavor. The wood of this shrub is termed spice-wood.

SPICE ISLANDS. See Moluccas.

SPICES, a popular name for such plant components, having essential oils of aromatic odor and pungent flavor, as are used direct and blended in for seasoning food; in fresh food nearly always ground, in preserves and pickles always whole. Their companions spread on, as mustard or used only in extracts, as vanilla, are not so reckoned, but

as condiments, flavor¬ ings, etc. They represent . most parts of the plant beyond the wood; cinnamon and cassia are the bark ; ginger the root ; cloves the flower- bud; allspice (pimento) and pepper, caraway and coriander, the fruit; nutmeg the kernel, mace its wrapper; cumin and dill the seed. All are tropic save the allied group of caraway, coriander and dill, now naturalized in temperate climes — and significantly, not often thought of as (<spice® ; and all foreign but these and some ginger.

The Spice Trade in History. — The su¬ preme importance of this in revolutionizing and generating modern civilization has never been set forth, because it is not recognized as the leading factor in the old Eastern commerce. Yet not only did it lead directly to the discovery of America and the sea route to the far East, but for centuries it was a chief agent in pro¬ voking world wars, determining the rise and fall of states, creating the present status of Europe and the Eastern Question, and even twice remade the world's religious history, first by making Mohammedanism a world power and long after by conditioning the time and early fortunes of the Reformation. The rela¬ tion of spices to earlier European food which caused this importance was something hardly conceivable at present. All could now be dis¬ pensed with at little loss beyond some pleasure; while till recent times they were an exigent need for comfort, health, and with the delicate even life. The winter food of most mediaeval English, for instance, was little but meal and salt junk — bacon from lean pigs, beef from scrawny cattle, insufficiently kept by dear and unpurified salt, and so half rotten by spring; washed down by ale without hops. Besides the results in scurvy and endless skin diseases — the source of the old tradition of sulphur and molasses with which women were wont to cleanse children's blood in spring — the meals were not only monotonous and pleasureless but hard for the sick and queasy to force down and bad for them if they did StO. Hence in the Middle Ages, perhaps the first call beyond bare nominal aliment was something to make unpalatable food palatable, to tempt invalid appetites and save drooping lives as well as to make eating a satisfaction, and spice became the foremost dream of luxury that was a neces¬ sity. The trade to the East, for it was not the only element of that trade, but it was the most vital, the only one that was literally in some measure of life and death, even though the sugar, currants, raisins, almonds, etc., of South Europe and the Levant were also alleviations.

Perfumes, dyewoods, jewels, were agreeable accessories; even drugs could be more or less matched in service: but absence of spices took much of the savor and some of the fibre out of life.

A few of the larger manifestations of the trade will show that the above review is not a fantasy. It is true that the agency of Eastern commerce in causing the Crusades is much over¬ stated, from the modern economic and rational¬ istic dislike of allowing the old weight to re¬ ligious feeling. But long before their time, it had assured their coming by creating their foe and need. From the earliest epochs, Arabia had gone through cycles of development cor¬ responding to the routes of trade from the East to Europe. In times of West-Asian peace or the mastery of strong states, this normally went overland, leaving Arabia unfertilized by it, barbarous and disintegrated; when interrupted by war or anarchy, it went around Arabia by the Red Sea and across Suez, creating or re¬ developing Arabian coast cities, spreading new needs and consequent political order among the tribes and raising their intellectual status. The Roman-Persian wars of the 6th century thus deflected Eastern trade and made Moham¬ med's career possible. Later, the trade en¬ riched the Italian cities as the distributors of its goods to central and northern Europe, and the rivalry of Venice and Genoa for Levantine and Black Sea monopoly of the commerce led, first to the Venetian use of the Fourth Crusade to destroy the Byzantine Empire, letting in the Turks on Europe, and then to feuds which neutralized Europe's naval strength against them. What the search for a sea route to In¬ dia did for the world is familiar. Here, again, the long Portuguese struggle down the West- African coast was primarily not for trade, but to take the Moorish dominion in the rear, unite with Preston John and crush the Moors in the interest of Christianity; but the riches of the spice trade were to be the means to finance this. As to Spain's share in the search, these riches were the direct object. In both cases gold bullion was the (special aim ; but craving for spices was its most efficient in¬ strument.

The supreme effect on European religion seems fantastic, but is quite simple. The Ger¬ man cities owed their prosperity and sometimes even existence largely to rehandling these goods from the Italian ports. Now the Cape route was so much cheaper, through not having to break bulk and reload and freedom from land tolls, that from its discovery in 1498 the Italo-German route began to lose profit and its factors to be forced out of business. By 1520 the business depression became severe in Germany, and just at this time of pinch came the exactions of the papacy for Saint Peter's. An explosion and revolt were probably not far distant in any event, from economic, political and moral reasons ; but hard times acted as the final weight to release the

lever.

SPIDER-CRABS, a family (Maiidce) of small, spider-shaped crabs represented by many remarkable and strange forms, some of them of large size, which mostly inhabit relatively deep waters. The shell is generally very hard and on the body bears numerous spines and a prominent beaked process or rostrum in front.

The first pair of legs is sometimes larger than the other limbs and always bears pincers and the rudimentary abdomen possesses seven joints. Many species are found along the coasts of the United States. The best-known shallow-water forms on the Atlantic Coast are two species of Libinia (L. dubia and L. emarginata). The former is especially common along the shore south of Cape Cod and has the long rostrum deeply divided in front. They are sluggish creatures which make no effort to escape cap¬ ture, but depend upon their hard covering for protection. Both species are scavengers and subsist upon all kinds of dead animal and vegetable matte'r. They conceal themselves by attaching sea-weeds, sponges, etc., to their backs, which growing as though fastened to stones afford them this additional protection. The females, with broad abdomens, are frequently found bearing eggs. The males are larger and often attain a foot in extent. A much smaller flat-bodied species is Hyas coarctatus, very com¬ mon among sponges hydroid and sea-weeds in both deep and shallow water. Lambrus pour- talesii is remarkable for the great size of the first pair of legs as compared with the others. It is found in moderately deep water among rocks along most of the Atlantic Coast of the United States.

SPIDER-MONKEY, a South American monkey of the genus Ateles, so called from the great length of the limbs, as compared with the body and the extraordinary agility of these animals in racing 'about the tree-tops ; no monkeys excel them in adaptation to an arbo¬ real life, in which they are especially assisted by the length and remarkable prehensile strength of their tails. Their structural resemblance to the langurs and other highly arboreal forms of the Old World is interesting; prominent among these is the absence or rudimentary con¬ dition of the thumb, a member which is not of great service in swinging from limb to limb, when the tail serves as an effective means of grasping. The fur is usually black, but in some species gray, in one decidedly brown and in a few Central American species white on the under surfaces and dark above. They go about in small bands, make little noise and are often made captive and become confiding and agree¬ able pets. Probably the best-known one is the red-faced spider monkey (A. paniscus), called coaita in Brazil, which has a rudiment of

thumb, is very black and extremely intelligent. Although only about a foot in length its tail is twice as long. Others are the chameck (A. chameck), 20 inches in length, the sooty-black white-bellied marimonda (A. beelzebuth) of Brazil, the grizzled (A. grisescens) and the black, yellow and white variegated spider- monkey (A. variegatus) , which occurs in the highlands about the headwaters of the Amazon Valley. Consult Lydekker, (Royal Natural His¬ tory* (1895) ; Bates, (Naturalist on the Ama¬ zons * (1863).

SPIDER-SHELL. See Scorpion-shell.

SPIDERS, invertebrates of the order Aran- ece, class Arachnida. The English name — spider, spinder, spinner, spinster, the spinning one — comes from the functions for which these creatures have been chiefly distinguished. They are cosmopolitan in distribution ; are found in

Greenland and swarm in the tropics. They show great and striking differences in form and in general habits. The spinning habit also differs widely; as one may see, by comparing the round web of a garden-spider, with the snare of the

speckled tubeweaver (Agalena ncevia) , made in hedges, fence-rows, roadsides and angles of out¬ buildings. These typical differences in habit are commonly united with variations in structure and, therefore, have been made the basis of scientific classification by the eminent Swedish arachnologist, Dr. T. Thorell, following sub¬ stantially M. Latraille. In no classification can these functional variations be disregarded; but for the use of the general public such an ar¬ rangement is most satisfactory and is here adopted. Spiders may be roughly divided into two great groups : (1) Sedentary; (2) wander¬ ing. Sedentary spiders live on or in woven habitations and take their prey by means of snares upon or near which they habitually stay. They thus have the distinction, almost unique among lower animals, of resembling man in pro¬ curing a livelihood by use of manufactured im¬ plements. The wandering spiders wholly or in large part hunt their prey afield. These groups may be thus subdivided :

I. Sedentary Spiders. — (1) Orbweavers (Orbit elarice) , which make open webs circular or partly circular in form, composed of radii issuing from a centre and crossed with spirals armed with viscid beads for the capture of in¬ sects ; these orbwebs are usually vertical, but

some are horizontal. (2) Lineweavers or Net- weavers (Retitelaricu) , whose snares are mazes of crossed lines in the midst of which they hang back downward; our common house and barn cobwebs made in corners or rooms are mostly the product of lineweavers. (3) Tubeweavers (Tubit elarice) , which live in silken tubes spun in divers situations sometimes with a sheeted snare outspreading from the mouth, as the com¬ mon speckled tubeweaver that nests in hedges, borders and grass. (4) Tunnelweavers (Ter- rit elarice), making tubular nests, usually silk- lined, often with extensions above ground; the trap-door spider (Cteniza calif or nica) is our best-known type.

II. Wandering Spiders. — (5) Citigrades (Citigradce) , many of which, as the lycosids, burrow in the ground. (6) Laterigrades (La- terigradce) , which live upon plants and among rocks, getting their name from their rapid side- wise movements. (7) Saltigrades (SaltT gradce), jumping-spiders, vivacious creatures, with large, bright eyes, living on plants and walls, etc., over which they move by frequent jumps and among which they make tubular nests of thick white silk.

This arrangement Professor Thorell subse¬ quently modified, dividing the order Aranece into two suborders, Tetrapneumones , containing (1) the Territelarice ; (2) the Dipneumones, em¬ bracing all other tribes. M. Eugene Simon, a distinguished French araneologist, retains the two suborders, which he names (1) Aranece theraphosce, composed of three families, of which the tarantula and trap-door spider are types; and (2) Aranece verce (38 families), con¬ taining all other spiders, divided into two great groups or sections, Cribellatce and Ecrihellatce.

Structure. — The early entomologists in¬ cluded spiders among insects and in popular thought they are still so ranked ; but they are widely separated therefrom. The most notice¬ able differences are : spiders have eight legs ; insects, six; spiders have the head united to the thorax, insects separated therefrom by a neck; spiders have simple eyes, insects have compound. The spider's body is divided into two parts, cephalo-thorax and abdomen, united by a straight pedicle or stem. Two mandibles or jaws are attached to the face, each having a hollow fang folded up within a groove when

aj >

Dorsal view of Epeira insularis. ab, abdomen; b, base; ap, apex; pt, pits that mark attachment of muscles; cp, head or cephalic part of cephalothorax: tp, thoracic part; mb, mandibles; 1, 2, 3, 4, the legs in their order, first, second, etc.; tch, trochanter of leg; cx, coxa; fm, part of femur; p, palp, dg, digital; ra, radial; cu, cubital; hu, humeral joints of palps.

at rest like a pocket-knife's blade within its handle. A small opening in the fang communi¬ cates through a minute duct with a pear-shaped

poison-sac, in the upper part of the mandible and head. 1 he poison, as in the case of snakes, ;s forced out when the spider strikes its victims. On either side of the mandibles is a six-jointed palp, shaped like the legs, which, besides other uses, serves to hold and turn the prey when swathing it or feeding upon it. The eight legs are attached to the cephalo-thorax, are seven- jointed, covered with spines, bristles and hairs, the tarsal joint ending in a foot having two or three claws constructed for grasping and handling delicate threads. The second main part of the spider's body is the abdomen, which while generally ovate greatly varies in form ; being globular, subtriangular, cylindrical ; some¬ times flat, sometimes convex above. The ventral surface is flat or slightly converse. The integu¬ ment is commonly soft, but sometimes leathery; in many species it is hairy; in others nearly

Ventral view of Argiope argyraspis. ps, palps; mx, maxilla ax, cu, hu.ra, dg, the auxiliary, cubital, humeral, radial, digital, joints of palpi; sm, sternum; cx, coxa of the leg; gl, breathing gills; ep, epyginum; sp, spinnerets, shown closed; ac, anal closure.

naked and glossy; in some bordered with sharp, hard, spinous processes or conical tubercles at the base, which for the most part overhangs the cephalo-thorax. The pedicle or stem unit¬ ing these two principal parts of the body is a short cartilaginous tube through which pass the organs of nutrition and circulation. This partial description, with the accompanying figures, will give a sufficient general idea of the structure and appearance of the most common species.

The mature male is most readily distin¬ guished from the female by the bulbous shape of the terminal joints of the palps, which often assume involved forms that serve as good spe¬ cific characters. Some times, as in certain orb- weavers, the male is so much smaller than his

mate that the disparity seems ridiculous. Woo¬ ing under such conditions is a serious under¬ taking. One will see several diminutive cour¬ tiers in attendance at the outer courts of the snare of our native species, the orange and the silvery Argiope (A. aurantium, A. argyraspis) ; and not infrequently dead and juiceless skele¬

tons may be seen hung up thereto in silken swathments, like scalps upon a savage's wig¬ wam.

Habits. — Gravid females differ largely in their modes of caring for their eggs and young. Most species enclose the eggs in a silken sac,

Face of Epeira mb, mandibles, with the falx, fx, and fangs, fg; es, eye space; v, vertex; cp, clypeus; MR, mid-rear eyes; SR. side-rear; MF, mid-front; SF, side-front.

which is protected in various ways. Orange Argiope spins a large pyriform cocoon with a tough, nearly waterproof case, lined inside with yellow floss, which encloses an ovate mass of brown silk, within which are the eggs number¬ ing as high as a thousand or more. This is hung upon bushes, stayed and surrounded by sundry braces and cross-lines. The labyrinth spider (Epeira labyrinthea) puts her eggs into several silken discs strung together in a bead¬ like row, which is swung within the thick maze that surrounds the leaf-thatched domicile that overhangs her orb. Many orbweavers spin their cocoons in angles of cornices, under bark, in cracks and crevices, knot-holes and sheltered

Female (upper figure) and male (lower figure) of Nephila nigra, shown one-half natural size.

openings of all sorts. A bit of loose bark on an old tree is a favorite cocooning place for many spiders; there the speckled tubeweaver will

often deposit her eggs within several wraps of silk, all overlaid with bark pellets gnawed from the tree. Some of our familiar lineweavers, as Theridium tepidariorum, put their eggs into several brown sacs which they keep near them within their netted cobwebs, on which the spiderlings hang when they are hatched. Many

(a) Epeira strix spinning her egg-cocoon. (b) The inner covering of the egg-mass, (c) Overlaying the thick outer covering.

tubeweavers and laterigrades spin a tough disc, white, gray, mottled or pinkish, against various surfaces, especially on or under stones. Most species die shortly after cocooning and the young are left to the nurture of nature. Others have some sort of care over the spiderlings when they appear and until they leave the home bounds. Among ground-spiders (Lycosida) one notes the interesting habit of tying the round egg-bag to the spinnerets and carrying it around until the younglings come out, when they mount the mother's back and are borne around clinging thereto until they disperse. A mother with a hundred babies piled upon her body as she runs over the ground is a gro¬ tesque spectacle; but the oddity vanishes in the light of mother-love. At least one species, the European water-spider, cocoons under water within her diving-bell-like domicile. This is but a glance at the varied forms which ma¬ ternal instinct takes among spiders to perpetu¬ ate the race.

Beneficial Uses. — One needs to give good heed who would know how large a part spiders have in the economy of nature. They are among the most numerous of our fellow-tenants of the earth. A fair idea of the myriads that live near us may be had on a dewy morning of late sum¬ mer or early autumn. Glancing over the fields and along the country roadsides one will see their webs, disclosed by the minute beads of mist caught by the delicate threads, literally covering the low herbage. Turning the eyes to bushes and trees, the branches, twigs and leaves are seen to be meshed with spinning work. In short, the whole landscape is overspread with the tents and meshes of the aranean hosts. Other hosts could be found by raking amid fal¬ len leaves and earth-litter and searching be¬ neath stones, logs and rubbish, in hollow trees, post-holes and crannies, under ledges and along the water side. There is scarcely a spot, indeed, where some species of spider may not be found. The problem of commissary supplies for this in¬ numerable army is an important one, and its

consideration opens up a strange contradictory phase of human nature, or perhaps one should say of human ignorance.

The popular prejudice against spiders has been so long fixed that it is hard to overcome it, but is yielding before the better knowledge of natural objects and sympathy therewith that now prevail. The prejudice is perhaps largely due to erroneous views of their ugliness and dangerousness. The species frequenting cellars and outhouses are dark colored and at first glance somewhat ungainly. But to judge the race by these would lead one as far astray as to judge all birds by buzzards and crows. In truth, some spider species rival butterflies and beetles in brilliancy of color. And these are not tropical forms alone,

but are among our indig¬ enous species and may be found in most parts of America by searching fields, bushes, bosky brook-sides, the edges of woods and open places therein. Delicate greens, pink, ruby, scarlet, orange, yellow, brown, gray and metallic hues, silver and green especially, abound, and give remarkable beauty to the outer robing of our native fauna. Exotic species are even more brilliant.

Yet more erroneous is the popular view of the spider's noxious and injurious character. That a few species may and occasionally do in¬ flict a wound that may cause suffering and under peculiar conditions even death is doubt¬ less true; although it is nearly impossible to verify current reports of injury and death caused by a so-called (<black spider, }) which, as it commonly turns out, had simply been seen somewhere near the victim. That insects inflict wounds which may be serious under certain unfavorable conditions is well known, and the possibilities for great damage to the human family by flies and mosquitoes is now estab¬ lished. But spiders may be ranked among the least dangerous to man of the small and most familiar invertebrates. The writer has been struck by large lycosids (ground-spiders) and has compelled one of our largest orbweavers to wound him, without more serious conse¬ quences than the prick of a pin. A mosquito's puncture, on the contrary, causes a painful hurt,

Diagram showing location of spinning organs in the abdomen of an orbweaving spider, spn, spinnerets; s. gl, silk glands; py. g, pyriform; cy. g, cylindrifotm, and others which connect by delicate ducts with the outer spinning-spools; cx, cephalo thorax; h, heart; ov, ovaries; ac, alimentary canal and its termination, a; bg, breathing gills; ep, epigynum and oviduct.

with an inflamed area the bigness of a silver dollar surrounding the central white swelling. This will show that personal idiosyncrasies are factors in the danger to man of a spider wound,

as of an insect's. Admitting the worst, how¬ ever, the credit side of the spider account is so large that the reverse is scarcely worth men¬ tion. Insects are known to be serviceable in the fertilization of many plants. The bee has been domesticated for the edible product of her cells and the silkworm for its cocoon fibre. But beyond these and a few other exceptions the insect hordes are among our most destruc¬ tive domestic foes. Farm, garden, orchard and plantation can be profitable

only by vigilant and unremitting warfare upon these destroyers

American works the student may obtain needed help. Among them are (Spiders of the United States 5 by Professor Hentz, the father of Ameri¬ can araneology; Dr. McCook's (American Spiders and their Spinningwork,5 3 vols., folio, profusely illustrates structure and habits and gives classification of Orbweavers: the studies by Prof. Geo. W. and Mrs. Elizabeth G. Peckham of general habits are most interesting and their work on the (Attidae5 is quite complete; (The Common Spiders of the United States> by J. H. Emerton is a good popular treatise; (Catalogue

Fig. 1. — A posterior spinneret of Epeira. sp, spigot-spool; 1. ss long spinning spools; s. ss, short spools; bb, branched bristles; sb, simple bristles which aid in spinning. _ ...

Fig. 2. — A middle spinneret of Epeira, sp. c, spigot-spool discharging cylin¬ drical gland; ss ands. ss, spools of pyriform gland; sp. t, of treeform gland.

whose inroads cost the nation hundreds of mil¬ lions yearly. But spiders injure no food-plant or other product of human industry. In fields and groves, orchards and outhouses they are not only absolutely innocuous, but are engaged in ceaseless warfare upon the enemies of man's prosperity, comfort and health. Their chief food is insects, and day and night they pursue that function which nature has assigned them and keep in check the myriads of insects that otherwise would overwhelm us. It is doubtful if civilized man could successfully cultivate or even inhabit the earth, if it were not for these despised benefactors, unless nature were to pro¬ vide some other agency to hold even the balance of helpful and harmful life. Even when spiders enter our homes and spin their cobwebs in our porches, halls and chambers, they come upon the wholesome errand of clearing our prem¬ ises of irritating and dangerous guests. It is pitiful that these benefactors of our race should be the subjects of unsparing obloquy and hate and should be slain at sight without compunc¬ tion.

Bibliography. — The literature of spiders is too abundant to be here cited ; but from several

of the Described Araneae of Temperate North America,5 by the late Dr. George Marx of the Smithsonian Institution, is valuable; Nathan Banks of the National Museum, Washington, has written some important papers, as also has Prof. Thos. Montgomery of the University of Texas, Austin. Among foreign works one should know

the (Histoire Naturelle des Araig- nees> of M. Eugene Simon. Among British authorities consult (BlackweH's Spiders of Great Britain and Ireland) and the works of Dr. Pickard. Emerton, J. H., (The Common Spiders of the United States) (Boston 1902) ; Fabre, J. H. C., <The Life of the Spider) (New York 1913) ; Keyserling, E., Graf, (Die Spinnen Amerikas) (Vol. IV, Niirnberg 1892) ; McCook, H. C., American Spiders and their Spinning Work5 (3 vols., Philadelphia 1889-93) ; Petrunkevitch, A., (A Synonymic Index Cata¬ logue of Spiders of North, Central and South America, etc.* (in American Museum of Natu¬ ral History Bulletins, Vol. XXIX, New York

1911) ; Warburton, C., (Spiders5 (Cambridge

1912) .

Henry C. McCook,

Author (American Spiders and Their Spinning Work ,5

SPIDERWORT, any plant of the genus Tradescantia, or (by extension) of the family Commelinacace. The spiderworts are perennial, succulent, somewhat mucilaginous herbs, having linear or lanceolate leaves and showy reddish or blue flowers in umbel-like cymes, subtended by bracts. Tradescantia virginiana is a species na¬ tive to the Middle Atlantic States, but often found farther north in cultivation or escaped from gardens. It has stems often in clusters and about a foot high ; the leaves very narrow, either glabrous or slightly pubescent, as long as the stem and of a bright green color. The large corollas of three petals are sky-blue, the villous pedicels being declined until in bloom. The sepals are broad and herbaceous. The anthers are large, crescent-shaped and golden, and the filaments are heavily bearded. A South Ameri¬ can spiderwort, T. duminensis, is better known under the title of Wandering Jew. It has simi¬ lar flowers and broadly lanceolate leaves and is very easily propagated by cuttings, growing often in water only.

SPIEGELEISEN, spe'g'l-i"zen, a white cast iron originating in Germany, made from specular iron ore, or hematite, containing a large percentage of carbon and manganese. Be¬ ing remarkably free from impurities, as phos¬ phorus, sulphur, silica, it is largely used in the Bessemer process of steel-making for the pur¬ pose of reintroducing carbon. It reduces the iron oxide and is itself subject to oxidation.

SPIELHAGEN. spel'ha"gen, Friedrich,

German author : b. Magdeburg, 24 Feb. 1829 ; d. 1911. He studied at Berlin, Bonn and Greifswald, turned from an academic career to literature, made some translations from French and English, including" one of Amerikanische Gedichte) (1856; 3d ed., 1871), and after pub¬ lishing two sketches that attracted little atten¬ tion, became well known through his (Problem- atische Naturen) (1860), in which he advo cated the advanced liberal politics of his time. His <Sturmflut) (1876), based on the financial crises in Berlin following the Franco-Prussian War, is worthy of comparison with this. He wrote a great number of optimistic and some¬ times extravagant novels, having a preference for social problems. His books are often truly voluminous and frequently somewhat grandiose, but display a certain energy of treatment in dealing with what the author believed important questions of the time. See Problematische Naturen.

SPIERS, sperz, Richard Phene, English architect and archaeologist: b. 1841. He was educated at King's College, London, and the Ecole des Beaux Arts, Paris, and is master of the Architectural School and surveyor of the Royal Academy. In addition to editing Pugin's (Normandy) (1870) and Fergusson's (History of Architecture) (1863), he has written Archi¬ tectural Drawing) (1887) ; (The Orders of Architecture *(1902) ; Architectural Essays on Sassanian Architecture* ; (Domed Churches in Perigord) ; Architecture, East and West,* etc.

SPIGELIA, spl-je'li-a, a genus of annual and perennial herbs of the order ' Log aniacece, of which about 35 species are American. They have opposite, membranous leaves and terminal spikes of yellow, red or purplish flowers. The

best-known one, pink-root or worm-grass (S . marilandica) , is native from New Jersey to Wisconsin and southward to the Gulf States. It is valued in hardy garden borders because of its handsome, red, tubular, yellow-throated flowers which appear during mid-summer and also because of its easy culture in rich, friable, loamy soils. It roots have been used medic¬ inally.

SPIKENARD, a North American herb. See Aralia.

SPINA BIFIDA, cleft spine. See Tumor.

SPINACH, spm'aj, or SPINAGE, an an¬ nual herb (Spinacia oleracea) of the family Chenopodiacece. The plant is probably indige¬ nous to southwestern Asia, whence it has been carried to all cool climates

throughout the civilized world for use as a potherb. The original species has a rosette of arrow-shaped radical leaves, from the centre of which a flower-stalk is developed two to three feet tall and bearing small axillary clusters of dioecious flowers followed by seed-like fruits (akenes). In cultivated varieties the form of the leaf is various and its size and thickness greater than in the wild. Only one other species of the genus is now recognized (S', tetrandra) but is not cultivated. There are, however, groups of varieties which have been given specific names mainly because of the form of the fruits. Though the popular names are retained in the trade the plants are considered one species. The original form is not known. Spinach thrives in light, well-drained, loamy soils and always gives best returns when abundant nitrogenous food is. readily available. It is easy of cultiva¬ tion. The seed may be sown in early autumn in the North and covered during the winter with loose straw or marsh hay, free from weed- seeds. In spring the mulch should be removed very early. Early spring sowing may be done but, since the plants produce smaller, fewer and poorer leaves, and are prone to develop a seed- stalky at the approach of warm weather, the planting season in spring must be curtailed. About eight weeks usually elapse between sow¬ ing and gathering the plants except when the crop is wintered. In field practice spinach is usually sown in beds about 10 feet wide made by plowing several furrows toward a centre and leaving dead furrows between the beds for surface drainage. The seeds are sown in drills about 15 inches apart and the ground kept cleanly cultivated. Since the crop is of short duration it is generally used prior to or after summer-maturing crops. It is, however, also frequently sown between the rows of other crops. Immense quantities of spinach are grown in the South, especially upon the Atlantic sea¬ board for the Northern markets, and except for home use the cultivation of the crop under cold frames is now little practised in the North. The plants are gathered when dry with some of the root attached, trimmed of dead leaves and shipped in tightly packed barrels or crates.

SPINAL CORD, the posterior or inferior portion of the cerebro-spinal axis, entirely located in the spinal canal. In those animals which stand upright it may be termed the lower portion. The spinal cord is directly continuous with the medulla oblongata (q.v.) and, varying with different animals, it extends practically the

length of the spinal canal, giving off numerous paired spinal nerves

(q.v.) and terminates by breaking up into a series of terminal nerves, the so-called cauda equina. With reference to its length and thickness, its divisions and ar¬ rangements, both internal and external, con¬ siderable variation exists in different animals. (See Anatomy, Comparative). In man, how¬ ever, the spinal cord comprises all that portion which lies between the cauda equina and the decussation of the pyramids in the medulla. It lies within the bony framework of the spine, covered on the outside by a thick membrane, the dura mater, which is continuous with the dura mater of the brain. Within this is a thin delicate layer of tissue, the pia mater, which covers the cord closely, being continuous with the pia mater of the brain. Between the dura and pia a certain amount of cerebro-spinal fluid is found, which serves as a protection-sheath. Passing out and coming into the cord are the paired motor and sensory nerves that carry motor impulses to all the muscles of the body below the head and sensory impulses to the brain from all the sense organs of the skin, mucous membranes and viscera. In simple language it is a large cable which carries in¬ coming and outgoing messages. The incoming messages come through various organs of sense, the stimuli come in through receptors, they then travel in nerve fibres, enter the cord, form connections, etc., with the brain or other nervous centrals and outgoing messages travel down to make effective action in the environ¬ ment. The general shape of the spinal cord is cylindrical. It is slightly flattened front and back and tapers at its caudal end into a long thin strip, the filum terminale. In its course it shows two enlargements, the cervical and dorsal enlargements, corresponding to the loca¬ tion of increased amounts of nervous tissue that go and come from the upper and lower extremities. The length of the cord proper, apart from its terminal filament, averages only about 18 inches; it, therefore, falls short several inches of filling the entire spinal canal. It is about one-half inch in width at the widest part and weighs in an average adult about one pound. The spinal cord is nothing but a collec¬ tion of nerve ganglia and nerve-fibres, but in the human cord these are not as simple in their arrangement as in the nervous cords of insects, for instance. The cord preserves its bilateral symmetry, but its metameric symmetry is much modified, particularly in its internal structure. Thus the spinal cord consists of nerve-cells and nerve-fibres, like all other parts of the nervous system. It is divided almost into two halves by deep fissures in front and behind; and there are several secondary fissures that further sub¬ divide the cord into segments corresponding somewhat to its anatomical arrangement. In order to understand somewhat of this ana¬ tomical arrangement it is important first to trace the different fibre-tracts that go up and down the spinal cord and which make up its white matter. The first nerve-fibres to develop are

sensory. These collect into bundles and, through the posterior spinous processes, pass into the cord and constitute two bundles of fibres, the columns of Gall and the columns of Burdach. These columns are at first very small, but as they continue to receive more and

more fibres passing upward they become larger. After their entrance into the cord the sensory fibres give off many collaterals, making ex¬ tremely complicated anatomical connections with the different segments of the cord. One set of these collaterals, however, makes a dis¬ tinct bundle of fibres, which has been called the column of Gowers, or ascending lateral tract. All three of these fibre-tracts carry sensory impressions from the surface of the body to the brain ; they constitute the sensory neuron- paths. The column of Gowers is known to carry pain-sensory stimuli. These sensory neuron-paths terminate in the sensory areas (q.v.) in the brain, having numerous interrup¬ tions or stations, on the way up. The typical sensory neuron-path is made up of three or four of these stations. The first ganglionic centre is in the posterior ganglia; the second is in the medulla, constituting the nuclei of the columns of Gall and Burdach ; the third is in the optic thalamus and the fourth' is in the cortex of the brain. As to the part of the cortex, it varies according to the character of the incoming stimuli : gravity stimuli are mostly located in the cerebellum, sight stimuli in the occipital lobes, sound stimuli in the temporal lobes, where the sensations for liver, spleen, kidney, heart, etc., are, is still under discussion. Passing down from the brain a large number of motor tracts make up the larger part of the re¬ maining white matter of the cord. The most important of these bundles are the direct and indirect or crossed pyramidal tracts. The de¬ scending anterolateral tract and direct cere¬ bellar tract are other smaller fibre-masses. Still other minute fibre-bundles are found in the cord, but their description belongs to more extensive treatises. The main function of these descending tracts is to carry motor im¬ pulses down from the motor area to the gray masses of nuclei located on the interior of the spinal cord. From these spinal centres the im¬ pulses are transmitted to the motor nerves which pass out the entire length of the cord, from in front, where they later bend backward and join the sensory fibres and together form mixed nerve-trunks. The motor nerves finally terminate in the muscles by specially modified muscle-plates. As the nuclei of the columns of Gall and Burdach in the medulla were the first ganglionic terminals of the sensory neuron- chains, so the gray masses in the anterior columns of the cord are the first ganglionic terminals of the motor neuron-chain. If the spinal cord be cut across, these ganglionic masses appear on the cut surface as a gray letter H, or as a butterfly-wing, according to the region where the cut is made. In these

wings certain definite groups of ganglion-cells may be made out, running short distances in and down the spine. These constitute definite ganglionic centres for certain muscle-groups, and their destruction causes the well-known spinal paralysis of children. Throughout the entire length of the spinal cord there is a small cavity around which there are bridges of fibres connecting the two halves of the cord. Thus the spinal cord is seen to represent a mass of cells and fibres, of vastly complicated structure, and subserving all of the nervous functions of the muscles of the skeleton and of the viscera below the diaphragm, save the stomach. The

spinal cord is in intimate connection through¬ out its entire length with the sympathetic nervous system. Any interruption in the spinal cord interferes with the carrying capacity of its fibres and cells. There then results disease of the spinal cord the symptoms of which will differ according to the place where the inter¬ ruption takes place. As the pathways of the different kinds of sensation messages and mo¬ tion messages are extremely complex they can¬ not all be spoken of here. Only some of the more striking types of loss will be spoken of. If the entire cord is cut across, as happens in broken back from diving into shallow water, from bullet wounds of war, or sometimes from a tumor of the spinal cord, or an inflammation, there results a paralysis of all motion below the place where the injury takes place. If in the upper neck region the paralysis is of the entire body below the neck. If the injury is lower down the lower extremities alone are involved with such portions of the trunk as lie below the site of the injury. All above the site of the lesion is a loss of sensation. This would naturally follow from what has been said that the pathways are carrying sensory messages up and. motor messages down. An incomplete section of the spinal cord introduces a number of complicated results which only the nervous specialist can analyze. He is like a telephone expert. He is a trouble hunter on the line and from the symptoms which the patient shows he is able to accurately locate the place where the interruptions are occurring or have oc¬ curred.

In some disease processes localized^ parts of the spinal cord are picked out by the process and a limited type of injury takes place. Thus in the disease known as infantile paralysis [poliomyelitis] the virus of the disease chiefly involves the connections of the motor pathways as they make a switchboard connection with the muscle groups in the anterior horns of the spinal cord. This results in a partial or com¬ plete

paralysis of one or more groups of muscles. Sometimes the sensory parts of the cord are cut off or diseased. This cuts off in¬ formation from switchboard operators higher up and various types of loss of feeling, in¬ ability to localize, inability to know what one is doing with one's muscles, etc., results. A great number of complicated troubles can result and bring about the clinical pictures called syn¬ dromes, in neurology, such as locomotor ataxia, syringomyelia, multiple sclerosis, paraplegia, muscular atrophies, etc., which must be con¬ sulted in a work on diseases of the spinal cord or diseases of the nervous system. Con¬ sult Barker, (Nervous System *(1901) ; De-jerine, (Anatomie du Systeme Nerveux) (1901—04) ; Van Gehuchten, (Systeme Nerveux) (1903) ; Spalteholz, (Anatomy Atlas) (1904) ; Winkler, (Manual de Neurologie> ; Jelliffe and White, (Diseases of the Nervous System* (3d ed., 1919). See Brain; Nervous System, Evolution of the; Reflex Action.

Smith Ely Jelliffe, M.D., Editor (Journal of Nervous and Mental Dis¬ eases.'*

SPINAL CORD SURGERY. The sur¬ gery of the spinal cord has been much advanced during the last decade and at the present time clear indications exist for operative interference.

In injuries of the spinal cord due to fracture of the vertebra or bullet or high explosive wounds, operative interference should be done only if the spinal cord has not been completely crushed. If the X-ray gives evidence of pres¬ sure on the cord from fractured bone or for¬ eign bodies, a laminectomy should be per¬ formed. If there is doubt as to whether the lesion is a complete one, i.e., involving the com¬ plete thickness of the cord, the patient should be watched for symptoms to give evidence that part of the cord is still functioning. Spinal cord surgery has had its greatest triumphs in the removal of tumors pressing upon the cord, and if the condition is recognized early the patients can be entirely relieved of their symp¬ toms. Inflammatory diseases of the spinal cord sometimes demand operative interference, es¬ pecially in those cases in which the disease is slowly progressing and at a definite level of the cord. Operations upon the spinal cord are sometimes required for the condition of the nerve roots. The technic of spinal operations has been much simplified. In the large major¬ ity of instances, in otherwise healthy individ¬ uals, the dangers of operation are very small. In the operation, known as laminectomy, the spinal canal is opened by the removal of its posterior wall, that is, by the removal of the spinous processes and laminae forming together a posterior arch of each vertebra. The func¬ tions of the vertebral column are fully re¬ gained after spinal operations. The mortality of

the spinal operation itself, in otherwise healthy individuals, should be no more than 5 per cent, which is a small mortality for a major operation of this kind.

Charles A. Elsberg, M.D.

SPINAL NERVES, the paired nerves which arise from and pass into the spinal cord (q.v.), and which are distributed to the vari¬ ous muscles of the body and come from the various sense-organs, skin, intestines, bladder, etc. The spinal nerves are so named in contra¬ distinction to the cranial nerves, or those which originate from or pass into the brain itself. From the spinal cord of man 31 pairs of spinal nerves arise. They pass from and enter into the spinal cord and spine through the interver¬ tebral foramina, or openings between the bodies of the vertebrae, the motor part of the nerve passing out in front, the sensory part coming in from behind. Eight pairs are cervical ; 12 are dorsal nerves, also named thoracic; five are lumbar, five sacral and one coccygeal. Each spinal nerve is formed from two portions, an anterior or motor, and a posterior or sensory. The posterior root has a nerve-mass or gan¬ glion, which is wanting in the anterior. The fibres of the anterior roots are motor in na¬ ture; that is to say, impulses travel by these roots outward from the cord or brain to the body. The fibres of the posterior roots are sensory: impulses are conveyed by these fibres to the cord or brain. The anterior and pos¬ terior fibres unite just beyond the nervous ganglion to form a single nerve-trunk, in which the two sets of fibres are indistinguish¬ able. See Anatomy; Brain; Nervous System, Evolution of the; Spinal Cord.

SPINDLE-TREE, a name originally ap¬ plied to an European species of Euonymus, shrubs belonging to the Celastracece. The

American species have more or less four-an¬ gled and winged stems, with petioled entire or serrate leaves and regular, perfect four to five-fnerous flowers in axillary cymes. They open in early summer and are small and inconspicu¬ ous and greenish or purplish in color; they are succeeded, however, by very brilliant fruits or pods, which are several-celled, lobed or angled and which, when mature, open, showing the somewhat fleshy red arils which have grown up from the base of the seeds and now enclose them. The fruits remain on the tree during the winter, so that these shrubs are often culti¬ vated in ornamental shrubbery. E. europoeus is called spindle-tree, because its

hard, close- grained, white wood was once esteemed as a material for spindles, musical instruments and netting needles and is still used for skewers and in turning. It is a glabrous shrub, with broad and shining leaves and deeply four- lobed, smooth pods which have been employed as a dye-stuff. One of our most handsome shrubs in autumn is the burning bush, or wa- hoo, E. atropurpueus, with crimson and scar¬ let lobed capsuels. E. americanus is the straw¬ berry-tree, a low bush, with oval leaves and a crimson capsule, scarcely lobed, but covered with pointed warts and disclosing scarlet arils. The E. obovatus is similar in fruit, but has a trailing habit and obovate leaves The foliage of a Japanese species (E . alata) turns to a brilliant rose pink in autumn.

SPINE, the backbone of a vertebrated ani¬ mal. See Anatomy ; Osteology ; Spine, Pathological Changes in; Tuberculosis.

SPINE, Pathological Changes in. The

odontoid process of the axis of the spine pre¬ sents two articulating surfaces, one in front, of an oval form, for articulating with the atlas, and another for the transverse ligament, the latter frequently encroaching on the sides of the process. Serious displacement at this point of articulation causes instant death, due to pres¬ sure and injury of the cord and nerve-trunks. The vertebral column quite frequently sustains fracture from an indirect violence which tends to produce overexertion on one flexion of its normal curvature. Tuberculosis of the ver¬ tebral articulations or Pott's disease is an af¬ fection of the spine. At birth there are no curves in the infant's spine, but as the child as¬ sumes the sitting or erect posture, curves which are recognized as the normal vertebral curves are developed. Weak muscles, careless pos¬ tures and paralysis of special groups of spinal muscles are causes of spinal curvature. Scolio¬ sis is lateral curvature, that is, with the convex¬ ity of the curve to one side. Cyphosis, or humpback, is the form in which the con exity of the column is increased in a posterior direc¬ tion. Lordosis, or hollow-back, is a spinal de¬ viation in which the convexity of the curve is forward. In old age the spine is apt to shorten owing to shrinking of the gristly for¬ mation between the vertebrae. Inflammation of the cord rarely gives rise to pus, but a few cases have been described. The suppuration is necessarily micro-organismal in origin and as a rule it is either due to some septicaemia or trau¬ matism, or secondary to purulent meningitis. The spinal cord (q.v.; is i ifluenced by diseased conditions of other paˆts of the body. It is the centre for all the deguo jtive disorders of

the nervous system, such as locomotor ataxia, degenerative spastic paraplegia, primary lateral sclerosis, etc. The chiropractics have made special study of the spine and the nerves pass¬ ing through its articulations. See Chiro¬ practic.

SPINE-FOOT, a genus of lizards (Acan - thodactylus), so named from the spinous ap¬ pearance of the toes, which are <(keeled® be¬ neath and possess fringed edges. A familiar brown species (A. vulgaris) occurs from Spain and Morocco eastward to northern India.

SPINEL, an isometric mineral of many colors, almost always in octahedral or dodec¬ ahedral crystals. Octahedral twins are so common as to give the name <(spinel twin® to this form (see explanation under Mineral¬ ogy). It is characterized by a hardness of 8, which is exceeded by only three min¬ erals, diamond, corundum and chrysoberyl, and is equaled by but a few. It is brittle; fracture conchoidal; specific gravity, 3.5 to 4.1; lustre vitreous ; streak white ; transparent to nearly opaque. Essentially it is a magnesium alumi- nate or a compound of the oxides of magne¬ sium and aluminum, these metals being at times in part replaced by iron and, in the vari¬ ety picotite, also by chromium. The varieties are distinguished by differences both in color and composition. The red variety is often transparent and is known as ruby spinel (q.v.) or balas ruby. Rubicelle is yellow or orange- red ; ceylonite or pleonaste is dark-green, brown or black and nearly opaque; chlorospinel is grass-green. Blue and yellow varieties are also found and sometimes yield choice gems. Its most noteworthy occurrences are in the gem gravels of Ceylon, Burma and Siam, in the ejected blocks of Vesuvius and in the limestone belt of Orange County, N. Y., and Sussex County, N. J.

SPINEL GROUP, an important group of isometric minerals, usually included among the oxides, though chemically they are oxygen salts. The group embraces the closely related alumin- ates, spinel, hercynite and gahnite ; the ferrates and manganates, magnetite, magnesioferrite, franklinite and jacobsite; and the metachrom¬ ite, chromite. Their general formula is R"R'"204.

SPINELLO, spe-nel'lo, Di Luca (called Spinello Aretino), Italian painter: b. Arezzo, 1333; d. there, 1410. His principal frescoes were done for the sacristy of the church of Saint Miniatus near Florence, for buildings at Pisa, Siena, Arezzo and for the municipal buildings of Sienna (a series illustrating the Italian wars of Frederick Barbarossa). Spi¬ nello enjoyed a great reputation in his own day, being compared, and by some preferred, to Giotto, whose style his own in some respects resembles. His (Virgin and Child) sold in 1889 for $3,725.

SPINET, a stringed instrument invented about 1490, formerly much in use, but now superseded by the pianoforte. It was some¬ what similar to the harpsichord, and like that consisted of a case, sounding-board, keys, jacks and a bridge. The spinet was smaller than the harpsichord and contained two or three sets of jacks (small oblong slips of wood, with crow- quills attached for striking) and strings so dis-

posed and tuned as to admit of a variety of stops, while the former had only one set of jacks and strings and consequently only one stop. See Pianoforte.

SPINGARN, Joel Elias, American edu¬ cator: b. New York, 17 May 1875. He was graduated from Columbia University in 1895, became an instructor and in 1909 was professor of comparative literature; has published (A History of Literary Criticism in the Renais- sance) (1899); (The New Criticism* (1911); and other works of literary criticism.

SPINIFEX, or PORCUPINE GRASS, a

perennial grass (Triodia irritans) which grows on otherwise barren dry ground in Australia, forming tussocks through which horses and men find difficulty in progressing because of the uncertain footing and because the spiny edges of the hard leaves cut the clothing or feet.

SPINNER, Francis Elias, American finan¬ cier: b. German Flats (now Mohawk), N. Y., 21 Jan. 1802; d. Jacksonville, Fla., 31 Dec. 1890. He was apprenticed to a confectioner and then to a saddler, but in 1824 became a merchant at Herkimer, N. Y. He was deputy sheriff of Herkimer County in 1829-34, sheriff in 1835-37, was active in the militia where he gained the rank of major-general and in 1838-39 was State commissioner for building the State luna¬ tic asylum at Utica. He was connected with a bank in Mohawk for 20 years as cashier and as president, was auditor and deputy naval offi¬ cer in the naval office at New York in 1845ˆ9, and in 1855-57 was a Democratic member of Congress. He was one of the original mem¬ bers of the Republican party, was re-elected by it to Congress in 1856 and in 1858, and was ap¬ pointed United States treasurer by President Lincoln in 1861, a post which he occupied until 1875. He was the first to suggest- the employ¬ ment of women in the government offices and carried his point, though against much opposi¬ tion. His name became during his

long term of office the synonym of integrity and his de¬ signedly singular signature on the ((green- backs® of the United States was the most fa¬ miliar autograph in the country.

SPINNING, the process of twisting into fine threads of uniform size fibres of cotton, flax, wool or other fibres for weaving pur¬ poses. The process was performed by hand from early Egyptian times with the distaff and spindle, the distaff being a stick or staff on which a mass of carded raw material called a roving was loosely bound and the spindle being a smaller round stick, usually weighted, to which the thread was attached and with which it was twirled into a thread or yarn by adroit manipulation. The art of spinning thus came to include two distinct operations : the draw¬ ing out and evening the fibre which was to form the thread; and the twisting of it. In hand-weaving the first was done by the fingers of the left hand ; the second by the right hand.

The spinning-wheel to revolve the spindle, attached to its frame, was an improvement on the manual method, introduced from India into Europe during the 14th century and thence to America in the 17th century. Its use did not begin to be displaced until the middle of the 18th century, and it was still to be seen in op¬ eration at the beginning of the last quarter of

the 19th century, in many provincial places un¬ touched by railways, throughout Europe and other parts of the world. The operation usually performed by young women gave rise among English-speaking people to the word ˆspinster.®

The India wheel was comparatively large and the operator stood at her work, walking away and back as the forming of the thread seemed to requre. A wool-spinner working continuously would thus travel 20 miles a day. The next development was the <(Saxony wheel® or flax wheel, invented in Nuremburg about 1530. This wheel was much smaller in diam¬ eter and operated by a treadle, the spinner sit¬ ting at her work. The driving-cord of the Saxony wheel was in two loops, one passing around the pulley of the spindle and the other around the pulley of a bobbin or reel on which the yarn was wound as it was spun. Later two spindles were in use on the Saxony wheel by expert spinners, who thus doubled the usual amount of thread in a given time. With the improvement of the loom, so that its output was quadrupled, the demand for yarns was sud¬ denly increased beyond the capacity of the hand spinners. Invention was thus stimulated and in 1738 two spinners, John Wyatt and Lewis Paul, devised and patented a method of drawing out and evening the fibre preparatory to twisting, by means of rollers revolving upon one another. For some

unexplained reason this mechanism failed to come into popular use in the spinning trade until 30 years later, when the idea was adopted by Richard Arkwright and embodied in his throstle machine. In quick succession, at the beginning of the last third of the 18th cen¬ tury appeared Hargreave's spinning jenny, an improvement on the double-thread producing Saxon wheel ; Arkwright's throstle machine, or roll-drawing spinning machine ; and Cromp¬ ton's mule-spinner, three inventions which revo¬ lutionized the art of spinning. Although many important improvements have been made since in constructive details, the general priciples of all modern spinning machinery are those of these three inventions.

The spinning jenny invented by James Har¬ greave's in 1767, in its simplest form, resembled a number of spindles turned by a common wheel or drum which was worked by hand. It stretched out the threads as in common spin¬ ning of carded cotton, eight at a time, but this was soon improved upon and with the applica¬ tion of power as many as 80 could be spun as easily. The drawing was done by a movable carriage on a track which simulated the move¬ ment of the walking spinner at the India wheel.

The throstle or roll-drawing spinning ma¬ chine, patented by Arkwright in 1769, accom¬ plished its object, the drawing of the rovings, through the action of successive pairs of roll¬ ers, each pair in advance of the others and moving at different rates of speed. The first pair to receive the sliver compressed it and passed it to the second pair, which revolved at a greater speed and thus pulled it out to ex¬ actly the number of times greater length that their revolutions exceeded those of the other pair. As the roving issued through the last rollers of each machine, it was received on spools or reels, calculated to hold a given quan¬ tity; and these were transferred to the spin¬ ning-frames, which resembled the roving- frames. As the roving unwound from the

EARLY SPINNING MACHINERY

1 Indian Spinning-Wheel

2 Saxony Spinning-Wheel

3 Arkwright's Water-Frame

4 Hargreaves' Spinning- Jenny

5 Crompton's Mule

spool, it was drawn through successive pairs of rollers, moving as before at different rates, each succeeding pair faster than the backward ones, so that the roving got thinner and thin¬ ner, until the tenuity was carried as far as de¬ sirable. It was then guided to a spindle which revolved with great rapidity and by a simple arrangement was made both to twist the thread and to wind it on the bobbin ready for the weaver.

Arkwright's machine produced too great a strain on the thread- in its progress to admit of it being drawn sufficiently fine for many purposes, and this led to the invention by Samuel Crompton, in 1779, of the mule jenny, which had a traveling frame upon which the spindles were set, and which, com¬ bining the principles of the two preceding inventions, produced much finer yarn. This frame is now made long enough to carry hun¬ dreds of spindles and it gently draws out and twists the thread after it leaves the last pair of rollers ; when it has reached its limits, now sev¬ eral yards, but in Crompton's time only five feet, it rapidly returns, winding up the spun thread on the spindles as it goes back. The intermittent action of the mule spinner has been almost entirely abandoned for the con¬ tinuous motion of the ring spinner, based upon the upright spinning frame of the Arkwright machine. The speed of the spindles is almost incredible, reaching over 10,000 revolutions per minute.

The preparation of fibres for spinning in¬ volves various important processes upon which the quality of the yarn produced depends. These include the opening of the fibres to re¬ lieve them from knots and lumps, a strong blast of air also being driven through to carry away dust and foreign matter; the beating and rolling into laps, which involve much careful attention, as on this first operation the ultimate size of the yarn depends ; and the carding or combing of the laps into a narrow web, which passing through calendar rollers coils in the form of a loose untwisted column of cotton or wool, about an inch in thickness, called the sliver.

The most modern machines combine in one the operations of carding, roving and spinning, and these machines are now applied with vari¬ ous necessary modifications to cotton, wool, flax, silk and other textile materials. (See Weaving; Cotton Manufactures in the United States;

Woolen, Manufacture of). Consult Blount, Mrs. G., (T'he Story of a Homespun Web : A Simple Guide to Spinning and Weaving1 (London 1913) ; Carter, H. R., (Modern Flax, Hemp and Jute Spinning1 (London 1907) and (The Spinning and Twisting of Long Vegetable Fibres1 (Lon¬ don 1904) ; Kissel, M. L., Warn and Cloth Making1 (New York 1918) ; McGowan, E. B., (Textiles and Clothing1 (New York 1919) ; Murphy, W. S., (The Textile Industries1 (Lon¬ don 1912) ; Posselt, E. A., (The Structure of Fibres, Yarns and Fabrics1 (Philadelphia 1892) ; Thornley, T., (Draw Frames and Fly Frames1 (London 1898).

SPINNING FIBRES. See Fibre.

SPINNING JENNY, in textile manufac¬ ture, the name given by James Hargreaves to the spinning machine invented by him in 1767. The name jenny is a corruption of engine, the

term gin being a common local expression for a machine. Some think, however, that the ma¬ chine was named for Hargreave's wife. Others point out that there is a' spinning mule, and that a jenny is a female mule, which suggests that early machines were operated by mule power. See Spinning.

SPINOLA, spe'noˆla, Ambrosio, Mar¬ quis of, Italian general: b. Genoa, about 1570; d. Castelruova, 25 Sept. 1630. In 1602 he joined the Spanish forces in the Low Countries, with 9,000 Italian and Spanish veterans, whom he raised, equipped and maintained at his own expense. As a consequence while mutiny and in¬ subordination prevailed in the rest of the army, his 9,000 Walloons were models .of discipline and order. The Archduke Albert of Austria, then governor of the Netherlands, employed Spinola in the capture of Ostend, long be¬ sieged by the Spanish troops. It fell into his hands in September 1604, after having sus¬ tained a siege of three years and two months. Spinola then hastened to Madrid, to give Philip III information of the discontent and insubordination that were rife among the greater part of the troops in the Netherlands, and was named commander-in-chief of all the Spanish and Italian forces in the Netherlands. On returning he found Maurice of Nassau op¬ posed to him, and in him met a more formid¬ able opponent than he had hitherto encountered. A decisive naval action near Gibraltar, in which the whole Spanish fleet was destroyed by the Dutch admiral Heemskerk (1607), in¬ duced the Spanish court to propose an armis¬ tice, which was concluded between Spinola and Maurice for 12 years (1609). Spinola was actively engaged during the Thirty Years' War; and in 1620 he conquered the Lower Palatinate, which had fallen into the hands of

the Protestant League. In 1621, the truce with Holland having terminated, he took Juliers, after which he invaded Hol¬ land itself and laid siege to Bergen-op- Zoom ; but while besieging this place he found himself unexpectedly attacked at once by Mansfeld and Maurice, and was obliged to raise the siege. In 1624 he invested Breda, the gates of which were opened to him after a 10 months' siege (May 1625). This was his last achievement. He was left without means or recognition in his last years, through political enmity. However, he died in harness at the siege of Casale.

SPINOZA, spe-no'za, Baruch (or in the Latinized form later adopted, Benedic- tus), Dutch philosopher: b. Amsterdam, 24 Nov. 1632; d. The Hague, 21 Feb. 1677. His parents belonged to a community of Jewish emigrants from Spain and Portugal who had been driven out of these countries by religious persecution and settled in Amsterdam. There the Jews soon took an important place in the commercial life of the city, though maintaining their own language, religion and distinct social life. Spinoza was carefully educated by the rabbis of his own people in Hebrew theology and literature, including, of course, the Tal¬ mud, and also the more modern commentaries of Maimonides (q.v.) and Ibn Ezra. He was also sent to the Latin school of Van den Ende, an Amsterdam physician, where he received

his first impulse to the study of Descartes' philosophy and his first lessons in the principles of natural science. After he grew to man¬ hood, suspicions of his orthodoxy were raised and after several attempts to induce him to con¬ form to the faith of the synagogue had failed, he was expelled from the Jewish community in 1656. Henceforth he provided for himself a slender but sufficient income by grinding and polishing lenses for optical instruments, while devoting the remainder ,of his time to the development of his own philosophical ideas. He lived first in the country near Amsterdam, at Rijnsburg, near Leyden, then at Vaorburg, a suburb of The Hague, and from 1670 to the end of his life in The Hague itself. Secluded as was his life, he was recog¬ nized both as a skilful optician and as an origi¬ nal philosophical thinker. He communicated his ideas to a club of young men at Amster¬ dam — the short tractate entitled (De Deo et homine ejusque fecilitate,* which was discov¬ ered in manuscript form in 1852, being probably written for this purpose. Spinoza also main¬ tained relations with the literary and scientific circle at The Hague, and corresponded with some of the noted scientific men of his

time. He was also a personal friend of Jan De Witt (q.v.) and is said to have been con¬ sulted by him on affairs of state. In 1673 he refused a chair of philosophy which had been offered him in the University of Heidelberg, feeling that it would be impossible to obtain in this position complete freedom for the ex¬ pression of his views. He maintained his in¬ dependence to the last, living in humble cir¬ cumstances and devoting himself to the life of thought which he had chosen. He died in his 44th year.

Spinoza's first work was an application of the geometrical method to the first two parts of Descartes (Prmciples) — (Renati Descartes Principiorum philosophise, Pars I et II more geometrico demonstratae) (1661). In 1670 ap¬ peared his (Tractatus Theologico-PoliticusP which is described on the title page as acon- taining some discussions to show that the lib¬ erty of philosophizing may be allowed without and danger to piety or the safety of the state; but that the loss of the public peace and even of piety follows when this is taken away.® The main thesis of the work is that ((in a free commonwealth it should be lawful for every man to think what he will and to speak what he thinks.® To support this he undertakes an investigation of the principles iof Scriptural in¬ terpretation and the relation of theology and philosophy, ˆanticipating,® as Sir Frederick Pollock has remarked, <(with wonderful grasp and insight, almost every principle and not a few of the results of the school of historical criticism which has arisen within the last two or three generations.® This work aroused so much opposition in theological circles that Spinoza did not think it wise to publish the (Ethics, > his chief work, on its completion in 1675. This appeared in the year of his death in the (Opera Posthuma, *which also contained the < Political Tractate) and the (Tractate on the Improvement of the Understanding,* both unfinished, as well as a compendium of He¬ brew grammar, and selections from the cor¬ respondence.

Spinoza's philosophy, notwithstanding its severe scientific form, is based on ethical mo¬ tives, and has a decidedly practical character. What he sought through his life of lonely meditation was not knowledge as the satisfac¬ tion of mere intellectual curiosity, but rather knowledge of man's place in the universe as practical insight into the nature of his true and permanent good. In the (Improvement of the Understanding) we find an autobiographical ac¬ count of Spinoza's decision to choose the high¬ est end of life. After explaining the unsatis¬ factory nature of a life devoted to pleasure or honor -or riches, and the evils and disturbances to which such a life is subject, he says: <(A11 of these arise from the love of what is perish¬ able, such as the objects already mentioned. But love toward a thing eternal and infinite feeds the mind wholly with joy and is itself unmingled

with any sadness. Wherefore it is greatly to be desired and sought for with all our strength.® Moreover, ((whatsoever in the sciences does not serve to promote our (Object will have to be rejected as useless.® Neverthe¬ less, there is for Spinoza no opposition be¬ tween theory and practice ; for the knowledge of the systematic unity of all things, and of God as their source and essence, is itself the supreme good and blessedness for man. The highest good is realized only in and through the most complete knowledge.

In Spinoza's chief work, the <Ethics,) he at¬ tempted to deduce his results from certain fundamental conceptions by the employment of the method of geometry. He even adopted the external form of the Euclidian geometry, be¬ ginning each of the five parts into which the work is "divided with definitions, axioms and postulates, and advancing by demonstrating in a formal way a series of definite propositions. This geometrical form adds nothing to Spinoza's work, and is, indeed, in many re¬ spects a drawback, since it gives to his pro¬ found insights an appearance of artificality which tends to obscure their real meaning. But Spinoza, as Descartes before him, believed that mathematics furnished the universal type of true science, and he assumed that the ab¬ solute certainty, which was then generally regarded as essential to science, could only be attained by following the same method. As has already been remarked, however, the value of Spinoza's philosophy does not at all depend upon his use .of the mathematical method. What is most valuable in his system is not the result of his formal deductions, but of his genius as shown through his wonderful speculative intuition and keen psychological analysis.

In spite of the scholastic terminology in which Spinoza's views are often expressed, his system grew out of the modern scientific con¬ ceptions which he had learned mainly from Descartes (q.v.). He was also influenced by Giordano Bruno (q.v.), and by his studies in Hebrew theology and philosophy. Spinoza's fundamental thought is that of the unity of the different forms of existence in one all-em¬ bracing whole <or substance. There is but one substance, one absolutely independent being, which include all things and determines itself and all things through the necessity of its own nature. Spinoza calls this one substance God;

but his conception is very different from the or¬ dinary theological

one. In the first place the world is not regarded as dependent on the will of God, but as the necessary result of his nature or essence. Everything necessarily fol¬ lows from the nature of God, just as the prop¬ erties of the triangle or circle follow, from the nature of these figures. The bond which necessarily unites all of the parts of the uni¬ verse to the common centre or substance, and thus to each other, is not causal in the usual sense of that relation, hut rather logical. God is the underlying ground from whose nature or essence all things proceed in a regular and uniform order. God does not act as a man acts by setting plans or purposes before him¬ self and then proceeding to realize them, nor has he emotions or passions like men which move him now in this direction and now in that. Spinoza satirizes unsparingly the ex¬ ternal teleology and anthropomorphism of his day which sought to explain the course of natural events by referring them to special ends and purposes on the part of God. For Spinoza, God is not transcendent, existing apart from nature, but nature itself as an active self-determining process (natura natn- rans) is God. The one infinite substance, or God, has an infinite number of attributes, but it is known to us solely through the two attri¬ butes of extension and thought. Thus every physical thing is a mode of extension, and every idea a mode of the attribute of thought. The physical and the psychical are not inde¬ pendent substances, as Descartes supposed, nor is there any interaction between them. The truth is, that physical things and thoughts are modes which express the nature of the one sub¬ stance, but each side expresses this nature in terms of a different attribute. Yet though there is no interaction there is an exact cor¬ respondence between the modes of extension and the modes of thought : ((the order and connection of ideas is the same as the order and connection of things.® This is Spinoza's statement of the Parallelism (q.v.) of mind and body, a doctrine which he was the first to maintain. He develops this theory in some de¬ tail, defining the mind as the <(idea of the body,® and emphasizing the correlation be¬ tween the perfection and development of the body and the effectiveness and sanity of the mind.

It is with the problem of man's place in nature — his relation to God or the total sys¬ tem of things, and the possibility of his free¬ dom — that Spinoza is most directly con¬ cerned. Here he shows that the possibility of man's freedom depends upon his first recog¬ nizing that he is a part of nature, and that his mind, like everything else, is subject to uni¬ form natural laws. Man forms no "kingdom within a kingdom®; it is not contingency or some strange power of free will which governs his mental experiences; but here as elsewhere all takes place according to law and necessity. "Nature's laws and ordinances

whereby all things come to pass and change from one fo/m to another are everywhere and always the same. There should, therefore, be one and the same method .of understanding the nature of all things whatsoever, viz., through nature's universal laws and rules.® Accordingly he VOL. 25 — 27

proceeds : "I shall consider human actions and desires in exactly the same manner as though I were concerned with lines, planes and solids.® From this standpoint he gives a scientific ac¬ count of the origin and nature of the emotions, showing how they necessarily arise from certain assignable causes, and how their intensity de¬ pends on definite natural conditions. The various emotions are all found to be com¬ pounds of the primary states, pleasure, pain and desire. But this reduction of the emo¬ tions to law is only a preliminary step in Spinoza's treatment. To attain freedom, it is first necessary to recognize the bondage of man, the fixed determination of the emotions through natural laws. But just as knowledge is power in regard to external nature, so we can free ourselves from the emotions by under¬ standing their laws. The mind is, after all, something more than a series of passive states. Its essence consists in an effort to preserve its own being to promote' its own good. And in carrying out this purpose it finds that nothing is so serviceable as knowledge. Through knowledge it is possible to free man from the bondage of the emotions. An emotion when understood becomes transformed and ceases to be a mere state of passivity. Moreover, when the conditions of an emotion are understood, it is possible to arrange and associate the various emotions in such a way as to strengthen and promote the occurrence of those that are desir¬ able, and to weaken and repress those which are hurtful. The highest kind of knowledge for Spinoza is not scientific reason, but intu¬ ition, the direct insight that all things follow necessarily from the nature of God and hence form one system. To see all things, not as a series of events in time, but in their necessary logical relation to God, is what Spinoza calls viewing the world under the form of eternity (sub specie cetcrnitatis) . And this highest knowledge gives rise to the intellectual love to¬ ward God (amor intellectualis) which is the highest good or blessedness for man. It is through the strength of this emotion, which is not a passion but the highest activity of mind, that the other emotions are mose successfully governed and transformed. This intellectual love toward God enables the mind to renounce entirely all finite or personal desires, as well as all envy and jealousy. (<He that loves God does not demand that God should love him in return®; he demands nothing f.or himself, but acquiesces completely in the order of the uni¬ verse. Moreover, Spinoza argues that since this knowledge and the

intellectual love to which it gives rise are eternal, the mind which experiences these must have something in it which is eternal and which cannot be destroyed with the body. Scholars, however, maintain that it is still doubtful whether Spinoza pro¬ nounces in favor of individual immortality. An interesting feature of Spinoza's philosophy is the close relation which he always recognizes between the individual and society. It is no merely individual good for which he was seek¬ ing but one which as ((many others as possible® might share with him. In numerous passages he approached very near to the modern con¬ ception of the individual as standing in an organic relation to society.

For about a century after Spinoza's death

his phiLosophy was wholly neglected, and his name used by both orthodox and unorthodox writers in a depreciatory way as that of an utter atheist who deserved little attention. Lessing was the first thinker who knew and appreciated Spinoza, and a controversy after his death between Mendelssohn and Jacobi as to Lessing's real opinions did much to spread a knowledge of the system in Germany. Goethe was deeply influenced by Spinoza and helped to awaken interest in the Spinozistic philosophy. Thus, since the beginning of the 19th century, Spinoza's ideas have affected in important ways the development of modern thought. It was Novalis who called Spinoza (<The God-intoxi¬ cated man.®

Bibliography. — The standard edition of Spinoza's works is that edited by Van Vloten and Land (2 vols., 1882-83 ; also in a cheaper form, 3 vols., 1895). The chief works have been translated into English by R. H. M. Elwes (Bohn Library, 2 vols.). The (Ethics) and the improvement of the Understanding are also translated by W. H. White and Miss A. Stiling (2d ed., 1899), and the (Ethics) in part by George S. Fullerton in (The Philosophy of Spinoza) (2d ed., 1894). The best general com¬ mentary in English is Sir F. Pollock's (Spinoza: His Life and Philosophy) (2d ed., 1899). Con¬ sult also Caird, <Spinoza) (Edinburgh,

1888) ; Joachim, H. H., (A Study of the Ethics .of Spinoza' (Oxford 1901) ; Duff, R. A.,

(Spinoza's Political and Ethical Philospohy) (Glasgow 1903).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

SPIRACLES, the apertures on the sides of the body in insects, centipedes, spiders, etc., through which air is admitted to the breathing organs or trachae. See Insects.

SPIR2EA, a genus of deciduous shrubs of the order Rosacece. The species (about 50) are natives of the northern temperate zone; but, being widely popular in shrubberies, an enor¬ mous number of varieties have been produced, and the plants have been introduced into south¬ ern temperate countries, where some have es¬ caped from cultivation. They are medium or small shrubs with usually little leaves and corymbs, panicles or umbels of white, pink or light crimson flowers, which appear either in profusion for a short time in spring or more sparsely and for a longer period during sum¬ mer. The various species and varieties are adapted to a wide range of soils and situations, from swamp to rocky hillside and from the full glare of the sun to shade. Consult Baily, (Cyclopedia of American Horticulture' (New York 1900-02).

SPIRAL, a curve, line or thing that winds about a centre, while also receding from it. The turns or whorls may be flat in one plane, or may rise spire-like, hence the name. Less accurately one that winds around a central axis, while advancing, as in a familiar form of coiled spring; properly this is helical. In geometry the term is confined to a curve in a plane that winds continuously around a centre with stead¬ ily increasing radius vector ; also a single com¬ plete turn in such a continuous spiral. A so- called spiral that departs from a plane is the loxodrome. The mechanics of spirals have

proved of great interest in logarithms. See Curves, Higher Plane; Spring.

SPIRE, a sharply-pointed, tapering roof, most commonly the roof of a tower, though a light structure often set at the crossing of the roof in a cruciform church is also called a spire (French, fleche), the term covering the lantern with upright sides from which the pointed roof swings. The term is hardly ap¬ plied to a roof of which the slope is less than an angle of 60° with the horizon and even a slope of that acuteness makes a blunt spire.

Spires may be formed of wood and covered with wood or metal or even tiles, exactly like an ordinary roof of lower pitch, but the aim has

always been to build the whole of stone and top it with a cross or a final of leafage or both.

The spire is associated with mediaeval build¬ ing in the west of Europe, and its greatest de¬ velopment is of the years 1180 to 1500 a.d. In later Gothic art the spire loses its character of roof in that its surfaces are occupied wiih open or pierced tracery, as in the German churches of Freiburg in Baden and Thann in Alsatia f Alsace), and the cathedral of Burgos in Spain. In the granite-building country of Brittany this decoration is common, though the openings are smaller and the spires look more massive. The latest development is that seen in Antwerp Ca¬ thedral and in Strassburg Cathedral. At Strass- burg the roof lines have disappeared and the spire is a cage of sloping bars of stone which carry an indefinitely great number of pinnacles; and in Antwerp a series of vertically-walled lanterns are surrounded by bold pinnacles which are themselves spirelets of considerable size, the whole tapering to the cross. Other spires of the same 15th century and 16th century Gothic have pierced galleries or open stories of arched work alternating with the solid and roof-like slope of the spire. Such a one is the famous north tower of the Cathedral of Chartres.

The highest spires existing are those of Co¬ logne Cathedral (modern from ancient design), 511 feet from pavement to top of cross; the Church of Saint Nicholas at Hamburg, 475 feet six inches; Strassburg Cathedral, 465 feet; Church of Saint Martin at Landshut in Lower Bavaria, 462 feet ; the Church of Saint Stephen, Vienna, 450 feet ; Antwerp Cathedral, 407 feet six inches; Salisbury Cathedral, 400 feet. Struc¬ tures in metal are not considered here.

Russell Sturgis.

SPIRES, spirz (German Speyer, spi'er), Germany, in Bavaria, capital of the district of Pfalz, at the confluence of the Rhine and the Speierbach, 10 miles southwest of Mannheim. It is an important government town, ancient royal residence, religious centre of various de¬ nominations and the seat of the German Diet. The chief glory of the town is its cathedral (1030) begun by Conrad and completed by Henry IV (1061). It has been embellished by frescoes and statuary, and the ashes of eight German sovereigns repose within its walls. Other interesting buildings are the Retscher palace, the consistory, the gymnasium, a Roman Catholic seminary and other institutions, hos¬ pital, orphanage, a real-school and a museum containing German antiquities. The important industrial works include foundries, cotton mills, breweries; the manufacture of machinery, to¬ bacco and leather goods. The Reformers here

first protested 0529) against existing Catholic dogmas and institutions. Pop. 21,856.

SPIRIT, Holy. See Holy Ghost.

SPIRIT-DUCK. See Buffel-head.

SPIRIT FRESCO. See Painting, Tech¬ nique of.

SPIRIT OF LAWS, The (L'Esprit des

Lois). (<Montesquieu,® says Professor Gid- dings, <(converted social philosophy into de¬ scriptive social science.® An eminent modern sociologist thus concisely summarizes the fun¬ damental contribution of one of the most prom¬ inent participants in that general intellectual movement which brought about the transforma¬ tion of social philosophy into the modern science of sociology. The work which right¬ fully entitled Montesquieu to this important distinction was <The Spirit of Laws,* which appeared in 1748.

(The Spirit of Laws *has traditionally been regarded as primarily, if not entirely, a contribution to the literature of political theory and, more specifically, as the work which gave the doctrine of the (<separation of powers® its vital impulse and made it both a persistent dogma in political science and a leading prin¬ ciple in modern constitutions. Viewed in its broadest aspects, however, this major work of Montesquieu was more than the instrument for the promulgation of a single dogma in political theory; it was even more than an extensive treatise on general political theory; it was, in fact, a most significant and influential contribu¬ tion to the literature and methodology of gen¬ eral social science. (The Spirit of Laws* was differentiated from the contemporary works on political theory not only by the profundity and scope of its inquiry, but also through the method by which it approached the problem of the analysis of the chief factors in social and political organizations. It was the first great inductive and objective analysis of social and political processes since Aristotle's (Politics, J written some 2,000 years before. There had been plenty of semi-descriptive material in the works of earlier and contemporary writers, but this had been mainly concerned with scenes and episodes from biblical and classical mythology and history, in which the presentation of the exploits of Nimrod, Seth and Enoch and the heroes of Homer and Livy had been much more conspicuous than an analysis of contem¬ porary societies. Montesquieu reflected the in¬

fluence of the geographic discoveries of the two previous centuries by virtue of the fact that he turned his attention to the many and varied types of existing societies and sought his ((men of nature® among living savages rather than among the mythical personages who had ex¬ hibited their characteristics in the period before the <(f all of man.® (The Spirit of Laws,* then, was as truly the point of departure for modern descriptive sociology as was Hume's (Treatise of Human Nature) for psychological sociology. By emphasizing the fact that wide observation must precede generalization, he gave a practi¬ cal application in social science to the general methodological principles which had been ad¬ vanced in natural science by Francis Bacon. This constitutes the enduring contribution of Montesquieu to the history of social science and political theory and it will remain unim¬

paired long after his specific doctrines have become obsolete and forgotten.

Such is the general significance of the work of Montesquieu as set forth in (The Spirit of Laws *; his specific contributions may now be summarized. Among the more important of these was his conception of the origin and nature of law. Comte, in describing the signifi¬ cance of (The Spirit of Laws,* said on this point : ((The great strength of this memorable work appears to me to lie in its tendency to regard political phenomena as subject to in¬ variable laws like all other phenomena.® Mon¬ tesquieu's definition of law as <(the necessary relations springing out of the nature of things® was truly epoch-making, being in all probabil¬ ity the first correct statement of what is now generally accepted as an accurate definition of a sociological law. From the different types of relationships there proceeded the various types of laws, as, for example, political law grows out of the relations of the governed and gov¬ erning in any political community; and civil law out of the everyday relations between the individual citizens in the community. Laws, springing thus out of basic relationships, must be related to the particular circumstances of a given society and its environing conditions. Laws are, therefore, natural and beneficial just in proportion as this perfect adaptability between a law and its social environment is attained. Finally, all types of laws are closely inter¬ related and should be consistent in their totality. The highest achievement of human intelligence is to secure this consistency of all types of laws and to prevent the encroachment of any type upon the domain of another. The entirety of these relationships — of social groups and in¬ dividuals giving rise to human laws ; of laws to the social and physical environment, and of the different types of laws to each other, con¬ stitutes the spirit of laws and Montesquieu's main task was to trace in some detail the nature and results of these

relationships.

Following the general premises laid down above, another highly significant proposition advanced by Montesquieu, in which he was thoroughly in accord with modern social theory, was that in which he relinquished the contem¬ porary absolutism regarding social and political organization and maintained the then novel doctrine of the relativity of the excellence of institutions. The excellence and effectiveness of laws and of social and political institutions he held to be dependent not upon any intrinsic superiority, but upon their specific adaptability to the particular social environment in which they are found or in which they may be in¬ tended for application. Now the social en¬ vironment, according to Montesquieu, is essen¬ tially determined by the historical conditions of the development of the particular society and by the surrounding physical environment. In accordance with this type of reasoning he endeavored to discover and indicate the relative excellence of the different forms of law, politi¬ cal organization and social institutions among the diverse peoples of the earth according to their relation to the various conditions of the physical environment and the resulting national of social and political phenomena, and he pre¬ sented what was by far the most complete and accurate interpretation of social processes and political institutions in terms of environmental

influences that had been developed by any traits and customs. This led him into the most comprehensive inductive and descriptive study writing. His treatment of the significance of climatic conditions unon mankind was especially exhaustive and has had a wide influence. But while Montesquieu's studies along this line gave an added impetus to the development of that school of "environmentalists® which has been most notably represented by Ritter, Buckle, Ratzel, Semple and Huntington, his theories were by no means original. As Dedieu has re¬ cently shown in a most convincing manner, Montesquieu took over his environmental theories bodily from the English physician Arbuthnot's (Essays on the Effects of Air on Human Bodies5 and drew his descriptive ma¬ terial almost wholly from Chardin's (Travels in Persia.5

While Montesquieu has received the respect¬ ful attention of

sociological writers chiefly on account of his emphasis upon the element of descriptive analysis and his environmental theories, his past reputation and his present notoriety among political theorists has been founded upon his famous doctrine of the sep¬ aration of governmental powers as the chief safeguard of political liberty. This theory, again, was not original as it was taken almost directly from Locke's differentiation of the powers of government into the legislative, executive and federative branches; but Mon¬ tesquieu brought his analysis more into har¬ mony with modern political terminology, and his treatment was so vigorous and elaborate that the doctrine has become inseparably con¬ nected with his name. Accepting this tripartite division of governmental powers as a logical and fundamental necessity, Montesquieu argued that each function must be exercised by a sep¬ arate and independent organ if any guarantee of political liberty wˆs to be secured by the cit¬ izens. This famous doctrine was deeply ab¬ sorbed by the framers of the Constitution of the United States, and it was given a more impor¬ tant place in that document than any other single dogma of political science. Famous and influential as this theory may have been, how¬ ever, it is now generally recognized to be his¬ torically inaccurate and practically unworkable. Montesquieu derived his dogma from a super¬ ficial study of the externals of the English Con¬ stitution, while, in reality, by 1748 the totality of governmental powers in England had be¬ come absorbed by the single branch of the Parliament and the Cabinet, viewed as a com¬ mittee of the Parliament. Not only was it thus, in its origin and derivation, the result of a misinterpretation, but, as Professors Ford, Goodnow and Powell have so clearly pointed out, it has proved unworkable in practice : and most of the advances which the United States has made in effective national administration since 1787 been effected by gradually break¬ ing away from the practical application of the doctrine of the separation and independence of governmental powers.

One more specific contribution made through the (Spirit of Laws) should be mentioned and that is the calm and judicious criticism of the cruel, barbarous and irrational criminal proce¬ dure of the time and the moderate and en¬ lightened suggestions offered as to the methods whereby it could be reformed. It was from the

treatment of this subject in the (Persian Let¬ ters } and the (Spirit of Laws> that Beccaria received his inspiration for his epoch-making work on Crimes and Punishments.5 In at¬ tempting, by way of summary, to differentiate the elements of permanent value in Montes¬ quieu's work from what is transitory or al¬ ready antiquated or discredited, it seems safe to hold that he will be accorded a permanent

and honorable place in the history of the de¬ velopment of social science and political theory on account of the vigor and priority of his insistence upon the doctrine of the relativity of the excellence of institutions according to their adaptability to the characteristics of a given population and upon the proposition that sociological and political generalizations must proceed from a wide observation of concrete facts and conditions and not from a priori as¬ sumptions of the deductive philosopher. These will ensure him the respectful consideration of the student of the history of social science long after his unfortunate insistence upon the doctrine of the separation of governmental powers has been forgiven if not forgotten. The standard edition of Montesquieu's works is that by E. Laboulaye (7 vols., Paris 1875-79). Nugent's translation of (The Spirit of Laws5 has acquired something of the reputation of a classic. The best analysis of the doctrines of Montesquieu in English is to be found in chap¬ ter XII of W. A. Dunning's <History of Politi¬ cal Theories from Luther to Montesquieu.5 More extended treatments are to be found in Janet's (Histoire de la science politique5 (Vol. II, pp. 322-399) ; in Franck's (Reformateurs et publicistes de l'Europe5 (Vol. Ill, pp. 133— 283), and in Dedieu's (Montesquieu et la tra¬ dition politique anglaise en France.5 Montes¬ quieu's contributions to history are analyzed and appraised by Fueter, <Histoire de l'his- toriographie moderne5 (pp. 475-478), and in Flint's (History of the Philosophy of History5

(pp. 262-280).

Harry Elmer Barnes,

Professor of History, The New School for Social Research, New York City.

SPIRIT LEVEL, an instrument used by surveyors and others for determining a level or plane parallel to the horizon and also the relative heights of two or more stations. It consists of a glass tube nearly filled with alco¬ hol, preferably colored. The remaining space in the tube is a bubble of air and this occupies a position exactly in the middle of the tube when the latter is perfectly horizontal. The tube is mounted on a wooden bar, which is laid on a beam or other object to be tested; or it is mounted on a telescope or theodolite and forms the means of bringing these instruments to a level, the slightest deviation from the hori¬ zontal position being indicated by the bubble rising toward the higher end of the tube. The spirit level quadrant is used for taking alti¬ tudes.

SPIRIT PLANT, called the Holy Ghost

Flower, an orchidaceous plant (Peristeria elata) of Central America, known also as the dove- plant, from the resemblance of the united sta¬ mens and pistil of the flower to a dove hover¬ ing with expanded wings, somewhat like the conventional dove seen in artistic representa¬ tions of the Holy Ghost. It has a spike of al-

most globose, sweet-scented flowers of a creamy white, dotted with lilac on the base of the lip.

SPIRITUAL CORPORATIONS, in the

law of England, corporations, the members of which are ˆspiritual persons® or clergymen, in¬ corporated for the furtherance of religion and perpetuation of the rights of the Church. The laws of the States of the American Union do not recognize any difference between ecclesiasti¬ cal (or spiritual) and other corporations; the same statutes apply to both kinds of corpora¬ tions.

SPIRITUAL EXERCISES (Zjercicios Espirituales) . The Jesuits have occupied a prominent place in the intellectual and spiritual life of the world since their foundation nearly 400 years ago. Their founder, Saint Ignatius Loyola, as well as the Jesuits themselves have always attributed whatever of influence they had to the formation of their characters by the Spiritual Exercises. *This is a little volume which contains the result of Ignatius' own ex¬ periences in the spiritual life. The title given it by its author was ˆSpiritual Exercises To Conquer Oneself and Regulate One's Life and to Avoid Coming to a Determination Through any Inordinate Affection.* He wrote it in Spanish, but made a translation into Latin, and it is this which is usually referred to as the original. The book is really a manual for four weeks of meditations on the significance of life and how it should be lived. The four weeks have been summed up ibriefly in the words (1) deformata reformare; (2) reformata con- formare; (3) conformata confirmare ; (4) con- firmata transformare ; that is (1) to reform what is deformed by sin; (2) to make what is thus reformed conform to the Divine model, Christ; (3) to strengthen what is thus con¬ formed; (4) to transform by love the firmly made resolutions. The first week of the Exer¬ cises is called <(the purgative way® because it dwells on cleansing from sin; the second and third are called <(the illuminative way® because they are devoted to the intensive contemplation of the light cast upon life by the example of Christ's life; finally there is <(the unitive way® by

which intimate union with Christ is sought. So far from being a merely conventional spirit¬ ual book, the (Spiritual Exercises * has been set beside the Umitation of Christ *by many com¬ petent critics. Janssen the German historian declared that <(no other ascetic work may be compared to it.® The French positivist, Lafitte, in a lecture delivered at the College de France, declared <(These exercises are to my mind a real masterpiece of political and moral wisdom and merit careful study.® It is not a book to read merely, but to live for the periods indi¬ cated. It is the basis of retreats for religious and seculars throughout the world, and serious non-Catholics often turn to it for direction in spiritual exercises. Consult Clare, (The Science of the Spiritual Life According to the Spiritual Exercises* (New York 1896) ; Diertins, (His- toria Exercitiorum spiritualium *(Rome 1732) ; Roothaan, (Exercitia Spiritualia* (Rome 1835; The author was General of the Jesuits and his notes are illuminating) ; Shipley, Spiritual Ex- ercises) (London 1870) ; Bouhours, H.ife of Saint Ignatius) (trans. by John Dryden, Lon¬ don 1686).

James J. Walsh, M.D.

SPIRITUALISM, the movement, based on belief in the genuine character of Spiritualistic phenomena, that originated in 1848, in the ex¬ periences of the Fox family of Hydes- ville, N. Y., and which within a few years spread over the United States and England and later over the civilized world. Also the philos¬ ophy or religion based on communication with spirits or discarnate human intelligence, through the process of mediumship. The Spiritualists had in the United States, in 1918, about 200 churches and a membership of about 600,000. Within recent years many distinguished people have declared their conviction that human beings not only continue to live after <(death,® so-called, but that communication with them is more or less common. Among such may be cited William E. Gladstone, A. J. Balfour, Oliver Lodge, William Crookes, Henri Berg¬ son, Caesare Lombroso, Camille Flammarion, Schiaparelli, Conan Doyle, A. R. Wallace, Wil¬ liam James, J. H. Hyslop, J. J. Thomson, Alfred Tennyson, Frederick Tennyson, John Ruskin and R. L. Stevenson. Many others might be added, but these are sufficient to show the dignity of the intelligences that accept Spirit¬ ualism as a fact. On the other hand, some hundreds of books have been published and innumerable magazine and newspaper articles printed, advertising and describing the frauds and humbugs of Spiritualism and many of these have come from men of high intelligence and culture, evidently wholly convinced that they were doing the world a service in exposing fraud. In this conflicting state of affairs it is necessary for an impartial statement to in¬ clude all sides of the case, without effort to prejudice the reader.

History of the Movement. — In 1848 the home of J. D. Fox of Hydesville, Wayne County, N. Y., was the scene of Wrap¬ pings® and various noises, accredited to spiritual agencies. The house was visited by a great many people, most of whom came away con¬ vinced that a supernatural agency was at work. Later the two daughters of this family, Kate and Margaret, moved to Rochester, where they became still more famous as the Fox sisters, being known by this name long after they mar¬ ried. These young women developed into what are now known as Spiritualist mediums, and produced or assisted in a variety of phenomena; went into trances and interviewed dead rela¬ tives for literally thousands of people and also brought messages from distinguished great men, in large numbers. Next appeared Andrew Jackson Davis, of Orange County, N. Y., who, when a very young man of moderate edu¬ cation, began to go into trances and received a great deal of scientific and philosophical infor¬ mation, which he put into books and lectures. His book Principles of Nature,* written while he was in his 'teens, passed through 34 editions. He was in great demand as a lecturer for many years and later started a publishing house in Boston to publish his own and other Spirit¬ ualistic books. Hudson Tuttle and Cora V. Richmond also developed as inspirational lecturers and writers, and their works are to be found in all large libraries. ' When only 17 Miss Richmond delivered remarkable addresses in a state of semi-trance, which it was admitted by all she was incompetent to produce by her own mentality. The movement spread into Eng-

land, two of the most active being D. D. Home, a remarkable medium, and W. Stainton Moses, an Episcopal clergyman and Oxonian. These two lights startled England for several years. At Home's seances he used to pick up live coals from the fire by the handful and carry them around without being burned. Many of his pupils were trained to do the same thing, and he was even known to wash his face in the flames unharmed. And these things were testified to by numerous and intelligent wit¬ nesses. Moses started a publication in London, Light, about 1872, and working with his friend, Mrs. Speer, gave many marvelous exhibitions, developing cabinet tricks, automatic writing, slate-writing, table-tipping, etc. Slade, Bishop and a host of others gave similar exhibitions in the United States, while in France, Cahagnat, Reisenbuch and DuPotet made investigations and gave seances. The Banner of Light was published in Boston as the principal American organ of the cult and Spiritualist societies sprang up

everywhere and the work developed into a religion, which at its height had nearly 2,000 churches or assemblies in America.

Then came a period of investigation and exposure. Mediumship and trance exhibitions, slate-writing, etc., proved so profitable that many sleight-of-hand performers, legerdemain artists and clever people engaged in it for profit, and it seemed impossible to distinguish the genuine from the impositions. There was so much discussion and dispute that in 1882 the Psychical Research Society was formed in Lon¬ don, and a few years later an American branch was organized. A large number of distinguished scientific men participated in this work, which many thought would result in demonstrating that Spiritualism was humbug and fraud from beginning to end. The American branch as¬ sisted the University of Pennsylvania in form¬ ing the Seybert Commission to investigate the phenomena of Spiritualism and Mediumship, and they promptly exposed a number of fraud¬ ulent mediums and their work, presented a <Report) and dissolved. This was far from satisfactory, as it simply showed that a num¬ ber of imitators of Spiritualist methods had hoaxed a large number of people. It left un¬ solved the question whether others were not genuine and whether there were not definite natural laws underlying the phenomena. So the Psychical Research Society continued its work and has now been active for more than 35 years and published voluminous reports or proceedings. Several of its prominent members have committed themselves to a definite con¬ viction as to the truth of many of the phenom¬ ena and the genuineness of communications with intelligences called dead, but living on the higher planes. Their most exhaustive experi¬ ments were made with Eusapia Paladino and Leonora Piper, and for particulars of their work the reader is referred to Psychical Re¬ search in this Encyclopedia.

Mediumship and Its Methods. — Spiritual¬ ism is based on mediumship, or the use of a human being as a means of communication be¬ tween discarnate intelligences (or dead people) and living persons. These mediums are usually persons of a nervous temperament, and they al¬ ways must be passive to develop what is called the ˆpower,® but which might be better de¬

scribed as the ability to interpret by submission of the will and voluntary senses. It is a sub¬ jective psychic process, and very wearing and trying upon the nervous system of the medium, and it has been contended that the disposition of mediums to impose upon the public was largely due to the fact that the work so ex¬ hausted them that they were unable to keep up with the demands of their sitters, and so <(faked® interviews with the dead, to give them satisfaction.

Impressional or inspirational mediums are those who do not go into a full trance, but are quite conscious of their sur¬ roundings, and who, when under this slight control, make addresses or write that which is impressed on their minds from the <(other side® of life. This has been done so frequently, and such wise and learned utterances have at times come so fluently from mediums of moder¬ ate education, that the fact of their being more or less inspired by intelligences of greater abil¬ ity than they themselves possess, has been widely admitted. The automatic writing form of mediumship is akin to this. The medium takes a pen or pencil and waits until some influence seizes his or her hand, and writing proceeds. The composition may be good, bad or indiffer¬ ent. But since such a reliable man of world¬ wide fame as William T. Stead, in his (Letters from Julia, > admits his hand was controlled and that the letters came from another intelli¬ gence; and so gifted an authoress as Elsa Barker has given us (Letters of a Living Dead Man,> and the son of that dead man has recog¬ nized his father from the information, and some hundreds of other really valuable books have been produced in this way, the public is becoming less skeptical. The planchette and ouija board furnish another means of mediumship, the method being described under those terms. Trance mediumship is of several varieties; its leading characteristic is that the medium goes into an artificial sleep, similar to that into which the subject of a hypnotist is thrown. In fact all the conditions of hypnotism and trance mediumship appear to be identical except that the control in one case is a dis¬ carnate spirit and in the other a living hyp¬ notist. This phase of the subject is very fully covered in F. Huntley's (The Great Psycho¬ logical Crimed (See also Hypnotism in this Encyclopedia). The medium in a trance usually informs the sitters around that a certain in¬ dividual is present, and the sitters are privileged to ask questions which the medium will answer for the spirit. The evidence that such testi¬ mony is not faked is that in a vast number of instances facts have been told of which the medium could have known nothing, and medi¬ ums have been known to speak in languages of which they were ignorant; and in many other ways the testimony has been held to transcend the ability of the medium to manu¬ facture. Materializing mediums are rare, and this phase of mediumship has been most ques¬ tioned; still there are so many instances well attested that it is hard to discredit them. A state of darkness or near-darkness is insisted on, and portions of human bodies, or an entire individual will be materialized and presented to the view of the audience, sometimes walking among them, and touching some of them, as well as engaging in more or less conversation.

It has been explained that this is accomplished by the medium's control, who draws upon the medium and the sitters for magnetism, and a certain amount of material matter, and builds this about a spirit form so that such spirit form is rendered visible. For the reality or non¬ reality of this phenomena the reader is referred to the bibliography at the close of this article. The subject is so disputed, and so difficult of proof, that it cannot be discussed at length here with profit. In addition to the foregoing, there are mediums who have practised a variety of cabinet tricks, as of speaking through trumpets, playing musical instruments, etc., while securely tied within a dark cabinet on the stage, the instrument being in full view of the audience and seemingly sounded without human agency. There is also a form of mediumship called (<table tipping® which was very popular in Eng¬ land in the early days of the Spiritualist move¬ ment. Articles of furniture would be made to move about with no visible person or attach¬ ment. This seems to have been a form of levitation and this is fully discussed under that word.

Theories, Opinions and Beliefs. — Spirit¬ ualism is regarded from four different view¬ points by as many classes of observers. First, are those who are easily convinced of the reality of the communications with the so-called dead, who consider practically all mediums honest, to whom the philosophy has become a religion, and who derive a great deal of com¬ fort from attending seances and meetings and getting messages mostly to the effect that their loved ones are well and happy. These are open and avowed Spiritualists, who resent any imputation as to the accuracy of the phenomena. Second, come those who believe the phenomena are produced wholly by trickery, legerdemain and magic, and constitute a great psychic fraud on the public. As a sub-class to these are a few who believe that ((if there is anything in it, it must be the work of the devil or his subordi¬ nates.® Third, are those who admit the genuine¬ ness of the phenomena (when not faked), but who contend that such communications only put sitters in touch with the lowest and least desirable class of spirits, with the ignorant, immoral and undeveloped spirits, this being why so many American Indian spirits appear. Em¬ blematic of this class is Ruskin, who is quoted as saying that ((Having learned through Spir¬ itualism that there is another life, I have no farther use for it.® Fourth, comes those who hold that the phenomena so widely exhibited is sometimes produced by trickery and sometimes by telepathic suggestion, by clairvoyance, telepathy and natural powers not wholly understood.

Some of this class, like Sir Oliver Lodge (q.v.), have come out openly and admit their conviction of the absolute proof of intelligent communication with disembodied spirits ; and others, like the late William James (q.v.), are inclined to think that the phenomena, which they admit, may be largely the reflex action of their own minds or the minds of others on the earth plane. It is this fourth class who largely constitute the members and followers of the Society for Psy¬ chical Research. That deep thinker and ex¬ plainer of Darwin's theories of Evolution, Alfred Russel Wallace, said in Chambers' Encyclopaedia, <(Spiritualism has grown and

spread continually till, in spite of ridicule, mis¬ representation and persecution, it has gained converts in every civilized portion of the globe.® Sir Oliver Lodge has written: «I tell you with all the strength and conviction I can utter that we do persist, that people over there still take an interest in what is going on here ; that they still help us and know far more about things than we do and are able from time to time to communicate with us.®

Conclusions. — The conclusions of the higher intelligences who have expressed them¬ selves as being convinced of the reality of Spiritualism may be summed up as follows : Through mediumship is proved the continuity of life beyond the grave; it is no longer a religious dogma but a living fact. Spiritual in¬ telligences are as anxious to communicate with us as we with them, but the lower and grosser intelligence seem to be the nearest to us, and most likely to be heard from in communication, and they like to impersonate great individuals and personal deceased friends of those present. This is held to account for much of the <(infor- mation® that comes through, and is valueless. For many years the Banner of Light, published in Boston, was the leading organ of this cult. In common with other Spiritualist papers it has disappeared. They have apparently given way to Psychological publications and New Thought periodicals. While the great public includes a . vast number who are virtually Spiritualists, they are less and less known by that name, but are affiliated with New Thought, Mental Science, Theosophy, Oriental cults, Psychical Research and other modern movements.

Spiritualistic teaching is largely in accord with the writings in the Bible. The <(familiar spirits® were very much like some modern ones that come to mediums ; the witch of Endor, the ghost seen by Balaam, the experiences of many of the prophets and saints are paralleled in Spiritualism. Seers of all ages have testified to various things about the future life that are in accord with what comes to us through the seance room. Emmanuel Swedenborg (q.v.), one of the most modern

seers, has told in many volumes of his experiences in the heaven world, which he was able to see and visit without a medium. And this seems to be the distinction between a seer and a medium : the former sees clairvoyantly with his own eyes; the latter goes to sleep and takes the word of some intelligence on the spiritual plane, which may or may not represent truth.

National Spiritualists* Association. — This

was organized 28 Sept. 1893 and incorporated in the following November at Washington, D. C. It comprises about 1,000 active working socie¬ ties and 22 State associations; there are also 32 camp meeting associations and perhaps 900 irregular unorganized local societies and meet¬ ings of Spiritualists. They maintain an acad¬ emy equivalent to a seminary and include 200 churches with a membership of 600,000. There arc believed to be about 1,500,000 others attend¬ ant on their gatherings or sympathetic with their work. Their secretary states that there are about 1,500 public mediums in the country, and a much larger number of private mediums. They have 500 ordained ministers and $7,500,000 worth of church property. Their headquarters are at 600 Pennsylvania avenue, Washington, D. C.

Bibliography. — Consult the writings of Swedenborg, of Andrew Jackson Davis, Owen, Robert Dale, (The Debatable Land) (1865), and Hudson Tuttle; Crookes, Wm. Rsychic Force and Modern Spiritualism } (New York 1871) ; id., Researches into the Phenomena of Spiritualism *(1874) ; Wallace, A. R., (Miracles and Modern Spiritualism* (1881); Peebles, J. M., (Seers of the Ages, *and (Who Are These Spiritualists?*; Home, D. D., Rights and Shadows of Spiritualism * (1890) ; Moses, (Spirit Identity) (1879) ; Babbitt, E. D.. Religion as Revealed by the Material and Spiritual Uni- verse) (1895) ; Hull, (Encyclopedia of Biblical Spiritualism *; Flammarion, M., R'Inconnu* ; Huntley, F., (Boston 1907) ; Lombroso, C., (Hyp- notism et Spiritisme *(Paris 1910) ; Sinnett, A. P., (In the Next World* (1914) ; Barrett, Sir Wm., (On the Threshold of the Unseen *(Lon¬ don 1917) ; Lodge, Oliver, Raymond, or Life or Death) (1917) ; Randall, E. C., (The Dead Have Never Died) (1917) ; Doyle, A. Conan, Us Sir Oliver Lodge Right? My Conversion to Spiritualism* (London 1918) and the Pro¬ ceedings of the Psychical Research Society. See Hypnotism; Magic; Psychical Research; Psychology.

SPIROMETER, a contrivance for deter¬ mining the capacity of the human lungs. The instrument most commonly employed consists of an inverted chamber submerged in a water- bath like a miniature gas-holder. The breath is conducted by a flexible pipe and internal tube, so as to collect in the chamber, which rises in the water and is fitted with an index marking the number of cubic inches of air expired after a forced inspiration.

SPIRULA, a genus of diminutive cuttle¬ fishes representing the family Spirulidce, which is distinguished by the possession of an internal chambered shell of nacreous structure and dis- coidal form, the whorls of the shell being sep¬ arate, and the siphon piercing the septa on their ventral surfaces. S. peronii is a species which inhabits the open ocean, and its shells are occa¬ sionally cast ashore. See Cephalopoda.

SPITHEAD, England, a roadsted which separates the northern coast of the Isle of- Wight from the mainland near the entrance to Ports¬ mouth Harbor (q.v.). It is much frequented by the English fleet and protected by strong forts, and extends for about two miles along the southwest side of Spit Sand. It is so safe that it received the title of the “King’s bedchamber.” In 1797 it was a scene of a determined mutiny, the sailors striking for better pay, which they obtained.

SPITTA, Julius August Philipp, German musical historian : b. Wechold, Hanover, 27 Dec. 1841 ; d. Berlin, 13 April 1894. He was educated at the University of Gottingen. He engaged in teaching, meantime making a study of the history of music and musicians. The appearance of the first volume of his life of Bach (2 vols., 1873-82) brought him immediate recognition, and in 1875 he was appointed pro¬ fessor of musical history at the University of Berlin, and perpetual secretary to the Academy

of Arts there. He was also connected with the High School of Music from 1875, and from 1882 was a permanent director. He wrote the biographies of Bach and Schumann for the (Musikalische Vortrage,* as well as the article on Spontini for that work. He was co-editor of Vierteljahrsschrift fur Musikwissenschaft; edited the organ works of Buxtehude (2 vols., 1875-76) ; and the complete edition of the works <of Heinrich Shultz.

SPITTA, Karl Johann Phillip, German

hvmnist : b. Hanover, 1801 ; d. Burgdorf, 1859. After completing studies at Gottingen Univer¬ sity, he taught from 1824 to 1828 at Lime, where he composed the hymns which brought him into

prominence. He served as pastor in several localities and became superintending clergyman at Burgdorf in 1859, a short time be¬ fore his death. His hymns of perfect lyric form and purity of style are marked by spiritual ele¬ vation and a wealth of thought and sentiment embodied in fresh, vigorous language. They came into general use and retain a high position in the hymnology of the period. They appear in (Nachgelassene geistliche Lieder *(1861 et seq.) ; in Rsalter und Harfe) (1833; rev. ed. with bibliography, 1890; Jubilee ed. 1901). Consult Miinkel, Rhillip Spitta) (Leipzig 1861) ; Majer, (id.* (2d ed., (Bremen 1891).

SPITS. See Shore Line.

SpiTTELER, Carl, poet: b. Liestal near Basel, Switzerland, 24 April 1845. His father was an official of the government, being Federal Secretary of the Treasury from 1849-56. Young Spitteler attended the gymnasium at Basel, be¬ ing fortunate in having among his teachers such men as Wilhelm Wackernagel, the great phi¬ lologist, and Jakob Burckhardt, the author of the famous work on the Italian Renaissance. Later he studied at the universities of Basel, Zurich and Heidelberg. He began with juris¬ prudence and afterward changed to theology, but when a position as pastor was offered him, he felt that he must decline it. He had begun to realize his mission as an epic poet and there¬ fore refused to work in the field for which he had prepared himself. His first work, (Prome¬ theus und Epimetheus> appeared in 1880-81. It is an allegory which symbolizes the joys and sorrows of an exalted soul striving to attain an ideal, although the loyalty to this ideal is paid for by a life full of misery. The style reminds one of Nietsche's (Zarathustra, *but Spitteler was not influenced by Nietsche, as that is chronologically impossible. Rather the re¬ verse is true, although Nietsche never acknowl¬ edged his indebtedness to Spitteler. The two works in a way complement each other. In Nietsche we have direct didactic statement, while in Spitteler a higher phase, the symbolical, is predominant. From 1870 to 1879 he spent in Russia as a private tutor and later he served as teacher in Neuenstadt not far from Berne. In 1882 he published his Rxtramundana,* a col¬ lection of poems. He gave up teaching in 1885 and devoted himself to a journalistic career in Basel. Now his works began to come in rapid succession. In 1891 there appeared Rriedli, der Ivalderi, *a collection of short stories, in which Spitteler, as he himself says, depicted Russian realism. In 1898 (Conrad der Leutnant* was published; Riterarische Gleichnisse* had appeared in 1892, and <Balladen) in 1896.

His most important production, (Der Olym- pische Fruhling,> appeared 1900-03 and was revised in 1910. It is an epic poem of the heroic type in which Spitteler has given us his interpretation of life. The ancient mythol¬ ogy is not used as a setting but as an appeal to the imagination. He tells of the doings of gods and men in an elevated style and by im¬ plication he impresses upon us his ideas and ideals.

Gottfried Keller, the realist, had some dif¬ ficulty in understanding the allegorical works of Spitteler and his admirers have been few up to recent times. Now a better appreciation of his works seems to be coming. Consult Boesche, (Life and Works of Carl Spitteler) (in (The German Classics, > Vol. XIV, New York, 1914) ; Biese, (Deutsche Literatur- geschichteC Vol III.

William F. Hau hart,

Assistant Professor of German, University of Michigan.

SPITZ, or POMERANIAN DOG, a

small sheep-dog, originally of the Baltic prov¬ inces of Germany, which is about the size of the spaniel, with a sharp-pointed face and an abundant white coat sometimes of great beauty. Other colors are known, including black. It was once comparatively common in the United States. See Dog.

SPITZBERGEN, spits-ber'gen, a group of islands in the Arctic Ocean, between Barents Sea on the east and Greenland Sea on the west, about 650 miles north of the North Cape in Norway. They lie between the parallels 76° 30' and 80° 30' N., and are about 450 miles east of Northeast Foreland in Greenland and 200 miles west of Franz Josef Land. The archi¬ pelago comprises three large islands and a large number of smaller ones. The largest island is West Spitzbergen, which has an irregular tri¬ angular form with the apex pointing south. Its coast is indented by many fiords, of which the two largest are Ice Fiord on the west coast, running north and northeast, and Wijde Bay, penetrating southward from the north coast. The northern branch of Ice Fiord almost meets the head of Wijde Bay. The narrow Foreland Sound separates the smaller island of Prince Charles Foreland from part of the west coast of West Spitzbergen. To the northeast, sepa¬ rated from the main island of West Spitzbergen by Hinlopen Strait, lies the second largest is¬ land, North-East Land. Edge and Barents islands lie on the southeast side of the groups. Of the smaller islands,

Danes Island, off the northwest coast of West Spitzbergen, is notable as the place from which Andree set out on his fatal balloon voyage to the North Pole. At the extreme north is a cluster of small islands known as the Seven Islands. The total area of the archipelago is about 27,000 square miles, of which West Spitzbergen represents about 15,-000. West Spitzbergen is in the main covered with great accumulations of ice, except along the west shore of Wijde Bay, where there is a relatively fertile area. The middle of the island, west of the main watershed, is de¬ scribed as a region of boggv valleys, fertile slopes and mountain ridges, or the remains of a high plateau. The highest measured peak of the island is Horn Sound Tind in the south, fully 4,500 feet above sea-level. Large glaciers are found throughout the whole group, but

especially on the eastern coasts. The average limit of solid drift ice skirts the northern edge of the archipelago. The ocean bed around the islands is shallow. Geologically the backbone of the island consists of granite, with gneiss and other archaic rocks, but Carboniferous, Triassic, Jurassic, Miocene and even more re¬ cent formations are also well represented. Dur¬ ing Miocene times Spitzbergen had a luxuriant flora, and there was also a postglacial period of genial climate favorable to the development of a varied phanerogamic flora. The proximity of the Gulf Stream renders the climate, espe¬ cially on the west coasts, less severe than that of other places in the same latitude. For

four months in winter the sun is below the horizon, and for an equal period in summer always above it. The most characteristic plants of the archipelago are mosses and lichens.

Rather more than 100 species of phanero¬ gams, however, have been collected on

the islands. The grasses form nearly a quar¬ ter of these, and next to them in number of species are the cruciferous plants. The larger forms, of animal life are foxes, bears and rein¬ deer, in pursuit of which, as well as the wal¬ ruses and seals abounding along the coasts, the islands are frequently visited by the Norwegians and Russians. Sea-fowl are at times so numer¬ ous that they literally hide the rocks and darken the air. The minerals include beautiful marble and good coal. The group is said to have been discovered (1553) by Willoughby, but the islands were known to the Russians before that time. They were again discovered in 1596 by the Dutch navigator Barents. To the latter navigator the islands owe their name (in Dutch spelling Spitsberghen), signifying ((peaked mountains.® The coasts of the

chief islands have been explored by many expeditions since that time, and during the 19th century the islands were used as a base for expeditions to¬ ward the North Pole. The interior was hardly known till the explorations in 1896-97 of Sir W. Martin Conway, who was the first to cross West Spitzbergen from west to east. There are no settled inhabitants, but explorers and others have often passed one or more winters in the archipelago. In the days of the Spitzber¬ gen whale fishery there was a thriving Dutch village called Smeerenberg on a small island to the northwest of West Spitzbergen. Tourist steamers sometimes sail to Spitzbergen during the summer months. A tourist hotel was built in 1896 at the entrance to Advent Bay, a branch of Ice Fiord.

SPITZKA, Edward Charles, American neurologist: b. New York, 10 Nov. 1852; d. 1914. He was graduated from the College of the City of New York and subsequently (1873) from the medical department of the University of New York, and studied later at the medi¬ cal schools of Leipzig and Vienna, becoming in the latter institution a laboratory assistant in embryology and histology. On his return to New York he made the nervous system his specialty, and gained national reputation as expert in insanity in the trial of the assassin Guiteau. He is the discoverer of the inter¬ optic lobes of the lower brain. He was vice-president of the neurology section at the Inter¬ national Medical Congress of 1887, and honorary president of the Pan-American Medical Con¬ gress in 1893. He was editor of the American

Journal of Neurology (1881-84), and has pub¬ lished a (Treatise on Insanity, J etc.

SPIVAK, Charles D., American physician: b. Krementshug, Russia, 25 Dec. 1861. Leaving Russia in 1882, on account of his political views he came to this country and worked as day laborer in New York, as a mill hand in Maine, and as a farmer in New Jersey, until he was enabled to graduate from the Jefferson Medical College, Philadelphia, in 1890, spending some time at the Berlin University (1891-92). In 1894-95 he was chief of clinic, gastro-intestinal diseases, at the Philadelphia Polyclinic. Set¬ tling in Denver, Colo., he became lecturer on diseases of the gastro-intestinal tract, Denver School of Medicine (1896-1900), and professor of anatomy at same college

(1897-98).

SPLEEN, a vascular abdominal organ which, in man at least, is now generally re¬ garded by physiologists as forming one of the ductless glands, and which is accordingly classed with the thyroid gland, thymus, and suprarenal capsules. All vertebrates — with the exception of the lancelet, and probably the lampreys, lepidosirens (or mudfishes), and the ceratodus or barramunda — possess a spleen, which is absent from the sub-kingdom in certain aber¬ rant fishes only. In man, the spleen lies in the upper part of the abdomen, and is situated in the left hypochondriac region, contiguous to the cardiac or gullet end of the stomach. Its outer surface is smooth, and lies in contact with the under surface of the diaphragm or midriff, this latter muscle separating the spleen from the 9th, 10th and 11th ribs of the left side. Externally the spleen is covered by the perito¬ neum, and is connected with the stomach by the omentum, known as the gastrosplenic band. Its internal aspect is concave, and is divided by a longitudinal groove or fissure named the hilum. The blood-vessels and nerves of the spleen enter and leave the organ by the hilum. In-feriorly the internal surface of the spleen is in contact with the pancreas (q.v.) or sweet¬ bread, and posteriorly with the suprarenal capsule of the left kidney. The upper end is of rounded conformation, and is thick; while the lower extremity is pointed, and is in con¬ tact with the colon (q.v.). A suspensory ligament or special fold of peritoneum attaches the spleen to the under surface of the midriff. The size of the spleen appears to vary much. Its average size in the healthy adult is about five inches in length, by three or four inches broad, and one to one and one-half inches in thickness. Its average weight is seven ounces.

The spleen is invested by an outer serous membrane formed by the peritoneal layers. It covers the entire surface. Below the serous coat is a second investment of fibrous nature. This is of elastic structure, and forms the frame¬ work or supporting fibres of the internal struc¬ ture. The essential spleen matter is called spleen pulp. It is of a dark brownish-red color, and when microscopically viewed is seen to be composed of colored parts, consisting of red blood corpuscles and other cells of colored na¬ ture; while other bodies of deep-red, yellow, or black hue, existing singly or aggregated together, may be seen amid the spleen pulp. The color¬ less elements seen in the spleen-structure are granular matters, free nuclei of cells, as well as nucleated cells or vesicles. The colorless ele¬

ments form about two-thirds of the pulp and are of the same nature as the round white cells of lymphatic glands (q.v.). They are also similar

to white blood-corpuscles. When the spleen is cut through, as in a vertical section, a number of opaque bodies of small size, masses of round cells, are seen to be scattered throughout its substance. They are the Mal¬ pighian or splenic corpuscles, which have intimate relations with the veins of the spleen, and re¬ semble lymph-corpuscles (see Lymph) in form. The splenic artery, supplying the organ with blood, is of large calibre, and pursues a re¬ markably tortuous course within the spleen. The veins of the spleen, like the splenic artery, are of large relative size, and they unite to form a large (splenic) vein, which pours its fluid into the portal vein. The nerves of the organ are derived from the right and left semilunar ganglia, and form the right pneumo- gastric nerve.

The purpose and functions of the spleen have been the subject of much speculation; but in modern research has shown that in all prob¬ ability the spleen is the seat of the change and elaboration of the red blood-corpuscles, which form such characteristic elements in vertebrate blood. It is thus to be regarded as a blood- gland, or kind of lymphatic gland. The spleen may be removed or extirpated, both from man and lower animals, without any apparent bad consequences. This is explicable on the ground that other glands (thyroid, thymus, or even the ordinary lymphatics) may assume the functions of the absent spleen.

Of the diseases to which the spleen is liable inflammation and enlargement are the most common. . Inflammation (splenitis) may result in splenic abscess and gangrene ; while the organ may be affected by various forms of tubercular and syphilitic disease, and is liable to be ruptured by violence — as from a direct kick or blow. Enlargement (known as ague- cake) results from chronic ague or intermittent fever, and may sometimes be met with in pregnant women, and in leucaemia (q.v.). See Intestine.

SPLEEN WORT. See Asplenium. SPLICE. See Knotting and Splicing.

SPLINT, in surgery, a thin piece of wood or other material, used to hold or confine a broken bone when set, or to maintain any part of the body in a fixed position. The original wooden splint is falling into disuse, modern surgeons preferring to build up something more easily molded to a desired shape. A plaster- of paris splint is made by charging a bandage of muslin or other open material with plaster of paris, and washing over each layer with water. The plaster hardens rapidly. Metal, wire, gutta percha and papier mache have also been employed. Often it is found advantageous to build up a plaster splint and stiffen it on a backbone of wood or metal.

SPLINT, in veterinary surgery, a bony en¬ largement on a horse's leg, between the knee and fetlock. It usually appears on the inside of one or both forelegs, frequently situated be¬ tween the large and small cannon bones, is due to concussion, and most common in young horses that have been driven rapidly along hard roads before their bones are consolidated. When

of recent and rapid growth the splint is hot and tender and causes lameness. A piece of spongio-piline saturated with cold water should be applied to the splint, kept in position with a light linen bandage, and wetted with cold water or refrigerant mixture every hour. Perfect rest must be enjoined for 10 days or a fort¬ night. When the limb is cool and free from tenderness, the swelling, which will still remain, may be greatly reduced by some stimulating applications, such as the ointment of the red iodide of mercury, the common fly blister, or the firing iron.

SPLITAIL, a Californian chub (Pogo - nichtys macrolepidotus) , dun-colored with silvery sides and the tail divided into two lobes, of which the upper is much the longer; length, 12 inches. It is common in all the lowland streams of central California.

SPLUGEN, Switzerland, in the Alps bor¬ dering the Italian frontier, is a lofty mountain 9,350 feet high, with a pass connecting the Rhine Valley of the Grisons, with the valleys of Lombardy. The pass, though known to the Romans, was of a dangerous character, because of frequent heavy avalanches. A French army in 1800, traversing the old path, lost a great number of men and horses overwhelmed by avalanches. The modern pass, completed in 1823 by the Austrian government, contains several galleries of massive masonry as a pro¬ tection against the descent of avalanches. It rises 6,940 feet above sea-level, and is a bold piece of Alpine engineering, rendering the route advantangeous for automobile tourists fond of mountain travel. There is a small inn at a high point for the refuge of travelers, and a hotel at Monte Spluga. The scenery com¬ prising deep cascades, sharp rocks, wild ravines and snowy peaks, presents a variety of mag¬ nificent views.

SPODUMENE, spod'u-men, a mineral oc¬ curring generally in monoclinic crystals often of great size. It has a well-developed cleavage, most perfect parallel to the orthodiagonal axis, and to the

prism planes. It is not unlike feld¬ spar in appearance, but may be distinguished from that mineral by its higher specific gravity (3.13 to 3.19), and its more pearly lustre. Its hardness is 6.5 to 7 of the scale, and its color grayish-green, passing into greenish-white and grayish-white, rarely faint-reddish. Its com¬ position is: Silica 64.2; alumina 29.4; lithia 6.4. In eastern United States it is found at Wind¬ ham, Me.; Winchester, N. H. ; Goshen, Chester¬ field and Norwich, Mass., and Brookfield, Conn. Very large crystals of the mineral are found in pegmatite dikes in the Black Hills, South Dakota. It also occurs in Sweden, in the Tyrol, and in Scotland. The mineral is valuable as a source of lithium, and a very transparent lilac-colored variety is used as a gem, under the name Kunzite.

SPOFFORD, spof'ord, Ainsworth Rand,

American librarian : b. Gilmanton, N. H., 12 Sept. 1825; d. 11 Aug. 1908. He received a classical education from private tutors, engaged as a bookseller and publisher in Cincinnati, and in 1859-61 was associate editor of the Cincin¬ nati Daily Commercial. He was first assistant librarian of Congress in 1861-64, librarian-in¬ chief in 1864-97, and chief assistant librarian till his death. He edited Catalogues of the

Congressional Library; (Annual American Al- manac) (1878-89) ; was associate editor of (Library of Choice Literature) (10 vols.) ; (Library of Historic Characters and Famous Events) (10 vols.) ; (Library of Wit and Hu- mor) (5 vols.) ; and has written Massachu¬ setts in the American Revolution (1895) ; (A Book for All Readers) (1900), etc.

SPOFFORD, Harriet Elizabeth Prescott, American author: b. Calais, Me., 3 April 1835; d. 15 Aug. 1921. She was graduated from Pinkerton Academy in Derry, N. H., in 1852 and was married to R. S. Spofford in 1865. She was one of the earliest contributors to The Atlantic Monthly, her story (The Amber Gods,5 attracting the attention of discriminating read¬ ers as much for the tropical luxuriance of its style as for the theme. Her earlier work in both verse and prose is in every case marked by originality and distinction of style, but her later work, while not without charm, is more conventional and informing. Among her publi¬ cations are (Sir Rohan's Ghost5 (1859) ; (The Amber Gods, and Other Stories5 (1863) ; Aza¬ rian5 (1864) ; (New England Legends5 (1871) ; (Hester Stanley and Saint Marks5 (1883) ; (A Scarlet Poppy5 (1895); (In Titian's Garden,5 verse (1896) ; (01d Washington5 (1906) ; (The Making of a Fortune5 (1911).

SPOHR, spor, Ludwig, German composer : b. Brunswick, 5 April 1784; d. Cassel, 22 Oct. 1859. He studied music, and at an early age acquired a great reputation as a performer on the violin. About 1805 he was appointed con¬ ductor of the court concerts at Gotha, and be¬ came afterward musical director of the Theatre an der Wien, Vienna, for which he wrote some of his finest dramatic works. He became chapel-master at Frankfort, 1817-19, and at the electoral court of Hesse-Cassel in 1822, and con¬ tinued in that office till near the end of his days. Spohr was the composer of violin music, con¬ sisting of solos, concertos and chamber-pieces, and his performance on that instrument was characterized by breadth and vigor of tone. He is also the author of (Faust5 (1818) ; (Jessonda5 (1823); (Zemire und Azor5 (1819), and other operas, which occupy a high rank among musical compositions. His oratorios, (The Last Judg¬ ment5 (1826); ((Die letzten Dinge5), (The Fall of Babylon5 (produced first at a Norwich musical festival), and (Calvary5 (1835), ((Des Heilands letzte Stunden5).' His last opera was (Die Kreuzfahrer,5 produced in 1845. His finest symphony was (Die Weihe der Tone5

(1832).

SPOILS SYSTEM. See Civil Service Reform.

SPOKAN. See Salishan Indians.

SPOKANE, Wash., city, county-seat of Spokane County, and the commercial and finan¬ cial centre of the territory known as the In¬ land Empire, comprising eastern Washington, northern Idaho and western Montana. Spo¬ kane to the Indian tribe of that name meant (<Children of the Sun.55 The place was origi¬ nally called Spokane Falls, so named from the series of cascades in which the Spokane River falls through the heart of the city. Five trans¬ continental railroads operate into Spokane over their own tracks — the Northern Pacific, the Great Northern, the Chicago, Milwaukee and Saint Paul, the Canadian Pacific and the Ore-

gon-Washington or Union Pacific. Two others, the Burlington and the Northwestern, operate under traffic agreements. All have branch lines radiating into the corners of the Empire. The heart of the city is bisected by the Spokane River, having a series of abrupt falls making possible the development of 400,000 horse power of electrical energy.

Only 172,000 horse-power has been developed up to the present for the operation of Spokane street cars and the illu¬ mination of the city and to provide power for the factories of Spokane and the surrounding country. This power also is transmitted 100 miles east to the Cceur d' Alene mining district. The city of Spokane, which in 1900 had only 36,000 inhabitants, had in 1910 a population of 104,402, according to federal census.

Industries. — • Spokane's factory output is valued at $50,000,000 per year, and 12,000 are employed in manufacturing. Some of the dif¬ ferent industrial establishments are lumber mills, manufacturing different kinds of lumber products, sewer and water pipe works, flour mills, flour mill machinery works, brick and terra cotta works, foundries, vinegar and pickle works, machine shops, iron works, cereal food plant, pottery, mattress and furniture fac¬ tories. Other manufactures are jewelry, tobacco products, gloves, clothing, brooms, trunks, wooden and tin ware, dairy products, packed and canned meats. A large part of the industrial prosperity is owing to the mines in the vicinity, the great agricultural and horti¬ cultural resources of the surrounding territory, extensive stock-raising, and to the vast water power which offers special inducements to man¬ ufacturers. This power is made available bv the generation of electricity. Spokane is also the centre of a rich lumbering region. The city is surrounded on the north, east and south by the greatest area of white pine timber forests in the United States. The city has grain eleva¬ tors, an electric light plant, an artificial gas plant and large lumber yards.

Commerce and Transportation. — Spokane is the commercial as well as the industrial cen¬ tre of eastern Washington, northern Idaho and western Montana. Spokane ships to the mar¬ kets of the world the fine wheat from the in¬ terior basin of the Columbia River, the vege¬ tables, deciduous fruits, berries and the prod¬ ucts in general from a region of fertile soil, and the semi-arid -districts of the Spokane, Yakima and Wenatchee valleys, made produc¬ tive by irrigation. Crop failures in this region, popularly known as the ((Inland Empire,® are unknown. The wealth production from the farms, orchards, mines, forests and ranges of the Spokane country in a recent year amounted to $217,158,000, as follows: Grain yield, $93,- 000,000; mineral output, $41,158,000; livestock and poultry, $27,500,000; lumber, $14,500,000; farm and garden products, $17,000,000; apples and other fruits, $11,000,000; dairy products, $13,000,000; total, $217,158,000.

Public Interests. — Spokane is finely situ¬ ated in the Spokane River Valley. In summer the winds from the Cascades and Rockies tem¬ per

the heat, while the breezes from the Japan current of the Pacific Ocean make extreme cold unknown here. In the 35 years that the United States Weather Bureau has been here, there has not been an instance of loss of life from ex¬ treme heat or cold or other climatic conditions,

such as heavy winds. Spokane leads all cities in the United States in public park area pro¬ portionate to population, having 1,933 acres valued at $2,000,000. The city also leads all others in percentage of home owners, 51 per cent of the people owning their homes, accord¬ ing to the United States census. The city has 68 miles of paved streets ; 392 miles of graded streets; 633 miles of concrete sidewalks; 144 miles of sewers; 137 miles of gas mains; 137 miles of electric street railways; 1,408 street lights; 356 miles of water mainS; 2,260 fire hydrants. The water supply comes from an underground river reached by deep wells, and is among the purest in the world. The death rate in 1915 was 8.14 per 1,000 of population, one of the three lowest among the cities of the United States. Some of the principal buildings are the government building, Davenport hotel, Old National Bank, Paulsen building, public library, city hall, county courthouse, Gonzaga College, high school, Auditorium, Review, Em¬ pire State buildings, Masonic temple, Spokane Club building, Spokane Amateur Athletic Club building, Protestant Episcopal and Roman Catholic cathedrals, and the churches and the schools. Fort Wright, a United States military post, is located on a tract of land, 1,022 acres, which the city gave to the government in 1894— 95, on condition that a large military post should be established and maintained here. The city is especially nbted for its fine residences and paved streets, and is known throughout the Pacific Northwest as the <(Home of the Mining Kings.®

Education. — Spokane is the educational centre of the ((Inland Empire.® The schools of higher education are Gonzaga University, Whit¬ worth College, Spokane College and Spokane University. The Catholic Church conducts Saint Michael's scholasticate for the training of priests. There are two high schools and five parochial schools, as well as four business colleges. Four hundred and ten teachers are employed in 35 grade schools. The value of the public school buildings is $2,505,396.92. Value of building sites, $740,741.90; school equipment, $351,762.78. Total school enrolment in 1918 was 20,134. The city maintains a public li¬ brary and seven branches in residence districts, besides 200 classroom libraries in public and private schools. Value of books and equip¬ ment, $118,000. There are 112 churches of all denominations in Spokane.

Banks and Finance.— There are 13 banks, of which three are national. The combined capital is $4,325,000; surplus and undivided profits, $1,354,919; deposits (May 1919), $46,- 592,052. Bank transactions in 1918 aggregated $1,263,198,089; clearings, $422,346,431. f The combined tax rate in 1918 for State, county, city and school purposes was 47 mills, on an assessed valuation of $108,760,004. Bonded debt, $4,710,000.

Government. — The city operates under a commission charter and five commissioners, elected on a non-partisan basis. The responsi¬ bility is centralized and the work divided un¬ der the following headings: finance, public safety, public affairs, public works and public utilities.

Historical. — Spokane's brief history is in¬ teresting. The first settlement was made in the summer of 1872, when a handful of sturdy

people gathered at the Spokane River Falls. Earlier it was the home of trappers and hunters, who sold their pelts to the Hudson's Bay Com¬ pany and the Astors, who in turn maintained the Spokane House, before the Oregon country became part of the United States. But the town did not really get under way until the Northern Pacific arrived in 1881. Eight years later fire devastated the 30 blocks in the business district. It was the first real test and it. found the people of Spokane undaunted. Since then its growth has been steady and sub¬ stantial. The following figures taken from the Federal Census Bureau's reports show the in¬ crease in population: (1890), 19,222; (1900),

36,843; (1910), 104,402; (1920), 104,437.

R. A. Laird,

Publicity Secretary, Spokane Chamber of Com¬ merce.

SPONDIAS, a genus of tropical trees be¬ longing to the family Amcardiacece, several of which are cultivated for their plum-like yellow fruit (drupes). The leaves are alternate and odd-pinnate, with numerous leaflets. The flow¬ ers are small, polygamous, in spreading terminal panicles, with four or five expanded petals. The leaves and bark have therapeutic value. The fruits of various species are known as hog- plums; they are laxative, and often austere in flavor. Spondias dulcis, the pomme de cytheie, sweet Otaheite apple, or wi-fruit, is the

golden- yellow fruit of a tree about 50 feet high, com¬ mon in Polynesia. This fruit has an apple- odor, but a sharp flavor resembling that of a pineapple, and stringy flesh. The Jamaica plum, or golden apple, is another tall tree, with an ash-like aspect (S. lutea), with yellowish flower buds which are made into conserve, and an oval drupe. The Spanish plum is the purplish or yellow fruit of S. purpurea, widely cultivated in the West Indies. S. mangifera, of India, has smooth fruits called wild mango or amra, which is cooked and made into curries, etc. ; the tree also yields therapeutical remedies, and a gum resembling gum arabic, and known as hog- gum. The Brazilian N. tuberosa not only has a fruit employed in that country as a febrifuge, but is said to produce aerial roots, that, upon touching the soil, form black hollow cellular tubers, containing about a pint of water, which, although intended as a reservoir for the tree in dry weather, serves travelers also.

SPONGE, the horny skeleton, formed of keratose, or spongin, produced by certain ani¬ mals living in the sea and of very low grade in the scale of life. Down to a quite recent period they were classified as colonial Protozoa, the lowest group of animals; but all naturalists now treat them as separate phylum under the name Porifcra (or Spongiaria) , given to them because of the water-pores with which they are provided in such abundance. These pores are ordinarily and chiefly of two kinds, both open¬ ing into the internal or digestive canals and passages which everywhere ramify through the mass of the sponge. There are large openings (oscula) relatively few in number, often guarded by special protective devices such as circles of spicules or muscles capable of con¬ tracting the orifice, and much more numerous small pores everywhere perforating the surface. The latter are inhalent pores or inlets, which admit water to the internal passages, from which it escapes through the former. A con¬

stant current is induced by the activity of count¬ less flagella or little living lashes, generally confined to definite enlargements of the canals known as ciliated chambers which constantly beat the water and drive it ever onward in one direction. This current is a veritable life- giving one to the sponge, bearing into the diges¬ tive cavities not only the minute organisms upon which the sponge animal feeds, but also supply¬ ing oxygen for respiration, bearing away all waste and excreted substances and assisting in the fertilization of the eggs and the distribution of the larvae. Some of the simplest sponges, such as are found among those with calcareous skeletons, have but a single osculum at the summit of a sac-shaped or cylindrical body, the walls of which are perforated by many radiating canals, each opening to the exterior by an in¬ halent pore and ending internally in the central

digestive chamber. The walls of such a sponge are composed of the sponge-flesh, formerly called sarcode, together with the skeleton secreted by certain cells of the latter. The flesh consists of three chiefly cellular layers, ectoderm, mesoderm and endoderm. The ectoderm is the sponge- skin and, in the form of a layer of flat cells, covers the whole exterior and lines certain spaces or chambers which are formed in many sponges by a process of enfolding. The en¬ doderm lines all of the truly internal chambers and passages, and consists partly of flattened digestive cells which line the central cavity and parts of the radial canals, and partly of cells which bear each a flagellum with a collar sur¬ rounding its base on their free ends, and which are confined to the ciliated chambers. These lat¬ ter collared and flagellated cells are very char¬ acteristic of sponges and are found elsewhere only among the Protozoa. Between these limit¬ ing layers the mesoderm makes up the great bulk of the sponge-body and consists of a variety of different kinds of cells, of which the most important are the reproductive, from which the eggs and spermatozoa are produced; and the skeletogenous, which secrete the ele¬ ments of the skeleton.

The great majority of sponges are originally of much the form just described, which may be considered as exemplifying the sponge in¬ dividual ; but as they grow they bud and branch in a very plant-like manner, forming many new oscula and many new partial individuals which often reunite and enclose cavities lined with ectoderm. In this manner colonies of large size and most varied forms are built up, and, simple as the fundamental sponge plan is, there are few animals which present more complex struc¬ tures and whose morphology has been so late in being correctly explained. The skeletons of sponges may be calcareous or silicious or horny, or the latter may be combined with either of the others. The first two may exist in the form of separate spicules, presenting the most varied shapes characterizing the different genera and species, or built up into a more or less continu¬ ous frame-work. Horny or sponging skeletons consist of fibres, almost always interlacing, branching and uniting in a most complete and complex manner, and sometimes strengthened by included silicious of calcareous spicules or granules.

Sponges reproduce asexually by a mode of budding and growth similar to that just de¬ scribed or, as especially exemplified in the fresh-

water sponges, by the formation of gemmules which are complexly formed buds protected by a spicule-sheath and capable of developing into a complete sponge colony. They also reproduce sexually by the union of ovum and sperma¬ tozoon which develops into a free-swimming ciliated larva (planula), serving not only to reproduce the species but through its activity to distribute these fixed and stationary animals. Except a few small fresh-water species all of the sponges are marine, and occupy all seas from the shores to great depths. It is in tropical and subtropical regions, however, that they are es¬ pecially prominent. Remains of fossil sponges in great number and variety, some of them rep¬ resenting extinct types, occur in all geological formations from the Cambrian upward.

The phylum Porifcra has been classified as follows :

Class I. Calcarea, including sponges with calcareous spicules, such as the little Grantia ciliata, so common on the New England coast.

Class II. Hexactinellida, including sponges with silicious usually six-rayed spicules, such as glass sponges and the beautiful Venus' flower-basket (Eupleciella) of the Japanese and Philippine seas.

Class III. Desmospongice, including all other sponges with horny or silicious skeletons, and divided into the following three grades: (1) Tetraxonida, with tetraxial silicious spicules; (2) Monaxonida , with uniaxial spic¬ ules, including the fresh-water sponges. (3) Keratosa, with a skeleton of spongin fibres, in¬ cluding all of the commercial and related sponges.

The sponges of commerce come from the eastern Mediterranean Sea, the West Indies, and the coasts of Florida and Central America. In the Grecian Archipelago, Crete, Cyprus, on the coasts of Asia Minor, Syria, Barbary and the Bahama Islands, sponge fisheries constitute a very important industry. The finest sponges are obtained in Turkish waters. The fishing season commences in May and closes in Sep¬ tember or October. Diving is practised and is carried on in a rude, primitive manner. The diver, who has no dress, seizes hold of a large stone, to which a line is attached, and sinks by means of it to a depth varying from 30 to 180 feet. Keeping hold of the rope, he tears the sponges off the rocks within his reach and places them in a net ; when he has secured a netful he signals by means of the rope to be drawn up.

Modern diving dresses have been introduced successfully in some places. The West Indian trade is annually increasing and the fishing in¬ dustry gives employment to 500 boats and over 2,000 persons.

The Bahamas and the coast of Florida are the best fishing grounds.

Florida is the only State in the Union which has a sponge-fishery, and there it is confined to the southwestern part of the coast, along the reefs and to the extensive rocky shoals that lie between Saint Mark's and Anclote Keys. The former is known as the Key ground, with its centre at Key West, the latter as the bay ground with its centre at Tampa Bay.

Nearly all of the sponges used in the United States were brought from the Mediterranean till 1852, when attention was called to the im¬ mense numbers that were growing in Florida waters. As soon as it was found that the qual¬

ity of these compared favorably with those of Europe the merchants and fitters-out of vessels of Key West engaged very actively in the busi¬ ness of placing them on the market. At first the best qualities were bought from the fisher¬ men at the rate of 10 cents per pound. As Mediterranean sponges became scarce and costly the Florida sponges came into more and more demand and their value increased proportion¬ ately. After about 18 years' fishing on the known ground the supply began to fail. Then, in 1870, a new area of ground, larger than the old one, was discovered, and this gave a new impetus to the trade. In that year Appalachi- cola sent out a small fleet of sponge vessels which has since been largely increased and the industry has been energetically pursued with good results.

The methods employed in the fishery differ greatly from those employed in the Mediter¬ ranean. Small vessels, carrying crews of from 5 to 15 men, are fitted out for trips of from four to eight weeks on the sponge grounds. The crews are paired off into small rowboats, or "dingies,® to catch the sponges. One man stands in the stern, sculling the boat, while the other kneels in the bottom amidship, leaning over the side and scans the bottom of the sea by the aid of a water-glass. When a sponge is sighted the boat is stopped and the kneeling man uses a three-pronged hook, attached to a slender nole 30 to 50 feet in length, to secure it. Consider¬ able dexterity is required of both men. To cure the sponges they are first spread about the vessel's deck in their natural upright position, so that they will die, and while decomposing allow the softened animal matter to run off freely. When they have been several days in this position they are taken to the shore and thrown into the water in little pens called "kraals® (corrals) where the remaining sub¬ stance is soaked and squeezed out, after which the sponges are removed at intervals and beaten with a stick to facilitate the process.

Although most actively prosecuted during the summer, sponge fishing is now followed more or less throughout the year, the vessels beginning their trips in January and working the different beds successively from north southward. The state of the weather greatly affects the result of the fishery. In some years it has been a complete failure, while in others it has been very profitable, always owing to the weather. As the natural beds of sponges have become scarcer prices have advanced, so that even if a vessel does not secure as large a quantity in a given time as formerly the finan¬ cial result is about the same.

Several varieties of sponges are caught in Florida waters. There are first, sheep's wool, which sell for $2 to $5 a pound ; second, yellow sponges, which sell for 50 to 60 cents per pound, and third, grass sponges, which are coarse in texture and not durable, and sell for 15 to 25 cents per pound. Other coarse grades are boat and glove sponges. When these are marketed they are trimmed and cleaned of sand and shells and then pressed into small bales of 100 to 120 pounds each, in which form they go to the wholesale dealers. The yellow sponge especially is subjected to a bleaching process to improve the color, but the process ordinarily employed greatly weakens the fibre.

Owing to the rapidly decreasing supply of

the finer grades and the rising price the prob¬ lem of propagating sponges artificially has been taken up seriously by the United States Bureau of Fisheries. It has been found that sponges may be raised successfully both from the egg and from cuttings, but, owing to the much shorter time required for the latter to reach a marketable size, the first, method has been abandoned. The technical problems of sponge raising have been largely solved and there is every promise that their culture on a commer¬ cial scale can be undertaken in the near future and that the depleted grounds will be restocked.

The Florida sponge fisheries employ about 2,245 persons, with 156 vessels and other ap¬ paratus valued at $594,598. The average annual product aggregates 418,125 pounds of all kinds of commercial sponges, which sell for $567,685. To this total, sheep's-wool sponges contribute 181,311 pounds, valued at $483,263.

Bibliography. — Bowerbank, J. S., (British Spongidae) (4 vols., London 1864-82) ; Cobb, (The Sponge Fishery of Florida in 1900) (in (Report of United States Fish Commission, *Washington 1903) ; Haeckel, (Die Kalk- schwamme* (Berlin 1872) ; Hinde, Catalogue of Fossil Sponges of the British Museum > (London 1883) ; Hyatt, A., (North American Poriferae *(in Boston Society of Natural His¬ tory's Memoirs, Vol. II, Boston 1875) ; Lenden- feld, (The Horny Sponges) (London 1889) ; Minchin, (Sponges* (in Lankester's (Treatise on Zoology) Part II, London 1900) ; Moore, •(Sponge Culture) (Washington 1903); Potts, (Freshwater Sponges* (Philadelphia 1887) ; Rathbun, fisheries Industries of the United States) (Washington 1884) ; Thompson, D. W., (Bibliography of Protozoa, Sponges, Coeler- terata and Worms> (Cambridge 1885) ; Wilson, (Sponges of Porto Rico) (Washington 1900).

Jv Percy Moore, University of P ennsylvania.

SPONGE-CUCUMBER. See Fibre.

SPONSORS, in the American Church, those persons who at the solemn administration of baptism make profession of Christian faith on behalf of the baptized. The sponsors are also called godfathers and godmothers of the neo¬ phyte; and as the sponsors are regarded as having contracted a spiritual relationship among themselves and with their godchild, they used also to be called godsips (gossips). Sponsors assist at the baptism of adults as well as of infants; but in the baptism of adults those to be baptized, not the sponsors, make answer to the questions put by the minister of the sacra¬ ment, ((Dost thou renounce the devil and all his works,® etc. By a decree of the Council of Trent two sponsors at most are permitted, a male and a female. In the Anglican Book of Common Prayer it is prescribed that for every male child to be baptized two godfathers and one godmother shall assist, and for every female child one godfather and two god¬ mothers; the same rule applies in the baptism of adults.

SPONTANEOUS COMBUSTION. See

Combustion, Spontaneous.

SPONTANEOUS GENERATION, the

doctrine that living matter may originate spon¬ taneously, that is, out of non-living matter. The sudden appearance of living things in dead

bodies, as of maggots in flesh, and mold on vegetables, was formerly accounted for by re¬ garding them as the direct products of the decay

or putrefaction in which they occurred, through some unexplained process. The Italian experimenter, Spallanzani (q.v.), first indicated the probability of the source of these growths being living things or their germs pre-existing in the atmoshpere. He found that when he bound organic solutions, as beef-broth or an infusion or “tea® of hay in a vessel closed against the admission of air, no appearance of living beings, or any evidence of “generation® followed; and the same freedom continued when the air which entered vessels containing fermentable solutions was made to pass first through sulphuric acid, through redhot tubes, and through cotton-wool. That the air does actually contain large quantities of minute organic bodies was demonstrated by Tyndall in his efforts to obtain optically pure atmosphere, and this explains why preserved meats keep for any number of years if properly closed, since, after their thorough cooking, the aper¬ tures are hermetically sealed while steam is still escaping, the entrance of atmospheric air with its contents being thus prevented. Lister’s antiseptic treatment in surgery is based on the same hypothesis.

But while spontaneous generation is unten¬ able as an explanation of phenomena now in progress, science knows nothing of the original development of living things. Some scientists have held that life comes to the earth from other planets by light pressure moving excess¬ ively minute forms. Others have advanced the theory that there is a life element in na¬ ture not appreciable to man’s five senses, but which under right conditions brings vegetable, animal and human life into matter. Until we know what life is no theory of spontaneous generation will maintain. Evolution is incom¬ plete as a scheme of the universe without the hypothesis of spontaneous origin of living things from inorganic matter. Therefore, many regard life as a problem to be solved only by occult means or by the reincarnated man after the death of his physical body. This is a matter in which chemistry must be con¬ sulted as well as biology; and the opinions of thinkers in respect to it — in general an atti¬ tude of waiting for more light — may be found under such heads as Animal; Antiseptic; Bac¬ teria; Evolution; Life; Protozoa.

SPONTINI, spon-te'ne, Gasparo (“Luigi Pacifico®), Italian composer: b. Majolatti, Italy, 14 Nov. 1774; d. there, 24 Nov. 1851. He was educated at the Conservatorio della Pieta d’Turchini at Naples and at 17 produced his first opera, (’Puntigli delle donne,* which met with immediate success. He went to Paris in 1803, was appointed musical director to the Empress Josephine in 1807, and in 1810 became director of the Italian Opera. In 1820 he ac¬ cepted the position of court composer and gen¬ eral musical director at the court of Prussia

and entered upon a brilliant career at Berlin. His intense jealousy of Weber aroused popu¬ lar feeling against him in the latter years of his sojourn in that city, and in 1841 he was re¬ moved from office though retaining both title and salary. He had been elected one of the five members of the Academie des Beaux Arts at Paris in 1839 and in 1842 he returned to that

city. His operas met with continued and bril¬ liant success and he is generally considered the greatest composer in French tragic opera be¬ tween Gluck and Meyerbeer. His operas in¬ clude 'L'eroismo ridicolo) (1797) ; cLa ves- tale) (1807) ; (NurmahaP (1822) ; <Alcidor) (1825); (Agnes von HohenstaufeiF (1829), etc.

SPOOL, a small cylinder, usually of wood and with a hollow centre, with expanding ends, on which thread, cord or yarn is wound ; also any small creel, reel or bobbin used for wind¬ ing. Machines for winding thread on spools are termed spooling machines or spoolers.

SPOON, an implement consisting of a shal¬ low oval bowl with a handle, used principally in eating food. The primitive spoon of the Teu¬ tonic nations was made of wood, while in the Mediterranean countries shells appear to have been first applied in this manner. Examples of early spoons of flint, ivory, slate and wood are extant as well as numerous examples of the bronze and silver spoons of the Greeks and Romans, in which the handle is usually a spike. Horn and wood, brass and pewter spoons were made for domestic use in the Middle Ages. The present form of the bowl developed about 1750. See Silverware.

SPOONBILL, a wading-bird of the fam¬ ily Plataleidcz, closely related to the ibises, from which the group differs principally in its straight giooved bill, which is quaintly flattened and expanded at the end. The three genera, Plcitalca, Ajaja and Platibis, comprise about eight species found in all warm countries. The only American species is the roseate spoonbill (Ajaja ajaja). At present it is found through¬ out South America and northward into the South Atlantic and Gulf States, but formerly ranged to Virginia and Illinois. The general form is heron-like but stouter; the length some¬ what less than three feet, the wing expanse about four and one-half feet; the color is white tinted with rose, which becomes quite deep on the under parts, with rusty yellow patches on the tail and sides. The head is bald and varie¬

gated with black, green, yellow and orange colors ; the bill similarly colored with the addi¬ tion of blue; the legs and iris red. Young birds lack the rosy tints and have the head fully feathered. The three white, rough, ellipti¬ cal eggs, more than two and one-half inches in length, are laid in April. The European spoon¬ bill (Platalea leacorodia) is widely distinguished throughout southern Eurasia, but formerly bred in England. Except that the head is crested and the color chiefly white it closely resembles our species in appearance and habits.

The name spoonbill is also given to a duck (see Shoveler), and to a sandpiper (q.v.)

SPOONER, John Coit, American legisla¬ tor: b. Lawrenceburg, Ind., 6 Jan. 1843; d. 11 June 1919. He removed to Madison, Wis., in 1859, was graduated from the University of Wisconsin in 1864, and then enlisted as a pri¬ vate in the Union army. He was mustered out of service as brevet-major, and in 1870 estab¬ lished himself in a law practice in Hudson, Wis. He was elected to the State legislature in 1872, served in the United States Senate in 1885-91, and again from 1897-1907, resigning in March 1907, and engaging in the practice of law at No. 14 Wall street, New York City.

SPORADES, spor'a-ddz, either of two groups of islands east of Greece, which have been known by various names at different periods. The Northern Sporades lie east of the Gulf of Volos, and their modern names of the larger areas are (in the order of size) Skopelos, Skiathos, Khilodromia, Pelagonisi and Giuri. They have a total area of 180 square miles, and about 13,000 inhabitants. Every householder on the islands is said to own a ship or boat. The Southern Sporades lie in the Jesaireh-Bahr-i-Sefid Archipelago, east of the Cyclades and south of Asia Minor, Icasia, Astrophalia and Leros are the largest, while Creti, Rhodes and Patmos are the most famed. The largest population is in Icaria (8,000) and Calymnus (7,000). See Patmos.

SPOROBOLUS. See Grasses in the United States.

SPOROGONY, a form of reproduction by spores. See Sporozoa.

SPOROPHYTE, Evolution of. Some botanists are still disputing in regard to those earliest stages in the evolution of the sporophyte which are found in the algae and fungi ; but there is complete agreement that in all plants from the liverworts and mosses to the sunflowers and orchids the sporophyte be¬ gins with the fertilized egg. (See Alternation of Generations). Leaving out the algae and fungi and beginning with the liverworts, the evolution of the sporophyte

can be traced with more or less certainty. Before considering the details of development, it may be said that, in such early stages of evolution as are seen in the liverwort and mosses, the sporophyte has no leaves or roots and is dependent upon the gametophyte throughout its lifetime. In the ferns and their allies, the sporophyte is de¬ pendent upon the gametophyte during its early embryology, but soon develops leaves and roots and becomes completely independent of the gametophyte, which then dies and disappears. In the seed plants, the gametophyte is the parasitic generation and contributes very little to the sporophyte. except during the first few divisions of the fertilized egg. Several of the most fundamental features in the evolution of the sporophyte are seen in the liverworts. In Riccia, one of the lower liverworts, the sporophyte is a small, globular body about one-sixteenth of an inch in diameter, and con¬ sists of a central mass of spores surrounded by a single layer of cells (Fig. 1. A). The signifi¬ cant fact is that the entire product of the fertilized egg, except a single, protective outer layer of cells, produces spores. Theoretically, the earliest sporophyte should be one, all of whose cells produce spores. In Riccia. a single outer layer of cells has been diverted from the spore producing function, to serve as a pro¬ tective layer. Botanists speak of this diversion as the ((sterilization of sporogenous tissue.® The evolution of the sporophyte is marked by more and more sterilization of sporogenous tissue, so that less and less of the product of the fertilized egg is devoted to the production of spores. In some liverworts, all the spores are derived from one-half of the fertilized egg, all the cells derived from the other half being diverted to a vegetative function. This is

shown, diagrammatically, in Fig. 1. B, where j indicates the spore tissue and v the diverted, or vegetative tissue. In most liverworts, even less of die product of the fertilized egg develops into spores, not only one-half, but a large part of the other half being diverted to a vegetative function. This diverted portion forms a ˆfoot® which acts as an absorbing organ, and a stalk, which becomes much elongated and places the spores in a more favorable position for dispersal when they are shed (Fig. 1, C-f, foot; s, stalk; sp, spore

B C D

Fig. 1. :

tissue). In many forms, even in the spore region, some of the cells become diyerted to a nutritive function or aid in the dispersal of spores. In Anthoceros, a much studied liver¬ wort, there is a still further sterilization of sporogenous .tissue, a central column being di¬ verted to vegetative purposes, so that the spore tissue forms only a thimble-shaped mass, the lower part of which is shown, in longitudinal section, in Fig. 1, D. In this case, the youngest spore tissue is at the bottom and the mature spores higher up, a continuous growth in the lower portion resulting in somewhat prolonged period of spore production. In the mosses, there is still further sterilization, so that a comparatively small portion of the sporophyte produces spores. In all these sporophytes, there is more or less green tissue, so that there is some advance toward independence ; but there are no leaves and the sporophyte lives and dies with its foot attached to the garneto- phyte. The simplest form among the ferns and fern allies has a root, stem and leaf, and so is independent. There is no form intermediate be¬ tween a sporophyte without a leaf and a sporophyte with a fairly well developed leaf. Consequently, the origin of the leaf is still a problem. In the ferns, the spore tissue is not only greatly restricted, appearing only as the ((fruit dots» on the underside of the leaf, but it often appears late in the life history of the plant. In the flowering plants, there is still less spore tissue and it may appear still later in the development of the plant. In some of the cycads, the plant may reach an age of 25 years, or even more, before any spore tissue is produced. There is such a tre¬ mendous difference between a flowering plant and the small, simple sporophyte of Riccia, that it hardly seems possible that the large, complex form could represent a final vol. 25 — 28

stage in an evolution resulting from a pro¬ gressive sterilization of sporogenous tissue. However, this is the most generally accepted theory of the evolution of the sporophyte. Con¬ sult Bower, F. O., {The Origin of a Land Flora) ; Campbell, D. H., (Mosses and Ferns. >

Charles J. Chamberlain, University of Chicago.

SPOROZOA, a group of protozoa, ranked as a class or more recently as a phylum, which is composed exclusively of parasitic species. They are characterized by complete absence of structures common in free-living protozoa, viz. (1) locomotor processes, pseudopodia, flagella and cilia, (2) openings for taking in solid food or ejecting waste, so that nutrition is purely osmotic, and (3) contractile vacuoles. The life cycle always includes a period in which a large number of spores is produced, and usually two such periods alternate; in one spores are produced asexually by schizogony and in the other by a so-called

sexual process (sporogony). These two occur in different organs if not in different hosts so that alternation of genera¬ tions is regularly associated with alternation of hosts. The development is often extraor¬ dinarily complex and no decision as to position or relationships can be reached until the life history is worked out. As this has been done in but few cases the classification and descrip¬ tion of the group is subject to constant and marked changes. The sexual phase which may involve isogametes or heterogametes is re¬ garded as more significant than the asexual in deciding relationships.

The class Sporozoa, as originally conceived by Leuckart (1879), embraced not only the Gregarinida, Coccidioidea, and Hsemosporidia which later Schaudinn grouped together as Telosporidia, i.e., those forms producing spores at the close of a stage in the life cycle; but also the Neosporidia which produce spores con¬ tinuously. The latter which have amoeboid spores and one or more polar capsules, are now grouped in a separate class, the C'nidosporidia, by many. They include the orders Myxospori- dia, Microsporidia, Actinomyxidia, Sarcospori- dia and Haplosporidia.

The Gregarinida are chiefly arthropod parasites. They begin the asexual stage as intracellular parasites in the intestinal wall and desert the cells to become adult in the in¬ testine of the host. They are elongate and the cell is often divided into two regions by a cross partition. The gametes are similar or dis¬ similar.

The Coccidioidea parasitize epithelial cells of vertebrates particularly in the alimentar}/ canal and its glands. In form they are spherical or nearly so and without differentiated ecto- and endoplasm. The host cell shrinks as the para¬ site grows until it is reduced to an empty cyst membrane within which the parasite breaks up into a number of crescentic spores surrounding a central residual mass. By rupture of the membrane these merozoites are scattered to infect new cells. At times some stimulus, per¬ haps excessive infection, leads to the produc¬ tion of micro- and macrogametes which fuse in pairs to form sporoblasts and these encysting became sporocysts in which are produced sporo¬ zoites. The latter are the agents by which new hosts are infected and their production

takes place usually outside the host. The Coc- cidioidea cause serious epidemics in _ rabbits, hares and other animals; they occur in many hosts, even including man.

The Haemosporidia are clearly coccidia which have been adapted for life in the blood. The asexual stage is amoeboid in the red blood corpuscles where merozoites are produced that infect other corpuscles, repeating the process until gametes are formed that await a change of host to find opportunity for further develop¬ ment. This is given by withdrawal of the blood into the stomach of some biting insect where the gametes complete their development and fuse. The sporoblasts and in them the sporozoites are formed in the wall of the in¬ sect's stomach and when the sporozoites are set free they penetrate the salivary gland and proboscis by which in the act of biting they are introduced into a new host. (For further details and illustration see article Plasmodium). The most famous members of this group are the organisms producing malarial fevers in man of which there are at least three distinct types. Other species occur in birds and re¬ lated genera in Amphibia, fishes and reptiles. The moscpiito (q.v.) is the inoculating agent for malarial fevers, and since it shelters the sexual generation must be considered the primary host whereas man is the secondary. A leech is believed to play a similar role for certain species parasitic in fish. Probably the most widely known disease among domestic animals which is caused by a member of this group is Texas fever in cattle, transmitted by the cattle ticks. See Rinderpest.

The Myxosporidia are practically exclusively fish parasites. Certain forms are common in the gills, others in the skin, where they form conspicuous masses. Less well-known forms inhabit the gall bladder or form ulcers in the muscles and are the cause of serious diseases. The Myxosporidia possess polar capsules which resemble much the nettling cells of Coelenterata.

The Microsporidia are not well known despite the fact that they are of conspicuous economic importance since one species is the cause of Nosema, a serious disease of the honey bee and another produces pebrine of the silkworm; the latter was the subject of early important studies by Louis Pasteur.

The Sarcosporidia are found parasitic in the muscle cells of vertebrates and are suf¬ ficiently large to be conspicuous to the naked eye. They were originally designated Miescher's or Rainey's corpuscles and occur occasionally in man. A serious Australian disease of sheep known as ˆscrapie® is caused by one of these forms; it is also found in North America. By dissecting Sarcosporidia out of host tissue and subjecting them, to chemical study a protozoan toxin named Sarcosporidin has been isolated; this is the first discovered in this group.

Bibliography. — Calkins, G. N., (The Pro- tozoa) (New York 1901) ;

(Protozoology) (New York 1909) ; Doflein, F., (Lehrbuch der Protozoenkunde) (Jena 1916) ; Labbe, A., <Sporozoa) (Berlin 1899, purely systematic) ; Minchin, E. A., (An Introduction to the Study of Protozoa) (London 1912) ; Prowazek, S. von, (Handbuch der pathogenen Protozoen) (Leipzig 1912).

Henry B. Ward,

Professor of Zoology, University of Illinois.

SPORRAN, a pouch or large purse worn by the Highlanders of Scotland in full dress, and by men of the kilted regiments. It is usually made of the skin of some animal, with the fur turned out, and often ornamented with silver and stones. It is worn in front of the kilt. The name is the Gaelic for purse.

SPORTING RECORDS. See Sports.

SPORTS, The Book of, a popular name

for the proclamation issued in 1618 by James

I, and ordered to be read in all churches, wherein it was declared that dancing, archery, May-games, morrice-dances, leaping, vaulting and other such games were lawful on Sunday after divine service, but prohibiting bear-bait¬ ing, bull-baiting, bowling and interludes. The order to read this declaration was largely dis¬ regarded, but in the reign of Charles I it was republished (1633) and enforced with severity. This created great outcry and opposition and in 1644 the Long Parliament ordered all copies of it to be collected and publicly burned.

SPORTS: THEIR DEVELOPMENT, SPEEDS AND RECORDS. In the state of savagery man's life depended on his agility in running, jumping, climbing and throwing of projectiles. In the high condition of civil¬ ization of ancient Greece the natives considered prowess in the arts of speed and endurance as evidence of superiority in manhood and they held their athletic sports in reverence as well as with enthusiasm. In their Olympic or Pan- Athenaic Games the entire populace partook. A proof of all-round manly vigor was given in their pentathlon, which consisted of a series of five games contested by the same rivals — running, jumping, wrestling, disc-throwing and javelin throwing. In recent years we have established a renewal of these ancient sports as well as that of the Marathon races. The latter covers a distance of 26 miles, 385 yards, and some of the records are as follows : Olympic Marathon, held at London in 1908, was won by the American John

Hayes in 2:56:02 2-5; in the same year at Madison Square Garden, run by the Italian Dorando against Hayes, the former won in 2 :44 :20 2-5.

J. T. Crowley of the Irish-American A. C., won the race at Yonkers, same year, in 2:49: 16 2-5. In the amateur race from Rye to Co¬ lumbus Circle, New York, Matthew Maloney of the Trinity A. C. won in 2:36:26 1-5. Of marvelous interest would be a comparison of the speeds and records achieved in sports by the ancient Greeks and Romans with those of our day. Only a few records of classic day sports have come down to us, however, and these pseudo-records can only amuse and sur¬ prise us. In leaping or long jump (termed halm a) the ancients used weights (called hal- t ere s') like our dumbbells to increase their ca¬ pacities, and we have the record attributed to a certain athlete named Phayllus of Kroton of 55 feet. This looks like the measure of our hop, skip and jump. And we are never likely to achieve what these sporting reporters recorded with their elasticity of statement. Our records are scientifically measured and corroborated by expert unbiased judges or are ignored as ˆunofficial.®

The outcome of the supreme efforts of man in recent days in running, walking and some

other contests will be found in the last sec¬ tion of this article under the head <(World's Sports Records.® These tables afford a record of the advance man has made in speed by science and physical development. The fol¬ lowing statistics give the various records to date.

Trotting Horses.

Trotting . — The ˆfoundation® horses or first sires of the American trotting track were the imported stallions Messenger and Justin Morgan (former died 1808; latter 1821). Hambletonian, a descendant of Messenger, headed a great family of thoroughbreds, and the Justin Morgan breed includes many noted trot¬ ters of this day. Of old records that can be relied on we have : Three miles under saddle, Screwdriver, 1828, 8:02; three miles in harness, Topgallant, 1829, 8:11; 1834, Edwin Forrest, one mile under saddle in 2:31*4; same year Sally Miller, one mile in harness in 2:37; 1845, Lady Suffolk, one mile in harness in 2 :29*4 ; 1849, Pelham, one mile in 2:28. Noted one mile high wheel records are : Maud S., 1885, 2:08J4; Sunol, 1891, 2:08*4

(kite track); Palo Alto, 1891, 2:08j4 (kite track); Jay-eye-see, 1884, 2:10. In 1892 the bicycle sulky arrived.

Records under saddle are : One mile, Great Eastern, 1877, 2:15; two miles, George M. Pat- chen, 1863, 4:56; three miles, Dutchman, 1839, 7 :32*4 ; four miles, Dutchman, 1836, 10:51.

Noted one mile trotting records ivith running mate are: Ayres P. (against time), 1893, 2:03*4; Frank (in a race), 1883, 2:08*4. One mile team records are : Monk and Equity, 1903, 2:08; Leaf and Sally Simmons (in a race), 1894, 2:15*4; Uhlan and Lewis Forrest, 1912, 2:03*4- For world's records see last section of article.

Harness speed (one mile) : Boston Blue, 1818, 3:00; Bull Calf, 1830, 2:47j4; Edwin For¬ rest, 1838, 2:36*4; Dutchman, 1839, 2:32; Lady Suffolk, 1845, 2:29* 4; Pelham, 1849, 2:28; Highland Maid, 1853, 2:27; Flora Temple, 1859, 2:19J4; Goldsmith Maid, 1871, 2:17; Rarus, 1878, 2:13*4; Maud S., 1880, 2:10j4; Jay-eye- see, 1884, 2:10; Maud S., 1885, 2 :08j4 ; Nancy Hanks, 1892, 2:04; The Abbott, 1900, 2:03*4*; Cresceus, 1901, 2:02*4; Lou Dillon, 1903, 1:58*4 (with shield) ; Uhlan (with running mate), 1913, 1 :54*4- In 1892 the bicycle sulky brought the record down quickly and in 1903 we meet the supposed impossible two-minute horse, Lou Dillon. For world's records see last section of

artˆ6' Pacing Horses.

These were brought into popularity when the country was young and roads bad ; the saddle- horse of easy gait was then of great use. The Rhode Island pacers, called Narragansetts, are claimed to be from Spanish (Andalusian) stock. The Kentucky and Tennessee pacing horses are said to have come from Canada, and they were never trained to harness till recent dates. Records to 1902 are: Star Pointer, 1:59*4; Dan Patch, 1:59*4; Prince Alert, 2:00, etc. The dirt shield aided Dan Patch to attain 1 :56*4 in 1903. For fastest speeds see table of ((World's Records® in last section of article.

Yachting Records.

Our earliest yachting records take us back to 1801 when Capt. George Crowninshield of

Salem, Mass., got Christopher Turner of that town to build him The Jefferson, a 22-ton sloop yacht. This craft in 1812 became a privateer, then for many years a fisherman. George's brother, Benjamin, then Secretary of the Navy, under President Madison, had the Cleopatra's

Barge, with a 93-foot waterline, of nearly 192 tons, 11 feet 5 inches depth of hold, built at a cost of $50,000. In this pleasure craft Captain Crowninshield made, in 1817, a cruise to Euro¬ pean waters, returning same year. Between 1830 and 1840 we find numerous pleasure craft in New York and Boston, with John C. Stevens (owner of Hoboken Island on the Hudson), George Crowninshield and R. B. Forbes leaders in the sport ; but it was chiefly with ship¬ owning families. George Steers, son of an English shipwright, modeled the schooner yacht La Coquilla, 44 feet in length, and (in 1847) modeled and built the schooner Cornelia (74 feet). Then were constructed by him the schooner Signet (53 feet, 2 inches) and the sloop Una (64 feet). This was probably the commencement of designing boats on special lines as pleasure craft. This <(boom® in yacht¬ building started the New York Yacht Club in 1844, and Stevens and Steers are considered the fathers of American yachting. In 1849 Steers modeled the Mary Taylor as a pilot- boat on radically novel lines so successfully that others followed on his new plans. On 17 July 1845, two days after the New York Yacht Club built its (wooden) clubhouse at Castle Point, Hoboken, the first regatta was sailed (Robbins-Reef to a Bay Ridge mark, past a Stapleton mark, around Southwest Spit buoy and return) with eight entries and Cygnet win¬ ning in 5:23:15. Regattas continued annually. The Southern Yacht Club of New Orleans was organized in 1849; North Carolina Yacht Club in 1854; Brooklyn Yacht Club in 1857, and Jersey City Yacht Club the following year. Between 1866 and 1872 yachting had become so popular that general clubs were formed all along the Atlantic Coast. In 1851 George Steers designed and a ((syndicate® had built an ocean-going $30,000 yacht in pilot-boat style, 101 feet long over all, drawing 11 feet, to enter a yacht race around the Isle of Wight, England, following an invitation from the British. The yacht was christened America, and sailed to Havre in 21 days. The story of America's vic¬ tories belongs elsewhere, but Commodore Ste¬ vens and associates brought the Royal Yacht Squadron’s Cup to New York, where it has resided ever since. The America’s model and sails established a new departure, followed by British as well as American yachts, and the old blunt noses gave way to keen prows (John Scott Russell, British designer, had first advo¬ cated these revolutionary changes before the America’s construction, and Steers had studied the suggestions). But centre-boards prevailed over keel boats for these shallow waters. The cat-boat was a favorite small craft in the 50’s of last century, and Capt. Bob Fish designed many for Europe (where they were called <(Una® boats) besides large yachts later (Ger¬ trude, Undine, etc.). In the 60’s John B. Herreshoff and family made Bristol, R. I., noted with his small and larger yachts, then launches and steamers. And James G. Bennett

with his Rebecca (sloop) racing the Julia (recently named Nirvana), the centre-board sloop, Bos-

ton also became a favorite yachting centre. The great schooner yachts came into vogue after the Civil War (Fleetwood , Phantom, Palmer, Josephine, Idler, etc.). And in 1866 Pierre Lorillard had his 201-ton Vesta built. Then came the ocean race (winter of 1866) from Sandy Hook to Isle of Wight, Henrietta (of J. G. Bennett), Fleetwing and Vesta contesting (times, respectively, 13d. 21h. 55m.; 14d. 6h. 10m.; and 14d. 6h. 15m.) over the 3,000 and odd miles course. The 274-ton Sappho (keel schooner), built by Poillon Brothers and launched in 1867, was a failure at Cowes races till W. P. Douglas had her altered and made the run to Queenstown in 12d. 9h., a record, and beat Ashbury's Cambria. By 1870 schooner racing was the vogue but the <(skimming dish" type was coming into its own, with its light draught. The Mohawk disaster (costing the lives of owner and family) hurt the large schooner type. The ((America Cup" races fol¬ lowing do not belong here. In 1871 the Sea- wanhaka Yacht Club was organized and yacht owners began to take a pride in knowing the technique of the craft, not leaving, as before, everything to the professional designer. Then the English ˆcutter" type was started in the V index (1871), and other seaworthy yachts fol¬ lowed, with Petrel (1876), Volante (lead keel), etc., proved successes ; and ((Corinthian" prin¬ ciples ruled. The lead keel brought in the narrow type such as Muriel (1878). Mischief (((compromise sloop") of 1892 was cutter type with centre-board. Next came racing by classes (all entered one race), and schooner and sloop entered separate classes. The latter, in the late 70's divided into 70 footers and 50 footers. Hulls of metal started with Mischief. In 1881 came Valkyr, wider and with less draught, lead keel, centre-board, cutter rigged. Madge (10 toner, lead keel) came from Glasgow (1879) as victor in England and Scotland, and, with her great club-topsail, took on a speed that won all New York Harbor events, only to be beaten by Shadow (Herreshoff) at Newport. But six victories in seven races hurt the reputation of centre-board sloops and cutter type looked up. Will Fife, Jr.'s, 62-foot Clara, narrow cutter, came from Scotland in 1885 and (under Capt. John Burr) defeated everything competing. Burgess was the popular designer now (Amer¬ ica Cup defenders 1885, 1886, 1887), and yachting was the most popular sport, the races being prolific in classes : 90 feet, 70 feet, 53 feet. Forty-foot waterline boats became the rage (Baboon , Nymph, etc.), and the 40- foot Minerva came over from Scotland (1888), beat¬

ing Liris. Burgess produced Gossoon (keel) and they tied in 10 races. After 1890 the 90-foot class was superseded by the 46-foot waterline craft. Herreshoff's Gloriana now be¬ came the furor with its abnormal projection of shallow bow, the ((forefoot" cut away; then he produced the ((fin" keel (1892). Space does not permit discussion of the <(small yachting" types (mosquito) , half-raters, (<knockabouts," etc.

On account of the World War yacht-racing had to fall into disuse after the Shamrock IV, contestants, Vanitie and Resolute had made trial speeds in 1915, but Sir Thomas Lipton renewed his challenge in 1919 and the races took place off Sandy Hook in July 1920, the Resolute winning three of the five starts.

Motor Boat Racing.

Competition has been keen in this most modern of aquatic races, and the development in speed is phenomenal. The popular National Power Boat Association championship Gold Cup races (30 miles) show the following winners :

Average

Date Winner Owner speed

1912 P. D. Q. II . A. G. Miles . 36.8

1913 Ankle Deep . Count Mankowski 44.5

1914 Baby Speed Demon II.. P. Blackton . 50.49

1915 Miss Detroit . D. P. B. A . 48.49

1916 Miss Minneapolis . M. P. B. A . 49.27

1917 Miss Detroit II . D. P. B. A . 54.36

1918 Miss Detroit III . Detroit Y. C . 34.10

For other records see World's Records sec¬ tion at end of article.

Steamship Speeds.

Transatlantic Records. — In the days of the fast-sailing packet ships the old Yorkshire crossed from Liverpool to New York in 21 days, and Ashburton made the passage in 24 days. With our modern ((greyhounds" of the ocean the following records show the ever-increasing speed of the liners between New York and Queenstown: 1856, Persia, 9d. lh. 45m.; 1856, Scotia, 8d. 2h. 48m.; City of Brus¬ sels, 7d. 22h. 3m.; 1873, Baltic, 7d. 20h. 9m.; 1876, Germanic, 7 d. 1 lh. 37m.; 1880, Arizona 7 d. 7h. 23m.; 1882, Alaska, 6d. 18h. 37m.; 1884, Oregon, 6d. 1 lh. 9m.; 1887, Umbria, 6d. 4h. 42m.; 1888, Etruria, 6d. lh. 55m.; 1891, Majes¬ tic, 5d. 18h. 8m.; 1891, Teutonic, 5d. 16h. 31m.; 1893, Campania, 5d. 12h. 7m. ; 1894, Lucania, 5d. 7h. 23m.; 1909, Mauretania, 4d. 13h. 41m. In 1910 Mauretania made the trip from Queens¬ town to New York in 4d. lOh. 41m. France made the passage from New York to Havre, 1912, in 5d. 17h. ; Kaiser Wilhelm der Grosse crossed from New York to Cherbourg, 1900, in 5d. 16h., and from New York to South¬ ampton, 1897, in 5d. I7h. 8m. The voyage from New York to Plymouth was made, 1909, by Kronprinsessin Cecilie in 5d. 7h. 25m. Passage from New York to Naples was made, 1904, in 7d. 16h. 44m. by Deutschland. The Allen Line Virginian (turbine), 1905, crossed from Mo- ville and passed Cape Race in less than four days.

Of recent years the aim of the great trans¬ atlantic steamship lines to

reduce passage time and make new records has died out under com¬ pelling circumstances. The advance in speed is gained, of course, by the increase of fuel consumption, but that increase is based on a progressive ratio of augumented consump¬ tion, and the cost of fuel together with loss of freight space in carrying such enor¬ mous quantities brought the competitors face to face with an actual loss, even at the ad¬ vanced passenger rates on such <(express" steamers. The designers of late have ex¬ pended their energies in increasing the size and carrying capacities of the leviathans and im¬ proving the life attractions on board. And the clipping of hours from passage time must be reckoned as an activity passed into desuetude.

Aviation Records.

The permanent success of the Wright brothers' invention was proven in 1905 by long distance flights in England, France and Ger-

many, and the armies of these powers grasped the merits of the revolutionary discovery of flight in heavier-than-air machines for war purposes. The governments aided advance¬ ment in the new art so that air squadrons soon entered the conflict when the World War reached its fiercest stage. But the war para¬ lyzed competition in popular races and records have not been accepted by the International Aviation Association since 1914. The enor¬ mous impulse in advancing the science of avi¬ ation caused by the use of the machines by the belligerent governments becomes clear to us when we read the few wonderful feats per¬ formed by the improved types of flying struc¬ tures. Some former prominent events were : The Paris-to-Madrid race won by Vedrine in 37h. 26m. 12s. in 1911. In 1910 Grahame-White had covered 100 kilometers (62 miles) at Belmont Park in 60m. 47jˆs. or 61.3 miles per hour. The United States army in 1911 had her first intercity race, from New York to Philadelphia (about 83 miles) which was won by L. Beachy in two hours (net time lh. 50m.), and G. Fourny accomplished in that year 447.3 miles at Buc, France (without stops) in llh. 29s. Against these records we have in 1918 (when the United States army inaugurated first airplane mail serv¬ ice) the New York to Washington route per¬ formed in 3h. 30m. Mail aviators flew last year (with mail) from Paris to London and return in 3h. 10m. In a long series of runs between New York and Washington in 1919 the mail planes have averaged a speed of 70.80 miles per hour. In the revived English aerial Derby, which was

interrupted by the war, the course of which is around the suburbs of London, Captain Gathergood, in 1919, won, averaging a speed of 140 miles an hour. T. Sopworth won that of 1912 (in a Bleriot) at an average speed of 59 miles an hour. In 1913 Gustav Hand won it (in a Morane) at an average speed of 76 miles an hour, and an American, W. L. Brock, won the 1914 contest at a speed of 72 miles the hour. For altitude flights January, 1919, Cap¬ tain Lang, British army, held the record with a height of 30,500 feet. On 28 May this year Adjutant Casale ascended 31,000 feet and on 8 June beat his own record with a flight of 31,168 feet. This record was bettered on 18 September by Roland Rohlfs, whose altimeter registered 34,610 feet. Lieut-Col. Leonhard H. Drennan, of the Air Service, flew from Boston, Mass., to Hazelhurst Field, Long Island, in 83 minutes, a distance of 175 miles, in a DeHavi- land four machine. Col. Davenport Johnson and Lieut. H. S. Ormsbee (pilot) of the Air

Service flew from Chicago to Selfridge Field, Mich., a distance of 250 miles in 140 minutes, in a DeHaviland four. And in this same year (1919) is realized the ultimate dream of the aviator, flight across the Atlantic Ocean. Under the supervision of the United States navy the naval seaplane NCˆl (piloted by Lieutenant Read) made a flight from Rockaway to Ply¬ mouth, England, a distance of 3,926 nautical miles, in 55h. 33m. actual flying time, averaging 70.80 miles an hour while in flight. The entire course and dates are as follows : Rockaway-Chatham (forced to land) 8 May; Chatham- Halifax, 14 May; Halifax-Trepassey, 15 May; Trepassey-Horta (Azores), 1,200 nautical miles, 16-17 May; Horta-Ponta Delgada, 20 May; Ponta Delgada-Lisbon, 27 May; Lisbon- Mondego River, 30 May; Mondego River-Fer- rol, 30 May; Ferrol-Plymouth, 31 May. Still more remarkable was the non-stop flight across the Atlantic Ocean, from Saint Johns, New¬ foundland, to Clifden, Ireland, made by Capt. John Alcock and Lieut. Arthur W. Brown, 14- 15 June, in an English Vickers-Viniy bomber biplane. They made the distance, 14—15 June, 1,980 miles, in 16 hours 12 minutes, at 120 miles per hour.

Railroad Speeds.

As railroading is not a sport, judges have not verified the records we have of the fastest attainments of locomotives and trains. The following are generally accepted as the highest speeds on rails:

Egg Harbor to Brigantine Junction (Phila¬ delphia and Reading), 4.8 miles, in 2m. 30s., averaging 115.20 miles per hour (1904). Crit¬ tenden run of <(Empire State Express® (1893) of New York Central and Hudson River, one mile in 32s., averaging 112.5 miles per hour.

The Plant system is said to have run, in 1901, a train from Fleming to Jacksonville, a distance of five miles, in 2m. 30s., an average of 120 miles per hour. A trial test of steam vs. elec¬ tric locomotives was made, in 1907, by the Pennsylvania Railroad at Clayton, N. J. ; the track was seven-mile curve specially con¬ structed, and speeds were: steam, 93.6 miles per hour against 90 miles electric. Records in long distances are: Eckley to Wray on Bur¬ lington Route, in 1902, covering 14.8 miles in 9m., an average of 98.7 miles per hour. Pad¬ dington to Bristol, England, 118.5 miles in lh. 24m., or average 84.6 miles per hour on the Great Western Line in 1904. In 1897 the ((Black» Diamond Express® (Lehigh Valley Railroad) ran from Alpine, N. Y., to Geneva Junction, N. Y., 43.96 miles, in 33 minutes, an average of 80 miles per hour.

Automobile Races.

Vanderbilt Cup.

Date

1912 .

1914 .

1915 .

1916 .

Car

. . Mercedes .

. . Mercedes .

. . Peugeot .

. . Peugeot Special ....

Driver

. . . Resta .

Place

. . . Santa Monica .

. . . San Francisco .

. . . Santa Monica .

Miles

299.54

294.035

300.78

294.035

Average

68.97 75.60 66.29

In 3h. 22m. 48s.

1912 .

1914 .

1915 .

1916 .

. . Fiat .

. . Mercedes .

. . Peugeot .

. . Peugeot Special . . . .

Grand

■ ■ ■ Bragg .

. . . Pullen .

. . . Wilcox and Aitken. .

Prize.

. . . Santa Monica .

. . . San Francisco .

. . . Santa Monica .

409.9

403.24

402 . 75 403.238

68.4 77.22 56.78

In 4h. 42m. 47s.

Elgin National.

1912 . Mercedes . De Palma . Chicago . 302.5

1913 ’ . Stutz . Anderson . Chicago . 301-16

1914 . Mercedes . De Palma . Chicago . 401.18

1915”” . Stutz . Anderson . Chicago . 301-44

68.9

71.05

73.05

77.256

In 1918 a number of races showed the fol¬ lowing records : Brooklyn, N. Y., 100 miles, in 50m. 21s. by De Palma in a Packard. Chicago, 100 miles, in 55m. 25s. by Chevrolet in a Frontenac.

In 1919 Ralph de Palma, at Sheepshead Bay in a Packard, made 50 miles in 26m. 23 l-5s. For other records see World’s Records tables at end of this article.

Bicycling Records.

Owing to the European War no world championships have been competed for since 1913. Speed records are :

Professional Motor-Paced in Competition. — One mile by McLean in

1.09 1-5, 1903; two miles in 2.19 by McLean, 1903; 26 miles in 29.22 3-5 by Walthour, 1904; 30 miles in 33.52

3- 5, by Walthour, 1904.

Motor-Paced Against Time. — One mile in 1.04 1-5 by M. Bedell, 1917; two miles in 2.09

4- 5 by Duer, 1909; five miles in 5.18 2-5 by M. Bedell, 1917 ; 10 miles in 10.59 3-5 by M. Bedell, 1917.

Unpaced Against Time. — One mile in 1.51 by Goullet, 1912; two miles in 4.01 3-5 by Pye, 1910; five miles in 10.38 by Williams, 1909; 10 miles in 23.09 2-5 by Hamilton, 1898.

Amateur Unpaced Against Time. — One mile in 1.55 by Giles, 1908; two miles in 4.09 by Giles, 1908; five miles in 11.00 bv Giles, 1908.

Six-Day Race Winners. — 1913, Goullet and Fogler, 2,751 miles; 1914, Goullet and Grenda, 2,758.1 miles; 1915, Grenda and Hill, 2,770.8; 1917, Goullet and Magin, 2.473.4; 1918, Madden and Corry, 1,303.4; 1919, Goullet and Magin,

2,510.

Road Records. — American Amateur with Competition. — One mile in 2.02 by Surman, 1908; two miles in 4.56 1-5 by J. Steinert, 1911 ; five miles in 12.28 2-5 by J. B. Hawkins, 1908; 10 miles in 23.08 by Thomas Bello, 1915; 25 miles in 1.03.07 by Thomas Bello, 1915; 50 miles in 2.14.00 4-5 by Edwin Jensen, 1915; 100 miles in 5.06.12 by T. La Rossa, 1911; 150 miles in 8.26.27 by J. G. Kopsky, 1912.

Motorcycle Races.

Records will be found in World’s Records section end of article.

Athletic Sports.

The maintaining and enforcing of clear-cut amateur conditions surrounding the entries and contests of the various athletic clubs, and the elimination of professionals surreptitiously get¬ ting into the ranks, necessitated a unification of clubs and setting up of jurisdiction centred in some body. In England the Amateur Athletic Association (A. A. A.) was founded in 1880 at Oxford, confederating the legitimate clubs. After the New York Athletic Club for three years had managed the amateur championship meeting they had established and

successfully carried on, the New York Athletic Club de¬ termined in 1879 to give up this management. The club had found the games profitable but the calls for the officers' time was too great in appeals as to decisions on athletic law, informa¬ tion as to the dates of the games, programs, entries, etc. So the New York Athletic Club decided to hand over the conduct of the cham¬ pionship games to a regularly organized asso¬

ciation of athletic clubs. Such an association was formed under the title <(National Associa¬ tion of Amateur Athletes of America.® But abuses crept in and the good name of the amateur sports was endangered. This led to the determination to form a national amateur union of clubs under the title <(Amateur Athletic Union of the United States,® which was organized in 1888. Relia¬ bility of the records is the outcome. As George P. Meade well expresses present condi¬ tions : The rules of the records are (<timed by at least three skilled timers, distances are accurately surveyed and are remeasured in case a claim for a record is to be made; strict rules are observed to prevent mistake or fraud at the start and finish, and unusual circum¬ stances, such as favoring winds, are noted by judges and referee. Finally the performance is investigated by a committee of the national athletic board of the country in which the race was run, and every circumstance that might affect the validity of the record is discussed before the record is sanctioned. (These pre¬ cautions apply only to amateur athletics).®

Boxing Records.

Professional Champions. Heavyweights (over 158 lbs.): John L. Sullivan, 1890-92; James J. Corbett, 1892-97; Robert Fitzsimmons, 1897—99 ; James J. Jeffries, 1899-1910; Jack Johnson, 1910-15; Jess Willard, 1915-19; Jack Dempsey, 1919- Middleweights (158 lbs.) : Robert Fitzsimmons, 1890-97 ; Tommy Ryan, 1897-1907; Stanley Ketchel, 1907-08; Billy Papke and Stanley Ketchel, 1908; Stanley Ketchel, 1908-10; Frank Klaus, Mike Gibbons, Ed. McGoorty and George Chip all claim cham¬ pionship from 1911-13; A1 McCoy, 1914—17; Mike O'Dowd, 1917-18. Welterweights (145 lbs.) : Tommy Ryan, 1894-96; Kiel McCoy, 1896-97; Billy Smith, 1898-1900; Rube Ferns, 1900; Matty Matthews and Rube Ferns, 1901: Joe Walcott, 1901-04; Dixie Kid. 1904-08; Kid Graves, 1914—16 ; Jack Britton, 1916; Ted (Kid) Lewis, 1917-18. Lightweights (133 lbs.) : Jack McAuliffe, 1890-93; Kid Lavigne, 1893-99; Frank Erne, 1899-1902; Joe Gans, 1902-08; Battling Nelson, 1908-10; Ad Wolgast, 1910-12; Willie Ritchie, 1912-14; Freddy Welsh, 1914- 17; Benny Leonard, 1917-18. Featherweights (122 lbs.): George Dixon, 1892-97; Solly

Smith, 1897 ; Solly Smith and Dave Sulli¬ van, 1898; George Dixon, 1898-1900; Terry McGovern, 1900-01; Young Corbett, 1901- 04; Tommy Sullivan, 1904-08; Abe Attell, 1908-11; Johnny Kilbane, 1911-18. Bantam¬ weights (116 lbs.) : George Dixon, 1890— 92; none recognized from 1892-94; Jimmy Barry, 1894-98; none recognized from 1898- 1901; Harry Forbes, 1901-03; Frankie Neil, 1903-05; none recognized from 1905-07; Johnny Coulon, 1907-13; Kid Williams, 1914—15 ; Pete Herman, 1916—18. For earlier champions see under title Prize-Fighting.

Prize-Fighting. Amateur Champions in 1918, A. A. U. National: 108-pound class, Joe Wiles, Boston; 145-pound class, James Sulli¬ van, New York; 158-pound class, Martin Burke, New Orleans; 115-pound class, James To- masulo, New York; 175-pound class, John Mc-Minimeri, Camp Devens; 125-pound class, James Fruzetti, Brockton; 135-pound class, Thomas O'Malley, Philadelphia; heavyweight class,

Martin Burke, New Orleans. Metropolitan Association A. A. U . : 108-pound class, D. Kamins, Clark House A. A.; 115-pound class, James Tomasulo, Eliza'beth Y. M. C. A.; 125- pound class, A. Schick, unattached; 135-pound class, S. Mosberg, unattached; 145-pound class, J. Sullivan, Union Settlement; 158-pound class, S. Lagonia, Bronx Athletic Club; 175-pound class, G. Schalk, unattached ; heavy-weight class, G. Schalk, unattached. New England A. A. U.: 115-pound class, Bob Josephs, Bos¬ ton; 158-pound class, Billy Rush, Boston Navy Yard; 108-pound class, Joe Willis, Chelsea; 125-pound class, Charles Parker, Boston; 135- pound class, Joe Melanson, Boston; 145-pound class, Al. Lacy, Chelsea; 175-pound class, Billy Rush, Boston Navy Yard.

Baseball Records.

This most popular of American games suf¬ fered with the rest through the World War. And the <(Work or Fight® regulations placed the professional league members, in 1918, among the ˆnon-essential® classes of workers. The National, American and International leagues closed 2 Sept. 1918, the pennant winning clubs continuing the world series only. Boston won, defeating Chicago four games to one.

National Amateur Championships : Joseph Mayer, Philadelphia, 1913; Edward W. Gardner, Montclair, N. J., 1914; Joseph Mayor, Phila¬

delphia, 1915; E. W. Gardner, 1916; Nathan Hall, Boston, 1917 ; Corwin Huston, Detroit,

1.

Trap Shooting Records.

Recent winners of the Grand American Tournament are: W. E. Phillips, 1912; M. S. Hootman, Dayton, 1913; W. Henderson, Day- ton, 1914; L. B. Clark, Chicago, 1915; J. F. Wolf, Saint Louis, 1916; C. H. Larson, Chicago, 1917 ; F. S. Tomlin, Chicago, 1918.

Chess Records.

This game is very ancient and ascribed to India, China, Persia and even Egypt. There was a chess club at Slaughter's coffee house, London, in 1747, and M. F. A. Danikin (<(Phili- dor®), who died 1795, played three matches blindfolded at the Salopian. The London Chess Club was founded in 1807. Herr Paul¬ sen (1861) played 10 games at once, winning five, three being drawn and one not played out. International Chess Congresses were started in 1851. Noted players of the 19th century were Howard Staunton, J. J. Lowen-

PREVIOUS WORLD BASEBALL CHAMPIONSHIPS.

Event Winners

1913 . Philadelphia (A. L.) .

1914 . Boston (N. L.) .

1915 . Boston (A. L.) .

1916 . Boston (A. L.) .

1917 . Cnicago (A. L.) .

1918 . Boston (A. L.) .

1919 . Cincinnati (N. L.) .

Billiards and Pool.

These are probably the most internationally popular indoor games. Already mentioned in the 16th century billiards has retained its hold among most civilized nations.

Best Billiard Record Runs. Professional : 312 at 18.2, Calvin Demarest, Chicago, 1910; 155 at 18.1, Willie Hoppe, Philadelphia, 1910; 246 at 18.2, Maurice Vignaux, Chicago, 1883; 303 at 14.1, Willie Hoppe, New York, 1914; 85 at straight cushion-caroms, F. C. Ives, Boston, 1906 ; 398, champion's game, Paris, 1882 ; 2,196 at English billiards, George Gray (Australian), at London, 1911. Amateur: 175 at 18.2, L. Lerolle, Paris, 1908; 202 at 14.2, Calvin Demarest, Chicago, 1908.

Best Record Averages. Professional: 135*4 at 18.2, Willie Hoppe, Chicago, 1914; 40 at 18.1, Jacob Schaefer, Chicago, 1898; 10 at straight cushion-caroms, J. Schaefer, New York, 1883; 37.97 at champion's game, G. F. Slosson, Paris, 1882 ; 52 at 14.1, George Sutton, Baltimore, 1914. Amateur: 57.14 at 14.2, Calvin Demarest, Chicago, 1908; 33.33 at 18.2, Lucien Lerolle, Paris, 1903.

Pool: under new rule, best run — 74, Mor¬ ton Phillips, Chicago, 1913; in amateur city championship — 59, Alfredo de Oro, New York, 1913 (professional).

Games Games

won Losers won

4 New York (N. L.) . i

4 Philadelphia (A. L.) . o

4 Philadelphia (N. L.) . l

4 Brooklyn (N. L.) . \

4 New York (N. L.) . 2

4 Chicago (N. L.) . 2

5 Chicago (A. L.) . 3

thal, J. H. Zukertort, etc. The World War greatly restricted activity in the game, Europe being entirely out of the game. J. R. Capa- blanca, of Havana, in 1918 showed his marvel¬ ous powers in 38 games played at the Manhat¬ tan Chess Club, winning 33, with 5 draws. The Manhattan Chess Club championship of 1918 was won by Oscar Chajes, 6-1, who also won at the Winter Meet of the New York State Association. In the International Tour¬ nament of 1918 Capablanca was the winner.

Football Records.

_ This is probably the second most popular sport in both the United States and England. Chester, England, had had a great annual foot¬ ball game up to the 16th century, when the match was discarded in favor of foot-races patronized by the city authorities. Eton, Rugby and Soccer rules have their advocates, but the latter style of play seems to be favored at present. In 1916 an all-American team of the United States Football Association went to Scandinavia where they won three games out of six, lost one and two were drawn. In 1917 the National Challenge Cup was won by the Fall River Rovers. Previous winners of this and other games were :

NATIONAL CHALLENGE CUP.

1913 True Blues, Paterson

1914 Bethlehem F. C., Bethlehem

1915 Scottish- Americans of Newark

1916 Bethlehem F. C.

1917 Fall River Rovers

1918 No games

INTERCOLLEGIATE LEAGUE .

1913 Harvard

1914 Pennsylvania’

1915 Haverford

1916 Pennsylvania

1917 Pennsylvania

1918 Games canceled

Y ALE-HARVARD FOOTBALL .

1913 Harvard

1914 Harvard

1915 Harvard

1916 Yale

1917 No-games

1918 No games

Basketball Records.

Intercollegiate League Winners : 1912, Co¬ lumbia; 1913, Cornell; 1914, Cornell; 1915, Yale; 1916, Pennsylvania; 1917, Utah; 1918, Pennsylvania.

Lawn Tennis Records.

National Championship: 1913, M. E. Mc- Loughlin ; 1914, R. Norris Williams ; 1915, Wm. M. Johnston; 1916, R. Norris Williams;

1917, no contest ; 1918, Robert Lindley Murray. Davis Cup Contests: 1913, U. S. A; 1914, Australasia; 1915, no contests during World War.

Wrestling Records.

Intercollegiate Championships (by points) :

1912, Cornell; 1913, Cornell; 1914, Cornell; 1915, Cornell; 1916, Cornell; 1917, Cornell;

1918, Penn State.

Professional International Tournament: 1915, Zbyszko won final bout at New York City.

Fencing Records.

National Championship Amateur Fencing League of America (foil) : 1912, S. Hall; 1913, A. V. Z. Post; 1914, Dr. S. D. Breckinridge; 1915, Lieut. Oliver A. Dickinson; 1916, A. E. Sauer; 1917, Sherman Hall; 1918, no contest.

Intercollegiate Champions: 1916, L. Mou- quin; 1917, Jeter (Navy); 1918, Javier Hor- casitan (Mexican).

Hockey Records.

Amateur Hockey League Championships :

1913, New York; 1914, Saint Nicholas; 1915, Saint Nicholas; 1916, Saint Nicholas; 1917, Boston; 1918, New York.

World's Professional Hockey Champion¬ ship (Stanley Cup): 1912, Quebec; 1913, Que¬ bec; 1914, Toronto; 1915, Vancouver; 1916, Les Canadiens; 1917, Metropolitans (Seattle); 1918, Toronto.

Skating Records.

International Outdoor Championship : Late records are: 1914, Three-quarters mile, R. G. McLean in 2 minutes, 14 4-5 seconds; 220 yards, R. G. McLean in 23 4-5 seconds; Half-mile, R.' G. McLean in 1 minute, 42 1-5 seconds ; One mile, R. G. McLean in 4 minutes, 3 seconds; Two miles, R G. McLean in 9 min¬ utes, 2 seconds ; Three miles, H. Cody in 12 minutes, 42 seconds. 1915, 220 yards, Edmund Horton in 20 3-5 seconds ; Half-mile, Russell Wheeler in 1 minute, 25 seconds; One mile, H. Cody in 2 minutes, 58 1-5 seconds ; Two miles, Russell Wheeler in 6 minutes, 10 sec¬ onds ; Three miles, Anton O'Sicky in 9 min¬ utes, 42 seconds. 1916, 220 yards, Lot Roe in 21 2-5 seconds; Half-mile, Ray McWhirter in 1 minute, 28 3-5 seconds ; One mile, Harry Cody in 3 minutes, 15 2-5 seconds; Tw.o miles, Arthur Staff in 6 minutes, 24 4-5 second; Three miles, Carl Fisher in 9 minutes, 42 4—5 seconds. 1917, 220 yards, E. Horton in 20 1-5 seconds; Half-mile, Arthur Staff in 1 minute, 24 2-5 seconds ; One mile, S. Larsen in 2 minutes, 52 seconds; Two miles, Arthur Staff in 5 minutes, 57 3-5 seconds; Three miles, Arthur Staff in 9 minutes, 35 1-5 seconds. Other skating records are in World's Records section.

Bowling Records.

American Bowling Congress: 1916, In¬ dividual, Frank Shaw, > Chicago, 685; two-man event, Thoma and Marino, Chicago, 1,279; five- man event, Commodore Barry's, Chicago, 2,905. 1917, Individual, Otto Kallusch, Rochester, 698; two-man event, Satorius-Holzschuh, Peoria, 1,346; five-man event, Birk Brothers, Windy City League, 3,061. 1918, Individual. C. Styles,

Detroit, 702; two-man event, H. Steers and Fred Thoma, 1,335; five-man event, Aquilas Cigars, Saint Paul, 3,022.

College Athletics.

Intercollegiate Amateur Athletic Associa¬ tion Championship Winners: 1912, Pennsyl¬ vania; 1913, Pennsylvania; 1914, Cornell; 1915, Cornell; 1916, Cornell; 1917, no games; 1918,

Cornell. _ _

Golf Records.

United States Open < Championship Win¬ ners: 1912, Jack McDermott; 1913, Francis

Ouimet; 1914, W. C. Hagen; 1915, Jerome Travers; 1916, Charles G. (Chick) Evans, Jr.; 1917, no games; 1918, no games.

United States Amateur Championship Win¬ ners: 1912, J. Travers; 1913, J. D. Travers; 1914, Francis Ouimet; 1915, Robert A. Gard¬ ner; 1916, Charles G. Evans, Jr.; 1917, no games; 1918, no games.

Track and Field Athletics.

National Amateur Athletic Union, Junior Championships: 1912, New York Athletic Club; 1913, Chicago Amateur Athletic; 1914, New York Athletic Club; 1915, Olympic Club; 1916, New York Athletic Club; 1917, Illinois Ath¬ letic Club ; 1918, Chicago Athletic Association.

National A. A. U. Senior Championships : 1912, Irish-American A. C. ; 1913, Irish-Ameri- can A. C. ; 1914, Irish-American A. C. ; 1915, Olympic Club ; 1916, Irish-American A. C. ; 1917, Chicago A. A.; 1918, Chicago A. A.; 1919, New York A. C.

N. A. A. U. All-Round Championships: 1912, James Thorpe (Indian) ; 1913, F. C., Thompson; 1914, Avery Brundage; 1915, A. Richards; 1916, Avery Brundage; 1917, I. H. Goelitz ; 1918, Avery Brundage.

Swimming. — A. A. U. Championships. Senior National Indoor Swimming Cham¬ pionships: 1916, 50 yards, by Duke P. Kahana-moku; 100 yards, by Perry McGillivray; 200 yards, Michael McDermott; 220 vards, Herbert Vollmer; 500 yards, Ted Cann. 1917, 50 yards, P. McGillivray; 100 yards, Ted Cann; 220 yards, N. Ross ; 500 yards, N. Ross.

Senior National Outdoor Championships: 1916, 440 yards, Ludy Langer ; 880 yards, Ludy Langer; One mile, Ludy Langer. 1917, 440 yards, N. Ross ; 880 yards, W. L. Wallen ; One mile. N. Ross. 1918, 440 vards, W. L. Wallen; 880 yards, W. L. Wallen ; One mile, W. L.

\ alien. Rowing Records.

Yale vs. Harvard — Varsity Eights: 1913, Harvard; 1914, Yale; 1915, Yale; 1916, Har¬ vard; 1917, no race; 1918, Harvard.

Oxford and Cambridge: 1913, Oxford; 1914, Cambridge; war precluded races in 1915, 1916, 1917 and 1918.

For other records see World's Records tables at end of this article.

Event

100-yards .

150 yards . .

200 yards . .

250 yards .

300 yards .

350 yards .

400 yards .

440 yards .

500 yards .

600 yards .

880 yards .

1,000 yards .

1,500 yards .

1 mile .

1 mile .

2,000 yards .

1 1/2 miles .

2 miles .

3 miles .

4 miles .

5 miles .

6 miles .

8 miles .

10 miles .

15 miles .

20 miles .

25 miles .

30 miles .

50 miles .

100 miles .

Event

100 yards .

100 yards .

120 yards .

130 yards .

150 yards .

200 yards .

300 yards .

350 yards .

400 yards .

440 yards .

500 yards .

600 yards .

880 yards .

3/4 mile .

1 mile .

11/2 miles .

2 miles .

3 miles .

4 miles .

5 miles .

10 miles .

50 miles .

100 miles .

500 miles .

Event Quarter mile . . . Half mile .

1 mile .

2 miles .

3 miles .

4 miles .

5 miles .

6 miles .

7 miles .

8 miles .

10 miles .

15 miles .

20 miles .

25 miles .....

50 miles .

100 miles .

1 hour .

2 hours .

1 2 hours .

24 hours .

Event

1 mile .

2 miles .

3 miles .

4 miles .

5 miles . .

8 miles .

15 miles .

20 miles .

30 miles .

40 miles .

50 miles .

100 miles .

500 miles .

Six days .

World’s Sport Records.

RUNNING AMATEUR RECORDS.

Time

9 3/5s .

14 2/5s .

19 2/5s .

24 3/5s .

29 3/4s .

36 2/5s .

42 l/5s .

47s .

57 3/5s .

lm. 1C 4/5s .

lm. 51 l/5s .

2m. 12 2/5s .

3m. 58 l/5s .

4m. 12 3/5s .

4m. 14 2/5s .

5m. 7 l/5s .

6m. 46 2/5s .

9m 9 3/5s .

14m. 17 3/5s .

19m. 23 2/5s .

24m. 33 2/5s .

29m. 59 2,/5s.. _

40m. 15 l/6s .

50m. 40 3/5s .

lh. 23m. 24 l/5s. .

lh. 51m. 54s .

2h. 39m. 29 2/5s. . 3h. 17m. 36 l/2s. .

6h. 13m. 58s .

17h. 36m. 14s .

Holder.

D. J. Kelly .

W. R. Applegarth . W. R. Applegarth . W. T. Macpherson .

j. Donaldson .

M. W. Long .

M. W. Long .....

M. W. Long .

C. N. Seedhouse. . . .

M. W. Sheppard. . .

J. E. Meredith .

Mel. Sheppard

W. Snook . .

N. S. Taber .

Joie W. Ray .

A. Shrubb .

T. P. Conneff .

A. Shrubb .

A. Shrubb .

A. Shrubb .

A. Shrubb . .

A. Shrubb .

A. Shrubb . .

A. Shrubb .

C. Pores .

G. Grassland . .

H. Green . .

J. A. Squires .

E. W. Lloyd .

J. Saunders .

Country Date

U. S. A . 1906

England . 1913

England . 1912

England . 1891

England . 1913

U. S. A . 1900

U. S. A . 1900

U. S. A . 1900

England . 1913

U. S. A . 1910

U. S. A . 1910

U. S. A . 1915

England . 1886

U. S. A . 1913

U.S. A . 1919

England . 1903

U. S. A . 1895

England . 1904

England . 1903

England . 1904

England . 1904

England . 1904

England . 1904

England . 1904

England . 1919

England . 1894

England . 1913

England . 1885

England . 1913

U. S. A . 1882

RUNNING — PROFESSIONAL RECORDS.

Tim e Holder

9 l/2s (down hill) . . A. B. Postle .

9 3/5s . R. Walker .

11 l/4s . J. Donaldson . .

12s . • . J. Donaldson .

14s . J. Donaldson .

19 l/2s . J. Applett . .

30s . H. Hutchins .

37 l/5s . B. R. Day .

44 4/5s . A. R. Downer .

47 4/5s . B. R. Day .

59s . J. Powers .

lm. 13s . E. C. Bredin .

lm. 53 l/2s . Frank Hewitt .

3m. 7s . Wm. Richards .

4m. 12 3/4s . . W. G. George .

6m. 43 l/2s . W. Cummings .

9m. 11 l/2s . W. Lang .

14m. 19 l/2s . P. Cannon .

19m. 25 2/5s . P. Cannon .

24m. 40s . J. White .

51m. 5 l/5s . H. Watkins .

5h. 55m. 4 l/2s . G. Cartwright .

13h. 26m. 30s . C. Rowell .

109h. 18m. 20s . P. Fitzgerald .

Country Date

Australia . 1906

South Africa . 1913

South Africa . 1909

New South Wales. . . 1911

South Africa . 1911

England . 1876

England . 1884

W. Australia . 1906

England . 1897

W. Australia . 1907

U. S. A . 1881

England . 1897

England . 1871

England . 1 866

England . 1886

England . 1880

England . 1883

England . 1888

England . 1888

England . 1 863

England . 1899

England . 1887

U. S. A . 1882

U. S. A . 1884

WALKING RECORDS.

Holder

AMATEUR Time

lm. 22 l/5s . F. H. Creamer

3m . F. H. Creamer

6m. 22 4/5s . W. Murray. . .

13m. 11 2/5s . G. E. Larner. .

20m. 25 4/5s . G. E. Larner..

14s . G. E. Larner

l/5s . G. E. Larner

26 l/5s . G. E.

40 2/5 s . G. H

Larner Goulding .

27m.

36m.

43m.

50m.

58m. 8 2/5s . G. E. Larner .

lh. 15m. 57 2/5s . G. E. Larner .

2h. 7m. 17 3/5s . Ed. Renz .

2h. 47m. 52s . T. Griffith .

3h. 37m. 6 4/5s . S. C. A. Schofield.

7h. 52m. 27s . J. Butler .

18h. 4m. 10 l/5s . T. E. Hammond.

8 miles, 438 yards . G. E. Larner .

15 miles, 128 yards . H. V. L. Ross. . . .

73 miles, 14 yards (road walk) . . E. C. Horton .... 131 miles, 580 3/4 yards . T. E. Hammond.

Country Date

New Zealand . 1897

New Zealand . 1897

Australia . 1912

England . 1904

England . 1905

England . 1905

England . 1905

England . 1905

U. S. A . 1915

England . 1905

England . 1908

U. S. A . 1917

England . 1870

England . 1911

England . 1905

England . 1908

England . 1905

England . 1911

England . 1914

England . 1908

PROFESSIONAL WALKING RECORDS.

Time Holder Country

6m. 23s . . W. Perkins . England .

13m. 14s . J. W. Raby . England .

20m. 21 l/2s . J. W. Raby . England .

27m. 38s . J. W. Raby . England .

35m. 10s . J. W. Raby . England .

58m. 37s . . . J. Meagher . U. S. A .

lh. 55m. 56s . J. W. Raby . England .

2h. 39m. 57s . W. Perkins . England .

4h. 34m. 54s . W. Howes . England .

6h. 16m. 50s . W. Howes . England .

7h. 54m. 16s . J. Hibberd . England.

Date

... 1874

. . . 1883

, . . 1883

. . 1883

. . 1883

. . 1882 .. 1883

.. 1877

. . 1878

.. 1878

1 888

18h. 8m. 15s . . . W. Howes . England . 1880

130h. 33m. 45s . G. Littlewood . England . 1882

531 miles, 135 yards . G. Littlewood . England . 188.9

World's Sport Records — Continued

JUMPING, AMATEUR

Event Record Holder Country Date

Running high jump . 6ft. 7 5/16in . E. Beeson. . . U. S. A . 1914

Running broad jump . 25ft. 3in . E. O. Gourdin . U. S. A . 1921

Standing broad jump . lift. 6in . R. C. Ewry . U. S. A . 1906

Standing high jump . 5ft. 5 3/4in . L. Goehring . U.S.A . 1913

Three standing jumps . 35ft. 8 3/4in . R. C. Ewry . U. S. A . 1903

Pole jump . . 13ft. 2 l/4in . M. S. Wright . U. S. A . 1912

Hop, step and jump . 50ft. llin . D. Ahearn . „. U. S. A . 1911

JUMPING, PROFESSIONAL.

Event Record Holder Country Date

Running high jump . 6ft. l/2in . E. W. Johnson . U. S. A . 1881

Running wide jump . 22ft. 6in . T. F. Keane . England . 1900

Standing broad jump . 12ft. 1 l/2in . J. Darby . . . England . 1890

Standing high jump . 5ft. 5 l/2in . J. Darby . England . 1892

Three standing jumps . 36ft. 3in . T. Colquitt . England . 1907

Pole jump . lift. 9in . R. B. Dickerson . Ireland . 1892

Hop, step and jump . 48ft. 8in . T. Burrows . U. S. A . 1884

HURDLE JUMPING, AMATEUR.

Event Record Holder Country Date

120 yards . 15s. (10 hurdles 3ft. 6in. high) ... F. C. Smithson . U. S. A . 1908

220 yards . 23 3/5s.(10 hurdles 2ft. 6in. high. A. Kraenzlein . U. S. A . 1898

440 yards . 56 4/5s. (10 hurdles 3ft. high). . G. R. Anderson . England . 1910

THROWING WEIGHTS, AMATEUR.

Event Record Holder Country Date

Putting 16-lb. weight . 51ft . R. Rose . . . U. S. A . 1909

Throwing 16-lb. hammer... 191ft. 5in . P. McDonald . U. S. A . 1912

Throwing 56-lb. weight. . . . 40ft. 6 3-8in . M. J. McGrath . U. S. A . 1911

Throwing discus . 143ft. 9 l/2in. (4 2/5 lb.). . J. Duncan . U. S. A . 1912

Throwing javelin . 207ft. 7in . F. Mayyrae . Sweden . 1914

Event

50 yards .

100 yards .

120 yards .

1 50 yards .

200 yards .

300 yards .

400 yards .

440 yards .

500 yards .

600 yards .

800 yards .

1,000 yards .

1,500 yards .

1 mile .

2 miles .

Record

23 2/5s .

53s .

lm. 8 2/5s. (bath) . lm. 29 4/5s. (bath)

2m. 7 2/5s .

3m. 16 3/5s. (bath)

4m. 51 l/5s .

5m. 17s .

5m. 53 2/5s. (bath)

7m. 32 2/5s .

10m. 11 3/5s .

12m. 52 2/5s .

19m. 47 4/5s .

23m. 16 4/5s .

54m. 54s .

SWIMMING, AMATEUR.

Holder

. Duke P. Kahanamoku

. D. P. Kahanamoku . , .

. P. McGillivray .

. H. C. Vollmer .

. H. J. Hebner .

. . Norman Ross .

. B. Kieran .

. Ludy Langer .

. Norman Ross .

. B. Kieran .

. B. Kieran .

. . B. Kieran .

. B. Kieran .

. B. Kieran .

. George Read .

Country

Hawaii .

Hawaii .

U. S. A .

U. S. A .

U. S. A .

U. S. A .

Australia . ' .

Hawaii .

U. S. A .

Australia .

Australia .

Australia .

Australia .

Australia .

Australia .

Date

Distance

1 mile .

1 mile .

1 mile .

2 miles .

4 miles .

10 miles .

50 miles .

100 miles .

WORLD TROTTING RECORDS.

Horse Time

Peter Manning. . . . 1:57} .

Uhlan (with running mate) . 1:54? .

Major Delmar (high wheel sulky) . 2:07 . .

Harvester . 4:15} .

Bertie R. (in England) . 9:58 .

Pascal . 26:15 .

Ariel . 3:55:40? .

Conqueror . 8:55:53 .

Date

1921

1913

1904

1910

1899

1893

1846

1853

WORLD PACING RECORDS.

Distance Horse Time Date

1 mile . Dan Patch . 1:55 J . 1906

2 miles . Dan Patch . 4:17 . 1903

5 miles . Marconi (in Quebec) . 12:03} . 1917

AUTOMOBILE RECORDS.

Event

Car

Driver

Place

Time

Date

1 mile .

25.50

1911

2 miles .

51.28

1911

3 miles .

1:26.61

1917

5 miles .

2:24.65

1917

10 miles .

4:50.88

1917

20 miles .

10:50.20

1918

25 miles .

14:12.72

1917

50 miles .

26:23.1-5

1919

100 miles .

54:20.98

1917

150 miles .

1:26:14.90

1917

200 miles .

1:55:11 . 05

1917

250 miles .

2:23:04.03

1916

300 miles . . .' .

2:55:32.23

1915

500 miles .

5:07:26.00

1915

TRAP SHOOTING RECORDS, PROFESSIONAL AND AMATEUR.

Straight scores: 565 straight by C. G. Spencer, 16 yards, Viola, 1909; 419 by J. R. Graham, 16 yards, Chicago, 1910; 99 by E. C. Carlton, 17 yards, Omaha, 1913; 104 by Harvey Dixon, 18 yards, Saint Louis, 1916; 100 by Riley Thompson. 19 yards, Chicago, 1910; 100 by C. A. Gunning, 19 yards, Omaha, 1913; 138 by H. S. Wells, 20 yards, Betterton, Md.t 1915; 119 by Fred Plum, 21 yards, Mapleton, N. H., 1916; 108 by Mark Arie, 22 yards, Chicago, 1917; 99 by Walter Huff, 22 yards, Atlanta, 1917; 100 by C. A. Young, 23 yards, Peru, Ind., 1916.

BILLIARD RECORDS.

Straight-rail: Maurice Vignaux, 1,531 on 5 X 10 table, Paris, 1890; Jacob Schaefer, 3.000 run on 4$ X9 table, San Francisco, 1890. 14.2 balkline and anchor allowed, Jacob

Schaefer, 566; same, anchor barred, F. C. Ives, 359. 18 1

balkline, 359, F. C. Ives, 1897. 18.2 balkline, W. F. Hoppe,

308, 1915. 14.1 balkline, W. F. Hoppe, 303, 1914. Cushion-

caroms, F. C. Ives, 85, 1896; three-cushion, G. W. Moore, 15, 1911. Continuous pocket billiards, B. Allen, 71, 1914.

SPORTS IN PLANTS

443

RAILROAD SPEEDS.

Records are: Philadelphia and Reading, 1904, 4.8 miles in 2m,. 30s., from Egg Harbor to Brigantine Junction, averaging 115.20 miles per hour. New York Central and Hudson River Railroad, by “ Empire State Express,” in 1893, 1 mile in 32 seconds, averaging 112.5 miles per hour. Fleming to Jacksonville, 5 miles, in 2m., 30s., an average of 120 miles per hour (1901). Long distance recores are: Paddington to Bristol, England, on Great Western Railway, in 1904, 118.5 miles in lh., 24m., averaging 84.6 miles per hour. Alpine, N. Y., to Geneva Junction, N. Y., on Lehigh Valley Railroad “ Black Diamond Express,” 43.96 miles in 33 minutes, averaging 80 miles per hour.

BICYCLING.

Records: Fastest amateur mile in competition’ lm„ 53 2/5s., by Hans Ohrt, 1915. 100 kilometer paced record

is 59m., Is. by Guignard, 1909. One-hour professional paced record is 63 miles 189.8 yards by Guignard, 1909. Amateur one-hour paced record is 56 miles 1,128 yards by F. Cuzin, 1909. One-hour unpaced record is 27.50 by Oscar Egg, 1914.

MOTORCYCLE RECORDS.

Professional: One mile in 36s.; two miles in lm., 12 2/5s.; five miles in 3m., 6 4/5s.; 10 miles in 6m., 6 1 /8s. ; 25 miles in 16m., 27s.; all by Ray Seymour, 1912. 50 miles in 33m.,

55 l/5s. by W. Humiston; 100 miles by Humiston; 200 miles in 4h.,

5m., 54 2/5s., by H. Martin, 1909; 400 miles in 9h., 6m., 25 4/5s., by H. A. Collier, 1909. In 6 hours 294 miles 800 yards; 12 hours, 471 miles 784 yards. In continuous riding, A. T. Bedell did 1,153£ miles in 24 hours, 1917.

Amateur one-mile in 55 4/5s., by C. Spencer, 1909, with standing start; Lon Claflin, 1912, did one mile in 38 4/5s., five miles in 3m. 18 4/5s., 10 miles in 6m., 42s. Fred Huyck did (1909) 25 miles in 20m. 54s. 100 miles was done by

M. J. Graves, 1915, in lh., 34m., 41s. 500 miles in lOh. 22m, 36s., by C. Spencer, 1909, who did 1,000 miles in 22h, 20m. 59s., same date.

MOTOR BOAT RACING RECORDS

1. Philadelphia to Bermuda (734 miles) won by Dream in 87h.. 25m. Bermuda to Brooklyn (680 miles) by Tocsam II in 70h., 27m., 39s., New York to Albany (235 miles) by Blue Peter V in 23h., 2m., 45s. International Harmsworth Trophy won at Isle of Wight by Mapleleaf at average speed 55.646 miles per hour. (No races till after the War.)

2. The Lake George Cup Race winner, Miss Minne¬ apolis, averaged in six one mile trials a speed of 61.08 statute miles per hour.

3. New York City to Albany and return, 235 miles in 29h., 38m., 26s., by Luetla. Miami to Palm Beach, Fla., 70 miles, in lh., 47m., by Raven III. In the National One- Mile championship race, Miss Detroit II won. She did six one-mile dashes against time, averaging 61.72 miles per hour.

SKATING.

American amateur records: 50 yards, Robert McLean in 5s. (1914). 100 yards, Morris Wood in 9 3/5s. (1903). One

mile, Morris Wood in 2m., 41 l/5s. (1904). One and one-half miles, L. Roe in 4m., 10s. (1910). Four miles, A. Schiebe in 12m., is. (1894). Five miles, E. Lamy in 14m., 55s. (1910). 1,000 metres, J. K. McCulloch in lm., 47s. (1897). 1,500

metres, J. K. McCulloch in- 2m,, 40 4/5s. (1897). 5,000

metres, J. K. McCulloch in 9m., 25 2/5s. (1897).

World's amateur records: 500 metres in 43 7/10s.; 1,000 metres in lm., 31 2/5s.; 1,500 metres in 2m., 19 l/2s. ; 5,000 metres in 8m., 36 3/5s. 10,000 metres in 17m.,

22 6/ 10s. All by O. Mathiesen of Norway.

Professional records: 50 yards, S. D. See and C. B. Davidson in 6s. (1885). 100 yards, J. S. Johnson in 9 4/5s.

(1893). 440 yards, J. S. Johnson in 31 3/ 4s. (1896). 600

yards, O. Rudd in 55 3/5s. (1893). One mile, Arthur Staff in 2m., 35s. (1916). One and one-half miles, J. Johnson in 4m., 28s. (1894). Two miles, J. Nillson in 5m., 33 2/5s. (1900). Three miles, J. Nillson in

8m., 41 l/5s. (1900). Four miles, J. Nillson in 12m. l/5s. (1897). Five miles, O. Rudd in 14m. 34s. (1896). 20 miles, A. D. Smith in

lh., 6m., 36 2/5s. (1894). 25 miles, John Karlsen in lh.,

30m., 15s. (1916). 50 miles, J. F. Donohue in 3h., 15m.,

59 2/5s. (1893). 100 miles, J. F. Donohue in 7h., 38 l/5s.

(1893).

BOWLING.

World's records: Individual, open, three games, Roy Flagg, 270, 300, 300, average 290, 1906. Six games, Lee R. Johns average 271 J, 1909. All events, Mortimer Lindsey, in nine games, average 225 6/9, 1912. Highest woman's score, Mrs. Nellie Lester, New York, 277, 1909. Two-men, open, Knox-Satterthwaite, Philadelphia, 1,445, 1912. Six games, Chailes Schaeder, average 256 1/6, 1907.

SPORTS IN PLANTS, a term in biology denoting an individual which differs more or less markedly from the type or parent species; an aberrant form. It is distinguished from

"monstrosity" by its ability to transmit its aber¬ rant character either sexually or asexually to offspring; whereas monstrosities properly so-called lack this power, their offspring, if any, reverting to the general type. The origin of sports has furnished much food for speculation, some biologists assuming that aberrations are freaks which nature destroys, while others de¬ clare that the transmutation of species is de¬ pendent upon them through the processes of natural selection of the adaptive ones. If the term is to be used as an approximate synonym of monstrosity the first hypothesis is probably true; but if used in its broadest sense the latter is more nearly correct. The matter hinges mainly upon the extent of observation ; for, while sports among undomesticated animals are comparatively rare, they are numerous among uncultivated plants, but have been commonly overlooked because biologists have been more awake to the animal than the plant. Each leaf- bud of a plant is capable of producing leaves and branches which differ from those produced by any other bud, and every flower-bud may produce a flower unlike any of its fellows; nay, further, the individual seeds which follow any flower in a single fruit may produce plants unlike one another in many respects and also unlike the parent. But unless these departures are striking enough to attract the attention of the ordinary observer as distinct they are un¬ noted and hence not calculated upon; hence the popular opinion that

sports appear “suddenly,” since only the remarkable cases are observed.

They can be no doubt that sports result from unusual or complex stimuli or unaccount¬ able refrangibility of vegetative force, and for these reasons may be, usually are, unstable when normal conditions are again operative. However, this does not oppose but it rather en¬ forces the statement that sports result from the same causes as underlie all variation in the plant kingdom, bud-variation being one of the most important and significant phenomena of plantlife. But though the causes are usually un¬ known in plants and vertebrate animals, sports have been produced artificially with diverse lepidopterous insects by varying the humidity, dryness and temperature of the air during the process of growth or pupation. The crossing of the sports with the type-species does not usu¬ ally result in an intermediate form but in two main groups, in one of which the offspring re¬ semble the male parent and in the other the female.

From a practical standpoint, selection and breeding of sports has long been widely em¬ ployed. Among domestic animals one of the most striking instances is that of Ancon or otter sheep, the ancestor of which was a long¬ bodied, crooked-legged freak which was bred to sheep of normal character. Only the in¬ dividuals which resembled the aberrant parent were used for subsequent breeding. With do¬ mesticated plants the practice of breeding from the sports is still more striking, because it can be practised either sexually or asexuallv. The initial sport may appear as a seedling or as a “bud-variation.” In the former case the gar¬ dener usually progagates by means of seed, rigorously discarding all specimens that depart unfavorably from the apparent intent of the primal sport, and carefully saving those sped-

mens that approximate or accentuate the char¬ acters. If the sport is a bud-variation the gardener usually propagates it by means of cuttings, practising a careful suppression of in¬ dividuals which seem to retrogress and select¬ ing desirable ones for further propagation, as in the former case. It may seem expedient to practise asexual methods with a plant pro¬ duced sexually or vice-versa; in each case, however, the after-selection is imperative. Some bud-varieties fail to ((come true® even from cuttings, and failure in this respect is common among seed sports. Bud-variation and seed-variation are the same kind since the same means of improvement can be used in each case.

Far from being comparatively rare, sports are very common among cultivated plants, al¬ most every species of importance furnishing in¬ stances. Among well-known bud-sports : the purple or copper beech, purple-leaved plums, and many weeping, variegated and cut-leaved trees and shrubs, are familiar examples. The perle dcs jardins rose has given rise to several commercially important bud-varieties. The moss-roses are bud-sports. The ˆmixing® of potatoes in the hill is also well known. Among plants propagated by seeds instances are legion — tomatoes, cabbage, corn, parsley, onions and a host of garden flowers. Probably the most striking instance of a plant producing both bud-sports and seed-sports of value is the peach. Occasionally a seed will produce a smooth¬ skinned fruit popularly called a nectarine, which in turn may produce either a nectarine or a peach. Certain branches of the peach tree may produce nectarines and vice-versa. Russet ap¬ ples are sometimes seen upon greening trees. The sports may occur in any part of the parent plant — roots, tubers, rhizomes, stems, flowers, leaves, seeds and even buds upon the stem or the roots.

Another practical application of the tendency to sport among plants is the grafting of fruit trees with scions taken from the ((bearing wood® of specially prolific or precocious trees of any particular variety. Such scions usually com¬ mence to bear earlier, or produce more regu¬ larly, or both, than scions taken from shaded portions of the same parent trees or from un¬ productive individuals.

One of the common troubles with sports is self-sterility. This is scarcely important ex¬ cept with fruit trees where, if large blocks of one kind of tree are planted remote from other varieties that blossom at the same time, little or no fruit will be set. See paragraph Varie¬ ties under title Apple.

Sports are to be distinguished from rever¬ sions in which the individual seems to hark back to the general form of its more or less distant ancestors. They must also be separated from cases of atavism (q.v.) in which the progeny exhibit a character not typical of their race, species or genus but characteristic of an allied ancestral race. Instances of reversion (q.v.) are the loss of the bulbous root of turnips and the <(head® of cabbage which ((run Wild® ; of atavism, the occasional appearance of several-toed horses* whose feet somewhat re¬ semble the three-toed foot of the horse of Tertiary time. See Breeding; Bud; Heredity; Hybridity; Natural Selection; Variation, and consult the authorities cited under them.

SPOT, a fish. See Goody.

SPOTSWOOD, spots'wiid, Alexander,

American colonial governor : b. Tangier, Africa, 1676; d. Annapolis, Md., 7 June 1740. He en¬ tered the English army in early youth, fought at the battle of Blenheim, was deputy quarter¬ master-general under the Duke of Marlborough and in 1710 was appointed governor of Virginia. His administration was one of great benefit to the colony, he was the bearer of the writ of habeas corpus, a fact which gained for him the favorable attention of the colony, and his popularity was for a long time unbroken. He greatly assisted the William and Mary College, concluded a treaty with the Six Nations in 1722 which secured for the colonists the terri¬ tory east of the Blue Ridge, south of the Poto¬ mac, and originated the act to make tobacco notes a medium of purchase, introduced various beneficial measures into the Colony. His aim was invariably the good of the colony, but his haughtiness won for him in time enemies, and the controversy which arose over church patron¬ age, which he held to be a privilege of his office, enabled his opponents to gain his removal from office in 1722. He continued his residence in Virginia, served as deputy postmaster-general in 1730-39 and greatly improved mail facilities. He fostered the iron industry, endeavored to promote vine-culture and otherwise evinced an undiminished interest in the colony. In 1740 he was appointed major-general to command an expedition to the West Indies, but died ju£t previous to embarking. His letters were pur¬ chased by the Virginia Historical Society in 1882 and published in their collection as (The Official Letters of Alexander Spotswood, Lieu¬ tenant-Governor of Virginia in 1710-1722)

(1882-85).

SPOTSWOOD, or SPOTISWOOD, spot'- ls-wud, John, Scottish ecclesiastic: b. in the parish of Mid-Calder, Midlothian, 1565; d. Lon¬ don, 26 Nov. 1639. He studied at the University of Glasgow, and at 18 became assistant to his father as parson of Calder. At the outset he supported the Presbyterian party, but in 1601, when the Earl of Lennox was sent as Ambas¬ sador to France, Spotswood accompanied him as chaplain and ((made no scruple to go in to mass.® On his return he was complained of to the General Assembly, but through the influence of the court escaped with merely a reprimand. He became a favorite at court, and in 1603, when King James set out for England, was one of the five Scottish clergymen selected to ac¬ company him. In the course of the journey news arrived of the death of the archbishop of Glasgow, and Spotswood was immediately appointed his successor, and in consequence re¬ turned to Scotland, but was not consecrated till 1610. In 1615 he exchanged Glasgow for the

metropolitan see of Saint Andrews and became primate of Scotland. In 1618 he presided over the General Assembly at Perth, and succeeded in carrying the five points of ecclesiastical dis¬ cipline known as the Perth Articles. He con¬ tinued to enjoy royal favor under Charles I, whom he crowned in the abbey church of Holyrood in 1633, and a little later he was made chancellor of Scotland. But by his harsh pro¬ cedure against Lord Balmerino contributed greatly to inflame the opposition to episcopal government, which now became general among all ranks, and finally led to its overthrow. In

1638, at the assembly held at Glasgow, he was deposed, excommunicated and declared in- famous. He saved himself by flight, and took up his residence in London, where he died. He is the author of a (History of the Church of Scotland1 (1655), commencing at 203 and con¬ tinued to the end of the reign of James VI.

SPOTTED FEVER, cerebro-spinal men¬ ingitis. (See Meningitis). Spotted fever is a term also applied to a form of typhus fever (q.v.).

SPOTTED SANDPIPER. See Sand¬

piper.

SPOTTISWOODE, spot'is-wiid, William, English mathematician and physicist : b. Lon¬ don, 11 Jan. 1825; d. 27 June 1883. He was educated at Balliol College, Oxford, and in 1846 became manager of his father’s printing establishment, the well-known house of Eyre and Spottiswoode. He was the author of (A Tarantasse Journey through Eastern Russia) (1857) ; (Meditationes Analyticae1 (1847) ; (Elementary Theorems relating to Determi¬ nants1 (1851); (The Polarization of Light1 (1874), etc. He was president of the London Mathematical Society (1870-72), of the British Association (1878), and of the Roval Society (1878). In mathematics he is chiefly distin¬ guished as one of the first to make extensive use of the symmetrical determinant notation, and as the author of a series of papers in the Philosophical Transactions1 of 1862 and the following years on the contact of curves and surfaces. In physics he devoted himself mainly to the study of polarized light and electrical discharge through rarefied gases.

SPOTTSYLVANIA COURT HOUSE, Battles of. The battle of the Wilderness (q.v.) was fought 5 and 6 May 1864, and a reconnois-

sance made by General Birney's division down the Orange plank road, on the morning of the 7th, developed the fact that the Confederates had fallen back to their intrenched lines, with pickets to the front, covering a part of the battlefield. ((From this,11 says General Grant, (<it was evident to my mind that the two days' fighting had satisfied him (Lee) of his inability to further maintain the contest in the open field, notwithstanding his advantage of position, and that he would await an attack behind his works. I, therefore, determined to push on and put my whole force between him and Rich¬ mond, and orders were at once issued for a movement by his right flank.11 The first ob¬ jective was Spottsylvania Court House, 15 miles southeast of the Wilderness field, which, by a night march it was proposed to reach early on the morning of the 8th. As a preliminary to the movement Sheridan's cavalry was to seize Todd's Tavern, on the Brock road, midway be¬ tween the Wilderness field and Spottsylvania Court House, and hold the place and the roads crossing Po River. This was done on the 7th, the Confederate cavalry being driven from the place, Wade Hampton's division retreating south to Corbin's bridge over the Po, and Fitz- hugh Lee's eastward on the Brock road to¬ ward the Court House. (See Todd's Tavern, Engagement at). At 3 p.m. the trains began their movement toward Chancellorsville and Piney Grove Church; Warren's Fifth corps started after dark and, marching on the Brock road, along the rear of Hancock's Second corps,

arrived at Todd's Tavern at 3 a.m. of the 8th, much impeded and delayed in its march by the mounted provost guard of the army which immediately preceded it ; Sedgwick's Sixth corps followed, marching eastward to Chancel¬ lorsville, then southward to connect with War¬ ren ; and Burnside's • Ninth corps followed Sedgwick. Hancock's Second corps did not march until daylight when it moved to the left on the Brock road to Todd's Tavern, which it reached at 9 a.m. of the 8th, and intrenched. When Warren arrived at Todd's Tavern he found Merritt's cavalry division engaged with that of Fitzhugh Lee. At 6 a.m. Merritt was withdrawn and Robinson's division of War¬ ren's corps took its place and, slowlv driving back Lee's cavalry, had reached open ground one and one-half miles from the Court House, when from a piece of wood 200 to 300 yards in front it received a heavy musketry and artillery fire, which severely wounded Robinson, and so staggered his division that it fell back to the woods in its rear. Robinson had encountered two brigades of R. H. Anderson's corps, the advance of Lee's army, which had beaten Grant in the race for Spottsylvania Court House. Lee had divined Grant's intention and, on the 7th, had cut a military road through the forest from the Orange plank road to the highway by Shady Grove Church, thence eastward

to the Court House; and being informed by Stuart, late in the day, that Grant's trains were in motion southward, that night he gave orders for the movement of his army to the Court House, on roads nearly parallel to the Union line of march, and but a mile from the Brock road. Gen. R. H. Anderson, who commanded Longstreet's corps, had been ordered to move on the morning of the 8th, but being much troubled by the fire and suf¬ focating smoke in the Wilderness woods, con¬ cluded to avoid it, set out at 11 p.m. of the 7th and, marching all night, arrived near the Court House at 8 o'clock next morning. There, find¬ ing Lee's cavalry engaged with Warren's in¬ fantry, he marched part of his corps to Lee's support, and two brigades marched on to the Court House and occupied it, Wilson's cavalry division, that had been sent by Sheridan to seize it, and that had been in possession two hours, withdrawing. Lee's cavalry withdrew as Anderson came up, and Anderson took up the fight with Warren. Griffin's division of War¬ ren's corps, which had advanced on Robinson's right, was repulsed, and both fell back upon Crawford's and Cutler's divisions, which had now reached the front. Cutler advanced and drove the Confederates from Griffin's right, and Warren threw up intrenchments from 200 to 400 yards from those of the enemy. It was now about noon. About 1 p.m. Sedgwick came up, under Meade's order to support Warren in an assault upon the Confederate position, the right of which rested on the Brock road. It was late in the day when the assault was made. Penrose's New Jersey brigade of the Sixth corps charging over open ground was repulsed by the right of Anderson's corps. A little later Crawford's division of Warren's corps went forward, passed the right of Anderson and struck Rodes' division of Ewell's corps, which was going into position on Anderson's right. Rodes, taken at a disadvantage, was driven back some distance, but rallied and drove Craw-

ford back to his intrenchments. Ewell's entire corps came up during the evening and formed on Anderson's right. The Union loss during the day was about 1,300.

A. P. Hill's corps, under command of Gen¬ eral Early, came up on the morning of the 9th, and Lee established his lines covering Spottsyl-vania Court House, with Anderson's corps on the left, resting on Po River, Ewell's corps in the centre and Hill's on the right, covering the Fredericksburg road. The line was 8 to 10 miles long, and the greater part of it ran through woods tangled with undergrowth, or on the

edge of them, with slashings and abatis in front. It was everywhere strongly intrenched and well planted with artillery. During the 9th Lee was employed in rectifying and strengthen¬ ing this line, and Grant in examining and de¬ veloping it, and also in readjusting his own lines. Skirmishing was sharp on both sides, and early in the morning General Sedgwick, commanding the Sixth corps, was killed. General Wright succeeded to the command of the corps. Early in the day Burnside moved across from the Plank road to the Fredericks¬ burg road, at the crossing of Ny River, east of the Court House, and threw one of his di¬ visions across the river, which encountered in¬ fantry and some dismounted cavalry. Hancock moved east from Todd's Tavern to the right of Warren and intrenched, overlooking Po River. Sheridan cut loose from the army and started from Todd's Tavern on his Richmond raid. Burnside had reported to Grant that in his movement on the 9th he had met the enemy east of the Court House and judged from indi¬ cations in his front that Lee was meditating a movement north toward Fredericksburg, upon which Grant ordered Hancock to make a move¬ ment on the 10th on Lee's left, across the east and west bends of Po River. This movement led to the engagement on Po River (q.v.). While this battle was in progress Warren was engaged in feeling the Confederate lines in his front preparatory to an assault and Gibbon's division was withdrawn from Hancock and placed on Warren's right and for the time under his orders. At 11 a.m. Gibbon advanced with two brigades, met an obstinate resistance from Fields' division and was compelled to fall back with much loss. Warren followed with two of his own divisions, with a view to gain ground for the formation of a column of assault, and was repulsed by Fields, but he had gained information of Fields' position which induced him to report to Meade that a general assault would be successful. Hancock had been designated to make jhe assault at 5 p.m. with the Fifth and Sixth corps and part of his own, but he was engaged at Po River, and at 3.45 p.m. Meade directed Warren to make the assault, which was done with Crawford's • and Cutler's divisions of the Fifth corps and Webb's and Carroll's brigades of the Second. The assault fell upon Fields' division and failed, Warren being repulsed with heavy loss, including General Rice killed. General Han¬ cock returned from Po River at 5.30 p.m., just before the close of Warren's assault, and at 7 p.m. made another assault with Birney's and Gibbon's divisions. This assault fell on Geo. T. Anderson's brigade and Greggs' Texas brigade, both of Fields' division. Some of the

assaulting troops gained the works held by the Texas brigade and went over them, pushing back the Texans; but a flank fire of Anderson's brigade drove them out and the attack was re¬ pulsed,

many dead and wounded being left in¬ side the works. The assaulting column fell back in some disorder, the men demoralized by the fruitless work.

At about the same hour General Wright, on the left of Warren, made an assault. He had found what he deemed to be a vulnerable place to a vigorous attack. It was on the west face of the noted salient, held by Rodes' division of Ewell's corps. Upton's brigade of the Sixth corps, reinforced by four regiments of Neills, was to make the assault, supported on the left by Mott's division of the Second corps, which was to assault on its own front at 5 p.m. Upton formed in four lines, and the batteries opened a direct and enfilading fire, which ceased only when Upton charged from the woods, and under a terrible front and flank fire, went over the Confederate works, broke Doles' brigade and part of Daniel's, captured many prisoners, and pushed on to a second line of works upon which he planted his colors, and captured a four-gun battery. He had broken the Confederate line to the length of a division; but Mott had failed in his allotted task of supporting him on the left; and recovering from their surprise and temporary disaster, the Confederates threw two brigades in his front; Daniels, R. D. Johnston's, J. A. Walker's and Steuart's brigades fell upon both flanks ; and Upton was ordered to with¬ draw, which he did under cover of the darkness. He had lost about 1,000 men, many of whom were left dead and wounded inside the Con¬ federate works. He was obliged to abandon the captured battery, but he carried back with him

1.200 prisoners and several stands of colors. Farther to the left Burnside made a reconnois- sance toward Spottsylvania Court House, and had a spirited engagement, driving back the enemy close to the Fredericksburg road and intrenching a part of his line, as he reports, within a quarter of a mile of the Court House. In this engagement General Stevenson, one of his division commanders, was killed. During the day of the 10th the Union forces engaged numbered about 38,000; the losses were about

4.200 killed and wounded; but few were missing. The estimated Confederate loss was 2,000 killed and wounded.

On the morning of the 11th Grant reported to Halleck that in the six days' fighting since crossing the Rapidan he had lost 11 general officers and probably 20,000 men; renewed his call for reinforcements, which he hoped would be sent as soon as possible and in great num¬ bers ; and assured Halleck that he meant to fight it out on that line if it took all summer. Find¬ ing that the Confederate left was so well guarded, he made arrangements to attack the centre at a

salient of the line. General Wright was directed to extend his left, concentrate on that wing and he prepared to co-operate with Hancock in an assault. Hancock, with the Second corps, was to pass to the left of Wright during the night and assault the salient at daylight. Warren's Fifth corps was to assault the works in his front to keep the Confederates in them, and on the extreme left Burnside was to lead the Ninth corps in an assault. The day was very stormy and disagreeable, and no

serious fighting took place, though there was heavy skirmishing along the entire line, in which the artillery occasionally took part. Wright extended his lines during the afternoon. The two divisions of Barlow and Birney of Han¬ cock s corps started at 10 p.m., and at midnight reached the Brown House, where they found Mott's division ; and passing over the intrench- ments, and as near to the picket line of the enemy as possible, they began the formation of the column of assault. Barlow's division was formed across a clearing in two lines of masses, each regiment being doubled on the centre. Brooke's and Miles' brigades constituted the first line, and Smyth and Brown the second. Birney's division formed on Barlow's right, in two deployed lines. Mott formed in rear of Birney, and Gibbon's division was placed in reserve. It was nearly daylight when these preparations were completed, and the column formed within 1,200 yards of the Confederate line.

The Battle of the Salient. — The point to be assailed was where Lee's intrenchments had been carried northward to enclose a space about a mile in length and half a mile in width, of the general shape of an acorn : the Con¬ federates called it the "Mule-Shoe.® Taken together, the faces of the salient or "Mule-Shoe® covered about two and one-quarter miles in length, and were occupied mainly by Ewell's corps, Edward Johnson's division holding the apex or east angle of the works, and Rodes' division the west angle and face. To provide against contingencies, a second line had been laid off and partly constructed some distance in rear, so as to cut off the salient at its base. In rear of this line was Gordon's division as a reserve. On Ewell's right was A. P. Hill's corps; on his left was Longstreet's, commanded by R. H. Anderson. General Lee had detected some movements that indicated a withdrawal from the front of Anderson's corps and, under the impression that Grant had begun another flank¬ ing movement, late in the day he ordered the withdrawal of all the artillery in the left and centre, which was difficult of access, that it should be done before it

was entirely dark and that everything should be in readiness to move at any moment. Under this order Ewell's chief of artillery removed all but two batteries from the line of Edward Johnson's division. During the night Johnson discovered that the Union troops were massing in his front; and, convinced that he would be attacked in the morning, he asked Ewell for the immediate return of the artillery. The men in the trenches were on the alert, when at dawn on the morn¬ ing of the 12th they saw a dense column emerge from the woods half a mile in front of the salient and rush to the attack. Johnson says : "They came on in great disorder, with a narrow front, extending back as far as I could see.® The charging column was Barlow's division, led by the brigades of Brooke and Miles. It had been ordered to make the assault at 4 o'clock, but owing to a heavy fog it was not sufficiently light to enable objects to be clearly discerned until 4.30, when the order to charge was given. Birney, on the right, met difficulty in the rough ground over which he moved, but kept nearly abreast of Barlow's line. When the Confederate works were seen a wild cheer was given ; Brooke and Miles tore down the

abatis, and in the face of a deadly fire sprang over the intrenchments, and a desperate hand- to-hand encounter ensued; Birney came up on the right; the battalion of Confederate artillery that had been withdrawn came back just in time to have its horses and cannoneers shot down before a gun could be fired; and in a very short time nearly a mile of the works had been carried. General Johnson himself and General Steuart, 20 guns, 30 colors and nearly 3,000 men were captured. With scarcely a halt Barlow and Birney swept on for nearly half a mile; then, thoroughly disorganized, they were brought to a stand before another line of works, held by Gen. J. B. Gordon's division and Lane's brigade of Hill's corps. As Gordon was about to charge, General Lee rode up and joined him, evidently intending to go forward with him. Gordon remonstrated, the men cried, "General Lee to the rear!® and one of them seized the general's bridle and led his horse to the rear, and Gordon's men went forward and attacked the Union lines in rear of the captured works. After a fierce struggle in the pine woods the Union troops, piled in one upon another, six or eight lines deep, were forced back out of the works but held the outer side of them. The Sixth corps, coming up, took post on the right of the Second, occupying the line from the west angle southward; Mott's division joined the Sixth corps at that angle ; Birney's division came next on the left; then Gibbon's; then Barlow's. All set at work to turn the captured intrenchments. There was great confusion in the intermingling of commands on a narrow front, and the Confederates now made most determined efforts to recover their intrench¬ ments.

Anderson sent troops from the left, three brigades of Hill's corps came from the right, and for the distance of nearly a mile, amid a cold, drenching rain, the combatants en¬ gaged in a desperate struggle across the breast¬ works. General Walker, the historian of the Second corps, says : "They fired directly into each other's faces; bayonet thrusts were given over the intrenchments ; men even grappled with their antagonists across the piles of logs and pulled them over, to be stabbed or carried to the rear as prisoners. General Hancock had, as soon as the first success was achieved, brought up some of his guns to within 300 yards of the captured works, and these were now pouring solid shot and shell over the heads of our troops, into the space crowded with the Confederate brigades; he even ran a section of Brown's Rhode Island, and a section of Gibbs' Fifth United States, up to the breast works ; and though the muzzles protruded into the very faces of the charging Confederates, the begrimed cannoneers for a time continued to pour canister into the woods and over the open ground on the west of the McCod house. The contest had settled down to a struggle for the recovery of the apex of the salient between the east and the west angle. . . . Never before since the discovery of gunpowder, had such a mass of lead been hurled into a space so nar¬ row as that which now embraced the scene of combat. Large standing trees were literally cut off and brought to the ground by infantry-fire alone. If any comparison can be made between the sections involved in that desperate contest, the fiercest and deadliest fighting took place at the west angle, ever afterward known as (The

Bloody Angled Here Wright's Sixth corps had taken post on coming up at 6'o'clock. . . . All day long the bloody work went on, and still the men of the North and of the South were not gorged with slaughter. The trenches had more than once to be cleared of the dead, to give the living a place to stand. All day long, and even into the night, the battle lasted, for it was not till 12 o'clock, nearly 20 hours after the command <Forward) had been given to the column at the Brown House, that the firing died down, and the Confederates, relin¬ quishing their purpose to retake the captured works, began in the darkness to construct a new line to cut off the salient.55 During the day diversions were made on both sides to relieve the tremendous pressure in the centre. On the right of the Sixth corps, Warren, with a part of the Fifth, made an attack upon Anderson's corps and was repulsed with a loss of over 1,000 men. On Hancock's left Burnside's Ninth corps made an assault, and after lodging the head of column of

Potter's division inside of Hill's works, it was attacked in flank and driven back with heavy loss. Later in the day General Early, commanding Hill's corps, advanced from his works to strike Burnside in flank, Burnside was met in motion and driven back to his works, and Early returned to his own lines. The Union forces engaged on the 12th num¬ bered about 66,000 men, of whom 6,020 were killed and wounded, and 800 missing. The records do not show the number of Confeder¬ ates engaged, nor their losses, but it is esti¬ mated that their total loss was between 9,000 and 10,000, of whom about 4,000 were captured.

On the morning of the 13th it was ascer¬ tained that the Confederates, failing to recover their lost intrenchments, had fallen back, and Colonel Carroll, with a brigade of the Second corps, went forward to reconnoiter, found them strongly intrenched on a new line at the base of the salient and after a sharp engagement withdrew. Dispositions were now made to turn Lee's right flank, and during the night of the 13th the Fifth corps, followed by the Sixth, moved over to the Fredericksburg road. The 14th was occupied in getting the two corps in position. The Confederates were found strongly intrenched on the Fredericksburg road in front of Spottsylvania Court House, and an attack was deemed inexpedient. During the day the Confederates attacked Upton's brigade of the Sixth corps, and compelled it to fall back from an advanced position, but the ground was immediately retaken by a brigade from the Fifth and one from the Sixth corps. When Lee saw that the Fifth corps had moved away from Anderson's front, Anderson's corps was shifted from the left to the extreme right, beyond the Fredericksburg road, and extended the line to Po River. Ewell still held the works in rear of the bloody salient. From the 12th to the 18th Grant was employed in constant recon- noitering and skirmishing, developing Lee's position and ascertaining if he could find a weak point in it; also in establishing a base at Aquia Creek, sending the sick and wounded there, drawing necessary supplies and await¬ ing the arrival of reinforcements from Wash¬ ington to fill his depleted ranks. Early in the morning of the 18th the Second corps, sup¬ ported by the Sixth corps on the right and Burn¬ side's Ninth corps on the left, Warren assist¬

ing with his heavy artillery, made an attempt to force the lines held by Ewell's corps, at the only point where former efforts had met with even partial success. It was a failure. Under the fire of 29 guns of Carter's battalion, which swept all the approaches to Ewell's line, the attacking force was driven back before it came well within reach of musketry, with a loss of over 2,000 killed and wounded. Grant gave up further effort; deeming it impracticable to break Lee's lines at

Spottsylvania Court House, he issued orders on the 18th with a view to a movement to the North Anna to begin at 12 o'clock on the night of the 19th. In pursuance to this plan, on the 19th the Second and Ninth corps were moved to the left, the Ninth corps taking position on the left of the Sixth, with the Second in reserve. Late in the afternoon Ewell's corps attempted a flank march around Grant's left to ascertain the extent of his move¬ ment and get possession of the Fredericksburg road. He was met by Tyler's division of new troops, who, being reinforced by Crawford's division of the Fifth corps and Birney's of the Second, after a severe engagement lasting until dark, drove Ewell back. Some of Ewell's forces, pushing to the rear on the Fredericks¬ burg road, met Ferrero's division of colored troops, by whom they were repulsed. Ewell's loss during the day was about 900. Grant re¬ ports his own loss as 196 killed, 1,090 wounded and 249 missing. Ewell's attack delayed Grant's march for the North Anna 24 hours. On the night of the 20th the Second corps and a small force of cavalry under General Torbert were pushed through Bowling Green to Milford, followed on the three succeeding days by the rest of the army. Lee followed, and the lines around Spottsylvania Court House were de¬ serted. The entire losses of the Union army around Spottsylvania Court House from May 8 to 19 inclusive are estimated by General Humphreys as 15,722 killed and wounded, and 2,001 missing, an aggregate of 17,723. The Confederate losses are not known, but were very severe. Consult (Official Records) (Vol. XXXVI) ; Humphreys, A. A., (The Virginia Campaign of 1864-65 5 (New York 1883) ; Walker, F. A., (History of the Second Army Corps) (ib. 1886) ; Powell, W. H., (History of the Fifth Army Corps) (ib. 1896) ; Penny-packer, (Life of General Meade) ; Grant, U. S., (Personal Memoirs) (Vol. II, New York 1885: 86) ; Early, J. B., (The Last Year of the War for Independence5 (ib. 1867) ; Lee, F., (The Life of General R. E. Lee) (ib. 1894) ; Long, A. L., (Life of General Lee) (ib. 1886) ; Gordon, G. H., (A War Diary of Events in the War of the Great RebellioiP (Boston 1882) ; The Century Company, (Battles and Leaders of the Civil War5 (Vol. IV, New York 1887-88).

SPOUTING HORNS. Wave-cut caves along shore lines sometimes extend back some distance from the face of the cliff and by rea¬ son of a fracture or joint in the rock open up to the surface of the ground through a deep pit or well. During storms these frequently spout foam and water which has been driven into the cave by the waves. Such an opening is called a spouting horn or blowhole.

SPRAGUE, sprag, Austin Velorous Mil-

ton, American inventor: b. Rochester, N. Y., 28 May 1840. He received

in law, medicine and engineering, and in 1865 went to the Pennsylvania oil-fields where he engaged in perfecting methods of improved oil production. The frequent explosion of boilers, caused by the use of the brackish water of the Allegheny River, suggested to him a plan for raising the water of the river to a reservoir whence it could be supplied to the boilers. He successfully executed his plan, overcoming the difficulty caused by an elevation of 740 feet in a distance of 2*4 miles. He has invented vari¬ ous household articles, improvements in laun¬ dry machinery, disinfectors, thermaerotherapic apparatus, introduced steam for the sterilization of surgical instruments and dressings in 1890, began experiments in 1891 with hot dry air for therapeutical purposes, since generally adopted, and introduced the use of steam for the disin¬ fection of textile fabrics in 1899.

SPRAGUE, Frank Julian, American elec¬ trical engineer and inventor: b. Milford, Conn., 25 July 1857. While at high school in North Adams, Mass., he won competitive appointment to United States Naval Academy, from which he graduated with honors in 1878. He then became interested in electrical inventions and took a special course in physics under the late Admiral Sampson. Shortly after graduation he started on a tour of duty around the world, and was correspondent of the Boston Herald while General Grant was on the flagship of the Asiatic squadron. In 1882 he was appointed a member of the jury of awards at the Crystal Palace electrical exhibition, where he conducted all the tests on dynamo-electric machinery, elec¬ tric lights and gas engines, his report being published in full by the Navy Department. In 1883 he passed examination for promotion, then obtained a year's leave, resigned and became assistant to Thomas A. Edison ; a year later parted company with Mr. Edison and formed the Sprague Electric Railway and Motor Com¬ pany, which, with his newly invented constant speed electric motor, began active exploitation for industrial purposes. Began inventions in electric railways in the early '80s, and conducted extensive experiments on the New York Ele¬ vated Railway in 1886. Is generally recognized as the pioneer of the modern trolley road, the first important installation of which was made by him at Richmond, Va., in 1887-88. (See Traction, Electric). In 1887 he invented the "multiple unit® system of electric train opera¬ tion, by which several cars in a train are inde¬ pendently equipped, but all are

under common control from several points. Has been an ac¬ tive exponent of underground electric traction. He was awarded a gold medal at the Paris Ex¬ hibition in 1889, the Elliot Cresson medal by the Franklin Institute in 1904, and the grand prize by the Louisiana Purchase Exposition for his inventions and developments in electric rail¬ ways ; also the Edison Medal, in 1910, for “inventive achievement in electrical science, engineering and arts.® He was a member of the electrical commission which had charge of the electrification of the New York Central Rail¬ road terminals, and coinventor of its protected third rail; also member of the commission which investigated the possibilities of electrifi¬ cation of the Sierra Division of the Southern Pacific Company and was primarily responsible for the use of high potential direct current in VOL. 25 — 29

railway work. He was chairman of commit¬ tees on electricity and ship construction of the United States Naval Consulting Board; presi¬ dent of the Sprague Development Corporation and the Sprague Safety Control and Signal Corporation and inventor of system of auto¬ matic braking control of trains. He has writ¬ ten many scientific papers on electric motor and railways and kindred subjects.

SPRAGUE, Homer Baxter, American edu¬ cator: b. Sutton, Miss., 19 Oct. 1829; d. 23 March 1918. He was graduated from Yale in 1852, studied at the Yale Law School and in 1854 was admitted to the bar. He entered the Union army in 1861, was commissioned colonel in 1864 and in 1866 was mustered out of service. He was a member of the Connecticut legisla¬ ture in 1868, professor at Cornell in 1868-70 and was founder and first president of Martha’s Vineyard Summer Institute. He was president of Mill’s College, California, in 1885-86, of the University of North Dakota in 1877-91 and thereafter was a lecturer at Drew Theological Seminary, Chautauqua assemblies and else¬ where. He published fellowship of Slave¬ holder (1857); (High School and Citizen- ship) (1883) ; (Voice and Gesture) (1874- 1903) ; (History of the Thirteenth Connecticut Infantry) (1867) ; Unaugural Addresses) (Adelphi Academy, 1870, Mills College, 1885); (The Place of Literature in a College Course) (1887) ; An Educational Party Needed-5 (1886) ; free Text-books Necessary in School and College5 (1886) ; (The Pilgrim Fathers and Civil Government5 (1894) ; (The Assassina¬ tion: Who is Responsible5 (1901); (The Na¬ tion’s Honor Roll : Fiftieth Anniversary of Yale Class of 1852) (1902) ; (Shakespeare’s Al¬ leged Blunders in Legal Terminology5 (1902) ; (The Right and the Wrong in our Civil War5 (1903); Appreciation of Daniel Coit Gilman5 (1910); Appreciation of George W. Shinn5 (1911) ; (The Elevation of His Satanic Majesty in Alpha Sigma Phi5 (1912) ; (Ban-

quet Speech as Grand Senior President5 (1913) ; fiteral Metrical Version of the Book of Job,5 with f ssay on The Mystery of Un¬ deserved Suffering in the Light of Evolution5 (1914); fights and Shadows in Confederate Prisons5 (1915) ; (Studies in Shakespeare5 (first series) ; for several years preceding his death he lectured annually at Cornell on Shakespeare, Milton, The Book of Job, Gold¬ smith, The Story of Paradise Lost, etc.

SPRAGUE, William, American legislator: b. Cranston, R. I., 12 Sept. 1830; d. 1915. He entered the counting-house of his father, senior partner of the A. and W. Sprague Manu¬ facturing Company, when 16, and afterward with his brother succeeded to the ownership of the business. He was governor of Rhode Island in 1860-63 and was among the most ac¬ tive of the Aar governors.® He went to the front, participated in the first battle of Bull Run and in the Peninsular campaign and in 1863 was elected to the United States Senate, whereupon he resigned his governorship. He served in the Senate until 1875 and then re¬ sumed his manufacturing business. He was married in 1863 to the celebrated Kate Chase, daughter of Salmon P. Chase, from whom he was afterward divorced.

.SPRAGUE, William Buell, American Congregationalist clergyman and author: b. Andover, Conn., 16 Oct. 1795; d. Flushing, N. Y., 7 May 1876. He was graduated at Yale University in 1815, studied theology at Prince¬ ton University and was ordained in 1819. He held pastorates at Springfield, Mass., in 1819— 29, and at Albany, N. Y., in 1829-69. He made an extensive collection of manuscripts, pamphlets and other matter connected with both religious and secular American history, which at his death was divided between the State Library at Albany and Harvard University. He was author of several biographical works besides his most important work, (Annals of the American PulpiU (9 vols., 1857-69).

SPRAGUE, Conn., township in New Lon¬ don County, on the Shetucket River, 18 miles north of New London, on the New York, New Haven and Hartford Railroad. It has a Ro¬ man Catholic academy and manufactures in¬ clude hospital supplies, paper and woolen and cotton goods. Pop. 2,551.

SPRAIN, the partial displacement or twisting of a joint with stretching, and more or less injury to the articulating apparatus; the ligaments,

tendons and their sheaths being all involved in the injury, while sometimes even small portions of the articulating processes of bones are separated. All joints are liable to this accident, but the wrist and ankle are most frequently the seat of this injury; their lia¬ bility arising from their immobility, compared with such a joint as the shoulder, which is more liable to dislocation. A sprain is attended with violent pˆin, and the sufferer feels sick and faint. Swelling and discoloration rapidly take place from extravasation of blood into the sheaths of the tendons and the other surround¬ ing tissues, through laceration of the smaller blood-vessels. Subsequently the swelling is kept up in consequence of the effusion of serum from the incited action which occurs. Thus the joint is much deformed, and great care is required in examining the parts to guard against mistakes and to gain an exact knowledge of the nature of the injury so as to ascertain decidedly and at once whether it be a simple sprain, or whether there be fracture or dislocation. For this purpose the radiograph has been most valuable. If it is a simple sprain the part af¬ fected should be laid in an easy position on a pillow and confined in that position by broad slips of bandage crossing the limb and pinned at each end of the sides of the pillow. The part should at first be fomented for an hour or two with cloths wrung out of warm water; afterward it is to be wrapped in cloths wetted with a warm lotion, say of sugar of lead, one dram; opium, one dram; and boiling water, one quart. These cloths, when applied, should be covered with oiled silk or cotton to prevent evaporation. Absolute rest is the principal point to be attended to. To secure this, when there is much restlessness, it sometimes be¬ comes necessary to use splints. In case of in¬ flammation, a purgative may assist. After the pain abates and the swelling disappears, gentle rubbing with a soap and opium liniment is well, and a light flannel bandage should be applied. If the joint remains weak and stiff, stimulat¬ ing frictions will be found useful, also the pouring of water on the part from a height,

beginning with warm water, and after a time gradually reducing the temperature till the patient can bear it cold. After each applica¬ tion the part should be well rubbed, as other¬ wise it may become rheumatic ; rheumatism is a very common occurrence in parts injured by sprains and fractures. Too great caution can¬ not be applied in bringing a joint which has been sprained into use, as many diseases of joints are brought on by mismanagement.

SPRECKELS, sprek'elz, Claus, American

merchant : b. Darmstadt, Hanover, Germany, 1828; d. San Francisco, Cal., 26 Dec. 1908. He came to the United States in 1846 and settled

in Charleston, S. C. In 1856 he went to San Francisco, where he kept a store and later a brewery, and in 1863 established the Bay Sugar Refinery. He imported his raw materials from Hawaii where he acquired large properties, and owned in addition a beet sugar farm of 1,500 acres and a factory at Watsonville, Cal. By financing the Pacific Steamship Company he se¬ cured an advantage in ocean freight rates. He invented a new refining process and was by far the most active man of his time in the devel¬ opment of the sugar industry in the western United States.

SPRECKLES, Rudolph, American sugar refiner, capitalist and civic reformer: b. San Francisco, Cal., 1 Jan. 1872. He entered his father's sugar refinery at Philadelphia when a youth, and at the age of 22 became owner of his father's interests in the Hawaiian Commer¬ cial and Sugar Company. He was markedly successful in his handling of its affairs and re¬ mained in Hawaii until 1898 when he sold out at a figure that netted him a large fortune. He then returned to San Francisco and engaged in banking. He. has . been prominent in the municipal affairs of San Francisco, lent mate¬ rial assistance at the time of the earthquake and organized and financed the exposure of the city's graft scandals in 1906.

SPREE, spra, a river of Germany which rises near New Salza in Saxony at a height of about 1,200 feet in the Riesengebirge, and after traversing 227 miles flows by canal into the Havel at Spandau. It has also been connected with the Oder by a canal 17 miles in length. It has been deepened and canalized until it is navi¬ gable almost its entire length, and divides into several arms in passing through Berlin. One section of the stream spreads out into a wide marshy region known as the Spreewald.

SPRENGER, spreng'er, Jacob, German

theologian of the 15th century, who with Hein¬ rich Kramer, was the author of the < Malleus MaleficarunP or (Hexenhammer) (1489), which first formulated in detail the doctrine of witchcraft, and formed a textbook of pro¬ cedure for witch trials. They were appointed inquisitors under the bull (Summis desider- antes affectibus) of Innocent VIII in 1484, and their work is arranged in three parts — 'Things that pertain to Witchcraft*; <The Ef¬ fects of Witchcraft* ; and <The Remedies for Witchcraft.* It discusses the question of the nature of demons; the causes why they seduce men, and particularly women; transformations into beasts, as wolves and cats; and the various charms and exorcisms to be employed against witches.

SPRENGTPORTEN, Goran Magnus,

Count, Swedish and Russian soldier and poli¬ tician: b. 1740; d. 1819. He was a younger brother of Jakob Magnus Sprengtporten (q.v.) and assisted. the latter in the revolution of 1772. In 1775, having risen to the rank of colonel and brigadier in East Finland, he distinguished him¬ self as an organizer and administrator. At Brahelinnd he founded a military school which afterward became a state institution. By nature irritable and suspicious, he, like his brother, conceived the idea that his services to his sov¬ ereign had not been accorded the appreciation he felt they deserved. In 1779 he entered the French service and remained therein for two years. In 1781 he returned to Finland and con¬ ceived a plan for separating the grand duchy from Sweden and establishing it as an inde¬ pendent state under Russian projection. In 1786 he openly opposed Gustavus III and endeavored to persuade the Russian ministers to aid the Finns by force of arms. A year later he en¬ tered the Russian service at the invitation of Catherine II. During the Russo-Swedish War of 1788-90 he was placed in command of a Russian army corps, and was seriously wounded at the Battle of Parosalmi in 1790. He is said to have taken no direct part in the An j ala con¬ spiracy, but urged Catherine to support it. When the war ended he found himself in a precarious position. Not only had the High Court of Sweden adjudged him a traitor, but Catherine had learned' to look upon him as an impostor, incompetent and unable to fill his promises. From 1793-98 he, finding a none too congenial atmosphere in Russia, lived at Toplitz, Bohemia. When Catherine II was succeeded by the Emperor Paul, the latter, in 1800, engaged Sprengtporten to confer with Napoleon regard¬ ing the Maltese Order and the exchange of prisoners. Paul’s death brought about another era of disgrace for the adventurer which lasted for seven years. However, on 1 Dec. 1808 he was appointed the first Russian governor-gen¬ eral of Finland and given the title of Count. His great unpopularity resulted in his resigna¬ tion the following year and thereafter he lived in retirement.

SPRENGTPORTEN, Jakob Magnus,

Swedish soldier: b. 1727; d. 1786. Whatever triumphs were experienced by the Swedish army during the Seven Years’ War were due, almost entirely, to Sprengtporten’s military ability. He entered the army when a mere youth and dur¬ ing the war above referred to

was promoted to lieutenant-colonel, having the reputation of being the “smartest® officer in the service. Such energy, ability and ambition as were possessed by Sprengtporten could not lie dormant. Gather¬ ing about him a band of young officers, royalists, everyone of them, he organized the so-called Svenska Botten to oppose the misrule of the “Hats® and “Caps®. His organization was sup¬ pressed and' he then conceived the idea of a revolution which was to begin in Finland where his own regiment was stationed. His plan was to seize the fortress of Sveaborg, and thereby gain control of Finland, then to embark for Sweden and make a night attack upon Stock¬ holm, the capital. Gustavus III, before whom he laid his plans, heartily approved of them, since Sprengtporten’s object was to dislodge the ruler’s own enemies. Sprengtporten went

to Helsingfors and on 16 Aug. 1772 per¬ suaded the fortress of Sveaborg to submit to him. The submission of Helsingfors followed and within one week all Finland was under the control of the Sprengtporten forces. On 23 August Sprengtporten embarked for Stock¬ holm, but the wind was against him and before he arrived Gustavus III had carried out the revolutionary plan without assistance. Sprengt¬ porten, however, was received in Sweden with great acclaim, made a lieutenant-general and colonel of the guards and placed at the head of a commission to strengthen Finland’s de¬ fenses. But notwithstanding the honors con¬ ferred upon him, he conceived the idea that Gustavus had treated him badly in forestalling the revolution and absolutely refused to forgive the ruler. Gustavus showed him every con¬ sideration, offered to make him commander-in¬ chief in Finland on the eve of threatened war with Russia and in various ways endeavored to placate him, but all to no purpose. Through¬ out the remainder of his days he constantly indulged in impertinences toward his monarch. He resigned as colonel of the guard in a fit of indignation and was allowed a pension of ap¬ proximately $12,000 a year together with the unusual privilege of a guard of honor through¬ out the remainder of his days.

SPRIGTAIL DUCK, or PINTAIL, a

very distinct species of fresh-water duck (Dafila acuta) the male of which is especially distin¬ guished by the great prolongation and narrow¬ ness of the middle pair of tail-feathers. Both the females and the young of the latter have the tail-feathers very stiff and acute, but not otherwise peculiar. The sprigtail is a very hand¬ some duck of more trim and slender appear¬ ance than most species and, including the tail, may reach two and one-half feet in length. It inhabits the entire northern hemisphere and on the American side breeds in the

northern United States and Canada and winters in the Southern States and the West Indies. It is, however, especially an inland duck, and, both when breeding and migrating, associates with teals and mallards in reedy sloughs and about lake margins. Its food being chiefly vegetable, and consisting largely of wild rice, it is one of the best of table ducks. A swift flyer and one of the most alert and wary of ducks, it affords fine sport to the skilful gunner. The nest, is always on the ground near the water and hid¬ den in rushes or grass, often at the base of a tree. As with most of the ducks, it is lined with down and the 6 to 12 elongated elliptical eggs are of a plain grayish olive color. See Duck.

SPRING, Gardiner, American Presbyterian clergyman, son of Samuel Spring (q.v.) : b. Newburyport, Mass, 24 Feb. 1785; d. New York, 18 Aug. 1873. He was graduated from Yale in 1805 and was admitted to the bar in 1808, but abandoned law for the ministry. He was or¬ dained pastor of the Brick (Presbyterian) Church, New York, in 1810, and continued in that pastorate until his death. He declined the presidencies of Hamilton and Dartmouth Col¬ leges. His publications include (Essays on the Distinguishing Traits of Christian Character > (1813) ; Obligations of the World to the Bible) (1844) ; (The Glory of Christ* (1852) ; (Brick Church Memorial) (I860, etc.

SPRING, Leverett Wilson, American edu¬ cator: b. Grafton, Vt., 5 Jan. 1840; d. 24 Dec. 1917. He was graduated from Williams College in 1863, studied theology at Hartford and Andover, and in 1868-81 was engaged in the Congregational ministry. He occupied the chair of English literature at the Kansas State Uni¬ versity in 1881-86 and the same chair at Wil¬ liams College in 1886-1909 when he became pro¬ fessor emeritus. In 1885 he published (Kansas) — the first non-partisan account of the border struggles — and subsequent historians have gen¬ erally accepted the conclusions set forth in the book. He also published articles in magazines concerning the Kansas career of John Brown.

SPRING, Samuel, American Congrega¬ tional clergyman: b. Northbridge, Mass., 27 Feb. 1746; d. Newburyport, Mass., 4 March 1819. He was graduated from Princeton in 1771, was licensed to preach in 1774, became a chap¬ lain in the Continental army in 1775, served un¬ der Arnold at Quebec, and in 1776 left the army. He was ordained in 1777 and from then until his death was pastor of the

church at New¬ buryport. He was instrumental in uniting the two parties in the Congregational Church, and a founder of Andover Theological Seminary.

SPRING, the season of the year which fol¬ lows winter and ushers in summer, and which in the United States includes the months of March, April and May. The first of these months, however, often presents, in the North¬ ern States, the harshest features of winter, although at other times genial and springlike. In the hot regions of Central and South America the seasons are divided into dry and wet, and the changes come suddenly and, with¬ out any transitional periods. The astronomi¬ cal spring in the southern hemisphere begins 23 September and ends 21 December, corre¬ sponding in some degree to the northern autumn.

SPRING, outflow of water. See Springs.

SPRING, in mechanics. See Springs.

SPRING BEAUTY. See Claytonia.

SPRING-BEETLES, or CLICK- BEETLES. See Elater.

SPRING, or GREEN, FROG. See Frog.

SPRING GARDEN INSTITUTE, an

educational institution located in Philadelphia, Pa. It was founded by public-spirited citizens in 1850 and incorporated in 1851 for the pur¬ pose of affording industrious young people of the city an opportunity for self-improvement. It was established in a building at the corner of Broad and Spring Garden streets which was dedicated in 1852. Its capacity was doubled in 1899 by the addition of a new building. The in¬ stitute has an average annual enrolment of over 1,600 students.

SPRING-HALT, or STRING-HALT, a

sudden involuntary twitching or convulsive movement of the muscles of either hind leg in the horse, the leg being raised unnaturally high and lowered with excessive force.

SPRING HILL, Nova Scotia, town in Cumberland County, 70 miles northeast of Hali¬ fax, on the Cumberland and the Intercolonial railways. There are important coal mines in

the vicinity. Industries include meat packing and the manufacture of

furniture and doors. Pop. 5,713.

SPRING HILL, Engagement at. After General Sherman had started from Atlanta, on his march to the sea (q.v.), General Hood, commanding the Confederate Army of Tennes¬ see, marched northward from Florence, Ala., 19 Nov. 1864, to drive General Thomas from Nashville and back to the Ohio River. Thomas, who proposed to concentrate his own army on the line of Duck River and the Nashville and Chattanooga Railroad and to await expected reinforcements, withdrew his advance posts from Pulaski and other points to Columbia, on Duck River, where works were thrown up, covering the approaches from the south. He had there on the 26th about 23,000 infantry and 5,000 cavalry, only 3,500 of the cavalry being mounted. General Schofield was in com¬ mand. His infantry consisted of two divi¬ sions of the 23d corps and the three divisions of Stanley's Fourth corps. Gen. J. H. Wilson commanded the cavalry. General Hood, pre¬ ceded by General Forrest with 6,000 cavalry, appeared before Columbia on the 26th and with the three corps of Gens. S. D. Lee, A. P. Stewart and B. F. Cheatham, about 40,000 men, and threatened a crossing of the river above and below. During the night of the 27th Schofield withdrew to the north bank of the river, where he remained on the 28th. The two divisions of the 23d corps were placed in position in front of Columbia, holding all the crossings of the river in the vicinity, with Stanley's Fourth corps in reserve on the Franklin pike, ready to move whenever Hood should attempt a grossing above or below the town. Wilson's cavalry held the crossings above those guarded by the infantry. Forrest succeeded in crossing one of his divi¬ sions, above Columbia, before noon of the 28th, pushing Wilson's cavalry back on roads lead¬ ing toward Spring Hill! and Franklin, and Hood began crossing his infantry at daylight of the 29th at Huey's Mills, five miles above Columbia, from which a good road leads into the Columbia and Franklin pike, at Spring Hill, 15 miles north of Columbia, a road by which he could intercept Schofield's march to Franklin and strike him in flank. Wilson had dispatched Schofield at 1 a.m. of the 20th that Hood would undoubtedly cross the river at daylight and suggested an immediate with¬ drawal to Franklin. At daybreak Schofield sent Colonel Post's brigade up the river to ascertain if Hood had really crossed, and ordered Gen¬ eral Stanley, with the two divisions of Wagner and Kimball, the trains and the reserve artil¬ lery, to Spring Hill, to cover that point and hold the road open for the passage of the entire army. At 8 a.m. Stanley was on the march. On reaching Rutherford's Creek, four miles from Columbia, Kimball's division was halted and faced east to cover the crossing against a possible attack, and remained in

this position during the entire day. Stanley, with Wagner's division, pushed on, and it was near¬ ing noon, when his head of column had ap¬ proached to within two miles of Spring Hill, that he was informed that Buford's division of Forrest's cavalry was approaching from the east. The troops were quickly thrown forward

and Bradley's brigade, deploying as it advanced, drove off Buford's men, just as they had driven back a small force of cavalry and infantry and were about to occupy the village. As the other two brigades came up, they also were deployed from the railroad on the north to the pike on the south, covering the village in a semi-circle, in which was placed the train. Bradley's brigade was sent half a mile to the front and right to occupy a knoll commanding all the approaches from the east. The greater part of the artillery was posted on a rise of ground south of the town. Scarcely had these dispositions been completed when Hood at¬ tacked. It was before sunrise when Cheat¬ ham's corps began crossing the river, Cle¬ burne's division in advance. Hood accom¬ panied Cleburne on the direct road to Spring Hill. Stewart's corps and Johnson's division of Lee's followed Cheatham, leaving Lee, with the remainder of his corps, in front of Colum¬ bia. Cleburne approached Spring Hill about 3 P.M., just as Bradley's brigade was taking position and immediately attacked it, and at the same time an attack was made by For¬ rest's cavalry at Thompson's Station, three miles north, on a small wagon-train pushing for Franklin, and a cavalry dash on the Spring Hill station northwest of the town. Cleburne's assault on Bradley was twice repulsed, but in a third front and flank attack Bradley was se¬ verely wounded and his brigade driven back to the edge of the village, where it was rallied and put in position to cover the wagon-train, part of which had reached Spring Hill. Cle¬ burne endeavored to follow up his advantage, but was repulsed by the fire of eight pieces of artillery. Bradley's loss was about 150 killed and wounded; that of the Confederates was somewhat more. It was now sunset and the engagement ended. The result of it was that the Confederate infantry was checked when within 800 yards of the road, but their cavalry had gained the road both north and south of the town. Stanley, with his one division of not more than 4,000 men, was in a critical posi¬ tion ; his nearest support was Kimball, who was more than eight miles in his rear ; the other divisions of the army were still at Duck River. But fortunately for Stanley and the whole of Schofield's army, Hood's efforts to press the attack and gain the road miscarried, and Cheatham's corps bivouacked

not more than half a mile from the road over which Schofield's army was obliged to pass from Columbia to Franklin. Stewart arrived after dark and formed on Cheatham's right, and by 8 p.m. two corps of Hood's army were in posi¬ tion facing the road and not over half a mile from it. There has been much Confederate contention as to who was responsible for the failure to seize the road and prevent Schofield's escape. Hood says: ((Nothing was done. The Federals, with immense wagon-trains, were per¬ mitted to march by us the remainder of the night, within gunshot of our lines. I could not succeed in arousing the troops to action, when one good division would have sufficed to do the Wiork."

General Schofield, who had remained dur¬ ing the day at Columbia, started late in the afternoon, with Ruger's division and Whit¬ taker's brigade, for Spring Hill, and when

about three miles from the town, came upon the Confederate cavalry holding the road, which was driven off, after quite a skirmish. Leaving Whittaker to cover a cross-road a mile or two below the town, and to observe the Confederates, who could be seen standing around their camp-fires, Schofield continued his march with Ruger to Spring Hill, which he reached about 7 p.m., and two hours later moved on to force a passage at Thompson's Station. The Confederates withdrew on his approach, the road to Franklin was clear and Ruger took possession of the cross-roads. Schofield returned to Spring Hill, where, meanwhile, General Cox had arrived with his division of the 23d corps. Just be¬ fore midnight Cox was ordered to start for Franklin, with instructions to take Ruger with him. He was fairly on the road by 1 a.m., of the 30th, at which hour the train of 800 wagons was started to follow Cox. At the very start the train was obliged to cross a bridge in single file, which made the movement so difficult and caused so much delay that Stanley was advised to abandon part of the train, to which he would not consent, and it was almost 5 a.m., before the rear of the train was fairly under way. As the head of the train passed Spring Hill it was attacked by cavalry and some wagons destroyed, but Wood's division, which had fol¬ lowed Cox from Duck River, was thrown on the flank of the train and the enemy driven off. It was near daybreak when the last wagon left Spring Hill. Kimball's division followed Wood's and at 4 a.m. Wagner followed Kim¬ ball, his skirmishers remaining until nearly day¬ light. Opdyck's brigade was rear-guard, and although hard pressed by Confederate cavalry, not a man nor a wagon was left behind. When the rear (of the column was leaving Spring Hill, the head of it was at Franklin. Seldom has an army made such a narrow es¬ cape from destruction or capture. Consult (Official Records) (Vol. XLV) ; the Century Company's (Battles and Leaders of

the Civil War> (Vol. IV, New York 1887-88); Van Horne, (History of the Army of the Cumber¬ land* (Vol. II, Cincinnati 1875).

E. A. Carman.

SPRING HILL COLLEGE, a Roman Catholic institution located at Mobile, Ala. It was founded in 1830 by the Jesuits and re¬ mains under their control. It offers, in addi¬ tion to the collegiate courses, a preparatory course and a commercial course. The degrees of A.B. and B.S. are conferred There is no endowment; the grounds and buildings in 1915 were valued at over $500,000; the library con¬ tained 15,000 volumes; the students in 1917 numbered 228, and the faculty 35.

SPRING LAKE, N. J., borough in Mon¬ mouth County, on the Atlantic Ocean, six miles south of Asbury Park, on the Pennsylvania and the Central of New Jersey railroads. It is patronized as a summer resort, has excellent bathing, good hotels and many fine summer residences. Pop. 1,492; summer pop., 20,000.

SPRING-RICE, Sir Cecil Arthur, British Ambassador: b. England, 27 Feb. 1859; d. Ottawa, Canada, 14 Feb. 1918. He was gradu¬ ated at Balliol College, Oxford, and after serv¬ ing as secretary to Earl Granville and as precis

writer to the Earl of Roseberry, he entered the diplomatic service. He was secretary of the legation at Brussels, Washington, Tokio, Ber¬ lin and Constantinople, successively; became charge d'affaires at Teheran, Persia, in 1900; British commissioner of the international debt at Cairo, Egypt, in 1901 ; and secretary of the embassy at Petrograd in 1903. He was Minis¬ ter and consul general to Persia in 1906-08; Minister to Sweden in 1908-12; and in 1912 succeeded Lord Bryce (then Sir James) as British Ambassador to the United States. He remained in Washington as Ambassador until 1918, when after his arduous duties during the European War, he was given leave of absence. His health, however, had broken under the strain, and he survived but a brief time. While of a quiet and retiring habit he performed the duties of his office with distinguished ability and unfailing tactfulness through many trying periods. He was knighted in 1916.

SPRING TIDE, the tide which happens at the full moon, which rises higher than com¬ mon tides. At these times the sun and moon are in a

straight line with the earth, and their combined influence in raising the waters of the ocean is the greatest, consequently the tides thus produced are the highest. See Tide.

SPRING VALLEY, Ill., city, Bureau County, on the Illinois River, and on the Chi¬ cago, Burlington and Quincy, the Chicago and Northwestern and the Chicago, Rock Island and Pacific railroads, 100 miles southwest of Chicago. It is the centre of a coal-mining re¬ gion, and mining is the chief industry; it has about 50 manufacturing establishments, includ¬ ing pump factories, foundries, machine shops, etc. There is a national bank and newspapers. It has a public high school and a hospital. Pop. (1920) 6,493.

SPRINGAL, an ancient warlike engine, used for shooting large arrows, pieces of iron, etc. It is supposed to have resembled the bal- lista in its construction, being operated by the release of a wooden spring.

SPRINGBOK, a small South African ante¬ lope or gazelle (Gazella euchore), about 30 inches in height, and rich cinnamon-yellow on the upper parts, white on the belly, buttocks and face, and with stout, ringed, lyrate horns. It formerly gathered and migrated in enormous herds, but has now become uncommon in the more settled districts. It was remarkable among gazelles for its extreme agility and powers of jumping, and for stripe of long white erectile hairs along the spine. Consult Sclater and Thomas, (The Book of Antelopes5 (London 1896), and the writings of South Af¬ rican travelers.

SPRINGER, Alfred, American chemist ; b. Cincinnati, Ohio, 12 Feb. 1854. He took his Ph.D. at the University of Heidelberg in 1872, and from 1873 was a member of a firm of manufacturing chemists at Cincinnati. He was co-inventor of the torsion balance, which he patented, and he also patented the aluminum sounding-board for musical instruments. He made many valuable experiments, and has pub¬ lished descriptions of most of them. Author of (Glycocholic Ether5 (1879) ; (Pentachlo- ramyl Formate5 (1881) ; (Reduction of Ni¬ trates by Ferments5 (1883) ; (A Latent Char¬

acteristic of Aluminum5 (1891); Uncrease of Segmental Vibrations5 (1897), etc.

SPRINGER, Reuben Runyan, American philanthropist: b. Frankfort, Ky., 16 Nov. 1800; d. Cincinnati, 10 Dec. 1884. At the age of 21 he became clerk on an Ohio River steam¬ boat and in 1830 became partner in the grocery firm of Kilgour, Taylor and Company, Cincin¬ nati. In this business and in various invest¬ ments he accumulated a

large fortune which he used for a variety of benevolent enterprises. He contributed over $200,000 to the building of the Cincinnati Music Hall and gave other large amounts to the Art Museum, the College of Music and the Exposition Building.

SPRINGER, William McKendree, Amer¬ ican jurist: b. New Lebanon, Ind., 30 May 1836; d. Washington, D. C., 4 Dec. 1903. He was graduated at the Indiana State University in 1858, and was admitted to the bar in 1861, beginning the practice of law at Springfield, Ill., In 1871 he entered the Illinois legislature and two years later was sent to Congress on the Democratic ticket. During his 10 successive terms he was prominent as temporary speaker, as chairman of the ways and means commit¬ tee and as a participant in tariff and currency debates. He was the author of the resolution passed by the 44th Congress against the elec¬ tion of any person for a third term in the pres¬ idency, and served on the Potter committee which investigated the election of 1876, and also on the joint committee which reported the Electoral Commission bill. As chairman of the committee on territories he was the author of the bill organizing Oklahoma Territory, and of the bill admitting Washington, Montana, North Dakota and South Dakota as States. In 1895 he was appointed judge of the United States Supreme Court for the Northern Dis¬ trict of Indian Territory and chief justice of the Court of Appeals of the Territory. In 1899 he removed to Washington and resumed the practice of law.

SPRINGFIELD, Ill., city, county-seat of Sangamon County and capital of the State, is in the centre of the great corn-belt, on the Illinois Central, the Chicago and Alton, the Chicago, Peoria and Saint Louis, the Wabash, the Cincinnati, Hamilton and Dayton and the Baltimore and Ohio railroads, 185 miles south of Chicago ; 99 miles north of Saint Louis and near the Sangamon River. It is built on an undulating and well-wooded prairie and is beautifully laid out. The city is compactly built and has well paved and beautifully shaded streets. Springfield is the centre of the great coal mining industry of Sangamon County, whose product of coal in 1918 was 11,694,055 short tons, value $23,000,000, the largest of any county in the State. This industry in the same year employed 7,453 men and represents a population of fully 35,000. The Illinois State Fair is permanently located here. Large and expensive buildings have been erected at a cost of $1,650,000. The grounds are extensive and highly improved. The annual fairs have come to be little less than a liberal exposition.

The Capitol Building. — The most conspic¬ uous public building is the State Capitol, which was completed in 1887. It stands in a park of eight acres, and cost over $4,500,000. The ground plan is in the form

of a huge cross and

the superstructure is of the modern classic style. The extreme length is 379 feet and the extreme width 286 feet. The exterior walls are of dressed Joliet limestone, the lofty porti¬ coes of sandstone, supported by columns of polished gray granite. The edifice is three sto¬ ries high and the massive symmetrical dome, the highest in the United States, is an object of great admiration.

The Lincoln Monument. — Among the historical attractions of Springfield are the Lincoln National Monument and the Lincoln residence. Both are owned by the State and are in charge of custodians. They are open daily to the public. The Lincoln National Monument stands in Oak Ridge cemetery, something over a mile north from the State House. The mausoleum contains the remains of President Lincoln, his wife, two children and one grandchild. The monument and the four heroic bronze groups, three representing the infantry, artillery and cavalry branch of the army, and the fourth, the navy, were designed by the sculptor Larkin G. Meade. It was dedi¬ cated 15 Oct. 1874 and cost about $350,000.

Public Buildings. — Among the prominent structures in Springfield are the United States Courthouse and Post Office, the County Court¬ house, the Governor's Mansion, the State Ar¬ senal and Armory, City Hall, Public Library, Reisch Building, Masonic Temple, Franklin Life Building, Ferguson Building, New Leland Hotel, Saint Nicholas Hotel, Sangamo Club, Illini Country Club, Springfield and Saint John's hospitals and David Prince Sanitarium.

Libraries. — In proportion to the size of the city the Springfield Lincoln Library, 185,000 vol¬ umes, at one time claimed to be the largest in the United States. It then contained over 58,000 volumes. Here also is the State Li¬ brary of 70,000 volumes ; the State Historical Library of 3,500 volumes, and many rare his¬ torical pamphlets, maps, etc., and the Supreme Court Law Library of 18,000 volumes.

Industries. — Springfield is the centre of an extensive coal mining, farming, horse and cat¬ tle breeding section and has large manufactur¬ ing interests. The invested capital in manu¬ factures amounts to upward of $7,174,000, with an annual output of products

valued at $11,- 441,706.14. The Illinois Watch Company has an immense establishment here, employing about 2,000 operatives, also Sangamo Electric Com¬ pany, manufacturers of electric meters, large implement factory of Montgomery Ward and Company, powder plant of Western Cartridge Company. There are several large printing and publishing houses, textile works, planing and wood working mills, machine shops, woolen mills, engine, boiler and car works and manu¬ factories of flour, clothing, boots and shoes, saddlery, soap, etc.

Banking and Finance. — On 1 March 1910, Springfield had a net public debt of $825,800 and the municipal receipts for a single year amount approximately to $500,000. This item of receipts does not include any school tax. In the same year there were five national banks with an aggregate capital of $1,450,000, one State bank, $300,000, and one trust company, $100,000. The average deposits in all these institutions was $22,000,000. There are 12 building and loan associations with 6,250 share¬ holders.

Government. — The city is governed on the commission plan, under revised charter regula¬ tions. The municipal expenses for a single fiscal year are approximately $450,000 ex¬ clusive of school expenses, and the municipal receipts for the same period, also exclusive of school tax, amounted to $500,000. The water¬ works are owned by the city and have a daily capacity of 12,000,000 gallons. This capacity may be increased almost indefinitely without great cost. There is a complete sewage sys¬ tem of 101 miles, electric light plant, 25 miles of electric street railway, 442 acres of improved park land, value# $515,452, and 85 miles of paved streets.

Education. — The expense of the public schools does not appear in the municipal finan¬ cial statement, but there is raised annually by taxation a sum sufficient to maintain public schools and to erect new buildings as required. The total estimated value of school property is $2,243,450. The cost of maintaining the pub¬ lic schools for 1917-18, was approximately $453,445.38, which does include expenditures for new buildings and permanent improve¬ ments. The total enrolment for 1918-19 was 10,066. The total estimated actual value of property, subject to taxation, for school pur¬ poses for the year 1917-18 was $16,299,181 which represents]/$ of true valuation. There were employed in the public schools for the year 1917-18 a superintendent, four special super¬ visors, two school nurses, an attendance officer, 18 principals and 260 teachers.

Religion. — Springfield has a total of 54 churches of all denominations, value $1,789,000, the Methodist leading with eight,

the Baptist next with seven, Roman Catholic six, Presby¬ terian six, Episcopalian four, etc. There are two Hebrew synagogues and one Christian Sci¬ ence Congregation. Among the charitable in¬ stitutions are the Home for the Friendless, the Home for Aged Women, the Home for Aged People under the control of the Roman Catho¬ lic Church, the Orphanage of the Holy Child and the Colored Old Folks' Home.

History. — Springfield was first settled in 1819 and was laid out in 1823 at which time it became the county-seat. It was first incorpo¬ rated as a town in 1832 and was chartered as a city in 1840. It was selected as the State capital in 1837 and the State legislature assem¬ bled here for the first time in 1839.

Population.— (1890) 24,963; (1900) 34,159;

(1910) 51,678; (1920) 59,183.

William H. Conkling, Secretary, The Springfield C otnrnercial Associa¬ tion.

SPRINGFIELD, Mass., city; port of de¬ livery and county-seat of Hampden County; on the east bank of the Connecticut River; the terminus of the New York, New Haven and Hartford, terminus of the Connecticut River Division of the Boston and Maine, halfway station of the Boston and Albany Division of the New York Central; 99 miles west of Bos¬ ton, 134 miles northeast of New York, 314 miles from Montreal — a logical railroad cen¬ tre. The place is noted for its beauty, being laid out with wide and well-shaded streets and being especially attractive as a residential city. Four bridges span the Connecticut River here, prior to the completion in 1839 of the Boston and Albany Railroad, Springfield was little

more than a good-sized market town. Since that date its growth has been rapid and in 1920 it was the third largest city in the State. The elevated sections of the city command delight¬ ful views of the Connecticut Valley.

Manufactures. — The industries of Spring- field represent a capital of: $63,237,707, with an annual output valued at $75,159,074. The lead¬ ing manufactures include firearms, motor¬ cycles, railroad and trolley cars and supplies, candy machinery, envelopes, papeteries, dic¬

tionaries, cotton goods, skates, valves, mag¬ netos, buttons, toys and kindergarten supplies sporting goods, corsets, tobacco, products, forg¬ ings, machinery, art goods, confectionery, elec¬ trical supplies. The United States armory and arsenal are located here. The armory, the chief government arms factory, originally founded in 1794 and in continuous operation ever since, has a capacity of 24,000 rifles per week in addition to repair work, the rate of production varying with the demand. The arsenal was built in 1846 and is modeled after the East India House in London.

Commerce. — The value of imports for the year July 1918 to July 1919 was $4,000,000; the receipts for the same period, $52,500. The city has an efficient Chamber of Commerce with a membership of 1,755 and various com¬ mercial and social organizations.

Banks and Banking. — Springfield's seven national banks and trust companies with a combined capital of $3,350,000 have surplus and undivided profits of $5,900,000 and de¬ posits of $48,382,492 ; there are three savings banks with a total of $50,000,000 in deposits; one safe deposit company with $500,000 capi¬ tal ; and a bank clearing house which cleared $153,378,375.24 in a recent year. Springfield's leading financial institution, the Massachusetts Mutual Life Insurance Company, has out¬ standing insurance of $490,793,291, and has paid $143,000,000 to policyholders. The Spring- field Fire and Marine Insurance Company has $1,484,970,034 insurance in force and has paid $76,223,233.71 in losses since organization.

Public Buildings. — Among the leading buildings in the city are the $2,000,000 munic¬ ipal group, consisting of an administration building, auditorium and Campanile Tower; city library, with its science and art museum build¬ ings ; the three high school buildings ; county courthouse, home buildings of the Springfield Fire and Marine Insurance Company, Massa¬ chusetts Mutual Life Insurance Company, Third National Bank, Union Trust Company, Chapin National Bank, Hampden Savings Bank, United Electric Light Company and Spring- field Gas Light Company and others.

Education. — The public school system em¬ braces high, grammar, primary, manual train¬ ing, vocational and kindergarten schools — 39 in all, with 680 teachers and 19,000 pupils. The evening trade school is said to be the first of its kind in the United States. The paro¬ chial schools enrolled 3,238 pupils in 1915. Springfield is the seat of the American Inter¬ national College, opened in 1885, and the Inter¬ national Young Men's Christian Association College. The city has a public library contain¬ ing 200,000 volumes, with three branch libra¬

ries ; and the Hampden County Law Library, dating from 1813. The facilities of the City

Library are perhaps unrivaled in any city of similar size in the country; the library itself is of unusual efficiency. The system of public education is considered one of the most ad¬ vanced in the United States. The city is the home of three famous publishing enterprises — Webster's Dictionary, the Springfield Republi¬ can and the Springfield Union.

Religion . — There are 65 churches in Spring- field, of which 11 are Congregational, eight Methodist, eight Baptist, 14 Roman Catholic, one Unitarian, six Hebrew, three Episcopalian, two Universalist and other denominations.

Parks and Monuments. — There is an ex¬ tensive public park system comprising 822.07 acres. Forest park has 729.14 acres and con¬ tains a collection of birds and animals. There are many small parks and squares throughout the city. In Merrick park stands a statue, (<The Puritan,® by Saint Gaudens ; on Court square and a soldiers' and sailors' monument and a statue of Miles Morgan by Jonathan Scott Hartley; on Pecousic Hill a bust of President William McKinley by Philip Mar- tiny. Hampden Park, containing 54p* acres, has been famous for its horse races and cy¬ cling tournaments.

Government. — The city is governed by a mayor elected biennially, and a bicameral coun¬ cil. The municipal appropriation in 1919 was $4,922,45 7.28, including $1,179,132.67 for the school department; $998,567.97 for the street department; $352,624.30 for the police depart¬ ment; $476,153.34 for the fire department. The waterworks are owned and operated by the city; the system cost over $2,000,000. In 1919 the city had a total debt of $9,026,500. The assessed valuation of real and personal prop¬ erty in the same year was $201,786,789.

History. — Springfield was first settled in 1636 by a party of emigrants from Roxbury under the leadership of William Pynchon. Until 1640, when it received the name of Springfield (from Springfield, England, the home of Pynchon), the town was known as Agawam. West Springfield, Chicopee and sev¬ eral of the neighboring towns were then in¬ cluded in its boundaries. On 5 Oct. 1675 during King Philip's War, the town was attacked by Indians and burned. In September 1786 during Shay's Rebellion (q.v.) it was the scene of a riot headed by Daniel Shay. In January 1787 occurred a skirmish between the State militia and 1,000 insurgents led by Shay, in which

the latter was defeated. The city was incorporated in 1852.

Population. — Springfield had a population of 2,312 in 1800; (1850) 11,766; (1880) 33,340;

(1890) 44,179; (1900) 62,059; (1910) 88,926; (1915); 103,000; (1920) 129,614.

Consult Burt, (The First Century of the History of Springfield) (1888) ; Green, < Spring- field, 1686-1886) (1888); Barrows, (The His¬ tory of Springfield in Massachusetts> (1911).

Clifton D. Jackson,

General Secretary , Springfield Chamber of Commerce.

SPRINGFIELD, Mo., city, county-seat of Green County, on the Saint Louis and San Francisco and the Kansas City, Fort Smith and Missouri railroads, about 130 miles south of Jefferson City, the capital of the State. In the early part of the Civil War there

occurred in the city and vicinity several battles. One, which is known as the battle of Wilson's Creek, took place 10 Aug. 1861 ; the Union forces were defeated and the Union general, Nathaniel Lyon, was killed. The city is on the ridge of the Ozark Mountains in a region known for its valuable deposits of zinc and lead. The climate is healthful and warm, temperate about all the year. Its industries are chiefly connected with the mining and marketing of lead and zinc. The chief industrial establishments are two large railroad shops, iron works, machine shops, wagon and carriage factories, furniture factories, flour mills and novelty works. It has an extensive trade in manufactures, lead and zinc and as a jobbing centre for a large part of the southern counties. The principal public buildings are the government buildings, county courthouse, municipal buildings, Saint John's Hospital, Springfield Frisco Hospital, the bank buildings, and several fine building blocks ; Landers Building (10 stories), Heer-Andre Building (five stories), Holland Building, Y. M. C. A. Building are all of recent construction. The educational institutions are a State Normal School, Loretto Academy (Roman Catholic), Drury College (Congregationalist), public and parish elementary schools and a public library. There are the National and Confederate ceme¬ teries, parks and in the vicinity many places where the scenery is most beautiful.

Pop.

(1890) 21,850; (1900) 23,267; (1910) 35,201; (1920) 39,631.

SPRINGFIELD, N. J., township in Union County, on the Rahway River, and on the Dela¬ ware and Lackawanna Railroad, eight miles southwest of Newark. The chief manufactories are boot and shoe factories, paper mills and hat factory. Springfield is celebrated as the scene of a battle between the American and British forces, 23 June 1780. The British, under General Knyphausen, advanced from Elizabeth¬ town about 5 o'clock in the morning. They were opposed by General Greene, but owing to the superior number of the enemy he was com¬ pelled to evacuate Springfield, which was then burned by the British. During the action the Rev. James Caldwell, chaplain in the New Jersey brigade, is said to have distributed the hymn books from the neighboring Presby¬ terian church among the soldiers for wadding, saying at the same time, (<Now put Watts into them, boys.® This battle prevented further ad¬ vance on the part of the British. The American loss was about 72 and that of the British about 150. Pop. 1,300.

SPRINGFIELD, Ohio, city, county-seat of Clark County, on the Lagonda Creek and the Mad River, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Cleveland, Cin¬ cinnati, Chicago and Saint Louis, the Erie and the Detroit, Toledo and Ironton railroads, about 45 miles west of Columbus. Five lines of elec¬ tric railways provide direct connections with the cities of Columbus, Dayton, Xenia, Urbana, Bellefontaine, Troy and Piqua, Lima.

Manufacturing. — The surroundings of the city were naturally rich in the possibilities of agriculture. An abundance of water power, utilized in woolen, cotton, flour and powder mills, enabled the early settlers to supply many of the needs of a pioneer community. In later

years native genius turned the drift of the city's principal energies into the line of manu¬ factures with the result that the fame of Spring-field, as a manufacturing centre, is literally world-wide, and, especially, in respect to the fabrication of implements designed for the planting, cultivation and harvesting of the great staple crops. The developments of more recent years have given these manufactures a varied character, embracing electric motors and fans, leather belting, gas and steam engines, piano plates, machinery in vast variety, tools, mechanical appliances and factory supplies, in iron, steel and brass. Three million copies monthly, periodical publications of high class and national renown, and floral industries ex¬ ceeded in aggregate

extent by no city in the Union, contribute to Springfield's commercial prestige and distinction. Flour, medicine, food, wearing apparel, chemical, coffin, rubber and paper manufactures add variety to the list of Springfield's notable products. A recent in¬ dustrial survey gives the total number of manu¬ facturing establishments as 285, the amount of capital invested $30,000,000, the number of wage- earners 9,100, the average annual wages $5,800,- 000 and the average value of the annual products $29,500,000. There were seven large manufac¬ tories of agricultural implements, with an in¬ vested capital of $8,194,543. The 30 foundry and machine shops had a combined capital of $2,772,- 036. They had 2,197 employees, to whom was paid annually, on an average, wages amounting to $1,084,681. The value of the annual products was $3,097,910. Since 1900 there has been a notable increase in the amount of manufac¬ turing.

Transportation and Commerce. — Ample shipping facilities afforded by the steam lines mentioned, ready access to the coal fields of various States and an excellent supply of natu¬ ral gas fuel at 30 cents per 1,000 cubic feet are prominent factors in the city's advancement. At an early stage of the development of electric traction lines Springfield took rank as one of the chief centres of Ohio.

Local mercantile interests in lines both of wholesale and retail trade reflect the conditions of a thrifty, growing community.

The Commercial Club, embracing a member¬ ship of 700 representative citizens, is the agency for organized effort in the promotion of the growth of the city and the conservation of all its material interests. Four live and progress¬ ive daily newspapers give voice and direction to public-spirited sentiment and action.

Buildings and Municipal Improvements. — High School, $300,000, beautiful building pat¬ terned after Congressional Library; Memorial Hall, $250,000, seats 3,500. The United States post-office building was erected and equipped in 1890 at a cost of $150,000. The 11 rural free delivery routes add over 6,000 to the number served by the Springfield office. The Clark County courthouse, a handsome structure, is supplemented by a county office building, of striking architectural design and modern con¬ struction, the two buildings representing an ex¬ penditure of more than $200,000. The City Building cost $250,000 and is one of the finest edifices of its kind in the State, providing a city market 300 feet in length and a spacious audi¬ torium in addition to quarters for municipal officers. Fronting the City Building are the

handsome and graceful Kelly fountain and esplanade which cost $8,000 and were presented to the city by Oliver S. Kelly. The city hospital, founded by the liberal donations of Ross Mitchell and J. H. Thomas and endowed in the sum of $100,000 in government bonds by John Snyder, was erected and furnished at a cost to the city of $100,000. It is equipped with every appliance and convenience essential to its use. The city prison and patrol station, the cost of which was $20,000, is of modern design and construction. Three State fraternal homes have been erected on the hills which border the city, and a fourth, ((The Eagles,® is under way. These homes are maintained by the brother¬ hood of the Masonic craft, the Independent Order of Odd Fellows and the Knights of Pythias. The city donated the sites on which the institutions are located, the funds being provided by voluntary contributions amounting to $100,000. Asa Smith Bushnell gave to the Masonic Home the sum of $10,000. Thousands of representatives of the fraternal orders an¬ nually visit these homes. The Lagonda Club has a handsome building which cost $25,000. The Young Men's Christian Association build¬ ing, erected by the gifts of the people of Spring- field, cost $90,000. Asa Smith Bushnell and Edwin S. Kelly each contributed $5,000.

Snyder Park, a tract of 275 acres, was the gift of John and David L. Snyder. Other dona¬ tions by the same public benefactors were those of $25,000 for a memorial bridge and $200,000 in government bonds in endowment of the park. A memorial arch, erected to the memory of the Messrs. Snyder, by the people of Springfield, at a cost of $6,000, is to span the entrance to Sny¬ der Park, and was dedicated 4 July 1904. Fern- cliff, Springfield's principal burial ground, oc¬ cupies a site of surpassing beauty. Springfield has an abundant supply of pure water. The waterworks system cost $800,000. Ample fire pressure is maintained, but the city fire depart¬ ment equipment includes three steam engines of large power.

Churches, Schools, Libraries. — The city has 60 churches, a large number of which are of modern construction and striking artistic beauty. There are 19 public school buildings, four Roman Catholic parish schools, two pri¬ vate business colleges and several private schools. The Springfield Seminary is one of the large city schools. The Wittenberg Col¬ lege, founded in 1845, by the Lutheran Church, has in attendance about 900 students. The Warder public library, which cost $100,000, is a gift from Benjamin H. Warder. It contains 35,000

volumes and is maintained by an annual appropriation. More than a score of literary clubs contribute to the culture and refinement which are marked characteristics of the people of the city.

Banks and Finances. — There are eight banks — six national and two savings banks. The national banks have a combined capital of $1,000,000; the six banks have deposits amount¬ ing to $5,214,520. There are two building and loan associations with assets in excess of $1,500,000. The bank clearings increased from 827,197,800 in 1910 to $41,194,503.02 in 1915. The gross receipts of the post office were in 1903, $163,041, and in 1915, $443,533.74. The aggregate financial transactions of the post- office, in 1910, were $1,000,000. The aggregate

value of the real and personal property, as as¬ sessed for taxation, for the year 1915 was

$58,712,650.

History. — The plat of the town was made in 1801 by Janies Demint. The city was char¬ tered in 1850. The life of the city is told by the growth of its industries, charitable institutions, churches and schools. It has been the home of many noted men, among whom may be men¬ tioned Joseph Warren Keifer (q.v.) and Asa Smith Bushnell. Pop. (1920) 60,840.

SPRINGFIELD, S. Dak., city in Bon Homme County, near the Missouri River, 170 miles southeast of Pierre, on the Chicago, Mil¬ waukee and Saint Paul Railroad. The South¬ ern State Normal School is located here. Pop. 719.

SPRINGFIELD, Vt., village and township in Windsor County, on the Black River, 35 miles southeast of Rutland, and on an electric railroad. It has shoddy mills, machine shops and a brass foundry. Pop. according to the 1920 census, 5,283.

SPRINGFIELD (Mo.), Military Opera¬ tions at. As the central point of southwest¬ ern Missouri, Springfield was an important place in military operations during the Civil War. After the engagement at Carthage (q.v.),

5 July 1861, Colonel Sigel retreated to Spring- field,- where he was joined by Gen. Nathaniel Lyon (q.v.) on the 13th, Lyon assuming com¬ mand of all the Union forces, and calling for more to make head against the combined forces of Generals Sterling Price and Ben. McCulloch, a call that brought no response. On 1 August, hearing of

the Confederate advance, Lyon marched from Springfield with 6,000 men and

18 guns against it, and next day at Dug Springs,

19 miles from the city, his advance encoun¬ tered and drove back the Confederates under General Rains, with slight loss, and returned to Springfield on the 5th, which he thought he should be compelled to abandon, falling back either to Saint Louis or Kansas, as he was largely outnumbered. He reported the condition of affairs to General Fremont (q.v.) in command at Saint Louis, held his position, and advancing on 10 August, fought the battle of Wilson Creek (q.v.), nine miles south¬ west of Springfield, and was killed. His army, under Colonel Sigel, retreated through Spring- field to Rolla, the Confederates following only to Springfield, which they held until the 25th, when they moved against Lexington. On 13 August, Fremont, hearing of the Wilson's Creek disaster, Lyon's death and the unobstructed re¬ treat of Sigel on Rolla, sent reinforcements to Rolla, and at the end of September he left S-aint Louis with an army of 38,000 men and 86 guns to take the field in southwestern Missouri, against Sterling Price (q.v.). His five columns were directed on Springfield. On 23 October, when about 50 miles from Springfield, Fremont sent Major Zagonyi, with about 250 men of his bodyguard and of the (<Irish Brigade® (37th Illinois) to advance on the place. Zagonyi reached Springfield on the 25th. It was then held by about 1,000 recruits, some mounted and some on foot, and after several charges Zagonyi routed them, his loss being 15 killed, 27 wounded and 10 missing. Fremont occupied the place on the 27th with 21,000 effective men,

and was about to advance and give battle to the Confederates, when (2 November) he was re¬ lieved in command by General Hunter, who withdrew the army to Rolla. Price reoccupied Springfield and began to recruit an army to re¬ cover Saint Louis, and had gathered some 8,000 men by 12 Feb. 1862, when he was driven from the place by General Curtis, Price retreating into Arkansas. Springfield now became a depot of supplies, and was well fortified. Early in January 1863 General Marmaduke (q.v.) with 4,000 mounted men and three guns, started from northern Arkansas on a raid into Missouri, and with a part of his command appeared before Springfield on the morning of the 8th. Gen. E. B. Brown, in command of the place, had but short

notice of his approach, but gathered some militia from the adjoining country, which, with his regular command, convalescents from the hospitals and some citizens, gave him about 2,100 men. The fight began about 10 a.m. of the 8th and continued until dark. Marmaduke's men drove in parts of the line, captured one gun, carried some of the works and seized part of the town, but Brown held the strongest fort against all efforts to take it. On the morning of the 9th Marmaduke withdrew in the direc¬ tion of Rolla, after a loss of 20 killed, 105 wounded and 26 missing. The Union loss was 14 killed, 146 wounded and 5 missing.

E. A. Carman.

SPRINGFIELD RIFLE. See Ordnance; Small Arms.

SPRINGS, elastic contrivances of any kind having the power of recovering, by their elas¬ ticity, their natural state after being bent or otherwise forced — interposed between two ob¬ jects in order to impart or check motion or permit them to yield relatively to each other. A common variety of spring is the carriage or automobile spring which diminishes concus¬ sion between the body and the frame or wheels. Another variety is the helical spring used to operate valves, etc. Modern carriage (car¬ riages, automobiles, railway cars, etc.) springs consist of finely tempered pieces of steel so formed and fastened together thit they strengthen each other, while allowing free play for the natural spring of each plate or leaf to act, and by so doing to absorb a large por¬ tion of the vibration and jolting caused by the wheels passing over inequalities in the road. The springs are mounted between the axles and framework, so that the wheels when passing over an obstruction or sinking into a hollow, compress or expand them, in the first instance, the motion being thus partly absorbed and partly passed on to the frame in a much lessened degree, and with the shock consider¬ ably deadened by passing through this elastic medium. Carriage and automobile springs are made in a variety of shapes. The elliptic spring consists of two halves fastened together with bolts; the top half is attached to the frame and the bottom half to the axle by bolts or slips in the centre. Varieties of the elliptic are the half-elliptic or semi-elliptic and the three-quarter-elliptic, in which an iron attached to the frame takes the place of one-half or more of the upper part of the ellipse. The grasshopper spring is arc-shaped with linking plates for attaching to shackle The volute spring is a type now in favor for heavy vehicles.

When a spring made up of several leaves, plates or laminations is compressed, the various leaves must slide upon each other. This

sliding motion is constantly taking place while the vehicle is traveling. To facilitate the slide movement the leaves are lubricated. The top member of the ordinary auto or carriage spring is of stout spring steel, with lugs forged on each end of it, by means of which it is attached to the shackles. It is furnished with lubrica¬ tors and slots through which the oil flows to the various grooves. For high-speed vehicles it has been found advisable to lengthen the spring considerably and increase the circle of which the spring forms an arc. Consequently the spring is more nearly horizontal. In power- driven road vehicles radius rods are used to take up the drive and other thrusts which tend to alter the position of the rear axle in regard to the frame. The rods tend to locate the axle relatively to the frame. Horn plates are used to prevent the side movement of the springs, while in some cases rollers are used to prevent the axle from moving laterally relatively to the frame. The rollers come up against the surface of the horn plates. The helical spring is a length of metal of either round or rect¬ angular section, wound round an imaginary cylinder. It is commonly miscalled a spiral spring. The corkscrew gives an idea of the helical spring. The spiral spring is a length of metal wound in a curve of continually decreasing or increasing radius. When wound it is quite flat. The main-spring and the hair-spring of a watch are spiral springs. The trembler spring is a flat spring used in coils and in contact breakers in order to make and break contact. The volute spring is a combination of the helical and the spiral spring. Helical and volute springs are in general use in modern machinery of several types, but are especially used in in¬ ternal combustion engines to return the valves to their seatings. Other uses of the helical spring will instantly occur to every reader.

SPRINGS, natural outlets by which ground water reaches the surface. The more common small springs usually result from the outcrop of a nonporous layer below a porous stratum, the water which soaks down through the porous layer being forced to move laterally along the top of the impervious bed until it emerges. This type is usually called the hillside spring. On many steep hillsides or mountain slopes the soil acts as the porous layer, the bed rock as the impervious stratum, and whenever the soil is thin, the water is forced to the surface forming springs or swampy places. Sometimes the water seeps slowly down into the earth along an inclined porous bed, until it reaches a crack or joint, along which it rises rapidly. Such fissure springs are often of large size, and fre¬ quently have a high temperature, due to the great depth from which the water ascends. A third type of spring, common in limestone regions, results from the emergence of an actual underground river, which flows through a cave dissolved in the limestone. Such springs are frequently of enormous size, sometimes

fur¬ nishing power to run local mills. Warm or hot springs are commonly termed thermal springs. The temperature varies greatly, ranging from normal to the boiling point. The heat may be due to the proximity of still uncooled volcanic

rocks or to the great depth from which the water ascends along fissures. The hot springs of Yellowstone are probably of the former type, many warm springs of eastern United States appear to be of the latter sort. Practi¬ cally all ground water carries mineral matter in solution. If this mineral matter is unusual in character or quantity, the spring is termed a mineral spring. Large quantities of lime cause calcareous springs ; iron, chalybeate springs ; silica, silicious springs ; salt, saline or salt springs ; hydrogen sulphide, sulphur springs. Many mineral springs are believed to have medicinal value, and much mineral water is bottled and sold. In 1913, mineral water to the value of $5,631,391 was reported in the United States alone.

SPRINGTAILS, a family of wingless in¬ sects of the order Collembola distinguished by the possession of an elastic forked caudal appendage, folded under the body when at rest, by the sudden extension of which these insects are enabled to make considerable leaps. The name is popularly extended to any thy- sanurous insect, as the snow-flea (Achorentes nivicola) and the bristletail (q.v.). Their scales are favorite test-objects for microscopes.

SPRINGVILLE, Utah, city in Utah County, 40 miles southeast of Salt Lake City, on the San Pedro, Los Angeles and Salt Lake and the Rio Grande railroads. The surround¬ ing region is devoted to dairying and to fruit and stock raising, and there are gold, silver, iron and copper mines. Industries include canneries, beet sugar factories and railroad con¬ struction shops. Pop. 3,010.

SPRIT, a small boom or pole which crosses the sail- of a boat diagonally from the mast to the upper aftmost corner, which it is used to extend and elevate. These sails are accordingly called sprit-sails. A sail attached to a yard hanging under the bow-sprit was also formerly so called.

SPROCKET, one of the projections (ˆteeth®) on a sprocket-wheel which engages the chain, also the name applied generally to any wheel upon which are radial projections that engage the chain passing

over it. Per¬ haps the commonest form of sprocket is found in the bicycle, in which the pedal shaft carries a large sprocket-wheel which drives an endless chain which in turn drives a small sprocket on the axle of the rear wheel. The early automo¬ biles were also largely driven by sprocket and chain mechanism, a practice largely copied from bicycle practice. Sprockets are of various de¬ signs, a maximum of efficiency being claimed for each by its originator. Sprockets and chains are also used for power transmission from one shaft to another where slippage is not admissible, sprocket chains being used instead of belts or ropes and sprocket-wheels instead of pulleys. They can be run at high speed and some forms of chain are so constructed as to be noiseless even at high speed.

SPROCKET CHAINS, chains used for power transmission from one shaft to another, of the endless type, and working over sprocket or radical pointed-tooth wheels. They are much used in the bicycle, where the type known as the block-and-side-link is well nigh universal. In this type every other <(link® is a block and is

connected to the one following by two steel side plates between which the sprocket tooth moves. This type of sprocket chain was also extensively used in automobile construction but has been displaced by the roller type of chain, consisting of side-links held together by rivets, the latter encircled by a roller. These offer less friction as the chain takes its place on the sprocket. The chief advantage of the sprocket chain as a means of power transmission is its ability to work with very little friction loss without slippage, as is the case with belts and ropes. A fault of the chain is its noise, arising largely from the fact that as the chain stretches and the sprdckets wear down in size, the two no longer fit together and the chain begins to rub upon and grind the teeth, thus increasing the working strain. In modern practice the silent gear chain has displaced all other types. Here the chain does not lie with its rivets or blocks between the sprocket-teeth, but carries them rather above, or outside the teeth, and each link is provided with points at one or both ends, which act as teeth to engage the teeth of the sprocket. These points grip the sprocket teeth as they come in contact with it and, hav¬ ing gripped it, they hold the chain in that posi¬ tion, which insures perfect-pitch line effect.

SPROULE, Thomas Simpson, Canadian physician and legislator: b. York County, On¬ tario, 1843. He was educated at the Univer¬ sity of Michigan and at Victoria University, Cobourg, and for a short time practised medi¬ cine in Michigan. He later returned to Canada and was a member of the Dominion Parliament in 1878-1911. In 1915 he became a member of the Senate. He was throughout his career a

strong supporter of Protestantism and worked earnestly for separate schools for Manitoba.

SPRUCE, or SPRUCE-FIR, a coniferous

tree of the subfamily Abietince and especially of the genus Abies. One of the best known and typical is the Norway spruce (A. excelsa), which is indigenous in the north of Europe where it is the loftiest (often 125 feet) of forest trees, but has been transplanted as an ornament to all cool climates. The American spruces are described under Fir.

SPRUCE-BEER, a decoction of the young green tops of the black spruce, boiled and evaporated to the consistence of a thick syrup. Spruce beer of good quality may be prepared as follows: Essence of spruce, one half pint; pimento and ginger (bruised), of each five ounces; hops, one-half pound; water, three gal¬ lons; boil the whole for 10 minutes, then add of moist sugar 12 pounds (or good treacle 14 pounds); warm water, 11 gallons; mix well, and when lukewarm add a pint of yeast ; after the liquid has fermented for about 24 hours it is ready for bottling. The beer is regarded as a diuretic and antiscorbutic, and is relished by many as an agreeable summer beverage.

SPRUCE PARTRIDGE. See Grouse.

SPUR, a metal instrument composed of a shank, neck, and prick or rowel, fastened to. the heel of a horseman to goad his horse to greater speed. Its use cannot with certainty be traced further back than Roman times. Rowels first appeared early in the 14th century. The spurs of mediaeval knights were gilt and those of esquires silvered. (<To win his spurs® meant to

gain knighthood. The Mexicans and Span- ish-Americans generally wear large spurs, often of silver, except the rowel, and sometimes beautifully ornamented. The tendency in North America and western Europe is to use spurs much less than formerly.

SPURGE. See Euphorbiaceˆe.

SPURGE-LAUREL. See Daphne.

SPURGEON, sper'jon, Charles Haddon,

English Baptist preacher: b. Kelvedon, Essex, 19 June 1834; d. Mentone, France, 21 Jan. 1892. He was the son of a Congregationalist minister and was educated at Colchester and Maidstone. In 1849 he was appointed usher in a school at Newmarket and soon after engaged in religious work at Cambridge and the neigh¬ borhood, being known locally as the ((boy preacher.55 Having joined the Baptist body he accepted the pastorate of a small Baptist con¬ gregation at Waterbeach at 18. Becoming known for his eloquence he was called, in 1854, to the pastorate of the Baptist chapel in New Park street, Southwark, and this, becoming too small for his audience, his congregation suc¬ cessively removed to Exeter Hall and the Sur¬ rey Music Hall, and ultimately built, in 1861, the great Metropolitan Tabernacle, which could accommodate 6,000 persons. Here he preached and labored for the rest of his life, his dis¬ courses attracting hearers from all parts of the world. Besides his ordinary ministrations and the publication from 1855 of a weekly sermon he founded the Pastors' College, at which the ministers of 36 London chapels were trained by him, the Stockwell Orphanage, _ almshouses, schools, etc. Earnestness, simplicity, direct¬ ness, liveliness and not infrequently a genuine touch of humor were the chief characteristics of his sermons. Sagacity, common sense, straightforwardness, hatred for sham and falsity were prominent traits of his character as a man. He was the author of numerous vol¬ umes, among which the best-known are (The Saint and his Saviour) (1867); (John Plough¬ man's Talk) (1868) ; (Feathers for Arrows) (1870) ; cThe Treasury of David,5 a com¬ mentary on the Psalms — extending to seven volumes (1865-80) ; (Types and Emblems 5

(1875) ; (The Metropolitan Tabernacle and its Work5 (1876) ; (Farm Sermons5 (1882) ; (The Present Truth5 (1883) ; (Storm Signals5

(1886); (Salt Cellars5 (1889); and he edited the monthly magazine Sword and Trowel. Consult (Life5 by Shindler (1892) and (Autobiography Compiled by his Wife5 (1900).

SPURGEON, Thomas, English Baptist clergyman, son of C. H. Spurgeon (q.v.) : b. London, England, 20 Sept. 1856; d. 20 Oct. 1917. He was educated at the Pastors' College, studied art and visited Australia and Tasmania in 1877 and in 1879. In 1880-89 he was in charge of the Baptist Church at Auckland, New Zealand, and was evangelist of the New Zea¬ land Baptist Union in 1889-93. From 1894-1917 he was pastor of the Baptist Church, Met¬ ropolitan Tabernacle, London. He was editor of Y zvord and Trowel and was publisher of (The Gospel of the Grace of God5 sermons (1884); < Scarlet Threads and Bits of Blue,5 poems (1892) ; fMy Gospel,5

sermons (1902), etc.

SPURRY, a plant of the genus Spergula, order Caryophyllacece ; annual herbs, with the

narrow or awl-shaped stipulate leaves fascicled at the swollen nodes of the succulent stems, and thus appear as if in whorls. The flowers are small and white in terminal, loose cymes, and have their parts in fives. S. arvensis is the common corn-spurry or yarr, a weakly spread¬ ing slender plant, generally glabrous, and with numerous flowers. It has been naturalized from Europe, where it is found in sandy fields, and is sometimes cultivated for green manure and for a rapidly growing fodder, or soiling crop, well liked by cattle and poultry. The sand-spurries are delicate plants of the closely allied genus Tissa. Found in salt-marshes and sea- beaches, with small pink flowers.

SPURZHEIM, spoorts'him, Johann Fried¬ rich Kaspar, German phrenologist : b. Long- wich, near Treves, Rhenish Prussia, 31 Dec. 1776; d. Boston, Mass., 10 Nov. 1832. He was educated at Vienna, where he became ac¬ quainted with Franz Joseph Gall (q.v.), the founder of the system of phrenology. To this study Spurzheim became exceedingly partial,; and he soon joined Gall in making inquiries into the anatomy of the brain. They quitted Vienna in 1805 to travel and went in 1807 to Paris. From that period Spurzheim traveled and lectured in England, Scotland and Ireland. In 1832 he visited the United States and began his lectures in Boston, but death soon inter¬ rupted his labors. He published (The Physi¬ ognomical System of Drs. Gall and Spurzheim5 (1815); (Sur la Folie5 (1818); (Essai philoso-phique sur la Nature morale et intellectuelle de l'Homme5 (1820) ; (A View of the Elementary Principles of Education5 (1821), etc. Consult Carmichael, (Memoir of the Life and Phi¬ losophy of Spurzheim5 (1833). See also Phren¬ ology.

SPUYTEN DUYVIL (spi'tn di-vil) CREEK, a tidal channel connecting the Hudson River with the Harlem and forming the north¬ ern boundary of Manhattan Island, New York. Its name is derived from the Dutch "Spyt den dniveP 5 (in spite of the devil), and is sup¬ posed to have been derived from the following circumstance : When the English fleet appeared in New Amsterdam (New York) Harbor, the governor's trumpeter was sent to warn the farmers up the Hudson and summon them to the defense of the city; on reaching this creek he found no ferryman willing to take him across on account of the high wind, and swore to cross the stream <(spyt den dniveP ; but was drowned in the attempt to swim across. The creek is crossed by a railway drawbridge near the Hudson.

SPY, in military usage, a secret emissary sent into the enemy's territory or encampment to inspect their works, ascertain their strength or movements and report thereon to the proper officer. As the service is most dangerous, for it is the custom when a spy is caught to put him to an ignominious death, a general has no right to compel any person, whether a subject of his own or the enemy's country, to under¬ take it. The proper business of a spy is to ob¬ tain intelligence and he must not be employed to take the lives of any of the enemy. An officer or soldier found within the enemv's lines should not be treated as a spy if he is clothed in his own uniform, but is dealt with either as a deserter or prisoner of war; but if

wearing his enemy's uniform or civil dress he is liable to be hanged. The American Civil War offered many instances of great daring on the part of spies, Union and Confederate, and in numerous cases their exploits resulted in tragic deaths. While spies are undoubtedly induced to perform their perilous work, in numerous cases, by hope of reward, yet there have also been many examples among them of pure and devoted patriotism. In the Russo-Japanese war several Japanese officers of rank and family position, who sought, in the disguise of coolies, to blow up a railway bridge in Manchuria, were promptly hanged as spies, and the spy record of the World War would fill many volumes.

SPY, The. (The Spy; a Tale of the Neutral Ground,5 Fenimore Cooper's second novel, pub¬ lished in 1821, was the earliest American novel to win wide and permanent fame and may be said to have begun the type of romance which dominated native fiction for 30 years. The share of historical fact in the story, indeed, is not large, but the action takes place so near to great events that the characters are all invested with something of the dusky light of heroes, while Washington moves among them like an unsuspected god. The book is full of swelling rhetoric and the ardent national piety of Cooper's generation. Fortunately Cooper saw the advantage of making his British out to be enemies worth fighting, if only in the interest of the plot, which ranges back and forth over the neutral ground between the two armies with great haste and sweep. To rapid movement Cooper adds the merit of a very real setting. He knew Westchester County, where he was then living, and its sparse legends as Scott knew the border. The topography of (The Spy5 is drawn with a firm hand. With his characters, Cooper is not uniformly successful. Accepting for women

the romantic ideals of the day, he cast his heroines in the conventional mold of helplessness and decorum. The less sheltered Betty Flanagan, no heroine at all in the elegant sense, is amusing and truthful. Of his men, too, the gentlemen are little more than mere heroes, whatever the plain fellows may be. But Harvey Birch, peddler and patriot, his character remotely founded upon that of a real spy who had helped John Jay during the Revo¬ lution, is essentially memorable and arresting. Gaunt, weather-beaten, canny, mysterious, he prowls about on his subtle errands, pursued by friend and foe, sustained only by the confidence of Washington, serving a half supernatural spirit of patriotism which drives him to his destiny, at once wrecking and honoring him. This romantic fate also condemns him to be sad and lonely, a dedicated soul. No character in American historical fiction has been able to obscure this first great figure. H. L. Barnum's (The Spy Unmasked; or Memoirs of Enoch Crosby, alias Harvey Birch5 (1828 ; 5th ed., 1864) claimed to identify the original.

Carl Van Doren.

SQUAD, in the army, a small body of troops assembled for drill, inspection or other purposes. A troop of cavalry or a company of infantry is usually divided into as many squads as there are sergeants or drill-instructors to train them. The awkward squad is composed of those recruits who have not received suffi¬ cient training to take part in regimental drill.

SQUADRON, (1) the principal division of a cavalry regiment in some European armies, commanded by a captain, and usually of 100 to 150 horsemen. This body is subdivided into two troops. Three to six squadrons form a regiment. When in line one yard in the length of the front is allotted for each man and horse; the space in line between every two squadrons is equal to one-quarter of the extent occupied by each squadron. (2) In the navy a squadron is a number of vessels employed on any par¬ ticular service or station, smaller than a fleet, under the command ot a commodore or junior flag-officer. A United States navy squadron may consist of 11 or less battleships. When a large fleet is assembled, they are usually divided into the van, centre and rear squadrons.

.SQUARCIONE, Francesco, fran-ches'-

ko skwar-che-6'ne, Italian painter : b. Padua, 1394; d. there, 1474. In early life he traveled in Greece and Italy, where he became acquainted with the masterpieces of ancient sculpture. He formed a collection of busts, torsos and _bas- reliefs (probably casts) . and foundeffi~the

Padovan school of painting, which produced Mantegna and Zoppo. One of his latest works is (A Madonna and Child,5 now in the posses¬ sion of the Lazzard family at Padua.

.SQUARE, (1) in geometry, a quadrilateral figure, both equilateral and equiangular, or, in other words, a figure with four equal sides and equal angles. In measuring superficial areas it is only necessary to multiply one side by itself to have the area of the square, because each of the sides may be considered as the basis or as the perpendicular height. Thus a square the sides of which measure four feet is equal to 16 square feet, that is, 16 squares each one foot high and one foot broad. To square a figure (for example, a polygon) is to reduce the sur¬ face to a square of equivalent area by mathe¬ matical means. It has often been attempted to square the circle, but this can be done only ap¬ proximately. (2) In arithmetic and algebra the square of a number is the number or quan¬ tity produced by multiplying a number or quantity by itself. Thus 64 is the square of 8, for 8X8 = 64. (3) In military tactics, a

body of infantry formed into a rectangular figure with several ranks or rows of men facing on each side, with officers, horses, colors, etc., in the centre. The front rank kneels, the second and third stoop and the remaining ranks (generally two) stand. This formation is usually employed to resist a cavalry charge. Hollow squares are frequently formed with the faces fronting inward when orders and instruc¬ tions, etc., are to be read and the like. (4) Any of a great variety of objects more or less rect¬ angular, as a city block, a .pane of glass, a simple measuring instrument for determining right angles, usually made in the form of an L or T. A geometric square, however, may be quite a complicated instrument.

SQUARE ROOT. Arithmetical. — The

square root of a number is one of its two equal factors. It is indicated by the fractional exponent (Y) placed at the right, and above the number, thus 16i, or by the radical

sign (V 16). The two equal factors of 16 are 4 and 4, either one of which may be taken as its square root. The square roots of many

numbers are approximate only and are repre¬ sented by a whole number and a decimal, the latter carried out as many places as the

ap¬ proximation is desired, as example, \/ 19 = 4.358899+. the square root of fractions may be found by extracting the root of the numera¬ tor and denominator, but a more practical method is to extract the root of the resulting decimal. Illustration of the method employed in finding the square root of 576:

576(20 20 = 400 4

2 X 20 = 40)176 24* (40 + 4) X 4=176

Since the number 576 has three figures its square root will be composed of tens, and units. The number of tens in the root will be 2, and the square of 2 tens, or 20, will be 400. (See

B

M

■■I

20

A 8

Fig. 1.

Fig. 2.

Fig. 1). But inasmuch as there is still a re¬ mainder of 176, such additions must be made to the square as will take up this remainder, and still keep the figure a perfect square. The neces¬ sary additions are the two rectangles B and C and the small square D (see Fig. 2). The re¬ mainder 176 divided by the length of the rec¬ tangles, 2 X 20, will give the width of the addi¬ tions, which is 4, and this width is also the side of the small square D; therefore the total length of the additions will be 40 + 4, and the area of the additions 4 times this length, or 176, which completes the square whose area is 576, and whose square root is 24.

Algebraic. — The preceding rules, with the exception of those relating to decimals, are ap¬ plicable to algebraic quantities. The square root of an algebraic quantity, however, may be positive or negative.

The square root of a negative quantity is imaginary, and is usually factored into two quantities, one of which is real, and the other

expressed by V — 1. Thus the square root

V — ab = V ~ab V — 1.

•The square root of algebraic quantities af¬ fected by other roots is indicated by multiplying its exponent, or index by 2, wherever possible the square root is first extracted, and the multi¬ plication avoided.

The indicated square root of an imperfect square, in algebra, is called a quadratic surd. To extract the square root of a binomial surd,

such as V a + ˆ~b, there are many methods ; one is to reduce the surd term so that its co¬ efficient shall be 2. Then separate the rational term into two parts whose product shall be the

quantity under the radical sign. Extract the square roots of these parts, and connect them by the sign of the surd term.

Square root finds its application in all branches of mathematics, and in the natural sciences. Its use is fundamental.

SQUARING THE CIRCLE. See Quad¬

rature of the Circle.

SQUASH, a garden vegetable, tlie fruit of several species of the genus Cucurbita (order Cucurbitacea?) . They are vine-like tendril-bear¬ ing herbs, with large rough leaves on long hol¬ low stalks, have large monoecious yellow flowers borne singly in the axils of the leaves, and fol¬ lowed by hard fruits of many forms and sizes. They are natives of warm climates, but are cul¬ tivated as annuals in temperate regions through¬ out the world. The summer squashes are derived from C. pepo mainly, and the winter kinds principally from C. . maxima, though C. moschata also enters into many varieties. The first species, which is also parent of the pump¬ kin (q.v.), has given rise to the scallop, patty¬ pan and summer crookneck squashes, the first known in southern markets as simlins, sym- blings and various similar names; the third is the parent of the winter and Canada crookneck, China and cushaw squashes. C. moschata and C. pepo have been crossed artificially, but none of these species are known to cross under field conditions, and the other pairs among these three species have not been crossed artificially.

Squashes thrive best in long seasons, in warm situations and upon light, loamy but only moderately rich well-drained soils. In the North they are often planted too early and are injured by late spring frosts and they often fail to mature all their fruits because the early frosts of

autumn injure the vines. To obviate these results the plants are frequently started under glass upon pieces of sod or in pots and are transplanted to the field when seeds could be safely planted. About three weeks is the max¬ imum time to allow between sowing and trans¬ planting, the plants being likely to be too large for best results if older. The soil should be deeply and finely prepared and marked off in checks prior to sowing. For “bush® and sum¬ mer squashes 4x4 feet is the usual distance ; for winter and viny kinds 8 or 12 feet. Most growers allow only two or three plants to each “hill,® but plant 12 or even more seeds in the hills to guard against contingencies. The ground is kept cleanly cultivated until the vines prevent tillage. In the North, the vines should not be allowed to root at the joints be¬ cause this prolongs the vegetative period, and here if one fruit sets long in advance of others upon a vine it is usually cut off since other fruits often fail to form. Two or three squashes are usually calculated upon per vine for winter varieties ; summer kinds will often continue to bear until frost if the fruits are removed as soon as they attain edible size. Winter squashes may be successfully stored for several months but they should be gathered before frost, handled with extreme gentleness to avoid the slightest bruise even to the hardest speci¬ mens and kept at a rather low temperature in a dry atmosphere until needed for use.

Several insects feed upon the squash and sometimes prove troublesome when very abun¬ dant. Probably the best known of these is the

squash bug (Anas a tristis) which appears from its hibernating quarters about the time the earliest plants appear. The eggs are laid upon the foliage and in about a week the scarlet larvae emerge. They pierce the tissues with their stout beaks and suck the juices and as they grow they turn gray, becoming dark brownish gray when mature. The adults are about an inch long and there is a seemingly constant succession of overlapping broods from midsummer onward, insects in all stages of de¬ velopment being found. There are, however, in the North usually only two broods. The plan found most satisfactory in controlling these insects is destruction of the vines and imma¬ ture fruits as soon as the crop can be gathered in the autumn. The squash vine borer, the squash lady-bird beetle, the cucumber beetle and several other insects also feed upon the squash. See Cucumber; Melon, etc.

SQUATTER, a person who settles on public or new lands without any title. In Australia the sheep-farmers, who occupy the unsettled tracts of land as sheep-runs Under lease from government at a nominal rent, are also called squatters.

SQUATTER SOVEREIGNTY, a term designating the right of occupation acquired through undisturbed possession of public lands for a certain number of years by settlers originally unauthorized. Public lands or public domain belonging either to the nation or indi¬ vidual States, from the necessities of govern¬ ment and the usual operations of capitalists, became an object of speculation, and were ac¬ cordingly sold from time to time in large tracts to capitalists and speculators, who generally resided at a great distance from the lands thus purchased by them. Their lands being thus entirely out of their view and control were of course continually intruded upon and possession taken here and there by emigrants from the more populous towns, who put them under cultivation and erected houses and buildings upon them for the common purposes of agricul¬ ture. These settlers came to be familiarly known as squatters, a name naturally derived from the act of settling upon lands in the man¬ ner practised. By the lapse of time the mere possession of these settlers, without any formal title to the land, ripened into what they consid¬ ered to be a right, although the titled proprietors of the soil were frequently wholly ignorant of such occupation of their property. Often, after a long series of years, it became impossible to dispossess them, whatever their possession, in its origin, may have been. It is true that the proprietors might, and did institute legal proc¬ esses and recovered judgment against the occupants, but the officers of justice frequently could not execute the sentence of the law and dislodge them from their possessions. Instances not unfrequently occurred where the officers of justice and the proprietors themselves, or their agents, were shot at or suffered other acts of violence from the occupants. In this critical exigency, which threatened the public welfare, and which was perhaps exaggerated by those men who wished to avail themselves of the occasion to obtain popularity for political pur¬ poses, it was thought necessary to pass laws which were to a great extent similar to the Roman agrarian laws and which deprived the

technical proprietor of a portion of his rights and transferred them to the possessor who had occupied and improved the land.

Under colonial laws and usages a title to land by mere occupancy could not be acquired by a possession short of 60 years. By one of the first laws promulgated by a State of the re¬ public on the question, the legislature of Mass¬ achusetts in 1808 shortened this term to 40

years.

This essential change in the legal rights of the titled proprietors, in violation of what they deemed to be the fair intent and meaning of their contracts, caused much excitement and dissatisfaction among them. Generally, it may be said that there evidently was hardship on both sides ; it was not equitable, on the one hand, that the proprietor should be deprived of his land, nor on the other that an innocent occupant who had been suffered to remain in possession for 30 or 40 years, undisturbed by the proprietor, should be suddenly expelled and stripped of the fruits of the labor of a whole life. By way of alleviating the difficulties of the case, it was provided in this law of 1808, agreeable to a well-known principle of the Roman code, that when the proprietor should institute a process to recover his land the oc¬ cupant should have a right to claim an allow¬ ance for the value of the improvements which he had made upon the lands thus occupied by him, and which were called in the Roman law meliorantes or melior amenta, and by analogy in the popular language of New England, bet¬ terments, improvements, which might have been taken to convey the idea of mclioramenta being already used in New England in the sense of occupation.

In practice, the law was more unequal in its operation as regarding the proprietor of the land, from another circumstance; for he being usually a non-resident or stranger, and the occu¬ pant 'being an inhabitant of the same territory from which the jury was taken who were to try the question of right between the parties, the proprietor was in the more danger of suffering from the prejudice or hostility of the jury.

The law remained in operation, and the lapse of time rendered it less and less unequal and injurious in its effects; finally it became the model of similar laws for all other States of the Union which respectively claimed the right to legislate upon the matter according to local needs.

And from this claim for legislation accord¬ ing to local needs arose the cry of ((popular sov¬ ereignty® which became identified with ((squat- ter sovereignty® in that its adherents, especially from 1847 to 1861, advanced and strenuously advocated the theory that the question of slav¬ ery in a State or Territory should be decided by the electorate of the State or Territory and not by Congress. See also Public Lands, Bounties.

SQUAW-BERRY, or SQUAW-HUC¬ KLEBERRY, the deerberry, genus

Vaccinium stamineum, a bush native to the eastern part of the United States. The bush rarely grows to any height and the berry is very unsavory. The bush, however, has pretty racemed flowers with white recurved corolla and yellow stamens.

SQUAWFISH, a fish of the genus Ptyo- chelus oregonensis, inhabiting the fresh water bodies in California, and commonly known there

as the ((Sacramento pike.® It grows sometimes to be five feet in length and is one of the largest species of the carp family to be found in Ameri¬ can waters.

SQUAWROOT, skwa'rot, a fleshy plant, Conopholis americana, of the family Orobanch- acece, native of the eastern part of the United States. It is generally root-parasitic and found among fallen leaves in oak woods. It is leaf¬ less, grows to a height of three to six inches and as large around as a man's thumb. Fleshy scales entirely cover the plant and the flowers are in axils of these scales. The blue cohosh, Caulophyllum thalictroides, is in rare instances also called squawroot.

SQUAXON. See Salishan Indians.

SQUETEAGUE, skwe-teg'. See Weak- fish.

SQUID, any 10-armed cuttlefish (q.v. ; also Cephalopoda), not a sepia or spirula (q.v.). The squids are divisible into several groups and range in size from less than an inch (Idiosepion) to 75 feet or more in length, when the arms are outstretched. They are found in all oceans, and most of the genera are nearly cosmopolitan. The small families Sepia- duriidcu and Idiosepiidce are confined to the Pacific, and the Chiro tent hides to the Atlantic, but the others are practically world-wide in their distribution and pelagic as well as littoral in range. Together these families form the dibranchiate suborder Decapoda. Most of the squids belong to the shore-haunting Loliginidce or else to the pelagic family Ommastrephidce. In both, the gladius ((pen,® or ((cuttlebone ,® is long and chitinous instead of broad and cal¬ careous as in the sepias proper. The old European names ((calamary® or ((pen-and-ink fish® refer to the pen-shape of this internal support, which is nearly or quite as long as the back, and to the reservoir of inky dye which they discharge when alarmed. In the Loligi¬ nidce it is flat, pointed in front and has the shaft keeled on the ventral side ; in the Onimastre- phidee, it is horny, narrow and terminates in a hollow

cone at the posterior end. There are many species, both existing and fossil.

The common squid of the north Atlantic coast of the United States is Loligo pealii, which after several years of slow growth be¬ come 12 to 18 inches long. The color when living is very changeable, owing to the alternate contraction and expansion of the color-vesicles (chromatophores, q.v.), but red and brown tints prevail, and the general effect is great beauty. These squids lay their eggs in midsummer in large bunches of long gelatinous capsules on shelly and weedy bottoms and along rocky coasts. This species is often found in great numbers in summer close to the shore of Maine and northward and many of them are stranded on the beaches. All the squids are caught by sea fishermen to use as bait.

The ((flying squids® of the genus, Omma- streplies are so named from their habit of leap¬ ing from the sea, sometimes to such a height as to land them upon the decks of vessels. They are met with chiefly far from land; but one small species (O . illecebrosa) is frequently seen in large companies near the New England coast. Verrill describes its attack upon schools of small fishes in which it resembles squids gen¬ erally. All the species are fish-eaters and are vol. 25 — 30

themselves the prey of larger fishes and of porpoises and the various whales, turtles, etc., of the sea. (<In attacking the mackerel,® says Verrill, (<they would suddenly dart backward among the fish with the velocity of an arrow and as suddenly turn obliquely to the right or left and seize a fish, which was almost immedi¬ ately killed by a bite in the back of the neck with the sharp beaks . . . cutting out a tri¬

angular piece of flesh.® They are mainly noc¬ turnal in activity.

To this family belong the (<giant squids® of the genus Architeuthis, which occur in Arctic and sub-Arctic seas, and are occasionally stranded on the shores of Norway and Green¬ land, or found in part in the stomachs of cap¬ tured sperm whales, for which they form an important food-resource. These giants, which probably reach a great age and frequently ex¬ ceed 50 feet in length, including the arms, have such strength that they would drag down a large boat, if given an opportunity, and cases are known where men in the water, seized by even small specimens, have escaped with great difficulty. Preserved remains and papier-mache models may be seen in many museums.

Consult Cook, <Mollusca) (London 1895) ; Kingsley, (Standard Natural History) (Vol. I, Boston 1885) ; Verrill, Unvertebrates of

Vine¬ yard Sound) (Washington 1874).

SQUIER, skwlr, Ephraim George, Ameri¬ can archaeologist : b. Bethlehem, N. Y., 17 June 1821 ; d. Brooklyn, N. Y., 17 April 1888. He engaged for a time in teaching, was con¬ nected with the village newspaper and studied engineering. He was employed on the New York State Mechanic in 1841, and in 1843 went to Chillicothe, Ohio, where he was on the staff of the Scioto Gazette and also clerk of the legislature. Soon after removing bo Ohio he began a series of investigations concerning the ancient mounds in Ohio and the neighboring States. In 1849 he was charge d'affaires to the Central American States, was secretary of the Honduras Inter-oceanic Railway Company there in 1853, in 1863-65 he was United States commissioner to Peru, and appointed consul- general to Honduras in 1868. While per¬ forming the duties of these various offices he prosecuted an extensive series of researches and became generally recognized as the prin¬ cipal authority on American Indian archaeology. He was afterward chief editor of Frank Les¬ lie's publications, and in 1871 was active in organizing the American Anthropological So¬ ciety, of which he was the first president. A severe illness in 1874 incapacitated him for fur¬ ther research, though he recovered sufficiently to complete the revision of his work on Peru. His publications include (Ancient Monuments of the Mississippi Valley) (1848) ; (Aboriginal Monuments of the State of New York) (1851) ; <Serpent Symbols) (1852) ; (States of Central Peru) (1861); (Peru: Incidents and Explora- tions) (1877), etc.

SQUILL. See Scilla.

SQUILLA. See Crustacea; Mantis- Shrimp.

SQUINT, in architecture, an oblique open¬ ing passing through the walls of many old churches, usually constructed for the purpose of enabling a person in the transepts or aisles to see the elevation of the Host at the high

altar. Generally they are not above a yard high and two feet wide, but sometimes they form narrow arches 10 or 12 feet in height.

SQUINTING. See Vision, Defects of.

SQUIRE. See Esquire.

SQUIRREL, a typical member of the ro¬ dent family Sciuridcc. The squirrels form the sub- family Sciurince, the members of which are of slender form and have long bushy tails. All squirrels have well-developed clavicles and the two bones of the lower leg well-developed and distinct ; the premolar teeth are two above and one below, but the first upper one is small and usually deciduous ; the molars, three in each jaw, broad, tuberculate and rooted; the incisor teeth are compressed and the palate broad. About 15 genera with very numerous species and sub-species are distributed through¬ out the world except in Australia. The typical species are diurnal and strictly arboreal, but some of the ground-dwelling species are transitional to the terrestrial and burrowing marmots (subfamily Arctomyince) , and some are nocturnal. They are chiefly vegetarian, but differ much in the exact nature of their food ; most of them partake more or less of an animal diet and many habitually rob the nests of birds of both eggs and young. In cold and temperate climates most species hibernate more or less completely and gather stores of nuts, grains and other foods for the winter months. Some species are known to migrate occasionally in large numbers. The species are of small or moderate size, the largest equaling a cat and the smallest a mouse. Squirrels are adaptable creatures and live under a great variety of climates and conditions, the two principal cen¬ tres of development being regions physically so different as the Malayan Islands and North America, in the latter of which five genera and 120 species occur. The typical genus Scinrus includes species mostly of propor¬ tionally large size with magnificent bushy tails, no cheek-pouches, the thumb rudimentary and without nail, and the first upper premolar absent or minute. Of the 75 species, approxi¬ mately, of this genus, fully one-half are Oriental.

Few native American mammals are better known or more beloved than the gray squirrel (N. carolinensis) , sometimes called the cat squirrel, and, in its melanistic phase, the black squirrel. It abounds in hardwood forests from Canada to Florida and westward to Minnesota,, and in the lowlands as well as the mountainous districts. As might be expected from this wide range, it splits into a number of distinct races. This species reaches a length of about 20 inches, of which the tail is nearly one-half and more rounded and bushy than in any other species. The eye is large, full and bright, the ears erect and pointed, but not tufted, and the color rusty gray above, more or less brown along the back and paler below. In the parks and more open parts of even large cities, wherever suitable trees supply a home and a refuge from cats and dogs, the gray squirrel has become semi-domesticated.

Its active arboreal habits and sprightly ap>- pearance have done

much to make the squirrel the admitted type of frolicsomeness and sport. The food consists of nuts, acorns, seeds, fruits,

etc., and these animals evince economic and frugal habits, in that they accumulate during the autumn a store of provisions, which is de¬ posited in the nooks and crannies of trees. The nest and dwelling-place consists of a spherical structure formed of intertwined twigs with at¬ tached leaves lined with leaves and bark and is generally placed in the fork of a bough, in an inaccessible situation in the top of a tall tree. Cavities in trees are similarly lined and serve as nurseries and shelters in which to hibernate. The squirrels exhibit a great attachment for their respective nests, one pair generally occupying the same tree and nest for a long period. From three to four young are produced at a birth, usually in June, the young remaining in the parent nest until the following spring. When engaged in eat¬ ing, these animals grasp the nut or other food in their fore-paws, sitting meanwhile on their haunches and gnawing off, by aid of their powerful teeth, the hard outer coverings, and even peeling the kernel before eating it. The bushy tail of the squirrel, besides serving, when folded round the body, to retain the heat, assists through its outspread hairs in support¬ ing the animal in its aerial leaps, a function subserved in other squirrels by special develop¬ ments of the skin.

Before the deforestation of this country had destroyed so many of its natural haunts this species was extremely abundant and not only sometimes raided cultivated fields to the great loss of the farmer, but occasionally migrated in great numbers, even crossing large rivers like the Ohio. Squirrel shooting is a favorite pas¬ time with many, and were it not for the de¬ struction which it entails of such lovable and sprightly animals could be commended as one of the pleasantest <of sports, the pursuit of which takes one into forests of noble old trees in the most exhilarating season of the year. It necessitates long cross-country walks without the assistance of a dog, and requires a quick eye and steady hand to bring down the alter¬ nately appearing and disappearing game as it leaps and bounds among the topmost branches or projects itself through space from tree to tree. The practice of the Kentucky pioneers of ˆbarking® squirrels has been too often graphically described by Audubon and others to require more than a passing comment.

The fox squirrel (S. rufi.ve.nter), which now inhabits almost exclusively the pine forests of the Southern States, is a large species. The body is 14 inches in length and the tail 12. The color is usually a rusty gray or clay color, whitish below and tending on the tail to rufous, margined with black; the top of the head black and the nose

and ears white. The colors are, however, exceedingly variable, rang¬ ing from gray to deep black. The tail, though large, is less bushy, flatter, and the hair coarser than in the gray squirrel. Some of the varie¬ ties of *the fox-squirrel extend northward through the mountains to New York and west¬ ward to the Dakotas, but have been nearly ex¬ terminated in most places and none are quite so large as the typical southern race. In gen¬ eral the habits of the fox-squirrel differ little from those of the gray squirrel, but in the South at least it does not hibernate nor store food, which consists largely of fruits, green corn,

etc. Because of its large size it is much sought f«or food by the natives.

Of all our squirrels the most abundant and best known in the northeastern United States is the red squirrel or chickaree (S. hudsonicus) which, like the others, splits into several sub¬ species and with related western species oc¬ cupies British America and the northern half of the United States. In the east the high mountains of North Carolina are the southern limit of its range. The body is eight and the rather thinly haired tail six inches long, the color bright rusty red above, yellowish gray to light gray on the sides and below. Of all the squirrels this species is the most active, noisy and mischievous, constantly tearing over the ground and through the trees, playing, quarrel¬ ing and chattering with its fellows. In most places it continues active through the winter. They breed and sleep in warm, lined nests in hollow trees or in old nests of crows and other large birds roofed over with twigs, leaves, bark of grape vines, etc.; they also have burrows, used partly as retreats, partly as one of their numerous storehouses for food. Besides nuts, etc., red squirrels feed largely on the seeds of spruce and hemlock, which they extract from the cones with great skill, and they are in¬ veterate robbers of birds' nests, as well as of the farmers' corn-cribs. A remarkable fact is that, though so much inferior in size, this species frequently expels the gray squirrel from certain areas and it is true almost everywhere in the New England and Middle States that it is increasing and the gray squirrel decreasing in numbers.

The ground squirrels (Tamias and Eu- tamias) are provided with a pair of large cheek pouches and a well-developed nail on the thumb. The skull is relatively light and narrow, the first upper premolar minute or absent, the tail small and little bushy and the colors striped.

The species and races are numerous, all but one Eurasiatic species being North American. The eastern chipmunk (q.v.) or ground hackee (T. striatus) is abundant everywhere in open woods from New England to Georgia, a dis¬ tinct variety replacing it farther north.

Spermophilus is a genus, represented by numerous species in western North America and one in northern Asia and Europe, transi¬ tional between the ground squirrels, which they closely resemble in appearance and habits and the marmots. In deed they are ordinarily called striped marmots and by some zoologists are placed in the family Arctomyince. All have large cheek pouches, well-developed upper pre¬ molars and usually short tails; but vary greatly in colors and their pattern. S. tridecenlineatus is marked with six light longitudinal stripes al¬ ternating with seven rows of white dots on a brown ground. It is an abundant species on the prairies as far east as Illinois and is often wrongfully called ˆgopher.®

Lastly come the flying squirrels, the Ameri¬ can species of which belong to the genus Scinr- opterus. In the absence of cheek-pouches and some other features of their organization these remarkable animals more closely resemble the typical squirrels than the ground-squirrels, but depart widely from these and all other North American mammals in the possession of a densely hairy fold of skin extending along the

sides and connecting the fore and hind legs, forming a parachute which, when extended, sup¬ ports the animal on its flying leaps from tree to tree. The tail also assists in this function, the dense fine fur spreading at the sides like the vane of a feather. The common species (S . volans) is found throughout the eastern half of the United States north to Maine, where it is replaced by a distinct species. See Flying Squirrel.

The squirrels of Europe in general resemble ours, but are less numerous. The common Brit¬ ish squirrel, pictures of which are so common, is distinguished by its tufted ears; but our gray squirrel is becoming acclimated in England and is said to be driving away from its haunts the smaller native. Many of the African, and espe¬ cially those of Borneo and neighboring islands, are remarkable for their large size, conspicu¬ ously striped fur, tufted ears or other peculiari¬ ties.

Consult Allen, (Bull. Geol. Geog. Sur. Ter¬ ritories, } Vol. IV (Washington 1878) ; Allen, (North American Arboreal Squirrels, *Ameri¬ can NaturalisC (1899) ; Bailey, (Prairie Ground Squirrels,* Bull.

Biological Soc. of Washington (1893) ; Stone and Cram, American Animals) (New York 1900).

J. Percy Moore, University of P ennsy'lvania.

SQUIRREL-CORN, or TURKEY- CORN, a delicate, succulent plant (Bicuculla canadensis), found in rich woods in North America. It has much dissected leaves, glaucous beneath, rising from the ground and simple scapes from which depend the peculiar, cordate- ovate corollas in racemes, each flower with four petals, the two outer oblong and concave, with short-rounded spurs at the base and parted at the other end to show the much-crested coherent tips of the other two. They are greenish-white tinged with rose-color and are fragrant. The perennial rootstock is creeping and bears many small yellowish tubers, scarred by fallen petioles, which have suggested the common names and also that of turkey-corn.

SQUIRREL HAKE. See Hakes.

SQUIRREL-MONKEY, a small Ameri¬ can monkey of the genus Chrysothrix. These are active, tree-hunting, gentle little creatures, with long, rather bushy and squirrel-like tails and tufted ears and are lively and affectionate as pets. A widely familiar species is the Bra¬ zilian (C. sciurea), which is grizzled gray, with whitish paws and the tail black at the tip.

SQUIRREL-TAIL GRASS. See Grasses in the United States.

SRI, PADMA, or LAKSHMl, a female Hindu deity, wife of Vishnu. See Lakshmi.

SRINAGAR, sri-na-gar', or SERINA- GUR, ser"i-na-goor' (signifying <(Holy City®), capital of Cashmere, or Kashmir (q.v.), in northern India, in the beautiful valley of the same name, on the Jehlam River, occupies a lofty position, about 5,000 feet above sea-level. It extends about two . miles along the river, which, with its windings and the numerous ves¬ sels plying upon it, has a very picturesque ap¬ pearance, but the surrounding low marshes make the climate unhealthful. Near by is the famous Nana Khana Mountain, 23,497 feet in height. It is poorly fortified, although com-

manding a site which permits of making it a great stronghold. Its

wooden buildings have been often destroyed' by fire and few of them deserve notice. The Jama Musjid, or Great Mosque, celebrated mostly for its enormous dimensions, has a rude dome and spire; an¬ other mosque of wood is curiously Chinese in character. There are numerous gardens and a beautiful lake east of the town marks the scene of Moore's (Lalla RookhP Srinagar manufac¬ tures attar of roses, shawls, leather, paper, fire¬ arms etc. It came under the British protectorate in 1846. Pop. about 126,344.

STAAL DE LAUNAY, stal da lo-na, Marguerite Jeanne Cordier, Baroness de, French author: b. Paris, 30 Aug. 1684; d. there, 16 June 1750. She was the daughter of a poor painter named Cordier, was brought up at the convent of Saint Louis at Rouen and adopted her mother's name, De Launay. In 1711 she entered the service of the Duchess du Maine as femme de chambre. Not long afterward she became amanuensis and companion to the duchess and remained in her household for many years. In 1718 she was implicated in the Cellamare conspiracy and was sent to the Bas- tile for two years. In 1735 she was married to Baron de Staal. Her (Memoires) appeared in 1755 and it is as the author of those frank and lively pictures of the humors of the ((court of Sceaux® that she is known to posterity, though she wrote also two comedies and some letters, which latter were published in 1806. Consult Sainte Beuve, Portraits LitterairesP

STABAT MATER, sta'bat ma'ter (((The Mother stood®), first words and title of a cele¬ brated hymn on the Crucifixion; its authorship is assigned to Jacopone da Todi, a disciple of Saint Francis de Assisi, in the 13th century. It has been set to music by several of the great composers including Palestrina, Pergolesi, Haydn, Rossini and Dvorak. The composition of Pergolesi, for two voices with accompani¬ ment, is the most celebrated, but that of Rossini is the most popular in the concert room. The hymn as given in the (Breviarium RomanunV office of the festival of the Seven Dolors of the Blessed Virgin Mary (Friday after Pas¬ sion Sunday) begins :

" Stabat mater dolorosa,

Juxta crucem lacrymosa,

Dum pen debat filius."

STABILLITE, a smokeless powder, in¬ vented by Hudson Maxim, possessing the great advantage that no volatile matter is employed in its manufacture and consequently it requires no drying after manufacture, but is ready for immediate use. It was named because it

is be¬ lieved that it undergoes no change by keeping for a great length of time.

STACHYS, sta'kis, a genus of perennial and annual herbs and a few shrubs of the order Labiatee. The species, of which there are about 150, are mostly natives of mild climates; a number flourish in the United States. They have simple, opposite leaves, small, white, yel¬ lowish, red or purple flowers in auxiliary whorls or terminal spikes. They are mostly found in low, moist ground, but though several are at¬ tractive when in flower they are little culti¬ vated.

STADIUM, a Greek measure of 125 paces, or 625 Roman feet, equal to 606 feet 9 inches English ; consequently the Greek stadium was somewhat less than our furlong. It was the principal Greek measure of length. This term was also applied to the course for foot-races at Olympia in Greece, which was exactly a stadium in length. The name was also given to all other places throughout Greece wherever games were celebrated and the name is ex¬ tended in modern use to cover buildings and equipment for a college racecourse or athletic- field.

STADTHOLDER, stat'hol"der, a title given in the Netherlands to a governor of a province who was also commander-in-chief of the forces. This title received its special signifi¬ cance in 1580 when the provinces of Holland and Zealand revolted against the authority of Spain and unitedly accepted William, Prince of Orange, as their stadtholder. The prince was assassinated before he was formally invested with this office, but the title was conferred on his son, Prince Maurice, and remained as the hereditary title of the chief of the state until Holland was annexed by France in 1802. This title was finally dropped in 1814 when the Prince of Orange was recalled from England and declared king of the Netherlands by an assembly of notables.

STAEL, Madame de, properly STAEL- HOLSTEIN, sta'el-hol'stin (Fr. stael ol-stan), Anne Louise Germaine Necker, Baroness de, French authoress: b. Paris, 22 April 1766; d. there, 14 July 1817. She was the only child of Jacques Necker, Swiss banker and Minister of Finance to Louis XVI. Her mother was Swiss (see Necker, Susanne C. de Nasse). Necker’s house was the resort of the most distinguished men of the capital ; every week on a certain day were assembled in the salon of Madame Necker the most eminent scholars of the day, as Marmontel, Raynal, Grimm, Thomas, etc. The encouragement the young girl received in this society and the various excitements which it furnished to her faculties, had an important influence on the formation of her mind. To these she owed that rare conversational power for which she

was so remarkable, with that inclination to ingenious, brilliant and striking theories, which appear in her earlier works. Her earliest productions were (Sophia, > a com¬ edy (1786), and two tragedies, (Lady Tane Grey) and (Montmorency.) Her (Lettres sur les Ouvrages et le Caractere de J. J. Rousseau > (1788), first attracted the public notice. In 1786 she was married to Baron de Stael-Hol- stein, Swedish Ambassador at the French court, a man much older than herself, whose suit was favored by Madame Necker's desire that her daughter should marry a Protestant.

The breaking out of the Revolution (1789) exercised a powerful influence both on her mind and fate. The first period of her father's serv¬ ice in the ministry (1777-81) brought his family into connection with the great world and public affairs. During Robespierre's ascendency she exerted herself to save the victims and pub¬ lished a powerful and eloquent (Defense of the Queen.) After the insurrection of 10 Aug. 1792 she fled in September to her father's house at Coppet in Switzerland, which now became the refuge of the French fugitives. When

Sweden recognized the French republic, her husband was again sent as Ambassador to Paris, whither she returned in 1795. The government of the Directory gave her an opportunity of effecting the recall of some of the emigrants. Barras became her friend, and she acquired so much influence that, on Talleyrand's return from America in 1796, she obtained, through Barras, his appointment to the Ministry of Foreign Affairs. To this period also belong two political pamphlets, (Sur la Paix> and (Sur la Paix interieure,* which contain her views respecting the situation of France in 1795 and express the remarkable opinion that France could arrive at limited monarchy only through military despotism. In 1796 appeared her (De l'lnfluence des Passions sur le Bon- heur des Individus et des Nations, y which, though characterized by enlightened views, does not contain any complete exposition of the subject. Her connection with her husband, who died in 1802, whose tastes were different and whose talents were inferior to hers, had been from the first marked by coldness, and when she became desirous of securing the property of their children from the effects of his lavish habits, a separation took place ; but his infirmi¬ ties rendering the service of his friends neces¬ sary to him, she again joined him. Bonaparte she saw for the first time in 1797, on his re¬ turn to Paris, after the Peace of Campo-Formio. His brilliant

reputation excited her admiration, but this soon gave way to fear and aversion. The danger which threatened Switzerland led her back to Coppet ; but when Geneva was in¬ corporated with France she hastened back to Paris, to cause her father's name to be struck from the list of emigrants. But some observa¬ tions of Necker in his (Dernieres Vues de Politique et des Finances) (1802) offended the first consul, who caused the work to be at¬ tacked in the journals.

Madame de Stael was banished to a distance of 40 leagues from Paris, under pretense that she had given her father false information of the state of France. During her banishment she lived with her father at Coppet, but spent much time in traveling. Her literary reputation was meanwhile increased by her (De la Litterature consideree dans ses Rapports avec les Institu¬ tions sociales) (1802) and her (Delphine) (1802). The former attracted many assailants, among whom Fontanes was the ablest and acutest. Her romance (Delphine) contained a faithful picture of herself as she was in her youth — separated from the multitude by genius and sensibility and struggling against the re¬ straints of custom and her sex. In 1803 she made a visit to Germany and lived for about a year in Weimar and Berlin. She paid a visit to Italy in 1805 and the fruit of her journey was (Corinne ou PItalie ' (1807), which com¬ bines in a happy manner the charms of romance with a faithful picture of Italy. It was finished in France and was no sooner published than she was ordered to quit that country, upon which she returned to Coppet. Here she wrote (Essais dramatiques) and finished (1809) her work on Germany ((De l'Allemagne)) . She then went to France to get it printed, but be¬ fore it could be published the printed copies were seized by the police and she was again ordered to quit France. It first appeared entire

in London in 1813. This work gave the French the first intimation of the intellectual develop¬ ment of Germany.

Returning to Coppet from France, Madame de Stael was subjected to new persecutions and was forbidden to go farther from her residence than two leagues. But in the spring of 1812 she escaped and passing through Vienna to Moscow, on the approach of the French army went to Saint Petersburg and soon after, in the autumn of 1812, to Stockholm. From Stock¬ holm she went to England, where she was re¬ ceived with the most flattering attention. Here was published her (Reflexions sur le Suicide) and (Zulma et trois NouvellesP After a long exile, described in her (Dix Annees d'Exil,* she landed at Calais in 1814. After the Restora¬ tion in 1815 she returned to Paris and was re¬ ceived with great distinction. She also received from the government public stock to tire amount of 2,000,000 francs, due to

her father by the treasury at the time of his dismissal from office. Surrounded by a happy domestic circle, esteemed and courted by the most eminent men of the capital, she lived in Paris, with the ex¬ ception of a short absence, till her death, and until her last sickness she was employed on her (Memoires et Considerations sur les principaux Evenements de la Revolution Frangaise) (1819). By her will it was made known that in 1812 she had been married a second time to a M. de Rocca, a young officer of hussars, who, suf¬ fering from wounds received in Spain, had quitted the service and come to reside at Geneva, where she became acquainted with him. See Corinne.

Consult (1890); Schiick, (History of a Marriage in Letters *(1906) ; Sorel, (Madame de StaeP (1890) ; Faguet, (Politiques et Moralistes) (Vol. I, 1898). Her son edited her works (17 vols.) in 1820-21. Her (Lettres Inedits* ap¬ peared in 1903.

STAFF, in the army or navy, a body of officers or non-commissioned officers whose duties refer to a body of troops or a fleet as a whole and who are not attached to particular subdivisions. Such officers are called staff offi¬ cers, while those in command of combatant organizations are line officers. The staff of the army includes the officers of the quartermaster- general's, adjutant-general's, ordnance, medical, engineer (in part), judge-advocate-general's and inspector-general's departments ; officers at¬ tached to commanding general officers as mili¬ tary secretaries and aides-de-camp, called the personal staff ; officers employed in connection with the civil departments at the War Depart¬ ment, chaplains, veterinarians, medical officers of combatant organizations, intelligence officers, etc., and those engaged in recruiting and garri¬ son work, and the general staff of the United States army. See Army Schools ; General Staff Corps.

STAFF, in music, the five parallel lines and their intermediate spaces on which the notes, sharps, flats and other musical characters are placed. See Music.

STAFF COLLEGES AND SCHOOLS,

military institutions for the advanced instruc-

tion of officers desirous of being placed on the staff of the army. See Army Schools.

STAFF CORPS. See Army Staffs.

STAFFA, staf'a, Scotland, a small island of the inner Hebrides, situated seven miles west of Mull. It is celebrated for its basaltic pillars and natural caves, the most noted of which is Fingal's Cave. The island, which is one-half mile in diameter, consists of columnar basalt capped by a shapeless mass. This gives the in¬ terior of the caves almost architectural forms. Fingal's Cave extends 227 feet inward and the opening is an arch 66 feet high. The floor is covered with from 9 to 18 feet of water.

STAFFORD, Stafford, Henry, duke of Buckingham. See Buckingham, Dukes of.

STAFFORD, William Howard, Viscount, an English statesman; b. 30 Nov. 1614; exe¬ cuted on Tower Hill, 29 Dec. 1680. He was the son of the 20th earl of Arundel, the well- known collector of the Arundelian marbles. In November 1640 he was created Viscount Stafford. He was brought up in the Roman Catholic faith and adhered during the civil wars to the royal cause; but after the Restoration he was frequently found in opposition to the court, although he appears never to have played an important part as a legislator. He was singled out by Titus Oates, the contriver of the <(popish plot,ˆ as one of his chief victims. On 23 Oct 1678 Oates deposed before the House of Com¬ mons that upon the subversion of the kingdom by the Jesuits, Lord Stafford was to have the appointment of paymaster of the army, and on the 30th the accused nobleman was committed to the Tower, with other Catholic peers against whom similar charges had been preferred. After lying two years in prison, he was brought to trial on a charge of high treason 29 Nov. 1680. During a trial of seven days he defended

himself by pointing out the weakness of Oates' evidence, so that Evelyn, who was present, thought <(such a man's testimony should not be taken against the life of a dog.ˆ Nevertheless a verdict of guilty was pronounced by a vote of 55 to 31. He was executed three weeks afterward.

STAFFORD, England, capital of Stafford¬ shire, on the river Sow, 18 miles south of Hanley and 25 miles north by west of Birming¬ ham. The principal buildings include the church of Saint Mary's, which has fine stained glass windows and many interesting monuments ; Saint Chads, a fine old Norman church ; a stately county hall ; a borough hall, con¬ taining a museum, and the market hall ; hospital, asylum, a Latin school (1550), technical schools and a theatre. The town has extensive tanneries, leather manufactories, and engineering and electrical works. In the neighborhood is Stafford Castle. Many ancient buildings like High House attest to the antiquity of the town. Pop. 23,400.

STAFFORD SPRINGS, Conn, borough in Tolland County, on the Willimantic River and on the Central Vermont Railroad, about 18 miles southeast of Springfield (Mass.) and 18 miles northwest of Willimantic. It is in an agricultural and a manufacturing section of the State. The chief manufacturing establishments are woolen mills, iron works, machine shops, flour-mill, creameries and tobacco works. There

are Protestant Episcopal, Roman Catholic, Con¬ gregational and Methodist Episcopal churches. The educational institutions are a public library, founded in 1874, a high school and public and parish schools. There are two banks. Stafford Springs is a favorite resort for health seekers on account of the mineral springs. Pop. 3,383.

STAFFORDSHIRE, staff ord-shir, Eng¬ land, a midland county, with an area of 1,128 square miles. The Moorlands is a hilly district at the north, intersected by deep valleys. The surface is mostly undulating. The Trent is the chief river and its tributaries are the Sow, Tame, Blythe and Dove. Few valleys are fertile in the central portion. In the south are im¬ portant iron and coal deposits. The Dudley and Pottery coalfields contain several hundred collieries and produce large quantities of iron¬ stone. Important copper-pits are found near Warslow, while on the banks of the Dove at the north, colored marble, alabaster, mill-sto-nes and chalk are found. The clay for pottery which makes the Wedgewood ware famous is taken from the ˆPotteries5* district of North Stafford¬ shire, where extensive china and pottery fac¬ tories exist. The manufacture of various metals is extensive, also

leather, silk, wool, linen and sailcloth. The important towns are Stoke-upon- Trent, Burton, Wolverhampton, Wallsall, Handsworth and Smethwick. Pop. 739,000.

STAG. See Deer.

STAG-BEETLE, a beetle of the family

Lucanidce, in which the jaws of the males are greatly enlarged and studded with spike-like protuberances which give them a resemblance to stag antlers. The mandibles of the females are short, of smaller size, and curved, and the club or terminal part of the feelers is four-jointed. These beetles are vegetable feeders and subsist upon the tender leaves and other parts of plants. The larvae are found in trees, into the substance of which they burrow.

STAGE, The. See Theatre.

STAGE, The American. See Theatre. STAGE COACH. See Coach; Omnibus. STAGE MECHANICS. See Theatre.

STAGGER-BUSH, an ericaceous shrub (Neopieris mariana) found south of Rhode Island in moist, sandy soil, chiefly along the Atlantic Coast. It has a bad reputation for poisoning livestock which may feed on its foli¬ age and giving them the disease known as ˆstaggers.ˆ It is a low shrub, rarely four feet high, with erect, wand-shaped, black-dotted branches, bearing alternate, oval leaves, which are shining and leathery and turn to an intense scarlet before falling in the autumn. The flow¬ ers are borne in axillary embels, on the under side of the naked year-old branches and are large, white, waxen urns, with five little teeth about the orifice. They bloom in early summer and the shrub is one of the handsomest of its kind.

STAGGERS, one of several varieties of disease in domestic animals, as blind-staggers in horses and cattle, an epileptic disorder pri¬ marily affecting the brain and spinal cord. A form of digestive derangement to which horses are especially liable is a kind of gastritis called stomach-staggers. This is a dangerous disease as yet little understood. In the stable the horse

dozes and rests his head in the manger ; he then wakes up and eats until the distention of the stomach becomes enormous. The peculiarity

of the complaint consists in the total stoppage of digestion and the uneasy feeling of distention, consequent to such indigestion, appears to de¬ ceive the horse, whose morbid excitement in¬ duces him to continue eating. This he does until the distention prevents the return of the blood from the head and the animal dies from apoplexy, or his stomach bursts. Recovery is rare, except in very mild cases. Grass-staggers is a disorder caused in horses and cattle by eating the loco-weed or crazy-weed (q.v.). It is also known as the loco-disease. In sheep a peculiar kind of staggers occurs which is called gid. See Sheep.

STAGHOUND. See Dog.

STAHL, stal, Georg Ernst, German phy¬ sician and chemist : b. Anspach, 1660 ; d. Berlin, 1734. He studied medicine at Jena and in 1691 was chosen second professor of medicine at Halle and rendered his name famous over all Germany by his academical prelections and his publications. In 1700 he was elected member of the Academia Curiosorum Naturae. His fame procured him the appointment of physician to the king of Prussia in 1716 and he went to Berlin. He was the author of the doctrine which explains the principal chemical phe¬ nomena by the agency of phlogiston. This theory was received and supported by some of the most eminent men which Europe had pro¬ duced. His principal works are (Experimenta et Observationes Chvmicae et Physicae) (1731) ; (Disputationes MedLaP ; (Theoria Medica Vera) (1737), and (Fundamenta Chymicae Dog- maticae et Experimentalist

STAHLBERG, stal'berk, Kaarlo Juho,

Finnish statesman : b. 1865. For several years he was the leader of the Finnish National Progressive party in the Diet and in 1914 was elected speaker. Dr. Stahlberg’s advocacy of democratic principles brought him under the ban of the old Russian Imperialist regime and at one time he was ordered to be expelled from the Diet by the Russian governor-general. He served as president of the highest administra¬ tive court in Finland and also as professor of law in the University of Helsingfors. In July 1919 Dr. Stahlberg was elected president of the new republic of Finland, receiving 143 votes in the Diet against 50 votes cast for Gen. Jus¬ tus Mannerheim, who had been acting as regent. Dr. Stahlberg has traveled extensively and is well known in European university circles.

STAHR, star, John Summers, American college president : b. Bucks County, Pa., 2 Dec. 1841 ; d. 21 Dec. 1915. He was graduated from

Franklin and Marshall College, 1867, and at once entered the faculty of that institution, success¬ ively being tutor in German and history, as¬ sistant professor, professor of natural science and chemistry, financial agent, president pro tern, and since 1890 president of the college. He studied theology, was ordained in 1872 and at one time supplied the pulpit of the First Re¬ formed Church, Reading, Pa. He was a con¬ sulting member of the editorial staff of the (Standard Dictionary.*

STAIGG, stag, Richard M., American painter: b. Leeds, England, 1820; d. 1881. He

emigrated to the United States in his 11th year and in early manhood attained consummate skill in painting miniature portraits on ivory. In 1861 he was elected National Academician, and after studying in Paris (1867-69) he abandoned miniature painting for landscape and portraiture in oils. His marines are admirable for color and detail and among his best genres are the (Sailor's Grave) (Lenox Library) and the (Cat's Cradled

STAINED GLASS. See Glass Staining and Glass Painting.

STAINER, sti'ner, Jakob, German violin- maker : b. Absam, 14 July 1621; d. 1683. He was apprenticed to a maker of stringed musical instruments at Innsbruck. He learned the secret of the Italian method of constructing violins and won a reputation that passed beyond Germany into Italy and England and lasted for more than a century.

STAINER, sta'ner, Sir John, English or¬ ganist and composer: b. London, 6 June 1840; d. Verona, Italy, 1 April 1901. At seven he be¬ came a chorister in Saint Paul's Cathedral; in 1856 Sir Frederick Ouseley appointed him or¬ ganist of the newly-founded Saint Michael's College at Tenbury, and four years later he became organist of Magdalen College, Oxford. From 1863 till 1872 he was university organist, and from the latter year until his resignation in 1888 held the post of organist in Saint Paul's, London. In this position he achieved great success and contributed much to the improve¬ ment of the musical part of the service in the cathedral. In 1881 he succeeded Sir Arthur Sullivan in the principalship of the National Training School, and in 1882 became inspector of music in the elementary schools of England. He was professor of music in the University of Oxford from 1889 till his resignation in 1899. He was knighted in 1888. He was a com¬ poser of considerable ability, his principal com¬ positions being cantatas entitled (The Daugh¬ ter of Jairus) (1878) ; (Saint Mary Magdalen* (1883), and (The Crucifixion (1887), and

many anthems, organ pieces, etc. He published various musical primers, a dictionary of Musical Terms) (with W. A. Barrett), and a valuable work on 15th century music entitled (Early Bodleian Music: Dufay and his Con¬ temporaries. J

STAINES, stanz, England, a town in Mid¬ dlesex, on the Thames, six miles southeast of Windsor. Runnimede, Egham and Cooper's Hill are interesting suburbs. Inigo Jones and Rennie, two of England's greatest archi¬ tects, are remembered by the church of Saint Mary's (1631), and the bridge across the river (1832), respectively their works. The Roman Catholic Gothic church dates from 1868. The industrial works include breweries and mustard mills. The garden-markets and race-course are interesting features. Pop. 6,688.

STAIR, Lord. See Dalrymple.

STAIR, a succession of steps affording means for a person on foot to get from a lower to a higher level. There are two main forms of this, one composed of a series of solid blocks generally touching one another at one edge, as when a series of squared stones are built into a wall at either end, their small surface of junc¬ tion merely steadying them; and the more com-

mon sort, in which two sloping beSms, planks or metal girders, called string pieces or strings, support a series of horizontal planks, slabs of marble or slate, or plates of metal called treads. The above are the essentials of a stair. The riser which stands for the vertical distance from one tread to another may be left open, or may be filled by a light board, a piece of open¬ work cast iron or the like. In the case of a stone step the tread is the uppermost surface and the riser the front — the surface turned toward the person who is ascending.

There is a marked distinction between the straight and the winding stair. In a straight stair all the steps are called fliers and the tread of each is of the same width from end to end. In the winding stair the steps are called winders and the treads are much narrower at one end than at the other. The typical winding stair is the spiral or corkscrew stair (in French called a colimagon, snail-like). These are commonly built into round towers, the walls of which sup¬ port the steps, but it is feasible to build them of wood or iron, and in modern libraries and other places of storage, very light spiral stairs are built for easy access

to balconies, galleries and upper floors, as in the stack-room for books or other place of deposit or storage.

A stair may be made up of several short stairs called usually flights. Thus in the case of a rather lofty story, there may be one or even two landings in the height from floor to floor, and, therefore, two or even three flights. If these landings give to the stair a change of direction of 90 degrees, so that a person ascend¬ ing and going northward suddenly turns east¬ ward or westward, the platform is called a quarter-pace (sometimes quarter-space). If the change of direction is of 180 degrees, the per¬ son ascending reversing his direction as from north to south, the word half-pace (half¬ space) is used. A combination of thes methods is also used, as where a platform is associated with some winders; the platform being then nothing but a tread much wider than the others. This is a very objectionable plan, as being dan¬ gerous for persons not acquainted with the stair.

The height of the riser and the width of the tread are matters of great importance. Rules exist for fixing these, and it is generally con¬ sidered that the riser and tread must be taken together. Thus, if it be held that each tread- and-riser should measure 18 inches, then the riser may be 6 inches high, the tread 11ˆ4 inches wide. This is often expressed by the formula, a riser 6/2 inches, a run of 11 inches, or by the phrase, the rise and run are to each other as 6ˆ2 to 11*4- In modern build¬ ings of no great cost or elegance the stairs are often very much steeper than this ; and the proportions may even be reversed, or nearly so, in the case of a flight rarely used, as from the top floor to the roof.

The stair is often an architectural feature of some importance. In the interior a large hall is sometimes devoted to- it, and the stair itself is a principal part of the decoration, perhaps passing along three sides of this hall, seeming to cling to the wall as it ascends, leaving be¬ low an open floor of considerable size which may be treated more or less as a sitting-room, and at the top communicating with a gallery. This gallery may be a highly architectural mem¬

ber, being treated with columns to support the roof. The objections to this treatment of a stair are the great amount of space occupied and the opening of so much of the interior to drafts of air and to ready communication of fire. It should only be used where the building is wholly fireproof. It leads to great expense in building the stair of marble, lining the walls with the same or an equally costly material and roofing the whole with an architectural dome or coved ceiling with or without a sky-light. The tendency in recent times is to use

elevators in buildings of all kinds, public and private, and in consequence of this the stair seems to be considered sometimes a mere piece of utility and for that purpose made as compact as pos¬ sible; while in another building not more costly and splendid it will be treated in the way described above. It is worthy of notice that any building in which it is expected to give stately entertainments, the stair-case, or hall, which encloses the stair, will be treated in a more stately way, and this because of a tra¬ dition that the persons of a large assemblage will seek the halls and stairs, perhaps for more space, perhaps for fresh air. Thus, in an opera house, the stair is a very important feature.

Out-of-door stairs are seen on city tene¬ ments and apartment houses as fire-escapes, but they do not often exist in connection with classical or neo-classical architecture. They have great picturesqueness of effect and are associated with mediaeval architecture — both northern and southern — and with the rough wooden buildings of Switzerland and Tyrol.

The term stair is not often used to cover the broad flight of steps leading up to a portico, nor for the steps of a front door when they do not exceed 10 or 12 in number; nor yet for those in a terraced garden. For such out-of- door flights of steps the French term perron may be used and is perfectly descriptive of the thing; no correlative term exists in English ex¬ cept the local term used in New York City and vicinity: stoop.

Russell Sturgis.

STALACTITE and STALAGMITE, de¬ posits of lime hanging from the roof (stalac¬ tites) or rising from the floor (stalagmites) of a cavern. Stalactitic formations occur chiefly in long and more .or less fantastic masses suspended from the roofs of caverns in limestone rocks. Stalactites appear to be continually forming; water containing car¬ bonate of lime held in solution by carbonic acid, trickling through crevices in the roofs of the caverns, gradually during its exposure to the air loses its carbonic acid and conse¬ quently deposits its carbonate of lime; the water passing over the portion first deposited gradually adds to it, and eventually gives the carhonate of lime its great length and stalac¬ titic character. The flatter deposits, called stalagmites, are formed on the floor of the cavern by the water there depositing that por¬ tion of its carbonate of lime which is not separated during the formation of the stalac¬ tite. They sometimes occur as cones rising to meet the stalactites in the form of large pil¬ lars, and sometimes form flat crusts over the bottoms or sides of a

cave. Stalactitic car¬ bonate of lime is met with in the veins of lead ore in Durham and Northumberland,

England. Caverns are sometimes nearly filled with these deposits, which in some cases are of very large dimensions. Oriental alabaster (q.v.) and Mexican onyx are formed as stalag- mitic crusts, and consist of calcium car¬ bonate. Among striking examples of stalac¬ tites and stalagmites are those of the Luray and Mammoth caves (qq.v.) in the United States ; those in the cavern at Castleton, Derby¬ shire, England, and in the Isle of Skye; in the grotto of Antiparos in the Grecian Archi¬ pelago; in the Woodman's Cave in the Harz, Germany; at Auxelle, France; and the most important of those at Adelsberg, Austria- Hungary. Stalactites of iron sulphide, mar- casite, are also known. By oxidation of the sulphide, they may be altered to limonite, forming the so-called pipe ore of certain Mis¬ souri iron deposits.

STALEY, Cady, American civil engineer and educator : b. Minaville, N. Y., 12 Dec. 1840. He was graduated at Union College in 1865, and after a period as a gold prospector in the Rocky Mountains he was a civil engineer en¬ gaged in the construction of the Central Pacific Railroad. He became associated with the faculty of Union College in 1867, was ap¬ pointed professor of civil engineering in 1868, and in 1876-86 he was dean of that institution. He was president of the Case School of Applied Science, Cincinnati, in 1886-1902. Author of (Strength of Materials and Stability of Struc- tures> (1876) ; and joint author of (The Separate System of Sewage> (1882; 3d ed.,

1899).

STALIMENE. See Lemnos.

STALKER, stak'er, James, Scottish Free Church clergyman : b. Crieff, 21 Feb. 1848. He was educated at the universities of Edinburgh, Halle and Berlin, and at New College, Edin¬ burgh. He held pastorates at Kirkcaldy and Glasgow, 1874— 87 ; delivered the Lyman Beecher lectures on preaching at Yale University, 1891 ; was Cunningham lecturer in 1899, and has been professor of church history in the United Free Church College, Aberdeen, since 1902. Among his many publications are (The Life of Jesus Christ, > (The Preacher and His Models,) (The Seven Cardinal Virtues, > (The Two Saint Johns, *(The Christology of Jesus,)* <*Life of St. Paul,* Umago Christi, *(Trial and Death*

of Jesus,) (The Seven Deadly Sins,5 (John Knox, (How to read Shakespeare, *(Poets and Poetry of the Bible,* etc.

STALL, Sylvanus, American Lutheran clergyman and author : b. Elizaville, Columbia County, N. Y., 18 Oct. 1847 ; d. 6 Nov. 1915. He was graduated at Pennsylvania College, Gettysburg, 1872, and studied theology there and at the Union Theological Seminary in New York. He held Lutheran pastorates from 1874 to 1888, and was associate editor of the Lutheran Observer from 1890. He was for years statistical secretary of the general synod of the Lutheran Church and published (Stall's Lutheran Year Book and Historical Quarterly) (1884-88). His other publications include (How to Pay Church Debts) (1880) ; (What a Young Boy Ought to Know) (1897); and the three other volumes of the <Purity Series, * concluding with (What a Man of Forty-five Ought to Know) (1901).

STALL, a fixed seat in a church, intended for the accommodation of one of the choristers or of the clergy, and therefore usually in the choir. Much the most common arrangement is to have the stalls in rows on the two sides of the choir, the occupants of the stalls looking in¬ ward toward the axis of the church and there¬ fore toward the altar or the space immediately behind or before it. Such a fixed seat forming one of a group will naturally be enclosed at the back and sides, and it is customary to have two rows of stalls, an outer one set immediately on the floor or with a few inches elevation in order that a wooden floor may be put above the stone floor of the church, and a second row behind, perhaps two steps higher. Where a row of stalls is very long there may be an opening or more openings than one in the front row, made by the omission of a seat, and intended for access to the back row.

As the occupant of a stall sometimes sits and sometimes stands for a length of time dur¬ ing the service, it is common to arrange a hinged seat easy to lift and to lower again, and made heavy so as to be firm. Such a seat is usually carved out of a solid mass of heavy wood, the boss underneath which gives it weight and balances it on the hinges, being often an elaborate representation of a cluster of leaves, a human figure or a group of several figures, <or a monstrous animal. Such bosses are called misericords or sometimes mise- xeres.

The most elaborate stalls known are those of the cathedral of Amiens, magnificent joinery and carving of about 1510.

Russell Sturgis.

STALLO, John Bernard, German-Ameri- can jurist and scientist : b. in Grand Duchy of Oldenburg, Germany, March 1822 ; d. Florence, 5 Jan. 1900. He received a liberal education in Germany and came to America when 16. Was professor of Latin and Greek in Saint Xavier's College, Cincinnati ; was also proficient in Eng¬ lish, German, Dutch, French, Spanish, Italian and Hebrew. After two years at Saint Xavier's he was made professor of Latin in Saint John's College, New York, and while there studied law. He returned to Cincinnati in 1847 to practise law, and sat upon the Com¬ mon Pleas bench of Hamilton County in the 50's. In 1885 Judge Stallo was appointed Minister to Italy by President Cleveland, but upon the election of Harrison he resigned and lived in Florence until his death. The last 15 or 20 years of his life were largely devoted to the study of philosophy. He published (General Principles of the Philosophy of Nature, *(The Concepts and Theories of Modern Physics,* and <Abhandlungen und Briefe.*

• STALWARTS. See Republican Party.

STALYBRIDGE, sta'li-brij, England, in

the counties of Lancaster and Chester, about five miles east of Manchester, on the Tarne, stands in a barren district on slopes rising from both banks of the river. The public buildings include the town-hall, free library, several churches and post office. The manufacture of cotton goods is considerable, occupying many thousand hands. Besides, there are foundries,

machine shop and millwright works. The im¬ portance of the town dates from 1776. Pop.

27,673.

STAMBOUL, stam-bool'. See Constan¬ tinople.

STAMBULOFF, stam-boo'lof, Stephen Nikolof, Bulgarian statesman: b. Tirnova, 1853; d. Sofia, 18 July 1895. He took part in the rising of 1875-76, and as an office-holder dur¬ ing the occupation by the Russians, following the War of 1878, became prominent as a leader of the radical party in the new national as¬ sembly. He was a conspicuous member of the regency which followed the abdication of Prince Alexander, strongly opposed to the ad¬ herents of the Russians, and when he became Premier in 1878, after the election of Ferdinand,

ruled with scant regard for prince or legisla¬ ture. He was forced to retire in 1894; his death the next year was the result of an at¬ tack by assassins.

STAMFORD, stam'ford, Conn., city in Fairfield County, on Long Island Sound and Mill River, and on the New York, New Haven and Hartford Railroad, about 22 miles south¬ west of Bridgeport and 30 miles northeast of New York. The harbor is large enough for large Sound vessels. The city has regular steamer connection with New York, and elec¬ tric lines extend to all the nearby cities and towns. Stamford was settled in 1641 by a colony from New Haven. An Indian village named Rippowam had existed here, but the name was changed in 1642. It was incorporated as a borough in 1830, and in 1894 was chartered as a city. The surrounding country is devoted mainly to agriculture, but the city has large manufacturing interests, and is the commercial centre of an extensive region. The chief estab¬ lishment is the Yale and Towne Manufacturing Company, which regularly employs about 2,500 persons. Other manufactures are extracts, type¬ writing machines, woolen goods, lumber, hats, shoes, machine shop products, pottery, dye¬ stuffs, patent medicines, chemicals, hardware and wagons and carriages. The government census of 1910 gives the number of manufac¬ turing establishments as 86; the amount of capi¬ tal invested, $11,926,000; the cost of material used annually, $3,704,000; and the value of the product, $8, 740, OCX). There are a number of small parks in different parts of the city; three in the residential section. The water supply comes from Trinity Lake in New York State. There is an excellent sewerage system and a paid fire department. There are a large city hospital, Saint John’s Hospital and Home, and several private sanatoriums. The educational institutions are a high school (new building erected in 1895), the diplomas from which en¬ title the holders to entrance to several univer¬ sities and colleges; nine large elementary schools, one large parish school, the Catherine Aiken School for girls, the Betts Academy, founded in 1838, for boys; Misses Low and Heywood School, the King School and the Manor School at Shippan Point.. The Ferguson Library is housed in a fine building. The banks have a combined capital of approximately $1,000,000. The government as at present con¬ stituted is administered under a charter which provides for a mayor and a common council, elected biennially in even years. Appropriations

are in charge of a board of appropriation. The population of the city in 1910 was 25,138, but the town of Stamford had 28,836 inhabitants. By 1920 the population had increased to 35,086 for the city and 40,057 for the town.

STAMFORD, England, in the counties of Lincoln and Northampton, on the Welland, 12 miles northwest of Peterborough. The main buildings are Saint Mary's Church (13th cen¬ tury), All Saints, Saint Martin's, Saint John the Baptist's (15th century), town-hall, corn exchange, assembly and club rooms, literary institute, Browne's hospital (15th century), school and charitable institutions. The manu¬ facture of agricultural implements and brewer¬ ies are the chief sources of industry and trade. Pop. 8,229.

STAMMERING, a defect of speech due to failure in co-ordinate action of certain muscles and their appropriate nerves. It is analogous to some kinds of lameness, to cramp or spasm, or partial paralysis of the arms, wrists, hands and fingers, such as is sometimes attendant upon certain exercises ; for speech is a muscular act involving the co-ordinate action of many nerves and muscles.

The words stammering and stuttering prac¬ tically denote the same infirmity, although stut¬ tering is now limited more or less to the futile repetition of sounds, while stammering covers the whole defect — hesitation, glide, stop, hold¬ ing on to the sound, as well as repeating it. Because stammering is proved to be pretty wide¬ spread in Prussia, Great Britain and its colonies, and the United States, and uncommon in Italy and Spain, the question suggests itself whether languages of Teutonic origin are not more apt to generate it than languages of Latin origin. This chief of the imperfections of speech may be hereditary, and it may be acquired by imita¬ tion. Like yawning, it is infectious. It may be the abiding result of mental strain or shocfi. Fever may bring it on, epilepsy, hysteria, or any serious nervous affection or strong emotion, temporary failure of health, any excitement, or even soreness of the mouth. It rarely shows itself earlier than at four or five years of age. It usually begins in youth, but may be produced at any later age. A much larger proportion of males than of females stammer. Stammering used to be ascribed exclusively to the organ of articulation, the mouth ; to faulty setting of the teeth or the jaws, to the largeness and thick¬ ness of the tongue, its weakness of movement, its excessive vigor, etc. At present in the re¬ search for the cause and cure of stammering full account is taken of the vocal cords or cushions and the vocal chink.

Stammering occurs in the mouth, the organ of articulation. Its proximate cause is always in the larynx, the organ of voice. Sometimes the lungs, the organ of breathing, complicate the uncertainty and unsteadiness of the vocal cords and the vocal chink in the larynx. A current of air, variously shaped by the mouth as a whole, is what is called a vowel. A stam¬ mer on a vowel can only take place in the

vocal chink, rima glottidis. The sounds called conso¬ nants are produced by closures, more or less firm, of contents of the mouth. Thus, b, p, m, w, by the closure of the two lips ; /, v, of the lower lip and upper teeth ; g soft and sh, of the teeth; / and th, tongue and upper teeth; t, d, n,

s, z, y, tip of the tongue and fore gum ; g hard and k back edges of the tongue and back gum. Stammering may occur at any of these six closures. It is, perhaps, most apt to occur at the labials b, p, the dentals d, t, the gutturals g hard, k, because for these the closure is firm¬ est. The stammerer has no difficulty in setting lips, teeth, tongue and gums against each other as required. His difficulty is to relieve the clos¬ ure, to get at the vowel which is to follow the consonant. The tongue, for example, will not part with the teeth — seems to cling spasmodically to them — because the current of air, the vowel, does not come at the proper instant through the vocal chink to relieve it. In this way the three observable modes of stammering are explained. If the vocal chink does not open soon enough there is a stop stammer ; if it flutters, there is a stutter; if it opens too soon, there is a glide stammer. But, further, the lungs expand and contract by nervous and muscular energy; and, besides, the muscular and nervous machinery of the breastbone, ribs, midriff and upper abdo¬ men are all concerned in that expansion and contraction. These complicated and delicate bel¬ lows which supply air under pressure to the organ of voice may be defective, out of order, misused. Their working is to be closely ob¬ served in the case of each stammer. Stammer¬ ers, as a rule, breathe badly. They constantly try to speak when their lungs are empty.

Stammering can be cured. It often disap¬ pears gradually without special effort at cure, through an improvement in the general health and especially of the nervous system. Improve¬ ment generally takes place as age advances. In some cases resolute endeavor is demanded. A waving motion of the arms, time kept to a baton were favored as cures at one time. They were on the lines of the musical methods of cure — intoning, chanting, singing — which were based on the fact that most stammerers can sing without difficulty. The stammerer should be taught to regulate the breath, and he should work for a habitual use of the chest voice — for deeper, steadier vibration of the vocal chords — since stammering usually occurs with use of a head voice. The stammerer should take exercise in a chest voice, on the

sounds (seldom vowels) at which a stumble is apt to be made.

.STAMP ACT, an act for regulating the stamp duties to be imposed on various docu¬ ments. In 1765 George Grenville, chancellor of the English exchequer, proposed a bill for tax¬ ing the colonies through a stamp duty. No serious opposition was expected. But the mea¬ sure aroused great excitement in America as an attempt at taxation without representation. In the United States, a Stamp Act congress con¬ sisting of delegates from all the colonies except New Hampshire, Virginia, North Carolina and Georgia, met at New York 7 Oct. 1765, and adjourned 25 October. The action of this con¬ gress consisted of an address to the king, peti¬ tions to Parliament and a declaration of the rights and grievances of the colonies. It pro¬ tested that the colonies could only be taxed by their own representatives in the colonial assem¬ blies ; claimed the inherent right of trial by jury, and declared the Stamp Act to have a manifest tendency to subvert the rights and liberties of the colonies.

STAMP COLLECTING. See Philately.

STAMP-DUTY. See Duty; Taxation.

STAMP-MILL, a crushing mill or ma¬ chine for pulverizing ores and rocks. In West¬ ern mining camps the stamp-mill is usually worked by water power. See Mining.

STAMPING OF METALS. See Dies and Die Making.

STAMPS, Postage. The boldness of con¬ ception in suggesting a penny (two cents) post¬ age for Great Britain for letters of half an ounce showed a broadness of mind well worthy the title of “Sir® it brought later on Mr. Rowland Hill. Railroads, it is true, were making travel both easier, cheaper and more rapid, but they were few and postal delivery through all the United Kingdom still meant transportation largely by coach and frequently over roads that were bogged in wet weather (and England, then as now, had a rainy climate). Rates for single letters at that time were as follows for delivery in England or Wales from any post office to any place :

Not exceeding 15 miles from such office . 4 pence.

Between 15 and 20 miles . 5 “

Between 20 and 30 miles . 6

Between 30 and 50 miles . 7

Between 50 and 80 miles . 8 “

Between 80 and 120 miles . 9 “

Between 120 and 170 miles . 10 “

Between 170 and 230 miles . 11

Between 230 and 300 miles . 12 “

Added to this was another penny on each single letter for every 100 miles over 300, also one penny for postage and sometimes ((toll-fees.)) A letter from Kirkwall to Southampton called for an expenditure of one shilling and six pence ; to London nine pence plus another penny for postage; to Cork, Ireland, cost one shil¬ ling and three pence. These sums were for a single sheet of paper, two sheets costing double. Under such conditions came Hill’s Uniform Penny Postage plan. The system of franking suggested did away with the great cost of “col¬ lection® and frequent loss on refusal of pay¬ ment on the part of the addressee. The cost of production and sales of penny stamps was comparatively infinitesimal, and this fact, of course, permitted its success, also the enormous growth numerically of the patronage. Before the introduction of the reform the post office handled (in 1839) 75,907,572 letters; letters for the following years were:

1. . . .

168,768,344

1880 .

. . . 1,176,423,600

1. . . .

347,069,071

1890 .

. . . 1,705,800,000

1. . . .

564,002,000

1900 .

_ 2,323,600,000

1. . . .

862,722,000

1910 .

_ 2,947,100,000

The term “postage-stamp® is, of course, something of a misnomer that has crept into the English language. It is no stamp. What we call the ((post mark® is a stamp. When the ad¬ hesive “stamp® was first introduced it was known as a “label,® and to the philatelist it re¬ mains a “label® to this day. As a discussion of a subject presupposes some knowledge of the. terms used by the expert it would be well to explain some of the terms used by the phila¬ telist. We will quote a few in part from Fred J. Melville’s (Chats on Postage Stamps. >

Terminology. — Albino. — An impression made either from an uninked embossing die, or from a similar ink die, under which two

pieces of paper have been (inadvertently) placed, the upper one alone receiving the color.

Bisect. — A term applied to a moiety of a stamp, used as half the value of the entire label.

Bleute. — This word implies that the blue¬ ness of the paper has been acquired since the stamp was printed, through a chemical reaction.

Block. — An unsevered group of stamps, con¬ sisting of at least two horizontal rows of two each.

Bogus. — Any stamp not designed for use.

Burele. — A fine network forming part of the design of stamp, or covering the front or back of entire sheet.

Chalky. — Called also chalk-surfaced. An overlay on the paper’s surface of a coating of chalk or similar substance. It renders the print liable to rub off if wetted; in combina¬ tion with a doubly-fugitive ink, this renders fraudulent cleaning impossible.

Cliche. — The ultimate production from the die, and of a number of which the printing plate is composed.

Color Trials. — Impressions taken from a plate in various colors, so that a selection may be made.

Duty-plate. — Many modern stamps are printed from two plates, one being the same (key-plate) for all values, the other differing for each denomination ; this latter is the duty- plate.

Entires. — When used in describing an ad¬ hesive stamp, as being “on entire,” this term implies the stamp is on the envelope or letter as when posted.

Envelope Stamp. — A stamp belonging to and printed on an envelope.

Error. — An incorrect stamp — either in de¬ sign, color, paper, etc. — which has been issued for use.

Essay. — A rejected design for a stamp; in the French sense also applied to proofs of ac¬ cepted designs.

Fugitive. — Colors printed in “singly-fugi- tive” ink suffer on an attempt to remove an ordinary ink cancellation; but if in “doubly-fugitive” ink it was thought that the removal of writing- ink would injure the appearance of the stamp.

Grille. — Small plain dots, generally ar¬ ranged in a small rectangle, but sometimes cov¬ ering the entire stamp, embossed on certain issues of Peru and the United States. Done to break up the fibre of the paper and allow the ink of the postmark to penetrate it and make cleaning impossible.

Guillotine. — A perforating machine that punches a single straight line of holes at each descent of the needles.

Gumpap. — Term of opprobrium applied to a stamp issued for sale to collectors and not to meet a postal requirement.

Head-plate. — See Duty-plate.

Imperforate. — Stamps which have not been rouletted or perforated.

Key-plate. — See Duty-plate.

Mint. — A term showing that a stamp, or envelope, etc., is in exactly the same condition as when issued by the post office — unused, clean,

absolutely unmutilated and with all the original gum.

Obliteration. — Any mark used in cancel¬ lation.

Pair. — Two stamps joined together as when originally printed.

Pane. — Entire sheets of stamps are fre¬ quently divided into sections by means of one or more spaces running horizontally or (and) vertically between similarly sized groups of stamps; each section being termed a pane.

Plate. — A sheet of metal with the stamps engraved on it, also a group of cliches.

Plate Number. — The consecutive number of each plate, appearing on the margin of the plates and (in some of the British series) on the stamps themselves.

Pre-cancelled. — Two or three countries have adopted the system, to save time in the post office, of supplying sheets of stamps can¬ celled prior to use.

Proof. — An impression, properly in black, from the die, plate or stone, taken to see if the design, etc., has been properly engraved or reproduced. There are plate-proofs as well as die-proofs.

Provisional. — A make-shift intended to sup¬ ply a temporary want of the proper stamp, which may have been unexpectedly sold out, or may not have been supplied owing to lack of time.

Surcharge. — An overprint altering the face value of a stamp, or confirming it in the same or a new currency.

Trials. — Impressions from die, plate, stone, etc., taken to ascertain if the design be correct, or to assist in the selection of a color.

Type. — A representative common design, as distinguished from “variety,” which indicates slight deviations therefrom.

History. — Adhesive stamps are said to have been invented by James Chalmers of Dundee, Scotland, in 1834, and came into use 6 May 1840, when Parliament had sanctioned their use. M. de Villayer, of Paris, in 1653, invented let¬ ter covers or wrappers with a distinctive mark which he sold for two sous (one English penny) as a frank for his collectors who took them from the letter-boxes he established in the chief thoroughfares and delivered to destina¬ tion addressed on them.

In 1839 Parliament passed the Uniform Postage Act. Mr. (later Sir) Henry Cole was secretary of the com¬ mittee (1838) appointed to inquire into the best methods of charging and collecting post¬ age. Stamped covers, stamped paper and stamps to be used separately were suggested as plans. Cole got Mulready, the artist, to draw a design for the envelope. On passage of the act he got together Wyon the medal sculptor, Henry Corbauld the artist, and Fred¬ erick Heath the engraver, and they devised the first penny postage stamp. Heath engraved the world-famous Victoria head and the let¬ tering and the back-ground was “engine- turned,” the curyes made with a Rose engine. To Messrs. Perkins, Bacon and Company, Lon¬ don printers, was given the task of printing the “labels” to be impressed by the “Perkins mill and die process,” which has been used ever since on art stamp work. Envelopes, covers, and adhesive stamps were all issued simultane¬ ously on 1 May 1840 but not to be used till 6 May; £2,500 worth were sold the first day, and Cole reported that “about half the letters”

mailed were stamped. Six more days clearly X>roved it was labels (stamps) the public al¬ most unanimously preferred, and the Mulready allegorical envelope enjoyed less than 1 per cent of the sales-, so was soon retired. And thus originated the first postage stamp. Lecky the historian wrote : ((The Stamp Act . . . must be deemed one of the most momentous legisla¬ tive acts in the history of mankind.®

The first postage stamp was the black im¬ pression and found a serious drawback; it was printed in a fast ink, and the consequence was that those dishonestly inclined washed out the ‘'obliteration® (cancellation) marks and. used the stamps over again. In nine months red stamps from this die were produced in a fugitive ink. And thus the first stamp (black one penny) naturally became a rarity for col¬ lectors early on account of its brief career. It is a source of wonderment how the British got along for such a prolonged period without stamps of any denomination but those of one penny and two pence. For a considerable time “■check® letters were used on the four corners of the postage stamp. The first foreign stamp was that issued by Brazil in 1843 (the “bull’s eye® which lasted one year) , Belgium and France following in 1849. To meet the request of some

high officials “cameo® embossed adhesive stamps with the Victoria head were produced to forbid forgery which line engraving had not done. They were done in three valuations (a shilling, two pence and six pence) for use (1847) of the rates to the United States, France, etc. These took 24 processes instead of the former one. Silk threads were embodied in the paper in the shilling and the sixpenny. The issue died out within a decade.

Odd Stamps. — The “albino® stamp is an “error® ; it is impressed with an uninked em¬ bossing die. An “Omaha® one dollar stamp uses Dunthorne’s etching of MacWhirter’s painting ‘The Vanguard1* to which the United States post office gave the title “Western Cattle in a Storm.® Little doubt but some artist im¬ posed on Uncle Sam’s innocence of art and ac¬ cepted the drawing as original. Some stamp specimens have their colors inverted through wrong “feeding® in the press. There are many such odd stamps, but they belong to the sub¬ ject of philately and stamp collecting.

Commemorative Postage Stamps. — These form a series of historical interest but were issued for postal service. A few might be men¬ tioned here. In 1890 appeared the jubilee “Uniform Penny Postage,® later followed the American Exposition, the Newfoundland (1897), “Queen Victoria Diamond Jubilee® stamp, the Canadian “Founding of Quebec® series, the United States Columbian World’s Fair series and the exposition stamps “Omaha,® “Pan- American,® “Buffalo,® “Panama,® etc. A lugu¬ brious reminiscence is the issue by Russia in 1913 of the stamps in honor of the House of Romanoff ! In commemoration of the Great War of Europe the Germans used on some of their adhesives the word “Belgian,® lacking foresight of the outcome, not to mention misstatements on freshly issued labels for their colonies, which tell volumes of the Teutonic misconcep¬ tion of her future. The United States three- cent lilac stamp of quite recent memory should act as a reminder of our 50 per cent rise in

letter postage during the war period. Speaking of United States postage stamps we should not omit to mention the fact of Uncle Sam not using the effigy of any President or other august personage until after death.

Forgeries, Fakes, Etc.— Naturally, the postage stamp, being a kind of government paper currency, forging of the specimens be¬ came an occult art and practice. The first of these false labels came to light as early as 1840, four months after the government’s first issue. By 1863 there already existed a suffi¬ ciently numerous quantity to justify the com¬ pilation and publication of a work detailing and describing

these pseudo franking labels. The first of these worthies to accelerate labels in commercial quantities was a Zurich, Switzer¬ land, forger. His specialty was Swiss Canto- nals, Modena, Romagna and others, and his agent in Basle obtained steep prices for his wares. Next cropped up a Brussels citizen with false Provisional Parma, Modena, Naples and Spain stamps of good execution. From Brunswick and Leipzig issued Danish “essays® and other species of fakes. Very soon there¬ after Stourton informed his readers that Glas¬ gow, Manchester, Newcastle, London, Hamburg and New York were competing with the gov¬ ernment output. Swiss and Belgian forgers multiplied the number. Bona-fide producers of “facsimiles® were placing such words as “fac¬ simile® or “Falsch® on their colored reproduc¬ tions of stamps that were printed to aid col¬ lectors in identifying specimens of the lesser- known varieties, but the dishonest utilized the opportunity by expunging the fake declaration and selling them as genuine. And the contro¬ versy goes on as to whether they do not pro¬ duce greater harm to the collector than good. Earee’s ‘Album Weeds > and other works no doubt aid to sift the chaff to some extent in the encounter with the great multitude of fakes. Forgeries are produced by altering originals as well as by making “facsimiles.® Usually the first are termed “fakes® and the latter “for¬ geries.® Strangest of the pseudo stamps are the “bogus® ones, designed and invented fiction on paper, the like of which has never been devised by any government but are pure fig¬ ments of the illicit designer’s genius. A great “haul® appears to have been made before 1898 (the date when the fraud was discovered) by forgeries of the green one shilling stamp, 1865 type, with uncolored corner letters. They were used on telegrams and, therefore, had escaped official scrutiny, and unknown masses had gone into circulation. The number of Spanish coun¬ terfeits was so large and so persistent that the government had to issue fresh series nearly every year; the Naples and Neapolitan States were bad sufferers. The Indian one rupee stamp, issue 1882-88, had a clever counterfeit, but the culprit was caught. A later fraud is the raised valuation mark on British colonial gen¬ uine stamps. While such forgeries and fakes are made at the expense of the government, more have been created with a view of mulct¬ ing the collector. Of such are the 10-shilling and the one-pound (on a large anchor) 1878—83 issue imitations done in 1903, apparently, on fiscal water-marked paper, but quickly discov¬ ered. A recent fake is a copy of the 1875 twopence halfpenny stamp which was “minted®

by the British government with an error in the corner-lettering LH-FL instead of LH-HL in the last stamp (12th) of the eighth horizontal row, and, being rare, it tempted fraudulent reproduction. The detection of some forgeries is exceedingly difficult. A well-known philate¬ list informed the public of a sure (but not ad¬ visable) test for differentiating government Cashmere stamps from fakes. His suggestion was to place the label of indeterminate charac¬ ter in water — if. the color is fast it is fake, if the water dissolves the color and leaves the paper blank it is genuine. Some sets of forgeries have been self-acclaimed counterfeits, such as the United States of America large 1875-95 stamp for use on newspapers of one cent to $100 valuation. These counterfeits had the words “Falsch® and “Facsimile® printed on each of them, as did some early Japanese frauds (the latter in microscopical characters). Of the popularity of certain issues with the fra¬ ternity of counterfeiters might be mentioned the fact that the Canton Basle 1845 has 17 counterfeit varieties done by various methods and with varying degrees of ingenuity. The “double Geneva® can boast of at least 15 dis¬ honest rivals, its value ((entire® being about $370 unused and about $135 used. Govern¬ ments (but only a few, be it to their credit) have supplied the fakers with discarded dies and plates ((for reprints ® to wreak their worst on innocent collectors or even to make coun¬ terfeits for themselves. The United States, in 1875, had new dies made for the 1847 fiye cents and 10 cents issues for those not in hand so as to produce a complete series of its issues. Their difference is distinguishable, but are they “counterfeits?® The Rumania gov¬ ernment, to fill a foreign demand, had three new die types produced for sale as the rare July 1858 stamps. The official fraud was not discovered for a number of years.

Bibliography — General. — Burroughs, W. D., <The Wonderland of Stamps) (New York 1910) ; Collin, H. C., and Caiman, H. L., (New York 1890-1901) ; Earee, Rev. R. B., (Album Weeds, or How to Detect Forged Stamps5 (2 vols., 3d ed., London 1906-07) ; Fitte, Miss, (The World’s Stamp Errors5 (Part I, British Empire; Part II, Foreign Countries, London 1910) ; Gray, J. E., (The Illustrated Catalogue of Postage Stamps5 (Lon¬ don 1875) ; Johnson, Stanley C., (Peeps at Postage Stamps5 (London 1915) ; Melville, F. J., (All About Postage Stamps) (London

1913) ; id., (Chats on Postage Stamps5 (London n. d.) ; id., (Postage Stamps Worth Fortunes5 (2d ed., London 1908) ; Scott, J. W., (A Re¬ vised List of Postage Stamps and Stamped Envelopes of All Nations5 (New York 1879) ; id., (The American Standard Catalogue of the

Postal Issue of the World5 (New York 1896) ; Smith, B. T. K., (The Postage Stamp and its History5 (in Quarterly Review, London 1913) ; Scott, J. W., (The International Postage Stamp Album5 (New York 1896). Special Works — Armstrong, D. B., (Postage Stamps of War (1854-1914) 5 (London 1914); Collins, H. C., Caiman, H. L., and others, (Catalogue of the Stamps, Envelopes and Wrappers of the United States of America and of the Confederate

States of America5 (New York 1900) ; Howes, C. A., (The Postage Stamps of Canada5 (Bos¬ ton 1911); Melville, F. J., (Great Britain: Em¬ bossed Adhesive Stamps5 (London 1910) ; id., (Great Britain: Line Engraved Stamps5 (2d ed., London 1910) ; id., (United States Postage Stamps5 (volumes for years 1847-69, 1870-93, 1894-1910, London 1910) ; Philatelic Society of London, (The Postage Stamps, Envelopes, Wrappers and Post Cards of the North Ameri¬ can Colonies of Great Britain5 (London 1889) ; Philbrick, F. A, and Westoby, W. A. S., (The Postage and Telegraph Stamps of Great Brit¬ ain5 (London 1881) ; Stanley Gibbons,, Ltd., (A Check List of all British and British Colonial Stamps issued during the 20th Century5 (New York 1913) ; Westoby, W. A. S., (The Adhesive Stamps of Europe5 (2 vols., London 1898- 1900) ; Wright, H. E., and Creeke, A. B., Jr., (The Adhesive Stamps of the British Isles5 (London 1899).

STANCHFIELD, John Barry, American lawyer and politician : b, Elmira, N. Y., 13 March 1855; d. Islip, N. Y., 25 June 1921. He was graduated at Amherst College in 1876, studied law at Harvard, and was admitted to the bar in 1878. He engaged in practice at Elmira, and in 187&-85 was a partner of JDavid B. Hill. He was district attorney of Chemung County in 1880- 85 ; mayor of Elmira in 1886-88 and a member of the State assembly in 1895-96. After his de¬ feat as Democratic candidate for governor of New York in 1900 he engaged in law practice in New York. He was defeated as Democratic candidate for United States senator in 1901. His career as a lawyer was markedly successful. In 1915 he was a delegate to the New York State Constitutional Convention.

STAND-PIPE, (1) in machinery, a boiler supply pipe of sufficient elevation to enable the water to flow into the boiler notwithstanding the pressure of the steam. Stand-pipes are also used on the eduction pipes of steam pumps to absorb the concussions arising from pulsations and irregularities, caused by the unavoidable employment of bends and change in the direc¬ tion of pipes. (2) In hydraulic engineering , a stand-pipe is a curved vertical pipe, arranged as a part of the main in waterworks to give the necessary head to supply elevated points in the district, or to equalize the force against which

the engine has to act.

STANDARD. See Ensign; Flag.

STANDARD, Battle of the, in English

and Scottish history, a battle in which David I of Scotland, who had espoused the cause of Maud against Stephen, was signally defeated by the English under the Bishop of Durham. It was fought in the neighborhood of Northaller¬ ton, in Yorkshire, on 22 Aug. 1138, and it got its name from the fact that the English forces were gathered round a tall cross mounted on a car, and surrounded by the banners of Saint Cuthbert, Saint Wilfred and Saint John of Beverley. A peace was concluded between the two countries in the following year, David acknowledging the claims of Stephen to the throne of England.

STANDARD OIL COMPANY, The.

Two very thrifty young men, John D. Rocke¬ feller and an Englishman named M. B. Clark, after making small savings from their meagre

salaries for years and with close financing, de¬ termined to pool their little capital. They started a produce commission business in Cleveland, Ohio, in 1858, and were quickly doing a very large turn-over. In 1862 they gave a financial backing of $4,000 to Samuel Andrews to enter into the mineral oil refining business. Andrews by his clever discoveries in refinery improvements soon made the concern wealthy and by 1865 it became the city's <(most promising industry.® Rockefeller sold out his interest in the commission business and devoted his time and money to the oil firm of Rocke¬ feller and Andrews. A second refinery was soon started — William A. Rockefeller and Company, with John D.'s brother as partner. H. M. Flagler bought a partnership and was assigned selling quarters in New York City. John D. Rockefeller remained head of all the concerns. Five years after the start in the refining business each of the companies (1870) became combined in the title Standard Oil Com¬ pany, with a capital of $1,000,000. The partners were John D. Rockefeller, Henry M. Flagler, Samuel Andrews, Stephen V. Harkness and William Rockefeller. The numerous oil re¬ fineries were progressing at a marvelous rate, but in three or four years the Standard's prog¬ ress was so greatly in advance of its rivals that they started an investigation to discover by what means this firm could be getting so

far ahead of the others. The Standard Oil Com¬ pany was found to be receiving rebates from the railroads which were not extended to its 25 rivals in Cleveland. While Cleveland was the largest refining centre in the United States and rapidly gaining in momentum, the Rocke¬ feller interests, by 1870, were the largest oper¬ ators in that field. The “wise® ones of that thriving city declared that the unflagging en¬ ergy and commercial talents of the Standard partners assured the concern rapid progress ; and the continuance of the extra substantial rebate in transportation cost, in spite of the clamors of its rivals, made their position posi¬ tively dangerous to competitors. Cleveland still outstripped her rivals in the refining field, but the “Oil Regions® threatened to become a re¬ fining* centre. Pittsburgh and the Pennsyl¬ vania Railroad were making the Cleveland future uncertain. The Standard had to face such facts as that the Pennsylvania Railroad and the Erie Railroad were allying themselves with the Empire Transportation Company and their rivals were putting up a refining plant in Jersey City connected with their pipe line supply. Railroad competition was becoming so keen rebates were given profusely and so much secret dealing was being revealed that each concern suspected its neighbor. The New York Central was forced into the scrimmage in self-protection, and now by 1871 the refining capacity was too great and supply was beyond demand, as so many were rushing into a field that had proven so prosperous. Refined oil prices began to drop. Rockefeller prices of 58J4 cents per gallon in 1865 had fallen to 263/s cents by 1870 — his 43 cent margin was wiped out except 1 7l/s cents. Added to these ominous conditions foreign sales of refined oil were decreasing rapidly, for Europeans were beginning to import the crude oil and do their own refining. A scheme was set on foot (John D. Rockefeller and H. M. Flagler on oath

declared they were not the originators but disbelieved in the plan at first) among the Pennsylvania refiners to combine enough plants and shippers to awe the railroads into giving the combination special rebates “and draw¬ backs on that of other people.® They felt as¬ sured thus the refiners could control the situa¬ tion and regulate the amount refined and put up prices. The extra rebate had been allowed by the railroads to the Standard Oil Company as shippers of larger quantities than those of competitors. This concern now purchased, secretly, a charter of a company that was in liquidation and which permitted its owners the widest scope of commercial action. It was en¬ titled <(Southern Improvement Company® and was owned and organized by a combination of railroad men and oil refiners in 1872. They are said to have obtained control of one-tenth of the refining capacity of the country. Favor¬ able freight contracts were made

between the Southern Improvement Company and the Penn¬ sylvania, Erie and New York Central railroads. Nearly all the Cleveland refiners subscribed later and one-fifth of the United States refining capacity was absorbed. In 1874 the Standard Oil Company acquired control of several leading refineries in Pittsburgh and Philadelphia as well as the great plant of Charles Pratt and Company at New York. From 1875 to 1879 the refiners were brought under the control or into the possession of the Standard Oil Com¬ pany in ever-increasing numbers. All the oil region was gained by the combine and large numbers of works were dismantled and closed. By 1879 the Standard Oil Company held almost a monopoly in oil transportation facilities, in¬ cluding pipe lines, and the Standard <(alliance® produced 95 per cent of the country's refined oil ; this "alliance® consisting of the principal refining companies from Cleveland to Balti¬ more. In 1882 the Standard Oil Trust was formed for "convenience of control and man¬ agement.® It placed all the stock in the hands of trustees and corporations were organized in the different States that had business centres of the trust. The growth of the gigantic con¬ cern was steady and its prosperity was unin¬ terrupted. In 1882 the properties under control of the Trust were valued at $75,000,000; by 1892 this valuation had grown to $121,631,312, 50 per cent of the increase being from profits in¬ vested. Dividends rose from 5% Per cent in 1882 to 12 per cent in 1891. But 1892 opened up litigation and a suit to oust the corporation from its corporate rights for "abuse of cor¬ porate powers.® The court decided the part¬ nership of corporations illegal and that such a combine was in restraint of trade, illegal, etc. Hence the Standard Oil Company was dis¬ solved into its 20 constituent companies. In 1899 the Standard Oil Company of New Jersey was organized to bring about closer unity and provision for the claims of small holders of trust certificates. The former Standard Oil Company of New Jersey had a capital of $1,000,000, whereas the newer concern had an increased capital of $110,000,000 with power to purchase and own stock of the different cor¬ porations, and since 1900 over $97,000,000 of this capital stock had been utilized in purchasing other standard companies at par, the market value based on good will and earnings have been valued at $650,000,000. Suit under the

Sherman Anti-Trust Law was instituted in 1906 in the United States Circuit Court at Saint Louis and its dissolution was ordered by the court, the decision being, on appeal, confirmed by the Supreme Court in 1911. But the distri¬ bution pro rata of the stock among subscribers left the strength of the companies a combined power equal to the

prior condition. The figures of the earning capacity of the concern appear to range from $8,000,000 from 1882, $15,000,000 from 1886, by 1896 rising to $34,000,000, and in 1905 amounting to $57,459,356. Computation of the income of the entire congeries of com¬ panies owned by the Standard is not obtainable. Immense oil well and refining interests are held in the Baku district of Russia, in Mexico, in fact in every section of the world where mineral oil has been discovered in commercial quan¬ tities. The great lines of tank steamers cross¬ ing the seas to all parts of the globe and owned by the Standard Oil Company have a stupen¬ dous value in their entirety.

Bibliography.— - Howland, H. J., Standard Oil, illustrated with photographs reproduced from The Outlook > (New York 1907) ; Hub¬ bard, Elbert, (The Standard Oil Company) (East Aurora, N. Y., 1910) ; Lloyd, H. D., (Story of a Monopoly > (extract from Atlantic Monthly, New York 1881) ; Montague, G. H., (The Rise and Progress of the Standard Oil Company* (New York 1904) ; Tarbell, I. M., (The History of the Standard Oil Company) (New York 1904).

STANDARD TIME. See Time.

STANDARD UNIT OF VALUE. See

Money — Standards of Value.

STANDARDS, Bureau of, a subdivision of the Department of Commerce of the United States, authorized to deal with standards of measurement, standard values of constants, standards of quality, standards of mechanical performance and standards of practice. Its testing laboratories are located at Washington, D. C. The bureau occupies somewhat the same position with respect to the manufacturing interests of the country that the bureaus of the Department of Agriculture do to the agri¬ cultural interests. Its work calls for con¬ tinuous scientific and technical investigations of the highest grade. It compares with its own standards of measurement the standards or measuring instruments of States, cities, scientific laboratories, educational institutions, manufac¬ turers, government bureaus or the public, for which a nominal fee is charged, except in the case of the National and State institutions. The bureau gives advice concerning these standards or their use, whether it be in con¬ nection with the enactment of laws, regulations or ordinances concerning the weights and measures of everyday trade or in connection with precision standards used in scientific work and the industries. It gives advice upon re¬ quest to State and city officials, public service commissions and public utility corporations re¬ garding

the standards of measurement, of quality or performance involved in legislation or regulation pertaining to public utilities. It also gives information to manufacturers in re¬ gard to standards of measurement, how to use them, how to measure the properties of ma¬ terials or as to the fundamental physical and chemical principles involved; also, how to initi¬

ate and carry out scientific investigations and tests on their own account in their particular fields of work. The staff of the bureau is or¬ ganized according to the nature of the expert service involved. For example, the division of weights and measures deals with all matters pertaining to standards of length, mass, time, density and similar questions ; the division of heat and thermometry deals with heat stand¬ ards, the testing of heat-measuring apparatus, the determination of heat constants, and all in¬ vestigations where heat measurement is the essential and predominating factor. The elec¬ trical division is concerned similarly with the various electrical standards of measurement, the electrical properties of materials or the per¬ formance of electrical equipment. Similarly the work of the optical and chemistry divisions deals with the standards and questions arising in connection with these subjects. The struc¬ tural engineering and miscellaneous materials division deals with the investigation, testing and preparation of specifications for these ma¬ terials, such as the metals and their alloys, stone, cement, concrete, lime, clay, clay products, paints, oils, paper textiles, rubber and other miscellaneous materials. Its work has greatly expanded and now ranges from the measure¬ ment of the radiation of stars to a study of the efficiency and capacity of a vacuum cleaner. After the outbreak of the European War in 1914 the most interesting work of the bureau was that of helping manufacturers to produce at home and out of American materials products for which before they had been dependent upon foreign supplies. Its most notable successes in this field were in the paper and porcelain in¬ dustries.

In 1915 the total appropriation for this bureau amounted to $695,811.33. Consult An¬ nual Report of the Director, Bureau of Stand¬ ards (Washington), and publications upon definite subjects issued by the bureau from time to time.

STANDARDS OF LENGTH, MASS AND TIME. Standards of length, mass and time are the fundamental units used alike in the business of daily affairs and in the measure¬ ments and calculations of physical science.

The most important standards of length now used are the British yard

and the international prototype metres. Both of these are legal stand¬ ards in the United States, the metric system having been legalized in 1866. The relations of the yard and metre are shown by the following equations :

1 yard = 0.9143992 metres.

1 metre = 1.093614 yards.

1 metre = 3 . 280843 feet.

1 metre = 39. 3701 1 inches.

The most important standards of mass now used are the British pound and the international prototype kilograms. Both are legal standards in the United States. The relations of the pound and kilogram are shown by the follow¬ ing equations :

1 pound = 0. 453592428 kilograms.

1 kilogram = 2.20462234 pounds.

The above relations of the yard and metre and the pound and kilogram are the precise values determined by the International Bureau

of W eights and Measures. The relations which have been legalized in the United States arc:

1 metre = 39 . 37 inches.

1 kilogram = 2 . 2046 pounds.

The unit of time adopted by common cen- sent, but used more especially in physical science, is the mean solar second, or l-86400th part of the mean solar day. The minute, the hour, the day, etc., also in common use, are multiples of the mean solar second. The latter is derived, however, from the time of rotation of the earth, or from the interval between two successive transits of' a fixed star across any meridian plane. This interval is called the sidereal day and it is equal in length to 86,164.1 mean solar seconds. The United States Bureau of Standards maintains fireproof vaults where platinum-iridium meter bars and kilogram weights are stored. This bureau makes tests of

material for the use of the government, and conducts work looking to the maintenance ot standards in all important industries. It has laboratories at Washington and Pittsburgh, and at the latter is the largest testing machine in the world. Consult (Annual Reports, Bureau of Standards' (Washington, D. C.). See Weights and Measures.

STANDING STONES. See Stones,

Standing.

STANDISH, Myles, English colonist in America: b. Lancashire, about 1584; d. Dux- bury, New England, 3 Oct. 1656. Prior to 1603 he had gained a lieutenancy in the English force then serving in the Netherlands, but after the truce of 1609 joined the Pilgrim or Sepa¬ ratist colony at Leyden, though he never be¬ longed to that communion, and sailed in the Speedwell and Mayflower. By reason of his experience in martial affairs, Standish was made military adviser to the colonists, and upon their arrival in America he headed ex¬ ploring and scouting parties. In February 1621 he was chosen unanimously military cap¬ tain of the colony. His force was always small, though recruited 11 November, and of the numbers and method of warfare of the Indians he knew nothing. But his demonstra¬ tions of power soon resulted in some degree of alliance with the powerful tribes along the coasts of Massachusetts Bay. In 1622 Thomas Weston established at Wessagusset (the present Wey¬ mouth) an independent settlement which quickly was involved in difficulties with the In¬ dians. A great conspiracy of the savages was thereupon formed, the design being to destroy Plymouth after Weston had been similarly treated. Standish, with a file of eight, marched to Wessagusset, killed the hostile chiefs Peck- suot and Witawamat, defeated the Indians in battle and thus greatly increased the prestige of the struggling colony. He went to London in 1625, to adjust disputes arising with certain merchants who had advanced money on the colony's enterprise, and who at last abandoned their claims on payment of £1,800. In 1628 he arrested Thomas Morton (q.v.), whom he wanted to have shot. The last actual conflict in which he took a part was that in 1635, when he unsuccessfully attempted to dispossess the French who had seized a trading-post estab¬ lished by the colonists on the Penobscot. Be¬ sides his military commission, he held also the VOL. 25 — 31

posts of assistant to the governor, and, from 1644 to 1649, of treasurer of the colony. He was active and soldierly, and by his ability con¬ tributed very greatly to decide the success of the settlement. Longfellow's (Miles Standish' contains numerous anachronisms and inaccu¬ racies. Lowell, also, wrote an (Interview with Miles Standish.'

In 1872 the corner-stone of a monument 110 feet high and surmounted by a bronze figure of Standish was laid at Dux- bury. Consult Abbott, J. S. C., (Miles Standish, Captain of the Pilgrims' (New York 1908) ; Bradford, William, (History of Plimouth Plantation, 1606-1646,' edited by W. T. Davis (New York 1908) ; Morton's (New England's Memorial' (ed. 1855) ; Jenks, Tudor, (Captain Myles Standish' (New York 1905) ; Johnson, (Exploits of Myles Standish' (1897).

STANFIELD, stan'feld, William Clark¬ son, English painter: b. Sunderland, 3 Dec. 1793; d. 18 March 1867. He began life as a sailor; occupied his spare time in sketching; received an engagement to paint scenery for the Old Royalty Theatre, London; became scene painter at Drury Lane in 1826; was elected a member of the Society of British Artists, and abandoned scene-painting in 1830. Among his pictures may be mentioned (Mount Saint Michael' (183!) ; (The Battle of Trafalgar' (1836) ; (The Body of Nelson towed into Gilbraltar' (1853) ; (The Abandoned'

(1856).

STANFORD, stan'ford, Sir Charles Vil- liers, English composer : b. Dublin, 30 Sept. 1852. He was educated at Cambridge, and continued his musical studies at Leipzig and Berlin. In 1877 a festival overture in B flat by him was performed at the Gloucester Festival, and a symphony at the Crystal Palace. Since that date he has produced numerous compositions in different styles, several of which have achieved a considerable degree of popularity. His best-known work is probably his choral setting of Tennyson's ballad of (The Revenge,' which was produced at the Leeds Festival in 1886. His operas include (The Veiled Prophet of Khorassan' (1881);

(Savonarola' (1884) ; (Shamus O'Brien' (1896)' and (Much Ado About Nothing' (1901). In oratorio he has produced (The Three Holy Children' (1885), and (Eden' (1891), both written for Birmingham Festivals. His symphonies are an (Elegiac Symphony' (1882) ; an Urish Symphony' (1887) ; a (Sym¬ phony in F' (1888) ; and (L'Allegro ed il Pen- seroso' (1895). The most important of his other works may be thus enumerated : a setting of Whitman's elegiac ode on the death of Lin¬ coln (1884) ; settings of the three cavalier songs by Browning (1884); music for 2Eschylus' (Eumenides' (1885) and Sophocles' ((Edipus Rex' (1887) ; settings of some psalms; a violin suite (1888) ; (The Battle of the Baltic' (1891), a ballad for chorus and orchestra; string quar¬ tets; pianoforte sonatas; an ode on the opening of the Chicago Exhibition, the words being by Swinburne; rpasses, and

Irish fantasies for the violin (1894). On the foundation of the Royal College of Music, in 1883, Dr. Stanford was ap¬ pointed professor of composition and orchestral playing, and in 1887 professor of music at Cam¬ bridge. He was knighted in 1902.

STANFORD, Jane Lathrop, American philanthropist: b. Albany, N. Y., 25 Aug. 1825; d. Honolulu, Hawaiian Islands, 28 Feb. 1905. She was married to Leland Stanford (q.v.) and after his death in 1893 was occupied chiefly in fostering the development and extension of Leland Standford Jr. University, which she had aided her husband to establish in memory of their son. In 1901 she increased her gifts to the university by further gifts <of securities valued at $18,000,000 ; her residence in San Francisco, valued at $400,000, for a museum and art gallery; and 1,000,000 acres of land valued at $12,000,000. She sulDsequently added other benefactions, thus making the university the wealthiest educational institution in the world. Mrs. Stanford established the children's hospital at Albany, N. Y., at a cost of $100,000, and provided an additional $100,- 000 to secure its maintenance; she also gave over $160,000 to various schools and kinder¬ gartens. See Leland Stanford Jr. Univer¬ sity.

STANFORD, Leland, American capitalist and philanthropist : b. Watervliet, Albany County, N. Y., 9 March 1824; d. Palo Alto, Cal., 21 June 1893. He studied law and com¬ menced its practice at Port Washington, Wis., but in 1852 went to California and engaged in mining for four years. In 1856 he founded a business in San Francisco which became the nucleus for a fortune estimated at over $50,- 000,000. In 1860 he entered public life as a delegate to the convention that nominated Abraham Lincoln for the Presidency. About this time he became president of the Central Pacific Railroad, an enterprise in which he was deeply interested financially. He was gov¬ ernor of California, 1861-63; and United States senator, 1885-91. He did much to promote the agricultural development of California and to increase its transportation facilities, but he will probably be longest remembered, how¬ ever, as the founder of Leland Stanford Jr. University, for which he made an initial gift of $20,000,000. This work, begun in com¬ memoration of his son, was continued by his wife, Jane Lathrop Stanford (q.v.), who erected at Palo Alto a beautful and costly memorial church to his memory. See Leland Stanford Jr. University.

STANG, William, Roman Catholic bishop of Fall River, Mass. : b. Langenbruchen, Ger¬ many, 21 April 1854; d. Rochester, Minn., 2 Feb. 1907. Received his primary education in the German Gymnasia and his philosophical and theological training at the American Col¬ lege, Louvain. Ordained priest in Mechlin, 15 June 1878, and came to Providence, R. L, in October of the same year. Was successively assistant and rector of the Cathedral, pastor of Saint Ann's and Saint Edward's parishes, and superior of the Diocesan Missionary Band. He was consecrated first bishop of Fall River in the cathedral. Providence, 1 May 1904. Among his best known works are (Life of Martin Luther *; (The Eve of the Reformation* ; (More About the Huguenots) ; (Germany's Debt to Ireland) ; (Pastoral Theology *; (Historiographia Ecclesi¬ astical * ; (TheoLogia Fundamentals Moralis) ; Spiritual Pepper and Salt.*

STANHOPE, stan'op, an English family, to which three peerages belong: Chesterfield (barony of Stanhope from 1616, and earldom of Chesterfield from 1628) ; Stanhope (barony, 1717; earldom, 1718). and Harrington (barony, 1729; earldom, 1742). James, 1st Earl Star- hope : b. Paris, 1673 ; d. London, England, 5 Feb. 1721. He entered the army and served as brigadier-general at the capture of Barcelona in 1705. In 1708 he was appointed commander- in-chief of the British forces in Spain, and in the same year he took Port Mahon, and thus made himself master of the Island of Minorca. After the accession of George I, he devoted himself to politics and became the favorite minister of that monarch, to whom he owed his titles of baron and earl. Charles, the 3d earl, grandson of the preceding; b. Lon¬ don, 3 Aug. 1753; d. Chevening, Kent, 15 Dec. 1816. He invented a printing press and built two calculating machines, and was a patron of science. He approved the French Revolution, openly avowing republican sentiments, and as a member of the House of Lords he favored parliamentary reform, the abolition of negro slavery, the freedom of the press, and the independence of juries. He was father of the celebrated Lady Hester Stanhope (q.v.). The 5th Earl Stanhope (1805-75), grandson of the last noticed, was authof of a (History of Eng¬ land from the Peace of Utrecht to the Peace of Versailles) (1713-83).

STANHOPE, Lady Hester Lucy, eccen¬ tric English woman, daughter of the 3d Earl Stanhope (q.v.) : b. Chevening, Kent, 12 March 1776; d. near Sidon, Syria, 23 June 1839. Her own home was uncongenial and in 1803 she went to preside over that of her uncle, William Pitt, becoming his most trusted confidant. After his death in 1806 she re¬ ceived a pension, but her life being much em¬ bittered by her loss of power through his death, and saddened also by the death of her favorite brother and a lover, she left England in 1810, and after

traveling over various parts of the East, settled in Syria, where she re¬ sided for the rest of her life, living latterly about eight miles from Sidon, at a villa of her own construction, called D'Joun, which was situated on a solitary mountain, remote from any village. The rich presents which she made to the Turkish pashas gave her a great influence over them for a time, though it was afterward greatly diminished. She habitually wore the costume of a Mohammedan chief, and .adopted many features of their religion, discovering many similarities in the Koran and the Bible. The Bedouins, or wild Arabs, whom her wis¬ dom and kindness had won, looked up to her, not only as a benefactor, but as a being of a superior order. She is ((the crazy Queen of Lebanon® to whom Whittier alludes in (Snow¬ bound. } Her guests also included Lamartine (1832) and Kinglake (1835). Consult King- lake, (Eothen* ; Meryon, < Memoirs of Lady Hester Stanhope) (1846); Hamel, ˆLady Hes¬ ter Lucy Stanhope) (New York 1913).

STANISLAUS, stan'is-las, or STANIS¬ LAS I, Leszcynski, les-chiin'ske, king of Po¬ land: b. Lemberg, Galicia, 20 Oct. 1677; d. 23 Feb. 1766. In 1704, being then woywode of Posnania, and general of Great Poland, he was deputed by the assembly of the states at War-

saw to wait upon Charles XII of Sweden, who invaded the kingdom with the view of dethron¬ ing Augustus of Saxony. Charles immediately resolved to raise him to the throne of Poland, which he effected at an election held in July 1704. He was, however, soon after driven from Warsaw by his rival Augustus ; but another change brought him back to that capital, where he was crowned, with his wife, in October 1705; and the next year Augustus was compelled for¬ mally to abdicate. The fatal defeat of his patron, Charles XII, at Pultava, in 1709, again obliged him to retreat into Sweden, where he endeavored to join Charles at Bender, in dis¬ guise ; but, being detected, he was held captive in that town until 1714. He remained in ob¬ scurity until 1725, when his daughter, the Prin¬ cess Mary, was selected as a wife by Louis XIV, king of France. On the death of Augus¬ tus, in 1733, an attempt was made by the French court to replace Stanislaus on the throne of Poland ; but, although a party supported him and proclaimed him king, his competitor, the electoral Prince of Saxony, being aided by the emperors of Germany and Russia he was obliged to retire. He endured this, like every other reverse of fortune, with great resignation, and at the peace of 1736, formally

abdicated his claim to the kingdom of Poland, on condition of retaining the title of king, and being put in possession for life of the duchies of Lor¬ raine and Bar. Thence forward he lived as the sovereign of a small country, and acquired the appellation of <(Stanislaus the Beneficent.® He not only relieved his people from excessive im¬ posts, but, by strict economy, was able to found many useful charitable establishments, and to patronize the arts and sciences. He wrote some treatises on philosophy, morals and politics, which were published under the title of (CEuvres du Philosophe bienfaisant) (8vo. 1765). Con¬ sult Des Reaulx, (Le Roy Stanislas et Marie Leszcynski (Paris 1895).

STANISLAUS, or STANISLAS II, Au¬ gustus, the last king of Poland, son of Count Stanislaus Poniatowski : b. Woczyn, Lithuania, 17 Jan. 1732; d. Saint Petersburg, 12 Feb. 1798. In 1752 he first appeared as a deputy in the Polish diet, where he soon attracted attention by his oratory. Augustus III sent him on a mission to the Empress Elizabeth at Saint Petersburg, and on this occasion he acquired the peculiar favor of the Princess (afterward Empress) Catharine. After the death of Au¬ gustus, the influence of Catharine secured the election of her favorite as his successor (Sept. 1764), and he was crowned at Warsaw on 25 Nov. 1764. Although of excellent ability and noble disposition, he was yet unable to do any¬ thing for the good of his country, because he lacked the strength of character necessary to check the license of the nobles, and to with¬ draw himself from Russian influence. In 1772, when the first partition of Poland was made, Stanislaus in vain protested against it, while his resistance to the second partition of Poland had only this consequence, that after the cap¬ ture of Warsaw the Empress Catharine caused him to be brought to Grodno, where he was compelled to sign the treaty for the third par¬ tition of Poland, and on 25 Nov. 1795, also to sign his own abdication. After the death of Catharine, Paul I brought him to Saint

Petersburg, where he lived for the rest of his life on a pension allowed him by the emperor. Consult ‘Memoires secrets et inedits de Stanislas) (1862) ; Bain, (The Last King of Poland)

(1909).

STANLEY, stan'li, Arthur Penrhyn, Eng¬ lish Anglican clergyman and author, popularly known as Dean Stanley: b. Alderley, Cheshire, 13 Dec. 1815; d. London, 18 July 1881. He was educated first at Rugby, where he conceived an abiding love and veneration for Dr. Thomas Arnold (q.v.) and gained a unique position in the school. In 1834 he entered Balliol College, Oxford, where he had a brilliant career and in

1838 was elected a Fellow of University Col¬ lege. He took deacon's orders in 1839 and priest's in 1843, became a college tutor in 1843 and was appointed in 1845 preacher to Oxford University. In that capacity he preached four sermons, which were published as (Sermons on the Apostolic Age,) in 1847, at a critical time in the religious history of Oxford. In these Stan¬ ley stood aloof from both the Evangelicals and the high churchmen, taking, rather, a rational¬ istic position. He was presented to a canonry of Canterbury in 1851 and shortly afterward traveled extensively in Palestine and Egypt. In 1856 he was appointed professor of ecclesiastical history at Oxford and canon of Christ Church, and in 1863 was made dean of Westminster. In this position, as the acknowledged head of the Broad Church party, he exercised an important influence, though the width of his sympathy and his tolerant spirit exposed him to attacks from many of narrower views within the Anglican Church. In 1863 he married Lady Augusta Bruce, daughter of the 7th Earl of Elgin (died 1876), to whom he owed much of his social popularity. He visited America in 1878 and delivered many notable sermons and ad¬ dresses (see bibliography). He was the author of numerous works, among which are (Life of Arnold) (1844) ; (Memoir of Bishop Stanley,) his father (1850) ; (Memorials of Canterbury CathedraP (1854) ; (Commentary on the

Epistles to the Corinthians) (1855) ; (Sinai and Palestine) (1856) ; (Three Introductory Lec¬ tures to the Study of Ecclesiastical History> (1857) ; Rectures on the History of the East¬ ern Church) (1861); (Lectures on the History of the Jewish Church) (1863-76) ; (Sermons in the East) (1863); 'Memorials of Westminster Abbey) (1868) ; (Essays on Questions of Church and State) (1870) ; 'The Athanasian Creed) (1871) ; 'Lectures on the History of the Church of Scotland) (1872) ; 'Addresses and Sermons delivered at St. Andrews) (1877) ; 'Addresses and Sermons delivered in the United States and Canada) (1879) ; 'Christian Institutions) (1881). The breadth and tolerance characteris¬ tic of Stanley's religious views were well shown in his attitude toward Bishop Colenso, whom he supported without endorsing his opinions on the Pentateuch and in his article on the famous 'Essays and Reviews) contributed to the Edin¬ burgh Review of April 1861. Consult Brad¬ ley, Recollections of Arthur Penrhyn Stanley) (1883) ; Prothero, Rife and Correspondence of Dean Stanley) (1893) and (Letters and Verses of Dean Stanley) (1895).

STANLEY, David Sloane, American sol¬ dier: b. Chester, Ohio, 1 June 1828; d. 1902. He was graduated from West Point Military

Academy 1852. As an officer in the Federal army he took an active part in the Civil War, commanding a division at Iuka and serving in the battles of the Atlanta campaign. He was promoted brigadier-general, United States army, in 1884, later was brevetted major-general and was retired -1892.

STANLEY, Sir Henry Morton, Anglo-

American explorer : b. near Denbigh, Wales, 28 Jan. 1841 ; d. London, 10 May 1904. His name was originally John Rowlands and at three he was placed in the poorhouse at Saint Asaph, where he remained for 10 years, making such progress that when he left the institution he was engaged as an instructor for other children at Mold, Flintshire. In 1857 he sailed as cabin-boy on a vessel bound for New Or¬ leans, where he was adopted by a merchant who gave him his name, but who died without making a will, thus leaving his adopted son penniless. At the outbreak of the Civil War Stanley entered the Confederate army but was shortly afterward taken prisoner and when dis¬ charged volunteered in the United States navy and later became acting ensign on the ironclad Ticonderoga. At the close of the war he went to Turkey and Asia Minor as a newspaper cor¬ respondent and in 1867-68 was engaged as special correspondent for the New York Herald on the Abyssinian expedition, winning a repu¬ tation as a journalist by sending his account of Lord Napier's victory to London in advance of the official despatches. He represented the same paper in Spain during the Carlist War in 1868 and in 1869 accepted the mission from the pro¬ prietor of his paper <(to go and find Living¬ stone,® from whom no tidings had come for more than two years. He was given full con¬ trol of the expedition, and after attending the opening of the Suez Canal, visiting Constanti¬ nople, the Crimea, Palestine, the valley of the Euphrates, Persia and India, he set sail from Bombay, for Africa, 12 Oct. 1870. He reached Zanzibar on the eastern coast of Africa in January 1871, organized an expedition of 192 men, divided them into five parties and set out on 21 March. He found Livingstone at Ujiji on Lake Tanganyika, 10 Nov. 1871 and re¬ mained with him four months, after which, the veteran explorer refusing to abandon his enter¬ prise until it was completed, Stanley furnished him with supplies and returned to England. In 1874 Stanley set out on a second African ex¬ pedition under the auspices of the New York Herald and the London Daily Telegraph. Reaching Zanzibar in the autumn of that year, he learned of Livingstone's death and resolved to shape his course to the northwest. He ex¬ plored the equatorial lake region, circumnavi¬ gated for the first time Victoria

Nyanza, prov¬ ing it to be the largest-fresh-water lake in the world instead of a series of lagoons, discovered the Shimeeyu River and afterward, continuing to the westward, discovered that Albert Nyanza was not connected with Lake Tanganyika as had been supposed. He returned to England in

1878 having on his return journey traced the Kongo River from its source to its mouth. In

1879 he again set out for Africa on the Belgian enterprise, which resulted in the development of the Kongo Free State. He visited the United States in 1886 on a lecturing tour and in 1887

organized the relief expedition in search of Emin Pasha whom he met on the Albert Nyanza 28 April 1888 and escorted him to the east coast discovering the Ruwenzori Mountains south of Albert Nyanza on the return trip. He reached England in 1890, visited the United States and Australia, on lecturing tours in the following year and in 1895-1900 sat in Parliament for North Lambeth. He was knighted in 1899. His publications include (How I Found Livingstone) (1872) ; ˆThrough the Dark Continent (1878) ; (The Congo, and the Founding of its Free State) (1885); (In Darkest Africa) (1890); (My Dark Companions and Their Strange Stories 5 ; (Slavery and the Slave Trade in Africa) (1893); (Through South Africa) (1898), etc. Consult his (Autobiography, 5 edited by his wife (Lon¬ don 1909) ; Wauters, A. J., Stanley's Emin Pasha Expedition5 (London 1890).

STANLEY, Thomas, English scholar: b.

Comberlow, Hertfordshire, 1625 ; d. London, 12 April 1678. He was graduated at Cambridge in 1641, but held also a master's degree at Oxford. He entered the Middle Temple and practised law all his life, but is best known as a scholar. His works include translations from the Greek, Latin, French, Spanish and Italian poets; the (History of Philosophy > (1655-62), dealing

with the Greek philosophers, and an edition of ZEschylus (1663-64), with Latin translation and commentary. These two works long remained standards, the latter being translated into sev¬ eral languages.

STANLEY FALLS, Kongo Free State, a cataract and an important trading station on the Kongo River about 1,400 miles from its mouth; also an administrative district of the Kongo State.

STANLEY POOL, Kongo Free State, a lake-like expansion of the Kongo

River, 325 miles from its mouth and about 80 square miles in area. It was discovered in 1877 by Stanley, who founded here the station of Leopoldville, which became the principal base for trade and exploration in the Kongo Basin. Stanley Pool is also the name of an administrative district of the Kongo State.

STANNARD, stan'ard, Henrietta Eliza Vaughan Palmer («John Strange Winter,® <(Violet Whyte®), English novelist: b. York, England, 13 Jan. 1856; d. 1911. She was mar¬ ried to Arthur Stannard in 1884. She was a prolific writer after her first appearance in print in 1874, her novels numbering above 70. She was the first president of the Writers' Club in 1892. Among her works, chiefly tales of army life, are (Cavalry Life5 (1881); (Bootles's Baby5 (1885); <A Siege Baby5 (1887); (Heart and Sword5; (A Blaze of Glory5; (Uncle Charles5; (Cherry's Child,5 etc.

STANNARIES, mines from which tin¬ bearing ore is dug. The most noted stannaries are those of Devon and Cornwall in England. Around the mines of these two counties there has arisen a body of law and customary usage peculiar to the locality and not imitated or duplicated in any other mines in England. By early usage the prerogative of the Crown was extended so as to cover these tin mines, al¬ though elsewhere it reaches only to gold and silver. King John in a charter to the tinners gave them the privilege of mining and working

anywhere in the two counties and this was con¬ firmed by subsequent monarchs, until Edward III created his son Duke of Cornwall with the stannaries as a perpetuity of the duchy. The Duke who is now always the Prince of Wales is represented by a warden and vice-wardens. In former times representative assemblies of the tinners (called parliaments) were sum¬ moned by the warden for the regulation of the stannaries and redress of grievances: the last of them was held in 1752. The Stannary Courts are courts of record held by the warden and vice-warden (of the same limited and exclusive character as the courts-palatine) , in which the tinners have the privilege of suing and being sued. They were remodeled and regulated by a series of acts of Parliament. Appeals from them are now taken to the Court of Appeals, and finally to the House of Lords.

STANNITE, or TIN PYRITES, a brit¬ tle gray or black tin ore, popularly called <(bell metal ore" by the miners of Cornwall,

England, its chief locality. It is identical with tin pyrites, and was only known massive until recently discovered in small tetrahedral crystals in Bolivia. Its hardness is 4; specific gravity 4.3 to 4.5 ; streak blackish ; color steel-gray to iron-black. It is a sulphide of tin, copper, iron and some zinc.

STANOVOI (sta-nd-voi') MOUNTAINS,

Siberia, a mountain range traversing eastern Siberia from the northern boundary of Mongo¬ lia to the Bering Strait. Its general course is northeast, but after traversing the Transbaikal district and running along the northern bound¬ ary of the Amur district, it skirts the shores of the Sea of Okhotsk in a large zigzag. It terminates in East Cape on the Bering Strait. Its total length is about 2,600 miles. The south¬ western portion, which is known as the Yablonoi Mountains, is less regular than the northern branch and spreads out into numer¬ ous parallel chains and transverse spurs. This part is heavily forested, while the forests dis¬ appear north of the 60th parallel. The Stanovoi range proper is a steep mountain-wall with rugged peaks reaching a height of over 8,000 feet. The whole range forms the divide be¬ tween the Arctic and Pacific oceans, and feeds the Yenisei, Lena, Indigirka, Kolyma and Amur rivers.

STANOYEVICH, Milivoy Stoyan, Ser¬ bian essayist and author : b. Koprivnica, Kraina, Serbia, 14 Feb. 1882. He studied at Belgrade University, where he successfully competed for academic prizes in literary essays. He graduated from that institution in 1907, and was immediately appointed professor ad interim of modern languages at Zajecar College. He came to the United States in 1908 and con¬ tinued his pursuits in literature, sociology and economics at Columbia University and the Uni¬ versity of California, receiving from the last-named institution his degree of M.L. (1914). In 1915 he became a lecturer on Slavonic litera¬ ture at the University of California, and in 1916 he was nominated as political adviser on Slavic affairs in the office of the Russian consul-general at San Francisco. Lie has been editor of several Jugoslav publications and frequent contributor to the American period¬ icals, besides having written (Omladina u

SadasnjostP (1907) ; (Figure u Pesmamaˆ

(1907) ; (Prevodi u Srpskin Zabavnicima* (1908); (Vestina Pisanja> (1915); (Pessimisme et Optimisme dans la Sociologie) (in joint collaboration with his brother, Milosh S.) in 1913; (Tolstoy's Theory of Social ReforrrP (1914); (Russian Foreign Policy in the East; (1916), etc. His writings are marked by a fresh and vigorous style, by refined

simplicity and incisive diction. His studies are full of delicate observations of human nature and he may be justly regarded as a representative writer of Serbian prose.

STANTON, Edwin McMasters, American statesman and jurist: b. Steubenville, Ohio, 19 Dec. 1814; d. Washington, D. C., 24 Dec. 1869. His paternal ancestors were Quakers originally from Massachusetts but later settled in North Carolina, and his mother was a Virginian. At the age of 13 upon his father's death he began to work, and at 17 entered Kenyon College but was obliged to leave after two years for lack of means. After three years of study he was admitted to the bar in 1836 and married.

He joined the Democratic party on the issue of nullification, and in 1837 was elected prosecut¬ ing officer of his county. After serving for two years he returned to private practice, and in 1847 he moved to Pittsburgh where he soon took rank among the leaders of the Pennsylvania bar. In 1856 he changed his residence to Washing¬ ton, and in 1858 was sent to California as special counsel of the United States in the cases growing out of land grants made by the Mexi¬ can government before the treaty of 1848. He added greatly to his reputation by his conduct of this litigation. During these years he took no part in politics but sympathized with the Free-soil wing of the Democratic party and favored the Wilmot Proviso. In 1856 he sup¬ ported Buchanan, and in 1860 voted for Breck- enridge, believing that the election of Lincoln would imperil the Union.

When Buchanan's Cabinet divided in Decem¬ ber 1860 and Cass, the Secretary of State, re¬ signed, Attorney-General Black took his place and Stanton was made Attorney-General 20 Dec. 1860, the day when the ordinance of secession was adopted in South Carolina. At his first Cabinet meeting the question was pre¬ sented whether Major Anderson should be ordered back to Fort Moultrie. Floyd, _ the Secretary of War, and his southern associates insisted that this should be done, while Stanton with Black and Holt vigorously opposed them, threatening to resign if such orders were issued. Their attitude drove the secessionists from the Cabinet and redeemed the close of Buchanan's administration. During the re¬ mainder of the administration he was active in studying the plans of the secessionists and con¬ sidering how to defeat them and protect Wash¬ ington. He feared insurrection or assassina¬ tion to prevent Lincoln's inauguration, and his influence helped to persuade President Buchanan that regular troops should be ordered to Wash¬ ington.

The attack on Fort Sumter found him a strong supporter of the

national authority and outspoken in calling upon all loyal men to stand by the government. On 13 Jan. 1862, Mr. Lin¬ coln appointed him Secretary of War in place of Simon Cameron. Stanton had criticized Lin-

coin severely and had not even met him since his inauguration, but Lincoln selected him for his ability and because he was a repre¬ sentative of the Democratic Unionists, whose support was essential. The wisdom of the choice was signally vindicated. The whole system of the War office was inefficient and reorganization was imperatively demanded. Stanton brought to his work great executive ability, prompt decision and a strong will which made itself felt through the whole military service. He had scant patience with men who were seeking personal advantages, or with frivolous calls upon his attention. Hence his manner was brusque, impatient and decided, and he made many enemies.

He advised the passage of a law authorizing the President to take possession of all the rail¬ road and telegraph lines of the United States, and this was at once enacted. He ordered that all contracts for supplies and munitions be in writing, appointed a commission to investigate and determine what valid contracts were out¬ standing, and waged vigorous war upon fraud¬ ulent contractors. By an order of 14 February he directed the release of all persons who had been arrested on suspicion of disloyal practices, with certain exceptions, upon their giving their parole not to aid the rebellion. From that time such arrests were made only under military authority, which was exercised on the theory that all doubts were to be resolved in favor of the country. No part of Stanton's career shows more loyalty to his country than his patience with McClellan during the first six months of 1862, but the latter's delay in moving his army to the support of Pope, his disregard of orders, and his whole conduct during the critical weeks which preceded Lee's invasion of Maryland at length satisfied Stanton that he should be removed, and in the last days of August he tried to unite the Cabinet in recom¬ mending this step, but Mr. Lincoln felt that McClellan's popularity and the political situa¬ tion made it necessary to give him the com¬ mand of the army. Stanton disapproved this action as did Mr. Chase, but the President took the responsibility. McClellan's conduct of the Antietam campaign, his inexcusable delays and almost direct insubordination increased Stanton's feeling and at length convinced the President, and

McClellan was dismissed from active service.

Taking office as a Democrat, Stanton early felt the importance of emancipation as a war measure, and when on 22 July 1862, Mr. Lincoln laid before the Cabinet a proclamation declar¬ ing that all slaves in the seceded States should be free on a fixed day, Stanton and Bates, the Attorney-General, were in favor of issuing it at once, while Seward and Chase opposed it. Stanton approved the issue of the proclamation after Antietam, and in his annual report made a powerful argument in support of the measure. When in the next year after the defeats of Fredericksburg and Chancellorsville, Lee a sec¬ ond time crossed the Potomac, Hooker was re¬ lieved and Meade appointed to the command by Stanton's advice, and during the critical sum¬ mer and autumn of 1863 he met every emer¬ gency successfully.

When it was apparent that General Rose- crans was not in a condition to retain the com¬

mand, Stanton summoned Grant from New Or¬ leans to Louisville, himself met him there and after a full conference placed him in command of the Western armies, giving Thomas com¬ mand at Chattanooga. The immediate success of General Grant in his new command with the crushing defeat of Bragg's army made the whole military situation much clearer, and General Grant's appointment to the command of the army and his removal to Virginia fol¬ lowed as a matter of course. After Appomat¬ tox, General Sherman agreed upon terms with General Johnston, which provided not only for the surrender of the latter's army but for the settlement of vital political questions, and the agreement was disapproved by the Administra¬ tion. Stanton stated the reason in a dispatch to General Dix that the public might understand why General Sherman was overruled. His statement was clear and poignant and while it reflected on General Sherman's discretion in consenting to such an arrangement, the general himself was not criticized. Sherman held Stan¬ ton especially responsible for the action of the government and became very hostile to him.

Nothing in the history of the Civil War is more remarkable than the speed with which the vast armies of the United States were dissolved. On 1 May 1865, a million men were on the rolls of the army. In hardly more than 60 days nearly 700,000 of them were returned to their homes. The grand review of the two great armies held in Washington 22 and 23 May 1865 showed the military force of the United States at its greatest. In little more than a month most of that

force was engaged in the labors of peace. Stanton had made this possible.

Stanton remained in the Cabinet of Presi¬ dent Johnson, and in the struggle between the President and Congress over the policy of reconstruction, sympathized with Congress. He felt that the President's policy meant the return of the disloyal element to power in the Southern States and he could not contemplate such a re¬ sult without indignation. The partisans of the President demanded his resignation, while the leading Republicans besought him to remain, feeling that his presence in the War Depart¬ ment was an insurance against violence. His position was extremely disagreeable, but he held it with persistent courage, taking no part in the discussion and making no public expression of his views. He simply remained at his post and discharged his duty. The Tenure of Office Act had been passed in part to prevent the removal of Stanton. He opposed its passage, advised the President to veto it and desired its defeat after the veto.

This act and the provision that the President should issue orders to the army only through the general of the army, effectually took the control of the army away from the President and he wished to regain it. When Congress adjourned in the summer of 1867 the President sounded General Grant as to removing Stan¬ ton from office. Grant counseled him against it. Thereupon the President asked for Stan¬ ton's resignation, which was refused and the refusal was applauded by the Republican lead¬ ers. A week later the President suspended him from office without stating any cause and di¬ rected him to turn over all public records and property to General Grant, whom he appointed Secretary ad interim. Stanton in reply denied

his right to suspend him without legal cause, but under protest obeyed the order. When Congress reassembled in December 1867 the Senate refused to concur in the suspension and Stanton was thus reinstated. The Presi¬ dent was very much irritated and after an interval spent in endeavoring to persuade Gen¬ eral Sherman to accept the position, removed Stanton on 21 Feb. 1868 and appointed Lorenzo Thomas Secretary of War ad interim. Stanton declined to obey this order, the Senate by reso¬ lution denied the President's power to remove him and the House voted to impeach the Presi¬ dent. The trial of the President followed and ended on the 26th of May, and during its progress General Schofield had been nominated to the Cabinet as

Secretary of War. When the Senate failed to convict the President, Stanton at once retired and the nomination of Schofield was confirmed.

He left the office which he had held for more than six years, a comparatively young man, but broken in health by the unremitting toil and anxiety which he had undergone. His income which had been considerable when he took office had been so reduced that he had nothing but his house in Washington, and he was obliged to resume the practice of his pro¬ fession. He argued several important cases, but hfs powers were exhausted, and he gradually failed. His last argument was made at a hear¬ ing in his own library in December 1869, and he never left the house again. The approaching resignation of Judge Grier made a prospective vacancy on the Supreme Bench and on the recommendation of the leading men in both Houses of Congress, President Grant nominated Stanton to the place on 20 Dec. 1869. His nom¬ ination was at once confirmed and he lived to feel the pleasure of receiving the only office which he ever desired, but his work was done and he died four days later. A sincere, un¬ selfish, patriotic man, the result of the Civil War was due in no small part to his labors. Consult Gorham, G. C., (Life and Public Serv¬ ices of Edwin Y. Stanton) (2 vols., Boston 1899) ; De Witt, D. M., (The Impeachment and Trial of Andrew Johnson) (New York 1903) ; Flower, F. A., (Edwin McMasters Stanton > (Akron, Ohio 1905).

Moorfield Storey, Author cLife of Charles Sumner.)

STANTON, Elizabeth Cady, American reformer: b. Johnstown, N. Y., 12 Nov. 1815; d. New York, 26 Oct. 1902. She was graduated from Emma Willard Seminary, Troy, N. Y., in 1832 and was married to Henry Brewster Stanton (q.v.) in 1840. Her attention was first attracted to the disabilities of her sex when at 15 she was prepared to enter college and found none in which she could obtain the education which her brothers received. She afterward studied Blackstone, Story and Kent, and while in London, in 1847, met Lucretia Mott, with whom in the following year she issued the first call for a woman-suffrage convention to be held in her home at Seneca Falls. From that time her career was one long struggle for equal rights for both sexes. The general principles for which she strove were equal educational advantages, equal rights of suffrage and of property, and more intelligent divorce laws. She addressed the New York legislature on the rights of mar¬

ried women in 1854 and again in 1860, advocat¬ ing divorce for drunkenness. In 1866, she offered herself as a congressional candidate

and for 25 years annually addressed congres¬ sional committees in the endeavor to gain a constitutional amendment granting enlarged privileges to women. She was president of the Women's Loyal League in 1861 and of the National Woman Suffrage Association in 1865—93. She traveled and lectured in all parts of the United States and also made addresses in England, Scotland and France. Throughout her entire career, Mrs. Stanton's personal life was a model of the fulfilment of the duties of a wife and mother, her public career never oper¬ ating to the neglect of her social and home life. While the changes which have been wrought cannot definitely be declared the re¬ sult of the exertions of Mrs. Stanton and her immediate associates, a great change certainly came about in her lifetime. The education within the reach of her brothers but unattain¬ able for herself in her girlhood is now within the reach of any determined girl, and the changes in legislation are even more notice¬ able. The laws which placed a woman's prop¬ erty absolutely at her husband's disposal have been replaced by those which give her equal rights with him, or possibly superior, since the law recognizes no claim on the woman for family support, and her earnings are her own. Her intellect, energy and perseverance, and her womanly traits made her generally respected, and she is rightfully regarded as the mother of the movement. She presided over the first International Council of Women held in Wash¬ ington in 1888, was one of the founders and afterward editor of The Revolution, and a fre¬ quent contributor to English and American magazines. She published (Eighty Years and More) (1895) ; and was joint author of (The History of Woman Suffrage) (1881-86) - and edited (The Woman's Bible) (1895).

STANTON, Frank Lebby, American journalist and poet: b. Charleston, S. C., 1857. He has resided in Atlanta, Ga., since 1894 and is now on the editorial staff of the Atlanta Constitution. He has published (Songs of the SoiP ; (Comes One With a Song> (1898); (Songs from Dixie Land) (1900) ; and (Up from Georgia) (1902) ; and (Little Folks Down South. >

STANTON, Henry Brewster, American abolitionist: b. Griswold, Conn., 29 June 1805; d. New York, 14 Jan. 1887. He was prominent in the anti-slavery movements of 1837ˆ11. In 1847 he was admitted to the bar and achieved a high reputation in patent law. In 1858-60 he assisted in the reorganization of the Republican party, and from 1868 was on the editorial staff of the New York Sun. He has published (Sketches of Reform and Reformers in Great Britain and Ireland) (1849) ; (Random Collec¬ tions } (1886).

STANTON, Robert Brewster, American civil and mining engineer : b.

Woodville, Miss., 5 Aug. 1846. He graduated at Miami Uni¬ versity — A.B., 1871; A.M., 1878; (hon. A.M. University of Wooster, 1885) ; was resident en¬ gineer Cincinnati Southern Railroad, 1874-80; division engineer Union Pacific Railway, 1880- 84. Since 1884 has been in private practice as consulting civil and mining engineer. Among

other engagements made survey as chief engi¬ neer through the Grand Canon of the Colorado, 1889-90; special work on the British Columbia landslides for the Canadian Pacific Railway, 1896; examined and appraised the value of rail¬ roads in the States of Michigan, Kansas and Washington, 1906 and 1910; located railroad line from Chicago to Saint Louis, 1902, and from Butte, Mont, to Boise, Idaho, 1905. He engaged in mining operations and explorations at various times from 1884 to the present date, throughout the United States, Canada, Mexico, the West Indies and the Dutch East Indies; engineer and general manager, Flint Idaho Min¬ ing Company, 1886-88; and the Hocumac Min¬ ing Company, 1893-94; special work in copper and nickel mines in Canada, 1892 and 1903; explored and examined gold mines in the Island of Sumatra, 1904; examined and reported upon the Cananea, Mexico, copper mines, 1906; gold mines in California, 1893, 1903 and 1907, and in Utah and Arizona 1898-1901 ; manganese mines in Washington, 1910; gold mines in Nova Scotia, 1913 and on iron and manganese mines in Cuba, 1909-14. He is the author of Avail¬ ability of the Canons of the Colorado River for Railway Purposes) (1882) ; (The Great Land¬ slides of the Canadian Pacific Railway, } etc (1898), and monographs and lectures on the Grand Canon.

STANWIX, stan'wiks, John, English sol¬ dier: b. 1690; d. Irish Channel, December 1766. He entered the army in 1706, was made lieu¬ tenant-colonel, 1745; and governor of Carlisle 1752. After General Braddock's defeat Stan- wix was sent to America in command of a battalion of the Royal Americans, and in 1758 was made brigadier and sent up the Hudson to the Oneida portage where he built Fort Stan- wix. In 1759, while Wolfe was storming Que¬ bec, he was in command in Pennsylvania, re¬ built Fort Duquesne, was promoted to major- general, and returned to England in 1760. He .was made lieutenant-general in 1761 and gover¬ nor of the Isle of Wight in 1763.

STANWOOD, stan'wud, Edward, Ameri¬ can editor and author : b.

Augusta, Me., 16 Sept. 1841. He was graduated at Bowdoin Col¬ lege in 1861 (Litt.D., 1894), was assistant editor of the Boston Daily Advertiser, 1867-82, and editor, 1882-83, and managing editor of the Youth's Companion, 1884-1913. He ha£ pub¬ lished (History of Presidential Elections) 1884;

(History of the Presidency) 1898; American Tariff Controversies in the Nineteenth Century) 1903; (The Life of James G. Blaine* 1905; Volume 2 of (History of the Presidency> 1912.

STANYUKOVITCH, Konstantin Mik- hailovitch, Russian author: b. Sevastopol, 1844; d. 1903. He was the son of an admiral and entered the navy at 16, but resigned in 1864 and thereafter devoted himself to literary work at Saint Petersburg. His work, consisting of sea stories, social studies and humorous sketches, appeared in the leading Russian journals, later appearing in book form. Among his numerous works the more important are (The Sincere People) ; (The Story of One Life> ; (The In¬ different People) ; <Priests) ; (Sea Tales.* His collected works were published (Saint Peters¬ burg 12 vols., 1906-07).

STANZA, a group of four or more lines so connected with each other by metre and

rhyme as to form one of the regular divisions of a poem. The use of the word stanza for a two-line verse is not to be commended. Two rhymed lines form a couplet, three a triplet. Stanzas are usually from four to 16 lines in length, and the lines mostly rhyme alternately or in couplets, though other arrangements are frequent. In Byron's (Don Juan,5 the eight lines are rhymed thus : 1 2 1 2 1 2 3 3, the same figures indicating rhymes. This particu¬ lar form of stanza is called the ottava rima.

STAPELIA, a genus of cactus-like plants of the family Asclcpiadacece, about 80 species of which are natives of South Africa. They have angular, generally four-sided, leaflets, green stems and branches, covered with ex¬ crescences ; bear large, showy, grotesquely mottled or barred flowers irregularly in angles and notches of the stems. Because of their fetid odor they are popularly known as carrion-flowers, a name shared by several other unre¬ lated plants. The flowers are frequently dis¬ proportionate to the size of the plant; for ex¬ ample, S. gigantea produces flowers about a foot in diameter. Except in fanciers' collec¬ tions and in botanic gardens these plants are rarely cultivated, probably because of their smell.

STAPFER, Paul, French author: b. Paris, 14 May 1844. He was educated at the Bona¬ parte Lyceum, . Paris. He was professor of foreign literature at Grenoble in 1881-83, then accepting a similar chair at the University of Bordeaux. He contributed to the Temps and other leading magazines, and is known as an essayist of profound learning and exquisitely finished style. He edited the (Grands ecrivains *series and is author of (Petite comedie de la critique litteraire de Moliere* (1866) ; Shakes¬ peare et l'antiquite *(2 vols., 1883) ; (Racine et Victor Hugo) (1886) ; (La Grande predica¬ tion chretienne en France) (1898) ; <Questiones esthetiques et religieuses) (1906); (Vers la verite* (1909; (Les legons de la guerre) (1915), etc.

STAPLES, sta'plz, Robert Ponsonby,

English artist: b. 30 June 1853. He received his instructions in art at the Louvain Academy of Fine Arts (1865-70) ; at Brussels under Por-taels, and at Dresden (1867). In 1869 he visited Paris and exhibited at the Royal Academy, Burlington House (1875). He subsequently passed a year in Australia (1879-80). He served as Art Master of the People's Palace, Mile-end Road (1897). His chief works are (Guilty or Not Guilty *; (The Last Shot for the Queen's Prize, Wimbledon) ; Cardinal Manning's Last Reception) ; (Mr. Gladstone introducing the Home Rule Bill* ; (The Queen and King Edward VII, * etc.

STAPLES, William Read, American

jurist and historian: b. Providence, R. I., 10 Oct. 1798; d. there, 19 Oct. 1868. He was graduated at Brown University in 1817, and was admitted to the bar in 1819. He was asso¬ ciate justice of the Rhode Island Supreme Court in 1835-54, and chief justice of that court in 1854—56. He then resigned because of failing health. From 1856 he was secretary and treasurer of the Rhode Island Society, and he was one of the founders of the Rhode Is¬ land Historical Society. He was an authority on the history of Rhode Island, and edited

the second volume of the Historical Society's collections, as well as Samuel Gordon's (Sim¬ plicities' Defense against Seven-Headed Policy) (1835). Author of (Annals of P rovidence to 1832) (1843) ; documentary History of the Destruction of the <(Gaspe>:> } (1845) ; Pro¬

ceedings of the First General Assembly for the Incorporation of the

Providence Plantations in 1647 } (1847) ; (Rhode Island Form-Book)

(1859).

STAPLES, Minn., city in Todd County, 120 miles northwest of Minneapolis, on the Northern Pacific Railroad. It has railroad re¬ pair shops, and is important as a railroad divi¬ sion headquarters and transfer point. It was settled in 1892. Pop. 2,558.

STAR-ANISE, the fruit of a shrub or small tree from Eastern Asia (Illicium anisa- tum) , of the Magnolia family. It has small, but beautiful, fragrant blossoms, in terminal cymes and oblong leaves, which emit, when bruised, the odor of anise. The fruit is a brown capsule, like a star, commonly eight pointed, each ray being a follicle, opening at the top, and enclosing an oval, glossy brown seed. These seeds yield an aromatic oil, which is carminative and stimulative, and although sometimes used therapeutically, is chiefly em¬ ployed for flavoring foods and liqueurs, hav¬ ing a sweet taste and odor more like fenrtel than anise. The fruits are burned as incense in the temples of Japan, where the tree is a great favorite with the native gardeners. It is also cultivated in Florida.

STAR-APPLE, the fruit of Chrysophyl- lum cainito, a sapotaceous tropical tree, native to the West Indies. It is about 25 feet high, very ornamental, and has slender branches and very beautiful foliage, the leaves being clothed beneath with golden-yellow hairs. The fruits are berries, about the size and shape of an apple, and vari-colored, white, green, yellow, rose-colored, or purple ; it contains a pulp with a pleasant flavor, but unless perfectly ripe is astringent and leaves an intense acridity in the mouth which is difficult to remove. In the centre are eight or 10 cells, each containing a shining brown seed. When cut across, while immature, these cells form a many pointed star in the centre of the fruit.

STAR OF BETHLEHEM, stated in the New Testament to have appeared in the sky at the time of the birth of Christ. At various times since the appearance of Tycho Brahe’s star in the constellation Cassiopeia in 1572, the celebrated Nova of that year, it has been sug¬ gested that this might be a variable star of long period, though there is nothing now in the vicinity of the place of this star brighter than the 12th of 13 magnitude. Nevertheless, a reported appearance of a bright star in some¬ where near that part of the heavens about the middle of the 13th century combined with a more vague account of some similar appearance a little more than 300 years earlier, furnished material for conjecture that these might possi¬ bly be former appearances of the

star of 1572, giving a period of about 310 or 315 years, which would carry it back three periods more to about the time of the birth of Christ. But as bright stars flame up occasionally, apparently from the collision of dead worlds, there is no scientific reason for doubting the existence of

one at this time ; although the idea that it stopped over the stable where the infant Jesus lay must have existed in the imagination of the beholders.

STAR OF BETHLEHEM, a liliaceous

herb of the genus Ornithogalum, the flowers of which are fancied to resemble the star which located the place of Jesus' birth. The species are natives of the Old World, but two have escaped from gardens and become naturalized in America, especially O. umbellatum. It is low, with narrow leaves (the midrib being lighter in tone), which spring from a coated bulb, the flowers are arranged in the plan of threes, and are corymbose and borne on slender, bracted scapes in late spring. The six perianth- segments are nearly equal and separate, and open only in sunshine, the outside of each being pale green with white edges, while the inside of all is pure white. The small bulbs have been eaten in Palestine. Among other species of Ornithogalum, is the O. caudatum from the Cape of Good Hope, sometimes called onion- lily. Its leaves dry into long tails and its watery bulbs have great vitality unless exposed to severe cold. The satin-flower is the hardy O. nutans, with nodding green, white-lined blos¬ soms, and, like O narbonense, remarkable for its height (three feet), is a hardy garden bulb.

STAR OF BOKHARA, Order of. See

Orders (Royal) and Decorations.

STAR-CHAMBER, formerly an English court of civil and criminal jurisdiction at West¬ minister. It consisted originally of a committee of the Privy Council and was remodeled during the reign of Henry VII, when it consisted of four high officers of state, with power to add to their number a bishop, and a temporal lord of the council, and two justices of the courts of Westminster. It had jurisdiction of forgery, perjury, riots, maintenance, fraud, libel, and conspiracy, and could inflict any punishment short of death. Its process was summary and often iniquitous (especially in the reigns of James I and Charles I), and the punishments it inflicted often arbitrary and cruel. Jurors were punished for finding verdicts against the Crown. It approximated the methods of the Spanish Inquisition, sending for persons, en¬ forcing

confessions, and in some instances em¬ ploying the torture. The excesses of this court brought about its own extinction, for it was abolished by Parliament in 1640. In the modern usage of the term a star-chamber is any secret session of a legislative body, council, board or other organization. In the United States Sen¬ ate, a star-chamber session is called an executive session.

STAR-GRASS, a name given to several kinds of plants that have star-shaped flowers. Among the ones most widely known in America is the Hypoxis liirsuta, a small herb belonging to the Amaryllis family, with a corm or short root-stock, grass-like leaves springing from it, and a slender hairy scape, bearing several stell¬ ate three-merous flowers. These are bright yellow, and there are six narrow segments of the perianth, hairy on the outside, and widely spread. One of the lily tribe is the Aletris fari- nosa, a perennial herb ; with tuberous rhizomes and bitter fibrous roots, which have been used as a domestic remedy, for intermittent fevers and for colic; whence its other name <(colic

root." It is often found in sandy soil, its smooth, lanceolate leaves lying on the ground in a flat rosette, from which arises a tall, stiff stem, terete, and sometimes three feet high, with narrow bract-like leaves. It is crowned by a virgate, spike-like raceme of bell-shaped white flowers, just touched with yellow, and having an appearance of crinkliness like crepe, and as if covered with a rough powder exter¬ nally. The water star-grass is an aquatic plant (Heteranthera dubia) of the pickerel-weed family, its slender forked stems, and grassy floating leaves being found in still water. The flowers are arranged on the plan of threes, and their primrose-colored, stellate rays are widely separated, narrow and acute.

STAR OF INDIA, Order of. See Orders (Royal) and Decorations.

STAR OF THE OCEAN, Order of. See

Orders (Royal) — Hawaii.

STAR QUARTZ, a variety of vitreous quartz, containing thin layers of a foreign sub¬ stance, which produce the phenomenon of aster- ism in transverse sections of a crystal when cut en cabochon. Good material of this char¬ acter has been found in Canada.

STAR OF RUMANIA, Order of. See

Orders (Royal) and Decorations.

STAR SAPPHIRE, a variety of the min¬ eral corundum which exhibits a six-rayed star in transverse sections of a crystal when cut en cabochon. This ˆasterism" appears to be due to reflections from the surfaces of twinning lamellae. Fine star sapphires come from Ceylon and are prized as gems. Star Ruby is the ruby- red asteriated sapphire.

STAR OF SEVILLE, The ((La Es¬ trella de Sevilla*), known also as (Sancho Ortiz de Roelas,* the title of a successful adaptation by Trigueros (1802), is commonly attributed to Lope de Vega (1562-1635), but is of doubtful authorship. One scene contains a reference to Velez de Guevara's (E1 Diablo Cojuelo) first published in 1641. Menendez y Pelayo believed that the play was originally composed by Lope de Vega, but was rewritten by Claramonte, a contemporary actor and play¬ wright. The oldest edition known is undated, but belongs apparently to the middle of the 1 7th century. The text is corrupt and often obscure, so that a critical edition is much needed. It is curious to note that a reprint was published in Boston, 1828, by George Ticknor's Spanish teacher, F. Sales, and is the first Spanish play printed in the United States.

(La Estrella de Sevilla) is a tragedy, and observes the unities of time and place, peculi¬ arities which give the play distinction in the history of the Spanish drama. It is acknowl¬ edged to be a work of unusual beauty, vigorous composition, clear characterization, and intense dramatic interest. The scene is laid vaguely in the stern times of the reconquest, when Spain was engaged in border warfare with the Moors. The dramatist had no historical foundation for the ignoble role played by King Sancho the Brave. His object was to depict the stern, unbending honor of Sevillan nobles of a dim past when there was no compromise with duty and honor toward a king, however base and unworthy. But with consummate skill the author represents inflexible justice, personified

in the firm and incorruptible magistrates of Seville, as victorious over the iniquitous monarch. Viewed in this light, the morality of the play, which critics have impugned, is vindicated. The resemblance to Corneille's (Le Cid, *based upon a Spanish original, has often been noted. In striking contrast with Chimene, Estrella retires to a convent rather than accept a lover who. at the request of the king, has murdered her brother. There is probably no ground for the contention that the play contains veiled references to the tragedy that befell Juan de Escobedo at the command of Philip II. Consult (Obras de Lope de Vega* (ed. Menendez y Pelayo, Vol., XI). Lord Holland's translation of fragments will be found in (Some

Account of the Life and Writings of Lope Felix de Vega Carpie* (Lon¬ don, 1806).

Milton A. Buchanan.

STAR-SPANGLED BANNER, The, a

patriotic song composed by Francis Scott Key 14 Sept. 1814, and now recognized throughout the United States as the national anthem, al¬ though it is not such in legal fact, Congress having repeatedly rejected proposals — one as recently as 1914 — to make a declaration to that effect by resolution. Nearly 100 years after it was written the song was prescribed by fdrmal orders to be played in the army and navy on occasions of ceremony, and that is the extent of its official recognition to-day. Foreigners have long believed (The Star- Spangled Banner) to be the fully accepted national anthem of America, and in their armies and navies, and on all public occasions when it is desired to honor America in music abroad, the familiar air is played. While many on this side of the water were inclined for many years to discredit the song and to ad¬ vocate strenuously the claims of (My Country Tis of Thee, *(The Battle Hymn of the Re¬ public^ and even (Yankee Doodle) and < Dixie,* the standing of (The Star-Spangled Banner) was never disputed in other lands.

Even as late as the Spanish War of 1898 the (Star-Spangled Banner *had only limited popular recognition and the general disposition at that period, at least in New England, was to elevate (My Country, Tis of Thee,* to the place of honor. Marching troops in Cuba and Porto Rico, as all the world knows, were partial to (There'll Be a Hot Time in the Old Town To-night. *In the Civil War, (John Brown's Body) and (Yankee Doodle,* on one side, and (Dixie* and (The Girl I Left Behind Me,' on the other side, were the favorite in¬ spirations of the stalwart men who clashed on a hundred bloody fields. During the War with Germany in 1917-18 debate and difference on the subject of whether we have a pre-eminently preferred national anthem and what that anthem is vanished altogether. The National Star-Spangled Banner Commission laid the groundwork for the change. This commission was organized in Baltimore for the purpose of preparing the centennial celebration of Key's song in September 1914 and for many months before that it conducted an active and wide¬ spread propaganda. Patriotic organizations, such as the Sons of the Revolution, the Society of the War of 1812, and others, co-operated with enthusiasm and did much to develop pub-

lie opinion. No other candidate for acceptance as the national anthem had this systematic and vigorous backing, and no other writer of an American patriotic song has had so many honors paid to him as Key, for whom Con¬ gress has erected an imposing sculptured memorial in Fort McHenry and whose linea¬ ments are preserved in public statuary as far from the scene of his labors as San Francisco. The incidence of war so soon after this propa¬ ganda caused it to have a maximum effect.

(The Star-Spangled Banner) was composed by one of the best of the American types. Key was poet, scholar, lawyer, public official and churchman, and member of a distinguished family. He wrote (The Star-Spangled Banner> in a burst of inspiration. It was written in a moment of acute national stress and expressed, as it does still, the characteristic feelings of the country — not desiring to provoke war, but rising with determination to take arms in defense of the national honor when a crisis required it. In literary form it is far superior to most patriotic songs, and even without the music would find wide popularity on its merits as a poetical composition.

It struck the popular fancy at first and has held it in large measure ever since. Key had the words printed in hand-bill form in the office of The Baltimore American, and distributed on the streets of the delivered city in September 1814, before the British fleet which had been beaten off from Fort McHenry had gotten out of the Chesapeake. It was sung on the stage of the famous Holliday Street Theatre in Baltimore and taken up with intense eagerness by the people there and throughout the nation. Few incidents in our national history have been beclouded by so much misconception of fact as the origin of this anthem. The most com¬ mon error, which has had an unfortunate habit of creeping into print, is that Key composed the words while he was a prisoner of war on the British fleet which attacked Fort McHenry. Key was not a prisoner of war, but had gone to the fleet on the cartel ship Minden, used by the American government in negotiating ex¬ changes of prisoners, for the purpose of obtain¬ ing the release of a civilian, Dr. William Beanes of Upper Marlborough, Md., who was being detained because he had caused the arrest of British marauders. As Key reached the fleet, when the attack on Baltimore was about to begin, he was kept behind the British lines until it was over in order that he might not convey information of the impending move¬ ment. He was treated with the utmost con¬ sideration and was promptly released when the attack ended. When he was rowed ashore on the morning after the bombardment he had

in his pocket, scribbled on the back of an old letter, the draft of the song which has become so famous since. The original manuscript is owned by Henry Walters, owner of the Walters Art Gallery. The flag whose ((broad stripes and bright starsw burst upon Key's enraptured vision on that September morning of 1814 is preserved in the National Museum at Wash¬ ington, D. C.

The words of the song follow:

The Star-Spangled Banner.

Oh! say can you see by the dawn's early light,

What so proudly we hail'd at the twilight's last gleaming, Whose broad stripes and bright stars through the perilous fight,

O'er the ramparts we watched were so gallantly streaming? And the rocket's red glare, and bombs bursting in air.

Gave proof through the night that our flag was still there! Oh! say, does the star-spangled banner yet wave O'er the land of the free and the home of the brave?

On the shore dimly seen through the mist of the deep, Where the foe's haughty host in dread silence reposes, What is that which the breeze o'er the towering steep.

As it fitfully blows, half conceals, half discloses?

Now it catches the gleam of the morning's first beam,

In full glory reflected, now shines in the stream;

'Tis the star-spangled banner. Oh! long may it wave O'er the land of the free and the home of the brave.

And where is that band who so vauntingly swore,

'Mid the havoc of war and the battle's confusion,

A nome and a country they'd leave us no more?

Their blood has washed out their foul footsteps' pollution; No refuge could save the hireling and slave

From the terror of flight, or the gloom of the grave,

And the star-spangled banner in triumph shall wave O'er the land of the free and the home of the brave.

Oh! thus be it. ever, when freemen shall stand,

Between their loved home and war s desolation;

Blest with victory and peace, may the Heaven-rescued land Praise the power that made and preserved us a nation. And conquer we must, when our cause it is just,

And this be our motto, " In God is our trust."

And the star-spangled banner in triumph shall wave O'er the land of the free and the home of the brave.

STAR-THISTLE, one of the European plants of the genus Centaurea (q.v.). They are not true thistles, but are closely allied com¬ posites. C. calcitrapa is an annual, much branched, and spreading weed sparingly naturalized in America. It has one to two- pinnatifid, serrulate, spiny leaves, the upper one sessile and clasping. The flowerheads are purple, small and rayless, and have an ovoid receptacle surrounded by ovate mvolucral bracts, the outer being long and spreading, and tipped with stout spines. The common name is said to be derived from a fancied resemblance of the spmv involucre of the vellow flowered star- thistle (C. solstitiatis) , to the weapon called ˆmorning-star,® an iron ball with short spikes.

STAR OF THE WEST. At sunset 5 Jan. 1861, the merchant steam-vessel Star of the West sailed from New York to supply and re¬ inforce Major Robert Anderson, at Fort Sum¬ ter, Charleston Harbor. She was commanded by Capt. John McGowan, was unarmed, and car¬ ried a large quantity of supplies for Anderson, as well as Lieut. C. R. Woods, United States army, with four officers and 200 artillery re¬ cruits. She reached the outer bar of Charles¬ ton Harbor before daylight 9 January and as the harbor lights were out, put out her own and groped in the dark until nearly daylight, when, guided by the light on Fort Sumter, she stood in. The South Carolina authorities had been notified of her coming by Secretary Thompson of President Buchanan's Cabinet, and a vessel was lying off the main channel watching for her. and when she was seen gave signal-lights of warning to the Confederates on Morris Island, and then ran up the harbor, the.S7ar of the West following, as soon as it was light, and steam¬ ing up the main channel for Fort Sumter. She flew the United States ensign at the fore and went on without interruption until within one

and three-quarters miles of Forts Sumter and Moultrie, when she was fired upon by a bat¬ tery near the north end of Morris Island and about five-eighths mile distant. She ran up a

garrison flag, to which no attention was paid, save to increase the rapidity of the Con¬ federate fire, which was kept up on her from Morris Island, with an occasional shot from Fort Moultrie. McGowan was powerless to de¬ fend himself, and no assistance came from the guns of Fort Sumter, as Major Anderson had not been notified of this expedition for his re¬ lief. Therefore McGowan turned his vessel seaward, after 17 shots had been fired at it, two of which had struck it, and returned to New York on 12 January. This firing on the flag of the United States was the first overt act in the Civil War. At the South there was great exul¬ tation that the flag of the Union had been in¬ sulted ; at the North it produced but little ex¬ citement. Consult (Official Records) (Vol. 1).

STARA-ZAGORA, Bulgaria (Turkish name Eski-Zagra), a town in Eastern Rumelia, capital of the department of the same name, 45 miles south of Tirnova, at the foot hills of the Balkans. Rose oil is the town's principal indus¬ try. It has also mineral springs and its com¬ merce is helped by its location at the junction of the principal passes of the Balkan Range. In the neighborhood, in July 1877 the Russians were defeated by the Turks under the command of Suleiman Pasha. Pop. about 22,000.

STARCH, a proximate principle exclusively of the vegetable kingdom with the formula n C12H20O 10. The value of n has not been de¬ termined but all experiments go to show that it is large — not less than 100, and that, therefore, the molecular weight of starch is at least 32,400. It is found in almost every plant at some period of its life-history, and is especially abundant in wheat, potatoes, arrowroot and other similar kinds of vegetation, and forms a very large and important part of the food of man and the herbivorous animals. It occurs in the ovule of the seed, in the cotyledons of the embyro, in the pith, the bulbs, stems and notably in the roots and tubers of certain families of plants, as the potato, sweet potato, cassava, etc. The starch granules are found in the growing plant in the protoplasm of the chlorophyll corpuscles, varying according to the time of day, being in greatest numbers toward evening and fewest in the morning, sometimes disappearing entirely during the night. Appearing at first as

simple points, they gradually increase in size, so that eventually they fill completely the chlorophyll corpuscle, the latter appearing as simply an envelope for the starch. The starch granules grow and increase in size only when in contact with protoplasm and under conditions of ex¬ posure to light at a favorable temperature and in the presence of carbon dioxide. These gran¬ ules are of widely varying sizes in different plants, ranging from a diameter of 0.0069 inch in the canna and 0.0055 inch in the potato, to 0.0003 inch in the parsnip and 0.0002 in the seeds of the beet. Starch appears to be formed in plants in greatest quantity when there is a large supply of nutriment, and it disappears when the nutriment becomes deficient. The amount of starch in various alimentary sub¬ stances is exhibited in the table following.

Starch is a soft, white, shining powder, in¬ soluble in cold water, alcohol or ether; under the microscope it is seen to consist of granules, each of which is formed of a series of stratified envelopes concentrically arranged round a com-

Name of substance

Haricot-bean flour .

Haricot-beans .

Wheat-flour .

Rye-flour .

Oats . .

Barley-flour .

Barle/ .

Rice .

Buckwheat. . .

Indian corn .

Corn- starch . . . . . .

Potatoes (air-dried) .

mon nucleus, the outer ones being the denser. Inasmuch as these layers or envelopes are of variable thickness they cause the granule to assume more or less a flattened ovoid form. Occasionally there are two nuclei within the outer envelope, each surrounded with its own series of concentric layers. The outer layer is the first formed and is known as (<starch cel- lulose" ; the interior is called ˆgranulose.® These two substances may be separated by ap¬ propriate chemical action. Starch dried at ordinary temperatures always retains an amount of water varying from 12 to 18 per cent; but by drying in a vacuum over sulphuric acid and gradually raising the temperature to 212° F. it may be obtained perfectly free from water; but if it be boiled with water the starch gran¬ ules are swollen and broken up, so that on cooling, a stiff, gelatinous mass, starch-paste, is produced ; on largely diluting this paste with water, the swollen granules for the most part subside, but a considerable quantity of starch re¬ mains in solution. By boiling starch mixed with a quantity of water, under pressure, at a tem¬ perature of about 300° F., it is mostly dissolved, and on filtering the liquid and allowing it to cool small granules of starch are deposited, which are slightly soluble in cold water, and are at once dissolved by water heated to 160°. This modification of starch is known as soluble starch. The simplest method of making soluble

starch is to dissolve it in hot glycerine. Starch may be detected by boiling the suspected sub¬ stance with water, cooling and adding tinc¬ ture of iodine, when, if starch be present, a fine deep blue color is produced ; this color is dissipated by heat or by substances such as alcohol, ether, etc., which dissolve and so re¬ move the iodine.

Nitric acid acts on starch in different ways, according to the strength of the acid used and the temperature. Cold concentrated nitric acid forms a substitution product, in which one hy¬ drogen atom of the starch is replaced by the group NO2. A mixture of concentrated nitric and sulphuric acid gives rise to the formation of a dinitro-substitution product, in which two atoms of hydrogen are replaced by the group NO2 twice. Hot nitric acid converts starch into oxalic, malic and acetic acids. Acted upon for 24 hours by a 12 per cent solution of hydro¬ chloric acid, the starch becomes soluble in water without forming a paste.

Preparation of Starch.— With regard to the purposes to which starch is applied, the vari¬ ous kinds may be divided into (1) starches used for food and (2) starches used for laundry and other industrial purposes, though certain kinds are extensively used under both of these heads. In their chemical relations all varieties of starch are identical, but in their physical con¬ stitution and microscopic structure they present

Starcli in 100 parts

99.96 37.7

57 to 67 54 to 61 30 to 40

64

38 to 42 75 to 77

44

65 to 66 77 to 78 16 to 23

marked differences, and they also vary much as regards digestibility and suitableness as articles of food. The size of these granules and the arrangement of layers differ in every different species of plant, and,

therefore, the source of any particular starch is readily determined by microscopic examination. Starch may be puri¬ fied by freezing a 1 per cent mixture with water and melting the ice. The starch settles and the liquid retains the impurities.

The food starches embrace arrowroot, tous- lesmois, sago and tapioca. Corn-starch, which has an enormous sale, is simply the starch of Indian corn or maize separated mechanically from the grain. The process most commonly in use in the United States is known as the sulphur dioxide process. The grain is steeped in a 1 per cent aqueous solution of sulphur dioxide at a temperature of 250° to 300° F. for from two to four days. The swelled grains while wet are then crushed between cylinders under a flow of water, washing the mass through a cylindrical sieve so as to separate out the husky matter. The milk-like fluid which contains the starch in suspension passes through the sieve and is run along a series of gently inclined surfaces, on which the heavier granules are deposited, the lighter and finer particles being carried with nitrogenous matter into settling-tanks. The deposit which accumulates in the settling-tank is purified by repeated straining and settling, and the separated starch is dried by gentle artificial heat, when it crum¬ bles to a powder, and as such it is packed for the market.

Starch for industrial purposes is obtained also from potatoes, wheat and rice, and sago starch is extensively employed for other than food purposes. Starch from many different substances finds occasional or limited employ¬ ment. Potatoes affected by disease yield as pure and useful a starch as sound tubers, but much less in proportion to their weight, as the disease usually results in the transmutation of starch to sugar. On a small scale the prepara¬ tion of starch from potatoes is a simple oper¬ ation. The tubers have simply to be thoroughly washed to free them from all earthy impurity, then rasped down to a fine pulp in a tub of water and allowed to settle, when the starch will fall to the bottom and the greater part of the skin or husk will float on the water. By repeated washing and settling of the starchy deposits the starch may be obtained in a con¬ dition of purity, and it may then be dried by gentle heat for preservation and use. On the manufacturing scale, machinery of various kinds is adapted for performing the several processes of steeping and washing, straining out of stones, rasping, straining, settling, puri¬ fying, draining and drying which the potatoes undergo. Some manufacturers pass the rasp¬ ings through a grinding mill, resulting in an increase of starch product by 8 to 12 per cent. Beyond its use in industrial pursuits in com¬ mon with other starches, potato-starch is much employed for making imitation sago, for adul¬ terating and as a substitute for the more costly food-starches, for

preparing starch-sugar and as a source of potato-spirit.

Wheat-starch is prepared by two distinct processes. By the first and old method the grain is subjected to a process of fermentation

whereby the gluten or nitrogenous constituent of the wheat is rendered soluble and the remain¬ der of it loses its adhesive property, and in this condition the starch is easily separated out by a washing wheel or drum. By this process the greater part of the gluten is wasted, and a smaller yield of starch is obtained than can be secured by the more recent system of Martin. The principle on which the latter proceeds can be easily illustrated by making a dough of flour, placing it in a muslin bag and squeezing it under the water, when the starch exudes min¬ gling with the water and settling as a sediment, leaving within the muslin a gray semi-elastic mass consisting chiefly of gluten. In this way the gluten is saved and can be utilized for cattle-feeding, etc. The production is two pounds of starch for each pound of gluten. By whatever process prepared, wheaten starch is purified by repeated washing and settling, and dried by gentle heat, and on drying it assumes the columnar structure by which it is familiarly known.

In the preparation of rice-starch, a variety preferred for laundry purposes, the grain has to be steeped in a slightly alkaline solution on ac¬ count of its peculiarly hard and horny envelope of gluten. In addition to being extensively used in laundries, starch is largely consumed in the manufacture of dextrin (q.v.), and it is also employed as a thickener in calico-printing, and in the finishing of bleached and printed calicoes. Placed in a 2 per cent solution of soda or potash the granules swell, forming a tenacious paste used 'by photographers for mounting prints and for many other purposes. Dry starch finds a valuable minor adaptation in dusting molds in metal-casting, besides being applied for many miscellaneous purposes.

Statistics. — In the United States in 1914 there were 82 starch factories, having an in¬ vested capital of $12,070,000. There were 1,780 persons employed and the total value of the product for the year was $13,996,000. In this production New York ranked first, Indiana sec¬ ond and Ohio third. The total quantity of starch manufactured was 620,764,347 pounds. Of this total, 574,247,697 pounds were made from Indian corn, 23,540,472 pounds from potatoes and 22,976,178 pounds from all other materials. A very large quantity of starch was made by the seven glucose factories previous to its conversion into glucose (q.v.). No ac¬ count is made of this in the figures given, as the product did not appear in the markets as starch.

STARFISH, any echinoderm of the group Asteroidea (see Echinodermata), in which a pentagonal disc forms the central body, whence radiate five or more pointed arms, containing prolongations of the stomach, as well as di¬ gestive glands, reproductive organs, etc. The mouth is on the inferior surface of the disc and the vent (when one exists) is on the upper surface. The exoskeleton consists of a mosaic of limy plates united and covered by a leathery, usually reddish-brown skin, forming a pliant armor. The plates of the disc are similar to those of the “cup® of crinoids (q.v.) and similar echinoderms. Those of the arms form along the floor a groove carrying the ambu¬ lacra! water-vessels and tube-feet. The exterior of the plates, except in the ambulacral grooves, is studded with tubercles, each bearing a spine,

giving the starfish a generally spiny appearance. Studding the skin among the spines are numer¬ ous branchial papillae and the usually three- jawed, flexible-stalked pedicellariae, which con¬ tinually bend about and by their snapping pick up and remove accumulated waste matter from the respiratory surface of the animal. So inde¬ pendently do they act that for many years they were considered to be parasites. The alimen¬ tary canal is simple, with a pair of large csecal digestive glands reaching into each arm. (The nervous, blood and water-vascular systems con¬ form to the plan described in the article Echinodermata) . Distinct eye-spots are present at the tips of the rays in most species, the large orange-colored spot which is popularly called the “eye® of the starfish being in reality the madreporic plate, by means of which water is admitted to the ambulacral system. In starfishes the sexes are usually separated and the eggs fertilized in the water. Development takes place with a metamorphosis, the larval stage be¬ ing free-swimming, provided with ciliated bands and processes, and known as the bipinnaria. The body of the young starfish forms within the body of the larva, only a small portion of which develops directly into the starfish, the remainder being simply absorbed to nourish it.

Locomotion is accomplished by means of the thousands of tube-feet arranged in double rows on the under side of each arm. These succes¬ sively extend, attach themselves, contract, let go and reach forward again, hundreds acting to¬ gether to draw the body slowly but continuously onward. The individual feet are extended by means of water forced into them by the con¬ traction of the ampullae, with

which each is pro¬ vided, and contracted by their own musculature, which forces the water back into the now re¬ laxed ampulla, the supply of water in any part being regulated through the madreporic plate and the system of canals and polian vesicles. Besides the sexual mode of reproduction star¬ fishes possess the power of regenerating lost parts developed to so great a degree that it amounts to a sexual reproduction. When han¬ dled or injured they will often automatically cast off an arm or even all of the arms close to the base. Not only will the disc regenerate any number or all of its arms when lost, but in some cases the single arms will develop new discs, thus producing several individuals from one. Experimental cuttings of starfishes has shown how bifurcated or extra arms may be produced. As their only natural enemies are bottom-feeding fishes of the cod family, and as it seems probable that one or more arms could thus often escape capture, this capacity for regeneration (q.v.), combined with their tenacity of life and enormous fecundity, prob¬ ably accounts for the surpassing numbers in which they sometimes occur.

All starfishes are marine and most of them live in comparatively shallow water, though a few extend to great and many to moderate depths. As fossils they occur in most forma¬ tions from the Cambrian upward, but are much less numerous than the sea-urchins, being less well adapted by their structure for preserva¬ tion. While the number of arms is generally five, or some multiple of five, some genera bear irregular numbers as 13 in Solaster, 9 to 13 in Brisinga, or upward of 20 in Heliaster, while

a few, as Culcita and Asteriscus, are pentag¬ onal and nearly without trace of arms.

Starfishes are voracious creatures which feed for the most part upon mollusks, including such large bivalves as oysters. The manner in which they accomplish this apparently impossible feat is very remarkable. By means of the suckers at the ends of the tube-feet the starfish attaches part of its arms to each valve of the oyster and by a steady continuous traction sooner or later so weakens the adductor muscle of the latter that the valves gape open. As the mouth is too small to admit the body of the oyster the stom¬ ach is protruded and, enwrapping its prey, the soft body is gradually sucked through the mouth. Small gastropods may be taken into the mouth entire. Many species of starfishes lives on the bottom in vast shoals, and, although sluggish creatures, they often migrate to new feeding grounds, moving over the ground steadily in a definite direction.

The best-known starfishes of our Atlantic shores are the

Asteracanthion vulgaris and A. forbesii, the former chiefly north, the latter south of Cape Cod, though both are found in Vineyard Sound and the neighboring waters. They are nearly alike, reach a diameter of 12 or 15 inches and extend from low water to considerable depths. Both species congregate in great numbers on mussel and oyster beds, often committing great havoc on the latter. They are removed from the latter by the boat¬ load by means of dredges and tangles and cast ashore. Formerly the oystermen broke them into pieces, which were cast into the water in expectation of killing them, with the result that their numbers were increased greatly. The smooth starfish (Cribrella sanguinolenta) is a very pretty, small, shallow water species with five long, round, nearly smooth arms and a color which varies from purple to yellow and pink. It is most abundant north of Cape Cod and is remarkable in utilizing the sides of the mouth as a brood pouch in which the young are car¬ ried. Echinaster sentus is a related southern species with rough spinous arms. Croosaster pappossus is common in a few fathoms of water on the New England coast. It has a very broad body disc and flattish arms, which vary from 12 to 15 in number. Luidia clathrata and As- tropecien articularis are flat, very brittle, five rayed starfishes with the upper surface very densely covered with small spines and the arms margined with large plates and a fringe of spines. Both occur on the south Atlantic coasts, occasionally as far north as New Jersey. Many interesting species are dredged in .deeper water or are sometimes thrown ashore during storms, and others occur in the Gulf of Mexico in shallow as well as deep water. One of these is the massive, heavily-armored, rigid Penta- ceros reticularis , the species commonly sold in shell shops at the seaside resorts and the lar¬ gest starfish of the Atlantic Coast. The Pacific Coast fauna is much richer and more varied, among the species being the gigantic Asterias giganteus, over two feet in diameter and six- rayed, the 10-rayed Solaster decemradiata , the flat, granulated, bright-red Mediaster cequalis, the thick, flat, pentagonal, great-spined Nidor- ella armata, and the nearly armless and very small Asterina miniata. Consult Agassiz, 'North American Star-fishes,) Memoirs Museum of Comparative Zoology (Cambridge 1877);

STARGARD

STARNINA

Slader , (Asteroidea of the Challenger Ex¬ pedition } (London 1889) ; Lankester, (Treatise on Zoology y (Pt. Ill, London 1900) ; Locking- ton, (Standard Natural History) (Vol. I, Bos¬ ton 1884).

J. Percy Moore, University of Pennsylvania.

STARGARD, star'gart, a town in Pomer¬ ania, Prussia, 21 miles southeast of Stettin, on the Ihna River. It consists of three parts, the main town and two suburbs. It was formerly a fortified town ; but of the ancient walls only the gates remain, the rest having been replaced by promenades. There is a monument com¬ memorating the Franco-Prussian War. The buildings deserving notice are the old town- house, churches, gymnasium and orphan asy¬ lum. Stargard has a law court and govern¬ ment offices, there is a brisk trade in agricul¬ tural produce, iron foundries, machine-shops, soap and oil factories, distilleries and roofing factories.

STARK, John, American soldier : b. Lon¬ donderry, N. H., 28 Aug. 1728; d. Manchester, N. H., 8 May 1822. In 1755 he became a lieu¬ tenant in Major Rogers' rangers and fought through the French and Indian struggles around Lakes George and Champlain. In 1775 he joined the Continental army, was appointed colonel and fought at Bunker Hill and later at Princeton and Trenton. After the retreat of General St. Clair and the capture- of Ticon- deroga by the British, Stark was put in com¬ mand of a force of (<Green Mountain boys,ˆ that met and defeated an English detachment under Baum at Bennington 16 Aug. 1777. A supporting British force under Breymann was also defeated. These events paralyzed the British operations and led to the surrender of Burgoyne at Saratoga. He was promoted brigadier-general, and continued in active serv¬ ice until the end of the war. Consult Everett, E., (John Stark* (New York 1902) ; Stark, C., (Memoir and Official Correspondence) (Con¬ cord, N. H., 1860).

STARKEY, star'ki, Thomas Alfred, Amer¬ ican Protestant Episcopal bishop: b. Philadel¬ phia, Pa., 1819; d. East Orange, N. J., 17 May 1903. He was educated as a civil engineer and engaged in that profession in 1839-45, after which he studied theology and in 1848 he was ordained to the priesthood. He was rector of Christ Church, Troy, N. Y., in 1850-54, of Saint Paul's, Albany, N. Y., in 1854458, of Trinity Church, Cleveland, Ohio, in 1858-69 and was in charge of the church of the Epiphany, Washington, D. C., in 1869-72. He was called to Saint Paul's Church, Paterson, N. J., in 1877 and in 1880 he was consecrated bishop of northern New Jersey.

STARKEY, Thomas Albert, Canadian physician and bacteriologist: b. Cheshire, Eng¬ land, 1872. He was graduated in medicine at the University of London in 1894, and later spent some time in the London hospitals. He was for a number of years engaged in re¬ search work in India, seeking methods for the prevention and cure of cholera.

He was en¬ gaged at the Imperial Research Laboratory, Bombay, in 1899-1901, and afterward superin¬ tended the sanitary work in the districts of

Satara and Poona, India. He was bacteriolo¬ gist to the London county council on his re¬ turn to England, and in 1902 accepted the chair of hygiene at McGill University. He became a member of the Royal Sanitary Institute, Lon¬ don, in 1906; and in 1910 was elected the first president of the Canada Public Health Associa¬ tion. He is author of many papers and re¬ ports on his specialties.

STARKVILLE, Miss., city and county- seat of Oktibbeha County, 115 miles northeast of Jackson, on the Illinois Central and the Mobile and Ohio railroads. The Mississippi Agricultural College is located here. There are stock-raising, cotton and lumber interests, and cotton and cottonseed-oil mills. Pop. 2,698.

STARLING, a field-bird of the family Sturnidce, known by the compressed sharp bill, the long and pointed wings and the short tail. The tarsi are stout and covered in front with broad scales. The toes are also elongated and strong, the hinder toe being largely developed. The common starling (Sturnus vulgaris) is a well-known European bird, commonly seen in large flocks, particularly in marshy districts. The general color is dark green, tinted with purple hues, and with metallic lustres. The shoulders are brown or buff, the wing-coverts edged with pale brown and the general plumage spotted with buff. The breast feathers are elongated and pointed ; the beak is yellow. In the second year of life the characteristic colors consist of the adult colors just described, these, however, being of generally lighter hue, whilst the general surface is marked with light-colored spots. The first year's birds are brown. The females are less brilliantly colored than the males. The nest is loosely constructed, and is generally found in some ruined wall or castle, or in a hollow tree. The five eggs are pale blue. The young are tended by both parents. The food of the starling consists of insects, and these birds haunt domestic animals to get the insects that prey upon them. They often perch on the backs of cattle in search of the insect larvae that burrow in the skin; and pluck wool from sheep for the purpose of lining the nest. They also eat mollusks, worms and vegetable matters, and they have been known to strip whole shrub¬ beries of their leaves. The common starling is found throughout Europe, Africa and most of Asia, and is migratory. Starlings are viewed with great favor in many districts, are caught to be kept in cages, and may be taught to speak, to mimic sounds with great distinctness and to whistle tunes. Their natural note is a peculiar, indrawn, clear and pleasing whistle. They have been

acclimatized in the neighborhood of New York, where they were introduced in 1890; since which time they have spread over most of the Northeastern States. Various more or less similar or related birds are called starlings in India and Australia. Consult Forbush, E. H., (The Starling) (in Massachusetts State Board of Agriculture 58th annual report, Bos¬ ton 1915) ; Leydekker, R., (Standard Natural History) (London 1895) ; Newton, dictionary of Birds* (New York 1896).

STARNINA, Gherardo, ga-rar'dd star- ne'na, Italian nainter: b. Florence, 1354; d. 1407. He was a pupil of Antonio Veneziano. After painting the history of Saint Nicholas and Saint Anthony, on the ceiling of the Castellani Chapel

in Santa Croce, he was forced for political rea¬ sons to take refuge in Spain. There he worked for the king and others, returning to Italy with considerable wealth (1387). He made many frescoes but little of his work remains save the (Death of Saint Jerome) in the church of Santa Maria del Carmine.

STARNOSED MOLE. See Mole.

STAROVERTZ. See Religious Sects.

STARR, star, Frederick, American anthro¬ pologist : b. Auburn, N. Y., 2 Sept. 1858. He was graduated at Lafayette College in 1882 and from 1889-91 was in charge of the department of anthropology at the American Museum of Natural History; in 1888-89 was registrar of Chautauqua University; 1892-95 was assistant professor, and since associate professor of an¬ thropology in the University of Chicago. Later he traveled extensively, making special studies in anthropology and ethnography, in Mexico ; in Central Africa, 1905-06; in the Philippines 1908; in Japan, 1909-10; and in Korea, 1911. He published (First Steps in Human Progress *(1895); (American Indians) (1899); (Indians of Southern Mexico) (1899) ; (Strange People) (1900) ; (The Ainu Group at the Saint Louis Exposition (1904) ; (The Truth About the Congo* (1907); (In Indian Mexico) (1908); (Filipino Riddles) (1909); Japanese Proverbs and Pictures *(1910) ; (Congo Natives* (1912) ; (Liberia) (1913) ; (Mexico and the United States* (1914).

STARR, Moses Allen, American neurolo¬ gist : b. Brooklyn, N. Y., 16 May 1854. He was graduated at Princeton University in 1876 and received his medical degree from Columbia Uni¬ versity in 1880. He

became editor of the Psychological Review and Journal of Nervous and Mental Diseases, and published (Familiar Forms of Nervous Disease *(1893) ; (Brain Surgery* (1895) ; (Atlas of Nerve Cells*

(1897) and lectures on (Diseases of the Mind *(1898), and (Diseases of the Nervous System* (1899) ; (Nervous Diseases, Organic and Func¬ tional* (1913) ; besides numerous articles to medical journals and chapters to textbooks on mental and nervous diseases. He received from Princeton the degrees of Ph.D., 1884; LL.D., 1899, and from Columbia, Sc.D., 1904. At Columbia University he was lecturer, 1887 — 89; professor, 1889-1915 and since professor emeritus of neurology.

STARRY CROSS, Order of. See Or¬ ders (Royal) and Decorations.

STARS, a designation familiarly applied to all the heavenly bodies which look like points of light. This designation includes five of the planets, Mercury, Mars, Venus, Jupiter and Saturn. In scientific language the term is ap¬ plied only to those bodies which seem fixed on the celestial sphere, and are, therefore, termed fixed stars. These are immense incandescent bodies, scattered through the immensities of space at distances which beggar all our con¬ ceptions. In accordance with the general plan of the present work, we begin with a study of the stars as they appear to us, and then pass to the consideration of their actual constitution and situation in space. We shall, therefore, suppose the reader to scan the heavens at night while we point out certain features of the scene of grandeur then presented to his vision.

The first feature to be noticed is the great diversity in the brightness of the stars, or, to use a technical expression, in their magnitudes. These range all the wray from that of the bright¬ est stars down to the point of invisibility to the naked eye. The smallest telescope will show scores of stars too faint to be seen without its aid, and the greater the power of the instru¬ ment the greater the number that will be brought into view, without any limit yet known.

The ancient astronomers divided the stars into six orders of magnitude, called the first, second, etc. The 15 or 20 brighter stars were classified as of the first magnitude,, those a grade below them as of the second, and so on, until they came to the sixth, which comprised the faintest stars visible to the unaided eye. All these stars are now called lucid; fainter ones telescopic. In modern times the preceding sys¬ tem of magnitudes has not only been extended to the telescopic stars, but has been arranged on a plan which gives greater

precision, and enables us to designate the exact measure of the light which we receive from a star by its magnitude. The magnitudes of stars are now designated to tenths, or, to give greater precision, even to hundredths of a magnitude. Thus we have stars of magnitudes 3.0, 3.1, 3.2, etc. These numbers are arranged on a diminishing scale of light, so that a difference of one magnitude corresponds to the multiplication or division of light by a number very near 2.5, or, more ex¬ actly, the number whose logarithm is 0.4. This means that a star of magnitude 3.0 is about two and a half times as bright as one of magnitude 4.0; this again about two and a half times as bright as one of magnitude 5.0, etc. The exact scale is such that a star of the first magnitude is precisely 100 times as bright as one of the sixth, while the latter is 100 times as bright as one of the 11th, so that an increase of five units in the scale of magnitude corresponds to a division of the light by 100.

Careful examination will also show that the stars of each magnitude are several times as numerous as those of the brighter magnitudes. There are three or four times as many stars of the fourth magnitude as of the third; three or four times as many of the fifth as of the fourth and so on in nearly geometrical progression. But when we pass to the stars invisible to the naked eye the progression is not so rapid. Yet its common ratio does not fall below two at any point yet known. The result is that the stars of the fainter magnitudes are to be counted by millions. The faintest stars visible in the largest telescopes are about of magni¬ tude 17 or 18.

Another familiar feature of the sky is that the stars are not scattered uniformly, but that the brighter ones appear to be collected to a greater or less extent into constellations. There is, however, no precise dividing line between one constellation and another. The irregularity is such that the number of constellations is somewhat arbitrary. The fainter the stars the less marked is the division into constellations. The telescopic stars cannot be divided into constellations at all. See Constellations.

Careful observation shows that the stars differ slightly in color. It is true that the colors are less marked than those of natural objects, there being no such red as the ruby and no such bright green as the emerald among the

Stars. But there is a regular gradation from a yellowish red through white, to a well-marked, bluish tint. These differences of color are supposed to indicate different degrees of tem¬ perature of the stars, or different periods in their growth and development.

Number of Stars. — The whole number of stars in the heavens, visible to the naked eye, is about 5,000. As one-half of these are neces¬ sarily below the horizon at any one time, it fol¬ lows that not more than 2,500 can be seen at once. But this is greater than the actual num¬ ber visible under ordinary conditions, because small stars near the horizon are rendered dim or invisible by the thickness of the air through which we see them. Practically, it is not likely that more than 2,000 stars can ever' be seen at once by the best eye, unless at elevated points where the air is very clear down to the horizon.

Up to the present time it has been impossible to make anything like an enumeration of the telescopic stars, because, as we have already said, every increase in the powder of the tele¬ scope brings out new stars that otherwise would be invisible. There is, however, no doubt that the stars visible in a large telescope are to be counted by tens of millions. It is now found that stars can be photographed with a large telescope which are so small that the eye would not perceive them in the telescope itself. It is probable that the whole number found on the best photographic plates amounts to more than 100,000,000. But we must not suppose that this number would actually comprise all the stars in the sky. Although in some direc¬ tions we seem to have reached the limit of the visible stars, we do not know, when the entire heavens is considered, how many fainter stars there may be for every one that can be pho¬ tographed. A very recent estimate fixes the total number of the stars at 1,600,000,000, but this is as yet necessarily very uncertain.

The Milky Way. — Another feature of the sky connected with the stars is the Milky Way or Galaxy. This really stupendous though not striking object can be seen at some hour of any night in the year, its position in the sky depending on the season. In our latitudes it is quite near, partly below the horizon during the evenings of May, and is then not readily seen, but even then it may be seen later in the evening. At the proper time, on any night, it passes nearly through the zenith, spanning the heavens like a complete arch, resting on two opposite points of the horizon.

Galileo, pointing his first telescope to the sky, found that this object was composed of congeries of stars too faint to be separately visible. This fact has been abundantly proved by modern observations. A very

little study of the sky without a telescope will show that the milky light of these stars is by no means uni¬ form, but is frequently gathered into clouds. These show that the Milky Way is in part made up of vast groups or collections of stars, rather irregular in form. The aspect of the Milky Way is also very different in different parts of its course. One of its most remarkable features is best seen in summer and autumn. It will then be noticed that, in the region of the zenith, the Milky Way seems to be divided into two separate streams with a comparatively dark space between them. This seeming cleft ex¬ tends toward the south, nearly to the celestial vol. 25 — 32

equator, where one of the streams branches off toward the west and comes to an end, while the other continues on its course. It will also be noticed that at some points of its course the Galaxy is narrow and well defined, while in others, notably in the extreme south, it is wide and diffuse.

Many astronomers have occupied themselves in making photographs of various portions of the Milky Way. Barnard has used a large camera for this purpose, and, in several obser¬ vatories, the largest telescopes have been so employed. One curious feature is brought out by these photographs. In that part of the Milky Way which in autumn is seen between the celestial equator and the southern horizon, numerous clefts and vacant spaces occur, as though there were actual openings through the mass of stars. This fact seems to show that the thickness of the Milky Way, or the distance through which the line of sight extends when we look at it, is less here than elsewhere. Going farther south, into regions invisible in our northern latitudes, other vacant spaces are found, known as coal-sacks. But it is found that stars really exist in these spaces, though they are comparatively few and faint.

Another feature of the southern hemisphere comprises two patches of light called the Ma¬ gellanic Clouds. These are situated at some distance from the Milky Way, and yet seem to be of the same general nature as the latter. They may be described as two outlying collec¬ tions of very faint stars.

It is found by careful observation and count that the stars of any magnitude seem to be rather thicker in the region of the Galaxy than elsewhere. The smaller the stars the greater the thickness in and near the Galaxy becomes, so that it is probable that a large majority of the very faint stars belong to the Milky Way. Several other peculiarities connected with stars of the Milky Way will be better understood after we have described certain varying char¬ acteristics of the stars.

Naming the Stars. — Most of the brighter stars, not only those of the first and second magnitude, but a few remarkable ones of fainter magnitudes, had special names assigned to them in ancient and mediaeval times. The oldest and best known of all these names is Arcturus, which is found in the book of Job. The names of Castor and Pollux were also assigned in classic antiquity to the two brightest stars in the constellation Gemini, or the Twins. But most of these special names are derived from designations given by the Arabs, which were supposed to express some peculiarity of the star. There are also quite modern names, Polaris, for example, which designates the Pole Star.

During the past three centuries most of these names have been, to a greater or less extent, replaced by a system of designating the brighter stars in all the constellations, which was intro¬ duced by Bayer about 1600. He assigned to the principal stars in each constellation the let¬ ters of the Greek alphabet, alpha, beta, gamma, etc. Commonly the first letter of the alphabet is assigned to the brightest star, and the prog¬ ress of the letters indicates, to a certain extent, the successive orders of brightness in the same constellation. But this rule wras not uniformly carried out; frequently the successive letters

taken in alphabetical order designate the stars which follow each other in position. For ex¬ ample, in the familiar constellation of the Great Bear, the first six letters of the alphabet are ap¬ plied to the consecutive stars which make up the Dipper. The Greek alphabet not being suffi¬ cient for all the stars, letters of the Roman alphabet are used when the Greek one is ex¬ hausted. Flamstead, Astronomer Royal at Greenwich, two centuries ago adopted the plan of numbering the stars in each constellation. Any such system, however, is imperfect, and, taken altogether, there is a lack of uniformity in the method of designating the stars, except the brighter ones. The following are a few of the brighter and best-known stars which have well-known names.

Individual name Name on Bayer system

Alcyone

Eta Tauri

Aldebaran

Alpha Tauri

Algol

Beta Persei

Antares

Alpha Scorpii

Arcturus

Alpha Bootis

Bellatrix

Gamma Orionis

Betelguese

Alpha Orionis

Canopus

Alpha Argus (Carinae)

Capella

Alpha Aurigae

Castor

Alpha Geminorum

Fomalhaut

Alpha Piscis Australis

Mira Ceti

Omicron Ceti

Mizar

Zeta Ursae Majoris

Polaris

Alpha Ursae Minoris

Pollux

Beta Geminorum

Procyon

Alpha Canis Minoris

Regulus

Alpha Leonis

Rigel

Beta Orionis

Sirius

Alpha Canis Majoris

Spica

Alpha Virginis

Vega

Alpha Lyrae

Spectra of the Stars. — When the spectro¬ scope was invented and applied, one of the first uses made of it was to analyze the light coming from various stars in order to see in what respect they differed in their constitution. The result has been to show that, out of several thousand stars which have been examined in detail, it can hardly be said that any two are exactly alike. It is true, in the highest branch of science, that one star differeth from another star, not only in glory, but in the substance which makes it up, as well as in various other features. At the present time the spectra of the stars are best studied by means of photog¬ raphy. The general fact that lights can be photographed which are too faint to be visible to the eye is here applied with great success. When only eye methods were used, it was hardly possible to accurately define or measure the spectral lines given by any but the brightest stars, and even here the measures were so un¬ certain that few definite results were reached. But, by applying photography, the negative on which the spectrum is impressed can be placed under a measuring engine, and the settings made by means of a

microscope with the highest de¬ gree of precision that admits of being reached.

At an early period of spectroscopic dis¬ covery, Secchi, the Roman astronomer, made an exact classification of the spectra of stars, which he connected with their respective colors. The bluish stars he designated as of the first type; those which were almost pure white or slightly yellowish were of the second type, while those approaching toward red were mostly of the third type. Speaking in a rough way, it would seem that these gradations correspond to the absorption of the light by atmospheres

surrounding all the stars. The more dense and the deeper this atmosphere the more blue light it absorbs, and the more red the remaining light appears. It seems, therefore, to be a general rule that the redder stars have the densest and most absorbing atmosphere. From many such stars a large part of the blue and green light is cut off. This deficiency in the blue light may also be due, in some cases, to the stars which show it being not so hot as the others; because we know that the hotter an object the more blue light it radiates in propor¬ tion to its red light. But everything we know of the stars leads us to believe that these cases are exceptional.

A very remarkable fact in connection with this classification is that the blue or first type largely predominates in the stars of the Milky Way, while stars distant from the Milky Way mostly belong to the other two types. Quite possibly it may be found that this distinction will enable us to determine in w'hat part of the universe a star is situated, by means of its spec¬ trum. When, at Harvard Observatory, the spec¬ tra of the stars were photographed on a large scale, and the number studied brought up into the thousands, it was found that Secchi's classifi¬ cation was quite insufficient. We now have a great number of such classes designated by letters of the alphabet and numerals which are too technical to be set forth in the present article. We shall mention but a single type known as Orion stars, because many of the stars showing it belong to the constellation Orion. A remarkable peculiarity of this type is the great number of fine lines in the spectra, many of which do not belong to any known substance. What gives great interest to it is that the stars which show it belong mostly or entirely to the Milky Way, and have markedly slower proper motions than the stars in general.

One result of spectral analysis is that most of the stars are composed in the main of the same chemical elements which we know to exist upon the earth : iron, calcium and hydro¬ gen seem to be present

throughout the whole universe of stars. It cannot yet be said with certainty to what extent elements unknown on the earth exist in the stars, for the reason that the spectrum of an element depends so much upon the conditions of pressure or temperature to which the substance is exposed. We may regard it as certain that, whether elements un¬ known to us do or do not exist in the stars, the substances which form the stars, and especially the nebulae, exist in many cases, in a form dif¬ ferent from any we have yet produced in the laboratory.

Proper Motions of the Stars. — One of the

most remarkable features of the universe is that every so-called fixed star is moving for¬ ward on an undeviating path which, so far as we can yet determine, is a straight line. This is called the proper motion of the star. Noth¬ ing is better calculated to give us an idea of the extent of the universe than the contrast be¬ tween the speeds of these motions as we know that they really are and the apparent speeds as we observe them from the earth. The actual speed is enormous when compared with any that we can produce by artificial means. The speed of a shot from the most powerful gun that can be made can scarcely, if at all, exceed

half a mile per second. But if the motion of anv star is as slow as one mile a second, it is only in very rare and extraordinary cases. The average speed of the stars is about 20 miles a second ; and this motion, it must be remem¬ bered, is not, so far as yet determined, motion round and round in an orbit, but a straight¬ ahead motion, never relaxing and never swerv¬ ing. Almost every star, therefore, travels hun¬ dreds of millions of miles every year, century after century. And yet, so slow do the motions appear to us that the naked eye can see no change in the configuration of the constella¬ tions during a period of thousands of years. A remarkable instance of this kind is afforded by Arcturus, which is, so far as we know, one of the swiftest moving stars in the heavens. It seems quite certain that its speed exceeds a hundred miles a second, and it may be much greater than this. And yet, if Job could again come to life and study the constellation Bootis, in which Arcturus is situated, he would scarcely notice any change in its appearance. There is not a star in the constellation Orion moving so fast that any change would be noticed by the naked eye in 100,000 years. The result is that the motions in question have been detected only by the most refined observations of

modern times, extended through long periods. Every star in the heavens appears in the same posi¬ tion when observed night after night. There are very few in which the astronomer can detect any motion by one year of observations. Accurate determinations of position commenced with the observations of Bradley, Astronomer Royal of England, in the middle of the 18th century, who determined the position of more than 3,000 of the brighter stars. Since his time the position of several hundred thousand stars have been accurately fixed. Yet, so small is the apparent proper motion in most cases that it has actually been detected in the case of only a few thousand stars. Even now there are scarcely a hundred stars of which the motions are known to exceed one second in a year. To under¬ stand what this means we must reflect that it would take a good eye to see that two stars in the sky, 200 seconds apart, were not a single object.

The following is a list of the stars whose proper motions exceed four seconds in a cen¬ tury. In the first column is given the name by which the star is commonly known ; in the second and third its position; in the fourth its magnitude, and in the last its proper motion in a year :

STAR

Position

Mag.

Prop.

motion

R.

A.

Dec.

h.

m.

Deg.

Sec.

Cord. 32,416 .

0

0

—37.8

8.5

6.07

O Eridani .

4

11

—7.8

4.5

4.05

Cord. Z. V. 243 .

5

8

—45.0

8.5

8.70

LI. 21,185 .

10

58

+36.6

7.3

4.76

LI. 21,258 .

11

0

+44.0

8.7

4.41

Groomb. 1830 .

11

47

+38.4

6.4

7.05

Barnard .

17

53

+4.5

1J .0

10.30

61 Cygni .

21

2

+38.2

6.1

5.16

Epsilon Indi .

21

56

—57.2

4.8

4.68

Lacaille 9,352 .

22

59

—36.4

7.1

7.00

It is very remarkable that only three of these stars are visible to the naked eye, and

these three are below the fourlh magnitude. It will be seen that the annual motion of the most rapidly moving star is less than 12 seconds annually. If this star were to continue its course round the sky without ever stopping, it would take it more than 105,000 years to make the circuit of the heavens.

Proper Motion of the Sun. — Our sun being one of the stars, we may expect that it also has its own proper motion. But this motion cannot be directly observed. The only way in which we can detect it is by the relative motion of the other stars, just as we know that a rail¬ way train is carrying us along when we see houses and trees seeming to pass by us. The motion of the sun was detected by observing that, notwithstanding the varied directions in which the stars appear to us to be moving, there is an average tendency to move from a point in the constellation Lyra toward the opposite region of the heavens south of Sirius. These two opposite points are near the Milky Way, though not in it. From this general community of motion we infer that our sun, carrying the earth and all the bodies of the solar system with it, is moving toward the constellation Lyra. The point toward which the motion is directed is called the solar apex. It was formerly supposed to be situated in the constel¬ lation Hercules, but more recent investigations have placed it farther to the east. Its position is still uncertain by several degrees, and there is some difference of opinion

among astron¬ omers as to its exact location. But the best re¬ sults seem to show its position, as defined by right ascension and declination, to be about the following :

Right Ascension, 18 h. 30 m.

Declination, 35° north.

This point is about 4° south of the bright star Lyra. We may, therefore, say that our solar system is constantly journeying toward that region of the heavens where Lyra is situated.

Star Streaming. — The earlier determina¬ tions of the point of the heavens toward which our sun is moving were all based on the as¬ sumption that there are no widespread sys¬ tematic motions among the stars themselves, that is, that when large numbers of them are considered any general backward drift of them all must be the effect solely of our own motion through space. If a considerable number of them are moving, or ˆstreaming,® together, the determination will be rendered inexact by this fact, although it is undoubtedly true that the direction and velocity of our motion as just described are very approximately correct. Several instances of star streaming have recently been discovered. Ludendorff has found that five of the bright stars of Ursa Major, though they appear to us widely separated in the sky, are moving together in parallel paths, and Hertzsprung has shown that the Dog Star, Sirius, though from our position it seems so far removed from the others, is also moving with them. The centre of this cluster is about 100 light years from us: Sirius, only 8.6 light years away, is thus far out of the centre.

An even more interesting example was dis¬ covered by Boss, who found that 39 stars, lying principally in the constellation Taurus, and

which appear scattered over a considerable area of the sky, do, in fact, form a globular cluster which is drifting through space with a velocity of about 25 miles a second. Some 800,000 years ago, this swarm passed nearest our earth, its centre then being 73 light years away. It is now about twice as far away from us as this and at the expiration of 65,000,000 years its 39 scattered bright stars will be so distant that they will appear to us as a faint, round cluster about two-thirds as large as the full moon.

A discovery of more widespread importance, however, is that of Kapteyn, who finds evidence of two very extensive systematic star drifts, the larger being directed toward the star Xi Orionis, and the other in an opposite direction. The cause of this extensive streaming is not known ; it has been suggested that it may arise from a falling in toward the centre of the outer stars of the cloud which surrounds us, and which, therefore, may change its shape periodically through intervals of time so great that all other eras hitherto considered in astronomy shrink to nearly nothing in com¬ parison.

Radial Motion of the Stars. — The most wonderful revelations of the spectroscope re¬ late to the proper motions of the stars and lead to the measurement of the speed with which a star is moving to or from our system. This speed is called its radial motion. The possibil¬ ity of determining it rests on the principle that the wave-length of light coming from a star is less when the star is approaching us and greater when the star is moving away from us. Hence, if, on measuring the refraction of a particular ray emitted by a star, we find it to be greater than its regular value, we know that the star is receding from us, and, in the contrary case, that it is approaching us.

It is very interesting that these measures agree as nearly as we could expect with obser¬ vations on the position of the stars as to the direction in which our solar system is moving. Moreover, they have enabled Campbell to de¬ termine with an approximation to certainty the speed of the motion, which is about 11 miles per second. The whole solar system, and our earth with it, has, therefore, been pursuing a journey through space during the whole of human history, nay for hundreds of thousands, possibly for millions of years. Even with this rapid and continuous motion it will probably take us half a million of years to reach the region in which Vega, the brightest star in the constellation Lyra, is now situated.

The proper motions of the stars naturally suggest the idea that these objects all have their proper orbits and are performing revolutions round some centre as the planets do around the sun. The idea of a universe of which this might be true — of a system in which the years were counted by millions of our years is very cap¬ tivating. But truth compels us to say that up to the present time astronomical science fur¬ nishes no sound basis for the reality of such a system : no resemblance of this sort can be traced Moreover the general trend of science is toward the conclusion that the duration of the universe, though very long, is finite and is not sufficient to enable a star to have made many revolutions round any centre.

Double Stars. — A careful watcher of the

heavens will notice that there are several pairs of stars in the heavens — two such objects being so close together as to suggest that they must have some connection. The most striking case of this sort is in the Hyades, a V-shapel fig¬ ure having the bright red star Aldebaran at one end of the In the middle of one of

the lines of the ((V)J are two stars of the third or fourth magnitude, forming a very beautiful pair. This pair is easily to be seen in some part of the sky on any clear evening in autumn or winter. Another case of the same sort is that of one of the brightest stars in the constel¬ lation Capricornus, visible in summer and au¬ tumn, which has a much fainter star alongside of it. A third case is in the constellation Lyra, one of whose stars of the fourth magnitude can be seen by the naked eye to be composed of two separate stars. But only a very good eye can distinguish them from a single star.

When the heavens are scanned with a tele¬ scope, it is found that a great many stars which seem single to the eye really consist of two such objects in close proximity. Sometimes these are of the same brightness, but more com¬ monly one is much brighter than the other. Very frequently the small companion is so faint and so close to the large one as to be lost in the glare of its light, except when very care¬ fully examined by an experienced observer. Such pairs are called double stars.

The first question suggested by these objects is whether the two stars appear in such close proximity merely because they chance to be on the same straight line from us, or whether they are really in each., other's neighborhood. The latter is known to be the case, for two reasons. In the first place these double stars are vastly more numerous than they would be if their proximity were merely accidental. Another conclusive proof is afforded by the fact that in many such cases the two_ stars are found to be revolving round each other, or the small one round the large one, as the case may be. The name Binary System is applied to such pairs. The most important and interesting conclusion drawn from the motions of these systems is that the law of gravitation extends to the stars. It is true that we could scarcely doubt such to be the case, even were no such proof available, but it is nevertheless of interest to have inde¬ pendent evidence of it. The revolution of the two stars round each other is in all respects similar to that of the earth and planets round the sun, or that of the moon round the earth. The time occupied in one revolution may be but a few decades, and in one instance it is but 5.7 years, yet in the vast

majority of cases, hundreds or even thousands of years are re¬ quired. As exact observations have only been made on these bodies since the time of Sir Wil¬ liam Herschel, there are less than 100 of which the orbits and periods are accurately deter¬ mined. Thus although the whole number known amounts to upward of 20,000 the deter¬ mination of the orbits goes on very slowly.

There are two binary systems of special in¬ terest because the companion was first discov¬ ered through its attraction upon the larger star. One of these cases is the brightest star in the heavens, Sirius. About 1840 it was discovered by comparing observations made since the time

of Bradley (1750) that Sirius did not move forward on the celestial sphere with a uniform and even motion, as the other stars did, but that there was a slight irregularity. A few years later a careful investigation of the obser¬ vations showed that Sirius was moving in a very small orbit with a period of about 50 years. This made it possible to calculate the orbit of an unseen companion which, moving round the star, would produce the apparent orbital mo¬ tion. In 1860 Alvan Clark, the son and suc¬ cessor of the celebrated maker of telescopes in Cambridgeport, Mass., on pointing one of the newly made great instruments at Sirius, saw a companion star. He knew nothing about the computations that had been made on this ob¬ ject, but when his observations were compared with them, this companion was found to lie in the right direction to produce the observed ine¬ quality. The observations since made show that it is going round in the orbit prescribed for it before its discovery.

The other case is that of Procyon, the brightest star in the constellation Canis Minor. Its motion was found to be affected by an in¬ equality somewhat smaller than that of Sirius; but the companion which produced it evaded the scrutiny of the most careful observers until it was discovered by Schaeberle with the great 36-inch telescope of the Lick Observatory. It also was found to be moving in the orbit com¬ puted for it before its discovery.

As the power of the telescope has been in¬ creased closer binary systems having shorter periods have been continually brought to light. This raises the question whether there may not be vast numbers of such systems in which the two stars are so close together that no

telescope will separate them. This question has been answered in recent times by the aid of the spec¬ troscope. We have already described how the radial motions of stars or the motion in the di¬ rection to or from our system is measured by this instrument. The determinations have been going on since 1880. As the number of meas¬ ures increases, it is found that the radial mo¬ tion of many of these stars varies in a regular period, thus showing that invisible planets are moving round them. A new feature of the universe is thus brought to our knowledge, which, if we had no other instrument than the telescope, would remain forever hidden. The difference between the measures made with the telescope and the spectroscope consists in this : The telescope can show the change in the position of a star only when it is great enough to be visible at the enormous distance of the star. Commonly this change must be measured by hundreds of millions of miles, nay, thou¬ sands of millions, else it would never be seen in the telescope. But the spectroscope shows, at any moment, how fast the star is moving to or from us, though it gives us no information as to its actual distance. It is not, therefore, necessary that the star should have moved through a definite space in order to have its motion detected by the change in its spectrum. Having given the speed of the revolution and the period, it becomes possible to determine the size of the orbit.

Pairs of stars discovered with the spectro¬ scope are called spectroscopic binary systems. The comparisons in such systems are not, how¬

ever, necessarily dark stars; the revolutions of a pair of stars, both of which are bright, may be determined with the spectroscone as if one of the bodies were dark. In this case the lines of the spectrum are sometimes double and sometimes single. They seem double when one star is moving from us and the other toward us, and single when the stars are moving later¬ ally to the line of sight from us to them. Thus bright double stars are shown by the use of the spectroscope which no telescope, however powerful, can distinguish to be more than a single star.

That this doubling of the lines is a true indication of a double star system is shown by the fact that at least one spectroscopic pair can also be seen as a double in the telescope. The orbits derived from the visual measures and from a study of the light, respectively, are in remarkably close agreement.

The most successful discoveries in this line have been made in recent times by or under the direction of Professor Campbell, in the Lick

Observatory, where it may almost be said that a new branch of astronomy has been cre¬ ated. The discoveries of these objects are now going on so rapidly that it is impossible to set any limit to their number. The general rule is found to be that the orbits described do not differ greatly in magnitude from those de¬ scribed by our planets in moving round the sun. That is to say, there are few or no orbits yet known which are as large as that of Neptune. There is, however, no limit to the minuteness of the orbits, some stars revolving almost in contact with each other.

Besides double stars, there are triple and quadruple stars of such variety that it is im¬ possible to give any general description of them. The most remarkable quadruple system is found in the great nebula of Orion, where Theta Orionis, which looks to the naked eye like a single star, is shown by the telescope to con¬ sist of four stars forming a trapezium ; this is, therefore, known as the trapezium of Orion. Altogether, these systems show the infinite vari¬ ety of the great bodies which make up the universe. The pairs of stars which form a binary system may be of every degree of bright¬ ness and of very different masses. Their times of revolution range from two or three days to unknown thousands of years. In a few cases the masses have actually been determined. It is a curious fact that they do not vary so much as does the brightness of the stars. When a bright and a faint star form a binary system, the mass of the faint star is generally out of proportion to the amount of light it emits. We have already remarked that many stars are thousands of times as bright as the sun ; but it is a curious fact that none have been found to have even hundreds of times the mass of the sun.

Variable Stars. — To ordinary observations, even to observations extending through genera¬ tions, the light of the stars seem to be as per¬ manent as the order of nature itself. But, although this is true of the great majority of stars which stud the heavens, it is now found that there are exceptions to the rule. So nu¬ merous have these exceptions become that the study of variable stars has developed into one of the important branches of astronomy. The

first star which was found to be variable in its light is known as Mira Ceti, or the wonder of the constellation Cetus, the Whale. This con¬ stellation extends from two hours to three hours of right ascension, and its central regions are situated a little south of the equator. It is on

the meridian at some hour in the evenings of the winter months. The star Mira is quite invisible to the naked eye the greater part of the time, but is found to blaze up at regular but slightly varying intervals of about 11 months, some¬ times attaining to the second magnitude. After, remaining visible to the naked eye for a few days, it gradually fades away into invisibility, but may always be seen in a telescope. Its greatest brightness varies markedly. Some¬ times it brightens up only to the fifth magni¬ tude, and is then not at all conspicuous.

There are two other remarkable variable stars. One is Algol in the constellation Per¬ seus, which may be seen in some part of the northern sky at some hour on almost any night of the year except in April and May. Com¬ monly this star is between the second and third magnitude, and is usually classified as of the second magnitude. At regular intervals of a little less than three days, it fades away to the fourth magnitude, and then, after a few hours, gradually increases again to its regular bright¬ ness. It is now known that this diminution of light is a partial eclipse of the star; the brighter star is about 51 times as bright as our own sun, while the so-called Mark'* companion is about three and one-third times as bright. Thus the companion is very far from being a dark body, but its interposition so greatly re¬ duces the light which we receive from the brighter star that the effect of an eclipse is produced.

In another class of variable stars these two bodies are each of noticeable brightness so that the light which we receive from them varies twice in each revolution, once when the brighter star partially hides the fainter one, and once when it is itself partly hidden. Strictly speak¬ ing, the system of Algol should be now included in this class since by the emnloyment of the delicate selenium photometer the light of its companion can be definitely measured.

The most remarkable of this class is Beta Lyrae, quite near the bright star Vega. It may be seen in some part of the northern sky dur¬ ing the spring, summer and autumn. Although the changes in its light are not striking, one who looks at it carefully night after night will notice them.

These three stars are only examples of a number of such objects now known to exceed 1,000, scattered over the whole sky. As obser¬ vations become more and more accurate, it is found that quite a number of the stars visible to the naked eye are subject to slight fluctua¬ tions of light, mostly in a more or less regular period, but sometimes in a quite irregular way. Spectroscopic observations render it somewhat probable that in most cases the regular changes are

produced by bright or dark bodies revolv¬ ing round the star in very eccentric orbits. Sometimes they partially eclipse the star, as we have already rfientioned ; but in many other cases it seems likely that they make the star blaze up by the disturbance they make when they approach close to it in their orbits.

The general rule is that a variable star goes through its series of changes in a regular period. At a certain day and hour it reaches its least brightness, which is called a minimum. Then it begins to increase in light. In the course of a certain number of hours or days it increases to its greatest brightness ; then it be¬ gins to decrease and once more fades away to its minimum. The length of time between two minima is a period. Commonly the successive periods of a variable star are nearly equal to each other, so that the stage of brightness at any future time can be predicted with confi¬ dence. The periods range very widely from a few hours to about 600 days. It is very re¬ markable that no period yet known exceeds two years. There are many periods less than a month ; but there are only eight between 50 and 100 days. The number then increases up to 350 days. The greatest number of periods is just about one of our years, a coincidence which of course is a pure accident. Above this their frequency rapidly falls off. This limitation of the period strengthens the view that the vari¬ ability of a great number of stars is produced by the disturbing action of an immense body revolving round the star in a very eccentric orbit.

New Stars. — In past generations, when the whole universe was supposed to be only a few thousand years old, it was quite natural to expect that new stars would from time to time be created to shine among their fellows. But this view has now to be modified. It is true that, from time to time, a star is seen to blaze out where none was known before. But the theory of a new creation is refuted by the fact that such stars invariably fade out in the course of a few weeks or months. On some very rare occasions they have continued visible to the naked eye for a year or more, and they can commonly be seen by the telescope for several years. The first remarkable case of this sort of which we have a scientific record occurred in 1752. On 11 November of that year, Tycho Brahe, the celebrated astronomer of Uraniburg, observed a star of the first magnitude in the constellation Cassiopeia. Before the end of the month it was so bright as to be visible in full daylight. Then it began to fade away and finally disappeared from view in May following. This was before the invention of the telescope, so that Tycho was unable to trace the star any longer. Thirty-two years later Kepler observed a similar star in the constellation Ophiuchus. This star continued visible to the naked eye for more than a year, but it never became so bright as the star of Tycho. As the

heavens were more carefully watched, and photographs of the stars were taken, these new stars were found to be more frequent than was formerly supposed. During the 19th century 11 were observed to blaze out, more than half of which were dur¬ ing the last 14 years of the century. But the greatest number of them scarcely reached the limit of visibility to the naked eye, being dis¬ covered principally by photography. On 20 Feb. 1901 the most wonderful of these objects which had been seen for 300 years blazed out in the constellation Perseus. In two or three days it was the third brightest star in the heavens. Then, following the example of its predecessor, it gradually faded away, though it

PHOTOGRAPH OF THE GREAT STAR CLUSTER OMEGA CENTAURI, TAKEN AT THE D. O. MILLS BRANCH OF LICK OBSERVATORY, SANTIAGO DE CHILE

PHOTOGRAPHS OF STAR CLUSTERS TAKEN* AT LICK, YERKES, ROBERTS AND

HARVARD OBSERVATORIES

Omega Centauri (Lick) M-14, Ophiuchi (Roberts) M-62, Scorpii (Harvard)

M-15, Pegasi (Yerkes) M-2, Aquarii (Roberts) M-ll, Antinoi (Harvard)

still remains visible in the telescope. It is not yet certain whether this object was impressed on any photographs until within a few days of its first appearance.

Similarly on 8 June 1919 a brilliant new star appeared in Aquila, almost on the border between Aquila and Serpeus. When brightest this was almost as bright as Vega, the brightest star of the northern heavens, and it was of a very blue color. It rapidly faded away, until now it is only a telescopic object.

By what convulsion of nature these objects burst forth it is quite beyond the power of our present science to decide. It is certain that the amount of light and heat emitted by these stars was suddenly increased hundreds or even thousands of times. One of the most plausible explanations is that of a collision. It is supposed that the star itself may have col¬ lided with another — perhaps a planet in its

neighborhood — or rushed to its own destruc¬ tion in some nebulous mass. But this is only . conjecture.

Very curious has been the fate of these objects after they have faded away. Those recently observed have been found to change into nebulas ; a mass of glowing gas emitting the bright spectral rays of hydrogen and other gases. Photographs and spectroscopic observa¬ tions give evidence of some explosive action, throwing out corpuscles with immense velocity in every direction, but throw no light on the origin of the explosion.

Star Clusters. — One of the remarkable fea¬ tures of the heavens revealed by the telescope consists in star clusters — great numbers of these bodies crowded into a space which, meas¬ ured by the expanse of the heavens, must be comparatively limited. It is not at all uncom¬ mon to find hundreds of stars in a single bunch so closely packed together that, to the naked eye or in a small telescope, nothing is seen but a minute patch of light. One of the most re¬ markable of these contains 60,000 stars, situated in the constellation Hercules, another in the constellation Centaurus was described by Sir John Herschel as one of the most remarkable objects in the heavens. There exists every variety of such clusters, from these closely packed ones to the agglomerations of the Milky Way, which any careful observer of the heavens can see on any clear evening during the late summer and autumn. Close together as the component stars of these clusters appear to be there is no doubt that they are really sepa¬ rate from each other by distances vaster than those which separate the planets of our solar system ; otherwise the most powerful telescope would not distinguish them as separate stars, but present them to our view as if confused to¬ gether in one mass of light.

By several different methods the distances from us of the globular clusters have very recently been found by Shapley of the Mount Wilson Solar Observatory. It is shown that while the cluster in Centaurus is the nearest, the more distant are not infinitely remote from our Milky Way cluster, but are outside of it and apparently connected with it. They are, in short, now known to be small universes of stars, the distances through them being meas¬ ured in hundreds of light years instead of in

tens of thousands as in the case in our Milky Way cluster.

It is a remarkable fact that many of these clusters contain a great number of variable stars. This fact, taken in connection with the probable cause of variability already men¬ tioned, makes plausible

the idea that close binary systems are very numerous in the clusters. If, at any one moment, all the stars of the cluster were at rest, they would in course of time be drawn together by mutual gravitation. Each star must, therefore, be in motion relative to the others, describing some kind of an orbit around their centre of gravity.

The laws of revolution in cases like this must be very complicated, but as they require thousands of years to go through their changes and accurate observations have been made for hardly more than a century, astronomers are not yet able to investigate them fully.

Constitution of the Stars. — There is no reasonable doubt that the general constitution of the stars is the same as that of our sun; and that they consist of masses of intensely hot vapors of the substance composing them, com¬ pressed together by the mutual gravitation of their parts. As we have already said, the stars are composed in the main of the substances found to exist in the sun, but, probably, in a great variety of forms as regards density and temperature. The spectra of the stars, consist¬ ing, as most of them do, of a bright continuous spectrum crossed by dark lines, show that we see the luminous surface through an atmos¬ phere cooler than itself, though really intensely hot.

The stars differ enormously in their actual luminosity, that is, in the actual amount of light emitted by each. If they were all equally lumi¬ nous we could form an idea of their relative distance by their brightness ; the farther a star was away the fainter it would shine. But as a matter of fact, some of the brightest stars in the heavens are so distant that their parallax proves to be immeasurably small. This is not the case with Sirius, the brightest of all, which has a parallax of 0" .38, showing it to be situ¬ ated at a distance from which light would travel in about nine years. But the next bright¬ est, Canopus (not visible farther north than our Southern States), is so distant that no parallax can be shown by the most refined measures. The conclusion is that it must be 10,000 times as luminous as our sun ; possibly 100,000 times. This is the case with several stars in or near the constellation Orion. At the other extreme, we find that among the nearer stars are several not visible to the naked eye. It is true that the nearest of all, Alpha Centauri, is nearly of the first magnitude; but the next in order, 61 Cygni, is only of the sixth magnitude ; two others are quite invisible to the naked eye. This shows that there are stars much less luminous than the sun, and. that the greatest stars are probably millions of times more luminous than the smallest ones.

Bibliography. — Ball, Sir R., < Story of the Heavens) (new ed., New

York 1905) ; id., (Popular Guide to the Heavens) (London 1905) ; Burnham, S. W.. (General Catalogue of Double Stars) (2 vols., Carnegie Institution, Washington 1906) ; Campbell, W. W., (Stellar Motions) (New Haven 1913) ; Chambers, G. F.,

(Handbook of Descriptive and Practical As¬ tronomy *(Vol. Ill, 4th ed., Oxford 1909); Clerke, Agnes M., 'Popular History of As¬ tronomy* (4th ed., London 1902) ; id., (Prob¬ lems in Astrophynes *(London 1903) ; id., 'System of the Stars* (2d ed., New York 1905) ; Eddington, A. S., (Stellar Movements and the Structure of the Universe* (London

1914) ; Furness, C. E., (Variable Stars* (Boston

1915) ; Hale, G. E., 'Study of Stellar Evolu¬ tion *(Chicago 1908) ; Lowell, P., 'Evolution of the Worlds* (New York 1910) ; Newcomb, S., 'The Stars: A Study of the LIniverse *(New York 1901) ; Parkhurst, J. A., Re¬ searches in Stellar Photometry 1894-1906* (Carnegie Institution, Washington 1906) ; Proc¬ tor, R. A., (Half Hours With the Stars *(new ed., London 1896) ; id., Rasy Star Lessons* (new ed., London 1905) ; id., (Star Atlas for Students and Observers *(7th ed., New York 1914). Consult T. J. J., (Evolution of the Stellar Systems* (Vol. I), Rapture Theory of Cosmi- cal Evolution *; Turner, H. H., 'Modern As¬ tronomy* (London 1909) ; Young, C. A., (Manual of Astronomy* (Boston 1902).

Simon Newcomb.

Revised by Eric Doolittle.

STARS AND BARS, The, a name applied to the flag of the Confederate States of America. It was an adaptation of the stars and stripes. On 5 March 1861 the Flag Committee appointed in the provisional Senate of the Southern States recommended that "the flag <of the Confederate States shall consist of a red field with a white space extending horizon¬ tally through the centre, and equal in width to one-third the width of the flag.** It was first displayed 4 March 1861, simultaneously with the inauguration of Lincoln, being un¬ furled over the State House at Montgomery, Ala. In 1863 the Confederate Senate adopted a white flag with one blue star in the centre, the Stars and Bars bearing too close a re¬ semblance to the Stars and Stripes.

STARS AND STRIPES, The. See Flag

of the United States.

STARVATION, or INANITION, low¬ ered vitality, accompanied by emaciation, en- feeblement which if prolonged results in death, through lack of food. Starve is derived from Old English steorfan, to die. The phenomena of starvation presents subjects of great interest from their bearing upon phenomena induced through the inability to take nourishment oc¬ casioned by some diseases. According to Chos- sat, the symptoms which intervene in starva¬ tion are at first marked by a very rapid di¬ minution in the weight of the body; this de¬ crease, however, becoming more gradual as death approaches. A striking uniformity is found between the period at which death re¬ sults from starvation and the loss of weight experienced. Thus Chossat found that in dif¬ ferent warm-blooded animals death resulted when the body had lost about 40 per cent or two-fifths of its original and normal weight. Great variations undoubtedly existed in the extremes of Chossat's cases ; the circumstances which seem most powerfully to have affected these results being the amount of fat con¬ tained in the body prior to the beginning of the starvation period. The animals which had

most fat stored up lost weight quickest and at the same time lived longest. Chossat found that in animals undergoing starvation the symp¬ toms observed during the first half or two- thirds of the period are those of calmness and quietness; the temperature then becoming ele¬ vated, restlessness and agitation prevails; and when life is terminated by the rapid fall of the temperature stupor supervenes. The ex¬ tremities become cold and weak, and are finally unable to support the weight of the body; while the pupils of the eyes become dilated ; and occasionally at death convulsive twitchings may be present. The excreta are small in quantity after those which are voided as the result of the food last partaken of, and con¬ sist chiefly of greenish matters, probably de¬ rived from the biliary secretions. At death the faeces become watery and contain saline matters.

The fatty matters are almost entirely re¬ moved by starvation, and the blood loses three fourths of its original amount. It is probable . that the total nutritive powers of the body during starvation go to nourish the nervous tissues, the loss of which is very small ; while the true mode of death from starvation ap¬ pears to be death from want of heat, the body being preserved alive, notwithstanding the want of fresh nutritive material, by the combustion or absorption of the fatty matters it contains. Chossat also found that proportionally to the more active nutrition and waste in young animals, such died sooner from starvation than older forms ; and he also determined the equally

important fact that if young animals especially are supplied with an insufficient amount of food, they succumb as if they were actually starved; the process of starvation being of necessity more gradual in the latter instance. The mere variations in the temperature ob¬ served by Chossat formed more prominent points of note in his observations than the actual decrease of heat. It fluctuated or varied daily, in some cases, some 5° and 6° F., instead of 1° and 2° F., as (Observed in the normal and healthy state of the body. In the human sub¬ ject the symptoms of starvation have been closely studied by physiologists, with the effect of determining a stated order in their ap¬ pearance and effects. The preliminary hun¬ ger appears to be accompanied in the first instance by severe pain in the stomach and epigastric region generally. The thirst be¬ comes intense and although undoubtedly in man the want of water induces death at a much earlier period than where drink is at¬ tainable by lower forms (for example, birds), the want of water may in reality make com¬ paratively little difference in the invasion of the fatal period. Sleeplessness appears to be early manifested; the severe pain at first felt in the stomach gradually ceasing. A charac¬ teristic feeling of sinking and weakness is de¬ scribed as occurring in the epigastric region, the thirst still continuing to an agonizing de¬ gree. The face assumes meanwhile an anx¬ ious, pale expression; the eyes are wild and staring; and the whole countenance and body participate in rapid general emaciation. The body latterly exhales a fetid (odor ; the breath and lung secretions become strong-smelling ; and the skin is said to become covered with

a brown secretion — these results, doubtless, arising from the decomposition and organic decay of the tissues. The gait totters, the mind becomes impaired, delirium or convul¬ sions may ensue and death occurs, with or with¬ out the accompaniment of diarrhoea. Post¬ mortem reveals a state of amemia in all parts of the body but the brain, which appears to the last to receive a due supply of blood. The fat is entirely wanting and the various organs and tissues have greatly lost in bulk. The coats of the small intestine are found exceedingly thin. The gall-bladder generally contains much bile, and the body goes more rapidly to decay than after death from ordinary causes.

Starvation suggests inciuiries respecting ab¬ stinence in diet and from various or particular kinds of food. A sudden and unfavorable change in a given dietary may induce, in virtue of the new food containing a

low percentage of certain nutritive matters, symptoms analogous to those of starvation. Want of nutriment produces an incapacity for the digestion of whatever amount is supplied, a result probably due to nervous causes and primarily perhaps to the want of stimulation of the appetite through insufficient secretion of gastric juice.

Where the temperature of the body is main¬ tained in tolerable efficiency, life may be pro¬ longed for great periods without food, a state of syncope prevailing — as in several noted cases of so-called apparent death. It was found by Chossat that in the case of animals whose death seemed imminent from starvation, restoration took place primarily by the applica¬ tion of artificial heat. They thus manifested activity, and were able afterward to partake of food. From 8 to 10 days is regarded as the usual period during which human life can be supported without food or drink. If water be given this period may be greatly exceeded, and where a moist condition of the atmos¬ phere exists life may for the same reason be prolonged. A case is recorded in which some workmen were dug out alive after 14 days' confinement in a cold damp vault; and another is mentioned in which a miner was extricated alive after being shut up in a mine for 23 days, during the first 10 of which he subsisted on a little dirty water. He died, however, three days after his release. Life has been prolonged for 60 days in a person suffering from religious mania who abstained from food, supporting his existence by sucking an orange. In some remarkable cases of nervous hysteria and other diseased conditions no food may be taken and yet the body be perfectly sus¬ tained. The system is disposed or becomes inured to the abstinence, just as under other conditions it exhibits a want of susceptibility to the ordinary effects of certain medicines. (See Fasting). Consult Benedict, F. G., (A Study of Prolonged Fasting) (Washington 1915) ; Davies, Starvation* (in Popular Sci¬ ence Monthly 1884—85, Vol. XXVI) ; Leeson, (Death from Starvation (in Dublin Medical Press 1847).

STARVED ROCK, a high, isolated pinnacle on the south side of the valley of Illinois be¬ tween Utica and Ottawa, La Salle County, Ill. Its name indicates the fate of the last of the Illini Indians who were besieged by invading Iroquois Indians until their sup¬

plies gave out. This rock, known as La Rocher to the French, was a famous locality all through the early history of the north-central Illinois region for it is a conspicuous landmark at the head of navigation in Illinois River. Late in 1682 La Salle built on its summit the fort (<Saint Louis des Illinois® which was a most important loutpost and intended to be the cen¬ tre of a large French colony. With sheer walls rising 130 feet above the river at its northern base

and almost inaccessible from the bluffs on its south side, it was easy to defend. The area on top was somewhat less than an acre. The fort was abandoned about 1690 and the Indians and traders finally left its vicinity. The rock consists of s<oft, massive, nearly horizontal sandstone of Saint Peters forma¬ tion which constitutes the bluffy sides of Illi¬ nois Valley in La Salle County. It was iso¬ lated by erosion from the main body of the formation in the neighboring bluffs. It is claimed that the first bituminous coal used in the United States was obtained near Starved Rock about 1695. On account of its great his¬ toric interest and highly picturesque surround¬ ings, Starved Rock has been made a State park of 10,000 acres. Consult Baldwin, C., (History of La Salle County) ; Carter, J. D., (Last of the Illinois,* and Sauer, C. O., (Geography of the Upper Illinois Valley * (State Geological Survey, Bulletin 27).

STASSFURTITE, a massive variety of the mineral boracite (q.v.) occurring chiefly at Stassfurt, Germany, where a few hundred tons are annually produced.

STATE. Political scientists of the present day distinguish sharply between the idea con¬ noted by the term ((state® and that indicated by the word ˆgovernment.® By ((state® is meant the body-politic abstractly considered, — the en¬ tity that possesses and exercises the sovereign political will. By ((government® is meant the mechanism of political rule, the ensemble of the agencies through which the tasks of the state are performed. The present article will be devoted to a discussion of the nature of the state. A treatment of Government will be found under that title.

As distinguished from a society, by which is meant simply an aggregate of human beings living together and united by mutual economic and social interests, a state is a body of in¬ dividuals that has assumed an organized form, that has a definite membership, and has created for itself specific organs for expressing and enforcing its corporate will. Thus, in order that there may be a state, three elements must be present: (1) An aggregate of human beings, individually termed citizens or subjects, form¬ ing a single group and as such termed a “people® ; (2) a political apparatus, termed a government, and administered by a corps of officials collectively termed a magistracy; and (3) a body of rules or maxims, written or unwritten, which are generally recognized to be such as may rightfully be enforced by those entrusted with the exercise of the powers of the state. Whether or not to these three es¬ sential elements there should be added a fourth, namely, a definite area of land, there is a difference of opinion. The eminent Ger¬ man publicist Bluntschli, who may be

taken

as a representative of one view, defines a state as <(the politically organized national per¬ son of a definite country.® On the other hand, Holland declares that ((a state is a numer¬ ous assemblage of human beings generally oc¬ cupying a certain territory, among whom the will of the majority, or of an ascertainable class of persons, is, by the strength of such a majority or class, made to prevail against any number who oppose it.® The definition of Bluntschli is undoubtedly applicable to all mod¬ ern civilized states, but certainly is not descrip¬ tive of very many bodies-politic of the past. Indeed, political sovereignty, by which is meant the supreme power of the state, was f.or many years, according to the ideas of the peoples of western Europe, not territorial at all, but based upon a personal allegiance of the subjects to their rulers.

. A people, a government and a body of laws are what may be termed the essential material elements of which a state is composed. In ad¬ dition to these there is one characteristic that it must possess in order properly to deserve its title and to be distinguished from the others and lower types of political life. This unique and distinguishing characteristic is sovereignty. By sovereignty is meant the highest, or supreme power. It thus means that its possessor is it¬ self the ultimate source of all the laws that are enforced over the territory which it claims as its own, and over citizens or other persons subject to its authority. It means, in short, formal legal omnipotence. The word formal is used, for of course the power of control that any state may actually exercise is limited by the intolerance of its subjects of oppression. But, formally, a state, because legally subject to the control of no other law-making power, has the power to issue such legally binding commands as it sees fit. Directly or indirectly, it is the source of all the rules that regulate not only the conduct of its subjects and others for the time being subject to its authority, but those that determine the form of its own government and the respective powers of its several organs and officials. The exercise of all political powers, either by individuals or associations of individuals, are, therefore, vali¬ dated only by its sanction. The state is thus legally supreme, not only as the ultimate source of all law, but is itself the ‘determinator of the matters that it will regulate, and the manner in which it will regulate them. Thus, as the Austrian publicist, Jellinek, has put it: <(Obli- gation through its own will is the legal char¬ acteristic of the

state.®

It is the state, it is to be observed, that is the possessor of sovereignty — its <(subject,® as continental writers express it — not the gov¬ ernment. To the government is entrusted only the execution of the sovereign will of the state. The powers of each governmental organ and of each public official are obtained from the state and are limited and- defined by its laws. Thus at any given time a citizen, though potentially subject in every matter of life, liberty and property to the will of his state, possesses a sphere of freedom, defined by exist¬ ing laws, upon which those exercising political authority may not trespass. To quote the words of Professor Burgess : ((The individual is defended in this sphere against the government

by the power (the state) that makes and main¬ tains and can destroy the government; and by that same power through the government, against encroachments from any other quarter. Against that power itself, however, he has no defense.®

Sovereignty is an attribute of a political body that has to be demonstrated as a matter of fact, and not as a matter of law. In other words, there is no proper distinction between de facto and de jure states, these terms being applicable only to governments. (See Govern¬ ment). If a given community of human beings, yielding a general obedience to an es¬ tablished government, asserts and fairly demon¬ strates that it is able to maintain a freedom from the control of any other political power, it becomes by that very fact a state, and is en¬ titled to recognition by other states as such. It is, however, the actual fact of independence from foreign control and maintenance of domestic order that demonstrates the existence of the sovereignty of the state in question, and not its recognition as a state by the other powers. Thus, for example, the American colonies ceased to be dependencies and became states not by reason of their recognition as such by England and European nations, but because of their actual ability to maintain that freedom from Great Britain's control which they formally asserted in 1776. The sovereignty of a state thus bears a double aspect. Considered internally, that is, from the viewpoint of municipal law, it appears as legal omnipotence. Looked at from the viewpoint of its relations to other states it appears simply as independ¬ ence. In the one case, it means the affirmative legal power of enforcing its will upon all those subject to its authority. In the other case, it signifies simply freedom from foreign control. From the domestic standpoint, it signifies supremacy. From the international standpoint, it means equality.

The state, though itself the source of all law, can only operate through law. That is to say, an expression of its sovereign will can validly proceed only from those legislative mouthpieces that, by already existing law, have been granted the right to voice its commands, and these commands may be legally ' enforced only according to laws already established. Be¬ cause of its legal omnipotence the state may at any time alter these rules according to the methods provided for the amendment or repeal of laws, but as they exist at any time the laws control. Any action not sanctioned by their provisions, however much approved by those in political authority, cannot, strictly speaking, be termed an action of the state.

Itself the creator of all law, the state is not itself a product of law. Constitutions create governments, not states. They are the crea¬ tions of states already existent. The cre¬ ative force, in the birth of states, is that feel- ing. of unity interests and desires that leads a society of human beings to assume a corporate form and create the political organs necessary for the attainment of all those interests that are connected with or arise out of their existence as a national unit. This being so, it follows that sovereignty cannot arise out of any formal, legal or conventional act. In other words, a state cannot be created by formal agreement

between individuals, as postulated by the social compact theory, nor brought into being by a compact between sovereign states. By a sur¬ render of private rights, individuals cannot create a public right; by a treaty agreement, there cannot be created a political power with a legal authority superior to that of the parties establishing it. From this last fact it ir¬ resistibly follows that any so-called composite or federal state that has for its basis a treaty or compact between states is not in truth a state at all, but a mere league of states, and this, notwithstanding the fact that very . extensive powers may have been granted to the central governing power. Envisaged as a legal person, the sovereignty of a state represents the supremacy of its will. As thus representing a supreme will, sovereignty is necessarily an in¬ divisible unity. A divided or double sovereignty is an impossibility. A given body-politic there¬ fore either possesses sovereignty and is for that reason a state, or it has not sovereignty, and, as a result, is not a state but simply an administrative division of the state that pos¬ sesses sovereignty over it. In all strictness then, it is a misuse of words to speak of a federal state, if by that term is meant a state formed by a

federation of states; for if, in such a federation, sovereignty is held to rest in the central body, that body is a state, and its constituent commonwealth members are ipso facto reduced to a non-sovereign condition, and therefore to the status of administrative dis¬ tricts. If, however, the federating units each retain their sovereignty, they remain states, and no central sovereignty or state can be held to be created. In the one case, there exists but one state with a government composed of one set of central or federal organs and as many sets of local governmental organs as there are mem¬ bers of the union. In the other case, there exist as many states as there are confederated units, an equal number of state governments, and a central government that acts as the com¬ mon agent of the several states; but no central state.

The line of distinction between a single na¬ tional state composed of non-sovereign bodies- politic enjoying extended powers of self-govern¬ ment, and a confederation of states with a central government exercising many of the most important sovereign powers, is not always easy to draw. The distinguishing criterion is not the amount of powers actually vested in the central government as compared with those retained by the individual commonwealths, nor whether the operation of federal law is upon the individual states themselves or directly upon their citizens, nor, necessarily, upon the manner in which the articles of union may be amended. The one absolute test is as to the power or lack of power of the members of the union themselves to determine, in the last resort, not only the extent of the obligations imposed upon them by the articles of union, but their constitutional right to withdraw from the union when they see fit.

Bearing in mind the distinction between the possession of the sovereignty itself and the mere exercise of certain of its powers, it is seen that a state may, without in any wise impairing its sovereignty, delegate the execution of its commands not only to governmental agencies of

its own creation, but to those of other states ; for, so long as such other states, or their gov¬ ernments, act but as the agents of the first state, it is the sovereign will of that state that is ex¬ ecuted. And, furthermore, whatever may be its actual power, the state in question has the legal right itself to assume again the actual ex¬ ercise of the powers it has granted. Such a withdrawal of delegated powers may be in violation of existing treaties, and, therefore, constitute a just ground for complaint, but it is not an illegal act, for treaties do not create law in the strict positive sense. Instances of the delegation by states to other states of the exercise of important powers is seen in the many

so-called protectorates that exist at the present day. Confederacies, real and personal unions, and colonies are not similar examples, for in them the exercise of powers is granted to government organs created by the sovereign parties themselves.

Theoretically, there is no limit to the extent to which a state may go in the delegation to other states of the exercise of its power. If, however, in any one respect it is absolutely de¬ prived of a power, so that it cannot legally, at its own discretion, resume the exercise of it, its legal omnipotence is destroyed and, together with it, its sovereignty and right to the title state.

Because the denial of the name state to non¬ sovereign powers makes it necessary to refuse that title to the many bodies-politic that gen¬ erally have been, and are, so designated, as for example, the members of a federation such as the United States of America, many writers have endeavored to discover some distinctive attribute other than sovereignty that will serve sharply to distinguish states from provinces, departments and other simple administrative districts. The better opinion would seem to be, however, that these efforts have failed, and must continue to fail. With the test of sovereignty discarded, the dividing line between states and other political bodies becomes an indeterminate one, and, therefore, an exact definition of a state an impossibility. Logical exactness, therefore, even at the expense of wounding political sentiments, requires an ad¬ herence to the definition of a state as a neces¬ sarily sovereign body.

Bibliography. — (1) American: Baldwin, (The Province of Jurisprudence De- termined) (1898) ; Burgess, J. W., (Political Science and Comparative Constitutional Law' (1893) ; Crane and Moses, Politics' (1893) ; Lowell, J. R., (Essays on Government' (1899) ; Woolsey, T. D., (Political Science' (1878) ; Wilson, W., (The State' (1889) ; Willoughby, W. W., (The Nature of the State' (1896). (2) English: Bosanquet, B., (The Philosophical Theory of the State' (1899) ; Green, J. R., (Lectures on the Principles of Political Obliga¬ tion' (1893) ; Lilly, W. S., Pirst Principles in Politics' (1899); Lorimer, J., institutes of Law' (1880); M'Kechnie, W. S., (The State and the Individual' (1896) ; Mathews, J. M., Principles of American State Administration' (New York 1916) ; Seeley, J. R., introduction to Political Science' (1896) ; Spencer, H., jus¬ tice' (1892). (3) German, French, etc.:

Ahrens, (Cour de Droit Naturel' (1892) ; Bluntschli, J. K., (Allgemeine Staatslehre'

(Eng. trans. (The Theory of the Stated (1892) ; Jellinek, (Das Recht des modernen Staates, Erster Band, Allgemeine Staatslehre) (1900); Gneist, (Der Rechtsstaat> (1879); Kant, (The Philosophy of Law) (Eng. trans. by Hastie) (1887) ; Le Fur, (Etat federal et confederation d,etats) (1896) ; Passy, (Des Formes de GouvernemenD (1876) ; Schmidt, (Der StaaD (1896).

W. W. Willoughby,

Johns Hopkins University, Baltimore, Md.

STATE APPOINTMENTS. See Ap¬

pointments, Federal, State and Local.

STATE APPROPRIATIONS. See Ap¬ propriations, American System of; Budgets, American.

STATE BANKING SYSTEMS. See

Banks and Banking — State Banking Sys¬ tem (Article 10).

STATE BANKS. See Banks and Bank¬ ing — State Banking System (Article 10) and Bank Organization and Management (Article 15).

STATE BOARD OF EQUALIZATION.

See Taxation.

STATE BOUNDARIES. See Bound¬ aries of the United States.

STATE BUDGETS. See Budgets, Amer¬ ican ; Appropriations, American System of.

STATE BUILDING LAWS. See Build¬ ing Laws.

STATE COLLEGE OF WASHING¬ TON, The, located at Pullman, Wash. It was founded in 1890 in pursuance of the national land grant act of 1862 endowing agricultural and mechanical colleges. The national govern¬ ment granted 190,000 acres of land, the proceeds of the sale of which will constitute a per¬ manent endowment for the institution. Women are admitted on equal terms with men. The regular courses are offered by the following colleges and schools: (1) College of

Agricul¬ ture, which is composed of the following de¬ partments : Animal Husbandry, Agricultural Engineering, Dairy Husbandry, Farm Crops, Farm Management, Forestry, Horticulture, Plant Pathology, Poultry Husbandry, Soils. (2) School of Education. (3) College of Home Economics. (4) College of Mechanic Arts and Engineering, which is composed of the following departments : Architecture, Ma¬ thematics and Civil Engineering, Mechanical and Electrical Engineering, and Physics. (5) School of Mines. (6) School of Music and Applied Design. (7) School of Pharmacy. (8) College of Sciences and Arts, which is com¬ posed of the following departments : Botany, Chemistry, Chemical Engineering, Economic Sci¬ ence and History, English, Foreign Languages, Geology, Zoology. (9) College of Veterinary Science. (10) Department of Military Science and Tactics. (11) Department of Physical Edu¬ cation and Athletics.

In all the above departments the work in the four-year courses leads to the degrees of bachelor of arts or bachelor of sciences. The School of Pharmacy offers a two-year course leading to the degree of graduate in pharmacy (Ph.G.), and also a three-year course leading to the degree of pharmaceutical chemist (Ph.C.), in addition to the four-year course

which leads to the degree of bachelor of science in pharmacy. The College of Vet¬ erinary Science also confers the degree of doc¬ tor of veterinary medicine (D.V.M.).

The degree of master of arts (M.A.) or master of science (M.S.) is conferred upon the completion of one full year of work after receiving the bachelor's degree from this insti¬ tution or another institution of well-recognized standing. Professional degrees in Engineer¬ ing are conferred upon graduates of the State College who have been in successful profes¬ sional work for at least three years and have had charge of difficult engineering or industrial enterprises.

There is also a Department of Elementary Science to which students are eligible after the completion of the eighth grade of the public schools. The courses offered in this depart¬ ment are largely along vocational lines in agri¬ culture, commercial and mechanic arts.

The study of military science is required of all male students.

The college grounds include approximately 650 acres, 75 of which is set apart for the col¬ lege campus. The buildings include the Ad¬ ministration Building, Bryan Hall, named in honor of Ex-President E. A. Bryan, Science Hall, Morrill Hall, Van Doren Hall, College Hall,

Mechanic Arts Building, Mechanical Building, yeterinary buildings, James Wilson Hall, Music Conservatory, Ferry Hall, the dormitory for men, named for the first State governor of Washington, Stevens Hall, the dor¬ mitory for women, named for the first terri¬ torial governor, gymnasium and armory, Col¬ lege Hospital and the president's house.

The laboratories for instruction in the bio¬ logical and physical sciences are well equipped with modern appliances. The library in 1917 contained more than 60,000 bound volumes and more than 100,000 unbound pamphlets and books. The students in 1917 numbered 2,130 and the faculty 225.

In addition to the colleges and schools men¬ tioned above, in which courses leading to de¬ grees are offered, the institution operates an agricultural experiment station in which the following departments are maintained: Agri¬ culture, Botany, Chemistry, Dry Land Investi¬ gations, Entomology and Zoology, Horticulture, Irrigation Engineering, Veterinary Science and Plant Pathology. The experiment station is partly supported by funds established by acts of Congress. There is also a department of extension service operated in co-operation with the. United States Department of Agriculture which is partly supported by the Smith-Lever fund established by Congress in May, 1914. The extension service consists largely in extension work in agriculture and home economics.

STATE CONSTITUTIONS. See Con¬ ventions, Constitutional in the United States.

STATE CONTROL, Growth of. I. The

State, an organized political entity, possessing and exercising sovereign powers, has always since its establishment controlled more or less completely the activities of its members, social, political, economic and moral, the extent of such control depending upon a number of fact¬ ors, such as character of government, state of civilization, classes of society and political and

social ideals. States may be divided into two classes, according to whether government is completely centralized or not. In completely centralized governments, such as Great Britain, France and Italy, the right of control is en¬ trusted to the national authorities while the local subdivisions such as counties and munici¬ palities act as their

agents. In the federalized form of government, such as the United States and Germany, the sovereign powers are par¬ celed out between the national and local organizations, each government being independ¬ ent of the other within its own especial field. With respect to growth, state control has ex¬ hibited two marked tendencies : first, that of the extension of the field of control entrusted to national authorities at the expense of the local subdivisions, and second, extension of control exercised by the government at the expense of the individual liberty of its citizens and mem¬ bers.

II. In general there are four distinct theories upon which the control of the state over indi¬ viduals and groups of individuals is based, viz., the divine right of kings, staatsgemacht or force, the social contract, and social welfare. The first of these fundamental theories is aptly illustrated by the reign of Louis XIV of France and his slogan, ((l'etat c'est moi.® During the past generation the theory was expounded and practised by the former emperor of Germany, Kaiser Wilhelm II, with what results the world knows too well. The second theoretical basis, staatsgemacht or the doctrine of force, is in practice, although not in theory, closely associ¬ ated with the first, for the purpose of giving a religious sanction to the dominating influence of the state over its citizens. The third theory, that of the social contract, first formulated by Jean Jacques Rousseau in his brilliant but now generally discredited (Social Contract, *con¬ stituted a distinct advance in political thinking and was naturally accompanied by marked im¬ provement in national administration and in social wellbeing. The fourth theory, that of social welfare, was first enunciated by Aristotle in his (Politics* and revived by the publicists and statesmen of England and continental Europe during the course of the 17th, 18th and 19th centuries. As an evolutionary institution, the state is held to be the natural development of the family and like it exists not for its own ends but for the benefit of its individual mem¬ bers. According to this theory, the state should exercise control over its members whenever and wherever such control results in the general welfare. To determine the scope and extent within which state control may be wisely ex¬ ercised for the good of its citizens, representa¬ tive governments have become a practical necessity.

III. During the Middle Ages and even well into the period generally denominated modern times, all the more important European nations were either absolute or limited monarchies and their governments were dominated by a group of courtiers who professedly believed in the divine right of the kings under whom they served. As the rank and file of the citizens grew in political wisdom they began to discuss the functions of government and the proper limitations of public control

over private rights. The first great movement along these lines began in England in the early part of the 17th

century and culminated in the overthrow of the Stuarts and the establishment of the Puri¬ tan Commonwealth in 1649. Unfortunately for the progress of civil liberty the Commonwealth proved unequal to the task imposed upon it, and it was not until the revolution of 1688 that the foundations of parliamentary government and its concomitant, a decent regard for the rights of individual men, were securely laid. From this date onward in England and the English-speaking countries the evolutionary theory of government gradually grew to be the predominating one, and with its growth the policy of economic liberalism became firmly established. As a result of the forces set loose by the American and French revolutions, despite the brief militarism of Napoleon and of the re¬ actionary movement led by Metternich and sup¬ ported by the Holy Alliance, the century begin¬ ning with the year 1776 may be characterized as the Golden Age of political and civil liberty in every domain of life. During this period mercantilism as a national policy was over¬ thrown, the old time restrictions on trade and industry were largely abrogated, and men were more nearly free to seek their own for¬ tunes and to live their own lives without in¬ terference by the government than ever before in the history of the civilized world.

IV. The establishment of civil and economic liberty even within the limitations set by the more progressive governments, notably those of the United States, Great Britain and France, brought results not wholly favorable to the welfare of certain classes of individuals. While the world grew rich with unprece¬ dented rapidity, the wealth tended to accumu¬ late in the hands of a somewhat limited few. *The rank and file, although living in compara¬ tive affluence compared with their former status, still remained poor. In the defense of the new system a great literature was created, among which Adam Smith's (Wealth of Nations,* John Stuart Mill's (Political Economy, *Her¬ bert Spencer's (Social Statics) and the (Man versus the Stated and Bastiat's (Harmonies Economiques,* should be especially mentioned. Notwithstanding the intellectual triumphs achieved by each of these able defenders of the new order, abundantly supported by hosts of lesser lights, the accumulative unfortunate effects of excessive economic freedom became too pronounced to be longer ignored by the various states and, therefore, beginning about 1830, the tide began to turn in favor of larger state control. To relieve the situation without at the same time changing the established order became the chief object of the political leaders in England, France, Germany and the United States. Palliative measures, such as the Eng¬ lish Poor Law of 1834,

centralizing and stand¬ ardizing the administrations of charity, abol¬ ishing out-of-door relief for the able-bodied, reinstituting the workhouse test, regulating the length of hours and the conditions of em¬ ployment for child labor, were concomitantly tried. Such measures, however, were largely ineffectual because they failed to strike at the root of the trouble, and naturally enough, atten¬ tion was more and more directed toward a study of the causes which were producing the

- King, 'The Wealth and Income of the United States' (New York 1913).

unfortunate and unsatisfactory results. As the investigation progressed the students of the social order almost immediately separated into two classes : first, those who deemed it wisest to destroy the existing system and inaugurate an entirely new one; second, those who pro¬ posed to preserve the fundamentals while elimi¬ nating certain non-essential features which had been found to be injurious to the common welfare.

The first group of reformers almost imme¬ diately divided into two branches, the Owenites and the Marxians. The Owenites, followers of Robert Owen, established a large number of independent communistic societies, the most of which soon disappeared and the Owenites with them, although their ideals are still of large influence. The Marxians, on the other hand, although since 1848 continuously exercising large influence on political and economic theory, have never until the present war, except in a very small way, had an opportunity to give their solution a practical trial. With the downfall of the Russian Revolution and the subsequent creation of the Bolshevik government, they have established a laboratory for the practical test of their ideals. If this experiment in industrial and social reorganization should prove able to produce goods as abundantly and at the same time distribute them more fairly than the capitalistic system, the latter will for the first time in history have encountered a real com¬ petitor. The adherents of the present system will in the latter event be under a stronger pressure than ever before to institute a sufficient amount of governmental control to insure that the products jointly produced shall be fairly distributed among the factors of production.

The second group of reformers, while at¬ tempting to maintain the

competitive capitalistic system for the sake of its great efficiency in production, have at the same time desired to introduce a sufficient amount of state control to secure what they considered a high degree of fairness in distribution. Their efforts have been centred upon certain critical problems of which the following are the more important :

(1) Protecting wage-earners (a) against un¬ favorable conditions of work and (b) against inadequate wages.

(2) Protecting consumers by (a) preventing the establishment of industrial monopolies; (b) by maintaining free competition among business enterprises, and (c) maintaining stand¬ ards in the character of the goods which are produced and sold.

(3) Creating systems of taxation which, while providing abundant revenue for the uses of the government in undertaking and main¬ taining state control, will at the same time act as an adjusting force in the distribution of wealth.

1. (a) It was early pointed out* that while the laborer was legally free to work for whom he pleased and could refuse employment where conditions or wages were unfavorable to him, the employer could generally wait until the terms he offered were acceptable, while the laborer generally could not ; that, while the employing classes were living on their capital the employees were starving; that consequently

2. Owen, 'Observation on the effect of Manufacturing System, etc.'

the state ought to interfere on behalf of the laborer, prescribing by lav/ the conditions under which the work might be carried on, and in certain cases at least the wages at which the laborers might work. It was further noticed that the economic independence of the laborer was largely conditioned by the character of the industrial organization, and that wherever ma¬ chinery was largely employed the relative ad¬ vantage of the employer was increased. On this account regulation in behalf of the laborer began earlier in the machine trades and in those countries where machine production was most widely used. England, being the first to introduce factory production on a large scale, naturally encountered the labor problem first, and it is there that the foundations of the pres¬ ent system of state control in the interests of labor were laid.f In the United States the labor problem attracted little attention until after the Civil War. In 1869 Massachusetts created the first labor bureauˆ in the world, and following her example a large number of the States in the American commonwealth have established similar departments, manned by a considerable force of inspectors and adminis¬ tering laws which are intended to protect the laboring classes from work under conditions unfavorable to either health or morals. In the case of certain classes of labor the maxi¬ mum number of hours which the laborer may work has been prescribed by law. As a result of state control in this sphere of action it has come to pass that the conditions under which the American laborer works are fairly conduc¬ ive to good health, to a reasonable standard of morals and to a fairly long life.

The general establishment of the factory system, together with its necessary concomi¬ tants, mining and railway transportation, intro¬ duced a new element into the labor problem, mainly that of danger to life and limb. Until comparatively recent years it was generally assumed by those responsible for legislation that the wage-earning classes were fully capa¬ ble of taking care of themselves ; that placing the risk of the industry upon the employers would be sure to result in carelessness on the part of the operatives and high cost of produc¬

tion for the goods sold. It was, therefore, the established rule of law in all countries that the employer would be held responsible only for damages to life and limb due to his own negli¬ gence, while the employees must suffer those resulting from their own lack of care. To secure redress for injuries due to the careless¬ ness of the employer the employee was obliged to bring a suit at law, stating the cause for his complaint and offering evidence to show that the employer was legally responsible for the acci¬ dent that caused the damage. In the litigation that arose over such cases the judges in the absence of specific statutes to the contrary de¬ veloped a series of common-law doctrines which to a large extent modified the original theory of the law. These doctrines are : that of con¬ tributory negligence, of assumption of risk, and the fellow-servant rule. Under the common law the employer could be held liable only when the accident was due to his own fault or neg¬ lect, but not when the negligence of the em-

t 3 & 4 Wm. IV. c. 103. 16 & 17 Victoria, c. 54.

j 3 Dec. 1913 there were 42 such bureaus.

ployee contributed to the accident or when the accident was due to a natural risk of the employment, nor when the accident was due to the act of a fellow-servant. Under these conditions the employer was legally respon¬ sible for damage resulting from certain classes of accidents ; but even when legally responsible it was not easy for the injured employee to prove his case and collect compensation for the damages. Moreover suits against the em¬ ployer were not conducive to pleasant relation¬ ships and gradually it became the custom for the employer to take out liability insurance under which the insurance companies undertook to defend all suits as well as to pay all dam¬ ages incurred. Thus, while the liability to pay damages on account of accidents was a real factor in the cost of production, viewed from the employers' standpoint, comparatively little of this expense filtered into the pockets of the employees as compensation for their injuries. With the growing appreciation of the unfairness of the common law, the social reformers of the revolutionary type proposed and finally secured remedial legislation by the passage of the so-called workmen's compensation acts, by virtue of which the common-law rules were largely and in some cases fully abrogated, and in their place a system of direct compensation for various accidents substituted. In this movement Germany took the lead, establishing the first system of

accident compensation on a large scale in 1884.* Since that date 48 other countries, including the United States, have adopted the same national system, and in the United States 35 of her Commonwealths and Territories had, on or before the first of Janu¬ ary 1917, enacted either compulsory or elective compensation acts. In general, the administra¬ tion of the compensation acts is entrusted to a commission, that established in Wisconsin in 1911 being generally regarded as an efficient type.

1. (b) State control of wages has for rea¬ sons that are readily appreciated made much less progress than public regulation of the con¬ ditions under which the laborer works. The movement of establishing public control of wages began in New Zealand in 1894, and for 15 years thereafter was confined to the coun¬ tries in that corner of the globe. Since 1909, when the first minimum wage act in any of the older countries was passed by the enactment of the Trade Boards Act of October 1909, in Great Britain, the system has been extended in that country to coal mines by the act of 29 March 1912, and in the United States to various lines of work in certain of the com¬ monwealths. The arguments relied upon to defend the system of minimum wages are similar in their nature and in their validity to those advanced in favor of the compensation acts, namely, the failure of competitive forces to insure a fair distribution of wealth for those engaged in certain occupations. While no method has yet been devised by which a reason¬ able wage may be determined by law it has not proven impracticable to establish minimum wages in the sweated industries on the basis of wages for similar work in the non-sweated industries. The object and the natural results of minimum wage legislation then is found to

2. Workmen's Compensation Laws of the United States and Foreign Countries, Washington, D. C., Bureau of Labor Statistics.

be the restoration of normal competitive con¬ ditions by state action in those industries where the laissez-faire system has for reasons that are sometimes obscure, but more often patent, failed to work.

1. (a) From the age of Elizabeth, when the English patents of monopoly threatened to be¬ come a prominent feature of the Crown's pre¬ rogative, up to the period of the Civil War in the United States, competition between indus¬ trial and commercial enterprises was suffi¬ ciently active and at the same time sufficiently moderate to prevent the growth and develop¬ ment

of industrial monopolies in a large way. Immediately after the conclusion of the Civil War conditions began to change, the new con¬ ditions tending to promote the growth of large combinations and consolidations in various fields of industrial activity. The first of these conditions was economic, the second moral and intellectual. With the development of steam as a motive force, the larger factories were found to be more efficient as producers of standardized commodiesˆ and a process of elimination thereupon followed, the smaller fac¬ tories giving way to the larger ones. At the same time the proprietors and managers for¬ merly abnormally hostile and suspicious began to get acquainted with each other at the clubs and at informal gatherings, and as a result of this acquaintance they discovered that, contrary to their former beliefs, co-operation was often¬ times more advantageous than open and con¬ tinuous warfare. As a result of these two con¬ current forces the consolidation movement be¬ gan first among the railroads and later among the industries. The railroads began consoli¬ dating even before the Civil War, while the first of the great industrial consolidations began with the union of the interests of . the Rocke¬ fellers, Andrews, Harkness and Flagler, in 1867. From that date until 1904, when the govern¬ ment became active in controlling the forma¬ tion and operation of various kinds of combi¬ nations, the consolidation movement was unin¬ terrupted in its progress when measured either by the number of enterprises united or by the size of the resulting organizations. The trust movement began to attract public interest in certain sections of the country as early as 1877, although it was not until 10 years later that the problem became a national one. As a re¬ sult of the investigations made by Congress in connection with the preparation and enactment of the Interstate Commerce Act of 1887, pub¬ lic attention became more intensely focused upon consolidations, their nature and import, and after two years of discussion the Sherman Act of 1890 was enacted into law. During the same period the State legislators were engaged in investigating combinations and in passing certain acts to protect intrastate business from monopolistic enterprises, so that by the end of the 19th century 32 of the American States had anti-trust acts on their statute books. Not¬ withstanding the legislation prohibiting such organizations, the trusts continued to develop, and it was not until the creation of the Bureau of Corporations, 14 Feb. 1903, and the simul¬ taneous adoption of a vigorous administrative policy by the Department of Justice, that the trust movement

began to abate. Since 1903 a considerable number of combinations have been

dissolved, several of the corporate consolida¬ tions have been disintegrated and at the same time the formation of new combinations and new consolidations has generally ceased. When America entered the World War, suits then in progress, directed against several of the larger consolidations, were by action of the Supreme Court, on motion of the Attorney-General, postponed for the duration of the war. It may be inferred, as a result of the better knowl¬ edge of co-operative effort engendered during the World War, that the policy of the adminis¬ tration and of the courts will be affected in such a way that decisions like that rendered in the Northern Securities case of 1904 will no longer be possible. On the other hand, combi¬ nations will be judged from the efficiency standpoint and government control established in such a way that their efficiency may redound to the common good.

1. (b) In 1914 an important change in the laws relating to combinations and competitive methods of doing business was introduced by the repeal of the act creating the Bureau of Corporations, and the enactment of two addi¬ tional statutes for the better regulation of the activities of business enterprises. The first of the two acts was that creating the Federal Trade Commission*; the second, the Clayton Act.f The result of the legislation of 1914 was to establish a commission of five, persons in place of the Bureau of Corporations and to impose upon the newly-created commission cer¬ tain additional duties, of which the most im¬ portant are : the enforcement of fair methods of competition^ and the establishment of certain standards by which fair competition may be judged. During the year ending 30 June 1918, the Commission received 332 complaints charg¬ ing unfair competitive methods or other viola¬ tion of the acts under which they were oper¬ ating. Since the creation of the Federal Trade Commission much more attention has been given to maintaining fair competition among competing business enterprises and less to the investigation of the combinations of various kinds. If, as confidently believed by many students of industrial conditions, the establish¬ ment and maintenance of fair competitive con¬ ditions by government action is efficacious in preventing many types of combinations, then the problem of industrial monopoly for the immediate

future is partially if not completely solved.

2. While the state has always either directly or indirectly exercised its sovereign right of taxation for the purpose of providing revenue to meet its expenses, it was not until recent years that tax systems were designed with the avowed purpose of controlling the production and the distribution of wealth. Taxes for the purpose of controlling production, either directly or indirectly, are illustrated by those on bever¬ ages, narcotics and certain drugs. Sometimes the article itself is taxed, sometimes the privi¬ lege of selling, as license fees for saloons and other articles whose consumption it is desired to check. Another example of ancient lineage is the tax on importation or exportation. In

3. Act of 26 Sept. 1914, 38 Stat. 717.

t Act of 15 Oct. 1914, 38 Stat. 730.

j Consult Stevens, Political Science Quarterly, June 1914, p. 283 et seq.

this case production is checked in one country and promoted in the other, the ultimate effect of the tax being determined by the rate of the tax and by the elasticity of the demand. The international economic effects of State control through import duties is aptly illustrated by the historical evolution of Great Britain and Germany. The former nation has followed the policy of laissez-faire with respect to foreign trade, the latter that of public control through the tariff. Great Britain became a specialist in manu¬ facture with a consequent large development of international commerce. Germany became an all-around producer, a farmer, a manufacturer, a trader and a financier, good in each without being pre-eminent in any. When the World War came on, England's most vulnerable spot was her dependence on foreign trade for food as well as for a portion of her raw materials, and Germany, well knowing this, launched her sub¬ marine campaign as her best line of attack. To parry this offensive, England was obliged to maintain at her peril her acknowledged mastery of the seas in order that her merchant marine might bring the requirements which her position as a specialist daily demanded. Ger¬ many on the other hand was able to withdraw from the seas since her diversified powers of production were sufficiently extensive to pro¬ vide for her major wants for a considerable period of time. In view of the experience of England and Germany some publicists have argued that taxation through tariffs ought to be more widely used for the

purpose of forc¬ ing a nation to become more largely self-suffi¬ cient in the production of the essentials of a complete national life.

Taxation for the purpose of controlling the distribution of wealth has long been under¬ stood by economists and statesmen but, for rea¬ sons that are patent, little used until the recent World War furnished the necessary stimulus by imposing burdens upon the participating gov¬ ernments so stupendous that the historic meth¬ ods of raising revenue were found to be en¬ tirely inadequate. To find additional reve¬ nue without at the same time imposing burdens of crushing weight upon the poorer classes of society, rates of taxation, it was thought, must progressively increase with the size of the income. As a result of the war, then, we have a new system of taxation in actual operation, one whose ultimate effect is to change profoundly the distribution of wealth by relieving certain of the poorer classes largely if not entirely from the paying of taxes based upon incomes and imposing far weightier bur¬ dens than ever before upon those whose in¬ comes exceed the requirements of rational life.

V. War, by emphasizing the importance of concerted action, strengthens the hands of those who believe in an efficient and extensive system of state control, and at the same time and for the same reason weakens the cause of those who favor the policy of economic liberalism. On this account the period beginning with the Civil War of 1861 and terminating with the Franco-Prussian War of 10 years later marks a turning point in the growth of state control. It was generally conceded that the Prussian system was efficient and the results of the three wars by means of which Prussia became the dominant force in central Europe argued so eloquently for strongly centralized governments

acting under wide powers that even England and the United States began to study, to admire and then to copy the style of government which they had previous to this period condemned in theory* and avoided in practice. f But even though yielding somewhat to the adherents of the Prussian system the rank and file of the Eng¬ lish and American people resisted the proposed innovations, and when the World War came in August 1914, both nations, Great Britain and the United States, were still predominantly exponents of a modified Laissez-faire system. Germany on the other hand, partly as a result of certain habits and traditions and partly be¬ cause of the fact that she

was always either en¬ gaged in, or preparing for war, continued to extend the activities of her government so widely and so deeply that no private interest and no individual was left untouched. By this process of prussianization, individuals instead of being left free, either partially or wholly, to pursue their own courses as it seemed best for their own interests, were forced to shape their activities in accordance with the policies de¬ termined upon by the government of the day. Industries that were thought to be essential for success in war were fostered and protected by subsidies or other favoring legislation. Economic and social institutions were en¬ couraged and established or discouraged and prohibited according as they were thought to be elements of national strength or causes of national weakness. The general results of this policy became evident immediately the World War was well under way. England and the United States, strong in peace, were weak in war. France, a nation historically opposed to extensive state control, had so far copied the Prussian system as to maintain a formidable standing army while otherwise following the policy of England and the United States. France therefore was able to hold the German forces in check while England and the United States, the pronounced exponents of economic liberalism, began to prepare, the former because she became a participant at the outset, the latter because it early became evident that she might be involved at any instant. Both England and the United States thus found it necessary in the interests of national efficiency to abandon their historic methods of managing their domes¬ tic affairs and substitute therefor the one by which Germany had so completely unified her national resources, men and materials, labor and capital, and turned the machine thus created upon those who threatened to block her path in her quest for world empire.

To accomplish the transition from a laissez- faire government to a system of complete State control, England, France and the United States followed similar paths. To secure adequate transportation facilities for the national needs it was early perceived, especially in England, that the railway, shipping, telegraph and tele¬ phone, all these instruments of communication, must be operated as units under the direct con¬ trol of the central governments and with small delay the required authority was granted the several administrations. Communication through railways, ships, telegraphs and telephone is, however, only an instrument of production, and production of arms, of food and of clothing, in

- Pollock, ‘ History of the Science of Politics.’

t Dicey, 4 The English Constitution.’

the necessary quantities and of the proper kinds were equally essential to the successful prosecution of the war. Factories that had been producing non-essentials must be made to produce essentials and farms and mines must join the factories in furnishing raw materials, food, minerals and other necessary articles for an efficient life. To secure control over produc¬ tion, factories and mines were commandeered, enlarged or closed down as the situation de¬ manded. Having secured control of production and communication, a third step became natural in all cases and necessary in some, that of con¬ trol over distribution by means of which ma¬ terial and labor available for use could be divided among men and industries in such a way that each unit of productive power would be most useful to the nation without regard to any other factors. In carrying this policy of completely unified state control into operation, the United States adopted a somewhat different plan from that followed in England. Whereas in the latter country authority was largely cen¬ tred in the ministry of munitions, in the former it was divided up among a considerable number of administrative organs, partially in¬ dependent although in general centralized under the immediate control of the President. Thus where England had her ministry of munitions, the United States had the food and fuel ad¬ ministrations, the emergency fleet corporation, the war trade board, the war industries board, the federal railway administration, the national war labor board, the labor policies board, and the United States employment service, all act¬ ing as separate entities except as unified by the common control exercised by the chief executive. By such means, the industrial ac¬ tivities of all classes of citizens in the allied countries were soon after the beginning of the war as completely and it is probable, as efficiently controlled as in that great proto¬ type of state control, Germany herself.

Now that the war is over and peace has come again the question as to whether economic liberalism has been abandoned permanently or only temporarily is the most important one now before the western world. The ease and fa¬ cility with which the allied nations transformed themselves into fighting machines, the initia¬ tive and resourcefulness displayed by industrial leaders and working men in conducting to a successful conclusion a war for which they had not directly perpared, furnishes strong if not conclusive evidence that the economic sys¬ tem under which they have been living and prospering in the past possesses merits of such a character that it should not be lightly dis¬ carded in favor of one that has been proven to be provocative of wars and destructive of individual initiative and individual character.

Maurice H. Robinson,

Professor of Economics, University of Illinois.

STATE AND CORPORATION. See

Corporations, Legal.

STATE COURTS. See Court.

STATE DEPARTMENT, one of the 10

executive departments of the United States government. It is presided over by the Sec¬ retary of State (q.v.), who is a member of the Cabinet, and next in line to the Vice-President for the Presidency. The department was estab¬ lished by act of Congress, 27 July 1789.

Through this department communication is made between the United States government and any of the States or any foreign country. The department has charge of the great seal of the United States; of all ambassadors and con¬ suls, and in its custody are all engrossed copies of the laws of the United States and of all treaties. The Secretary of State publishes all statutes and resolutions of Congress and all proclamations of the President of the United States. Under his charge, too, are all passports issued to American citizens visiting foreign countries ; and all warrants for the extradition of criminals for delivery to foreign govern¬ ments. It is the duty of the Secretary of State to make a report of the activities of his depart¬ ment annually as to its conduct of the foreign relations of the United States. There are three assistant secretaries in the department and a large force of clerks, translators, librarians and other employees. Bigelow, John, (Breaches of Anglo-American Treaties) (New York 1917) ; Butler, C. H., (The Treaty-making Power of the United States *(New York 1902) ; Corwin, IP, (The President's Control of Foreign Rela¬ tions* (Princeton 1917); Foster, J. W., A Century of American Diplomacy* (Boston 1900) ; Hasse, A. R., (United States Documents Relating to Foreign Affairs * (Washington 1914) ; ˆHistory of the Department of State) (Washington 1901) ; Johnson, W. F., Ameri¬ can Foreign Relations) (New York 1916) ; Moore, J. B., American Diplomacy) (New York 1905). Consult also the various reports of the secretaries of State.

STATE EXECUTIVE. See Executive.

STATE FORESTRY. See Forestry in the United States.

STATE GOVERNMENT, American.

<(The States,® said Lincoln, <(have their status in the Union and they have no other legal status.® The powers reserved to the States, their obligations to one another and to the Union, and the obligations of the Union to them : all are provided for in the Constitution of the United States. The people of. the United States under their National Constitu¬ tion have assumed the obligation of guarantee¬ ing to each State the republican form of gov¬ ernment, of protecting it against foreign in¬ vasion and domestic insurrection and of secur¬ ing to its citizens all the rights and privileges of citizens of the United States. Each State, on the other hand, is obliged to respect the supremacy of the Constitution, the laws and the treaties of the United States and to per¬ mit its government to act for certain purposes as the agent of the government of the United States. In general, however, the government of the United States operates directly upon the people of the United States and there is no occasion to rely upon the State govern¬ ments for the accomplishment of national pur¬ poses. The States are also obliged to give full faith and credit to one another's public acts and records, to extend equal privileges to one another's citizens, to return fugitives from justice and to submit controversies among themselves, if not settled by mutual agreement, to the arbitrament of the Supreme Court of the United States. The power of the national government, however, to enforce some of these obligations is defective.

Powers of the States. — The powers re¬ served to the States may be said in a general way to include all the powers .of free and in¬ dependent States, except: (1) those which are expressly delegated to the government of the United States or are reasonably implied in the grant of the expressed powers; (2) those which are expressly prohibited to the States ; and (3) those which, though neither expressly delegated to the national government by the Constitution nor prohibited by it to the States, are reserved to the people of the United States. Of the powers expressly delegated to the na¬ tional government some, such as the power to govern the territories of the United States or the District of Columbia, do not directly affect the p.owers of the States. Some of those, however, which do not directly affect the powers of the States, such as the powers to tax, to regulate interstate and foreign com¬ merce, and to make treaties, may be used in such a manner as indirectly to affect very strongly the exercise by the States of their re¬ served powers. Others, such as the power to establish a uniform bankruptcy law, may not limit the powers .of the States unless Congress expressly so orders. Some powers, such as the

power to coin money, are re-enforced by express prohibitions upon the States. The other express prohibitions uipon the States are of varying importance. Probably the most important, besides those intended to give the national government exclusive control of for¬ eign relations and the conduct of war, are those incorporated in the Constitution at the close of the Civil War, notably the provision that no State shall deprive any person of life, liberty or property without due process of law nor deny to any person the equal protec¬ tion of the laws. Finally, the reservation of certain rights to the people of the United States by the 10th amendment, adopted in 1790, prevents the States from exercising any powers which, though not expressly delegated to the national government nor prohibited to the States, _ are essential to the preservation of the sovereignty of the Union.

The people of the several States are sub¬ ject to the sovereignty of the people of the Union, but the people of each State are equal to those of any other before the law of the Constitution. Congress may admit new States to the Union, imposing such conditions as it may deem suitable as the price of admission, but once within the sacred edifice a new State becomes the peer of the others. The powers which the States may exercise, though limited, are nevertheless very extensive and highly im¬ portant. They include among others the fol¬ lowing: (1) the power to establish and main¬ tain organized governments, State and local, subject to the limitation that they be republi¬ can in form; (2) the power to regulate the suffrage, both in State and in national elections, subject to the limitation that no citizen be deprived of the vote on account of race, color or previous condition of servitude; (3) the power to levy and collect taxes, except upon the instruments of the national government and upon interstate and foreign commerce; (4) the police power, including the power to enact all measures restricting the personal freedom of the individual or his use of his property,

which may be necessary and proper for the preservation of the peace, the protection of the public health and morals or in any other way for the promotion of the common wel¬ fare, subject to the limitation that no person be deprived of life, liberty or property without due process of law or denied the equal protec¬ tion of the laws; (5) far-reaching powers to deal with education, religion and the supply of public services of all kinds, except the com¬ paratively few, such as the post office, which are placed in the hands of the national govern¬ ment ;

(6) the power to create corporations and trusts; and (7) to deal with the whole subject of private law, including the power to regulate the vital institutions of modern civilization, such as the family and the institution of pri¬ vate property. Despite the growing centraliza¬ tion of government in the United States, evi¬ denced by the adoption of the 18th Amendment to the Federal Constitution, the so-called pro¬ hibition amendment, the powers of the State remain, as they were in the beginning, more important than those of the Union, so far as concerns the regulation of the daily life of the people.

Rights of the States. — The basis of the State is the Constitution of the United States, but the basis of State government is the State constitution. The original State constitutions, adopted at the time of the Revolution, con¬ tained (1) an enacting clause, (2) a frame of government, (3) a schedule, and (4) in most cases a declaration of rights. In some cases there was also a preamble, setting forth the reasons for the adoption of a State constitu¬ tion and intended to justify the overthrow of the former government. The declaration of rights ordinarily comprised a statement of the political philosophy of the Revolution and of the civil rights claimed for the people. The political philosophy was not radically different from that set forth nearly a hundred years earlier by John Locke in justification of the English Revolution of 1688. The civil rights were of two kinds: (1) abstract rights, such as the right to freedom of speech and of the press ; and (2) concrete rights, such as the right to the writ of habeas corpus and to trial by jury. Practically it was upon the latter kind of rights that the former were de¬ pendent for their force. The declarations of abstract rights, to be sure, had their effect upon public opinion and thereby indirectly upon the conduct of government, but the sys¬ tem of trial by jury enabled the people to im¬ pose a direct check upon the acts of those in authority. The schedule dealt with such matters as the boundaries of the State and the transition from the provisional to the con¬ stitutional government. The frame of govern¬ ment was a body of rules for the organization of the government and the division of powers between its several branches. It also regu¬ lated to some extent the conduct of elections and the procedure of the legislative, executive and judicial departments. The enacting clause expressed the purpose of the Constitution and set forth its sanction in the will of the people. The existing State constitutions contain, in addition to the foregoing, a good deal of ordi¬ nary legislative matter, inserted from time to time by State constitutional conventions for

the purpose of putting it beyond the reach of ordinary legislatures. Some of this matter is important, such as measures for the regula¬ tion of the liquor traffic, but much of it is comparatively trivial.

The Suffrage. — The fundamental organ of government in the States is the electorate. The right to vote was originally conferred only on those who were deemed to have a sufficient interest in the welfare of the State and who were otherwise fit. Manhood suf¬ frage did not exist. During the first half of the 19th century it was established in substan¬ tially all the States, so far as white men were concerned, and after the Civil War the ballot was extended to the freedmen. Meanwhile a reaction had set in against the principle of manhood suffrage. First, literacy qualifica¬ tions were established in several northern State to exclude uneducated foreign-born voters and then qualifications of various kinds were established in the southern States to ex¬ clude Negro voters. At present qualifications designed to restrict the franchise to those who are deemed fit exist in just half the States. The extension of the ballot to women on the same terms as to men began in the territories of the west. Equal suffrage for men and women now exists in more than a third of the States, and in several others women may vote for presidential electors and most local officers, though not for governor and members of the State legislature. There is a larger number in which they may vote in certain local elections, particularly in public school elections. The 19th Amendment to the Federal Constitution will, however, put an end to disfranchise¬ ment on account of sex. In most States the voters must be registered, at least in the larger cities, in order to exercise their right. In most States also the ballots are printed and elections are conducted by public officials at public expense. The collection and expendi¬ ture of money by candidates for election and by political parties is generally regulated by law and corrupt practices are carefully defined and prohibited.

State Legislatures. — The State legislatures consist of two branches. The lower branch, generally called the house of representatives, contains as a rule from two to three times as many members as the upper, which is always called the Senate. The number of members of the lower branch ranges from 35 in Ari¬ zona and Delaware to 402 in New Hampshire. The number of senators ranges from 17 in Delaware to 63 in Minnesota. In most States the county is the basis of representation in both branches of the legislature. Various methods of apportionment have been adopted for the purpose of adjusting representation more or less accurately to population, but in many States there is deliberate discrimination against the larger cities in the apportionment of members. The term of members of the lower branch is two years in almost all States, and that of senators in the majority of States is four years. Members of the legislature are paid in all States. In most States the rates are low; in some they are no more than the wages of unskilled manual laborers. In most States the legislature

meet regularly once in two years and the length of the session is gen-

erally limited to 60 or 90 days. Both the powers and the procedure of the legislatures are more or less strictly limited by the State constitutions. The legislative powers are con¬ ferred equally on both branches, with the ex¬ ception that money bills must originate in the lower. The senates are also entrusted with certain executive and judicial powers, notably the power of confirming executive appoint¬ ments and of trying impeachments when brought by the lower branch. In practice the latter power has proved of little importance, whilst the former has made the Senate an ex¬ ceedingly important factor in executive affairs in all States where the executive has much patronage. In general the working of the legislatures has been the least satisfactory feature of State government.

The Governor. — Most of the State con¬ stitutions declare that the governor shall be the chief executive magistrate, but few con¬ stitutions actually confer on him the powers necessary and appropriate for a chief execu¬ tive. His principal associates are generally elected, like himself, directly by the people, and for terms as long as his own. It is con¬ sequently impossible for him to direct them in the conduct of their offices. Though in all States the governor may appoint some of the department heads and members of administra¬ tive boards and commissions, his power of re¬ moval is often surrounded with restrictions which render him more or less of a figurehead in the actual conduct of administration. The importance of the office of governor results mainly from its political powers, notably the power to recommend measures to the consid¬ eration of the legislature and to veto bills which though passed by the legislature are objection¬ able. In most States the veto power extends to the veto of items in appropriation bills, thus giving the governor a specially strong position with respect to appropriations. The State constitutions further provide that an executive veto may be overridden by special majorities in the legislature, but in several States, where a two-thirds majority of all the elected members in each branch is required to pass a measure over a veto, it is exceedingly difficult in practice to do it. Moreover in States where the length of legislative sessions is strictly limited, most of the measures are passed in the last days of the session and the executive veto is not exercised upon them un¬ til after the session has closed. Thus the gov¬ ernor has come to be the chief legislator rather than the chief executive of the State.

Administrative Agencies. — The expansion of the administrative activities of the States in recent years has caused a great increase in the number of separate administrative agencies. In New York there were more than 150 sepa¬ rate administrative agencies in 1915 and in several States there were over 100. Some of these separate administrative agencies, such as tax commissions, railroad and public serv¬ ice commissions, industrial Gommissions and departments of health and various special boards and offices charged with the adminis¬ tration of laws for the regulation of industry and the protection of labor, exercise impor¬ tant powers. In practice they are much more subject to control by the courts than by the

nominal chief executive of the State. In a few States appointments to minor places in the administrative service are made from lists of applicants certified as competent by State civil service commissions, but in most States ap¬ pointments are made by the governor or the department heads at their discretion, except so far as limited by the requirement of sena¬ torial confirmation or by special conditions laid down by law. In general, political considera¬ tions outweigh considerations of fitness too often for the good of the public service. Econ¬ omy and efficiency in State administration tend to suffer from neglect.

The Judiciary. — The State judiciary are elected directly by the people in three-fourths of the States. In the others they are appointed by the governor or elected by the legislature. In the central and western States popular elec¬ tion is universal. Terms of Supreme Court judges vary from two years in Vermont to 21 years in Pennsylvania, but in most States the term ranges from 6 to 12 years. In Massachu¬ setts the judges hold office during good be¬ havior, like Federal judges. Salaries, as in the case of other State elective officers, are in most States comparatively low. Terms of judges of lower courts are generally shorter and salaries lower. The organization of the courts is generally regulated in the State con¬ stitutions. In most States it is highly decen¬ tralized. Magistrates' courts of various kinds exercise a limited jurisdiction in the towns and cities, above them in most of the States are the County Courts, apd between the latter and the highest court of the State there are as a rule one or more intermediate courts with varying original and appellate jurisdictions. The States are generally divided into fixed judi¬ cial districts in order to localize these inter¬ mediate courts, and a separate court with a prescribed. number of judges is organized in each district. . The resulting judicial system is highly inelastic and not infrequently uneconom¬ ical and inefficient. On the whole, however, the working of the judicial system is more satis¬ factory than that of either of the other prin¬ cipal

departments of State government.

Amendment of State Constitutions. — Two different modes have been provided in almost all States for the revision and amendment of State constitutions. One is by the constitu¬ tional convention. The organization and pro¬ cedure of constitutional conventions is far from uniform. In some States a convention may be called by the legislature at any time. In others the approval of a majority of the voters is required before a convention may be called. In some States the number and manner of election of delegates to a convention is regu¬ lated by the constitution. In others the legisla¬ ture may determine the numbers and manner of election. Most conventions, however, are actually organized upon the model .of the 'lower branch of the legislature. In some States a convention may put the revised constitution, when agreed upon, in force without further reference to the people. In most States refer¬ ence to the people is required or is practised without any special requirement. The other mode of constitutional change is by the pro¬ posal of specific amendments by the legislature, subject to approval by a majority of the voters.

In some States a proposed amendment must be adopted by two successive legislatures before it can be submitted to the people. In others adoption by one legislature is enough. In all States the legislature must approve a proposed amendment by more than a bare majority vote. Recently beginning in Oregon in 1902, a fourth of the States have established another mode of constitutional amendment not requiring ac¬ tion by the legislature or by any other repre¬ sentative body. This is the so-called con¬ stitutional initiative. Upon petition of a pre¬ scribed number of voters a proposed amend¬ ment is placed directly on the ballot and may be adopted by a majority of the voters.

The Initiative. — A larger number of States, beginning with South Dakota in 1898, have established the statutory initiative. Upon peti¬ tion of a prescribed number of voters an ordi¬ nary legislative measure may be proposed for adoption directly by the voters. This pro¬ cedure for direct legislation by the people is generally associated with the direct popular referendum, a device by means of which the voters may veto a measure which, though en¬ acted by the legislature, is objectionable to them. In 1919 the statutory initiative existed in 19 States and the popular referendum in 21 States. In some of these,

notably Oregon, California, Arizona and Colorado, the initia¬ tive and referendum have been freely used in recent years.

Party System. — Actual government in the States is profoundly affected by the existence of the party system. In most of the States the political party is recognized by law as an in¬ strument of government. In all of them the nomination of candidates for elective office is entirely in their control, and to a considerable extent the nomination of candidates for ap¬ pointive office is practically vested in the leaders of the party organizations. A political party is commonly defined as an association of voters which at the last preceding election polled not less than a certain number of votes, or a certain percentage of the total vote for some representative office. This qualification is usually easy to meet. A political party, when recognized, becomes entitled to the exclusive use of a party name and, in most States where illiterates may vote, also a party emblem, which assists the illiterate in marking his ballot. The number of recognized parties varies, but in most States is at least three and in some as many as six. Only two parties, however, are anywhere of major importance, and in many States one of these is generally much more successful than the other. In most States the major parties are now required to make their nominations at primary elections, which are conducted by public election officers at public expense. In some of these States the voter may attend the official primaries and help nominate the candidates of any party^ he chooses without divulging his party affiliation. In the greater number of States, however, he must declare his party affiliation before he can participate in the nomination of candidates, the voters' declarations being checked by a system of party enrolment. The organization of the parties also is commonly regulated by law, and the members of the party com¬ mittees, like the candidates for public office,

are selected at the primaries. The regulation by law of the methods of nomination has been accomplished for the most part within the last quarter of a century, and the establishment of the direct primary system has been the work of the last 15 years. Taken together with the introduction of the Australian, or secret offi¬ cial ballot, the legal recognition of parties and the regulation of their proceedings has brought a great improvement in the conduct of elec¬ tions and in the general tone of politics in the States. See Appointments, Federal, State and Local; Apportionment; Appropriations, American System of; Budget; Federal Government; Legislation; Legislature.

Bibliography. — Bryce, James, (The Amer¬ ican Commonwealth *(pts. ii, iii, new and rev. ed., New York 1910) ; Beard, C. A., (American Government and Politics) (pt. iii, new and rev. ed., New York 1914) ;*

Hart, A. B., (Actual Government (pts. i-iii, 3d ed., New York 1909) ; Willoughby, W. W., (The American Constitutional System *(New York 1904) ; Reinsch, P. S., (American Legislatures and Legislative Methods* (New York 1907) ; Finley, J. H., and Sanderson, J. F., (The American Executive and Executive Methods) (New York 1908) ; Baldwin, S. E., (The American Judicial (New York 1905) ; Cooley, T. M., (A Treatise on the Constitu¬ tional Limitations which rest upon the Legis¬ lative Power of the States of the American Union) (7th ed., Boston 1903) ; Goodnow, F. J., (The Principles of the Administrative Law of the United States> (New York 1905) ; Mathews, J. M., (The Principles of American State Administration (New York 1917) ; Dodd, W. F., (The Revision and Amendment of State Constitutions> (Baltimore 1910) ; Croly, H., Progressive Democracy> (New York 1914) ; Holcombe, A. N. (State Govern¬ ment in the United States) (New York 1916) ; Dealey, J. Q., (Growth of American State Constitutions) (Boston 1915) ; Stimson, F. J., (The Law of the Federal and State Con¬ stitutions of the United States) (Boston 1908 J .

A. N. Holcombe,

Department of Government, Harvard University.

STATE GOVERNMENTS, Character¬ istics of. As a federation, the government of the United States comprises the national gov¬ ernment controlled by its legislative and ad¬ ministrative departments, and the separate gov¬ ernments of the 48 States of the Union. Under the national Constitution, each State may or¬ ganize its government system as it pleases, but it must be republican in form, or organized so that the will of its citizens can be ascertained and enforced. When forming the Union under the Constitution of 1787, the 13 original States reserved to themselves certain characteristic rights, which the Federal government is bound by fundamental law to respect. These can be reduced only by amendments to the Constitu¬ tion. Nearly all forms and powers of gov¬ ernment were comprised in the sphere of State authority with the exception of those relating to foreign affairs, army and navy, interstate commerce, coinage and the tariff, the powers of the national government being specified in the fundamental law. The individuality, the dignity of the sovereign State, the only gov-

ernment officially known to foreign states, is represented by the

national government pos¬ sessing the powers involved in international relations, including war and diplomacy. In domestic matters, general economic interests are under its control. By contrast, the States control the mass of governmental power in respect to life, property and education and legislate freely on property rights, occupations, crimes, charities, sanitation and schools. Ex¬ cept import and export taxes, each State may levy what taxes it pleases ; and it may legis¬ late for the general welfare of its citizens sub¬ ject only to the few restrictions of the national Constitution. The differences of taxation and legislation in each State form their distinctive characteristics. See State; Taxation; United States — States Constitutions ; and articles on the different States of the Union.

STATE MILITIA. See Militia.

STATE SYSTEMS OF EDUCATION.

The government of the United States has never exercised control or supervision over public education. The American people were not prepared for a national system of education when the foundation of the national govern¬ ment was established by the adoption of the Constitution of the United States. That docu¬ ment does not, therefore, contain a single pro¬ vision in relation to the subject of education. There was not that common mutual interest in the social, industrial, commercial and political relations between the several (States which later gradually developed among them. There was much prejudice and even fear against the power of a centralized national government. The idea of State control in all matters pos¬ sible prevailed to a large extent among the people of all the States. While the subject of education was not regarded generally by the national leaders as one to receive their con¬ sideration, there were men in all parts of the country who recognized the vital need of es¬ tablishing schools for the education of all children. Even in colonial days this idea had strong support in many of the colonies, notably in Massachusetts, New York, Connecticut, Rhode Island, New Jersey and Pennsylvania. The Dutch settlers brought with them the ideas of governmental institutions which pre¬ vailed in Holland. In the Dutch settlements schools had generally been established. The English Dissenters also brought with them their beliefs on social problems and they also organized schools in their settlements. When States were organized and institutions were being developed to meet the social needs of a progressive people, the influences which had been created by these forces were bound to be a potent factor. In these States, therefore, the establishment of schools received early consideration. The British evacuated the City of New York in November 1783, and

within two months from that time Governor George Clinton was urging upon the legislature of New York the need of schools in the follow¬ ing language :

“ Neglect of the education of youth is among the evils consequent on war — perhaps there is scarce anything more worthy your attention, than the revival and encouragement of seminaries of learning; and nothing by which we can more satisfactorily express our gratitude to the Supreme Being for his past favors; since piety and virtue are generally the offspring of an enlightened understanding.”

Gradually each State by legislative enact¬ ment either continued the schools established by the colony or authorized the establishment of new schools. In many cases special acts conferred upon a particular community the authority to maintain a school. The general laws authorizing and requiring all communi¬ ties in the State to provide schools were en¬ acted. State aid was gradually extended. Thus through a process of legislation there was gradually established a system of education in every State in the Union. By this method the accepted policy of the nation in relation to public education was adopted and that policy is the voluntary action of each State in organ¬ izing and maintaining a State system iof public education. When the practice of a State upon a subject has been continued for a long period of years so that such practice becomes the fixed policy of the State, the people of the State usually express that policy in their State con¬ stitution. When new States are admitted to the Union such States adopt a constitution, and it has been the settled practice of the newer States to incorporate in their constitu¬ tions a provision requiring the maintenance of a system of free schools. As the constitu¬ tions of older States have been revised a pro¬ vision relating to education has been incor¬ porated in such constitutions. The State of New York, which enacted a general law estab¬ lishing a State-wide school system in 1812, did not include an article in her constitution in relation to education until 1894.

Nearly every State in the Union has written in its constitution a provision requiring the maintenance of a system of free common schools. These constitutional provisions are similar to the following:

Minnesota (sec. I, art. 8). — “ The stability of a repub¬ lican form of government depending mainly upon the in¬ telligence of the people, it shall be the duty of the Legislature to establish a general and uniform system of public schools.”

Oklahoma (sec. I, art. 13). — “ The Legislature shall establish and

maintain a system of free schools wherein all the children of the State may be educated."

New York (sec. I, art. 9). — ** The Legislature shall pro¬ vide for the maintenance and support of a system of free common schools, wherein all the children of this State may be educated."

It must not be inferred that, because the national government has not assumed direction and control of education throughout the coun¬ try, it has not been interested in public educa¬ tion. On the contrary, the government has given aid in various forms to the support of education in the States for nearly a century.

In 1836 the national government distributed several million dollars of surplus funds among the States. In 1862 the National Land Grant Act was passed. This was followed by the Second Morrill Act, the Nelson Law, the Adams Law, the Smith-Lever Law and, in 1917, by the Smith-Hughes Act. The national government has given for public education nearly one hun¬ dred million acres of land. It has also established various agencies which exercise functions in relation to the educational affairs of the country. The Bureau of Education in the Department of the Interior and the Federal Board for Voca¬ tional Education are two important agencies dealing with education. It appears that more than 80 other agencies, which have official rela¬ tions in one way or another with the school sys¬ tems of the several States, have also been estab-

lished by the national government. There is now pending before Congress a bill creating a national department of education, whose head shall be a member of the President's Cabinet and known as Secretary of Education. Not¬ withstanding this aid to education on the part of the national government, and the activities of the nation in promoting the interests of edu¬ cation throughout the country, education in America remains subject to the control and direction of the several States. Even under the terms of the bill pending in Congress the con¬ trol of education by the several States remains undisturbed.

Under this general plan which has been fol¬ lowed in administering educational affairs, there has grown up in America a fundamental prin¬ ciple of school administration which is becom¬ ing more

pronounced and more controlling year by year. That principle is that education is a State function and that all the schools of a State constitute one system — a State system. In other words, the schools maintained in a city or a school district are not independent, detached systems, but they are a part of the State system and subject to general control and direction by the State. The fact that local officers are selected by popular vote or are ap¬ pointed by a mayor does not make these offi¬ cers local or city officers, or the schools local or city schools. These school officers are offi¬ cers chosen by a method determined by the State and for the performance of State func¬ tions, and the schools are a part of a State system.

There is probably no question related to the administration of public schools which is of greater importance at the present time than the distinction between local control and State con¬ trol. All powers exercised by local school offi¬ cers in the administration of schools are powers delegated by the State through legislative enact¬ ment and may be modified or revoked by the agency which conferred them. Local control often means municipal control, and the greatest obstacle that has stood in the way of educa¬ tional progress in the cities of this country has been the control or domination of school af¬ fairs by municipal officers. Where such domi¬ nation has existed the schools have very gen¬ erally been administered upon the same political and partisan bases which have .governed the ad¬ ministration of municipal affairs. In several of the leading cities of the country the mayors and other municipal officers are attempting to override the statutes regulating the administra¬ tion of the schools, to obtain control of the management of such schools and to establish the general policy under which they shall be governed. This interference of municipal offi¬ cers has resulted in legislation in many States to make more secure the right and the author¬ ity of school officers to administer the schools.

The decisions of the courts have uniformly, in the several States, sustained the cardinal principle that education is a matter of general concern to the State and subject to the State's general control and direction.

An examination of the leading cases decided by the courts of the several States in relation to the control and supervision of public educa¬ tion will show that the following fundamental principles of school administration have been clearly established.

1. Public education is a State function or a subject under the control and supervision of the State. Systems of education which

have been established in the several States but ad¬ ministered by local officers in the several locali¬ ties of the State are State systems.

2. The officers chosen to administer laws enacted to operate and maintain a school system in various localities throughout the State are not local officers, neither are they town, village or city officers but public or State officers per¬ forming duties for the public at large.

3. When the officers of a city are authorized to perform some duty in connection with the operation or maintenance of public schools, as the appointment of members of a board of edu¬ cation by the mayor or the collection of taxes for school purposes by a city treasurer, such city officers do not act, in the discharge of such duties, as municipal officers but as special offi¬ cers exercising a power devolved upon them to administer a function of government for the benefit of all the citizens of the State.

4. The laws relating to the schools of a city which are written in the charter of such city are a part of the school laws of the State and not a part of the charter or law of the city.

In support of these fundamental principles the following excerpts are taken from leading court decisions :

“ The power of the States to establish and maintain systems of common schools, to raise money for that purpose by taxation, and to govern, control and regulate such schools when established is one of ‘ the powers not delegated to the United States by the constitution nor prohibited by it to the States; and consequently it is reserved to the States respectively or to their people.” (Marshall v. Donovan, 10 Bush [Ky.] 690).

“It is apparent from the general drift of the argument that the learned counsel for the defendant is of the opinion that the employment of the teachers in the public schools and the general conduct and management of the schools is a city function in the same sense as it is in the case of the care of the streets or the employment of police and the payment of their salaries and compensation; but that view of the relations of the city to public education, if entertained, is an obvious mistake. The city can not rent, build or buy a schoolhouse; it can not employ or discharge a teacher, and has no power to contract with teachers with respect to their compensation. There is no contract or

official relation, express or implied, between the teachers and the city. All this results from the settled policy of the State from an early date to divorce the business of public education from all other municipal interests or business, and to take charge of it as a peculiar and separate function through agents of its own selection, and immediately subject and responsive to its own control. To this end it is enacted in the general laws of the State that all school trustees and boards of education shall be corporations with corporate powers, which, of course, includes the power to sue and be sued in all matters relating to the control and management of the schools." (Gunnison v. Board of Education, 176 N. Y. 11).

" If only elected or appointed in accordance with the mandates of the law to perform a duty which is neither local or corporate, and if they are independent of the corporation in the tenure of their office, and the mode of discharging its duties, they are not servants or agents of the corporation, but public or State officers, with such powers and duties as the statute prescribes, and no action lies against the cor¬ poration for their acts or negligence." (Ham v. Mayor, 70 N. Y. 459).

"|He is an employee of the board of education. It is not a part of the corporation of the city of Brooklyn, but is itself a local school corporation, like every board of school district trustees throughout the State (general corporation law, sec. 3), and is like every such board an integral part of the general school system of the State. It is a State and not a city agency, doing State and not city work and functions. Edu¬ cation is not city, village, county or town business. It is a matter belonging to the State government. From the com¬ prehensive foundation by chapter 75 of the Laws of 1795, down to the recent codification of our school laws (' Consoli¬ dated School Law,' Laws of 1894, ch. 556), our State system of education has remained a consistent whole." (Ridenour v. Board of Education, 15 Misc. 418).

" Where the duties which are imposed upon municipalities are of the latter class, they are generally to be performed by officers who, though deriving their appointment from the corporation itself, through the nomination of some of its executive agents, by a power devolved thereon as a con¬ venient mode of exercising a function of government, are yet the officers, and hence the servants, of the public at large. They have powers and perform duties for the benefit of all the citizens, and are not under the control of the munic¬ ipality which

has no benefit in its corporate capacity from the performance thereof. They are not then the agents or servants of the municipal corporation, but are public officers, agents or servants of the public at large, and the corporation is not responsible for their acts or omissions, nor for the acts or omissions of the subordinates by them appointed. And where a municipal corporation elects or appoints an officer, in obedience to an act of the Legislature, to perform a public service, in which the corporation has no private interest and from which it derives no special benefit or advantage in its corporate capacity, such officer can not be regarded as a servant or agent of the municipality, for whose negligence or want of skill it can be held liable. It has appointed or elected him, in pursuance of a duty laid upon it by law, for the general welfare of the inhabitants or of the community. He is the person selected by it as the authority empowered by law to make selections; but when selected and its power exhausted he is not its agent, he is the agent of the public for whom and for whose purposes he was selected." (Max- millian v. Mayor, 62 N. Y. 164).

** Essentially and intrinsically the schools in which are educated and trained the children who are to become the rulers of this commonwealth are matters of State, and not of local jurisdiction. In such matters, the State is a unit, and the Legislature the source of power. The authority over schools and school affairs is not necessarily a distributive one to be exercised by local instrumentalities; but, on the contrary, it is a central power residing in the Legislature of the State." (Clark v. Haworth, 122 Ind. 465).

" The only function of these trustees is the management of the school and they are officers of the school rather than of the county." (State v. Freeman, 61 Kan. 90).

" The word system as used in the constitution means an organized plan, an institution, something established for the use and benefit of the people so long as the want of public education will continue." (Peay v. Talbot & Bros., 39 Tex.

346).

The following cases are also cited as having a very direct and vital bearing upon the propo¬ sition :

In 1876 James N. Gerard, inspector of schools in the city of New York, was elected to the State senate. His seat in that body was con¬ tested by his opponent, William Laimbeer, upon the ground that the constitution provided that a municipal officer shall not be eligible to

elec¬ tion to the legislature. The committee on judi¬ ciary reported adversely to the claim of the peti¬ tioner and on its recommendation the senate adopted the following preamble and resolution :

“ Whereas, In the judgment of the Senate, an inspector of common schools in the city of New York is not an officer under the city government within the meaning of the eighth section of the third article of the constitution of this State; therefore, Resolved, That the prayer of the petitioner be denied.” (N. Y. Senate Journal, 1876, page 209).

In 1881 the late State commissioner of edu¬ cation, Dr. Andrew S. Draper, was a member of the board of education of the city of Albany. He was elected to the assembly. His seat was also contested upon the same ground that the seat of Senator Gerard was contested. The report of the committee on contested seats, which was an exhaustive treatment of the ques¬ tion and to the effect that a member of a board of education was not a municipal officer, was unanimously adopted. (Assembly Journal, 1881, Volume I, pages 716-727).

It is not contended, not even suggested, that the State control and direction of education which is urged in this article means a State monopoly, of educational affairs. Such a scheme of education would be repugnant to the whole American idea of education. State direction and control of public education means simply that the State shall clearly assert its duty and

obligation to the people and shall guarantee to them full protection in their rights and needs in a matter so vital to their happiness and prosperity. It has been a wise procedure on the part of the States to establish in their State school organizations a local school autonomy. Such action gives to a community the right to provide school facilities which shall not only satisfy the standard prescribed by the State, but to provide even higher standards if the wealth, the commercial needs and prosperity, the social and intellectual attainments, and the sentiment of their people will support them.

The administration of public education on the basis of the State instead of the nation has resulted in great inequality of educational facili¬ ties in the various States of the Union. Some States, because of their wealth and population; are able to provide for the children of such States school facilities which cannot be provided by the sparsely settled and less wealthy States. It is unnecessary to enumerate all of these in¬ equalities, but some are indicated. The school term ranges in the several States from 108 days per year to 194 days per year. In 11

States the period of the school term is less than 140 days. The average number of days which each child attends school ranges from 55 in one State to 134 in another. In 20 of the States the average number of days in the school term is 90 or less, and in 30 of the States it does not exceed 100 days. The expense per capita of the average day's attendance in North Caro¬ lina is $12.31, while it is $86.36 in Montana. The minimum period of compulsory attendance ranges from four months in one State to the full school year in 30 States. It may be said, however, that in several States having a com¬ pulsory attendance law, such law is not en¬ forced. It should be further noted that it has taken one-half a century of hard work to write into the statutes the compulsory attendance laws of the several States.

The difference in the qualifications of teach¬ ers provided for the schools of the several States also results in an inequality of educa¬ tional opportunity for the children residing in such States. It is known that in some States young people 16 years of age, and even under such age, are employed as teachers. In 19 of the States there is no minimum age requirement for teachers employed in the pub¬ lic schools. In a majority of the States large numbers of teachers are employed whose edu¬ cation has been obtained solely in the element¬ ary school. In many States the authority to teach is determined entirely by an examination based on preliminary subjects only.

In 26 States the salary paid the chief execu¬ tive or supervisory school officer is not above $3,000 and runs as low as $1,800. In one of the States the State superintendent of public in¬ struction is chosen at the general election, hav¬ ing been nominated at a direct primary, for a period of two years. He receives a salary of $2,500. His duties are defined in the law as follows :

" To have general supervision of the public schools; keep official records, etc., at his office in the State capitol; furnish to county examiners questions for the examination of teach¬ ers; furnish blanks, registers, etc., to county examiners for use of school officers; prepare and furnish poll books for use at school elections; aid commissioners of the school fund in the administration of the same; make annual report to the governor as to the condition of the schools and the school fund, which report shall be transmitted to the legislature;

apportion annually to counties the State school funds on the basis of

number of persons between 6 and 21 years old; have school laws published and distribute the same; give opinions as to construction of school laws."

This official is a fiscal school officer tinder the duties imposed upon him by law and not a leader directing and stimulating the educational affairs of his State.

A constitutional mandate requiring the maintenance of free schools throughout a State must be interpreted to mean that so far as pos¬ sible the system of common schools established throughout the State shall provide equal educa¬ tional opportunities for all the children of the State. It does not mean that a State school system may be established which must of neces¬ sity, by its very form of organization, give to the children of one section of the State or of any community in the State educational facili¬ ties which are denied the children of another section or of another community. It must also be held that, under this provision of the consti¬ tution, a State school system must be established which imposes equal burdens upon the taxpay¬ ers who support such system. Inequality of taxation for school purposes is unequality of educational opportunity. A school system, therefore, whose administration imposes an in¬ equality of taxation and which does not pro¬ vide equal educational opportunities does not conform to the letter or the spirit of the con¬ stitution and should be modified.

In many States funds have been established, the revenue of which is used for the support and maintenance of schools. In nearly all States provision is made by which funds are appropriated from the State treasury for the support and maintenance of schools, and ap¬ portioned by the chief school officer of the State to the various districts or cities in the State. In some States, as in California, New York, Pennsylvania, New Jersey, Minnesota and Washington, large appropriations are made by the State for the support of the schools. The balance which is needed in any district or city to meet the expense of the maintenance of schools, after applying State funds, is raised by local taxation. Nearly all the States main¬ tain State normal schools for the training of teachers for the public school system, and not only construct the buildings at State expense but meet all the expenses of maintenance and operation.

There is a tendency in legislation on educa¬ tional matters to follow the general policy of the whole country in legislation upon other important subjects, and to establish in a greater degree State uniformity, direction and super¬ vision in educational matters. In

several States provision has been made for minimum salaries of teachers, for the uniform certification of teachers, for the retirement of teachers, for the supervision of schools, for compulsory attend¬ ance, for medical inspection and health instruc¬ tion of pupils, and for the construction of sani¬ tary and safe school buildings.

In some States the administration of pub¬ lic education is highly centralized under the direction of the chief educational officer of the State. This is notably true in the State of New York. In such State the commissioner of education prescribes the conditions on which students may enter State normal schools ; he prescribes the courses of study in the State

normal schools ; he has the final approval of teachers appointed in such institutions and he appoints the members of the local boards in charge of the administration of such schools. The examination and certification of teachers is in accordance with rules and regulations which he prescribes ; he is authorized by law to prescribe, by regulation, the functions of dis¬ trict superintendents who supervise rural schools ; he may also, by regulation, impose upon city superintendents and boards of edu¬ cation throughout the State duties in the ad¬ ministration of the schools ; he may condemn schoolhouses in any part of the State and re¬ quire new buildings to be erected; he has judi¬ cial authority in determining all school con¬ troversiesˆ arising throughout the State, and his decisions in such matters are final and not sub¬ ject to review by the courts. The tendency throughout the country is strongly toward greater centralization. This is due to the fact that education is more and more recognized as a matter to which the State must .give more careful direction and supervision. A law which is State-wide can be made stronger and more effective than a local law. A general statute is respected more by the public, and is, therefore, more readily enforced, than a local statute.

There are three distinct systems of local ad¬ ministration of schools in operation in this coun¬ try. These are known as the district system, the township system and the county system. The district system is the one which was first estab¬ lished. When it was first necessary to organ¬ ize schools a few families living in the same neighborhood associated themselves together, employed a teacher and maintained a school. When school systems were organized in States which had adopted this system, the organization already established was utilized and in some of the States, as in New York, that system is still in operation. In each town throughout a State in which this system is in operation there are several separate school districts. Each of these districts maintains an independent organization with its own local

officers, and each is a tax district; so that in each township there are all the way from 8 to 35 separate and independ¬ ent authorities in charge of the schools of a single town, and possessing the power to assess taxes upon the property of such districts for the maintenance of schools. This kind of an organization for the administration of rural schools has been demonstrated to be cumber¬ some, obsolete and inefficient. This system has been discontinued in many States and must be in all States before rural schools can be im¬ proved and modernized and enabled to serve the people of the agricultural sections as the schools should and as present conditions de¬ mand.

In New England and many of the western States, the township is the unit of administra¬ tion. Under 'such systems a town board of education is usually chosen at a town school meeting and is given general authority over the supervision and administration of all the schools of a town. In other words, it is the substitution, in rural communities, of an economical and professional system in the ad¬ ministration of schools for the inefficient and unbusinesslike plan which is followed in school districts generally where the school district sys-

tem is in operation. It .gives all the schools of a town the same businesslike management which is generally afforded in cities where all the schools are under the control and supervision of one board of education. In most of the western States the general form of government followed in administering public affairs has been followed in the administration of school mat¬ ters. In these States, the county is the unit of school administration. Where this system pre¬ vails, there is a county board of education and a county superintendent of schools. These offi¬ cers perform the functions which are generally performed in towns and districts by the town and district boards.

The local school officers, whether under the district, town, or county system, have the direct charge of the administration and operation of the schools. These officers employ the teach¬ ers, determine the period of time school must be maintained beyond the period required by law, determine the salary to be paid in advance of that required by statute, make repairs to buildings, construct new buildings, purchase supplies and equipment, and perform such other functions as may be required to operate the schools or to make effective a State plan of education.

A sound, effective, equitable State system of education must rest upon a legal foundation similar to the following:

1. There should be a constitutional mandate which requires the legislature to provide for a free system of common schools. This consti¬ tutional provision should require school officers for every unit of school administration in the State, with powers not conditioned in any way whatever upon the action of municipal officers. It should also provide for raising such funds as are necessary for the operation of the schools. In other words the absolute manage¬ ment and control of the schools, independent of all local municipal authority, should be guaran¬ teed the school authorities by the constitution. It should further require the establishment of a State department of education with sufficient authority to administer a sound, progressive educational policy.

2. The legislature should confer on the chief educational officer of the State sufficient power and provide him with sufficient funds to be a real leader of power and influence in directing and supervising the educational activities of the State.

3. A unit of school administration and tax¬ ation for the rural communities should be es¬ tablished, embracing not less than the territory of the town, so that rural school facilities may be provided which shall be equal, so far as may be possible, to the facilities provided in the cities and other populous centres.

4. State aid in much larger proportion than has yet been provided should be furnished and distributed upon a basis which shall enable the community having less property values to maintain schools which shall give the children in these less favored sections advantages as nearly equal as may be possible to those ad¬ vantages afforded children whose homes are in more favored centres.

Thomas E. Finegan,

Superintendent of Public Instruction for ˆ the

State of Pennsylvania; formerly Deputy Com¬ missioner of Education , State of New York.

STATE TAXATION. See Taxation.

STATE UNIVERSITIES, The. General Statement. — The history of

education hardly offers a parallel to the rise and growth of State-supported institutions for higher learning in the United States during the latter part of the 19th and the first decade of the 20th century. In 1875 20 such institutions had been founded but a very few had risen to any kind of educa¬ tional prominence. They had at that time a total registration of 2,340 students. In 1885 26 institutions enrolled 4,599 students. In 1903 36 institutions enrolled 41,369 students. On 30 June 1917, according to the latest available figures issued by the United States Bureau of Education, there were 90 institutions in the States and Territories of the Republic sup¬ ported in whole or in part by public funds and offering collegiate or professional courses beyond the range of the secondary school, with faculties numbering 12,368 persons, a total enrolment of 138,838 students and a total annual working income of upward of

$60,000,000.

This movement is not only unrivaled in the history of education; it is also perhaps the most significant and promising development in the history of our democracy. The sentiment which supports the movement is practically uni¬ versal and it is the product of the spirit of the pioneers of the Central and Western States. Thirty-nine States now tax themselves without stint to provide a practically free education for their sons and for their daughters from the kindergarten through the college, and in many instances through the professional school as well. The nine States which do not have reg¬ ularly designated State-supported universities, nevertheless contribute very generously to the support of higher education and maintain or help to maintain institutions which serve in part at least to perform the functions so admi¬ rably performed by such typical State univer¬ sities as those in Michigan, Minnesota, Wiscon¬ sin and Illinois. The nine States which do not have State universities, as the term is now commonly understood, are Connecticut, Dela¬ ware, Maryland, Massachusetts, New Hamp¬ shire, New Jersey, New York, Pennsylvania and Rhode Island.

No people have ever before carried forward such a movement on any similar scale. In the early days Massachusetts and Connecticut and New York and New Jersey gave substantial aid to Harvard and Yale and Columbia and Princeton, but without any idea of becoming responsible for their permanent support and management. The common thought as to the functions of government touching education would not permit more than State aid and en¬ couragement to a university in the colonial days or even in the earlier years of the Re¬ public. The settlement of the great West opened the way for a

new educational order of things. The pioneers built for the future, and they were especially anxious that ample pro¬ vision should be made by the State for the edu¬ cation of their children.

Nearly all the State universities are open to women on an equal footing with men, and the tuition in collegiate courses is free or only a nominal sum. The tuition in the professional schools is ordinarily higher but is not based upon the theory of an adequate financial re-

turn for the expense involved. Indeed, the State universities more than any other agency have been responsible for removing professional schools in recent years from the realm of commercial enterprises. This is particularly and fortunately true of the profession of medicine. The State universities in common with a few highly endowed and thoroughly reputable private institutions have demonstrated that the teaching of medicine, as it ought to be taught, is not and cannot be a profit-making business.

All classes are represented in the great student bodies of the typical State universities, but the middle class predominates overwhelm¬ ingly. There are many students who find it necessary to ((work their way,® and if they do it and sustain themselves in their university work they uniformly gain the respect they de¬ serve for it. Young men and young women work side by side in classrooms and labora¬ tories; they attend social gatherings in com¬ pany, with little in the way of regulation which is not self-imposed, and with the very best results. Life is free and genuine and natural and earnest, and the sentiment of the campus is wholesome. More than that the spirit of the typical State university is widely regarded as the most splendid promise of our democracy.

Historical Development. — As has been in¬ dicated, although all the colleges established in early or colonial days were private corpora¬ tions they were in nearly every instance the willing recipients of public bequests. This in¬ vestment of public funds naturally carried with it the thought of State control, but the early colleges were all, more or less, under denomi¬ national supervision and did not satisfy the de¬ mands of the people as a whole. The growing spirit of democracy is responsible for the birth of the State university. Strangely enough as it may now seem because of the marvelous prog¬ ress of public education, elementary, secondary and higher, in the

North and West in recent decades, the South took the lead in this early movement for publicly supported institutions for higher learning. The constitution of North Carolina framed in 1776 provided that ((all use¬ ful learning shall be promoted and encouraged in one or more universities.® An institution was founded upon the provision of this clause in 1789 and came into the full control of the State in 1821. But the fullest development of the State university was to be reached in the newer States in the Middle West. The con¬ stitution of Indiana, which is typical, provided in 1819 that <(It shall be the duty of the General Assembly as soon as circumstances will permit to provide by law for a general system of edu¬ cation ascending in regular gradation from township schools to State university, wherein tuition shall be gratis and equally open to all.® Impetus was given to the establishment of State universities in 1862 by the passage of the Morrill Act by Congress. This act granted to each State 30,000 acres of public land for each senator and representative in Congress to which the State was entitled under the census of 1860. All money derived from the sale of these lands was to be invested by the State in securities bearing interest at not less than 5 per cent, ex¬ cept that the legislature of the State might authorize the use of not more than 10 per

cent of the capital for the purchase of sites for a college or experimental farms. The in¬ terest was to be used for the endowment, sup¬ port and maintenance of at least one college where the leading object should be to teach such branches of learning as are related to agriculture and the mechanic arts in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life. Of the colleges bene¬ fiting under the act Kentucky, Mississippi, South Carolina and Virginia divide the income be¬ tween an institution for whites and one for col¬ ored students. With the exception of Massa¬ chusetts which divides the fund between two colleges, each of the other States maintains one college or university to receive the benefit of the fund. Nineteen States have created and maintain independent colleges of agriculture and the mechanic arts while also maintaining State universities. In each of 21 States the college of agriculture is a part of the State university. Twenty-eight States were allotted 8,160,000 acres of land in scrip; 20 States received 2,890,- 000 acres in place. The scrip and lands have been sold for $12,643,309.43. Each State now applies all the income for the support of the agricultural and mechanical college. The total income for 1913-14 was $856,318.95. Among the State universities owing their origin to the Morrill Act are those of California, Illinois, Maine, Minnesota, Nebraska, Nevada, Ohio, West Virginia and

Wyoming.

The State universities now existing in 39 different States were founded as shown in following table :

Alabama .

Nebraska .

. . 1879

Arizona .

Nevada .

. . 1886

Arkansas .

.... 1872

New Mexico .

. . 1891

California .

.... 1868

North Carolina. . . .

. . 1789

Colorado .

.... 1877

North Dakota. . . .

. . 1883

Florida .

.... 1884

Ohio .

. . 1870

Georgia .

.... 1785

Oklahoma .

. . 1892

Idaho .

. . . . 1889

Oregon .

. . 1876

Illinois .

. . . . 1868

South Carolina. . . .

. . 1801

Indiana .

. . . . 1820

South Dakota .

. . 1882

Iowa .

. . . . 1847

Tennessee .

. . 1794

Kansas .

Texas .

. . 1883

Kentucky .

.... 1878

Utah .

. . 1850

Louisiana .

. . . . 1860

Vermont .

. . 1791

Maine .

. . . . 1867

Virginia .

. . 1825

Michigan .

. . . . 1837

Washington .

. . 1861

Minnesota .

. . . . 1868

West Virginia .

. . 1867

Mississippi .

. . . . 1848

Wisconsin .

. . 1848

Missouri .

. . . . 1840

Wyoming .

. . 1886

Montana .

. . . . 1895

Resources and Revenues. — While the Mor¬ rill Act had much to do with the inception of State universities, as has been indicated, the income from the fund and from supplementary acts is a very small part of the amount now ex¬ pended annually by the several States for the furtherance of higher education. The principal sources of income in addition to Federal land grants are student fees, gifts and State ap¬ propriations. As has been noted, fees are merely nominal in all under-graduate courses and are not calculated upon a commercial basis in the professional schools. While the State universi¬ ties have never strongly relied upon gifts many have profited by donations at various times. This is notably true of Georgia, Indiana, Kan¬ sas, Michigan, Minnesota and North Caro¬ lina. The University of Virginia received a gift of $2,000,000 in 1909 from Andrew Carne¬ gie and others. The University of Wisconsin and the University of California have each been greatly enriched by private gifts. The

chief source of income, however, is from direct appropriations by the legislature. Several States now have a mill-tax for the university which makes assured provision for maintenance. Colorado, Illinois, Indiana, Kentucky, Michigan, Minnesota, Nebraska, Nevada, Ohio, Oregon, Utah, Washington, Wisconsin and Wyoming have a mill-tax rate. For the year ending 30 June 1917 the University of Illinois received $2,111,629 from her mill-tax, the University of Michigan $1,175,385 and the University of Wis¬ consin $1,285,048.

Organization and Administration. — The

supervision and control of the typical State university is vested in a board of regents or trustees usually appointed by the governor with the consent of the senate. In a few instances the regents or trustees are chosen by the people at a general State election. This is true in Illi¬ nois and Nebraska. There have been a few conspicuous departures

from the general rule, but in the main these boards have been singu¬ larly free from political interference and have as a natural consequence drawn to their mem¬ bership representative citizens generally inter¬ ested in the promotion of sound education and been able to act disinterestedly upon all im¬ portant questions coming before them. In Indi¬ ana University the alumni have a voice in the selection of the trustees, and the influence of the alumni is coming to be felt indirectly in the selection of governing boards throughout the country. It is not unusual to find one or more graduates on the board of an institution and the tendency in that direction is growing.

In practice the theory that boards legislate and individuals act or execute is the guiding principle in determining the relations of the governing board and the president. This prin¬ ciple of procedure has not been established with¬ out a struggle and regents or trustees without conception of their duties and with an inordi¬ nate desire to ((run)) their institutions have more than once caused serious trouble. The typical management of a State university to¬ day is not unlike that of the average bank where the board of directors act in an advisory ca¬ pacity only and leave the management of the daily business of the bank entirely in the hands of the executive officers. Accordingly the po¬ sition of president of a great State university is a dignified one and calls for well-trained executive powers as well as for seasoned scholarship. Almost universally the president is in fact as well as in name the real executive head of his institution, turning to his board for advice or for endorsement of general plans. In the matter of appointments and resignations upon the faculty the president initiates action and goes to his legislative board only for the confirmation or veto of his recommendations. Men like Angell at Michigan, Northrop at Minnesota and Draper at Illinois, through the free exercise of their great executive powers and by the force of their characters had much to do in determining methods of university pro¬ cedure which have now widely become un¬ written laws and which have in many instances, indeed, been written into university statutes.

While the president is given large executive powers, the very widest latitude in the interior management of the State university is given to the deans and the faculties of the several colleges and the relations of administrative offi¬

cers and instructors are notably harmonious. The organization of the typical State univer¬ sity may be understood by noting the actual conditions at the University of Illinois. The board of trustees consists of 12 members, three of whom, the governor, the president of the State board of agriculture and the State super¬ intendent of public

instruction, are ex-officio members. The nine other members are elected by the people and serve for terms of six years each, three being elected every second year. The board appoints the president who is the general executive officer. The chief adminis¬ trative officers below the president are the vice- president, the deans of the colleges, the registrar, the comptroller, the dean of men, the dean of women, the adviser to foreign students, the high-school visitor, the execu¬ tive secretary, the director of the infor¬ mation office, the supervising architect, the uni¬ versity health officer, the director of physical training for men, the director of physical train¬ ing for women, the professor and commandant in charge of military training, the university librarian and the curators of museums. The university is divided into the following colleges and schools : the College of Liberal Arts and Sciences ; the College of Commerce and Busi¬ ness Administration, the College of Engineer¬ ing, the College of Agriculture, the College of Law, the Graduate School, the Library School, the School of Music, the School of Education, the School of Railway Engineering and Ad¬ ministration, the One-Year Medical College, the Summer Session, the College of Medicine, the College of Dentistry and the School of Phar¬ macy.

It will be noted that the typical State uni¬ versity practically undertakes with the excep¬ tion of theology to carry out the maxim of the famous founder of Cornell University, (<I would found an institution where any person can find instruction in any study.® The ideals of the State universities as a group were clearly de¬ fined by the National Association of State Uni¬ versities in a report of its committee on stand¬ ards, adopted in 1908:

** We may define a standard American university to be an institution: (1) which requires for admission the com¬ pletion of the curriculum of a standard American high school with a four years' course . . .; (2) which offers in the

college of literature and science two years of general or liberal work, completing or supplementing the work of the high school; (3) which offers a further course of two years, so arranged that the student may begin work of university character leading to the bachelor's degree at the end and reaching forward to the continuation of this work in the graduate school or the professional school; (4) which offers professional courses based upon the completion of two years of collegiate work, in law or medicine or engineering; (5) which offers in the graduate school an adequate course lead¬ ing to the degree of doctor of philosophy.

“ To be a standard university an institution shall be equipped to give instruction leading to the degree of doctor of philosophy in at least five departments, according to the standards prescribed in this report and shall have at least one university professional or technical school (which shall require) . . . the two years’ collegiate training for

admission.”

Range of Instruction. — The permanent contributions of State universities to the cause of higher education is abundantly assured because the common sentiment of the people who sup¬ port them encourages the universities to enter practically every field of scientific research and intellectual activity. Ancient and modern lan¬ guages and literatures, rhetoric and oratory, history and philosophy, economics and sociology

and ethics, education and psychology, music and painting, mathematics, the earth and air and water and sky and life sciences, medicine and pharmacy and dentistry and law, every phase of agriculture and horticulture, the raising of wheat and corn as well as of horses and sheep, dairying and homemaking, architecture, civil engineering, electrical engineering, mechanical engineering, municipal and sanitary engineering, railway engineering, mining engineering, library science, business administration, physical train¬ ing, and every other interest which stirs the intellect and challenges thorough study are grouped in separate colleges, schools or depart¬ ments, with the necessary libraries and labora¬ tories and farms and shops for the most prac¬ tical and effective work. Military training un¬ der the immediate charge of United States army officers has long been a feature of the practical and productive work of the State universities. The drill and the study of military tactics usually continue for the first two years of the course. The students, or cadets as they are sometimes designated, wear uniforms, drill with army rifles, engage in sham battles and other manoeuvres, and are ordinarily led in dress parade by their own military band. This mili¬ tary training has long been regarded of great value to the physical well-being of the men and has been proved to be immensely worth while to the nation. The officers and men who had their initial military training in university battalions gave a good account of themselves in the war with Spain and the gallant and in¬ telligent service of the many thousands who joined the colors in the Great War

with Germany testified to the wisdom of the prac¬ tice and gives assurance that even larger at¬ tention will be given to such training in the future. On the whole it can be said that the students welcome the drills and the accompany¬ ing taste of military discipline and it is certain that they are universally glad of the experi¬ ence as they look back upon it. The State uni¬ versities have a unique opportunity to lead the nation in a permanent program for adequate preparedness in the future.

Place in the Educational System. — The State universities in many instances, and espe¬ cially in the Middle West, are a deliberately planned and component part of the educa¬ tional system of their States. The educational system in a State which emphasizes such a plan may be said to cover 16 years, eight in the elementary school, four in the high school and four in the college. The articulation of the different parts is complete. The grammar- school graduate passes into the high school without examination and the graduate of the approved high school enters his State uni¬ versity without examination. The State uni¬ versity in such an instance is the natural cap¬ stone of the State s educational system. The relation of the State universities very gen¬ erally to the schools below, and especially to the high schools, is intimate and helpful. The relation has its personal and human side due to the intelligent and tactful activity of uni¬ versity high-school visitors whose business it is to ' visit and inspect high schools for the maintenance of an accredited entrance list. Cordial relations are also further cemented by frequent conferences at the universities of superintendents and principals and teachers

upon topics of mutual interest. The high schools are invigorated and inspired by contact with the universities and the universities are kept sane in their entrance requirements by intimate knowledge of the capacity of their prospective students.

Social Life. — The social life at the univer¬ sities is ordinarily democratic and wholesome. Greek-letter fraternities for men and sororities for women, national in character, have after many vicissitudes proved their right to perma¬ nent place in university life. They are now rarely frowned upon and are qften encouraged by university faculties. Many of them have per¬ manent homes at the university seat and con¬ tribute largely to the comfort and social op¬ portunity of their members. They also are coming to be a means of aiding rather than of hindering university discipline and are fre¬ quently employed by tactful college officers in forming and directing student sentiment and action. The relation of men and women stu¬ dents is on the whole helpful to both sexes. The social and college

intermingling of men and women is natural, and the disadvantages of a co-educational system, if there are any, are hardly thought of in a great State uni¬ versity. Physical training for men and for women is everywhere emphasized and class and club and fraternity games are very common. Athletics — basketball, football, baseball and track and field sports — occupy the spare time of the students and are valued more by col¬ lege authorities than the public ordinarily un¬ derstands as means of creating healthy college spirit and of controlling the enthusiasm of youth. The military band, glee and mandolin clubs, literary and scientific societies also con¬ tribute to the enrichment of university life.

Progress and Future. — The older state universities may now be said to have passed the creative or building stage. Their growth and de¬ velopment has been unprecedented, but it has not been without heroic struggle. The people in every commonwealth almost, especially in the Middle West and the Far West, have been united in their desire for a State institution of higher learning, but they have rarely known how best to go about creating and building such an institution. It has remained for educational statesmen — and it has called for statesman¬ ship of the highest order — to lay down the guiding policies and educate the public to a right appreciation of its university. Singularly enough — and yet in a certain sense naturally enough too — the very public which has sought to promote the university has steadfastly in¬ sisted that it should prove its worth step by step. Hardly a State university has not gone through the period of being an outcast in the eyes of its own constituents. This means that patience and tact and disinterested public serv¬ ice is woven into the fabric of every one of them. The elementary scope of their progress is now well nigh over. Legislatures need no longer be convinced of their legitimate place and func¬ tion in the life of the commonwealth, they no longer have to be haled into the open court of public opinion to establish reputable char¬ acter. They have arrived in the minds of the public.

For the last two or three decades much has been heard — sometimes directly from their own press bureaus — about the growth of their

appropriations, the size and number and cost of their buildings, the number of their stu¬ dents and in general the ˆbigness® of their work. This prevailing note has been natural because the material growth of

the State uni¬ versities has of itself changed the educational map of the United States. The enduring serv¬ ice and the progress that is in the long run to count the most is to come through the build¬ ing of the invisible universities within and with¬ out the magnificent walls that have been set up. The bringing together of trained teachers and scholars, the creation of libraries and labora¬ tories and museums that shall do fine as well as large things, the searching out of new truths, the widening of human knowledge, the leader¬ ship of the State in the promotion of health, creature comforts for the masses, sound ad¬ ministration of public affairs — these are the things that are beginning to characterize the State university of to-day and that will un¬ doubtedly signalize its service in the future. There is no better endowment than the will of a great free people for better things and this is the continuing heritage of the State uni¬ versities.

Harlan H. Horner,

Dean of the State College for Teachers, Albany,

N. Y.

STATE UNIVERSITY. See American

University and College. The.

STATEN (stat'n) ISLAND, N. Y., in the southeastern part of the State, is separated from Long Island by The Narrows and New York Bay, from Manhattan Island by New York Bay, from New Jersey by Kill Von Kull, Newark Bay, Arthur Kill and Staten Island Sound. Staten Island was discovered by Henry Hudson in 1609, and its first settlers were Dutch. It is about 14 miles long and five miles wide. The surface is somewhat hilly along the coast; in some parts there are bluffs. The is¬ land constituted the county of Richmond and had a county government until 1898, when it became a part of New York City under the name of Borough of Richmond. It is chiefly a residential suburb of the Borough of Man¬ hattan, but in the interior are farm lands, and there is considerable manufacturing. Fort Wadsworth, on the east coast, at the entrance to The Narrows, is one of the most important fortifications in the United States. The im¬ proved road system of the island embraces over 200 miles of highways. The police force of New York City has headquarters, detective bureau and four police precincts on Staten Island. The city fire department also affords fire protection to all the larger places on the island. Education is well looked after through¬ out Staten Island, which has many good private schools, two large high schools, one in Saint George and the other in Tottenville,

and 34 public schools. It has, therefore, become one of the favorite residential sections of New York City. The borough is divided into five wards ; but the villages which were incorporated before the island became part of New York retain their Federal post-office organizations in¬ dependent of the New York post office. Some of the largest post offices are at Port Richmond, New Brighton, Stapleton, Tompkinsville, Saint George, Tottenville and Rosebank. During the Revolutionary War Staten Island was occu¬

pied by a large body of British soldiers, and their old fortifications form historic landmarks to-day. Pop. (1920) 116,531. Consult Mer-shon, S. L., (The Major and the Queen) (New York 1915) ; (Staten Island Illustrated) (New York 1911); (Staten Island and Staten Islanders) (New York) ; historical Guide of the City of New York) (New York).

STATEN (stat'n or sta'ten) ISLAND, South America, belonging to the archipelago off the southeast coast of Tierra del Fuego, and virtually a continuation of the same, ex¬ tends for 38 miles from northeast to south¬ west between Capes Saint John and Saint Bartholomew, and is separated from Argentina by the Strait of Le Maire. It rises in Mount Buckland to a height of 3,000 feet. The peak is covered with snow, the slopes verdant in evergreens, shrubs* and plants. There is great humidity or rain at all times, and the tempera¬ ture is even. The chief harbor, among several excellent ones, is Port Cook, on the northeast¬ ern coast. This island was formerly an im¬ portant whpling station for the English.

STATES, Admission of. No specific form of procedure is provided in the National Con¬ stitution for the admission of new States to the Union. Different methods of admission have marked the addition of the 35 States to the original 13. For admission, however, certain conditions must exist. The community must be organized with a population in numbers and character capable of upholding self-govern¬ ment, and Congress is the final judge whether these requirements are in evidence. The de¬ cisions of Congress, however, have often been influenced by party reasons, and in 1872 it was enacted that no State should be admitted there¬ after unless <(having the necessary population to entitle it to at least one representative ac¬ cording to the ratio of representation fixed by this bill.® The action of a Congress, however, does not appear to have a binding effect on subsequent Congresses, for in contravention of this act Nevada, Wyoming and Idaho among other States were admitted. To gain admission, a petition is presented to Congress, which grants an enabling act if the request is favorably re¬ ceived. While these acts

vary in details, the general principles define the boundaries of the new State, authorize the people to frame a State constitution, fix the mode of its forma¬ tion and adoption, prescribe rules of suffrage for election purposes, set forth such provisions as Congress requires to be inserted in the document and provide for its submission to Congress or the President for approval. When all the terms of the enabling act have been complied with, Congress by resolution, or the President by proclamation, declares the new State admitted to the Union. Consult Beard, C. A., (American Government and Politics> (1910); Dunning, W. A., (Essays on the Civil War and Reconstruction (1898) ; Hart, A. B.,

(Actual Government* (1908); Poore, B. P., Charters and Constitutions) (1877) ; Thorpe, F. N., (Federal and State Constitutions) (1909); Willoughby, W. W., American Con¬ stitutional System) (1904).

STATES, Classification of. States or na¬ tions may be classified according to: (a) the extent of the political state; (b) the structure of the political state; (c) the structure of the

government. In political science a state is understood to be a body of people inhabiting a given territory, organized for common pur¬ poses, independent of external control and supreme in the enactment and enforcement of law within the state territory. -For the enact¬ ment and for the execution of law, and for international interchange, it is essential that the state be organized for public purposes. Without a definite political organization, no body of people can be recognized as having international status. This organization must be adequate to ascertain and express the pub¬ lic will and must have supreme power to sub¬ ordinate all other wills to that which is taken as the will of the state. The essential marks of sovereignty are independence without and supremacy within.

States may be democratic, oligarchic, or autocratic. A democratic state is one in which the social state dominates the political. In an oligarchic or aristocratic state the social state relatively is a small part of the political. In an autocratic state political power is supposed to be vested in a single person. As democracies, republics and monarchies, states may be classi¬ fied as: (a) Pure democracies, in which nearly all functions of government and especially legislation are performed

directly by the political state; (b) republics, in which representatives chosen directly or indirectly by the political state carry on nearly all the functions of government, including legislation and adjudica¬ tion; (c) monarchies, in which the head of the administration owes his position to birth rather than to personal choice by the political state. A state is oligarchic or aristocratic, if the members of a branch of the government owe their position to birth or some other cause independent of the will of the political state, as in the British House of Lords, the upper house or senate of the imperial legislature, where the members hold their position by hereditary title, and some by virtue of holding some other office. But with a few aristocratic survivals, the British Empire constitutes a democratic monarchy, republican in fact, and so are most modern monarchical states, the monarch being really little else than the hered¬ itary president of a more or less democratic republic.

The organization of the political state may also determine its classification. It may be either centralized or federal, if (a) the will is determined in mass, as in France; or (b) if the will of the state is determined by balancing the separate will of a series of fundamen¬ tal groups, as in the United States, Switzer¬ land and in Germany. The well-being of the social state as a whole is the purpose of all political organization, and a central¬ ized government may be more efficient than a federal government, but where intelli¬ gence and education are generally diffused among a people self-reliant and mutually tolerant, a federal government is more re¬ sponsive to the variety of ideas which may characterize a large state, and is more likely to be permanent. Autocracy may attain high efficiency but is usually attended by tyranny. While a democracy has a republican form of government, a republic is distinguished by an oligarchic tendency, and a monarchy may be democratic or oligarchic, as well as autocratic.

The most practical form of state appears to be a republic with powers delegated to the government. With the nominal exception of Canada, all North and South American states have adopted this form, also France, Switzer¬ land, Portugal and China and in 1919 the newly formed European states. Consult Dealey, J. Q., development of the State *(1909); Willoughly, W. W., (Nature of the State) (1896); Wilson, W., (The State* (rev. ed.,

1909).

STATES OF THE CHURCH. See

Church States.

STATE'S EVIDENCE is a term applied to evidence in a criminal case, in the form of a confession of one who committed or partici¬ pated in the commission of a crime, and to be admissible it must be freely and voluntarly made. The equivalent law term in England and throughout the English-speaking British possessions is king's evidence (or queen's evi¬ dence). There is no provision in the law to make a state's evidence agreement legal or bind¬ ing, yet such an agreement is frequently made and adhered to on the part of the State and countenanced by the court, as a means of securing the conviction of other criminals. In case where confession has been obtained under promise of immunity from the law, and the witness thus making the confession is subse¬ quently placed on trial, it is a general practice not to use his confession against him. There is a general tendency in the courts of many of the States of the Union not to convict a defendant upon the uncorroborated evidence of an accomplice. See Accessory; Accomplice; Principal.

STATES-GENERAL, the name given in France till 1789 to the general assemblies of the deputies of the three orders of the nation, the clergy, nobility and the third estate (bour¬ geoisie). When peers were present it was not as forming a separate body but as the representatives of their order. The right of convoking the states, belonged to the king, to the regent, or the lieutenant-general of the kingdom. There was nothing fixed as to the number of electors or deputies, nor as to the conditions entitling one to vote or to be elected. As far back as the time of Charlemagne, and probably earlier, clergy and nobles assembled twice a year to deliberate on matters of public interest and importance. After about 100 years of active life these assemblies seem to have died, or to have been suspended; and it was not until 1302 that the States-General were first convoked by Philip the Fair to sup¬ port the quarrel of the king with Pope Boni¬ face VIII. Six years later the States-General, at the instance of the king, condemned the Knights Templars. The States-General had no power of making laws, but they served as a check on the arbitrary power .of the sovereigns through their ability to give ex¬ pression to the will or displeasure of the peo¬ ple. But as the States-General became more exacting of the sovereign, and the latter, through his increasing military power, more and more independent of the popular will, the States-General were less and less frequently called together. In 200 years they assembled only twice at the call of the king, once in 1614, and again in 1789. On this latter date

they assumed to themselves the title of National Assembly, and that of States-General was never afterward revived in France. See France — History b.c. 58 to a.d. 1796.

The name of States-General is also given to the legislative assembly of the kingdom of the Netherlands, in which there are also provincial states f.or local government.

STATES RELATIONS SERVICE. See

Agriculture, Department of.

STATES or STATE RIGHTS, in a fed¬ eral government, the rights of the several States in their constitutional relations to the central or national government. In United States history the term has played a prominent part since the early years of the 19th century, and especially during the period immediately preceding the Civil War, when it represented the prevailing view in the Southern States re¬ garding the relation of those States to the Union. Out of this view developed the doc¬ trine of nullification and the attempts to put it into practice ; and the doctrine of secession as put to practical test in the Civil War, the final issue of which made an end of the State- rights view in its former constitutional as¬ pects. See Confederate States of America; Government; Nullification; United States — State Constitutions ; Dartmouth College Case.

STATESBORO, Ga., city and county-seat of Bullock County, 42 miles northwest of Savannah, on the Savannah and Statesboro and the Central of Georgia railroads. The First Congressional District Agriculture Col¬ lege is located here. The district is devoted principally to the production of melons and cotton, and there is a cottonseed-oil mill. Pop.

(1920) 3,807.

STATESVILLE, N. C., city, county-seat of Iredell County, on the Southern Railroad, (about 43 miles north o£ Charlotte and 20 miles northwest of Salisbury. It is in an agricultural and stock-raising region in which there is also considerable corundum mining. Cotton, gain and tobacco are cultivated exten¬ sively. The chief manufacturing establishments are cotton and tobacco factories, flour and lum¬ ber mills, tanneries, foundries and ironworks. The trade is chiefly in grain and cotton and to¬ bacco products. There are seven churches and public and private schools. Pop. 7,895.

STATHAM, stat'am, Henry Heathcote,

English architect and musical critic: b. 11 Jan. 1839. He studied architecture in Liverpool and practised there for a time, but removed to London about 1870, and since 1883 has been editor of The Builder. He has written much on both archiecture and music, and was for many years musical critic to the Edinburgh Re¬ view. For several years in succession he gave classical organ recitals on Sunday afternoons at Albert Hall, London. He has published Architecture for General Readers) ; (Modern Architecture) ; Architecture Among the Poets1 *; (My Thoughts on Music and Music- cians) ; (1913); (Form and Design in Music.1* In addition he has written much on art, music and literature.

STATICE, slat'i-se, a genus of maritime or desert plants of the family Plumbaginacece, called sea-lavender, marsh rosemary, etc., and found chiefly in the northern hemisphere. They are usually perennials, with tufted, alternate leaves, sometimes becoming diminutive shrubs. The flowers are commonly borne in cymes or panicles, composed of one-sided spikes, and have scarious, membranous, funnel-shaped calyces, colored, but often of a different hue from that of the five long-clawed petals. The fruits are small astricles. Several species are cultivated, among them the Russian statice (S . latifolia), notable for its very thick, long, perennial root, which is used for tanning in its native country. It is a handsome border- plant, having a radical tuft of long leathery leaves, elliptical in shape, and very loose panicles of minute blue flowers sometimes measuring a yard across, and useful in bouquet¬ making on account of the delicate sprays. Cer¬ tain species yield valuable remedies, and others are useful as fuel in the deserts of Afghanistan.

STATICS. See Mechanics.

STATIONERS' HALL, the name of the hall of the <(Master and Keepers or Wardens and Commonalty of the Mystery or Art of the Stationers of the City of London.® The com¬ pany was incorporated in 1557, and had, till the passing of the Copyright Act in 1842, an absolute monopoly, as all printers were ob¬ liged to serve an apprenticeship to a member of the company, and every publication was re¬ quired to be ((Vol. I, Lon¬ don 1875-94).

STATIONS (Latin statio, from stare, to stand) in the Roman Catholic Church, the name given to the Wednesday and Friday fasts. Tertullian says that the name is derived from military usage. On those days the Christian stood on guard and <(watched in prayer.® The word has another peculiar signification in the city of Rome. There certain of the churches are visited on stated days by clergy and people, and those

churches are called Stations. But by the word stations are more usually under¬ stood the (<Stations of the Cross,® a very pop¬ ular devotional exercise which is in use throughout the Catholic world. These stations are a series of 14 images or pictures ranged round the interior of a church or even along a public way, in which are represented 14 in¬ cidents in the life of Jesus on the day of his crucifixion, namely, Sentence of death pro¬ nounced by Pilate ; Christ receiving the cross ; his first fall; his meeting with his mother; the cross borne by Simon of Cyrene; Veronica wiping Christ's face with a handkerchief ; his second fall; his words to the women of Jeru¬ salem ; his third fall ; stripping him of his gar¬ ments; his crucifixion; his death; taking the body down from the cross; the burial. The people move in procession from station to sta¬ tion, reciting prayers at each, and between stations chanting the Stabat Mater, one stanza at a time. (See Via Dolorosa). Consult

Thurston, H., (The Stations of the Cross) (London 1906).

STATISTICAL METHOD, The. The

word ((statistics)) was coined about the middle of the 18th century by Gottfried Achenwall, a professor at the University of Marburg. Achenwall derived the term from the Italian word <(statista," meaning statesman, which, in its turn, came from the Latin <(status," mean¬ ing state. E. A. W. Zimmerman, professor of Natural History at Brunswick, in 1787, in a work entitled (A Political Survey of the Present State of Europe,) gave this history of the origin of the word and the science which it represents : ((It is about 40 years ago that the branch of political knowledge which has for its object the actual and relative power of the several modern states, the power arising from their natural advantages, the industry and civil¬ ization of their inhabitants, and the wisdom of their governments has been formed, chiefly by the German writers into a separate science.

. By the more convenient form it has now received . . . this science, distinguished by the new coined name of (Statistics, } is be¬ come a favorite study in Germany."

At first the method of approach was de¬ scriptive, but it was inevitable that figures, be¬ cause of their greater simplicity and compact¬ ness, should take a more and more prominent part in the

development of the new science and finally replace the old verbal form of exposition. Next, as a man naturally pictures an object in terms of its most prominent char¬ acteristics, it was not long before the term ((statistics" was transferred from the science to the compilation of the facts and figures in¬ volved and, finally, to the arrays of facts them¬ selves. Thus we read in the first number of the Royal Statistical Society Journal issued in 1838-39, (< (Statistics) may be said, in the words of the prospectus of this society, to be the ascertaining and bringing together of those facts which are calculated to illustrate the con¬ dition and prospects of society." The name, having once come to be applied to the data themselves, it was but a short step to the call¬ ing of any compilation of figures or facts, ((statistics," which is the modern usage of the term, while the science itself has come to be called ((The Statistical Method." The latter may be defined briefly as the science of analy¬ sis and exposition of quantitative or qualitative data secured through enumeration or experi¬ ment.

Application of Statistical Method, (a)

Scope. — From this definition it may be seen that the statistical method is found applied wherever compilation of facts are given and accurate conclusions therefrom are wanted. Perhaps the most common application is that of the governmental census. The most ancient of our literatures, including the Fourth Book of the Bible, the name of which denotes its reference to a statistical subject, abound in ref¬ erences to the taking of censuses in preparation for large undertakings, such as the building of pyramids, military campaigns, the distribution of lands, and the levying of taxes. In modern times the taking of the census has been made periodic — in the United States every 10 years — and has been developed along very extensive lines, not only gathering the data, but analyz¬ ing and illustrating them as well. The student vol. 25 — 34

of statistics will find in these government re¬ ports a wonderful wealth of data on innumer¬ able subjects.

But the Statistical Method is no longer con¬ fined to investigations such as the census, by governmental agencies for administrative or other purposes. To-day each large corporation has its statistician, and all policies of the con¬ cern are based on his findings. Very fre¬ quently a business concern has been changed from a losing venture to a great success by a new manager who installed scientific methods based on a statistical study of the conditions affecting the business. Rents of business loca¬ tions in cities are determined by a study of the

number of people who pass the place. In fact modern industrial development has come to depend more and more on statistical re¬ search. In the sciences, both physical and bio¬ logical, the statistical method is of foremost importance. The chemists who were given the task of finding a suitable clay for spark plugs for the Liberty motor solved the problem by this method. New serums and medical treat¬ ments are now subjected to the severest statis¬ tical tests before they are accepted by the medi¬ cal profession. Statistical analyses have en¬ abled the chemist to predict the existence of unknown elements with given atomic weights ; and the astronomer to predict eclipses and lo¬ cate new planets. The whole doctrine of evo¬ lution and heredity rests on a statistical basis as shown by investigations of Mr. Francis Gal- ton and Prof. Karl Pearson in the field of the mathematical theory of evolution, and by the work of Gregor Mendel and his followers along the lines of Mendel's Laws of Alternative Inheritance.

In the social sciences, especially in the field of economics, the statistical method is equally indispensable. No economist would attempt to arrive at a conclusion concerning the produc¬ tion or distribution of wealth without an ex¬ haustive study of statistical data. Business men and economists alike are convinced that only when Congress bases its tariff legislation upon a scientific study of the natural resources and economic needs of the various parts of the country will an equitable tariff law be passed. Careful analysis of the effects of the English system of <(out-relief," the granting of partial relief to paupers without sending them to the poorhouse, showed that the system was lower¬ ing wages and increasing instead of decreasing pauperism, thus producing a social evil which grew as it fed on itself. In economics and the other social sciences the old Roman proverb is pre-eminently true, {(Sine numero nihil dem¬ onstrandum est."

In seeking to apply the statistical method to any line of investigation care must be taken to avoid certain errors likely to be encountered where statistical data are inaccurately compiled or carelessly applied. One of the most common causes of error in conclusions derived from statistical data is the lack of proper definition of the elements entering into the problem con¬ cerning which data are being gathered. Other errors arise from careless or premeditated abuse of data, correct in themselves, but leading to erroneous conclusions when improperly used. False statistical deductions may result from in¬ accuracy, from slovenliness in gathering or ar¬ ranging data, from partial statement of truth,

from a comparison of heterogeneous qualities, or from lapses in logic. The man who thought he had discovered that eminent mathematicians were remarkable for their longevity was cor¬ rect in his data, but careless in their applica¬ tion. He should have compared the average length of life of eminent mathematicians, not with the average length of life of all human beings including those who die in infancy, but with the average length of life of men who at¬ tain intellectual maturity. Again, it is mani¬ festly unfair to judge the skill of the physician by the number of his patients who have died, without also considering the total number he treated. Such abuse of statistics as the use of the same set of figures to prove that prohibi¬ tion does prohibit, and that it does not prohibit has, to some extent, destroyed the popular faith in statistics and is responsible for the often heard expression, ((You can prove anything by figures.® Statistics may be likened to a razor, a delicate and very effective tool when handled by an expert but very dangerous to an infant. While care must be taken that accuracy is pre¬ served in the gathering of statistics too great minutiae in description defeats the object sought. If, for instance, we wish to study the distribu¬ tion of wage-earners in industrial establish¬ ments we will find ourselves lost unless we effect a grouping into a few classes, as there is a rather small limit to the number of im¬ pressions which a mind can receive and hold at one time. Closely related to this error of excessive attention to minutiae of detail is the attempt at greater accuracy in statistical de¬ ductions than the facts themselves warrant. There is in statistics much swallowing of camels and straining at gnats. We are continually confronted with financial statistics carried out to the last cent when many of the individual items cannot be ascertained with any degree of certainty to within the nearest thousand, or even million. The young man who, wishing to know the circumference of a wagon wheel, mul¬ tiplied the diameter, obtained with a 35-inch yard stick, with the value of *r carried out to 18 decimals, is illustrative of our ingrained but untrained desire for accuracy. That no resultant can be more accurate than the least accurate of its constituents is an axiom that is altogether too often forgotten, and much time and labor have been spent in efforts to secure precision not warranted by the facts. On the other hand no statistical conclusions should be adopted without a statement indicating the degree of reliance which may be placed on them. It must be borne in mind that statistics is , (<the science of large numbers,® that results ob¬ tained from a few cases cannot be considered representative and should, therefore, be received with due caution. It can readily be proved that the precision of a determination

is pro¬ portional to the square root of the number of observations, but also that there is a limit beyond which it does not pay to carry the re¬ finement.

b. Statistical Tables. — In employing the statistical method statistical tables, both simple and complex are constantly brought into use. To illustrate the construction of these we will use the problem, referred to in a previous para¬ graph, of the distribution of wage-earners in the United States. The 1910 census (Vol. VIII) divides the industrial establishments of this

country into the following seven classes : those employing 1 to 5 wage-earners; 6 to 20; 21 to 50; 51 to 100; 101 to 250; 251 to 1,000; and over 1,000. We construct a table with these seven classes in one column and in a second column enter the number of establishments in each class. For comparative study we now enter in a third column the number of establishments in each of these classes as given in the census of 1900. This suggests a fourth column giving the increase or decrease for each class, and still another column giving the proportions, ex¬ pressed as percentages, which such increase or decrease bears to the figures given for the earlier of the two years. Such a table is called a simple statistical table. Similarly we may construct another table, but giving here the number of wage-earners in each class. A combination of the two into a double-column table, such as is given in the census of 1910, is called a complex statistical table. Applying to this the proper arithmetical operations gives numerous interesting and important facts.

c. The Use of the Relative. — While satis- tics are absolute facts, a study of them is really a study of relatives. In the above problem this was shown by the introduction of propor¬ tions. In that problem the number of establish¬ ments employing 1 to 5 wage-earners, or the number of employees, means little unless we also know the proportion which these numbers bear to the total. This proportion is, in general, best expressed as a percentage. In vital statis¬ tics, however, it has become customary to use a radix number; so many deaths per thousand, for instance. Except in actuarial mathematics, where the formulae have been developed on this basis, the latter is not a good method, as it does not readily yield itself to mathematical treatment.

d. Graphic Methods. — To show vividly the facts compiled in statistical tables and the conclusions to be deduced therefrom the statis¬ tician uses various graphic illustrations. What the microscope is to the biologist and the tele¬ scope to the astronomer, of like importance is this mechanical interpretation or illustration of statistics

to the statistician. The common housefly is to the casual observer an uninter¬ esting and repulsive creature, but the micro¬ scope reveals it as an object of wondrous struc¬ ture and beauty. Similarly a table giving the temperature, taken each half hour during a cer¬ tain day, means very little to us, but the curve automatically drawn by a thermograph records the changes in temperature momently and still tells us its whole story at a glance.

To construct such a frequency curve, as it is called, where variation is reasonably continu¬ ous, as in the above problem, erect at equal intervals along a horizontal line a series of vertical lines called ordinates, proportional in length to the number of objects in the classes which they represent. Then join the tops of these ordinates in such a way as to make a smooth curve. Such a curve not only makes clear to us the fluctuations in the frequency of its variates, which in the table are effectively hidden, but it also enables us to make import¬ ant comparisons. We may, for instance, draw, on the same diagram but in different colors or with different types of lines five curves representing the total gold and silver in the national treasury, and the amount of silver,

silver certificates and treasury notes in circu¬ lation at the end of each quarter for a number of years. We have thereby before us the whole financial history of the country during this period and are, furthermore, able to make both interesting and valuable deductions by com¬ parisons of these curves. These curves play an especially important part in the physical and biological sciences as they enable the scientist to replace the rough approximations obtained from a few observations with the law governing the frequency distribution. As aids in inter¬ polation and extrapolation these curves are in¬ dispensable. This branch of statistical inquiry has been developed to its present high stage of perfection by Prof. Karl Pearson, who, through his work on the (Mathematical Theory of Evo¬ lution, > has breathed into the clay of dry statis¬ tical data a living soul.

Where variation is not continuous or where discrete objects are under consideration the histogram or pictogram are preferable. The histogram is merely a succession of rectangles obtained by drawing through the tops of the frequency ordinates lines parallel to the base. A common and effective pictogram is a circle

Flour Mills and Grist Mills. — Value of Products for Leading States, 1909 and 1899.

(Miltons of dollars.)

Minn.

N. Y.

Kan.

III.

Ohio.

Penn.

Mo.

Ind.

Mich.

Tex.

W is.

Tenn.

Cal.

Ken.

Okla.

Wash.

Nebr.

Va.

Iowa.

N. Da.

Md.

Oregon

N. C.

Ga.

Col.

W. Va. S. Da. Ark.

N. J.

■OB 190®

paaa taao

divided into sectors, the areas of the sectors being proportional to the magnitude of the re¬ spective objects under comparison. For in¬ stance, we can illustrate the relative values o f the principal crops of Nebraska by dividing a circle into five sectors of the proper relative sizes and label them “corn,® “wheat,® “oats,® “hay,® and “all other crops.® Or we can place, side by side, on equal bases, five rectangles whose altitudes are proportional to the values of these crops. A complex table can be illus¬ trated by superimposing two such diagrams on each other, as shown in the preceding figure. The number of ways in which such illustrations can be made is limited only by the limits of human ingenuity.

e. The Use of the Average. — Because of the important part which they play in statistics, the statistical method has been defined by some writers as “the Science of Averages.® Aver¬ ages may be considered as types through which we get an adequate conception of groups of variates and by means of which comparisons with other groups may be effected. Thus, though men of any race may differ greatly in height, we still get a very fair conception of the relative stature of a Patagonian Indian,* an Englishman, and a Lapp when we learn that their average heights are six feet one inch, five feet seven inches, and five feet, respectively. The first real development of scientific methods in statistical study came about through the needs of astronomers for some means of secur¬ ing accurate determinations from their ever growing stock of observational data. It was found errors of observation were symmetrically grouped about their arithmetic mean, where they were clustered most closely, and decreas¬ ing continuously and equally in number in ac¬ cordance with a certain law, called the normal law of errors, as the observation re¬ ceded in either direction from the mean.f This law, also known as the Law of Probability or the Law of Chance, was found by the great Belgian astronomer and mathmatician, Jaques Quetelet, to govern not merely

the distribution of errors of measurement of inanimate things, or direct the action of “blind chance,® such as the manner in which coins, when tossed, turn up “heads® or “tails,® but also the chance dis¬ tributions in the animate world. Whether dealing with barometric pressure, human height or the size of plants the law was found to hold. Later it was found that where a bias exists, as, for instance, the inclination of the loaded coin to turn up one face more fre¬ quently than the other, or wages to taper off more rapidly to the lower limit, the law still held, but in a generalized form. The place of concentration which is no longer the mean has been called by Professor Pearson the “mode.® There are three forms of averages in com¬ mon use, two of which have already been re¬ ferred to. The three are the arithmetic mean, the median and the mode, the first being by far the most widely used. To these may be added

This pictogram shows us at a glance, and in a clear and striking manner, a number of important facts, as for instance: the actual values of the milling products of the more import¬ ant milling states in 1899 and again in 1909, the growth of the industry in each state during this period, the relative importance of these states in 1899, and again, ten years jater, which states have made the greatest progress, and which have been practically stationary.

Consult Pearson, ‘Reconstruction of the Stature of Prehistoric Races’ in Transaction Royal Phil. Soc. (1898).

t Given by the equation y = — e

(X-aY

where y

L2tc 2 c2

is the frequency of the deviation x from the mean a, c is a mathematical consent called the standard deviation, and e is the base of the natural system of logarithms.

the geometric and harmonic means, which, though seldom used, are indispensable in cer¬ tain lines of investigation. The nature of the mode has already been described in the pre¬ ceding paragraph. The median, meaning the

halfway point, is especially useful in dealing with non-measurable quantities, such as eco¬ nomic unrest, eye color or mental character¬ istics. We cannot for instance, state in figures the mental alertness of a class of boys, but we can readily arrange them in the order of their intelligence and thus determine the average boy. In a normal distribution the mean, the median and the mode naturally coincide. The arithmetic mean may be subdivided into the simple and the weighted. The simple arith¬ metic mean of two or more quantities is the sum of those divided by their number, with¬ out regard to their respective weights or rela¬ tive importance. The weighted mean is the sum of the quantities, each multiplied by its weight, divided by the .sum of the weights. The difference can best be pointed out by some examples. If we wish to find the average wage in an industry we cannot do this by simply

£

a-

z -

Moderately asymmetrical skew curve; ages of wives for given age of husband at marriage, aa mode; bb median; cc mean. The age of the bridegroom in this case is between 24 and 25 years, and the total

number of marriages is 28,454. The mean age of the bride is 22.19 years while the modal age is 20.42 years. The age of the bride rises very rapidly from 15 — 16 years up to about 20 years, after which it tapers off rather slowly, the maximum age being 45 years.

averaging the scales of wages paid in the vari¬ ous occupations. If that were done the few, highly-paid experts and superintendents would count as much as the many common laborers and so give a very misleading conception as

to the wages really paid. The true average is obtained by weighting each wage by the num¬ ber of men receiving that wage, adding the products and dividing by the number of men. In this case the weights are definitely determin¬ able numbers, which is not always the case. An astronomer taking a series of observations on a certain evening will average these as equally good. When, however, he wishes to combine observations taken on different even¬ ings he may consider these sets as of unequal value because of the unequal atmospheric con¬ ditions under which the "observations were made. He will then use as weights numbers which, in his estimation, give the relative val¬ ues of the observations.

An excellent example of the use of weights is afforded by the index numbers for the changes in wages or prices of commodities. In comparing prices of different years we find that, though some have increased and others have decreased, there has been a general tend¬ ency in one direction. To measure this tend¬ ency, that is, to determine the increase or de¬ crease in the purchasing power of money, is one of the most important tasks of the econo¬ mist. It is at once obvious that we cannot solve the problem by taking the simple arith¬ metic mean of the prices of all commodities, for that would unduly accentuate the lesser things ; would, for instance, give matches as great weight as coal. Instead, we take the most important ones whose prices we can estimate rather accurately and tabulate for a number of years. Taking any year as a base year we can then express the prices of each other year as percentages of those of the base year. The properly weighted mean of these percentages will then measure the movement of prices during this interval.

In the use of the mean as a type it must be remembered that it will not fairly represent the group if there is too great a divergence from it within the group. For instance, sta¬ tistics may show the same per capita wealth, say $1,000, in two cities without giving us any idea as to the real prosperity of the inhabit¬ ants. The one city may have the wealth well distributed with all of its inhabitants pros¬ perous and

happy, while the other has its slums and its palaces with only a small middle class. If, however, to this per capita average is appended another figure showing limits with¬ in which half the people come, we can form a better estimate of the economic condition of the city. Suppose in the one case we find that this limit is $100 in excess or defect of the mean while in the other it is $400. We would then give the per capita wealth of the two cities as $1,000 ±$100 and $1,000 ± $400, respectively. In the one case one-half the people fall within the narrow class of more than $900 and less than $1,100; 'in the other the limits would be $600 and $1,400. This additive quantity is called the probable error or probable deviation. We are, accordingly, in the development of the statistical method, interested not merely in the average as a type, but also in the divergence of the group from the type. The best measure of an aver¬ age deviation from the mean is the so-called standard deviation, the square root of the mean of the squares of the deviations. Before we can compare the variabilities of two groups

we must first reduce their measures of disper¬ sion to relatives by expressing them as per¬ centages of the means. For instance, a differ¬ ence of 1,000 pounds between the weights of two elephants is less, proportionately, than a difference of one ounce between the weights of two mice. Failure to recognize this principle has led some very eminent biologists into espousing theories absolutely at variance with the facts. But the statistician does not limit his study to the consideration of a single vari¬ able. One of his most important tasks is to analyze the relationship between one variable or phenomenon and another. He seeks, for instance, to find the correlation between pov¬ erty and crime, between the heights of fathers and of their sons, between the ages of hus¬ bands and of their wives, between the price of wheat and the marriage rate, between the size of the wheat kernel and its protein content, between vaccination and immunity from disease. We cannot, however, directly and definitely measure the effect of one vari¬ able on another because of the many other variables which enter into the problem. But by dealing with a large number of observa¬ tions we can, to a large extent, neutralize these disturbing causes, and so make it possible to secure a very fair determination of the cor¬ relation between the two variables under con¬ sideration. We may, for instance, seek to determine the correlation between rainfall and the potato crop though recognizing that the size of the crop is a function, not merely of the amount of

rainfall, but also of the temper¬ ature, culture, seed and a multitude of other causes. By dealing with a sufficiently large number of years, however, we can eliminate these disturbing elements and so secure an average value of the correlation sought. For the methods and formulae used in this computa¬ tion the reader is directed to Yule's work on the (Theory of Statistics.*

Bibliography. — Bertillon, Jacques, (Cours elementaire de statistique *(Paris 1896) ; Blaschke, E., (Vorlesungen fiber mathematische Statistic (Berlin 1910) ; Block, Maurice, (Traite theorique et pratique de statistique) (Paris 1878) ; Bowley, Arthur L., (Elements of Statistics) (London 1901) ; Edgeworth, F. Y., (Index Numbers) ; Palgrave, dictionary of Political Economy) ; Elderton, W. Palin, and Ethel M., (Primer of Statistics) (London 1910) ; Faure, F., (Elements de statistique) (Paris 1906) ; Gabaglio, A., (Storia e teoria della statistica) (Milan 1880) ; Galton, Fran¬ cis, all publications, but especially (Natural In¬ heritance* (London 1889) ; King, W. J., (Ele¬ ments of Statistical Method) (New York 1912) ; Meitzen, August, (History, Theory and Technique of Statistics) (trans. by R. P. Falk- ner, American Academy of Political and So¬ cial Science, Philadelphia 1891) ; Pearson, Karl, ˆGrammar of Science) (London 1910), and articles on ˆMathematical Theory of Evolu¬ tion* *(in Philosophical Transactions, Bulletin, Royal Philosophical Society*) ; Biometrica and Journal of the Society of Drapers; Mayo-Smith, Richmond, ˆStatistics and Economics) (New York 1896) ; Yule, G. Udny, (An Intro¬ duction to the Theory of Statistics * (London 1912) ; Webb, A. D., dew Dictionary of Sta- tistics) dew York 1911).

Carl C. Engberg,

Executive Dean, the University of Nebraska.

STATISTICS is the science that deals with the collection, tabulation, analysis and presentation of numerical data. Any phenom¬ ena that may be classified and counted may be studied by the statistical method, in fact, no other method will yield a comprehensive, quantitative view of many kinds of phenomena. Statistics thus becomes the adjunct of all the sciences and the indispensable agency of gov¬ ernments in acquiring information concerning production, trade, distribution of wealth, unem¬ ployment, population, births, marriages, deaths, divorces, diseases-, accidents and the many other matters on which the welfare of the state depends.

The principal functions of statistics are :

1. To furnish definite bases for comparison of -related facts dealing

with phenomena of the same or of different periods.

This function is well illustrated by the decennial census taken by the Federal gov¬ ernment. Such census gives a comprehensive view of the population in all the various civil divisions of the country and enables compari¬ sons to be made of the composition of the population in the several divisions with respect to age, sex, marital condition, nativity, citizen¬ ship, etc. The comparison of the data of the latest census with that of preceding censuses adds greatly to its significance. The facts relative to the increase or decrease of popu¬ lation and the changes in composition that have taken place during the 10-year period are fully as interesting and valuable as the data contained in the census itself.

1. To reveal laws underlying phenomena that could not be determined by individual ob¬ servers.

In dealing with large numbers, by the sta¬ tistical method, the constancy and uniformity of natural and social phenomena become ap¬ parent. In other words the laws underlying the phenomena are revealed. The mortality tables used by insurance companies constitute a practical illustration.

1. To show trends in phenomena that other¬ wise would be imperfectly known.

Changes in the trend of rates of birth, death, marriage, divorce, etc., are shown ade¬ quately only by statistics.

1. To reveal relations of cause and effect that otherwise would remain hidden.

The discovery by statistics of the relative longevity of total abstainers and moderate drinkers is a noteworthy example.

1. To serve as a guide for legislative, so¬ cial and commercial action.

Statistics of dependents, delinquents and defectives are a prerequisite to the formulation of adequate statutes relating to these classes. The financial statistics compiled by the govern¬ ment and by commercial agencies are indis¬ pensable guides to investors, banking and other business houses and to the government itself.

Methods. — In the compilation of statistics three distinct processes are necessary, namely : 1. Collection of data; 2. Tabulation and chart¬ ing of data ; 3. Analysis and summarization of data. The collection of data

comprises twro separate steps : the preparation of blank sched¬ ules and the filling out of the blanks. The mak¬ ing of the schedule is a very important piece of w'ork as on it depends the success or failure of the statistical undertaking. The principal points to be observed in preparing inquiry

blanks are: (a) The schedule must be made to fit in with the general tabulation scheme. The whole study must be very carefully thought out and a plan of tabulation made that will clearly show the answers to the general ques¬ tions it is desired to ask. The schedule should contain the items needed for tabulation and nothing more. It is a serious mistake to load up an inquiry blank with superfluous or use¬ less questions, (b) The schedule must give due regard to precedents. It is of the highest im¬ portance that the data obtained by the partic¬ ular study should be comparable with those obtained in similar previous studies. If the study is one of a series taken at regular inter¬ vals, changes in standardized schedule items should not be made unless results had shown the necessity therefor. The study may be en¬ larged by adding new items but the contin¬ uity of the series should be preserved, (c) The schedules should be as clear and simple as possible. The captions or questions should be short and leave no doubt as to their meaning. Where necessary, brief explanations should ac¬ company the items, (d) Except in institutions, questions should not relate to the habits, abil¬ ity or private life of those expected to answer. It is obvious that the one replying will not place himself in an unfavorable light, (e) Sched¬ ules should be printed on sheets or cards of standard size so that no difficulty will be found in obtaining filing cabinets in which they will fit. (f) If the schedules are elaborate and are to be filled out by many different persons, they should be accompanied by a booklet of detailed instructions covering all the questionable points that might arise. If enumerators are sent out from a central office they should be given full instructions before beginning the work.

Statistical schedules are filled out in vari¬ ous ways. Census blanks are taken from house to house by paid enumerators who write in the information obtained by direct questioning. They are instructed to make all necessary ex¬ planations and to require answers to the ques¬ tions asked, as refusal to answer is made a misdemeanor. Thus little difficulty is experi¬ enced in securing complete data. Statistics of births and deaths are usually obtained from schedules filled out by

attending physicians. Statistics of inmates of institutions are best prepared by having uniform schedules filled out and sent to a central statistical office. Elab¬ orate statistical reports on prepared schedules are obtained by the Interstate Commerce Com¬ mission and by public service commissions from companies operating public utilities. In order to make the reports comparable, uniform sys¬ tems of accounting have been devised for com¬ panies of the various classes. The data now being collected from such companies are note¬ worthy examples of the efficient use of statis¬ tical methods. Labor bureaus secure data rela¬ tive to wages and employment by sending ques¬ tionnaires to employers and to labor unions and by means of special agents. Social and philanthropic organizations make special sta¬ tistical studies or surveys by the use of ques¬ tionnaires sent out by mail or by means of investigations made by field workers ; the lat¬ ter although of limited scope is usually more successful. When the schedules have been filled out and returned to the statistical office they must be examined for errors and incon¬

sistencies and corrected before tabulation is undertaken. In 'spite of every precaution some mistakes will occur on the schedules and some desired data will be unascertained.

Two methods are used in presenting sta¬ tistical data to the general reader, namely, tabulation and charting; the former is the pri¬ mary method and is almost universal ; the lat¬ ter is supplemental and of limited use. The preparation of effective statistical tables re¬ quires good judgment and a thorough under¬ standing of the significance of the data and of the questions that are to be answered by the tables. Although the numerical table is an end in statistical work the plan of tabulation must be decided upon before the schedule is prepared. The latter must be so formulated that it will furnish the information needed for the table. Tabulations should be as simple as the data will permit and should show only significant aggregates. The necessity of making the data comparable with corresponding data in previous studies must be borne in mind. Tabulations may be made either by sorting by hand and counting or by machines specially devised for such purpose. The number of cards and the kinds of tabulations to be made determine the method to be used. In census work, where elaborate studies of millions of individuals are made, machines are indispens¬ able. Machine tabulation necessitates the use of codes whereby the data on the schedule card may be transferred to the card to be used in the machine by punching holes at prescribed places. The punching machines and cards are made to meet the requirements of the sorting and tabulating machines. The electric tabulat¬ ing machines will make cross tabulations at the rate of 250 to 400 cards

per minute.

Statistical charts or graphs are used to il¬ lustrate statistical tables. They make clear and emphasize the principal numerical results shown in the tables. To be effective, statistical charts must meet certain definite requirements : (a) They must be self-explanatory. Charts are useless if they can be understood only after reading lengthy explanations in the text or footnotes, (b) They must be simple. Com¬ plicated charts are more difficult to understand than statistical tables, and therefore fail in their purpose, (c) They must have unity, i.e., not more than one principal theme should be por¬ trayed on a single chart. A large variety of graphic forms are used in making charts, the most common of which are points, bars, curves, areas and maps. The kind of statistical results to be shown determines the form to be used in any case. To standardize the use of diagrams, a joint committee on standards for graphic presentation representing 17 national societies was appointed in 1915. A preliminary report of this committee sets forth the following prin¬ ciples as applicable to elementary graphic pre¬ sentation :

The general arrangement of a diagram should proceed from left to right.

Where possible, represent quantities by linear magni¬ tudes, as areas or volumes are more likely to be misin¬ terpreted.

For a curve the vertical scale, whenever practicable, should be so selected that the zero line will appear on the diagram.

If the zero line of the vertical scale will not normally appear on the curve diagram, the zero line should be shown by the use of a horizontal break in the diagram.

The zero lines of the scales for a curve should be sharply distinguished from the other co-ordinate lines.

jUrYes having a scale representing percentages, it is usually desirable to emphasize in some distinctive wav the 100 per cent line or other line used as a basis of comparison.

when the scale, of a diagram refers to dates, and the period represented is not a complete unit, it is better not to emphasize the

first and last ordinates, since such a diagram does not represent the beginning or end of time.

When curves are drawn on logarithmic co-ordinates, the limiting lines of the diagram should each be at some power of 10 on the logarithmic scales.

It is advisable not to show any more co-ordinate lines than necessary to guide the eye in reading the diagram.

The curve lines of a diagram should be sharply dis¬ tinguished from the ruling.

In curves representing a series of observations, it is advisable, whenever possible, to indicate clearly on the diagram all the points representing the separate observa¬ tions.

The horizontal scale for curves should usually read from left to right and the vertical scale from bottom to top.

Figures for the scales of a diagram should be placed at the left and at the bottom or along the respective axes.

It is often desirable to include in the diagram the numeri¬ cal data or formulas represented.

If numerical data are not included in the diagram it is desirable to give the data in tabular form accompanying the diagram.

All lettering and all figures on a diagram should be placed so as to be easily read from the base as the bottom, or from the right-hand edge of the diagram as the bottom.

The title of a diagram should be made as clear and com¬ plete as possible. Subtitles or descriptions should be added if necessary to insure clearness.

Ratios and Averages. — In presenting sta¬ tistical information to the public it is gener¬ ally necessary to publish the detailed tables showing the results of the original compilation. Such tables show the numerical relation of totals to totals in one category of data, or of a part or parts to a total, or a part to a part, or of a number of one category to a number of another category. Ratios may be expressed by common fractions, decimals, percentages, or rates per 1,000 or per 100,000, etc. Percentages are most commonly used but death and birth rates are usually expressed by the number per 1,000 of general

population; and death rates from single diseases, by the number per 100,000. A common form of ratio in business and eco¬ nomic statistics is the number per capita, as money in circulation per capita, as wealth per capita, etc. Crop yield may be expressed as bushels per acre or tons per acre. Density of population is indicated by number of persons per square mile. The ratio to be used in any case is determined partly by custom and partly by the demands of clarity and conciseness of expression.

Averages form another indispensable aid to the statistician in the summarization of data. An average is a quantity which serves to char¬ acterize a number of divergent quantities. The purpose of averages is to express by a single item the net result of a series of items. The cipal forms of averages used in statistics are the simple arithmetic mean, the weighted arith¬ metical mean, the geometric mean, the median and the mode. The simple arithmetic mean is most widely used. It is computed by dividing the sum of a series of numbers by their num¬ ber. The weighted arithmetic mean is found by multiplying the numbers of a series by co¬ efficients or weights of different sizes and dividing the sum of the products resulting by the sum of all the coefficients. The weighted average is used in cases where it is desirable to give greater emphasis to some items than to others. The geometric mean of a series of n items is the nth root of the product of the items. The use of the geometric mean in sta¬ tistics is limited. Its principal value has been

found in the computation of index numbers. The median is that value which ((has the central position in a series of items arranged accord¬ ing to size.® (Czuber). It an odd number of items is arranged according to size, the median is the middle number of the series. If the number of items constituting the series is even, the median lies between the two central items. The median is less dependent upon extreme values than the arithmetic mean and may often be taken as typical of the series. The mode in a series of items is the value occurring most frequently and around which the other items are distributed most densely. As an average it is more typical than either the arithmetic mean or the median. The mode and median, however, can be computed only for a series of quantitative individual observations such as se¬ ries of wages, incomes, etc.

Index Numbers. — Index numbers are used principally to indicate changes in prices or wages from one period to another. The prices of a certain period are arbitrarily taken as a standard and the index number of such pe¬ riod is fixed at 100. The prices in succeeding periods are computed as a percentage of those of the standard period,

a general rise being indicated by an index number above 100 and a general decline by a number below 100. It is obvious that index numbers are valuable only for comparative purposes and that of themselves they give no indication of the val¬ ues from which they are derived. The wide range of possibilities in the selection of com¬ modities, prices and weights and in methods of computation has necessitated standardization of procedure which has been improved from time to time in recent years.

Dispersion. — Dispersion is a statistical term used to denote the variation in magnitude of the items constituting a series. It is meas¬ ured by the difference in size of the extremes or by the general deviation of the items from the type. Such measurement may be absolute or relative. For purposes of comparison co¬ efficients of dispersion are found by dividing the absolute measure of dispersion by the quantity representing the typical item. The most common measures of dispersion are known as the average deviation and the stand¬ ard deviation ; the former is found by dividing the sum of the deviations of the several items from the arithmetical mean, without regard to signs, by the number of items ; the standard deviation is computed by dividing the sum of the squares of the several deviations from the arithmetical mean by the number of items and extracting the square root of the quotient. In series where the items represent different fre¬ quencies the standard deviation is found by multiplying the squares of the several devia¬ tions by the corresponding frequencies and di¬ viding the sum of the products by the total frequencies and extracting the square root of the quotient.

Skewness. — Skewness in statistics denotes asymmetrical dispersion or that at points of like deviation above and below the mode the frequencies are unequal. Skewness is measured in various ways, the simplest measure being in¬ dicated by the difference between the arithmeti¬ cal mean and the mode. The simplest co¬ efficient of skewness is found by dividing the difference thus found by the average deviation

from the mode. Other coefficients are found by more complicated mathematical processes.

Correlation. — The determination of the causal relationship between two or more groups of phenomena known as correlation, constitutes

one of the principal developments of statistics in recent years. While statistics alone are not able to prove causal relationships absolutely, they are able with other factors to furnish satisfactory demonstrations of the fact and ex¬ tent of correlation in many realms of phe¬ nomena. Correlation between two statistical series may be shown by diagrams or by com¬ putation of the coefficient of correlation. The former method is used in statistical work designed for the general reader, as the cor¬ respondence of the two frequency curves on the diagram is recognized at a glance. The second method is used in cases where a definite measure of correlation is desired. The formula most commonly used in computing co¬ efficients of correlation is that devised by the biologist Karl Pearson. Without attempting a full mathematical demonstration the method of computation may be briefly described as follows : Two series of items of equal length representing two groups of phenomena are taken. The one group may be designated as group A and the other as group B. The devia¬ tions from the arithmetical mean of the several items of each group are determined. The devia¬ tions in group A may be designated by Xi, x2, Xs, etc., and those of group B by yi, y2, ys, etc. The several deviations of the items of group A are multiplied by the deviations of the correspond¬ ing items of group B and the products are added. This summation of products is desig¬ nated as 2(,ry). The standard deviation of group A is designated as cq and that of group B as c2. The number of items is denoted by n. Then r, the coefficient of correlation of groups A and B, is determined by the following formula,

ˆ r > stated in words, the sum of the prod-

noi cr2

ucts of the deviations as above obtained is divided by the product of the number of items and the standard deviations of the two groups. Modifications of the method are used in deal¬ ing with various kinds of phenomena, and elab¬ orate formulae have been devised to determine the coefficient of correlation of three or more groups of phenomena. Through the work of Pearson, Bowley, Yule, Persons and others, rapid development has taken place in mathe¬ matical statistics during recent years. Much of the work in this field, however, is of a theoretical nature and has limited application in general statistics.

History. — The beginnings of statistics are found in very early times. The ancient Egyp¬ tians compiled data concerning population and wealth preparatory to the building of the Pyra¬ mids, about 3050 b.c. There are accounts of statistical works in China as early as 2300 b.c. Two censuses of the Israelites are recorded in the book of Numbers. A

census was taken in Greece for the purpose of levying taxes in 594 b.c. Athens took a census of population in 309 b.c. The Romans excelled every other nation of antiquity in making definite measure¬ ments. Besides making quinquennial enumera¬ tions of the population, they prepared surveys of the entire country including parts of the

provinces. They also kept records of births and deaths. It was many centuries after the fall of the Roman Empire before another com¬ prehensive system of governmental statistics was established. Very few statistical records of value were made during the Middle Ages but occasional investigations were ordered by sovereigns. Pepin the Short in 758 and Charle¬ magne in 762 ordered the detailed description of church lands. The registries of lands in France taken at these and succeeding periods known as ˆPolyptiques® included an enumera¬ tion of the rural population. The best known census of this period is the ((Domesday Book" prepared by order of William the Conqueror in 1088 a.d. The purpose of this was to ac¬ quaint the sovereign with the extent of his new dominion and the tenure of the various parcels of land. Sebastian Muenster, a Heidelberg professor, anticipated the field of comparative statistics by preparing a systematic treatise on the organization, wealth, armies, commerce, laws, etc., of ancient countries. Francesco Sansovino published a similar work in 1562, and Giovanni Botero, another in 1589. Pierre d'Avity, Seigneur de Montmarin, compiled a much more comprehensive and accurate treatise in the same field in 1614. The registration of deaths was begun in London in 1532 and was followed by that of baptisms by parish clergy¬ men. In 1629 the distinction of sex was made in the record. In 1661 a noteworthy statistical advance was made by the publication by Capt. John Graunt of his Observations5 on the Lon¬ don Bills of Mortality. He was the first to point out the regularity of social phenomena and the excess of male births over female. Caspar Neumann of Breslau in 1691 compiled data relative to 5,869 deaths from the parish records of that city and pointed out that the supposed fateful significance of the years seven and nine was unfounded. His work attracted the attention of Edmund Halley, the astronomer, who laid the foundations of scientific life in¬ surance by calculating a mortality table from the data collected. Another noteworthy con¬ tribution of this period was the mathematical demonstration of the theory of probabilities by Jacques Bernouilli, a professor of Basel. The first to use the word statistik was Gottfried Achenwall, (1719-72) a professor of philoso¬ phy at the University of Gottingen. The word comes from the Italian statista, which denoted statesman. Achenwall in his book discussed matters that he believed of interest to the state, such as population, resources, constitu¬ tions, etc. The name statistics

was introduced into England by Dr. Zimmerman about 1787 and was popularized by Sir John Sinclair in his Statistical Account of Scotland5 (1791— 99). Writings more of the nature of modern statistics are found in Sir William Petty's (Political Arithmetick5 (1691) and Sfissmilch's (Betrachtungen fiber die goettliche Ordnung in den Veranderungen des menschlichen Gesch- lechts aus der Geburt, dem Tode und der Fort- pflanzung desselben erwiesen5 (1741). The close of the 18th century and the beginning of the 19th marked the revival of census taking, ihe United States took its first decennial census of population in 1790. England and France began periodic census taking in 1801. The former country has continued the practice at 10-year intervals, but the latter after taking a

second census in 1806 took no further enumera¬ tions of population until 1836. From that year to 1901 four general censuses were taken; since 1901 a census of population has been taken in France every five years. Belgium took its first census in 1829. The analysis of this census by Quetelet contains noteworthy observations on the influence of age, sex, occupation, economic condition and season upon mortality. Upon the organization of the Belgium Statistical Central Commission in 1841, Quetelet became its presi¬ dent and continued to hold the office until his death in 1874. His work not only placed the statis¬ tics of his native country on a high plane but did much to raise the standards of statistical work throughout the world. The progress of statistics was accelerated by the founding of the Societe de Statistique de Paris in 1803, the Royal Statistical Society of London in 1834, and the American Statistical Association in 1839. Each of these societies holds meetings periodically and publishes the papers presented by its members. The first meeting of the International Statistical Congress was held in Brussels in 1853. After holding eight addi¬ tional meetings it was succeeded by the Inter¬ national Statistical Institute in 1885. These so¬ cieties have done much to promote uniformity in statistical classifications, schedules and tables, and otherwise to advance the science. Since 1890 there has been wonderful expansion in the field of statistics. Practically every civilized country now takes periodic enumerations of its population, keeps continuous records of births, deaths, marriages and divorces, and pre¬ pares elaborate statistics relative to production, foreign and domestic commerce, finance, public utilities, labor, agriculture, education, immigra¬ tion, etc. The United States made a great advance in 1902 by making the Census Bureau a permanent office. Previous to that time the bureau

was organized anew every 10 years for the purpose of taking the general census and was discontinued when the work was com¬ pleted. While national statistics has been ex¬ panding there has been an equally great exten¬ sion of statistical work in States and cities. Massachusetts took the lead in State statistics by establishing a permanent bureau of statistics and labor in 1869. A similar bureau was estab¬ lished by Pennsylvania in 1872, by Connecticut in 1873, and by Ohio in 1877. Subsequently several other States took like action. With the enlargement of State activities during the past 30 years the need of adequate statistics has been met, in part at least, by creating bureaus of statistics within State departments. These bureaus publish annual statistics relating to finances, taxation, banking, insurance, intra- State commerce, labor conditions, public utili¬ ties, education, dependents, delinquents, defect¬ ives, deaths, births, disease, accidents, etc. Scarcely less important are the valuable statis¬ tics prepared by the principal cities of the country. These statistics deal with the func¬ tions of the city and the problems that the city is required to solve, such as education, housing, transportation, docks, pavements, water supply, electricity, gas, crime, fires, accidents and dis¬ eases. Noteworthy contributions to statistics are being made by various organizations such as insurance companies, banking houses, na¬ tional sociological and philanthropic societies, etc. The insurance companies especially have

done remarkable work in studying health con¬ ditions in various parts of the world.

Bibliography. — Bailey, W. B., (Modern So¬ cial Conditions) ; Bailey, W. B., and Cummings, J., ‘Statistics* ; Bertillon, J., ‘Cours Llemen- taire de Statistique) ; Block, M., ‘Traite The- orique et Pratique de Statistique) ; Bowley, A. L., ‘Elements of Statistics) ; Brinton, W. C., (Graphic Methods of Presenting Facts) ; Gal- ton, F., Correlations and their Measurement ; John, V., (Geschichte der Statistic ; King, W.

I. , ‘The Elements of Statistical Method *; Meitzen, A., (History, Theory and Technique of Statistics) ; Persons, W. M., ‘The Correla¬ tion of Economic Statistics) ; Secrist, H., (An Introduction to Statistical Methods* ; West, C.

J. , (Introduction to Mathematical Statistics) ; Yule, G. U., (An Introduction to the Theory of Statistics*; Koren, J., (ed.), (The History of Statistics, Their Development and Progress in Many Countries,* a series of articles collected and edited for the American Statistical Asso¬ ciation; Quarterly Publications of the Ameri¬ can Statistical Association; United States Cen¬ sus Reports.

Horatio M. Pollock,

Statistician and Editor , New York State Hos¬ pital Commission.

STATIUS, sta'shi-us, Publius Papinius, Roman poet: b. Naples, 61 a.d. ; d. 101 a.d. His principal productions are two epic poems — the <Thebais,) in 12 books, treating of the war of the seven princes against Thebes; and fhe <Achilleis,) in two books, relating the achieve¬ ments of Achilles, and incidents in his life previous to the Trojan war. The latter is un¬ finished. The style of Statius is bombastic and affected, often exhibiting the art of the de- claimer rather than that of the poet; but he attracted general admiration in his own time, and even some modern critics have considered him inferior only to Virgil. He wrote some shorter poems, called 'Silvae, *which have been distributed into five books, and some of these compositions are beautiful. A modern edition of the complete works of Statius is that of Queck (Leipzig 1854) ; and of the 'Silvae,* the best are those of Markland (London 1728) ; Sillig (Dresden 1827) ; Bachrens (Leipzig 1876) ; Vollmer (Leipzig 1898) ; Klotz (Leipzig 1900) ; and Phillimore (1904) ; Pope, Howard, Lewis, Stater and Stephens have made translations from Statius. Consult Butler, E. H., 'Post- Augustan Poetry * (Oxford 1909) ; Schanz, M., 'Geschichte der romischen Litteratur* (Munich 1913) ; Teuffel, W. S., (Geschichte der romischen LitteratuU (Leipzig 1910).

STATUARY HALL, National, the popu¬ lar name of the historic chamber formerly used by the House of Representatives at Wash¬ ington, and now utilized for the preservation of the statues of historic Americans. In this chamber Madison was inaugurated President in 1809 and again in 1813; and there Monroe was inaugurated for his second term in 1821, and there Millard Fillmore took the oath. of office as President on 10 July 1850, following the death of President Taylor. This is the hall in which Henry Clay presided as speaker of the House in the old days. There occurred the stormy debates incident to the War of 1812 and the war with Mexico and the pre¬ liminary struggles over the vexed question of

slavery. There Daniel Webster and later Abra¬ ham Lincoln sat as obscure congressmen, each before the day of his meridian fame. There John Quincy Adams was chosen President in 1825 over Andrew Jackson and William H. Crawford, when the election was thrown into

the House of Representatives. By the terms of an Act of Congress approved by President Lincoln on 2 July 1864, the chamber was offici¬ ally designated as a national statuary hall, and an invitation was extended to all the States to contribute statues to be set up therein. Some 47 statues have been contributed by the different States of the Union ; but the result of these contributions has not been altogether happy his¬ torically or artistically.

STATUTE, a law proceeding from the government of a state; a written law. Some ancient statutes in Europe are in the form of charters or ordinances, proceeding from the Crown. Statutes are either public or private (in the latter case affecting an individual or a com¬ pany) ; but the term is usually restricted to public acts of a general and permanent char¬ acter. Statutes are said to be declaratory of the law as it stood before their passing; reme¬ dial, to correct defects in the common law; and penal, imposing prohibitions and penalties. The term statute is commonly applied to the acts of a legislative body consisting of representatives. In monarchies not having representative bodies, the laws of the sovereign are called edicts, decrees, ordinances, rescripts, etc. See Law.

STAUNTON, stan'ton, Sir George Thomas, English traveler and Orientalist: b. near Salisbury, 26 May 1781 ; d. London, 10 Aug. 1859. He was the son of Sir George Leonard Staunton, 1st baronet, diplomat and Orientalist, and in 1792 accompanied his father to China and the Far East. He learned Chinese, returned to England for study at Trinity College, Cambridge, in 1797, and in 1798 entered the service of the East India Company, Canton, China. He succeeded his father as baronet in 1801, and in 1805, through his translation of Dr. George Pearson’s treatise on the subject, was the means of introducing vaccination for smallpox into China. He re¬ turned permanently to England in 1817 ; served in Parliament in 1818-26, 1830-31, 1832-35 and 1838-52. He served on the East India Com¬ mittee, and was one of the founders of the Royal Asiatic Society in 1823. He made the first translation of a Chinese work into Eng¬ lish (Ta Tsing leu lee, Being the Fundamental Laws of China) (1810) ; and was author of Miscellaneous Notices Relating to China) (1822) ; (Notes of the British Embassy to Peking* (1824) ; (Observations on Chinese

Commerce) (1850), etc.

STAUNTON, Howard, English Shakes¬ pearean editor and pre-eminent as a chess¬ player: b. England, 1810; d. London, 22 June 1874. He was educated at Oxford, after leav¬ ing which he settled in London, and devoted himself to literary pursuits, and to chess, be¬

coming the champion chess-player of his day. His first important publications were (The Chess-player's Hand-book) (1847) ; Chess¬ player's Companion and Chess-player's Text¬ book (1849) ; Chess Tournament *(1852) ; Chess Praxis* (1860). Before the appearance of

the last work he had begun the publication of an edition of Shakespeare, 1857-60, which was generally considered by the Shakespearian scholars of the day to furnish the best text that had till then been published. Later studies were given to the world in a series of papers on Cnsuspected Corruptions of Shakespeare's Text, *begun in the (Athen3eum* in October 1872, and continued to the time of his death. He published Creati Schools of England (1865), and from 1844 till his death edited the chess column in the Illustrated London News. (The Theory and Practice of Chess, 5 by Staun¬ ton and Wormald, appeared in 1876.

STAUNTON, Ill., city in Macoupin County, 37 miles northeast of Saint Louis, Mo., on the Litchfield and Madison and the Wabash railroads. Its industries are derived from the neighboring coal mines, gas and oil wells. It was settled in 1S30. Pop. 6,495.

STAUNTON, Va., city, county-seat of Au¬ gusta County, on the Cnesapeake and Ohio and on the Valley Branch of the Baltimore and Ohio railroads, about 40 miles northwest of Charlottesville and 55 miles north of Lynch¬ burg. It was settled in 1745 by people from the northern part of Ireland. In 1802 it was incorporated and in 1871 it. was chartered as a city. From its importance as a strategical point Staunton became the objective point of many campaigns of the Civil War, but was not oc¬ cupied by the Union troops until 6 June 1864, when General Hunter entered the place with¬ out opposition and, after destroying the rail¬ road several miles east and west of the place, and burning much public property and many warehouses, marched toward Lynchburg. (See Piedmont, Battle of). It was again occupied by General Sheridan's cavalry 2 March 1865, and the railroad and public property were again destroyed. (See Waynesborough, Battle of; Shenandoah Valley, Military Operations in). Woodrow Wilson was born in Staunton. It is in an agriculture region and has considerable manufacturing interests. Its chief manufactures include chemicals, bricks, pen¬ nants, flour, organs, machine shop, foundry prod¬ ucts, canned goods, agricultural machinery. The principal public buildings are the Western State Hospital for Lunatics, the Virginia School for the Deaf and Blind, 16 churches, and the schools. The educational institutions are the State school mentioned, the Mary Baldwin Seminary, Virginia Female Institute, Staunton Military Academy, two business col¬ leges, two

other private schools, and public and parish schools. The four banks have a combined capital of $600,000 ; the annual amount of business is about $30,000,000. The government is vested in a mayor and a council of 12 members, each of whom holds office two years. Pop. (1920) 10,623.

STAUROLITE, STAUROTIDE, CROSS¬ STONE, or FAIRY-STONE, a mineral very frequently found in cross-shaped, penetration twins, whence its name (from Greek, stauros, a cross; lithos, a stone). It crystallizes in the orthorhombic system, the simple crystals being short prisms. Besides the twins above mentioned other forms abound. The crystals are usually rough and of a dark reddish-brown to brownish- black color. Hardness 7 to 7.5 ; specific gravity,

3.65 to 3.75 ; lustre somewhat resinous. It is a silicate of aluminum, iron and magnesium. It abounds in many of the crystalline schists, such as mica schist, argillaceous schist, and gneiss. Important occurrences are Monte Campione, Switzerland, and Fannin County, Ga., and in scores of localities in New England and North Carolina. It occurs sparingly in Brazil and North Carolina in trans¬ parent fragments which yield gems remarkable for their green to reddish-brown pleochroism.

STAVANGER, sta-vang'ger, Norway, cap¬ ital of Stavanger County, a seaport on Bokn Fjord, 105 miles northwest of Christiansand. It has two excellent harbors with quays and docks, and is protected by islands. The Bay of Dusevik is a rendezvous for warships, and is visited more than any other port of Norway by merchant vessels. The principal buildings are the ancient Gothic cathedral. Saint Peter's Church, several schools, museum, hospital and mechanics' institute. The chief articles of ex¬ port are herrings, anchovies, lobsters, sheep, butter, fertilizers and preserved foods, marble, oil and hides. There are some manufactures of woolen, linen and cotton goods, soaps, pre¬ serves, butter, oleomargarine, bricks, hardware, iron foundries and pottery, and distilleries, ship-building yards, a repairing slip and foundries. Kjelland, the novelist, was born at Stavanger. Pop. about 40,000.

STAVESACRE, a larkspur (Delphinium staphisagria) , native to the Mediterranean region, whose seeds have been used medicinally since ancient times. It is a pubescent plant, about two feet high, with

purplish flowers in terminal racemes. The seeds are grayish brown, reticulated with ridges, oily, and have an acrid and biting taste. They contain the poisonous principle delphinine, but were used as a purgative and emetic; being too power¬ ful, their use at present is confined to an ex¬ ternal remedy, in tincture, for rheumatism, and, in powder or ointment for killing parasitic vermin.

STAVROPOL, stav'ro-poly, Russia, in the Caucasus, (1) capital of the government of Stavropol, on the Atchla, 307 miles southwest of Astrakhan. It is the seat of a Greek- Catholic bishop and is a well-built town. The schools include gymnasia for both sexes, and several town and industrial schools ; there are also several libraries, and a people's palace. The manufactures comprise soap, leather and flour-mills, and there is considerable trade in hides, tallow and corn. The town was founded in 1776, and, on the commercial route between Russia and Persia, has flourished. Pop. over 60,000, (2) The government of Stavropol

covers 23,398 square miles. The rainfall is scant, forests rare, the fauna and flora differ from other sections of the Caucasus, some¬ what resembling central Asia. The inhabitants include Armenians, Greeks, Poles and Rus¬ sians, about one-third being nomadic. On the wide prairies agriculture is carried on, and for this purpose various machines and implements are manufactured, and the products form the exports. Interesting is the communal tillage of lands, for the reserve fund of grain. The main streams are the Kuma and tributaries,

and in this section are the best lands. The Mantych is a lake-formed river, once a con¬ necting link between the Black and Caspian seas. Near the Caspian are some unimportant salt lakes. Other small streams water the country at the west. The climate is char¬ acterized by sudden changes. Stavropol was early colonized but unsuccessfully, until the military colonies of Cossacks (1711) were established. After the emancipation of the serfs, immigration increased rapidly, and still grows. Population 1,300,000, principally Rus¬ sians.

STAWELL, sta'el, a town of Victoria, Australia, 176 miles by rail northwest of Mel¬ bourne. The chief buildings are the municipal offices, some churches, mechanics' institute and theatre. The great quartz reefs of the Pleas¬ ant Creek gold-fields are extensively ex¬ ploited, and large cyanide works are operated. Agriculture is an important industry; wheat, and vine-culture is especially carried on.

STEAD, sted, Albert, English journalist and author, son of W. T. Stead (q.v.) : b. 1877. He was educated at University College, London, and

afterward served on the Review of Reviews under his father. He was sent as a correspondent to the different British posses¬ sions, and to the near and the far East. He became well versed in international politics, and lent his aid as a journalist to the Anglo- Japanese Alliance, and to the restoration of diplomatic relations between England and Serbia, which were broken upon the accession of King Peter after the murder of King Alexander and his consort. He was consul- general for Rumania in London in 1907-11; and in 1912-13 he was editor of the Review of Reviews. He was joint author of (South Africa> (1899) ; and author of (China and Her Mysteries) (1901) ; (Japan, Our New Ally) (1902); (Great Japan *(1905); (Modern Roumania) (1908) ; (Servia by the Servians) (1909); (My Father* (1913), etc.

STEAD, Francis Herbert, English Con¬ gregational clergyman and social reformer: b. Howdon-on-Tyne, Northumberland, 20 Oct. 1857. He was educated at Owens and Airedale colleges, Glasgow University and at the lead¬ ing universities of Germany. He entered the Congregationalist ministry in 1884; was pastor at Leicester in 1884-90; and in 1890-92 edited the Nonconformist and Independent. He was appointed warden of the Robert Browning Settlement in 1894. He was instrumental in securing the appointment of the National Com¬ mittee on Old Age Pensions in 1898; com¬ menced an agitation for national old age homes in 1913; and in 1916 was convener of the League to Abolish War at a Third Hague Conference. He has written (Hand Book on Young People's Guilds) (1889) ; (How Old Age Pensions Began to Be) (1909) ; (No More War, a NoveP (1917).

STEAD, William Thomas, English jour¬ nalist: b. Embleton, 5 July 1849; d. at sea 15 April, 1912, one of the victims of the Titanic disaster. His father was a Congregational clergyman. He became editor of the Northern Echo, 1871 ; assistant editor Pall Mall Gazette, 1880, and in January 1890 founded the Review

of Reviews and similar publications in the United States and Australia. In July 1885 he published (The Maiden Tribute to Modern Babylon. *For some of his acts in procuring evidence for this book he was arrested and imprisoned for three months. In 1893 he founded Borderland , a magazine de¬ voted to occult subjects. He introduced Amer¬ ican newspaper methods and ideas into Eng¬ land and he exercised a powerful influence on the government, which he was accused of, at times, forcing to*

do his will. He was noted as an advocate of permanent international peace and an undaunted champion of reform of social evils and civic administration. He wrote (If Christ Came to Chicago) ; (The Pope and the New Era ; (No Rent) ; (No Reduction) ; (Truth About Russia> ; (The Story that Trans¬ formed the World *; (The Labor War in the United States*; (Satan's Invisible World) ; (The United States of Europe *; JMr. Carnegie's Conundrum* ; (The Americanization of the Worlds (Peers or People) ; <Mrs. Booth) ; (The Despised Sex) ; cThe Last Will and Tes¬ tament of Cecil John Rhodes.* In 1898 his War against War, a weekly magazine, was founded to oppose the Anglo-Boer War. Con¬ sult Stead, Estelle W., (My Father) (London

1913).

STEAM. Steam is water in a gaseous state. It liquefies at a temperature of 100° C., or 212° F., under a pressure of one atmosphere at the sea-level, namely, 14.7 pounds per square inch. High pressure and low pressure steam once meant steam used at pressures above or below this point. An engine which exhausted its steam into the open air — that is, at ordi¬ nary atmosphere pressure — was known as a high-pressure engine ; an engine which ex¬ hausted into a condenser, where a partial vacuum was maintained, was called a low pres¬ sure engine. But these terms have lost their former significance. Absolute steam pressure is the total pressure computed from the zero of an absolute vacuum, as distinguished from relative pressure at sea-level. Ordinary steam- gauges indicate pressure above that of the at¬ mosphere. To this must be added the pressure of the atmosphere in order to obtain the abso¬ lute steam pressure. The temperature of steam is sometimes expressed in degrees ˆabsolute,® meaning the number of degrees above (<abso- lute zero®, which is, on the Fahrenheit scale, — 460° ; that is, 460 below the zero mark on a Fahrenheit thermometer.

Saturated steam is steam at its greatest dens¬ ity and pressure at the particular temperature existing: that is, any increase in pressure or any lowering of temperature would cause con¬ densation — a part of the steam would return to the condition of water. If saturated steam holds in suspension less than 3 per cent of unvaporized water, it is known as dry steam; if 3 per cent or more of water is present it is termed wet steam. Dry steam as it issues from a jet into the air is colorless: wet steam issues as a white cloud. The presence of free water in steam is highly objectionable. It rep¬ resents a loss of heat without production of useful work, and to that extent reduces the efficiency of the boiler and increases the cost of the steam actually used. Further, it adds to the amount of water of condensation to be

cared for; increases the wear of valves and valve-seats ; washes away lubrication ; and, in the case of turbines, erodes the blades almost as if they had been subjected to a sandblast.

When a space is saturated with steam the pressure exerted is known as saturation pres¬ sure. If the content of a space which is satu¬ rated with steam be reduced, some of the steam is condensed to a liauid state, but the pressure remains the same. If the volume of the space be increased, provided that it contains sufficient liquid, more water evaporates and the pressure exerted by the water vapor soon attains the same value as before the change of volume. If the temperature of a space containing water, and its saturated vapor be raised, the satura¬ tion pressure of the vapor is increased; if on the other hand the temperature falls, some of the vapor is condensed, and the saturation pres¬ sure is less.

Superheated steam is saturated steam heated until it resembles a perfect gas. The super¬ heating of steam is accomplished by ˆdrying® it of the water vapor, or by relieving it of some of the pressure upon it. The former method is the one used in steam practice. The drying cannot be done while the steam is in contact with the water in the boiler, for any increase of heat applied to the latter goes to forming more saturated steam, the temperature remaining relatively the same — that is, according to the pressure. While saturated steam begins to con¬ dense at once upon loss of heat superheated steam retains its gaseous form until it has lost all its heat above 212°. This quality of steam makes it of great value in engines, the expansion in the cylinder being wholly gaseous, and without leaving any water of condensation — the source of the largest loss of efficiency in engines. The superheating of steam is com¬ monly accomplished by passing it through a grid of pipes open to the fire. In ordinary en¬ gine practice the effect of superheated steam is secured by (<wire-drawing® it — the term sig¬ nifying the causing it to pass through a (rela¬ tively) very small opening. This is done on an engine by partly closing the throttle valve. The temperature remaining the same, the small fall in pressure results in superheating the steam allowed to pass through the valve.

Superheated steam has a lower thermal conductivity than saturated steam, and this quality reduces the leakage of heat to the cylin¬ der walls by 12 per cent. The radiation from pipps carrying superheated steam is less, also. The fuel expense of superheating steam is not large : the amount of fuel required to raise steam to 100° of superheat — that is, to 312°, being an increase of only 5.69 per cent over that required to produce the satu¬ rated steam of 212°. The limit to which

superheat may be added to water confined in a boiler is about 600°, equivalent to a pressure of 1,574 pounds per square inch. Above this point the proper lubrication of the cylinders of reciprocating engines, and the maintenance of packings of valves and condens¬ ing apparatus in normal condition is impracti¬ cable. The practical limit of safe pressure in modern boilers is 200 pounds per square inch, equivalent to a temperature of about 380°, or 168° of superheat. In the United States the range of superheat practice does not exceed 500

degrees, and there are few instances in which it exceeds 450°, In Europe, however, few plants are installed without superheaters, and the temperatures range from 600° for ordinary to 850° as the top limit. For these very high pressures specially built boilers are required, and the extra cost of such work offsets the advantages which may be gained. <(Live steamˆ is steam which has performed no work, or rather which is available for the performance of work. Steam which has performed work is called exhaust steam. When a pound of water at 212° is turned into steam at 212°, 965.7 heat units are ab¬ sorbed in the change of form. This energy reappears when the steam returns to the form of water. Herein lies the vast economic profit in the utilization of exhaust steam in the heating of feed water for the boiler, warming the shop, etc. Every pound of exhaust steam

Fig. 1.

has within itself the potency of 751,314.6 foot¬ pounds of heat energy, imparted to it by the fuel. If even but a part of this latent heat energy can be used, an equivalent amount of fuel is saved, or, what practically amounts to the same thing, so much of the fuel is used twice.

Vaporization. — When heat is applied to water, a point is reached at which the heat overcomes the cohesion and the pressure of the atmosphere, then the water passes into vapor. Evaporation takes place at the surface of the water. Its rapidity varies with the temper¬ ature and the pressure upon that surface. When a flask containing water (see Fig. 1) is placed over the flame of a lamp, the air dis¬ solved in the water is first driven off, then as the temperature of the water rises, the liquid molecules in contact with the bottom of the flask become so hot that the heat is able to overcome their cohesion, the weight of the overlying water and the pressure of the atmos¬ phere above the

water. At this temperature

the change from a liquid to a gaseous state takes place beneath the surface, the steam ris¬ ing to the surface and escaping with ebullition.

The boiling point — that is, the temperature at which steam is formed, depends on the pres¬ sure under which it is generated. If the water is confined to a limited space, as in a boiler, if the pressure above it is relieved with an airpump, the boiling point will be lowered. If pressure is brought to bear on the water in the boiler, the boiling point is raised. This is, in effect, what happens in ordinary boiler practice : the pressure is increased by making more steam than there is room for in the boiler above the water. The steam being compressible, accumu¬ lates in a state of compression, and the boiler pressure rises, as shown by the steam-gauge. The following table gives the relations between pressure, volume and total heat of steam for temperatures between 32° F. and 428° F. Dur¬ ing the first stage of heating, all the heat sen¬ sibly goes into increasing the internal energy of the fluid. This is represented in the last column of the table. During the second stage the heat taken in is known as latent heat of steam. The total heat of both stages is repre¬ sented by the numbers in the fourth column of the table. The latent heat of the steam is de¬ termined by subtracting the heat content of the liquid from the heat content of the steam.

Table I.

Tempera¬ ture in degrees Fahrenheit

Pressure per square inch in pounds

Volume per pound in cubic feet

Total heat content of steam

Heat content of water

32 .

0.089

3,296.00

1,073.0

0.00

41 .

0.127

2,352.00

1,077.4

9.06

50 • ••••••••

0.178

1,702.00

1,081.5

18.08

59 .

0.247

1,248.00

1,085.8

27.08

68 .

0.340

926.00

1,089.9

36.08

77 .

0.459

695.00

1,094.1

45.06

36 • •••••••

0.615

527.20

1 ,098.2

54.04

95 .

0.815

404.20

1,102.3

63.01

104 .

1.069

313.06

1,106.4

71.99

113 .

1.389

244.70

1,110.4

80.96

122 .

1.788

192.90

1,114.4

89.93

131 .

2.281

153.40

1,118.4

98.91

140 .

2.887

123.00

1,122.3

107.89

149 .

3.625

99.40

1,126.1

116.88

158 .

4.518

80.80

1,130.0

125.88

167 .

5.589

66.23

1,133.7

134.88

176 .

6.870

54.62

1 ^ 137 . 5

143.89

185 .

8.380

45.33

1,141.1

152.90

194 .

10.170

37.84

1,144.7

161.92

203 .

12.260

31.76

1,148.3

170.96

212 .

14.700

26.81

1,151.7

180.00

221 .

17.520

22.75

1,155.2

189.00

230 .

20.780

19.39

1,158.5

198.10

239 .

24.530

16.61

1,161.7

207 . 20

248 .

28.800

14.29

1,164.9

216.30

257 .

33.670

12.35

1,167.9

225.40

266 .

  1. 190

10.71

1,170.9

234.50

275 .

45.420

9.33

1,173.8

243.70

284 .

52.430

  1. 16

1,176.5

252.80

293 .

60.280

7.15

1,179.2

262.00

302 .

1. 100

6.30

1,181.8

271.30

311 .

78.800

5.56

1,184.2

280.50

320 .

89 . 700

4.92

1,186.5

289 . 80

329 .

101.600

4.37

1,188.6

299 . 20

338 .

114.900

3.89

1,190.7

308.50

347 .

129.400

3.48

1,192.5

317.80

356 .

145.400

3.11

1,194.3

327.20

365 .

162.900

2.79

1,195.9

336.70

374 .

182.000

2.51

1,197.3

346 . 20

383 .

202.700

2.26

1,198.6

355.70

392 .

225.300

2.04

1,199.7

365 . 20

401 .

249.800

1.69

1,200.6

374.80

410 .

276.300

1.67

1,201.4

384.40

419 .

306.040

1.52

1,202.0

393 . 80

428 .

1. 100

1.38

1,202.3

403.70

542

STEAM

Dulong and Arago determined the tension of steam many years ago by means of the apparatus shown in Fig. 2.

In the figure (k) is a copper boiler, with a tube (a) containing a thermometer (f), which meas¬ ures the temperature of the water, and its vapor. The tension of the steam is measured by a manom¬ eter (m). The steam passing through the tube (c) exerts a pressure on a column of water in the tube (i). This pressure is further transmitted to the mer¬ cury in the vessel (d), and thence to the manometer. By taking the manometer readings correspond¬ ing to each degree of the ther¬ mometer, a direct measurement of tension was obtained up to a pres¬ sure of 24 atmospheres, and from this on by calculation. The fol¬ lowing is a table of results:

Fig. 2.

In the making of steam in boilers it is of the greatest importance that clean, soft water be

Table II.

Temperature

....

Number of atmospheres

Temperature

Number of atmospheres

Temperature

Number of atmospheres

Temperature

Number of atmospheres !

100.0°

1

170.8°

8

198.8°

15

217.9°

22

112.2

u

175.8

9

201.9

16

220.3

23

120.6

2

180.3

10

204.9

17

222.5

24

133.9

3

184.5

11

207.7

18

224.7

25

144.0

4

188.4

12

210.4

19

226.8

26

152.2

5

192.1

13

213.0

20

228.9

27

159.2

6

195.5

14

215.5

21

230.9

28

165.3

7

Regnault, 14 years later, devised a method by which the vapor of water could be measured at temperatures above or below boiling point. By this method the following tensions were obtained for temperatures ranging from 10° below to 101° above zero, of the Centigrade scale.

Table III.

Temperatures,

degrees

Tensions in millimeters

1 Temperatures,

degrees

Tensions in millimeters

Temperatures,

degrees

Tensions in millimeters

Temperatures,

degrees

Tensions in millimeters

—10

2.078

12

10.457

29

29.782

85

433.41

8

2.456

13

11.602

30

31.548

90

525.45

6

2.890

14

11.906

31

33 . 405

91

545.78

4

3.387

15

12.699

32

35 . 359

92

566.76

2

3.955

16

13.635

33

37.410

93

588.41

1

4.600

17

14.421

34

39.565

94

610.74

- 1

4.940

18

15.357

35

41.827

95

633.78

2

5 . 302

19

16.346

40

54.906

96

657.54

3

5.687

20

17.391

45

71.391

97

682.03

4

6.097

21

18.495

50

91.982

98

707.26

5

6.534

22

19.659

55

117.478

98.5

1. 15

6

6.998

23

20.888

60

148.791

99.0

733.21

7

7.492

24

22.184

65

186.945

99.5

746.50

8

8.017

25

23 . 550

70

233.093

100.0

760.00

9

8.574

26

24.998

75

288.517

100.5

773.71

10

9.165

27

26.505

80

354.643

101.0

787.63

11

9.792

28

1. 101

used. The condensation of the salts in boiler water eventually reaches a point where they are deposited as scale on the inside of the plates and tubes, a condition in which much fuel is wasted. (See Water Softening).

The Energy of Steam. — Water has the greatest specific heat of any known substance, except hydrogen. By this we mean that more heat enters into it, in order to raise its tem¬ perature one degree, than into any other sub¬ stance, with the one exception mentioned. Its stored energy as noted above is 965.7 thermal units per pound of water, Fahrenheit scale. It is easily condensed, giving out this energy. These facts, together with its universal and abundant presence in large quantities, have ren¬ dered steam, up to this time, a favorite means for the generation of mechanical power. The process of changing steam into mechanical power may be briefly outlined as follows: If we

start with water at 32° F. and apply heat, the temperature of the water will rise one degree for each thermal unit, but expansion does not begin until 38° to 40° of tem¬ perature are reached. When 180ˆ2 units of heat have been absorbed the temperature of the water will be found to be 212° F. and its expansive force (into a vacuum) equal to 14.7 pounds to the square inch, or that of the atmos¬ phere at sea-level. At this point the water is incapable of becoming any hotter under that pressure. The heat added, after that point is reached, is used in converting the water into steam, and 965.7 thermal units are required for each pound of water thus converted. This so- called latent heat is stored energy, to be given back again in mechanical work and heat, as the steam is condensed. If we enclose both water and steam in a boiler of suitable con¬ struction, and continue heating, part of the water will be vaporized, but being prevented by the confined space from expanding, it crowds the steam already enclosed into a smaller vol¬ ume and the pressure upon the surface of the water is increased so that the heat now added increases temperature again. When we have added 1,188.6 total thermal units (including temperature and latent heat) the pressure or

energy .of the steam will be equal to 101.6 pounds to the square inch and the temperature will have risen to 329° F. (See table I, columns 1, 2 and 4),.

We have now to consider how this energy is transformed. When the steam in the cylin¬ der of an engine performs work by pushing the piston against a resistance, that work robs the steam of a portion of its heat, hence the steam is condensed. Theoretically, it requires two and a half pounds of steam, saturated, to supply one horse power of work each hour ; but practically, from 5 to 25 times that amount is required to pass through an engine in order to secure this result.

This is due to the loss .of the energy of the steam, in giving up its heat to the walls of the cylinder, and to the immense portion of the steam which acts only as backing. In the best quadruple engines of to-day less than one-fifth of the energy of the steam is con¬ verted into actual work, and in the best non¬ condensing engines .only one-tenth. The waste is enormous, but the abundance of the supply in part compensates for it.

According to the 1914 census of manufac¬ tures the number of steam

engines and steam turbines employed in manufacturing in the United States was 137,176, and the total horse power developed was 15,681,688 or 69.5 per cent of all forms of power in the country. A large amount of steam is used, in addition to this, for heating purposes. Its value in this respect is due to its being able to carry more heat for a given weight than any other substance, and when it has given up its heat to drop out of the way, by condensation, and make way for a fresh supply. Steam is also used extensively in extracting processes.,. It is often injected directly into a liquid, bub¬ bling through it and carrying over certain con¬ stituents to be released in the condensing chamber. In other cases, especially those of liquids boiling at a Lower temperature than water, coils of steam pipes supply the mild de¬ gree of heat needed for a gentle distillation. Consult Goodenough, G,, A., Properties of Steam and Ammonia *(New York 1915) ; Hausbrand, E., and Wright, A. C., Evaporat¬ ing, Condensing and Cooling Apparatus* (London 1916) ; Holmes, U. T., Experimental Engineering* (Annapolis 1911).

Richard Ferris,

Editorial Staff of The Americana.

STEAM-ENGINE, the apparatus by means of which the stored hea't-energy of fuel, trans¬ ferred to water and steam, is transformed into mechanical work. This transformation of thermal into dynamic energy, this thermodyna¬ mic change, requires f.or its successful and economical conduct special forms of mechanism and is subject to a variety of wastes of serious aggregate amount, even with the most perfect of modern engines. The series of processes in the train between the fuel and the point of application of the useful energy with state¬ ment of the corresponding wastes and efficien¬ cies are as follows : it being understood that an efficiency is the quotient of useful result divided by outgo producing it, the two being

expressed in similar terms : — These efficien¬ cies are those of

1. Combustion of fuel; ratio of heat set free to total heat latent in the fuel. This efficiency is usually not far from 90 per cent. Wastes due to incomplete combustion.

2. Heat-transfer from furnace to boiler; efficiency as a rule, about 75 per cent, as measured by heat stored in the steam supplied. Wastes occurring mainly at the chimney.

3. Heat-transfer from boiler to engine with loss by con¬ duction

and radiation, en route. Efficiency of operation about 90 per cent in small boilers and increasing to 95 or 98 per cent in large sizes.

4. Heat-transformation into work at the engine with wastes by defective thermodynamic change and rejection of heat at the lower limit by conduction and radiation within and without the cylinder, variable with size, with mean temperature of steam and other conditions. Efficiencies for the ideal case usually approximate 25 per cent with only thermodynamic wastes, and attain to 20 per cent with suc¬ cessful constructions in the real case; the wastes including the thermodynamic and inevitable losses and the partly con¬ trollable extra-thermodynamic wastes.

5. The transfer of mechanical energy from cylinder to point of application. The wastes occur by friction and usually amount to about 10 per cent, as a minimum in con¬ densing, and to 5 per cent i.n non-condensing engines. Effi¬ ciency, 90 to 95 per cent.

The thermodynamic efficiency of the best steam-engines may be thus taken to be 25 per cent ; the thermal efficiency at the engine, involv¬ ing other wastes than thermodynamic, about 20 per cent; the total efficiency between steam- valve and fly-wheel about 18 per cent and the efficiency of engine and boiler combined not far from 14 per cent ; while the total efficiency of engine, boiler and furnace, from coal-pile to engine-belt, may be about 12ˆ2 per cent. In common constructions these efficiencies are

Hero's Steam-turbine (120 b.c.). — A B, steam boiler; C D. supports; a, revolving globe; H K, nozzles.

much reduced and in many cases may be di¬ vided, by from two to four, the demand for fuel of good quality ranging from about one pound or half a kilogram in the best work to several times that amount per horse-power- hour, and for steam from 10 pounds, about four and a half kilograms, to a multiple of that quantity. In some instances, as with many small boiler feed-pumps, 10 or even 20 times the minimum figure just given are reached, the wastes becoming enormous and the utilized energy of the fuel insignificant.

The ((ideal case® is understood to be that purely thermodynamic operation which illus¬ trates the conversion of thermal into dynamic energy where no other energies than thermal and dynamic are concerned, and where the change is effected in a machine which is not

subject to wastes by conduction or radiation; an apparatus composed of perfectly non-con¬ ducting materials and perfectly constructed. In the ((real case,® the materials of construc¬ tion are necessarily good conductors and good

radiators of heat, and the wastes by conduc¬ tion and radiation are roften supplemented by leakage of steam as well as of heat. In the real case, the details of construction, adjust¬ ment and operation affect very greatly the re¬ sultant efficiency and the commercial rating of

Savery's Engine (1702). — L, boiler; G, feed-vessel; PP, forc¬ ing vessels; S, rising main; T, suction.

the engine. The study of the steam-engine thus comprehends the ideal, the purely ther¬ modynamic, case and the real case with its various wastes, thermodynamic and extra-ther¬ modynamic, as well as an investigation of the principles and practice in the design and con¬ struction of the real engine.

Newcomen's Engine (1705). — B, boiler; a, steam-cylinder; s r, piston and rod; K, pumo rod.

Engines. — The power of steam and the em¬ ployment of that fluid in various sorts of en¬ gines have been familiar to mankind from an unknown and possibly prehistoric period. The earliest known record is that of Hero, who, in his <Pneumatica) of which the manuscript was produced at Alexandria, about 120 b.c., de¬

scribed a steam-turbine and several forms of steam-fountains and steam-boilers. So far as known, none of them had any useful applica¬ tion and they were simply toys or impracticable schemes. It is unknown, in fact, whether any of them were constructed; although the draw¬ ings appear in some cases to be those of actual constructions.

Through the later centuries, up to the 17th, but little progress was made either in the ac¬ quirement of a knowledge of the properties of steam or in its application to useful purposes. Some forms of ˆseolipile,® furnished a steam- jet for improving the draft of the chimney, apparatus for turning the spit and even more ambitious uses were either attempted or sug¬ gested; but, until Da Porta's treatise on pneu¬ matics appeared in 1601, in which a steam-foun¬ tain was described, and the description in 1629 of an impulse steam-turbine, by

Branca, no de¬ velopment took place of any real importance.

Watt's Engine (1774).— a, cylinder; b, piston; x , rod ;

y, beam; i j, air-pump and condenser; m, valve-gear.

It was not until the second Marquis of Wor¬ cester, Edward Somerset, constructed a steam- fountain (1650) and employed it in raising water from the moat to the top of the tower of Raglan Castle, and later erected another for similar purposes at Vauxhall, that the story of the evolution of the steam-engine really begins. Meantime the scientific men of the later cen¬ turies were acquiring some exact knowledge of the nature of steam, earlier confounded with other gases, and some familiarity with its latent powers.

Steam power first became an acknowledged industrial agent and useful as a prime mover when Savery, at the beginning of the 18th century (1698), made Worcester's steam-foun¬ tain practically applicable to the drainage of mines and the elevation of water for water- supply generally. This apparatus, which could not be properly called an engine, consisted of a pair of cylindrical or ellipsoidal ((forcing ves-

sels» which were alternately filled with water, by the production of a vacuum within the vessel, and emptied by the introduction of high-pressure steam from an adjacent boiler; the one being emptied while the other was filling and vice-versa, This apparatus, introduced by Sav- ery, improved and further made known by Desaguliers and by Smeaton, was known and in use before the year 1775 throughout the world where mining at considerable depths and in presence of water was carried on. The steam- fountain is still in use and is known as the <(pulsometer.®

Watt's Double-acting Engine (1784). — C, cylinder; b, beam;

O, connecting rod; Q s, governor and valve.

Newcomen's steam-engine, the first steam- engine properly so termed, the first which con¬ sisted of a train of mechanism as distinguished from the Hero steam-fountain, which was a piece of apparatus without moving parts, was patented in 1705. It consisted of a steam-cylin¬ der and piston, actuating a beam, above from the opposite end of which

was pendant the pump-rod operating the pumps in the shaft of the mine; it was always used as a steam pump¬ ing engine. Thomas Newcomen and his part¬ ner, John Calley, are thus to be credited with the invention and introduction of the modern steam-engine with all its essential elements as a pumping engine. It was the improvement of this engine by the addition of various valuable devices which gave James Watt his fame and fortune.

This earliest type was a condensing en¬ gine in which condensation was effected by means of a jet of water directed into the steam cylinder when the pressure on the under side of the piston was <to be removed. The upper side was open to the air, there being no upper cylinder-head. The engine was thus operated by the atmospheric pressure, steam being held at about atmospheric pressure and only em¬ ployed to secure a vacuum below the piston. The pressure of the atmosphere depressing the piston, the pump-rod on the opposite end of the beam was raised and the pump filled. With

the fall of the pump-rod the water was forced out of the pump and raised to the upper level. The weight on the outer end of the beam always overbalanced the weight of the piston and attachments sufficiently to do the iequired work. This type of engine remained in use for a century, and old engines of New¬ comen's time are still in existence. The type became known, later, as the Cornish engine, Watt's improvements having been meantime added. After Newcomen's death, the machine was improved in details by Desaguliers and by Smeaton, who considerably increased its econ¬ omy by attaching wood to the piston and cylinder-head to prevent what has been called <(cylinder condensation® by action of alter¬ nately heated and cooled metal in contact with the steam. This was probably the first rec¬ ognition in construction of this important phe¬ nomenon.

The valves of this engine were at first worked by hand ; but a boy, Humphrey Potter, is credited with having devised an automatic system, which, later in 1718, carefully designed and constructed in a workmanlike manner by Henry Beighton, a well-known engineer of that period, became the first automatic valve-motion.

James Watt, introducing the needed improve¬ ments in the Newcomen engine, finally produced the modern types of ˆreciprocating® steam- engine. His first great improvement was the separate condenser, which permitted condensa¬ tion to be effected without the introduction of water into the working cylinder and thus

re¬ duced very greatly the waste of steam by initial condensation. Watt first enunciated the prin¬ ciple: ((Keep the cylinder, if possible, as hot as the steam that enters it.® The first step was this of removing the primary cause of refriger¬ ation. The next was to surround the cylinder with a chamber containing steam at boiler pres¬ sure ; thus introducing his second great inven¬ tion, the ((steam-jacket.® He next covered the upper end of the cylinder, excluding the cold air and supplying the place of the atmosphere and its pressure on the upper side of the piston by steam from the boiler, completing his scheme of keeping the cylinder as far as was practi¬ cable as hot as the entering steam.

The <(double-acting engine® constituted the next and an easy step. With steam admitted at both ends of the cylinder, it was immedi¬ ately evident that each might be utilized, alter¬ nately, in the performance of work and Watt soon adjusted his valve-gear and connections in such manner as to permit this alternation and produce a push and a pull on the piston-rod. This compelled a rigid connection between the piston and overhead beam, on the one end, and between the outer end of the beam and its work, now become that of rotating a shaft with crank and fly-wheel. Thus one improvement led to another and Watt's steam-engine ultimately be¬ came capable of supplying power to every im¬ aginable kind of machine or work. The single-acting engine was, for many years after Watt's death, used in raising water and the double¬ acting engine continues to turn the shaft of mill, locomotive, steamship and factory.

Watt invented and introduced many acces¬ sory inventions and devices, as the attachment of the governor — already a well-known ap¬ paratus — the steam-engine ˆindicator,® the ex-

pansion of steam, the compound engine, the non-condensing engine, practically all that dis¬ tinguishes the modern engine from that of New¬ comen. These improvements raised the "duty® of the pumping engine, in the course of 25 years, from about 7,000,000 foot-pounds to 30,000,000, and, in the latest forms of Cornish engines, about 1850, to twice the last figure or more, reducing cost of steam-power enormously, and at the same time adapting the steam-engine to every requirement in the industries, giving to the world, in fact, its contemporary civiliza¬ tion. This cost in coal per horse-power-time is reduced from the 35 pounds of Smeaton's time to one pound, as a

minimum to-day, and the work of the world is performed by steam-engines, mainly, probably amounting to 150,000,- 000 horse power and equivalent to the working power of several times the population of the globe, if employed in manual labor.

At the commencement of the 19th century, Trevethick and other able mechanics and in¬ ventors were seeking to construct locomotives, and complete success was achieved by George Stephenson in engines built from 1814 to 1833. The steamboat had been suggested by numerous writers and engineers, and, after many attempts, was made a practical success by John Fitch in the United States about 1785, by John Stevens in 1804-09 and commercially by Fulton, 1807-15. In Great Britain, after many early failures, Mil¬ ler and Symmington and Bell, step by step, at¬ tained permanent success and by 1830, the date of the first transatlantic steamship voyages, those of the Cirius and the Great Western, all civilized countries were employing the steam¬ boat. See Steam Vessels.

Meanwhile the elements of economy became recognized and steam-pressures rose from the two to seven pounds above the atmosphere of Watt's time to 25 or 30, about 1850, and to 100 and upward to occasionally 200 at the end of the 19th century; the ratio of expansion of the steam increasing in similar ratio. The speeds of engine-piston also gradually increased from about 100 feet per minute, at the beginning, to 600 and often to 1,000 at its end. The weights of engine and sizes for the usual powers mean¬ time fell from 1,000 pounds or more per horse power developed at the time of Watt, 500 about 1850 and to 250 in 1900 where weights were comparatively unimportant and, in special cases, where weight and volume required to be reduced to the smallest possible figures, as for torpedo- boats, to a fourth or a fifth the last-named quantity.

The compound, the triple and the quadruple expansion engine have largely displaced the sim¬ ple engine of Watt; the first of these types having been introduced in Watt's time by Horn- blower, Woolf and Falk and the second by Kirk about 1874; while the last-mentioned became standard with the rise of steam-pressures to about 15 atmospheres, about 1890. These com¬ plications are mainly the outcome of the en¬ deavor to follow Watt in repressing the waste by cylinder condensation, reducing the propor¬ tion of heat-absorbing surface and the temper¬ ature-head producing flow of heat into the metal of the cylinder. Incidentally, the multiple cylinder engine gives a steadier rotation of the crank-shaft and a smoother action of the steam than the simple engine, and also reduces weight

by lessening the maximum load upon the work¬ ing parts, the range of pressure in each cylinder being reduced with this reduction of tempera¬ ture-range.

This steady progression from the days of Watt to the present finally culminated in a re¬ trogression to the simple form of the Hero en¬ gine, the steam-turbine, in which all the compli¬ cation of the Watt-Newcomen engine is done away with and but one moving part performs every essential office, apart from condensation, and yet secures, in its best constructions, the economical results of the whole series of changes distinguishing the 19th century, with the added gain of reduced volume, weight and cost, both initial and operative. The turbine promises thus to provide power with maximum ultimate result in financial efficiency. Mean¬ time, the gas-engine, after a similar period of development, is now rivaling the reciprocating steam-engine in many of its fields. The best steam-engines of both the standard types and the gas-engine are now capable of deriving large powers from substantially the same quantity of energy potential in fuel.

The Structure of the Steam-engine differs in detail according to place and purpose. The familiar forms may be thus classed : A primary classification as condensing and non-condensing distinguishes engines by their utilization or non¬ utilization of the vacuum. In the former class, condensation may be effected by sur¬ face or by jet-condensation; this distinction indicating a subordinate method of identi¬ fication of a variation within the type. The usual classifications are based upon the essen¬ tial features of structure, and these are ordi¬ narily as follows :

1. According to the number of cylinders:

(1) Single cylinder, simple engines. _ _ m

(2) Multiple-cylinder engines, “ compound, ” etc.

1. With reference to the construction of cylinders:

(1) Fixed cylinder.

(2) Movable cylinder.

In the first case, the engines are:

(a) Vertical.

(ft) Horizontal.

(c) Inclined.

In the second case, they are:

(a) Oscillating, vibrating, etc.

(ft) Rotary, steam-turbines.

1. With reference to the action of the steam:

(1) Single-acting.

J2) Double-acting.

1. With reference to the transmission of the steam power:

(1) Direct-acting.

(2) Indirect-acting.

And in the latter case either —

(a) With balance lever, or beam.

(ft) Without lever or working beam, geared, etc.

The essential details of these engines are usually the same in all the forms in which the individual piece is found. A rod or a crank, a shaft or a valve, will commonly be found to have assumed a standard form, and the differ¬ ence in engines is largely a difference in group¬ ing. Since Watt, but few advances have been made in real invention, and the progress ob¬ served has been mainly one of refinement and adaptation. Frederick E. Sickels introduced a successful form of “drop cut-off®; Corliss, Greene and others invented improved valve- gears embodying the same general principles, and Potter and Allen, and others, successfully established the “high-speed® engine as a motor where rapid rotation of the prime mover facili¬ tated transmission of power, as with electric generators and in rolling mills.

Similarly, the locomotive proposed by a num¬ ber of earlier inventors, particularly by Treve- thick, who constructed several, was successfully brought into use by George Stephenson and, to-day, in its many forms and uses, the engine in its essential details and distinguishing feat¬

ures is that of Stephenson, refined and adapted to high and to low speeds, to heavy and to light loads. A very noticeable feature of the later engines is the forward ˆtruck® or ˆbogie,® de¬ vised by John B. Jervis, which, by permitting the forward wheels to swivel and the engine to rock upon the truck, accommodates the locomo¬ tive to sharp curves and irregular track.

In marine construction, a similar adaptation of the form and proportions of the engine to the special purpose in view gives rise to the types employed with side-wheel and screw, high powers and low, to the essential requirements in lightness and small bulk of torpedo-boat practice and the needs of transatlantic naviga¬ tion and of that of the rivers of the United States. The substitution of surface condensa¬ tion for condensation by the jet has been com¬ pelled in sea-going ships by the use of high- pressure steam and the impracticability of using sea-water in the boilers. The latter forms of engine are thus refinements and adaptations of the earlier.

Meantime, in all directions, the steam-engine has come to be utilized in the production of very large powers, and its construction in very large units is found to be very frequently eco¬ nomically desirable. Stationary engines for mills, and especially for large power-statmns supplying the energy applied in electric lighting or power distribution for electric railways, are built in sizes ranging from a few hundred horse power up to 13,000 horse power, and sometimes grouped into systems rating as high as 100,000. Marine engines are also constructed in these large sizes and powers, and as high as 70,000 horse power may be used for the. latest and largest transatlantic steamers, as in the Mauretania. The locomotive, in the time of Stephenson weighing, in the case of his first successful machines, four to six tons is now built of nearly 120 tons weight and capable of hauling loads of 30,000 tons at good speeds, on level rails. The steam pumping engine of the time of Newcomen and Watt had a capacity of a few hundred thousand gallons per day; it is now furnished in sizes up to 75,000,000 gal¬ lons per day for reciprocating engines and up to 320,000,000 for rotary engines, while its duty has risen from the comparatively insignificant figures of the times of the inventors to 150,000,- 000 and even 180,000,000 foot-pounds per hun¬ dred pounds of' fuel. The steam-turbine, for all these uses, may now be obtained in as large powers as the reciprocating engine and with substantially the same guaranteed duty. Its relatively high speed of rotation, ranging from 600 to 3,000 in the largest sizes, to 30,000 in the small, and its smooth rotation, make its use distinctively advantageous in electric serv¬ ices and its small weight and volume are pe¬ culiarly helpful to the marine engineer and naval constructor.

The Thermodynamics of the Steam-engine, the science of its ideal case, involves the funda¬ mental principles of Energetics and in particu¬ lar the laws governing the transformation of

energy from the form of heat to that of mechan¬ ical energy and vice-versa. An all-comprehend¬ ing law, of which the laws of Energetics are in fact corollaries, the law of Existence, or of whether matter or force or their resultant, en¬ ergy, and in whatever form, is indestructible by finite power.

Matter may change its form and its chemical composition by rearrangement of its molecules or of its elementary atoms, but it cannot be de¬ stroyed; forces inhere and are persistent as characteristics of all matter and cannot be sep¬ arated therefrom ; energy, like matter, is con¬ stant in its total quantity in the universe and may be transferred and transformed, but cannot be extinguished. Transformation of energy, as of thermal into dynamic or mechanical, is sim¬ ply the change of the kind of mass affected and consequent alteration of the kind of motion due to its action. A shot from a gun, stopped in its rapid flight by impact on the target, if not frac¬ tured, will exchange the thousands of foot-tons of mechanical energy sustaining its flight for precisely the same quantity of molecular mo¬ tion and energy. Similarly, were a shot heated to a high temperature and then were all its molecules by some conceivable process of steer¬ ing each into its path, made to take up simul¬ taneously a definite rectilinear motion, it would become absolutely cold and would fly out into space with a dynamic mass-energy precisely equal and, in fact, with the identical energy at first displayed as molecular. The heat-engine is a device for bringing about such a change for industrial purposes.

The laws of energetics, as usually enunciated, are :

1. The Law of Persistence, or of Conservation of Energy, namely: Existing energy can never be annihilated; and the total energy, actual and potential, of any isolated system can never change.

This is evidently a corollary of that grander law, asserting the indestructibility of all the work of creation, which has already been enunciated.

1. The Law of Dissipation, or of Degradation of Energy, namely: All energy tends to diffuse itself throughout space, with a continual loss of intensity, with what seems, now, to be the inevitable result of complete and uniform dispersion throughout

the universe, and consequently of entire loss of availability.

It is only by differences in the intensity of energy, and the consequent tendency to forcible dispersion, that it is possible to make it available in the production of work.

1. The Law of Transformation of Energy, namely: Energy may be transformed from one condition to another, or from any one kind or state to any other; changing from mass- energy to molecular energy of any kind, or from one form of molecular energy to another, with a definite quanti valence ,

Thermodynamics, being a restricted ener¬ getic, in which only two energies, thermal and dynamic, are comprehended, its laws are, funda¬ mentally, identical with the preceding and the enunciation just adopted is entirely accurate in this restricted science.

The Laws of Thermodynamics, in the special forms considered best for the purposes of the thermodynamist, are corollaries of the laws of energetics and of Newton's laws, which are a different method of expression of the same fundamental principles. They are usually stated thus :

1. Thermal and Mechanical Energy are mutually inter¬ convertible in the proportion of one British Thermal Unit for each 778 foot-pounds , or of one calorie for each 427 kilogram- metres of energy or of work.

The mechanical equivalent of heat is the specific heat of water at its temperature of maximum density expressed in dynamic units, as foot-pounds or kilogrammetres.

The value of the mechanical equivalent of heat has been taken as first adopted by Joule, although recent and most carefully conducted investigations indicate a value higher by perhaps 1 per cent, to be more accurate. Many existing tables, and much work done in this field to date, have, how¬ ever, been based upon Joule's figure, 772 foot-pounds, 423 kilogrammetres. The figure, above given, 778 or 427, is now, however, generally accepted.

1. The total of any single effect of any given quantity of heat acting in any thermodynamic operation is proportional to the

total amount of heat-energy so acting.

This principle is substantially that first accepted by Rankine as the second law. Actually energy of vibration is understood.

Thus, of the whole quantity of heat passing from the heater to the working substance, one part is always trans¬ muted into mechanical work, or energy; while the remainder goes to the refrigerator, and the ratio of the one quantity to the other is perfectly definite.

Professor Wood expresses this law thus:

“ If all the heat absorbed be at one temperature, and that rejected be at one lower temperature, then will the heat which is transmuted into work be to the entire heat absorbed in the same ratio as the difference between the absolute tempera¬ tures of source and refrigerator is to the absolute temperature of the source.”

The second law finds important application simply in enabling us to ascertain the total quantity of work, external and internal, required to produce changes of volume and energy in fluids, like the vapors, in which we cannot measure directly the internal forces and internal work.

If the change of sensible heat be called dS, that of “ latent ” heat, dL, and of external work, dU, then the first law of thermodynamics is expressed by the equations:

$dH = dS + dL + dU$. (A)

and

$dH = *dS + dW$, . (B)

$dH = dE + dU$, . (C)

where, in the last two expressions, $dE = dS + dL$, and is the variation of energy, actual and potential; while dW — dL -f- dU, and is the total work done, externally and internally. These are primary and general equations.

The quantity E is often called the intrinsic energy of the substance; L is evidently a potential energy; while 5 is a form of molecular kinetic, or actual, energy, which may sometimes be regarded as also in a sense potential.

The above are completely general expressions of the general fundamental equation of thermodynamics.

Internal work or energy, positive or nega¬ tive, is the work performed in changing the relative distances between molecules, atoms or corpuscles, or in causing variation of their rela¬ tive velocities, and within the mass and out of reach of the human senses. In the fundamental equation, it is measured by dL.

External work is that performed by mass or molecule, by atom or corpuscle against outside resistances, as where steam expands, doing work upon a piston. As indicated by the above laws, it must do so by surrendering an equivalent quantity of heat-energy. This is dW.

Heat-energy, thermal or dynamic, is of the same nature and may be measured in either thermal or dynamic units, foot-pounds and kilo¬ grammetres, or in British or metric thermal units or ˆcalories.® One B. T. U., expressed in thermal units, is 778 foot-pounds expressed in dynamic units; one metric unit, the calorie, is 3.96832 times as great as the British, or the B. T. U. is 0.251996 of the metric unit. The en¬ gineer often conducts his thermodynamic inves¬ tigations in dynamic terms; the physicist and the chemist employ the thermal ; the one often uses British, the other always adopts the metric. Where work is performed by an expanding fluid upon a moving piston, the total work,

U — {pe + pi) as;

where a is the piston-area, and s is the space traversed by the piston ; mean pressures cor¬ responding to the external and the internal work being pe and pi while as~v, the volume traversed.

The Perfect Gas is a fluid within which no

internal work is done with varying volumes and which may be defined by the equations, pv~ aT ; pv/T — a. In thermodynamic equations, the perfect gas has zero values of internal en¬ ergy and work. T is absolute temperature, p and v the pressures and volumes at that tem¬ perature of unit mass.

Corliss Engine Valve-motion (1850).

Vapors are fluids in which the internal energy and work may be large, both absolutely and relatively, with changing volumes. Inter¬ nal cohesive forces are often not only sensible but very great, the internal latent heat, which simply measures the internal work when ex¬

panding water into vapor of one atmosphere pressure, as an example, is the equipment of the work of elevation of the weight affected to a height of about 150 miles. These forces, however, as with the gases, do not prevent the free movement of molecules in any direction and to any extent; nor do they fix the volume and density of the substance.

Liquids are fluids in which the action of in¬ ternal molecular forces gives stability of vol¬ ume, but not of form, and the energies, internal and external, are thus limited to comparatively small ranges and to comparatively small values; while range and values are often enormously great when the liquid becomes vaporous, not¬ withstanding rapid diminution of molecular at¬ tractions.

Solids have stability, both of volume and of form; the ranges of internal forces and of ener¬ gies are still more restricted than with liquids and their extent of action and their values are still less than in liquids. By accession of heat, all solids become at some definite point liquid, liquids become vapors and vapors, when “super¬ heated,® become gases. It is to be noted that, whenever a substance, of whatever class, alter¬ nately expands and contracts through a fixed range of volume, whatever its temperature or the pressure, precisely the same amount of in¬ ternal energy is lost and gained by variation of volume against or with the constant effort of the internal forces.

Cycle is, thermodynamically, an operation in which a working substance passes through a series of changes of pressure, volume and tem¬ perature resulting in the final return of the sub¬ stance to its initial physical state. In this

operation, it is evident that the net change of in¬ ternal energy is zero. This process is illustrated in heat-engines in which the working substance is confined within the working chamber and therein passes through repeated cycles with repetition of the kinematic cycle of the machine itself. Obviously, also, where a working fluid traverses a cycle, the presence or the absence of the quantity of internal energy becomes a mat¬ ter of no importance when we seek only to de¬ termine the quantity of permanent thermo¬ dynamic transformation. The magnitude and effect of internal forces and energies have no influence upon the efficiency of transformation ; but they have importance as affecting the rela¬ tions of pressure, volume and temperature and the magnitude of the working cylinder and of the

heat-engine itself. In the highest boiler pressures now usual, these forces are about 10 times the gauge pressure. At atmospheric ex¬ ternal pressure, they amount to 13 atmospheres. These pressures cannot be measured by any gauge, but may be readily computed with pre¬ cision from easily ascertainable data; they are

Greene Engine (1855).

perfectly well known, as are the specific volumes of the fluid, which are very difficult, but not impossible, of direct measurement.

The gas-engine has the advantage in com¬ parison with the steam-engine, in its higher available temperature range and consequent higher thermodynamic efficiency.

The exact treatment of the thermodynamics of the steam-engine requires the use of. the higher mathematics, but the general principles have been given and the following will permit its applications to be understood:

A steam-engine is a thermodynamic system in which only thermal and dynamic energies are present and operative. Its action is to trans¬ form as large a proportion as possible of the heat supplied it into mechanical power and work. Each pound of steam from the boiler

usually brings over the equivalent of about 0.4 horse-power-hour and each horse-power-hour is the ideal equivalent of the heat-content of about 2.3 pounds, a kilogram, nearly, of boiler steam. Of this heat, a part, which is precisely measured by the area of the indicator diagram, is con¬ verted into useful work and an ˆefficiency® is attained measured by the ratio of the useful to the supplied energy in common units. Thus : where 23 pounds of steam per hour are de¬ manded per horse power developed, in the case assumed, the efficiency is 10 per cent; the heat supplied being that furnished from the fuel and measured by the difference between the (<total heat® of the feed-water at condenser tempera¬ ture and that of the steam in the boiler.

The nine-tenths which fails of utilization is composed of a variety of wastes, including the thermodynamic, that portion of the heat reach¬ ing the steam-cylinder and actually acting upon the piston which is not converted into indicated work, the waste by conduction and radiation ex¬ ternally and the waste by the transfer of heat between the metal of the cylinder and the work¬ ing fluid. These quantities in a good example may be taken as follows, the friction wastes of the

machine itself being included:

f Thermodynamic wastes . . 70

| Internal thermal loss . 10

Available heat-energy from External waste . 5

the boiler . 100 1 Friction . 2

Useful work . 13

100

This corresponds, for the ideal case, to an efficiency of 0.20, nearly.

The external waste of the steam-engine is usually considered to be covered by an allow¬ ance of about one B. T. U. per square foot per hour per degree range of temperature, Fahren¬ heit, or about three calories per square metre, although, on exposed metal having a rough sur¬ face, it may attain two to three times these fig¬ ures. The exterior of the cylinder is commonly lagged and the heads, if not thus covered, are polished, thus minimizing the waste. The total waste, on even small engines, has been found capable of being reduced to less than 3.5 per cent, total, inclusive of engine and boiler, by the use of good non-conducting coverings. This loss is often quite unimportant on large engines.

The internal wastes are produced by heat- exchanges between metal and steam, at induc¬ tion and eduction ; the steam giving heat to the metal at its entrance into the cylinder and rob¬ bing the metal at exhaust, thus transferring heat often in large quantities from the steam to the exhaust side, very much as leakage car¬ ries the steam itself with its charge of heat. The effect on efficiency is precisely that of leak¬ age. In this action, the cylinder-heads and the sides of the piston, being exposed to the widest range of temperature and for the longest periods, are most fruitful of waste; the cylin¬ der, proper, and especially its middle portion, wastes least. The total loss is a function of the temperature range, the time of exposure to transfer, and the quality of steam, and of the ratio of expansion which measures rudely the quantity of steam per unit weight of metal. In any one engine it may be stated, as a rough approximation, that the condensation is a con¬ stant quantity at all expansions. It may be treated as either a constant leakage or as a

constant loss of work measurable by an equiva¬ lent back-pressure. A common value of this leakage may be taken, in pounds, as not far from 0.02 B. T. U per square foot of surface exposed at cut-off, per minute per Fahrenheit degree of temperature-range. As a fraction of the steam supplied, it is approximately propor¬ tional in any given engine to the square root of the ratio of expansion. With various types of engine, it ranges from 25 or 30 per cent, with simple engines of moderate size to 10 per cent, in multiple-cylinder engines of modern con¬ struction as a minimum. In steam pumps and very small engines, it may amount to more than the whole amount of steam taken in, for ther¬ modynamic action. These machines, demanding 100, and even sometimes 150 or more pounds of steam per horse power hour, waste three-fourths or more by ˆleakage® of heat. The <(record- breaking® engines of large size and superior design demand as little as 10 to 12 pounds, ap¬ proximating 200 B. T. U. per horse power hour.

The velocity of heat-exchange in this man¬ ner is many times greater than in transfers across the boiler heating surfaces. It is the most rapid known form of condensation of steam, and is often 10 times as rapid as the pro¬ duction of steam in the boiler supplying it.

The conditions of maximum efficiency are mainly two : the reduction to the practicable minimum of the thermodynamic waste by in¬ creasing in all possible ways the area of the in¬ dicator diagram per unit of steam supplied, and by minimizing the wastes of heat between boiler and engine-piston. The first includes the in¬ crease of the initial pressure, with decrease of back-pressure and adjustment of the ratio of expansion of the steam to the range thus se¬ cured; the second involves reduction of conduc¬ tion and radiation by use of suitable non-con¬ ducting coverings of heated surfaces, protection from cooling influences and reducing ((cylinder condensation® by drying and superheating the steam, by increasing the speed of engine and by diminishing the heat-exchanges between metal and steam by fine finish of surfaces, and, where practicable, by interposition of non-conducting material, as was done by Smeaton and at¬ tempted by later inventors.

<(Mechanical efficiency,® the ratio of work transmitted from the piston to the point of useful application, ranges from 95 per cent in direct-acting engines as a maximum, to 85 per cent with the older non-condensing engines. It is made a maximum and friction reduced to a minimum by careful design, and especially by securing constant, complete and free lubrication; usually, in the best cases, by a

circulatory flow of oil, flooding the bearings and returned by pumps, to the source, through a filter, to be again distributed to the rubbing surfaces of the engine. The lost work is the less, as the pres¬ sures are higher within limits determined by the nature of the materials, as the lubricant is bet¬ ter adapted to its intended purpose, and as the flow is more liberal where reaching the rub¬ bing parts. The highest values of the coeffi¬ cient of friction are often 10 and sometimes 20 times the lowest and the careful attention of the engineer to this detail is always well com¬ pensated.

The ultimate limit of economy in operation, with any class of engine, is fixed by financial

considerations, and the principle involved in de¬ termining the limit may be thus expressed :

That engine is most perfectly adapted to its place and purpose of which the type is such that no practicable substitution will permit the supply of the demanded power at lower total operative costs, including interest on first cost, a sinking fund to provide for replacement at the end of its period of use and annual operating expense; and that size of engine is on the whole best, variation from which inˆ the direc¬ tion of either increased or lessened size will in¬ crease that total expense of operation. In the latter case, the gain by reduction of size will be more than compensated by the loss due to its reduced efficiency. The best engine is that which will give largest returns on the capital invested, adding most effectively during its life to the dividends obtainable from the ((plant® of which it forms a part.

The adjustment of the ratio of expansion of the steam to the requirements of maximum effi¬ ciency is the vital problem of the designing en¬ gineer and the purchaser of the engine. In the ideal case of the purely thermodynamic ma¬ chine, this ratio is that of the initial to the back-pressure, very nearly, and the terminal pressure on the expansion-line should coincide with the back-pressure. For maximum economy of fuel, this expansion ratio should be reduced in proportion, closely, to the loss by heat-wastes between boiler and piston. For maximum effi¬ ciency from the financial point of view, a still further reduction is required in proportion to the relation of the operating costs apart from those of steammaking to those of engine-opera¬ tion proper. Thus, in the thermodynamic case, with initial and final pressures, respectively, 10 atmospheres and one, the ratio is reduced, often from about 10 to seven or eight by initial con¬ densation and minor wastes, and to six by ad¬ justment to that value, departure from which, in either direction, would increase total costs of the horse-power-hour.

With condensing engines, the ideal ratio might be 40 or 50, while the ratio for maxi¬ mum duty would be not above 20, and the best ratio,

from the point of view of the treas¬ urer, might be not above 12 or 15. The ac¬ curacy with which the designing and construct¬ ing engineer determines the adjustment for maximum financial efficiency is a measure of his ability and skill and a gauge of his success in solving his problem. With each standard con¬ struction, experience usually enables the engi¬ neer to satisfactorily determine the proper solu¬ tion of this problem.

The case of the steam-turbine exhibits here one of its essential peculiarities. The ratio of expansion is fixed by the conditions of its de¬ sign, construction and operation and is neces¬ sarily the ratio of initial to back-pressure if properly constructed. The maximum efficiency of the turbine is obtained at its maximum power and it possesses the same inherent inflexibility as the hydraulic turbine, if of other than the <(partial® class, in which latter case power is adjusted to load by varying the number of noz¬ zles or supply-passages in action. It has the same possibilities of adaptation as has the hy¬ draulic with, further, available recourse to in¬ termittent supply, as with the Parsons turbine, a plan unavailable with the hydraulic machine,

as an element of regulation. The steam-tur¬ bine, also, is not subject to internal condensa¬ tion as all its elements, when in steady opera¬ tion, maintain a constant temperature. Its economic theory is thus greatly simplified. Its financial theory simply dictates the construc¬ tion of a light, rapidly moving vane and a minimum cost of application to its work, to operation and to maintenance, as a total.

Essential Parts of the Steam-Engine.— The steam-engine consists necessarily of two parts — the engine proper, in which the expan¬ sive force of steam is expended and the gen¬ erator or boiler, in which the energy derived from a burning fuel is transferred to water. (The steam generator or boiler is fully dealt with in the article Boiler). The engine proper is made up of several parts of which the chief is a cylinder in which a piston is moved by the expansive force of the steam generated in the boiler. The boiler is connected to the cylinder by means of the steam pipe, in which is a stop valve, also the throttle valve or regu¬ lator, for adjusting the opening for the admis¬ sion of steam to the cylinder, which in some engines is regulated by hand, and in others by a governor. The steam pipe contains some¬ times also the cut-off valve or expansion valve, for cutting off the admission

of the steam to the cylinder at any required period of each stroke of the piston, leaving the remainder of the stroke to be performed by the expansion of the steam already admitted to the cylinder. The cylinder, the heart of the steam engine, may be single or double acting. In a single-acting engine, the piston is forced in one direction by the pressure of the steam, and made to return in the opposite direction when the steam is discharged by the action of a weight or counter¬ poise. In a double-acting cylinder, the piston is forced in either direction by the pressure of the steam which is admitted and discharged at either end of the cylinder alternately. The admission and discharge of the steam take place through openings near the ends of the cylinder, called ports (see illustration), connected with

Slide valve, ports, piston and seat of an ordinary steam- engine. In the position shown, steam is entering from, the steam-space S through the port A to the space Q; steam in R is exhausting through port B to E.

passages called nozzles, which are opened and closed by induction and eduction valves. Some¬ times the induction and eduction valves are combined in one valve, called a slide valve. The valves are contained in the valve chest. In non-condensing engines (conventionally called high pressure engines), the waste steam discharged from the cylinder escapes into the atmosphere through the blast pipe; in locomo¬ tive engines, as well as some others, the blast

pipe is placed in the centre of the chimney, sc that the successive blasts of steam discharged from it augment the draught of air through the furnace, and cause the combustion of the fuel to be more or less rapid, according as the engine is performing more or less work. The cylinder cover has in it a stuffing box for the passage of the piston rod ; in large engines there are sometimes more than one piston rod and stuffing box, and sometimes a tubular piston rod, called a trunk. The cylinder cover is also provided with a grease cup to facilitate the lubrication of the cylinder and piston rod. In many large engines, there is a spring safety valve, called an escape valve, at each end of the cylinder ; the chief use of which is to discharge water which may condense in the cylinder, or be carried over in the liquid state from the boiler, by what is called priming. To prevent condensation in the cylinder, it is sometimes enclosed in a casing, called a jacket, the in¬ termediate space being filled with hot steam from the boiler, or hot air from a flue. Out¬ side the jacket, to prevent loss of heat ex¬ ternally, there is a covering of felt and wood or other insulation. Double cylinder engines have two cylinders; the steam being admitted from

the boiler into the first cylinder and then filling the second by expansion from the first. The ordinary condenser is a steam and air¬ tight vessel of any convenient shape, in which the steam discharged from the cylinder is liquefied by a constant shower of cold water from the rose-headed injection valve.

In land engines the injection water comes from a tank called the cold well, surrounding the condenser, and supplied by the cold water pump; in marine engines, it comes directly from the sea. In the surface condenser the steam is liquefied by being passed through tubes or other narrow passages surrounded by currents of cold water or cold air. The con¬ denser is provided with blow-through valves, communicating with the cylinder, usually shut, but capable of being occasionally opened, and with a snifting valve opening outwards to the atmosphere; through these valves steam can be blown to expel air from the cylinder and con¬ denser before the engine is set to work. The condenser has also a vacuum gauge, to show how much the pressure in it falls below that of the atmosphere. The water, the small por¬ tion of steam which remains uncondensed, and the air which may be mixed with it, are sucked from the condenser by the air pump, and dis¬ charged into the hot well, a tank from which the feed pump draws the supply of water from the boiler. The surplus water of the hot well in land engines is discharged into a tank there to cool and form a store for the cold well; in marine engines, it is ejected into the sea.

In all, except certain peculiar classes of engines, there is a parallel motion for guiding the head of the piston rod to move in a straight line, consisting either simply of straight cheeks or guides, or of a combination of levers and linkwork, invented by Watt, and more or less modified by others. The special classes of engines above referred to are — first, trunk engines, where the stuffing box is the guide ; secondly, oscillating engines, in which the head of the piston rod is directly connected with the crank, and the cylinder oscillates on trun-

nions; thirdly, disc engines in which the func¬ tions of a cylinder are performed by a vessel of the figure of a spherical zone and those of a piston by a disc having a motion in that zone, and fourthly, rotary engines, in which the piston revolves round an axis. In single-acting en¬ gines for pumping water, the pump rods are worked either by direct connection with the piston rod, or through the intervention of a

beam. In double-acting engines, the power is communicated to a revolving shaft, driven by means of a crank and connecting rod, with or without the intervention of a beam. In sta¬ tionary engines the shaft carries a fly-wheel, to distribute and equalize irregularities in the action of the power by its inertia; this func-

Clark, D. K., (The Steam Engine' (London 1890) ; Corbin, T. W., (Modern Engines' (Lon¬ don 1918) ; Crane, W. E., (American Stationary Engineering' (New York 1917) ; Dalby, W. E., (Steam Power' (ib. 1915); Derr, L., Cyclo¬ pedia of Engineering' (7 vols., Chicago 1915) ; Duncan, J., (Steam and Other Engines' (Lon¬ don 1907) ; Ewing, J. H., (The Steam Engine' (Cambridge 1894) ; Fernald, R. H., and Orrok, G. A., Engineering of Power Plants' (New York 1916) ; Galloway, R. L., (The Steam Engine and Its Inventors' (London 1881) ; Gebhardt, G. F., (Steam-Power Plant Engi¬ neering' (4th ed., New York 1913) ; Haeder, H., (Handbook of the Steam Engine' (London 1914) ; Heck, R. C. H., (The Steam Engine

Horizontal Steam Engine.

A B cast-iron cylinder closed at ends by castings E and F. This engine has no steam jacket, and the lagging of felt and wood which is used to diminish radiation and condensation is not shown. There are two flat openings or ports at the ends C C, through which steam may be admitted and exhausted. Valve motion is not shown. The piston D is fitted with three packing rings to make it steam-tight. G O piston rod packing. H knuckle of connecting rod L. M crank. N main shaft. R fly-wheel.

tion is performed in marine engines by the inertia of the paddle wheels or screw, and, in locomotive engines, by the inertia of the driv¬ ing wheels and of the engine itself. The feed pump, and other pumps which are appendages of the engine, are worked by the mechanism ; so also are the induction and eduction valves, through what is called the valve gearing or valve motion — a part of the machinery which is under the control of the engineman, and so contrived as to enable him to stop and reverse the motion of the engines at will, and whose forms are very various. Most marine and loco¬ motive engines, and many stationary engines, have, in order to equalize the action of the power, a pair of cranks at right angles to each other, driven by a pair of pistons in a pair of cylinders, with their appendages.

Bibliography. — Barton, J. K., (Naval Recip¬ rocating Engines' (3d eel., Annapolis 1914) ;

and Turbine' (New York 1911) ; Hirshfeld, C. F., and Ulbricht, T. C., (Steam Power' (ib. 1916) ; King, W. R., (Steam Engineering' (ib. 1913) ; Peabody, C. H., (Valve Gears for Steam Engines' (2d ed., ib. 1906) ; Perry, John, (The Steam Engine and Gas and Oil Engines' (London 1909) ; Rigg, A., (A Practi¬ cal Treatise on the Steam Engine' (2d ed., New York 1894) ; Shealy, E. M., (Steam Engines' (New York 1919) ; Spangler, Green and Mar¬ shall, (Elements of Steam Engineering' (ib. 1912) ; Stuart, (Descriptive History of the Steam Engine' (5th ed., London about 1835) ; Swingle, C. F., twentieth Century Handbook for Steam Engineers' (Chicago 1916) ; Thurs¬ ton, Robert H., (Manual of the Steam Engine' (6th ed., 2 vols., New York 1907) ; id., (History of the Growth of the Steam Engine' (ib. 1890) ; Whitham, J. M., (Steam Engine Design' (ib. 1914). See Boiler; Engine; Engine, Test-

ing of; Locomotive; Rotary Steam Engine; Steam Vessels; Traction Engines; Turbine.

STEAM ENGINEERING, Bureau of, a

bureau of the United States Department of the Navy, established by act of Congress, 5 July 1862. Its duties as defined by the navy regula¬ tions comprise ((all that relates to the design¬ ing, building, fitting out and repairing ma¬ chinery used for the propulsion of naval ves¬ sels, the steam pumps, steam heaters, distilling apparatus, refrigerating apparatus, all steam connections of ships and the steam machinery necessary for actuating the apparatus by which turrets are turned.® The engineer-in-chief of the navy is chief <of the bureau. Rear Admiral R. S. Griffin was its chief in 1918.

STEAM GAUGE. See Steam; Steam- Engine

STEAM HAMMER. See Hammer.

STEAM HEATING. See Heating and Ventilation.

STEAM JACKET, a space filled with steam surrounding the cylinder of a steam- engine; from it heat passes into the cylinder and prevents the condensation of steam which would otherwise take place during expansion.

STEAM NAVIGATION. See Steam

Vessels.

STEAM-TURBINE. See Steam-engine ; Turbine.

STEAM VEHICLES or STEAM CAR¬ RIAGES, as the name implies, are carriages or conveyances in which steam is used as the motive power. The name is now usually ap¬ plied to those vehicles which preceded the steam locomotive on rails and were designed for use on the ordinary highways. In 1824 David Gordon patented an arrangement for fitting to a steam-engine a set of jointed legs in imitation of the action of a horse's feet. In the same year Burstall and Hill made a steam-carriage in which the engine was like Evans', except that its cylinder was at the end of the beam and the connecting-rod in the middle. Earlier efforts to construct a steam- vehicle were made by Robinson and by Watt in 1759 and by Cugnot 10 years later, but it was not until the third decade of the 19th century that the steam-engine had been sufficiently developed to tempt inventors to try to adapt it to road service. In 1827 Gurney built a steam- carriage which worked for about two years in and around London, one of its trips covering 85 miles in 10 hours, including all stops. In

1828 he built a steam-carriage having a sec¬ tional boiler. Its cylinders were horizontal and the valve-gearing was driven by an eccen¬ tric on the rear axle. The link was moved by a cord running from the driver's seat. There was a separator to dry the steam, a forced draught and a feed-heater ; and the valve cut off the steam at about one-half stroke. In

1829 Anderson and James built a road-engine which weighed three tons and carried 15 pas¬ sengers on a rough graveled road at from 12 to 15 miles per hour. The same year Han¬ cock built a road-engine with a boiler con¬ sisting of a collection of flat chambers with boiler-plate sides, the chambers being con¬ nected by tubes and stays. In 1831 he placed a steam-carriage on the road between London

and Stratford, where it ran regularly; while at the same time Dance had one running be¬ tween Cheltenham and Gloucester, where it ran back and forth 3,500 miles, running nine miles, the distance between the two places, in 55 minutes and meeting with but one mis¬ hap, which was the result of malice. Ogle and Summer's steam-carriage ran from 32 to 35 miles an hour, carrying 250 pounds of steam. Hancock's Infant of 1831 ran from Brighton to London, carrying a party of 11, at from nine to 15 miles an hour. Hancock's Autopsy of 1833 went about the streets of London at all times without difficulty. By this time there were about 20 steam-carriages and traction- road engines running in

England, where good roads had aided the inventors and builders ; but hostile legislation checked the advance of this method of conveyance. Moreover the life of a steam-vehicle was very short, due to ex¬ cessive vibration. No steam-carriage, steam- omnibus, street-locomotive or traction engine became a serious competitor to the horse car¬ riage throughout the 19th century and in the closing years of the latter the automobile ar¬ rived, fitted with an internal combustion engine and pneumatic tires which eliminated all ex¬ cessive vibration and the doom of the steam- vehicle was finally sealed.

STEAM VESSELS. The paddle wheel was in use for the propulsion of a vessel long before the application of steam to navigation. In the war galleys of the ancient Egyptians and Romans there were wheels operated by hand power through a windlass; and in one of the Punic wars the Romans transferred an army to Sicily upon vessels moved by wheels that were operated by oxen. Prince Rupert, after retiring from his military life, had a boat con¬ structed on the Thames River, prior to 1680, that was propelled by paddle wheels, which were driven by horse power. It is thus clear that some form of paddle wheel for propulsion was made use of long before the steam-engine was in service. The Marquis of Worcester had experimented with the steam-engine from about 1655. He died in 1667 leaving a manu¬ script in which he says : (<By this I can make a vessel of as great burthen as the river can bear to go against the stream. . . . And this

engine is applicable to any vessel or boat what¬ soever, without, therefore, being made on pur¬ pose. ... It roweth, it draweth, it driveth, to pass London Bridge, against the stream at low water.®

Early Steamboats. — The experiment nar¬ rated many years ago of Blasco de Garay in 1543 at Barcelona moving a vessel by steam power has long since been looked upon with doubt. This was 100 years before the steam- engine was put to any practical use even in its crude form. Denis Papin and Thomas Savery had proposed the application of steam to navigation about 1690, and the former is said to have applied it on a model at a later date. The name of Newcomen is also in¬ timately associated with these earliest experi¬ ments and he is doubtless to be credited with having built the steam-engines used. In 1736 Jonathan Hulls of England obtained a patent upon what would be termed a stern wheel boat for towing purposes. The engine for this boat was made by Newcomen, and the vessel was

tested on the Avon but without enough success to attract needed capital, and no further efforts were made. Experiments were made in France from 1779 to 1783 by Genevois and Perrier, when the Marquis de Jouffroy built on the river Saone a steamboat of 150 feet long by 15 feet

Stevens' Screw Steamer (1804)

wide, which continued running with more or less success for 16 months, but defects de¬ veloped in the machinery so serious as to cause the project to be abandoned for lack of money. Jouffroy proposed a company to build and operate steamboats, but failed to gain support. He has, however, been credited in history as the true inventor of the steamboat. Patrick Mil¬ ler, a wealthy retired banker of Scotland, in 1788 had a double hull boat constructed 25 feet long and seven feet broad, and fitted with a steam-engine, under the supervision of William Symington. It succeeded so well that he built the next year a larger double hull boat, and a trial was made on the Forth and Clyde Canal in the summer of 1789, when seven miles an hour was made. The boat, the wheels and the engine were so ill proportioned to each other that the wheels were continually breaking, and the hull suffered so much from the strain imparted by the machinery as to be in danger of sinking. The trial was not considered to be a success, and the vessel was shortly after laid aside. It was now over 10 years before any further trials were made in Great Britain. It will be noted that John Fitch's experiments began in 1786, and Patrick Miller did not begin until some two years later. Symington had not lost faith in the project, and succeeded finally in interesting Lord Dundas, one of the pro¬ prietors of the Forth and Clyde Canal, in steam propulsion for canals, and with his support in 1801 built the Charlotte Dundas, a stern wheel boat to tow the canal boats on the canal, instead of towing with horses. The vessel was 56 feet long, 18 feet beam and 8 feet in depth and was fitted with an engine of 22 inches cylinder by four feet stroke. The trial was made in March 1802 with two boats in tow, and three and one-half miles per hour was made for a distance of nearly 20 miles. A great clamor arose as to the probable destruction of the banks of the canal from the violent agitation of the water produced by the paddle wheel, and the project was abandoned. A further effort by Symington, under the patronage of the Duke of Bridgewater, came to an end with the death of the duke and Symington, reduced to poverty, withdrew from further endeavor. It

was now 10 years before another steam vessel was built in Great Britain, and in the meantime Livingston and Fulton had constructed

four steamboats for the Hudson River, and the Raritan for the New Jersey line, and the New Orleans for the Western rivers; while John Stevens had built the Phoenix and sent her to sea from New York to Philadelphia, Pa. This vessel was built in 1812 at Glasgow by John Wood for Henry Belfi and was the first suc¬ cessful steam vessel in Great Britain. The hull was 42 feet long by 11 feet beam and five feet six inches deep, and named Comet. By means of spur wheel gearing the power was transmitted to two pairs of paddles. As this arrangement proved to be unsatisfactory the vessel was fitted with a single pair of wheels, and the hull was lengthened to 60 feet, and the engine power increased. The speed of this ves¬ sel was originally five miles per hour. Robert¬ son, the engineer of the Comet, succeeded in so improving her engines as to raise the speed to six miles per hour. His success led him into steamboat building on his own account, and in 1813 he started the Clyde, and in 1814, the Tay, Caledonia and Humber, all of which proved commercially profitable. The first iron hull steam vessel built in Great Britain was in 1822 named the Aaron Manby, built at the Horsley Iron Works near Birmingham. The vessel was 166 feet long and 16 feet beam, and fitted with a 30 horse-power engine operat¬ ing <(01dham's Revolving Oars that enter and leave the water edgewise.®

First American Steam Vessels. — The pe¬ riod when the first experiment with a steam vessel in the United States was made, so far as the mechanical side was concerned, was any¬ thing but inviting to those interested. There was not in the United States at the time one steam-engine in use, and it is doubtful if the first principles of its working were understood. The American people were comparatively poor at this time, having but a few years prior to this date returned to the peaceful pursuits of life after the long and costly War of the Revolution. After a few years the ((steam mania® broke out, and the application of steam to navigation was under trial. To John Fitch of Connecticut must be given the credit for the first steamboat in the United States, imperfect as it was. He made his first trial on 22 Aug. 1787, but was not able to attain more than three miles an hour. This boat was propelled (<by 12 oars or paddles five and a half feet, which work perpendicularly and are represented by the stroke of the paddle of a canoe.® Then in 1789 another boat was built that was fitted with more power, that developed on trial a rate of speed of eight miles an hour. These experi¬ ments were carried on by a company who fur¬ nished the capital for the enterprise, and not meeting with the success anticipated after three years' labor, refused to advance any more funds for thp further prosecution of the enter¬ prise, thus leaving Fitch to carry on his trials on his own account. This he did for

a short time only, as he was unable to procure the means for the necessary changes in the vessel, and it was this financial condition that finallv forced him to abandon the whole business, and he went to France and England with his draw¬ ings, but met with no better fortune. Upon

his return in 1796 he made an experiment on the Collect Pond in New York in a common yawl boat, with both side wheels, and again with a propeller at the stern of the boat. Nothing seems to have come from these later experiments. Fitch has been described as hav¬ ing been brought up from manhood as a watch¬ maker, and being fond of mechanics through the prosecution of his trade, he was continually experimenting along different lines, and at last drifted into the application of steam to navi¬ gation. He no doubt had a small knowledge of the steam-engine, but his peculiar disposition, ever urged on by his impulses, subjected him to many disappointments. There is no doubt he accomplished more in propelling his boats than some others have done at a later date. James Rumsay, a native of Maryland, and a strong competitor in the experimental stage of steam navigation with John Fitch, constructed in 1784 a boat that was propelled by cranks and a series of (<setting poles.® This project was soon abandoned. In 1787 he constructed a boat about 50 feet long, that was propelled by ad¬ mitting water through a trunk on the keelson of the vessel, and by means of a steam pump discharging it at the stern. This boat was never put to any practical use. Leaving the United States to his opponent, Rumsay sailed for London, where he built another vessel, but he died in 1793, following a successful exhibit of his craft. Another name connected with the earliest experiments with steamboats in America is that of Samuel Morey, who in 1790 ran a small boat with a paddle wheel at the bow on the Connecticut River, and in 1797 operated a side-wheel steamboat on the Delaware River. To Oliver Evans, an engine builder of Penn¬ sylvania, must be given some credit for his trials in steam navigation. In 1802 he was called on to construct an engine of nine inches cylinder by 36 inches stroke, for a boat of 80 feet long and 18 feet beam, built in Kentucky for Capt. James McKeever, United States navy, and Louis Valcourt, and' floated to New Or¬ leans, La. Before the vessel was completed the river had fallen so much as to leave the vessel high and dry on shore. The engine and boiler were taken out and placed in a saw-mill, where they were in use until the mill was destroyed by fire. In 1804 he constructed for the city of Philadelphia a

machine for dredging the slips of the city. The machinery was fitted in place on a large scow 30 feet long by 12 feet beam, and was driven by a stern wheel that was operated by a small steam-engine. It was driven down the Schuylkill River to the Dela¬ ware River, and up the latter river, in all some 14 or 15 miles.

Robert Fulton. — After the withdrawal of Fitch from the activities of steam navigation, and the death of Rumsay, there does not seem to have been that mania for the application of steam to navigation. It languished for a time, but not long: for Robert R. Livingston of New York, who had been interested in Morey's experiments, was granted by the New York legislature the exclusive privilege of navigating the waters of the Hudson with a vessel pro¬ pelled by steam. Livingston was a man of wealth, and had a taste for mechanics. He was associated with John Stevens and Nicholas J. Roosevelt in experiments with a steamboat

that year, but the results were unsatisfactory, the best speed attained being three miles per hour, while the State requirements were four miles. Other trials were made the next year with another vessel, but with no better success. The grant by the State had now expired. Rob¬ ert R. Livingston had been appointed Minister to France, and while there had met Robert Ful¬ ton, who had been engaged in experiments with the application of steam to navigation, among other things, and in 1803 made a trial with a boat propelled by paddle wheels, which showed

Fulton's Clermont (1807)

with improvement in the engine they might look for better results. The French paid no attention to these achievements, and Fulton ac¬ companied Livingston back to America. Liv¬ ingston had the legislative privileges restored to him and Fulton, for two years, by the legis¬ lature. As those were not complied with, it was extended in 1807 for two years. John Stevens, then of New York, but later of Hobo¬ ken, N. J., was also a man of large means, with a mechanical turn of mind. His trials with the screw propeller began in 1802 and lasted until some time in 1806. In 1804 he had in operation on the Hudson a small vessel with a tubular boiler propelled by twin four-bladed screws, which attained a speed of about nine miles per hour. This was the first practical application of the propeller to a vessel. But the men who at that time were working with steamboats had their minds set upon paddle-wheels, and the screw propeller was ignored. Robert Fulton before leaving Europe in 1806 had parts of a steam-engine built to his order by Boulton and Watt of Birmingham,

England, that were shipped to New York. He had the hull of a vessel constructed at New York in 1806-07, and the engine from Boulton and Watt was fitted on board. This vessel was named Clermont. It was 140 X 13 X 7 feet deep, and the engine having a bell crank motion, had a cylinder of 24 inches diameter, and four feet stroke. Her trial trip from New York to Albany was com¬ menced on 17 Aug. 1807. The vessel was en¬ larged during the following winter and rechris¬ tened the North River. As there was no part of the original Clermont that was an invention of Robert Fulton, though he obtained patents at a subsequent date on improvements, his theoret¬ ical knowledge of steam navigation and its adaptation to practical purposes was the cause of his success. He knew very nearly all that had been done in the way of experiments, and his ability lay in selecting those features that were of value and bringing them together so

they were first seen in the Clermont. He must certainly have had mechanical ability of no mean order for that day to have accomplished so much at one stroke. The first complete American-built steamboat, both hull and ma¬ chinery, was the Phoenix, constructed in 1808 by John Stevens; and as Fulton held the exclu¬ sive privilege of New York waters for steam vessels, Stevens sent the vessel around to the Delaware River, leaving New York 8 June 1809, to form part of a line between New York and Philadelphia. About the same time the Raritan was built to run from New York to New Bruns¬ wick, N. J., to form the New York end of the New York and Philadelphia line. This vessel was run in the interest of the New York monopoly.

Early Ferry-boats. — Fulton and his asso¬ ciates, or the North River Steamboat Company, met much opposition in the proposition of their enterprise, and it became so bold after a time in placing obstacles in the way, during the running of their vessels, that they were com¬ pelled to resort to the legislature of the State for a law to protect them in their lawful rights. There was one company which built two boats that were originally fitted with experimental engines, that were removed almost as soon as erected on board, and steam-engines and boilers substituted, in defiance of the monopoly of the Fulton company. After three years in the courts the vessels were delivered into the pos¬ session of the Fulton company, who broke them up. This exclusive privilege was the cause of a petition being laid before the New York legis¬ lature in 1814 by Aaron Ogden of New Jersey, who

desired to run a steamboat on his ferry to Elizabethtown, N. J., but was prevented by Liv¬ ingston and Fulton. The matter was at length compromised so that Ogden ran his boat. He had a partner in his ferry property named Thomas Gibbons of Savannah, Ga., who opened an opposition line to Ogden, and it was on this route and line Cornelius Vanderbilt began his steamboat career. This opposition, commenced in 1818, was the cause of the lawsuit that was carried to the United States Supreme Court, where in 1824 a decree was entered against Ogden, thus breaking down the steamboat monopoly. The steam ferry-boat was first brought into use by Robert Fulton, on the Ful¬ ton ferry running from New York to Brooklyn in May 1814.

Hudson River Boats. — < After the waters of the United States were thrown open to the free navigation of steamboats in 1824, the num¬ ber of steam vessels increased- on the Hudson River, as that was the most expeditious mode of travel from New York to Albany, as well as the best patronized channel of travel from the seaboard to the Western States, that were just then being opened to the settler. The new vessels were great improvements over the ves¬ sels of the North River Company, that now in many instances became tow-boats. For nearly 10 years later several lines were formed that were well backed financially for that period, until in 1832, when they were all consolidated. In 1835 the People's Line was opened with the Westchester and the Emerald. The most noted of the boats of this period were the Swallow and the Rochester, that were rivals on the New York and Albany route, and for several years

were very often engaged in racing. This was the opening stage of that fierce rivalry between the lines on the river that was so well known for many years, when at times, so intense has been the competition, passengers have been transported the entire length of the navigable river free of cost of carriage. This lasted until 1852, when the steamboat law went into effect, which brought the operation of our steamboats under the United States law. And it was well it did even at that late date. The completion of the Hudson River Railroad in the latter part of 1851 had a great effect in diminishing the num¬ ber of steamboats on the river. Since then the business on the river has been in the hands of companies that have been strong financially, and who have catered to the public travel with the better class of vessels suited to the service. The present Hudson River Day Line was started in 1863 with the City of Albany, and was incorporated in 1879. The People's Line of night boats, or New Jersey Steamboat Com¬ pany, had built in 1896 the Adirondack, that was a marked advance upon the form of the previous vessels of the line. Their first steel hull vessel, the C. W . Morse, appeared in 1904. The second Hendrick Hudson was launched

in 1907, and leads the Day Line fleet, which in¬ cludes also the Robert Fulton and the Wash¬ ington Irving. There have been at different periods several fine boats on the river possessed of high speed that may be mentioned, such as the Daniel Drew ; Mary Powell, the fastest vessel known until the torpedo-boat destroyer was devised, having a speed record of 27 miles per hour; Thomas Powell; the Alida, and the first Hendrick Hudson.

Long Island Sound. — Communication by water on Long Island Sound dates back to 1813-14 when the Fulton was constructed for service from New York to New Haven by Cap¬ tain Bunker, whose boats Hope and Persever¬ ance on the Hudson had been seized by Fulton and Livingston under their monopoly, and broken up. On account of the War of 1812 and the activity of the British naval vessels off our coast at the time, it was deemed prudent to postpone the opening of the new line. It was not until 21 March 1815 that the vessel was placed on the route. The Firefly was the first steamer to round Point Judith and sail into Newport. This was in May 1817. In 1818 the Connecticut was brought out in the same inter¬ est, and run from New York to New Haven, while the Fulton was run from New Haven to Norwich, Conn., as it was considered unwise to run a boat on such a long route as from New York to Norwich, Conn., at that time. These vessels thus ran until prevented by the passage of the retaliatory law by Connecticut in 1822, when they ran to Providence, R. I. The United States was purchased in 1822 by New Haven parties and ran to Byram Cave, N. Y., and this service continued until the exclusive privilege of Fulton and others was declared unconstitu¬ tional, when the vessel was run direct from New York to New Haven. This was the be¬ ginning of the New Haven Steamboat Com¬ pany. Other vessels followed of improved con¬ struction, and larger and better accommoda¬ tions. They had their periods of opposition and low fares as on other important routes. One of the fastest vessels that has thus far been on the

line has been the Richard Peck. In 1899 a du¬ plicate of this vessel, the Chester IV. Chapin, was added to the line. Providence, R. I., was first served with a steamboat line in 1822. In the following six years three new steamboats were built for the line to New York, and during

The Side-lever Engine (1849).

this period opposition began on the route. This had then become the most popular route from New York to the Eastern States. In 1835 Cor¬ nelius Vanderbilt placed the Lexington, then a new boat, on the route, and being one that de¬ veloped in a short time higher speed than those on the old line, drew a greater portion of the passenger travel. The Boston and New York Transportation Company had the Boston, the Providence and the Massachusetts in 1836. The Lexington was again on the route in 1836, and having made it lively for the old company, they had the Narragansett built, to be on even terms with the opposition, as they thought; but they were mistaken. The Lexington was pur¬ chased by the Transportation Company in 1838, as another opposition line with the /. IV. Rich¬ mond had presented itself for public favor. The Lexington took fire while on a trip from New York to Stonington on 13 Jan. 1840 when off Eaton's Neck, Long Island. There were at least 150 persons on board, and all were lost except four. After 1845 the passenger service to Providence fell off to a great extent, and it was many years before it was resumed with a first-class passenger line. Stonington had be¬ come the popular route. The New Jersey Steam Navigation Company controlled the business of this route from 1840 to 1867, when they withdrew their boats from the service. A first-class passenger line was not resumed to Providence until 1877, when the Rhode Island and the Massachusetts were placed on the route by the Stonington Steamship Company, and then began the war of rates that lasted so long on Long Island Sound. These boats were fol¬ lowed by the Connecticut, and later by the Plymouth .and others. The Joy line commenced running to Providence in 1899. After the Stonington line was closed up in 1867 there were no steamboats running to Stonington until January 1868, when the Stonington Railroad

Company and others organized the Stonington Steamship Company, and ran the Narragansett and the Stonington. These vessels were suc¬ ceeded by the Rhode Island (No. 3) and later by the two propellers Maine and the New Hampshire. The Fall River Line was opened in 1847 with the Bay State, much the largest and fastest steamer of her time, and the next year the Empire State was added, and a few years later the Metropolis. The company was reorganized in 1863 and a new fleet of boats built for the line that did service until the con¬ solidation . with the Narragansett Steamship Company in 1874. The two famous steamers Bristol and Providence, of the Merchants' Shipping Company, merit distinguished remem¬ brance. The first iron hull vessel, built with 96 water-tight compartments, was the Pilgrim, added to the Fall River Line in 1883, and sub¬ sequently the floating palaces, Puritan, Plymouth and Priscilla were placed in commission.

The Commonwealth, the largest and fastest of the Fall River fleet, represents the very highest type of American river steamer of the sturdier class of side-wheelers. To New London and Norwich, Conn., there were several lines run up to 1860, when the Norwich and New York Transportation Company was organized, and the City of Boston and City of New York were built. A few years later three smaller pas¬ senger and freight boats were built. In 1881 their first iron hull steamboat, City of Worces¬ ter, was placed in service, and in 1894 the steel hull twin-screw propeller City of Lowell was added to the line. This vessel has proved to be one of high speed.

Lake .Steamers. — Steam navigation on the Great Lakes dates from the year 1818 when the Walk-in-the-Water was built to run on Lake Erie. The most radical departure in steamboat design and construction on the Lakes was in the building of the Great Western in 1838, by the adding of the upper cabin with staterooms, and converting the lower cabins into steerage quar¬ ters and freight compartments. There were several fine and large side-wheel passenger boats built after 1845, after the general style of the Long Island Sound boats. By 1849 there were 29 side-wheelers and 10 propellers running out of Buffalo ; and by 1862 the number had in¬ creased to 147 side-wheelers and 203 propellers. The extension of the railroads along the shore of Lake Erie soon made their business unprofit¬ able. Since 1880 there have been several large iron or steel hull passenger boats built to run from Buffalo and Cleveland to Detroit, and fitted with large engine power, that have proved themselves to be vessels of very high speed. Lake Ontario had its first steam vessel in the Lake Ontario built in 1816. There were sev¬ eral lines of beam-engine boats on the lake up to 1860, when the railroads, having absorbed the greater part of the business, several of the vessels were brought to the coast by running the rapids of the Saint Lawrence River. The finest passenger steamer on the Great Lakes is the City of Cleveland, running between Detroit and Cleveland. The largest cargo vessel in those waters is the William M. Mills, with a capacity of 514,500 bushels of wheat, or 12,380 tons of iron ore. Prominent among the Cana¬ dian-built lake steamers are the immense freighters Collingwood and Midland Prince.

Coast of Maine Steamboats. — The coast of Maine was first visited by a steam vessel in 1823. There were many vessels running from Boston, Mass., to Portland, Me., and the coast towns up to 1845, when the Sanford line began operations. The Portland Steam Packet Company

began their operations in 1843. The iron hull propeller Bangor, running from Bos¬ ton to Bangor, Me., began its service in 1845. The International Steamship Company, run¬ ning from Boston to Saint John, New Bruns¬ wick, began operations in 1859. All the lines running from Boston to the coast of Maine were consolidated in November 1901.

Western River Steamboats. — The first steamboat constructed for the Western rivers was the New Orleans, built at Pittsburgh, Pa., in 1811 under the supervision of Nicholas J. Roosevelt for Livingston and Fulton. Several vessels were constructed for these waters dur-

RiverJ;Steamer (1895).

ing the next decade, but of a different form of hull and type of engine, several of them being more like those of a later date. The condi¬ tions under which the steamboats on the West¬ ern rivers are operated are so different from those on other rivers of the United States that they are required in design to conform more closely to the surrounding conditions. The shallowness of the channel makes it necessary for the hulls of these vessels to be of great length and width in proportion to the depth of hull. The engines are all poppet valves, worked by levers, with the cylinders set hori¬ zontally on wooden frames, generally. The boilers are usually plain cylinder with two flues each. They are worked non-condensing under a pressure of 100 to 125 pounds to the square inch. They are usually fitted with side wheels, but the stern-wheel boat has been favored for some service. There were a few compound engines in boats on the rivers several years ago, which type of engine has gained in favor again on the Western rivers in more recent times. Before the railroads in the Western States be¬ came so numerous, the passenger and freight business in that section of the country was largely carried on by the steamboats, and at that time there were many fine and fast steam¬ boats on the Mississippi and the Ohio rivers, and a few of large dimensions. Among the earlier steamers on the Mississippi were the Moselle and Oronoko, memorable for their boiler explosions; and the Pioneer and Ontario, which raced often on the Ohio. There was in 1852 the Eclipse of 363 feet long with two en¬ gines of 36 inches by 11 feet stroke each. The J. M. White of 1844 of 250 feet long, with two engines of 30 inches by 10 feet stroke each. Then at a later date the Grand Republic of 1876 of 350 feet long with two engines of compound type. The J. M. White of 1878 was 321 feet long with two engines 43 inches by 11

feet stroke each, and water wheels 45 feet diameter and 18 feet 6 inches face. The fa¬ mous race of the Natchez and Robert E. Lee on

the Mississippi River began on the afternoon of 30 June 1870 from New Orleans, and ended at Saint Louis on the morning of 4 July. The latter made the 1,218 miles in 3 days 18 hours and 30 minutes. The Natchez had run into a fog and grounded about 300 miles below Saint Louis that delayed her about six hours.

Ocean Steamships. — There have been a few attempts made to dispute the claim of the Sa¬ vannah as the pioneer steamship of the Atlantic Ocean, but when these attempts have been closely examined it still leaves the American vessel at the head of the list. She was con¬ structed at New York in 1818 by Francis Fick- ett as a sailing packet originally, but an auxil¬ iary engine and boiler with paddle-wheels were fitted before she was placed in service. She was owned by parties at Savannah, Ga. On 24 May 1819 she left Savannah for Liver¬ pool, England, which port was reached in 27 days, 80 hours of which time she was operated by steam power. On 29 September she started on her return to the United States, stopping at Saint Petersburg, Stockholm and other Baltic ports, and arrived at Savannah 30 November. Subsequently her machinery was removed and the hull converted to a sailing vessel, and run between New York and Savannah, Ga., until driven ashore on Great South Beach on Long Island, 5 Nov. 1821, during a gale, where she became a total loss. The Rising Star, built for the government of Chile, made the next west¬ ward crossing of the Atlantic in 1822, arriving in Valparaiso in April. She was a full-rigged ship with an auxiliary steam-engine. There was a long interval of time before another American steamship crossed the Atlantic Ocean, but during that period much knowledge had been gained of steam navigation that was iof use in constructing ocean steamers. The Ocean Steamship Company in 1847 had the Washing¬ ton and the Herman built for a line from New York to Bremen, they having obtained a con¬ tract to carry the United States mail for 10 years. In 1849 the New York and Havre Steam Navigation Company obtained a contract to carry the United States mail to Havre, and during the same year had the Franklin and the Humboldt constructed for the line. The latter vessel having been lost in 1853, and the former in 1854, the company ran the line with chartered vessels until the Arago and the Ful¬ ton were built and placed on the line in 1855. This line was well managed and received more American patronage than any other running to the same ports. These vessels ran until the opening of the Civil War in 1861. The next line of American ocean steamships was the Collins line, organized about 1847 as the New York and Liverpool United States Mail Steam¬ ship Company. The Atlantic and the Pacific were built in 1849, and the next year the Baltic and the Arctic and Antarctic were constructed for them at New York. The general dimen¬ sions of

these vessels were each 277 feet long, 45 feet beam and 31 feet depth of hold. Their motive power was a pair of <(side lever* engines, the first two vessels built having cylinders 95 inches by 9 feet stroke, while the others were larger. These engines were of

1,000 horse power and the vessels were of 2,860 tons. The line started under a contract to carry the mail for $385,000 per annum, which was subsequently increased to $858,000 : yet with this large mail pay or subsidy, just as it is viewed, and a large share of the passenger travel and freight, it failed to be a paying line. The rivalry existing with the Cunard line at this time was very great and the expenses of operation in making record time voyages made a heavy drain upon the finances of the com¬ pany. There were also commercial and politi¬ cal interests that were antagonistic to the com¬ pany, so that by 1857 Congress had cut down the appropriation for mail pay to less than the original amount; and as the line could not be operated successfully under these conditions the last vessel was withdrawn from the route in January 1858. Congress virtually ((froze out® the company. The Adriatic, a vessel of 4,150 tons, was added to the fleet in 1857, and made but one voyage in the line. The remain¬ ing vessels afterward passed into other hands. The Arctic was lost by collision off Cape Race on 27 Sept. 1854; and the Pacific sailed from Liverpool on 23 Sept. 1856 and was never heard from afterward. The Atlantic was broken up in September 1871 ; and the Baltic was broken up about 1880, having for some time been run as a sailing vessel, her machinery having been removed. Cornelius Vanderbilt in 1855 began the operation of a line of steam¬ ships to Southampton and Havre with the North Star and the Ariel, and during the next year ran to Bremen. At this time he had built the Vanderbilt, his largest ocean steam¬ ship, that ran with some one of his large fleet of ocean steamships, to either Bremen or Havre until the opening of the Civil War. There were a few attempts made after 1865 to build up an American transatlantic line from New York, but they all ended in failures. It was also tried from Boston by the American Steam¬ ship Company, who had in 1866-67 the Erie and the Ontario built. The latter vessel made one voyage and returned, when laid up ; while the former never made a voyage in the line.

The names of the great steamships which have ploughed the waters of the seven seas are legion and but a few may be mentioned here. For the five years following the outbreak of the Great War no notable

steamships were placed in commission. The Leviathan of 1914 (formerly the German Vaderland) is still (1921) the world's largest merchant steamship; 950 feet in length, 100 feet beam and a dis¬ placement of 58,000 tons. Its four turbines of 90,000 horse power drive four propellers, attain¬ ing a speed .of 25.8 knots. The Imperator, also a German vessel seized by the United States in the war, is the second largest of the world's vessels. It was placed in commission in 1913. It is 909 feet long, 98 feet beam and of 52,000 tons displacement. Its turbines drive four pro¬ pellers with 60,000 horse power, developing a speed of 22.5 knots. The Aqnitania, a Clyde- built steamer of 1914, has a length of 901 feet; beam of 97 feet ; displacement of 53,000 tons ; engines of 60,000 horse power and a speed of 23.5 knots. The Olympic, of 1911, has a length of 883 feet; beam of 92'/2 feet; displacement of 52,000 tons ; engines of 60,000 horse power ; and a speed of 22.5 knots. The Mauretania (1906)

is 790 feet long; 87*4 feet beam; 41,550 tons displacement ; with engines of 74,000 horse power, developing a speed of 26.06 knots. These are the five largest vessels now in ocean service.

The American Liners. — In 1871 the Ameri¬ can Line, controlled by the Pennsylvania Rail¬ road Company, was organized to run a line of steamships from Philadelphia, Pa., to Liver¬ pool. It will be noted that this was at the beginning of the period when iron shipbuilding in the United States began to increase, and the compound marine engine was coming into favor. The company had built in 1873-74 the Pennsylvania, Ohio, Indiana and Illinois. These proved to be good, staunch and serviceable ves¬ sels for the line, though only of average speed under good conditions. They subsequently passed into the hands of the International Navigation Company, which absorbed the In¬ man line in 1886. The present American line is the result of an act of Congress of 1892, providing with other conditions that certain foreign-built steamships should receive Ameri¬ can register on condition that steamships of corresponding tonnage were built in the United States. This led to the City of Paris and the City of New York receiving American register in 1893, and their names being then abbreviated Paris and New York. Contracts were then made with the William Cramp Ship and Engine Building Company for the Saint Paul and the Saint Louis, they having the first quadruple expansion engines built in the United States for the Atlantic service. These vessels ran to Southampton and Cherbourg. They are ele¬ gantly fitted and furnished in their passenger accommodations, are well patronized by the American traveling public and have shown on more than one occasion that they are possessed of more than average high speed. In January 1903, the American and Red Star lines were consolidated

with four British lines as the International Mercantile Marine Company.

Coastwise Steamships. — The Robert Ful¬ ton, built in 1819, was the pioneer in the coast¬ wise trade with steam vessels and ran between New York and the island of Cuba from 1820 to 1825, when it was sold to the Brazilian gov¬ ernment. There were no steam vessels running coastwise from the latter date till 1832, when a small steamboat named the David Brown was refitted and run from New York to Charleston, S. C. In the next six years there were five larger vessels built for the same route, but of the same general type of vessel. After the loss of one of these vessels in 1837, public confidence in their safety became so shaken that they no longer found profitable employ¬ ment on the route, and in a short time were withdrawn. The first steamships to be em¬ ployed along our coast were those built in 1846-47 to run between New York and Charles¬ ton, S. C., the Southerner and the Northerner. These vessels were the pioneers of the many steam vessels that were built in a few years to run on lines between the Atlantic ports. The largest development of our early ocean steam marine began with the disGOvery of gold in California. During the Civil War these coast¬ wise lines of side wheel steamers were dis¬ continued. Then they were opened again and gradually fell into financially strong hands.

Most of them after 1870 began the construc¬ tion of iron hull vessels with compound pro¬ peller engines, and by 1880 had laid aside the wooden hull vessels with the expensive beam- engine or the simple condensing propeller en¬ gine, so that at the present time we find a fine fleet of large vessels running from all our prin¬ cipal ports on the coast that are operated at a much less cost for same size of vessel than those in the same service 30 years or more ago.

Whalebacks. — These vessels have a main deck rounded over, and resemble the back of a whale. They are for use in rough water, the waves passing completely over them without resistance or injury. The first one was built for a Baltimore company about 1860. Such vessels are now used as grain carriers on the Great Lakes ; and more recently as passenger vessels. As oil-carriers this type has been very successful upon the deep sea. Their average speed is nearly 20 miles per hour.

Double Screw Ferry-boats. — This type of vessel, having a screw at

each end of the ves¬ sel, is, for ferry service, of comparatively re¬ cent date, although double-screw steam vessels were built in this country many years ago. These vessels must not be confused with a twin-screw vessel having two screws at the stern of a vessel. The pioneer of the later de¬ velopment was the Bergen, built in 1888 for the Hoboken ferry, having a triple expansion en¬ gine. Since then this type of ferry-boat has been growing in favor until at this time it has practically driven the old-fashioned side¬ wheeler out of use; except on the shorter ferries.

Screw Propellers. — After John Steven's ex¬ periments with the screw propeller in 1802 to 1806, there was nothing done in this country to practically demonstrate the value of the screw until the Robert F. Stockton, having an Erics¬ son propeller, was brought to this country in 1839. Then the propeller began to come into use, both on the Atlantic Coast as well as on Lake Erie and Lake Ontario, and it is alto¬ gether probable that its largest development in the first decade was on the northern lakes.

Summary. — The progress in the develop¬ ment of the modern steam vessel may be sum¬ marized by divisions into decades marked by salient advances.

Between 1845 and 1855 iron was substituted for wood in the hulls of steam vessels and the boiler pressure was advanced from 10 pounds to 20 pounds per square inch ; the coal con¬ sumption being reduced from 4.5 pounds to 3.5 pounds per horse power per hour.

Between 1855 and 1865 the screw-propeller took precedence of the paddle-wheel as a means of propulsion ; the boiler pressure was in¬ creased to 35 pounds ; and the coal consumption dropped to three pounds per horse power per hour.

Between 1865 and 1875 the compound engine was introduced; the boiler pressure went up to 60 pounds ; and the coal went down to 2.5 pounds per horse power per hour.

Between 1875 and 1885 steel superseded iron in hull construction, and the triple-expansion engine came into use. The boiler pressure was advanced to 125 pounds, and the coal con¬ sumption fell to two pounds per horse power per hour.

Between 1885 and 1895 twin screw propul¬ sion with quadruple expansion engines and the principle of the forced draught were brought into use. The boiler pressure rose to 200 pounds, and the coal

consumption dropped to 1.5 pounds per horse power per hour.

The decade 1895 to 1905 was one of transi¬ tion. A few turbines appeared and the steam pressure in compound engines reached a maxi¬ mum <of 225 pounds.

Between 1905 and 1915 turbine engines came generally into use, and the boiler pressures came down to 160 to 175 pounds, at which figures the turbines were most effective. The coal consumption also decreased to 1.2 pounds per hoise power per hour. See also Ship¬ building; Warships.

J. H. Morrison,

Author of (History of American Steam Navi¬ gation?

STEAMBOATS. See Steam Vessels.

STEAMSHIP SPEEDS. See Sports,

Their Development, Speeds and Records.

STEAMSHIPS. See Steam Vessels.

STEARATES. See Stearic Acid.

STEARIC ACID, N — Octodecylic Acid, C17H35COOH, occurs in large quantities as a glycerol ester in animal and vegetable fats. Palmitic acid, C15H31COOH, and oleic acid, C17H33COOH, are usually associated with stearic acid in these sources. Animal fat contains the glycerol esters of all three acids in varying quantities, depending upon the nature of the fat. Shea-butter, a vegetable fat obtained in West Africa, contains the glycerol esters of stearic and oleic acids only. When these fats are saponified and then treated with a mineral acid, a mixture of the acids is produced. In the preparation of these acids from fat, saponifica¬ tion may be brought about by the use of lime, superheated steam or sulphuric acid. The mixed acids are fractionated by first pressing between warm plates in order to remove liquid oleic acid. The residue is then dissolved in alcohol and poured into an alcoholic solution of magnesium acetate ; magnesium stearate pre¬ cipitates first, yielding free stearic acid when treated with a hot solution of hydrochloric acid. The product may be purified by crystal¬ lization from alcohol.

A number <of synthetic processes have also been developed for the preparation of stearic acid. It may be obtained: (1) By heating oleic

acid with hydrogen iodide and red phos¬ phorus at 200°-210° C. ; (2) by the direct addi¬ tion of hydrogen to oleic acid or other un¬ saturated acids, in the presence of nickel or other reduced metallic substances, the metals acting as catalysers. According to United States patent 1,209.512, stearic acid, suited for the manufacture of candles or high-grade toilet soaps, can be produced by hydrogenating fatty materials like tallow, in the presence of finely divided nickel, until the iodine number is re¬ duced to zero and the melting point is raised to 62° C. The product is saponified and the acids extracted are purified. Stearic acid is a white crystalline solid with no taste or smell. It melts at 69.32° C. and boils at ordinary pres¬ sures with partial decomposition at 360° C. The acid is insoluble in water, but will readily dissolve in boiling alcohol and ether. The

potassium or sodium salts of stearic acid are the chief constituents of soft or hard soap. Commercial stearic acid, known as ˆstearin,55 contains a large quantity of palmitic acid. In order to destroy its crystalline structure stearin is usually mixed with wax or paraffin ; it is extensively used for the manufacture of can¬ dles, stove polish, shoe polish and varnish. Pure stearic acid is used for the prepara¬ tion of glycerin suppositories.

V. S. Babasinian, Lehigh University.

STEARIN. See Stearic Acid.

STEARNS, Frederick Pike, American hy¬ draulic engineer: b. Calais, Me., 11 Nov. 1851. He was connected with the city surveyor's office, Boston, Mass., in 1869-72; with the construction and maintenance of the additional water supply of Boston in 1872-80; with the main drainage works of that city in 1880-86. He was chief engineer of the Massachusetts State Board of Health in 1886-95 ; a member of the board of sanitary engineers to devise a sewage system for the District of Columbia in 1889-90; and chief engineer of the Massachusetts Metropoli¬ tan Waterworks in 1895-1907. He served as consulting engineer to the Charles River Basin Committee in 1903-10 and to the New York Board of Water Supply from 1905. He was a consulting engineer of the Panama Canal in 1905-06. He served on the boards making re¬ ports on the Los Angeles waterworks in 1908, the Baltimore water supply in 1908-09, and that of Winnipeg in 1913. He has been con¬ sulting engineer for the new water supply of

Providence, R. I., since 1914. He was president of the American Society of Civil Engineers in

1.

STEATITE, the mineralogical name for soapstone. See Talc.

STEBBINS, George Coles, American evangelistic singer: b. East Carlton, N. Y., 26 Feb. 1846. He studied music in Rochester, Chicago and Boston. He was director of music at the First Baptist Church, Chicago, in 1870- 74, and at -the Clarendon Street Baptist Church, Boston, in 1874ˆ76. In 1876-99 he was engaged in evangelistic work as a singer with D. L. Moody and I. D. Sankey, touring the United States and Great Britain. He later made tours in Egypt, Palestine and Europe. From 1880 he was conductor of music at the Northfield, Mass., Conference. He collaborated with Sankey and McGranahan in editing (Gospel Hymns5 (Nos. 3-6), and compiled (The North- field HymnaP (1904).

STEDMAN, Charles, English military his¬ torian: b. Philadelphia, Pa., 1753; d. London, England, 26 June 1812. He was educated at the William and Maiy College. In the Revolution¬ ary War he enlisted in the British army and served at Lexington, Bunker Hill and under Cornwallis in the south. At the end of the war he was retired on the half-pay of a colonel and returned to England. He served on a committee to examine and settle the claims of the American loyalists, and in 1797 was appointed deputy controller and accountant- general of the stamp office. His < History of the Origin, Progress and Termination of the American War5 (2 vols., London 1794) is the standard British work on the American Revo¬ lution and contains military maps of high value.

Its accuracy in minor details was questioned by Sir Henry Clinton in (Some Observations upon Mr. Stedman's History> (1794).

STEDMAN, Edmund Clarence, American poet and critic: b. Hartford, Conn., 8 Oct. 1833; d. New York City, 18 Jan. 1908. He studied at Yale, and in 1856 began contributing to various New York journals. He was Washington cor¬ respondent of the World in 1861-63 ; he held a post in the office of Attorney-General Bates; but in 1869 entered business in New York, where until 1900 he was a member of the stock exchange. After the appearance of his first col¬ lection, (Poems, Lyric and Idyllic, > in 1860, he published several books of

verse, such as (The Blameless Prince, and Other Poems) (1869) ; (Hawthorne, and Other Poems) (1887); (Lyrics and Idyls, with Other Poems5 (1879) ; and (Poems Now First Collected5 (1894). (Pan in Wall Street5 is one of his best poems. His (Victorian Poets5 (1875) passed through many editions. It is a judicial, careful and sufficiently learned work, and much better than his (Poets of America5 (1885). He also edited a (Victorian Anthology5 (1895) and (An Amer¬ ican Anthology5 (1900), the latter of which was criticized for too great catholicity, while both displayed wide knowledge. The (Library of American Literature5 (1888-89) was pre¬ pared by him with E. M. Hutchinson. His Turnbull lectures at the Johns Hopkins Uni¬ versity and repeated at Columbia and Pennsyl¬ vania universities appeared as (The Nature and Elements of Poetry5 (1892). His other works include (Alice of Monmouth,5 (Genius and other Essays,5 (The Works of Edgar Allan Poe5 (with G. E. Woodberry). Consult Sted- man and Gould, (Life and Letters of Edmund Clarence Stedman5 (New York 1910) ; Winter, W., (01d Friends5 (New York 1909).

STEDMAN, Elizabeth Clementine (Mrs.

William Burnet Kinney), American writer, mother of E. C. Stedman (q.v.) : b. New York, 18 Dec. 1810; d. Summit, N. J., 19 Nov. 1889. She was a sister of D L. Dodge, the philan¬ thropist, was married to E. B. Stedman in 1830 and was widowed in 1836. She was married to W. B. Kinney, a newspaper publisher, in 1841, and in 1851, when her husband was appointed on the Sardinian mission, she accompanied him to Turin. She was already known as a con¬ tributor to the Knickerbocker, Blackwood's and other magazines, and in the 14 years she re¬ mained abroad with her husband she wrote extensively on matters of art, travel and scen¬ ery. In Italy she was associated with an inter¬ esting literary circle, among whom were the Brownings. She wrote (Felicita5 (1855); (Poems5 (1867) ; <Bianca Capello, a Tragedy5 (1873), etc.

STEDMAN, Fort. See Fort Stedman.

STEEDMAN, sted'man, Charles, Ameri¬ can naval officer : b. Charleston, S. C., 24 Sept. 1811 ; d. 1890. He entered the navy as midship¬ man in 1828, was promoted lieutenant in 1841, and in the Mexican War was in command of the siege guns in the naval battery on shore during the bombardment of Vera Cruz. In 1855 he was appointed commander and sailed in the brig Dolphin in the Paraquay expedition. Dur¬ ing the Civil War he remained loyal to the Union. In 1861 he commanded the railroad ferry steamer Maryland that conveyed General

Butler and the 8th Massachusetts Regiment from Havre de Grace to Annapolis; and later, after assisting Admiral Foote in organizing the naval forces along the Mississippi River, commanded the steamer Bienville at the capture of Port Royal, S. C. In the following year he commanded the Paul Jones during the engagement and capture of Fort McAllister and later operated on the Saint John's River, Florida. In September 1862 he was promoted captain, and in the Powhatan was engaged in the blockade of Charleston. With the steamer Ticonderoga he pursued the Confederate cruiser Florida to the coast of Brazil and took part in the two attacks on Fort Fisher in 1864. In 1865 he commanded the Mediterranean squad¬ ron and in 1866 he was promoted commodore and had charge of the Boston Navy Yard in 1869-72. He was appointed rear-admiral in 1871 and retired in 1873.

STEEDMAN, James Barrett, American soldier: b. Northumberland County, Pa., 30 July 1818; d. Toledo, Ohio, 18 Oct. 1883. He re¬ moved to Ohio in 1837 and entered the legisla¬ ture of that State in 1843. In 1851 he was appointed by President Buchanan public printer at Washington, and at the opening of the Civil War became colonel of the 4th Ohio Regiment and fought in western Virginia and Kentucky in 1861-62. In July 1863, having already been promoted brigadier-general, he was placed in command of the first division of the reserve corps of the Army of the Cumberland and for his services at Chicamauga was promoted major-general 24 April 1864. He took part in the Atlanta campaign; defeated Gen. Joseph Wheeler's cavalry in June 1864 and served with General Thomas at Nashville while Sherman was making his march to the sea. He resigned from the army in 1866, retiring with the rank of major-general of volunteers. He was made provisional governor of Georgia, but resigned and received the appointment of collector of internal revenue at New Orleans. He subse¬ quently became chief of police of Toledo and editor of the Weekly Ohio Democrat. In 1887 a monument was erected to his memory in Toledo.

STEEL. Before the introduction of the modern methods of steel making in the middle of the 19th century the name of steel was ap¬ plied only to iron containing a sufficient per¬ centage of carbon to become intensely hard on rapid cooling (quenching) from a red heat or higher temperature. The invention of the Bessemer and Open Hearth processes, however, by which it is possible to produce, in a molten condition, iron containing any proportion of carbon from a trace to 2

per cent or more, made a revision of the nomenclature necessary. The name of steel is now very generally applied to any iron obtained in a liquid state, provided it is malleable, regardless of the percentage of carbon it may contain and regardless, therefore, of whether it possesses or not the property of becoming hard on quenching. All malleable products manufactured by the Bessemer or Open Hearth processes are consequently classi¬ fied as steel although some of them may con¬ tain but a mere trace of carbon and be as soft and as deprived of hardening power as wrought iron. Iron products which are obtained in a molten condition but which are not malleable.

owing generally to too high a percentage of car¬ bon, are classified as cast iron. Iron products which are malleable but obtained in a pasty state are classified as wrought iron. This nomen¬ clature necessarily leaves out of consideration blister steel (also called cemented or converted steel, and by the English blister bar) which is obtained by introducing carbon (the cemen¬ tation process) at a high temperature but below the melting point, into bars of wrought iron. Ingot iron (obsolete) was a term applied to steel containing too little carbon to be usefully hardened. Plated bar is blister steel in the form of bars obtained through rolling or forg¬ ing while hot. Shear steel is steel obtained through rolling or forging piles or fagots of plated or blister bars. After one such operation it is known as single-shear steel. The piling and forging of bars of single-shear steel yields double-shear steel. Bessemer, Open Hearth, crucible, electric steels, etc., are steels made re¬ spectively by the Bessemer, Open Hearth, cru¬ cible, electric, etc., processes. Crucible steel is sometimes called cast steel. All steels, however, are initially cast. Eutectoid steel is steel con¬ taining in the vicinity of 0.90 per cent carbon. Hypo-eutectoid steel is steel containing less than 0.90 per cent carbon, while hyper-eutectoid steel is steel containing more than 0.90 per cent carbon (see Iron and Steel, Metallogra¬ phy of). Acid steel is steel made by Bessemer or Open Hearth processes when an acid (silicious) lining is used. Basic steel is steel made by the same processes when a basic lining is used. Low phosphorus pig iron must be used for the manufacture of steel by an acid process whereas by a basic process high phosphorus pig iron may be used. Alloy or special steels are steels containing a sufficient percentage of one or more special elements to cause some of its properties to be deeply modified. The alloy¬ ing elements most commonly used are nickel, chromium, tungsten, molybdenum, vanadium, manganese and silicon, hence the names of nickel steel, nickel-chromium steel, manganese steel, etc. By opposition steels which do not contain appreciable quantities of these elements are sometimes termed carbon steels. High¬ speed steel is an alloy steel

generally containing large proportions of tungsten and chromium (sometimes also molybdenum and vanadium) and which after suitable heat treatment is so resistant to wear by abrasion that it can be used as cutting tools under such severe condi¬ tions that the cutting edge of the tool may be heated to a red heat by the heat generated in cutting and still retain its cutting properties. This makes high speed cutting possible, hence the name of the steel.

Iron and carbon are the essential elements of all ordinary (carbon) steels. The carbon con¬ tent may vary from a mere trace (a few hundredths of 1 per cent to some 1.5 per cent). With much larger proportions of carbon the metal ceases to be malleable and is no longer, therefore, classified as steel. Manganese *is a necessary element of all steels, its introduction in the process of manufacture being necessary to obtain good forgeability. It is generally present in amounts varying between 0.1 to 1 per cent. Sulphur and phosphorus are unavoid¬ able impurities. No steel of good quality should contain more than 0.1 per cent of either

of these, while high grade steels should con¬ tain much smaller proportions. Silicon is also always unavoidably present, varying in amount between 0.1 per cent or less to some 0.3 or 0.4 per cent.

Assuming ordinary carbon steel to be in the annealed condition, i.e., having been slowly cooled from a red heat or higher temperature, as the carbon increases to 0.90 per cent the tensile strength of the metal increases from some 50,000 to 125,000 pounds per square inch, the elastic limit remaining equal to not less than one-half the tensile strength. With further increase of carbon the tensile strength decreases while the elastic limit continues to increase. The elongation which meas¬ ures the ductility of the metal decreases with the carbon content from some 25 or 30 per cent in steel containing very little car¬ bon down to some 5 per cent in very highly carburized steel. The hardness of the metal increases continuously with the carbon content while the hardening power reaches its maximum at about 0.90 per cent carbon. Very low carbon steel can be readily welded but as the percent¬ age of carbon increases the difficulty of weld¬ ing increases rapidly. Carbon lowers appreci¬ ably the melting point; while low carbon steel melts slightly below 1,500° C., steel containing 1 per cent carbon melts in the vicinity of 1,300° C. Through suitable mechanical and heat treat¬ ments the physical properties of steel can be deeply

altered. Mechanical work performed while the metal is red or white hot in¬ creases its physical soundness and gen¬ erally raises its strength and elastic limit. Mechanical work performed while the metal is cold greatly increases its tensile strength and elastic limit as well as its hardness, but decreases its ductility, eventually causing brittle¬ ness. The heat treatment generally applied to steel may consist (1) in annealing, i.e., in cool¬ ing slowly from a high temperature when it is desired to remove existing stresses, tp produce softness and ductility, but necessarily at the expense of strength and elastic limit; (2) in hardening, i.e., in cooling quickly (quenching) from a high temperature followed generally by reheating (tempering) to a temperature seldom exceeding 400° C. when it is desired to produce implements of very great hardness, but neces¬ sarily lacking in ductility to the point of being actually brittle and (3) in hardening followed by reheating to a temperature generally exceed¬ ing 400° C. and which may be as high as 700° C. when it is desired to obtain great strength and elastic limit combined with a fair amount of ductility according to requirements.

Albert Sauveur,

Professor of Metallurgy , Harvard University.

STEEL, THE BESSEMER PROCESS.

The Bessemer process is employed to manu¬ facture from the crude product of the blast furnace a comparatively low grade of steel, which is at the same time better suited for certain purposes than that manufactured by any other process. It does not seek to make high-grade tool steel or steel castings, but a cheaper grade, for which there is an im¬ mense demand, for instance, steel rails and structural shapes. It occupies a field in which it is and probably always will be supreme, so long as the supply of suitable

raw material lasts. Many modifications of the Bessemer process have been introduced, most of which have not met with approval, but one or two have become commercially recognized, such as the Clapp-Griffiths, the Robert and the Tropenas processes. These latter by variations in the method of applying the blast, or by modifications in the modus operandi, have made changes in the resulting product so that it may be successfully applied to the manufacture of castings, etc., but they are all essentially Besse¬ mer converters. Further notes on these proc¬ esses will appear later in this article.

To get a fair idea of the revolutionary nature of Bessemer’s invention

mention must be made of the fact that before his time steel, on aocount of the difficulty of its manufacture, was in use for practically little else but cut¬ lery, springs and the small parts of machines. It had to be made in crucibles by melting ce¬ mented bar or <(blister steel,® itself the result of a long and costly operation on Swedish iron in a cementation furnace. A steel rail, build¬ ing or bridge was unthought of. Everything was wrought iron, made at great expenditure of time and human energy in the puddling furnace or charcoal bloomery.

The story of Bessemer's discovery is of un¬ usual interest. Experiments had been made from time to time to improve iron castings by the addition of wrought-iron scrap to pig iron in a cupola, and Bessemer had achieved more success than his contemporaries by the use of a reverberatory furnace instead of a cupola, into which he had introduced great improve¬ ments such as a hollow bridge wall through which jets of air were forced, giving a higher temperature, enabling him to fuse more steel in the bath of cast iron. How he came to dis¬ cover that great principle on which all air- blast processes of steelmaking are based is best told in his own words. In connection with the description of some experiments with his forced draft reverberatory furnace he says : ((Some pieces of pig iron on one side of the furnace attracted my attention by remaining unmelted in the great heat of the furnace, and I turned on a little more air through the fire bridge with the intention of increasing the combustion. On again opening the furnace door, after an interval of half an hour, these two pieces of pig iron still remained unfused. I then took an iron bar with the intention of pushing them into the bath when I discovered that they were merely thin shells of decarbur- ized iron showing that atmospheric air alone was capable of wholly decarburizing gray pig iron and converting it into malleable iron with¬ out puddling or any other manipulation. Thus another direction was given to my thoughts, and after due deliberation I became convinced that if air could be brought into contact with a sufficiently extensive surface of molten crude iron it would be rapidly converted into malle¬ able iron.®

With great enthusiasm Bessemer proceeded to the next step, namely, the experimental test of his conviction. He procured a crucible hav¬ ing a perforated cover and a pipe of refractory material passing through the lid, connected to a blast supply. A small quantity of cast iron was melted in the crucible and while still in the furnace a current of air was passed through

it. After 30 minutes blowing the contents of the crucible were found to be soft malleable iron. The next thing to be determined was whether the chemical reactions caused by the blowing would generate sufficient heat to keep the contents of the crucible liquid without any additional heat being applied from outside. This seemed a preposterous idea — that blow¬ ing air into molten iron should only not solidify it in a short time, but actually increase its tem¬ perature very materially. But Bessemer was confident it would be so and immediately set about the construction of a converter. The first converter was about four feet in height, cylin¬ drical, having a flat top with a circular open¬ ing, and six horizontal tuyeres around the bottom fed by a circular blast pipe. Its capacity was about 700 weight of iron, which was introduced by a sort of funnel in the side after the blast was turned on. The first blow was full of surprises, for what took place could be readily seen, whereas in the former experiments in the crucible the entire apparatus was out of sight. For the first few minutes sparks and smoke were emitted from the converter, but then a flame burst forth, which increased in violence so that no one could go near the converter. Then the flame died down and the metal was tapped out through a hole in the bottom of the converter, and found to be malle¬ able. The possibilities of the process were now demonstrated beyond the slightest doubt, but prodigious labors were yet to be undertaken in order to make it mechanically perfect. The chief difficulties were that during the operation large quantities of slag and some drops of iron were blown out of the converter, and that the blast had to be kept on during the whole time of introducing the charge and also tapping it out when converted. Many changes were made in the interior shape to obviate the first. The height was increased and a double dome¬ shaped top added with the idea that any pro¬ jections of slag and iron would strike the dome and drop back into the converter. This was fairly successful and was the type of con¬ verter used in the first public exhibition of the process. In order to overcome the necessity of keeping up the blast while filling and emptying the converter the shape which is so well known to-day was evolved after a great many changes and experiments. It had to be a movable vessel, in order to bring the metal away from the tuyeres and permit of shutting off the blast, and so a shape somewhat oval, and with a mouth inclined to one side at an angle, the whole mounted on trunnions, became the stand¬ ard Bessemer converter. Other vast improve¬ ments came quickly, the hydraulically driven rack and pinion to rotate the converter, the hydraulic crane for handling the ladle and the casting pit for handling of ingots and molds. One of the

difficulties encountered was the mix¬ ing of the slag with the iron, and this was over¬ come by providing a ladle having an opening at the bottom which was closed by a refrac¬ tory stopper attached to a rod. The iron was run into the ladle and the stopper held in posi¬ tion till it was full. Then as the slag floated the stopper was withdrawn, allowing perfectly clean metal to run into the ingot molds.

The Bessemer process has another peculiar and, romantic feature in its history in that it has

been twice invented. When he took out United States patents in 1856 Bessemer was confronted at once by a priority of claim to invention by William Kelly. The contention was sustained in the United States courts and Kelly was granted a patent. It is now not doubted that while the two men independently and separately discovered the principle, Kelly was ahead of Bessemer some eight or nine years in his dis¬ covery. Kelly was in the iron business in Eddy- ville, Ky., in 1846, refining iron in an old- fashioned refinery, to make kettles used in the manufacture of sugar. He was an inventive genius, but a poor business man. An inspiration came to him one day while watching the progress of his refinery, on noticing that at a certain place where the blast of air happened to play on the molten iron direct without the

Modern Rotary Converter.

intervention of any fuel, it became white hot and boiled violently. He immediately realized the revolutionary nature of his discovery and his knowledge of metallurgy easily furnished him with the explanation, namely, that the car¬ bon content of the iron was acting as fuel, and by its combustion increasing the temperature of the iron. It was later discovered that the lar¬ gest addition of heat arose from the oxidation of the silicon content, and that where less than one per cent of silicon exists in the iron the Besse¬ mer process fails. On speaking of his hopes he was met with derision, but proceeded to make a public demonstration which convinced all who saw it. But, as with nearly all important dis-

coveries, there was a hard battle ahead of Kelly. There is always a prejudice against revolutionary discoveries, and Kelly's customers refused to accept iron refined by the new method even though it passed the customary tests. ˆ His financial backing was also

withdrawn, but Kelly could not be extinguished. How he persevered with his process when experiment after experiment failed, how he worked secretly in the forest, and finally got permission from the Cambria Iron Works to erect a converter (the eighth he had constructed) in their works, and how after a disastrous commencement suc¬ cess was finally achieved, are familiar stories. Kelly was recognized as the inventor of the Bessemer process, and while Bessemer's patents were refused renewal, Kelly's were renewed. He died in 1888.

The Bessemer Process To-Day. — In mod¬ ern American practice the pig iron is sometimes used direct in a fluid condition from the blast furnace and sometimes remelted in cupolas. Rapid working is the object aimed at so as to avoid loss of heat by radiation, and permit of the use of lower silicon in the pig iron. To¬ day but little more than 1 per cent of silicon is permitted in the charge and the blow is made in from 9 to 12 minutes. With a larger pro¬ portion of silicon the blow is unduly pro¬ longed. Even with this comparatively low content of silicon the blows are sometimes too hot and steel scrap has to be added in the con¬ verter during the blow to cool it off. In place of scrap a jet of steam is sometimes turned on. As regards the capacity of the converter any¬ thing less than 10 tons is considered a small converter and the usual amount treated at one time is from 10 to 20 tons. Two types of the Bessemer process are in use, known respec¬ tively as the acid process and the basic process. The difference lies in the character of the lining with which the converter is fitted. In the first named type this lining is of acid material, chiefly silica (held together with fire-clay) ; and in the second type it is of basic quality, generally calcined dolomite, held together with a small proportion of tar. In the latter case a percentage of lime is added to the charge before the blowing begins — the purpose being the formation with the silica of a basic slag which does not attack the lining.

In the acid process the sulphur and phos¬ phorus elements of the iron are not removed, the acid slag refusing to dissolve them. It is imperative, therefore, that iron selected for the acid process should contain less than .10 per cent of phosphorus and less than .08 per cent of sulphur in order to yield a grade of Bes¬ semer steel acceptable to the market. In the basic process the oxidized silicon is readily ab¬ sorbed by the basic slag, and hence is more quickly removed than it is in the acid process. The carbon ingredient is next eliminated; and following that condition the phosphorus and a part of the sulphur are absorbed by the basic lime slag. The basic process is most largely in use in regions where the phosphorus con¬ tent of the iron is large — particularly in Ger¬ many and Great Britain. In the United States the

acid process prevails almost universally. The lining generally consists of brick, sand or stone and the walls are lined to a thickness of about one foot. The bottom section of the

converter containing the tuyeres is separate from the main section and is about 26 inches thick on account of the great amount of corro¬ sion that takes place there and each vessel has a number of extra bottoms so that they can be quickly changed when burned out. The diameter of the tuyeres is about half an inch. The pressure of blast varies from 30 to 10 pounds, the former being used at the com¬ mencement of the blow and the latter being the lowest it would ever be safe to reduce it to, and this only when the blow is particularly hot or the projections of slag excessive. Sufficient air must always be kept on to support the iron and prevent it running into the tuyeres and wind box. The converters are rotated to suit the exigencies of blowing, and receiving or pouring the metal, by means of a pinion at¬ tached to the trunnion, and a hydraulically driven rack. The illustrations to this article give a good idea of the development of the converter from the earliest type.

The Clapp-Griffiths Bessemer. — This proc¬ ess, which is now practically obsolete, was one of the earlist types of Baby Bessemer con¬ verters. Its capacity was from two to three tons. A stationary side-blown converter was used, having a slag spout at one side from which the slag poured during the boil. The converter was in two sections, being jointed on a line above the tuyeres and the bottom section was handled and put in place on a car which could be lifted by a hydraulic ram. The only original feature of the converter was the slag spout, and the benefit derived from its use was always problematical. It was claimed that the steel made in this converter, even though high in phosphorus, was vastly superior to that made in ordinary converters. This claim was of course not substantiated.

The Robert Process. — In this process a rotary converter was usedi with horizontal tuyeres placed tangentially, in order to impart a rotary motion to the metal. The tuyeres were submerged, but near to the surface of the bath. Whilst the loss was greater than in the ordinary vessel, a hotter steel was made, which was suitable for steel castings, and for this purpose it was almost exclusively used.

The Tropenas Process. — This has been by far the most successful development of the Bessemer process for casting work, introducing the idea that the violent mechanical disturbance of the bath is unnecessary and that the more tranquil the bath is the purer, sounder and better will be the steel. A rotary, side blown converter of two tons capacity is used, and the tuyeres are arranged in a symmetrical posi¬

tion from the centre tuyere in order that any tendency to stirring or rotation may be neutral¬ ized. The tuyeres, moreover, are never beneath the surface of the metal, though they approach it very closely. A second row of tuyeres is placed a few inches higher than and parallel with the lower tuyeres, and when the carbon flame appears these tuyeres are opened, admit¬ ting air to complete the combustion of carbon from CO to C02. The result of this is to increase the temperature of the bath by radia¬ tion. A high silicon, high manganese mixture is used in the converter, and results in exceed¬ ingly hot and fluid steel, which can be car-

ried around in hand ladles and poured into very small and complicated shapes.

When the blast is first started the surface only of the metal is oxidized, three pounds pressure of air being used, and by dilution and change of specific gravity a fresh surface is constantly presented to the action of the blast without any mechanical disturbance whatever. In this way the possibility of occluded gases is reduced to a minimum, no more air being intro¬ duced than is necessary for the chemical re¬ action. The fact remains, however, that for casting basic open hearth steel is greatly pre¬ ferred.

The Roll of Honor. — The history of the de¬ velopment of the Bessemer process in the United States is the history of a company of the brightest minds this country has produced. There is no doubt that the Bessemer process is worked more perfectly in America than else¬ where, and the credit must be given to those brilliant men who in the early days gave their great intellects to its problems and overcame them. The most important work has been done by A. L. Holley, John and George Fritz, Wil¬ liam R. Jones and Robert W. Hunt. To Alex¬ ander Lyman Holley one of, if not the fore¬ most American engineers, were granted 10 pat¬ ents in connection with the Bessemer process alone, some of them being raised converters, hydraulic cranes, accumulating ladles and con¬ verter bottoms. Holley investigated the Besse¬ mer process in England in 1863 and realizing its possibilities and also its defects obtained the only American license, and set to work to perfect its machinery. The latest and most im¬ portant of the modern improvements is the Jones metal mixer, which is a large storage re¬ ceiver in which the various quantities of iron direct from the blast furnace are stored and equalized, so that the silicon is

uniform in the converter. One of the most important links in this perfectly welded chain was the work of Robert Mushet, who developed the method of recarburizing the iron after blowing in the con¬ verter. The Swedish method of checking the blowing when the carbon had been reduced to the proper percentage proved too slow and uncertain. Mushet's plan was to burn out all the carbon and restore a right proportion by the addition of a quantity of melted spiegeleisen (about 10 per cent) after the blow. Without his method the Bessemer process could not have been a commercial success. Considerable trouble was caused in the early days by the con- fliction of the Bessemer and Kelly patents. The Winslow, Griswold and Holley Company at Troy had control of the Bessemer patents covering the important and essential machinery, and the owners of the Kelly and Mushet patents could not operate without the use of this ma¬ chinery. In fact each side was necessary to the other and naturally this resulted in an agree¬ ment by which a joint-stock company of all the pneumatic steel manufacturers was made. All the patents on these processes have now ex¬ pired. According to the 1914 census of manu¬ factures there were in the United States in that year 9,146 plants engaged in the manufac¬ ture of Bessemer steel. Their combined prod¬ uct was 6,219,304 tons of ingot steel and 43,437 tons of castings. The decline in the use of Bessemer steel in favor of open hearth steel is

markedly indicated by the decrease of nearly 3,000,000 tons in the annual production for the census period 1909-14 for the former and an equal gain for the latter. The production of open hearth steel in 1914 was over 17,000,000 tons — nearly three times that of the Bessemer product. See Steel — Open Hearth Manu¬ facture. Consult Hall, J. H., (The Steel Foundry) (New York 1914) ; Harbord, F. W., and Hall, J. W., (The Metallurgy of SteeP (London 1918) ; Stoughton, B., <The Metal¬ lurgy of Iron and SteeP (New York 1913).

Arthur. Simonson,

Metallurgical Engineer, Philadelphia, Pa.

STEEL, ELECTRICAL PROCESSES OF MANUFACTURE. Electrometallurgical processes for the manufacture of pig iron, steel and ferro-alloys, have received profound attention from a commercial point of view during the years of this century. In fact, a commercial production of electric steels seems to coincide almost exactly with the opening of the 20th century, for we have it as a matter of record that three days before its beginning Heroult delivered to Messrs. Schneider and Company, Creusot, France, a carload of electric steel bars. This is

the first record we have of a commercial sale and delivery of such steel. Experiments were made and basic patents covering different processes were taken out during the closing years of the 19th century. It is over 40 years, however, since Sir William Siemens constructed and patented an electric arc furnace which would melt steel. It is not recorded that he believed this laboratory furnace was the begin¬ ning of the new industry, but whether he thought so or not he stated very clearly the reasons why electric furnaces should be su¬ perior to other furnaces where the product is in contact with the products of combustion of carbonaceous fuel. The advantages of electric melting as stated by Siemens are, first, the degree of temperature is theoretically unlimited; second, the fusion is effected in a perfectly neutral atmosphere; third, the operation can be carried on in a laboratory without much prepa¬ ration and under the eye of the operator; fourth, the limit of heat practically obtainable with the use of ordinary refractory material is very high, because in the electric furnace the fusing material is at a higher temperature than the crucible, whereas in ordinary fusion the temperature of the crucible exceeds that of the material fused within it. In short, he says that the function of electric melting is to ˆeffect such reactions and decompositions as require for their accomplishment an intense degree of heat, coupled with freedom from such dis¬ turbing influences as are inseparable from a furnace worked by the combustion of carbona¬ ceous materials.® The soundness of these conclusions as applied to commercial conditions have been amply confirmed during the past decade.- It seems like the fulfilment of proph¬ ecy, for they were overlooked and all but for¬ gotten for nearly a generation until there arose a group of engineers and inventors in several European countries during the closing years of the last century who perfected various processes for doing in the mills what Siemens had done in the laboratory. The enthusiastic claims of these inventors were not received

with much interest by the steel men, but the Canadian government displayed commendable foresight when it appointed a commission in 1903 to investigate these processes at first hand in Europe, and in their report in 1904 Professor Harbord, the metallurgist of the com¬ mission, stated first <(that steel equal in all respects to the best Sheffield crucible steel could be produced either by the Kjellin, Heroult or Keller processes at a cost considerably less than the cost of producing high class crucible steel,® and second, <(at present

structural steel, to compete with Siemens or Bessemer steel, cannot be economically produced in the electri¬ cal furnaces, and such furnaces can be used commercially for the production of only very high class steel for special purposes.® Even this opinion of a competent observer was not sufficient to overcome the conservatism of the crucible steel makers. The venerable crucible process had withstood the competition of Besse¬ mer steel and of acid and basic open hearth steel, and it \vas only natural that the new arrival should be viewed with distrust.

At the time of this report the writer found it very difficult to accept Harbord's first con¬ clusion except in so far as it applied to the induction type of furnace, in which at that time no purification of the charge was attempted, and to make a good steel one started with selected raw materials just as in crucible melt¬ ing. The combination of melting and refining in one operation did not appear promising, and such samples of steel as came under examina¬ tion, both foreign and domestic, did not tend to change this opinion. Metallurgical^ considered, electric furnaces are of two kinds. First, the early melting furnaces analogous to the crucible steel process — for example, the earlier Girod or the Colby and Kjellin induction furnaces; and second, smelting or refining furnaces, such as the Keller or Heroult furnaces for either pig iron or steel. In furnaces of the melting type we must start with the best raw materials if we wish to produce the best steel. Furnaces of the second type may be used (a) for the electric refining of pig iron direct from the blast furnace; (b) for melting and refining cold pig iron and scrap; (c) for the direct reduction of iron from its ores with or without subsequent refining to produce steel; (d) the electric refining furnace such as the Heroult, may be used as an adjunct to the open hearth or Bessemer process, in which the preliminary melting and refining is done. Electrically con¬ sidered, these furnaces include (a) arc fur¬ naces, e.g., the Stassanno process; (b) arc- resistance, e.g., Heroult steel process; (c) re¬ sistance furnaces, e.g., the Keller, Harmet and Heroult pig-iron furnaces, in all of which there is a movable carbon electrode and the hearth constitutes a fixed electrode. These fur¬ naces are especially suited to the reduction of iron ore, the charge of ore, lime and coke constituting a resistance conductor between the movable electrode and the fixed electrode. In the Gin process a current is passed through the melt itself, making use of the Joule effect. In the Girod crucible process we have what may be called a furnace of the superficial resistance type. The current does not pass through the charge itself. The furnace consists of a cru¬ cible of refractory materials surrounded by a

granular carbon resistance material to which the current is conveyed by solid carbon con¬ ductors, and the whole device is enclosed in a

refractory chamber of non-conducting ma¬ terials for thermal and electrical insulation ; (d) the induction furnace invention is due to E. A. Colby, but Kjellin, Schneider and others employed the same principle, in that the heating current is an induced one, generated in an annular bath of metal constituting a single¬ turn-secondary of a step-down transformer. In the original Colby patents the primary windings of the transformer surrounded both the electro¬ magnet and the crucible itself. In the Kjellin process the primary winding is close to one leg of the electro-magnet and both are surrounded by the single-turn-secondary or crucible itself. It w'ould appear that there might be an ad¬ vantage in dividing the primary winding into two parts, one within and one without the crucible-secondary, in other words, in com¬ bining the Colby and Kjellin constructions in the same furnace. In the limited space of this article only a few typical processes can be described illustrating some of the above-men¬ tioned general principles of construction. The variety of details of construction are very numerous, but the underlying principles are not so numerous; in fact, while so-called new proc¬ esses have been introduced frequently during the past 15 years, they do not constitute essen¬ tially new discoveries, but differ only in details of application of the electric heating and of furnace construction.

Before describing a few of the processes it may be said that in the earlier days of electric steel furnaces it was considered that they could only be installed in places most favorably lo¬ cated for a cheap supply of power, or in places where metallurgical fuel, such as coal and coke, was extremely scarce and high priced. The earlier furnaces were all of the single-phase type, and in the case of those employing elec¬ trodes only one or two electrodes were used. About 10 years ago three-phase furnaces with three electrodes came into use, and since that time furnaces with from four to six electrodes have been produced in the larger sizes. The cheapening of power costs in many localities has brought about a much more general in¬ troduction of these furnaces than was con¬ templated even by their inventors. Another early idea in regard to electric furnaces oper¬ ation was that they could only be used commer¬ cially for refining material previously melted in the open hearth or the Bessemer. The first installation in the United States, which was made at the plant of the Halcomb Steel Company, was of this type, and the electric furnace, which was of four gross ton capacity, was used for refining material melted in a 20-ton basic open hearth furnace. This in¬ stallation is still in use after 13 years of con¬ tinuous service. An identical installation was started in Germany at almost the same time. To-day furnaces operated on cold charges are much more numerous than those employing the original duplex

process, and they are located in places that formerly would have been thought unsuitable for such installations.

The Stassano Process. — In the Stassano furnace the heat is radiated from one or more pairs of large carbon electrodes placed above

the charge and in the top of the furnace. The furnace is of the arc type, and, as the elec¬ trodes are not in contact with the material that is to be melted, it is plain that no impurities are introduced into the melt from the electrodes themselves. Either iron or steel may be pro¬ duced, depending upon the mixture used. With the earlier furnaces of this type the hearth

large electrodes pass through the roof of the furnace. In the single-phase furnace, such as was first used exclusively, the current passes down one of these electrodes, crosses a narrow air gap through the slag into the melt, and is then conducted back through the slag and an¬ other air gap to the second electrode. Alter¬ nating current of about 100 volts is used. The

Heroult Steel Furnace. — A, lip of furnace; H, dolomite brick, lining the metal shell; K, crushed dolomite constitut¬ ing the hearth; E, one of the electrodes; R, S, T, P, Z parts of device for regulating the position of the electrodes.

rotated during the operation at a small angle to the vertical, facilitating the mixture of the ingredients and the reactions taking place in them. This process is still in use in Italy with both rotating and stationary hearths. Its use has not been adopted to any very great extent in other countries, and some of the installations that were made in this country have been aban¬ doned. It was found that the arc, placed so high above the charge, produced an excessive heating of the refractories of the roof, and that the expense for upkeep was high. The furnace is capable, however, of producing high- quality steel.

Heroult Process. — This process, as applied to the production of steel, makes use of an arc- resistance tilting furnace, usually basic lined with dolomite or magnesite. Two or more

width of the air gap is automatically regulated by very ingenious devices which automatically raise or lower the electrode as the resistance in the circuit varies. Tool steel, or structural materials, and

especially alloy steels, can he made by this process in this furnace either from a charge of cold materials or from a liquid charge previously melted in some other fur¬ nace. The charge may consist of miscellaneous scrap, ore and lime, and usually some fluor¬ spar, sand and lime are used for the prepara¬ tion of slags toward the end of the process. When it is desired to remove both sulphur and phosphorus from the charge it is custom¬ ary to rake off the first slag formed during the melting-down period, and with it goes most of the phosphorus. The operation during this period is oxidizing. After the phosphorus slag

is removed a second slag, usually known as a <(carbide slag,ˆ is formed, and under reducing conditions in the furnace the sulphur is very largely eliminated. In this particular the elec¬ tric processes of several types are far superior to any other processes for removing sulphur. When such furnaces are used in conjunction with the basic open hearth furnace, the bur¬ den of dephosphorizing is borne by the basic open hearth and desulphurizing and deoxi¬ dizing only are done in the electric furnace, and the operation is carried out entirely under re¬ ducing conditions.

made by the Canadian commission, by Dr. V. Engelhardt and by the writer, during the earlier years of its operation. The furnace, as described by Dr. Haanel, constitutes a step- down transformer. A primary coil of insulated wire is wound about one leg of the magnetic circuit. The secondary is formed by the charge in an annular groove, also surrounding the same leg of the magnetic circuit. In the original Kjellin furnace at Gysinge, Sweden, the primary alternating current is delivered at 90 volts and 3,000 amperes. The secondary current induced in the charge itself is of low

A, is just above the primary coil; B, iron core or magnetic circuit; and C, the bath (secondary circuit). The advan¬ tages of this furnace are that it can be tipped over the lip, or from the taphole, and can easily be repaired and relined when necessary.

KJELLIN TILTING FURNACE.

Colby and Kjellin Processes. — The in¬ ventor of the induction furnace was Mr. Ed¬ ward A. Colby, an American. It does not appear, however, that at the time of taking out his patents in 1890 he had any

idea that the process might be used on a large scale for steel melting. Ten years later Kjellin, in Sweden, employed the principle of induction to the con¬ struction of electrical furnaces for steel melt¬ ing, and since the results of these later experi¬ ments have been made public Colby has also designed a furnace for similar use. The Kjellin process was put into actual service in Sweden about 1900, producing a merchantable product, mostly tool steel, and has been made the subject of many careful investigations. This process naturally attracted the attention of makers of high-grade steels as the nearest substitute for the old process of crucible melt¬ ing. The furnace was studied in operation, and careful investigations of the product were

potential, and the conversion of electric energy into heat takes place in the substance of the charge itself. The furnace may be either acid or basic lined, but the latter is most used, the lining constituting the annular groove or crucible, being usually made of magnesite. The furnace may be either tilting or stationary. No attempt was made at purification of the ma¬ terials used, but carefully selected raw ma¬ terials, well melted, gave an excellent steel, the analysis of which was nearly the mean of the constituent materials of the mixture. This, of course, is a more expensive way of producing tool steel than by refining processes, but it is the surest way, and processes depending upon refining methods can never be as certain in their results as the crucible or the induction process, in which raw materials of known impurity are employed. Larger furnaces of 4he induction type were later produced in Germany, in which by a special arrangement

of the hearth refining was possible, but in both the simpler and these more complicated fur¬ naces the question of repair of linings was very serious, and it can scarcely be considered that they have been a commercial success. Some very large ones were installed in this country, but it is understood that they have been abandoned as uncommercial. One elec¬ trical disadvantage is that these furnaces for best operation require a current of unusually low frequency. The modified Kjellin furnace, adapted to refining, is known as the Rochling- Rodenhauser furnace. The induction furnace can operate upon two kinds of mixtures : first, pig iron or scrap, and second, pig iron, scrap and ore briquettes.

Conclusions.— Of the many other processes two may be mentioned which employ the prin¬ ciple of bottom electrodes. The Girod furnace

makes use of water-cooled metallic electrodes imbedded in the bottom lining of the furnace so that the current actually passes through the charge itself from top to bottom. The Greaves-Etchells furnace, a fairly modern English process, makes use of the principle of a conductive hearth itself, and no inserted electrodes are used. The entire bottom, after the furnace is once heated, becomes a resist¬ ance conductor and is supposed to produce beneficial results by heating the materials at the bottom of the charge more perfectly than can be done by an overhead arc furnace, and this advantage is supposed to be most marked in the manufacture of alloy steels, especially those of heavy metals, such as tungsten, which sink through the bath and are apt to lie on the bottom of the furnace without being entirely molten or absorbed by the charge itself. It is difficult to compare the various processes as to their efficiency. In the first place, at no one plant have all of them been tried under uniform conditions and skill of operation. There are so many variables entering into the matter that comparisons can be made only in one or more particulars. For example, the current consumption per ton of product can be readily compared, but unless the furnaces com¬ pared are operating under similar conditions, and on a similar product, the figures are quite valueless: Moreover, in melting a similar qual¬ ity one furnace may require more current than another, simply because the melter refines his steel more perfectly and the kilowatts used may make the difference between well and poorly-melted steel. Other variables are the life of the roofs, bottoms, side walls and electrodes, the first cost of the furnace and the quality of construction, and, from the power-house point of view, simplicity and the cost of equipment must be considered, and this involves differ¬ ences of phases, frequency, voltage and power factor. When all of these elements are con¬ sidered, together with ease of operation, it is apparent that it is not simple to give off-hand judgment as to what furnace is best to use. The time is past when the electric current itself is supposed to confer any mysterious benefits upon the products, but its function is just as stated by Siemens 40 years ago. Various claims are made by inventors depending upon whether the current passes through the bath horizontally or vertically or is merely radiatecj to the surface. However, it should be remem¬ bered that at the temperature involved molecu¬

lar mobility is very great, and solution and diffusion will take place satisfactorily if the total heat available is sufficient to maintain the entire contents of the bath perfectly fluid.

The electric processes under most careful handling are capable of producing steel approx¬ imately equal to crucible steel, but each process has its peculiar field, and while some crucible tonnage may be

diverted to electric steel, yet it is more likely that electric steel will find its own market in the most exacting requirements of steel for structural and tensile properties, such as have come about almost simultaneously with the processes themselves, namely, for the automobile and airplane parts. Crucible steels for these purposes are not commercial because of the difficulty of making very low or medium carbon alloy steels in the crucible and the ton¬ nage demand is far beyond what could be met by the crucible process. The electric furnace was apparently invented to meet a new demand rather than to replace an old process. As one writer has said, (<The luxury of to-day is the necessity of to-morrow. Safety cannot be measured by price, and public opinion will more and more insistently call for the highest excel¬ lence in the automobile, the airplane and other forms of fabricated material.®

There are now in use in the United States between 300 and 400 electric furnaces of vari¬ ous types, over half of them being of the Heroult design. There are probably as many furnaces altogether in Europe as there are in the United States. The introduction of the process was stimulated amazingly by war re¬ quirements for materials of unusually high grade, and in meeting these requirements the electric steel makers responded nobly in their contribution to the war program.

Bibliography. — ˆReport of Commission on Electric Smelting of Iron Ores and the Mak¬ ing of SteeP (Canada 1904) ; Keller, in Journal of the Iron and Steel Institute (Vol. I, p. 161, 1903) ; Louis, H., ib. (Vol. I, p. 40, 1904, upon Herrang briquette process) ; Haanel, in Journal of the American Chemical Society (Vol. XXVIII, p. 921, 1906, upon Heroult pig-iron process) ; Neumann, B., in Stahl und Eisen (15 June, 1 July and 15 Aug. 1904) ; also Electrochemical Industry (p. 488, 1904) ; Engelhardt, V., in Stahl und Eisen (1, 15, Feb. and 1 March 1905, upon Kjellin proc¬ ess) ; Frick, in J crnkontorets Annaler (Vol. LIX, pp. 333-464) ; Mathews, (Electric Fur¬ nace in Steel Manufacture, > in American Iron and Steel Institute (1916) ; also (Comments on the Electric Steel Industry, } in Trans. Ameri¬ can Electrochemical Society (Vol. XXXI, 1917) ; Robinson, T. W., (The Triplex Process of Producing Electric Steel, > American Iron and Steel Institute (1918) ; Rodenhauser, Schoneawa and Vombaur, (Electric Furnaces in the Iron and Steel Industry) (2d ed., 1917). The Electro-chemical and Metallurgical In¬ dustry (Vols. I, II, III and IV) treats the whole subject fully, including patents, theory and practice.

John Alexander Mathews, President, Halcomb Steel Company, Syracuse, N. Y.

STEEL, EVOLUTION OF STEEL¬ MAKING PROCESSES. In prehistoric times the earth's inhabitants fashioned their im-

plements from flint. After a time, as the result of observation or chance, primi¬ tive men discovered that metals, such as copper and lead, could be obtained from certain earths or ores, and it was not long until they found that copper could be made harder by the addition of a little iron, arsenic or tin. That they ever actually hard¬ ened copper, in the sense that we harden steel for tools, is extremely improbable.

It is not easy to say whether the Bronze Age preceded the Iron Age or not, and if it did, by what period. Flint instruments and weapons are almost imperishable, bronze is very endur¬ ing, while iron rusts, and if buried in a damp place is wholly converted into hydrated .oxide or carbonate of iron, soluble in waters contain¬ ing much organic matter. For this reason iron relics of great age are scarce, while flint and bronze fill the museums. However, in certain ruins of the Swiss lake dwellings all three sorts of implements were found, flint, bronze and iron.

The use of iron is frequently mentioned in the early books of the Old Testament. The Egyptians were familiar with it at least 4,000 years ago. The Assyrians probably knew how to obtain iron from its ores and how to fashion it into saws, chisels, etc., at a still earlier date than the Egyptians. The various ages known as the Stone, Bronze and Iron ages are not fixed periods in the world's history, but are periods in the history and development of individual tribes and nations. For example, while at a period, say 1000 b.c., the Egyptians and As¬ syrians were making swords of iron (and a cross-cut twio-handed saw of this period is in the British Museum) the Bronze Age existed in southern Europe, while in the northern and western Europe wood and stone implements were in general use. In India, China and Japan there is abundant evidence of the manu¬ facture and use of iron at a very early period. In 'this very day there are tribes in central Africa which have but attained the degree of skill which we picture in our minds when the ((Iron Age® is mentioned. They are making iron in a most primitive fashion and their methods may be the identical .ones used thou¬ sands of years ago by the Assyrians. Their metallurgical skill is by no means slight, for they know how to smelt ores in a little cupola blown by a hand bellows, and to employ the right fluxes to obtain a

product of remarkably good analysis. They use charcoal as fuel and the chunks of metal which they obtain by first smelting are sold to smiths who refine them still further by a sort of puddling process, and a tool made by this means gave, according to Bellamy and Harbord, the following excellent analysis: Carbon, 1.02; silicon, .026; sulphur, .006; phosphorus, .012; manganese, trace. There are evidences in Belgium of ancient iron workings dating from the Roman occupa¬ tion, and they were famous armorers through many centuries. The skilled workmen of this country emigrated especially to England and Sweden and were the founders of the fine steel industries in those countries. Those who emigrated were the Walloon Belgians, and the exodus became so great that at one time it was stopped by law.

During the time of the Norman Conquest

and the Tudors, the manufacture of iron in Great Britain was an insignificant industry, and the chief supplies were imported from Bel¬ gium, and from Belgium came the invention which gave a great impulse to the iron and steel business, viz., the invention of the blast fur¬ nace. Prior to this invention iron was pro¬ duced direct from ore in a crude form of hearth, the product being wrought iron or steel, which was obtained in a solid or pasty condi¬ tion far from homogeneous in composition, and when large or intricate forms were desired they were made from these crude materials by laborious welding and forging methods. With the invention of larger and improved blast fur¬ naces by the Belgians it was found that prac¬ tically a new metal, fused cast iron, was at the disposal of the early metallurgist. Cast iron was made in Sussex as early as 1350, and the art of iron founding gradually grew and flour¬ ished in England and on the Continent, until in 1543 cast-iron cannon were made in England, and in 1595 these were made as heavy as three tons each. But cast ir.on was not only used for foundry purposes, for it was argued that if by one application of the purifying influence of fire the crude metal had been prepared from the ores, the second application of the same agency might convert it into a malleable prod¬ uct, and wrought iron was subsequently pro¬ duced in small fineries, and from that day to this the blast furnace has been the first step in the manufacture of iron and steel. Much of this early wrought iron was delightfully low in sulphur and some other impurities, but at that time no means were known of reducing the phosphorus, and the amount of this element present in the product was due to the chance selection of the ore. There were no chemists in those days to say whether the iron contained phosphorus or not, and practical experience with the product in use was the only way of de¬ termining the merits of ores from various sources. It was soon discovered that wrought iron by

long heating in contact with carbon ab¬ sorbed some of that element and was thus con¬ verted into <(cemented® or <(blister steel.® Blister steel when piled, welded and forged be¬ comes ((shear steel,® and if shear steel is piled, welded and forged the product is known as (<double shear.® By this piling and welding operation, the carhon which is highest in the outer portions of the cemented bar becomes more uniformly distributed throughout the mass of steel. In 1781 Bergman, of Upsala, pointed out that it was carbon which determines the difference between wrought iron, steel and cast iron.

The early steel works were all located in the vicinity of great forests, for charcoal was the only fuel used. The works were also lo¬ cated near running streams, and water wheels were used to provide power for the blast, and for the first power hammers. There are many such still in use in Sheffield. In Queen Eliza¬ beth's time the iron trade had become so great that the wholesale destruction of forests was stopped, and the position and number of iron works was limited by law. As the result of this legislation the iron trade languished until Dud Dudley, in 1620, or a little earlier, success¬ fully used coal in the blast furnace. In his day 20 tons a week was a large output for a

blast furnace, while to-day the output of one of the blast furnaces at Homestead is nearly 5,000 tons per week. In primitive processes, the workers took advantage of natural draft and located their furnace on a windy hillside. Later, crude bellows were made from hides and still later a blowing arrangement operated by flowing water was invented. Not much real progress could be expected from such crude devices, and one of the first applications of the steam engine of Watt was running a blow¬ ing engine at the Carron Iron Works in 1760. It was not until 1730 that it occurred to Abra¬ ham Darby and his son to treat pit coal just as his charcoal burners treated wood. His idea, needless to say, was a good one, and coke was produced, which in turn was soon successfully used in the blast furnaces, and is at the present time the principal fuel used in blast furnace practice, although a few charcoal blast fur¬ naces remain in America and are quite com¬ mon in Sweden. The next great advance in the metallurgy of iron was that of Robert Hunts¬ man, of Sheffield, who first produced crucible steel in the year 1740. As Dr. Percy says, re¬ ferring to Huntsman : <(Formerly, so far as I am aware, steel was never melted and cast after its production ; indeed, by the founding and casting of steel after its production its heterogeneousness is remedied, and ingots of the

metal can be produced perfectly homo¬ geneous throughout, and for the practical solu¬ tion of this problem we are indebted to Robert Huntsman, of Sheffield.®

Huntsman was by trade a clockmaker, and no doubt had his troubles in attempting to make springs from the crude steel which was avail¬ able in his time. It was to overcome this dif¬ ficulty that he began experiments with a view to melting the cemented, or blister bar, of his day, to obtain a homogeneous product. A grandfather's clock, the pendulum rod and spring of which are supposed to have been made from the first cast steel produced by Huntsman, is still shown in Sheffield. Huntsman's chief difficulty in his investigations was to find the right kind of clay for making crucibles which would stand the intense heat of steel melting. His first crucibles were only 10 inches high, and held about 20 pounds of steel. Steel made by this process was of course expensive, and could only be used for edge tools, dies and drills, for which a great degree of hardness and fine polish was desired. The original business started by Robert Huntsman is still conducted by his lineal descendants of the fifth generation at the present time. See Steel, Manufac¬ ture of Crucible.

The next great inventions which made for progress in the iron industry were those of Henry Cort (b. 1740; d. 1800), who first made use of grooved rolls in 1784, and in 1785 pro¬ duced the dry puddling process. The invention of puddling was without doubt the foundation of Great Britain's commercial greatness during the century that followed. Prior to this time cast iron had been decarbonized in small hearths, very wasteful of fuel and labor, in which only 100 pounds could be treated at a time. 'Cort employed the reverberatory type of furnace, in which the metal was not in contact with the fuel, but was heated by the flame, which was caused to reverberate, or beat down

from the roof of the furnace. This process permitted the use of coal instead of charcoal, and allowed the use of 250- to 500-pound charges. The story of Cort's life is a very sad one, for through a dishonest partner, who died suddenly, his patents were seized to satisfy this partner's liabilities, and Cort died in poverty in 1800. Prominent treasury officials were impli¬ cated in this unjust treatment of Cort. Quite recently Americans have erected a bronze tablet to his memory in the little church in Hamp¬ stead, in the churchyard of which his grave was located with difficulty.

The invention of the hot blast by J. B. Neil- son, of Glasgow, in 1828, afforded the next great advance in the metallurgy of iron. In six months the fuel consumption per ton of product was reduced from

somewhat Over eight tons to a little over five tons, the blast being heated to 300° F. A few years later the blast was heated to 600° F. and the fuel consumption dropped from five and one-sixth to two and one-fourth tons. At the same time there was a great in¬ crease in output as well as decrease in fuel consumption and the production of pig iron in Scotland increased fivefold between 1830 and 1840, while the use of the hot blast became a general practice during that period. As was the case with Cort, so Neilson reaped almost no reward for his invention, although the wealth it conferred upon iron manufacturers could hardly be reckoned. The same was true of Heath, who in 1840 patented the use of man¬ ganese in steel. This conferred an incalculable benefit upon the manufacturers, but Heath died unrewarded after 15 years of litigation.

It was not until 20 years after the discovery of the value of the hot blast that Sir William Siemens introduced the system of regenerative gas firing — a system in which the waste prod¬ ucts of combustion are employed to heat the incoming gas and air of a gas furnace or the blast of a blast furnace. The application of this principle of regenerative heating in the Cowper and Whitwell stoves effected a still further great saving in fuel in the blast fur¬ nace and at the same time increased the yield.

During more than one-half of the last cen¬ tury wrought and cast iron were the only ma¬ terials available for structural and machine con¬ struction, boilers, engines, etc. Crucible steel owing to its high cost could not be used for any of these purposes. Such was the situation when Henry Bessemer gave to the world his wonderful invention. This was the real be¬ ginning of the modern age of steel in which we live. Prior to Bessemer's invention there is every reason to believe that William Kelly, an American, was working upon what may be called the ((pneumatic process.® According to a recent magazine writer, Kelly was experi¬ menting with this process fully 10 years before the date of Bessemer's invention and had built seven stationary converters prior to 1856. His claim of priority of invention was allowed by the United States Patent Office. Nevertheless the process is universally known to-day as the Bessemer process and indeed there can be little doubt but that Bessemer made an independent discovery of the pneumatic process. Robert Hunt and James M. Swank both agree that for priority of invention William Kelly deserves all praise. See Steel, The Bessemer Process.

STEEL, EVOLUTION OF STEELMAKING PROCESSES

Although the first iron furnace in America was built in 1619, in Virginia, and the first blast furnace with forced blast dates from 1714, nevertheless the iron and steel business did not assume a large magnitude in the United States until the building of the Edgar Thompson fur¬ naces in Pittsburgh, the first of which was blown in in 1879. In these furnaces American skill showed the world how to triple the weekly output and to cut the fuel cost in two. That is, while the best English and Scotch furnaces in 1880 produced from 400 to 800 tons of pig iron per week and required two tons of coke for one ton of pig, the Edgar Thompson furnaces between 1880 and 1885 produced from 2,000 to 2,500 tons per week and used only one ton of coke to one ton of pig. The coke in some cases fell as low as 1,882 pounds per ton of output. The ore used contained about 62 per cent of iron and the volume of air reached 25,000 cubic feet per minute, at a temperature of 1,000° to 1,100° F.

While we thus see that the modern steel industry is of such recent date, yet the inven¬ tions of the processes now used mainly, viz., the Bessemer (1856) and open-hearth (1861), for making steel, were relatively of long standing, and the gradual improvements in the processes themselves, their mechanical details and costs, and the gradual education of the large users of metals to employ steel in place of wrought iron and cast iron, gradually led up to the enormous demands of the last 30 years, to which the American manufacturers have re¬ sponded so energetically.

Henry Bessemer was of a distinctly in¬ ventive turn of mind and had many useful in¬ ventions to his credit before he turned his at¬ tention to steelmaking. He gave considerable attention to the manufacture of projectiles during the Crimean War. The cast iron can¬ non of this time were seen to be unsuitable for Bessemer's powerful projectiles and he, therefore set about producing not only the pro¬ jectiles, but a better material for making large guns. After many trials and discouragements he succeeded in producing steel from cast iron by blowing air through it to oxidize the im¬ purities. His first experiments were performed in a crucible, and this being successful his next idea was to use several crucibles fed by a com¬ mon air pipe. Later he adopted a large sta¬ tionary converter about three feet in diameter and seven feet high and used 700-pound charges. The results were most astonishing, for Bessemer found that by the simple method of blowing air into fluid cast iron that the highest temperature then known in the arts was produced. The first formal announcement of his invention was made at the British Asso¬ ciation for the Advancement of Science in 1856, the title of his paper being (The Manu¬ facture of Malleable Iron and Steel Without Fuel.* Great excitement followed the

reading of this paper and the process was tried in many parts of England, but in many cases the results were anything but satisfactory. The steel produced was red short and cold short. The cause of the trouble was soon found to lie in the use of very impure pig irons running high in sulphur and phosphorus. The first converters were lined with acid or silicious materials, and little or no sulphur or phos¬

phorus was eliminated. As long ago as 1856 Dr. Collyer writing of the effects of phosphorus and sulphur said : (<The former I consider most pernicious of all. I would suggest, with due deference, that a stream of finely pulver¬ ized anhydrate of lime be forced at a given time with the compressed air into the incan¬ descent mass of iron. The lime having a great affinity for silica and phosphorus would form a silicate and phosphate of lime and be thrown off with the slag. By this contrivance I can¬ not conceive but that the phosphorus would be entirely got rid of.® Here we see the <(basic Bessemer® process clearly anticipated many years before it was actually successfully worked out and adopted (1871). The irregularity men¬ tioned above was overcome by the use of se¬ lected pig irons, low in sulphur and phosphorus, and by the important discovery of Robert Mushet, viz., the addition of manganese to the metal in the ladle after the blow. The steel in the converter after the blow is dead soft, being nearly carbonless, and contains a good deal of dissolved oxide of iron, beside rather high sulphur and phosphorus. The addition of speigeleisen or ferro-manganese corrects all of these troubles. It adds a certain amount of carbon to the steel, thereby increasing its strength and hardness ; it deoxidizes the over¬ blown metal and the residual manganese com¬ bines chemically with phosphorus and sulphur, some of ‘the sulphide and phosphide being eliminated in the slag, and the rest being ren¬ dered relatively harmless by reason of its com¬ bining directly with the manganese. After these chemical difficulties with the process had been overcome, Bessemer and others turned their at¬ tention to the mechanical side of the question and produced the converter mounted on an axis, so that the vessel could be rotated or tipped down and the air-inlets or tuyeres could be thus brought either above or below the surface of the metal in the converter. This improve¬ ment rendered the charging or discharging of the metal much easier. Bessemer was more fortu¬ nate than all the other inventors previously mentioned in that he made a vast fortune out of his invention. As a matter of fact his in¬ vention was so complete in every way that the process stands to-day exactly as he originated it, excepting for minor details. Somewhat less than half of all the steel now produced is made in the Bessemer converters. What the inven¬ tion of Bessemer steel meant to the world will be seen from a few

illustrations.

Steel boiler plates were first used in 1860, and because of their much greater strength, permitted of steam pressure up to 80 pounds being used. This was a great advance in boiler¬ making. Three years later locomotive boilers were made of steel. But the greatest applica¬ tions by far for steel were for steel rails and steel ships. The first steel rails were made in the year Bessemer steel was first described to the public. They lasted six years in a place where iron rails had to be replaced every three months. From that day to this the great bulk of steel rails has been made by the Bessemer process. In 1863 two small barges were built of steel, and a year later a steel vessel of 1,250 tons was built.

Basic Bessemer. — Many investigators tried to solve the problem of removing phosphorus

in the Bessemer blow, but it was not until the early 70's that Mr. Sidney Thomas came to the conclusion that its non-removal was due to the presence of a strongly acid slag, and obviously a basic slag could not be maintained in an acid lined vessel. After many failures Thomas and his cousin, Mr. Gilchrist, discovered that a lin¬ ing of lime or dolomite could be made for the converter, using silicate of soda or clay as a binding material, and that additions of lime during the blow facilitated the removal of phosphorus and that an ˆafter-blow® was necessary.

Open Hearth. — The next great advance in the metallurgy of steel was the development of the open-hearth process. (See Steel, Open Hearth Manufacture). The prior discovery which led up to the open-hearth process was the invention of the regenerative furnace by Sir W. Siemens. William Siemens, a German by birth, had both a technical school and university edu¬ cation. His first visit to England was in 1843 for the purpose of introducing a process of electroplating, by means of which silver was deposited with a bright, smooth surface, rather than in the form of a crystalline deposit. The following year, 1844, he returned again to Eng¬ land and resided during the 40 more years of his useful life.

Siemens, profoundly impressed 'by the theory of the conservation of energy and with Joule's determination of the mechanical equiva¬ lent

of heat, was ultimately led to the great discovery of the regenerative gas furnace. Then Siemens invented his gas producer, and with economical gas fuel the regenerative gas furnace was a great success. The first furnace on a commercial scale was used for glass melt¬ ing in 1861, and a little later it was used for zinc distillation, heating and puddling furnaces, and for melting crucible steel. In this latter application it is used exclusively in America, while in England coke fires are still used for melting crucible steel. These are very wasteful of fuel, and possess not one single advantage over the Siemens producer and regenerative gas crucible melting furnace.

Siemens was not very successful in applying his invention to steel melting on the hearth of the furnace itself, and it was several years be¬ fore any degree of success was attained in Eng¬ land,, but meanwhile Messrs. P. and E. Martin, in France, taking Siemens' own drawings, erected a furnace in France and overcame the obstacles that had almost proved too much for Siemens. Thus originated the Siemens-Martin process, as it is universally known abroad; while in America it is usually merely desig¬ nated as the open-hearth process.

Martin produced his steel from wrought iron scrap dissolved in cast iron on the hearth of Siemens' furnace, with the necessary recar¬ bonization at the end of the process and the addition of manganese. This method is known as the (<pig and scrap® method. Siemens mean¬ time was working on a method now known as the ((pig and ore® method, in which pig iron is decarbonized by the addition of ore, while scrap may or may not be used. It was not until 1868 that the open-hearth process became an assured success.

As with the case of the Bessemer process, so with the Siemens-Martin, the acid process

was the first to be employed. In fact Acid Bessemer and Acid Open-Hearth steel both antedate the basic Bessemer. Thomas and Gilchrist, who perfected the basic Bessemer process, also realized that the essential change necessary to dephosphorize was to substitute a basic lined furnace for the acid lining which had been previously used, and the maintenance of a basic slag during the operation by the use of lime.

Thomas announced the success of his ex¬ periments in 1878 before the Iron and Steel Institute, and although he announced that he had succeeded in removing from 20 to 99.9 per cent of the phosphorus from iron in the con¬ verter, and thus rendered available for steel¬ making mountains of ore the world over, which without

dephosphcrization were useless, his an¬ nouncement attracted little attention, but before many years England was besieged with Ger¬ man, French, American and other metallurgists, anxious to learn about the epoch-making dis¬ covery, — the basic steel process. Germany profited particularly because of the large quan¬ tities of phosphoric ores which thus became a valuable asset.

In favor of the Bessemer process we may say that when steel of from .06 to .10 per cent phosphorus is wanted it is a cheaper process than open-hearth, but low phosphorus Bessemer requires a very careful selection of raw materials. Phosphorus and sulphur must be lower in the raw materials than is desired in the steel. A disadvantage of the Bessemer process is that the steel cannot be tested dur¬ ing the operation. Bessemer plants are suitable where tremendous tonnages of a rather cheap product are required. The open-hearth proc¬ ess gives a good outlet for steel scrap, billet ends, old rails, etc. The product is more re¬ liable than Bessemer, and the low phosphorus open-hearth steels are much cheaper than low phosphorus Bessemer. The process allows more latitude in the selection of raw materials. Low or high sulphur pig can be used and both phosphorus and sulphur can be reduced. The steel can be tested chemically and physically during the operation, and whereas in Bessemer it is customary to continue the blow until all the carbon of the pig is oxidized, in the open- hearth process the decarbonization can be checked when it has gone far enough, or when the carbon desired in the product is reached.

As regards the quality of steels made by the various methods, it is undoubtedly true that even when the analyses are almost identical that crucible steel takes first place. Next in order comes open-hearth, and last place falls to Bessemer. As regards excellence of analy¬ sis, they usually stand in the same order, crucible being finest, open-hearth next and Bessemer last. Acid open-hearth, if the proper materials are used, i.e., if virtually a crucible mixture is melted in an acid open- hearth furnace, will be a most excellent ma¬ terial, but as actually made, acid open-hearth is usually very high in sulphur and phosphorus and much of it resembles a Bessemer analysis. In general then basic open-hearth takes next rank to crucible because of its low phosphorus and sulphur contents. In general, of two steels of identical analysis, acid and basic open-hearth, the former will show much the

higher tensile strength. Campbell has even constructed a formula for

calculating tensile strength from the analysis, and in his formula it is assumed that each 1/100 per cent of car¬ bon increases the tensile strength by 1,000 pounds in acid steel and only 770 pounds in basic. Each 1/100 per cent phosphorus exerts the same effect in either process and raises the tensile 1,000 pounds. One one-hundredth per cent manganese in low carbon acid steel raises the tensile 80 pounds and 130 pounds in basic, but the condition is reversed when the carbon is high and then the manganese raises the tensile by 400 pounds per 1/100 per cent in acid and only 250 pounds in basic. The effect of sulphur is very small.

As regards the tonnage production of steel we find that the most remarkable increase is in open-hearth steel. In 1917 the increased production of open-hearth steel over 1907 was over 200 per cent, and the total reached the impressive figure of 34,148,893 tons, or three times the production of 10 years ago.

The total production of open-hearth and Bessemer steel in 1896 was 5,250,000 tons, while in 1906 it was about 23,000,000, and in 1916 42,500,000 tons. In 1896 25 per cent of all steel produced was open-hearth and 75 per cent Bessemer, while in 1917 there was three and one-half times as much open-hearth steel made as there was Bessemer.

One must not imagine from these figures that the production of Bessemer is declining materially. The facts are that Bessemer pro¬ duction is about at a standstill while the gain is in the making of open-hearth steel. The basic open-hearth process has made much more rapid gains than the acid. In 1917 about one-sixteenth of the open-hearth steel was of acid manufacture. Nevertheless that was the biggest year by a considerable margin the country has ever had in the manufacture of acid steel.

Bessemer steel still holds its own to a con¬ siderable extent for rails, although open- hearth steel is making great progress in this direction and is more largely used than Besse¬ mer for ordinary structural purposes. Of the Bessemer steel made in the United States every bit is acid. Of the acid open-hearth steel produced in the country the larger part is used in the form of castings, rather than in the manufacture of ingots for rolling.

Electric processes, which represent the latest development in the steel industry, are not an important factor yet, so far as tonnage is con¬ cerned, but they have already outstripped the production of crucible steel, and in fact in 1917 the production of electric steel was more than double that of crucible.

The total production in the United States of steel ingots and castings by all processes in 1917 exceeded 45,000,000 gross tons, which is almost exactly double the production of 10 years ago.

Bibliography. — Brough, (The Early Use of Iron) (in iron and Steel Magazine, Vol. XI, p. 417, 1906) ; Campbell, H. H.,(Manufacture and Properties of Iron and SteeP (4th ed., New York 1907); Casson, (The Romance of Steel and Iron) (in Munsey's Magazine, Vol. XXXV, 1906) ; Forsyth, R., (Blast Furnace> (New

York 1908) ; Harbord and Hall, Metallurgy of

SteeP (4th ed., London 1911); Howe, H. M., (Metallurgy of SteeP (New York 1908) ; Stoughton, B., Metallurgy of Iron and SteeP (New York 1908) ; Swank, Uron in All Ages) (Philadelphia 1884) ; Tiemann, H. P.,(Iron and Steel: A Pocket Encyclopedia) (New York, current) ; the volumes of the Journal of the Iron and Steel Institute; of the Iron Age (New York); of the Iron Trades Review (Cleveland) and the Bulletins of the American Institute of Mining Engineers (New York).

John Alexander Mathews, President, Halcomb Steel Company, Syracuse,

STEEL, HEAT TREATMENT OF. The

physical structure of steel may and does vary to a marked degree according to the heat treatment that it has undergone ; and that the strength, toughness and general usefulness of a struc¬ tural member of steel may be largely controlled by the way in which it is subjected to the action of heat. Formerly it was assumed that phos¬ phorus gives brittleness, that sulphur makes the metal red-short, and that the other properties are almost entirely dependent upon the per¬ centage of carbon present. With the introduc¬ tion of the microscope and modern methods of metallography in the study of steel and other alloys, it has been found that the structure and the properties of the material may be largely modified without any change whatever in the chemical composition, and as a conse¬ quence some very practical lessons have been learned. When steel of a coarse structure, but not necessarily brittle, is heated to a certain temperature and is then allowed to cool in air, or is quenched in oil or in water, the original structure is destroyed and is replaced by one of a very fine-grained character. Pure iron, when so coarsely crystalline as to resemble cast zinc, may be restored to excellent qualities by simply heating it to a certain temperature (known as the <(critical point") ; its subsequent structure resembling that which it possessed when it originally left the

rolls. The old idea of the process of annealing was to reheat the material to a high temperature, and then to hold it for a time at that temperature, and subsequently to cause it to cool very slowly; but later researches showed that the temperature of reheating must not exceed 1,650° F., and that the time of cooling has little or no influence upon the result. It is altogether unnecessary to reheat and re¬ forge the specimen, and, in fact, the material is apt to be still further injured by such a proc¬ ess. Since almost any piece of structural steel is liable to be rendered more or less crystalline during the operations through which it is neces¬ sarily passed, it is most desirable that the proc¬ ess of restoration be made a regular portion of the routine of manufacture. To permit this it is only necessary that proper furnaces be de¬ signed to admit the large pieces, and to permit a uniform temperature to be maintained in all parts, reliable pyrometers being of course pro¬ vided so that the correct temperature may be maintained. The operation may then be per¬ formed upon every piece as the final stage in its manufacture. The result is elimination of danger of accident from weakness by crystalli¬ zation. The microscope indicates that heating at high temperatures causes a great develop¬ ment in the size of the crystalline grains, and

that reheating to about 1,600° F. restores the original structure, or yields an even better one. A structural steel, although good in its normal rolled or forged condition, may easily de¬ teriorate by being heated to a temperature a little above that to which steel is most com¬ monly heated, previously to being rolled or forged. Steel that is made brittle by such heat¬ ing, or dangerously brittle by exposure to con¬ siderably higher temperatures, can be com¬ pletely restored to the best possible condition without remelting and without forging down to a smaller size. Practically all of the ex¬ perimental results show, not only that the original good qualities of normally rolled steel can be restored after the material has been made brittle by the exceedingly simple expe¬ dient of heating to about 1,600° F. for a very short time, but also that the steel may even be made better than it was originally.

It was long ago noted that the influence of thermal treatment increases rapidly with the carbon content of steel. In one of Howe's experiments with a muffle the following varia¬ tions were shown :

STEEL OF

0.035 carbon . j

l

(

1. 70 carbon and .68 Mn |

1

0.92 carbon and .240 Mn |

l

Elastic

Tensile strength limit lbs.

per sq.

in.

per sq. in.

750° C.

28,353

19,948

1,100° C.

28,657

18,130

1,300° C.

28,529

12,142

1,400° C.

30,064

11,483

750° C.

82 , 660

40,062

1,100° C.

92 , 342

59,363

1,300° C.

48,921

29,247

1 , 400° C.

41,327

33,082

750° C.

81,087

34,710

1 , 100° C.

109,586

39,226

1,300° C.

106,913

33,992

1,400° C.

64,189

42,008

A yet higher carbon with less manganese yielded less tensile strength than the ((0.92 car¬ bon and .240 Mn,® but a higher elastic limit. It will be noted that generally the best result was obtained by cooling from 1,100° C. These experiments were made in a closed muffle, with both slow heating and slow cooling. The elastic limit reaches a minimum at about 720° C., then rises rapidly on heating to temperatures of 750° to 850°, and then decreases steadily. The slower the cooling the lower elastic limit is to be expected. In the matter of elongation it has been found that with 0.50 per cent of car¬ bon, as the initial temperature (for slow cool¬ ing) is raised, the elongation decreases moder¬ ately up to 1,200° or 1,300°. With higher initial temperature the elongation decreases rapidly. In the matter of tensile strength it is noted that the increase is more marked when cooling is done in the open air than in the muffle. With rapid cooling hardness and brittleness increase, without much reference to the initial temperature of cooling, so that the steel maker always has to consider his product from several different angles. If the steel is low in carbon it will be little affected by heat treatment, but if high in carbon the heat treat¬ ment is all important.

STEEL, MANUFACTURE OF CRUCI¬ BLE. Crucible steel is so called because the ingredients from which it is made are melted in crucibles or pots. The name to¬ day is almost synonymous with <(tool steel®
—

meaning a steel containing at least one- half per cent of carbon, which will, there¬ fore harden materially when plunged at a bright red heat into water or oil. Steel of lower carbon than this may be made in crucibles for especial purposes when hardness is not the chief quality desired. For example, steel cast¬ ings are frequently made of crucible steel. The quantity actually so used in this country is only a few thousand tons per annum.

The practice of hardening steel is of great antiquity and is referred to by the early Roman and Greek writers. The ancient Egyptians heated iron, in some cases possibly of meteoric origin, in the forge until, by long contact with the fuel, it absorbed enough carbon to impart considerable surface hardening when quenched. The difference between oil and water hardening is referred to by Lucretius who says : <(The finest tools are tempered in oil, which gives a more durable hardness than that imparted by water.®

The fact that iron heated in contact with carbon absorbs some of that element, which renders it harder, seems to have been known for many centuries and prior to Huntsman's invention, in 1740, all steel for tools was made by the process of cementation. Especially in Austria and England the art and industry of converting pure wrought iron into cement- or blister-bar flourished, by which, as French says : <(A steel was obtained which had uncertain per¬ centages of carbon, higher on the outside than on the inside, and varying in hardness from one end to the other, according as the bar came in contact in the converting furnace, with more or less of the carburizing material, or a higher or lower degree of heat.® It was to overcome this lack of uniformity that so-called <(single® and <(double-shear® were made, but Huntsman conceived the idea of melting the cemented-bar in crucibles, thus rendering it absolutely homo¬ geneous and of uniform carbon contents throughout the mass. As first carried out, the melted steel was allowed to cool in the crucible, which was then broken away and the resulting mass was used as an ingot. About a century ago Mushet patented the production of steel made in the crucible by melting together soft bar iron and a certain amount of carbonaceous matter. This process did not amount to much until 1839, when Heath patented the use of man¬ ganese as an essential addition to crucible steel. In America the Mushet-Heath process of melt¬ ing together in crucibles soft bar-iron, with or without a certain percentage of steel scrap, charcoal and oxide of manganese, spiegeleisen or ferromanganese is more generally employed than the original Huntsman process of melting cemented or blister-bar. It has been said of Huntsman's invention that, — (<The invention of cast-steel was second in importance to no pre¬ vious event in the world's history, unless it may have been the invention of printing.® Hunts¬ man's process was rapidly adopted and at the time of his death there were several firms melt¬ ing steel, and possibly 500 individuals and firms making files, edge-tools, etc., in Sheffield, — famous for its ((thwytles® since Chaucer's day. Among these names appeared Spencer, Jessop, Sanderson, Parkin, Turner, Hobson and Rogers and these same names appear to-day in con-

nection with both English and American cru¬ cible steel works.

The Materials. — The base used for cruci¬ ble steel is usually wrought iron. England, Ger¬ many and America draw on Sweden for the more expensive grades, and by many it is be¬ lieved that Swedish materials

possess some mysterious virtues not afforded by other irons, regardless of what the results of chemical analysis show. The Swedish irons are all made from charcoal pig iron and are refined by the Lancashire or Walloon processes. Some have claimed that these irons contain traces of vana¬ dium and that to this they owe their virtue. They usually contain small amounts of manga¬ nese, while ordinary puddled irons are nearly free from this element. To the writer this seems more important than a possible trace of vanadium. A careful investigation of products made from Swedish and American irons of the same analysis has revealed absolutely no differ¬ ence in the quality of the product, chemically, physically or by practical test in tools of divers sorts. Certain it is that rarely does Sheffield tool steel show as great purity as regards sul¬ phur and phosphorus as is seen in the product of American mills. In America, while Swedish iron is still used to some extent, it has been replaced by selected open hearth bar and by the purer product of the puddling furnace. This com¬ monly carries less than one-hundredth of 1 per cent of sulphur and phosphorus, and also contains much less copper than the Swedish irons.

In German and English tool-steels a com¬ bined percentage not exceeding 0.06 per cent of sulphur, phosphorus and copper is considered first class, while in America this combined per¬ centage is about one-half as much and would not be expected to exceed 0.04 per cent in the best product.

Swedish bar or puddled bar may be and is melted directly or it may be first carburized by the cementation process. Cemented bar is used more largely abroad than in America. For the purpose of adding carbon, when the cemented bar is not used, it is customary to use either a pure Swedish charcoal pig iron or the American product known as ˆwashed-metaL* Both carry about 4 per cent carbon and are low in sulphur and phosphorus, but the former carries rather variable quantities of silicon and manganese, from which washed metal is nearly free. This is an advantage in favor of the Swedish pig, if the silicon and manganese can be maintained fairly uniform and not excessive in amount. In some cases all the carburizing in the crucible charge is effected by means of charcoal. Small quantities of oxide of man¬ ganese or ferro-manganese are usually em¬ ployed, and for special steels metallic nickel, manganese), tungsten, chromium, or molyb¬ denum or their ferro-alloys are employed.

Crucibles. — In England, clay crucibles are almost exclusively used. They are nearly al¬ ways made in connection with the works using them, the mixing usually being done by men who tread the clay with

their bare feet. Little or no machinery is used in their production. The mixed ingredients are made into balls of suitable weight and these are dropped into a mold and a plug shaped like the inside of a crucible is driven in, forcing the clay up into VOL 25 — 37

the mold and around the plug, which is then withdrawn and the crucible removed from the mold and dried for several weeks. Before using, it is ˆannealedˆ or baked and is always filled while hot. The crucibles last only about three heats, carrying 60 pounds at the first heat and a less amount on each subsequent charge. This is because the metal attacks and weakens the crucible at the slag line and hence the level of the metal is lowered in the pot on each suc¬ ceeding heat.

Graphite crucibles are generally used in Ger¬ many, Austria and the United States. These according to analysis, quoted by Howe, may contain from 20 to 83 per cent of graphite, about 50 per cent being commonly used in America. The best Ceylon graphite should be used. Arti¬ ficial graphite made in electrical furnaces is unsuitable for crucibles because of its granu¬ lar rather than lamellar structure. With the graphite is used either clay or a mixture of clay and old crucibles finely ground. It is also cus¬ tomary to use a little coke dust in making clay crucibles. Graphite crucibles are much larger than clay ones and will carry the customary 90 to 100-pound charge from 5 to 10 heats. They will stand much abuse, especially in the way of sudden changes of temperature, and need not be filled hot each time. Indeed, it is quite cus¬ tomary to allow them to cool off completely between heats, when they are cleaned and in¬ spected. Graphite crucibles cost from five to eight times as much as clay crucibles, but this disadvantage is more than offset by their greater endurance and the much greater produc¬ tion per crucible. The disadvantage frequently mentioned, that they impart variable amounts of carbon and silicon to the steel, is more fancied than real.

Furnaces and Fuel. — Several types of fur¬ naces have been employed for crucible steel melting, but such steel for tool purposes is nearly always melted in shaft furnaces using coke as fuel or in Siemens regenerative fur¬ naces using gaseous fuel, — either producer or natural gas. The latter is almost exclusively used in the Pittsburgh district and seems to be the ideal fuel because of its uniformity of com¬ position and its freedom from sulphur. In ad¬ dition to these fuels, anthracite has been employed to a limited extent in a special form of shaft furnace, somewhat resembling the coke-holes or furnaces. They differ in this, however, that they require forced draft and to provide this the ash-pit is enclosed and air is driven into it and thence through the bed of anthracite on the grate by means of a fan

blower. Waste heat from anthracite furnaces may be used for heating steam boilers. Petro¬ leum has been used for fuel in the Nobel fur¬ nace for melting crucible steel for castings, as in the Mitis process. We now hear little of anthracite or petroleum for crucible steel melt¬ ing, and the writer is not aware that either of these fuels is actually being used in America at the present time.

The Sheffield coke-holes or shaft-melting furnaces hold only two crucibles each, and they are not run at night. The furnace itself con¬ sists of an oval chamber about three feet deep to the grate bars and a foot and a half to two feet in section. These holes are arranged around one or more sides of the melting-house.

Their cover-bricks are just above the floor level. The melting holes are connected either to sepa¬ rate flues, some half dozen of them being united to form one large chimney, or else the indi¬ vidual flues may be united in a large common flue and stack. The draft is roughly regulated by inserting bricks in the flues. Beneath the furnaces there is always a large ash pit and cel¬ lar. In Sheffield the crucibles, after air-drying and annealing, are put into the furnace and well packed around with coke, and the materials to be melted are charged into the red hot crucible through a sheet iron funnel. The crucible rests on a stand and this in turn is supported on the grate bars. The charging being ended, a cover is placed on the crucible, the fire is urged and during the operation the coke must be replen¬ ished at least twice. Three heats from a cru¬ cible constitute a day's work and require about 12 hours' time, and three heats, also, is about the life of the crucible.

The regenerative gas furnace, which is used exclusively in the United States, has never been popular in England, although it is much more economical as regards fuel consumption. Nu¬ merous reasons have been given to explain why it is not used in Sheffield. Strangely enough it has been stated that gas fires are not under such good control as coke fires, or again, that the entire crucible and its contents are not heated to a uniform temperature. Whatever weight these objections may have, it is interest¬ ing to note that whenever English capital has been invested in the crucible steel business in America, graphite crucibles and gas-fired regen¬ erative furnaces have been adopted without apparent hesitation.

The American furnace consists of from 2 to 10 melting holes in a row, and each hole will accommodate six crucibles at a time. Each hole is provided with three ports on either side through which the gas and air and the products of their combustion pass. The direction of flow of the gas and air is reversed about every IS minutes, in the way common to all Siemens regenerative furnaces. Beneath and at either side of the melting holes are the regenerative chambers, one for gas and one for air on each side. The chambers are filled with so-called checker work of brick, which takes up heat from the outcoming gases or imparts it to the entering gas and air. The furnace of Dawson, Robinson and Pope, which is said to be giving very good results at Jessop and Sons, Sheffield, differs from the American furnace in that all four regenerative chambers are on the same side of the melting holes, which have four ports each. The melting hole is curved or horse¬ shoe shaped on the side opposite the ports. The gas and air thus enter by two of the ports and rush around the curved outer edge of the fur¬ nace and down the other two ports. The six crucibles break and impede the passage of the flame and absorb its heat as it passes.

The melting holes have a layer of coke from six to eight inches deep in the bottom and on this rest the crucibles. The crucibles are usu¬ ally filled carefully by hand, while cold, and are set into the furnace. The crucibles are well adapted to stand this sudden change of tem¬ perature if they have been well baked and have been kept in a dry place prior to use. Unlike the coke furnace, the gas furnace is run con¬ tinuously, day and night, from Monday morning

to Saturday afternoon, from 33 to 36 heats con¬ stituting a week's work. These furnaces will last from eight months to a year or even longer before the holes need relining or the checker work needs replacing. Coke furnaces require relining about once a month. The first cost of a gas furnace is much greater than that of the coke furnace, but the crucibles are more readily accessible in them and they are much more economical of fuel. A ton of ordinary bitumi¬ nous coal, burned in a producer, will melt a ton of steel, while the coke shaft furnace requires about three tons of the more expensive coke to melt a ton of steel. Commenting on this phase of the subject, Harbord, the distinguished Eng¬ lish authority, says : ((The economy in fuel, ease with which gas can be regulated, freedom from clinkers on pots, offer so many advan¬ tages over the coke-hole, that notwithstanding past failures of gas furnaces, there seems every prospect of this or some similar gas-fired fur¬ nace being very largely adopted in crucible steel melting.® By the ((past failure of gas furnaces® Professor Harbord must refer to their failure of general adoption in England rather than in any real difficulty with the gas furnace itself as

compared with coke-holes or other furnaces. More crucible steel is melted in gas furnaces than in all other forms combined.

Melting. — The materials being charged into crucible the fire is urged in the case of coke or more gas is turned on in the case of Siemens furnaces, until at the end of about two or three hours the materials are melted. In the case of mixtures consisting of much high carbon scrap, pig iron or cemented bar the melting takes place more quickly than with mixtures consisting largely of puddled iron and charcoal. When the melter thinks the contents are about melted, the cover of the crucible is raised and the contents examined by the melter who prods about in the crucible with a Long iron rod to de¬ tect unmelted pieces. The melting of large pieces of steel scrap takes place in a rather un¬ expected fashion, — the inside seems to melt first and to run out, leaving a shell looking exactly like the original piece, floating around on top of the metal.

After the materials are <(clear melted,® the heating is continued for an extra half hour or more and this is known as the (<killing® heat. If the metal were poured into the ingot molds immediately after melting, unsound and spongy ingots would result. . During the killing some silicon is taken up from the walls of the cru¬ cible by the metal and this seems to assist in making sound castings. Then, also, the oxide of iron which is present in the metal has a chance to react with the carbon in the steel or in the walls of the pot and is thus reduced to metal¬ lic iron, while oxides of carbon are formed and eliminated. Steel that has been given sufficient killing, if cast in open molds and allowed to cool spontaneously, would be quite free from blow holes, but would be deeply piped. In actual practice means are employed to elimi¬ nate the pipe, and the ingots are perfectly sound from top to bottom. The tendency to eliminate gas during solidification is offset in varying degree by silicon, manganese and alumi¬ num.

The Ingots. — The crucibles, after the killing heat, are withdrawn from the furnaces and

STEEL INDUSTRY

Copyright, Underwood & Underwood, N. Y. Copyright, Underwood & Underwood, N. Y.

Making pipe molds in the great steel plant at Encloy, near Birmingham, Ala. 2 Huge electric magnets stacking street rails at one of the big mills near Pittsburgh

STEEL INDUSTRY

Tapping open hearth

■

.

. *

.

•

the small quantity of flux or slag always present is ˆmopped' *off. The metal is then poured or ˆteemed'* into molds. The molds are of cast iron and usually in two parts, held together by rings and wedges. Before use, the molds are smoked with resin. When it is desired to make large ingots, the product of any number of crucibles is cast into one mold. Until quite recent years large castings for ordnance, ar¬ mor and projectiles were made of crucible steel. The Krupp works continued this prac¬ tice longer than the leading English and Ameri¬ can works. Crucible steel ingots weighing 30 tons and above and requiring over 1,000 crucibles of metal have been made. It is now 25 years since the general use of crucible steel for heavy ordnance, shafting, cranks, etc., ceased, though some is still used for these re¬ quirements.

Grading the Ingots. — The quality of steel depends upon the method of manufacture, the analysis and the method of handling. Even when of almost identical analysis, crucible steel takes first rank for quality with electric steel a very close second, open-hearth steel stands third and to Bessemer must be assigned last place. The exact reason why this is so is not known definitely, but the fact is generally admitted. The quality of crucible steel depends upon the nature of the raw materials entering into the crucible mixture. In general, the lower the percentages of sulphur and phosphorus the better the steel, and the higher the carbon the more pernicious is the effect of these unwel¬ come metalloids. The degree of carburization is generally referred to as the ˆtemper® of an ingot. In a works making hundreds or even thousands of small ingots per day it would manifestly be impossible to

analyze each ingot for carbon. Fortunately, this is not necessary. Very small differences in carbon so change the fracture or crystallization of the ingot that the skilled inspector can detect by the eye differ¬ ences of carbon not greater than one-twentieth of 1 per cent, within the limits of carbon most used for tool steel, say, 0.90 per cent to 1.40 per cent carbon. The presence of large amounts of tungsten, chromium, molybdenum and other alloying metals interferes with or precludes entirely the estimation (of carbon by the eye. Other elements being within the usual limits, e.g., silicon and manganese from 0.10 per cent to 0.25 per cent and sulphur and phosphorus from 0.01 to 0.025 per cent the percentage of carbon is the most important factor in determining the suitability of any steel for a given purpose. According to Thallner, steel containing upward of 1.5 per cent carbon may be called very hard and is suit¬ able for turning and planing knives, drills, razors, etc. Hard steel of 1.25 per cent carbon is suited for ordinary turning and planing knives for use on materials of medium hard¬ ness, also for rock drills, scrapers, cutters, etc. Medium hard steel of 1.0 per cent carbon is suitable for screw taps, coining dies, chisels, punches, etc. Thallner calls steel of 0.85 per cent carhon tenaciously hard, and recommends it for screw-taps, cutters, broaches, matrices, swages, pins, bearings, chisels, gouges, etc. Steel of 0.75 per cent carbon is tough and suited to tools requiring rough handling, ham¬ mers, shear blades, drifts, springs, cupping tools

and certain kinds of needles. Soft tool steel is rather a misnomer, but the term is used in a relative sense, and applied to steel of about 0.65 per cent carbon, for blacksmith's tools, bolts and for welding to harder steel to stiffen and toughen it. No arbitrary list of this kind can fit all cases. In general, the crucible steel business is one involving a tremendous amount of detail, care and watchfulness. The tem¬ perature of the metal must be carefully guarded and controlled at every step — melting, welding, cogging, rolling or hammering, and when the steel reaches the customer equal care is re¬ quired to forge, to harden and to temper the finished tool. The proper selection and blend¬ ing of raw materials or the choice of the proper quality and carbon for a given use, and its successful fabrication may not be learned from books or acquired in a day, but are a legitimate part of the stock in trade of Bohler, in Styria; Jessop or Huntsman, in Eng¬ land; Sanderson or Halcomb, in America, and other firms with established reputations.

Bibliography. — Harbord and Hall, Metal¬ lurgy of Steel *(4th ed., London 1911) ; Howe, H. M., Metallurgy of Steel* (pp. 296-315, New York 1908) ; Mathews and Stagg, fac¬ tors in Hardening Tool Steel, *in Transactions of the American Institute of Mechanical En¬ gineers (Vol.*

XXXVI, p. 845, New York 1914) ; Stoughton, B., Metallurgy of Iron and Steel (New York 1908) ; Tiemann, H. P., (Iron and Steel: A Pocket Encyclopedia* (New York, current).

John Alexander Mathews, President, Halcomb Steel Company, Syracuse, N. Y.

STEEL, OPEN HEARTH MANUFAC¬ TURE. The process of producing steel of this class derives its name from the type of furnace used — an open hearth. In European practice the process is known as the Siemens- Martin, receiving its name because of being originated, developed and perfected by two eminent and early metallurgists (1864-67). The process is conducted either in an acid or basic furnace depending upon the character of the raw material treated.

There are several divisions of the process. The original plan was to treat a charge of all pig-iron with the assistance of iron ore to con¬ vert into steel. Later a modification was intro¬ duced wherein pig-iron and steel or wrought- iron scrap were melted together and subse¬ quently refined to steel. The first named con¬ stituted the Siemens process and the second the Siemens-Martin. To-day the essentials of both processes remain, but modifications have been introduced from time to time. The Monell process, conducted in an open hearth furnace with a basic lining, consists of a charge of molten pig-iron to which certain quantities of iron ore and lime are added which fuse to form a slag and which slag flows out of the furnace at a point above the surface of the molten metal, thus carrying with it certain impurities in the charge of metal it is desired to remove. The ore and lime are added at certain intervals to make the overflow of slag continuous until the desired stage of purification is reached.

Next in importance is the Talbot process, also conducted in a basic lined open hearth steel

furnace. The furnace for this process is of movable type and is so constructed that the body can be tilted forward to discharge the bath of metal through an opening placed at the level of the bath, or it can be moved in the opposite direction to pour out of suitable openings placed at a higher point greater or less quanti¬ ties of the slag. The process is a continuous one. A full charge of metal — about 200 tons — which may consist of molten pig-iron direct from the blast furnace,

or a mixture of pig- iron and steel scrap is treated by additions of iron ore and lime until proper pre-determined conditions are reached by slag action. At that stage the bulk of the slag is poured off and about one-third of the refined charge is with¬ drawn into a ladle allowing the balance to re¬ main in the furnace. The steel in the ladle is recarburized and teemed into the ingot molds and an additional charge of impure molten pig-iron is poured into the furnace in sufficient quantity to bring the contents up to the initial charge. The remaining slag is then removed by tilting the furnace, a fresh slag made by ore and lime and the refining operation repeated. In the second treatment, however, the interval of time is considerably reduced because the residue of refined metal from the initial charge greatly dilutes the succeeding addition of molten impure stock and so making a smaller total of objectionable elements to remove by slag action. Under normal conditions the furnace is never empty excepting at week ends when incidental repairs are made. In Siemens-Martin open- hearth practice the furnace is emptied com¬ pletely at the end of each heat. It is then patched up, as may be necessary and recharged.

Another process of recognized importance is the Bertrand-Thiel process. It is used in Eu¬ rope to some extent. Two open-hearth furnaces are used, one acid lined and another basic. One furnace may be placed at a higher level than the other so that the charge treated in the upper furnace can be tapped directly by gravity into the one below. Or the furnaces may be placed at the same level and the charge transference from one to the other be accom-

Elevation Through Open Hearth Furnace, Showing Charger and Locomotive Casting Crane.

plished by ladles. In the Hoesch modification of this process only one furnace is employed, the metal being temporarily transferred to a ladle while the basic lining is being spread, when it is returned for final treatment The principle of the process is that a charge of impure stock is first treated in an acid-lined furnace to greatly lessen by nearly full re¬ moval certain elements objectionable to further

purification by the basic process, by which the metal is treated and fully refined in the sec¬ ond stage of the process. It is a combined acid and basic process whereby pig-iron is con¬ verted to steel and allows the use of stock so high in phosphorus and sulphur that it could not be successfully refined by either process singly. In the acid-lined furnace the charge of molten metal is desiliconized and partly de- carburized, but not desulphurized or dephos-

Fig. 1. — Plan and Elevation of Open Hearth Furnace Designed for Burning Producer Gas. — (1) Gas cham¬ ber; (2) air chamber; (3) ports; (4) melting chamber; (5) air up take; (6) gas up take; (7) base of reversing valves; (8) stack.

phorized, but when transferred after such treat¬ ment to a basic-lined furnace, either by gravity or ladle, the decarbonization, desulphurization and dephosphorization are completed to meet any requirements. In the United States and Canada the Bertrand-Thiel process has, to some extent, been modified by the introduction of the Duplex process, in which an acid Bessemer converter replaces the acid open-hearth furnace, the Bessemerizing effecting the same action practically in regard to silicon and carbon re¬ moval from the charge which is subsequently transferred to a basic open-hearth furnace for removal of ˆ the phosphorus and sulphur and further purification.

Construction of Furnaces. — The furnace is built on the regenerative principle. The waste heat of the spent gases from fuel con¬ sumption being absorbed and stored in the walls

and partitions of chambers placed below the furnace body and at each end of it, can be utilized for preheating the air necessary to promote complete combustion of the fuel. Without such preheating it is not possible to depend upon flame temperature alone for melt¬ ing and preserving the desired fluidity of the charge.

Reference to Figs. 1 and 2 will outline the general form of a stationary open-hearth fur¬ nace. The furnace body- or melting chamber is lined with high-grade refractory bricks. The whole is braced and supported by girders, tie rods and plates. In an open-hearth furnace for the production of acid steel, the roof, hearth sides and end walls are constructed of silica bricks. The roof is very thin and of the purest silica bricks set with a little lime. It is arched and suspended from above so as not to weigh upon the side walls. The regeneration chambers are lined with fire bricks. The bottom of the hearth is lined with 18 to 24 inches in depth of fire brick over which is spread about half an inch of silica sand, the surface being dished or so formed that the metal when leav-

Fig. 2. — Sectional Elevation of Open Hearth Furnace. (1) Spout; (2) gas port; (3) gas port; (4) air port; (5) hearth lining, sand for acid

melting, magnesite for basic melting; (6) charging platform; (7) regenerator chambers with checkers — dark markings spaces between bricks; (8) flues leading to stack and from gas and air valves; (9) charging door; (10) buckstays and tie rods.

ing the furnace through the tapping hole will flow and drain toward it. When a new furnace is ready to receive a charge the gradual pre¬ liminary heating up is of sufficient degree to harden the sand by slight fusion or sintering so that the hearth will preserve its shape and not be broken down by rough usage or attri¬ tion when receiving a charge of stock. In a furnace for the manufacture of basic steel, the roof walls, sides and end walls above the slag line are formed of silica bricks, but the hearth is lined in the pan with first quality fire¬ brick followed by bricks composed of mag¬ nesite, and at the junction of the silica bricks and the magnesite a neutral parting of chrome ore is placed to prevent fusion of the two kinds of bricks at furnace-working temperatures. The upper courses of magnesite bricks will stand about 6" to 8" above the slag line. In other particulars of brick-work the construction is the same in both classes of furnaces.

The various dimensions, areas and volumes of body, down-takes and regenerator chambers varv mainly with the capacity of the furnace in regard to tons per heˆt or operation. The

width of the furnace is usually between 12 and 15 feet and does not exceed 16 feet. The length and depth of hearth are not fixed, but the area of both closely follows certain val-

Fig. 3. — Arrangement of Furnace Port for Burning

Natural Gas.

ues per ton. The length and depth of regener¬ ator chambers will vary also, but the volumes as a rule closely follow standard figures per ton. Generally stated the following cover the various dimensions, etc. :

Hearth area, 9 sq. ft. per ton.

Chamber volume, 90 cu. ft. (J for gas, § for air, per ton.) Air port area, 16 sq. ft.

Ga,s port area, sq. ft.

Stack, diameter 4-5 ft., 100'-160' height.

Producer area, 3£ sq. ft. per ton.

Fuel.

Coal, 700 to 1,000 lbs. per ton.

Natural gas, 800 to 1,000 cu. ft. per ton.

Oil, 60 to 100 gals, per ton.

The following figures represent hearth meas urements for representative capacities :

Capacity

30 tons 50 tons 200 tons

Length x Width

27 x 10 ft.

34 x 13 ft.

40 x 16 ft.

Hearth Area

270 sq. ft. 438 sq. ft. 640 sq. ft.

The last item covers the dimensions of a Talbot furnace which has a deeper bath than other furnaces. The depth of bath varies from 12 inches for a very small furnace (5 to 15 tons) to 24 inches for a 50-ton furnace. The Talbot bath is over 36 inches deep.

Fuel and Accessories. — The choice of fuel varies with the location of plants. In and around Pittsburgh natural gas is extensively

used and is really the ideal fuel. It is not passed through the regenerator chambers but is fed directly into the furnace port (Fig. 3). It is uniform in composition, possesses the high¬ est calorific value and does not contaminate the bath. Next in heating value is crude petroleum or residuum, a by-product in the distillation of petroleum. Both have advantages in uniformity of composition and ease of control. Oil is pumped, under pressure, from storage tanks delivered to a suitable oil-burning device where it is atomized by compressed air

or steam be¬ fore ignition in the furnace (Figs. 4 and 5) The next preferable source of fuel is the gas producer (Fig. 6). In this apparatus bituminous coal is gasified and the gaseous matter conveyed through mains controlled by regulating valves (Fig. 7) before entering the regenerator cham¬ bers. The principle of operation is to force through a mass of incandescent carbon air and steam. On top of the glowing coals fresh fuel is regularly fed to keep the bed at a constant level. The bed must be frequently poked to

Fig. 4. — Oil Burner for Open Hearth Furnaces.

prevent holes forming, allowing air and steam to pass through un-decomposed. The bottom of the producer rests in a tank of water to pre¬ vent too much air from entering, since the air necessary to form a good working gas must be under control by compelling it to pass through the blower. The gas is apt to vary in composi¬ tion and is not always constant in volume. A ton of coal treated in a producer will give about 160,000 cubic feet of gas. The average com¬ position is as follows:

Carbon Monoxide . 27 per cent by volume

Carbon Di-Oxide . 5 per cent by volume

Hydrogen . 10 per cent by volume

Nitrogen, etc., by diff . 58 per cent by volume

CALORIFIC VALUE OF FUELS.

Per cu. ft.

Natural Gas . 900 to 1000 B. T. U.

Oil . 16-1700 B. T. U. lb. or 913.760 B. T. U.

Producer Gas . 130 to 140 B. T. U.

Furnace Operation — Acid Practice. — In

order to produce steel by any open-hearth proc¬ ess it is necessary that a certain amount of carbon be introduced with the metal to be con¬ verted. For that reason ordinary pig-iron which will contain 2.5 to 3.5 per cent of total carbon is required. The presence of carbon lowers the fusing point of iron and when charged in an open-hearth furnace it is comparatively easy to liquify the bath at an early stage of

the

process and maintain it to the end of the op¬ eration. Low-carbon stock, such as steel or wrought-iron scrap, cannot be used singly be¬ cause if exposed to flame action it would not fuse, but would be pasty and viscous, causing loss. The charge may be all pig-iron or a mixture of 20 per cent pig-iron and 80 per cent

m

LZ

Fig. 5. — Construction for Oil Burning Open Hearth Furnace. (Half Section at Centre). — (1) Opening for oil burner; (2) air port from regenerator chamber; (3) airport from regenerator chamber.

scrap. The usual American practice is 50 per cent of each.

The acid process is so-called from the char¬ acter of the hearth lining which is formed of nearly pure silica sand, a substance, chemically an ˆacid.® It is fairly refractory but must carry a small percentage of foreign elements to very slightly lower its fusing point. In forming the hearth, as has been mentioned, it must be hard to resist wear and at the same time be inert under strong actions within the bath of molten metal at high temperature. It has no affinity for sulphur and phosphorus, but will fuse with oxides of iron or manganese. For the latter reason care is taken with heat manipulation to prevent scorification of hearth by such oxides. Since specifications for finished material, such as boiler plates, structural ma¬ terial, etc., state that the sulphur and phos¬ phorus be kept below certain limits, the choice of raw material in regard to those elements is also subject to limits, and because of non-re¬ moval, in refining, whatever sulphur and phos¬ phorus may be present in the initial charge will appear in the finished product in like propor¬ tions.

Raw material for acid treatment is called <(Acid Stock,® and the following will represent average analysis :

Scrap Steel. — Sulphur, 0.04% or less; phosphorus, 0.04% or less.

Pig Iron. — Carbon, 2. -3. 5%; silicon, 0.50-1.5%; sulphur, 0.04% or less; phosphorus, 0.04% or less; manganese.

0.50-.75 %.

The figures on carbon, silicon and man¬ ganese for scrap are not

specified, because the scrap is always the result of some previous con¬ verting process and is, therefore, low in those elements. The shapes may be ingots, blooms, steel castings, tires, springs and rolling-mill waste. If scrap composes part of the charge it will be put in the furnace first followed by either molten pig-iron brought in a ladle direct from the blast furnace or iron in the forms of pigs. Before the iron addition some little

lime is allowed for the scrap to heat or partly melt. The chemical action is mainly a de¬ carbonizing one or rather an oxidizing one. The first elements to oxidize are silicon and manganese of the charge forming respectively silica (Si02) and manganese oxide (MnO) which fuse readily and unite to form part of the slag. The slag is mainly composed of Si02 and FeO. The FeO (ferrous oxide) being formed mainly in the melting of the scrap and the silica from sand carried in mechanically with the pig-iron and the oxidization of the silicon in the metals charged. The following analysis represents a normal acid open-hearth slag:

SiO . 52.00 per cent.

Mn02 . 17.50 per cent.

FeO . 28.50 per cent.

Under flame action the temperature of the bath is gradually increased mainly because the heat stored in the regenerator chambers and radiated to the air passing through them to support flame or fuel combustion increases the efficiency. The checkers nearly fill both sets of chambers and are formed of first quality fire bricks so placed that numerous passages three

Fig. 6. — Gas Producer. — (1) Coal hopper; (2) poke holes;

(3) steam pipe; (4) blower; (5) connection with gas main;

(6) water seated ash pan; (7) grate.

to three and cne-half inches square are formed both vertically and horizontally, thus offering very large areas for the waste gases to pass through and give up their heat to the numerous bricks. The temperature at which the furnace is operated ranges from 1600° to

1700° C. (2912° to 3092° F.). The waste gases leaving the furnace body are about 1100° to 1650° C. and after passing through the chambers should normally measure about 500° to 600° C. at the stack. At regular periods the course of the flame and gases are reversed so that while one set of chambers are giving up heat to the inflowing air or gas (producer only) the other is absorbing the heat from waste products of combustion. Without a careful regulation of fuel there would be danger of melting the brick¬ work in the furnace because with each reversal there is a constant increment of temperature carried into the furnace melting chamber.

The bath under increased temperature be¬ comes very liquid both in regard to the metal and slag. There is a lively action caused by the burning of the carbon and silicon which draws upon the oxygen in the slag and oxides dis¬ solved in the metal. To hasten the removal of carbon, iron ore is added from time to time which produces the following reaction :

Carbon

6 C.

•

Iron Ore 2 Fe203

Carbon

dioxide

= 3 C02

•

Iron

4 Fe.

(1) c.

(2) FeO

•

or

Fe203 = CO.

•

2 FeO

•

C.

= CO.

•

Fe.

The reduced metallic iron entering the bath, adding to the yield of metal while the gaseous carbon bubbling through the bath keeps it mov¬ ing and so promotes homogeneity, an advan¬ tage in favor of any open-hearth process. When the carbon removal has been completed or has proceeded to any desired point, as indicated by the fractured appearance of test pieces taken at intervals, the metal is tapped out of the furnace by breaking open with an iron bar the tapping hole previously closed, before charg¬ ing with some suitable refractory material. While the metal is flowing into a preheated

Arrows show direction of intake and outgoing gases. Arrow to left indicates: “ To furnace through regenerator chambers.” Arrows to right indicate: ” From furnace through regenerator chambers to stack.”

clay-lined ladle measured quantities of either spiegeleisen or ferro-manganese are added which have a cleansing effect upon the steel and performs the function of recarburizing it. They are alloys of iron and manganese each carrying respectively 20 per cent and 80 per cent of manganese with about 5.5 to 6.0 per cent of carbon. It is possible to stop the re¬ fining process at any stage, and by using varying quantities of the substances just named known as deoxidizers or recarburizers, there is offered a possibility of producing numerous grades of steel. Without any additions of manganese at the end of an open-hearth operation the metal would be charged with oxides which would in¬ terfere with its rolling properties. The action of manganese is to liberate such oxides by making them readily fusible, when they float upward and mingle with the slag above the metal. Metal not well deoxidized is likely to

crumble or crack when forged, rolled, ham¬ mered or welded.

After the steel is tapped into the ladle and from that into ingot molds (Fig. 8) they are stripped therefrom when the metal has solidi¬ fied and the ingots are reheated and rolled out into various shapes.

Fig. 8. — General Arrangement of Molds When Cast¬ ing Ingots With Bottom Pouring Ladle.

Basic Practice. — To successfully conduct the basic open-hearth process it is necessary to have a hearth lined with such material that will withstand the action of slags highly charged with lime. The presence of lime in moderate or excessive quantities in an acid furnace would be fatal to the hearth because of the strong fluxing action between silica and lime when brought together at high temperature. A basic lining in general practice consists of calcined magnesite, a substance carrying a high percent¬ age of magnesia. In furnace construction it is ground and mixed with about 10 per cent of anhydrous tar, then rammed in and shaped to the sloping form. At the beginning of the heating of the furnace the tar is carbonized into a solid cinder. It can also be mixed with pulverized basic slag which assists the sintering and hardening effect. A hearth of magnesite so formed is practically inert under the action of a limey slag, but will fuse or cut if siliceous matter should be present excessively. The life of a magnesite hearth is practically indefinite. With a hearth of basic and refractory material, such as magnesite, there is offered an oppor¬ tunity to treat a charge of such stock carrying a high content of elements not removed in an acid hearth; namely, pig-iron with 1.00 per cent of phosphorus and 0.07 per cent of sulphur is easily treated, so that 95 per cent of the phosphorus and 75 per cent of the initial sul¬ phur can be removed by the action of the slag, consisting largely of lime and iron oxide. The only element that is objectionable is silicon and basic stock or raw material is selected with amounts of silicon not exceeding 1 per cent. To get a slag of the necessary dephosphorizing and desulphurizing activity 10 to 15 per cent of the charge is made up of limestone of a pure variety with ore added from time to time. Sili¬ con under the oxidizing action of flame and additions of iron ore to the bath of liquid metal, will be converted to silica and combine with the lime of the slag and if excessive rob it of its power to absorb phosphorus and sul¬ phur. The details of charging are the same as in acid melting excepting that a charge is best

made up of 50 per cent of pig and 50 per cent of scrap, when scrap is used, or the charge may be all direct molten metal. It is desirable to use scrap moderately because it is easier to promote liquation with a

higher carbon content initially.

The layer of supernatant slag is thick in a basic heat and more heat units are required to penetrate it than an acid slag. For that reason the fuel consumption per ton is greater in the basic process.

The flame manipulation is the same as in acid melting as is also the carbon oxidization by the action of iron ore. The details of re¬ carburizing are followed as in acid practice. During the progress of the heat samples are frequently taken which, in addition to being studied for the carbon content, are also tested to determine how far the dephosphorizing ac¬ tion has gone. The heat is not tapped until its removal is complete or only a few thousandths of 1 per cent remain. There is some tendency on the part of the phosphorus to revert to the metal after it has been tapped into the ladle. The amount given up by the slag at that stage varies directly with the quantity of phos¬ phorus charged initially. But with proper slag' conditions and care in stock selection the re¬ absorption of phosphorus is not excessive. Be¬ ginning with pig-iron carrying 1 per cent of phosphorus and an equal amount of scrap with not more than 0.1 per cent a heat of basic steel can be produced to equal in analysis acid finished material.

When the furnace is emptied after an op¬ eration some unavoidable cutting of the hearth at the slag line is patched with basic material of a cheap kind, usually dolomite, a double car¬ bonate of lime and magnesia. There is not, under normal conditions, any cutting of the hearth below the slag line since the function of the hearth is only a refractory one playing no part in the purification of stock, that function being effected only by the calcareous.

While there is little difference in the physi¬ cal qualities of acid and basic steels, engineers are accustomed to specify acid steel for most structural work.

In a 30-ton furnace it is possible to produce 18 heats per week of six working days. In a 50-ton furnace 12 heats per week is an aver¬ age, either on acid or basic practice.

Steel Castings. — For marine, locomotive, freight and passenger car, electrical and gen¬ eral machinery construction it is important to have certain parts of great strength and elas¬ ticity. For such purposes steel-castings are pre¬ ferred to gray-iron castings. In the United States the industry is increasing rapidly. The sources of supply are mainly divided between acid and basic open-hearth steel with moderate productions by small Bessemer, crucible and electric

processes.

During the year 1914 the total production was as follows :

Acid open hearth castings . 228,742 tons

Basic open hearth castings . 301,206 tons

Bessemer (Tropenas) castings, etc . 43,437 tons

Crucible castings, etc . 8,920 tons

Electric castings . 6,386 tons

Open-hearth castings generally enter into heavy parts weighing several hundredweights

to tons or more each, but do not enter into parts weighing a few pounds. For lighter parts the Bessemer and crucible processes fill a special field.

So far as equality and reliability of output is concerned in open-hearth castings there is no choice between acid and basic steel. In the early history of the processes (open hearth) the acid held sway, but with the development of the basic process it has largely met the grow¬ ing demand for steel castings in spite of the fact that at first basic steel was more uncertain in its qualities.

For the production of open-hearth castings the details of construction and operation are essentially the same as for ingot practice. The main differences are that direct molten metal is not used, the charges being made up of cold, raw material (pig-iron and scrap). The sizes of furnaces vary from 10 to 25 tons per heat.

In the manufacture of steel castings prob¬ lems are encountered which are unknown in ingot practice. It is comparatively simple to pour liquid steel into such receptacles as ingot molds but when pouring it into sand molds de¬ signed to cast shapes more or less intricate with various thicknesses of metal, greater or lesser length and irregularities of section than is found in the plain columnar lines of ingots the complexities become quite numerous. It is necessary that the steel be more fluid and hence hotter. This condition is secured by

starting with a siliceous iron. The common difficulties encountered are lack of solidity, liability of the castings to crack or separate when cooling, particularly in complicated designs where there may be different rates of cooling in sections of unequal thickness. These difficulties are not insurmountable, but their avoidance calls for constant care and watchfulness and a high de¬ gree in skill in keeping conditions regular and uniform in the furnace melting practice and also in the molding and coring of designs.

For molding purposes a high-grade silica sand is preferred, one that is highly refractory and that will not fuse at the temperature of liquid steel — about 1600° C. An impure sand will stick to steel castings and make rough unsightly surfaces. The sand must be of such a formation that there will be voids between the grains to permit a free escape of the gases formed within the mold when the hot steel is poured into it. Silica sand is devoid of any bond, and, to allow it to retain the form of the pattern after the sand is rammed around F and the pattern withdrawn, a small amount of plastic fire clay is added to the sand with a little water, followed by thorough niixing to furnish the necessary bond or stability to the molding mass. Sometimes a mold is baked, or it may be used without any drying. The first is known as <(dry sand® and the other a “green sand® practice.

When the mold is filled with the liquid steel

the molding mass under the high temperature disintegrates or loosens and should allow a free movement of the casting which contracts when . cooling. Should there be a resistance to such a movement in cooling the casting will be liable to crack at points when the resist¬ ance and stresses are the greatest.

To promote solidity in steel castings it is the practice to add at the end of the refining and decarburizing operation certain amounts of ferro-silicon and ferro-manganese. The former may carry from 10 to 50 per cent of silicon and the latter usually about 80 per cent manganese. The combined action of the alloys is to thoroughly deoxidize the steel by uniting with the dissolved oxides, flux them so that they become separated from the liquid steel and enter the slag on top of the bath of metal and restore to the steel the desired percentage of carbon. Were the oxides not removed there would continue, so long as the metal remained liquid, a reaction between them and the small quantity of carbon always present in a bath of liquid steel, so that there would result a forma¬ tion of gaseous carbon. Without a stoppage of that action the metal, if fractured when cool, would be found to be more or less honeycombed — an undesirable condition in any casting.

The value of a steel casting, physically con¬ sidered, depends upon its elasticity, toughness and ability to resist heavy duty. The elasticity is controlled by the carbon content of the fin¬ ished casting and that will vary with the re¬ quirements of its service. Steel castings are divided into three grades: Soft, medium and hard. Standard specifications give the follow¬ ing figures as the physical properties :

Soft Medium Hard

Tensile strength lbs. per sq. in. . . 60,000 70,000 85,000

Yield point (elastic limit) lbs.

per sq. in . 27,000 31,500 38,250

Elongation per cent, in two in. . . 22 18 15

Contraction of area per cent . 30 25 20

Approximately the following will represent the ranges of chemical composition for the fore¬ going :

Soft Medium Hard

Carbon, per cent. . . 0.17 -0.20 0.20 -0.30 0.30 -0.40

Silicon, per cent .. . 0.25 -0.35 0.25 -0.35 0.25 -0.35

Sulphur, per cent . . 0.015-0.05 0.015-0.05 0.015-0.05

Phosphorus, per

cent . 0.02 -0.04 0.02 -0.04 0.02 -0.04

Manganese, per

cent . 0.50 -0.75 0.50 -0.75 0.75 -1 00

In order to increase the ductility of castings, the ability to resist shock or impact without fracture, they are subjected to an annealing process, which treatment consists of a careful heating to a temperature that releases original cooling stresses and refines the grain of the metal. In a steel casting cooled from casting temperature there is a tendency of the crystals to become enlarged and with that condition the metal may be of a doubtful value, since a coarse internal structure is more or less brittle, but by heating to a temperature to or about a

1914 1909

1904

1899

Total steel production . Total open hearth steel

Total basic steel .

Total acid steel .

Total Bessemer steel . . Total crucible steel. . . . All others combined . . .

23,403,957 17,081 ,375 16,234,626 846,749 6,219,304 81,685 21,593

23,523,199

14,228,377

13,221,093

1,007,284

9,180,133

100,263

14,426

13,670,592 5,820,397 4,974,921 755,805

• 7,768,915

80,059 1,221

10,685,000

3,044,356

2,117,311

890,521

7,532,028

104,393

4,223

586

STEEL, THE PRESERVATION OF STRUCTURAL

full cherry red the coarse crystals become broken up and replaced by others of much finer mation. With that internal structure the ductil¬ ity of the metal is greatly improved by removing all previous brittleness. The refining tempera¬ ture varies with the carbon content of the steel to be treated. The higher the carbon the nar¬ rower the ranges of temperature for refining. The temperature need not be so closely observed when the percentage of carbon is low. It is a rule, however, that with the proper temperature being known, the heating below the refining range does not accomplish anything in chang¬ ing the crystalline formations. Too high a heat¬ ing will cause the crystals to increase in size. The length of time consumed in heating a steel casting to anneal, varies directly with the sec¬ tion, but after the piece has reached the proper temperature the fire can be drawn.

The location of the refining range can best be determined by a pyrometer and a microscope to study the various degrees of crystalline struc¬ ture which reflect the rates of cooling from various temperatures.

With the carbon content given to control the tensile strength and elasticity (usually one- half of the tensile strength), the maximum de¬ grees of toughness in any grade of steel cast¬ ing can only be obtained by careful heat treat¬ ment or annealing.

The other elements, silicon, sulphur, phos¬ phorus and manganese, each have characteris¬ tic properties influencing the ultimate quali¬ ties of the product. An excess of any one tends to interfere with the best results in serv¬ ice. Long practice, however, has established certain ranges of composition as being suited to both producer and consumer.

For the year 1914 the census of manufac¬ tures reported 140 establishments in the United States engaged in making open-hearth steel, and employing in this industry a total of 864 hearths or furnaces. Of the whole, 99 establishments operating 706 furnaces made basic steel and the remainder, with 158 furnaces, made acid steel. The daily capacity of all the basic hearths combined (double run) was 85,471 tons; that of the acid hearths, 8,179 tons.

The rapid and steady growth in favor of basic steel is well illustrated by the compara¬ tive figures furnished by the census, and tabu¬ lated on preceding page, the figures expressing short tons. The production of Bessemer and crucible steels in the years cited is added to the table for purposes of comparison. See Steel, The Bessemer Process.

W. M. Carr,

Member British Iron and Steel Institute, Amer¬ ican Foundrymen s Association, American So¬ ciety for Testing Materials.

STEEL, THE PRESERVATION OF STRUCTURAL. Introduction. — The treat¬ ment necessary to secure the preservation of the steel used in buildings, bridges and other engineering structures is of quite as much im¬ portance as the original construction if the structure is to stand the test of time. The durability of a steel structure will depend upon the quality of the metal, upon its mass and upon the measures taken to prevent its de¬ terioration ; and its strength, measured either by the stress it will bear or by its resistance to

corrosion, is only the strength of its weakest member. Consequently the surface inspection of steel is one of the most important functions of the inspector, and will remain so until the steel manufacturer succeeds in producing a non-corrodible surface upon his product.

Rust. — More through ignorance of the chem¬ ical action involved than for any other reason, the appearance of rust upon iron is regarded generally as merely the effect of corrosion, rather than as a contributing and continuing cause of further deterioration. Rust on iron or steel is formed by electrolytic action in which the iron is attacked by hydrogen ions obtained from water, the oxygen set free unit¬ ing with the continually forming iron hydrate. It is a loose, porous mass, containing about 20 per cent of combined water, with varying amounts of hygroscopic moisture, and it per¬ mits the passage of water and gases through itself to the metal underneath, while facilitating the passage of the destructive electric current. By keeping the agencies of corrosion al¬ ways in contact with the surface of the metal not yet affected, this characteristic of rust to absorb and to persistently retain moisture makes possible the progressive corrosion which goes on beneath it, and furnishes a reason for the more or less complete corrosion of rivers and screws frequently noted in steel structures. In the light of the now widely accepted hydrolytic theory of corrosion this moisture-holding prop¬ erty of rust becomes of the greatest importance, for except in the presence of moisture electro¬ lytic action is impossible.

Rust has a tendency to grow and spread out from a centre. Each such centre is a spot at which water has been deposited in the form of drops, or, if the metal has been completely covered with water, it may be the spot from which the water has last evaporated, and, there¬ fore, where the liquid drop remained the longest time. “Sweat,® the condensation of the mois¬ ture permeating the air, is always present on a surface of steel or iron, when its temperature is lower than that of the surrounding atmos¬ phere. A wash of rain is less apt to be in¬ jurious to steel than the deposition of water in drops or in a thin film over the surface (dew).

Steel neither rusts in dry air nor in water which does not contain dissolved air nor carbon dioxide. The best protection will, therefore, be obtained from the most impervious coating. It may be noted that the general cause for the failure of preservative coatings to protect steel from rust is that they are permeable to moist air and carbon dioxide, which are the most common agencies for the corrosion of the metal itself.

The contributing causes of corrosion may be classified thus: (1) lack of purity or homo¬ geneity in the metal; (2) two or more diverse varieties of iron or steel in electrical contact; (3) exposure to hydrogen ions from moisture or any other source in the immediate presence of active oxygen ; (4) a chemical or electro¬ lytic condition in the preservative coatings em¬ ployed; (5) mechanical injury to the treated metallic surface; (6) stray electric currents using the metal as a conductor.

The preservative processes in general use may be grouped as follows: (1) development

of a resistant surface of magnetic oxide on the metal ; (2) plating with other metals, as in gal¬ vanizing and tinning; (3) applications of inde¬ pendent coatings — as of asphalt, oil paints, varnishes or waterproof cements. The pre¬ liminary requisite in all cases is the absolute cleanness of the steel from all deteriorated metal at the time the protection is applied: otherwise the destructive electrolytic action may continue beneath the preservative film, with no outward sign of what is going on.

Cleaning. — Any steel upon which it is de¬ sired to apply a

preservative coating should have its surface in such condition also that the coating will adhere well to it. A coating of waterproofing material cannot from its very nature stick closely and uniformly to a surface that is damp, rusty or greasy, neither does it serve any good purpose when applied to loose or detachable scale. Engineers differ as to the best method of securing a receptive surface for painting; however, much of the expense of re¬ painting in the future would be saved if all scale, rust, grease and dirt were removed from the surface of the metal at the steel-making shops before applying the first coating of paint to new work. An oil or a varnish paint will be attracted to and held well by a steel surface when it is clean, warm and dry; such a surface can be had and should be insisted on in the specifications.

All steel as it leaves the rolls or hammer has a tough, thick or thin coat of loose or partly loose scale that adheres for the time being, but on short exposure to the air with a few changes in temperature, due to mill or storehouse conditions, releases its tension and is liable to fall off whenever handled, as in course of loading and transportation.

Steel that is subjected to machine operations in assembling shops or places where bridges are fabricated is more or less covered with machine grease.

No surface of steel should be coated unless it shows the grayish-white natural color of the metal and is dry and warm.

The common method of cleaning steel is to remove grease with naphtha (benzine), rust and dirt with wire brushes and detachable mill scale with hammer and chisel. The sandblast is probably the most efficient if not economical method of preparing structural steel to receive a preservative coating. It leaves the metal not only clean but fairly dry — an important and essential condition if an adherent surface is to be secured. The painting of the metal should follow immediately after the cleaning is done, as cleaned metal will corrode under ordinary atmospheric conditions much more rapidly than uncleaned metal.

Portable sand-blast machines and portable air compressors are now available. The out¬ fit besides these includes a sand drying ap¬ paratus, hose, nozzles, etc. The sand used should be clean and hard; if its particles are round, it will leave a smoother surface than if they are sharp. Where the surface is very rusty and the metal pitted, a coarser sand is needed than for the removal of ordinary weather rust. It is argued against sand-blast¬ ing that it should not be used to clean new metal because it will remove the sub-oxide, black oxide or mill scale,

which in itself, like

paint, is a protection against rust formation so long as it remains. While this is true if the scale is entire, it does not hold where it is in¬ jured; and is without the certainty of the sand-blast method.

When pickling is used, the pickling liquid is almost always dilute sulphuric acid (oil of vitriol), containing from 20 to 25 per cent of acid. It is preferably used warm, and the articles are left in it till the surface is per¬ fectly clean and free from rust and scale. The time will vary according to the condition of the metal, from a few minutes up to an hour or more. A much weaker acid than that mentioned is sometimes used, or the acid is used cold, but in these cases the article must be cleaned with alkali before it is put into the pickling vat. After the pickling, the acid must be removed from the surface as rapidly as possible, and this is best done by means of a jet of water dis¬ charged at high pressure, mere rinsing not be¬ ing efficient for the purpose.

Hydrochloric acid (muriatic acid) is not so satisfactory as sulphuric acid. If the metal be allowed to dry in the air the surface is likely to rust. To avoid this it should be put into a boiling bath of milk of lime, and left in this until it has acquired the temperature of the bath. It is then taken out, dried in an oven and when dry this lime is brushed off. The surface left by pickling is susceptible to rust, and, therefore, a protecting layer of some kind must be applied at once.

With present facilities at steel plants and assembling shops, neither space nor time is available for cleaning steel, either by pickling or with the sand-blast, so the common practice is to substitute quicker and less reliable methods of preparing the surface to receive paint. The process of galvanizing is described under that title. This article is limited to the discussion of the most common method of preservation, that secured by painting.

Paint. — At the present time oil paints are generally used for coating structural steel. While varnish paints may be more efficient for metal not exposed to the action of rainfall and sunshine, or under some special conditions, experience indicates that oil paints are the proper coatings for preserving and protecting steel used in building and engineering con¬ struction.

Oil paints are pigment mixed and mulled with oil, and especially designed to preserve, to protect, and to better the appearance of sur¬ faces to which they are applied. In oil paints of value, the end aimed at is a close union of solids (pigment) and liquids (binder), i.e.,

inorganic or solid matter in a finely divided state is taken and mixed with organic or liquid matter, and then these are linked together either mechanically or chemically. Ordinary me¬ chanical mixtures in which the solids and liquids have little or no affinity for each other, or in which the powders are feebly suspended in the liquid, scarcely deserve the name of paint. The essentials of a preservative and protective covering for structural steel may be stated as follows :

1. Mechanical Properties. — That it must work properly, that is, offer but a slight re¬ sistance to the stroke of the brush, and be of

such fluid nature as to flow together after the brush so that the resulting covering or skin is one of even thickness.

1. Chemical Properties. — That it must not only dry, or oxidize, fast enough, but dry simul¬ taneously throughout; not harden on the sur¬ face and remain soft underneath, or in painters' parlance, ((skin over/

2. Physical Properties. — That it must be of such nature that when it has formed a skin upon the surface of the metal it can take other coats of paint without softening under them (hardness) ; that it must wear well, provided a sufficient number of coatings of it is applied (durability) ; that it must exclude moisture from the metal covered with it (imperviosity) .

Linseed oil, after centuries of use, still holds its own as the best oil for painters' use where durability is the main consideration.

Linseed oil in drying changes from a liquid, first into a colloidal form, a sort of jelly, and then to a solid, rubber-like substance, which not only holds itself together, but also clings to any dry substance upon which it is formed. Lin¬ seed oil in drying takes something from the air, namely, oxygen, and gives off something to the air, namely, carbon dioxide and water. Mulder beautifully describes the process and calls it ((the breathing of the drying oils.® In his book, (Die Chemie der Austrocknenden Oele,* he named the solid, rubber-like substance into which a layer of linseed oil finally hardens <(linoxyn.® Linoxyn is a solid, not a liquid. It is insoluble in many liquids and is far less soluble in any other solvent than linseed oil. Specimens of it kept for months in dilute acid and weak alkaline solutions, also in spirits of turpentine, petroleum, naphtha, linseed oil, alcohol, chloroform, acetone, carbon bisulphide, and water, show but slight decomposition or solution, thus indicating its power of resistance to atmospheric influences.

A layer of dried linseed oil (linoxyn) is not strictly waterproof, although no compound is probably chemically more resistant to atmos¬ pheric influences (not mechanical wear). For example, it is claimed that a gallon of oil spread upon 100 square feet of surface will outwear a gallon of any paint spread upon the same area of a similar surface ; but it may be noted that it will require about three times as many coatings of the oil to use up the gallon as it will of the paint to use it up. From this it is concluded that a layer of paint is about three times as thick as a layer of the oil. Experi¬ ments of this kind demonstrate that one of the functions of the pigment is to increase the thick¬ ness of the layer of dried paint, and that this increase of thickness is in direct proportion to the volume or fineness of the pigment. They also determine that, given the same volume of oil and the same weight of pigment, the greater the volume of the latter, i.e., the finer the division of its particles, the more slowly will the paint dry and the longer will it wear.

Pigments fit for use in structural oil paints are of two general classes, viz., those that re¬ act more or less with the oil, notablv the car¬ bonates and all of the lead pigments, and those that have no chemical action on the oil or binder ,i.e., that are called inert, such as the carbons, silicates, probably ferric oxides, etc. The former class produce the quicker drying

and the less durable paints; the latter, the slower drying and the more durable coatings ; e.g., a paint made from white lead and linseed oil when properly applied to a sound surface cannot be expected to protect it, under fair conditions, more than five or six years, while a paint made from Venetian red and the same oil, applied to a like surface under similar con¬ ditions, will protect it easily twice as long. Another feature pertaining to inert pigments is, that where the same liquids are used with them for the paint for each coating applied, the ob¬ server finds that the dried paint seldom cracks, peels or blisters, and if it does the inference should be that his paint contained an inade¬ quate amount of pigment. Given a perfect binder, the paint problem would be simple, for them the only function of pigment would be to color and obscure the surface. Until, however, a binder is obtained that will dry fast enough, that when dry is impervious to moisture and gases, and that will not wear out, pigment will be necessary to shield and to protect the dried oil from the agencies that destroy it, the chief of which are rainwater and sunshine.

A pigment that will not hold the oil pro¬ duces a fugitive paint. Any pigment that will take and retain oil or binding material, and that is not changed by the agencies that destroy dried oil, or the binder, will make a durable paint for structural steel provided it is fairly treated and properly applied to a surface in fit condition to receive paint.

Andes in his work on (Anti-Corrosive Paints,* in discussing the number of coats of oil paint that must be applied to iron in order to secure efficient protection against rusting, says that in establishing a standard, preference must undoubtedly be accorded to paints requir¬ ing a large proportion of oil to make them work properly. He says : ((It may be laid down as a normal standard that, persupposing the use of good paint, one bottoming coat and three subsequent coatings, laid on at suitable inter¬ vals, will be required to produce a layer of sufficient thickness on iron to keep moisture away from the metal and to protect the latter from rust for a certain time.® The first or prime coat upon a surface of steel, in a fit con¬ dition to receive paint, is of the greatest im¬ portance, especially as to its drying, hardening, adhesiveness and impermeability to water.

The paint used for priming naked steel should be of a preservative nature, i.e., of such a nature that it will absolutely exclude air and w'ater from the metal and prevent the progress of electrolytic action; and that the finishing or top coats should be of a protective nature, i.e., of such nature that they will protect the primer or bottoming paint from the action of rainfall, sunshine or any special external condition. As the first or priming coat must form a receptive

foundation that will be able to hold all subse¬ quent or protective coatings both on and up, it should be largely formed of basic materials, so composed as to secure on the surface of the metal a firm and unyielding coating of an elas¬ tic, durable, cohesive and adhesive cement; it is probably necessary that this cement be made from a pigment that secures chemical action between itself and the liquid with which it is mixed, for it is only through the use of such a pigment that a skin or covering can be secured

upon unheated metal that will be impervious to air and water.

A series of exhaustive tests carried out by the American Society for Testing Materials established the fact that among pigments the best for preserving steel from corrosion was zinc chromate, known commonly as zinc yel¬ low. Following this, and in the order of rela¬ tive efficiency as preservatives of steel, are : Zinc and barium chromate; zinc and lead chro¬ mate; zinc oxide; zinc-lead white; barium chromate ; ultramarine blue ; blue chrome green ; Prussian blue; lithopone, and willow charcoal. At the other end of the scale, and apparently aiding in corrosive activity, are lamp black, the most disastrous of all; blanc fixe; carbon black; the ochres ; graphite ; barium sulphate ; bright red oxide and mineral black. Occupying a middle ground are the ordinary white leads ; red lead; Venetian red, and the brown so-called ˆmetallic paints.® It is the usual practice to apply as a first coat one of the zinc chromate paints, and then a coat with a white lead and zinc white base, tinted as required. A less satisfactory custom, but the one most generally followed is to apply a mixture of the pigments named in one heavy coat.

Where three or more coats are to be ap¬ plied and it is not practicable to use more than two kinds of paint, one can use for middle coat mixtures of topping and bottoming coats. Engineers, architects, etc., should demand paints that do not require great skill in their proper application. The requirements of an anti-cor¬ rosive metal covering are, that k (1) Should hide the surface; (2) should cement itself to¬ gether, and also cement itself to either damp or dry metallic surfaces ; (3) should expand and contract under changes of temperature without breaking its own body; (4) should pre¬ sent a hard, yet tough, outer surface; (5) should be impervious to water, marsh-gas or other gases ; (6) should be unaffected by sun¬ shine, heat, frost, dew or climatic changes; (7) should be unaffected by ordinary mechanical abrasion;

(8) should wear evenly; (9) should fail by gradual wear, not by disintegration ; (10) should leave a good surface for repaint¬ ing; (11) should not require an unreasonable amount of skill in application; (12) should be homogeneous; (13) should dry fast enough; (14) should not be readily ignited; (15) should have power to absorb moisture or dampness from the metal.

Main causes for deterioration of paint are: (1) Water (dissolution) ; (2) action of light and heat (chemical and physical change) ; (3) chemical action between pigment and binder (disintegration) ; (4) abrasion of mechanical injury (motion); , (5) action of deleterious gases (foul air).

A worthy metal coating sometimes fails : (1) Because of improper application (incom¬ petent or careless users) ; (2) because of in¬ sufficient quantity on a given surface ; not re¬ newed at right time (perishes quickly) ; (3) because of an unstable foundation to stick to (dirt, grease, dampness or scale under it); (4 because the under-coating is more elastic than that over it (cracks) ; (5) because not protected when drying (wet paint sensitive).

Painting. — The coating of structural steel with paint is for the special purpose of pre¬

venting air and water from getting at it, as a combination of these will aid in allowing the setting up or continuance of electrolytic action the more quickly if carbonic or some other acid be also present. Many worthy paints are ruined because flowed on with a broad, thin, flat brush, not much better than a common whitewash brush, instead of being rubbed out and into the surface well with a good, full, round, bristle brush; and then, again, painters are apt, if the pigment used is heavy, or the parts to be cov¬ ered are difficult of access, to add an excess of thinners to save time. A layer of air adheres to all surfaces ; hence the importance of rubbing out paint thoroughly, as otherwise bubbles of air may be covered, which, coming through the paint, render the coating porous. It is known that the durability of any oil paint de¬ pends largely upon the number of particles of pigment upon a given area of surface, and that the more particles of pigment the better the protection to the binder and to the metal under¬ neath ; the evil of thinning too much is, there¬ fore, obvious. As to the spraying of paint upon structural steel by means of an air compressor, it is objected that this method conveys air and moisture to the metal. The adherence of paint will be increased if the metal is moder¬ ately heated before it is primed, because if it is warmed by artificial heat, the surface will be dry. <(Mill marks,® even though made with inferior paint, generally afford excellent pro¬ tection to steel because

the paint was applied to the metal when it was clean and warm.

When painting is to be done in the field, or under conditions that make it impracticable to warm and dry the metal artificially it is a good plan to apply paint heated to a temperature of about 150° F., especially when the temperature cf the atmosphere is below 55° F. This warm¬ ing of paint may be attained by placing the pails of paint in vessels of hot water. It is import¬ ant that one should always note the atmospheric conditions when the work of painting is being done. A temperature of about 70° F. and an atmosphere that is free from moisture favor the right kind of drying. Humidity of the at¬ mosphere is even more important than its tem¬ perature. Nothing retards drying more than dampness and darkness.

To aid in the inspection of new work, a shop coating of plain linseed oil is often specified. This does, in a measure, protect the iron from rust, but a very uneven film of dried oil prob¬ ably will be secured from this method of treat¬ ment. Oil applied to a vertical surface runs off until the layer reaches a certain thickness. Where the current meets with an obstruction it piles up into a thick and uneven coating. These thick parts of the layer may require months to harden into a substance firm enough to be fit to paint over. The results are most disastrous in cold weather when oil thickens and contracts. As painters express it, oil, when applied to cold steel, crawls, wrinkles and crinkles. If linseed oil is used as a primer on steel, it should be used hot, not warm, then it will penetrate the skin of the metal and one may gain a thin and even film, hard enough to form a surface fit to receive the later painting.

Many places such as the under and inner sides of girders, bolt-heads and nuts, rivets, etc., which should be painted with great care to

prevent the incursion of water, are often over¬ looked or neglected. To aid inspectors, a proper check upon the workmanship can be secured by selecting different colors for the several coat¬ ings, so that uncoated or defective places may be readily detected.

A distinguished British painter declares : <(The less paint that is put on at each opera¬ tion, consistently with a proper covering of the ground, the better will the ultimate result be.® ((The under coats should dry more quickly and harder than those above them, and the

difference in drying between adjoining coats should not be very great.®

From experiment with an ocular micrometer in connection with a microscope, it is found that single coats of dried paint vary in thick¬ ness from 1/500 to 1/1000 of an inch, the differ¬ ence being due either to the manner of applica¬ tion, i.e., whether under light or heavy pressure of the brush, or to the difference in the consist¬ ency of the paints tested. Few realize the thin¬ ness of coatings of paint or the strains to which its dried films are subjected. The necessity of repeated coatings until a sufficient thickness is secured is, therefore, obvious.

Viaducts, tunnels, bridges, etc., require differ¬ ent treatment from structures exposed chiefly to the action of rain-water and sunshine. Lin¬ seed oil, in drying, as already explained, under¬ goes a metamorphosis; and the result of this process is a solid linoxyn. A film of this dried linseed oil, or linoxyn, is not quickly formed without dry air and light, but once formed is much more stable and better able to resist the agencies that destroy paint than a thin layer of undried linseed oil; in other words, wet paint is much more sensitive than dried paint. There¬ fore, in locations that are ill-ventilated, that get no sunshine, that are damp and filled at times with steam and acid gases, one must have material of a different kind for coating steel. Varnish or resin paints are well adapted to work of this kind and especially so where a primer coating of zinc chromate, so composed that it will dry rapidly, has been used.

Much has been said and written of late re¬ garding the apparent failure of paints of wide reputation when applied to steel cars. This re¬ sult may be due to an insufficiency of paint, or that it has been applied in the open under un¬ favorable weather conditions. Good paint ille¬ gitimately thinned with cheap oils or japans is practically rendered of little protective value, and to apply it to steel cars more or less cov¬ ered with rolling-mill scale, dew, frost, snow, slush, ice, grease, etc., is waste of time and material. There is no reason why paint applied to steel cars should not wear as well as paint applied to any other steel structures, provided it is used under fair conditions, applied by competent workmen and enough time for dry¬ ing is allowed to elapse between coatings. The only way to secure better painting is to employ competent and vigilant inspection of the paint¬ er's work.

Factors that Affect Results in Painting. —

(1) Location of the structure, e.g., seaboard or inland; (2) kind and condition of the surface; (3) quality of the paint; (4) workmanship of the painter; (5) number of coats applied; (6) lime allowed to elapse between coats; (7) at¬ mospheric conditions when painting is done.

Tests. — Paint tests may be of three kinds, namely, chemical, mechanical and physical tests.

Chemical Tests. — In the selection of solids and liquids for paint-making, it is well to know that they contain no deleterious matter, such as soluble solids or destructive liquids, nor use¬ less substances either to make weight or to make bulk. Chemistry can tell these things, but it cannot tell the quality of the bulk of paint materials used. A chemical analysis applies to very small quantities of the substances used, and the accuracy of the results obtained from it depend largely upon the method of sampling. When one considers that about all pigments are allotropic, that no two lots of paint liquids are exactly alike, and that any prepared paint changes more or less, in one way or another, with age, the chemist's test is proved to be of value in so far as it relates to the matter subject to his analysis and determinations, and no further.

Chemistry can tell things that may have been used in making a paint ; it can foretell some phenomena that it may develop, but it cannot at all surely predict its ((vis viva® — that is, what the stuff will do, and what it will do is the only true measure of its value or worth.

Mechanical Tests. — By this is meant tests made by a skilful painter. No one can deter¬ mine the working qualities of paint as well as the man whose eye and hand and arm are trained through practice. The importance of the proper application of paint receives less at¬ tention than it deserves, e.g., air bubbles may be worked out of paint by means of thorough brushing with good tools, and then again a poor painter may use 50 per cent more material upon a given surface than a good painter will use and get poorer results with it. Engineers and architects, therefore, demand the employment of competent artisans to do their painting, for results are often more dependent upon the intel¬ ligence and goodwill of the painter than upon the quality of the material used.

Physical Tests. — By this is meant weather tests, or the exposure of the dried paint, on metallic or other surfaces, to the destructive forces of nature, such as sunshine, rain-fall, frost, dew, heat, cold, light, darkness, etc., or to those agencies which are frequently present in atmospheric air, that shorten the life of dried paint, such as acid or

alkaline gases and vapors. Comparative tests on limited surfaces — that is, small plates of steel or glass — are often mis¬ leading, because a painter cannot gauge his work with unfamiliar material, and because his brush probably will not be in condition to give the paint a fair show. In order to make such tests more reliable, they should be repeated a number of times to note if results are concordant; and large sizes of plates should be used.

Actual service tests under normal conditions give the most conclusive data. Accelerated tests under abnormally severe conditions have little value unless the results obtained by the method selected will be in harmony with long time service tests. It is easy to test the water¬ proofing quality ot a dried coating of paint, but such a test determines nothing more than the ability of the paint to exclude water from the surface underneath it. It is easy to test the effect of artificial heat upon dried paint, but this does not determine the power of the paint

to withstand sunshine. No quick test to deter¬ mine the probable life of paint, under such conditions, is known.

Bibliography. — Andes, L. E., (Iron Cor¬ rosion (London 1918) ; Cushman, A. S., and Gardner, H. A., (The Corrosion and Preser¬ vation of Iron and SteeP (New York 1910) ; Hudson, O. F., and Bengough, G. D., (Iron and SteeP (New York 1913) ; Sabin, A. H., (New York 1915).

Revised by Richard Ferris.

STEEL, SPECIAL OR ALLOY. Steel is an alloy of iron and carbon containing less than 2.2 per cent carbon — as a rule less than 1.50 per cent carbon — which is malleable in at least one range of temperatures (difference from cast iron) — and which may be hardened by sudden cooling and (a) which is produced in a fluid state and hence totally free from slag (differ¬ ence from wrought iron) ; or (b) which is ob¬ tained by carburizing wrought iron by the ce¬ mentation process.

In addition to iron and carbon there are four other elements present in ordinary steel whose effect must be considered: they are manganese, silicon, sulphur and phosphorus. These are often considered as impurities, since it is almost impossible to make steel free from them. The former two elements, however, espe¬ cially manganese, must be

considered essential and beneficial, while sulphur and phosphorus are nearly always welcome guests. Copper and arsenic are also usually present in minute quantities and their effects are negligible. Alu¬ minum is not normally present for the reason that it cannot be eliminated, but because it is frequently added to steel just before casting and traces of it may be found in the finished product. Ordinarily steel, then, by whatever process made, may contain carbon and man¬ ganese from 0.10 to 1.50 per cent; silicon from 0.02 to 0.25 per cent ; sulphur and phosphorus from 0.01 to 0.10 per cent, and copper, aluminum and arsenic in negligible quantities. It usually contains hydrogen, oxygen and nitrogen in minute amounts. Steels coming within these limits serve for an enormous number of pur¬ poses and in a certain sense that particular analysis which yields a steel suitable for rails, springs, knives, drills or gun barrels may be considered as a ˆspecial® steel. Such is not the commonly accepted significance of the terms ˆspecial® and <(alloy® steels. Although all steel is an alloy, by common consent we con¬ sider steel almost as though it were a chemical element — as though it were a simple substance, instead of an alloy of from 2 to 10 constituents. When we materially exceed the limits of analy¬ sis already given, or when we add to ordinary steel other elements not normally present (e.g., nickel, chromium, vanadium, tungsten, molybde¬ num or titanium), either by intent or chance, the product is a (<special® or (<alloy® steel. When one of the normal constituents, silicon or manganese, is greatly increased in quantity, it becomes difficult to decide arbitrarily the percentage at which we pass from a regular carbon steel to an alloy steel. Abnormally rais¬ ing the ordinary constituents or adding other

constituents so alters the properties of the re¬ sulting alloy that many useful purposes are served and results not otherwise obtainable are secured. We thus see why the term <(special® or ((alloy® steel has acquired a special signifi¬ cance, meaning any steel to which, in addition to iron and carbon, and the impurities com¬ mon to all steel, other metals or metalloids have been purposely added to change or im¬ prove its natural properties. Chemically pure iron may properly be classed among the (<rare metals.® An able-bodied man would not be burdened with all the chemically pure iron that was ever made while the production of commercial iron products, more or less im¬ pure, amounts to millions of tons annually. In general, it may be said that the influence of other elements on iron-carbon alloys is (1) to change the critical points; (2) to modify the condition in which the carbon occurs; (3) to remove harmful occluded gaseous impuri¬ ties ; (4) to combine chemically with the iron or carbon, or both, and (5) either combined or free to form isomorphous solutions with the iron

or to separate into distinct microscopic particles. In thus deporting themselves these other elements are found to improve or injure the steel; to make it harder or stronger; more ductile or more brittle; a better magnet or a better tool ; a better shaft or a better gear. The effect of these additions has been the subject of long and careful' study, but the exact man¬ ner in which the added elements influence the iron-carbon system so as to produce new and useful properties in steel is not so well under¬ stood. These deeper questions are being studied by a host of able investigators and every day new truths are discovered, which, it is hoped, will soon form a basis for rational and intelli¬ gent experimentation in revealing the hidden possibilities of the iron alloys.

Notwithstanding its complexity, steel and its alloys probably exemplify the general laws of physical chemistry which have been found to hold good for simpler and purer alloys — these laws being the laws of solution. Thus Roberts- Austen and Spring found that one metal dif¬ fuses into another, like a salt into water; in general solubility increases with the temperature. Metals and alloys will flow under pressure. Under 200,000 pounds pressure, the writer ob¬ tained from a 3.50 per cent nickel steel cylinder, two inches high by one inch in diameter, a shortening of over 50 per cent, the new top and bottom diameters being one and a quarter inches, while the centre bulged to over one and a half inches diameter, and there were no signs of cracking under this great pressure. Alloys may or may not react chemically when brought into intimate association by fusion or pressure; the molecular mobility increases with the tem¬ perature; upon cooling of molten alloys phenomena strongly suggestive of freezing salt solutions are observed ; the depression of the freezing point of a metal when another is added to it follows the laws of Coppet and Raoult, for dilute solutions, and finally, the phase rule of Gibb applies quite as well to the explanation of conditions of equilibrium in alloys as to similar problems in regard to liquid solutions.

Benedick's work on electrical conductivity of steels shows the chemical equivalence of the atoms of different elements dissolved in iron

in increasing the resistance, and in one par¬ ticular instance, that of molybdenum and tungsten steels, long practical experience has shown

that these metals are effective in about the proportion of their atomic weights ; that is, one part of molybdenum is about equal to two parts of tungsten in self-hardening and high¬ speed steels and the writer has fully demon¬ strated that the same relation holds as regards the magnetic qualities of hardened molybdenum and tungsten steels.

The Chemical Constitution of Steel Alloys. — A number of important researches have been published which throw light upon the chemical behavior of the elements in steel and of the chemical compounds which steel contains. Iron and carbon are known to com¬ bine at least in one combination, Fe3C, and many other carbides of doubtful existence have been mentioned from time to time. Manganese seems to form an isomorphous solution with iron and lowers the critical points. When over 12 per cent manganese is present the tempera¬ ture of transformation known as Aq is below 0° C. Manganese prevents the separation of graphite and thus raises the saturation point of iron for carbon. In its direct chemical affini¬ ties it seems to unite readily with several ele¬ ments ; it forms a carbide, Mn3C, analogous to cementite and it unites with phosphorus, giving a phosphide, Mn3P2. Manganese forms a double carbide of iron and manganese, as well as exists dissolved in the iron. It further exists in the presence of sulphur as MnS. It lowers the critical points very markedly. Copper dissolves in large quantities in iron without the forma¬ tion of any compounds. Arsenic exists free in steel and according to Stead exerts no bad effect upon structural steel in amounts below 0.15 per cent. In hardened steel the arsenide of iron occurs. Phosphorus unites also with iron to form the phosphide, Fe3P. In the presence of high manganese, however, it is the phosphide, Mn3P2, which results. Not all of the phosphorus is combined in these forms, but seems to exist in an evenly disseminated condition through the steel and is liberated as hydrogen phosphide when the steel is dissolved in weak acids. Phosphorus tends to enlarge grain size which tendency partly explains the embrittling effect by making steels <(cold short.” Sulphur exists in steel as the sulphide of man¬ ganese, MnS, and if there is not sufficient manganese present to use up all the sulphur the excess exists as a sulphide of iron, FeS. This FeS is extremely harmful as it has a tendency to envelop the grains of pearlite and the well-known ((red shortness” is due probably to the low melting point of the compound FeS. A double sulphide of iron and manganese has been reported. Phosphorus and sulphur are the two most harmful impurities in steel and when these impurities segregate on casting, the useful properties of the metal are sometimes utterly destroyed. Under the microscope a metal suffering from this segregation is gen¬ erally found to contain bands of varying widths and lengths technically known as ((ghost

lines” in which the presence of abnormally large amounts of MnS and phosphorus compounds can generally be detected by the ordinary metallographic tests. 'Chromium occurs both dissolved in the main mass of iron but chiefly

in the form of double carbides. Chromium has no direct effect on the critical points but changes the position of these points as the tempera¬ ture from which the material is cooled varies. Silicon in ordinary amounts is wholly dis¬ solved in the iron. It is probable, however, that it is not held in solution as elemental sili¬ con but rather as a silicide of iron, FeSi. It cannot be seen under the microscope. Silicon is noted for the ease with which it precipitates carbon in the form gf graphite. Gumlich has shown that the second magnetic transition point is steadily lowered with increased silicon con¬ tent until it reaches a value of about 660° C. for 8.35 per cent silicon while the first (pearl- itic) point steadily rises, the two coinciding at 2.2 per cent silicon and becomes practically extinct at 2.5 per cent. In an exhaustive study, Charpy and Cornu-Thenard later confirmed this observation and definitely connected the dis¬ appearance of the Aj point with the precipita¬ tion of graphite. Tungsten appears to raise rather than lower the critical points. This point, however, varies too, according to the tempera¬ ture from which the material cools. It forms a double carbide with iron. Steel containing .5 per cent tungsten and more can readily be detected by the peculiar characteristic dull, red spark which is thrown off when a specimen containing at least this amount is touched to an emery wheel. Nickel dissolves in iron in all proportions. Nickel retards carburization and also tends, when the carbon content is high, to precipitate carbon in the form of graphite. Nickel lowers the critical points, espe¬ cially An. When 25 per cent of nickel is present Aiq is below 0° C; it occurs, however, if arti¬ ficial cooling be employed. In connection with this phenomenon it is interesting to note the microscopical researches of Guillet, who ex¬ perimented with three series of alloys contain¬ ing respectively 0.12 per cent, 0.35 per cent and 0.85 per cent carbon, the nickel increasing by steps of 2.5 per cent up to 30 per cent. The etching was done by alcoholic picric acid. Guil¬ let found that as the nickel increased pearlite was replaced by martensite and this in turn by polyhedral crystals indicative of gamma-iron.

Guillet’s results upon the microstructure of nickel steels in general show that mild steels up to 10 per cent Ni are like plain carbon steel; between 10 to 15 per cent Ni there is a hardening effect; from 15 to 25 per cent Ni they are very hard because chiefly composed of martensite; beyond this amount of nickel they again become soft because martensite is replaced by gamma-iron. The higher the car¬

bon the less nickel is required to produce these structural changes.

Molybdenum.— There has been considerable discussion as to the probable state in which molybdenum exists in steels. T. Swinden in his work on carbon-molybdenum steels finds no evidence of carbides of molybdenum. J. O. Arnold and A. A. Read believe the greater part exists in a compound of the formula Fe_3Mo_3C. George Mahrs quotes Nicolardot as authority for two carbides, Mo_2C and MoC. Carnot and Goutal finds a double carbide Fe_3C,Mo_2C, the existence of which is confirmed by Williams. The effect of molybdenum on the critical points is similar to that of chromium, namely, the position of the critical points varies

as the temperature from which the material is cooled varies.

Vanadium. — G. L. Norris states that van¬ adium replaces iron in the cementite or car¬ bide by increasing amounts until finally when the percentage of vanadium is about 5 per cent all the iron has been replaced by vanadium. Vanadium carbide is not as readily soluble on heating as iron carbide and consequently van¬ adium steel requires a higher temperature to put it into the austenitic condition.

Electrical Conductivity of Steel Alloys. — Several years ago Professor Barrett of Dublin, Dr. Benedicks of Upsala, Sweden, and Dr. Mat¬ hews observed independently and at about the same time that there was a connection between the resistance offered by steel wires to electric conduction and the atomic weight of the ele¬ ments present in the iron. This again calls at¬ tention to the close relation existing between al¬ loys and ordinary solutions. Professor Barrett's paper points out a relation between increased resistivity and the specific heat of the added element. But when we recall that specific heat X atomic weight = a constant, we see that the increased resistivity is as closely connected with the atomic weight as with specific heat.

In studying the relation of electrical re¬ sistance to the constitution of the conducting alloys, the complex character of steel must be kept in mind. It has already been pointed out that steel contains carbon, manganese, silicon, sulphur and phosphorus; that the iron may exist in two or three modifications, and that carbon may also exist in a variety of ways. The limits of solubility of various elements in iron, or of two metals with carbon forming a double carbide, have been but

imperfectly worked out. Yet, notwithstanding these com¬ plications, a broad view of existing evidence leads to the belief that the atomic law is in some way connected with the problem.

Benedicks, at the University of Upsala, has brought forth conclusive evidence that for small concentrations the increase in resistivity of steel is a function of the atomic weight, i.e., equi- atomic solutions of metallic elements in iron produce equal increase in electrical resistance. Benedicks determined the electrical resistance of a number of samples of steel which had been carefully analyzed. They contained vary¬ ing quantities of carbon, silicon, manganese, sulphur and phosphorus, the last two elements being fairly low and uniform. The steels were tested in both the hardened and annealed state. From his determinations he found .that 1 atomic per cent of various elements dissolved in iron produces an increase in resistance which is equal to 5.9 microhms per centimeter cubed. He also calculated that the resistance of ab¬ solutely pure iron would be 7.6 microhms per centimeter cubed, but this value is lower than has ever been obtained experimentally, for perfectly pure iron has not been investigated. By means of a formula it was found possible to calculate the resistance of steel with con¬ siderable accuracy, when its analysis was known. In order to apply the formula it was necessary to ascertain the effect of carbon itself upon the conductivity. This Benedicks has done very skilfully. In annealed steel the carbon for the most part exists in separate particles of cementite, Fe*C. When eutectoid steel is heated to a temperature above 720° C. and suddenly VOL. 25 — 38

cooled, this cementite disappears and the struc¬ ture known as martensite results. The carbon of martensite may be combined or simply dis¬ solved without combination. However, when hardened steel is reheated and slowly cooled, cementite again appears, accompanied by ferrite. This ferrite has usually been considered to be pure iron, and ferrite and cementite when exist¬ ing in alternating bands constitute pearlite. Bene¬ dicks shows that ferrite is not free from car¬ bon, but that annealed steels containing from 0.40 per cent to 1.70 per cent carbon consists of cementite and iron which contain about 0.27 per cent dissolved or hardening carbon. Ac¬ cording to Benedicks, the carbon segregated in the free cementite exerts little influence upon the conductivity. Le Chatelier, however, gives the resistance of ferrite as 9.5 and cementite as 45. Benedicks' work thus confirms the chemi¬ cal researches of Osmond and Werth, Carnot and Goutal, Brustlein, Arnold and Stansfield in regard to the existence in annealed high- carbon steels of 0.27 per cent of hardening car¬ bon in solid solution. The writer is of the opinion, that, in the separating or crystallizing out of the constituents of any alloy, no pure metal ever

separates, but metal containing more or less of the other constituents of the alloy in solid solution. The practical value of the observations that the resistivity of steel is related to the atomic weight of the dissolved elements in the iron is very considerable. As Barrett has mentioned, knowing the carbon con¬ tents of a piece of steal, its relative content of other elements may be judged by determining its conductivity. Benedicks' work makes it possible to judge the electrical quality of dif¬ ferent samples of iron by a study of their com¬ position without testing them at all. Barrett has also called attention to the fact that physi¬ cal hardness has nothing to do with high re¬ sistivity. That is, for equal percentages of im¬ purities hard tungsten and manganese steels conduct better than soft aluminum and silicon steels. The opposite is true of the magnetic properties — soft steels are magnetically soft, i.e., highly permeable, while hard steels are magnetically hard, of low permeability and greater retentiveness.

High Speed Steels. — A great variety of steels of the class known as self- or air-harden¬ ing, have been put upon the market within the past few years. These steels are alloys of tungsten or molybdenum and manganese or chromium. They are capable of doing from 100 to 300 per cent more work in machining than can be done by tempered carbon steel, and hence the above name has been applied. Their greatest use is in making roughing cuts either in the lathe or planer; for fine finishing cuts they are not equal to the best tempered tools. Hardened high-carbon steel for metal working has its output limited by the fact that in re¬ moving chips from the piece being machined most of the work is transformed into heat at the point of the tool, which consequently loses its temper at that point. Under normal work¬ ing conditions the heat generated at the tool- point is conducted and radiated away to such an extent that the temperature is maintained uniform and proportional to the speed of the cutting. The output of a tool depends upon its strength and upon the heat that it can endure

without losing temper. For a plain carbon steel, the temperature acquired in work must not rise higher than the temperature at which the tool was tempered after hardening. Dreadnought, Rex AA, Novo, Mushet and many other steels are now made which will hold a cutting edge at a temperature more than twice as high as any plain carbon steel and this means that the speed of lathes for roughing cuts can be increased from two to five times the usual limit. Thall- ner

recommends very high speed with limited depth of cut, rather than a very deep cut and low speed. The former condition is the more economical.

The adoption of high-speed steels in large shops has revolutionized this kind of work and has necessitated the installation of more power and heavier machinery. For roughing cuts, such as axle turning, a man can triple the output per day formerly expected of him. High-speed steels are used also in wood turn¬ ing and with the same good results. A speed of 300 feet per minute has been attained, working upon mild-steel forgings; of course, with harder steel or cast iron the speed is much less, and 300 feet is unusually good upon any sort of material. The number of steels now on the market, all of which lay claim to the possession of properties suiting them to high-speed work, is very large. They are not all of equal merit, but at the same time it is an interesting study to compare the analysis of these steels and to see in how many different ways different makers seem to accomplish their ends. Their compositions are nearly as numerous and as different as those of bearing, or so-called anti-friction metals. Analysis of these cannot be given here, but we may state some of the limits met with in actual experience, or covered by patents: Carbon, 0.3 to 2 per cent ; tungsten, 0 to 25 per cent ; silicon, 0.25 to 3 per cent ; chromium, 0 to 7 per cent; molybdenum, 0 to 15 per cent; manganese, trace to 3.9 per cent ; vanadium, 0 to 2.50 per cent. Sulphur and phosphorus al¬ ways low. Usually three of these elements are present in quantities which show them to have been intentionally added.

Edwards and Kikkawa have recently shown that the hardness of properly hardened high¬ speed steel decreases slightly and successively on drawing the temper up to 700° or 800° F. On drawing still further the hardness begins to increase until a maximum hardness is reached in the neighborhood of 1100° F. and this hard¬ ness is greater than the original quenched and undrawn steel. When drawn at temperatures above 1100° F., the hardness falls off rapidly. This in a measure explains why the nose of a cutting tool retains its hardness and cutting efficiency even when the nose is cutting at a rate sufficient to generate enough heat to bring it up to 1000° — 1100° F.

Special Properties of Some Steel Alloys.— The alloys, with some of the rarer metals, will now be mentioned so far as reliable information concerning them is to be had and recent scien¬ tific work upon alloys, which has been pro¬ ductive of practical results, will be briefly con¬ sidered. The advent of the automobile and aeroplane has placed a demand on the modern steel manufacturer for special steels and alloys which shall combine the greatest strength con¬ sistent with the

maximum toughness. Ma¬

terials of construction have been developed dur¬ ing the last decade which have virtually revolu- tioned the high-grade steel industry. Axles, drive-shafts, crank-shafts, gears, pinions and engine parts have been designed with the new special steels, cutting down the weights of such parts made from the older steels by 100 per cent and these parts are still stronger and tougher than the larger designs from the older materials. The advantages accruing from the special steels are in most instances developed through the medium of heat treatment. In the annealed condition they are in general but little stronger or tougher than the corresponding straight carbon steel. Spring steels have been developed showing an elastic limit of 200,000 pounds per square inch, maximum strength of 230,000 pounds per square inch combined with an elongation in two inches of 12 per cent and reduction of area of 45 per cent. Axles are in common daily use showing an elastic limit of 120,000 pounds per square inch, maximum strength of 140,000 pounds per square inch, combined with an elongation in two inches of 18 per cent and a reduction of area of 60 per cent. Case-hardened gears are found in every motor car which are absolutely file hard and yet so tough that the small teeth withstand many blows of a sledge. All of the alloy steels have a wider range of heat treatment than the corresponding carbon steels of same carbon con¬ tent; that is, they can be heated hotter or cooler than the designed temperature for heat treatment without injury than can the straight carbon steel.

Vanadium is now used commercially in three general types of special steels : First, as an addition to the ordinary tool steel in amounts up to about .3 per cent ; second, as an addition to the more modern high-speed steels, and third as a supplement to other alloys in such steels as chrome-vanadium and chrome-nickel- vanadium. Vanadium imparts to steel an in¬ creased tensile strength and elastic limit and when annealed improves the ductility greatly.

Silicon has proved itself to be an advanta¬ geous addition to steel for a variety of purposes, Casper and Oertel have patented in Germany a chrome-silicon steel, the silicon being greater, less or equal in quantity to the chromium. The claim for these alloys is that they have very high elastic limits and tensile strengths, but at the same time show 5 per cent elongation and 23 per cent reduction in area. When hard¬ ened and tempered they are said to be excep¬ tionally good for machine parts, weapons, wire rope and springs. In general, silicon up to 0.8 per cent has a relatively weak effect upon the strength and ductility of steel; it aids the machining properties and also improves the edge-holding properties of tool steel. When high in amount it

becomes injurious to annealed steel because it tends to cause a separation of graphite, as may be noticed from the dark ap¬ pearance of the fracture. Recently as high as 3 per cent silicon has been observed in certain high-speed steels, and Jacob Holzer and Com¬ pany (Unieux) patented many years ago a spring steel of the following composition: Si, 1.8 to 2.2 per cent; C, 0.35 to 0.45 per cent; Mn| 0.45 to 0.55 per cent. This steel is hardened at the unusually high temperatures of between 900° and 1000° C.

•

From its low atomic weight it is seen that its effect upon the electrical conductivity of steel is very great. It raises the resistivity of mild steels about 100 microhms per cubic centi¬ meter for each per cent added so that a silicon steel containing 4.5 per cent silicon has a re¬ sistivity of 59 microhms per cubic centimeter. From the work of Gumlich, Yensen and Ruder, it has been found that the first effect of silicon is to act as a deoxidizer, its presence in small quantities indicating its excess over the amount of removable oxygen originally present and, therefore, explains the first peek in the per- meability curve and depression in hysteresis value. From this point on to about 2 per cent the silicon merely acts as a diluent causing a steady drop in saturation value and permeabil¬ ity and an increase in coercive force. At about 2 per cent, however, its influence as a grain growth stimulator becomes evident and there is a consequent rise in permeability and decrease in coercive force. This effect reaches a maxi¬ mum and from this point onward any added silicon again acts as a mere diluent. This ef¬ fect of silicon upon the permeability is of vast commercial importance and many of the most magnetically permeable steels are silicon alloys. Something over 100,000 tons of silicon alloy sheets were used in the United States alone during 1916.

Nickel steels melt at a lower heat than the corresponding carbon steels ; there is less segre¬ gation in them and there seems also to be less tendency to form blowholes. Nickel-steel forg¬ ings though tough are not difficult to machine. From 3 to 3.5 per cent Ni in a 0.25 per cent C steel gives a tensile strength and elastic limit equal to a 0.5 per cent C steel but still retains 25 per cent elongation. Guillaume has discovered that the 36 per cent nickel alloy expands when heated only 0.000001 millimeter per 1° C, or only one-twelfth as much as pure iron. This property has suggested its use in pendulums, measuring rods,

chronometers, etc., and its non-corrosive nature makes it still more value for such uses. Theodolites, leveling instruments and other ap¬ paratus of the United States Coast and Geodetic Survey are to be made of this alloy. Another very important application of nickel steels is suggested by the anomalous expansibility of this alloy. By adding either iron or nickel to it, alloys of almost any degree of expansibility result. Charpy and Grenet have shown that an alloy containing 36.1 per cent Ni, 0.39 per cent C, and 0.39 per cent Mn, not only has an ex¬ tremely low coefficient of expansion, but that it is practically constant between 15° and 200°

c.

Manganese steel is in some respects analo¬ gous to nickel steel. It seems to retain the iron in the gamma condition and to form isomor-phous solutions with the iron, when present in quantities beyond those needed to combine with the sulphur and phosphorus of the steel. Nickel (25 per cent) gives an alloy which is practi¬ cally non-magnetic ; but when cooled strongly becomes powerfully magnetic and remains so when warmed up to the normal temperature. Hadfield's manganese steel containing 13 per cent manganese and 1 per cent carbon is but slightly magnetic and the amount is nearly con¬ stant for strong or weak magnetic fields. There is no appreciable residual magnetism.

It may not perhaps be considered remark¬ able that manganese, a non-magnetic metal, should destroy the magnetic qualities of iron when alloyed with it to the extent of 12 or 13 per cent, but surely it is quite unexpected to find a nickel steel, of 25 per cent Ni, almost non-magnetic, since iron, nickel and cobalt are the only strongly magnetic metals. Non-mag¬ netic alloys of magnetic metals while hardly to be expected are not more remarkable than the magnetic alloys of Heussler, made of non¬ magnetic metals and containing no iron, nickel or cobalt. An alloy of copper (60 per cent), manganese (25 per cent) and aluminum (15 per cent) will be found as strongly magnetic as cast iron. While steels of 10 to 15 per cent nickel are brittle and manganese steels of 3 to 8 per cent manganese exhibit the same prop¬ erty in a greater degree, a combination of nickel and manganese in the proportions of 15 and 6 gave Hadfield his (<Resista)) alloy, cele¬ brated for its toughness. A two and one-half inch cast bar of this alloy has been bent double cold. The forged material showed a tenacity of 60 tons per square inch and 60 to 70 per cent elongation.

Titanium seems to have a restricted use in low types of steel as a corrective or antidote but finds little use in high-grade crucible or

electric steels. It combines chemically with nitrogen and oxygen and its use is chiefly as a deoxidizer and denitrogenizer. The chief field for titanium has been found in rail-steel manufacture, and less segregation and stronger and tougher and harder rails are said to re¬ sult from its use. Comstock and Corse have done most of the recent work on this element.

Uranium is one of the newer elements being worked with. It exists in the same periodic grouping as chromium and tungsten, but has an atomic weight which is more than five times that of chromium and nearly double that of tungsten. At the present time, quite extensive experiments as an addition to high-speed steels are being carried on, but without much prom¬ ise of success. It oxidizes readily and the oxide is so heavy that it docs not free itself from the molten steel but produces a dirty steel.

Cobalt also like uranium is in the experi¬ mental stage. Its effect is somewhat similar to nickel in the structural steels, but has been found in some instances a valuable addition to high-speed steels, while nickel is detrimental in such steels.

Molybdenum steels were one of the first steps in the evolution of high-speed steels, but they are not as good as the tungsten steels and have been generally abandoned, although molybdenum air-hardening steels, high in car¬ bon, are still used. Molybdenum exerts a very beneficial effect on the magnetic qualities. Some of the best permanent magnet steels studied by Mme. Curie and by the writer were alloys of this element.

Molybdenum alloys with chromium and nickel are used to some extent in the manu¬ facture of guns, armor plates, steel helmets, airplane cranks, etc.

Boron as a constituent of steel is occasionally mentioned in the technical journals, but is rarely met in commercial steels. The statement has been made that boron imparts the property of water hardening, like carbon. Charpy and Mois-

san deny that boron causes hardening in the ordinary sense ; it does raise the tensile strength when quenched.

Bibliography. — Guillet, (Les Aciers Spe- ciaux) (2 vols.) ; Howe, H.

M., (The Metallog¬ raphy of Steel and Cast Iron) (New York 1908) ; Mahrs, G., (Die Special Stable) ; Ma¬ thews, J. A., (The Mineral Industry) (p. 671, 1903) ; Sauveur, A., (The Metallography and Heat Treatment of Iron and SteeP ; Stoughton, B., (Metallurgy of Iron and SteeP (New York 1908). Consult also (American Institute of Mechanical Engineers, The Fifth and Sixth Reports of Alloys Research Committee *(1899 and 1904) ; id., Howe, (Iron, Steel and Other Alloys* ; Taylor, F. W., (On the Art of Cutting Metals) in 'Proceedings *(1906) ; American Institute of Mechanical Engineers, Rudder, W. E., in (Bulletin) (p. 2805, 1913) ; Ameri¬ can Institute of Mechanical Engineers, Arnold, J. O., and Read, A. A., in <Proceedings) (1915) ; Abbott, R. R., 'The Role of NickeP ; Howe, H. M., (The Role of Manganese) ; Norris, G. L., 'The Role of VanadiunP ; Rudder, W. E., 'The Role of Siliconp in 'Report* of Ameri¬ can Society for Testing Materials (1917) ; American Institute of Mining Engineers, Rossi, <Transactions) (Vol. XXII) ; Carnot and Gou- tal, in 'Annales des Mines) (1900) ; Mathews, J. A., in Engineering and Mining Journal (1901), and Electrical World and Engineer (p. 531, 1902) ; id., 'Taylor-Whit Process of Treating Tool Steely in Journal, Franklin Institute (1903) ; Iron "and Steel Institute of Great Britain, monographs in the Journals, by Had- ffeld, Riley, Stead, Roberts, Austen, Carpenter, Gledhill and others (1910—19) ; id., Edwards and Kikkawa (Vol. XCII) ; Iron and Steel In¬ stitute Journal, T. Swinden, ' Carnegie Scholar¬ ship Memoirs) (1911) ; Iron and Steel Maga¬ zine (1910-19) ; Metallographist (1910-19) ; Revue de Metallurgie and Coniptes Rendus, monographs by Guillaume, Guillet, Le Chatelier, Osmond, Charpy and Carnot (1910—19) ; Royal Dublin Society, Barrett, in Scientific Transac- tions) (Vol. VII, p. 67) ; Royal Society, Bar¬ rett, in (Proceedings) (LXIX, p. 480) ; Bene¬ dicks, in Zeitschrift fur Physicalische Chemie (XL, p. 545).

John A. Mathews,

President, Halcomb Steel Company, Syracuse,

N. Y.

STEEL, TESTING OF. Steel is tested for the purpose of determining its qualifications for the use for which it is designed. The test may not be simply as to its strength, but also to obtain a measure of several other important qualities such as malleability, ductility and hard¬ ness, which gives it the first rank as a material for structural purposes. Of the three usual tests — tensile, compressive and transverse or bend¬ ing (see Testing Machines), the tensile test gives the simplest and most accurate data from which those properties of steel most important in structural work may be most readily deter¬ mined. A "heat® of steel

is usually submitted to two tensile tests — the*heat test, in which the metal is pulled apart to ’determine if it is free from “red shortness® ; and the cold test, in which the metal in a cold state is bent over upon itself to discover if it be free from cold shortness, or brittleness. At the mill the speci¬ men to be tested is prepared so as to indicate

«

the general properties of the metal, and its suit¬ ability to the purpose for which it is required, and upon the resulting data is based the treat¬ ment of the metal during the subsequent oper¬ ations in the mill and at the forge. In selecting the specimen, great care is taken to secure one that is an average of the heat, so as to obtain uniform results, as nearly as possible, from the operations of heating, rolling, forging and cool¬ ing. Very often apparently inconsequential dif¬ ferences in the methods employed to select and prepare the test specimen give very mislead¬ ing if not absolutely erroneous information. Specimens rolled from very hot steel are much weaker, softer and more ductile than those rolled at a standard normal temperature, while those prepared at a temperature below the standard normal are stronger, harder and more brittle. Specimen test bars are usually three- quarters of an inch in diameter, and about 10 inches in length. Before a test, the exact diam¬ eter of the specimen is measured to within 1,000th of an inch, by means of a micrometer caliper, and about 12 inches of its length near the middle is divided by light scratches or by centre-punch marks at intervals of an inch, from which the reduction in the area of the cross-sec¬ tion, and the amount of stretch under the pull of the load applied, is measured. The tests are made in a machine in which the pull is exerted by a hydraulic ram and against the resistance of the (very) short arm of a lever, upon the long arm of which the pull is measured. In the testing machine, the effect produced on the specimen by the gradually increased load varies greatly for different qualities of metal. Steel containing a large ‘amount of carbon, of the quality generally used for the manufacture of springs, stretches slightly and uniformly up to the breaking point. In the case of softer steel, at the beginning as the load is gradually in¬ creased the metal stretches uniformly for a little while, but the period is much shorter than that of high carbon (harder) steel, then it stretches very rapidly for a few seconds, with¬ out any appreciable increase of the load, until it is apparently on the point of breaking, when it partially recovers its strength, and stretches slightly but uniformly as the load is gradually increased to the maximum. In the case of hard steel, the metal ruptures under the maximum load, but the soft steel continues to stretch for a little while beyond that point under a decreas¬ ing load, with a great reduction in the sectional area

of the specimen. To determine the amount of elongation produced by the test, the frac¬ tured ends of the two pieces of the broken bar are put together and the increase in the lengths of the original inch spaces marked on the bar are measured. In very hard steel, the amount of elongation is very small, but even the hard¬ est and most brittle varieties undergo a meas¬ urable change of length. In soft steel it is very great, varying from 25 to 30 per cent of the original length. The behavior of a specimen in the testing machine when subjected to a gradu¬ ally increasing load is studied by means of a stress-strain diagram which consists of two sets of parallel lines intersecting each other at right angles. The horizontal lines represent the strains in pounds per square inch of the sec¬ tional area of the specimen, and the vertical lines represent the amount of elongation of the

specimen at the rate of 0.01 per inch of the original length. When the data obtained by the test are plotted upon the diagram, the behavior of the specimen is indicated by a characteristic curve. Assuming an original length of six inches (between the grips of the machine) for a specimen the behavior of soft steel under a gradually increasing load may be briefly sum¬ marized as follows : Up to a load of 40,000 pounds to the square inch the elongation is very slight, about 0.01 of an inch in a length of six inches. From 40,000 to 43,000 pounds the elongation is more rapid, but the total amount is only 0.02 of an inch. From this point the metal stretches very rapidly with no increase of load until the elongation -amounts to 0.15 of an inch, then it apparently regains some of its strength and stretches slowly and uniformly until the elongation amounts to 1.96 inch, or 33 per cent of the original length, under a maxi¬ mum load of 63,000 pounds to the square inch. An analysis of these results shows that it would require a load greater than 40,000 pounds per square inch to induce a permanent set in the metal, and is, therefore, the value representing its ((elastic limit,® or the limiting stress below which there is practically no change in the original length of the metal, no matter how often that stress may be applied or removed.

It is generally assumed that a constant pro¬ portion exists between stresses and strains. This relation is expressed by the term ((limit of proportionality,® and represents the limit be¬ low which each increase of a given amount in the load results in the same change in the length of the specimen. It agrees very closely with the elastic limit, but it is not considered an important factor in engineering

calculations, while on the other hand the coefficient or mod¬ ulus of elasticity, based upon the theory of the proportionality between stresses and strains, and obtained by dividing the stress on each unit of area of the section by the resultant strain in each unit of length, of a specimen, is extensively used in calculations pertaining to the deflection of beams and springs. The coefficient of elas¬ ticity for all grades of steel is practically the same, about 29,000,000, and very delicate meas¬ urements are required for its determination, so much so that the values obtained by different observers vary considerably, and places its exact value very much in doubt. For similar reasons, the determination of the exact value of the elas¬ tic limit of a metal is a very difficult matter, and as a rule the values stated as the elastic limit, in the reports of tests of specimens, sent out from rolling mills, is really the "yield point® of the metal, or the point at which the specimen suddenly elongates without any increase of the load, and although it is not theoretically as cor¬ rect a gauge of the property of the metal as the true elastic limit, it is really a more re¬ liable guide to the manufacturer and user, on account of the ease and accuracy with which it is determined by simple practical methods, and the fact that in good engineering practice structures are not intentionally designed to sus¬ tain a stress as high as the true elastic limit.

Relative to the ultimate or breaking strength of the metal, the tests show that the speci¬ men continues to elongate under a decreas¬ ing load after the maximum load has been

applied, so that owing to the reduced sectional area the stress under which the specimen finally breaks is generally much less than the maxi¬ mum, and represents the "tenacity,® rather than the ultimate breaking strength of the metal. High elongation indicates a metal of good mal¬ leable and ductile quality, and if produced under a cold test shows that the metal is especially suitable for boiler plate, rivets, etc. Another element considered in the tensile test is the character and appearance of the fracture. It often takes a form described as "cup® or "half¬ cup,® in which one of the ends is wholly or in part concave, while the other is correspondingly convex. In other cases, especially with flat bars, the fractured ends are quite flat and smooth, but with their surfaces making an angle of 45 degrees with the length of the bar, instead of a right angle, as in the case of the former. In hard steel the surfaces present a rough crystalline appearance, while in soft steel they have the glossy appearance of woven silk, or bundles of fine silk fibres. Although the char¬ acter of the fracture is always noted in connec¬ tion with the other data derived from the test, it is seldom made an important requirement in specifications owing to the impossibility of de¬ termining a fixed standard of comparison.

Compression tests are made by the same ma¬ chine in slightly different arrangement so that the hydraulic power is pressure instead of pull.

Cold bending tests are useful for the pur¬ pose of determining the ability of steel, or any other metal, to withstand severe distortion, when the metal is cold, under such operations as punching, shearing, flanging and riveting, usu¬ ally employed in the manufacture of bridge members and structural shapes in general. The test does not require an expensive or elaborate plant for its application, and is, therefore, avail¬ able where more complete tests are impracti¬ cable. On the other hand, however, it is very difficult to deduce accurate conclusions from the data obtained, owing to a lack of proper clas¬ sification and standards of comparison. In making the test, the metal in each case is bent over upon itself through an angle of 180 degrees. The inner radius of the bend varies from 0, in steel with a tenacity less than 62,000 pounds per square inch, to the “thickness of the specimen® in steel with a tenacity not greater than 70,000 pounds per square inch. The specimen is re¬ quired to stand the bending without fracturing on the outside of the bend. The test for hard¬ ness is applied by pressing or driving a hard¬ ened steel ball into the material so as to pro¬ duce a dent. The diameter of the ball used is commonly 10 millimeters and the standard pres¬ sure used is 3,000 kilograms. The diameter of the indentation is then measured. Two in¬ dentations are usually made not far apart on the specimen being tested. The formula ap-

p'ied Xi-otTS- th,s EIVing thehard-

ness number in the Brinell scale. It has been objected to these ball tests that the tendency of the pressure is to raise up a cup-shaped rim of steel around the ball and above the level of the test specimen, and that the diameter meas¬ ured will thus be of the raised cup. To obviate this a delicate instrument has been devised to measure the depth of the indentation below the level of the tested surface, and from this to

calculate the true diameter. Another method of applying this ball test is by a falling ham¬ mer which carries the ball upon its face. The standard weight of the hammer is 1.76 kilo¬ grams, and the drop may be any distance up to 90 centimeters. Several tests are made at

different falls, and the results correlated. A variation of this test substitutes a cone-shaped point with an angle of 9Q degrees for the spherical ball. This also is applied by a stand¬ ard pressure or by the falling hammer, and a closer accuracy is claimed. As determined by these methods the Brinell hardness numbers for the commoner grades of steel are as follows:

Mild steel . 120.

Boiler plate . 128.

Rail steel . 183.

High carbon steel . 236.

Cast iron . 213.

Another method of testing steel of great accuracy in the hands of an expert is the <(spark test.® This is applied by pressing the sample of steel for an instant firmly against a sharp emery wheel revolving 7,000 feet per minute. To the educated eye the kind of sparks emitted indicate with great certainty not only the proportion of carbon in the sample, but the several alloys with tungsten, manganese or chromium.

Other tests are made for endurance of steel samples, especially that used in the automobile industry. Such steels are tested for fatigue, being subjected again and again times without number to the same kind of strain, and also to shocks which they must safely withstand in the ordinary use of a car. These tests are ap¬ plied by automatic machines acting unceasingly for many hours. Another test of great import¬ ance in automobile steel is the abrasion test for wear.

In some cases torsional and shearing tests are made, but these stresses are not commonly expected. The impact test is more often em¬ ployed, applied by means of a heavy, swinging pendulum, or by an oft-repeated drop of a weight upon a bar supported at the ends. The tests of finished steel are similar to those made in the mills during the process of manufacture, with the exception of the methods employed in the preparation of the test specimens. These are cut directly from the finished product in the form of rectangular pieces 10 inches in length, in the larger kinds of work, while small bars are generally tested full size. Consult Bullen, D. H., (Steel and Its Heat Treatment (New York 1918).

STEEL, THEORIES OF HARDENING.

That steel has the property of hardening when suddenly cooled from a bright cherry heat has been known for centuries. The origin of steel hardening cannot be traced definitely, but Homer refers to it and Pliny, the Younger, describes a method which, in its main points, is general practice to-day. (Otto Vogel in Stahl und Eisen, 1899, p. 242). During the 15th and 16th centuries the practice grew to be an art and great secrecy and superstition were attached to it. Quaint and curious methods were evolved and the secret was hoarded and handed from generation to generation. Even to this day, in some sections, the same old type superstition exists among some of our own blacksmiths, and it is quite common to meet

with one whose ideas and practices are identi¬ cal with those followed in the Middle Ages.

Many of the mechanisms of what happens during the process known as hardening have been studied and are known, but the real reason of why steel hardens is still in doubt. The very fact that there are at least seven distinct theories, in vogue to-day advanced by as many eminent metallurgists, is mute evidence of the fact that we are in the dark regarding this rea¬ son. Sir Robert Hadfield (Farady Society, November 1914) in discussing these theories says : ((I cannot say that there is one which throws light on what really happens when a piece of carbon steel is changed from a soft to a hard condition.® Dr. J. E. Stead (Farady Society, November 1914) expresses the opinion, ((We have not sufficient data upon which to found any definite conclusion as to the process known as the hardening of steel by quenching,® and Albert Sauveur (International Engineering Congress, September 1915, San Francisco), ((It will likewise be obvious that no theory so far presented fully satisfies our craving for a scientifically acceptable explanation of the many phenomena involved.® H. M. Howe (Farady Society, November 1914) says <(Each of these theories has its difficulties,® and Rosenhain ((Study of Physical Metallurgy, > p. 180) says regarding Martensite (the normal constituent found in normally hardened steels), (<The ques¬ tion (What is Martensite ?} cannot be answered quite conclusively, particularly as several rival views are in the field.®

In the usual practice followed in hardening a piece of ordinary carbon steel the operation is an extremely simple one. It consists of heating the piece to a predetermined tempera¬ ture, holding at this temperature for a length of time sufficient for the entire mass to be evenly heated and then suddenly cooling it. The cooling is usually done by immersing in a liquid, usually water or oil.

The simplest steel has at least two constitu¬ ents, one iron or ferrite, and the other a carbide of iron or cementite, and, in order to gain an inkling of what transpires, it is necessary to study the properties of these two constituents.

If we plot a cooling curve of pure iron, we find that at 898° C. and 768° C. marked evolu¬ tions of heat occur, indicative of a change in the physical properties (see Fig. 1), while, if carbon be present, as in steel, a third evolution of heat occurs at 690° C. (see Fig. 2).

Floris Osmond (Journal Iron and Steel In¬ stitute, No. 3, 1906, p. 444), in a series of brilliant researches first brought out the momentous discovery that iron exists in three separate and distinct allotropic modifications. At all temperatures up to 768° C. pure iron or ferrite exists in the Alpha condition. Be¬ tween this temperature and 818° C. it is in the Beta condition, and above 898° C. it exists in the Gamma condition. In each of these three conditions the physical properties are entirely distinct. Crystallographically, they are all of the cubic system, but the Gamma iron assumes the octahedra while the Beta and Alpha assume the cube. Twin crystals are frequent in the Gamma, but the Beta and Alpha are free from them. Alpha iron is magnetic, and the change from Alpha to Beta is accompanied by an abrupt change in the electrical conductivity, strength and hardness and crystalline form. On cooling,

changes occur which are the reverse of, and appear at very, nearly the same temperatures as, those on heating. The points on heating are known as the AC3 and the AC3; on cooling, as the AR3 and the AR2. When carbon is present, a third evolution on cooling takes place at about 700 C. which is known as the ARi and the reverse as the ACi. The ranges in which these changes occur are known as the critical ranges.

The carbon in steel exists in the form of a definite chemical compound known as cementite which has the chemical formula Fe3C. It crys¬ tallizes usually in flat plates or needles which in some cases coalesce into the form of granules. It is the hardest constituent of steel and is at¬ tacked by ordinary reagents less than the other constituents.

(Sauveur, (The Metallurgy and Heat Treat¬ ment of Steel/ p. 308).

I.

RETENTION

THEORIES

A.

B.

C.

Solution

theories

Carbon

theories

a. .Beta iron or aiiotropic tneory, Osmond.

b. Alpha iron theory,

H. LeChatelier.

Amorphous iron theory, Humphrey.

' a. Hardening carbon theory, b. Sub carbide theory,

Arnold.

A. Early stress theory, Andre LeChatelier.

B. Interstrain theory, McCance.

C. Twinning and amorphous iron theory,

Carpenter and Edwards.

I. The Retention Theories base their ideas on the claim that a condition or set of condi¬ tions existing normally above the critical range

II.

STRESS

THEORIES

Fig. 1. — Inverse Rate Heating and Cooling Curves of Pure Fig. 2. — Inverse Rate Heating and Cooling Curves of Mild Iron. (Burgess and Crowe, Transactions American In- Steel. (.106 Carbon) (Rosenhain and Humphrey, Jour-

stitute Mining Engineers, XLVI, 1913). nal of the Iron and Steel Institute, LXXXVII, p. 232).

Cementite and ferrite are the two most im¬ portant constituents of steel, and it is, therefore, their inter-relation which we must study in order to understand what is transpiring, con¬ stantly bearing in mind that the ferrite can and does exist in three different aiiotropic condi¬ tions depending upon the temperature. At ordinary temperatures cementite and ferrite exist together as completely decomposed con¬ stituents, and, in the lamellar condition, ar¬ range themselves in tiny flakelets. Upon heat¬ ing to the Gamma range of temperatures, cementite dissolves in the Gamma iron with the result that there is formed a constituent known as austenite. In only special cases can this be preserved at ordinary temperatures be¬ cause it is extremely unstable and breaks down into martensite, this latter being the usual constituent found in ordinary hardened steel.

There are two sharply defined schools at¬ tempting to explain the problem of hardening, and below is given classification in tabular form.

are, by sudden cooling, retained as such or a transformation therefrom, which state is un¬ stable and, upon tempering or reheating, tends to revert to the original or normal condition.

I A. The Solution Theories claim that the constituents or a part of the constituents ex¬ isting normally at ordinary temperatures, on heating pass into a solid solution and are re¬ tained in this state upon sudden cooling. The idea of one solid dissolving another solid may be new to some readers but under certain con¬ ditions this is true. As an example, gold and silver are mutually soluble in each other in all proportions.

IAa. The Aiiotropic Theory claims that the hardness of steel is due to the presence of Beta iron. The followers of this theory be¬ lieve that, on heating, the cementite dissolves in the Gamma iron and, on sudden cooling, the Gamma iron immediately breaks down, forming a certain amount of Alpha iron but mostly Beta iron which still retains the cementite in solu-

tion. They believe that the cementite in solu¬ tion simply (as Howe puts it) acts as a brake on the Beta iron and prevents it from entirely reverting to the Alpha iron. Were it possible to obtain Beta iron by means other than the solution of the cementite, the material would still be hard. The allotropists are also of the opinion that, in the transformation from the Gamma to the Beta, the internal pressure may contribute to the final hardness.

IAb. The Alpha Iron Theory denies the presence of Beta iron entirely, and explains that the hardness is due to the fact that, on cooling, the Gamma iron with the cementite in solution changes directly to the Alpha form, which latter still retains the cementite in solution. This theory has little or no standing, since the careful and thorough experiments of Dr. G. K. Burgess (Bureau of Standards, Scientific Paper, 1914) have proved conclusively the pres¬ ence of Beta.

IB. The Amorphous Iron Theory was brought out by J. C. W. Humphrey and sec¬ onded by Rosenhain (Rosenhain, (Study of Physical Metallurgy,) p. 181). The followers of this theory believe that the hardness of steel is due to the presence of an intrinsically hard but unstable product, amorphous iron. ((The Gamma iron crystals, in passing through the transition temperature, break up, leaving the molecules temporarily in a chaotic (amorphous) con¬ dition pending their reorganization into crystals of Alpha iron and cementite, and it is only this rearrangement which is stopped by the rapidity of cooling.® Rosenhain believes fur¬ ther that the breakdown of the Gamma crystals occurs only around the boundaries of the grow¬ ing crystals of Alpha iron.

IC. The Carbon Theories claim that the hardness is due to the retention in the cold of a very hard form of carbon.

ICa. The Hardening Carbon Theory claimed that the hardness of steel was due to the pres¬ ence of hardening carbon, which was stable only above the critical range. This theory is now pretty much discredited.

ICb. The Sub-Carbide Theory. — Arnold be¬ lieves in the existence of a carbide FewC, which he has named hardenite, and that it is due to the retention of this constituent that steel owes its hardness. He establishes the identity of this carbide by an indirect method and the theory has little support to-day.

IIA. The Early Stress Theory. — When steel is heated to its critical range it expands at a rate which is approximately directly propor¬ tional to the temperature change. On passing through the range it contracts. Then, on heat¬ ing above the range, it again expands, but at a rate greater than it did before. (LeChatelier, Contribution to l'Etude des Alliages/ p. 386). On cooling, the reverse occurs and the stress theories attempt to explain the hardening as being due to the immense strains set up there¬ upon.

IIB. The Interstrain Theory. — McCance says (Journal of the Iron and Steel Institute, 1914, No. 1, p. 233) : (<On quenching steel the carbon is retained in solution and, in turn, it retains a portion of . the iron in the Gamma condition, but the majority of the iron is Alpha iron. At the quenching temperature, the crystalline grains had the crystalline symmetry of Gamma iron, and the Gamma iroia retained. in .the

quenched state by the carbon will form an in¬ ternal network in these original steel grains. The units of the iron will be transformed and will form crystal units of Alpha symmetry, but these will be prevented by lack of time, by in¬ ternal friction and by the Gamma iron network from arranging themselves to form homogene¬ ously orientated Alpha iron crystals. . The Alpha iron will thus be in a condition similar to interstrain and great hardness will result.®

IIC. The Twinning and Amorphous Iron Theory. — Professor Carpenter and Edwards advance the theory that <(In the operation of quenching, the normal heat of the carbide, or other similar change is retained in the rapidly cooled material and, when the change is sup¬ pressed in this way, severe internal stresses are set up and these cause internal straining of the material.® That this is a fact is proved be¬ cause the ((Metallic crystals are broken up into an exceedingly large number of twin lamellae.®

There is a further type of hardness which is common to metals including steels which is dif¬ ferent in many respects from the hardness pro¬ duced by sudden cooling. This is the well- known hardening effect of cold working, such as hammering, swedging or cold drawing.

Howard J. Stagg,

Metallurgist, Halcomb Steel Company, Syra¬ cuse, N. Y.

STEEL ALLOYS. See Chemistry, Prog¬ ress of; Steel, Special or Alloy.

STEEL ARMOR PLATE. See Armor Plate.

STEEL BRIDGES. See Bridge Con¬ struction, Modern Methods of.

STEEL CAR INDUSTRY, The. The

building of steel railroad cars is recognized as one of the most prominent of our industries. European countries were pioneers in the use of iron cars, and as early as 1861 we find records of cars with iron bodies being built in France, while in India, iron was substituted for wood at an early date, as the latter material was par¬ ticularly susceptible to the attacks of ants and other insects, which condition necessitated the use or iron or steel in the construction of equip¬ ment for use on the railroads of that country. In other foreign countries the selection of iron for this purpose was undoubtedly governed largely by the comparative cost of iron and wood, which in many instances favored the use of the former material, and also for the reason that climatic conditions in many of these countries are such that wooden cars rapidly dis¬ integrated. To the American engineer, how¬ ever, should be given the credit of foreseeing the possibilities of steel in car construction, not solely from a constructive standpoint, but as a scientific solution of the problem of economical transportation. The successful operation of a railway is dependent on the relative cost of transportation, and the use of steel in car con¬ struction has made it possible to decrease to the minimum the percentage of dead weight to that of paying load. The progress made in the proper appreciation of the stresses to which the different parts of a car are subjected has re¬ sulted in great improvements, providing ample strength for the duties imposed on the several parts, eliminating superfluous material where it may be done without detriment to the car as a

whole, thus producing, in steel, cars of minimum weight and maximum strength. This favorable comparison of percentage of dead weight to paying load is much more evident in the higher capacity cars, where the full benefit of the dif¬ ference in strength between wood and metal may be realized.

The capacity of freight cars in this country has been continually on the increase, and con¬ stant efforts are being made to reduce the rela¬ tive proportion between weight of car and weight of lading. Up to 1876 the average freight car had a carrying capacity of 20,000 pounds, while the ratio of paying load to total* weight of car and lading was about 47 per cent. In 1880 the capacity had been increased

to 40,000 pounds, and the ratio of paying load to 60 per cent ; in 1883 to 50,000 pounds and 65 per cent; in 1889 to 60,000 pounds and 66 per cent ; in 1895 to 80,000 pounds and 68 per cent ; and in 1903 to 100,000 to 110,000 pounds and 75 to 79 per cent, respectively.

In the catalogue of all-steel cars manufac¬ tured in 1918, the largest load capacity is that of the 120-ton gondola car. It is 50 feet in length, 9 feet 8 inches in width and with walls

7 feet 4 inches high above the floor level. This car weighs about 74,000 pounds and with its full load represents a total weight of 314,000 pounds — the paying load approximately 77 per cent. The standard all-steel 50-ton box (freight) car varies in weight from 43,100 pounds to 52,600 pounds. It ranges in inside length from 36 feet to 40 feet; from 8 feet 6 inches to 9 feet in inside width, and from

8 feet 4 inches to 9 feet 2 inches in inside height. The higher weight car carries a paying load of 70 per cent of the total weight; the heavier car a paying load of about 66 per cent. Hopper cars for coal carry 100 tons upon a car weight of 60,000 pounds to 75,300 pounds, the paying load thus ranging from 77 to 73 per cent of the total rolling weight. The 100-ton flat car and the 110-ton well-hole car, weighing respectively 90,000 pounds and 92,000 pounds, have still lower paying efficiency. However, when durability is considered, the heavy cars are more economical in the long run, and with their far greater burden serve to roll up the record of ton-miles with far greater rapidity than the light car of smaller burden. The modern all-steel passenger coaches range in weight from 116,000 to 146,000 pounds, and the dining-cars, the heaviest of all standard coaches, reach 175,000 pounds.

The general introduction of the steel car was not accomplished without serious opposi¬ tion; first, from those who were directly in¬ terested in the manufacture of wooden cars; and second, from those who were skeptical as to the advisability of adopting steel as a vehicle of transportation, exposed to the action of in¬ jurious elements which might cause a rapid de¬ terioration of the metal and a consequent reduction in strength. However, up to the present time no serious effects from this cause can be noticed in the cars now in service. If proper attention is given to the method of con¬ struction and weight of metal used, and all parts are thoroughly painted at the time of manufacture to protect them from corrosion, and if after the cars are placed in service care is taken to repaint them when necessary, it is

fair to presume, judging from the present con¬ dition of the earlier steel cars built in this country, that we may reasonably expect an average length of service from the steel car of at least 30 years, or fully twice as long as the service obtained from cars of wood construction.

The steel car industry may be correctly said to date its origin in this country from the year 1896, although the records of the Patent Office show that patents were granted to citizens of this country, as well as of foreign countries, for cars made entirely of steel or other metal, as early as 1854, and it is also true that prior to this time cars of metal, or a combination of metal and wood', had been constructed and put in service in this country; but these early ef¬ forts had little in common with the modern steel car, now standard on many of our leading railways. Previous to the year 1897 many cars had been constructed in this country of steel or iron, but were built for special service by the several railroads, mainly for the purpose of facilitating the transportation of heavy ma¬ terials, where the load was more or less con¬ centrated, such as wire cables, guns, bridge gird¬ ers, etc. In the design of such special equip¬ ment no particular attention was given to the consideration of a reduction of the weight of the component parts, with the result that most of these earlier metal cars were excessively heavy and not suitable for general service.

Iron-box cars were used as early as 1862, these having been built by the Baltimore and Ohio Railroad and weighed 18,000 pounds, with a capacity of 30,000 pounds. Later, in 1869, the Lake Shore and Michigan Southern Railroad placed in service flat cars with iron channel sills, and the New York Central and Hudson River Railroad had several metal cars run¬ ning on its road as early as 1873. In these cars the substitution of iron for wood was more particularly confined to the underframing of the car, the superstructure, if any, being of wood. In connection with these early types of metal underframes mention may also be made of steel underframes for carrying water tanks of locomotives, which were in use as early as

1.

It was not until 1887, however, that metal underframe cars were placed in service in any considerable numbers, these being built under patents owned by the Southern Iron Car Com¬ pany, who constructed several thousand steel- underframe freight cars, including box cars, hopper bottom gondola cars, flat cars, etc. These underframes were of

the iron tubular type, being formed by the assemblement of different sizes of wrought-iron pipe, tied to¬ gether by means of threaded connections, so as to form a light and compact structure. How¬ ever, in actual service it was found that the connections would rapidly loosen, thus destroy¬ ing the strength of the whole, and after only a comparatively short time the construction of cars of this type was entirely abandoned. From this time on numerous experimental cars with steel underframing were built, but the unsatis¬ factory results derived from the tubular under¬ frame undoubtedly retarded the adoption of the modern type of steel underframe car. The Penn¬ sylvania Railroad in 1887 built a number of cars having steel underframes which were de¬ signed to carry a concentrated load of 120,000

pounds, and a steel fireproof car was built in 1889 at the shops of the Louisville, New Albany and Chicago Railroad. The Chicago, Burlington and Quincy Railroad, about the year 1890, placed in service a steel car of 60,000 pounds capacity, constructed from designs of the Harvey Steel Car Company.

In 1894 the Carnegie Steel Company ordered from the Fox Solid Pressed Steel Equipment Company, of Joliet, Ill., a number of steel-flat cars of 80,000 pounds capacity, to be used in service about its mills for the transportation of heavy billets. These were built entirely from pressed steel shapes and embodied in their de¬ sign special features of pressed-steel work, be¬ ing similar in this respect to cars then being built by the Leeds Forge Company of England, both the Fox Solid Pressed Steel Equipment Company and the Leeds Forge Company being controlled by Sampson Fox, who was the orig¬ inator of pressed-steel shapes in car construc¬ tion. Up to this time, 1894, the possibilities of the use of steel in car construction, it is fair to state, were not fully appreciated by those con¬ trolling the design and operation of railroad equipment, and to the Carnegie Steel Company should be given the credit for properly placing before the railroad world the possible advan¬ tages to be derived from the use of an all-steel car. The interest displayed by the Carnegie Company was no doubt largely the result of a desire to increase the demand for its product by providing additional avenues for the con¬ sumption of steel plates and shapes. The argu¬ ments at the time set forth in favor of the use of steel for freight-car construction, and all which claims experience has since verified, were lightness, durability, strength,

greater propor¬ tion of paying load to total weight of car, re¬ duced cost of maintenance, less liability to dam¬ age and greater salvage value.

To further exploit the possibilities of steel in car construction the Carnegie Steel Com¬ pany in 1896 had -built at the Keystone Bridge Works three all-steel cars, one of these being a steel-flat car and two self-clearing hopper cars, in which the floors are inclined from the ends downward toward the centre and at the bot¬ tom of these inclines doors being provided, which, when opened, permit the load to dis¬ charge by gravity. These cars were exhibited at the conventions of the Master Car Builders and Master Mechanics' associations, held at Saratoga in Tune 1896, and elicited the interest of car builders and railroad men throughout the country. Rolled plates and shapes, which could be purchased in the open market and all of which constituted the product of the Car¬ negie mills, were used in the construction of these cars.

Previous to this time the Schoen Pressed Steel Company, of Pittsburgh, Pa., had for a number of years been manufacturing various parts of cars by pressing plates into special shapes. This company was the first to intro¬ duce a design of an all-steel self-clearing hopper bottom coal car built entirely from pressed shapes, these being built under patents issued to C. T. Schoen and J. M. Hansen. The prompt and extended adoption of the all-steel car is undoubtedly due to the aggressive policy pur¬ sued by this company and its successor in the introduction of its product. The designs for

these cars were placed before railroad engineers shortly after the exhibit of the cars built at the Keystone Bridge Works for the Carnegie Steel Company. The Carnegie Steel Company, own¬ ing and operating the Pittsburgh, Bessemer and Lake Erie Railroad, extending from Pittsburgh to Lake Erie, decided to place in service on this road enough cars to thoroughly demon¬ strate the possibilities of cars built of steel, and early in 1897 placed with the Schoen Pressed Steel Company an order for 600 self-clearing steel hopper cars of 100,000 pounds capacity, it being specified that 400 of these cars were to *be of the structural design originally prepared by the Carnegie Company's engineers, and 200 to be of the pressed steel design advocated by C. T. Schoen. At the time of the placing of this order, it may be interesting to note that there was no industrial establishment in the country specially equipped for the construction of steel cars and the Schoen Pressed Steel Company was not able to turn out one com¬ plete car per day. Upon being awarded this order, however, those interested in the Schoen Pressed Steel Company, of which C. T.

Schoen was the executive head, immediately arranged for the extension of its plant and carried on the work of enlargement simultaneously with the construction of the cars, with the result that the entire order for 600 cars were com¬ pleted in nine months, the first car having been completed in June 1897.

Following the order of cars for the Pitts¬ burgh, Bessemer and Lake Erie Railroad, the Pittsburgh and Western Railroad placed with th-e Schoen Pressed Steel Company an order for 450 pressed steel self-clearing hopper cars of 100,000 pounds capacity. These two orders marked an epoch in car construction and rail¬ way freight transportation and the steel car industry was firmly established, and has since grown with phenomenal rapidity. As already stated, the cars for the Pittsburgh, Bessemer and Lake Erie Railroad were of two different designs, one employing rolled sections and the other pressed shapes. As both were along radi¬ cally different lines from previous designs of either wood or .metal cars a general description of both types may prove of interest.

The cars designed by the Carnegie Steel Company were what is known as the hopper bottom type of car, the cubical capacity being about 1,400 cubic feet. The centre sills con¬ sisted of two 15-inch I b-eams, and the side sills were 12-inch channels with their flanges placed inward. No intermediate sills were used. The plates forming th-e sides of the car extended to the bottom of the side sill channels, and were riveted to the web of same. This latter form of construction was employed on the first sample car, but on later cars was modified by omitting the channel side sills and riveting an angle along the lower edge of the side plates, a second angle being riveted to the plates about 18 inches higher up, both angles extending the full length of the car. The body bolster was of a built-up latticed girder type, and the floor of the car was made up of inclined steel plates and a cross-hood placed at the centre of the car. This car weighed about 37,150 pounds. The car made of pressed steel was similar in general appearance to the above described car, but differed materially in the d-etails of con-

struction. The centre sills were made of plate, pressed to channel form, being 17 inches deep at the centre and tapering to 10 inches deep at the bolsters. The side sills were of similar con¬ struction, and the side plates were flanged at both top and bottom, the bottom flanges being riveted to the top flanges of the side sills. The body

bolsters also were of pressed steel, being trough-shaped in form. This car weighed about 34,350 pounds.

At about the time the order for the Pitts¬ burgh, Bessemer and Lake Erie cars was placed the Pittsburgh and Lake Erie Railroad was de¬ signing a hopper car along somewhat similar lines to the cars designed by the Carnegie Steel Company, and a sample car in accordance with these designs was built by the Youngstown Bridge Company, this car being completed and placed in service about March of 1897. In this car the centre sills consisted of 15-inch I beams, the sides of the car being built-up plate girders, with diagonal reinforcing angles extending from top to bottom and stiffening angles ex¬ tending the length of the sides being riveted to the ujf>per and lower edges, thus forming a girder which was designed to carry the entire load. In order to reduce the weight of the car the side sheets below the floor line, from the bolsters to the ends of the car, were cut out. This car was of 100,000 pounds capacity and weighed 35,500 pounds. No pressed shapes whatsoever were used in its construction.

Up to this time all the cars built by the Schoen Pressed Steel Company were of the hopper bottom type, but the value of steel in freight car construction having been fully dem-r onstrated, orders for other types followed in rapid succession, so that to-day practically all forms of freight cars, including hoppers, flat bottom gondolas, flat and ballast cars, have been constructed from steel in large numbers.

The adoption of the idea of maximum train loads, and the consequent enormous increase in the tractive power of the locomotive, served to further increase the popularity of the steel car, as it early became ’evident that the draft rigging and underframe construction of the wooden car would prove inadequate for the severe service to which they were subjected. As a consequence many cars of the box, stock and gondola types were built with steel under¬ framing and having a superstructure of wood as a substitute for the original all wood struc¬ ture. Cars of this type have given very satis¬ factory results in service, as with the com¬ bination all the desirable features of the wooden body are retained, while the under¬ time is sufficiently strong to resist the most severe buffing and pulling strains. A further advance in the substitution of steel in cars of the combination type has recently been made by the use of steel posts, braces, plates and car¬ lines as a substitute for those of wood, thus producing a complete steel frame car.

The successful results obtained from the introduction of rolled steel as the basic ma¬ terial in many large engineering enterprises warranted

its careful consideration in the in¬ fancy of steel car construction, and when the Carnegie Steel Company specified that the major portion of its first order for steel cars was to be constructed of rolled section, it is evident that from the very beginning it was

recognized that the ideal car would be one made throughout of standard commercial shapes. As pressed steel, however, admitted of the pro¬ duction of shapes of the ’exact form desired, and the early development of the steel car being in the hands of those predisposed in favor, and interested in the manufacture, of pressed steel parts, it is natural that great progress was first made in the perfecting of this latter type of construction, while the car made of rolled sec¬ tions remained for th>e time in its original crude state, being clumsy and heavy when com¬ pared with the more highly developed pressed steel car. The advantages of constructing a car from a few standard commercial shapes, easily obtained in the open market, especially when considering the question of repairs, rather than from numerous special parts, re¬ quiring expensive machinery in their manufac¬ ture, were too manifest, however, to permit of being long ignored, and that it was possible to build cars from standard rolled sections, hav¬ ing all the advantages of light weight and maxi¬ mum strength claimed for the pressed steel car, has been fully demonstrated by the later de¬ velopments of the art, and is amply evidenced by the numerous structural steel cars now in service which compare favorably with the pressed steel types in the matters of lightness, strength and simplicity of construction.

With the increasing demand for the steel car it is natural that a very inviting field for the investment of capital was disclosed, with the result that we have to-day in the United States a score of large corporations actively en¬ gaged in this line of manufacture. The Penn¬ sylvania Railroad builds its own steel cars, both passenger and freight designs ; and several other railroads build freight cars for their own use. Besides the very large domestic trade the steel car builders have developed a profitable and growing export trade which is destin-ed to be much larger in the near future, as the Bel¬ gium production, heretofore the chief com¬ petition in the foreign markets, must necessarily be small for several years to come.

J. M. Hansen,

President, Standard Steel Car Company.

STEEL ENGRAVING. See Engravings.

STEEL INDUSTRY IN THE UNITED STATES. See Iron and Steel Industry in the United States.

STEEL NAILS. See Nails; Steel Wire and Nail Making.

STEEL PIPE. See Pipe, Manufacture of.

STEEL RAILS. See Rails and Struc¬ tural Shapes.

STEEL SKELETON CONSTRUCTION.

See Building in the United States.

STEEL STRUCTURAL SHAPES. See

Rails and Structural Shapes.

STEEL TUBE. See Pipe, Manufacture of.

STEEL TUBING. This is the most mod¬ ern and one of the widest used products of steel. For many years steel tubing was not con¬ sidered entirely satisfactory by manufacturers because the welded parts were not as strong as the rest of the tubing. This difficulty has been overcome and to-day steel tubing finds a re¬ markable market in the manufacturing of auto¬ mobiles, engines, furniture, baby carriages, beds,

boilers, etc. Steel tubing is made from solid or hollow billets or from steel ribbon.

Technology. — There are four methods of manufacturing steel tubing, i.e., lap welding, butt welding, the piercing method and the Lloyd oxy-acetylene method. The lap method has been in vogue for many years, dating back to the period when steel first began to be used. The early manner of lap welding was known as spiral welding. Steel sheets of a desired width were wound spirally to form a tube. The spiral joints were heated and welded by a hammer, although in many cases these joints were cold riveted. An even earlier method of making steel piping was to take two semi-circular pieces of steel and insert the edges into steel bars with grooves in either side. These were held in place by pressure applied on all sides. There was no welding or joining of the semi-circular pieces and the piping thus made was useless

except for underground purposes or in such places where the pressure could be applied at all times. Later came the straight lap welding, where flat steel of a desired width was passed through rolls, drawn over dies and formed with the edges overlapping. Heat was applied and the overlapping edges were hammered or squeezed together. This left the welded part thicker and stronger than the rest of the tube and was never satisfactory for good manufac¬ turing work. In a later method — the flat steel ribbon was heated and the edges were scarfed or bevelled by passing through rolls, drawn through dies and so formed that the scarfed or bevelled edges of the one side of the flat steel fitted into the same edges of the other side. This partly-made tubing was then re¬ heated, passed through rolls with the inner lap resting on a stationary mandrel. The rolls and the mandrel pressed the heated steel to¬ gether and welded it. The rough tubing was then passed through sizing rolls, straightened, rolled on cooling tables and finally forced through straightening machines by hydraulic pressure. Butt welding then came into use, the first process requiring that the entire piece of flat steel be heated to a welding heat and drawn through a conical shaped die, so that square edges were pressed together. Then came the brazing process of butt welding, in which a blow-torch like that of a tinsmith, only with far greater heat, was used to centralize the heat at the square edges where the brazing is to take place. The brazing method is used when very thin tubing is to be made because the heat of the blow-torch is not sufficient to make thicker steel tubing. It is largely used in brass or copper welding, where a heat of from 1,200° to 1,400° is required, while steel needs from two and one-half to several times that heat. The electric process consisted of heating the edges and applying pressure so that the steel is pushed together and welded at the same time. Flat steel is put through conical shaped rollers, bringing the edges of the steel together at the point where electric heat is applied. As the steel is heated the rollers press the edges closer together. This was a decided improvement over other processes of butt welding, but the greater strength and thickness of the welded part made several other processes of rolling, etc., necessary before the tubing was ideal.

The piercing seamless method is the latest and most efficient for producing heavy steel tubing. Solid or hollow billets are heated to about 2,300° and passed through diagonal rolls traveling at a tremendous speed. These rolls work the steel into desired size.. While the billet is passing over the rolls it is pushed against a mandrel which is stationary but re¬ volving 2,400 times per minute. The billet is thus worked into a desired size with a hole through the centre and comes through a tube after many operations. For example, if a two-inch

tubing 46 inches long is desired, a billet three inches round and 26 inches long is heated, passed through the diagonal rolls and at the same time has the mandrel passed through it. When this operation is completed the tubing measures three and one-half inches on the outside with a seven-sixteenths shell. It is then taken to the round rolls where it is elongated and the shell reduced. Then it is cold drawn, hot rolled, pickled, cold drawn, annealed and so on. The lighter the shell de¬ sired the more operations necessary. The piercing method found itself very applicable to the hollow steel billet made first in Sweden, where the molten steel was poured over a core, the latter removed when the steel shell had cooled, thus leaving a round billet with a rough hole through the centre. This made it possible for the piercing method to become much speedier in production.

The Lloyd oxy-acetylene is the latest method of producing thin gauge steel tubing. Until this method was invented thin-gauge tubing was exceedingly costly in comparison to larger gauge tubing, owing to the many more treat¬ ments required in order to get a thin-walled tube. The Lloyd oxy-acetylene method re¬ quires steel ribbons of desired widths. The ribbons are passed through oval-shaped rollers, thus bringing the square edges close together. The partially shaped tubing then passes to other rollers which press the edges very close to¬ gether. At this point oxy-acetylene heat is ap¬ plied at about 2,500° and the welding takes place. It is then polished, cut off to desired lengths and comes out of the machine ready for use. A single machine accomplishes the entire work. The Lloyd oxy-acetylene method differs from the butt welding in that the steel edges are not pressed together and only a very small portion of the partially shaped tubing is heated. So delicate is the operation that a seamless tube is produced in desired lengths without waste.

History. — While the use of iron and steel has become so common in mechanical and structural work as a result of modern ingenu¬ ity, it is hard to realize that nearly five and one-half centuries passed by after the dis¬ covery of iron before steel became a commer¬ cial product. Iron was first found, say his¬ torians, in the pyramid of Gizeh, where it had been placed by builders, most likely as a relic. This same iron to-day rests in the British Museum. So far as is known iron was used commercially for the first time by Assyrians in Egypt. They made various kinds of tools, etc. History shows that for some time before the coming of Christ iron was used in making the implements of war, tools and other articles. It was not until 1350, however, that cast iron

1 The Lloyd Oxy-Acetylene Steel Tube Welding Method and Machine, the only machine in the world that takes flat ribbon steel, rolls it into a tube, welds it, polishes it and cuts it off to proper lengths ready for use. Note ribbon steel

passing into rollers in front of photograph . . ,. ...., , ...

2 The Lloyd Endless Vise, showing how endless tubing can be carried through it to the welding torch, the latter being

shown with its nose between the two endless vise wheels

and steel first made their appearance, when a German metallurgist produced them. The in¬ ventions of the Bessemer process for manu¬ facturing steel opened this metal up to com¬ mercial use. This took place in 1855. The use of steel became an important product in mechanical and manufacturing history very soon after processes for preparing it were in¬ vented. The first known use of steel as a tube or pipe is the Coolgardie pipe-line, 328 miles long and 30 inches in diameter. This pipe was not welded. It was formed by taking ribbon steel and bending into semi-circular shape. The edges were inserted into steel bars with grooves on either side. Heavy pressure was applied on the plates and bars, thus rendering the pipe serviceable. Steel tubing itself was one of the very latest uses of steel owing to the early inability to make welded steel tubing so that the welded portion was of the same strength as the rest of the tube. Later, just the op¬ posite condition arose, but to-day the piercing and Lloyd oxy-acetylene methods have over¬ come all these objections. The early lap and butt welding methods were not satisfactory for high-class work, and it was not until Mannes¬ man Brothers, German by birth, but residents of Landore, Wales, and backed by British financiers, brought out the piercing method. They took round or square steel billets and pierced and rolled them to the size desired. This was a seamless method in which no weld¬ ing was required and, therefore, gave great impetus to steel tubing uses. Improvements on the Mannesman method have been made by W. C. McCool of Beaver Falls, Pa., he being the first to invent a cold draw bench for draw¬ ing cold shafting. R. C. Steifel made other improvements at Ellwood City, Pa. He fol¬ lowed these with new improvements at Shelby, Pa., while George J. Thust added more at Detroit and Milwaukee, where mills were built in which the piercing method was used. The ' great ■

difficulty of the piercing method arose when thin-gauge tubing was required, for the thinner the gauge the more rolling and drawing required. These many operations made the cost of thin-gauge tubing almost prohibitive. It was not until 1910 that Marshall B. Lloyd of Menominee, Mich., solved the problem of the thin-gauge, seamless steel tubing. High prices, long delays and imperfect thin-gauge tubing drove Mr. Lloyd into inventing the Lloyd oxy-acetylene method of making seam¬ less steel tubing. By this method the very thinnest gauge steel tubing is possible, the thin¬ ner the tubing the cheaper the price, due to the fact that under the Lloyd method the real cost of the tubing is the material, while in all other cases the high cost is due to the numerous operations in which labor plays an important part along with material.

George W. Rowell, Jr.

STEEL WIRE AND NAIL MAKING.

The importance of the steel wire and nail in¬ dustry in the United States may be measured by the fact that in 1902 there was produced a total of 1,574,293 tons of wire rods of which nearly 500,000 tons were made into wire nails. In 1909 the production of wire rods was 2,514,- 504 tons, valued at $67,440 000. The 1918 out¬ put is estimated as 3,000,000 tons, of the value of $100,000,000. About one-fourth of this goes

into nails. Time was when both wire and nails were manufactured entirely from wrought iron, and to secure the toughness and high tensile strength required, great care had to be used in the preparation of the iron, the cost of the prod¬ uct being proportionately high. It was only a question of time before steel, because of its less cost and its high strength, became the standard material in this as in other branches of the iron and steel industry; and today practically the whole of the wire and wire nails used are made from either Bessemer or open-hearth steel, the latter being specified where wire of the special grades with higher physical prop¬ erties is required.

Physical Properties of Steel Wire. — As

showing the great increase in strength of steel over iron wire, it may be mentioned that while good black iron wire will show an ultimate tensile strength of about 25 tons to the square inch, and bright hard-drawn wire a strength of 35 tons to the square inch, Bessemer steel wire will stand a strain of 40 tons and open-hearth steel wire 60 tons to the inch. Of the ˆspecial® grades of wire a high-carbon open-hearth

steel will stand about 80 tons, crucible cast-steel wire about 100 tons, and the best cast steel, or as it is sometimes called, ˆplowˆ steel wire, 120 tons to the square inch; while certain qualities of cast-steel wire, made under specifications calling for a particular composition and requiring very elaborate working, have been produced, showing an ultimate breaking strength of from 150 to 170 tons to the square inch. The process of wire-drawing serves greatly to improve the physical qualities, and the smaller the size to which the wire is drawn down the greater is the ultimate breaking strength. The wonderful qualities of piano wire are proverbial, _ the average strength of English piano wire as given by the manufacturers ranging from 225 pounds for No. 12 music wire gauge, which is 0.029 inch in diameter, to 650 pounds breaking strength for No.* 22, which is 0.052 inch in diameter. Re¬ duced to the square-inch unit, the ultimate ten¬ sile strength per square inch would range from 300,000 pounds to 340,000 pounds. The com¬ position of this remarkable wire is as follows: Carbon, 0.570; silicon, 0.090; sulphur, 0.011; phosphorus, 0.018; manganese, 0.425. An analy¬ sis of another wire of unusual strength known as ˆplow,® shows 0.828 per cent of carbon, 0.587 per cent of manganese, 0.143 per cent of silicon, 0.009 per cent of sulphur, 0.030 per cent of copper and no phosphorus. The tests of this wire ran from 200,000 pounds per square inch for wire 0.191 inch in diameter to 350,000 pounds for wire 0.093 inch in diameter. Of course, with such high tensile strength the elongation or stretch was very small, ranging from 0.75 to 1.1 per cent only.

Billet Yard. — The bulk of the wire and wire nails of commerce are manufactured from Bes¬ semer billets. Open-hearth billets are worked up into rods for the manufacture of chain, for special grades of wire and for various finished products in which high tensile strength is called for. In each rod mill billet continuous-heating furnaces are continually at work. The billets, which are 4X4 inches in section and 36 inches in length, are fed transversely into the furnace, side by side. They are pushed through the fur¬ nace door by a hydraulic charging machine, and by the time they have been heated to the proper

temperature for rolling, they are pushed, one after the other, out through the rear door of the furnace and fall upon a conveyor, by which they are carried down into the rod mill.

Roughing Mill. — The roughing mill consists usually of eight pairs of

rolls, in which the billet is reduced from a 4-inch x 4-inch section to a three-fourths inch square section, and it is in this mill that the steel receives the first in¬ stalment of that thorough mechanical working which contributes so greatly to its ultimate tensile strength. Each pair of rolls is placed at an increasing distance from the one that pre¬ cedes it, in order to allow for the increase in length due to the decrease of section of the billet. It has been found, moreover, that by changing the shapes of the grooves in the suc¬ cessive pairs of rolls, making them alternately square and oval, oval and round, etc., there is not only an economy of power secured, but a more thorough working or manipulation of the metal is obtained, and its qualities are propor¬ tionately improved. In the eighth set of rolls, or "pass,® as it is technically known, the grooves are three-quarters of an inch square. From these, the last pair of roughing rolls, the rods are carried to the finishing mill.

Finishing Mill. — In this mill the wire rods are given commonly 10 more passes and brought down to the required dimensions. The finishing mill generally lies at right angles to the rough¬ ing mill; and instead of the rods passing through pair after pair of rolls in a continuous straight line, they pass through the successive rolls in alternating directions, describing half¬ circles between each pair. In order to guide the rods into the proper rolls, workmen stand be¬ tween each pair, and as the rod issues from the rolls it is seized with a pair of tongs, bent around through a half-circle and fed to the next "pass.® Consequently, when a rod mill is in full blast, it presents one of the most in¬ teresting sights. Owing to the rapid decrease in section and increase in length, as the rod passes through the successive rolls, it is neces¬ sary that the speed of the successive rolls be increased; and by the time the rod issues from the tenth roll of the finishing mill, it is travel¬ ing at a speed of 1,350 feet per minute, or about 15 miles an hour. As the whole of the rolling down from the 4-inch x 4-inch billet to the finished rod, which will be, say, 13-64 of an inch in diameter, is done at one heat, it can be understood that the scene is extremely pictur¬ esque. In order to protect the men who stand between the pairs of rolls and direct the course of the rods, a series of curved semi-circular guards or shields are fastened upon the iron floor of the mill. The amount of working to which the steel is subjected, and the great horse power that is required to perform this dutv, may be judged from the fact that the billet, which at the first pass through the mills was 4 inches x 4 inches in section and only 3 feet long, as it issues from the last pair of rolls is a scant quarter of .an inch in diameter and measures no less than 1,189 feet, or not far from a quarter of a mile in length. As the rods leave the last pair of rolls the

ends are caught up and attached to the drums of a set of reels, on which they are wound up into a convenient coil for further handling. As soon as the coil is completed, it is dropped from the

reel onto the floor of a conveyor, by which it is carried to the wire mill.

Wire-Drawing. — Up to this point the product is known by the technical name of “rods,® and it is only after it has been drawn down in the dies that it is known commercially as “wire.® Wire-drawing has the advantage of permitting the production of a much smaller wire than could be produced under the rolls, while the very process of drawing down the wire greatly enhances its physical qualities, in¬ creasing the tensile strength to a truly remark¬ able degree. The wire-drawing machine con¬ sists of a stout bench, on which is mounted a strong cast-iron drum, on which the wire is wound as it is drawn through the plate. The draw-plates, or die-plates, as they are called, are stout blocks of cast steel which are per¬ forated with conical holes, carefully gauged to the exact desired size of the wire. The holes have a slight taper, the wire, of course, enter¬ ing at the larger end of the hole. The coil of wire is placed on a spool located on the floor of the shop near the bench, and the end of the wire having been swagged down is passed through the die-plate and attached to the drum, which then proceeds to wind up the wire until the whole coil has been drawn down. As the wire-drawing is done cold, it can be well under¬ stood that with several score of these machines running at the same time it requires very powerful motive power to drive the mill. An increasing quantity of wire is now drawn to special shapes other than round — some square, or flat, some of D-section, or with a groove, these being adapted to various mechanical uses. After it has been drawn down, it is necessary to remove the strains in the wire, and it is ac¬ cordingly taken to the annealing room, where it is loaded into large annealing pots. After the pot is filled, it is carefully sealed with sand to exclude the air, and the wire is exposed to a steady heat for a period of from eight to nine hours. Of the total product, part is now ready for the open market without any further treat¬ ment, a small portion of it is sent to the gal¬ vanizing room to be galvanized and a large proportion of it goes to the nail mill to be made up into wire nails or barbed wire.

Nail Mill. — In the nail mill each separate machine is capable of turning out from 150 to 500 finished nails per minute. In front of each machine is a reel, upon which the coil of wire is placed. One end of the wire is led into the machine, and as the power is thrown on, one sees the wire disappear through a small hole in the massive vertical

casting; while to the ac¬ companiment of a rapid succession of blows, a stream of the finished wire nails begins to pour out of the side of the machine into small iron boxes placed to receive them. The wire first passes between two pairs of horizontal, grooved wheels, which are pressed firmlv together to give the required tension to the wire as it is drawn into the machine after each finished nail has been formed and cut off. The nail is pointed by the action of a pair of pliers with V-shaped cutting edges and the head is formed up by the action of a very powerful cam- operated member, which strikes a hammer-like blow. As each nail is finished, the wire is gripped and enough of it drawn forward to form another nail. The 3-D fine nails are turned out at the rate of 500 per minute, and the large

O0-D nails at the rate of 150 per minute. The boxes of finished nails are covered up and taken to big, revolving iron cylinders, known as rumblers, where they are rolled over and over, the nails being thrown against each other and against the sides of the cylinders and receiving that high polish which characterizes the finished product. The time during which they are treated in the rumblers varies according to the size and quality of the wire. A certain amount of sawdust is also used during this process in order to clean the nails thoroughly of grease and dirt. The nails are then loaded into 100- pound kegs, stenciled with the size and weight of the nails and the makers' name and taken to the warehouse.

Barbed Wire. — In a barbed wire shop coils of wire, carried on reels, are placed con¬ tiguous to the (<barb® machines. The wire from two spools serves to form the strands, and the wire from the other two spools is used for the ˆbarb.® The two-strand wires, which are heavier than the others, are led between a pair of friction wheels, and drawn to proper tension. They are then met by the two other strands, which are led in transversely, one on either side. At stated intervals of a few inches, ac¬ cording to the spacing of the barbs, a pair of revolving fingers catch the two barb wires and give them a twist around one of the strand wires and at the conclusion of the twist two pairs of shears cut the ends of the barb diagon¬ ally, giving them the desired sharp points. The two wires next pass downwardly around an idler, and then horizontally into a combined winding and twisting frame. The frame itself revolves on a horizontal axis parallel with the machine, and serves by its revolution to twist the two strands. On a shaft arranged trans¬ versely within this frame is carried the barbed- wire spool, on

which the finished product is wound ready for the market. When it is once started the operation is continuous and ex¬ tremely rapid.

STEEL-WOOL, a material largely used as a substitute for sand paper or emery paper, for polishing metal or wood surfaces. It is simply a collection of very fine drawn steel wire waste or minute shavings made in turning steel, the result being a mass that looks and feels like wool, but on close examination what appear to be hairs are discovered to be very fine steel curlings.

STEEL-YARD. See Balance.

STEELE, Daniel, American Methodist Episcopal clergyman, and university president: b. Windham, N. Y., 5 Oct. 1824; d. 2 Sept. 1914. He was graduated at Wesleyan Univer¬ sity in 1848 and held various pastorates until 1862. He was a professor at Genesee College, Lima, N. Y., in 1862-71, and in 1872, upon the organization of Syracuse University, he was elected its first president. He resigned later in that year, however, to resume work as a pas¬ tor at Boston. In 1884-93 he was professor at the Boston University School of Theology, after which he retired. He wrote (A Com¬ mentary on Joshua) (1873) ; (Milestone Pa- pers) (1878) ; Commentary on Leviticus and Numbers *(1891);* <*Jesus Exultant* (1899); (1901), etc.

STEELE, stel, Flora Annie Webster, Eng¬ lish novelist : b. Harrow, Middlesex, 2 April 1847. She lived in India until 1889, was pro¬ vincial inspector of government and aided schools in Punjab, and for several years a member of the educational committee. She was married to a Bengal civilian in 1867. Her publications include (Wide-a-Wake Stories) (1884); (From the Five Rivers) (1893);

(Tales from the Punjab) (1894) ; (On the Face of the Waters) (1895), a work of much power; (The Host of the Lord* (1900) ; (Voices in the Night> (1900), etc.

STEELE, Joel Dorman, American text¬ book author: b. Lima, N. Y., 14 May 1836; d. Elmira, N. Y., 25 May 1886. He was grad¬ uated at Genesee College in 1858, and was later engaged in teaching. He became a cap¬ tain in the 81st New York Volunteers in the first year of the Civil War, saw service in the Peninsular Campaign and was severely wounded at Seven Pines. He was principal of the Newark, N. Y., High School in 1862- 66; and of the Elmira Academy in 1866-72. He was thereafter engaged in preparing text¬ books, in: which occupation he was highly successful. He became a trustee of Syracuse University in 1872, and bequeathed $50,000 to that institution to

found a chair of theistic science. His textbooks were planned for peri¬ ods of 14 weeks' study, and were widely used. He wrote (Chemistry) (1867) ; (Astronomy) (1868) ; < Natural Philosophy* (1869) ; (Ge- ology) (1870) ; (Human Physiology * (1873) ; <Z,oology) (1875) ; (Barnes' Popular History of the United States) (1875). With his wife, Esther Baker Steele, he was author of a series of short histories: (United States) (1872);

(France *(1874) ; (Ancient Peoples) (1883) ; (Mediaeval and Modern Peoples) (1883) ; Gen¬ eral History* (1883) ; <Greece) (1883) ; (Rome) (1884).

STEELE, Sir John, Scottish sculptor: b. Aberdeen, 18 Sept. 1804; d. Edinburgh, 15 Sept. 1891. He received his art education in the Royal Academy, Edinburgh, and also in Rome. In the competition for a statue of Sir Walter Scott he was chosen to execute the seated figure for the Scott Monument in Edinburgh, and from the time of its unveiling (1846) his pro¬ fessional success was assured. Among his best known works, also in Edinburgh, are the statues of Wellington (1852), Professor Wilson, Allan Ramsay, Thomas Chalmers, Queen Vic¬ toria, and the Scottish memorial to the prince consort, on the completion of which (1876) the artist was knighted.

STEELE, Sir Richard, British author: b. Dublin, March 1672; d. Carmarthen, Wales, 1 Sept. 1729. He left Oxford without taking a degree, for some time rode as a private trooper in the dragoon guards, obtained an en- signcy in the foot guards, and wrote as his first comedy, the or (Grief a-la-mode,* which was acted in 1701, with considerable suc¬ cess. Through the recommendation of Addi¬ son, whom he had known at Charter-house, he was appointed, in the beginning of the reign of Anne, to the post of writer of the London Gazette. His comedy of the (Tender Husband) (in which Addison had some hand) appeared in 1703, and his (Lying Lover) in 1704. In 1709 he began the periodical paper so celebrated

under the title of the Tati er (q.v.). The ma¬ jority of the papers in this periodical are by Steele, blit a considerable number are wholly or partly by Addison, and one or two by other writers. Early in 1711 the Taller was succeeded by the still more celebrated Spectator (q.v.). The Spectator terminating, Steele commenced, in March 1713, the Guardian, which was fol¬ lowed in October of the same year by a

politi¬ cal periodical called the Englishman. By this time he had taken to active political life, hav¬ ing been returned to Parliament as member for Stockbridge in August 1713. In March 1714, he was expelled from the House for an alleged libel in the last number of the Englishman, and in another paper called the Crisis. On the ac¬ cession of George I he received the appoint¬ ments of surveyor of the royal stables, and governor of the king's comedians, and was knighted (1715). He again entered the House of Commons as member for Borough- bridge. Always engaged in. some scheme or other, few or none of which succeeded, he wasted his regular income in the anticipation of a greater, until absolute distress was the con¬ sequence. In 1720 his patent as governor of the royal comedians was revoked. He appealed to the public, in a paper called the Theatre, which he had begun to publish at the beginning of 1720, a week or two before the event re¬ ferred to. He was restored, the following year, to his authority over Drury Lane Theatre, and soon after wrote his comedy of the (Conscious Lovers,' on a hint from Terence. This piece he dedicated to the king, who rewarded the author with £500. Consult the (Life) b}f Aitken (1889) and by Dobson (1886), who also edited Se¬ lected Works' (1885).

STEELE, Sir Samuel Benfield, Canadian soldier: b. Purbrook, Ontario, 5 Jan. 1849. He was educated at the British American Commer¬ cial School and at the Royal Military School, Toronto. He served in the Fenian Raid in 1866; in the Red River Expedition in 1870; joined the Canadian Permanent Artillery in 1871, and the Royal North West Mounted Police in 1873, becoming its superintendent in 1885. Lie commanded a body of cavalry and scouts in the second Louis Riel Rebellion in 1885 ; and in 1898 he commanded the Royal North West Mounted Police during the Klon¬ dike gold rush. He served in Africa in the Boer War in 1899-1901, attaining rank as colo¬ nel ; was administrator of the 10th and 13th military districts in Canada in 1907-10; and upon the outbreak of the European War in 1914 he engaged in organizing the troops of Manitoba. In December 1914 he was promoted brigadier-general with rank (of major-general, and became inspector-general for western Canada. He organized, commanded and trained the Second Canadian Division in 1915; and in 1915-18 he commanded the Imperial and Cana¬ dian troops at Shorncliff. He was knighted in 1918. Author of (Forty Years in Canada'

(1915).

STEELHEAD, a fish. See Salmon.

STEELTON, Canada, town in Algoma Dis¬ trict, province of Ontario, 10 miles northwest of Sault Sainte Marie, Mich., on the Algoma Central and Hudson Bay and the Canadian Pacific railways. There are manufacturing in¬ dustries. Pop. 3,936.

STEELTON, stel'ton, Pa., borough, Dau¬ phin County, on the Susquehanna River, the Pennsylvania Canal, and on the Philadelphia and Reading and the Pennsylvania railroads, three miles east of Harrisburg. An electric line connects the borough with Harrisburg. In 1866 the place was laid out under the name of Bald¬ win ; later it was called Steel-Works P. O., and in 1880 it was incorporated under its present name. The chief industrial establish¬ ments of the place are owned by the Pennsyl¬ vania Steel Company, which has bridge and construction works, several blast furnaces, and rail and blooming mills. Other manufactories are lumber mills, several flour mills, brick yards and machine shops. The public school was erected by the Steel Company. The national bank has a capital of $75,000. Pop. 13,428.

STEEN, stan, Jan Havickz, Dutch painter: b. Leyden, 1626; d. 1679. He studied under Nicolas Knupfer, Van Ostade, and Van Goyen, and married the daughter of the latter. From the conflicting accounts of his career it appears that he was at one time a tavern-keeper, and the tradition is that he led a drunken and dis¬ solute life; but in disproof of this his numerous paintings attest that he must have been a la¬ borious and careful worker. He stands in the foremost rank among Dutch painters alike as regards execution, composition and color, and the action, gestures and expression of his figures, while his composition is always full of spirited suggestiveness and genial humor. In the British National Gallery he is represented by (The Music Master,' but his chief paintings are to be seen in the galleries of The Hague and Amsterdam. Consult Van Westrheene, (Jan Steen, Etude sur l'Art' (1856) ; Bode, W.,

(Great Masters of Dutch and Flemish Paint¬ ing' (New York 1909).

STEENSTRUP, stan'stroop, Johann Iape- tus Smith, Norwegian zoologist and archaeol¬ ogist: b. Vang, 8 March 1813; d. Copenhagen, 20 June 1897. From 1845 until his retirement from active duties in 1885 he was professor of zoology and director of the zoological museum at Copenhagen. He was a busy investigator and wrote treatises on a wide range of subjects, from parasitic crabs and the change in the po¬ sition of the eyes in flounders, to peat-bogs and the prehistoric remains known as kitchen-mid¬ dens. He wrote also (Yak-Lungta Bracteaterne'

(1892).

STEEN WYCK, stan'vik, Henrik van,

Dutch painter: b. Steenwyck, 1550; d. Frank- fort-on-Main, 1603. He excelled in the execu¬ tion of church interiors and was a master of both linear and aerial perspective. His son, Hendrik, called ((the young Steenwyck," was born about 1589, and became the friend of Van¬ dyke, for whom he is said to have painted architectural backgrounds. He died in London, in what year is unknown, but it must have been subsequent to 1647.

STEEPLE, in architecture, any tower-like structure attached to a church, whether a tower proper or spire or a combination of tower and spire or tower and lantern. See Spire.

STEEPLE-BUSH. See Hardhack.

STEEPLECHASING, horse racing over a rough course, so called from the fact that the riding involves steep hill climbing or that the riders had a distant church steeple as a goal

which they reached regardless of the country over which they might be obliged to travel. Steeplechase racing is most exciting, as the ob¬ stacles over which the horses are obliged to jump involves considerable danger. The Great National Steeplechase of Liverpool is a big English racing event. It was established in 1839. The Meadowbrook Club in the United States is the pioneer of steeplechasing.

STEERAGE, in passenger steamships, a section on or below the main deck that has common appointments and is assigned to the cheapest class of passengers. Since it is mainly occupied by immigrants and poor people, the term has acquired a literary sense equivalent to “common people.® In a war-vessel the quarters of the junior officers, clerks, etc., fitted with lockers, mess tables, etc. The character of a vessel’s response to her helm is also termed steerage. Steerage-way implies a sufficient de¬ gree of motion communicated to a ship for her to become susceptible of the effects of the helm in governing her course.

STEEVENS, ste'venz, George, English Shakesperean critic : b. Poplar, London, 10 May 1736; d. Hampstead, 22 Jan. 1800. He was edu¬ cated at Eton and King’s College, Cambridge, but did not take a degree, and in 1766 pub¬ lished (Twenty of the Plays of Shakespeare) in four volumes. After this he was associated with Dr. Johnson in an edition of Shakespeare published in 1773. He then prepared (1793) a corrected text, with notes of the dramatist’s works, in 15 volumes, which long remained the standard edition. He made many enemies by his acrimonious and ill-natured attacks on con¬ temporary editors and others, but his contribu¬ tion to Shakespearean criticism has permanent value.

STEEVENS, George Warrington, English journalist: b. Seydenham, near London,

10 Dec. 1869; d. Ladysmith, South Africa, 15 Jan. 1900. He was graduated at both Ox¬ ford and London universities in 1892, and in 1893 he became a Fellow of Pembroke College, Oxford. In the summer

of 1893, however, he abandoned his fellowship, and embarked upon a journalistic career in London. He had al¬ ready contributed to the National Observer and other publications, and now joined the staff of the Pall Mall Gazette, also contributing to the New Review and to Blackwood's Maga¬ zine. Upon the establishment of the Daily Mail in 1895 he became a member of its staff, and it was as its correspondent on various missions in foreign countries that he estab¬ lished his reputation as a writer gifted with the power of vivid description and with a keen perception of salient points. He covered the McKinley-Bryan Presidential campaign in the United States in 1896; and his first experi¬ ence as a war correspondent was with the Turk¬ ish army in the Graeco-Turkish War in Thessaly in 1897. He was with Kitchener's army in Egypt in 1898, and wrote a brilliant' account of the cam¬ paign. He was in India in the winter of 1898- 99; and in 1899 reported the second trial of Captain Dreyfus at Rennes. In September 1899 he went to South Africa as the Daily Mail's correspondent. He was with Sir George White at the defense of Natal, and at the siege of Ladysmith, where he died of enteric vol. 25 — 39

fever. He wrote (The Land of the Dollar) (1897); (With the Conquering Turk* (1899);

(Egypt in 1898) (1899); (With Kitchener at Khartoum) (1899); (From Capetown to Lady- smith) (1900).

stefAnsson, sta'fan-s5n, Vilhjalmur,

Arctic explorer: b. Arnes, Manitoba, Canada, 3 Nov. 1879. He received his education at the State University of North Dakota and the State University of Iowa. In 1903-04 he studied at the Harvard Divinity School, and in 1904—06 at the Harvard Graduate School. His early years were spent on a farm; in 1893-96 he was a cow-boy; at different times he was employed as school teacher, life insurance agent, organ¬ izer of secret society lodges, public lecturer, reporter on the Boston Evening Transcript, city editor of the Plaindealer, Grand Forks, N. D., and assistant instructor in anthropology at Harvard University. In 1904 he undertook a private expedition to Iceland and in 1905 undertook an archaeological expedition to Ice¬ land for Harvard University. In 1906-07 he made an ethnological expedition to the Eskimo of the mouth of the Mackenzie River and north¬ ern Alaska for the universities of Harvard and Toronto. He undertook a second Arctic expedition under the auspices of the Ameri¬ can Museum of Natural History and the Geo¬ logical Survey of Canada, accompanied by Dr. Rudolph M. Anderson, zoologist, in 1908-12; made investigations and collections in geog¬ raphy, geology, ethnology,

archaeology, zoology, botany, etc., reported so-called blond Eskimo found on both sides of Dolphin and Union straits and Coronation Gulf and visited several tribes whose ancestors had never and who them¬ selves had never seen a white man. Stefansson was commander of the Canadian Arctic expedi¬ tion which sailed from Victoria, British Colum¬ bia, in June 1913, for four years of exploration north of Canada and Alaska. With two com¬ panions he crossed Beaufort Sea on moving ice from Martin Point, Alaska, to the northwest cor¬ ner of Banks Island. With three companions he explored the sea west of Prince Patrick Island to the north of which he discovered a new land in 1915. In September 1915 he left Cape Bathurst with the schooner Polar Bear, out¬ fitted for two years' further exploration of land already discovered, and seas to the west and north. He returned in 1918, and in the same year was awarded the Charles P. Daly medal of the American Geographical Society. V. Stefansson has published (Arctic Search> (1913); (My Life with the Eskimo) (1914); and many scientific articles in journals of an¬ thropology, folklore, philology, geography; also popular articles on literature of Iceland in Poet-Lore and on the Eskimo and Arctic travel, chiefly in Harper's Magazine after 1906.

STEFFANI, sta-fa-'ne, Agostino, Abbate,

Italian composer: b. Castlefranco, Venice, 1655; d. Frankfort-on-Main, 1730. He received his musical training in Venice and Munich, in which latter city he was appointed director of the Grand-ducal Concerts (1681), and, after the production of his opera (Servio Tullio) in 1688, chapel master to the court of Hanover. In that capacity he did much to improve the re¬ ligious music of his day. His Italian operas, which were produced with brilliant stage setting at Herrenhausen Castle, were also translated

into German and performed at Hamburg (1690). Fine as are his operas, his chamber music, much of it set to Italian words, is even richer in melody and tonal expression. Later in life he became more and more engrossed in his dip¬ lomatic duties, resigned to Handel his office of chapel master (1710), and was appointed councillor by the Grand-duke Palatine, and, by the Pope, prothonotary and bishop of Spizza (in Partibus). He applied himself henceforth to his civil and religious functions, in pursuance of which he made his last visit to Italy in 1729. His works include (Psalmodia Vespertina, for Eight

Voices5 (1674); ‘Sonate da Camera a due violine, alto e continuo) (1679) ; ‘Duetti da Camera a soprano e contralto) (1683), etc.

STEFFENS, Joseph Lincoln, American author: b. San Francisco, Cal., 6 April 1866. He was graduated at the University of Cali¬ fornia in 1889 and later studied at the univer¬ sities of Berlin, Heidelberg, Leipzig and Paris. He was connected with the New York Evening Post in 1892-98; was city editor of the New York Commercial Advertiser in 1898-1902; managing editor of McCliite’s Magazine in 1902-06; and editor of the American Magazine and of Everybody’s Magazine in 1906-11. He is well known as a contributor of short fiction and special articles to magazines. Author of ‘The Shame of the Cities) (1904) ; ‘The Struggle for Self-Government 5 (1906) ; (The Uplifters) (1909); ‘The Least of These5 (1910).

STEGOCEPHALI, one of the primary

divisions of the amphibia, sometimes considered as a sub-class, sometimes as an order, especially characterized by the great development of der¬ mal or superficial bones on the dorsal surface of the head. Being totally extinct and conse¬ quently known only from their skeletal remains many questions concerning their relationships continue open. Many of the stegocephali were of salamander-like form, with broad, flattened head, simple, weak paired limbs of the typical pentadactyl type and a more or less elongated tail. Some were lizard-like with stronger limbs. Some, like Ophiderpeton, lacked limbs and were serpentine in form. Many are known to have passed through branchiate larval stages and some, like the Branchiosauridce, retained the gills throughout life. Many of the large labyrinthodonts had rudimentary tails and must have 'been somewhat frog-like in aspect. One remarkable form, the Dissorophus multicinctus from the Permian formation of Texas, is de¬ scribed by Professor Cope as having borne an armadillo-like carapace on the back. The roofing bones of the head were numerous and covered the temporal fossa as well as the cranium. In some of the larger forms they were much sculp¬ tured and excavated for the accommodation of mucous canals. The large eyes were supported by a ring of sclerotic bones, found well de¬ veloped at the present day only in the eyes of some birds. In the middle of the cranial roof between the two parietal bones was the con¬ spicuous pineal foramen supposed to have lodged a functional median eye. The nostrils were situated near the tip of the snout and the internal nares in the anterior part of the palate. The base of the skull was imperfectly ossified, but there was a well-developed basi-occipital bone with usually two occipital condyles. This

deficiency of bone was supplied by the large superficial parasphenoid. The lower jaw was complex and the occurrence of an infradentary bone is especially noteworthy. Teeth of a sim¬ ple, conical, partly hollow form, or with the walls fluted or, as in the labyrinthodonta (q.v.), complexly folded, existed on the jaws and palate. The notochord generally persisted and the vertebrae consisted of mere bony shells or were better ossified and formed of alternating intercentra and pleurocentra supporting the haemal and neural arches or were otherwise segmented. There was never more than a sin¬ gle sacral vertebra. Scapula, coracoid, clavicle and interclavicle were always present in the shoulder girdle and traces of a sternum some¬ times appear. Likewise an ischium, ilium and occasionally a pubis have been found on each side of the pelvis. Both fore and hind limbs were simple and salamander-like, the carpus and tar¬ sus unossified in the smaller species and pre¬ senting all of the primitive elements with two or three centralia in Archegosaurns and other larger forms. Ribs were simple and never joined the sternum. Some forms like Branchiosaurus were covered with an armor of scales.

The stegocephali were the first vertebrates to leave the water and assume more or less completely terrestrial habits ; they were the first whose limbs departed from the fin type and became pentadactyl ; their nasal passages show that they breathed air and they probably had lungs ; their teeth indicate a flesh diet, probably consisting chiefly of fish. Footprints of stego¬ cephali are found in abundance in rocks repre¬ senting the muddy shores of the Carboniferous Period and remains of these creatures are found from the Lower Carboniferous through the Permian and in the Triassic in Europe and America. They are especially abundant in the Permian of Texas from which many interest¬ ing forms have been taken. Palaeontologists differ on the question of their origin, some con¬ sidering them descendants of the crossopter- ygians, others of the Dipnoans. Whatever their origin the stegocephali formed the starting point for all terrestrial and air-breathing verte¬ brates, probably first giving rise to primitive reptiles like the cotylosauria, becoming them¬ selves extinct. Consult Credner, ‘Die Urvier- fiissler) ; ‘Naturw. Wochenschrift5 (Berlin 1891) ; Cope, (American Naturalist (1884) ; Woodward, ‘Vertebrate Palaeontology) (Cam¬ bridge 1898) ; Knipe, H. R., (Evolution in the Past5 (London 1912).

STEGOSAURIA, a group of dinosaurs

(qv.).

STEIN, stln, Charlotte von, German

writer, friend of Goethe (q.v.) : b. Weimar, 25 Dec. 1742; d. there, 6 Jan. 1827. She was mar¬ ried in 1764 to the duke's master of the horse. Her friendship with Goethe was broken sud¬ denly after his return from Italy (1788). Goethe's 'Letters5 to her were first published in 1848—51, edited by Schott. Their almost perfect friendship for 10 years is believed to have pro¬ foundly assisted Goethe in his work. A final collection was printed by the Goethe Society in 1886. She wrote a tragedy 'Dido5 (1867; ed. by Duntzer). Consult the 'Life5 by Duntzer

(1874).

STEIN, Heinrich Friedrich Karl, German statesman: b. Nassau, 26 Oct. 1757.; d. Kappen- berg, Westphalia, 29 June 1831. He studied at Gottingen, entered the mining department of the Prussian government, became head of the mines and manufactures (1784) department in Westphalia, visited the mining districts of Eng¬ land in 1786, became president of the provincial chambers of Westphalia in 1796, and a minister of state in 1804. For the severity of his crit¬ icisms on the administration he was dismissed (1807), but in a few months he was recalled, with power to introduce his reforms. Accord¬ ingly he abolished serfage by edict, made mili¬ tary service obligatory on all classes, and rear¬ ranged the financial and administrative affairs. By means of these reforms he laid the basis of Prussia's future greatness, but in less than a year he was oroscribed by Napoleon and dis¬ missed from office. He afterward visited Saint Petersburg, and was instrumental in bringing about the coalition which crushed Napoleon. When the military struggle was over he spent his life in retirement. Consult Pertz, <Das Leben des Ministers Freiherrn von Stein) (1849) ; Stern, (Stein und sein Zeitalter) (1855) ; Seeley, (Life and Times of Stein) (1878) ; Meier, (Die Reform der Verwaltungs- organisation unter Stein und Hardenberg) (1881) ; and the popular biographies by Neu- bauer (1894) and Bauer (1895).

STEIN, Sir Mark Aurel, British Orientalist and archaeologist : b. Budapest, Hungary, 26 Nov. 1862. He was educated at the universities of Vienna, Tubingen, Oxford and London. He was registrar of the Punjab University and principal of the Oriental College, Lahore, India, in 1888-99, and in 1899 he became principal of the Calcutta Madrash. The Indian govern¬ ment sent him to conduct archaeological inves¬ tigations in Chinese Turkestan in 1900-01, and he was afterward appointed inspector of edu¬ cation in the Punjab. He was engaged in

archaeological investigations in central Asia and western China in 1906-08, and in 1909 he became connected with the archaeological de¬ partment of India. He received the gold medal of the Royal Geographical Society in 1909. He published a critical edition, with an English translation, of Kalhana's (Rajatarangini, or San¬ skrit Chronicle of the Kings of Kashmir *(2 vols., 1900) ; and is author of (The Sand- Buried Cities of Khotan* (1903) ; (Ancient Khotan) (2 vols., 1907)'; (Ruins of Desert Cathay) (2 vols., 1912), etc.

STEINER, sti'ner, Bernard Christian,

American educator : b. Guilford, Conn., 13 Aug. 1867; prepared for college at the Frederick (Md.) Academy; was graduated at Yale A.B. 1888, A.M. 1890; was a Fellow in history at Johns Hopkins, 1890-91 and Ph.D. 1891 ; in¬ structor in history at Williams College, 1891—92; instructor of history at Johns Hopkins, 1893, and associate there from 1894 to 1911. He was graduated at University of Maryland with de¬ gree of LL.B. in 1894; was dean and professor of constitutional law, Baltimore University, 1897-1900, and was dean and professor of pub¬ lic law in the Baltimore Law School from 1900 to 1904. Since 1892 he has been librarian of the Enoch Pratt Free Library of Baltimore City. His publications include cEducation in Connecticut (1893) ; (Education in Maryland>

(1894) ; (Citizenship and Suffrage in Mary¬ land *(1895) ; (Institutions and Civil Govern¬ ment of Maryland> (1899); (Life of James McHenry* (1907) ; (Life of Reverdy Johnson) (1914), etc.

STEINHAUER, Henry Bird, Canadian Chippewa Indian clergyman and missionary: b. Ramak Indian Settlement, Lake Simcoe, On¬ tario, 1804; d. Whitefish Lake, Ontario, 29 Dec. 1885. He was adopted and educated by a Ger¬ man family, and about 1840 he accompanied a Methodist missionary, Rev. James Evans, to the Canadian Northwest. He was at Norway House -with Evans for about 15 years, acting as Cree interpreter and assisting the missionary in his task of forming symbolic characters for the Cree language. He was afterward ordained in the Methodist Church and established a mis¬ sion at Whitefish Lake, where he labored until his death. He translated nearly all of the Bible into the Cree language.

STEINHEIL, stm'hil, Karl August, Ger¬ man physicist and astronomer : b. Rappolts- weiler, Alsace, 12 Oct. 1801 ; d. Munich, 12 Sept. 1870. After completing a course in law at the University of Erlangen, and courses in astronomy at Gottingen and Konigsberg, he was appointed to the chair of physics and mathe¬ matics in the University of Munich.

He later entered the service of the Austrian government, becoming especially noted for his development and perfection of the telegraph system, a serv¬ ice which he also rendered to the Swiss govern¬ ment a few years later. In 1836 he built the first printing telegraph, invented an electro¬ magnetic telegraph, the electrical clock, a spe¬ cial pyroscope, and brought out the first daguerreotype picture in Germany. He also in¬ vented several optical instruments, and in 1854 began the manufacture of optical, astronomical and photographic materials, and it was in his factory that the telescopes for the observatories of Upsala, Mannheim, Leipzig, etc., were made. Steinheilite or iolite, a transparent mineral, was named after him.

STEINHEIL, Louis Charles Auguste,

Alsatian painter: b. Strassburg, 26 June 1814; d. Paris, 17 May 1885. He studied with De- caisne and painted in nearly every medium, but gave especial attention to glass painting and church decoration. In 1876 he was commis¬ sioned to execute frescoes in the cathedral of Strassburg. Among his works are (Saint Philo- mela > (1841) ; (1847), Nantes Museum.

STEINHEIL, Marguerite, French woman, central figure in a mysterious cause celebre: b. Beaucourt, 16 April 1869. She came of a wealthy family named Japy and was married to Adolphe Steinheil, an artist. They lived in Paris, where Mme. Steinheil became prominent in a distinguished circle, including many of the most famous Parisian lights in politics, art and literature. She was on terms of intimacy with President Faure, and gossip connected here with his sudden death, but no proof was ever pro¬ duced. On the night of 30— 31 May 1908 Mme. Steinheil's husband and her mother, Mme. Japy, were murdered and robbed and Mme. Steinheil herself was found bound and gagged upon a bed. She was later accused of committing the crime, but was acquitted after a sensational

trial. There were rumors of political compli¬ cations, enhanced by a mysterious pearl necklace supposed to have been given her by President Faure. How much or little of truth was in the rumors and accusations rife at the time of the trial has never become known, and no light has ever been thrown upon the crime of which she was accused. After her acquittal she lived in England in retirement. Author of (My Memoirs) (New York 1912).

STEINITZ, William, German-American chess player: b. Prague, Bohemia, 14 May 1836; d. New York, 12 Aug. 1900. He was educated at Prague and Vienna and early became -famous as a chess player, taking prizes at Vienna in 1859, 1860 and 1861. In 1862 he won sixth prize in an international match at London and in 1866 took the first prize in the tournament of the British Chess Association. In the same year he defeated Anderssen in a set match for the world's championship, which he held for 28 years. He later won championship matches from Zukertort, Tchigorin and others. At the Vienna international tournament of 1873 he beat the world's record by Winning 16 straight games. That year he settled in London, but in 1882 removed to the United States. During 1885-91 he edited the International Chess Maga¬ zine. In 1894 he lost his first great match and the championship to Emmanuel Lasker (q.v.). A return match in 1897 was also lost, after which date he ceased playing serious chess. He more than any other player originated the modern school of winning by accumulating minute advantages instead of by grand strat¬ egy and combination. He published (The Modern Chess Instructor (1889).

STEINMETZ, stin'mets, Charles Proteus,

American electrician : b. Breslau, Germany, 9 April 1865. He was educated at Breslau, Zurich and Berlin, specializing in mathematics, electrical engineering and chemistry. In 1902 Mr. Steinmetz received the degree of A.M. from Harvard University and in 1903 the de¬ gree of Ph.D. from Union University. Since 1893 he has served as consulting engineer of the General Electric Company and since 1902 has in addition held the chair of electrophysics at Union University. Mr. Steinmetz is also Socialist president of the City Council and president of the Board of Education of Sche¬ nectady. He is one of the greatest scholars and scientists in the electrical field to-day and his researches have done much to further the prog¬ ress of applied industrial chemistry. His works include (Theory and Calculation of Alternat¬ ing-Current Phenomena) (1897; 5th ed., 1916); theoretical Elements of Electrical Engineer- ing) (4th ed., 1915) ; theory and Calculation of Transient Electric Phenomena and Oscillations) (1909 ; 2d ed., 1911); (General Lectures on Electrical Engineering) (5th ed., 1917) ; (Radi¬ ation, Light and Illumination > (1909; 2d ed., 1911); Engineering Mathematics> (1910; 3d ed., 1917) ; Electric Discharges, Waves and Impulses) (1911) ; (America and the New

Epoch) (1916); theory and Calculation of Electric Circuits* (1917) ; theory and Calcu¬ lation of Electrical Apparatus) (1917), also

sundry mathematical papers on theoretical, ex¬ perimental investigations in electric engineer¬ ing.

STEINMETZ, Karl Friedrich, Prussian military officer: b. Eisenach, 27 Dec. 1796; d. Landeck, 4 Aug. 1877. He entered the army in 1812 and fought during the Napoleonic cam¬ paigns of 1813-15. In 1848 he commanded a regiment of the Royal Guards at Berlin and gained distinction in his encounters with the populace. The same year he fought in the Danish campaigns. In the Austrian War of 1866 fie commanded the fifth army corps and defeated the Austrians in three successive en¬ gagements at Nachod, Skalitz and Schwein- schaeld, 27-29 June. At the outbreak of the Franco-Prussian War he was appointed, in July 1870, to command of the right wing oper¬ ating in the neighborhood of Metz against Bazaine, and fought at Spichern, Colombey- Nouilly and Gravelotte. At this time friction arose with other officers and he asked to be re¬ lieved of his command, which was granted in September 1870, and he was appointed gover¬ nor-general of Posen and Silesia. The follow¬ ing year he was made field-marshal.

STEINTHAL, stin'tal, Heymann, German

philosopher and philologist : b. Grobzig, Anhalt, 16 May 1825 ; d. 1899. He was distinguished as a follower of the Herbartian ethical school, maintaining that the psychology of society com¬ bined with comparative philology yielded the best results toward the solution of human problems. His philosophy was allied with that of Moritz Lazarus who was co-editor with him of Zeitschrift fiir Volkerpsycho'logie und S pracliwissenschaft from 1859 to 1890. In phi¬ lology he followed the methods of Wilhelm von Humboldt whose work he elucidated in several books in 1848, 1864, 1867 and an edition in 1884. He studied and was graduated at the University of Berlin in 1850; from 1852-55 studied Chinese language and literature in Paris ; in 1863 became extraordinary professor of philology in Berlin; and after 1872 lecturer at the school of Judaism there on the history and philosophy of religion. His chief works are Eer Ursprung der Sprache im Zusammenhang mit den letzten Fragen alles Wissens *(1851; 4th ed. 1888) ; Elassification der Sprachen) (1850) ; (Charakteristik der hauptsachlichen Typen des Sprachbaues* (1860) ; <Die Entwicke- lung der Schrift *(1852) ; Erammatik, Logik, Psychologie, ihre Prinzipien, etc.* (1885); Eeschichte der Sprachwissenschaft bei den Griechen und Romern) (1863; 2d ed., 1889-91) ; (Die Mande-Negersprachen, psychologisch und phonetisch betrachtet *(1867) ; (Abriss der Sprachwissenschaft } (2d ed., 1881) ; <Allge- meine Ethik) (1880); (Zu Bibel und Religion- philosophy*

(1890-95); a memorial essay by his widow in (Jahrbuch für jüdische Geschichte und Literatur (1900).

STEINWAY, stin'wa (originally STEIN- WEG), Henry Engelhard, American piano manufacturer: b. Wolfshagen, Germany, 15 Feb. 1797 ; d. New York, 1871. He learned organ-building and piano-making and estab¬ lished a business at Seesen, near the Harz Mountains, but emigrated to the United States in 1849, and with his three sons was employed

in various piano factories in New York. In 1853 he founded the firm of Steinway & Sons, and in 1855 exhibited a square piano in which the American iron frame was combined with an overstrung scale, the first example of the Steinway system. About 1866 the Steinways began to make upright pianos ; their instru¬ ments exhibited at the Universal Exhibition of 1867 became models for Continental manufac¬ turers, while later improvements have enabled the firm to take rank with the famous older makers of Europe.

STEJNEGER, Leonhard, American nat¬ uralist: b. Bergen, Norway, 30 Oct. 1851. He was graduated at Frederick's University, Chris¬ tiania, in 1875, and came to the United States in 1881. He went on a natural history expedi¬ tion to Bering Island and Kamchatka for the United States National Museum in 1882-83, and was appointed assistant curator of that insti¬ tution at Washington in 1884; he became curator of reptiles there in 1889 and head curator of biology in 1911. Author of Poison¬ ous Snakes of North America> (1893) ; (Re- port of the Rookeries of the Commander Is- lands *(1897) ; (The Asiatic Fur Seal Islands and the Fur Seal Industry* (1898) ; (The Herpetology of Porto Rico) (1904) ; (The Herpetology of Japan* (1907) ; (The Origin of the So-Called Atlantic Animals and Plants of Western Norway) (1907), etc.

STELLA MIRA. See Mira.

STELLARTON, Canada, town in Pictou County, Nova Scotia, on the East River, 75 miles northwest of Halifax, on the Intercolonial Railway. It is situated in a coal-mining region and has manufacturing interests. Pop. 3,910.

STELLHORN, Frederick William, Amer¬ ican Lutheran theologian : b. Hanover, Ger¬ many, 2 Oct. 1841 ; d. 17 March 1919. He was graduated at Concordia College, Fort Wayne, Ind., in 1862, was

ordained to the Lutheran min¬ istry in 1865 and held two pastorates, 1865-69. He was a professor at Northwestern University, Watertown, Wis., 1869-74, at Concordia College, 1874-81, and was professor of theology at Capi¬ tal University, Columbus, Ohio, after 1881, and dean of the theological seminary of the same institution after 1903. He published (Kurzge- fasstes Worterbuch zum Griechischen Neuen Testament *(2d ed., 1905) ; (A Brief Commen¬ tary on the Four Gospels* (1891) ; Annota¬ tions to the Acts of the Apostles) (18%) ; (The Error of Modern Missouri (1897) ; Pie Pastoralbriefe Pauli iibersetzt und erklart *(2 vols., 1899) ; Paul's Epistle to the Romans Briefly Explained> (1899) ; (Schriftbeweis des Lutherischen Katechismus* (1912). With a brief intermission he was editor of Lutherische Kirchenzeitimg from 1881 to 1898. He was also editor of Theologische Zcitbldtter after

1.

STELLITE, name applied to a series of alloys consisting essentially of cobalt and chromium. The alloy consisting of cobalt and chromium only is made by melting the two metals together and casting the resulting mix¬ ture into bars. If the chromium does not ex¬ ceed 25 or 30 per cent, these bars may be forged into rods or rolled into sheets. During the cast¬

ing and rolling process the alloy becomes cov¬ ered with a thin film of oxide of a dark blue-black color. When this is ground off, however, and the rod or plate is polished, it shows a beautiful lustre which is not dimmed by exposure to any kind of metal conditions. It remains perfectly bright in moist air, and even in the atmosphere of a chemical labora¬ tory. In fact it retains its lustre under all cir¬ cumstances and is only equaled in this respect by gold and the metals of the platinum group. It may be readily forged into spoons, knives, forks, etc., and these articles are so hard that they can scarcely be scratched by the file. The alloy is stiffer than steel. In fact it is the most rigid alloy in use and, while its elastic limit is not very high, it is sufficient for practical pur¬ poses in almost any form into which it may be made. When a certain amount of tungsten or molybdenum is added to the alloy, the hardness is greatly increased, and some of the alloys thus formed are harder than any steel ever pro¬ duced. These latter are termed tool metal alloys, and when cast into bars need only to be ground to a cutting edge and placed in the tool holder of the lathe to render them immediately available. Results obtained with these tools in the machine-shop are very remarkable. Red hot shavings may be cut from steel bars without injury to the edge of the tool, and on certain kinds of work a machinist is able to turn out from 25 to 100 per cent more work in a day than with the best high-speed steel tools.

The name stellite is derived from the Latin word Stella, meaning a star, because when once polished it always retains its lustre or brightness. Stellite alloys have been manufactured into pocket and table cutlery, spoons, forks, mirrors, razors, knife edges for balances, surgical tools, dental instruments and machine tools. Pocket knife blades made of this metal retain their lustre under all circumstances, and may be used for cutting apples, oranges, lemons and various other fruits without marring their lustre in the slightest degree.

STELVIO, stel've-o, PASS, a lofty Alpine pass (9,055 feet), between the Tyrol and Lom¬ bardy, forming part of the great military road from Milan to Innsbruck, completed by the Austrian government in 1824, at a cost of $1,500,000. It iis 33 miles long, and its bridges and causeways, and terraces cut in the rock are especially noteworthy. The pass is remark¬ able for its views and the grandeur of its scen¬ ery. It can only be utilized in the summer season.

STELZLE, Charles, American Presby- terial clergyman and sociologist: b. New York, 4 June 1869. He was for some years a ma¬ chinist, studied at the Moody Bible Institute in 1894-95, and in 1895 became pastor of Hope Chapel, Minneapolis, Minn. He was ordained in 1900, and held various pastorates until 1903, when he became superintendent of the Presby¬ terian Department of Church and Labor, a division of the Home Mission Board. He was organizer and in 1910-12 was director of the Labor Temple in New York; is director of the department of Christian sociology in the Bible Teachers' Training School, New York; investi¬ gated the economic aspect of the liquor prob¬ lem in the United States and Europe in 1914 — 15 ; and with a staff of investigators made

social surveys of 200 American cities. Author of (The Workingman and Social Problems) (1903) ; (Messages to Workingmen> (1906) ; Principles of Successful Church Advertising) (1909) ; (The Church and Labor *(1910) ; (The Call of the New Day to the Old Church* (1915) ; (Why Prohibition) (1918), etc.

STEM, the main axis of a plant. Stems usually bear foliar organs, such as leaves, but in the carrion-flower (Stapelia) and in some other plants no leaves are produced ; and in cacti the leaves are rarely observed because they are early deciduous. Though there are stem-like organs among the algae and fungi (TUallo'phytes) and liverworts and

mosses (Bryophytes) , true stems are found only among the club-mosses, horse-tails and ferns (Pt en¬ dophytes) and the flowering plants (Sperma- tophytes). In the last-named group the stems are produced by the development of the embry¬ onic plumule, and reach their maximum size in the California redwood which becomes more than 350 feet tall and may exceed 20 feet in diameter.

Stems are very diverse in' 'general habit; they may be erect and unbranched as in most palms ; erect and branched as in pine and many other trees ; scrambling as in blackberries and rasp¬ berries ; twining as in morning-glory and hop ; climbing as in grape and Boston ivy; creeping as in dewberry and periwinkle; and with many modifications of these general types. They are also definable according to duration as annual and perennial ; and according to structure as herbaceous and woody. These are also modified in nature.

Botanists tavor a classification which deals with the character of foliar organs borne, thus : (1) leaf-bearing stems, generally most evident since they bear leaves, and consequently aerial and frequently branched; (2) flower-bearing stems; and (3) scale-bearing stems, which bear rather small, more or less leaf-like but not green organs, and may be situated above or below the surface of the soil. The last group runs into many modifications, such as rhizomes, tubers and bulbs below ground, and the buds of trees and shrubs above ground. They are also grouped according to their anatomical structure, as described later.

The functions of stems are usually to lift the leaves and flowers off the ground and ex¬ pose them to light and air, or to act as storage- organs in which reserve food is placed until needed. While the epidermis remains green, aerial stems can, and do, perform the functions of leaves in assimilating food, a very important office in such plants as cacti. In function the stems may be sharply contrasted with roots or descending axes ; but none of these are con¬ stant, there being exceptions. Thus, most stems have chlorophyll (q.v.) which is almost never present in roots, except a few aerial ones ; stems usually bear leaves, roots do not; the stein-tip is almost invariably a naked growing point, a root-tip is generally protected by a root-cap ; stem-ibranches are superficial outgrowths (exog¬ enous buds), root-branches develop endoge¬ nously from an internal layer; and usually stems and roots take opposite directions with respect to gravitation. In describing aerial stems the positions of leaves (nodes) are distinguished from parts which are leafless (internodes) ; the

buds which appear in the axils of the leaves (axillary) from those

which are terminal (apical) or which appear arbitrarily (adven¬ titious), etc. The method of branching is also important in classification, as lateral, false di¬ chotomous, dichotomous, etc.

The internal structure of a stem may be un¬ derstood by examining twigs of a dicotyledon¬ ous tree such as oak. The bark peels off and leaves a white woody cylinder. At the place where bark and wood separate is a more or less mucilaginous layer of cells (cambium) which are readily ruptured. This layer is re¬ sponsible for growth in girth, since its cells are actively dividing during the growing season, forming bark layers externally and wood layers internally. It is also from this layer that the healing of wounds in the stem is conducted. The formation of the C(callus** in cuttings and the union of grafts is also a function of this layer; hence its importance from the forester's and horticulturist's standpoint. When a ring of bark, which is usually found in three layers (outer, middle and inner), is removed, but the wood is uninjured, the leaves will not wither; hence the conclusion that the water ascends through the wood. If the ring be through the young wood the leaves will wither ; hence the deduction that the ascent of water is through the young wood. This conclusion is corroborated by the fact that trees will flourish after the heart-wood has decayed. The descent of food to the roots and to other places where it is needed for growth or for storage is through the layers just outside the cambium (the inner bark). By means of the microscope and thin sections of stems a great variety of structures are revealed. Com¬ mencing with the growing-point there is found an external epidermis and an almost homo¬ geneous internal structure of ˆfundamental tis¬ sue.ˆ This latter becomes more and more differentiated in parts more remote from the tip. Firm strands (fibro-vascular bundles) are usually first observed arranged radially in dicotyledonous plants. They consist of an in¬ ternal woody part (xylem) and an external bast part (phloem) and between each pair a persistent layer of cambium. Each bundle ter¬ minates in a leaf above, becomes connected with others lower down and terminates below in the little rootlets. In the internal structure of the stems of dicotyledonous trees they consti¬ tute the wood. Between them are plate-like structures extending, in cross section, like the spokes of a wheel from various points at, near or remote from the centre to or toward the cir¬ cumference. The fundamental tissue continues undifferentiated in the cambium, slightly modified in the pith, if there be any pith, and in the medul¬ lary rays. In monosotyledonous plants the fibro-vascular bundles are scattered in the funda¬ mental tissue, pursue a curved course (inward and outward) and are collateral. The cambium being consumed at an early period of growth accounts for

the usually uniform or very slightly tapering stems of plants belonging to this group — bamboos, grasses, etc. — and also for the non¬ separation of the bark from the generally thin layer of wood which surrounds a mass of pith or a hollow space. The development of growth in these plants is not marked by annual rings as in the dicotyledons.

From an economic standpoint, stems are of wide importance. Various underground stems are used for food, for example, potato, sweet potato, Jerusalem artichoke, onion, asparagus, kohl-rabi, etc. Others are used as condiments such as ginger, licorice, cinnamon, sassafras, etc. Many furnish valuable fibres such as hemp, flax, jute, ramie, etc. Others are employed in tan¬ ning, as the barks of oak, chestnut and hemlock. The pith of many, such as sago, are used for food. The juices of others .furnish rubber, palm wine, pulque, arrack and various oils. But the most important commercial uses made of stems are probably as timber and lumber, for which the dicotyledonous trees are most widely em¬ ployed, as will be sufficiently clear from the above discussion. Consult any * treatise on botany, as Lang's English edition of (A Text¬ book of Botany,* by Strasburger and others (New York 1903).

STENCILING, a mode of decorating or marking with paint or ink, in which the design is formed through the spaces of a pattern. The design or pattern is cut out in a sheet of paste¬ board or a thin plate of metal called a stencil, which is applied to whatever is to be marked. The paint or other coloring matter is then laid freely over the stencil by means of a brush, and after the stencil is removed the design re¬ mains marked out on those parts of the sur¬ face which the coloring matter has reached through the spaces left in the stencil.

STENCILS. A stencil is a thin metal plate or a fibrous or waxed sheet of paper bearing wording or a design formed by cutting through the plate or the chemical coating or waxed sur¬ face of a paper sheet, or by embossing the wording upon a thin metal plate. The stencil is used to reproduce quickly characters, designs or wording by rubbing or pressing through the cut portions specially prepared stencil ink or stencil paste, or, in the case of embossed sten¬ cils, striking the paper against an inked ribbon covering the raised letters.

Stencils have been in use for several cen¬ turies as a means of

marking characters upon certain objects. Formerly they were exten¬ sively used in making ornamental designs for stamping wood, cloth and paper material or imi¬ tating natural pictorial work upon friezes, panels and pottery. The Japanese for hundreds of years have practised the art of stencil mak¬ ing, while the Egyptians and Romans were well versed in it also. It is claimed that the Japanese learned the craft from the Chinese, who, perhaps, can be credited as being one of the first originators. These early stencils were probably not made of metal but of some tough fabric, paper or wood. The metal stencils used so extensively to-day in commercial trades have been developed from the pictorial stencils only within the past 50 years or so. We have definite knowledge that during our Civil War stencil¬ cutting was practised in America, the stencils being used for marking packing boxes and other shipments, and were cut in metal in about the same manner as stencil cutters cut them now. From that time there has been a huge de¬ mand for commercial stencils, as they can be made quickly, economically, and pleasing to the eye. They can be made very small or extremely large, their size being governed only by the di¬ mensions of the metal sheet or the object upon

which they are to be imprinted. Any lettering, brand, trademark or other design can be made into stencil form and as such can be reproduced upon any suitable object by placing it against this object and brushing in the letters or design with stencil paste. Being cut from sheet metal, stencils naturally are durable and conveniently handled. The most artistic stencils are those that are laid out by an experienced stencil cut¬ ter who is talented in making good designs. This man will sketch out his lettering or design on a piece of sheet brass, copper or zinc, with a pencil, and then cut out the perfected design with special stencil chisels. Thirty or 40 chisels of various curves and sizes and straight chisels from one-thirty-second to one and one-quarter inch wide are used for this purpose, the cutter placing the sheet metal upon a block of lignum vitae and chipping out the metal in the design, leaving occasional strips of metal, known as ties or stays, so that the design or letters will hold together. Ordinarily, lettering from one-quarter inch to one and one-half inches is usually cut with stencil dies. These stencil dies are steel punches, each bearing a letter of the alphabet or one of the numerals, and, when driven into the sheet metal with a blow of a hammer, will cut out the selected letter or figure. By using a series of these stencil dies, words can be quickly cut into the metal in let¬ ters of various heights if desired. The stencil can then be flattened by burnishing it or going over it with a special instrument called a ˆslapper** and then smoothing it with the mallet on the stencil block. Stencils for commercial use are frequently made

by a special type of machine which cuts letters out of oil board or paste board. Such stencils are less durable than metal and necessarily bear only the one style of lettering. Stencils for transferring patterns, as in embroidery, are usually made upon heavy paper, the lines of the design being indicated by small holes pierced through the paper. For wall decorations, either the cut or the perforated stencils are used, the design being cut by hand with sharp knives of various shapes in thin metal, lead foil, tin foil, or prepared paper held against a piece of plate glass.

Another kind of stencil is the waxed paper which is used in mimeograph work and the dermatype stencil, a chemically coated fibrous sheet of great toughness which is converted into a stencil by the impression of type or stylus. With this form of stencil, the fibrous sheet is prepared ready for use of a size about the dimensions of the typewriter paper. It is in¬ serted in the typewriter and a liquid is applied to it with a brush, when it is ready for the type matter. With the ribbon of the typewriter re¬ moved or held away from contact with the keys by an attachment usually fitted to typewriters, the pressure of the keys separates the chemical coating on the fibrous sheet. After all the wording required is typed on the sheet, the lat¬ ter is removed and spread over an inked cylin¬ der of a hand or motor-driven press. Paper of about the usual" typewriter size is run be¬ tween this cylinder and a platen roller, in which operation a small amount of ink is squeezed through all of the places in the fibrous sheet where the typewriter keys have made an im¬ pression, which brings out all the letters on the sheet of paper in a very satisfactory manner. For mechanically addressing, a portion of this

fibrous sheet enclosed in a frame of paper is placed into a special attachment that can be fitted to a typewriter and the wording can then by typed through the coating on the fibre as explained above. Stencils for addressing pur¬ poses are also made by cutting out small letters from stiff paper, by embossing metal plates, or perforating thin metal plates or paper. These perforated, cut or embossed stencils for addressing are made by special machines which stamp dies bearing letters or numerals with cutting edges, or punching surfaces as the case may be, against the stiff paper or thin metal. From these small stencils, the address is im¬ printed upon the desired place on a paper by means of other machines, either hand or power driven. The usual machine for this purpose holds a tray of these stencils and

automatically carries each one over an inked pad where the ink is forced through the letters and printed upon the paper by the pressure of an arm that bears upon the stencil from above. This arm of the machine moves up when the pressure is released, and, if adjusted for the purpose, dis¬ poses of the used stencil ,by pushing it to one side; at the same time it moves forward the next stencil into its proper position on the pad. The addressing from embossed sten¬ cil addresses is performed by bringing down a plunger in which there is a rubber section that strikes the paper against an inked ribbon which covers the raised letters of the stencil.

STENDAL, sten'dal, Germany, a town in Prussia in the province of Saxony, on the Uchte, 35 miles north of Magdeburg. The cathedral, restored in 1893, contains archaeo¬ logical and natural history collections of the region. It has courts of justice, a Roland pillar, two ancient gateways and a statue of Winckel- mann, the art critic. It is an important railway centre. There are textile industries and large railroad shops, starch mills, brick yards, agri¬ cultural machine works and other factories. Pop. 27,263.

STENDHAL, stan-dal. See Beyle, Marie- Henri; La Chartreuse de Parme; Le Rouge et le Noir.

STENIA, Turkey, a village on the Euro¬ pean side of the Bosporus, eight miles north of Constantinople, of which city it is a suburb. The name is probably an abbreviation of Sosthenia (ˆsafety®), to which the Argonauts erected a temple in thanksgiving for their safe return from the Golden Fleece expedition. Con¬ stantine the Great converted the temple into a Christian church, and had the statue of the winged goddess in it transformed to represent the archangel Michael. In ancient times many sea-fights took place in the bay.

STENNESS, or STENNIS, Scotland, a loch in the Orkney Islands, a few miles north¬ east of Stromness, 14 miles in circumference. It is celebrated for two groups of prehistoric standing stones on its shores similar to those of Stonehenge. The large group, known as the Ring of Brogar, consists of 15 stones in an enclosure 340 feet in diameter. See Stones, Standing.

STENO, sta'no, Nicholas, Danish scientist: b. Copenhagen, 1638; d. Schwerin, Germany, 25 Nov. 1687. He was educated in medicine, made study of the anatomy of the time, wandered

about the Continent, finally settled at Florence, was made physician to Grand Duke Ferdinand II, but subsequently turned to a churchly

career, was made a Roman Catholic bishop, and went to northern Germany as vicar-apostolic. He was the first to explain the nature of fossil animals, and in writing of the structure of the crust of the earth clearly described the strati¬ fication of rocks, and differentiated them as of mechanical, chemical and volcanic origin. Con¬ sult the article by Hughes in Mature5 (1882).

STENOGRAPHY. See Shorthand.

STENOTAPHRUM. See Grasses in the United States.

STENTOR, in Greek history, the name of a herald in ihe Trojan War, famous for the loudness of his voice, which was said to equal that of 50 other men together; hence, a per¬ son having a very loud, strong voice.

STENTOR. See Infusoria. _

STEP, Edward, English author : b. London, 11 Nov. 1855. He was editor of Welcome (1886-92); Boys (1892-94) and Science Gossip (1894-95). He has published (Plant Life) (1880); (By Seashore, Wood and Moorland* (1891); (By Vocal Woods and Waters) (1894); (Romance of Wildflowers> (1899); (Shell Life) (1901), etc.

STEPHANITE ((<brittle silver ore**), an orthorhombic metallic mineral, of iron-black color and streak; hardness 2 to 2.5; specific gravity, 6.3; brittle and opaque. It is a silver sulphantimonite, containing a large percentage of silver, and is an important ore of that metal in Austria, Germany, Mexico, Peru, Nevada, Idaho and elsewhere.

STEPHANOTIS, a genus of tropical as- clepiadaceous climbing plants. They are twining shrubs, often reaching great heights, with deep-green, coriaceous, opposite leaves. The flowers are large, five parted, waxy and very fragant, in axillary cymes. The corollas are funnel-shaped or salver-shaped, the limb being starlike, with overlapping lobes, and the tube long and cylindrical, but enlarged at tfie base and often again at the throat. S. floyibunda is the ever¬ green greenhouse creeper, from Madagascar, famous for its waxen, fragrant flowers, appear¬ ing in spring and summer, and known by its generic name, or occasionally, as wax-flower or Madagascar jasmine.

STEPHANUS (Latin for Estienne, a-te- en, Etienne), Charles, French scholar and printer: b. Paris, 1504; d. there, 1564. He aban¬ doned the practice of medicine, in order to un¬ dertake the management of the Paris printing house which his brother Robert had abandoned on

his retirement to Geneva. He was the author and printer of one of the first encyclopaedias and gazetteers, (Dicti9nnaire historique et poetique de toutes les nations, hommes, lieux, fleuves, *etc., (1553) and of (Praedium Rusticum* (1554).

STEPHANUS (Estienne, Etienne), Henry

(nephew of the preceding), French scholar and printer: b. Paris, 1528; d. Lyons, March, 1598. He was educated by the most accomplished scholars of his day and in 1551 accompanied his father to Geneva, where he acted as corrector of the press in his father's printing house. In 1554 he set up as an independent publisher and opened a new printing press with the assist-

ance of Huldrich Fugger of Augsburg. He subsequently spent some years in Italy, in Eng¬ land and in the Spanish Netherlands. His monumental work (Thesaurus Linguae Graecae> did not bring him the returns he had counted upon, principally through the rival enterprise of John Scapula, who had been his proofreader, and had treacherously published himself a more handy and cheaper edition of the work. His troubles were increased by the death of his talented wife, Barbe de Wille (1581). Falling in commercial difficulties he became despondent, and was overtaken by sickness during a journey to Lyons; his reason became unsettled and he died in the hospital unattended by a friend. He was one of the most thorough Greek scholars of his time and his publica¬ tions comprehended every relic of Greek litera¬ ture then extant, and were distinguished by critical acumen, felicitous conjectural emenda¬ tion, and exquisite typography. To him the scholars of Europe are indebted for 30 edi- tiones principes of classical authors, publica¬ tions which have remained in many cases the standard text, and the basis for subsequent re¬ censions. He wrote also several important works in the French language, among which may be mentioned (Traite de la Conformite du Langue Frangais avec le Grec* ; ^'Introduc¬ tion au Traite de la Conformite des Merveilles Anciennes avec les Modernes, ou Traite pre- paratif a l'Apologie pour Herodote) (1566). Consult Feugere, (Essai sur la vie et les ouv- rages de Henri Estienne) (1853).

STEPHANUS (Latinized form of Esti- enne, or Etienne), Robert,

brother of Charles Stephanus (q.v.), French scholar and printer: b. Paris, 1503; d. Geneva, 7 Sept. 1559. He early devoted himself to a study of the ancient languages, Hebrew, Greek and Latin, and after the death of his father, Henry Stephanus the printer, he worked in the printing house with his stepfather Simon de Colines, but in 1529 opened an establishment of his own. Ten years later Francis I appointed him ((Printer Royal in the Ancient Languages,® but the hostility of the divines of the day was roused by his publication of certain works, es¬ pecially the Bible, and drove him to Geneva (1551), where he joined the Reformed Church. In his house even the servants spoke in Latin. His publications amounted to 382 in all, and included the Bible, Old and New Testaments in the original ; the Greek and especially the Latin classics, with prefaces and notes; gram¬ mars and school books. Francis I caused to be made for him the famous ((royal type® (char - acteres regii). As an author he produced with the collaboration of Jean Thierry de Beauvais his valuable (Thesaurus Linguae Latinae) (1531). Consult Crapelet, < Robert Estienne, Imprimeur RoyaP (1839).

STEPHEN, ste'ven, Saint, one of the first

seven deacons of Apostolic times. He was stoned to death by fanatic Jews, probably in the August of 32 or 33 a.d. In the Acts of the Apostles (chapter six and seven) an account of his character, works and death is given in some detail. He did ((great wonders and miracles among the people® ; he was ((full of faith and power.® While dying he prayed for those who were stoning him ; and is considered the protomartyr, the earliest Christian witness

who died for his faith. In art he is repre¬ sented in the vestments of a deacon ; holding stones in his robe (the dalmatic) or in his hand; or with a stone in one hand, and a palm in the other. He is celebrated in the Greek Church on 27 December; in the Roman Catholic and Anglican Church on the 26th of that month.

STEPHEN, the name of ten popes, as follows :

STEPHEN I, Saint. He succeeded Lu¬ cius I in 253 and filled the papal chair till 257. He carried on a controversy with Cyprian of Carthage concerning the validity of the baptism of heretics, deciding in opposition to Cyprian that on being received into orthodoxy they must be rebaptized, which was not then the custom in Africa. He suffered martyrdom, and is honored as a saint, his day being 2 August.

STEPHEN II. He was chosen pope in March 752, but died four days

later, before his enthronement and is sometimes erroneously omitted from the list of popes.

STEPHEN III. His pontificate lasted from 752 to 757. He sought the aid of Pepin the Short, against the Lombards who had overrun the exarchate of Ravenna. Pepin on defeating the Lombards gave the exarchate to the Pope, which marks the beginning of the temporal power of the papacy.

STEPHEN IV. He succeeded Saint Paul I in 768 and in a synod held in Rome in 769 sanctioned anew the veneration of relics and saints.

STEPHEN V. He succeeded Saint Leo IV in 816, but his pontificate came to an end the next year. During his pontificate the council of Aix-la-Chapelle was held, by which provisions were made for the foundations of cloistral schools.

STEPHEN VI. He succeeded Hadrian III in 885 and in a controversy with the Emperor Charles the Fat, occasioned by his consecration having occurred before Charles had given his sanction to the election, came off victorious. Guido of Spoleto and Berengarius of Friuli having contended for the throne of Italy Ste¬ phen supported the former and crowned him. His pontificate ended in 891 when he was suc¬ ceeded by Formosus.

STEPHEN VII. In 896 he succeeded Boni¬ face VI, caused the body of Pope Formosus, the predecessor of Boniface VI, to be exhumed and thrown into the Tiber on account of his having belonged to the opposite political party. He also canceled all the ordinances and consecra¬ tions of Pope Formosus. The next year he was imprisoned by his opponents and murdered in prison.

STEPHEN VIII. He succeeded Leo VI in the papal chair in 929 and was succeeded by John XI in 931.

STEPHEN IX. He was a relative of Em¬ peror Otto I and his pontificate lasted from 939 to 942.

STEPHEN X. His rule lasted only from 1057 to 1058 but in that time the separation took place between the Roman and Greek churches. His pontificate is also noteworthy on account of the commencement of a series of internal re¬ forms in the church which were probably due

to the influence of Hildebrand, afterward Gregory VII.

STEPHEN, king of England: b. Normandy, about 1100; d. 25 Oct. 1154. He was a son of Stephen, Count of Blois, by Adela, a daughter of William the Conqueror. His uncle, Henry I, gave him the earldom of Mortaigne, in Nor¬ mandy, and large estates in England, in return for which he took the oath for securing the succession to Henry's daughter, the Empress Matilda. Upon the death of Henry, however, he claimed the Crown for himself (December 1135), and was crowned in London. His seat on the throne, by reason of the disaffection of many of the nobility, was very insecure, and in 1138 David of Scotland invaded England to secure the claims of his niece, but in the battle of the Standard was defeated by the northern barons (August 22). In the following year the empress herself landed in England with her half-brother, Robert, Earl of Gloucester, and a civil war ensued, in which Stephen was taken prisoner and Matilda acknowledged queen. Her conduct, however, excited an insurrection against her government; and, being shut up in Winchester Castle, she escaped with difficulty, while the Earl of Gloucester was taken pris¬ oner. Stephen was exchanged for the earl, and the war was renewed. When Matilda retired to Normandy (about 1147) the contest was taken up by her son Henry. Finally the struggle was brought to an end in 1153 by the Treaty of Wallingford, in which it was agreed that Stephen should reign to his death, and that he should be succeeded by Henry.

STEPHEN, the name of several kings of Hungary from the 10th to the 13th century. Stephen I, Saint; d. 1038. He succeeded his father as Duke in 997, and was crowned first king of Hungary in 1000. He reformed the manners of his subjects, enacted excellent laws and introduced Christianity into his kingdom. Stephen was canonized and became the patron saint of Hungary. Stephen II succeeded his father Koloman in 1114. He invaded Poland and Austria, and marched into Russia, but was unsuccessful everywhere. He abdicated, re¬ tired to a monastery, and died in 1131. Stephen III; d. 4 March 1173. He was crowned king in 1161, but was almost immedi¬ ately deposed by the nobles. He regained the Crown, however, in 1165 and reigned till his death. Stephen IV; d. Semlin, 1164. He as¬ cended the throne in 1161. He was the uncle of Stephen III by whom he was defeated in 1163, soon after which he died. Stephen V; d. 1 Aug. 1272. He reigned two years only, 1270-72, but gained an illustrious name by his victories over Ottocar, king of Bohemia.

STEPHEN, Sir Leslie, English biographer and essayist: b. London, 28 Nov. 1832; d. there, 22 Feb. 1904. He was educated at Eton and Cambridge, and in 1883-84 was Clark lecturer on English literature at

Cambridge. He edited The Cornhill Magazine 1871-82, and in the last-named year became editor of (The Dic¬ tionary of National Biography,) which position he held for nine years, but continued to con¬ tribute to it till the work was completed, writ¬ ing in all 378 biographies, an amount equal to three entire volumes and practically covering in the list the literary history of the 18th and

19th centuries. He was thoroughly conversant with the work of the theologians, philosophers and economists of those centuries and the out¬ come of his knowledge is seen in such works as (History of English Thought in the 18th Century) (1876); (Freethinking and Plain Speaking) (1873); (Lives of Johnson) (1878); (Pope) (1880) ; and (Swift) (1882) ; (An Ag¬ nostic's Apology) (1893) ; and (The English Utilitarians) (1900), a work of the utmost importance. Still other works by him are (The Playground of Europe) (1871), a record of Alpine experiences; (Hours in a Library) (1874-79); (Life of Sir James Fitzjames Stephen,) his brother, (1895) ; (Social Rights and Duties) (1896) ; (Studies of a Biographer) (1898); (Thomas Hobbes) (1904). He was the warm friend of James Russell Lowell, vis¬ iting him more than once in this country, and was an appreciative admirer of the best in American literature and life. At the close of the Civil War he accomplished a great deal toward clearing away prejudice and misunder¬ standings between America and England in a pamphlet which contained a strong arraignment of the course of the London Times during the four years of war. His first wife, the young¬ est daughter of Thackeray, died in 1875. Stephen's religious attitude was that of the ag¬ nostic, but he was not aggressive. His great¬ est service to his time was in the dictionary of National Biography.) For this work he was an ideal editor, his judgment determining not only the selection of subjects but the choice of writers, and he so carefully held them to their task that the work went regularly for¬ ward at the rate of four volumes a year. He was knighted in 1902.

STEPHEN BATHORI, king of Poland:

b. Hungary, 1522; d. Grodno, Poland, 12 Dec. 1586. He was the second of the kings elected by the nobles of Poland, having been declared sovereign in 1575 to succeed Henry of Valois, who had become king of France. The royal prerogative, having been curtailed still further than in Henry's time, extended only over a small district adjacent to the king's estate, but Stephen wrested Livonia from Russia. He was the organizer of the first Cossack regiments and established the University of Wilna. See Poland.

STEPHENS, ste'venz, Alexander Hamil¬ ton, American statesman : b.

near Crawfords- ville, Wilkes County, Ga., 11 Feb. 1812; d. At¬ lanta, Ga., 4 March 1883. He was of Scotch- Irish ancestry; his grandfather, a youthful ad¬ herent of the House of Stuart, came to Penn¬ sylvania in 1746, fought under Washington in the French and Indian War and in the Revo¬ lution, reaching the rank of captain; late in life he migrated to Georgia. His son, a schoolmaster of humble circumstances, was the father of Alexander and died when the latter was 15 years of age. Alexander was prepared for college by a Presbyterian minister, Rev. Alex¬ ander Hamilton Webster, and at the age of 16 he entered Franklin College (now the Univer¬ sity of Georgia), a Presbyterian educational society paying his expenses with the under¬ standing that he would become a minister. In 1832 Stephens was graduated with first honors, and having decided not to enter the ministry, he taught school for two years in order to pay

for his education. In 1834, after three months' preparation, he passed a brilliant examination and was admitted to the bar. As a lawyer he soon attained marked success and was then drawn into politics. An opponent of the policy of nullification he was one of the leaders in organizing the Whig party in Georgia ; he was a member of the State legislature, 1836-42 ; in 1839 a delegate to the Charleston Commercial Convention; and in 1843 was elected to Con¬ gress on a general ticket. In 1838-39 he fa¬ vored the annexation of Texas by joint resolu¬ tion, but in 1844 he opposed Tyler's treaty of annexation and in the next year he framed the measure that secured the annexation. Though opposing Polk's policy in the Mexican War he considered the results of that war fortunate for the South. In Congress he fought the principle of the Wilmot Proviso, and was in¬ fluential in bringing about the Compromise of 1850 which he considered a repeal of the Mis¬ souri Compromise. He opposed the strong (<Southern Rights® movement that threatened to result in secession in 1850 and drafted the celebrated <(Georgia platform® in which the State constitutional convention declared that while not entirely satisfied with the Compro¬ mise of 1850, Georgia was anxious to remain in the Union, though further encroachment upon her rights would result in secession. In 1852, Stephens, with other prominent Southern Whigs, signed a declaration that they would not support General Scott, the Whig nominee for President, because he did not approve the Compromise of 1850 as a final settlement of the questions involved. This stand broke up the Whig party in the South. Stephens and his colleague Toombs voted for Daniel Webster after he was dead.

Holding the same views as Douglas in regard to the territories Stephens pushed through the House (1854) the Kansas- Nebraska bill. After 1854 he acted with the Democrats in opposing the formation of the American or Know-Nothing party out of the wreck of the Whig organization. Though he disliked Buchanan, Stephens supported his ad¬ ministration until 1859 when foreseeing a pro¬ longed conflict over slavery he retired from Congress. In Congress he was a moderate pro-slavery man, not disposed to make extreme demands for theoretical rights. In 1860 he was on the Douglas electoral ticket and in Georgia he led the opposition to secession both before the people and in the Georgia conven¬ tion, where, though asserting the right of the State to secede, he declared that conditions did not then justify a resort to that remedy. When his State seceded he acquiesced, was elected to the Confederate Provisional Congress by which he was chosen vice-president of the provisional government, and was sent to ar¬ range a treaty between the Confederacy and Virginia. In 1862 he was elected vice-president under the permanent Constitution of the Con¬ federate States. He was unable to reconcile his theories of government wifn conditions of war and was often at variance with President Davis on questions of war policy and State rights. In consequence the elements of oppo¬ sition to the Davis administration gathered around him, but he had little influence during the war. In 1864 Stephens, his half brother, Linton Stephens, Robert Toombs and Joseph E.

Brown were leaders of the Georgia Peace party which declared that the Richmond government could make peace if Davis desired. In Febru¬ ary 1865 Stephens headed the unsuccessful Confederate Peace Commission which met President Lincoln at Hampton Roads. Be¬ fore the end of the war Stephens, discouraged, left Richmond and returned to his home in Georgia whence arose the report that he had deserted the Confederacy. He was arrested by the Federals in May 1865 and confined in Fort Warren in Boston Harbor until October when he was paroled. Stephens favored President Johnson's plan of restoration of the Union, saying that since the South had failed to pre¬ serve the Constitution out of the Union it should try again to save it within the Union. In 1866 he was elected to the United States Senate, but on account of the controversy over reconstruction, was refused a seat. He then turned his attention to writing a history of the sectional controversy, the first volume o f which was published in 1867 and the second in 1870. In 1868 he was elected professor of history and political science in the University of Georgia, but on account of ill health, he was forced to decline. He edited the Atlanta Sun in 1871 in opposition to the election of Horace Greeley. Having lost nearly all his

savings in this ven¬ ture he undertook the instruction of a private law class. In 1871 he was an unsuccessful candidate for the United States Senate, but in 1874 he was elected to the lower house of Con¬ gress where he remained until 1882 when he resigned to become governor of Georgia. While in Congress he opposed the Civil Rights Bill of 1875, which aimed to extend certain social rights to the negro in the Southern States. He also objected to the methods of the Electoral Commission in 1877 and demanded that the fradulent returns be rejected; but when Hayes was declared elected Stephens advised acquiescence. He was elected gov¬ ernor of Georgia in 1882 by a majority of 60,000 over his opponent, a popular Confederate soldier, and made an excellent governor but died before the end of his term. In personal appearance Stephens was small and thin, never weighing over 90 pounds. His health was always poor but his disposition was cheerful. He was never married. Chil¬ dren and negroes especially were fond of him, and to the latter he was a trusted friend. He never blamed them for the excesses of the carpet-bag governments. He believed in the fundamental and natural inequality of the races ; and Southern society and government are still based on the principle of his Savan¬ nah speech of 1861 in which he declared that the Confederacy was founded on that inequal¬ ity. He was a logical and effective speaker, without the arts of the popular orator. Whig or Democrat his political principles were the same; he was a Democrat of the school of Jefferson believing in State rights, State sov¬ ereignty, strong local government and the larg¬ est liberty of the individual compatible with good government. It was difficult for him to understand that changed economic and social conditions should be reflected in changed po¬ litical institutions. Therefore in his views of government he was a legalist rather than a political scientist. He published (A Consti-

tutional View of the War between the States) (1867-70) ; (A School History of the United States* (1871) ; and a Compendium of the History of the United States) (1878-83). Though his Constitutional View) has great value as a historical document and all of his books are useful to show his views on politics and government, it cannot be said that he was successful as a historian, but rather as a law¬ yer, a politician and a statesman. Consult Johnston and Browne Rife of A. H. Stephens) (1878; new ed., 1883) ; Cleveland, (A. H. Stephens in Public and Private Life, with Let¬ ters and Speeches) (Philadelphia 1866) ; Pen¬ dleton, Lewis, (Alexander H. Stephens> (ib. 1908) ; Trent, William P., (Southern States¬ men of the Old Regime) (New York

1897) ; Avary, M. L. (ed.), Recollections of Alexan¬ der H. Stephens) (1910).

Walter L. Fleming,

Professor of History in Vanderbilt University.

STEPHENS, Henry Morse, American his¬ torian: b. Edinburgh, Scotland, 3 Oct. 1857; d. 16 April 1919. He was educated at Haileybury College, and Balliol College, Oxford, and was engaged in journalism 1880-92. After being lecturer on Indian history at Cambridge Uni¬ versity 1892-94, he was called to the chair ot modern European and English history at Cor¬ nell University in 1892, which he held till 1902. Thereafter he was professor of history at the University of California. He is the author of a much valued (History of the French Revolution (1886-92) ; and of (The Story of PortugaP (1891); ‘Albuquerque* (1892); Revolutionary Europe 1789— 1815 J (1893) ;

(Syllabus of a Course of Lectures on Modern European History 1600-1890> (1899).

STEPHENS, James, Irish revolutionist: b. Kilkenny, 1824; d. Dublin, 29 March 1901. At 21 he went to Dublin and joined the young Ireland party. He was wounded at the fight at Ballingarry, 29 June 1848. In the next 12 years he became prominently known as a Fenian, and as such exercised an enormous and despotic influence, and throughout showed re¬ markable dexterity in the disguises and char¬ acters' he assumed on his visits to all parts of Ireland. In 1863 he founded the Irish People , published in Dublin. He visited the United States, early in 1864 to attempt to overthrow the rival schemes formed there by patriots, and was arrested in Dublin on 10 November of the same year, 14 days later making his escape from Richmond Bridewell. He found his way to New York, where, in 1867, he was formally deposed by the Fenians, and fled to Paris. He was allowed to return to Ireland in

1.

STEPHENS, James, Irish poet and novel¬ ist : b. County Dublin, February 1882. After many difficulties in early life he became a solicitor’s clerk in Dublin, and in his leisure engaged in the writing of verse and fiction, showing marked ability in. both fields. He has contributed to Sinn Fein and to the Irish Re¬ view. Author of (Insurrections) (1909); (The Hill of Visions) (1912) ; (The

Charwoman's Daughters) (1912) ; (Here Are Ladies) (1913) ; (The Rocky Road to Dublin) (1915); (Songs from the Clay) (1915) ; Reincarnation* (1918), etc.

STEPHENS, James Burton, Australian poet: b. Barrowstowness, Scotland, 17 June 1835; d. 29 June 1902. He was educated at the University of Edinburgh ; and was a travel¬ ing tutor from 1857 to 1860, when he went to Queensland where he ultimately secured an ap¬ pointment in the Colonial Secretary's Office at Brisbane. Later he became Under-Secretary of the department. During his spare time he wrote much and is considered one of the fore¬ most of Australian poets. Among his pub¬ lished works are (Convict Once and Other Poems *(London 1871) ; c Black Gin and Other Poems> (Melbourne 1873) ; (Mute Discourse) (Brisbane 1878) ; Miscellaneous Poems* (Lon¬ don and Brisbane 1880) ; 'Tayctle or Bush Revels) (Brisbane 1892) ; Roetical Works) (Sidney 1902).

STEPHENS, John Lloyd, American

author: b. Shrewsbury, N. J., 28 Nov. 1805; d. New York, 10 Oct. 1852. He was graduated at Columbia College in 1822 ; studied law, and practised for eight years at the bar in New York. He made an extended journey through Europe and the East, an account of which he published in fuller narrative form under the title (Incidents of Travel in Egypt, Arabia, Petrsea, and the Holy Land> (1837) ; and (In- cidents of Travel in Greece, Turkey, Russia and Poland) (1838). In 1839 he was sent by the United States government to negotiate a treaty with the government of Central America; and as the result of his exoeriences and in¬ vestigations in that country published (Incidents of Travel in Central America, Chiapas and Yucatan *(1841); and after further explora¬ tion 'Incidents of Travel in Yucatan* (1843). He was one of the organizers of the first At¬ lantic steam navigation company and one of the first presidents of the company which con¬ structed a railway across the Isthmus of Panama, and superintended the construction.

STEPHENS, Uriah Smith, American labor reformer: b. near Cape May, N. J., 3 Aug. 1821 ; d. in Europe, 13 Feb. 1882. He was edu¬ cated for the Baptist ministry, but became a tailor, which calling he followed until his death, He was a lover of books and a close student of economic affairs, and sought through speeches and letters to the press to reform labor condi¬ tions in the United States and to further the cause of Abolition. In 1869 he founded the Knights of Labor and afterward devoted him¬ self to the upbuilding of that order. He be¬ came the first Grand Master Workman of its general assembly in 1878.

STEPHENS, William, American colonial governor: b. Boscombe, Isle of Wight, 28 Jan. 1671 ; d. Georgia, August 1753. He was grad¬ uated at Cambridge in 1688, and before com¬ ing to America represented the Isle of Wight in Parliament. In 1736 he made the acquaint¬ ance of James Oglethorpe in South Carolina, and in the following year went to Georgia, where he was successful as a planter, and rose to prominence in the new community. In 1743 he was made president of the county of Savannah, and later governor of the entire colony. His administration lasted until 1750, when he resigned. He wrote 'A Journal of the Proceedings of Georgia from October 20, 1737,> a valuable historical work, but few complete

GEORGE STEPHENSON

First to apply the locomotive steam engine to railways for passenger traffic

-p*

» •

't

•

copies of which remain. (The Castle-builder, or the History of William Stephens of the Isle of Wight) (2d ed. 1759) is a biography by his son.

STEPHENS, William Richard Wood,

English Anglican clergyman and author : b. Gloucestershire, 5 Oot. 1839 ; d. Winchester, 22 Dec. 1902. He was educated at Oxford, took orders in the Established Church, was vicar of Mid-Lavant, Sussex, 1870-73, rector of Wool- beding, Sussex, 1876-94, and dean of Winchester from the latter date. He published (Saint Chrysostom: his Life and Times) (1872) ; (Christianity and Islam) (1877) ;

(Hildebrand: his Life and Times) (1888); (Life and Letters of Edward Augustus Free¬ manˆ a work of much value (1895) ; (The English Church from the Norman Conquest to Edward P (1901).

STEPHENSON, ste'ven-son, George, Eng¬ lish inventor: b. Wylam,

near Newcastle, 9 June 1781 ; d. near Chesterfield, 12 Aug. 1848. He was successively assistant fireman, fireman and brakeman in a colliery, in 1802 was made engineman at Willington Ballast Hill, in 1808 took with two others the contract to operate the engines at Killingworth pit, and in 1812 was appointed engine-wright there. The appli¬ cation of steam power to locomotive engines had for some time engaged the attention of scientific men. Stephenson eagerly devoted himself to the working out of the idea, and hav¬ ing established an extended reputation for soundness of judgment and engineering skill he was supplied by Lord Ravensworth with the means of constructing a locomotive engine, which was placed, 25 July 1814, on the colliery tramway, and drew eight loaded wagons at the rate of four miles an hour. Though thus partially successful, Stephenson saw that more was needed to make this mode of conveyance advantageous, and he accordingly invented the <(steam blast,® which enabled him to double his rate of speed, and in 1815 he took out a patent for, and constructed, an engine which up to the present day (under certain modifications and improvements) has, like Watt's steam engine, continued as a model in the construction of locomotives. In this same year he devised a safety-lamp, the Geordie, for miners, which was produced prior to and altogether independent of the better-known invention of Sir Humphry Davy, and is still employed in preference to the latter in some parts of Northumberland. The following year he took out a patent for an im¬ proved form of rail and chair. In 1819 he was employed to construct a railway for the pro¬ prietors of the Hetton Colliery, and in 1822 the Stockton and Darlington line for. Pease, its leading promoter, who appointed him resident engineer, with an annual salary of £300. The line was opened 27 Sept. 1825, the engine being driven by Stephenson himself, and drawing 38 carriages, with a total weight of about 90 tons, at a rate of from 12 to 16 miles an hour. This was the first steam railway in Great Britain on which passengers were conveyed as well as goods. At this period a copartnership was formed between Pease and Stephenson for the establishment of a locomotive manufactory at Newcastle, which was long the only work of the kind in the kingdom, and rapidly increased in extent and importance. The scheme of con¬

structing a railway between Liverpool and Manchester had been set on foot in 1824, but the opposition to it, both in and out of Parlia¬ ment, was so strong that it had to be tem¬ porarily abandoned. The bill was passed, how¬ ever, on a second application, and the work commenced in 1826. After overcoming many difficulties, one of the greatest being the carry¬ ing of the line over Chatmoss, the railway was opened on 15 Sept. 1830. The results of the undertaking were most triumphant

for Stephen¬ son, and it proved the commencement of the British system of railroad transit. For 10 years subsequent to this there was scarcely a line of railway opened in Great Britain with the construction of which Stephenson was not concerned. In 1840 he resigned most of his ap¬ pointments, and settled at Tapton, in Derby¬ shire, where he took in hand the working of the Clay Cross Collieries, leaving the exten¬ sion of the railway system to be carried out by his son Robert (q.v.). He still, however, re¬ mained connected either as engineer or other¬ wise with several lines, made professional jour¬ neys to Spain and Belgium, and was created a knight of the latter country by King Leopold. He also took a considerable interest in me¬ chanics' institutes, and was the founder and president of the Institution of Mechanical Engi¬ neers at Birmingham. George Stephenson may be regarded as an embodiment of the sturdy and energetic spirit which has raised the British nation to its high position industrially among the other countries of the world, and enabled 'it to effect such triumphs in enterprise. The stand¬ ard authority is the (Life) by Smiles as re¬ vised by that author for Vol. Ill of his (Lives of the Engineers) (1862). See Locomotive.

STEPHENSON, Robert, English civil engineer: b. Willington Quay, near Newcastle, 16 Oct. 1803 ; d. London, 12 Oct. 1859. He was the son of George Stephenson (q.v.). In 1822 he studied at Edinburgh University. The elder Stephenson having shortly after this en¬ gaged in the locomotive manufactory at New¬ castle in conjunction with Pease, Robert became his apprentice in 1823, but his health giving way after two years, he accepted an engage¬ ment to examine the South American mines, returning to England in 1827 by way of the United States and Canada. Not long after his return he assisted his father and Henry Booth in the construction of the locomotive (the ((Rocket®) which gained the prize of £500 offered by the directors of the Liverpool and Manchester Railroad for the best railway engine. The next great work on which he was engaged was the construction of the London and Birmingham Railway, the first railway into London, of which he was appointed engineer. The first sod of the line was cut at Chalk Farm in June 1834, and the railway opened to the public in September 1838. Much of his atten¬ tion was given to the superintendence of the manufactory at Newcastle, and he made fre¬ quent professional journeys abroad, laying out lines of railway in Switzerland, Germany and other parts of the Continent and likewise in Canada, Egypt and India. One of the most brilliant proofs of his engineering skill is dis¬ played in the system of railway bridges and viaducts constructed under his directions. Among these may be mentioned more especially

the high-level bridge at Newcastle, the. Vic¬ toria bridge at Berwick, the tubular bridges, of which he was the inventor, as exemplified in those over the Conway and the Nile, and the still more wondrous erections of the Britan¬ nia bridge over the Menai Straits, and the Victoria bridge over the Saint Lawrence. He introduced the tubular girder system in the building of wrought-iron bridges. He took a considerable interest in public affairs, and from 1847 represented the borough of Whitby in Parliament. He served a term as president of the Institution of Civil Engineers, and his re¬ mains lie in Westminster Abbey. Consult Smiles, (Lives of the Engineers* (Vol. Ill,

1862).

STEPHENSON, Mich., township and vil¬ lage in Menominee County, on a tributary of the Menominee River, 168 miles north of Mil¬ waukee, Wis., on the Chicago and Northwestern Railroad. There are flour and lumber mills and a sugar ibeet industry. Pop. township, 3,000.

STEPHENSON'S DEPOT (CARTER'S FARM), Engagement at. ,,On 19 July 1864 General Averell with 1,000 cavalry, 1,350 infan¬ try and two batteries, marched up the Valley Pike from Martinsburg, W. Va., drove the Confederate cavalry from Darkesville toward Winchester, and halted near Stephenson's De¬ pot, about six miles from Winchester. This placed him in rear of Early, who was at Berry- ville, who immediately retreated toward Stras- burg, first sending Ramseur's division of infan¬ try and two batteries to Winchester to sup¬ port the cavalry brigades of Jackson and Vaughan, and check Averell's advance. On the morning of the 20th Averell, who had re¬ ceived a reinforcement of 300 cavalry, raising his force to about 2,800, resumed his march toward Winchester, in line of battle, to resist a sudden attack or to make one. A regiment of infantry was deployed on either side of the road, with skirmishers in advance, another regiment marched on each side in column in rear of the right and left flanks, artillery in the centre, on the road, and a regiment of cav¬ alry on each flank. Three miles north of Winchester, on Carter's Farm, Ramseur was encountered, moving with intent to capture Averell, whose force had been reported as a regiment of cavalry and one of infantry. Ram¬ seur opened fire with four guns and demon¬ strated with his cavalry on both flanks, under cover of which he formed line, Johnson's bri¬ gade on his right, Hoke's on the left, with Pegram's in

reserve. Averell deployed his en¬ tire command in one line, withdrew his skir¬ mishers, opened fire from his 12 guns, and, with¬ out pausing, sent in all his cavalry and infan¬ try, drove in the Confederate cavalry, broke 'Ramseur's left, held by Hoke, which fled in disorder, followed by the remainder .of the division to near Winchester, where Averell's immediate pursuit was checked by Jackson's cavalry. Averell captured four guns and about 280 wounded and unwounded prisoners, among them Generals Lewis and Lilly, wounded. Ramseur had 73 killed and 130 wounded. Averell had 53 killed, 155 wounded and six missing. Informed that a large force was gath¬ ering in his front, Averell established a strong picket-line and fell back two miles. On the

morning of the 21st he entered Winchester un¬ opposed, the Confederates having retreated toward Strasburg. On the 22d he was joined by Crook and next day both fought the battle of Kernstown (q.v.).

STEPNEY, a metropolitan borough of London, England, within the Parliamentary borough of Tower Hamlets. Area, 1,766 acres. The borough is typically east end, containing the districts of Whitechapel, Limehouse and Mile End, abounding in the most depressing poverty. Saint Katherine's and the London docks, the Tower of London and the Royal Mint, are situated within the borough. The People's Palace, Toynbee Hall, the London Hospital, Whitechapel and Dr. Bernardo's Homes are some of its institutions. Spital- fields is historically famous as a silk-weaving centre. There is a large foreign population, numbering about 53,060, of which 43,925 were natives of Russia or Russian Poland, out of a total of 63,105 .of these nationalities in London. Pop. about 279,804.

STEPNIAK, step'nyak, Sergius (real name Sergius Michaelovitch Kravchinski) , Rus¬ sian revolutionist and author : b. southern Rus¬ sia, 1852; d. London, 23 Dec. 1895. After a liberal education, he identified himself with the revolutionary movement, was arrested in 1874 but released, and in 1880, on account of his advocacy of the "terrorist** policy, was com¬ pelled to leave the country. He went to Switz¬ erland and later to England, became identified with the Socialists there and with the Social Democrats of the Continent, and wrote and lectured (also in the United States) on the liberalization of Russia. Among his books on conditions and methods were Underground Russia' (1882) and (King Stork and King Log) (1896). His views altered from violent to constitutional means in securing popular freedom.

STEPPES, steps, Russia, a Tatar term em¬ ployed geographically to denote those ex¬ tensive tracts of land which, beginning at the Dnieper, extend along the southeast of Russia, round the Caspian and Aral seas, between the Ural and Altai mountains, and occupy a con¬ siderable portion of Siberia. These steppes present wide, treeless, monotonous tracts, which are covered with rough grass and shrubs dur¬ ing the short spring season, but soon become arid deserts owing to the drought of summer, and in winter are wastes of snow. Though they are all open, flat and treeless, they differ considerably in aspect according to the nature of the soil of which they are composed; some tracts consisting of deep, black earth, clothed with shrubs and grasses ; others of hard, sandy clay and sterile ; and others again of sand or rocky shingle and only here and there dotted with vegetation. This applies, however, only to the spring and early summer; for dur¬ ing the summer droughts all are alike desert save round the springs and streamlets, and during winter, which comes on in October, the whole is one exposed and inhospitable snow- waste. The Siberian plain, as might be ex¬ pected from its extent, is of a more varied character, consisting of low-lying tundras, or black, swampy peat mosses, of broad undu¬ lating steppes and partially wooded uplands ;

hut the tundras and wooded lands are scarcely included in the steppes proper. From June till the middle of August the tundras are thawed to a small depth, the steppes are scantily covered with grass and mosses, the banks of the great rivers are green with the birch and pine and immense herds of horses and cattle give animation to the scene. In winter fearful storms rage and the dry snow is driven by the gale with a violence which neither man nor animals can resist.

STERCULIACEZE, ster-ku-li-a'se-e, a fam¬ ily of dicotyledonous plants closely * allied to the Malvacece, from which they are distin¬ guished by the two-celled anthers. There are about 30 genera and 150 species, which com¬ prise tropical and sub-tropical herbs, shrubs and trees with alternate, entire, lobed or digi- tately compound leaves, and generally axillary flowers which are often large and beautiful. They are also characterized by their mucilag¬ inous qualities. Many are of economic import¬ ance, being used for food and for various other purposes. One of the best known species cul¬ tivated in the United States is the Chinese parasol tree, or Japanese varnish tree (Ster- culia platanif olia) , which is very popular in the southern States upon lawns and is often found wild. In California S. diversifolia and S. aceri-

folia are popularly planted upon* lawns and in streets for their shade and showy flowers, which in the former species are yellowish- white or greenish-red, and in the latter bril¬ liant scarlet, hence a popular name ((flame- tree.® Both are natives of Australia.

STERE, star, the French unit for solid measure, equal to a cubic metre or 35.3156 cu¬ bic feet. See Weights and Measures.

STEREO-CHEMISTRY (Greek, stereos, ((solid®). In the development of the science of chemistry, it was discovered that two or more compounds may have the same empirical for¬ mulae and yet differ from one another in chem¬ ical and physical properties to a marked degree. Resorcin, pyrocatechin and hydroquinone, for example, all have the empirical formula C6H4(OH)2, and yet they are distinctly differ¬ ent substances. Most cases of this kind are explainable by supposing that the constituent atoms are linked together in different ways in the several compounds ; the compounds them¬ selves being called ((isomers,® and the phenom¬ enon ((isomerism.® (See Isomerism; Aromatic Compounds ; Fatty Compounds). The arrange¬ ment of the atoms in such compounds has been investigated in many of these cases, and ((con- stitutional formulae® have been devised for the purpose of representing the internal structures of their molecules. Compounds have been found to exist, however, which apparently have the same constitutional formulae and which resemble one another very closely indeed in most respects, but which nevertheless exhibit certain differences in physical and chemical properties, so that they cannot be regarded as absolutely identical. It is the province of stereo-chemistry to investigate such bodies and to show how it is possible to reconcile their exceedingly close similarity with the existence of recognizable differences in certain respects. Isomerism of the kind here contemplated is commonly called ((optical isomerism,® from the

fact that the bodies that manifest it differ with respect to their action upon polarized light. It has long been known that certain crystals possess the power of rotating the plane of polarization of the light that they transmit. It is also known that the crystals of a sub¬ stance that affects light in this manner may sometimes be obtained in two slightly different forms, which possess symmetry of the same kind, and whose corresponding angles are equal, but which differ in the same manner as a man’s right hand differs from his left one, or as the image of an object as seen in a mirror differs from the object itself. A pair of crystals that differ only in this respect are said to be “enantiomorphous,® and if one of them rotates the plane of polarization to the right, the other, when similarly placed, will rotate

it to the left; the angle of rotation being the same in each case, if the crystals are of equal thick¬ ness. If two such enantiomorphous crystals of the same substance are melted or dis¬ solved, the respective fluids that are obtained from them are commonly found to be identical with each other in all respects, so that if they affect the plane of polarization at all, they rotate it in the same direction, and by the same amount. It is plain that in cases of this sort the differences between the original crystals are of a purely physical nature, depending only upon the way in which the molecules of the substance are grouped, and not at all upon the internal structure of those moleclues. In other words, two enantiomorphous crystals are to be regarded as composed of identically the same chemical substance, if they differ only in their optical properties, and become identical in all respects upon being melted or dissolved. Stereo¬ chemistry has nothing to do with substances of this sort, which are not to be regarded as isomeric in any sense. Stereo-chemistry deals

entirely with substances whose optical differ¬ ences are manifested even in the liquid state, and hence are to be attributed to internal differ¬ ences in the molecules rather than to mere differences in the grouping of the molecules among themselves.

As a simple example of optical isomerism, the case of lactic acid and its isomers may be cited. Lactic acid (which occurs in sour milk, and which may be extracted in the form of a syrupy liquid) has no effect upon polarized light; but sarcolactic acid (which occurs in the juice of flesh) rotates the plane of polari¬ zation to the right, and yet its chemical proper¬ ties are practically identical with those of com¬ mon lactic acid. A third acid, known as “laevo-rotatory lactic acid,® has been prepared, which is almost indistinguishable from the two foregoing substances so far as its chem¬ ical properties are concerned, but which rotates

the plane of polarization to the left. The chem¬ ical properties of all three agree with the con¬ stitutional formula CH3.CH (OH) .COOH ; and yet they cannot be regarded as chemically iden¬ tical. When polarized light is passed through equal thicknesses of equally concentrated solu¬ tions of sarcolactic and lsevo-rotatory lactic acids, the plane of polarization is rotated in opposite directions, but by the same amount; and when equal quantities of sarcolactic and laevo-rotatory lactic acids are mixed, the mix¬ ture has no effect upon the

plane of polariza¬ tion, and (in fact) the mixture cannot be dis¬ tinguished from ordinary lactic acid in any way. These general characteristics are manifested by all of the simpler optical isomers. They occur in pairs (or ((twins®), one member of which rotates the plane of polarization to the right, while the other rotates it equally to the left. A third isomer also exists, which is composed of equal parts of the two optically active ones, and which is, therefore, itself inactive. The in¬ active member of the group is often called the ((racemic® modification, the name being derived

OH CHS

H COOH

GH3 OH

Fig. 3.

Fig. 4.

from racemic acid, which is an optically inac¬ tive mixture of dextro-rotatory and laevo-rota- tory tartaric acids. (This statement, it is to be observed, applies only to the simpler cases of optical isomerism. For a more general state¬ ment, applicable in all cases, see below).

In 1874 Le Bel and van't Hoff, simultane¬ ously and independently, pointed out that all known compounds which manifest optical isomerism contain at least one ˆasymmetrical® (or unsymmetrical) central atom. In most of the known cases, this central, asymmetrical atom is a carbon atom ; but a few cases are now known in which it is nitrogen. The chemistry of asymmetrical nitrogen compounds is still in its infancy, however, and hence in the present article attention will be confined solely to the asymmetrical carbon atoms ; and we shall first treat of compounds in which only one such atom is present.

Carbon is a tetravalent substance, having four valencies (or bonds) ; and it has been well established (especially by the exhaustive re¬ searches of L. Henry) that these four valencies of carbon are all alike, so that if one atom of hydrogen in methane (CH4), for example, be replaced by one atom of any other mono¬ valent substance, such as chlorine, the resulting compound is precisely the same, whichever of the hydrogen atoms is so replaced. The funda¬ mental discovery of Le Bel and van't Hoff was that the simplest class of the substances which exhibit optical isomerism may be regarded as derived from methane, by substituting, for at least three of the hydrogen atoms that it con¬ tains, an equal number of monovalent atoms or radicals, no two of

which are alike; so that the resulting compound consists of a central

nucleus of carbon, each of whose valencies is satisfied by a different atom or radical. A car¬ bon atom whose valencies are satisfied in this way is called an ˆasymmetrical® carbon atom.

H COOH H COOH

COOH H

Fig. 6. — Fumaric Acid.

In the case of the various lactic acids which have already been cited, one of the fundamen¬ tal hydrogen atoms of the methane remains undisturbed, while the other three are respec¬ tively replaced by OH, CHa and COOH. The structural formula of any one of these acids

CHa

may, therefore, be written OH — C — COOH.

The central carbon atom is here the <(asymmet- ric® atom, since its four bonds are satisfied by four unlike univalent radicals or atoms. From the admitted equality and similarity of the four carbon bonds, it appears to be inadmis¬ sible to suppose that the nature of the com¬ pound that is represented above can depend (for example) upon whether the COOH group is opposite the OH group, or adjacent to it. Le Bel and van't Hoff, however, suggested that we should think of the four carbon bonds, not as four lines radiating out from the carbon atom in some one plane, but as lines radiating out from the carbon atoms in space, in four sym¬ metrically related directions. The carbon atom being represented by a given point in space, for example, we are to think of the four bonds that it has as corresponding to the four vertices of an equilateral tetrahedron, having the carbon atom at its centre. For the sake of further illustration, let us suppose that we are looking down upon one of the vertices of such an equi¬ lateral tetrahedron, as suggested in Figs. 1 and 2; and let us represent the four dissimilar radi¬ cals (or atoms) by which the four bonds of the carbon are satisfied, by the letters A, B, D and E. We may suppose that in one of the optically active isomers these four radicals are disposed as in Fig. 1, and in the other as rep¬ resented in Fig. 2. It is evident that two sub¬ stances having such similar constitutions would be chemically so similar that it would be diffi¬ cult to distinguish them by any ordinary test; and yet it is evident that they are not identical' since it will be found to be impossible to super¬ pose either of these tetrahedra upon the other one, in such a way as to bring into

coincidence all the vertices that carry similar radicals (or atoms). In fact, these two tetrahedra resemble each other enantiomorphically, just as the image of an object in a mirror resembles the

object itself; and superposition is, therefore, impossible. The constitution of sarcolactic acid, according to this general scheme, might be rep¬ resented as in Fig. 3, that of lsevo-rotatory lactic acid being then represented as in Fig. 4. The central dot by which we have here repre¬ sented the asymmetric carbon atom in each of these compounds is usually omitted from diagrams of this sort, the presence of this atom being sufficiently represented by the tetrahedron itself.

The name ˆstereo-chemistry® has reference to the use of a solid diagram for representing the constitutions of the compounds with which it is concerned; and the ideas which have been presented above are capable of being expanded into a general theory of the constitution of carbon compounds. The first successful attempt at the formulation of a theory of this sort was made by van't Hoff, in 1878. In this the¬ ory (which includes the explanation of isomer¬ ism of all kinds by the geometric relations of the solid diagrams that are used, and which is, therefore, often called the theory of <(geometri- cal isomerism®), each carbon atom in a given compound is supposed to be represented by a separate tetrahedron ; though in the practical applications of the theory it is customary to omit all the tetrahedra except those that relate to the central carbon atom, or to those which are of special or fundamental importance. When two carbon atoms are united by a single bond, their corresponding tetrahedra are sup¬ posed to be united in such a wray that they are symmetrically situated, with one vertex in com¬ mon ; when they are united by two bonds, they are supposed to be symmetrically situated, with one edge in common ; and when they are united by three bonds, they are supposed to have one entire face in common. In the case of the triple bond, the theory has no special interest; for in this case theory does not indicate any possibility of isomerism, nor has experiment revealed any case of this kind in which isomer¬ ism exists. The use of a solid diagram for illustrating the isomerism of compounds con¬ taining two carbon atoms united by a double bond will be understood from Figs. 5 and 6, which correspond, respectively, to maleic and fumaric acids. (See Maleic Acid). There is no optical isomerism in the case of these com¬ pounds ; this circumstance being explained,. ac¬ cording to the theory of geometrical isomerism, by the fact that the points of

attachment of the hydrogen atoms and the COOH groups are in each case all in the same plane. Moreover there is no asymmetric carbon atom in either case, be¬ cause if the tetrahedra were separated, they could be turned so as to be perfectly superpos- able. The relative distances between the points of attachment of corresponding radicals (or atoms) is not the same in Fig. 5 as in Fig. 6, and hence it is to be expected that the isomers that these diagrams represent will behave differ¬ ently with respect to solubility, melting. point, boiling point and in other respects also, includ¬ ing the facility with which they will react with other substances. It may be noted, in passing, that the atoms and radicals shown in Figs. 5 and 6 admit of still another arrangement, in which both of the hydrogen atoms are attached to one of the tetrahedra, and both of the carboxyl

groups (COOH) are attached to the other one. The substance having this structure is actually known, and is called (<methylene-malonic acid.® Its properties are quite different, however, from those of maleic and fumaric acids, as might be inferred from the markedly different character of its structural diagram.

Tartaric acid affords an interesting example in stereo-chemistry, not only on account of its structure, but also because it was upon this acid and its modifications that Pasteur per¬ formed the classical experiments which led (1860) to the development of the methods that are now used for the separation of optical iso¬ mers. The constitutional formula for tartaric acid as ordinarily written is

H

I

HO — C- COOH.

HO — i — COOH

I

H

Each of the two central carbon atoms is here asymmetric, because each has its four bonds satisfied by four different substances. In the solid diagrapi for representing the structure of tartaric acid we shall, therefore, have to make use of two tetrahedra ; and since the two nu¬ clear carbon atoms are directly united by one bond, their

corresponding tetrahedra will be symmetrically situated, and will have one vertex in common. In attaching the hydrogen, the hydroxyl (OH) and the carboxyl (COOH) to the vertices of the tetrahedra, we may adopt any one of three essentially different arrange¬ ments, for representing the relations expressed by the foregoing structural formula. These are shown in Figs. 7, 8 and 9. It will be observed, in Fig. 7, that the radicals and atoms that are attached to the vertices are so situated that the two tetrahedra would be superposable in all respects, if they were separated from each other. According to stereo-chemical theory, this signi¬ fies that the compound that Fig. 7 represents will rotate the plane of polarized light by an amount equal to the sum of the effects of the two constituent asymmetrical tetrahedra. Turn¬ ing now to. Fig. 8, it will be seen that the two tetrahedra in this diagram also admit of super¬ position upon themselves, if they are separated; and hence the compound that this diagram rep¬ resents will also rotate the plane of polarization by an amount that is equal to the sum of the effects that are due to its two constituent tetra¬ hedra. It will be noted, however, that neither of the tetrahedra in Fig. 8 can be superposed upon either of those in Fig. 7 ; and this fact (when taken in connection with the identity of the two types of tetrahedra in all other re¬ spects) signifies that the compounds that are represented by Figs. 7 and 8 will rotate the plane of polarization by equal amounts, but in opposite directions. Fig. 7 may, therefore, be taken to represent dextro-rotary tartaric acid, while Fig. 8 represents the laevo-rotatory va¬ riety of the same substance. In the configura¬ tion shown in Fig. 9, it will be observed that the two tetrahedra, if separated, cannot be superposed; for they are enantiomorphic, or re¬ spectively right-handed and left-handed. Ac¬ cording to the theories of stereo-chemistry, one

of these tetrahedra tends to cause the plane of polarization of polarized light to rotate to the right, while the other tends to rotate it by an equal amount to the left; and hence the sub¬ stance, as a whole, will be optically inactive. In addition to these three varieties of tartaric acid (all of which are known and can be ac¬ tually prepared), there is a fourth variety which is optically inactive, but which is not really chemically distinct from the varieties that have been described. This is known as (<racemic acid,® and it consists of a mere mixture of equal parts of the dextro-rotatory and lsevo- rotatory acids.

exceedingly close, but certain slight differences are nevertheless

observable, and these render the separation of the isomers possible. Special methods of separation may be adopted in spe¬ cial cases ; but the three general methods that we have, and which are due to Pasteur, are as follows: (1) The mixed isomers are caused to combine with some other substance, whose iso¬ meric compounds exhibit differences in melting point, solubility or crystallization ; and when the compounds have been separated by the usual methods applicable in such cases, they are separately decomposed so as to liberate the isomers of the original substance again.

COOH

DEXT RO - ROT KT ORV

Fig. 7.

COOH

LfiLMO-ROTWORY

COOH

Fig. 8.

Constitution of the Isomers of Tartaric Acid.

INACTIVE

Fig. 9.

The general facts of optical isomerism are thus stated by Nernst: (1) No compounds are optically active in the amorphorus, homogeneous state (whether solid, liquid or gaseous), save those which contain one or more asymmetrical carbon atoms in the molecule. (2) If several asymmetrical carbon atoms exist in the mole¬ cule, — for example, two, — then the rotations that are due to these respective atoms may be denoted by A and B, and the following com¬ binations are possible, in the isomeric forms which the substance may exhibit:

A + B; — A — B;

A — B; —A + B.

The two substances corresponding to the first horizontal row are called “isomeric twins,® since they produce equal rotations, but in op¬ posite directions. If the compound has n asym¬ metrical carbon atoms, then the number of optical isomers is 2n, and two of these

must be twins. (3) All compounds which contain asymmetric carbon atoms are not necessarily optically active ; for the rotation that they pro¬ duce may be too small to admit of detection ; or the internal structure may be such as to pro¬ duce internal optical compensation, as in the case of Fig. 9; or the compound may be a mix¬ ture of the dextro-rotatory and laevo-rotatory isomers, as in the case of racemic acid, already cited.

Optical isomers are often said to be iden¬ tically alike in their chemical properties ; but this is not rigorously true. The resemblance is

Pasteur separated racemic acid into its constit¬ uents by neutralizing it wdth cinchonine, sepa¬ rating the respective salts by crystallization, and then decomposing the respective cinchonine salts so as to liberate the two active varieties of tartaric acid. Ordinary lactic acid may be sep¬ arated into its constituents by making use of the different solubilities of the lactates of zinc. (2) Certain microscopic organisms affect the various isomeric forms in different ways. Thus the mold fungus, Penicillium glaucum, when allowed to act upon a dilute solution of am¬ monium racemate, destroys the dextro-rotatory tartaric acid, while leaving the laevo-rotatory variety unaffected. (3) Sometimes the com¬ pounds of the dextro-rptatory and laevo-rotatory isomers crystallize in separate enantiomorphous crystals, from which the crystals of one type can be picked out by hand. This method was used by Pasteur with success in the case of sodium-ammonium racemate; but it is not of very general applicability, because the isomeric salts usually separate out together, in one mass.

In conclusion it may be well to say that it is not at all probable that the atoms of carbon compounds are actually arranged in space in accordance with the .geometric representations that are adopted in stereo-chemical theory. The tetrahedron diagrams are exceedingly use¬ ful for representing the chemical facts as we know them in the laboratory ; but we know very little and perhaps nothing, of the actual way in which the atoms of compounds (whether

carbon compounds or not) arc arranged in space.

Consult Van't Hoff, ˆtereochemie/ and (Dix annees dans l'histoire d'une theorie> ; Hantzsch, (Grundriss der Stereochemie) ; and Nernst,

theoretical Chemistry/ together with the references therein given.

Allan D. Risteen.

STEREOCHROMY, in art, a process of mural painting in which water glass is used to fix or consolidate the colors. See Paint¬ ing, Technique of.

STEREOGRAM, Parallax, a novel photo¬ graphic transparency, the invention of Frederic E. Ives, which, without a stereoscope or other optical aid, shows the objects photographed in full stereoscopic relief, when viewed from a certain point, directly in front. It consists of (1) a single photograph on glass which is a composite in alternate fine vertical lines of the two halves of an ordinary stereogram, and (2) of an opaque line cover screen mounted upon it, with a separation of about thirty one- thousandths of an inch. The relative disposition of the lines of the photograph and those of the cover screen is such that by parallax of vision, each eye sees those lines and only those which make up the image belonging to that eye. They can be so made as to show the objects apparently standing in the air, either through and beyond the glass or between the glass and the eyes. The large size of the photographs and the ab¬ sence of any visible optical aid make the results more realistic and impressive than by other means of stereoscopic representation.

STEREOGRAPHIC PROJECTION, a

name given that projection of the sphere which is represented on the plane of one of its great circles, the eye being situated at the pole of that great circle. All circles are projected either into straight lines or circles, and the an¬ gle made by two circles meeting on the globe is the same as that made by the projections of those circles. It is the projection generally employed in ordinary atlases. The distortion in the form of countries on the plane surface is very slight.

STEREOPTICON, a name given to a com¬ bination of two or three magic lanterns or optical lanterns arranged so as to focus in the same circle of light on the screen, for the production of what are termed ˆdissolving views.® The views are ((dissolved® one into another by alternately throwing pictures from the two lanterns, the one gradually taking form while the picture from the other gradually fades upon the screen. With the oxy-hydrogen or calcium light the dissolving effect is pro¬ duced by switching the gas from one lantern to the other. With the electric light it is done by revolving a shutter in front of the pro¬ jecting lenses of the lanterns. This effect is much more beautiful with

the calcium light, as the lime loses its brilliancy in the one lan¬ tern and acquires it in the other by degrees, the one view ˆmelting® into the other. With the shutter the transformation is perceptible in a very unpleasant <(winking® movement. Where the third lantern is added it is used independently to throw a second image upon a picture already on the screen, as in the case of a vision .or dream, ghost or other phantas¬

magoria. It may also be used to tint delicately the view on the screen. See Magic Lantern ; Optical Lantern.

STEREORNITHES, ste're-or'm-thez, a group of extinct birds of gigantic size, remains of which are found in Patagonia in the Miocene Age strata. They were distantly related to the herons and to the Seriema. The head was large with a high and powerful beak, and the palate was desmognathous.

STEREOSCOPE, an optical apparatus

which enables us to look at one and the same time upon two photographic pictures nearly the same, but taken under a small difference of an¬ gular view, each eye looking upon .one picture only; and thus, as in ordinary vision, two images are conveyed to the brain which unite into one, the objects being thus represented under a high degree of relief. The stereo¬ scope is constructed in accordance with the visual phenomena which convey to the mind impressions of the relative forms and positions of an object. When a near object having three dimensions is looked at, a different perspective representation of it is seen by each eye; in other words, there is distinct binocular parallax. Certain parts are seen by the right eye, the left being closed, that are invisible to the left eye, the right being closed and vice versa, and the relative positions of the portions visible to each eye in succession differ. These two visual im¬ pressions are simultaneously perceived by both eyes, and are combined into one image, pro¬ ducing the impression of perspective and relief. If, then, truthful right-and-left monocular pic¬ tures of any object be so presented to the two eyes that the optic axes, when directed to them, shall converge at the same angle as when directed to the object itself, a solid image will be seen. This is effected with the stereoscope, a reflecting form of which was invented by Professor Wheatstone in 1838. It is con¬ structed so that the two dissimilar pictures are reflected to the eyes from two small plane mirrors placed at right angles, the faces being toward the observer. Subsequently Sir David Brewster invented the refracting or lenticular stereoscope, based on the refractive properties of semi-double convex lenses ; and this instru¬ ment, of which there are

numerous forms, is now in general use. Convex lenses magnify the pictures besides producing a stereoscopic effect. Photography greatly assists the stereo¬ scope in providing perfectly accurate right- and-left monocular views, which are taken si¬ multaneously on a plate in a twin camera. Sometimes, in the case of .objects which from their distance have no sensible binocular paral¬ lax, photographs are taken from two points con¬ siderably apart; and when such views are com¬ bined in the stereoscope the effect of relief is greatly exaggerated. A most interesting ap¬ plication has been made of this principle to the photography of comets, the position of the observer between the two exposures being greatly changed owing to the fact that the earth on which he stands is continually mov¬ ing about the sun with a speed of more than 18 miles a second. Though the results are some¬ what marred by the fact that the comet itself is moving, and also changing its shape, yet when the two pictures are combined, the stereo¬ scopic effect is in many cases beautifully shown.

Several modifications of the reflecting stereo¬ scope are distinguished by the names pseudo- scope,' iconoscope, telesteraoscope and polis- tereoscope, the last being an apparatus which serves the purposes of all the others. See Camera ; Light.

STEREOSCOPIC SLIDE, a slip of card¬ board on which are mounted side by side two photographs of the same scene or object, in¬ tended to be viewed through a stereoscope. Theoretically, these photographs should be taken by similar lenses from points of view separated by a space equal to the distance between the human eyes, but in practice — especially in deal¬ ing with architectural groups — the space is increased in order to procure a greater effect.

STEREOTROPE, a mechanism by which an object is perceived as if in motion, and with an appearance of solidity or relief as in nature. It preceded and suggested the moving pictures. It consists of a series of stereoscopic pictures, generally eight, of an object in the successive positions it assumes in completing any motion, affixed to an octagonal drum, revolving under an ordinary lenticular stereoscope, and viewed through a solid cylinder pierced in the entire length by two apertures, which makes four revolutions for one of the picture drum. The observer thus sees the object constantly in one place, but its parts apparently in motion, and in solid and natural relief.

STEREOTYPE, a printing plate cast in soft metal from a plaster or papier-mache mold, on which is a facsimile in reverse of a form of type, linotypes, cuts, etc., and which, when fitted to a block, may be used on a print¬ ing press exactly as movable type. For daily newspaper printing the stereotype is usually a curved plate, clamped directly on the surface of a printing cylinder. The stereotype process is rapid, but adapted only to coarse printing, the fine grades of printing requiring the elec¬ trotype (q.v.). See Autoplate.

STERILITY is a condition which may be present in either sex where from various types of disorder there is incapacity to reproduce the species. In the male sex the spermatozoa may be absent in the semen or if present may be diseased and incapable of impregnating the ovum of the female. A practical type of steril¬ ity may arise from impotence in the male, whereby the consummation of the reproductive act is impossible. This is not a real sterility cause, technically speaking, but is practically so for certain matings, for many males are impotent with certain mates and not so for others. (See Impotency). The. chief causes which render the male sterile are either anatomi¬ cal defect of the genital apparatus producing an obstruction to the discharge of semen or to some disease of the testicles themselves. Ab¬ sence of the testicles, accidental . or induced (eunuchs), is a rare cause. Various inflam¬ mations of the testicles such as gonorrhoeal orchitis, mumps orchitis or other type of testicular inflammation may destroy the spermatozoa or reduce their viability. Syphilis is also a frequent cause for reducing the ca¬ pacity of the spermatozoa to fecundate the ovum. A large group of rare conditions re¬ lated to the glands of internal secretion may cause sterility. (See Syndromes, Endocrinous).

A peculiar accidental type of sterility occurs among individuals exposed frequently to X-ray emanations. Some of these emanations or rays of light of very high wave velocity have an action upon the te'sticles causing loss of power to manufacture spermatozoa or to cause a loss of their fecundating power. The development of spermatozoa is largely regulated by the nervous system, and there are certain individ¬ uals who permanently or periodically are unable from nervous (mental) disturbance to manu¬ facture viable spermatozoa. Little is known of this important group but recent researches in psychopathology are revealing the relation¬ ships between faulty affective reactions (psychoses and psychoneuroses) and the proper metabolic activities of the body which make healthy spermatozoa. This is an extremely large group and is classed, in general, by psychopathologists under the broad head of compensating neuroses. Here the individual’s over-compensatory affective striving for social potency may so disturb the endocrinous func¬ tions as to bring about

the results just de¬ scribed. This psychogenic basis for sterility affects both male and female and is to be seen in many individuals who show such symptoms as unusually eccentric individuals either voca¬ tional, such as professional, religious, artistic, mechanical, commercial, philosophic striving : Exaggerated sexual strivings as seen in pimps, seducers, white slavers. Eccentric penitentials, reformers, reconstructionists, hyperconscious individuals, obsessional, occultists, mystics, divine inspirationists. These over-compensatory strivings are frequently obvious in eccentric food habits, exhibitionistic clothing, eccentric modesty, grandiloquents, etc. The affective cravings cause hypertensions in the muscles, increased heart action, raised blood pressure, hyperactive adrenal glands, thyroid and liver activities and cause retrograde changes in the sex glands, thus impairing fecundity. This type of individual may be helped by the use of the organic endocrine extracts or by proper psychotherapy-psychoanalysi s (q.v.) .

In the female the causes for sterility are equally plentiful. These may be grouped as (1) failure of development of the ovary, uterus or other important parts of the reproductive apparatus. (2) Disease of the ovary, similar to diseases of the testicles, from syphilis, al¬ coholism, gonorrhoea, mumps and other inflam¬ mations. (3) Obstructions to the passage of the spermatozoa to the ovum or of the ovum to the uterus, the chief one of these is gonor¬ rhoeal disease of the fallopian tubes and is the one greatest single factor in causing sterility in the female. (4) Disease of the uterus lin¬ ing membranes or of the vaginal membranes, causing changes in the chemisms of the secre¬ tions which destroy or weaken either the ovum or the spermatozoa or both. (5) The psycho¬ genic factors already enumerated which may affect the vitality of the ovum through the nervous system mediated through the balance of endocrine function, or such affective dis¬ turbances can modify permanently or periodi¬ cally the chemism of the vaginal or uterine secretions and destroy the viability of sperma¬ tozoa. Very minute variations in the chemistry of these secretions can prove disastrous to the viability of both ovum and spermatozoa.

In the determination of what factors may be operative in causing sterility of any given mating all of the factors enumerated may have to be investigated. The mechanical causes de¬ scribed are readily determined but the study of and amelioration of the psychogenic factors is extremely complicated and difficult. In the present state of

knowledge many of these fac¬ tors cannot be thoroughly comprehended. Con¬ sult (American Textbook of Obstetrics for Me¬ chanical Causes } ; Falta, (The Ductless Glands for Endocrine Disorders> ; Kempf, (The Au¬ tonomic Functions and the Personality for Psychogenic Mechanisms. >

Smith Ely Jelliffe. M.D.

STERILIZATION, in reference to human beings, an operation performed in order to deprive a man or woman of the power of reproduction. Many methods of sterilization might with greater propriety be termed asexu¬ alization, since they have certain harmful effects, both physical and mental. The general methods now employed are, in the male, vasectomy, or the removal of a portion of the seminal duct, and, in the female, salpingotomy, or the re¬ moval of a portion of the Fallopian tubes.

In the United States the sterilization of indi¬ viduals is ordered by positive legal enactment for eugenic, punitive and therapeutic reasons. Indiana, in 1907, enacted the first sterilization law and Washington, California, Connecticut, Nevada, Iowa, New Jersey, New York, North Dakota, Michigan, Kansas and Wisconsin have since passed similar laws. The main object of such legislation is to prevent the procreation of habitual criminals, feeble-minded and insane persons. For an extended discussion of this subject, its advisability, the proper limitations, etc., consult Ellis, Havelock, <The Sterilization of the Unfit* (in Eugenics Review, Vol. I, Lon¬ don 1909), and Laughlin, H. H., (The Legal, Legislative, and Administrative Aspects of Sterilization * (in (Eugenics Record Office, Bul¬ letin No. 10B) (Cold Spring Harbor, N. Y.,

1914).

STERILIZATION OF MILK. See Milk.

STERILIZED FOOD, any article of food which has been subjected to a sterilizing proc¬ ess that destroys the bacteria which cause fer¬ mentation and disease. Heat is the agent most commonly employed, and the process is more especially applied to milk. See Food Preserva¬ tion ; Milk — Pasteurisation.

STERLING, John, Scottish author: b. Karnes Castle, Isle of Bute, 20 July 1806; d. Ventnor, Isle of Wight, 18 Sept. 1844. He was graduated from Cambridge in 1824 and had at¬ tained some prominence in the literary world of London before his editorship with Frederick Denison

Maurice of the Athenceum in 1828. In 1833 he published a novel, (Arthur Coningsby, *and in 1839 (Minor Poems. > Three years later appeared (The Election,* a poem, and < Straf¬ ford, > a drama. His later work, accomplished during his years of declining health, includes also a series of prose poems published in Blackwood's , and eight cantos of (Richard Cceur de Lion,* three of which were published posthumously in Frazer's Magazine, and were much praised by his friend, Carlyle. A collec¬ tion of his essays and tales was published with a memoir by J. C. Hare in 1848. Consult

Carlyle, (The Life of John Sterling) (1851) ; also letters of Sterling and Ralph Waldo Emer¬ son, with sketch of Sterling's life by Edward Waldo Emerson (1897).

STERLING, Thomas, American public official : b. near Amanda. Fairfield County, Ohio, 21 Feb. 1851. In 1875 he was graduated at Illinois Wesleyan University, was admitted to the bar three years later and in 1880-81 was city attorney of Springfield, Ill. In 1882 he removed to Spink County, S. D., and from 1901 to 1911 was dean of the College of Law of the University of South Dakota, afterward resum¬ ing his law practice. Mr. Sterling was member of the first state senate of the South Dakota legislature in 1890, and in 1913 was elected to the Senate of the United States.

STERLING, Colo., city and county-seat in Logan County, on the South Platte River, 118 miles northeast of Denver, on the Union Pacific and the Chicago, Burlington and Quincy rail¬ roads. It has a sugar beet factory and is a trade centre for sugar beets, alfalfa and live¬ stock. Pop. (1920) 6,415.

STERLING, Ill., city in Whiteside County; on the Rock River, ana on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads, about 110 miles west of Chi¬ cago and 50 miles northeast of Rock Island. Electric lines connect the city with many of the nearby places. It was settled in 1834 by Heze- kiah Brink; and founded as two places, Chat¬ ham and Harrisburg, in 1837. In 1839 they were consolidated, and on 16 Feb. 1857 organ¬ ized as the village of Sterling. In 1872 it was reorganized under the Illinois general law. Sterling is in a fertile agricultural and rich dairy region, and its excellent water power con¬ tributes to its manufacturing advantages. _ The chief industrial establishments are farm imple¬ ments, nuts and bolts, wire factories, gas en¬ gine works, condensed milk, ice cream, candy, hearse factories, pump factory, foundries, ma¬ chine shops, buggy factory, silver plating and hardware works. There are about 3,000 em¬ ployees. There are 14 churches, a township high

school, three graded schools, one parish school and one business college. One State, one savings and two national banks have a com¬ bined capital of $300,000. . The government is commission form. Pop. (including Rock Fall)

13,000.

STERLING, Kan., town in Rice County, 225 miles west of Kansas City, on the Atchison, Topeka and Santa Fe and the Missouri Pacific railroads. Its industries comprise milling, grain elevators and salt making. There are three banks with combined capital of $150,000 and deposits aggregating $600,000. The value of the taxable property is placed at $2,183,000. Ster¬ ling is the seat of Cooper College and has a high school, city hall and library. The government is carried on through common council. The municipal receipts average yearly $15,000. Pop.

(1920) 2,060.

STERLING. A term used for the ((stand- ard** quality of English silver. The British sterling alloy proportion has varied at different times in the course of her history. For a long series of years the standard of silver (sterling) has been 11 ounces and two pennyweights of

chemically pure silver alloyed with 18 penny¬ weights of copper; which is 37 parts out of 40 pure silver and three parts of copper, or, as commonly expressed, 222 parts pure silver to 18 parts alloy. As to the derivation of the term sterling this is a long-standing topic for controversy. Numerically, the preponderance of opinion is in favor of the word being derived from the Anglo-Saxon easterling or esterling. Some writers describe the conditions thus : The merchants of the Hanseatic cities and the Netherlands produced a better coinage than the degraded English pieces and King John (early 13th century) called in the services of the coin¬ ers (moneyers), who were known as <(easter- lings® or men of the East, to use their pro¬ ficiency at the English mint; and the coins so struck were termed esterling, or sterling. Cam¬ den (16th century) derives the word from easterling or esterling and observes that the money brought from Germany, in the reign of Richard I (end of 12th century), was the most esteemed on account of its purity, being called in old deeds (<nummi easterling.® A stat¬ ute of Edward I reads: 5 ˆDenarius Anglise qui vocatur

sterlingas,® etc. (which translated means (<the penny of England, which is called sterling®). Du Cange, in 1733, wrote: ((Published in Nancy in 1874).

Clement W. Coumbe.

STERN, Louis, American merchant : b. Germany, 22 Feb. 1847. He received a common school education at Albany, N. Y., and remov¬ ing to New York established the well-known department stores of Stern Brothers. He was the Republican candidate for president of the

borough of Manhattan in 1897, United States commissioner to the Paris Exposition of 1900, chairman of the executive committee, New York State commission to Louisiana Purchase Ex¬ position (1904) and is president of the Re¬ publican Club. He is a member of the Metro¬ politan Museum of Art and of the American Museum of Natural History and president of the Hebrew Orphan Asylum.

STERNBERG, Constantin Ivanovitch Elder von, pianist, composer, educator and author : b. Saint Petersburg, Russia, 9 July 1852. He studied at the Leipzig Conservatory under Moscheles, Reinecke, Richter, Hauptmann and David in 1856-67 ; later under Kullak at the Berlin Academy of Music in 1872-74, also in Weimar and Rome under Liszt. Became conductor of operas in the Bruehl Theatre in Leipzig and assistant chorus master at the Mu¬ nicipal Theatre there from 1867 to 1869. In 1870 he conducted opera in Wurnburg, Kissin- gen and became conductor of the Court Theatre in Mecklenburg-Strelitz, 1873. Here intervened his study of the piano under Kullak and Liszt, and from 1875 to 1878 he was director of the Academic Music School and pianist to the Court at Mecklenburg-Schwerin, which posi¬ tions permitted him to fill a large number of engagements for concerts in all the large music centres of Germany. In the following year his concert tours extended over the most of continental Europe, Russia, Asia Minor and part of central Asia, also northern Egypt. At the end of this tour he was summoned to play for Emperor William I, who distinguished him so markedly as .to spread his fame across the ocean. He received and, after some hesitation due to his being engaged to marry, accepted an offer to play in the United States and Canada 100 concerts within five months. He was re¬ engaged season after season until 1886 his wife's ill-health obliged him to locate in the South (Atlanta, Ga.), where he conducted a college of music, which, however, did not prevent him from making several concert tours. His depart¬ ure to Philadelphia (1890) called forth a public request to remain in Atlanta, which request, published in the Constitution (11 May 1890), was signed by the governor, the entire legis¬ lature of

Georgia, the mayor of Atlanta and 150 of the prominent women of the State and city. Coming to Philadelphia he acquired full citizenship of the United States and founded the Sternberg School of Music, which has de¬ veloped many pianists and composers who have gained national reputation. Withdrawing grad¬ ually from the concert stage he devoted his time to composition and has so far published over 300 pieces for the piano (many of which are in the concert programs of the present pianistic celebrities), a number of works for chamber music, which have had many public performances in Petrograd, Paris, Leipzig, Ber¬ lin and London, also several choral works and songs, amounting up to the present writing to 116 in opus numbers, many of these contain * from 3 to 10 separate pieces. Sternberg is an accomplished linguist, the author of < Ethics and Esthetics of Piano Playing* and a frequent contributor of essays to musical and other periodicals.

STERNBERG, stern'berg, George Miller,

American surgeon: b. Otsego County, N. Y., 8

June 1838; d. 1915. He was graduated from the College of Physicians and Surgeons, New York, 1860. He was appointed assistant surgeon in the United States army, 28 May 1861; cap¬ tain and assistant surgeon, 28 May 1866; major and surgeon, 1 Dec. 1875 ; lieutenant-colonel and deputy surgeon-general, 12 Jan. 1891; and re¬ ceived the commission of brigadier-general, and surgeon-general in 1893. He was retired 8 June 1902. His first service during the Civil War was with the Army of the Potomac and later with the Army of the Gulf. After the war he was in charge of the United States General Hospital in Cleveland, Ohio, served through yellow fever and cholera epidemics, and during the war with Spain (1898), had com¬ mand of the medical service. He was a mem¬ ber of the Havana Yellow Fever Commission, sent there by the National Board of Health (1879), and president of the American Med¬ ical Association (1898). He has published (Photo-Micrographs, and How to Make Them *(1883) ; (Bacteria, Malaria and Malarial Dis- eases) (1884) ; (Manual of Bacteriology) (1893) ; (Immunity, Protective Inoculations, and Serium-Therapy) (1897) ; (Sanitary Lessons of the War* (1912). In 1885 he was awarded the Lomb prize of $500 by the American Public Health Association for an essay entitled dis¬ infection and Individual Prophylaxis Against Infectious Diseases. }

STERNBURG, Herman von Speck, Ger¬ man diplomat : b. Leeds, England, 21 Aug. 1852 ; d. Heidelberg, Germany, 24 Aug. 1908. He was educated at the Fiirstenschule Saint Afra, Meissen, Saxony, and the military academy of Potsdam, fought through the Franco-Prussian War in the Second Saxon dragoons, and re¬ mained in the military service until 1885. In 1890 he entered on his diplomatic career, being made successively first secretary of legation at Peking, charge d'affaires at Belgrade, Servia, and first secretary of the embassy at Wash¬ ington. In 1898 he was high commissioner on the Samoan commission ; became consul-gen¬ eral for British India and Ceylon in 1900, min¬ ister plenipotentiary and envoy extraordinary to the United States in 1903, and ambassador in July 1903.

STERNE, stern, Adolphus, Texan pioneer: b. Cologne, Germany, 5

April 1801; d. New Orleans, La., 27 March 1852. Leaving his birthplace in his 16th year to escape military duty, he came to the United States, going first to New Orleans and then visiting Texas in 1824. A lover of adventure and proficient in many languages and dialects, he joined the English settlers in their early struggles against the Mexicans, and took part in the Fredonian War. Saved from being sentenced to death by an amnesty, he went into business at Nacogdoches, and became a notable figure in eastern Texas. He studied law, was court interpreter, and after Texas won her independence he served in both upper and lower houses of Congress.

STERNE, Laurence, English humorist : b. Clonmel, Ireland, 24 Nov. 1713; d. London, 18 March 1768. He was a great-grandson of Richard Sterne, the master of Jesus College, who attended Laud to the scaffold and after¬ wards became archbishop of York. The arch¬ bishop's third son, named Simon, married Mary Jaques, heiress to the lordship of Elvington,

near York, on the river Derwent, and subse¬ quently purchased Woodhouse Hall in the parish of Halifax. Their eldest son Richard succeeded to the two estates. Jaques, the third son, entered the church, and rose to many dig¬ nities, including an archdeaconry. Between them was born Roger Sterne, father of the humorist, who turned for a career to the army. When a mere stripling, Roger Sterne was ap¬ pointed an ensign in the 34th regiment of foot and passed the rest of his life in service on the continent or in English and Irish barracks. He took part in the siege and capture of Vigo and in the defence of Gibraltar. In 1711 he married at Dunkirk, Agnes Hebert, of a humble Irish family and widow to a brother officer. Of their seven children only three lived be¬ yond the fourth year. For 10 years the boy moved about with his parents from place to place, wherever the regiment happened to be stationed. Eventually the poor ensign left his family and went out to Jamaica, where he died of fever in 1731. As Laurence remembered him, Roger Sterne was (

Long before this, Laurence had been placed, by the aid of his uncle Richard, in the Halifax grammar school, where he was kept at his acci¬ dence for some seven years, and then sent to Cambridge on an allowance of £30 a year. Lau¬ rence Sterne was admitted to Jesus College as a sizar in 1733, and the next year he was elected to one of the several scholarships founded by his great grandfather. At the university the young man in no way distinguished himself, and in after life he ridiculed the curriculum. Graduating A.B., in January 1736-37, he was ordained deacon in the following March. In 1738 he

was admitted to the priesthood and ob¬ tained, through the influence of his uncle Jaques, the vicarage of Sutton-in-the-Forest, eight miles from York. To this preferment was soon added the neighboring Stillington and a prebendal stall in York minster. On 30 March 1741 he married Elizabeth, daughter to Robert Lumley, sometime rector of Bedale, and immediately settled in the parsonage at Sutton. He lived there for 20 years. Two daughters were born, of whom only Lydia reached ma¬ turity. Besides officiating in his two parishes and taking his turns at preaching in the cathe¬ dral, the vicar cultivated his glebe and pur¬ chased two farms for large crops of oats and barley. He amused himself with fiddling and painting, read hundreds of books on all sorts of subjects and visited extensively among con- vival squires. Possessing a facile pen, he wrote for a time political articles for his uncle Jaques, and twice he appeared in print with a sermon. A pamphlet called (A Political Romance) (Jan¬ uary 1795) brought to a gay close a hot dispute then waging in the York chapter. Aware now that he could write so as to make his reader laugh, he began <The Life and Opinions of Tristram Shandy, Gent,* the first two volumes of which were given to the public in December 1759. In the following march Sterne went up to London and met his great fame. After see¬ ing through the press a second edition of his book and two volumes of sermons, he returned to the north and settled at Coxwold, a parish at the foot of the Hambleton Hills, which had

been bestowed upon him by Lord Fauconberg. In the parsonage there, renamed Shady Hall, Sterne went on with his comic romance, nine volumes in the whole, which appeared in further instalments near the beginning of several years down to 1767. Two more volumes of sermons were issued in 1765.

Never strong, Sterne broke down in Janu¬ ary 1762, and hurried across the channel. After a brief stay in Paris, where statesmen, philoso¬ phers and the world of fashion crowded about him, he moved south to Toulouse, where he was joined by wife and daughter. He remained in southern France till the summer of 1764, when he returned alone to Coxwold. His health failing again, he set out for France in October 1765 on his famous sentimental journey. He traveled mostly by chaise from Calais via Montreuil to Paris, on to the south through Languedoc and then crossing over into Italy on to Rome and Naples. He was back at Coxwold in the summer of 1766. All this time his wife and daughter remained abroad. While in Lon¬ don for

the winter of 1766-67, Sterne met and fell in love with Mrs. Elizabeth Draper, wife to a writer in the service of the East India Company. She sailed for India in April 1767 and poor Yorick was left broken-hearted. Mrs. Draper is the Eliza of the (Sentimental Jour- ney) and of a series of letters. After her de¬ parture for India, Sterne had a serious illness from which he barely recovered. In June he returned to Coxwold, where he recorded his sensations from day to day in a journal he kept for Eliza, and began (A Sentimental Journey through France and Italy. J In the following January he went up to London with the new book, which was published on 26 Feb. 1768. He soon took to his bed and died 18 March 1768 at his lodgings in Old Bond street. At the time he was alone save for a nurse and a foot¬ man whom friends had sent to inquire after him. Four days later he was buried in Saint George's cemetery on the Bayswater road. Ac¬ cording to a story which is probably true, his body was taken up and sold for dissection to the professors of anatomy at Cambridge. The next year Mrs. Sterne swept his study for three more volumes of sermons; and in 1775, Lydia, then Mrs. Medalle, brought out her father's let¬ ters and brief autobiography.

Stern's career appeals strongly to the imagi¬ nation. An obscure country parson till his 47th year, he at once became known throughout western Europe. Everybody wished to see the man who had written (Tristram Shandy.) In London and in Paris there always awaited him <(dinners a fortnight deep.® A letter addressed to (<Mr. Tristram Shandy, Europe,® was handed him by the postboy on the way to Sutton. When Lessing heard of Yorick's death, he said that he would gladly have given him five years from his own life. See Sentimental Journey, A; and Tristram Shandy.

Bibliography. — In 1780, Sterne's original publishers issued his work in 10 volumes. Of the numerous reprints, the best is the one edited by J. P. Brown (London 1873). It includes some additional letters. The convenient edition by Saintsbury (6 vols., London 1894) omits most of the sermons. The (Works and Life) (12 vols., New York 1904), edited by Cross, contains the recently recovered (Journal to Eliza,* additions to the correspondence, Mrs.

Draper's letters to friends in England, a body of anecdotes, and the (Paris 1870), and Thackeray's Eng¬ lish Humorists.) Of more special interest are Texte's Rousseau et le cosmopolitisme lit- terarie au XVIII erne siecle *(Paris 1895), and Thayer's Raurence Sterne in Germany,* with a biliography (New York 1905).

Wilbur L. Cross,

Professor of English, Yale University.

STERNE, Simon, American lawyer and economist: b. Philadelphia, 23 July 1839; d. New York, 22 Sept. 1901. He studied at the University of Heidelberg, was graduated from the law department of the University of Penn¬ sylvania in 1859, and was admitted to the bar of New York in 1860. He represented many corporate interests, and paid special attention to real estate and constitutional law. He found time to take part in social and civic reform, lectured on political science at Cooper Institute (1861-63), and was secretary of the committee of 70 for the overthrow of the Tweed Ring (1870). He was appointed in 1875 on a com¬ mission to devise plans for the government of cities, and in 1895 on a commission to recom¬ mend changes in methods of administration ; and by President Cleveland in 1896 to report as to the relations of western European govern¬ ments to railways. Besides a large number of articles on historical and political economic subjects, he published Representative Govern¬ ment (1871) ; Suffrage in Cities) (1878) ; hindrances to Prosperity (1879) ; Consti¬ tutional History and Political Development of the United States) (1882) ; Railways in the United States) (1912). Consult Foord, Rife and Public Services of Simon Sterne) (1903).

STERNER, Albert Edward, American ar¬ tist : b. London, England, 8 March 1863. He studied at Julien's Academy and the Ecole des Beaux Arts, Paris, and in 1881 came to the United States, opening his studio in New York in 1885. He is best known for his illustrations, which are effectively drawn and possess refine¬ ment and charm, while notable among his oil paintings are (The Bachelor * and Rortrait of My Son.* He became an associate of the National Academy of Design in 1910, and in¬ structor at the Art Students' League and the New York School of Applied Design for Women.

STERNHOLD, stern'hold, Thomas, Eng¬ lish hymnologist : b. Blakeney, Gloucestershire, about 1500; d. 1549. He was one of the versifiers of the first metrical version of the Psalms, long used in public worship in churches, but superseded by the version of Tate and Brady, published in 1698. He was educated at Oxford, became groom of the robes to Henry VIII, and held a similar office under Edward VI. The principal coadjutor of Sternhold in his versification of the Psalter was John Hop¬ kins. The first edition (1548) contained 19 psalms, the second (1549) 37 psalms, translated by Sternhold, the third (1551) includes 7 trans-

lated by Hopkins. In 1562 W hole Book of Psalms.5

appeared (The

STERNUM, the breastbone in vertebrates. See Anatomy, Comparative; Ornithology; Osteology.

STERRETT, James Macbride: b. How¬ ard, Pa., 13 Jan. 1847. He graduated A.B., Uni¬ versity of Rochester, 1867 ; A.M., Harvard Uni¬ versity, 1870; B.D., Episcopal Theological School, Cambridge, Mass., 1872; D.D., University of Rochester, 1886. He was ordained in the Prot¬ estant Episcopal Church, 1872; served in Brook¬ lyn, Wellsville, N. Y., and Bedford, Pa., 1872— 1882; professor of ethics and apologetics in the Seabury Divinity School, Faribault, Minn., 1882-92; professor of philosophy in the George Washington University, 1892-1909; professor emeritus on The Carnegie Foundation, 1909; president, Society for Philosophical Inquiry, 1893-1910; rector of All Souls' (Sterrett) Me¬ morial Church, 1911. He is author of (Studies in Hegel's Philosophy of Religion5 (1889) ; (Reason and Authority in Religion5 (1891) ; (The Ethics of Hegel5 (1893) ; (The Freedom of Authority5 (1905).

STERRETT, John Robert Sitlington,

American educator and classical scholar: b. Rockbridge Baths, Va., 4 March 1851 ; d. 1914. He was educated at the universities of Vir¬ ginia, Leipzig, Berlin, Athens and Munich. After holding professorships of Greek at Miami University and the University of Texas he was called to Amherst College, 1892-1901 ; he became head of Greek department at Cornell University, 1901. He was a professor in the American School of Classical Studies at Athens, Greece, 1896-97, led various archaeological expedi¬ tions to Asia Minor, and was a joint editor of the American Journal of Archceology. Among his publications are (Qua in re Hymni Ho- merici quinque majores inter se differunt5 (1881) ; (Inscriptions of Tralles5 (1885) ; (Notebook of a Traveling Archaeologist5 (1889) ; (The Torch-race5 (1902) ; 'Research in Asia Minor and Syria5 (1911).

STESICHORUS, ste-sik'6-rus, Greek poet: b. Himera, Sicily, or perhaps Locrian Mataurus, Italy, about 640 b.c. ; d. Catana, 555 b.c. His own name, Tisias, he changed to Stesichorus ("conductor of the choric ode55) as the inventor of strophe, anti-strophe and epode. With his predecessor, Aleman, he stands at the head of Dorian poets of the lyric

dance. He incurred the wrath of Phalaris by the warning and poetic appeals which he addressed to his townsmen in view of the tyranny of that prince and died in exile. He employed folk-tales, the impersonal love poem and Epic-Doric dialect. He is considered one of the powerful influences in Greek poetry. He gave life and secular force to the Greek religious hymn, by giving it and his other poetry a more epic expression and form ; and he is looked upon as the forerunner of Greek ro¬ mance. He also set the style and versification for Greek lyric poetry so firmly that they suffered little subsequent change. His frag¬ ments are collected in Bergk's 'Poetic Lyrici Grseci. 5 Consult Farnell, G. S., (Greek Lyric Poetry5 (London 1891); Smyth, H., 'Greek Melic Poets5 (London 1900) ; Wright, W. C.,

(A Short History of Greek Literature5 (New York 1907).

STETEFELDITE, a mineral containing silver with copper, iron, antimony and sulphur. An ore of some importance in Klondike district, Nevada.

STETHOSCOPE, an instrument, the in¬ vention of Laennec (q.v.), originally consisting of a short wooden tube, from 7 to 12 inches long, widening toward each end, with which physicians sounded the lungs by pressing on the chest or back and listening; also for diag¬ nosing hernia, pregnancy, etc. The modern form of the instrument has two ear-tubes with flexible attachments, so that the physician hears simultaneously with both ears. The differential stethoscope permits comparison of sounds in different parts of the body. Another improve¬ ment is the phonendoscope, which renders audi¬ ble more minute sounds.

STETSON, Francis Lynde, American jurist: b. Keeseville, N. Y., 23 April 1846; d. New York, 5 Dec. 1920. He was graduated at Williams College in 1867 and took his LL.B. at Columbia University in 1869. He engaged in practice in New York and became known as an authority on corporation and railroad law. He was retained as general counsel by the United Steel Corporation, the International Mercantile Marine Company, the Northern Pacific and the Southern railroads, and the United States Rub¬ ber Company. He was also a railroad and cor¬ poration director. He was a trustee of Williams College and a director of the New York Bo¬ tanical Gardens.

STETSON, John Batterson, American philanthropist: b. Orange, N. J., 5 May 1830; d. near Deland, Fla., 18 Feb. 1906. He engaged in hat manufacture and founded the John B. Stetson Company, with the largest factories in the world. Connected with them are reading-

rooms, library, armory, etc. He built Stetson Hall for Deland University at Deland, Fla., and added other endowments, the name of the institution being changed to the John B. Stet¬ son University.

STETTIN, stet-ten', Germany, in Prussia, capital and port of Pomerania, ana of the gov¬ ernment of Stettin, on the Oder, 60 miles north¬ east of Berlin. The old and new towns are distinct sections. Since the removal of the for¬ tifications (1873) the town has extended greatly and several outlying villages have become incor¬ porated in the main town: Both the Oder and the Parnitz, a tributary, are spanned by sev¬ eral bridges. There are numerous public squares embellished by statues of German sov¬ ereigns and other celebrities. There are many churches, of which the churches of Saint James (14th century) and Saint Peter's (1124) are most noteworthy, also a fine synagogue. Of secular buildings may be mentioned the royal palace (1346), now used for government pur¬ poses ; the old town-hall, the exchange, asylum, orphan-home, concert-hall and club, arsenal, schools of architecture, technical school, etc. Stettin is one of Germany's chief ports and an important shipbuilding centre. The industries are varied and include iron-foundries, engi¬ neering works, manufacturing of ready-made clothing, chemical, cement, soap, oil, paper and

pasteboard works, sugar refineries and famous breweries and distilleries. In 1898 a free har¬ bor east of the Lastadie suburb was opened, and in 1900 another new harbor on the east bank of the Oder. A ship-canal connects Stettin with Berlin, and ocean-going vessels now load and unload at its docks. The imports include coal, iron, soda and potash, seeds, coffee, cotton, wine, corn, herrings, timber; the exports are sugar, timber, liquor, grain, po¬ tatoes and flour. In the 12th century Stettin had already attained considerable importance. In 1121 Boleslas, Duke of Poland, introduced Christianity. The Treaty of Westphalia ceded the town to the Swedes, and it subsequently became a possession of Prussia. Pop. 257,400.

STEUART, stu'art, John Alexander,

Scottish novelist: b. Perthshire, 3 July 1861. After traveling extensively in North America he entered journalism, and returning to

Europe settled in London and was editor of The Publishers' Circular (1896-1900). He has pub¬ lished (A Millionaire's Daughters) (1888) ; (Letters to Living Authors> (1890) ; (The Eternal Quest) (1901) ; >*A Son of God) (1902); (The Hebrews) (1903); (The Red Reaper5 (1905) ; Quicksands5 (1907) ; (Faces in the Mist5 (1911) ; (The Rock of the Ravens5 (1912) ; (Cupid, V. C.5 (1916).

STEUBEN, stu'ben (Ger. stoi'ben), Fried¬ rich Wilhelm August Heinrich Ferdinand,

Baron von, Prussian soldier and American gen¬ eral : b. Magdeburg, Prussia, 15 Nov. 1730; d. Steuben, Oneida County, N. Y., 28 Nov. 1794. Before coming to America he had attained the rank of lieutenant-general in the Prussian army, and had won distinction in the Seven Years' War. At its close he retired from military life, but was persuaded by colonial representatives in France to come to the assistance of the American people. He at once became an en¬ thusiastic supporter of the American cause, and, tendering his services to Congress in 1777, was assigned to the main army under Washington at Valley Forge. His splendid discipline and ability as an organizer were at once recognized by Washington, who recommended his appoint¬ ment as inspector-general of the entire army. Unable to attain a separate command in the open field, he spent most of his time recruiting the forces sent to those who took a more promi¬ nent part in the war; but it was undoubtedly due to his almost unrecognized efforts that the American troops were from the first so well organized and disciplined a body. He attained at last his coveted place as an officer in the line, and as major-general of the forces at Yorktown received the first offer of capitulation from Lord Cornwallis. Refusing to be re¬ lieved by Lafayette, he was allowed to remain with his command until the complete surrender of the enemy. At the close of the war he was refused pecuniary remuneration which he had asked of the colonies in the event of their suc¬ cess, but to recuperate his fortunes, abandoned for their cause, was subsequently awarded sev¬ eral grants of land, among them a township in northern New York, where he spent the re¬ mainder of his life in a log-cabin, within the present limits of Utica, N. Y., and where a monument to his memory was unveiled 3 Aug. 1914. Consult Sparks, (American Biography5 ; Kapp, (Life of Steuben5 (1860).

STEUBENVILLE, stu'ben-vil, Ohio, city, county-seat of Jefferson County, on the Ohio River, and on the Pittsburgh, Chicago, Cin¬ cinnati and Saint Louis, the Cleveland and Philadelphia division of the Pennsylvania, the Wabash (Wheeling and Lake Erie) railroads, about 68 miles below Pittsburgh, Pa., and 23 miles north of Wheeling, W.

Va. In 1786 a fort was built on the site of the present city. In 1798 the place was laid out as a town, and in 1851 it was incorporated as a city. It was one of the first American towns to use steam for manufacturing purposes.

The city is in an agricultural and coal and gas region, and has valuable clay deposits, pe¬ troleum wells and large quarries of excellent building stone. The chief manufacturing estab¬ lishments are iron and steel, soap, tin plate and clay works, potteries, foundries, glass factories, blast furnaces, a paper mill, flour mills, boiler and tube works, machine-shops and nail and electric light furnishings and factories. .

The city possesses numerous good churches, a high school opened in 1860 and public and parish schools, private commercial colleges, a Carnegie public and school libraries. It has four regular banks and two private banks and two building and loan associations. Pop. (1920)

28,508.

STEUNENBURG, Frank, American states¬ man: b. Keokuk, Iowa, 8 Aug. 1862; d. De¬ cember 1905. He removed to Caldwell, Idaho, in 1887, and engaged in the newspaper business. In 1889 he was a member of the convention which framed the State constitution, and in 1890 he was elected to the State legislature. He was elected governor of Idaho by the Popu¬ list party in 1898, and served in that capacity until 1901. He was assassinated by Harry Or¬ chard (q.v.) in 1905, because of enmity engen¬ dered by his handling of the miners' strikes dur¬ ing his administration.

STEVENS, Abel, Methodist Episcopal clergyman and author: b. Philadelphia, Pa., 19 Jan. 1815; d. San Jose, Cal., 12 Sept. 1897. He studied at Wesleyan University, entered the New England Conference of the Methodist Episcopal Church in 1834, and held pastorates at Boston, Mass., and Providence, R. I. He was editor of Zion's Herald in 1840-52, of the National Magazine in 1853-54 and of the Chris¬ tian Advocate in 1856-60. He returned to active duty as a pastor in New York and Mamaro- neck, N. Y., in 1860-65, and in 1865-74 was joint editor of the Methodist. He subsequently traveled extensively in Europe, and was for a time in charge of the American Union Church at Geneva, Switzerland. His writings on the history of Methodism are exhaustive and au¬ thoritative. Author of Memorials of the In¬ troduction of Methodism into the Eastern States5 (2 vols., 1847-52) ; < History of the Religious Movement of the Eighteenth Century, Called Methodism5 (3 vols., 1858—61) ; <The History of the

Methodist Episcopal Church in the United States of America5 (4 vols., 1864- 77) ; (A Compendious History of American Methodism5 (1867); (Madame de Stael5 (2 vols., 1881) ; (Christian Work5 (1882), etc.

STEVENS, ste'venz, Alfred, Belgian painter: b. Brussels, 11 May 1828; d. Paris, France, 24 Aug. 1906. He studied under Navez

at Brussels and Roqueplan at Paris, and won a first-class medal at the Paris Exposition of 1867. He soon evinced striking talent in por¬ traying fashionable and elegant life in Paris of the day — such as the lady in her boudoir, with all the bright, piquant accessories added in a spirit as suggestive, but not so bitter as that which characterized Hogarth, although his later pictures which take their subjects from common life had a distinctly ethical motif. Among his best-known canvases are (The New Year's Gift) ; <Innocence) ; (The Allegory of Spring) ; (The Visit) ; (The Parisian Woman turned Japanese,5 and (Morning in the Country5. He also painted for the king of the Belgians four figures in fresco representing the four seasons, — female figures in modern costume. His (Five O'Clock Tea5 is in the Vanderbilt collection, New York.

STEVENS, Alfred George, English sculp¬ tor: b. Blandford, Dorsetshire, 1818; d. London, 1 May 1875. He was educated at the village school, and for a time followed his father's trade of house-painter. The assistance of a friend enabled him to study painting, architec¬ ture, and sculpture in Italy, where he lived from 1833 till 1842, being for some time a pupil of Thorwaldsen. After his return to England he became a teacher for two years in the School of Design. He is to be looked upon as one of the most important figures in the history of English sculpture. He was a follower of Michelangelo and the Renaissance, yet broke completely with the English tradition of stiff classicality, and worked naturally and freely at the dictates of his own individuality, bringing about something like a revolution in the ideals of English statuary. His influence was more active after his death, and during his lifetime his genuine strength and greatness were only known to the few. His great work is the monu¬ ment to the Duke of Wellington in Saint Paul's. Consult Stannus, (Alfred Stevens and His Work5 (1891); Armstrong, Alfred Stevens: a Biographical Study5 (1881).

STEVENS, Benjamin Franklin, American bibliographer, brother of Henry Stevens (q.v.) : b. Barnet, Vt., 19 Feb. 1833; d. London, Eng¬ land, 5 March 1902. He studied at Middlebury College, and in 1860 went to London to engage with his brother Henry in his rare book busi¬ ness. He made a chronological catalogue of the American documents of the period 1763-84 in England, France, Holland and Spain, and likewise secured facsimiles of many important manuscripts concerning American history. For many years he was in charge of the Chiswick Press, and he was agent for many American libraries, as well as being United States dis¬ patch agent in London. His publications in¬ clude American Manuscripts in European Archives5 (1887); (The Campaign in Virginia in 1 781 5 (2 vols., 1888); facsimiles of Manu¬ scripts in European Archives Relating to America, 1773-17835 (25 vols, 1889-98), etc.

STEVENS, Bertram, Australian author .and critic: b. Inverell, New South Wales, 9 Oct. 1872. He entered journalism and became editor of a literary section called the fed Page5 (in the Sidney Bulletin, 1909—11) ; and editor of the Australian magazine, The Lone Hand (1911-18). He has written and pub¬

lished much on literary matters and has made two anthologies of Australian poetry, Anthol¬ ogy of Australian Verse5 (1906) and (Golden Treasury of Australian Verse5 (1908). Among his other publications are Australian Birth¬ day Book5 ; (Bush Ballads5 ; (The Charm of Sydney5 ; (The Poetical Works of John Far¬ rell, with Memoir5 ; (Verses by Victor Daley, with Memoir.5

STEVENS, Ebenezer, American soldier: b. Boston, 1751; d. 1823. He was one of the Massachusetts colonists who took part in the memorable demonstration in Boston harbor in 1773, and was an active revolutionist from 1775 to the close of the war, during which he raised three Massachusetts companies for the siege of Quebec, and served as a commander in the battles of Ticonderoga, and later in the Vir¬ ginia campaign. In 1778 he became lieutenant- colonel. He was also an officer in the War of 1812, engaged in the defense of the New York frontier. Later he was successful as a merchant in New York.

STEVENS, Edward, American soldier: b. Culpeper County, Va, 1745; d. there, 17 Aug. 1820. In 1776 he became colonel of the 10th Virginia regiment, the next year checked the forces of General Howe at the battle of the Brandywine, and after serving with distinction at Germantown, was appointed brigadier-gen¬ eral (1779). He served later at Camden, Guil¬ ford Court House, and at the siege of York-town, his gallantry being highly commended. After the adoption of the

Virginia State con¬ stitution he was a member of the State senate till 1790.

STEVENS, Edwin Augustus, American inventor, capitalist and shipbuilder, son of John Stevens (q.v.): b. Hoboken, N. J., 1795; d. Paris, 7 Aug. 1868. He made numerous experi¬ ments in steam navigation and in 1861 urged the government to put into service his projected ironclad of 6,000 tons. This was not done and this first ironclad was never finished. The construction of this vessel was begun in 1854, under authorization by Congress; and $1,000,000 left in Stevens' will to finish it was spent after his death in 1868. Finally the boat was sold for scrap iron in 1880. He inherited a large for¬ tune from his father and his brother and en¬ dowed the Hoboken high school, and bequeathed $1,000,000 to establish at Hoboken the Stevens Institute of Technology (q.v.). He was one of the foremost railroad organizers of the United States.

STEVENS, Edwin Augustus, American mechanical engineer, son and namesake of the founder of the Stevens Institute of Technology (q.v.): b. Philadelphia, 14 March 1858; d. 8 March 1918. He was graduated at Princeton in 1878 and thereafter resided in Hoboken, N. J., where he was director in various corporations. He designed the first screw ferryboat.

STEVENS, Frank Lincoln, American plant pathologist: b. Syracuse, N. Y., 1 April 1871. He was graduated at Hobart College in 1891, at Rutgers in 1893, later studied at the Ohio State University and took his Ph.D at the University of Chicago in 1899; he also studied at the universities of Bonn and Halle, and at the Naples Zoological Laboratories. In 1902-12 he was professor of botany and plant

pathology at the North Carolina College of Agriculture and Mechanical Arts, also serving for a time as biologist of the North Carolina Agricultural Experiment Station. He was dean of the College of Agriculture and Mechanical Arts at the University of Porto Rico in 1912— 14; and since 1914 has been professor of plant pathology at the. University of Illinois. He was president of the American Phytopatho- logical Society in 1910. Joint author of (The Hill Readers> (1906) ; (Diseases of Economic Plants) (1910) ; and author of (The Fungi Which Cause Plant Disease) (1913), etc.

STEVENS, George Barker, American professor of theology: b. Spencer, N. Y., 13 July 1854; d. New Haven, Conn., 22 June 1906. He was graduated from the University of Ro¬ chester in 1887 ; held pastorates in a Con¬ gregational and Presbyterian church, 1880-85; studied in Germany, 1885-86; and became pro¬ fessor of New Testament criticism at Yale University in 1886. From 1895 till his death he was Dwight Professor of Systematic Theol¬ ogy in the Yale Divinity School. His publica¬ tions include (The Pauline Theology5 (1892) ; (The Johannine Theology) (1894) ; (The Mes¬ sage of PauP (1900) ; (The Message of the Apostles) (1901) ; (The Christian Doctrine of Salvation5 (1905) ; (The Theology of the New Testament5 (1899) ; (The Teaching of Jesus5

(1909).

STEVENS, Henry, American bibliographer, brother of B. F. Stevens (q.v.) : b. Barnet, Vt., 24 Aug. 1819 ; d. South Hampstead, England, 28 Feb. 1886. He studied at Middlebury College, at the Harvard Law School and was graduated at Yale University in 1841. He became inter¬ ested in the bibliography of early American his¬ tory and genealogy, and in 1845 went to London to execute a number of commissions for col¬ lectors of such works. He lived there the re¬ mainder of his life. He was agent of the Brit¬ ish Museum to procure for it books and manu¬ scripts produced in both North and South America, and through his efforts the Museum's collection of Americana was at the time the largest in the world. He collected for the Lenox Library, New York; and his collection of documents relating to Benjamin Franklin was purchased by the United States govern¬ ment. His bibliographical catalogues are of great value, being of rare accuracy and most minute in detail. He published many essays and pamphlets and edited many works on Amer¬ ican history. He wrote Catalogue of a Library of Works Relating to America5 (1854) ; Cata¬ logue of the American Works in the Library of the British Museum5 (1859); (Bibliotheca Historica5 (1870) ; (Bibles in the Canton Ex¬ hibit5 (1878) ; historical Collections5 (2 vols., 1881-86), etc.

STEVENS, Isaac Ingalls, American mili¬ tary officer: b. Andover, Mass., 18 March 1818; d. near Chantilly, Va., 1 Sept. 1862. He was graduated at the United States Military Acad¬ emy in 1839, and served in the Mexican War as adjutant of engineers. From 1849 to 1853 he was in charge of the coast survey at Washing¬ ton. In 1853 he resigned from the army to become governor of Washington Territory. At the outbreak of the Civil War he was made colonel of the 79th New York regiment. He was made a major-general 4 July 1862. He

was killed while leading a charge at Chantilly. He wrote Campaigns of the Rio Grande and Mexico5 (1851).

STEVENS, John, American engineer and inventor: b. New York, 1749; d. Hoboken, N. J., 6 March 1838. He was graduated in law in 1771. In 1787, having accidently seen the imperfect steamboat of John Fitch, he at once became interested in steam propulsion, and experimented constantly for the next 30 years on the subject. In 1789 he petitioned the legislature of New York for a grant of the ex¬ clusive navigation of the waters of that State. The petition was accompanied with drafts of the plan of his steamboat, but the right was not granted because the boat did not meet the exactions made by Congress. The following year he again petitioned Congress, this time for laws to protect American inventors. Out of this petition and subsequent active interest in the matter on the part of Stevens have sprung the present American patent system. In 1804 he constructed a propeller, a small open boat worked by steam, and his success was such that he built the Phenix which ran for six years on the Delaware river, a steamboat, which was completed but a very short time after Fulton had finished the Clermont. Fulton hav¬ ing obtained the exclusive right to the naviga¬ tion of the Hudson, Mr. Stevens placed his boats on the Delaware and Connecticut. In 1812 he published a remarkable pamphlet urg¬ ing the government to make experiments in railways traversed by steam carriages. The first steam ferry in the world was established by him in October 1811, connecting Hoboken with New York. His locomotive model (1826) was exhibited in operation and it has been claimed as the first locomotive run on a track in this country. His other inventions and im¬ provements were many and various.

STEVENS, John Austin, American banker, son of Ebenezer Stevens (a.v.) : b. New York, 22 Jan. 1795; d. there, 19 Oct. 1874. He was graduated at Yale University in 1813, and be¬ came his father's partner in the mercantile busi¬ ness in 1818. He was president of the New York Bank of Commerce in 1839-66. As chair¬ man of a committee of bankers of New York, Boston and Philadelphia he greatly assisted the United States government in negotiating its loans during the Civil War, and he was fre¬ quently called into consultation by the Treasury Department. He was for many years secretary of the New York Chamber of Commerce and was one of the organizers of the New York Merchants' Exchange, of which he was the first president.

STEVENS, John Austin, American au¬ thor: b. New York, 21 Jan. 1827; d. 16 June 1910. He was graduated at Harvard in 1848, when he entered commercial life, becoming secretary of the New York Chamber of Com¬ merce (1862-68), and later, librarian of the New

York Historical Society. He was founder of the Society of the Sons of the Revolution and the Loyal League, and was the founder and for many years editor of The Magazine of American History (1877-83). He wrote <The Expedition of Lafayette against Arnold5 ; <The Burgoyne Campaign5 ; (Progress of New York in a Century5 ; (The French in Rhode Island5 and (Life of Albert Gallatin,5 (The Valley of

the Rio Grande) ; (Colonial Records of the New York Chamber of Commerce) ; (New York CityP

STEVENS, John F., American civil engi¬ neer and railroad official : b. Gardinier, Me., 25 April 1853. He was assistant engineer of the city of Minneapolis in 1874-76, and was after¬ ward engaged in railroad engineering. In 1889 he became connected with the Great Northern Railroad and in 1902-03 he was its general man¬ ager. He was later connected with the Rock Island Railroad, and in 1904-05 he was second vice-president of the Pacific Railroad. He was appointed chief engineer of the Panama Canal in 1905, at the time when its construction policy was being determined, and for two months be¬ fore he resigned, 1 April 1907, he was also chairman of the Isthmian Canal Commission. He was vice-president of the New York, New Haven and Hartford Railroad in 1907-09; and in 1909-11 he was president of the Spokane, Portland and Seattle, the Oregon Trunk and other western railroads.

STEVENS, John Leavitt, American writer and diplomat: b. Mount Vernon, Maine, 1 Aug. 1820; d. Augusta, Me., 8 Feb. 1895. He was ordained in 1844 in the Universalist minis¬ try, but was obliged to give up the profession, in 1854, on account of ill-health. He became associated with James G. Blaine on The Kenne¬ bec Journal in 1855 ; went to the Maine legisla¬ ture, 1865-68, and to the State senate, 1868-70. He was minister from the United States to Uruguay and Paraguay, 1870-73 ; and to Norway and Sweden, 1877-83. In 1889 he was sent as minister to the Hawaiian Islands, and in 1890 his rank was raised to that of Envoy Extraor¬ dinary and Minister Plenipotentiary. In 1893, having placed the islands, then in revolution, under the protection of the United States, Ste¬ vens was recalled by President Cleveland, who did not approve of his course; but he was exonerated by the Senate. He is the author of (The History of Gustavus Adolphus) (1884) and a collaborator on (Picturesque HawaiP

(1894).

STEVENS, Lillian M. N., American tem¬ perance worker; b. Dover, Me., 1 March 1844; d. Portland, Me., 6 April 1914. She was mar¬ ried to Michael Stevens of Portland, Me., in 1867. In 1874 she was one of the organizers of the Maine Women's Christian Temperance Union, was its treasurer in 1874-77 and its president the remainder of her life. She was also vice-president of the National Women's Christian Temperance Union in 1894-98 and its president from 1898 until her death. She was one of the lady managers of the Columbian Ex¬ position in 1892-93.

STEVENS, Phineas, American soldier: b. Sudbury, Mass., 20 Feb. 1707; d. Chignecto, N. S., 6 Feb. 1756. At 16 he was carried captive by the Indians from Rutland, Mass., to Saint Francis, Canada and learned their mode of warfare. During King George's War he com¬ manded Fort No. 4, now Charlestown, N. H., and he held this post successfully against the French and Indians till the close of the war. He was sent to Canada in 1749 to negotiate for exchange of prisoners and again in 1752. For journal of his trip in 1749 consult <New Hampshire Historical Collections. } His travels

in the American Colonies was edited by D. N. Mereness (New York 1916).

STEVENS, Robert Livingston, American inventor: b. Hoboken, N. J., 18 Oct. 1787 ; d. there, 20 April 1856. He was a son of John Stevens, inventor. He early became interested in steam navigation and made many improve¬ ments in the construction of vessels, among which was that of giving concave water lines to the hull. In 1813 he invented the beam-engine, percussion shells for smooth-bore guns, and in 1836 introduced the T-rail on the Camden and Amboy Railroad, of which he was president. He made many improvements in the marine engine.

STEVENS, Thaddeus, American states¬ man: b. Danville, Vt., 4 April 1792; d. Wash¬ ington, D. C., 11 Aug. 1868. He was graduated at Dartmouth College in 1814; went to York, Pa., where he taught school. He was gradu¬ ated in law, and began to practise in Gettys¬ burg. In 1828 he joined the Whig party, and became active in politics. He worked with the party of anti-Masonry (q.v.), and took part in its Baltimore convention (September 1831). In 1833 and for several succeeding years he was a member of the Pennsylvania legislature, acted with the Whigs, and became distinguished through his opposition to slavery. At the State constitutional convention in 1836, to which he was a delegate, he advocated negro suffrage. During his

legislative career he was engaged in fighting the party ˆmachine,® and in the end came off victorious. He was appointed a canal commissioner in 1838, and rendered im¬ portant services to the State in developing its system of internal improvements. Remov¬ ing to Lancaster, Pa., in 1842, he there engaged for six years in the practise of law. In 1848 and again in 1850 he was elected to Congress, where he strongly opposed the fugitive-slave law (see Fugitive-slave Laws), the Kansas- Nebraska Bill (q.v.), and other measures in¬ volving concessions to Southern interests. Again in 1858 he was elected to Congress, and became the acknowledged leader of the House, in which he remained as such until his death. Throughout the Civil War he was chairman of the Committee on Ways and Means, and after¬ ward held the chairmanship of the Committee on Reconstruction. He reported from that committee the Reconstruction Act of 1867, hav¬ ing previously (1865) assisted in framing the Wade-Davis Reconstruction Bill. (See United States). He was also chairman of the House committee which had charge of the impeach¬ ment of Andrew Johnson (q.v.). Stevens was a man of boundless energy and tenacity of will, with the intenseness of a zealot in the cause which he espoused ; and in respect to slavery his radicalism outran that of all its other con¬ gressional opponents. Consult Callender, E. B., (Thaddeus Stevens) (Boston 1882) ; Mc¬ Call, (Thaddeus Stevens) (in (American Statesmen Series, > 1899) ; Woodburn, (Thad- deus Stevens) (Indianapolis 1913).

STEVENS, Walter B., American journal¬ ist: b. Meriden, Conn., 25 July, 1848. Gradu¬ ated University of Michigan, A.B., 1870; A.M., 1872; honorary degree of LL.D., from Washing¬ ton University, Saint Louis, in 1908. From 1870 he was connected with Saint Louis newspapers; was Washington correspond-

cnt of the Saint Louis Globe-Democrat, 1884-1901 ; president of the Gridiron Club, 1895. As staff correspondent he traveled in Canada, Cuba, Mexico, Porto Rico, Jamaica, Panama and the United States writing in serial form letters over the signature <(W.B.S.55 on The New States, Convict Camps, In a Silver Country, Black Labor in the South, Signs of the Times, etc. He was secretary, director of exploitation and member of the superior jury, World's Fair of 1904; secretary of the National Prosperity Association in 1908; secretary of the Saint Louis Centennial Association in 1909; executive secretary of the Fourth American Peace Congress in 1913, secretary of the Saint

Louis City Plan Commission, 1912-16. He has written (Through Texas,) (The Ozark Uplift,5 (The Forest City,5 (A Trip to Panama,5 (Notes on Facsimiles of Robert Burns, 5 (The Building of Saint Louis,5 (Saint Louis The Fourth City,5 (The Log of the Alton,5 (The Brown-Reynolds Duel,5 (Water Purification at Saint Louis,5 (Life of Samuel Morris Dodd,5 (Book of the Fourth American Peace Con¬ gress, Saint Louis,5 (Nights Wi' Burns,5 'Eleven Roads to Success,5* •'Missouri the Cen¬ tre State,5 'Halsey Cooley Ives,5 (Lincoln and Missouri,5 (Grant in Saint Louis.5

STEVENS, Walter Le Conte, American physicist: b. Gordon County, Ga., 17 June 1847. He was graduated at the University of South Carolina in 1868, and later studied at the uni¬ versities of Strassburg, Berlin and Zurich. He was appointed professor of mathematics and physics at Packer Institute in 1882; was profes¬ sor of physics at Rensselaer Polytechnic Insti¬ tute in 1892-98; and since 1898 has been pro¬ fessor of physics at Washington and Lee Uni¬ versity. He has specialized in physiological optics and acoustics, and is author of numer¬ ous scientific papers. He revised Steele's 'Physics5 (1888).

STEVENS, William Arnold, American philologist and Baptist theologian : b. Granville, Ohio, 5 Feb. 1893; d. 2 Jan. 1910. He was graduated at Denison University in 1862 and later studied at the Rochester Theological Semi¬ nary and at the universities of Harvard, Leipzig and Berlin. He was professor of New Testa¬ ment interpretation at the Rochester Theological Seminary in 1877-1910. Author of (Select Ora¬ tions by Lysias5 (1876) ; Commentary on the Epistles to the Thessalonians5 (1887) ; 'A Har¬ mony of the Gospels for Historical Study5 (1894; 3d ed., 1904) ; and joint author of Cut¬ line Handbook of the Life of Christ5 (1892); 'Life of the Apostle Paul5 (1894), etc.

STEVENS INSTITUTE OF TECH¬ NOLOGY, is located at Castle Point, Hoboken, N. J. It was founded in 1870 by Edwin A. Stevens, who bequeathed about two acres of land, $150,000 for buildings, and $500,000 for an endowment for ((an institution of learning.55 The trustees decided that the new "institution55 should be a college of mechanical engineering and in 1871 it was opened to students, being the first college course in America devoted to mechanical engineering and the first to give the degree of (<Mechanical Engineer.55 The founder, himself an engineer of achievement, was the son of John Stevens and the brother of Robert L. Stevens both famous in the early

annals of American engineering. The Institute offers but one course of study for all students, requiring four years and leading to the degree

of M.E. It has bestowed the honorary degrees of Doctor of Philosophy, Doctor of Science and Doctor of Engineering on prominent scientists and engineers. The subjects taught are basic in both science and economics and are designed to produce successful men in electrical, civil, chemical, hydraulic and other branches of prac¬ tical engineering, . as well as in mechanical engi¬ neering. In addition to the lecture and class¬ room subjects in science and business princi¬ ples, the Institute maintains a foundry, black¬ smith shop, machine shop, carpenter shop, draft¬ ing rooms, physical, chemical, electrical and experimental engineering laboratories in all of which there are organized courses which every student must pursue. During the entire four years the student is under the supervision of a physical director and is required to report twice a week for individual and class exercise. Henry Morton, Ph.D., LL.D., Sc.D., was the first president, being succeeded at his death in 1902 by Alexander C. Humphreys, M.E., Sc.D., LL.D. The Institute is governed by a board of 20 trustees, eleven of whom are Stevens gradu¬ ates. Three of these serve as representatives o i the Alumni Association for temporary pe¬ riods of three years each. The principal in¬ creases in grounds, buildings and endowment have been : a total of $145,000 from Henry Mor¬ ton for current uses, 1871-1902; grounds and buildings from Mrs. E. A. Stevens valued at $30,000, 1897 ; a laboratory of engineering and an endowment amounting to $350,000 from An¬ drew Carnegie, 1899-1911; land valued at $15,000 from Robert L. Stevens, 1905; $90,000 in the form of contributions from the Alumni toward the Morton Laboratory of Chemistry which was dedicated in 1906; a total of $26,000 from Dr. Edward Weston for extension of plant; $80,000 secured by President Humphreys from friends of the college, toward purchase of Castle Point property, 1910-1913; $1,385,000 from an intensive campaign for subscriptions in 1915, of which Andrew Carnegie gave $250,000, the Rockefeller Foundation, $250,000; William Hall Walker, $100,000, the remainder coming from alumni and friends. With these and other gifts the entire plant now includes about 23 acres situated on elevated ground on the bank of the Hudson River immediately over¬ looking New York City and harbor. It in¬ cludes five large buildings used for instruction purposes, one of these being a large and well- equipped gymnasium constructed in 1916, from the subscription of William Hall Walker given expressly for this purpose. Stevens Castle, for several generations the home of the Stevens family, was secured in 1911 and is now used as a dormitory and social centre. The endowment funds in 1917 amounted to $1,625,000 and the entire plant was valued at about $2,800,000. The Institute offers 28 free scholarships of which 10 are available each year. Four of the schol¬ arships are open to all, their presentation

being in the control of the president of the college; the remainder are in the gift of specially des¬ ignated schools, or of organizations that have provided funds for the endowment of scholar¬ ships. There is a special loan fund for stu¬ dents who need financial assistance. Six

prizes, ranging from twenty dollars to fifty dollars, are offered each year for proficiency in chemistry, physics, general scholarship and ac¬ complishment in student activity as measured by the upbuilding of character and its influence on student life.

STEVENS POINT, Wis., city, county- seat of Portage County; on the Wisconsin River, and on the Wisconsin Central and the Green Bay, Wisconsin and Saint Paul railroads ; about 20 miles northeast of Grand Rapids and 100 miles north of Madison. It is the commer¬ cial and industrial section of the southern part of a rich pine district and has extensive lum¬ bering interests. The river furnishes good water-power. The chief manufacturing estab¬ lishments are several lumber mills, planing mills, foundries, flour mills, railroad shops, machine shops, furniture factories and important produc¬ tions of self-rocking cradles and artificial flies for anglers. The educational institutions are private commercial schools, a high school, pub¬ lic and parish schools, a State normal school, a Polish convent and a public library. Two national banks have a combined capital of $150,000 and one State bank has a capital of $60,000. Pop. (1920) 11,371.

STEVENSON, ste-ven-son, Adlai Ewing,

American statesman : b. Christian County, Ky., 23 Oct. 1835 ; d. 1914. He was educated at Centre College, Danville, Ky., but without grad¬ uating removed to Bloomington, Ill., in -1852. He was admitted to the bar in 1857 and was master in chancery from 1860 to 1864. He took an active part in politics as a Democrat, and in 1875-77 and 1879-81 represented Illinois in the National House of Representatives. In 1885 was appointed first assistant postmaster- general but he antagonized the advocates of civil service reform 'by his wholesale removal, on political lines, of employees of the post office department; and after the renomination of Grover Cleveland in 1892 was chosen the can¬ didate for the vice-presidency. The Democratic candidates were elected, and after the expira¬ tion of his term he was appointed by President McKinley a member of the American commis¬ sion to visit Europe and endeavor to secure the adoption of international

bimetalism. In 1908 he was Democratic candidate for the govern- ship of Illinois.

STEVENSON, Andrew, American states¬ man: b. Virginia, 1784; d. Blenheim, Va., 25 June 1857. He studied law, attained a promi¬ nent position at the bar, in 1804 was elected to the house of delegates of Virginia, and after being a member for several sessions was chosen Speaker. In 1821 he was elected a representa¬ tive in Congress and for 13 years held that office, for the last six of which he was Speaker of the House. He was minister to England from 1836 to 1841, and on his return became rector of the University of Virginia.

STEVENSON, Burton Egbert, American

novelist, dramatist and anthologist : b. Chilli- cothe, Ohio, 9 Nov. 1872. He was educated at Princeton University, and entered newspaper work in 1893. Since 1899 he has been librarian of the Chillicothe Public Library. His novels are (At Odds with the Regent' (1900) ; (A Soldier of Virginia' (1901); (The Heritage' (1902) ; Tommy Remington's Battle' (1902) ;

(The Holladay Case' (1903) ; (Cadets of Gas¬ cony' (1904) ; (The Marathon Mystery' (1904) ; (The Young Section Hand' (1905) ; (The Girl with the Blue Sailor' (1906) ; (The Young Train Dispatcher' (1907) ; (That Affair at Elizabeth' (1907) ; (The Quest for the Rose of Sharon' (1909), (The Young Train-master' (1909); (The Path of Honor' (19.10); (The Mystery of the Boule Cabinet' (1912) ; (The Gloved Hand' (1913) ; (The Destroyed' (1913) ; (Little Comrade' (1915). Mr. Steven¬ son's travels have resulted in two books, (The Spell of Holland' (1911), and (The Charm of Ireland' (1914). He is the editor of Theodore Winthrop's posthumous novel, (Mr. Waddy's Return,' and of the Condensed Classics edi¬ tion of Fielding's Tom Jones.' He is the editor and compiler of cDays and Deeds — Verse' (1906); (Days and Deeds — Prose' (1907) ; (Poems of American History' (1908) ; and the author of (A Child's Guide to Biog¬ raphy' (190$). He is also the compiler of the anthology (The Home Book of Verse' (1912) and of the companion (Home Book of Verse for Young Folks' (1915). He has done edi¬ torial work for various publications; is a con¬ tributor to the leading magazines ; and the author of the play, (Little Comrade,' a dramatization of his novel of the same name.

STEVENSON, Edward Luther, American cartographer and historian : b. Rozetta, Ill., 18 Oct. 1860. He was graduated at Franklin Col¬ lege, Indiana, in 1881, and afterward studied at the universities of Johns Hopkins, Jena, Halle and Heidelberg, taking his Ph.D. at Hei¬ delberg

in 1890. He was professor of history at Rutgers College in 1891-1911, and in 1910— 15 he was secretary of the Hispanic Society of America. Since 1917 he has been lecturer on historical geography at the University of Cali¬ fornia. He is a leading authority on cartog¬ raphy, and in 1913 was made a Knight of the Royal Order of Isabelle the Catholic of Spain. Author of (Maps Illustrating the Early Explo¬ ration and Discovery of America, 1502-1530' (1902-06) ; (The Marine World Chart of Nic¬ ola de Canerio Januensis' (1908) ; (Early

Spanish Cartography of the New World' (1909) ; (Willem Janszoon Blaeu, 1571-1638' (1914) ; (Terrestrial and Celestial Globes' (1917), etc.

STEVENSON, John James, geologist: b. New York, 10 Oct. 1841. He was graduated at New York University in 1863 and was pro¬ fessor of geology in his alma mater, 1871-1909 and since professor emeritus. He was United States geologist, 1873-74, 1878-80 ; was the geol¬ ogist of the Pennsylvania geological survey, 1875-78, 1881-82; and was president of the New York Academy of Sciences, 1896-98. He pub¬ lished several geological treasures, among which are (Geology of a Portion of Colorado' (1875) ; (Report on Greene and Washington Districts, Pa.' (1876) ; (Geology of Bedford and Fulton Counties, Pa.' (1882) ; (Monograph on Car¬ boniferous of the Appalachian Basin' (1903- 07) ; formation of Coal Beds' (1911-13), etc.

STEVENSON, Joseph, Scottish historian: b. Berwick-upon-Tweed, 27 Nov. 1806; d. Lon¬ don, 8 Feb. 1895. He studied at the University of Glasgow, and in 1831 was appointed to a position in the manuscript department of the British Museum, where in 1834 he became a

sub-commissioner of the permanent records. He was reared in the Presbyterian Church, but in 1839 he was ordained in the Anglican Church. He was one of the editors of the Rolls Series of historical works under the title (Chronicles and Memorials of Great Britain and Ireland> which the British government undertook at his suggestion in 1847. In 1863 he again changed his faith, entering the Roman Catho¬ lic Church, in which he was ordained priest in 1872. He was commissioned by the government to make a detailed examination of the Vati¬ can archives, a work occupying four years and resulting in 13 volumes of transcripts now in the keeping of the Public Records Department. He edited numerous works for learned societies, as well

as for the collections of the (Church Historians of England,* and he was joint editor of (Scottish National Memorials) (1890).

STEVENSON, Joseph Ross, American Presbyterian clergyman and educator: b. Ligo- nier, Pa., 1 March 1866. He was graduated at Washington and Jefferson College in 1886, at the McCormick Theological Seminary in 1889, later studied at the University of Berlin and was ordained in 1890. He' *was engaged as a pastor until 1894, when he became connected with the faculty of the McCormick Theological Seminary, where in 1897-1902 he occupied the chair of ecclesiastical history. He was in charge of the Fifth Avenue Presbyterian Church in 1902-09, and of Brown Memorial Church, Baltimore, in 1909-14. Since 1914 he has been president of the Princeton Theological Seminary. He was elected moderator of the Presbyterian General Assembly in 1915.

STEVENSON, Matilda Coxe, American ethnologist: b. San Augustine, Tex., 1855; d. 24 June 1915. Her maiden name was Evans and she was married to James Stevenson, an ethnologist, in 1872. From him she received in¬ struction in ethnology, and for 13 years she was engaged with him in ethnological explora¬ tion in the Rocky Mountains. Left a widow in 1888 she was appointed to the staff of the Bureau of American Ethnology of the Smith¬ sonian Institution, and was thereafter es¬ pecially engaged in study of the Pueblo tribes of New Mexico and the Taos and Tewa In¬ dians. Author of (Zuni and the Zunians *(1881); (Religious Life of the Zuni Child> (1887) ; (Zuni Ancestral Gods and Masks) (1898); (The Zuni Indians; their Mythology, Esoteric Fraternities and Ceremonies* (1903), etc.

STEVENSON, Robert, Scottish engineer: b. Glasgow, 8 June 1772; d. Edinburgh, 12 July 1850. Having studied engineering, he was ap¬ pointed engineer and superintendent of Scottish lighthouses. In 1843 he had constructed 23 lighthouses on the coast of Scotland. He was the originator of the intermittent or flash light now in general use. The famous Bell Rock Lighthouse, described in the Diary ofi Sir Walter Scott, was built by Stevenson in 1807— 10 after overcoming tremendous difficulties. He was the grandfather of Robert Louis Stevenson.

STEVENSON, Robert Louis (baptized Robert Lewis Balfour), Scottish novelist, es¬ sayist, and poet : b. 8 Howard place, Edinburgh, 13 Nov. 1850; d. Vailima, island of Upolu,

Samoa, 3 Dec. 1894. He was the only child of Thomas Stevenson, an eminent light-house en¬ gineer, — as his father, Robert Stevenson,

had been before him, — and Margaret Isabella, daughter of the Rev. Lewis Balfour, of Colin- ton in Midlothian. He was a playful, imagina¬ tive child; was fond of being read to, and com¬ menced to compose (by dictation) at the age ot six. His health was infirm from the first; but he was tended and kept alive by a devoted nurse, Alison Cunningham, to whom he re¬ mained affectionately grateful throughout his life. His schooling was irregular and incon¬ secutive; and even while attending school he showed a truant disposition. On his many rambles, he always took a copy-book, in which he tried to fit into words his impressions of people and places, imitating the cadences of his favorite authors. In 1867 he entered Edin¬ burgh University, and studied engineering with a view to following the family profession. He showed, however, little interest in this; though in 1871 he won a silver medal for a paper on light-house apparatus. The same year he gave up engineering, and began to study law. He was called to the bar in 1875 ; but immediately forsook the legal profession also, and turned his attention entirely to letters.

Acute nerve exhaustion and danger to the lungs forced him to spend the winter of 1873 at Mentone. In 1874 he joined the Savile Club in London, and soon made friends with many of the most prominent literary men of the day, including Sidney Colvin, William Ernest Hen¬ ley, Edmund Gosse, Andrew Lang, Walter Pollock, Leslie Stephen, Cosmo Monkhouse, Sir Walter Simpson, George Meredith and Prof. Fleeming Jenkin. His social charm was irresistible, and he was noted for the brilliancy and ardor of his talk. Henley's sonnet, ap¬ parition^ gives a vivid description of him at this period. He practised writing constantly. In April 1875, he made his first visit to the artist haunts of Fontainebleau, in company with his painter cousin, R. A. M. Stevenson. In 1876, in company with Simpson, he took the canoe trip from Antwerp to Grez, which he afterward narrated in his first book, (An In¬ land Voyage *(1878) ; and in 1878 he went alone upon the tramping trip which resulted in (Travels with a Donkey* (1879). These little books of travel stamped him already as a master of English prose style, though they were written with more elaborate mannerism than he showed in his maturer work. Mean¬ while, beginning 1876, he contributed to the Cornhill and other magazines the critical essays later collected in (Familiar Studies of Men and Books> (1882), and the bracing and vigorous papers on life and the living of it, collected in (Virginibus Puerisque) (1881). As a critic he showed thorough study and sympathetic in¬ sight, and as a moralist he displayed a militant gaiety and bracing bravery of spirit. His first published stories were (A Lodging for the Night *(1877) ; (The Sire de Maletroit's Door* (1878), and (Will o' the MilP (1878). His first volume of fiction was

(New Arabian Nights,* which appeared serially June to Octo¬ ber 1878. These early stories showed at once his romantic love for the poetry of circumstance, and his mastery of rapid and brilliant narra¬ tive.

Soon after the inland voyage of 1876, Stevenson met in France an American lady, Mrs. Fanny Van de Grift Osbourne, for whom he conceived almost immediately a devotion that changed the entire course of his life. Her domestic circumstances had been unhappy, and on her return home in 1878, she took steps to obtain a divorce from her husband. Learning her determination, Stevenson resolved to follow her, and started suddenly for California in August 1879. He undertook the journey against the remonstrances of his family and friends. He was very short of funds; and therefore crossed the ocean in the steerage, and traversed the continent in an emigrant train. The experiences of this double journey he afterward narrated in (The Amateur Emi¬ grant and (Across the Plains.) On board ship he wrote (The Story of a Lie,* under stress cf immediate need for money. The hardships that he genially endured resulted in a general breakdown of his health. From September to December 1879, he lived at Monterey and worked incessantly. In December 1879, he moved to San Francisco, where for three months he lived in a workman's lodging, and was reduced almost to the point of death by enforced frugality and excessive labor. Mrs. Osbourne nursed him back to life. She was now free from her former husband, and Steven¬ son married her in May 1880. Immediately afterward, in order to insure his recovery, the couple moved to a deserted mining camp in the California Coast Range. An account of their experiences here is given in the (Silverado Squatters.)

In August 1880, Stevenson brought his wife to England, where she was1 enthusiastically wel¬ comed by his parents and friends. During the next two years he spent his summers in Scot¬ land and his winters, on account of his pre¬ carious health, at Davos Platz, in Switzerland, where he enjoyed the companionship of John Addington Symonds. At Davos he completed (Treasure Island,* a stirring narrative for boys, both young and old, that made his fame as an artist in romance. It appeared serially in Young Folks from October 1881 to January 1882, and was published in book form in 1883. The author received £100 for the book rights of the story, and was delighted at the price, little knowing how the work was destined to endure. From

1882 to 1884 he lived in the south of France, partly at Marseilles and Nice, but chiefly at Hyeres. In 1884 he returned to Eng¬ land and settled at Bournemouth, where he re¬ mained till 1887. His health was at its lowest ebb during this period. A great part of his time was spent necessarily in bed ; often, be¬ cause of his tendency to hemorrhages, he was forbidden to speak aloud. In spite of this handicap, he kept cheerfully at work, and pro¬ duced, besides many minor stories of the high¬ est merit, the graceful and urbane romance. (Prince Otto) (1885), the thrilling and ad¬ venturous (Kidnapped } (1886), and (The

Strange Case of Dr. Jekyll and Mr. Hyde) (1886), that terrible and searching tale of the good and bad in man. In 1885 he also pub¬ lished CA Child's Garden of Verses,) a collec¬ tion of poems showing such unsophisticated memory and intimate understanding of child¬ hood as to make its author the poet laureate of the nursery. During the same period he vol 25 — 41

composed four plays in collaboration with W. E. Henley ; but his attempts in the dramatic form were never of great importance. In 1887 appeared (The Merry Men and Other Tales,) a volume which collected some of his most artistic novelettes and short stories, among them being (Markheim,* a grim tale of conscience and remorse; and also c Memories and Portraits, * a collection of papers chiefly autobiographical.

The death of Stevenson's father in May 1887, severed the strongest tie which bound him to the old country; and weary of battling for health in an unpropitious climate, he accepted the advice of his physicians to try a complete change of surroundings. Accordingly, with his wife and mother, he sailed to America in August 1887. He spent the next winter at Saranac Lake, in the Adirondack Mountains. His main work that season was the prepara¬ tion of 12 articles for Scribner's Magazine, which appeared one a month through 1888, and the composition of a large part of (The Master of Ballantrae, *perhaps his most at¬ tractive romance. Among the Scribner papers were several of his greatest essays on litera¬ ture and life, — for example, (The Lantern Bearers,) (Pulvis et Umbra* and (A Christmas Sermon. *In June 1888, he crossed the con¬ tinent to San Francisco; and being subsidised by large advance orders for travel letters and other literary work, sailed forth with his entire family on the schooner yacht Casco for a long voyage to the South Sea Islands. His first extensive stay was at Honolulu, 1889, where he completed (The Master of Ballantrae) and also (The Wrong Box,* — the latter in collabo¬ ration with his step-son, Mr. Lloyd Osbourne. Thence, in the schooner Equator, he proceeded to Samoa and Sydney. From Sydney, after

voyaging to many islands on the steamer Janet Nicoll, he returned to Samoa, bought an estate named Vailima on a mountain slope above Apia in the island of Upolu, and de¬ termined to settle there for good. From 1891 to his death he lived at Vailima, building a great house and dwelling with a feudal dig¬ nity emulous of Scott's at Abbotsford. He was beloved by all the natives, — who called him rtTusitala, *teller of tales, — took an active interest in Samoan affairs, and became, by the force of his engaging personality, a real power in the land. At Vailima he produced (The Wrecker and (The Ebb Tide,* both in col¬ laboration with Mr. Osbourne; a sequel to (Kidnapped, *called (Catriona, or David Bal-* *four) ; a collection of Hsland Nights Enter- tainments) ; sundry writings about Samoan affairs; and three-quarters of a romance called (St. Ives,* completed after his death by Mr. A. T. Quiller-Couch. In all of this work he was aided by his step-daughter, Mrs. Isobel Strong, who proved to be a devoted amanuensis. He also commenced (Weir of Hermiston,* which gave promise of being by far the greatest of his novels. He labored on this book with feverish intensity until the very day of his death. The end came suddenly. With char¬ acteristic gaiety of spirit, he was making a salad on the veranda, when a blood-vessel burst in his brain. He lost consciousness im¬ mediately, and died within two hours. The Samoans bore his body to the summit of Vaea

Mountain, where he lies buried. See Treasure Island; Kidnapped; Dr. Jekyll and Mr. Hyde.

Bibliography. — All the material really nec¬ essary for a study of Stevenson is comprised in the Edinburgh and Thistle Editions, includ¬ ing the 'Life,' by Graham Balfour, and the <Letters,) edited by Sidney Colvin (4 vols., New York 1911). Consult also the biography by Graham Balfour (2 vols., New York 1901) ; Simpson, E. B., (Stevenson Originals ' (New York 1912) ; Mrs. R. L. Stevenson, 'The Cruise of the Janet Nicoll among the South Sea Islands) (ib. 1914) ; Pinero, A. W., 'Robert Louis Stevenson as a Dramatist' (ib.

1914) ; James, Henry, in (Notes on Novelists' (ib. 1914) ; and Hamilton, Clayton, (On the Trail of Stevenson' (Garden City, N. Y.,

1915) ; Rice, R. A., 'Stevenson, How to Know Him' (New York 1916).

Clayton Hamilton,

Sometime Tutor in English, Columbia Uni¬ versity.

STEVENSON, Sara Yorke, American archaeologist: b. Paris, France, 19 Feb. 1847. She was educated in Parrs, lived in Mexico, and came to America in 1862, where in 1870 she was married to Cornelius Stevenson. She received the degree of Sc.D. from the Univer¬ sity of Pennsylvania, the first degree ever con¬ ferred on a woman by that institution. In 1897 she went to Rome on a special mission for the departments of archaeology and palaeon¬ tology of the University of Pennsylvania, and in 1898 was sent to Egypt for the American Exploration Society, to make investigation in connection with archaeological work in the Nile Valley. She was vice-president of the jury, for ethnology, Chicago Exposition, 1893; and has been assistant curator of the Pennsyl¬ vania Museum since 1908. She has been vari¬ ous times president of the Civic Club of Phila¬ delphia and was the first woman lecturer on the Harvard Calendar (1894). Since 1908 she has been literary editor of the Public Ledger of Philadelphia. She has published Maxi¬ milian in Mexico' and 'The Book of the Dead.'

STEWARD, Sir William Jukes, Austra¬ lasian statesman and author: b. Reading, Eng¬ land, 1841 ; d. 2 Nov. 1912. He went to New Zealand in 1862 and a few years later entered journalism and became successively editor of the North Ortage Times, Wainmate Times and the Ashburton Mail and Guardian. Elected to the house of Representatives in 1870 he held his seat until his death and during this long tenure of office had many important commis¬ sions and offices in connection with the legisla¬ tive body, among that of speaker (1891-93). He was knighted in 1902. Among his published works are (Carmina Varia' (1867); (The Vision of Aorangi and Other Poems ' (1906) ; (Parliamentary Procedure in New Zealand' (1906). A great deal of his most interesting work is in the files of magazines and news¬ papers.

STEWARD (Anglo-Saxon, stig, cattle-pen, and weard, guard) in common usuage, a head servant who attends to domestic matters in a house, club, hotel or other establishment. (1) On shipboard an officer whose duty it is to distribute provisions to the officers and men. In passenger ships, a man who superintends

the distribution of provisions and liquors, waits at table, etc. (2) A fiscal agent of certain bodies ; as, the recording steward of a congre¬ gation of Methodists. (3) The Lord High Steward of England was one of the ancient officers of state, the greatest under the crown. A lord high steward is now made only for par¬ ticular occasions, such as a coronation or the trial of a peer. (4) The Steward of the Household, an .officer of the English royal household, who is head of the court called the Board of Green Cloth, which has the super¬ vision of the

household expenses and accounts. He selects the officers and servants of the household and he appoints the royal trades¬ men. This office is of very ancient origin and was hereditary, though not always in the same line, until 1319, when Henry IV merged it with the crown.

STEWART, stu'art, Alexander P., Amer-

can military officer: b. Rogersville, Tenn., 2 Oct. 1821 ; d. Biloxi, Miss., 30 Aug. 1908. He was graduated from the Military Academy in 1842 and after serving in the artillery for three years resigned from the army. When the Civil War came Stewart was appointed a major of artillery by Governor Harris of Tennessee. His promotion was rapid. He was made a major- general on 2 June 1863 and lieutenant-general on 23 June 1864, almost a year before the close of the war. In 1868 he accepted the chair of professor of mathematics in the University of Mississippi, and from 1874 to 1886 was chan¬ cellor.

STEWART, Alexander Turney, American

merchant: b. Belfast, Ireland, 12 Oct. 1803; d. 10 April 1876. He came to the United States in 1823 and engaged in teaching. In 1825 he founded in New York, a dry-goods business which gradually expanded into one of the largest mercantile concerns in the world. He was at one time considered the wealthiest man in the United States and was a giver of large sums of money to various charitable institutions, and was active in many philanthropic under¬ takings. Before his death the business of which he was head had branches and agencies in the principal cities of Europe and several factories and mills at home. He was buried in Saint Mark's churchyard, from which his remains were stolen on 7 Nov. 1878. They were after¬ ward recovered and deposited in the mausoleum of the Cathedral of the Incarnation, erected by Mrs. Stewart in memory of her husband at Garden City, Long Island.

STEWART, Alvan, American lawyer and

reformer: b. South Granville, Washington County, N. Y., 1 Sept. 1790; d. New York, 1 May 1849. He moved with his parents to Ver¬ mont, where in 1809 he entered Burlington Col¬ lege. He spent some time in Canada in 181 1— 12, but in the latter year returned to college. During the War of 1812 he again went to Can¬ ada and was held as a prisoner. On his return to the United States he studied law and began the practice of his profession at Cherry Valley, N. Y., where he rapidly attained success. In 1832 he moved to Utica and continued his prac¬ tice, but gave a large share of his .ime and attention to the temperance

and anti-slavery causes. His first anti-slavery speech was de¬ livered- in 1835; in 1837 he called and organized

an anti-slavery convention at Utica, which was, however, soon dispersed by mob violence. He was the leader in New York State in forming an independent political party to promote the abolition of slavery, and was that party's can¬ didate for governor. Among his most famous speeches are those delivered before the New Jersey Supreme Court to establish the uncon¬ stitutionality of slavery in the State under the Constitution of 1844, and one delivered in 1837 to prove that Congress could constitutionally abolish slavery. His speeches were edited by L. R. Marsh and published under the title, (Writings and Speeches of A. Stewart on Slavery.*

STEWART, Balfour, Scottish physicist: b. Edinburgh, 1 Nov. 1828; d. near Drogheda, 18ˆDec. 1887. He was educated at Dundee and later at the University of Edinburgh. In 1859 he was appointed director of the observatory at Kew and in 1870 professor of physics, Owens College, Manchester. He is best known by his investigations into the absorption and radiation of heat and his remarkable meteorological studies, especially those undertaken in collabor¬ ation with De la Rue and Loewy on the physical constitution of the sun, and with Tait on the generation of heat in a vacuum. He devoted most of his labors to the study of terrestrial magnetism. His main discovery on the subject of heat constituted a remarkable extension of what is known as Prevost's ((Law of Ex¬ changes,® and he established the fact that radi¬ ation is not a surface phenomenon, but takes place throughout the interior of the radiating body, and that the radiative and absorptive pow¬ ers of a body must be equal. He published Elementary Treatise on Heap (1866) ; Ele¬ mentary Physics) (1870) ; (12 ed.).

STEWART, Bertrand, English army cap¬ tain : d. August 1914 in action, reported to be the first man killed in the British expeditionary force in France. Though a lawyer by profes¬ sion, he had held a commission in a Yeomanry regiment for many years, had served through the South African war as a trooper and was attached to the staff of Sir John French at the time of his death. Stewart was arrested in Bremen, Germany, on 7 Aug. 1911 on a charge of espionage. He was accused of visiting vari¬ ous towns and islands (where he had never been) and of attempting to secure secrets con¬ cerning German military and naval defences and the North Sea dockyards. He was

made the subject of a bitter press campaign in Ger¬ many and described as <(the gentleman spy,® ferretting out secrets to the advantage of ((our adversary,® as England was openly designated. He was tried in camera and on the evidence of only one witness was sentenced to three and a half years' imprisonment in a fortress 3 Feb. 1912. He was released in May 1913 as an act of clemency on King George's visit to Berlin.

STEWART, Charles, American naval of¬ ficer: b. Philadelphia, Pa., 28 July 1778; d. Bordentown, N. J., 7 Nov. 1869. Shipping on a merchant ship at the age of 13, he eventually became captain. In 1798 he entered the navy

as a lieutenant on board the frigate United States and served on this vessel among the West Indies and against French privateers. In 1800 he returned to the marine service and was captain of several schooners. Later he com¬ manded privateers. In this latter capacity he captured the French vessels Deux Amis and Diane. In 1804 he joined the Mediterranean squadron, where he took command of the Siren in operations against Tripoli. On his return to the United States in 1806 he was promoted to the rank of captain. In 1813 he commanded the Constitution in a cruise to the Guiana coast and the Windward Islands, which resulted in the capture of the British schooner Piston and a number of merchant vessels. In 1815 he made a second cruise in the same vessel and captured two large British ships, the Cyane and the Levant , but he was later defeated by the British and lost the Levant to therm In 1816— 20 he commanded a squadron in the Mediter¬ ranean and from 1821-23 he had command of a Pacific squadron. He was also in command of the home squadron (1842-43). In 1857 he was placed on the retired list, but two years later took charge of the Philadelphia Navy Yard, which office he held for three years, when he was retired as rear-admiral.

STEWART, Dugald, Scottish philosopher: b. Edinburg, 22 Nov. 1753; d. there, 11 June 1828. He was the son of Matthew Stewart, who for 25 years was professor of mathematics at Edinburgh University, and there young Dugald studied from 1765 to 1769, devoting himself to mathematics and philosophy. In the latter sub¬ ject his teacher was Adam Ferguson. In 1771 Stewart went to Glasgow, partly to prepare him¬ self as a candidate for one of the Snell scholar¬ ships at Oxford, and partly to attend the lec¬ tures of Thomas Reid, who came to exercise a profound influence on the young student. In 1772 he was called upon by his father, whose health was failing, to teach the mathematical classes in the University of Edinburg. In 1775 he was elected joint professor and acted in that capacity till 1785. During

Ferguson's absence on a political mission in America in 1778-79, Stewart also had charge of the courses in phi¬ losophy, and upon the resignation of Ferguson in 1785 was chosen to succeed him and con¬ tinued in the active duties of his class for 25 years. His field embraced a wide array of sub¬ jects: psychology, logic, metaphysics, ethics, natural theology, the principles of taste, politics, and last of all, political economy. In 1792 ap¬ peared the first volume of the Elements of the Human Mind, *followed in 1793 by the (Outlines of Moral Philosophy.* In the same year he read before the Royal Society of Edinburgh his (Account of the Life and Writ¬ ings of Adam Smith *; in 1796 came the Ac¬ count of the Life and Writings of Principal Robertson, * and in 1802 the (Account of the Life and Writings of Dr. Reid.* In 1806 he received a sinecure office worth £300 a year. The death of his second son in 1809 proved a severe blow for his health, otherwise indifferent, and he was unable to conduct his lectures during the following session. Thomas Brown was ap¬ pointed as conjoint professor, and Stewart passed the rest of his life in retirement. In 1810 he published his (Philosophical Essays) ; in 1814 the second volume of the Elements of

the Human Mind) ; in 1815 the first part and in 1821 the second part of (A Dissertation on the Progress of Metaphysical, Ethical and Political Philosophy since the Revival of Learn- ing) ; in 1827 the third volume of the (Ele- ments> ; and in 1828, a few weeks before his death, the (Philosophy of the Active and Moral Powers. J Stewart has little claim to be con¬ sidered an original thinker, and his chief im¬ portance rests in the success which attended his attempt to expound the philosophy of Thomas Reid. From the latter he differed chiefly in his more sympathetic attitude toward the Cartesian philosophy, and in certain principles of psychology, . notably those connected with the subject of association. A gifted orator and possessed of an extremely attractive personality, Stewart attained very great popularity as a lec¬ turer and he was successful in implanting in the minds of his hearers a profound respect for the value of philosophic thought and the standards of a lofty morality. His works, in 11 volumes, appeared in 1854—58 and included the by John Veitch. Consult also McCosh, Scot¬ tish Philosophy } (1875) ; Stephen, (English

Thought in the 18th Century.)

STEWART, George, Canadian journalist: b. New York, 26 Nov. 1848;

d. 1906. He early removed with his parents to the province of New Brunswick, Canada, and was educated there. He edited and published Stewart's Lit¬ erary Quarterly Magazine in 1867-72, and was afterward engaged in newspaper work, serving as editor of the Quebec Daily Chronicle in 1879-96. Author of (Canada Under the Ad¬ ministration of the Earl of Dufferin> (1878) ; (Emerson the Thinker *(1879); Essays from Reviews* (1892-93), etc.

STEWART, George Black, American Presbyterian clergyman and educator: b. Co¬ lumbus, Ohio, 28 Feb. 1854. He was graduated at Princeton University in 1876, later studied at the McCormick Theological Seminary and was graduated at the Auburn Seminary in 1879. He was ordained in 1879 and held pastor¬ ates until 1899, when he became president of Auburn Seminary. He also holds the chair of practical theology there. He was founder of the Pennsylvania Chautauqua, of which he was president for five years. He is a con¬ tributor to religious periodicals, is editor of the Auburn Seminary Record, and is author of Eife of Jesus for Juniors) (1896) ; (A Study of the Life of Jesus) (1907) ; Efficiency Tests for Pastors and Churches) (1915), etc.

STEWART, James, Canadian physician and educator: b. Osgoode, Ontario, 1846; d. 1906. He was graduated in medicine at Mc¬ Gill University in 1869 and afterward engaged in practice as a physician. He was professor of materia medica and therapeutics at McGill University in 1883-91, held the chair of clinical medicine there in 1891-93 and from 1893 was also professor of medicine. He was president of the Association of American Physicians in 1903. He wrote extensively on neurology, and was for many years one of the editors of the Montreal Medical Journal.

STEWART, Julius, American artist : b. Philadelphia, Pa., 6 Sept. 1855. He studied under Gerome and Madrazo at Paris, and lived there the greater share of his life. He is

known as a figure and genre painter. His style is decidedly French in finish, but his characteri¬ zations of American types is excellent, particu¬ larly his studies of the American colony in Paris. He was a member of the executive and advisory committee of the Saint Louis Expo¬ sition in 1904. He was awarded gold medals at Berlin in 1891 and 1895 and at Munich in 1897 and 1901. He was elected a chevalier of the Legion of Honor in 1901. His (Hunt BalP is in the Essex Club, Newark, N. J.

STEWART, Matthew, Scottish mathema¬ tician: b. Rothesay, 1717; d.

Edinburgh, 23 Jan. 1785. He studied at the University of Glasgow, and in 1746 published his (General Theorems of Considerable Use in the Higher Parts of Mathe¬ matics. > In 1761 he published (Tracts Physical and Mathematical, * and in 1763 (Propositions Geometricae More Veterum Demonstratae.*

STEWART, Robert, marquis of London¬ derry. See Castlereagh.

STEWART, William Rhinelander, Ameri¬ can humanitarian: b. New York, 3 Dec. 1852. He was graduated at the Columbia Law School in 1873, and engaged in law practice, but abandoned it in favor of his work as executor and trustee and for philanthropic work. He became in 1908 the president of the Rhine¬ lander Real Estate Company. He was commis¬ sioner on the New York State Board of Charities from 1882, was its president in 1894- 1900 and has occupied that office since 1904. He was president of the 25th National Con¬ ference of Charities and Correction in 1898; in 1900 he organized the New York Board of Charities and Correction, serving as its presi¬ dent in 1903, and in 1910 he organized a similar conference for New York City. In 1889 he organized the committee that erected Wash¬ ington Arch in Washington square, New York, and served as its treasurer. He was one of the committee of 70 organized in 1894 for the pur¬ pose of defeating Tammany Hall. Author of (The Philanthropic Work of Josephine Shaw LowelP (1911).

STEWART ISLAND, New Zealand, the smallest and southernmost of the three main islands composing New Zealand (q.v.). It is separated by Foveaux Strait from the southern extremity of South Island. Its area, together with the neighboring islets, is 665 square miles, and its population about 300.

STEW ARTIA, a genus of the tea family, which contains ornamental shrubs and trees, found only in eastern America and eastern Asia. They have simple, membranous, decidu¬ ous leaves, which turn to brilliant autumnal coloring, and solitary, axillary flowers. These blossoms are large and showy, cup-shaped and like camellias. They have usually five petals and numerous stamens; the fruits are capsules, somewhat woody and contain lenticular seeds, sometimes winged. The two American white- flowered species, from the Southern States are Y. malachodendron, bearing the largest flowers of the genus, and S. pentagyna, flowering in late spring and summer. These are sometimes cul¬ tivated, but S. pseudo-camellia is more widely known. In its original habitat, mountainous Japan, this species is a tall tree, with smooth, bright-red bark, flaking off in thin, large pieces. It has handsome, elliptical, dark-green leaves,

not troubled by insects, and creamy-petaled liowers, with wavy edges, purple filaments and orange stamens. Like the S. pentagyna, it is hardy as far north as Massachusetts.

STEYER, sti'er, or STEYR, stir, a city in Austria, at the junction of the Steyer with the Enns, 19 miles southeast of Linz. The town proper has two suburbs connected by bridges, and there are three public squares, one of which contains beautiful fountains. The buildings are typically Italian : the parish church is modeled on Saint Stephen's of Vienna; the town-hall is embellished by a graceful tower; the Castle of Lemberg (10th century) stands upon a rocky height overlooking the rivers. There are sev¬ eral monuments, a grammar school, technical and industrial schools and museum. Steyer is one of the most important manufacturing cities of Austria and very wealthy. The factories for iron and steel, paper, calico, woolens, leather, cutlery, hosiery, bell-founding, dyeing, small- arms, and bicycles are among the most im¬ portant of the country. The historical in¬ terest of the town centres in the treaty of peace concluded there 25 Dec. 1800 between Austria and France. Pop. 18,000.

STEYN, Marthinus Theunis, ex-president of the Orange Free State, South Africa: b. 2 Oct. 1857; d. 28 Nov. 1916. Of Dutch (Boer) descent, his mother was a daughter of Wessels, one of the leaders of the Great Trek in 1836. He studied law in England, was called to the bar and returned to South Africa to practise in Bloemfontein. He became a judge 'before he was 40, and was elected President of the Orange Free State in 1895. In the South African War of 1899 he threw in his lot with President Kruger. Both republics were an¬ nexed by Great Britain as a result of the war and were federated under the Union of South Africa in 1910. Though he subscribed to the Constitution, Steyn was strongly suspected of favoring the rebellion of 1915. See Beyers ; Orange Free State, Province of the; War, European.

STIBICONITE, a mineral consisting of hydrous-oxide of antimony, Sb204.H20. It con¬ tains 74.05 per cent of antimony and is an important ore in Nevada and California.

STIBNITE, ANTIMONITE, or ANTI¬ MONY-GLANCE, the only important ore of antimony. It crystallizes in the orthorhombic system and forms not only in acicular crystals often radially grouped, but also, in Japan, in magnificent groups of large crystals, prismatic and

deeply striated vertically, which are un¬ doubtedly among the finest of minefal speci¬ mens. The crystals are often twisted, while angular bends, due to gliding planes, are very common. Massive, granular and columnar forms also occur. Brachypinacoidal cleavage is highly perfect. Though flexible, even when in large, stout crystals, and slightly sectile, it seems very -brittle because of its easy cleavage. It is very soft, hardness 2; specific gravity 4.6; lustre metallic, splendent ; color and streak lead- gray, becoming black and often iridescent on exposure to light. Chemically it is antimony trisulphide, Sb_2S_3. It fuses even in large pieces in the flame 'of a candle and is number one in the scale of fusibility. It occurs in many locali¬ ties throughout central Europe, in England,

China, Mexico, New Brunswick, and in the United States in Arkansas, Utah, California and elsewhere. See also Antimony.

STICK-INSECTS. See Walking-stick.

STICKIT MINISTER, The, and Some Common Men, a collection of short stories by Samuel Rutherford Crockett (q.v.), published in 1893.

STICKLEBACK, a small fish of the fam¬ ily Gasterosteidco, order Hemibranchii, in which the rays of the first dorsal fin form a scries of detached spines. The body is elongated and compressed and tapers behind to a narrow caudal peduncle. Teeth exist in both jaws, but are absent from the tongue and palate. The premaxillary is protractile. The sides of the body may be covered with vertical bony plates, while the other parts are destitute of any scaly covering. These fishes inhabit the rivers and brackish waters of temperate climates of the northern hemisphere. The brook stickleback (G . bispinosus) , very common on the New Eng¬ land and New Jersey coasts and sometimes in fresh water, is a voracious little fish, swimming eagerly after bait of all kinds, and not at all disturbed by noises and acts which would in¬ fallibly frighten away most other fishes. It is highly pugnacious, especially at the breeding season. In its reproductive habits it evinces many most interesting features, constructing a nest and attending its young with care and affection. The nest is the size of a large hick¬ ory-nut and is composed of vegetable matters, pieces of straw, sticks and the like, bound to¬ gether with a silky fibre secreted by an organ closely connected with the kidneys of the male. In the top of the nest a small pit is formed in which the eggs are deposited. These are about the size of poppy seeds, and are bright-yellow. Over this nest and its contained ova the fishes watch with the most jealous care, the male tak¬ ing upon himself almost the entire duty of nidi- fication, as well as of tending the young after hatching. The genera Encalia, Pygostcus

and Ap cites are all represented in the salt or fresh waters of the United States, where are found seven species of these interesting little fishes, each exhibiting individual peculiarities in ap¬ pearance and habits. Consult Gill, (Standard Natural History, > Vol. Ill (Boston 1885), and Ryder, (Bulletin United States Fish Commis- sion) (Washington 1881).

STIEGLITZ, Julius Oscar, American chemist : b. Hoboken, N. J., 26 May 1867. He was graduated at tbe Realgymnasium, Carls- ruhe, Germany, in 1886; took his Ph.D. at the University of Berlin in 1889; and after his re¬ turn to the United States studied at Clark University. He was connected with the faculty at the University of Chicago from 1892, became professor of analytical chemistry there in 1905, director of the laboratories in 1912, and since 1915 has been chairman of the chemical depart¬ ment. He was Hitchcock lecturer at the Uni¬ versity of California in 1909, and became a member of the National Academy of Sciences in 1911. Author of papers on molecular rear¬ rangements, carbamid bases, imido ethers and related subjects and of (The Elements of Qualitative Chemical Analysis) (2 vols., 191 1—

12).

STIGAND, stig'and, William, English clergyman: b. 1002; d. 1064. He enjoyed great favor with King Edward, who in 1044 made him royal chaplain and bishop of Elmham or of the East Angles. Eight years later the bishop mediated sucessfully in the interests of peace between the king and Earl Godwin, and was awarded with the archbishopric of Canterbury. Stigand received the pallium from Pope Bene¬ dict X. On the death of Harold, Stigand gave his vote for Edgar Atheling to be king, and for this reason, and because he was a firm friend of the House of Godwin, William the Con¬ queror distrusted him, and induced the Pope to send a commission of cardinals, who deprived him of his dignities and sentenced him to per¬ petual imprisonment. But Stigand died shortly afterward in Winchester, starved to death, it is said.

STIGMA, plural, stigmas, or stigmata (Greek stigma, mark, puncture, brand), a mark made with a red-hot iron ; a brand impressed on slaves and others. The original Greek signifi¬ cation of the word has received many secondary meanings. Owing to its association with the branding of slaves, stigma has come to have the signification of a mark of

infamy, a slur at¬ tached to any one on account of evil conduct. In anatomy stigma bears a meaning closer to the original signification of the word which was to puncture with a sharp pointed instrument. This sense is closely related to that of the Eng¬ lish verb (<to stick,11 meaning to pierce, puncture or stab (with a pen or other pointed weapon). The expression <(to stick one with a stick® con¬ veys the meaning and shows the derivation of the English word, which is related to the Eng¬ lish to sting, and the German stechen, to prick, pierce, sting thrust and stab. These being the equivalents of stigma in the English language, the Greek word came to have, in English, a more or less popular usage, only one of its sig¬ nifications, and that metaphorical, being derived from its association with slaves and outcasts, the official marks on whom came to be sym¬ bolical with social and moral degradation.

But science has gone back to the original sense of the Greek word and has given us nu¬ merous scientific terms in modern English, de¬ rived from the Greek or from its Latin deriv¬ ative. In anatomy and zoology stigma is used in the sense of a mark, point or noticeable place, as for example a naevus, a birth-mark. * The place on the surface of an ovary where there is a rupture of a mature Graafian follicle is termed a stigma. The word also signifies a chitinous mark on the anterior margin of the forewings of numerous insects. It is the term used to designate the interior orifice of a trachea, a spot of pigment in protozoa, one of the pores of the segmental organs ; a ciliated opening connecting the cavity of the pharynx with that of the artificial canal. Any mark on the skin which bleeds periodically or even at irregular intervals is also termed a stigma. None of these uses of the term departs from the root meaning of the word, which, as we have seen, was to puncture or prick, with the substantive sense of the thing punctured or pricked.

In botany the stigma is a part of the style, or in the absence of the latter, of the surface of the ovary, which receives the pollen.

Stigma was used in Greek grammar as a signature which is still used sometimes for <(st.® It also designated the number six.

STIGMATA, the Greek plural form of stigma, is used in various collective significations. Anatomical stigmata, for instance, comprises irregularities or malformations of various parts of the anatomy, among them being those of the face, the skull-cap, palate, teeth, tongue, lips, nose, ears, limbs, fingers, thorax and, in gen¬ eral, any part of the human anatomy. The presence of less or more than four fingers on one human hand would be stigma, as would be the dwarfing or over

growth of the frame of man or animal. Abnormal conditions of the skin, hair and limbs are also characterized as stigmata. Often these persistent stigmata are used as signs by which to judge abnormal con¬ ditions or physical, mental or moral degeneracy in an individual. These abnormalities have been classified by Peterson as belonging to (1) motor functions; (2) sensory functions; (3) speech; (4) genitro-urinary function; (5) in¬ stinct or appetite; (6) diminished resistence to diseases and external influences; (7) delayed development of puberty.

Under the head of psychical stigmata are classified all kinds of irregular functions of the mind from simple feeble-mindedness, eccentric¬ ity, moral delinquency and sexual perversion to idiocy and embecility. In this section stigmata have been divided and subdivided by scientists and specialists into a large number of classes and a vast number of interesting and important experiments have been made to show the rela¬ tion of each separate abnormality to the normal individual. Frederick Peterson, an authority on the subject of deformities, for example, found only 10 per cent of abnormal palates among persons apparently otherwise normal and 40 per cent among feeble-minded persons. An¬ other investigator found 35 per cent of abnor¬ mal palates among people subjected to general paralysis ; 70 per cent among hysterical insane ; 76 per cent in epileptics; 80 per cent among hopelessly insane; and 82 per cent among idiots. But apparently the investigations did not show whether the diseases were affected by the abnor¬ malities or the latter the direct or indirect re¬ sult of the diseases. See Eugenics; Heredity; Psychology of the Abnormal.

Bibliography. — Beaunis, (Recherches) (Paris 1886) ; Bourbeyre, (Les Stigmatisees> (Paris 1886) ; Dublin Review (1871, p. 170) ; Ennemoser, (Der Magnetismus in Verhaltniss zur Religion1 (Stuttgart 1853) ; Franciscus Quaresmius, (De vulneribus domini1 (Venice 1652) ; Gorres, (Die christliche Mystik1 (Ratis- bon) ; Henriquez, (Menologium cistersiense1 ; Hueber, (Menologium Franciscanorum1 (1698) ; Hurter, (Tableau des institutions et des mceurs de l'eglise au moyen age1 (Paris 1842) ; Imbert-Goarbeyre, (Les Stigmatisees1 (1873) ; Marchese, (Sagro Diario1 ; Maury, (Magie et astrologie1 ; Meyer, (Blatter fur hohere Wahr- heit 1 ; Morel, (Traite des degenerescences1 (Paris 1857) ; Nordau, Max, (Degeneration1 (New York 1895) ; Peterson, (The Stigmata of Degeneration1 (in State Hospitals Bulletin, Utica, N. Y., July 1896) ; Petrus de Alva y Astorga, (Prodigium naturae polrtentium gra¬ tis1 (Strassburg 1664) ; Ra'ymond, ˆpera1 (Vol. 13, Lyons 1665) ; Sehmieder (in Evan-

?l7CS?hecKifiChellZeitUngˆ (PP‘ 1§3’. 345> Berlil1

/ t -ii - ’ ˆeill, Wphemerides dominicano sacrae)

(Dillingen 1692) ; Thiepolus, (De passione

Christi* ; Thorluck, (Vermischte Schriften)

(Hamburg 1839).

STIGMATIZATION, derived from the Greek word stigma, a puncture, the name ap¬ plied by Roman Catholic writers to the im¬ pression on certain individuals of the ((stig- mataC or marks of the wounds which Christ suffered during the course of His Passion. In the early days many Christians branded the name of Christ on their foreheads, and various voluntary mutilations for Christ’s sake were practised by enthusiasts. The stigmata comprise not only the wounds of the hands and feet, and that of the side, received in the crucifixion, but also those impressed by the crown of thorns and by the scourging. The most remarkable example of stigmatization is that narrated of Saint Francis of Assisi and occurring in 1224, on the mountain of Alverno. Being absorbed in rapturous contemplation of the Passion of Christ, he saw a seraph with six shining wings, blazing with fire, and having between his wings the figure of a man crucified, descend from heaven and approach him, so as to be almost in contact. After a time the vision disappeared, leaving the soul of Francis filled with reverence and awe. And now he became aware that in hands, feet and side he had received externally the marks of cruicifixion. These mysterious marks continued during the two years until his death, and are declared by the saint’s biograph¬ ers to have been seen by many eye-witnesses, including Pope Alexander IV.

The Dominicans openly disputed the fact, but at length made the same claim for Catharine of Sienna, whose stigmata were explained as at her own request made invisible to others. The Franciscans appealed to Sixtus IV, and that pope, himself a Franciscan, forbade representa¬ tions of Saint Catherine to be made with the stigmata. Still the fact is recorded in the breviary office, and Benedict XI I'l granted the Dominicans a special feast in commemoration of it. Many others, especially women, are enumerated as having received all or some of the stigmata. Among these is Saint Veronica Giuliani, who is said to have received in 1694 first the marks of the crown of thorns, and

afterward those of the crucifixion. More re¬ cent cases are those of Anna Katherina Em¬ merich (1774-1824), who became a nun at Ag- netenberg; ˆL'Ecstatica® Maria von Mori of Caldaro (1839) ; Louis Lateau (1850-83, in 1868), whose stigmata were stated to bleed every Friday; and Mrs. Girling (1827-86, about Christmas 1864), of the New Forest Shaker community. Dr. Imbert-Gourbeyre, in his work <Les Stigmatisees) (1873), enumerates 145 persons, of whom but 20 were men, as hav¬ ing received the stigmata, and of these 80 lived before the 17th century. By 1894 he had col¬ lected 321 examples of stigmatization. Apart altogether from the question of the value of the evidence offered, we may reasonably conclude that some kind of stigmatization is a pathologi¬ cal condition of occasional occurrence. The Roman Catholic Church is extremely cautious in giving credence to cases of stigmatization as genuinely supernatural and Theodor Schwann, a professed Catholic professor at Louvain and

a noted biologist, who carefully looked into the subject, refused to admit for stigmatization other than a perfectly natural character. See Stigmata.

STIKINE, stik-en, STAKHIN, a Tlingit

tribe of the Koluschan linguistic stock of North American Indians, about the mouth of Stikine River, southern coast of Alaska. They are divided into the Wolf and the Raven clans. In 1880 they numbered 317 in eight villages, but by 1890 they had diminished to 255.

STILBENE DYESTUFFS. See Coal-

tar Colors.

STILBITE, one of the commonest of the zeolite family of minerals. Though crystal¬ lizing in the monoclinic system, its crystals simulate rhombic forms on account of their twinning which is uniformly present and which is revealed by polarized light under the micros¬ cope by the division into sectors whose extinc¬ tion angles are 10°. These twin crystals are often grouped into the curious sheaf-like bundles so characteristic of the species. Clino- pinacoidal cleavage is perfect; fracture uneven; brittle; hardness 3.5 to 4; specific gravity 2.2; lustre vitreous, pearly on the clinopinacoid ; color usually white or yellowish, though not infrequently brownish to brick-red; transparent or translucent. Essentially a hydrous silicate of aluminum and calcium, generally with a little soda. Jlefore the blowpipe it acts like scole- cite (q.v.). It mostly occurs in cavities in trap rocks. Many localities have yielded fine speci¬ mens, among the most important being Poona,

India; Iceland; Faroe Islands; Nova Scotia; Paterson and Upper Montclair in New Jersey. Sphaero-stilbite and puflerite are globular varieties.

STILES, stilz, Charles Wardell, American zoologist: b. Spring Valley, N. Y., 15 May 1867. He was educated at Wesleyan University, Conn., 1885-86; College de France, 1886-87 ; Berlin University, 1887-89 ; Leipzig University, 1889-90; Trieste Zoological station, 1891; Pas¬ teur Institute and College de France, 1891. He was zoologist, 1891-1902, and has been consult¬ ing zoologist since 1902, in the bureau of animal industry, United States Department of Agri¬ culture. He has been professor of zoology in the United States Public Health Service since August 1902; professor of medical zoology at Georgetown University 1892-06; at Johns Hopkins University since 1897 ; and United States Navy Medical School since 1902; and was a special lecturer on that subject at the Army Medical School, 1894-1902 ; scientific sec¬ retary of Rockefeller Sanitary Commission, 1909-14. He has held other offices as consultant with national and private scientific institutions, has represented the United States government at several International Zoological Congresses, and was detailed as agricultural and scientific attache to the United States Embassy, Berlin, 1898-99; secretary of International Commission on zoological nomenclature since 1896. His publications, chiefly on medical zoology and sanitation include (A Revision of the Adult Cestodes of Cattle, Sheep and Allied Animals) (1893) ; (Tapeworms of Poultry > (1896) ; (In- ternal Parasites of the Fur SeaP (1899) ; (The Cattle Ticks of the United States) (1902) ; (Report on Hook Worm Disease in the United States) (1903); (Index-Catalog of Medical and

Veterinary Zoology,* 7 vols., etc. Outside of scientific circles he is known chiefly because of his medical studies among the tenant whites of the South, upon the medical side of the negro problem and child labor, and because of his con¬ nection with the hookworm problem.

STILES, Ezra, American clergyman and college president: b. North Haven, Conn., 15 Dec. 1725; d. New Haven, Conn., 12 May 1795. He was graduated from Yale in 1746, and was a tutor there 1749-55. Dr. Franklin having sent an electrical apparatus to Yale, Stiles entered with great zeal upon this then new field of philosophical investigation,

and performed the first electrical experiments ever made in New England. At the time he was pursuing the study of theology, was licensed, and commenced his ecclesiastical work in June 1749. In April 1750 he visited the Housatonic tribe of Indians at Stockbridge. He then studied law, in 1753 was admitted to the bar, and practised at New Haven for the two following years. In 1775 he became pastor of the Second Church in New¬ port, R. I., and during his residence there found time for literary and scientific investigations, corresponding with learned men in almost every part of the world. His congregation at New¬ port being entirely broken up by the British occupation of the place, in May 1777 he re¬ moved to Portsmouth, N. H., to become pastor of the North Church. In September following he was elected president of Yale and shortly after professor of ecclesiastical history in con¬ nection with the presidency; and in June 1778 he entered on his official duties. After 1780 he discharged the office of professor of divinity. His labors for the college were intense and uninterrupted during the rest of his life. He was widely learned, being particularly versed in the Oriental languages. He published a funeral oration in Latin on Governor Law (1751) ; a Latin oration on his induction to his office as president (1778); an (Account of the Settlement of BristoP (1785) ; (History of Three of the Judges of Charles P (1795). His (Literary Diary *in 45 volumes, was edited and published by F. B. Denter in 1901. His life has been written by J. L. Kingsley (in Sparks' (American Biography,* first series, Vol. VI, 1845), and by Abil Holmes (Boston 1798).

STILETTO, a knife or dagger with a round pointed blade from 6 to 12 inches long, common in the Middle Ages.

STILICHO, stil'i-ko, Flavius, Roman gen¬ eral : b. of Vandal origin about 359 a.d. ; d. Ravenna, 23 Aug. 408. In 384 a.d. he was sent by the Emperor Theodosius on an important mission to Persia where he arranged a peace that was very advantageous to his sovereign and on his return in 384 was made commander- in-chief of the Roman army and given the hand of Serena, the niece of Theodosius, in marriage and with it several high titles and flattering of¬ ficial notice and the following year he was made commander-in-chief of the army in Thrace where he directed the war against the Piets, Scots, Saxons and the barbarians on the Hebrus. In 392 he carried on a very successful campaign against the Bostarnae. Goths, Alani and Huns. In 394 Theodosius appointed Stilicho guardian of his son Honorius whom he had raised to the dignity of Augustus with

sovereignty over Africa, Gaul, Italy and Spain. But as the young man took little interest in affairs of state, this made Stilicho practical ruler

of the Western Empire, which he defended against the invasion of the Goths under Rufinus, the guardian of the Empire of the East. He again repulsed the Germanic hordes in 406, and was the loyal servant of the empire in its foreign wars, defeating Alaric at Pollentia. He was accused of aiding Alaric in his encroachments upon the empire previous to its final conquest, and was obliged to flee from Rome. On the charge of high treason he was taken from the church at Ravenna which had given him shelter and executed. He was accused of plotting to put his own son upon the throne ; which, it would seem, he came very near accomplishing. His distinguished services in behalf of Rome were commemorated by the poet Claudius. Consult Gibbon, (Decline and Fall of Rome) ; Hodgkins, T., (Italy and her Invaders1* (Oxford 1880) ; Villari, P., (The Barbarian Invasions of Italy * (New York

1902).

STILL, Andrew Taylor, discoverer and

founder of osteopathy: b. near Jonesboro, Va., 6 Aug. 1828; d. 12 Dec. 1917. With his father, Abram, Methodist minister and doctor, he re¬ moved to Tennessee, and at the age of nine to Missouri. At 19 he married Mary M. Vaughn and in 1853 they removed to Kansas, where Mrs. Still died in 1859. He farmed, studied medicine in Kansas City and practised among the pioneers and Indians with his father who had followed him. He fought with John Brown in the border warfare ; was elected to the legislature in 1857 ; was one of the founders of Baker University at Baldwin, Kan. In 1860 he married Mary E. Turner, who lived until 1910. In the Civil War he served in the cavalry and afterward became captain and then major in the 21st Kansas Volunteers which saw considerable service. Ever a student of nature, he decided that the God who made man had placed in the body everything necessary for health, without the use of drugs. He studied the anatomy of the animals he skinned, and dissected many an Indian body in his search for truth. The war interrupted his investiga¬ tions, but when three of his children died of spinal meningitis in 1864 he attacked the problem anew. In 1874 he announced the science of osteopathy (q.v.). For many years he waged a battle for recognition. For a while he practised as an itinerant doctor in Missouri, at times accompanied by one or more of his sons, and performed wonderful cures with his new science. In 1887 he settled in Kirksville, Mo., which had really been his home since 1875, and developed a large practice.

In November 1892, he opened the American School of Osteopathy, at Kirksville, which now gives a four-year course, and whose clinics and

hospital draw patients from all over the United States as well as from Canada. Among his writings are (Autobiography) (1897 and 1908); (Philosophy and Mechanical Principles of Osteopathy* (1902) ; (Osteopathy, Practise and Research (1910).

Ray G. Hulburt,

Associate Editor, Journal of Osteopathy.

STILL, John, English ecclesiastic: b. Grantham, Lincolnshire, about 1543; d. Wells,

26 beb. 1608. He was graduated from Christ's College, Cambridge, of which he was elected a Fellow, and took orders. In 1570 he be¬ came Margaret preacher and Margaret pro¬ fessor of divinity in the university. The next year he obtained the rectory of Hadleigh, Suf¬ folk, and in 1572 became, with Dr. Thomas Watts, joint dean of Booking, at the same time being appointed chaplain to the primate. In

1573 he was made vicar of East Markham and canon of Westminster, whereupon he resigned his Cambridge professorship. He was then promoted to be dean of Norwich and in July

1574 was elected master of Saint John's College, Cambridge. Having acted as vice-chancellor in 1575, he was in May 1577, transferred to the mastership of Trinity. In 1592 he was again elected vice-chancellor and was called upon to provide an English comedy for the queen's amusement. In 1593 he was consecrated bishop of Bath and Wells. The supposition that he was the author of (Gammer Gurton's Needle) (q.v.) is highly probable. In 1575 the play published under the following title: (A Ryght Pythy, Pleasant, and Merie Comedie : Intytuld Gammer Gurton's Needle: Played on Stage not long ago in Christes Colledge in Cam¬ bridge. Made by Mr. S., Master of Art,* and this Mr. S. can be identified with no one so naturally as with the vice-chancellor, Dr. Still, of the time. (See Gammer Gurton's Needle). Consult Dodsley, (01d Plays) (London 1874—

76).

STILL, William, American philanthropist: b. Shamony, N. J., 7 Oct. 1821 ; d. 1902. He was of African descent; and became chairman and corresponding secretary of the Philadelphia branch of the

Underground Railroad, 1851-61. Previous to this he had been a clerk in the Pennsylvania Anti-slavery Society from 1847. During the Civil War he was post-sutler at Camp William Penn for colored troops. He was very active in all movements to help colored people and was member of numerous societies organized to that end. He sheltered the wife, daughter and sons of John Brown while he was awaiting execution in Virginia. He pub¬ lished (The Underground Railroad) ; (Voting and Laboring) ; < Struggle for the Rights of the Colored People of Philadelphia.

STILL. See Distillation.

STILL-LIFE, a branch of the art of painting which deals with the portrayal of life¬ less objects. It is called in Germany, Still Leben; in Holland, stilleven; in France, nature morte; in Italy, riposo. The subjects generally chosen are dead animals — deer, birds or fish, kitchen and table utensils, plate, crockery or china, fruit, flowers, curios and jewelry. These objects are arranged so as to make a picturesque combination of color, light and shade. This branch of art flourished from the earliest days of color decoration, and was at its highest perfection during the Alexandrian age ; the paintings at Pompeii and the Roman mosaics furnish many fine examples of it. The Renaissance painters did not execute still-life as an independent department of their art, but early in the 17th century it was cultivated most elaborately and with the greatest success by the Dutch school. The taste, beauty, and exquisite virtuosity of their work have never been sur¬ passed, if ever even equaled. There are two

main styles of still-life painting. While some artists have endeavored, by a certain breadth and freedom of handling, to obtain a mere decorative effect by the introduction of brilliant metallic surfaces and the juxtaposition of rich color tones, others have aimed at minute and painfully elaborated compositions, fine and deli¬ cate as a miniature on parchment or ivory. The chief Dutch painters of still-life are J. Brueghel the elder, Snyders, Leghers, the de Heem family, A. van Beijeren, W. Kalf, Heda, W. van Aelit, Dou and Fyt. In the 19th cen¬ tury a great revival took place in this class of art. In France it was practised successfully by Robie, Vollon, and Ph. Rousseau; in Germany by Preyer of Diisseldorf ; Hoquet of Berlin; P. Meyerheim, Hertel, Th. and R. Gronland, and by the woman painters Begas-Parmentier, H. von Preuschen, Hormuth-Kallmorgan, and Hedinger. The still-life of flowers and fruit is generally most successfully accomplished in water colors. The ancient Greek painter Pausias was especially skilful in the repre¬ sentation of flowers, while of another an¬ cient artist it is said that the birds flew down and picked at his picture of fruit. Among the

American painters who have been successful in depicting still-life are W. M. Chase, E. Carlsen and W. Lockwood.

STILLS, Alfred, American physician : b. Philadelphia, Pa., 30 Oct. 1813 ; d. there, 24 Sept. 1900. He studied at Yale University in 1828-30, was graduated at the University of Pennsylvania in 1832 and took his M.D. there in 1836. He studied in Paris and Vienna sub¬ sequently at different times after engaging in practice in Philadelphia. He was resident phy¬ sician at the Pennsylvania Hospital in 1839-41 ; professor of the theory and practice of medi¬ cine at the Pennsylvania Medical College in 1854-59, and at the University of Pennsylvania in 1864—84, afterward being professor emeritus there. He was lecturer on clinical medicine at the Philadelphia Hospital in 1865-71. He was one of the founders of the American Medical Association and became its first secretary, serv¬ ing as president in 1867. He was one of the first to distinguish typhus from typhoid fever, and attained high rank in his profession both as practitioner and as teacher. Author of (Medi- cal Instruction in the United States) (1845) ; (Therapeutics and Materia Medica) (2 vols., 1860) ; (Epidemic Meningitis) (1867), etc. He was joint editor of the National Dispensatory

(1879).

STILLE, stil'e, Charles Janeway, Ameri¬ can educator and historian : b. Philadelphia, Pa., 23 Sept. 1819; d. 11 Aug. 1899. He* was grad¬ uated from Yale in 1839 and was admitted to the bar, but abandoned law for literature. In the Civil War he was a member of the LTnited States Sanitary Commission, and in 1866 was made professor of history and English literature in the University of Pennsylvania. He was provost there (1868-80). He published (Historical Development of American Civiliza¬ tion ; (History of the United States Sanitary Commission) (1866) ; Studies in Mediaeval His¬ tory } (1882) ; (Bcaumarchias and the Lost Mil- ton J (1886).

STILLINGFLEET, Edward, Anglican bishop: b. Cranborne, Dorset, 17 April 1635; d. Westminster, 28 March 1699. He was gradu-

ated at Saint John's College, Cambridge, in 1652 and was elected to a fellowship there in 1653. He was appointed chaplain to Charles II in 1668, dean of Saint Paul's in 1678 and be¬ came bishop of Worcester in 1689. He was famous for his profound learning, his liberal views

and for his untiring efforts to effect a satisfactory compromise between Episcopacy and Presbyterianism. He was brilliant as both a preacher and a writer, and in his lifetime ex¬ erted a wide influence. Author of ‘IrenicunP (1659) ; (0rigines Sacrse, or a Rational Account of the Christian Faith as to the Truth and Divine Authority of the Scriptures *(1662) ; ‘Origines Britannicae, or Antiquities of the British Church* (1685), etc. His collected works were published (6 vols., London 1710).

STILLMAN, Samuel, American Baptist clergyman: b. Philadelphia, Pa., 18 March 1738; d. Boston, Mass., 12 March 1807. He was or¬ dained in the Baptist ministry in 1759, and in 1765 became pastor of the First Baptist Church, Boston, which pulpit he occupied for more than 40 years. He was among the most influential preachers of his day in New England. He was one of the original ’trustees of Brown University, and was a member of the conven¬ tion that ratified the United States Constitution in 1788. Author of (A Sermon on the Repeal of the Stamp Act> (1766) ; ‘Thoughts on the French Revolution (1794) ; ‘A Sermon Oc¬ casioned by the Death of George Washington* (1799), etc.

STILLMAN, stfl'man, Thomas Bliss,

American chemical engineer : b. Plainfield, N. J., 24 May 1852; d. 1915. He was graduated from Rutgers College in 1873 and went to Ger¬ many to study engineering and analytical chem¬ istry. Returning to the United States he was appointed instructor of analytical chemistry at Stevens Institute (1874-76), and was professor there 1881-86. In 1884 he was state oil in¬ spector for New Jersey. He was .editor of the ‘Stevens Institute Indicator * (1895-98) and has published ‘The Rutgers Scarlet Letter* (1873) ; ‘Engineering Chemistry * (1897) ; ‘Examination of Lubricating Oils } (1914).

.STILLMAN, William James, American author: b. Schenectady, N. Y., 1 June 1828; d. Surrey, England, 6 July 1901. After graduation from Union College (1848) he studied land¬ scape art with F. E. Church, and in 1849 went to England to continue his art-work. He adopted the views of Rossetti and Millais, whence he was styled “the American Pre- Raphaelite.® On return to the United States he began exhibiting at the Academy of Design, of which in 1854 he was made an associate. In 1852 he went for Louis Kossuth to Hungary to secure the crown-jewels which had been secreted by Kossuth at some point on the Danube. After some further study with Yvon at Paris, he came back to found with John Durand, the Crayon, a magazine of art criticism, which continued two years (1855-57). In 1859 he was again in England and in 1861-65 was United States consul at Rome, and in

1865-69 he held a similar post in Crete. Having abandoned art, owing to failing eyesight, he was a special correspondent for the Times of London from 1878 to 1898, traveling widely about the continent, and being from 1886 cor¬ respondent for Italy and Greece. In 1883-85

he contributed critical papers on art subjects to the New York Evening Post. An expert photog¬ rapher, he was at one time associate editor of the Photographic Times. He made for the Hellenic Society of London a valuable series of photographs of the Acropolis at Athens, and published (1872-73) two manuals of photog¬ raphy. As a journalist he wrote much on many subjects, chiefly art, history and politics, and gained a considerable reputation. His best picture is ‘The Procession of the Pines) (1858). Among his published volumes are: ‘History of the Cretan Insurrection (1874); ‘Herzegovina and the Late Uprising > (1877) ; ‘On the Track of Ulysses) (1887) ; ‘The Union of Italy) (1898) ; ‘The Old Rome and the New) (1898) ; ‘Francesco Crispi* (1899) ; and an interesting ‘ Autobiographv) (Boston 1901, first printed in the ‘Atlantic 1900).

STILLWATER, stilW'ter, Minn., city, county-seat of Washington County, on Saint Croix River, 30 miles from its junction with the Mississippi River, and on the Chicago, Milwaukee and Saint Paul, the Northern Pacific and the Chicago, Saint Paul, Minnesota and Ohio railroads, about 18 miles northeast of Saint Paul. It has steamer connections with the river ports and regular connection with Dubuque and Saint Louis. It was settled in 1840, and incorporated as a city in 1854. The Saint Croix River boom, through which pass each year about 300,000,000 feet of pine logs, is north of and near the city. Stillwater is in an agricultural region, and is extensively engaged in manufacturing. The chief industrial estab¬ lishments are flour and feed mills, grain elevators, lumber mills, foundries, machine shops, carriage and wagon works, and furniture factories. The city has a large trade in logs, lumber and lumber products, wheat, flour and livestock. It is the commercial and industrial centre of the Saint Croix lumber region in Minnesota and Wisconsin and has grain elevators, machine shops, foundries, forges, brickyards, boat and wagon factories. The edu¬ cational institutions are a high school, public and parish elementary schools, private business schools, two convents, the Minnesota State prison and the Carnegie library. The govern¬ ment is vested in a mayor and council of nine members, three of whom are elected each year. Stillwater was first located on the plain border¬ ing on Lake Saint Croix, with bluffs outside the settled portion. Now the old part of the city is given up to trade and manufacturing houses and the residential portion is on the bluffs. Pop. (1920) 7,735.

STILLWATER, Battles of. See Sara¬ toga, Battles of.

STILLWELL, Lewis Buckley, American electrical engineer : b. Scranton, Pa., 12 March 1863. He was educated at the Wesleyan and Lehigh universities, and in 1886 established himself in New York as a consulting electrical engineer. He was chief engineer of the West- inghouse Electrical Company in 1891-97 ; elec¬ trical director of the Niagara Falls Power Company in 1891-1900; of the Rapid Transit Subway Construction Company in 1900-08, and consulting electrical engineer to the Manhattan Railroad Company in 1900-04, and to the Hud¬ son Company from 1904. He was president of

the American Institute of Electrical Engineers in 1909-10.

STILT, or FROST-BIRD. See Sand¬ piper.

STILTED ARCH, in architecture, an arch which does not spring immediately from the imposts, but from a vertical piece of masonry resting on them, so as to give the arch an appearance <of being on stilts. Arches of this kind occur frequently in all the mediaeval styles.

STILTS, wooden poles with steps or foot supports at a sufficient distance from the ground to allow a person standing on the steps to walk with long strides. Stilts are very use¬ ful in marsh lands and were formerly very pop¬ ular in the French Landes. In various Euro¬ pean countries stilts are used by the peas¬ ants for crossing streams.

STIMSON, Frederic Jesup, American lawyer and author, known also by the pen- name “J. S. of Dale” : b. Dedham, Mass., 20 July 1855. Graduated from Harvard in 1876 and from the law school of the institution in 1878, he entered practice in Massachusetts and was assistant attorney-general of that State in 1884-85. He was secretary to the National Conference on the uniformity of law in 1892; was made counsel to the United States Indus¬ trial Commission, and lectured at Harvard on legislation. He published ‘Stimson’s Law Glos- sary) ; ‘American Statute Law’ ; (Handbook to the Labor Law of the United States’ (1896) ; (Labor in its Relation to Law’ (1896) ; and in fiction, among several other works, ‘Guern- dale) (1882) ; (The Crime of Henry Vane) (1883) ; (The Residuary Legatee) (1887) ; ‘First Harvest’ (1889) ; ‘King Noanett’ (1896); ‘Jethro Bacon of Sandwich) (1901); ‘In Cure of her SouP (1906) ; ‘The American Constitution (Lowell Institute Lecture, 1906) ; ‘The Law of the Constitutions, State

and Federal' (1907) ; (Popular Law-making) (1910) ; 'The Light of Provence) (poem- play) ; 'My Story: An Imagined autobiography of Benedict Arnold) (1917).

STIMSON, Henry Albert, American Con¬ gregational clergyman: b. New York, 28 Sept. 1842. He was graduated from Yale in 1865, and studied in the Union and the Andover The¬ ological seminaries. He has held pastorates in several American cities including New York; is a lecturer at the Chicago Theological Semi¬ nary; and has published 'Religion and Busi- ness) (1894) ; (Questions of Modern Inquiry' (1894) ; 'The Apostles' Creed) (1899) ; (The Right Life' (1905) ; (The New Things .of God) (1908) ; (Behind the World and Beyond' (1910); (While the War Raged' (1914); and many articles in magazines and newspapers. Was recording secretary of the American Board of Commissioners for Foreign Missions (1881-1915) ; vice-president, American Mission¬ ary Association and American Tract Society ; director of Seaman's Friend Society and Ameri¬ can Bible Society; president of Board of Visit¬ ors, Andover Theological Seminary; trustee of Carleton College, Drury College and Mount Holyoke College; director, Chicago Theologi¬ cal Seminary and Hartford Theological Semi¬ nary; president. Congregational Board of Mini¬ sterial Relief ; president . of Congregational

Annuity Fund for Ministers ; vice-president, Congregational Church Extension Society ; and president of Congregational Church Building Society. Has degrees of M.A., and S.T.D., from Yale and D.D., from Ripon.

STIMSON, Henry Lewis, American law¬ yer and cabinet officer: b. New York, 21 Sept. 1867. He was graduated at Yale University in 1888, at Harvard in 1889 and at the Harvard Law School in 1890. He was admitted to the bar in 1891 and engaged in practice in New York. He became a member of the law firm of Root and Clarke in 1893, of Root, Howard, Winthrop and Stimson in 1897 and of Winthrop and Stimson in 1901. He was United States district attorney for the southern district of New York in 1906-09; unsuccessful candidate for governor of New York in 1910, and in 1911— 13 he was Secretary of War under President Taft. He was a delegate to the New York State Constitutional Convention in 1915.

STIMSON, John Ward, American artist : b. Paterson, N. j., 16 Dec. 1850. He was graduated from Yale in 1872, and from Ecole des Beaux Arts, Paris. He became lecturer and art teacher at Princeton University, and was for four years director of the art schools of the Metropolitan Museum of Art, New York. He founded the Artist-Artisan

Insti¬ tute, New York, 1888, and later became di¬ rector of the Art and Science Institution, Tren¬ ton, N. J. He is a brother of Henry Albert and Lewis Atterbury Stimson. He is a pop¬ ular lecturer on art, and has published 'The Law of Three Primaries' ; Principles of Vital Art Education' ; (The Gate Beautiful' ; and 'Wandering Chords.'

STIMSON, Lewis Atterbury, American surgeon: b. Paterson, N. J., 1844; d. 17 Sept. 1917. He was graduated from Yale University in 1863 and received the degree of M.D., from the same institution in 1874. He served as cap¬ tain in the Union army during the Civil War. In 1893 he was a Regent of the University of the State of New York, and later was professor of surgery in Cornell University. He published : 'Operative Surgery' (1900) ; 'Fractures and Dislocations' (1900).

STIMULANTS, agents which temporarily increase the vital activities, either in particular organs and functions or in the whole physical organism. They are among the most valuable and important of medicines, and perhaps are more often the direct means of saving life than any others. But as they are powerful, their in¬ jurious effects, when misapplied, have been even more prejudicial to mankind than their best use has been beneficial. In fact it may be said that the abuse of this class of medicines, under the names of cardiacs, cordials, alexipharmics, etc., caused more deaths during the dark ages of medicine than did sword and pestilence united. The dreadful mortality of smallpox and fevers during the Middle Ages, and even as far down as the earlier parts of the 19th century, was mainly owing to the administra¬ tion of heating stimulants, the tendency of which was to increase the violence of the dis¬ ease, although they were intended merely to expel noxious and poisonous humors. But by a more cautious use of these articles they are the means of preserving life, Stimulants are

either simple and direct in their operation, as the external application of heat in all forms, dry and moist, by friction, etc. ; the applica¬ tion to the stomach of hot liquors, spices, cam¬ phor, hartshorn, warm and aromatic gums and oils, as mint, cardamon, cajeput, ginger, asa-foetida, red pepper, spirits of turpentine, etc. ; or they act first as stimulants, but produce af¬ terward effects of a different character, as is the case with wine, brandy and spirits of all sorts; opium, ammonia, ethers, etc., all of which are highly stimulant at first, and in small quantity, but afterward, and when taken in larger doses, produce

exhaustion, debility, sleep and death. The first class are upon the whole the safer, and should always be used in preference to the last when they can be had, in cases of suspended animation from cold, drowning, suffocation, etc. ; while the others are more valuable for their secondary and re¬ mote effects, by means of which they ease pain, and relieve spasm and other affections ; and for these purposes they should be used freely, as they can do no hurt while the violence of the disease persists. But they should never be resorted to unless pain is urgent, or debility become so great as to endanger life.

STINDE, stin'de, Julius, German humor¬ ist: b. Kirch-Niichel, in the eastern part of the province of Holstein, 28 Aug. 1841 ; d. Olsberg (bei Kassel), Westphalia, 7 Aug. 1905. He attended the gymnasium at Eutin, near his native village, became an apothecary in 1858, and then attended the universities of Kiel, Giessen and Jena to study chemistry. For several years he served (1863-66) as a chemist attached to factories, but made simultaneous attempts to enter journalism. From 1864 to 1868 he was editor of the Hamburger Gewerbe- blatt, from 1865 to 1875 of the Reform. He resided in Berlin after 1876. His stories of Berlin life depict the commercial lower middle class of the large cities, especially in communi¬ ties that are expanding successfully. His most successful types are the members of the Buch- holz family, who, in their life at home, and in their travels in Italy and elsewhere, retain constantly the coarse but healthy humor that is characteristic of their class, with that certain Berlin or metropolitan superciliousness which is as unmistakable as it is unpleasant. So suc¬ cessful was Stinde's exploitation of their foi¬ bles, that he settled down to a sort of factory production, turning out nothing but repetitions of the same types, which never failed to yield the expected financial return. Among his best known stories are <Buchholzens in ItalieiF (1883; 54th ed., 1905) ; (Die Familie Buchholz) (3 vols. 1886 ; 87th ed. 1905) ; (Frau Buch- holz im Orient) (1889); (Frau Wilhelm Buch- holz' Memoiren) (1895); (Hotel Buchholz' (1897). His comedy on the same subject, (Bei Buchholzens) (1900), was not a success. Con¬ sult Cherbuliez, (Profils etrangers5 (Paris 1889) ; Meyer, R. M., (Die Ahnen der Familie Buchholz) (Berlin 1905).

Jacob Wittmer Hartmann.

STINESS, John Henry, American jurist: b. Providence, R. I., 9 Aug. 1840; d. 3 Sept. 1913. He graduated at Brown University in 1876; studied law, admitted to the Providence bar (1868) and practised law there until he was

appointed judge of the Supreme Court of Rhode Island, 1893. He was

a member of the Rhode Island House of Representatives (1874- 75), and Associate Justice (1875-1900); and Chief Justice of the Supreme Court of Rhode Island (1900-04) ; has written (History of Lotteries in Rhode Island *and (Liquor Legislation in Rhode Island* ; < Civil Changes in the Senate.*

STING, a weapon possessed by many plants and small animals, in various forms, employed to pierce and in most cases also to poison, the flesh of animals to be killed for food, or from which injury is received or expected. In plants this office is performed by stiff, sharp, hollow hairs emitting an acrid juice. (See Nettle.) Such stinging-hairs sometimes cause extreme irritation in the skin and mucous membranes of even the largest animals, and hence cause the plants to be avoided, thus protecting the species against harm. The simpler marine animals (Ccclenterates) are widely defended by sting¬ ing instruments, consisting of coiled poison¬ carrying threads which dart from microscopic capsules in the surfaces of the integument. (See Nematocysts; Jelly-fish). Insects are plentifully provided with piercing weapons. These in some cases are mouth-parts and in others are modified ovipositors. To the first class belong the sharp prolonged jaws, many plant-sucking bugs, or blood-sucking ones, such as the bed-bug, cone-nose (qq.v.) and others. In another group are found the gnats and mos¬ quitoes, which inflict pain upon large creatures and death upon minute ones by stabbing with their complicated beaks *which consist of a bundle of lancets and saws. (See Mosquito). Many caterpillars are - defended by nettle-like hairs, each of which is a specially modified spine and able to inflict so great annoyance that hairy caterpillars generally are studiously avoided by most animals. The <(sting,** prop¬ erly speaking, however, is found among in¬ sects only in the hymenoptera, as bees and wasps, where it is a modified ovipositor (q.v.). In wasps (q.v.) it serves a special purpose in paralyzing the insects stowed away alive with the. eggs in the nest cells. Spiders are said to <(sting,» but in reality they bite, in some cases, poison. Scorpions, however, possess what is properly enough termed a sting in the pointed telson or tail-piece appended to the extremity of the abdomen, with which a poison-infected puncture is inflicted (see Scorpion). Some fishes, as the . sticklebacks, surgeon-fish, and notably the sting-rays (q.v.), has certain de¬ fensive spines, by which highly irritating wounds may be inflicted. The use of the fangs by poisonous snakes, also is often spoken of as stinging.

STING-RAY, or STINGAREE, STIN- GOREE, a fish -ray of the family dasyatidce remarkable for the long, flexible, whip-like tail, which is armed near its root with an erectile spine or spines, very sharp at the point, and furnished along both edges with sharp cutting teeth. It

inflicts a painful, poisonous wound. In some of the numerous members of this family, two or even three spines are bundled together. In Great Britain the sting-ray is called the fire-flare, or sometimes fiery-flare. In the United States it is often called the clam-cracker. See* Ray,

SI INK-BUG, any of several small hete- roptenous plant-feeding bugs, allied to the squash-bugs, which emit a vile odor. The name is generally applied to the common squash- bug.

STINK-HORN FUNGUS. See Fungi.

STINK-POT, a malodorous kind of box- turtle (q.v.).

STINKING MAY-WEED. See Fennel.

STINKWOOD, a tree (Oreodaphne footida) of the family Lauracece, a native of the Cape of Good Hope, remarkable for the strong disagreeable smell of its wood, which, however, is hard, very durable, takes an ex¬ cellent polish and resembles walnut. It has been used in shipbuilding.

STINT. See Sandpiper.

STIPA, feather -grass ; an important genus of grasses (q.v.).

STIPEND, a payment at stated periods for services rendered, and generally used in con¬ nection with official or ecclesiastical salaries. It is not officially used, however, except in Scotland, where the provisions for the support of the parochial minister .of the established church is designated as a stipend.

STIPENDIARIES. See Mercenaries.

STIPPLE ENGRAVING. See Engrav¬ ings.

STIPULES, in botany , are organs con¬ nected with the leaves, existing only in the dico¬ tyledonous plants. They are small scale-like or leafy appendages at the point where the leaves come off from the stem, and are commonly in pairs, there being one on each side of the petiole, as in the hornbeam and lime. They are more frequently free, not being attached to the petiole ; but sometimes they are united to the base of that organ, as in the genus Kosa. The stipules afford excellent

characters for the ar¬ rangement of plants. When a vegetable of a natural order has these organs, it is very seldom the case that all the others are not equally pro¬ vided with them. Thus they exist in all plants of the natural orders Leguminosoe, Rosacece and Tiliacece. As they fall off very easily when they are free, their absence might sometimes induce one to suppose a plant destitute of them, but this error may be avoided by observing that they always leave on the stem, at the place where attached, a small cicatrix, which attests the fact of their having existed. They vary greatly in their nature and consistence. They may be foliaceous or leaf-like, as in the common agri¬ mony; membranous, as in the fig and magnolia; spinescent or thorny, as in the jujube and goose¬ berry. Some fall off before the leaves, as in the common fig and the lime ; others are merely deciduous, or fall at the same time as the leaves ; and there are others which continue for a longer or. shorter time after the leaves have fallen, as in the jujube and gooseberry. The use of the stipules appears to be to protect the leaves before their expansion, as is evidently shown by their relative disposition in the buds of some orders of plants. See Leaves.

STIRLING, Edward Charles, Australian

anthropologist: b. Strathalbyn, South Australia, 8 Sept. 1848. He was educated at Cambridge University and London where he graduated in

medicine. He became lecturer in London ; but returned to South Australia in 1881 as professor of physiology in the University of Adelaide, consulting physician at the city hospital and di¬ rector of the South Australian Museum. He was a member of the House of Assembly, 1883- 86. His published works include Anthropol¬ ogy of Central Australia) ; (The Horn Scien¬ tific Expedition } ; and a vast amount of scien¬ tific work contributed to journals and maga¬ zines.

STIRLING, James Hutchinson, Scottish philosopher: b. Glasgow, 22 June 1820; d. 1909. He was educated in arts and medicine in Glas¬ gow University, France and Germany; and practised as a surgeon in Wales for some years, but ultimately devoted himself to travel, study and literary and philosophical pursuits. He is the author of (The Secret of HegeP (1865) ; cSir Wm. Hamilton, being the Philosophy of Perception) (1865); (Jerrold, Tennyson, Ma¬ caulay and other Essays) (1868) ; (As Regards Protoplasm) (1869) ; (The Philosophy of Law) (1873) ; (Burns in Drama, together with Saved Leaves) (1878) ; (Text-book to Kant) (1881) ; (The Community of Property) (1885) ; Phi¬ losophy and Theology) (the Gifford Lectures, 1890) ; (Darwinianism, Workmen and Work) (1894); (What is Thought?) (1900); <The Categories) (1903) ; and translator of Schweg- ler's (History of Philosophy,) and Kant's (Critique of Pure Reason in his Text-book to Kant. } Consult Stirling, A. H., (James Hutch¬ inson Stirling) (London 1912).

STIRLING, John William, Canadian ocu¬ list, aurist and surgeon: b. Halifax, Nova Scotia, 2 July 1859. He was graduated in medi¬ cine at the University of Edinburgh in 1884 and later studied at the universities of Berlin and Vienna. He engaged in practice in Montreal in 1887 as an ophthalmological and aural sur¬ geon. Since 1906 he has been professor of ophthalmology at McGill University. He is also oculist and aurist to the Montreal General Hos¬ pital and surgeon oculist to the Royal Victoria Hospital. Author of numerous papers on ocu¬ lar diseases.

STIRLING, William Alexander, Earl of, Scottish poet and colonial proprietor : b. about 1567; d. London, 12 Sept. 1640. He was edu¬ cated. at Glasgow and in Germany. His trag¬ edy (Darius) was published in 1603, and was followed by three others, <Crcesus) ; (The Alex¬ andrian Tragedy,) and (Julius Caesar,) which were collected under the title, the (Monarchicke Tragedies,* in 1607. He also wrote a number of sonnets, but is best known as a recipient from James I of a grant bestowing upon him, under the name of Nova Scotia, the whole of the east¬ ern portion of Canada, and the patent of

sole printer for 31 years of King James' version of the Psalms. The conquests of France in Can¬ ada, however, deprived him of practically all of his grant. Consult Charles Rogers, Memo¬ rials of the Earl of Stirling and the House of Alexander) (1877).

STIRLING, Yates, American rear admiral: b. Baltimore, Md., 6 May 1843. He was gradu¬ ated at the United States Naval Academy in 1863, and in 1863-65 served on the Shenandoah in the North Atlantic blockading squadron, participating in both actions at Fort Fisher,

He was promoted commander in 1880, captain in 1894 and rear-admiral in 1902. He was com¬ mandant of the naval station at San Juan, Porto Rico, in 1900-02; of the navy yard in Puget Sound in 1902-03 ; commander of the Philippine squadron of the Asiatic fleet in 1903— 04, and of the cruiser squadron of that fleet in 1904, while in 1904-05 he was commander-in¬ chief of the Asiatic fleet. He was retired upon reaching the age limit in 1905.

STIRLING (formerly STRYVRLYNE or ESTRIVELIN), a river-port, city and county in Scotland: (1) county-seat of Stirlingshire, on the south side of the Forth, 29 miles northeast of Glasgow. It occupies a commanding site, Castle Hill, resembling its namesake at Edin¬ burgh. The castle is of great historical inter¬ est. It contains the rooms where Douglas re- ceive<j[a mortal stab from James II, who, as well as James V was born in this castle; and the Parliament-house, chapel-royal. The view from the battlements comprehends many of the lochs and fertile vales of Scotland, the winding river and the Grampian and Ochil hills, together with the ruins of Cambus-Kenneth Abbey and the Bridge of Allan. Within the town, Grey- friars Church, begun by James IV, museum, library, picture-gallery, several ancient mansions and monuments deserve notice. The manufac¬ tures of the town include: woolen, cotton and linen goods, carpets, leather, malt, soap, mineral oils, ropes and carriages. The salmon-fisheries are profitable. There is little trade. Pop. about 22,000. (2) Stirlingshire is a county of South

Scotland with an area of about 466 square miles. About one-third of the county is hilly, and rises in Ben Lomond to a height of about 3,000 feet. Here the Forth flows into the Firth of Forth, coming from Ben Lomond. The southeastern portion is traversed by the Forth-Clyde canal. The famous Loch Katrine forms one of the numerous lochs or lakes. The valleys and plains are exceedingly fertile and highly culti¬

vated. There are a few marshy lands. The country is rich in minerals, especially iron and coal. The chief industries in addition to those mentioned in connection with the city of Stir¬ ling are the working of the mines. The chief towns besides the capital are Falkirk, Grange¬ mouth and Kilsith. Consult (History of the Chapel Royal of Stirling > (published by the Grampian Club) ; and (The Charters of Stir- lin } (by same as above).

STIRLING'S PLANTATION ON BAYOU FORDOCHE, Engagement at. On

5 Sept. 1863, General Herron's division of the Thirteenth corps, General Banks' army, em¬ barked on transports at Carrollton, La., and sailed up the Mississippi to disperse a Confed¬ erate force under Gen. R. Taylor, which was then on the west side, below the mouth of Red River, seriously threatening the navigation of the river. Morgan's Bend was reached on the 7th, from which point, on the morning of the 8th, about 200 cavalry and a brigade of infan¬ try, under Col. H. M. Day, moved out on a reconnoissance toward the Atchafalaya River, and encountering the Confederate pickets, drove them across the Atchafalaya and then fell back three miles. On the 9th Day was joined by General Herron, with another brigade, and a second reconnaissance was made to the Atcha¬

falaya, where there was a smart skirmish, and Herron fell back to the river, with a loss of a few men killed and wounded. On the 12th the cavalry was again sent to the front to feel the enemy, and the 19th Iowa, 26th Indiana and two guns were sent out seven miles to the vicinity of Atchafalaya Bayou to picket the country and support the cavalry. All were under command of Lieut.-Col. J. B. Leake, of the 20th Iowa. Leake had a skirmish with the enemy and fell back to Stirling's Plantation, on Bayou Fordoche, about six miles from Mor- ganza, from which point he sent out parties daily, which skirmished with the Confederates. On the night of the 28th Gen. Thomas Green, with two brigades of Confederate infantry, one of cavalry and mounted infantry, and a battery, crossed the Atchafalaya, and by different routes reached the rear and flanks of Leake's com¬ mand, by marching through swamps and cane- brakes, and about noon of the 19th fell upon his unsuspecting camp. The cavalry was soon driven from the field, and managed to escape with small loss; the infantry made a gallant stand and fought desperately, but attacked on all sides, were soon overpowered and captured, with the two guns. Leake was severely wounded. The Union loss was 16 killed, 45 wounded and 454 missing or captured; the Con¬ federate loss, 26 killed, and 85 wounded. Con¬ sult Official Records) (Vol. XXVI).

STIRNER, ster'ner, Max, German phi¬ losopher, a pseudonym for Johann Kaspar Schmidt, b. Bayreuth, 25 Oct. 1806; d. Berlin, 26 June 1856. His reputation is based upon a single book, (Der Einzige und sein EigentunP (l£pl5, English tr. (The Ego and his Own,5 by S. T. Byington, London 1913). After complet¬ ing his gymnasium course in his native town (1819-26), he attended the University of Berlin (1826-28), where he heard lectures chiefly on philosophy and theology under Hegel, Schleier- macher, Neander, Marheineke and others. His next university was that of Erlangen (1828-29), which he left for that of Konigsberg, not at¬ tending any lectures at the latter institution, however, for ((family reasons,® the nature of which is not known, any more than the manner in which he distributed his time between Konigsberg and Kulm in East Prussia (the new home of his parents) in 1830-32. The year 1832-33 was again spent at the University of Berlin, after the completion of which he ap¬ plied for a certificate as a teacher in Prussian gymnasiums. He wrote two papers as part of the requirement for this position, one on Thucy¬ dides, the other on the School Laws, the latter showing considerable revolutionary spirit. He served as teacher in training (Probekandidat) without pay at the Berlin Konigliche Realschule for a year and a half, and married Agnes Burtz (1815-38), who (with her child) died in child¬ birth after a very short marriage. Stirner seems to have kept away from government in¬ stitutions after his first experience in teaching, and obtained a position in the Girls' School of Madame Gropius (later the Misses Zepp), in Berlin, which he held from 1839 to 1844. Little is known of his life, beyond the data given above. For several years after 1841 he was the most regular attendant at the meetings of an irregular organization known as <(Die Freien® (The Free), which met in Hippel's Weinstube

on Friedrichsstrasse and elsewhere, none of the other members of which attained much fame. A few occasional visitors to the place expressed themselves unfavorably as to its rather loose tone. Karl Marx, who was present once, never met Stirner, as the latter joined after Marx's departure. Stirner married, as his second wife (21 Oct. 1843), Marie Dahnhardt (1818-1898?), who after his death asserted that he had de¬ ceived and neglected her, and who probably had little understanding for his philosophical work. They separated in 1846, after which time Stir¬ ner led an irregular life in furnished rooms. The house in which he died (Berlin NW, Phil- ippstrasse 19) has been marked with a tablet since 1898.

Stirner's great work, (The Ego and His Own, *met with sensational success on its first publication (1845), but passed into a relative oblivion, and did not again attract attention until the superficially similar philosophy of Nietzsche began to be widely read (about 1895). It is a work in excellent aphoristic style, apparently an anarchistic attack on all human society, on co-operation and institutions of every kind, on the human race itself. Obed¬ ience to any form of authority is derided, re¬ spect for the traditions of the past scorned. The Ego is the supreme law, external obliga¬ tions and submissions to them are concessions to the (<spooks® with which the world is in¬ fested. Laugh at them, and they melt away. A careful reading will convince the reader, how¬ ever, that Stirner was not an anarchist, and that his propaganda was an attack on those ideological compulsions (church, state, mon¬ archy, etc.) that are not based on the real needs of humanity, and displays a considerable anal¬ ogy with the destructive portions of the social criticism of Karl Marx (whose (Deutsch-franzosische Jahrbiicher) the book quotes un¬ favorably), without any of the latter's construc¬ tive method. All of Stirner's other writings seem to have been chiefly general literary work: a translation of Adam Smith's (Wealth of Nations* (4 vols.), of the French economist Jean Baptiste Say's (Handbuch der praktischen politischen Okonomie *(4 vols.), and an orig¬ inal work: (Geschichte der Reaktion* (2 vols. 1852), which sketches the practices of the reac¬ tionary classes following the French Revolution as well as of the same classes in the German Revolution of 1848. Robert Giseke (1827-1890) published a novel, (Moderne Titanen) (Leipzig 1850), of which Stirner is the hero (under the name Horn). Consult Adler, M., (Wegweiser: Studien zur Geistesgeschichte) (Stuttgart 1914) ; Carus, P., (The Predecessor of Niet- zsche) (Chicago 1911) ; Mackay, J. H., (Max Stirner) (Berlin 1910) ; Messer, M., <Max Stir¬ ner *(Berlin 1907) ; Ruest, A., (Max Stirner) (Berlin 1906) ; Zoccoli, E., <1 gruppi anarchici degli Stati Uniti e l'opera di Max Stirner) (Modena 1901); Stirner, M., (Kleinere Schrif- ten,* ed. by J. H. Mackay (Berlin 1907).

Jacob Wittmer Hartmann, Assistant Professor of the German Language and Literature, College of the City of New York.

STIRRUP, an article of equestrian equip¬ ment with which the ancients were not ac¬ quainted. The Roman youth were accustomed to leap upon their horses sword or lance in

hand. Distinguished persons and old men had servants to place them on their horses, and conquered sovereigns were often compelled to perform this office for their vanquishers.

STITCH WORT, plants of the genus Al- sine, belonging to the pink

family, A. (Stel - laria) holostea, most properly bears the name. It is an Old World species, an erect, but low, hardy perennial, with slender stems and op¬ posite grass-like leaves, which are sessile and usually glabrous. The flowers are five-merous, the petals deeply cleft, and are showy, being three-fourths of an inch wide and very numer¬ ous. They are gathered in leafy panicles and fairly cover the plants with bloom. For this reason stitchwort is cultivated as a border plant. It was reputed to be a cure for a ((stitch in the side® and even for snake-bites. It has many other names, as shirt-buttons, all¬ bone and snap-jack, the latter referring to its brittle nodes.

STITH, William, American colonial his¬ torian: b. Virginia, 1689; d. Williamsburg, Va., 27 Sept. 1755. He studied theology, was or¬ dained in England to the ministry of the Es¬ tablished Church, was chaplain of the Virginia house of burgesses, and in 1752—55 rector of Henrico parish and president of William and Mary College. He published a (History of the First Discovery and Settlement of Virginia) (1747), which De Tocqueville criticised as <(long and diffuse,® but it is nevertheless a standard work on early Virginian history, and written with excellent scholarship. It was the only published instalment of an extended work planned by the author, and reaches as far as the dissolution of the London Company. It is pre¬ pared from the colonial archives, Sir John Randolph's papers, the (Records* of the London Company, and the Byrd library. It was re- edited and published with a biography in 1866.

STIVER, a former Dutch coin and money of account worth about two cents.

STOAT, <(The British name of the common European weasel.®

STOBZEUS, Johannes, Greek grammarian and critic: b. Stobi, Macedonia, of the latter half of the 5th century. For the education and improvement of his son Septimius, he compiled a florilegium of Greek literature, for which he drew upon aˆout 500 Greek poets, historians and philosophers. This has formed one of the most precious legacies which ancient scholarship has bequeathed to posterity. His works con¬ tain citations and quotations from many lost works and have been of immense assistance to modern Greek criticism. The original work was composed under the single title (Anthologion, *but the scholars of the Middle Ages divided it into two parts (Eclogae Physicae et Ethicae* and (Florilegium,* which were edited by Gaisford and published at Oxford, the former in 1825 ; the latter in 1850. There is a good edition of his works published by Wachsmuth and Hense (Berlin 1884-1909). Consult Christ-Schmid, (Geschichte der Grieschen

Literatur) (Munich

1913).

STOCK. See Batholith.

STOCK, a popular name for several species of cruciferous flowering plants long favorites in gardens. The Virginian stock (Malcomia maritima) is a hardy annual herb which grows

wild in the Mediterranean region. It is of simplest culture and will thrive well in cities without apparently impairing its beauty or fra¬ grance. The common autumnal queen, or Brompton stock (Matthiola incana) is a biennial or perennial semi-woody herb or sub-shrub, a native of the Mediterranean region and the Isle of Wight. The intermediate or ten-weeks stock (M . incana , var. annna) is considered by some botanists to be a distinct species, but except for its annual habit it differs little from the preced¬ ing and is, therefore, ranked as a variety. Both are known as gilliflower or gellyflower and are widely cultivated for their variously colored, deliciously fragrant flowers which in many varieties are double. The latter usually are sown very early and successionally so as to bloom during the early summer months; the former are planted somewhat later so as to continue the blossoming into the autumn. They are about as easy to grow as geraniums and re¬ quire fairly rich friable garden soil, good drain¬ age, but plenty of moisture, and clean cultiva¬ tion. There are about 30 other species, some of which are cultivated and several of which are fragrant only at night.

STOCK (Anglo-Saxon, stoce, post, trunk, stick) in law, represents the capital of cor¬ porations and is usually divided into shares of a definite value denoting the rights in the as¬ sets, profits and management of the company possessed by the members of the corporation or the persons contributing the capital. A cer¬ tificate of stock is a mere evidence that the person therein designated is entitled to an in¬ terest in the company, which is stated. Shares of stock may be of any value the company sees fit to set, and the par value may not, and in fact, generally is not the selling price of the stock. In the United States some States have a law requiring stock to be issued at its nar value. Stock may be divided into several classes, for example, as common and preferred; holders of the common stock have an equal

right in the company and its profits; holders of the pre¬ ferred stock are entitled to a preference over other shareholders but they are not creditors of the corporation. Dividends on stock repre¬ sent a division of the surplus or net profits aris¬ ing from the business of the company. Stock is considered as personal property and may be transferred at the will of the owner by proper assignment of the certificate. This is generally done by having the name of the purchaser of the stock placed legally upon the books of the company in the place of that of the seller. The purchaser o*f stock from a stock-owner should have his name entered at once on the books of the company to prevent fraud on the part of the seller who might have the name of some one else entered. This would stand good, in so far as the company was concerned. (See Stock¬ holder; Stock Exchange; Corporations). Con¬ sult Cook, (Treatise on the Law of Corpora- tions) (Chicago 1903) ; Dos Passos, (The Law of Stock Brokers and Stock Exchanges } (New York 1905). The capital stock of a company is the amount fixed by the charter of a corpora¬ tion as the sum already paid or to be paid into its treasury for use in the carrying on of its business operations. This does not include the actual property owned by the corporation or company.

STOCK BREEDING, the art of producing and rearing domestic animals, particularly those of greater agricultural value known as farm live stock, including cattle, horses, pigs, sheep and fowls. The successful practise of this art depends upon an intimate knowledge of the particular kind of stock to be bred and a familiarity with certain general principles ap¬ plicable to the breeding of stock of various kinds. The special knowledge of each kind of live stock can best be obtained by actual farm experience under skilled supervision but much useful information can be obtained from live stock manuals, which describe the breeds of farm animals and their management. To impart such information is also the aim of courses of instruction in animal husbandry and poultry management given in argicultural col¬ leges.

General Principles. — The discovery of gen¬ eral principles applicable in stock breeding is a work to which agricultural experiment stations are appropriately giving much attention. In¬ vestigators in universities and research insti¬ tutions have made important contributions in this field through their studies of variation and heredity. See article Genetics.

To propagate any kind of animal success¬ fully the breeder should know its life history thoroughly, under what climatic conditions it attains sexual maturity or becomes sexually active, what is its period

of gestation or in¬ cubation, at what age full size and productive¬ ness are attained, when senility begins, what are the best feeds arid how to prepare them, and other similar facts.

The successful breeder will employ all knowledge of this sort which he possesses in controlling and utilizing the activities of his animals to serve the purpose which he has in mind. What that purpose is will determine both the choice of foundation stock and his management of it. For example, breeding cattle for milk production, for butter making, for cheese making or for beef require in each case a different choice of foundation stock and different management of it.

The question of when and how man ac¬ quired domestic animals, while of little present practical concern, has much scientific interest. A complete answer to it might show whether domestication of other animals is likely to occur in the future and if so under what con¬ ditions. Its solution would also throw much light on the early history of man and the rise of civilization. Present knowledge indicates that man as distinct from other primates originated in Central Asia and at first utilized for food and clothing wild plants and wild animals, as the most primitive races of mankind still do. Later, plants began to be cultivated and animals kept and reared in captivity to insure more de¬ pendable supplies of food and clothing. In Asia man domesticated the dog, sheep, goats, the ass, cattle, horses and pigs. All of our more important farm animals originated with man in his old home, Central Asia, in a remote, prehistoric period. With man they were taken in migrations into Europe and Africa. The migration of man into America from Asia oc¬ curred undoubtedly at a very early period. The dog was the only domesticated animal that came with the emigrants from Asia to America. Pos-

1 Raleigh's Oxford Prince, A. J. C. C. 123167. Grand Champion Jersey Bull at the National Dairy Show, Columbus, Ohio, 1918. Bred, raised and exhibited by Edward C. Lasater, Falfurrias, Texas. 2 Great Scot's Champion, A. J. C. C. 203703. Grand Champion Cow at National Dairy Show, Chicago, 1911. Register of Merit, record 11,138.6 lbs. milk and 774 lbs. 4 ozs. of butter, in her 13th year. Owned by Edward C. Lasater, Falfurrias, Texas. 3 First Prize Breeders' Young Herd, at National Dairy Show, Columbus, Ohio, 1917, bred and exhibited by Edward C. Lasater, Falfurrias, Texas. This is the most coveted prize of any show; the herd consists of one bull, two yearling heifers and two heifer calves, all bred and exhibited by owner

sibly this migration occurred before other animals had as yet been domesticated, cer¬ tainly no others were brought over. A con¬ siderable degree of civilization was acquired by man in the American hemisphere quite inde¬ pendently of the development of civilization in the Old World, but all the many food plants cultivated here by the natives, as well as their few domestic animals (except the dog), were indigenous. The cultivated food plants of American origin include many of the world's best, such as maize and potatoes, but the domestic animals are of little consequence, in¬ cluding only the llama, alpaca and guinea-pig. That man in America developed so many good food plants but such unimportant domestic ani¬ mals shows that the available material in one case was excellent, but in the other case was poor. Conversely the pre-eminent success of man in central Asia in securing what are still our best domestic animals shows what paleon¬ tology confirms, that herbivorous animals suit¬ able for easy domestication were abundant in the early home of man and were in fact early domesticated. They have been much modified subsequently and many diverse breeds have been produced in consequence of the supervision which man exercised over their racial evolution. The study of breeds of domestic animals af¬ forded to Darwin some of the most convincing evidence for his theory of organic evolutionjpy descent with modification from simpler and less specialized ancestors. As compared with their wild ancestors, domestic animals have under¬ gone modification through the agency of selec¬ tion, sometimes exercised consciously and with the definite end in view of perpetuating new and useful variations, sometimes obtained incident¬ ally and without set purpose. Conscious selec¬ tion for breeding purposes of the most docile individuals and of those which were strong and vigorous has in general given to domestic ani¬ mals tameness and docility, making them easy of management. It has also given them early maturity which is usually accompanied with fecundity. Unconscious or natural selection would also favor variations toward early ma¬ turity and fecundity, since such variants in a mixed herd would naturally leave most off¬ spring. Indirect effects of increased tameness and gentleness are greater and more economical consumption of food and more ready fattening, with decline in intelligence unless specially selected for as in the case of the dog and the saddle horse. Products of special utility have by selection been greatly improved or intensified and thus breeds kept for special purposes have originated. Examples are seen in the great milk production of dairy cattle and milch goats, of wool production in

sheep and the alpaca, of meat production in pigs, mutton sheep and beef cattle. Under the guiding influence of selec¬ tion continued through untold centuries breeds of domestic animals have become machines of the greatest efficiency for the production in maximum quantity of a specialized product of supreme quality. No more convincing evidence can be produced of the effectiveness of selection in guiding evolution in useful directions than is afforded by a study of breeds of domestic animals.

Present Day Methods. — The method of the present day breeder is that of all his predeces-

sors who more or less consciously and intelli¬ gently have worked for the improvement of domestic animals. The method is to select in each generation and to rear offspring from those animals which are best suited to the special purpose for which the breed is kept, be it milk, meat, wool, work or what not. Thus breeds for special purposes are created and further improved. But the work of the animal breeder is less simple than this statement might seem to imply, since in the production of a new generation of animals two parents are involved, each of which influences the character of the offspring. Each selection of animals for propa¬ gation thus involves a double selection, selection of a sire and selection of a dam, and it is not sufficient that each be excellent for its kind. •The two must be compatible in the inherited traits which they transmit. Otherwise undesir¬ able combinations of characters may be ob¬ tained in the offspring, or a lack of the de¬ sired uniformity in different individuals.

The breeder's first principle of success is ac¬ cordingly (1) Select the best individuals to breed from. His second principle is (2) Mate each selected animal with one having compatible characters. This in general will mean the mat¬ ing of like with like, selecting mates only within . the same established breed or sub-breed. But here comes in a danger which must be avoided. If animals most like each other in inherited traits are mated together, brother will by mated with sister, or cousin with cousin. But age-long experience shows that such matings very often result in diminished vigor, size or fecundity and so the careful breeder is reluctant to resort to close inbreeding, and if he does so occasionally in order to secure or preserve some particularly desirable combination of characters, he takes special precautions to avoid enfeebling effects. The breeder's third principle is accordingly (3) Avoid close inbreeding. No one can tell in ad¬ vance to what extent inbreeding may safely be followed in a particular case. Miss

King, ex¬ perimenting with rats, has found it possible, by selecting in each generation only the most vigorous individuals to breed from, to continue mating brother with sister for more than 20 generations, without loss of vigor or fecundity in the race. On the other hand, rats inbred without such selection for vigor as was made by Miss King show marked loss of vigor and fecundity after 10 or 15 generations. He who resorts to inbreeding should do so with caution, keeping careful watch of the size and vigor of his race. Crossbreeding, i.e., the mating to¬ gether of unrelated individuals, or those of very different inherited characters, has an effect on vigor contrary to that of inbreeding. It in¬ creases size and vigor and induces rapid growth. This is an important principle utilized by animal breeders in meat production among cattle, sheep and pigs. Distinct breeds are crossed, such as short-horn and Angus cattle, or Berkshire and Duroc-Jersey pigs. The result is to produce an animal superior to either pure breed as regards rapid growth and early maturity. But this superiority persists for a single generation only, so that the production of a second generation from the vigorous cross-breeds is not to be recommended. Lack of uniformity both in vigor and in other characters is quite sure to occur in the second generation, though not in

the first. A fourth maxim for the breeder would be (4) Employ crossbreeding whenever practicable, to increase vigor, but do not go be¬ yond the first cross.

While the variable second crossbred genera¬ tion is of little use to the ordinary breeder, it may be of great value to the experimental breeder, who is engaged not in mere quantity production of a standard type of animal, as the ordinary breeder is, but in the attempt to pro¬ duce a new type of animal better suited for some special purpose than are existing types. The experimental breeder works by the method of crossing two breeds, each of which contains a different inherited character or set of charac¬ ters, which he desires to combine in one new race. Crossbreeding is the only method by which characters found in different races may • be combined in a single new race. Seldom is the desired combination secured in the first crossbred generation. More often it will only be found in a small percentage of the second generation crossbreds obtained by breeding first generation crossbreds with each other. Such animals of the second generation crossbreds as do present the desired corribination of charac¬ ters may now be mated with each other and a new race of the desired type may

thus be secured. But at first it is apt to be rather . variable and several additional generations of selection are usually required fully to establish the new type. The production of a new breed is thus a difficult and expensive undertaking and should be tried only by experts familiar with the method of inheritance of different characteristics.

The fundamental law of inheritance which underlies character recombination in new breeds, and to which also established breeds owe their uniformity, is known as Mendel's law (q.v.). This is the law of unit character in¬ heritance, in accordance with which the dif¬ ferent inherited characters are found to behave like independent units in transmission and so can be rearranged in new combinations. Each individual of an established breed of animals transmits a certain assemblage of inheritance units, which constitute the breed characteristics. So long as matings are made only within the breed all the progeny have these same inherited breed characteristics, such as black color and hornlessness in the case of Aberdeen-Angus cattle, red color and hornlessness in the case of Red Polled cattle, red color and horns in the case of Devon cattle, and white face and horns in the case of Hereford cattle.

But if we cross a breed ot black cattle with a breed of red cattle, the first generation off¬ spring will be black, the color unit black being stronger than the color unit red. We call black the dominant unit of the two, and red the re¬ cessive unit. But the black crossbreds have inherited red no less than black, even though they do not show it, and they will transmit it to half their progeny the alternative with black being transmitted to the other half of the progeny. Accordingly if a crossbred black bull is mated with red cows, we find that on the average half the calves are black in color and half are red. This comes about as follows : The crossbred bull transmits the black unit to half his calves. This unit meets a red unit transmitted by the red dam and dominates it producing a black calf. To the

remaining calves, half of the total, the bull transmits the red unit which meets a red unit transmitted by the red dam and thus produces a pure red combination. Such reds will breed true because they contain only the red unit. But the blacks which contain also a red unit will not breed true. Nevertheless true breeding blacks may be obtained even from crossbreds, by mating black with black. If the crossbred black bull were mated with pure black cows, half his calves would be pure blacks, viz., those to which he transmitted the black unit, for to all the calves in such matings the black dam would transmit the black unit. If the crossbred bull were mated with

crossbred cows, one- fourth of the calves would be pure blacks, two-fourths would be impure blacks (not true breeding) and one-fourth would be pure reds. For each parent would transmit impartially either the black or the red unit and the ex¬ pected combinations would be :

Units transmitted by sire, B or R Units transmitted by dam, B or R

Combinations . BB, BR, BR, R R

Pure black Impure black Pure Red

If the two breeds of cattle which we crossed were Aberdeen-Angus and Red Polled, all the cross-bred calves would be polled, since both breeds possess this same unit. But if we crossed Aberdeen-Angus cattle, which are black and polled, with Devon cattle, which are red but have hoˆns, we should get a different re¬ sult, viz., imperfectly developed horns (scurs) in the crossbreeds, which would all be black. A crossbred bull of this sort would transmit to half his calves the polled condition and to half he would transmit horns. To half he would transmit black color and to half he would transmit red color. But horns and color are distinct units in heredity, hence the com¬ binations of units which a crossbred of this sort might transmit would be of four sorts, viz., polled black, polled red, horned 'black and horned red. In fact animals presenting these four sorts of combinations would be obtained in the second generation of crossbreds pro¬ duced by mating first generation crossbreds with each other. This case illustrates how the principle of unit character inheritance may be utilized to secure new combinations of inheri¬ tance units in which breeds differ. The maxi¬ mum number of recombinations may be ob¬ tained in the second crossbred, not the first crossbred, generation. This principle has un¬ doubtedly been utilized, consciously or uncon¬ sciously, in producing existing breeds and can be used more freely in the future because its operations are now better understood. Never¬ theless the crossing of breeds is something which should be undertaken cautiously, for it will be found that few cases are as simple as the hypothetical one just discussed. Most breeds differ by a great many unit characters and a cross in such cases produces an extrem¬ ely variable second generation, because of the large number of recombinations of characters which will be obtained, and few of these re¬ combinations, even if desirable, can be isolated in true breeding types without subsequent selec¬ tion through several generations.

Moreover most inherited characters are not simple (behaving as single units) but complex, depending upon the simultaneous presence of

several or many independent units. This makes their manipulation in crosses extremely difficult. Differences in size, early maturity and produc¬ tiveness are among the most valued economic characters of breeds, yet these in no case behave as simple units in transmission. They com¬ monly behave neither as - dominant nor as re¬ cessive units but yield intermediates or blends. A second crossbred generation again yields blends but with increased variability, giving indications of segregation more or less com¬ plete. This is interpreted as meaning that many distinct units are involved which segre¬ gate and recombine independently of each other. In such cases crosses are useful only if the production of intermediates is desired. If it is desired to extend the range of existing vari¬ ation in quantitative characters, it is better not to cross breeds, but to practise systematic selec¬ tion in the desired direction within the breed which most nearly approaches the ideal. For example, suppose increased quantity production of milk is desired in cattle. The most produc¬ tive of existing breeds is admitted to be the Holstein-Friesian. If this breed is crossed with a less productive breed, the offspring are found to be of intermediate productiveness. Such a cross would not be a promising means of obtaining productiveness greater than that of the Holstein-Friesian. It would be better to search within the breed for families of unusual productiveness and try further to improve these best families by selection, avoiding close in- breeding however by mating with each other representatives of different families of great excellence. This is the practise now followed by the best informed breeders. Still there are conditions under which crossbreeding, even of Holstein-Friesian cattle, may be desirable. Holstein milk contains too little butter fat to satisfy some markets. Improvement in its quality may, be secured by a cross with dairy breeds which produce richer milk, though less of it, as is true of Guernseys and Jerseys. Whether the improvement in quality thus se¬ cured will offset the diminished quantity pro¬ duction entailed by the cross and the undesirable variability of the later crossbred generations is a matter for experimental determination.

A fifth maxim for the breeder may now be formulated. (5) Both the uniform excellence of established breeds and the making of new breeds with novel combinations of characters depend upon Mendel's law of unit character inheritance. The breeder should be thoroughly familiar with the workings of this fundamental law.

Bibliography. — Babcock, E. B., and Clau¬ sen, R. E., (Genetics in

Relation to Agricul¬ ture (New York 1918) ; Darwin, Chas., Vari¬ ation of Animals and Plants under Domesti¬ cation (New York 1871); Gay, C. W., (The Breeds of Live Stock) (New York 1916) ; Keller, C., <Naturgeschichte der Haustiere) (Berlin 1905) ; Plumb, C. S., (Types and Breeds of Farm Animals) (Boston 1907) ; Wallace, Robert, (Farm Live Stock of Great Britain* (Edinburgh 1907).

William E. Castle,

Professor of Zoology , Harvard University.

STOCK-DOVE, a wild European pigeon (Columba cenas) , about 13 inches in length, and with a general bluish-gray plumage, the breast being purplish. It raises two or three broods

in a season and builds its nest in the hole of a tree, in a rabbit-burrow or some similar place. See Pigeon.

STOCK EXCHANGE. See Exchange.

STOCK JOBBING. See Exchange.

STOCK RAISING. See Cattle; Stock Breeding.

STOCK YARD. See. Abattoir; Meat Packing; Meats and Meat Product.

STOCKADE, (1) In civil engineering a row of piles, or a series of rows, driven into a sea or river shore, to prevent the erosion of the banks. (2) In fortification, stout timbers planted in the ground so as to touch each other and loop-holed for musketry. In its most effect- five form it is eight or nine feet high, has a ditch in front and a banquette in the rear. The stockade is a very old form of fortification. See Fortifications.

STOCKBRIDGE, Henry, American law¬ yer; b.. North Hadley, Mass., 31 Aug. 1822; d. Baltimore, Md., 11 March 1895. He was gradu¬ ated at Amherst College in 1845 and was ad¬ mitted to the bar in 1848. He was a special district attorney in the service of the War De¬ partment of the United States in the Civil War; and in 1864 was a member of the Maryland legislature, where he introduced the bill which resulted in convening a constitutional conven¬ tion and the abolition of slavery in the State. Later he successfully combated in the United States courts the indentures of apprenticeship through which emancipation was being evaded. He was for more than 20 years vice-president of the Maryland Historical Society and editor of its fund publications. Author of (Archives of Maryland) (1886).

STOCKBRIDGE, stok'brij, Mass., town, Berkshire County, on the Housatonic River, and on the New York, New Haven and Hartford Railroad, 15 miles south of Pittsfield. The town includes the villages of Stockbridge, West Stockbridge, Centre, Curtisville and Glendale. In 1736 the Stockbridge Indian mission was moved here from Great Barrington, and under the influence of this mission the Indians were civilized and Christianized, so that, in 1739, when the town was incorporated they were given full privileges of citizenship. In 1751 Jonathan Edwards became pastor of the church. After the Revolutionary War the Indians moved west, finally settling in Kansas. The town is situated in the midst of picturesque mountain scenery, and contains many handsome summer residences. It has a number of mills, including woolen, paper, grist and saw mills ; and a na¬ tional bank, a public high school founded in 1868 and a public library, founded in 1862. Pop. about 2,000. Consult Jones, (Stockbridge Past and Present.)

STOCKER, stek'er, Adolf, German theo¬ logian and social reformer: b. Halberstadt, 11 Dec. 1835; d. 1909. After studying theology and philology in Halle and Berlin, he was made pastor at Seggerde (1863) and eventually court and cathedral preacher at Berlin. His import¬ ance is owing to the fact that in opposition to the Social-Democrats he founded, in 1877, a Christian Socialistic party. This new associa¬ tion won numerous adherents in only a few places, but the idea of Christian Socialism has been widely accepted by a large number of re-

ligious teachers. In his fiery zeal and activity against his opponents he was particularly vio¬ lent in his treatment of the Jews, and he thus hindered the practical success of his theory. In 1880 he was elected to the Reichstag and allied himself with the extreme conservatives. But his socialistic activity, by which he was led more and more to take the attitude of reform¬ ing agitator, displeased the government and in 1890 he was dismissed from his office of court- preacher. He was president of the Berlin City Mission; Member of the Upper Synod; and in 1892 became editor of the (Deutsche Evan- gelische KirchenzeitungP He is the author of a volume of (Sermons for the People) as well as of (Speeches. } He has also published many Socialistic tracts and an autobiography.

STOCKHOLDER. A stockholder is one who owns stock in a corporation or joint stock company, and who has been vested with certain rights

and liabilities by law, by virtue of his relation to other owners of stock and to cred¬ itors of the corporation. The term shareholder is used commonly interchangeably with stock¬ holder. When a corporation is formed and the books of the company are opened, individuals subscribe for stock or shares in the company and certificates are issued to them as evidence of their right in the company which is granted by virtue of the sale of stock, the certificates of stock being merely the evidence of the trans¬ action. Loss of certificates, or the fact of their not being issued cannot relieve the owner of stock of his rights, or of his liabilities. Al¬ though stock may be paid for in services, or good will, or patents, or property, as well as in money or negotiable paper, the stockholders as soon as they acquire membership in the corpora¬ tion stand on the same footing, and have equal privileges. The number of shares owned regu¬ lates the proportion of interest to be drawn by the individual, and the voting power in the affairs of the company. Any person who has legal capacity to own personal property may be a stockholder, and municipal and private cor¬ porations may be stockholders in other corpora¬ tions within limitations contained in their in¬ corporation. A manufacturing corporation may not subscribe to the stock of a bank or of a railroad, but may in payment of a debt, take stock in such other corporation, and may hold it and enjoy the same rights as other stock¬ holders. The rights of all stockholders are represented by the corporate management, usu¬ ally a board of directors. Legal relation be¬ tween the corporate management and the share¬ holders is created by subscribing to, or contrib¬ uting for shares of stock. The stockholder re¬ lies entirely upon the charter of the corporation as to his contract, regardless of representations of an agent, and an alteration in the constitution effecting a radical change in the corporate enter¬ prise releases a shareholder from his subscrip¬ tion. A corporation has the right, through its management, to carry on the corporate enter¬ prise as against all persons including a minority of the shareholders, in a manner and for the purposes set forth in its constitution. The board of directors can be controlled only by action of a majority of shareholders. It is understood that the majority of shareholders shall govern in all matters coming within the act of corporation, and all shareholders are bound by

the acts of the majority represented by the management. The individual shareholder has only that control of the affairs of the corpora¬ tion which his vote represents at the meet¬ ings of shareholders. If it may be shown that any act of the corporation will benefit a majority of shareholders, one shareholder or a minority, may not interfere, because the act may be an injury to him. But a minority

may prevent by law any use of the funds of the corporation which are not strictly within the charter, or which may be shown as detrimental to the majority. Shares of stock give the holder a fixed right in the division of the profits or earnings of the company so long as it exists, and of its effects when dis¬ solved. At corporate meetings each shareholder has a right to vote, and this cannot be taken from him. The right to vote by proxy does not exist unless so stated in the constitution of the company. Each holder has the right to inspect the company books either personally or through a representative or attorney.

It is supposed that stock is paid for at par and that the number of shares sold represents the working capital of the corporation. A cred¬ itor may enforce his right to have the nominal value of capital stock paid in, even to making the directors call upon the stockholders to pay a pro rata share on their stock. The liability of a stockholder for the debts of the company is fixed by statute and differs in the various States. In some States a stockholder can be held for a sum equal to his subscription ; special liabilities which make the stockholder responsi¬ ble for other amounts or for particular debts, also exist under the laws of some of the States. Regarding the liability of shareholders in a national bank, it has been held that the share¬ holders are individually responsible, equally and ratably, and not one for another, for all con¬ tracts, engagements and debts of .such associ¬ ation to the extent of the amount of their stock therein, at the par value thereof, in addition to the amount invested in the shares.

Irregular or fraudulent transfers may be set aside if it can be shown that there was inten¬ tion to escape liability to the detriment of creditors.

A subscriber to stock is presupposed to know the obligations assumed and ignorance will not excuse him from liability to creditors. See Corporations, History of; Stock; Exchange.

Bibliography.— Boisot, L„ (By-laws of Private Corporations) (Saint Paul, Minn. 1902) Conyngton, T., (Philadelphia 1860) ; Lewis, F. A., (Law Relating to Stocks, Bonds and Other Securities in the United States> (Philadelphia 1881) ; Van Antwerp, W. C., (The Stock Exchange from Within (New York 1913) ; (The Stock Exchange Year BookP

STOCKHOLM, stok'ho-lm, capital of Sweden, situated on the Malar See (Lake Malar), 440 miles southwest of Saint Peters¬ burg. It is on a cluster of islands, connected with the mainland by bridges, chief of

which are the Norrbro and Vasabro, joining the stadtin or city with the north side of the strait. The city, without its northern accessories, might impress one as another Venice, especially

STOCKHOLM, SWEDEN

1 The Royal Palace, Stockholm

2 General view of Stockholm

in approaching it from the Baltic or from Mose- back Hill. Yet it surpasses in natural attrac¬ tions the Venetian city. The largest island is Gustavsholm, containing the city proper ; and with the islands of Riddarsholm and Helgeands- holm, is the oldest section. Its antiquity and irregularity render this part most interesting. Other islands contain the modern-constructed town. The houses are frequently coated with stucco in light colors or white. The buildings of note are the palace of the 17th century, with Corinthian pillars adorning the fagade, and an edifice of symmetrical proportions. The Na¬ tional Museum, the Northern Museum, the Riddarhus (Knight's house) and several churches. The oldest church is Saint Nicholas (1264), in which Swedish sovereigns are crowned ; the Riddarsholm Kyrka, contains the remains of a long line of kings and has other historical interest. In Norrmalm is the church of Adolphus Frederick and the National Li¬ brary, containing 250,000 books, and 8,000 manu¬ scripts. On the northern mainland stands the National Museum, a fine Renaissance edifice, which contains many antiquities, coins, draw¬ ings, engravings, etc. There are, too, the gov¬ ernor's house, facing the quay where an obelisk commemorates Gustavus III ; the Ridderhus or Senate Chamber; the Rigsdagshus or House of Parliament ; exchange, mint, town-house, with courts of law; ethnographical museum with numerous Scandinavian antiquities ; theatres, opera-house, arsenal and barracks. There is a medical college, technological institute, naviga¬ tion school, school of design, also benevolent institutions and other educational establish¬ ments ; literary, scientific and artistic associa¬ tions, etc. Chief among the latter are the Swedish Academy, Academy of Sciences, cele¬ brated by the name of Berzelius ; musical acad¬ emy; medical, horticultural and agricultural so¬ cieties. Ship-Island, east of the city island, is headquarters of the Swedish navy, and contains ship-building yards and marine repair-shops. Farther east are the islands containing the zoological gardens. All the islands have

com¬ munication with each other by bridges, tram¬ ways and steamboats. The recreation grounds and promenades are attractive, especially Djur- garden, Haga Park and Carlberg. The city's manufactures are chiefly textiles, porcelain, pot¬ tery, sugar, tobacco, cotton, ironware, beer, soap, food products and machinery. Trade is con¬ siderable, Stockholm, being the largest Swed¬ ish industrial and commercial centre and its most important port of entry, and the principal exports are : iron, copper, tar and timber. The imports: colonial produce, wine, salt, fruit, etc. The shipping of Stockholm is second highest in the kingdom and shipbuilding is one of the industries of the city. There were, in 1908, 249 vessels engaged, with a total tonnage of 124,- 037. Stockholm was founded in 1260. Subse¬ quently fortified, it withstood several memorable sieges. Pop. about 400,000.

STOCKHOLM, Bank of. As this was the

earliest bank to issue circulating notes, an out¬ line of its history can scarcely fail to prove of practical value. After the death of Gustavus Vasa his daughter, the Regent Christina, 1632— 45, was compelled by the embarrassments of the treasury to issue a sort of exchequer-bill, which appears to have had a somewhat slow

and grudging circulation as money. Ten years later the treasury, still embarrassed, adopted the suggestions of a financier named Palm-struck and established! a bank at Stockholm in 1656, which invited deposits of coins, bullion and runstyks, for which it granted transferable credits on its books in <(Bank-money® ; an ex¬ pedient which met the approval of the com¬ mercial community. In 1658 the bank began to issue ˆtransport-notes® which being more con¬ venient than copper runstyks soon drove the latter into the bank, which now being upon an avowedly copper basis, began to lose credit as bullion, copper fell in value and the copper plates to support the transport-notes became too heavy for convenient circulation. In this dilemma Baron George Heinrich de Goertz,. the king's financial adviser, closed the mints to the ((free coinage® of copper and issued light copper dal-ers (dollars) instead. But the government was too weak to sustain a fiduciafy currency ; the pieces were too inartistic to defy counterfeiting, and there was no fixed limit to their emission, three cardinal requirements of such a currency, especially the third one. The inevitable con¬ sequence was a ruinous fall in their value, a rise of popular indignation against Baron Goertz, his impeachment, trial, condemnation and unjust execution 3 March 1719. The bank (Rigsbank) is still in existence. (Consult his¬ tory of Monetary Systems, J 298). For list of other ancient banks see list under the

heading Banks and Banking.

STOCKING, a covering for the foot and leg, knitted or woven either from cotton, woolen or silk thread. The stocking is made usually only of one thread entwined so as to form a species of tissue, extremely elastic, which readily adapts itself to the part it is intended to cover. The tissue differs from cloth in hav¬ ing neither warp nor woof, but approaches it closely, and is much superior for the purposes to which it is applied. The ancients wore no particular covering for the legs, but during the Middle Ages, hose or leggings of cloth came into use; and at a later period the art of knit¬ ting stockings was invented, according to some authorities by the Spaniards, while some at¬ tribute it to the Scots. In 1589 William Lee of Nottinghamshire, England, invented the stock¬ ing-frame, a machine for weaving stockings which was in use and scarcely improved upon for nearly two centuries. Lee met with little encouragement in his attempts to set up an establishment in England and went to France where he was received with great favor by Henry IV. The monarch's assassination soon after, however, interrupted his prospects and he died in Paris in great poverty. A knowledge of his machine was carried back to England by some of his workmen who established them¬ selves in Nottingham, which has since remained the principal seat of the English hoisery manu¬ facture. For the stocking-frame and improve¬ ments in stocking machinery, and for modern methods of manufacture, see Hosiery and Knit Goods Industries in the United States.

STOCKPORT, stok'port, England, in the counties of Cheshire and Lancashire, on the Mersey River, .five miles southeast of Man¬ chester. It stands upon an elevation, in ter¬ races, is irregularly built, but highly picturesque.

There are churches of various denominations, the chief of which are Saint Mary's, Saint Thomas', Saint George's, Saint Peter's, Saint Paul's and Christ Church. Other noteworthy buildings are the Mechanics' Institute, market- hall, free library, technical and grammar schools and infirmary. The museum is situated in Vernon Park, one of the several recreation grounds of the city. The railway viaduct on the London and North-Western Railroad is of fine proportions and spans a great part of the town. The staple manufacture is cotton. There are numerous factories and industrial works, including print, dye and

bleach works, and ex¬ tensive hat factories, iron and brass foundries, breweries and brickyards. The city owns the street railway, electric-light plant, markets, gas, water-power and sewage works. Pop. about

110,000.

STOCKS, a wooden apparatus to put the legs of offenders in, formerly used for the re¬ straining of disorderly persons, or as a punish¬ ment for certain offenses.

STOCKTON, Charles G., American phy¬ sician : b. Madison, Ohio, 27. Aug. 1853. He was graduated in medicine at Buffalo Univer¬ sity in 1878. He was professor of materia medica and therapeutics at Niagara University in 1885-87 ; and has been professor of medicine and clinical medicine at Buffalo University since 1887. He is attending physician at the Buffalo General Hospital ; and consulting phy¬ sician at the New York State Hospital for Crip¬ pled and Deformed Children. He has contrib¬ uted to various medical compilations and ency¬ clopedias, and is author of (Diseases of the Stomach. ’

STOCKTON, Charles Herbert, American rear-admiral: b. Philadelphia, Pa., 13 Oct. 1845. He was graduated at the United States Naval Academy in 1865, first having seen active service in the Civil War on the Macedonian. He was promoted commander in 1892, captain in 1899 and rear-admiral in 1906. He commanded the Yorktown in 1895-97; was president of the Naval War College in 1898-1900; commanded the Kentucky in 1901-03 ; was naval attache at the American embassy, London, in 1903-05 ; and commanded the Special Service squadron visiting Bordeaux, France, for the maritime ex¬ position in 1907. He was retired in 1907. He was president of the George Washington Uni¬ versity in 1911-13; and was the first United States delegate to the London Naval Confer¬ ence in 1908-09. He has written extensively on international law and besides numerous papers is author of (A Manual of International Law’ (1911) ; (Outlines of International Law’ (1914), etc.

STOCKTON, stok'ton, Francis Richard,

(Frank R. Stockton), American author: b. Philadelphia, Pa., 5 April 1834; d. Washington, D. C., 20 April 1902. After a secondary educa¬ tion in Philadelphia, he became a wood-en¬ graver, practised the art with some success, and invented a double graver (1866). In 1872 he entered journalism, . joining the staff of the Philadelphia Post , in the same year that of Hearth and Home of New York, somewhat later that of Scribner’s Monthly, and in 1874 that of St. Nicholas, of which he

was assistant editor until 1882. During this period he wrote

many stories for children, among which were (Roundabout Rambles) (1872); (What Might Have Been Expected) (1874) ; (Tales Out of SchooP (1875); (A Jolly Fellowship' (1880) ; (The Floating Prince' (1881) ; (The Story of Viteau' (1884) and Personally Conducted> (1889). His first success was made with (Rudder Grange' (1879), a burlesque account of a house-boat outing, and this he followed by the now well-known series of quaint and whim¬ sical volumes which have made Stocktonian humor a thing peculiar to itself. Much of his best work is to be found in his short stories, the best known of which is probably (The Lady or the Tiger.) He was a prolific writer of novels, short stories, sketches and tales for children. Much of his humor depends upon the situation in which his characters are placed and the grotesque attitude of the author toward them; yet Stockton created many delightful characters that, with all their whimsicality, are quite human and very likeable personages. The list of his published works includes (The Cast¬ ing Away of Mrs. Leeks and Mrs. Aleshine) (1886); <The Late Mrs. NulP (1886); <The Christmas Wreck' (1886) ; (The Bee Man of Orn' (1887); (The Dusantes' (1888); Amos Kilbright' (1888) ; (The Great War Syndicate' (1889); (The Squirrel Inn' (1890); (Ardis Claverden' (1890) ; (The Watchmaker's Wife' (1893) ; (The Adventures of Captain Horn' (1895) ; (The Girl at Cobhurst' (1897) ; (A Story Teller's Pack' (1897) ; (The Associate Hermits' (1898); (Afield and Afloat' (1900); (A Bicycle of Cathay' (1900) ; (John Gayther's Garden, and the Stories Told Therein' "(1902) and (The Captain's Toll-Gate' (1903). See Casting Away of Mrs. Lecks and Mrs. Aleshine; Rudder Grange.

STOCKTON, Richard, American states¬ man: b. near Princeton, N. J., 1 Oct. 1730; d. there, 28 Feb. 1781. He was graduated from the college of New Jersey, at Newark, in 1748, studied law, was admitted to the bar in 1754 and rose rapidly to the first rank as a lawyer. In 1776 he visited England. He was made a member of the executive council of New Jersey in 1768 and in 1774 was appointed a judge of the Supreme Court. In 1776 he was elected to Congress and, though at first doubtful of its policy, cordially supported the Declaration of Independence. In the same year he served on the committee appointed to inspect the northern army and report its state to Congress. After his return to New Jersey was captured by the British and confined in the common prison at New York. The unusual severity with which he was treated there broke his strength and eventually caused his death. Consult "Sander¬ son, J., (Biography of the Signers of the' Declaration of Independence' (Philadelphia

1847).

STOCKTON, Robert Field, American

naval officer and politician: b. Princeton, N. J., 20 Aug. 1795; d. there, 7 Oct. 1866. He served in the War of 1812 and in the Algerian war 1814-15. In 1821 he commanded the Erie on a cruise to Africa, where he secured the territory which now forms the present Liberian republic; and in the autumn of the same year he was in¬ strumental in the suppression of pirates and slavers in the West Indies. He strongly ad¬ vocated a steam navy and drew the plans for

the sloop of war Princeton on which an explod¬ es killed the secretaries of war and the navy in 1844. He was commander of the Pacific squadron during the Mexican War, when he took possession of California in the name of the United States, capturing Los An¬ geles and San Diego and establishing civil gov¬ ernment on the coast. After his resignation from the navy in 1850 he devoted himself to politics and in 1851 was elected to the United States Senate, where he introduced a bill, sub¬ sequently passed, abolishing flogging in the navy. On leaving the Senate in 1853 he turned his attention to the improvement of the Dela¬ ware and Raritan Canal, an enterprise he had previously encouraged. Consult (Life and Speeches of Robert Field Stockton> (Phila¬ delphia 1856).

STOCKTON, Thomas Hewlings, American Methodist Protestant clergyman, half-brother of F. R. Stockton (q.v.) : b. Mount Holly, N. J., 4 June 1808; d. Philadelphia, Pa., 9 Oct. 1868. He began the study of medicine but in 1829 en¬ tered the ministry of the Methodist Protestant Church. He was chaplain to the House of Rep¬ resentatives in 1833-35 and in 1859-61. He had charge of churches at Philadelphia in 1838-47 ; at Cincinnati in 1847-50: at Baltimore in 1850— 56; and again at Philadelphia in 1856ˆ68. He was a pioneer in anti-slavery agitation, an oppo¬ nent of sectarianism and was famous for his eloquence. He compiled a hymnbook for the use of his denomination, and was author of (Sermons for the People1 (1854) ; (Poems, with Autobiographic and other Notes1 (1862) ; (The Book Above All1 (1870), etc.

STOCKTON, Cal., city, the metropolis and chief distributing centre of the San Joaquin Valley, county-seat of San Joaquin County; 78 miles

east of San Francisco and 397 miles north¬ west of Los Angeles.

Transportation and Commerce. — Stockton is favorably situated to command the trade of the San Joaquin Valley and of the mining and lumbering districts along the eastern rim of the valley. The main lines of the Atchison, Topeka and Santa Fe and the Western Pacific and two lines of the Southern Pacific run through Stockton, connecting it with San Francisco and its bay region, the San Joaquin Valley to the south, the Sacramento Valley to the north and eastern points. Branch lines of the Southern Pacific extend from Stockton to the mining regions on the Mother Lode and the lumbering districts of the Sierra. One hun¬ dred and seventeen passenger trains daily enter and depart from Stockton. The Yosemite Val¬ ley, the Tuolumne Grove of Big Trees, the Calaveras Big Trees, Mercer's Cave and Lake Tahoe are readily reached by automobile from Stockton; Yosemite Valley and Lake Tahoe also being connected by rail. The city is at the head of all-the-year navigation on the San Joaquin River system, being connected to the river by a navigable channel two and one-half miles in length. To San Francisco by water is 94 miles and daily steamer service is maintained. The leading articles, in the order of their valuation, are general merchandise, millstuffs and grain, potatoes, barley, beans, vegetables, wheat, horses, sheep, vehicles, lumber, onions, fuel oil, machinery and canned goods. Since the beginning of the grain industry of California,

Stockton has been the principal grain market of the great central valley. The 14 grain and produce warehouses of Stockton have an aggre¬ gate capacity of 165,000 tons .and there are another 10 warehouses in the outside districts which bring the aggregate storage capacity up to 200,000 tons. All of the local warehouses are conveniently located to handle shipments by both rail and water. Grain is transported from Stockton to ocean vessels in San Francisco Bay for 65 cents per ton. Forty-nine commodities are shipped annually from Stockton in carload lots, the most important being agricultural im¬ plements, grain, beans, engines, flour and mill¬ stuffs, hay, livestock, onions, potatoes, wine, brandy, grapes, fruits and leather.

Manufactures. — Abundance of raw ma¬ terial, cheapness of power, low transportation rates and location as a distributing centre have developed the manufacturing interests of the city, and there are 157 manufacturing establish¬ ments in Stockton, with an annual output valued at $11,293,000. Fuel oil from the upper San Joaquin Valley is the most common source of power. With fuel oil at recent current prices, power can be generated in Stockton as low as one-half of a cent per horse-power per hour. Electricity, coal and gas are also used as

sources of power. From the source of power on the Mokelumne River, 45 miles distant, a line with the capacity of 30,000 horse-power delivers elec¬ tricity in Stockton for lighting and manufactur¬ ing purposes. A second line of the capacity of 6,000 horse-power extends from the south fork of the American River to Stockton, a distance of 80 miles. Fourteen natural gas wells, vary¬ ing in depth from 1,800 to 3,000 feet, supply gas for home and factory use. This city is the centre of the flour, cereal, poultry and dairy feed industry of the State. The mills have a daily capacity of 2,000 barrels of flour, 1,500 barrels of cereals, 100 tons of poultry and dairy foods and 600 tons of by-product foods. Large export shipments are made to the Orient, Europe, Alaska, Central and South America and the Southeastern States. <(Caterpillar11 and "sieve-grip11 traction engines, combined har¬ vesters, rice harvesters, seed cleaners, pumps, plows, harrows, scrapers and other agricultural machines and implements are manufactured in Stockton. Stockton has the largest traction engine plant west of the Mississippi River and its product is shipped to every country in the world. This combined harvester factory covers approximatelv nine acres and is the largest of its kind in the world. This type of machine combines header and threshing machine, cut¬ ting, threshing and sacking the grain by con¬ tinuous process. The so-called "tanks,11 used with such effectiveness b}ˆ the British army in the European War, were nothing more than armored Stockton "caterpillar11 tractors. Notable among Stockton manufactures is the bean threshing machine that performs every opera¬ tion from threshing to recleaning the beans. Stockton contains the only window glass fac¬ tory west of the Mississippi. Dredges and ditch digging machinery, which have played so important a part in the reclamation and irriga¬ tion of the San Joaquin delta, are manufac¬ tured in Stockton. Stockton contains one of the four electrical steel furnaces west of Chicago. Machine works and foundries supply machinery and castings throughout the Pacific

Coast. A large cannery uses a substantial part of the output of the numerous orchards and truck gardens near the city. Other important manufactures are sole, harness and other leathers, paper, scoured wool, boats and barges of varied descriptions, paving machinery, com¬ mon and fire brick, engines (marine, gas, gaso¬ line, distillate and crude oil), ice, pottery, lum¬ ber, olive oil, butter, insect powder (Buhach), macaroni, pumps, windmills, wagons, gloves, soap, paint, jewelry, soda water, medi¬ cines, cigars and bread and candy for a

large territory.

Municipal Facilities. — Stockton is an at¬ tractive, modern city, having 12 public parks, including one of 27 acres at the northwest cor¬ ner of the city, a good electric car system, and 190 miles of streets of which 32 miles are paved with asphalt and 53 miles with miscellaneous pavements, principally asphalt bound macadam. There are in Stockton two large public baths supplied by warm artesian water, a park with picnic grounds and a baseball diamond. Stock- ton Channel, the San Joaquin River and Lake Yosemite also afford opportunities for swim¬ ming as well as rowing and other water sports. Stockton is one of the best shaded cities in California, the most popular trees along the streets and in the gardens being the elm, the maple, the acacia, the orange, the palm, the ole¬ ander and the umbrella tree. From 27 wells, varying in diameter from 12 to 20 inches, and in depth from 250 to 1,100 feet, water is pumped direct into the city mains, against a head of 110 feet above the ground level, using a 200,000 gallon steel tank at that elevation for balancing. These 27 wells are located at three separate stations about two miles apart. Twenty of them are located on a 10-acre tract and sup¬ ply from 8,000,000 to 10,000,000 gallons daily, without showing any diminuation of their ca¬ pacity. The water system is owned by a private corporation. Rates are regulated by the Rail¬ road Commission of California.

The city has a fully-paid and well-equipped fire department with 38 men. The police de¬ partment has 36 men. A post-office of the first class, has an annual revenue of about $150,000, 65 employes and 7 rural delivery routes, one of which, serving the delta, is a water route, of which there are only three or four in the United States, delivery being made by launch. There are about 7,500 telephones connecting at Stock- ton, including 265 reaching nearby farming dis¬ tricts ; 36 church organizations and 26 buildings used for religious purposes; 15 public schools valued at $752,600 and enrolling about 4,200 pupils, the high school group of buildings, in¬ cluding the science, manual arts and gymnasium buildings, costing $206,000 ; 2 parish schools, including Saint Agnes College; a business col¬ lege, a normal school and a number of smaller private schools and academies. The public li¬ brary cost $75,000 and has 70,000 volumes and 33,000 pamphlets, maps and atlases. It serves not only the people of Stockton but 26 deposit sta¬ tions throughout San Joaquin County. There are 17 hotels, including the half-million dollar Mission hotel facing the plaza, built by the peo¬ ple of Stockton; the buildings of the State Hos¬ pital for the Insane; Saint Joseph's Home and Hospital; Young Men's Christian Associa¬ tion building; Elks' building; several bank

buildings, the 10th story and roof of one of which is occupied by the chamber of commerce ; three daily papers, one semi-weekly and five weekly papers are published in the city. The eight banks of Stockton have a paid-up capital of $2,802,700, with surplus, undivided and other profits of over $1,821,000; deposits amounting to over $20,661,000, including the circulating notes of national banks; loans over $17,644,000; and resources aggregating in excess of $25,285,-000. There are three building and loan associa¬ tions with assets of over $1,882,000. The as¬ sessed valuation of all property in the city proper is about $29,000,000; bonded indebted¬ ness, $750,000.

History and Government. — In 1843, Capt

C. M. Weber, the founder of Stockton, se¬ cured a grant of 11 square leagues (48,747 acres) of land from the Mexican government. This grant known as the Campo de los Fran¬ ceses included the site of the present city of Stockton. At first stock raising was the only industry. With the discovery of gold in 1848, Stockton became at once the most important supply station, for the southern mines. At the head of navigation on the San Joaquin River, goods were brought on sailing vessels from San Francisco to Stockton, the nearest point to the mines. From Stockton supplies were sent to the miners by ox teams, by pack animals or in huge wagons known as ((prairie schooners.'* As grain farming developed, the city naturally became the shipping point for the entire tribu¬ tary region. The completion of the first over¬ land railroad in 1869 greatly increased the im¬ portance of Stockton as a manufacturing and distributing centre. In 1850 Stockton was in¬ corporated with a population of 2,000. The city's growth has been steady and substantial. Under the charter of 1911 the elective officers of the city are a mayor, four councilmen and 5 school directors, so classified that their terms do not expire coincidentally. They serve for four years. The council designates one council¬ man to be commissioner of finance, revenue and public supplies, who shall be ex-officio treas¬ urer, one to be commissioner of public health and safety, one to be commissioner of public works and one to be commissioner of audit. The city was named in honor of Commodore Robert Field Stockton of the LTnited States navy. It was laid out in blocks 303 feet square.

Population.— (1900) 17,506; (1910) 23,253; (1920) 40,296. A complete census of the city is taken each year by the school census marshals. In 1914 well-developed territory to the north, east and south was incorporated within the city limits. The population of the city and its immediate tributary territory is estimated at

52,219.

STOCKTON-ON-TEES, tez, a seaport town in Durham, England, situated on the Tees River, 11 miles northeast of Darlington. The river is navigable for vessels of heavy draught. Stockton consists of two sections, the town proper and South Stockton of more recent date, connected by a fine modern bridge. It has mu¬ nicipal buildings, a custom-house, many good churches, quays and steam tramways. There is a fine race-course in the vicinity and Ropner Park, laid out in 1893. Shipbuilding is an ex¬ tensive industry and there are important foundries, blast-furnaces, engine-works and pot-

leries, breweries, corn and spinning-mills and factories for the making of sail cloth, ropes and linen. The exports include iron-ware and pottery; the imports are chiefly corn, timber, etc. There is quite a brisk river trade. The Stockton and Darlington were the first boats to carry passengers and goods. Pop. about

52,000.

STODDARD, stod'ard, Amos, American soldier: b. Woodbury, Conn., 26 Oct. 1762; d. Fort Meigs, Ohio, 11 May 1813. He served in the Revolutionary War and at its close practised law in Maine. He was governor of the Terri¬ tory of Missouri, 1804-05, fought in the War of 1812 and was mortally wounded in the siege of Fort Meigs. He published ‘Sketches of Louisiana) (1810), and several valuable histori¬ cal papers.

STODDARD, Charles Augustus, Ameri¬ can Presbyterian clergyman : b. Boston, 28 May 1833. He was graduated from Williams Col¬ lege in 1854 ; taught ; traveled in Europe and the East; studied at the University of Edin¬ burgh and the Free Church of Scotland Theo¬ logical Seminary, and was graduated D.D., from Williams College 1871 ; Union Theological Semi¬ nary in New York in 1859. He was pastor in a Presbyterian church in New York, 1859- 83; became associate editor of The Observer in 1869, part owner in 1872 and was owner and editor-in-chief, 1885-1902. His publications in¬ clude ‘Across Russia from the Baltic to the Danube) (1891) ; ‘Glimpses of Gibraltar and Tangier) (1892) ; ‘A Spring Journey to Cali- fornia) (1895) ; ‘The Centennial Celebration of Williams College.)

STODDARD, Charles Warren, American author: b. Rochester, N. Y., 7

Aug. 1843; d. 24 April 1909. He studied at the University of California and was for some time an actor and for seven years special traveling correspondent of the San Francisco Chronicle, visiting nearly every quarter of the globe and spending five years in the South Seas. From 1885 to 1887 he was professor of English literature at Notre Dame College, Indiana, and from 1889-1903 at the Catholic University of America. Among his publications are ‘Poems) (1867) ; ‘South Sea Idylls J (1873) ; ‘Summer Cruising in the South Seas) (1874); ‘Mashallah> (1880); ‘The Lepers of Molokai) (1885); ‘A Troubled Heart) (1885); ‘Hawaiian Life) ; ‘Lazy Letters from Low Latitudes) (1894) ; ‘The Wonder-work¬ ers of Padua) (1896) ; ‘A Cruise under the Crescent) (1898) ; ‘Over the Rocky Mountains to Alaska) (1899) ; ‘Hither and Yon) ; ‘In the Footprints of the Padres) (1902) ; ‘Exits and Entrances) (1903) ; ‘The Island of Tranquil Delights) (1904). Consult James, G. W., ‘Charles Warren Stoddard) (in ‘Apostrophe to a Skylark,) Los Angeles 1909).

STODDARD, Elizabeth Drew Barstow,

American poet and novelist : b. Mattapoisett, Mass., 6 May 1823; d. New York 1902. She was married to R. H. Stoddard (q.v.) and fre¬ quently collaborated with him in literary work. In addition to verse of not a little individuality she wrote three novels, ‘The Morgesons) (1862); ‘Two Men) (1865), and ‘Temple House) (1867), which display vigor and orig¬ inality. Her ‘Poems) were collected in 1867.

STODDARD, Francis Hovey, American

educator and writer: b. Middleburg, Vt., 25 April 1847, son of Solomon Stoddard, professor of languages in Middlebury College. He was graduated from Amherst College in 1869; studied for two years at Oxford, England ; re¬ ceived the degree of M.A., from Amherst Col¬ lege in 1886, of Ph.D., from Western University of Pennsylvania in 1896 and of LL.D., from New York University in 1914. He was in¬ structor in English at the University of Cali¬ fornia from 1886 to 1888 and professor of Eng¬ lish language and literature at New York Uni¬ versity from 1888 to 1914. From 1910 to 1914 he was dean of the College of Arts at New York University. He retired in 1914. He has published ‘The Modern NoveP (1883) ; ‘The Ideal in Literature) (1884) ; ‘Psycho-biography) (1885) ; ‘Women in the English Universities) (1886) ; ‘The Csedenon Poems) (1887) ; ‘Con¬ ditions of Labor in England) (1887) ; ‘Miracle Plays and Mysteries) (1887) ; ‘Tolstoi and Matthew Arnold) (1888); ‘The Uses of Rhet¬ oric) (1888) ; ‘Inductive Work in College Classes) (1889) ; ‘Literary Spirit in the Col¬ leges) (1893) ; ‘Lord Byron) (introduction to works, 1899) ; ‘The Evolution of

the English NoveP (1900) ; ‘The Life of Charles Butler) (1903) ; ‘Poems of National Spirit) (edited with introduction, 1904).

STODDARD, John Lawson, American lecturer and traveler: b. Brookline, Mass., 24 April 1850. He was graduated from Williams College, 1871 and studied divinity at Yale. He has traveled extensively and is the originator and promoter of the Stoddard Lectures in the larger cities of America. He has made his home in Italy for years. He has published ‘Red Letter Days Abroad) (1884) ; ‘Glimpses of the World) (1892) ; ‘Stoddard Lectures on Travels Abroad and in America) (1898-1909); ‘The Stoddard Library) (1910) ; ‘Poems) (1911) ; ‘Poems on Lake Como) (1914).

STODDARD, John Tappan, American educator : b. Northampton, Mass., 20 Oct. 1852. Prepared for college in the Northampton High School and after a year’s experience in the wholesale woolen business in Boston entered Amherst College, graduated in 1874. Assistant principal of Northampton High School, 1874—75, graduate student in chemistry and physics at Amherst, 1875-76; University of Gottingen, 1876-77 ; received degree of A.M., and Ph.D., from Gottingen in November 1877. After two months in Paris he returned to Northampton and became a member of the faculty of Smith College, professor of physics and mathematics, 1878-81, of chemistry and physics, 1881-97, of chemistry, 1897. In 1886 he devised a practical method for making composite photographs (suggested by Francis Galton) and made many composites, especially of college classes, pub¬ lishing two illustrated articles on composite photography in the Century magazine (March and November 1887). He invented the univer¬ sally used wire-test tube holder (1889), a bal¬ ance for first year’s work and numerous other laboratory devices. Author of ‘Outline of Qualitative Analysis) (1883), which has been widely used; ‘Lecture Notes on General Chem¬ istry) (1884-85, 2 vols.) ; ‘Quantitative Experi¬ ments in General Chemistry) (1908) ; ‘Intro¬ duction to General Chemistry) (1910) ; ‘The

Science of Billiards> (1913) ; < Introduction to Organic Chemistry) (1914) ; (Photography> in (Johnson’s Universal Cyclopedia* (1905), be¬ sides many scientific articles and reviews.

STODDARD, Richard Henry, American poet and journalist: b. Hingham, Mass., 2 July 1825; d. New York 12 May 1903. He went to

New York when very young and there he was employed for some time in an iron-foundry. He began, about 1848, to write in prose and verse for periodicals and ultimately devoted himself to literature. From 1853 to 1870 he was connected with the custom-house, in 1870- 73 he was secretary to General McClellan, in 1860-70 was literary reviewer for the World and from 1880 for the Mail and Express (now the Evening Mail). The amount of his critical work in these posts was very large. He wrote much worthy verse, lyric and narrative, of a reflective cast patterned in the earlier period after Keats. (Abraham Lincoln, *an ode, is among his best efforts. Among his numerous writings are <Footprints) (1849) ; (Songs of Summer * (1856) ; (The King's Bell* (1862) ; (The Children of the Wood *(poems, 1867) ; (Putnam the Brave) (1869) ; (The Book of the East) (1871) ; (Memoir of E. A. Poe) (1875) ; (Poems) (1880, collected) ; (Life of Washing¬ ton Irving) (1886) ; (1893), essays on Hogg, David Gray, Ebenezer Elliot, Edward Fitzgerald and others. His valuable collection of autographs and manuscripts was presented by him to the New York Authors' Club, a few months before his death. Consult his (Recollections, Personal and Literary,* edited by Ripley Hitchcock, with introduction by E. C. Stedman (1903).

STODDARD, William Osborne, American author and journalist: b. Homer, N. Y., 24 Sept. 1835. He was graduated at the University of Rochester in 1857, tried farming and journal¬ ism until 1861, when he was three months in the United States volunteers. He was secretary to President Lincoln, 1861-64 and United States marshal of Arkansas, 1864—66. Afterward he followed journalism and business pursuits in New York and took out nine patents for inven¬ tions. His publications are numerous and com¬ prise verse, biography, fiction and adventure stories for boys. Among them are (1870); (Life of Abraham Lincoln) (1884); (The Talking Leaves) (1885) ; (The Red Mus- tang> (1890) ; (Table Talk of Lincoln) (1892) ; 'The Lost Gold of the Montezumas) (1897) ; (The Errand Boy of Andrew Jackson) (1902) ; (The Boy Lincoln> (1905) ; (Dan Monroe) (1905) ; (Two Cadets with Washington (1906); Un the Open> (1908); (1909) ; (The Captain of the Cat's-Paw1*

(1914).

STODDERT, stod'ert, Benjamin, Ameri¬ can Revolutionary soldier and statesman : b. Charles County, Md., 1751 ; d. Bladensburg, Md., 18 Dec. 1813. He was educated for mer¬ cantile pursuits, but on the outbreak of the Revolutionary War entered the Continental army and served with distinction until the battle of Brandywine, when he was severely wounded and obliged to retire from active service. At the. time of his retirement he had the rank of major. He was Secretary of

the Board of War till 1781. At the close of the war he estab¬

lished a mercantile business at Georgetown, D. C. In 1798 he was appointed Secretary of the Navy, holding the position till 1801. Dur¬ ing his administration, war with France was threatened and he had charge of the organiza¬ tion of the naval force. For a time he served also as Secretary of War. At the close of his term he returned to business in Georgetown.

STOECKEL, Gustave Jacob, American musician and instructor : b. Maikammer, Ger¬ many, 9 Nov. 1819; d. Norfolk, Conn., 17 May 1907. He graduated from Kaiserslautern, Ger¬ many, and for several years was a teacher and organist. He came to the United States in 1847, becoming instructor in music at Yale Uni¬ versity in 1849 and the organist in College Chapel. After 1890 he was professor emeritus of music. He published several collections of sacred music, several operas and College Hymn Book for male voices.

STOESSEL, Anatoli Mikhailovitch, Rus-.

sian general : b. of Swedish parents in Saint Petersburg, 10 July 1848; d. 1915. He was educated in Paul Military School, Saint Petersburg, and entered the army in 1864, serv¬ ing with distinction in the Russo-Turkish War, 1877-78. He was appointed colonel in 1889, major-general in 1899, commander of the Ninth East Siberian Sharpshooters' Brigade, 1900, and for meritorious services against the Boxers in the same year, was made a lieutenant- general. At the outbreak of the Japanese War in February 1904, he was appointed commander at Port Arthur, ' and soon afterward com¬ mander of the entire army corps ordered to the defense of that fortress, which he sur¬ rendered to the Japanese, 2 Jan. 1905. On 20 Feb. 1908 he was condemned to death (com¬ muted to 10 years' imprisonment) <(for sur¬ rendering the fortress before all means of de¬ fense had been exhausted; failing to enforce authority; and for military misdemeanors.® A year later he was pardoned.

STOEVER, Martin Luther, American

educator and author: b. Germantown, Pa., 17 Feb. 1820; d. Gettysburg, Pa., 22 July 1870. He graduated from Pennsylvania College, Gettys¬ burg, in 1838, and was a tutor there from 1839 to 1840, afterward becoming principal of the preparatory department and professor of Latin, history and political economy, a position which he very ably held until his death. For several years he acted as secretary of the General Synod of the Lutheran Church, and as editor

of the Evangelical Quarterly Reviezv, for which he wrote a series .of (Reminiscences of Lutheran Ministers.) He also edited (The Literary Record> from 1847 to 1848. He pub¬ lished biographies of Dr. Henry M. Muhlen¬ berg (1856), and of Dr. Philip F. Mayer (1859), and wrote (A Brief Sketch of the Lutheran Church in the United States) (I860). At the time of his death was preparing a full history on that subject.

STOHMANN, sto-'man, Frederick Karl Adolf, German agricultural chemist : b. Bremen, 1832; d. 1897. He was educated at Gottingen University, Germany and London; was assist¬ ant professor under Graham at University Col¬ lege from 1853 to 1855, and afterward assistant at Celle. He organized the department for agricultural experiments at Brunswick in 1862;

jnMM he accepted a call to Halle, and in 1871 became director of the agricultural physiological institute of Leipzig University. Ke wrote ‘Beitrage zur Bedgriindung einer rationellen Fiitterung der WiederkaueD (1860); (1873); <Hand- buch der technischen Chemie) (1872); Hand- huch der Zuckerfabrikation) (1878) ; (Die Starkefabrikation) (1878); <Die Milch-und Molkereiproducte) (1898).

STOICISM, the Stoic system of philosophy and practical attitude toward life. The Stoic school of philosophy was founded at Athens, about 300 b.c. by Zeno, a native of Citium, in Cyprus. It received its name from the Stoa Pcecile, or mottled porch, where its meetings were held. Zeno had been a pupil of the Cynic Crates, and in its essential principle Stoicism may be regarded as the continuation and sci¬ entific development of Cynicism (q.v.). The successor of Zeno in the leadership of the school was Cleanthes, the author of the hymn t.o Zeus, who died 251 b.c. He was followed by . Chrysippus who, on account of his great activity as a teacher and writer, is sometimes called the second founder of the school. The leadership at Athens then passed the order to Zeno of Tarsus, Diogenes of Seleucia and Antipater of Tarsus. Of the numerous writ¬ ings of these men and their contemporaries only a few fragments have come down to us.

Panaetius of Rhodes (180-110 b.c.) and his contemporary, Boethius of Sidon, introduced new elements into Stoicism, bringing it into closer relations with the systems of Plato and Aristotle. It was mainly through the influence of the former that Stoicism was introduced into

Rome. Panaetius was the friend of Scipio Africanus and of Laelius, and the teacher in philosophy of many Roman youths of dis¬ tinguished families. Cato, the younger, is per¬ haps the most famous Roman Stoic of the time of the republic. By the time of the empire, the original form of Stoicism had been greatly modified by the prevailing eclecticism of the age, and may almost be said to have ceased to exist as a scientific system. It still survived, however, as a popular moral philosophy, and in this form gave expression to many of the noblest ethical and religious convictions of the ancient world. Its chief representatives at this time whose works are still extant were Seneca, Epictetus and the Emperor Marcus Aurelius.

Stoicism, like all the later systems of Greek thought, was primarily practical in character. The end and object of philosophy for the stoic was to teach virtue as the art of right living. But, in order to act rightly, it is necessary to be able to reason correctly and to understand the nature of the universe of which man is a part. Hence, logic and physics were regarded as indispensable preliminary studies for ethics, but not as possessing an independent value of their own. The extensive logical investigations undertaken by the Stoics contributed little of permanent value for the development of the science. In physics, their general view of the universe may be described as pantheistic materialism. Whatever exists is for the Stoics a material body. Not only do they maintain that all substances — including the soul and God — are corporeal, but they go on to dei- scribe as material all properties and relations

of things, and even virtues and vices. Their view of the world was, however, essentially dynamic : all is process and movement. More¬ over, the world-process forms a single whole, whose unitary principle is sometimes de¬ scribed in material terms, similar to those of Heraclitus (q.v.), as fire of warm breath, some¬ times in spiritual terms as God, Providence, the Logos or Universal Reason, or Universal Law. In spite of the variety of terms, these names all have for the Stoics the same meaning, and de¬ scribe at once both the essential substances of the world, and the ordering power and prin¬ ciple according to which it is regulated. There is no distinction to be made between God and the world, between matter and force. Further, these statements imply that every part of the world is ruled by the same unchanging laws, and is thus subjected to strict necessity. There is no chance or contingency anywhere ; every¬ thing is ruled and governed by unvarying laws.

Man only differs from the other parts of the universe in that, as possessing consciousness and reason, he is able to learn the laws of

nature and to follow them consciously and voluntarily. Hence we find that the fundamen¬ tal doctrine of the Stoic ethics is contained in the injunction to ((follow nature,® to lead a <(life according to nature.® This general prin¬ ciple was made more specific, however, when it was pointed out (it is said by Chrysippus) that the laws of nature with which man is most directly and intimately concerned are those of human nature, and that he must there¬ fore obey the fundamental laws which are found within himself. This implies that rea¬ son, the fundamental principle of human nature, shall govern action. Between the reason and the life of feeling and emotion there is the sharpest opposition. The highest good is not pleasure, or any object .of desire, but virtue, the end which reason shows to be in harmony with our true nature. This sharp antithesis between virtue and pleasure was doubtless made more emphatic by the rivalry between the Stoic and the Epicurean schools. To regard pleasure as the good is, they maintain, to lose sight of the true nature of virtue, to base it upon the feel¬ ings and emotions, which are subject to ex¬ ternal circumstances, and thus to deprive a man of his moral freedom and independence. The ideal of the wise man plays a very im¬ portant part in the Stoic ethics. The wise man is completely free and independent, com¬ pletely independent of external circumstances, and entirely emancipated from the bondage of the desires and emotions. For him virtue is the only good and vice the only evil : all ex¬ ternal circumstances are indifferent; health, power, riches, even life itself are not real goods, nor is pain, poverty, contempt, or death evils. He has completely mastered his posses¬ sions through the insight of reason and the resulting strength of will, and has attained to a state of apathy, or freedom from the sway of the emotions. This ideal has been realized at best by very few men ; the Stoics refer only to Socrates and Antisthenes, the founder of the Cynic school, as examples of its complete ful¬ filment. The wise man recognizes the necessity of all events, and welcomes whatever takes place as a part of the divine order of the universe.

The fundamental Stoic virtues are thus strength of will and resignation based on rational insight. These enable a man to bear cheerfully whatever lot fortune may apportion to him. Even when external circumstances make endurance no longer possible, but would compel a man to unworthy action, he may still triumph by voluntarily withdrawing from life by suicide. The Stoic gives up life, as he gives up external goods, as a means of preserving his own freedom and

independence; and many of the most famous members of the school com¬ mitted suicide in this spirit. In spite of the emphasis on the necessity of independence, the Stoics recognize that a life of reason implies social relations with one's fellow-men, and they give an important place in their system to the social duties and virtues, especially to the im¬ portance of justice, mercy and friendship. As reason is the essential basis of society, being the common element that unites a man with his fellows, they attach slight importance to citizenship in a particular country, and em¬ phasize the cosmopolitan idea of social unity with all rational beings .of.every society and of every country. In this and in other doctrines, Stoicism, especially in its later form, goes be¬ yond the conceptions usually prevailing in Greek ethics, and approaches the Christian idea of the universal brotherhood of man.

Bibliography. — Seneca, (tran. from Ger. by O. K. Reichel, 1892) ; Brown, J. B., (Stoics and Saints) (1893) ; Davis, (Greek and Roman Stoicism > (1903) ; Bevan, E. R., Sto¬ ics and Skeptics) (Oxford 1913).

James E. Creighton,

Professor of Philosophy, Cornell University.

STOJOWSKI, Sigismund, American pian¬ ist and composer: b. Strelzy, Poland, 1870. He studied under Zelenski in Cracow, and under Diemer, Paderewski, Dubois and Massenet in Paris. He toured Europe successfully as a pianist, and in 1906 became professor of piano¬ forte at the Institute of Musical Art, New York. Since 1913 he has been professor of pianoforte at the Von Lnde School of Music, New York. Author of (Symphony in D Minor) ; several violin sonatas and piano con¬ certos; for violin and orchestra; (Der Friihling,* a choral work with orchestra; and many pieces for the piano and the violin.

STOKE NEWINGTON, a metropolitan borough of London, bounded east by Hackney and west by Islington. Area, 863 acres. Pop.

50,659.

STOKE-POGES, stok po'jis, England, a village of Buckinghamshire. It is the burial place of Thomas Gray, and its churchyard is the scene of the famous (Elegy.)

STOKE-UPON-TRENT, England, a sea¬ port and market-town, in Staffordshire, 14 miles northwest of Stafford, capital of the ˆPotteries** district. It dates mainly from the 18th century and has

been greatly improved recently. The municipal buildings, free library, Minton Me¬

morial, Hartshill infirmary, monuments to prominent citizens and public baths are note¬ worthy features. The industries and manu¬ factures are varied, including earthenware, por¬ celain, tiles, tesselated floors or pavements, coal¬ mining, the manufacture of machinery, engines, etc. Pop. about 30,458.

STOKER, Bram (Abraham), English au¬ thor: b. Dublin, 1848; d. 22 April 1912. He was educated at Dublin University. He entered the government civil service and while there he became noted as a literary, art and dramatic critic on various Dublin newspapers. In 1876 he was associated with Henry Irving in the management of the Lyceum Theatre and has published (Under the Sunset) (1882) ; (The Snakes' Pass) (1891) (The Watter's Mou'* (1894) ; (The Shoulder of Shasta) (1895) ; (1897); (1898); (1903) ; (The Man > (1905) ; Per¬ sonal Reminiscences of Henry Irving) (1906) ; (Lady Athlyne) (1908) ; (Snowbound) (1909) ; (The Lady of the Shroud) (1910).

STOKER, Sir (William) Thornley, Irish

surgeon: b. 6 March 1845; d. 3 June 1912. He obtained his early education in the Wymond- ham Grammar School, later studying in the Col¬ lege of Surgeons, Ireland, and Queen's College, Galway. He rapidly attained eminence in his practice and was created a knight in 1895 in recognition of his services to surgery. He was appointed surgeon to the City of Dublin Hospi¬ tal in 1873 ; appointed surgeon to Richmond Hospital 1873, and Swift's Hospital 1876, later becoming governor. He was profes¬ sor of anatomy in the Royal College of Surgeons, Ireland, 1876-89, and its president, 1894--96; governor of the Royal Hibernian Military School, the House of Industry Hospi¬ tals and of the National Gallery, Ireland; he was appointed inspector for Ireland under the Vivisection Act and was a Fellow of Royal University from 1890. He contributed many scientific papers on his profession to magazines and periodicals.

STOKES, Adrian, English painter: b. Southport, in 1854. He received his education at the Liverpool Institute and the Royal Acad¬ emy Schools, London. He has exhibited works at the Royal Academy each year since 1876 and has been awarded medals at the Paris Exhibi¬ tion, 1889, and the World's Fair at Chicago, 1893. He has also written much on art for magazines and newspapers.

STOKES, Anson Phelps, American finan¬ cier and reformer, father of

J. G. P. Stokes and A. P. Stokes (qq.v.) : b. New York, 22 Feb. 1838; d. 28 June 1913. He was early en¬ gaged in the mercantile business, later was a member of the banking firm, Phelps, Stokes and Company, and was prominent in financial cir¬ cles. He was the first president of the Reform Club, New York; was vice-president of the Civil Service Reform Association, and was president of the National Association of Anti- Imperialist clubs. He was deeply interested in social reforms and was prominent in works of charity, to which he contributed liberally. Au¬ thor of Urnm Metallism* (1894 ; 5th ed., 1896); bruising in the West Indies) (1902); bruis¬ ing in the Caribbean with a Camera) (1903).

STOKES, Anson Phelps, American Prot¬ estant Episcopal clergyman and educational writer, son of A. P. Stokes (q.v.) : b. New Brighton, S. I., 13 April 1874. He was gradu¬ ated at Yale University in 1896 and at the Epis¬ copal Theological Seminary, Cambridge, in 1900. He traveled in China, Japan, India and other countries in 1896-97 ; has been secretary of Yale University since 1899, and assistant minister of Saint Paul's Church, New Haven, 1900-18. He is also secretary of the Phelps Stokes Foundation for educational work among negroes ; and since 1912 has been a member of the General Educa¬ tion Board. Author of (Memorials of Eminent Yale Men *(1914); (What Jesus Christ Thought of Himself* (1916) ; (Historic Universities in a Democracy) (1913) ; (The Question of Pre- paredness) (1916).

STOKES, Frank Wilbert, American artist; b. Nashville, Tenn. He was educated at Phil- ' adelphia, Pa. ; studied music under Prof. Hugh Clark of the University of Pennsylvania, and art under Eakins, at Philadelphia Academy of Fine Arts. In Paris he studied art under Gerome at Lcole des Beaux Arts ; also at Cclorni's under Raphael Collin and Academy Julien under Boulanger and Lefevre. He lived four years at Etampes, Pas-du-Calais ; exhibited at Salon Societe-des-Artistes Frangais for four years ; returned to United States in 1891 ; in 1892 accompanied Peary Relief Expedition for Scribners Magazine ; in 1893 was artist member of Peary's North Greenland Expedition, 17 months in Bowdoin Bay, Greenland, building a studio and painting from natives and nature. Remained in Philadelphia until 1900 then going to New York City in 1901 joined the Swedish Antarctic Expedition under Dr. Otto Nor- denskjold, at Buenos Aires, Argentine, remained about eight and one-half months painting from nature as member of the ((Land Party.® The expedition failed in landing on the

Antarctic continent and Mr. Stokes left the expedition at Port Stanley, Falkland Islands, and thence by steamer to Montevedio, Uruguay, Buenos Aires and finally via Antwerp returned to the United States. Mr. Stokes paid his way with all of the above expeditions, in order to be inde¬ pendent and do his special work. Lectured and exhibited at various places in the United States and Canada, London, England, and exhibited paintings at Salon of Societe Nationale des Beaux Arts; lectured before Societe de Geog¬ raphic de Paris, also before Societa Geografica Italiana, Rome, Italy, before the king and queen. Awarded Prix Alphonse de Montyot silver medal by the Societe de Geographic de Paris. Painted and completed in 1909 a series of mural decorations for Eskimo Hall of the American Museum of Natural History of New York, on legends and the life of the Eskimo. His publications include essays in (Color in Far North *(1894) ; (An Arctic Studio* (1896) ; 'Essentials of Polar Expedition (1900), in Philadelphia Saturday Evening Post; (Aurora Borealis> ; 'An Art in the Antarctic *and 'In the Tropics* (in Century Magazine 1903) ;

(Color in Polar Worlds) (1906), International Geographical Congress.

STOKES, Frederick Abbott, American publisher: b. Brooklyn, N. Y., 4 Nov. 1857. He was graduated at Yale University in 1879 and in 1881 ' established a publishing house known as

White and Stokes. The firm became White, Stokes and Allen in 1883; Frederick A. Stokes in 1887; Frederick A. Stokes and Brother in 1888; and since 1890 has been Frederick A. Stokes Company, Mr. Stokes being its presi¬ dent. He edited 'Poems of Sir John Suckling> (1886) ; and the Pocket Magazine in 1898-1901; and has contributed to various magazines.

STOKES, Sir George Gabriel, British

mathematician and physicist: b. Skreen, County Sligo, Ireland, 13 Aug. 1819; d. 1903. He was graduated at Cambridge in 1841, in the same year was elected a Fellow of Pembroke Col¬ lege and was elected Lucasian professor of mathematics at Cambridge in 1849. In 1885 he became president of the Royal Society and from 1887 to 1892 was member of Parliament for Cambridge University. He was made a baronet in 1889 and in 1902 became master of Pem¬ broke College. He was distinguished as an ex¬ pounder of the principles of hydrodynamics and of the phenomena of fluorescence and phos¬ phorescence and he was the first to demonstrate in college and public lectures the scientific prin¬ ciples of spectrum analysis. He greatly ex¬ tended the field of physical inquiry and demon¬ strated more clearly

than had ever before been done the relation of physics and the natural sciences in general to higher mathematics. He was also a high authority on optics. His work, especially in mathematical physics, was brilliant and exact. He attempted successfully the solu¬ tion of problems thought by leading scientists to be practically unsolvable. His publications include the (Burnet Lectures on Light *(1892) ; Mathematical and Physical Papers* (1880- 1902) ; 'Gifford Lectures on Natural Theology) (1891-93), and more than 100 important papers printed in the transactions of learned societies. His mathematical and physical papers were col¬ lected and published in five volumes at Cam¬ bridge (1880, 1883, 1901, 1904 and 1905), and his Memoir and Scientific Correspondence, * also at Cambridge in 1907. Consult Brown, E. W., 'Biography of Stokes) (in 'Annual Report of Smithsonian Institution, 1904,* Washington

1905).

STOKES, Henry Newlin, American chem¬ ist : b. Moorestown, N. J., 24 Oct. 1859. He was graduated at Haverford College (1878) and received the degree of Ph.D., at Johns Hop¬ kins (1884), whence he went to Europe. From 1884-89 he studied at the University of Munich and Federal Polytechnic, Zurich, Switzerland. He was chemist for the United States Geologi¬ cal Survey 1889-92 and 1894-1903, becoming as¬ sistant professor of inorganic chemistry (1892- 93) and associate chemist. Bureau of Stand¬ ards (1903-09).

STOKES, James Graham Phelps, Ameri¬ can Socialist: b. New York, 18 March 1872. He was son of Anson Phelps Stokes and was graduated (1892) at Sheffield Scientific School (Yale). In 1896 he received the degree M.D., at the College of Physicians and Surgeons (Columbia), when he took up graduate work in the School of Political Science, Columbia (1896-97). In 1905 he married Rose Harriet Pastor, prominent Socialist leader and lecturer He spent much time on the governing boards of the corporations in which his family estate was interested. In very numerous philanthropic institutions, such as the New York Association

for Improving the Condition of the Poor, Uni¬ versity Settlement Society, Federation of Chris¬ tian Churches and Christian Workers, Peoples' Institute, Tuskegee Normal and Industrial In¬ stitute, etc., he has done much practical work. From 1906 he has devoted his

activities largely to the Socialist cause, being president of the Intercollegiate Socialist Society (1907-17), presidential elector on Populist ticket (1904), vice-chairman, Municipal Ownership League, its candidate for president of board of aldermen, New York (1905). In 1911 he was member of the State executive committee of the Socialist party of Connecticut; candidate for New York assejnbly (1908) ; candidate for mayor of Stamford, Conn. (1912). In 1917 he withdrew from the Socialist party, together with numerous other leaders when the party views were pacifist and antagonistic to the American government and its war policy. In the latter year he became vice-chairman of the Nationalist party, secre¬ tary-treasurer of the Social Democratic League of America, etc. He enlisted (1917) in the Veteran Corps of Artillery, New York, and was transferred to Ninth Coast .Artillery, New York.

STOKES, Whitley, Irish Celtic scholar: b. Dublin, 28 Feb. 1830; d. 1909. He was edu¬ cated at Trinity College, Dublin, and called to the bar at the Inner Temple in 1855. He went to India in 1862 and became successively secre¬ tary to the governor-general's legislative council and to the legislative department of the gov¬ ernment of India. In 1877-82 he was law mem¬ ber of the governor-general's council and dur¬ ing his official career in India drafted the greater part of the present Anglo-Indian codes of civil and criminal procedure (4 vols., 1887— 91) and numerous acts relating to property, trusts, etc. In 1879 he was president of the Indian Law Commission. In 1868 he proposed a scheme for collecting and cataloging the Sanskrit manuscript preserved in India. His published works include those treating of legal and those dealing with Celtic subjects, by the latter of which he is best known to the literary and scientific world. He began his Celtic studies in his youth and continued them enthusiastically all his life. Most of his work is of a very learned nature, and some of it is of high literary merit. Especially faithful and sym¬ pathetic are his translations from Celtic into English. His Celtic studies and writings in¬ clude Irish, Scotch, Welsh, Breton and Cornish. He has placed, through his researches, a vast amount of early Celtic material at the disposi¬ tion of students of the Celtic tongues. The former comprise (Treatise on the Liens of Legal Practitioners) (1860) ; (On Powers of Attorney) (1861) ; (Hindu Law Books' (1865) ; (The Older Statutes in Force in India, with Notes) (1874) ; and (The Anglo-Indian Codes' (1887-8; supplements, 1889-91) etc. Among his Celtic works may be named Hrish Glosses) (1860) ; (Three Irish Glossaries' (1862) ; <The Play of the Sacrament' (1862) ; (The Passion, a Middle 'Cornish Poem) (1862) ; (The Crea¬ tion of the World, a Cornish Mystery) (1863) ; (Three Middle Irish Families) (1871) ; (Goi- delica) (1872) ; (The Life

of Saint Meriasek) (1872) ; (Middle-Breton Hours' (1876) ; (The Calendar of Aengus' (1880); tripartite Life of Saint Patrick' (1887, in the Rolls Series); (Lives of Saints from the Book of Lismore'

(1889) ; (Urkeltischer Sprachschatz' (1894), with Bezzenberger ; the Martyrology of O. Gorman' (1895) ; the Annals of Tigernach' (1897) ; the Eulogy of Saint Columba' (1899). He is joint-editor of Hrische Texte' and of the (Archiv fur Celtische Lexikographie.'

STOKOWSKY, sto-kof'skl, Leopold, American orchestral conductor : b. London, Eng., 1882. He was graduated at Queen's College, Oxford, studied instrumentation at Paris and came to New York in 1905. He conducted symphony, operatic and oratorio work in Paris, and was musical director (1905-08) of the New York Saint Bartholo¬ mew's choir. From 1909-12 he was conductor of the Cincinnati Orchestra, and (since 1912) of the Philadelphia Orchestra.

STOLA, the Latin name of a loose gar- .ment worn by Roman matrons over the tunic. To the bottom of it a border or flounce was sewed, the whole reaching down so low as to conceal the ankles and part of the feet. It was the characteristic dress of the Roman matrons, as the toga was of the men. Divorced women or courtesans were not allowed to wear it. It was usually gathered and confined at the waist by a girdle, and frequently ornamented at the throat by a colored border. It had either short or long sleeves and was fastened over the shoulder by a fibula.

STOLBERG, stol'berk, Christian, Count, German author: b. Hamburg, 1748; d. 1821. He traveled through Switzerland and North Italy in company with Goethe and Lavater, and finally settled in Schleswig where he wrote poems and dramas. He made excellent trans¬ lations into German of the Greek poet Sophocles, and other works from the Greek. His poems, which are generally .of an intimate nature and depict faithfully and sympatheti¬ cally family life, were published in several editions under the simple title of (Gedichte' (1779, 1782, 1787, 1810). He was a brother of Friedrich Stolberg, and the works of the two brothers were published in 20 volumes under the general title (Werke der Briider Stolberg' (Hamburg (1820-25). Stolberg was influenced by Klopstock.

STOLBERG, Friedrich Leopold, Count, German poet, brother of Christian Stolberg (q.v.) : b. Bramsted, 1750; d. 1819. He wrote plays, poems, travels and translated the (Iliad, ' four tragedies of 2Eschylus, some of the works of Plato and Ossian's poems. From 1777 to 1780 he was Ambassador to Copenhagen for Prince-Bishop of Lubeck; and

Ambassador for Denmark at Berlin (1780--89). He also held other important official positions. In 1800 he and his whole family became converts to Catholicism. From this time .on he lived in comparative retirement, devoting his energies to literary work. He wrote an elaborate his¬ tory of the Religion of Jesus Christ' (15 vols., 1807-18). Consult Hennes, J. H. (Frank¬ fort 1876) ; Janssen, J. (Friedburg 1900), and Menge, T. (Gotha 1862) for biographical studies.

STOLE (Latin stola, long robe), a long narrow band or scarf with fringed ends, worn by ecclesiastics of the Roman Catholic and Protestant Episcopal churches, by deacons over the left shoulder, being fastened under the

right arm ; by bishops round the neck with both ends pendant in front to the knees; and by priests similarly, but with the ends crossed over the breast at mass.

STOLP, stolp, or STOLPE, stol'p, a town in Prussia, in the province of Pomerania, on the river of its own name, 64 miles west of Dantzig. The interesting features are a castle of the 16th century, two good churches, the ancient town-gates and several schools. The industries are chiefly fishing, iron founding, linen weaving and amber turning. There is some trade in cattle, fish, geese, grain and liquor. The port is Stolpmunde at the mouth of the river. This is also a favorite summer resort. It formerly belonged to the Hanseatic League, from which it passed to Brandenburg in 1637. Pop. about 35,000.

STOLYPIN, stol'y-pen, Peter Arkadie- vitch, Russian statesman: b. 1862; d. 1911. He studied at Saint Petersburg University, and (1885) was engaged in the department of public domains. He became president of the provincial court in the government of Kovno, and was promoted (1902) to governor of Grodno, and (1903) governor of Saratov. He was appointed Minister of the Interior in 1906, and then constitutional Premier after Goremy¬ kin's Duma was dissolved. He placed most of the empire under martial law to suppress the growing elements of revolution, and he was assassinated in 1911.

STOMACH. The ancients conceived di¬ gestion (q.v.) as a process of cooking, executed by the animal heat of the body. Not until the 1 7th century was the idea advanced that digestion in the stomach was a chemical process largely due to ferments. In 1752 Reaumur, and in 1783 Spallanzani, established that the main factor in digestion was a secre¬ tion of the stomach, the gastric juice, which dissolved and

transformed the ingested food¬ stuffs chemically. Previous to that time — even in the 17th century — digestion was thought to be due to a mechanical trituration of the food, Reaumur knew that the secretion of the stomach was acid, but it was not until 1834 that Prout discovered that the acidity was due to hydrochloric acid (HC1). In 1836 Schwann recognized the active ferment of the gastric juice, the pepsin.

A research work of the most far-reaching importance concerning the nature of stomach digestion was executed by the American mili¬ tary surgeon, William Beaumont, on the stomach of the Canadian hunter, Alexis St. Martin. After a gunshort wound had opened the organ, it healed not perfectly but, leaving a fistula permitting introspection and direct, ob¬ jective study of digestion. The investigations of Beaumont constitute what may justly be designated as the most epoch-making research on the physiology of the human stomach. ((Experiments and Observations on the Gas¬ tric Juice and the Physiology of Digestion, } Plattsburg, N. Y., 1833).

The digestive processes in the intestines were first systematically studied by Claud Bernard, who discovered in 1848 that the pancreatic juice digested fats. Corvoisart in 1857 discovered the albumen-digesting power of the pancreatic juice. In 1865 the secretion of the intestinal glands was gained in a pure state by Thiry.

6?i

Valuable contributions to the physiology of di¬ gestion in the stomach and intestines have been made by J. P. Pawlow, of the Institute for Ex¬ perimental Medicine, Saint Petersburg. These scholarly researches belong to the most recent acquisitions of our knowledge of the digestive tract. Still much remains to be worked out. Even at the present time the function of the bile is not completely understood, nor are the functions of the liver and pancreas satisfactor¬ ily investigated. In a brief and practical ac¬ count like this, the reader seeks only well- ascertained facts and not hypotheses. What he wants to know is (1) how the stomach works under healthy conditions, what are its normal performances, and (2) how its abnormal con¬ ditions are brought about, how its diseases are manifested, and what are the best means of avoiding or curing them.

Normal Gastric Digestion. — For an under¬ standing of the normal functions of the stom¬ ach, a brief reference to recent discoveries is indispensable. The stomach is not the main digestive organ, only one-seventh of the entire digestive process occurs in it. The remaining six-

sevenths of digestion are carried on in the intestines. But it would be a grave error to assume for this reason that the stomach is not necessary for the digestive process. For so de¬ pendent is intestinal digestion upon gastric di¬ gestion that it is impossible to have a normal digestion in the intestines without a previous digestion in the stomach. It is also a mistake to assume that the intestinal digestion is normal in individuals who for surgical reasons have had to undergo the operation of the removal of the stomach as a whole or in part. None of such operated cases where the entire stomach was removed have lived over a year or six months, although they were kept under con¬ stant supervision and the most careful dietetic control.

The chemical changes which the various food-articles undergo in the stomach are of far- reaching importance for the changes which are to occur in these foods after they reach the intestines. Many of the old authors, beginning with the American physiologist, Beaumont, be¬ lieve that the mechanical irritation of the foods causes the gastric secretion, but the experi¬ ments in Pawlow's laboratory have proved the fallacy of this view. In the first place, if the secretions were due to simple mechanical irrita¬ tion, there is no reason why irritation with the point of a glass rod, with a feather, or with sand placed in the stomach, should not also cause the secretion. A secretion may be caused by me¬ chanic irritation, but it is composed mainly of a liquid resembling plasma, containing mucus, and having no digestive power. The mistake of the older experimenters, according to Pawlow, grew out of the fact that they ignored the so-called psychic secretion, a secretion which can be set up by the mere smell or sight of food, or even by a very intense feeling of hunger. If the oesophagus of a dog be cut in the neck and its end sewed to the edges of the wound, and at the same time a gastric fistula be established, pieces of meat which are fed to the dog after healing of these fistulae will not reach the stom¬ ach, but will fall out of the upper end of the fistula leading into the oesophagus. Neverthe¬ less in five to six minutes after the swallowing of the food gastric juice begins to be secreted,

running from the gastric canula first in drops and afterward in a continuous stream. If the dog be offered meat without receiving it, the gastric secretion will also appear, though not so plentifully as when the dog was actually allowed to chew the meat. A further interesting fact observed in dogs so experimented on was that no secretion followed the swallowing of indigestible substances like small stones.

These experiments furthermore suggested that for every kind of food a definite gastric secre¬ tion is formed of specific composition. There¬ fore it has been said that the stomach provides a special gastric juice to meet each dietetic requirement. It must therefore be further studied whether the mucous membrane of the stomach is capable of distinguishing between the varieties and classes of foods that come in contact with it, much as the skin recognizes mechanical, chemical, thermic and electrical stimulation.

It might be asked, <(What is the object of this psychic secretion?® for Pawlow has clearly es¬ tablished the existence of two kinds of gastric secretion, the chemic and the psychic. This question applied to the 'humdh physiology would be the same as inquiring, <(What is the object of the appetite?® The answer is, that under the influence of the psychic secretion a gastric juice is furnished which is much more effective than that which is secreted under purely chem¬ ical stimulation of the food, that is, when food is taken without any special appetite. Further¬ more, under the influence of psychic secretion foods which would otherwise not stimulate the gastric mucosa to secretion become converted by the already present psychic secretion into something else which constitutes a further stim¬ ulant to the secretion of gastric juice. For in¬ stance, if a solution of albumen be administered to a dog upon which a Pawlow operation has been performed, that is, splitting off part of the stomach, with all the vessels and nerves in¬ tact, and making this second smaller stomach communicate with the abdominal wall, but not with the general cavity of the large stomach from which it is dissected (see Hemmeter's Practical Physiology) there will be no secretion from the small stomach, for albumen by itself does not excite chemical secretion. But if the psychic secretion is previously set up by some other means, before the albumen is placed in the large stomach — for instance, by waving a piece of meat before the dog's eyes — then, following the introduction of albumen, a secre¬ tion will be found in the small (artificial) stomach which is qualitatively and quantitat¬ ively greater than the psychic secretion alone, or when albumen is given alone, it is evident that, while albumen in itself does not excite secretion, the products of albumen do cause this secretion. The same is true of pieces of bread winch, when placed in the large stomach through the fistula, will not promote a secre¬ tion ; but if the dog is allowed to swallow the bread, secretion begins and continues for sev¬ eral hours. Psychic secretion therefore is a preparatory secretion, transforming substances, which otherwise would not stimulate the stom¬ ach into such forms as can accomplish this stimulation. The fact that bread will cause a secretion when chewed and swallowed and not when placed

directly in the stomach through the fistula, may be interpreted (as by Pawlow

and Peter Borisoff) as proving the secretion of a gastric juice under psychic influence; but — as will be shown presently — it may be due to a special body formed in the salivary glands and reaching the blood eventually circulates through the glands of the stomach and stimu¬ lates gastric secretion.

Edkin has demonstrated that the pyloric mucosa forms a chemic substance during diges¬ tion which also stimulates gastric secretion af¬ ter it has once been started by other mechan¬ isms. Further revelations from Pawlow's labor¬ atory disclose very important relations between the various classes of food, permitting the con¬ clusion that they may mutually advance or in¬ terfere with the digestion of their various con- stitutents in the gastric chyme. For instance, starch paste does not by itself promote gastric secretion, but when mixed with meat it was found to accelerate the action, of the gastric juice, increasing its digestive power. Further¬ more, it was demonstrated that the stomach is capable of distinguishing between lactic, butyric and hydrochloric acids and responded to each of these acids with a varying quantitative secretion. As lactic and butyric acids are either contained in the food as such or are prod¬ ucts of gastric fermentation, their stimulating influence on gastric secretion is of therapeutic importance. It is evident, therefore, not only that the stomach is extremely delicate in de¬ tecting the composition of foods and regulat¬ ing the composition of its secretion correspond¬ ingly, but that it can distinguish between vari¬ ous organic acids. These experiments further¬ more gave the clue to the treatment of gastric secretory disorders not by drugs merely but by dietetic measures.

Hemmeter found that extracts made from salivary glands that were removed from ani¬ mals during the act of chewing, when injected into the general circulation of dogs caused a flow of gastric juice. This occurred when the animal's stomach was empty. All of these chemic agents that correlate the function of physio¬ logically and anatomically distant organs are called Hormones by Starling (from the Greek cjp/zaw, I stimulate).

The human stomach accomplishes its work by the means of three essential functions, secre¬ tion, absorption and peristalsis (this term re¬ fers to the movements of the stomach). The secretion of the gastric glands owes its digestive power to hydrochloric acid and three ferments. The quantity of hydrochloric acid amounts to two parts in the 1,000 of gastric juice. The ferments are pepsin, which acts mainly

on the proteid constituents of food like meat and egg, rennin or chymosin, which acts principally up¬ on milk, precipitating the casein; lipase, which is a fat-digesting ferment; and the new gastric ferment, ((chymaze,® which is not a digestant of food, but an accelerator of the digesting action of the ferments of the pancreatic juice. (International Clinics, Vol. II, 12th Series, p. 276, article by Peter Borisof).

Dependence of Intestinal upon Gastric Digestion. — It is a prevalent opinion among the laity that the stomach has a marked ab¬ sorptive power. This is a natural consequence of an older error, according to which the stom¬ ach is the chief digestive organ, it having been formerly believed that by far the greater part of the digestive act takes place in the stomach.

As already intimated, the actual digestion which takes place in the stomach is insignificant com¬ pared with that which takes place in the in¬ testine. Later it will be shown here that the secretion of pancreatic juice depends upon the liberation from the membrane of duodenum, or first part of the bowel, of an agent called duodenal secretin , another hormone (discovered by Bayliss and Starling), and that the liberation and secretion of this agent depends upon the presence of hydrochloric acid in the gastric chyme. So that if this acid is not present in the chyme as it enters the upper bowel, there can be no normal performance of intestinal di¬ gestion. Just as normal gastric digestion de¬ pends upon a normal condition of the mouth and normal salivary secretion, so normal in¬ testinal digestion depends upon a normal stom¬ ach.

Absorption from the Stomach. — The

amount of absorption that takes place from the stomach is surprisingly small. Water is prac¬ tically not absorbed at all, for it appears that fully 95 to 100 per cent of all water taken into the stomach is passed out into the duodenum and absorbed from the intestine. Alcohol and sub¬ stances in solution of alcohol are readily ab¬ sorbed. Grape-sugar, milk, cane-sugar and mal¬ tose are absorbed in moderate amounts when they are in aqueous solution. When they are in alcoholic solution larger amounts are absorbed. Dextrin and peptones are also taken up from the stomach, but in smaller amounts than sugar. The amount of these substances absorbed in¬ creases with the

concentration of the solution. But simultaneously with this absorption oc¬ curs a more or less active secretion of water into the stomach, which secretion increases or diminishes directly in proportion to the amounts of the substances absorbed. So that under cer¬ tain conditions it is possible to draw more water out of the stomach by means of a stom¬ ach-tube than has been drunk half an hour previously, which certainly refutes the assump¬ tion that water could be absorbed from the stomach, and favors the view that water is not only not absorbed, but that it is actually se¬ creted into the stomach under certain conditions. This conclusion is of great value in the treat¬ ment of certain dyspepsias characterized by a weakened condition of the gastric muscula¬ ture; for in these the contractile power of the stomach is not sufficient to expel the water into the bowel in the proper time. And as water is, bulk for bulk, the heaviest substance which the human being takes into the stomach, its reten¬ tion in the stomach beyond a certain length of time drags down and exhausts the already attenuated gastric muscularis and dilutes the al¬ ready weakened gastric secretion. Therefore in some forms of gastric atony an essential part of the treatment consists in restricting the amount of water to the lowest possible requisite or to give it by means of colon-injections, if necessary, for a time at least; or if some of it must be taken by way of mouth, to induce the patient to lie on his right side and by means of massage to facilitate the expulsion of the water from the stomach into the intestine.

The Gastric Peristalsis or Motor Func¬ tion of the Stomach. — This is perhaps the most important function of the stomach, for not only does the motor function mix and churn up the gastric contents, but it expels them at

the proper time into the bowels. An animal might live without a gastric secretion, or with a stomach which could not absorb anything, but it could not live with a stomach that had no peristalsis, The muscular layer of the stom¬ ach is much thicker and stronger at the pyloric end, which is near the outlet toward the in¬ testine, than at the cardiac end, which is the dilated rounded pouch extending in the oppo¬ site direction. The cardiac end of the stomach is therefore mostly quiet during the digestive act, and the principal gastric movements of churning and expulsion occur in the pyloric end where the muscles are strongest. According to Oppel, the cardiac or quiet end of the stom¬ ach in certain animals, like the horse, pig and rat, is functionally distinct from the pyloric end. It is lined by a different kind of epthelium called pavement epthelium and its glands have no acid secretion. Accordingly this quiet region is, even under normal conditions, the seat of active starch digestion. It has been thought

that, inasmuch as the starch-converting agency of the saliva could not act in the presence of an acid like that of the gastric secretion, there¬ fore, all starch digestion was arrested in the stomach and was not resumed until the food reached the intestine. That this is not the case is. shown by W. B. Cannon, who proved that in man as in other animals the cardiac end of the stomach serves chiefly for starch diges¬ tion by the action of the salivary ptyalin dur¬ ing the early part of digestion in the stomach. ((American Journal of Physiology,* Vol. VI, p. 396). This again emphasizes the importance of thorough mastication, for only thereby can the food be thoroughly penetrated by the saliva and further starch conversion take place in the cardiac end of the stomach during gastric di¬ gestion.

The movements which food undergoes in the stomach during digestion can be studied by the aid of the X-rays. An inert and in¬ soluble substance which is capable of cutting off the X-rays must be mixed with the food in order to make the gastric movements visible before the Roentgen apparatus. Bismuth sub¬ nitrate answers this purpose admirably. Even the movements of the human stomach can be studied by adding this insoluble substance to the food and placing the individual who has eaten it before the X-ray instrument. In this way it has been discovered that the pyloric or highly muscular portion of the stomach is the part where the most effective gastric movements are brought about. The movements in the other portions of the. stomach are not of sufficient force to be noticeable before the X-ray appa¬ ratus. It seems probable, therefore, that the fundus or pouch end of the stomach serves simply, to push the food into the pyloric end. where it is churned to and fro for a while and eventually expelled into the duodenum. Three or four inches from the exit of the stomach, known as the pylorus, the musculature of the stomach is particularly strongly developed (sphincter muscle of the antrum pylori) ; and here it is that the stomach may constrict to such an extent as to partition off a special por¬ tion of the pyloric end and expel the food into the duodenum without permitting of any regurgitation into the fundic end. All this is in contradiction of the* view originally held by Beaumont and still quoted in some of the

textbooks of physiology, namely, that there is a regular circuit of food around the walls of the gastric cavity.

Structure of the Stomach. — It is impossible to enter here into a

consideration of the micro¬ scopic structure of the stomach, although this

is indispensable for the proper understanding of its abnormal functioning. Much is yet to be learned concerning the cells of the peptic glands and their function. It is certain, how¬ ever, that the different products of the gastric secretion, the hydrochloric acid and the fer¬ ments, do not originate in the same cells, but that there are acid-producing cells and fer¬ ment-producing cells in the glands within the stomach. It is even conceivable that the differ¬ ent ferments of the stomach are produced by different cells. The organ is composed of five different coats. Passing from without inward, these are (1) the peritoneal; (2) the muscular coat, which is in turn composed of the longi¬ tudinal and circular layers; (3) a connective tissue layer; (4) a very small thin layer of muscular tissue, called the muscularis mucosae, separating the connective tissue from the gland¬ ular layer; (5) the glandular layer itself, in¬ nermost of all. In addition to these structures the stomach is permeated by arteries and veins, a liberal network of lymphatics and is richly supplied with nerves. The glandular layer is bordered by a stratum of columna epithelial cells.

The Abnormal Digestion of the Stomach; Gastric Diseases. — One of the first and most

important things to decide when an individual complains of dyspepsia, or of any distress, pain, distention or symptom referable to the stomach, is whether the signs and symptoms are really traceable to the stomach or not. For one may have all the symptoms of gastric disease and yet the stomach itself may not be abnormal either in structure or function. For instance, the stomach may give rise to abnormal sensations as a consequence of disease of other organs. The organs which most frequently derange the stomach in this manner are the heart, liver and kidneys. Even physicians of experience who have become afflicted with abnormal gastric digestion have been at times deceived concern¬ ing the true source of their malady. Fully two-thirds of all gastric sufferers who come to special clinics devoted to dis¬ eases of the stomach are suffer¬ ing not from any primary dis¬ ease of the stomach whatever, but either from a nervous affection of the stomach or from one of the gastric derange¬ ments that are secondary to disease of other organs. Per¬ haps the most frequent of these disorders are those that are due to the nervous gastric affection, or as they are called, the gastric neuroses. To de¬ termine precisely the exact nature of an affection of the stomach, the chemical analysis and microscopic examination of known test-meals is indispens¬ able. According to the gravity of the morbid condition, a heavy or a light

test-meal is given and a certain time after it is eaten the stomach tube is passed into the stomach and a certain amount of the gastric contents with¬ drawn for analysis. As long as this is not done, all deductions from the symptoms and signs alone are conjectural. That is not to say that the inferences drawn from test-meal analysis and microscopical examination of test-meals are always conclusive. It is fre¬ quently necessary to examine also the blood and the urine of the patient and even to ex¬ amine the stools after certain test-meals. Recently the method of fractional analysis of test-meal samples drawn at short intervals has been rediscovered. In a way it is of interest to ascertain the time relations of the gastric secretion, that is, when it reaches its height. Clinically, however, the expediency, feasibility and possibility of this method are still “subju- dice .» Then all the other organs of the body should be carefully examined, bearing in mind that it is not always correct to presume that a patient has a disease of his stomach because he has gastric symptoms. The reverse is equally true, that a patient may have no symptoms what¬ ever referring to the stomach and yet have very grave disease of this organ. The gravest affec¬ tion which may befall the organ — cancer of the

DORSAL VIEW.

(Dotted area shows location of Stomach).

a. Lungs. d. Left kidney. g. Hepatic flexure.

b. Spleen. e. Descending colon. h. Right kidney.

c. Splenic flexure. /. Complementary space, i. Ascending colon.

stomach — has been known to run its entire course and cause death in a latent manner; that is, without giving a single symptom re- ferrable to the stomach. This is an instance where a patient may have a gastric disease and no gastric symptom. A person who suffered from almost complete blindness, yet manifested no disease in his eyes, was found after exhaus¬ tive study to have been thus affected by a poison circulating in his blood, which was ab¬ sorbed from his gastro-intestinal canal and was due to an abnormal digestion. Under treat¬ ment directed toward his stomach and intestine his vision gradually returned.

It is important to avoid aggravating an ex¬ isting trouble by illogical

and promiscuous medication, faulty diet and the use of alcoholic stimulants. Between 80 and 90 per cent of the so-called stomach tonics, liver regulators and stomach bitters are composed of alcohol. But even the prescriptions of physicians are not al¬ ways adapted to the. existing conditions. One of the most frequent abuses among practition¬ ers of medicine is the indiscriminate dosing with mixtures containing pepsin. In a similar manner the ferments which convert the starches, the carbohydrates, into sugar, have been much abused. These substances are called diastases. Now diastase is a ferment with which the digestive tract is abundantly supplied. It exists in the saliva in the shape of a ferment called ptyalin, and in many hundreds of tests with human saliva it has been discovered in only 2 per cent of the cases that this substance was not secreted in sufficient quantity. It is conceivable, however, that in a mouth which has been made offensive by carious teeth, by a badly coated tongue, enlarged tonsils and catarrh of the mouth, throat and nose, this ptyalin can be destroyed and rendered ineffect¬ ive ; it can also be inhibited by the loss of alkilinity of the saliva in acidosis and gout. The proper thing to do then is not to give ptyalin or diastase in form of a medicine, but to cure the abnormal condition of the mouth and general system. A frequent form of gastric disturbance is called by general practitioners ((amylaceous dyspepsia,® which is an objec¬ tionable name given to the symptoms of hyperacidity and hypersecretion. This disease is frequently treated by cutting off the car¬ bohydrates or starchy foods, which is irra¬ tional, because they cannot be dispensed with, not on account of the starch only, but on ac¬ count of the proteid which amylaceous foods contain. It will be found from the army rations of men under service of various nations that the carbohydrate portion of the foods is in¬ creased with harder work* much more than the proteid or fat portion. Therefore these foods should not be taken away because they may not be perfectly digested; but the cause of the indigestion should, if possible, be removed. If possible, a large amount of natural saliva should be swallowed after meals. Often it has been ob¬ served that with the simple supply of additional saliva caused by chewing a piece of rubber, etc., starch indigestion could not be demon¬ strated in the test-meal, although it had existed before. To Fothergill is attributed the saying that ((ferments are crutches.® No doubt many an invalid would prefer walking on crutches rather than not at all. But there are many crutch-walkers, who by modern surgery have been enabled to throw away the crutches and

walk unaided. So with the digestive ferments ; they may be used with success temporarily, hut the best thing to do is to discover how the patient may digest without them. And in case of amylaceous dyspepsia

this is accom¬ plished by cure of the excess of hydrochloric acid formation, or restoring the lost motor function of the stomach. For when the starchy foods are retained in the stomach overtime, they are very apt to cause an excessive secre¬ tion, or to produce an excessive amount of organic acid by fermenting in the stomach un¬ der the influence of bacteria.

In this connection it becomes a duty to warn against the use of saccharin as a substitute for sugar. Our nation while engaged jn the gigan¬ tic struggle to preserve its civilization from autocracy found it necessary to restrict the sugar consumption. Fortunately, however, not under the caloric requirements for a human being. But to sweeten food and drink by sac¬ charin is a mistake because this substance im¬ pairs the digestive power of the gastric juice — in fact, of all digestive ferments.

Instruction in Cooking Needed in Amer¬ ican Schools. — One of the chief features in the treatment and also in the prevention of diseases of the stomach is the avoidance of improper medication and, what is even more important, of unsuitable diet. Much improve¬ ment is needed in American cooking and public kitchens and cooking schools might be of great benefit. Serious injury is being caused by in¬ sufficient or improper food. Instruction in cooking and diet should be given in all public schools where young girls attend. For nine out of 10 girls that attend these schools it will be a greater blessing, and they personally will prove a greater blessing to the community, if they know how to prepare a roast, boil potatoes and make an omelet or good bread, than if, ignorant in these things, they can give the most scholarly translation of Virgil. In Europe it is not considered below the dig¬ nity of daughters of the highest families, even those directly connected with royalty, to attend cooking schools. Nor is such an education incompatible with the best scien¬ tific and classical training. So the prevention of diseases of the stomach demands a wider and more thorough knowledge of the art of cooking. In addition to this, it necessitates a simpler life, closer adherence to the laws of nature, more freedom from business strain and nervous tension, and above all things the avoid¬ ance of excess in the use of alcoholic beverages and tobacco. Patients should be impressed with the fact that neither drugs nor any methods of treatment can improve them if they persist in their bad habits and faulty diet. Partic¬ ularly must American business men, who, with admirable energy, but with little regard for their own health, persist in work too severe for their mental and physical constitutions, be taught that the prime factor in their successful treat¬ ment is rest. To such cases mental and physical rest is more essential to recovery than medicine or treatment directed to

the stomach. Another factor which frequently leads up to stomach dis¬ eases is inactivity of the intestines, or consti¬ pation. This should in all cases of dyspepsia receive proper attention. When a person begins to feel distress after eating, or eructates, vomits, or has feelings of oppression, fulness or pain in the abdomen and headaches, one of the first

treatments that is usually given by sympathizing friends is a drink of some alcoholic beverage, usually whiskey; then comes the abuse of pep¬ sin; very frequently the abuse of some com¬ bination containing soda and mint, or some widely advertised panacea for the diseases of digestion. All this is generally being done in the entire absence of a correct recognition of the real disease. The safest thing for the patient to do in the absence of a logical diag¬ nosis is to rest the stomach absolutely for 24

to 48 hours, and not take any food or medicine whatsoever; and thereafter, beginning with the very simplest kind of food — a small plate of farina, of strained oatmeal, a piece of toast, and a cup of hot milk and lime-water — pro¬ ceed gradually to a cup of bouillon, .and a small slice of lean boiled beef. Alcohol, sugars, rich and fatty substances should be avoided for a long time.

Organic Diseases of the Stomach. — These are the various forms of gastritis (catarrh of stomach, ulcer, carcinoma, etc.) and the dis¬ placements and enlargements, dilatation. Dis¬ placements — gastroptosis — may be congenital or acquired. When the stomach is displaced from its normal position, the condition is in the great majority of cases accompanied with an infirmity of the general nervous system known as neurasthenia (q.v.). Stiller has pointed out that this condition in over 80 per cent of these cases is attended by the loose or floating 10th rib. Normally the 10th rib is attached to the costal cartilages, and these to the breast-bone. But whenever the stomach is displaced out of its normal position and a very diffused splashing sound is audible over the abdomen on shaking the stomach, there is, as a rule, a very movable or floating 10th rib.

Dilatations of the stomach may be primary,

due to disease of the structure of the gastric walls. In these cases there is, as a rule, no mechanical interference at the outlet of the stomach,

or such interferences are secondary to some obstruction at the outlet. The causes of this obstruction may be scars from old gas¬ tric ulcers ; tumors, especially cancers ; indura¬ tive chronic gastritis; or any peritonitic in¬ flammation which may constrict the stomach from the outside. Frequently gall-stones which result in pericystic inflammation may constrict the part of the bowel immediately below the stomach in such a man¬ ner that it is indistinguishable from an obstruction of the pylo¬ rus. Five such cases are reported in Progressive Medicine,5 by Prof. 1. C. Hemmeter, December 1903, p. 45. So the cause of a dilated stomach is not always to be sought within the stomach itself.

A knowledge of displacements and dilations of the stomach neces¬ sarily precludes a knowledge of its normal position. This is admirably depicted in the accompanying illus¬ trations where it is seen that the larger end of the stomach, or the blind pouch, may extend higher than the fifth rib, on the left side, thus reaching up behind the apex of the heart. This readily ex¬ plains the distress felt about the heart, and also the irritable heart- action in some forms of gastric disturbance. The dorsal view of this illustration also shows the cor¬ rect or normal relations of the 10th rib just referred to in connec¬ tion with gastroptosis. When the 10th rib is detached or floating its tip sticks out like that of the 11th rib in this illustration. The same illustrations also demonstrate the anatomical fact that only a very small portion of the stom¬ ach is palpable through the soft part of the abdominal wall, when it is in normal posi¬ tion, because the larger part of it is concealed under the ribs and under the liver. So that the simple fact that we can see or feel a large part of the entire stomach projecting through the abdominal wall, when it is distended, is a suffi¬ cient evidence that the stomach is out of place. The stomach can be made visible through the abdominal wall by distending it artificially with carbon dioxide by means of an effervescent mixture containing tartaric acid and bicarbonate of soda. Hemmeter was the first to propose and use a method for locating and determining the size of the human stomach by successful use of the X-ray (Boston Medic, and Surgic. Journal 1897), and later another method for recognizing gastric ulcer by means of radio¬ graphy ((Archives of Digestive Diseases,5 Ber¬ lin 1906).

The remaining organic diseases of the stomach necessitates all the intricacies of chemi¬ cal and microscopical diagnosis for their detec¬ tion. They include the various forms of acute and chronic gastric catarrh or, as they should preferably be called, the forms of acute and chronic gastritis, the various types of gastric or peptic ulcers, the various tumors of the stomach,

ANTERIOR VIEW.

(Dotted area shows location of Stomach.)

a. Lungs; b. Complemental pleural space: c. Liver; d. Transverse colon; e. Heart; /. Complemental pleural space.

especially cancer, which is becoming more and more frequent. Then there are numerous dis¬ eases of a general nature, such as tuberculosis, typhoid fever, glanders, lymphadenoma and syphilis, to be considered in the study and treat¬ ment of disorders of the stomach.

When ever there is an organic disease of the stomach present it should be sought after with all the resources of modern clinical diagnosis. There should be no dallying with so-called stomach panaceas. Quite a number of the so- called incurable gastric diseases which have been allowed to go on to destruction of the glandular layer and absolute loss of peristalsis of the stomach are not incurable in themselves, but have become so from neglect, maltreatment, or procrastination. And even in those cases in which the practitioner is at present helpless, the rapid progress of medical art, especially* as ap¬ plicable to digestive diseases, promises a sub¬ stantial gain in the near future.

Bibliography. — Hemmeter, (Diseases of the Stomach, *in which there are 1,288 separate publications arranged categorically in separate chapters to which they refer especially, and over 1,000 references in the text; Ewald, (Diseases of the Stomach,* translated into English by Morris Manges; Boas, (Diagnostik und Thera- pie der Magenkrankheiten *; Riegel, (Erkran- kungen des Magens,* being Vol. XVI of Nothnagel's Encyclopedia on special Pathology and Therapy *; Stockton, (Diseases of the Stomach) ; Fleiner, (Krankheiten der Ver- dauungsorgane) ; Einhorn, (Diseases of the Stomach) ; Martin, (Diseases of the Stomach) ; Abercrombie, investigations on Diseases of the Stomach) ; Habershon, (Diseases of the Abdomen) ; Rosenheim, (Pathologie u. Therapie des Verdauung apparats* ; Pick, (Magenkrank- heiten) ; Brouar del et Gilbert, (Traite de Medecine et de Therapeutique, *Vol. IV ; Mathieu, (Traite de Maladies de l'Estomac* Hemmeter, (Organic Diseases of the Stomach) ; Leo, (Krankheiten der Bauchorgane) ; Robin, (Traite de Therapeutique appliquee,* fasc. XII (article on indigestion by G. LeMoine).

John C. Hemmeter, M.D., Professor in University of Maryland, Baltimore.

STOMACH-PUMP, a small pump or syringe used for removing matter from the stomach, for washing it out, or for injecting fluids into it. It resembles the common small syringe, except that there are two apertures near the end, instead of one, which, by means of valves in them opening different ways, serve respectively as a sucking and a forcing passage. When the object is to extract something from the stomach, the pump is worked while its sucking orifice is in connection with an elastic tube passed into the stomach ; and the ex¬ tracted matter escapes by the forcing orifice. When it is desired to throw cleansing water or other liquid into the stomach, the connection of the apertures and the tubes is reversed. A pump may not be always procurable when the occasion for it arises, and a simple tube will in many cases answer the purpose as well, if not better. If the tube be introduced and the body of the patient be so placed that the tube forms a downward channel from the stomach, all fluid matter will escape from the stomach by it, as water escapes from a funnel by its pipe; and if the outer end of the tube be im¬

mersed in liquid, there will be, during the dis¬ charge, a siphon action of some force. On changing the posture of the body, water may be poured in through the same tube to wash the stomach. For washing out the stomach a long flexible tube is also in common use, water being run in by means of a funnel attached to one end, and this end being afterward lowered so as to form the tube into a siphon.

STOMATA (Greek stoma, mouth), minute orifices or pores in the epidermis of leaves, etc., which open directly into the air cavities per¬ vading the parenchyma. The stomata are also called the <(automatic gateway.® See Leaves.

STOMATITIS. See Mouth, Diseases of the.

STONE, Amasa, American business man and philanthropist: b. Charlton, Mass., 27 April 1818; d. Cleveland, Ohio, 11 May 1883. At 21 he engaged in the construction of railroad bridges and railroads, and soon attained high rank among constructors. In 1846 he entered into a partnership for the building of. the Cleve¬ land, Columbus and Cincinnati Railroad ; in 1850 he was president of that road and thence¬ forward resided in Cleveland. He was later engaged in the construction of the Cleveland and Erie Railroad ; was managing director of the Lake Shore Railroad in 1872-74; and was president or director of several railroads and industrial corporations in Ohio. He

gave largely to charitable institutions in Cleveland, and built and endowed an old ladies' home and an indus¬ trial school. He also gave to Western Reserve University, $600,000, on condition that the uni¬ versity should be moved from Hudson to Cleve¬ land, and that the classical department should be named in memory of his son, Adelbert Col¬ lege. Consult (Amasa Stone, A MemoriaP (New York 1883).

STONE, Charles Pomeroy, American sol¬ dier: b. Greenfield, Mass., 30 Sept. 1822; d. New York 24 Jan. 1887. He was graduated from West Point in 1845; served in the Mexi¬ can War and was brevetted captain. He became chief of ordnance of the division of the Pacific and subsequently settled in California. At the opening of the Civil War he was an officer of volunteers in the Union army, but after a short term of service was arrested, and im¬ prisoned in Fort Lafayette, New York harbor, February-August 1862. Upon his release he served in the Department of the Gulf, and was chief of staff to General Banks, 1863-64. Later in the year he resigned from the army and en¬ tered the service of the khedive of Egypt in 1870 where he rose from brigadier-general and chief of staff to be Ferik-Pasha (1873-83). He received numerous decorations and held confidential positions under the khedive. Re¬ turning to the United States he became the engineer in charge of building the foundation for the Statue of Liberty in New York harbor.

STONE, Edward James, English astrono¬ mer : b. London, 1831 ; d. Oxford, 1897, He was graduated from Queen's College, Cambridge, and in 1860 was appointed chief assistant at the Greenwich Observatory. In 1870 he was made royal astronomer at the Cape of Good Hope, in which position he prepared a catalogue of all stars to the 7th magnitude between the south pole and 25° S. declination. For this he

was awarded the Lolande prize of the French Academy in 1881. This he supplemented in 1891 by a catalogue of all stars to the 7th magnitude between 25° S. declination and the equator (6424). In 1879 he was appointed Radcliffe observer at Oxford, a position he held till his death. Among his contributions to astronomical science were his deduction of the value of the solar parallax and his observation of the reversal of the Fraunhofer spectrum during an eclipse of the sun in 1874. Consult Royal Society, (Catalogue of Scientific Papers) (London 1867-1902).

STONE, Ellen Maria, American mission¬ ary: b. Roxbury, Mass., 24 July 1846. She was a member of the staff of the <Congregationalists) at Boston in 1867-68, in 1878 went to Samokov as a Congregational missionary, and was re¬ moved subsequently to Philippopolis, southern Bulgaria, and (1898) Salonica, Macedonia. In September 1901 she was kidnapped by brigands between Bansko and Djumia, Macedonia, and a ransom of $110,000 for her and Mme Tsilka, captured at the same time, was demanded. By subscription in the United .States, $65,000 was raised and the release of the prisoners followed. Her narrative appeared as (Six Months Among Brigands) in McClure's in May-October 1902, and in 1903 in book form. Later on she lectured in order to raise money for foreign missions. She also contributed to magazines and newspapers.

STONE, Frank, English painter: b. Man¬ chester, 22 Aug. 1800; d. London, 18 Nov. 1859. He originally painted in water colors, and in 1837 became a contributor to the exhibitions of the Royal Academy. Subsequently for more than 20 years he produced many works in genre and history, and on subjects of sentiment and imagination. Some of these are well known by engravings, particularly the companion pieces entitled 'The First AppeaP and (The Last Ap¬ pealˆ once very popular. He was elected an associate of the Royal Academy in 1851.

STONE, Harlan Fiske, American law scholar and educator: 'b. Chesterfield, N. H., 11 Oct. 1872. He was graduated at Amherst College (1894), received the degree LL.B., Columbia University of Law (1898), and LL.D., Amherst (1913). He was admitted to the New York bar in 1898, was lecturer on law (1899-1902), professor of law (1902-05) and was dean from September 1910, of Columbia University School of Law. He is a member of the law firm of Satterlee, Canfield and Stone. He wrote (Law and its Administra¬ tion5 (1915).

STONE, James Samuel, American Protes¬ tant Episcopal clergyman : b. England, 27 April 1852. He was graduated from the Philadelphia Divinity School 1877, took orders, and was rector of Saint Philip's Church, Toronto, 1879-82, of Saint Martin's Church, Montreal, 1882-86, of Grace Church, Philadelphia, 1886- 95, and of Saint James' Church, Chicago, since 1895. He was made B.D., by the Cambridge Theological School, and D.D., by Bishop's Col¬ lege, Lennoxville, Canada. He has published 'Simple Sermons on Simple Subjects) (1879) ; 'The Heart of Merrie England 5 (1887) ; 'Readings in Church History) (1889) ; 'From Frankfort to Munich5 (1894) ; 'Woods and Dale of Derbyshire5 (1895); 'The Prayer

before the Passion5 (1911) ; 'The Passion of Christ5 (1912) ; 'The Glory After the Pas¬ sion5 (1913) ; 'The Preparation for the Passion5 (1915).

STONE, John Timothy, American Presby¬ terian clergyman : b. near Boston, 7 Sept. 1868. He was graduated (class orator) at Amherst College (1891) and at Au¬ burn Theological Seminary (1894). Served as pastor at Utica (1894-96), Cortland, N. Y., (1896-1900), Brown Memorial Church, Baltimore (1900-09), and, since 1909, at Fourth Church, Chicago. He was moderator of the General Assembly of the Presbyterian Churches in United States, 1913-14 and presi¬ dent of trustees of the College of Wooster from 1917. During the World War he was Captain-Chaplain of Illinois Reserve Militia, First Infantry, and

director of Y. M. C. A. religious work at Camp Grant, Ill. He has written ‘Footsteps in a Parish5 (1908) ; ‘Re¬ cruiting for Christ5 (1910), as well as mono¬ graphs on themes educational and religious.

STONE, Lucy Blackwell, American re¬ former: b. West Brookfield. Mass., 13 Aug. 1818; d. Boston, 18 Oct. 1893. She was gradu¬ ated at Oberlin College in 1847 and in 1855 was married to Dr. Henry B. Blackwell, re¬ taining, however, her own name. In 1848 she toured the New England States and Canada lecturing against slavery. In 1869 she helped organize the American Woman’s Suffrage Association of which she was president until 1872 ; became connected with the Women's Journal in 1872, and was editor after 1888. Her lectures on woman suffrage made her known throughout the country.

STONE, Marcus, English painter: b. Lon¬ don, 4 July 1840; d. 25 March 1921. A son of Frank Stone, he learned his art in his father’s studio; exhibited. his first picture in 1858 in the Academy, of which he became an associate in 1877, being elected an academician in 1887. Among his better-known pictures are ‘Claudio Accuses Hero5 ; ‘On the Road from Water¬ loo to Paris5 ; ‘Stealing the Keys5 ; ‘Henry VIII, and Anne Boleyn5 ; ‘Sain et Sauf5 ; ‘II y en a toujours un autre5; ‘A Gambler’s Wife5 ; and ‘The First Love Letter.5 Many of his pictures have been published as en¬ gravings and in this form have become well known to the public.

STONE, Marvin Cheater, American in¬ ventor: b. Portage County, Ohio, 1842; d. Washington, D. C., 17 May 1899. He invented several small articles, and afterward discovered a method of imitating, in colored china, the famous “peach-blow55 vase. He acquired a large fortune, and during his later years was engaged in many philanthropic undertakings.

STONE, Melville Elijah, American jour¬ nalist : b. Hudson, Ill., 22 Aug. 1848. He began his journalistic career on the Chicago Tribune, but was not permanently settled in it until 1871, when he established the Chicago Daily News. In 1881, with Victor F. Lawson, he acquired the Chicago Morning News, changing its name to the Record. In 1888 he retired temporarily from newspaper work, and spent some years in Europe, and upon his return entered the bank¬ ing business, organizing the Globe National Bank (1891) of which he was president until

its consolidation with the Continental Bank in 1898, when he became general manager of the Associated Press.

STONE, Ormond, American astronomer : b. Pekin, Ill., 11 Jan. 1847. He was edu¬ cated at the University of Chicago, and in 1870 was made assistant astronomer at the Naval Observatory at Washington. From 1875 to 1882 he had charge of the Cincinnati Observa¬ tory superintending among other works an ex¬ tended series of measures of Southern double Stars. From 1882 to 1912 he was professor of astronomy and director of the observatory at the University of Virginia, where he devoted himself principally to the observation of neb¬ ulae and variable stars. As a teacher he trained a large number of astronomers. He founded and edited the Annals of Mathematics ; con¬ tributed to various scientific journals, and de¬ voted much of his time to the cause of public education. In 1912 he retired on a pension from the Carnegie Foundation.

STONE, Thomas, American patriot, signer of the Declaration of Independence : b. Pointon Manor, Charles County, Md., 1743; d. 5 Oct. 1787. He studied law at Annapolis, and began to practice at Frederickton in 1764. He was a delegate to the Continental Congress in 1775-77, and served as a member of the Committee on Confederation (1776-77). In 1777 he urged Maryland to ratify the Articles of Confedera¬ tion, which, however, the State did not do until three years later. In 1783-84 Stone was again a delegate to the Continental Congress, and in the latter year acted as president pro tempore. Consult Sanderson, (Signers of the Declaration of Independence, > Vol. IX (1823-27).

STONE, Walter King, American illustra¬ tor: b. Barnard, N. Y., 2 March 1875. He was educated at the Rochester public schools, studied at Rochester Mechanics' Institute and Pratt Institute, Brooklyn. He has been illustrator and designer for Century, Harper's. Scribner's, American, Delineator, etc., besides designing numerous book-covers.

STONE, Warren Sanford, American labor leader : b. Ainsworth, Iowa, 1 Feb. 1860. He was educated at Washington Academy and Western College. He started service (1879) with the Rock Island system railroad as fireman and was promoted to engineer in 1884. He was appointed (1903) grand chief of the Inter¬ national Brotherhood of Locomotive Engineers (succeeding grand chief Arthur) and has held this office ever since. He is a member of the Industrial Peace Commission.

STONE, William Joel, American states¬ man: b. near Richmond, Ky., 7

May 1848; d. 14 April 1918. He studied law and was admitted to the bar in 1869 and practised at Nevada, Mo., in partnership with Judge C. R. Scott. In 1872 he was elected prosecuting attorney at Vernon County. He was Democratic Con¬ gressman from the 12th Missouri district from 1884-90, and was elected governor of Missouri in 1892. In 1903 he was elected to the United States Senate receiving re-election 1908 and 1914. He became chairman of the committee on foreign relations after 1913 and was one of those few who advocated that Americans should be warned against sailing on ships of the belligerents.

STONE, William Leete, American histor¬ ical writer: b. New York, 4 April 1835; d. Mount Vernon, N. Y., 11 June 1908. He graduated from Brown University in 1858 and in 1859 was admitted to the bar. He was centennial historian for New York and made the speech at Independence Hall, 10 May 1876. He published (The Life and Times of Sir William Johnson, Bart} ; Revolutionary Letters> ; (History of New York City) ; (The Saratoga Battle Grounds) ; and Rife of Governor George Clinton.)

STONE, Witmer, American naturalist: b. Philadelphia, 22 Sept. 1866. He was educated at the University of Pennsylvania, and was as¬ sistant curator in charge of the museum of the Academy of Natural sciences, Philadelphia. He has published (Birds of Eastern Pennsylvania and New Jersey) (1894) ; ˆMammals of New Jersey *(1908); (Birds of New Jersey) (1909) ; (Flora of Southern New Jersey> (1912); (Birds of. Yucatan and Southern Mexico) ; (The Molting of Birds*, etc.

STONE. (1) A small piece or fragment of rock; a piece of rock adapted in size and shape for a specific purpose, as for building, etc. (See Building Materials; Rocks; Granite; Min¬ eral Production of the United States). (2) In medicine, a calculous concretion in the blad¬ der, kidney, etc. (See Calculus). (3) A de¬ nomination of weight. See Weights and Measures.

STONE, Artificial. See Cement; Con¬ crete; Masonry.

STONE AGE, the name given to that pe¬ riod in the development of prehistoric man¬ kind when stone, bone, shells and wood were the only materials employed as tools, weapons, and implements. The term first came into recognized use by the publication in 1865 of (Prehistoric Times,* written by Sir John Lubbock (Lord Avebury), who compiled and set in order the discoveries made in France and elsewhere during the previous half century. He classified the

prehistoric period into three divisions, namely: Iron Age, when bronze, copper and stone were superseded by iron in most instruments and weapons, continuing to the present ; Bronze Age, preceding the use of iron, when bronze was the predominant material; and Stone Age, still earlier, in which, until near its close, no metal was made use of by men.

The Stone Age was further divided by Lubbock into 1. Paleolithic, Old Stone Age, the more ancient time of chipped stone im¬ plements; and 2. Neolithic, New Stone Age, the more recent time of polished stone im¬ plements. This classification persists, but further collection of materials has enabled archaeologists to define several subdivisions, especially in the Paleolithic part, marking successive changes in the population and ad¬ vances in culture, at least in southern and western Europe. Elsewhere there seems never to have been such a concentration of primitive humanity, nor have its remains been so thoroughly studied ; nevertheless it is possible in a general way to arrange the facts gathered in all parts of the world into the European culture-scheme. Chronologically, however, this cannot be done. Some peoples learned how to

smelt and forge iron long before others ; bronze was made and cast in some countries earlier than in others; and meanwhile races and tribes elsewhere continued in ignorance of either. In fact, savage peoples in remote corners of the world remain in the Stone Age to the present time, and will continue to do so indefinitely, except for such improvements as they may adopt from more enlightened neighbors. The succession of stages in cultural evolution to be outlined in this article never¬ theless accords with the truth as applied to any one region or race, because there is never a retrogression from a higher to a lower stage. At the same time it seems probable that the significant advances were not often, if ever, by slow evolution, but rather were owing to the conquest and occupation of each country by strangers bringing some superior degree of culture.

Paleolithic or Old Stone Age. — It is

hardly a century since the chance finding of an arrowhead unmistakably of human work¬ manship (i.e. an artifact) deep in the gravel of the Somme Valley, in France, led to an immediate and lively interest in the new science of prehistoric anthropology, and to

extended explorations not only in France but all over the world. This soon resulted in large col¬ lections of objects picked up on the surface, taken from various depths in river-sands and gravel-deposits, or found in caves, peat-bogs, graves, etc. These were attentively studied not only with reference to material, form and possible purpose, but in the light of geography and geology, in order to determine their rel¬ ative age. The determination of the geological position in which each relic was found was particularly important. The general result of 50 years of study has been the perception and arrangement of the following series of culture- groups, or “stages®, within the Paleolithic period, numbered from the oldest (1) to the most recent (8) :

1. Azilian-Tardenoisian 4. Mousterian

2. Magdelenian 3. Acheulian

3. Solutrean 2. Chellean

4. Aurignacian 1. Prechellean

A brief account of the geological record is here necessary in order to place the earliest traces of man in the Stone Age in proper perspective. All readers are probably acquainted with the fact that an era of intermittent glaciation that in its maximum effects covered nearly all of the northern hemisphere with an arctic climate and thick ice, intervened between the close of the Tertiary (Pleistocene division) and the beginning of the Quaternary era, which latter immediately preceded the present conditions. This Glacial Period, as it is termed, is now known to have been not continuous, but to have had — at any rate in Europe — three breaks, during which intervals the ice disap¬ peared and a mild climate prevailed. This amelioration was most marked following the second ice-period, when for an immensely long time both Europe and North America were restored to a climate and appearance not greatly different from the present. Forests and vegetation were much the same as now, and most of the animals, with the addition (perhaps implying a somewhat warmer climate)

of hippopotami, elephants, rhinoceroses, lions, and some other now tropical species, all long ago extinct.

Eolithic Relics. — In geological formations of this “Eolithic® time have been found rudely chipped and hammered stones that are regarded by most archaeologists as true artifacts, and are called “eoliths.® It is very likely that some of them are really of human

handiwork; and it is believed by many persons that an indica¬ tion of their makers is given by the discovery, in 1907, deep in a gravel-bed near Piltdown in Kent, England, of a broken, fossilized skull having human characteristics. Piltdown is on a plateau abounding in eolithic flints and broken pebbles. This skull has been the subject of intense study and discussion. All its features, as well as the brain capacity, denote a being inferior to any other prehistoric race known; but its relationship to them, or to the more recent inhabitants of the globe, remains unde¬ termined; it is not, in fact, fully conceded to be anything but the braincase of an anthropoid ape. These rude relics of the dawn of humanity mark the Pre-Chellean stage; and the situation implied would be dubious were it not that in some places the accompanying imple¬ ments are convincingly of human workman¬ ship, and were it not that an indubitable relic of a human frame has been exhumed: for in the sands of Maurer, near Heidelberg, Ger¬ many, there was found, in 1907, a human lower jaw, which is the oldest or earliest known repre¬ sentative of the human race. This Heidelberg man (Homo Heidelberg ensis) had many apelike features, but he was unmistakably human, and his period is estimated at 250,000 years ago.

Pre-Chelleans. — This long warm period was followed by one of great aridity, changing latterly into a moist, cooling phase that brought a renewed glaciation, which, however, did not extend nearly as far toward the south as has the earlier ones; and after a time the glaciers again retreated, and a third warm stage re¬ newed livable conditions throughout the North Temperate Zone, so that southern Europe and northern Africa again became occupied by human inhabitants. They were nomadic sav¬ ages, no doubt, wandering along the river courses; and they possessed so little ingenuity that they were able to improve very little the shapely pebbles, or accidentally fractured flints and other sharp-edged stones that they picked up and tried to use as aids to their hands. That these rude Pre-Chellean forerunners of man¬ kind existed for an immensely long time, and became widely diffused, is shown by the fact that in every part of the world their rough im¬ plements are to _ be found, substantially alike whatever the region.

Chellean Stage. — The .first indication of advance is that stage called Chellean, in which men had not only improved in the shap¬ ing of flint pieces to service, but invented new tools. Its characteristic implement is the “hand-ax® (coup de poing, of the French), in which an elongated pebble of flint or quartzite was flaked by chipping it on both sides to a point at one end, while usually the natural roundness of the stone was left at the other. This tool was roughly almond-shaped, of any convenient size, and was grasped in the palm of the

hand, it having no other sort of a handle.

Acheulian Stage. — A more advanced stage of this industry is marked particularly by the earliest evidence of knowledge how to kindle a fire — probably the most momentous single dis¬ covery in human history. The flaked flints and other worked-stones of this culture-stage are much superior in both form and variety of utility to those of the Chellean, and represent a really remarkable advance in intellectuality and in breadth of life. This Acheulian period was brought to an end, slowly but steadily, by the approach of the fourth recurrence of glacial cold in Europe, after a third interglacial, or warm, interval of about 125,000 years, dur¬ ing which man had progressed in industry from Pre-Chellean inability to the excellence of Acheulian productions, which imply a very con¬ siderable elevation above a mere animal existence.

Mousterian Stage. — * The arid and steadily cooling climate of Acheulian times was fol¬ lowed, as has been stated, by a fourth glaciation, equivalent to what in North America was the last and greatest ((glacial period, ® when one ice-cap covered all Europe north of the Baltic, and another spread far outward from the Alps; and the climate was, of course, exceed¬ ingly cold. This is the <(Reindeer Period® of the older writers on prehistoric antiquities, a name suitable enough since that and other boreal animals characterized the semi-arctic fauna of all the North Temperate Zone. During this cold time, estimated to have lasted 25,000 years, man continued to exist in what is termed the Mousterian stage of culture; but under the hard conditions of life at that time mankind deteriorated, judging by the inferiority of his tools as compared with those of his Acheulian predecessors. His relics are found most abundantly in southern Europe, and in caves, which were then first resorted to as permanent human habitations, the wintry weather driving men to seek their snug shelter. The Mousterian, then, is the true ˆcave-man.® What he was like is known from a great number of skulls and other parts of skeletons exhumed from cave-floors and other subterranean deposits of this time. The first important find of the kind was in 1856 in a grotto in the Neanderthal (Neander Valley) near Dusseldorf, Rhenish Prussia ; but since then skulls and other bones in excellent preservation have been procured at Canstatt in Germany, Spy in Belgium, Sipka in Moravia, Krapina in Croatia, and at many places in southern France, especially in the caves at Le Moustier in Dordogne,

from which the period derives its name.

Neanderthal Cave-Dwellers. — Southern France, a limestone region, is honeycombed with caves (see Cave-Dwellers), and seems to have been the most populous centre of the Neanderthals (q.v.) — an intermediate race that extended from England to Hungary, at least, and were the typical savages of Paleolithic times. They were men of a species (Homo neanderthalensis) superior to the Heidelberg type of Chellean times (possibly their ancestor) , but retained apelike characteristics, and cer¬ tainly were far inferior in physique, as in mind, to the Neolithic men, presently to be described. The skull of the Neanderthal man was char¬ acterized by an extremely receding forehead, by the great ridges of bone above the eyes, a massive jaw with little chin, and very strong •

teeth and chewing-muscles, indicating that these ancient people were meat-eaters. They were men of stocky, robust frames, averaging aboui five feet and four inches in height, but they had not yet acquired a fully erect attitude of body.

The relics of the earlier part of the Mous¬ terian period show little advance over the pre¬ ceding culture; but later the increased employ¬ ment of the sharp, knife-like flint-flake, re¬ touched on one side only, is observable, and a gradual increase in the making of different hunting-weapons, and of small awls, scrapers and so forth, of stone and bone, and of needles necessary to sewing the skin clothing re¬ quired in the colder weather of that time as compared with the era of their remote fore¬ fathers. Is it not possible that the improve¬ ment noted may be the result of the greater wants to be filled, and energy required ˆthereby, owing to the increased difficulty of maintaining existence and comfort in a cold world? No evidence that these cave-men had or knew of the bow and arrow has yet come to light.

As the glaciers of this Mousterian period of cold, which lasted many thousands of years, melted, returning warmth of climate introduced the post-glacial conditions that with minor changes have continued to the present. It was at this juncture that the Neanderthal race came to an end, and did so with a relative suddenness that is astonishing. The latest student of the matter, Prof. H. F. Osborn, regards it as a case of the complete extinction of a species. <(So far as we know at present,® he declares, <(the Neanderthals were entirely eliminated; no trace of the survival of the pure Neanderthal type has been found in any of the Upper- Paleolithic burial-sites.® With their disappear¬ ance ends the Mousterian stage, and the Lower- Paleolithic period.

The Upper Paleolithic. — In the strata over- lying that in which the relics of the Mousterian or Cave-man culture are found, lie the evi¬ dences of a new and different kind of industry, which introduces the Upper-Paleolithic division of the Old Stone Age.

This is known as the Aurignacian culture, and is attributed to the immigration into western Europe of a race of men, probably from the southeast, as Aurignacian relics are found on all the shores around the Mediter¬ ranean Sea. The inroad of these foreign and better-armed people was followed by the destruction of the race of Cave-men, whose grottoes and rock-shelters were adopted as homes by their conquerors. This happened, it is believed, between 25,000 and 30,000 years ago. Who were these strangers? Whence, did they come? It is believed that they were Asiatics who had Slowly worked their way westward chiefly, if not wholly, along the southern shore of the Mediterranean into and beyond Spain. They were true men — Homo sapiens — not intermediate in structure and ability between human and simian, as were their predecessors- in Europe. In short they are the ancestors of a large part of the men of to-day, and it is unfortunate that they are not known by a better name than ((Cro-Magnons® — the designation of the cave in Dordogne, France, where their first-known skeletons were obtained. They were tall, well-built men, with heads long fore and aft .(dolichocephalic), and

with broad faces, pleasing features and well- developed chins. Probably the complexion of the skin was dark. They were men of large brains, a race, in Osborn's opinion, <(capable of ideas, of reasoning, of imagination, and more highly endowed with artistic sense and ability than any uncivilized race which has ever been discovered.* A large volume would be needed to describe thoroughly all of their industrial and social life as shown by the relics of the four successive stages oi culture into which their long history has been divided by archaeol¬ ogists. It must be summarized here in a few paragraphs.

The Cro-Magnons. — The Cro-Magnons were essentially hunters, living on the flesh of wild beasts, including the mammoth, an extinct rhi¬ noceros (elasmothere), aurochs, wild horse and other animals of the forests and plains. They dwelt not only in caves and rock-shelters but in great winter-camps, where they built clusters of houses made of timbers and covered with hides, many sketches of which they have left for our information. But they were nomads, and in summer

wandered ,in hunting and fish¬ ing bands, for there is no evidence that agri¬ culture was practised. They had excellent weapons ˆof chipped stone for both warfare and hunting, and probably used bows and ar¬ rows. They made various hooks and spears for fishing, and tools of stone, bone and horn for the preparation of skins, for sewing and other household purposes ; but they made no pottery. In some regions they advanced in culture more than elsewhere. They spread in Aurignacian times from the upper Danube in the East to Belgium and Britain in the West, but southern France was the most populous. There it was that their life came to be most settled, and the extraordinary art that distinguished the Aurignacian time was most highly developed. The soil of the caves occupied by the people of this period, and the sites of their camping- places, abound in small flint-flakes carefully pointed into delicate engraving tools — among them one shaped just like a modern burin. It was with these gravers that they cut from ivory and soapstone statuettes of animal and human figures, or incised on slabs of slate, tusks, flat bones, antlers, and especially on the walls of grottoes, pictures of the beasts about them, scenes of the chase, drawings of their houses, etc., sketched not only with startling fidelity to nature but with an artistic sense marvelous in the circumstances. They had a love of beauty, an instinct for true art, which led them to try to ornament everything they used ; and this art was steadily cultivated and developed until it reached its astonishing culmination in Magdaleniafi times. The cutting out of figures in bas-relief from stone surfaces (usually a cavern wall), and the modeling of statuettes, are distinctively Aurignacian; and in this stage, also, painting had its birth, for many of the colored drawings that adorn the walls and ceilings of the caves date from this period — for examples, the red-outlined bison and aurochs in the grotto of Castillo, Spain, and the spirited drawings in red ochre of the woolly rhinoceros, and of a stag in the cave at Font de Gaume, France. In many cases the Aurig¬ nacian artist carved the outlines and distin¬ guishing features of his subject in deeply in¬

cised lines, with minute attention to character¬ istic details. Therefore zoologists find some of these portraits of animals valuable to them, particularly with reference to the history of horses in Europe. The picture whose outlines were thus engraved was then coated with a red¬ dish or yellowish paint composed of ochre and manganese mixed on a palette of schist.

Solutrean Culture. — The Aurignacian stage was succeeded by the Solutrean. This horizon is distinguished by the presence in its remains of the most delicately and perfectly worked leaf-shaped flints for knives, heads of spears, javelins and arrows, and in general by a sud¬

den great improvement in the manufacture and design of all objects made of flint or quartz. This skilful culture, evidences of which are spread from the lower Danube Valley to the Bay of Biscay, is believed to be the product of fresh immigration of people from the teeming East, who moved westward along the northern border of the Black Sea and advanced up the Danube Valley and finally became predominant in southern Europe; yet it seems plain that the Cro-Magnons were not utterly destroyed even there, and that both in northern Europe and south of the Pyrenees they persisted in force. These invading Solutrean folks, who take their name from a vast camp, ringed with the turf-covered bones of tens of thousands of horses, slaughtered for food, near Solutre in southern France, were a practical people, ruder than those they had overcome, and during their time art declined.

Magdalenian Culture. — Comparative re¬ finement revived, however, during the succeed¬ ing stage, the Magdalenian, when art was de¬ veloped to its highest perfection in prehistory. Whatever may have been the racial character of the Solutrean people, the Magdalenean folk were unquestionably of Cro-Magnon stock. What was the occasion of the change that ar¬ chaeologists note at this point can only be con¬ jectured, but the fact is plain. These Magda¬ lenian Cro-Magnons attained in this period their highest culture and widest dispersion of the race. They have been traced northward to England and central Belgium, and eastward throughout central Germany, but never, ap¬ parently, colonized Italy or southern Spain. They were, as before, a nomadic and hunter people; but by this time the cold, wet climate had gradually softened into a warmer and dry¬ ing o;ie, and the growth of dense forests every¬ where made the chase more and more difficult and arduous. Moreover the animals going in herds, such as the reindeer, wild cattle and horses, that needed large open grazing areas, had departed. In conformity with this the Magdalenians gradually became less nomadic, and depended more on fishing than on hunting for subsistence. Under these sedentary and softening influences the craft of the flintworker declined, for only poor and simple kinds of stone implements are recovered from village- sites of this time of decay; but the village-sites yield great numbers of skilfully contrived hooks, harpoon-heads, and other fishing-tools, chiefly made of bone. The style is quite new, and now are first seen round and barbed 'bone spearheads, the earliest with only an experi¬ mental barb, but later always furnished with rows of recurved barbs along their sides.

In this quieter life, where in the long-settled,

favorable and populous districts of southern f ranee and the neighboring border of Spain the people must have obtained a firm tribal organi¬ zation, the Magdalenians acquired that power of draftsmanship, sculpture and painting that has astonished the critical world, and has been il¬ lustrated so thoroughly in several recent books, as those of Sollas, Elliot and Os'born, and in the Annual Reports of the Smithsonian Institution, not to mention the many learned writings in French, Spanish and German. Nearly all the finest painting of this period as well as that of the Aurignacian artists is on the walls and ceilings of deep and totally dark caverns — a fact that has caused much speculation as to the motive that carried such art into places where the work could be made or observed only by lamplight. (<It would appear,® remarks Osborn, ((that the love of art for art's sake . . .

together with the fine spaces which these cav¬ erns alone afforded for large representations, may be an alternative explanation.®

Azilian-Tardenoisian Invasion. — The de¬ cline of the Cro-Magnons may have been owing largely to environmental causes ; but it may have been accelerated by the arrival, probably occasioning long battling, of two streams of newcomers, one of which, known as the Azili- ans, spread all over France and Belgium, and the other, the Tardenois, occupied Spain at first, but gradually coalesced with the other. Their flints are small and peculiar, totally unlike any¬ thing used by the Cro-Magnons. This may have been the result of a necessary change in the character of hunting weapons, for now southern Europe was covered with heavy for¬ ests, the reindeer had retreated to the North and the stag was the principal game-animal ; in fact the people seem to have depended mainly on fishing for subsistence. The climate was still cool and moist, and therefore the use of caves and rock-shelters continued, but otherwise the habits and culture of these final races of Paleolithic man in southern Europe were to¬ tally different from, without being much in ad¬ vance of those of the Magdalenians. Who were these final Paleoliths? The Azilians were a brachycephalic people, the first of that type to appear in the West; and it is believed that they may represent the first-comers of the Alpine, or Celtic, race of modern ethnology. They are often designated as the Furfooz stock. The other was a long-and-narrow-headed race that came in from northern Africa via Spain, and are thought to represent the earliest indication of what Sergi calls the Mediterranean race. It is evident that both were mentally superior to, and more broadly cultivated than, the Cro- Magnons, except in artistic matters,

and sub¬ dued the latter completely; yet there is evidence that in southern France, at least, large commu¬ nities of Cro-Magnons continued to live and develop, and have persisted there to the present day. After a few centuries, however, these Azilian-Tardenois men, the last of the purely hunting-races, themselves suffered displacement by the incoming of a more advanced people moving westward along the great Mediterranean highway of migration, and with their disappear¬ ance the Old Stone Age comes to an end.

Neolithic, or the Age of Polished Stone. — The notion formerly prevalent that there was a sudden clearing away of Paleolithic men and

things, and an equally sudden supercession of Neolithic people and culture, has been aban¬ doned before the progress of information. Men in different parts of the world have always ad¬ vanced toward better conditions at an unequal pace; and in most cases, as, for example, our North American Indians, who at the time of their discovery by Europeans were in the Neo¬ lithic stage, no evidence can be found of just how or when the advanced step was taken. In southern Europe, where circumstances favor a clearer local understanding of prehistory, it appears probable that between 7,000 and 10,000 years ago strangers began to filter in from the eastward along the Mediterranean shores, and to settle in selected spots ; and that this process went on — not always peacefully, we may imagine — until the inferior occupiers of the land had been displaced, or absorbed and educated, and the superior culture was generally established — a matter probably of a few cen¬ turies. These immigrant conquerors, who brought with them new arts of life, and dis¬ possessed the wandering hunters, introduced in western Europe the Neolithic Age. Whether a similar conquest or a more peaceful process of intellectual development produced the same re¬ sult in other parts of the world remains to be discovered. In the earlier part of their history, at least, the Neolithic men continued to make and use strong hatchets, picks, flake-knives, etc., of flint and quartz, but the patterns were more serviceable ; and they introduced an entirely new article in the stout axe, the chisel-like <celt,) and other tools made of granite, jasper and other tough rocks, and formed by hammering, grinding, and then, often, polishing. This is the distinctive mark of the Neolithic period, but other dstinctive innovations followed, of which the most important, socially, perhaps, was the making of pottery. They had the rudiments of agriculture, had domesticated the dog and ox and pig, refused to hunt horses for food but captured and tamed them; and to carry on these domestic industries they were settled in defen¬ sive houses and villages, an excelllent idea of which may be had from

the remains of their lacustrine towns (see Lake-Dwellers) in Switzerland and Italy. This article may fitly be closed by a comprehensive extract from Boyd Dawkins's standard work (Early Man in Britain } : <(The arts of spinning, weaving, min¬ ing and pottery-making were known, and that of boat-building had advanced sufficiently far to allow of voyages being made from France to Britain, and from Britain to Ireland. Traffic was carried on by barter and stone axes were distributed over areas far away from those in which the stone was found. Tombs also were built, some of imposing grandeur, for the habi¬ tation of the dead in the after-world, in which the spirits were supposed to lead a life not very different from that of the living, and at which they were worshipped by the family or tribe, after the manner of the red Indians and many African peoples. . . . The neolithic civili¬

zation was long established, and underwent so little change, if any, in the lapse of ages that no traces of a change have been preserved to our times. Its duration varied in different coun¬ tries, and it yielded place to a higher culture in Greece and Italy long before it passed away from central and northern Europe.®

Bibliography. — Some of the most recent

books in English are listed below. In most of them, especially those of Osborn and Sollas, will be found extensive references to other works, especially those by original investigators in France, Belgium and Germany. Dawkins, B., (Early Man in Britain) (London 1883) ; Rip¬ ley, W. Z., (Races of Europe *(New York 1899) ; Avebury, Lord, (Prehistoric Times) (re¬ vised edition, New York 1913) ; Keith, A., (Antiquity of Man> (London 1915) ; Parkyn, E. A., (Prehistoric Art* (London 1915) ; Sol- las, W. J., (Ancient Hunters *(London 1915) ; Osborn, H. F., (Meii of the Old Stone Age* (New York 1916) ; Spurred, H. G. F., (Modern Man and His Forerunners) (London 1917).

Ernest Ingersoll.

STONE CIRCLES, circles of standing stones and of small boulders, found throughout Great Britain and in some places on the conti¬ nents of Europe, Asia and Africa. See Stones, Standing.

STONE COAL, a name used to some ex¬ tent in the United States and in England for anthracite coal to distinguish it from soft coal or

bituminous coal. On the continent of Europe it is more frequently used to distinguish the older (Carbonic) coals form the later Mesozoic and Cenozoic coals and lignites.

STONE-CROP, a plant, also called live-

for-ever. See Sedum.

STONE-CUTTING AND -DRESSING.

This is the art of shaping, fitting, smoothing and finishing quarried stone, for use in masonry, foundations of monuments, arches, etc. (For the preliminary steps of taking out the stone see Quarrying; Drill and Drilling, the drill being one of the most important machines used in quarrying stone). Stone-cutting is more than a mechanical operation ; it in¬ volves theoretical and geometrical calcula¬ tions. The study of these is often termed Stereotomy. It involves some knowledge of architecture, and very exact calculations. Sup¬ pose that stones are required to be cut for an arch of 100 feet span and 25 feet rise. The exact curve and angle of each particular stone must be determined geometrically, and drawings made to guide the cutter. In the case of mass¬ ive stone fronts for buildings, in which per¬ haps carvings occur, the design must be first perfected on paper, and sometimes models are made of more intricate parts. When dealing with angles the stone-cutter speaks of a batter of one in 10, meaning that there is a change of angle of one inch in width in 10 inches of length. Or he will specify a one in five rise, indicating the angle above the horizontal.

The primary tools of the stone-cutter are heavy hammers and chisels, the latter being operated with wooden mallets. By striking a stone a number of heavy blows with an edged hammer, along a given line, it will break ap¬ proximately on that line. The more valuable stones, as imported marbles, are sawed, to avoid waste of material. For knocking off projec¬ tions of stones from the quarry, a blunt double- faced hammer is used, of perhaps 20 to 30 pounds weight. Next, for roughly shaping, the face hammer may be employed, this tool having one blunt and one sharp face, and weighing ordinarily 20 to 25 pounds. The cavil, having

one blunt and one pyramidal point, is also use¬ ful for rough dressing, and is somewhat lighter than the face hammer. The mason’s pick is straight, double pointed, and commonly 18 inches long. It is useful for rough-dressing soft stone. The mason’s axe or pean-hammer has two cutting edges, of three to four inches wide. It is useful after the cavil,

to prepare the stone for the patent hammer. The tooth- axe has a serrated double head and is not suited to very hard stone. The bush hammer has a head made of a series (as 36) of steel pyramidal points bound together ; the points vary in size accord¬ ing to the work to be done. The Crandall and the patent hammer are forms of steel blades or chisels clamped together and used for finishing. Hand hammers, mallets and chisels complete the common tools of the mason for hand dressing. Chisels are named as tooth-chisels, splitting chisels and pitching chisels, the latter being used in forming a straight square edge on a stone. Short-handled, heavy mallets are employed with the chisels. In using a stone chisel, it has to be directed at such an angle as will break off the weaker part of the stone. The knack of this is soon learned, and the experienced stone¬ cutter will remove with each blow almost ex¬ actly what he calculates on doing. For rapid stone-cutting, pneumatic tools are now em¬ ployed. The pneumatic hammer, operated like the familiar pneumatic rivetter, is very speedy in operation. Pneumatic plug drills and bush¬ ing tools are made and operated on the same principle, air pressure supplying force for the blow, and a spring returning the tool to position. Portable surfacing machines are used on large stones, an adjustable arm being swung over the stone, and aligned to the work. Any one of a variety of surfacing tools may be inserted in the tool carrier, and when the compressed air is turned on the tool pounds away at a fixed level under the guidance of the operator, who directs it over the entire surface requiring to be dressed. The stone saw is commonly em¬ ployed for cutting up marble and sandstone. The cuts made are not quite smooth, and may be rubbed off with a slab and grit, operated by hand or power with water. Consult French, (Stereotomy J (1906) ; Warren, < Problems in Stone Cutting) (1911) ; Howe, <Masonry*

(1915).

STONE OF DESTINY. See Lia-fail.

STONE FERRY, Battle of. During the Revolutionary War an engagement took place here (20 June 1779) between the small en¬ trenched force of British troops under Lieu¬ tenant-Colonel Maitland and a much larger body of the American forces under General Lincoln ; the latter's attack was repulsed and Lincoln was obliged to withdraw as General Moultrie had failed to carry out the orders for prepared¬ ness and fresh forces came from the John's Island garrison of Britishers. The Americans sustained a loss of about 150 and the British about 130.

•

STONE-FLY, an aquatic neuropterous in¬ sect, much used as a bait in trout-fishing by anglers. These flies belong to the platypterous sub-order Perlaria, recognized by the hinder wings being of large size, and folded, while the tarsi are three-jointed, and the antennae or feelers are filamentary in nature. The abdo-

men is provided with a pair of long-jointed caudal appendages. The mandibles are rudi¬ mentary. These flies and their larvae occur plentifully in the neighborhood of lakes and ponds. They are carnivorous, and the larvae are aquatic.

STONE MOUNTAIN, a dome-shaped hill of granite in De Kalb County, Ga., ris¬ ing about 700 feet above the surrounding level, and covering an area of about two square miles ; also a town near by. The northern face of Stone Mountain is precipitous, its base present¬ ing an almost vertical cliff 300 feet in height; but the other sides have a more gentle slope. The dome is everywhere naked rock, except where here and there a few hollows have per¬ mitted a little soil to accumulate, and some trees and shrubs to take root. Its visible bulk is estimated to contain seven and a half billions of cubic feet of dark granite, which is quarried from the northeastern foot. An electric road recently constructed from the neighboring town has made the rock a pleasure-resort, a path leading to its summit from the terminus. A plan has been made for the carving on the ver¬ tical northern face of the mountain of a series of gigantic figures representing scenes in the Civil War. This project would require a vast amount of time and money, and has been pro¬ tested by many persons on the ground that its execution would detract from rather than en¬ hance the interest of an extraordinary natural object.

STONE-PINE, a pine (Pinus pinea), common in the south of Italy, and often intro¬ duced into pictures of Italian landscapes. See Pine.

STONE RIVER, or MURFREESBORO, Battle of. After the battle of Perryville (q.v..) 7-8 Oct. 1862, and General Bragg’s retreat from Kentucky into East Tennessee, Bragg was au¬ thorized by the Confederate government to make a movement into Middle Tennessee, and late in November had gathered his army at and near Murfreesboro, on Stone River, 33 miles southeast of Nashville. Wheeler’s cavalry covered his front, its pickets within 10 miles of Nashville.

Gen. W. S. Rosecrans, who had succeeded General Buell in command of the Army of the Ohio, 27 October, made some changes in the organization of the army, henceforth to be known as the Army of the Cumberland; which was composed of the 14th Army corps. The corps was divided into three wings ; fhe right wing, of three divisions, under Gen. A. McD. McCook, the centre of five divisions, under Gen. Geo. H. Thomas, and the left wing, three divisions, under Gen. T. L. Crittenden. On 26 December Rosecrans, with 56,000 men, advanced from Nashville in three columns, the right, under McCook, by the Nolensville pike, the centre, under Thomas, first on McCook's right by the Franklin pike and subsequently on his left; and the left, under Crittenden, by the Murfrees¬ boro turnpike. Opposition was encountered from Wheeler's cavalry and Bragg's outposts at Nolensville, La Vergne and Stewart's Creek bridge; and there was some delay caused by rain and bad roads; but at night of the 29th Crittenden was close up to Murfreesboro, and under Rosecrans' orders to occupy the place he threw a brigade across Stone River, two

brigades were crossing the stream, and two divisions were under orders to follow, when the movement was suspended by Rosecrans, and the brigade recalled, after a sharp skirmish with a brigade of Bragg's troops. Thomas came up on Crittenden's right, but McCook was de¬ layed until the next day, and after some severe fighting, in which he lost 135 killed and wounded, he took position on the right of Rose¬ crans' army, with his left, Sheridan's division, on the Wilkinson pike and with Davis's division on the right of Sheridan. At first R. W. John¬ son's division was in reserve, but when McCook ascertained that the Confederate left overlapped him, Johnson was brought up on the right of Davis. Thomas rested his right, Negley's divi¬ sion, on the Wilkinson pike, connecting with Sheridan. Crittenden's left rested on Stone River, with his right across the Nashville and Murfreesboro pike connecting with Thomas.

General Wheeler had promptly informed General Bragg on the morning of the 26th that Rosecrans was on the march, upon which Gen¬ eral Hardee's corps was ordered in from Triune, and Wheeler was directed to protect its flank, impede the Union advance and, when hard pressed, fall back upon the main body of the Confederate army, which was to give battle in front of Murfreesboro. Hardee's corps, con¬ sisting of the divisions of Breckinridge and Cleburne, with John K. Jackson's brigade as a reserve, made up Bragg's right wing; its right rested on the Lebanon pike, north of Murfrees¬ boro, its left on the Nashville road. Wheeler's cavalry was on the right. Polk's corps — the divisions of Withers and Cheatham — was on Hardee's left, connecting with it on Stone River; McCown's division of E. Kirby Smith's corps,

which at first was held in reserve east of the river, was ordered on the night of the 29th to cross over and extend Polk's left; so, on the night of the 30th, Hardee's corps was east of Stone River and Polk's corps and McCown's division west of it. The two armies bivouacked opposite each other; west of the river they were not over 500 yards apart. Rosecrans had on his rolls 56,000 men, of whom 43,400 were to become engaged; Bragg 51,000, of whom 37,700 were to be carried into action.

While Rosecrans was taking position on the 30th Wheeler's cavalry was raiding his rear. Wheeler, with seven regiments of cavalry and a part of a battery, started from Bragg's right, on the Lebanon pike, about midnight of the 29th, crossed Stone River at Jefferson, after daylight, and attacked Starkweather's brigade, by which, after a sharp fight, he was repulsed, with a loss to Starkweather of 122 men, most of them prisoners, but he captured and burned part of the brigade train. He then marched for La Vergne, picking up stragglers and burning wagons, and reaching La Vergne at noon of the 30th, attacked and captured the immense sup¬ ply-train .of McCook's command, which he burned, took and paroled over 700 prisoners and, pushing on to Rock Spring, attacked, cap¬ tured and destroyed another large train. He then marched to Nolensville, capturing large trains, stores and arms, and about 300 prisoners, who were paroled; halted near Nolensville for a short rest; and at 2 a.m. of the 31st resumed his march and joined the left of the army, then engaged. He had made a complete circuit of the rear of Rosecrans' army, had taken and

paroled over 1,000 prisoners, and destroyed over $1,000,000 worth of stores, leaving miles of road strewn with burning wagons. He brought back with him nearly 5,000 stand of small arms.

According to Rosecrans' plan of battle, Mc¬ Cook was to hold fast on the right and keep back Bragg's left in his front, while Thomas and the right division of Crittenden were to open the battle on the morning of the 31st with skirmishing, and to engage Bragg's centre and left as far as the river, and Van Cleve's and Wood's divisions of Crittenden's wing were to cross Stone River and attack Bragg's right, to drive it back through Murfreesboro, and into the open country toward Salem. Thomas was to take up the movement on Crittenden's right. The attack was to commence at 7 a.m. ; Van Cleve's and Wood's divisions had been massed on the left; Van Cleve's skirmishers had crossed the

stream, and one of his brigades had fol¬ lowed and formed line and the rest were in motion, when the roar of battle came up from the right, the movement on Bragg's right was abandoned, Van Cleve was recalled, and Rose¬ crans was obliged to yield his plan of battle to one laid down by Bragg. >•

Bragg had determined to attack and turn Rosecrans' right at daybreak, and for that pur¬ pose, leaving Breckinridge's division to hold the right against Rosecrans' left, Hardee was or¬ dered to march Cleburne's division from the right to the left, take command of that and of McCown's division, and open the fight at day¬ break by an attack upon McCook's right. Hardee's attack was to be followed up by Polk's divisions in succession to the right, the move to be made by a constant wheel to the right on Polk's flank on the river, as a pivot, the object being to force Rosecrans back on Stone River, gain the roads in his rear, and cut him off from his base of operations and supplies by the Nashville pike. On the night of the 30th Hardee led Cleburne's division to the left and placed it in rear of McCown. At day¬ break McCown advanced and fell upon the right of R. W. Johnson's division while the men were preparing breakfast. The skirmishers had seen the advance and had resolutely opposed it, while the main line was preparing to meet the shock. The skirmish-line was driven in by the impetuous Confederate advance, and McCown, swinging to the right, overlapped Johnson's right, soon overcame the two brigades holding the first line, captured most of their artillery, and swept them from the field. MqCowii's first movement had diverged somewhat to the left, leaving an opening between his right and the left of Withers' division, into which Cleburne's division sprang, and then advanced on Davis' division, and it was severely engaged with Davis when Johnson gave way, upon which McCown turned one of his brigades upon Davis' flank. Davis changed front on his right, to meet Mc¬ Cown, made counter attacks upon Cleburne in his front, and repulsed some of Cleburne's fierce assaults, but was finally forced back with great loss, with a part of Sheridan's division on his left. Sheridan also changed front to meet at¬ tacks upon his flank; but after desperate fight¬ ing, making three successive stands and re¬ pulsing some furious assaults, he was obliged to fall back upon the divisions of Negley and Rousseau of Thomas' command, on the left of the Wilkinson pike ; and upon those and Sheri¬

dan, Polk's two divisions of Withers and Cheatham fell with great force, attacking them in front, left flank, and rear, causing them to fall back in rear of Crittenden's line. The en¬ tire right and centre of the Union line had now been driven back beyond the Wilkinson pike, and Rosecrans made heroic efforts to stem the tide setting against him and

hold the Nashville pike, his only remaining connection with Nashville, and on which were all his trains. Everything was rallied on a new line covering this road, and Van Cleve's division of Critten¬ den's wing was brought up. There was another fierce struggle, but the Confederate attack was repulsed, with Rosecrans' right and centre thrown back at a right angle to its position of the morning, and with Bragg's line also at a right angle to his original line, the left of Rosecrans and the right of Bragg resting on Stone River. It was now past noon ; Bragg held a large part of the field, with many pris¬ oners, guns, wagons and ammunition, and the dead and wounded of both armies ; but Rose¬ crans still held the road to Nashville. Bragg had made persistent efforts to crush the left of the Union line, where it rested near Stone River, and Polk's corps had been bloodily re¬ pulsed in several assaults on that part of the Union line. Another effort was now made. At 10 a.m. Bragg had ordered Breckinridge to send one brigade and, soon after, a second to reinforce Hardee; but when Bragg was in¬ formed that Rosecrans' left was crossing the river to attack Breckinridge the order was countermanded. It was ascertained that the in¬ formation of an attack upon Breckinridge was incorrect; upon which Bragg ordered Breck¬ inridge to send two brigades to report to Hardee, and soon after gave him a second or¬ der — to leave one brigade east of Stone River and march with the rest of his command to Hardee's support. When the brigades of Adams and Jackson crossed Stone River Hardee had been checked and thrown back, and the two brigades were sent to Polk, who was still as¬ sailing Rosecrans' left. The two brigades, the right of their line resting on Stone River, went forward, relieved part of Cheatham's, and be¬ came hotly engaged, but were driven back with great slaughter, some regiments losing more than half their men. As they were falling back Breckinridge came up with the brigades of Preston and Palmer, which were sent forward and speedily repulsed. Cannonading continued until nightfall, when, exhausted by a conflict of full 10 hours' duration, rarely surpassed for its continued intensity and the heavy losses sustained, both armies sank to rest.

While Bragg's infantry and artillery were breaking the Union lines and forcing them back, his cavalry under General Wharton, with part of McCown's infantry were engaged on Rose¬ crans' right and rear' inflicting losses in killed and wounded, capturing guns and wagons, and taking nearly 2,000 prisoners.

Rosecrans' losses during the day had been appalling, and when night came he was in some doubt whether to remain on the field. He says: (<After a careful examination and free consultation with corps commanders, followed by a personal examination of the ground in

rear as far as Overall's Creek, it was deter¬ mined to await the enemy's attack in that posi¬ tion, to send for the provision train and order

up fresh supplies of ammunition, on the arrival of which, should the enemy not attack, offensive operations were to be resumed.® There was a readjustment of the line, the left was drawn back, though still resting on Stone River, and the right and centre grasped more firmly the Nashville road. On the morning of 1 Jan. 1863 Bragg began to demonstrate with infantry and artillery, and again Wheeler's and Wharton's two brigades of cavalry sought the rear of the Union line. They attacked a large train near La Vergne, capturing part of it and a piece of artillery, and informed Bragg that heavy trains were moving toward Nashville, some loaded, and all the ambulances filled with wounded. Early in the morning Van Cleve's division, commanded by Col. S. Beatty, supported by Grose's 'brigade, was thrown across the river from the left, and formed line on a hill in front of Breckinridge, who had resumed his position on that side, on Bragg's right. During the morning of the 2d there was quiet along the lines except on Rosecrans' left, where there was some shelling, but there were indications that Bragg was meditating an attack upon Rose¬ crans' left, and preparations were made to meet it, Davis' division being ordered from the right to the left and some changes made on that flank. From his headquarters west of the river Bragg had seen that Polk's line could be enfiladed by artillery placed on the hill occupied by the right of Van Cleve's division, and after noon Breckinridge was ordered to take the hill and occupy it with his artillery. The two brigades that yet remained west of Stone River were re¬ turned to Breckinridge, and he was reinforced by 2,000 of Wharton's and Pegram's cavalry and some artillery. Breckinridge formed his divi¬ sion in two lines, two brigades in each, with two batteries of artillery in rear. He had, ex¬ cluding the cavalry, which came too late to take an active part, about 4,500 men. The distance to be traversed was about 1,600 yards. At 4 p.m. the signal-gun was fired, and the four brigades advanced to the attack. After a severe fight the two right brigades of Van Cleve's division were broken and driven from the hill and toward the river. Bragg's order had been fully obeyed, but the Confederates, exultant with success, did not stop at the hill, hut pur¬ sued the broken Union fragments, and as they neared the river a few of them crossed it. Major John Mendenhall, who had hurriedly massed 58 guns on a commanding position on the west bank of the river,

opened fire with all the guns upon the somewhat massed column, the infantry added their fire, and Breckinridge's attack was repulsed. That part of Van Cleve's line that had not been driven across the river attacked the fleeing Confederates, a Union bri¬ gade, without orders, crossed the river in pur¬ suit, and the Confederates were driven back to the position from which they had advanced with a loss of four guns and over 1,700 killed and wounded of the 4,500 engaged. It was night, and Davis' and Wood's divisions were sent across and intrenched on the hill that had been the point of contention. A cold and heavy rain-storm marked the 3d, and, fearing a rapid rise in the river, Rosecrans withdrew all his troops from the eastern side of it. No other movement was made on the lines, the day passed in comparative quiet, and at night Bragg,

under the erroneous impression that Rosecrans was receiving reinforcements, marched for Tullahoma, 36 miles distant. The 4th was oc¬ cupied by Rosecrans in burying the dead, and on the 5th his army occupied Murfreesboro. The Union loss in the battle, including 53 killed and 259 wounded in minor engagements between Nashville and Stone River, was 1,730 killed, 7,802 wounded and 3,717 missing, an aggregate of 13,249. The Confederate loss was 1,294 killed, 7,945 wounded and about 2,200 missing. Consult (Official Records* (Vol. XX) ; Van Horne, (History of the Army of the Curnber- lamP (Vol. I, Cincinnati 1875) ; Stevenson, A. F., (Battle of Stone River) (Boston 1884) ; The Century Company's (Battles and Leaders of the Civil War> (Vol. Ill, New York

1887-88).

E. A. Carman.

STONE WORSHIP, a form of fetishism which has persisted in the religions of some cultivated races. The ancient Germans and Gauls paid reverence to stones : Saint Eligius (Eloi), bishop of Noyon, exhorts his Frisian converts against this practice : (<Let no Christian presume to set lights or to say prayers (reddere vota) at fanes or rocks or fountains or trees :® and throughout the Middle Ages the Church never ceased to condemn the practice of ad¬ dressing prayers or vows to stones — votum vovere ad lapidem vel ad quamlibetrem. All the great nations of antiquity worshipped stones : at Pharos in Achaia, according to Pau- sanias, 30 square stones were worshipped ; and he adds that in earliest times (<rude stones, in¬ stead of images, received divine honors.® Meteorites have ever been special objects of worship : such was the stone symbol of Diana at Ephesus, of the sun-god at Emesa in Syria, of Mars at Rome; such too was the Kaaba at

Mecca. As stones are in India set up standing in groups as representing deities, Tylor con¬ jectures that menhirs, cromlechs and dolmens may have had a like signification.

STONECHAT, a small and pretty Euro¬ pean non-migratory bird (Motacilla rubicola), closely related to the American bluebird and the familiar English wheat ear. It is chiefly ter¬ restrial in its habits.

STONEHAM, ston'am, Mass., town in Middlesex County, on the Boston and Maine Railroad, 11 miles north of Boston. It was in¬ corporated and became independent of the ad¬ joining towns in 1725. It has several large manufacturing establishments, among which are boot and shoe factories, machine shops, box factory, tanneries and a furniture factory. It has a number of fine residences, six churches, 23 elementary school buildings, a high school and a public library. There are a national and a savings bank. Pop. (1920) 7,873, of which, 6,300 are in the borough proper.

STONEHENGE, ston'henj, a notable ex¬ ample of the ancient stone circles, situated in Salisbury Plain, Wiltshire, England, about seven miles north of Salisbury and within two miles of the town of Amesbury. The structure con¬ sists of two concentric circles of upright stones surrounding two concentric ellipses, the whole surrounded 'by a double earth wall and ditch, about 370 yards in circumference. There is an entrance at the northeast which proceeds in the

form of an avenue, guarded on each side by a wall and a ditch, for a distance of 594 yards, after which it divides, one branch going east¬ ward up a hill, between two groups of burial mounds or barrows, and the other branch lead¬ ing northwest to the cursus or race-course, about 300 yards distant. The outer earth-wall is 15 feet high, the ditch 30 feet wide and the avenue at the entrance 15 feet wide. The outer circle is about 105 feet in diameter and con¬ sisted when complete of 60 stones, 30 uprights and 30 horizontal imposts between them. The upright stones are about 16 feet high and six or seven feet thick. Of the original 60 there re¬ main 32 stones, being 17 uprights in position, seven prostrate and eight imposts. At the ave¬ nue entrance there are 11 uprights remaining with five imposts. The uprights of the outer circle were placed about four feet apart, with the imposts fitted to them continuously at their top, each upright bearing a vertical peg at each side, into which fitted a mortise in the end of the horizontal

impost. The imposts are on an average about 10 feet long, three and one-half feet wide and two feet eight inches deep. There is a space between the outer and the inner circles of from eight to nine feet forming a walk 300 feet in circumference. The num¬ ber of uprights composing the inner circle has been stated variously, the different figures ranging from 40 to 60; there were no imposts in the inner circle and the height of the stones, judging from the 11 still standing, seems to have been about six feet. This circle, like the first, has an opening to the northeast, opposite the entrance. But unlike the outer circle, it is composed, not of hewn sandstone, but of smaller rocks, seemingly boulders brought from a distance. Within the inner circle and about the same distance from it as the outer circle stands the first oval, an incomplete oval, in the shape of a huge horse-shoe with its open end facing the entrance at the northeast. The first oval consists of five groups or trilithons, each trilithon being composed of two uprights with an impost at the top completely covering their upper edges. The five trilithons are thus independent and not connected by continuous imposts. Their size gradually rises from east to west, the largest being the grand central trilithon in the closed end of the ellipse and the smallest, about 16 feet high, those nearest the entrance. The height of the central trili¬ thon, with impost, is 28 feet, the pillar stones being about 23 feet above .ground, and the impost about four feet thick. Other dimensions of this trilithon are: Length of impost, 15 feet; breadth, four and one-half feet; breadth of uprights, seven and one-half feet; thickness, four feet. The other four trilithons stood two and two facing each other. Only two of these five groups are now perfect. One of the pillars of the central trilithon, fallen, is broken into three pieces ; the impost though fallen is -intact, and the remaining upright is nine feet out of the perpendicular. Of the two trilithons of the west side the one nearer the centre fell outward, entire, in 1797; though prostrate the stones are intact. The other trilithon on the west broke up at an earlier date ; one of its pillar stones remains standing — the other and the impost lie at its foot, broken. The trilithons of this, the outer ellipse, are of

hewn sandstone like the stones in the exterior circle. Within this outer ellipse is a smaller one of the same shape, with the opening facing the northeast, but, like the inner circle, com- oosed not of tool-dressed sandstone, but of blue- stone boulders, and, also like the inner circle, without imposts. The stones employed in the smaller ellipse are on an average about a foot to a foot and a half taller than those in the smaller circle; they are set at intervals of about five to six feet. Within the inner oval, at its upper end, in front of the central trilithon, is a slab of coarse-blue marble, 16 feet long, four feet broad and 20 inches

thick. This is commonly spoken of as the altar stone. The cursus at the end of the western branch of the avenue of approach is a stretch of flat land, about one and three-fourths miles long and 110 yards across. It is bounded by parallel banks and ditches and is rectangular in shape, with a flat mound stretching across its eastern end. There is a smaller cursus a little to the north and barrows lie all around. Within the avenue of approach there is a large upright which has been nicknamed the Friar's Heel. It is 16 feet high and is supposed to be a bowing- stone.

The purpose of Stonehenge, its time of erec¬ tion and the race or races which built it, will probably never be known with certainty. De¬ spite the efforts of the numerous archaeologists who have given it their attention, nothing in the nature of proof has been found for anyone of the various theories. It is generally accepted as an extraordinary development of the stone circles (q.v.) found throughout Great Britain and in parts of France and Scandinavia. For a long time these circles were known as Druidical Rings, and Stonehenge was regarded as prob¬ ably the head temple of Druidical worship. This theory, however, has been discredited re¬ cently on account of the discovery that many other of these monuments, also supposed to be of Druidical origin, were of a sepulchral na¬ ture. The circular form of the monument has suggested to some writers that it was connected with a worship of the sun. By others it has been attributed to the Phoenicians, the Belgae, the Saxons and the Danes. It has been called a martial court of justice — a battle ring for judicial combatants — a shrine to Buddha, a temple to serpent worship and a monument of victory. The theory most widely accepted is that it is a burial ground or a temple connected with burial ceremonies for some ancient peo¬ ple who inhabited at some time the greater part of Great Britain and who eitfier emigrated from or to the shores of France and Scandi¬ navia. The fact that Stonehenge is the centre of a region numerous in barrows, and that this is true of all the other great stone circles or standing stones seems to bear out the likeli¬ hood of its connection with the burial cere¬ mony. Sir John Lubbock assigns its date as that of the Bronze Age, basing his beliefs on the character of the contents found in the surrounding barrows and upon the evidences of tool-work upon the stones of the outer circle and outer ellipse. This latter fact, however, is interpreted by others merely as an indication that the other portions of the structure are of much older date.

Stonehenge is first mentioned in the 9th cen-

lury by Hennius, who states that it was erected in the 5th century by Ambrosius, the last Briton king, aided by the magician Merlin, to com¬ memorate the 460 Briton nobles who were treacherously murdered at that spot by Hengist, the Saxon. This legend is repeated by Henry of Monmouth in his (Historia Britonum,) in the 12th century, and then by numbers of the historians of the Middle Ages. The first his¬ tory of Stonehenge, written by Inigo Jones, and published in 1655, speaks of the structure as a Roman temple and deprecates its demoli¬ tion by the country-folk of the neighborhood, who removed portions of the fallen stones to build bridges, make mill-stones and for such like uses. (See Stone Circles). Consult Bar¬ clay, (Stonehenge and Its Earthworks } (1895) ; Davies, (Celtic Researches *(1804) and My¬ thology of the Druids* (1809) ; Gidley, Stone¬ henge Viewed in the Light of Ancient History, * etc. (1877) ; Sir Henry James, (Plans and Photographs of Stonehenge) (1867) ; Lockyer, Stonehenge and Other British Stone Monu¬ ments Astronomically Considered) (1906); Long, Stonehenge and its Barrows) (1876) ; Sir John Lubbock, (Prehistoric Times) (ed. 1898); Flinders, Petrie, Stonehenge) (1881); and Stukeley, William, Stonehenge and Abury> (1840).

STONEMAN, ston'man, George, American soldier: b. Busti, N. Y., 8 Aug. 1822; d. Buffalo, N. Y., 5 Sept. 1894 He was graduated at West Point in 1846, served on the Pacific. Coast (1847-57), in 1855 was promoted captain, and until 1861 was on duty mainly in Texas. Early in 1861, while in command of Fort Brown in that State, he was ordered by General Twiggs to surrender to the Confederates. He refused, evacuated the fort, and with his men sailed by steamer to New York. In August 1861 he be¬ came brigadier-general of volunteers and chief of cavalry in the Army of the Potomac, and commanded the cavalry in the Peninsula Cam¬ paign of 1862 (q.v.) , distinguishing himself at the battle of Williamsburg (q.v.). In Novem¬ ber 1862 he was promoted major-general of volunteers, having already been placed in com¬ mand of the Third corps, which he led at the battle of Fredericksburg. . He led a cavalry raid toward Richmond during the Chancellors- ville campaign. In April 1864 he took com¬ mand of a cavalry corps in the Army of the Ohio, and during the Atlanta campaign made another notable raid, (see Stoneman’s Macon Raid). At Clinton, Ga., he was captured in July 1864, and for three months was kept a prisoner. In December 1864 he made his third important raid (see Stoneman’s Raid from East Tennessee into Southwestern Vir¬ ginia) ; and in the following March he entered upon still another of these remarkable in¬ cursions into Confederate

territory. (See Stoneman's Raid in East Tennessee, South¬ west Virginia and Western North Caro¬ lina). In 1871, having received several brevets in the regular army, he retired from the service and settled in California, where for six years he served as a railroad commissioner, and from 1883 to 1887 was governor of the State, to which office he was elected by the Democratic party.

STONEMAN'S MACON RAID. When General Sherman was operating against Atlanta

he ordered all his available cavalry to prepare for a blow at the Macon Railroad, simultane¬ ously with the movement of the Army of the Tennessee toward East Point. General Stone- man, with 5,000 cavalry, was to move by the left around Atlanta to McDonough, and Gen. E. M. McCook with two divisions of 3,500 men, by the right on Fayetteville ; and on the night of 28 July 1864 Stoneman and McCook were to meet on the Macon Railroad, near Lovejoy's Station, and destroy it in the most effectual manner. On the morning of the 27th both columns started. McCook on the right, with 3,200 men and eight guns, marched down the west bank of the Chattahoochee, laid a pontoon-bridge near Riverton and crossed, and moving on Palmetto Station, on the West Point Rail¬ road, tore up some two miles of the track, and went on to Fayetteville, where he captured about 250 prisoners, 500 wagons, which he burned, and 800 mules, a greater part of these he killed, and then pushed on to the Macon Railroad at Lovejoy's Station, about seven miles below Jonesboro, and 30 from Atlanta. • He hoped here to meet Stoneman, but heard noth¬ ing of him, destroyed the depot, the railroad to some extent, burned army trains, and was prosecuting his work in the destruction of the road, when he was driven off it by a consider¬ able Confederate force, and still hearing noth¬ ing from Stoneman, endeavored to return and recross the Chattahoochee by marching south¬ west, and had reached Newman, on the West Point Railroad, on the 30th, where he encoun¬ tered an infantry brigade, coming from the south and at the same time was attacked in rear by Jackson's division of Wheeler's cavalry, soon reinforced by Wheeler himself with two additional brigades. McCook had several hard encounters, in some of which he was successful, but was forced to let loose his prisoners, about 400 in number, abandon his artillery and trains, and cut his way out, each brigade commander looking out for himself, and succeeded, with parts of his command, in reaching the Chatta¬ hoochee, which he crossed and marched to Marietta, with a total loss of about 600 men. Stoneman at the moment of starting had re¬ ceived Sherman's permission after the com¬ pletion of his work at Lovejoy's, to march on Macon and Andersonville and release the thou¬ sands of Union prisoners, at these places.

Marching on the morning of the 27th, he left Gerrard's division at Flat Rock, and with the brigades of Colonels Adams, Biddle and Capron, in all about 2,200 men, crossed the Ocmulgee River, near Covington, and made for the rail¬ road running from Macon to Augusta, on which he destroyed a large number of engines and cars at Gordon and Griswoldville. A detach¬ ment went eastward and burned the bridge over the Ocoonee. Stoneman reunited his detach¬ ments near Macon, on the 30th, but the river was between him and the city, and he contented himself with shelling the place and then moved back toward Clinton. Meanwhile he had heairl that the prisoners had been removed. General Iverson's cavalry division had been ordered by Wheeler to follow Stoneman, and was now upon him. On the morning of the 31st Stone¬ man, finding what he supposed to be a heavy Confederate force in his front, deployed a strong line of skirmishers, which soon developed the fact that Allen's brigade of Confederate

cavalry had passed around his flank and taken up a strong position directly across his line of retreat, while Armstrong's brigade, co-operating with Allen's, was closely menacing his left flank. Dismounting the men of one brigade he repeatedly charged the Confederates, but every charge was repulsed with heavy loss, and Arm¬ strong followed by a charge upon his left flank. The Union line gave way and was with difficulty rallied and re-formed. By this time he was nearly surrounded, and as he mistakenly thought by a greatly superior force. Believing further resistance useless, he authorized his brigade commanders to cut their way out, while he, with a regiment and a section of artil¬ lery, held the enemy in check until the others got through, when he surrendered about 500 men. The greater part of Adams' brigade es¬ caped and joined the army near Atlanta. Ca-pron's brigade escaped, but was subsequently surprised and scattered, very few getting back to the Union lines. Consult Official Records, > (Vol. XXXVIII) ; Van Horne, (History of the Army of the Cumberland,* (Vol. II, Cincinnati 1875) ; Sherman, W. T., (Personal Memoirs) (Vol. II, New York 1875). '•

E. A. Carman.

STONEMAN'S RAID FROM EAST TENNESSEE INTO SOUTHWESTERN VIRGINIA. After the defeat of General Gillem's Union brigade at Russelville, Tenn, (q.v.), 14 Nov. 1864, General Thomas, com¬ manding the Military Division of the Missis¬ sippi, of which East

Tennessee was a part, ordered General Stoneman to concentrate his forces in Kentucky and advance from Lexing¬ ton to Cumberland Gap to oppose General Breckinridge should he attempt to move into Kentucky, and to advance into East Tennessee and drive Breckinridge back into Virginia or North Carolina. Thomas' instructions were <(to concentrate the largest possible force against Breckinridge, and either destroy his force or to drive it into Virginia and, if possible, destroy the salt-works at Saltville, and the railroad from the Tennessee line as far into Virginia as he could go without endangering his command.'* These instructions were repeated by Thomas on 6 December, when it was known that Breckin¬ ridge was on the retreat. By the 9th Stoneman had completed the organization of his command and was ready for operations in the field. He had a body of mounted troops, under General Burbridge, that had been doing duty in Ken¬ tucky. the Tennessee brigade of General Gillem, and some infantry and dismounted cavalry under General Ammen, in all a fcyce of 8,000 men. The Fourth Tennessee and Third North Carolina (Union) regiments were sent to Paint Rock to hold the pass over the mountains into North Carolina, and Stoneman concentrated his command at Bean's Station on the 11th. Stoneman started from Bean's Station on the 12th, with Gillem's and Burbridge's commands of about 5,700 men, and Gillem, in advance, reached the north fork of the Holston River, opposite Kingston, during the night, crossed after a sharp engagement, and early in the morning of the 13th attacked and routed Duke's cavalry under Colonel Morgan, capturing Mor¬ gan and 80 of his men and his entire wagon train. During the day Burbridge pushed on to Bristol, to intercept General Vaughn, who had

been holding Greenville with some 1,200 men. Stoneman, with Gillem, joined Burbridge at Bristol early on the 14th, and fearing that Vaughn would pass in the night and join Breck¬ inridge at Saltville or in the vicinity, Burbridge was pushed on to Abingdon, with instructions to send the 12th Kentucky cavalry forward to strike the railroad between Saltville and Wytheville to prevent the former place from be¬ ing reinforced by troops from Lynchburg. The 12th Kentucky, after threatening Saltville, struck the railroad and cut off two trains that had brought Breckinridge with a battery and rein¬ forcements from Wytheville, accomplishing its object. Stoneman now decided to push on to Wytheville, destroy that place and the salt¬ works on New River, and attend to the capture of Saltville on his return. He moved early on the 16th and Gillem overtook Vaughn at Marion, attacked and routed him, pursuing to Wythe¬ ville, capturing his trains, artillery and 198 men, and destroying the town. About midnight Bur- bridge's command was put on the road, and reached

Mount Airy at daylight of the 17th, where Colonel Buckley's brigade was detached to destroy the lead-mines 25 or 30 miles beyond, in Wythe County, which was accomplished without loss. Having destroyed the railroad and bridges some distance beyond Wytheville, Stoneman now set out on his return to destroy the salt-works at Saltville, and on the 17th encountered Breckinridge in a strong position at Marion. He had moved out of Saltville with all the troops he could collect that had been operating in East Tennessee, and had not far from 2,000 men. With these he had proposed to follow Stoneman and attack his rear. He now stood in the path of his return. Burbridge, who was in the advance with two brigades, en¬ gaged him and called uoon Stoneman for re¬ inforcements; and Stoneman, riding forward, took the command in his own hands. Night soon came on, the troops had become disar¬ ranged, and a general attack was delayed until morning, when it opened with great spirit, Stoneman meeting with a stiff resistance and some loss, and making no headwav. Buckley was supposed to be coming up in the afternoon, and Gillem, now up, was sent around Breckin¬ ridge's left, thus cutting him off from the salt¬ works. The skirmishing during the day was accompanied with considerable loss on both sides, and as soon as night set in Breckinridge finding himself cut off from Saltville, and nearly surrounded, withdrew by the road lead¬ ing over the mountains .into North Carolina and escaped. The 12th Ohio cavalry was sent in pursuit, capturing some abandoned wagons and caissons, and then returned; and that night Stoneman concentrated his command at Glade Springs. At daybreak pf the 20th Stoneman advanced on Saltville in two columns, Bur¬ bridge to enter the place on the north, Gillem on the south. Gillem arrived first and waited for Burbridge, who was not in position, and night coming on and nothing yet accomplished, Colonel Stacy, with the 13th Tennessee cavalrv, was ordered to make a detour to the left and dash into the town. Stacy carried out his orders to the letter. He dashed into the town, set part of his regiment to work in burning it and with the remainder charged the fortifica¬ tions, held by 400 men under Colonel Preston, went over them, dispersing Preston's men, and

capturing two guns and a number of prisoners without the loss of a man. Stoneman says the charge (<was a signal for a general stampede of the enemy, and by 11 o'clock in the night all the works were evacuated and in the possession of Colonel Stacy, and the town of Saltville was m flames.® All day and night of the 21st was devoted to

the destruction of the salt-works and all the machinery, and on the 22d Stoneman began his. return march, Burbridge going by way of Big Sandy to Kentucky, and Gillem to Knoxville by Poor Valley and the west side of Holston River. Stoneman reports that he cap¬ tured 34 officers and 845 men, 19 guns, 3,000 horses and mules, great quantities of ammuni¬ tion, and from 50,000 to 100,000 bushels of salt, and that he destroyed the towns of Bristol, Abingdon, Wytheville and Saltville, 13 railroad trains, with engines attached, several trains without engines, all the depots of supplies in southwest Virginia, and railroad depots, foundries, mills, storehouses, turnpike and rail¬ road bridges, but that the greatest loss inflicted was the destruction of the lead-works 17 miles from Wytheville and' the salt-works at Salt¬ ville. A Confederate writer says: ((Vol. XLV) ; Van Horne, (History of the Army of the Cumberland) (Vol. II, Cincinnati 1875).

E. A. Carman.

STONEMAN'S RAID IN EAST TEN¬ NESSEE, SOUTHWEST VIRGINIA AND WESTERN NORTH CAROLINA. Early in February 1865, General Grant directed Gen¬ eral Thomas to send an expedition under Gen¬ eral Stoneman from East Tennessee to pene¬ trate North Carolina and well down to Colum¬ bia, S. C, to destroy the enemy's railroads and. military resources in that section and visit a* portion of the State beyond the control or reach of Sherman's column, which had started on its march northward from Savannah. On the 27th Grant wrote that Stoneman was to repeat the raid of the previous fall, destroying the rail¬ road as far toward Lvnchburg as he could. As the movement was merely for the purpose of destruction, Stoneman was to avoid any heavy engagement. Stoneman's force, which was concentrated at Mossy Creek, East Tennessee, 22 March, consisted of the cavalry division of Gen. A. C. Gillem, three brigades of three regi¬ ments each, under Cols. W. J. Palmer, S. B. Brown and I. K. Miller, numbering about 6,000 men. It had now become known that Sherman had captured Columbia, S. C., and there were rumors that Lee's army . would evacuate Petersburg and Richmond, with the possible intention of moving by way of Lynch¬ burg to Knoxville; and Stoneman was, there¬ fore, directed to move toward Lynchburg, give his first attention to the destruction of the railroad, and then sweep through western North Carolina. On the 24th Stoneman moved

to Morristown, and Sent Miller's brigade to cut off a Confederate force between Jonesboro and Carter's Station, but the force escaped, and on the 26th Miller rejoined Stoneman, who had advanced to Jonesboro. All encumbrances were thrown aside, and with but four guns, and two ambulances to accompany the column, Stone¬ man left Jonesboro on

the 26th and, crossing Iron Mountain, arrived at Boone, N. C., on the 28th, where he captured a body of home- guards, and the column was divided marching by two different routes across the Blue Ridge and through Wilkesboro, Jacksonville and Mount Airy, N. C., and Hillsville, Wytheville, Christianburg and Salem, Va., to within four miles of Lynchburg, destroying bridges and railroad track, capturing trains and prisoners, and causing the Confederates to abandon many guns. This was accomplished by 6 April, at which time Stoneman had possession of 90 miles of the Virginia Central Railroad, from Wytheville nearly to Lynchburg. The bridges over Roanoke and New rivers were destroyed, and on the 9th the entire command arrived at Danbury, N. C. Next day at Germantown, beyond Danbury, Palmer was detached and ordered to Salem, N. C., where he destroyed the extensive factories which were supplying the Confederate armies with clothing, then destroyed the railroad south of Greensboro, and also a part of it between that place and Danville, Va. The main column moved toward Salisbury, dispersing small bodies of the enemy, and bivouacking on the night of the 11th 12 miles north of that place. At midnight the march was resumed, and the South Yadkin River crossed, and at daybreak the Confederate pickets were driven in and across Grant's Creek two miles from Salisbury. The bridge across the creek was defended by 18 guns, under com¬ mand of Col. J. C. Pemberton (formerly a lieutenant-general) and about 3,000 men, com¬ manded by General Gardener. The flooring of the bridge had been taken up. Detachments were sent up and down the stream to cross and come in on the Confederate rear; and time be¬ ing given for this, a charge was made on the bridge, the men went over on the stringers, and the Confederates were totally routed and pur¬ sued through Salisbury, Stoneman capturing the 18 guns, 1,364 prisoners, 10,000 stand of arms, and some wagons. At Salisbury an im¬ mense amount of public property was destroyed, and the railroad was wrecked for several miles south of the place. Having raided over 500 miles, destroying railroads, and capturing horses enough to refit his entire command, Stoneman concluded to take the prisoners and the captured artillery not destroyed to East Tennessee. He withdrew from Salisbury, on the 13th, and reached Lenoir on the 15th, where he turned over the command to General Gillem and, with a strong escort, conducted the artillery and prisoners to Tennessee. His instructions to Gillem were to scout on the east side of the Blue Ridge ; to put Palmer's brigade at Lincoln- ton to scout down the Catawba ; Brown at Mor¬ gantown, to connect with Palmer on the Catawba ; and Miller at Asheville, to open com¬ munication through to Greenville, Tenn. When Gillem, with the two brigades of Brown and Miller, reached the Catawba, two and one-half miles from Morgantown, the bridge was

found

to be torn up, the ford blockaded, and the pas¬ sage of the river disputed by General McCown with about 300 men and one gun. A flanking force was sent up the stream about two miles, crossed, and gained McCown's rear; the force in front attacked with artillery; and .the infan¬ try, crossing on the sleepers of the bridge, charged McCown and routed him, killing some of his men, and capturing his gun and about 50 prisoners. On. the 19th Gillem moved to¬ ward Asheville, by way of Swannanoa Gap, reaching the gap on the 20th, which was found to be blockaded and defended by about 500 men with four guns. Leaving Miller to feint in front, Gillem, with the rest of his force, on the 21st, moved to Rutherford, 40 miles south of Swannanoa Gap, and at sundown on the 22d had passed the Blue Ridge at Howard's Gap, with but slight resistance and was in the enemy's rear. At daylight of the 23d his ad¬ vance entered Hendersonville, where it was learned that the Confederates had retreated through the place. Pursuit was given and 70 men and four guns captured. The entire column then moved on Ashville, and at 3 p.m., when near the town, was met by' P. flag of truce, with a communication from General Martin, stating that he had received official notice of a truce between Generals Sherman and J. E. Johnston, and proposing a meeting next morning. At 11 p.m. an order was received from Sherman directing the command to move to Durham Station or Hillsboro. Being convinced that Sherman had given the order in the belief that the division was at or near Salisbury, and as it would have required a march of about 200 miles to reach Durham Station, and was but 60 to his base at Greenville, Tenn., Gillem deter¬ mined to march to the latter place, and so in¬ formed General Martin, when he met him next morning, of whom he requested rations to make the march, and thus relieve him of the necessity of subsisting on the country, already impover¬ ished. Martin furnished the rations, and on the 25th Gillem set his brigades in motion for East Tennessee. The raid was one of the most suc¬ cessful and destructive of the war. Gillem and Stoneman report the capture of 25 guns taken in action, and 21 that the Confederates were forced to abandon in southwestern Virginia; about 6,000 prisoners, and 17 battle-flags. Con¬ sult (Official Records) (Vol. XLIX) ; Van Horne, (History of the Army of the Cumber- land> (Vol. II, Cincinnati 1875).

E. A. Carman.

STONEMAN'S VIRGINIA RAID. When

General Hooker initiated the campaign finally resulting in the battle of Chancellorsville (q.v.I, he ordered General Stoneman, commanding the cavalry corps of the Army of the Potomac, about 10,000 men and four batteries, to move quietly and rapidly up the left bank of the Rap¬ pahannock, on 13 April 1863, cross the river above the Orange and Alexandria Railroad, disperse Gen. Fitzhugh Lee's cavalry brigade at Culpeper Court House, push on to Gordons- ville, and from there strike the Fredericksburg and Richmond Railroad at Saxton's Junction, destroying it with all its bridges and telegraph lines, thus severing General Lee's communica¬ tions with Richmond. He was also directed to harass Lee's retreating troops that Hooker ex¬ pected to defeat near Fredericksburg. Heavy

rains delayed both Hooker's plans and Stone- man's movement, and after Stoneman had crossed one brigade at Freeman's Ford the Rappahannock rose so rapidly and high that the brigade was recalled and crossed to the left bank of the river by swimming the horses. Stoneman now waited two weeks for Hooker's initiative and better weather. On 29 April, under modified orders to cross the river between , Kelly's and Rappahannock Fords, and to send one column in the direction of Raccoon Ford and Louisa Court House, Stoneman again crossed the river, with the main body, at Kelly's Ford. General Averell, with three brigades and a battery, was to cross at Rappahannock Station, under instructions to push on through Culpeper Court House to Gordonsville and keep the enemy employed in that direction, while de¬ tachments from the main body were destroying the railroads north from Richmond. Stoneman had in all six brigades of cavalry, numbering about 8,000 men, with two batteries. Averell was dilatory in his movement, but soon ran against a regiment of Gen. W. H. F. Lee's bri¬ gade, driving it through Culpeper Court House and beyond the Rapidan, where on the morning of 2 May he received a message from Hooker that he did not understand what he was doing at Rapidan Station, and ordering him to re5oin the army at United States Ford. Averell imme¬ diately returned, and was relieved from com¬ mand because he had failed to regard the in¬ structions given him, and had contented him¬ self with marching but 28 miles in three days with but an insignificant force opposing him.

With picked men and horses, in light march¬ ing order, not a wagon accompanying him, Stoneman pushed forward, with three brigades of 4,300 men and a battery of six guns ; Gen¬ eral Buford's regular brigade was sent to the left in detachments and, after skirmishing with small bodies of Confederate cavalry, reached the Rapidan at Raccoon

Ford on the night of the 30th ; Stoneman followed, the ford was crossed on the morning of 1 May, and at 2 o'clock on the morning of the 2d, after some opposition, and after marching through Orange Court House, Gregg's division of two Brigades struck the Virginia Central Railroad about a mile from Louisa Court House and destroyed much of the railroad, and at day¬ break Colonel Kilpatrick, with his regiment, dashed into Louisa Court House, captured some supplies, and toward evening being attacked by some of W. H. F. Lee's cavalry, withdrew to Thompson's Cross-Roads, and joined his di¬ vision, which during the day had marched by way of Yanceyville, and concentrated at the Cross-roads after night. Here during the night Stoneman gave orders for operations upon Lee's communications by separate parties led respec¬ tively by General D. McM. Gregg, Col. P. Wyndham, Colonel Kilpatrick, and Lieut.-Col. Hasbrouck Davis. At midnight, with a bright moon, the various detachments started, and all were on the road before 3 a.m. of the 3d.

Wyndham, with two regiments of about 400 men, pushed southward to Columbia on James River, at its junction with the Rivanna, driving before him a squadron of cavalry, and on the morning of the 3d he destroyed some canal- boats, bridges, and a large quantity of supplies and medical stores, and attempted to destroy the

stone aqueduct, by which the water of the canal was carried over the Rivanna ; but hearing of the approach of W. H. F. Lee, he withdrew and rejoined Stoneman the same day, having marched 50 miles in 16 hours. He brought in 140 horses and mules, and was followed by Lee nearly to camp.

Kilpatrick marched, with one regiment, reached Hungary Station, on the Fredericks¬ burg Railroad, at daylight of the 4th ; destroyed the depot and part of the road, crossed to the Brook road, and went within two miles of Richmond, driving back a battery and some cavalry, and capturing about a dozen men within the fortifications of the city. Then he struck the railroad at Meadow bridge, over the Chicka- hominy, burned the bridge, ran a train of cars into the river, captured more prisoners and 60 wagons, crossed the Pamunkey and Mattapony next day, swept through the country without opposition, though closely pursued by cavalry, and reached Gloucester Point on York River on the morning of the 7th, with a loss of 38 men. He reported that he captured and paroled over 300 men.

Lieutenant-Colonel Davis, with one regiment, moved along the banks of the South Anna to the Fredericksburg Railroad at Ashland, scat¬ tered a few cavalry bodies, captured an ambu¬ lance train with about 250 wounded from the field of Chancellorsville, whom he paroled, destroyed the road and other property in the vicinity, and pushed on to Hanover Station on the Virginia Central Railroad, burned the depot and other property, marched to Hanover Court House, and then to within seven miles of Rich¬ mond, when he changed direction to the left and started down the Peninsula for Williams¬ burg. At Tunstall's Station, near White House, he met and had an engagement with Confeder¬ ate cavalry, infantry and artillery and, being re¬ pulsed in an attempt to break through, with¬ drew, moved to the left, crossed the Pamun¬ key and Mattapony, and reached Gloucester Point, after a march of over 200 miles, with a loss of 35 officers and men.

Gregg and Buford meanwhile had been raid¬ ing in the neighborhood of the South Anna, closely watched by Wade Hampton and W. H. F. Lee. Buford's brigade was broken into de¬ tachments, and on the 4th one of these, under command of Capt. James E. Harrison, Fifth United States cavalry, was attacked at Flem¬ ming's Cross-Roads, by 800 men, under com¬ mand of W. H. F. Lee. Harrison had less than 100 men, and after a hand-to-hand fight of about five minutes he retreated to Yancey- ville with a loss of five killed and wounded, and two officers and 31 men captured. Lee fell back to Gordonsville, hearing by telegraph from Richmond that the enemy were everywhere. The whole of Stoneman's command, excepting the forces under Kilpatrick and Davis, was con¬ centrated on the 5th at Yanceysville, on the South Anna. Stoneman says : ((The six days having now expired, during which we were assured by the commanding general he would certainly communicate with us, and no communi¬ cation having been received, no retreating enemy having been seen nor heard of, and no information as to the condition of things in the vicinity of Fredericksburg, except vague rumors of our defeat and capture, having been

attained; supplies for man and beast becoming scarce ; having accomplished all that we were sent to perform, and having come to the con¬ clusion that Colonels Kilpatrick and Davis, with their commands, had gone in the direction of Yorktown, I determined to make the best of our way back to the Army of the Potomac.®

Knowing that the cavalry brigades of Lee and Wade Hampton were to the west of him, and that the withdrawal of Averell had exposed his flank and rear to an attack from them, he determined to send General Buford, with 650 men and picked horses, to threaten Gordons¬ ville,

and another force, under Captain Roden- bough, in the direction of Bowling Green, to threaten the enemy's communications and, under cover of night, with the main body, take the middle road through Tolersville, and cross¬ ing the North Anna near the Victoria Iron Works march to Orange Springs, where all were to rendezvous next day. Everything worked favorably. Buford marched to within two miles of Gordonsville, where he found infantry and artillery in position, awaiting his arrival, upon which he turned north, marched until nearly daylight, and halted on the north side of the North Anna, near Orange Springs, where at noon of the 6th he was joined by Stoneman, who had made a night march in a heavy storm. From Orange Springs Stoneman continued his march to Raccoon Ford, on the Rapidan, thence to Kelly's Ford, on the Rappa¬ hannock, which was crossed at daylight of the eighth by swimming the horses, and then to Bealeton.

The result of the raid was the capture of over 500 men and 460 horses and mules and the destruction of nearly 20 bridges and culverts, three trains of railroad cars, 122 wagons, sev¬ eral canal-boats, and a large amount of army supplies. The railroads had been cut in seven places, but these breaks, which General Lee considered as of small consequence, were soon repaired. As the chief object of the raid was the effectual destruction of Lee's communica¬ tions with Richmond, which was not accom¬ plished, it was considered a failure. The Union loss was five killed, 21 wounded and 163 missing. About 1,000 horses were broken down and abandoned, some being killed. There are no trustworthy records of Confederate losses in killed and wounded. Consult (Official Records, > (Vol. XXV) ; the Century Company's (Battles and Leaders of the Civil War) (Vol. Ill, New York 1887-88).

E. A. Carman.

STONES, STANDING, or STONE CIRCLES, are found in numbers throughout Great Britain, to a less extent in Norway and Sweden, and a few in France and northern India. The typical stone circle of Scotland, England and Ireland consists of rough, un¬ hewed stone set up at comparatively equal dis¬ tances in the form of a circle. These circles vary in size from a diameter of 20 feet to more than 100 feet, and are composed of stones of heights ranging from less than six feet to 19 feet, and of varying thicknesses. The stones are set up at distances of from five feet to six yards apart and the site of the circle is usually a level plain, although the gentle slope iof a hill has sometimes been used. The stones used are often in the form

of huge loaf-shaped boulders set up on end and wedged in with smaller rocks at their bases ; sometimes the standing stones are set into a slight excavation in the soil. In a num¬ ber of the stone circles found in Scotland the space between two of the upright pillars, usu¬ ally the two at the southwest side of the circle, is filled by a large flat rock set up on edge and extending from pillar to pillar. The loca¬ tion of this distinguishing feature at the south¬ west seems coincident with the general plan of structure and location of the supposed altar stone in the structure of Stonehenge (q.v.). Some of the stone circles contain a second smaller circle within them, which circle is often composed of stones larger than those in the outside) circle; and some of the examples show a ditch around the circle of pillar stones, or else an earth wall. In either case whether it is ditch or wall, the entrance over or through it is invariably to the northeast. The ditches are in some instances as wide as 30 feet with a depth of six feet; the walls rarely exceed five or six feet in height, and the en¬ trances over the ditches *are usually half as wide as the ditch proper. In one notable in¬ stance, that of a small circle of large stones near the Great Circle of Stennis, in Orkney, Scotland, hoth the ditch and the rampart occur, the latter within the former, and the entire interior area of the circle is raised about three feet higher than the surrounding level.

Besides the circles of standing stones and great boulders, there are also found in the same territory and in Algeria, Syria and north¬ ern Arabia, continuous circles of smaller stones bedded in the ground or resting on the surface. Explorations of the interior area of these cir¬ cles has established the fact that they were used for burying grounds, and from the nature of the contents, the burial urns and the imple¬ ments found beside the graves, Sir John Lub¬ bock has concluded that they belong to the Bronze Age. (See Stonehenge). But it is to the circles of standing stones that the chief interest attaches ; and while it has never been proven that these areas were intended for burying grounds, there seems to be sufficient reason for belief that they were connected with the burial rites of the people who erected them. This theory is borne out by the presence of burial mounds or barrows (known as cairns in Scotland and Ireland) in close proximity to all the larger circles. Indeed in some cases the cairns were surrounded by the circle of stones; as is seen in the great chambered cairn of New Grange in Ireland and in the smaller ones of Clava, near Inverness. Although it is more often the case, the contents of the cairns, particularly of the larger ones, do not always show interments of the Bronze Age. In this latter case there is no incinerary urn contain¬ ing the deposits or over them, and the remains show that there has been no cremation. In like

manner many of the stone circles, indeed the great majority of them, show no evidence <of tool-work in their building, while the im¬ posts of the outer circle and outer ellipse of Stonehenge give conclusive proof of it.

As a rule the cairns which covered the cre¬ mation interments of the Bronze Age are smaller than those of the preceding period, and the custom of placing the burnt hones in

a cavity in the soil, covered only by an in¬ verted urn of clay, dispensed with the cairn altogether, while it retained the circle of stand¬ ing stones as a visible mark or fence of the grave ground. In about 20 instances in which there has been systematic excavation of stone circles in Scotland, the examination of the interior space has disclosed burials of the Bronze Age mostly after cremation but occa¬ sionally unburnt. The cremated remains were deposited with cinerary urns placed either in an inverted position over the burnt bones or upright and containing the burnt bones, at the bottom of a shallow pit excavated in the sub¬ soil. These cinerary urns exhibit the forms and ornamentation characteristic of the age of bronze. Sometimes the burials have been placed in cists of unhewn slabs of stone, cov¬ ered by small cairns of loose stones, under¬ neath the surface level ; at other times the burnt bones of many burials have been found placed in shallow cavities excavated in the soil of the interior area of the circle near the bases of the upright stones. It seems from these circumstances that the common variety of stone circles, as found in Scotland, are ceme¬ teries of the Bronze Age, and while, on the one hand, the difference in the size of the circles of Avebury and Stennis and in the structure and size of Stonehenge may point to a difference in purpose and use, on the other hand, the great size of the circle sur¬ rounding the chambered cairn at New Grange and the objects uncovered by the repair ex¬ cavations at Stonehenge in 1901, seem to show that a great circle also was associated with a sepulchre.

The largest of the Scotch stone circles is that of Stennis, in Orkney. It has a circum¬ ference of 340 feet, enclosing an area of two and one-half acres, and is surrounded by a ditch 30 feet wide. It originally consisted of about 60 pillars, set about 17 feet apart, of an aver¬ age height of about 13 feet. Of these 13 still stand and 10, though prostrate, are intact. The largest stone circle in England is that of Ave¬ bury, in Wiltshire, which consisted of a large outer circle of probably 1,000 stones of from 15 to 17 feet in height and 40 feet in circum¬ ference; this circle was about 1,000 feet in diameter and contained two smaller circles of 350 and 325 feet in diameter respectively. The inner circles each consisted of a double row of stones, a stone pillar 20

feet high occupied the centre of one, and a bowing-stone, or crom¬ lech, that of the other. Surrounding the whole were a broad ditch and a high earth-wall, traversed by an avenue of approach which led toward the southeast for over 1,400 yards. This structure and Stonehenge are considered the most remarkable examples found in England of monuments of megalithic stones. In Nor¬ way and Sweden the few stone circles sys¬ tematically explored have been found to be bur¬ ial places of the Iron Age. They are usually simple circles composed of 8 to 13 stones; occasionally there are two concentric circles, one within the other, the inner circle being sometimes composed of small stones set close together in a ring. Sometimes there is a single pillar stone in the centre of the circle. As a rule they are not remarkable either for the size of the circles themselves or fior the massive-

ness of the stones of which they are composed. Circles of standing stones are rare to the south, of the Baltic. See bibliography under Stone¬ henge. Consult also Dawkins, (Early Man in Britain* (1880).

STONES OF VENICE. This work by John Ruskin, the first volume of which ap¬ peared in 1851 and the second in 1853, was the result of close study and labor in Italy and at home. It was a continuation and expansion of the theories he had already advocated in (The Seven Lamps of Architecture) published in 1849. In that work he had sought to do for architecture what he had already achieved for painting in his (Modern Painters) (q.v.) — to instil the sense of the indissoluble association of art with all other branches of human activ¬ ity. The (Stones of Venice) appeared con¬ temporaneously with the (Construction of Sheepfolds,* an eloquent plea for the reunion of Christian churches, and was as Carlyle wrote of it to the author, ((a new Renaissance — a singular sign of the times — -a sermon) irf stones.® The book was beautifully illustrated with engraving from drawings by the author and some of the most prominent living artists and visualized an embodiment of the concrete idea which he sought to express, that the build¬ ings and art of a people are the expression of their religion, their morality, their national aspirations and social habits.

STONEWARE is that kind of earthen ware (see Ceramics) which is impervious to water and non-absorbent, almost non-porous, the whole substance of the paste being very silicious, either from the original

nature of the clay or from a mixture with the clay of some natural silex such as flint. A simple test is that a broken fragment, if put to the tongue, will not seem to cling to its surface; whereas a broken flowerpot will cling tenaciously, this being caused by the rapid absorption of moist¬ ure by the porous substance. It is for this reason that stoneware is used for acid contain¬ ers, bottles, vinegar jugs and all such common purposes, and also for larger and more deco¬ rative vessels in countries and in times where it is customary to use earthenware vessels in¬ stead of glass or metal at least to a great ex¬ tent. Thus in the Rhine towns and north¬ western Germany during the 14th and follow¬ ing centuries a very elaborate series of cans, jugs and flagons of all sizes from a pint to three or four gallons, were made and decorated by simple impressions from metal or wooden dies impressed upon the surface before firing; the pattern being afterward more or less em¬ phasized by a thin glazing of blue applied in parts. The glaze of stoneware in the usual sense is no more a separate substance than that of Greek vases; it is a mere modifying of the surface generally by some vaporized ingredi¬ ent which is absorbed during the actual process of firing. Thus the most common glaze, called salt-glaze, is generally understood to be pro¬ duced by throwing into the furnace roqgh salt, which is vaporized and leaves the soda in its composition on the surface of the stoneware in the form of a slight, glassy film. The stone¬ ware would not need this to be sufficiently re¬ sistant against water, wine -or the like, but some acids would attack the stoneware, against which the glaze is a sufficient protection.

These decorative wares have been known to the collectors, and in museums and in treatises on Ceramics under the general name of gres dc Flandre, as if they were of Flemish make, but this term is now replaced by such terms as Cologne Ware, German Stoneware and the like. In modern times stoneware has not been gen¬ erally used for decorative purposes ; but recent experiments in the national manufactory of porcelain at Sevres in France have led to the invention or adoption of many brilliant colored enamels which can be applied to stoneware with¬ out in the least diminishing its value as a dur¬ able and weatherproof material; and in this way a whole class of architectural ceramic wares has been made practicable. Magnificent specimens of these wares — even to the extent of huge friezes containing many figures, were on exhibition at Paris in 1900 and any future attempts at decorative architecture will have to include the consideration of these new means of brilliant adornment in color and in form. See Pottery.

STONINGTON, sto'nmg-ton, Conn., town. New London County, on

Long Island Sound and on the New York, New Haven and Hart¬ ford Railroad, about 10 miles east of New London and 40 miles southwest of Providence, R. I. It comprises the borough of Stonington and the villages of Mystic, Old Mystic and Pawcatuck. There is a good harbor. The prin¬ cipal industries are agriculture and the manu¬ facture of machinery, printing presses, woolen goods, velvet goods, thread, fertilizers, cotton and silk goods, etc. The first permanent settle¬ ment in Stonington was made by William Chesebrough of Plymouth in 1649. In 1658 it was chartered by Massachusetts as Souther- town ; passed to Connecticut in 1662, and in 1665 was named Mystic, and Stonington the year following. It was attacked by Sir James Wallace in the frigate Rose in 1775 and in 1814 was bombarded four days by Admiral Hardy. Sealing and whaling were for many years among the town's most flourishing industries. The area of the town is 25,222 acres. It is reached by steamboat from Watch Hill in the summer season. Government is vested in a warden and burgesses as an official board. Pop. 2,100. Consult Palmer, (Stonington by the Sea) (Stonington 1913) and Wheeler, his¬ tory of the Town of Stonington from 1649- 1900) (New London 1900).

STONY CREEK, Battle of, in the War of

1. After the capture of Fort George (q.v.) General Dearborn sent Gens. William H. Win¬ der (q.v.) and John Chandler with 1,300 troops in pursuit of the retreating British under Gen. John Vincent. Chandler marched to Stony Creek, within 10 miles of Vincent's position at Hamilton. Learning .of the American advance, Vincent with 750 troops attacked on the morn¬ ing of 6 June 1813 and might have captured the whole force of Americans had not the Indians accompanying him raised the usual war-whoop, thus warning the Americans of the attack. In the confusion that followed, both Chandler and Winder walked into the midst of the British troops and were cap¬ tured, and Vincent, too, lost his way, being found the next day without sword or hat. The British loss was 23 killed, 134 prisoners and 55 missing; the Americans lost 17 killed, 38

wounded and 100 missing. Had the Americans pursued they might have captured the main body of the enemy, but abandoning baggage and leaving the dead unburied they retired 10 miles up Forty Mile Creek and thence went to Fort George arriving 8 June and remaining

inactive until the battle of Beaver Dams (q.v.). Consult Armstrong, John, (Notices of the War of 1812) (Vol. I, pp. 134—141) ; (American State Papers, Military Affairs *(Vol. I, pp. 445-448) ; Brackenridge, H. M., (History of the Late War* (pp. 117-118) ; Brannan <Official Letters) (pp. 165-171) ; Lessing, <War of 1812) (pp. 602-604) ; Wiley and Rines, (The United States) (Vol. V, pp. 406-407).

STONY POINT, N. Y., town in Rockland County, on the west bank of the Hudson, and on the New Jersey and New York, the New York, Ohio and Western and the West Shore railroads, 35 miles north of New York City. At this point is the rocky promontory from which the town derives its name, which was strongly fortified during the Revolutionary War by the British. In 1779 the Americans had begun to fortify the place, but were forced to abandon it by the British under Clinton, who then completed the fortifications. The only land approach was across a marsh which was covered by water at high tide and was defended by a double line of abattis and picket stations. Washington had determined on a recapture of Stony Point and for this purpose organized a body of picked troops known as the Corps of Light Infantry and placed Gen. Anthony Wayne (popularly called ((Mad Anthony®) in command. Wayne carefully reconnoitered the place and decided for a night attack and sur¬ prise, which was carefully planned by Wash¬ ington. In accordance with this plan, Wayne brought his men as near Stony Point as pos¬ sible and by 8 p.m., 15 July, camped about a mile from the fort. Here he divided his force into columns, and about 11:30 commenced the march against the fort ; when the marsh was reached, one column under Wayne turned to the south to cross the marsh, the other to the north. By the time the Americans had crossed the morass, the British were thoroughly aroused, and opened fire upon both columns. The Americans did not fire but charged with the bayonet so impetuously that the enemy were quickly driven from the outer abattis into the fort, where they were obliged to surrender; the two American columns reached the fort almost at the same time. Wayne was wounded in the head during the charge, and was carried into the fort but the wound proved slight. The whole British garrison of over 540 were taken prisoners; the Americans lost only 15 killed, the British 63. The Americans were not able to hold the place, but destroyed the fortifica¬ tions, and it was reoccupied for a time by the British who, however, abandoned it in October. The immediate effect of the victory was to encourage the Continental army, and increase the confidence and zeal of the people. The site of the fortifications was acquired as a public park by New York State in 1897. The population of the village is less than 1,000, but the town's population is about 4,000. Consult

Johnston, (The Storming of Stony Point) (New York 1900).

STONYHURST COLLEGE, England, a Roman Catholic institution 10 miles north of Blackburn, Lancashire. The college was orig¬ inally founded at Saint Omer in Flanders in 1592, but in 1794 was transferred to England. It is affiliated to the University of London, and provides a school course of instruction for boys and a university course for young men. At¬ tached to it is a good observatory, an excellent library of 40,000 volumes, museums, etc. Sev¬ eral wellknown men have been educated here. The series of (Stonyhurst Philosophical Manu¬ als* by the Jesuit professors in the philosophical department of the college represents an able and notable attempt to revive the scholastic philos¬ ophy as expounded by Saint Thomas., and adapt it to modern thought.

STOOP, in architecture, an uncovered plat¬ form at the entrance to a house or other build¬ ing, raised to the height of the door-sill and approached by a flight of steps, the same width as the stoop. The word is Dutch, having its origin in New York in Colonial days. It is fre¬ quently used incorrectly for porch or veranda.

STOPPAGE IN TRANSITU, in law, is the exercise of a right allowed by law to a seller to stop the delivery of goods purchased by a buyer who has become bankrupt while the goods are in the hands of a carrier or middle¬ man for transmission. Under the laws of Eng¬ land it is not necessary that the vendee should have been judicially declared bankrupt or in¬ solvent ; mere inability to pay his debts as they become due constitutes the insolvency contem¬ plated by the law. Of course the burden of proof rests on the seller to establish the fact of insolvency or bankruptcy in case it is denied. Stoppage in transitu is not held to cancel the transaction, but only to place the goods under lien of the seller for the price. The transitus, during which goods are liable to stoppage, is terminated by actual or constructive delivery to the buyer or his agent. A common carrier is not considered the agent of the buyer, although employed by him for the transmission of the goods ; but if goods are delivered at a shipping port to a buyer's agent for transshipment, the tansitus is at an end and cannot be renewed when they are redelivered to a common carrier. Although the buyer is the charterer for the voyage of the ship in which the goods are car¬ ried they are not held to be delivered to him until the delivery is completed in the usual man¬ ner at the close of the voyage; but if he has hired the ship for a period it will be considered as his premises and the delivery will be com¬ plete. The law of the United States in relation to this subject is virtually the same as that of England.

STORAGE BATTERIES. See Electric

Storage Battery, The.

STORE CHECKS. See Truck Systems.

STORER, Bellamy, American diplomat: b. Cincinnati, 28 Aug. 1847. He was graduated from Harvard in 1867, and from Cincinnati Law School in 1869. He practised law in Cincinnati ; was a member of Congress, 1891-95; United States Minister to Belgium, 1897-99 ; to Spain, 1899-1902; United States Ambassador to Aus¬ tria-Hungary, 1902-06, when a controversy with President Roosevelt over ultra-diplomatic activities led to his resignation. Consult Storer,

B., ˆLetter to the President and the Members of his Cabinet (1906).

STORER, David Humphreys, American physician and naturalist: b. Portland, Me., 26 March 1804; d. Boston, Mass., 1891. He was graduated at Bowdoin College in 1822, studied medicine at Harvard Medical School, then started to practice (1825) in Boston and con¬ tinued till 1888. He was called to the chair of obstetrics and medical jurisprudence in 1854, in Harvard Medical School, becoming dean from 1855 to 1864. In 1866 he became president of the American Medical Association. He wrote (Report on the Ichthyology and Herpetology of Massachusetts) (1839) ; (Synopsis of the Fishes of North America) (1846), long the standard on this subject. In 1876 he was awarded the degree LL.D., by Bowdoin.

STORER, Francis Humphreys, American agricultural chemist : b. Boston, Mass., 27 March 1832; d. 1914. He was son of David H. (q.v.). He studied chemistry under Prof. J. P. Cooke, becoming his assistant in 1851, and was gradu¬ ated at Harvard in 1855 after returning from an exploring expedition of the United States to the North Pacific. He next went to Europe and studied under Bunsen at Heidelberg, Rich¬ ter at Freiberg, Stoeckhardt at Tharund, and Emil Kopp in Paris. On his return (1857) he became chemist to the Boston Gas Light Com¬ pany while working in a private laboratory. In 1865 he became professor of general and indus¬ trial chemistry at the Massachusetts Institute of Technology. He was appointed, in 1870, professor of agricultural chemistry at Harvard University and became (1871) dean

of the Bussey Institution. In conjunction with Cyrus M. Warren he made notable researches upon hydrocarbons. While at the Massachusetts In¬ stitute of Technology he developed, in collabo¬ ration with Charles W. Eliot, a system of teaching applied arts chemistry; together they published (Manual of Inorganic Chemistry * (1868), setting forth their advanced method of training, which became very popular. Other valuable works were (A Dictionary of Solu¬ bilities of Chemical Substances) (Cambridge 1864) ; (Manual of Qualitative Chemical Anal- ysis) (1868; 17th ed. 1893) ; (A Cyclopaedia of Quantitative Analysis *(1870-73) ; (Elementary Manual of Chemistry) (1894) ; (Agriculture in Some of its Relations with Chemistry* (3 vols. 1897) ; (Manual of Qualitative Analy¬ sis > (1899).

STOREY, George Adolphus, English artist and author: b. London, 7 Jan. 1834. He first exhibited at the Royal Academy in 1852. In 1863 he was in Spain, painting portraits at Madrid. Among his pictures are (A Royal Challenge> (1865) ; (After You- *(1867) ; (The Shy PupiP (1868) ; (The Old Soldier* (1869) ; (The Duet, *and (Only a Rabbit* (1870) ; (Rosy Cheeks) and <Lessons) (1871) ; (Little Butter-Cups) (1872) ; <Caught *(1875) ; (A Dancing Lesson * (1876); (The Ivory Door* (1881) ; ˆCoracles on the Dee) (1882); (The Connoisseur *(1883) ; (First Practice* (1894) ; (Rival Minstrels *and (Coming Events* (1895) ; (A Love Stratagem *(1896); (A Fair Musician* (1897) ; (Daughter of the Regiment *(1897) ; (In Evening Shade* (1898) ; <The Lost Labour of the Danaides *; ˆPhilomel* (1900);

The Love Letter (1901); (A Love Sonnet*; (Miss Reynolds* (1902) ; (Pluto's Messenger* (1904) ; (Venus Lamenting the Death of

Adonis*; (Griselda* . (1905) ; (Leda, *Pamela,* etc. (1906) ; (Mrs. E. W. Meyerstein *(1907) ; (Phryne* (1908) ; (Circe, *(Pan and Syrinx,* and (Phillis Meyerstein *(1909) ; (My Moth¬ er's Portrait,* purchased for the National Gallery of British Art; (My Father's Por¬ trait *(1874); (Lady in Furs*; (Miss Gladys Storey *(1912) ; (Her First Letter* (1913) ; (A Young Painter, *(Edward Cressy* ; (Armida in the Enchanted Wood* (1914) ;

) Viola *(diploma work), (Diana* (1915). He is author of (Sketches from Memory *(1899); (Theory and Practice of Perspective* (1910).

STOREY, Moorfield, American lawyer: b. Roxbury, Mass., 19 March 1845. He was graduated from Harvard University in 1866 and from the Harvard Law School three years later. He was private secretary to Charles Sumner 1867-69, and from 1873-79 was editor of the

American Law Rcvieiv. He was active in the <(Mugwump *movement in 1884 and was presi¬ dent of the American Bar Association in 1896. He has published (Life of Charles Sumner (1900), and a (Memoir* of E. R. Hoar (1911).

STORKS, a family (Ciconiidce) of wading- birds of the order Hcrodiones. In this family the bill is very stout at the base', longer than the head, usually straight but occasionally curved either up or down. The nostrils are remark¬ able in being entirely unprotected either by a scale or bristles; they are placed close to the base of the bill and perforate its horny sheath directly, not being even sunk in a groove. The hallux is placed on a level with the other toes which are either moderately or considerably elongated and terminate in a more or less flat, broad claw. The general aspect of these birds is somewhat heron-like but they lack all of the grace of those birds, being of rather heavy build and clumsy action. To this family belong the true storks, the jabirus and the wood ibises, the latter being quite distinct from the true ibises. True storks form the subfamily Ciconince and, with the exception of the closely related American jabirus, are confined to the warmer parts of the Old World, where about six genera occur. The white stork (Ciconia alba), which during some portion of the year is found in most parts of Europe, Asia and Africa, is the celebrated bird of German and Dutch story and folklore, and familiar from the pictures in children's Christmas books of German manufacture. In its domesticity and love of human habitations as nesting-sites it departs widely from the solitary, retiring habit of most of its kindred ; but in other respects it is thoroughly a stork, feeding upon frogs, small fishes, mice and insects, which are cap¬ tured in the marshes and meadows ; sleeping during the heat of the day often with one foot drawn up and the bill lying on the breast; becoming active at dusk and in the cool of the morning; voiceless but producing a clattering noise with its bill; during the mating season indulging in dances and other queer stiff-legged antics; and on the approach of cold weather migrating to Africa. They fly in pairs or small flocks at a great height and with their long legs stretched out straight behind. A

stork's nest on the house-top is the best of good omens and as the birds are undisturbed they re¬ turn year after year to add to the huge struc¬ ture of sticks and raise another callow brood. Other species of the same genus inhabit Europe, Asia and Africa, but they breed on rock}' cliffs or tall trees and shun human habitations. The adjutant (

Leptoptilus dubius) of India is another semi-domesticated species which acts as a scavenger and feeds largely upon carrion. A very peculiar Indian stork is the open-bill (q.v.) in which the mandibles do not com¬ pletely close. Its food consists largely of mus¬ sels. But two species (Dissura maguari and Mycteria americana) inhabit America, the last only, the jabiru, entering occasionally the south¬ ernmost United States. It is a large bird, standing more than four feet high, with a huge, massive bill more than a foot long, the head and neck bare and black except for a bright red zone on the lower part of the latter; the plumage is entirely white. The young are largely grayish. Along the seacoast and about the mouths of some of the rivers of tropical South America this bird is very abundant. Be¬ sides capturing living repfiles, frogs, etc., it feeds upon carrion and has a curious habit of probing the mud with its bill in search of worms and larvae. Its nest, a platform of sticks, is built in tall trees and two dull green eggs more than three inches long are laid. When angered or excited the crop is inflated beneath the red skin of the throat which swells out like a huge ball of a most threatening aspect. The wood ibises form the subfamily Tantalince, distin¬ guished from the true storks chiefly by the strongly decurved bill and longer claws. Tanta¬ lus is generally considered to be the only genus, with species in tropical Africa, India and the Malayan Islands, and the American T. loculator which inhabits the entire South American con¬ tinent and the southern United States, occasion¬ ally straying northward to Pennsylvania and New York. Except that it is gregarious, espe¬ cially when breeding, its habits are stork-like. In the Southern States the wood ibis is resident in thickly wooded swamps, along the seashore, rivers and bayous where it is extremely abun¬ dant in many places. In Florida, however, it is said to be more solitary. When feeding it rakes the bottom with its hooked bill and captures the small fishes, worms, mollusks and crustaceans thus disturbed; in fresh water it captures especially crayfish and batrachians, and on land snakes, lizards and rats. The two or three eggs are dull white. The stork is the omen of births, and ((to receive a visit from the stork55 means to have a new baby in the family. Con¬ sult (Newton Dictionary of Birds5 (London 1896) ; Gubernates, Zoological Mythology5 (New York 1872) ; Baird, Brewer and Ridg- way, (North American Water Birds5 (Vol. I, Boston 1884).

STORM, storm', Theodore, German novel¬ ist, poet and short story writer : b. Husum, a seaport and manufacturing town of Schleswig, on the coast of the North Sea, 14 Sept. 1817; d. Hademarschen, 4 July 1888. He studied law at Kiel and Berlin and practised his profession in his native town. On account of his strong Ger¬ man sympathies in the Schleswig-Holstein ques¬ tion he was forced to leave the country and

was a political exile for 10 years (1854-64). When

the disputed territory passed under the do¬ minion of Prussia in the latter year he was permitted to return and was rewarded with several judicial positions under the Prussian government for his faithfulness to the German cause, and he was finally retired on a govern¬ ment pension in 1880. His most popular story is Ummensee5; but it is only one of half a hundred which were received with satisfac¬ tion by the German reading public. In this story he recalls, in a strangely vivid, poetical, realistic, yet dreamy, fanciful manner, the scenes of his early life. Almost all his stories and poems are touched with the same quiet sad¬ ness as that which characterizes Ummensee.5 This loneliness and melancholy surround most of the people about whom he writes. Yet through this strange loneliness there is ever in evidence an engaging warmness of heart and tender sentiment expressed in sweet and grace¬ ful language. Everywhere we feel, in the stories, novels and poems of Theodore Storm, that he expresses much more by suggestion than he actually says ; and this characteristic forms one of the chief charms of his works. Storm may be called the prose Longfellow of Ger¬ many. See Immensee.

STORM, The ((Groza5). In this tragedy,

which appeared in 1860, Ostrovski has given the most vivid picture in literature of the fright¬ ful consequences of domestic despotism, such as formed the foundation of the lives of the Moscow merchant class. The old widow Kab- anikha believes in the rule of terror and cannot understand her son's sentiment that his wife should not live in fear of him. Catherine, his wife, who is the heroine of the play, has by the critic Dobrolyubov been denominated (<a ray of light in a world of darkness.55 She is one of the most touching characters in any litera¬ ture. Warmhearted, profoundly religious, her nature is chilled in her home surroundings by the hostility of her stern mother-in-law and the indifference of her profligate husband. She begs him not to go on a journey, not to rob her of her soul's peace. During his absence she is easily captivated by the urbane Boris, and she falls. Upon her husband's premature re¬ turn a raging storm evokes in her mingled feel¬ ings of superstition and remorse, and she con¬ fesses to her husband. When she hears that Boris is forced to leave for a long journey she, in a sense comparable to the finest scenes in Goethe's (Faust, 5 bids him good-bye and then commits suicide by leaping into the river. The positive characters in the play are Cath¬ erine's family, among whom she had been brought up in love, and the autodidact Kuligin, who gives expression to Ostrovski's humane sentiments in some such way as did the chorus in the ancient Greek tragedy. In

Russia this drama has maintained itself on the repertoire until the present time, but it has not met with success abroad, on account of the great objec¬ tivity of the characters and the absence of climaxes and melodramatic situations. It is to be found in an English translation by Con¬ stance Garnett (London 1899 and Boston 1907).

Leo Wiener.

STORM KING, or BUTTER HILL

(called by the early Dutch The Klinkenberg , which means “Echo Mount55), one <of the highest peaks of the Highlands on the west

bank of the Hudson, in Orange County, N. Y. It was also called Boterberg (Butter Moun- tain) by the Dutch. It is a rounded mass (1,530 feet high), made more conspicuous by being on the river’s bank. The village of Corn¬ wall is near by. The peak stands like a ((storm king® at the northern ((Gate of the Highlands,® as a protection against the fierce storms of the north.

STORM-PETREL. See Mother Carey’s Chicken.

STORM AND WEATHER SIGNALS.

See Meteorology ; Weather Bureau.

STORNOWAY, stor'no-wa, Scotland, a seaport in Ross and Cromarty County, on the east coast iof the island of Lewis, Outer Hebrides. The principal buildings are the courthouse, assembly-rooms, public library, customs house, drill-hall, industrial and gram¬ mar schools. There is a naval reserve station, a good harbor with quays and wharves, and a ship-building, yard with patent slip. The her¬ ring and whitefish fisheries are valuable. The town has a population of about 4,000, and the parish of about 14,000.

STORRS, storz, Richard Salter, American

Congregational clergyman : b. Braintree, Mass., 21 Aug. 1821 ; d. 5 June 1900. He was descended from a long line of ministers; was graduated at Amherst in 1839, and at the An¬ dover Theological Seminary in 1845. He preached for a jˆear in Brookline, Mass. ; and in 1846 became minister of the Church of the Pilgrims, Brooklyn, N. Y.,

continuing in that pastorate until his death. He reached a com¬ manding position among the leading preachers of his time, and added new meaning and dignity to the title of pulpit orator, which by eminence he bore, although his oratory was free from limitations of a professional character, being effective through its intellectual and moral qualities and its masterful delivery, whatever the subject or the occasion might be. He was also a scholar and writer of much distinction, and contributed articles on various subjects to many publications. From 1848 to 1861 he was one the editors of the Independent. He also published (The Graham Lectures on the Wisdom, Power and Goodness of God, as Manifested in the Constitution of the Human SouP (1856) ; (The Conditions of Success in Preaching Without Notes) (1875) ; (The Divine Origin of Christianity Indicated by his His¬ torical Effects) (1884) ; (Bernard of Clairvaux) (1892); (Forty Years of Pastoral Life) ; and also many religious, historical and literary dis¬ courses (Of varied interest. From 1887 to 1897 he was president of the American Board of Commissioners for Foreign Missions. Con¬ sult Storrs, Charles, (The Storrs Family* (New York 1886).

STORRS, William Lucius, American jurist and congressman: b. Middletown, Conn., 25 March 1795; d. Hartford. Conn., 25 June 1861. He was graduated (1814) at Yale Col¬ lege and admitted (1817) to the New York bar, soon returning to practice at Middletown. He was elected member of the State assembly (1827-29) and again in 1834, when he became speaker the last term. From 1829-1833 he was member of Congress for Connecticut, and again in 1839-41, when he resigned to become

judge of the Supreme Court of Connecticut, serving till 1856. From the latter date till his death he was chief justice of the Supreme Court of Connecticut. From 1846-47 be was professor of law in Yale College. Western Reserve conferred the degree of LL.D. on him in 1846. His decisions may be found in the Connecticut Reports.*

STORTHING, stor'ting, the parliament or legislative assembly of Norway. It is elected triennially, and holds annual sessions. See Norway.

STORY, George Henry, American artist: b. New Haven, Conn., 22 Jan. 1835. After serving three years' apprenticeship to a wood carver he studied under Charles Hines for a like period. He next spent a year in Europe, after which he went to Portland, Me., where (1859) he received the State medal. In 1863 he settled in New York, where he has painted many notable portraits and genre pictures. At the

Philadelphia Centennial Exposition he was awarded a medal. From 1889-96 he was curator of the department of paintings at the Metropolitan Museum of Art, New York, be¬ coming acting director 1904-05, and has been curator emeritus since 1906. He received A.N.A. diploma in 1875.

STORY, Joseph, American jurist: b. Mar¬ blehead, Mass., 18 Sept. 1779; d. Cambridge, Mass., 10 Sept. 1845. He was graduated from Harvard in 1798, and afterward studied law. In 1808 he entered Congress, in 1811 became speaker of the Massachusetts State legislature, and soon after was appointed a judge of the United States Supreme Court. In 1829 he be¬ came first Dane professor of law at Harvard, a position which he held for the rest of his life, while he still continued to serve as judge of the Supreme Court. He was strongly op¬ posed to slavery, and for this reason he was very unpopular where the slavery sentiment prevailed. As a judge of the Supreme Court he made a mark for himself and helped to largely mold American equity jurisprudence. Many editions (1851) by his son William Wetmore Story (q.v.).

STORY, Julian, American artist ; son of W. W. Story (q.v.) : b. Oxford, England; d. 24 Feb. 1919. Educated at Eton and Oxford, studied art at Paris ; received the third class medal at the Paris Salon, 1889; in 1891 took the

gold medal at the Berlin Exhibit and in 1900 was awarded the silver at the Paris Exposi¬ tion. The same year lie was made Chevalier of the Legion d'Honneur of France.

STORY, (Mrs.) William Cumming, Amer¬ ican women's club leader. She is an active worker in patriotic societies as well as women's clubs, and was elected president-general of the Daughters of the American Revolution, 1913. She has served as president of the New York City Federation of Women's Clubs, vice- president New York State Federation of Women's Clubs, etc. Her maiden name was Daisy Allen.

STORY, William Edward, American mathematician : b. Boston, Mass., 29 April 1850. He was graduated (1871) at Harvard, and studied (1871-75) medicine at the universities of Berlin and Leipzig, receiving the diploma of Ph.D. From 1875-76 he was tutor of mathe¬ matics at Harvard, becoming successively associate, assistant professor and

associate pro¬ fessor of mathematics at Johns Hopkins (1876— 89). Since 1889 he has been professor .of mathematics at Clark University. He has been editor-in-charge American Journal of Mathemat¬ ics (1878-82) and editor Mathematical Re- view. Many valuable articles on mathematical questions have been contributed by him to the leading American, English and German scientific periodicals.

STORY, William Wetmore, American sculptor and author : b. Salem, Mass., 19 Feb. 1819; d. Vallombrosa, near Florence, Italy, 7 Oct. 1895. He was graduated from Harvard in 1838, from its law department in 1840, was ad¬ mitted to the bar at B.oston, and published treatises (On the Law of Contracts1* (1844) ; and (On the Law of Sales of Personal Prop¬ erty } (1847), besides three volumes of Re¬ ports of Cases Argued and Determined in the Circuit Court of the United States for the 1st Circuit5 (1847). Two volumes of (Poems) appeared in 1847 and 1856. In 1848 Story went to Rome, where he afterward chiefly resided as a sculptor and writer. He was United States commissioner on fine arts to the Paris World's Fair of 1879. Among the better examples of his art are statue of Cleopatra (1864) ; busts of Lowell, Josiah Quincy and Theodore Parker; a statue of Everett in the Boston Public Gar¬ dens ; a statue .of George Peabody for London (1869), placed in replica in Baltimore in 1888; (SauP ; (Jerusalem) ; (1874). Two of his sons, Julian and T. Waldo, were noted in art, the first being a painter and the second a sculptor. Of his further books may be mentioned (Roba di Roma) (1862) ; (Graffiti d'ltalia5 (1869); (The Tragedy of Nero5 (1875), and (Fiammetta5 (1885). Con¬ sult James, Henry, (William Wetmore Story and His Friends5 (Boston 1903) ; Phillips, M. E., (Reminiscences of William Wetmore Story5 (New York 1898) ; Taft, Lorado, his¬ tory of American Sculpture5 (New York

1903).

STORY, or STOREY, in architecture, a floor of a house or other building, or a set of rooms on the same level or floor. A story is considered the distance from floor to floor, usually 9, 12 or 16 feet apart.

STORY OF A BAD BOY, The, by

Thomas Bailey Aldrich, takes high rank among the books in which American authors have recounted in the guise of fiction some of their boyhood experiences — a list that includes among others Mark Twain's (Tom Sawyer, 5 William Dean Howells's (A Boy's Town,5 and Charles Dudley Warner's (Being a Boy.5 In (The Story of a Bad Boy5 the author has thinly disguised his name as Tom Bailey, and that of

his native town, Portsmouth, as River- mouth. The seaside setting gives the nar¬ rative a flavor as distinctive as that afforded by Tom Sawyer's Mississippi environment. None of the escapades of the bad boy and his friends are in themselves remarkable, but they are told with a thorough understanding of boy psy¬ chology, and a pervasive but restrained humor, so that they hold the interest of readers of all ages. Only those of mature years may be able fully to appreciate the satire of a chapter like <(I become a blighted being,55 in which Tom tries hard to make his love-sickness overcome the healthy appetite and interests of a boy, but those of Tom's own age can see the humor .of the situation, and may even find their under¬ standing aided by secret recollections of their own experiences. The one tragic occurrence, the helpless drifting out to sea of little Binny Wallace,- is told with remarkable power. Al¬ drich was always an artist in prose as well as in verse, and his perfection .of form and the charm of his style are seen to advantage in this book. It seems likely to last longer than any of his other prose works with the possible exception of one or two short stories.

William B. Cairns.

STORY OF GOSTA BERLING, The, a

novel by Selma Lagerlof, appeared about Christmas-time 1891. In the summer of 1890 a Swedish magazine, the Idun, had offered a prize for the best novel of a certain length. Selma Lagerlof entered the contest with a few chapters from (Gosta Berling,5 a story which was then beginning to take shape in her mind, and won the prize. In (Gosta Berling5 Selma Lagerlof is a romanticist and represents a re¬ action against the realism which prevailed at the time. As a child she had absorbed the folk tales of her surroundings, and later on in life il occurred to her like a lightning flash that it was her particular mission to give these stories expression. (The Story of Gosta Berling5 has been called the ((prose epic of Swedish country life.55 The scene is laid on the shores of Lake Fryken (Lake Loven in the story) in Varm- land. The hero, Gosta Berling, is a deposed minister, who has been saved by the Mistress of Ekeby from freezing to death and thereupon becomes one of her pensioners in the manor at Ekeby. As the pensioners finally get power in their own hands, they manage the property as they themselves see fit, and their lives are filled with many wild adventures. Gosta Berling is the leading spirit, the poet, the charming per¬ sonality among a band of revelers. But be¬ fore the story ends, Gosta Berling is redeemed, and even the old Mistress of Ekeby is permitted to come to her old home to die. In this as in her other works, the authoress shows a marvel¬ ous simplicity of style.

Everything she touches quickens with new life and takes on a deeper meaning. Consult Ruben Berg, <Svenska

skalder fran nittiotalet) ; Johan Mortensen,

- Selma LagerlofB

Joseph Alexis.

STOTHARD, stoth'ard, Thomas, English painter: b. 17 Aug. 1755; d. 27 April 1834. He very early exhibited a taste for drawing. At eight he was placed at school at Stretton, near Tadcaster, where he remained till his 13th year, when he was removed to a boarding-school at Ilford, Essex. On his father's death, about a year after, he was bound apprentice to a drawer of patterns for brocaded silks in London. His apprenticeship was cut short in consequence of the decline of the trade. In 1777 he became a student at the Royal Academy, and in the fol¬ lowing year exhibited as his first picture there The Holy Family. > In 1791 he was elected an associate of the Academy and in 1794 he be¬ came an academician. Among his works may be mentioned his designs for novels by Richard¬ son, Fielding, and Smollett; for Sterne's Tris¬ tram Shandy) ; for Milton's works; for Rogers' Poems and (Italy) ; some historical pictures and his Canterbury Pilgrims. He painted internal decorations of buildings and designed silver plate, medals, etc. He is said to have made 5,000 designs, 3,000 of which .were engraved. Consult <Life) by Mrs. Bray (London 1851) and a second by A. C. Coxhead (London 1906).

STOTT, Henry Gordon, American elec¬ trical engineer: b. Orkney Islands, 1866; d. 15 Jan. 1917. He studied at the College of Science and Arts, Glasgow, and at the Glasgow and West of Scotland Technical College. He served (1884) with the Glasgow Electric Light Com¬ pany and (1885-89) with the Anglo-American Telegraph and Cable Company, experimenting at the same time. He was (1889-90) assistant engineer for Brush Electric Engineering Com¬ pany's plant at Bournemouth, England, then on electric works (1890-91) at Madrid, Spain. From 1891-1901 he was engineer of the Buffalo General Electric Company. After 1901 he was superintendent of motive power, Interborough Rapid Transit Company and New York Rail¬ ways Company.

STOUGHTON, stoAon, Israel, American colonist : b. England at the close of the 16th century; d. Lincoln, England, 1645. He emi¬ grated to America in 1630 with the company which founded Dorchester, Mass., of which John Endicott was a conspicuous figure, and served the colony as assistant to the governor during a number of years. He was identified with the famous antinomian controversy intro¬ duced by Ann Hutchinson and Wheelwright, and having written a pamphlet upon the sub¬ ject which was displeasing to his fellow towns¬ men he was removed. He was later restored to his place in the government of the community. In 1639 he was appointed to act with Endicott in a boundary dispute with the Plymouth colony, but in 1644 he left Massachusetts and returned to England where he later on entered the Parliamentary army as lieutenant-colonel. By will he left 300 acres in Dorchester to Har¬ vard University. Consult Quincey, Josiah, The Historv of Harvard University) (Boston

1860).

STOUGHTON, William, American col¬ onist, son of Israel Stoughton: b. about 1630; d. Dorchester, Mass., 7 July 1701. He studied

at Harvard and was afterward graduated at Oxford, where he was fellow from 1652 to 1660 when he was dismissed as a result of the Restoration. Returning to America, he was elected assistant in the Dorchester colony from 1671 to 1686. In 1692 he was appointed lieu¬ tenant-governor of Massachusetts, and in this capacity presided over the witchcraft trials at Salem, and he treated the accused with great cruelty. He seems, notwithstanding his travels and education, to have been a man of very nar¬ row calibre. Following the example of his father, he became a liberal patron of Harvard University. Consult Sibley, J. L., (Biographical Sketches of Graduates of Harvard University) (Cambridge 1873).

STOUGHTON, Mass., town in Norfolk County, on the New York, New Haven and Hartford Railroad, 16 miles south of Boston. Within its limits are the villages of Stoughton, West Stoughton and North Stoughton. The chief manufacturing establishments are woolen mills, rubber works, boot and shoe factories and machine shops. The town has one public high school, 17 district schools, several private schools and a public library, established in 1874. There are several beautiful residential sections and in the southern part of the city are small bodies of water. Pop. (1920) 6,855. Consult Hurd, (History of Norfolk County) (Phila¬ delphia 1884).

STOUGHTON, Wis, city in Dane Cmmty, located on the Catfish River

and on the Chicago, Milwaukee and Saint Paul Railroad. It is 15 miles south-southeast of Madison. It has a Carnegie library and manufactures of plows, carriages and wagons, flour mills, etc. Pop.

(1920) 5,101.

STOUT, George Frederick, English psy¬ chologist: b. South Shields, 6 June 1859. He was educated at Saint John's College, Cam¬ bridge, of which he became a fellow in 1884. He was Anderson lecturer in comparative psy¬ chology at the University of Aberdeen in 1896, and previous to that lecturer on moral science at Cambridge (1894). He became professor of logic and metaphysics in Saint Andrews Uni¬ versity in 1903. He was Wilde reader in mental philosophy at the University of Oxford (1898) ; examiner at London University (1899) and Gifford lecturer at the University of Edinburgh (for 1918-20), and has been editor of Mind from 1891. He has published (Analytic Psychology) (1896) ; (Manual of Psychology* (1899) and other similar works.

STOVAINE. This .chemical is amylo- caine or dimethyl-amino-benzoyl-ethyl-carbinol hydrochloride and its formula is

C Hs r O. CO. Ce h5 C, H., > U < CH2 N(CH3)2 H Cl.

It crystallizes in small scales that melt at 175° C. It is freely soluble in water, dilute alcohol and acetic ether, slightly soluble in absolute alcohol. Its therapeutic value is as a local anaesthetic (substitute for cocaine). The claims in its favor are that it is a vaso-dilator rather than vaso-constrictor and has but half to one-third the toxic power of cocaine. When adminis¬ tered subcutaneously it is not an anodyne, but produces analgesia in epidural or epidermal in-

jections, especially in cases of neuralgia, in¬ cluding sciatica. It is favored in ocular surgery for its rapid action. Dentists employ stovaine preceding extractions.

STOVES AND HEATING APPARA¬ TUS. Any system of heating must necessarily include three things, the combustion of fuel in a fireplace, stove, furnace, steam or hot-water boiler; a system by which the heat is trans¬ mitted to its destination with the least possible loss ; and a system of diffusion, by which the heat is conveyed to the air in a room, and to its walls, floors, ceilings, etc. The simplest and most

economical method of heating to instal is the stove, which requires no system of trans¬ mission, but by radiation and convection dif¬ fuses the heat directly to the air and to the objects in the room. Though this method has not been entirely superseded in dwellings by the hot-air furnace, owing to the cost of in¬ stalling the latter, the furnace has largely done away with use of the stove solely as an ap¬ paratus for heating purposes, beside which the furnace has many advantages over the stove, as such. The hot-air furnace is generally con¬ structed of brick or iron plates and provided with a brick-lined firepot; there is a combustion chamber over the fire, and between these latter two and the outside casing is left a space for the circulation of air. Through a box or pipe, called the <(cold-air box,® located at the bottom of the casing, fresh air is brought from outside, enters the space between the casing and the firebox, passes over the heated surface of the firepot and combustion chamber, and, by means of pipes at the top of the casing which connect with the registers, is transmitted to the various rooms of the house.

The furnace in its turn was followed by the steam boiler which transmits the steam to radiators throughout the house, and from them the heat is diffused to the air in the room. This method of heating has come into use largely as the office building has been increased in size, and the majority of such buildings are now heated by steam. Gas and oil stoves have also become valuable as means of heating isolated rooms in a building or house, not other¬ wise connected with any heating appliances.

Stoves. — In 1490 the first stove was reported as being made in Alsace, and in 1509 others were cast in Islenberg. The first blast furnace erected in this country at Lynn, Mass., in 1642, turned out a small round-bottomed kettle with a cover, probably the first stove of any descrip¬ tion made in this country. The industry lagged for nearly a century, and it was not till the middle of the 18th century that the manufac¬ ture was pushed to any great extent. About 1735 Christopher Sower, of Germantown, Pa., began to manufacture the jamb-stove, which was the first attempt to heat other rooms than the one in which the great brick fireplace was located. This jamb-stove consisted of a cast- iron box built into the side of the kitchen fire¬ place, one end opening in the adjoining room, the other being heated by the fire, so that when the door of the jamb-stove was opened, a small amount of heat was transmitted to the room.

In 1744 the manufacture of Franklin stoves was commenced in Philadelphia. This stove, the invention of Benjamin Franklin, consisted of a cast-iron open fireplace, jutting out from

the chimney, and thus the heat was thrown out from three sides into the room, instead of only the one side, as in the jamb-stove. Be¬ tween 1752 and 1760 the six-plate, or box-stove, which was the pioneer of the many modern forms of heating apparatus, was made in Marl¬ boro, Va. Stoves were made in 1760 by Baron Steigel of Letitz, Pa., and in 1786 box-stoves were made in Philadelphia, but were not put together there, that work being done at Provi¬ dence, R. I., and Troy, N. Y., whither the plates were shipped. In 1802 Isaac Orr began the manufacture of the cylindrical or oval stoves of sheet iron at Philadelphia and in New Hampshire. This was the forerunner of the oval regulator stove, having a fire-damper, auto¬ matically opened and closed by the difference in expansions of a brass rod and the sheet- iron stove-body. In 1820 the Conant stove was made at Brandon, Vt., and the Woolson stove soon followed, being first made at Bran¬ don, but they were later manufactured in Massachusetts, Cleveland and Detroit. In 1836 a stove having an illuminated case of cast iron and mica, enclosed flues, a check-flue and a direct draft damper, was made by James At¬ water of New York, and almost simultaneously the Stanley square heating-stove was brought out. The cylinder-stove, invented by Dr. Bush- nell in 1845, except for the fact that it was cylindrical and the inside was lined with fire¬ clay, was similar to the Stanley stove, the latter having return and exit flues enclosed in the four corners, whereas the former had a pipe at the back through which the heat made its exit after having come down the four pipes or flues in the corner to the hollow base. The next in succession was the round or oval gas burner or surface burner, made of sheet iron, and having the flues which returned the heat to the base enclosed in the body of the stove. It should be understood that these ˆgas-burn¬ ing® stoves consumed coal, the reason for the name “gas-burning® being that they were as¬ sumed to consume all the gas emitted by the coal. In these gas-burners also the coal was more thoroughly burned out by having perfo¬ rated firepots and perforated gas rings at the top of the brick. Fuller, Warner and Company of Troy, N. Y., made the style of oval and round parlar stoves most generally used, the P. P. Stewart.

The base-burner has been in use for many years, one of the first to be constructed being the self-feeder, patented by Jordan L. Mott, Sr., of New York, in 1833; the plan of his stove being to feed the coal from a magazine to the firebox, and to use the chestnut size of anthracite coal. This was followed in 1852 by the self-feeding base-burning stove, and in 1862 by the “Morning Glory,® both of which were the inventions of D. G. Littlefield of Al¬ bany, N. Y. ; then came the ((American® of Van Wormer & McGarvey of Albany, N. Y., and in 1863

the revertible-flue gas-burner with the magazine attachment, the" production of Hailes and Treadwell, in Albany. Since then there have been innumerable styles of stoves introduced, with many more or less valuable changes and additions. The following are the most important of these: the base-burner hav¬ ing a small mica window opposite the grate, by Hunt and Miller of Hudson (1865) ; the anti-

clinker direct draft base-burner, by James Spear of Philadelphia (1871); “Keep’s Side- Burner,ˆ ® having a full mica section below and above the firepot, by W. J. Keep (1871) ; the “Argand® base-burner, a combination of the “American® with an anti-clinker grate and the full double illumination, by Perry and Company of Albany (1873) ; the “Splendid® by Fuller, Warner and Company (1875) ; the “Garland® by the Michigan Stove Company (1876) ; Keep’s square-base and square-sided, round front and round firepot, called the “Art Garland,® by the Michigan Stove Company (1884) ; the “Hub® base-burner, by Smith and Anthony of ’Boston (1884) ; the Keep “Reflector Art Garland,® by the Michigan Stove Company (1887) ; and many other makes, including the oval sheet iron stove, known as the “Tamale,® and the P. D. Beckwith “Oak® stove, having fluted fire¬ pot, steel drum and airtight fittings.

In the cooking stove there has been as much change as in the stove used for purely heating purposes. The pioneer in this line was the James stove, a nine-plate, with the oven on the side of the stove. The next in succession was the Conant stove, invented in 1819, which had the oven directly over the firepot and doors at both ends, but as the fire underneath the oven heated the bottom too quickly, this style was soon abandoned. The Woolson stove of Claremont, N. H., hav¬ ing the oven at the side, the heat being thrown under or over it by means of dampers, was next on the market, but as the fire caused the oven to bake more rapidly on the near side, the oven was next placed at the rear and above the boiler-holes. In 1833, Stanley invented the rotary cook stove, with the cook¬ ing holes and firebox on the same level as the oven. The next step along progressive lines came in 1810-20, in shape of an oval stove, the invention of a Mr. Hoxie of Salis¬ bury, Conn., in which the fire, having gone down the two end flues and met at the bottom, passed to the chimney through an aperture in the hearth of the fireplace over which the stove was situated. P. P. Stewart patented two stoves, one in 1828, the other in 1850, in the first of which the firebox was hung in the upper part of the oven, thus

throwing off heat from three sides while the flame passed all around the oven on the outside and on the pipe collar on top of the stove. The latter, the large oven stove, had a sheet flue under¬ neath with three flues at the rear. At about the same time, 1850, the curved plate which dumped the ashes from the grate into the pit in the hearth was invented by Samuel Pierce, and since then only minor changes have been made in construction, the water-tanks, reser¬ voirs, grates, etc., being rearranged, various methods of open ventilation, return-flue con¬ struction and different styles of ornamentation being introduced.

The improved kitchen cooking stove when of large size was named “range.® A sheet-iron range, in which the grate containing the fire was suspended inside a sheet-iron casing, the heat thus coming from the fire direct, was placed on the market in Boston, in 1850, by a Frenchman named Gillette. About the same time a similar range was made in New York by Duparquet, Knot and Monetise, but they

later made a radical change in the construction by placing flues around the oven, as at present, and the oven was made a separate part of the construction. These two were followed, in 1885, by the wrought-iron range of John Van of Cincinnati, but with the many rapid advances made in the manufacture of steel, the use of wrought iron has largely given place to the use of blue polished steel and aluminum painted steel.

The manufacture of stoves is largely car¬ ried on in the West — Ohio, Illinois and Michi¬ gan being the largest producers. The earliest factories in the East where stoves were made exclusively were at Troy, Albany and New York. The West then began to loom, the first foundry being established in Detroit about 1830, known as the Hydraulic Iron Works, which was followed by Dwyer and Brother in 1861. This firm later became the Detroit Stove Works, which, in 1871, was followed by the Michigan Stove Company, and in 1881 by the Peninsula Stove Company and others. The competition thus engendered between western and eastern manufacturers soon led to the es¬ tablishment of branch foundries by the eastern people in western cities, and Chicago became the centre of distribution. Later Ohio took the lead, and in 1915 one-fifth of the production of stoves and furnaces was in that State. The statistics of the trade are meagre, but for the year 1900 the output of stoves was valued at $35,446,600, distributed through the States as follows : Pennsylvania, $5,209,000 ; Michigan, $4,935,000; New York, $4,913,700; Ohio, $4,384,- 200; Illinois, $3,801,000; Massachusetts, $2,061,- 800; Missouri, $1,921,000; Indiana, $1,439,500; Tennessee, $1,280,000; Kentucky, $1,044,000; Wisconsin, $972,000; etc.

Thereafter the census placed together the manufacturers of stoves, furnaces, and gas and oil stoves, and the total annual value of the products is' over $75,000,000.

Oil and Gas Stoves. — Oil stovesˆ for do¬ mestic use became common about 1875. The earlier types were simply large lamps, burning kerosene, and having a fixture on top for sup¬ porting a pan, kettle or cooking or heating utensil. Very broad wicks were employed, and a circular burner and wick were also intro¬ duced, that gave good results. These oil lamps or oil stoves had to be kept very clean to secure good combustion, as they delivered a great deal of carbon, which tended to clog the mechanism. It was a decided improvement when the vapor¬ burning stove was later introduced. In this the naphtha or other light product of pe¬ troleum was stored in a small metal tank, and led through a pipe to one or more burners — usually a set of burners, arranged like the top of a stove. The aperture to the burner was very small, and the slight stream of naphtha that flowed was easily vaporized, so that after a burner had been lit a minute or less, it ceased to burn oil directly as the pipe near the burner became hot enough to vaporize the oil, and delivered vapor to the burner. This vapor could be mixed with air, on the principle of a Bunsen burner, and thus the consumption of fuel was both economical and safe, for the tank was at a distance from the flame. Oil stoves of a variety of types, utilizing the prin¬ ciples here described, are on the market, and

are not only an economical method of heating, but very convenient as to portability. They have the disadvantage, however, of rapidly consuming the oxygen in a small room, and constant ventilation is required to render the air fit to breathe.

Gas stoves have been made and used for a long time, but were never popular until after the general agitation for lower-priced gas had resulted in bringing ordinary illuminating gas resulted in bringing illuminating gas to a price below $1.50 per 1,000 cubic feet. An exception region of the Middle West where they first came into common use in the 60's and 70's. About 1890 the gas companies of the United States began a concerted effort to introduce gas stoves to increase the sale of their com¬ modity. The common type of heating stove offered was of the radiator type, with a row of burners in the base, and large metal tubes directing the heat toward the top, so as to afford plenty of radiating surface. These were made of sheet iron,

usually ornamented with nickel, in various sizes, and they have become common for household use, where rooms are not heated by furnace of steam. For cooking purposes, the gas companies have supplied gas ranges, patterned after the coal ranges on top, and as to oven conveniences. Rosette burners are placed where the ((holesˆ are in a coal range, and mixers employed to admit air to the burners, so as to secure hot blue flames, with a minimum consumption of gas. These gas ranges have become very popular with housewives, for they save the dirt and dust of coal and ashes, involve cost only when in actual use and are easily lit and turned out. They are often used in summer time along¬ side coal ranges, which are allowed to lie idle, the reason being that the gas range creates less heat in the room, and is, therefore, more com¬ fortable. Despite the fact that gas fuel gen¬ erally costs considerably more than coal, the conveniences of the gas stove and gas range have resulted in a steadily increasing use.

Furnaces. — The first hot-air furnace for supplying pure heated air to rooms was prob¬ ably that constructed by Franklin in 1744. This was a sheet-iron oblong box, burning wood, the smoke passing into the chimney over the top of the flat chamber behind the fire, and between it and the real back of the stove. The cool air entered this flat hollow chamber through a pipe, and when heated passed through small holes in the side of the chamber into the room. This style of ap¬ paratus was not much improved upon till the beginning of the 19th century when in 1808 Daniel Pettibone of Philadelphia took out a patent on a stove for rarifying air by heat. This was followed by the warm-air furnace of William A. Wheeler of Worcester, Mass. (1835) ; by that of Gurdon Fox of Hartford, Conn. (1835-40); the Blaney and the Culver; the Boynton, made by Richardson and Boynton ; the Thatcher and others. The reduction of the price of furnaces has made their use more com¬ mon, till now nearly every large dwelling- house has one. Furnaces may be divided into two general types, the direct and indirect draft, The better class of direct draft furnaces have a radiator, generally placed in the top, through which the gases pass before reaching the smoke-

pipe, and usually have but one damper com¬ bined with the cold-air check. In the cheaper styles of direct-draft furnaces, this radiator is done away with, the gas passing directly into the smoke-pipe, but this system wastes much heat that is utilized by the better grade of fur¬ nace. In the indirect draft type of furnaces the radiator is located near the base and the gases pass down through flues to it, thence up¬ ward and through another flue to the pipe. This style of furnace has a direct-draft damper in addition to the damper in the pipe, thus allowing the gas to escape to the chimney more easily. .

The matter of grates and firepots is most important. The most approved form of grate is the revolving triangular pattern, consisting of teethed triangular bars, connected by gears and turned by means of a detached lever. Fire- pots are usually made of cast iron or of steel plate lined with fire-brick, the pot ranging in depth from 12 to 18 inches. In a wrought-iron or steel furnace this fire-brick lining is neces¬ sary because the intense heat may harm the out¬ side shell, but it has not the advantage of giv¬ ing off heat when the coal is first put on, as does the furnace having the cast-iron firepot.

The combustion chamber, or space above the firepot, should be of sufficient size to allow the gases to become thoroughly mixed with the air passing up through the fire or through the openings of the feed door. The radiator, generally constructed of cast iron or steel plate, is used as sort of a reservoir for the gases and air passing over the furnace, till the air has extracted a considerable portion of the heat from the gas. The cold-air box should be large enough to supply a volume of air suffi¬ cient to fill all the hot-air pipes at the same time, the general size or area of the cold-air box being three-fourths the combined area of the hot-air pipes.

Steam and Hot Water. — Heating by means of hot water has been in use since time imme¬ morial, and was known prior to the Christian Era, for Seneca mentions the methods by which water was heated in the Thermae at Rome, that of passing water through a coil of brass pipes which passed through a fire. This method was used in France in 1777 by M. Bonnemain, and in London, in 1817, by Marquis de Chatan- nes, for heating a conservatory, and in 1822 an Englishman named Bacon introduced the method of using an inclined pipe of large di¬ mensions, but this was not successful because of imperfect circulation. The first hot-water apparatus introduced in this country was the Perkins system, introduced from England by Joseph Nason in 1842. Hot-water heating in the United States has been an evolution since 1880, the most popular heaters at the beginning of this period being the Gurney and. the H. B. Smith. In 1885 the Bolton heater was intro¬ duced by the Detroit Heating and Lighting Company, the Mouat heater was the next in succession, and since that time the improve¬ ments have been so many and the demand so great that the price of the hot-water plant has been reduced till it is within the reach of the average householder. Hot-water heating is pre¬ ferred by some to steam because the heat is available as soon as the temperature of the water is higher than that of the room, whereas

steam yields no heat until 212 degrees is passed and steam generates, filling the pipes. But in large installations steam is cheaper and has other advantages.

The practice of heating buildings by .steam was begun about 1845, the first building to be so heated being the Eastern Hotel of Boston, and the first factory building the Burlington, Vt., Woolen Mill. The system by which these buildings were heated was introduced by Joseph Nason, and consisted of small wrought- iron pipes. From this small beginning have developed the many intricate systems of appa¬ ratus now used for warming buildings.

There are two systems of heating by steam, the direct and the indirect, the former being used in all classes of buildings, both by itself and in combination with other systems. The direct system consists of a furnace and boiler for the combustion of fuel and the generation of steam ; a system of pipes, by means of which the steam is conveyed from the boiler to the radiators and the condensed water re¬ turned to the boiler, and the radiators or coils of pipes placed throughout the rooms of a building for the purpose of diffusing the heat to the air. The types of boilers used are many and various ; the cast-iron sectional boiler is more commonly used for dwelling-houses and the tubular or water-tube boiler for larger buildings. In the boiler used for heating pur¬ poses only it is not necessary to carry a press¬ ure of more than two to 10 pounds, the con¬ densation flowing back to the boiler by gravity. When under a high pressure, the steam for the heating system is forced through a reducing valve and the condensation returned to the boiler by means of a pump or return trap. The system of diffusing the heat by radiators is not standard, no particular one being of greater benefit than another. There are the common cast-iron sectional radiator; the vertical wrought-iron pipes screwed into a cast-iron base ; the cast-iron wall radiator, which does not obstruct the flow, and the coils of iron pipes placed along the ceiling or walls, these latter being of late years ornamented and fre¬ quently gilded.

Indirect steam heating has the advantages both of the furnace and of the direct steam, but the cost of installing the system is greater. The main difference between the two lies in the radiator, in the indirect system a special form of heater being placed beneath the floor and encased in galvanized iron or brick work. Connected with the space beneath the heater is a cold-air box and warm-air pipes at the top are connected with registers in the floors or walls as previously described

for furnaces, so that the air in passing through the spaces between the sections of the heater becomes warmed and rises to the rooms above. As compared with furnace heating this method has one great advantage, being less affected by outside wind pressure, as long runs of horizontal pipe are avoided and the heaters can be placed near registers. See Furnace; Heating and Ventilation; Electric Fur¬ naces ; etc.

STOWE, Calvin Ellis, American educator: b. Natick, Mass., 6 April 1802; d. Hartford, Conn., 22 Aug. 1886. He was graduated at Bowdoin College in 1824, and at Andover yol. 25 — 45

Theological Seminary in 1828. In 1829 he be¬ came an editor of the Boston Recorder, but abandoned journalism for the chair of Greek at Dartmouth in 1830. In 1832 he was called to Lane Theological Seminary, Cincinnati, and in the same year was married to Harriet Eliza¬ beth Beecher, author cf (Uncle Tom's Cabin.) He was professor of divinity at Bowdoin in 1850, and in 1852 became professor of sacred literature at Andover, retiring in 1864. His writings include (1829) ; (Lectures on the Sacred Poetry of the Hebrews* (1829) ; introduction to the Criti¬ cism and Interpretation of the Bible) (1835);

(Elementary Education in Europe* (1837) ; (The Religious Element in Education) (1844) ; (Origin and History of the Books of the Bible)

(1867).

STOWE, Emily Howard (nee Jennings),

Canadian suffragist and physician : b. South Norwich, Ontario, 1831 ; d. 1903. She was edu¬ cated at Provincial Normal School, Toronto, then taught at school. She married John Stowe, of Norwichville, Ontario. In 1867 she was graduated at the New York Medical Col¬ lege for Women and fought all opposition in Canada till admitted (1880) a member of the Ontario College of Physicians and Surgeons, being the first woman physician permitted offi¬ cially to practice in Canada. The Toronto Woman's Literary and Science Club was organ¬ ized (1877) by her to become later a suffragist club and (by 1883) widows and spinsters were granted the suffrage at municipal elections in Ontario. In 1893 she organized the Dominion Woman Suffrage Association and was elected its president.

STOWE, Harriet Elizabeth Beecher,

American writer: b. Litchfield, Conn., 14 June 1811; d. Hartford, Conn., 1 July 1896. She was a daughter of Rev. Lyman Beecher (q.v.) and sister of Henry Ward Beecher (q.v.). She was educated at Litchfield and then at Hartford, un¬ der her sister Catherine, whom she joined in teaching in her school there. In 1832 the sis¬ ters removed to Cincinnati, where their father was appointed president of Lane Theological Seminary. In 1836 she was married to the Rev. Calvin E. Stowe, a teacher in the seminary, who in 1850 removed to Brunswick, Me., on being appointed a professor in Bowdoin College, soon after exchanging this post for a similar one at Andover. Mrs. Stowe published in 1843 The Mayflower. She had become familiar with the evils of slavery during her residence at Cincin¬ nati, and the

work by which her name became known throughout the world — (Uncle Tom's Cabin, > a direct attack upon slavery, was (in 1851-52) contributed in serial form to The National Era, an anti-slavery newspaper pub¬ lished at Washington. The story was to some extent based on the experiences of Josiah Hen¬ son (q.v.). It was defective in style and con¬ struction, but was vividly done. It did not per¬ fectly render Southern life, and the injustice of some of its presentations has been much dis¬ cussed. It certainly helped to liberate the slave, though its effect was enhanced by political con¬ ditions. As a serial it was successful ; but it was not until it was published in book form in 1852 that it became famous. In five years over half a million copies of the book were sold in the United States ; and its sale in England was

very large. It became almost immediately fa¬ mous, was translated into many foreign lan¬ guages and published in innumerable editions. In 1853 Mrs. Stowe visited Europe, and this furnished her material for her (Sunny Mem¬ ories5 published the following year. In 1868 she was associated with Donald G. Mitchell on the editorial staff of Hearth and Home. In 1879, when the ˆIllustrated55 edition was pub¬ lished, there were in the British Museum 43 English editions and 19 translations. None of her subsequent works attained anything like the same popularity. Among her works are (Sunny Memories of Foreign Lands) (1854) ; (The Mayflower, and Miscellaneous Writings5 (1855); Rred: A Tale of the Great Dismal Swamp5 (1856) ; (The Minister's Wooing,5 her most artistic work (1859) ; (The Pearl of Orr's Island) (1862) ; (Agnes of Sorrento) (1862) ; (Reply to the' Address of Thousands of Women of Great Britain and Ireland to their Sisters of the United States) (1863) ; (House and Home Papers) (1864) ; (Stories about our Boys) (1865); Rittle Foxes) (1866); Reli¬ gious Poems) (1867) ; (Queer Little People) (1867) ; (Daisy's First Winter and Other

Stories5 (1867) ; (The Chimney Corner) (1868) ; (Men of Our Times) (1868) ; ˆId- town Folks) (1869), a popular study of New England life; (The American Woman's Home* (1869), with Catherine E. Beecher; Rady Byron Vindicated) (1870) ; (Little Pussy Wil- low) (1870) ; Rink and White Tyranny5 (1871) ; (Sam Lawson's Fireside Stories) (1871); (1871); Rives and Deeds of Our Self-Made Men) (1872) ; (Pal- metto Leaves5 (1873) ; (Woman in Sacred His¬ tory5 (1873) ; (Betty's Bright Idea, and Other Tales5 (1875) ; (We and Our Neighbors5 (1875) ; (Deacon Pitkin's Farm, and Christ's Christmas Presents5 (1875) ; (Footsteps of the Master5 (1876) ; (Captain Kidd's Money, and Other Stories5 (1876) ; (The Ghost in the Mill, and Other Stories5

(1876) ; (Poganuc People5 (1878); (A Dog's Mission5 (1881). Consult Field, Rife and Letters of Harriet Beecher Stowe5 (1897) ; Stowe, C. E., and L. B., Har¬ riet Beecher Stowe5 (Boston 1911) ; Rife,5 by her son, C. L. Stowe (ib. 1889). See Uncle Tom's Cabin.

STOWELL, Ellery Cory, American pro¬ fessor of international law : b. Lynn, Mass., 12 Dec 1875. He was graduated (1898) at Har¬ vard, traveled (1901-02) in the Orient and Europe, attended the University of Berlin (1903-04) and University of Paris (1904-4)7). He was appointed secretary of the College of Political Sciences, Washington (1908-09) ; in¬ structor of international law at George Wash¬ ington University (1908-10) ; assistant profes¬ sor of international law at the University of Pennsylvania (1910—13) . He filled the last- mentioned position at Columbia from 1916. From 1910-12 he was assistant editor Annals of American Academy of Political and Social Science. In 1907 he was a member attending the Second Peace Conference at The Hague and (1908-09) was secretary of the American delegation of the Naval Conference at London. He has written Re Consul5 (1909) ; (Con¬ sular Cases and Opinions5 (1909) ; (The Di¬ plomacy of the War of 19145 (published in part). '

STRACHAN

STRABISMUS. See Vision, Defects of.

STRABO, stra'bo, Greek geographer and historian : b. Amasia, about 64 b.c. ; d. 19 a.d. He received a good education and adopted the stoical philosophy. He studied for some time in Rome and was with Aelius Gallus in Egypt and Arabia in 24 b.c. He returned to Rome 20 b.c. ; and from this time on made that city his home ; though he traveled much, for, as he states himself, he had been from Ar¬ menia in the East to Sardinia in the West; and from the Pontus Euxinus on the North, to the borders of Ethiopia. It seems prob¬ able that these journeys were made in pur¬ suit of knowledge and information for his literary labors. He wrote a historical work in 43 books, which is lost. It formed a con¬ tinuation of the history of Polybius to the bat¬ tle of Actium. The extant fragments of it are collected in Muller's Rragmenta Histori- corum Grsecorum.5 His great work on geog¬ raphy, in 17 books, has been preserved entire, with the exception of the seventh book, of which there is only an epitome. It includes notices of important political events and of chief cities and their great men. Eight books are given to Europe, six to Asia, one to Egypt and Libya. Internal evidence shows that he did not complete the plan he had laid out for this work. The best critical edition is that by Kramer (Berlin 1844). Consult Dubois, (Ex- amen de la Geographic de Strabon5

(1892) ; Hamilton, (A Translation of Strabo's Geog¬ raphy.5

STRACHAN, John, Canadian bishop: b. Aberdeen, Scotland, 12 April 1778; d. To¬ ronto, Canada, 1 Nov. 1867. He was edu¬ cated at grammar school, then (1793) at King's College, Aberdeen. While continuing his stud¬ ies at the college he taught at schools, till he was graduated in 1797. In 1799 he went to Canada to take charge of a new college pro¬ jected by Governor Simcoe at York (near To¬ ronto). The project failing, he took to teach¬ ing at a private school at Kingston which he established. He abjured his adherence to the free church and joined the Church of England and was ordained minister in 1803, becoming curate at Cornwall. In 1807 he was made LL.D. of Saint Andrew's and (1811) D.D. of Aberdeen. He was made (1812) rector of York (Toronto) and chaplain to the troops as well as master of the grammar school and promoted (1825) to archdeacon. In 1839 he was made first bishop of Toronto. He made great success during his visitations which were an annual episode. He had more than doubled the number of churches in five years, also establishing common schools throughout the province and a statute was passed estab¬ lishing 20 grammar schools affording classi¬ cal education. He obtained 500,000 acres (1827) to endow a university at Toronto, and, after difficulties, succeeded in its foundation. In 1850 it was taken from the Anglican Church and made non-sectarian. Strachan made ve¬ hement appeals to the laity and, assisted by a royal charter, formed another university un¬ der the name Trinity College. He was Canada's greatest advocate of the Church of England, for which sect he gave business energy, diplo¬ matic talent and a devoted zeal. Consult Bethune, (Memoir of Bishop Strachan5 (To-

STRACHEY -

ronto 1870) ; Mockridge, C. H., (The Bishops of the Church of England in Canada and New- foundland) (Toronto 1896).

STRACHEY, stra'chi, John Saint Loe,

English journalist: b. 1860. He was educated at Oxford and has been a London journalist from 1884. He was editor of the Cornhill Magazine (1896-97) and is now editor and owner of The Spectator and proprietor of The Country Gentleman. He has published (From Grave to Gay) ; (The Manufacture of Pau¬ pers* (1907) ; (Problems and Perils of Social- ism) ; (The Practical Wisdom of the Bible) (1908) ; (A New Way of Life) (1909).

STRACHEY, William, English colonist and historian: b. England, about

1585. Nothing definite is known of him before the sailing of a party of colonists, 15 May 1609, bound for Vir¬ ginia. He sailed in the Sea Venture , which was wrecked on the Bermudas in July. An account of the wreck was written by Strachey and pub¬ lished in (Purchas his Pilgrimes) (1625) under the title (A True Repertory of the Wracke and Redemption of Sir Thomas Gates upon and from the Islands of the Bermudas, his coming to Virginia and the state of that Colony. * Strachey and his party finally reached James¬ town, 23 May 1610, where he was appointed secretary and recorder of the colony by Lord De la YVarr. He returned to England in 1611 and he edited the laws promulgated for Vir¬ ginia by Sir Thomas Gates and Sir Thomas Dale, (For the Colony in Virginia Britannia Lawes Divine, Morall and Martiall, Alget qui non ardet) (1612). His larger work on Vir¬ ginia, (The Historie of Travaile into Virginia Britannia, expressing the Cosmographie and Comodities of the Country, Together with the Manners and Customes of the People. Gath¬ ered and Observed As Well by those who went First Thither, As Collected by William Strachey, gent. Three Yeares thither Imployed Secretarie of State,) failed of finding a pub¬ lisher during his lifetime and was brought out by the Hakluyt Society in 1849. This is re¬ garded as the most ably written of the numer¬ ous accounts of the settlement of Virginia. Nothing is known of the history of Strachey subsequent to 1618 when he tried unsuccessfully to interest Bacon in the publication of his book. Consult Brown, Alexander, (Genesis of the United States* (Boston 1891).

STRADELLA, Alessandro, Italian singer and Gomposer : b. Naples, 1645; d. Genoa, 1681. After receiving his early musical training at Naples, he subsequently went to Venice, and thence to many other cities of Italy where he was greeted with enthusiasm. He was con¬ stantly threatened with death or injury by the rivals to whom his triumphant success was in¬ tolerable. While he fortunately escaped from the hands of his would-be assassins at Rome, he was severely wounded by bravos at Turin, and an attack made upon him at Genoa proved fatal. The most exquisite of his many com¬ positions is the oratorio (San Giovanni Bat¬ tista. * Flotow's opera of <Stradella) is con¬ cerned with the career of this composer. Con¬ sult Crawford, F. M., ˆtradella *(London 1911) ; Richard, P., (Stradella et les Con- tarini* in the Paris musical Journal (Le Menestrel* (1865, No. 51; 1886, No. 18).

STRADIVARI, stra-de-va're, Antonio, Italian violin-maker: (b. Cremona, 1644; d. 1737. He was a pupil of Nicolo Amati, in whose

employment he remained until about 1679, when he began making on his own ac¬ count. It was he who settled the typical pat¬ tern of the Cremona violin, and his instruments for tone and finish have never yet been ex¬ celled. His improvements consisted chiefly in lowering the height of the arch of the belly, in making the four corner-blocks more massive, in giving greater curvature to the middle ribs, in altering the setting of the sound-holes, and in making the scroll more massive and prominent. He made a great number of violins, but a few of which are now in existence. He reached his greatest perfection in his art about 1714. He also made many other kinds of musi¬ cal instruments, but it is on his violins of all kinds that his fame rests. Consult Hill, W. H.,

(Antonio Stradivari* (New York 1909) ; Riechers, A., (The Violin and the Art of its Construction (London 1905).

STRAFFORD, straf o-rd, Thomas Went¬ worth, 1st Earl of, English statesman: b. Lon¬ don, 13 April 1593; d. by execution Tower Hill, 11 May 1641. Entered at Saint John's College, Cambridge, in 1607 he became a student of the Inner Temple, and in 1611 received the honor of knighthood. He was returned for York¬ shire to the Parliament which met 5 April 1614, and in 1621 he was again chosen. On the convening of the new Parliament he was one of the six popular members who were prevented serving their country in that as¬ sembly by being appointed sheriffs for their respective counties. When Charles, among other expedients for raising money, had re¬ course to a forced general loan, Wentworth refused to pay his contribution, and was first imprisoned in the Marshalsea. In 1628 he took his seat for Yorkshire, and became one of the most conspicuous advocates of the petition of right. In 1628 he was created Baron Went¬ worth, and some months afterward a viscount and privy-councillor, and on the resignation of Lord Scrope, nominated President of the North. The assassination of Buckingham soon after re¬ moved an obstacle to his further promotion, and he became so influential in the king's council that his powers in the four northern counties over which he presided were enormous. The legality of some of the powers of the Council of the North, created by Henry VIII, had been questioned by judges in the reign of Queen Elizabeth, and these powers had been greatly increased at the instance of Went¬ worth. He was selected by Laud to proceed to Ireland as lord-deputy in 1632. He greatly im¬ proved the state of the country, both as re¬ garded law, revenue and trade. By a con¬ siderable outlay at his own risk he introduced the growth of flax, established looms, brought workmen from France and Flanders to work them, and thus endowed the country with a new and most valuable industry. But, at the same time, nothing could be more arbitrary than his system of government, it being his boast that he had

rendered the king as absolute in Ireland <(as any prince in the whole world could be.® He returned with the full title of lord-lieu¬ tenant, with a view to gain subsidies and troops,

in which he fully succeeded. He again re¬ pairing to England took the command in the north, but found himself obliged to retire be¬ fore the Scottish army, and to retreat to York. The very first movement of the party opposed to arbitrary power was to impeach him for high treason, with which charge Pym appeared at the bar of the House of Lords in November 1640. The articles of impeachment, at first nine in number, were afterward increased to 28, the object of which was to convict him of an attempt to subvert the fundamental laws of the country. As in the case .of Laud, it was easy to prove that he acted as a friend and promoter of arbitrary measures, but not to sub¬ stantiate any particular fact to justify a capital charge. There can be no doubt, however, that his design was to subvert the fundamental laws and liberties of his country, and to enable the king to rule absolutely and without control. Although treated with the extreme of legal rigor and debarred the assistance of counsel, his own great abilities and force of mind sup¬ plied every deficiency. ((And never man,® says Whitelock, the chairman of the impeaching committee, <(acted such a,, part, on such a theatre, with more wisdom, consistency, and eloquence, or with greater reason, judgment, and temper.® His defense, indeed, was so strong that the original impeachment was de¬ serted for the unjustifiable proceeding of a bill of attainder. The bill passed the Commons by a great majority, and was carried in the Lords by a feeble one. The king, who had impru¬ dently endeavored to stop the bill by his per¬ sonal interference, had not sufficient firmness to redeem the pledge of safety which he had previously given, but yielded to the advice of his counsellors, backed by a letter from Strafford himself, who urged him, for his own safety, to ratify the bill. Charles ratified the bill of attainder on 10 May 1641, and two days later Strafford was executed. Browning's (Strafford: An Historical Tragedy) (1837), is based «on his career. Consult Browning, Robert, (Prose Life of Strafford) (Boston 1892) ; Firth, C. H., (Papers Relating to

Thomas Wentworth, First Earl of Strafford *(London 1890) ; Foster, Statesmen of the Commonwealth* (1836) ; Gardiner, S. R., his¬ tory ,of England) (10 vols., New York 1883— 84) ; Radcliffe, (The Earl of Strafford's Let¬ ters and Dispatches) (London 1739) ; Traill, H. D.,

(Lord Strafford) (London 1889).

STRAIGHT, Willard Dickerman, Ameri¬ can consul-general: b. Oswego. N. Y., 31 Tan 18S0; d. 28 Nov. 1918. He studied a+ the Bordentown, N. J., Military Institute (1897) and was graduated (1901) at Cornell. He served (1902-04) in the Chinese Maritime Cus¬ toms at Nanking and Peking, became Ameri¬ can vice-consul-general and private secretary to American Minister at Seoul in 1905. From 1906-08 he was consul-general at Mukden. In 1909 he was appointed representative in China for a group of American bankers. In 1917 he was commissioned to the major-adjutant gen¬ eral's department United States Reserve.

STRAIGHT TICKET. See Ballot.

STRAIGHT COLLEGE, an educational

institution in New Orleans, La., open to pupils of both sexes without regard to race or

nationality. It was the pioneer school in Louisiana to provide education privileges for the negro race. It was founded in 1869 by the American Missionary Association (Congrega¬ tional), and its first building was erected by the United States government. At first it offered only courses of elementary and secondary grades, but as the work steadily prospered higher departments were added. The organization now includes (1) the Daniel Hand Primary School; (2) the Grammar De¬ partment; (3) the College Preparatory Depart¬ ment; (4) the Industrial Department; (5) the Normal Department; (6) the College Depart¬ ment; (7) the Department of Music; (8) the Theological Department. There is also a night school. The College Department offers two courses, classical and Latin scientific, and con¬ fers the degrees of A.B. and B.S. The prepara¬ tory department provides two corresponding secondary courses. The normal course requires four years' study beyond the grammar grades, but the first year's course is identical with the first year of the College Preparatory Depart¬ ment. The Theological Department provides courses for those who are graduates in a classical course and for those who have had only English courses. There is, in addition, a course in Bible Study. Industrial training is given only in connection with the regular school work. The courses in the Industrial Depart¬ ment are Domestic science, sewing and dress¬ making, wood-working, mechanical drawing and printing. The college has a central loca¬ tion ; the buildings include the main edifice, replacing the former building destroyed by fire in 1891, Stone Hall, a dormitory for girls, and

Whitin Hall, a dormitory for boys. The college depends partially for its support on the American Missionary Association. The tuition fees are small, and the older students are al¬ lowed to pay a part of their expenses by doing work. . The average annual attendance of stu¬ dents is over 600. The teaching staff numbers

1.

STRAIN, Isaac G., American naval officer: b. Roxbury, Pa., 4 March 1821 ; d. Aspinwall, Colombia, 14 May 1857. He was appointed mid¬ shipman in the United States navy in 1837 ; in 1845 led an exploring expedition into the interior of Brazil and in 1849 made the overland journey from Valparaiso to Rio Janeiro. He received rank as lieutenant in 1850, was engaged in that year with the commission which laid out the boundary line between United States and Mexico, and in 1854 was in charge of the ex¬ pedition for the survey of the Isthmus of Darien. The extreme hardships which his command was called upon to endure in this latter expedition and the skill and courage with which Strain met the difficulties that beset him brought him favorably before the public. He was assigned to the Arctic in 1856 and was engaged in making soundings in the North Altantic Ocean for the purpose of ascertaining the possibilities of laying a submarine cable be¬ tween United States and Great Britain. He wrote (The Cordillera and Pampa *(1853); (The History and Prospects of Interoceanic Communication* (1856). Consult Headley, Joel Tyler, (Darien Exploring Expedition, Under Command of Lieutenant Isaac G. Strain, U. S. N.* (1885).

STRAIT OF MAGELLAN. See Magel¬ lan, Strait of.

STRAITS SETTLEMENTS, East India, a British colony consisting of Singapore, Pe¬ nang, Malacca and several isolated posses¬ sions on and adjacent to the Malay Peninsula, and bounded by the Federated Malay States. Singapore includes the island of that name, the Cocos (Keeling) Islands, and Christmas Island. The total area of the colony is 1,600 square miles, and the combined population about 762,000, the greater portion being divided be¬ tween Chinese and Malays, only 7,945 being white. The colony is administered by a gov¬ ernor residing at Singapore, under whom are British resident councillors at Malacca and Pe¬ nang. In 1867 the Straits Settlements were transferred from the government of India to the colonial office. The colony has a large and important transit trade through Singapore and

Georgetown. Among its exports are tin, spices, gambier, rubber, copra, gum, tapioca, coffee, pineapples, sago and rattan. It imports rice, cotton and cotton goods, coal, opium, tobacco, petroleum, flour, fish and dress goods. The ports of the colony are all free; the shipping amounts to over 27,000,000 tons, and the trade to about $497,000,000 annually. For further details see Penang; Singapore.

STRAKOSCH, stra'ko'sh, Moritz, Aus¬ trian pianist and impresario : b. Lemberg, Po¬ land, 1825 ; d. Paris, 8 Oct. 1887. He was edu¬ cated at Vienna, and came to the United States in 1845, where he was a teacher and a concert pianist. In 1856 he began opera and concert managing, and introduced to the public Patti, Nilsson, and other famous singers. He also composed several pianoforte pieces, and (Giovanna di Napoli,* an opera; and wrote (Memoirs of an Impresario.)

STRALSUND, stral'soond, capital of the government of Pomerania, and seaport on Strela Sound; 120 miles northwest of Berlin. The town stands on a promontory and presents a picturesque appearance with its wooden- gabled, antique buildings. The town-house (1311) contains an interesting collection of ancient relics from the island of Rugen and several churches, government-house, gymna¬ sium, mint, arsenal, a large public library and charitable institutions. The principal manu¬ factures are leather, sugar, starch, machinery, arc lights, bricks, furniture, oil and cards. There is considerable trade carried on from the port. This consists principally of grain, , sugar, fish and malt. Stralsund was founded in 1209 by Saxons. It joined the Hanse Confederation and early attained commercial importance. It has repeatedly suffered severely from war. Wallenstein besieged it without success in the Thirty Years' War (1628). In 1678 Frederick William, the great elector of Brandenburg, took it after a severe bombardment. Politically it was a Swedish possession from 1648 to 1815 when it was annexed to Prussia. Popu¬ lation about 35,000.

STRAMONIUM. See Datura.

STRANAHAN, stran'a-an, James Samuel Thomas, American philanthropist: b. Peterboro, N. Y., 25 April 1808; d. Saratoga, N. Y., 3 Sept. 1898. He taught school for a year and then became a surveyor. In 1827 he went

to the Northwest to trade with the Indians, but this venture proving a failure he reurned to Albany and entered the wool business. He founded the town of Florence, N. Y., in 1832 and in 1838 represented it in the assembly. In 1854 he was elected to Congress from Brooklyn

to which he had removed in 1844. In 1860 he became park commissioner of Brooklyn. This office he held for 22 years, and during this time he controlled the expenditure of nearly $9,000,000 for improvements. A bronze statue of him was unveiled at the entrance to Prospect Park 1891. He was actively engaged in the consolidation of New York, Kings, Queens and Richmond counties into the present city of New York.

STRANG, strang, Lewis Clinton, Amer-

can dramatic critic: b. Westfield, Mass., 4 Dec. 1869. He was graduated from the Boston Uni¬ versity 1892. In 1894 he was assistant city editor and assistant in the dramatic department of the Boston Journal and in the fall of 1898 became dramatic editor. He has published (Famous Actresses of the Day* (1899-1901) ;

(Famous Actors of the Day *(1899-1901) ; (Prima Donnas and Soubrettes of Light Opera and Musical Comedy in America* (1900) ;

(Celebrated Comedians of Light Opera and Musical Comedy in America *(1900) ; (Players and Plays of the Last Quarter Century*

(1902).

STRANGE, stranj, Sir Robert, English engraver: b. in Pomona, one of the Orkney Isles, 14 July 1721; d. London, 5 July 1792. He studied law, attempted a seafaring life, then resolved to devote himself to painting. When the rebellion of 1745 broke out, he joined the forces of the Pretender and was present at the battle of Culloden. To conceal himself from pursuit he wandered for some time in the Highlands, and afterward ventured to Edinburgh, where he subsisted for some time by selling drawings which he had made of the chiefs of the re¬ bellion. He afterward went to France, gained a prize for design at Rouen, and then resided for some time in Paris, where he studied en¬ graving under Le Bas. In 1751 he settled in London, and became the founder of the Eng¬ lish school of historical engraving. In 1760 he again visited the Continent and engraved pictures of many of the old masters. He was admitted member of the academies of Rome, Florence, Bologna, Parma and Paris, and on his return to England in 1787 was knighted. He followed the Italian masters, for the most part. His work is strong and individualistic; though it is sometimes defective in execution and especially drawing. Consult Blanc, Charles, (L'Giuvre de Robert Strange *(Leipzig, 1848) ; Dennistoun, (Memoirs of Sir Robert Strange* (London 1855).

STRANGE, Robert, American senator and lawyer: b. Virginia, 20 Sept. 1796; d. Fayette¬ ville, N. C., 19 Feb. 1854. He was educated at Hampden-Sidney College and, after gradua¬ tion, studied law and removed to Fayetteville, N. C. In 1821 he obtained election to house of commons and served till 1826, when he was elected judge of the Superior Court, from which he resigned to become member of the United States Senate. In 1840 he resigned in preference to carrying out the demands of his constituents. Returning to private practice he

was appointed solicitor of the Fifth Judicial District. He wrote a novel, (Eoneguski; or the Cherokee Chiefs which was based on Indian legends of the Fayetteville region.

STRANGLES, a disease of the horse, ass, and mule, affecting especially young animals. It generally appears between the third and fifth years, and is preceded by cough, with a yellow¬ ish discharge from the nostril, and a consider¬ able discharge of ropy fluid from the mouth. This is accompanied by the formation of a tumor under the jaw, beginning about the centre of the channel, and gradually filling the whole space. The disease is sometimes mis¬ taken for glanders, but is easily disinguished by the fact that there is only a single tumor. The tumor gradually swells in the centre, be¬ coming softer until it bursts, when a discharge of pus takes place. The cough then subsides, and the disease rapidly abates, although a con¬ siderable time often elapses before the animal recovers its strength. During the progress of the disease the animal suffers considerably from thirst, which it is unable to satisfy by drinking freely, the attempt to swallow bringing on a convulsive cough, from which the disease has its name. Treatment is chiefly directed toward advancing the development of the tumor, on the bursting of which convalescence depends. This is most effectively done by blistering or fomentation. When the swelling becomes soft on the top it should be freely lanced. When it is allowed to burst naturally an ulcer is formed which is very difficult of treatment. Consult Hutyra and Marek. (Special Pathology and Therapeutics of the Disease of Domestic Animals) (Chicago 1912) ; Pearson, L., and others, (Special Report on Diseases of the Horse) (Washington 1911).

STRANGULATION, violent constriction of the neck, involving such compression of the windpipe as to close the air-passages, prevent respiration, and finally cause death. In hang¬ ing, which sometimes produces strangulation, if much violence is used, death may be caused

by direct injury to the upper part of the spinal cord (q.v.) from fracture or dislocation of the cervical vertebrae, or by syncope from shock; in such cases death must be almost instantaneous. If the constriction is so applied as to compress the great vessels in the neck and not the wind¬ pipe, death is due to coma, and is somewhat slower than in cases of asphyxia. If both ves¬ sels and windpipe are compressed, coma and asphyxia may both contribute to cause death. When suspension of the body has not contin¬ ued for much more than five minutes, and the parts about the neck have not suffered violence, there is a probability that resuscitation may be established ; though many cases are recorded when after only a few minutes' suspension it has been found impossible to restore life. Moreover, if a person who has hanged himself has been cut down sufficiently soon to allow of the respiratory process being restored, he is by no means safe, death often taking place from secondary effects. It is believed that uncon¬ sciousness comes on very rapidly, and death takes place without causing any suffering; the violent convulsions that are so often observed being similar to those which occur in epilepsy. Ex¬ posure to a free current of air, cold affusion, if the skin is warm, the application of ammonia

to the nostrils, of mustard poultices to the cljest and legs, and of hot water to the feet, and the subsequent abstraction of blood if there should be much cerebral congestion, are good measures for the treatment of partial strangulation. They should be used if natural breathing is not at once resumed. From the post-mortem appear¬ ances together with circumstantial evidence, the medical practitioner is not unfrequently called upon to answer such medico-Tegal ques¬ tions as : Was death caused by hanging, or was the body suspended after death? Was the strangulation the result of accident, homicide or suicide? In case of strangulation from other causes than that of hanging the post-mortem symptoms are similar, but the injury done to the parts about the neck is commonly greater. In manual strangulation the external marks of in¬ jury will be in front of the neck, about and be¬ low the larynx; and if death has been caused by a ligature the mark around the neck will be cir¬ cular, whereas in hanging it is usually oblique. The internal appearances are much the same as in the case of hanging.

STRANGURY, an affection marked by scanty and painful micturition, with a frequent and irresistible desire to pass water. The uri¬ nary discharge is accompanied with scalding, cutting pains in the urethra, which sometimes ex¬ tend to the bladder, the kidneys and the rectum. Strangury is a variety of retention of urine which may be caused by idiopathic urethrites, by gonorrhcEa, or by such irritating substances

as cantharides and oil of turpentine, or by gravel or calculus in the bladder. Besides re¬ moval of the cause, the following means are useful in treatment: The warm sitz-bath, or hot fomentations over the bladder; an injection of starch and tincture of opium, a wine-glass¬ ful of the former to a dram of the latter; and mild mucilaginous drinks of barley or rice water, which may be freely given to render the urine less irritating.

STRANSKY, Josef, American orchestral conductor : b. Humpoltz, Bohemia, 9 Sept. 1874. He was educated at the Prague Gymnasium and the universities of Prague, Vienna and Leip¬ zig. He studied music under Judassohn, Fuchs and Bruckner. From 1897-1902 he was con¬ ductor at the Royal Opera at Prague, then at the Hamburg Opera and Symphony Concerts (1902-09). After directing operatic perform¬ ances and concerts all over Europe he came to New York and has been conductor of the Philharmonic Society of New York since 1911.

STRAP-WORK, a style of architectural ornamentation or enrichment general in the 15th and 16th centuries and of which specimens exist executed as far back as the 11th century. It consists of a narrow fillet or band folded and crossed, and occasionally interlaced with another.

STRAPAROLA, stra'pa-ro'la, Giovanni Francesco, Italian novelist: b. Caravaggio, Italy, end 15th century; d. Venice, about 1557. His life is enveloped in doubt in spite of much research, but he wrote (Canzoniere) which were edited in 1508 at Venice, besides a num¬ ber of novels from popular traditions published under the title ((Facetious Nights*) at Venice in 1550. The work has been reprinted. The Fairy Tales are the first work

of the kind in Italy’s prose literature and it has proved the well from which many later writers have drawn their inspiration. From him are derived our (Puss in Boots,) (Fair Star,) etc. Consult Rua, G., (Le Piacevoli Notii’di F. Straparola recherche) (Turin 1898) ; Borromi, C. (M. G. F. Strap¬ arola da Caravagio* (Pavia 1899).

STRAPPADO, a former military punish¬ ment, which consisted in having the hands of the offender tied behind his back, drawing him up by them to a certain elevation by a rope, and then suddenly letting him drop to within a certain distance of the ground.

STRASSBURG, Gottfried of. See Gott¬ fried of Strassburg; and Tristan

und Isolde.

STRASSBURG, stras'boorg, France, capi¬ tal of Alsace-Lorraine, on the Ill, two miles west of the Rhine, on the French frontier, 350 miles southeast of Paris. It is ranked as a fortress of the first class. A massive inner rampart and 14 modern forts defend the city. It is cut by the Ill into several sections, and bears a quaint mediaeval aspect. It is divided into four cantons ; and owing to the fact that through it in normal times passes most of the traffic between France, Germany and Switzer¬ land, from the Strassburg side, the city is of very considerable commercial importance.

The minster or cathedral, the product of four centuries (10th to 14th), is one of the grandest Gothic churches of the Continent. The tall spire (466 feet) rises from the western front, which is richly embellished with statues and bas-reliefs. The screen of double tracery is the work of Steinbach (13th century). The majestic interior is also richly decorated, and of vast dimensions. In the south transept stands a wonderful astronomical clock (14th century), renovated in 1839-42. It includes a perpetual calendar; the relative position and movements of the planets forming the solar system and many automatic figures which act at stated in¬ tervals. Other interesting features of the min¬ ster are the beautiful stained glass and rose- window (42 feet wide) ; choir-frescoes; and a pulpit of 1485. The Emperor William Univer¬ sity (16th century) received a new foundation from the German emperor in 1872, the institu¬ tion having been closed during the German occupation of Strassburg in 1870. It includes six faculties, has 172 teachers and an attendance of about 2,200 students. The library, which is one of the largest university collections in Ger¬ many, contains about 1,000,000 volumes, and 12,000 manuscripts. The main fagade faces the imperial palace. Beyond the principal buildings are the various institutes for the exact sciences, the observatory, etc. Others are for the study of experimental physiology, pathology, phar¬ macy, surgery, eye-clinic, etc. The town also contains several good churches, Hotel-du-com- merce, governor’s palace, town-house, assembly- room, various museums and collections, benevo¬ lent institutions, excellent hospitals and a very large railway station.

Numerous public squares are embellished by statues, fountains and historical monuments, in¬ cluding busts of Goethe, Gutenberg and others.

The burgomaster, six associates and a coun¬ cil of 36 members constitute the governing body of the city. The most famous industry is the

making of pates-de-foie-gras (fat liver pies) whose annual export has sometimes reached $500,000. Other industries comprise tobacco, liquor, leather goods, clothing, furniture, car¬ pets, machinery, musical and surgical instru¬ ments, artificial flowers, gloves and the prod¬ ucts of foundries, locomotive works, tobacco factories, tanneries, chemical works and piano factories. Transportation facilities by land and water are excellent. The town has always oc¬ cupied an important military position and has been defended by fortifications of great strength and magnitude. Celts were the first inhabit¬ ants, replaced by Romans, and subsequently by Teutons, and about the 6th century Strassburg became a Frankish possession. This was the commencement of its German connection. Bishops and citizens were in perpetual strife in the early history of the town and the citizens finally obtained their independence (14th cen¬ tury). In 1681 it was seized by Louis XIV and became a province of France. In 1870 it was besieged and captured by the Germans and was ceded with Alsace and Lorraine to Germany. By the Peace Treaty of 1919 it again came under French control.

The population, which is about equally di¬ vided between Protestants and Roman Catho¬ lics, is 180,000. Consult Enting, Julius, de¬ scriptive Guide to the City of Strassburg) (Strassburg 1905) ; Signouret, Raymond, Sou¬ venirs du bombardement et de la capitulation de Strassburg . . . 1870) (Bayonne 1872).

STRATEGY, the science of directing, with promptitude, precision and clearness, masses of troops to gain possession of points of import¬ ance in military operations. Its object is to so direct these masses that upon reaching any designated point, the army shall have a better position than that held by the enemy, or shall have such a position as will force him to change his position, or shall be superior to him in num¬ bers, or shall have some decided advantage over the enemy, in case of a conflict. In general, it may be divided into peace and war strategy, and the latter can be subdivided into that in the area of hostilities and that at home, comprising the mobilization, etc., of units and resources to support the forces at the front. There are two main principles which guide all warfare, whether on land or sea, and these are concen¬ tration and the initiative. Concentration con¬ sists in so disposing the forces that they may be superior to the enemy at the critical point and moment. A belligerent secures the initia¬ tive when he compels the enemy to conform to his movements, to accept battle on his own terms, and that means when his concentration is completed. The value of the initiative is- that it enables the belligerent securing it to take advantage of concentration, and strategy is the art by which a belligerent brings about this condition of affairs. The

initiative must not be confounded with the offensive, they are not synonymous terms.

There is a close relationship between strat¬ egy and tactics. Strategy is, in a peculiar sense, the science of generals in command of armies; while tactics in all its ramifications, from the elementary drill of the soldier to orders of battle, from the bivouac of an outpost to the encampment of an army, now belongs to offi¬ cers of all grades. Yet with these marked dif-

ferences, it is sheer pedantry to pretend to de¬ fine the precise limits of these two prominent branches of the military art, as they present a multitude of exceptions in which they approach and run into each other. Tactics, if we re¬ strict its meaning to the evolutions and manoeu¬ vres of troops on the field of battle, may be taught with mathematical exactness, because every movement is accurately prescribed, and the more so the lower we descend the scale of this branch of military knowledge. But this is far from being true of strategy, because in the calculations involved in its operations, a great many considerations enter which do not admit of exact computation, and upon which success or failure essentially depend ; as time, the character of the roads over which the army has to move, the nature of the obstacles which lie between it and the enemy, the moral quali¬ ties and activity of the enemy's forces, etc.

In a mountainous country, the strategical points, although few in number, are generally very prominent. The junction of several val¬ leys, or roads along the crests of several ridges, would naturally be of grea>t- value to an army occupying it, as the forces might operate in any one of the valleys or along any of the roads with an equal facility, while the enemy, once committed to one line, could not change to an¬ other without great labor and loss of time, necessitated by the retrograde movement result¬ ing from the difficulty of crossing the interven¬ ing spurs or valleys. In the campaign of 1 796— 97, in Italy, Bonaparte, by causing the redoubt which closed the pass of the Montenotte to be occupied by 1,200 men, was able to interpose his army between the armies of the allies — Aus¬ trians and Sardinians — and whip them in de¬ tail. At this time the allies, numbering about 60,000 men, were operating in three columns by three roads separated by very difficult mountain¬ ous country. Bonaparte, with about 30,000 men, holding the middle road, the pass of the Monte¬

notte, very successfully accomplished his plan of attacking in succession the columns of the enemy. The campaign was thus decided from its inception, and the redoubt of Montenotte, seconded by a small and brave garrison had great influence upon the final result. The capi¬ tal city of a country is usually a very import¬ ant strategical point. This may proceed, not from its influence on the military operations of a campaign or from its position, but from the fact that it is the seat of the government the occupation of which by the enemy may have a lasting and damaging effect in a political point of view. During the American Civil War great importance was attached to the capture of the city of Richmond, and all the campaigns of the army of the Potomac were made with that city as the objective point, with the idea that its fall would put an end to the war. This was undoubtedly too much to expect, for the bul¬ wark of the rebellion was not the city of Rich¬ mond, but the Confederate armies, and their capture or overwhelming defeat was necessary before the fall of the city would be a decisive cause of the close of the war. The supplies and reinforcements of the Confederate army were nearly all drawn from the States south of Virginia, and as long as the avenues of sup¬ ply remained intact the cohesion of the army was 'ssmed and it remained a menacing force.

Movements in war, whether offensive or de¬ fensive, must always be based on calculation of time and distance. In an offensive war the operations are vaster, the conditions more vari¬ able and the elements of the calculation more uncertain. In a military point of view, the offensive has its good and its bad side. Strate¬ gically an invasion leads to deep lines of opera¬ tion, which are always dangerous in a hostile country. All the obstacles in the enemy’s country, the mountains, rivers, defiles and forts, are favorable for defense; while the inhabitants and authorities of the country, so far from being the instruments of the invading army, are generally hostile. However, if success be obtained, the enemy is struck in a vital point; he is deprived of his resources and compelled to seek a speedy termination of the contest. For a single operation, which we call taking the initiative, the offensive is almost always ad¬ vantageous, particularly in strategy. Indeed, if the art of war consists in throwing the masses upon the decisive points, to do this it will be necessary to take the initiative. The attacking party knows what he is doing and what he desires to do; he leads his masses to the point where he desires to strike. Tactically, the offensive also possesses advantages, but they are less positive since, the operations being upon a limited field, the party taking the initiative cannot hide them from the enemy, who may detect his designs, and by the aid of good re¬ serves cause them to

fail. Whatever advan¬ tages may be expected either politically or strategically from the offensive, it may not be possible to maintain it exclusively throughout the war; for a campaign offensive in the be¬ ginning may become defensive before it ends. The offensive confers, at the outset, the power of concentrating on the flank or centre of the enemy's line of defense, and so turning or breaking it. The defender must either oppose the enemy with an inferior force at first, or abandon territory in order to assemble his forces at some point further back. On the other hand, offensive war demands great re¬ sources, and success itself, if not absolute and decisive, entails fresh difficulties on the invader. And when he has penetrated very far within the defender's territory, the situations of the antagonists differ greatly, inasmuch as the army on the offensive is bound to its base, be that base wide or narrow, while the defensive forces may base themselves on any portion of the territory which will supply them and which their front protects. It is evident that when one belligerent power feels secure behind an unassailable frontier, and holds many issues into the enemy's territory, either by command of the sea or otherwise, it can assemble its forces unknown to its antagonists upon some point selected by itself,, from whence to make an eruption into the theatre of war. And if the belligerents be divided only by a frontier line — a river such as the Rhine, or a mountain range such as the Alps — the army that passes it will nearly always find itself immensely superior to the forces that can immediately interpose.

Battles have been stated by some writers to be the chief and deciding features of war. This assertion is not strictly true, as armies have been destroyed by strategic operations without

the occurrence of pitched battles, by a succes¬ sion of inconsiderable affairs. It is also true that a complete and decided victory may give rise to results of the same character when there have been no grand strategic combina¬ tions. The results of a battle generally depend upon a union of causes which are not always within the scope of the military art; the nature of the order of battle adopted, the great or less wisdom displayed in the plan of the battle, as well as the manner of carrying out its de¬ tails, the more or less loyal and enlightened co¬ operation of the officers subordinate to the com¬ mander-in-chief, the cause of the contest, the proportions and quality of the troops, their greater or less enthusiasm, superiority on one side or the other in artillery or cavalry, and the manner of handling these arms ; but it is

the morale of armies, as well as of nations, more than anything else, which makes victories and their results decisive. When the march of an army has been so conducted, that, when it meets the enemy on the field of battle, it has a decided advantage over him, the battle which follows will usually be more decisive than in the contrary case. A single battle well fought un¬ der the foregoing condition has frequently been decisive of the whole campaign, and even of the war. The battle of Jena gave NapoleOn advantages, which vigorously followed up in the manner so peculiar to him, soon placed the kingdom of Prussia at his feet, and left him free to turn his attention to the Russians.

Tactical and strategical consideration both enter into the problem of determining the point of attack ; the consideration which will govern in any particular case will depend upon the re¬ sults which are expected to follow the defeat of the enemy, or the risks to be run in attain¬ ing these results. The tactical considerations relate to the advantages which can be gained on the field of battle ; and the strategical to the consequences of victory. The strategical

X

y

A B

/

/

G D

P

Fig. 1.

conditions are more important than the tactical, unless the difficulties of the ground are too great, and the results expected to follow do not justify the risks to be taken. Let the army P in Fig. 1, find the enemy in the position A B, with one flank resting on a hill and the other on a river, with an impossible marsh in front. The point A is both the strategical and tactical point of attack; for its capture would command the field of battle, force the enemy from his line of retreat, .r y, and throw him

back on the impassable obstacle opposite the left flank, A C ; with the

right reinforced it would be a better position for the assailed to take, as in this case an attack at A would compel the assailant to fight with an obstacle at his back, and an attack at C would give the assailed the full benefit of the height. The position A C is also objectionable, as it presents a salient D, always a weak point in a line, because it renders both faces liable to be enfiladed. Suppose an army, acting on the defensive, to have the posi¬ tion X Y, Fig. 2 ; its right uncovered, and its left resting on an impassable obstacle. The strategical point of attack is Y ; for, if the left is forced back, the line of retreat A B is ex¬ posed. But the selection of Y as the point of attack forces the assailant to fight with his back to the obstacle Z, which would be very dangerous unless greatly superior to the enemy. Rather X select as the point of attack, and depend upon vigorous fighting and pursuit for

Fig. 2.

great results. Combined attacks, like combined marches, cannot be relied upon for success. They should only be undertaken when the natural features of the country are such that the enemy can be easily checked if he attempts to make a counter-attack, and when the prelimi¬ nary movements of the troops are concealed from his view. When the features of the coun¬ try are such that the detachments can, by tak¬ ing up naturally strong positions, hold the enemy in check, the main body can operate with safety against the flank; for, in case of repulse, its main line of retreat would not be com¬ promised. Much depends upon the character of the opposing general; if he be alert and al¬ ways ready to act promptly and vigorously, any extended movements would be dangerous, al¬ though it might under other circumstances be successfully carried out. Movements may be made with troops that are superior in numbers or in discipline, which would be very rash when the opposing forces are nearly equal, or the commanders of the same capacity. A careful reconnaissance is important in both tactical and strategical operations. A general reconnais¬ sance has for its object the obtaining of de¬ tailed and accurate information of countries and their armies that will be of assistance in case of war. It comprises within its scope our own as well as other countries, for the data obtained may be useful in prosecuting military studies, and as an aid to a general in drawing up his plan of operations, which includes the

movements of troops necessary for concentration as well as their

employment after this has been accomplished and they are ready to meet the enemy. Tables of statistics, giving population, manufactures, industries and information con¬ cerning the roads, railroads, canals, rivers, im¬ portant improvements, etc. ; geographies, general and military; reports of various kinds, etc., will all be found of great assistance in compiling the required information. But, however com¬ plete and exhaustive these sources of informa¬ tion may be, officers of the army should fre¬ quently be sent to different countries to examine and report not only upon their military systems, but upon any subject which may become im¬ portant in a military point of view. This method not only serves to retain possession of

arms, as by its assistance, woods or other sus¬ picious places, within range, could be effec¬ tively examined or cleared of the enemy's pres¬ ence, without the necessity of a close approach. Guns can also cause the withdrawal of parties of the enemy from small defensive positions by acting on their flank.

From the point of view of most recent mili¬ tary strategy, America's greatest contribution to the successful outcome of the European War was the hotly-contested battle of the Meuse, which resulted in cutting the main artery of the German supply system. Up to the middle of September 1918 the Germans were able to operate unmolested the Sedan-Mezieres rail¬ way running parallel to the front and furnish¬ ing a base of supply for the whole line from

V

The Seven Years Warin Europe

AND

Raids on the French Coast

'nc/re/orf

'y

Mll«s

Fig. 3. — Illustrating the value of Land-and-Sea Operations and combined expeditions directed

against the Sea-power of the enemy.

much that might be of great utility in planning militar}' operations,

but it enables officers to gain personal experience of peoples and their customs, which might be invaluable to them and to their country, in the event of war. Special reconnaissances are made with refer¬ ence to the actual military situation at the time, and a report of them is usually made at once, frequently upon the spot. They are known as topographical and armed reconnaissances, the latter being usually termed a patrol, scout, or secret reconnaissance . A reconnaissance in force is generally made just before a battle, for the purpose of forcing the enemy to develop his strength and dispositions.

The addition of infantry gives to recon- noitering parties a strength and power of re¬ sistance which cavalry can never attain by it¬ self. The employment of artillery tends toward a similar end and the especial mobility of horse artillery renders it most appropriate for such service. Artillery is nevertheless seldom added to an ordinary reconnoitering party, its use being generally confined to a reconnaissance in force, or a special reconnaissance. But, although guns are not much employed upon this kind of duty, there may still be occasions where artil¬ lery would prove a useful addition to the other

Valenciennes to Metz. To cut this supply line at both ends and force withdrawal or capture on this entire front the British attacked in the north. The first few days of fighting yielded considerable gains. Fully conscious of the gravity of the situation, the enemy threw in division after division of fresh troops, and during the ensuing wreeks occurred the bitterest fighting in which American troops took part. The second week of October practically all available units — about 28 divisions — were in the line. Progress could be made only a few yards at a time, but the continued hammering finally wore out the resistance of the enemy forces and the American troops broke through. Day after day steady gains were made up the west bank of the Meuse, until, on 7 November, the United States forces entered the outskirts of Sedan and definitely cut the German supply line. A day later the French forces came up on the left flank. The meeting of French and American troops on this historic spot signal¬ ized the defeat of the German arms, a defeat as decisive and humiliating as that forced upon France 47 years before at the same spot. If there had been questions before as to the ac¬ ceptance of the armistice terms, the allied ad¬ vance culminating in this meeting at Sedan

left no choice in the matter. In the final cam¬ paign of the war

American troops thus played a part in a triumph which was beyond all praise.

The actual success of operations in war must primarily rest on the action of small bod¬ ies ; good previous strategical movements, a correct formation of the order of battle, a proper selection of the points to be attacked, will make the success when obtained of far greater importance ; but the actual success must ultimately depend on the correct handling of small bodies of men. This is one of the fea¬ tures of modern fighting and one which must be carefully considered. A battle under exist¬ ing circumstances is a series of small battles or fights in which bodies of troops, perhaps not greater than a brigade, are engaged, and each of these bodies must be tactically com¬ plete, must work for one object, and seek to carry one point. It has been said that for the future no direct attack can possibly be made on troops occupying a position and that at¬ tacks must be made on the flanks : but recent experience shows that attacks on the flanks, unless supported by a strong front attack, can always be met and defeated. The strategy of the recent European War was largely influ¬ enced by the enormous frontages successfully held Relying on the defensive power of mod¬ ern weapons, great, extensions of lines were made for the purpose of resting flanks on se¬ cure obstacles. When a line is persistently and sufficiently battered, a retirement becomes nec¬ essary. This is depressing to the morale of the troops and even in a voluntary retirement the losses in men and materiel are unduly large. Therefore, a retirement should be avoided when possible and should be accom¬ panied by a contraction of the front, either closing in on the centre leaving two exposed flanks, or to one side leaving one exposed flank. It would appear that whatever advantage ac¬ crues from shortening the front would accrue equally to both sides. The advantage of a short front lies in the fact that it takes a greater preponderance of force to break a front strongly held than one weakly held. Further, the oppor¬ tunity for manoeuvre is restricted by a narrow front. Wellington's withdrawal to the lines of Torres Vedras is a classical example of shortening front by retirement. The European War furnished one example of the successful shortening of a line in the Allied withdrawal to the Salonika position.

Numerous wars have demonstrated the strategical principles of concentration of ef¬ fort, importance of initiative, value of sur¬ prise and necessity for unrelenting pressure on a beaten enemy, and they have been demon¬ strated again in the European War. But op¬ erations of detached forces against the enemy's communications, of which there are many ex¬ amples in former wars, seldom occurred in the late war. Such operations depend on rapid and resolute execution

and close co-operation between the divided forces. Operations against communications are hardly practicable under modern war conditions with the huge forces and continuous fronts involved. General Maude used this method against the Turks at Kut el Amara, but it was not used in the great the¬ atres in Europe.

The attack at Gallipoli can hardly be classed as an operation against communications, al¬

though undertaken partly with the object of cutting off the Turks from their German allies. The operations demonstrated the futility of employing inadequate forces, for the French and British gained no advantage from this em¬ ployment of a dozen divisions assisted by naval forces. The operations of the German sub¬ marines were aimed at the British sea com¬ munications. The Allies could not get at the German fleet because of mine fields and coast defenses and the submarines caused the em¬ ployment of considerable naval forces against them. It is thus advantageous to menace the enemy's communications.

The European War may be termed a war of positions. The French and German armies, after marching toward one another, came into collision. The French army, led away by war¬ like enthusiasm, threw itself without protection against the cannon, the machine guns and the trenches of the German army; and left thou¬ sands of dead on the first battlefields. It re¬ treated. At the Marne it offered a superb resistance, once more sacrificing thousands of lives. Then the German army retreated in its turn, but established itself solidly on the Aisne, protected by previously prepared trenches. The French army dug in opposite. Each adversary, finding himself unable to dislodge the other by direct assault, tried to outflank him. Thereupon began the famous <(race to the sea® ; the two armies stretched out trenches, face to face with one another, all the way between two im¬ passable obstacles, the sea and Switzerland. The European War, much more than any pre¬ ceding war, may be termed a war of materiel. An offensive, even a partial one, requires not only an enormous supply of cannon, munitions and machines, but also factories capable of producing them, railroads and highways suf¬ ficient for their circulation, ships, cars and trucks in plenty to bring them up and special depots for their storage. The European War may also be termed a war of attrition. In pre¬ vious wars professional soldiers fought with their own resources and settled between them the quarrels of nations. To-day it is the na¬ tions themselves, with all their forces, human and material, that take part in the struggle ; they fight till one of the adversaries is com¬ pletely exhausted. Thus,

attrition, which ap¬ plies to both men and materiel, is a factor which is bound to enter largely into final re¬ sults. Attrition in men is irreparable; attri¬ tion in materiel can be offset by greater activ¬ ity in the factories, but these factories must be sufficiently well equipped to meet the needs of the army under all circumstances. Attrition in men is not very dangerous for countries which have sufficient human reserves, such as Russia, nor yet for those like France and Great Britain, which can draw on their colonies. On the other hand, it is highly dangerous for countries like those of Central Europe, where human resources are strictly limited. For these countries there will inevitably come a moment when it will be impossible to find enough men to hold the front and to run the factories.

During the European War numerous ac¬ tions and things occurred to change the sig¬ nificance attached in certain quarters to the word strategy. Its meaning may be better grasped if illustrated, rather than defined. Hamley, a well-known English writer, claims

that <(the ’theatre of war is the province of strategy, the field of battle is the province of tactics.® Clausewitz considered that ((tactics is the employment of troops for the object of the fight ; strategy is the adaptation of fighting for the object of the war.® Derrecagaix, a French author, observed that <(the combinations of strategy are governed by immutable prin¬ ciples, while tactics includes operations which are subject to modification as improvements are made in war material.® This, however, does not furnish the whole truth, as certain principles of tactics, such as concentration of force, the value of surprise and of superiority of fire, are as constant as those of strategy. At the commencement of the European War, the word strategy at once attained high popularity,

rout of Bulgaria. This was due to the rein¬ forcement of the Allies by Venizelo’s new Greek army, though this army was not used on the part of the field where the chief rupture was effected. Contributing causes were the dete¬ rioration of the morale of the Bulgarian army and people and the skill with which General D’Esperey chose the time and place for the chief attack. The Allied intelligence was thorough in its functions. (See Fig. 4.).

Considering the great advances in aero¬ nautics, radio-telegraphy and gunnery it is ap¬ parent that the true way to security is stra¬ tegic

surprise, that is to say, it is possible for the enemy to attack when we are least prepared to cope with him and by the skilful use of inner lines. The British in the Northwest were

while the word tactics was neglected. Strategy, then, soon came to be the term applied to every operation of war, large and small. A reconnoitering patrol which had carried out its du¬ ties smartly was said to have displayed fine strat¬ egy, the clever concealment of a machine gun was cunning strategy, etc., etc. Mont Kemmel, a small hill in French Flanders, became a strategical key point, and it has been stated on the highest authority that Vimy Ridge, which was captured in 1917, has proved to be a feature of the highest strategic importance. Formerly tactical would have been the adjective used in these descriptions, now it is strategical.

In the course of the European War, 1914—18, there developed many strategic mysteries — the Russian success in East Prussia, followed by the defeat at Tannenberg; the sudden arrest and defeat of the Germans on the Marne; Mackensen's overwhelming blow against the Russians when the latter were threatening to overrun Hungary in the early part of 1915; and many others. The easiest of these stra¬ tegic mysteries to explain is the final and rapid

very efficiently assisted by the French to keep up their priceless communications with their sea bases and held back for months hundreds of thousands of the invaders and at last the converging Entente armies, in November, 1918, brought about the completest collapse of Ger¬ many since the days of Julius Caesar. (Fig. 4). Profiting by a study of the blunders of 1870, we may add to Napoleon's maxims about readiness these two principles: (a) In strat¬ egy, as in everything else, the jump into the unknown is the reverse of desirable, or rea¬ sonably one has no right to substitute for the hard facts of reality, which should always be sought for, the creations of imagination and hypothesis. On these known facts alone a reasonable operation can be based. (b) In any case, not merely in strategy, but in fact, one ought not to undertake a manoeuvre which causes dispersion without being guaranteed the possibility of being able in time and place to change it into a concentrated plan.

Another lesson enforced on all students of war alike by Napoleon, Moltke and Foch is

that knowledge, a disciplined understanding, a cultivated memory and all the resources of science, art, invention, as well as readiness, judgment and initiative are more important to the general than to surgeons, engineers, etc. I he strategist of to-day declares that ignorance and carelessness are intolerable in military men and that military skill is priceless. The* mind is the army. The general is the soul, the nerve centre, the brains of the army. (See Tactics). Consult Altham, ‘The Principles of War) (Lon¬ don 1914) ; Aston, (Sea, Land and Air Strategy J (ib. 1914) ; Clausewitz, (Germany’s War Mania5 (ib. 1914) ; Derrecagaix, (Modern War) (Washington 1890) ; Dufour, ‘Strategy and Tactics) (New York 1864) ; Dickman, ‘Notes on the German Army5 (United States Infantry and Cavalry School, Fort Leavenworth 1897) ; Mahan, ‘Mahan on Naval Warfare5 (Boston 1918) ; Wagner, ‘Organization and Tactics5 (London 1895).

Edward S. Farrow,

Consulting Military and Civil Engineer.

ˆ STRATEMEYER, strat'e-mi-er, Edward, “Capt. Ralph Bonehill,55 “Arthur M. Win¬ field,55 American writer of juvenile fiction: b. Elizabeth, N. J., 4 Oct. 1862. He was editor of Good News, Young People of America, and Bright Days. He has published over 100 volumes, including ‘Old Glory Series5 (1898- 1902) ; ‘Dave Porter Series5 (1905-16) ; ‘Flag and Frontier Series5 (1899-1907); ‘Rover Boys Series5 (1899-1917) ; ‘American Boys Life of William McKinley5 (1901) ; ‘Ameri¬ can Boys Life of Theodore Roosevelt5 (1904) ; ‘Putnam Hall Series y (1905-12).

STRATFORD, Canada, city and county- seat of Perth County, Ontario, on the Avon River, and on the Grand Trunk Railway sys¬ tem ; 88 miles west-southwest of Toronto, and 80 miles northeast of Sarnia. The chief in¬ dustrial establishments are the railway repair shops, saw, planing, flour and woolen mills, foundries, and manufactories of chairs, car¬ riages, bricks, shoes, biscuits and confectionery, cigars and machinery. There are five banks. The city contains a general hospital, house of refuge, boys’ home, numerous churches, a pub¬ lic library, city hall and courthouse. For educational purposes there are the Provincial Normal School and several public and separate schools. Stratford was first settled in 1831, became a borough in 1855, and was incorporated as a city in 1885. Its government is vested m a mayor and a council of 10 aldermen elected annually. Pop. about 20,000.

STRATFORD, Conn., city in Stratford township, Fairfield County, on

the west bank of the Housatonic River, about two miles from its mouth, and on the New York, New Haven and Hartford Railroad. It is three miles from Bridgeport and is bounded on the south by the Long Island Sound. Its manufactures con¬ sist of paints, silverware, brassware, etc.

STRATFORD DE RADCLIFFE. See

Canning, Stratford.

STRATFORD-UPON-AVON, a von, England, a market-town and municipal borough in Warwickshire, 94 miles northwest of Lon¬ don, on the Avon. The town comprises an old and a new section, but its chief points of

interest are associated with the name and life of Shakespeare. In Henley street stands an unpretentious one-story gabled wooden house, where he was born, and which now belongs to the British government. The house where he died was torn down in 1759. The parish church of Holy Trinity, late Gothic, dates from the 15th century, and Shakespeare's remains were in¬ terred in its chancel. There stands to-day a monument and bust erected to his memory.

Anne Hathaway also is buried in this church. A small memorial hall and the interior of the town-hall are dedicated to Shakespeare's mem¬ ory. The town has a fine guild-hall, a new public library, rich in Shakespeareana (1905), art gallery with many Shakespearean paintings, market-house, corn exchange, almshouses, churches for Dissenting denominations, a hospital for infectious diseases, a new school for technical education, public schools, the fine Shakespeare memorial theatre, and the Shakes¬ peare fountain, erected by George W. Childs, the well-known American. The town-hall con¬ tains Garrick's portrait by Gainsborough. At Wilmcote near by is the cottage of his mother and at Shottery, also in the neighborhood, that of his wife, Anne Hathaway. The visitors to the town are its chief source of wealth. The tercentenary of Shakespeare's death was celebrated with great eclat in 1916. In recent years, through the efforts of Marie Corelli, and a few who support her artistic tastes great changes have been wrought in the ancient town. Old houses with plastered walls, which were eyesores to the visitors and residents alike, have been stripped of their outward ugliness, to reveal the quaint, picturesque tudor archi¬ tecture of Shakespeare's time. Wherever it has been possible the early appearance of the buildings has been restored, and the effect has been a most remarkable transformation and restoration of the place as Shakespeare knew it. The ancient "sword of state,55

which hangs in Shakespeare's birthplace, was removed from its scabbard in August 1914, as an official notice that England was at war. The people say tradition forbids them to sheathe the old sword carried by Shakespeare's father when he was high bailiff in 1568-69, until England is again at peace. The town owns the gas and water¬ works, and has constructed an excellent system cf main drainage and works for sewage dis¬ posal. Pop. 8,531. Consult Lee, Sir Sidney, 'Stratford-on-Avon5 (London 1890) ; Savage, 'The Registers of Stratford-on-Avon5 (ib. 1898) ; Stopes, C. C., 'Shakespeare's Environ¬ ment5 (ib. 1915).

STRATHCONA, Canada, a town of Al¬ berta, Northwest Territories, on the south bank of the north Saskatchewan River, opposite Edmonton, with which it is connected by a steel bridge. It is the northern terminus of the Calgary and Edmonton branch of the Canadian Pacific Railway, and with Edmonton (q.v.), it is the transportation centre for the grain, cattle, and other industries of northern Alberta. There are in the town some manufactures, among them flour, oatmeal, butter and cheese, lumber, foundry products, boats and dredges. Coal is mined in the vicinity. Strathcona has churches, schools, banks and weekly newspapers. Pop. about 8,000.

STRATHCONA AND MOUNT ROYAL, Donald Alexander Smith, 1st Baron, Cana¬ dian statesman: b. Forres, Morayshire, Scot¬ land, 1820; d. 1914. After education in the preparatory schools of his native country, he went to Canada in the employ of the Hudson's Bay Company in 1838, where he spent 13 years on the Labrador coast, after which he was stationed in the great Northwest, where he was promoted to be a chief factor. Later he was named resident governor and chief commis¬ sioner of the company in Canada. He first be¬ came prominent in public life when appointed special commissioner by the Dominion gov¬ ernment to investigate the insurrection under Louis Riel in 1869 at the Red River settlement. In 1870 he was elected to the Manitoba legis¬ lature as member for Winnipeg on the organ¬ ization of that province, and later on to the Canadian House of Commons for Selkirk. But owing to the passage of a law against dual representation he resigned from the local house in 1874. He was also appointed a mem¬ ber of the Northwest Territorial Council. In 1880 he lost his seat in the Canadian House. He re-entered public life in 1887, as a member of the Dominion House, remaining there till 1896, when he was appointed to represent the Dominion of Canada in

London as High Com¬ missioner, a position he held until his death. At the beginning of his political career he supported Sir John Macdonald, the conserva¬ tive leader ; but at the time of the “Pacific Scandal® in 1873, he transferred his support to the Liberals. After 1878 he gave Macdonald independent support in his fiscal and railway policy. He was actively connected with many industrial and commercial undertakings, but his name is particularly connected with railway development in Canada. The organization and success of the Canadian Pacific Railway is due largely to him. In 1886 he was knighted and in 1897 raised to the peerage as Baron Strathcona and Mount Royal, and he was the recipient of many other favors and honors, among them degrees from a dozen universities. He was president of the Bank of Montreal (1887), gov¬ ernor of Fraser Institute, and governor and chancellor of McGill University (1898) and of the University of Aberdeen (1903) and also Lord Rector of the latter institution. He was prominently connected with a long list of edu¬ cational, religious and financial institutions. Lord Strathcona was a very liberal and ap¬ preciative patron of art and his art collection is said to have been the largest and most varied possessed by any one person in Canada. His benefactions to education were extensive and widely distributed. He endowed the Royal Victoria College, Montreal, for the higher edu¬ cation of women; gave over $1,000,000 to McGill University; about the same amount to the Royal Victoria Hospital, Montreal ; and he endowed chairs in numerous colleges. He gave $1,000,000 to the King Edward Hospital fund and was a liberal helper of other similar in¬ stitutions.

STRATHROY, Canada, town and outport of Ontario, County of Middlesex, on the River Sydendam and on the Grand Trunk Railroad. It is 20 miles west of London and has a col¬ legiate institute and armory, a cannery, brewery and manufactures of iron castings, stoves, etc. Pop. 2,823.

STRATIFICATION, layering in sedi¬ mentary rocks. Such layering is usually pro¬ duced by changes in the character of the sedi¬ ments being deposited. These may be changes in the composition of the material, as when a clay is laid down on top of a sand; or they may be changes in the size of particles, as when a fine sand is covered by coarse sand. A cross section of any sand bar along a creek bed will illustrate the process. On a small scale it is produced by daily or seasonal variations in the carrying power of a stream or streams. On a larger scale in the ocean it is produced by de¬ pression or uplift, so that areas near shore which received coarse material such as sand are brought out into the deeper water and re¬ ceive fine muds or oozes, and the reverse. Sometimes, after a layer of material has been

deposited, there is an interval during which the material partly solidifies before the next layer is formed. This will produce a plane of parting or bedding plane. See Formation ; Stratum, etc.

STRATIGRAPHY, that branch of geol¬ ogy that deals with the arrangement, age and succession of rock strata, mainly as revealed by the contained fossils. See Geology, section de¬ voted to Stratigraphy.

STRATTON, strat'n, Charles Sherwood (((Tom Thumb®), American dwarf: b. Bridge¬ port, Conn., 4 Jan. 1838; d. Middleborough, Mass., 15 July 1883. He was born of normal parents, and showed no peculiarity until the age of seven months, when he ceased to grow in height. In 1842 he was taken by his mother to P. T. Barnum, and at that time was 28 inches in height, and weighed a little more than 15 pounds, though he later increased in size. He was perfectly proportioned, active and intelli¬ gent ; and his exhibitions proved a great suc¬ cess. In 1854 he was taken to England by Barnum and presented to the queen and royal family, and later to Paris, everywhere receiving marked attentions. In 1863 he was married to Lavinia Warren, a dwarf girl, and together they traveled widely and gave exhibitions.

STRATUM, a unit of classification in the scale of geological formations. It is a section of any geological series, composed throughout of the same material as shale, limestone, sand¬ stone, coal, etc. The stratum may be subdivided into beds of which there may be many in a thick stratum. Beds, where very thin, are known as laminae, and the sediments are said to be laminated. A stratum indicates a uni¬ form condition of decomposition during its for¬ mation.

STRAUS, strows, Isidor, American mer¬ chant and communal worker : b. Rhenish Ba¬ varia, 6 Feb. 1845 ; d. with his wife in the Ti¬ tanic disaster, 1912. He arrived in America in his ninth year and settled in Tolbolton, Ga., and was preparing to enter the West Point Academy, when the Civil War intervened. In 1865 he removed to New York, where his father founded the firm of L. Straus and Sons a year later. In 1888 he and his brother Nathan associated themselves with R. H. Macy and Company of New York, and in 1893 with Abra¬ ham and Straus of Brooklyn. Always inter¬ ested in tariff and currency reform, he was elected 3 Jan. 1894 from the 1 5th District, New York, to fill the unexpired term of A. P. Fitch

to Congress. He was president of (The Edu¬ cational Alliance > and a prominent worker in charitable and educational movements, and was very much interested in civil service reform and the general extension of education. He de¬ clined the portfolio of Postmaster-General which was offered him by President Cleveland.

STRAUS, Nathan, American merchant and philanthropist: b. Rhenish Bavaria, 31 Jan. 1848, brother of Oscar Solomon and Isidor Straus (qq.v.) He came to the United States in 1854 with his family who settled in Tolbolton, Ga., where he attended school. He afterward went to New York and graduated at Packard's Business College. He joined his father in the firm of L. Straus and Sons, importing pottery and glassware; from 1888 was partner in R. H. Macy and Company, New York; from 1892 of Abraham and Straus, Brooklyn, and retired in 1914 to devote his time to charity. In 1898, dur¬ ing the Spanish-American War, he donated an ice plant to Santiago. He originated, in 1890, and has since maintained at his own expense, a system of distribution of pasteurized milk to poor of New York City, which, statistics of health department show, is saving many thou¬ sands of lives annually. He also originated and maintained a system of depots for distribu¬ tion of coal to poor of New York in winter; and in the panic of the winter 1893-94, main¬ tained a system of lodging houses for poor and homeless. He was appointed by President Taft sole United States delegate to the Inter¬ national Congress for Protection of Infants, Berlin, 1911, also delegate to the Tuberculosis Congress, Rome, Italy, 1912. In 1912 he es¬ tablished soup kitchens in Jerusalem for relief of destitute, and a health bureau for the elimi¬ nation of conditions causing malaria, in Pales¬ tine. During winter of 1914-15 served for the unemployed 1,135,731 penny meals from his milk depots in New York City, was chief con¬ tributor in sending a food ship to war sufferers in Palestine, and extended his Jerusalem health bureau to care for sick and wounded, under auspices of the Palestine government. He has delivered numerous addresses on pas¬ teurization and published (Disease in Milk, the Remedy, Pasteurization > (1913).

STRAUS, Oscar Solomon, American mer¬ chant and diplomat, brother of Isidor and Nathan Straus (qq.v.) ; b. Otterberg, Bavaria, 23 Dec. 1850. A resident of Georgia from 1854 to 1865, he was graduated from Columbia Uni¬ versity in 1871 and from its law school in 1873. He engaged in mercantile life for a time with his father's firm, but found leisure for literary and educational work. He was appointed United States Minister to Turkey 1887-98 and 1898-1900, in 1902, a

member of the . Perma¬ nent Count of International Arbitration at The Hague and in 1906 he became Secretary of Commerce and Labor in the Roosevelt Cabinet. He was Ambassador to Turkey (1909-10) ; and Progressive candidate for governor of New York State; and he arbitrated the dispute between the engineers and managers of the eastern railroads (1914). The following year he became chairman of the public service com¬ mission of New York State. He is president of the American Jewish Historical Society and has published <The Origin of Republican Form of Government of the United States) (1886);

(Roger Williams) (1894) ; (The Development of Religious Liberty in the United States) (1896) ; (Reform in the Consular Service) (1897) ; (United States Doctrine of Citizen- ship) (1901) ; (Our Diplomacy with Reference to our Foreign Service) (1902) ; (The Ameri¬ can Spirit) (1913).

STRAUSS, David Friedrich, German theo¬ logian: b. Ludwigsburg, Wurttemberg, 27 Jan. 1808; d. there, 8 Feb. 1874. He studied in Tubingen University; became assistant to a country clergyman in 1830 ; was appointed tem¬ porary professor in the seminary at Maulbronn ; resigned this position and went to Berlin in 1831 to study under Schleiermacher and Hegel. He returned to Tubingen and lectured on logic and philosophy ; and published in 1835 his famous (Life of Jesus, > in which he attempted to prove that the gospel narratives had a mythical origin and growth. To his numerous critics he replied in and (Zwei friedliche Blatter.) Appointed in 1839 to the chair of dogmatic theology in Zurich he was prevented from entering upon his duties by a storm of popular indignation, but received a small pension in recompense. In 1848 he was elected a member of the Wurttemberg Diet; a position he resigned because he found it un¬ congenial. His subsequent writings were (Christliche Glaubenslehre) (1839-41) ; (Life of SchubarD (1849) ; (Life of Christian Marklin) (1851) ; (Life of Ulrich von Hutten *(1858— 60) ; (Leben Jesu fur das Deutsche Volk) ((Life of Jesus for the German People,) 1877) ; (Der Christus dcs Glaubens und der Jesus der Geschichte) ((The Christ of Faith and the Jesus of History,* 1865), and (Der alte und der neue Glaube> ((The Old and the New Faith, > 1872), in which he defines his final attitude to Chris¬ tianity, that being now entirely hostile. His more important works have been translated into English. He also gave much attention to literary criticism and wrote critical biographies of Schubart.

STRAUSS, Eduard, Austrian composer of dance music, son of Johann Strauss: b. 1835; d. Vienna, 29 Dec. 1916. He was the composer of more than 200 pieces of dance music, being almost as prolific a

composer as his famous father, who wrote 246 pieces of dance music and innumerable operettas. His brother Johann, known as the (< Waltz King,® was the composer of over 500 waltz pieces. In 187C Eduard Strauss became prominent in the musi¬ cal world when he was made conductor of the court balls in Saint Petersburg. Later he made many tours with his own orchestra throughout Europe and in 1892 and 1901-02 visited America. He made his home in Vienna, where in the summer he played at the Volks- garden and in the winter at the Gesellschaft der Musikfreunde.

.STRAUSS, Emil, German novelist: b. Pforzheim, 31 Jan. 1866. He attended gym¬ nasia at Pforzheim, Mannheim, Karlsruhe and Cologne and the universities of Freiburg, Lau¬ sanne and Berlin. At Freiburg, where his studies were in philosophy, literature and politi¬ cal economy, he formed a close friendship with Emil Gott (1864-1908), with whom he settled successively in various country places in order that they might live the life of common peasants

together (Ueberlingen, Emmisheim, Kappel- rode). He is at present living at Hellerau, a suburb of Dresden. His favorite pursuit in literature is the detailed study of childhood and adolescence, resulting in the production of a number of fine psychological studies, of which the best are (Der Engelwirt, eine Schwaben- geschichte) (Berlin 1900 ; 4th ed., 1910) and (Freund Hein, eine Lebensgeschichte) (Ber¬ lin 1902 ; 20th ed., 1912). Other works are (Kreuzungen) (novel; Berlin 1904); (Hoch- zeit) (drama; Berlin 1908) ; (Hans und GreteC (short stories; Berlin 1909); (Der nackte Mann* an historical novel (Berlin 1912). A translation of his short story, (Mara,) is given in (German Classics) (Vol. XIX, New York

1914).

STRAUSS, Johann, Austrian composer of dance music: b. Vienna, 14 March 1804; d. there, 25 Sept. 1849. He was violinist and as¬ sistant conductor in Lanner's orchestra ; and in 1824 organized an orchestra of his own, with which he made a number of tours, going to England in 1838. In 1845 he was appointed to conduct the court balls at Vienna. His musical compositions, mostly waltzes, number about 250. They raised the standard of dance music to a high artistic level. Among the waltzes are (Lorelei J ; (Gabrielen:> ; (Victoria) ; (Baja- deren) ; (Taglioni) ; 'KettenbruckenC and (Donau LiederP Consult

Lange, F. J., (Lanner and Johann Strauss} (Vienna 1914).

STRAUSS, Johann, Austrian composer, son of the preceding : b. Vienna, 25 Oct. 1825 ; d. there, 3 June 1899. Though his father strongly opposed his musical aspirations he became con¬ ductor of an orchestra in a popular restaurant, after the death of his father uniting the latter's and his own orchestras. He conducted the summer concerts in Petropaulooski Park in Saint Petersburg 1855-66, and the court balls 1863-70 and made tours throughout Europe. 'The Beautiful Blue Danube) is the most cele¬ brated of more than 500 waltzes composed by him, of which many others gained great popu¬ larity. He also composed successful operettas, including 'The Carnival in Rome) (1871) ; 'Indigo *(1871); (Die Fledermaus) (1874); 'Cagliostro* (1875) ; (Prinz Methuselem *(1877) ; (Das Spitzentuch der Konigen* (1880) ; (Der lustige Krieg *(1881) ; 'Eine Nacht in Venedig) (1883) ; 'Der Zigeunerbaron) (1885) ; 'Simplicius* (1887) ; 'Ritter Pasman) (1892) ; 'Fiirstin Ninetta) (1893) ; 'Jabuka oder das Apfelfest *(1894) ; (Waldmeister* (1895) ;

'Die Gotten der Vernunft *(1897) ; 'Aschen- brodeP (ballet, 1897). Consult Eisenberg, L., 'Johann Strauss) (Leipzig 1912) ; Prochazka, R. Von, 'Johann Strauss* (Berlin 1900).

STRAUSS, Joseph, American naval offi¬ cer and inventor : b. Mount Morris, N. Y.t 16 Nov. 1861. He was graduated from the United States Naval Academy in 1885, and was engaged in hydrographic surveys on the east and west coasts of the United States and in Alaska 1887— 90. He spent three years in the bureau of ordnance, Navy Department in 1893-96, and here invented the superposed turret system of mounting guns on battleships. He was then in charge of the LTnited States Naval Proving Ground at Indian Head 1900-03. The powder factory was completed during the first year of

this service and its operation begun. His next cruise was as navigator and executive officer on the monitor Arkansas. He was again ordered to the proving ground for two years as inspec¬ tor in charge ; was next executive officer on the Montana during a period of one year, after which he was in command of the Montgomery, conducting experiments with torpedoes. In 1910-12 he was assistant aid for material, Navy Department. He was a member of the com¬ mission to determine the cause of the sinking of the Maine. October 1912 he was ordered to command the battleship Ohio; October 1913, he became chief of the bureau of ordnance, Navy Department. He was promoted rear-admiral in

1.

STRAUSS, Richard, German musician and composer: b. Munich,, 11 June 1864. He studied music at Munich, was made court musical di¬ rector there in 1886, and became court kapell¬ meister successively at Weimar (1889), Munich (1895) and Berlin (1898), with the Royal Opera. He has made extensive concert tours of Europe and he visited the United States in 1904. Strauss is one of the most successful song writers and composers of music therefor in the German language. He is one of the great masters of orchestration; and he has done much to improve program music. Much of his work is weak in invention but his wonderful technical skill is always in evidence. In addi¬ tion to songs and chamber-music, he published a symphony (1884) ; a fantasy for orchestra, (Aus Italien *(1886); the ((1891); 'Till Eulenspiegels Lustige Streiche* (1894) ; (Sprach Sarathustra) (1896); 'Don Quixote> (1898); (Ein Helden- leben> (1899); (Sinfonia Domestica) (1904); (Salome> (1905); 'Elektra *(1909); 'Der Rosen Kavalier* (1911) ; (Ariadne auf Naxos * (1912); 'Josefliegende *(1914); 'Alpen-Sym-phonie) (1915) ; (Festliches Praeludiuni* (for orchestra) ; 'Enoch Arden) ; <Das Schloss Am Meer) ; <Taillefer) ; (Deutsche Motette *; 'Bar-dengesang.* Consult Bie, O., (Die moderne Musik und Richard Strauss) (Berlin 1906) ; Henderson, W. J., (Modern Musical Drift)

(New York 1904) ; Huneker, J. G., 'Mezzotints in Modern Music) (1899); <Overtures) (New York 1904) ; Newman, E., (Richard Strauss) (London 1908) ; Schmitz, E., 'R. Strauss als Musick-dramatiker *(Munich 1907) ; Steinitzer, M., (Richard Strauss* (Berlin 1914) ; Symons, Arthur, (Studies in Seven Arts) (New York 1906) ; Urban, E.„ 'Richard Strauss) (Berlin 1901) ; 'Strauss contra Wagner* (Berlin 1902) ; Weingartner, Felix, (Post-Beethoven Sym- phonists) (New York 1906).

STRAW MANUFACTURE. The use of

straw in manufacture is varied and extensive. Besides its use in the making of paper it is woven into hats, baskets, bottle covers and saddles. Straw hats were first made and worn by the Romans, but the industry did not receive any impetus until about the 16th century, when Mary, Queen of Scots, engaged a number of straw-plaiters of Lorraine to return with her to Scotland to instruct her people in their art. The principal sources from which the United States imports straw are Italy, China, England, Switzerland, Japan, Belgium and France. It is estimated that in Saxony and Bohemia there

STRAWBERRY

are from 20,000 to 30,000 persons engaged in straw manufacture. The finest straws and braids are imported from Tuscany, where a fine grade of straw is produced, from which the delicate Leghorn braid is made. Some of the braids are so fine, and the work so trying on the eyes and nerves, that a person cannot work steadily at it more than an hour or two at a time. The Panama hat, though often classed as straw, is in reality made from young leaves of a certain kind of pine (Corludozrica palmata). Straw has become one of the most important materials employed in the making of cardboard and coarse paper. Straw is sometimes used with other materials in the making of better grades of paper. Straw boards are the cheapest paper board on the market. Of these about 200,000 are manufactured annually. See Paper.

STRAWBERRY, a perennial herb of the genus Fragaria (order Rosacea) . The species are natives of the north temperate zone and of the Andes region of South America. They are exceedingly variable, botanists having described about 130 species, which are considered only forms of about 12 species; and even these are reduced by Bentham and Hooker to only four or perhaps three. The number of hybrids — crosses and varieties — is enormous and actively changing annually, as new varieties are intro¬ duced into cultivation and inferior ones are dis¬ carded. In the United States alone there are probably 1,000 varieties offered for sale each year, and half that number are occasionally tested in a single season at some of the experi¬ ment stations. The cultivated strawberries are derived from four species which are character¬ ized by palmate, trifoliate leaves produced upon very short stems often less than an inch long and usually called a crown. The white or yel¬ low, perfect or pistillate, flowers are borne in corymb-like racemes upon scapes which arise from the axils of the leaves. The pistils de¬ velop into small hard akenes, Seeds,® persistent upon the enlarged pulpy, edible receptacle, the ((berry,® which in some varieties is white, but in the majority red. In Europe the hautbois strawberry (F . moschata) is somewhat culti¬ vated for its dull red berries which are noted for their musky odor. They are seldom. grown in America. Another European species, F. vesca, the alpine or perpetual strawberry, is also cultivated abroad, where its high quality and continuous bearing have rendered it popular in private gardens for which places it should be, but is not, very popular in America. The scarlet or Virginian strawberry (F. virginiana) is a native of eastern North America, where it is the common wild strawberry. It has been cultivated to some extent, but is more or less blended with other species, especially the fol¬ lowing. The Chilean

strawberry (F. chiloen- sis) is a native of the Pacific Coast of South America, with large, dark red, firm, fragrant fruits, which through its botanical variety, F. chiloenses, var. ananassa, the pine or common garden strawberry, is the parent of the vast majority of horticultural varieties cultivated in America if not throughout the world. This species was introduced into cultivation early in the 18th century.

The first successful American variety, the Hovey seedling, was introduced in 1834 or 1835, up to which time the European varieties had VOL 25 — 46

been cultivated in gardens. But not until 1854, when the Wilson or Wilson's Albany was intro¬ duced, can strawberry growing be said to have gained a footing upon a commercial scale. This firm-fleshed, large-berried variety quickly proved itself adaptable to a great variety of soils throughout the whole country, and its wonder¬ ful productivity led to its extensive planting. The growth of the industry has. been so rapid and has reached such proportions that one writer asserts that probably more strawberries are shipped into New York in a day during the busy season than appeared in its markets dur¬ ing its history up to 1840. Commencing in Florida and the Mississippi Delta during Feb¬ ruary or earlier the strawberry <(season® travels northward to Canada where it closes in July. And during this <(season,® which lasts usually from two to three weeks in a locality, there are often trainloads of berries sent to market each day. In some of the more important regions such as the coastal plain of North Caro¬ lina, the Chesapeake Peninsula and western New York, the rate often reaches a carload a day for each mile of railroad through the ship¬ ping district. The berries are mostly used as dessert, but immense quantities are used for canning and for making jams and jellies. Various beverages and fruit syrups are also made from them.

Strawberries are propagated by means of seeds, division of the crown and by runners. New varieties are almost invariably grown from seeds, no two of which from the same fruit can be reasonably expected to produce plants identical as to vigor, productivity, season of maturity, etc., and among which if taken from ordinarily good fruits the proportion of valua¬ ble new varieties is probably less than one in 10,000. With seeds produced by hand-pollina¬ tion of individual blossoms, and under the most careful management, the proportion may be one in 1,000 seedlings. All or almost all of the im¬ proved varieties have been produced in this way, only a very few being obtained by selection of individual plants, though this method is really operative more or less unconsciously in all plantations. Division of the crown is very rarely practised with American varieties but is more

common with European. It consists in cutting the old plants apart so as to have roots with each part ; after management is about the same as for runners. Very few of the strawberry plants grown in America are grown by other methods than by runners, which are produced freely by most varieties and will become independent plants usually within three or four weeks if covered with earth. When rooted they may be dug, trimmed and planted, care being taken to place the crown level with the surface of the ground. Sometimes they are rooted in pots for planting in autumn. In such cases they may be allowed to fruit the following season, and are usually allowed to bear two crops before being turned under, since they are more costly, and since the ground is generally cleaner by this method of management than by the common one. Some¬ times the runners are dug in the spring, planted closely in nursery beds for a month, during which the soil is thoroughly worked to get rid of weeds and make it fine, and the plants which have developed numerous roots set preferably just before a shower.

Strawberries will succeed well upon almost any soil except the sandiest and the undrained mucky soils. They thrive best, however, upon rich sandy loam well drained but moist rather than dry. These may be anywhere in the United States or Canada where corn will ma¬ ture and even in some places where the season is too short or the nights too cold for that. They should not be planted upon low ground, since in such places the blossoms are frequently destroyed by late spring frost unless expensive precautionary measures are taken. High land from which the cold air will readily descend, and upon which the flowers may open somewhat later, especially if the exposure be to the north, should be given the preference. If the soil has been in sod for several years it should be planted to corn or potatoes for at least two years to permit the ground to be brought into perfect condition and to allow the larvae of various root-feeding insects a chance to escape, otherwise they, being deprived of their natural food, may injure the strawberry plants. Dur¬ ing these two years liberal applications of stable manure should be given and the ground made as free from weeds as possible by thor¬ ough cultivation. If a crop of early potatoes be grown they may usually be harvested in time to allow autumn planting and except for harrow¬ ing, the land may not need further prepara¬ tion. Usually, however, spring planting is pre¬ ferred, the ground being plowed as deeply as practicable without turning up the subsoil. It is then harrowed and marked (off in rows about 30 inches

apart and the plants set by hand or, upon a large scale, by transplanting machines. During the first season most growers destroy the blossoms because it is considered that fruit bearing this season stunts the growth and im¬ pairs fruitfulness during the succeeding year. Since the plants are low growing and unable to fight weeds and also produce well clean cul¬ tivation is essential throughout the growing period. After the fruiting season runners will appear (often they come earlier) and should be allowed to root so as to form a more or less continuous row which by the end iof the autumn should be about 18 inches wide. Some growers who supply fancy markets or special customers grow the plants in Chills® or ˆstools,® the runners being destroyed' and the original plant encouraged to develop additional crowns. As soon as the ground freezes a mulch of marsh hay, straw, pine needles or other material free from weed seeds, is spread liberally upon the plants to keep the frost in the soil and prevent heaving of the plants and the consequent break¬ age of the roots. In the spring this mulch is either removed entirely from the field or is raked between the rows. In the former case one or two cultivations are usually given ; in the latter, none. Either at this time or during the previous summer, or at both times, appli¬ cations of commercial fertilizers may be made, the kinds and amounts depending upon the grower's idea of the needs of the plants and the richness iof the soil. Wood ashes, muriate or sulphate of potash, dried blood, ground bone and superphosphates are favorite fertil¬ izers. Nitrate of soda and sulphate of ammo¬ nia must be given with caution since they may tend to an abundant growth of foliage aH: the expense of fruitfulness. If, however, the leaves

are yellowish, one of these should be given as a rule. When the berries have become fully colored they are gathered with the stems on and shipped to market in crates containing 24, 32 or 36 quart boxes. A yield of 200 bushels per acre is not uncommon and more than double thalt is often obtained by the most care¬ ful growers in favorable years. As soon as the crop has been gathered the plants are plowed under and the land planted to such crops as cabbage, turnips, beets or other plants that require only a short season to reach maturity. Sometimes if the land is exception¬ ally clean, when the crop has been light, or where the plants are especially vigorous, they may be allowed to remain for two seasons ; 'the second crop, however, is usually lighter than the first and the beds are likely to become weedy even under best management. A favor¬ ite rotation is corn, potatoes, strawberries, cab¬ bage, and grass and clover used for hay one or two years or pastured for several.

Strawberries are occasionally forced in greenhouses to supply a small

demand among the wealthy. The plants are usually grown in pots because they can be better controlled than in benches and because they may be sold for decorative purposes as well as for dessert. They are generally potted in early spring and the first runners from them rooted in small pots which when full of roots are discarded for large pots in which these plants are to bear fruit. The pots are then kept in deep beds of ashes, preferably under a cold frame in which great care is directed to watering, especially toward and during autumn when it is gradually withheld, the plants even being allowed almost to wilt, in order to shorten up their growth and to store reserve food. After freezing, the plants may be removed as desired to the green¬ house, at first to low temperatures and later to higher ones in imitation of spring. In about eight weeks the fruit should be ready, but all through great care must be exercised in man¬ agement, especially as to humidity of the air, ventilation, and pollination of the flowers, an operation that must be done by hand with a camel's hair brush, preferably.

Under the best management strawberries are seldom seriously injured by insects, al¬ though a considerable number are partial to this plant. The larvae of several root-feeding beetles are sometimes troublesome, if the grower plants his strawberries upon a freshly turned sod. But this may be obviated by two or perhaps even one intervening crop of pota¬ toes or corn. There are also several beetles which enjoy the blossoms, tender foliage or fruits, but since these travel slowly they may be avoided by selecting new ground each year. There are a few general feeding insects such as caterpillars, plant bugs, etc., which occasion¬ ally vary their diet with strawberries, but they are rarely troublesome. Several so-called plant diseases have been reported as causing losses in plantations, but very frequently the cause may be readily traced to other sources, such as planting in unsuitable soil, or upon lowlying land, by insufficient vigor of plant, due to lack ,of plant food, e!tc., but especially to con¬ tinued use of the land for this one crop. All the above may be avoided by proper rotation, the strawberry being allowed to occupy the land

only one year or in exceptional cases two years, and the ground being thoroughly cleaned by cultivation and judicious rotation before straw¬ berries are again planted upon it.

Bibliography. — Bailey, (Cyclopedia of Amer¬ ican Horticulture >

(New York 1900-02) ; Bar¬ nard, (The Strawberry Garden) (Boston 1871) ; barmer, (Farmer on the Strawberry) (Pu¬ laski, N. Y., 1891) ; Terry and Roet, (How to Grow Strawberries } (Medina, Ohio, 1890) ; Fuller, (Strawberry CulturisP (New York 1862, and later editions) ; Pardee, (Manual of the Cultivation of the Strawberry) (New York 1854, and later editions) ; and numerous bulle¬ tins of the Agricultural Experiment Stations.

STRAWBERRY BASS, one of the many local names in the Mississippi Valley of a large and handsome sun-fish (Pomoxis sparoides) , closely related to and resembling the crappie, but having the mottlings a clearer green and tending more to become spottings. It reaches a length of 12 inches, is a favorite game fish for young anglers, is good food and is abundant in clear cold streams and ponds. Other names are calico bass, grass bass and bar- fish.

STRAWBERRY BUSH. See Spindle Tree.

STRAWBERRY SHRUB, a shrub (Caly - canthus jioridus) native to the southern United States, which is widely cultivated for its flow¬ ers. These are dark purple, terminating leafy branches, with many series of imbricated strap¬ like sepals and petals. When crushed they give out a delicious aromatic fragrance which has been likened to that of strawberries or of fer¬ menting wine. The receptacles are hollow and enclose the pistils ; at maturity the receptacles enlarge (the bases of sepals, petals and bracts still adhering) into an urn-shaped capsule hold¬ ing the true fruits or achenes. The leaves are ovate, rough above and pubescent beneath, and, together with the twigs, have an odor of cloves. Western species of the genus have like aromatic foliage and flowers, but C. fertilis bears in¬ odorous blossoms.

STRAWBOARD, the name of a very thick, coarse cardboard, made of straw after it has been boiled in lime and soda to soften its tex¬ ture. It is one of the products of paper mills and is manufactured by machinery similar to that used in such mills. The cheaper grades of strawboard are largely utilized in making boxes. The finer qualities are utilized in mak¬ ing book covers.

STREAK, in mineralogy, is the essential color of a mineral, or the color of its powder. It is most commonly obtained by rubbing the specimen on a tablet of rough white porcelain or on a piece of white hornstone. Any method may be employed which makes it possible to see the powdered mineral. It is a property of first importance in all schemes for the determination of minerals by their physical properties and is of especial value in differentiating the metallic minerals, whose external

colors are often iden¬ tical while their streaks may be very different. The greenish-black streak of chalcopyrite in¬ stantly distinguishes it from gold whose streak is like its external color. The red or reddish-brown streak of hematite serves to identify it when compared with the ochre-yellow or rust-

brown streak of limonite, or the black of mag¬ netite.

STREAM LINES. In the flow of fluids (including gases and liquids), the path described by any infinitesimal portion, or particle, of the fluid is called a stream line. The theory of stream lines is a part of the mathematical sci¬ ence of hydrokinetics. The most important re¬ sult of this theory is known as the principle of Bernoulli (Daniel). It asserts that in the steady motion of liquids (or fluids of constant density) the sum of the pressure, the kinetic energy per unit volume and the potential energy per unit volume of the liquid, is constant along a stream line. The principle holds also, with a slight modification of statement, for the case of gases. This principle accounts for the fact that in the steady flow of liquids through tubes of variable cross section the pressure is least where the velocity of the liquid is greatest and vice versa, supposing the potential energy per unit volume of the liquid unchanged. It explains also the action of the Venturi water meter, the aspira¬ tor, the ball-nozzle contrivance and other me¬ chanical devices. Consult Appel, (Traite de Mecanique Rationelle) ; Lamb, hydrodynam¬ ics. J

STREAM PIRACY. Streams which are favorably located can cut down their channels and extend their tributaries faster than less favored streams. This is particularly true of those that are located in areas of softer rocks where less energy is required to erode. Such streams often extend their headwaters so rap¬ idly that they encroach upon the less favorably located rivers and capture portions of their drainage. The former stream is said to behead the latter and the process is called stream pir¬ acy. In the Appalachian region, where many of the larger streams occupy parallel valleys on softer rocks, those streams which flow across the harder rocks are often beheaded by the larger rivers on the softer beds. The old val¬ ley notch across the hard ridge, which consti¬ tuted a water gap, becomes abandoned and is then called a wind gap. See Trellised Drain¬ age.

STREAM TIN, the name applied to cas- siterite when it occurs in the form of sand or small pebbles in the beds of streams or in ad¬ jacent bottom lands. Owing to the great hard¬ ness, density and insolubility of cassiterite, it is readily concentrated by running water, and ac¬ cumulates in extensive deposits, thus constitut¬ ing an important

source of supply of tin ore. It is largely worked in Australia, Tasmania, the East Indies, and formerly in Cornwall, England. See Cassiterite.

STREATOR, Ill., the largest city in La Salle County, on the Vermilion River, and on the Atchison, Topeka and Santa Fe, the Chi¬ cago, Burlington and Quincy, the Chicago and Alton, the Wabash, the New York Central, the Chicago, Ottawa and Peoria railroads, 90 miles southwest of Chicago. The city was developed as a coal-mining centre, mining commencing about 1868. The city was incorporated in 1882. It lies in the fertile agricultural region known as the northern Illinois corn belt, and is under¬ laid with coal and shale. The manufacturing establishments include glass and bottle facto¬ ries, brick, drain tile and sewer pipe works,

automobile factories, automobile accessory works, agricultural implements, washing ma¬ chines, windmills, acetylene plants, foundries, detinning factory, etc. The latest census of manufactures reported 60 manufacturing estab¬ lishments employing 1,918 persons, of whom 1,770 were wage-earners. The capital invested in these establishments was $6,993,000, annual amount of salaries, $150,000; wages, $1,045,000; the cost of materials, $1,762,000, and the value of products, $3,887,000. The trade is chiefly in manufacturing, coal, grain, livestock and dairy products. The principal buildings are the Fed¬ eral building, municipal buildings, opera houses, hotels, Y. M. C. A. building, City Club, Elks' building, Masonic Temple, public library, Saint Mary's Hospital and about 25 large well- equipped churches. The educational institu¬ tions are a large high school, well-equipped public schools, parish schools, a kindergarten, private commercial schools, library and Y. M. C. A. reading rooms. The three national banks have a combined capital of $300,000. There are four thriving building and loan asso¬ ciations, and a large number of fraternal socie¬ ties, lodges and organizations. Pop. 14,779.

STREET, Alfred Billings, American nature poet: b. Poughkeepsie, N. Y., 18 Dec. 1811; d. Albany, N. Y., 2 June 1881. From 1848 until his death he was State librarian of New York. Though diffuse, his verse displays a love of nature founded upon close and accurate obser¬ vation and scarcely deserved the neglect into which it has fallen. His published works in¬ clude (The Burning of Schenectady and Other Poems5 (1842) ; (Drawings and Tintings5

(1844); (Fugitive Poems5 (1846); (Frontenac5 (1849) ; (Woods and Waters5 a volume of Adi¬ rondack travel (1860) ; (Forest Pictures in the Adirondacks,5 poems (1865) ; (The Indian Pass5 (1869) ; <Lake and Mountain5 (1870) ; < Eagle Pine5 (1871).

STREET, George Edmund, English archi¬ tect: b. Essex, 20 June 1824; d. 18 Dec. 1881. He was educated in Mitcham and Camberwell and received part of his professional training under Sir G. G. Scott, and like him held the Gothic style in highest favor, the numerous lec¬ tures and papers which he wrote on architecture being all directed to illustrate the history and principles, and promote the progress of that style. His principal literary works are (The Brick and Marble Architecture of North Italy in the Middle Ages5 (1885) ; and Tome Account of Gothic Architecture in Spain5 (1865). He was for many years engaged in the work of erecting and restoring churches and other eccle¬ siastical buildings. In this connection he de¬ signed Cuddesden Theological College, the Cri¬ mean Memorial Church at Constantinople. Saint Paul's (American) Church at Rome, the Law-Courts at London and various other churches in Oxford, Liverpool and other parts of England. He was also one of the most success¬ ful of church restorers, among his restorations being the cathedrals at York, Bristol and Car¬ lisle and various noted chapels. In 1868 he was appointed architect of the new Courts of Jus¬ tice in the Strand, London, after a competition in which were engaged the most famous archi¬ tects of the day. This gigantic undertaking was not quite completed at his death. In 1866 he was elected an Associate of the Royal Acad¬

emy and in 1871 became a Royal Academician. In the last year of his life he was appointed professor of architecture at the Royal Academy. Among his published works are (The Brick and Marble Architecture of Northern Italy in the Middle Ages5 (1855) ; (Gothic Architecture in Spain5 (1865). Consult a memoir by his son, A. E. Street (1888).

STREET, Julian Leonard, American au¬ thor : b. Chicago, 12 April 1879. He was edu¬ cated at the public schools and Ridley Prepar¬ atory School, Saint Catherines, Ontario. He started as reporter for the New York Mail and Express (1899) and had charge of the dramatic department 1900-01. He has written (My Enemy the Motor5 (1908) ; (The Need of Change5 (1909) ; (Paris a la Carte5 (1911) ; (Ship-Bored5 (1911); <The Goldfish5 (1912); (Welcome to our City5 (1913) ; (Abroad at Home5 (1914) ; (The Most Interesting Amer¬ ican5 (1915); (American Adventures5 (1917).

STREET (Latin strata, Anglo-Saxon strset, road) an open way or

thoroughfare within the corporate limits of a city or town. In the rural districts streets are called roads or highways. Very primitive cities seem to have been built without real streets, much after the manner of Indian villages ; but as population and the activities of communities grew, the ne¬ cessity for better means of communication within the towns themselves and between them and the surrounding country arose and called into being the more regular distribution of buildings. In the large cities of pre-Columbian America, with a few notable exceptions, the buildings seem to have been grouped irregularly around a public square, along the four sides of which were paved roads. From this square, at first, exit was had by one or two highways along which were grouped buildings of many kinds. This seems to have been the only evidence of the regular placing of buildings in a town. This constructive plan, or rather lack of plan, is strongly in evidence in the ruins of the cities of the early period of semi-modern civilization in Yucatan. In the ruined city of Uxmal (q.v.) the central plaza is occupied by a great flat-top pyramid, terraced in form, round which are grouped the other important buildings on high pyramids or elevated terraces but without any evidence of plan. But in some of the later cities the pyramid is found surrounded by an open space consisting of the outer edges of the central plaza. From this plaza, roads led in various directions, often for hundreds of miles into the country. These were efficiently paved and maintained at the expense of the general government. From the heart of the city of Itzamal led, far into the interior, four excel¬ lently paved roads over which the traffic was immense. Each of these roads started from one of the four corners of the central plaza, the broad ground-level space of which was hand¬ somely paved with carefully-cut large stone blocks. From the ancient Chiapan city of Pa- lenque stretched a well-paved street for over a hundred miles into Guatemala. All along this street, intermittently, were stone buildings, the ruins of which are still in evidence. This was evidently a great highway of commerce and general traffic, especially to the sacred shrines of the city. These great highways seem to have preceded the organization of cities and towns

into sections divided by more or less geometri¬ cal streets. Most primitive towns are very ir¬ regular in their structure and the more primitive they are the more a matter of accident seem to be the arrangement, the width and the construc¬ tion of the streets, which are generally (when they do exist) narrow, crooked and irregularly placed. Excavations of ruins where one city has been built upon the

remains of another show, often, that the older town was much more irregular in its street structure than the later.

As nations began to extend their commerce, trade and other relations, they generally im¬ proved their roads and streets. The construc¬ tion of the magnificent streets of the cities of the Roman Empire seems to have been along the same line of growth as that of the later civilized empires of America. Two necessities compelled the building of magnificent highways — commercial activity and political require¬ ments. No one other factor gave more effi¬ ciency to the Roman Empire than its system of magnificent roads. These, in their turn, brought commerce, trade, commercial import¬ ance, wealth and luxury to the greater cities. All these called for more sanitary modes of living and better facilities for moving about the cities and towns. This brought into being a more geometrical organization in many cities and towns and the construction of magnificent well-paved streets and avenues, many of which were lined with stone benches and handsome statues. The famous ((Appian Way,® known as the <(queen of roads,® stretched away from the heart of the Rome of the empire for a dis¬ tance of 350 miles, every mile of which dis¬ played some feature worthy of attention. It was quite natural that such great roads, lined with magnificent palaces and other noteworthy edifices, should have had their effect upon the streets of the cities of the empire.

But after the fall of Rome the art of city street construction declined throughout Europe. Under Germanic and Gothic influence new cities and towns were constructed with narrow, crooked, unsanitary streets, many of them little better than alley-ways, in which plagues, fevers and other diseases made their homes. When the streets were paved at all it was generally with loose cobble-stones and later with roughly cut stones in the more progressive cities. The old Roman art of building cement ways seems to have been completely lost, forgotten or neg¬ lected. Here again the old story has repeated itself. The rapid extension of trade and com¬ merce during the 19th century, the invention of the steam engine, the locomotive and the steam¬ boat called for the extension of highways and the material improvement of those already ex¬ isting. These, in turn, brought increased popu¬ lation and wealth and importance to the cities and towns. In their train came the improve¬ ment of the city streets. The invention of the bicycle and the automobile led, about the be¬ ginning of the present century, to the rapid extension of the city boundaries and the intro¬ duction of wide avenues and streets in the mod¬ ern city planning and construction. These fac¬ tors have brought with them many improve¬ ments in street pavement. The ancient cobble¬ stones were replaced by carefully-filled rectan¬ gular wooden blocks, cut stone and brick.

These are being rapidly replaced by the more

durable and sanitary asphalt and cement pave¬ ments. Handsome sidewalks are taking the place of the old-fashioned narrow walks of a gener¬ ation ago. Even in the United States the board walks are disappearing as the price of lumber continues to advance.

The tendency now is more and more to turn over the management of city streets to experts in city planning and beautifying, and it is safe to say that the future city and town street is destined to be as great an improvement on the present street as the present is on that of the past century. The planning of the streets of a city, their connection with proper recreation parks, their pavement, drainage, lighting, water supply, gas conductors, telegraph and telephone lines, street railways, policing, flushing and cleaning, all now form proper subjects of municipal forethought and regulation. The days when the fates took care of the health of a city are past. The health officer has come into his own; and to the attention given by him to the city street is due the banishment of the most fearful of the ancient scourges of great centres of population, making the cities more healthful than the rural districts. (See City; Municipal Government; City Planning; Roads and Highways; Pavements; Drainage; Electric Lighting; Railways, Street). Consult Doo¬ little, F. W., (Urban Transportation Service) (New York 1916) ; Holt, R. B., (Tramway Track Construction) (New York 1915) ; Robin¬ son, C. M., (The Wealth and Arrangement of Streets) (New York 1911) ; (City Planning) (1916); Walker, E. K., (City Planning) (Civic Bulletin, Berkeley 1914).

STREET CLEANING, a term used to include all operations of municipal departments charged with keeping the streets free from litter which might affect the public health or com¬ fort, or offend the public taste. In the larger cities of the world the work consists of the daily sweeping of all paved streets ; the col¬ lection of house refuse — garbage, ashes and light waste — when deposited by the house¬ holder in cans on the sidewalk or adjacent thereto; the removal of dead animals from the street ; summer sprinkling to lay the dust ; and the disposal of snow in winter. In small com¬ munities the term covers only the more pressing of these functions — the removal of dead ani¬ mals and household garbage and ashes, with a spring cleaning of the streets after the melting of winter snows, and an autumn cleaning after the fall of the leaves.

The routine work of street sweeping and the removal of household waste is performed by men regularly employed by the department ; while work which varies much with the season, such as the removal of

dead animals, street sprinkling and the disposal of snow, is, in most cities, let to contractors who are subject to the call of the department, but are better able to supply the sudden demands for men and teams at any point.

For a long time in Europe, and of late in America, the men of the departments of street cleaning have been protected in their employ¬ ment by civil service rules which insure their positions during efficiency and good conduct : and in Europe they receive pay during sickness and pensions on retirement. This has had the effect of providing a class of men suited to

the work and contented with their positions, and in raising the morale of the departments. In Europe the men sometimes wear distinctive caps or some other badge of employment, and in some cities they wear a modest uniform. In New York City the sweepers are garbed in white, because this is most conspicuous on a crowded street and conduces most to the safety of the men and the efficiency of the depart¬ ment; and because these uniforms, to be kept white, must be thoroughly washed and always in good sanitary condition. In many of the older and larger cities of Europe — Vienna, for example — where strict obedience to law has long been rigidly enforced, each house¬ holder keeps his portion of the sidewalk uni¬ formly and always clean, having it sprinkled and swept twice daily in summer and kept clean in winter; while in New York few house¬ holders regard it as a duty and a point of honor to keep their individual sidewalks clean in sum¬ mer and free from snow and ice in winter. In New York it is very common to see a news¬ paper dropped on the street with no protest, whereas in Europe such an act would almost certainly cause a man's arrest if he refused to pick up the paper. There are streets in New York where one sweeper keeps clean 20,000 square yards of pavement ; there are other streets, in the crowded districts, where one man's work is to keep clean 1,000 square yards. In the latter case the pavement is laboriously swept seven times daily.

The late Street Commissioner Waring, of New York, at the close of his administration made a report considering in succession 13 fac¬ tors which were deemed to be beyond the con¬ trol of the department, and for each was de¬ termined approximately its relative difficulty. They were :

(1) Kind of pavement — asphalt, 100; wood, 100, brick, 100; granite, 150; Belgian block, 160; cobble, 400.

(2) Condition of pavement — good, 100; fair, 120; bad,

1.

(3) Amount of traffic — light, 100; medium, 140; heavy, 180; dense, 250.

(4) Amount of car track — on basis of 30 foot street with single track.

(5) Kind of car track rail — none, 100; flat or grooved, 110; T rail, 120.

(6) Amount of sanding — little, 110; much, 120.

(7) Amount of sprinkling — heavy, 125.

(8) Elevated railroad — 110.

(9) Character of population — good, 100; fair, 200; bad,

1.

(10) Presence of schools — 110.

(11) Existence of markets — 125; or (12) Push-cart stands — 175.

(13) Vicinity of unpaved streets — 200.

That a street bears heavy traffic is seen to have more influence on the labor of sweeping than that it has granite instead of asphalt pavement. The amount of traffic affects the cost ; but no other single cause contributes so much to the difficulty and expense of sweeping as the action of careless and thoughtless per¬ sons in making the public streets the receptacle of all kinds of rubbish — fruit parings, bits of paper, etc. — of which they wish to be rid, and which a little consideration would induce them to deposit in some can which might be emptied into a cart without the trouble of sweeping and shoveling from the pavement.

Machine sweepers (horse or automobile) lessen the cost of street cleaning, and may be used to advantage with preliminary sprinkling

on wide, level, well-paved streets, between mid¬ night and dawn; but their service on crowded streets in daytime is impracticable.

A fall of snow is such an impediment to city traffic, which is usually conducted on wheels even in winter, that it is recognized as a duty of the departments of street cleaning to remove it promptly from important streets, especially from the lines of daily food distribu¬ tion and from the avenues of daily approach to the business districts. The numbers of men and teams suddenly required are very large, and dumping facilities are in general quite inade¬ quate to the work. The cost is also great — about $125 per mile of street per inch of snow, or $1,250 per mile of street for a 10-inch fall. For these reasons numerous efforts have been made to develop practical processes for melting the snow as it lies, or at least on the block where it lies, and running the water into the nearest sewer opening. Machines for the pur¬ pose have been tried in many cities for many years, but have usually proved unequal to the task, because of the cost of melting. The most satisfactory method where there is plenty of water in the city pipes, that is well above the freezing point, is to turn a hydrant hose on the snow and wash it down the gutters. Of course this method is applicable only to a light fall, or to the remnant of a heavy snow¬ fall.

In all street dirt disease germs lurk in un¬ known numbers, and when the dirt is dry and dust is raised by passing traffic or by winds, the dust and the germs find lodgment in eyes, nostrils and mouths, and the work of disease is begun. Of course the dust and the germs are the thicker the nearer the pavement, and no other cause is necessary to explain why the children of the crowded streets are so affected. Careful experiments carried out in New York by Commissioner Woodbury, with germ cul¬ tures from plates exposed, some at the curb level and some at six feet above, exhibited a wonderful difference in the number of germs which found lodgment on the plates in differ¬ ent parts of the city. At the curb level the evi¬ dence of the plates showed on the average five times as many germs as at six feet above. In a tenement district densely populated, where push carts are numerous and traffic heavy, as many as 9,600 germs were caught in a 15-minute ex¬ posure of a plate two and one-fourth inches in diameter. In another part of the city, in a residential district, with heavy traffic but well- flushed pavement, only 54 colonies were found after a 15-minute exposure.

The relative costs of street cleaning in dif¬ ferent cities of the world are impossible of comparison, because the conditions and the standards of cleanliness vary so much, and be¬ cause the work of the department has nowhere been reduced to an exact science. But in gen¬ eral the cost in Europe is much less than in America because of the greater waste and care¬ lessness of the average American citizen, and because of the lower wage cost in Europe. The cost of street

cleaning in Manhattan and the Bronx, including the collection and removal of house waste but not the removal of snow, be¬ fore the war prices set in was about $7,000 annually per mile of street. In Vienna, where only some 25 miles of street in the heart of the

oty is kept thoroughly clean, the annual cost, excluding snow removal, was about $5,000 per mile. In Budapest, where the pavement is ex¬ cellent and where much value is recovered by sorting the wastes, the annual cost was not far from $2,000 per mile. In Paris it was about the same. In Brussels the cost was about $1,350 per mile. In Birmingham, England, the cost was still less, though wages were higher than on the Continent. See Wastes, City, Dis¬ posal of.

STREET RAILWAYS. See American Street Railways ; Railways, Street.

STREIGHT'S RAID FROM TUSCUM¬ BIA, Ala. In the spring of 1863 General Rosecrans organized an expedition to cut the communications of General Bragg's army, then at Tullahoma, Tenn. The objective point was the railroad south of Dalton in northwestern Georgia. For this purpose Col. A. D. Streight, 51st Indiana, who had suggested the expedi¬ tion, was designated to lead it, and was given a provisional infantry brigade of 1,700 men, composed of the 51st and 73d Indiana, 80th Illinois, Third Ohio and two companies of Ten¬ nessee cavalry. He was ordered 'to Nashville to organize the expedition. His instructions were to descend the Cumberland River to Palmyra, thence to Fort Henry, on the Ten¬ nessee, and sweep around the rear of Bragg's army, cut all his railroad communications in northern Georgia, destroying manufactories and depots of supplies, and in every way to cripple the Confederates. Having obtained a partial outfit of unserviceable mules, depending upon the country for a further supply, Streight left Nashville 11 April, with his troops on steam¬ boats, and landed at Palmyra, from which point he marched across to Fort Henry, gathering on the way as many serviceable mules as possible. He remained at Fort Henry until the fleet of steamboats went down the Ohio and up the Tennessee to that point, when he again em¬ barked his men on the 17th and landed at East- port on the 20th of April. On the 21st, with General Dodge, who with 7,000 cavalry and infantry had marched by way of Corinth and Iuka, to protect the movement, he moved on Tuscumbia to mask his real intention. Follow¬ ing Dodge, who steadily pushed back Roddey's cavalry, he arrived at Tuscumbia on the 24th, and being supplied by Dodge with some animals and

rations, and leaving his sick and disabled men with Dodge, who was to return to Corinth, after holding the enemy until Streight could get a good start, at midnight of 26 April, with only 300 of his 1,500 men on foot, Streight cut loose from Dodge, started southward in a heavy storm, and scouring the country for horses and mules arrived at Moulton, after some slight skirmishing, about dark of the 28th. At midnight, every man being mounted, he re¬ sumed the march eastward to Day's Gap, about 35 miles, bivouacking on the night of the 29th at the east foot of the gap. March was re¬ sumed before daylight next morning, and before his rear guard had cleared the gap Forrest's cavalry was upon it. With 1,200 men and eight guns Forrest had left Courtland, Ala., 16 miles north of Moulton, at the same hour Streight had left Moulton, and with scarcely a halt had overtaken him. Streight formed an ambuscade into which Forrest rode and

was repulsed with the loss of two of his guns. This check, with Forrest's necessity for rest, gave Streight an advantage of time, which he improved, and in the forenoon of 1 May he reached Blountsville, after a running fight in which he was hard pressed and some of his men captured. Here Streight seized fresh ani¬ mals, discarded wornout ones, distributed ammu¬ nition and rations, burned his wagons and near noon started for Rome, Ga., the seat of ex¬ tensive iron works, which he thought to de¬ stroy. His column was not fairly in motion before his rear guard was attacked in the streets of the town. There was a running fight from Blountsville to the Black Warrior River, and upon reaching the river Streight was com¬ pelled to make a stand. Forrest was beaten off, and at 5 p.m. Streight crossed the river and moved on with but little more interruption, until 9 a.m. of the 2d, when his rear guard was fiercely attacked at the crossing of Black Creek, near Gadsden. Forrest was held in check some time by the burning of the bridge and Streight continued the march to Gadsden, where he made a short halt to rest his men and animals. Con¬ tinuing the march at 4 p.m., he again halted 15 miles beyond Gadsden to procure forage for his animals. Meanwhile -Forrest was pressing him closely, drove in his rear guard and made a general attack, in which he was repulsed and fell back, and as it was growing dark Streight withdrew half a mile; but Forrest moving to flank him, he again resumed his retreat intend¬ ing to reach Rome and burn the bridge over the Chattooga. When, near Cedar Bluffs, Ala., he was again overtaken and attacked by For¬ rest, he found the bridge over the Chattooga held by the enemy; his men and horses had broken down ; he had no hope of accomplishing the principal object of his expedition; and at noon 3 May he surrendered 1,365 men. He had lost in killed, wounded and captured prior to the surrender 145 men. The

captives were sent to Richmond and confined in Libby prison, from which Streight escaped in February 1864 by burrowing under the foundation walls. Con¬ sult (Official Records *(Vol. XXIII) ; Wyeth, <Life of Gen. N. B. Forrest.*

E. A. Carman.

STRELETS (pi. Streltsi), Russian, sharp¬ shooter, the life-guards of the Russian tsars until the reign of Peter the Great. They were instituted by Ivan the Terrible in the latter half of the 16th century as a national guard; for 200 years they rendered valuable service to the empire. They amounted sometimes to 40,000 highly-trained men. Their numerous privileges and their frequent insurrections made them as formidable as the Roman praetorians or the Turkish janissaries. On the death of Tsar Feodor in 1682, the double family of Alexis, his father, struggled to seize the crown. The Streltsi joined in the revolt of the people of Moscow caused by false rumors that the young tsarevitch Ivan (half-brother of Peter), had been strangled. Followed by an immense crowd, 20,000 Streltsi marched to the Kremlin, dragging cannon behind them. When the dowager tsaritsa appeared with the two princes the revolt was almost ended. A violent harangue against the rioters by Prince Mikhael Dolgoruki inflamed the Streltsi, who flung him from the top of the red staircase upon their

pikes. They sacked the palace, murdering all who fell into their hands. The violent re¬ forms of Peter the Great met with strong op¬ position from the Streltsi, who likewise suffered hardships and privations while campaigning in distant and inhospitable regions. Thousands deserted from the ranks while Peter was abroad in 1697; others revolted, deposed their officers

. and marched against Moscow. They were stopped on the banks of the Istra by Generals Gordon and Schein with regular troops. The Streltsi presented a petition setting forth their grievances, when 4,600 were arrested. Peter hastened home from Vienna, determined to crush the turbulent troops. Hundreds of the Streltsi underwent terrible tortures ; 230 were taken in carts to the Red Place in Moscow on 1 Oct. 1698, followed by their wives and chil¬ dren. In seven days a thousand Streltsi were executed. Peter obliged his nobles to assist at the wholesale slaughter, and it is said that on the last day the tsar himself chopped off the heads of 84 Streltsi. The removal of the

corpses was forbidden; ttfor five months the Muscovites had before their eyes the spectacle of the dead bodies hanging from the battle¬ ments of the Kremlin and the other ramparts. M The Streltsi as a distinct organization ceased to exist. Some 20,000 of ‘the survivors were distributed among the regular army.

• STRELITZIA, a genus of perennial herbs of the family Musctcea ?. The species, of which there are less than half a dozen, are natives of South Africa, and are called bird of paradise flowers. They have stout rhizomes, more or less woody, usually short stems, long petioled, generally large paddle-like leaves, and showry flowers of striking form. The genus is closely related to Musa (banana, plantain, etc.), Ravenala (travelers’ tree of Madagascar), Maranta , Curcuma and Canna (some of which furnish starch and arrowroot). The best- known species (S. rcgince) grows about three feet tall, and has a spathe about six inches long, purplish at its base, and surrounding the bases of about six orange and bluish-purple flowers.

STRENGTH OF MATERIALS. The

relation between force and the distortion it produces in materials of construction (metal, stone, timber, etc.), the harmful effects of force, and the proportioning of materials safely to re¬ sist given forces are studied under this title. For brief notes on the history of the subject see the article Elasticity.

Stress and Strain. — Since forces are dis¬ tributed over surfaces, and not concentrated at points as in the mechanics of rigid bodies, the concept of force-per-unit-area is of funda¬ mental importance; it is called stress in this article although stress is generally used as be¬ ing synonymous with force; this use is con¬ fusing as well as superfluous. If the stress is normal (perpendicular) to the surface on which it acts it is called normal, or tensile or com¬ pressive stress; if tangential it is called shear. The deformation resulting from the application of force may be manifested as a change of length, of area or cross-section, of volume, or of angle. The change of length (or area, or volume) per unit length (or area, or volume) is called linear (or areal, or volumetric) strain. Strains are purely numerical ratios ; they are not lengths, areas or volumes. If a rectangle

drawn on any plane in a stressed material is distorted into a parallelogram the change, in radians, of any one of its right-angles is called the shear strain for reasons which will be evi¬ dent presently. The deformation produced by stress requires time to develop. Tar, for in¬ stance, is brittle or fragile under quickly ap¬ plied loads and

breaks, like flint, with a smooth conchoidal fracture. It behaves like a very rigid solid under sudden blows, but under the smallest forces applied for a long time it flows as if it were a liquid ; under gradually applied large forces it is plastic and can be kneaded like dough or putty. Metals behave in the same kind of way but to a decidedly smaller extent.- The full effect of stress is not produced im¬ mediately although the greater part arises very quickly. If the stress is removed some of the distortion disappears at once, some takes hours, days or even months to vanish, and some, re¬ mains permanently. The property of recover¬ ing from deformation is called elasticity. A body that recovers completely and resumes its original dimensions is said to be perfectly elastic for the particular stress that acted on it. The slow return to shape, occurring during the second period of recovery, is the elastic after¬ effect discovered by Weber in 1835; some very curious phenomena are associated with it. The after-effect has thus far been of no importance in engineering but it is not unlikely that its study will help to clear up difficulties met with in the molecular derangements resulting from stress. For an exhaustive account consult the article by Braun and Jaeger in Winkelmann's (Handbuch der Physik,* Vol. I, 1908.

Laws of Elasticity. — For many metals and certain other materials the laws of elasticity, i.e., the relations between stress and strain, are quite simple; they date from the time of Hooke in 1678. If a tensile or compressive force F is applied at the end of a rod or bar of length l and cross-section A it produces a change of length A/; if the force is not too large these quantities are connected by the experimentally discovered equation

F EAl

A~ l

In terms of stress and strain, putting F/A~ p and A l/l~s, we have

p~Es

where £ is a constant called Young modulus ; its value depends on the material and, within cer¬ tain limits, not upon the stress. For iron and steel E is the same for tension as compression : for cast iron and stone this linear relation does not hold at all; for wood E depends upon whether p is along or across the grain. Typical values of E in pounds per square inch are steel (tens, or comp.) 30,000,000; cast iron (tens.) 15,000,000; concrete (comp.) 2,000,000; wood (along grain) 1,500,000.

When a bar is stretched (compressed) longi¬ tudinally its cross-section gets smaller (larger) without change of shape, all transverse di¬ mensions in any plane growing proportionally smaller (larger). If j is the longitudinal strain and s' the lateral strain — the strain of any line in a cross-section —

s' ^ s/ m

wffiere m is constant for a given material and generally independent of the stress. 1/m is

called Poisson's ratio (See article Elasticity) ; tor steel and iron 1/m = 0.3 approximately.

F= a A * >

a>,

Tj i

I

• |

1

. /

•

1 •

«

•

1

•

I

Fig. 1.

Experiment shows that if a tangential force acts on top of a block fastened at the base, as m Fig. 1, the displacement of the top is within certain limits proportional to the force, i.e. £ ˆA l. Using q for the shear stress we may write this in the form

q~ G tan .

In nearly all cases is so small as to be very closely equal to its tangent

• '.q = = G

where G is the modulus of shear or modulus of rigidity; it depends on the material but in many cases not upon the stress. is the angle of shear or the shear strain; it must be measured in radians. Typical values of G in pounds per square inch are: Steel, 12,000,000; cast iron, 6,000,000; stone, 1,800,00; wood (across grain), 400,000.

All materials are compressible. If a cubical block is subjected to equal compressive stresses P on all six faces experiment shows that the volumetric strain, varies directly as p,

i.e.

K &v

where K is the bulk modulus and depends only on the material. As proved in the article Elasticity the four constants E, G, K and m are related as follows :

w£ = 2G (1 + m) = 3 A" (m — 2).

Testing Machines. — It would seem to be comparatively simple to find

experimentally the safe stress a body can carry. Yet it is not simple because it is difficult to test for one kind of stress without having some other kind present; furthermore it is not definitely known what stress or combination of stresses is the ultimate cause of failure. The precise meaning of the word ˆstrength® is not fully understood; that is, we do not know upon what properties of a material its strength depends. The best we can do in the physical testing of materials is to find by direct and, if possible, imitative ex¬ periments the values of the elastic constants and the stresses p and q that enter the formulas derived in the rational mechanics of perfectly elastic bodies. Shear stresses are best found by experiments on circular shafts in torsion ; tensile tests are made by subjecting a test piece of specified size and shape to direct pull. As both kinds of tests are made in about the same way we shall, on account of lack of space, describe only the latter. Testing machines dif¬ fer in the devices used for applying and measur¬ ing the loads; they are fully discussed in John¬ son, J. B., <The Materials of Construction (1919) ; Martens, Adolf, 'Handbook of Testing Material (translated by Henning, 1899) ; Unwin, (Testing of Materials) (1910).

Testing machines may be divided broadly into three classes according to the manner in which the applied load is measured: (1) lever balance; (2) hydraulic press gage; (3) spring balance. In type (1) the load is applied by means of a screw-press or a hydraulic press but is measured with a lever balance as in the ordinary platform scales. Fig. 2 (a), after Martens, is a schematic representation of this

type; it shows only the bare principle and omits the actual arrangement of levers, supporting frame, method of gripping and applying the load, measuring the extension and details of design. The machines made by Riehle and by Olsen are of this kind; so are those made by Wicksteedˆ in England, Martens in Germany and Marie in France, except that the lever system is attached to the upper shackle or clamp. The Olsen at the Bureau of Standards in Pittsburgh is the most powerful machine in the world, having a capacity of 10,000,000 pounds compression; it is used for tests on full- size columns and masonry piers. In type (2) one of the shackles is connected to the dia¬ phragm of a hydraulic chamber the pressure in which is read on a gage. The load is ap¬ plied at the other shackle either mechanically or hydrostatically. Fig. 2 (b) shows the es¬ sentials of an Emery machine. The Emery, designed at the Watertown arsenal in 1879 for the United States government, differs from other types in having flexible steel plate-fulcra instead of knife edges; the one at the Bureau of Standards in Washington can take specimens 35 feet long and subject them to a push of 2,300,000 pounds or a pull of half as much.

The Martens machine is similar to Fig. 2(b) only the diaphragm is so arranged as to com¬ press the water in the gage chamber; in the Whitworth a gage is attached directly to the hydraulic press that applies the load. Type (3) is represented by the Dalby weigh-bar ma¬ chine. (Consult Dalby, 'An Optical Load Ex¬ tension Indicator/ in Proceedings Royal So¬ ciety, Vol. LXXXVI, 1912; 'Load Extension Diagrams*, ib., Vol. 88, 1913; The Engineer 1917; pp. 422, 453, 468). Dalby describes it thus: "The instrument is self-contained and its principal element is a hollow bar of fine steel about a foot long. This bar, called the weigh- bar, hangs by one end from the upper shackle of a vertical testing machine. The other end is coupled to the specimen bar to be broken, and the lower end of the specimen bar is se¬ cured in the lower shackle of the testing machine. . . . The cross-sections of the bars

are proportioned so that the pull applied through them is ultimately able to break the specimen bar without loading the weigh-bar beyond its elastic limit. . . . The stretch of the weigh-

bar is used to determine the load,® and is meas¬ ured by the movement of a spot of light recorded on a photographic plate. The spot moves horizontally in proportion to the load on the weigh-bar and vertically in proportion to the stretch of the specimen bar; the resultant locus on the photographic plate is the load- stretch diagram of the specimen which is being tested. The idea used by Dalby is not new but he has employed it very skilfully. Actual spring balances were in existence long before in small machines for testing paper, cloth and wire; in 1890 Martens designed a 50-ton ma¬ chine having a steel bar instead of a spring and Kennedy and Ashcroft had employed a similar device in 1886. Dalby's form is superior to the earlier ones because the inertia of the moving parts is reduced to a very small minimum and the recording, being photographic, does away with the unavoidable friction of pencil re¬ corders. Diagrams may be 'taken in less than two seconds from start to break.

Extensometers. — Elastic deformations are usually so small that delicate instruments are required in measuring them. Fig. 3 shows in

jut

XT

A

uli —

Direct

Ewmq

n

l_ J

n

•

L

V

1 1 — 1

Martens Goodman

Fig. 3.

bare principle several types of extensometers or extension-measurers; for more detailed in¬ formation consult the works by Martens, John¬ son and Unwin cited above, and also Morrow, Measurement of Strains) (in Proc. Inst. Mech. Eng., April 1904) ; Dalby's photographic ex- tensometer is described in the references al¬ ready given. In the direct form, Fig. 3, two brackets are clamped to the specimen bar at a fixed distance apart. The stretch of this length is found by noting the separation between the end of a micrometer screw on the upper clamp and the end of a fixed rod on the lower. In

Ewing's extensometer the stretch is read through a small telescope focused on a scale at¬ tached to the lower clamp ; multiplying levers (not shown here) are used so that readings may be taken to a precision of one part in 50,000. The displacement of the end of the lever in Goodman's instrument is read on a circular scale. The form devised by Martens is ex¬ tremely delicate and precise but correspondingly difficult to calibrate and to use. A double knife-edge carrying a mirror M is supported between the test piece and a stationary or idle rod; relative motion due to stretching tilts the mirror and the angular deflection of a ray of light reflected by it is measured on a scale. Several recording extensometers have been used but the

best is that of Dalby.

Shape of Test Pieces. — Elastic properties and strength depend on the shape and size of the test specimen for several reasons. Local stresses due to clamps and grips have greater disturbing effects on small pieces than on large; rolling, machining, etc., produce a surface layer which, like the capillary film on liquids, has properties different from those within the material ; blow-holes, minute cracks and par¬ ticles of foreign substance are relatively larger in smaller specimens; stress tends to concen¬ trate itself at corners, edges, abrupt changes in section and internal cavities so that in a test piece having such peculiarities it is difficult to learn what stress really acts; the planes or surfaces of separation between the molecular crystal groups which are known to exist in even the most homogeneous metals are oriented differently throughout the mass as a result of which two specimens cut from the same body show somewhat different properties. The differences which have been observed between the strengths of long and short round bars cut from the same stock are due largely to lack of homogeneity. Chaplin (in Van No strand's Engineering Magazine, December 1880 and in Proceedings Engineers Club, Philadelphia, March 1882) has calculated them by means of the theory of probabilities. It is evident, there¬ fore, that tests give comparative results at best. The American Society for Testing Materials accordingly specifies a piece about 18 inches long and two inches in diameter, the middle nine inches being turned to a diameter of one and a half inches and the three cylinders thus formed running smoothly — without shoulders — into one another. The British Standards Committee recommends a cylindrical bar of a length equal to nine times its diameter, ex¬ tension to be measured on a middle length of not less than eight diameters. Numerous ex¬ periments, especially those by Bauschinger and Martens, have shown that the relations be¬ tween shape and strength follow closely the law suggested by Barba (Memoirs de la Societe des Ina enieurs Civils, 1880j I, p. 682) : Under identical conditions geometrically similar bodies of the same material suffer similar de¬ formations under the same stresses, identical conditions) are difficult to realize in practice. An approximation to Barba's law will obtain if the ratio of the length of a bar to the square root of its section area is constant; a length of 20 to an area of tt would be convenient as a standard but is considered to be too expensive to prepare for use in commercial tests.

Stress-strain Diagrams.— Hooke's law is only a partial statement of stress-strain rela¬ tions and sometimes does not apply at all. The behavior of wrought iron and structural steel under tension in the testing machine is ex¬ hibited graphically in Fig 4 which is exag¬

gerated in order to show characteristic peculiarities. Compression tests are not satis¬ factory from a strictly scientific standpoint: long specimens tend to bend or buckle and in short blocks the local strains produced at the ends manifest themselves too strongly even when the compression plates are well lubricated — as they usually are not. Up to a certain point P stress is proportional to strain and the graph is a straight line of which the modulus E is the slope; the slope seems to be unaffected by cold-working the material whence Rosenhain concludes that E depends more on the nature of the atoms themselves than on their arrange¬ ment. P is the proportionality limit and marks the point beyond which Hooke's law ceases to hold; the material may or may not be perfectly elastic within this region or beyond it. The limit of perfect elasticity — briefly, the elastic limit — depends on the accuracy with which small extensions can be measured and very largely on the previous history of the material. (Consult the discussion by Bairstow, Phil. Trans. Roy. Soc. 1912). For practical purposes P may be regarded as coincident with the elastic limit. At P, which of course is not a sharply marked point, the locus begins to curve downward until Y, the yield point, is reached ; Y is always beyond the elastic limit. All the strains up to Y develop simultaneously with the stresses ; beyond Y they do not attain their full values until considerable time has elapsed. This plastic flow or slow growth of strain under constant stress has been called <creeping) by Ewing; when the stress is removed the strain creeps back but does not wholly disappear. This lagging in the diminution of strain is named hysteresis and belongs to the group of phenomena associated with the elastic after¬ effect; see the reference above. Plastic flow occurs with hardly any increase of volume; during elastic strain the cross sections change according to Poisson's law. The serrated part of the curve, Y to A, occurs only in wrought iron and mild steel ; it indicates unstable re¬ adjustments in crystal grouping. Real ductile distortion begins at A, and a waist of hour¬ glass shape starts to form near the middle of

the test piece. If the stresses are calculated by dividing the load by the original cross-section the curve runs through M to R the point of rupture. This gives nominal stresses ; the actual stresses determined by using the actual area of section — must be computed as they cannot be plotted by automatic recorders.

Other materials show characteristically dif¬ ferent curves. With

increase of carbon, nickel, or chromium the serrated line in the strain di¬ agram of steel smooths out and plastic ductility sets in immediately after the yield point; the curve from A onward is different enough in each case to indicate quite closely the nature of the metal under test. Neither cast iron (in tension or compression) not concrete (in compression) follows Hooke's law. Some writers infer from this that these materials are never perfectly elastic. This is unjustifiable because there is at present no known connec¬ tion between perfect elasticity and the pro¬ portionality of stress and strain. Conclusions drawn from experiments on cast iron are un¬ satisfactory on account of the existence of initial stress due to sudden cooling. Rolled aluminium does not obey Hooke's law but is de¬ cidedly elastic. For materials such as these Bach and Schiile have proposed the empirical law

pn = Es

where n is a constant equal in the case of cast iron in tension to 1.07.

Stress Relations. — In most engineering problems the stresses at any point in a body are all parallel to one plane and are, therefore, called plane stresses ; we shall limit the dis¬ cussion to this case. Stress on one plane at any point produces stress on every plane at that point. Fig. 5 shows an infinitesimal ele-

Fig. 5

ment in the most general state of plane stress, there being by assumption no stresses per¬ pendicular to the paper. The stresses on any face, for example the left, are pi normal, and qi tangential ; the corresponding forces are pidy and qidy if the thickness is unity; the other stresses are assumed to act as in the diagram. As the element is in equilibrium un¬ less vibrations occur the sum of the moments of all forces — not stresses — about a central axis normal to the paper must vanish ; al¬ though the stress may vary from point to point it is constant over an infinitesimal area. Hence

{qi ± q' 2) dxdy — {qx -f q) dydx.

In the limitg'i —q\ and qz = q't .'. q\ — qi or: shear stress on any plane through a point is always accompanied by equal shear stress on a per¬ pendicular plane through that point, both stresses acting away from or toward the edge of intersection and normal to it. This is Cauchy's theorem.

If the stresses on two planes X and Y at a point P are known as in Fig. 6, the stress on

any other plane through that point can be found. Pass any plane at an infinitesimal dis¬ tance from P and take the wedge thus formed as a free body. There will in general be nor¬ mal and shear stresses p' and q on the oblique plane. If the hypothenuse of the wedge has an area dA the forces on it will be p'dA and qdA; the horizontal force on the vertical face is pxdAsinOy and so on for the other forces. By resolving along p' and q! respectively and replacing functions of 0 by functions of 20 we get

P'

Pv

2

- -rj > v- cos 20 — g sin 20 . . .

pxArpy_ — q cos 2 q

Jmi

(1)

(2)

which remain unchanged when dA becomes zero. They are the stresses at P on any oblique plane of angle 0..

When g, = a 0

tan 26 = —- — — — (3)

px — py

which, being satisfied by the two values 0 and 0 + 90°, shows that there are always two orthogonal planes free from shear stress. They are called principal planes and the pure normal stresses on them principal stresses. If (3) is substituted into (1) the principal stresses, say pi and p2, are found to be _

pl,p2—--x~Y~^~ ± $^(Px — py)2 + 4g2 . . . (4)

By putting dp' /d0 from (1) equal to zero we get the important fact that the principal stresses are the largest and smallest normal stresses in the body at P.

While there are always two pure normal stresses, pure shear exists only under special conditions. Take, instead of X and Y, the principal planes as the planes of reference. Then in (1) and (2) q drops out, px and py must be replaced by Pi and P2, and 0 stands for the angle between the oblique plane and one of the principal planes ;

... p, = h + _ hszPL COS28 . . . (5)

sin 20 . . .

(6)

The condition for pure shear on the .oblique plane is p'= 0 from which

pi - pi

this is impossible unless pi and p2 are opposite in sign or unlike in sense. Hence pure shear exists only when the principal stresses are un¬ like. If they are unlike but numerically equal,

6 =45°. But pure shears are not in general the greatest or least shears. It is evident from (6) that maximum and minimum shears occur when 0=45°; in other words, the planes of maximum and minimum (greatest numerical) shear lie at 45° to the principal planes. The largest shear stress is, therefore,

9' = h(pi — P2) = 5 V (Px — py)2 +4 g2 . . . (7) The effect of a stress p is a strain p/E in the direction of P and, by Poisson's law, a lateral strain p/mE perpendicular to P; they are opposite in stign. Consequently when a block is acted on by tensions pi on one pair of opposite faces and tensions p2 on a pair per¬ pendicular to the first, the resultant strain Ei along pi is

Et=£ _ &•

1 E mE

(8)

A single stress equal to Ee 1 acting alone in the direction of pi will produce the same strain in this direction as both pi and p2\ in this re¬

spect it is equivalent to them and is called the equivalent simple stress.

Working Stress; Elastic Failure. — The mechanics of elastic bodies is of limited value in rational designing and serves only as a re¬ fined rule of thumb until it is decided how large a stress or strain a material can safely resist, how large a stress causes ultimate rup¬ ture and finally whether failure is produced by normal or shear stress or by some combination of them. Researches initiated by Wohler in 1870 and continued by Bauschinger, Reynolds and Smith (Phil. Trans., Roy. Soc., 1902, p. 265), Stanton and Bairstow (Proc. Inst., Civil Engineering, 1906, Vol. CLXVI, p. 78), and others have shown that alternating stresses (tension to compression) well below the elastic limit may produce rupture when repeated often enough. A familiar illustration of this phe¬ nomenon is that springs do not last forever, although they might never be stressed beyond the so-called “safe® limit. It used to be be¬ lieved that these reversals caused the material to crystallize or become granular. This is now known to be incorrect ; all inorganic bodies are crystalline under the microscope, and re¬ versed stresses, or even fluctuating ones always of the same kind, weaken the material by caus¬ ing grinding and abrasion on planes of cleav¬ age. Investigations solely with the aid of testing machines will throw probably little light on the subject. The most fruitful results are undoubtedly to be looked for in the compara¬ tively new field of metallography. This is con¬ cerned with the microscopic examination of internal structure. The first attempt to bring the microscope to the aid of the testing ma¬ chine was made in 1864 by Sorby of Sheffield, whose work, however, remained unknown until it was independently taken up again by Mar¬ tens in Germany and Osmond in France. The subject is too large to be discussed in a short article. Consult Mellor, < Crystallization of Iron and SteeP (1905) ; Rosenhain, introduc¬ tion to Physical Metallurgy *(1917), and Humphrey, (Metallography of Strain* (1919).

Both strength and stiffness need to be con¬ sidered in designing. No structural member may yield or give more than a certain amount apart from the question of strength. For in¬ stance, if a floor beam sags by an amount

greater than about one-third per cent of its length a plastered ceiling under it will crack. Questions of rigidity or stiffness are decided by

means of mathematical formulas derived either from the principles of mechanics or em¬ pirically. They are based on Hooke's law and on the assumption that the elastic limit is not exceeded. The usual method of checking them is to compare calculated with experimentally found deformations ; the calculated stresses are difficult to verify because we have no direct method of measuring stress within a body. However, use has been made of the well-known fact discovered by Brewster in 1815 that an isotropic transparent medium is made doubly refracting by stress and breaks plane polarized light into orthogonal components; likewise, cir¬ cularly polarized waves become elliptically pol¬ arized. Wilson, Carus (in Phil. Mag., Vol. XXXII, 1891, p. 481) ; Honigsberg (in Zeit- schrift ost. Ing. Verein, 1904, Nr. 11); Mesnager (in Annales des Fonts et Chaussees, Fasc. iv, 1913) and Coker (in Engineering , Vol. XCI, p. 1), examined the optical properties of various structural elements made of celluloid and glass and found a remarkably close agreement be¬ tween theory and fact. Of the many books dealing with the formulas of the mechanics of materials the most complete are Morley, (Strength of Matcrials) (1908 and later edi¬ tions), and Bach, (Elastizitat und Festigkeit5 (5th ed., 1905).

The working stress is the greatest stress to which a member of a structure or a machine is subjected during use or operation. If it ex¬ ceeds the elastic limit there may occur per¬ manent deformations not allowed for in the design, change of properties of the material, and when the stresses alternate or vary, ulti¬ mate failure. Indeed, the working or safe stress must be taken considerably below the elastic limit to allow for deterioration due to wear, unavoidable imperfections in workman¬ ship and manufacture, lack of uniformity of material, accidental overloading, but not for poor design. As it is difficult under commercial conditions to determine the rather ill defined elastic limit it is customary to state the safe stress as a certain fraction, 1/m, of the breaking stress ; n is called the factor of safety and is de¬ termined by experience. According to the ex¬ periments of Wohler and Bauschinger on steady, fluctuating, and alternating loads, the safe stresses are in these cases roughly in the ratios 3:2:1, which are, therefore, taken as a guide in determining the factors. The building laws of many cities in the United States specify definite, safe stresses instead of factors of safety. For recent data consult Marks, (Mechanical Engineers' Handbook (1917); Merriman, (American Civil Engineers' Pocket Book)

(1916).

A material is simple tension or compression, or simple shear is considered to be overloaded when the corresponding safe stresses, as

defined above, are exceeded. The immediate cause of failure in the case of compound stress — a number of stresses acting simultaneously — is still a matter of dispute. A material fails when the yield point is reached. Lame assumed that the largest principal stress produced yielding; this theory is sometimes called after Rankine because he gave it considerable authority by

using it in his (Applied Mechanics5 (1858), and it is generally followed by American and Eng¬ lish engineers. In it the effect of the other principal stresses is disregarded, which implies that a block under compression on top and bottom is just as strong as it would be if it were prevented from expanding laterally. Pon- celet and Saint Venant believed that excessive strain caused failure, i.e., stress is harmful only in so far as it produces molecular separation. From this point of view, the equivalent simple stress must not exceed the working stress. Coulomb, Tresca and G. H. Darwin proposed the theory that the difference between the prin¬ cipal stresses, i.e., the greatest shear — eq. (7) above — is a measure of strength. Recent ex¬ periments have given some confirmation to it, at least for ductile metals. Consult Guest, (Strength of Ductile Materials under Combined Stress5 (in Phil. Mag., 1900, Vol. L) ; Han¬ cock, ˆEffect of Combined Stresses5 (ib., 1906, Vols. XI, XII) ; Scoble, (Strength of Ductile Materials under Combined Stress5 (ib., 1906, Vol. XII). The latest theory is that of Mohr (in Zeit. Verein d. Ing., Vol. XLIV, 1900, p. 1524, Vol. XLV, 1901, pp. 4, 740), the essential hypotheses of which are: (a) failure depends only on the normal stress on the surface of rupture; (b) the surface of rupture is normal to the planes of greatest and least principal stresses [for space stresses there are three principal planes], i.e., is parallel to the principal plane of intermediate stress and is in¬ dependent of that stress.

In the absence of conclusive experiments it is necessary to design independently for greatest shear, greatest normal stress and greatest equivalent simple stress; this errs on the side of safety. Metallographical researches have shown such great differences in the molecular structure of materials that a complete theory of elastic strength will probably have to take structure into consideration instead of, as now, dealing only with the geometric arrangement of the stress vectors on the one hand and the stress-strain curve on the other.

Richard F. Deimel,

Assistant Professor of Mechanics, Stevens In¬ stitute of Technology.

STRENUOUS LIFE, The, a collection of 13 essays and addresses on various subjects by Theodore Roosevelt, published in 1900. The book takes its title from the first of the series.

STREPTOCOCCUS. See Coccus.

STRETFORD, stret'ford, a town in Lan¬ cashire, England, four miles southwest of Man¬ chester. Among its chief features are a public hall, municipal offices, a free library, charitable linstitutions and botanical gardens. It has numerous cotton factories. Pop. about 50,000.

STRETTON, stret'on, Hesba, the pseudo¬ nym of Hannah Smith, English novelist, who began writing fiction in 1859. Among her 40 or more books are (Bedes' Charity,5 by which she is best known; (The Doctor's Dilemma5; (Hester Morley's Promise5; (Soul of Honor.5 Her works are deservedly popular and have been translated into all of the European and several of the Asiatic languages.

STRIDE, grooves or scratches on rock. These are commonly produced by glaciation, as a result of bowlders frozen into the ice

scratching against bed-rock. As the bowlder may break loose in the ice and turn its position, and then freeze fast again, bowlders may be striated in several directions. More than one set of striae on the bed-rock, however, means one advance of the ice following another from a different direction. Striae are also produced by faulting. See Fault ; Slickensides ; Glacier, and section on Glaciers in article on Geology.

STRICKLAND, strik'land, Agnes, Eng¬ lish historical writer: b. Reydon Hall, Suffolk, 19 Aug. 1806 ; d. there, 8 July 1874. She. was one of five sisters, all of whom were writers. Her first work, in which she was aided by her sister Susannah, was a volume of (Patriotic Songs, > followed by (Worcester Fields a his¬ torical poem. Her later works were (Queen Victoria from her Birth to her Bridal *(1840) ; (Historic Scenes and Poetic Fancies) (1850) ; (Lives of the Bachelor Kings of England) (1861); (Lives of the Seven Bishops* (1866); (Lives of the Tudor Princesses *(1868). Her best works are (Lives of tjje Queens of Eng- land) (12 vols., 1840-48), and (Lives of the Queens of Scotland) (8 vols., 1850-59) ; (How Will It End?1* (1865) ; ˆives of the Last Four Stuart Princes) (1872). In these her sister Elizabeth collaborated, but at the latter's own desire her name was not revealed as co-author with Agnes. Miss Strickland's work is very readable and has been

exceedingly popular, but belongs to a school of historical writing now gone by. Consult (Life) by her sister Jane (1887); and (Pearls and Pebbles* by Mrs. Catherine P. Traill, another sister (London

1894).

STRICT CONSTRUCTIONISTS, in

American politics, those who believe the Federal government has no rights nor powers which are not expressly granted by the Constitution. The Anti-Federalists (q.v.) were strict con¬ structionists. The broad constructionists, on the contrary, believe that a liberal view of the power and intentions of the Constitution should be held and that the Federal government should not be bound by an inflexible law preventing the natural growth of the democratic institutions of the country. The strict and the broad con¬ structionists have come into conflict often in the history of the American Republic, the most notable occurrence being in the struggle over slavery. The strongest supporters of the strict- construction point of view have been the Anti-Federalists and the Democratic party, who were opposed by the Federalists, National Republi¬ cans, Free-soil and modern Republican parties. Of late years the Strict Constructionists have lost ground so rapidly that their contentions no longer form an issue in American politics.

STRICT OBSERVANCE, Friars of. See

Orders, Religious.

STRICTURE, a morbid contraction of a mucous canal or duct of the body, as the urethra, oesophagus, or intestine. When the affected part is not mentioned, and a person is stated to suffer from stricture, it is always the urethral canal that is referred to. Contraction of this canal may be either permanent or transitory. The first form is due to a thickening of .the walls of the urethra in consequence of organic deposits, and is hence termed organic stricture. The second may be due either to local inflam¬

mation or congestion, or to abnormal muscular action, the first of these varieties being inflam¬ matory or congestive stricture, and the second spasmodic stricture, of which the last named seldom exists except as a complication of the other kinds of stricture. There are two princi¬ pal causes of organic stricture, inflammation of the canal, and injury by violence. Inflammation is by far the most common cause, and gonor¬ rhoea is the common agent by which it is excited. It is

only in exceptional cases that a stricture results from inflammation of the urethra. Stricture in the second case arises from such causes as falling across spars, scaffolding, lad¬ ders, etc., or from some sharp object which punctures the perinaeum.

The earlier symptoms of stricture are a slight urethral discharge and pain in the canal behind the seat of the stricture at the time of micturi¬ tion. The stream of urine does not pass in its ordinary form, but is flattened or twisted, and as the disease advances it becomes smaller, and ultimately the fluid may only be discharged in drops. The straining efforts to discharge the urine often induce tenesmus. As the case ad¬ vances the urine becomes alkaline and ropy, and deposits a precipitate when allowed to stand. Attacks of complete retention of urine occur with increasing frequency. But these symptoms are not in themselves sufficient to establish the presence of stricture. It is necessary to examine the urethral canal with a catheter or bougie to ascertain whether an organic obstruction exists, whether one or more strictures are present, and their calibre. The treatment of organic stric¬ ture is chiefly mechanical. It is 'sufficient to restore the natural calibre of the canal so far as this can be safely effected, and to maintain this patency after it has been established. Spasmodic stricture usually occurs as a com¬ plication of organic stricture or of inflammation of the mucous membrane, but may arise from an acrid condition of the urine, from the ad¬ ministration of cantharides, turpentine, etc., and from the voluntary retention of urine for too long a time. The treatment consists in the re¬ moval of the causes as far as possible and the use of a hot bath. The inhalation of chloro¬ form sometimes gives immediate relief. In¬ flammatory or congestive stricture commonly arises when a recent purulent discharge from the urethra has been checked by external cold or wet. The treatment is much the same as that for retention of urine. Consult Rowlands, R. P., (The Operations of Surgery* (New York 1915).

STRIFE, by John Galsworthy. Nothing is more striking in Galsworthy's work as a drama¬ tist than the skill with which he combines the functions of the artist and the social critic without prejudice to either. In all but two of his plays he has chosen for his theme some one of the outstanding problems of modern social organization and clothed it in dramatic form of compelling interest. In Strife1* it is the conflict between capital and labor as ex¬ emplified in a prolonged strike at the Trenartha Fin Works. The directors of the company have been summoned down from London for a conference with the men and the action takes place during a single afternoon. The company is losing money; the men and their families aie starving; both are ready to come to terms but their indomitable leaders, old John An-

thony, founder and president of the company, and David Roberts of the workmen's committee, will not hear of compromise. Both men are fighters and both are fighting for a principle ; it is a clear-cut ((conflict of wills® such as few dramas present. When Anthony talks to his frightened directors we feel that nothing can balk that iron will. But Roberts' passionate appeal to his fellow workers to hold out in order that their sacrifices and suffering shall not be in vain is still more moving, and no less force¬ ful. Although the struggle finally ends in com¬ promise between employers and men, the tense emotional interest is maintained to the very end. Roberts comes from the death bed of his wife to fling defiance at the board only to learn that the agreement has just been signed, and he and Anthony face defeat together with a like scorn of their weaker followers and a re¬ luctant sympathy and respect for each other. While these two are the chief protagonists, Galsworthy uses no less than 30 speaking parts to fill in his picture and at least half of these are clearly defined individual characters, yet his canvas is neither crowded nor confused. This is largely due to his masterly command of natural and characteristic dialogue. His personages are never mere mouthpieces for his own ideas but speak their own thoughts in their own language.

An interesting comparison suggests itself with certain plays of other nationalities based on the same theme, such as Bjornson's (Beyond Human Power, > Hauptmann's, (The Weavers, > Bergstrom's, (Lyngaard & Co., *Mirbeau's, (Les Mauvais Bergers.* Lack of space forbids com¬ parison in detail but it is noticeable that all these plays culminate in a scene of mob vio¬ lence whereas Galsworthy achieves the effect of violent emotion and strained nerves by more subtle means.

<Strife) was first produced in a series of matinees at the Duke of York's Theatre in London in March, 1909. The first American production took place at the New Theatre, New York, in November of the same year.

Grace R. Robinson.

STRIGES, the suborder containing the owls, the typical family of which is Strigidce. See Owls.

STRIKE. See Dip.

STRIKES AND LOCKOUTS. A strike is a cessation of work on the part of working¬ men to enforce their demands against the em¬ ployer or to resist demands and rules made by the employer; a lockout is a cessation of work on the employer's initiative to enforce demands against his employees. Strikes are essentially a feature of the modern industrial organization; they developed gradually with the progress of industry and organization by unions of working¬ men, reaching their height in the 19th century; the largest and most important strikes having occurred since 1870. While it is true that strikes have increased as the modern labor union has grown, yet it is also true that many strikes oc¬ cur in unorganized or poorly organized indus¬ tries ; and it has usually been true that a young organization is much more apt to enter upon strikes as a means of testing its strength and enforcing its demands than an old organization. The older and stronger a labor union grows,

as a rule, the more conservative it is in regard to strikes, and the less likely to order a strike for petty and insufficient cause. Nevertheless strikes are a recognized and important part of trade union policy. They are defended by trade unions on the following grounds ; they are absolutely the only means which labor has of enforcing its demands in case argument and arbitration fail and afford the most practical means of controlling the supply of labor for the benefit of labor; whether a strike succeeds or not it attracts public attention to the ques¬ tion at issue and may lead to the satisfactory solution by the pressure of public opinion; they mark the line beyond which labor will not be forced in the reduction of wages or enforcement of unjust demands; the very pos¬ sibility of a strike which inflicts an injury that the employer desires to avoid often prevents the attempt to enforce demands which employ¬ ers know would be unwelcome to labor. The more radical view of a strike is based on the doctrine that the interests of labor and capital are necessarily antagonistic; that a strike, there¬ fore, is an attempt to advance the interests of labor as against those of capital and is from labor's point of view entirely right and justi¬ fiable; it is a sort of advance skirmish in the war of interests between labor and capital and useful as winning some definite advantage to labor or of proving the strength and vitality of the labor movement and inflicting a more or less serious injury on capital. Against the pol¬ icy of strikes it is urged that they cause heavy loss to both the labor and capital lying idle ; that with their modern magnitude they seri¬ ously affect the whole industrial life and inflict an injury upon the general public; and that the points gained by labor are not commensurate with the cost of the strike. It must be remem¬ bered, however, that a strike is essentially a war and that many of the evils of

war attend it ; whereas if it be based upon a principle of, justice it can be defended upon the same grounds as a war.

Causes of Strikes. — The chief causes of strikes are centred about the. wage question; the largest number of strikes in the decade of 1881-1900 were for increase of wages; other important causes are for reduction of hours, against reduction of wages, for the recognition of the union and for the enforcement of union rules. The following statistics are taken from the report of the United States Bureau of Labor Statistics :

Leading Causes of Strikes.

Cause

1915

1916

Increase of .

355

1,031

374

107

Increase of wages and reduction of hours . Rpd'if't'on of hours .

156

73

Against reduction of wages .

32

97

Sympathetic .

16

32

For union recognition .

66

257

For increase of wages and recognition of union .

28

119

Recognition wages and hours .

11

68

Uicrharp'p of emnlovees .

67

121

Frnplnympnt-. of non-unionmen .

55

70

Cpfipra] rrmdit.ions .

37

55

Miscellaneous .

634

826

Totals .

1,420

3,157

736

Of the above strikes, 15 in 1915, lasted over 200 days and 16 in 1916. In 1915 24 lasted 92 to 199 days and 79 in 1916. In 1915 48 lasted 50 to 91 days and 106 in 1916; while in 1915 74 lasted 25ˆ to 49 days and 182 in 1916. The lockouts in 1915 totaled 173 and in 1916, 108. The States most affected by the disturbances in these years were New York, Pennsylvania, Massachusetts, Ohio, New Jersey, Illinois and Connecticut in the order named. The trades most affected were metals, mining, building, textiles, transportation and clothing.

Sympathetic Strikes. — The sympathetic strike is one undertaken by a body of workmen who have no special grievance of their own, in behalf of another body of workers on strike. It developed about 1880 and was based upon the workingman's recognition of the principle of the ((solidarity of labor® ; the principle that la¬ bor's interest are everywhere essentially the same and that an injury to one is an injury to all. The sympathetic strike is usually under¬ taken by workingmen employed by the same employer as the original strikers ; or against an employer in some direct relationship with the employer of the original strikers, as competitor, buyer or seller or co-operating. In this way their action has direct economic effect on the question at issue, as well as the more general and less tangible effect of ˆsympathy.® Sym¬ pathetic strikes involve the dangers of violence and the weakening of a powerful organization, by the keeping idle of a body of men not so closely bound together nor so individually in¬ terested as if the strike directly concerned their personal welfare. Nevertheless, the mere fact that sympathetic strikes are undertaken is a proof of the development to some extent of a more enlightened and far-seeing self-interest, which often amounts to altruism, among work¬ ingmen. In connection with sympathetic strikes, the question of the universal strike may be mentioned; a universal strike in all depart¬ ments of industry to obtain some special de¬ mand is naturally the logical development of the sympathetic strike. The universal strike has never been a problem for serious considera¬ tion in the United States ; but on the Conti¬ nent, where the labor movement is largely di¬ rected by the Socialists, it has been frequently agitated, especially in France; and was used as a powerful weapon in Belgium in 1893 to force the government to the adoption of the principle of universal suffrage.

Methods of Conducting a Strike; Picket¬ ing, etc. — The ordinary method of beginning or ((ordering® a strike is by vote of those who are concerned; in the case of organized labor, the matter is usually referred to the national officers for an attempt at settlement, or ap¬ proval of the action of the strikers, the latter securing the support of

the whole organization. Often in large strikes, or in the case of par¬ tially organized industry appeal for financial aid and moral support is made to labor in gen¬ eral or to some large general organization like the Federation of Labor. The interest of the strikers is kept up and public interest aroused by meetings, speeches and the circulation of literature. The most important consideration is to prevent the (<breaking® of the strike either by defections from the ranks of the strikers or by the bringing in of more workmen to take their places. The method generally adopted to

prevent the latter is known as picketing, that is, the placing of some men near the establish¬ ment involved in a strike to speak to any who may come to take the strikers' places and to dissuade them from so doing. This has led often to threats and intimidation on the part of the pickets ; and sometimes to violence. The result has been that the tendency of judicial de¬ cisions is to declare picketing illegal, or to so strictly limit the rights of the pickets as to make their work practically useless ; a few States have declared picketing illegal by statute. An¬ other method of preventing workmen from taking strikers' places is by large general meet¬ ings near the establishment involved, or at the place where workmen are brought into the town ; this, however, is a more dangerous method than picketing, as it is often the means of collecting a large and irresponsible crowd, quite beyond the control of the leaders of the strike. Violence in a strike probably works more harm to the strikers than to any other thing; it arrays public opinion against them and brings against them the forces of govern¬ ment and the military. Trades unionists every¬ where recognize this fact and invariably de¬ nounce violence whenever it occurs ; the vio¬ lence is often committed by persons having nothing to do with the strike, but taking the opportunity to do mischief and when committed by the strikers has not the approval of organ¬ ized labor. It is often charged that strikers have sometimes been provoked to violence by agents of the employers in order to give bet¬ ter cause for breaking the strike ; such charges are difficult to prove, but it is generally the opinion that such cases have occurred in the coal fields at least, if not elsewhere. One of the methods of fighting a strike is the injunction. The first time the injunction was of marked importance was in the Pullman strike of 1894, when the officers of the American Railway Union were enjoined not only from threats, intimidation and encouraging violence, but also from aiding or "persuading® any persons to strike. Injunctions since then have been fre¬ quently used and are often very severe against the strikers ; the terms of most sweeping in¬ junctions, however, have usually been changed in favor of the workingmen if the matter was brought into court by the strikers.

History and Statistics. — The first strike on record in the United States is that of the bakers in New York in 1741 ; the strikers were brought before the court on a charge of “con¬ spiracy,® but not convicted; the shoemakers of Philadelphia struck for increase of wages in 1792 and three times subsequently before 1800 and were in every case successful ; in 1805 the shoemakers again on strike were convicted in court on a charge of forming a “combina- tion to raise wages,® and were fined eight dol¬ lars a head. Up to the Civil War strikes were comparatively few and small in extent; they were mostly for increase of wages or reduction of hours. After the Civil War the strikes in¬ creased in number and in importance ; in 1872 occurred a succession of strikes in the build¬ ing trades for the eight-hour day, which were mostly successful. In 1877 was the great rail¬ road strike, begun by the firemen of the Balti¬ more and Ohio against a reduction of wages ; it spread to the Pennsylvania, the Erie, the Lake Shore and numerous other important

railroads and involved a large amount of violence and bloodshed, particularly in the re¬ gion about Pittsburgh. Numerous strikes have taken place in the coal fields and have as a rule been attended with more or less bloodshed; though many have failed, some have been suc¬ cessful and the miners have gained some im¬ portant points. Prominent among the coal strikes are those in the bituminous coal fields in 1894 and 1897, the latter resulting in a fairly satisfactory wage scale; and those in the an¬ thracite coal fields of 1900 and 1902, that of 1902 threatening a coal famine and being adjusted by a commission appointed by the President of the United States. Among other noted strikes was that at Homestead in 1892 and the Pullman strike of 1894; the latter was a sympathetic strike undertaken by the American Railway Union in behalf of the employees of the Pullman Company, their purpose being to boycott the Pullman cars and prevent the railroads from hauling them ; traffic was seriously delayed and considerable violence occurred, especially in Chicago ; the national troops were brought into use by President Cleveland, though against the protests of the governors of Illinois and other States. The injunction, before mentioned, caused the imprisonment of the president and other officers of the American Railway Union, and the strike was a failure, though for the first few days it promised success.

The statistics of strikes for 1881-1900 show that there were 22,793 strikes, involving 117,509 establishments and 6,105,694 workingmen;

of this number 50.77 per cent were successful ; 13.04 per cent partially so, and 36.19 per cent failed. The greatest per cent of strikes which were successful were for reduction of hours, overtime pay, etc., 59.3 per cent; 53.2 per cent of those for increase of wages were successful and 18.2 per cent partially so ; and 50.8 per cent of those for recognition of the union were successful. The statistics of lockouts show 42.93 per cent successful and 6.28 per cent partially so.

The first decade of the present century was marked in the United States by many strikes for the reduction of hours. Eight hours had become customary in many trades and those unions not enjoying it made concerted efforts to attain shorter hours and generally won. Among the most severe and protracted of these strikes was that of the International Typo¬ graphical Union and affiliated organizations in the printing trade in 1906. This was bitterly fought in every large city in the country and was not entirely won for two or three years. The losses to the employers, unions and the public, both direct and indirect, were estimated at $25,000,000. As a result the Printers' League was organized by employers in the book, job and publication branch of the industry and this body, together with the American Newspaper Publishers' Association, has since endeavored to settle all difficulties by arbitration and largely succeeded.

The railroad trainmen were among the last to secure eight hours, the companies contend¬ ing that the character of railway work was such that men had to continue until the trains arrived at destinations, so no hour schedule was possible. The men demanded overtime rates for work beyond eight hours and a nation¬ wide strike was called for 4 Sept. 1916. At

the time the railways were glutted with busi¬ ness and obviously a prolonged railroad strike meant paralysis to more than half the industries of the country, and lack of both food and fuel in many places. President Wilson demanded Congressional legislation to meet the situation and the Adamson Eight-Hour Act was rushed through and put into effect 1 Jan. 1917.

The War Situation. — In 1917 there were numerous demands made on employers for higher wages, growing out of the presumed great profits of manufacturers working on war orders. The strikes were mostly settled by pay¬ ing the wages demanded and rapid increases of wages followed. When America entered the war, the reduced number of workers en¬ abled workmen in many instances to dictate their pay

and this with a general understand¬ ing that strikes were unpatriotic, reduced the strike evil for the time being. Owing to the scarcity of domestic commodities, however, the advance in prices and consequent high cost of living, the demands on employers for increased wages became more urgent during 1919 and re¬ sulted in many serious strikes, lockouts and closing of factories. Arbitration in many cases was refused and the strike remedy unfortu¬ nately was resorted to with ever-increasing fre¬ quency. See American Federation of Labor ; Trade Unions.

STRINDBERG, strind'ber'ig, August, Swedish novelist, dramatist and publicist: b. Stockholm, 22 Jan. 1849; d. Stockholm, 14 May 1912. In his autobiographical novel (The Son of a Servant *he emphasizes the dual social na¬ ture of his origin and attempts to derive his con¬ flicting and unstable position on many ques¬ tions from it. His mother (d. 1862) was of the poorest classes, his father of middle-class business position (steamship agent, d. 1883). From earliest childhood his life was one long struggle with his associates, teachers, parents, friends and rivals, differing, however, from that of other persons in that the consciousness of struggle is always present in his work; he never for a moment pretends that life is any¬ thing else. After passing through a number of parochial and preparatory schools, the tor¬ tures of which he has described in (The Son of a Servant,* he went to the University of Upsala in 1870, where his experiences were not less unpleasant. (I Rom) (In Rome) is a tragedy of this year, dealing with the experi¬ ences of the sculptor Thorvaldsen. (Den fred- lose) (1871) is a one-act tragedy with a viking subject, in saga language. His first important play, written after Strindberg had turned to literature and left the university (1872), is (Master OloP (English trans., New York 1915), a prose drama of the Swedish Reforma¬ tion (a version in verse was written 1878), full of youthful rebellion and pessimism. The play was written in the skerries of the Swedish Bal¬ tic, which were to remain for many years a source of stimulus and inspiration to Strind¬ berg. A collection of sketches of student life at the university (Fran Fjardingen och Svart- backen* (1877) is realistic and boisterous to the extreme, qualities which are emphasized in Strindberg's great satirical novel on all of Swedish society, (The Red Room) (1879, Eng¬ lish trans., New York 1913), which with all its intimate warmth of narration, remains an icy

and supercilious tirade of scepticism, doubt, agnosticism. (Nya Riket> ('The New King- dom) 1881) is a criticism of Swedish social life after

the parliamentary reforms of 1865. From 1880 to 1885, much of which period he spent in Switzerland, Strindberg was active as a Socialist of revolutionary tendencies ; the most striking expressions of this attitude are his collection of propagandist material called 'Upper and Lower Class) (written 1880, first published 1884), and the four short stories published under the title 'Utopier i Verk- ligheterP ('Utopias on Earthy 1885). 'Sam- vetskvaP ('Pangs of Conscience*; two trans¬ lations, Chicago 1915, and New York, in The Call, 1916) is the best of the latter; it is a powerful anti-militaristic tale of the Franco-Prussian War of 1870. His writings after that period display a growing conservative, even, on occasion, fanatically reactionary tendency. This evinced itself in his violent hatred of women, in general, although he was by no means inac¬ cessible to their charms, and, toward the end of his life, in a predilection for mystical and occult study, and for mystic and supernatural elements in his later plays. In 1885, when he published the 30 short stories known as 'Mar- ried) (English trans., New York 1912), his attitude toward women was not that of the misogynist, although his introduction to the collection indicated his belief that the economic and social conditions of the age were constantly driving women into a more and more selfish and immoral position. His most delicate and human touches are to be found in this collec¬ tion. In the dramas written about 1890, mi¬ sogyny is already a dangerous obsession with Strindberg, leading him to produce such im¬ pressive perversions as the dramas 'The Father,* 'Countess Julia, * 'Creditors. By 1890, Strindberg had completely passed out of his socialistic stage and into that of anarchic in¬ dividualism, strongly influenced by Nietzsche. In that year appeared his novel of fishermen's life: (I hafsbandet) (two English translations : 'By the Open Sea,* New York 1913; 'On the Seaboard,* Cincinnati 1913), in which the hostility between the educated and the lower classes is concentrated into a conflict with a tragic outcome, the woman taking the side of the lower classes against the intellectual aristo¬ crat.

Throughout his life Strindberg was a dili¬ gent scholar and undertook painstaking, though not always original research in many fields, particularly Kulturgeschichte, philology, chem¬ istry, sociology and ethnology. His great his¬ toric work on the history of the Swedish people ((Svenska Folket)) appeared in 1880 and the studies for it are the basis of the collection of historical short stories 'Svenska Oden och Aventyr *(1880-90) and of a long series of historical dramas: 'Folkungasaga,* 'Gustaf Vasa, *'Erik XIV, 5 'Gustaf Adolf,) 'Charles XII,* 'Engelbrekt, *<Christina,) (Gustaf III,* etc. His last plays were peculiarly resigned and gloomy studies of city life: 'Ovader, *'Briinda Tomten,* 'Spoksonaten, *(Pelikanen) (all 1907) ; (Stora landsvagen* (1909). He at¬ tempted to gather all his disjointed opinions, in short articles of a page

or two each, with strong reminiscences of Swedenborg, Goethe, Peladan and others, in the (Blue Books * (1907, 1908, 1912), selections from which will

be found in ‘Zones of the Spirit } (New York 1913). Strindberg was thrice married: his first wife was the Swedish actress, Siri von Essen (married 1878; d. 1912; divorced in the ’80’s) ; his second wife was the Austrian au¬ thoress, Frida Uhl (married 1893; divorced 1896) ; his third wife was the Swedish actress, Harriet Bosse (married 1901; divorced 1904). Three children also survive him. (See Father, The). Works not already mentioned and col¬ lected editions include ‘Samlade Skrifter, *ed. Landquist, thus far 55 vols. (Stockholm 1912—18) ; (SchriftenP trans. by Schering, thus far 30 vols. (Munich 1906-14) ; ‘Plays,* trans. by Bjorkman, thus far four vols. (New York 1912—16) ; (Easter and StoriesP (Cincin¬ nati 1912) ; (In Midsummer Days and Other Tales) (New York 1913) ; (The Inferno) (New York 1913) ; ‘The Growth of a Soul *(New York 1913) ; historical Miniatures* (New York 1913) ; ‘Advent* (Boston 1915). Con¬ sult Lind-af-Hageby, L., ‘August Strindberg, the Spirit of RevolP (New York 1913) ; Bjorkman, E., ‘Voices of To-Morrow > (New York 1912) ; Esswein, H., ‘August Strindberg) (Munich 1908) ; Paul, Ad., ‘Strindberg-Erin- nerungen und Briefe) (Munich 1914) ; ‘En Bok om Strindberg) (Karlstad 1894) ; Udd- gren, G., ‘Boken om Strindberg) (Gothenburg 1909) ; Uddgren, G., ‘En ny bok om Strindberg) (Gothenburg 1912) ; Zetterlund, R., ‘Bibliograf- iska Anteckningar om August Strindberg) (a good bibliography, Stockholm 1913).

Jacob Wittmer Hartmann.

STRINGHAM, string'am, Silas Horton,

American naval officer: b. Middletown, N. Y., 7 Nov. 1798; d. 1876. He joined the United States navy in 1809 and served on the frigate President. He was promoted lieutenant in De¬ cember 1814; served on the schooner Spark in the Mediterranean Sea in 1815-18; and took part in the war with Algiers. In 1821-24 he was executive officer on the Hornet in the West Indies. He was promoted captain in 1841 ; he served on the Ohio during the bombardment of Vera Cruz in 1847. On the opening of the Civil War in the United States he was appointed flag officer of the North Atlantic blocking squadron and was at the capture of the forts on Hatteras Inlet. He was relieved of his command in the fall of 1861 and the following year was made a rear-admiral.

STRIPED BASS, STRIPED SKUNK, STRIPED SQUIRREL, STRIPED SNAKE,

etc. See Bass ; Skunk ; Squirrel ; Garter Snake.

STROEBEL, stre'bl, Edward Henry,

American diplomat: b. Charleston, S. C., 7 Dec. 1855; d. Bangkok, Siam, 15 Jan. 1908. He was graduated from Harvard in 1877 and from Harvard Law School in 1882 and after prac¬ tising in New York (1883-85) was secretary of the United States legation at Madrid in 1885-90. He was third assistant secretary of state April 1893, April 1904, Minister to Ecua¬ dor April to December 1894, and to Chile 1894- 97, and in 1899 was appointed counsel for Chile before the United States and Chilean Claim Commission. From 1898-1906 he was Bemis professor of international law at Har¬ vard. He was granted leave of absence by the University in 1903 to become general adviser to the Siamese government and in 1906 resigned

from the university to become permanent ad¬ viser. Among his published writings is (The Spanish Revolution (1898).

STROMBOLI, strom'bo-le, an island of the Lipari or 2Eolian group, in the Mediterra¬ nean Sea, off the northern coast of Sicily. It consists of a lofty volcano, whose cone rises to a height of 3,022 feet and is in constant ac¬ tivity. It was believed by the ancients to be the abode of Vulcan and in mediaeval times the entrance to purgatory. The island is fertile and its chief products are cotton, wine, figs and other fruits belonging to this region. It yields besides, sulphur and pumice stone and possesses warm mineral springs.

STROMEYERITE, an ore consisting of sulphides of silver and copper in somewhat variable proportions, occurring in some of the mines of the far West.

STRONG, Augustus Hopkins, American theologian : b. Rochester, N. Y., 3 Aug. 1836. He was graduated at Yale in 1857 and was Bap¬ tist clergyman at Haverhill, Mass. (1861—65) and Cleveland, Ohio (1865-72). He was presi¬ dent and professor of biblical theology at the Rochester Theological Seminary (1872-1912). He has written (Systematic Theology) ; Phi¬ losophy and Religion) and (The Great Poets' and Their Theology,' (Christ in Creation and Ethical Monism, > Popular Lectures on the Books of the New Testament.'

STRONG, Caleb, American statesman: b. Northampton, Mass., 9 Jan.

1745: d. there, 7 Nov. 1819. He was graduated at Harvard Col¬ lege in 1764, studied law and was admitted to the bar in 1 772. During the Revolution he was a member of the general court or legislature and of the Northampton committee of safety. For nearly 25 years after 1776 he was county attor¬ ney, in 1779 was a member of the State consti¬ tutional convention, and in 1780 of the State council, and several times represented his county in the State senate. In 1787 he was elected to the convention for framing a national constitution but was obliged by sickness in his family to return home before the completion of its labors; and in 1789 he was elected one of the first United States senators from Massa¬ chusetts, was re-elected in 1793 and resigned in 1796. From 1800 to 1807 he was governor of Massachusetts and again from 1812 to 1816. As a Federalist he was opposed to the war with England and he refused to comply with the President's order to call out the State militia on the plea that the governor alone had the right to decide whether or not the militia should be called out. Consult Alden Bradford's biography of him (1820).

STRONG, Frank, American educator: b. Venice, N. Y., 5 Aug. 1859. He was graduated at Yale in 1884 and was admitted to the bar in Rochester, N. Y., in 1886. Received degrees of A.M. and Ph.D. (Yale), 1893 and 1897, re¬ spectively. Received degree of LL.D., (Baker University, University of Oregon and Kansas State Agricultural College) 1910. He began the practice of law in Kansas City, Mo., but retired in 1888 to become principal of the high school at Saint Joseph, Mo. He was elected superintendent of schools at Lincoln, Neb., in 1892 and in 1897 was elected lecturer in history

in Yale University. In 1899 he was made pres¬ ident of the University of Oregon and in 1902 returned to Kansas where he was called to the chancellorship of the State University. His published works include (The Government of the American People) (1891) ; (Life of Ben¬ jamin Franklin) (1898) ; (Cromwell's West

Indian Expedition' (1899); (A Forgotten Danger to the New England Colonies' (1898) ; (Annual Reports to the Board of Regents, Uni¬ versity of Oregon' (1900-01) ; (Annual Re¬ ports to the Board of Regents, University of Kansas' (1902-12); <The Problem of Higher Education in States that Maintain more than One College or University' (Transactions and Proceedings of the National Association of State Universities, 1908) ; Peport of Educa¬ tional Progress During the Year' (Proceed¬ ings of the National Education Association, July 1910) ; (Control and Management of Ath¬ letics' (Transactions and Proceedings of the National Association of State Universities, 1913) ; Umagination in College' (The Nation, 1 March 1914) ; (Economy of

Time in Educa¬ tion' (Journal of Proceedings and Addresses, National Education Association, 1914) ; (The Opportunity of American Universities' (School and Society, June 1915) ; and Present Activi¬ ties and Accomplishments of Higher Education' (School and Society, October 1915). Served as member of the National Council of Educa¬ tion of the National Education Association; president of the section of higher education of the National Education Association; president, Kansas State Teachers Association; and presi¬ dent of the National Association of State uni¬ versities. He is a member of the State Board of Education of the State of Kansas and a member of the Board of Education of the Northern Baptist Convention, United States. The University of Kansas enlarged and devel¬ oped under his administration, adding to its schools and divisions the Summer Session, the School of Medicine, the School of Education, the Extension Division, the Division of State Service Work, the Biological Survey, the Engi¬ neering Experiment Station, etc.

STRONG, George Crockett, American soldier: b. Stockbridge, Vt., 16 Oct. 1832; d. New York, 30 July 1863. He was graduated fr.om the United States Military Academy in 1857, and in the Battle of Bull Run was ordnance officer on General McDowell's staff. In 1862 he was in command of an expedition from Ship Island to Biloxi, Miss., and the next year participated in the operations against Charleston, and in the two attacks on Fort Wagner. In the last he fell mortally wounded. Fort De Kalb on the Potomac was renamed Fort Strong in his honor. Author (Cadet Life at West Point' (1862).

STRONG, James, American biblical scholar: b. New York, 14 Aug. 1822; d. Round Lake, N. Y., 2 Aug. 1894. He was graduated (1844) at Wesleyan University, Middletown, Conn., then taught ancient languages at Troy Conference Academy, West Poultney, Vt., for two years, when he went to Flushing, L. I., where he continued his biblical studies, but undertook commercial enterprises, such as building the Flushing Railroad, of which he became president. He became professor of bib¬ lical literature (1858-61) and acting president

of Troy University. In 1868 he was made pro¬ fessor of exegetical theology at Drew Theological Seminary, Madison, N. J., but re¬ signed on account of bad health 1893, and retired. He edited, in collaboration with Dr. McClintock (The Cyclopaedia of Biblical, Theological and Ecclesiastical Literature) (1867-85), continuing the

work alone after the death of his co-worker. His Exhaustive Concordance of the Bible> (1894) was the outcome of the work of many years.

STRONG, Josiah, American clergyman : b. Naperville, Ill., 19 Jan. 1847; d. 28 April 1916. He was graduated at Western Reserve College in 1869, and studied at Lane Theological Semi¬ nary; was ordained in the Congregational Church, and held pastorates in Wyoming and Ohio ; was secretary of the Evangeli¬ cal Alliance for the United States in' 1886-98. In the latter year he was made presi¬ dent of the League for Social Service. (Re¬ organized, 1902, as The American Institute of Social Service). President of Social Centre Association of America ip, 1911. His publica¬ tions include (Our Country) (1885) ; (The

New Era *(1893) ; (The Twentieth Century City* (1898) ; (Religious Movements for

Social Betterments) (1900) ; <Expansion) (1900) ; (The Times and Young Men) (1901) ; (The Next Great Awakening) (1902) ; (The Challenge of the City) (1907) ; (My Religion in Every Day Life) (1910); (Our World; The New World-Life) (1913); (Our World; The New World Religion) (1915). He was editor of (Social Progress) (a year book) (1904-06) ; and edited Gospel of the Kingdom , a magazine, from 1908.

STRONG, Richard Pearson, American biologist: b. Fortress Monroe, Va., 18 March, 1872. He was graduated (1893) at Yale and received the M.D. diploma (1897) from Johns Hopkins. He was appointed (1899) president of the board for investigation of tropical diseases in the Philippines, and was director of the Government Biological Laboratory at Manila (1901-13), since which he has been professor of tropical medicine at Harvard. He was medical director of the International and American Red Cross Sanitary Commissions in Serbia in 1915, during the typhus epidemic.

STRONG, Sir Samuel Henry, Canadian jurist: b. Poole, Dorsetshire, England, 13 Aug. 1825 ; d. Ottawa, 21 Aug. 1909. He was taken to Canada in his 11th year by his father, who was appointed chaplain of the forces in Quebec and rector at Bytown (now Ottawa). He was educated at the Quebec High School, and under private tuition, taking^ later to law studies. In 1849 he was called to the Toronto bar, becoming partner with Sir Thomas W. Taylor (later chief justice of Manitoba), then with James David Edgar (later speaker of the Canadian House of Commons). Strong soon built up a high reputation, and was appointed (1856) on the- commission for consolidating the

statutes of Canada and Upper Canada. By 1869 he had risen to a position on the bench as a vice-chancellor of Ontario. He was mem¬ ber of the commission (1871) of enquiry into a union of the law and equity courts. He rose next (1874) to the Court of Error and

Appeals of Ontario, then (1875) to the Supreme Court of Canada as puisne judge, becoming (1892) successor to Sir W. J. Ritchie as chief justice. He resigned from this post in 1902 to become chief of the commission for con¬ solidating the statutes of Canada. He was one of Canada's ablest jurists.

STRONG, Theodore, American mathe¬ matician: b. South Hadley, Mass., 26 July 1790; d. New Brunswick, N. J., 1 Feb. 1869. He was graduated at Yale University in 1812; became professor of natural philosophy and mathe¬ matics at Hamilton College in 1816-27 ; and held a similar chair at Rutgers College in 1827— 61. In the realm of pure mathematics he was conceded to have no superior. After the ablest mathematicians of Europe had failed to solve the irreducible case of cubic equations left by Cardan, he discovered its solution by a direct method. His publications include (Notes on the Parallelogram of Forces and on Virtual Velocities) (1864) ; (On the Integration of Dif¬ ferential Equations of the First Order and Higher Degrees *(1864) ; (A New Theory of the First Principles of the Differential Calculus* (1865) ; (A Treatise on Elementary and Higher Algebra* (1859) ; (A Treatise on the Differen¬ tial and Integral Calculus) (1869).

STRONG, William, American jurist: b.

Somers, Conn., 6 May 1808; d. 1905. He was graduated (1828) at Yale, and taught at Bur¬ lington, N. J., while studying law under Garret D. Wall. He was admitted to the bar at Read¬ ing, Pa., in 1832 and started practice there where he rapidly advanced to prominent civic positions. He was elected to Congress in 1846 as a Democrat, re-elected in 1848 and declined nomination in 1850 to return to private prac¬ tice. In 1857 he became justice of the Supreme Court of Pennsylvania for a 15-year term, serving only 11, and attaining very high repute as a jurist. President Grant appointed him (1870) justice of the United States Supreme Court.

STRONG, William L., American merchant and mayor of New York: b. on a farm in Richmond County, Ohio, 22 March 1827 ; d. New York 1900. He began life as dry goods clerk in Wooster, Ohio, spent 10 years in trade in Mansfield, Ohio, then came to New York in 1853. He commenced here as salesman for L. G. Wilson and Company, a dry goods com¬ mission house, where he learned every detail of the

business, when his firm failed in the panic of 1857. He entered his services with Farnham, Dale and Company's dry goods store till 1869, when he started the next year his own business of W. L. Strong and Company, succeeding to the trade of Farnham, Dale and Company. Branches in Boston and Philadel¬ phia grew up with his great business success. Strong was a Republican and took a general in¬ terest in public matters, refusing office, however, till his party combining with reform Democrats got him to be candidate (1894) for mayor and he was elected. He was the last mayor before the founding of Greater New York, and the 91st mayor of New York.

STRONTIANITE, native strontium car¬ bonate, a mineral usually found massive with a crudely fibrous and radiating structure. It

rarely occurs in perfectly developed, orthorhom¬ bic crystals simulating aragonite in form and twinning, spire-shaped, branching groups being the most common. It has good prismatic cleav¬ age ; is brittle, breaking with an uneven frac¬ ture; hardness 3.5 to 4; specific gravity 3.69; lustre vitreous; color usually yellowish-white, sometimes pale-greenish; streak white; trans¬ parent to translucent. Before the blowpipe it swells and sprouts, but fuses only on thin edges. It imparts to the flame the crimson color char¬ acteristic of strontium. Its name is due to its occurrence in Strontian, Scotland, but its most important locality is Hamm, Westphalia. It is found at Schoharie and elsewhere in New York. Celestite (SrSCh) and strontianite are the min¬ erals from which all of the strontium salts so valuable in sugar refining and in pyrotechnics are derived.

STROPHANTHUS, a genus of trees, shrubs or climbers, belonging to the family Apocynacece , and found in Asia and Africa, being chiefly tropical. The leaves are feather veined and opposite, and the cymose inflores¬ cence is terminal. The flowers are handsome, ranging in color from white, through the yel¬ lows and reds, to purple. The calyces are glandular, the corollas funnel-shaped, with five lobes tapering into attenuated, long tails. The two carpeled ovaries develop into capsular fruits having two diverging free follicles, which enclose the hairy seeds. A climbing species (Y. hispidus) has seeds which are hairy and have a plumose tuft of silky hairs attached to their apexes, by a slender filament and which contain a bitter, poisonous glucoside called strophanthin. This poison contracts the volun¬ tary muscles, and is so deadly that an elephant wounded by the spiked and

strophanthus- poisoned beams, which are hung for the purpose in the runs of the huge beasts, is unable, it has been stated, to go more than 10 miles from the spot. Species of Strophanthus, especially Y. his¬ pidus , are powerful ingredients of those Afri¬ can arrow-poisons called in West Africa inee, onaye or poison of Pahonias, and in East Africa, Kombe; while still another near Somali¬ land is known as wanika poison. Strophanthin is a valuable cardiac stimulant, and a drug em¬ ployed in heart disease, similar in its effects to digitalis, slowing the heart's action, and increas¬ ing its contractility and the tension of the ar¬ teries, but is more rapid and uncertain in its effects than the other drug. Several species are known in gardens and greenhouses, one, Y. petersianus, being remarkable for its octopus¬ like twisted corolla lobes, colored red and yellow.

STROPHE, stro'fe, the name of one of the divisions of a Greek choral ode. It is a designa¬ tion also often applied to the stanza in modern poetry. The singing of the strophes on the stage was accompanied with a motion or turn from right to left toward the images of the gods placed on the sides of the orchestra (in the ancient sense of this word) ; but the singing of the antistrophe, with a contrary motion, from the left to the right. In a poetical sense the strophe designates a union of rhythmical periods corresponding closely to a following combination.

STROSSMAYER, stros'mi-er, Joseph Georg, Hungarian bishop : b. Essek, Slavonia, 4 Feb. 1815; d. 1905. He was educated for the priesthood at the University of Budapest and at Vienna, and in 1849 was made bishop of the Croatian diocese of Diakovo. He was for many years the leader of the movement for the sepa¬ rate existence and self-government of Croatia, and was known as a zealous churchman. At the Vatican Council in 1870, he was the leader of the Opportunists, the party which opposed the declaration of the dogma of infallibility on the ground that the times were not ripe for the definition. But when the Council declared it to be a formal article of faith, he acquiesced and subscribed to it.

STROTHER, strot'h'er, David Hunter,

American author and artist: b. Martinsburg, Va., 16 Sept. 1816; d. Charleston, W. Va., 8 March 1888. Before the outhbreak of the Civil War his articles and illustrations of Southern life attracted wide attention, being especially noteworthy for their faithful pre¬ sentation of Southern scenes and customs. He wrote under the nom de plume of ((Porte Crayon,® in 1852, a series of humorous papers in Harper's Magazine which attracted con¬ siderable attention owing to the fact that they presented a new and sympathetic view of the Southern

States of the United States. He served as colonel in the Union army during the Civil War, and was consul-general to Mexico (1879-85). His writings were collected in book form and published under the names of (The Blackwater Chronicle) (1853) ; (Virginia Illustrated> (1857).

STROUDSBURG, strowdz'berg, Pa., bor¬ ough, county-seat of Monroe County; on Broad- head Creek, and on the Delaware, Lackawanna and Western, and on the New York, Susque¬ hanna and Western Railroads, about 25 miles north of Easton. It is in the Blue Ridge region, between the Delaware Water Gap and Mount Pocono. The climate, scenery, good water, and the good roads have made the place a favorite summer resort. There are public and private schools, and two national banks. Pop.

(1920) 5,278.

STROZZI, strot'se, the name of a wealthy and illustrious Florentine family, which came into prominence about the end of the 13th century. Palla, Filippo and Piero were the three most renowned members of this princely house, between 1432 and 1537, who were either exiled or lost their lives in the struggle for liberty against the power of the Medici family. The Strozzi family engaged in banking and be¬ came very wealthy and their wealth continued to steadily increase. With this increase of wealth grew their influence in Southern Italy which is said to have been upheld by over 80 Strozzi wealthy families. Their power was finally overthrown by Cosmo I di Medici in 1537. Various representatives of the Strozzi family still live in Florence where the titled head of the house has been, since 1722, the Prince of Forano.

STROZZI, Bernardo (II Prete Genovese, or II Cappucino), Italian painter: b. Genoa, 1581 ; d. Venice, 1644. He painted in the naturalistic style of Caravaggio, and produced

many frescoes and easel pictures in oils. They are all of a somewhat crude character, and fiery coloring, though the design is strong.

STRUCTURAL GEOLOGY, that branch of geology that treats of the architecture of the earth’s crust. See Fault; Folds; Moun¬ tains; Unconformist; also section on Struc¬ tural Geology in article on Geology.

STRUCTURAL SHAPES. See Rails and Structural Shapes, Manufacture of.

STRUCTURAL STEEL. See Rails and

Structural Shapes, Manufacture of; Steel — The Evolution of Steel Making Processes.

STRUENSEE, stroo'en-za, Count Johann Friedrich von, Danish statesman and philoso¬ pher; b. Saxony, 5 Aug. 1737 ; d. 28 April 1772. He studied medicine, and in 1768 was appointed physician to the king of Denmark. He soon became a favorite, and effected the dismissal of all those who were obstacles to his own ambitious plans. In 1770 he advised the king to abolish the council of state, and to estab¬ lish the ancient royal power lost through the rise of the nobles to influence in 1660, a meas¬ ure which roused the indignation of the Danish nobility. Struensee, by various means, gradually usurped the administration of all affairs in the name of the king, and caused himself to be created count. The king, Christian VII, a feeble-minded nonentity, was completely under his domination and that of the ambitious queen, who appears to have been in love with Struensee. Between them they appointed new ministers and proceeded to run the affairs of state. An alliance was formed with Sweden in opposition to the Russian influence that had previously been all powerful at the Danish court. Struensee appears to have been, under the guise of an autocrat, very much of a liberal. He mitigated the penal laws, greatly reduced the extent of serfdom and encouraged free industry and trade in opposition to the monopolies that had previously prevailed. This angered the clergy and the nobles who organized a conspiracy against him, and on 16 Jan. 1772, Struensee was seized, found guilty of criminal relations with the queen, convicted and executed.

STRUNSKY, strun'ski, Simeon, American author: b. Vitebsk, Russia, 23 July 1879. He was educated at Horace Mann High School, New York, and was graduated (1900) at Columbia. He was (1900-06) a department editor of the New International Encyclopiedia, from 1906-13 he was editorial writer, becoming literary editor of the New York Evening Post (1913-14). He wrote (The Patient Observed (1911) ; (Through the Outlooking Glass with Theodore Roosevelt5 (1912), an amusing parody; (Post-Impressions5 (1914) ; (Belshazzar Court, or Village Life in New York City5 (1914) ; ' <Post-Impressions) (1914). Most of his writings, including the above are in essay form, and are marked by good-humored satire and shrewd wit which make them entertaining reading.

STRUT, in architecture, a brace or support, either upright, horizontal or diagonal. The struts of a roof extend obliquely from a rafter to an upright post. Diagonal struts are fre¬ quently used in gates, doors and between joists.

STRUTHIONID.®, the ostriches and re¬ lated ratite birds. See Ostrich.

STRUTT, strut, Joseph, English antiquary : b. Chelmsford, 27 Oct. 1749; d. London, 16 Oct. 1802. He was articled to W. W. Ryland, the engraver, studied engraving and painting and obtained the gold and silver medals of the Royal Academy. Later he devoted most of his time to research work in the British Museum. In 1773 he published his Glegal and Ecclesias¬ tical Antiquities from Edward the Confessor to Henry VHP and shortly afterward his (Horda Angel-Cynnan, or Manners, Customs, etc., of the English) (1774-76). His other works include a (Chronicle of England5 (1 777— 78) ; (Biographical Dictionary of Engravers) (1785-86) ; (Dresses and Habits of the People of England,5 etc. (1796-99) ; and (Sports and Pastimes of the People of England> (1801). He left some manuscripts, from which were afterward published his (Queenhoo-Hall,5 a romance, concluded by Sir Walter Scott; An¬ cient Times, 5 a drama; also (The Test of Guilt, or Traits of Ancient Superstitution,5 a tale. His literary work and researches had con¬ siderable influence on Scott's ((Waverly55 novels.

STRUVE, stroo'fe, Friedrich Georg Wil¬ helm von, Russian-German astronomer : b. Al- tona, 15 April 1793; d. 23 Nov. 1864. In 1813 he entered the Dorpat observatory, and was appointed director in 1817. On the completion of the Russian observatory at Pulkova, near Saint Petersburg, in 1839, he was nominated its director, and here he continued his researches on nebulae and double stars. From 1816 to 1819 he was engaged on the triangulation of Livonia, and from 1830 to 1845 he was con¬ nected with the measurement of the arc of the meridian in the Baltic provinces, which was afterward extended to the Arctic Ocean and the Danube. Among his published works are (Observationes Dorpatenses) (1817-39) ; (Cata- logus Novus Stellarum Duplicium et Multi- plicium> (1827) ; (Stellarum Duplicium et

Multiplicium Memsurae Micrometricae5 . (1837) ; Etudes d'astronomie Stellaire) (1847) ; Stellarum Fixarum Imprimis Duplicium et Multiplicium Positiones Mediae5 (1852) ; (Arc du Meridien de 25° 20' entre le Danube et la mer glaciale> (1857-60).

STRUVE, Otto Wilhelm vonL Russian as¬ tronomer : b. 7 May 1819 ; d. 1905. He early studied at the Dorpat and Pulkova observa¬ tories,

and on the death of his father, Friedrich- Georg Wilhelm von Struve (q.v.) he suc¬ ceeded him as director of the great Pulkova observatory near Saint Petersburg. His work was given mostly to the observation of double stars, and continuing the organization and ad¬ ministration of the observatory founded by his father. He is credited with having discovered 500 binary stars in his examination of the northern heavens alone. He also discovered new principles in star measurement and phenomena and made interesting and valuable observations respecting the mass of Neptune, the dimensions of the ring of Saturn, solar velocity and corona extent. His published books, apart from the 14 volumes of Observa¬ tions de Pulkova5 which he edited, are to be found in technical journals devoted to his special field of work. He was the presiding

officer of the International Astrophotographic Congress at Paris in 1877. In 1890 he re¬ signed the directorship at Pulkova and retired to Karlsruhe.

STRYCHNINE, strik'nin, (Latin strych- nos, from Greek of same form) $C_{21}H_{22}N_2O_2$, an alkaloid existing in the seeds of the Strychnos Nux-vomica, Saint Ignatius bean, and the other species of Strychnos. The Strychnos Nux-vomica is a tree of medium size growing in the East Indies. It bears a pulpy fruit about the size of an orange, con¬ taining the large seeds that are the drug nux- vomica. These seeds are circular, about three quarters of an inch in diameter, an eighth of an inch thick, and very hard and horny. Rasped or filed they are used to kill cats, dogs, rats and vermin under the name of rats-bane or dog but¬ tons. The active principle strychnine may be obtained by treating nux-vomica with alcohol containing a little sulphuric acid. This solution contains the strychnine as well as various color¬ ing matters. From it the strychnine may be obtained in small white prismatic crystals, slightly soluble in water, giving it a bitter taste even in as dilute a solution as one part in 700,000. Strychnine is very poisonous, a small amount causing death with violent tetanic convulsions. It is, however, used ex¬ tensively in very small doses in medicine, be¬ ing valuable as a heart stimulant, and in cases of paralysis, nervous affections, dyspepsia, etc. It is a weak base forming salts with acids, The sulphuric acid salt or strychnia sulphate is used generally in place of the free alkaloid. Sulphuric acid and strychnine together form a colorless solution which is turned strongly violet by the addition of bichromate of potash. The purple rapidly changes into red and from

that into yellow. See Alkaloids; Toxicology; Brucine.

STRYCHNOS, a genus of the family Loganiaceoe, represented by trees, shrubs or vines which climb by stiff hooked tendrils, and are mostly tropical. The leaves are opposite, thin or coriaceous, and prominently three to five- nerved. The flowers are small and whitish, col¬ lected in dense axillary or terminal cymes, and are salver-shaped, with five valvate lobes. The ovary is usually two-celled and develops into an indehiscent, globose berry with a hard rind and pulpy interior enclosing the seeds. This pulp is sometimes innocuous, and is eaten by birds and men, but the seeds are generally vio¬ lently poisonous. Those of the Indian Strych¬ nos potatorum, when rubbed in a vessel of water, send all the impurities to the bottom, whence the name of clearing-nut tree. Its pulp is edible. While many of the species of Strychnos contain the poisonous alkaloid called strychnine, which is used in small quantities as a valuable medicine, most strychnine of com¬ merce is obtained from the button-like, satiny seeds of S. mix-vomica, or nux-vomica tree (q.v.), or from those of S. ignatii, the Saint Ignatius bean. Strychnine is also the sole active principle in S. tieute, from Java, being extracted from the bark by boiling, and employed by the Javanese for poisoning their arrows. S. toxifera, a woody climber often three inches thick, with hooked tendrils, and covered with dark-brown hairs, is found in South America, and, with other species, is supposed to be the source of

the arrow poison called woorali or curare. This substance is black-brown, like an extract, or firmer, brittle and friable; it is used somewhat in medicine as a nervous sedative, and in physi¬ ological experiments. The South American Indians put it on arrows, chiefly on those shot from blow-guns, and use it for hunting, since the game is wholesome after being poisoned. Curare acts by paralyzing the terminals of the motor nerves, and causes death instantly when mixed with the blood, by paralyzing the muscles of the chest, and so suffocating the victim. The bark of S', nux-vomica was at one time introduced as a substitute for Angostura bark, with such deadly effect that the use of the latter was discontinued for a while. In Brazil, how¬ ever, the cortex of S', pseudo-quina has been used as a febrifuge. S', colubrina furnishes the snakewood (q.v.).

STRYKER, striker, Melancthon Woolsey,

American college president: b. Vernon, N. Y., 7 Jan. 1851. He was graduated from Hamilton College, New York, in 1872 and from Auburn Theological Seminary in 1876. He held pas¬ torates in the Presbyterian Church, 1876-83, in the Congregational Church,

1883-85, and again in the Presbyterian Church, 1885-92. From 1892-1917 he was president of Hamilton Col¬ lege. A student of hymnology he published, among others, the following hymns and poems; (Song of Miriam' (1888) ; (Church Song' hymnal (1889); (Lattermath Verse) (1896); (College HymnaP (1897) ; (Faculae AnnorunP (1917); and is author of (Well by the Gate,' sermons (1903) ; (Baccalaureate Sermons)

(1905) ; (English Bible Versions and Origins) (1915); (Three Addresses on Lincoln) (1917).

STRYKER, William Scudder, American historian: b. Trenton, N. J., 6 June 1838; d.

there, 29 Oct. 1900. He was graduated from Princeton in 1858, enlisted in the Union army and served on General Gillmore's staff in South Carolina ; was returned north on account of ill-health, resigning his commission in 1866. He was adjutant-general of New Jersey from 1867 until his death. He published a (Roster of Jerseymen in the Revolutionary War' (1872) ; a (Roster of New Jersey Volunteers in the Civil War' (1876); and (The Battles of Tren¬ ton and Princeton' (1898).

STUART, the name of a royal family of Scotland and England, also written Stewart and, less frequently, Steuart. The name is de¬ rived from the important office of steward of the royal household of Scotland. The founder of the house seems to have been a Norman baron named Alan (the son of Flaad) a fol¬ lower of William the Conqueror, who obtained the lands and castle of Oswestry, in Shrop¬ shire. His second son, Walter, entered the service of David I of Scotland, by whom he was appointed dapifer, that is, meatbearer, or steward of the royal household. The steward obtained from David the lands of Renfrew, Paisley, Pollock, Cathcart, and others in that district ; he founded the abbey of Paisley in 1160; and died in 1177. His grandson Walter held, in addition to the office of steward, that of Justiciary of Scotland. He died in 1246. His eldest son, Alexander, the 4th steward, seized the islands of Bute and Arran, in the right of his wife Jean, heiress of James, lord of Bute. This led to the expedition of Haco of Norway,

and the battle of Largs (1263), in which the steward is said to have

commanded the right wing of the Scots, greatly contributing to the defeat of the Norwegians. Alexander had two sons, James, the 5th steward, and John, known in history as that Sir John Steward of Bonkyl, or Bonkill, who was killed at the battle of Fal¬ kirk (22 July 1298). The eldest of Sir John's sons, Alexander, was the ancestor of the Stew¬ art earls of Angus; the 2d Alan, of the Stew¬ art earls and dukes of Lennox; the 3d, Walter, of the earls of Galloway; the 4th, of the earls of Athol, Buchan and Traquair and the Lords Lorn and Innermeath. James, the elder brother of Sir John, succeeded as 5th steward in 1283. Three years later, on the death of Alexander III he was chosen one of the regents of the king¬ dom. He fought bravely under Wallace for some time, but submitted to Edward I in 1297. In spite of the most solemn oaths which the English king obliged him to take, he died in the service of Bruce in 1309. His son, Walter, the 6th steward, had an important command in the Seztch army at Bannockburn. Some time after, King Robert bestowed the hand of his daughter Marjory upon him, a union which brought the crown of Scotland, and eventually that of Great Britain into his family. Walter was succeeded by his son, Robert, the 7th stew¬ ard. During the long and disastrous reign of David II, the steward distinguished himself by his patriotic exertions for the defense of Scot¬ land, defeating the intrigues of that prince and Edward III to seat Lionel, Duke of Clarence, on the Scottish throne. On the death of David, without issue, the steward peacefully succeeded to the crown as Robert II in 1371, and died in 1390. From this time to the death of James

V in 1542 the crown of Scotland remained in the direct male line of Stuarts, passing in un¬ broken succession from father to son. James

V left a daughter Mary who succeeded to the throne. Her son, James VI of Scotland, suc¬ ceeded to the English throne on the death of Elizabeth, tracing his claim through his great¬ grandmother Margaret, a daughter of Henry VII of England. The Stuarts were driven from England in the person of James II in 1688. (See for the history of the royal line, Robert II and III; James I, II, III, IV, V; Mary Stuart; James I (of England); Charles I and II; James II; William and Mary, and Anne). James II of England was twice married, first to Anne Hyde, daughter of Lord Clarendon, by whom he had Mary, queen of William III, and Anne, both of whom died leaving no issue. His second wife, Mary of Modena, gave birth, on the eve of the revolution, to James Edward Francis, Prince of Wales, commonly called the Old Pretender, or the Chevalier St. George. The legitimacy of this prince was long doubted ; a great majority of the nation was convinced that the queen had never given birth to a child; but that there was no imposture is now a mat¬ ter of historical belief. On the outbreak of the revolution, the queen

and her infant son took refuge in France, and on the death of the ex-king, Louis recognized the child as king of England by the title of James III. In 1715 an unsuccessful attempt was made to seat him on the throne of his ancestors by force of arms. James Edward, who had landed in Scotland after his cause had been irretrievably lost, suc¬

ceeded in making his escape. France, however, no longer offered him an asylum, as the Regent Orleans wished to stand well with the English government, and the Pretender went to Rome, where he lived in obscurity until his death in 1766. In 1720 he married the Princess Maria Clementina Sobieski, granddaughter of John Sobieski (q.v.), king of Poland, one of the wealthiest heiresses in Europe, by whom he had two sons, Charles Edward Louis Casimir (see Charles Edward Stuart), and Henry Benedict Maria Clement, born at Rome in 1725. In 1745, when the last effort was made for the restoration of his family, Henry Benedict as¬ sumed the command of the troops assembled at Dunkirk to aid the operations of his. brother in Britain, but the news of the battle of Cullo- den prevented the embarkation of this arma¬ ment, and Prince Henry returned to Rome. He took holy orders, and in 1747 was raised by Benedict XIV to the. purple. On the death of his brother in 1788, he assumed the barren title of Henry IX, king of England. When the French conquered Italy he was obliged to flee to Venice, where, stripped of his bishoprics and rich church livings, he lived in great pov¬ erty until George III settled on him a pension of £4,000, which he enjoyed till his death in 1807. Next to the children of James II in representation of the royal Stuart family, come the descendants of Henrietta Maria, daughter of Charles I, and wife of Philippe, duke of Orleans, brother of Louis XIV of France. This princess gave birth to two daughters, Mary, who married Charles II of Spain, but had no issue, and Anna Maria, wife of Victor Amadeus, king of Sardinia.

The present representative of this line is Archduchess Maria Theresa of Austria-Este of the branch of Modena, wife of ex-King Lud¬ wig III of Bavaria, eldest son of the regent Luitpold(d. 12 Dec. 1912). The present royal fam¬ ily of Great Britain trace their descent through Sophia, electress of Hanover, granddaughter of James I, by her mother Elizabeth, electress palatine, and queen of Bohemia. George V derives his descent from the electress Sophia through George I, George II, Frederick, Prince of Wales, George III, Edward, Duke of Kent, Queen Victoria and Edward VII. Consult Cowan, S., (The Royal House of Stuart from its Origin to the Accession of the House of Hanover > (2 vols., London 1908).

STUART, Arabella, commonly called the Lady Arabella: b. Chatsworth,

1575; d. Lon¬ don, 27 Sept. 1615. This unhappy arid innocent victim of jealousy and state policy was the only child of Charles Stuart, Earl of Lennox, younger brother to Henry Lord Darnley, the husband of Mary Queen of Scots. She was, therefore, cousin-german to James I, to whom, previously to his having issue, she was next in the line of succession to the crown of England, being the great-great-granddaughter of Henry VII, whose daughter Margaret, having been first married to James IV of Scotland, became by a second marriage the mother of Margaret Douglas, mother of Darnley, and Charles Stuart, Earl of Lennox. She received an ex¬ cellent education. Her proximity to the throne was the source of her misfortunes. Elizabeth, for some time before her decease, held the Lady Arabella under restraint, and refused the

request of the king of Scotland to give her in marriage to the Duke of Lennox, his kinsman, with a view to remove her from England. The Pope had likewise formed the design of raising her to the English throne, by espousing her to the Duke of Savoy; which project is said to have been listened to by Henry IV of France, from a wish to prevent the union of England and Scotland. The detection of a plot of some English nobles to set aside James in favor of Arabella Stuart, of which she was altogether innocent, ultimately proved her destruction ; for although left at liberty for the present, when it was some time after (in 1610) discovered that she was secretly married to William Sey¬ mour, son of Lord Beauchamp and grandson of the Earl of Hertford, both husband and wife were placed in confinement, the husband being committed to the Tower. At the end of a year they both contrived to escape at the same time, but the unhappy lady was retaken. She was then herself committed to the Tower, the re¬ mainder of her life was spent in close confine¬ ment, which finally deprived her of her reason. Consult Bradley, E. T., (Life and Letters of Lady Arabella Stuart5 (London 1889).

STUART, Charles Edward Louis Philip Casimir, of Scotland: b. Rome, 31 Dec. 1720; d. there, 31 Jan. 1788. He was a son of James Francis Edward Stuart, and was known va¬ riously as the <(Young Pretender,® the <(Young Chevalier,® and ((Bonny PrinCe Charlie.® He first saw service at the siege of Gaeta (1834) ; fought bravely at Dettingen (1743) ; and next year repaired to France to head Marshal Saxe’s projected invasion of England. Sailing from Nantes, he landed with seven followers at Eriska in the Hebrides on 2 Aug. 1745, and on

the 19th raised his father's standard at Glen- finnan. The clansmen flocked in ; on 17 Sep¬ tember Edinburgh surrendered, though the castle still held out; and Charles held court at Holyrood, the palace of his ancestors. There followed the victory over Sir John Cope at Prestonpans, the march upon London with 6,500 men, the fatal turning at Derby (6 December), the victory over Hawley at Falkirk (17 Jan. 1746), the crushing defeat by the Duke of Cumberland at Culloden (16 April), and Charles' five months' hidings and wanderings. The peace of Aix-la-Chapelle (1748) caused his forcible expulsion from France, and there¬ after he lived successively at Avignon, Liege, Basel, Florence and Rome.

STUART, Charles Macaulay, American theologian : b. Glasgow, Scotland, 20 Aug. 1853. He was graduated (1880) at Kalamazoo College and took the A.M. degree (1883) at Garrett Biblical Institute and Northwestern University (1887). He was pastor at River Forest, Ill. C 1 880—83) , at Fort Saint Church, Detroit (1883— 85), becoming associate editor Michigan Chris¬ tian Advocate (1885-86) and filling the same position on the Northwestern Christian Advo¬ cate (1886-96). From 1896-1909 he was pro¬ fessor of sacred rhetoric at Garrett Biblical Institute and was appointed editor Northwest¬ ern Christian Advocate, 1909-11. He became president of Garrett Biblical Institute in 1911. He has written (Gospel Singers and Their Songs > (1891) ; (Vision of Christ in the Poets) (1896) ; (Story of the Masterpieces) (1897). He also edited the 'Methodist HymnaP (1905) ;

(In Memoriam, Charles J. Little) (1912) ; (The Manifold Message of the GospeP (1913).

STUART, Elizabeth, daughter of James I

of England. See Elizabeth Stuart.

STUART, Gilbert, American painter: b. Narragansett, R. I., 3 Dec. 1755; d. Boston, 27 July 1828. He was a portrait painter and be¬ gan at the age of 13. In 1775 he paid his second visit to England where Benjamin West recog¬ nized his talent, took him into his home and gave him instruction in art. Eventually obtain¬ ing much favor and distinction in London he painted portraits of George III, George IV while prince of Wales, Mrs. Siddons, Sir Joshua Reynolds, Benjamin West, and at Paris had Louis XVI as sitter. His great ambition, how¬ ever, was to practise his art in his own country and he returned to the United States 1792 and opened a studio first in New York; subsequently in Philadelphia, where he painted Washington in 1795. This was the first of a series of por¬ traits of the "Father of his

Country® by Stuart. There are still extant six half-face portraits from the same sitting, painted from the right. The famous “Athenaeum portrait,® now in the Boston Museum, was produced about 1796 and takes the left half face of the sitter. Some¬ where about the same time he painted a full- length portrait of Washington for the Marquis of Lansdowne. Nearly 40 copies made by him from the original of various sittings are now in existence. In the Metropolitan Museum of Art, New York, Stuart is represented by six pic¬ tures, namely ‘Washington5 (two portraits) ; ‘John Jay > ; (Captain Henry Rice5 ; (Mr. David Sears5 ; ‘Commodore Isaac Hull.5 He also painted the first five Presidents of the United States; Edward Everett, Jacob Astor; Judge Story; W. E. Channing; Josiah and Edmund Quincy and O. H. Perry. The characteristics of Stuart’s portraits are fine coloring and life¬ like expression. Though he has been charged with incorrectness of drawing, he ranks with some of the best portrait painters of the Eng- lish-American school. Consult Mason, (Life and Works of Gilbert Stuart5 (1879) ; Isham, S., (History of American Painting5 (New York

1915).

STUART, Henry Benedict Maria Clem¬ ent, Duke of York, cardinal and bishop of Frascati; b. Rome, 5 March 1725; d. Paris, 1799. He was a son of James Francis Edward Stuart. In 1747 received a cardinal’s hat from Benedict XIV. Clement XIII consecrated him bishop of Corinth, and subsequently appointed him to the suburban see of Frascati. He enjoyed, through the favor of the French court, the revenues of two rich abbeys, as well as a Spanish pension ; and the liberal charity with which he dispensed his income endeared him to his flock. On his brother’s death in 1788 he caused a medal to be struck, bearing the Latin legend, ((Henry IX, king of England, by the grace of God, but not by the will of men.® The French Revolution stripped him of his fortune.

STUART, James, Earl of Murray; regent of Scotland: b. 1533; d. 21 Jan. 1570. He was the natural son of James V by Margaret, daughter of Lord Erskine. At five years of age his father made him prior of Saint Andrews, and he was long known by that title. He be-

came a warm supporter of the Reformers, and was chosen a member of the council, and one of the lords of the articles. On the return of Mary to Scotland as queen, Murray became her chief adviser, and was

created first, Earl of Mar, and then Earl of Murray. He was opposed to the queen's marriage with Darnley, and has been accused of implication in the mur¬ der of the latter. He remained out of Scot¬ land for some months in 1567, only returning on the accession of James VI. He saw his sister a captive in Lochleven Castle, and was soon after named regent. Mary having escaped and taken arms, he encountered and defeated her at Langside, in 1568. He was assassinated at Linlithgow.

STUART, James, English antiquary and architect: b. London, 1713; d. 2 Feb. 1788. In his early days he devoted himself to the paint¬ ing of fans, a profession which gave some room for the cultivation of a genuine artistic talent. In 1742 he went to Rome and engaged in the study of its architectural monuments. When in 1750 he accompanied Nicholas Revett to Greece, he found leisure and opportunity for completing his architectural knowledge. After traveling from point to point of antiquarian interest he finally settled in Athens for nearly three years and amassed a great body of material in the way of sketches and antiquarian notes. He re¬ turned to England in 1755 where he found his services much sought after as an architect, but his principal employment was the completion of his magnum opus, (The Antiquities of Athens) in three volumes, only one of which was pub¬ lished before his death.

STUART, Sir James, Canadian jurist and statesman: b. Fort Hunter (now in New York State), 4 March 1780; d. Quebec, 14 July 1853. He was educated at Schenectady, then at King's College, Windsor, Nova Scotia. He next studied law in a prothonotary's office at Montreal, then (1798) becoming a pupil of Jonathan Sewell at Quebec. In 1800 he was appointed assistant secretary to the government of Lower Canada and was called to the bar in 1801 and made solicitor-general for the prov¬ ince. He entered the House of Assembly (1808) as member for Montreal. In conse¬ quence of disagreements he had to resign the ' solicitor-generalship and joined the opposition. He was sent to England by the advocates of the union of Upper and Lower Canada and (1825), was appointed attorney-general for Lower Canada and was elected the same year to the Assembly. Beaten in the following election (1828), he was next (1831) impeached by the House of Assembly and was suspended from office by Lord Aylmer, the claims against him being corruption in elections and improper use of office. The litigation was kept open by him in his defense both in Canada and Eng¬ land, but (1834) he resumed his private prac¬ tice and his great success was proof of the public's confidence in him. In 1838 he was appointed chief justice of Lower Canada. He at once re-entered the political field, assisted Lord Sydenham with his advice and

drew up many legal ordinances and other work in fram¬ ing the union. He was created baron in 1841 for his services and on the union of the two Canadas became chief justice of Lower Canada.

STUART, James Ewell Brown, American soldier: b. Patrick County, Va., 6 Feb. 1833; d. Richmond, Va., 12 May 1864. He was de¬ scended on his father's side from ancestors distinguished during the colonial and Revolu¬ tionary periods, in the War of 1812, and in civil life in Illinois, Missouri and Virginia. On his mother's side he was a descendant of the Letcher family of Virginia. After a course at Emory and Henry College, in Virginia, he en¬ tered the National Military Academy at West Point, N. Y., and upon his graduation in 1854 was commissioned third lieutenant and in Oc¬ tober of the same year was promoted to the rank of second lieutenant. After serving with the mounted riflemen against the Apaches in Texas he was transferred to the First Cavalry, then stationed at Fort Leavenworth. In December 1855 he was promoted first lieu¬ tenant, about a month after his marriage at Fort Riley to the daughter of Col. Philip St. George Cooke. He accompanied Col. Robert E. Lee as aide in the attack upon John Brown and his raiders at Harper's Ferry, where he read to Brown the summons to sur¬ render. In April 1861 he received from the United States government the commission of captain; but he had decided to go with Vir¬ ginia, and as soon as his resignation was ac¬ cepted (7 Mav 1861) tendered his services to his native State, and was three days later commis¬ sioned lieutenant-colonel of Virginia infantry. Reporting to "Stonewall® Jackson at Harper's Ferry, he was promoted colonel 16 July 1861, and at the head of 350 cavalrymen began his brilliant career. On outpost duty he Was ever vigilant and wary, and of his service at the first battle of Manassas (Bull Run), where he made a dashing charge, General Early wrote that "Stuart did as much toward saving the battle as any subordinate who participated in it.® After the victory had been won he pursued the Fed- erals 12 miles. Subsequently he held the heights in sight of Washington with headquarters on Munson's Hill. In front of this position and at Dranesville he had combats with the Federals. On 24 Sept. 1861 he was commissioned brigadier- general. In the spring of 1862 he covered the retreat from Yorktown and opened the battle at Williamsburg (q.v.). For his daring raid around the army of General McC'ellan, just be¬ fore the Seven Days' Battle, (q.v.), Stuart won the applause and hearty admiration of both friend and foe, and on 25 July 1862 he was com¬ missioned major-general. He won additional fame by his raid around Pope's armv, in which he captured that general's headquarters and a part of his staff at Catlett's Station by his raid in conjunction with General Trimble upon the Federal depot of supplies

at Manassas, his serv¬ ices in screening the movement of Lee's army into Maryland, the brilliant fighting of his troopers at the passes of South Mountain, and by the skill with which he managed his horse-artillery on the Confederate left at Sharpsburg (Antietam), where with these hard fighters he powerfully assisted in the repulse of Sumner's gallant charge.

In October after the battle of Sharpsburg Stuart led his bold horsemen to Chambers- burg, Pa., and on his return, thwarting every effort of the Federal cavalry to intercept him, passed between McClellan's army and Wash-

ington, and with little loss recrossed the Potomac into Virginia. This expedition caused great demoralization in the Federal cavalry, and by delaying McClellan's advance gave to the Army of Northern Virginia several weeks for rest and preparation against a new invasion.

After the mortal wounding of ((Stonewall® Jackson and the disabling of A. P. Hill on 2 May at Chancellorsville, Stuart took command of Jackson's corps and by his audacious attack upon greatly superior numbers completed the work so brilliantly begun by Jackson. When Lee began his movement into Pennsylvania, Stuart, after defeating the Federal cavalry at Fleetwood, or Brandy Station (q.v.), passed again between the Federal army and Washing¬ ton with orders to meet Early at York. March¬ ing almost without rest for eight days and nights, the last three with almost constant fight¬ ing, he joined Lee's army at Gettysburg (q.v.), bringing with him a large train of captured Fed¬ eral supplies. On the third day of the battle he made a fierce attack upon the cavalry on the Federal right, and at Williamsport, on the retreat, came up in time to drive off the heavy odds of Federals, who were making a desperate fight to capture the Confederate train so bravely defended by General Imboden. On 5 May 1864 he guided the movement of A. P. Hill's corps against Grant's advance, on the 7th gave notice to Lee of Grant's flank march to Spott- sylvania Court House and, throwing his cavalry in front of the Federals, delayed them until the Confederate infantry could be thrown across their path. When Sheridan attempted to make a sudden dash into Richmond, Stuart with a part of the cavalry barred his way at Yellow Tavern (q.v.), and saved the Confederate capi¬ tal. But he received a mortal wound, of which he died next day (12 May 1864) in Richmond. John Esten Cooke has written thus of his last moments: ((As his life had

been one of earnest devotion to the cause in which he believed, so his last hours were tranquil, his confidence in the mercy of heaven unfailing. When he was asked how he felt, he said, Easy but willing to die, if God and my country think I have done my duty. *His last words were: H am going fast now; I am resigned. God's will be done.* As he uttered these words he expired.®

In every battle Stuart's black plume had waved in the advance. In every arm of the service he had won the highest honors. Gay and rollicking in camp, merry on the march, often calling upon Sweeny to ride by his side and thrum upon the banjo an accompaniment to his merry songs, he was always fully awake to the demands of duty and equal to any emergency. See Stuart's Raid to Chambers- burc. ; Stuart's Ride Around the Army of the Potomac on the Chickahominy. Consult McClellan, H. B., (The Campaigns of Stuart's Cavalry) (1885).

Toseph T. Derry, Author of ' History of Georgia .*

STUART, James Francis Edward, the

Pretender, of Scotland: b. Saint James Palace, 10 June 1688; d. Rome, 1 Jan. 1766. He was a son of James, regent, and Mary of Modena. At six months he was conveyed by his fugitive mother to Saint Germains, where his boyhood was passed, and where, on his father's death in 1701, he was proclaimed his successor. In

an attempt, in March 1707, to make a descent upon Scotland, the young (<Chevalier de Saint George,® as he was styled by his adherents, showed some gallantry, but was not suffered to land; and after his return he served with the French in the Low Countries, at Malplaquet re¬ ceiving a sword-thurst in the arm. But in Mar's ill-conducted rebellion (see Jacobites) he showed himself heavy, spiritless, even tear¬ ful, when, too late in the day, he landed at Peterhead (22 Dec. 1715), and sneaked away six weeks afterward from Montrose. France was now closed to him by the treaty of Utrecht, and almost all the rest of his faineant, dissolute, prayerful life was passed at Rome. In 1719 he married Maria Clementina Sobieski, grand¬ daughter of John Sobieski, king of Poland. Charles Edward, his son, was the Young Pre¬ tender.

STUART, John McDouall, Australian ex¬ plorer: b. Dysart, Fifeshire, Scotland, 7 Sept. 1818; d. London, 5 June 1866. He was edu¬ cated in Edinburgh, where he engaged in busi¬ ness for some time. In 1838 he went to Aus¬ tralia and accompanied Sturt's expedition into the interior, 1844-46. In 1858 he started a series of six expeditions in

search of a path across the continent of Australia. The first had no noteworthy result; but on the second, in 1859, he explored much of the country about Lake Torrens. In 1860 he penetrated to the centre of Australia and discovered Mount Stuart; and at last, in 1862, his sixth expedi¬ tion, succeeded in crossing Australia near the centre of the continent, from south to north and back again. For this achievement Stuart was granted £2,000 and 1,000 square miles of land by the Australian government. He wrote Ex¬ plorations in Australia,* edited and published by W. Hardman (1864).

STUART, Moses, American biblical scholar and theological teacher : b. Wilton, Conn., 26 March 1780; d. Andover, Mass., 4 Jan. 1852. He was graduated at Yale in 1799; studied law, and was admitted to the bar in 1802; was tutor at Yale for two years; studied theology with President Dwight; in 1806 be¬ came minister of the First Church (Congrega¬ tional) in New Haven; and in 1809 entered upon his life-work as professor of sacred liter¬ ature in the Andover (Mass.) Theological Seminary, a position which he held until 1848. In the encouragement and direction of biblical study during this period his influence was widely felt, as it also was in the theological discussions of the time, which enlisted many able controversialists of various schools. More than 1,500 ministers were the recipients of his teachings at the seminary, and many pens and pulpits aided in the propagation of his views. Besides textbooks and commentaries relating to the biblical writings, he published Elements of Interpretation, *from the Latin of Ernesti (1822) ; Ehilological View of Modern Doc¬ trines of Geology* (1836) ; (Hints on the Prophecies *(1842) ; < Critical History and De¬ fense of the Old Testament Canon* (1845), and a volume of Exegetical Essavs) (1867).

STUART, Ruth McEnery, American au¬ thor: b. Avoyelles, La., 1856; d. 4 May 1917. She was educated in New Orleans until 1865; removed to New York in 1885. Her writings include (A Golden Wedding,- and Other Tales)

(1893) ; (Carlotta's Intended, and Other Stories) (1894) ; (The Story of Babette) (1894) ; Solo¬ mon Crow's Christmas Pockets* (1896) ;

(Sonny * (1896) ; (The Women's Exchange)

(1899) ; (Napoleon jackson> (1902) ; (George Washington Jones *(1903) ; (The River's Chil¬ dren* . (1904) ; (The Second Wooing of Salina Sue) (1905) ; (Aunt Amity's Silver Wedding* (1908); (Sonny's Father) (1910); (The Haunted Photograph) (1911) ; cDaddy Do-Funny's Wisdom Jingles) (1913) ; (The Cocoon)

(1915).

STUART'S RAID TO CHAMBERS- BURG, Pa. Early in October 1862 the Army of the Potomac, under General McClellan, was encamped on the Maryland side of the Potomac, its infantry from Hagerstown, on the north, to beyond the Monocacy, on the south, with cavalry on both flanks. Advised of some move¬ ments in the Union army, General Lee, to as¬ certain the nature of these movements and to disarrange McClellan's plans for crossing the Potomac, ordered Gen. J. E. B. Stuart, on 8 October, to cross the Potomac, above Williams¬ port, with cavalry, destroy bridges and rail¬ roads, seize horses, do all the damage pos¬ sible and, if advisable or necessary, recross the Potomac in the vicinity of Leesburg. Stuart selected 1,800 men, 600 each from his three brigades, commanded by Gen. Wade Hampton, and Cols. W. H. F. Lee and W. E. Jones. At daylight of the 10th he crossed the Potomac at McCoy's Ford above Williamsport, with slight opposition, captured the signal sta¬ tion at Fairview, passed Cox's Kanawha di¬ vision near Clear Spring, taking 10 stragglers from it, and marched northward and along the western side of the Cumberland Valley, by way of Mercersburg to Chambersburg, where he arrived at 8 p.m. and passed the night. In the morning of the 11th he destroyed the railroad depots and such military supplies as could be found, including 5,000 new muskets, pistols and a large amount of army clothing; captured and paroled 280 sick and wounded soldiers in hos¬ pital ; and seizing over 500 good cavalry horses in the surrounding country, and leaving the town quite early, crossed the South Mountain to Cashtown, where he turned southward, passed to the west of Gettysburg and through Fairfield to Emmittsburg, and thence toward the Potomac. All through Pennsylvania he had gathered in horses, but none were taken from Maryland farms or towns. He passed Em¬ mittsburg after dark, and during the night pushed on, most of the time at a trot, through Woodsborough, Liberty, New Market and Monrovia, where he cut the Baltimore and Ohio Railroad, and reached Hyattstown early on the 12th, and continued his march to Barnesville, having met no opposition. As soon as it be¬ came known that Stuart had crossed the Potomac there was great excitement. Gov¬ ernor Curtin ordered out troops at Harrisburg; General Wool sent troops from Baltimore to Harrisburg and Chambersburg; Cox's Kanawha division, which was on the way from the Army of the Potomac to Clarksburg, W. Va., was

halted at Clear Spring, near Hagerstown ; all the fords of the Potomac above and below Harper's Ferry were carefully guarded by in¬ fantry; and two brigades of infantry were placed on cars, with steam up, at the railroad

crossing of the Monocacy, near Frederick, ready to move at once to the point where Stuart might cross the railroad. Infantry was placed at such points back from the river as it was supposed he would pass on his return. Averell's cavalry was ordered down from near Hancock, and Pleasonton's cavalry, then near Hagerstown, was started in pursuit. McClellan was sure that Stuart's escape was impossible. Stuart heard of the preparations to intercept him, through a captured courier carrying a dispatch, and having skilfully avoided Pleasonton's cav¬ alry, pushed on through Barnesville, passed through Stoneman's division of Union troops lying between Poolesville and the mouth of the Monocacy, and sent the head of his column, un¬ der Colonel Lee, to secure a crossing of the Potomac, at White's Ford, while with the rear¬ guard he held in check Pleasonton, who was advancing from the Monocacy. Colonel Lee found White's Ford guarded by a part of the 99th Pennsylvania infantry, strongly posted on a bluff commanding the ford, and he sum¬ moned it to surrender, but met with no re¬ sponse, and at the end of 15 minutes opened with artillery and advanced his skirmishers; upon which the Union infantry retreated and Lee seized the crossing. Stuart, who had been engaging Pleasonton with artillery, followed Lee and in a short time had crossed the river, with over 1,200 horses from the farms of Pennsylvania, and some prisoners, 30 of whom were <(public functionaries and prominent citizens,® to be held as hostages for citizens of the Confederacy who had been arrested and im¬ prisoned. In the entire expedition Stuart had l3Ut one man wounded ; two men were captured. From the time of leaving Chambersburg until he reached the Virginia shore at noon of the 12th Stuart had marched more than 80 miles; and during the same period Pleasonton had marched about the same distance. The result of the expedition was very gratifying to Lee, for Stuart brought him valuable information; but it was mortifying to the Union officers to know that Stuart had succeeded in riding for a second time clear around the Army of the Potomac, and it delayed the movement of Mc¬ Clellan, who says that the exhausting service in chasing Stuart <(completely broke down nearly all the cavalry horses, and rendered a remount absolutely indispensable before we could ad¬ vance on the enemy.® Consult (Official Rec- ords) (Vol. XIX) ; Allan, W., (Army of North¬ ern Virginia in 1862) (New York 1867) ; Mc¬ Clellan, (Life of Gen. J. E. B. Stuart.*

E. A. Carman.

STUART'S RIDE AROUND THE ARMY OF THE POTOMAC ON THE CHICKAHOMINY. While General Lee was making arrangements in June 1862 to bring ((Stonewall® Jackson from the Shenandoah Val¬ ley, to unite with the army at Richmand in a blow upon McClellan, he ordered Gen. J. E. B. Stuart, commanding his cavalry, to make an expedition around the right and to the rear of McClellan's army to ascertain its position and movements. Stuart made a verbal suggestion that it was possible to ride clear around Mc¬ Clellan, and he was permitted to use his discre¬ tion in the matter. With portions of the First, Fourth and Ninth Virginia cavalry, under Cols. Fitzhugh Lee and W. H. F. Lee, two squadrons

of the Jeff Davis Legion, under Lieut.-Col. W. T. Martin, and a section of artillery under Lieutenant Breathed, in all about 1,200 men, Stuart started from near Kelly's Station, on the north bank of the Chickahominy, on the morning of 12 June 1862, and marched north¬ ward, west of the Richmond and Fredericks¬ burg Railroad and parallel to it, bivouacking at night near the railroad bridge over the South Anna, 22 miles from Richmond. No fires were permitted at night, nor bugle-call in the morn¬ ing, when he turned toward Hanover Court House. At the Court House was a detachment of Union cavalry, which Stuart endeavored to surround and capture, but it escaped in the di¬ rection of Mechanicsville, and Stuart kept on in the direction of Hawes' Shop and Old Church. Soon after he left the Court House a squadron of the Fifth United States cavalry, under Lieutenant Lieb, was encountered, which fell slowly back toward Old Church, from which it had advanced that morning on a recon¬ naissance. Stuart followed cautiously, took some prisoners, crossed Totopotomoy Creek, and was nearing Old Church when he met Capt. W. B. Royall, who, informed of his approach, had marched from Old Church and joined his squadron to Lieb's, making not to exceed 125 men. Stuart ordered a charge, which was led by Captain ' Latane, of the ninth Virginia cavalry. The contest was short and severe, sabres being freely used; Latane was killed and a few men wounded; Royall was wounded by several sabre-cuts ; and the Union cavalry was driven back and with difficulty partially rallied by Lieb. Stuart pressed on, drove Lieb, captured and destroyed Royall's camp, and took some prisoners. He had ful¬ filled his orders by passing entirely around Mc¬ Clellan's right, and had gained sufficient infor¬ mation for General Lee's purposes; but instead of returning, he determined to cut McClellan's communications, go entirely around his army, make him, ((tremble in

his boots,® cross the Chickahominy beyond his left at Forge Bridge, and reach Richmond. Two squadrons were sent to the left to Garlick's Landing, on the Pa- munkey, and destroyed two loaded transports and some wagons, killing two men and taking some prisoners; while Stuart with the main body marched to Tunstall's Station of the York River Railroad, surprised and captured the guard of 15 or 20 men, overhauled a number of wagons, and fired into a passing railroad train, killing three men and wounding eight. The railroad bridge over Black Creek, near by, was burned, also several wagons and some public stores, when Stuart marched by moonlight to Talleysville, where he halted nearlv four hours, and at midnight resumed his march for Forge Bridge, which was reached at daylight of the 15th. The bridge was gone, and the river too high for fording. Some crossed by swimming; but the debris of an old bridge was found; there was a warehouse near by, which was torn down, and Lieutenant Burke, with a party, was set to work to build a bridge. Stuart says: <(A foot-bridge was soon improvised, and the horses were crossed over as rapidly as possible by swimming. Burke's work progressed like magic, in three hours it was ready to bear artillery and cavalry, and as half the latter had not yet crossed, the bridge enabled the whole to reach the other bank by 6 p.m. Another branch of

the Chickahominy still further on was with difficulty forded, and the march was continued without interruption to Richmond.® Besides the property destroyed, Stuart reports that he took into Richmond with him 165 prisoners, 260 mules, harness, etc. The only one killed in his command was Captain Latane, and but few were wounded. The whole affair was very mortifying to McClellan. The orders given for pursuit of Stuart came from four or five general officers, and were so conflicting that movement was paralyzed. The expedition con¬ firmed General Lee in his plan of bringing Jackson down on McClellan's right. See Peninsular Campaign of 1862; Seven Days' Battles.

E. A. Carman.

STUBBES, Philip, English author : b. about 1555; d. London, about 1610. He was educated at Cambridge, and in 1581 began to write a series of ballads and other pamphlets directed against the sinful practices of various persons whose conduct did not reach his puri¬ tanical standard, and later published a broadside against the English public, entitled VA View of Vanitie and Alarum to England, or Retrait from Sinne.5 This was followed by his more ambitious and better-known arraignment of the world in general, which he called (The Ana-tomie of Abuses, conteyning a Discoverie or Briefe Summarie of such Notable Vices and Imperfections as now raigne in many Christian

Countreyes of the World,5 which was published in 1583. His later diatribe (A Chrystal Glasse for Christian Women5 (1591) was still more widely known. Consult Morley, H., (English Writers) (London 1892).

STUBBS, William, English prelate and historian: b. Knaresborough, Yorkshire, 21 June 1825; d. Oxford, 22 April 1901. He was educated at Oxford University, took Anglican orders in 1848 and was vicar of Navestock, Essex, 1850-60. He was librarian of Lambeth Palace, 1862-68 and regius professor of modern history at Oxford, 1866-84. In 1869 he became curator of the Bodleian Library, and was rec¬ tor of Cholderton, Wiltshire, 1875-84. He be¬ came in 1879 canon residentiary of Saint Paul's, in 1884 bishop of Chester and in 1888 bishop of Oxford. He edited many valuable historical works in the Rolls Series, including Chronicles and Memorials of the Reign of Richard P (1864-65) ; (Gesta Regis Henrici IP (1867) ; Chronicle of Roger Hoveden5 (1872-73) ; Me¬ morials of Saint Dunstan5 (1874) ; and Cpera Radulphi de Diceto) (1876), but is best known by his Constitutional History of England) (1874-78). Among other works of his are (The Early Plantagenets5 (1876) ; Seventeen Lec¬ tures on the Study of Mediaeval and Modern History 5 (1886) ; (Registrum Sacrum Angli- canum,5 a calendar of the English bishops from the time of Augustine (1858) ; Councils and Ecclesiastical Documents Relating to Great Britain and Ireland> (1869-73), and the posthu¬ mous works, Cectures on European History) (1904); <Letters) (1905); Cectures on Early English History) (1906) ; Crdination Ad¬ dresses5 (1901) ; (Visitation Charges5 (1904) ; Cermany in the Middle Ages5 (1908). Con¬ sult Gross, (Sources and Literature of English History5 (New York 1900) and Hutton, W. H., Cetters of William Stubbs5 (London 1906).

STUCCO, in architecture, a composition of white marble pulverized and mixed with plas¬ ter of lime, which, being sifted and wrought up with water, is used like common plaster. Architectural and sculptural ornaments, such as fruits, flowers, garlands, festoons, etc., are made of it. In the interior of buildings stucco work is generally applied to the ceilings of apartments, the moldings, etc. In some coun¬ tries a stucco of common mortar and of plas¬ ter- is applied to the outside of houses, and is extremely durable.

STUCK, Franz, Knight von, German painter: b. Tettenweis, Lower

Bavaria, 23 Feb. 1863. He received his early art training in the academy at Munich under Lindenschmit and ex¬ hibited striking and original talent by his fan¬ tastic and grotesque designs, many of them furnished as illustrations to the Fliegende Blatter, as book covers, vignettes for pro¬ grams, etc. In 1889 he made his debut as a painter in oils with (The Seraph at the Gate of Paradise) ; and numerous other Biblical, mytho¬ logical and allegorical works followed. His chief works are (Lucifer.' ; (The Expulsion from Paradise' ; a (Pieta' ; (The Crucifixion' ; (Sin' (1893) ; (War' (1894), both in the Munich Pinakothek; (The Sphinx' (1895), now in Budapest) ; (Evil Conscience' (1896) ; Pro¬ cession of Bacchantes' (1897); (Pan' (1908); Hnnocentia' (1909). Among his most success¬ ful portraits is one of Fritzi Scheff. He has also produced several statuettes and bronze fig¬ ures, including (The Faun' (in the Berlin Na¬ tional Gallery), and is professor royal in the Munich Academy. He is regarded now as one of the greatest figures in modern German art, although at first his work was scorned and de¬ rided. Consult Bierbaum, O. J., (Stuck' (in Punstler-Monographien,' Vol. XLII, Bielefeld 1899); Singer, H. W., (Franz Stuck: Zeich- nungen' (Leipzig 1912) ; Hanfstangl's repro¬ ductions (Munich 1909).

STUCK, Hudson, American clergyman: b. England, 11 Nov. 1863; d. 10 Oct. 1920. He was graduated (1892) at the Theological De¬ partment, University of the South, Sewanee, Tenn. He became (1892) deacon and priest of the Protestant Episcopal Church and rector (1892-94) at Grace Church, Cuero, Tex., dean (1894-1904), Saint Matthew's Cathedral, Dallas. After 1904 he was archdeacon of the Yukon. He published (Ascent of Denali' (Mount Mc¬ Kinley) (1914) ; (Ten Thousand Miles with a Dog Sled' (1914) ; (Voyages on the Yukon and its Tributaries' (1917). He was in the first party of three climbers to reach the summit of Denali Peak, in 1913, about 20,500 feet high; an account of the ascent is the subject of one of the above-mentioned works.

S T U C L E Y , stuk'li, orSTUKELY, Thomas, English adventurer: b. about 1525* d. Alcazar, 4 Aug. 1578. He was sent to Eng¬ land (1552) recommended by Henry II of France, to whose notice he had been brought through his military talents. Instead of obtain¬ ing the secret information he was sent for that would assist the French to land on English shores after a projected capture of Calais, he disclosed the French royal plot. Instead of being rewarded for his information he was thrown into the <(Tower" and the Duke of Northumberland betrayed him in turn to the

French king. Escaping from prison he entered service under Emperor

Charles V and the Duke of Savoy. He was actively present at the vic¬ tory of Saint Quentin (1557), after which he went on a privateering expedition, Queen Eliz¬ abeth providing one of his fleet of six ships (1563). His voyage was a series of robbery from ships of every nationality. After two years of piracy the remonstrances of other na¬ tions caused Elizabeth to arrest him. Upon being pardoned he went to Ireland where he is alleged to have started further plotting but the queen squelched his ambitious schemes. He had been in correspondence with Philip II of Spain, accepting a pension from him. Suspicion of his treason came up in court and he fled to Spain (1570) where he again plotted against England. He visited Paris and the papal court, then joined in an expedition against Morocco backed by Portugal but was killed in the battle of Al¬ cazar (1578). The story of Stukely's career was very popular in England as he was said to have been an illegitimate son of Henry VIII, king of England. A play entitled (The Battle of Alcazar . . . with the Death of Captain

Stukely' was printed by E. Allde in 1594. Later <The famous History of the Life and Death of Captain Stukely was printed (1605), Simpson's (School of Shakespeare' (1878, Vol. I) gives a detailed account of Stukely's career based on state papers.

STUDENT LIFE AND CUSTOMS.

Student life and customs have varied so much in various ages and countries, and have differed so greatly according to the school, elementary, secondary or college, in which the students are, that it is necessary to divide and subdivide the subject for effective treatment.

Consideration must be given to ancient, mediaeval and modern times; particular coun¬ tries in those ages; the grade of institution, whether elementary, secondary or collegiate, in each country; and the life of the student both inside and outside of the classroom or ac¬ ademic precincts.

We lack sufficient evidence to make many statements about student life in ancient times. That which we do know has almost entirely to do with the teaching in the classroom (see Education, History of). Of the life of the student there, the connection between flogging and learning was the feature — ((he that is not flogged, can not be taught."

With the Greeks much of the instruction given to the young was in the nature of that which we should call supervised sports. This being the case student life for the young was happy and entertaining. The Greek boy played ball, flew kites and rolled marbles, and engaged in similar

recreations.

As he grew older, if he were not apprenticed to a trade, he attended the gymnasia, which were open air exercising grounds. Here he got in¬ struction in running, wrestling, boxing, spear throwing, jumping and hurling the discus. Horse-back riding and chariot driving were also a part of his instruction. Oratory and music came nearer than other subjects to being aca¬ demic work in our sense of the word, but to-day even these subjects are likely to be more thought of in the nature of student life rather than a part of the instructional work in our educational institutions.

STUDENT LIFE AND CUSTOMS

751

1 he Roman schools partook a little more oi. the nature of actual classrooms, though in most cases they were merely a sort of pergola, bchool-boy life was enlivened with floggings, as with the Greeks, but seemingly more system¬ atic classroom work was done by the Romans. The latter did not give the time to formai instruction in sports that the Greeks gave, so that to the Roman boy and youth his amuse¬ ments were much more his own. Marbles, blindman s buff, hide and seek and other games of childhood were played. Riding, swimming and wrestling were, however, a regular part of the instruction, and the Roman youth en¬ tered them with a seriousness that made them less a part of the lighter side of life. With the Romans, therefore, the sports of student life tended to fall into the class of the pro¬ fessionals.

For some centuries after the gradual decline of the Roman civilization until the beginning of those schools which grew up in connection with the Christian churches there is little evi¬ dence of any kind of school life. When the church and monastic schools did begin to come into existence, they were looked upon as places where in general boys were to be prepared for the service of the Church. Even those who were not to be so prepared were given the same kind of training. In view of the severity of the ideal of preparation for the Church the school life of the boy both during the hours of actual instruction and outside of such hours was one of constant task and supervision. Al¬ most every sport to which a boy of the time might turn was prohibited under the severest penalties. Flogging, even of young men of 18, was common. Unlike the schools of the Greeks and the Romans, those in the Middle Ages were frequently of the kind to which boys went to live during their period of school life. The only holidays he had were

those of the Church.

In spite of the extreme repression of all youthful inclinations, the boys committed nu¬ merous offenses in the schoolrooms and in chapel. Some, when they got a chance to get away from the strict supervision of the teacher, indulged in all kinds of prohibited sports, such as cock-fighting, gambling and fist, fighting.

It was in the mediaeval universities that we first hear of those student groups which gave color to a real student life such as we know it. The freshman was then, as until recently in our own colleges and universities, the par¬ ticular object of attack on the part of those who had been in the institution longer than he. He was likely to be waylaid and thoroughly pummeled before arrival. In Germany and France he was put through an initiation bor¬ dering on the grotesque, horrible and cruel — far worse than the modern initiation to any of our secret societies. If he passed through such ordeals and succeeded in getting registered with a master or in a college, his life in the class¬ room and out of it was marked by turbulence and hardship. A master who delivered his lecture too rapidly was interrupted with all kinds of noises. The lecture-rooms were wholly unheated in winter and the windows unglazed. The floors were covered with straw on which the student sat. The rooms in which the stu¬ dents lodged were equally uncomfortable and the sanitary arrangements negligible. The ec¬ clesiastical gowns which they were required to

wear afforded them scant protection against the cold, unless they were fortunate enough to be able to buy furs. Many of the students were well-to-do and others extremely poor. In whichever condition they found themselves let¬ ters to their parents which have come down to us give evidence of that almost chronic ap¬ peal of all students in all ages for more money. The poorer students frequently begged and were sometimes officially licensed to do so.

So many of their natural inclinations for the amusements and sports of youth were repressed by strict prohibitions that the natural conse¬ quences followed. Not having any outlet for their youthful spirits they indulged in riotous conduct. Brawls amongst the individual stu¬ dents and those of different national groups were frequent, and occasionally a whole group of them would get into conflict with the towns¬ folk, so that <(Town and Gown® fights became infamous. As the students as well as the towns¬ folk went about armed, these battles frequently ended in bloodshed and death.

In spite of such incidents which were of course not of the usual, but of

the unusual class, the mediaeval student did a goodly amount of serious work, some naturally more and some less. The absence of healthy sports to relieve the daily routine was his most serious trouble.

The hold, which student customs have, brought many of them far down into modern times, not only in Europe but also in America. Curious survivals in the treatment of freshmen, fagging, the conflict between the freshmen and the sophomores, represented at Harvard until a short time ago by <(Bloody Monday Night,® and at other colleges by cane rushes, and the like, bear witness to this conservatism.

The popularizing of college education and the removal by university authorities of many of the restrictions on the natural impulses of youth for activity have led to the gradual dis¬ appearance of the many so-called mediaeval customs. In their place has grown up a be¬ wildering variety of activities for the student, which form a large part of his life. A perusal of the daily or weekly paper, or monthly, or annual periodicals published by the students in almost everyone of our institutions of collegi¬ ate rank, particularly in the United States, re¬ veals not only the literary activity along such lines, but in the notices, which they publish, they bear witness to the existence of an ex¬ tended variety of sports — baseball, football, rowing, tennis, lacrosse, basketball, hockey; numerous clubs and fraternities to which almost every student of any walk in life may belong; debating organizations, dramatic societies pre¬ senting operas and plays, musical clubs and orchestras, foreign language clubs and religious societies. Many of these intramural activities are represented also by intercollegiate contests in almost all of the sports, in debating, oratory and music.

On the social side dancing and singing, in large choruses, both during term time and at graduation exercises occupy a prominent place, especially at girls' colleges, which, after their establishment, in many ways followed in the footsteps of those for men. Luxurious living quarters have taken the place of the bare and comfortless rooms of less than half a century ago.

Though in America student life has gone

far beyond anything in the way of student life and customs, such as

they exist in Germany, France and Italy, the English universities are a very close second. In the latter as well as in America there is that love of the' “Alma Mater® which is not at all to be found on the continent of Europe. In the larger cities of America are to be found clubs of the gradu¬ ates of the various institutions which hold them by close ties to the institutions from which they were graduated. There the student life and customs take a longer lease of life, especially at the time of the great intercollegiate athletic contests.

On the continent of Europe there is" no such broad development of student life and customs as is found in Great Britain and America. The usual absence of dormitories or living halls in the great universities of Ger¬ many, France, Italy and Spain, the treatment of the universities as great day schools, the common practice of the students to take some semesters of academic work in one institution and some in another, the slight development of athletics, and other minor factors have caused the failure to develop that variety of student life and customs and that abiding affection for the ((Alma Mater® found in English-speak¬ ing countries.

Student life and customs in schools of ele¬ mentary and secondary grade were under the same repression as the colleges during the Middle Ages and came out from under it far less slowly than the latter. The tendency to imitate the higher institutions was very strong in all countries, and during the 19th century the secondary institutions reflected the student life and customs of the colleges and the ele¬ mentary schools reflected those of the second¬ ary. In large institutions of the latter grade, particularly in America, are to be found the same periodical publications, athletic sports and contests, literary clubs and fraternities, the same cohesive grouping of the student body, the same affection for “Alma Mater® as are found in the colleges. In a lesser degree and on a smaller scale the large elementary schools reproduce the same life.

The drunkenness and licentiousness which used to prevail in American colleges previous to the close of the 19th century had very largely disappeared in the earlier years of the 20th. College pranks resulting in the destruc¬ tion of property had become fewer in number and <(rough house® tactics in secondary school life had ceased to be so fashionable. In the matter of the elimination of drinking in the colleges, America had progressed far more rapidly than the countries of Europe. Duelling such as prevailed in German universities had never taken root in America.

The establishment of academies and, later, colleges for girls in

America in the 19th cen¬ tury led to their own development of college life and customs. These very rapidly took on the color of almost exact imitations of those which had grown up in the institutions for men. The publications, literary clubs, sororities (in¬ stead of fraternities) and even athletic con¬ tests resembled those of the men. Though drinking never prevailed to any extent, cigar¬ ette smoking among the young women in Amer¬ ican colleges is on the increase.

As the secondary and elementary schools for boys imitated in the life and customs of the students the doings of the colleges for men, so the elementary and secondary schools for girls tended to imitate the colleges for women.

In England such close imitation of the life and customs of men's institutions by the women is not found, and on the continent of Europe the life and customs in institutions for girls is very much more restricted. In fact there is about them the same atmosphere that pre¬ vailed about the institutions for boys in the earlier Middle Ages.

Bibliography. — No one book covers the subject in all ages, in all countries and in educational institutions of varying grades. In¬ formation must be sought in treatises on edu¬ cation covering various periods of history and separate countries, and even separate institu¬ tions. (For an extended list of books see the bibliographies referred to in the article : Edu¬ cation, History of). Information of particular value will be found in the following: Alex¬ ander, (The Prussian Elementary Schools> ; Becker-Goll, ; Capes, 'University Life in Ancient Athens) ; Converse, 'Wellesley5 ; Corbin, 'An American at Oxford) ; Farrington, 'French Secondary Schools> ; Findlay, 'Arnold of Rugby) ; Fulton, 'College Life5; Goll on Becker's 'Gallus5 (II, p. 61); Haskins, 'Life of the Mediaeval Students as Revealed by their Letters1* ; Hill, 'Harvard by an Oxonian) ; Hinchman, 'The American SchooP ; Jones, 'Girton5 ; Keppel, 'Columbia) ; Mahaffy, 'Old Greek Education5 ; Maspero, 'Life in Ancient Egypt and Assyria5 ; Paulsen, 'The German Universities5 ; Rait, 'Life in the Mediaeval Uni¬ versity5 ; Rashdall, 'Universities of Europe in the Middle Ages5 ; Risk, 'America At College5 ; Russell, 'German Higher Schools5 ; Sheldon, 'Student Life and Customs5 ; Taylor and Haight, 'Vassar5 ; Tennyson, 'Cambridge from Within5 ; Von Engeln, 'Concerning Cornell5 ; Walden, 'The Universities of Ancient Greece5 ; Wilkins, 'Roman Education.5

James Sullivan,

Director of the Division of Archives and His¬ tory of the University of the State of New York.

STUDENT OF SALAMANCA, The (‘El-

estudiante de Salamanca5), an admirable fan¬ tastic legend in verse by the brilliant, erratic Spanish genius, Jose de Espronceda (1810-42). It appeared in a collection of the au¬ thor’s poems published in 1840, and has since appeared in popular collections of the author’s lyrical productions, such as the ‘Biblioteca uni¬ versal,5 easily procurable. The hero of the poem, Don Felix de Montemar, is a new Don Juan, who has deceived his sweetheart, the beautiful, tender and loyal Dona Elvira, and killed her brother, Don Diego de Pastrana, wJio sought to avenge his sister. In the profligate Don Felix, a sublime and rebellious spirit, seek¬ ing pleasure and forgetfulness of his crime in the most violent emotions, the poet has drawn a picture of himself, yet painted blacker by far than reality reveals. For Espronceda seems to take pride in astonishing by his audacity and his moral cynicism and in giving a certain air of attractive grandeur to vices which he

affects but does not have. There is hardly any¬ thing in literature richer, more weird and fan¬ tastic than the description of the impious and unterrified Don Felix following the phantom who leads him along the shadowy way to the abodes of death where Don Pastrana, placing the phantom’s hand in that of the Satanic Montemar, tells him that at last the promise made to Elvira is fulfilled, and Don Felix, struggling in vain, expires amid countless shades of the nether world. In this exquisite poetic creation, made so largely by the many varieties of verse forms adapted to the par¬ ticular situations, which render the production well nigh impossible of translation, may be divined something of the brief life of this romantic genius. The influence of Byron, Goethe and Leopardi is apparent. Capable of equaling each of these great geniuses, Espron- ceda in his brief career did not produce suffi¬ cient to make his poetic power so effective a reality. Consult for the poem, biography and commentary, the authoritative work by Don Patricio de la Escosura and Dona Blanca Espronceda de Escosura, (Obras poeticas y escritos en prosa de Jose de Espronceda> (Madrid 1884). James Geddes, Jr.

STUDENT SELF-GOVERNMENT.

Student self-government as an organized sys¬ tem is the product of modern times and of democratic ideas. In its ideal form it must not be confused with systems of government of one roup of pupils by an

older pupil set over them y an appointment from a teacher or the head of the school. Such systems of maintaining good order in the schoolroom and out of it existed in the Middle Ages and continued down into our own day under the names of prefec- tural and monitorial systems. Though these involved the government and sometimes even the teaching of students by students, there was little about them to warrant their being called self-government systems.

Strictly defined self-government of students implies the existence of a system under which the students elect their own leaders or com¬ mittees to see that school or college rules are obeyed and that violators are punished. Even though in the background the supreme authority of the school or college officials is always present, it is never so apparent as to disabuse the student body of the idea that it is to all intents and purposes governing iself.

The most advanced steps in student self- government under such a definition have been taken in America. The development of a great number of extramural activities on the part of college students led quite naturally to the or¬ ganization of governing bodies for such pur¬ poses almost entirely free from control by col¬ lege officials. In fact in some cases the abuses of self-government in such matters became so great that the college officials and the alumni had to interfere to set things right and to impose a supervision which had not previously existed. Nevertheless the influence of self- governing action in their own affairs made for the development of self-reliance and character and both college officials and students found it was but a short step to granting the participa¬ tion of the students in matters heretofore deemed the business of the professional staff of the college.

One of the first of these steps was that of self-government in the examination room. This has commonly been defined as the <(honor sys¬ tem. M Before its institution one or several college officials were deputized to guard the examination room to prevent cheating. Under the new system these officials were withdrawn and the students put on their honor not to cheat and in some institutions to report those whom they saw cheating. In general the sys¬ tem has come into vogue far more widely in the colleges of the South and West than in those of the Northeast. Another development has been in taking resident officials out of the dormitories or living halls of the students and placing reliance on the honor of the latter to commit no infractions of the college rules and to report students guilty of such. Still another development in some colleges has been the elec¬ tion by the students

of a committee which takes up the matter of disciplining students and acts in consultation with members of the fac¬ ulty in important questions affecting the students.

In some colleges the attempt to put these measures of student self-government through have met with failure whereas in others they have been a success. In the latter case reports would indicate that although some weaknesses are discovered, the general conditions are no worse and are sometimes a good deal better than when all of the government was directly in the hands of college officials. The most serious difficulty encountered is in getting students to play the part of informer even though the information given is secret and in¬ violate.

The development of self-government in American public elementary and high schools grew from somewhat different motives. At first it came into vogue through the desire on the part of teachers to teach civics or civil govern¬ ment in a graphic manner. Inspired by such a motive they organized their classes into school cities and States, and sometimes the whole school was organized into a great gov¬ ernmental institution with legislative, execu¬ tive and judicial departments and an array of government officials. This organization was in many cases used as a self-governing body, but, as was the case with the colleges, some were successful and some were not. It usually depended upon how much backing and time the school teachers and officials were willing to give to it, or how much they were able to simplify and modify the structure to meet the purposes of self-government. The enthusiasm of a teacher or a principal made up for much, and in almost all cases there is evidence of a certain artificiality and a feeling that the school official is constantly behind the scenes to make the wheels of self-government work smoothly. The value of the systems is not always so much in what the students accomplish as in the development of character which such sys¬ tems may produce. Teachers in high schools have sometimes reported very adversely on students coming to them from self-governing elementary schools and sometimes very favor¬ ably.

The extramural athletic and social activities of the secondary and elementary schools were for a long time exclusively in the hands of the

students and thought to be no affair of the school authorities; With the

great increase in their variety and importance, especially in in¬ terscholastic contests, the governing hand of the teacher or principal had to enter. A large measure of self-government, however, is left to the student body, the principal or teacher acting as an adviser and only exercising a power of veto in extreme cases. The amount of self-government in such matters is less for the secondary schools than for the colleges and is more than for the elementary school, a fact naturally due to the differences in the ages of the students.

Whether the large amount of self-govern¬ ment allowed to students in some of our col¬ leges, secondary and elementary schools is go¬ ing to be productive of the good results claimed for it only the future will tell. A survey of the field at present would seem to indicate that the American youth has not that law-abiding quality which is found in Old World communities where the hand of authority and the demand for obedience lies far more heavily. Opponents of the system maintain that lawlessness and fail¬ ure to obey the command of governmental agencies have increased since the discipline and control of the school has been relaxed. Its supporters, however, say that such symptoms are due not to the self-government plan, but to the great preponderance of women teachers in the schools, to the heterogeneous character of our population and to the fact that in every new land where people foreign to each other in race, language and tradition lack for many years the proper ideals and common standards found in older and well-established nations.

Bibliography. — See general bibliographies under Education, History of. Much material is to be found in the files of current educational publications (consult Poole's Index) and in the proceedings of professional organizations of teachers such as the National Education As¬ sociation. Consult Birdseye, (The Reorganiza¬ tion of Our Colleges) and individual Train¬ ing in Our Colleges) ; Cranson, (Pupil Self- GovernmenP ; Fulton, (College Life) ; George, (The George Junior Republic ; Gill, (School City) ; Morehouse, (The Discipline of the SchooP ; Thwing, (A History of Higher Edu¬ cation in America, *(The American College,* and (College Administration. *

James Sullivan,

Director of the Division of Archives and His¬ tory of the University of the State of New York.

STUDY CLUBS. See Supplemental Edu¬ cation.

STUFFING-BOX, in machinery, a con¬ trivance for securing a steam,

air or water tight joint when it is required to pass a movable rod out of a vessel or into it. It consists of a close box cast round the hole through which the rod passes, and in which is laid, around the rod and in contact with it, a quantity of hemp or other material called packing, this packing being lu¬ bricated with oily matter. The stuffing-box is used in steam-engines, pumps, on the shaft of a screw-steamer where it passes through the stern, etc. See Piston.

STUHLWEISSENBURG, stool-vis'sen- boorg, Hungary (Hungarian, Szekes Fejervar, sa'kesh-fe'har-var ; Slavonic, Bieligrad), free

city, capital of a county of the same name, 30 miles southwest of Buda. It was built in the 11th century, and during five centuries was the place where the kings of Hungary were crowned. It has declined from its former im¬ portance, and has a poor appearance, though it contains some good buildings, among which are the splendid cathedral of the Virgin Mary, the church of Saint John and the bishop's palace. It has a theological seminary, a Catholic gymnasium, a military academy and various other educational establishments. The manu¬ factures consist of cotton and woolen cloth, flannel, leather, knives, etc. In 1543-1601 and 1602-88 it was held by the Turks. Pop. 36,625.

STUMM-HALBERG, stum-hal-berk, Karl Ferdinand, German manufacturer and political leader: b. Saarbriicken, 30 March 1836; d. Schloss Halberg, 8 March 1901. He studied at the universities of Bonn and Berlin and, in 1858, took up a share in the management of his ancestral estate consisting of iron works on the Saar, Neunkirchen, Dillingen and Bur- bach. In 1875 he became a partner and carried the works on successfully under difficulties. He led a squadron of Uhlans in the war of 1870-71, after being three years a member of the Chamber of Deputies. He was member of the Reichstag till 1881 and again in 1889. In 1882 he became a member of the House of Lords and was created baron in 1888. As member of the Reichspartei he upheld the agrarian and Socialists' policy of Bismarck. He favored the protection tariff reform of 1879 as well as the protection of the laborer, on whose behalf he did much in the iron workshops yet fighting against Social Democracy at the same time. A monument was erected (1902) in his memory at Neunkirchen.

STUMP-TREE. See Kentucky Coffee- tree.

STUMPF, stumpf, Carl, German psycholo¬ gist and physician: b. 21 April 1848, at Wies- entheid, Bavaria. Studied at Bamberg Gym¬ nasium and the universities of Wurzburg and Gottingen. He taught in

Gottingen from 1870, became professor of philosophy at Wurz¬ burg (1873), Prague (1884), Munich (1889), Berlin (1894). From 1907 to 1908 he was rector of the Berlin University. His works concern¬ ing the psychology of music are numerous, such as (Musik-Psychologie in England *(in Vierteljahrschrift fur Musikwissenschaft 1885); <Tonpsychologie) (1883-90) ; (Beitrage zur Akustik und Musik Wissenschaft* (1898- 1913). Other notable works are (Tafeln zur Geschichte der Philosophy (1900-03) ; and his (Philosophischen Reden und Vortrage* (1910), etc.

STUNDISTS, ston'dists, members of a political and social faction in Russia, known also as Russian Baptists. Originally the Stun- dist movement was religious and would have re¬ mained thus except for government interference. The orthodox priests, aided by the police and the courts, entered upon a vigorous campaign of persecution, with the result that the Stundist movement developed into political and social radicalism. From association with their foreign brethren, the Russian Baptists gained some knowledge of the political institutions of other countries where the state did not interfere with

the religious beliefs of its citizens. There were among them moderate liberals, with whom the paramount issue was the separation of the Church from the state and a constitutional gov¬ ernment, as a guarantee of religious and civil liberty. The development of political aspira¬ tions among the Stundists brought into the ranks the most intelligent class of the Russian peasantry, whose influence spread in spite of persecution and undoubtedly was a serious fac¬ tor in paving the way for the Revolution of 1917. The Stundists are strongest in Bessarabia and in Little Russia. Consult Dalton, H., <Der Stundismus in Russland) (Giitersloh 1896) and Heard, A. F., (The Russian Church and Rus¬ sian Dissent* (London 1887). See also Nihil¬ ism.

STUPART, Robert Frederic, Canadian meteorologist : b. near Toronto, Ontario, 1857. He studied at Upper Canada College, entered (1872) the service of the government meteoro¬ logical department and served several years at the Toronto Magnetic Observatory. From 1884-85 he was meteorological observer in the Hudson Strait expedition, and became director of meteorological service and director of the Toronto Magnetic Observatory. He was elected president of the

Royal Astronomical Society of Canada (1902-03), and president of the Cana¬ dian Institute (1906-07).

STURDEE, Sir Frederick Charles Dove- ton, English admiral : b. 1859. He entered the navy in 1871 and served in the Egyptian War of 1882; assistant to the director of Naval Ord¬ nance, 1893-97; became captain in 1899 and com¬ manded the British force in Samoa in that year; rear-admiral in 1908. From 1900 to 1902 he was assistant director of naval intelligence, be¬ came chief of staff in the Mediterranean fleet in 1905 and in the Channel fleet in 1907. He was made rear-admiral of the First battle squadron in 1910, and commander of the second cruiser squadron in 1912. At the outbreak of the Euro¬ pean War Vice-Admiral Sturdee was chief of the war staff at the Admiralty. After the disas¬ trous engagement off Coronel (q.v.), resulting in the loss of Admiral Cradock (q.v.) and three ships, Sturdee was dispatched with a squadron to deal with the German Admiral von Spee. The squadron arrived at Port Stanley in the Falkland Islands (q.v.) on 7 Dec. 1914, and early next monring, as if by arrangement, the five German battleships accompanied by two transports arrived off Port Stanley from the direction of Cape Horn. Von Spee expected to find only the remnants of Cradock's squad- don, the Canopus and Glasgow , and also in¬ tended to seize the wireless station, at which a shell was fired at 9 a.m. Half an hour later, on coming abreast the harbor mouth, he saw the strength of the hidden British squadron. He hastily put to sea, and Sturdee's command steamed out in pursuit. The running fight lasted all day, and by nightfall Von Spee had gone down with four of his ships and the two transports, only one, the Dresden, making her escape. That vessel, however, was sunk on 14 March 1915. See War, European: Naval Operations.

STURE, stoo're, Sten, regent of Sweden : d. 1503. He was a nephew of Charles VIII and became regent upon the death of the latter in 1470. In spite of the opposition of the nobility

and the claims of Christian I of Denmark to the Swedish throne by the restoration of the Kalmar Union, he retained, with a short inter¬ mission, his position as the ruler of Sweden until his death. His reign was characterized by prosperity and intellectual progress among the people. He founded Upsala University, and introduced the art of printing into Sweden. The family of Sture became extinct in 1616.

STURGEON, William, English physicist: b. Whittington, Lancashire, 22 May 1783; d. 4 Dec. 1850. His education was begun in the army, where he received, through the aid of his officers, instruction in Latin, Greek and mathe¬ matics, which enabled him to read scientific books

and to follow in particular his desire for a knowledge of electricity. His experiments begun during this period attracted attention on his settlement in Woolwich as a private citizen, and in 1823 he became widely known for his experiments with Ampere's rotary cylinders, and in the same year constructed the first soft iron electro-magnet. In 1832 he developed a ma¬ chine which produced the greatest electric cur¬ rent then known, and during the remainder of his life was engaged in many valuable experi¬ ments. He founded the first electrical journal — the Annals of Electricity — in 1836. His chief writings are included in his Scientific Re¬ searches *(1850). He also wrote Experimen¬ tal Researches in Electro-Magnetism, Galvan¬ ism, etc.* (1830) ; (Lectures on Electricity* (1842); (Twelve Lectures on Galvanism) (1843). Consult Smith, (Centenary of Science in Manchester (1850).

STURGEON, ster'jon, a family (Acipen - seridce) of fishes, now generally considered to constitute, with or without the paddle-fishes (Polyodontidce) the distinct order Chondrostei. Formerly the sturgeons were classified as carti¬ laginous ganoids, an arrangement which ichthy¬ ologists no longer find adequate. This group is considered to be one of the primary divisions of the Teleostomi, and the modern sturgeons to be the degenerate descendants of the more highly developed extinct forms. This degeneracy is expressed in the deficiency of the skeleton in numerous respects.

The sturgeons are bulky fishes of elongated form. The snout is conical and tapering. The mouth, which is small, toothless and protractile, is situated on the under surface of the muzzle, and is preceded by four tentacle-like filaments or barbules. The eyes and nostrils exist at the sides of the snout. The head is completely in¬ vested by ganoid plates, some of which are median, while on the body these plates are ar¬ ranged in five longitudinal rows with smaller plates between. The tail is heterocercal, or un¬ equally lobed, and is provided with bony spines along its upper margin. A single dorsal fin is present and placed far back, as are also the anal and ventral fins. Spiracles or apertures for the admission of water to the gills exist on the upper aspect of the head. The opercula or gill-covers are of large size, but imperfectly os¬ sified and the branchiostegal rays are wanting. There are four pairs of gills and a pair of pseudobranchiae on the opercula. The internal skeleton is chiefly cartilaginous, though the weak maxillary, premaxillary and dentary bones, serving as supports for the jaws, are ossified as are also the cerato-branchials. A persistent

notochord is surrounded by partly segmented cartilaginous vertebrae. A remarkable feature of the shoulder-girdle is the presence of an in¬ terclavicle. Among features of the soft anat¬ omy are to be noted the presence of an elaborate spiral valve in the rectum, of pyloric caeca, of a large swim-bladder communicating with the oesophagus by a duct but without any highly vascular respiratory area, of several series of valves in the bulbus arteriosus, or base of the aorta, and of distinct funnel-shaped oviducts. All of these characters separate the sturgeons from the more highly specialized spiny-rayed fishes. Two to four genera and from 20 to 50 species have been recognized by different au¬ thors, the disparity arising from the great changes undergone by these fishes in the course of their growth. All are found in the northern hemisphere and most of the species are anadro- mous, living in the sea except at the time of reproduction, when they migrate up the rivers to fresh water for the purpose of spawning.

The latest authorities on the North Ameri¬ can species give six as belonging to our fauna, five of the genus Acipenser; and one of Scaphi- rhyncliops. All of them are of more or less importance as food fishes. The common stur¬ geon (A. sturio) is common to the Atlantic coasts of the United States and Europe. This and the related species are distinguished by minute characters in the shape, sculpturing,

number, etc., of the large shields, the propor¬ tions of snout, fins and other similar characters for which the reader is referred to the literature cited. On our coasts the common sturgeon is found from New England to the Carolinas, entering rivers in the spring. In the Delaware River they appear in April and remain until September, the eggs being deposited during the early summer, being forced out by the female as she rubs her belly over rocks, stubs or other hard objects to which the eggs adhere after their immediate fertilization by the male. They are blackish in color, very glutinous, about a ninth of an inch in diameter and their number very great, not less than one to two and one-half millions being produced by each large female, and the ovaries at the time of maturity are so bulky that they constitute fully one-third of the fish's weight. Although so large the stur¬ geon feeds almost entirely on small mollusks, annelids, crustaceans and dead animal matter which it digs from the mud with its pointed snout, detects with its sensitive tentacles and sucks in with its small toothless mouth; to a great extent it is a scavenger. At times small fishes are also devoured in considerable quan¬ tities and that it may display considerable agil¬ ity is attested by its occasional leaps from the water. The sturgeon reaches a length of from 5 to 10 feet, and a weight of 500 pounds, though examples of that size are now exceedingly rare. Formerly this fish was exceedingly abundant, a fact frequently mentioned by colonial and other early writers.

In the Delaware River, where the chief sturgeon fisheries exist, it was not valued pre¬ vious to the last 60 years, but when captured was thrown away or an entire fish of several hundred pounds sold for 25 cents as hog food. The importance of the fisheries dates from about 1870, but they have been prosecuted so recklessly that they have been already nearly

depleted. Drift gill-nets are the chief means of capture. They are set on the flood tide and when the bobbing of the floats indicates the enmeshment of a fish, are drawn and the cap¬ tive, which is singularly docile, removed. The flesh is sold fresh or smoked and is valued chiefly by the foreign population of the large cities. It brings a high average price in the market. The roes fetch a higher price and are immediately removed and worked through a wire sieve to separate the eggs, which are then placed in a brine of salt and boracic acid or similar preservative. After a sufficient treat¬ ment they are thoroughly drained and packed in oaken kegs or cans. This product is the cele¬ brated caviar of the Russians. Vinegar seems to be no longer employed in the preparation of caviar in America. Besides using the flesh and roes for food the swim-bladders of the stur¬ geon are largely employed in Europe in the manufacture of isinglass. This substance is

prepared by washing the sound in fresh water, and then carefully dried. The outer coat is then peeled off, the inner coat being cut into lengths or staples, which afford the isinglass. The stur¬ geon was celebrated among the ancient, for we find that in the palmy days of the Roman Em¬ pire sturgeons, profusely decorated with flow¬ ers, were borne in triumph to table. In the Volga, sturgeons are captured by driving piles at close distances so as to form a barrier across the river; by this barrier the fishes are forced into an enclosure, in which they are trapped and readily seized. Formerly any sturgeon cap¬ tured in the Thames above London Bridge might be claimed by the lord-mayor, while one caught elsewhere might be claimed by the king as a <(royal);> fish. This custom doubtless arose from the high esteem in which the flesh was held by former sovereigns. Henry I is said, indeed, to have prohibited its use at any but his own table.

The white, Oregon or Sacramento sturgeon (A. transmontanus) , is a still larger species, reaching a length of 13 feet and a weight of 1,000 pounds, found on the Pacific Coast. It is captured in considerable numbers in pound-nets and on set-lines in the Columbia and Sacra¬ mento rivers. It furnishes caviar, and smoked or frozen flesh, which is shipped East. This species is said to feed chiefly on minnows. The lake sturgeon (A. rubicunSus) lives in the up¬ per Mississippi Valley, in the Great Lakes and other smaller lakes of the central United States and Canada. It seldom exceeds 50 pounds in weight, but is the object of important fisheries in Lakes Erie, Ontario and Lake of the Woods. It feeds on snails, crayfish and insects. The green sturgeon (A. medirostris) of the Pacific is of little value as food, though not poisonous as often stated, while the Atlantic short-nosed sturgeon (A. breviro strum) is disregarded on account of its small size. Scaphirhynchops has a broad flat snout, no spiracles, and a complete covering of bony plates on the base of the tail. Besides several Asiatic species, the white or shovel-nosed sturgeon (S . platyrhynchus) is common throughout the Mississippi Valley and beyond, and although seldom exceeding two feet in length is much valued for food.

The family Polyodontidw or paddle-fishes are sturgeon-like fishes sometimes placed in a separate order and distinguished from the true

sturgeons especially by their remarkably pro¬ longed spatulate snouts, the absence of maxil¬ lary bones and the smooth unarmored skins. P sephurus gladius is found in the rivers of China, Polyodon spathula in

the rivers of the Mississippi Valley. This remarkable fish stirs up the mud of the bottom with its long paddle and strains out the small organisms so exposed by means of its filter-like gill-rakers, and swal¬ lows them. It breeds in the ponds and bayous connected with the upper parts of the rivers or in the shallows of lakes. It is captured in seines and on set-lines and the product of the fisheries is utilized in the same manner as other sturgeons. The important centres of this fish¬ ery are along the lower Mississippi and in Lake Pepin, Minn.

The sturgeon fisheries of all parts of the country are in serious danger of being de¬ stroyed, but the above data indicate that the evils of overfishing, etc., have been most harm¬ ful in the Delaware River. Several attempts to propagate the sturgeon artificially have been made by the Fish Commission, but the peculiar difficulties resulting from the methods of the fisheries and the mode of reproduction of this fish have up to the present proved insurmount¬ able.

Bibliography. — Jordan and Evermann, (Fishes of North and Middle America) (Vol. I, Washington 1896) ; Ryder, (Sturgeons and Sturgeon Industries of the Eastern United States) (Washington 1896) ; Cobb, (Sturgeon Fishery of the Delaware River, > Reports of the United States Fish Commission (Washington, annually) ; Langworthy, Eish as Food> (Farm¬ ers' Bulletin 85, United States Department of Agriculture, Washington 1905) ; Lankester, (Treatise on Zoology) (London 1909) ; Jordan,

(Fishes > (New York 1907) ; (Cambridge Nat¬ ural History> (Vol. VII, London 1904) ; Goode, (American Fishes) (New York 1888) ; Gunther, introduction to the Study of Fishes* (Edinburgh 1880).

STURGEON BAY, Wis., city, county-seat of Daor County, on Sturgeon Bay and on the canal which connects Green Bay with Lake Michigan by a short route and on the Ahnapee and Western Railroad. It is about 40 miles northeast of the city of Green Bay. The bay is a good harbor about eight miles long and from one to three miles wide. The city is in an agricultural region, formerly an extensive lumbering region. Sturgeon Bay exports large quantities of grain and lumber. Its in¬ dustrial establishments include box factories, flour mills, foundries, machine shops, ship¬ yards, canneries, stone quarries, etc. There is a State fish hatchery here. The city has also a public library, government lighthouses, Indian burial-ground and Peninsula State Park. Pop.

(1920) 4,553.

STURGEON FALLS, Canada, town and outport of Nipissing District, Ontario, on Lake Nipissing and on the Canadian Pacific Railroad. It is 385 miles west of Montreal, and has paper and other mills. Pop. 2,199.

STURGIS, Richard Clipston, American architect : b. Boston, 24 Dec. 1860. He was graduated at Harvard in 1881, studied architec¬ ture in London, England and began practice in Boston in 1887. He was a member (1904-

09) of Sturgis and Barton Company, but has since been alone. He was architect of Frank¬ lin Union, Boston, Brookline Public Library building, First National Bank building, Bos¬ ton and the Cathedral, Manila, etc.

STURGIS, Russell, American architect and author: b. Baltimore, Md., 16 Oct. 1836; d. New York, 11 Feb. 1909. He was graduated at the College of the City of New York in 1856; studied architecture in Europe and practised his profession, 1865-78, retiring because of fail¬ ing health. He devoted his attention to the artist societies of New York City and to writ¬ ing and lecturing on art subjects. He edited the art sections of the Century and Webster's UnternationaP dictionaries and of Johnson's (later Appleton's) (Universal Cyclopedia *; con¬ tributed largely also to the (New International Encyclopaedia* and the Encyclopedia Amer¬ icana. * He was editor and chief author «of the dictionary of Architecture and Building) (1901-02), and edited the department <(The Field of Art® in Scribner's Magazine after Jan¬ uary 1898; also issued a revised edition of Lubke's (Outlines of the History of Arts, *completely revised and brought down to date (1904). He was the author of the (Manual of the Jarves Collection of Early Italian Pic¬ tures, } published by Yale College (1868) ; European Architecture, a Historical Study* (1896) ; (Annotated Bibliography of Fine Art *(1897) ; (How to Judge Architecture) (1903) ; (The Appreciation .of Sculpture* (1904) ; (The Interdependence of the Arts of Design* — the Scammon Lectures for 1904 (1905) ; numerous critical monographs in different periodicals.

STURGIS, Mich., city in Saint Joseph County, on the Grand Rapids and Indiana and the Lake Shore and Michigan Southern rail¬ roads. It is 36 miles southeast of Kalamazoo and has manufactures of furniture, plumbers' woodwork, shears, a foundry, etc. Pop. 5,995.

STURLUSON, stoor'la-son, Snorri, Ice¬ landic author and politician: b. 1178; d. Reyk- holt, 22 Sept. 1241. He was well educated in Scandinavian history, mythology and poetry. He soon rendered

himself popular by his brav¬ ery on the field and eloquence in the assem¬ blies of the people and was elected by the unanimous voice of the people supreme judge of the island. In 1213 he composed his first poem which became widely known, a panegy¬ ric of Hako IV, king of Norway. In 1218 he paid a visit to Norway, where he was well received by Jarl Skule, who loaded him with rich presents and high dignities on the eve of his return to Iceland in 1220. In 1237, being forced by feuds to leave Iceland, he made a second voyage to Norway, where he was once more warmly welcomed by Skule, now become duke. Snorri composed some poetical pieces warmly laudatory of his patron, and promising him success in the struggle going on between him and Hako V. That prince forbade Snorri to return to his native land, but the order was unheeded, and Sturluson, being informed of the decline of the power of his enemies, re¬ turned to Iceland in 1239, and was there mur¬ dered. His principal work, which he com¬ pleted about 1230, is the <Heimskringla) (Cir¬ cle of the World), in which he records the lives tof the legendary and historical kings of

Norway down to the death of Magnus Erlings- son in 1177. It was translated into Danish by Peder Clausson, and published in Copenhagen by Olaf Worm in 1633. A recent edition is that by Jonson (1893 onward). The work has also been translated into German, Norwegian, Swedish, Latin and English (by S. Laing, 1844; new ed. by R. B. Anderson, 1889; by W. Mor¬ ris and E. Magnusson, 1893-94). He com¬ posed numerous eulogistic poems on the princes and jarls whose courts he had visited; and wrote, it is believed, the first part QGylfa- Ginning5) of the (Snorra-Edda,5 or ‘Younger Edda.5 See Eddas, The.

STURM, stoorm, Jacques-Charles-Fran-

cois, French mathematician: b. Geneva, 29 Sept. 1803 ; d. Paris, 18 Dec. 1855. He studied at the Geneva College, passing the course be¬ fore his 14th year, to enter the Academy course. He became teacher to the son of Madame de Stael. . In 1827 he was awarded the grand prize in mathematics and by 1829 he had pro¬ pounded his great theorem “the solution of numercial equations,® which has done so much to assist in the advance of scientific research. He was successively appointed professor of special mathematics at the Rollin College (1830) ; was made member of the Academie des Sciences (1836), succeeding Ampere, and in 1840 he was made professor of analysis in

the Ecole Polytechnique and professor of me¬ chanics to the faculty of sciences. Consult Liouville, ‘Discourse prononce sur la tombe de Sturm,5 in Siecle (1855); Prouhet’s <Notice) in Nouvelles Annates Mathematiques (1856).

STURM, or STURMIUS, Johannes, Ger¬ man educator : b. near Cologne, 1 Oct. 1507 ; d. 3 March 1589. In 1537 he founded the gym¬ nasium in Strassburg which attained world-wide celebrity. He was generally regarded as the greatest educator connected with the Reformed Church. Sturm’s ideal in education was ((to direct the aspiration of the scholars toward God, to develop their intelligence, and to ren¬ der them useful citizens by teaching them the skill to communicate their thoughts and senti¬ ments with persuasive effect.® In carrying out this ideal Sturm showed his superiority by his judicious gradation of the course of study, and by his novel and attractive methods of instruc¬ tion. His influence has been potent in the Ger¬ man system of secondary education down to our own day.

STURM, Julius, German lyric poet : b. Kos- tritz in Reuss, 21 July 1816; d. Leipzig, 2 May 1896. He studied theology at Jena and was pastor at Goschitz, 1851-57 and at Kostritz, 1857— 85. His poems have a decidedly religious or nationalistic trend. Among his published vol¬ umes are (Two Roses; or, the Canticle of Love) (1854) ; ‘Devout Songs and Poems) (1858); ‘Israelite Songs5 (3d ed., 1881); (Poems of Battle and Victory5 (1870) ; Mir¬ ror of the Time in Fables5 (1872) ; (To the Lord my Song5 (1884) ; ‘Palm and Crown5 (1887) ; ‘In Joy and in Sorrow5 (1896) ; (Fiir das Haus5 ; (Lieder und Bilder5 ; (Kampf und Liegesgedichte5 ; ‘Spiegel der Zeit in Fabeln5 ; ‘Kinderleben5 ; ‘Immergriin5 ; (Natur, Liebe, Vaterland.5 Consult the biographies by Hep- ding (Giessen 1896) and Hoffman (Hamburg

1898).

STURT, stert, Sir Charles, English ex¬ plorer: b. Bengal, India, 1795; d. Cheltenham, England, 16 June 1869. He entered the army and in 1825 went with the rank of captain to New South Wales, where in 1827 he headed an ex¬ pedition into the interior of Australia, in the course of which he discovered the Macquarie, Castlereagh and Darling rivers, and in June 1830, while on a later expedition, discovered the important Murray River, which he descended to its mouth. In 1844 he discovered the stony desert in the centre of the Australian con¬ tinent. He was made registrar-general and colonial secretary of South Australia, but his exposure during his expeditions soon rendered him totally blind and he returned to England, where he was knighted just prior to his death. He published (Two Explorations into the In¬ terior

of Southern Australia in 1828-31 5 (2 vols., 1834) ; (Narrative of an Expedition into Central Australia in 1844-465 (2 vols., 1849). Consult Sturt, N. G., ‘Life of Charles Sturt5 (London 1899).

STUTTERING, faulty articulation which results in defective speech. See Stammering.

STUTTGART, Ark., city of Arkansas County, 50 miles southeast of Little Rock, on the Chicago, Rock Island and Pacific and the Saint Louis Southwestern railroads. It has rice mills, pump and screen factories, iron and brass foundries, a saw mill and a handle fac¬ tory. There is a large trade in agricultural produce. Pop. (1920) 4,522.

STUTTGART, stoot'gart, Germany, capital of Wiirtemberg, in the basin of a broad valley, enclosed by vine-clad or wooded hills, near the Neckar, 40 miles southeast of Carlsruhe. Many of the important buildings are grouped near the central Palace square; chief of these are the old and new Schlosser or Palaces, of the 16th and 17th— 18th centuries, respectively, with ex¬ tensive and beautiful grounds, embellished by statuary and fountains. Other interesting feat¬ ures are the numerous princely palaces ; the Konigsbau, with colonnades; Akademie; the Gothic churches of Saint Leonard’s, Saint John and the Hospital Church ; the Queen Olga buildings, on the north side of Castle square, the National Industrial Museum, with lofty cupolas; the Liederhalle, containing an enor¬ mous hall ; the new town-hall, Peace Church, Saint Nicholas, etc. Other interesting feat¬ ures are the numerous collections of antiquities, art, numismatics, archives, conservatory of music, chemical laboratory, schools of art, science and commerce; and the magnificent royal library, which contains about 500,000 vol¬ umes and the largest collection of Bibles in the world (7,300). Stuttgart is one of the most important publishing centres in the world and has a constantly increasing trade. The manufactures include textiles, chemicals, furni¬ ture, carriages, paper, jewelry, bells, cigars, chocolate, pianos, pigments, leather, etc. There is a large trade in hops, cloth and horses. Near the Neckar, at Berg, there are mineral springs, and Carnstatt is a watering-place near the town, connected with it by tramway. Many monuments of German heroes and celeb¬ rities stand in the various squares of the city and in the parks. The town is on the line of several railways. It stands on the site of an

ilifSi

fSl|f€

5§»£««

-?V'

;

IkII

T&Cj-kr?'* WW

; P ■/'•' i

ancient monastery. In the 15th century it be¬ came the residence of German princes and &re at.y improved, being designated the official capital in 1482. Art and science were introduced in the 19th century. Stuttgart was the home of the philosopher Hegel and Hauff, the art critic. The ˆ city is governed by an overburgomaster, assisted by two advisers and a council. Pop. 286,218. Consult Klaiber, otuttgart (in (Europaische Wanderbilder) (Zurich 1892) and Widmann, (Wandering ion?}1 StuttSart und Umgebung > (Stuttgart

STUYVESANT, sti've-sant, Petrus, Dutch director-general of New Netherland: b. Hol¬ land 1592; d. New York, August 1672. He served in the war in the West Indies, became director of the colony of Curasao, and, having lost a leg in an unsuccessful attack on the Portuguese island of Saint Martin, returned to Holland in 1644. In 1645 he was appointed by the Dutch West India Company director-general of New Netherland, succeeding William Kieft, who had involved the settlers in a war with the Indians, and created general disorder. He did not arrive until 11 May 1647, when he commenced a vigorous and often arbitrary ad¬ ministration, conciliating the savages and thoroughly restoring order. In 1650 he ar¬ ranged at Hartford with the New England commissioners a boundary between the Dutch and English territories, previously undefined and a cause of frequent disputes. He was also involved in trouble with the Swedes on the south. In 1651 the Dutch built Fort Casimir on the Delaware, but the post was captured by Rising, governor of New Sweden, in 1654. To revenge this, Stuyvesant in 1655, with seven vessels and about 700 men, sailed into the Delaware, and made a conquest of the whole settlement of New Sweden, calling it New Am- stel. Ten years of peace followed, disturbed only by the growing jealousy of the English, and by the civil discontents which the haughty character of Stuyvesant's administration pro¬ voked. In 1653 a convention of the people, consisting of two deputies from each village in New Netherland, met

and formulated demands that <(no new law shall be enacted but with the consent of the people ; that none shall be ap¬ pointed to office but with the approbation of the people; that obscure and obsolete laws shall never be revived.® This assembly was dissolved by Stuyvesant, who comanded the members to disperse, saying: (<We derive our authority from God and the company, not from a few ignorant subjects.® The encroachments of the New England colonies at last induced Stuyve¬ sant himself to lay his remonstrances before the convention of the united colonies at Bos¬ ton, but he met with little favor. A second em¬ bassy to Hartford had no better success. The Connecticut agents made exorbitant claims to territory by virtue of the royal patent. In 1664 Charles II granted to his brother, the Duke of York, the territory from the Connecti¬ cut to the shores of the Delaware, and in August an English fleet under Capt. Richard Nicolls appeared in the bay and demanded the sur¬ render of. the city. The municipality insisted on yielding. After holding out for a short time, the governor at last consented, and the

city was surrendered 3 Sept. 1664. After the capture Stuyvesant in 1665 left to report to his superiors in Holland, but afterward returned, spending the remainder of his life on his farm or bouwerij (whence the name of the street called Bowery). He lies buried in the vaults of Saint Mark's Church. The semi-burlesque account .of him by Irving in the Knicker¬ bocker's History) is well known. Consult Ab¬ bott, J. S. C., (Peter Stuyvesant *(New York 1898) ; Tuckerman, Bayard, (Peter Stuyvesant* (ib. 1893) ; Van Rensselaer, Mrs. S., (History of the City of New York in the Seventeenth Century* (2 vols., ib. 1909) ; O'Callaghan, E. B„ (The History of New Netherland) (ib. 1848).

STY, or STYE, an inflammatory swelling about the follicle of an eyelash, known in sur¬ gery as hordeolum. It resembles a grain of barley, and is strictly only a little boil which projects from the edge of the eyelid, mostly near the great angle of the eye. It is of a dark red color, much inflamed, and much more painful than might be expected, considering its small size, partly owing to the vehemence of the inflammation, and partly to the exquisite sensibility and tension of the skin which cov¬ ers the edge of the eyelid. On this account a sty often excites fever and restlessness in deli¬ cate, irritable constitutions ; it suppurates slowly and imperfectly; and when suppurated has no tendency to burst. It generally bursts in a few days, however, though it is generally better to puncture it. Warm-water dressings with lint and oiled silk should be applied.

STYLE, (1) in chronology, see Calendar; (2) in art, see Painting; (3) in architecture, see Architecture.

STYLITES, stl-H'tez. See Pillar Saints.

STYLOBATE, in architecture, the sub¬ structure of a Greek temple below the columns, sometimes formed .of three steps which were continued round the peristyle, and sometimes of walls raised to a considerable height, in which case it was approached by a flight of steps at one end.

STYLUS. See Pen.

STYPTIC, an application for checking the flow of blood or closing the aperture of a wounded vessel. Oak-bark decoction, gall-nuts in powder or infusion, matico and turpentine are styptics derived from the vegetable king¬ dom; and from the mineral are derived salts of iron, the sulphates of copper and zinc, the acetate of lead and the nitrate of silver.

STYRAX, the typical genus of the family Styracaeae, graceful, spreading shrubs or trees, with entire or serrate leaves, and bearing white five-parted flowers in drooping racemes, often very showy and fragrant. Styrax benzoin of the East Indies and adjacent Asiatic coasts yields, when the bark is wounded, a yellowish- brown resin, which, when heated or rubbed, gives out a balsamic vanilla-like odor. It is a favorite ingredient of incense, perfumes and cosmetics; also a stimulating and healing drug and one of the principal constituents of court- plaster. Styrax officinalis, found in Asia Minor and Syria, has a resinous bark and flowers of orange-blossom-like sweetness. This species formerly yielded the fragrant solid resin, vanilla-scented, and like benzoin, known as

storax, once much used in incense, but which has now disappeared from commerce, its place being taken by the ˆliquid® storax, furnished by Liquidambar, which also was anciently known. Styrax americana is a small shrub, of the south¬ ern United States, which has slender branches, and, in spring, drooping solitary or racemed, bell-shaped flowers, having a faint fragrance, and nearly hidden by the small, oval leaves which are nearly smooth. S. qrandifolia is more pubescent, has larger leaves and more fragrant flowers. Certain Japanese species are in cultivation, and are hardy as far north as Massachusetts, such as S'. japonica and S. obassia.

STYRIA, stir'i-ai, Austria, a province, for¬ merly duchy; area, 8,662

square miles. It is traversed by three Alpine ranges, whose highest points reach in the Grimming at the northwest, and the Eisenhut at the southwest, an elevation of 7,400 and 7,646 feet respectively. The ranges are penetrated by many valleys of different extent; the only level land is at the southeast. Styria belongs wholly to the basin of the Danube, and is dra'ined by the Enns, Mur, Drave and Save. The mountain lakes lie amid beautiful scenery. There is much barren land, and about 20 per cent of the total area is arable; vineyards flourish in certain districts. Fruits abound, and hemp, flax and the poppy are grown extensively. The forests and mines are the staples of wealth, and their products constitute the chief exports. The minerals comprise gold, silver, copper, lead, zinc and the finest quality of iron — besides sulphur, salt and alum. The iron manufactures are the most im¬ portant, including scythes, swords, rails, sheet- iron, wire, hardware, etc. Other manufactures are glass, tobacco, liquors, beer and paper. Pop. about 1,450,000. The population is about 98 per cent Roman Catholic. Graz, the capital, has a population of 151,181. Other large cities are Marburg, Eggenberg and Leoben.

In Roman days Styria was divided between Pannonia and Horicum and was inhabited by the Taurisci, a Celtic people. In the various migrations that swept over Europe Styria was crossed by Visigoths, Huns, Ostrogoths, Lango- bardi, Franks, Arars, Slavs, etc. The Slavs predominated after the 6th century a.d. It was included in the great duchy of Carinthea but was recognized as a separate mark in 1056. It became a duchy about 1192, when it passed to the house of Austria. In 1282 it passed to the Hapsburgs. Consult (Die Oesterreichisch-ungarische Monarchic in Wort und Bild > (Vol. VII, Vienna 1890) ; Gsell-Fels, Thomas, (Die Steiermark) (Munich 1898) ; Imendorfer, Benno, (Landeskunde von SteiermaHU (Vienna 1903) ; von Machar, Albert, (Geschichte der Herzogtums Steiermark5 (9 vols., Graz 1844-74) ; Rosegger, P. K., (Das Volksleben in Steiermark) (Leipzig 1895) ; Mayer, F. M., (Geschichte der Steiermark) (Graz 1898).

STYX, stiks, the name of a river of the infernal regions, in the mythology of the Greeks and Romans. The real Styx was a stream in Arcadia, which is now called the Mauraneria, or Black Waters, and also the Drako-neria, or Terrible Waters, and which was and is con¬ sidered injurious to men and beasts. Souls go¬ ing to the infernal regions were, according to

the ancient myth, ferried across the Styx by Charon.

SU-CHAU, soo'chow', China, the capital of the province of Kiang-su, situated on the Grand Canal east of Lake Tai-hu, and 50 miles west of

Shanghai. The city is surrounded by walls 30 feet high, and the inner portion is intersected by numerous natural and artificial waterways which communicate with the larger channels connecting the city with the Yang-tse-kiang, Lake Tai-hu, Shanghai and Hang-chau. Su- chau is the seat of the provincial college, and contains several interesting pagodas. In the vicinity stands the ancient temple of Hu-kiu- shan. The inhabitants manufacture silks and other cloths, and fine carved and lacquered articles. The city was made a treaty port in 18% by the Treaty of Shimonoseki. Pop. estimated at 500,000.

SUAKIN, swa'kin, or SUAKIM, Nubia, a seaport on the coast of the Red Sea, consisting of two parts joined by a causeway, one part occupying the shore of the mainland, the other the rocky island in the bay. It is the principal town of the district of the same name, in the Sudan. The natives live at El-Keff, the section on the mainland, and here stands the bazaar — a scene of bustling activity, also the barracks occupied by Anglo-Egyptian troops ; beyond are the fountains surrounded by date-groves and orchards. The natives live in tents. The prin¬ cipal manufactures are silver ornaments, knives, spear-heads and leather-work. Trade is considerable, and the chief exports include the above-mentioned articles, besides ivory, gums, millet, cattle, hides and gold. The imports: durra, cottons, . flour, sugar, rice, ghi, dates and coal. This is a starting-point for African pilgrimages to Mecca. The vicinity was the battlefield of the allied British and Egyptian forces against the Mahdi and his Dervish fol¬ lowers. It was for many years a slave port. Pop. about 10,500.

SUAREZ, swa'reth, Francisco, Spanish theologian: b. Granada, 1548; d. Lisbon, 1617. He was one of the most eminent scholastic and polemical writers of the Roman Catholic Church. He entered the Society of Jesuits in 1564, and soon became professor in succession at Valladolid, Rome, Alcala and Salamanca. In 1597 Philip II appointed him principal pro¬ fessor of divinity at the University of Coimbra, a position he held until his death. The most recent edition of his works was completed in Paris in 1860.

SUAREZ MUJICA, Eduardo, Chilean

diplomat : b. Santiago, 1850. He was educated at the Santiago University and became (1882- 1888) Acting Secretary of Foreign Affairs, governor of Atacama (1901-03), member of Congress (1903-09) and Minister of Tustice and Public Instruction (1908). In 1909 he was made Minister to Mexico and Cuba, then (1911) Minister and (1914) Ambassador to the United States. He was a member (1915) of the Niagara Falls Pan-American Conference to dis¬ cuss and

settle the imbroglio with Mexico.

SUB-DEACON, the lowest step in major orders in the Roman Catholic Church and the highest of the minor orders among the Greeks. In the Roman Catholic Church sub-deacons pre¬ pare the sacred vessels and the bread and wine

for Mass, pour the water into the chalice at the Offertory and sing the Epistle; in the Greek Church they prepare the sacred vessels, and guard the gates of the sanctuary. There are no sub-deacons in the Protestant Episcopal Church.

SUBCONSCIOUSNESS, a state of the mind or a process of cerebration similar to those mental states and processes of which we have consciousness, though of this state or process we are unconcious. See Consciousness.

SUBLIMATION, a chemical process by which volatile solids which do not melt are vaporized by heat, and again condensed in a solid form, without passing through an in¬ termediate liquid phase. The operation is com¬ monly conducted either for the purpose of purifying certain substances and disengaging them from extraneous matters, or of reducing them into vapor and combining them while in that form. As all fluids may be volatized by a sufficient degree of heat, and consequently may be separated, in most cases, from fixed matters, so various solid bodies are subjected to a similar treatment. The substance formed by the process of sublimation is called a sub¬ limate. The principal subjects of this operation are volatile alkaline salts, neutral salts, com¬ posed of volatile alkali and acids, as sal-ammoniac, arsenious acid, benzoic acid, mercur¬ ous chloride, indium trichloride, anthracene, iodine, camphor and sulphur. In some cases, by applying the heat under pressure a sub¬ stance which usually sublimes before melting may be first melted and then distilled as in the case of liquids. For instance camphor sub¬ limes at any temperature below 350° F. If confined under pressure it will melt and boil at 400°. However if the vapor from the boiling liquid is passed into a vessel of lower tempera¬ ture it does not deposit as a liquid but as a solid. Sulphur melts to a liquid in the process of sublimation but does not pass through a liquid state in condensing. See Distillation ; Evaporation.

SUBLIME, The, that which, in the works of nature or of art, is grand and awe-inspiring. Longinus, the eminent philosophical critic (3d century), in his work (Peri Hypsus,* (Of Sub¬ limity, > characterizes the sublime in literary composition as that which (< fi 1 1 s the reader with a glorying, and sense of inward greatness® ; but he does not inquire into the nature of the sublime in general. Burke finds the essence of the sublime to consist in terror, acting whether openly or latently. Blair sees the cause of the feeling of pleasurable elation excited by the sublime, a mighty power or force; Kaimes in height or elevation; according to Sir William Hamilton the emotion produced by the sublime is a mingled feeling of pleasure and pain — pleasure in the consciousness of strong energy, and pain in the consciousness that this energy is vain. He distinguishes three phases of the sublime, the sublime of extension or space, of intension or power, and of protension or power, and cites the following passages from Kant as admirably illustrating the sublime in each of these three forms:

“Two things there are, which, the oftener and the more steadily we consider them, fill the mind with an ever new, an ever rising admiration and reverence — the Starry Heaven above, the Moral Law within. Of neither am I compelled to seek out the reality, as veiled in darkness, or only to con¬ jecture the possibility, as beyond the hemisphere of my

knowledge. Both, I contemplate, lying clear before me, and connect both immediately with my consciousness of existence. The one departs from the place I occupy in the outer world of sense; expands beyond the bounds of imagination this connection of my body with worlds lying beyond worlds, and systems blending into systems; and protends it into the illimitable times of their periodical movements — to its commencement and continuance. The other departs from my invisible self from my personality, and represents me in a world, truly infinite indeed, but whose infinity can be tracked out only by the intellect, with which also my connection, unlike the fortuitous relation I stand in to all worlds of sense I am compelled to recognize as universal and necessary. In the former, the view of a countless multitude of worlds annihilates, as it were, my importance as an animal product, which, after a brief and that incomprehensible endowment with the power of life, is compelled to refund its constituent matter to the planet — itself an atom in the universe — on which it grew. The aspect of the other, on the contrary, elevates my worth as an intelligence even without limit; and this through my personality, in which the moral law reveals a faculty of life independent of my animal nature, nay, of the whole material world; at least, if it be permitted to infer as much from the regulation of my being, which a conformity with that law exacts;

proposing as it does, my moral worth for the absolute end of my activity, conceding no compromise of its imperative to a necessitation of nature, and spuming in its infinity, the conditions and boundaries of my present transitory life." See vEstheti cs.

SUBLIME PORTE, port, or OTTO¬ MAN PORTE, the common term for the Turkish government. The chief office of the Ottoman Empire is styled Babi Ali, meaning the High Gate, from the gate (bab) of the palace at which justice was administered; and the French translation of this term being Sub¬ lime Porte, hence the use of this word. See Turkey.

SUBMARINE CABLES. See Cable, Sub¬

marine.

SUBMARINE FORESTS are remains of forests found submerged beneath the present sea-level, and either not at all exposed or ex¬ posed only at low tide. They occur on all coasts, and indicate either a subsidence and sub¬ mergence of the land after the trees had grown to their present size, or an encroachment of the sea and removal of a barrier which separated a low-lying forested area from the sea, which then submerged this area. Submerged trees are known on the Maine, Massachusetts and New Jersey coasts, as well as elsewhere in this and other countries.

SUBMARINE MINES. The Russo-Jap¬ anese and the European wars demonstrated that the most deadly weapons of seacoast and naval warfare are the submarine mine and tor¬ pedo. A single submarine mine exploded at the proper time will disable or sink the largest battleship. The Turkish Coast artillery in clos¬ ing and keeping closed the Dardanelles was pitted against the persistent and combined at¬ tack of the Allied fleets of Great Britain, France and Russia. Submarine mines are prin¬ cipally used in defensive operations within harbors, whereas torpedoes are primarily an element of offensive warfare by warships. Mines are generally classed as fixed and float¬ ing. The fixed or stationary submarine mine is fired by contact, electricity, timing device or fuse. Such mines, which are extensively used by all navies, are rugged in design and may contain large charges of explosives. They are placed in position by submarines and other es¬ pecially equipped mine-laying vessels. Such mines are provided with anchoring devices and are deposited, if possible, in harbors and chan¬ nels of the enemy or in the paths of ocean travel. Floating mines differ from fixed mines

in that they are unanchored, and unless guard boats are at hand to warn friendly vessels of their proximity, may be as dangerous to friend as to foe. Such mines must be, according to the laws of war, designed to become inoperative within a few hours after being set adrift. The German floating mines were often cast adrift in pairs, connected by a line about 100 feet long. If a ship runs between the two mines they are drawn alongside the ship and exploded. Con¬ tact depth mines, which rise to the surface if failing to contact, are sometimes used with tell¬ ing effect. The essence of the depth charge is that it explodes in the vicinity of the submarine or other craft, in case it fails to strike the boat itself. The use of the contact depth mine pre¬ supposes the necessary accuracy to strike the target. The high-explosive mines used by the Germans and other belligerent powers, known as submerged contact mines, when first put in place were so anchored that they were held at a certain distance below the surface of the water. It was intended that they should re¬ main invisible and be exploded when struck by any vessel that might come in contact with them. Such mines may be removed by various methods of dragging or sweeping, such as by sinking a long cable, each end of which is at¬ tached to a tug, and thus dragging a suspected locality.

Submarine mines, fixed and floating, are of three different kinds: (1) Observation mines, fired from shore, when a ship is judged to be within effective range of the explosion; (2) Au¬ tomatic mines, which are self-firing when struck by a ship; (3) Electrical contact mines, which, on being struck by a ship, give notice to an operator on shore, who, by the throw of a switch, fires the mines. As a rule the sub¬ marine mine consists of a metal case, filled with high explosives and fitted with a fuse that may be fired automatically, or at will by an operator located at some distant point. In shallow water the mine is laid on the bottom and is known as a ground mine. When the depth is so great as to interfere with the de¬ structive force of the explosion, the explosive is carried in a buoyant cylinder or sphere, which is anchored to the bottom by a length of cable which causes it to float at the proper depth to be struck by a passing ship. The mines (the type in general use being the electro¬ contact mine) are usually planted in rows across the channel to be defended, the mines in suc¬ cessive rows being ˆstaggered,® so that if a vessel should pass through the first row it must inevitably strike one or more in the fater rows. They are planted in what is known as <(grand groups,® which consist of 21 mines in groups of three. Some distance in the rear of the line of

mines there lies on the bottom of the channel a grand junction box, from which seven cables spread, each leading to a triple junction box, which in turn controls its small group of three mines. From the grand junc¬ tion box, also, the multiple cable winds its way to the switchboard connection in the oper¬ ating-room on shore. The grand junction box is placed at the centre of the line of mines and about 100 feet to the rear. The triple junction boxes are laid in a straight line at intervals of 300 feet; from each of these boxes separate cables lead to each of three mines, the

mines, 21 in all, being spaced 100 feet apart, in a line which extends for 2,000 feet across the channel. Each mine is anchored by a cable to an anchor, the length of the cables being such that each mine will float at a depth of 10 or 12 feet below the surface of the water. By an ingenious arrangement, one, three or the whole grand group of mines can be fired, either from the operating-room ashore, or by contact with a ship, all at the will of the operator. No mine field is complete, or can ever be thoroughly effective, unless it is protected by rapid-fire guns. It is possible for small boats, launches, etc., to be sent forward ahead of the ships, and set off the mines by exploding large charges of dynamite in the mine field. If the mines are within the ˆsympathetic radius® of the explo¬ sions, they will be exploded by the shock. The most effective protection against such counter¬ mining, as it is called, is by flanking the field with batteries of rapid-fire guns.

In the European War, the outstanding anti¬ submarine offensive project was the closing of the North Sea by a mine barrage extending from the Orkney Islands to the territorial waters of Norway, together with a barrage across the Straits of Dover. The plan to close the North Sea, and thereby deny enemy sub¬ marines free access to the Atlantic from Ger¬ man bases, had its inception in the United States Bureau of Ordnance in April 1917, immediately following the entrance of the United States into the war. At this time there had not been developed anywhere a type of mine suitable for the Scotland-Norway line, whereon the depths of water are as great as 900 feet and where a prohibitive number of mines of the then exist¬ ing type would have been required to mine this line from the surface to a depth of 250 to 300 feet. A special mine-loading plant, with a capacity of more than 1,000 mines a day, was established near Yorktown, Va., by the Navy Department, in accordance with Congressional authorization, about 11,000 acres of land hav¬ ing been secured for the purpose. An immense number of mines were stowed at this depot, and it included a mine-loading plant, a mine¬ assembling plant and storage for a large amount of high explosives. More than a score of cargo vessels were placed in service as mine carriers to transport mines to Europe. Many

mine layers, and auxiliary vessels were fitted out and assigned to the execution of the proj¬ ect. The manufacture of the large number of mines required was a work of unprecedented magnitude and necessitated unusual methods. It was clearly impossible, in the time available, to manufacture the mine as a whole in any plant ; therefore, the mine was divided into its many component parts and the parts were sepa¬ rately produced in a large number of industrial factories throughout the country.

The submarine mine was invented by Bush- nell in 1777, improved by Fulton in 1812, fur¬ ther improved by Colt by the addition of the electric element in 1863, carried forward to a complete and practical system of mine defense by Gen. Henry L. Abbott, United States army, and since 1901 further perfected by the United States Coast Artillery corps in its use to the present efficient system of submarine defense of harbors, the planting and exploding of the mines at the right time and with precision be-

ing a most difficult problem, the mathematical features of which are very exacting. See Naval Mines and Torpedoes.

Bibliography.— Biles J. H., (The Protection of Battleships Against Submarine Attacks (En¬ gineering 1914) ; Currey, E. H., (The Menace of the Torpedoˆ (New York 1914) ; Degouy, Admiral, (The Submarine War of 1917> (in Revue des Deux Mondes 1917) ; Domville-Fife, C. W., Submarines, Mines and Torpedoes in the War) (London 1914) ; Fitzgerald, C. C. P., Submarine Warfare* (London 1919) ; Fulton, Robert, (Torpedo War and Submarine Ex¬ plosions, 5 Reprint (New York 1914) ; Newbolt, Sir H., Submarine and Anti-Submarine) (London 1918).

Edward S. Farrow,

Consulting Military and Civil Engineer. SUBMARINE PHOTOGRAPHY, a proc¬ ess of taking photographs under water dis¬ covered by Dr. L. Boutan, professor of zoology at the University of Paris. He has made suc¬ cessful experiments, to the depth of several hundred feet, on the coast of France and in the waters of the Mediterranean. Dr. Boutan in taking these photographs wears the regular diver's suit and extra heavy leaden shoes, so as to get a good foothold on the bottom of the sea. He uses the ordinary outfit of a photog¬ rapher, with the

exception that he has it all protected by water-proof coverings. He places his Leyden jars in a barrel which is surmounted by a bell glass provided with the necessary lamp. The latter is a spirit lamp to which is attached a receptacle for the magnesium powder con¬ nected with the usual pneumatic ball and tube. The photographs are taken by the instantaneous flash which follows the scattering of powdered magnesium into the flame. He has a branch tube connected with the pneumatic ball which forces a puff of air into the powder and carries it into the flame, exposing the lens at the mo¬ ment of maximum light. The pictures taken at the bottom of the sea by this process show no material difference from those produced in the ordinary way by the instantaneous method, with one exception, that the negatives have a pe¬ culiarly soft tone. Since Dr. Boutan's accom¬ plishment many others have succeeded in tak¬ ing under-water pictures of great interest, which from time to time have ornamented pages of the magazines. One enterprising moving picture concern established a submarine outfit in a locality where sharks were common, and actu¬ ally reproduced excellent views of a combat be¬ tween a naked pearl diver and a shark, in which the intrepid diver neatly disposed of the great fish with a long dagger.

SUBMARINE SIGNALING. Submarine signaling is the art of producing sound waves in water and of transforming them into air waves so that they can be heard.

The art of submarine signaling has been directed entirely toward safeguarding lives and property at sea. Sound waves can be trans¬ mitted through water from a suitable source of sound and heard with well designed receiving apparatus at greater distances and with greater certainty than is possible through air with any sound-making device that has ever been pro¬ duced. This fact gave the incentive to those who originally undertook the development of this art. Later, as the knowledge of submarine

signaling increased, it has become possible to determine with considerable accuracy, from a ship moving or at rest, the direction from which the sound is coming and even the distance be¬ tween the ship and the sound-producing de¬ vice. Moreover, the receiving devices have been so far perfected that it is not necessary that the source of sound should be made artificially. The receiving devices can now be made in such a way that the noises of invisible ships moving through the water can be heard and the posi¬ tion of the moving ship relative to the listener ascertained. With the latest forms of sub¬ marine signaling devices it is possible to send and receive telegraph messages transmitted by sound waves through the water. It must be

appreciated that no wires connect the sending and receiving stations. Submarine signaling is wireless communication using compressional or sound waves in water as the means rather than the transverse ether waves used to-day in what is commonly called wireless transmission.

History. — It had been well known for nearly 75 years that sound waves were transmitted through water in the same manner as through air, but to greater distances and with greater velocity (velocity of sound waves in air about

Fig. 1. — Submarine Signaling.

1,040 feet per second; in sea water about 4,900 feet per second). A number of inventors prior to about 1900 had suggested or patented de¬ vices for making or detecting submarine sounds. No consistent or real progress was made until

in 1898 a group of investigators attacked the problem. These investigators and their suc¬ cessors, associated in the Submarine Signal Company, have carried the art to its present high degree of usefulness. A few of those who have made material contributions to the advancement of the art are Arthur J. Mundy, Elisha Gray, J. B. Millet, Lucian I. Blake, E. C. Wood and Reginald A. Fessenden.

Receiving Devices. — The earliest sound re¬ ceiving device for use in water was employed by Colladon and Sturm in experiments made by them in Lake Geneva in 1823. The sound receiver was a large ear trumpet, the small end of which was placed in the observer's ear. The large end was closed with a thin plate and was placed under water. Modifications of this early form are in successful service to-day, but the receiver most commonly used to-day is an elec¬ trical current varying device similar in principle to the telephone transmitter generally used on land lines.

One of the problems in submarine signaling which has been most difficult of solution was to find a way by which the**sound-receiving de¬ vice should be responsive to the noises pro¬ duced by the distant source and, at the same time, would be insensitive or non-responsive to the noises produced by the impact or move¬ ment of the surface waves of the water on the sides of a moving ship, and by the noises of the machinery within the ship. Innumerable means have been suggested for eliminating these foreign disturbing noises called

<(water noises.® Success has been attained by the use of a properly designed microphone element or ˆbutton® mounted in a special form of water¬ tight case, Fig. 1, and, when used on ship¬ board, by suspending the microphones in tanks, filled with water or other suitable fluid. These tanks are located within the ship below the water line and are so arranged that the fluid is in contact with the skin of the ship. It has been found that the sound waves from a dis¬ tant source pass through the steel or iron skin of the ship with but little loss from re¬ flection or absorption and, as a consequence, the sound waves from the distant source can be easily heard. Furthermore, by this arrange¬ ment the water noises are reduced to a mini¬ mum as the ship passes through the water with the least possible disturbance.

Electro-magnetic devices are less sensitive as receivers than microphones and are con¬ sequently less disturbed by the waves pro¬ ducing, water noises. On account of this lack of sensitiveness they have not been as com¬ monly used as the microphone. On the other hand, electro-magnetic devices have been made which can be mounted directly in the side of the ship, the diaphragm of the instrument re¬ placing a portion of the skin of the ship which is cut away. Instruments of this kind ar¬ ranged in this way have proved most efficient sound-receiving devices.

Sound-Producing Devices. — The earliest sound-producing device was a bell struck under water. Innumerable other means of producing sound have been suggested, tried and abandoned. Water sirens, subaqueous explosions and similar methods have never been brought to a degree of perfection which has made com¬ mercial use possible. The submarine bell has

remained up to the present time, with the ex¬ ception of the Fessenden oscillator to be later described, the most serviceable form of sub¬ marine sound-producing' device.

The development of a mechanism by means of which a submarine bell can be operated commercially in all weathers and for long periods of time has been very difficult. The problem has, however, been solved and several forms of submarine bells are now made to meet service requirements. One form, shown in Fig. 2, uses the movements of the surface waves to give the power required to strike the bell. In this form the bell and striking mechanism are supported at the requisite depth from a buoy or float. A wing, platform or Wane® is hinged to the sides of the bell case containing the striking mechanism, and is so counterbalanced that, as the bell case rises and falls with the waves, the differences in the move¬ ments of the bell case and vane cause a

pow¬ erful spring within the bell case to be com¬ pressed and, when fully compressed, to be re¬ leased. The released spring draws up the striker of the bell and causes a sharp blow to be struck. The bell mechanism is such that, whenever there is wave motion, the bell is operated at frequent intervals. Bells thus made can be kept in successful operation for con¬ siderable periods of time without attention and without any expense for the power consumed. The complete bell mechanism is so designed that corrosion, especially from sea water, is reduced to a minimum and, as all of the parts within the bell are immersed in oil, the wear upon the moving parts is small.

This form of submarine bell is the dis¬ tinctive feature of the art of submarine signal¬ ing. The bell is supported from a buoy moored in places where there is no lightship or where it is practically impossible to obtain any other form of power with which to actuate the signaling device. The bell stroke is powerful enough to be heard at all times much farther than the uncertain signals that might be produced in the air by a mechanism operated by the energy derived from the motion of the ocean. The submarine bell can be used without requiring the attendance of an opera¬ tor and in places where it is impossible to utilize wireless apparatus employing ether waves. Submarine bells of this type are to¬ day located at many points of danger on the coasts of most maritime countries and the num¬ ber of bells in service is increasing.

Another form, shown in Fig 3, of submarine bell has been designed for use from lightships. The blow of the striker upon the bell proper in these bells is produced by compressed air derived from an air compressor on the light¬ ship. When signals are to be sent, the pneu¬ matic bell is suspended from the side of the lightship and the compressed air is delivered to the bell through a hose. By a simple arrange¬ ment, the compressed air can be admitted by the normal operation of a key or automatically. Thus code signals, giving the number of the lighthouse station, can be sent out during the time the bell is required for operation.

Other forms of submarine bells are avail¬ able for special conditions. Thus for service on buoys in rivers or other places where there is insufficient surface movement of the water

SUBMARINE MINES

'.frwnfi,

Jrˆ y- > -

Ilf,

■Ml

TYPES OF BRITISH AND GERMAN MINES

1 German Mine. Note the dangerous horns on top of 2 German Mine. — Note the dangerous horns on top of

i writuh6 Mine — Note the dangerous bar at top of 4 British Mine.— In this type the dangerous bar is at

a d riu&ii • the bottom of the mine

mine

SUBMARINE SIGNALLING

m

Fig. 2 — Submarine Automatic Bell Fig. 4 — - Oscillator

Fig. 3 — Pneumatic Bell Fig. 6 — Indicator Box

SUBMARINE WARFARE

765

to operate the vanes of the bell of the type first described above, an electric bell is provided which is operated by electricity generated on shore and carried to the bell by a cable.

Another commercial form of sound-produc¬ ing device for submarine work is the oscillator shown in Fig. 4, devised by Prof. Reginald A. Fessenden. The Fessenden oscillator is an electro-magnetic mechanism which is capable of producing sound waves in water of very large amplitude and, at the same time, can be con¬ trolled with ease. The Fessenden oscillator is shown in Fig. 4. A diagrammatic cross-sectional drawing of the oscillator is shown in Fig. 5.

Fig. 5. — Submarine Signaling.

The oscillator consists of a ring-shaped electro¬ magnet within which is a steel cylinder or core upon which is wound the requisite number of turns of wire. In the air gap between the core and the electro-

magnet is a copper tube. The supports of the copper tube are two steel discs, rigidly clamped to a shaft, one end of which is firmly secured to a steel diaphragm, the outer face of which is in contact with the water when the oscillator is in use. The field magnet is energized by a direct current when the oscillator is in operation either for sending or receiving. When used for send¬ ing, an alternating current of approxi¬ mately 540 cycles per second is made to pass through the core winding. This causes cur¬ rents of electricity to be generated by induc¬ tion in the copper tube with the result that great forces are produced which cause the tube to move back and forth at the frequency of the alternating current. The motion of the tube is transmitted to the diaphragm and to the water in contact with it. When the oscillator is used for receiving, the core winding is con¬ nected to telephone receivers. When incoming sound waves actuate the diaphragm, motion is imparted to the copper tube and currents of electricity are induced into the core winding. The currents in the telephone receivers, con¬ nected to the core winding, produce sounds of the same periodicity as those vibrating the diaphragm of the oscillator.

The Fessenden oscillator, when sending, pro¬ duces a series of waves of constant frequency or pitch so long as an alternating current is passed through its core winding. By apply¬ ing the alterating current to the oscillator for different lengths of time, it is possible to send series of waves of greater or less duration so that such series will correspond to the dots and dashes used in telegraphic communication.

Direction Finding. — It is customary when submarine signaling devices are used on ship¬ board to use at least two instruments and to so mount them that sound which reaches one instrument may be screened, under certain con¬ ditions, from the other. This is accomplished, in the simplest case, by mounting two small tanks on the ship's plates, inside the ship, one on each side toward the bow. The tanks are filled with water (or other fluid) and the sound¬ receiving devices are submerged in the water within the tanks. Each sound-receiving device is so arranged that it can be connected by means of a switch, with telephone receivers which can be held at the ears of a listener. When sound waves from a distant source reach a vessel equipped in this way, the sound waves agitate the sides of the vessel, and through the medium of the water in the tanks actuate the sound-receiving devices, thus vary¬ ing the electric current and so producing similar sounds in telephone receivers. The sounds heard in the telephone receivers will be loudest when they are connected with the re¬ ceiving device on the side of the vessel nearest to the source of sound. By turning the vessel until the sounds are the same from the

re¬ ceiving devices on both sides of the vessel, the direction of the source of sound can be ascer¬ tained, for the reason that when the sounds are equal the vessel must be pointing directly toward the source of sound. The so-called <(indicator box,® which is customarily em¬ ployed on ships equipped with microphones supported in two tanks, one on the star¬ board and the other on the port side of a ship, is shown in Fig. 6. This device provides the means of connecting the telephone receivers with the microphones in either the port or star¬ board tank as may be desired.

While the above arrangement is that which has been most commonly used in direction find¬ ing, other methods are employed with satis¬ factory results which do not require the ship's course to be changed in order to obtain direction.

Clement W. Coumbe, Editorial Staff of The Americana.

SUBMARINE WARFARE. Of the many new instrumentalities of destruction employed during the recent World War the submarine torpedo boat proved the most effective. It differs from battleships and cruisers in that it operates for the most part beneath the surface of the ocean, it is slower of speed, frail of structure and possesses no facilities for the ac¬ commodation of crews and passengers found on the vessels which it sinks. Its inability, there¬ fore, to comply with the well-established rule of international law governing prize destruction, which requires a naval commander before destroying a merchant vessel to provide for the safety of all persons on board, raised the question as to whether such craft were entitled to a special immunity from the rule governing prize destruction by cruisers and battleships, in short whether the submarine may be employed for the destruction of merchant vessels without violating the law of nations as well as the principles of humanity. Soon after the out¬ break of the war the German naval forces for the most part were driven from the ocean

and compelled to take refuge in their home ports or in those of neutral countries. The Germans were, therefore, reduced to reliance upon submarine torpedo boats in their naval operations against the enemy and these v/ere speedily built in large numbers and used on an extensive scale. By a decree of 4 Feb. 1915 the waters around the British Isles were declared to be a (<war zone® within which, it was an¬ nounced, all enemy merchant vessels would, if possible, be

destroyed, notwithstanding the inability of the destroying submarines to pro¬ vide for the safety of the crews and passengers found in such vessels. In pursuance of this decree scores of enemy merchant ships, includ¬ ing great ocean liners like the Lusitania, the Falaba, the Arabic, the Persia and many others, were torpedoed and sunk, sometimes without any warning at all or after warning which was insufficient to permit the persons on board to take to the lifeboats. In consequence of this mode of warfare large numbers of non-com¬ batants, men, women and children, of neutral as well as of enemy nationality, lost their lives. A considerable number of ,peutral vessels were also sunk, the excuse alleged by Germany in most cases being mistake, which was an in¬ evitable result of a method of naval warfare in which visit and search are never practised. In consequence of the protest of the American government and of its threat to hold the Ger¬ man government to a strict accountability for the loss of American lives, the German govern¬ ment in September 1915, while disclaiming all responsibility for the loss of more than a hun¬ dred American lives on the Lusitania, gave the American government assurance that in the future <(liners would not be sunk without warn¬ ing and without providing for the safety of the persons on board, unless the vessels attempted to escape or unless they offered resistance.® The pledge, however, was not observed and on 5 October, in consequence of the American pro¬ test against the torpedoing of the Arabic, the German Ambassador informed the Secretary of State that orders had been given submarine commanders which were so stringent that the recurrence of (<incidents® like the torpedoing of the Arabic would not again be possible. But notwithstanding these assurances, German and Austrian submarines continued to sink merchant vessels, enemy and neutral alike, without warn¬ ing and without making provision for the safety of the innocent persons on board : among the most flagrant instances being the torpedo¬ ing of the Italian liner Ancona on 7 Nov. 1915, with the loss of more than 200 lives. It was true that this atrocity was committed by an Austrian submarine but it was understood in the United States that the German pledge bound the allies of Germany equally with her¬ self and the Austrian government was fully aware of the American position in regard to the torpedoing of merchant vessels without making provision for the safety of their crews and passengers, and it was fully cognizant of the pledges given by Germany to refrain from the practice in the future. The action of the submarine commanders in continuing to fire upon the passengers while they were endeavor¬ ing to take to the lifeboats was characterized by the American government in a note to Austria as (<wanton slaughter of defenceless non-combatants® and a demand was made upon

the Austrian government that the officer guilty of the act be punished and that an indemnity be promptly paid for the loss of American lives.

In February 1916 the German government announced that after 1 March its submarines would sink whenever possible and without warning all armed merchantmen, irrespective of whether they were armed for defensive or offensive purposes. The German government took the position that a merchant vessel had no right to carry guns, not even for the purpose of defense. Although the practice of carrying arms for defense against unlawful attacks had been followed by the merchant vessels of all nations for 200 years, the German government maintained that this practice had been intro¬ duced for the purpose of enabling them to de¬ fend themselves against pirates and later against privateers, but since piracy had disap¬ peared and privateering had been abolished by the Declaration of Paris in 1856 the old rule no longer had any raison d'etre and consequently the German government could not recognize it as binding. In short, according to the German contention, the rule was never intended to au¬ thorize merchant vessels to arm for the purpose of defense against the lawfully commissioned war vessels of belligerents. In fact not only armed merchantmen but also unarmed merchant vessels continued to be sunk, notwithstanding the pledges of September and October 1915. The torpedoing in April 1916 of the Sussex, an unarmed English Channel steamer, with 380 passengers on board, some 80 of whom lost their lives, came very near precipitating a crisis in the relations between the United States and Germany. The German government at first denied responsibility for the act, but when the proof produced removed all doubt as to this the German government finally acknowledged that the steamer had been torpedoed by a Ger¬ man submarine.

The President in an address to Congress, on 20 April, reviewed the history of German submarine warfare since its inauguration in July 1915 and informed Congress of the contents of a note which he had two days before dis¬ patched to the German government and in which he denounced German methods of sub¬ marine warfare as contrary to both the law of nations aqd the sacred principles of humanity. The President concluded by saying that unless the ˆImperial government should now im¬ mediately declare and effect an abandonment of its present methods of submarine warfare against passenger or freight carrying vessels, the government of the United States can have no choice but to sever diplomatic relations with the German Empire altogether.® The German government replied that it had ((imposed far reaching restraints in the use of the submarine,® denied that the torpedoing of the Sussex was but one instance of a deliberate policy of

in¬ discriminate destruction of merchant vessels of both enemy and neutral nationality, as the President had charged in his note; declared that it was ready to admit that there had been un¬ avoidable errors and, again for the hundredth time, placed the responsibility upon Great Bri¬ tain for having proclaimed a blockade against Germany for the purpose of starving the Ger¬ man nation, men, women and children alike, into submission. Notwithstanding all this, how-

ever, the German government in ((the interest of the sacred principles of humanity® pledged itself that in the future unarmed ocean liners would not be torpedoed without warning pro¬ vided they did not attempt to escape or offer resistance. This was the third time a pledge of this kind had been made to the American gov¬ ernment. Like the others it was not lived up to and a considerable number of unarmed vessels were torpedoed and sunk by German sub¬ marines. As time passed, public opinion in Germany demanded a repudiation of the pledges given by the German government and the re¬ sumption of the policy of unrestricted sub¬ marine warfare. The tightening of the Anglo- French blockade and the growing feeling that this policy alone could save Germany from de¬ feat intensified the popular demand. Finally, on 31 Jan. 1917, the German government threw off the mask and informed the American government that in consequence of a <(new situation® having arisen which forced Germany to ((new decisions® Germany must resume the liberty of action reserved in the Sussex pledge of 4 May 1916, and that, therefore, beginning on 1 Feb. 1917, German submarine commanders would no longer be bound by the previous as¬ surances given to the American government. German submarines would, therefore, sink without warning all merchant vessels, neutral as well as enemy, encountered within a vast zone embracing more than a million square miles of the open seas (see War Zones). The (rnew situation® referred to in the German note was the refusal of the Entente powers ((owing to their lust of conquest,® to enter into a discussion of peace terms with Germany and their avowed determination to starve the Ger¬ man people into submission in <(brutal contempt of international law.® The American govern¬ ment, it was added, knew the steps which Ger¬ many had taken to cause England and her allies ((to return to the rules of international law and to respect the freedom of the seas® and the hope was expressed that it would ((view the situation from the lofty heights of impartiality and assist on their part to prevent further misery and unavoidable sacrifice of human life.® In consequence of this

deliberate repudiation of its pledges the President recalled the Ameri¬ can Ambassador from Berlin, handed the Ger¬ man Ambassador his passports (3 Feb. 1917) and broke off diplomatic relations with the Ger¬ man government.

The new policy thus announced by the Ger¬ man government was promptly and ruthlessly put into effect and large numbers of merchant vessels, neutral and belligerent alike, were torpedoed and sunk without warning. Neutral vessels laden with innocent cargoes even when consigned to their own governments, ships homeward bound in ballast, even hospital and Belgian relief ships proceeding on missions of mercy and philanthropy, in fact vessels of every nationality and mission were sunk as if they were pirate vessels. Down to 29 March 1917, 226 American lives had been lost since the out¬ break of the war, in consequence of the torpedo¬ ing of merchant vessels by German submarines. In August 1917, the American consul, Mr. Frost, at Queenstown placed the total number of British lives, mostly non-combatants, lost in consequence of the German methods of sub¬ marine warfare at more than 10,000.

Turning now to a consideration of the law¬ fulness of this method of naval warfare we may state that a belligerent has an undoubted right to sink the merchant vessels of the enemy with certain exceptions (e.g., coast fishing vessels, hospital ships and vessels on philanthropic missions) in certain cases as where he cannot take the prize in to a home port for adjudica¬ tion by a prize court, either because of im¬ minent danger of recapture or for lack of a sufficient coal supply or because of his inability to spare a prize crew, and the like. But a long established customary rule of the law of nations requires that in such a case the com¬ mander must, before proceeding to the destruc¬ tion, remove the passengers and crew of the vessel and provide for their safety, that is, he must take them aboard his own vessel or allow them ample time in which to take their own lifeboats. This humane rule is expressly laid down in one of The Hague Conventions, in the Declaration of London, and is even incor¬ porated in article 116 of the German prize code as promulgated in August 1914. It is an equally established rule of the law of nations that the captor must visit and search the vessel, examine its papers and inspect its cargo, in order to satisfy himself of the nationality of the vessel and of its liability to destruction. The verification of these facts obviously can¬ not be made through the periscope of a sub¬ marine at a great distance. The German gov¬ ernment frankly admitted that the obligation to provide for the safety of crews and passengers was binding upon the commanders of warships and cruisers but it denied that it was equally binding upon the commanders of submarines, for the reason that they

were small craft, slow of speed, fragile in construction and were with¬ out facilities for accommodating crews and passengers found on the vessels which they destroy. By reason of their lack of speed it would often be impossible for them to give sufficient time for the crews and passengers to leave the ship and embark in lifeboats, without exposing the submarine to destruction by ves¬ sels of the enemy which might upon signal ar¬ rive on the scene before the torpedo had done its work. Moreover, it was argued, British merchant vessels were generally armed with guns which might be turned upon the attacking submarine with deadly effect in case it gave warning and an opportunity to the persons on board to leave the ship, before the torpedo was discharged. The rule in respect to providing for the safety of crews and passengers, the Germans argued, originated at a time when submarines had scarcely been dreamed of. Cruisers and battleships then were the prin¬ cipal craft employed for destroying enemy merchant vessels and they possessed facilities for accommodating crews and passengers or they could allow them sufficient time to take to the lifeboats without themselves being exposed to the danger of destruction. To require sub¬ marine commanders to observe this rule would in effect render the employment of the sub¬ marine for the destruction of prizes impossible, and this being the only available craft left to Germany for carrying on the war at sea she could not be expected to relinquish it. (<New situations,® said Professor Fleishmann of the University of Konigsberg in an article on the <(Lusitania Case,® ˆnecessitate new rules® and

the submarine being a new weapon is not bound to conform to the rules adopted long ago for the conduct of cruiser warfare. <(Who,® said Professor Zittelmann of the University of Bonn, ((would have thought at the time the old rule regarding provision for the safety of crews and passengers, of the possibilities of sub¬ marine warfare.® Had the use of submarines been anticipated, he says, ((special rules govern¬ ing their employment would have been de¬ vised® (see his chapter in a book entitled (Deutschland und der W eltkrieg d 1916). The submarine, said Count Bernstorff in a memoran¬ dum laid before the Department of State on 8 March 1916, is <(a new weapon, the use of which had never been regulated by international law.® From this doubtful premise he drew the unwar¬ ranted conclusion that in using this weapon Germany ((could not and did not violate any existing rule of law.®

In the main, the German argument reduced itself to a claim of special immunity for sub¬ marines because of their peculiar build and con¬ sequent weakness. Since it is impossible to em¬ ploy them in conformity with the long estab¬ lished rules governing prize destruction their commanders are relieved from the obligation to do so. In short, a prohibited method of war¬ fare becomes legitimate whenever a new instru¬ ment for doing it is invented — that is, when¬ ever an immediate belligerent interest would be subserved by the employment of an instrument which cannot be employed in conformity with the existing rule of law, the rule may be over¬ ridden and the interest allowed to prevail. This argument is specious ; it ignores the fundamen¬ tal fact that the rule of international law which requires naval commanders to spare the lives of innocent non-combatants on the merchant vessels which they destroy was adopted in the interest of humanity and was intended to govern prize destruction by any and all types of vessels which then existed or which might be invented in the future. To argue that a sub¬ marine commander may drown unoffending non-combatants but that the commander of a cruiser cannot is preposterous. The employ¬ ment of new instruments and agencies of destruction must be adjusted to the require¬ ments Qf the law, not the law to the instrument; it cannot be admitted that the invention of a new weapon may serve to repeal the law of nations and of humanity. The German defense harmonizes well with their theory that ((what- ever is effective and whatever tends to shorten the war is legitimate® ; in its final analysis it amounts to a claim that a single belligerent may at will change the law of the sea to meet his own immediate necessities. The United States Supreme Court in the case of the Scotia laid down a principle of international law which has never before been contested that ((the law of the sea is universal and cannot be changed by a single nation.® Germany, there¬ fore, had no right to repudiate a long estab¬ lished rule which by common agreement had come to be a part of international law. It will readily be admitted that the introduction of the submarine will necessitate certain modifications of international law, those governing blockade, for example, but it cannot be admitted that the invention of a new instrument of destruction can alter what the President of the United States called <(those rules of fairness, reason,

justice and humanity which all modern opinion regards as imperative.®

The Germans claim, in fact, that in many instances in which their submarines destroyed merchant vessels they saved the persons on board whenever possible. But there are al¬ most no recorded instances in which crews or passengers were taken aboard the submarine, for

the good reason that submarines have no accommodations for any but their own crews. The Germans likewise claim that wherever pos¬ sible they allowed sufficient time for the crews and passengers to leave the ship and take to the life boats, but the instances in which this was not done are so numerous that it may be said that the contrary practice was rather the rule. In many cases where warning was given be- force the torpedo was discharged, the period of time allowed, sometimes not more than 10 minutes, was wholly inadequate, and instances were common in which huge ocean liners sank while the passengers were endeavoring to leave the ship. Incredible as it may seem also, in¬ stances are not lacking (e.g., the Ancona) in which the crews and passengers were deliber¬ ately shelled while taking to the boats. Even when ample time was allowed the passengers to leave the ship it was only a technical com¬ pliance with the rule requiring naval com¬ manders to provide for the safety of the per¬ sons on board, for they were set adrift in small boats often hundreds of miles from land, sometimes in mid-winter, without food or drink¬ ing water and left to drift at sea for days, to suffer the tortures of thirst and hunger, to die of starvation or exposure to cold or to be washed overboard by rough seas and to drown while struggling to save themselves. The Ger¬ man government readily admitted (in a note of 29 Nov. 1915, relative to the sinking of the Frye) that this procedure was not a sufficient compliance with the spirit of the rule nor in accord with the assurances which were given the government of the United States that the crews and passengers of ships sunk by Ger¬ man submarines would not be exposed to danger in this fashion.

Few chapters in the history of the Great War reveal German militarism in a worse light than this cruel war against unoffending non-combatants who were in most instances peace¬ fully navigating the seas for the freedom of which the German Government pretended to be fighting. For sheer ruthlessness and barbarity there is nothing comparable to it in any other modern war. German methods of submarine warfare have frequently been characterized as piratical. Technically, of course, their sub¬ marines were not pirates, since their command¬ ers bore commissions from a belligerent gov¬ ernment, but they might with reason be con¬ sidered as pirates within the meaning of the old rule which defined pirates as hostes humani generis. Naturally few reputable authorities on international law outside Germany have been found to defend such methods of warfare, and even in Germany and Austria they have been denounced as barbarous by many persons, nota¬ bly by leaders of the Social Democratic party. It is difficult to reconcile the conduct of the German submarine commanders with the utter¬ ance of Germany's great

diplomat, Marschall von Bieberstein, who at the second Hague Con-

fcrence said : <(The officers of the German Navy, I loudly proclaim it, will always fulfill in the strictest fashion the duties which emanate from the unwritten law of humanity and civili¬ zation. As to the sentiments of humanity and civilization, I cannot admit that there is any government or country which is superior in those sentiments to that which I have the honor to represent.®

Bibliography — Burgess, (American Rela¬ tions to the War) (Ch. 1); Archer, (The Pirates Progress; A short History of the U-Boat, *Diplomatic Correspondence with Belligerent Governments Relating to Neutral Rights and Duties, Department of State, Euro¬ pean War (No. 3, 1916) ; Garner, in American Journal of International Law (Vol. IX, pp. 594 ff) ; Higgins, (Defensively Armed Mer¬ chant Ships and Submarine Warfare) ; New- boldt, Sir Henry, Submarine and Anti-Sub- marine) (New York 1919); Rogers, American's Case Against Germany * (Chs. 2-5, 7, 9) ; Scott, (A Survey of International Relations Between United States and Germany) (Chs. 9, 13-16) ; Noyes, (Open Boats) ; Frost, Submarine War¬ fare* ; Zeitschrift fur V olkerrecht (Vol. IX, Der Lusitania — Fall).

James W. Garner,

Professor of Political Science in the University of Illinois.

SUBMARINES: THEIR HISTORY, DEVELOPMENT AND EQUIPMENT.

The aerial flight of the bird and the subaqueous navigation of the fish were always wished-for and dreamed-of activities of human ambition. Science achieved both performances between the years 1900 and 1906, when the actions of the denizens of the air and sea were brought within the practice of mankind by the airplane and submarine. Protracted life and motion within each of the elements has in the last Great War been such a prominent and method¬ ical part of warfare that they are already com¬ monplace to us. But while the performance of the dirigible and heavier-than-air machines has been visible by millions of our populace, the invisibility and secrecy surrounding the sub¬ marine has been maintained, few ever seeing the submersible in action and still fewer hav¬ ing been allowed access to her internal economy. A fairly lengthy description of the ((secrets® of the submarine should be of peculiar interest to readers.

History. — A Dutchman, Cornelis van Dri- bel, in 1624 invented a successful submarine rowboat, and King James of England was pas¬ senger on one in a subaqueous voyage on the river Thames. Contemporaries describe the vessel as an ordinary large rowboat decked over with stout, well-greased leather. About 1652 Le Son, a Frenchman, built a wooden submarine (known as the ((Rotterdam Boat®) 72 feet long, 12 feet high, with 8 feet beam. It had sharply tapering ends and sloping sides (for defense against projectiles) and iron-tipped legs for resting on the bed of rivers or bottom of the sea. Midships a paddle-wheel propelled the ves¬ sel. In 1747 Symons built a submarine decked rowboat having leather bottles projecting through her bottom ; when filled they submerged the boat and by forcing out the water with a lever and fastening the necks the boat rose to the surface. An English mechanic named Day VOL. 25 — 49

built a boat he could submerge 30 feet, remain¬ ing 24 hours under water in it. He tried the same performance with a 50-ton sloop on a bet in Plymouth Plarbor, but the boat failed to rise and he was drowned. In 1776 David Bushnell, a native of Connecticut, invented his submarine, or rather submersible, boat Turtle, so christened because its sides were shaped like the shell of a turtle. When submerged the head of its single passenger remained above the water in a conning tower while he propelled the boat with a bladed tractor forward. Lead ballast kept her submerged. From the rear- end of this lense-shaped hull projected an arm- steered rudder. Sergt. Ezra Lee operated the craft and when the British fleet entered New York Harbor to capture Manhattan Island Lee tried to attach a mine to one of the men-of- war but failed after repeated attempts, barely escaping capture. In 1797 Robert Fulton tried vainly in Paris to interest the French govern¬ ment in his plans for a submarine even after he had built a model and an appointed com¬ mission had given a favorable report ; he next appealed to the government of Holland. In 1800, however, First Consul Napoleon ad¬ vanced 10,000 francs for Fulton to build a sub¬ marine, which was launched and christened Nautilus. It was constructed of copper plates on iron ribs and fish-shaped, 21 feet 3 inches long, 6 feet 3 inches diameter at the widest part. Stability was gained by a heavy keel, above which were water ballast tanks. It was driven by a two-bladed propeller geared to a hand wheel. A dome formed the conning tower. Horizontal planes guided her down¬ wards. Above the surface a sail unfurled itself fanwise on a hinged mast upon pulling a rope. Fulton and another remained submerged, on the trial, 20 minutes in the Seine, extending the period to six hours' submersion later at Brest, aided by a tank of compressed air. He blew up an old ship by attaching an explosive shell to her bottom to prove

the practicability of the offensive craft. Failure, however, to injure the English fleet as a proof caused the French government to refuse further negotia¬ tions. Fulton went to England and interested Prime Minister Pitt and he successfully blew up the Dorothea with a time bomb attached to her during his submersion ; but within a week Nelson at Trafalgar so injured the morale of the French fleet that England's danger from sea attack was gone and Fulton returned to America, where he again failed to gain gov¬ ernment recognition of the merits of his sub¬ marine. The Confederate torpedo boat David, which could not actually submerge but had to keep her funnel and pilot-house above water, attacked and exploded a spar-torpedo against the iron-plate protected hull of the U.S.S. New Ironsides in Charleston Harbor, October 1863, but did little damage. The Confederate Hundley > was a true diving craft with ballast tanks, diving planes and driven by hand power. Each of her five trial trips met with serious accidents and loss of some or all her crew. General Beauregard was still able to get vol¬ unteers for another trip and determined this time to make it a practical test against the Northern blockade fleet. On 17 Feb. 1864 the Hundley blew up the U.S.S. Housatoriic, a new corvette of 13 guns, in Charleston Harbor, with a spar-torpedo which struck her and ex-

ploded her magazine. But the Hundley went down with her victim. And this was the first success of a submarine's action with a warship and the only one till the late World War. The Strornboli and Spuyten Duyvil, con¬ structed by the United States government, sub¬ merged their hulls only, leaving the upper works (conning tower, ventilators, etc.) above the surface. With the invention by Whitehead (1864) of the fish torpedo and automatic pro¬ pulsion by compressed air, the dangers of self-immolation of the aggressors in torpedo attack disappeared. (See Torpedo). William Bauer, a Bavarian, now invented a submarine craft but it was refused by the governments. Halstead's Intelligent Whale (1864-65), quite similar to the Nautilus, was supposed to allow a member of its crew (a diver) to emerge and place a torpedo under a ship ; experiment ended in failure. In 1863, Captain Bourgois and M. Brun, Frenchmen, built the steel submarine Plongeur, 146 feet long, equipped with an 80 horse-power compressed-air engine ; she be¬ haved too unsteadily, submerged deeply and her engines had insufficient capacity. The French¬ man Olivier Riou (1861) failed in his trial of electricity as the motive power ; then his com¬ patriot, Admiral Aube (1886), took up the electric idea and built

a small experimental vessel, the Gymnote, on lines laid down by Dupuy de Lome, who had recently died; it was 55 feet long and had 564 battery cells developing 55 horse power. Showing good points, the French government built the larger Gustave Zede, on similar lines but advanced principles. She failed in every respect at first, but after years of experiment and alteration became practical. From 1886 to 1901 the French government was so enthusiastic in adopting the submarine as an arm of the fleet that she built 29, all electric driven. M. Goubel, a Frenchman, experimented with two small elec¬ tric submarines at this time but they were failures. In 1878. the Rev. G. W. Garett, an Englishman, built a submarine which he chris¬ tened Resurgam ((<I shall Rise®). Advancing in his calculations he built a second with a steam engine. On submersion the smoke-stack was closed with a sliding panel and the furnace was shut up tight and the engine under water was run by steam from the reserve tank of hot water. Thorsten Nordenfeldt, Swedish engineer and inventor of the famous gun bear¬ ing his name, took up and improved the Garett system so that his boat ran for 14 miles sub¬ merged. He next got patents for his vertical propeller device which drove the craft deep under the surface. After tests (1886) Greece purchased his first craft and he built larger submarines (Nordenfeldt II and Nordenfeldt III), which Turkey acquired. The first of the latter introduced the novelty of a torpedo-tube in the bow to discharge Whitehead torpedoes. They were shipped to Turkey in parts and one was assembled in Constantinople for tests and acted well on the surface, but under water, with every movement of her crew, she lost her level keel and dived nose down or tail first, whichever part her crew worked. Firing a torpedo she lost her balance badly, but see¬ sawed till her crew got her safely to the sur¬ face. ; As no other crew could be found to take the risk, she rusted in dock and when the Brit¬ ish attacked the Dardanelles she could take no

part in the defense. The Russian Drzewiecki and the Spaniard Peral invented a foot-driven propeller submarine which proved useless. A strange submarine craft indeed was that pro¬ jected by the Russian Apostaloff, whose hull was armed with great ˆthreads® forming a gigantic screw by means of which, the hull re¬ volving, this great propeller would, the inventor claimed, cross the Atlantic at 111 knots an hour. His submerged hull was to have a large cabin suspended by davits above the water. John P. Holland, an Irishman, in 1875 built a 16-feet long, two feet diameter, cigar-shaped submarine vessel in New Jersey (Holland No. 1), which carried a torpedo that was to be attached to the bottom of the enemy ship and then exploded like the plan of Bushnell with his Turtle. The craft was divided into an air-

chamber fore and aft and two compartments amidships, in one of the latter of which the operator reclined while working pedals with his feet to turn a propeller in the stern. It enabled Holland to practice navigation beneath the Passaic River and neighboring waters. Holland No. 2 was launched in 1877 and stuck in the mud. She was furnished with an outer hull for water ballast and was driven by a four horse-power petroleum engine. A few experiments proved to both inventor and spec¬ tators that she was a failure and he sunk her after salvaging the engine. He persuaded the Fenian Brotherhood to pay for the construc¬ tion of two of his submarines with a view to attacking English men-of-war, but they do not appear ever to have shown activity. Hol¬ land constructed five more submarines without profit; but in 1893 Congress made an appro¬ priation for constructing an experimental sub¬ marine and invited bids. Holland won against his competitors and in 1897 his Plunger was launched but had so many evident defects she was never finished. Holland No. 8 followed and failed, but Holland No. 9 was built and was the first successful submarine from actual practical viewpoints. She was launched in 1898 and was 53 feet 10 inches long, 10 feet 7 inches deep and porpoise-shape. In 1900 she was placed in commission by the United States navy. Her power was conveyed on the surface bv a 50-horse-power gasoline motor and by electric storage batteries when submerged and the combination of the two methods of pro¬ pulsion was the great Holland achievement. Upon filling her water tanks she sank till flush with the water's surface, then two hori¬ zontal rudders steered her to a depth of 28 feet in five seconds. As periscopes had not been perfected, she had to rise and dip like a porpoise to get an air-glimpse and aim. Re¬ peated tests produced such satisfaction with Admiral Dewey and his fellow-officers that the United States government ordered six sub¬ marines of this type and in 1901 the British Admiralty ordered five. The race was on and all the navies ordered Hollands or paid royal¬ ties to the inventor's patent to build larger or improved craft. But the British Admiralty acquired the master patents, making a purchase of all rights for Great Britain, and has built up England's fleet on Holland lines, making, of course, many changes. The next Holland submarines were built for seagoing purposes and were constructed for the United States navy, having 122 tons displacement, 160 horse-

SUBMARINES

“ c

c3 o

g.§

c/5 c/5 wai p’p’

M tJ-

■§!

<2 5

S3 v- O «

WK

COCO

coco'

pp

*-< n

SUBMARINES

1 U. S. S. K-l

2 U« S. S. L-4

3 U. S. S. M-I

SUBMARINES

1 View of diving rudder control

2 View of battery compartment

SUBMARINES

1 View of engine room

2 View of torpedo tubes

SUBMARINES

771

power gasoline engines for surface and 70 horse-power electric for submersion, making, respectively, eight and one-half and seven knots

with 300 miles radius awash. These were termed the Adder class, after which came the Viper class, somewhat larger, and the Octopus. The latter was furnished with twin screws and had 273 tons displacement submerged, surface speed 11 knots, produced by internal combus¬ tion engine of 500 horse power and 10 knots submerged, developed by electricity. Simon Lake, a Baltimore citizen, built a triangular box-shaped submarine craft, which he named Argonaut Junior, that could sink to the bottom of a river or lake and permit a passenger to emerge through the bottom by an air-lock filled with compressed air. The passenger, equipped with a diving suit, could search the bottom of the river. The strange craft was mounted on three wheels, the front pair was rotated by hand gear, the rear one did the steering. In 1897 Lake built his Argonaut, having cigar¬ shaped hull 36 feet long, on similar principles, but with a 30 horse-power gasoline engine, the fresh air being supplied through a hose con¬ nected with a float on the water's surface (later changed to two tubular masts). For sinking, The Argonaut relied on two anchor weights of over 1,000 pounds attached to cables and raised and lowered by a drum on the vessel. On lowering the weights to the bed of the river, then letting in water to ballast compartments, the weight cables were hauled in till the ves¬ sel rested on her wheels at the bottom of the water, when the weights were hauled into pockets in the keel. In 1898, The Argonaut traveled from Norfolk to New York under her own power. To fulfil the prophetic vision of Jules Verne's Nautilus, The Argonaut cov¬ ered over 1,000 miles submerged. She was lengthened in New York and a superstructure of ship form was built over her, making her a safe sea-going submarine riding waves easily. The Narval, conceived in 1899 by M. Labeuf, was launched in France with its double hull, the outer shell perforated. She used steam on the surface and storage batteries beneath, but absolute silence has been maintained as to advances in French submarines. In 1906, Lake's Protector was built and sent to Russia equipped to run along the bottom of the water and cut through enemy nets, avoid mines, rocks and sandbars. Lake was consulted by the German firm of Krupps, who, he says, agreed to em¬ ploy him as adviser in the building "Lake type® boats and share the profits with him; after parting with his plans and specifications he says the Krupps refused to sign the agreement and used his plans on the submarines they built during the World War.

Until recent years naval authorities divided war submarines into two classes : Coast defense type of from 300 to 700 tons surface displace¬ ment and cruising tvpe of from 800 tons up with radius of 3,000 miles or more.

Submarine Construction and Equipment. — As may be supposed the

apparatus and mech¬ anism for such a complex condition of warfare must be very elaborate and complicated. The submarine's internal bewildering labyrinth of pipes, valves, gears, wheels, cylinders, etc., crowding the confined space is the wonder of those few visitors who are allowed an inspec¬ tion of their interior workings. We will give

a short review of the subject as described by such experts as M. F. Hays and others.

Hulls. — Submarines are built with double and single hulls. The latter have to be of con¬ siderable strength to resist the pressure when submerging deeply, necessitating a circular or nearly circular cross section. They were of so-called spindle shape, both ends tapering to reduce the resistance in motion, but to obtain better sea-going qualities the bow and stern have been modified in recent construction. The Holland type has single and double hulls ; the Labeuf type has an inner hull cylindrical with flat ends ; this is enclosed entirely in an outer hull pointed at each end to reduce resistance in motion. The latter are used by the French, Aus¬ trian and German (Krupp-Germania) navies. Another type has single hull reinforced in parts by an outer construction as employed by the Italian, Portuguese and Brazilian navies and designed by Maj. Cesare Laurenti of the Fab-brica Italiana Automobil Torino (Fiat), while the Dutch and Danish navies have used a com¬ posite hull designed by M. F. Hay. Other types have, of course, been developed.

Engines. — • Steam soon had to give way to high-speed internal combustion engines. The .first “Hollands® built for the British navy were fitted with four-cylinder vertical engines. Next came 16-cylinder Wolseley horizontal motors with 550 horse power; later, with increased dimensions they arrived at 850 horse power, giving 16 knots surface speed. The remaining defect was the noxious gas from the petrol or gasoline fuel, sickly as well as dangerously ex¬ plosive, not to mention carburetor objection so well-known to aviators. Then came the new Diesel motor invention using heavy (crude) oils and all the above troubles were wiped out when the early slow-speed defects were over¬ come. England used her first Diesel motor on submarine DI in 1907, developing 1,200 horse power. Its simplicity of operation, though complicated in mechanism, makes the Diesel engine (see Internal Combustion En¬ gine) perfect for surface propulsion, its low cost of running also being much in its favor. A development of 5,000 horse power by 1915 was a great advance over two- and four-cycle engines. The Fiat firm advanced the high¬ speed Diesel greatly and Britain gradually took up the work; all boats since and includ¬ ing the E and F class have Diesel engines. Diesel engines have been used on all United States Holland boats for the last ten years. The driving power for under-water activity remains electricity, derived from batteries placed below the main floor of the machinery space. On later types of submarines, batteries are placed in a lead-lined compartment to prevent corrosion of hull by sulphuric acid fumes. But in recent types the Diesel engine charges the bat¬ teries and does away with these dangers. Krupps of Kiel and M.A.N. of Nuremberg developed, at the German government’s expense, engines best adapted for their 900

tons submerged displace¬ ment submarines and (1915) two Diesels of about 900 to 950 brake horse power were in¬ stalled on each and found to act admirably. Many other navies were supplied with them. The M.A.N. Diesels constructed at Augsburg four-cycle, 800 horse power and the Nurem¬ berg M.A.N. two-cycle motors of 900 horse power. The Diesel engines of the British sub-

marines were built by tbe Vickers company and are four-cycle ; those for E class developed 800 horse power in eight cylinders. The Fiat two-cycle 1,300 horse-power motor has been used by both Italian and British submarines, having six cylinders and 400 revolutions per minute. The Sulzer Brothers (Swiss) two- cycle reversible 600 horse power were used at that time (1915) by the United States and Japan. The Polar (Stockholm, Sweden) four¬ cycle motor was used by the Swedish navy.

Tank System. — The submerging from sur¬ face to underwater conditions is brought about by reducing the vessel's buoyancy by means of filling her tanks with seawater. The tanks of the single hull construction are, of course, built inside the vessel, whereas in the case of double hulls the intervening space between the hulls is the tank space. But the disposition and dimensions of these water-ballast tanks is one of the most important problems of submarine building. The safety as well as the efficiency of the vessel hinges entirelv on the absolutely correct calculations made in designing the sub¬ marine. The history of failures and accidents is generally that of faulty tank distribution. With full tanks the vessel must lie on a level keel under the water. The tankage space has to be divided into a dozen or more compart¬ ments so that each unit shall be strictly self- contained in its action and each tank must be completely filled before submerging. This set of ((main ballast tanks® has to reduce the buoy¬ ancy, leaving only 25 per cent. In about the middle of the ship's length is another tank known as the "central,® (<midship,® ((buoyancy® or "auxiliary® tank; this must never be com¬ pletely filled after submerging. Next come the "trimming® tanks located fore and aft, used in maintaining the vessel on an even keel when getting ready to submerge. All submarines have the above tanks. To them are added, generally, "compensating® tanks, each to compensate for the consumption used up in operating. Thus we have fresh water, the torpedo, the fuel and the lubricating oil compensation tanks ; all needed to maintain the original weight. A "safety® tank is installed in

some submersibles for use in case of emergency (accidents, etc.) ; this is quickly emptied by air pressure. But in recent constructions each tank is made capable of being emptied by air pressure, mak¬ ing the special one unnecessary. Emptying the tanks quickly brings the submarine speedily to the surface in case of accident.

Steerinq Gear. — Steering can be performed on top of the conning tower, in the conning tower or in the “central station,® properly called central operating compartment. Small sub¬ marines are steered by hand power, the larger by electricity, but in the latter case, as on other ships, emergency handgear is provided for use in case of electric trouble. An indicator along¬ side the steering gear shows the rudder’s po¬ sition and direction is found by repeating com¬ pass when a gyroscopic master compass is in¬ stalled, otherwise the steering station has its own compass if magnetic or has an image re¬ flected from the master compass.

Diving Gear. — The diving “hydroplanes® (horizontal rudders) are operated similarly to the rudder. When the diving rudders are at bow and stern there are generally two hand wheels and the operators receive each instruc¬

tion from the first officer. In sight of opera¬ tors are depth gauges (the depth attained is read on a pressure diagram) and two indi¬ cators display position of rudder and inclina¬ tion of the vessel respectively. The submarine under ordinary conditions cannot remain be¬ low water unless under way, at least slowly, but when it is necessary to stay in one spot for a period there is available the “statical div¬ ing gear® which admits and ejects a small amount of water into or from the central bal¬ last tank as the vessel shows inclination to rise or sink from her position.

Air System. — The need of air on board is for many purposes besides breathing. Air is installed in seamless steel flasks compressed 2,500 pounds pressure per square inch and others at 1,000 pounds. After reduction of the pressure by valves the first kind is used for blowing out the water tanks, for charging the torpedoes’ air chambers, for charging the flasks for firing the torpedoes, for refreshing the air breathed by the crew and for blowing the whistle; the latter pressure air is required for starting the Diesel engines.

Water Piping System. — Several pumps driven by electricity are generally installed to give a duplicate system of piping to each tank and they are so distributed as to preclude all pumps being thrown out of commission in an accident.

Refrigerating System. — This is installed for campaigns in tropical waters.

Heating System. — This is installed for campaigns in frigid waters as the North Sea, north Atlantic, etc.

Anchor Gear. — In great storms on certain occasions anchoring is an urgent need. In spite of the difficulties attending the invention of a practical device in recent years most large sub¬ marines are equipped with two located on bow and capable of use while submerged, operated, of course, from the inside, but for fear of in¬ ability to disengage the anchor when let down, a method had to be devised to cut the cable or slip it.

Navigating Appliances. — Under submerged conditions a gyroscopic compass set is, of recent years, considered among the necessities. It consists of the master compass in the central station and three repeating compasses magnet¬ ically operated by the former and located at the steering stations. A device for depth sounding is also necessary as the submarine often runs in uncharted waters. The engine-room tele¬ graph, speaking tubes, ship-lights, etc., are those common to ordinary ships.

Air Regenerating System. — A few navies supply each submarine compartment with a ves¬ sel containing a chemical to absorb carbon-dioxide and several flasks of compressed oxy¬ gen for emergencies when the vessel has to stay submerged over 24 hours and the air becomes vitiated.

External Fittings. — All submarines except the Laurenti type carry a walking platform con¬ structed with light metal plates and which also answers as a smooth surfaced covering to the anchor gear, entrance and escape hatches, lift¬ ing eyes, engine exhaust pipes and other pro¬ jections that would afford resistance in navi¬ gation. The conning tower, located midships, has been greatly increased in dimensions in re¬ cent years to afford space for navigating the

vessel on the surface when stormy weather forbids using the bridge. Some of the German conning towers reach nine feet above the upper deck. In the German boats one of the peri¬ scopes enters the conning tower and navigation in such is carried on in the conning tower when slightly submerged and, therefore, has to be sufficiently roomy to hold

two or three men. In the walls of the conning tower are eight or so sighting ports fitted with plate glass about an inch thick to resist the great pressure ; bronze port covers are also provided to aid in withstanding the pressure when very deeply sub¬ merged or when the glass gets broken. A port¬ able railing is provided for use around the superstructure deck and is removed on sub¬ merging. Exposed to view outside the hull are a towing hook for use when disabled and abaft the forward bow are the diving rudders, some of which fold up into a pocket leaving the space occupied flush and as they are only in use when submerged they are operated from inside the hull. On the deck is the bell for signaling under water. (See Submarine Sig¬ naling). The perpendicular pipes that pro¬ ject from the wave-breaker are ventilators com¬ municating with the living quarters and engines. Large submarines lately carry a folding-boat that is stowed in the superstructure.

Living Arrangements. — On the larger or sea-going boats the average of three officers and 20 men have three separate cabins fitted up rather similarly to the quarters on a steam¬ ship, with plenty of locker accommodation and steam-heated in cold weather. Steel work is encased in compressed cork to absorb moisture. The cook's galley is equipped with electric range, oven and hot-water reservoir. Coffee and soup are kept heated electrically in urns.

Armament. — 'Most navies equip their sub¬ marines with four torpedo tubes, two on the bow and two astern ; others carry an additional two in the superstructure ; the latter are of fixed or revolving type. Some British sub¬ marines have fixed port and starboard broadside tubes in the interior of the boat. The number of torpedoes carried varies from two per tube to whatever the larger space of the big ves¬ sels permit. Both ends of the torpedo tube are covered by watertight caps or shutters each opened and closed by hand. To load a tube the inside cap is opened, leaving the outside closed and the projectile is placed in the tube, the inside cover being at once closed and the open spaces at head and tail of the cigar-shaped torpedo is filled with water by pumping or blowing water from an internal tank specially fitted for the purpose. Next the outer shutter is opened and the projectile is discharged by compressed air, released from a tank ana entering behind the torpedo by electric gear operating a large valve. The boat's com¬ mander generally performs this latter opera¬ tion. During the torpedo's egress mechanism in the tube pulls a lever that starts the pro¬ pelling machinery of the torpedo as it leaves the tube on its deadly mission. Another weapon of the submarine is its one or two three-inch rapid-fire guns used as defense against air¬ planes, dirigibles and small craft. In submerg¬ ing the

gun is housed in the superstructure aided by its hinged mount. To render the mount more rigid the later German submarines have eliminated the hinge and on submersion

leave the gun projecting, after removing the breach-block and sighting telescope. To reduce propulsion resistance when submerged the gun is enclosed in a ˆbreakdown® casing of sheet metal. During the World War cannon have been added to armament, the calibre growing ever with the capacity of the enlarged boat. (See notice, end of article, on the very latest structures).

Periscopes and Range Finding. — The eyes of the submerged craft — the periscope — in its more recently developed form consists of an arrangement of prisms within a vertical tube (see Periscope) adjusted to an eye-piece simi¬ lar to a marine telescope. Usually submarines have at least two periscopes to provide for loss, besides permitting commander and the steers¬ man to be using one each simultaneously. The periscope tube has about six inches diameter and 18 to 20 feet length above the superstruc¬ ture. The more recently constructed peris¬ copes have on the upper end a reduced diameter of from two to three inches for the length of five or six feet. This has the effect of reduc¬ ing the ((periscope wave® left in its wake which makes itself more visible to the enemy than the projecting tube. The remaining instrument needful to correctly aiming the torpedo is a range-finding device; for this purpose there are several inventions, space for the description of which in this article is lacking. The dangers attendant on the operation of the submarine have given rise to numerous inventions for their prevention and cure. One of the most interesting is the (<safety keel® used in Euro¬ pean navies ; it consists of a flat, hollow keel filled with lead and has a depth of about 12 inches and about 24 inches width. This is fastened to the hull in such a way as to permit quick releasing in emergency and the reduced tonnage quickly brings the vessel to the surface.

A good example of strictly recent submarine construction is the Holland type, United States submarine Schley, built in 1917. It is 263 feet long, displaces 1,453 tons submerged, has sur¬ face speed of 20 knots, submerged speed 11ˆ4 knots. The hull is divided longitudinally into nine watertight compartments. There are four torpedo tubes in the bow, two port and two starboard; water-ballast tanks are also located here for their discharge. There are also two deck torpedo tubes besides those (four) in the bow. Aft of this is the torpedo com¬ partment. The officers' compartment comes next and the crew's quarters, with storage batteries below deck, is aft of the officers' quarters. Next comes a smaller compartment, the upper part of which

contains the wireless operator's room, while the lower half is devoted to cold storage. Next, at about midlength of the vessel comes the central operating com¬ partment with conning tower and the bridge above. The Schley has three periscopes, two running into the operating room, the third leading to the conning tower. To the rear of this is another crew's quarters and storage batteries beneath its floor. Next comes the engine-room with its two 12-cylinder engines, capable of driving the vessel at 20 knots on the surface. The next compartment contains the electric motors, one attached to each shaft, together with other auxiliary machinery. Water ballast fills the last compartment. The torpedo armament consists of four fixed tubes in the

bow ; and two others on a revolvable mount, which are carried above the main hull, and within the false superstructure.

During the progress of the World War wonderful stories appeared in print of the great advances being made by Germany in submarine construction and the immense size of her latest craft. The British navy had been well posted because of steady capture of enemy submarines and their consequent examination. But the officers were silent and the public was unen¬ lightened. Captain Persius, Germany's naval critic, gave out the following figures concern¬ ing the German submarine fleet: In 1917 Ger¬ many built 83 and had 66 destroyed; in April of that year she had 126 submarines; in Oc¬ tober 146. In February 1918 she had 136 and in June 113. England's 1917 War Cabinet de¬ clared the German submarine had a surface speed of 18 and 10 or 11 knots submerged. It

later). All details are not given out but we read of four of these enemy boats : <(The best of these were (tuned upJ for special trial® and a special trial board appointed. The German boat tried was U-III, built at Germania Yard, Kiel, 1918, and S-3, a submarine designed by the United States Navy Department and com¬ missioned in 1918. They both belong to the SOO-ton class with the following measurements :

	U-III.	S-3 •
Length .	235 feet	231 feet
Beam .	21 feet	21.5 feet
Draft .	12.5 feet	12.5 feet

The report reads: ((In the trials the maxi¬ mum surface speed of the U-III was 13.8 knots, while the S-3 made 14.7 knots. The sub¬ merged speed of U-III was 7.8 knots, while S-3 made 12.4 — a remarkable difference in favor of S-3. The radius of action of the two boats is

ˆLongitudinal Section of Submarine.

carried 15 to 20 torpedoes and was able to travel 100 miles submerged, remaining com¬ pletely submerged up to 48 hours. On fairly reliable information we learn that England at the outbreak of war had about 80 submarines, built about 130 more and lost about 50 during the conflict. The British experts were sur¬ prised, when the Germans brought in their submarines according to the terms of the armistice, how little they had to learn from them. By 1917 both England and the United States were building submarines of 1,500 to 2,000 tons. And now, it is claimed, Britain has in her M-I a 1,700-ton submarine carrying a 12-inch gun (six-inch guns were the big calibre during the war). She has two tubes and an anti-aircraft gun. It is also said that the British have steam-driven 2,700-ton submarines with surface speed of 23 to 25 knots. In Sep¬ tember 1916 was published an interesting report of the United States navy making comparative tests of American submarines alongside the German (examples of which arrived here

also in favor of S-3, despite all the furore that was created by the advent of the U-boats on the American coast during the war. U-III can cruise 8,500 miles at eight knots, while S-3 can cover 10,000 miles at 11 knots. The submerged cruising radius shows an equal preponderance in favor of S-3. Both can carry 12 torpedoes. U-III mounts two four-inch guns, one forward, one aft, while S-3 mounts one gun forward, this practice of one gun on a submarine being standard practice in the United States navy.® Living accommodations are far inferior on the German boat, and, according to the report, un¬ necessarily so. As to seaworthiness the Amer¬ ican is the better, <(decks drier, her bridge less subject to green seas, and her general behavior in a sea-way superior.® Diving capabilities dif¬ fered little, but slightly in favor of the S-3. The latest word in United States undersea boat construction is the AA-2 built September 1919 from designs of the Electric Boat Company and declared to be the fastest Diesel-engined boat afloat. She has a cruising radius of about 7,000

miles, is 268 feet long and her surface speed is expected to develop 20 knots an hour, 13 knots submerged.

Bibliography.— Bishop, F., (New York 1917) ; Lake, Simon, (The Submarine in War and Peace J (Philadelphia 1918) ; Newbolt, Sir Henry, Submarines and Anti-Submarines) (New York 1919); Talbot, Submarines: their Mechanism and Operation (London 1915).

SUBPOENA, sub- or su-pe'na, in law, a writ directed to a witness, commanding him to appear at the court to testify what he knows in the case therein described, pending in the court. Should the court wish to examine any books or papers connected with the case in possession of the witness, a clause is inserted in the writ instructing him to bring them with him. An action of damages lies against the party disobeying this writ, unless he has a good legal excuse ; but the subpoena must have been served a sufficient time beforehand to enable him to arrange his affairs. See Witness.

SUBSCRIPTION. From the Latin sub, under, and scribo, I write. In the common vernacular this term defines the placing of a signature to any written or printed statement. In the law it applies to the signing Qf one's name to an engagement, or is the attestation of a witness by so writing his name ; the illiterate or blind person, however, is permitted to make his mark as a sufficient subscription. It most commonly applies to a person making an agree¬ ment over his signature to furnish certain moneys for a particular purpose, as a sub¬ scription for a book, or to a charitable institu¬ tion, etc. The extent to which subscriptions, made voluntarily, for charitable objects are binding still remains a legal problem. In sub¬ scribing, (<agreeably to the statute and by-laws of a chartered company,® the party acquires a right to his shares, which is sufficient consider¬ ation to make the subscription binding on his part. Subscriptions to a contemplated corpora¬ tion may be enforced when the corporation is formed. <(The consideration which supports the promise of a subscriber to an enterprise is expenditure by the promisee on the faith of the subscription and not advantage to be gained by the promisor® (41 Ill. App. 259; 57 Iowa 307; 69 id. 134). But (<until liability has been in¬ curred or acts have been done on the strength of the subscription, it may be withdrawn, and it is revoked by the insanity or death of the inscribed (96 Ill. 177; 93 id. 475; 77 Pa. 328). The payment by a subscriber of a part of his subscription, which is not legally enforceable, does not make the residue of said subscription valid.

SUBSEQUENT STREAMS. As conse¬ quent streams (q.v.) deepen and widen their valleys, new slopes are formed, no longer toward the

ocean, but toward the consequent streams. On these new slopes new streams are developed as tributaries to the older rivers. Their courses are not determined by the orig¬ inal but by the subsequent slope of the land, in part influenced by the softer rocks along the sides of the original valleys. These are called subsequent streams.

SUBSIDIES. From the Latin subsidium, support, assistance, composed of sub, under, and sedeo, I sit. The term subsidies is applied more generally to English law, and the systems in use in this * country are brought under the title bounties. Subsidies were grants by Parlia¬ ment of assistance to the king, as taxes or tribute assessed for urgent occasions and levied on all subjects according to their holdings in lands or goods. Later the term applied to aid given by the government to commercial enter¬ prise likely to prove of public benefit. In inter¬ national law the term applies to money given by one nation to another as an aid to carrying on war without taking active part in such campaign. See Bounties.

SUBSTANCE. . Ever since Thales ex¬ plained the universe in terms of water, there has been an almost irresistible tendency among philosophers to explain the unity of intricate assemblages of phenomena in terms of a per¬ manent quasi-material substratum, or, as it is technically known, a substance. The notion of substance runs through the entire pre-Socratic philosophy, and the Platonic realistic hypostasis of the ideas makes of them something very like the substance of the particulars which they em¬ brace. Substance first receives its name and its separation from form in the philosophy of Aris¬ totle, but this separation is by no means com¬ plete. Substance, or to vtc ond[ievovf is for Aristotle at once something like the explanatory principles of Thales and the other pre-Socratics, and a form or essence endowed with actual existence. Into the form or essence of a par¬ ticular not all its attributes enter, but Aristotle never makes clear the principle in accordance with which the essential may be separated from the inessential.

The scholastic view of substance is a per¬ petuation of that of Aristotle. The essence- aspect of substance was transmitted by the Scholastics to the earlier modern philosophers of the Continent; though the latter progressively emphasized the function of substance as a sub¬ stratum. Descartes makes mind and matter his two substances, and defines substance as that which depends for its existence on God alone. God is clearly the ultimate Cartesian substance. This view is modified by Spinoza, though more in terminology than in fact; he holds that God is the one substance, and that mind and matter are two among His infinite number of attri¬

butes. Whether God is simply the sum of his attributes is left uncertain. The Leibnizian concept of substance is not widely different from that of Descartes, but the number of dif¬ ferent substances — the monads — is multiplied indefinitely.

The British philosophers from the start mixed less of the Aristotelian notion of form and essence with their substratum-substance than their colleagues on the Continent. Locke followed Descartes in his dualism, but saw that a substratum which is nothing more than a sub¬ stratum can only manifest itself through its appearances, and is unknowable in its inner es¬ sence. Once this became clear, it was obvious that we might remove the substance from the assemblage of appearances overlying it without making any noticeable difference. But of two indistinguishable situations it is impossible to assert categorically that one exists and the other

does not. Berkeley accordingly discarded sub¬ stance from the realm of matter; he believed, however, that a substantial subject was neces¬ sary for cognition. Hume followed Berkeley in reducing the material world to its phenomena, but saw that the notion of substance furnished as little support for the states of a mind as for the qualities of a material object. Combining this with his unwillingness to admit the exist¬ ence of anything of the nature of a general idea or universal, he was necessarily driven to the opinion that things are mere aggregates of their appearances, which are associated together in a manner quite independent of any inherent re¬ latedness on their part.

The Humian refutation of substance is es¬ sentially valid. The very least which we can demand of a principle of explanation is that it should explain ; and the explanation of a group of facts is essentially the more intimate correla¬ tion of them with the rest of our knowledge. After we have been told that the attributes, say, of the material world are unified through their inherence in a material substance, we know just as little of their bearing on one another and on our remaining stock of information as before. Nevertheless, Hume went too far in denying to the mental and material aggregates of phenomena, respectively, all unity other than that which is furnished by the power of ideas to attract associates. Such collections of enti¬ ties as the material world, the world of mind, individual minds, etc., have, prima facie , a very real unity — the unity, namely, that consists

in their forming systems. (It may be shown by such means as are used in the article on Uni- versals that this unity is not purely illusory). In the post-Humian philosophies, some such no¬ tion of system tends to replace the older con¬ cept of substance.

In the philosophy of Kant the system-notion of the unity of phenomena and the substratum- notion are both found, and are almost inextri¬ cably interwoven. Kant retains the old, un¬ knowable substances of Hume under the name of the Things-in-Themselves. While he re¬ gards the existence of these as indubitable, he nevertheless excludes them from any active part in his critical philosophy, in so far as this concerns itself with the pure reason. Within the realm of phenomena, the substances are just such relational, structural complexes as have been described in the last paragraph. Indeed, substance is made a category of relation. The followers of Kant retained this latter phase of his views on substance, and discarded his things — in themselves. They made the entire uni¬ verse their ultimate reality but though they gen¬ erally viewed this in the light of a system, there was not wanting among them the tendency to revert to the substratum idea. However, sub¬ stance, except as the Absolute may be substan¬ tial, was not assigned a fundamental status. Thus in the philosophy of Hegel, substance is but a stage of the cosmic dialectic, not its termi¬ nation.

Though the problem of substance, under its own name, has ceased to play any great part in current philosophical disputes, there are not wanting in the system of the present day enti¬ ties which differ from substances in little but their appellation. Certainly the Bergsonian elan vital serves as a principle of explanation

simply by virtue of being a substratum. There is not a little resemblance between the sense- data and other particulars of modern atomic realism, which serve primarily as pegs on which to hang relations and qualities, and the sub¬ stances which subserve a like function in the philosophy of Locke. See Matter; Soul.

Norbert Wiener, Editorial Staff of The Americana.

SUBSTITUTIONS, Groups of. See

Groups, Theory of.

SUBWAYS. Underground railways, now common in cities, have come to bear this name. Of all the difficult problems that have arisen as a result of the great and continuous concentra¬ tion of population in

cities, the most difficult and the most expensive to be satisfactorily solved is the furnishing of suitable and econom¬ ical means of local travel. With the enormous vehicular traffic that congests the streets, the surface cannot be used except for lines whose speed, being limited by the ordinary street con¬ ditions, is too slow, except for short-distance journeys. In some American cities, and in a few exceptional cases in European, elevated railroads have been constructed to furnish means of travel on which traffic, freed from surface conditions, could move more rapidly. Such railroads, although successful in them¬ selves, are so unsightly and so objectionable to the abutting houses that they are disliked.

With the surface impossible for use for rapid transit purposes, and with the super-surface undesirable for such use, recourse is necessarily had to the sub-surface, and it is in the develop¬ ment of sub-surface lines that there is the greatest activity. To this class of railroads, and regardless of the method of construction, whether by tunnel or by open excavation, the generic term of Subway has come to be ap¬ plied. This name is now used to describe a railroad built beneath the surface, with stations at comparatively short distances apart, and pri¬ marily intended to serve the needs of local tran¬ sit in a thickly populated locality.

History. — The first city in the world to feel the need of subways was London, where, in 1853, there was begun the ..construction of a two-track underground road from Edgeware to Kings Cross. From this beginning there were finally produced two lines, known as the Metro¬ politan Railway and the Metropolitan District Railway, the greater part of whose construction was finished prior to 1870. These roads were not given a satisfactory location, a compromise route having been determined on by which it was attempted to serve as many districts as possible, the result being that the line lacked directness. This error in proper route selec¬ tion, and the fact that the railways were neces¬ sarily operated by steam locomotives — the only means then at hand — rendering them exceed¬ ingly disagreeable for passengers, failed to pro¬ duce satisfactory financial results, and, conse¬ quently, to furnish any encouragement for an early repetition of a similar experiment in Lon¬ don, or, even less so, in other cities, where the demand for transit facilities was less strong. It was not until 1886 that any further attempt was made to construct a subway line; in that year the late J. H. Greathead, an eminent Eng¬ lish engineer, designed a railroad circular in section, lined with cast iron, which it was at

first intended to operate with a cable, such method of operation having proved successful in America for surface lines, avoiding the dis¬ agreeable consequences of operation by steam locomotives. Before the line was completed it had been demonstrated that such railroads could be successfully operated by electricity, and so that power, instead of cable, was installed.

This tubular railroad, the first to be prac¬ tically operated, the prototype of many others, having conclusively shown that by means of electricity subways could be operated not only free from the objections of steam operated lines, and free from the objections to the construc¬ tion of elevated lines, but also more econom¬ ically than by steam, a serious study of the problem was at once taken up in New York, Boston, Paris, Berlin and Budapest. The last- named city has the honor of having produced a new type of subway, which has influenced the most approved form of construction. This road was built with a flat roof, consisting of steel beams with arches turned between them, per¬ mitting the whole structure to be brought close to the surface of the street, and was, therefore, in direct opposition to the Greathead method, in which the railroad was carried at a great depth below the surface of the street, necessi¬ tating mechanical means of taking the passen¬ gers from platform to street level. This line in Budapest was put in successful operation in 1893. In the meanwhile similar lines had been projected both in New York and in Boston, but owing to certain legal delays in the former city work was first begun in Boston. The latter subway was intended for the accommodation of the surface trolley cars in order to carry them through the congested centre of Boston, where, on account of the narrowness of the streets, the speed of the cars had been necessarily reduced to a rate that was intolerable.

The first subway planned in Boston was partly a two-track structure and partly a four- track structure, and had a length of 1.7 miles. This has since been increased and the subway has also been connected with the elevated rail¬ road system, so that at present both the elevated trains and trolley cars pass through it.

When these various railways were put under construction or in operation, the era of subway construction may be said to have become firmly established, and other lines were undertaken in Glasgow and Berlin, some of the shallow type and some of the tubular type, and elaborate and complex studies were being prepared for both Paris and New York. Although the work of beginning subway construction in these two last- named cities had been retarded for one cause or

another, the delay has nevertheless worked to their advantage, as the experience gained at other points had proved of great benefit. These two systems now present the most advanced and the highest development in the art of subway construction.

Work on the first line was begun in Paris in 1898. The French engineers, instead of doing as had been done elsewhere — laying out short and detached lines to serve the most urgent requirements and without regard as to the definite part that such lines would play in the final plan of urban development — laid out, at the beginning, a comprehensive map of a great system covering the whole of Paris, embracing

all the lines that could reasonably.be foreseen as necessary or desirable. This plan covers 47 miles of railway, all of which are considered as a unified system to be operated as a whole, and the construction of which has been steadily proceeding.

The work of building the subway in New York did not begin until the year 1900. In no city in the world are the demands for transit facilities as great as in New York. On account of the peculiar shape of the city the main travel is necessarily concentrated on a few well-estab¬ lished north and south lines, and although great as is the carrying capacity of the elevated and surface systems, such capacity is much inferior to the demands of the population. At the time the first subways were opened the number of paying passengers on the street railroads of New York exceeded 1,000,000,000 per annum. It was decided to build a subway railroad with four instead of two tracks. Of these four tracks, two are used for express trains — that is, trains that stop at intervals of about one and one-half miles — and two of the tracks used for local trains, which stop at intervals of about one-quarter of a mile, in order to differentiate between the passenger who desires to travel a long distance and the one who desires to go a short one.

The initial subway had a length of 20.8 miles, of which 6.3 miles are of four-track, 6.7 miles of three-track and 7.8 miles of two-track. This road begins at a point in front of the City Hall, extends northerly to Kingsbridge in the north¬ western part of the city, and to the Zoological Gardens in Bronx Park in the northeastern part of the city, being in plan like the letter Y.

When this work was about half completed, a second subway was designed and contracted for to extend the above railroad southerly along Broadway from the City Hall and under the East River to a point in the Borough of Brook¬ lyn. This extension consists of 2.8 miles of

two-track and 0.7 mile of three-track, making in all 24.3 miles in length, with 86.6 miles of track, exclusive of side tracks. Soon after this first subway was in full operation from At¬ lantic and Flatbush Avenue Station in Brook¬ lyn to Van Cortlandt Park on the west side and to Bronx Park on the east it was seen that additional transportation facilities would be required within a very few years. Negotiations to this end were initiated by the New York Public Service Commission with the Brooklyn Rapid Transit and the Interborough Rapid Transit in 1911 and on 19 March 1913 the so- called dual contracts were signed by these companies on the one hand and the City of New York on the other. Under these con¬ tracts the cost of construction was to be borne partly by the city and partly 'by the operating companies. The latter agreed also to extend their elevated roads and to increase the facili¬ ties of existing roads, by third tracking or by constructing a second story structure. The contracts called for the construction of 44.55 miles of new subways; 53.10 miles of new elevated railways, and 19.8 miles of third- tracking or other additional track. The new lines, now practically completed, consist of 330 miles of single track, made up of 260 miles of subway, 45 miles of elevated and 25 miles of new third track, taken in connection with the

old lines with their 330 miles of track, con¬ stitute a mileage exceeding that of all the other rapid transit systems of the world. The year 1918 saw a number of the new lines included in the Dual System placed in operation, leaving to be finished those lines providing new routes between Brooklyn and Queens and Manhattan by tunnels underneath the East River. These tunnels are difficult engineering feats and re¬ quire a longer time than does ordinary subway or elevated railroad construction. Subsequent to the completion of the first subway the city determined to build certain additional lines, in¬ cluding the so-called tri-borough route in Man¬ hattan and the Bronx ; the Centre Street Loop in Manhattan and the Fourth Avenue Subway in Brooklyn. All these lines later were in¬ cluded in the Dual System. Of the Dual Sys¬ tem subway lines, there were opened previous to 1918, exclusive of the first or old subway, the Queensboro Subway; the Fourth Avenue Sub¬ way in Brooklyn; its 86th street extension; its Sea Beach branch to Coney Island; its New Utrecht avenue branch; th& Astoria branch of the Queensboro Subway; the White Plains Road extension of the first subway; the Corona branch of the Queensboro Subway; the Jerome avenue branch of the Lexington Avenue Sub¬ way : a portion of the Seventh Avenue Subway ; the West Farms Subway connection, and the Broadway Subway, Manhattan. About 170 track miles of new lines were in operation at the beginning of

1918. On 1 July 1918 the new Seventh Avenue Subway was placed in partial operation from 33d street to South Ferry, and on 17 July the new Lexington Avenue Subway was placed in use from 42d street to 167th street in the Bronx. On 1 Aug. 1918 the so-called H system was tried. The beginning of this system terminated the service of the old subway as it had been given for 14 years. Under the H system the old subway from Times square north with its branches was joined to the new Seventh Avenue Subway, thus constituting the west side subway, while the part of the old system south from 42d street and Fourth avenue was joined to the new Lexington avenue line and its Bronx branches, making a complete through line all on the east side from South Ferry to 167th street in the Bronx. This division of the old subwav left the part under 42d street from Grand Central Station to Times square as cross-bar to the Its tracks were assigned as follows : Two tracks for a shuttle service between the east side and west side lines, and two tracks for a continuation of the Queensboro Subway west from Grand Central to Times square. Very serious delays in the work of construction of the new lines occurred in 1917-18, owing to the fact that the demands caused by war condi¬ tions had been such as to delay the work, and in some respects to bring it to a halt. More subaqueous tunnel work is under construction for Dual System lines than has ever been at¬ tempted before. This work represents an ex¬ penditure of about $30,000,000, and includes four new tunnels of two tubes each and one tunnel of four tubes. The last named connects the Lexington avenue line in Manhattan with its Bronx branch. The other tunnels mentioned are the 60th street tunnel connecting the 59th Street Subway with the Queens line, the tunnel

for the 14th street eastern line, the new Inter¬ borough tunnel between Manhattan and Brook¬ lyn and the tunnel connection between the Broadway Subway in Manhattan and the Fourth Avenue Subway in Brooklyn.

The total cost of New York's Dual Subway System, including equipment, real estate, power¬ house construction and changes, interest during construction, etc., will be about $400,000,000. Of this sum about $60,000,000 is contributed by the Brooklyn Company, about $146,000,000 by the Interborough, and the remainder, ap¬ proximately $194,000,000, by the City of New York.

The general type of subway adopted for New York was of the flat roof shallow form, bringing the rail and platform level as close to the surface of the street as possible. The ir¬ regular topography of the city, however, has compelled a departure from this type in several instances, so that a portion of the road is in ordinary deep tunnel, and

the portion beneath the East River, and the approaches thereto, is of the tubular type, as adopted in London.

While this work of subway construction had been going on in other cities, London had made many additions to its subway construction by building detached and separately operated lines on the tubular principle, there having been a decided popular prejudice against any form of construction that would threaten to interfere with surface travel during construction, or that would invade the vested rights of the several local governments, which form the constituent parts, of the government of the Metropolitan district, or what is commonly known as London.

Construction. — The construction of sub¬ ways presents a wide field for the display of engineering skill and ingenuity, as a modern line demands the application of nearly all the principles on which engineering science is based. At the time when the first railroad was built in London, iron was expensive, and steel, as a ma¬ terial of construction, unknown, and recourse was had to masonry, except in cases where the use of iron girders was obligatory. The struc¬ ture was, therefore, a continuous archway, and calls for no extended description.

When the City and South London Railway was begun, cast iron was sufficiently cheap to be used. At that time the building of a line so near the surface as to disturb it, even tem¬ porarily, was out of the question, owing to the opposition of various interests. Mr. Greathead therefore decided to make a deep tunnel, which he built by means of a ˆshield,® such as is com¬ monly employed -in deep turned work in soft soil.

The advantage attending tubular construction is that it can be carried on without the inter¬ ruption of surface traffic, but the disadvantages are that elevators must be installed to carry passengers between the platform and street sur¬ face, a distance varying usually from 50 to 100 feet, with the attending cost and delay, and the greater difficulty of properly ventilating the deep tubes. On the other hand, a subway built close to the surface of the street, whether by tunneling or in open excavation, introduces many complex difficulties, as there are involved the interference with street travel, and the care and at times extensive reconstruction of other

sub-surface structures, such as sewers, pipes or electric conduits.

In Boston these difficulties were avoided in some instances by tunneling with the aid of a semi-circular shield, and elsewhere reduced, as a rule, by keeping the roof of the subway suf¬ ficiently low to pass beneath the water and gas mains, so that they were left in their previous positions. When tunneling methods were not employed, surface travel was maintained by permitting the contractors to break the con¬ tinuity of the surface during the night only. The first step was to make an excavation across the street and with a length of about 12 feet. This excavation,, roofed over with wood during the day, was carried down to the foundation level and a section of the subway structure built. Such an excavation was called a ˆslice.® After the first slice was well advanced, a second was begun, and an intervening slice interval left undisturbed. When a series of alternate slices were completed the intervening excavation was removed.

4 In Paris, subway construction was much aided by the width of the streets and the placing o f nearly all sub-surface structures beneath the sidewalks. In New York, in order to reduce to the minimum the distance between the platform and street surface so as to give the shortest flight of steps for passengers to climb, it was planned to build the old subway regardless of sewers and pipes, even though extensive read¬ justment was necessary. A general design of a flat roof was adopted, the top of which was permitted to come within 30 inches of the top of the paving, a distance just sufficient to con¬ tain the yokes carrying the sub-conduit of the electric surface tramway. In order to support the flat roof with its superincumbent load, a steel framework was devised, consisting of horizontal steel beams in the roof resting on rows of columns between the tracks and verti¬ cal steel beams at the sides. These steel frames were set at intervals of five feet, and provide a series of supporting ribs. Between the roof beams and again between the wall beams, arches of concrete were formed. The floor of the structure is also of concrete, reinforced with steel beams, whenever an upward hydrostatic pressure was present. At the sides and immedi¬ ately next to the wall columns were placed two vertical rows of terra-cotta ducts, into which were drawn, through manholes leading to the street surface, the lead-covered cables to carry the power current for operation. In order to keep moisture from the subway a layer of water-proofing material consisting of felt and asphalt was laid in the floor concrete and then carried up outside of the ducts and over the roof, making a continuous envelope. Immedi¬ ately outside of the waterproofing was laid a thin protective wall of brick in concrete in

order to guard it against damage. For the special difficulties incident to the tunnel construction of the New York subways see Tunnels and Tun¬ neling — New York Rapid Transit Tunnels.

The bringing of the subway close to the sur¬ face necessitated carrying surface traffic during construction, usually by means of temporary bridges, and the permanent readjustment of sub¬ surface structures. In the matter of sewerage, this readjusting was done by substituting for a single sewer in the centre of the street, two

smaller sewers, one on each side, and by car¬ rying cross sewers in iron pipes beneath the sub¬ way at suitable points. In the matter of water and gas mains, pneumatic tubes and electric conduits, a complete rearrangement was adopted by leaving the smaller ones above the roof and placing the larger ones at the sides. A satis¬ factory arrangement of these sub-surface struc¬ tures was a work of great difficulty and ex¬ pense.

In general the design of this old subway proved very satisfactory, yet in operation cer¬ tain defects developed which were avoided by the engineers of the Dual System. Many of the stations of the. old subway were built on curves. A considerable space was left between the car and station platform on these curves which proved a source of constant danger in rush hours and were the cause of not a few fatalities. Moreover, it is necessary to slow down sooner when approaching a curved plat¬ form than a straight one, and in the rush hours, when trains are operated on short head¬ ways this slow-down tends to cause congestion at those points of the line where there are curved platforms. The ventilation of the old subway was defective in that all four tracks were placed in one tunnel. The passage of a train there stirred the air, but did not renew it, since the air escaped to the side of the train and was not propelled ahead of it to the ex¬ hausts. The new subways have a partition be¬ tween each pair of tracks, so that there is really a tunnel for trains going in the same direction and one for those going in the op¬ posite direction. Excessive heat developed in the old subway in the summer. This is due to friction of wheels, brakes, etc., and to the op¬ eration of the car motors. The old subway was waterproofed all the way around — 'Underneath, at the sides and overhead — and this waterproof¬ ing, while most effectively keeping water out, prevents radiation, and confines the heat within the tunnel, which is augmented by each passing train. Less waterproofing characterizes all recent subway construction.

On the old New York subway there are two classes of stations, one for local, the other for express trains. The platforms of the local sta¬ tions

are on the outside of the outer pair of tracks, and are reached directly from the street surface, and at these points there is no con¬ nection with the express (the central) tracks. At the express stations, the local (outer) tracks are curved outward so as to permit the con¬ struction of an island platform between each local and express track. The station stairways in this case are located as before, on the side¬ walks and lead to a ticket office beneath the street, from whigh there leads a bridge passing over the tracks and connected with both the island platforms by stairs. The more import¬ ant stations cover two streets and have numerous exits and entrances. Straight plat¬ forms exclusively are built on the new lines. The openings at subway stations were assumed to be sufficient to provide for ventilation of the subways ; but this proved an error, and numer¬ ous openings were added, as well as blowers at congested points. See New York City.

The cost of constructing subways is very great. In this respect, the New York subway, being the largest and most complete as yet

constructed, has cost (including all work in hand estimated complete) about $400,000,000. This figure includes many miles of surface and elevated tracks allied with the system, and the usual proportion of “water® for financing the proposition. The most expensive four-track section cost at the rate of nearly $5,000,000 per mile. In Boston 1.7 miles of subway, a part of which was four-track, cost $4,250,000. In Paris the cost averages for two-track subway about $850,000 per mile, while in London tubu¬ lar railways cost about $1,500,000 per mile, without equipment in all cases.

Operation. — As stated above, the first sub¬ ways built in London were worked by steam locomotives. All lines subsequently constructed, except one in Glasgow, have been and are oper¬ ated by electricity. In the exception above noted a cable was the source of power. As the orig¬ inal lines are now being converted to electrical operation, it has become the sole power now in use. The power is generated in central sta¬ tions by direct driven generators, usually of large size. The largest central station so far constructed is the station built to operate the subway in New York. In this station there are eight units, which have nominally 5,000 kilowatt capacity each, and which, together with sub¬ sidiary engines, represent a total of 132,000 horse power.

The current as produced is, according to the most approved practice, of the three-phase alter¬ nating type, and at a pressure of from 6,000 to 11,000 volts. This current, in appropriate sub¬ stations, is transformed and converted into di¬ rect current at a pressure of about 550 volts, and as such is fed to the line. The means of delivering the current to the trains is usually by means of a third rail set on the floor of the subway, and at a distance of about two feet from one of the track rails. From this rail the current is taken by contact shoes on the motor cars and led to the motors themselves. On some railroads the trains are drawn by electric locomotives at the head of the train, coupled in the same manner as steam locomotives. The most desirable practice, however, is to distribute the power to various cars in the train, so that the weight of the cars and passengers furnishes the necessary track cohesion. This method of working is called the multiple unit system. The various motors thus distributed through the train are controlled from either end of the train or can be arranged so as to be controlled at any intermediate point. In the New York subway the most powerfully equipped cars as yet con¬ structed are in operation. The motor cars have each two 200 horse-power motors, and are adapted so that the express trains can be com¬ posed of five to seven motors and three trailers. The total weight of an eight-car train, including passengers, standing space occupied as well as seats, is about 300 tons. The nominal power capacity is, therefore, six and two-thirds horse power per ton of train, or, say 10 horse power per ton of train available during the short period of acceleration. This power capacity is greatly in excess of European or other American prac¬ tice on account of higher speed to be realized. Inasmuch as subways are built to convey large numbers of passengers, it becomes necessary that the cars be run in trains and not in single units, except in the case of Boston, where the

subway was built for the passage of the surface trolley cars. The trains vary in length from 2 to 10 cars.

Ownership. — The various subways in Lon¬ don, as well as in Glasgow, Berlin and Buda¬ pest, are the property of private corporations. In England the authorization for such com¬ panies has to be procured by a special bill passed through Parliament, the ownership of the work being vested in perpetuity in the cor- poration, the various powers of the corporation being expressed in the act.

New York, Boston and Paris adopted the principle of municipal ownership, but under dif¬ ferent methods of application. In New York the Dual System was created when the city through the Public Service Commission, on 19 March 1913, entered into an agreement with the

Interborough Rapid Transit Company and the New York Municipal Railway Corporation (the latter a subsidiary of the Brooklyn Rapid Transit), providing for the construction and operation of new subway lines, elevated and subway extensions, of existing subways, and third tracking and extensions of elevated lines. The city and the two companies contributed large sums for the construction of subway lines, while cost of equipment, plus the cost of construction of elevated extensions and ele¬ vated third tracking and other improvements, was met by the two companies on their re¬ spective systems. Despite the substantial con¬ tributions by the companies to the expense of subway construction, all subways and elevated extensions of subways are owned by the city, while elevated railroad extensions and third tracking on elevated railroads remain the prop¬ erty of the companies. The dual agreements included leases to the companies of the lines to be operated by them and their subsidiaries.

In Boston a commission appointed on be¬ half of the city constructs the road by con¬ tracts as cheaply as possible and makes a lease to the company owning and operating the sur¬ face and elevated lines at a figure that will at least return to the city the interest that the city has to pay. In the case of both New York and Boston the profit that the municipality reaps is the securing of the construction of rapid transit lines necessary for the development of the city.

In 1918 the Boston operating company found itself in financial difficulties due to a variety of causes and appealed for aid to the State legisla¬ ture. An act was passed by the latter body vesting a board of five trustees with power to operate the Boston system and to fix the fare rate. For the first six months of control by the board from 1 July 1918 the success of the experiment was questionable. The fare has since been increased 100 per cent and agitation for public operation has decreased proportion¬ ately. Boston's subway now extends to all parts of Greater Boston and to Cambridge, Mass.

In Paris the city arranged with a corporation especially organized for the purpose, the leasing of all lines that the city of Paris might build, the company to pay to the city one-third of the gross receipts, . and, in addition, to furnish the equipment, which will become the property of the city at the end of the lease without pay¬ ment. The city of Paris then constructs in its own name the several lines, which must con-

form to a certain standard of excellence. The company has no supervision of the construction of the lines, as it is not directly interested in the cost. The city of Paris is not secured against loss, as in the case of New York and Boston, but, on the other hand, being practi¬ cally a partner in the enterprise, it can secure a direct monetary profit, provided the roads are profitable in their operation, which have so far been found to be the case. Chicago and Phila¬ delphia are building subways, construction is well advanced in the latter city. Chicago pro¬ poses to spend $100,000,000 in a nine-year build¬ ing plan, involving the construction of a double¬ track rapid transit subway six miles in length and a five-mile subway for street surface cars. These subways would be the nucleus of a larger system to be constructed later, which provides for 58.1 miles of subway. Consult Beavan, A. H., (Tube, Train, Tram and Car* (New York 1903) ; McPherson, L. G., transportation in Europe) (New York 1910) ; Johnson, E. R., (Elements of Transportation J (ib. 1909). See also Tunnels and Tunneling.

SUCCESSION. Succession is the transmis¬ sion of property either real or personal at the death of the owner, by rules laid down by law, in distinction to that by will made by the de¬ ceased. The term “succession® is used in law to cover both the technical word “descent,® which applies to real property, and “distribu¬ tion,® which applies to personal property.

When the owner of property dies, it is pre¬ sumed that his property will follow in its suc¬ cession the rules laid down by law, unless it is shown that a will is in existence. This fixes great responsibility upon the law to be just and fair to the survivors, and the statutes of the different States are very carefully worded to cover the rights of all. In all of the States the statutes of descent and distribution show conclusively how property will be disposed of by administers of estates. The statutes vary in some points, but in most provisions they fol¬ low the old common law of England and the Roman civil law.

Family ties form the base on which are built up the laws of succession. Children of the deceased (known as the “intestate® from the fact of not having made a will or testament regarding his property) have the first right in the property. In the United States, except where modified by statute, the heirs or persons who inherit through the laws of succession, take both the real and personal property, the only distinction being that the real property vests at once and the personal is distributed by administrators.

Children, male and female, share alike in the property of the ancestor,

and if one or more of the children is deceased, the grandchildren will take that share that would have fallen to their parent, so long as one child of the an¬ cestor lives. If there are no children living, and only grandchildren, all the grandchildren will share and share alike regardless of the ap¬ portionment that would have taken place if their parents had lived. The former is known as “per stirpes® or by representation; the latter as “per capita® or by the number of persons.

Property will first descend in a direct line as long as there are descendants, such as to

children, grandchildren and their descendants. These are known as lineal descendants.

It will then go to brothers and sisters of the full blood and to the half blood of the same father, and their descendants. Failing these de¬ scendants, it will ascend to the parents and their descendants who are not in the direct line with the intestate, and are known as collateral de¬ scendants. Property will descend to even re¬ mote kindred before it will ascend one genera¬ tion.

Where there are no children the husband or wife inherits in some States the entire estate personal and real, but in other States the per¬ sonal property only is inherited, and the realty descends to the blood of the intestate, a life interest known as dower only vesting in the widow.

The rights of the half blood are settled by statute. Half-blood brothers and sisters inherit from the common ancestor, but not of the parent by marriage.

Where lineal descendants fail, the succession is counted from the common ancestor with the intestate who last owned the property by right of “purchase® rather than by descent. This rule is enforced in order that ancestral property shall not be diverted from its original source.

In the United States there is no preference in descent for male rather than female heirs, nor for first born.

If there are not found any lineal descendants, or any collateral descendants to take the prop¬ erty, the succession fails and the property re¬ verts or “escheats® to the State or county.

Adopted children are treated as not capable of inheriting property other than that of the adopting father and mother, and are not in¬

cluded in succession from other members of the family, either ancestors or brothers or sisters.

A child born after the death of the father is included in the inheritance as if the birth was before the death of the father, if the child is born alive, and the share taken is the same as others of the children.

A bastard may not inherit except from his mother or illegitimate brothers or sisters. Being illegitimate, the law does not recognize rights due him. If legitimized by special act of legis¬ lature or subsequent marriage, he takes then in the same share as any legitimate child.

Personal property is distributed according to the laws of the place where the intestate has his domicile. The realty descends according to the laws of the State in which the property is situated. Modern European civil codes differ widely in their provisions regarding inheritance and succession. In general the principles of Roman law obtain. See Descent in Law ; Heir; Inheritance.

SUCCESSION, Apostolic, the transmis¬ sion, through the episcopate, of the power and authority given by Christ to his apostles for the governance of His church. Theologians of the Catholic Church and of the Anglican High Church maintain that those sects which are without apostolic succession, that is, which separated from the Catholic Church without re¬ taining bishops regularly ordained and con¬ secrated, have, strictly speaking, neither church nor sacraments, nor divine mission to teach their people the truths of the Christian religion. Catholic theologians hold further that apostolic

succession by itself does not involve the au¬ thority to teach, to rule the church, to admin¬ ister the sacraments ; that when, for example, a national church goes out of the communion of the Church Catholic, though it have duly con¬ secrated bishops, and duly ordained clergy, by being severed from the Church Catholic it loses jurisdiction, mission, right to exercise the powers of priesthood and episcopacy; its bishops and priests are in a situation resembling that of a bishop or a presbyter who is suspended or excommunicated. See Bishop ; Ordination ; Catholic Church.

SUCCESSION POWDERS, from the

French Poudresˆde Succession, secret poisonous powders formerly prepared in Italy and France, to kill persons slowly, so that their heirs might succeed (hence the name) to their property and personal estate. Private enmities also found these powders a ready and secret means for satisfying the treacherous desire for revenge. Their composition has never been definitely es¬ tablished, but the principal active ingredient is now known to have been arsenious acid, or common white arsenic; then unknown except in the laboratories of a very few chemists. A reference to these powders may be found in Beckmann's (History of Inventions, etc., *translated by Johnson (Vol. I, chapter Secret Poison). Consult Stenzelii, (Dissertationes de Venenis et Temporaneis,* resp. J. G. Arnold, Vitebergse, 1730.

SUCCESSION WARS are wars which arise from claims for the possession of the crown on the occasion of a sovereign dying without undisputed legal heirs. In modern European history the most important of these struggles were those of the Spanish succession (1700-13), and of the Austrain succession

(1740-48).

War of the Spanish Succession. — Shortly before the death of Charles II of Spain, with¬ out issue or collateral male heirs, several com¬ petitors laid claim to the throne, the two principal being the dauphin of France, son of Charles' elder sister; and the Emperor Leopold, who first claimed as male representative of the younger branch of the house' of Austria, be¬ ing descended from Ferdinand, second son of Philip and Joanna of Castile, though he after¬ ward withdrew this claim and substituted an¬ other in right of his mother, Mary Ann, daugh¬ ter of Philip III of Spain. The other leading powers, Great Britain, Germany and Holland, were naturally deeply interested in the settle¬ ment of this question, for the union of either France ,or Austria with Spain, which at that time ruled over the Netherlands, the Milanese, Naples and Sicily and vast territories in Amer¬ ica, would have seriously endangered the bal¬ ance of power in Europe. After much nego¬ tiation which had little result, Louis XIV put forward his second grandson, Philip of Anjou, as the representative of the French claim, and Leopold nominated his second son Charles as his substitute, both parties solemnly promising that Spain should never be incorporated with their respective dominions. Charles of Spain's second consort, Mary Ann of Neuburg, being a sister of the empress, naturally promoted the views of Leopold ; in which, however, she was opposed by the Count d'Harcourt, a clever dip¬

lomatist sent by Louis to Madrid, and who conciliated many of the

nobles and grandees, whom the queen had alienated. The French ambassador also intimated a resort to force if the rights <of the children of France should be superseded. Thus the king of Spain was in¬ duced to recognize Philip of Anjou as his heir, 2 Oct. 1700. On 1 November the king died, and the Junta immediately caused Philip to be proclaimed at Madrid. The young king entered his capital 18 February. All the European provinces and all the American possessions of the Spanish empire recognized the new monarch nor was his title at first disputed by the greater part of the European powers. But the meas¬ ures of Louis excited suspicion; and gave offense. On the death of James II of England, the French king recognized his son the Old Pre¬ tender as James III; the new works which the French were constructing on the Dutch fron¬ tier alarmed the States-General, and on 15 May 1702 England and Holland allied themselves with Austria and declared war against Louis XIV and the "usurper** of Spain. The contest had, however, been already opened by Austria unaided. Prince Eugene descended into the plains of Verona at the head of 25,000 men about the end of May 1701, defeated the French under Catinat at Carpi (9 July), and under Villeroi, at Chiari (September), but this severe fighting had no adequate result. In the fol¬ lowing summer Marlborough led an Anglo- Dutch-German army into Belgium and reduced one by one the French fortresses on the Maas; the German states, which, with the exception of Bavaria and Cologne, had been gained by Leopold, sent out an army under the margrave of Baden, which crossed the Rhine and cap¬ tured Landau. Early in September the elector of Bavaria raised an army and endeavored to effect a junction with Villars, who was sent by Louis to co-operate with him, but they were both kept in check by the margrave of Baden. In 1703 Marlborough, whose actions were hampered by the delegates of the States- General, confined himself to reducing the strongholds held by the French in the low countries. In Germany the elector of Ba¬ varia drove the Austro-German armies out of his dominions, and formed a junction with Villars. The latter advised a rapid march upon Vienna, which might have then been easily captured, but the elector preferred to attack the Tyrol, where the French general Vendome, with half the army of Italy, was to meet him. The Tyrolese, however, rose against the Bava¬ rians and compelled the elector to retreat before Vendome could join him. The elector again united his forces with those of Villars, and in¬ flicted a severe defeat on the Imperialists at Hochstedt (20 September) ; but many mis¬ understandings arose between the two com¬ manders, and Villars in disgust obtained his recall. In the following year Eugene and Marl¬ borough joined their forces at Donauworth on the Danube, and coming up with the Franco- Bavarian army under Tallard, Marsin, and the elector, at Blenheim, inflicted

upon it a severe defeat, 13 August. In consequence of this de¬ cisive victory the French had to recross the Rhine and evacuate all Germany. On the 4th of the same month Gibraltar had been taken in a few hours by a party of English sailors. The

campaigns ,of Marlborough in the Netherlands and of Eugene in Italy in 1705 have no feature of interest. In Spain the English under the Earl of Peterborough captured Barcelona, and had the • archduke proclaimed king as Charles III. The year 1706 was disastrous to the French arms. In Italy the united forces of Eugene and the Duke of Savoy fell upon the French while they were besieging Turin, and gained a complete victory, all the siege artillery falling into their hands (7 September). All Lombardy submitted to the Imperialists, and Charles III was proclaimed at Milan. In the Netherlands, Marlborough routed the French under Villeroi at Ramillies (23 May), and was prevented from besieging Dunkirk only by the jealousy of the Dutch. In 1707 an Anglo- Portuguese army under the Earl of Galway entered Spain, but was met by a much superior Franco-Spanish force under the Duke of Ber¬ wick at Almanza, and completely defeated (25 April). In southern Italy the whole kingdom of Naples submitted to a small Imperial army under Daun. Nothing of importance took place in the Netherlands or Germany. Eugene and the Duke of Savoy, penetrating into France by the Maritime Alps and Nice, appeared before Toulon toward the end of July, but the ap¬ proach of SiOme strong French divisions com¬ pelled them to retreat with considerable loss. In the following year Marlborough and Eugene, according to a fixed arrangement, reunited their forces in the Low Countries, and coming up with the French under the Duke of Bur¬ gundy and Vendome at Oudenarde inflicted on them a severe defeat (11 July). The allies then entered French Flanders, and laid siege to Lille, its capital, which capitulated 22 Octo¬ ber. On the Rhine both sides remained on the defensive. In Spain Charles III was compelled to shut himself up in Barcelona. The island of Sardinia submitted to Admiral Lake in August, and in the following month Minorca was cap¬ tured by Lake and General Stanhope. The length and ill success of the war had now be¬ gun to tell with fatal effect upon France. The funds required for the equipment and support of the armies were raised by ruinous loans, in¬ judicious and vexatious taxes, the forestalment of future revenue and the issue of paper money and a debased coinage. A severe winter destroyed the corn, vines and fruit-trees, and the dearth and famine which ensued produced discontent and sedition. Louis XIV

sued for peace, offering to give up, in the name of his grandson, the whole of the Spanish succession, and to restore Strassburg to the empire; but the allies looked upon these overtures as mere tricks to gain time, and rejected them. Both sides now made extraordinary preparations for renewing the struggle. Villars was sent into Flanders with an army of nearly 100,000 men to oppose Marlborough and Eugene, whose combined strength was slightly superior. After capturing Tournai, the allies proceeded to in¬ vest Mons. For this purpose they had to attack Villars in a strongly fortified position at Mal- plaquet, from which they succeeded in driving him, but not without suffering enormous loss (11 Sept. 1709). After some more fighting, besieging and negotiating, the death of the emperor, Joseph I, son and successor of Leo¬ pold, without male issue, leaving his crown to

his brother Charles, changed the whole aspect of affairs. The British thought that if Charles became undisputed sovereign of Spain and her dependencies, the very evil of an almost uni¬ versal monarchy ' would be again established, the prevention of which had been the chief cause for taking up arms against Philip V. A new Tory ministry unfavorable to Marlborough having come into power, private preliminaries of peace were signed between France and Eng¬ land 8 Oct. 1711. Eugene, however, continued the war aided by the Dutch, and was pushing steadily forward on Paris, but the defeat and capture of the British contingent under the Earl of Albemarle at Denain by Villars (24 July 1712) so weakened his forces that he was compelled to retreat. This defeat greatly modified the views of the Dutch, and the Eng¬ lish government persuaded the States-General to moderate their demands and come to terms with France. On 11 April 1713, the Dutch plenipotentiaries signed a treaty of peace (Peace of Utrecht) with France, their example being immediately followed by Prussia, Savoy and Portugal. Forsaken by all his allies, the Em¬ peror Charles was reluctantly compelled to sign a treaty at Baden, 7 Sept. 1714, in which he recognized Philip V as king of Spain.

War of the Austrian Succession. — On the extinction of the male line of the house of Hapsburg, by the death of Charles VI (20 Oct. 1740), his eldest daughter, Maria Theresa, in terms of the Pragmatic Sanction, (q.v.) claimed the whole of his dominions, and at once as¬ sumed the government, with the title of Queen of Hungary and Bohemia. The announcement of her accession was answered by England, Russia, Prussia and the States-General with assurances of friendship and good-will. France returned an evasive answerˆ; Charles Albert, elector of Bavaria, refused to acknowledge the queen of Hungary until his pretensions to the Austrian succession were

examined and decided. He appealed to two ancient documents — the marriage contract between Albert V, Duke of Bavaria, and Anne, daughter of the Emperor Ferdinand I, and the testament of that mon¬ arch ; and he contended that by these two deeds the succession was assured to Anne and her descendants in default of male heirs, the issue of the archdukes, her brothers. Maria Theresa, however, having called together the foreign ministers at her court, caused the testament to be read before them, when it turned out that it spoke not of the extinction of the male issue of Ferdinand's sons, but of their legitimate issue. The first blow against the young queen came not, however, from any claimants of her in¬ heritance, but from a sovereign who had al¬ ready acknowledged her right. This was Frederick II of Prussia, who, in the middle of December 1740, invaded Silesia at the head of 30,000 men, to sustain an old family claim on four duchies in that province. On the condition that Maria Theresa would cede to him all Silesia, he promised a close alliance with him¬ self, in conjunction with the maritime powers and Russia, his assistance in upholding the Pragmatic Sanction, his vote for her husband as emperor, and an advance of 2,000,000 thalers, but the high-spirited queen, determined not to begin her reign by dismembering her dominions, gave these offers a flat refusal. Owing to an

exhausted treasury and a disorganized army, all Silesia, with the exception of Glogau, Brieg, and a few other places, was overrun by the end of January 1741. A severe winter hindered further operations for a time, but on 9 March the Prussians took Glogau, and pushed toward Jagerndorf. The advance of three bodies of Austrian troops from different quarters now threatened to hem in the Prussians; and to maintain his communications with Lower Silesia, Frederick had to risk a battle at Mollwitz, in which his forces were victorious (10 April). This victory called into action those powers that had postponed their schemes till they had learned the issue of Frederick's attempt. France put herself at the head of a confederacy of all the claimants to the Austrian dominions, the principal among whom were the electors of Bavaria and Saxony, sons-in-law of the Em¬ peror Joseph I; Philip V of Spain; Charles- Emmanuel of Sardinia, who claimed the Milan¬ ese, and Frederick II of Prussia, who de¬ manded all Silesia. To this formidable coalition Austria could oppose only a few allies. Eng¬ land granted her an annual subsidy equal to $1,500,000; the Dutch were arming in her favor; the mixed population of Hungary and the peasants of the Tyrol rose almost in a mass. Toward the end of June

the Bavarians entered the Austrian territory, overran Bohemia, .and being joined by the French under Belleisle, oc¬ cupied Lintz, the capital of Upper Austria, without striking a blow. Alarmed by this in¬ vasion Maria Theresa bought the neutrality of her most formidable foe, Prussia, by the ces¬ sion of Silesia and the county of Glatz. On 24 Jan. 1742, the elector of Bavaria was unani¬ mously chosen emperor, with the title of Charles VII, but at the moment when he had attained the object of his ambition his fortune began to turn. Khevenhiiller at the head of one Austrian army, advanced up the valley of the Danube, captured a Franco-Bavarian corps 12,000 strong in Lintz (24 January), invaded Bavaria, and on 13 February took possession of Munich, only a day or two after Charles VII's election to the imperial throne had been celebrated there. Another Austrian army under the grandduke of Tuscany kept the French in check in Bohemia. The successes of Austria alarmed Frederick II for the security of his new acquisitions, and he suddenly broke the treaty, poured his forces upon Moravia and Upper Austria, and defeated the Austrians un¬ der Prince Charles of Lorraine at Czaslau (17 May). But Frederick was not inclined to push his victory further, he once more made peace with Austria (11 June), and his example was followed by the elector of Saxony. In conse¬ quence of these arrangements the French under Belleisle, left without the co-operation of the Saxons, were forced by the maneuvers of Charles of Lorraine to shut themselves up in Prague, where Maillebois, with the French army, was defeated in endeavoring to relieve them. Only 12,000 of the 60,000 men whom Belleisle led into the campaign succeeded in escaping from Prague and making their way into France early in 1743. In the May of that year Bavaria was again occupied by the Aus¬ trians under Prince Charles and Khevenhiiller. An Anglo-German army of 40,000, under the Earl of Stair, crossed the Maas and Rhine in

March and April, in order to cut off the Bavarian army from France, and coming up with the French under Marshal Noailles at Dettingen completely routed them (27 June), but did not know how to profit by their victory, and nothing was done during the remainder of the campaign. The year 1744 -brings with it a new phase of the war; France and Great Britain, which up till this time had been en¬ gaged in the struggle merely as allies, declared war against each other. In February a descent was attempted on England, but Admiral Norris, aided by a tremendous storm, proved too strong for the French fleet and the English proceeded to destroy gradually the shipping of the French, and that of their allies, the Spaniards. As a compensation Marshal Saxe conducted a splendid defensive campaign in the Netherlands. Meanwhile the successes of Austria on the Rhine, and the

ill-concealed regrets of Maria Theresa for the loss of Silesia, again alarmed Frederick for his possession of that province. He accordingly entered into an alliance known as the Union of Frankfort (22 May), with the emperor, the elector palatine, and the king of Sweden, as landgrave of Hesse-Cassel ; a secret treaty was also signed with France, 5 June. A Prussian army of 80,000 men was at once poured into Bohemia, which for a time car¬ ried all before it, capturing the capital Prague after a siege of six days, 16 September. The junction of a superior Austro-Saxon force how¬ ever, and the hostile attitude assumed by the Bohemian population compelled Frederick to quit the kingdom with considerable loss. To avenge this attempt upon Bohemia the Austro- Hungarians broke into Upper Silesia and Glatz, from which the Prussians were almost totally expelled before the end of the year; but before the spring of 1745 the territory was again occu¬ pied by the Prussians. Frederick's unsuccessful invasion of Bohemia had proved of service to the emperor, as it compelled the Austrians to return from Alsace, and thus allowed time to recover his electorate of Bavaria. The Italian campaign of 1744 was unfavorable to the Aus¬ trians. In the preceding year they had driven the Spaniards almost to the Neapolitan fron¬ tiers, and seemed to threaten an invasion of Naples itself. To avert such a catastrophe Don Carlos joined the Spaniards with his forces, and enabled them to drive the Austrians and Sardinians out of the papal territories toward the Po. On 20 Jan. 1745, the Emperor Charles VII died, an unexpected event, which changed the face of affairs. He was succeeded in the Bavarian electorate by his son, Maximilian Joseph, then only 17 years of age. Being too young to make any pretensions to the im¬ perial crown, and the war going so unsuccess¬ fully for his cause, his subjects loudly demanded a termination of their miseries, and he accord¬ ingly concluded a peace with Austria, 22 April. The king of Prussia having now no other ally but France, remained on the defensive for a considerable part of this year. He intrenched himself near Jauernik, on the Bohemian fron¬ tier, and awaited the approach of the Austro- Saxons. Prince Charles, who commanded them, advanced by Landshut into the plains of Hohenfriedberg, where he was unexpectedly attacked and defeated by Frederick, near Striegau (4 June). Charles retreated into

Bohemia followed by the Prussians, and an¬ other battle was fought at Storr, which again went against the Austrians (20 September). About this time the queen of Hungary con¬ ceived the bold plan of detaching 10,000 men from the army of the Rhine, who, supported by the

Saxons, were to march upon Berlin ; while Prince Charles was to attack the Prus¬ sian king in his winter quarters in Silesia with another army. Hearing of this project, Fred¬ erick determined to anticipate it by an advance into Saxony. About the end of November he entered Lusatia, reduced that province, and marched upon Dresden. The king of Poland (the elector of Saxony) fled to Prague, while Frederick's veteran lieutenant Leopold of Des¬ sau entering Saxony by way of Halle, took Leipzig and Meissen, defeated the Saxon army at Kesseldorf (15 December) and joined the king before Dresden, which capitulated 18 De¬ cember. Maria Theresa was now compelled to listen to the appeals of the elector of Saxony, as well as to the British Cabinet, which threat¬ ened to withdraw its subsidy unless she made peace with Prussia. Frederick was willing to come to terms, feeling that he could not de¬ pend on the assistance of France, and that he was unequal to another campaign, his money being almost exhausted. The Peace of Dres¬ den (25 December) assured him of Silesia and Glatz, the cession of which was guaranteed by England, and of an indemnity of $1,000,000 from Saxony. As elector of Brandenburg Frederick adhered to the election of Maria Theresa's husband as emperor, with the title of Francis I. Meanwhile the French under Mar¬ shal Saxe carried all before them in Flanders. The battle of Fontenoy, gained over the Duke of Cumberland and Field-Marshal Konigseck (11 May), was followed by the capture of Tournai, Ghent, Bruges, Oudenarde, Nieuport and Ath. Little was done on the side of the Rhine. The Italian campaign of this year was unfavorable to the Austrians. The Spanish- Neapolitan army, now joined by the Genoese and Modenese, and numbering in all 70,000 men, overran the whole of Lombardy and the greater part of Sardinia, compelling the king to seek refuge under the walls of his capital ; but in the following year (1746) the battle of Piacenza, gained by the Austro-Sardinians over the Franco-Spanish forces (16 June), com¬ pelled the latter to relinquish all their conquests and recross the Alps. On 9 July died Philip V of Spain, and was succeeded by Ferdinand VI, one of whose first steps was to recall his forces from Italy, and the French, unable to hold out against their enemies, retreated across the Var, which left Genoa at the mercy of the Austrians, 6 September. Marshal Saxe continued his career of conquest in Flanders, and in 1747 he entered and overran Dutch Flanders, defeated the Duke of Cumberland at Laffeld (2 July), while his chief engineer, Count Lowendahl, captured, after a siege of two months, the im¬ portant fortress of Bergen-op-Zoom, deemed by the Dutch impregnable. Meanwhile it was evident that the war was drawing to a close. Though great preparations were being made for another campaign, negotiations had been going on during the winter, and a congress had been appointed to meet at Aix-

la-Chapelle, whose first conference took place 24 April 1748. Great

Britain and Holland were weary of the war; France and Spain were almost exhausted, and preliminaries of peace were signed between these powers (30 April) ; Austria, thus deserted by her allies, grudgingly consented to sign, 18 May; and the definite Treaty of Aix-la Chapelle was signed by the French, English and Dutch Ministers on 18 October, and in a few days after by those of Spain, Austria, Genoa and Modena.

The War of the Bavarian Succession, be¬ tween Austria and Prussia, which lasted but little over one year, ended in the Peace of Teschen, 13 May 1779, the elector palatine Charles Theodore retaining possession of the Bavarian dominions. See Aix-la-Chapelle, Treaties of Peace Concluded at; Austria; Bavaria; Frederick II; Maria Theresa; Polish Succession War.

Bibliography. — De Vault, (Memoires mili- taires relatifs a la succession d'Espa.gne) (Paris 1835) ; Stanhope, (History of the War of the Succession in Spain > (London 1836); Parnell, A., (The War of Succession in Spain) (ib. 1888) ; Cambridge Modern History) (Vol. V, New York 1908) ; von Noorden, K., (Europaische Geschichte im 18ten Jahrhundert: Der spanische Erbfolgekrieg) (3 vols., Diisseldorf 1870-83) ; Crousse, (La guerre de la succession dans les provinces belgiques) (Paris 1885) ; Deroy, (Beitrage zur Geschichte des oesterrichischen Erbfolgekriegs) (Munich 1883) ; Parkman, Francis, (A Half Century of Conflict (in (France and England in North America,* part VI, 2 vols., Boston 1903) ; Shrine, F. H., (Fon- tenoy and the War of the Austrian Succession (London 1906).

SUCCINIC (suk-sTn'ik) ACID, amber acid, C2H4(COOH)2, was first obtained by Ag¬ ricola (1657) by distillation of amber. It occurs in lignite and fossil wood, in many vari¬ eties of plants, in the urine of many animals, and in small quantities in the products of the fermentation of sugar with yeast. In this case it is not a product of the sugar but of the anto- lytic fermentation of the protein substance of the yeast cells, first into glutamic acid, and the subsequent conversion of the latter into succinic acid. It is usually prepared by the oxidation of fats with nitric acid or by fermentation of calcium malate. A colorless crystalline sub¬ stance with no odor and a slightly acrid taste; soluble in water or alcohol ; melts at 360° F. ; heated to boiling point, 502° F., it slowly loses water, forming the anhydride GJTiCCOˆO. It is a dibasic acid forming salts and many other

derivatives. The sodium salt has been used in cases of catarrhal jaundice and gall¬ stones. The other derivatives are of interest only to the synthetical chemist. The principal economic use of succinic acid is in its combina¬ tion with the rare earths of the yttrium group through whose fractional crystallization these rare elements are secured separately.

SUCCINITE. See Amber.

SUCHET, sii-sha, Louis Gabriel, Duke of Albufera da Valencia, French military offi¬ cer: b. Lyons, 1779; d. 1826. He entered the military service at an early age and passed rapidly through the inferior ranks. In 1796 he was attached to the army of Italy and at¬ tracted the notice of General Bonaparte, by his courage, boldness and caution, being made

brigadier-general for distinguished bravery at the battle of Neumark in 1797. He then served with distinction under Massena and Joubert and was one of the most active and successful of Napoleon's generals in the campaigns of 1805 and 1806. In 1808 he received the command of a division in Spain and was almost con¬ stantly victorious till after the battle of Vittoria. His brilliant services in that country obtained him the marshal's staff and the title of duke. After the overthrow of Napoleon in 1815 Suchet was shorn of his honors but the rank of peer of France was restored to him in 1819. He left unfinished his (Memoirs of the War with Spaing These were published in 1829.

SUCKER STATE, The, a popular nick¬ name for the State of Illinois, whose inhabitants are sometimes dubbed ˆsuckers® by their fellow citizens of neighboring States. The following is the reputed origin of the epithet :

" The western prairies are full of the holes made by the crayfish, which burrows to reach the water beneath the soil. In the early days of the country's settlement travelers armed themselves with slender hollow reeds, which they thrust, when thirsty, into these natural reservoirs, and thus easily supplied tneir longings by sucking Ihe water through the reed or pipe." _ _

SUCKERS, soft-rayed teleostomous fishes of the genus Catostomus and related genera be¬ longing to the family Catostomidce (q.v.). The family is extremely characteristic of the fresh waters of North

America, where all but two of the 60 or more species are found, replacing in our fauna the carps of the Old World. The 14 recognized genera include, besides the suckers proper, the blackhorse and redhorse, the buffalo- fish, the jumping mullet and the white mullet. Many of these fishes exhibit migratory habits recalling the anadromous marine fishes, mov¬ ing regularly in the spring from ponds and lakes into the fresher waters of brooks to spawn. As examples of this large group the following may be selected : The common or white sucker (Catostomus teres or C. com- mersonii) reaches a length of 15 to 18 inches, has thick protusible lips with two or three rows of papillae, about 65 scales along the lateral line and a rather short dorsal fin. The color is dusky above, light olivaceous on the side, tinged in the spring with rosy hues. This species is exceedingly common in rivers, mill-dams, ponds, etc., throughout the entire eastern half of the United States. Early in the spring, as soon as the ice is out of the streams, this species leaves the larger bodies of water and deep holes and seeks the swift-running brooks, up which large schools migrate until stopped by some obstruc¬ tion, to deposit their spawn in the upper stony shallows. At this season they take the hook eagerly, especially when baited with earth¬ worms ; but they are listless, lazy fishes and never afford any real sport nor good eating, except for a short time in early spring. In the summer they are soft and tasteless. Many are captured in small nets at sluiceways, etc., or even in the hands by boys who wade in the streams and feel for them under overhanging banks. Hog-sucker, stone-roller (C . nigricans) are some of the names of a considerably larger species, with larger scales, found plentifully in the lakes and clear swift streams of much the same region. Its habits are similar and favorite methods of capture are spearing and

noosing with fine copper wire or horse-hair. Other related species are the carp-sucker or sail-fish (Ictiobus velifer) of the Mississippi Valley, the carp-sucker of the Susquehanna River (I cyprinus) , the chub-sucker (Erimyzon sncetta) and the striped sucker (Minytrema rnelanops) of the Great Lakes and Mississippi Valley. Consult Goode, (American Fishes) (New York 1888).

SUCKING-FISH. See Remora.

SUCKLING, Sir John, English poet: b. Twickenham, Middlesex, 1609; d. Paris, May or June 1642. He was educated at Trinity Col¬ lege, 'Cambridge, was admitted at Gray’s Inn, traveled in France and Italy and essayed to cut much of a figure at court. Apparently he ac¬ companied the Marquis of Hamilton with the contingent of 6,000 for the reinforcement of Gustavus Adolphus and took part in Tilly’s defeat

before Leipzig (7 Sept. 1631). In 1637 he had his play of <Aglaura) presented with large expenditures for its mounting, scenery having, with the exception of masques, been rarely, if at all, used before that on the Eng¬ lish stage. He marched at the head of a levy of a hundred horse, recruited by himself, to the Scottish border in May 1639, and he was much laughed at for the gorgeous equipment of his troop. He set on foot the <(first army plot,® to obtain command of the army for Charles I, but was betrayed to the opposition and compelled to escape to France. The col¬ lection (Fragmenta Aurea) (1646) contains all of his work that is of any importance, com¬ prising edited by A. Hamilton Thomp¬ son (New York 1910).

SUCRE, Antonio Jose de, an-td'ne-o ho-sa'

da soo'kra, Venezuelan military officer: b. 1793; d. June 1830. He entered the insurrectionary army in 1811, and in 1819 he had attained the rank of brigadier-general. With the assistance of the Peruvians under Santa Cruz he gained the decisive, victory of Pichincha, 24 May 1822, which was immediately followed by the capitu¬ lation of Quito. He totally routed the Spanish forces in the battle of Ayacucho, 9 Dec. 1824, * the most brilliant ever fought in South Amer¬ ica. Sucre promptly followed up this glorious victory and his troops entered Cuzco on 12 December in triumph. Upper Peru was soon entirely liberated and turned into a republic called Bolivia, of which Sucre was elected Presi¬ dent in 1826. An insurrection broke out in 1828 and Sucre was driven from the country; but he returned at the head of a Colombian army and reinstated himself. He was assassinated in the neighborhood of Pasto.

SUCRE, or CHUQUISACA, choo-ke-sa'- ka, Bolivia, the capital of the republic and of the department of Chuquisaca, in the extreme northwestern corner of which it is situated, 318 miles southeast of La Paz. It is now reached by rail from Mollendo, Peru, via La Paz and

from Tacna and also from Argentina. It lies on a plateau to the west of the eastern Cordil¬ lera, 8,987 feet above the sea, and is surrounded by beautiful mountain scenery. The houses are well built and surrounded by gardens. A fine cathedral and a number of other public build¬ ings testify to the former wealth of the city. Sucre is also the seat of the oldest university in Bolivia, as well as of other high educational institutions. The Supreme Court of Bolivia sits at Sucre.

Sucre was founded in 1536 on the site of the Indian village of Chuquisaca. In the Colonial period it was called La Plata and soon acquired great wealth and importance from its rich silver mines. It was later eclipsed by Potosi, but is still the centre of a prosperous mining and agricultural region. Although it is officially the capital, the national government is now chiefly administered from La Paz. Here Bolivian independence was proclaimed on 6 Aug. 1825. The city was later named after Sucre, first President of the new republic. Pop. 24,000.

SUDAN, soo-dan', or SOUDAN, is the Arab name given to the vast extent of country in central Africa which lies between the Sahara on the north, Abyssinia and the Red Sea on the east, the countries draining the Kongo Basin on the south and Senegambia on the west. Its area is estimated at 2,000,000 square miles, and its population at from 10,000,000 to 20,000,000. The inhabitants comprise numerous nations of different races, chiefly the negro, together with Arab colonists and traders. The western and central Sudan are divided into a number of states which until recently maintained their semi-independence. It is now virtually all con¬ trolled by England and France. Bambarra, Gando, Sokoto, Adamawa, Bornu, Baghirmi, Wadai and others. The eastern Sudan includes Darfur, Kordofan, Senaar, etc. Egyptian rule was first extended to the eastern Sudan in the early part of the 19th century by Mohammed Ali, under whom Ibrahim Pasha carried it as far south as Kordofan and Senaar. An Egyp¬ tian expedition under Sir Samuel Baker in 1870 led to the conquest of the equatorial regions on the Nile farther south than the Sudan proper, of which General Gordon was appointed governor-general in 1874. On the fall of Ismail Pasha of Egypt, Gordon was recalled and hordes of Turks, Circassians and Bashi-Ba- zouks were let loose to plunder the Sudanese. Egyptian misrule then became intolerable, and in this crisis appeared Mohammed Ahmed of Dongola, who gave himself out to be the Mahdi, the long-expected redeemer of Islam. (See Egypt), Emin Pasha (Eduard Schnitzer) was appointed governor of the equatorial province on the Upper Nile, north of the Albert Nyanza, by Gordon in 1878.

During 1881-82 the Mahdi destroyed nearly every Egyptian force sent against him, but in the spring of 1883 elaborate preparations were made to suppress the rebellion. A well- equipped army, organized and commanded by Colonel Hicks, an old Anglo-Indian officer who had entered the Egyptian service, began its march up the Nile in September with the inten¬ tion of striking at once at El Obeid, the head¬ quarters of the Mahdi. But, after enduring many hardships, Hicks' army was led by a treacherous guide into an ambuscade and

anni¬

hilated. Colonel Coetlogon, the British officer at Khartum, at once adopted defensive meas¬ ures, and called in as far as possible the outly¬ ing garrisons. After some further reverses the British government advised the khedive to relinquish the country south of Wady Haifa or the second Nile cataract. English troops were sent out to relieve the garrisons of East¬ ern Sudan, and General Gordon undertook to effect the withdrawal of the garrisons of Khar¬ tum and other places, unaccompanied by Eng¬ lish troops. In a short time he was shut up in Khartum, and in the autumn of 1884 a British force under Lord Wolseley was sent up the Nile to effect his relief. This expedition was too late to accomplish its object. Khartum was stormed by the Mahdists in January 1885, and Gordon was butchered.

After the successful revolt of the Mahdi the Red. Sea and Somali possessions of Egypt were occupied by Italy and Britain, respectively, and Darfur threw off the Egyptian yoke, but the equatorial province was held by Emin Pasha till he was relieved by Stanley. In 1896 an Egyp¬ tian force under the sirdar, Sir Herbert Kitch¬ ener, proceeded up the Nile, occupying Dongola on 23 September of that year, and taking pos¬ session of Abu Hamed and Berber during 1897. Early in September 1898 the Mahdist forces, under the command of the Mahdi's suc¬ cessor, the Khalifa, were completely defeated at the battle of Omdurman and Khartum was reoccupied by the Egyptian forces. About the same time the question of the southern limit of the Egyptian,. Sudan was raised by the occu¬ pation of Fashoda, a little north of the Sobat River, by a French force under Major Mar- chand. By an Anglo-French agreement in 1899 the western boundary was drawn so as to leave Wadai to France and Darfur and the Bahr-el-Ghazal to the Egyptian Sudan. In the same year the 22d parallel of latitude was declared to be the northern boundary of the Egyptian Sudan, which is now under the government of Britain.

Bibliography. — Alford, H. S. L., (The Eng¬ lish Soudan: Its Loss and its Recovery) (Lon¬ don 1898) ; Arminjon, Pierre, (La situation economique et financiere de l'Egypte, le Soudan Lgyptien) (Paris 1911) ; Barth, Heinrich, (English trans., London 1892) ; Kumm, H. K. W., (The Sudan: A Short Compendium of Facts and Figures *(2d ed., ib. 1909) ; id., (From Hausaland to Egypt* (ib. 1911) ; Low, (Sir) S., (E.gypt in Transition* (London 1913) ; McMichael, H. A., (Tribes of Northern and Central Kardofan) (New York 1913) ; Mardon, H. W., (Geography of Egypt and the Anglo- Egyptian Sudan * (London 1902) ; Parke, T., H., (My Personal Experiences in Equatorial

Africa' (New York 1891) ; Robinson, C. H., (Hausaland, or Fifteen Hundred Miles Through the Central Soudan' (London 1897) ; Schweinfurth, Georg, (Heart of Africa' (Eng¬ lish trans., by E. E. Frewer, 2 vols., New York 1874) ; Stanley, H. M., (In Darkest Africa' (new ed., ib. 1913) ; Steevens, G. W., (With Kitchener to Khartum' (new ed., ib. 1914) ; Stevens, E. S., (My Sudan Year' (ib. 1913) ; Wingate, F. R., (Mahdiism and the Sudan, 1881-90' ■(London 1891).

SUDBURY, Canada, town and capital of the district of the same name, Ontario, situated to the north of Georgian Bay, on the Canadian Pacific, the Canadian Northern and the Algoma Eastern railroads, 443 miles west of Montreal and 182 miles east of Sault Ste. Marie. The branch to Sault Ste. Marie leaves the main line here. Two short railway lines connect the town with its celebrated mines of nickel and copper. The ores are partly reduced in furnaces near the town. The town is the seat of a govern¬ ment school of mines and of a Jesuit college. Pop. 4,150.

SUDERMANN, Hermann, German drama¬ tist and novelist : b. Matziken (near Heydekrug), East Prussia, 30 Sept. 1857. His father was a brewer, descended from a family of Dutch Mennonites, one of whom was the didactic and moralistic author Daniel Sudermann (1550— 1632), who wrote in German. Hermann Suder¬ mann attended the Realschule at Elbing, the Realgymnasium at Tilsit, earning a living at the same time as an apothecary's apprentice, and went to the University of Konigsberg, where he studied philology and history until 1877. In the latter year he went to Berlin and became a tutor to various Berlin families, including that of the author Hans Hopfen (1835-1904). He then turned to journalism (his first charge was that of co-editor of the Deutsches Reichsblatt, 1881-82), which was to be his introduction to literature. In 1891 he married the authoress Klare Lauckner, a widow (nee Schulz, b. 14 Feb. 1861). Sudermann later retired to a villa at Grunewald, a suburb of Berlin, and now spends much of his time at his castle of Blan- kensee, near Trebbin, which the enormous royalties on his plays enabled him to acquire. But his first successes were not in the field of the drama, but in the novel and short story. (Im Zwielicht' ((In the Twilight'), a volume of short stories, appeared in 1887 (36th ed., 1910), followed in the same year by (Frau Sorge' (English translation may be had under the name Tame Care'), his most famous novel. The latter is a powerful, simply con¬ structed, objective work, excellent in

suggestion of tone and milieu, with a somewhat sensa¬ tional ending. Bjornson's story, <Arne,' was probably used as a model, and Sudermann's work in turn served as the model for Frens- sen's great success, (J6m Uhl.' The 125th edi¬ tion of (Frau Sorge' was printed in 1912. After another volume of short stories ((Die Geschwister' 1888), came another strong but somewhat more vulgar novel, (Der Katzensteg' (1889; English translation to be had under the title (Regina'). Although his talent as a nar¬ rator is very great, he felt his skill as a drama¬ tist to be greater, and in the same year (1889, which is the year of the opening of the realistic movement in the German theatre (consult arti¬

cles on Fontane, Gerhart Hauptmann), his first play, (Ehre' ((Honor') was played in the Les¬ sing Theatre, Berlin, on 27 November. This play, which had been originally intended to be a tragedy, and which, on Blumenthal's advice, had been conducted to a (happy ending,' was a pseudo-Nietzschean attack on the morality of the lowly and had a great success. The next play, (Sodoms Ende' (5 Nov. 1890), a tragedy of artistic life in Berlin, was not a success. It was followed by (Heimat' (7 Jan. 1893), in which Sudermann again emphasizes the right of the artist to a freer moral life than that of the petty bourgeoisie, and which is constructed with such telling dramatic effect, that this play has carried Sudermann's reputation all over the world. Every great actress considers (Magda' (in English the play is known by that name), the heroine of (Heimat,' to be one of the touchstones of her profession. There is in this play some of the moralistic and didactic tendency of the later French dramatists, es¬ pecially the younger Dumas, and all of their technical finesse. Sudermann attempted an¬ other long novel, (Das hohe Lied' (English translation, (The Song of Songs') in 1908. His latest work of which any report has reached this country is the dramatic cycle (Die entgotterte Welt' ((The World made God¬ less'), of which one section, (Die gutge- schnittene Ecke' (performed at the Lessing Theatre, 28 Jan. 1916), treats satirically of the sordid commercial phases of theatrical art in Berlin. On the whole, Sudermann must be regarded as a seeker for sensational effect and high royalties, in which he has been extremely successful. The permanent value of his work is slight. But its present popularity renders it important to study it as a symptom of the times. His other works are Holanthes Hoch- zeit' (short story, 1892) ; (Es war' (novel, 1894) ; (Die Schmetterlingsschlacht' (1895) ; (Morituri' (three one-act plays, 1896) ; (Das Gluck im Winkel' (1896) ; (Johannes' (1898) ; (Johannisfeuer' (1901) ; <Es lebe das Leben' (1902); (Das Blumenboot' (1905); (Strand- kinder' (1909); (Der Bettler von Syrakus' (1911) ; (Der gute Ruf' (1912). See Magda.

Jacob Wittmer Hartmann, The College of the City of New York.
SUDETIC MOUNTAINS, or SUDE- TENGEBIRGE, soo-de'ten-ge-bre"ge, Cen¬ tral Europe, a range of mountains running along the northeastern boundary of Moravia and Bo¬ hemia, which it separates from Silesia. It rises from the valley containing the headstreams of the Oder, north of the Carpathian Mountains in Moravia, and ends on the southern boundary of Saxony, where the Elbe separates it from the Erz Mountains. Its length is 192 miles. It is a continuous ridge only in its middle portion, which is known as the Riesengebirge. The two ends spread out in the form of plateaus trav¬ ersed by numerous minor ranges. The slopes are covered with pine forests below which are fertile fields, while the higher summits are bare. The highest point, Schneekoppe, has an altitude of 5,265 feet. The range, which consists mainly of primitive rocks, is rich in minerals, especially iron, lead, copper and zinc. Coal is found in paying quantities in the southeastern quarter of the range.

SUDORIFICS. See Diaphoretics.

„_SUDRAS. See Caste.

SUDWORTH, George Bishop, American dendrologist and botanist: b. Kingston, Wis., 31 Aug. 1862. He was graduated at the Uni¬ versity of Michigan (department of literature and science) 1885; instructor of botany in State Agricultural College of Michigan 1886; botanist in United States Agricultural Department from 1889 to 1898 and dendrologist in the Bureau of Forestry and forest service of the same depart¬ ment since 1898. He has written numerous papers and works on North American trees and is a member of various scientific societies.

SUE, Marie-Joseph Eugene, mare zho-zef e-zhan sii, French novelist: b. Paris, 10 Dec. 1804; d. 3 Aug. 1857. He adopted his father's profession of medicine, became a surgeon in the army and served in Spain in 1823. In 1825 he joined the naval service and in the capacity of surgeon was present at the battle of Navarino in 1827. On his father's death in 1829 he inher¬ ited an immense fortune and, having aban¬ doned his profession, he devoted himself to lit¬ erary composition. His first work was a sea novel entitled ˆernock le pirate, *which was quickly followed by (Plick et Plock,* (Atar- Gull, *(La Salamandre* and (La Vigie de Koat- venP He now entered the departments both of historical

fiction and the novel of real life. Of the former description were ˆatreaumont, *(Jean Cavalier* and cLe Commandeur *; of the latter were (Arthur, } (L'H6tel Lambert* and (Mathilde. *But his most famous works are (Les Mysteres de Paris) and/Le Juif Errant, * well known in English as (The Mysteries of Paris) and (The Wandering Jew.*- His later novels are (L'Enfante Trouve, *(Les Sept Peches Capitaux* and (Les Mysteres du Peuple. *In 1850 he was elected to the Constituent Assembly and sat as an advanced radical. After the coup d'etat by Napoleon III in 1851 he was exiled and retired to Annecy. See Wandering Jew, The, and consult Mirecourt, Eugene de, (Eugene Sue* (4th ed., Paris 1870).

SUESS, zus, Eduard, Austrian geologist and seismologist : b. London, England, 20 Aug. 1831 ; d. 25 April 1914. He studied at the Universities of Prague and Vienna and was appointed (1852) assistant of the Court Mineral Cabinet. In 1867 he was made pro¬ fessor of geometry at the University of Vienna, in the same year being elected mem¬ ber of the Akademie der Wissenschaft, Vienna, of which he was vice-president in 1897, and president from 1897-1911. He wrote (Entstehung der Alphen> (1875); (Zukunft des Goldes *(1877) ; (Zukunft des Silbers* (1892); (1883-1901).

SUET. See Tallow.

SUETONIUS, swe-to'ni-us (full name, Gaius Suetonius Tranquillus), a Roman writer, the son of a military tribune, flourished about 100 a.d. Little is known of the circum¬ stances of his life. He distinguished himself as an advocate, obtained the tribuneship through the influence of Pliny the Younger and was appointed secretary to the Emperor Hadrian. His chief works are (Vitae Duodecim Caesarum *and the treatises (De Ulustribus Grammaticis) and (De Claris Rhetoribus.* The former work gives an interesting account of the 12 first Roman emperors from Julius Caesar to Domi-

tian and is of great value from the light which it throws on domestic manners and customs. Among the best editions of Suetonius are those of Wolf (1802), Baumgarten-Crusius (1816- 18) and Roth (1858).

SUEVI, swe'vi, the general name of a number of united tribes who, before the Chris¬ tian era, inhabited the greater part of Ger¬ many. The Hermunduri, Semnones, Lombards, Angles, Vandals, Burgundians, Rugii and Heruli were the most important, at least the best known. In Caesar's time they advanced to the Neckar and the Rhine. The Visigoths over¬ came them entirely in 586 and their empire and name disappeared from Spanish history.

SUEZ, soo'ez, Egypt, town on the borders of Arabia, situated at the north end of the Red Sea, and at the south end of the Suez Canal, 76 miles east of Cairo, with which and with Alexandria and other towns it is connected by rail. Formerly it was a small, ill-built, miser¬ able-looking place, badly supplied with fresh water; but the construction of the Suez Canal, and of the fresh-water canal from the Nile, has caused a great change. The fresh-water canal has been taken advantage of for irrigation, which has quite altered the appearance of the land around. In the town the houses, offices and warehouses of European merchants are now to be seen in every direction. Among the principal buildings are the Greek church, viceroy's villa, two hospitals, custom-house, etc. There is here a salt manufactory established by the Egyptian government. A stone pier carry¬ ing a railway stretches from the town across an extension of the Red Sea (dry at low water) to Port Ibrahim, at the mouth of the Suez Canal. The population before the construction of the canal was 1,500; at present it is in ex¬ cess of 18,000.

SUEZ, Gulf of, an arm of the Red Sea, lying along the east coast of the Sinaitic Penin¬ sula.

SUEZ, Isthmus of, an isthmus which unites Asia and Africa, and separates the Mediterranean from the Red Sea; now inter¬ sected by the Suez Canal.

SUEZ CANAL. This great canal, which may be said to have converted Africa into an island, runs for nearly 100 miles from Port Said on the Mediterranean to Suez on the Red Sea, forming a channel navigable for large ves¬ sels between the two. It is not the first work of the kind constructed in the same locality — a large canal from the Red Sea to the Nile be¬ ing known to have existed from six centuries before the Christian era to the latter part of the 8th century after it, when it finally became choked up and useless. Napoleon I, when in Egypt, had thoughts of making a great ship canal across the isthmus; and from that time various schemes for accomplishing this were proposed. At last, about 1854, M. Ferdinand de Lesseps, a French engineer, obtained from the late Said Pasha, viceroy of Egypt, the con¬ cession or exclusive privilege of making a ship canal from Suez to Tineh on the Mediterra¬ nean ; and after his plans had been weighed and debated for years he was able to form a com¬ pany in 1858_for the purpose of. carrying them out. Half the shares were taken in France, one- fourth in Egypt and very few in England,

mainly owing to Lord Palmerston's objections on political grounds and Robert Stephenson's on engineering considerations. After many com¬ promises the following important conditions were agreed to : The land on both sides of the canal is to be retained by the company for 99 years. The quantity of this land is only to be sufficient for the purposes of the canal and for the various works at Port Said, Ismailia, and Suez ; none of it is to be sold to other parties. All persons residing upon the conceded land are to be subject to the same local and consular jurisdiction as residents in other parts of Egypt. Some of the privileges originally granted to the company by the viceroy of Egypt were bought back by him at very high prices ; some others he was unable to fulfil and paid a corresponding compensation by remit¬ ting certain demands which he would have been otherwise entitled to make. In these and in other ways the viceroy became largely inter¬ ested in the scheme. In November 1875 the British government bought from the viceroy his interest in the canal, consisting of 176,602 shares, for $20,000,000.

The work was begun on 25 April 1859 and it was estimated that the canal would be wholly completed in 1864, at a cost of $30,000,000. It was opened only on 17 Nov. 1869, and the total cost was about $80,000,000. Large numbers of men were of course required for the works, and crowds of Fellahin, Arabs, Nubians, Ne¬ groes, Sicilians, Greeks, etc., were engaged upon them, while dredges and other machines of great power were also employed. To facili¬ tate the construction of the great canal a service canal 20 feet wide and five deep was constructed for part of the distance, by which men and materials could easily be conveyed. A canal was also constructed for bringing fresh water from the Nile at Bulak near Cairo, since with¬ out an extensive supply of this necessity of life the canal works could not have been carried on in the waterless region of the isthmus. This canal reaches the salt-water canal at Ismailia, about midway between the Mediterranean and the Red Sea, and then runs almost parallel to the course of the ship-canal till it arrives at Suez. Previously existing canal works were partly available for the fresh-water canal. It has proved a boon to the country all along its banks. It is about 40 feet wide and 9 deep, and is used for navigation as well as for domestic purposes and irrigation. From Is¬ mailia to Port Said fresh water from this canal is conveyed through large pipes. Plugs are in¬ serted in the pipe along the route where neces¬ sary to allow the withdrawal of water for domestic or other purposes. The great canal itself differs in dimensions in different places, being narrowest where the amount of cutting was greatest. For about four-fifths of its length (77 miles) it

was at first 327 feet wide at the surface, 72 at the bottom and 26 deep; for the remainder (22 miles) it was only 196 feet wide at the surface, the other dimensions being the same. Many portions of the canal were easily enough made, but at other points the ex¬ cavation demanded an immense amount of labor. Tn one place the workmen had to cut a passage 90 feet deep and 200 wide through sandstone rock. Port Said was chosen as the Mediterra¬ nean entrance of the canal instead of Tineh, be¬

cause here the deep water is nearer the shore. It has grown up since the works commenced, and possesses basins, quays, a lofty lighthouse with electric light, etc., and a harbor protected by two breakwaters or piers, the one 2,070 yards long, the other 2,730. Leaving Port Said the canal first passes for about 24 miles along the eastern margin of Lake Menzaleh, an extensive and very shallow lagoon. The water of the lake is not admitted into the canal, which is confined between embankments, and is from 26 to 29 feet deep — much deeper than the lake. Beyond Lake Menzaleh occurs a sandy strip of three or four miles, after which the canal enters Lake Ballah, where embanking and dredging had again to be resorted to; passing through this for about eight miles it next runs through a land portion of the same length, in which occurs the formidable cutting mentioned above, and it then reaches Lake Timsah, about half way across the isthmus. This is a small lake, and had long been dry, but is now filled with sea-water, and abounds with fish. Lake Tim¬ sah is a stopping place for vessels passing through the canal, and affords a large space suitable for anchoring. Between Port Said and Lake Timsah the canal is nearly straight, and between the former place and Lake Ballah quite so; the southern half of its course is more winding. On the western shore of Lake Tim¬ sah is situated the town of Ismailia, which owes its existence entirely to the canal and the rail¬ way which connects it with Zagazig, Cairo and Alexandria. At Ismailia the fresh-water canal is connected with the great canal by means of locks, their levels being different. In the nine miles through which the great canal is carried after leaving Lake Timsah enormous quantities of rock had to be removed ; then come the Bit¬ ter Lakes, like Lake Timsah formerly dried up, but now filled with sea-water; then a length of 17 miles, partly through a shallow lake, partly through a sandy desert, after which the canal reaches its terminus at Suez. Extensive works have been constructed here, among which are a mole 850 yards long; a dry dock, 413 feet by 95, built by the Khedive of Egypt ; another, 360 feet by 85, for the Peninsular and Oriental Company, etc.

The shipping passing through the canal has steadily increased since its opening. In 1870, 486 vessels, of a total burden of 654,915 tons, sailed through it, yielding the company an in¬ come of $1,032,000; in 1874, 1,264 vessels of 1,649,188 tons passed through and the receipts amounted to over $5,000,000. In 1913, 4,979 ships of a total tonnage of 19,785,040 passed through the canal, the passengers on these ships numbering 282,235. In 1918, 2,522 vessels of 9,251,601 net tons passed through the canal. The following table covers the ships of those nations chiefly represented in 1913 :

Nationality

Number

Tonnage

British .

2,902

771

11,887,170

3,317,593

1.283,986

925,709

840,068

German .

Dutch .

338

French .

255

Austro-Hungarian .

244

The tolls charged were nine francs per ton for laden passenger or cargo steamers and war¬ ships ; six and one-half francs per ton for ships in ballast without passengers and 10 francs for each passenger. Successive reductions in the tolls in 1911, 1912 and 1913 have made the charges equal to the rates proposed for the Panama Canal. (See Panama Canal). The fact that Britain was miserably represented on the board of management in course of time created much dissatisfaction among British shipowners, and in 1883 there was much talk about the construction of a second canal. This came to nothing, but led to the widening and deepening of the existing canal and the con¬ struction of large basins to allow north and south-going vessels to pass each other. The depth is now (since 1913) 36 feet, accommoda¬ ting vessels of 3ll/2 feet draught. An electric lighting system has also been installed which permits of navigation being carried on at night. The distance between London and Bombay by the old route round the Cape is about 11,220 miles ; by the new route opened up by the canal 6,332 miles. Steamships are allowed to sail at a speed of five to six knots an hour along the canal. Consult Statesmans' Year Book.* See Canals.

SUFFERN, N. Y., village of Rockland County, on the Erie Railroad, 32 miles north by west of New York. It has iron works, foundry, etc. Pop. (1920) 3,154.

SUFFIELD, Conn., town in Suffield town¬ ship, Hartford County, on the New York, New Haven and Hartford Railroad. It is 16 miles north of Hartford and has chiefly tobacco and cigars as its manufactures. Pop. 3,841.

SUFFOLK, suf'ok, Va., town and county- seat of Nansemond County, on the Nansemond River, and on the Atlantic Coast Line, the Southern, the Seaboard Air Line, the Norfolk and Western, the Norfolk and Southern and the Virginian railroads, about 20 miles southwest of Norfolk. It is in an agricultural region. The chief manufacturing industries are woolen mills, lime kilns, lumber mills, iron works, grist mills, peanut factories, machine shops and truck package plants. Large quantities of oysters are shipped during the season. Ac¬ cording to the government census, there are in Suffolk 100 manufacturing establishments, with over $2,000,000 capital invested and employing over 3,000 persons. The cost .of material used annually amounts to more than $1,060,000. There are three, banks with a combined capital of $210,000. The educational institutions are the public schools. Pop. (1920) 9,123.

SUFFOLK (Va.), Operations Around and Siege of. Soon after the occupation of Norfolk and Portsmouth by the Union tioops, 10 May 1862, a force was pushed out to occupy Suffolk, 25 miles southwest of Portsmouth by the Seaboard and Roanoke Railroad, and at the head of Nansemond River, by which it had com¬ munication with the mouth of James River, and also Petersburg and Richmond by the Norfolk and Petersburg Railroad. It was not only an important outpost to Portsmouth, and the key to the mouth of James River, but also the key to all operations in the region bordering on the Nansemond and the Dismal Swamp, and was a favorable point for operations against the

Weldon and Petersburg Railroad. The Confed¬ erates began active measures to reoccupy the place. Late in August it was held by General Mansfield with about 6,000 men and six guns. About half .of the garrison was withdrawn early in September and sent to the Army of the Potomac, and with them went Mansfield. Tak¬ ing advantage of the reduction of the garrison, the Confederates began preparations to attack the place, and on 22 September Gen. J. J. Peck was placed in command, with 9,000 men, under orders to repel the advance from the Black- water of a reported column of 15,000 Confed¬ erates, under Generals French and Pettigrew. On the 25th Peck began the construction of a system of defenses, encircling and covering the place, which, by the end of January 1863, mounted 60 heavy guns. Early in January 1863 the Confederate authorities came to the con¬ clusion that Peck was preparing a base of operations for a grand movement on Peters¬ burg and Richmond, in co-operation with the Army of the Potomac, and began the construc¬ tion of a series of works from the line of the Blackwater to Eort Powhatan, on James River.

General Peck was a vigilant officer, and made frequent reconnaissances of the Confed¬ erate positions along the line of the Blackwater, bringing on several collisions at Franklin, Zuni and other points, during the months of October, November and December 1862. Late in Janu¬ ary 1863 General Pryor, who for some time had commanded a Confederate brigade on the Black¬ water, crossed to the east side of that stream on a foraging expedition. He had three Vir¬ ginia regiments of about 1,800 men and seven guns. On 30 January Gen. M. Corcoran, with a regiment of cavalry, five .of infantry and 12 guns, in all about 4,800 men, started from Suf¬ folk at 1 a.m., and at 3.30 a.m. the cavalry came upon Pryor's camp at Kelly's store, nine miles west of Suffolk. Artillery was run forward and engaged that of the Confederates for nearly three hours, when the infantry advanced, and after a short contest Pryor fell back two miles to a strong position, from which he was forced and pursued as far as Carrsville. Corcoran

re¬ turned to Suffolk the same night, with a loss of 23 killed, 108 wounded and 12 missing; Pryor's loss was 8 killed and 31 wounded.

General Lee, informed that Union troops were being sent down the Potomac with the evident intention of operating against Rich¬ mond by the south side of James River, on 18 February ordered General Longstreet, with two divisions of his corps, to Petersburg and placed him in command of all Confederate troops south of James River, including those in North Caro¬ lina, to defend Petersburg and Richmond. Late in February Longstreet had, not including those in North Carolina, about 24,000 men, 12,000 of whom were on the line .of the Blackwater, and 12,000 near the railroad to Petersburg, so posted that within 24 hours he could concentrate them all near Suffolk. It was left entirely to his dis¬ cretion whether he should assume the offensive, but he saw the importance of confining Peck at Suffolk, and of collecting all the subsistence in that section of the country and getting it inside the Confederate lines, and Longstreet began a very thorough system of foraging. He em¬ ployed the month of March in constructing elaborate defenses on the Blackwater, in assist-

ing Gen. D. H. Hill in his operations against Newbern, Washington and Plymouth, N. C. (qq.v.), and in gathering all the forage and subsistence possible, under Lee's orders <(to draw from the invaded districts every pound of pro¬ vision and forage.® He reported to Lee on the 30th that there was no particular advantage in giving battle at Suffolk, nor was it prudent to make the attempt, unless he could get assist¬ ance from the navy in protecting his left on James River and the Nansemond. On 4 April he advised Lee of his intention to cross the Blackwater in a few days to get what supplies there were east of the stream, and, if he found it possible, to make an effort to get the Suffolk garrison. He crossed the Blackwater by pon¬ toon-bridges on the 10th, and on the 11th, in three columns of nearly 20,000 men, advanced on Suffolk, capturing some of the Union out¬ posts on the way, halting only when he came under artillery fire from the advanced works of the Suffolk defenses. Peck was fully pre¬ pared ; he had been watching for the movement, and 14 March had been reinforced by General Getty's division of the Ninth corps, raising his command to 15,000 men. Admiral Lee, at Fort Monroe, was asked by telegraph to send gun¬ boats up the Nansemond to prevent Longstreet from passing that stream and thus getting to the rear of Suffolk and

the railroad to Portsmouth. Lee promptly responded by sending two flotillas of tugs (by courtesy called gunboats) to hold the river, one .of eight boats, under Lieutenant Lamsion, to hold the upper Nansemond, and one of four, under Lieut. W. B. Cushing, to hold the lower Nansemond. Longstreet's first move was to control and blockade the upper Nanse¬ mond, a narrow, tortuous stream, about seven miles long. For this purpose batteries were erected under cover of darkness, and on the morning of 14 April they .opened fire on Lam- son's boats, disabling one, seriously injuring others, and driving all into the lower Nanse¬ mond. In the afternoon of the 19th Lamson opened a heavy fire upon Stribling's Virginia battery, which had been put in an old work at Hill's Point, a tongue of land just above the junction of the Western Branch and Nanse¬ mond, and after a heavy cannonade one of his boats, carrying 270 men of the Eighth Connecti¬ cut and 89th New York, ran in shore and landed the men, Lamson following with four howitz¬ ers. They carried the work, capturing five guns, 55 gunners and 71 officers and men of the 44th Alabama. Next day the guns were carried across the river and the work aban¬ doned. The erection of batteries gave Long- street control of the upper Nansemond, but he made no effort to cross it, in the face of Getty's division on the eastern bank. He dem¬ onstrated on the lines west and southwest of Suffolk, but found no weak point in them, and did not consider an assault advisable, reporting to the Confederate Secretary of War 17 April:

have not fired again at the enemy's strong¬ hold, nor do I expect to do so. I am very well convinced that we could reduce it in two or three days, but doubt if we can afford to ex¬ pend the powder and ball. To take it by as¬ sault would cost us 3,000 men. . . . The principal object of the expedition was t.o draw out supplies for our army. I shall confine my¬ self to this unless I find a fair opportunity for

something more.® On 29 April he wrote to Gen. D. H. Hill: <(I am of the opinion that I can hold my position against any attack from the front. We shall be here two weeks longer hauling out supplies.® Hooker had now opened his Chancellorsville campaign, and on the 29th Longstreet, with his army, was ordered to re¬ turn to Fredericksburg and join General Lee. It took him four days to call in his foraging trains and get them beyond the Blackwater. D. H. Hill was recalled from North Carolina, and on the night of 3 May Longstreet with¬ drew and recrossed the Blackwater, his rear¬ guard being closely pursued to that stream next day. The greatest number of troops Longstreet had before Suffolk was about 20,000. Peck had 30 April about 25,000. The loss of the Union army was 41 killed, 223 wounded and 2 miss¬ ing. There was small loss in the navy. The Confederate

loss is unknown. When it was definitely ascertained that Longstreet had with¬ drawn from the Blackwater, leaving only French's division of about 5,000 men to observe Peck, General Dix .ordered Peck to take up all the rails on both railroads from the Blackwater to Suffolk and send them to Fort Monroe, and suggested to the authorities at Washington that Suffolk should be abandoned for a more defen¬ sible position on the line of Deep Creek, eight miles from Norfolk. The suggestion was ap¬ proved, the position at Deep Creek fortified, the roads dismantled, under several attempts of French to prevent it, nearly 7,000 tons of rail¬ road iron removed, the 100 heavy guns in the works around Suffolk withdrawn, the works leveled, and 3 July Suffolk, except as an out¬ post, evacuated. Consult (Official Records > (Vol. XVIII, XXVII) ; (Naval War Records *(Vol. VIII) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. IV).

E. A. Carman.

SUFFRAGE. See Aliens; Electoral Qualifications; Woman Suffrage; Elec¬ tions; Naturalization; Vote, Voters, Vot¬ ing; United States — Suffrage in the.

SUFFRAGE IN THE UNITED STATES. See United States, Suffrage in the; Woman Suffrage.

SUFFREN DE SAINT-TROPEZ, su-

fran de san tro-pa, Pierre Andre de, French naval officer: b. Saint-Cannat, 17 July 1726; d. Paris, 8 Dec. 1788. He entered the navy at 14. In 1772 he was commissioned captain. Early in 1777 he sailed to America, and his ship be¬ gan the indecisive battle of Grenada on 6 July 1779. He next served with the allied fleet blockading Gibraltar, and early in 1781 was placed in command of a squadron of five ships for service in the East Indies. Sailing to Madras, he fought a hard but indecisive battle off Madras, and soon after, in a bloody two- days' battle off Providien on the coast of Cey¬ lon, proved himself a consummate master of naval tactics. Having captured Trincomalee, he two days later stood out of the harbor with 15 ships against the English 12, and fought a hard but indecisive battle. His last fight (June 1783) was also indecisive. Suffren arrived in Paris early in 1784, and was received with the greatest honors, and created Vice-Admiral of France. He was called also the Baillie de

Suffren, an office he held in the Knights of Malta.

SUFISM, soo'fizm or so'fizm (Arab. lasawwuf, being or becoming a Sufi), is Mo¬ hammedan mysticism. It derives its name from the Arabic sufi , mystic, ((clad in wool® (from suf, wool), because most of these mystics clad themselves in woolen garments or carry a woolen headdress. Some philologists connect the word with the Greek o o<pog “wise,® but their theory is untenable. Sufis often call them¬ selves arafa, “Gnostics® or “Theosophists ,» namely, those who piossess a special and esoteric knowledge of divinity. Travelers of to-day in Persia, Egypt, India and Turkey commonly call them fakirs or dervishes (Arab fagir; Pers. darvish), that is, “the poor,® “beggars,® and the name is correct both in a good and a bad sense with this proviso that not all beggars are fakirs or dervishes.

The origin of Sufism is disputed. Some will derive it from the Vedanta and Buddhism, but their theories have no real foundations and fall to the ground when it is remembered that Vedanta is pantheistic and that Sufism in the main follows the Theistic lines of the Koran. Some even refer to it as an offshoot of Chris¬ tianity. Sufis themselves reckon it to be older than its known historic forms and it seems quite probable that there was Sufism before the Sufis. As early as the 2d century after the Flight, asceticism and ethics and with them Sufistic quietism and the disinterested love of God, assumed a prominent position in Islam, and as fate would have it, contrary to Moham¬ med’s explicit order, this new feature arose in his own family with the favorite Ali. The name seems first to have been used by Abu Hashim (780 a.d.) ; but Abul Said Chair is mentioned as founder (about 820 a.d.). Leg¬ endary lore, which has surrounded the pious woman Rabia al Adawiyya (725 a. d.) with much Sufistic halo, calls her the first Sufi and tells numerous stories about her quietistic dis¬ position, all of which are profoundly character¬ istic of early Sufism.

Early Sufis are pr.ofuse in their expressions about their “Union with the Beloved® (namely, God), and that has probably led some Western scholars to confound the mystic, union with the pantheistic tat tvam asi, “That (the Universal Spirit) art Thou.® Most Sufis of to-day are very moderate in their claims compared with their early predecessors, and declare that they are simply esoteric Mohammedans and place more value upon the <(inner doctrine,® which they see behind the external forms, than upon the direct Koranic word. The inner meaning or doctrine which they read in such a verse as the following, which refers to the battle at Bedr, “Thou didst not shoot when thou didst shoot, but Allah shot,® minimizes individualism and makes the deity <(all there is,® but in no wise All.

Essentially, Sufism is an inner and personal experience or feeling of God. In this respect it is as original as any other mysticism, but in its outward forms it has borrowed, like any other mysticism, from its environment. Its im¬ mediate cast is Mohammedan, but its specula¬ tive and doctrinal forms are in the main drawn from Parseeism, Peripatetic Philosophy and Neo-Platonism. From the first it draws a large

part of its rich symbolism. The two latter were brought to it by the seven Greek philosophers whom Justinian's intolerance drove into exile and who found a welcome refuge at the court .of Nushirwan, the Sassanian king. Sufis do not like to admit this, but it is a fact.

Sufism is primarily not a doctrine, but an experience, a "feeling.® When it expresses it¬ self intellectually it finds outlet in two principal doctrines, that of the One (Ahad) and the Way to the One (Tariqat). The first declares that there is not only "no god but God,® but that there is nothing but God, a teaching which excludes all pantheism, inasmuch as it never says that the All is God, only that God is the All, and emphasizes that the world is a phan¬ tom, an unreality. The second doctrine : "The Wayˆ to the One® contains the whole of the Sufis' ethics and is practically the main burden of all Sufi conversation. There are many methods or "Ways® (Tariqat) to "Union with God.® They say "The Ways unto God are as the number .of souls of men®; but they all begin with ascetic practices and end in a con¬ templative beholding of the Divine.

Most of them include the well-known Der¬ vish dances, absolute silence for several years, and other occult practices.

Sufism is rich in symbolism and some of it is familiar to readers of Hafiz and other Persian Sufi poets. A symbol is to a Sufi rather more than an emblem or a figure of speech ; it is what he calls a "veil,® that through and by its ma¬ terial form reveals the Deity. When Hafiz and Omar Khayyam in true Sufi fashion glory in wine, for instance, they do not glorify intoxica¬ tion in any other sense than that in which it was used about Spinoza, namely, that he was full of God — a "God-intoxicated man.® Wine is to them a form or manifestation of God, as it is in the sacrament to the Christian. When they sing its praises, their song is a hymn and spiritually they partake in a mystery. A Sufi is not a drunkard nor a licentious man. The "wine and women® of the reveler has no place in asceticism and the inner life. That Sufi poets should use such strange language has always been a mystery to

the uninitiated, who likes to read the Sufi's language literally and believe what he says literally.

Sufis lay more weight upon the conception of God as the "Eternal Beauty® than most re¬ ligious and mystics. God creates because he is beauty, it being the essential nature of beauty to reveal itself. The act of creation consisted in God throwing His reflection on "the mirror of not-being,® and creation itself is thus only a reflection, a contingent being.

Man is the eye of creation, the point through which the Divine looks out and the one who, if he loves wisdom, goodness and beauty, can overlap his individual limitations and attain <(Union with God,® the goal of Sufism.

In addition to the already mentioned famous Sufis are to be reckoned Dhun-Nun (859 a.d.), who formulated the doctrine of ecstacy and prepared a scale of mystic steps; Junaid (910 a.d.) , who wrote about Sufism; Al-Ghazzali (411 a.d.) , and Jallal-ud-Din Rumi (1262 a.d.), the two most famous Doctors of Sufism. Omar Khayyam is now known in the West mainly in the negative light of Fitzgerald's paraphrase

and by (thus far) the only Sufi interpretation by the writer of this article. Almost all the famous Persian poets were Sufis, namely, Attar, Anvari, Nizami, Hafiz, Saadi, Jami, etc.

A Sufi Publishing Society, Ltd., has been established in London by Inayat Whan in 1915. He is of the Chistee Order and is the Pir-0 Murshid of the order in the West. Sufism is also being preached in America, but has as yet no recognized headquarters and director.

A large number of the Ottoman poets are also Sufis. Consult following Sufi works: Jalal- ud Din Rumi, <Mathnawa) ; Attar, (Man*tigat- Tair5 ; Shabistari, (Gulsan-i-Raz) ; Al-Ghazzali, (Alchemy of Happiness5 ; (The Divan of Shamsi Tabriz5 ; Tholuck, (Sufimus) ; Pal¬ mer, E., (Oriental Mysticism5 ; Gibb, (History of Ottoman Poetry5 ; Browne, E. G., (Literary History of Persia5 ; Nicholson, J. A., Selected Poems from the ˆivan-i-Shams-i-Tabriz* and Nicholson, Reynold A., (The Mystics of Islam.5

C. H. A. Bjerregaard.

SUGAR ACT. See Acts of Trade.

SUGAR BEET. See Beet; Beet-sugar.

SUGAR-BIRD, one of the small, in¬ sectivorous honey-creepers (genus Certhiola) of the West Indies (except Cuba). Some species of which are called banana-quits, quit- quits, etc., which come about the grinding mills and warehouses where sugar is kept, attracted by the multitude of insects there. These little birds, on account of their familiarity and their pretty plumage, are favorites and often enter dwelling-houses, where they hop gravely about the furniture and explore the room after spiders and other prey winch the housekeeper will will¬ ingly part with. In their figure and motions they remind a Northern naturalist of a nut¬ hatch, while their coloration — black, yellow, olive, gray and white — recalls to him a tit¬ mouse. They generally keep in pairs and build a rather rude domed nest, which finally holds three red-specked eggs. There are many species, several of which are peculiar to single islands. Consult Gosse, (Birds of Jamaica5, and Cory, (Birds of the West Indies.5

SUGAR GROWING AND SUGAR MAKING. Sugar (French, sucre; German, sucker; Spanish, asucar) is a substance of the formula (C12H22O11.) . There are other substances, lactose, maltose, etc., of this formula and of the formula CaHˆOe, that are termed sugars, but they differ in their characteristic proper¬ ties from cane sugar or sucrose, which is sweeter and more pleasant to the taste than any other natural saccharine substance, unless it be levulose (CsHˆOe) which is formed by the inversion of sucrose. Levulose is a con¬ stituent of honey, the fine flavor of which is due largely to this sugar. It will be seen from the sucrose formula that sugar is composed of carbon, hydrogen and oxygen and the two last in proportion to form water, hence the term carbo-hydrate applied to it and many other similarly constituted bodies, such as starch (CcHioOr.) and dextrose or grape sugar (CeHˆOe). The theory of the formation of sugar as well as that of some other similar bodies, is that carbon dioxide combines with water to form a substance, formaldehyde, of the simple formula CH20. This then becomes the nucleus of the sugars and carbo-hydrates

and possesses the property of polymerization (uniting with itself to form a larger molecule of similar percentage composition) by which they are built up. The term sugar, in its strict¬ est sense, means cane sugar and while it oc¬ curs in many plants and flowers, its manufac¬ ture for commercial purposes is confined almost entirely to the sugarcane and the sugar-beet, though small quantities are made from a cer¬ tain variety of the maple tree, from sorghum and from the date palm.

Cane Sugar.

Historical. — Although sugarcane (Saccha - rum ofkcinarum) is now cultivated in all tropi¬ cal and semi-tropical countries, its origin and that of its manufacture into sugar date back to the remotest antiquity and both remain some¬ what in obscurity. However, the majority of evidence traces sugarcane to India as the home of its origin, though George Richardson Porter in his work entitled (The Nature and Proper¬ ties .of Sugar Cane,5 says, (<The strongest proofs, carefully collected from the authorities of ancient and modern times, lead to the con¬ clusion that China was the first country in which sugarcane was cultivated and its produce manufactured.55 Another author (Prinsen Geerligs) states, <(No real preparation is re¬ corded before about 600 a.d., at which time a Chinese emperor sent a man to learn the art of sugar-making in India, for in the year 500 a.d., white sugar is mentioned as being shipped from India to Europe.55 The views of Dr. H. W. Wiley and Prof. W. C. Stubbs agree with Prinsen Geerligs. In the 8th century sugarcane was extensively cultivated in the Nile delta and in this century the Arabs introduced it into Sicily and from there it was transported to Spain. It appears that the sugarcane was car¬ ried into Siam, Ceylon and Japan from China.

A sugar trade existed between Syria and France in the 12th century. From France it was trans¬ ported to Holland, from Holland to Italy and thence to Germany. Sugarcane was introduced into Santo Domingo soon after the discovery of America and from there it spread to Cuba and adjacent islands. It was introduced into Mexico in 1520, Brazil in 1532, Martinique in 1650 and Guadeloupe in 1644. It continued to spread through South America.

The manufacture of sugar up to this time was very crude. Inefficient mills operated by wind, water or oxen, were used for extraction ; lime, clay and ashes as purifying agents; the evaporation was effected in open copper or iron pans placed directly over the fire and the re¬ fining consisted in melting, boiling and recrystal- izing. These crude methods exist yet in some countries, especially in districts where cane is grown for making syrup and very crude sugar. Sugarcane was introduced into Louisiana from Santo Domingo by the Jesuits in 1751. Dubeuil built the first cane-mill and his efforts at manu¬ facturing failed. The first refined suga<r was ' made by Antonio Mendez in 1792, but the first refined sugar on' a commercial scale was made in 1794 by Etienne De Bore. The plantations of these two planters now form a part of the city of New Orleans.

Varieties. — The variety of cane grown by them was called

((Creole.55 The principal present varieties, ˆstripped55 and <(purple,55 were intro-

cuced in 1820 by Mr. Coiron, the first to use the steam-engine for extraction. He secured them from a planter in Savannah, Ga. These varieties are natives of Java and their intro¬ duction into this State gave a great impetus to the new industry. Dr. W. C. Stubbs, while director of the sugar experiment station of Louisiana, introduced two seedling canes known as D— 74 and D— 95, which have proved very superior to any ' varieties grown previously; the former is a green cane and better than the latter, which is purple. Since the success of Bore the industry has continued and reached its maximum yield, 710,827,438 pounds, in 1894- 95, while other Southern States (chiefly Texas and Florida) the same year produced 18,565,- 123 pounds, making a total of about 325,621 long tons. Alabama, Mississippi and Georgia grow cane extensively, on a small scale, for the manufacture of syrup which is also produced in Louisiana, Florida and Texas.

Description. — Cane grows from 5 to 15 feet in height and from one to two inches in diameter. It is made up of short sections con¬ nected by nodes or knots, the spaces between the nodes being termed inter-nodes or joints. The nodes have on them a bud or eye and are made up largely of non-saccharine content, while the inter-nodes contain most of the sugar. With proper conditions of temperature, moist¬ ure and soil the eye swells, bursts and puts forth a young cane which emerges from the soil with one leaf- (being endogenous) which is rolled and tapers to a sharp point. In a few days a leaf is observed, which gives place to a bud. As the plant grows leaves are formed on alternate sides of the nodes and below the eyes. The leaves grow to a length of about three feet, two inches wide at the base and taper grace¬ fully to a point. When only a few weeks old, the plant will begin to exhibit nodes and inter¬ nodes, which are at first green. As the plant matures some continue green, while others be¬ come purple, striped, yellowish-green, etc., the color depending on the variety, of which there are a great many. As the cane matures the first leaves (those at the bottom) turn yellow, lose vitality, dry up and fall off, leaving the lower portion of the stalk bare while the upper portion continues green, succulent and grow¬ ing until killed by frost or arrested by maturity, when it flowers and seeds. It is only in tropi¬ cal countries that cane flowers and the time required for this is from 12 to 15 months.

Propagation. — Sugarcane is a perennial plant and can be propagated by layers or cut¬ tings, or seed, the former beiqg generally prac¬ tised, the latter to cross-fertilize and produce new varieties. The entire cane may be planted, but the upper portion is thought best for seed. In many countries this portion is used for seed, but in Louisiana and adjacent States the tops are thrown away except a small portion fed to stock during harvesting. The Louisiana planter clai-ms that labor is too scarce at harvest time to take care of this part of the crop, which would, by taking off the partially-matured joints, be ample for seed. The cane is cut near the surface of the ground, leaving a stubble or ˆratoon® which sprouts in the spring and is capable of producing a second and even a third crop in Louisiana, and in tropical countries 5 to 10 crops can be grown with but one planting,

though the general practice, where cane and labor are abundant, is to plant annually or bi¬ ennially. The tendency of the young canes is to sucker and a large portion of the crop may come from suckering, especially if the stand is poor. The crop from the plant cane is larger than that from stubble in Louisiana, but the re¬ verse is true for two or three years in the tropics and each successive stubble crop is less than the preceding. The stubble cane is richer in sugar and has more fibre than plant cane and is not considered as good for seed as the latter.

Soil, Its Preparation; Cultivation. — Sugar¬ cane is grown more or less in all tropical and semi-tropical climates and the soil in which it can be grown may be of very varying char- acter. A suitable soil should be very fertile, capable of retaining a large amount of moisture and with enough clay in the sub-soil to prevent leaching of the soluble constituents, at the same time it should be well drained. Cane grows well in the Southern States (Georgia, Florida, Ala¬ bama, Mississippi, Louisiana and Texas) in both sandy loam and clay loam soil, but the alluvial soils of the valley lands are best adapted for growing cane. The preparation of the soil is a very important feature of cane culture. If the land should be at all stiff or very clayey, preparation should take place or begin in the fall. The lighter soils of a porous or loose character may be prepared just before planting. It is customary in this country in preparing the soil to throw it up in ridges, five to seven feet apart, and when this is done in late sum¬ mer or in the fall with a large quantity of vegetable matter, whether of grasses or pea- vines, the soil is in fine condition for planting in early spring. In rotation of crops corn and peas usually follow cane.

Planting. — The planting of the cane con¬ sists in opening the ridges and putting the cane into a deep furrow and then covering with a

plow, sometimes rolling after covering. One, two or three canes may be planted along side by side in Louisiana or other Southern States growing cane, but in the tropics short pieces may be planted. It is the custom of some to cut the cane in lengths of 18 to 24 inches be¬ fore planting, while others cut it only where it is crooked, the object being to make it lie well in the furrow. Recent experiments in Hawaii have shown cutting to be of great value in securing a good stand. In some countries only the upper portion of the cane is planted, for reasons already given. The quantity required per acre varies from four to six tons, thus requiring a large investment in seed cane on a large plantation.

Preserving Seed. — The seed-cane is pre¬ served through winter by windrowing or mat¬ ting, the former being more generally prac¬ tised. Windrowing consists in cutting and pil¬ ing the cane in a continuous row between the ridges in such a manner that the tops and leaves cover up the butts of the cane, after which dirt is thrown over, sufficient to cover the cane or partially cover it. Matting differs from windrowing chiefly in having trash or grass thrown over the cane before it is covered. Cane thus preserved is not altogether protected from hard freezes nor from ˆdry-rot® in case of very dry weather.

Fertilization. — The fertilization of the

cane is very important, as one fertilizer may tend to grow a heavy tonnage with small sac¬ charine content, while another may grow less tonnage but proportionately more sugar. The fertility of the soil is maintained by the addi¬ tion o.f commercial fertilizers, distributed either in drill or broadcast, by rotation of crops and by growing heavy crops of pea vines.

Cultivation. — The cultivation should be¬ gin as soon as the cane is well up and has for its object the destruction of weeds and grass and maintenance of good tilth. Frequent mov¬ ing of the soil to a very shallow depth is ad¬ vantageous, while deep plowing is very in¬ jurious. It is necessary to hoe the cane from one to three times. The cane is usually laid by in this country in the latter part of June or the first of July and the implement used for this final work is the disc plow which throws the soil well up around the roots of the cane, leaving it on a high ridge, the chief purpose of which is to aid in drainage.

Drainage.— The drainage of the valley lands in Louisiana is very important and ex¬ pensive. The land is cut into small pieces vary¬ ing from two to five acres, with a system of mains and laterals to take off the excess of water.

Irrigation. — -Irrigation should be practised, if possible. This is essential in some of the islands of Hawaii. The water is applied by allowing it to run in the furrows. Irrigation is practised very little in Louisiana.

Harvesting. — Cane has about eight months to produce sugar in this country, while in Hawaii, Cuba and other tropical countries its growth may extend over one year or 18 months before being harvested. The harvesting period in this country is from October to January, in those, from January to mid-summer. Cane is usually cut by hand, though cane-cutting ma¬ chines have been in operation of recent years, These, however, have not been perfectly satis¬ factory. The instrument used for cutting cane is a large steel knife, with a blade about five inches wide, 18 long and provided with a lit¬ tle hook on the back. The cane is cut at or near the surface of the ground, the leaves stripped off with the hook, the top cut off at the last matured joint and the cane put into piles along the rows. From here it is taken up, either by hand or machinery, put into carts and laid across large ropes, or put into cars, and transported to the factory. Here the cane is taken out by hand or machinery and if the latter, it is accomplished by a derrick which lifts the entire load by means of the rope on which the cane has been laid. These large bundles are piled up around the factory and when the cane is to be crushed, it is taken un by the same machine, elevated to an incline, dropped on it and slides down to the cane carrier and thence to the mill.

Extraction. — There are in practice two methods of extracting the sugar from cane, namely, milling and diffusion. The older and more generally used is milling, the diffusion being confined almost entirely to manufacture of sugar from beets. A mill may consist of two or three rollers, usually placed horizontally, and vary in length from 18 inches to 72 inches, and in diameter from 12 to 32 inches. If the mill is to be operated by oxen or by horses the

rollers are set in an upright position. The most primitive mill was the wooden roller. This has been used in a small way in some of the Southern States since the Civil War, but there is at this writing, perhaps, not one in existence in this country. In most large factories there are two of these three-roller mills and in some, three. The rollers are so arranged that two are placed on a level and geared to move in

the same direction while the third moves in the opposite direction. If a factory operates two mills the rollers of the first are further apart than those of the second, and if three mills, the third has its rollers closer together than the second. These rollers revolve very slowly (one and one-half to two and one-half revolu¬ tions per minute) and are operated under great hydraulic pressure. To relieve the strain upon the mill, a cane crusher or shredder has come into general use. The cane enters one of these as it leaves the cane carrier and is either crushed or shredded into small pieces before reaching the mill. This not only relieves the mill of the work of crushing the whole cane, but increases its capacity. The capacity of mills will vary from 200 to 1,400 tons of cane per day and the extraction is 70 to 80 per cent on the weight of cane and 90 to 95 per cent of the sugar in the cane. Between the first and second mill the juice receives a spray, through a perforated pipe, of either hot or cold water, the object being to dilute the sugar so a larger percentage will be crushed out by the second mill. This addition of water is termed maceration and the quantity of water added may vary from 5 to 15 per cent of the weight of the cane and in some cases as much as 20 per cent, the quantity depending somewhat upon the value of fuel and the capacity of the evaporating outfit. In some instances the di¬ luted juice from the third mill is returned and used for macerating the crushed cane between the first and second mill, and water is used between the second and third. The value of maceration may be seen from the following estimate taken from practice: It has been esti¬ mated that maceration increases the extraction from four to six pounds of sugar per ton of cane. A factory crushing 500 tons daily and operating for 90 days, would crush a total of 45,000 tons. An increase of five pounds per ton would yield to this factory 225,000 pounds of sugar. This quantity at 3.5 cents per pound (the price paid for 96 test last season in Louisiana) would amount to $7,825. Supposing that 10 per cent of water on weight of cane was used, then for every ton of cane there would have been 200 pounds of water or approximately 25 gal¬ lons. It is estimated that one pound of coal will evaporate about eight pounds or one gal¬ lon of water. Then the 25 gallons of water would require 25 pounds of coal. Coal being valued at $4 per ton or 20 cents per 100 pounds, 25 pounds would be worth five cents, this de¬ ducted from 17.5 cents, the value of five pounds of sugar, leaves 12.5 cents as the net value gained per ton of cane and the 45,000 tons would be worth $5,625.

Diffusion. — Extraction by diffusion is treated under beet sugar and it is necessary here to give only a brief statement with reference to diffusion as applied to sugarcane. Diffusion has been practised at several factories in Louisiana

and some other countries, but it has not yet met with very great favor. The diffusion proc¬ ess in Louisiana has been abandoned. There are claimed for diffusion the advantages of a purer juice and a higher percentage of extraction. In a battery used for sugarcane, the juice will vary in sucrose from .3 per cent in the last of a series of 12 to 14 cells, to 16 per cent in one freshly filled. The disadvan¬ tages of this process are, large amount of water to evaporate, more skilled workmen required and the chips are not so good fuel even after running through a press, which causes ad¬ ditional expense.

The Utilization of Bagasse.— The cane after receiving its final crushing, whether passed through two or three mills, contains from 40 to 50 per cent of water and is, therefore, a poor fuel if its value be estimated on the weight of bagasse. If allowed to accumulate it would become a great nuisance about the factory, hence it is consumed as fuel. If the ash con¬ tains silica and alkalies in proportion to form a fusible mixture, a slag will result and choke the furnace by forming a coating over the gratings; for this reason the burning of a mixture of bagasse and molasses has not been satisfactory. Notwithstanding its high water content, it supplies about two-thirds of the fuel in the Louisiana sugar factory and practically all of it in the tropical countries where the percentage of fibre is from 2 to 3 per cent more than in this State. Six tons of wet bagasse or three of water-free, are said to be equivalent to one ton of ordinary bituminous coal. Ex¬ periments at a very great cost have been made to produce paper from bagasse at Sugar Land, Tex., and at Kenilworth Sugar Factory in Louisiana. Neither has been a commercial suc¬ cess, though there has been a considerable amount of rather an inferior grade of brown paper from these mills put on the market in this section. The Kenilworth mill cost about $300,000 and it is said that the running of it for one year added to this amount $50,000 to $60,000 more. This mill is shut down and the bagasse from the last crop was consumed as fuel. The manager of this mill claims that the percentage (about 30 per cent, according to his estimate) of paper-producing fibre is too small, that the color is poor and bleaching is too expensive and that the paper is wanting in strength. The opinion of the writer is that a fair test has not yet been made.

Clarification. — The juice as extracted by the mill has a gray or dark green color, an acid reaction, and contains sucrose, glucose or dextrose, perhaps a little levulose, gums, albu¬ men, organic acid, pectine, the ash or mineral constituents, earthy and coloring matter, fine particles of suspended bagasse, etc. The fol¬ lowing analyses

show the composition of three samples of Java cane juice taken respectively from first, second and third mills in triple crushing :

These results indicate the composition of cane juice in Java and other tropical countries where cane is grown under most favorable conditions. In Louisiana the juice has from 10 to 15 per cent sucrose, 1 to 2.5 per cent glucose or re¬ ducing sugars and the non-sugars vary from 1 to 3 per cent. There is usually a difference of 2 to 3 per cent sucrose and even more in some instances from the beginning, October, to the end, December and January, of the grind¬ ing season. The reducing and non-sugars also vary very much between the opening and close of the grinding. The purpose of clarification is to remove the impurities as far as possible. This is accomplished by chemicals and heat, causing the soluble impurities to become in¬ soluble or solid. These are removed by settling or filtration. The principal chemicals are sul¬ phur, lime and phosphoric acid. Sulphur is applied as sulphur dioxide which bleaches, dis¬ infects, coagulates some of the albumen and prepares the juice for taking more lime, thereby causing a heavier precipitation which brings about a mechanical cleansing. Sulphur is not much used in the tropical countries where the juice is of a high degree of purity, but it is extensively used in Louisiana and other sec¬ tions where the juice contains large portions of impurities. Lime is universally used and is the most important of all the chemicals em¬ ployed in the sugar factory. It neutralizes acids, acts upon the gums, albuminous substances, coloring matters and, if added in excess, upon the glucose, converting it into organic acids. The lime compounds thus formed are largely insoluble, but some of them are soluble, the in¬ soluble portion is removed by settling or filtra¬ tion and much of the soluble can be got rid of by the addition of phosphoric acid to form the insoluble tri-calcium phosphate, or in some cases sodium carbonate, to form the almost insoluble calcium carbonate. Phosphoric acid is also used to correct any alkalinity resulting from excessive liming and sodium carbonate is very essential in properly correcting the acidity of sour juices. Lime salts, if left in solution in any. considerable quantity, give trouble by depositing on the coils of the <(effects® and (<pans,® thereby reducing their efficiency in the evaporation. Carbon dioxide is used to correct alkalinity and remove excess of lime.

Defecation. — To carry out the process of clarification the juice as it leaves the mill is strained through a copper-wire gauze, then drawn into a sulphur box or tank, if sulphur be used, where it is thoroughly mixed with sulphur dioxide which is produced by the burning of sulphur in an appropriate oven nearby. From the sulphuring apparatus which may consist of a box in which the juice and ((sulphur gas® are

mixed by a pump or of a cylindrical rotating and inclined vessel in which the mixing takes place by rotation, the juice is drawn into meas¬ uring tanks of 2,000 to 6,000 gallons capacity. The clarifiers are rectangular or circular metal-

MILL

Brix

Sucrose

Glucose

Ash

Gummy

matter

Albu¬

men

Acid

P

G. R.

Color

First .

19.2

16.49

1.98

.98

. 125

.025

.048

88.90

12.1

light

Second .

19.3

16.33

1.57

.41

.376

.092

.072

84.40

9.6

dark

Third .

19.0

15.95

1.57

.42

1.250

.025

.096

84.00

9.5

798

lie pans, 700 to 1,200 gallons capacity, provided with a steam coil. These pans may be used also for measuring. In some cases the juice is heated before entering the clarifier, in others it is heated in them. Milk of lime, prepared by slaking and grinding, in especially constructed machines, is added in the clarifiers in sufficient quantity to neutralize, or leave slightly acid, or slightly alkaline, according to the practice of the factory, acid juices being worked to pro¬ duce high-grade sugar and alkaline or neutral to produce low grades. The necessary quantity of lime required for a given quantity of juice is not easily determined. Several methods are in use for this purpose: (1) By the addition of lime until it shows a desired reaction with litmus or turmeric papers. (2) By testing a litre or gallon of the juice with milk of lime and applying the same proportion in the clari¬ fier. (3) An approximate quantity is added, the juice heated, agitated, a small portion fil¬ tered and tested with sucrate of lime (prepared by shaking powdered lime with a 20 per cent sugar solution) which forms a precipitate if an insufficient quantity hˆ been added. More lime is then added and the sucrate test repeated. This testing is repeated until the necessary quantity is obtained (Prinsen Geerligs). (4) The acidity of the juice is determined with a tenth normal caustic soda solution, using phenol-phthalein as an indicator. An approximate but insufficient amount of lime according to the soda test is added, the juice heated, agitated, a small portion filtered and again tested with the soda. Now the exact quantity indicated by the soda may be put into the clarifier. On heating the limed juice a portion of the impurities rise to the surface, while others fall to the bottom. In some factories the settling takes place in the clarifiers, while in others the boiled juice is drawn off into large cylindrical tanks provided with conically-shaped bottoms, which facilitate settling, if the former method is used it is the practice of some to brush off the scum of impurities into a trough attached to the side of the clarifier and then allow other suspended particles to subside when the clear liquid is drawn off through a two-way cock and led into the evaporators or ˆeffects.® When all of the clear juice has been drawn off and the mud be¬ gins to show up, the clear-juice cock is closed and the other one is opened and the residual juice with impurities is conducted to a recep¬ tacle provided for this quality of the liquid. The custom in other factories is to heat the limed juice nearly to boiling (about 95° C.), shut off the heat and allow to stand until the heavier particles of the precipitated matter col¬ lect at. the bottom. The clear portion of the liquid is then separated as .above stated. When settling is to take place in the settling tanks the juice is heated to boiling and at once drawn into these tanks. After complete

settling the clear liquid is drawn off in a manner similar to that already described. It is the custom in some factories to filter through heavy canvas bags (one folded within another) the entire volume of juice, that is, the partially clarified juice, the muddy portion being conveyed to fil¬ ter presses, arranged with cloths that fit in be¬ tween cast-iron plates. The juice is pumped into the filter press where these cloths retain all the solid particles. The juice defecated and clarified as above described is sometimes defe¬

cated a second time, but in a very . similar man¬ ner to that already described. This second de¬ fecation may take place immediately after fil¬ tration or in some instances it is after partial concentration or evaporation.

Carbonation. — See Beet Sugar.

Super-heating. — Of recent years there has been added to the ordinary defecating process a super-heating apparatus generally known by the name of the Deming Super-heater. It is claimed that the principle of the Deming system is in converting some of the soluble into in¬ soluble material at a temperature of from 110° to 115° C. To apply this principle three ves¬ sels, cylindrical in form, are connected with each other by a system of tubes, two of these vessels being termed absorbers and the other digester. . The juice enters one of the absorb¬ ers and is pumped through it into the second. In these it is heated by exhaust steam and passes thence into the digester where it is heated with live steam to the high temperature above mentioned. As it passes out from the digester it is surrounded by an inflow of the juice on its way to the absorbers which heats it up to about 50° C. The super-heated juice, limed before being heated, is conveyed to spe¬ cially constructed settling tanks that permit of a continuous inflow and outflow of juice, the impurities being collected in the conical bot¬ tom of the settling tank. This tank carries within it a large cone, the top part of wrhich is on a level with the top of the tank, the bottom part ending at the top of the conical portion of the tank. The cone, both ends of which are open, is suspended within the tank. The lower end of the cone is of a very large diameter while the upper end has a small diameter. The principle of this contrivance consists in a down¬ ward current of juice from its entrance into the tank and an upward flow through the cone, the particles of solid matter having a greater density than the liquid and to go downward, but the upward current causes a portion of them to rise, though in their ascent they strike the sides of the cone and are returned to the bot¬ tom.

Evaporation and Crystallization.— The

evaporation of sugar solutions or cane juice has for its object the concentration of the liquid to such a density as will cause the sugar to crys¬ tallize out. To accomplish this there are two methods, the ((open kettle® and the vacuum pan. The open-kettle process consists in boiling the juices in open pans, either of circular or rect¬ angular form, provided with steam coils. The heat is continued until the density indicates suf¬ ficient cooking. When a density of 22 to 36 Baume is reached, the liquid is termed a syrup, and when the syrup is cooked to a stiff mass, a masse cuite. After allowing crystallization to take place in wood or iron vats, the masse cuite is thrown into a hogshead and the mo¬ lasses percolates through a perforated bottom, or the sugar and molasses may be separated in a centrifugal machine. The sugar thus made is termed open kettle and the process is not used in the up-to-date factory.

The vacuum apparatus, a dome-shaped ves¬ sel, 5 to 10 feet in diameter, 8 to 15 feet high, provided with steam coils, is the most economi¬ cal for evaporating sugar solutions, requiring only about one-third the fuel of the open ket¬ tle process and reducing to the minimum the

SUGAR INDUSTRY

ir

SUGAR INDUSTRY

1 Chemical Laboratory, Molasses Factory, New Orleans

Copyright, Underwood & Underwood, X. Y,

2 Gas Producing Plant, Molasses Factory, New Orleans

SUGAR INDUSTRY

Battery Electrically-Driven Centrifugal Machines

Interior Cuban sugar factory, showing evaporators

SUGAR INDUSTRY

SUGAR GROWING AND SUGAR MAKING

799

loss by burning or inversion. This apparatus may be arranged in <(multiple effect® — two or more pans connected — or consist of

one pan. More than three pans have not been found ad¬ vantageous. These vessels are so controlled that the vacuum in the first is about 5, in the second 15 and in the third 25 to 27 inches, 30 representing a perfect vacuum. They are con¬ nected with a system of valves so that the juice

discharging of the pan is termed a ˆstrike,® and the product discharged, <(masse cuite.® This is conveyed to a mixer provided with a shaft carrying paddles or fingers that keep the sugar and adhering molasses mixed. The well- mixed masse cuite is next conveyed to a cen¬ trifugal machine, made to revolve 1,000 to 1,200 times per minute, and in its rapid motion the sugar and molasses are separated, the latter

Clarifiers.

may be drawn from the first to the second and from this to the third, from which it is drawn into a syrup tank. Exhaust steam is usually utilized for concentrating the juice, though it becomes necessary at times to use live steam. The steam enters the first and causes it to boil, and the steam generated in this is sufficient to boil the second and so on. The concentration is carried to a density of 22 to 26 Baume or about 50 per cent water.

The syrup is drawn from the syrup tank into the vacuum strike pan until one, two or three coils are covered, and this definite quan¬ tity is heated until grains of sugar may be seen on withdrawing, with a proof stick, a sample and spreading it on a piece of glass. The for¬ mation of grain is sometimes brought about by permitting a little cold juice to enter the pan and suddenly cool it. The object here is to form a crop of ((seed crystals,® and the re¬ mainder of the process has for its purpose the developing or growing to a desired size. This is accomplished by continuing the boiling and adding, from time to time, small quantities of the syrup, taking care that no more grains or crystals are formed. In three to four hours the pan will be as full as is convenient to cook it and the sugar crystals as large as desired. If very large crystals are wanted, as is sometimes the case with confectioners, a <(cut® strike is made, that is, one-third or half the sugar in the pan is dropped out through the bottom and the remaining portion, say one-half, is built up in the same manner as already described. On completing the boiling the second time there are not so many crystals, but they are twice as large. This process may be repeated, but it is very expensive. The principle of the strike pan is similar to that of the effects already de¬ scribed. The vacuum in the pan is usually 25 to 28 inches and the temperature 140° to 160° F. The cooking is continued

until the concentrated mass contains 6 to 8 per cent of water. The

being thrown through very small perforations in a copper gauze basket, while the sugar re- • mains in the basket. The product thus obtained is termed <(first sugar,® also <(raw sugar,® and usually of 96° test.

Beet Sugar.

Historical. — Sugar was discovered in the ordinary beet by Margraff, a member of the Berlin Academy of Science, in 1747, but the sugar content was very small, being from 2 per cent to 4 per cent. About half a century later, Karl Franz Archard undertook the extraction of sugar from the beet and his efforts were suc¬ cessful. Great interest in both Germany and France followed his investigation' and by 1812 there were many factories established. Napo¬ leon added greatly to the progress of this in¬ dustry by government aid and by the establish¬ ment of sugar schools. After the new industry had become well established, it was almost ob¬ literated by destructive wars. It was revived, however, soon in France and by 1829 a yield of 4,000 tons of sugar was made, but Germany's interest was not resumed until 1835. From these countries the industry has spread through¬ out Europe until the production for 1903 has been variously estimated at 5,000,000 to 6,500,- 000 long tons.

The first experiments with sugar-beets in the United States were made by two Philadel¬ phians in 1830. About 10 years later David Lee Child, Northampton, Mass., attempted beet culture and the manufacture of beet sugar. He produced 1,300 pounds at a cost of 11 cents per pound. These enterprises failed and seem to have discouraged further efforts until Gen- nert Brothers, natives of Brunswick, Germany, inaugurated a plant at Chatsworth, Ill., in 1863, and this failed seven years later. Attempt after attempt failed and it may be said that this industry was not permanently established until

between 1875-80. From this time sugar beet culture has been successfully conducted in the United States and at this writing there are 51

Filter Press.

factories distributed over 13 States, with a pro¬ duction of about

208,790 long tons for 1905.

Soil and its Preparation. — Sugar-beets re¬ quire a mean summer temperature of about 70° F., and may, therefore, be grown in a very ex¬ tensive territory in the United States, stretching from New York to California, but in this vast scope of country designated the sugar belt, there is much land that will not grow beets profitably because the soil is not adapted for such a pur¬ pose. While a great variety of soils may be suitable for growing beets, the soil best adapted for this purpose is a sandy loam with a sub-soil open so as to permit the beet to send down a tap-root and at the same time insure enough loose soil for the beets to grow well under ground, otherwise the tap-root will <(sprangle)> and the top of the beet will show above ground, both of which growths are deleterious to the best results.

In order that the beets may develop thor¬ oughly, the soil must be of a loose, friable char¬ acter and thoroughly prepared before planting the seed. The preparation is best effected by plowing about eight inches deep and following a sub-soiler to the depth of about seven inches and finally harrowing until all clods are broken and the soil thoroughly pulverized. If the land should be lumpy the young plants will find great difficulty in coming up, and it will be very troublesome to work or cultivate them. Thorough preparation usually destroys much weeds and grass that otherwise would interfere with the cultivation of the young beet.

Planting. — 'The beet seed are about the size of a small pea with a very small and rough ex¬ terior and should be put well under the earth but not deep. The seed are sown in ridges or furrows in the level ground, the latter being more general, from 14 to 18 inches apart. The seed are distributed with an implement termed a drill or seeder. The best time for planting is in the months of April and May. After planting a roller is pressed over the seed to press the soil close to them. If the rolling should make the surface too smooth and hard, another implement is passed over the ground to <(roughen it up® because the wind sweeps over the fields and causes the sand to do damage to the young plants when the surface is without obstructions. Some plant seed in rows at right angles to the wind in order to avoid injury by it.

Thinning. — As soon as the young plants are well up or show four leaves thinning is begun. This consists of first bunching and then thinning to the proper number of plants to be cultivated for the crop. The thinning is per¬ formed by hand. The first part of the work is

done with a hoe which leaves a clump of beet plants about eight or nine inches apart. The thinning to a stand is then completed by select¬ ing the best looking plant from the bunch left by the hoe and this plant is protected by placing it between the fingers with the back of the hand down, and the remainder of the small beets are removed with a sudden pull. The thinning should be done before the beets grow tall enough to become entangled with each other.

Cultivation. — The cultivation of the beet is very expensive, inasmuch as a large portion of the work must be done by hand, though of late, improved agricultural implements have reduced the expenses. The beet should be worked in some way or other, if possible, every week, with a view of preserving good tilth, the chief object being to destroy weeds and grass and conserve the moisture by forming a loose layer of soil on the surface which closes the capil¬ lary tubes in the soil through which the water evaporates. Beets should be hoed two or three times, depending upon the weeds and grass. This hoeing is partly done by a plow, but the chief part of it must be done by hand. The cultivation period usually extends over six or seven months.

Harvesting. — The harvesting is begun in different sections of the country at different periods, depending upon the climatic conditions. In some portions of California harvesting may begin in August while in sections where the temperature is not so favorable it is begun in September and October. The harvesting extends from two to four months. The beets usually indicate wThen they are ripe by the leaves turn¬ ing yellow and drooping to the ground. The first step taken in harvesting consists in run¬ ning an implement down underneath the beets so as to cut the tap-root where it is small, and, at the same time, loosen the earth around the beet so it may be readily pulled up by hand. The beet is then taken up, by hand, and with a special knife the top or ((neck,}) as it is termed, is removed by one stroke. The top is cut off where the leaves begin to grow on the beet or just below this point. It has been found by experience that the top of the beet is very rich in non-sugars and that it is better to remove these to prevent their contamination in the process of manufacture. The beets are thrown in piles and, if they are to be sent to the factory immediately, they are not covered up, but where the beets are to be. preserved some time they are put into piles of three to four feet in diameter and covered with a layer of earth varying in thickness from six to 24 inches. This latter process is termed siloing and the beets thus preserved remain in a silo until the factory is ready for them. The beets are taken to the factory in carts in which are placed nets, so. arranged that they may be removed by ma¬ chinery, carrying with them the entire load of beets, or the beets may be thrown directly into the cart and at the

factory the cart is driven upon an elevated platform and the beets dumped out. The beets are next thrown into a large tank filled with water having a shaft, pro¬ vided with fingers, so that during the process of washing the beets are kept continually agi¬ tated and brought near where fresh water is flowing into the tank. In this way all of the adhering soil is removed.

From the washing tanks the beets are taken by an elevator and carried above the diffusion battery and dropped into a slicing machine, where they are cut into very thin, narrow pieces so that when the chips fall they will not lie too compactly one upon the other. The chips are conveyed from the slicing machine to a hop¬ per with a funnel-shaped tube and so arranged that it may be rotated or moved otherwise to fill the cells of a battery arranged in a circle or in ((line.)) The battery consists usually of from 12 to 14 cast-iron cylindrical cells connected with each other by a system of pipes with cocks between, so that one may empty and fill without interfering with the operation of the rest. The extraction of the sugar consists in washing the chipped beets with hot water so as to remove the sugar. The battery is so operated that the water is admitted into the cell, the chips of which have been most nearly exhausted and passes out at the cell last filled. In this way the water is made to do its maximum work. When the beets have been exhausted of the sugar the bottom of the cell is opened and the beets discharged and led to a press where most of the remaining water and sugar are pressed out. The pulp cake is used in the wet condition for cattle food or it may be dried with the ex¬ haust steam so it can be preserved for the same purpose. It may also be used to spread over the land and serve as a fertilizer.

Carbonation. — The purification of the sugar solution as above extracted consists of the ap¬ plication of lime, carbon dioxide and sulphur, together with settling and filtering. The use of the lime followed by that of carbon dioxide is termed carbonation. These two materials, lime and carbon dioxide, are obtained by burning limestone in a kiln constructed for that pur¬ pose at the factory. The limestone is decom¬ posed and the lime, mixed with water, is added to the sugar solution in a quantity equal to 2 or 3 per cent. The gas is led from the lime kiln through water to wash it and admitted into a large cell from five to six feet in diameter, with a capacity of from 4,000 to 6,000 gallons. These cells are provided with steam coils so the solution may be heated. The temperature at which the carbonation is carried on is

80° to 90° C. This process of adding lime, then charging with carbonic acid gas, is repeated two or three times, depending upon the quality of the juice, but after the first treatment the juice is filtered each time before repeating the. carbonation. Finally the juice is treated with sulphur dioxide, which is used to bleach the solution, and then the excess of this gas or acid is removed by the addition of lime and the juice is again treated with carbonic acid. Be¬ fore filtering the juice it is allowed to settle so that the impurities may collect at the bottom of the settling tank. The clear liquid is drawn off and filtered by gravity _ through bags. These bags are arranged in pairs, a large bag with a diameter of three or four feet is partially folded and ,put into one of thicker and stronger material, with a diameter of not more than 12 to 18 inches. When the bags become filled with impurities they are steamed and washed and made ready for another operation. That por¬ tion of the solution containing the bulk of im¬ purities is also filtered through bags which are placed in a filter press and much of the liquid removed. The press cake is scattered over the

field and used as a fertilizer. The clarified juice is treated the same as under cane sugar.

Molasses. — The molasses, containing 40 to 50 per cent of sugar, discharged by the centri¬ fugal, must be treated for the sugar which it contains, though some of it in Louisiana is sold to merchants for direct consumption as table molasses, to confectioners and to glucose mixers for the preparation of glucose syrup. Generally, this molasses is recooked over and over again until all of the crystallizable sugar has been separated. The first reboiling yields <(second sugar" and ((second molasses," the second reboiling <(third sugar" and ((third molasses," etc. The reboiling may be done directly in the vacuum pan without previous treatment, in which case 5 to 10 per cent of water is evaporated, the boiled mass put into hot-room cars and kept at a temperature suffi¬ cient to maintain the masse cuite in rather loose or limpid state for from one to three weeks, or put into large cylindrical, slowly revolving drums provided with a proper supply of heat and kept in these for three to four days to permit crystal¬ lization to take place in motion. In either case the masse cuite is returned to the centrifugal and the crystals separated from the molasses. The practice at some factories is to mix the molasses with hot juice before reboiling, while others put it into eliminating pans, charge it with steam, dilute and reclarify. The second sugar may be sold to the refineries, but as it falls below the 96-test sugar (probably the most profitable grade) it is melted in the hot juice and turned out as first

sugar of the test above mentioned. The second molasses is re¬ boiled to ((string proof," put into large magma tanks or hot-room cars (about five by five feet and three to four feet deep) and allowed to remain at rest from four to six months, when the crystallized mass is subjected to centrifugal- ing. The third molasses usually contains a large portion of impurities which may make it unprofitable to further reboil it, though some work this molasses for fourth sugar. All the above grades of sugar recovered by reboiling may be worked back into a first sugar or sold to the refineries. The refuse or exhausted molasses, which amounts to from four to five gallons per ton of cane crushed and carries 25 to 40 per cent sugar, has increased very much in value in recent years, selling at 6 to 10 cents per gallon. Some of it is fed to stock and some consumed by distillers.

The molasses from the beet is worked over again and finally, in some factories, diluted, treated with powdered quicklime, which forms a sucrate of lime at low temperatures, and this sucrate is decomposed, with carbon dioxide, filtered and evaporated to obtain sugar. The final disposition of the beet molasses is also unprofitable.

Refining. — The refining of sugar consists in washing, melting, purifying, evaporating and recrystallizing. Some factories in Louisiana turn out two or three grades of refined sugar or sugar that is sold direct to the trades, but as the process used by them for refining con¬ sists chiefly in washing with water, with a solution of tin chloride, ultramarine or phos¬ phoric acid, it is expensive because of the large portion of the sugar that is dissolved while washing in the centrifugal machine. (<White clarified," (<yellow clarified® and granulated

sugars are the grades referred to, but the amount of these turned out is decreasing every year. The chief difference between refining and manufacturing of sugar is in the method of clarification. This is similar in almost every respect, except in the refinery, the sugar solu¬ tion, after melting and chemical treatment and filtering, is filtered through ((bone black" or bone charcoal. This substance has the property of decolorizing the sugar solution which leaves these filters in an almost colorless condition. The evaporation and crystallization are carried

5 to 25 years. The sugar season is from No¬ vember to February. The sugar is obtained by tapping the tree. The tapping consists in mak¬ ing a triangular hole in the tree, into which the sap is collected. The

sap is withdrawn from the tree by means of a spile in a hole bored beneath and inclined upward to the sap recep¬ tacle. Through this spile the sap runs out and is collected in earthenware vessels. The spile is generally made of bamboo cane. The flow of sap is more rapid at night than in the day and the cooler the night the greater the flow. A

The National Cane Shredder and Mill.

out in the same way as in manufacturing. The bone charcoal soon loses its power to decolorize and is then revivified by burning out the absorbed material in specially constructed re¬ torts. The bone black will finally be exhausted of its valuable property of decolorizing and it is then sold to the fertilizer manufacturer for the manufacture of acid phosphates. The refuse molasses is used for making alcohol, for cul¬ inary purposes and to some extent for making lampblack and shoe polish.

Comparison of Cane and Beet Sugar. — When highly refined, no one can distinguish be¬ tween cane and beet sugar as they are one and the same thing. Between the crude or raw beet and cane sugars there is a great difference, the latter being edible while the former is not, as it possesses a very disagreeable odor and taste. Cane sugar molasses is good for culinary pur¬ poses, beet sugar molasses is not. Cane juice contains ˆglucose® (reducing sugars), but beet juice- does not, though the latter contains raffi- nose and the former does not. In Louisiana about 20 tons per acre is an average cane crop, and 15 to 16 an average beet crop in the United States, Cane is worth $3 to $4 per ton and beets $4 to $4.50. Cane costs $30 to $35 per acre and beets $25 to $30. The sucrose content will vary in Louisiana from 10 to 16 per cent, and from 12 to 18 per cent in the beets in the LTnited States. The cost of the production of a ton of sugar is $60 to $75, whether from cane or beets.

Palm Sugar. — The palm-sugar industry of India is a very old one, but insignificant com¬ pared with the sugarcane industry of that coun¬ try. A fair estimate places the annual produc¬ tion of palm sugar about 100,000 tons of 2,204.5 pounds. The sugar palms are planted on dry land, and one planting will produce sugar from

large tree will yield from 30 to 40 pounds of sugar annually and 800 trees is considered a valuable possession. The sap is collected daily, mixed with a little lime and evaporated in open vessels in a very crude way. The boiling is continued until the sap is a thick syrupy con¬ sistency or until it forms, on cooling, a solid mass. The solidifying or

the last stages of evaporation is sometimes accomplished by ex¬ posure to the hot sun in that climate. The syrup is sometimes sold under the name of date-honey. This has been known for a very long time as an article of commerce.

Maple Sugar. — The variety of maple tree (Acer barbatum) is the one from which sugar is chiefly obtained. This tree grows wild in the forest or is cultivated in Ohio, Indiana, New York, Vermont and other northeastern States and to some extent in Canada. It is only within the last few decades that the trees have been cultivated to any great extent. A tree is 30 to 40 years old before it yields the maximum amount of sugar. A short tree with broad, spreading branches is said to produce larger yields and richer quality of sap than the tall ones with less foliage. The sugar period is from January to April. The sap begins to flow at the break-up of winter. So in one section the sap may flow as early as January while in the colder sections it may not flow before March. The flow lasts from six weeks to two months. The sap, or sugar, may be extracted from the tree in a manner similar to that of extracting it from the palm, but the triangular hole has proved to be more injurious than a small round hole. The general custom is to bore two to four holes in a tree, from two to four feet above the ground, with a three-quarter-inch augur. These holes are placed to southern

exposure and are slightly inclined upward. In the hole is arranged, water-tight, a spile made of wood or metal on which a tin pail or wooden bucket is hung to catch the sap. The flow of sap ceases with the budding of the tree. The sap is a very pure sugar juice containing from 2 to 4 per cent of sugar, the average being about 3.5 per cent. The sap contains, in addition to the sugar, other substances in solution, some of which are of an aromatic nature and these latter give to maple sugar its splendid flavor for which it is so highly prized as a material for making table syrup. The fact that the sap is of such a high degree of purity makes the manufacture of maple sugar very simple. The sap collected in the pails is poured through a strainer into a storage tank. From this tank the sap is drawn into vats or pans, usually made of Russia iron, 2.5 feet wide and about 5 feet long. These pans are set on grate bars in brick furnaces. The fuel used is wood, one cord of which is sufficient to evaporate the water from 100 pounds of sugar. The sap is evaporated with but little or no clarification except the removal of the scum as it rises to the top during the process of boiling. The cooking is continued until the sap is

of a syrupy consistency or until it begins to grain; in the former case it is sold as syrup, in the latter, it is stirred while cooling in order to produce a soft granular sugar which is put on the market and sold for making table syrup. The annual production is estimated at 153)00 to 20,000 tons.

Sorghum and Maize Sugar.— Many ex¬ periments have been made to produce sugar from sorghum, but in all the results have Hot been profitable. There is now very little, if any, sugar made from sorghum, though there is con¬ siderable syrup. Maize contains 9 to 12 per cent sugar, but impurities along with it have not been successfully understood and no method exists by which this sugar can be profitably extracted.

Commerce. — The sugar trade of the world has become so great that international agree¬ ment has been necessary to regulate it. European countries for quite a number of years have paid directly and indirectly bounties to sugar producers and refiners on their exports. This encouraged and abnormally developed the sugar industry in some countries and depressed it in others. The bounties placed the price of sugar so high that the poorer people in bounty¬ paying countries could not afford it and so low in many non-bounty-paying countries that the industry was no longer profitable to producers. A movement was started in England in 1887 to correct this evil. A convention representing Austria, Belgium, Germany, Great Britain, Italy, the Netherlands, Russia and Spain met in London, 30 Aug. 1888, and passed a resolu¬ tion to guarantee ((that no open or disguised bounty shall be granted on the manufacture or exportation of sugar.® France would not enter the agreement because the United States would have nothing to do with it. There was no ratification of this convention, though it should have taken place 1 Aug. 1890. The bounties paid by Germany and Austria-Hungary were reported to be about $16 per ton, and this was approximately doubled in 1896. Renewed efforts were then made to break up the bounty system and this was practically accomplished, temporarily at least, in Brussels, 1 March 1902,

after eight sittings of an international conven¬ tion. This was the eighth European Sugar Bounty Conference since one held in Paris in 1862. Germany, Austria-Hungary, Belgium, Spain, France, Great Britain, Italy, the Nether¬ lands and Sweden were represented in the con¬ vention of 1902. The following is a summary of the principal articles passed upon by that convention :

“Article 1. The high contracting parties agree, from the date of putting in force this present convention, to suppress- the direct and indirect

bounties which might benefit the production or export of sugar, and not to establish bounties of this kind, during the whole duration of this convention. The agreement applies to confectionery, chocolate, and all analogous products, containing sugar artificially incorporated in a notable proportion; and to all advantages resulting indirectly or directly for producers from fiscal legislation, including: (a) direct bounties granted to exports; (&) and to production; (c) total or partial exemption from taxation as to any part of the output; (d) advantages derived from excessive yield; (e) and from the exaggeration of drawback; (/) and from any surtax in excess of the rate fixed by article 3.

1. Sugar factories and refineries of all kinds are to be placed in bond and worked under the continuous supervision of revenue officers; and finished sugars are to be stored in bonded warehouses.

2. The surtax is limited to a maximum of 6 francs per 100 kilogrammes (2s. 5.25d. per cwt.; or £2, 8s. 9d. per ton) for refined and assimilable sugars; and 5 francs 50 centimes per 100 kilogrammes (25s. 8d. per cwt., or £2, 4s. 8.5d. per ton) for other sugars. The surtax is the difference between the rate of the duty imposed on imported foreign sugar and the rate of duty or tax imposed on the home product. The pro¬ visions of this article do not apply to import duties on sugar imposed by countries that do not produce sugar, nor to the by-products of sugar manufacturing or sugar refining.

3. The high contracting parties agree to impose a special duty on the importation into their respective territories of sugars from countries that grant bounties either on produc¬ tion or export. This duty shall not be less than the amount of the bounties direct or indirect granted in the country of origin and each of the parties reserves the right to prohibit the importation of bountied sugars. In order to compute the advantages which may be derived from the imposition of an excessive surtax as specified in paragraph 5 of article 1, the surtax, at the agreed rate fixed by article 3, is deducted from such excessive surtax, and the half of the difference is considered to represent bounty. A permanent commission, instituted by article 7, will have the right, on the demand of a contracting party, to revise the rate imposed in excess.

4. The high contracting parties agree to admit, at the lowest rate of import duty, sugars of any of the contracting countries, or of

any colonies or possessions belonging to them that do not grant bounties, and to which the obligations imposed by article 8 apply.

5. Spain, Italy, and Sweden are exempt from articles 1,2, and 3 as long as they do not export sugars.

6. The convention to come into force 1 Sept. 1905 remain five years from that date; and thenceforward (in case no state denounces it, 12 months before 1 Sept. 1908) it will remain for a year and so on from year to year. The denun¬ ciation will only have effect on the party making it.

7. The convention shall be ratified at Brussels on or before 1 Feb. 1903."

The effect of this international agreement in Europe practically shut off importations of sugar from that continent to the United States, which, however, (including its possessions, Hawaii, Porto Rico and the Philippine Islands) together with Cuba produce sufficient to supply the demand for sugar in the United States.

Duty per 100 Pounds on Cuban Sugars Im¬ ported into the United States.

Test

Old Rates

New Rates

75 raw .

$0.76

$175

89 raw . . . .

1.152

1.05

96 raw .

1.348

1.28

Refined .

1.560

1.33

All Cuban sugars coming into the United States are allowed 20 per cent discount on above rates.

In 1916 a provision in the Underwood Tariff

Law, by which sugar was eventually to go on the free list, was rescinded by Congress. The imports of sugar into the United States from

1915 to 1918 were as follows:

Short tons

1915 . 2,710,500

1916 . 2,816,581

1917 . 2,666,373

1918 . 2,451,664

The exports during the same period were :

Short tons

1915 . 300,552

1916 . 842,598

1917 . 634,153

1918 . 293,753

Sugar Production of the World for Follow¬ ing Years :

Cane

Beet

Total

Short tons

Short tons

Short tons

1905-06 .

7,551,000

8,090,000

15,641,000

1906-07 .

8,365,000

7,587,000

15,952,000

1907-08 .

7,926,000

7,390,000

15,316,000

1908-09 .

8,654,000

7,350,000

16,004,000

1909-10 .

9,423,000

6,991,000

16,414,000

1910-11 .

9,540,000

»* 9,042,000

18,582,000

1911-12 .

10,275,000

7,072,000

17,347,000

1912-13 .

10,908,000

9,509,769

20,417,769

1913-14 .

11,225,000

9,430,145

20,655,145

During the World War, 1914—18, the world's sugar production was as follows :

Short tons

1915 . 20,755,960

1916 . 18,547,373

1917 . 18,572,220

The Cane and Beet Sugar Crops of the World for 1914-15, with Average of Crops for Seven Preceding Years.

CANE SUGAR

Crops

1914-15

(Tons of 2,240 lbs.)

Average crop for

7 years ending

1914-15

Africa

Egypt .

83,000

303,000

44,000

115,000

64,263

233,142

40,714

61,316

Mauritius .

Reunion .

Natal .

Total in Africa .

545,000

399,435

America

Argentina .

370,000

269,000

120,000

46,000

32,000

192,744 251,000 108,181 46,536 33 , 299

Brazil .

Rrit.ish Guiana .

Trinidad .

Barbados .

Cane and Beet Sugar Crops — Continued

Crops

1914-15

(Tons of 2,240 lbs.)

Average crop for

7 years ending

1914-15

America — continued

Jamaica .

15,000

14,000

13,444

22,553

Antigua and Saint Kitts .

Total .

866,000

667,757

Central America

Costa Rica .

2.500

7.500 4,000

18,000

2,371

7,407

1,247

8,057

Guatemala .

Nicaragua .

Salvador .

Total in Central America .

32,000

22,082

Cuba .

2,980,000

5,000

44,000 44 , 000 119,000

2,025,588

10,714

38,154

40,209

94,143

Danish .

French colonies

Guadeloupe .

Martinique .

Haiti and San Domingo .

Total .

3,192,000

121,000

2,208,808

132,254

Mexico .

Asia

British India .

2,561,000

222,000

1,541,000

408,000

2,273,330

130,557

1,291,985

223,916

Formosa .

Java .

Philippine Islands .

Total .

4,732,000

3,919,788

North America

United States (contiguous) Louisiana .

240,000

44,000

612,000

364,000

280,000

10,142

496,829

28,243

Texas .

N on-contiguous

Hawaii .

Porto Rico .

Total United States except Philippine Islands .

1,260,000

815,214

Oceania

Queensland .

269,000

114,000

206,164

78,100

New South Wales .

Fiji .

Total .

383,000

284,264

Europe

Spain .

8,000

13,429

SUMMA

Africa .

RY

545,000 866,000 4,732,000 8,000 383,000 3,192,000 1,260,000 121,000 32 , 000

399,435

667,757

3,919,788

13,429

284,264

2,208,808

815,214

132,254

22,082

America .

Asia .

Europe .

Oceania .

Cuba .

North America .

Mexico .

Central America .

Total production cane sugar in the world .

11,139,000

8,863,031

BEET SUGAR

North America

United States .

Canada .

Europe

Austria-Hungary ....

Belgium .

France .

Germany .

Netherlands .

Russia .

1905-06

1906-07

1907-08

1908-09

1909-10

1912-13

1913-14

1914-15

Average for 7 years

279,393

11,419

1,509,789

328,770

1,089,684

2,418,156

207,189

986,500

410,255

431,796

11,367

1,343,940

282,804

756,094

2,239,179

181,417

1,440,130

467,244

413,954

7,943

1,424,657

232,352

727,712

2,129,597

175,184

1,410,000

462,772

380,254

6,964

1,398,000

258,000

802,000

2,080,000

214,000

1,265,000

500,000

457,562

8,802

1,260,000

250,000

825,000

2,040,000

200,000

1,150,000

460,000

•

692,556

12,439

1,442,159

326,653

967,440

2,983,085

315,775

1,361,842

427,500

733,401

11,982

1,287,787

251,023

790,790

2,993,704

231,073

1,688,247

431,220

722,054

13,773

1,288,960

224,437

333,953

2,755,750

263,852

547,382

10,467

1,349,357

260,752

743.284 2,454,476

255,498

1,328,817

451.284

Other countries .

Total beet .

7,223,155

7,153,971

6,984,171

6,904,218

6,651,364

8,101,949

7,988,007

5,602,779

7,401,317

Grand total cane and

beet sugar .

13,964,988

14,506,811

13,900,539|14,531,108

14,495,692

20,518,000

20,605,000

18,041,779| 16,668,41 7

Sugar Consumed in the United States, 1914. (Willet and Gray of N. Y.)

Imported (including 510,385 tons Hawaiian, 274,149 Porto Rico, and 120,887 Philippine) . Domestic manufactured from imported

molasses, U. S. Maple, etc .

Domestic cane .

Domestic beet .

Domestic total . . .

Total annual product consumed in the United States is 84.29 pounds per capita .

2,972,333

20,200

143,996

624,298

788,494

3,760,827

From 2,238,588 tons in 1900 the consumption of sugar in 1918 had reached 4,339,616 tons.

Consumption of Sugar Per Capita — Licht's Estimate for 1914.

Per

capita

in

pounds

Per

capita

in

pounds

Germany .

45.13

Netherlands .

50.09

Austria .

1. 17

Denmark .

95.57

France .

43.85

Italy .

11.68

Spain .

1. 19

Belgium .

36.08

England .

93.37

Turkey .

21.93

Switzerland .

73.55

Sweden .

57.73

United States .

84.29

Norway .

46.64

Russia .

25.43

From 1916 to 1918 the sugar production of the United States was as follows :

Cane

Beet

Total

1916 .

Short tons

138,620 310,900 245,839

Short tons

874,222 820,657 764,811

Short tons

1,012,842 1,131,557 1,010,650

1917 .

1918 .

The large increase in sugar export during these years was due to the European War. Early in the fall of 1917 the International Sugar Committee was formed to arrange for the dis¬ tribution of the available sugar in the world. The committee consisted of two members from each of the allied governments, two from the United States Food Administration being also supplemented by the head of the sugar division. This committee arranged for the purchase and distribution of all sugar to the allied countries, and as it became difficult to procure household supplies, in December 1917 the United States Senate directed an inquiry into the causes of the shortage of sugar. This was found to be due largely to consumer hoarding, and to the unusual amounts used for home preserves, also to about two-fifths of the whole quantity con¬ sumed in the United States being required for the manufacture of candy. The efficiency of the Food Administration, of the International Committee and the willing co-operation of the people served to keep down the price, to regu¬ late the supply and to tide over the difficulty and the shortages occasioned by the indiscrim¬ inate sinkings of merchant vessels through the German submarine policy.

In 1916 the government of Panama was authorized to loan $500,000 to plantation oper¬ ators for the development of the sugar industry in that country, the loans to be repaid within 10 years; a government subsidy of one cent on every four pounds of white granulated sugar

produced was also granted. In 1917, from its

development fund, Great Britain also made a grant of $625,000 for the development of sugar- beet growing and manufacture in England.

Bibliography. — Andrews, F., Statistics of Sugar in the United States and its Insular Pos¬ sessions, 1881-1912) (in Bulletin No. 66, United States Department of Agriculture, Washington 1914) ; Beaudet, Pellet and Saillard, Eabrica- tion du sucre de betterave et de canne) (2 vols., Paris 1894) ; Brown, C. A., Sugar Analysis) (New York 1912) ; Geerlig, H. C. P., (Cane Sugar and Its Manufacture> (Manchester 1909) and ˆPractical White Sugar Manufacture) (London 1915) ; Helot, J., (Le sucre de better¬ ave en France de 1880 a 1900) (Cambrai 1900) ; Koppeschaar, E., Evaporation in the Cane and Beet Sugar Factory) (New York 1915) ; Mc¬ Intosh, J. G., technology of Sugar) (New York 1903) ; Meyer, H. H. B., Select List of References on Sugar *(Washington 1910) ; Myrick, H., (American Sugar Industry) (New York 1899) ; Nelson, Sugar Industry of the Philippine Islands) (Manila 1911) ; Newlands, J. A. R, and B. E. R., SugaD (New York 1909) ; Roth, H. L., (Guide to the Literature of Sugar* (London 1890) ; Spencer, G. L., hand¬ book for Sugar Manufacturers and Their Chemists) (3d ed., New York 1897) ; Tucker, J. H., (Manual of Sugar Analysis) (5th ed., New York 1900) ; Surface, G. T., Story of Sugar) (New York 1910) ; Wallis-Taylor, A. J., Sugar Machinery *(2d ed., New York 1909) ; Ware, L. S., (Beet Sugar Manufacturing and Refining* (2 vols., New York 1905-07) ; Wiechmann, F. G., Sugar Analysis for Cane Sugar and Beet Sugar Houses, Refineries and Experimental Stations> (3d ed.. New York

1914).

SUGAR OF LEAD. See Lead.

SUGAR LOAF, The, an isolated, conical hill, rising from the east bank of the Hudson River, a short distance below Garrisons. It is at the north entrance to the Highlands, about 57 miles north of New York.

SUGAR MAPLE. See Maple.

SUGGESTION, in psychology, a term which in its widest sense signifies an intimation, a hint, a1 prompting, the abrupt introduction of an idea into consciousness. It is also employed as synonymous with association. But, more specifically, it is a method of effecting belief, whether the conditions of the subject be normal, or abnormal, as in the case of hypnotism (q.v.). Under normal conditions this belief may be manifested as a conviction arrived at by reason¬ ing, as in the case

of the acceptance of a series of logical arguments; or it may be mere acqui¬ escence in what deliberation would show to be false. Psychologists disagree as to the means by which suggestion may effect belief under abnormal conditions (for example, those of hypnotism). Lipps holds that the critical facul¬ ties of the hypnotized subject are kept in abey¬ ance, and he is, therefore, incapable of making opposition and thereby destroying the belief. Wundt contends that the consciousness of the subject is limited, no ideas entering save those directly aroused. Such ideas are, therefore, freed from contradiction, and have a special or hyperaesthetic force. When belief persists for a time after hypnotic conditions have ceased to exist, and ultimately takes effect, such

form is called post-hypnotic suggestion. Con¬ sult Bain, (The Senses and the Intellect (Lon¬ don 1894) ; Bernheim, (Suggestive Therapeu- tics> (trans., New York 1889) ; Binet, A., (La Suggestibilite) (Paris 1900) ; Keatinge, W. M., ˆSuggestion in Education) (London 1907) ; Lipps, (Zur Psychologie der Suggestion > (1897) ; Sidis, B., (The Psychology of Sugges¬ tion (New York 1898) ; Stoll, O., Suggestion und Hypnotismus in der Volkerpsychologie) (2d ed., Leipzig 1904) ; Wundt, (Hypnotismus und Suggestion > (Leipzig 1911).

SUHL, zool, Germany, city in Prussian ju¬ dicial district Erfurt, on the southern slope of the Thuringen Forest, in the valley of the Hasel. It is situated on the State Railroad Plaue-Ritschenhausen and has two Evangeli¬ cal and one Catholic church, synagogues, a city hall, upper Realschule, law court, etc. It is noted for its arms manufacturing, an ancient industry. Other manufactures are porcelain, machinery, ammunition, hardware, wooden- ware and toys, besides iron foundries, screw-

work, etc. Its records reach back to 1330.

♦ •

SUICIDE, the act of intentionally destroy¬ ing one's own life, whether sane or insane — the act in itself, accompanied by the purpose, is suicide : the condition of sanity or insanity bears on the question of responsibility. In con¬ sidering the causes which lead to suicide it may be well to mention the motives which deter from it. First of all is the natural love of life, which leads even condemned criminals, perhaps

awaiting death by torture, to cling to the few hours or days remaining to them. This love of life is in the very nature of all living beings, and it is not always or even usually to be measured by the apparent value of existence to the individual. It is at least as strong in the Digger Indian or the Kongo negro as in the civilized and well-to-do resident of America or Europe. There is next, among the more in¬ telligent, whether religiously inclined or not, the sense of duty to others ; among the strictly religious, there is the dread of punishment be¬ yond the grave, and statistics indicate that this is a potent and prevalent deterrent from self- destruction.

Suicide is not in itself a sign of weakness of intellect. There were periods of depression in the Revolutionary struggle when Washington was despondent almost to the point of welcom¬ ing death, and Bismarck once contemplated suicide. Napoleon, after his first overthrow, attempted suicide by taking poison. Hannibal committed suicide. Herndon, Abraham Lin¬ coln's law partner, relates that after the death of Miss Rutledge, whom Lincoln loved, his friends watched him closely for fear that (<the dark and gloomy weather might produce such a depression of spirits as to induce him to take his own life.® Instances might be multiplied of the world's greatest men who either committed suicide, or attempted it, or were on the brink of it.

Although there are no statistics for compari¬ son, yet the observations of trustworthy nar¬ rators indicate that suicide is very much more common among Asiatics than among Western nations. Arthur H. Smith, D.D., says there are parts of China in which young girls band themselves into a secret league to commit suicide within a certain time after they have

been betrothed or married, that the practice of suicide ((is adopted even by children, and for causes relatively trifling. At times it appears to spread like the smallpox, and the thirst for suicide becomes virtually an epidemic.® China is probably the only country in the world in which criminals are permitted, or rather di¬ rected as an act of special grace, to commit suicide. Before the Japanese adopted civilized methods suicide was also prevalent among them, the usual form being known as (<hari- kari or seppuku® the victim disembowel¬ ing himself with knife or sword/ In India vast numbers of fanatics sought death under the car of Juggernaut, and widows on the funeral pyres of their husbands, until the British au¬ thorities put a stop to these practices.

It is yet an undecided question whether edu¬ cation fosters the tendency to suicide or not. Thomas Garrigue Masaryk (q.v.), first

Presi¬ dent of the Czecho-Slovak Republic, when a lecturer on philosophy at Vienna in 1879, came into prominence by a study on ((Suicide® as a pathological symptom of the condition of con¬ temporary Europe. He attributed its chief cause to the decline of religious sentiment. It cannot be alleged that education has anything to do with the epidemics of suicide among Chi¬ nese women. On the other hand, it is easy to suppose, and statistics appear to support the presumption, that, other things equal, a preva¬ lence of materialism, a disbelief in things super¬ natural, and consequent loss of assurance that privations and sufferings here are to be recom¬ pensed by an eternity of happiness hereafter, tend tc make men tired of life and willing to anticipate by a few years their inevitable des¬ tiny. Bismarck said that (<if this world were the end of all, it would not be worth the dressing and the undressing.® So far, therefore, as edu¬ cation helps to promote materialism, it pro¬ motes suicide. At the same time it is to be remembered that such men as Tyndall and Darwin, who were avowedly in discord with accepted religious tenets, regarded it as a duty and a pleasure to live and do their share of life's work.

Professor Bailey, of the Social Science De¬ partment at Yale, after examining 10,000 cases of suicide, arrived at the following conclusions :

((Three and one-half males commit suicide to every female. From 30 to 40 is the popular suicide age, and the married are more apt to do away with themselves than the single. Among the single the maximum number of cases is between 20 and 30; among married persons between 30 and 40; among widowers, between 60 and 70, and among divorced per¬ sons the same. In this country shooting is the favorite method of suicide, poisoning being a close second. Hanging is more popular in northern Europe, and drownings in southern countries. In Maine most of the suicides hang themselves; in the cities they jump from build¬ ings or bridges, poison themselves or turn on the gas ; in the South they shoot themselves. Women drown themselves, use poison and gas. Women as a rule commit suicide in such a way as to avoid injuring their features. Young per¬ sons seem to prefer poison ; the middle-aged shoot themselves and older people hang them¬ selves. Despondency leads as the cause of suicides in America.®

New York is the only American Slate in which attempted suicide is prosecuted as a crime. In England attempted suicide is also criminal, and the body of a person found to have committed suicide while sane is debarred from Christian burial. The feelings of rela¬ tives are almost invariably spared, however, both in America and England, by a verdict of the ctproner's jury that the act was the result of insanity.

Bibliography. — Durkheim, E., (Le suicide ; Etude de sociologie5 (Paris 1897) ; Gaultier, (Les maladies sociales) (Paris 1913) ; Legoyt, A., (Le suicide ancien et moderne) (Paris 1881) ; Medeville, (Le suicide en droit penal 5 (Bordeaux 1911) ; Morselli, E. A., (Suicide) (in International Scientific Series, Vol. XXXVI, New York 1882) ; Motta, E., (Bib]iografia del suicido) (Bellinzona 1890) ; Pfeiffer, (Ueber den Selbstmord) (Jena 1912) ; Rost, H., (Der Selbstmord5 (Cologne 1905) ; Strahan, S. A. K., (Suicide and Insanity: A Physiological and Sociological Study5 (London 1893) ; American Statistical Association, Publications .

suidˆ:, su'i-de, the family which includes the pigs (genus Sus) and other relatives, char¬ acterized by the rooting snout, bristly coat, large and low hind hoofs, peculiar dentition and other common features. See Swine or Hogs.

SUIDAS, su'i-das, Greek lexicographer of the 10th or 11th century. He wrote a lexicon which forms a kind of cyclopaedia and diction¬ ary, giving explanations of words, and notices of persons, places, etc., in alphabetical order.

SUIR, shoor, Ireland, a river which rises in the Slieve-Bloom Mountains, in the north of Tipperary; flows in an irregular course, form¬ ing the boundary between Tipperary, Waterford and Kilkenny; passes the towns of Clonmel and Carrick ; and after a course of about 80 miles unites with the Barrow to form the estuary of Waterford harbor. It is navigable by vessels of 500 tons to Waterford, and by large barges to Clonmel.

SUKA-SAPTATI, soo'ka-sap'ta-te, San¬ skrit, (Seventy (Tales) of a Parrot,) taken from Nakshabi's (Tuti Nama,5 or Parrot Book (a.d. 1320). It is the Persian story of a mer¬ chant leaving his young wife for a 70 days' journey. He commends her always to obtain advice by consulting his wonderful trained parrot in every emergency. The bird's advice is solicited early when the wife has tempta¬ tion thrown her way and the parrot temporized with her by telling a story which so pleased and flattered her that she speftt the night listening to the absorbing relation. And with the sunrise the advice was declared by

the parrot to be con¬ tingent upon what happened under the condi¬ tions that prevailed in a story which he would recite the next evening. The following night's story aroused equal interest in the wife, but is indissolubly connected with another night's story which the parrot recites so entertainingly that in this manner the luring continuations of the tales keep the tempted wife from erring the remaining evenings of the 70 days' absence of the merchant. And the husband returns to find his wife saved from dishonor. Consult Schmidt, (Uber die Suka-Saptati5 (Halle 1898) ; MacDonnell, A. A., (History of Sans¬ krit Literature5 (London 1913) ; Wortham's

,(Enchanted Parrot5 (London 1911) contains several of these parrot stories.

SUKHAVATI, sook-ha'va-te, Sanskrit, blissful. The Mahayana Bu dhist's Land of Bliss, the heaven he reaches in the course of Ms transmigrations if a believer in Amitabha Buddha who presides over it. Gods and men .are here on a perfect equality, earthly ills do not exist and the seasons and days are not Elevation to this heaven is by absolute trust in the presiding deity. Consult Suzuki, D. F., ˆOutlines of Mahayana Buddhisms5 (London

1907).

SULEIMAN PASHA, soo-la-man' pash'a, Turkish military officer: b. 1840; d. 11 Aug. 1892. After entering the army he was made a major in 1867; colonel in 1873, and general of brigade in 1874. In 1876 he distinguished himself as commander against the Servians. When the Russians declared war (1877) against Turkey, Suleiman checked them at Eski Zagra, and destroyed his army in heroic but vain attempts to force them from the Shipka Pass. In October he was appointed commander-in- chief of the Army of the Danube, but failed to accomplish anything, retreated behind the Balkans, and suffered defeat near Philippopolis (January 1878) . Brought before a court-martial, he was condemned to be degraded and kept in a fortress prison for 15 years. The Sultan, however, pardoned him.

SULIMAN (soo-le-man ') MOUNTAINS)

India, a range of the Northwest Frontier* Province, near the Afghanistan frontier. The range consists of several parallel ridges, of which the most westerly form the water-parting between the rivers flowing east to the Indus and those flowing westward through Afghanis¬ tan. It extends north and south from the Safed Koh to about the Bolan Pass, and is crossed by many passes, of which the chief are

those of Kuram, Gumal and Sangar. The highest peak, Takht-i-Suliman, or (<Suliman's Seat,55 has two summits, 11,295 and 11,070 feet high respectively. These mountains are generally rocky and precipitous, and their sides are com¬ pletely bare of trees. The passes through them are generally held by independent tribes in alli¬ ance with the British.

SULINA, soo-le'na, Rumania, the central arm of the Danube delta. In 1902 extensive improvements were completed which rendered it a navigable ship canal, and the commercial entrance to the Danube. At its mouth is the town of Sulina, which is a free port with a population of about 5,611, and an extensive transit trade.

SULIOTS, soo'li-otz, a mixed people of Arnaout and Greek descent, who, to escape the tyranny of the Turks in the 17th century, set¬ tled in the mountains near Parga, occupying a wild valley enclosed on three sides by almost inaccessible mountains, and accessible on the fourth only by a narrow defile. Here their numbers had increased toward the end of the 18th century to 10,000, their chief village being called Suli. Their government was republican. Old customs were followed instead of written laws. They were distinguished for the sim¬ plicity of their manners and for their brayerv. Their mother-tongue was the AJbanian, hut they also spoke Greek. Thqy\ lived partly 1 /

the rearing of cattle and the chase, and partly by plunder. When, after a struggle of several years, Ali, pasha of Yanina, had rather reduced them to despair than conquered them (1803), most of them abandoned their country. But when Ali found himself hard pressed by the Turks and deserted by the Albanians, he re¬ called the Suliots to his assistance. When the Greek war of independence broke out, the Suliots joined the Greeks. Suli was besieged by the Turks, and in September 1822 was com¬ pelled by famine to surrender. Three thousand Suliots then embarked in British ships for Cephalonia ; the rest dispersed themselves in the mountains. The corps of 500 men, raised and equipped by Lord Byron at his own ex¬ pense, was composed of Suliots, for whom he had a great admiration. See Bozzaris.

SULLA, sul'a, Lucius Cornelius, Roman dictator: b. 138 b.c. ; d. 78 b.c. He received a good education, but was notorious from his youth upward for his excessive dissipation and debauchery. He served with

distinction under Marius in the Jugurthine (107, b.c.) and Cim- brian (104-2) wars, and in 93 was chosen praetor. For his services in the Social war (90-88) he was appointed consul (88 b.c.), and the province of Asia, with the conduct of the war against Mithridates, fell to his lot. Marius was also ambitious of his command, and re¬ sorted to acts of violence to carry his point, by which Sulla was compelled to escape from Rome. But Sulla re-entered the city at the head of his army, drove Marius to Africa, and then sailed for Greece at the beginning of 87 b.c. Fie expelled the armies of Mithridates from Europe (86), crossed into Asia (84) and was everywhere victorious, gaining plenty of wealth for himself and his soldiers, and forcing Mithridates to conclude a peace. Marius had died in 86 b.c., after proscribing Sulla and con¬ fiscating his property, but the party of Marius was still strong. Sulla now hastened to Italy, and landed at Brundusium with 40,000 men 83 b.c. He was joined by many of his friends who had been banished from Rome. He gained four battles over the Roman forces in person, and defeated a Samnite army under Telesinus. He entered the city victorious in 82, and imme¬ diately put to death between 6,000 and 7,000 prisoners of war in the Circus. Rome and all the provinces of Italy were filled with the most revolting scenes of cruelty. After satisfying his vengeance by the murder or proscription of thousands he caused himself to be named dictator for an indefinite period (81 b.c.). He ruled without restraint, repealed and made laws, abolished the tribuneship, and settled his vet¬ erans in various parts of Italy. In 79 b.c. he laid down his dictatorship.

SULLINS (sul'lnz) COLLEGE, a college for women, located at Bristol, .on the State line between Virginia and Tennessee. It was founded in 1870 by David Sullins, a minister of the Methodist Episcopal Church, South, and is under the control of the Holston Conference of that church. It has an elementary, a prepara¬ tory and a collegiate department. The col¬ legiate oourse leads to the degree of A.B. ; courses in pedagogy are offered ; there is also a business course of one year, a School of Ex¬ pression and Physical Culture, a School of Art and a Department of Music. Physical exercise

is encouraged, and a course in light gymnastics is required of all students. The college has a beautiful and healthful situation ; the grounds and buildings are valued at $75,000). The students average annually 230, and the faculty numbers 22.

SULLIVAN, Sir Arthur Seymour, Eng¬ lish composer: b. London, 13 May 1842; d. 22 Nov. 1900. His father was a military band¬ master, and taught his son before nine years of age to play every wind-instrumeut used in the band, thus laying the foundation of the wide

orchestral knowledge afterward displayed by Sir Arthur. Endowed with a fine treble voice he became a choir-boy at the Chapel Royal ; in 1856 gained the Mendelssohn scholarship of the Royal Academy of Music, where he continued his musical education ; and in 1858 went to Leipzig, completing his studies with Moscheles, Hauptmann, and other famous instructors of that period. On his return to England in 1862 he at .once attracted attention by his music to Shakespeare's (Tempest. > His serious works include the oratorios (Prodigal Son, *and (Light of the World,* anthems, hymns, numer¬ ous favorite songs, etc. ; but his most popular compositions are the Savoy series .of burlesque operettas which he produced in conjunction with W. S. Gilbert. Among the most popular of these are (H. M. S. Pinafore *(1878) ; (Pirates of Penzance* (1880) ; (Patience *(1881); (Iolanthe) (1882); <Mikado* (1885); (The Yeoman of the Guard *(1888), and the ˆGondoliers* (1889). In 1886 he set to music an arrangement of Longfellow's (Golden Legend, *which is one of his finest composi¬ tions, and in 1891 produced his grand opera Hvanhoe,* a masterly work which did not win the success its merits deserved. He was knighted in 1883. Consult Cellier and Bridg¬ man, (Gilbert and Sullivan and their Operas) (Boston 1914) ; Findon, B. W., <Sir A. Sul¬ livan, His Life and Music) (London 1903) ; Lawrence, A., (Sir A. Sullivan, Life-story, Letters and Reminiscences *(London 1900) ; Wyndham, H. S., (Arthur Sullivan* (London

1904).

SULLIVAN, John, American military of¬ ficer : b. Berwick, Me., 17 Feb. 1740; d. 1795. He received, in 1772, the commission of major, and in 1775 that of brigadier-general. The next year he was sent to Canada, and on the death of General Thomas, the command of the army devolved on him. In this year he was pro¬ moted to the rank of major-general, and was soon after captured by the British in the battle on Long Island. He commanded a division of the army at the battles of Trenton, Brandy¬ wine and Germantown ; and was the sole com¬ mander of an expedition to the island of New¬ port, which failed through want of co-opera¬ tion from the French fleet. In 1779 he com¬ manded an expedition against the Indians. He was afterward a member of Congress, and for three years president of New Hampshire. In 1789 he was appointed a judge of the District Court and continued in that office till his death.

SULLIVAN, John Lawrence, American pugilist: b. Boston, Mass., 15 Oct. 1858; d. West Abington, Mass., 2 Feb. 1918. This re¬ markable man, who has not inaptly been described as ((the last of the gladiators,** was

the principal exponent of a science that seems to have passed out of vogue. Endowed with herculean strength and physique, together with the necessary concomitants of courage and pugnacity, his picturesque figure and exciting cAareer were typical of the ancient gladiator. At 19 he fought his first battle on the stage of a Boston theatre when he knocked out a pugilist named Scanned, who had challenged any man in the audience. Hereafter he adopted fighting as his profession. His feats of strength earned him the sobriquet of «the Boston Strong Boy,® and in 1878 he made his debut as a professional by knocking out “Cockney® Woods. On 7 Feb. 1882 he met and defeated Paddy Ryan in a bare-knuckle fight at Mississippi City for $5,000 a side and the championship of America. Sullivan’s trainer, Billy Madden, is said to have coined the now well-known phrase “knockout® on this oc¬ casion. His next important fight was in 1888, with “Charlie® Mitchell (q.v.), ending as a draw at the 39th round, and on 8 July 1889 he fought his greatest battle, that with Jake Kilrain, at Richburg, Miss. This was the last championship fight in America under London Prize Ring rules and gave Sullivan the victory in 75 rounds. His contest with Mitchell proved that the only method likely to succeed against him was that .of agility in keeping beyond the range of his powerful right-hand blows, and it was by adopting these tactics that James J. Corbett deprived Sullivan of the championship in 21 rounds at New Orleans on 7 Sept. 1892. This was his last contest, after being cham¬ pion of the world for 12 years. His bohemian style of life had injured his magnificent con¬ stitution. In his later days he became an ardent advocate of temperance and retired to the farm where he died.

SULLIVAN, Sir William Wilfrid, Cana¬ dian statesman: b. New London, Prince Ed¬ ward Island, 1843. He was educated at Saint Dunstan’s College, and was called to the bar in 1867. He was a member of the provincial legislature, elected as a conservative, till 1889, becoming premier and attorney-general (1879— 89), and being raised in the latter year to chief justice. Knighthood was conferred on him in 1914.

SULLIVAN, Ill., city and capital of Moul¬ trie County, on the Wabash, the Chicago and Eastern Illinois and -the Illinois Central rail¬ roads. It contains the Illinois Masonic Home and hospital, and its industrial establishments consist of a planing mill, flour mill, machine shops, grain elevators, etc. Pop. 2,621.

SULLIVAN, Ind., city and capital of Sul¬ livan County, on the Evansville and Terre Haute and the Illinois Central, the Chicago and Eastern Illinois and the Chicago, Terre Haute and Southwestern railroads. It is two miles west of Terre Haute, and has coal mining and other industries, and contains a Carnegie library, Elks' Home, etc. Pop.

(1920) 4,489.

SULLIVAN'S ISLAND, at the north en¬ trance to Charleston Harbor, South Carolina, six miles out from Charleston. It is separated, from the mainland by a tidal channel. On this island is the well-known Fort Moultrie (q.v.). The island is about six miles long. It is a

favorite resort for sea-bathing. Steam ferry¬ boats ply regularly between the city and the island.

SULLY, sul'i, Alfred, American military officer: b. Philadelphia, Pa., 1821; d. Fort Van¬ couver, Wash., 17 April 1879. He was graduated at the United States Military Academy in 1841 and assigned to the Second infantry, with which he took part in the Seminole War and served in the war with Mexico in 1846-47. In 1861-62 he won distinction in the battles of Fair Oaks and Malvern Hill ; was promoted brigadier-gen¬ eral of volunteers in October 1862. In 1863 he was given command of the Department of Dakota and greatly distinguished himself in his campaigns against hostile Indians. At the close of the war he was brevetted major-gen¬ eral of volunteers, and brigadier-general, United States army, for gallantry during the war, and was promoted colonel of the 10th infantry in

1.

SULLY, James, English philosopher: b.

Somerset, 3 March 1842. He was educated in the Independent College at Taunton and in Regent's Park College, London. He afterward studied at the universities of Gottingen and Berlin, and in 1871 began to contribute to news¬ papers and reviews. From 1892 to 1903 he was Grote professor of the philosophy of mind and logic in University College, London, and also held the post of lecturer on education at the College of Preceptors. He published Sensa¬ tion and Intuition) (1874) ; (Pessimism: a His¬ tory and a Criticism y (1877), containing acute criticism of Schopenhauer and Von Hartmann; with especial reference to the theory of education (1884) ; (The Teacher's Handbook of Psychology *(1886), based upon the preceding work; (The Human Mind) (1892) ; Studies of Childhood* (1895); Children's Ways *(1897); (Essay*

on Laughter: Its Forms, its Causes, its Develop¬ ment and its Value) (1902) ; Htalian Travel Sketches (1912).

SULLY, sul'i, Thomas, American artist: b. England, 1783; d. Philadelphia, 5 Nov. 1872. He came to the United States with his parents, who were actors, in 1792 ; studied painting in Charleston, S. C, and Richmond, Va., and in 1806 removed to New York. In 1809 he went to London to complete his studies. Two years later he returned and settled in Philadelphia. His reputation as one of the leading American portrait painters is founded on numerous works, the best known of which are the full-length portraits of Dr. Benjamin Rush, Commodore Decatur, Thomas Jefferson and Lafayette. The Boston Museum possesses his celebrated picture of (Washington Crossing the Delaware.*

SULLY-PRUDHOMME, sii-le pru-dom, Rene Francois Armand, French poet: b. Paris, 16 May 1839; d. Chatenay, 6 Sept. 1907. He studied law, but turned entirely to letters ; pub¬ lished his first verses (Stances et Poemes, *in 1865, and gained praise from Sainte-Beuve, and followed up his success by several volumes, grave in manner, with finished versification and subtle in thought. Pre-eminently a thinker, he attempted a poetic treatment of abstract themes in the didactic (La Justice* (1878) and (Le Bonheur* (1888). He also made a metrical

rendering of Book I of Lucretius' (De Rerum Natural accurate enough, but somewhat ragged (new ed., 1886), and published in prose, (Re¬ flexions sur l'Art des Vers) (1892), and a note¬ worthy article on Pascal in the Revue des Deux Mondes (1895). In 1881 he was chosen to the Academy and in 1882-88 his (CEuvres 'Completes > appeared. Among the titles of several individual volumes are (Les Epreuves) (1866) ; (Les Soli- tudes) (1869) ; (Les Destins) (1872). In 1901 he won the Nobel prize for literature.

SULPHANILIC ACID, Para-Aminoben-

/\TTT

zene Sulphonic Acid, C6H4 gˆp., or,

» was first prepared by Gerhardt

in 1845. It is usually obtained by heating ani¬ line with fuming

sulphuric acid at 180° C., for several hours. Upon pouring the reaction mix¬ ture into cold water a fairly pure product is ob¬ tained, which may be further purified by con¬ verting into the sodium salt and by treat¬ ing the latter with animal charcoal. Sul- phanilic acid has also been prepared by a patented process (Ger. 205150), which consists in heating chlor-benzene-p. sul¬ phonic acid with ammonia under pressure in the presence of cupric chloride. Under this treatment the chlorine atom is readily replaced by the NH2 group. Sulphanilic acid crystallizes from hot water in plates with one molecule of water of crystallization. It has no definite melting point; upon heating it decomposes be¬ tween 280°-300° C. One part of the acid dis¬ solves in 112 parts of water at 15° C. Upon oxidation with manganese dioxide and sulphuric acid it forms quinone. Fused with caustic potash it yields aniline and with bromine water it is readily converted into tribromaniline.

Sulphanilic acid is of special importance as an intermediate in the manufacture of azo¬ dyes. When its sodium salt is treated with sodium nitrite in the presence of sulphuric acid, diazobenzene sulphonic acid is formed, which may be readily coupled with a number of reagents forming important azo-dyes. With phenol the diazo compound forms Tropaeolin Y. With resorcin it yields Resorcin Yellow. With dimethyl aniline it forms Helianthine, the alkaline salt of which is the well-known indi¬ cator Methyl Orange. With alpha-naphthol the diazo compound forms Orange I, one of the seven food colors, and with beta-naphthol it forms Orange II. Sulphanilic acid has also been used for the manufacture of Resorcin Brown, Azofuchsine G, Hessian Brown MM, Benzo- Brown G, Columbia Green, and Conogo Brown G.

V. S. Babasinian, Lehigh University.

SULPHIDE COPPER ORES. The prin¬ cipal sulphide copper ores of the United States are chalcocite or copper glance (Cu2S), con¬ taining 79.8 per cent of metallic copper ; enargite (CuaAsSi), 48.3 per cent; covellite (CuS), 66.4 per cent ; chalcopyrite or copper pyrites (CuFeS2), 34.5 per cent; bornite or peacock ore (CmFeSO, 50 to 70 per cent. Other sul¬ phide copper ores of less commercial importance because in small quantity are : tetrahedrite (4Cu2S.Sb2Sa) , 25 to 40 per cent metallic cop¬ per; tennantite (4Cu2S.As2S3) , 57.5 per cent;

chalcanthite (CuSO + fl- 5H20), 25.4 per cent; chalmersite (CuFe2S2) ; cubanite (CuFe2S4) ; and the rare carrollite (CuCo2St). As all these minerals show evidences of recent formation they are regarded as probably concentrations from pyrite beds. Chalcopyrite and bornite

seem to have been the primary deposits from which the others have been derived. In most localities the ores are of such low grade that water concentration is necessary before smelt¬ ing. Nevertheless the sulphide ores must be regarded as the most important of all ores of copper as they supply much the larger part of the metal sold in the world's markets.

The most important sulphide mining dis¬ tricts are Butte, Mont. ; Bisbee, Ariz. ; Bingham Canyon, Utah; Ely, Nev.; Ducktown, Tenn., and Shasta County, Cal. In the Butte district of Montana, the greatest copper producing terri¬ tory in the world, the ores are mainly secondary sulphides in fissure veins. More than half are chalcocite and considerably less than half enargite, although the proportion of the latter is increasing with the depth. With these are bornite, covellite and cupriferous pyrite. The primary ores of this region were chalcopyrite and pyrite. At deep levels (2,800 feet) are found masses of primary chalcocite, far below the zone of secondary enrichment. In Arizona three-fourths of the copper ores are sulphides. At Bisbee occur large masses of primary ore, but in the other districts the replacement of the original chalcopyrite and pyrite with chalcocite has been practically complete. In the Globe district the primary ores — pyrite and chalco¬ pyrite — occur in commercial quantities, but the largest output is from the secondary de¬ posits of chalcocite on deeper sulphides. In the Jerome district the important ore is primary chalcopyrite. At Bingham, Utah, there are large replacement deposits of pyrite, chalcopy¬ rite, sphalerite and chalcocite, with some bornite and primary enargite. In some places covel¬ lite and tetrahedrite are found with chalcopy¬ rite. At Ely, Nev., there are extensive replace¬ ments of chalcopyrite by chalcocite, and also bodies of chalcopyrite enriched with chalco¬ cite. At Ducktown, Tenn., the primary ores are pyrite, chalcopyrite and bronite. The paying ore bodies are secondary chalcocite, with second¬ ary chalcopyrite at a lower level — with some covellite, bornite and chalcanthite. In the Shasta copper belt of California large bodies of massive sulphides are found along the bor¬ ders and within the areas of eruptive rocks, chiefly pyrite and chalcopyrite, with chalcocite below ; and some bornite and tetrahedrite.

Examples of replacement of pyrite by chal¬ cocite are found in every important district producing sulphides. The pyrite first becomes coated with a black stain ; later the chalcocite penetrates it along cracks and fissures, and finally the whole becomes a mass of sooty black chalcocite.

At some of the sulphide mines all of the ore goes directly to the

roasting furnace. At other mines where the ore is of lower grade it is first concentrated by mechanical means — screening, crushing and separating on jigging tables. The flotation process (q.v.) is particu¬ larly adapted to the concentration of sulphide ores, which are difficult to wet, and hence have a greater tendency to float, a tendency which

is largely increased by treating them with oil. At other mines the ore is crushed to a diameter of one-fourth of an inch and leached with a solution of sulphuric acid, made on the spot by the burning of pyrite.

Treatment of Concentrates. — These are usually roasted in mechanical roasters, the most approved type being the improved McDougal furnace. The chemical action is the change from the sulphide condition to the oxide. The iron sulphide present also becomes the pro¬ toxide and then the sesquioxide. After roast¬ ing to, say, *74 per cent sulphur content, the product is fused in reverberatory furnaces to form matte running usually 40 per cent to 50 per cent copper, and slag running 0.30 per cent to 0.67 per cent copper, which is usually thrown away as valueless. The matte is, as a rule, converted without being allowed to cool be¬ tween reverberatories and converters*.

Treatment of Lump Ore, Etc. — Ores are treated in blast furnaces, using coke as fuel in greater or less amounts, according to the smaller or larger content of pyrite in the ore. The smelting generally practised in the United States is known as the “semi-pyritic® and it takes advantage of the fuel value of the sul¬ phides in the ore, as far as possible.

The fines are briquetted before charging them into the blast furnace, wherever suitable bonding material is obtainable, at low cost ; — for example, slimes from the water concentra¬ tion of the copper ores. In some localities the fines are sintered and in others nodulized to prepare them for blast furnace treatment. The resulting matte and slag are treated in ways similar to those obtaining in reverberatory smelting.

Converting. — The most common type of converter is the ((trough® converter, with rows of tuyeres along the back, entering the charge a few inches above the bottom. The linings are usually made of magnesite brick. The prod¬ ucts of the converter are sulphurous gases which escape through the flues and stacks; slag which is returned to

the blast, or reverberatory fur¬ naces ; and ((blister® or converter copper, which is either cast in pigs or anodes for electrolytic refining and the extraction of gold and silver values. For refining, see Electro-chemical Industries.

The improvements in recent years in the sul¬ phide smelting have consisted in the adoption of mechanical roasters, the arrangement of the furnaces so that the product can be trans¬ ferred from one department to another with minimum loss of heat and with the least pos¬ sible handling, and the enlargement of the smelt¬ ing units ; for example, some reverberatory smelting furnaces now have a hearth measure¬ ment of 25 X 146 feet, and a smelting capacity of over 1,000 tons daily. Blast furnaces may now be built of unlimited length, the largest measuring 56 inches by 87 feet at the tuyeres with a daily capacity of 3,000 tons of charge; converters holding over 100 tons of matte have been built, but the most economical size seems. to be of a capacity of about 80 tons. Other eco¬ nomical practices are the handling of slag, ashes, and other waste products in sluice boxes by water; the handling of materials generally by machinery; and the saving of waste heat from smelting furnaces ; all the modern appli¬ ances for handling materials, water, steam,

electricity and compressed air are called upon to assist in the operation of modern plants. Fuel oil and pulverized coal have been applied to reverberatory furnaces with great success in recent years. Developments looked for in the near future are .the substitution of electric fur¬ naces for the blast furnaces and an extension of the hydro-metallurgical processes.

The industry is prosecuted on a gigantic scale in the United States; the amount of capi¬ tal invested is enormous, the average cost of a sulphide smelting establishment being $1,000 for each ton of ore treated daily. The largest plant constructed to date (1919) is the Anaconda Reduction Works at Anaconda, Mont., having a daily capacity of 18,000 tons of ore and produc¬ ing about 15 per cent of the world's output of copper. A brief description of this smelter will give a general idea of the operation of a modern copper sulphide smelting plant, and the immense size of the plant. The copper ores, delivered on the (<high line® by the Butte, Ana¬ conda and Pacific Railway, are first enriched by mechanical concentration. In this process the useless part of the ore is separated from the valuable portion by making use of differences in specific gravity, the useless part being sluiced to the dump and the 3 per cent of copper in the ore becoming 8 per cent in the concentrated product.

The fine portion of this product is roasted, to remove 80 per cent of its sulphur, and is then smelted in reverberatory furnaces. The coarser portion goes to the blast furnaces, in which the burning off of 60 per cent of the sulphur and the melting of the charge are done in one operation. The reverberatories and blast furnaces produce matte (the copper content of which ranges from 40 to 50 per cent), and make slag as a waste product which is sluiced to the dump. The matte is treated in converters, which deliver an impure copper. The last stage is reached in the refining furnaces, which turn out the commer¬ cially pure metal ; and this is shipped to the company's electrolytic plants at Great Falls, Mont., and Perth Amboy, N. J., where the silver and the small amount of gold are separated. The metals are then marketed.

The zinc ore is increased from an assay of 12 per cent zinc to 32 per cent by mechanical concentration. The metallurgical treatment of this concentrate is conducted at the company's plant in Great Falls, except as noted under the subject of roasting.

Bibliography. — Hofman, H. O., (Metal- lurgy of Copper *(New York 1914) ; Peters, E. D., principles of Copper Smelting) (New York 1917) ; Read, T. T., editor, (Recent Cop¬ per Smelting* (San Francisco 1914) ; Wiard, E. S., (The Theory and Practice of Ore Dress- ing) (New York 1915). The details of locali¬ ties and individual copper mines are to be found in Weed's (The Mines Handbook published annually in New York.

E. P. Mathewson.

SULPHIDES, compounds of sulphur with some other element, constitute a large and im¬ portant group of minerals. Pyrite and Mar- casite, of the same composition (FeS2) but dif¬ fering in crystal form are probably the most abundant and widely disseminated sulphides. They are of no value as ores of iron but are largely used in the manufacture of sulphuric

acid. The sulphides are the most important group of ore minerals and include the lead ore Galena (PbS), the zinc ore Sphalerite (ZnS), the silver ore Argentite (Ag2S), the copper ores Chalcocite (Cu2S), and Chalcopyrite (CuFeS2), the quicksilver ore Cinnabar (HgS), the magnetic iron sulphide Pyrrhotite (FeS) which is often nickel bearing, and many other ores of lesser importance. See Pyrite; Galena.

SULPHINDIGOTIC ACID, or INDI- GOTIN DISULPHONIC ACID, an amor¬ phous blue, solid substance, having the chemical formula Ci6HsN202(S03H)2, and prepared by heating indigo with fuming sulphuric acid. It is readily soluble in water and in alcohol. It has acid properties, and its salts are sparingly sol¬ uble in water. The sodium salt is known com¬ mercially as indigo extract, indigo-carmine, or soluble indigo. As the color is not fast it is now seldom used as a dyestuff.

SULPHINIC ACIDS, organic acids con¬ taining the group SO (OH), with the sulphur united to a carbon atom. Methane sulphinic acid, for example, which is* prepared by the action of sulphur dioxide upon zinc-methyl, Zn(CH3)2, has the formula CH3.SO(OH). The sulphinic acids, in general, may be prepared by the action of zinc dust upon ethereal or al¬ coholic solutions of the chlorides of the sul- phonic acids; and the sulphinic acids of the fatty series may be prepared (as in the fore¬ going example) by the action of the dioxide or trioxide of sulphur upon zinc alkyls. They oxidize into sulphonic acids (q.v.).

SULPHITES. See Sulphurous Acid.

SULPHOCYANIC ACID, or THIOCY- ANIC ACID, a substance having the chemical formula HS.CN for the normal form. The acid form, HN.CS, has not been isolated but its ethereal salts have been recognized, and possessing powerful acid properties. The hy¬ drogen that it contains can be replaced by bases, with the formation of a series of salts known as sulphocyanides or thiocyanates, most of which are soluble in water. Potassium sulphocyanide, KSCN, may be prepared by the direct combina¬ tion of sulphur with cyanide of potassium, KCN. The ammonium salt (NH-OSCN, is obtained (together with ammonium sulphide) when car¬ bon disulphide is heated with an alcoholic solution of ammonia. The ammonium salt is found abundantly in gashouse liquor. The sulphocyanides of the heavy metals are usually prepared by fusing them with the sulphides of the alkaline metals, preferably potassium, by double decomposition. The free acid may be prepared by heating small quantities of mer¬ cury sulphocyanide in a stream of dry sulphuretted hydrogen gas; but its prepa¬ ration in this manner is more or less dangerous, as it is often attended by explosions of some violence. A dilute solution may be obtained by distilling an excess of a sulphocyanide with di¬ lute sulphuric acid. The pure acid is a color¬ less liquid at ordinary temperatures, with a strong characteristic smell. By the action of a freezing mixture of snow and salt, it may be obtained in the form of crystals. When heated it decomposes into hydrocyanic acid (HCN) and persulphocyanic acid (H2C2N2S3). Dilute aqueous solutions of

sulphocyanic acid are stable at ordinary temperatures, but the anhy¬

drous acid gradually passes into the polymeric substance known as disulphocyanic acid, H2S2C2N2. Disulphocyanic acid, when pure and freshly prepared, is a waxy yellow substance, nearly insoluble in water. It hardens with age, and upon the application of heat it is converted into ordinary sulphocyanic acid. Trisulphocy- anic acid is not known except through its me- thylic salt (Me3S3C3H3), obtained (with methyl triocarbamide) by heating methyl sulphocy¬ anide to 356° F.

SULPHONAL, Diethylsulphone Dimethyl- CH3 / S02C2H5

methane , was discovered by

CH3 / \ S02C2H5

Baumann in 1886, and introduced into medicine as an active hypnotic in 1888. It is prepared by the condensation of a mixture of ethylmercaptan and acetone in the presence of hydrochloric acid or zinc chloride. Under these conditions dimethyl diethyl mercaptole, CH3 /SC2H5

yC is obtained, which yields sulpho-

CH3X \SC2H5

nal upon oxidation with potassium permanganate. On account of the difficulty experienced in handling ethyl mercaptan, the use of sodium thiosulphon- ate C2H6S.S020Na, in the presence of hydro¬ chloric acid, has been suggested. This com¬ pound will also yield a mercaptole with acetone, and from mercaptole sulphonal may be obtained by oxidation.

Sulphonal crystallizes in colorless prisms, It melts at 125° — 126° C'., and boils without de¬ composition at 300° C. It dissolves in 15 parts of boiling water, and in 500 parts of water at 15° C., but is freely soluble in boiling chloro¬ form, alcohol, acetone, benzene and toluene. In doses of 1 5—30 grains sulphonal will usually induce sleep, although the time required for its action shows wide individual variations. It has been classed among the safe and depend¬ able hypnotics, as it induces quiet sleep with no marked after-effects, but its continued use has in some instances developed chronic poisoning with fatal consequences.

The hypnotic action of sulphonal has been traced to the ethyl groups

present in its molecular structure. It has been definitely shown that of the compounds closely related to sulphonal those containing no ethyl groups are not physiologically active. Thus dimeffiyl-

CH3 /so2ch3

sulphone dimethyl methane, ,

CH/ \S02CH3 has no hypnotic action. On the other hand 5 CH3 / S02C2H6

trional, , C , is more active than

C2H/ \ S02C2H5

C2Hsx /S02CH5 sulphonal, and tetronal, ˆ,C

C2UU \S02C2H5 is even more active than trional.

V. S. Babasinian, Lehigh University.

SULPHONIC ACIDS, a series of acids, both organic and inorganic, distinguished by containing the monovalent radical, S02.OH, also written, SOaH. The inorganic mem¬ bers of the group may be regarded as derived from SOa.OH.H by replacing the final H by a monovalent atom or radical, such as chlorine; or, more generally, from

n molecules of S02.0H.H, by replacing the n final H atoms by a single n-valent atom or radical. Chlorosulphonic acid, C1(S02.0H), is an example of such an acid. It may be pre¬ pared by the direct combination of sulphur trioxide, SO3, with hydrochloric acid, and also in various other ways. The number of hy¬ drogen atoms replaced depends on the strength of the acid used and on the temperature at which the action is carried on. In organic sulphonic acids, the SO2.OH group is joined, by means of its own sulphur atom, to a carbon atom in some organic base. There arise from such combination two classes of sulphonic acids, the aliphatic and the aromatic. Only the latter series is of importance in the arts. The sul¬ phonic acids of aromatic compounds play an important part in the coal-tar color industry, and they may be readily prepared by digesting aromatic compounds with either sulphur trioxide, sulphuric acid, or chlorosulphonic acid. The

aromatic sulphonic acids are usually pre¬ pared by boiling the sulphonation product with an excess of calcium carbonate, or, preferably, barium carbonate. The barium sulphate pre¬ cipitated is separated out by filtering. The fil¬ trate contains the barium (or calcium) salt of the sulphonic acid. To this filtrate sulphuric acid is added drop by drop until no more pre¬ cipitate forms. The solution is again filtered, and the filtrate evaporated to dryness, the acid appearing either as a syrupy liquid or in crystals, according to its constitution. If cal¬ cium carbonate has been used traces of it will remain in the acid, and must be removed by adding alcohol, filtering, and evaporating the alcohol with gentle heat. Where the result con¬ tains two sulphonic acids they are usually separated by conversion into sulphonic chlor¬ ides by the addition of phosphorus pentachloride (or oxychloride) and crystallized — when they assume their distinctive forms..

The aromatic sulphonic acids are strongly acid in reaction, and are generally highly soluble in water, the crystalline forms as a rule being hygroscopic. When heated, they de¬ compose gradually without melting. They are manufactured in large quantity to be converted into phenols — readily accomplished by fusion with caustic alkalies. Consult Benedikt, (Chemistry of the Coal Tar Colors.*

SULPHOVINIC ACID, or ETHYL' SULPHURIC ACID, in chemistry, mono¬ ethyl sulphate, C2H5.HSO4, or acid sulphate of ethyl. It consists of sulphuric acid, for one of whose replaceable hydrogen atoms the organic radical ® ethyl,® C2H5, has been substituted. Sul- phovinic acid may be prepared by heating a mixture of equal parts of strong sulphuric acid and absolute alcohol to about 212° F., allowing it to stand for four hours, and then diluting the solution with water, and saturating it with barium carbonate, or as an alternative, lead car¬ bonate. The excess of sulphuric acid is thereby precipitated as barium sulphate, and the filtrate (which contains the barium salt of sul- phovinic acid) is then evaporated to crystalliza¬ tion. The crystals of barium-ethyl-sulphate thus obtained are redissolved in water, and the barium is removed by the addition of an exactly equivalent quantity of sulphuric acid, the filtrate from this operation being subse¬ quently evaporated in a vacuum over a power¬ ful drying agent, such as calcium chloride. Pure sulphovinic acid is a colorless, syrupy liquid, which mixes readily with water and with alcohol, but which is insoluble in ether. It is a strongly acid substance, containing one atom of replaceable hydrogen ; and it forms, with vari¬ ous bases, a series of crystallizable salts which are all readily soluble in water. Its aqueous solution decomposes slowly in the cold; and when heated, it decomposes with the liberation of alcohol and free sulphuric acid. Its

alcoholic solution when heated yields ether and sul¬ phuric acid. It combines with the salts of various organic acids, with the formation of the corresponding ethyl ethers, or esters. Di¬ ethyl sulphate, (C2H.O2SO4, is a compound of this character, which is most conveniently pre¬ pared by slowly distilling absolute alcohol with concentrated sulphuric acid in a vacuum. The distillate separates into two layers, the lower of which consists of pure di-ethyl sulphate. It is an oily liquid with an odor resem¬ bling that of peppermint. It is insoluble in water, in which, however, it decomposes slowly. If di-ethyl sulphate is heated in water it decomposes rapidly into alcohol, sulphuric acid, and sulphovinic acid.

dip a Qimvoi.‘':.ru8 ,

.

h * . 1 7 ! '■ ' >• '<91 > • :ii .*)

• * >

■ » ■■ ■ t r ' . rr /■ j!

-vy ext i' .v ' tr.H iv ?ii ' *<|1 ra Jiiio" .• ' • ■ " •

..

-h#»v ihi'-7 u !• R : *\k .vst k <i

■

•

.foiloaiˆ \'I J6t t:)8p •; . O'j'ifj 1

... •! 1 • L¥ ■ Jl • -i» -in ::

.

iicntit:* R o: Jt! i, vui,}ifj« i .vo i fo norn /J

•; . >;J irt.1 i fU) : ‘U9

.Biil fj ni stttefroqmi to gi 4»ir>*

i i r;t- -), viir. • f" ■ mi.

• ".-o.c ’«• -■ m

■ »kj t. >m orf lit in: <? nf) vcf rft ; t {> kf)M>j} ai i b., Jljt fttsgfi r n<imlQ2

39 • b-*;t rm.'i rl 9ir m<' mu'/

18lri /K

bi 'OfrbnJi *q ;rVHf v] ton. lilt nli y i > ni ti si3 Jv'iri uv&'O !0>

■fj i 9i ; .1. ;«••»<{ ii o'

vsˆX .gm fitfa rootitrw ttaftibfiig 9«joomoo

Doti vndb od o /mns;;> > <y *t«iI n fi/frmc iim; a m'* u t v hirfsilqiiiobo... /!.* -cm

<!|J ,f

■ '

■■ •

Vol. 26, SULPHUR TO TRAMWAYS

Americana

r

■

••

d

1

I

1

I

I

1

j

!

1

1

2

THE

ENCYCLOPEDIA

AMERICANA

jr

i&ˆr

Uriveesal

JQoWLEDGEj

In Thirty Volumes

»

j

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

I

£

I

I

1

E3

Copyright, 1920

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY ALBANY NEW YORK

JAN 18 1922

©&LA654317

j

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXVI

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Leland Stanford Jr. University

TOTTEL'S MISCELLANY

ALEXIS, JOSEPH, A.B., A.M.

Assistant Professor of Germanic Languages and Literatures, University of Nebraska

SYNNOVE SOLBAKKEN

BABASINIAN, V. S., Ph.D.

Professor of Chemistry, Lehigh University

TANNINS TARTARIC ACID TOLUENE TOLUIDINE

BENEDICT, H. Y., B.S., M.A., Ph.D.

Dean, University of Texas

TEXAS

BOGART, ERNEST L., Ph.D.

Professor of Economics, University of Illinois

TARIFF

BOUCKE, EWALD A., Ph.D.

German Department, University of Michigan

SWEDISH LANGUAGE SWEDISH LITERATURE

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

TALE OF TWO CITIES, A TESS OF THE D'URBERVILLES

BROOKE, TUCKER, M.A., Litt.B.

Professor of English, Yale University

TAMING OF THE SHREW, THE TIMON OF ATHENS TITUS ANDRONICUS

BRUBACHER, A. R., Ph.D.

President of State College for Teachers, Albany, N. Y.

SUMMER SESSIONS

BUCKLEY, EDMUND, A.M., Ph.D.

Editor of “ University Lessons in Art ”

TAO TE KING TAOISM

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Uni¬ versity of Wisconsin

TALES OF THE ARGONAUTS, THE TALES OF A WAYSIDE INN

CANFIELD, ARTHUR G., A.M.

Professor of Romance Languages, University of Michigan

TELEMAQUE

CARMAN, E. A.*

Brigadier-General, United States Army

THOMPSON’S STATION, BATTLE OF TODD’S TAVERN, ENGAGEMENTS AT

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

THREE MUSKETEERS, THE

CHOATE, JOSEPH H., LL.B., LL.D., D.C.L.*

New York City

SUPREME COURT OF THE UNITED STATES

COCHRANE, CHARLES H.

Author of “ Modern Industrial Progress ”

TELEPATHY

CORNYN, JOHN HUBERT, LL.B.

Birmingham Southern College

SYRIAC LANGUAGE AND LITERA¬ TURE TABOO

COUMBE, CLEMENT W.

Technical Art Expert

SYMBOLISM

SYMMETRY

TAPESTRIES

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

TOM JONES

CUTLER, FRANCES W., M.A.

Instructor in English, Vassar College

TAM O'SHANTER

DAKE, CHARLES LAURENCE, A.M.

Associate Professor of Geology and Mineralogy, School of Mines and Metallurgy, University of Missouri

TERTIARY PERIOD

DARTON, NELSON H.

Geologist, United States Geological Survey

SURVEYS, UNITED STATES GOVERN¬ MENTAL

- Deceased.

Contributors to Volume XXVI —Continued

DAVENPORT, EUGENE, B.S., M.S., M.Agr.

Dean of the College of Agriculture, University of Illinois

THREMMATOLOGY

DAY, JAMES R., S.T.D., LL.D., D.C.L., L.H.D.

Chancellor of Syracuse University

SYRACUSE UNIVERSITY

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

TORRENTS OF SPRING

DRISCOLL, JAMES F., D.D.

Rector, Saint Gabriel's Church, New Rochelle, N. Y.

TEMPORAL POWERS

DUNN, JOSEPH, Ph.D.

Professor of Celtic Languages and Literatures, The Catholic University of America

TAIN BO ClIALNGE, THE CUALNGE CATTLE-RAID

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Col¬ gate University

THESSALONIANS TIMOTHY AND TITUS

EVAARD, JOHN M., B.S., M.S.

Professor of Animal Husbandry, Iowa State College

SWINE

FARROW, EDWARD S., C.E.

■ = 3

Consulting Military and Civil Engineer

SUPPLY RAILWAYS

TAPTTP9

TORPEDO BOATS TORPEDOES TRACTION, ELECTRIC

FFOULKE, CHARLES M.

Lecturer and Writer on Antique Art Tapestries

TAPESTRIES, MANUFACTURE OF

FINCK, HENRY T., A.B.

Musical Critic “ New York Evening Post ”

TCHAIKOVSKY, PETER ILICH

FINEGAN, THOMAS E., M.A., Pd.D., LL.D.

Superintendent of Public instruction. State of Pennsylvania ; formerly Deputy Commissioner of Education, State of New York

TEACHERS, PROFESSIONAL TRAIN¬ ING OF

FLEMING, WALTER L., M.S., A.M., Ph.D.

Professor of History, Vanderbilt University

TANEY, ROGER BROOKE TOOMBS, ROBERT

FORMAN, SAMUEL E., Ph.D.

Author “ First Lessons in Civics ”

TOWN AND TOWN MEETINGS

GARNER, WIGHTMAN W., Ph.D.

Physiologist in Charge of Tobacco Investigation, Bureau of Plant Industry, United States Depart¬ ment of Agriculture

TOBACCO

GHERARDI, BANCROFT

Chief Engineer, American Telephone and Telegraph Company

RHODES, FREDERICK L.

Outside Plant Development Engineer, American Telephone and Telegraph Company

TELEPHONE

HARRIS, ROLLIN A., Ph.D.

Author of “ Manual of Tides ”

TIDES

HART, J. M. EDGAR

Instructor of the American Academy of Dramatic Arts

THEATRE, STAGE MECHANICS OF

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Literature, College of the City of New York

THOMA, LUDWIG TIECK, JOHANN LUDWIG

HORNADAY, WILLIAM T., Sc.D.

Director, New York Zoological Park

TAXIDERMY

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University

SUNKEN BELL, THE TILL, EULENSPIEGEL

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

TALES OF HOFFMAN

JELLIFFE, SMITH ELY, M.D. Ph.D.

Editor, “ Journal of Nervous and Mental Disease ”

SUNSTROKE

SYNDROMES

THERAPEUTICS

TOXICOLOGY

JERNEGAN, MARCUS W., Ph.D.

Associate Professor of History, University of Chicago

SUMNER, CHARLES

KAINS, M. G., B.S., B.S.A., M.S.A.

Horticultural Consultant

TEA

TOMATO

Contributors to Volume XXVI — Continued

KEMMER, EDWARD P.

Managing Secretary of the Tacoma Commercial Club and Chamber of Commerce

TACOMA, WASHINGTON

KLEIN, HENRI F.

Editorial Staff of The Americana

SWITZERLAND

SYRIA

THUGS

McCREA, NELSON G., Ph. D.

Anthon Professor of Latin Language and Literature, Columbia University

TACITUS, PUBLIUS CORNELIUS

McGRANE, R.C., Ph.D.

Assistant Professor of History, University of Cin¬ cinnati

TAYLOR, ZACHARY

MACLAY, JAMES, C.E., Ph.D.

Professor of Mathematics, Columbia University

SURFACES, THEORY OF

MAVER, WILLIAM, Jr.

Author of “ American Telegraphy and Encyclopedia of the Telegraph ”

TELEGRAPHY TELEGRAPHY, WIRELESS TELEPHONY, WIRELESS

MIMS, EDWIN, A.M., Ph.D.

Head of English Department, Vanderbilt University

TEMPEST, THE

MOORE, J. PERCY, Ph.D.

University of Pennsylvania

TICKS AND MITES

MORE, PAUL ELMER, LL.D., Litt.D.

Author of “ Platonism,” etc.

SYMPOSIUM, THE

NEWCOMB, SIMON, Ph.D., LL.B., D.Sc.* DOOLITTLE, ERIC, C.E.

Professor of Astronomy and Director Flower Astronomical Observatory, University of Pennsyl¬ vania

SUN

NORTON, FREDERICK E.

Secretary, Syracuse Chamber of Commerce

SYRACUSE, NEW YORK

PACKER, O. H.

Mining Engineer, San Francisco, Cal.

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

SURVEYING

PARK, ROSWELL

Author of “Text Book of Surgery ”

VANDER VEER, ALBERT, M.D.

Professor of Anatomy 1869-74; Professor of Surgery 1876-1915, Albany Medical College

SURGERY IN AMERICA

POLLOCK, HORATIO M., Ph.D.

Statistician, New York State Hospital Commission

TEACHERS’ EMPLOYMENT AGEN¬ CIES

PORTER, GEORGE C.

Tennessee Historical Society, Nashville, Tenn.

TENNESSEE

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers' Insurance Company, Hartford, Conn.

SULPHUR

SULPHURIC ACID

SURFACE TENSION

TEMPERING

THER MOCHEMISTRY

THERMODYNAMICS

THERMOELECTRICITY

THERMOMETER

THERMOMETRY

TORSION BALANCE

ROBINSON, GRACE R.

New York City

THUNDERBOLT, THE

SAYLES, JOHN MANVILLE

Professor of Education, State College for Teachers, Albany, N. Y.

TEACHING METHODS AND SYSTEMS

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ America, Asia and the Pacific,” etc.

SUMERIAN LANGUAGES TEUTONIC LANGUAGES

SCOTT, ARTHUR P.

Assistant Professor of History, The University of Chicago

TAFT, WILLIAM HOWARD

SEDGWICK, HENRY D.

Author ” Essays on Great Writers,” etc.

THEOCRITUS, BION, AND MOSCHUS, IDYLS OF

SELIGMAN, EDWIN R. A., LL.B., Ph.D., LL.D.

McVickar Professor of Political Economy and Finance, Columbia University

TAXATION

SHELDON, HENRY C., S.T.B., D.D.

Professor of Systematic Theology, Boston University

THEOLOGY

- Deceased.

Contributors to Volume XXVI— Concluded

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois

TALE OF A TUB, A

SINGLETON, ESTHER

Author of “ The Art of the Belgian Galleries ”

TITIAN

SKINNER, RAYMOND T.

Secretary, The Toledo Commerce Club

TOLEDO, OHIO

STURGIS, RUSSELL*

Author of “ The Artist’s Way of Working in the Various Handicrafts and Arts of Design "

TEXTILES

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia University

TASK, THE

THACKERAY, WILLIAM MAKEPEACE

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

TINTERN ABBEY TO A SKYLARK

VAN DYKE, HENRY, D.D., LL.D., D.C.L.

Professor of English Literature, Princeton Uni¬ versity, and former

United States Minister to the Netherlands and Luxembourg

TENNYSON, ALFRED

VAN DOREN, CARL, Ph.D.

Associate in English, Columbia University

THANATOPSIS

VANDER VEER, ALBERT, M.D.

Professor of Anatomy 1869-74; Professor of Surgery 1876-1915, Albany Medical College.

SURGERY

VAUGHAN, VICTOR C., M.D., Ph.D.

Dean, Department of Medicine and Surgery, University of Michigan.

TOXINS AND ANTITOXINS

WALSH, JAMES J., M.D., Ph.D., LL.D., Litt.D., Sc.D.

Author of “ The Thirteenth Greatest of Centuries ”

TENTH CENTURY THIRD CENTURY THIRTEENTH CENTURY

WARD, HENRY B., A.M., Ph.D.

Professor of Zoology, University of Illinois

TAPEWORM

WARNER, WORCESTER REED, F.R.A.S.

Of the Warner and Swasey Company, Cleveland, Ohio

TELESCOPE

WARRINGTON, A. P.

Fellow of the Theosophical Society

THEOSOPHY

WATSON, WILLIAM R., B.S.

Chief of Educational Extension Division, New York State Education Department, Albany, N. Y.

SUPPLEMENTAL EDUCATION

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern French Literature ”

TARTARIN

THIBAULT, JACQUES ANATOLE

FRANCE

WISE, MORRIS S.

Editor of the “ Trade-Mark Record," New York

TRADE-MARKS

WOOLMAN, MARY SCHENCK, B.S.

Specialist in Vocational Education, formerly Pro¬ fessor of Domestic Art, Teachers College, Colum¬ bia University, and Director of the Manhattan Trade School for Girls

TRADE SCHOOLS

WRIGHT, HERBERT F., Ph.D.

Sometime of the Department of Latin, Catholic University of America

TARTUFFE

TERTULLIAN

WRONG, GEORGE M., A.M.

Professor of History, University of Toronto

TORONTO, CANADA

- Deceased.

KEY TO PRONUNCIATION

••

a

far, father

n

Span, h, as in canon (can'ybn), pin on (pen'yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

A

a

all, fall

o or o

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e, as in de ;

oi

oil, soil ; also Ger. eu, as in beutel

eu, as in neuf ; and oeu, as in boeuf, coeur; Ger. b (or oe), as in okonomie.

o or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

u

between u and e, as in Fr. sur,

Ger. Muller

1 or 1

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

A

1

y

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n Fr. nasal m or n, as in embon- '(prime), " (secondary) accents, to indicate

point, Jean, temps syllabic stress

JA. O I T A I J TA\J . O H r O'j Y . ! >1

•

v) J. cil /. . j2

VniV/\ :^<i) ttv)u.\

81-Tfyma ,9^11/1

ntxjo ,oit

v

HUi I ft : t :f; I j:)

■ I , f w^ig jju

4 . >,Ul1

JJ IO u

if

u

a m lit i .sntis

V

llx

yJj ■ . ; n • ,i • 1 .)'

'ti ri /)h

■

y no 3

r. \ • l : ■

-KW$«Vi iti »<: ,u TO ’ ‘ lc2 M .1 .

SULPHUR, a non-metallic element known from very early times, and proved to be an element by Lavoisier, in 1772. It was not definitely admitted to the list of rec¬ ognized elements, however, until after the re¬ searches of Gay-Lussac and Thenard, in 1809. In the free state, it occurs native in many parts of the earth, usually in volcanic regions or in connection with gypsum and other allied rocks. Until within recent years the commercial sup¬ ply has been obtained largely from Sicily, though a considerable quantity has been ob¬ tained from the Chilean Andes, and from cer¬ tain parts of Mexico, China, Japan, India and the Philippine Islands. The large deposits of southern Utah are also mined, but the American supply is now obtained almost wholly from the extensive deposits in and near Calcasieu Parish, La. Four general methods have been employed for separating sulphur from the stony and earthy impurities with which it is usually associated in nature. (1) The “ore” containing it may be heated to a temperature high enough to melt the sulphur and permit it to run out at the bot¬ tom; or (2) the “ore” may be heated still more strongly, so as to cause the sulphur to volatilize and pass away in the form of vapor; or (3) the “ore” may be lixiviated with a fluid (such as carbon disulphide) in which the sulphur is soluble, the sulphur being afterward recovered by evaporating the solvent. (4) The Frasch process, specially developed in connection with the Louisiana deposits, is described below. The method by melting is almost exclusively used in extracting sulphur from the inert mate¬ rial with which it is associated in nature, the volatilization and solution methods being re¬ served for the subsequent purification of the product as first obtained by melting. When the sulphur is extracted from an “ore,” the heat required for melting it and isolating it is obtained by various means. In some regions it is obtained by burning a part of the sulphur itself. This method is wasteful in sulphur, but it can be put into practice very simply, and hence its application does not call for skilled labor. In Nevada and California, and, to a more limited extent, in Italy and Sicily, the “ore” is heated by steam under a pressure of 70 pounds or more ; the yield by this method being considerably greater, though the expense of treatment is also much greater. * .

In mining the Louisiana deposits a special method is used, which merits separate descrip¬ tion. These vast deposits occur in the form of

subterranean beds, having an average thickness of 125 feet, and covered by about 90 feet of soft rock (mainly gray limestone) and 375

feet of clay, sand and gravel. The deposits were first discovered in 1865, and between 1868 and 1895 many unsuccessful attempts were made to work them commercially by ordinary meth¬ ods of mining. Herman Frasch, an American petroleum expert, then undertook a careful study of the subject, and worked out a method of mining the sulphur that has proved emi¬ nently successful. The entire practicability <?f the Frasch process was first established in 1903, in which year 35,000 tons of sulphur were brought to the surface by means of it. The essential ideas of the Frasch process are (1) the use of highly heated water to melt the sul¬ phur as it lies in its bed, and (2) the use of compressed air to force the molten sulphur to the surface of the ground. Several concen¬ trically-arranged steel pipes are driven into the ground, and highly superheated water is forced down into the sulphur bed through the outer ones. The sulphur is. thereby melted, and as it is considerably heavier than water it collects in a subterranean pool, into which the pipe system dips. Air, compressed to. a pressure of about 250 pounds to the square inch, is forced down the central pipe (which is one inch in diameter), and as this air returns to the sur¬ face of the ground through the annular space between the inner pipe and the next one to it, the melted sulphur is carried upward at the same time. When the operation is properly conducted the melted sulphur and hot water can be kept separate, so that when the sulphur reaches the surface it is only necessary to run it into bins to cool and solidify. The product that is obtained in this way is remarkably free from impurities. In fact it is not uncommonly 99.9 (and sometimes even 99.98) per cent pure, and hence it does not require further purifi¬ cation for technical use. For a good tech¬ nical description of the Frasch process, consult Thorpe's dictionary of Applied Chemistry,* article "Sulphur."

Iron pyrites (native yellow sulphide of iron) is utilized quite extensively as a source of sulphur in certain lines of manufacture, but the sulphur of the pyrites is rarely won in the elementary form. Almost invariably the sulphur dioxide that is obtained by roasting the pyrites is used in the preparation of sul¬ phuric acid or other compounds, without being reduced to sulphur.

2

SULPHUR

Native crystals of sulphur are common. They belong to the orthorhombic system, and are usually oyramidal in habit, often with trun¬ cated ends. They are transparent to translu¬ cent, and are usually yellow in color, with a resinous lustre, a hardness of from 1.5

to 2.5, and a specific gravity of about 2.07.

Sulphur occurs abundantly, also, in combina¬ tion with other elements, mostly as sulphides and sulphates. Many of the compounds of sulphur are valuable as ores of other elements than sulphur. Galena (sulphide of lead) and cinnabar (sulphide of mercury), for example, are valuable ores of lead and mercury, respec¬ tively.

It is difficult to give an adequate physical description of sulphur since the element is cap¬ able of existing in many allotropic forms. Six of these appear to have been prepared in a state of satisfactory purity, and others, although they have long been known, are not yet universally admitted to be true allotropic modifications of pure sulphur. A brief description of the six best-known forms follows :

1. Ordinary Rhombic Sulphur.— This is the form in which native crystalline sulphur occurs. Crystals of this variety may be pre¬ pared by dissolving ordinary sulphur in carbon disulphide, and evaporating the solvent. This variety is also obtained by melting sulphur and allowing it to cool with extreme slowness. Ordinary rhombic sulphur melts at about 240° F., and boils (under a pressure of 760 milli¬ meters of mercury at Paris) at 832.2° F.f ac¬ cording to the very careful experiments made by Callendar and Griffiths with the normal con¬ stant-pressure air thermometer. In the solid- form rhombic sulphur has a specific gravity of from 2.03 to 2.09, and in the liquid form (just above the melting point) its specific gravity is about 1.81. It is practically a non-conductor of electricity at ordinary temperatures, although it conducts to some extent near its boiling point. When rubbed, sulphur becomes nega¬ tively electrified, and globes of sulphur were used in the place of glass in some of the ear¬ lier forms of static electrical machines. Rhom¬ bic sulphur has a coefficient of linear expansion of about 0.0000356 (Fahrenheit scale), and, when at a temperature just above the melting point, it has a specific heat of approximately 0.235. It is easily soluble in carbon disulphide, and, to a lesser extent, in benzene, chloroform, warm concentrated acetic acid and liquid sul¬ phur dioxide.

2. Monoclinic Sulphur. — Sulphur may be

obtained in the form of monoclinic crystals by melting a considerable quantity of ordinary sulphur, allowing it to cool until a crust has formed upon the surface and then piercing the crust and pouring out the still molten portion. The walls of the crucible will then be found to

be covered with the monoclinic crystals. It may also be prepared in mass by melting ordi¬ nary sulphur, cooling it almost to the point of solidification, and then throwing in a single crystal of monoclinic sulphur; the whole mass then solidifying in the monoclinic form. (If a crystal of rhombic sulphur is added under these circumstances, the crystalline structure of the resulting solid mass is rhombic). Mono-climc sulphur has a specific gravity of about 1.97, melts at about 245° F., and is freely solu¬

ble in carbon disulphide, from which it crystal¬ lizes in the rhombic form. It also dissolves in alcohol, chloroform and benzene, the crystals obtained from these solutions being partly mono¬ clinic and partly rhombic. Monoclinic crystals may be obtained by evaporating the solution ob¬ tained by dissolving sulphur in an alcoholic solution of ammonium sulphide. Monoclinic sulphur passes slowly into the ordinary rhom¬ bic form, the transformation being facilitated by rubbing the monoclinic crystals with a glass rod. When ° heated, under atmospheric pres¬ sure, to 203° F., monoclinic sulphur passes at once into the ordinary rhombic form, the trans¬ formation being accompanied by a small con¬ traction in volume, and the evolution of a cer¬ tain amount of heat.

1. Soft Soluble Sulphur. — This variety of sulphur may be prepared in various ways, — for example, by decomposing sodium hyposul¬ phite (or thiosulphate) by means of a limited quantity of a mineral acid. It is a soft, amor¬ phous substance, nearly white in color, which gradually hardens, and eventually passes (like all the other kinds) into ordinary rhombic sul¬ phur. This form of sulphur is not (as its name indicates) entirely soluble in carbon disulphide; it consists, apparently, of a mixture of two kinds of sulphur, one of which is soluble, while the other is insoluble. When heated, it evolves sensible quantities of sulphuretted hydrogen, showing that it contains hydrogen in some form or other; but it has not been determined w-hether such hydrogen is essential to the existence of the sulphur in this form, or whether it is to be regarded merely as a non-essential constituent, which could be eliminated (if we knew how to eliminate it) without affecting the continued existence of the sulphur in the «soft soluble® form.

2. Plastic Insoluble Sulphur.— When ordi¬ nary sulphur is melted, h first passes into the form of a clear, yellow liquid ; but as the tem¬ perature is raised, the liquid begins to thicken and darken at about 300°. F., and at about 360° -T. it is black and quite viscid. If the tempera- ˆTre iS father increased, the liquid gradu¬

ally loses its viscidity, until, at about 640° F it becomes quite fluid again, though it remains dark even at its boiling point (832.2° F) If sulphur which has been heated almost to its boiling point is suddenly cooled by being poured in a thin stream into water, it becomes con¬ verted into a plastic mass, which may be readilv kneaded with the fingers. Plastic sulphur is commonly dark brown; but Mitscherlich states that the dark color is due to impurities and that perfectly pure plastic sulphur is citron- yellow in color. Plastic sulphur soon becomes hard and yellow, the transformation taking place quickly (and with evolution of heat) at temperatures in the vicinity of 212° F. It is not soluble, as a whole, in carbon disulphide though that reagent dissolves a portion of it ’

5 Amorphous Yellow Insoluble Sulphur.

Plastic sulphur, when treated with warm car¬ bon disulphide until all the soluble part is re¬ moved leaves a yellow, amorphous powder as a residuum. This form appears to be stable at ordinary temperatures, but at about 212° F. it slowly passes into the ordinary rhombic crystal¬ line form.

1. Colloidal Sulphur. — When sulphuretted

hydrogen gas is passed into a cold solution of sulphur dioxide, sulphur is liberated in still an¬ other allotropic form. If the current of sul¬ phuretted hydrogen is continued until all the dioxide has been decomposed and the solution (after filtration) is concentrated by evaporation in a vacuum, a yellow solid is finally obtained, which is soluble in water, but which gradually passes into the form of ordinary rhombic sul¬ phur. “Colloidal® sulphur receives its name from the fact that in its aqueous solution it is not diffusible.

Sulphur occurs in commerce in several forms. When cast into cylindrical or slightly conical sticks it is known as “roll 'sulphur® or “brimstone.® It is very brittle under ordinary circumstances, and when reduced to powder by crushing it is sold simply as “sulphur.® When sulphur vapor is suddenly cooled, the sulphur condenses in the form of a very finely divided powder, which is commercially known as “flowers of sulphur,® or “sublimed sulphur.® “Precipitated sulphur® is the fine powder that is thrown down upon the addition of

hydrochloric acid to a solution prepared by heating sublimed sulphur with lime and water.

Chemically, sulphur has the symbol S, and an atomic weight of 32.06 if O ~ 16, or 31.81 if H = l. It combines directly with many of the other elements, producing binary compounds which are known as “sulphides,® and which are analogous to the oxides of the corresponding elements. With hydrogen it forms hydrogen sulphide, or “sulphuretted hydrogen,® which has the formula H2S, and is gaseous under ordinary conditions of temperature and pressure. (See Hydrogen). Many of the metallic sulphides occur in nature as minerals, as has been already mentioned. Many of them may also be prepared by passing a current of sulphuretted hydrogen gas through acid or alkaline solutions of various metallic salts, or by adding a soluble sulphate to such solutions. See Chemical Analysis.

Several oxides of sulphur are known, of which two are of great industrial importance. These are the dioxide, SO2, and the trioxide,

SO3. .

Sulphur dioxide, S02, is prepared, in the

laboratory, by treating sodium acid sulphite (HNaSCh) with concentrated sulphuric acid (H2SO4) ; sulphur dioxide and sodium acid sul¬ phate being formed, as indicated by the equation HNaSOs 1 H2SO4 “ SO2 T HNaSCh Hr H2O. It is also prepared by heating strong sulphuric acid with metallic copper, the reaction in this case being 2H2SO4 + Cu — SO2 + CuSCh H~

2H2°. ' . , ,

Sulphur dioxide is a colorless gas with the familiar suffocating odor of burning sulphur. It is irrespirable in the pure state, or even when largely diluted with air. Mere traces of it, when inhaled for some time, produce inflammation of the mucous surfaces of the respiratory tract and of the stomach, followed by nausea. The

gas is about twice as heavy as air under the same conditions of temperature and pressure. Its specific heat at constant pressure (as com¬ pared with an equal weight of water) is about 0.154; and the ratio of its specific heat at con¬ stant pressure to its specific heat at constant volume is about 1.256. When exposed to a temperature of 18° F. under ordinary atmos¬ pheric pressure, sulphur dioxide condenses to a colorless liquid having a specific gravity of

about 1.43. The critical temperature of the gas is probably about 313° F., and the critical pressure about 79 atmospheres. When cooled to about 105° F. below zero, liquid sulphur dioxide freezes to a transparent solid.. Liquid sulphur dioxide evaporates rapidly when ex¬ posed to the air, the evaporation being attended with the absorption of a very considerable quantity of heat; a temperature as low as 140° F. below zero being attainable in this manner. On account of this property, liquid sulphur dioxide has been employed to a considerable extent in machinery for the manufacture of artificial ice.; though at the present time anhy¬ drous liquid ammonia is usually preferred for this purpose. Gaseous sulphur dioxide dissolves freely in water, especially under pressure; the solution being known as sulphurous acid (q.v.).

Sulphur dioxide is prepared in large quan¬ tities, in the arts, by the simple process of burn¬ ing sulphur with a proper supply of air. When obtained in this manner, the gas contains large quantities of atmospheric nitrogen, but for many industrial purposes this is of no importance. The gas is used for bleaching straw, silk and wool, and (in enormous quantities) in the manufacture of sulphuric acid. (q.v.). It is -like¬ wise employed extensiveˆ in the “sulphite - process® for the manufacture of paper from wood.

Sulphur dioxide and sulphuretted hydrogen readily combine with each other to form water and free sulphur, according to the equation S02 + 2H2S = 3S + 2H20; and it has been suggested that the deposits of sulphur that occur in volcanic districts have been formed, at least in part, by this reaction. . In bleaching by means of chlorine compounds, it is found, to be impossible to wash the last traces of chlorine from the bleached fabric, and hence it is cus¬ tomary to treat the fabric, after the bleaching is complete, with some substance (called an “antichlor®) with which the free chlorine will combine, to produce compounds that can be more easily washed out. Sulphur dioxide gas is very useful for this purpose, since it com¬ bines with chlorine (in the presence of mois¬ ture) to form sulphuric and hydrochloric acids, according to the equation SO2 + 2H20 + 2C1 = H2SO4 + 2HC1. The dioxide is also used as an antiseptic and disinfectant; but it is in¬ ferior to chlorine in this respect, and although it possesses germicidal powers to some extent, it is seldom used in sufficient quantities to be really effective in this application.

Sulphur trioxide, SO3, may be prepared by distilling fuming sulphuric acid, or by passing a mixture of one volume of oxygen with two of sulphur dioxide over red-hot platinized asbestos ; the latter method being now used to a consider¬ able extent in the manufacture of

sulphuric acid (q.v.) by the so-called “contact process.® The trioxide appears to be capable of existing in two different physical states. The white fumes that are first obtained in the course of its preparation condense into long prismatic crys¬ tals, which melt at 62° F. to a colorless, mobile liquid, boiling at 112.8° F. Upon standing, these prismatic crystals are said to change into needle-like forms, which, when heated to about 122° F., pass directly into the gaseous state. Weber has shown that this second form is not observed unless the trioxide contains some measurable quantity of sulphuric acid, due to

the action of the trioxide itself upon moisture. Sulphur trioxide has a powerful affinity for water, in which it dissolves with a hissing noise and the formation of sulphuric acid, as indi¬ cated by,the equation $H20 + SO3 = H2SO4$. The reaction is accompanied by the liberation of a great deal of heat.

Sulphur combines directly with carbon, at a red-heat, with the formation of a substance known as <(carbon disulphide® (or (<carbon bi¬ sulphide®), which has the chemical formula CS2. The vapor that is thus produced may be con¬ densed to a very volatile, mobile liquid, pos¬ sessing a high dispersive action upon light. Carbon disulphide freezes at about — 166° F., boils (undfcr a pressure of one atmosphere) at 115° F., has a specific gravity of 1.29 and a specific heat of 0.247, and is used as a solvent for resins, sulphur, phosphorus, gutta percha and many other substances that do not dissolve in water. It is almost insoluble in water, but mixes readily with alcohol, ether and many kinds of oil. It is exceedingly inflammable, and its vapor forms explosive mixtures with air. The vapor of carbon disulphide takes fire, when heated in contact with air to 300° F., and this circumstance, taken in connection with the volatility of the substance and the explosive¬ ness of its vapor when mixed with air, renders the use of the disulphide exceedingly dangerous in the presence of any sort of a flame, or even in the presence of bodies heated as hot as 300° F. As ordinarily met with in commerce, car¬ bon disulphide possesses an exceedingly offen¬ sive odor; but this is due to impurities, and when these are removed, the pure disulphide has an ethereal odor, which is not objectionable. The vapor of carbon disulphide is poisonous, even when greatly diluted with air.

The known compounds that contain sulphur in combination with two or more other ele¬ ments are almost innumerable, as are also the uses

to which sulphur is put in the arts. Among the simpler compounds containing sulphur with two or more other elements, the various salts of sulphurous and sulphuric acids are exceedingly important. For data concerning sulphur black and the sulphur compounds that are in general use in the coal tar color industry, consult Cain and Thorpe, <The Synthetic Dyestuffs and Intermediate Products *; also Wahl and Atack, (The Manufacture of Organic Dyestuffs.*

Allan D. Risteen.

SULPHUR, Medical Uses of. Sulphur is

prepared in various ways for use, both internally and externally, in medicine. It is used in the forms of washed, precipitated or milk of sul¬ phur, and sublimed sulphur, or flowers of sul¬ phur, corresponding to the manner of its prep¬ aration from crude sulphur — by washing, precipitation, or sublimation. The precipitated sulphur is regarded as the most efficacious, perhaps because of its finer division, which is chemical instead of mechanical. It is prepared by boiling equal parts of sulphur and freshly slacked lime for an hour, and then adding dilute hydrochloric acid until the alkalinity almost disappears. The sulphur precipitates as a white powder and is washed, and dried at a low temperature. Precipitated sulphur is much employed as a mild laxative, taken in medicinal doses and by its action facilitates evacuation in cases where intestinal or rectal disorders pain¬

fully interfere. Sulphur is also a valuable remedy in certain blood-diseases, chronic skin- diseases, chronic bronchitis, chronic rheu¬ matism, etc., both internal administration — especially in the form of mineral waters con¬ taining sulphur — and sulphur baths being often efficacious. The administration of sulphur in obstinate chronic cases of many diseases often works such a change in the patient's condition as to give potency to other remedies given without effect. As a parasiticide, and especially in skin affections, ring-worm, itch, etc., sulphur ointment is a specific, or at least an active curative agent.

SULPHUR DIOXIDE. See Liquefied

and Compressed Gases.

SULPHUR DYESTUFFS. See Coal- tar Colors.

SULPHUR SPRINGS, Tex., city, county- seat of Hopkins County, on the Missouri, Kan¬ sas and Texas, and the Saint Louis South¬ western railroads, about 240 miles northeast of Austin, the capital, and 75

miles northeast of Dallas. It is in an agricultural and stock- raising region and has an extensive domestic export trade in cotton products, wheat, corn, fruit (peaches and plums), honey, poultry and livestock. It has two national banks with a combined capital of $200,000. The educational insitutions are the Central College (Methodist Episcopal, South), opened in 1876, and public schools. Pop. (1920) 5,558.

SULPHURETTED HYDROGEN (H2S), a gaseous compound of hydrogen and sulphur, found abundantly in nature in gases issuing from crevices in volcanic regions, and oc¬ casionally in natural gas. It is one of the com¬ mon products of decomposition of vegetable substances, especially those of the leguminous family. . It occurs in illuminating gas, from which it is scrupulously removed at consider¬ able expense. It is prepared on a large scale by heating together equal parts of vaseline or paraffin and sulphur.

Sulphuretted hydrogen is a colorless, in¬ flammable gas, burning with a bluish flame, and having an extremely offensive odor, similar to that of rotten eggs. It is very poisonous; when inhaled in small quantity producing nausea and headache, and in large quantity, asphyxiation. One part of the gas in 200 parts of air is fatal to horses, and one part of gas to 800 of air is fatal to dogs. It is soluble in water in the proportion of 4.4 volumes of gas to 1 volume of water at 32° F. At higher temperatures less of the gas is held in solution. Alcohol at 32 dissolves 17.9 times its own volume.

The aqueous solution of sulphuretted hy¬ drogen is known as hydrosulphuric acid. It smells of the gas, and decomposes on standing depositing sulphur, and. the hydrogen oxidizing into water. Its solution in glycerine, how¬ ever, keeps good for a long time.

The gas may be liquefied at ordinary tem¬ peratures by submitting it to a pressure of 17 atmospheres — that is, about 250 pounds to the square inch. Liquid sulphuretted hydrogen is a colorless, mobile liquid which

ˆrC'7nˆS s.°ˆaˆes.at — H7° F., and boils at “79.. In its liquid form it is nearly inert chemically.

Sulphuretted hydrogen is used in large

quantities in the manufacture of sulphuric acid to remove the arsenic

which is found in larger or smaller percentage in all acid made from pyrites. It is also used to precipitate copper from solutions containing salts of copper, and for precipitating gold and silver from sweep¬ ings and other waste material. In the chemist's laboratory it is one of the most valuable reagents.

SULPHURIC ACID, or OIL OF VIT¬ RIOL, a common and exceedingly important oxy-acid of sulphur, having the chemical formula H2SO4. It was first prepared by Geber, in the 8th century, by distilling alum ; and in the 1 5th century it was manufactured by burning sulphur with saltpetre, though the identity of the product so obtained with that described by Geber was not established until near the end of the 16th century. Considerable quantities of sulphuric acid were formerly manufactured by the distillation of ferrous sulphate, the prac¬ tice of this method dating from the early part of the 18th century. At the present time prac¬ tically all of the sulphuric acid that is used is prepared from sulphur dioxide gas, either by the <(chamber process,® or by the more recently perfected ((contact process,® both of which are described in this article.

When pure and free from water, sulphuric acid is a colorless liquid with an oily appear¬ ance, and a specific gravity of 1.89. It may be readily frozen, the solidified acid melting again at 50.9° F. It exhibits the phenomenon of surfusion to a marked extent, and the liquid acid can be cooled, much below the melting point here given, without inducing solidifica¬ tion; but if a crystal of the solid acid, or a small amount of sulphur trioxide, be added to the supercooled fluid, crystallization begins at once, and the temperature rises until it becomes 50.9° F., after which no further solidification occurs. The presence of a trace of water in the acid lowers the freezing point nearly to 32° F. If five parts (by weight) of sulphuric acid be mixed with nearly one part of water, and the solution is cooled by a freezing mixture, a definite hydrate of sulphuric acid, having the composition H2SO4 + H2O, crystallizes out at 45° F. Another solid hydrate, having the com¬ position H2SO4 + 4H20, may also be prepared by cooling, to a much lower temperature, a mixture of sulphuric acid and water, containing 57.6 per cent of water. Several other hydrates are also believed to exist, and special study has been expended upon them, on account of their importance in the illustration of the "hydrate® theory of solutions. (Consult Mendeleeff, 'Principles of Chemistry,* Vol. II). Sulphuric acid has no really definite boiling point. It begins to boil at about 550° F., the distillate containing sulphuric acid, water and sulphur trioxide. (See Sulphur). The temperature of the liquid may be raised to 640° F., how¬ ever, before a state corresponding in definite¬ ness to the boiling point of water is

attained, the vapor that passes off then consisting en¬ tirely of water vapor and free sulphur trioxide. At higher temperatures the decomposition is even more complete. Thus if a stream of the acid be allowed to flow over redhot bricks, it is broken up into sulphur dioxide (S02), free oxygen and water-vapor. If the gases re¬ sulting from this decomposition are passed

through cool water, and the steam that they contain is condensed and the sulphur dioxide removed by solution, a supply of pure oxygen gas is obtained. Pure anhydrous sulphuric acid has a specific heat, at ordinary temperatures, of about 0.34, and a coefficient of expansion (Fahrenheit scale) of about 0.000310. The con¬ centrated acid is a powerfully corrosive poison, destroying organic tissues rapidfy, and even charring paper and wood. It is also poisonous (though far less violently so) when adminis¬ tered in any considerable quantity in a highly dilute form. Concentrated sulphuric acid has a powerful affinity for water, its combination with water being attended by the evolution of a large amount of heat. The strong acid is used as a drying agent, for removing moisture from gases. For this purpose it is sometimes suffi¬ cient to allow the gas to stand for a time in a receiver containing a dish of the concentrated acid; but a more effective mode of procedure consists in passing the gas through tubes that are partially filled with fragments of pumice that have been wetted with the acid.

Chemically, sulphuric acid is dibasic, either or both of its hydrogen atoms being replace¬ able by metals or other bases, the compounds - that are thus formed being termed “sulphates.® With the metals of the alkalis (which are monovalent), sulphuric acid therefore forms two kinds of sulphates, which may be sufficiently illustrated by the potassium salts. If one of the hydrogen atoms of the acid is replaced by potassium, the resulting salt, HKSCh, is called “hydrogen potassium sulphate,® or “acid po¬ tassium sulphate® ; while if both are replaced, the resulting salt has the formula K2SO4, and is known as “normal potassium sulphate.® Many of the sulphates of the metals occur native in large quantities, and many of them are of great value in the arts. Those that are of especial importance are described, in this en¬ cyclopedia, under the metals (or other bases) with which the acid is combined. The sulphate of barium is perhaps the most insoluble salt known. It is formed whenever a soluble barium salt (such as the chloride) is added to a solution of a soluble sulphate ; and its forma¬ tion constitutes a valuable test for sulphuric acid and the sulphates. See Chemical Analysis.

When sulphur trioxide is dissolved in anhy¬ drous sulphuric acid in

the proportion of one molecule of the trioxide to one of the acid, a definite compound having the formula H2S2O7 (or H2SO4.SO3) is obtained. When pure, this su'bstance is known as “pyrosulphuric acid.®

It is a dibasic acid, forming salts which are termed “pyrosulphates,® but which are of com¬ paratively little practical importance. Pyro¬ sulphuric acid forms large crystals, which melt at 95° F., and it is easily decomposed by heat into ordinary sulphuric acid and free sulphur trioxide. Fuming sulphuric acid (now com¬ monly known in the arts as “oleum® but for- merely called “Nordhausen oil of vitriol®) con¬ sists of a mixture of pyrosulphuric acid and ordinary sulphuric acid and may be regarded as a solution of sulphur trioxide in sulphuric acid, the trioxide not being present in sufficient quantity to convert the ordinary acid entirely into pyrosulphuric acid. It fumes strongly in the air, gives off sulphur trioxide when heated

and is prepared by the <(contact process,® described in this article.

The uses of sulphuric acid in chemistry and in the arts are past enumeration; for this acid is one of the most important chemical sub¬ stances known, and it is employed is so many industrial processes that it has been said that the wealth and prosperity of a nation can be estimated from its consumption of sulphuric acid. About half of the total quantity manu¬ factured in the United States is consumed in the preparation of fertilizers. The two general methods now in use for manufacturing the acid are described in this article.

The sulphur used for the manufacture of sulphuric acid is obtained (1) from the gases generated by burning iron pyrites' (FeS2), (2) from the sulphur deposits of Louisiana, Sicily and elsewhere, and (3) to a very limited ex¬ tent from the waste gases given off by sul¬ phide smelters. At the present time pyrites is the most important source, but it is probable that smelter gases will be utilized to a greatly increased extent in the future, and they may eventually compete with pyrites. The sulphur dioxide that is now wasted by discharging the fumes from smelters into the air would far more than supply the United States with sul¬ phuric acid. Moreover, the fumes are exceed¬ ingly objectionable, and they are destructive to vegetation.

The fundamental principles in the manu¬ facture of sulphuric acid are

(1) to oxidize sul¬ phur or a suitable sulphide, so as to obtain sul¬ phur dioxide, S02; (2) to further oxidize this to the trioxide, SCh; and (3) to effect the combination of the trioxide with water, in ac¬ cordance with the equation S0a + H20 — H2S04. In attempting to carry out the second of these processes, however, we are confronted by the fact that sulphur dioxide does not readily take up oxygen, so as to become completely con¬ verted into the trioxide. To effect this oxida¬ tion we are in fact compelled to resort to one or the other of two expedients: (1) To mix a certain amount of an oxide of nitrogen with the sulphur dioxide and air — the oxide of nitro¬ gen then acting as -a sort of ˆcarrier®, taking up oxygen from the air and passing it on to the sulphur dioxide; or (2) to subject a mixture of air and sulphur dioxide to the action of a suitable catalyzer. The first of these expe¬ dients is used in the ((chamber process® and the second in the (<contact process.®

The first step in the manufacture of sul¬ phuric acid is to provide a suitable supply of sulphur dioxide gas. This is usually obtained by burning sulphur or iron pyrites in a special furnace and considerable skill and judgment are required in this part of the operation, to obtain gases of proper composition. It is also important to minimize the quantity of dust that the gases carry over into the later parts of the process. Settling chambers, baffle plates, centrif¬ ugal separators, parallel-plate separators, and filtration through piles of marbles or other loosely aggregated solid lumps are among the devices used for the removal of the dust.

Chamber Process. — In manufacturing sul¬ phuric acid by the so-called ((chamber process® the hot gases from the burners (consisting of air, sulphur dioxide and moisture) pass first over ((niter pots,® which contain nitrate of soda

and sulphuric acid, and which give off the nitric oxide gas that is to act as an oxygen carrier. Then, after passing through the dust-removing apparatus, the gases are passed up¬ ward through a tower (technically known as a <(Glover tower®) that is loosely filled with fragments of coke, pumice, acid-proof stone¬ ware or other inert material to distribute the flow, and here they are met by a downward stream of aqueous sulphuric acid obtained from a later stage of the process and containing oxides of nitrogen in solution. The precise reactions that occur cannot be discussed here, partly because they are complicated, and partly because they are not fully understood. The general effect, however, is to oxidize the S02 to S03, and the downward-flowing stream of weak acid dissolves the S03 and thereby becomes stronger. In certain plants of recent design the oxidation of

the sulphur dioxide and the absorption of the resulting trioxide are carried out in a series of Glover towers, without the use of chambers of any sort; but it is usual, after the gases have passed through one or two Glover towers, to cause them to enter large lead-lined chambers (from which the process takes its name), where the oxidation of the dioxide and the consequent strengthening of the acid are continued. Liquid sulphuric acid settles in the bottom of these chambers, and is drawn off from Time to time. Steam or water is sprayed into certain of the chambers, as needed, to provide the H20 that is required for the formation of the HuSCh. The gases coming from the last chamber are passed up through a <(Gay-Lussac tower,® which resembles the Glover tower in general construction. The liquid that is sent down through this tower, however, is concentrated sulphuric acid, and its purpose is to absorb the nitric oxide gas that is present, thereby preventing its loss and dimin¬ ishing the quantity of nitre that must be used in the early part of the process. Upon leaving this tower the gases (which then consist mainly of nitrogen and oxygen) enter a stack and pass off into the atmosphere. The acid that is drawn off from the bottom of the final Gay- Lussac tower contains oxides of nitrogen in solution, and is introduced (diluted, as may be necessary, with weaker acid) into the tops of the Glover towers. As the acid passes down through a Glover tower, however, the heat due to the reactions that occur, added to that which the entering gases already possess, drives off the nitrous oxides, and these keep returning upward through the tower with the sulphur oxides and air, while acid nearly free from nitrous oxides comes away from the bottom of the tower.

Sulphuric acid, as made by the chamber process (and especially when made from pyri¬ tes) is likely to be contaminated with lead, arsenic, nitrous oxides and many other sub¬ stances. Certain of these may be removed in considerable measure by treatment with sul¬ phuretted hydrogen. If an acid of high purity is required, however, it is better to make it by the contact process, presently to be described. When treated with sulphuretted hydrogen for the removal of impurities, the acid should not have a greater specific gravity than 1.4, cor¬ responding to about 50 per cent of actual H2SC>4, and must be diluted to this strength if

it is already stronger. After the removal of the arsenic the purified acid is concentrated by evaporation if a strong product is required. The evaporation may be carried out in leaden pans, but a better

product is obtained by effect¬ ing the concentration in platinum stills. Owing to the high cost of platinum, however, it is com¬ mon to perform the evaporation in a series of evaporating dishes constructed of fused silica. These are arranged like a flight of steps, the lip gf each one projecting out over the next dish below. A slow stream of acid is kept running down through the cascades of dishes, while heat is applied to each dish from below. When an apparatus of this kind is properly arranged and operated it gives excellent re¬ sults. Hoods should be arranged over the dishes, however, to take up the vapors that are given off and dispose of them in some proper way.

The Contact Process. — In the contact proc¬ ess for the manufacture of sulphuric acid, the sulphur dioxide is caused to combine with the oxygen of the air by bringing the mixed gases into contact with finely divided platinum, or with platinized asbestos. The catalytic ac¬ tion of platinum (that is, its power of inducing combination in this way, without being itself consumed or otherwise permanently affected) was discovered by Sir Humphrey Davy, in 1818; and in 1824 Doebereiner showed that finely diyided platinum can effect the ignition of 2l jet of hydrogen, when this gas impinges upon it in contact with air. Peregrine Phillips, of Bris¬ tol, England, first produced sulphur trioxide by utilizing the catalytic effect of finely divided platinum upon a mixture of oxygen and sul¬ phur dioxide, taking out a patent for this proc¬ ess in 1831 ; and Schneider, in 1848, made a working model of an apparatus for manufac¬ turing sulphuric acid by this method. Since that time many attempts have been made to make the contact process practicable for the manufacture of sulphuric acid, and many other catalytic agents have been tried besides platinum. It was not until about 1898, however, that the various practical difficulties involved in the process were satisfactorily overcome, largely through the la¬ bors of Herr Knietsch of the Badische Anilin und Soda-Fabrik, a German company for the manufacture of chemical substances of nearly every kind. It was found that the prime con¬ dition of success in the application of the con¬ tact method is that the gases that are treated shall be absolutely free from dust, arsenic, mercury and certain other substances. The gases from the pyrites-roaster are cooled very slowly and are then purified by filtration and washing. When passed to the tubes con¬ taining the platinized asbestos that is used as the catalytic agent, 100 volumes of the roaster- gas contain 7 volumes of sulphur dioxide, 10 volumes of oxygen and 83> volumes of nitrogen (from the air). The catalytic platinum is main¬ tained at a temperature of about 750° F., since it is found that at this temperature the produc¬ tion of sulphur trioxide is about 98 per cent of the theoretical production. The nitrogen that is present has no influence

upon the reac¬ tion, when the apparatus is working properly. The sulphur trioxide that is produced by this method needs only to be dissolved in previously prepared sulphuric acid containing more or less

water, in order to yield an acid that is quite pure. It might naturally be supposed that water would be the best absorbent for the tri¬ oxide ; but it is found that an acid that contains from 97 to 99 per cent of H2SCh is a better absorbent; and in the practical conduct of the process the trioxide is absorbed by an acid of this strength ; the stronger acid that its solution yields being continuously drawn off and con¬ tinuously replaced by fresh supplies of the 97 to 99 per cent acid, except when fuming acid of a very high degree of concentration is wanted. The minute details of the contact process are trade secrets and are carefully guarded.

The standard work on sulphuric acid manu¬ facture is Lunge's (Sulphuric Acid and Al¬ kali.* Very good general accounts will be found, however, in Rogers' (Manual of Indus¬ trial Chemistry) and Thorp's (Outlines of In¬ dustrial Chemistry. *

Allan D. Risteen.

SULPHURIC ETHER. See Ether.

SULPHUROUS ACID, an acid having (probably) the formula H2SO3, and prepared by dissolving sulphur dioxide gas (see Sulphur) in water to saturation; the acid being formed - by the union of one molecule of the dioxide with one molcule of water, according to the equation SO2 + H20 = H2SO3. Sulphurous acid has never been isolated, and is known only in its aqueous solution, in combination with bases in the form of the salts known as <(sulphites,® and as a solid hydrate. At 70° F. water dissolves about 35 times its own volume of sulphur dioxide; the solubility being greater at lower temperatures, and less at higher ones. When an aqueous solution of sulphurous acid is cooled below 41° F., a crystalline hy¬ drate of the acid separates out, the composition of which is not definitely known. Sulphurous acid has the taste and smell of sulphur dioxide gas, and is strongly acid. It readily gives off sulphur dioxide gas, and upon standing in con¬ tact with the air it gradually absorbs oxygen and becomes converted into sulphuric acid. Its composition is also modified by the action of light, probably by the formation of a more complex oxy-acid of sulphur. It acts as a dibasic acid, combining with the oxides, hy¬ drates and carbonates of many of the metals to form salts (that is, sulphites) which are readily decomposed by the addition of stronger acids, with the liberation of

sulphur dioxide. It is used in the bleaching of silk and wool but not so much as formerly, having been largely displaced by hydrogen peroxide. When the hydrogen atoms of the acid are both re¬ placed by a metallic base, the resulting salt is called a <(normal sulphite® ; and when only half of the hydrogen of the acid is so replaced, the salt is called an ((acid sulphite,® or a (<bisul- phite.® Both of the sulphites of sodium are extensively used in photography; the normal sulphite having the formula Na2S037H20, and the acid sulphite the formula HNaSCh. (See Photography). Industrially, the bisulphites of calcium and of magnesium are of exceeding importance, since the aqueous solutions of these substances possess the power of dissolving the gummy matters by which the fibres of certain kinds of wood are cemented together. Upon this property, the ((sulphite process® for the

manufacture of wood pulp is based. (See Paper). Calcium sulphite is also used in the brewing industry.

SULPICIANS, sul-pish'i-anz. See Orders, Religious.

SULPICIUS SEVERUS, sul-pish'i-us se- ve'rus, Roman ecclesiastical writer: b. Aqui- tania, 363 a.d. ; d. Marseilles, between 410 and 429. He was from a family of high rank and in the practice of the law at Toulouse attained a great reputation for learning and eloquence and led a gay though charitable life. The death of his wife led him to more serious pursuits. Having entered a monastery, he spent some years in preparing an abridgment of the scrip¬ tural narrative, which from the purity of its style was long a favorite textbook in the schools of the Middle Ages, but is liable to the charge of serious tampering with the facts, arising in part probably from the desire to rebuke in this guise some contemporary rulers. He con¬ tinued this history, describing the destruction of Jerusalem and bringing the narrative down to his own time, under the title of (The Chron¬ icle of Sulpicius Severusˆ in which he varies materially from Josephus. His other works are (Life of Saint Martin, Bishop of Tours> ; (Three Dialogues) and a collection of letters. From the elegance of his Latinity he was called, not undeservedly, <(the Christian Sallust.® His works have been often printed.

SULTAN, in Arabic, signifies monarch, ruler. The title is borne by various Moham¬ medan rulers, while the Turkish emperor as¬ sumes the title of Sultan-es-selatin, (Sultan of sultans. } The daughters of the

sultan have also the title of sultan. The title of sultana is given out of Turkey to the chief concubines of the sultan, but no such title is in use for them in Turkey. If the mother of the sultan is living she is styled sultan Valide.

SULU, soo-loo', or JOLO, hd-lo', Philip¬ pines. (1) An archipelago, consisting of over 400 islands, forming the southern central por¬ tion of the Philippine Archipelago, lying be¬ tween the parallels 4° 30' and 121° 52' N. lat. and the meridians 119° 25' and 121° 52' E. long.; area 1,029 square miles. The archipelago is surrounded by the Sulu and Mindanao seas on the north and west and the Celebes Sea on the south and east. The islands form a long chain extending from northeast to southwest and are divided into five principal groups: (1) Balan- guingui; (2) Pangutarang; (3) Sulu; (4) Tapul; (5) Tawi Tawi. The larger islands are generally high and of volcanic formation; the smaller islands are low and rest on coral; mountain chains traverse the islands of Sulu and Tawi Tawi. The larger islands are fer¬ tile; rice, coffee, chocolate, corn, hemp, saffron, indigo, sesame and cotton are cultivated, but not as a rule for export. The raising of horses, cattle and goats is an important indus¬ try; there is some metal working in the manu¬ facture of chisels, knives, etc., and weaving for home consumption. The chief industry from the commercial standpoint is pearl and pearl shell fishing, large quantities of pearl shell especially being exported; other exports are shark's fins, beche de mer and native cordage. The trade is largely in the hands of the Chinese. The forests contain many of the most valuable woods of the East. The people of

the archipelago are divided into four groups, according to their origin and customs: (a) The Guimbajanos, the aborigines living in the mountains; (b) the Malay and Visayan slaves; (c) the Samales ; (d) the Moros proper, the dominating race. Mohammedanism is the prevailing religion ; polygamy and slavery are recognized institutions. Piracy was formerly a regular occupation of the people and their depredations were carried as far as Singapore. (See Moros). Spain never occupied but a. few towns on the coast and the native government remained largely independent of Spanish do¬ minion. When the islands were transferred to the United States, after the Spanish-Ameri- can War, negotiations were immediately begun for establishing satisfactory relations between the United States government and the sultan of Sulu and his datos (or chiefs). In August 1899 a treaty was signed in accordance with which the sovereignty of the United States over the whole archipelago was recognized, but the government of the sultan and datos continued under this supreme jurisdiction, the rights and religion of the Moros to be respected, with the following important

stipulations: the United States shall occupy and control such parts of the archipelago as public interest demands ; any person can purchase land with the sultan's con¬ sent; piracy shall be suppressed; American courts shall have jurisdiction except between Moros ; the American government shall protect the island against foreign aggression. Pop. (estimated) 22,680. (2) A group of islands in

the central part of the Sulu Archipelago, lying between the Balanguingui group on the north and the Tapul group on the south; area 380 square miles. All of the larger islands of this group are volcanic, each of them being formed of a central peak sloping to a narrow stretch of level coast land; the islets are generally rocks. All the staples of the archipelago are cultivated ; a small amount of hemp and indigo is exported; but cattle raising and fishing oc¬ cupy a larger number of the inhabitants. The trade between islands is by native craft; the port of export is the town of Sulu. Pop. 14,500. (3) An island, the central and largest one of the Sulu group; area 333 square miles. It is traversed from northeast to southwest by three nearly parallel mountain chains, between which lie fertile valleys; there are several important peaks, ˆ of which the highest has an elevation of 2,894 feet. There are numerous small streams ; which are nearly or completely dry during the summer season. The climate is particularly good, the temperature being even and unusually cool for the latitude. The soil is fertile and is well cultivated ; rice, however, is imported and the chief articles of export, as in the rest of the Sulu Archipelago, are 'the products of the fisheries. The mountains are heavily wooded and valuable cabinet woods are also among the exports. Under the Ameri¬ can jurisdiction, a school has been established on the island. (4) A town, capital of the Sulu Archipelago, situated on the northwest coast of Sulu Island, 540 miles south of Manila. It was the ancient residence of the Sulu sultans, but scarcely a trace of the ancient Moro town remains ; the present town was built in 1878 by the Spaniards. It is surrounded by a wall, within which the town is regularly laid out, with three principal streets, broad and well

shaded. The houses are mostly well built and there is a large modern market house. It is the chief town and chief port of the Sulu Archipelago and carries on a large trade with Singapore and Manila, as well as a native inter¬ island trade. In the channel between the

road¬ stead and Marongas is a pearl oyster bed, which employs a large number of fishing boats and the town is the centre of this industry.

SULZBERGER, sfilz'ber-jer, Mayer, Ger- man-American jurist: b. Heidelsheim, Ger¬ many, 22 June 1843. During the Revolution of 1848 his father came to America with his wife and family, settling in Philadelphia in 1849. He received his early education at the public schools where he graduated in 1859 from the Central High School, being at the same time an apt pupil at home in Hebrew language and literature. On 16 Sept. 1865 he was admitted to the bar, where his career was brilliant and his commanding abilities received their recog¬ nition on his appointment as judge of the Court of Common Pleas (1895-1915), and presiding judge (1902-15). Judge Sulsberger edited The Occident for a year after its founder's death, was tendered the position of United States Minister to Turkey during President Harrison's administration but declined the honor, is prominently identified with Jewish charities and instructions, and is a trustee of the Baron de Hirsch Fund. He is the author of (Am ha-Aretz) (the ancient Hebrew Parlia¬ ment) (1909) ; (The Polity of the Ancient He- brews) (1912) ; (The Ancient Hebrew Law of Homicide® (1915). _

SUMAC, any shrub or tree of the genus Rhus. Some species are poisonous to the touch. (See Plants, Poisonous). One of the most common innocent eastern species of America, and the largest, is Rhus hirta, the staghorn sumac, so called because its young, short branches are covered with down, in color and texture not unlike a deer's antlers <(in the velvet.® The trees are not more than 30 feet high, but are apt to grow in clumps and have a tropical appearance, with their long pinnate leaves turning to vivid yellow and crimson in autumn. Their autumnal beauty is further en¬ hanced by the torch-like panicles of fruits, small drupes matted together by the crimson plush of the hairs that cover them in to pyra¬ midal bunches terminating the branches. These fruit-masses remain throughout the winter, and are a favorite food .of chickadees, in spite of the fur and the acidulous taste. The sour flavor was taken advantage of by the Indians and colonists who made a cooling drink from the plant. The crimson hairs also yielded a red dye, when immersed in boiling water. The wood is yellow and handsomely veined, but is very brittle; it is, however, occasionally made into canes. The fragrant, or sweet-scented sumac (Rhus crenata), is a low shurb with aromatic leaves and large panicles of greenish, honey-scented flowers which bloom in spring and are a famous food for bees. R. glabra is the upland or smooth sumac, which is smooth and even glaucous; its leaves were added to the tobacco of the aborigines ; and an efficient gargle is made from the refrigerant and

as¬ tringent drupes. The dwarf black or mountain

sumac (R. copallina) , similar in size to the above species, and like them having panicles of bloom succeeded by scarlet masses of drupes, is more bushy in growth, forming low thickets in sandy or dry, almost sterile soil, and is peculiar in that the main stem of its compound leaves bears coriaceous wings between the leaflets. The latter are shining above, and pubescent beneath, and, like those of R. glabra, when dried are material for tanning. They are, however, said to be inferior to those of the Rhus coriaria, native to and cultivated in the Mediterranean regions, which are especially valuable f.or tanning fine leathers, as the light- tinted moroccos. They are collected, dried, and exported in great quantities in the shape of a fine dust. The Venetian sumac, or smoke- tree, is also used for the same purpose. (See Smoke-tree). The sumacs are very useful tree shrubs to the Indians of the western United States. The twigs of Rhus trilobata, the aro¬ matic sumac, having small three-lobed leaves, are soaked, scraped and split, resoaked in water, and then woven into baskets., sometimes in conjunction with other materials. These light, straw-colored withes are used probably more than any material except the willows for' native basketry. R. diver siloba, the poison- oak, although greatly dreaded by the Cherokees, who endeavor to conciliate it by addressing it as ((my friend,® does not seem to injure certain Californian tribes so much. They even use it as medicine, sometimes poisoning themselves internally by the practice, and use twigs of it as water-sprinklers in sacred ceremonies; it is also a material for woven fabrics. Its juice, which turns black rapidly on exposure to air, is utilized as an intense black dye for basketry. R. trilobata likewise yields a dye. A strong decoction of the leaves and twigs is made, to which is added roasted pinyon gum and yellow ochre, forming a rich, blue-black fluid, which is practically an ink, the tannic acid of the sumac combining with the iron in the yellow ochre, and being strengthened with the carbon of the burnt gum. The lacquer or varnish of China and Japan is nothing but the sap of another sumac (R. vernicifera) or varnish-tree, cultivated in those countries. When the bark is cut, the shrub exudes a juice, darkening after exposure. When kept for some time this sap becomes thick and viscous, blackish-brown in color in one mass, but yellow-brown and trans¬ parent in thin layers. When properly applied in successive layers and dried, it becomes a natural varnish of great hardness and unal- terability. Nut galls, or iron in solution, added

to this, or gold and other metals, make the various kinds of lacquer or japanning, which it often takes years to perfect. Japan wax is a vegetable wax used chiefly for candles and obtained by crushing,

steaming and pressing the drupes of this species and of the Asiatic R. succedanca.

SUMATRA, soo-ma'tra, an island in the Indian Seas immediately under the equator. Its extreme limits are lat. 5° 45' N., and 5° 55' S. ; long. 90° 40' E., and 106° 5' E. In the direction of its greatest length it extends from northwest to southeast. Its greatest length is about 1,000 miles, and its greatest breadth about 260 miles; its area is about 161,600 square miles. It ranks in magnitude as the second of the

Asiatic islands, Borneo being the first. The population is about 4,000,000.

Topography. — The west side of the island is mountainous, but the east side has a totally different character, and spreads out into inter¬ minable plains nearly as level as the sea. The mountains viewed from the west appear at first view to form a continuous ridge, but a closer examination reveals breaks in the chain, and discloses the fact that two or three ridges lie behind that which is mainly seen from the coast. This chain, known generally as Barisan, extends from the northwest of the island to Sunda Strait. The islands of Pulo Bras and Pulo Wai really form detached parts of it, and near them, at the northwestern end of the is¬ land, it attains a height of 5,663 feet in Mount Yamura. Farther south, but still in Achinese territory, are the lofty volcanoes Abong-Abong and Luse, whose heights are estimated at over 11,000 and 12,000 feet respectively. Mount Ophir, close to the equator, is an extinct vol¬ cano 9,610 feet above sea-level. Not far to the south is Mount Merapi, one of the most violent of Sumatran volcanoes. Other notable peaks are: Talang (8,343), an extinct volcano, from which the natives obtain sulphur; Indrapura (12,000), the highest peak yet ascended in Su¬ matra; Mount Paung; Mount Kaba (5,413); Mount Dempo (10,562), an active volcano; and Mount Tangkamus (7,422), near the Straits of Sunda. Granite, slates, clay-schists and sim¬ ilar rocks abound, and limestones of Carbonif¬ erous age occupy much of the surface. The Tertiary formations cover a very large area. All the peaks seem to be volcanic. Various metals have been found in the island, and ex¬ cellent coal is known to be abundant.

Rivers and Lakes. — The rivers that flow toward the west are naturally short and of small importance for navigation, but those

trav¬ ersing the broad alluvial eastern slopes are long and deep. Many of them form large del¬ tas. In order from south to north the most important are : the Musi or Palembang, about 400 miles long, passing the town of Palembang and entering the sea opposite the island of Banka, an important highway for trade; the Jambi or Batang-Hari, over 500 miles long, and navigable throughout most of its length, important as an outlet for the chief coal-fields ; the Indragiri; the Kampar; the Siak, rising near Mount Ophir; the Rakan and the Batu Bara. Of the west-coast rivers the Singkel is the most important. The lakes of Sumatra are mostly mountain lakes, and not a few of them occupy the craters of extinct volcanoes. The largest are : Toba, 500 square miles in area, at the source of the Singkel River ; Sing- kara and Maringin, about the centre of the island near the west coast ; Korinchi, near In¬ drapura ; and Danau. Sumatra is almost bi¬ sected by the equator, and in consequence the monsoons of its northern extremity have differ¬ ent directions from those of the southern end. During the periods when the monsoon is chang¬ ing, navigation in the neighboring waters is impeded by squalls. The climate is generally of the usual tropical character, and is on the whole rather unhealthy.

Flora and Fauna.— The flora of Sumatra differs much from that of Java. It is very rich in forest trees, many of which yield valuable timber or other useful products, such as ben¬

zoin and gutta-percha. Pepper is the chief cul¬ tivated product. Sago and rice are also culti¬ vated, and excellent tobacco and coffee are grown for export. The fauna of Sumatra in some respects resembles that of Borneo more closely than that of the countries with which it is almost in contact. The elephant and the tapir, frequent in Sumatra, are unknown in Java. The former island has the two-horned, the latter a single-horned rhinoceros. The orang-utan is found locally. The tiger occurs both in Sumatra and Java, but not in Borneo; Sumatra has also some species of deer and ante¬ lope, the sunbear, a peculiar kind of hare, and the muntjac. The most notable birds are the Argus pheasant, several trogons, bush-shrikes, rain-birds, pheasant-cuckoos, etc. Of the do¬ mesticated animals the most important by far is the pig, next to which rank the cow and the horse. The buffalo is more frequent in the low country, but is only valued as food, and never yoked for labor as in Java. The horse of the highlands is small, but vigorous and capable of enduring much fatigue.

Government. — The authority of the Dutch extends, nominally at least, over the greater part of the island, and may be considered to be real over all the coast districts. In the interior, however, there are still considerable tracts un¬ der native rulers, or forming village

confedera¬ tions, over which the Dutch exercise little or no authority. The Dutch possessions are divided into six chief divisions. The government of the west coast, with an area calculated at 31,649 square miles, extends along the middle portion of the west coast, and includes Padang and other districts. The governor resides at Pa¬ dang. The residency of Benkulen lies to the south of that of the west coast, and has an area of 9,399 square miles, Benkulen being the capital. The residency of Lampong comprises the southern districts of the island on the Strait of Sunda, and has an area of 11,284 square miles. The residency of Palembang on the east coast, with an area of 53,497 square miles, lies to the north of Lampong, and has as its capital the large town of Palembang. The district of Indragiri, farther north, belongs to the resi¬ dency of Riou, which is named after the island of that name. Farther north is the residency of the east coast, its area being estimated at 35,312 square miles; and at the extreme north¬ west that of Achin, which still remains semi¬ independent, area 20,471 square miles.

Racial Characteristics. — Sumatra is inhab¬ ited by a very mixed population. Malays col¬ lected from every quarter of the archipelago inhabit the coast. Hindus appear to have set¬ tled at an early age in the north, and to have modified the Malay type of the Achinese. The Arabs in the island, though few in number, have always formed an important class. Chi¬ nese are numerous, particularly on the east coast. Northwest of Palembang the Orang- Kubu live in a savage state, and shun any inter¬ course with the neighboring tribes. The Orang-Kubu must not be confounded with the people of Menankabu, a pure Malay race inhabiting the highlands of Padang, which some are dis¬ posed to consider the original seat of the Malay stock. 'Ihe Battaks are a peculiar and inter¬ esting race. Like the Malays they are of short stature, but they differ from the former in be¬ ing strongly built and well proportioned. The

art of writing has been known among the Bat- taks from a date beyond the reach of tradition. Their characters are peculiar, and also their mode of writing, for they begin at the bottom of the page at the left-hand side, and place letter above letter in a vertical column till they reach the top, when they return to the bottom. Their ancient books are written in a brilliant ink on paper made of the bark of trees, but now they scratch their writings on slips of flattened bamboo. Among all the indigenous tribes of Sumatra the characteristic political

tendency is one that could have originated only in the recesses of the mountains. Every village affects independence, but the villages form con¬ federations. The native tribes of Sumatra have no temples and no priests. They are said to be¬ lieve in the existence of an evil spirit and of demons who haunt the mountains. On the coasts Buddhism appears to have been introduced at an early age, but it has since been completely superseded by Mohammedanism, which, among the Malays, however, is of a very relaxed char¬ acter.

History. — The fu st European who. visited the island of Sumatra is said to have been Nic- colo di Conti, who came there before 1449. In the beginning of the 16th century it was visited by the Portuguese, but no Europeans obtained a firm footing on the island until the Dutch estab¬ lished a factory on the west coast at the end of the 16th century. In 1666 the Dutch took possession of Padang, and soon after enlarged their territories by treaty with the Sultan of Achin. Since that time they have gone on con¬ tinually consolidating and increasing their do¬ minion much more by negotiation than by force of arms. Their last important accession of in¬ fluence on the island was gained by a treaty with the kingdom of Siak, concluded in 1868, by which they obtained the virtual control of that state. In 1685 the British formed a settle¬ ment in Benkulen, and in 1811 they seized the Dutch possessions on the island. These were, however, restored in 1815, and in 1824 Benku¬ len was given over to the Dutch in exchange for Malacca. A treaty concluded between the Dutch and English governments in 1834 left the Dutch free to make what treaties they pleased with the native powers in the island of Sumatra, the same liberty being allowed to the British on the Malay Peninsula; but the right of the Dutch to make advances in the island by conquest and annexation was not then recognized. This right was, however, con¬ ceded in the treaty of February 1871, in return for the cession to the British of the Dutch pos¬ sessions on the Gold Coast; and in accordance with this permission the Dutch despatched an expedition against Achin. In April 1873, the forces of the two powers came into collision, and a war ensued which dragged on for a num¬ ber of years, caused severe losses to the Dutch, and terminated only in the nominal subjugation of Achin. In August 1883 the tidal wave that accompanied the terrific volcanic outburst in Krakatoa, swept with destructive effect the south coast of Sumatra, a total change in the aspect of the Straits of Sunda also resulting from the eruption. Consult Bernard, (A travers Sumatra) (Paris 1910) ; Breitenstein, H., <Sumatra) (Leipzig 1902) ; Cabaton, A., <Java, Sumatra and the other Islands of the Dutch East Indies) (New York 1914).

SUMBAWA, soom-ba'wa, an island be¬ longing to the Sunda group, in

the Indian Ocean, east of Java, containing 5,192 square miles. The island is mountainous and of ex¬ traordinary profile. The volcano of Tomboro or Tombura, 8,940 feet high, is near the north¬ ern coast and famous for its eruptions. The island consists of two parts, with two rulers or sultans, who acknowledge the sovereignty of Holland. There are few streams. The chief products are rice, cotton, tobacco, tropical fruits and sappan-wood. Of domestic animals deer and swine are plentiful, and the finest horses of the Indian Archipelago are reared here, and exported. Edible birds' nests are found on the coasts; gold, silver, saltpetre and pearls from the mines and waters, respectively. On the north coast there is a good harbor, and here stands the town of Sumbawa. The inhabit¬ ants are Malays and Mohammedans. Pop.

75,000.

SUMBUL, an East Indian name of the spikenard (Mardostachys) , and also of the valerian, but, more particularly of Ferula sumbul, the commercial drug also known as musk-root. The last is an umbelliferous plant, with dis¬ sected leaves. The roots reach the pharmacists in transverse segments, light and spongy in texture, with a thin, brown, wrinkled and fi¬ brous skin, but whitish inside. The taste is bitter and balsamic, the odor strong and like musk. Sumbul is used therapeutically as a stim¬ ulant and nervine, and was of importance long before its botanical history was known.

SUMERIAN LANGUAGES. The pris¬ tine, agglutinous language spoken by the earli¬ est, prehistoric people of Mesopotamia, a region generally referred to in surviving documents as mat Shumeri u Akkadi, i.e., land of the Sumer¬ ians and Akkadians, probably the biblical Shinar or Shin'aar. It was a non-Semitic people thus dwelling in the lowlands between the Euphrates and Tigris, as comparative philology has of recent years proved beyond a doubt. True, the eminent French scientist, Joseph Halevy, in 1876, and certain of his followers, contended for the non-existence of any such early non-Semitic population. Halevy attempted to ac¬ count for the early Sumerian documents in cuneiform characters by assuming a Semitic, priestly, secret style of writing, a cryptography, and cited as a parallel the Egyptian hierarchical writing. However, this has since been amply disproved. The meaning of the word Sumerian, or rather Shumerian, refers to the word ˆreed,® ˆreedy® in that idiom, evidently because of the marshy, reedy landscape. The Sumerians and the Akkadians seem to have formed one people, though originally they may have come from different parts of the earth. The Sumerians, at any rate, as their tongue, an agglutinous one, shows, must have come from the north,

possibly the Ural region, as there were no words or word pictures and phrases in it sym¬ bolizing fauna and flora of the subtropics.

So far as the records go, the Sumerians were the earliest nation, and their system of writing, the cuneiform, is likewise the earliest we know of. Later on, the Sumerians, by co¬ habitation and intermarriage, were gradually amalgamated with the later Semitic invaders, Arab tribes originally coming chiefly from the island of Bahrin. The Sumerian tongue like-

wise coalesced in a manner with the Semitic idiom, the latter being superimposed on the former, much as the Norman French was super¬ imposed on Anglo-Saxon, and thus the later Babylonian was formed. Sumerian civilization and language, however, were highly developed before the coming of the Semites, as well in the construction of the latter as in its religion, its religious observances, its legislation, arts, science and social life. The Semitic Babyloni¬ ans imbibed the earlier civilization.

Nevertheless, the <(Sumerian problem,® so- called, had for generations perplexed Assyriol- ogists. Oppert, in 1854, first made modest, though in a measure successful attempts to un¬ ravel its mysteries. But Prof. Paul Haupt, assisted by Profs. Peter Jensen and Zimmern, somewhat profiting by these initial labors, stead¬ ily hewed his way through these etymological brambles, and it is strikingly illustrative of the value of Haupt's pathbreaking labors that all subsequent phonetic and grammatical work in Sumerian has only tended to confirm Haupt's views in almost every instance. Haupt's <(Sumenan Family Laws® and ((Akkadian and Sumerian Cuneiform Texts® laid the founda¬ tion to all later researches. In the investiga¬ tion of the Sumerian idiom no comparison should be made between Sumerian vocables and those of more recent agglutinous idioms, despite frequent tempting resemblances, such as in Turkish, for instance. Now and then, though, certain similarities are traceable with Esthonian and Finnish. Sumerian, as far as has been shown up to the present, must be held a language standing alone by itself, a <(prehis- toric philological remnant.®

To Prof. Friedrich Delitzsch is due the merit of having clearly shown the full meaning, the derivation and development of Babylonian cuneiform signs. They were, then, at first pure picture writing and

finally grew into conven¬ tionalized ideographic and syllabic sign lists. The etymological labor involved in this proc¬ ess of gradual elucidation was surrounded with enormous difficulties.

Sumerian cuneiform was adopted at least about b.c. 7000. By b.c. 5000 we see it already highly specialized, and between b.c. 4000 and 3000 we perceive it applied to the transmission of the invading Semitic language, the Babylo¬ nian ; and since then the Semitic Assyrians, the Medes, the Turanian Susites, and the Caucasian Armenians have all habitually used the cunei¬ form.

Besides other evidence tending in the same direction, perhaps the most convincing proof, from a philological point of view, that ancient Sumerian was a real idiom, of natural growth and whollv unartificial, may be found, aside from the internal phonetic changes, in the in¬ dubitably established fact that there were two dialects of it. These were the Emeka, the man's language, the noble, virile, though harsh form, and the Emesal, the woman's language, the softer. There were no geographical bound¬ aries to these two dialects. In R. E. Brun-now's ((A Classified List of all Simple and Compound Ideographs® (1889), it is also demon¬ strated that the Sumerian original idiom was of unaided growth. He and others point out that there were probably eight voice tones em¬ ployed in Sumerian, similar to the Chinese of

to-day, and that the intonation often deter¬ mined the meaning. As a possible illustration may be cited: a — water, weep, moisture, dew, tears, inundation, irrigation; ab~ dwelling, sea, road, and a grammatical suffix.

After Sumerian had ceased to be a living tongue it was, up to a very late period of Baby¬ lonia's existence, greatly used as a ritual one, and was read aloud at worship in the temples, much as is, for example, early Slavonic in Rus¬ sian and other Orthodox churches to-day.

Bibliography. — Delitzsch, F., (Assyrian

Studies) (Leipzig 1874) ; (Assyr. Worterbuch) (Leipzig 1890) ; (Babel und BibeP (ib. 1899) ; Halevy, J., Observations critiques sur les pre-tendus Touraniens de la Babylonie) (Paris 1874) ; Journal asiatique (3d series, Vol. IV, pp. 461 seq., Paris 1874) ; (Recherches critiques sur l'origine de la civilisation babylonienne) (id. 1876) ; (Precis d'allographie ass.-babyiP (ib. 1912) ; Haupt, M., (Die sumerischen Familiengesetze) (Leipzig 1879) ; (Die akka- dische Sprache) (Berlin 1883) ; Meyer, E., ˆumerier u. Semiten in BabylP (Berlin 1906) ; Lenormant, F., (Etudes accadiennes) (II 2, p. 70, 3 vols., Paris

1870-79) ; Pinches, T. G„ (Language of the Early Inhabitants of Mesopotamia) (in Journal Asiatic Society, pp. 301 seq. 1884) ; (Sumerian or Cryptography) (pp. 75 seq., 343-344, 551-552, London 1900) ; Prince, J. D., Journal of American Oriental Society, XXV 49-67 ; American Journal of Semitic Languages, XIX 203 seq.; (Materials for a Sumerian Lexicoffi (Leipzig 1905-07) ; Radan, Wm. G., (Sumerian Hymns and Prayers to the God Nin-ib-* (London 1911) ; Sayce, A. H., (Hibbert's Lectures } (pp. 415-436, 1887) ;

Schrader, E., (Keilinschriften u. Geschichts- forschung) (pp. 290, 533) ; Tiele, C. P., (Babyl.- Assyr. Geschichte) (pp. 58—71, Leipzig) ; Zim¬ mern, K. F., (Babyl. Busspaslmen) (Leipzig

1885).

Wolf von Schierbrand, Author of (America , Asia and the Pacific, > etc.

SUMMARY COURT. See Law, Military.

SUMMARY PROCEEDING, in law, a form of trial in which the ancient established course of legal proceedings is disregarded, espe¬ cially in the matter of trial by jury. In no case can a party be tried summarily unless when such proceedings are authorized by legislative authority, as in a committal for contempt of court, the conviction of a person by justices of the peace, etc.

SUMMER, the season of the year which in the northern hemisphere generally may be said to comprise the months of June, July and Au¬ gust. The astronomical summer lasts in the northern hemisphere from the June solstice to the September equinox, during which time the sun, being north of the equator, shines more directly upon this part of the earth, and rises much sooner and sets later, which renders this the hottest period of the year. The period of greatest heat generally takes place in August, since the influence of the sun's rays has then been felt for a long time on the earth, and the wind blowing from the north becomes milder owing to a moderation of the temperature in the polar circle caused by the thawing of the ice. In the southern hemisphere the summer lasts from the December solstice to the March equinox.

SUMMER DUCK. See Wood-duck. SUMMER REDBIRD. See Tanager.

SUMMER SCHOOL OF THE SOUTH,

a school for teachers established at the Uni¬ versity of Tennessee, Knoxville, in the sum¬ mer of 1902. It was organized to supply the ever-increasing demand on the part of southern teachers for a summer school of high grade and adequate equipment for the best normal training. It receives its financial support from the General Education Board, from the Uni¬ versity of Tennessee, from the citizens of Knox County, and from individual donations; the registration fee is small. All the build¬ ings and full equipment of the university are given to the use of the school. The courses number over 150. The work is arranged in the following groups: (1) Common school subjects and methods, including kindergarten and primary grades; (2) psychology and pedagogy; (3) high school and college subjects; (4) rural schools and county supervision; (5) city school supervision; (6) general lectures; (7) library work and educational exhibits; (8) campaigners' conventions. Teachers have free choice of subjects, but are advised not to take work for more than three or four periods a day. The instructors and lecturers are men and women of recognized scholarship and authority, coming from various institutions and different sections of the country. The school has a large attendance and has proved a marked success.

SUMMER SESSIONS. The summer school responds to a specific need. Professional people such as teachers, ministers, doctors and also other workers like social workers, Y. M. C. A. and Y. W. C. A. secretaries and even business men and women, find the summer vacation pe¬ riod a suitable time to undertake advanced edu¬ cational work in specially selected subjects. The other seasons of the year are devoted to ex¬ haustive labors ; the summer study is both recreative and inspirational and may be made to contribute to professional advancement. When systematically planned and extended over a period of years, such summer work may even have recognition in the form of academic credit or academic degrees.

Of the persons listed above teachers in service make the most insistent demand for summer courses. New methods and new edu¬ cational movements continually call for special short courses. For example, the Montessori method, or the Direct Method in Latin, may be studied to advantage in this way. Teachers may add to their regular accomplishments cer¬ tain special, perhaps new, activities, such as domestic science and art, various phases of handwork, craftswork, physical education, elo¬ cution, etc. Again, a famous teacher from a foreign land may offer courses during a sum¬ mer session, affording attractive opportunity for special investigation, or for getting a par¬

ticular method or a particular form of inter¬ pretation in a known field. It is a growing practice among municipal school authorities to offer special inducement to public school teach¬ ers to take summer courses. The elementary teacher more particularly, but the high school teacher also to some extent is tempted to stag¬ nate. After teaching the same subject several years, the dull monotony of the process deadens

the ambition. This is especially true where knowledge of method is more important than knowledge of subject matter as in the ele¬ mentary school. The opportunity for summer study is especially inspiring in such cases.

Physicians also find it desirable to investi¬ gate new treatments, to observe and learn new methods in surgery, to get a new point of view in the profession. The summer session or clinic may give the desired opportunity. Even the farmer demands special opportunities for the observation of special methods and prac¬ tices and looks to a short session of the Agri¬ cultural College to supply his needs. In this case, however, the winter may offer greater advantages.

Recently efficiency experts have advocated the continuous use of educational plants. The idle recitation halls, laboratories and libraries are considered uneconomical. This idleness may continue from 15 June to 15 September, 25 per cent of the educational year. Apparently this records only 75 per cent efficiency for fac¬ ulties, plants and investments. For the faculty the inefficiency is only apparent since the fal¬ low months are essential to the later increase in fertility and resourcefulness. Of the plant, - however, and of the invested funds, the charge of inefficiency is partly true. If a separate faculty can be provided to use the equipment during the summer, a faculty that has its fal¬ low months at another season of the year, then an all year program becomes efficient.

The Four-Term Year. — A continuous ses¬ sion plan was devised at Chicago University by President William Rainey Harper, when that institution was first opened in 1892. It provides (1) four terms of twelve weeks each; (2) twelve terms completed work are required for graduation; (3) that a student may com¬ plete twelve terms in three years; (4) that a student may select any three terms as a year's work, devoting the other term to rest or busi¬ ness; (5) that a member of the faculty may elect to be absent from college duties during any one term of any calendar year.

This plan accomplishes all that summer sessions usually seek to do

and much more. (1) It incorporates the summer session as an integral part of the academic year. The sum¬ mer term differs in no essential respect from any of the other terms. (2) Students may begin their college or university courses four times each year. (3) The university equip¬ ment is in continual use. (4) The university can use the best men from other institutions in this country and even from foreign uni¬ versities.

The continuous session plan or the four- term year is the logical development of the summer school movement. Its sponsor, Chi¬ cago University, has used it continuously from 1892 to 1918. A quarter of a century has tested the plan thoroughly and has justified it. That few other colleges and universities have adopted it is no argument against it. It seems prob¬ able that acquaintance with its features and its satisfactory results will gradually lead to a wide if not universal use of it.

History of Summer Schools. — The Con¬ cord School of Philosophy was proposed by Ralph Waldo Emerson as early as 1840 and came to full fruition between 1879-85. The Harvard Summer School has lived from 1869

to the present. The Chautauqua Summer School began in 1874. A summer school of law was opened in 1870 by the University of Vir¬ ginia. From these beginnings have grown in¬ numerable schools. Not only do most of the colleges and universities conduct such schools but Chautauqua schools, Y. M. C. A. and Y. W. C. A. schools, music schools, tutoring schools, normal schools, library schools, etc., are meeting the growing demand for summer school facilities. According to the latest re¬ port (1916) of the United States Bureau of Education 674 schools were in session during the summer of 1915, 47 universities, 40 col¬ leges, 90 normal schools, 39 other institutions, 458 independent schools.

All colleges and universities listed offer academic credit for work completed in the summer session. Of 90 normal schools listed, only 48 offer credit. The basis for such credit is 30 hours of recitations, implying 60 hours of preparation for each credit-hour. A student may usually earn four credit-hours in one summer session. Since a college year is given 15 credit-hours, it will require four summer sessions to earn a full credit-year.

The process is, therefore, slow, but thou¬ sands of students persist until they earn the coveted credit-year. Especially is this true of students whose college course was inter¬ rupted and who in this way complete work for the bachelor's degree ; and many college graduates take this means of earning a master's degree.

A. R. Brubacher,

President of State College for Teachers, Al¬ bany, N. Y.

SUMMERS, George William: b. Fairfax County, Va., 4 March 1807; d. Charleston, W. Va., 18 Sept. 1868. He entered Ohio Univer¬ sity at Athens, Ohio, in 1819 and graduated in 1826. Fie then studied law and was admitted to the bar in 1827. In 1830 he was elected a member of the lower house of the Virginia legislature and was later re-elected several times. In 1841 he was elected to the United States House of Representatives, and was re¬ elected in 1843. In 1850 he was elected to the Virginia Constitutional Convention and took a prominent part in framing the new constitu¬ tion. In 1851 he was the Whig candidate for governor of Virginia, in the first popular elec¬ tion for governor in Virginia, but was de¬ feated by Joseph Johnson, the Democratic nominee. In May 1852 he was elected judge of the eighth judicial circuit of Virginia, but re¬ signed his office 1 July 1858. He was a promi¬ nent member of the <(Peace Conference® held at Washington in the spring of 1861 and took an active part in defense of the Union. He was also elected a delegate to the Richmond convention which passed the Ordinance of Seces¬ sion.. In the convention he made an able speech in defense of the Union. At the opening of the Civil War he retired to private life upon his farm and thereafter refused to accept office but continued the practice of his profession. He wielded a large influence in western Vir¬ ginia.

SUMMERS, sum'erz, Thomas Osmund,

American Methodist Episcopal (South) clergy¬ man : b. near Corfe Castle, Dorsetshire, Eng¬ land, 11 Oct. 1812; d. Nashville, Tenn., 6 May

1. In 1830 he came to the United States where he studied for the ministry and was ((admitted on trial® to the Baltimore Conference, 1835. He was active in the organization of the Texas Conference, 1840, and later was sent to the Alabama Conference. He was professor of systematic theology at Vanderbilt Univer¬ sity, dean of the faculty and pastor ex officio of that university. He has published Com¬ mentaries on the

Gospels, the Acts, and the Ritual of the Methodist Episcopal Church (South)); (Seasons, Months and Days* ; (Talks, Pleasant and Profitable. * Consult <Life) by Fitzgerald (1884).

SUMMERSIDE, Canada, town and port of entry of Prince Edward's Island, capital of Prince County, on Bedeque Bay and on the Prince Edward's Island Railroad. It is 40 miles northwest of Charlottetown and has an excellent harbor with anchorage for the largest vessels. There are flour and saw mills, manu¬ factures of plows, etc., and is the centre of the recently developed fox ranch industry. Sum- merside has regular communication in summer by steamer with Nova Scotia and New Bruns¬ wick. Pop. 2,678.

SUMMERSVILLE, Ga., city in Richmond County and suburb of Augusta. It lies in a fertile valley 25 miles north-northwest of Rome, on the Central of Georgia Railroad. On account of its mild winter climate it is a popular winter resort. It contains a govern¬ ment arsenal and ordnance department. Pop.

(1920) 1,003.

SUMMIT, N. J., city in Union County, on the Delaware, Lackawanna and Western Railroad, 20 miles west of New York and 12 miles west of Newark. It is in an elevated part of the county, about 450 feet above tide water. Summit was settled in 1795, and the first school was built the same year. The first church building was erected in 1840. It was in¬ corporated as a township in 1869 and as a city in 1899. It is a purely residential community, noted for its beautiful scenery and delightful climate. The chief industries which contribute to the prosperity of the city are manufacturing silk goods, cultivation of roses, farming and the cultivation of fruit. Summit is a residen¬ tial city, and has many New York and Newark business men among its inhabitants. The mu¬ nicipal improvements include gas and electric lights, pure water, an excellent tide water sewerage system, well-organized police and fire departments, free postal delivery and telegraph and telephone service. There are eight churches, Y. M. C. A. building and the Arthur Home for Blind Babies under the International Sunshine Society. The educational institutions are Kent Place School, for girls ; Summit Academy, for boys ; five public schools, one parish school and a free public library. The two banks have a combined capital of $200,000. The government is vested in a mayor and a council of seven members, who hold office for three years. Pop. (1920) 10,174.

SUMMONS, in law, an admonition to ap¬ pear in court, addressed to

the defendant in a personal action. It is the writ by which a per¬ sonal action is always commenced. According to English law it need not state the form or cause of action, but it must contain the names of all the defendants, and must have endorsed

upon it the name and address of the person tak¬ ing it out, whether the plaintiff himself or his attorney. It is the duty of the person taking out a summons to serve it on the defendant in person; but if the judge is satisfied that reason¬ able efforts have been made to do this, and that the defendant knows that the summons has been issued against him, he may authorize the plain¬ tiff to go on with the action without personal service.

SUMNER, Charles, American statesman: b. Boston, 6 Jan. 1811 ; d. Washington, D. C., 11 March 1874. His family was English in origin, Charles being a descendant in the seventh gen¬ eration from William, who came to America about 1635 and settled at Dorchester, Mass. The Sumners lived in the same vicinity for the next 200 years and more, generally as farm¬ ers. The father, Charles Pinckney Sumner (b. 1776; d. 1839), graduated from Harvard in 1796. He was a lawyer, was married to Relief Jacob of Hanover, N. H., in 1810 and had nine children, of whom Charles was the eldest. The father took an active interest in politics, was clerk of the Massachusetts House of Repre¬ sentatives in 1806-07 and 1810-11 and from 1825 to 1839 was sheriff of Suffolk County. He was interested in the temperance movement and was strongly anti-slavery in feeling. He was fond of books, conscientious, earnest, grave and stern. It was not strange, then, that he brought up his son in the old Puritan style and the latter's career shows that he was greatly influenced by his father's training, views and character.

Charles was educated at the famous Boston Latin School, having as schoolmates Robert C. Winthrop and Wendell Phillips. His tastes were those of the scholar and he read widely and became proficient in the classics. He en¬ tered Harvard College in 1826, where he con¬ tinued to excel in the classics, but also devoted much time to history and literature and per¬ fected himself in oratory or "declaiming." After a year spent in private study and diligent attendance on the lectures and orations of the great Boston orators, Webster, Everett, Choate and Channing, he entered the Harvard Law School in 1831 and received the personal at¬ tention and teaching of Judge Story, an old friend of

Sumner's father. His plan of study was thus described 'in a letter to a friend: "Six hours, namely, the forenoon, wholly and solely to law; afternoon, classics; evening, his¬ tory, subjects collateral and assistant Jo law, etc. Recreation must not be found in idleness or loose reading." In January 1834 he entered the law office of Benjamin Rand in Boston. In February he made a journey to Washington, where he received his first impressions of slav¬ ery in the South. His first subscription for a newspaper was for Garrison's Liberator. While in Washington he heard Webster, Clay and Calhoun speak in the Senate, but he still thought he preferred law to politics. During the next three years, 1834-36, he practised law in Bos¬ ton, but without remarkable success. His argu¬ ments were in the nature of learned essays rather than forcible presentations of the case in a manner to convince juries.

In 1837 he went abroad and spent three years traveling in France, England, Italy and Ger¬ many. In Paris, where he lived five months, he attended university lectures, visited the mu¬

seums, galleries and historic places, attended the Chamber of Deputies and law courts, went into society and met many eminent persons. He next spent 10 months in England and met the famous men of the day, Carlyle, Words¬ worth, Macaulay, etc. In Italy he studied Italian literature. Then he spent several months in Germany and finally returned to America in May 1840. His foreign travel un¬ fitted him for his chosen profession, to some extent, and still further intensified his longings for the scholar's career.

During his absence abroad the slavery ques¬ tion had become a burning issue, though up to this time he had but slight interest in politics or in the great public questions of the period. From 1841, however, his letters commence to show evidence of more positive views on the slavery question and more determination to oppose the further spread and influence of this institution. His humanitarianism showed itself in his interest in popular education and in the support of Horace Mann, in the work for the blind, in that for the improvement of prison discipline and in his opposition to war under all circumstances. In 1843 he commenced to write against slavery, and contended, in oppo¬ sition to many, that it was a national rather than merely a local evil : that the nation was responsible and that it m'lght to a large extent remove the evil by abolishing slavery in the District of Columbia and in the Territories, by compelling the rendition of fugitive slaves, by preventing the slave trade, by remedying the laws of slave States which abridged the right of free negroes in free States, by stip¬ ulating the conditions of admitting new States and by amending the Constitution so as to abolish slavery. Sumner made his

real debut in public life by a Fourth of July oration in Boston, 1845, on the “True Grandeur of Na¬ tions,” in which he bitterly denounced wars of all kinds as dishonorable. Four months later he made his first anti-slavery speech at a meeting in Faneuil Hall to protest against the annexation of Texas.

In 1846-47 Sumner made several speeches in favor of the Whig party adopting an anti¬ slavery attitude. He wrote for the newspapers against the Mexican War; declared that it was unconstitutional, unjust and detestable, op¬ posed further expenditures for it, called for the withdrawal of troops and opposed the open¬ ing of the territory to be acquired from Mex¬ ico to slavery. He joined the Free Soil party of 1848 and was nominated for Congress in October, but failed of election. When Web¬ ster, in his speech of 7 March 1850, refused to vote to exclude slavery from California and New Mexico, he became, in the eyes of many in Massachusetts, an apologist of slavery and this situation opened the door of the Senate to Sumner.

In Massachusetts the autumn campaign hinged on the question whether the State should ap¬ prove the Compromise of 1850 and the course of Webster in supporting it. There was bitter opposition to the Fugitive Slave Law and the manner of its enforcement. Sumner made an important speech in Faneuil Hall 6 November against the Fugitive Slave law and demanded its repeal. This speech made possible his elec¬ tion as senator in January 1851, for in the State election the combined Democrats and

Free Soilers had a majority of the legislature and chose Sumner rather than Winthrop, the Whig candidate, as senator.

With the entrance of Sumner into the Sen¬ ate in December 1851 a new force for anti¬ slavery agitation was present. He was an uncompromising, fiery, earnest and persistent antagonist of slavery. He was the spokesman of the anti-slavery forces in the Senate as Calhoun had been for the pro-slavery interests. Although the leaders of both parties were for peace, Clay and Webster on one side and Cass, Buchanan and Douglas on the other, never¬ theless Sumner believed that the Compromise of 1850 was wrong and that (<nothing can be settled which is not right.® It was not until August 1852, after both the Whig and Demo¬ cratic National Conventions had declared their support of the Compromise of 1850, that Sum¬ ner spoke of the great

question, viz., ((Freedom National, Slavery Sectional.® His argument was to the effect that slavery was not recog¬ nized in the Constitution, that Congress had no power to establish it and that, therefore, it could not legally exist where the jurisdiction of the national government was exclusive ; that the Fugitive Slave Law was unconstitutional and, therefore, should not be obeyed. This speech made Sumner the leader of the anti¬ slavery party and his doctrines were accepted as sound by its rank and file.

The next Congress, that commencing 5 Dec. 1853, was made famous by the passage of the Kansas-Nebraska Bill, which was de¬ signed to repeal the Missouri Compromise. It was on 23 Jan. 1854 that Senator Douglas in¬ troduced a bill dividing the Nebraska Terri¬ tory into Kansas and Nebraska. This bill de¬ clared that the Missouri Compromise <(was superseded on the principle of the legislation of 1850, commonly called the compromise measure, and is hereby declared in operation.® Sumner spoke against the bill 15 Feb. 1854 and declared that the Missouri Compromise was a binding contract. His speech on 26 June in reply to an attack on Boston and Massachusetts by Southern senators, particularly Senators Butler of South Carolina and Mason of Vir¬ ginia, aroused great feeling.

The passage of the Kansas-Nebraska Act led to the formation of the Republican party. A Republican convention, composed mostly of Free Soilers, was held at Worcester, Mass., 7 Sept. 1854 and Sumner spoke for the new party. He advocated resistance to the enforce¬ ment of the Fugitive Slave Law and advised the passage of personal liberty laws to nullify its workings. He justified his position by denying that the provision of the Constitution touching the rendition of <(persons held to service or labor,® conferred any power on the national government <(to establish uniform rules for the rendition of fugitives® ; that therefore, each State had the right to determine for itself the extent of the obligation assumed. In consequence the Fugitive Slave Law was un¬ constitutional and the States had a right to act so as to secure for their citizens claimed as fugitive slaves the right of trial by jury and the privilege of habeas corpus. This view would give the States liberty to construe the Con¬ stitution and pass laws which their construc¬ tion of the Constitution permitted. In case there was a conflict between the Supreme Court

and the States in the construction of the Con¬ stitution, then no man ((will voluntarily aid in enforcing a judgment which in conscience he believed wrong.® This was preaching revo¬ lutionary doctrine and was the most violent and extreme position which Sumner had taken up to this date.

In the second session of the 33d Congress, that commencing December 1854, Sumner endeavored to secure a repeal of the Fugi¬ tive Slave Law, but was defeated. In the spring of 1855 he prepared an address entitled <(The Anti-Slavery Enterprise, its Necessity, Practicability, and Dignity, with Glances at the Special Duties of the North.® This was de¬ livered in Boston, New York and other places. It was in this address that he prophesied the downfall of slavery because of a <(moral blockade® against it. <(With the sympathies of all Christendom as allies, already it (Anti- Slave movement), encompasses the slave mas¬ ters by a moral blockade, invisible to the eye, but more potent than navies, from which there can be no escape except in final capitulation.®

Two of the great events of the session of Congress that met 3 Dec. 1855, were Sumner's speech of 19 and 20 May 1856, on <(The Crime against Kansas,® and the assault on him by Rep¬ resentative Brooks of South Carolina. It was on 12 March 1856 that Senator Douglas reported a bill for organizing a State government in Kansas. This provided that the steps taken should be prescribed by the territorial legisla¬ ture. This was the pro-slavery legislature which had been elected in March 1855 as a result of fraudulent votes of Missourians who had entered Kansas for this purpose. Con¬ gress had to decide whether it would recognize this legislature or admit Kansas as a free State under the Topeka constitution, which had been formed by the free-state men in the con¬ vention which met at Topeka 23 Oct. 1855. The debate on the subject began 20 March and continued for some months. Conditions in Kansas had been going from bad to worse and pro-slavery troops had been disarming free-state settlers, and finally, on 21 May, they made an attack on Lawrence, demanded the surrender of all arms, broke the presses of the newspapers, burned the Free State Hotel and plundered houses and dwellings.

It was under such circumstances that Sum¬ ner delivered his famous and carefully pre¬ pared speech which he meant to be (<the most thorough philippic ever uttered in a legislative body.® In this speech he reviewed the whole case from the passage of the Kansas-Nebraska Bill up to the time of the attack on Lawrence. He criticized the administration and attacked his opponents in the most bitter language, especially Senators Butler of South Carolina and Douglas of Illinois. The former had ((chosen a mistress to whom he has made his vows, and who, though ugly to others, is always lovely to him; though polluted in the sight of the world, is chaste in his sight; I mean the harlot Slavery.® Douglas had used language in denouncing Sumner that brought forth the reply that ((no person with the upright form of a man® could be allowed <(to switch out from his tongue the

perpetual stench of offen¬ sive personality. Sir, that is not a proper weapon of debate, at least on this floor. The noisome, squat, and nameless animal to which

I refer is not the proper model for an Ameri¬ can senator. Will the senator from Illinois take notice?® These bitter personalities led to the assault on Sumner on 22 May by Preston S. Brooks, a representative from South Caro¬ lina, and a cousin of Senator Butler. The Senate had adjourned and Sumner was seated at his desk writing letters, when Brooks en¬ tered and said, (<Mr. Sumner, I have read your speech carefully and with as much impartiality as was possible, and I feel it my duty to tell you that you have libeled my State and slandered a relative who is aged and absent, and I am come to punish you for it.® He then struck Sumner a series of blows on the head with a gutta percha cane, until he fell bloody and senseless to the floor. An effort to ex¬ pel Brooks from the House failed because of lack of two-thirds majority. While a resolu¬ tion of censure was pending Brooks resigned, but was immediately re-elected by his constitu¬ ents. His action was generally upheld by the Southern leaders and press. The indignation in the North was intense, and the incident crystallized sentiment against* slavery more, perhaps, than any other single event had done up to this time.

Sumner was re-elected to the Senate in January 1857, but. owing to the state of his health he spent nearly four years abroad, re¬ turning in time to resume his seat in the Senate 5 Dec. 1859. It was not until June 1860, however, that he delivered an im¬ portant speech on (<The Barbarism of Slavery:® It was intended as a reply to numerous assertions recently made to the effect that slavery was a moral, social and political blessing, and ((ennobling to both races, the white and black.® The speech was a reservoir of facts drawn largely from South¬ ern sources, and an appeal to the- great moral sentiment of the North to help abolish the system.

In the session of Congress which opened 3 Dec. 1860, Sumner devoted himself to pre¬ venting any compromise between the slave and the free States; for his object was the de¬ struction of slavery. When the Southern senators withdrew as a result of secession, the committee was reorganized, and Sumner was made chairman of the committee

on Foreign Relations. In this capacity he rendered the country signal service during the war. He was largely instrumental in the surrender of the captured Confederate commissioners, Slidell and Mason, who had been taken from the English mail steamer Trent by Captain Wilkes while on the high seas. He showed the President that this would be in accordance with our doctrines and an abandonment of claims made by Eng¬ land to which we had always objected. He used all his influence to prevent foreign inter¬ vention, and opposed the use of force in an attempt to get the French troops out of Mexico, as it might result in war. He was opposed to the issuing of letters of marque, and when the bill was passed used every effort to prevent the law going into effect, in which he was success¬ ful. His argument was that it would embroil us with foreign nations. His speech in New York, 10 Sept. 1863, was a strong statement of the American position. He raked England for her unfriendly acts with respect to neutrality vol. 26 — 2

and for allowing Confederate cruisers to be fitted out in English ports, and called France to account for her intervention in Mexico. The speech had an important effect in putting a check on England. He made an exhaustive re¬ port on the French Spoliation Claims. He argued vigorously for the treaty for the purchase of Alaska in 1867. He was in favor of settling all questions of dispute with Eng¬ land and in bringing the two nations into re¬ lations of harmony and good will, and hence supported the efforts to settle the Alabama claims. Owing to a disagreement with Presi¬ dent Grant and Republican senators over the acquisition of Santo Domingo, which Sumner opposed, he was removed from his chairman¬ ship of the Committee on Foreign Relations, 10 March 1871,

Sumner supported the policy of emancipa¬ tion and wishecT to take the step before Lincoln finally acted because he thought that it would prevent foreign intervention. He made the first public demand for emancipation by a responsible statesman on 1 Oct. 1861, before the State Re¬ publican Committee of Massachusetts, and re¬ peated his demand in a number of cities in the next few months. In the session of Congress which met in December 1861, he spoke in favor of legislation to prevent the surrender of fugi¬ tive slaves by the Union army, and in favor of the abolition of slavery in the District of Columbia, the first public word on the subject since the Republican party came into power.

During the war and after he was active in furthering the interests of the negro. He was influential in getting ratified the treaty with England for the more effectual suppression of the slave trade. He proposed bills allowing colored persons to become mail carriers, for

en¬ listing negroes freed by Confiscation Act and for receiving colored volunteers. He proposed and carried legislation preventing the exclusion of witnesses in the courts of the District of Columbia on account of color. He voted against the bill to admit West Virginia, because the Senate refused to amend it so that after 4 July 1863 slavery should cease in that State. He was continually urging Lincoln to issue the Emancipation Proclamation. He introduced a bill in the Senate to repeal all fugitive slave laws, and succeeded in getting'a similar bill, which had been passed in the House, through the Senate. He began the contest for negro suffrage, was a leader in his effort to prevent the exclusion of colored persons from street cars in the District of Columbia, supported a bill to secure for colored soldiers equal pay with the white and was energetic in getting the bill passed to es¬ tablish the Freedman's Bureau, which Sumner called <(a bridge from slavery to freedom.® He also aided in forcing a repeal of the law which excluded colored testimony in the United States courts, and was largely responsible for the ad¬ mission of a colored man to the bar of the Supreme Court, the privilege being granted by Chief Justice Chase on motion of Sumner. He offered an amendment to one of the reconstruc¬ tion measures to the effect that <(every constitu¬ tion in the rebel States shall require the legis¬ lature to establish and maintain a system of public schools open to all without distinction of race or color.®

On the question of reconstruction, Sumner

felt that the conditions must be faced by Con¬ gress and the President together, and hence opposed the policies of Lincoln and Johnson, viz., reconstruction by the executive. He con¬ sidered this policy unconstitutional while the Constitution supported the authority of Con¬ gress — its duty <(to guarantee to every State in this Union a republican form of govern¬ ment.® He voted for the conviction of Presi¬ dent Johnson in his impeachment trial.

After his removal as chairman of the Com¬ mittee on Foreign Affairs, Sumner exerted lit¬ tle influence in the Senate, and occupied his time mainly in pressing civil rights bills for negroes. He supported Horace Greeley for President in the election of 1872, on the ground that he was an ˆunswerving® Republican, that principles must be preferred to party and that Grant was unfaithful to the Constitution and Republican principles.

The character of Sumner and his services to his country were both based on fidelity to great moral principles. He was sincere, unselfish, simple, kind, conscientious, honest and pure and without envy or personal animosity. He was also energetic, uncompromising, courageous and fearless, and indomitable in his purpose. On the other hand, while not entirely a man of one idea, his intense convictions on slaverv often helped to defeat his desires, because of his in¬ ability to give sufficient weight to other im¬ portant interests. He became egotistical, dog¬ matic, irritable, and was lacking in a sense of humor. Next to Lincoln he undoubtedly did more to win freedom for the colored race than any other man. His other great service was in keeping the country out of war with England and France during the period of the Civil War, when such a catastrophe might easily have led to a permanent dissolution of the Union.

Bibliography. — The best short life of Sum¬ ner is that by Moorfield Storey ((American Statesmen Series,) Boston 1900). Other biog¬ raphies are those by Edward Lillie Pierce, New York 1892) ; by George H. Haynes (‘American Crisis Biographies, y Philadelphia, Copyright, 1909) ; by G. H. Grimke, ‘Life of Charles Sumner, the Scholar in Politics) (New York 1892). The ((Works® of Sumner were published in 15 volumes, Boston 1874-83. A famous oration on Sumner is that by L. Q. C. Lamar, 27 April 1874. Consult also Shotwell, W. G., (Life of Charles Sumner) (New York 1910), and Whipple, E. P., Recol¬ lections of Eminent Man.) Some of Sumner’s most famous speeches have been printed separately, viz., Report on the War with Mexico,® and “Speech on the Crime against Kansas® (Directors of Old South Work, Bos¬ ton) ; (<Address on War, containing True Gran¬ deur of Nations®; ((War System of Nations®; ((Duel between France and Germany® (Boston).

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

SUMNER, George Watson, American naval officer: b. Michigan, 31 Dec. 1841. He was appointed to the navy in 1858. In the Civil War he participated in the bombardment of Forts Jackson and1 Saint Philip; commanded

the Massasoit on the James River, and with the Onondaga forced the Confederate iron¬ clads to relinquish the purpose of attacking Grant’s transports and base of supplies at City Point, Va. After the war he served in various capacities, was commandant of the naval station, Port Royal, S. C., 1899-1901 ; and in January 1901 was appointed

commandant of the Phila¬ delphia navy yard.

SUMNER, Increase, American statesman: b. Massachusetts, 1746; d. 1799. He was graduated at Harvard College in 1767; ad¬ mitted to the bar in 1770, and in 1779 was a member of the State Constitutional Conven¬ tion. He was elected to Congress in 1782, was a member of the United States Constitu¬ tional Convention in 1789, and in 1797 was elected governor of Massachusetts.

SUMNER, Samuel Storrow, American military officer: b. Pennsylvania, 6 Feb. 1842. He was appointed to the army from New York in 1861, served in the Civil War, and against the Indians in the campaigns from 1869 to 1878. In May 1898 he was appointed a briga¬ dier-general of volunteers and in the Spanish- American War was assigned to duty in Cuba. He was ordered to England as military attache, but left there in 1900 to join the United States troops in China. Later he was sent to the Philippines, where he was promoted brigadier- general United States army in 1901, and major- general, August 1903. His last service was in command of the Division of the Pacific, and he retired 6 Feb. 1906.

SUMNER, William Graham, American educator: b. Paterson, N. J., 30 Oct. 1840; d. 12 April 1910. He was graduated at Yale in 1863, studied abroad, was tutor at Yale in 1866-69, in 1867 took orders in the Protestant Episcopal Church, was assistant at Calvary Church, New York, and rector of church of the Redeemer, Morristown, N. J., appointed professor of political economy and social sci¬ ence at Yale College in 1872. His writings in¬ clude a translation of Lange's Commentary on Second Kings) (1872); 'History of American Currency) (1874); Rife of Andrew Jackson) (in (American Statesmen) Series, 1882) ; (What Social Classes Owe to Each Other) (1883) ; 'Problems in Political Economy) (1884) ; 'Pro¬ tectionism) (1885) ; (History of Banking in the United States) (1896) ; Robert Morris)

(1892).

SUMPTUARY LAWS, a term often used in American political discussion with reference to laws regulating the sale of liquor. The orig¬ inal meaning, however, was the regulation by law of eating and drinking, wearing apparel and style of living generally. The early settlers of New England adopted harsh laws of this char¬ acter, which have been exaggerated and cari¬ catured in the fictitious Connecticut ((Blue Laws® of the Rev. Samuel A. Peters.

Sumptuary laws existed in ancient as well as modern times. One of the

Roman laws or the Twelve Tables aimed at repressing extrava¬ gance in funerals. After the establishment of the censorship those holding this office had the right of punishing those guilty of luxurious liv¬ ing. After the Twelve Tables the first sump¬ tuary law passed at Rome was the Lex Oppia (215 b.c.), directed exclusively against the ex-

travagance of women in dress, jewelry, etc. This law was repealed 20 years later. The other sumptuary laws enacted at Rome were almost exclusively designed to keep down extravagance in entertainments. The Lex Julia, passed in the reign of Augustus, was the last sump¬ tuary law passed at Rome, but a few endeavors were made under later emperors also to re¬ press luxury by decrees of the Senate and im¬ perial edicts. The last attempt of this nature that is known to have been made belongs to the reign of Nero. Sumptuary laws were re-vived by Charlemagne. Both he and Louis the Debonnaire promulgated capitularies against luxury -in dress and furniture. Various other laws and decrees having a like object were made under many of the later kings of France, even down to Louis XV. A royal ordinance, dated 19 April 1737, forbids the common people (vilains) the use of calico, which was reserved for the nobility, and there are instances of the wives of commoners being fined in virtue of this decree. In England sumptuary laws began to be enacted in the reign of Edward III, and continued to be passed down to the time of the Reformation. Most of them were repealed by 1 James I, ch. xxv, but they were not all ex¬ punged from the statute-book till 1856.

Sumptuary laws in the early colonial period of America were not confined to New England. Directions were sent to Virginia in 1621 not to permit any but members of the council to wear gold in their clothes, ((or to wear silk till they make it themselves.® In New England the Massachusetts magistrates prohibited the wear¬ ing of gold, silver or thread lace, all em¬ broideries or needle-work in the form of caps, bands or rails, gold and silver girdles, and other ˆextravagances which offended Puritan simplicity. The laws were, however, ignored or but slightly enforced, and gradually became obsolete. At present in the United States dress is solely a Question of decency, and sumptuary laws are, in that sense, of the past.

SUMTER, Thomas, American military offi¬ cer : b. Virginia, 1734; d. 1 June 1832. After the capture of Charleston by the British in 1780 he took the field as a brigadier-general at the head of a body of light

horse and soon became one of the most active and able partisan leaders of the South. His bravery, endurance and unvarying cheerfulness and determination under reverses gained him from his followers the sobriquet of the ((Carolina game cock,® and Cornwallis confessed that he was one of his (<greatest plagues.® After gaining important successes over the British and Tories, lie was, in September 1780, routed with considerable loss near the mouth of Fishing Creek on the Catawba by Tarleton. In 1781 he took a dis¬ tinguished part in the battle of Eutaw Springs. The thanks of Congress were tendered him in 1791, and he was afterward sent to that body as a representative of South Carolina. In 1809 he was appointed United States Minister to Brazil and two years later was elected United States senator.

SUMTER, S. C., city, county-seat of Sum¬ ter County, on the main line and several branches of the Atlantic Coast Line Railroad, 80 miles north of Charleston. It is in an agri¬ cultural region, producing cotton, tobacco and vegetables, of which it exports large quantities.

It also has manufacturing interests of import¬ ance which include cotton factories, planing mills, sash and blind factories, etc. There is a national bank and a State bank. The city has a public high school founded in 1889, and is the seat of Saint Joseph's Academy, a Roman Catholic school for girls, and of the Sumter Military Academy and Female Seminary, a coeducational non-sectarian school. Since 1913 the commission form of government admin¬ isters city affairs. Pop. (1920) 9,508.

SUMTER, Fort. See Fort Sumter.

SUMY, soo'me, Russia, a town in the gov¬ ernment of Kharkov, on the river Psiol, 83 miles north of the town of Kharkov. It has nine churches, a gymnasium, technical school, banks and a large sugar refinery, besides nu¬ merous distilleries. The soil is productive, and agricultural products are exported together with brandy. Four annual fairs give considerable impulse to trade. Pop. 51,500.

SUN, the great central body of the solar system. The aspect of the sun with which all are familiar from infancy shows that it is a shining globe. Astronomical measurements show that this globe is more than 100 times the diam¬ eter of the earth, and, therefore, more than 1,000,000 times its volume. Its small apparent diameter is due to its enormous distance of 93,000,000 miles. The following are more exact numerical particulars :

Mean distance (miles)

Eq hor. parallax .

Density (water = 1) . Mass (earth = 1) . . . .

Diameter (miles) .

Gravity (earth's — 1)

92,900,000 8 . 80" 1.41 332 , 800 866,400 27.65

For methods of determining the distance and other quantities see Astronomy, Theoretical. The aim of the present article is to set forth the physical constitution of the sun, so far as modern research has made it known.

One of the most certain results of research is that the sun is at an extremely high tempera¬ ture, higher than any that we can produce in our furnaces. This is shown by two consider¬ ations. One is the enormous amount of energy radiated, which suffices to keep the earth warm and support life on its surface, notwithstanding the immense distance at which it is placed. Nothing but a hot body could radiate so great a volume of energy. Another proof of the high temperature is shown by the spectroscope, which discloses the vapor of iron and other refractory metals in the sun's atmosphere. It requires a hot furnace to melt iron. Much higher must be the temperature which would make it boil away like water. The temperature of the sun not only does this, but the fact that the spectral lines of iron are dark on a bright ground shows that the solar light emanates from a body yet hotter than the vapor of iron.

Aspect of the Sun. — We can see only the surface of the sun, not its vast interior. To distinguish the two, the shining surface is called the ˆphotosphere.® The latter presents to our view the appearance of a flat disc. The edge of this disc is called the <(limb.® When seen without telescopic magnification, through a dark glass or other medium, the disc of the sun ap¬ pears quite uniform, slightly shading off in tint at the limb. But when carefully examined with

the telescope, under good atmospheric condi¬ tions, the entire photosphere appears as a dark¬ ish background, sprinkled with

brighter grains or nodules. These “rice-grains® are quite ir¬ regular in size and form, and appear as if bright on a relatively dark or yellowish back¬ ground. It is probable that they are produced by currents of heated matter from the interior, hereafter to be described, which are constantly rising to the surface, there to radiate their heat and then fall back again. When the intensity of the heat radiated from different parts of the photosphere is accurately measured, it is found that the amount of radiation diminishes from the centre of the disc to the limb, where it is least. The diminution is slow at first, but in¬ creases quite rapidly at the limb, where it is little more than one-half of that at the centre. The light diminishes in a still greater ratio than the heat. The tint of the light is also different

scope was first pointed at the sun, the observers were surprised to find that that object was now and then variegated by dark spots. These were observed by Galileo, Scheiner and Fabritius. The two latter published more or less elaborate treatises on the subject, but with their imperfect instruments they were not able to learn much as to the laws of these objects. We now know, with the modern perfected methods of observa¬ tion, that the spots are of very different sizes, ranging from the minutest point visible in the telescope to a size so great as. to be perceptible to the naked eye. The largest must, therefore, exceed the earth itself in diameter. These ob¬ jects are usually very irregular in their outline, being frequently jagged and cornered, as if made by a shot or bunch of shot passing through a tin plate or wooden plank. They frequently appear in groups ; indeed a spot vis¬ ible to the naked eye commonly consists of a

-p, Fig. 6.— On the left is a monochromatic (Spectrohehogram) of the sun taken with the light at the centre of the dark Fraunhofer line known as H, due to calcium vapor. The instrument used was the Rumford spectroheliograph of the Yerkes Observatory Numerous areas of calcium vapor, lying at a high level in the sun’s atmosphere, are thus brought to light They are not seen on the direct photograph to the right, which shows the sun as photographed in the ordinary wav A con¬ siderable number of spots will be noted. The horizontal black line across the photograph gives the east and west direction

at the centre and at the limb, although this would hardly be noticed by the eye. The light at the limb has more red in its composition than at the centre. This effect is especially noticeable at the time of a total or annular eclipse of the sun. When the moon has nearly covered the sun, the remaining light has a lurid aspect, as if the sun were shining through a smoky atmosphere, thus giving to observers the illusion that the sky is hazy. There can be no doubt of the cause of this appearance.

The sun, like the earth, is surrounded by an atmos¬ phere ; but this atmosphere is cooler than the photosphere which sends out the light and heat, d he existence of the atmosphere is demon¬ strated by the lines of the spectrum, as well as by the absorption of heat at the limb, which is greater than near the centre because the light coming from that portion of the photo¬ sphere has to pass through a greater depth of the atmosphere than when it rises directly upward from the centre.

The Solar Spots. — When the Galilean tele¬

group of these objects close together. The spots of the group may run into each other to any extent, forming an irregular and jagged mass. Sometimes a spot has almost the appear¬ ance of a crack in the photosphere. In the spot two portions can generally be distinguished, a dark interior called the “umbra® and a shaded border much brighter than the umbra, though not quite so bright as the photosphere, called the “penumbra.® When the atmosphere is steady, the latter is seen, with a good telescope, to be not of uniform shade, but to be striated,’ presenting an appearance somewhat like that of a thatched roof. This can be seen better by a figure than by a long description. A spot seems black only by contrast with the brilliancy of the sun. If it were possible to cut off the sun s light, the light from the spot itself would be of dazzling brightness.

It was formerly supposed that the spots were openings m the photosphere, through which a darker interior was seen. This conclusion was reached because it was supposed that when

the spot approached the edge of the solar disc the penumbra looked broader on the side of the spot next the edge. But careful observations made in recent times show that this is not the case. Sometimes the penumbra is broader at one edge and sometimes at another. It was also supposed that the spots might be something in the nature of cooler dark metals floating on the photosphere. But this view also has been abandoned. It has recently been shown by Hale that a sun spot is an immense vortex, in which whirling electrically charged particles produce an intense magnetic field. Thus a sun spot re¬ sembles a terrestrial tornado. The observations of Evershed and St. John indicate that the gases are rising from the interior of the sun toward the surface, flowing nearly radially out¬ ward above the surface from the centre of the spot. Measurements of the heat radiated from the spot, as

compared with that of the neighbor¬ ing disc, show that the spot is really cooler than the rest of the photosphere. Spectroscopic ob¬ servations agree with this by showing a great absorption of the light coming from the interior of a spot. . .

Another salient feature of the sun is its rotation on an axis deviating only six degrees from a line perpendicular to the ecliptic. The time of rotation is shown by observations of the spots on the sun, which we see to move from east toward west. The relation of the sun to its axis of rotation is much the same as in the case of the earth. The sun's axis inter¬ sects the photosphere at two opposite points called the poles of the sun. A circle passing round the sun midway between the poles is called the solar equator. Distances north and south of the equator are called solar latitude. When we look at the sun at noon its north and south poles are near the upper and lower points of the disc ; and the equator passes horizontally, or nearly so, across the centre of the disc. The position of the sun's equator is more exactly defined by the following numbers :

Inclination to the ecliptic . 7° *5

Longitude of the node .

The earth in its annual course around the sun passes through the line of the nodes about 5 June and 5 December of each year. At these times the apparent paths of the spots across the sun's disc are straight lines. At the interme¬ diate times they are more or less curved. In March the south pole is slightly turned toward us, and the paths of the spots are curved up¬ ward. In September the reverse is the case. We see only the north pole, and the paths are curved downward.

Observations of the spots lead to the unex¬ pected conclusion that the equatorial regions of the sun rotate in less time than those nearer the poles, although the distance they have to go is greater. The sun is so much larger than the earth that, although the time of rotation is more than 25 limes as long, yet the absolute linear velocity of the rotation near the equator is four times as great as that of the earth's rotation, being very nearly one mile per second.

The observations of Carrington give the period of rotation as follows:

At the sun's equator . 24.9 days.

At 30° of latitude . 26 4

The apparent time of rotation, as we see it, is nearly two days longer,

because the earth has carried us forward in its annual motion while the sun is rotating, and the spot has to catch up to our direction before a rotation seems complete.

The rotation of the sun can also be de¬ termined by means of the spectroscope, through this instrument enabling us to determine whether a luminous body is approaching the earth, or receding from it. In consequence of the rotation, the photosphere on the east side of the sun is continually moving toward us, and that on the opposite side moving away from us. The observations made by this method agree with those made on the solar spots in giving a period of about 25 or 26 days ; but they are dis¬ cordant as to the variation with latitude. The angular motions in the different latitudes, found by two observers with the spectroscope, Duner and Adams, are as follows :

Daily Angular Rotation of the Sun in Dif¬ ferent Latitudes, from Spots and Spectroscopic Observations.

Spectroscope

Spots

(Carring¬

ton)

”

Latitude

Duner

Adams

(1908)

o .

14.46°

1. 14°

14.65°

11 .

14.29

13.80

14.43

15 .

1. 13

13.66

14.28

21 . .' .

13.90

13.40

13.86

30 .

13.65

13.06

13.64

45 .

13.10

11.99

12.78

60 .

10.62

11.52

75 .

9.34

10.86

It is a remarkable and interesting fact that the velocities thus determined by the displace¬ ment of spectral lines differ systematically when the lines of different elements are chosen. Thus, the values determined by Adams from the lines of iron, calcium and hydrogen, are as follows:

Solar Latitude

Iron

lines

P

Calcium

lines

Hydrogen.

lines

0 3° .

14.65°

15.0°

15.2°

14 9 .

14.31

14.9

15.0

29 7 .

13.65

14.2

14.6

44 7 .

12.85

13.6

14.0

60 0 .

11.53

12.5

13.7

74 9 .

10.93

13.1

14.3

This difference agrees with much other evi¬ dence on the same point in indicating that the different elements effective in producing the lines lie at different levels around the bail of the sun.

The rotation of the sun must produce an ellipticity or bulging out of the equator, as in the case of the earth. But this effect is so small as to elude all astronomical measurement. To all appearance the sun, notwithstanding its rotation, is a perfect sphere.

Two very remarkable laws govern the solar spots, one relating to their frequency, the other to the region of the sun's disc on which they are seen. We recall the fact of the sun having

north and south latitude as we have on the earth. The first peculiarity of the spots is that they are rarely seen at more than 35° to 40° of solar latitude, north or south. They are most numerous at about 15° latitude, and from that parallel grow less numerous both toward and from the equator. At the equator they are com¬ paratively scarce. Thus we see that there are two zones of spots; one north and the other south of the sun's equator. The following table of the number of spots observed by Carrington in different zones of latitude illustrates the law:

Limiting Number

lat. of zones of spots

0° to 5° 471

5 to 10 1,940

10 to 15 2,522

15 to 20 2,158

20 to 25 1,303

25 to 30 740

30 to 35 203

35 to 40 84

The other remarkable feature of the spots is their periodicity. At intervals of 11 years they are very numerous, while at the inter¬ mediate . times they are comparatively scarce, none being visible for perhaps half the time. It is found that the period is almost exactly 11 years 47 days. It was at one time supposed to be the same as the period of revolution of Jupiter, which is somewhat less than 12 years. Had such been the case we_ should have con¬ cluded that the spots were in some way pro¬ duced by the action of that planet. But it is now proved that the period is more than six months less than that of Jupiter, and does not coincide with any other period known in the solar system. Its average duration is found to be 11.13 years; but it is subject to changes of a year or more. We, therefore, conclude that the cycle of change in the spots is due to a round of processes going on inside the sun itself. What these may be we have no means of determining.

The very careful series of photographs of the sun made at the Greenwich Observatory during the past 30 years show a singular law of vanation in the spots with the 11-year period. After a space of two or three years, during which, as we have said, the spots are few and small, the first evidence of a renewal of activity is seen in the occasional appearance of a spot at an unusually high latitude, say 30° to 35° north or south. This may continue for several months, or even a year. Then the spots begin to be more frequent nearer and nearer the equa¬ tor, while there are fewer beyond 30° of lati¬ tude. Finally, after three or four years, they become thickest of all, as we have said, in about 15° of latitude. About five years from the time when fewest are seen, they will be most numerous , then they will also be seen nearer the equator, or even on the equator itself. After five years they begin to diminish rather more slowly than they increased, until they gradually seem once more almost to disappear. The years, of minimum sun spots are 1889, 1900, 1911, etc. The years when they are ’ most numerous were 1882, 1893, 1904, etc. But these dates are only approximate, as the intervals be¬ tween the minima are not always exactly the same.

The Faculae. — Another curious feature of the sun is the occasional appearance of spots

brighter than the rest of the photosphere. These commonly appear in bunches in the neighbor¬ hood of the spots, and derive their name from the Latin word facula, a torch. They follow a law similar to that of the spots not only in having the same period of frequency, but in being most numerous where the spots are most numerous.. But they are seen over a very much wider region of the sun's disc than the spots, sometimes, although rarely, near the poles of the sun.

A third feature of the sun associated with the spots and the faculae is known as the ˆprominences.ˆ These can be actually seen through an ordinary telescope only during total eclipses of the sun. But they may now be seen at any time, when the air is clear, by means of a powerful spectroscope. Like the faculae, they are commonly, but not always, found in the neighborhood of the spots, being seen from time to time all round the sun's limb. (See Eclipse). They will be described more fully hereafter.

It is quite evident, from what we have said, that the spots, faculae and prominences are all results of one series of operations. This fact has been brought out in a very interesting way by the spectroheliograph. This is an instrument invented by George E. Hale of the Mount Wilson Observatory, which enables a photo¬ graph of the sun to be taken by the light of a single ray of ihe spectrum, the light from all the other rays being cut off. A ray frequently used for the purpose is one emitted by calcium. When a photograph is taken with this ray, we have not a general photograph of the sun by all its light, which is what the ordinary camera would give us, but a photograph in which no light is allowed to enter except that emitted by the vapor of calcium. A photograph thus taken is found to be extremely variegated, some parts of the sun's disc being much brighter than others. The interesting feature is that, in the general average, the brightest parts of the disc are those where the spots, faculae, and prom¬ inences are most numerous. But these bright patches may appear on any part of the sun. The general conclusion is that the three classes of objects we have described are all produced by processes going on in the sun which result in the thi owing up of great masses of calcium vapor.

Having thus described what the sun is in a general way, and shown its appearances, we pass on to particulars respecting its constitution and surroundings. Our conclusions must be drawn step by step from the phenomena ex¬ hibited by the photosphere, combined with rea¬ soning upon the laws of force and the prop¬ erties of. matter. A conclusion most easily reached is that the sun is not a solid body throughout. If it were, its enormous radiation of heat would result in the surface rapidly cool¬ ing off, so that, in a very short time, it would

cease to emit light. Moreover, a study of the surface, shows changes constantly going on in¬ compatible with the idea of solidity. It follows that the heat radiated from the surface must be continually supplied, either by the rising up of hot material from the interior, or by radia¬ tion from within outward. It is the latter which is believed to be acting. For the material of the sun is probably transparent, and it is sup¬ posed that the enormous heat is absorbed and re-radiated as we pass outward from the center.

The absorption and re-radiation from succes¬ sive layers is almost instantaneous, the velocity of heat transference approaching 180,000 miles a second.

In drawing our conclusions the intensity of gravitation on the sun must be borne in mind. It has nearly 28 times the force of gravity on the earth. A man of ordinary size would weigh two tons at the surface of the sun, and would, therefore, be instantly crushed to death by his own weight, were it possible for him otherwise to exist there. Consequently, the pressure to which the vapors of the sun are subject in¬ creases with enormous rapidity below the surface.

The average specific gravity of the ma¬ terials composing the sun can be determined by astronomical theory with great exactness. It is known that the mean specific ' gravity is about 40 per cent greater than that of water, and one-quarter that of the earth. It is doubt¬ less much smaller than this at the surface, and, therefore, increases toward the centre. A cal¬ culation of the resulting pressure shows that near the centre of the sun the pressure produced by the enormous mass and gravitation of the matter composing the solar orb amounts to about 5,000,000 tons per square inch. This pressure is so far beyond any that we can produce at the earth's surface that we are un¬ able to say what effect it would have upon matter.

Yet another unknown factor is the tem¬ perature of the interior. At no great distance toward the centre the temperature exceeds our powers of determination — it may even be 1,000- 000°. As the highest temperature which it is possible to produce artificially probably does not amount to 12,000°, it is impossible to say what effect such a temperature would have upon matter. Thus we have two opposing causes, the one an inconceivable degree of heat, such that, were matter exposed to it on the surface of the earth, it would explode with

a power to which nothing within our experience can be compared, and a pressure thousands of times any we can produce, tending to con¬ dense and solidify this intensely heated matter. One thing which we can say with confidence as to the effect of these causes is that no chemical combinations can take place in matter so circumstanced. The distinction between liquid and gaseous matter is lost under such condi¬ tions. Whether, the central portions are com¬ pressed into a solid, of remain liquid, it is im¬ possible to say.

Modern research shows that the sun, as a whole, is a complex body, the various parts of which are in very different conditions. Begin¬ ning at the centre and passing outward, we have first the vast, invisible interior which forms the globe itself, and which our sight can never pene¬ trate. Surrounding this interior is the visible photosphere, or seeming surface, which we see with the naked eye or the telescope, the appear¬ ance of which has been fully described. So far as ordinary direct observation could show, this would be the whole of the sun. But the spec¬ troscope, as well as eye observation during total eclipses, has shown most complex surroundings of the sun, which would otherwise have been invisible. The surroundings are formed of two envelopes, the chromosphere and the corona.

The earliest accurate observers of total eclipses with the telescope noticed that dur¬ ing the total phase red cloud-like masses were seen here and there projecting beyond the limb of the dark moon. Moreover, at the beginning or the end of the eclipse, it is found that these projections are connected with a red border ex¬ tending round the sun. There is, therefore, an envelope which radiates red light and surrounds the sun, and which is invisible except during eclipses. Quite independent of this envelope is a bright effulgence which is seen during a total eclipse. These phenomena are fully described in the article Eclipse. What we have now to do is to set forth what they indicate.

The red envelope which rests immediately on the photosphere is called ˆchromosphere.® It is comparatively thin — so thin as to be almost im¬ mediately covered when the sun is totally eclipsed. Its nature was first made known by the spectroscope, which showed it to be com¬ posed mostly of hydrogen, helium, and calcium vapor. Its principal and lower parts differ in constitution. At the photosphere it comprises nearly all the substances which exist in the latter. This was shown in a very beautiful way by observations of the reversing layer, first made by Young at the total eclipse of 1870. The ex¬ planation of the phenomena there described is that the photosphere is hot enough to shine by its own light, and, being a gas, to give bright spectral lines.

But the photosphere is so much hotter than the chromosphere that the latter is, in comparison, a cool gas which absorbs the spectral lines from the light radiated by the photosphere. The question of the density of the chromosphere and reversing layer, as its base is called, has given rise to very varied esti¬ mates.

The fact that the spectroscope shows bright lines as the last ray of true sunlight disappears at the beginning of a total eclipse shows that the gas from which these lines emanate must be so rare as to be transparent through a dis¬ tance of thousands of miles. We are, there¬ fore, justified in concluding that the gases of the chromosphere are extremely rare, and the same is probably true of the principal regions of the photosphere.

Among the most extraordinary phenomena exhibited by the sun are the mountainous eleva¬ tions of the chromosphere, which we see as the red protuberances already described. These are of two kinds, the eruptive and the cloud-like. The latter present to us the appearance of vast clouds floating in an atmosphere of the sun. It seems certain, however, that they cannot be what they seem, because there can be no atmosphere there to support them. They are probably held up by an impulsion of the solar rays, which will be described presently. The eruptive promi¬ nences seem to be due to outbursts of intensely hot gases, mostly hydrogen, from the sun. These are thrown up with a velocity of several hundred miles per second, like immense moun¬ tains of fire. They sometimes rise to a height of many thousand miles, their ascent being doubtless aided by the impulsion of the solar rays ; then they fall back again to the sun. The chromosphere and prominences can now be pho¬ tographed in projection against the sun's disc with the spectroheliograph. When such photo¬ graphs are made with the light of the red hy-

drogen line, they show great vortex phenomena, centering in sun spots and closely related to the vortices in the photosphere which constitute the spots themselves. See Plate III.

The violent forces seen in action in the chromosphere are in singular contrast to the soft white light of the corona. Much mystery still surrounds the constitution of the latter. It was supposed to be an atmosphere of the sun; but this view is rendered untenable by the fact that an atmosphere supported by its own weight would more than

double in density for every mile that it was nearer its base. It probably consists of exceedingly minute molecules of gaseous matter, similar to those which make up the tail of a comet, and possibly having some resemblance to the latter. The newly-discov-

an electrical thermometer. The unit usually employed is the calory, which is the amount of heat required to raise one gram of water 1° C. The solar constant is then the number of calories which would be received on each square centimeter of the earth's surface, ex¬ posed perpendicularly to the solar rays, if there were no loss in transmission through the atmosphere.

The following small table gives the mean values of the solar constant obtained from ob¬ servations made at Washington, Mount Whit¬ ney and Mount Wilson. Observations were made at the second station, whose elevation is nearly three miles, in order to test the accu¬ racy of the laws assumed for the absorption of solar rays by the atmosphere.

Washing¬

ton

Mount Whitney

Mount Wilson

Observations .

Mean value .

1902-07

44

1.960

1909

1

1 .959

1910

3

1.956

1905

52

1 .925

1906

62

1 .921

1908

113

1.929

1909

95

1.896

1910

28

1 .914

ered fact of the impulsion of the solar rays probably affords a clew for an explanation of these and similar phenomena. More than 40 years ago it was announced by Maxwell, as a result of his electro-magnetic theory of light, that light and heat emitted by the sun should exercise a very minute pressure on any object which they struck. Conclusion showed that this pressure was so slight that no apparatus then known was so delicate as to make it sensible. Within the last few years, however, E. F. Nichols and others have succeeded in showing experimentally that on very finely divided mat¬ ter this action of light can be observed and measured. It follows that particles below a certain size will be repelled by the sun's light with greater force than they are attracted toward it, and will thus be driven from the sun when in its neighborhood, or supported tempo¬ rarily at a certain height above the sun. Hale has proved, by spectroscopic methods similar to those employed in his discovery of magnetic fields in sun

spots, that the entire sun is a mag¬ net, with a field about 80 times as intense as the magnetic, field of the earth and with its mag¬ netic axis inclined about six degrees to the sun's axis of rotation.

The Sun's Rotation. — As the light and heat which we receive from the sun are the source of all life on the earth, the important work is at once suggested to measure exactly how much radiant energy we receive from the sun in a given time, and especially, if possible, to find whether this is growing greater or less, or if it varies from time to time. Until so late as 1905 the measurements were comparatively very crude, but the sensitiveness of the instruments employed has recently been so increased and observations with them have been so carefully and continuously carried on that this quantity has now been well determined.

For measuring the amount of heat received on a square unit of the earth's surface, the so-called pyrheliometer is employed, an instru¬ ment which presents a surface of known area to the solar rays, the rise in temperature due to the heating being communicated to a stream of water (in the best form), and measured by

Prior to 1905 the true value of the con¬ stant was in much doubt; numbers ranging from 1.76 to 4.10 were stated for it, and the average value 3.0 was frequently accepted. There can be no doubt that the value 1.95 is very near the truth, and this may be regarded as the best value now obtainable. It has been well established, however, especially by the recent work of Abbot, that this fundamental constant varies slightly and irregularly. In 1919 a solar station was established at Calama, Chile, at which it is planned to make constant meas¬ ures of the sun's radiation for several years, in conjunction with northern observations, with a special view of ascertaining, if possible, the law of this variation, and its effects upon ter¬ restrial climates.

The Sun's Magnetism.— In the year 1908, Prof. G. E. Hale of the Mount Wilson Observa¬ tory, from an examination of the spectral lines in sun spots, discovered that around each spot there is a more or less powerful magnetic field. A powerful field will double many of the lines of the spectrum ; a less powerful one will merely widen them. A few lines were found triple in sun spots, and afterward these same lines were found to become triple in the laboratory when viewed along the magnetic lines of force. Thus the lines of sun spots near the sun's limb tend to become triple, while those from spots near the centre of the solar disc are doubled merely. In many cases a pair of sun spots quite near . together are found to have opposite polarity, and while in general the polarity of spots in the southern hemisphere

is different from that in the northern, many cases of ex¬ ception occur. It has, however, been well estab¬ lished that the sun, like the earth, has a north and south magnetic pole; the inclination of the sun's magnetic axis has been determined, and the fact has been established that the magnetic pole is in slow rotation about the pole of the sun.

A curious relation is found by the study of magnetic storms on the earth. The latter con¬ sist in occasional perturbations of the magnetic needle, which are very irregular in their char¬ acter and are felt over the whole globe. They

SUN

. 1

1 Prominences on the edge of the sun. Photographed during the total solar eclipse, in Algiers 30 August 1905

2 The corona of the sun during the total eclipse of 28 May 1900

3 Calcium flocculi in the neighborhood of a sun-spot. Photographed with the spectro-heliograph 10 October 1903, at the Yerkes Observatory

SUN

gHBUnlTC

i> *isis

1 The appearance of the corona during the total eclipse of 30 August 1905

2 Spectro-heliogram of the whole ball of the sun taken at the Yerkes Observatory. 12 August 1903

SUN

'< . ,

VVi

1 Solar prominence 80,000 miles high, photographed with the spectroheliograph on Mount Wilson

2 The chromosphere and prominences photographed in projection against the sun's disk, showing the hvdroeen vortices centering in sun-

spots discovered at Mount Wilson

'

•

r*

.

generally occur when there is an unusually bright aurora. Now, investigation shows that the number of these disturbances follows ex¬ actly the period of the solar spots. During those years when the spots are most numerous magnetic storms are most frequent, and vice-versa. The conclusion is that the sun spots and magnetic storms are due to the same cause. The sun's spots can be due only to something going on in the sun, and it follows that there must be some emanations from the sun which produce magnetic storms. Modern investiga¬ tion has not been able to detect or define these emanations, though they are supposed to be electrically charged particles, shot out from the sun, and drawn in around the magnetic poles of the earth, where they give rise to the aurora. We have the strongest reasons to believe that neither the magnetic field of the sun as a whole nor the much more intense local fields in sun spots, produce any measurable magnetic effect at the distance of the earth.

Age and Duration of the Sun. — The great¬ est problem connected with the sun is suggested by modern science. Up to 100 years ago stu¬ dents and philosophers saw no reason why the sun should not continue to shed heat and light on the earth for an indefinite period without undergoing any change whatever. But toward the middle of the 19th century the laws of energy were developed and understood. These laws set forth that the radiation of heat always in¬ volves the expenditure of something called energy; and that the latter is necessarily limited in supply. It was also .seen that the sun must be a hot body, and must lose all the heat it radiated. To make this subject clear, we must remark that what the sun really radiates is not properly called heat in scientific nomenclature ; the more exact term is radiant energy. But this differs in no respect from what is radiated into a room from a hot 'fire. Radiant energy goes out from the fire and strikes the walls of the room, where it creates heat, and thus warms the walls. All the heat thus transmitted to the walls comes from the coal, although

in its pas¬ sage from the fire to the walls it passes through an intermediate stage called radiant energy. That the latter does not necessarily warm a me¬ dium through which it passes is shown by the striking experiment of making a large lens out of ice instead of glass. When the sun's rays are concentrated on a point by passing through this mass of ice they will burn the substance on which they fall, as if they had passed through glass. We see, then, that however cold the space between us and the sun may be, all the radiant energy reaching us from the sun must come from a source in the sun limited in supply.

If the sun were merely losing energy like an ordinary hot body cooling off, a very simple calculation will show that it would be so cooled off in the course of 3,000 or 4,000 years as no longer to radiate much heat. It is clear that such has not been the case. Yet the most care¬ ful study shows no possibility that it can be receiving any considerable part of its energy from any outside source. Moreover, the geol¬ ogists assure us that the stratification of the rocks, as well as many other other phenomena associated with them, proves that the sun has been radiating heat to the earth at not much

less than its present rate for hundreds of millions of years.

The only solution of the puzzle that was sug¬ gested until 1903 was based on the mutual con¬ vertibility of heat and motion. From the time that the theory of energy was developed it was known that when the motion of a material sub¬ stance is arrested without any other effect being produced, heat is generated. For example, the waters of Niagara are warmed by about one- quarter o i a degree Fahrenheit in striking the bottom of the falls. The blacksmith by ham¬ mering a piece of cold iron can make it hot, be¬ cause the energy which he puts into the motion of the hammer is converted into*heat when the latter strides the iron. It follows that if bodies of any sort are falling into the sun, heat will be generated by the fall. Moreover, owing to the power of the sun's attraction, such bodies may fall with great velocity; and the heat thus gen¬ erated increases as the square of the velocity. Thus arose the first theory as to how the sun's heat could be kept up. It was supposed that meteors were continually falling into that lumi¬ nary. But further study showed it to be im¬ possible that meteors could fall in such quantity as to have this effect.

Then it was suggested by Helmholtz and Thomson that if the sun were a gaseous body, as it is now supposed to be, radiating energy, the loss of the latter would continually be made up by the fall of its outer portions involved in the continual contraction of the sun through loss of heat. All bodies, and gaseous ones in *a higher degree than any

others, diminish in vol¬ ume when they cool off. Accordingly, when the photosphere of the sun cools off, it diminishes in volume, grows smaller and falls down upon the mass of the sun below it. Careful calcula¬ tion shows that if the sun contracted about 250 feet per annum, the energy thus generated would keep up all the heat which the sun radi¬ ates. An important addition to this theory was made by J. Homer Lane, who showed that if the sun contracted like a mass of pure gas it would continually grow hotter as it con¬ tracted. This is now known as Lane's law. But there is a necessary limit to the quantity of heat which can thus be generated. If the sun has been thus growing smaller through long ages, there must have been a time when it filled the whole space now occupied by the solar sys¬ tem. What is more, the contraction must have been far more rapid the larger the sun was ; because the force of attraction at the sun's sur¬ face diminishes as the inverse square of the diameter of the sun. For example, when the sun was twice as large as it is now, this force was only one-quarter as great; consequently it would have to contract four times as much to generate a given amount of energy as it does now. Finally, exact computation showed that even on this theory there was still a limit to the existence of the sun too narrow to satisfy the demands of geology. It could not have been radiating heat for more than 50,000,000 or 100,000,000 years. Before that time it must, ac¬ cording to the theory, have been a gaseous mass filling the whole space now occupied by the solar system, which contracted and formed sun and planets, in accordance with the theory known as the (<nebular hypothesis.^

It also seemed very improbable that the sun's

heat could have been at all constant for even 20,000,000 years; on the other hand, geologists went hundreds of millions of years. Thus ap¬ parently an irreconcilable contradiction was pre¬ sented to scientific investigators when in 1900 the discovery of radium began to put a new face upon the fundamental theories of physical science. We now know that there is an im¬ mense amount of energy stored in the atom, which is a very complex thing. With the so- called "radioactive® substances, the atoms may be broken up, the result of the process being an element of lower atomic weight than the original substance. And in this breaking up of the atom a great amount of energy is liberated. Though it has been known for many years that Helm¬ holtz' theory was inadequate, whether a large part of the sun's energy is of

this sub-atomic origin, we do not know, but it is reasonable to suppose that it is. And it is only necessary to suppose that a part of the energy of the atom is in this way changed into heat energy to al¬ most indefinitely prolong the life of the sun.

The most recent semi-popular, but authen¬ tic work is (The Sun) by C. G. Abbot (New York 1911) ; this contains many references to more extended works or detailed publications. A larger and very important work is (Physik der Sonne, > by E. Pringsheim (Leipzig 1910). Numerous papers will be found in the Proceed¬ ings of the Royal Society, London, and in the Astrophysical Journal, Chicago.

Simon Newcomb.

Revised by Eric Doolittle.

SUN, Eclipses of the. See Eclipse.

SUN, Order of the. See Orders (Royal) and Decorations.

SUN-BIRDS, a large family (Nectariniida) of small insect-eating birds of the tropics of the Old World, having elongated, slender and curved bills, wings of moderate size and the central tail-feathers usually prolonged beyond the others. These birds occur in the Eastern Archipelago, India and Africa. They take the place of the humming-birds of the New World, and in brilliant coloration and habits much resemble these, but are far removed from them in classification, the honey-eaters (Meliphagi - dee) being their nearest relatives. They are constantly hovering about flowers seeking the minute insects found within the petals and sip¬ ping the flower-juices, so that they have been named sucriers or sugar-eaters, by French au¬ thors. Some certainly eat fruits. The song is sweet, but without any special characteristics, and in habits they are exceedingly lively, quar¬ relsome and even pugnacious. The gaudy plumage is chiefly confined to the male sun- birds and depends for effect upon intensity of color and not upon metallic or prismatic lustre. The nests are built in the hollows of trees or are placed in thick bushes. Some species (such as Nectarinia lotenia and N. asiatica) make dome-like nests, which are suspended from the extremities of twigs of bushes, and are covered with cobwebs for the purpose of concealment. A magnificent treatise upon the sun-birds, with colored plates, has been written by Shelley, en¬ titled (A Monograph of the Nectariniidse) (London 1876-80). The name is sometimes given to various other birds. Thus the sugar- birds or banana-birds (qq.v.) of the West

Indies are often so called; and a large South American bird, also called finfoot, for which see Heliornithidˆ:.

SUN-BITTERN, an extraordinary some¬ what rail-like bird of Brazil and Guiana (Eurypgahelias) . It is about 16 inches long, body small and thin, neck long and slender, head like that of a heron, with a long, power¬ ful beak compressed at the sides and slightly arched at the culmen ; the plumage is minutely variegated with bars and spots of many colors, and it has the habit of spreading wings and tail in courtship or on other occasions of ex¬ citement, forming a rosette about its head and neck fancifully compared to a “sunburst.® It is often made a pet by the Brazilians, who call it peacock. A larger species (E. major) in¬ habits Venezuela and Colombia. Their nearest relative is the kagu (q.v.). Consult Newton, A., dictionary of Birds* (New York 1893-96).

SUN CRACKS. See Mud Cracks.

SUN-DANCE, a ceremony performed, with local variations, by most of the prairie Indians, including the Mandan, Omaha, Pawnee Loup, Cheyenne, Arikara, Hidatsa, Blackfeet, Nez Perce, Winnebago, Yankton, Santee and Kiowa. It is held apparently at the full moon occur¬ ring at or next after the summer solstice, and lasts from three to six days. The budding of the wild sage also indicates the times for hold¬ ing the ceremony, and all neighboring tribes, whether friendly or not, are usually invited. The dance begins at sunrise and ceases at the following sunrise. As may be inferred from the length of the festival, including the fasting and purification of the devotees and other preparatory acts, the actual sun-dance is but the chief episode in a ritual comprising a congeries of ceremonies. The motive or pur¬ pose of the dance is to promote welfare through the gratification of desires and wants and to avoid ill-fare through the dispelling of hostile agents. The devotee or sun-dancer indulges in the ceremony to fulfil a vow, made by him during the previous winter or season from va¬ rious motives, that he would make a prayer to the disposer of what he needs through an ap¬ peal to the sun, to “Wakanda® (among the Sioux). 1 he Tetons call the ceremony by a name which means “They dance looking at the sun.® In it the moon is regarded as the rep¬ resentative of the sun, hence the dancers gaze at it just as they do at the sun. Among the principal objects in the festival of the sun- dance is the sun-pole or “mystery tree® (svm- bolic of the centre of the four quarters of the heavens), the sacred tent of preparation erected within the so-called camping-circle of the tribe, wild sage, a sweet-smelling grass called wach- ahga by the Teton and the dancing-lodge. Each devotee persists in his part until he has received a vision from the sun;

but if at the close of the ceremony no such vision has been vouchsafed to him, resort is had to self-sacri¬ fice, which is called “vision-hunting.® One of the characteristic forms of self-sacrifice is that of having two wooden skewers inserted under¬ neath strips of skin raised by slashing the breast or back, to which stout thongs are made fast, by which the devotee is drawn up and fastened to the sun-pole, to which he remains suspended until his weight, sometimes made

greater by having a buffalo-skull hung to his person by similar skewers, causes the latter to rend the skin, thus letting the devotee fall to the ground, usually in a faint ; another may have a buffalo-skull suspended from thongs passing through raised strips of the skin on the back or breast, which is allowed to hang thus until the skin is parted by violence and the thongs are freed. Some men who do not intend to dance seat themselves near the sun-pole, and small pieces of flesh are cut out in a row from the shoulders of each ; these are offered to the being represented by the sun-pole. Women do not scarify themselves in the sun-dance, and self-torture and the shedding of blood are not practised in the Kiowa ceremony. Consult Cat- lin, G., (North American Indians> (new ed., 2 vols., Philadelphia 1913) ; Lowrie, R. H., (The Sun Dance of the Crow Indians* (New York

1915).

SUN-DEW, any herb of the genus Drosera, which is classified near the pitcher-plants and the roses. Several species are found in Amer¬ ica. The flowers are very pretty, like that of the saxifrage, five-petaled, and borne at the top of a leafless scape, in a raceme, the buds in which are bent downward, the blossom of each day surmounting the arch and facing the sky. They are white .or purplish in color. Sun¬ dews grow in bogs or wet ground, the roots are poorly developed and yet the small plants thrive even in sphagnum ; this is because they are flesh-eaters, and live on the nutriment ob¬ tained from such insects as they can catch on their foliage; the roots, therefore, serving prin¬ cipally to anchor the plants and to supply the large amount of water needed. The leaves, varying in shape in the several species, from round to filiform, are covered thickly on the upper face with wine-red filaments having a glistening drop like dew at the tips. These are stalked glands, destined for a purpose as deadly as that of the tentacles of the octopus. The leaf blades of the Drosera rotundifolia, a com¬ mon sun dew, are round, and are arranged in a rosette around the base of the

flower-scape, the smooth green under surfaces resting on the ground. In times of inaction the tentacles ra¬ diate in concentric circles and are tipped by their globular translucent glands, which sparkle with a viscid secretion exuded by them. But let a fly light on one of the glands and remain there, glued fast by the viscous fluid, and there is immediately a ghange in the state of things. In its efforts to release itself, the struggling insect is only besmeared more com¬ pletely, chokes the organs of respiration and is ultimately smothered. In the meantime, the tentacles, disturbed by the fly, have become ex¬ cited and have transmitted the stimulus to the other glands so that they all bend toward the tiny body, converging over it, and striving to touch it. They even shift the inert object toward the centre of the leaf-blade, so that the greatest number of tentacles may reach it. Such glands as succeed in touching the meat secrete an acid juice, with the addition of a ferment which is entirely similar to pepsin, and apply this secretion to the fly, digesting it, as it were. The glands then absorb the flesh and blood of the meat, and also their own secre¬ tions. The tentacles straighten up, the undi¬ gested portions of the insect resting on the dry

glands are blown away, and the glands soon begin to exude their viscid secretion again, and make themselves ready for a fresh victim. When a large insect is entangled, the leaf-blade itself folds inward slightly, so that a maximum number of tentacles may concentrate upon the food. D. filiformis has erect, very narr.ow leaves, and when an insect is caught by the glands, the leaves themselves bend toward it. In D. longifolia the leaf-blade enfolds the fly. Sun-dew glands respond by bending to repeated touches, although no object rests upon them. It is only nitrogenous food which is obtained by this digestive process ; carbonic acid is as¬ similated from the air as by other plants. Consult Darwin, C., insectivorous Plants* (1875; new ed., 1900).

SUN-DIAL, an hour-measuring instrument known from the earliest times to the Egyp¬ tians, the Chaldaeans and the Hebrews. It is worthy of remark, however, that no ancient Egyptian sun-dials have been found. Those connected with Egyptian remains have been recognized as all of Greek origin. The Greeks adopted it from their Eastern neighbors, and it was introduced into Rome during the First Punic War. One of the earliest types of sun¬ dial found in Egypt, and still in use there, consists of a palm rod set upright in the ground, with a circular arc around it set out with stones to mark the hours as the shadow of the rod traverses the circle. Another more primitive form still in existence in Egypt has a rod laid horizontally in a north-and-south direction on two forked uprights, a short dis¬ tance above the

ground. At equal distances east and west of the rod are placed two stones or pegs. When the shadow of the rod lies across the westerly peg the day's work begins ; when it reaches the easterly peg the day's work is ended.

It was discovered in very early times that a vertical rod could not throw a shadow that would accurately denote time, and the correct inclination of such a rod or the stile of a sun-dial was evidently a matter of experiment and approximation before the ancient astrono¬ mers fixed the angle by calculation. This sur¬ mise is borne out by the various inclinations found in ancient dials. Some of these were constructed arbitrarily at 45°, an angle having no relation whatever to the latitude of its location.

The first historic sun-dial dates from about 1000 b.c. It was found in Rhodesia, and is be¬ lieved to be of Semitic origin. Sun-dials are referred to in Grecian literature in 560 b.c., and a certain sun-dial is specifically spoken of as having been set up at Athens by the astronomer Meton in 433 b.c. It is said of the Turks that wherever they build a mosque they place a sun-dial. In China they are every¬ where, and small ones which may be carried in the pocket are very common. The correct use of these portable dials depends, of course, upon their accurate orientation when reading them.

Sun-dials have been classified under three headings, according to their superficial form : spherical, cylindrical and plane. The spherical form is the most ancient. It consists of a hemispherical hollow cut into a rock or built up in that form, the flat of the hemisphere being horizontal. An upright rod was set in

the centre of the hemisphere, pointing to the zenith. The hour marks were cut into the hol¬ low surface. A variation of this type was the cutting away of the front half of the hemi¬ sphere. This form of necessity can mark only the hours from 6 a.m. to 6 p.m. An old Roman dial is in the form of a spherical shell of which about two-thirds have been cut away, held upon the shoulders of a herculean figure. Cylindrical dials have the hollow in the shape of a semi-cylinder cut through lengthwise. A rod in the position of the axis of the cylinder throws the shadow. A variation of this form is a semi-cone cut through its axis. The plane dials are too well known to need description.

In the placing of sun-dials another classifi¬ cation comes into play; they may be horizontal or vertical. Many of the latter type are set into or carved upon the walls of churches or other buildings or on stone blocks set upon pillars or pedestals. As a rule, the vertical sun-dials are set to. face directly south. Where this is not feasible the gnomon may extend toward the south at the angle of a corner of a building, the hour lines being partly on one fagade and partly on the other. In some of the odd pillar types the stone block at the top is cut with many facets like a crystal, with a gnomon on each facet.

The leading principles of dialing may be made intelligible to general readers by the following simple illustration:

Let P B p D represent the earth as a hollow transparent sphere, having an axis P E p, of

which P and p are the poles. Let the equator be divided into 24 equal parts and through these divisions draw the meridians, a, b, c, d, etc. Let one of these meridians pass through any given place for which a dial is required to be made, and where that meridian cuts the equator let it be numbered XII. The opposite meridian must likewise be numbered XII, the other meridians being numbered as shown in the cut. This being done, these meridians will be the hour circles of the place on the first meridian; so that if the axis P E p were opaque, the sun in his (apparent) motion round the earth in 24 hours will pass from one merid¬ ian to another in one hour, and cause the

shadow of the axis to fall on the hour on the plane D C B A. This diagram has been drawn for the latitude of Glasgow, 55° 52', and the plane in its present position would form a horizontal dial for that place; but we may suppose it capable of moving round its axis A C, so as to assume different positions

in the sphere. If it move round so as to be¬ come vertical, that is, at right angles to its position in the figure, we then obtain an erect south dial. The plane may also be made to incline from the meridian either toward the east or west. Thus we have dials of different kinds dependent on the position of the plane with regard to the first meridian, the position of the hour lines of which are all determined by the meridians of the sphere cutting the plane.

We have been considering the earth as the sphere, in our illustration of the nature of dials, but the earth’s magnitude is so small compared with the distance of the sun, that no appreciable error will follow in considering a small glass sphere similar to that above described, but

placed on the surface of the earth with its axis parallel to that of the earth ; then will the sphere show the hour of the day in the manner before specified. The only things absolutely essential for a dial are the axis and the plane, the places of the hour lines having been once determined. Dials may have various forms, many of which are exceed¬ ingly curious and intricate, and require for their construction the application of complicated trigonometrical formulae. We shall confine our attention here to the most common, and, at the same time, most useful form, that is, the plane horizontal dial. On the proposed plane, which may be either of marble, slate or brass, draw a straight line P H S for the meridian or 12 o'clock line, and parallel to this draw 12, h S, leaving a space between them equal to the thickness of the gnomon. g

The gnomon is a thin triangu¬ lar plate of metal, somewhat similar in shape to the figure A E B, the side A B being fixed into the plate of the dial, so that the gnomon shall stand perpendicularly, the line A E being directly north and south. Fig. 3. L7 The line A E is called the style, and the angle E A B is made equal to the latitude of the place for which the dial is constructed. In the case of a vertical dial the angle E A B must be the complement of the latitude, the

line A B the top of the gnomon and the line B E affixed to the dial.

We return again to the consideration of Fig. 2. Draw 6 H 6 perpendicular to 12 H S, and it will be the six o'clock hour line; make the angle 12 H F equal to the latitude of place, and draw 12 F perpendicular to H F ; con¬ tinue S 12 to P, making 12 P equal to 12 F. The line 12 1 2 3 4 is drawn parallel to the line 6 H 6. From the point P draw the lines P 1, P 2, P 3, etc., terminating in the line 12 1 2 3 4, making angles with the line 12 P at the point P of 15°, 30°, 45°, etc., increasing by 15° each line. Next from the centre H draw the lines H 1, H 2, H 3, etc., and thus the hour lines of 1, 2, 3, 4 and 5 p.m. will be found. The hour lines on the other side of the style should now be formed by taking a tracing of the side al¬ ready formed ; the hours are of course num¬ bered differently, and both sides will stand thus, the hour line of both sides corresponding :

1, 2, 3, 4, 5, 6, 7, 8,

12,

11, 10, 9, 8, 7, 6, 5, 4.

Here we have carried the hours beyond 6, which was the extent of the construction but to find the hour lines for 4 and 5 in the morning we have only to produce the hour lines of 4 and 5 in the evening, and in like manner for the hour lines of 7 and 8 in the afternoon, produce the hour lines of 7 and 8 in the morning. The dial gives solar time, and, therefore, the time, according to it, will only agree four days in the year with a well-regulated clock. See Equa¬ tion.

The orientation of the sun-dial after it is made is a necessity of the first importance if satisfaction is desired. This process is carried out usually at night with the aid of two plumb-lines one north and the other south of the position in which the dial is to be set. From the Nautical Almanac the time is found at which the polestar crosses the meridian of the place. The two plumb lines are brought into a line pointing to the star at that moment. The dial can then be placed in the same line conveniently by daylight. It is usual to erect frames of considerable height to hold the plumb-lines so that the sighting upward may be the easier. If the location of the pedestal of the dial is chosen beforehand, the frames for the plumb-lines must be so arranged that both may be moved so as to have the centre of the pedestal in the same line with them and the star.

The sun-dial is daily getting more rare in this age but notwithstanding the superiority of the clock, why has the dial almost everywhere vanished? <(If its business use,® as has been well observed, <(be superseded by more elabo¬ rate inventions, its moral use, its beauty, might have pleaded for its continuance. It spoke of moderate labors — of pleasures not protracted after sunset — of temperance and good hours. It was the primitive clock — the horologue of the first world. Adam could scarce have missed it in paradise. It was the measure ap¬ propriated for sweet plants and flowers to spring by — for the birds to apportion their silver warblings by— for flocks to pasture and be led to fold by. The shepherd carved it out quaintly in the sun, and, turning philosopher

by the very occupation, provided it with mot¬ toes more touching than tombstones.®*

Bibliography. — Denison, E. B., (Clocks, Watches and Bells) (London 1860) ; Gatty, Mrs. A., <The Book of the Sun DiaP (London 1900) ; Hogg, W., (The Book of Old Sun- dials5 (London 1917) ; Horner, E., (Primitive Sun-Dials or Scratch Dials) (Taunton, England 1917) ; Leybourn, W., <Dialling) (London 1700); Wells, I., (Sciographia : or

the Art of Shadows* (London 1635).

SUN-DOG; also called MOCK-SUN and PARHELION. In meteorology, a bright, luminous area sometimes seen .on either side and at the same altitude as the sun. Sun-dogs are found at the points in which the solar halos cut the horizontal, parhelic circle. Thus two sun-dogs are usually seen on either side of the sun, and at equal distances from it, though four are not infrequent. The nearer pair are 22° from the sun and the outer are 46° distant, while fainter sun-dogs are more rarely seen at 50°, 98° and 120°, and even directly opposite the sun, at 180°. The last is sometimes known as an Anthelion.

Bright areas formed at the intersections of any two circular halos near the sun are some¬ times also referred to as sun-dogs and such sometimes are seen directly above and below the sun. The parhelic circle is produced by the reflection <of the sun's light from ice prisms or snow crystals whose axes lie in a vertical po¬ sition : so-called <(Contract Arches® arise from prisms whose axes are horizontal. It is the latter that give rise to sun-dogs which are vertically above and below the sun.

Sun-dogs are usually reddish on the sides toward the sun and they are sometimes greatly elongated along the parhelic circle which pro¬ duces them. They vary greatly in brightness and distinctness with the variation of the num¬ ber and arrangement of the ice crystals in the air.

SUN AND LION, Order of, a Persian order founded in 1808 by Shah Fath Ali, in imitation of the French Legion of Honor, established about six years previously by Na¬ poleon I, then first consul. It includes five classes.

SUN MOTOR. See Solar Motor.

SUN WORSHIP, a form of nature wor¬ ship which prevailed in all the ancient civiliza¬ tions. In numerous primitive religions the sun is not the supreme deity: in many the moon holds the pre-eminence. The mode of reckoning time by moons is more ancient than solar cal¬ culation: in the language of the Hottentots, just as in Teutonic, the Moon is ((he,® the Sun ((she® ; and rude tribes in both hemispheres still make the moon masculine, the sun feminine: the ancient Germans used to say Hermon (herr - mond. Lord Moon) as the Germans still say Herrgott: on the other hand, as a mediaeval writer tells us, the sun used to be called ((Holy Lady® : ((I knew an old woman who believed the sun to be a goddess, calling her sancta domina .® The aborigines

of North America worship the sun; for them the peace-pipe is the gift of the sun ; in the council the pipe is always passed

*“Horas non numero nisi serenas ” (“I .count not the hours unless they be bright ") was an ancient dial motto of great beauty and significance.

around, following thus the sun’s course. The Natchez lived under a monarchy and the royal family, children of the Sun, like the race of the Incas of Peru, stood high above the com¬ mon people. In Mexico the sun was pre-emi¬ nent over all the other gods. In the Hebrew sacred books there are solemn denunciations of sun worship, for the heathen all around paid adoration to that luminary; and it is clear from 2 Kings xxiii, 5, 19, that some of the kings both of Judah and of Israel favored the worship of the sun.

SUN-YAT-SEN, Chinese revolutionary leader: b. Fatshan, near Canton, 1866. He was graduated (1892) at Hongkong School of Medicine, and started practice at Macao when he became one of the plotters resolved on forcing the Manchu dynasty from power. He fled from Canton after the first failure at revolt and went to Japan, thence to San Francisco. He formed the revolutionary association Kao Lao Hwei and carried on his propaganda all over the world, making the United States his headquarters and domicile. Dr. Sun’s life was jeopardized by the standing reward of $50,- 000 for his assassination, but the revolution of 1911 in China succeeded, thanks largely to his indefatigable energy and resourcefulness in propagating the work in every country. He was rewarded by being made Provisional Presi¬ dent of the new Chinese Republic but resigned in 1912 in favor of Yuan Shih-kai in order to bring the great Northern influence of the latter into the cause. Sun’s later opposition to Yuan Shih-kai in the Peking Parliament caused his expulsion and he had to flee to Japan. Consult Cantlie and Jones. (Sun-Yat-Sen and the Awakening of China5 (3d ed., New York

1913).

SUNBURN (erthema solare or eczema solare), an injured condition of the skin caused by exposure to the action of the heat of the sun’s rays. The resulting conditions vary according to the degree of elevation of the tem¬ perature, the character of the medium through which its effect is exerted, length of time the skin is subjected to the action. The

effect is productive of an erythmatous redness, skin slightly tumified (swollen), with sensation of burning heat. In its course the skin usually desquamates (scales off) and becomes the seat of a <(dirty-brownish stain,® which passes off later. Such a condition is brought about by several hours' exposure of the bare skin to the sun's rays. Under severe conditions of tem¬ perature blistering may arise at times. In the former, ordinary cases a lotion or salve ex¬ cluding the air from the injury, and to relieve the pain, is applied. Zinc oxide, boric acid, vaseline, etc., are recommended. In severer cases where blistering arises the same treatment must be used as in scalds or burns.

S U N B U R Y, sun'bu-ri, Pa., borough, county-seat of Northumberland County, on the Susquehanna River, and on the Pennsylvania and the Philadelphia and Reading railroads, about 157 miles north of Philadelphia and 55 miles north of Harrisburg. It was settled in June 1772 by Surveyor-General Lukens and William Maclay. It was incorporated as a borough 24 March 1797. The place was once the site of the Indian village of Shamokin. In

1756 Fort Augusta was erected here as a means of defense against the French and Indians. The city is in a lumbering and coal region. The chief manufacturing establishments are railroad shops, planing mills, silk mills, dye works, sash and door factories, nail factories, a rolling mill and coffin and casket works. It is an important commercial and industrial centre for a large region ; extensive coal shipments are made from here. The principal public buildings are the county courthouse, municipal buildings, the Mary M. Packer Hospital, the churches and public schools. The three banks. have a com¬ bined capital of $500,000. The government is vested in a chief burgess and a council of 18 members, who hold office two years. A small stream separates Sunbury and East Sunbury ; the boroughs are one in industrial and com¬ mercial interests, but have independent munic¬ ipal governments. Pop. about 16,000.

SUNDA (sun'da) ISLANDS, a group of islands in the Indian Ocean, comprising three minor groups, namely, (1) the Great Sunda Islands, to which belong, Sumatra, Borneo, Celebes, Java, Madura, Banka and Billiton; (2) the Lesser Sunda Islands, comprising nine islands of smaller extent, and (3) the Timor Group, all forming part of the Malay or East Indian Archipelago. The flora is exceedingly rich and varied. This is the home of sugar¬ cane and many of the spices, and the different altitudes from coasts upward produce an ex¬ ceptional variety of plant-life. Some districts, as in Sumatra, reach high elevations, others consist chiefly of grassy plains, or forest- covered

slopes.

SUNDA STRAIT, East Indies, the channel which separates the island of Java from Su¬ matra. It is from 20 to 100 miles wide, and contains a number of volcanic islands, the most noted of which is Krakatoa (q.v.). The strait is an important commercial channel.

SUNDARBANS, soon'dar-banz, or SUN- DERBUNDS, soon'der-bundz, India, the allu¬ vial islet region lying around the mouths of the Ganges River (q.v.), and forming the lower part of the delta. It stretches for 175 miles along the coast, and has an area of 8,000 square miles. The region is intersected by a network of innumerable channels and back¬ waters, many of which are navigable. The intervening islands are largely marshy, and covered with dense forest jungle abounding in wild animals, snakes, crocodiles, tigers and leopards. The unhea'lthful climate has hitherto defeated all attempts at reclamation.

SUNDAY, William Ashley, American evangelist: b. Ames, Iowa, 19 Nov. 1863. He was educated at the high school, Nevada, Iowa, and studied at Northwestern University. From 1883-90 he. was a professional baseball player in the Chicago, Pittsburgh and Philadelphia teams of the National League. He became as¬ sistant-secretary Y. M. C. A at Chicago (1891- 95) and started his career as evangelist in 1896. In 1903 he was ordained a Presbyterian minister by the Chicago Presbytery. He has held evangelistic meetings in many of the cities of the United States, drawing large audiences and securing great numbers of converts.

SUNDAY, the Christian weekly festival, by theologians associated with the Jewish Sabbath

(see Sabbath'), while its observance is often enforced by the citation of the Fourth Com¬ mandment in the Decalogue. While the Chris¬ tian Church has never identified Sunday with the Jewish Sabbath, it has always quoted the Fourth Commandment as sanctioning, if not enacting, rest and relaxation from labor in one day out of every seven. When the Church was made a department of the state by the Christian emperors of Rome, the observance of Sunday was enforced by civil statute. When the Roman Empire passed away, and the office of pontifex maximus, once held by the emperor of Rome, was claimed by

the bishop of Rome, Sunday observance was enforced by ecclesiastical as well as civil law. The Third Council of Orleans 538 forbade all rural work on Sunday. Pope Gregory I made at Rome the same law as had been passed in 578 by the Council of Auxerre : <(On the Lord's Day it is not permitted to yoke oxen or to perform any other work, excepting for approved reasons.® Charlemagne in 813 enacted that on the Lord's Day all servile labor should be abstained from.

By the laws that obtained in England during the Saxon monarchy up to the time of Edward the Confessor (whose Sunday law is dated 1056), abstention from marketings on Sunday and from popular meetings was enforced under penalty of a fine. Equally strict was the Sun¬ day legislation which followed the Norman Conquest. The mediaeval Sunday laws in Eng¬ land were but the expansion of the Saxon laws. In 1281 a.d. John Peckham, archbishop of Canterbury under Edward I, explained the Fourth Commandment as follows :

<(In the commandment (remember that thou keep holy the Sabbath day,> Christian worship is enjoined, to which laymen as well as clerks are bound; and here we are to know that the obligation to observe the legal Sabbath, accord¬ ing to the form of the Old Testament, is at an end, together with the other ceremonies in that; to which in the New Testament hath succeeded the custom of spending the Lord's Day, and other solemn days appointed by the authority of the Church, in the worship of God; and the manner of spending these days is not to be taken from the superstition of the Jews, but from the canonical institutes.®

A statute of the 28th of Edward III runs as follows : ((Item, it is accorded and established, that showing of wools shall be made at the stable every day of -the week, except the Sun¬ day and solemn feasts of the1 year.®

In 1359 a.d. Islep, archbishop of Canterbury, issued the following to his clergy: "Whereas, the most excellent prince, our lord, the King of England, is now going to make an expedition in foreign parts with his army for the recovery of his right, exposing himself as a soldier to the doubtful events of war, the issue whereof is in the hand of God; we who have hitherto lived under his protection are, by the divine favor shining on us, admonished to betake our¬ selves to prayer, as well for the safety of every one of us as for the public good, lest if adverse fortune should invade us (which God forbid), our confession and reproach should be the greater. But, though it is provided by sanc¬ tions of law and canon that all Lord's days be venerably observed from eve to eve, so that neither markets, negotiations or courts, public or

private, ecclesiastical or secular, be kept, or

any country work done on these days, yet we are clearly to our heart's grief, informed that a detestable, nay, damnable perverseness has pre¬ vailed, insomuch that in many places markets not only for victuals, but other negotiations (which can scarce be without frauds and de¬ ceits), unlawful meetings of men who neglect their churches, various tumults and other oc¬ casions of evil are committed, revels and drunk¬ enness, and many other dishonest doings are practised, . from whence quarrels and scolds, threats and blows and sometimes murder pro¬ ceeds on the Lord's days, in contempt of the honor of God; insomuch that the main body of the people flock to these markets, by which the devil's power is increased; whereof we strictly command you, our brother, that ye, without de¬ lay, canonically admonish and effectually per¬ suade, in virtue of obedience, or cause to be admonished and persuaded, those of your sub¬ jects whom you find culpable in the premises, that they do wholly abstain from markets, courts, and other unlawful practices above described, on the Lord's days for the future; and that such of them as are come to years of discretion, do go to their parish churches to do, hear and receive what the duty of the day re¬ quires of them; and that ye restrain all what¬ soever that transgress and rebel in this respect, both in general and particular, with Church censures according to the Canon.®

The 27th statute of Henry VI is as follows: ((Item, considering the abominable iniquities and offenses done to Almighty God and to his saints, always aiders and singular assisters in our necessities, because of fairs and markets upon their high and principal feasts, as in the feasts of the Ascension of our Lord, in the day of Corpus Christi, in the day of Whitsunday, in Trinity Sunday, with other Sundays, and also in the high feast of the Assumption of our Blessed Lady, the day of All Saints, and on Good Friday, accustomably and miserably holden and used in the realm of England : in which principal and festival days for great earthly covetise, the people is more willingly vexed, and in bodily labor foiled, than in other ferial days, as in fastening and making their booths and stalls, bearing and carrying, lifting and placing their wares outward and home¬ ward, as though they did nothing remember the horrible defiling of their souls in buying and selling, with many deceitful lies and false per¬ jury with drunkenness and strifes, and so specially with drawing themselves and their servants from divine service; the aforesaid lord the king, by advice and assent of the lords spiritual and temporal and the commons of this realm of England, being in the said Parliament, and by authority of the same Parliament, hath ordained that all manner of fairs and markets in the said principal feasts and Sundays and Good Fridays,

shall clearly cease from all show¬ ing of any goods and merchandise (nedessary victual only excepted) upon pain of forfeiture of all the goods, aforesaid so showed.®

In 1464 a.d., under Edward IV, an addition was made to the act of Henry VI, of 1448 a.d., declaring that — “Cobblers and cordwainers in the city of London, or within three miles thereof, excepting within the precincts of Saint Martins- le-Grand and the palace at Westminster, were forbidden on any Sunday in the year, or on the feasts of the Nativity or Ascension of our

Lord, or on the feast of Corpus Christi to com¬ mand or cause to be sold, or place or put on any one’s feet or legs, any shoes, hose or galoches, under the penalty of the forfeiture of the article and a fine of twenty shillings for every offense; a third part to go to the king, a third to the governors of the guild (mestier) of cordwains,. and the residue to the informer.®

In 1523 this act was repealed by Henry VIII (15th Henry VIII, ch. ix).

On coming to the throne in 1547, Edward VI issued the following injunctions ((Whereas in our time, God is more offended than pleased, more dishonored than honored, upon the holy day (Sunday), because of idleness, pride, drunkenness, quarreling and brawling, which are most used in such days ; people nevertheless persuading themselves sufficiently to honor God on that day if they hear mass and service, though they understand nothing to their edify¬ ing; therefore all the king’s faithful and loving subjects shall from henceforth celebrate and keep their holy day (Sunday) according to God’s holy will and pleasure, that is in hearing the Word of God read and taught, in private and public prayers, in acknowledging their offenses to God, and amendment of the same, in reconciling theirselves charitably to their neighbors, where displeasure hath been, in oftentimes receiving the communion of the very body and blood of Christ, in visiting the poor and sick, and in using all soberness and godly, conversation.®

Elizabeth put forth the following injunction touching Sunday: <(A11 the queen’s faithful and loving subjects shall, from henceforth celebrate and keep their holyday according to God’s will and pleasure; yet notwithstanding, all parsons, vicars and curates shall teach and declare unto their parishioners, that they may with a safe and quiet ˆ

conscience, after their common prayer in the time of harvest, labor upon the holy and festival days, and save that thing which God hath sent ... in every parish three or four discreet men, which tender God's glory, and his true religion, shall be appointed by the ordinaries diligently to see, that all the parishioners duly resort to their church upon all Sundays and holy days, and there to con¬ tinue the whole time of the godly service ; and all such as shall be found slack and negligent in resorting to the church, having no great or urgent cause of absence, they shall straightly call upon them, and after due admonition if thev amend not, they shall denounce them to the ordinary.®

Under the Puritan influences attempts were made to bring about a too strict observance of Sunday. To counteract this Charles I repub¬ lished an injunction issued by his father, James I, in which he declared : ((As for our good peo¬ ple's lawful recreation, our pleasure likewise is, that after the end of divine service our good people be not disturbed, letted or discouraged from any lawful recreation, such as dancing, either men or women, archery for men, leaping, vaulting or any other such harmless recreation, or from having May games, Whitsonales and morris dances, and the setting up of May poles and other sports therewith used, so as the same be had in due and convenient time without im¬ pediment or neglect of divine service; and that women shall have leave to carry rushes to church for the decorating of it, according to

their old custom. But withal we do here ac¬ count still as prohibited all unlawful games to be used on Sundays, only as bear and bull bait¬ ings, interludes, and at all times in the meaner sort of people by law prohibited bowling.®

The act of Charles II (1676) was the law of the American colonies up to the time of the Revolution, and so became the basis of the American Sunday laws. It runs as follows :

((For the better observation and keeping holy the Lord's day, commonly called Sunday: be it enacted by the king's most excellent majesty, and by and with the advice and con¬ sent of the lords, spiritual and temporal, and of the commons in this present Parliament as¬ sembled, and by the authority of the same, that all the laws enacted and in force concerning the observation of the day, and repairing to the church thereon, be carefully put in execution ; and that all and every person and persons what¬ soever shall upon every Lord's day apply them¬ selves to the observation of the same, by exer¬ cising themselves thereon in the duties of piety and true

religion, publicly and privately; and that no tradesman artificer, workman or other person whatsoever, shall do or exercise any worldly labor or business or work of their or¬ dinary callings upon the Lord's day, or any part thereof (works of necessity and charity only excepted), and that every person being of the age of fourteen years or upwards offending in the premises shall, for every such offense, for¬ feit the sum of five shillings; and that no per¬ son or persons whatsoever shall publicly cry, show forth, or expose for sale any wares, mer¬ chandise, fruit, herbs, goods or chattels what¬ soever, upon the Lord's day or any part thereof, upon pain that every person so offending shall forfeit the same goods so cried or showed forth or exposed for sale.® ((And it is further enacted that no drover, horse-courser, wagoner, butcher, higgler — they or any of their servants shall travel or come into his or their inn or lodging upon the Lord's day, or any part thereof, upon pain that each and every such offender shall forfeit twenty shillings for every such offense; and that no person or persons shall use, employ, or travel upon the Lord's day with any boat, wherry, lighter or barge, except to be upon extraordinary occasion to be allowed by some justice of the peace of the county, or some head officer, or some justice of the peace of the city, borough or town corporate, where the deed shall be committed, upon pain that every person so offending shall forfeit and lose the sum of five shillings for every such offense.® The Lord's day legislation of Cromwellian days was as distinct and detailed as a fragment from Leviticus, as is shown in the following extract from an act of Parliament dated 1656:

((Every person grinding or causing to be ground any corn or grain in any mill, or causing any fulling or other mills to work upon the day aforesaid; and every person working in the washing, whiting or drying of clothes, thread or yarn, or causing such work to be done, upon the day aforesaid; every person setting up burning or branding beet, turf or earth, upon the day aforesaid; every person gathering of rates, loans, taxations or other payments upon the day aforesaid (except to the use of the poor in the public collections) ; every chaundler melt¬ ing, or causing to be melted, tallow or wax be¬ longing to his calling: and every common

brewer and baker, brewing and baking, or caus¬ ing bread to be baked, or beer or ale to be brewed upon the day aforesaid ; and every butcher killing any cattle, and every butcher, coffermonger, poulterer,

herb seller, cordway- ner, shoemaker or other persons selling, expos¬ ing or offering to sell any their wares or com¬ modities, upon the day aforesaid; all taylors and other tradesmen, fitting or going to fit, or carry any wearing apparel or other things ; and barbers trimming upon the day aforesaid; all persons keeping, using or being present upon the day aforesaid at any fairs, markets, wakes, revels, wrestlings, shootings, leaping, bowling, ringing of bells for pleasure or upon any other occasion (saving for calling people together for the public worship), feasts, church ale, May- poles, gaming, bear-baiting, bull-baiting, or any other sports and pastimes; all persons unneces¬ sarily walking- in the church or church-yards, or elsewhere in the time of public worship; and all persons vainly and profanely walking, on the day aforesaid ; and all persons traveling, carrying burthens or doing any worldly labor or work of their ordinary calling on the day aforesaid, shall be deemed guilty of profaning the Lord's day.®

In the 17th century a number of dissenters fled from England and reached America in 1620, and settled at New Plymouth. In 1629 another band from England joined them. Thus the establishment of Puritanism in America. The theocracy of the Hebrews furnished the model after which their civil government was constituted. Their idea of Sunday is summed up in the enactment of 10 June 1650, passed by the Plymouth general court : ((Further be it enacted, that whosoever shall profane the Lord's day by doing any servile work, or any 'such like abuses, shall forfeit for every such default ten shillings, or be whipped.® Profanation of the Lord's day included traveling, loitering at the door of a meeting house, drinking in an inn, staying at home instead of attending church and it was also enacted by the court, that ((if any in any lazy, slothful or profane way doth neglect to come to the public worship of God. shall for¬ feit for every such default ten shillings, or be publicly whipped.®

In Massachusetts the laws were equally strict.

In 1716 Sunday desecration appears to have been on the increase, since we are told : ((Many persons do presume to work and travel on the said day® ; so that the authorities saw fit to in¬ crease the penalty for ((working or playing® to 10 shillings, and that for traveling to 20 shillings for the first offense. For the second offense these fines were doubled and the parties made to give ˆsureties® for good behavior in the fu¬ ture. A month's continued absence from the public Sunday services was also made finable in the sum of 20 shillings, or three hours 'in the stocks or cage. In 1727, the fine for ˆworking or playing® was increased to 15 shillings, and that for traveling to 30 shillings for the first offense, and for the second, three pounds. If the

offender failed to pay, he was liable to the stocks or the cage for four hours, or to im¬ prisonment in the county jail not to exceed five days. At this time, also, funerals, since they induced (<great profanation® of Sunday, by the traveling of children and servants in the streets, were prohibited, except in extreme VOL. 26 — 3

cases, and then under license from a civil of¬ ficer of the town. The director of a funeral transgressing this was to be fined 40 shillings, and the sexton or grave-digger 20 shillings. Shops for the retailing of strong drinks were also to be searched by the proper officers, and if any were found there drinking, the proprietor and the drinker were each to pay five shillings.

In 1760 all former laws relative to Sunday gave way to a new code, the provisions of which were as follows : Work or play, on land or water, is fined not less than 10 nor more than 20 shillings. Traveling by any one except in extremity and then only far enough for immediate relief, is liable to the same pen¬ alty. Licensed public-house keepers are for¬ bidden to entertain any except ˆtravelers, strangers and lodgers® in their houses or about their premises, for the purpose of drinking, playing, lounging or doing any secular business whatever, on penalty of 10 shillings; the per¬ sons lounging, etc., also paying not less than five shillings. On the second conviction the innkeeper is made to pay 20 shillings and on the third offense to lose his license. Loitering, walking or gathering in companies in <(streets, fields, orchards, lanes, wharves,® etc., is pro¬ hibited on pain of five shillings fine ; and on a second conviction the offender is required to give bail for future obedience. Absence from public service for one month is fined 10 shill¬ ings. No one is to assist at any funeral, not even to ring a bell, unless it be a licensed funeral, on penalty of 20 shillings fine. In Boston, however, a funeral might be attended after sunset without a license. The observance of the Sunday was to commence from sunset on Saturday. Twelve wardens were appointed in each town to execute these laws ; these were to look after all infringements, enter all sus¬ pected places, examine or enquire after all suspected persons, etc. In Boston they were to patrol the streets every Sunday (very stormy or cold days excepted), and diligently watch and search for offenders. In case any one convicted on any point in this code failed to pay his fine at once he was to be committed to the common jail, not less than five, nor more than 10 days. These laws were to be read at the ((March meeting® of the towns each year.

Practically all the States of the American Union have laws prohibitive of labor on Sun¬ day; but these laws are practically a dead letter. In

Arizona and California, however, there are no special Sunday laws. In all other States there are laws, in one form or another, providing for the Sunday-closing of stores and general places of business, exclusive of drug stores, restaurants and businesses of prime necessity to the general comfort of the com¬ munity. These laws are pretty generally ob¬ served. In some places even barber shops are closed.

Bibliography. — Baylee, (History of the Sabbath > (1857) ; Cox, (Literature of the Sab¬ bath Question) (1865) ; (Brampton Lectures) (1860); Holden, (The Christian Sabbath) (1825) ; Lewis, (Sunday Legislation (1892) ; Neale, (Feasts and Fasts) ; Rule, (The Holy Sabbath); Schaff, (History of the Christian Church > ; Zahn, (Geschichte des Sontags vor- nehinlich in der Alten Kirche.*

SUNDAY CONSTABLE. See Town and

Town Meetings.

SUNDAY SCHOOLS, meetings or gather¬ ings in which religious instruction is given to children and young people, usually orally and on Sundays. Such schools are sometimes also known as Bible classes, 'as the Bible is the textbook in frequent use and often the Bible and the Christian doctrine lessons are ar¬ ranged in a catechetical form and hence arises the name of the textbook used, catechism, which is sometimes applied to the class or school using such a book. More commonly, however, a Bible class is one of a series of classes in a Sunday school, frequently being a class for adults and older scholars. The work of teaching religion to classes or in schools was practised in very ancient times (Gen. xiv, 14) and by the ministers of God, or their ap¬ pointed assistants, whenever conditions were such that the young were not taught in their own homes (Deut. xxxi, 10-13). The study of the law was of obligation ; and religious schools existed in connection with the syna¬ gogues. The catechetical method was at first in general use.

Early Christian Doctrine Schools. — The

apostles, or certain persons appointed for the work, gave religious instruction to the cate¬ chumens. The religious school, among Chris¬ tians, seems to have had first place ; before the books of the Bible were collected as they now exist, the life of Christ had been taught orally. As Christianity extended the schools came under control of the

Christians as nearly all the teach¬ ers were Christians, so the religious instruction became a part of the regular work of the school. The differences which arose at the time of Luther (q.v.) led to the establishment of classes and schools for teaching the religious beliefs of different churches. In many cases the re¬ ligious teaching was continued in the schools and the new classes formed were for the poor and those, both young and old, who were not well instructed. Luther and his followers established such schools. Saint Charles Bor- romeo (q.v.) was one of the most zealous in founding Sunday schools in all parts of his archdiocese of Milan. He succeeded in arous¬ ing the enthusiasm and in securing the co-op¬ eration of the laity, men and women, so that he had a large number of teachers. In order to unite the workers and furnish a means of training them for the work, he established an organization called the <(Confraternity of Chris¬ tian Doctrine." Besides the teachers who were members of this Confraternity, there were also others, who were called Fishers, whose duty was to gather the children and the igno¬ rant and bring them to the places appointed, on Sundays or on week days. At the death of Saint Charles there were in his diocese alone nearly 4,000 members of the Confraternity. They taught in 740 Sunday schools and had over 40,000 pupils. Those receiving religious instruction in the regular schools were not in¬ cluded in this number. This Confraternity still exists. In England there is a large member¬ ship. It was introduced into the United States in 1902 and established in the archdiocese of New York by the Roman Catholic archbishop, Michael Augustine Corrigan.

Modem Sunday Schools. — Robert Raikes (q.v.) of Gloucester, England, is the founder of the modern Protestant Sunday school. He

first thought of the work in connection with a number of children of wretched appearance whom he saw playing in the suburb of the city where he lived. He was informed by an in¬ habitant to whom he addressed himself, that on Sundays, when the children were released from work, and the few who enjoyed the bene¬ fit of any instruction during the week were free from school, they presented a more af¬ flicting sight of misery and vice. This obser¬ vation immediately suggested to him the idea that the profanation of the day might be pre¬ vented by keeping them occupied ; and he en¬ gaged several women, who kept schools in the neighborhood, to receive such children as he should send to them on Sundays and instruct them in reading and the catechism, paying each of them a shilling for her day's work. He soon collected a considerable number of chil¬ dren, distributed books among them, gave them advice, settled their quarrels. The effects of his benevolent exertions were so beneficial

that his example was followed by other charitable persons in different quarters of the city and in a few years Sunday schools were established in almost every part of Great Britain. Raikes made his first experiment in 1781 and in 1786 it was estimated that 250,000 children were re¬ ceiving instruction in Sunday schools. A Sun¬ day school society was formed in 1785 and the members were encouraged to give their personal service gratuitously. In 1803 the first Sunday school union was formed in London and the example was soon imitated in many large towns and some of the counties. The Scotch Sab¬ bath schools (first established in Edinburgh in 1787) arose from the English Sunday schools, but from the first were more entirely devoted to religious instruction than the Sunday schools of England. The first Sunday schools united secular with religious instruction. Sunday schools were established in Protestant churches in Scotland, Ireland and America, in the years immediately following their establishment in England; the Scotch Society for "Promoting Religious Instruction Among the Poor" was formed in 1796 and the Irish Sunday School Society was founded in 1809, though a system of Sunday teaching had prevailed in Ireland for some years previously. In later times Sun¬ day schools increased rapidly in connection with all Protestant churches throughout the world. The Sunday school movement was not at first looked upon with favor by the people of New England. It was regarded as a menace to the sacredness of the Sunday (Sabbath) and also as an infringement of the home duties. The Protestant Sunday school, as it exists to-day in the United States, may be said to have had its real beginning in Philadelphia 19 Dec. 1790, when 12 persons held a meeting and decided to begin the work. Sunday schools had been established in the United States shortly after Raikes had begun his work but they existed more as local institutions. On 11 Jan. 1791 a society was established in Phila¬ delphia which had for its object the support of Sunday, or <(First Day" schools. The presi¬ dent of the society was Bishop William White and Matthew Carey was the secretary. In New York 13 Jan. 1816, a woman's society for the promotion of the work and in the same place, on the 26th of February of the same year, a society of men was organized for the

same purposeˆ The American Sunday School Union is the outgrowth of the Sunday and Adult School Union, established in Philadelphia in 1817. The new and broader organization took definite form 24 May 1824. On the 75th anniversary, the American Sunday School Union had 100,928 Sunday schools with a mem¬ bership of 4,070,346 pupils

and 578,680 teachers. It had distributed literature amounting to near $10,000,000. The first national convention was held in Chatham Street Chapel, New York,

3 Oct. 1832. National conventions were held 23 May 1833 and 22 Feb. 1859, in Philadelphia; 29 April 1869, Newark, N. J.; 16 April 1872, Indianapolis, Ind. ; 11 May 1875, Baltimore, Md. At the Baltimore meeting the convention took upon itself the name international, to which title it had a right on account of the enlargement of the work both in aim and ter¬ ritory. On 1 July 1889 a world's convention was held in London. Other world's conventions have been held in Saint Louis, Mo., 3 Sept. 1893; London 11 July 1898. The organization embraces, besides the usual executive officers, lesson committees and different department workers. In many of the States are held an¬ nual State conventions, county conventions and city conventions. The department of field workers is most important. In fact their main work is the financing of missionaries in sparsely settled and neglected localities, where they found and foster evangelical but undenomina¬ tional Sunday schools. Morris K. Jesup, who was for many years the president ; Gen. O. O. Howard, Jay Cooke, William E. Dodge, Louis Klopsch and other prominent men have taken a great interest in the Union's work. In the decade ending 1917, they organized over 17,000 new Sunday schools, reorganized 7,000, besides aiding several thousand public schools. The Chautauqua (q.v.) has been a great aid in the enlargement of the work. In 1908 the Prot¬ estant Sunday schools in the United States, including Hawaii and Porto Rico, numbered 140,739, with a membership of 11,355,000 pupils and officers and teachers numbering 1,505,000. In 1917 the Protestant and miscellaneous Sun¬ day schools had over 19,000,000 scholars en¬ rolled and the Roman Catholic schools 2,850,- 000 more ; the Methodist group was the largest, comprising 7,000,000 scholars ; the Baptist group followed with 3,800,000; Presbyterian, 2,000,- 000; Lutheran, 1,000,000; Disciples, 940,000; Congregationalist, 750,000; and Episcopal, Re¬ formed and United Brethren, each nearly 500,-

1.

All the teaching orders in the Roman Catholic Church, in all countries, give religious instruction in the regular schools, and, when necessary, classes are organized and held on Sundays. The Sunday classes are graded as are the regular school classes. The founder of the first normal school for the training of teachers, Saint John Baptist de La Salle was most earnest in having his teachers pre¬ pare themselves well for the work of teaching Christian doctrine. The members of his

order (popular name, Christian Brothers) have charge of many Sunday schools. Both Protestants and Roman Catholics have estab¬ lished training classes and normal schools for Sunday school teachers. In New York, in 1901, under the auspices of the Confraternity of Christian Doctrine, a training school for teach¬

ers in the Roman Catholic Sunday school was established, and affiliated with it are local training classes.

Conventions and Conferences. — The Prot¬ estant Sunday School conventions, international, national, State and county, are most inspiring and educational. The question brought home to the members, most forcibly, and at all the con¬ ventions, is that the Sunday school is a neces¬ sary feeder of the Church, that to have the adult a communicant, the child must be in¬ structed. As a direct result of the great con¬ ventions there has grown up a vast Sunday school literature, the churches have been ar¬ ranged so as to provide suitable meeting places for the Sunday schools. The Sunday school hymns are also an important outgrowth of the conventions and conferences. In the Roman Catholic Church every educational convention, congress, or conference, has for its beginning and end, the subject of Christian doctrine. Sunday school conferences have been held at the Eastern and Western Roman Catholic Sum¬ mer schools, and Boston and other pities have had, for some years, regular annual Sunday school conventions.

International Lessons. — In 1872 at the national Sunday school convention of the Protestant Sunday school workers, held in Indianapolis, the plan of having a series of uniform Bible lessons was proposed and met with favor. The lessons were adopted by the Sunday schools of Canada and England, and came into use in many of the Protestant Eng¬ lish-speaking Sunday schools of the world. Several periodicals and a large number of books are published as aids for the International Sun¬ day school lessons. Another plan of Bible lessons in use in many parts of the United States is the Blakeslee or inductive system. In the Roman Catholic churches the system in general use is based upon preparation for the sacraments (q.v.). Bible study is correlated with the catechism lessons. In addition to the general system, in many dioceses there is a prescribed course of study for the Christian doctrine work (New York, Philadelphia, Brooklyn, etc.). The Jews have regular courses of study for their Sunday schools, which in the United States are quite numerous.

Bibliography. — Axtell, J. W., (The Or¬ ganized Sunday School) (Nashville, Tenn., 1907) ; Brown, M. C., (Sunday School Move¬

ments in America) (3d ed., New York 1901); Brown, F. L., (Sunday School Officers Manual: The Training of Officers and Committees) (ib. 1916) ; Cope, H. F., (Evolution of the Sun¬ day School) (Boston 1911); id., Efficiency in the Sunday SchooP (New York 1912) ; 'The Boston Catholic Sunday School Conference) ; Daniel, 'Lessons on Catechism *; Dupanloup, Mgr., (The Catechist*; Foster, A. P., 'Manual of Sunday School Methods) (Philadelphia 1899) ; Gregory, 'Robert Raikes, Journalist and Philanthropise ; Harris, J. H., 'Robert Raikes: The Man and his Work) (New York 1899) ; Hamill, H. M., 'Brief History of the Inter¬ national Lessons *(Chicago 1901) ; id., 'The Sunday School Teacher* (Nashville, Tenn., 1901); Hutchins, W. N., 'Graded Social Serv¬ ice for the Sundav SchooP (Chicago 1914) ; Howe, 'The CatechisP ; Johnson, F. W., 'Prob¬ lems of Boyhood) (Chicago 1914) ; Kinkead,

(Explanation of Catechism) ; Lawrence, Marion, (The Sunday School Organized* (Boston

1914) ; id., 'How to Conduct a Sunday School* (New York 1915) ; Lester and Stevenson,

Sunday Schools and Religious Education) (ib.

1915) ; Littlefield, M. S., 'Hand-Work in the Sunday School *(Philadelphia 1908) ; Mead, G. W., ' Modern Methods* (New York 1912) ; Meyer, H. H., 'The Graded Sunday School in Principle and Practice> (ib. 1910) ; Messner,

Spirago's Method of Christian Doctrine) ; O Brien, 'Advanced CatechisnP ; Pattee, F. L., 'Elements of Religious Pedagogy *(Milwaukee 1914) ; Pattison, T. H., (Ministry of the Sun¬ day SchooP (Philadelphia 1908) ; Peloubet, F. N., (Front Line of the Sunday School Move¬ ment (Boston 1904) ; Peters, L. E., Practical Handbook on Sunday School Work* (Phila¬ delphia 1900) ; Pray, L. G., 'History of Sun¬ day Schools . . . from the Earliest Times> (Boston 1847) ; Slattery, Margaret, 'Guide for Teachers of Training Classes *(ib. 1912) ; Schauffler. S. F., 'Ways of Working* (New York 1895) ; id., 'Pastoral Leadership) (Nash¬ ville, Tenn., 1903) ; Shepherd, R. P., (Religious Pedagogy in the Modern Sunday SchooP (Saint Louis 1911); Trumbull, H. C., 'Yale Lectures on the Sunday Schools1 *(Philadelphia 1888) ; id., (Teaching and Teachers* (ib. 1884) ; Trull, G. H., 'Manual of Missionary Methods for Sunday

School Workers) (ib. 1908) ; Vincent, J. H., ‘Church, School and Normal Guide) (New York 1889) ; id., ‘The Modern SchooP (ib. 1900) ; Watson, W. H., (First Fifty Years of the Sunday SchooP (London 1873) ; Watson, ‘History of the Sun¬ day School Union.) Consult also ‘Report of the American Sunday School Union* and (The Encyclopedia of Sunday Schools) (1914).

SUNDERLAND, Jabez Thomas, Amer-

can Unitarian clergyman: b. Yorkshire, Eng¬ land, 11 Feb. 1842. He was graduated from the University of Chicago in 1867 and from the Union Baptist Theological Seminary in 1870. He was editor of The Unitarian Monthly 1886-95, and has held Unitarian pastorates in Milwaukee, Chicago, Ann Arbor, Oakland, Cal., London, England, Toronto, Ontario, Hartford, Conn., and Poughkeepsie, N. Y. He has been director of the American Unitarian Associa¬ tion, secretary of the Western Unitarian Con¬ ference, president of the Michigan Unitarian Conference and non-resident lecturer on the Religions of India in the Meadville (Pa.) Theological School. He is a member of the Michigan Authors Club. Has the following honorary degrees: A.B., A.M. and B.D. from the University of Chicago and D.D. (1914) from Tufts College. He was sent to India, 1895-96, by the British and Foreign Unitarian Association, to study the educational, social and religious conditions of the Indian people, and made an extended report on the same on his return to London. In 1913-14 ’was Billings Lecturer of the American Unitarian Associa¬ tion .in Japan, China, Ceylon and India. Was president of the All-India Theistic Congress, 1913. Has written extensively for magazines' reviews and other periodicals in the United States, Canada, England and India. He is author of ‘A Rational Faith> (1878) ; (What is the Bible *(1878) ; ‘The Liberal Ministry* (1889) ; ‘Home Travel in Bible Lands* (1894) ;

‘A. College Town Pulpit *(1895); ‘Liberal Religion in India* (1896) ; ‘A Pacific Coast Pulpit *(1898) ; ‘Travel and Life in Palestine* (1900) ; ‘James Martineau *(1905) ; ‘The Spark m the Clod* (1906); ‘Causes of Famine in India *(1906) ; ‘The Origin and Character of the Bible* (1907); ‘The Bible and Bible Country *(1909) ; ‘Oh, to be Rich and Young* (J910) » ‘The Orient and Liberal Religion* (1913) ; ‘Liberal Religion as a World Move-

Q913) ; ‘Military Preparedness the World s Menace* (1916).

SUNDERLAND, England, a seaport town and parliamentary borough of Durham, at the mouth of the Wear, 13 miles northeast of the city of Durham and 12 miles southeast of New¬ castle-upon-Tyne. The chief

buildings are the magnificent Town Hall, .Museum, Art Gallery, Libraries and the old parish church of Saint Pe¬ ters, on the site of the monastery in which the venerable Bede was educated.' Sir Joseph Swan the electrician (“Ediswan**) was born here. Two lighthouses stand at the entrance of the excellent harbor. The industrial works include shipbuilding establishments, marine engine. works, bottle, pottery and rope factories, coal mines, iron works, paper mills, anchor and chainworks. Coal is the chief export. The imports are timber and grain, together with materials for use in manufactures, and pro¬ visions. These are brought from Baltic ports and Holland. Pop. about 166,000.

SUNFISH, a fresh-water fish of the family Centrarchidce, closely related to the perches (Percidce) and including also the black bass, crappie, and calico bass. These fishes are among the most characteristic of the fresh waters of the United States, where all of the 12 genera and 30 species are found, and of these only one (Archoplites interruptus) occurs west of the Rocky Mountains. Because of their abundance, beautiful colors and forms, in¬ teresting habits, courage and gameness, they are perhaps the best known and most esteemed of fresh-water fishes. Most of the true sun- fishes belong to the genera Lepomis and Eupo- motis, and the different species are not readily defined without a long technical description; but to the layman, or rather boy, all are known collectively as “sunnies.** The commonest and most generally distributed species east of the Alleghany Mountains is E: gibbosus, one of the brilliant beauties of our clear brooks and ponds, the type of piscine courage and pugnacity, not fearing to assault any fish that approaches its nest, and itself proof against attacks even from pickerel. Like other sunfishes, it builds a nest of cleaned pebbles on a warm sunny bottom in shallow water, and the male stands guard over the eggs until they hatch and the young are able to care for themselves. This is the boy’s favorite game-fish, and it is an excellent morsel on the table. An equally beautiful and larger species, abundant in more sluggish waters throughout the same range and westward, is

l*Gie sunfish (L. pallidus). The long-eared sunfish (L . auritus) is distinguishable at once by the long appendage of the gill cover. The spotted sunfish (E nneacanthus gloriosus) is a most beautiful little fish with gracefully flowing fins and brightly spotted translucent body.

. A large marine sunfish is the prevailing spe¬ cies (Mola mola) of the plectognath family

SUNFLOWER

Molida ?. It is almost circular in form, and the dorsal and anal fins project posteriorly, with the caudal between. The posterior part of the body looks as if it had been cut squarely off and then the tail replaced, and something like this actually happens in the development of t<he young. On each side, near the centre, is a small pectoral, and in front of it the gill open¬ ing; the gills are-arranged in comb-like fringes. It attains a large size, four or five feet in length and three or four feet in depth, with a weight of several hundred pounds ; the flesh is white, tough, of a disagreeable odor, unfit for food, and remarkably elastic, the last prop¬ erty depending on the great amount of yellow elastic fibre, interlaced in an intricate manner, almost to the exclusion of white fibre and mus¬ cle. It is grayish above and whitish below, with a silvery lustre when alive, and phos¬ phorescent at night, which, with the rounded form, has given rise to a sailor's name, moon- fish. It is sluggish in its motions, and is often seen asleep at the surface ; when swimming, it is said to turn round like a wheel, and to be able to float with the head and eyes above the surface ; the liver is very fat, and its oil is used for lubricating purposes on board ship, and for sprains and bruises among fishermen. Sailors fashion balls from the elastic subdermal tissue. In some seasons it is common in summer in Massachusetts and New York bays, and feeds partly if not principally on medusae or jelly fishes. There is probably no fish more infested by parasites, internally and externally; the flesh and intestines contain many entozoa, and the skin is studded with crustacean parasites. Consult Gunther, introduction of Fishes) (Edinburgh 1880) ; Bollman, (Review of Sun- fishes1 (Reprint, United States Fish Commis¬ sion, Washington 1892) ; Abbott, (Naturalist's Rambles About Home1 (New York 1887) ; Dean, Bashford, (Fishes, Living and Fossil1 (New York 1895).

SUNFLOWER, the common name of the New World plants belonging to the large composite genus Helianthus, so called because their golden-rayed heads are likened to the sun. The robust annual sunflowers (Helianthus annuus), native to the prairies of the American West, where they grow over large tracts, some¬ times so tall that they hide a horseman riding among them, are often planted as a coarse but brilliant ornamental plant good for concealing fences and the like. The leaves are numerous, rough, very large, and somewhat heart-shaped; the flowers sometimes measure a foot in diam¬ eter, generally nodding, and inclining to the sun. The disc is very broad and brownish, and its tubular florets develop four-sided very oily achenes,

which are a tid-bit for the Tartars, have been used somewhat for food by the American aborigines, and are the main resource of many western seed-eating animals and birds. In Russia, and in some modern gardens, sun¬ flowers are grown solely for these fruits, which form a valuable food for poultry, and yield an oil, useful for either illuminating or soap-mak¬ ing. They are said also to be a remedy for heaves in horses. The smooth western H. orgyalis has narrow graceful leaves, and brown, disked flowers, and is quite apt to bloom from top to bottom, a distance of some 10 feet. H. decapctalus var. multiflorus is one of the best

for cultivation, being not so coarse as other species, and having long-stemmed, clear-yellow flowers, sometimes double, and about three inches across. H. mollis is also interesting, for its soft, white velvety foliage, and stands only about five feet high. H. subtuberosus, the Indian potato, has thick lanceolate leaves, and fleshy roots, which are thick and edible. It is found on the Northwestern prairies. H. tuberosus, with a wider range, has ovate leaves, and fleshy thickened rootstalks bearing the tubers called Jerusalem artichokes. It often grows along roadsides in the East, having been cultivated, doubtless, by the aborigines, and is now largely grown as a fodder for livestock, especially valuable in dry seasons, and as a vegetable for fall.

SUNFLOWER STATE, a popular nick¬ name for the State of Kansas, so named from its prolific growth of sunflowers.

SUNGA. See Indian Humped Cattle.

SUNGARIA, soon-ga're-a, or DZUN¬ GARIA, a region of central Asia, once an in¬ dependent kingdom. It is not well delimited but comprises generally the district of East Tur¬ kestan north of the Tarim Basin and between the Altai and the Tian-Shan mountains, west of Mongolia. In the 17th century the Sun- gajians extended their power over a region much greater than that above indicated. In 1670 the Chinese overran the country but were driven out after 40 years, when the Sungarians re-iestablished their independence. The new kingdom did not last long, however, for in 1759 the Chinese conquered and annexed it to their empire. Chinese colonists were thereafter sent there in great numbers.

SUNIUM, su'm-um, or CAPE CO-

LONNA, Greece, a promontory forming the southernmost point of Attica, 28 miles south¬ east of Athens. It consists of a mountain or hill which in ancient times was fortified and crowned by a marble temple

of Athene. Por¬ tions of the walls and 13 of the columns (whence the name ˆColonna11) of the temple still remain. At the foot of the mountain lay the silver-mining town of Sunium.

SUNKEN BELL, The. Gerhart Haupt¬ mann's (Versunkene Glocke1 ((The Sunken Bell1) (1896) is commonly supposed to be the poet's elegy on the failure of the hopes which he had set upon the attempt to adapt naturalis¬ tic methods to the treatment of an historical subject in (Florian Geyer1 (first played 4 Jan. 1896). Quite as probably, however, Haupt¬ mann symbolized in this fairy drama a mood to which poets as such are no strangers, even without the chagrin of recent defeat : the melancholy sense that ascent to spiritual heights is toilsome and is impeded by fetters to the lower earth. Moreover, there are spirits of the depths as well as of the heights.

The bell-founder Heinrich is thwarted of his supreme ambition, to place a bell in a mountain chapel, by the malice of a wood-sprite who cannot abide the ringing of it, and despairing he plunges into the abyss which engulfs the product of his Christian devotion. His humble, unesthetic wife can give him neither comfort nor the courage to live. Both come to him from a mountain elf, Rautendelein. In asso¬ ciation with her, he plans a new masterpiece,

half church, half temple to the sun, but he is not destined to accomplish his design. The humdrum dwellers in the valley persecute him as a renegade ; the wood-sprites assail him in hostility like Loki's to Balder; the tolling of his submerged bell recalls him to where his wife and children have died of grief. He repulses Rautendelein and hastens below — but only to return and discover, a moment before he breathes his last, that his proper dwelling place is with her on the heights, and that the nether sphere, the realm of failure and of death, is that from which no man' can escape.

The play, rich in elements derived from Ger¬ man folklore, with some reminiscences of class¬ ical mythology, is enhanced by the contrast of naturalism and fantasy, and contains, along with some hollowness, the most intense and musical poetry that its gifted author has ever written. Translated by Mary Harned in (Poet Lore *(Vol. X, 1898), by C. H. Meltzer (Gar¬ den City, 1915), and by Ludwig Lewisohn (in (The Dramatic Works of Gerhart Hauptmann* New York 1913-15). Edited by T. S. Baker (New York 1901). C'f. Ludwig Lewisohn, (The Modern

Drama* (New York 1915).

William G. Howard.

SUNN HEMP. See Fibre.

SUNNAH, sun'a, SONNA, or SOON- NUT, the oral teachings of Mohammed, built upon his sayings and practices, and other tra¬ ditions, which are regarded as authoritative by the orthodox Mohammedans, although not part of the law, as set forth in the Koran. A great number of so-called ˆTraditions® were fabricated to uphold certain political and sec¬ tarian claims, but these were subsequently re¬ jected. The six standard Sunni collections were all compiled under the Abbaside caliphs, and the earliest of them partly during the reign of A1 Mamun. The four canonical collections of the Shias are of later date and less trust¬ worthy. See also Mohammedanism; Sun¬ nites.

SUNNITES, sun'its, or SUNNI, the ortho¬ dox Mohammedans, who accept as authoritative the oral teachings of Mohammed, the deliver¬ ances of the orthodox imams, and the various traditions assumed to be traceable to those who had the confidence of the prophet, in addition to the Koran, which is received as law by Mo¬ hammedans of every sect. The Sunnites re¬ gard as heretics the Shiites (Shia) who do not accept the Sunna, as the body of oral tradi¬ tion is called. While the animosity between the two great divisions of Islam, like that between Christians of different creeds, has vented itself, and among the more prejudiced still finds ex¬ pression, in bloodshed and bitter persecution, there is a much more tolerant feeling in the present age than existed in the past, and Shiites occupy important places in the Turkish empire, which is almost universally Sunnite. The Sunni contend that Mohammed never intended to establish any hereditary right in his descend¬ ants. See Mohammedanism.

SUNNYSIDE, Washington Irving’s estate at Irvington, N. Y. It is close to the Hudson River, about half a mile north of the Irvington railway station. It was bought in 1835 by Irv¬ ing, who gave it the name of Sunnyside; at that time the estate contained 10 acres, later

eight more acres were added. A small stone house was standing on the estate, known as Wolfert’s Roost, which during the Revolution¬ ary War was a station of the Dutch ((water guards® who watched and constantly annoyed the British ships anchored in the river. It was an old-fashioned mansion, with many gables and according to Irving ((as full of angles and corners as an old cocked hat.® Its picturesque¬ ness pleased the author’s fancy, and while he had it enlarged and

modernized under the di¬ rection of an artist, George Harvey, he was careful to keep its ((old-time® appearance. Eng¬ lish ivy grown from a slip brought from Mel¬ rose Abbey, was trained over the front, which it now completely covers. Though additions have been made to the house since Irving's time, the old part has not been materially changed, and maintains the same general ap¬ pearance.

SUNSHINE STATE. The name given by statute to South Dakota, which is also known as the <(Koyote State.®

SUNSTONE, or aventurine feldspar, a variety of feldspar showing a beautiful golden schiller. This is due to the reflection of light from the surfaces of multitudes of minute, tabular crystals of hematite or goethite, en¬ closed in the spar in parallel position. Under the microscope, or even with a pocket lens, these little crystals appear gorgeously iridescent. Sunstone from Tvedestrand, Norway, the finest known, is a reddish variety of ol'igoclase ; a green microcline sunstone occurs in Pennsyl¬ vania.

SUNSTROKE, prostration due to ex¬ posure to intense external heat. Such exposure may be to the direct or indirect rays of a trop¬ ical sun or to the excessive heat of an engine room. In either case heat and physical exer¬ tion combine to bring about the results. A high degree of humidity of the atmosphere is one of the most important features, since this hind¬ ers free evaporation of fluid from the body which is one of the most important devices for cooling the body. Sunstroke is an old disease. Osier mentions that two instances are on record in the Bible and many of the ancients described it very well, confounding the severer forms with apoplexy. Two main types are seen — heat exhaustion and heat stroke. Other terms for heat stroke are isolation, thermic fever, coup de soleil.

Heat exhaustion is frequently seen among workmen who are exposed to the direct action of the sun. Bricklayers, drivers, farmers, etc., or firemen and stokers in large vessels, while in the midst of their work suffer from extreme prostration. There is great restlessness, muscu¬ lar weakness, fainting spells and collapse, and often delirium. The surface of the body is usually cool and the temperature may be sub¬ normal, 95° to 96° F., the pulse is small and rapid and unconsciousness rapidly develops. In heat stroke or thermic fever, the symptoms are quite different. Here marked physical exertion and direct exposure to the sun with high hu¬ midity are important factors — in addition some form of alcoholic drink is being taken, notably ale, beer or whisky. In the severe grades the patient may be suddenly struck down and die with rapid breathing, heart weakness and uncoil-

sciousness. These cases are rare and frequently, on autopsy, turn out to be something else. The more common type commences with severe head¬ ache, dizziness, a sense of weight in the head, and nausea and vomiting. If these signs are disregarded and the patient continues to march, if a soldier; or to stoke, if a stoker; or to work, if a laborer, symptoms of disordered vision develop ; diarrhea and increased urina¬ tion are present and then unconsciousness sets in. Seen in this condition the patient is usually flushed, the eyes blood-shot, the skin is hot and dry, the temperature, an important sign, is very high, 105° to 110° F., or in some cases even higher. The pulse is rapid and bounding; the breathing is apt to be noisy, and the patient, apart from his very high temperature and dry skin, may seem to be suffering from alcoholism. The pupils may be dilated or contracted and there may be an eruption on the skin. In these cases that end fatally the unconsciousness deep¬ ens, the temperature mounts, convulsions and twitching occur, the breathing becomes very irregular and shallow. A gradual fall in tem¬ perature and a return to consciousness are symptoms of recovery. Many patients after re¬ covery have a permanent susceptibility to high temperatures.

It is important to distinguish between these two forms of heat poisoning as the treatment is radically different. In heat exhaustion there is vasomotor paralysis with cold wet skin and subnormal temperature, and patients should receive alcohol hot bottles and supportive treat¬ ment. Heat stroke should be treated by cold and stimulants. The body should be drenched with cold water. The wrists and sides of the neck rubbed with icewater or ice, as the large arteries are here more readily reached and the blood more rapidly cooled. Icewater rectal injections are also useful to reduce the tempera¬ ture rapidly and also to empty the bowels, an important indication. It may be necessary to immerse the patient directly into an ice bath. During this treatment careful readings of the clinical thermometer must be taken and as soon as the temperature sinks below 102° to 103° F., and stays there, the cold applications may be dis¬ continued. Moderate venesection is not contra¬ indicated, but that is a technical question for the physician to decide. In malarial countries, particularly below Mason and Dixon's line, quinine may be used to advantage to obviate possible malarial combinations. Coal tar anti¬ pyretics are not advisable if signs of heart weakness are present. Of cardiac stimulants ammonia is the most serviceable, as it can be breathed by an unconscious patient. Sometimes chloroform is essential to control

convulsions.

The mortality from heat exhaustion is about 9 per cent, whereas the high mortality of 25 per cent is recorded for heat stroke or thermic fever. Consult Manson, (Tropical Diseases) (1900); (Sunstroke* in Encyclopedia Medica) (1902); Wood, (Thermic Fever, or Sunstroke)

(1872).

Smith Ely Jelliffe, M.D.

SUPEREROGATION, performance of more than duty requires, for example, if one commits theft of a dollar and makes reparation of the wrong by giving back two dollars; or if one not only forgives those who injure him, but confers unmerited benefits upon them. The

Anglican Church, in the 14th of the 39 Articles of Religion, expressly condemns the notion of works of supererogation as impious: ((Voluntary works besides, over and above, God's Com¬ mandments, which they call Works of Super¬ erogation, cannot be taught without arrogancy and impiety; for by them men do declare that they not only render unto God as much as they are bound to do, but that they do more for his sake than of bounden duty is required ; whereas Christ saith plainly, When ye have done all that are commanded to you, say, We are un¬ profitable servants.® Supererogation is not a term of theology in the Roman Catholic Church ; but that Church teaches that good works done by the faithful in the state of grace are meritorious of eternal reward, and that merits of holy men redound, through the goodness of God, to the spiritual advantage of the whole Church. This doctrine differs not from that taught in the (Institution of a Chris¬ tian Man,* published by authority of convoca¬ tion in 1537 :

" I believe that whatsoever spiritual gift or treasure is given by God unto any one part or member of this mystical body of Christ, although the same be given particularly unto this member, and not unto another, yet the fruit and merit thereof shall, by reason of that incomprehensible union and bond of charity which is between them, redound necessarily unto the profit, edifying, and increase in Christ's Body of all other members particularly."

SUPERFCETATION, a second concep¬ tion and the formation of a foetus after a previ¬ ous impregnation in the same female, whereby two foetuses coexist in the uterus. In such a case a woman may be delivered of a full-grown child and of an undeveloped embryo at the same time, the period of conception of each being presumed to be

different ; or a woman may be delivered of two living children, the one appearing much more developed than the other. In recorded cases women have given birth to twins, the one child being white and the other black, showing that each had a separate father and of a distinct race, and proving the pos¬ sibility of a double conception. But far more typical cases of superfoetation have been found. Such is that instance in which, as published by Eisenman of Strassburg, a woman was de¬ livered of a second child 140 days after the first, both children being fully developed. In this case, therefore, the second child must have been conceived at a later and different period from the first; and the development of the second child must have been proceeding sepa¬ rately from that of the first, and after the latter was born. Still more remarkable cases of this kind have been recorded. The explanation of these curious cases has afforded a very intri¬ cate study and puzzle to obstetricians and phys¬ iologists, as well as to those concerned with their medico-legal aspect, which sometimes bears directly upon questions of conjugal fidel¬ ity. As the subject at present stands, its full elucidation is still a matter for obstetrical in¬ vestigation ; but there can be little doubt either of the actual occurrence of cases of superfoeta¬ tion, or of the great importance of the study of its phenomena.

SUPERHEATERS. See Locomotive.

SUPERIMPOSED DRAINAGE. When a stream flowing across a region cuts down and uncovers an old buried erosion surface the

drainage is said to be superimposed on that surface. For example, if any familiar region of hills and valleys should sink beneath the sea, and all the old surface be buried beneath sands and muds, a plain would result. If this plain would then emerge and rivers were to start flowing over it, the new streams would pay no attention to the old buried topography, but would wander freely over the plain. As they cut down the region, they would uncover this old topography, and would then be super¬ imposed. Such is much of the drainage in the glaciated regions, where glaciation has filled up the old valleys, and obliterated the old pre¬ glacial drainage.

SUPERIOR, Wis., city, port of entry, county- seat of Douglas County, on Lake Superior, and on the Northern Pacific, the Chicago, Saint Paul, Minneapolis and Omaha, the Duluth, South Shore and Atlantic,

the Great Northern, the Minneapolis, Saint Paul, and Sault Sainte Marie, the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads opposite Duluth. It shares with Duluth the commercial advantage of being the extreme western port of the Great Lake system of the United States. It has three connecting harbors, well sheltered and deep, making a combined length of 13 miles, with an extreme width of three miles. The city comprises the ports known as East, West, South and Old Superior. The climate is cool in summer and cold in winter. The chief manufacturing establish¬ ments are flour and lumber mills, iron and steel works, boiler works, windmill, factories, ship¬ yards, bag factories, tractor factories, cooper¬ age, chair factory, wagon and carriage works. Lath, shingles and other lumber products are also manufactured. It has also shipyards, coal docks capable of receiving 6,370,000 tons of coal, large grain elevators, a large dry-dock and a number of wholesale merchandise establish¬ ments. The government census gives the amount of capital invested in industries $7,050,- 000 and the annual value of the products $11,- 663,000. There is an extensive lake trade, and railroads furnish transportation for products sent to the interior. The principal public buildings are the government building, county courthouse, municipal buildings, Saint Francis Hospital, Saint Mary's Hospital, Women's Christian Temperance Union Hospital, national and State banks, several business blocks and hotels. The educational institutions are a State normal school, the Finnish University, two busi¬ ness colleges, two high schools, public and parish schools and two public libraries. The commission form of government is in opera¬ tion. The port's foreign trade has become ex¬ tensive in recent years, having now an annual volume of about $1,500,000, of which 80 per cent is in exports. The city's annual expendi¬ ture on various municipal activities is about $550,000, of which $200,000 is expended on schools, $100,000 on fire protection and $60,000 for police. Pop. (1920) 39,624.

SUPERIOR, Lake, the largest expanse of fresh water in the world and the most westerly and most elevated of the great lakes of the Saint Lawrence basin ; lat. 46° 30' to 49° N. ; long. 84° 30' to 92° '20'. W. It washes the shores of the State of Minnesota on the west, of Wisconsin and the northern peninsula of

Michigan on the south and of Canada on the north and east. The greatest length, measured on a curve through its centre from east to west, is 420 miles; greatest breadth, 167 miles; cir¬ cuit, about 1,750 miles; estimated area, 31,200 square miles ; height above sea-level, 602 feet ; approximate mean depth, 900 feet ; maximum depth, 1,008 feet. It is of very irregular shape, widening out toward its centre and

gradually narrowing, partly toward its eastern but much more toward its western extremity, so as to form an irregular crescent, with its convexity on the north and its concavity on the south. The northern shore is generally bold and ele¬ vated, presenting almost continuous ranges of cliffs, which vary in height from 300 to 1,500 feet ; the southern shore is low and sandy, though occasionally interrupted by limestone ridges, the most remarkable of which, situated toward the eastern extremity, present a per¬ pendicular wall 300 feet high, broken by nu¬ merous caverns and projections, and forming, under the name of the Pictured Rocks (q.v.), one of the greatest natural curiosities of the United States. The central portion of the lake is clear of islands, but these are numerous to¬ ward both the southern and the northern shores. In the former direction they are small, and, being insufficient to give shelter behind them, only increase the difficulties of navigation with¬ out contributing to form a single good harbor. On the north shore several of them, more es¬ pecially the Isle Royale, are of considerable dimensions, and along with the indentations of the coast afford good shelter for vessels. The water of the lake, remarkable for its trans¬ parency, derives its supplies from a basin which is estimated at 54,000 square miles, and is drained by more than 200 streams. The water never freezes except in the shallow regions along shore. About 30 of the streams are of considerable size, but they are almost all im¬ petuous torrents, interrupted by rocks and rap¬ ids. Superior discharges into Lake Huron, at the southeast end, by Saint Mary's River, which at Sault Sainte Marie descends 22 feet in three quarters of a mile, navigation being here carried on by means of two ship canals, one on the Canadian, the other on the United States side. Within the lake itself the only obstruction to its navigation are the violent gales to which it is subject. It is well sup¬ plied with fish, principally trout, whitefish and sturgeon. There are a great number of fishing- stations. Large deposits of copper and iron are worked on the shores of the lake, especially on the southern shore along the northern coast of Michigan. The boundary line between Can¬ ada and the United States, in passing through Lake Superior, proceeds from the outlet nearly through its. centre till it approaches Isle Roy¬ ale, when it bends north so as to give that island entirely to the United States, and is then carried south-southwest to its termination at the mouth of the Pigeon, in lat. 48° N. The chief towns on the shores of Lake Superior are Duluth, Minn., at the western extremity, with an excellent harbor; Superior, Wis., near Duluth; Marquette, Mich.; Fort William, On¬ tario, also with a good harbor; and Port Ar¬ thur, Ontario. Consult Agassiz, <Lake Supe¬ rior: Its Physical Character, Vegetation and Animals) (Boston 1850) and Martin, Progress¬ ive Development of Resources in the Lake

Superior Region* (In American Geographical Society publications, Vol. XLIII, New York

1911).

SUPERNATURALISM, «above nature® or miraculous, in theology, the generally re¬ ceived belief that divine revelation is the sole and ultimate ground of the Christian religion ; it is opposed to naturalism, the theory that while the Scriptures contain many truths these truths are only a reassertion of natural religion and therefore unnecessary; it is also opposed to rationalism (q.v.), which makes reason the supreme arbiter in all matters connected with revelation and the religion of Christ. Super¬ naturalism regards the Christian religion as an extraordinary phenomenon out of the circle of natural events and as. communicating truths above the comprehension of human reason. Though the supernaturalist, no less than the rationalist, employs reason in matters of reve¬ lation, he does so only to search and judge those claims to a divine origin which Christian¬ ity puts forth ; when he is once convinced that Christianity contains the direct teachings of God, it becomes his highest, his sole authority; called also supranaturalism.

SUPERPHOSPHATE FERTILIZERS.

See Fertilizers.

SUPERSTITION, Popular. That which others believe and we do not, is classed as superstition. The religion of our friend, if differing radically from our own, seems to us a superstition. In the heart of nearly every human being, savage or civilized, exists a set¬ tled conviction that he dwells in the midst of an unseen world, peopled with beings of strange powers, who thwart the plans of his own life or assist him in his endeavors. Folk¬ lore, legends, ghost stories and witch tales were early in the 19th century regarded as mere fables, but in the light of modern science they are now as worthy of study as the surely not less indelicate recitals of Roman and Greek mythology. Every profession, trade and occu¬ pation has its peculiar superstitious lore. Even the farmer who sudies the actions of animals will tell you what they portend concerning the weather and in many cases sensibly, too, for they build their homes and lay in their food through instinct given by Divine Providence with reference to the coming winter ; they house

themselves before the coming storm; their coats are heavy or light, as the winter shall be severe or otherwise, and they often give the farmer who watches them valuable indications concerning his crops. So to a greater or less extent man has followed the habit of the bird and the beast ; he has been guided in all his acts by omens; he has often planted his crops, gathered his harvests, made his journeys, waged war, built his house and gone fishing and hunting according to imaginary signs and superstitious beliefs. Though many of the old omens and superstitions have passed into oblivion, there still remain among every race of people hundreds and thousands of popu¬ lar beliefs and many of them seem destined to be extant as long as man exists. As indicative of the variety, peculiarity and unusual extent of present-day superstition, the following examples selected from the folklore of the different na¬ tions and peoples of the world and now first

collected will prove of undoubted interest alike to scientist, student and casual reader.

Superstitions of the World.

Africa. — The snake is held in superstitious reverence by some African natives, who once a year kill a cobra de capello and hang its skin to the branch of a tree, tail downward. Then all the children born during the last year are brought out and made to touch the skin. This, their parents think, puts them under the ser¬ pent's protection. The Kaffirs use the venom of the puff adder, to poison their arrows, and when they have any small quantity left they swallow it, having a theory that it will protect them from the effects of future bites. If they find a dead serpent they dress it in clothes and give it a superb funeral.

American Indian. — Various tribes of American Indians have a theory that every white deer has a <(mad stone® in his stomach. They believe that the (<Great Spirit® places this stone in the white deer's stomach to absorb poisons which that delicate animal may take in while eating grass. Feathers figure very prom¬ inently in the religious customs of most aborig¬ ines, and remarkably so in the Southwest. Among Navajos and Pueblos alike these plume symbols are of the utmost efficacy for good or bad. They are part of almost every ceremonial of the infinite superstitions of these tribes. Any white or bright-hued plume is of good omen — <(good medicine,® as the Indian would put it. The gay feathers of the parrot are particularly valuable. The Navajo Indian will not eat fish under any circumstances, and cherishes the be¬ lief that the use of such food will be followed by dreadful punishment.

Arabia. — Many Arabs, when overtaken by severe storms in the desert, cry out, <(Iron! Iron !® which they think will propitiate the evil spirits who have raised the storm.

Arctic Regions. — The Eskimos believe in ghosts. Many also believe in the transmigration of the souls, that spirits return in animals, winds, rocks, ice and water, that they are evil, angry or good, as the elements may be favorable or unfavorable, and that they can be appeased by hoodoo rites if the performer is sufficiently versed in occult sciences. To change the wind they chant, drum and howl against it, build fires, shoot against it, and, as a last resort, fire the graves of the dead. Eclipses of the moon create the greatest consternation and almost paralyze the people with fear. When a child dies in some parts of Greenland, the natives bury a live dog with it, the dog to be used by the child as a guide to the other world. When questioned in regard to this peculiar supersti¬ tion, they will only answer, ((A dog can find his way anywhere.®

Australia. — Some Australians say that Mit- yau, the moon, was a native cat, who fell in love with some one else's wife, and was driven away, to wander ever since. The natives of New Zealand tie the hands of their dead to¬ gether and pull out their nails ; this is for fear that the corpse may scratch its way out of the grave and become. a vampire.

Bohemia. — The peasants of Bohemia have a queer superstition by which they think to rid themselves of the depredations of sparrows among their crops. A frequent charm is to

plant, in the centre of the field, a stick or splin¬ ter of wood taken from the timber of which a coffin has been made, or to scatter about pieces of the coffin itself. It is also considered very effective to lay upon the threshold or window¬ sill of the barn or storehouse a human bone taken from a grave. In Bohemia the willow is said to be the tree on which Judas hanged himself, and it is supposed to have a special attraction for suicides.

Brazil. — • Religious superstitions are com¬ mon here. Once a year some churchmen dress up a figure to represent Judas (usually with red hair and sandy beard), and give it to the street arabs, who carry it about until it has been rid¬ dled by stones and other missiles and then

burn it on the commons. In the same country the sailors dress a figure on certain feast days, sub¬ ject it to all sorts of indignities, winding up the ceremony by hanging it at the yard-arm.

China. — Many Chinese guard their homes from witchcraft by suspending bunches of herbs and magic plants over the door. At the new year the Cantonese clean out their houses and post near the doors a pair of scrolls made of red paper (the lucky color) bearing an inscription such as ((Leaves of the moxa, like a banner, procure a hundred blessings.® In China the peony is regarded with superstitious reverence and pride. In China, too, the old man of the moon is known as Yue-loa, and holds in his hands the reins of marriages among mortals. The future husband and wife are tied together by an invisible silken cord, which is only sev¬ ered at death.

Cuba. — A belief very prevalent among the common people is that the rain water of May has peculiar beneficial qualities which that of no other time possesses. _ The moonlight in Cuba seems particularly objectionable, and strangers are warned not to go out in it with uncovered head, and not to go out in it at all if it can be avoided; it is thought that this light brings many evil effects and not under any circumstan¬ ces will a superstitious Cuban sleep in its rays — he thinks that, among other things, it will draw his mouth to one side of his face. The hoot¬ ing of an owl is taken as a very bad sign. The superstitious Cuban kills any creature of this kind which makes weird sounds near his home. This is supposed to break the spell, and it is not then inevitable that a member of the family shall meet death in the near future.

Egypt. — When Egypt was in the height of her power her people worshipped a black bull with a circular white spot in the exact centre of his forehead, and the advent of such a crea¬ ture in any herd was the signal of wild demon¬ strations. Even as late as the time of Cleopatra such animals were shod with gold and had their horns tipped with the same metal. Herodotus tells of a man who died with grief because he sold a cow that soon after became the mother of a black bull calf marked with the sacred white circle in his forehead. In modern times the Egyptian housewives mark their bread loaves with a cross, and housemaids insure a brisk kindling of a newly lit ffre by making the same sacred sign over the grate. The sacred ibis of the Egyptians was supposed, from the color of its feathers, to symbolize the light and shade of the moon. It is said that its feathers would scare, and even kill, the crocodile. The

bird was believed to deliver Egypt from winged and other serpents

that came from Arabia. It was so deeply venerated that it entered the most sacred temples with impunity, and to kill one, even by accident, was a crime punishable with death. After death, its body was embalmed, and thousands of their remains have been found at Thebes, at Memphis and at other Egyptian cities.

England. — In England there existed, even so late as the 18th century, a superstitious belief that a man condemned to be hanged could es¬ cape that undesirable fate provided some com¬ passionate woman came forward at the foot of the gallows and expressed her willingness to marry him. Superstition has always clung to the cricket. In Hull it is unlucky to kill them, and in Lancashire, it is said, they cut holes in the worsted stockings of those members of a family that kill them. It is a custom in many parts of England and the Continent to announce to the bees a death in the family, especially that of the master. It is said that if a swarm of bees settle on the dead branch of a live tree a death will occur in the family within a year. In some places it is thought unlucky to sell them. They are given away for another gift. It was a popular superstition in Norfolk that whatever you are doing the first time you hear the cuckoo, that you will do most frequently all the year. The English housewife will not sweep the dirt out of the front door, fearing to sweep away the fortune of the house. In the north of England, the peasantry do not favor naming a child after some respected an¬ cestor; that departed worthy might not like it. In the same locality when the dairy maid churned for a long time without making butter, she would stir the cream with a twig of moun¬ tain ash and beat the cow with another, thus breaking the witch's spell. But to prevent acci¬ dents of this nature it has long been customary to make the churn staff of ash. For the same reason herd boys employ an ash twig for driv¬ ing cattle. In England it was thought, and not many years ago, that oak trees were mysteri¬ ously protected, and many superstitions clung round the sacred tree. The hawthorn used to be hung up at the entrances of houses in May to guard the dwelling from witches. In Devon¬ shire it was considered unlucky to plant a bed of lilies of the valley, as the person who did so would surely die in the course of the next 12 months.

Fiji Islands. — In the mountain country of the Fijis there is orevalent a superstition called by the natives ((Tuka.® The priests profess to possess an elixir of life, which, preventing decay or disease, insures to faithful disciples of this faith everlasting youth and vigor and a robust enjoyment of life. The natives who give their adherence to these priests (and this means the giving up of all they possess to them) are promised the life of immortal youth, the imme¬ diate resurrection of their ancestors, vengeance on all their enemies and oppressors, whose

wives and property they should inherit, together with all the wealth of the white settlers, these latter being also promised to them for domestic slaves.

France. — Perhaps the most common of all French spread superstitions is the belief met with through all the south of France, that the

position of a drowned body may be discovered by a floating loaf of bread. Possibly the only scientific basis is that the loaf is apt to be car¬ ried by a current of water just as a body is. The French peasant's faith in fermented grape juice is truly beautiful. If his children are stricken with the measles he gives them beakers of wine, well sweetened with honey and highly spiced with pepper. For a severe cold he ad¬ ministers a quart of red wine and a melted tal¬ low candle mixed. For scarlet or brain fever he gives eggs, white wine and soot, well beaten together. Not all their superstitions are curi¬ ous — some are pathetic. A mother, for in¬ stance, often buries her dead child with its favorite toy, or her own beautiful hair in the coffin, <(that it may not feel quite alone.® Along the sea coast, unless the waters are strewn with flowers by the fishermen's wives and daughters, there will be no fish to catch. A curious super¬ stition which is current among the street gamins of Paris and the large cities of France, is that which makes it unlucky to pass a priest. To break the ill luck, the passer must immediately touch a piece of iron. Gamins carry in their pockets pieces of iron to touch, but none of them seem to know the wherefore.

Germany. — Throughout northern Germany and in the Low Countries the stork is held in beloved reverence, for the peasants believe that where the stork has its brood no fire can ever come. There is a German belief that any one who during his lifetime may have made cats his enemies, is certain to be accompanied to the grave amidst a storm of wind and rain. It is said to indicate good luck to have a spider spring his web downward toward you, but bad luck when he rises toward you. If one has a four-leaved clover, and carries it about on Christmas eve it is believed the owner has the power to see witches. In Germany the apple has been deemed potent against warts. In Pomerania it is eaten on Easter morning as a preventive of fever. <(If on Christmas night,® says a German proverb, <(the wine ferments heavily in the barrels a good wine year is to follow.®

Greece. — Before a Greek selects the day for his wedding he observes most minutely every omen, and with prayer and fasting and sacrifice, takes every precaution. The Grecian mother, before putting her child in its cradle, turns three times around before the fire while singing her favorite song, to ward off evil spirits.

Hawaii. — In the Hawaiian Islands the su¬ perstition that the Kanaka holds dearest is that concerning the power of the Kahuna, or native witch doctor. This power is almost limitless. If a native in any way offends a Kahuna he is in deadly fear that he will be condemned to die, and he immediately hunts up a Kahuna higher in rank than the one whom he has offended and asks to have the curse offset and neutralized.

Iceland. — The Icelanders have a supersti¬ tion which they call <(Skipamal,® or the speak¬ ing ship. They conceive that utterances came forth from the motionless hulls of vessels; but few can understand the strange language.

India. — The natives of India have many curious beliefs and superstitions, some of which

are essentially Oriental in their nature. The Hindus think it brings a person ill luck to be openly admired or praised, and if you should praise or even look too admiringly at a child the mother will hastily withdraw it from notice, and either beat it or say something disparaging of it in order to counteract your ill-omened admiration and avert the jealousies of the gods. In Burma it is rather a suspicious thing to give money for a charitable object. It is supposed to mean that the donor has been very wicked and is desirous to make amends. The Hindu troubled with a wart looks at the new moon, picks up a pinch of dust from beneath his left foot, rubs the wart with it — and when the moon goes so does the wart. In India one may observe the quasi sign of the cross which a Hindu makes should he chance to sneeze while performing his morning ablutions in the Gan¬ ges. Having touched his forehead, nose, chin and cheeks with the tip of his finger, he re¬ commences his prayers from the very begin¬ ning, and will do so as often as they are inter¬ rupted.

Ireland. — The Irish peasant is subject at all seasons to the sense of shadowy supernatural agencies. But at no other time is his help¬ lessness against such fateful and inexorable agencies brought home to him as in Lent. Moreover at this time the auguries and omens assume an especially depressing complexion. Thus the <(keen® of the Banshee, always an eerie presager of death, when it occurs during

Lent has the gloomy significance of a double funeral. Peasant mothers in Ireland still carry their children to holy wells where the little ones are made to creep on hands and knees beating their infant breasts the while they pray and plead for Lenten mercy on their own and the manifold sins and wickedness of their fel¬ lows, and are bathed in the blessed water which is credited with a miraculous power of averting sickness and washing away sin. The ceremony is completed by tying to a tree in the neigh¬ borhood of these consecrated springs, shreds of colored rag as a thank-offering and propitia¬ tion to the particular patron saint who is be¬ lieved to preside over the birth of the child and to hold its future in his keeping. The people in the south of Ireland are particularly fearful of the robin entering their houses, for they say that it is always a certain prognostic of severe snows and frosts.

Isle of Man. — One of the superstitious cus¬ toms in Manxland is for the family on stormy nights to retire to rest at a very early hour, so that the good fairies may unobserved enter bo find shelter and repose.

Italy • — In Italy the snake is invulnerable except during the full vintage of the moon, when the serpents are believed to become drunken on the vineyards, and may be slain. The slaying of one of these serpents, though, would be the calling down on the head of the slayer and his family forever some terrible plague. The superstition about snakes as guard¬ ians of buried treasure seems to be a favorite one with the Italian peasantry; for they be¬ lieve that all snakes hover about where such treasures are. In Sicily the time honored su¬ perstition of the ((Evil Eye® is still so widely spread throughout the island, even among the

upper classes, that no one who does not wear a charm is considered safe. A Venetian su¬ perstition is that the young girl across whose feet dirt is swept will never get married. The periwinkle has in Italy gained for itself the name of Death's flower, from the ancient custom of raising it for garlands when an infant died.

Japan. — Japanese sailors think it is a good omen to cross the bows of a foreign vessel and frequently they run into considerable danger in order to do it. The Japanese have some curi¬ ous ideas about their finger nails. One of them is to the effect that they must not be cut before starting on a journey, lest disgrace befall the person before he

reaches his destination. Neither should they be cut at night, lest cat's claws should grow out. To throw nail parings into the fire is to invite some great calamity. If, while trimming the nails, a piece should fall into the fire, the person will soon die. They are superstitious about many flowers and will have none of them. Many favorites, as the orchid, gentian, daphne and azalia are utterly prohibited for felicitous occasions. There is also with them an aristocracy of flowers most sharply defined. The iris is of princely dig¬ nity, but because of its purple color must not be used for weddings. Some flowers in them¬ selves are regarded as being of ill omen. Such is the camelia, for instance, which is neglected because its red blossoms fall off whole in a manner which reminds them of decapitated heads.

Java. — When search is made for the body of a drowned person a live sheep is thrown into the water and is supposed to indicate the position of the body by sinking near it.

Mexico. — In Mexico the Indian carnation bears the name of the flower of the dead, and when a virgin dies it is customary for a young woman to carry a garland of flowers and sweet herbs in front of the coffin. The high priest of the ancient Mexicans gave aloe leaves, traced over with sacred characters, to people going among volcanoes, to protect them from the incident dangers.

Norway. — Norwegian sailors believe in the existence of a heck or merman, a sea animal represented as having a fish body with the head of a man and the flowing ringlets of a boy. The merman sits upon the waves, plays the harp and, following the 'example of many of the Norse fishermen, wears a red cap. It is never seen more than once in seven years, and no matter how many vessels appear in its sight they all must inevitably perish. A curi¬ ous custom is practised in Norway, where those in search of a drowned body row to and fro with a cock in the boat, fully expecting that the bird will crow when the boat reaches the spot where the corpse lies.

Persia. — In Persia the crowing of a cock is the sign of some event affecting the family, and the master of the house hastens to feel the bird's feet. If they are cold it is a premoni¬ tion of death ; but if they are warm the sign is propitious, and the master rejoices in com¬ ing good fortune.

Peru. — To procure rain the Peruvians used to set a black sheep in a field, pour chica over it and give it nothing to eat till rain fell.

Philippine Islands. — In the interior moun¬

tain districts the natives have gods innumer¬ able; gods of the air, of the water, and in fact of everything imaginable. When sickness or death approaches, the witch or sorceress of the village is called in. An ox and a pig are killed; she places the reeking skull of the pig over her own head and works herself into a frenzy of invocation. The spirits of the dead receive special honors and sacrifices are made in their behalf. Many curious demons and hob¬ goblins abound in Philippine superstition, too numerous to be described in detail.

Poland. — Poland has a wealth of animal superstitions. The goat is there considered the best harbinger of luck, while the wolf, crow and pigeon are Looked upon as unlucky. The skin of a cat worn on the

chest is alleged to cure consumption.

Romany. — The people of the gypsy tribe believe that a coin or shell or pebble carried by a person becomes imbued with his or her per¬ sonality. For that reason the Maria Theresa dollar is sought after by Romany people throughout the world. In all lands this piece of money is held in high esteem for magical purposes. The gypsies believe that witches use egg shells to make plates, pots and dishes to feed from at their banquets.

Rumania. — Rumanian mothers tie red rib¬ bons around the ankles of their children to preserve them from being harmed.

Russia. — Superstition has always found a place in Russia. The Russian General Skobeleff would never ride in battle any other horse than a gray one, since it was on a gray horse that he fought his first battle (in the Russian war, 1863) and he believed that it would be fatal to him to change afterward. The primitive Rus¬ sians place a certificate of character in a dead person's hands, which is to be given to Saint Peter at the gates of heaven.

Samoa. — The natives of Samoa, in order to secure the admission of a departed spirit to the joys of their paradise, wreathe the head of the corpse with flowers, and offer, as the Chinese do, a baked pig to their god in the name of the departed

Scotland. — In Scotland it is considered un¬ lucky for the mother and her baby to go out of doors until the child is baptized ; to be en¬ gaged with a ring containing either opals or emeralds ; for lovers to give either a Bible as a present before marriage ; to be married in a month where there is a letter a, such as May; also unlucky for any of the wedding guests to be dressed in green or black; a crepe bonnet or a band on a gentleman's hat. These ill omens en¬ tail lifelong misery to the newly married couple. A young woman who tries on a widow's cap is sure to be a widow after marriage. It is unlucky to try on your bridal dress before the bridal day; to see your future husband on the day of the marriage until the ceremony. To bring flowering hawthorn into a house denotes a death in the family. In Scotland all salt cellars should be full on New Year's Day; otherwise the household having the empty cellars will suffer want during the ensuing year. In Scotland to pass a bare¬ footed woman before going on board ship will result in scaring the fish away, and men bear¬ ing the names Rosse, Fullie and White must never be on a fishing boat at the same time for

the combination will <(hoodoo® the catch. Scotch sailors will not speak of a four-footed animal while on the ocean.

Solomon Islands. — The savages of these islands believe that the world is a cocoanut shell of enormous dimensions, at the top of which is a single aperture communicating with the upper air, where human beings dwell. At the very bottom of this imaginary shell is a stem gradually tapering to a point which repre¬ sents the beginning of all things. This point is a spirit or demon without human form, whose name is ((Root of All Existence.® By him the entire fabric of creation is sustained. In the interior of the cocoanut shell, at its very bottom, lives a female demon. So narrow is the space into which she is crowded that she is obliged to sit forever with knee and chin touch¬ ing. Her name is ((The Very Beginning,® and from her are sprung numerous spirits. They inhabit five different floors, into which the great cocoanut is divided. From certain of these spirits mankind is descended. The island¬ ers, regarding themselves as the only real men and women, were formerly accustomed to regard strangers as evil spirits in the guise of humanity, whom they killed when they could, offering them as sacrifices.

Spain. — The Spaniards never put the left foot down first when stepping on board a ves¬ sel, for to do this will surely bring disaster. Spaniards, in the 16th century, believed that spiders indicated gold where they were found in abundance. In Spain the new born infant's face is swept with a pine bough to bring good luck.

Sweden.— In Sweden it is unlucky to kill a stork, a robin or a swallow. If one kills a wren he will break a bone before the year is out. It is also unlucky to kill a marten. Many animals possess the power of curing diseases. Three hairs taken from the <(cross® of an ass, that is the mark running up the back and out at right angles over the shoulders, will cure whoop¬ ing-cough, but the ass will die. Another sure cure for whooping-cough can be obtained by asking and following the advice of a man riding a piebald horse. Swedish sailors will not men¬ tion the name of the port for which they are bound.

Switzerland.— If a huntsman, on going out in the morning, sees a fox cross his path, or meets an old woman dr friar, he immediately returns home again ; as he is persuaded that, in the first instance, he will meet with no game, and in the other that he will shoot a man hidden in the leaves, or do some other irreparable mis¬ chief. In the Alps the mountaineers believe that if the cuccoo sings in the direction of the

north, it will rain the next day; but if toward the south, the weather will be fine. In the Tyrol if a youngster look pale and sickly his parents suspect that the moon-rays must have found their way into his bedchamber.

Turkey. — In Turkey if a cat enters a chamber where a person is dying and manages to pass over hjs or her body before being driven from the room, both the dying person and the cat become vampires and live ever after by sucking the blood from living people. If one finds a piece of bread lying upon the ground he must pick it up, kiss it and carry it until he finds a hole into which it can be inserted. To

step upon a piece of bread or to leave it lying upon the ground is one of the unpardonable sins and dooms the offender to the third hell, where he is perpetually gored by an ox that has but a single horn, and that in the centre of his forehead. The Turk is convinced that mis¬ fortune hovers nigh when he sees a rose leaf fall to the ground, and many people pay par¬ ticular attention to the flowers and leaves which are decaying, gathering them carefully to pre¬ vent them from dropping.

United States. — In Michigan a double cedar knot is carried in the pocket by some to cure rheumatism, and in New Hampshire a man may carry a gall from the stems of golden- rod for the same disease. Hickory nuts, the buckeye and its cousin, the horse chestnut, which brings good luck in New Jersey, are other foes to rheumatism in different localities. Some people wear a strange ring made of a potato with a hole bored through it for rheu¬ matism and others carry a plain potato in the pocket. The charm is more potent if the potato has been stolen. According to a Maine belief, a nutmeg pierced and hung on a string around the neck prevents boils, croup and neuralgia. In some parts of Massachusetts the cows are believed to forecast the future, and if they ((moo® after midnight it is a warning of an ap¬ proaching death in the family. Among the West Virginia mountaineers the crowing of the cock before the door tells of coming company. It is 'believed on Cape Cod and in many other dis¬ tricts along the New England coast that a sick man cannot die until the ebb tide begins to run. In New England the sailors carry as a talisman a bone taken from a living turtle, a pebble from a fishhawk's nest or a small bone from the head of a cod. In Connecticut the belief holds that beans and potatoes must be planted in the old of the moon to prevent them running to vines. In Texas some superstitious people carry a small bone from a fish's head,. but the luck only comes after the charm has been lost. See also Amulets ; American Mythology ; Divination ; FoLKLbRE; Greek Mythology; Legend; Mas¬ cots and Hoodoos ;

Mexico — Mythology ; Mythology; Omen; Talisman; Witchcraft, etc.

SUPPtf, soop-pa, Franz von, Austrian opera composer: b. Spalato, Dalmatia, 18 April 1820; d. Vienna, 21 May 1895. His musical ability early manifested itself and when he was but 15 years old he composed a mass which was sung at the Franciscan church at Zara. His first opera, ˆommernachtstraumj appeared in 1844. His best known works are the operas <Fatinitza) and ˆoccaccioj and his overtures (Poet and Peasant* and (Morning, Noon and Nights He was for many years Kapellmeis¬ ter at Vienna.

SUPPLE-JACK, the popular name given to various strong twining shrubs, for example, certain West Indian species of Panllinia and Serjania which furnish walking-sticks ; or Car- diospermum grandiflorum or the high-climbing shrubby Berchcmia scandcns. This last is found in the southeastern United States and has tough, terete branches, oval leaves, small green¬ ish flowers in panicles and oval purple drupes, which render it conspicuous in autumn. The supple-jacks of Australia are climbing, woody

varieties of Clematis aristata, and that of New Zealand is one of the largest brambles known (Rubus australis), reaching to the tops of the tallest trees. It is also called the New Zealand lawyer.

SUPPLEMENTAL EDUCATION. Defi¬ nition. — <lExtension education is for every com¬ munity and for everybody. It extends the opportunity for education to the whole body of the people, to the whole period of life and to all the vital interests of life.®

Formal education may be said to include the systematic instruction which is imparted through personal contact with the student, whether by class-room work or lectures, when given under the direct guidance and supervision of trained instructors in schools, colleges, universities and similar institutions, as distinguished from knowledge acquired through the more informal methods of study whether or not allied with teaching institutions. These methods vary widely and range from the carefully organized study clubs of university extension courses to the entirely independent research work of single individuals in libraries, museums and similar educational institutions.

General Purpose. — ((Universities exist for two purposes: (1) To perpetuate and discover knowledge; (2) to disseminate that knowledge

both in its academic and its practical results. Extension teaching furnishes a means of fur¬ thering knowledge in both these aspects, par¬ ticularly the practical.

<(By instituting popular instruction in those practical, technical and cultural subjects over which universities tend perhaps unconsciously to exercise a monopoly those institutions can so influence public taste and intelligence as to contribute greatly to social progress.® Nalder.

The chief object of extension work is to provide the best education possible at the lowest practicable cost for those who are unable to attend established educational institutions.

I. Systems. — University Extension. — His¬ tory. — As early as 1831 some forms of univer¬ sity extension were in use in the United States in the work of the American National Lyceum, an organization which, though not associated with any educational institution, had a part in the wide spread of popular education. Lecture courses and debating clubs were begun in many city and country communities. In 1887 an ad¬ dress before the American Library Association on the subject of the English system of univer¬ sity extension aroused much interest, and as a result university extension work was begun in several cities in connection with the work of the city library. In 1889 Columbia University announced to the teachers in and near New York City the offer of certain elementary courses in science, to be given by means of classes outside the university. From this be¬ ginning university extension grew steadily as a power in popular education.

Purpose and Scope. — University extension provides a means for the acquirement of an education by those who for any reason are un¬ able to attend institutions offering formal in¬ struction. The courses are designed not only to assist such persons but also to supplement the regular work of such institutions by offering an opportunity for continued study to those who may have completed the formal courses.

Extension courses cover a wide range of subjects from those of a very elementary char¬ acter to those which are of interest and benefit only to a highly educated and cultured class, the courses being adapted to the particular need to be met. In many instances it is difficult to make a clear line of distinction between uni¬ versity extension and the formal instruction of teaching institutions as exemplified in night schools and vocation schools.

Methods. — Extension service as carried on by the universities of this country varies widely in methods. In some institutions there is a

separately organized extension faculty entirely distinct from the regular faculty, while in others extension work is conducted by the regularly organized faculties through the medium of the various departments. The former plan, which is relatively more expensive, provides for a highly specialized and intensive type of work, but the other secures co-ordination of effort by the various departments and co.-operation on the part of the faculties that would otherwise be impossible.

1. Lectures and Classes. — More or less lecture work is offered in most of the institutions which do extension teaching. Several forms of such work are employed, in some cases all are used in the same institution while in other cases one form may represent the entire work of the institution along extension lines. One form of lecture wrork is the lecture class — often these classes are held on Saturdays or late in the afternoon of other days for the benefit of students who are fully occupied during the hours of the regular college classes. Frequently the lectures are given by members of the fac¬ ulty, also by men engaged especially for the work and by local experts in particular lines. One of the chief developments in the establish¬ ment of local classes throughout the country has been in connection with engineering wrork. Classes have been formed in shops and fac¬ tories, and short courses offered at a number of colleges and universities.

In California out of 300 classes held under the direction of the University of California in eight cities, more than 200 classes were in San Francisco alone, showing to what an extent extension service may contribute to the in¬ tellectual, industrial, social and commercial life of a great modern city.,

<(The welfare work of university extension is based upon the theory that there is a large field of human interests, specifically social in their nature, which is not covered by any other public educational agency. Such interests are those of health, municipal affairs, a public forum, the music interests of a community and the promotion of the economic prosperity of the small town. Many other topics might be mentioned but these are typical and are the more easily organized and directed.®

Extension work in home economics seeks to conserve the home through reaching and training the individuals who compose it. In the South there are nearly 1,000 women who are devoting their entire attention to 15 South¬ ern States. South Carolina has 45 county

agents and 20 cotton mill villages organized for community improvement.

The extension work of normal schools in¬ cludes all forms of educational activity carried

on by the normal schools among people who are not enrolled as resident students in the regularly organized classes. The extension work of these' schools differs principally from that of the universities in that it lays special emphasis upon the study group or local class method, not upon correspondence work.

1. Study Clubs. — Some of the first steps in university extension were taken in the State of New York and it was the first State in this country to make university extension a part of its educational system. A special feature of the work was the development of the library system in all its branches. Through the travel¬ ing libraries division of the University of the State of New York collections of books were sent out as early as 1894 to university extension centres for the use of the study clubs formed in connection with the lectures. From this be¬ ginning has grown the present widespread use of the traveling libraries by hundreds of study clubs throughout the State.

2. Debating Societies. — The discussion of public questions of importance and interest has been encouraged and stimulated by the es¬ tablishment of a service which supplies cur¬ rent information and data on live topics of the day. Package libraries consisting of books, pamphlets, clippings and typewritten material on important social, economic and political questions, on the principles of debating and on the organization and conduct of debating so¬ cieties are supplied freely to schools, debating clubs and similar organizations. Local li¬ braries co-operate by furnishing available ma¬ terial and in some instances, notably in the case of the New York State Library, the work is carried on directly under the jurisdic¬ tion of the library. This work has been very fully developed at the University of Wiscon¬ sin.

3. The Co-operative Plan. — The co-operative system has been defined as the co-ordination of

. theoretical and practical training in a progress¬ ive educational program. One of the reasons why the night school has not been able to cope with the problem of the illiteracy of the adult worker with entire success is because it fre¬ quently does not connect his education with his work. Co-operation between school and factory helps to solve this problem. This system, whereby manufacturers agree with the school authorities to carry on apprenticeship courses in practical trades while the school gives general¬ ized and special instruction, has already met with practical success. In the co-operative plan the students frequently work in pairs; while one is at the office, shop or laboratory, the other is at school, the two changing places weekly. Courses are properly called ((co-opera- tive® because they enlist the active co-operation of the outside practical world in directing some of the educational policies of the school. At the present time there is a growing tendency on the part of manufacturers, department store managers and others to conduct, often during business hours, classes for their employees along the lines of their specific forms of busi¬ ness or on general elementary subjects of edu¬ cation. Such schools are described more fully elsewhere under the subject of Corporation Schools.

Principal Present Day Agencies. — Of the

many institutions conducting university exten¬ sion courses at the present time among the most notable ones are the University of Wis¬ consin, University of Michigan and Columbia University.

1. Wisconsin. — The University of Wisconsin offers several plans of extension work for the benefit of persons who desire to study any subject as members of a club, class or study group and provides special guided outlines. Such co-operative study makes possible per¬ sonal visits and class instruction from university professors and specialists. These plans are adapted to the needs of teachers' groups, women's clubs, labor unions, farmers, business men's associations, etc. The outlines which are provided carry the privilege of a lecture or series of lectures and of direction, guidance and assistance by the person who outlined the work. Because of this provision the studies are much more effective and interesting. There is a nominal charge for outlines with the at¬ tendant privileges and the cost of lectures varies somewhat with the lecturer. Much work is done in supplying material for debates. The department of debating and public discussion has approximately 10,000 packages of material available for distribution and there is an in¬ creasing demand for this service. Recently a Chautauqua circuit has been established in the State for the purpose of providing instruction,

inspiration and recreation.

Community institutes are held iq various parts of the State to assist local communities to solve certain definite problems. These in¬ stitutes are in charge of men specially trained in the economic and social problems common to small country communities.

The university in its extension work has free access to the Legislative Reference Depart¬ ment, the State Historical Library, the Uni¬ versity Library and the City Library. The Wisconsin Free Library Commission and those in charge of the different libraries co-operate generously in this work. Bulletins are issued, bibliographies and study outlines are prepared and publications are supplied gratis in the State. The Wisconsin Civil Service Commission has co-operated with the university in educational work among State employees by means of con¬ ferences, talks, lectures and circulars.

1. New York City. — In New York city a plan is being followed of training persons already in the city public service through the co-operation of the College of the City of New York and the city government. In 1917 a thousand city employees were studying 1,300 courses in the evening classes. The College of the City of New York in co-operation with the board of education offers free extension courses in sev¬ eral centres to the teachers of the New York City schools.

2. Columbia University. — The extension teaching department of Columbia University offers many courses in subjects which form a part of the curriculum of Columbia College and in the more advanced branches of these sub¬ jects shares in the work for the higher de¬ grees. Subordinate and subsidiary to this are the courses of secondary school grade for mature students who cannot return to ordinary schools of this type. The professional schools are represented in an increasing number of

courses so that students may pursue their studies in many special branches. In addition to the regular courses of the extension tea.ch-ing department extramural courses in New York and in outlying cities are offered.

1. Other Agencies. — One that is attempting to reach working people along educational lines is the Young Men's Christian Association. The subjects pursued in the Y. M. C. A. classes may

be approximately grouped under six heads: (1) Commercial; (2) political; (3) industrial, (4) scientific; (5) language and miscellaneous - — music, first aid to the injured, etc ; (6)

special schools, such as law, art, automobile, etc.

The Young Women's Christian Association also has educational classes but comparatively little instruction is given in the regular high school subjects. The main effort is to help women who are self-supporting to become more efficient and to put within the reach of those who are not self-supporting the training which will enable them to become so.

The University of Michigan endeavors to conduct its extension service as far as possible through established university channels. Its policy is to render through its extension di¬ vision the largest possible measure of public service commensurate with the equipment and facilities of the university. It is a condition that all extension lectures shall be free to the public and that they shall be so advertised. In one year 1,000 reprints were made for the 300 lectures 'offered. The total number of auditors reached throughout the State in the year was

71,500.

II. Home Education. — Definition. — There is no distinct line of demarkation between what is termed university extension and home edu¬ cation, but in general the former may be said to provide for the giving of instruction to groups or classes rather than to individuals. The work is conducted for the most part by teaching in¬ stitutions by means of lectures and _ other methods which are not comprised within the lines of formal education. It is the extension of the teaching power of an institution beyond the boundaries of regular class-room work. Home education is that which can be ac¬ quired in the home independently of association in groups or classes. It embraces all means of obtaining knowledge which are individual > in their nature as distinguished from education acquired through association with other indi¬ viduals by means of classes, study clubs, lec¬ tures, etc. Correspondence schools, reading courses, libraries, museums and other similar sources all offer a means of securing an educa¬ tion without the formal instruction associated with class-room work.

Purpose — A very large proportion of our population leave school before completing either the high school or grammar school course. Within a few years many of these people realize their educational limitations but because of age, hours of labor, financial condition or other reasons it is impracticable for them to re¬ sume a course of

study in an educational insti¬ tution. University extension courses and home education facilities are designed to meet the needs of such persons and of all who for any reason desire to continue their studies. The recent increase in the number of persons tak¬

ing correspondence courses is the best testi¬ mony of the need of educational facilities to supplement those of our regular schools, col¬ leges and universities. To obtain an education through individual effort without the personal guidance and inspiration of a teacher requites determination and perseverance, and those who take advantage of these supplementary educa¬ tional opportunities show evidence of a real de¬ sire and serious purpose to acquire an educa¬ tion. There are certain benefits to be derived from formal class instruction which cannot be obtained in any other way, but the serious and ambitious student may find in the United States ample opportunity to pursue his studies in his leisure hours at little or no expense.

Methods. — 1. Libraries. — -These are well termed (<the people's university" for they con¬ stitute the most universal, most accessible and most economical source for self-education. They are storehouses of knowledge which is made readily available to readers by modern methods of classification, cataloging and index¬ ing. Nearly all large libraries in this country are equipped with the latest and best biblio¬ graphical aids so that the student has every pos¬ sible means of assistance at hand. Our libraries are great laboratories for research and are in¬ creasingly frequented bv those seeking informa¬ tion on all sorts of subjects. Ordinarily only such restraints with regard to the use of the books are imposed as are necessary to protect the rights of readers, and serious students are frequently granted special privileges. Within recent years all libraries have become much more liberal in their service to the public and have been transformed into active rather than passive educational institutions. ((There is a sense in which the school may be looked upon as a fairer test of community opportunity than the library. The school is compulsory; it im¬ presses people most during their most impres¬ sionable period. On the other hand the library reaches old as well as young. Once established . it remains as a centre for the distribution of knowledge and hence of opportunity."

1. Traveling libraries. — In some States li¬ brary facilities, to a certain degree at least, are at the disposal of every citizen even though there may be no library in his local community. This distribution of books is accomplished by means of traveling libraries in some cases and in others by sending books by parcel

post or express from a central public library or agency such as a State library or library commission. In the State of New York both methods are in use the traveling libraries having been in opera¬ tion since 1893. These traveling libraries are small collections of books, usually in units of 25 volumes, which are sent anywhere in the State without charge on condition that the books shall be for the free use of the public. These libraries are intended primarily for com¬ munities without any free library facilities but under certain conditions they are sent also to small public libraries. There is a wide use of these libraries also by schools, study clubs and various organizations, and many ((house libra¬ ries" of 10 volumes are borrowed by individuals. Institutions or individuals wanting only a few books for a month or less may procure them from the New York State Library by paying the return transportation charges. By means

of this library extension service any citizen of the State may secure books either free of all charge or at a merely nominal cost.

1. Reading > Courses. — Reading courses on various topics are prepared and made available by libraries, schools, individuals and govern¬ mental departments of education and by means of these guides to study, the individual is enabled to inform himself fully on the subjects covered by the courses.

In the Home Education Department of the United States Bureau of Education work is carried on largely through personal correspond¬ ence and through the dissemination of reading courses. In 1917 there were 10 courses offered and approximately 100,000 copies of the printed outlines were distributed during the year. The bureau has been able to secure the co-operation of libraries and library commissions in bringing these courses to the attention of the public and in carrying on the work. About 6,000 persons are now enrolled in the National Reading Circle and certificates are granted to persons complet¬ ing the courses.

1. Museums. — The rise of the museum as a new force in town, city, state and nation is one of the latest phases of educational evolution. The growing museum influence which during the past quarter of a century has been especially remarkable throughout the cities of the United States is largely due to what

> may be called the new museum idea, namely that the museum is not a negative but a positive educational force and that it has teaching qualifications peculiar to itself. The most important function of a pub¬ lic museum is that of usefulness to the public in an educational way. With the great resources at their command museums are working out plans of various kinds for the definite instruc¬ tion of the public, such as study rooms, illus¬ trated lectures in the museum or elsewhere, tours of the museum under trained and com¬ petent guides, and loan collections.

One of the most interesting and important developments is the Children's museum, or Children's room which is one of the results of the growing conviction that the museum is a public educational institution which should meet the needs of all ages and classes of people.

1. Correspondence Courses. — Certain univer¬ sities have especially emphasized correspond¬ ence-study work. At those institutions, where this form of instruction has had the longest trial statistics show that the students who take advantage of the opportunities offered by these courses to do a certain portion of the work re¬ quired for a degree cannot be classed among those who are seeking easy methods for gain¬ ing credit but are earnest students as a rule, frequently doing considerably better work than the average class-room student.

The subjects offered are mainly cultural; those courses for which there has been the greatest demand include the languages, mathe¬ matics, history, education, political economy and technical subjects. A large number of biblical and theological courses are offered by some institutions.

Correspondence schools also play a large part in Home Education, but instruction by correspondence can never take the place of class instruction for it lacks the inspiration of personal contact. As a means of heloing am-

bitious people along special lines, however, it has been and is of very great value. In the commercial schools the great bulk of examina¬ tion and correction of student's work is done by clerks who are under the direction of ex¬ perienced men, but the textbooks and questions to be answered are usually prepared by com¬ petent experts. The system is

ˆbusiness-like® and in the best of the schools it is fairly efficient and satisfactory to patrons. Extensive advertising and organized systems of branch offices contribute greatly to the financial success of these schools. The methods of the stock company schools may not commend themselves to the conservative person but the results ac¬ complished have been in the right direction. Schools of this character are usually incor¬ porated under State laws and are managed by a board of directors. It was from the Metho¬ dist camp-meeting that the correspondence school first came into being. The work at Chautauqua, N. Y., developed from a camp meeting and as a part of that work correspond¬ ence classes were conducted. These were be¬ gun in 1871 and appear to constitute the first complete plan formally announced in the United States for correspondence work. For financial reasons this branch of the work at Chautauqua was dropped in 1900, but through it the way had been marked out for others. The commercial possibilities of correspond¬ ence work were soon recognized, several busi¬ ness schools adding that feature to their resi¬ dent work. Some of the largest of the com¬ mercial correspondence schools were estab¬ lished through the interest of certain publishing houses as a means of selling their books.

The largest of these educational schools is the International Correspondence Schools at Scranton, Pa. This institution is representa¬ tive of the class of schools operated as com¬ mercial ventures by stock companies. A daily paper published in Shenandoah, in the coal¬ mining district of eastern Pennsylvania, had in the early 80’s a department devoted to the edu¬ cation of miners in the principles of mining and from this beginning has grown the present great organization. These schools offer over 200 standard courses and an indefinite number of special and combination courses covering many branches of technical education. There are nearly 2,000 persons employed in the various departments of the schools in America alone and hundreds in other countries of the world. The schools have enrolled more than 1,850,000 persons, approximately 100,000 new students being enrolled each year. More than 500 ex¬ perts, instructors and assistants, are occupied in writing and revising the International Correspondence Schools textbooks and in ex¬ amining and correcting the work of students. To teach successfully by correspondence re¬ quires an entirely different kind of textbook from that used in the class-room and the In¬ ternational Correspondence Schools textbooks constitute the foundation of this system.

In regard to achievements of such institutions as the University of Chicago, Pennsylvania State College, University of Wisconsin and others of a similar type nothing but good may be said. They have

carried the higher educa¬ tion to thousands to whom college walls were but a dream. From the University of Chicago

correspondence study reaches literally every part of the world. Through the Correspond¬ ence Study Department the university offers a large number of the courses given in the class¬ rooms of its different divisions, and all non¬ resident work for credit is conducted through this department. Each course is designed to be equivalent to the corresponding residence course and calls for an equal amount of work. No preliminary examination or proof of previous work is required of applicants for correspondence work. At the Pennsylvania State College correspondence courses are of¬ fered in agriculture, home economics and in¬ dustrial education, free of charge to any citizen of the State. Students at the summer session are permitted to complete their work in cer¬ tain subjects by correspondence at a nominal cost. At the University of Wisconsin 300 single courses are offered in 28 departmental lines and 70 of these courses are in engineering subjects. Each course is divided into units designated as assignments and each assignment represents six to eight hours of work. The in¬ struction is carried on in three ways ; by special lesson sheets, by correction of the exercises submitted, and by personal letters and other as¬ sistance where special needs are not otherwise met.

Education of Adults in Other Countries.

—Schools for the education of adults originated in England through the Sunday School move¬ ment during the 18th century. The first adult school was opened in Nottingham in 1798 and has continued to the present day. The move¬ ment soon spread to^ other parts of the country and though providing secular instruction it was religious in its association. Parallel with these schools were classes in scientific and civic subjects. In 1851 the English government first made pecuniary grants to evening schools. At the beginning of the 20th century out of every 1,000 of the population of England and Wales about 23 persons voluntarily attended some form of evening class on week days. Several agencies have been influential in the development of this movement — namely the University Extension system, the National Home Reading Union, the Y. M. C. A., the Recreation Evening Schools Association and the Worker's Educational Association.

England had in 1918 a new education bill which provides for national

oversight, national direction and compulsory attendance of chil¬ dren from five to 14 years of age, for part time continuation schools for those between the ages of 14 and 18, for medical inspection, physi¬ cal training and more than 30 other incidental aids to democratic education — this bill will revolutionize education in England.

University extension as a means of carry¬ ing higher education to adults has had an un¬ paralleled success in England and the progress of the movement has been remarkable. Insti¬ tuted by the University of Cambridge in 1873, adopted by Oxford in 1878, with the work of the London Society for the Extension of Uni¬ versity Teaching, which was founded in 1876, taken over by the reconstituted University of London in 1900 — these three universities are the world-wide acknowledged leaders of the movement. The original form of university extension teaching has not declined in England

as it has in the United States. The character¬ istic features of the lecture system at local centres, with a class following the lecture and a final examination, have been maintained. Taking Oxford alone some 500,000 persons have attended the courses given in nearly 40,000 lectures by over 200 lecturers and nearly 30,000 students have been examined.

One of the most far reaching educational results of the war of 1870, with its great lesson of the importance ot national educa¬ tion, was the law of 1873 passed in Saxony making attendance at continuation schools com¬ pulsory for three years (that is up to 17 years of age) in that kingdom. The Saxon law ap¬ pears to have been justified by the experience of a generation. There is no doubt • that in this matter of continuation schools, as in so many other fields of social organization, the adoption of compulsion has been facilitated by the habituation of the working classes to compul¬ sory military service.

Adult education forms an important part of the educational work of Denmark also. Chil¬ dren of ability who can pass the required ex¬ aminations are sent on from the communal schools to the middle school, gymnasium and university at State expense. Most other chil¬ dren go to work after five years at school but a fair percentage of them go to evening classes not only for technical training but also for higher education generally, and many attend University Extension lectures regularly for years after they leave school. <(A great social-educational movement was started in Denmark in the late 80's. The primary object of this movement which was organized and is still worked by students of the Copenhagen Univer¬ sity, with the cordial help of the professors, is to draw together the diverse sections of the

community, to weave bonds of friendly sym¬ pathy between them and to spread the light among even the lowest sections. Students hold night schools in the Copenhagen communal day schools and give lessons there gratis to all the working men and women who care to go. There are more than 100 teachers and more than 2,000 are taught. On Sunday night there are free popular lectures by students and pro¬ fessors to which the working classes flock in thousands. The Danes boast that in their coun¬ try there is no Unenlightened class) and they do so with good reason. w

William R. Watson,

Chief Educational Extension Division, State hartment of Education, Albany, N. Y.

SUPPLEMENTARY PROCEEDINGS

are in the nature of a civil and equitable action whereby property of a judgment debtor may be reached, where said property cannot be taken under the usual process of execution; its object primarily is to discover the property of a judg¬ ment debtor which is subject to execution, and to learn if the debtor possesses or controls any property which is applicable to the satisfaction of the judgment. Any creditor who has re¬ duced his claim to a judgment and issued exe¬ cution thereon may institute supplementary pro¬ ceedings, and the first creditor who does so and prosecutes the proceeding with due diligence obtains a prior lien on the assets of the debtor. Supplementary proceedings exist and are regu¬ lated according to the statutes in each State;

some jurisdictions afford much the same remedy through other means ; many States do not allow the remedy against corporations. In some ju¬ risdictions certain classes of property are ex¬ empt, as, for example, wages earned by the debtor within a specified time next before the institution of the proceedings, the period vary¬ ing with the statute. Orders for examination in supplementary proceedings are granted by a judge having jurisdiction according to the statutes under which the right to maintain the proceeding is derived and may be held before a judge or referee appointed for the purpose; this order must be served upon the person to be ex¬ amined and it may be set aside on account of any defect but otherwise must be complied with. If, from

the examination, it appears that the judgment debtor has in his possession or under his control property or money by which a judg¬ ment may be satisfied, the judge may, in his discretion, direct the debtor or person holding said property for him to deliver the property to a receiver for the purpose of applying same to the judgment. One who disregards or diso¬ beys the orders of the judge in these proceed¬ ings is subject to punishment for contempt.

SUPPLICANTS, the name assumed by the Presbyterian petitioners against the introduction of Archbishop Laud's Service Book and the Book of Canons into the 'Church of Scotland : as their petition had no effect the Supplicants in 1638 signed the National Covenant and Con¬ fession of Faith, which that year were ratified by the General Assembly: thereafter they were known as Covenanters (q.v.).

SUPPLY RAILWAYS. Under this des¬ ignation are included all railways, except com¬ bat railways, that may be constructed or used for the supply of an army in the field. They may vary from a light portable track to a standard-gauge road. Their principal uses are to connect the army with its base; to connect permanent camps with the nearest existing rail¬ way; to form a belt line around a besieged place outside the field of observation; to form a belt line inside the line of defense of a besieged place; for the movable gun defense, and for a general supply line to supply an army in a per¬ manent position. In extreme cases a railway may have to be constructed to supply an ad¬ vancing army when local conditions preclude other means of transportation.

Regardless of the gauge, the same underlying principles govern the construction of all such lines, and having a plan for the operation and maintenance of an existing line of railway, it is easy to adapt it to the requirements of a tem¬ porary line. The principal considerations that govern in planning for such a line are (1) the amount of army supplies, troops and animals that must be handled; (2) the time that can be permitted for its construction; and (3) the amount of transportation necessary to place the railway supplies on the work which applies particularly to operations beyond the sea. This latter condition ordinarily necessitates a nar¬ row-gauge railway for a supply railway in a country beyond the sea. Local conditions, such as a large supply of standard-gauge material and rolling stock, may render advisable the building of a standard-gauge railway for oper¬ ations from a friendly land base; but where conditions extremely favorable to a standard-

gauge line do not exist, a narrow-gauge railway will probably be

decided upon in the general case of supply railways. The weight of the materials and rolling stock is so much smaller, the bridges can be so much lighter, and the earth work is so much less than for a standard-gauge road that the narrow-gauge railway is decidedly easier and quicker to build.

In case an official report is desired by the commanding general before he decides whether or not to construct the line, the entire survey and the estimates must be finished before the report is made. This report is accompanied by maps and profiles showing the routes considered and the final location decided upon, and the reasons therefor. It also shows the approxi¬ mate cost of material and of civilian labor, the amount and cost of rolling stock and other equipment, the capacity of the line when it is completed and the time that will be necessary to complete the work as desired. In case it has been definitely decided in advance to build the line, the cost and time are only considered in that they must be kept as low as practicable, and the survey need not be completed before construction work begins. See Military Rail¬ roads.

Edward S. Farrow,

Consulting Military and Civil Engineer.

SUPPOSITORY, a medicinal compound prepared in the form of a cone, sphere, or cyl¬ inder, for introduction into the rectum, urethra or vagina, there to be dissolved (melting grad¬ ually by the heat of the body) for the purpose intended, as action on inflamed mucous mem¬ brane, evacuation of the bowel, etc.

SUPPURATION, a morbid process in ani¬ mal tissues which gives rise to the formation of pus. It is one of the destructive terminations of inflammatory action. The inflammatory leu¬ cocytes, instead of developing into fibre-cells and forming tissue, become developed into pus- globules, and the exudation breaks down more or less completely into a creamy fluid called pus, which consists of these globules floating in serum, the liquor puris. Pus-globules, as seen out of the body, are but little different in ap¬ pearance from leucocytes. The leucocyte, when treated with acetic acid, displays the appearance of a nucleus in its interior, that appearance being usually regarded as the result of a shrink¬ ing of the protoplasm of which it is composed. The pus-globule shows more distinct trace of a membrane, and is frequently many-nucleated when treated with acid, a condition which Rindfleisch regards as indicating a tendency to degenerate and break down. Many of the corpuscles of pus display no difference in char¬ acter from the blood-leucocytes, having only single nuclei, showing

the same amoeboid move¬ ments, and being in fact obviously the same things both in structure and function. Suppu¬ ration is not. in most cases, wholly a destruc¬ tive process, but serves also as one of the usual modes of repair. The result of the process of suppuration is thus twofold, being in part de¬ structive and in part constructive. Suppuration in the interior of the body usually terminates in the formation of an abscess; but in some cases the matter is diffused through the inter¬ stices of the part, and is termed diffuse inflam¬ mation.

SUPRALAPSARIANS, su'pra-lap-sa'ri- anz, those Calvinistic theologians who maintain the strict doctrines of Predestination, Election of Grace and Reprobation, namely, that the Cre¬ ator for His own glory decreed the fall of man and the consequent introduction of sin into the world; and that the election of some to life everlasting and the damnation of others was made <(beyond® (or before, supra) Adam's fall, and was in no way consequent on it or depend¬ ent upon it. See Predestination.

SUPRANATURALISM. See Supernat¬ uralism.

SUPRARENAL CAPSULES, two small, ductless glandular bodies situated at the front portion of the upper end of each kidney. They are generally classified with the spleen and similar structures as ductless glands. Each suprarenal capsule exhibits a yellowish color. That of the right kidney is somewhat of trian¬ gular shape* the left being of somewhat cres¬ centic form. In some cases these bodies may be hardly recognizable on account of their minute size. Their average weight is from one to two drams. Each capsule is connected to its kidney by areolar tissue only, no vascular or other connections existing between the glands ; and neither capsule has any outlet or excretory duct. They lie behind the peritoneum, or lin¬ ing membrane of the abdomen, the front sur¬ face of the right suprarenal capsule being in contract with the under surface of the liver, the same surface of the left being in relation with the pancreas and spleen. The capsules derive their blood from the aortic, renal and phrenic arteries, and return their blood by the supra¬ renal vein, which receives its blood from the net-work of the medullary portion, and also partly from the cortical substance of the organ. The nerves of the suprarenal capsules are nu¬ merous, and are branches of the solar and renal plexuses and of the phrenic and pneumogastric trunks. The suprarenal capsules are present in all mammals, and are largest in Rodentia, and smallest,

proportionally, in the whales, in which they are tabulated or divided into lobes. In birds they are of small size, and exist generally on the inner aspects of the kidneys. In sharks they exist as a single, long, lobular organ lying behind the kidneys ; and in frogs and toads they appear as yellowish patches on the kidney. They are also lobular in sturgeons and other fishes, and in newts and Urodela generally. That these bodies may have some important function to discharge in connection with the blood-circulation of the embryo is a highly rea¬ sonable suggestion ; but further than this gen¬ eral statement physiology cannot certainly pro¬ ceed. Facts of much interest in connection with these bodies, however, have been observed in cases of Addison's disease (q.v.). The ac¬ tual diseases to which these bodies are liable consists of hypertrophy or enlargement, atrophy or wasting, tuberculous degeneration, fatty dis¬ ease and occasionally cancerous infiltration.

SUPREMACY, Royal, as a term in Eng¬ lish law, is practically restricted to denote the authority of the Crown in matters ecclesiastical. After the abolition of the papal supremacy at the English Reformation, the royal supremacy was affirmed by various acts under Henry VIII and Elizabeth, all enforcing an oath of suprem¬

acy. The oath was taken by holders of public offices along with the oath of allegiance, and afterward with that of abjuration, until the three were consolidated in one. The revised oath of allegiance imposed upon members of Parliament does not expressly affirm the royal supremacy in ecclesiastical matters. Supremacy acts were passed in 1534, 1559 and 1689.

SUPREME COURT OF THE DIS¬ TRICT OF COLUMBIA. See Court.

SUPREME COURT OF JUDICATURE,

a legal tribunal in which are united all the higher courts of justice in England, exclusive of the appellate jurisdiction of the House of Lords and of the Privy Council. It dates from the Act of 1873. See Court.

SUPREME COURT OF THE UNITED STATES, The, is a cardinal feature of our Federal representative government, balancing and harmonizing all its parts, a tribunal which has received the general approval and admira¬ tion of foreign jurists and statesmen, and com¬ mands the universal respect and confidence of the people for whom it administers justice. The Federal Convention of 1787, which framed our Constitution and created this unique tri¬ bunal, was composed mostly of members of the legal profession, which has always in

America been the chief nursery of statesmen ; but Wash¬ ington, the soldier, presided and Franklin, the philosopher, advised at every step. The mem¬ bers of the convention were undoubtedly chosen from the best qualified men that the country could furnish for the momentous work which was set before them, and their merits have been so universally recognized that it is not necessary to repeat any of the emphatic tributes which many great Englishmen have paid to the results of their labors. Their work was finished in four months' secret session at Philadelphia, but most of them had been in training for it through 20 long years of trial and trouble. From 1765, the time of the passage of the Stamp Act, which was passed through both Houses of Par¬ liament with little opposition, the colonists, and especially the lawyers of the Colonies, had been careful and earnest students of the principles of free government.

In 1774, having exhausted in vain all appeals to king and Parliament for a redress of their grievances, they sent delegates to a Continental Congress to deliberate on the state of public affairs, and in this Congress, which lasted for seven years, many of the future framers of the Constitution who were members of it found a most instructive school of statesmanship, and constantly devoted themselves to the social and political education of the colonists in matters of government and of public law and popular rights. In 1776, as the representatives of the United States of America in General Congress assembled, appealing to the Supreme Judge of the world for the rectitude of their intentions, they did, <(in the name and by the authority of the good people of the Colonies, solemnly pub¬ lish and declare that these United Colonies are, and of right ought to be, free and independent States ; that they are, qnd of right ought to be, absolved from all allegiance to the British C rown ; and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved.® They declared

"that as free and independent States they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent States may of right do,® and for the support of this declaration, with a firm reliance on the protec¬ tion of Divine Providence, they mutually pledged to each other their lives, their fortunes and their sacred honor. From the hour of the Declara¬ tion, the men who made it, and all the other statesmen of the Colonies, had to give renewed and constant study to the whole

science of gov¬ ernment. As they proved able by force of arms to make good this declaration, the United Colonies became from its date a new nation, over which Congress, by general consent and acquiescence, exercised the powers of a general government, for all the purposes of the very serious exigency which had called it into exist¬ ence. But it was a government by Congress only, with feeble and undefined powers, without an executive and without a judiciary. While the war lasted it barely sufficed, and afforded daily object lessons of its own defects and of what was required for a better government when better days should come.

The several individual States, being Absolved from the royal charters under which they had before practically managed their own affairs, adopted written constitutions, based in each case upon the sovereignty of the people, to take the place of the former dominion of Parliament. An epoch of constitution making set in, during which the principles of representative popular government were discussed and understood. Virginia, the largest of the States, the home of Washington, Jefferson, Madison and Monroe, who were to be four out of the first five Presi¬ dents of the United States, took a leading part. New Hampshire had already framed a tempo¬ rary form of government Muring,® as they said, <(the unhappy and unnatural contest with Great Britain.® South Carolina and New Jersey had followed, but in the case of the former it was expressly declared that the Constitution estab¬ lished was “established until an accommodation of the unhappy differences between Great Bri¬ tain and America could be obtained.®

Massachusetts, in 1780, with the utmost pains and deliberation prepared and adopted a com¬ plete Constitution, in which the powers of gov¬ ernment were carefully distributed, with the solemn declaration that neither the legislative, executive or judicial department should ever exercise the powers of either of the others “to the end that it may be a government of laws and not of men.® During the war the other colonies were engaged in the same business of founding States upon the principles of civil and religious liberty, embodied in written constitu¬ tions. Rhode Island alone, founded by Roger Williams, the great apostle of toleration, having received from Charles II in 1603 a royal char¬ ter, subsisted under it until 1842 without adopt¬ ing any written Constitution.

But it was not only in the individual States that the framers of our Constitution were in all those years gathering knowledge and experi¬ ence in the science of popular government. From the very date of the Declaration, Con¬ gress, conscious of the inadequacy of its pow¬ ers, even for the purposes of carrying on war and conducting foreign

affairs, entered upon the novel and difficult task of arranging a

scheme which should enable it more efficiently to conduct those affairs which were of common interest to all the people of the 13 States, and which no one of them, nor all of them individually could control. After two years they adopted and submitted to the States what they styled “Articles of Confederation and per¬ petual Union,® but it was not until March 1781 that the powers of Congress were en¬ larged by the final ratification of these articles by the delegates of all the States. But this attempted’ bond of union — a crude experiment in the formation of a national government — proved little better than a rope of sand, and ut¬ terly failed to accomplish the purposes intended. While the war lasted the tremendous pressure of their common danger and common distress kept the States together and made them obedi¬ ent to the request of Congress which really had no power to command, but as soon as this external pressure was taken off, they fell apart, and each asserted its independent sovereignty. So jealous were the States, which had just escaped from the dominion of one central power, of anything which should seem to cre¬ ate dominion over them in another, that al¬ though upon paper they had laid many re¬ straints upon their own action, and conferred upon Congress extensive powers over their Federal affairs, they had carefully refrained from giving any sanction to those powers and from granting to Congress the means of com¬ pelling obedience to its enactments. The Ar¬ ticles provided for no Federal executive and for no judiciary department, although they author¬ ized Congress to provide for the settlement of boundary disputes between States and to ap¬ point courts of prize and for the trial of piracies and felonies on the high seas. More¬ over, Congress could not of its own authority raise a dollar of money for revenue or a single man to recruit its armies. It could only make requisitions for men and money upon individual States, which met them or not as they found it convenient. Nor could it proceed at all in the exercise of the principal powers nominally conferred upon it until nine States assented to the same. One of the leading writers of the time thus describes the powers of Congress under this Confederation :

“ By this political compact the United States in Congress assembled have exclusive power for the following purposes, without being able to execute one of them. They may make and conclude Treaties, but can only recommend the observ¬ ance of them. They may appoint Ambassadors, but cannot defray even the expense of their tables. They may borrow money in their own name on the faith of the Union, but cannot pay a dollar. They may coin money, but they cannot purchase an ounce of bullion. They may make war and determine what number of troops are necessary, but cannot raise a single soldier. In short, they

may declare everything, and do nothing."

Judge Story says that, strong as this lan¬ guage is, it has no coloring beyond what the naked truth would justify, and even Washing¬ ton himself wrote : ((The Confederation ap¬ pears to me to be little more than a shadow without the substance, and Congress a nugatory body, their ordinances being little attended to.® Of course, under such a system our national affairs drifted steadily and rapidly from bad to worse. Interest on the public debt could not be paid, nor the ordinary expenses of gov¬ ernment be provided for. The treaties which had been made could not be carried out, and

foreign nations would not deal in the way of new treaties with the envoys of a body which had no head and no power to perform what they should agree to in its behalf. Our ex¬ ternal commerce was at the mercy of foreign nations, whose laws contrived for its destruc¬ tion, Congress could do nothing to counteract. And worst of all, our domestic commerce, which between all the citizens of one nation should be free and equal, was at the mercy of the caprice or selfishness of each individual State. There were many boundary disputes be¬ tween States which threatened civil war. Fed¬ eral laws were a dead letter, without Federal courts to expound and define their true mean¬ ing and operation, or an executive to see that they were properly executed. There was a general failure as yet to realize in actual en¬ joyment the advantages we had won by seven years of war, and everything seemed drifting toward bankruptcy, disunion and anarchy. But these very defects of the Confederation, and the evils which resulted from them, demanded the constant exercise of the best brains in all the States to understand and to remedy them, and opened a new school for all our statesmen in the study of constitutional government. When Washington had laid down his sword and surrendered his commission to Congress, after the signing of the treaty of peace which acknowledged the independence of the United States, he exhorted his countrymen by all they held dear to provide for the establishment of a strong and stable government as the only hope of retaining the liberties they had won; and from that hour until the Federal Constitution was made and ratified he and Hamilton, and Franklin and Madison, and all the other great statesmen who made it, or helped to secure its adoption, were engaged in the constant study of the principles of free government and in enforcing them upon the attention of their fel¬ low citizens, so that they came to the per¬

formance of their great duties in the Federal Convention as graduates of the best practical school of Constitutional Law that the world has ever seen.

Their allotted task was to create a National Government which should reach, for its own proper purposes, by its own power, every man and every foot of territory in the whole United States, and should at the same time leave un¬ touched and undiminished the complete control 'by each State of all its internal and domestic affairs — which should be entirely adequate without aid from the States, to govern the peo¬ ple effectively in all matters that involved the general interests of all, to deal with foreign nations with the whole power and resources of the entire people behind it, in all the exigencies of peace and war, and to accomplish all this with the least possible vesting of arbitrary power in any department or officer of the new government. They differed in opinion and senti¬ ment on many points, but all agreed in a su¬ preme dread of arbitrary power, whether it should be exercised by the executive, the legis¬ lative or the judiciary department, whether by a single man or by a majority of all, for they considered that the majority without any re¬ strictions upon its power might become quite as dangerous as any other despot. They did

not believe with my Lord Coke that absolute despotic power must in all governments reside somewhere. They carried this distrust of arbi¬ trary power so far that they actually tied the hands of the people, whom they regarded as the source of all political power, and deprived them of the right to consider any amendment of the Constitution until it should be proposed by a vote of two-thirds of both houses of Congress or by a Convention called by Con¬ gress, on the application of the legislatures of two-thirds of the States, and deprived them of the power of voting directly upon any amend¬ ment, which could only be ratified by the legis¬ latures or conventions of three-fourths of the States.

In other words, the people of the United States who ordained the Constitution, deprived themselves of the power to modify it by the direct vote of a majority or two-thirds or even three-quarters of their own numbers, whether that number should be 3,000,000 or 80,000,000. They must act deliberately and indirectly through Congresses, legislatures, conventions and primary elections. Truly a rare instance of political self-restraint at the basis of free popu¬ lar government. One of the best definitions of the objects of such government is contained in the preamble of the Constitution :

“We, the People of the United States, in order to form a more perfect

Union, establish justice, insure domestic tran¬ quility, provide for the common defence, promote the general welfare and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America."

It was to <(establish justice® for the people of the United States that the Federal judiciary, with the Supreme Court as its head, was cre¬ ated. It forms the balance wheel by which the affairs of the nation and its relation to the States are kept in working order, and is itself held in check by the power of the President to appoint its members as vacancies may occur, and by the power of Congress to impeach them for misconduct, to regulate the measure of its appellate jurisdiction and to increase or diminish its numbers. The permanent stability of the judicial power is assured by its being imbedded in the Constitution, with a jurisdiction co-ordi¬ nate with that of the executive and legislative departments, by the extreme difficulty in the way of any amendment that would impair it, and by the universal conviction which the ex¬ perience of a century has produced, that its continued existence with the full enjoyment of its present functions is absolutely essential to the successful working of our scheme of popu¬ lar representative government.

The great achievement of the framers of the Constitution, was so to distribute the powers of government between the States and the Na¬ tion, as .to give the latter supreme control over all subjects that concerned the general interests of all, and reserve to each of the former ex¬ clusive control over local affairs which con¬ cerned only its own territory and people, and to do this in such a way that the State and Federal administrations should not clash in actual opera¬ tion. They knew well the importance of a distribution of the powers of government be¬ tween the three great departments. They created a Congress on which they conferred legislative powers over 18 enumerated subjects,

necessarily involving the general interests of the people of all the States and essential to national sovereignty, including the levying and collection of taxes for Federal purposes, the borrowing of money, the regulation of com¬ merce with foreign nations and among the several States, the coining of money, declaring war, raising and supporting armies, and main¬ taining a navy. They placed such limits upon the exercise by Congress of legislative power as should prevent its

interference with legiti¬ mate local administration by the States, or with the fundamental rights of the citizens, and put such prohibitions upon the legislative power of the States as should prevent their interfer¬ ence with the general powers and functions of the Federal government. They vested the executive power of the Federal government in the President, who was made commander-in¬ chief of the army and navy and of the militia of the States when called into the service of the United States. He was granted power to pardon offenders against the United States, to make treaties, provided two-thirds of the Senate concur, to have a veto power over acts of Con¬ gress, which could be overridden only by a vote of two-thirds on reconsideration. He was also to nominate, with the advice and consent of the Senate, ambassadors, judges and all the principal officers of the United States, to recom¬ mend to the consideration of Congress such measures as he should judge necessary and proper, to commission all officers of the United States, and to take care that the laws should be faithfully executed.

And, finally, to secure the absolute su¬ premacy of the Federal government over all matters of Federal cognizance, it was expressly provided that ((this Constitution and the laws of the United States which shall be passed in pursuance thereof, and all treaties made under the authority of the United States, shall be the supreme law of the land, and the judges of every State shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding.® This making the Federal Constitution and treaties made, and laws of Congress passed under its authority, the supreme law of the land is the key of our dual system of government, as the omnipotence of Parliament is the key of the British Con¬ stitution. But the Federal government, though supreme within the limits prescribed, is not omnipotent ; it must keep within those limits. By the 10th amendment, passed immediately after the adoption of the Constitution, to pre¬ vent Congress from meddling with the domestic concerns of the States, or exercising powers not granted to them, it was expressly provided that the powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States re¬ spectively, or to the people.

Thus the people of the United States created for themselves two separate and distinct gov¬ ernments, each «of the people, by the people, and for the people,® each independent and exclusive of the other within its own scope and sphere, and each able, without aid from the other, to reach for its own purposes, by its own authority, every person and every foot of land within its territory. Complex as it may appear to people living under other forms of government, this

dual system has worked very simply, smoothly, and harmoniously from the beginning until now, except for the single occasion when the terrible question of slavery proved to be too much for all the departments of government combined, and could only be settled by our long years of Civil War. But how has this marvelous result been accomplished? How has it been possible for these two governments, each of prescribed and limited powers, and each department of both similarly defined, to act independently and at the same time harmoniously over the same people? By what magical force has each power, State and Federal, been kept within its own limits? What has prevented constant and hope¬ less conflict between State functions and offi¬ cials, and Federal functions and officials, be¬ tween State and Nation, and between State and State, originally 13 in number and now 48? How has it been possible to secure the due pro¬ tection of the law to the citizens of one State in each of the other States, and the rights of aliens against local prejudice and discrimination in any State, and how has the faith of treaties been preserved in every locality? These, and a thousand other similar questions and doubts as to the successful working of our system, are answered by pointing to the Supreme Court created by the Constitution, and to the Federal courts inferior to it created by Congress, in which the judicial power of the United States is vested, a power which, as has been said, is co-ordinate and co-extensive with the executive and legislative. Over whatever region Congress may attempt to legislate or the President to execute its laws, there the judicial power ex¬ tends, to pass, if need be, upon the legality of their acts and the validity of their laws. The Constitution, and each of its provisions, is su¬ preme over President, Congress, Courts and States, and the valid laws of Congress, and treaties made under the authority of the United States, are the supreme law of the land for all its people, and for the courts, legislatures, and governors of each State. The Supreme Court is the final judge of the validity of all laws passed by Congress or by the legislatures of each of the 48 States, when brought to the test of the Constitution of the United States, and of the legality of all official acts when brought to the same test. It and the Federal courts inferior to it furnish the vehicle by which the judicial power of the United States is carried into the whole of its vast territory, to administer justice within the limits prescribed to it, to enforce the Federal laws and to punish offenders against them.

The third article of the Constitution is marvelously brief and simple. The judges, ac¬ cording to that good old rule which has worked so well in England since the days of William and Mary, are to hold their offices during good behavior, and can only be removed by impeach¬

ment, and their compensation shall not be diminished during their continuance in office. The Supreme Court has original jurisdiction only in cases affecting ambassadors, public ministers and consuls, and in those in which a State shall be a party. The first branch of this original power has seldom been invoked, but over and over again a great State has been brought to its bar by another State to settle boundary disputes, always the most dangerous

to the peace of adjoining States, and in each instance its decree has been submitted to with implicit obedience — a most unique judicial power, and a most convincing example to per¬ suade all nations to settle these most perilous questions by arbitration. It has been well said <(that the provision that the judicial power created by the people shall be the arbiter be¬ tween the States themselves, in all their contro¬ versies with each other, marks the highest level ever attained in the progress of representative government.® Tocqueville says : (<In the na¬ tions of Europe the courts of justice are only called upon to try the controversies of private individuals, but the Supreme Court of the United States summons sovereign powers to its bar.® John Stuart Mill declares it to be <(the first example of what is now one of the most prominent wants of civilized society, a real in¬ ternational tribunal.® In all other matters the jurisdiction of the Supreme Court is only ap¬ pellate. The judicial power extends only to cases as they arise between party and party, and in the Supreme Court as they come to it mostly by appeal from the inferior Federal courts, or by writ of error to the State courts.

The courts- of the United States exercise no supervision over, or interference with the Presi¬ dent or Congress, or the legislatures of the States. They have no veto power. They do not lie in wait for acts of Congress, to strangle them at their birth. They have no jurisdiction to pronounce any statute, either of a State or of the United States, void because irreconcilable with the Constitution, except as they are called upon to adjudge the legal rights of litigants in actual controversies. They simply pass upon the rights of parties as they come before them, and if a provision of the Constitution, or of a Federal statute, or a treaty is invoked for or against a right claimed or denied, they interpret the Constitution, the law, or the treaty, and determine the right. In this way, and in this way only if an act of Congress or of a State legislature is claimed to be invalid, or an official act is claimed to be illegal under the Constitu¬ tion of the United States, and the

decision of that question is vital and necessary to determine the rights of the parties, they perform the ordi¬ nary duty of interpretation, and declare the validity or invalidity of the act, and so deter¬ mine the right between the parties before them in that particular case, and for no other purpose, and this may happen months or years after the enactment of the statute.

The Supreme Court performs no duties except judicial duties. So, when in 1794 Presi¬ dent Washington requested the opinions of the judges on the construction of the treaty with France of 1778, they declined to comply, and when an early Congress enacted that certain pension claims should be considered and passed upon by the Federal courts, the Supreme Court upheld them in refusing to act under it, upon the ground that the power proposed to be con¬ ferred was not judicial power within the mean¬ ing of the Constitution. Nor will the court give a hearing to a fictitious or collusive case, con¬ trived to raise a question as to the validity of a statute. Keeping strictly within the limit pre¬ scribed to it of exercising only judicial power, the Federal judiciary has steadily refrained from exercising any political power, which belongs

exclusively to Congress and the President, and so it has been brought into no collision with the other departments. It will not even indulge in discussions, or express opinions upon purely political questions. All attempts, for instance, to induce it to interfere either to restrain or compel the President in the exercise of his power to see that the laws are faithfully exe¬ cuted have failed. In the case of foreign na¬ tions, as well as in that of the sovereign States of the Union, the government acknowledged by the President, or by the President and Con¬ gress, is always recognized by the Supreme Court. In all such questions as are purely political it holds itself bound by the acts of the other departments. So the question whether and upon what conditions aliens shall be ex¬ cluded from the United States, belonging to the political departments of the government, the court refused to express any opinion upon the wisdom, the policy, or the justice of the meas¬ ures enacted by Congress in the exercise of the powers confided to it by the Constitution over that subject. Thus it constantly sets the ex¬ ample to each of the other departments of the government of minding its own business, and keeping strictly within its assigned province. But, careful as the judges are to confine the exercise of the Federal judicial power to cases as they arise, that power does extend to (<all cases of law and equity arising under the Con¬ stitution, the laws of the United States, and treaties made under their authority, to all cases affecting ambassadors, other public minis¬ ters and consuls, and to all cases of admiralty and maritime jurisdiction®; and whenever any

such case does come before the Supreme Court it must take cognizance of it, and it cannot shrink, and never has shrunk, from determin¬ ing the question of private right so arising. It is under these clauses that its unique and pe¬ culiar function of testing the validity of State laws and constitutions and of Federal statutes, and the legality of the acts of State and Federal officers arises.

The remainder of the Federal judicial power depends wholly upon the character of the parties to the controversy. It extends (<to controversies to which the United States shall be a party.® This enables the Federal courts to enforce the acts of Congress, civil and criminal, against all persons within the realm ; <(to controversies be¬ tween two or more States,® the purpose of which has already been indicated, as making the Supreme Court the arbitrator and peacemaker between sovereign States; to ˆcontroversies be¬ tween a State and citizens of another State, between citizens of different States, between citizens of the same State claiming lands under grants off different States, and between a State, or the citizens thereof, and foreign States, citi¬ zens, or subjects.® It was wisely concluded that in all such cases justice would be safer and surer, against State or local interest, prejudice or passion, in courts representing and vested with the authority of the whole nation, than in the courts of the State of an interested party, and that foreigners especially should have the right to have their causes heard and decided by national tribunals. These clauses, which make jurisdiction dependent upon the citizenship or character of the parties, have been a prolific source of litigation in the Federal courts, have

opened to them the entire field of law and equity; have extended their adjudications to the whole body of jurisprudence, and have given to the decisions of the Supreme Court, by rea¬ son of the weight and force of character of the court and its members, a commanding authority with the State courts, and persuasive influence with foreign tribunals. But in this department of its functions the Supreme Court does not differ, in the scope of its powers and duties, from the courts of last resort of other nations, and its distinctive and peculiar character is not involved. The power of the court to declare State and Federal statutes, and the acts of the National and State executive officers invalid, as being in violation of the Constitution of the United States, naturally attracts the attention of foreign observers.

In the 130 years of its existence the court has pronounced 33 acts of Congress, and more than 225 State statutes, to be in conflict with the Federal Constitution, and therefore invalid, and in each instance there has been complete and peaceful acquiescence in the decision. So that instead of being a disturbing element, the exercise of this power confirms the peaceful relation between the States and the Nation, and beween the States as among themselves, pro¬ tects foreign nations from the breach of treaties, and conserves the rights of property and con¬ tract, and the fundamental rights of personal liberty. The Constitution provides that <(no State shall pass any law impairing the obliga¬ tion of contracts,)} and the aid of the court has often been invoked for protection against the attempts of States to violate this prohibition. The framers of the Constitution believed, and the people of the United States, in view of the suc¬ cessful operation of this prohibition for more than a century, believe that the States ought not to be permitted to intervene between the parties to a contract, to destroy or impair the binding force of terms by which they have agreed to be bound, and that such intervention is contrary to the principles of popular govern¬ ment. It is true that in the days that tried men's souls before the adoption of the Federal Con¬ stitution many attempts had been made by States to intervene for this purpose, which doubtless led to the adoption of this clause.

Mr. Hamilton, in the Federalist classing such laws with bills of attainder and ex post facto laws, which are prohibited by the same clause, says :

"Laws impairing the obligation of contracts are contrary to the first principles of the social compact, and to every principle of sound legislation. They are prohibited by the spirit and scope of the State constitutions. Our own experience has taught us, nevertheless, that additional fences against these dangers ought not to be omitted. Very prop¬ erly, therefore, have the Convention added this constitutional bulwark in favor of personal security and private rights. And I am much deceived if they have not, in so doing, as faithfully consulted the genuine sentiments as the undoubted interests of their constituents. The sober people of America are weary of the fluctuating policy which has directed the public councils. They have seen with regret and indignation that sudden changes and legislative interferences in cases affecting personal rights, become jobs in the hands of enter¬ prising and influential speculators, and snares to the more industrious and less informed part of the community. They have seen, too, that one legislative interference is but the first link of a long chain of repetitions, every subsequent interfer¬ ence being naturally produced by the effects of the preceding. They very rightly infer,

therefore, that some thorough reform is wanting which will banish speculations on public measures, inspire a general prudence and industry, and give a regular course to the business of Society.”

In the celebrated Dartmouth College case the protection of this clause was invoked by the trustees of the college, to recover its property from a person who held it for new trustees under the authority of a law of the State of New Hampshire. In 1769, King George III by royal charter incorporated 12 persons, therein named as ((The Trustees of Dartmouth Col¬ lege, }) granting to them and their successors the usual corporate privileges and powers, and authorizing the trustees who were to govern the college to fill up all vacancies which may be created in their own body. The application by the founder, who had already established the college, was for a charter to incorporate a religious and literary institution, and stated that large contributions had been made for the object, which would be conferred upon the corporation as soon as it was created, and on the faith of the charter the property was con¬ veyed to it. After the Revolution (in 1816), the legislature of New Hampshire passed an act increasing the number of trustees to 21, giving the appointment of the additional members to the governor of the State, and creating a board of overseers with power to inspect and control the most important acts of the trustees. Admit¬ ting that the provision of the Constitution em¬ braced only contracts which respect property or some object of value, and which confer rights which may be asserted in a court of justice, and did not refer to grants of political power or to acts creating institutions to be employed in the administration of government or of pub¬ lic property, or in which the State as a govern¬ ment was alone interested, the court after most mature consideration reached the conclusion, that the charter was a contract which secured to the trustees the property and control of the college — a contract made upon valuable con¬ sideration — for the security and disposition of property, and on the faith of which real and personal property had been conveyed to the institution, and, therefore, a contract, the obli¬ gation of which could be impaired without a violation of the Constitution of the United States. It held that the statute of New Hamp¬ shire did impair it, and was, therefore, void, and rendered judgment restoring the property and control .of the college to the trustees who represented the founder. The opinions of Chief Justice Marshall and Judge Story are masterpieces of judicial reasoning, and the principles laid down by them have ever since prevailed. In 56 cases decided by the court, acts of State legislatures have been declared invalid in accordance with these principles, because they impaired the obligation of con¬ tracts, and it is not too much to say that, instead of having a disturbing or

disintegrat¬ ing effect upon civil society, these decisions have done more than any other single cause to inculcate a reverence for the law, and for the sanctity of the right of private property, which is .one of the chief objects of free government.

It is true that the constitutional prohibition against laws impairing the obligation of con¬ tracts does not expressly apply to Congress. In the convention, Mr. Gerry, a prominent dele¬ gate from Massachusetts, made a motion that Congress ought to be laid under the like pro-

hibition, but found no seconder. But in the amendments which were proposed by Congress at its first session, almost as conditions on which many of the States had adopted it and which were quickly ratified, other restraints were laid upon Congress which had the like effect. It was expressly declared that no per¬ son shall be deprived of life, liberty or prop¬ erty without due process of law, nor shall private property be taken for public use with¬ out just compensation, and Congress is hound by these prohibitions. No matter what the emergency, it cannot violate these fundamental principles of personal rights. The court has held that the United States cannot, any more than a State, interfere with private rights ex¬ cept for legitimate governmental purposes, that they are as much bound by their con¬ tracts as are individuals, that if they repudiate their obligations it is as much repudiation, with all the wrong and reproach that term implies, as it would be if the repudiator had been a State, a municipality or a citizen. But strict and earnest as the court has been in enforcing its constitutional prohibition against laws impairing the obligation of contracts, it has been ready to recognize and give full force and effect to the statutes of other nations which imposed no such prohibition on the law-making power.

The Canada Southern Railway Company, under its charter granted by the Dominion of Canada, had issued its bonds at a high rate of interest, and had sold them in New York to citizens of the United States, but getting into difficulties the company devised a scheme of arrangement, which was enacted by the Do¬ minion Parliament, by which the interest on the bonds outstanding was scaled down to a lower rate without the consent of the bond¬ holders, a clear case of impairing the obliga¬ tion of a contract. The bondholders appealed to the Supreme Court, which held that the ((Arrangement Act® was valid in Canada, and bound non-assenting bondholders there by force

of the schem'e ; that as it did have that effect in Canada, the Gourts of the United States should give it the same effect, even as against citizens of the United States whose rights accrued in the United States before its passage; that there was no constitutional prohibition in Canada against the passing of laws impairing the obligation of contracts, and that, under these circumstances, the true spirit of inter¬ national comity required that schemes of this character, legalized at home, should be recog¬ nized in other countries.

The clause of the Constitution giving Con¬ gress the power to regulate commerce with foreign nations and between the States, has been another fruitful source of business in the Supreme Court in the way of testing the valid¬ ity of State laws. At the outset .of steam navi¬ gation, the State of New York undertook to reward Robert Fulton for his invention and enterprise by an act giving him the monopoly of navigating by fire or steam all the waters within the jurisdiction of the State. Under this act the assignee .of Fulton had commenced running a line of boats between certain ports of New Jersey and New York, and obtained from the State courts of New York an injunc¬ tion to restrain the owners pf an opposition

line of boats, put on between the same ports, from entering the waters of New York Scate with their boats. But the Supreme Court held, upon appeal, that the New York enactment was in conflict with the power of Congress to regu¬ late commerce, and with its acts in relation to commerce, and upon this ground vacated the injunction and established the right of all ves¬ sels to enter the port of New York under the authority of Congress. It was held that by virtue of the constitutional clause referred to, Congress had exclusive authority to regulate commerce in all its forms in all the navigable waters of the United States, their bays, rivers and harbors, and to make navigation free to all without and restraint or interference from any State legislature. By a long series of deci¬ sions that followed under the commerce clause the court, with inflexible firmness and far- reaching sagacity, established the absolute su¬ premacy of the nation .over the whole sub¬ ject of commerce, navigation, travel and inter¬ course between the States, which went far to strengthen the power of the Union. At the same time they secured to the citizens of every State the full enjoyment of the privileges and immunities of citizens in all the other States, and also that absolute freedom of internal trade throughout the country which has so vastly promoted the prosperity of the people.

The influence of the court in maintaining the faith of treaties has been powerful and far reaching. By the treaty of peace with Great Britain,

in 1783, it was agreed that British creditors should <(meet with no lawful impedi¬ ments® in the collection of their claims ; and the Constitution said that treaties, like laws, made under its authority, should be the supreme law of the land. Various attempts had been made by several States, before the adoption of the Constitution, to impede or prevent the col¬ lection of such claims. The subject provoked bitter and exciting controversies, but the court, against the contention of John Marshall him¬ self, then at the bar, held that the treaty was supreme, and equal in its effect to the Constitu¬ tion itself, in overruling all State laws upon the subject, and that its words were as strong as the wit of man could devise to override all obstacles directed against the recovery of such debts. Of course, any such law passed by a State after the treaty contrary to its terms would be void.

Perhaps the most striking illustration of the power of the court to declare acts of Con¬ gress itself invalid, as contrary to the Consti¬ tution, was the celebrated Income Tax (q.v.) case. Congress in 1894 had passed a General Revenue Law, certain sections of which im¬ posed an income tax upon all incomes exceed¬ ing a certain amount named. This tax was levied indiscriminately upon all incomes alike, from whatever source derived, whether from the rents of real estate, the income .of invested personal property or from earnings. But the Constitution had ordained that direct taxes should be apportioned among the several States according to the numbers of their respective populations, in contradistinction to duties, im¬ posts and excises, which should be uniform throughout the United States. It was con¬ tended by those who challenged the validity of the law, that taxes on rent, and taxes on

the income derived from invested personal property, were direct taxes within the meaning of the Constitution, and that instead of being levied uniformly, man for man, throughout the United States, they should have been appor¬ tioned among the several States according to population. The difference was very consider¬ able and substantial. The effect of the act, if sustained, would be to throw the principal burden of the tax upon a few large States, in which the relative proportion of wealth was in excess of the relative proportion of popula¬ tion, and to exempt the other States propor¬ tionally from their constitutional share of the tax. The opponents of the income tax also insisted that any inequality, which should arise from its being apportioned among the States according to population, was an

inequality con¬ templated by the framers of the Constitution, and was intended to prevent an attack upon accumulated property by mere force of num¬ bers. The court, against vehement and power¬ ful opposition at the bar, and from a formidable minority of the members of the court itself, took this view, and declared the tax to have been laid unconstitutionally, so far as it affected incomes from rents and from invested per¬ sonal property. And as the invalid por¬ tions constituted so large a proportion of the whole income tax levied by the act, that Congress could not be deemed to have intended to impose the rest without them, it further adjudged that all the income tax provisions of the act, which constituted a single and entire scheme, must be held void. There were some popular protests against the deci¬ sion, and direful prophecies that it would dis¬ able the nation in future emergencies from raising the revenue it needed, but no such re¬ sults have yet appeared. Congress, in its sub¬ sequent enactments, has conformed to the deci¬ sion, and when the war with Spain came on, and an immensely enlarged revenue was needed at once, it found no difficulty in imposing taxes constitutionally and so successfully that, the year after the war closed, the Treasury was found to be burdened with so great a sur¬ plus that the entire body of war taxes had to be repealed at once. The same case contains a fine illustration of the power of the court to protect the States in the exercise of their legitimate power to manage their own affairs from interference by the Federal government. The income tax was levied also upon income derived from the interest upon bonds issued by municipal corporations, which were but civil divisions of the States, and the court held that as a tax upon the income of municipal bonds tended to cripple the power of the local au¬ thorities to raise money for the purposes of local government, it was not within the power of the Federal government to impose it, any more than it would be constitutional for the States to impair the power of the Federal gov¬ ernment to raise money for Federal purposes by taxing its bonds.

By the adoption of the 14th Amendment (q.v.), to meet the conditions resulting from the abolition of slavery at the close of the Civil War, new restraints were imposed upon the States, the consideration of which has largely occupied the attention of the Supreme Court. •It provides that ((No State shall make or en¬

force any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty or property without due process of law ; nor deny to any person within its jurisdiction the equal protection of the laws.' Doubtless this amendment was primarily intended for the protection of the newly emancipated slaves, especially in the States where they

had so long been held in bondage, but in its language there is no distinction of race or color, and the court held that it could make no such dis¬ tinction in its application, which must be made alike to all cases and subjects that came within the scope of its language in its natural mean¬ ing.

It must not be thought, however, from these numerous restraints imposed by the Constitu¬ tion upon the power of the States, and the very considerable number of cases (exceeding 200 in all) in which the Supreme Court has pro¬ nounced their statutes invalid, that the court is biased against the States or inclined unduly to enforce the limits imposed upon them. On the contrary, it has been quite as jealous and careful to uphold and maintain the reserved rights of the States in all matters of local and domestic concern, and to protect them from violation by the Federal government, as it has been to maintain the exclusive province of Congress in national concerns against intrusion by the State legislatures. It has endeavored, with success, to maintain the just and exact balance of power between them as prescribed by the Constitution. As against the 225 cases in which State laws have been invalidated by its judgments, vastly more numerous cases will be found, in its reports, in which State laws have been maintained by it against attack on the ground that they involved a violation of the Federal restraints. If, then, it be asked — why has it only pronounced about 35 acts of Con¬ gress invalid on constitutional grounds ; while 225 State laws have been condemned? the an¬ swer is that there are 48 States and only one Congress, and that the members and com¬ mittees of Congress are much more familiar with the Federal Constitution than those of a State legislature, who naturally look first to that of their own State. It is notable, too, that the legislators of some States must be much more studious iof the Federal Constitution than others, for while Louisiana, which became a State in 1812 and from its French origin has retained the civil law instead of the common law, has had 20 of its laws pronounced invalid for violation of the Constitution, Massachu¬ setts, .one of the original 13 States, has only suffered twice in this way in her whole his- tory.

Congress is, of course, in the first instance the judge of the constitutionality of its own acts, and its members, being mostly lawyers, are familiar with the letter and spirit of the Con¬ stitution. The cardinal and wholesome rule of the court has been, not to pronounce either a State or Federal law invalid on constitutional grounds unless the violation is clearly estab¬ lished, that the presumption is in favor of the validity of a statute, and that this continues until the contrary is shown beyond a rational doubt. The Supreme Court has felt that one branch of the government cannot

encroach on

the domain of the other without danger, and that the safety of our institutions depends in no small degree on a strict observance of this salutary rule. It speaks volumes for the wis¬ dom and caution of the court which is vested with this remarkable and fascinating power, that in so great a mass of State legislation, some of it crude and undigested, consisting of thousands of volumes, it has not found it neces¬ sary to exercise the power much more fre¬ quently. It has been a source of frequent wonder to foreign observers that a written Constitution, which was framed in the 18th cen¬ tury for 13 feeble States, with 3,000,000 of people of substantially uniform wealth or poverty, scattered along the Atlantic seaboard, and for whose government it was regarded as a precarious experiment, should be found to an¬ swer as well in the 20th century for the needs of a great nation of 80,000,000 in 48 States, occupying the breadth of the continent, with gigantic accumulations of individual and corpo¬ rate property, with conflicting interests and sen¬ timents, and wide differences of social condi¬ tion. There was much debate in the discus¬ sions which resulted in the adoption of the Constitution, whether the government which it called into being could reach and control even a people that was expected to occupy the terri¬ tory which the Treaty of Peace of 1783 secured to the United States, which extended only from the Atlantic to the Mississippi River, and from the lakes to the northern boundary of Florida. Since that time our territory has expanded more than four times, and now embraces in¬ sular possessions of vast extent, at enormous distance from the seat of government and half way round the globe.

The fundamental difficulties of time and space have been overcome by the triumphs of steam and electricity, wholly unforeseen and unexpected in 1787. but which now, in the case of the United States and Great Britain alike, have rendered possible the administration of government from London or from Washington on any portion of the earth's surface. At the time of the adoption of our Constitution it took about as long to travel the length or breadth of the then United States as it does now to go from New York to Manila, or from London to Peking, and orders of either government which then would have taken months to transmit, now reach their destination so as to be put in execu¬ tion at the other end of the world in a few hours, and sometimes in a few minutes. But in our case, we can account for the

fact that a written Constitution, instead of being torn asunder and left by the way as the nation expanded, as new and wholly unexpected con¬ ditions arose, has grown with the growth of the nation, like the hide of an animal from its birth to its maturity, so that it still embraces and covers the whole of our vast national life. We owe it, first, to the wisdom of its framers, who inserted in it only fundamental rules and principles, generally and briefly expressed, leaving it always to Congress to fill in and provide for all details; and secondly, to the vigorous and masterly manner in which the Supreme Court has exercised its essential and lawful function of construction. By this it has applied the whole instrument and each of its parts to new conditions as they arose, and has developed and strongly asserted the inherent

powers of sovereignty intended to be vested in the government of the United States, and neces¬ sarily resulting from their existence as a nation. It was our happy fortune that for 34 years, in that critical period of our history which was to determine whether we were to be a great and powerful nation, adequate for all the needs of a first-class power in the world, or only a league of States like the old Confedera¬ tion, we had the benefit of the broad and robust intellect of Chief Justice Marshall, to enforce the liberal principles of construction which the genius of Hamilton had laid down.

In a single paragraph he states the whole theory upon which the court has administered the Constitution, and fitted it to the growing wants and changing conditions of the nation:

“ The Government is acknowledged by all to be one of enumerated powers. The principle that it can exercise only the powers granted to it is now universally admitted. But the question respecting the extent of the powers actually granted is perpetually arising, and will probably continue to arise, as long as our system shall exist. The powers of the government are limited, and its powers are not to be trans¬ cended. But the sound construction of the Constitution must allow to the National Legislature that discretion with respect to the means by which the powers it confers are to be carried into execution, which will enable that body to perform the high duties assigned to it, in a manner most beneficial to the people. Let the end be legitimate, let it be within the scope of the Constitution, and all means which are appropri¬ ate, which are plainly adapted to that end, and which are not prohibited, but are consistent with the letter and spirit of the Constitution, are constitutional.”

Hamilton, in the Federalist, declared that <(the judiciary is beyond

comparison the weak¬ est of the three departments of power ; that it can never attack with success either of the other two ; and that all oossible care is requisite to enable it to defend itself against their attacks.® Montesquieu, whose works, with Blackstone's, were the textbooks of constitutional liberty which the framers had constantly in hand, de¬ clared that ((the judicial power is next to noth¬ ing.® And it was said by another French publicist, (<It has no guards, palaces or treasures, no arms but truth and wisdom, and no splendor but the justice and publicity of its judgments.® But the Supreme Court, sustained generally by the confidence and affection of the people, has more than held its own. Keeping carefully within its own limits, it has for the most part labored to keep the other departments of gov¬ ernment within theirs, and the powers of the States and of the nation from coming into conflict. In its hands the judicial power has been the force of gravitation wrhich has kept each member of our Federal system in its proper orbit, and maintained the essential har¬ mony of the wholp.

The closing scene in the Federal Conven¬ tion, which made the court in a way the guard¬ ian of the Constitution, will be ever memor¬ able. After months of discussion, sometimes violent, more than once approaching the very brink of dissolution, in hopeless despair of com¬ ing to any agreement, at last the grand triumph of compromise and mutual concession was ac¬ complished, and the members met to affix their names to the instrument. Hamilton, one of the youngest, acted as scribe, and after Washing¬ ton had signed first as ˆPresident and Deputy from Virginia,® inscribed on the great sheet of parchment the name of each State, as the dele¬ gates came forward in geographical order to add their names. When all had signed, Frank- •

lin, the oldest and most famous of them all, pointing to the sun emblazoned behind the chair in which Washington had presided through the whole struggle, said to those about him, (<In the vicissitudes of hope and fear, I was not able to tell whether it was rising or setting. Now, I know that it is the rising sun.® After more than a century's trial of their work, the sun which Franklin saw is not yet near the zenith — much has been done, but vastly more remains to be accomplished, and it is still morn¬ ing with our young Republic.

Consult Carson, H. L., (History of the Supreme Court of the United States, with Biog¬ raphies of all Justices) (2 vols., Philadelphia 1902) ;

Curtis, B. R., jurisdiction, Practice and Peculiar Jurisprudence of the Courts of the United States-* (2d ed., Boston 1896) ; Moore, B. F., (The Supreme Court and Unconstitu¬ tional Legislation (New York 1913).

Joseph H. Choate.

SURABAYA, soo-ra-bi'a (Dutch, Soera- baja), Java, (1) the seaport and capital of the province of the same name on the north coast of the island of Java. The city is situ¬ ated on the Strait of Surabaya, which sepa¬ rates Madura Island from Java. It is, next to Batavia, the most important port and com¬ mercial station in the Dutch East Indies, and has machine-shops, an arsenal, a mint, sugar and furniture factories, shipbuilding yards and foundries. It exports sugar, coffee and the various products of the region. Pop. about 150,000 including about 10,000 Europeans. (2) The province of Surabaya has an area of 2,327 square miles and a population of over 2,115,-

1.

SURAJAH DOWLAH, soo-ra'ja dow'la, the last independent nabob of Bengal, under whom was perpetrated the massacre of the Black Hole (q.v.). He succeeded his grand¬ father, Ali Verdv Khan, in 1756, and within two months of his accession found a pretext for marching on Calcutta. On the arrival of Clive and Admiral Watson he retreated to Maorshedabad, but was routed at the battle of Plassey (23 June 1757). He then fled up the Ganges, but was betrayed by a fakir, and was put to death by order of the son of Meer Jaffier, the new nabob. Surajah Dowlah’s reign lasted 15 months, his age at the time of his death being barely 20.

SURAKARTA, soo-ra-kar'ta, a town in central Java, connected by rail witlUSamarang on the north and Surabayaˆcm the east. It is the residence of the nˆtiCe sultan of Sura¬ karta, who is a vassal .of the Dutch govern¬ ment and is advised by a resident. The town (pop. 125,000) is the capital of his kingdom, a mountainous but in part very fertile region, with an area of 2,191 square miles and a popu¬ lation of about 1,100,000.

SURAT, soo-rat', India, a city in the Gu¬ jarat division of Bombay, extends for some distance in crescent form along the south bank of river Tapti, (spanned by an iron bridge) in a fertile valley. It is 160 miles by rail north of Bombay. The Nawab’s palace lies within the confines of the fort. The re¬ markable buildings are four handsome Moham¬ medan mosques, two Parsi fire-temples, sev¬ eral Hindu

temples, and a clock-tower (80 feet

high). There is also an extensive bazaar, and a Hindu hospital for sick animals. The city in 1512 was burned by the Portuguese, again in 1530 and 1531. The English estab¬ lished themselves there in 1612, and the city came under British rule in 1800. Industry is limited to the manufacture of cotton and silk goods, shawls, etc., articles of ornamentation, jewelry and ivory objects, indigo and pottery. The exports are cotton and grain. The com¬ mercial importance .of Surat was established in the 16th century, and it was the starting point for pilgrimages to Mecca. Its decline dates from the removal of the East Indian Company to Bombay. Fire and flood contrib¬ uted subsequently to its decadence. It flour¬ ished during the American Civil War through its cotton export. Pop. about 115,000.

SURCOUF, siir-koof, Robert, French naval officer: b. 1773; a. 1827. Much of his life at sea was devoted to privateering and he was known as ((the king of the Corsairs.® From 1798 to 1801 and from 1809 to 1811, he scoured the sea for English merchantment as Paul Jones did some years previously. His life was divided between building French ships on shore and scouring the high seas for English mer¬ chant vessels. It was his advice to Napoleon: ((Attack rich England in her riches — in her merchant vessels ; leave your ships of the line at home and send out light privateers 1®

SURETY. See Suretyship.

SURETYSHIP, a word derived from the French surete, from the Latin securitas, which means freedom from care. It signifies the obli¬ gation of a person to answer for the debt, de¬ fault or non-performance of another, and to make good any loss occasioned thereby to the extent provided in the contract. The differ¬ ence between suretyship and guarantee is an essential one, a contract of suretyship being a direct liability to the creditor for the act to be performed by the debtor, whereas a guarantee is liability only for the debtor's ability to per¬ form this act. A contract of suretyship is an immediate and direct undertaking that the act shall be done, and if the act is not done, the surety becomes responsible at once.

The Constitution of the United States makes it impossible for any State to enforce a law which might be construed as impairing the rights of a creditor under a contract of suretyship, but like other contracts it may be vitiated and annulled through fraud or duress in the execution. The surety is entitled to such information both from creditor and debtor as will enable him to know the nature of the obli¬ gation which he is

assuming, and if there is fraudulent misrepresentation or suppression of the facts with the purpose of obtaining his agreement to the undertaking the surety can obtain relief in a court of equity. On the other hand this relief would not be granted against innocent parties who had, without notice from the surety, incurred expenditure or assumed obligations on account of the existence of the suretyship contract. Of course in such a case the surety would have a right to redress from the creditor or debtor, or both, who had caused Iiim loss by deceiving him.

It should be understood that there is no obligation on the part of the creditor or of the

debtor to disclose all facts relating to the risk, but only those the withholding of which, if known to them, or either (of them, would con¬ stitute intent to mislead. The surety, on the other hand, is expected to use reasonable judg¬ ment and precaution in making the contract. The presumption of law is that the suretyship, the surety's signature being admitted, is valid, and upon him rests the onus of attacking its validity, if he so desires.

The surety's responsibility cannot be changed or the oontract modified in any manner with¬ out his consent, and should any change be made in the contract without such consent, the surety is discharged from his obligation. It does not matter whether the change would be advantageous to the surety or otherwise ; he has a right to stand upon the (Original terms, and cannot be held responsible for any different terms. This applies also to any extension of the term of credit specified in the contract without the surety's approval in legal form.

Upon discharge of his (obligation by the debtor, the surety is of course released. The surety is likewise released by tender of pay¬ ment by the debtor and refusal to receive it by the creditor. In some States the surety is released if the creditor does not sue the prin¬ cipal upon request of the surety. Should the debtor default and the surety have to pay, the surety becomes entitled to all the rights and securities previously held by the creditor against the debtor. If there are several sure¬ ties, and the creditor's claim is enforced against one only, the latter can compel his cosureties to pay their several shares, and he also has a claim against the principal for the amount which he has expended in meeting the obliga¬ tion. See Guarantee.

SURF-BIRD, a shore-bird (Aphriza vir- gata), having a distinct place of its own be¬ tween the sandpipers and plovers. It is about 10 inches long, with the wing seven ; dark brown above, lighter on the wing coverts, with white spots and stripes on the head and neck; upper tail coverts and basal half of tail white, the latter terminated with brownish black ; un¬ der parts white, tinged with ashy in front, each feather having a brownish black crescent. The bill is about as long as the head, with vaulted obtuse tip and compressed sides; wings long and pointed. It is found on the Pacific Coast of North and South America, and in the Sand¬ wich Islands, migrating from northern to tem¬ perate regions in winter and back again in summer. It is usually seen on the edge of steep rocks, among the retreating waves, search¬ ing for small mollusks and marine animals, allowing the surf sometimes to dash over it, whence the common name ; its flight is short, with a quick and jerking motion.

SURF-CLAM. See Clam. .

SURF DUCK, or SURF SCOTER. See

Scoter.

SURF-FISH, one of the many small ovoid fishes of the family Embiotocidce, related to the percoids, which abound upon the Pacific Coast of North America, where they are found numerously in the surf on sandy beaches, and in the mouths of rivers. They are often gayly colored, sometimes in extraordinary patterns of spots or bars ; and are easily caught but not

valued much as food. The most familiar one is Amphisticus argenteus; several others are locally known as the blue, black, red and white perches, the alfione, etc. All are vivipa¬ rous.

SURF-SMELT, a small, eminently tooth¬ some smelt (Hypomesus pretiosus) , numer¬ ous along the coast of California and north¬ ward, where it spawns in the surf, and is caught in great quantities in nets. See Smelts; Whitefishes.

SURFACE, Joseph, a character in Sheri¬ dan’s comedy, (The School for Scandal. } He is a mean hypocrite who affects great serious¬ ness and sentimentality.

SURFACE. (1) A physical surface may be defined as formed by the boundaries or limiting portions of a given body. (2) A mathematical surface is the boundary between two given por¬ tions of space. It may be of ' various orders, a plane surface being of the first order, a

quadric surface of the second order, etc. A surface through all points of which a straight line may be so drawn as to rest entirely within the said surface, is termed a ruled surface. The cone, conoid and cylinder are examples of this class. A surface is said to be of the nth order when it is intersected at n points, either imaginary or real, by a given arbitrary line. For a treatment of the subject, consult Eisenhart, L. P., treat¬ ise on Differential Geometry on Curves and Surfaces1* (Boston 1909) ; Michaelis, M. L., (Dynamics of Surfaces> (New York 1914) ; Smith, Charles, (Solid Geometry) (3d ed., New York 1891).

SURFACE TENSION, that property of liquids in virtue of which they tend to take such a form as to have the smallest surface possible. The name <(surface tension® has ref¬ erence to the fact that liquids, when freed from the action of gravity and other compara¬ tively powerful forces, behave as though their surfaces were elastic membranes, which are everywhere in a state of uniform tension. Be¬ ginners in the study of physics often form the idea, from their textbooks, that this hypothet¬ ical tension is real and that the surface of a liquid really is membranous in nature, and sub¬ ject to an actual, physical tension. This is not at all the case ; for the behavior iof the liquid is due to an entirely different cause, as will be understood by reference to Fig. 1. AB here represents a liquid surface, and ni m m m m represents a molecule of the liquid, which is originally in the interior of the liquid, but which is removed from it in the manner illus¬ trated by the successive figures 1, 2, 3, 4 and 5. Consider, first, the state of the molecule m in the position 1. It is here surrounded by the liquid on all sides, and the attractive influence that the other molecules of the liquid exert upon it is sensibly the same in all directions. The circle that is drawn about m represents a sphere whose radius is the ((radius of sensible molecular attraction® ; that is, it is equal to the (unknown) distance at which we may suppose that the attraction of one molecule of the liquid for another one ceases to be sensible. The at¬ tractive influence of those parts of the liquid which are external to this sphere being by hypothesis insensible, we may regard m as in¬ fluenced solely by such molecules as are within

a sphere of the radius shown. It is easily seen, therefore, that the attraction of the liquid for vi will be the same in all directions (and therefore without any resultant effect), so long as the sphere remains totally submerged. But when the molecule m approaches the surface so nearly that a part of its sphere projects into the air as shown at 2, it

is equally evident that the attractive force upon m is no longer the same in all directions. In order to make it so, we should have to cut off, from the bottom of the sphere at 2, a segment equal to the segment that projects into the air, as indicated by the little shaded area. The mass of fluid that lies between this shaded segment and the surface of the liquid is without any resultant effect upon

vi, on account of its symmetry with respect to vi; and hence in the position 2 we may regard vi as subject only to the unbalanced downward attraction that the shaded segment exerts upon it. In position 3 the molecule has reached the surface of the liquid, and it is subject to a downward attractive force due to the mass of liquid contained in the entire lower half of the sphere. In bringing the molecule from position 1 to position 3, we therefore have to move it upward against a force which tends to pull it back into the liquid again ; this force becoming active from the moment that the sphere of sensible molecular attraction first becomes tan¬ gent to the surface of the liquid,' and increasing in magnitude until it attains its maximum value when the molecule actually reaches that sur¬ face. Hence we have to perform work, in order to transport a molecule from the interior of a liquid to the surface; and this amounts to say¬ ing that we have to perform work in order to increase the surface of a liquid. But this is just what we should have to do if the surface of the liquid were an elastic membrane; and hence it is permissible to imagine that the sur¬ face is such a membrane; and it is found that such a conception makes it easier to under¬ stand and describe the phenomena that result from molecular attractions in liquids.- It will be noted, however, that in extending the sur¬ face of a liquid we do not actually stretch the existing surface. We merely bring more mole¬ cules from the interior, where the forces acting upon them are balanced, to the surface, where these forces are not balanced.

The phenomena of surface tension are most obvious in soap films and in foams, where the mass of the liquid concerned is so small (rela¬ tively to the surface) that the molecular forces which give rise to the so-called ((surface tension® can easily preponderate over gravity, which is relatively powerful in liquid bodies of large mass and small surface. The French physicist Plateau devoted a vast amount of attention to

the phenomena that are manifested by liquid films, and by masses of liquid that are freed from the influence of gravity by being sus¬ pended in other liquids with which they will not mix, but which have the same density as the liquid to be studied. Olive oil can readily be freed from the action of gravity, by submerg¬ ing it in a mixture of

alcohol and water, whose composition is regulated by trial until the mix¬ ture has precisely the same specific gravity as the oil. A mass c>f oil which is submerged in this manner, and is not constrained in any way, at once assumes a spherical form ; for the sphere has a smaller surface than any other solid of the same volume.

The existence of surface tension can be shown readily and strikingly, even in a large mass of water, by several very simple experi- ments; Of these, the camphor-movement experi¬ ment is one of the best known. To perform it, a perfectly clean vessel is filled with clean water, some of the water being allowed to flow over the sides of the vessel, so that any superficial impurities may be washed away. Very fine scrapings of camphor are then allowed to fall upon the surface of the water; and if the water surface is sufficiently clean, these scrapings at once begin to execute the most violent move¬ ments. The motion <of the camphor is due to the fact that the surface tension of a solution of camphor in water is less than that of pure water. The camphor particles do not dissolve evenly on all sides ; and the horizontal pull exerted upon them by the water is greatest in those directions in which the concentration of the solution in immediate contact with the par¬ ticles is least. Hence the motions. The great importance of absolute cleanliness in this ex¬ periment is well illustrated by touching with a slightly greasy finger a water surface upon which camphor particles are in rapid motion. The entire surface becomes contaminated al¬ most instantly, so that the camphor movements become deadened, or cease altogether.

The effects of surface tension are observable in large masses of liquid, where those masses come in contact with the walls of their contain¬ ing vessels. The slight elevation of the water in a drinking glass, where the water touches the glass, is due to this cause. This particular phenomenon is more marked in the case of a glass tube of small diameter, dipping in a verti¬ cal position into a vessel of water (or any other liquid which actually wets the glass). Let the glass tube be inserted into the water, so that it is wetted up to a certain level, and let the tube be then raised slightly. The glass, in the region which has been submerged below the general level of the water and is now raised above it again, adheres to the water, and as the tube is raised, the column of water within it sinks at the centre, so that its surface becomes con¬ cave, as is illustrated in Fig. 2. The weight of that part of the water within the tube which stands above the general level of the water in the external vessel (that is, the weight of that portion which lies between the actual water surface in the tube, and the dotted horizontal line), is sustained by the tension of the curved surface (or “meniscus®) that bounds the col¬ umn at the top; this

tension acting everywhere in the direction of the surface of the water, and therefore having an obliquely-upward di-

rection around the edges, and hence a vertical component, which is capable of sustaining the water in the tube. In the case of a liquid which does not wet the tube (for example, in the case of mercury and glass), the curvature of the liquid surface is in the opposite direc¬ tion from that observed with water and glass; that is, the meniscus is convex upwards, as shown in Fig. 3, and the liquid in the tube

Fig. 2. Fig. 3.

stands at a lower level than corresponds to the general level of the liquid surface in the con¬ taining vessel. In a barometer, the meniscus of the column is convex upward, and the depres¬ sion of the column due to the surface tension of the mercury is usually quite sensible; so that in order to be in a position to know the exact height at which the mercury in the column would stand if the tube were large enough in diameter for the effects of surface tension to be negligible, it is necessary to investigate, very carefully, the way in which the depression varies with the diameter of the tube, and with the height of the meniscus itself. Numerous observers have made extensive investigations of this sort, and have given their results in tables. A very good table of this kind, due to Men- deleeff, is given in Guillaume's <Thermometrie de Precision, } and other tables will be found in nearly all of the works upon meteorology. The property of liquids in virtue of which they stand, in a vertical tube, at an elevation dif¬ ferent from that in the vessel into which the tube dips, is commonly called "capillarity,® in reference to the small diameter of the tubes in which the effect is most noticeable (Latin, capillus, "hair®).

Table of Surface Tensions at 20° C. (68° F.).

Liquid

Dynes per centi¬ meter

Grams per centi¬ meter

Grains

per

inch

Water .

1.

0.083

3.24

Mercury .

1.

.551

21.58

Carbon disulphide .

32.1

.033

1.28

Chloroform .

30.6

.031

1.22

Alcohol .

25.5

.026

1.02

Olive oil .

36.9

.038

1.47

Turpentine .

29.7

.030

1.19

Petroleum .

31.7

.032

1.27

The surface tension of a liquid is measured by the horizontal pull that the liquid can exert upon a straight line one unit in length, lying in its surface; the pull being perpendicular, of course, to the direction of the line. The ac¬ companying table contains the surface tensions of various liquids as determined by Quincke,

and quoted by Maxwell. Mercury, for example, is capable of exerting a pull of 21.58 grains upon a straight line one inch long, lying in its surface. The value of the surface tension of water given in this table is certainly too great Brunner found it to be 75.2 dynes per centi¬ meter, and Wolf found 76.5 and 77.3. Ray¬ leigh's determination, based upon a study of the wave-length of ripples, gave 73.9 dynes at 18° C. ; and T. Proctor Hall found that at T° C. the surface tension of water, in the same units, is given by the expression.

75.48 — 0. 1407.

Bibliography. — Boys, (Soap Bubbles and How to Make Them) ; Plateau, <Statique ex- perimentale et theorique des liquides soumis aux seules forces moleculaireS) ; Risteen, (Mole¬ cules and the Molecular Theory of Matter.* Also, any extended treatise on physics.

Allan D. Risteen.

SURFACES, Theory of. Surface, in the mathematical sense, is the common boundary of two contiguous regions of space. The de¬ velopments in this vast field of mathematical investigation are

essentially of modern origin. The geometers of the Greek school were ac¬ quainted with some of the elementary proper¬ ties of a few surfaces, notably those of sphere, cylinder and cone, but the systematic and fruit¬ ful study of surfaces began with their repre¬ sentation by means of equations in Cartesian co-ordinates (see Geometry, Cartesian). This was not done until the method of co-ordinates had been employed with success in the study of plane curves, whereupon its application to sur¬ faces presented itself as a natural extension. According to Cantor, “Geschichte der Mathematik,* Parent (1666-1716) was the first to rep¬ resent surfaces analytically by means of a sin¬ gle equation F(x. y, z)~ 0. To each set of values of x, y, z satisfying this equation corre¬ sponds a point of the surface. With the intro¬ duction of co-ordinates two distinct phases in the study of surfaces present themselves. On the one hand the surface is defined in some purely geometric way, and the problem is to find an equation analytically representative of the surface. On the other hand an equation is assumed, and the problem is to arrive at the properties of the surface from its analytical definition. In the first case no less than in the second, the deduction of geometric proper¬ ties proceeds, in the main, along analytical lines. It is at once evident that the second phase of the general problem greatly broadens the scope of investigation, and it is from this point of view that the mathematicians have studied the surfaces defined by algebraic equa¬ tions of second, third, fourth and higher de¬ grees. The algebra brings in imaginaries, and this leads to the introduction of surfaces that are altogether imaginary, and to the con¬ sideration of imaginary points and elements in connection with real surfaces.

In what has been said thus far the point has figured as the primitive element of the surface, and in connection with it the surface is a two-dimensional continuum of points. With the expansion of the subject additional primitive elements were introduced, viz., the plane and the line, and from the standpoint of the new elements the surface may be regarded as a

two-aimensionai continuum of planes, i.e., as the envelope of its tangent planes, or as a three- dimensional continuum of lines, i.e., the enve- ’ lope of its tangent lines. The theory of a sur¬ face as the envelope of its 003 of tangent lines constitutes a special chapter in the general theory of complexes of straight lines (see Geometry, Line, and Allied Theories). Along with the analytical method, the synthetic or

projective method has been employed, and with special elegance and completeness in the case of surfaces of the second order. With this brief introduction we now pass to a more detailed account of the developments in this branch of mathematics.

1. Algebraic Surfaces in General. — Any surface which can be analytically expressed by an algebraic equation between the Cartesian co-ordinates x, y, z of a point of space is called an algebraic surface. The order of the surface is the number of points of intersection (real or imaginary) of the surface by an arbitrary straight line. The order of the surface is obviously the same as the degree n of its equation. The class is the number of tangent planes of the surface that pass through an arbitrary line. When there is no singularity (see 7) on the surface the class is n(n — l)2. The rank of the surface is the order of a cir¬ cumscribing cone whose vertex is an arbitrary point of space. The rank is n(n — 1). The intersection of the surface by a plane is a curve of nth. order, and, by the foregoing, the class of this curve is the same as the rank of the surface.

2. The Plane. — This is the simplest of all surfaces, and its equation in the variables x, y , z is of the first degree : Ax + By + Clz -f- D = 0, in which A, B, C, D are constants. It is the only surface of first order.

3. Surfaces of the Second Order, or Quad¬ ric Surfaces. — 'The earliest investigations were connected with the surfaces of the second order, namely, those defined by the general equation of the second degree :

Ax* + By2 + Cz? + 2Fyz + 2 Gzx -f- 2 Hxy

- 2Lx + 2 My + 2Nz + P = 0.

classification gives, (a) ruled surfaces with real generating lines (see 16), (b) non-ruled sur¬ faces (analytically these latter surfaces are ruled surfaces with imaginary generating lines). A third classification rests upon the presence or absence of vertices on the surface. For example, a cone has a vertex and two inter¬ secting planes are a degenerate form of a sur¬ face of second order with the line of intersec¬ tion as a line of vertices. An ellipsoid is with¬ out a vertex. The fourth classification is based upon the nature of the conic that is cut from the surface by the plane at infinity.

We now present a classification based upon analytical criteria. This is

effected by means of the values of two polynomials A and D, functions of the coefficients, and of the roots fc = 7, p, v, of a cubic equation in k called the discriminating cubic. The polynomials may be conveniently put in the determinant form, as also the cubic equation :

0

A =

A HG L

, £> =

A HG

y

A-kHG

HB F M

HB F

H B-k F

G F C N LMN P

•

G F C.

G FC-k\

I. Surfaces for which A ˆ.0.

(a) Dˆ.0, (i) Ellipsoid, real, if — — ,

Dp

Dv

T

— a d =

are all negative.

(ii) Hyperboloid of one sheet if

two of the quantities are negative.

(iii) Hyperboloid of two sheets if

one of the quantities is nega¬ tive.

(iv) Ellipsoid, imaginary, if all the

quantities are positive.

These are surfaces with centre. By a suit¬ able transformation of the co-ordinate axes to the centre the general equation can be thrown into the form 7 x 2 + py2 + vz2 + d — 0, in which

-jj and 7, py v are the roots of the discrimi¬

This equation contains 10 coefficients which enter homogeneously. However, only the nine ratios of the coefficients are essential, as the equation may be divided through by any coefficient that is not zero. From this fact comes an important theorem. The substitu¬ tion of the co-ordinates of a given point in the general equation imposes one equation of condition upon the coefficients ; nine such equations determine the ratios of the coeffi¬ cients, and herewith the equation, and with it the surface. The theorem follows : A sur¬ face of second order is in general determined by nine points through which it is to pass.

1. Classification of Quadric Surfaces. — There are in all 16 surfaces of the second order, when the purely imaginary and degen¬ erate cases are included in the numeration. The grouping of the individual surfaces varies with the principle employed. The principle of division may be based on analytical criteria or on geometrical characteristics. Four differ¬ ent varieties of geometrical classification are known. In one the surfaces are divided into (a) the surfaces with centre or central sur¬ faces, (b) the non-central surfaces. A second

nating cubic.

Z

0, (i) Elliptic paraboloid if 7 and P have the same sign.

(ii) Hyperbolic paraboloid if A and p have different signs.

When D~ 0, one of the roots 7, py v is zero, and it is here assumed

that v— 0. By a suitable transformation of the origin of co¬ ordinates to a point of the surface, the equa¬ tion may be made to take the form 7 x 2 --py2 + 2 Qz = 0.

The surfaces (a) and (B) are surfaces without vertices.

vol. 26 — 5

II. Surfaces for which A = 0.

(y) D 2” 0, (i) Cone, real, if 7,, v are not all of ˆ same sign.

(ii) Cone, imaginary, if 7,, //, v are of same sign.

Fig. 2. — Hyperboloid of One Shee

By taking the origin at the vertex of the cone the equation may be brought into the form T-*2 4- fy*2 + vz 2 = 0.

Fig. 3. — Hyperboloid of Two Sheets. 1

($)D =0 (i) Elliptic cylinder, if 7 and H are

of same sign and d ˆ 0.

(ii) Hyperbolic cylinder, if 7. and ˆ

signs

are of different

and

d> 0.

(iii) A pair of intersecting planes,

real or imaginary, if d~ 0.

(iv) Parabolic cylinder; or two paral¬

lel planes, real or imaginary (if all the subdeterminants of D are zero).

Z

Fig. 4. — Elliptic Paraboloid.

For (i), (ii), (iii), the general equation admits of being thrown into the form %x2 -f- fJ-y2 + d= 0, and for the parabolic cylinder into the form Ry2+ Sx = 0.

Since a cylinder may be regarded as a cone with infinitely distant vertex, and a pair of planes as a degenerate case of a cone, it follows that the surfaces (7) and (d) may be con¬ sidered as cones, i.e., the surfaces with vertex or vertices.

The ruled surfaces among quadric surfaces fall into two categories: (1) the cone and cylinder, each containing one set of generating

Fig. 5 — Hyperbolic ‘Paraboloid.

lines infinite in number; (2) the hyperboloid of one sheet and the hyperbolic paraboloid, each containing two sets of generating lines infinite in number. On the two last-named sur¬ faces no two lines of one set intersect, but each line of one set intersects all the lines of the other set.

1. Surfaces of the Third Order, or Cubic Surfaces. — A considerable number of theorems about these surfaces are now known, though their properties have by no means been so ex¬ haustively studied as in the case of quadric surfaces. There are two especially distinguish¬ ing properties to be noted concerning them : first, on the general surface there are 27 right lines; second, there is related to the sur¬ face a pentaedron whose edges and vertices lie on the Hessian of the surface. When there is no singular point on the cubic sur¬ face its equation can be thrown into the form C\Wi3 -}- C2W23 T C3IT33 T c4W43 -J- cbWb* = 0y where W 1, Wz, . . . are linear in x, y, z and the equa¬ tion W\~\~ W-Hr Wz~\~ HAT W 5— O holds identi¬ cally. The Hessian of the cubic is

$L + JL + _L + _L + _L = 0$

c{Wi C2W2 ^ C3W3 ^ c4W4 ^ cbWb ’

a surface of fourth order. It contains the 10 edges and the 10 vertices of the pentaedron formed by the five planes Wi~ 0. Wz~0, . . . The vertices are double points (see 7) of the Hessian. For particulars as to these surfaces consult Salmon, (Geometry of Three Dimen¬ sions,) and also Sturm, (Synthetische Unter- suchungen fiber Flachen dritter Ordnung) (Leipzig 1867).

1. Surfaces of Fourth Order. — Of these

only special surfaces have been thoroughly dis¬ cussed, among them the ruled surfaces and the Kummer surface. The Kummer surface contains 16 double points and 16 singular planes. Each of the planes is tangent to the surface along a conic and contains six of the double points, and through each double point pass six of the singular planes. Consult Salmon- Fiedler, Vol. II, and Kummer, (Berliner Ab- handlungen) (1866) . The results obtained in the study of algebraic surfaces of order higher than the fourth are of more or less fragmentary character and need not be referred to in this brief sketch.

1. Ordinary and Singular Points. — In gen¬ eral the n points of intersection of a line and surface are distinct, but if a point P appears as k coincident points among the n intersec¬ tions for every straight line through it, it is called a k multiple point of the surface. When k' = = = 2 it is a double point, when k~3 a triple point. Multiple points are singular points. Through a double point on a surface an in-

finity of lines can be drawn each of which will pass through a third point on the surface in¬ finitely near the double point. The locus of these lines is a. cone of second order. There are three cases: (1) the cone is a proper cone and the double point is called a conical point; (2) the cone degenerates into two intersecting planes and the point is a biplanar point; (3) the cone degenerates into two coincident planes and the point is a uniplanar point or pinch point. There may be a curve locus of double points on a surface : for example, the curve of intersection of a surface by itself is such a locus, as is also the curve of contact of two sheets of the same surface with each other. For a detailed study of the character of a sur¬ face in the neighborhood of a double point consult Rohn, (Mathematische Annalen, 22) (1883). As the study of a surface proceeds in general from the equation of the surface, it is to the analysis we must look for a definitive criterion distinguishing ordinary and singular points. A point x\, yi, zi of a surface F(x, y,z) ˆ 0 is said to be ordinary, if the F function is developable in an entire series in the neighbor¬ hood of xi, yi, zi, and if the three first deriva-

,. dF dF dF , . ,

tives ˆ , — do not simultaneously vanish

at the point. All other points are singular points.

1. General Considerations. Curvilinear Co¬ ordinates. — Modern progress in the theory of surfaces begins with the appearance in 1827 of Gauss' paper, (Disquisitiones generales circa superficies curvas) (translated into German in Ostwald's (Klassiker der exakten Wissenschaf- ten) ; into English by Morehead and Hilte- beitel, Princeton). Two things in this classical production have profoundly affected subse¬ quent developments in the theory. The first was the systematic employment of curvilinear co-ordinates, and therewith a demonstration of the great advantages which could be derived from their use; the second was the conception of a surface as a two-way extension, not rigid but flexible, which could be made to assume new shapes by bending without stretching. All surfaces derived from a given surface by bend¬ ing are said to be applicable, or developable, upon each other. It is clear that the geometry of figures on such surfaces is the same. The analytical criteria, whether two given surfaces are applicable upon each other, constitute one of the interesting chapters in the general theory. In expressing the Cartesian co-ordinates x, y, z as functions of two variables u, v called parameters :

(A) x = v), y = x(u, v), z = ˆ(w, v),

a new form of representation of surfaces is established. The elimination of u and v would obviously lead to one equation, F(x, y, z) = 0. If u be given a definite value Uo, and v be al¬ lowed to vary, a curve will be generated lying on the surface (see Curves of Double Curva¬ ture). The curve is called the u« curve, that is, it is named by the special value of the para¬ meter that is constant at all its points. Assign¬ ing a second value to u, say uh and allowing v again to vary, there would be formed the Ui curve of the surface. In this way there could be formed an 001 of curves on the surface con¬ stituting the family of u curves. Similarly, there is a family of v curves each characterized

by a definite value of v while u is variable. Each point of the surface is the intersection of a u curve and a v curve, and the curves are called its curvilinear co-ordinates. One may thus speak of the point (w0 > v0) of the surface, or in general of the point (u, v), in place of referring to it by its Cartesian co-ordinates. Both co-ordinate systems are put in evidence by writing the point in the form (x, y, z; u, v). A

restriction upon the values u and v may take, such as an equation f(u, v) = 0, defines a curve on the surface.

1. Tangent Plane. Principal Normal Sec¬ tions. — If to all the curves on a surface passing through an ordinary point P (x, y, z; u, v), tangents be drawn at P, the line will lie in a plane called the tangent plane at P. Its equation is

/dy dz \d« dv

dy dz dv du

\ (e _) + /3£.S_8? 3*\ ,

) u ’ + \0m dv du)

- (r-r-r7r)«-z>:

\du dv dv du]

y)

1.

where V , C are the current co-ordinates of

the points of the plane.

The line perpendicular to. the tangent plane at P is the normal of the surface at P. Every plane through the normal is a normal plane, and the sections made by them .with the sur¬ face are normal sections.

1. The Fundamental Quadratic Forms and the Fundamental Magnitudes of the First and Second Order. The Fundamental Equations. ; — The entire theory of a surface is implicitly involved in two fundamental quadratic differ¬ ential forms, and in three fundamental differ¬ ential equations. The first form is the ex¬ pression for the square of the arc length ds on the surface between two infinitely near points P(x, y, z; u, v) and Pi(x + dx, y + dy, z + dz; u + du, y + dv). This is found to be (a) dsi = *dx1--dy'--dz* = Edui + Fdu dv + Gdv\ where

mi r + (i)' + (i)'

< HS) ■ + ©' + (!)'.

„ _ djc dx dy dy dz dz .

du dv du dv du dv

The second quadratic differential form is the expression for twice the distance, d, from the point Pt to the tangent plane at P:

(/5) 2d~ DdidP 2D'du dv + D" dv\

where

d2X

d2y

d2z

d2x

d2y

d2z

du 2

du 2

du 2

dv2

dv2

dv2

dx

dy

dz

dx

dy

dz

du

du

du

du

du

du

dx

dy

dz

dx

dy

dz

dv

dv

dv

D" —

dv

dv

dv

V EG — F2 ’ V EG — F2'

d2x

d2y

d2z

du dv du dv du dv

dx

dy

dz

du

du

du

dx

dy

dz

dv

dv

dv

V EG — F2

The six magnitudes E, F, G ; D, D' , D" on account of their importance are called funda-

mental magnitudes : the first three as contain¬ ing derivatives of the first order are called the fundamental magnitudes of the first order: the second three as containing derivatives of the second order are called the fundamental magnitudes of the second order. The six mag¬ nitudes are not independent of each other, but are connected by three partial differential equations called the fundamental equations of the surface. These may be obtained by differ¬ entiation from the foregoing equations. They are :

(7)

DD'

D' 2

EG — F2

'2 (EG

d2F + d2E

du dv dv2 du

d2G\

du2)

•

4 {EG — F2)2

G F / dE\ 2 , dE

2) 2 . \ dv) du

4 (EG — F2y

/dGy ,

\ du) dv dv dv du

•

dE dG

4:(EG — F2)2[du dv _2dFd_E dFdFl

dv dv du dv

y ' dv du

1

dG

du dEdG

dv du

TE0F

- du dv 2dFdG

du d u

-2＜EG-dDˆG～ruF)

-D'(d£G-¥uE＋2f F～2d£F)

, , dD" dD' du dv

＝ 271 £＝W)[D"(fuE-2dlF)

- D' (i £

(dG

r 4- 2 dG F ? dF F -toG ＋ 2TuF～2i;F

')

Equation (/) was established by Gauss in the paper previously cited. The first member

£)'2

of this equation, -＝-y - ＝5—, has an interesting

EG — t

geometrical significance in connection with the curvature of the surface (see 12). Equations (d) and (f) were determined by Mainardi (1857) and 11 years later, independently, by Codazzi. The three

equations are known as the Gauss-Mainardi or Gauss-Codazzi equa¬ tions. It is evident that E, F, G satisfy the conditions: £>0, G>.0, EG — .F^> 0. To Bonnet is due the theorem that a surface is completely determined in all respects, except only as to its position in space, by six given functions E, F, G, D, D', D " of two variables u, v, provided that the six functions satisfy the three fundamental equations (y), (4), (e), and the three inequalities. The determination of the Cartesian variables x, y, z as functions of u and v, depends upon the integration of a differential equation of the Riccati type (see Equations, Differential).

1. Curvature of Curves Traced upon the Surface Theorems of Mensnier and Euler. Principal Radii of Curvature. — The problem of the curvature of curves traced on the surface through P, and the relations of these curva¬ tures, is simplified by considering first only

those curves that have a common tangent at P. Let the common tangent be PT, and, for the sake of definiteness, let it be the tangent through P(u, v) and the infinitely near point Pi(u + du, v+dv). Conceive as drawn the sphere whose radius R and centre are the radius of curvature and centre of curvature (relative to P) of the normal section with the tangent line PT. Mensnier's theorem states that the plane of osculation of any curve through P with tangent line PT intersects the sphere in the circle of curvature of the curve relative to P. If r is the angle between the plane of osculation of the curve and the

normal section, and_j? the radius of curvature

of the curve, then R = R cos r.

It remains to express the value of R. Newton's Theorem concerning curvature of plane curves gives immediately:

1 2 d Ddu 2 + 2 D'du dv + D"dv 2

~R 'ds2 Edu2 + 2 Fdu dv + Gdv2 '

dv

To each value of -y- correspond a tan,gent

du

direction at P and a normal section, and the equation above

determines the curvature of this section relative to P. There are two dv

•

values of -7— for one of which R takes a maxi- du

mum value, and for the other a minimum value. By the usual methods employed in

dv

maxima and minima the two values of y-

du

are found to satisfy the equation.

- (££"— GD) ^ 4- ED ' — FD = 0,

d'U'

and the two corresponding values of R, viz., R\ and R2, the equation.

(d) (DD" — D,2)R*

— (ED" — 2FD' + GD)R + EG — F2 = 0.

The two tangent directions at P thus distin¬ guished are at right angles to each other and are called the principal directions of curvature at P, and the corresponding normal sections are the principal normal sections. Ri and R3 are called the principal radii of curvature of the surface at P.

Euler's theorem expresses the radius of curvature R of any normal section in terms of the principal radii of curvature and an angle . The equation is

(*) jjr = jjr cos2 0 + ^ sin2 <P,

where <p is the angle between the normal sec¬ tion in question and the principal normal sec¬ tion corresponding to Ri. In Euler's and Mensnier's theorem the theory of the curva¬ ture of curves traced on a surface finds a satisfactory exposition.

1. Curvature of the Surface. Gauss Spher¬ ical Representation. — Various definitions of curvature of a surface have been suggested, of which three have found general acceptance. The three curvatures differ in kind. It is found that the mean value

of the curvatures of all the normal sectiqns through P (relative to P) is one-half the sum of the curvatures of the principal normal sections at P, viz.,

j(JjT + • It would be natural to take this

value as the mean curvature of the surface at P, but the mathematical world has chosen to give the name mean curvature to the double of the quantity. Having regard to (&), one has

(X) Mean curvature at a point

1 1 ED" — 2 FD' + GD

~~ Ri R2~~ EG — F 2 *

The other two curvatures are connected with Gauss's method of representing a surface upon a sphere by means of parallel normals. At a point P of the surface the positive normal is drawn; from the centre of the sphere a radius is drawn parallel to the normal ; the extremity p of this radius is called the spherical image or picture of P. When P describes a curve on the surface, p describes a curve on the sphere, and, in general, to an area on the surface corresponds an area on the sphere. Gauss has called the area on the sphere the total curvature (curvatura integra) of the cor¬ responding area on the surface. If do is an in¬ finitely small area on the surface above the point P and its total curvature, the ratio

is called the measure of curvature (curvatura ao

specifica) or Gauss curvature of the surface at P. Gauss showed that this ratio 'is p D >

KxKi

whence the theorem, that the measure of curva¬ ture at a point is equal to the product of the principal curvatures of the surface at the point. Using K to represent this curvature, and having regard to ($) ,

(a) Measures of curvature at a point

1 DD" — D'2

~~K RiR2 EG — F2 * 13. Dupin's Indicatrix. Lines of Curvature, Asymptotic Lines. Conjugate Directions. —

To ascertain the nature of the surface in the immediate neighborhood of a point P, one inter¬ sects the surface by a plane parallel to and in¬ finitely near the tangent plane at P. The curve of section is called the indicatrix relative to P. The indicatrix is, in general, a conic whose equation is ((3) when d is constant. As d is infinitely small of second order, the curve may be regarded as lying in the tangent plane at P with P as centre. Taking the tangents of the principal directions of curvature at P as co-ordinate axes (fi, £2), equation (/?) becomes

/?! + i?2 2 '

When Ri and R 2 have like signs the indica¬ trix is an ellipse, and when the signs are unlike it is a hyperbola. In the first case P is an elliptic point of the surface and the neighbor¬ hood of P is convex-convex relative to the tan¬ gent plane; in the second case P is a hyperbolic point and the neighborhood of P is convex- concave. If either Ri or R2 is infinite at P, the indicatrix is two infinitely near parallel right lines. P is then called a parabolic point. A surface may contain a region of elliptic points and a region of hyperbolic points. The curve separating the two regions is a locus of parabolic points. For a surface of parabolic points, K must be identically zero (see 17).

By reference to the indicatrix at every point of the surface, one may define the system of lines of curvature as the two series of orthogo¬ nally intersecting curves (oo» in each series)

whose tangent directions coincide with the principal axes of the indicatrix, i.e., with the principal directions of curvature (see 11). From the definition it follows that (v) is the differential equation of the lines of curvature. The integration of (v) for any surface whose fundamental magnitudes are known furnishes the two series of lines of curvature of the surface. It is characteristic of a line of curva¬ ture that the normals of the surface at two consecutive points of the curve intersect, and this property is sometimes given as the defini¬ tion of the curve. By reference to this property a ready means is occasionally afforded for identifying the lines of curvature ; for example, on a surface of revolution one of the series of lines of curvature consists of the meridian curves and the other series of the parallel circles. The sphere and plane form a class apart from all other surfaces as regards lines of curvature, for any curve on either surface is a line of curvature. To Joachimsthal is due the theorem that, if two surfaces intersect in a constant angle and the curve of intersection is a line of

curvature on the one, it is also a line of curvature on the other. It follows in particular that, if a rlane or sphere intersects a surface in a constant angle, the curve of section is a line of curvature.

Again, by reference to the indicatrix, one de¬ fines the system of asymptotic lines as the two series of intersecting curves whose tangent directions coincide with the asymptotes of the indicatrix. Asymptotic lines are real only in the hyperbolic region of the surface. The differential equation of asymptotic curves is

(<* = 0)

(v) Ddu2 + 2 D'du dv -f- D"dv 2 = 0.

It is characteristic of an asymptotic line that the plane of osculation at any point of it is the tangent plane of the surface at the point.

Two cpnjugate diameters of the indicatrix of a point give conjugate directions at the point ; hence to any direction there is a conjugate. A system of curves consisting of two series of intersecting curves is conjugate when the above condition is satisfied at every point of inter¬ section. In partial illustration of the fore¬ going definitions it may be remarked that all the points of a hyperboloid of one sheet are hyperbolic, and that the right-line generators are its asymptotic lines. On the anchor-ring surface, i.e., the surface generated in rotating a circle about a line in its plane, the curves described by A and B, the extremities of the diameter parallel to the axis of rotation, are curves of parabolic points ; the inner surface of the ring is the region of hyperbolic points, the outer surface the region of elliptic points. The generating circle is in every position a line of curvature. It remains to define an um- bilic as a point at which the indicatrix is a circle.

1. Isothermal Lines. Minimal Lines. Geo¬ desic Lines — Curvature — Circles — Co-ordi¬ nates. — If the ds2 of a surface assumes the form

(f) ds 2 = a(u, v) [du 2 + dv2],

where E — G— «(m, v) , jF = 0, the parameter curves u~ constant, v — constant, form an isothermal system (or isometric system) of curves. The parameters u and v are called thermal parameters. The distinguishing prop-

erty of isothermal lines lies in this, that by their means the surface can be divided into a network of infinitely small squares. The di¬ vision is effected by giving to u and v series of values in arithmetical progression, the two series having the same common difference (du — dv). The squares differ, in general, in magnitude. There is an infinity of isothermal systems on a surface, for the characteristic form (?) is reproduced in new parameters Ui, Vij by making the substitutions

u + iv — f(ui + iv 1) , u — iv = fi (Mr — iv i) , where f and fi are conjugate functions but otherwise arbitrary.

It is noted that (?) may be thrown into the form ds = *a(u, v)[(du--i dv) (du — i dv)], and hence, by the substitutions 7* = = u + iv, fi — u — iv, an equation of second order. From the theory of these equations (see Equations,

a geodesic may cease to be a shortest curve when prolonged. A string stretched on a sur¬ face lies in a geodesic; keeping one extremity of the string fixed at a point P and rotating about P, the second extremity of the string describes a curve called a geodesic circle. It is, in general, not a geodesic curve. If at P and Pi, two infinitely near points of an arbitrary curve c on a surface, geodesics be drawn tan¬ gent to the curve, the ratio of the angle be¬ tween the geodesics to the arc length PPt is called the geodesic curvature of c at P. Ob¬ viously, geodesics are curves of zero geodesic curvature. The torsion of the geodesic tangent to c at P is called the geodesic torsion of c at P. A line of curvature is a curve of zero geo¬ desic torsion at every point. The differential equation of geodesics, derived from the defini¬ tion, is

dv 1 dE dE dv /3F 1 0G\ / dv\ 2 p d2v

du 2 du dv du \0y 2 0m/ \du) du 2

F4-C- i — 4- — — *l* JL . r —

du du 2 dv du du 2 dv \du) du 2

= 0,

Differential) it follows, that an infinity of geodesics may be drawn at any point of a sur¬ face, each determined by its direction at the point.

The expression for ds2 takes a notable form when the parameter lines, constant, are geodesics and the parameter lines, u = constant, are their orthogonal trajectories. Two cases are of interest:

(1) The geodesic parallel system, in which the geodesics are drawn perpendicular to an arbitrary curve c as shown in Fig. 6, and t, ti, . . are the orthogonal trajectories. Any two trajectories intercept equal lengths on the geodesics, and it is from this fact that the trajectories derive their name of geodesic parallels. If u represents the distance from c to a geodesic parallel measured on the geodesics, into the form

(w) ds 2 = fidˆd/J-,

where /3 is a function of 7 and /u The parame¬ ters 7,, g. are conjugate imaginaries and the two series of corresponding curves on the surface are imaginary. They are called the minimal lines of the surface, as it is evident that along any one of them ds2— 0. The tan¬ gents of a minimal line are the minimal right lines (see 'Curves of Double Curvature). By integrating ds2— 0, one can determine the minimal parameters and thence a pair of iso¬ thermal parameters. Just as there is but one system of lines of curvature and one system of asymptotic lines, so there is but one system of minimal lines on a surface.

A geodesic line is a curve such that at every point P of it, the principal normal of the curve and the normal of the surface coincide. The shortest curve traced between any two points of the surface is a geodesic. A given geodesic does not always represent the shortest curve between any two of its points, but the property of shortest distance does hold for sufficiently small segments of the geodesic. On a surface of negative Gauss curvature (K negative at all points) a geodesic does not cease to be a curve of shortest length. On a surface of positive Gauss curvature (K positive), e.g., on a sphere,

one has

ds* = du2 + Gdv \

(2) The geodesic polar system, in which the curve c reduces to a point O as shown in Fig. 7, and the geodesics proceed from O. The orthogonal trajectories are geodesic circles. If m represents the distance from O to a geodesic circle, and v the angle from a fixed geodesic taken as a base, to any geodesic, there follows : ds2 = = du2 Gdv2,

where G is a function of u and v satisfying two conditions at the pole point :

Vc

$=0.$

dV G

u $=0$

du .

We mention, finally, a system of references in which the curves are geodesic ellipses and hyperbolas. If a point P moves so that the sum (difference) of its geodesic distances from two arbitrary curves c, C\ of the surface is constant, it describes what is called a geodesic ellipse (hyperbola) ; c and Ci must not be geodesic parallels. Weingarten has shown that the system of geodesic ellipses and hyperbolas is orthogonal. A special case is when c and ci reduce to points. Liouville has investigated a class of surfaces on which there is an isother¬ mal system of geodesic ellipses and hyperbolas. The form of the arc element is

ds 2 = { f(u) + g(v) } (du2 + dv2) ,

and the differential equation of the geodesics can be integrated and brought to the form

/du f' dv

VW+a~ J VW=-a = b' Where “ and b

are constants of integration. Surfaces of the

second order and surfaces of rotation belong to the Liouville surfaces. Gauss established the theorem that the sum of the angles of a geodesic triangle (the sides are geodesic lines) is greater than, less than, or equal to, tt, accord¬ ing as the triangle lies in an elliptic, hyperbolic or parabolic region. The only surface that can contain an area of parabolic points is a develop¬ able surface (see 16), i.e., a surface developable upon a plane.

1. Representation of One Surface upon Another Surface. Conformal Representation. Applicability. — In map drawing one has an in¬ stance of the depiction or representation of one surface upon another. To each point of one surface corresponds a definite

point of the other surface. The character of the depiction is a matter of the law of relation of the corre¬ sponding points of the two surfaces. If the equations of a surface A are expressed in parameters u, v and those of surface B in parameters, Ux Vx, any equations Ux — g (m, v) , Vx —h(u, v) will give a law of correspondence of points, provided that to a pair of values of u, v there corresponds a pair of values Mi, Vi, and conversely.

When each infinitely small triangle on the one surface is depicted in an infinitely small and similar triangle on the other surface, the de¬ piction is said to be conformal. It follows that corresponding angles on A and B are equal ; also that ds 2 = kdsf, where ds is arc length on A measured from a point P, dsx the corresponding arc length on B and k a quantity depending on the position of P and independent of the direction of ds. The analytical side of con¬ formal representation is completely resolved by recourse to thermal parameters. The arc element of A in the thermal parameters u, v is ds — *a(du2 + dv)* ; similarly, arc element of B in the thermal parameters uh Vx is

ds* — P (dih 2 + dvx2) . The relations

Mi + iv — f(u + iv) , ih — iv i — fi(u — iv) ,

where f and fi are arbitrary conjugate functions establish a conformal representation, since, by virtue of these relations, ds2 — kdsP. Any two surfaces can, in general, be conformally repre¬ sented upon each other in an infinity of ways. The functions / and fx can be chosen to furnish the most advantageous conformal representa¬ tion.

Two surfaces are applicable or developable upon each other if the corresponding infinitely small triangles are equal in all respects. This requires that corresponding arc elements shall be everywhere equal, namely, that Ux and Vi shall be such functions of u and v as to trans¬ form the first member of the equation

Exdux2 + 2Fxdihdvi + Gidvi 2

= Edu2 + 2Fdu dv + Gdv*

into the second member. The letters with sub¬ scripts indicate the elements of the second sur¬ face. In general, this transformation cannot be made, and hence two arbitrarily given sur¬ faces are, in general, not developed upon each other. It is obvious that all surfaces derived from a given surface by bending without stretching (see 8) are applicable upon each other. Hence • the parameters of any one of them are expressable in the parameters of the original surface. All the

surfaces may, accord¬

ingly, be assumed definite in the same parame¬ ters u, v, whence it follows that the fundamen¬ tal magnitudes E, F, G will be identically the same for the entire series of surfaces. The three magnitudes E, F, G and all functions formed from them and their partial derivatives are invariants of bending. Some important conclusions can immediately be drawn from these statements. We observe that the left- hand member of equation (y) is the Gauss measure of curvature and that the right-hand member is a function of E, F, G alone. We conclude that the Gauss curvature does not change in any deformation of a surface by bending. One notes also that equation (p) depends only on E, F, G, whence the theorem that a geodesic curve remains a geodesic in the deformation by bending.

As earth-dwellers the most interesting depic¬ tion to us is that of a sphere upon a plane. The sphere is not developable upon a plane and, therefore, any depiction is bound to be a distorted image of the original. A conformal representa¬ tion will at least preserve angles, and the pic¬ ture and original will be similar in the cor¬ responding infinitely small parts. The two best- known examples of a conformal representation are the stereographic projection (Hipparchus, Ptolemy) and the projection of Mercator. Ex¬ pressing the sphere of radius one in thermal parameters Ux, Vx :

_ 2m i t 2v\ _ Mi2-}-^2 — 1

~XUi2 + VX + *1* y ~~ Ml2 + Vd + 1 ’ 2 “ «i2+»i2+T

and a plane in thermal parameters u, v : x = u, y—v, the stereographic proj ection is furnished by the relations u -j- iv = Ux + iv i, u — iv = Ux — iv i, or simply u = Ux, v— Vx. For the Mercator correspondence one sets up the relations Mi + ivi —eu+iv} u\ — iv i = eu — ■*», or Mi eu cos v, V\ — eu sin v. In the stereographic projection the circles of the sphere are represented by circles (or straight lines) in the plane; in the Mercator map the meridians and parallels of latitude appear in the plane as a system of orthogonally intersecting right lines.

Special Surfaces.

1. Ruled Surfaces. — The continuous motion of a straight line through a simple infinity of position generates a ruled surface. When the consecutive generators intersect, that is, when the generating line is always tangent to one and the same space

curve, the surface is a developable surface. In the contrary case the surface is called a skew surface. The director cone of the ruled surface is formed by drawing through an arbitrary point of space lines par¬ allel to the generators of the ruled surface. The equations of the most general ruled surface are

x = ax -j- ft**, y = a2 -f /?2m, z = a3 -f p3 u,

where au a2, a3; /3i, p2, pz are functions of v alone. The curves v = constant are the right¬ line generators ; the curves u = constant are trajectories of the generators. The trajectory u — 0 is sometimes called the director curve. The important elements are: (1) The angle d between two consecutive generators g and gx;

(2) the shortest distance d* between g and gx\

(3) the value of u corresponding to the point,

called central point, where the shortest dis¬ tance meets g. Putting for brevity

— B, = frdfc — Bidfa,

B& — B1 d/3i —

the values are

Vbs + Bt + a,«

ft ‘ + & + B*

@1 B* B 3

B\ Bi B 3

dBi d/3 2 dB*

j8i B 2 B 3

da 1 da2 da 3

da\ da2 da3

Vs,2 + S22 + Bt* ’ “ VSi2 + B!2 + B32'

The locus of the central points of the gen¬ erators is a curve called the line of striction. Its equation is the third of the group above. For a developable surface 0. The surface is cylindrical if Bi = B* — B3— 0. The tangent plane to a skew surface at a point contains the generator through the point, and the plane rotates about the line as the point of contact moves on the line. The normals of the surface along a generator form a hyperbolic paraboloid. A ruled surface may undergo a deformation by bending so as to remain a ruled surface. The developable surfaces are so named because they are developable upon a plane. Their linear element ds2 admits of being thrown into the form of the ds2 of the plane.

1. Surfaces of Constant Gauss Curvature. — These surfaces are of three kinds: (1) Sur¬ faces of constant positive curvature for which K

or -D p- is positive and constant at every point.

The sphere is the type of this class. (2) Sur¬ faces of zero curvature for which K — 0 at all points. These are the developable surfaces (see 16) of which the plane is the type. (3) Surfaces of constant negative curvature, K < f 0, of which the pseudosphere is the type. The pseudosphere is the surface generated by rotating a tractrix about its asymptote. Minding showed ((Crelle’s Journal fur Mathe- matik, 19, 1839*) that all surfaces of the same constant curvature are developable upon each other, and in °°3of ways. The geometry of fig¬ ures on a surface of constant positive curva¬ ture may, therefore, be studied on a sphere; that of developable surface on a plane ; and, finally, the geometry of surfaces of constant negative curvature is identical with that of the pseudosphere. All surfaces of constant negative curvature are called pseudospherical surfaces. In employing a geodesic polar sys¬ tem of reference (see 14) the ds2 of pseudo¬ spherical surfaces with measure of curvature

1

- stakes the form ds 2 = du2 -}- R2 sin —dz > 2. A

R1 K

characteristic distinction between the geometries of the three kinds of surfaces of constant curv¬ ature is indicated by the number of geodesics that may be drawn through a point parallel to a given geodesic. On a pseudospherical sur¬ face two parallels may be drawn ;

on a develop¬ able surface only one parallel; on the surface of positive curvature, none.

1. Minimal Surfaces. — They are defined to be the surfaces of mean curvature zero, H — (see 12). At every point of such a surface Ri = — R 2. Historically the theory of these surfaces had its origin in Lagrange's investi¬ gation of the surface of minimum area with prescribed boundary curve. It was ascer¬ tained that for such a surface Ri = — R3, but

the converse statement does not always hold without limitations. Integrations of the differ¬ ential equation of minimal surfaces were given by Legendre, Monge and Enneper. We give here the equations as found by Weierstrass:

z =

= (1 — u2)F(u)du + \ ^ (1 — v2)Fi(v)dv,

- ^2^ (1 + u2)F(u)du — 2 j (1 + ^2)Fi (v)dv, ^ uF(u)du + J' vFi(v)dv.

F and Fi are conjugate functions of the con¬ jugate complex variables u and v. All minimal surfaces are contained in these formulas. When the function F is algebraic the surface is algebraic, and conversely. A minimal sur¬ face can be deformed by bending so as to remain a minimal surface. For this it is necessary and sufficient that one replace F (u) and Fi(v) by eaiF(u) and e — aiFi(v) respect¬ ively. All the surfaces corresponding to val¬ ues of a (real constants) are developable upon each other as having the same ds2. The only ruled minimal surface is the ordinary helicoidal surface with director plane. The only minimal surface of rotation is the catenoid, i.e., the surface generated by rotating a catenary about its base. These two surfaces are developable upon each other. The minimal surface is the only surface (aside from the sphere) whose spherical representation is conformal (see 12 and 15). For particulars as to these surfaces consult Schwarz, (Gesammelte Mathematische Abhandlungen) (Vol. I, 1890) ; Darboux, (Leqons sur la Theorie Generate des Surfaces) Vol. I, 1887).

1. Concluding Remarks. — In addition to the special surfaces here described may be noted the surface of centres, i.e., the locus of the centres of curvature of a given surface. It consists of two sheets S\ and S? corresponding to the two centres of curvature at every point. Also may be noted the IV-surfaces or Weingarten surfaces, in which Ri and R2 are functionally related. A

functional relation, f(Ri, R2) — 0, defines an infinity of surfaces. In passing to the surface of centres of each individual of such a group, Weingarten showed that all the sheets Si are developable upon each other and upon the same surface of rotation. The same theorem holds of course for the sheets S2. Sur¬ faces of constant curvature, and minimal sur¬ faces are special W-surfaces. Finally, there are certain analytical expressions constructed in the fundamental magnitudes, some arbitrary functions, and derivatives of the functions, which have the same value whatever the para¬ meters employed. In other words they are quantities invariant with respect to a change of parameters. When the arbitrary functions are present they are called differential parameters. When the arbitrary functions are not present they are called differential invariants. Mani¬ festly these magnitudes are connected with those geometrical properties that are essentially independent of the particular system of para¬ meter reference. For example, Gauss curvature

p is obviously an invariant. •

Bibliography. — Some of the principal trea¬ tises on the theory of surfaces are Darboux,

G., (Legons sur la Theorie Generate des Sur¬ faces } (4 vols., Paris 1887-96) ; Bianchi, L., (Lezioni di G'ometria Differenziale) (Pisa, 2d ed., 1902, translated into German by Lukat, ˆifferentialgeometrieP Leipzig 1896) ; Raffy, L., (Legons sur les Applications Geometriques de l'Analyse) (Paris 1897) ; Scheffers, G., (Anwendung der Differential- und integral- rechnung auf Geometrie) (2 vols., Leipzig 1902) ; Salmon, (Geometry of Three Dimen¬ sions y (Dublin 1882) ; Salmon-Fiedler, (Analy- tische Geometrie des Raumes) (Leipzig 1880-98).

James Maclay,

Professor of Mathematics J Columbia University.

SURGEON IN THE ARMY AND NAVY OF THE UNITED STATES. The

history of the connection of a regular staff of surgeons to the army dates back to the siege of Boston in 1775. At that time the Second Pro¬ vincial Congress of Massachusetts Bay was in session and on 8 May 1775 appointed a com¬ mittee ((to examine such persons as are

or may be recommended for surgeons with the army now forming in this colony." Of the 16 candi¬ dates examined only six were rejected. On 21 July 1775 Washington urged in a tetter to the Colonial Congress that a ((Hospital Depart¬ ment" be established, and on 27 July this de¬ partment was created, having a director-general, chief physician and 20 surgeon's mates. In April 1776 Congress passed an act that the board of surgeons be increased <(not exceeding one surgeon and five mates to every 5,000 men, to be reduced when the army is reduced." Between 1784-89 no medical department was officially recognized by the government, but was in the latter year recognized and remained the same until 1821, when it took the form which it retained with no decided change until 1908 when the titles of all medical officers, excepting the surgeon-general of the army, became the military rank, major, captain, etc., followed by the words, Medical Corps, U. S. A. Applicants for the medical corps must be between 22 and 30 years of age, be citizens of the United States and graduates of a reputable medical school and have had at least one year's hospital train¬ ing. After successful examination they are commissioned as first lieutenants. The Act of 1908 also established the Medical Reserve Corps, the members of which rank as first lieutenants and are appointed by the President after an ex¬ amination. During the Civil War and the Spanish-Americap War the corps was increased to meet the emergencies, but on the cessation of hostilities was again placed upon a peace foot¬ ing. Consult Lamphere, (United States Gov¬ ernment (Philadelphia 1880) ; Farrow, (Mili¬ tary Encyclopedia) (New York 1885) ; Ham- ersley, (Army and Navy Register) (New York 1888) and other War and Navy Department records. See United States, Army of the; United States, Navy of the.

SURGEON-FISH, a fish of the family Teuthidce, allied to the butterfly-fishes (q.v.) and distinguished by the presence of one or more erectile lancet-like spines on each side of the root of the tail which may inflict an ugly wound. Some 80 species are known, mostly of the genus Teuthis, scattered through the warm seas of the world and variously known as doctor-fish, lancet-fish, tangs and among the Spanish-speaking fishermen of the West Indies

as barberos and medicos. All are oblong, com¬ pressed, brownish or bluish fishes from 6 to 12 inches long, with narrow protruding incisor¬ like teeth. Several are good food, especially the ocean surgeon-fish (T. bahianus) found throughout the West Indies, and the blue tang (T . caruleus), found near Porto Rico.

SURGERY, History of General. The his¬ tory of medicine, fascinating at all times, is most valuable to the surgeon when applied to the

subject of general surgery. At the present time there is much in the literature of medicine that is very instructive and it becomes more and more so as we are put in possession of facts pertaining to prehistoric man and of those presented in the study of manuscripts ante¬ dating the Christian era.

Skulls of the prehistoric period have been discovered in caves and dwelling-places which show undoubted evidence that trephining had been performed on them and that healing of the bone had later taken place. The examina¬ tion of these specimens is exceedingly interest¬ ing. Again, as we study the periods between this age and the beginning of the Christian era we note a great deal that leads to the convic¬ tion that surgery was understood in those times. The early embalmers, in their famili¬ arity with the human body, must have acquired some knowledge of surgery, and this as far back as 1700 b.c.

White medicine as a profession was con¬ fined to the duties of the priest, surgery suf¬ fered, and was more and more neglected. His¬ torians of that time have just reason to con¬ demn Egyptian surgery. There are some very excellent books appearing at the present time giving a full description of what little was known, bestowing full credit upon those who practised surgery, or advocated it, and who were making some progress in that branch of medicine. The Egyptians were proud and fond of their work as scribes or writers, their learn¬ ing in that direction leading them to advise their sons to take up what was then known on the subject of medicine; but very little seems to have been developed in the way of clinical observation, or, more particularly, in surgical procedure.

In the study of medicine by the Hindu one cannot but note that in their writings there is plain evidence that surgery had reached an ad¬ vanced stage. ((Surgery," says their great Susruta, (<is the first and highest division of the healing art, least liable to fallacy, pure in itself, perpetual in its applicability, the worthy produce of heaven, the sure source of fame on earth." He also makes the very excellent ob¬ servation that ((he who knows but one branch of his art is like a bird with one wing." This writer was a very careful observer and beyond doubt did much to advance the art of surgery centuries before the birth of Christ. Some of the Hindu works and operations are yet spoken of by modern writers. They knew how to per¬ form successfully the operation of developing a new nose by flaps taken from the forehead and were familiar with lixe procedures. The sur¬ gery of ancient India is worthy our most thorough and careful investigation. Great in¬ terest is being manifested in its study and there can be no doubt that good will result from the recent

organization of the Charaka Club in

New York. This body of investigators bids fair to give us papers of great value in the elucidation of that period when Hindu sur¬ gery developed — and, it may be said, ceased. Why it disappeared so mysteriously has never been shown.

Through the study of manuscripts of suc¬ ceeding centuries, and of other records of dif¬ ferent peoples, one is greatly impressed with the difficult operations performed, now and then, by some predominating man, who, per¬ haps having more knowledge of the anatomy of the human body, and being somewhat bolder than his fellows, would perform an operation, leaving a report of possible success. Then for centuries this work would be forgotten, then revived, perhaps modified. Possibly to the operator it was a new operation (since he was not aware that it had been performed pre¬ viously), yet to be developed into a line of work that was to lead to greater success. Thus we see reported very important advances in the line of surgical procedure from our earliest knowledge on.

The early Greek knowledge of surgery is not so apparent or abundant as that of later periods, yet Homeric medicine gives endorse¬ ment to the fact that there were surgeons capable of rendering aid in emergencies, such as the removal of foreign substances from the body, and who were able to control bleeding by the application of what were evidently under¬ stood to be drugs possessing some styptic power and to bind up and dress wounds. Even fractures and dislocations were treated. In time of war these men were looked upon with reverence and the aid they were expected to render was highly valued. Of their real work there is little known before the Trojan War. The most observing student of cases in antiquity was Hippocrates (q.v.) born 460 b.c. He wrote on the treatment of articulations, luxations, fractures and also on the subject of the use of instruments, but his knowledge of anatomy must have been very meagre. The Greeks had great respect for their dead, which prevented dissection of the human body. They knew nothing of physiology and, therefore, anatom¬ ical structures, such as arteries, veins, nerves, tendons, ligaments and membranes were hope¬ lessly confused. Hippocrates gave classifica¬ tions not unlike those of the present day, “in¬ ternal medicine® and “external or surgical medicine,® which were convenient, but not philosophical. The period of his life marked the

transition from mythology to history. His doctrine and clinical observations were received with great respect. He advanced the science and art of surgery, but only a little later ignorance again reigned in the school which he made celebrated.

Erasistratus (about 300 b.c.) was a close ob¬ server as an anatomist and made, use of his knowledge of the valves of the heart. He dis¬ covered1 the lymph vessels, described the epi¬ glottis, successfully removed the spleen and per¬ formed other remarkable operations.

Aretaeus was one of the most brilliant men of the second century before the Christian era. He recognized surgical affections of the brain and described the Syriac or Egyptian ulcer, tetanus and anal fistula.

Galen (q.v.), who died about 201 a.d., must have had considerable knowledge of anatomy.

History indicates that he was a vivisector, and to him is due a clear classification of the mus¬ cles, which is followed at the present day, as the “flexors and extensors.® He came very near discovering the circulation of the blood, and divided the body into the “cranial, thoracic and abdominal cavities,® whose proper viscera and envelopes he described. This was during a period when encouragement was given to the study of anatomy. The works of one Oribasius (q.v.), who died about 400, were based on the writings of those who had preceded him, but had a distinct importance of their own. He showed much originality in the treatment of hydrocephalus, advised oaracentesis of thorax and abdomen, removal of vesical calculi, treat¬ ment of aneurism, excision of hypertrophied mammae in men, etc. Antyllus who flourished about this period was one of the most distin¬ guished and original surgeons of antiquity. He was the first to describe the extraction of small cataracts and is perhaps best known to the sur¬ gical world of to-day by his exceedingly bold plan of opening aneurisms, so successfully imitated by the late James Symes.

It is to be remembered that during the Greek period Galen and his followers dissected animals and occasionally a corpse on the field of battle.

In the 6th and 7th centuries the Arabians gave more encouragement to dissection and demonstrated that surgery required a knowl¬ edge of anatomy. One of the most celebrated Arabian physicians was Rhazes (q.v.), who died about 932. He compiled from all authors some 37 books on medicine and surgery.

Albucasis (936-1013) in one of his writings gives a most detailed account of necessary in¬ struments and in speaking of their proper use and application to surgery, he emphasizes the fact that surgeons should be versed in the science of anatomy.

In visiting the various museums in Europe at the present time, especially Naples, one is greatly impressed with the variety of ancient surgical instruments that have been recovered from the ruins of Pompeii and other former surgical centres.

Avenzoar (q.v.), who died about 1169, wrote one of the most remarkable treatises on renal diseases, especially in reference to the treat¬ ment of calculus and further surgical inter¬ vention.

From the 9th to the 13th century the Jews and the Christian clergy shared the honors of the healing art, and during this time references are not infrequently made to the work of the barber-surgeon (see Barber). Lithotomy (q.v.) seems to have been developed in this period and it is noted (1022) that Henry II, Holy Roman emperor, was cut for stone by Saint Benedict himself.

In the 13th century Rolger of Palermo was evidently one of the mpst distinguished, pio¬ neers in modern surgery. He was the first to use the term “seton.® His pupil, Roland, wrote a treatise on surgery, which became very famous and was mentioned by Guy de Ghauliac, “restorer of French surgery in the 14th cen¬ tury.® The latter was probably one of the most famous surgeons of that time. He opened the abdomen for dropsy and operated for the radi¬ cal cure of hernia and for cataract.

The history of the school of Salerno in the 13th century indicates that practitioners of surgery had to devote a certain time to the study of anatomy, were obliged to pass an examination by the faculty of the university and were licensed by the royal hands. Surgeons recognized the importance of nausea, vomiting and hemorrhage from the ears, in injuries to the head. They used the trephine (q.v.) in treating fractures of the skull and treated hernia cerebri by pressure and caustics. Ligatures were used in wounds of the carotid arteries and jugular veins. The surgeons also treated wounds of the abdomen. Lithotomy was described with care and compound fractures were treated with splints.

The first important work on minor surgery appeared during the 14th century. It was writ¬ ten by Lanfranc, but although it grew into a second and larger treatise, surgery soon after this began to decline. The barber-surgeons of this time seemingly commanded considerable at¬ tention, although it is evident that the im¬ portance of this body of men has been greatly exaggerated.

From the 15th century through the 19th surgery developed more and more as a science. In England, Thomas Linacre of Canterbury (1460-1524) was one of the earliest writers. Jerome Fabricius (1537-1619) was also a noted writer and authority on the practice of sur¬ gery during this period. Benivieni during the same period was, according to Malgaigne, the first to impress upon the profession the im¬ portance of searching in the cadaver for the concealed cause of disease. His observations on gall-stones and conveyance of syphilis from the mother to the foetus were original.

Notwithstanding the progress in surgical science during the 15th and 16th centuries, the practice of surgery was largely abandoned to a class of ignorant barbers and bone-setters. Most of these operators traveled from city to city, individual practitioners limiting themselves to the operation for stone or for hernia. This condition of affairs, together with the prejudice against dissection, was most unfavorable for the profession of surgery.

France at this time presented the only spe¬ cial college for the instruction of surgeons. To the 16th century belongs the career of that most wonderful surgeon, Ambroise Pare. He was an original thinker, had the courage of his convictions and did away with the use of the cautery and boiling oil in amputations, using ligatures to control hemorrhage, the latter being the most important advance until the introduc¬ tion of ether in 1846 (see Anesthetics). At the beginning of the 17th century surgery reached a higher social and intellectual plane than it had heretofore occupied. Amphitheatres for dissection developed in many European cities, together with hospitals and dispensaries in connection with the various schools. The term ˆinflammation® was then introduced and from that time until the present day has been a subject for continuous investigation. From this period may be dated the beginning of con¬ sultation work between expert practitioners; and clinical teaching and the presentation of surgical cases then advanced their claims. Sur¬ gical history from Valsalva on presents the names of many who became eminent operators,

and in their writings did much to advance the art of surgery. Notably

was this so among the Italians, who in their plastic surgery de¬ veloped the Italian method for construction of a new nose.

In France, Morel (1674) invented the tourni¬ quet, Denis performed the first transfusion of blood in man and other French surgeons be¬ came very expert in the operation for lithotomy. Mareschal (1658-1736) had a record of eight lithotomies performed in half an hour. He was one of the founders of the French Acad¬ emy of Surgery.

In Holland, Rau (1658-1719) taught prac¬ tical surgery upon the cadaver.

Wiseman (1625—86) was the first to develop English surgery. He was also the first to do external _ urethrotomy for relief of stricture. At this time in France alone was instruction in surgery well regulated, as it was the only coun¬ try which possessed a proper surgical college.

In the 18th century hospitals began to mul¬ tiply in Germany, benefiting general surgery to a great extent. Brasdor (1721-76) developed the method of distal ligation of aneurisms, while Sabatier (1732-1811) wrote a treatise on operations and recommended resection of the head of the humerus. DeSault and Chopart did much in developing operative surgery. In Italy Scarpa (1752-1832) advanced our knowledge of hernia and aneurisms. Spanish surgeons did little to improve the science and art of surgery. In England, Cheselden (1688-1752) did much in advancing the knowledge of pathology and general surgery. White, of Manchester, devised a method of reducing dislocations of the hu¬ merus with the foot in the axilla. A well-de¬ fined operation for excision of the joints was also first practised in England. The investiga¬ tion of pathology and diagnosis in France at this time had much to do in the 19th century in developing the <(new Vienna School.® Percival Pott (q.v.) did much in elaborating and classi¬ fying diseases of the joints and especially spinal diseases. John Hunter (q.v.) was the most famous English surgeon of his day. He be¬ longed to a family which in many ways assisted the development of pathological anatomy and surgical technique. At the close of the 18th century, Benjamin Bell was the first to make use of drainage by means of tubes of lead or silver. In France, Bichat (q.v.), although not generally so understood, became a forceful lecturer on surgery and did much to bring hos¬ pital-gangrene under observation and control. The Dutch during the 18th century developed some eminent surgeons, and it is interesting to note how dextrous they became in the use of instruments. At the same time their knowl¬ edge of anatomy enabled them to present some very able papers on the subjects of hernia and dislocation. Sandifort, of Leyden, first de¬

scribed a downward dislocation of the femur.

In reference to the surgery of our own country in the 18th century, one of the most in¬ teresting works, which was of great service to American surgeons during the Revolution, was that of John Jones, (Plain, Practically Precise Remarks on the Treatment of Wounds and Fractures.)

The 19th century witnessed great advances and from 1838 was one continuous chapter of investigation toward the development of the

parasitic or germ theory. Of all the many names associated with this immense work, one can refer to but few: Pasteur, Klebs, Koch, Lister, Tyndall (qq.v.) and others, in their de¬ velopment of bacteriology, have done more to advance the principles of technique in surgical operations and have placed the art and science of surgery upon a more lasting foundation, than any of their predecessors.

The first half of the 19th century was a period of great success for the French sur¬ geons. The English surgeons, in their superior knowledge of gross anatomy, also made great advances in their diagnosis and surgical treat¬ ment. This century became noted as the period during which general surgery developed more into an exact science. Its writers did much to eradicate erroneous ideas and to end the trans¬ mission of meaningless sentences from one text¬ book to another. The introduction of anaes¬ thesia in 1846 enabled some of the bolder men to perform operations heretofore deemed quite impossible; yet the ratio of mortality continued high and it was not until the dawn of antisepsis, more particularly the period of true asepsis, that general surgery advanced so rapidly. The death-rate in major operations, in many in¬ stances, was in a short time reduced from 66 to 6 per cent, and this ratio was soon applied to all departments of surgical work. As technique became more perfect, all manner pf operations were suggested and carried out with great suc¬ cess. Hence to-day there is no part of the human body that the surgeon is unable to reach for the relief of injuries or pathological con¬ ditions.

In operative surgery much help has been re¬ ceived from the use of cocaine, eucaine, su¬ prarenal extract, ethyl chloride and other prep¬ arations for local and spinal anaesthesia. Bac¬ teriology has taught the surgeon the cause of inflammation, suppuration of wounds and sepsis.

New hospitals, aseptic operating-rooms and fur¬ niture, thorough sterilization of instruments, hands and the 'field of operation and cleanliness of person, together with the wearing of rubber gloves, coupled with aseptic dressings, have enabled the surgeon to perform operations un¬ known before the last decade of the 19th cen¬ tury, reducing mortality to a much lower figure. An important factor which has been of much aid to general surgery is the art of nursing, first recognized in 1840. Too much credit can¬ not be given to the training schools of to-day for their development of trained nurses who have aided so much in the care of surgical cases.

During the 19th century the microscope be¬ came of more and more value. The anthrax bacillus was classified in 1850 and then followed classification of the various micro-organisms known to-day. Koch's identification of the tubercle-bacillus has aided the general surgeon as much in the treatment of osseous tubercu¬ losis as it has the physician in tuberculosis in other parts of the body.

For the past two decades general surgery has presented a mass of material, largely ex¬ perimental, and much of it bacteriological and pathological. The latter has assumed a better position because of some real practical dis¬ coveries, but, during that time there has been a large sifting out of much that was thought

of great value, experience, however, ˆ demon¬ strating to the contrary. Let us consider the treatment of fractures. The various methods of plating and suturing, by means of silver wire, have had very strong advocates, yet the use of splints, extension and position have re¬ tained their well-recognized effectiveness. There would seem to be a concensus of opinion that when the X-ray shows the fracture has been reduced and the parts brought into a fairly normal position, these cases do fairly well with¬ out operative intervention ; however, when the positions are faulty, and, even though an anaesthetic is employed, reduction cannot be accomplished satisfactorily, there can be little doubt that they do very much better and more perfect results obtained, by operative proce- ure. It is now becoming recognized the frac¬ tures of the clavicle and other irregular bones demand operative intervention, by employment of plates and like methods.

The knowledge of the anatomical relations of the various joints, especially that of the hip and shoulder, with the aid of X-ray, manipula¬ tion, becomes more perfect and more reliable in results.

In dislocations the X-ray has continued to demand greater employment because of its worth.

In the past 10 years it is pleasing to ob¬ serve that the methods of scientific X-ray work have become very much more extensive and precise; that with the ability to use the X-ray apparatus, in examinations of the head, thorax, abdomen, pelvis and extremities, greater pre¬ cision has been reached and the results much more reliable and satisfactory; that in the understanding of the location of foreign bodies, much has been accomplished in reading the shadows correctly.

It is in the diagnosis of fractures and dis¬ locations that there has been a steady, con¬ tinuous improvement. This observation be¬ comes very appropriate when referring to lesions of the spinal column and surgery of the spinal cord.

This knowledge also applies to the better understanding of pathological conditions, espe¬ cially within the abdomen and the location of stone in the kidney and bladder; however, this must be said, that in the past few years phy¬ sicians, surgeons and specialists have come to recognize the Roentgenographer as the one alone who can interpret the radiograms and make it clear to the surgeon who is respon¬ sible for the case, when an operation is under¬ taken. In the past it has been too much the custom for the attending medical man to trans¬ late the X-ray picture himself and many errors have occurred in that way. This is especially true in reduction of dislocations.

Operations upon the head and teeth, due to the study of X-ray work, have become much better understood, the classifications calling for such procedure much more reliable and show¬ ing more and more perfect results.

Compartively recently pathology has dem¬ onstrated that septic teeth have much to do with the development of many surgical lesions, iri the past overlooked, and, which, like the tonsils, frequently become the bed for the in¬ troduction of pathological micro-organisms into the system.

SURGERY

There has been added to the history of general surgery a very interesting chapter on the treatment of phlegmons and inflammatory, septic conditions, by employment of the method known as passive hypersemia. When promptly and effectively made use of it is of great value in cutting short infective invasion of the lymphatic system,

especially when applied to the extremities.

The treatment of malignant disease by means of serums, especially Coley's fluid, main¬ tains a semi-successful position, but, consider¬ ing the length of time it has been employed, it would seem as though it ought to have offered more encouraging results.

The same applies to X-ray treatment, ad¬ vocated by some so earnestly in its use previous to, and after, an operation for relief of malig¬ nant troubles, yet not establishing itself as a positive curative agent.

The range of general surgery is becoming so great, the multiplicity of theories and papers presented such that one grasps with satisfac¬ tion any contribution and conclusion, regard¬ ing the methods of diagnosis and treatment that may be said to be final and the results such as to command the confidence and respect of the operator.

The history of modern methods, regarding general surgery, in pathology and diagnosis, through bacteriological, laboratory work, is wonderfully encouraging, but much more time is required than was made use of by the sur¬ geons of a somewhat recent and later date, in their examination of cases.

The thorough study of the blood, bac- tcriologically and otherwise, the vaccines, are all to be considered in the present history of surgery and proving elements of great im¬ portance. This applies to all modern surgery, reaching all points that have developed through research work and of great use in the study of general surgery to-day.

In the study of the history of general sur¬ gery, the many papers that are presented in our medical journals, also in our textbooks, from year to year, it is to be observed that advances are being made in the methods of diagnosis and proper treatment. There is this criticism: That too often exploitation of sup¬ posed new discoveries, in their proper rela¬ tion, have failed to maintain the expected high standard of success, for instance, in appen- dicostomy. At first suggestions for this opera¬ tion met with a great deal of encouragement in the hope that, as the appendix was per¬ manently fixed in the incision, it could be made the source of successful treatment of patholog¬ ical changes within the large intestine; how¬ ever, it does not seem to have found approval to the extent of many cases appearing on record, or employed so extensively as at one time thought possible.

Also, while there have apparently been a few excellent results, yet

Edebohl's suggestive treatment of nephritis, by decapsulation of the kidney, does not seem to have sustained the endorsement of the pathologist or the operating surgeon.

In the changes and successes in diagnosis and treatment, during the past decade or two, great progress is to be observed in comparing one period with another — one method with

another. That of which so much was expected too often proves valueless, while that which seemed of lesser importance proving of great value, on trial.

In civil life the advances made in surgery of the head, face, neck and thorax, the medi¬ astinal space, the heart, of the lungs and pleura, indicate the calm, steady progress that is now to be observed in all larger hospitals.

Especially does this apply to stab wounds of the heart, _ to the drainage of abscesses within the pericardium, also in operations upon the lungs and treatment of the pleura for various surgical conditions.

The recent acquisition of the pathology of the thyroid and parathyroids has resulted in the understanding of goitre, far ahead of any¬ thing that has ever taken place in the past. The function of these glands, the classifica¬ tion of symptoms and of the pathological con¬ dition, has enabled the surgeon to do his work in a more scientific manner and the results much more favorable. The better understand¬ ing of the term exophthalmic goitre is exceed¬ ingly pleasing in every respect.

In abdominal surgery it is no longer neces¬ sary to make use of theories, for practical facts are such that, for instance, in surgery of the liver, gall-bladder, pancreas, gall ducts, the pancreatic ducts, there is now a fixed line of treatment, and not to be deviated from very much. This is becoming more and more posi¬ tive, and also applies equally well to the ap¬ pendix.

The surgical treatment of gastric and duodenal ulcer is one of the finest demonstra¬ tions of surgery being made more of as an exact science than internal medicine has yet attained.

Injuries and diseases of the pancreas and spleen illustrate much of the advance made in the field of diagnosis and treatment.

The abdominal cavity has come under such thorough observation that the right side can no longer hold its exclusive position regarding

operative intervention.

There is no part of this one classification of the human body, and in which Galen was so correct, that is entirely free from possible invasion.

In the past two decades much has been added to our knowledge of intestinal surgery and methods of treatment have reached a more conclusive line of operative procedure.

In civil life no more brilliant results can be shown in any of the various departments of surgery than the treatment of multiple gun¬ shot wounds and ruptures of the intestines and other organs within the abdominal cavity.

This applies particularly to hernia — rupture — and especially for relief of gangrene of the intestine. To the surgeon of many years prac¬ tice, it is particularly striking to note how few cases we now come in contact with of delayed strangulated hernia, in which we have the complication of gangrene of the bowel. The prompt recognition for early operation in such cases has largely eliminated this catastrophe. Our pathological knowledge is much more clear, also the willingness of the patients to have an early operation, and not trust to mechanical supports. These cases, treated, as they often are, comfortably and palliatively by the applica-

tion of trusses, still continue to present an ex¬ cellent history in the good results of operative intervention. We see a gradually increased willingness, in fact patients often seek an operation, the result being so thoroughly satis¬ factory. All of this applies as well to children as adults.

In the treatment of conditions within the abdominal cavity a greater concensus and uni¬ formity of opinion has been reached than in some other surgical channels.

Perhaps we may say there is yet a lack of uniformity in doing the operation of intestinal anastomosis.

Excision of the large intestines seems to have reached the peak of operative interven¬ tion, and present results are being studied with great care, regarding curative results in this class of surgery.

Surgery of the appendix gives a very ex¬ tensive history regarding what has been written in the past, and, now, regarding diagnosis and treatment, becoming very concise. The general practitioner of to-day is more alert than ever in the recognition of early symptoms and prompt surgical procedure. When these methods are yet more thoroughly considered and carried -out, the appendix, from the medical and surgical standpoint, will present a mor¬ tality much less than exists at present, though this is exceedingly small.

The history of operations done upon the bladder, for various pathological conditions, is a very impressive one. Decided advances have been made in this direction, and the same can be said of the prostate gland, while surgery of the kidney has reached a point of great pre¬ cision, the same also to be said regarding the ureters.

In all that pertains to the surgery of the abdominal cavity, much has been accomplished through the study of the Trendelenberg and other positions for the patient during the time of operations, especially upon the kidney or gall-bladder and in pelvic work. Much of this also applies to the treatment of the patient after an operation, particularly in suppurative, septic appendicitis, as has so well been brought out by the writings of the late Dr. Fowler.

In the advances made within the abdominal cavity the searching out of every pathological condition, no organ or tissue being overlooked, is one of the most impressive to be noted in the history of general surgery.

Gall-stones have a way of giving a great variety of symptoms, the same applying to cases of appendicitis, and which, perhaps, has brought out many valuable conclusions.

In operating upon either of these organs and not finding a pathological condition that will accord with the symptoms, it is admitted by most surgeons that a more thorough ex¬ amination is called for, and in some other un¬ suspected organ may be found the source of the symptoms, relief being afforded only by doing the operation called for in that direction.

Since the last edition of the Encyclopedia Americana much has occurred in the history of general surgery, regarding surgical procedure, to make clearer new fields of observation, and which applies especially to the abdomen and its contents.

The abdomen has claimed much of the at¬ tention of the general

surgeon. It has not been possible for the specialist to control this line of work. With our increased knowledge of pathological changes within this cavity, and with the aid afforded the operator through the advances made by the assistance of the ex¬ perienced radiographer, who is able to inter¬ pret radiograms correctly, the success has been so great that patients, or their friends, have little hesitation in entering a hospital, or going to the operating table, when the necessity is made apparent to them. Hence in the building of the many smaller hospitals the past few years, local surgeons have developed an ex¬ perience that permits of doing many opera¬ tions deemed impossible for them to perform a few years ago.

In the past two decades much progress has been made in surgery of the bones ; in the conservation of limbs and joints ; in the better understanding of pathological conditions and especially does this apply to cases of malig¬ nant and tubercular troubles.

Surgical lesions of the circulatory system have received much attention, and surgeons have had occasion to discuss the subject of idiopathic aneurisms. Operative surgery in the near past has not met with so many of these cases, and the condition is believed to be due to the more successful treatment of syphilis, this being one of the chief factors in develop¬ ment of this lesion.

The subject .of inflammation of the veins — phlebitis — has commanded careful investiga¬ tion in our laboratories, it so often being the factor in connection with sudden death follow¬ ing an important operation. To relieve the blood clot that forms in the vessel, then sud¬ denly separates, enters the circulation, plug¬ ging the heart valves and causing sudden death, calls for surgical intervention, when it can be recognized as being present in the large veins of the extremities.

It is also to be observed that a less num¬ ber .of cases of stone in the bladder are pre¬ sented, due to the better understanding of calculi originating in the kidney, and this con¬ dition corrected by the study of diet, the drink¬ ing of properly selected mineral waters or the careful use of plain sterile waters. Here diet has much to do in lessening the development of many surgical lesions.

The medico-legal side of the responsibility of the surgeon has been pretty thoroughly covered the past few years in the history of malpractice suits for foreign bodies left in the abdominal cavity, with the result that the operator, the hospital or nurse share somewhat alike the responsibility, and must give evidence of having exercised

every precaution possible to avoid such occurrences. Especially is it the duty of the surgeon to have it well understood with the one nearest in relationship to the patient regarding the extent of an operation. If, in the midst of it, it is found necessary to do more than was explained, the operator must communicate with the responsible person re¬ garding the condition present that requires more serious, additional procedure. This is one reason why every cautious surgeon desires some person near at hand to inform them, should complications unexpectedly arise. Our

British surgeons have bad some unpleasant ex¬ periences in this direction.

Regarding the anaesthetic in use by the general surgeon, it may be said that sulphuric ether is undoubtedly employed to a greater ex¬ tent than either one of the other anaesthetics. Chloroform is believed to be advisable in the short operations, and in those upon children, while for those only requiring a few moments the nitrous oxide or ethyl chloride are of great service.

Albert Vander Veer, M.D., Professor of Anatomy, 1869-74. Professor of Surgery, 1876-1915, Albany Medical College.

SURGERY IN AMERICA. If at any

time one should purpose writing a history of the progress of surgery on the American con¬ tinent he must not fail to remember that in the earlier part of its history America was abso¬ lutely dependent on Europe, and could not be expected to reflect anything better in the direc¬ tion of science than that which it received from its mother-country, Therefore, the most suit¬ able introduction that could be made for the history of surgery on this continent would be a review of the status of the 17th century in Europe. Very prominent were two or three philosophical systems which had been handed down from previous thinkers. The skepticism of Montaigne, with its final reduction by Bayle to universal doubt or universal credulity, and the supernatural or mystic philosophy of Bohme, sometimes spoken of as the cabalistic or theosophistic, which includes the discoveries of Pascal and Malebranche, were the prevailing systems or methods of thought. In the mean¬ time Bacon had lived and died (1626), who, though he laid great stress on gunpowder and the compass, had but

little respect for the dis¬ coveries of Copernicus. Zoology and botany were fairly well advanced and had been ex¬ tended by dissection and by classification. Hooke had discovered the cell and had founded the cell-doctrine. Kepler and Galileo had been persecuted and had left their discoveries for others to verify. Newton entered the world some years after the date of the first expedition of the Mayflower (1642). Continental Europe had many universities, some of which have been discontinued or merged into others. Numerous academies of science had sprung up in different parts of Europe, and the present British Royal Society was remodeled in 1662 by Charles II. Nevertheless, all kinds of superstition prevailed, alchemy flourished, witchcraft was in full bloom, necromancy was generally practised and the divining rod flourished, and all domestic animals were kept under cover during an eclipse lest they be threatened by dire pestilence of unknown character. In 1628 Harvey had published his work on the circulation of the blood, and in 1608 the microscope had been in¬ vented by Lippersheim, although by some its invention is attributed to Jansen in 1620. At all events it was greatly improved by Hooke, who died in 1702. Logarithms were not in¬ vented until the American colonies were nearly 100 years old (Napier, 1700) ; but the weight of air had been established by Toricelli in 1643. Previous systems in medicine were then modi¬ fied, to be reformed on the modified Paracel- sism devised by Van Helmont or the humeral views of Sylvius and Willis. Sydenham ap¬

peared upon the scene about the time of the first expedition of the Mayflower , and, until his death in 1689, the larger number of English physicians who came over in his day had been more or less under the influence of his teach¬ ings.

The 17th century is important in the history of surgery, since superstition and self-satisfac¬ tion gradually gave way to the inductive method and improved habits of observation. Even among the Dutch, who settled new colonies in this country, surgery now assumed a dignified position, while among the English, French and Germans it had already attained something of this character. These were still, however, the days of the barber-surgeons, who were not con¬ sidered gentlemen nor fit to associate with gen¬ tlemen, who were, for the greater part, an uned¬ ucated and illiterate class. The study of anat¬ omy was still pursued with difficulty, the ban of the Church yet covering those who took part in any operation which was accompanied by the shedding of blood. In such a state were the mother-country, the Netherlands and France, while still worse off was Spain, at the time when the early adventurers or pilgrims from these various countries landed upon our shores and began to make

American history.

Colonial History. — The English colonists brought their physicians with them on nearly all of their expeditions. Thus when Jamestown was founded, in 1607, we hear of one Wotten, or Woolton, who came out as surgeon of the London Company, who was even considered a gentleman among the others of the expedition, whether by courtesy or right it is not known. Walter Russel followed in 1608. Even within that first half-century came the need for some definite laws regulating the practice of medi¬ cine, since throughout the colonies quackery flourished to a considerable extent. There was at this time little to attract travelers to this country except the spirit of adventure, which the better educated men possessed in minor degree. Many of the earlier physicians of the colonies were church deacons or politicians or both. Thus Samuel Fuller, who came to Ply¬ mouth in 1620, preferred to be known as a deacon rather than as doctor, although he prac¬ tised medicine faithfully and, for his time, well. John Winthrop, Jr., was not only a physician but a statesman. In 1667 he became governor of the New Haven colony, and he must have enjoyed much repute in England since he be¬ came one of the founders of the Royal Society. Up to 1692, 134 physicians had been catalogued as practising in the colonies. The first person executed for witchcraft was one Margaret Jones, who was also a physician.

In the New Netherlands, controlled first by the Dutch West India Company, it was pro¬ vided in their charter that they should procure a “Comforter for the Sick.® The first one of prominence under this provision was Bogaerdet in 1637 ; later came LaMontaigne, who was both a Huguenot and a physician. Prominent during the middle of the century was one Samuel Megapolensis, who was born in this country and graduated from Harvard in 1657, and then went to Utrecht, where he took his medical degree. He practised in Manhattan both as a physician and preacher. In 1772 a Quaker, George Fox, was traveling with John Jay when the latter

was thrown from his horse and had his neck apparently broken. Fox at once instituted a manipulation by which, apparently, the dislo¬ cation of the upper vertebrae was reduced and by which Jay was restored to life. This must be one of the earliest cases of this kind on rec¬ ord. When William Penn came to this country he brought with him Dr. Wynne, an accom¬ plished Welshman and probably the most com¬

petent man of his profession in America at that time.

The colonies were swept during this cen¬ tury with fierce epidemics of yellow fever, smallpox, scurvy, dysentery and many other dis¬ eases, by which the colonists suffered great loss. Those who came over with William Penn num¬ bered about 100, of whom one-third died on the voyage of smallpox. This was perhaps the most terrible scourge of all and was not successfully battled with until Dr. Boylston dared to institute the method of inoculation to which his attention had been called by Mather, who had read of its successful introduction into England from Constantinople by Lady Monta¬ gue. In this is constituted one of the most inter¬ esting episodes in the history of medicine in this country. The Rev. Cotton Mather, distin¬ guished both as a politician and divine, still had this on his mind even after he had lost his interest in the burning of witches. In 1721 he read a paper on Turkish Inoculation written by one Timonius, and became deeply interested in it. He endeavored to interest various young men, especially a Dr. Douglas, in the discovery and in the method. Failing in this he turned to Dr. Boylston, then of Brookline, Mass., who saw the importance of the method and the ripe¬ ness of the occasion. As soon as his purpose became understood he was at once denounced in the pulpits and attacked by the multitudes, and had as his only backer the man Mather, who had not yet lost his authority with the clergy. Opposed, then, by his colleagues and by the clergy in general, and the universal rabble, Boylston had the hardihood to inoculate first his own son and two negro servants, and this only six weeks after the first inoculation was done for Lady Montague in London, by Dr. Maitland. But Boylston lived to reap glory and profit from his intrepidity. The controversy which he aroused had subsided in this country when he went to London, where he found it still raging, and where he again aroused a storm, but eventually triumphed. (This method must not be confused with vaccination, but consists of the actual inoculation of the dis¬ ease by pus or discharge from the lesions of the patient suffering from the real malady. It is practically the same method which had ex¬ isted for centuries in the Orient).

A great part of the 18th century was spent in warfare between natives and the newcomers to this country. The Indians were almost al¬ ways active, while the English and French fought more or less continually, the scene of conflict extending from Quebec on the north to the Niagara Frontier on the west and Geor¬ gia on the south. In spite of the many oppor¬ tunities thus afforded for the study of military surgery it does not appear that much was done in the wav of improvement of older methods or in new discoveries. The wounded soldier of 1776 had but little better treatment than the wounded

pilgrim of 1676. There were a few

men of such prominence scattered along the coast line in the early and middle part of the 18th century that they deserve to be mentioned, at least by name. Cadwallader Colden was born in Scotland in 1688, and came to this country in 1707. In 1710 he moved to Philadel¬ phia. Here he wrote some of the first medical papers written in this country, particularly on animal secretion. After some years spent in this country he took up his residence in New York, in 1716. He was during the early part of his life an indefatigable student and attained remarkable popularity in his practice. He held numerous public offices and figured rather as a statesman than a physician. He acquired a large estate up the Hudson and became the inti¬ mate friend of Benjamin Franklin, to whom he first suggested the foundation of the Amer¬ ican Philosophical Society. He left a large number of writings and correspondence with the most eminent savants all over the world.

As the colonies steadily progressed in wealth and size, Charleston became more and more a prominent centre of influence, and here there lived and died during the century a group of five men, namely, Chalmers, Lining, Gardner, Moultrie and Bull, who made important contri¬ butions to science and achieved unusual distinc¬ tion. All of these were of Scotch origin save the last, of whom it was claimed that he was the first person born in South Carolina, as well as the first native to receive a doctor's degree. He was a pupil of Boerhaave, a graduate of Leyden in 1774. He gradually drifted into poli¬ tics, as did Colden. Lining was perhaps the first American physiologist and published nu¬ merous papers in the (Transactions) of the Royal Society. He also published the first American account of yellow fever, which was the scourge of the century, and which appeared to spread to this country from the West Indies. Moultrie achieved an honorable position. He had a son who was also a doctor, and while both of them attained a high place in the es¬ teem of their fellow-citizens, the death of the father was regarded as a public calamity, after some 40 years of phenomenal activity. Chal¬ mers was already a friend of Colden and the others when he came to this country. He made himself generally known as a writer and de¬ veloped power which would have made him, under suitable surroundings, a rare teacher. Gardner, like Colden, was a man of culture and fine education; in fact one of the most ver¬ satile men of his century in this country. He was made a Fellow of the Royal Society. To these should be added, perhaps, John Mitchell, an Englishman by birth, who came to this

country in 1705 and made a reputation which spread to the centres of learning in the old country. He published a number of essays in the

Philosophical Transactions. >

A great epoch in the medical history of the 18th century was the foundation of the first hospital in this country. This must be duly credited to the energies of Benjamin Franklin, Dr. Thomas Bond and, later, Drs. Shippen

and Morgan. Bond was born in 1712, in Mary¬ land. After studying for six years in this

country he went to Europe, whence he returned full of the idea of introducing the hospital sys¬ tem which had proved so advantageous abroad. Though he returned in 1734, not until 1751 were circumstances sufficiently propitious to found

something more than a mere camp for the treat¬ ment of smallpox or a lazaretto for the care of sick seamen. Franklin threw the whole weight of his influence into this movement and finally £2,000 raised hy private subscription, added to a similar sum contributed by the colonists, pre¬ pared the way for the opening of the Pennsyl¬ vania Hospital in 1752. After four years of existence in rented quarters, the cornerstone of a new building for that purpose was laid, bearing an inscription suggested by Franklin himself. This institution had an enormous in¬ fluence in more than one respect, since its foun¬ dation had made possible the creation of the first medical school in this country, which be¬ came a part of the University of Pennsylvania, and which owes its inception to the study and liberal enthusiasm of Morgan. Although Har¬ vard College was founded in 1636 and Yale in 1701, it remained for this to become the pioneer medical, school in the United States. Albany has a somewhat famous history regarding civil and military hospitals.

Previous to the American Revolution it had cared for many sick and wounded. Just before that period, in connection with the French and Indian wars, it had established a military hos¬ pital with accommodations for 500 patients. This was in use during the fighting along Lake Champlain, Lake George, Ticonderoga, Fort Edward, Bemis Heights, Saratoga, Schuyler- ville and the campaign of the Revolution. Later, during the epidemic of cholera, in 1832, barracks were erected for care of the sick; also in the beginning of the Civil War a large hospital was erected, much in the style of the barracks of to-day, and

to this were brought the sick and wounded from about Richmond during the fighting under McClellan.

John Morgan began his study during the period of the French and Indian wars. As he came in contact with the foreign surgeons who came over with the English troops, he found his own ability not at all commensurate with his ambition. So in 1760 he went to Lon¬ don and studied under the Hunters, and then to Edinburgh, where he came under the influ¬ ence of Cullen, the Munroes and others, and where he graduated. He next went to Paris and was admitted to the Academy of Surgery; he then made a tour of Europe, having the ad¬ vantage of a personal acquaintance with Mor¬ gagni in Padua. Morgan spent five years in this foreign study and upon his return, in 1765, became closely associated with the younger Shippen. The Shippens were a well-known medical family of Philadelphia, and were men of liberal education and social distinction. Shippen had already given private instruction in midwifery and the two men joined hands most heartily in this commendable effort. When the trustees of the college opened the school Mor¬ gan and Shippen became professors, respec¬ tively, of medicine and surgery. Thus it will be seen that Shippen was the first professor of surgery in this country, and that the first sys¬ tematic instruction in surgery was given by him in 1765.

The faculty was joined a little later by Ben¬ jamin Rush, who became the most conspicuous figure of his day, as a professional man, in this country. He was but 24 years of age when he was made professor of chemistry, and he was but 31 years of age when he became a signer of

the Declaration of Independence. The gather¬ ing war clouds of the Revolution dampened the ardor of all at this time, and the work of car¬ rying on the hospital and medical school was exceedingly heavy and fell mostly upon the shoulders of three or four men. In 1779 the assembly revoked its charter which was, how¬ ever, restored in 1793. In the meantime the condition of affairs in New York was not much better.

One man, however, stood out pre-eminently as an efficient physician and broad-minded citi¬ zen. This was Samuel Bard, whose name de¬ serves to be closely associated with that of Rush. When he returned to this country in 1765, after a period of foreign study, he was inspired with the thought of founding a medi¬ cal school in his native land. In 1768 he as¬ sociated with himself, Clossy in anatomy, John Jones in surgery, Middleton in physiology, Rush in chemistry, Tennent in

obstetrics, he himself taking charge of the principles and practice of physic. Thus the medical school of King's College was established. Jones was perhaps the first in this country to distinguish himself as a surgeon. He had been under the best teachers in Europe, and had seen a great deal of military surgery in his day, especially during the French War. He was independent enough to decline to adopt some of the peculiar notions of his colleagues regarding appropriate cos¬ tumes, but in the end the absurdities which he dispensed with were discontinued by them. He wrote a book for the Revolutionary surgeon, entitled (Plain, Concise and Practical Remarks on the Treatment of Wounds and Fractures. } Up to this time, midwifery had been practised by untrained women and it can readily be seen what an advantage it was to have the science of obstetrics systematically taught as it was in both schools above mentioned.

During the six years while New York was occupied by British troops there was a cessation of college activity. The faculty was not a unit in its political beliefs and after the Dec¬ laration came dissensions. Three years after the war the college went on under its new name, ˆColumbia,® but with very poor success. A spurt was made again in 1792. In 1807 the New York University opened a medical college, but jealousy and strife prevented its success. Fi¬ nally, in 1811, a union of the two schools was accomplished under the name of the younger and thereafter the College of Physicians and Surgeons prospered and is to-day one of the leading schools in this country, though now again under the aegis of Columbia. Meantime under Bard's influence, the New York Hospital had been founded in 1768 and chartered in 1770. It was in their new building that the Provincial Congress used to meet during the second year of the Revolution ; but when the British arrived the hospital was turned into a barracks and Bard and Jones joined the Con¬ tinental armies. It was not until 1791 that the hospital was fully and finally equipped and began its career of usefulness.

The Revolutionary Period.— At the time of our Revolutionary War the science of military surgery was scarcely yet created and even with the Continental armies the barber-surgeon had a certain place, in which he was almost a menial, and above which he could scarcely raise himself. The English troops were better

equipped in this respect than were the Hessians, for instance, while

during the latter part of the war, especially when the French sent some of their best men to this country, our raw and untrained army surgeons came in contact with a better class of men and by whom they were, to some extent, inspired. Nearly all of the prominent medical men, save the Tory physi¬ cians of Massachusetts, entered the army or took public service, and in the Massachusetts Provincial Congress of 1775 there were 22 physicians. Both the colonial and general gov¬ ernments dealt very stingily with their medical departments and the professional equipments provided were almost meagre. The history of surgery in those days is mostly the history of a few prominent individuals who made it what it became and who deserve to be briefly men¬ tioned. The brothers Joseph and John Warren took a very prominent part during the earlier portion of the war. It was the former who started Paul Revere on his famous ride. He was elected president of the Provincial Congress and just before the battle of Bunker Hill was made major-general of the Continental forces, preferring this office rather than the office of physician-general which he had been offered. During the battle he showed a wonderful spirit of self-sacrifice and, declining his rank, acted as a private, and with musket in hand fought nobly, and was shot dead just at the conclusion of the battle. The younger brother, John War¬ ren, lived to achieve fame and reputation, and transmitted them to a posterity by whom they have been well preserved. He constituted a brilliant contrast to many of the regimental surgeons who had been too often appointed by political influence without regard to attainment. Some regiments were even organized without a surgeon and came into camp without the slightest provision for disease or injury. In 1776 Congress enacted that there should be one surgeon and five assistants to each 5,000 en¬ listed men. The former was to be paid $1.66 per day and the latter each $1 a day. The reader can imagine the care 5,000 men would receive from six physicians whose services were compensated at this rate. At that time such a thing as camp hygiene was almost unknown and a hospital corps and ambulance drill were quite lacking. But John Warren, then but 23 years old, proved extremely efficient in the organization and completion of, and accom¬ plished a great deal for the improvement of his department. The first surgeon-general of the Continental armies was Benjamin Church, of Boston, who was given the title of director- general and chief physician and was paid $4 per day. Church gave promise of effi¬ ciency in his department, but before long was detected in correspondence with the enemy, for which he was court-martialed, imprisoned for one year and allowed to leave the country and was then probably lost at sea. His place was taken by John Morgan of Philadelphia, already mentioned above. He had the politi¬ cians to fight and after a long and arduous struggle,

failing to satisfy them, he was dis¬ missed from the service, although he was finally acquitted of all blame. This was a time of unrest, excitement and suspicion and had Washington himself been a weaker man, he could scarcely have withstood the dissensions and jealousy with which he was continually

surrounded. Morgan was succeeded by Ship- pen, his old associate, who remained in office from 1777 to 1781. Under his guidance the medical department almost prospered and was at least conducted with dignity and great bene¬ fit to all concerned. Smallpox, which had been the scourge of the soldiers as well as the people in general, was kept down by the practice of inoculation, which had been generally accepted by nearly all men from Washington down.

From the Revolution to the Civil War. — The most conspicuous figure in the history of American medicine, which practically began with the conclusion of the Revolutionary War, was Benjamin Rush, of Philadelphia (1745- 1813), an exceedingly versatile, many-sided, er¬ ratic, obstinate, skeptical man, constant only to his religion which he considered to be a pro¬ fessional duty. He was hated by many of those to whom his methods most strongly appealed. He had rare didactic gifts, but his teachings were abused by his students and followers. As a young man he had spent three years in Europe and had taken his degree at Edinburgh. He had come especially under the influence of Cullen, whose views he had imbibed and later accepted in a modified form. He served two years in Congress, where he advocated and signed the Declaration of Independence. In the same year, 1776, he got his first army medi¬ cal experience. Rush seems to have been one of the few men who failed to come under the influence of Washington's personal magnetism, and he endeavored in some ways to belittle his commander-in-chief. After a rather ignomini¬ ous exposure he retired from service and took up his practice in Philadelphia. From that time on he became noted as author, teacher, prac¬ titioner and politician. He proposed a cabinet position whose incumbent should be called Secretary of State for Peace. He wrote exten¬ sively on many subjects, not all of which were medical. He finally exposed the weakness of Cullen's doctrine and fell rather into accord with that of his great rival, Brown. He taught that yellow fever was not contagious, but warmly advised purgation and excessive letting of blood in its treatment. At his death he was one of the few surviving signers of the Dec¬ laration of Independence. He made many con¬ tributions to science and it is said of him that since the death of Washington no man was so deeply and universally mourned. A list of his writings would include several pages of titles and would show the mental and physical activity, of this great man.

The earlier portion of the 19th century in the large cities of the country was characterized by unfortunate dissensions and jealousies which for many a year kept back medical progress. Prejudice against the study of anatomy was as strong as ever, and the difficulties surrounding dissection were often very great. The so-called ˆDoctor's Mobˆ occurred in 1788, when an ex¬ cited crowd tried to break up a dissection which was being carried on in the old New York Hos¬ pital, where the provincial legislature at one time held its sessions. The students and doc¬ tors took sanctuary, for the time being, in the jail, the militia were called out, seven rioters were killed and the doctors got no sympathy. Although this was before the 19th century actu¬ ally began, it nevertheless indicated the spirit

of the times. The great benefit of the Revolu¬ tion came from the presence of the educated and more cultured French and other foreign officers who came to this country and brought their books and wisdom with them.

The greatest figure in American surgery dur¬ ing the earlier part of the* previous century was Philip Syng Physick. He was born in 1768 and died in 1837. He came of a good family and had a good education. But it was not until 1789, when, in London, he had the good for¬ tune to be taken into the family of John Hunter, that he developed those qualities which helped to make him great in after life. Had he been willing to remain in. the old country he might have become Hunter's partner. He had the best that the old country could afford, spending some 11 years in study, all told, which was a remarkably good preparation for practice 100 years ago. He yielded to the claims of his native land and quickly built up a practice after his return to this country. He had much with which to contend, including indigestion, an absolute lack of humor, in fact a tempera¬ ment such as to make him unpopular, the only thing that saved him from this being his brains. In spite of all this he left behind him the reputation of being the Father of American Surgery. One of his most celebrated cases was that of Chief Justice Marshall, from whose bladder he removed an astonishing number of calculi. In 1805 he became professor of surgery in the University of Pennsylvania, which chair he held for 13 years. Though clumsy and un¬ couth in person he was singularly dexterous with his hands, and excelled in deftness with the knife, and with all forms of orthopedic apparatus. He gained great reputation in his treatment of fractures and dislocations, many

modifications of which he made which proved very advantageous. For some years he had promise of a successor in his nephew, John Dorsey, who, however, died before his uncle, and never lived out his promised career.

The next great figure in American surgery was Ephraim McDowell, who came from what was then called the <(Far West,® in Kentucky. When young he went to a classical seminary, where he got a smattering of Greek and Latin, but did not conclude to study his profession until he was 20. He began reading medicine in Danville, Ky., but was finally sent to Edin¬ burgh by his father. Flere he came under the influence of John Bell, whose teachings made him what he became. He returned in 1795 and decided that there was a rare opportunity in Kentucky for an educated physician, in which matter his foresight proved correct. In 1809, when he undertook the first and great historical (Ovariotomyˆ he was already known as an ac¬ complished and educated man, upon whose mind the teachings of John Bell had made a great impression. When Mrs. Crawford came to him, suffering from an ovarian cyst, he was ready to undertake her case despite the protests of others. The case terminated favorably, but it was not until he had performed a number of similar operations that he thought it best to publish anything on the subject. Even then his paper did not see the light as it should, and there was for a time a doubt in the minds of those who should have known better as to whether his report was really authentic and whether he should be credited with this path¬

finding expedient. He has been amply vindi¬ cated, however, and this fortunate experience of his paved the way for many operations but for whose effects thousands of lives would have been sacrificed.

The next great figure was Valentine Mott. He was born in 1785, and was of Quaker par¬ entage. He was a great classical student, and was well equipped for professional study when he began to study medicine. He then spent two years in Great Britain, especially in London, which was then rich in famous surgeons. Un¬ der Hunter, Cooper, Abernethy and Charles Bell he acquired that familiarity with surgical anatomy which was a great help both then and in later years. He returned to New York in 1809, and his personal traits as well as his thoroughness quickly brought him practice and made him known. He became the teacher of surgery in the Columbia School until he trans¬ ferred his activities to the new school which re¬ sulted from the union of Columbia and the College of Physicians and Surgeons, where he lectured for 56 years, inspiring in his classes constant enthusiasm and eagerness for work. The influence of his insistence upon the im¬

portance of anatomy still persists, and was bril¬ liantly demonstrated by his work upon the blood vessels. It is said that he tied more large vessels than any other surgeon living or dead. Perhaps his greatest achievement, at least the one that made him most famous, was ligature of the innominate artery. This first operation of its kind was not permanently successful, nevertheless it stamped the operator as a man of wonderful resource and daring. The first successful case belongs to another American surgeon, A. W. Smythe, of New Orleans, who tied at the same time, the carotid artery in the neck. Again he won great repute by removing the entire clavicle for a large tumor. In 1827 he tied for the first time, successfully, the com¬ mon iliac artery. The previous operation had been made by another brilliant American sur¬ geon, Gibson, of Baltimore, whose patient un¬ fortunately died of peritonitis. In 1835, quite broken in health, he made a tour of Europe, which had about it much of a triumph, inasmuch as he was everywhere received with eclat.

We have already recounted how John War¬ ren served in the Revolution both as a surgeon and patriot. His son, John Collins Warren, was born in 1778, and was reared in an atmos¬ phere of study and refinement. He was thor¬ oughly educated for his work, in which he took the greatest pride, and, like Mott, had the advantage of the teachings and friendship of the most distinguished foreign surgeons. Two events of importance, in which he was conspicu¬ ous, were the founding of the Massachusetts General Hospital, and the introduction into sur¬ gery of the then new anaesthetic, sulphuric ether, of which we shall have more to say be¬ low. He was a bohi operator and for his oper¬ ations on bones, especially the jaws, he became famous. He gathered a memorable collection of his personal cases in his (Surgical Observa¬ tions on Tumors,) which are to-day most in¬ structive. He was the founder of the large col¬ lection of specimens now known as the War¬ ren Museum, in Boston.

While Warren and Mott were making their great reputations in the East, it remained for Kentucky to produce still another even greater

than McDowell, in the person of Benjamin Winslow Dudley, born in 1785, who began life in an obscure way and who raised himself to eminence purely through his own attributes and strength of character. While quite young he made enough money, by a shrewd enter¬ prise, to take him abroad where he remained several years, returning a

polished and educated gentleman. Cooper and Abernethy in London, and Larrey in Paris, were men for whom he had much admiration and with whom he be¬ came well acquainted. When he returned he was 29 years of age, matured and devoted to his science. As a measure of his success it may be said that in his first 100 cases of cutting for stone in the bladder he lost not one; a state¬ ment that could be made by but few surgeons to-day. His early work in the surgical treat¬ ment of epilepsy directed attention to what could be done in this almost hopeless disease, and his treatment for hydrocele by excision of the sac is in common use to-day. For 20 years he was prominent in the Transylvania Medical School, in Lexington, Ky., which was later merged into the College of Louisville. Dudley wrote very little, but his personal influence was extraordinary, and he was without doubt the leading practitioner of the West. He died in

1.

In the interest of economy in space, it will be best, perhaps, to recount the various histor¬ ical achievements of American surgeons with¬ out going into further biographical details. In the department of surgery of the large blood vessels the American surgeons were almost pioneers. In 1803 Cogswell of Hartford tied the common carotid, making the first successful ligation of this vessel on record. In 1807 it was first successfully tied for secondary hem¬ orrhage by Twitchell of Keene, thus antedating Astley Cooper's famous case by eight months. In 1813 Post of New York first tied this artery for the cure of aneurism. In 1823 MacGill of Maryland first successfully tied both carotids simultaneously, the case being one of fungus tumor in both orbits. In 1867 Carnochan of New York first tied both carotids for the treat¬ ment of elephantiasis of the face and neck. Post, in 1817, first tied successfully the sub¬ clavian artery in its third portion, after it had failed in the hands of some of the great English surgeons. The same artery was first tied in its first portion by Rodgers of New York, an operation hitherto considered impossible, and which was never successfully repeated until 1892, by Halsted, of Baltimore. Mott's first ligation of three innominate artery has already been mentioned, an operation which made him famous all over the world. The internal iliac was first tied by Stevens in 1812, the external by Dorsey in 1811, and both internal and ex¬ ternal by Dennis in 1886, while Davidge first tied the femoral and gluteal for the cure of elephantiasis of the lower extremity. Digital compression for the relief of aneurism was first successfully practised by Knight of New Haven in 1848. The use of the elastic bandage in the treatment of varicose veins was first successfully adopted by Martin of Boston, who preceded Estmach in the use of this expedient for controlling blood supply during amputa¬

tions ; while Wyeth recently introduced long

pins for the same purpose in amputation of the shoulder and hip.

In fractures and treatment of injuries and diseases of bones and joints, Physick exceeded all men, without question. The so-called Amer¬ ican method, which is now so widely accepted, that is, the treatment of fractures by traction with a weight and pulley, was introduced by Daniel of Georgia. Van Ingen of Schenectady added to the method the elevation of the foot of the bed, and Buck increased its value by his coaptation splints. The present universal method is, therefore, a composite of all these, but is distinctly American. So is also the use of elastic traction by the aid of rubber bands. Barton, Bond, Hamilton and Reid, the latter of Rochester, all studied assiduously the mechanism of fractures and dislocations, and described the methods for their treatment and relief. The interdental splint for the treatment of fractured jaw was also of distinctly Ameri¬ can origin. Rodgers introduced metallic sutures in the treatment of fractures; Brainard of Chi¬ cago, the method of drilling fragments in de¬ layed union, while both Henry Smith of Phila¬ delphia and Nathan Smith of New Haven did very much to improve apparatus for the reten¬ tion of fragments in their proper place.

In the treatment of dislocations, especially in the matter of their reduction by manipula¬ tion, the world owes a great deal to Reid and Moore of Rochester, Bigelow of Boston and Gunn of Chicago, by whose efforts it was brought about that the ponderous machinery of the clinics was completely abandoned. In the removal of diseased bones Jamieson of Balti¬ more, in 1820, made the first resection of the upper jaw, while the upper and lower jaws were both simultaneously removed by Rodgers of New York. The first removal of the lower jaw was by Deaderick of Tennessee in 1810, while the clavicle was first successfully re¬ moved for necrosis by McCreary of Kentucky, in 1803, and for malignant disease by Mott in 1828, and the entire upper extremity, including the scapula and clavicle, by Crosby in 1836, and again the entire radius in the same year. Stone first removed a rib for drainage in 1862, and Mott the coccyx in 1832. Wood of New York had a famous case of entire removal of the lower jaw with almost complete reproduction of bone. Other operations of importance on bones were the first removal of a W® shaped piece of the hip, and also for the cure of bony anchylosis of the lower jaw. Nathan Smith of New Haven is entitled to the credit usually given Brodie for the trephining of in¬ flamed bones for the relief of inflammation and abscess.

In the matter of amputation Richard Bailey is to be credited with the first systematic am¬ putation of the shoulder joint, in 1762. Cros¬ by's case of the removal of the entire extremity has already been mentioned. The first success¬ ful amputation of the hip was made by Brash- ear of Kentucky in 1806. The patient was a slave boy belonging to the monks of Saint Joseph's College. The first operation of this kind ever done was in England by Kerr in 1774; while the first done for gunshot wound was by Larrey in 1793. American surgeons also made many improvements in genito-urinary surgery. The first successful plastic operation for exstro-

phy of the bladder was made by Pancost of Philadelphia in 1858. He and others preceded Wood and various English surgeons to whom the credit is Usually given. Parker of New York introduced cystotomy for the relief of chronic cystitis. The kidney was removed suc¬ cessfully by Wolcott and by Stoddard of Mil¬ waukee nine years before it was removed by Simon of Heidelberg, who has been credited with it. The first really successful method of operation for cleft palate was introduced by J. C. Warren of Boston, while Cheever, another Boston surgeon, was the first to remove the tonsils by external incision.

In abdominal surgery Americans have al¬ most led the world. Had it not been for Mc¬ Dowell's epoch-making case, in 1809, this branch of surgery would have been much re¬ tarded. Any one practising to-day can scarcely realize the moral courage and surgical daring required during that historical incident. Atlee of Philadelphia and Kimball of Lowell were the first to successfully remove large uterine fibroids, and it is claimed that Stevens of South Carolina, as early as 1763, successfully removed the entire uterus, an operation repeated by Briggs in 1830. The first vaginal operation for extra-uterine pregnancy was made by King of South Carolina in 1813, while the abdomen was first opened for this purpose by John Baird as early as 1759. Bobbs of Indianapolis was the first to attack the gall-bladder surgically, while Willard Parker first made clear the surgical treatment of peri-appendical, or as it was then called, perityphlitic abscess. The entire eluci¬ dation of the surgery and pathology of appen¬ dicitis is due to Americans, especially to Fitz and McBurney. The treatment of gunshot wounds of the abdomen by abdominal section was conceived, developed and perfected in America, especially by Bull and Parkes, while Senn, Murphy and others have made valuable contributions. The first four cases of pancreatic cyst were in the hands of American

surgeons. The surgery of the female genital organs owes more to the ingenuity and skill of Americans than to those of all other nationalities combined. Especially valuable in this direction were the labors of Sims and Emmet. Other procedures of distinctly American origin might be named without making the list too long; for instance, the invention of skin grafting by Dr. Frank Hamilton of Buffalo in 1854. The same pro¬ cedure was independently instituted by Rev- erdin of Geneva, Switzerland, each being inde¬ pendent of the other. Animal ligatures were first used by Physick in 1844. The innocent character of the metallic ligature, as well as its usefulness, was first demonstrated by Levert, of Mobile. The use of plaster-of-paris splints and jackets was greatly promoted by Sayre of New York, although he was not their originator. The first abdominal section for gunshot wound of the intestines was made by Kinloch of Charleston in 1881. The discoveries and in¬ ventions of American orthopedic surgeons have been models for the rest of the world.

The two great events in the history of American surgery in the 19th century were the introduction of anaesthesia and the antiseptic technique. Both stand to the credit of the Anglo-Saxon race, the former being an Ameri¬ can, the latter a British device. These two

measures together wrought a complete revolu¬ tion in the practice of surgery, and show that the Anglo-Saxons have done more for it than had been accomplished in the previous 18 cen¬ turies. By the latter the devastations of sepsis have been almost completely done away with ; and by the former the tortures of pain and the agonies of serious and protracted operations have been abolished.

Period of the Civil War. — The exigencies of the Civil War made demands upon the medi¬ cal resources of the regular and volunteer armies which at first could not be adequately met ; in this as well as other respects both sides were but meagrely equipped either with men or means. It was before the days of antiseptic surgery, bad methods still prevailed and the sacrifices then made to sepsis and to bad sanita¬ tion were fearful to contemplate. Wounds of large joints condemned the patient to amputa¬ tion above the injury, compound fractures were very generally, fatal, hospital gangrene and tet¬ anus were like spectres which stalked by night through the hospital camps. With characteristic readiness measures were rapidly adopted to minimize the slaughter from disease, and within a comparatively short time a well-equipped medical corps, backed by the government Sani¬ tary Commission, had brought order out of chaos, while the Red Cross Bureau had shown what it could do, especially under the guidance of Miss Clara Barton and other devoted women. Military surgery was but

emergency surgery practised under peculiar conditions, and as this fact became more greatly appreciated our wounded soldiers received better and better care. The outcome of this extended experience, in two or three different and indirect ways, was remarkable. It led to the foundation of the Army Medical Museum, in Washington, which has since grown to enormous proportions and now occupies the larger portion of a large building, wherein everything pertaining to so- called military surgery finds ample illustration. It led also to the building up of the wonderfully rich and complete library of the surgeon-gen¬ eral's office, with most extensive index cata¬ logues, including the Index Medicus, by which the entire medical literature of the world is catalogued and made available to all. And, thirdly, it led to the publication of the Medical and Surgical History of the War of the Re¬ bellion, in six enormous volumes, which far exceed in magnitude and value anything of the kind ever published. In their efforts to build up these three features the names of Otis, Huntington and Billings will ever stand pre¬ eminent.

From the Civil War to the Present Time.

— The Civil War developed very many excel¬ lent American surgeons, and within a decade after its close the good effects of their experi¬ ence were manifested in a great many of the civil hospitals throughout the country, partic¬ ularly in the practice of men who had located in the larger cities and towns. This, together with the development of asepsis, brought out a great deal of beneficial work in this country, in the practice of surgery. It also presented a period when specialists began to develop with greater precision than at any time in the previous history of medicine. This was espe¬ cially true in regard to gynecologists, and, what

at that time were termed, abdominal surgeons. The outcome has been the organization of several national surgical associations, which have included in their fellowship some of the ablest surgeons in the United States, thus en¬ abling America to keep thoroughly abreast of all that was being done elsewhere. There has been a progressive development of bacterio¬ logical, biological and pathological laboratories where much research work has been accom¬ plished, aiding very decidedly in the better understanding of surgical lesions, and result¬ ing in a great increase in the possible opera¬ tions to be performed for relief of the patient. Had the elder Gross, in his early experiments, in 1843,

known of or had a laboratory at his disposal, such as exists to-day, greater honors would have come to him in doing intestinal surgery.

Laboratory work, with increased surgical skill, has brought about the establishment of many hospitals in the larger and smaller cities, and it may safely be asserted that in the latter many strong surgeons in the World War just brought to an end will be found doing superior work. Many of these institutions will feel the good impulse of benevolence, excellent nursing and support from Red Cross organizations, while the larger hospitals in cities will become better endowed and less embarrassed in meet¬ ing their financial obligations.

It is very impressive to note how willingly communities have accepted going from their homes to the hospitals for treatment. Research work has brought out many surgical conditions associated with illnesses heretofore considered medical, such as lesions of the bones following typhoid fever, also tubercular conditions of the joints, syphilis, actinomycosis and other ob¬ scure lesions of internal organs, this advance being conducive to recoveries of cases formerly doomed to a long, painful sickness. Our lab¬ oratories have been of incalculable value in the preparation and standardization of absorbable ligatures; in the examination of the blood, and various secretions, and, especially, in the de¬ velopment of tetanus, antitoxin and other se¬ rums.

One great advance made by American sur¬ geons has been the surgical treatment of the thyroid gland; another the energetic manner in which they have attacked the gall-bladder, the stomach, the intestinal tract, the spleen, pancreas and the reproductive organs within the pelvis, for conditions considered quite hope¬ less in the past. Operations upon the appendix, and intestinal tract, with the ability to remove portions of the latter, yet allow normal func¬ tions to follow in a healthy manner seem won¬ derful. This same confident development of surgical procedure has eliminated much of the distress due to lesions of the kidneys, the ure¬ ters, the bladder and prostate gland. All of this work could not have been accomplished without our knowledge of pathological micro¬ organisms, and the employment of sterilization of the operating-room, the field of operation, the operator and dressings.

American surgeons had much to do with the evolution of this chapter in surgery. From the introduction of the carbolic spray, as taught by Mr. Lister, through all the various experi¬ ments in the use of antiseptics, and, finally, of

asepsis, much has been accomplished. The battle has been to control suppuration — i.e., the formation of pus — and when every precaution has been carried out, when no link in the chain of technic of procedure has been omitted, to the public at large the recovery of patients becomes very noticeable.

In successful work surgery made a stride that commanded the respect and attention of wealthy citizens with a benevolent trend of thought, so that hospitals and laboratories were endowed, and in America we were able to do what for some time seemed only to be known in Europe.

Through the study of germs, in the various laboratories, and their danger to operative sur¬ gery, and with the employment of absorbable ligatures, the science and art of surgery has been brought up to a very high plane of activity. The advances made in operations upon the spine, and the transferrence there of splinters from the long bones of the body, for the treatment of curvatures, has been one of the most decided advances in surgery. This is also to be observed in the immobilization of wounds, as illustrated in the fixation of fractures of the extremities. #

Very much credit is due the American sur¬ geon for discoveries and advances in local an¬ aesthesia in operative surgery, in hospital con¬ struction and for the persistent use of rubber gloves, particularly when operating in septic cases.

Some of the most brilliant advances made in surgery of the nerve trunks, in the removal of the Gasserian ganglia, for relief of neuralgia, has been accomplished by the American sur¬ geon. The investigation, study and progress made in the department of genito-urinary sur¬ gery is one of the most convincing arguments that surgery has become more of a fixed sci¬ ence than ever in its past history.

The genius of the American surgeon is well shown, in so many ways, by the invention of new instruments, as. well as the improvements made in those long in use, and in hospital fur¬ niture.

History of Anaesthetics.— The abolition of pain is in itself a matter of such vast interest and humanitarian importance that a brief his¬ tory of the introduction of anaesthetics should be much appreciated, especially in a rehearsal of American achievements. Strictly speaking, the term anaesthesia refers to the abolition of sensation of all kinds, whereas for the preven¬ tion of pain the term analgesia should be used. The distinction is an important one in certain cases; for instance

in the injection of cocaine solution into the spinal canal, it produces the latter without the former, whereas by the use of the anaesthetics now in use general anaesthe¬ sia is produced. By general consent the term is restricted to complete loss of consciousness produced by such drugs as ether, chloroform and nitrous oxide, and not to the intoxication produced by drugs like opium, hashish or the mandragora of the old writers. The substance known as sulphuric ether had been known by the mediaeval alchemists in 1540, and was spoken of as sweet oil of vitriol. It was not called ether until 1730. In the earlier years of the previous century it was often inhaled for ex¬ periment or diversion because of its peculiar

exhilarant effects. Nitrous oxide gas had been previously used for the same purpose, and even for the production of anaesthesia. It will be seen, then, that these two anaesthetics had been well known for some of their properties. Chlo¬ roform, on the other hand, was not discovered until 1831, and not recommended as an anaes¬ thetic until 1847. The honor of the introduction of ether into surgery is claimed for at least four men, Long, of Georgia; Jackson of Massa¬ chusetts, who were physicians; Wells, of Ver¬ mont, and Morton, of Massachusetts, who were both dentists. The first public demonstration of the value of ether as an anaesthetic agent, for the prevention of pain during surgical oper¬ ations, was made 16 Oct. 1846 by Morton, at the Massachusetts General Hospital, before a group of men including some of those already mentioned in this article, especially Warren and Bigelow. In all probability Long antedated this event by its use for a similar purpose in 1842, but in those days in this country the population was sparse, means of travel very slow and no public record of the event was ever made ; in fact no account of Long's work appeared until 1849. To Wells probably belongs the credit of first producing anaesthesia by nitrous oxide gas, when he took it himself in 1844. After his own happy experience with it he began its manufac¬ ture and introduction to the profession. In 1845 Wells visited Boston, and even called on his old partner, Morton, endeavoring there to introduce his new compound for surgical pur¬ poses, but met with no encouragement. In Hartford there stands to-day a monument erected by the public, bearing the following in¬ scription : ((Horace Wells, who discovered an¬ aesthesia, November 1844.® Morton had been a student in Wells' office, but not being a good chemist he consulted Jackson, whose office he later entered, and by whom he was advised to experiment with ether. Jackson told him, for instance, that the

students at Cambridge often inhaled it for amusement, and in 1846 he first gave it for the extraction of a tooth, the patient stating that he felt no pain. Then came efforts to patent the new anaesthetic which were not to the credit of either Jackson or Morton. Finally came the public demonstration above alluded to, when Morton adminis-tered his <(letheon,® and Warren removed without pain a tumor from the neck of a young man. At this time Morton endeavored to disguise the odor of the substance he was using so as to prevent its recognition, and it was not until the hospital staff declined to use any substance whose composition was kept secret that Morton revealed his discovery. During the ensuing years there took place a most active and acrid controversy between the partisans of the men most concerned in the introduction of ether into surgical work, as to the respective merits of their various champions.

A dispassionate judgment of the whole indi¬ cates that to Wells, doubtless, the credit of the introduction of nitrous oxide belongs. Long probably was the first to use ether in a surgical way, but was slow in making his results known. Morton finally became the promoter of the new agent, partly by virtue of his own energy and partly because of his acquaintances and sur¬ roundings. Chloroform, although discovered independently by Guthrie, of Sacketts Harbor,

N. Y., in 1831, was introduced into surgical work by Simpson, of Edinburgh, who advised it especially for the relief of the pangs of child¬ birth, and who was, in consequence, violently assailed by the Scottish clergy as interfering with the spirit of the primal curse which read, (<In sorrow shalt thou bring forth children.® Simpson, however, disarmed his opponents by a quotation, also from the Scriptures, to the effect that when God created Eve from one of Adam's ribs, he <(caused a deep sleep to fall upon Adam.® It will hence be seen that, at the date of this writing, it is almost 70 years since it became possible to make surgical opera¬ tions painlessly. What this means both for the surgeon and the patient will be appreciated, while what it has made possible can be easily realized by contrasting the resources of the sur¬ geon of to-day with those of the middle of the 19th century. See Vivisection — Its Influ¬ ence on Surgery.

Roswell Park,

Author of (Text Book of Surgery. y Albert Van der Veer,

Professor of Surgery, Albany Medical College,

1878-1915.

SURGICAL ASSOCIATION, American,

a society organized in 1880, the objects of which are to promote the improvement of the science and art of surgery. The active membership is limited to 125 Fellows and the honorary mem¬ bership to 25 Fellows. An applicant for Fel¬ lowship must be 30 years of age, a graduate of five years' standing from a recognized medical college and have an established reputation as practitioner, author or investigator. Meetings are held annually and an annual volume of T ransactions is published. Every third year the association joins with other associations constituting the 'Congress of American Physi¬ cians and Surgeons in a meeting held in Wash¬ ington, D. C.

SURICATE, or MEERKAT, a South

African civet (Suricata tridactyla) , which dif¬ fers from typical viverrines in several points, notably in having only four toes on each foot. It is dark brown and has dark transverse stripes on the rear of its back. The body and head reach a length of 12 or 13 inches, the tail six inches and the animal has a general resemblance to a small raccoon, but the tail is more cat¬ like. It lives in caves and rock-caverns or sometimes digs burrows. It is diurnal, lives mainly on roots and barks like a dog. 'Consult Martin, (Home Life on an Ostrich Farm* (New York 1903).

SURIGAO, soo-re-ga'd, Philippines, (1) Town, capital of the province of Surigao, Min¬ danao, on the extreme north coast of the island of Mindanao. This district was the site of the first Spanish mission in the Philippines ; in 1879 a series of earthquakes caused the ground in the neighborhood of the town to sink two feet and many of the government buildings were rendered uninhabitable for a time. The chief industries are the gathering and export of pearl shells and trepang and the placer mining of gold. Pop. 7,749.

(2) Province, island of Mindanao, occupy¬ ing the northeastern part of the island; area, 6,988 square miles. The principal dependent island is Dinagat, lying off the north coast;

it is mountainous, heavily wooded and has deposits of gold ; area, 387 square miles ; the sec¬ ond island in importance is Siargao (q.v.), 190

square miles. The mainland of the province is traversed by two mountain ranges, extend¬ ing from north to south, one near the east coast, the other forming the western boundary; spurs of these ranges extend in both directions. The central valley is drained by the Agusan River, one of the finest in the Philippines. Cotton, hemp, rice, sugar, tobacco, indigo, etc., are cul¬ tivated; the cocoanut, betel nut and betel pepper are grown for export. Gold is found in the mountains and in the sands of the mountain streams and is mined; the forests are valuable, and gums and resins are obtained in large quan¬ tities ; fishing is an important industry, and there is some weaving of native fabrics for home use. There are few roads, the communi¬ cation is by sea or by the rivers and lakes of the central valley. Civil government was es¬ tablished in the province in May 1901, but the jurisdiction of the provincial government does not extend to the non-Christian tribes. Pop.

115,112.

SURIGAO, Strait of, connecting the Sulu Sea with the Pacific, having Mindanao on the south and the islands of Leyte, Panaon, Bohol, Cebu, Negros and Samar on the north. It was the route taken by Magellan after crossing the Pacific. The San Bernardino Strait is now used more than Surigao during certain seasons, but Surigao is the more direct, deeper throughout and the more advantageous route for vessels bound for the southern Philippines.

SURINAM, soo-ri-nam'. See Guiana.

SURINAM TOAD, or PIPA TOAD, a

toad of the South American family Pipidaz; specifically Pipa americana. It is one of the largest and the most repulsive-looking of the toads and is noted for its extraordinary mode of developing the eggs and young. When the female is about to expel her eggs the male mounts upon her back and the eggs as they are extruded are squeezed upward between the back of the female and the belly of the male, where they stick to her skin and gradually sink into the spongy skin, each occupying a pit with a lid. Fertilization takes place by some process not well understood just before the extrusion of the ova. The eggs remain in the pits until they have reached a mature condition (although yet very small) and then escape into the water. Consult Gadow, (Amphibia and Reptiles) (New York 1901).

SURMULLET. See Mullet.

SURNAMES. A surname is a name added to a baptismal or Christian name which makes it more specific, and is generally a family designa¬ tion. It may be indicative of descent, habitat, craft, or may have originated in totemistic asso¬ ciations, clanship, personal peculiarities or from vulgar nicknames. A proper name, once given or adopted, beoomes in time a part of the in¬ dividuality. The giving of names is not neces¬ sarily proof of an advanced civilized condition. It may be considered coeval with and intimately connected with the gift of speech; the Adamic tradition of the origin of common names is a self-evident proposition when applied to pre- Adamic savagery. The primal family grew into the primal tribe, and proper names became nec¬

essary; the land and the gathering of men upon it necessitated proper designations for each, or the same name for both.

All proper names have, at first, a peculiarly appropriate meaning, which in time often be¬ comes obscured, and ultimately forgotten. Schlegel traced descriptive epithets in almost all Hindu names, and the older names among the Hebrews, Arabs, in fact all Oriental nations, are highly significant and grotesque; as, (<son of wool,® <(son of wealth,® <(son of the scythe,® <(young of dog,® <(prince of the dogs® among the Tcherkessians of Mount Caucasus. This is measurably true of names of Aryan origin, and noticeably those of Teutonic and Scandinavian lines. The North American native is usually named from some animal, for totemic reasons, and later earns another from some deed of dar¬ ing performed; and similar practices prevail in all savage tribes. In fact, the origin of heraldry may be looked for in totemic devices and sym¬ bols.

The study of proper names is useful in his¬ torical and literary researches — as important as numismatics, heraldry, superstitions, symbol¬ ism and tradition. The name of a man often retains the impress of his country, and some¬ times of the period in which he lived, and may thus furnish a clue to correct a date or vague notion, or to settle a disputed question in chro¬ nology, geography or genealogy; the conquer¬ ors of Andalusia, the Vandals, gave their name to that province, and it is hence not derived from Andalus, son of Japhet and grandson of Noah; the posterity of one man cannot, in rea¬ son, cover 30 degrees of longitude, in three generations, in a barbaric age.

In Rome, family or clan names were heredi¬ tary, but surnames remained individual, sanc¬ tioned by public consent, as Scipio Nasica, Piso Frugi, Lentulus Sura. In the republics of Greece, notably Athens and Sparta, men's names were significant of the power, valor, virtues or victories of the people, as Agesilaus, Charide- mus, Demagorus,

Demophilus, Demosthenes, Laodice. In fact it is common among all peo¬ ples to exaggerate the importance of the signifi¬ cance of names. Both Greeks and Romans augured well or ill from them. Grecian names are significant, either of religious feeling, the remembrance of great events, some happy omen, chance, friendship or gratitude. Daughters were named from their fathers more scrupu¬ lously than were the sons; Homer uses their names in this wise without exception, as Chry- seis, the daughter of Chryses; Briseis, the daughter of Briseus. The son's name was fre¬ quently an enlarged form of the father's, as it was deemed that polysyllabic names were more honorable than shorter ones, which were given to slaves; the Spartan Hegesander named his son Hegesandrides, and Hiero, tyrant of Syra¬ cuse, named his son Hieronymus. There are traces of a desire to adopt family names, among the Greeks, but it generally ended in a vague reference to the hero from whom the family sprung; these surnames were only adopted by those families who pretended to trace back to deities or fabulous periods of history.

The Scandinavians and largely the Germans had none but individual names; every family, as with the Greeks, showed a decided prefer¬ ence for certain names, and these were gener¬ ally transmitted from grandfather to grandson,

or from uncle to nephew, for some occult rea¬ son, while the daughter was only known by her father's name (as Alf-hide meaning literally the child of Alf'r). Others retained the root from which the head of the family derived his name, but varying the other syllables (thus, the three sons of the formidable Argrim retained the last syllable which signified rage). There were thus no family names among the Celts, strictly speaking. The songs of the Druids have perished with the names of the heroes they sang of ; but more fortunate were the heroes of Erin and Morven, for the ancient national songs still exist in Ireland and Scotland.

The need of surnames began to be felt. Many would naturally prove themselves ((dread- ful-in-the fight, M ˆHardy,® "Stern-of-look,® and the Northern nations soon adopted a method of adding the father's name to the son's; as Oscar son of Ossian, Oscar son of Caruth, Dermid son of Duthno, Dermid son of Diaran. The introduction of Christianity, which taught the equality of man, breaking up class distinctions, rapidly advanced the adoption of surnames by the use of new or

baptismal names — Biblical or saints' names, anything but pagan cogno¬ mens — and this caused endless confusion ; the new names were almost wholly derived from foreign languages, and as such had no local or personal significance.

The rise of feudal power was another source of change and confusion, as retainers or feoffees often bore the name of their overlord, whose title might arise from his office at court or his most valuable estate. The division of estates led to a new distribution of surnames among the heirs, taken from the inherited estates, only the oldest retaining the father's name by reason of the name being attached to the home-estate. The charters of the 10th and 11th centuries often recited the same individual under differ¬ ent names — sometimes because he had lost the manor which gave him title, or had come into possession of another which was more flatter¬ ing to his vanity. The law of primogeniture finally cleared away much confusion, the prop¬ erty becoming settled in tenure and the owner desiring to proclaim his patent of nobility; from that time a surname was rarely lost and was further confirmed by the granting of armorial bearings.

In heraldry we find many surnames derived from ((canting arms,® which clearly proceed from the arms ; as in Sweden, the family whose arms represented the head of an ox took the name Oxenstiern (like the well-known Front- de-Bcef) ; the Racines had originally placed in their coat-of-arms a rat and a swan (Rat- Cygne), but the writer of ˆAthalie® retained only the swan, as the rat offended his taste.

To England the Saxons brought their feudal institutions; immense properties were at¬ tached to the king and his Thanes, and they farmed them out to substantial tenants who again let them to subtenants for cultivation. William the Conqueror redistributed these lands as fiefs among his Norman warriors; Henry I, in 1100, changed the fief tenure into real or freehold property, but his concession produced no great increase of hereditary names. In 1160 Henry II enfranchised the land in order to counteract the ambitious barons; soon after his lime hereditary names became common in England,

It appears that surnames began to be adopted in England about 1000 a.d., coming mainly from Normandy. A few Saxons had surnames : (<Hwita Hatte was a keeper of bees in Hcethfelda, and Tate Hatte, his daughter, was the mother of Wulsige, the shooter,)} in the Cottonian manuscript shows a transition point. In the time of Edward the Confessor there were Saxon tenants in Suffolk : Leuric Hobbesune (Hobson), Suert Magno or Manni, Godric Poinc, Tedricus Pointel, Siuward Rufus (redhead) and Stigand Soror. In the Domes¬ day

Survey they were becoming more common : as Alwin Dodesune (Dodson), Walter Achet, Osmund Angevin, Roger Arundel, Walter Bee, William Bonvaslet; some of these being curious Norman blends of their own names with those of their Norman masters, as above in Arundel and Angevin. When King Magnus assumed Highland dress he became known as Berbeinn (Bareleg), still preserved, probably, in the Puritan “Barebones.®

The terminations ing , kin , son , in English names, were derived from the Norse ingr, kyn and sonr, the r being dropped. The Danish make the last sen. The diminutives: Friesian, ken, ke, ock, cock (a foolish fellow, hence the Scotch ˆgowk®) ; Norman-French et, ette, let, ot, otte, el; Old Norse, i, a, ki, ka, gi, ga, ungr, ingr and ling, became quite common additions to English names, which have since adhered.

The Gaelic Mac, Irish O’, the British Ap, the Norse ungar, the Friesian ingar and en, the Anglo-Saxon ing, the Norman Fits (probably from Flanders originally; many Irish families substituted Fitz for Mac in Norman times) are all ancient family prefixes. The ancient tribe of Waring or Wearing, the Vceringi or Veringun (originally from the Voeringif jord in Norway) formed the celebrated Varangian guard of the Byzantine emperors, which was afterward largely recruited from the North and especially from England.

In England, as of old in Schleswig, the vil¬ lage community formed the unit of English society. Each such township was still bounded by its mark of forest, mere or fen, which di¬ vided it from its nearest neighbors. In each lived a single clan, supposed to be of kindred blood and bearing a common name. Many family names are thus perpetuated in England; as the Bassingas at Bassingbourne in Cam¬ bridgeshire; at Bassingfield in Notts; at Bas- singthorpe and Bassingham in Lincolnshire ; and at Bassington in Northumberland. The Billings have left their stamp at Billing in Northampton; Billingford, in Norfolk; Billing- ham, in Durham; Billingley, in Yorkshire; and Billinghurst, in Sussex. Birmingham, Notting¬ ham, Wellington, Farington, Warrington and Wallingford are well-known names formed on the same analogy. In London alone occur the clan settlements at Kensington, Paddington, Notting-hill, Billingsgate, Islington, Newington, Kennington, Wapping and Teddington. There are altogether 1,400 names of this type in Eng¬ land.

Totemism consists in the belief that each family is literally descended from a particular animal or plant whose name it bears and mem¬ bers of the family formerly refused to pluck the plant or kill the animal after which they were named. The genealogies of the Anglo- Saxon

kings include such names as those of

the horse, the mare, the ash, the whale. In the ancient poem (Beowulf,) two of the characters bear the names of Wulf and Eofer (boar) ; the wolf and the raven were sacred animals. The boar was greatly reverenced and our Christmas boar's head is a survival of the old belief. The oak has left its traces in Oaking- ton, in Cambridge ; the birch, at Birchington, in Kent; the boar (eofer) in Evringham in Yorkshire; the hawk in Hawkinge in Kent; the horse, at Horsington, in Lincolnshire; the raven, at Ravingham, in Norfolk; the sun, at Sunning in Berks; and the serpent (wyrm) at Wormingford, Worminghall and Worming- ton in Essex, Bucks and Gloucestershire, re¬ spectively. Every one of these objects is a common and well-known totem among savage tribes and the inference that at some early period the Anglo-Saxons had been totemists is almost irresistible.

The suffix atte, as implying residence, if not possession, crept in, and thereby arose such names as Atte Bourne, Atte Brigg, Atte Hash, Atte Hay, Atte Kirkstile, Atte Lane, Atte May- dens, Atte Stile, Atte Well ; the modern names Atwater, Atwood and Atwell occur to us to¬ day. The de and atte were often dropped, hence arose names like Wood, Lane, Briggs. Many names that seem to defy all explanation are disguised beyond recognition ; as, who would expect to find Sevenoaks in Snooks ; Saint Olave's street in Tooley street; Saint Etheldreda in Tawdry; Douglas in Diggles; Wilburgham in Wilbraham ; Tuberville in Troublefield ; Longueville in Longfellow; Long- champs in Longshanks; Blondeville in Blom- field ; Adburgham in Abraham and Abram ; Renshaw in Wrencher and Wrinch; Wymond- ham in Wyndham. As Mr. Lower truly says: Corruptions which many family names have undergone tend to baffle alike the genealogical and etymological inquirer.® The name of Shakespeare has had at least 27 permutations in old documents; Goodwin, 17; Finnimore or Phillimore 59 and 34 of the latter surname.

When the country became settled under Ed¬ ward the Confessor and the Norseman, Saxon and Welshman lived together under a semblance of law and order, official names arose : as Lag- man (lawgiver), Fawcett (forseti, judge), Al¬ derman, Reeve, Sheriff, Tabberer, Chamberlain, Chancellor, Chaplain, Clerk, Deacon, Beadle, Latimer (Latinarius, an interpreter), Miles (miles, a soldier), Marshall, Sumner (a sum¬ moned as Chaucer's ((Sompnoure®) , Parker (a park-keeper),

Franklin (a freeholder), Botiler (butler). Trade names and craft names are of later origin ; but it is an open question whether some of the names popularly ascribed to occupa¬ tions will not bear different interpretation.

Because America is a country made up of all nations there exists in the United States a greater variety of names than anywhere else on the globe. Russian, Polish and middle European names seem particularly hard for the American to grasp, and, therefore, immi¬ grants, finding their long names a handicap, are apt to shorten them. Tolchinsky becomes Tolins, and Rawitzer is shortened to Rawser. There is also a tendency to translate names. Herr Vogel becomes Mr. Bird, and M.ons. Pantoflen is Mr. Slipper. One is amazed at the com¬ binations disclosed in any large city directory, as in the firms of Au and Magenheimer,

Stretch and Shrink, and the famous Call and Tuttle, Preserved Hoskins, Singular Onions Gallyhawk and Esa Hogg must each and all bear grudges against those who inflicted such names on them. It is a fact that all three of these names have appeared in city directories.

Consult Lower, (Patronymica Britannica) ; Bardsley's (English Surnames } ; Wagner's (Names and their Meaning) ; Mordacque's (History of Names> ; Barber's (British Family Names) ; Grant Allen's (Anglo-Saxon Britain *; and (Origines Genealorgicae,* by Stacey Grimaldi.

SURPLICE, a garment of white linen, sometimes adorned with lace, worn over the cassock by priests, choristers and other attend¬ ants in the chancel during the divine service and by ministers in the solemn administration of the sacraments. It is usually a loose, flow¬ ing garment, varying in length : in the 12th century it reached to the ankles and this length was prescribed by the Council of Basel (15th century) ; in the Anglican Church the surplice reaches almost to the feet. In the Roman Catholic Church its length is much less, never extending below the knees, while in the Italian fashion it does not reach nearly so far and is known as the cotta. See Costume, Ecclesi¬ astical.

SURRA, a disease of domestic cattle in the Philippines, due to the presence in the system of a protozoan parasite.

SURRENDER, in law , the restoring or giving up, as an estate for years, to the re¬ versioner or remainderman, by which act the surrendered estate is merged in the other; also, the written instrument evidencing such surrender. It should be distinguished from a release, which is an

alienation of the e'state by the reversioner or remainderman to the tenant. It should also be distinguished from a renunci- action, which is the refusal to take an estate to which one is entitled by law. A surrender by agreement must be in writing, but it may take place by operation of law, as where a landlord accepts another person as tenant.

SURREY, sur'T, Henry Howard, English poet: b. about 1517; d. 21 Jan. 1547. He was the grandson of the Earl of Surrey who was the victor at Flodden, and who, as a reward for his services, was created Duke of Norfolk. He succeeded to the courtesy title of Earl of Sur¬ rey when his father became third Duke of Norfolk of the Howard house in 1524. Surrey became companion to the Duke of Richmond, a natural son of Henry VIII, and in 1533 trav¬ eled with him to the French court. He took part in the suppression of the Pilgrimage of Grace in 1536 and in the following year was imprisoned for striking a courtier who had repeated a rumor of his sympathy with the rebels. He served in the army on the Conti¬ nent and in 1545 was appointed commander of Boulogne, but he was shortly afterward de¬ feated by the French and superseded in his command. Shortly before Henry's death Sur¬ rey and his father were suspected of aiming at the throne and were arrested and lodged in the Tower and Surrey was tried, condemned and executed. In 1538 there was published his translation of the second and fourth books of Virgil's ˆneid,* the first attempt at blank verse in English. He also wrote many sonnets

after the Italian model. There is an edition of his works in the (Arber Reprints. *Consult Hales, J. W., (Folia Literaria* (London 1893).

SURREY, a kind of light carriage having two seats in a box mounted on side bars, four wheels and sometimes a top.

SURROGATE, formerly a deputy, a sub¬ stitute, a delegate, a person appointed to act for another. In the United States, an officer who presides over the probate of wills and testa¬ ments and the settlement of estates. In Eng¬ lish law, one appointed by a bishop or his chancellor or by an ecclesiastical judge, to issue licenses for marriages without bans and to deal with probate and kindred matters.

SURROGATES' COURTS. See Court.

SURTEES, ser'tez, Robert, English au¬ thor: b. Durham, 1 April 1779;

d. 11 Feb. 1834. He was graduated from Oxford in 1803 and studied law at the Middle Temple till he in¬ herited an estate near Bishop Auckland in 1802. Thenceforth he devoted himself to preparing a ˆHistory and Antiquities of the County Pala¬ tine of Durham *(18KL23), to the fourth vol¬ ume (1840) of which, completed by Raine, a (Memoir* of Surtees is prefixed. The Surtees Society, founded in 1834 for editing unpub¬ lished manuscripts chiefly relating to the north¬ ern counties of England, published its 73d vol¬ ume in 1884. Consult Taylor, G., (Life of Surtees* (Durham 1852).

SURVEYING, the science of determining accurately the relative locations of points and lines on the earth's surface and of recording the same on maps ; it includes also the reverse operation of discovering and locating on the ground points and lines depicted on a surveyor's map.

Two principal kinds of surveying are recog¬ nized, plane and geodetic. In plane surveying the area which is the subject of survey is re¬ garded as a plane surface, the curvature of the earth being disregarded. In geodetic survey¬ ing, which deals with areas of large extent, the curvature of the earth is considered and given its proper circumstance.

Plane surveying consists essentially of the lineal measurement of lines and the spacial measurement of angles, either vertical or hori¬ zontal ; together with the subsequent calcula¬ tion of the content of areas to which such lines and angles appertain. It includes as classes (1) land surveys — the defining of the bound¬ aries of land areas; (2) topographical surveys — the determining of variations in altitude and the denotation of physical characteristics ; as, for instance, roads, rivers, forests, swamps, etc.; (3) construction surveys — the staking out of bridges, buildings, sewers, railways, etc. As the earliest records of man refer to skilful measurements and calculations, it is impossible to assign the birth of the science of surveying to any particular year or even century. Foreip states that, according to the Chaldaeans, 4,000 camel steps make one mile, 66ˆ miles one degree, from which the circumference of the earth is 24,000 miles. A papyrus in the British Museum, written 1700 b.c., gives rules for cal¬ culating the areas of triangles, trapezoids and circles and the works of Hero of Alexandria (285 b.c.) mention mine surveying and the relatively crude instruments used at that time.

In 1617 Snellius, in Holland, made one of the first attempts to determine accurately the earth's radius. Picard, in 1667, adapted cross-wires to a telescope. In 1735 the French Academy of Scientists

sent out two surveying expedi¬ tions, one to Peru and one to Lapland. The latter resulted in the first demonstration that the earth is not a sphere but an oblate spheroid. The invention of the vernier by Venierus in 1631 and of the transit by Roemer in 1672 gave an impetus to the science of surveying, the final results of which are yet to be achieved.

Chain Surveying.— A great variety of work can be done by the use of a chain or tape alone, as, with the measuring of straight lines, the areas of triangles, rectangles and even poly¬ gons can be ascertained by dividing the polygon into triangles which are then measured. Angles can be ascertained by laying off equal lengths, b, from the vertex, A, on the two lines, then measuring the third side, a (base of isosceles), and using either of the following formulae:

_ , . a A a

Tan \ A = — - or Sine ur— FT.

V 462 —a2 2 2b

The angle may then be looked up in a table of sines and tangents. The measurement of inaccessible lines can also be accomplished with the use of only an accurate tape line, as shown in the accompanying Fig. 1. Assume CB to represent the distance to be determined. Lay out from C a perpendicular line (CD) to the point D, from which also the point B is visible; and from D lay DC off DC perpendic¬ ular to DB, cutting the extension of the line BC at E. There are then the two similar triangles whose corresponding sides are pro¬ portional ; and we have the proportion — DC:CB::CE:DC — from which we find CB= DC2

It remains only to measure DC and CE

CE

with the closest accuracy possible and to substi¬ tute their values in the proportion. The laying of the perpendicular is a simple application of the pons asinorum of the geometry — <(The square of the hypothenuse of a right-angled triangle is equal to the sum of the squares on the other two sides.® In surveying practice this becomes the striking of two curves from the points X and Y respectively, these two points being eight feet apart. The radius of the curve from X is to be six feet, and that from Y 10 feet. The point Z where these curves intersect will be in a perpendicular to XY from the point X, the angle YXZ being a right angle. But such measurements are not comparable with work done with the aid of the transit.

Compass Surveying. — The use of the azi¬ muth compass is considerably restricted for several reasons, namely : The magnetic needle points north at but few places on the earth, the disagreement varying from 1° to 50 u from true north. This disagreement, or the angle between true north and the magnetic needle, is called the (<declination of the needle.® The declination does not remain constant, however, there being diurnal, annual and local variations from the normal declination which introduce unknown errors into the compass survey. The diurnal variation is usually not more than 6 minutes but may reach 20 minutes. It is usually zero at 11 o'clock a.m.; the annual,

1 to 2 minutes, and the local variation amounts to as much as several degrees in some localities, owing to deposits of iron ore near the surface. Errors from this source may be avoided by back sights at each station. There are also secular variations in the declination, so that when retracing the lines of a compass survey made several years previously, the surveyor must use the same declination used in the original survey. In making a compass survey it is necessary to determine the declina¬ tion of the needle by an observation on a polar star, or on the sun with the aid of a solar attachment (see below). The stellar observation is usually made on Polaris .which, however, is not precisely at the north pole. It is necessary, therefore, to make the observation exactly at the time of upper or lower culmina¬ tion, or at eastern or western elongation; a correction being required in the later case. Tables have been published, however, by the United States Land Office for taking the obser¬ vations on Polaris at any convenient time.

where surveyed correctly — hence the necessity for correction lines every 24 miles as noted above. The distances between the meridians at certain latitudes are in proportion to the cosines of the respective latitudes concerned.

There are several methods of surveying north and south boundary lines of townships and sections so as to make them conform to a parallel of latitude, but the secant method is the one commonly employed (Fig. 4). Briefly stated it is as follows : A straight line, for con¬ venience called a secant, is run upon a certain course, precisely calculated (nearly due west), and dependent upon the latitude, and from such a point as will cause it to intersect the curve of the parallel of latitude . (boundary line) at the mile and five mile points. From this

secant line offsets, as previously calculated, are measured north or south as required at the mile and half mile points, to points in the curve or boundary line where monuments are placed. Convenient tables are published by the United States Land Office which show the azimuths

COURSE	Bearing	Distance
1—2 .	n48° 17'e	400.00
2—3 .	s30° 42'e	150.00
3—4 .	s20° 5'w	140.00
4—5 .	s72° 53'e	75.00
5—6 .	s80° 39'w	300.00
6 — 1 .	n57° 39'w	121.66

North

Lat.

South

Lat.

East

Dep.

266.18

128.98

131.49

22.07

48.74

298.58

76.58

71.68

65.10

West

Dep.

L. O.

D. O.

65.10

000.00

331.28

298.58

48.07

202.30

375.16

70.81

327.09

269.01

48.74

398.71

102.76

000.00

102.76

1. M. D.

N. Area

S. Area

298.58

79476.02

673.74

702.25

725.86

501.53

102.76

6689.68

86899.00

92339.00

16019.73

24444.57

86165.70

219702.30

86165.70

2)

133536.60

43560.)

66768.30

1.53 A.

Government Land Surveying. — The first public surveys in the United States were made in the State of Ohio under an ordinance of the Continental Congress passed 20 May 1785. This ordinance was slightly modified by an act of Congress, passed 18 May 1796. This act, which is still in force, provided that all public land, except certain private land grants shall be divided into townships six miles square, and that sections shall be subdivided into one-fourth sections one-half mile square. The act further provides that all lines of pub¬ lic land surveys shall be run on either true meridians or true parallels of latitudeˆ The method of surveying townships and sections is as follows: First — In each State, or convenient group of States, there is established a principle (true) meridian, and, at right angles thereto, a base line conforming to a true parallel of latitude. Second — Standard parallels or cor¬ rection lines, also conforming to parallels of latitude, are established at intervals of 24 miles north and south of the base line. Third — Guide meridians conforming to true meridians are initiated at intervals of 24 miles along all standard parallels, and run due north to the intersection of the next standard parallel. Fourth — The rectangles thus formed by the guide meridians and standard parallels are sub¬ divided into 16 townships. As meridians con¬ verge toward the north pole the north boundary lines of townships are less than six miles long

and offsets required at any latitude in the United States.

Traversing. — This is a method of survey¬ ing a polygon by surveying its perimeter only, as distinguished from the method of cutting the polygon up into triangles (Fig. 5). In a

traverse survey the transit is usually oriented at each station, thus referring all bearings to a magnetic meridian. In mapping such surveys the <(north point® shows the magnetic north at the date of the survey and a skeleton arrow is drawn through it showing the needle's declina¬ tion at -that time and place from true north. It

is not necessary to take convergence of the meridians into account except in geodetic work. The method of procedure is as follows: The transit is set up at station No. 1 and the bear¬ ing and distance of the first course determined. The transit is then removed to station No. 2. With vernier ((A® still at the previous reading, the lower spindle is undamped and a plumbed rod bisected at station No. 1, with the telescope inverted. The telescope is then revolved to its normal position, undamped, and the bearing and distance to station No. 3 ascertained. The transit is then removed to station No. 3 and the operations repeated. To illustrate this import¬ ant branch of surveying the tabling of a tra¬ verse and the rules governing the same are given in the table on the preceding page.

In the foregoing ((tabling® the latitude and departure of each course is found by multiply¬ ing the distance by the cosine and sine of the angle expressed by the bearing. The latitude

of making a topographical survey. First, by the use of a tape, level and transit. Second, by the use of the plane-table. Third, by the use of a transit and stadia rod. The last-named method alone will be discussed here, it being the method usually adopted, on account of its celerity and low cost. Stadia wires are two horizontal wires placed in an adjustable ring so that they appear at equal distances above and below the horizontal cross-wire when look¬ ing through the telescope.

The theory of stadia measurements is based on the two following equations :

1. i : o : : fi : fa

1 1 1

2 _ + _ = _

fi fa f

in which (<i® is the height of image or distance between the stadia wires, <(o® the height of object or the stadia reading on the rod, <(fi® the

and departure ordinates are self-explanatory. The single meridian distances are the de¬ partures of the respective stations from the most westerly station. The double meridian distances of the respective courses are equal to the sum of the single meridian distances of the stations at each end of the respective courses. Each North and South area is equal to the product of the latitude of a course into its corresponding double meridian distance. The area of any polygon is equal to one-half the difference between the sum of the North and South areas. When the course and distance of any side of any polygon is lacking it is found as follows : Ascertain the difference between the north and south latitudes and the difference between the east and west departures. Divide the difference in departures by the difference in latitudes for the tangent of the bearing. Divide the difference in departures by the sine of the bearing found, for the distance.

Topographical Surveying. — In order to facilitate the selection of a route for a railroad, to properly locate an irrigation reservoir or dam for power purposes, or to correctly make a geological survey of a large tract it is generally necessary to make a topographical survey of the area under consideration. From the field notes of the survey a map is made showing the surface elevations with considerable particu¬ larity by a system of contour lines at stated differences in level, and also showing all im¬ portant objects, such as buildings, roads, canals, fences, streams, etc. There are several methods

distance from the lens, to the image, <(f2® the distance from lens to the object and <(f® the focal length of the lens. From the above equa¬ tions and other considerations it can be shown that when the rod is held vertical at various points in the line of sight, the rod readings will be proportional to the respective distances from the rod to a point at a distance <(f® in front of the lens of the telescope. It can also be shown that the distance from the stadia rod to the centre of the transit is equal to the sum of three factors, namely, the rod reading, the dis¬ tance <(f,® and the distance from the lens to the centre of the transit, <(c.® But this is true only for horizontal sights, for when the rod is held upon an elevation, as a hill, then ((f2® becomes the slope distance and, moreover, the stadia wires will intercept a length on the rod greater than the slope distance. Therefore, if the stadia wires be adjusted so that they will intercept a space of one foot on the rod at a horizontal distance equal to c + f + 100 feet from the centre of the transit, then the true horizontal

distance to any point above or below the hori¬ zontal line will be found by the following equation :

1. D = 100 r cos2v + (c + f) cos v.

In which

D = true distance horizontally, v = vertical angle. _ c = centre of transit to object lens, f = focal length of lens.

The height is found by multiplying the hori¬ zontal distance by the sine of the vertical angle. Tables are published containing the factors for the various vertical angles.

In topographical field work where the area to be surveyed is considerable it is usual to first lay out a triangulation net work, all measurements being made with a tape or by triangulation from an accurately measured base line and the stadia measurements taken from the triangulation stations. In work of less magnitude it is not necessary to lay out a sys¬ tem of triangles, but all measurements from station to station are carefully made and checked by cross-readings. The location of objects is quickly and accurately accomplished by sights from two different points of the measured line. In making a map of a topo¬ graphical survey there are several methods em¬ ployed. One requires the use of a T-square and brass protractor, another and a better method is by the use of a protractor sheet larger than the sheet upon which the drawing is to be made. After all distances are laid off and the heights indicated at the various points, contour lines are drawn in by.proportioning the distance between points with reference to heights. Sometimes the contour lines are drawn in pencil to be afterward erased and the <(hatchure® method of representing topography employed.

Mines Surveying. — The chief purposes of an underground survey are to ascertain the amount of ore ((in sight,® to find the (<pitch® and position of the ((pay chute® with respect to the shaft and levels, to find the <(dip® of the vein and also to ascertain and lay out the direc¬ tion of connections commonly called <(ho lings.® Moreover the laws of some States and countries require plans of the underground workings to be kept on file. Ventilation being one of the serious problems in mining — especially coal mining — it is generally necessary to make passageways or ftholings® connecting the vari¬

ous drifts and levels in such a way as to facili¬ tate the circulation of fresh air throughout the mine. In order to make these connections a careful transit survey is necessary, the compass needle being unreliable in the presence of pipes, rails, ore cars, etc. While mine surveying does not call for the precision of a geodetic survey, casks arise requiring great skill and ingenuity. One of the chief difficulties is to transfer the bearing or azimuth of a surface line to the lower workings. This is especially difficult if the survey has to be carried down a deep ver¬ tical or inclined shaft. In vertical shafts heavy plumb-bobs suspended in pails of water or mo¬ lasses at the bottom of the shaft by means of wires reaching to the surface have been suc¬ cessfully used. A transit with a secondary telescope, so attached to the extended axis of the primary telescope that it may be sighted vertically downward, is also used for this pur¬ pose. In underground work it is necessary to note both vertical and horizontal angles and to make tape measurements on the slope or level as the circumstances may permit. Illuminated plumb-lines are used for fore and back sights and it is also necessary to hold a candle so as to illuminate the telescope cross-wires. Per¬ manent pegs for future use are usually placed in the roof instead of in the floor of a drift and even then their position must be often checked for ground moves considerably in some mines.

Geodesy. — This branch of surveying has for its object the exact location of points and

lines with reference to the true form of the earth. In most geodetic work the earth is as¬ sumed to be an oblate spheroid, all measured angles and distances being reduced to spheroi¬ dal angles and distances. The United States Coast and Geodetic Survey had adopted the ((Clarks spheroid of 1866.® The foundation of a geodetic survey is a base line. This is most carefully measured with specially constructed bars of invar steel (q.v.) encased in wood, called a (<Base line apparatus.® Base lines can be measured with steel tapes with an accuracy of one in 1,000,000 under favorable circum¬ stances. These tapes have a screw adjustment for temperature as shown by a thermometer in the handle and there is also a helical spring attachment for regulating exactly the pull used in stretching the tape. Two tapes are used in each measurement and, in case of disagreement are compared with a third and fourth tape. An accuracy of one in 300,000 is generally accepted as' satisfactory. With a base line as a nucleus, a system of triangles is laid out over the sur¬ rounding country, additional base lines being measured from time to time to serve as a check upon the work. In a primary triangulation the sides of the triangles are very long — 20 to 100 miles. The first series of

triangles laid from the base line are as nearly equilateral as they can be made. This conduces to accuracy in the larger triangles. Within the primary tri¬ angles secondary and tertiary triangles are laid out, the lines of which are from 1 to 20 miles in length. Angles are measured with specially constructed transits, average results of several readings by the (<continuous reading® method being necessary. The unknown sides and an¬ gles of the spheroidal triangles are calculated and, when possible, the angles are checked by actual observation. Vertical angles are also read at each station and corrected for refrac¬ tion and curvature of the earth. The permis¬ sible error in a primary triangulation by the United States Coast and Geodetic Survey is one-fourth inch per mile or one in about 250,000; the permissible error in the measure¬ ment of an angle is three-tenths of a second and the closing error must not exceed five sec¬ onds, or one in about 260,000. As it is impos¬ sible to measure angles with absolute accuracy it is necessary to adjust the angular measure¬ ment by a system of averaging errors. In de¬ termining the azimuth of any geodetic line the convergence of the meridians has also to be taken into account.

Hydrographic Surveying. — This includes surveys for determining the depths of water in rivers, bays and harbors for purposes of navi¬ gation; the determination of velocity and di¬ rection of currents; the location of hidden rocks or shoals and buoys, lights, etc. ; and the determination of the amount of silt or sedi¬ ment carried by streams and deposited in bays. Permanent bench-marks and stations are gen¬ erally made on shore, and the points at which soundings are taken located by triangulation. There are several methods of locating sounding points. First, an observer with a transit is sta¬ tioned at each end of a base line. At the in¬ stant the man on the water makes a sounding he signals the two transitmen to take their ob¬ servations for azimuth. Second, by the <(three point problem.® That is, by reading from the

boat two angles to three points on shore whose relative positions are known. Of course, sex¬ tants only can be used for measuring angles from the boat.

Soundings are taken in feet or fathoms, the mean water level being taken as the datum plane. For tide waters the average sea-level is ascertained by means of a tide-rgauge. In some cases automatic tide-gauges are kept in oper¬ ation for one or more years to determine an

average sea-level.

The velocity of water currents in large streams is ascertained by means of a current metre, several styles being in use. The flow of the water in small streams is best determined by means of a weir.

Photographic Surveying.— The use of the

camera in surveying is comparatively recent and, though its use is restricted in many ways, it has come into quite general use. It may be called a successful rival to the plane-table. Photo-surveying has been used with success in Italy, India, France, United States and Canada. In the latter country it has supplanted the plane-table almost entirely.

The advantages of a photo-transit are that with it more rapid and cheaper work can be done than by any other means. The results, however, are not as satisfactory as with the plane-table. The photo-topographer must have a thorough knowledge of perspective drawing, descriptive geometry and photography. The in¬ strument used consists of a compass or a hori¬ zontal, graduated plate with a vernier, to which is attached a camera having a sensitive level and a means of very accurately measuring the focal length at the time each view is taken. If a box camera having a universal lens is used this latter requirement is not necessary. There is also attached to the top or side of the camera a telescope having stadia wires and a vertical circle. Some styles have a scale so placed in the box that it is photographed on the plate when the view is taken. In any case four pro¬ jecting needles or two cross-wires are so placed in the box that they will indicate the horizon and line of sight in the developed negative. The stadia rod is also photographed as a part of the record. The topographical map is drawn in accordance with the principles of perspective drawing and descriptive geometry, from meas¬ urements taken from the photograph, the com¬ pass bearing and stadia measurements being taken into account.

Plane-table Surveying. — A plane-table con¬ sists essentially of a drawing board mounted upon a tripod together with an alidade, an ali¬ dade being a graduated ruler carrying a tele¬ scope. (Fig. 3). A graduated vertical circle for measuring vertical angles is attached to the telescope, and stadia wires for measuring dis¬ tances are often inserted in it. In operation, the drawing board is covered with a sheet of drawing paper and the alidade telescope sighted consecutively to the various objects which are to be represented in the drawing, pencil lines being drawn upon the paper along the edge of the ruler at each sighting. The plane-table is then set up over another station whose

relative position has been fixed by survey with respect to the first station, and sights taken to all the points sighted from the first station. The pen¬ cil lines will intersect at the points which repre¬

sent the respective objects. Stadia readings are often taken with the alidade telescope, the true elevation and horizontal distances being taken from a slide rule constructed for that purpose. The plane-table is much used by the United States 'Coast Survey and the United States Geological Survey, as more topographical work can be done in less time by its use than by any other means except photo-topography. Errors in azimuth are impossible and more complete ˆ work can be done by making the drawing in the field than by plotting from field notes in the office.

Railroad Surveying. — Railroad surveys are either preliminary, for the study of the terrain, or for the purpose of actual location. A pre¬ liminary survey is often nothing more than a topographical survey of a comparatively wide strip of country through which it is expected to run the line, a paper location being made in the office and the location survey of the paper location afterward made upon the ground. While a topographical survey gives little or no information regarding cuts and fills it is of great value in deciding upon the most advan¬ tageous location.

Briefly stated a railroad location survey con¬ sists of a survey of curves, the tangents joining them and the grades. Tangents and curves are laid out with a transit, the grades and cross- sections being worked out with a level. From the cross-section field notes the cubic yards of earth or rock in the cuts and the volume of the fills is computed in the office. The grade line is so located that the material taken from cuts will furnish enough material to make the fills. All straight portions of a railroad are called ((tangents,® and the curves are surveyed as the sides of an inscribed polygon of equal sides, each side being 100 feet. (Fig. 6). The ((degree of curve,® D, is the angle at the centre

(of the circumscribed circle) subtended by a chord of 100 feet. The (<length of curve,® L, is the sum of the sides of the inscribed poly¬ gon. The ((central angle,® Ai is the angle at the centre included between the radii which pass through the tangent points. It is equal to the external angle of the polygon, that is, the de¬ flection angle of the tangents. The (<tangent distance,® T, is the distance from the vertex to

either tangent point. The conditions are such that in any simple railroad curve :

50 C

1. Sin 7-2 D = — 4. Sin Vad— - sin 72 D

R 100

1. T= R tan 1/2 A 5- R=Tcot7*A

A

1. L=100 -

D

By means of the above and other formulae all the elements of a railroad curve can be com¬ puted. Where tracks are to be laid especially for trains of certain speed it is the practice to lay out compound curves approaching closely the parabola, in order to make a more gradual transition from tangent to curve. When passenger and freight trains run upon separate parallel lines the outer rail of the passenger line is made higher than the outer rail of the freight line, to better counter the higher centrifugal force at the greater speed. There are several methods of surveying a railroad curve: by tan¬ gent offsets, by ordinates from a long chord, by middle ordinates, by offsets from chords produced and by deflection angles. Circum¬ stances determine the method to be used. Tables are published giving the formulae and other information needed by the railroad surveyor.

Leveling. — Ordinary leveling is usually done with either a “Dumpy® or a “Y® level, the latter being favored by American engineers. The superiority of the “Y® level is due to its construction, which permits the telescope to be reversed in the Y’s. Some levels have stadia wires inserted for reading distances and in some cases these are so placed that they can be thrown out of focus by revolving the eye piece, thus making it impossible to make an error by reading a stadia wire instead of the central cross-wire. In order to increase the clearness and sharpness of vision, levels are often rendered “inverting® by omitting one lens. Ordinary level rods are made to telescope — that is, lengthen or shorten — and are usually graduated into feet, tenths and hundredths of feet, but they can be read to thousandths of a foot by the aid of a vernier attached to the target. In precise leveling three

methods are practised by the United States government, de¬ pending upon the instruments used. The United States engineers employ the “Kern® level and a “speaking® rod, the United States Coast and Geodetic Survey employs a peculiar instrument called a Geodesic level, which re¬ quires lengthy and expensive computations. The United States Geological Survey employs a modification of the ordinary Y level and either “speaking® or target rods. In precise leveling the fore and back sights must be taken at the same distance, otherwise a correction for curvature of the earth must be applied. One method of checking a line of levels is to level back over the same line of pegs. Another and a better check method is to employ two rods and two rodmen with one levelman, two inde¬ pendent lines of turning points being run. Pre¬ cise level rods are usually non-telescopic, that is, made in one piece, and the wood is heated and then paraffined. Graduations are some¬ times on strips of metal countersunk into the

wood. The limit of permissible error of the United States Coast and Geodetic Survey is .02 X -\/ distance in miles, the product expressed in feet.

Solar Attachment. — This is an instrument which may be attached to a compass or tran" sit to aid in determining the meridian, latitude and time by observations made on the sun. There are various forms manufactured, the Burt and the Smith being those most exten¬ sively in use. The solar is usually secured to the transit telescope and it is used at any time of day, the early morning, late evening and noon hours being avoided for reasons too lengthy to be explained here.

In order to determine the true meridian from the sun it is necessary to ascertain the declination of the sun at the time of observa¬ tion. A solar ephemeris or nautical almanac will give the sun’s declination at noon at Greenwich, England, for each day of the year. The surveyor must correct this declination for longitude (q.v.), hours from noon, and re¬ fraction before making the observation. The refraction correction varies with the latitude (q.v.), hours from noon and declination of the sun. Having found the declination of the needle, the compass-box is moved so as to bring the needle at N. and S. in which case it will indicate true bearings.

Bibliography. — Breed, C. B., and Hosmer, G. L., (The Principles and Practice of Sur- veying) (New York 1915) ; Brough, B. H., (Mine Surveying) (London 1913) ; Cary, E. R., (Geodetic Surveying1 *(Troy, N. Y., 1915) ; Finch, J. K., (Plane Surveying* (Chicago 1918) ; Holt, A. H., <A Manual of Field As¬ tronomy *(New York 1917) ; Mulford, A. C., boundaries and Landmarks* (New York 1912); Reed, H. A., (

Topographical Drawing: Including Applications of Photography *(New York 1912) ; Searles, W. H., and Ives, H. C., (A Handbook of the Theory and Practice of Railway Surveying* (New York 1919) ; Wil¬ liamson, Sir J., Purveying and Field Work) (New York 1915) ; Wilson, H. M., topo¬ graphic, Trigonometric and Geodetic Surveying* (New York 1912).

O. H. Packer,

Mining Engineer, San Francisco, Cal.

Revised by Richard Ferris

SURVEYING, Marine. See Surveying.

SURVEYING INSTRUMENTS. The in¬ struments used in the business of surveying fall into two general classes : those used in the 6eld work and those used in recording the field work on maps. In both classes there are three objects to be attained, and suitable instruments are provided for each — the marking of points, the measurement of lines and the measurement of angles.

In field work the “pin® is the instrument used for the temporary location of a point. It is made of stout iron wire, or slender steel wire, about eight inches long, and with a ring turned at the top. Ten pins go in a “set.® In field use it is customary to tie a bit of red flannel rag in the ring of the pin, so that it may be found quickly by the chainman. If the point is one which is to be marked permanently, the pin is replaced by a wooden “hub® with a copper nail, or with a

SURVEYING INSTRUMENTS

stone monument marked with a simple cross cut into the stone, or a bronze bolt may be set into a hole drilled in the top of the monument.

For making .linear measurements a long-rec¬ ognized standard has been the surveyor’s or Gunter’s chain. It is 66 feet in length, made up of 100 links of stiff iron wire or steel, with a ring-shaped loop at each end, the adjacent links being connected by two rings. Each measured link is 7.92 inches long, including the span of a connecting ring at each end. This chain is still in use for retracing the lines of old sur¬ veys in which it was originally used, particularly in the resurvey of government public l^nds. The more modern engineer’s chain is 100

feet long, and has 100 links ; each, with its two ad¬ jacent rings, comprising one foot. Both of these types of chains are comparatively rude in¬ struments, and for close work have been sup¬ planted by the narrow steel ribbon or tape, which, however, in surveyors' parlance goes by the name of ((chain.® This is a continuous strip of steel, one-eighth to three-sixteenths of an inch in width and one-fortieth to one-thir¬ tieth of an inch in thickness. It may be 50 feet or 100 feet in length. Ten-foot divisions are marked by small blocks of brass soldered upon the steel, the exact points being indicated by notches filed in the brass. These ribbons are generally provided with a compensating handle for the forward end of the (<chain.® This han¬ dle is of two sections of brass tubing, one of which contains a thermometer and an adjust¬ able scale, so that the length of the <(chain)) may be made longer or shorter according to the reading of the thermometer — the ˆchain® hav¬ ing been tested according to a given temper¬ ature. The other section of the handle contains a spirit level, to ensure that the measurement is strictly horizontal ; and a stout helical spring which must be drawn out to an index mark, and thus ensures that in every measurement the same degree of tension is exerted upon the ((chain.® This type of chain cannot be bundled up as with the link type, and a folding reel is provided upon which it is safely carried about. For short and precise measurements the steel tape- line is employed. This is a ribbon of steel about half an inch in width and one-eightieth to one-hundredth of an inch in thickness. It is graduated in feet, tenths and hundredths of a foot, so etched upon the steel that the divisions appear in relief. This type of tape line rolls up by means of a cranked handle into a leather case. Linen tapes and combination tapes of linen and brass wire are useful in some in¬ stances, but cannot be depended upon where ac¬ curacy is important. Tapes and ribbon (<chains® may be authoritatively tested if sent to the Su¬ perintendent of the United States Coast Survey at Washington. Measurements of extreme accuracy, as in the establishment of a base line for triangulation, are made with ((base bars® or ˆcompensation bars® so constructed of iron and brass that they remain the same length regard¬ less of changes in temperature. These bars are carried about in cases of wood, and are used in sets of six, being each supported on two stout tripods. Another form of base bar is provided with a trough in which is kept continually while in use a mixture of ice-water and ice — thus ensuring a constant temperature of 32°, to which the bars are standardized. The steel alloy known as <(invar® (q.v.) is also used with entire vol. 26 — 7

satisfaction within a certain range of temper¬ atures, in which the metal does not expand in length. For measuring small vertical

distances, as in leveling, a telescoping rod is used. The type most in use is known as the New York Leveling Rod. This rod is of maple, about two inches square and nearly seven feet in length, and has a brass shoe and a brass cap. The face of the rod is graduated into feet, tenths and hundredths of a foot, up to 6.50 feet. A slid¬ ing target of oval outline has its centre cut away so that the graduations of the rod are visible. On one of the inner edees of the tar¬ get a vernier is provided so that thousandths of a foot may be read. The rod is made in two longitudinal sections dovetailed together, the back section sliding upon the front. When a vertical distance of more than 6.50 feet is to be measured, the target is clamped at that fig¬ ure, a lower clamp loosened and the back part of the rod raised upward until the target comes into line. The reading now is taken on the side of the rod, which also is graduated, so that distances up to 12 feet may be measured to the thousandth of a foot. To ensure the verticality of the rod in the hands of the rodman, when meas¬ urements are being made, the target is some¬ times constructed with two target faces, one three or four inches back of the other, the ends of the front face being cut away, so that a view of both discs is had at once. Any deviation from a vertical position is immediately noticed through the lack of agreement of the horizontal line of both discs. There are several other forms of leveling rods, but in the United States the New York rod is almost universally in use. ((Speaking rods® are those which are so painted as to be easily read by the observer at the in¬ strument, without dependence upon the rodman. This type is exceptionally useful in rapid re¬ connaissance work, where long sights are taken. They are not so accurate, however, as the tar¬ get rod when it is carefully used. The type most in favor is the Philadelphia rod, in which the graduation is in figures six one-hundredths of an inch in height, set with their centres on the lines marking the tenths of the foot. It is quite easy for the leveler to estimate the hun¬ dredths of a foot with great accuracy, but im¬ possible to read to thousandths.

The level is obviously an essential instru¬ ment in using the leveling rod, to mark the upper limit of the vertical distances measured upon the latter. It consists of a telescope, 20 inches in length, in which the line of sight is carried by the intersection of cross-hairs, and to which is attached a “bubble tube® of glass filled with a mixture of ether and alcohol except for the long bubble of air. This tube is about eight inches long and three-fourths of an inch in diameter, and is curved to a long radius, the convexity of the curve being set uppermost. Upon this face of the tube is a centre line and graduations on either side of it. The tube is so attached to the telescope that it may be ad¬ justed and brought accurately parallel to the line of sight through the

telescope. The com¬ bination of bubble tube and telescope is rever¬ sible in its Y-shaped bearings, from which it is called a Y-level ; and is mounted upon a frame with a long conical spindle held by a pair of plates between which are four leveling screws, the whole being attached to a tripod, as shown in the accompanying illustration. A pair of

stadia wires is often added to the cross-hairs of the telescope, so that the distance of the leveling rod may be computed by taking a sec¬ ond reading, above or below the level line at the time when the level is fixed. An ingenious de¬ vice renders the stadia wires invisible when the cross-hairs are being used, and vice-versa. A small pocket level known as the ((Locke Level,® is of great usefulness in reconnaissance work. In this instrument the bubble tube is attached to

45 degrees placed beneath it in the telescope. The image of the bubble in the mirror decides when the instrument is held in a true level posi¬ tion, and at the same moment the point at which the level line strikes the leveling rod is in plain view.

For the measurement of angles in the field the commoner instruments are the magnetic compass and the transit. The former depends upon a continual reference of the direction of a line to the magnetic north-and-south line indi¬ cated by a magnetic needle swinging in a com¬ pass box, the rim of which is graduated to 15 minutes of arc ; from which the angle can be very closely estimated to five minutes. By an attachment to the compass it may be made a solar compass, a necessity where the principal lines of the survey are referred to the true meridian, as in government surveys of the pub¬ lic lands. The compass may be still further improved by the addition of a telescope, which may be clamped to the rear sight, and this tele¬ scope may have a long bubble tube, making it available for running levels, and it may also carry a vertical circle for measuring vertical angles.

The transit is the engineer's instrument of precision for angular measurements. Its essen¬ tial factor is the plate, from five to seven inches in diameter, bearing graduations of exquisite accuracy, to 30 minutes of arc in the smaller instruments and 20 minutes in the larger ones. Verniers are affixed at opposite sides of the plate by which the angular measurement may be made to 30 seconds in the one case or to 20 seconds in the other. The telescope which car¬ ries the line of

sight with the intersection of cross-hairs is often fitted with stadia wires also, so that the tangents of the distances may be measured upon a leveling rod. A long bubble tube enables the engineer to use the transit for all ordinary leveling work. It is not uncom¬ mon to have a four-inch vertical circle attached,

carried on four arms, and reading to single minutes. A solar attachment, consisting of three arcs of circles, on which the latitude of the place, the declination of the sun and the hour of the day may be set off, converts the instrument into a solar transit. Where a ver¬ tical circle is a part of the instrument, this serves for the latitude arc. The transit shown in the illustration is equipped with the popular Saegmuller solar attachment mounted above the primary telescope. A special form of the transit for mining engineers has the axis of the telescope extended beyond the standard at one side, and a second telescope mounted upon it so that a sight may be made directly down¬ ward. For very accurate and extended work, as in geodetical work, the telescope of the tran¬ sit is sometimes 36 inches in length, the hori¬ zontal graduated circle 36 inches in diameter and the vertical circle 24 inches in diameter.

The plane table is practically a drawing board, usually 24 by 36 inches. In its simplest form the ruler or ˆalidade® carries two sights at the ends by which the direction is obtained, the line of this direction being then drawn along the ruler upon a sheet of paper attached to the board. In the better class of instrument the sights are replaced by a telescope, which some¬ times carries stadia wires for measuring dis¬ tances, a compass box for orientation and short vertical arcs for measuring tangents which can¬ not be covered by the stadia wires. The plane table is of use chiefly for rapidly filling in topo¬ graphical details upon the may made by ordi¬ nary surveying methods. The plane table shown in the accompanying illustration is equipped with reels for carrying a continuous roll of drawing paper. See Surveying.

Bibliography. — Baker, I. O., Engineers' Surveying Instruments : Their Construction, Adjustment and Use) (New York 1909) ; Bausch and Lomb Optical Company, (Metro Manual: A Handbook for Engineers) (Roches¬ ter 1915) ; Gurley, W. and L. E., 'Manual of the Principal Instruments used in American Engineering and Surveying > (Troy 1914) ; Lovell, W. H., 'The Plane Table, and Its Use in Surveying) (New York 1908); Stanley, W. F., Purveying and Leveling Instruments y (London 1914) ; Webb, W. L., and Fish, J. C. L., 'Technic of Surveying Instruments and Meth- ods) (New York 1917).

SURVEYS, United States Governmental.

From an early period in its history the govern¬ ment has made provision for exploring expe¬ ditions of various kinds, mainly in the vast region west of the Mississippi which for many years was a but little known wilderness. Some of these explorations were for military routes to the west and later came surveys of public lands. The first official surveys were made by a geographer attached to the Continental army in the Revolution and in 1781 Thomas Hutch¬ ins (q.v.) was attached to Greene's division (Southern) as geographer. After the Revolu¬ tion he was retained to supervise surveys of the Western lands and continued in office until his death in 1789.

The earliest governmental explorations in the West could hardly be regarded as surveys although many of them prepared maps which added greatly to knowledge of a little known region. Position were determined astronom-

ically, and route maps were the principal prod¬ ucts. The first of these was the Lewis and Clarke expedition sent out by President Jeffer¬ son in 1803. One of its products was a map of the country between Lake Superior and the Pacific Ocean between the 39th and 49th paral¬ lels. Major Z. M. Pike's expeditions in 1805— 07 to the sources of the Mississippi and of the Arkansas and Red rivers were fruitful of ge¬ ographic results. Major S. H. Long's expedi¬ tion from Pittsburgh to the Rocky Mountains in 1819 and 1820 was under order of the Sec¬ retary iof War. In 1823 Long made another journey to the Great Lakes and the source of Saint Peter's River. Sextant and pocket chro¬ nometer were used, distances were estimated and courses were taken by compasses. The most elaborate early survey was that of J. C. Brown of a road from Osage to Taos in 1825-27. Chain compass and a good sextant were used and a large scale map prepared. Similar to it are the surveys by R. Richardson of a road from Little Rock to Fort Gibson in 1826, and a survey by Dimmock in 1838 for a military road from Fort Smith to Fort Leavenworth. In 1832 Lieutenant Allen on the Schoolcraft expedition made an excellent map on a scale of 5.75 miles to an inch, of the head of the Mississippi Valley but all the distances were estimated. He was the discoverer of the source of the great river.

The Bonneville expedition in 1832-36 was not under governmental authority although Bonneville was an army officer. The Wilkes expedition in 1841 surveyed part of Columbia River. The first of the early expeditions which could be regarded as a geological survey was

made by Featherstonhaugh in 1834 to the

Ozark region. The following year his obser¬ vations were extended along the Couteau des Prairies between the Missouri and Minnesota rivers. In 1838 Nicollet was sent by Colonel Abert of the United States Army Engineers to make a map of the hydrographic basin of the Mississippi River. In 1839 and 1848 D. D. Owen made surveys of mineral lands of the Northwest extending to Lake Superior and covering an area of 57,000 square miles. These surveys were made for the United States Land Office. In 1847-48 C. T. Jackson and J. D. Foster and J. W. Whitney operating under orders of the Secretary of the Treasury ex¬ tended this work in the copper district of the Lake Superior region.

Corps of Engineers, United States Army.

— A large amount of surveying was done by the topographical engineers of the United States army. The first notable expedition under that bureau was N. Nicollet's explorations of the basin of the upper Mississippi River in 1836-40 which resulted in a map which is regarded as a most important contribution of American geog¬ raphy. His surveys were largely instrumental and he used a barometer for ascertaining ele¬ vations. The Fremont expedition in 1842 re¬ sulted in a valuable map on the millionth scale, of the country from the forks of Platte River to South Pass between the 43d and 45th paral¬ lels. Expeditions by Fremont in following years 1843-46 extended his observations westward to the Pacific Ocean and the surveys made were the basis for important new maps.

The following is a list of some of the more notable army expeditions and surveys from 1836 to 1879 (excepting the surveys for Pacific railroads which are noted on following page) ;

List of Principal Surveys under the Bureau of Topographical Corps of Engineers,

United States Army.

1836-40 . I. N. Nicollet .

1842 . Lieut. J. C. Fremont .

1843-44 . Capt. J. C. Fremont .

1846 . Capt. G. W. Hughes .

1845 . Lieut. J. W. Abert .

1846-47 . Maj. Wm. H. Emory .

1849 . Lieut. G. H. Derby .

1847 . Lieut. J. D. Webster .

1849 . Lieut. J. H. Simpson .

1849 . Lieut. J. H. Simpson .

1849- 50 . Capt. H. Stansbury .

1849 . Capt. John Pope .

1850 . R. H. Kern .

1850- 51 . Capt. Sitgreaves and Lieut. Woodruff .

1851 . Capt. Sitgreaves .

1852 . Lieut. Derby .

1852 . Capt. R. B. Marcy .

1853 . Capt. J. H. Reno .

1854 . Lieut. G. H. Derby .

185-5 . Lieut. G. H. Men dell .

1855 . Lieut. G. K. Warren .

1856 . Lieut. G. K. Warren .

1857 . Lieut. G. K. Warren .

1857-58 . Lieut. J. C. Ives .

1859 . J. N. Macomb .

1859 . Capt. J. H. Simpson .

1859—60 . Capt. W. F. Reynolds .

1859 . J. E. Dixon . : .

1869 . Capt. Chas. W. Raymond .

1869 . Lieut. Geo. M. Wheeler .

1870 . Capt. D. P. Heap .

1871 . Capts. J. W. Barlow and D. P. Heap .

1871 . Capt. W. A. Jones .

1873 . Capt. Wm. Ludlow .

1873 . Lieut. E. H. Ruffner .

1873 . Capt. W. A. Jones .

1874 . Lieuts. E. H. Ruffner and Anderson .

1874 . Capt. Wm. Ludlow .

1875 . Capt. Wm. Ludlow . .

1876 . Capt. W. S. Stanton . .

1877 . Capt. W. S. Stanton .

1869-79 . Capt. G. M. Wheeler .

Upper Mississippi Basin.

Missouri River to Rocky Mountains.

Rocky Mts. and to Oregon and northern California. San Antonio to Saltillo, Mexico.

Between Platte River and 35th Parallel to Rocky Mts. Fort Leavenworth, Mo., to San Diego, Cal. •

Part of Sacramento Valley.

Rio Grande from north of Matamoras.

Road from Fort Smith to Santa F6.

Navajo County.

Vaxley of Great Salt Lake.

Red River of the North.

Rio Pecos.

Survey of Creek Boundary.

Down Zuni and Colorado rivers.

Colorado River Mouth to Fort Yama To sources of Red River.

Big Sioux to Mendota.

Oregon and Washington Territories.

Snake River.

Dakota and Sioux County.

Missouri and Yellowstone rivers.

Territory of Nebraska and Black Hills.

Colorado River from Fort Yuma to Grand Canyon. Santa Fe to junction of Green and Grand rivers.

Great Salt Lake Valley.

Headwaters of Yellowstone and Missouri rivers.

Route from Fort Dallas, Ore., to Great Salt Lake Valley.

Yukon River Basin.

Southern and southeastern Nevada.

Northern Montana and Dakota.

Upper Yellowstone County.

Uintah Mountains.

Yellowstone River.

Ute County.

Northwestern Wyoming and Yellowstone Park.

Fort Garland, Colo., to Fort Wingate, N. Mex.

Black Hills.

Carroll, Mont., to Yellowstone Park.

Bighorn and Yellowstone Valley.

Routes in Wyoming.

Geographical Surveys west of 100th Meridian.

There were also many reconnaissance trips and explorations for roads which can hardly be called surveys. Some of the maps were not published but remain on file in the War De¬ partment.

• Black Hills Survey. — In 1874 Capt. W. Ludlow made expeditions through the Black Hills of South Dakota with N. H. Winchell as geologist. The results were given in a quarto volume issued in 1875. Later the Indian Bu¬ reau sent an expedition under W. P. Jenney and H. E. Newton to investigate reports of gold in these hills and a quarto report with folio of maps was published by the Survey of the Rocky Mountain region.

Pacific Railroads. — In 1853 the War De¬ partment began a series of explorations for routes for railroads across the Far West. The expeditions were conducted by army officers but had topographic and geologic assistants, who made surveys of various kinds. Among these geologists were Jules Marcou, Thomas Antisell, J. S. Newberry, W. P. Blake and James Schiel. The routes surveyed were not far from the several transcontinental railroad lines of to-day. The results were published in 13 quarto volumes which contain not only geographic results of the surveys but a large amount of information on natural history, re¬ sources, etc.

International Boundaries. — The boundaries of the United States have been surveyed by various organizations. In 1818 surveys were begun on the northern boundaries of New York, New Hampshire and Maine by United States arnty engineers. In 1822 (?) the Northwest Boundary Commission, appointed under the Treaty of Ghent, made a survey of the boundary in the region about the outlet of Lake Superior, and in 1857-61 the United States Commission working under direction of the State Depart¬ ment surveyed the boundary west from longi¬ tude 110°. In 1872-75 the United States Bound¬ ary

Commission under the State Department surveyed the Canadian boundary along the 49th parallel and a narrow strip of contiguous country from Lake of the Woods to the Rocky Mountains, connecting there with the survey from the west. The Louisiana-Texas line sur¬ vey in 1840 was made jointly by engineers of the United States army and surveyors ap¬ pointed by Texas. The results are in Senate Ex. Doc. 199, 27th Congress, 2d Session. Con¬ siderable boundary surveying has been done by the Coast and Geodetic Survey. The Mexican Boundary Survey was made by Maj. W. H. Emory in 1855-56 and its results were published in two quarto volumes which included geological observations by Parry and Schott. Detailed remapping of this boundary in 1889 was done by a joint International Boundary Commission consisting of three Mexican members, two army engineers and a member of the United States Coast Survey. The result was a folio of maps showing topography and profiles from El Paso to the Pacific. The southern boundary of Kansas was surveyed by Lieut.-Col. J. E. Johnson in 1857 and the Texas boundary in 1858-60 by a commission organized by the Interior Department.

Lake Survey. — A survey of the Great Lakes was made by the War Department (corps of engineers) in 1841 to 1881. Very detailed charts (79) were prepared of the lakes, their

shores and of the straits and rivers immediately connected with lake navigation. In 1876-79 this work was extended down the Mississippi River to Memphis.

Hayden Surveys. — The survey under F. V. Hayden began in 1867 for the General Land Office and its work was in Nebraska Territory, but it was not until 1871 that it began much surveying. In 1873 it became the United States Geological and Geographical Survey of the Territories and in the next five years covered 170,000 square miles with topographic and geologic mapping, mostly in Colorado, Wyom¬ ing, Idaho and Montana. James T. Gardner was chief geographer and A. D. Wilson and Henry Gannett were in charge of parts of the work. The principal geologists were A. C. Peale, W. H. Holmes, A. R. Marvine, F. H. Endlich and F. V. Hayden. Twelve annual reports and a series of quarto memoirs were published.

Geological and Geographical Survey of Rocky Mountain Region. — These surveys were organized and conducted by Maj. J. W. Powell under the Interior Department. In 1869 Major Powell made his famous boat trip through the Grand Canyon under auspices of Smithsonian Institution. In 1871 continuation of his ex¬ planatory work in the West was provided for by the government and from that time to 1878

an area of 67,000 square miles was covered by topographic and geological surveys. A. H. Thompson was chief geographer and G. K. Gilbert, E. E. Howell, Capt. C. E. Dutton and C. A. White were assistant geologists.

Fortieth Parallel Survey. — This survey organized and conducted by Clarence King and under direction of the chief of engineers, United States army, operated from 1867 to 1872. It prepared topographic (contour) maps and geo¬ logical map of a wide strip of country contigu¬ ous to the 40th parallel west of the 105th merid¬ ian. The geological work was by Clarence King, S. F. Emmons, Arnold Hague and James D. Hague. John D. Gardner was in charge of topographic work. The results were published in seven quarto volumes and a folio.

Wheeler Survey. — From 1869-79 extensive explorations were made in the West under direction of Capt. G. M. Wheeler of the United States army engineers. The title of the organ¬ ization was United States Geographical Surveys west of the 100th meridian. Many hachured topographic maps were prepared of parts of Arizona, Utah, New Mexico and Colorado and the geology of various regions was mapped by G. K. Gilbert, A. R. Marvine, E. E. Howell, J. J. Stevenson, I. C. Russell and others. The principal results were published in three quarto volumes issued in 1875, 1881 and 1889.

United States Geological Survey. — In 1876 there were four geological surveys in progress, the Hayden, King, Wheeler and Powell with some duplication of work, a condi¬ tion which roused so much criticism that Con¬ gress referred the consideration of the con¬ tinuance of the work to the National Academy of Science. That body recommended the sub¬ stitution of a single organization for the topo¬ graphic and geologic work, and accordingly in 1879 Congress created the United States Geo¬ logical Survey (q.v.) as a bureau of the In¬ terior Department. This survey has been continued by annual appropriation (about $1,500,-

000 in 1917). It has made detailed topographic maps of 40 per cent of the area of the United States. Large areas have also been mapped geologically, considerable public land classified in various ways and water resources determined. The maps are on various scales and sold at cost of paper and printing, most of them by the survey. Many of the geological reports are for gratituous distribution. Two hundred and

eleyen folios of the Geologic Atlas of the United States have been issued which sell from 25 to 75 cents each.

Reclamation Service. — Many detailed sur¬ veys have been made by the Reclamation Serv¬ ice in connection with its various projects, and many suggested ones. Some of the resulting maps have been issued in the various annual reports of the bureau and others are filed.

Isthmian Surveys. — Many surveys have been made by parties sent to the Central America and Panama by the United States gov¬ ernment to obtain data for canal routes.

General Land Office. — The General Land Office created in 1812 (see Public Lands) and since 1849 a bureau of the Interior Department, has surveyed a large proportion of the public lands in the States west of the Mississippi River, except Texas, and also Ohio, Illinois, Indiana, Florida, Alabama, Wisconsin and Michigan. Many of the State lines were run by the Land Office. In the surveys by this bureau public lands are divided into townships six miles square, comprising 36 sections one mile square, the latter divided into quarter sections of 160 acres and in some cases, minor divisions, a system devised by Lieutenant-Colonel Mans¬ field in 1803. The enclosing lines are due north and south and east and west and owing to con¬ vergence of meridians and varying length of parallels at different latitudes the divisions are only approximate. The townships are num¬ bered east and west from prime meridians, and north and south from standard parallels. The sections, ordinarily a mile square, are numbered thus :

5

4

3

2

1

7

8

9

10

11

12

18

17

16

15

14

13

19

20

21

22

23

24

30

29

%

28

27

26

25

31

32

33

34

35

36

Thus, for instance, a piece of land is desig¬ nated NWˆ Sec. 28, T. 19 S., R. 28 W. New Mexico. Farther subdivision is indicated by J4, sections, and odd areas as lots. The maps are prepared on a scale of two inches to one mile and In most cases the con¬ figuration of the land is represented by hachures excepting in later work in a

few Indian reservations where contour lines have been used. This mapping covers most of the smooth surfaced or rolling lands but large areas of mountain lands are not yet subdivided. The maps are not issued but held in file in the general land office and local land offices in various public land States. The bureau does, however, issue general maps of the States and of the United States compiled largely from its own surveys.

Coast and Geodetic Survey. — The work of mapping the coast of the United States was initiated by Congress, 10 Feb. 1807, on recom¬ mendation of Thomas Jefferson, with an appro¬ priation of $50,000. F. R. Hassler was its first superintendent, beginning work in 1816 and continuing to 29 April 1818 as a bureau of the Treasury Department. The surveys were then continued by the United States army en¬ gineers and by officers of the navy until the bureau resumed operations again in 1832 under the Navy Department with Hassler again as superintendent. On reorganization late in 1843 A. D. Bache

became superintendent and he con¬ tinued in charge until his death in 1867. Pierce, Patterson, Hilgard, Thorn, Mendenhall, Duf- field, Pritchett, Tittmann and Jones were later superintendents. The geodetic work or deter¬ mination of the form of the earth was made an additional function of the survey in 1878. The survey has prepared charts of the coasts and exterior waterways of the United States and of parts of its possessions, and mapped more or less of the coast, the District of Columbia and other areas. Many special reports on geodesy, tide tables and scientific researches of the bureau have been issued. The charts which are issued in sheets of various sizes and scales are sold at low rates directly by the bureau and by local agents in seaboard cities.

Mississippi and Missouri River Commis¬ sions. — The Engineers corps, War Department has made a detailed survey of the Mississippi River and of its principal tributaries, showing topography of the shore, 1876-84. These sur¬ veys were intended primarily for guidance in the many engineering problems connected with improving the waters for navigation, a task on which the government had expended nearly $150,000,000 up to end of - June 1916. The War Department has made special surveys for many river and harbor improvement projects.

Hydrographic Office (q.v.). — To this branch of the Navigation Bureau of the Navy Depart¬ ment is entrusted the preparation of many kinds of data relating to navigation. Numerous maps are produced in many cases based on original surveys.

Forest Service. — The Forest Service of the Agricultural Department has made sur¬ veys in most of the Forest Reservations in some cases with detailed representation of topography and distribution of various kinds of timber. A series of atlases has been published and many maps are on file in the various offices of the bureau. Some work of this kind was also done by the United States Geological Survey in 1897— 1900 and many maps were published in annual reports and professional papers. Since 1897 this survey obtains data as to forested areas in all districts mapped topographically.

Soil Surveys. — The Agricultural Depart¬ ment has made surveys of soils in many parts

of the United States, publishing the results on the detailed topographic maps by the United States Geological Survey. These soil maps are issued for gratuitous distribution.

Biological Survey. — The Agricultural De¬ partment is also conducting a survey to ascer¬ tain the geographic distribution of animals and plants.

Bibliography. — ‘United States Geological and Geographic Surveys,* G. M. Wheeler, Vol.

I, pp. 519-745; ‘Report of Third International Geographic Congress) (Venice, Italy, by G. M. Wheeler, 48th Congress, Second Session. H. of R. Ex. Doc. 270, 1885) ; Emmons, S. F., ‘The Geology of Government Explorations* (Geo¬ logical Society of Washington, 1896) ; Merrill, G. P., ‘Contributions to the History of Ameri¬ can Geology * (Report of United States National Museum, 1904, pp. 189-734).

N. H. Darton,

United States Geological Survey.

SUSA, soo'sa, Persia, capital of the prov¬ ince of Susiana or Elam, on the Choaspes River, 50 miles west of Shuster, was one of the celebrated cities of the Old World, renowned in Biblical history. Shushan, meaning lilies, is alluded to in the Old Testament and on the cuneiform tablets of Assyria. It has a rec¬ tangular form without walls, but possessed a strongly fortified citadel, which enclosed the stately palace and one of the most important treasuries of the Persian kingdom. Numerous rivers water the plain in which it stands, some of which partly surrounded the ancient city. All the Persian kings, beginning with Darius I, erected beautiful palaces, the remains of which belong to the most magnificent ruins of Asia. It was here that Esther’s intrigue was developed ; Daniel saw the vision at Shushan, and here he was buried. Consult Billerbeck, ‘Susa) (Leip¬ zig 1893) ; Dieulafoy, ‘L’Acropole de Suse) (Paris 1888-92) ; de Morgan, J., ‘Fouilles a Suse> (Paris 1900).

SUSAN NIPPER, a character in ‘Dombey and Son* by Charles Dickens. She is an attendant upon Florence Dombey and is noted for her sharp tongue.

SUSANNA, soo-zan'a, the Jewish woman who figures in the book of Susanna, as the in¬ tended victim of two elders who obtained her condemnation to death on a false charge. The prophet Daniel proved her to be innocent, and obtained a reversal of the sentence. The date

of about 600 b.c., is ascribed to the event. See Susanna, Book of; Bible.

SUSANNA, Book of, the 13th chapter of Daniel in the Septuagint version of the Old Testament. It is accepted as canonical by Ro¬ man Catholics, but rejected by Protestants. (See Bible). Consult Kay, D. M., in Charles, 'The Apocrypha and Pseudepigrapha of the Old Testament* (Oxford 1913).

SUSPENSION, in canon law , a censure of which a clergyman is forbidden to exercise his order or to enjoy the fruits of his benefice. Partial suspension inhibits a cleric from the exercise of his spiritual functions, or from the administration of his benefice, or only from a part of his sacred functions : for example, a bishop may be suspended from ordaining, and yet be perfectly free to govern his diocese. En¬ tire suspension prohibits all use of order, juris¬

diction or benefice. In the English canon law, as in that of the Roman Catholic Church, a suspension is removed by absolution, by revo¬ cation of the censure by the person inflicting it or by dispensation.

SUSPENSION BRIDGE. See Bridge.

SUSPENSION RAILWAY, a railway in which the carriage is suspended from an ele¬ vated cable or track. See Monorail.

SUSQUEHANNA, Pa., borough of Sus¬ quehanna, on the Susquehanna River and on the Erie Railroad. It is ˆ38 miles north of Car- bondale and 23 miles southeast of Bingham¬ ton, N. Y. It has machine shops, chemical works and manufactures of washing machines and metal ware. Pop. (1920) 4,500.

SUSQUEHANNA, sus-kwe-han'a, a river formed by two branches, an eastern or northern and a western, which unite at Northumberland in Pennsylvania. The eastern branch, which is considered the main stream, issues from Lake Otsego in New York, and has a length of about 250 miles. The western branch rises in the western slope of the Alleghenies, and flows very circuitously east-southeast for about 200 miles. The united stream flows south and southeast, passing Harrisburg, Wilkesbarre and Bingham¬ ton, N. Y., enters Maryland, and after a course of about 150 miles flows into the northern ex¬ tremity of Chesapeake Bay at Port Deposit. The navigation was much obstructed by rapids, but by constructing canals the river has been made navigable for a considerable distance from the Chesapeake.

SUSQUEHANNA COMPANY, The, in

American history a land company formed in 1754, chiefly by Connecticut farmers, for the colonization of the Wyoming country. By a treaty with the Five Nations, 11 July 1754, an enormous tract of country was purchased for $10,000. It began at the southern boundary of Connecticut and followed in a northerly direc¬ tion the course of the Susquehanna to northern Pennsylvania. In 1785-86 many disputes arose between the Susquehanna Company and the Pennsylvania claimants of the territory. This was called the “Pennamite War.®

SUSQUEHANNA UNIVERSITY, a

Lutheran institution of higher education at Selingsgrove, Pa., founded in 1858. The faculty numbers 22; the average annual attendance of students is 325; tuition fees are $75 to $90; living expenses, board, etc., $175 to $225; the productive funds amount to $72,000; the total income, including tuition and incidental charges, amounts to $42,000. The college colors are orange-maroon. The library contains over 16,000 volumes. The number of graduates since organization number over 1,000.

SUSSISTINNAKO, the Spider, was ac¬ cording to the Sia Indians of New Mexico, the first of all beings in the lower world. He lay out the directions by drawing one line of meal from east to west and another from north to south. Within the magic confines thus laid out he sang his magic songs and rattled his magic rattle, and as he sang and rattled people, animals, birds and insects appeared at his call. He created two mothers who were the mothers of all ; then he divided the peo¬ ple into clans, after he had created the earth for them, and he made the Cloud People,

the Lightning People, the Thunder People and the Rainbow People, and he commanded them to work for the people of Haarts (the earth). He divided the 'world into three parts: Haarts (the earth) ; Tinia (the mid-plain) ; and Hu- waka (the upper plain) ; and to the Clouds and the Rainbow he gave the Middle Plain. When all this had been done he had the two original mothers create the sun, the moon and the stars.

SUSTENTATION FUND, the name spe¬ cifically applied in the Presbyterian denomina¬ tion to a fund for the support of poorer churches. All important religious bodies have funds of this character.

The object is to en¬ able communities unable from their own means to support properly a pastor or minister, to have the benefit of religious services.

SUTHERLAND, Alexander, Canadian Methodist clergyman: b. Guelph, Ontario, 17 Sept. 1833 ; d. 1910. He learned the printer's trade, but studied for the ministry and in 1859 was licensed as a preacher and stationed at Niagara. He removed to Therold in 1861 and afterward preached at Drummondville, Ham¬ ilton, Yorkville, Toronto and Montreal. He was secretary of the Conference in 1870-71, and after the union of the Methodist churches in Canada he was secretary and treasurer of the missions of the Church. In this capacity he made extended tours of Canada; and in 1879 he inaugurated a campaign to raise $75,000 for the purpose of clearing the missions depart¬ ment of debt and succeeded in raising $116,000. Author of (A Summer in Prairie Land) (1882).

SUTHERLAND, George, United States senator : b. Buckinghamshire, England, 25 March 1862. He came to the United States with his parents in 1864, received his academical educa¬ tion in Utah and studied at the University of Michigan in 1882-83. He was admitted to the bar in 1883 and engaged in practice at Salt Lake City. He was elected to the first Utah senate by the Republican party in 1896; served in Congress in 1901-03 and in the United States Senate in 1905-17.

SUTHERLAND, Howard, United States senator : b. near Kirkwood, Mo., 8 Sept. 1865. In 1889 he was graduated at Westminster Col¬ lege, Fulton, Mo., studied law at Columbian (now George Washington) University, but did not complete course. In 1889-90 Mr. Suther¬ land was editor of the Republican of Fulton, Mo., and from 1890 to 1893 served from clerk to chief of population division of the 11th census. In 1893 he removed to Elkins, W. Va., where for 10 years he was connected with the Davis-Elkins coal and railway interests, be¬ coming their general land agent. For some years he has engaged in coal and timber land operations on his own account and is president of the Greenbrier Land Company of Valley County. In 1908-12 he was member of the West Virginia State senate and from 1913 to 1917 was a member of the 63d and 64th Con¬ gresses, serving as member-at-large from West Virginia. In 1916 he was elected to the United States Senate for the term 1917-23. Senator Sutherland is a member of the American Academy of Political and Social Science.

SUTLEJ, sut'lej, India, a river forming the eastern boundary of the Punjab. It rises in

Tibet, in the sacred lakes of Manasarowar and Rakas-Tal, flows through the latter lake at an elevation of 15,000 feet, follows a circuitous course through the Himalayas, finally joining the Indus at Mithankot. Its principal tribu¬ taries are the Li, Beas and Chenab ; it passes in its upper course through scenery of a wild and savage grandeur. Its entire length is 900 miles; a swift current marks its upper course, often forming deep cascades and waterfalls; it is navigable only in its lower course. The river is spanned by splendid bridges, that of the Indus Valley Railway connecting the shores near Bhawalpur, and another iron bridge of the Sind, Punjab and Delhi Railway, near Jullunder.

SUTPHEN, William Gilbert Van Tassel,

American author: b. Philadelphia, 11 May 1861. He was graduated at Princeton in 1882; since engaged in editorial work. He has written (The Golficide) (1898) ; (The Cardinal's Rose) (1900); (The Golfer's Alphabet (1899) ; (The Nineteenth Hole) (1901); (The Doomsman) (1903) ; (The Gates of Chance* (1904), etc.

SUTRA, soo'tra, in Sanskrit literature, the technical name of aphoristic rules and of works consisting of such rules. There is a bibliog¬ raphy of sutra texts in Macdonell's (History of Sanskrit Literature) (London 1913). See Sanskrit Literature.

SUTRO, soo'tro, Adolph Heinrich Joseph,

American engineer and philanthropist : b. Aix- la-Chapelle, Rhenish Prussia, 29 April 1830; d. San Francisco, 8 July 1898. Coming to the United States in 1850 he went to California where he engaged in business for 10 years. In 1860 he visited Nevada and planned the Sutro tunnel, a charter being secured on 4 Feb. 1865. It was begun on 19 Oct. 1869 and cost nearly $4,000,000. The main tunnel is 20,000 feet long, 1,650 feet below the surface, 12 feet wide and 10 high. On the discovery of gold, years before, he had invested heavily in San Francisco real estate and became very rich. In 1894 he was elected mayor of that city, to which he gave a park and other gifts. His library of 250,000 volumes was peculiarly rich in works on the history of the Pacific settlement. The library was almost totally destroyed in the fire follow¬ ing the earthquake of April 1906. The 100,000 volumes saved were, after continued litigation, turned over to the State Library in 1913.

SUTRO TUNNEL. See Tunnels and Tunneling.

SUTTAS, Buddhist, a collection of the most important religious, moral and philosophical discourses taken from the sacred canon of the Buddhists. It gives the most essential, most original and most attractive part of the teach¬ ing of Buddha, the Sutta of the Foundation of the Kingdom of Righteousness and six others of no less historical value, treating of other sides of the Buddhist story and system. The translator, T. W. Rhys Davis, gives as the dates of Buddha's life of 80 years about 500-420 b.c.

SUTTEE, su-te', in India, a term applied to the self-immolation of Indian widows on the funeral pile of their deceased husbands. The origin of this practice is of considerable antiq¬ uity, but it is not enjoined by the laws of the great legislator, Manu, nor is it based on the Vedas. This practice was abolished by Lord

Bentinck, governor-general of India, in Decem¬ ber 1829, and may now be said to be extinct, though perhaps rare cases still occur. Until then the British government had permitted it, provided the act was perfectly voluntary (which the religion of Brahma also prescribes), and if notice of such resolution had been previously given to a magistrate, who was required to see that the suttee was public and that all the requisitions of the law were fulfilled. The cere¬ monies of a suttee were various and lasted from a quarter of an hour to two hours. Sometimes the widow was placed in a cavity prepared un¬ der the corpse of the husband ; sometimes she was laid by the body, embracing it. If the husband died at a distance from home, anything which belonged to the deceased — his garments, slippers, walking-staff — might be substituted for the corpse. Consult Bose, J. C., (The Hin¬ dus as they Are) (2d ed., London 1884), and Tylor, E. B., Primitive Culture> (4th ed., 2 vols., New York 1903).

SUTTER, John Augustus, American pioneer: b. Kandern, Germany, 15 Feb. 1803; d. Washington, D. C., 17 June 1880. He was graduated at the Bern Military Academy in 1823 and came to America in 1834, locating at Saint Louis. Receiving favorable accounts of California he crossed the Rocky Mountains in 1838; sailed down the Columbia River and thence to Hawaii. After going to Sitka, Alaska, he cruised along the Pacific Coast and was stranded at the site of San Francisco in July 1839. During that year he established the first white settlement on the site of Sacramento. In 1841, after receiving a large tract of land from Mexico, he built a fort which he named New Helvetia on the site of

the present Sacramento, Cal. ; was made governor of the frontier country by Mexico, but was held in suspicion by the Mexicans owing to his friendly feelings toward the United States. In 1848, when California was ceded to the United States, he owned many thousand head of cattle, much land and other property, but owing to the discovery of gold his estates were overrun by miners, and his workmen left him, and not being able to secure others he was financially ruined. He appealed to the Supreme Court, but was not sustained. Later the legislature of California granted him a pension of $250 a month. He moved to Littz, Pa., in 1873. (See Sacramento, Cal.). Consult Dellenbaugh, F. S., (Fremont and ,49) (2d ed., New York 1914).

SUTTNER, Bertha, Baroness von, Aus¬ trian author and worker for universal peace: b. Prague, 9 July 1843; d. Vienna, 21 June 1914. She was the daughter of Count Franz Kinsky, an Austrian field-marshal, who died in her infancy. She was excellently educated, traveled extensively, and in 1876 she was married to Freiherr Arthur Gundaccar von Suttner, the novelist, who died in 1902. She was for a time secretary to Alfred Nobel, and for the greater share of her life was an indefatigable worker for world peace. She was widely known as a writer of fiction, on social science and on a world union to ensure peace. She was awarded the Nobel Peace Prize in 1905. Author of (Inventarium Einer Seele) (1882) ; (Die Waffen Nieder) (1889) ; (Hanna) (1894) ; (Krieg und Frieden) (1896); (Schack der QuaP (1898); (Die haager Friedenskonferenz)

(1900); (When Thoughts Will Soar) (1914); (Der Kampf um die Vermeidung des Welt- kriegs) (2 vols., 1917), etc. Consult her (Memoirs) (Stuttgart 1908; Eng. trans., Bos¬ ton 1910).

SUTTON, Mass., village and township in Worcester County, eight miles southeast of Worcester, on the New York, New Haven and Hartford Railroad. There are manufactures of cotton goods. Pop. town, 2,829.

SU TUNG P’O, or SOO TUNG P’O,

also known as SU SHIH, Chinese poet, essayist and statesman: b. 1031-36; d. 1101. He was educated under the care of his mother and passed first on the list when he was examined for his degree. He was at various times the holder of high offices at court, but was several times banished through the jealousy of enemies. He was a brilliant writer of verse and essays, and holds a high place in Chinese literature. Consult Giles, H. A., (Gems of Chinese Liter- ature) (1884) ;

(A History of Chinese Liter¬ ature* (1901).

SUTURE, a line along which two things are joined, as by sewing, etc., so as to form a seam or something resembling a seam. In anatomy a suture is the immovable junction of two parts by their margins. The sutures of the skull are the lines of junction of the bones of which the skull is composed. Various types of suture exist, as the serrated or dentated suture, the squamous or scaly suture and the harmonic suture or harmonia. Arranged ac¬ cording to their situation, there are coronal, frontal, fronto-parietal, occipito-parietal and many other sutures. In surgery a suture is the uniting of the lips or edges of a wound by stitching. In zoology sutures are the outlines of the septa in the Tetrabranchiata, so named from their resemblance to the sutures of the skull. When these outlines are folded the ele¬ vations are called saddles and the intervening depressions lobes. In botany a suture is the line formed by the cohesion of two parts. If the suture formed by the carpellary leaves in a pistil face the centre of a flower it is called the ventral suture; if it face the perianth, the dorsal suture. The former corresponds to the margin and the latter to the midrib of the carpellary leaf. Consult Da Costa, J. C., (Mod¬ ern Surgery) (7th ed., Philadelphia 1914).

SUVA, soo'va, the capital of the British colony of the Fiji Islands (q.v.). It is about 1,100 miles distant from Auckland, New Zea¬ land. It has a population of over 1,300 Europeans.

SUVALKI, soo-val'ke, Poland, (1) capital of the province of the same name, on the Czarna-Hancza, near the Prussian frontier, 152 miles northeast of Warsaw. It contains two churches, municipal buildings and a large market-place, various schools of primary and grammar grades, two breweries, etc. Pop. about 33,000. The town was taken by the Ger¬ man forces in 1915. (See War, European). (2) The province of Suvalki lies in the extreme northeastern part of Poland. In the north is covered by thickly-wooded plains and on the Prussian frontier by forests, swamps and lakes. The fertile region is at the south. The chief streams are the Niemen, Bohr, Scheschupe and Pissia. Agriculture is the principal occupation.

There are numerous factories, including tan¬ neries, distilleries and mills. There are some schools. Area, 4,763 square miles. The popu¬ lation is about 700,000, of whom 50 per cent are Lithuanians.

SUVOROFF-RIMNIKSKI, soo-vo'rof rim-nyik'skl, Alexander Vasoilievitch (Prince Italieski), a celebrated Russian general: b. in Moscow according to one account, in Finland according to another, 24 Nov. 1729; d. Saint Petersburg, 18 May 1800. He entered the army as a private, fought bravely in the war against Sweden and by his distinguished conduct dur¬ ing the Seven Years' War gained the rank of colonel (1762). He participated in the sup¬ pression of the Polish uprising of 1768-72, capturing Cracow in the first year of the con¬ flict and attaining the rank of major-general. When war with Turkey broke out in 1773, SuvorofF as general of division achieved notable victories at Turtukai and Hirsuva, and in con¬ junction with a force under Kainenskvi com¬ pleted the overthrow of the Turkish armies at Kosludji beyond the Danube. Subsequently he fought against the pretender Pugatcheff, whose overthrow was largely due to his exertions, and made successful campaigns in Crimea, against the Kuban Tatars and against the mountain tribes of the Caucasus. Upon the renewal of war with Turkey in 1787 he was entrusted with the chief command, and after inflicting decisive defeats upon the enemy at Kinburn, Otchakov and Tokshani, performed the most splendid feat of arms of the entire war by effecting the rescue of the Austrian army under the Prince of Saxe-Coburg, which was surrounded on the banks of the Rymnik by a vastly superior Turkish force, which Suvoroff utterly overthrew, gaining thereby the title of Rimnikski and the rank of count. In 1790 he stormed Ismail, where his troops were guilty of the most bloody excesses. Sent in 1794 against the Polish insurgents he gained the title of field-marshal by his storming of the Praga, suburb of Warsaw, and the occu¬ pation of the Polish capital. After five years of retirement, he was summoned to take com¬ mand of the Russian forces which were to co-operate with the Austrians against the revo¬ lutionary armies of France in Italy. At 70 Suvoroff was to achieve the most notable tri¬ umphs of his career. Arriving in Italy in April 1799 he succeeded within four months in driving the French from the northern part of the country, after he had defeated their armies at Cassano, 27 April, on the Trebbia, 17-19 June and at Novi, 15 August. Thereupon he crossed into Switzerland to effect a junction with a sec¬ ond Russian army under Korsakoff. The cross¬ ing of the Saint Gotthard pass was accom¬ plished only after fearful hardships, with the loss of one-third of his army and all his guns. In Switzerland he found that Korsakoff had been defeated by Massena and that the French were masters of the country. He thereupon began a retreat through the Grisons and Vorarlberg, in which he displayed some of the highest quali¬ ties of his generalship. Setting out on the way to Russia, after he had been named commander- in-chief of all the Russian forces with the title of Prince Italieski, he lost the favor of the

Emperor Paul before his arrival in Saint Peters¬ burg, where after a short ailment he died. Consult Smith, F., <Suworow's Leben und

Heerziige) (Vilna 1833-34) ; also his (Auto¬ biography, *edited by Glinka (1819) ; and biog¬ raphies by Polevoi (1853); Spalding (1890). Consult also Macready, E. N., (A Sketch of Suwarrow and his Last Campaign* (London 1851), and Reding-Biberegg, (Der Zug Su- worows durch die Schweiz* (Zurich 1869).

SUWANNEE, su-wa'ne, a river in southern Georgia, in the Okefinokee Swamp, which flows in a winding, generally south-southwest course through Florida into the Gulf of Mexico, about 10 miles north of Cedar Keys. It is the sub¬ ject of the popular ballad, (01d Folks at Home,* beginning ((Way Down on the Suwan¬ nee River.® Its total length is about 240 miles.

SUWARROW, soo-va'rov, or SUVAROF,

a group of islands in the Pacific Ocean, be¬ tween Samoa and the Manihiki Islands, is gen¬ erally included in the Tokelan Islands. It has important pearl fisheries. Great Britain an¬ nexed the islands in 1889.

SUYEMATSU, Kencho, Viscount, Jap¬ anese statesman, son-in-law of Marquis Hiro- bumi Ito (q.v.) : b. Bunzen, Kiusiu, August 1855. He served in the Satsuma Rebellion as civilian staff officer to the commander-in-chief of the army, and later engaged in journalism on the staff of Nichi Nichi. In 1890-95 he was a member of the Japanese House of Commons, and after he was created baron in 1895 he served in the House of Peers. He was director of the Legislative Bureau in 1892-1905; Minister of Communications in the Ito Cabinet in 1898; and held the portfolio of the Interior in the Seiyukai Cabinet in 1900-01. He served as a non-official agent for Japan in London during the Russo-Japanese War in 1904-05. He was made a viscount in 1907. He translated into English (Genji MonogatarP ; and is author of <The Risen Sun: A Fantasy of Far Japan*

(1915).

SUZZALLO, Henry, American university president: b. San Jose, Cal., 22 Aug. 1875. He was graduated at the California State Normal School in 1895, at Leland Stanford Junior Uni¬ versity in 1899 and took his Ph.D. at Colum¬ bia University in 1905. He was connected with the faculty at Leland Stanford Junior Uni¬ versity in 1902-07; was professor of the phi¬ losophy of education at Teachers' College, Co¬ lumbia, in 1909-15; and since 1915 has been president of Washington

University, Seattle. He has edited the Riverside Educational Mono¬ graphs since 1909, has lectured extensively and is a contributor to educational magazines. He was appointed chairman .of the Washington State Council of Defense in 1917.

SVERDRUP, sver'drup, Otto, Norwegian Arctic explorer: b. Harstad Farm, Helgeland, 1855. He went to sea at 17, went with Nansen to Greenland in 1888, and again in 1893, as commander of the Fram, which he brought back to Norway in 1896. He led an expedi¬ tion to the northern regions in 1898, with the intention of exploring the north of Greenland. The ‘expedition received its financial support mostly from two brothers of the name of Ring- nes, and the Norwegian government renovated and equipped the Fram for his use. On reach¬ ing Smith Sound, between Ellesmere Land and Greenland, he found it impossible to force his vessel further north through the ice, and sent

two expeditions to the southwest across Elles¬ mere Land, which penetrated a region never before explored, and found in the southern part of Ellesmere Land a large glacier district. Later in 1899 he brought the Fram down to Jones Sound, to the south of Ellesmere Land, and from there conducted a number of sledg¬ ing expeditions, exploring the southern and western portions of Ellesmere Land. On the southeast coast of Ellesmere Land, north of Jones Sound, a large bay was discovered about 100 miles in breadth and penetrating into Elles¬ mere. On the northern side .of this bay large and complicated fiords are situated. On the west coast of Ellesmere Land, in about 89° W., a large system of fiords was discovered. To the west of Ellesmere Land, about 130 miles north of the Parry Islands, Sverdrup dis¬ covered two islands, to the north and west of which nothing was visible but rough polar ice. He returned to Norway in 1902. The discov¬ ery of the islands and the mapping of the west¬ ern and southwestern coasts of Ellesmere Land are the most important results of Sver¬ drup’s expedition. He brought back also a valuable series of meteorological reports, and a representative natural history collection. In 1914—15 he led a relief expedition to the Arctic and wintered on the shores of Kara Sea. He published (New Land: Four Years in the Arctic Regions* (1904).

SVETLA, Karolina, Bohemian novelist: b. Prague, 24 Feb. 1830. She gained the attention of the literary critics by her first novel (A Double Awakening, * published in 1858. She has attained high rank in

Bohemian literature, many of her novels being translated into French, German, Polish and Russian. Among them are (Laska k basnikovi *(1860) ; (Vesnicky roman* (1869) ; (Kriz a potoka *(1871) ; <The Atheist* (1873).

SWABIA, swa'bi-a, or SUABIA (German, Schwaben), capital Augsburg, now part of the republic of Wiirttemberg, formerly a duchy in the southwestern part of Germany, occupying the area now covered by Baden, Wiirttemberg and a part of Bavaria. It extended from the Rhine on the west to the Lech on the east, and from Switzerland northward to the Rhine Palatinate. It is a mountainous country, and probably the most picturesque portion of Ger¬ many. The region was known in ancient times as Allemannia, and received its present name from the Suevi, who entered it in the 5th cen¬ tury and amalgamated with the Allemanni. In the 10th century Swabia was raised into a duchy which continued in the house of Ho- henstaufen until 1268, when it was resolved into a number of lesser principalities among whom there was continual feud. In 1488 these little states formed the famous <(Swabian League** for the purpose of securing internal peace and giving mutual aid to each other. In 1512 the emperor, Maximilian I, made Swa¬ bia one of the 10 circles into which Germany was divided, and enlarged its territory. This division continued until 1806, when the modern kingdom of Wiirttemberg was founded. (See Baden; Wurttemberg). At present the name of Swabia is retained by one of the south¬ western provinces of Bavaria. Consult Stalin, B. F., (Geschichte-Wurttemberg> (Gotha 1882-

87) ; Schneider, Eugene, (Wiirttembergische Geschichte) (Stuttgart 1896). See War, Euro¬ pean.

SWAGE (swaj) BLOCK, a heavy iron block or anvil provided with notches and perforations, used by blacksmiths in shaping metal. The swage block is so arranged that it may be readily clamped in any desired position and may as readily be released whenever it is necessary to adjust the anvil to a different posi¬ tion. The block has trunnions or journals which engage open bearings formed on the top .of the standards of the frame. The standards are connected with each other at their lower ends by bolts. Midway of their height they are con¬ nected by a clamping device which consists of a rod revolubly secured to one standard and threaded into a nut in the other standard. By operating a crank on this rod the upper ends of the standards may be drawn together to bind against the ends of the swage block and hold it from turning. Inwardly-directed flanges are formed on the standards just be¬ low the trunnion bearings, and these on being drawn inward form firm supports f.or the swage block when in

horizontal position. The re¬ cesses lying between these flanges receive and securely hold the swage block when turned to vertical position. When the swage block is held at other angles the flanges sink into grooves formed in the ends .of the block around the journals. The usual variety of notches, re¬ cesses, perforations, etc., are provided for as¬ sisting in upsetting bolts, shaping horseshoes and forming all other devices which a black¬ smith may be called upon to make. The con¬ struction of this swage block is the extreme of simplicity.

SWAIN, swan, George Fillmore, American civil engineer: b. San Francisco, Cal., 2 March 1857. He was graduated at the Massachusetts Institute of Technology in 1877 and then studied in Berlin, Germany. In 1887 he ac¬ cepted the chair of civil engineering at the Massachusetts Institute of Technology, where he remained until 1909. He also served as consulting engineer of the Massachusetts Rail¬ road Commission and was member of the Boston Transit Commission and its chairman in 1913. In 1909 he was made professor of civil engineering at the Harvard Graduate School of Applied Science. He is the author of (Notes on Hydraulics *(1885) ; (Notes on Theory of Structures* (1893) ; (Report .on the Water

Power of the Atlantic Watershed *(in Vol. XVII of the (Tenth United States Census*) and Conservation of Water by Storage*

(1915).

SWAIN, Joseph, American college presi¬ dent: b. Pendleton, Ind., 16 June 1857. He was graduated at the Indiana University in 1883, was assistant professor of mathematics in 1883-86 and full professor, 1886-91. He was called to the chair of mathematics in the Le- land Stanford Junior University in 1891, which he held till 1893, and was president of Indiana University, 1893-1902. Since the last-named date he has been president of Swarthmore Col¬ lege. He is the author of numerous scientific papers. In 1913-14 he was president of the National Education Association.

SWALLOW HOLES. See Sink Holes.

SWALLOW-TAILED BUTTERFLIES,

butterflies of the family Papilionidce, typical species of which have the hinder wings ex¬ tended into prolongations called ˆtails.® See

Butterfly.

SWALLOWS, a family (Hirundinidce) of passerine birds which are the counterpart in this order of the swifts (q.v.). This family is distinguished by the small, flat, triangular bill which has its sides gradually compressed toward the tip and the deeply cleft mouth, the margins of which bear very small bristles or none; the nostrils rounded at the base .of the bill, either exposed or covered by a scale. The wings are long, while the tail is forked in nearly all spe¬ cies and the outer feathers may be prolonged. The feet, although small and weak, are totally unlike those of the swifts, the hind toe being never versatile, the number of phalanges not different from that of ordinary birds and the squamation normal; sometimes the tarsi and toes are feathered. In striking contrast to the somber-hued swifts, many of the swallows are adorned with rich iridescent colors and some¬ times the sexes differ. Anatomically the swal¬ lows are truly passerine, but the fissirostral bill and mouth, together with their peculiar adapta¬ tions to life awing, makes them one of the most clearly circumscribed and natural families of that order. Owing to the many interesting modifications of the type the genera are nu¬ merous and many of them restricted in dis¬ tribution; but the more generalized genera, like the typical Hirundo, are, like the family, cos¬ mopolitan. About 100 species have been de¬ scribed- Belonging to the North American fauna are 10 species representing no less than seven genera, most of which are peculiarly American. The barn-swallow (Hirundo or Chelidon erythrogaster) is abundant through¬ out North America and is easily distinguished by the elongated outer tail-feathers, the lus¬ trous steel-blue color of the upper parts and the ruddy breasts. (See Barn-swallow.) The cliff or eaves swallow is colored much like the barn-swallow, but the tail is shorter and only slightly forked ; it makes retort-shaped nests outside of barns, etc., under the eaves, as it formerly did on the faces of cliffs.

One of the swallows which retains its origi¬ nal habits is the beautiful white-bellied or tree-swallow (Tachycineta bicolor). It is of a fine lustrous green above, pure white below, with a tail only slightly more forked than in the last. The tree swallow is abundant in most parts of temperate North America, but espe¬ cially so coastwise where great numbers nest in holes of trees from New Jersey northward. It is one of the first swallows to move north¬ ward in the spring and is frequently forced to retreat before a belated snowstorm or cold snap, being, therefore, one of the species to which the common saying, ((one swallow does not make a summer,® is especially applicable. In the West a related species, the violet-green swallow (T . thalassina), is found. Another conservative member of the family is the bank-

swallow, which is found in Europe as well as in America. Closely resembling it is the rough¬ wing.

Biggest, handsomest, jolliest, most domestic of American swallows and ever ready to de¬ fend his home is the purple martin (Progne

subis), a familiar species throughout temperate North America, distinguished as a genus (Progne) by the strong bill with curved edges, by the moderately-sized forked tail, and by the strong and large feet. The sexes are quite dissimilar, the male being entirely blue black, the female and young, dull sooty gray on the breast. Except in the wilds where it con¬ tinues to nest in hollow trees, it takes up its abode among the habitations of men. A com¬ mon practice is to hang up gourds, properly hollowed, for its convenience in nest-building; and in the more settled parts considerable ex¬ pense is sometimes incurred in preparing for it a suitable residence. The eggs are four to six in number and white. In the country it renders essential services by attacking and driving away crows, hawks, eagles and other large birds. Its note is loud and musical. The regularity with which this species arrives from the South is noteworthy. The western variety is distinct and another species enters Florida.

Of exotic species of swallows the Hirundo rustica takes the place in Europe of our barn- swallow. On account of its frequent use of disused chimneys for nesting places this spe¬ cies shares with the swifts the name of chimney swallow. The migration of these birds has al¬ ways attracted attention from the well-known and unvarying character of their movements. They fly southward at the end of October or sometimes sooner, to winter in Africa, some finding their way to India. The majority arrive in Great Britain in April, some stragglers later and a few coming before the great body of birds. They generally return to the nests they have constructed the previous year. The house martin (Chelidon urbica) with the tarsi and toes feathered is of small size. It is of smaller size than the common swallows, and builds its nest under the eaves of houses, in the corners of windows, etc., the nest being a hemispheri¬ cal structure of clay, with a round opening for entrance. A related species is the fairy mar¬ tin (C. arid), found in South Australia, where it arrives in August, leaving again in Septem¬ ber or October. The nest, built in some tree, under eaves or in rocks, is formed of mud, and is of flask-like shape. Each nest appears to be built by a number of these swallows. The wire-tailed swallow (C. filifcra) of Abys¬ sinia is so named from the presence of the two elongated tail-feathers, which, being un¬ provided with a web, consist of the shafts of the feathers alone, and appear as long fila¬ ments. The genus Attic ora includes the white¬ breasted swallow of South

America (Atticora cyanoleuca) , which makes its nest in the de¬ serted burrows of animals. A number of other South American swallows have similar habits, occupying the nests or holes of various birds and mammals.

Consult Sharpe and Wyatt, (Monograph of the Hirundinidae) (London 1885-94), with bib¬ liography and numerous colored plates ; For- bush, (Useful Birds and their Protection (Boston 1913) ; Wilson, American Orni- thology) (Philadelphia 1828) ; and recent works on field ornithology.

SWAMMERDAM, swam'mer-dam, Jan, Dutch naturalist: b. Amsterdam, 12 Feb. 1637; d. there, 15 Feb. 1680. He was educated for the ministry but turned his studies to the pro-

fession of medicine. fie was devoted es¬ pecially to the study of insects; and his (Gen¬ eral History of Insects > and other works laid the foundations -of the modern science of en¬ tomology. These works include (Tractatus de Respiratione usuque PulmonunP (1667; All- gemeene verhandeling van bloedeloose dierjes* (1669) ; (Biblia Naturae, sive Historia Insecto- rum in certas classes Redacta) (1737-38).

SWAMP. See Bog.

SWAMP ANGEL, in the American Civil War the popular name of an 8-inch Parrott gun, so called by the Federal soldiers. It was mounted on a battery constructed on piles driven into the swamp near Charleston, S. C., and was used in the siege of that city. It burst 22 Aug. 1863, and was sent with a lot of old metal to Trenton, N. J. The gun was rescued from its impending fate and set on a granite base on the corner of Perry and Clinton streets in the city of Trenton.

SWAMP DEER, or BARASINGHA, an

East Indian deer (Cervus duvaucelli) , about four feet in height, rich light yellow in color, found in large herds in moist situations. The antlers are large, with a long beam which branches into an anterior continuation of the main portion, and a smaller posterior tine which is bifurcated.

SWAMP GRASS. See Grasses in the United States.

SWAMP HICKORY. See Hickory.

SWAMP LAND GRANTS. The need of reclaiming the swamp and - overflowed lands within the territory of the United States was brought to the attention of Congress in the early part of the 19th century. It was not, however, until the Act of 2 March 1849 that Congress made provision for the reclamation of such lands. This Act applied exclusively to the State of Louisiana, and provided that in order to aid the State in constructing the necessary levees and drains to reclaim the swamp and overflowed lands therein the whole of such lands that may be found unfit for cultivation were granted to the State with the proviso that the proceeds of the sales of all such land shall be applied exclusively as far as necessary to the construction of levees and drains for their reclamation.

This was followed by the Act of 28 Sept. 1850 which provided for a similar grant to the State of Arkansas. This act contained a sec¬ tion which extended its benefits to each of the other States of the Union in which such swamp and overflowed lands may be situated.

By the Act of 12 March 1860 the provisions of the Swamp Acts were extended to the States of Minnesota and Oregon which had been admitted to the Union since the passage of the Act of 1850. The reasons assigned for these grants were the worthless character of the lands in their present condition, the un¬ healthful effects of these lands ancj the en¬ hancement in value of the adjoining govern¬ ment property.

At the time of this legislation it was es¬ timated that the area of lands involved would be about 5,000,000 acres. However, up to 30 June 1918 there had been conveyed to the several States under these grants 64,258,731.04

acres. In addition there have been granted to the States 7 44,385.23 acres as indemnity f<or lands which had been disposed of to settlers prior to the time when the several grants be¬ came effective and also a cash indemnity in lieu of lands which would otherwise have been granted, amounting to $2,095,466.70. Com¬ paratively small additional claims are coming in under these grants.

In spite of these liberal grants of land and money the States have not drained the great body of land actually granted and in many cases the proceeds from the sales of the lands have been used for other purposes. The same reasons for reclaiming these lands which formed the original basis for these grants, therefore, still exist and the United

States government has in recent years spent consid¬ erable sums to aid in the development of plans for the reclamation of small bodies of these swamp lands. There has also been a wide¬ spread sentiment that something definite should be done to make these lands available for agricultural purposes as the area of actual swamp land in the United States is estimated at from 75,000,000 to 80,000,000 acres.

Morris Bien.

SWAMP LOCUST. See Locust.

SWAMP RABBIT, or WATER HARE.

See Hares.

SWAMP SASSAFRAS. See Magnolia.

SWAMPSCOTT, swomp'skot, Mass., town in Essex County, on Massachusetts Bay, and on the Boston and Maine Railroad, about 12 miles northeast of Boston and two miles northeast of Lynn. The town contains the villages of Beach Bluff, Mountain Park, Phillips Beach and Swampscott. It is a favorite watering place, and has an excellent beach and good accommo¬ dations for transient guests. There are several churches, a town high school, district schools, a public library and several private . schools. Most of the inhabitants are employed in Lynn. Pop. (1920) 8,101.

SWAN, James, American soldier and au¬ thor: b. Fifeshire, Scotland, 1754; d. Paris, 18 March 1831. He came to Massachusetts at an early age, became an artillery captain, a mem¬ ber of the legislature in 1778, and was subse¬ quently adjutant-general of the State. He went to Paris in 1787 where he wrote (Causes qui sont opposees au Progies du Commerce entre la France et les Etats-Unis de l'Amerique5 (1790). He returned to America in 1795 only to go back to France in 1798. In 1815 he was arrested and imprisoned for 15 years at the suit of a German with whom he had had busi¬ ness relations. Among other books of his are (On the Fisheries) (1784) ; fisheries of Massa-chusetts) (1786).

SWAN, John Macallan, English sculptor: b. Old Brentford, 1847 ; d. 1910. He studied at the Worcester School of Art and the Lambeth Art School and under Gerome and Fremiet in Paris. In 1885 he received honorable mention at the Salon, and in 1889 received the silver medal at the Paris International Exhibition. He received the first and second gold medals at Munich and the first class gold medal for painting and the first class gold medal for sculpture at Paris, 1900. Most of his

sculptures are studies of animals and in representing the

cat tribe he is particularly successful in giving vivacity and vitality to the rapid furtive ad¬ vance of the leopard or tiger. His principal works are ‘Leopard Running) ; (The Prodigal Son) ; ‘Lioness defending her C'ubs) ; (Polar Bears Swimming*; (A Dead Hero) ; ‘The Jaguar* ; (Puma and Macaw) (1900); (Wounded Leopard*; ‘Tigers Drinking, '* owned by Henry Frick, New York; ‘Ceylon Leopards. *In 1905 he was made a Royal Academician. Consult Baldry, ‘J. M. Swan R.A.* (New York 1905).

SWAN, Joseph Rockwell, American ju¬ rist: b. Westernville, N. Y., 28 Dec. 1802; d. Columbus, Ohio, 18 Dec. 1884. He removed to Columbus, Ohio, in 1824 and was there ad¬ mitted to the bar. He was prosecuting attorney in 1830-34, and judge of the Court of Common Pleas (1834-45). In 1854 he became judge of the Supreme Court and 1859 rendered his most im¬ portant decision. The United States District Court in Ohio had sentenced a prisoner for violating the Fugitive Slave Law. Under a writ of habeas corpus the Supreme Court of the State sought to set aside the sentence, but it was sustained by Judge Swan, who declared that the State could not reverse the decisions of the United States courts. His publications in¬ clude ‘Treatise on Justices of the Peace and Constables in Ohio) (1836) ; ‘Statutes of Ohio) (1841) ; ‘Manual for Executors and Ad¬ ministrator (1843); ‘Practice in Civil Ac¬ tions and Proceedings at Law in Ohio and Precedents in Pleading* (1845); ‘Swan’s Pleadings and Practice) (1851); ‘Com¬ mentaries on Pleadings under the Ohio Code)

(1860).

SWAN, Sir Joseph Wilson, English in¬ ventor: b. Sunderland, 31 Oct. 1828; d. 1914. He invented the carbon process of making autotypes, and with Woodbury introduced Woodburytype. To him also is due the in¬ vention of the dry plate, which has revolution¬ ized photography. His name is, however, best known in connection with a form of incan¬ descent electric lamp devised by him, which was the earliest in date of the many electric lamps now in use. His other inventions in¬ clude a miner’s electric safety-lamp, and vari¬ ous improvements in photo-mechanical printing and electro-metallurgical deposition. He was a knight of the Legion of Honor, and in 1898- 99 he was president of the Institution of Electrical Engineers. He was knighted in 1904.

SWAN, a sub-family (Cygnincc or Oloridce) of the duck family, characterized by great size and length of neck. The swans have the legs (tarsi) short and reticulated, the front toes being stronglv webbed, while the hind toe is not webbed, and has no lobe; and the loral region (between the eyes and the bill) is naked.

In the water the swans are the type of grace and beauty of figure, the long arched and flex¬ ible neck, the elevated wings, and their buoyancy and skill in turning and gliding over the sur¬ face, all contributing toward this effect. On land, however, the very posterior position of the legs renders them awkward and slow. Un¬ like the fussy ducks and geese there is a calmness and dignity about the behavior of swans which has always excited admiration and has caused these birds to figure much in poetic literature. Swans are generally quiet birds

and some appear to be constitutionally mute, but most of them possess the most powerful and sonorous voices, though none of the musi¬ cal ability attributed by poets to their death song. Ihese great vocal powers are due to the sounding apparatus developed by the coil¬ ing of the greatly elongated trachea within the sternum, much after the fashion of the same organ in certain cranes (q.v.). Not over 10 clearly marked species of true swans are known the world over and nearly every part of the world has its one or more species, for these birds are strong of wing and wide ranging. No species, however, breeds in Africa. They are arranged in four or five genera.

The North American swans belong to the genus Olor, distinguished from the typical Cygnus by purely technical characters. The two species, the whistling swan (O. columbianus) and the trumpeter swan (O. buccinator) are much alike in appearance, being chiefly white, but the latter is the larger, attaining a length of five feet and a spread of eight feet. And the tail contains 24 quill feathers, whereas the whistling swan has but 20. The former is the more widely distributed and the one usually seen on both the Atlantic and Pacific coasts, while the trumpeter swan is most characteris¬ tic . of the _ Mississippi Valley, up and down which it migrates, breeding in the upper parts and wintering along the Gulf coast. The whistling swan breeds only in the far north entirely beyond the limits of the United States. It winters in considerable numbers in Chesa¬ peake Bay and the sounds of North Carolina. They associate with wild geese and like these feed largely upon water plants. On account of their large size they are considered great prizes among gunners, but the younger birds, dis¬ tinguished by the duskiness of their plumage and their less brazen voices, are preferred for table use. The nests are on the ground and are lined with

dried grass and down. The two to five eggs are about four and one-half inches long and of a yellowish-white color. Except for the differences resulting from its distribu¬ tion and fresh-water habitat the habits qf the trumpeter swan hre essentially similar.

The common domesticated white or mute swan (Cygnus olor) is a native of Europe, Asia and Africa. Those of Great Britain are all of the introduced domesticated variety. The swan has, from a very early date, been especially pro¬ tected by both legal and regal interference. In Henry VII's reign the theft of a swan's egg was deemed an offense punishable by a year's imprisonment; and the theft of a swan itself was very severely punished. Swans at a prior date were declared to be exclusively "royal® or "king's® property; and no subject was entitled to hold possession of these birds, save under special favor from the sovereign. To such subjects as possessed the permission to keep swans a special "swan® mark was attached, and this mark was cut on the bill of the birds as a distinctive badge of ownership. The process of marking is known as "swan-uppine®* or "hopping,® and the ceremony in the Thames on the part of the Crown and of the Dyer's and Vintners' companies takes place on the first Monday in August. At the present time but few swanneries remain, but in some places cygnets are carefully raised and bred for the market and a few of these birds are kept for

ornamental purposes in most large parks. Sev¬ eral other wild species occur in the Old World and one true swan in South America. The black swan (Chcnopsis atrata) is an Australian species, first discovered in 1698; the general plumage is black, the bill being deep red, the primary wing-feathers white and the trachea does not enter the sternum. It is well known in the United States as an ornamental bird. Consult Beebe, C. W., 'The Swans) (in 'Tenth Annual Report of the New York Zoological Society, } New York 1906) ; Stejneger, 'Pro¬ ceedings U. S. Nat. Mus.* (Washington 1882) ; Newton, 'Dictionary of Birds) (Vol. IV, Lon¬ don 1896) ; Grinnell, 'American Duck Shoot- ing) (New York 1901).

SWAN, Knight of the, according to a legend of the lower Rhine, a knight who comes from an unknown country in a boat drawn by a swan, delivers a prince's daughter from her hated suitor and marries her himself, and after¬ ward is obliged to leave her since in spite of his forbidding her to do so she inquires and learns his origin, her

ignorance of which is the sole condition of his remaining with her. This fable, which has parallel forms in the earliest mythologies, is varied in many ways by the poets and story-tellers of the Middle Ages. Thus in the French variant ‘Roman du Chevalier au Cygnet Godfrey de Bouillon is the hero of the story. This version is followed by the unknown author of the tale ‘LohengriiP ; while Conrad of Wurzburg in his poem, ‘The Swan Knight, } places the incident in the days of Charlemagne. Consult Hagen, ‘Die Schwanensage) (1845) ; Muller, ‘Die Sage vom SchwaneiP ; Jaffray, ‘Two Knights of the Swan* (New York 1910) ; Newell, W. W., ‘Legend of the Holy GraiP (Cambridge, Mass., 1902).

SWAN, Order of the, an order of knight¬ hood created in 1440 by the Elector Frederick II of Brandenburg. Its headquarters were in a monastery on a hill near Brandenburg and in Ansbach. It was composed of members of the nobility and its object was to encourage more enthusiastic homage to the Virgin Mary, and perseverance in works of mercy. The order was abolished at the time of the Reformation, but was revived by Frederick William IV of Prussia 24 Dec. 1843 in the form of a free asso¬ ciation of men and women of all ranks and creeds for the purpose of alleviating the moral and physical misery of others. Consult Hanle, ‘Urkunde und Nachweise zur Geschichte des Schwanenordens* (1874).

SWAN MAIDEN, The. See Valkyries. SWAN RIVER. See Australia, West.

SWANEVELT, svan'e-felt, Hermann, Dutch painter: b. Woerden, 1618; d. Rome, 1690. He set out for Italy when very young, carefully studied the scenery of its beautiful districts and, captivated by the pictures of Claude Lorraine, became a scholar of this famous master. He equaled, or perhaps sur¬ passed, his master in his figures both of men and animals, and will always hold a first place among the greatest of landscape-painters. His etchings, 116 in number, partly of subjects of his own invention and partly of actual scenery, are very much admired. His pictures, even during his lifetime, brought very high prices.

SWANK, James Moore, American econo¬ mist: b. Westmoreland County, Pa., 12 July 1832; d. 21 June 1914. He -founded the Johns¬ town Tribune, 1853; was chief clerk Agricul¬ tural Department, 1871-72; secretary American Iron and Steel Association 1873-85. He is the author of ‘History of Iron in all Ages) ; ‘Iron Making and Coal Mining in Pennsyl¬ vania^ and over 50 tracts on the tariff question.

SWANSEA, swon'se, or ABERTAWE,

Wales, an important seaport, capital of the county of Glamorgan, on the right bank of the river Tawe, at its mouth in Swansea Bay, 35 miles west-northwest of Cardiff. The town con¬ tains a fine town-hall with a Corinthian faqade ; the Royal Institution of South Wales, including a library, museum, etc.; a large building in which are housed the public library, art gallery and schools of science and art; a grammar, tech¬ nical and other schools; the general hospital, a deaf and dumb institution, a blind asylum, etc.; remains of an ancient castle dating in its present form from the 16th century, though first built in 1099; and several public parks. The harbor is an excellent one with ample modern docks. The staple industries are the smelting and refining of copper, gold, silver and pyrites, which are imported for the purpose from many countries, the manufacture of tin¬ plate and the working of iron, steel, zinc, nickel, lead and other metals. Chemicals, patent fuels and alkali are also made in consid¬ erable quantity, and there are flour-mills, ship¬ building yards, etc. Swansea is also a leading seaport, its imports average annual value $22,- 000,000, being chiefly the raw material for its metallurgical industries, wheat and other grains, sugar and timber; and its exports average an¬ nual value $30,000,000, mainly coal, coke and patent fuel, iron and iron and steel manufac¬ tures, wrought and unwrought copper and chemical products (dyestuffs, sulphate of cop¬ per and carbide of calcium). The vessels an¬ nually at the port have an average total ton¬ nage entered and cleared of about 5,000,000 tons. Swansea has municipal tramways worked by electricity, and the town is served by the Great Western, London and North-Western, Midland and some local Welsh railways. The first charter of the borough was granted by King John, and subsequent charters were con¬ ferred by Henry III, Edward II, Edward III and Cromwell. The copper industry of the town began to attain importance early in the 19th century, and since about 1830 the town has rapidly advanced in consequence of the development of this and other industries. Pop.

114,663.

SWANSON, Claude Augustus, American senator: b. Swansonville, Va., 31 March 1862. He was graduated at the Randolph-Macon College in 1885 and at the University of Virginia in 1886, afterward engaging in law practice at Chatham, Va. He served in Congress as a Democrat in 1893-1905, when he resigned after re-election, and in 1906-10 he was governor of Virginia. In 1910 he was appointed United States senator to fill the unexpired term of John W. Daniel, and was subsequently elected to that office for the terms 1911-17 and 1917-23.

SWANTON, John Reed, American ethnol¬ ogist : b. Gardine., Me., 19 Feb. 1873. He was graduated at Harvard University in 1896, later

Ill

studied at Columbia University and took his Ph.D at Harvard in 1900. He has been ethnologist of the Bureau of American Ethnol¬ ogy, Washington, since 1900. Author of < Con¬ tributions to the Ethnology of the Haida) (1905); (Haida Texts and Myths* (1905);

Social Conditions, Beliefs and Linguistic Re- lationship of the Tlingit Indians *(1904-05) ; .Tlingit Myths and Texts* (1909); <Haida* w 11 ' Incˆan Tribes of the Lower Mississippi

Valley and the Adjacent Coast of Mexico *(1911), etc. He is joint author of dictionary of the Biloxi and Ofo Languages* (1912) ; (Anthropologv in North America) (1915), etc.

t SWARTHMORE (swarth'mor) COL¬ LEGE, located at Swarthmore, Pa. It was founded by the liberal (or Hicksite) body of

ioa Society Fiends,, and was first opened in 1869. The main building was destroyed by fire in 1881, but was immediately rebuilt. The col¬ lege now confers regularly but one baccalaure¬ ate degree, that of A.B. This was the original custom until 1874, when the practice of confer¬ ring the three degrees- of A.B., B.S. and B.L., and the special degree of bachelor of science in civil engineering was adopted; in 1903 the college returned to its first practice. Courses in engineering and mechanic arts are offered, and provision is made for a special course leading to the degree of bachelor of science in civil engineering. The A.B. course includes certain prescribed studies, one major study in any one department in which three full years of college work must be completed, and electives to com¬ plete the required number of hours. The pre¬ scribed studies include English, Bible study, history or economics, at least one language and one science, and mathematics, or engineering. In the departments of biology, chemistry and physics courses are planned to prepare for the study of medicine. The degrees of master of arts and civil engineer are conferred for graduate work. Swarthmore has been from the first a coeducational college, being the sec¬ ond institution east of the Alleghany Moun¬ tains to offer instruction to men and women on absolutely equal terms. Though it is a small college, and not a university, it is especially well equipped for an institution of its size,

especially in the science and engineering departments. It has a campus comprising more than 200 acres, bordered by the gorge of Crum Creek, and in¬ cluding the farm on which Benjamin West, the artist, was born. The chief buildings are Par¬ rish Hall (the main building), Science Hall, the observatory, the two gymnasiums, the presi¬ dent's house and residences of the professors, Wharton Hall (a new dormitory). There are two fellowships and 17 scholarships. The pro¬ ductive funds amount to about $1,600,000 and the annual income to $170,000, the library con¬ tains 35,000 volumes, including the Friends' Historical Library. The students number 450 and the faculty about 50.

SWASTIKA, a symbol of the sun in the nature-religions of Aryan races from Scan¬ dinavia to Persia and India; and similar devices occur in monumental remains of the ancient Mexicans and Peruvians, and on objects ex¬ humed from prehistoric burial mounds within the limits of the United States. The Swastika consists of a Greek cross, either enclosed in a circle the circumference of which passes through

its extremities 0, or with its arms bent back thus 0, and it is found invariably asso¬ ciated with the worship of the Aryan sun-gods (Apollo, Odin), it is believed to represent the sun. Consult d'Alviella, Eugene Goblet, (La migration des symboles) (Paris 1891) ; de Milloue Leon, (Le Svastika) (in Annales dn Musee Ghumet, Vol. XXXI, Paris 1909) ; Wil¬ son, Thomas, (The Swastika, the Earliest Known Symbol and its Migration (in United States National Museum, Annual Report, 1894, Washington 1895).

SWAT, swat, India, a territory or district of the Northwest Frontier Province, occupying the valley of the Swat River, north of Peshawar and south of Chitral. It was well known to the ancients, but seldom visited by Europeans until the uprising of the frontier tribes in 1895. It is a narrow valley between lofty mountains, and inhabited by industrious, liberty-loving Afghan tribes. Pop. about 40,000.

. SWATOW, swa-tow', China, a treaty port in the province of Kwang-tung, situated at the mouth of the Han River, 175 miles northeast of Hongkong. The total trade of the port amounts to nearly $34,000,000 annually. The chief ex¬ ports are sugar, tobacco, cloth and fruits. The port was opened to foreign trade in 1858. The imports reach annually the sum of about $30,- 000,000, and the exports to $11,000,000. Pop

66,000.

. SWAYNE, swan, Noah Haynes, American jurist: b. Culpeper County,

Va., 7 Dec. 1804; d. New York, 8 June 1884. He was admitted to the bar in 1823; settled in Coshocton, Ohio, in 1825; and was prosecuting attorney of the county in 1826-29. In the latter year he be¬ came a Democratic member of the legislature. He was United States district attorney for Ohio in 1831-41. He was an associate justice of the United States Supreme Court in 1862- 81. In the latter year he resigned owing to ad¬ vanced age.

SWAZILAND, swa'ze-land, South Africa, a native state between the Drakensberg and Lo- bombo ranges, on the borders of the Transvaal. Its surface is mountainous but fertile, and it is thought to contain rich gold and coal deposits. It possesses fine prairies, which offer fine pas¬ turage, especially in winter. There are also ex¬ tensive forests which contain fine timber — a rarity in South Africa. Water is plentiful, the climate is healthful. The Swazis are a Zulu tribe and were subject to the intrigues of Great Britain and the Transvaal. The Boers obtained supremacy in 1895, which passed with their conquest and annexation by England in 1902. Authority passed to the high commissioner of South Africa in 1906. The Roman-Dutch law is in force. The British resident commissioner is located at Mbabane. Area, 6,536 square miles. Pop. 107,117.

SWEABORG, sva'a-borg, or SVEABORG,

Finland, a fortress and naval arsenal, three miles southeast of Helsingfors, which it de¬ fends, on a series of islands in the Gulf of Finland. The fortifications are so important as to entitle the islands <(The Gibraltar of the North.® The principal works occupy five is¬ lands which are connected by bridges. The is¬ land of Bargo contains the chief military de¬ partments, arsenal and school of marines ; the

shipping docks hewn in solid rock, powder magazine and the monument to the Swedish Field-Marshal Ehrensvards, who erected the fortifications. The strongest fort stands on the island south from here and is called Gus- tavsfard. Sweaborg was taken by the Russians in 1808; in 1855 it was bombarded by the French and English allied troops. After the revolution in Russia in 1917 Sweaborg was taken by the Finns, and upon the establishment of Finland as an autonomous state it was incorporated therein. Civil pop. about 1,000.

SWEARING, Profane, the use of oaths in a light and familiar manner

by way of assevera¬ tion or emphasis. As popularly understood, (<profane swearing® involves also many terms of a gross and obscene character. Profane swear¬ ing and cursing are made punishable in England by the Act of 19 Geo. II, ch. xxi, which pre¬ scribes a graded tariff of penalties for offenders according to their social rank: for each profane oath or curse a laborer, soldier or sailor incurs a penalty of a shilling; other persons under the rank of gentleman two shillings; a gentleman or any one above that rank, five shillings. In several of the States of the American Union profane swearing is variously declared punish¬ able by the statutes. See Blasphemy.

SWEAT. See Perspiration.

SWEATMAN, Arthur, Canadian Anglican archbishop: b. London, England, 19 Nov. 1834; d. Toronto, Canada, 24 Jan. 1909. He studied at the University of London and was graduated at Cambridge University in 1859. He was or¬ dained priest in 1860 and in 1865 he removed to Canada where he became head master at Hell- muth Boys' College, London, Ontario, a posi¬ tion he occupied in 1865-72 and 1874-76. He was chaplain to the bishop of Huron, and secre¬ tary to the Synod of the diocese of Huron in 1872-79, and held other offices in the Church. He became canon of the cathedral at London, Ontario, in 1875 and was made archdeacon later in that year. In 1879 he was appointed bishop of Toronto, and in 1907 he became archbishop, metropolitan and primate of all Canada.

SWEATING SICKNESS, a febrile epi¬ demic disease of extraordinary malignity which prevailed in Europe, particularly in England, at different periods toward the end of the 15th century and the beginning of the 16th. It ap¬ pears to have spared no age nor condition, but is said to have attacked more especially persons in high health, of middle age and of the better class. Its attack was very sudden, producing a sensation of intense heat in some particular part, which heat afterward overspread the whole body, and was followed by profuse sweating, attended with insatiable thirst, restlessness, headache, delirium, nausea, an irresistible pro¬ pensity to sleep and great prostration of strength. The patient was frequently carried off in one, two or three hours from the erup¬ tion of the sweat. It seems to have first ap¬ peared in the army of the Earl of Richmond upon his landing at Milford Haven in 1485, and soon spread to London. This body of troops had been much crowded in transport vessels, and was described by Philip de Comines as the most wretched that he had ever beheld, col¬ lected probably from jails and hospitals, and buried in filth. It broke out in England four

times after this, in 1506, 1517, 1528 and 1551. The process eventually adopted for its cure was to promote perspiration and carefully avoid ex¬ posure to cold. The violence of the attack generally subsided in 15 hours. The disease is endemic in parts of Picardy, France, and in Italy, being known in the latter country as mili¬ ary fever. In 1906 there was an epidemic in France. It appears to be allied to influenza. Compare the epidemic of the latter disease in the armies operating in Picardy in 1918, whence it spread throughout the world. Consult Hecker, J. F. K., (Epidemics of the Middle Ages> (London 1859) and Osier,, W., (Modern Medicine) (Philadelphia 1914).

SWEATING SYSTEM. See Factories and Factory Inspection; Factory System, The.

SWEDBERG, svad'berg, afterward SWE¬ DENBORG, swe'dn-borg, Swed. sva'den-borg, Emanuel, Swedish theologian : b. Stockholm, 29 Jan. 1688; d. London, 29 March 1772. His father, Jesper Swedberg, was a chaplain and court-preacher to. the king, Charles XI. Swedberg's paternal ancestors had been opulent miners in the province of Dalecarlia, and it is also claimed that the heroic blood of Engelbrecht, who liberated Sweden from Denmark in 1434, flowed in his veins. On the side of his mother, Sarah Behm, he descended from Gustavus Wasa, king of Sweden from 1523 to 1560. The name (<Swedberg,® as well as Swedenborg, which was given to the family later when they were ennobled, was derived from (<Sveden, by which name the homestead was called, and which means a clearing in the forest made by fire.

About all that is known of Swedenborg's childhood and early youth is contained in his autobiographical statements made in two let¬ ters, one to Dr. G. A. Beyer, a celebrated clergyman of Sweden, the other to Rev. Thomas Hartley, of the Established Church in England. In the former he writes: <(From my fourth to my 10th year I was constantly engaged in thought upon God, Salvation and the spiritual ills of mankind; and several times I revealed things at which my father and mother wondered ; saying, that angels must be speaking through me. From my sixth to my 12th year I used to delight in conversing with clergymen about faith, saying that the life of faith is love, and that the love which imparts life is love to the neighbor; also that God gives faith to every one, but that those only receive it who practise that love. I knew of no other faith at that time, than that God is the Creator and Preserver of Na¬ ture, that he imparts understanding and a good disposition to men, and several other things that follow thence. I knew nothing at that time of that learned faith which teaches that God the Father imputes the righteousness of his Son to whomsoever, and at

such times, as he chooses, even to those who have not re¬ pented and have not reformed their lives. And had I heard of such a faith, it would have been then, as it is now (1769), above my compre¬ hension.®

In the second letter he says : ((In the year 1710 I went abroad. I proceeded first to Eng¬ land, and afterward to Holland, France and Germany, and returned home in the year 1714.

In the year 1716, and also afterward, I had many conversations with Charles XII, king of Sweden, who greatly favored me, and the same year offered me an assessorship in the College of Mines, which office I filled until the year 1747, when I' resigned it, retaining, however, the official salary during my life. My sole object in tendering my resignation was that I might have more leisure to devote to the new office to which the Lord had called me. A higher post of honor was then offered me, which I positively declined, lest my heart should be inspired with pride. In the year 1719, I was ennobled by Queen Ulrica Eleanora, and named Swedenborg; and from that time I have taken my seat among the nobles of the rank of knight¬ hood, in the triennial Diet of the Realm. I am a Fellow and Member, by invitation, of the Royal Academy of Sciences in Stockholm; but I have never sought admission into any literary society in any other place, because I am in an angelic society, where such things as relate to Heaven and the soul are the only subjects of discourse ; while in literary societies the world and the body form the only subjects of discus¬ sion.® In the same letter he speaks of his special mission as follows : (<I have been called to a holy office by the Lord Himself, who most mercifully appeared before me, His servant, in the year 1743 ; when He opened my sight into the spiritual world, and enabled me to converse with spirits and angels, in which state I have continued up to the present day (1769). From that time I began to print and publish the various arcana that were seen by me or revealed to me, concerning Heaven and Hell, the state of man after death, the true worship of God, the spiritual sense of the Word, besides many other most important matters conducive to sal¬ vation and wisdom. The only reason of my jour¬ neys abroad has been the desire of making myself useful, and of making known the arcana that were entrusted to me. Moreover I have as much of this world's goods as I need, and I neither seek nor wish for more.®

In the year 1709 Swedberg finished his studies at the University of Upsala. In Sep¬ tember 1710 he went to London, where for two years he studied astronomy, chemistry, physics, mathematics and other sciences. Then he jour¬ neyed through Holland to Paris and after a full year of studies and researches there proceeded to Germany in pursuit of knowledge at the universities, returning to Sweden in 1715.

During the following five years Swedberg wrote 21 separate treatises and works on vari¬ ous scientific and practical subjects. Among these were descriptions of his own discoveries and inventions in science and the mechanic arts, as the construction of air-pumps, ear-tubes and flying machines, improvement in mining and smelting ores, the building of sluices and canals, the nature of fire and color, the manu¬ facture of salt, the regulation of the coinage, and various astronomical, geological and mathe¬ matical subjects, besides an important and orig¬ inal little work on <Tremulation,) being a the¬ ory of sensation in the human body. Up to this time Swedberg had written in Swedish for the most part, but afterward all his works were published in the Latin language.

In 1719, as above mentioned, the family was ennobled and took the name Swedenborg. In

vol. 26 — S

1721 Emanuel Swedenborg set forth again on a Continental tour of 15 months, publishing the same year at Amsterdam treatises on (Chem¬ istry, y on (Iron and FireP and astronomical and mechanical subjects. At Leipzig in 1722 he published his Miscellaneous Observations on Natural Things.) Returning to Stockholm he devoted the next 11 years to his duties in the College of Mines, his office in the Diet, and in elaborating a great work on the theory of cre¬ ation or cosmogony which he published at Leipzig in 1734 while on a third foreign jour¬ ney. This treatise, the respectively. The same year he published (Outlines of a Philosophical Argument on the Infinite, etcP The next year was devoted to duties at home, and the prepara¬ tion of an extraordinary work on the (Brain. > In 1736 he left Sweden for a fourth time, trav¬ eling by way of Hamburg and Amsterdam to Paris, where he remained through the follow¬ ing year, proceeding to Rome in 1738. The next year he returned to Paris and in 1740 pub¬ lished at Amsterdam the (Economy of the Ani¬ mal Kingdom, Part IP The next year he pub¬ lished at the same place the second part of this remarkable work on the composition, essence and circulation of the blood; the arteries and veins, the heart and brain; the circulation in the foetus, etc. Swedenborg's ruling aim and end in all his work now

was to discover, if pos¬ sible, the soul. Says he : (<Bending my course inward continually, I shall open all the doors that lead to her, and by Divine permission, con¬ template the soul itself.®

(The Animal KingdomP a great work elab¬ orating still further a rational and philosophical view of human anatomy, was published in The Hague in 1744. It is notable that many of the doctrines in these books, discoveries and con¬ clusions original with Swedenborg, have since been confirmed by modern investigation, but the honor has. been attributed to others. Among such anticipations may be mentioned, the true office of the lungs; the animation of the brain, and of its coincidence, during formation, with the systole and diastole of the heart, and after birth, with the pulmonary respiration ; the vital¬ ity of the blood, etc.

In 1745 appeared at London his (Worship and .Love of Godp the last of his publications previous to the opening of his spiritual sight, when he became a seer and revelator. He records three manifestations of the Lord to him calling him to his new office. The first was in 1743 in Amsterdam during a ˆpreternatural sleep.® The second was at Delft in Holland in 1744 when, as he says, the Lord manifested himself in person and spoke with him. ((It was a countenance with a holy expression, and such that it cannot be described; it was smiling, and I really believe that his countenance was such during his life upon earth.;

The third appearance of the Lord to him, Swedenborg relates, was in 1745 in London when the Lord manifested himself again in per¬ son, commissioning Swedenborg and calling him to the office of revealing the Doctrine of the New Jerusalem. ((From that day,® he says, ((I gave up the study of all worldly science and labored in spiritual things, according as the Lord

commanded me to write.® Then followed two years of preparation and illumination before it may be said that he was gifted with a full state of inspiration and a perception of the in¬ most or celestial sense of the Word.

From 1748 to 1756 the (Arcana Coelestia* in eight vols., quarto, was published in London. This work, the first of Swedenborg's Theolog¬ ical and Doctrinal series, sets forth the internal sense of Genesis and Exodus as it was revealed to himt he declares, immediately by the Lord alone. Then followed (1758) (Heaven and Hell,5 describing the

spiritual world and the life of man after death, as well the happy state of the blessed as the miserable lot of the infernal. In the same year appeared (The White Horse) ; (The Earths in the Universe) ; (The Last Judgment ; (The New Jerusalem and its Heavenly Doctrine. 5 During 1757-59 Swedenborg was engaged upon an explanation of the spiritual sense of the Apocalypse, which work he left uncompleted after writing 1,992 pages. It was published in 1785-89. (The Last Judgment describes that event itself which, as he testifies, Swedenborg witnessed in the spirit¬ ual world in 1757. (The New Jerusalem and its Heavenly Doctrine) teaches that the New Jerusalem means the New Church now being established both in the natural and spiritual worlds, the doctrine of which is called Heav¬ enly because it is received by angels and will be received on earth by men of angelic minds. In

1763 appeared (The Four Doctrines of the New Jerusalem: The Lord, The Sacred Scripture, Life and Faith,5 which as revealed in the Word are fundamental teachings of the Church; and <The Divine Love and Wisdom5 treating of the Lord as the Sun of heaven, the Creator of the Universe; of the nature of the Divine and its method and order in bringing ultimate finite and human creatures into existence and being. In

1764 (The Divine Providence5 was published, showing how the created universe is perpet¬ ually sustained and setting forth the laws of God by which he governs man in even the least things of his life to eternity. (The Apocalypse Revealed5 (1766), discloses the internal and real meaning of the (< Apocalypse55 or <(Revela- tion,55 describing the New Jerusalem as to its quality of life among all who receive the Heav¬ enly Doctrine in this world and by obedience to its teachings are inaugurated by the Lord into his New Church. (Delights of Wisdom Concerning Conjugal Love5 (1767-68) setting forth the laws of spiritual and eternal marriage which must exist between the souls of wedded consorts. Disclosing the insanities and horrors of adultery together with a prescription of laws for the preservation of the conjugal quality in the mind, in the heart and in the life of the man who is unmarried but who regards marriage as a heavenly and blessed estate and condition. (The Brief Exposition of the Doctrine of the New Church5 (1768-69) wherein is shown the utter variance of the theological dogmas pre¬ vailing throughout what is known as the Chris¬ tian world, both in the Roman Catholic and Protestant churches, from the genuine doctrine of the Scriptures. In the preparation of this work Swedenborg had especially in view the clergy of the Christian church and he distrib¬ uted the book to them and to theological semi¬

naries in Europe. The last and crowning work of this series of philosophical and doctrinal ex¬ positions of the Internal Sense of the Word and of the nature of the Spiritual World is (The True Christian Religion or the Universal The¬ ology of the New Church5 (1771). In this book is presented a general view of the Doc¬ trines of the New Church fully explained to¬ gether with wonderful accounts of things seen and heard in the Spiritual World related by Swedenborg as a witness thereof.

Among the writings of Swedenborg pub¬ lished since his decease may be specially men¬ tioned (The Spiritual Diary5 (1748-65), com¬ prising a chronicle in the form of notes about persons and things in the Spiritual World, memorable for one reason or another, which he either met or was in some way concerned with on account of his mission.

In another posthumous little work, (The Consummation of the Age,5 etc., Swedenborg explains that now is the end of the Christian Church, the Second Advent of the Lord and the beginning of the -New Church which is sig¬ nified by the (<New Jerusalem55 in John's Apocalypse.

Bibliography. — Complete edition of works issued in England by the Swedenborgian Soci¬ ety of London, also concordance by J. F. Polk (6 vols., 1888 et seq.). There is also the edition of Rotch (32 vols., Boston 1907).

Biographies: Wilkinson, J. J., (Emanuel

Swedenborg5 (Boston 1849) ; Hitchcock, E. A.,

(Swedenborg ; the Hermetic Philosopher5 (New York 1858) ; (Swedenborg: Harbinger of the New Age5 (Philadelphia 1910) ; Emerson, R. W., (Swedenborg, or the Mystic in Repre¬ sentative Men5 (Century Edition, Boston 1903) ; Trobridge, George, (Life of Emanuel Swedenborg5 (Boston 1913) ; Bernheim, Paul¬ ine, (Balzac and Swedenborg5 (Berlin 1914). Documents concerning (Life and Character of Emanuel Swedenborg,5 collected and translated and annotated by R. L. Tafel (3 vols., London 1875-77) ; Hyde, J. J. G., (Bibliography of the Works of Emanuel Swedenborg5 (New York 1906) ; Stroh, A. H., (Abridged Chronological List of Works of Emanuel Swedenborg5 (Upsala 1910). Edition de luxe issued by the Swedish Royal Academy of Sciences.

SWEDEN, or .SVERIGE, sya're-ge, a northern European state, forming with I'Jorway (q.v.) a united kingdom, occupying the whole of the

peninsula known in ancient times by the name of Scandinavia. Sweden is situated be¬ tween lat. 55° 20' and 69° N. ; and long. 11° 40' and 24° E. ; and is bounded north and west by Norway; southwest by the Skager-Rack, Katte¬ gat and Sound; south by the Baltic; east by the Baltic and the Gulf of Bothnia ; and northeast by the Tornea and its affluent the Muonio, sepa¬ rating it from Finland. In addition to the mainland it has a great number of islands, most of small dimensions, lying close to the coast. The largest, and also the most distant, is Gota- land, or Gothland, in the Baltic.

Sweden consists of the three historical divi¬ sions of Swealand or Sweden proper in the middle, Gotaland, or Gothland, in the south and Norrland in the north. For administrative pur¬ poses it is divided into Ians or governments. The area is estimated at 173,035 square miles, of which 3,700 are occupied by the larger lakes ;

the population in 1917 was estimated at 5,757,- 566, of whom 2,817,950 were males and 2,939,616 females. The average density is 33.3 per square mile, hor 1916 the total recorded births num¬ bered 121,214' deaths, 77,683; and marriages, 35,156ˆ, The same year 10,571 persons emi¬ grated, 7,268 going to the United States. The recent increase in population chiefly affected the larger cities. In 1917 Stockholm numbered 111,823 inhabitants; Goteborg, 191,535; Malrno, 35,783; Norrkoping, 55,623; Kalsingborg, 35,- 783; Gafle, 36,623; Orebro, 34,453; Eskilstuna, 30,111, and Karlskrona, 28,556.

Between 1860 and 1916 the town population had risen from 434,519 to 1,617,116, showing an increase of from 11 per cent of the total popu¬ lation of Sweden in the first-named year to 28 per cent in 1916; and between 1840 and 1910 the number of persons dependent on commerce and industry had risen from 10.75 per cent to 45.39 per cent. At the present time the pro¬ portions are about equal.

Topography.— The coast-line, above 1,400 miles in length, is serrated rather than deeply indented ; its bays and creeks, though very numerous, having neither the width nor tor¬ tuous lengths by which the fiords of Norway are characterized. The west coast is very rocky, but seldom rises so high as 30 feet. Along the south and southeast coast low shores alternate with precipitous cliffs, which, however, are of no great elevation. As above stated many islets are scattered near the shores, and these where they form the archipelago of Stock¬ holm

are especially numerous. The whole of the upper part of the shore of the Gulf of Both¬ nia consists of sandy alluvial deposits, which are brought down bv the rivers in such quanti¬ ties that they seem destined at no distant period to convert a large portion of the gulf into dry land. It would appear, however, that alluvium is. not the only agent employed in carrying on this process of shallowing, since it has been proved that the whole coast of Sweden is con¬ tinually rising, the rise being greatest in the north.

The interior of Sweden is by no means gen¬ erally mountainous, and its surface has far less of a highland than of a lowland character. The most elevated portion of it commences in the west near the parallel of 62°, and is continued north along the frontiers of Norway, not so much in a continuous chain as in isolated moun¬ tain-masses rising from an elevated table-land, which, where loftiest, is at least 4,000 feet, and forms the base of several summits which rise more than 6,000 feet above sea-level, and owing to their high altitude are covered with perpetual snow. The two loftiest mountains, Sarjekt-jakko and Kebnekaisse, both in Swedish Lap- land, attain a height of about 7,000 feet. Other lofty peaks are Sulitjelma and Sylfjellen, be¬ tween lat. 63° and 67° on the Norwegian fron¬ tier. These mountains and their table-land slope east toward the Gulf of Bothnia, sending down numerous torrents, which in their course often expand and form chains of lakes and dreary swamps. The same slope is continued south of 62° N., but besides it there is a south slope which attains its lowest level near lat. 59° N., on the shores of the magnificent lakes which there stretch ajmost continuously across the country east to west. To the south of 59° N. the country is generally flat, though in many

parts finely diversified. This region has several fertile and well-cultivated tracts, but a good deal of it is covered by barren sand or stunted heath, though interspersed with forests, green meadows and cornfields. What is called the Plain of Scania, occupying the whole of the south peninsula between the Sound on the west and the Baltic on the south and east, is gener¬ ally a fine tract of land.

Hydrography. — The rivers and lakes are numerous ; the latter in particular on a large scale, giving to the scenery of the country sev¬ eral of its grandest features. The rivers all belong to the basins of the Baltic Sea and the German Ocean. The former receives the far larger share. To it belongs the Tornea, which, rising in the Norwegian mountains, pursues its course south-southeast for nearly 290 miles, augmented by numerous large affluents, and falls into the northern extremity of the Gulf of Bothnia; the Lulea, Pjtea, Skelleftea, and united Windel and Umea, which flow precipi¬ tously southeast into

the same gulf ; the Anger- mann, which flows 230 miles, and in the lower part of its course becomes so wide and deep that vessels of 600 tons can ascend nearly 70 miles from the sea; and the eastern and west¬ ern Dal, which, uniting their streams, receive the discharge of numerous lakes, and pursue a.more circuitous course than usual in Swedish rivers. The principal rivers belonging to the basin of the German Ocean are the Klar and the Gota, the former of which, issuing from Lake Famund, on the edge of the Doverfield Mountains, fur¬ nishes Lake Wener with its chief supply of water; while the latter, which may be consid¬ ered only as its continuation, discharges it into the ocean. The lakes not only add to the beauty of the scenerv but yield large supplies of fish, and both by their natural depth and the canals which have been cut to connect them are of vast navigable importance and furnish a long line of internal communication. In this way a direct channel has been opened from Gote¬ borg on the west to Soderkoping on the east coast, and communicating with the important towns of Wenersborg, Carlstad, Mariestad, Jonkoping and Linkoping. In the same manner the capital has been enabled to extend its con¬ nections with the interior. In general, however, the rivers are too rocky for navigation. The largest lake is Lake Wener (area, 2,014 square miles) ; the next in size Lake Wetter (715 square miles). Lake Malar, better known than the other large lakes, from having the capital on its shores, is also remarkable for the number of islands which so crowd its surface that it is scarcely possible to find a square mile of open water. Hjelmar, which has both a natural and an artificial communication with Lake Malar, has an area of 188 square miles.

Geology and Minerals.— The mines of Sweden are rising in importance as rapidly as new mining machinery is being introduced. In 1916 they already engaged 48,166 persons and yielded large quantities of iron and other ores, as well as. lead, silver, copper and gold. In the year mentioned the amounts in tons were : iron ore, 6,986,298; coal, 414,825; zinc ore, 60,700; sulphur pyrites, 27,848; copper ore, 13,895; manganese ore, 8,894; silver and lead ore, 3,707; pig iron, 732,734; bar iron, 526,353. Be¬ sides, there were produced 230 tons of gold ore,

3,707 tons of silver and lead ore, and 8,894 tons of manganese ore. Almost the whole of the country is composed of gneiss, partially pene¬ trated by granite. Patches of porphyry and greenstone, of

Silurian rocks, of oolite, and of cretaceous rocks, appear in various localities. Iron not only occurs in beds of immense thick¬ ness, enclosed in strata of gneiss, but forms the principal mass of whole mountains. The most celebrated iron-mines are those of Dane- mora in lan Upsala, where the iron worked is perhaps the best in the world, and is admirably adapted for steel. The quantity produced, however, is much smaller than in some other districts where the quality is also excellent.

Climate. — The climate of Sweden varies considerably with the latitude and elevation. There is hardly any spring or autumn interven¬ ing between the heat of summer and the cold of winter, but in the north the winter lasts for nine months, in the south only for seven. Speaking generally, the climate of Sweden, though modified by the proximity of the sea, so as to be milder in all respects than the inte¬ rior of the northern parts of the Russian and Asiatic continents, is much more extreme than that of our own islands, even where the two countries are in the same latitude, and experi¬ ences greater degrees both of cold and heat. Hence at Stockholm the thermometer has been known to descend 26° below zero in January, and to rise in July to the almost tropical heat of 96.8°. The climate, however, is favorable to health, and no country furnishes more nu¬ merous instances of longevity.

Forestry and Flora. — Most of the public forests, covering an area of over 19,000,000 acres, belong to the government and yield con¬ siderable timber. In the very northern ex¬ tremity of Sweden fine trees of pine, fir and birch are found. These, however, occupy only occasional patches, and the true forest-land must be considered as having its limit near 64°. Below this latitude, and chiefly in the central and southern parts of the kingdom, the forests occupy at least one-fourth of the whole surface, and sometimes stretch continuously for 80 miles in length by 20 miles in breadth. Many of these, however, consist of trees of stunted growth, available chiefly for domestic fuel or the supply of the smelting furnaces, and seldom of much use as timber. Forests in which oak and beech are the prevailing trees occur only in the south. The flora is of the post-glacial pe¬ riod, and of Finnish characteristics rather than of more southern and continental latitudes. Wild brier berries are plentiful.

Fauna. — Among the larger wild animals the wolf and bear abound in the forests, and often commit great ravages. The elk and deer are also found, but in more limited numbers. Of smaller animals the most destructive is the lem¬ ming, which at intervals of years descends in immense numbers into the low country and lays it waste. Among birds

the most remarkable are eagles, capercailzies and woodcocks.

Fisheries. — The rivers and lakes are well stocked with salmon and trout, but the fisheries on the sea-poast have long ceased to be produc¬ tive. Herrings, which used to visit the coast of the Baltic, have almost entirely disappeared, though large numbers of a fish resembling herrings are taken along the east coast. About 34,000 persons find employment in the fisheries.

Agriculture. — About 9.1 per cent of the total area is under crop, 3.3 in natural meadow and 54.7 per cent in forest, the latter furnishing a staple industry. Only a small portion of the arable land, and that mostly in the south, is favorable for the growth of wheat; but there is now a considerable export of oats and some of other cereals to Great Britain. Until re¬ cently the grain grown in Sweden did not suffice for domestic consumption. Potatoes are grown in almost all parts of the country, and foim one of the main articles of food among the lower classes. The most important auxiliary crops are beet-root for sugar, hemp and flax, the latter of excellent quality; on a few favored spots to¬ bacco, hops and madder are grown. Cherries, apples and pears are tolerably abundant in the southern districts. The principal domestic ani¬ mals are cattle, sheep and reindeer. The last supply food and clothing. In 1917 there were 447,695 farms under cultivation, the products of which form a staple export.

Commerce, Manufactures, etc. — Of all the countries trading with Sweden, Great Britain is the one with which the largest amount of business is done, Germany coming next. The total value of the exports to all countries in 1916 was nearly $206,991,000, of which 5.3 per cent came from the United States, the exports to Great Britain amounting to half that amount. The total imports amounted to about $194,- 811,000 (United States, 27.4 per cent). The principal exports are timber, iron, butter and wood pulp ; imports, iron and steel, wrought and unwrought, coal, machinery, woolen and cotton goods. Next to agriculture the most important industry in Sweden is iron-mining. Other industries now of some importance are iron-founding and engineering, the spinning and weaving of cotton and woolen goods, paper¬ making, brewing, sugar-refining, match-making and glass-making. In 1917 there were 9,368 miles of railways, of which 3,268 miles be¬ longed to the state. The public telegraph and telephone lines in 1917, 341,013 miles, belong wholly to the state. A tram ferry service oper¬ ates between Trelleborg and Sasnetch in Prussia.

The mercantile marine in 1917 engaged 2,801 vessels of 1,128,435

tons burden. The tonnage entered and cleared in 1915 was 28,799,114 tons. Goteborg is the principal port and Stockholm comes next.

Weights and Measures. — The denomina¬ tions of money are the ore and the krona, or crown (silver); 100 ore (each = A32d.)= 1 krona — Is. }d. The .greater part of the cur¬ rency, however, is in paper, which is circulating in sums varying from 5 to 1,000 kronor. The metric system of weights and measures was introduced in 1883. Among old measures are the skalpund — .937 lb. avoirdupois; the centner (100 skalpund) = 93.7 lbs. avoirdupois; the nyldst (100 centner) = 83.67 cwts. ; the kanna = 4.6 pints imperial; the cubic fot (10 kanna) = 5.76 imperial gals.; the cubic aln = 46 gals.; the foot (/ of) = = = 11.689 inches imperial; the tunneland or acre = 1 acre 35 poles ; the mile = 6.64 United States miles, and the square mile = 44 United States square miles; 10 linier — 1 turn; 10 turn— 1 foot; 10 feet=l stong (~9.74 United States feet); 10 stdnger—\ ref; 360 ref— 1 mile.

TRYVANDSHC

NORWAY AND

SWEDEN

SCALES

Statute Miles, 97 = 1 Inch,

50 100

lODTAj

ˆSTORSTENS

ˆutr,

.Kilometres, 156 = 1 Inch.

100 150 200

\Haeggetia]

Ripk'abo k Rinov,

i> Raara

Rand, McNally & Co.’s New 11 x 14 Map of Sweden and Norway.

Copyright by Rand THcNally k Co.

y /Oskarsborg| ~ [fcDrobak Iky

-Senjrn*

ˆKlovehj

Sir i '•i*e

Kioto]

XOFOTICN r»n3,

Oksnesl

LanooˆOJ

ISLANDS

M

HaD8EI

B.ikrko

Vestvaao,

\luonionalu6tˆ {>

KEBNEKAlSSi

Cori /

"""tyb

Mo8ken<w

Vˆno. *Rost* $.

jsganavare d

v® Juckoeiirˆ

feSjf wli3uksne8

Flakstado ˆ Moskenasb

\ e* Ledingjˆ

tJr Foldcn fy

Hortei

\ VUtangi

' — >Alalrober?eV

nske,'iyiˆ "Alksivare/.ˆV dyˆˆf/aunˆ

2 Twˆsu Cit’jelma «/»mˆ-,V'8-ft, 'Quickjock .HA

Junosuan)

Bast'o

xmn&gNxW \

• -SKA A\@»r®aker

K V=V3 :

%* ˆ'Tonsfiiˆ

Sal ten fjord

Sandhori

GildegW/

ikaebyp

StfADBteBl 5

ARCTIC

IˆBOV

Vallo

H x ’%*

.A'aratr

L1AS(M

- ○ — -HEagwANhoJi

Trie.nenop.S /

Jaur_

Haxko

Fulchuk l. a t

SKndtrtslC

Go.»f V%. f f* ˆeder V T°Y"ˆa

y, Tonieaft I 1

mm

fel VZ&mdefj

ˆ?Arjeplnog N

r4v \ V !r {St(i)raJven

Donneso

Alhti

Alstnhoi

Torgauten- L. H.

Elfsby

Store F&rder

Tirnai

Sorsele'

v Sic

.Malutra8kv\/?

£tor-

Scale of Miles.

V -

-,«(ft j Fatt momaol ˆKul tsjo-

ˆBrannlors

■ˆByske

;eUeftea.

ˆ Fredriksvaerp

CHRISTIANIA FJORD AND VICINITY

®61dereifl.

.uystutrasl

JvereTd

ˆRiBliackX • ˆ i V > 3J ˆXgˆMalgamaj-L,.

iVXwK;

\ Vs. ' ˆrwuv'o'V v. V.

DoroteaS v. ' ˆˆˆyTayoˆ Aseleˆ K

ˆromsVoˆhtt.

ˆLWsjb|SStrom

{urtrask

{Jotmejty

iKvtrnljrr})-

ftpfrhiken

XBygˆea jRataa \SHfvar A

yfO A.MJB60

Y >

'Reason

Utneav

nefora

Treh’o'rningejoˆ

Hittej ,l*ie n<5&

£do§

CVˆuneeb la/msele, ?

Jjornot

ST Afe ’rkedaiy

VˆGrundsunda,

ˆOrnekbldavlk

falevad

Xv Rˆseleˆ ˆ Lancaelcˆ_Vˆ >

idi.tpnunil'- v |Brunflo

[fprSY.L FJEL

T&'WfiJy

SolleftenA liVy land \ 'pran o'

fordingTa

BergViVWrˆSˆftˆles:

t Hempo HernosancL

(SabtaUy

.liidal

ˆSkoW

Borg8jo

Nf° TolEenˆfft’

Torps-\

ihaminir

ˆ%,.-ˆHafver'(ˆT%Y tteN-. llˆHogdaU

ideˆ-vSumisvall ˆ ° QnarP

'yˆL.Ifcllen

ˆg°lHudiksvan •orainj S\jvl HorxBlaHB

[*p7 5?V\$»ˆS

sajjOho 'pTrSL o A]4°»tedaw

S'4fjar < ’wi,S’qeNE-:

-%A«LMrJ

\K\stao_jah

H oc(£R0/1Usˆ ˆUˆˆJELOˆ gˆriWgffDXi

LHERJEHOGNEN

S8I f)-SQ v- '

S8 < tS a

ˆˆTammel

ijorneborgˆ?

30 7'n g

)alfors Rilafora ˆ£ˆ3ljusne 'SvabenB-'wSl.-'

TRittTˆ'Hoˆ > !! > '-ˆ0':rS'UndCt

»n,'wY»

■sˆnW ‘* , ”7Tor sqke r '/ ˆ * Hueby'-K - lftdesundafi < f i'BojJerfp \ . SiiterS / GysWeiˆY ‘

i'AlsmaVVfcd % '%usdaU%'

jTavastˆ

< N e iu 1 1 1

bYwhiuiig'

;xamv

, o-y'egrund t '» VoC

•ˆwˆgsˆanlTVv

3 'YˆGrii851ˆˆ

paaW Waddo

. \ * ˆ .Wrrtelge

Rimbo'pˆ-

ˆSigtuna -ˆ-FuruBund rJAˆvSh-olm

ffnark a ■'Charloi

Hango

"«'«eS|iodra

Slu*»ni»h°|P

£,ik'ke Fj»!

%ir*ne4

iaD4n*$ / 0rfe<jY

; i 1 1 1 .«• r_-:

Liddarhytli

XlndefeVierf

Glllbergjr

(Isillerud.

j UiarlstaSL U j ajI

yY/p™ J'j™

!0tteHjackcjjr;"|V

Askor.i\nd«,H<rt

?PTV\ &&P)

fi

Grebbeatad'^ 0

.W f QullleVb

.SS^vffll

TroBajpN'

•AGO

TenerJL:

Ogne^#3 |

EgersuhSW^^

SogndaV^-

ii-ter fe

rOxelos.und

^^jSikb^rfg: Kansl)or(^karyu, j. •5sk'gfd <

P_W

°fflrte5sund

GOTBKX

Sando

4sbderJ

linkbping'

Lysckir Alorluna^ Oeust 1. 1 Tjorn L.

^demaesvik.

^^idaberg.

Si /’udealu

I

InVoPi'M

v-Bolnmdde

Faro

bi JUDga)

o Tirpk^um' ^Gamlebj ijnmerbjr \

{^yo KafpelBliM

esteryTk J

jV&karBruDi Wlsby L

’ Skae,n 'yjyˆ°njfinjk OTHEMa , XungsbaclSl

(f V,

-ˆ-Prmevallab Y * CHoltslji

ibjMlss

W Varberˆ?01?ˆˆ/:

'y. gKi/naredyWBy/

FalkenbergSˆ £ % frXˆjf ˆ Getingˆb / XK

ˆ Halrostadˆˆ

ˆ Laholm £ay'\ˆc.o\&

-. YP xr ***t, Tyk’

fjgfSLAUD

k/' ArdroH Oatcrgarn

Windau.

lerikBh'avbi

Tnkkum

Sundre

Ualsta Colmar .

£ oSo

f//B»rgbolia m/c Mogsrum J /6l.\ND (To Kalmar) a ill i ear 'Miirbylong*

Sodra Mockelby yOttenby \

ilagskullai

’allehtui

yVlalandaˆ

JTf:

• OBterokeF

(anen eJ

_ · ·,

/" \1 O r lirWoiTrtv- fiˆjnBobdft (

lolobrol

Idsbergl

ˆ*ngkjbbl8S|

SkjLELˆ

oikeborgi

SJ«anderb(

'Horspij

v?“VejJˆ

Ki*£er‘cia

Roldipg ,-aˆ

ˆtLsrcci

Drbtjtalnghwn

-ˆ'Roskildo

.SEELA-N]

[svedala.

iimrishamn

:,f»jo 8oltsjd» N. Erstavik1

yoandhammaren V Basle (

.Ronne1

HedJnge ‘ Stege

BORNHOLM

!■* Nil FI

(To Denmark)

Environs of STOCKHOLM

iprisburg'

NwkjoWng I /fc’ALSTER I.

Statute Miles

Kilometres

taaiinid. Em

from Greenwich.

SWEDEN, PKOVIXCES (LANS)

1 Stockholm 13 Gothenburg k Bohua

2 Upsala

14 Elfaborg

3 Sodermanland

15 Skaraborg

4 UBtergotland

Hi Vermland

5 Jonkoping

17 Orebro

6 Kronoberg

18 Vestmanland

7 Kalmar

19 Kopparberg

8 Gothland (Isl.)

20 Gefleborg

9 Blekingc

21 Vesternorrland

10 ChriBtianntad

22 Jemtland

11 Malmohu#

23 Vesterbotten

12 Halland

24 Norrbotten

NORWAY, PROVINCES (AMTS)

1 Smaalenene

10 Stavanger

2 AkerehuB

11 8. Bergonhus

3 Hedemarken.

12 N. Bergenbus

4 Christian

13 Romsdal

6 Buskerud

14 S. Trondhjem

6 Jarlsbcrg k Laurvik

15 N. Trondhjem

7 Brateberg

16 Nordland

8 Nedeneg

17 Tromeo

9 Lieter k Mandal

18 Flnrnark

5° A T >

SWEDEN

117

Government. — The crown is hereditary in the male line. The king must be a member of the Lutheran Church, and has to swear fidelity to the laws of the land. His prerogatives con¬ sist of the right to preside in the high court of justice, to grant pardons, to conclude treaties with foreign powers, to declare war and peace, to nominate to all appointments civil and mili¬ tary and to veto absolutely any decree of the Diet or Parliament of the kingdom. He also possesses a power of administrative legislation. The princes of the blood-royal are excluded from all civil employments. The Diet consists of two chambers, which are both elected. The first or upper chamber consists of 150 mem¬ bers. The members are elected by 25 provincial landstings (or provincial assemblies) and the corporations of Stockholm, Goteborg, Norr- koping, Malmo and Gefle. All the members must be above 35 years of age, and a property qualification is required to the taxed value of 50,000 kronor, or $13,885 in real property, or an annual income of 3,000 kronor or $830. They are elected for six years. The second chamber, elected on universal male suffrage for three years, contains 230 members, 150 elected by the rural population, being one for each 40,000 inhabitants ; and 80 by the towns, being one for every 10,000 inhabitants. Mem¬ bers of both houses are paid 1,200 kronor or $335 per session of four months, in addition to traveling expenses. The election is by ballot on a basis of proportional representation. The executive power is in the hands of the king, under the advice of a council of state consist¬ ing of 11 members, eight of whom are depart¬ mental heads. The eight departments are: The Ministry of Justice, the Ministry of For¬ eign Affairs, the Ministry of War, the Min¬ istry of Marine, the Ministry of the Interior, the Ministry of Finance, the Ministry of Edu¬ cation and Ecclesiastical Affairs and the Min¬ istry of Agriculture. All the ministers are re¬ sponsible for the acts of the government. The

administration of justice is controlled independ¬ ently of the government by the Justitie Kansler, appointed by the king, who acts for the Crown; and the Justitie Ombudsman, appointed by the Diet, who exercises a supervision over the law- courts.

Finances. — A large part of the revenue is derived from national property, including rail¬ ways ; the remainder from customs, excise, in¬ come tax, etc. The total estimated revenue for 1917 amounted to $107,000,000 and the expendi¬ ture was rather more. Part of the expendi¬ ture — civil, military and ecclesiastical — is de¬ frayed from Crown lands and does not appear in the public accounts. The public debt is over $225,000,000. Sinking funds are provided for the payment of the debt.

The Riksbank, or National Bank of Sweden, belongs entirely to the state and is managed by directors elected for three years by the Diet, except one, the president, who is designated by the king. ,

Army and Navy. — The army has hitherto consisted of enlisted troops, a militia maintained by landowners and Crown domains, and con¬ scription troops, drawn by annual levies; but it is now undergoing reorganization, which will take some years to complete, the result being an increase in numbers. Military service is compulsory. The active military force in 1916

consisted of 2,657 officers, 537 non-commis¬ sioned officers, 16,370 volunteers and a con¬ tingent of recruits. The total (including con¬ scripts) was 83,000 men. The naval strength includes 15 armored coast defense vessels, four old torpedo gunboats, 10 torpedo-boat destroyers, 45 torpedo boats and submarines.

Ethnology. — Almost all the inhabitants of Sweden, with the exception of the Laplanders and Finns, found only in the north, are of Teu¬ tonic origin, and preserve the original features of the race in great purity, particularly in the central and southern provinces, where they are characterized by a tall, robust stature, light hair, blue eyes and light complexion. They are active and enterprising, and manifest a marked predilection for scientific pursuits. The state of morality is on the whole favorable. Heinous crimes are few, but a great number of minor delinquencies figure in the calendar and are evidently accounted for by the far too prev¬ alent use of ardent spirits ; but a considerable improvement in respect of the consumption of intoxicants seems to have taken place in recent times.

Religion and Education.— Almost all the inhabitants belong to the

Evangelical Lutheran Church, which is the religion of the state, at the head of which is the archbishop of Upsala. Other religions are tolerated ; but appointments in the public service can be held by Lutherans only. Education is gratuitous and compul¬ sory. Primary education is well diffused. In 1916 there were 704,000 pupils in the elementary schools. The proportion of illiterates among recruits is 0.16 per cent. The University of Upsala (2,344 students in 1916) has done much to foster the cultivation of the higher depart¬ ments of science and scholarship. There is also a university at Lund (1,341 students in 1916).

Language and Literature. — See Swedish Language; Swedish Literature.

History. — In the case of Sweden, as of many other countries, the industry of chroni¬ clers has supplied details about ages with wfiich they were unacquainted. These early chronicles, called Sagas, contain lists of kings at variance with each other, and stories of ad¬ venture of the kind to which the epithet heroic is usually applied, in which it is impossible to separate the fabulous from the historical. The first dynasty of Swedish kings, according to the legendary chronicles, belonged to a family called Ynglings, from their founder, Freyer Ingve, the reputed grandson of Odin, from whom the family claimed to be descended. The last of them was expelled by Ivar Widfadm, representative of the Danish family of the Skioldings, also descended from Odin, who united Sweden and Denmark under one rule. This event is referred to about 630 a.d. Near the end of the following century Ragnar Lod- brok, the reigning representative of this house, fell in battle on the English Coast, and his second son, Biorn Ironside, inherited Sweden, which was again separated from Denmark. Christianity was introduced under his grand¬ son, Biorn II ; but it was first established by Olaf, who reigned in the beginning of the 11th century (1001-26 a.d.). Until the beginning of the 12th century the chronicles contain rival lists of kings. From the first appearance of Sweden in history two rival tribes or confed¬ eracies, both of German origin, the Goths and

the Swedes, contended for ascendency, and the confusion of the chronicles is probably due to the mingling of the lines of separate chiefs or monarchs reigning simultaneously in differ¬ ent districts. Emund Slemme, the last of the descendants of Biorn, was defeated and

killed by the Goths in 1056, when the two nations were united under Stenkil, the Gothic monarch. On the death of his descendant, Inge II, in 1129, the Swedes raised a private individual, Sverker I, to the throne. To conciliate the Goths it was agreed that Erik, a descendant of Stenkil in the female line, should succeed Sverker, and that the two families should reign alternately. This arrangement, which seems to indicate that the power of the monarchs was merely that of leading chiefs, was continued, though the cause of much dissension and civil war, for several reigns. During the reign of Sverker the kingdom was divided into four dioceses (1152). Erik IX, called Saint Erik, succeeded about 1155. In his reign the Finns were conquered and converted to Christianity. Charles VII, son of Sverker, who succeeded about 1162, was defeated and killed by Knut Erikson, who succeeded in 1168. Sverker II, the son of Charles, was likewise defeated and killed by Erik X, son of Knut, who succeeded him in 1210. John I, son of Sverker II, and the last of his line, was succeeded in 1253 by Erik XI, the last of his, who died in 1260. Waldemar I, nephew of Erik, was raised to the throne by election, and founded the dynasty of Folkungar. Waldemar made a voyage to the Holy Land, leaving his brother Magnus regent, in 1272; on his return s civil war took place, but Waldemar abdicated in favor of Magnus in 1279 and failed in subsequent attempts to recover the throne. Magnus assumed the title of king of the Swedes and the Goths. His son, Birger II, in whose reign the conquest of Finland was completed, was expelled by the people in 1319, who chose his nephew, Magnus Snek, an infant, as his suc¬ cessor. He had already succeeded, in right of his mother, to the crown of Norway, which he gave to his son Haco in 1344. Scania, con¬ sisting of the two southern provinces, Mal- mohus and Kristianstadt, which then belonged to Denmark, yielded to him in 1332, but he restored them on affiancing his son Haco to Margaret of Denmark. Magnus was deposed by the states and obliged to carry on a civil war for the crown with his son Erik, whose death again left him in possession of the king¬ dom; but aiming at absolute power, he was again deposed in 1365 in favor of his nephew, Albert of Mecklenburg, who had already been in possession, since 1363, of the supreme au¬ thority. Albert formed a league with Schles¬ wig, Holstein, Mecklenburg and the Hanse towns against Denmark and Norway. He suc¬ ceeded in driving the king of Denmark out of his dominions, but was defeated by the king of Norway, who besieged him in his own capital. Peace was concluded; but Albert, aim¬ ing, like his predecessor, at absolute power, made himself unpopular with his own subjects, who invited Margaret of Denmark and Norway, the Semiramis of the North, who had united the crowns of these kingdoms, to replace him. Al¬ bert, though supported by Holstein, Mecklen¬ burg and the Hanse towns,

was finally over¬ come and returned to Mecklenburg. Margaret succeeded in 1389, and by the union of Calmar

the three kingdoms were formally united, each retaining its own constitution. Under the reign of her grandnephew Erik (1412-41) the Swedes revolted under Engelbrecht (1433). The union was renewed 1436, but both Danes and Swedes revolted against Erik, and Charles Knutson, grand mareschal of Sweden, was chosen regent. His rule proving oppressive, the joint crown was conferred in 1441 upon Christopher of Bavaria, nephew of Erik. On his death in 1448 Charles VIII (Knutson) was chosen king of Sweden. Norway also acknowledged him, but soon threw off the yoke. The severance of the union also produced a war with Denmark. Charles' reign was stormy and his subjects repeatedly revolted against him. He died in 1470. Christian I, king of Denmark, had been crowned king of Sweden in 1458 by the party opposed to Knut¬ son, but on the death of Knutson his party chose his nephew, Sten Sture, administrator of the kingdom. Christian attempted to take pos¬ session of the kingdom, but was defeated and forced to retire. In 1483 John I, son of Chris¬ tian, was recognized as king of Sweden in virtue of the Union of Calmar. The country was divided between the Danish and the na¬ tional parties, but Sture contrived to hold the administration, and raised an army to drive the Russians out of Finland. In 1497 John in¬ vaded Sweden with a powerful army. Sture was completely defeated at Rotebro, 28 October. John conferred on him the government of Dalecarlia ; but the Swedes again revolted and proclaimed him administrator in 1501. He died in 1503 and was succeeded in the administration by Svante Sture, who concluded peace with Russia and formed an alliance with the Hanse¬ atic towns in order to prosecute the war with Denmark. The clergy and a large portion of the Senate favored the Danish alliance, but the peasantry were strongly opposed to it. Svante Sture died in 1512 and was succeeded by his son, Sten Sture the Younger. In the following year Christian II succeeded to the crown of Denmark. After the death of Sture, Gustavus Vasa raised the peasants of Dalecarlia, de¬ feated the Danes, and, having embraced the Lutheran religion, was crowned king by a Protestant archbishop of Upsala in 1528. The Lutheran religion was formally established in Sweden in 1529. Christian II having been driven from Denmark, his title was acknowl¬ edged by his successor, Frederick I, and in 1544 was declared hereditary in his house. He died in 1560. His son, Erik XIV, reigned only eight years. Erik was one of the candidates for the hand of Queen Elizabeth of England and also of Queen Mary of Scotland.

To balance the power of the great nobles Erik created a secondary nobility and intro¬ duced the titles of count and baron into Swe¬ den.

A war with Russia, undertaken for the protection of the Teutonic order, resulted in the acquisition of Esthonia by Sweden; but war having subsequently broken out with Den¬ mark was, in the confusion caused by the king's insanity, ill-conducted, and resulted in repeated disasters to the Swedes. John III, the brother of Erik, succeeded him on his deposition. By the peace, of Stettin with Denmark, 13 Dec. 1570, Sweden renounced her claims to Norway, and surrendered a large part of Gotland, in¬ cluding the west coast to Denmark. This treaty was made with a view to a war with

Russia. In this war the Swedes were success¬ ful in toiling the designs of Ivan IV on Livo¬ nia. Peace was concluded in 1582. John had married Catherine Jagellon, daughter of Sigis- mund, king of Poland, and through her influ¬ ence endeavored to restore the Catholic re¬ ligion in Sweden. A formidable opposition arising, headed by his brother Charles, and the queen dying, he abandoned the project. Sigismund, his son, was, however, brought up in the Catholic faith, and in 1587 he was elected king of Poland under the title of Sigismund III; John died 1592. Charles, Duke of Suder- mania, who held the regency in the absence of his nephew Sigismund, endeavored to de¬ prive him of his crown on the ground of his religion, but on the return of Sigismund with an army he was compelled to relinquish the government to him. Sigismund, on receiving the crown, returned to Poland, and left his uncle Charles regent. Charles again attempted to seize the crown and defeated Sigismund in the battle of Stangbro (September 1598). The states now conferred on him the title of heredi¬ tary prince, and insisted upon Sigismund send¬ ing his son to Sweden to be educated in the evangelical faith. Failing to comply, he and his posterity were excluded from the crown, and in 1604 Charles was acknowledged as king- elect of the Swedes, Goths and Vandals, and his son, Gustavus Adolphus, was recognized as his successor. He took the title of Charles IX. From these events arose a war with Po¬ land, which was not terminated by a permanent peace till 1660. Wars also with Denmark and Germany continued till the end of Charles' reign. Charles IX died 1611, and was suc¬ ceeded by his son, Gustavus Adolphus, then en¬ gaged in conducting the war with Denmark. One of the first acts of Gustavus was to se¬ lect as his chancellor Alex Oxenstiern, who became one of the first statesmen of Europe. Failing to make peace with Denmark, Gustavus took the field in person, and nearly lost his life in the battle of Widsji ; but in 1613 he suc¬ ceeded through the mediation of England in making peace. The Russian

throne was then vacant. The Swedes and Poles each set up candidates for it, Charles Philip, brother of Gustavus and Ladislaw, son of Sigismund. Both had invaded the country and made ex¬ tensive conquests and Gustavus granted favor¬ able terms to Denmark that he might turn his attention to this quarter. Michael Romanoff, elected in 1613, was compelled to make peace with Sweden by the cession of all his Baltic provinces ; and Sweden, which notwithstanding internal troubles had been advancing in politi¬ cal importance since the time of Gustavus I, now became the leading power of the North. The war of succession with Poland still con¬ tinued and in 1621 Gustavus turned his arms against that country and captured Riga. The war continued for nine years, and was con¬ cluded by the six years' truce of Altmark in 1629. Gustavus retained four frontier towns of East Prussia.

Sweden was now about to take for the first time a leading part in the affairs of Europe. Gustavus had been watching with anxiety the course of events in Germany, and had de¬ termined to interfere on behalf of the interests of religion and the political rights of the Prot¬

estant princes. (For the events of this war and the effects of the intervention of Sweden in the affairs of Europe see Gustavus ; Prussia ; Richelieu; Thirty Years' War, and other articles). The body of Gustavus, who fell at the battle of Liitzen, was brought back to Swe¬ den in 1632, and his daughter Christina was recognized as his successor. She was a minor, and the management of affairs devolved upon the Chancellor Oxenstiern. He confirmed his alliance with the German rulers, and made ar¬ rangements to prosecute the war with vigor. His power continued absolute till 1644, during which time the war in Germany continued. At the beginning of this year a war broke out with Denmark, provoked by the scheming of the queen-mother, who was jealous of the power of Oxenstiern. Denmark was sud¬ denly invaded by Torstenson. Christina as¬ sumed the reins of government on 5' Dec. 1644, her 18th birthday. The peace party now prevailed, and the treaty ,of Bromsebro was concluded with Denmark, which ceded to Swe¬ den the greater part of her possessions in Gotland, and exempted Swedish vessels from Sound and Belt dues. The peace of West¬ phalia, 24 Oct. 1648, gave Sweden western Pom¬ erania, the duchy of Bremen and other acquisi¬ tions in Germany, with a seat and triple vote in the diet.

The reign of Christina began under favor¬ able auspices. She had received a 'masculine education, and showed great attention to busi¬ ness and determination in supporting her views. Contrary to the advice of Oxenstiern she ex¬ erted herself to promote peace both with Den¬ mark and Germany. She patronized learning, and drew many

distinguished men to her court; but she was extravagant in her expenditure, licentious in her behavior, and soon brought herself into inextricable difficulties by the pro¬ fusion with which she lavished the crown do¬ mains on worthless favorites. In these circum¬ stances she renounced the crown in 1654 in favor of her cousin Charles Gustavus, son of the count palatine, professed the Catholic re¬ ligion, and after an extraordinary career died at Rome in 1689. The short reign of Charles X was distinguished by some brilliant military enterprises, which extended to Poland, Prussia, Russia and Denmark. In January 1658 he crossed the sea on the ice, and occupying the island of Fiinen without resistance, advanced to Copenhagen. By the mediation of England and France peace was concluded at Roeskilde, 8 March 1658, Denmark surrendering the re¬ mainder of her possessions in Gotland. Charles, however, had set his heart on the conquest of Denmark, and was not long in recommencing operations against that country. He died sud¬ denly on 13 Feb. 1660, leaving a son, Charles XI, only four years of age. A council of re¬ gency was appointed, which soon concluded peace with Poland, the emperor and the elector of Brandenburg. Peace with Russia was not concluded till 1661. Sweden formed an alliance with England against Holland in 1665, and took part in the triple alliance against France in 1668. The common policy of Sweden was to ally herself with France, and her change of policy was due to the failure of French subsi¬ dies. By the treaty of Stockholm, 14 April 1672, she agreed to assist France if attacked by

any German power during her war with Hol¬ land. In consequence of this treaty the Swedes invaded Brandenburg in 1674. They were de¬ feated by the elector at Fehrlallin, 28 June 1675. After this victory Denmark entered into a league with the elector against Sweden. In the hotly contested war which ensued Syveden was defeated by the elector on land and by the Danes at sea, but her ally was victorious, and Louis XIV compelled the elector by the treaty of Saint Germain-en-Laye to restore to Sweden all her German possessions except a district beyond the Oder, and by the treaty of Fon¬ tainebleau Christian V engaged to restore all his conquests to Sweden. Peace was concluded on these terms between Sweden and Denmark at London, 26 Sept. 1679.

Sweden, whose financial resources were al¬ ways limited, had, however, been impoverished by the war, and the nobility, who during the minority of Charles had acquired the chief power in the state,

although the king had as¬ sumed the government in 1672, became unpop¬ ular. A revolution was accomplished in 1680, in which the states, under the guardianship of a military force, declared Charles absolute and irresponsible, and entitled to dispose of the government by his last will. The remaining years of Charles XI were employed in organiz¬ ing the army and restoring the finances. He adopted a regular system of conscription, which greatly strengthened the military power of the nation. He died 15 April 1697. His son, Charles XII, born in 1682, was declared of age in November. His youth induced Den¬ mark, Poland and Russia to enter into a league against him to partition his dominions. Em¬ barking for Copenhagen in 1700, he soon dis¬ concerted the plans of the allies, and refusing peace began a career of conquest, which after many marvelous successes ended in the dis¬ astrous battle of Poltava, 8 July 1709. After an exile in Turkey he returned to Sweden in 1714, reconciled himself with Peter the Great, and was pushing the conquest of Nor¬ way when he was killed at the siege of Fred- erickshall, 30 Nov. 1718. The Swedish states passing over Charles Frederick, son of Charles' elder sister, named the second sister of Charles, Ulrica Eleonora, queen, who in 1720 associated with her husband Frederick I. The revolution was accomplished so suddenly that it led to a suspicion that Charles' death had been antici¬ pated, and it has always been suspected that he fell by the hand of an assassin. The new gov¬ ernment allied itself with Great Britain, and ceded the duchies of Bremen and Verden, the cause of quarrel between Charles and England, to George I. Peace was concluded with Po¬ land on the basis of the treaty of Oliva, and with Prussia, to which Sweden ceded the terri¬ tory between the Oder and the Peene, Stettin, the islands of Wollin and Usedom, etc. By the Treaty of Stockholm, 12 June 1720, Sweden paid Denmark 600,000 rix-dollars, and renounced the freedom of the Sound, while Denmark re¬ stored Riigen and other conquests in Pomerania and elsewhere. War still continued between Sweden and Russia. It was concluded by the Treaty of Nystadt, 10 Sept. 1721. Sweden re¬ ceived $2,000,000 for Livonia, but she finally lost the valuable Baltic provinces for which she

had so long contended. Of her conquests Rus¬ sia only restored Finland.

Sweden was now under the hands of an oli¬ garchy. This council was easily bribed by for¬ eign powers. It was divided into two factions, called (after 1738) the Hats and Caps, the for¬ mer of which preferred to sell themselves to France, the latter to Russia. On the breaking out of the war of the Austrian Succession, the Swedes, who had been irritated by the murder, at the instigation of the Russian Empress

Anna, of their Ambassador to the Porte, were easily induced by France to declare war with Russia. The war on the part of Sweden, from military incapacity and the selfishness of her civil rulers, was ill conducted. On the accession of Eliza¬ beth peace was concluded by the Treaty of Abo, 17-18 Aug. 1743, by which Sweden re¬ nounced forever her claim to the provinces ceded by the Treaty of Nystadt, the recovery of which was the main object of the war, and ceded part of Finland, the boundary between the two states being fixed at the river Kymene. By the influence of Russia Adolphus Frederick of Holstein was elected successor to the Swed¬ ish crown, to which he succeeded on the death of Frederick in 1751. During this reign Swe¬ den took some part in the Seven 'Years' War. At home the country was distracted by the ri¬ valries of the Hats and Caps, and the royal power sank to a shadow. Adolphus died in 1771 and was succeeded by his son Gustavus III. His reign was distinguished by a monar¬ chical revolution. He undertook a war against Russia, which brought him fame indeed, but was productive of no other result. Gustavus was assassinated in 1792. In 1809 his son Gus¬ tavus IV was deposed, and his family declared forever incapable of succeeding to the crown. (The leading events of his reign will be found under Gustavus IV). His uncle, the Duke of Sudermania, was declared king with the title of Charles XIII. He concluded a war with Rus¬ sia, begun by Gustavus, by the Treaty of Fred- ericksham, 17 Sept. 1809, by which Sweden sur¬ rendered Finland, the Aland Isles and part of West Bothnia to Russia. In 1810 the states elected Jean Baptiste Bernadotte, crown-prince. In the final struggle with Napoleon previous to 1814 Sweden joined the Allies, while Denmark took the .part of France. The Danes were driven out of Holstein by Bernadotte, and the Treaty of Kiel was concluded between Sweden, Denmark and Great Britain, 14 Jan. 1814. Swe¬ den by this treaty ceded to Denmark her last German possessions in Pomerania, and the Isle of Riigen, while Denmark was compelled to cede Norway to Sweden as a compensation for the loss of Finland. The cession was confirmed by the Norwegian Storthing on 4 November. Greenland, the Faroe Islands and Iceland, which had belonged to Norway, were retained by Denmark. Sweden now held the whole Scandinavian Peninsula, and had lost all her other European possessions. Bernadotte suc¬ ceeded to the crown in 1818, under the title of Charles XIV. Under his reign Sweden ad¬ vanced _ greatly in agricultural and mercantile prosperity. He died in 1844, and was succeeded by his son Oscar I, who introduced extensve reforms in the government. (See Oscar I). He died 8 July 1859, and was succeeded by his son, Charles Louis Eugene, under the title of

Charles XV. Charies Xy died 18 Sept. 1872, and was succeeded by his brother, Oscar II, who, dying on 8 Dec. 1907, was succeeded by his son, the present king Gustav V. On 7 June 1905, owing to the refusal of Sweden to grant separate consulates to Norway, the Storthing of Norway passed a resolution to dissolve the union, which was finally ratified by the Treaty of Karlstad by both countries on 16 October. On 20 November Prince Charles of Denmark was made King of Norway.

In 1909 Sweden experienced one of the most extensive industrial strikes in the history of labor disputes. Beginning in a few industries, this strike soon involved nearly 300,000 men and lasted for two months, completely paralyz¬ ing all trade, commerce and transportation fa¬ cilities and ending in the defeat of the strikers.

Sweden in the World War.— The World War, while it stimulated agricultural production and certain branches of mining, entailed great hardships on the majority of the people, and <(hunger® demonstrations became frequent, espe¬ cially in the urban districts. Up to the later stages of the war the attitude of the Court (the Queen was formerly Princess Victoria of Baden), the military and official classes gener¬ ally, was one of (<benevolent neutrality® toward the Central Powers, while that of the Socialists, although neutral, was more favorable to the Entente. The strict enforcement of the British blockade by the seizure of ˆcontraband® de¬ signed to be sent through Sweden to Germany, and the detention of mails from the United States, caused intense irritation; and on the other hand, the German submarine campaigns, and the sinking of Swedish ships, raised con¬ siderable feeling against Germany. Sweden's position as a neutral was seriously compro¬ mised by the revelations made by the United States government in September 1917 that the Swedish Foreign Office was permitting German official messages from foreign countries to be sent as its own messages, these including mes¬ sages from Count Luxburg, German Charge d'Affaires at Buenos Aires, in reference to the sinking of ships of the Argentine Republic by submarines, the most extraordinary of which advised his government that Argentine vessels should not be sunk at all, or <(sunk without leaving any trace® (spurlos versenkt). These revelations raised a storm of indignant protest in all Allied countries, and a breach of diplo¬ matic relations between Germany and the Ar¬ gentine was narrowly avoided. Two changes of government were made in Sweden in 1917, the return of the second of which, under the premiership of Mr. Eden, ensured a national policy more acceptable to the Entente nations. The attempt to hold an International Peace Conference,

promoted by Socialist groups in warring and neutral countries, was prevented by the refusal of the French, British and Italian governments to issue passports.

Bibliography. — Guinchard, J., (Sweden:

An Historical and Statistical Handbook (official; Stockholm 1914) ; and British Foreign Office Reports: Bald, (Norway, Sweden and Denmark5 (London 1912); Bain, (Scandinavia : a Political History of Denmark, Norway and Sweden5 (Cambridge 1905) ; Barnes, (Things Seen in Sweden) (London 1915) ; Drachmann and Westergaard, (Independent Development

and Commercial Policy of the Three Scandi¬ navian Countries) (ib. 1915) ; Kennedy, E. B., 'Thirty Seasons in Scandinavia5 (ib. 1903) ; Leach, H. G., (Scandinavia of the Scandina¬ vians5 (ib. 1918) ; Stefansson, J., (Denmark and Sweden> ((Story of the Nations5 ib. 1916).

SWEDENBORG. See Swedberg.

SWEDENBORGIANS. See Church of

the New Jerusalem.

SWEDISH LANGUAGE.— The North

Germanic dialects seem to have differed very little from each other originally. A fairly uni¬ form language was spoken all over the North which in English and Scandinavian sources is often referred to as ((Donsk tunga.® During the Viking age, between 700 and 1100, four dia¬ lects developed from the original Old Norse: Icelandic, Norwegian, Danish and Swedish. The former two are grouped together as West- norse, the latter two as Eastnorse. Among the distinguishing features may be mentioned the passive ending -s for Eastnorse, where Nor¬ wegian and Icelandic have -sk, f. i. kallas ((to be . called® versus kallask. The Old Swedish period extends to the time of the Reformation and covers geographically not only Sweden proper, but also the coast districts of Finland and Livonia. Our knowledge of the earlier stage of Old Swedish is based on Runic in¬ scriptions which only in the 13th century were replaced by the Latin alphabet. During the later Middle Ages many phonetic changes took place which tended to differentiate Swedish more and more from the other Scandinavian branches, such as lengthening of vowels, the Genetive ending -s instead of -r, the relative pronoun sum in place of aer, etc. The vocabu¬ lary absorbed many foreign elements, especially from Danish

and German, as f. i. numerous industrial and commercial terms, all the verbs in -era (= German -ieren), the suffix -het (=heit), the prefixes be-, bi-, unt-. From this somewhat chaotic stage of transition which is characterized by absolute lack of linguistic norms or standards, modern Swedish emerges gradually as a literary language. The first com¬ plete Bible translation which is named after Gustavus I and appeared in 1541 is regarded as the first monument of modern Swedish lit¬ erature. Throughout the 17th century gram¬ marians and purists made efforts to create na¬ tional standards and to eliminate foreign ele¬ ments. In spite of that, however, a large num¬ ber of French words crept into Swedish, es¬ pecially in the 18th century and have maintained themselves to this day. The internal linguistic changes concern chiefly the simplification of case endings or inflections and the adoption of certain sound-shifts which are characteristic of modern Swedish, such as the sh-sound for combinations like sj, stj, sk, skj. The pronoun of address became ni instead of I. Since the middle of the 18th century Swedish grammar has changed very little, while the vocabulary shows quite a different appearance, particularly since the enormous wealth and variety of ex¬ pression which is stored up in the dialects has been utilized by modern writers. The dialects of Dalarna and the island Gottland are es¬ pecially noteworthy on account of their quaint¬ ness and archaic character.

Accent.— Longfellow who first introduced

Swedish writers to the American public, char¬ acterizes the Swedish language as soft and musical with an accent like the Lowland Scotch. Jacob Grimm considered it even the most musi¬ cal of all Germanic languages, comparable to Italian among the Romance languages. This musical character of Swedish is partly ex¬ plained from the fact that it has retained full endings like -a and -o in many posi¬ tions where the other Germanic languages have substituted -e or dropped them en¬ tirely. More important, however, are the peculiar laws of pitch and modulation which hardly any other language has developed with such consistency. Certain combinations of stress and tone result in definite forms of a musical cadence of (<tonlag.® The simple tonlag, or acute accent, differs very little from that employed in other languages, the com¬ pound tonlag occurs only in Norwegian and Swedish : the voice first sinks about two tones and rises suddenly two or three tones on the second syllable with a weak secondary stress. The question of

accent and modulation is one of the chief difficulties in the study of Swedish.

Bibliography. — For history of the lan¬ guage: Noreen, A. G., (De nordiska spraken) (Upsala 1887). By the same scholar the au¬ thoritative grammar, (Stockholm 1903 et seq.). A shorter grammar in Swedish is by Sunden, D. A., (Svensk spraklara) (Stock¬ holm 1885). For pronunciation and accent con¬ sult Storm's article (Om Tonelaget i de skandi- naviske Sprog) (Christiania 1847). Also Sweet's treatment in the Transactions of the Philological Society (London 1877). Two practical grammars for American students are Vixner, E. J., (A Brief Swedish Grammar> (Rock Island, Ill., 1914) and Elmquist, A. L.,

(Elementary Swedish Grammar) (Chicago 1914). The official dictionary of the Swedish Academy is still in progress, (Ordbok ofver svenska sprakeD (Lund 1893 et seq.). For dia¬ lects consult Rietz, J. E., (Svensk Dialectlexi- kon> (Malmo 1867). For etymology Tamm, F., (Etymologisk svensk ordbok) (Stockholm 1890). For American readers Bjorkman, ˆwedish-English Dictionary) (Stockholm 1889) and Wendstrom and Lindgren, (English- Swedish Dictionary) (Stockholm 1889).

Ewald A. Boucke,

German Department, University of Michigan.

SWEDISH LITERATURE. The intel¬ lectual life of the North has been at all times more or less dependent on central Europe, es¬ pecially on German and French civilization. Swedish literature shows these influences in a marked degree and has only within the last generation produced writers of distinct origi¬ nality and more than national significance. The mediaeval period appears rather meagre as compared with those of Norway and Iceland. Codes of laws, chronicles, legends of saints, adaptations of chivalrous romances and didactic writings : these or similar categories cover a literary activity which is altogether imitative and chiefly of philological interest. Among the historical documents may be mentioned the Erics- chronicle, covering the period from 1230- 1320, the New Chronicle (1490) and the so- called Small Rhymechronicle which contains some interesting autobiographies of Swedish kings. The most conspicuous religious char¬

acter of the later Middle Ages was Saint Birgitta who, after an extended experience as wife and mother, turned her mind to things spiritual, undertook reforms of all kinds, founded a religious order,

came in touch with the leaders of German mysticism and died 1373 in Rome. She contributed to Swedish literature a volume of visions or ˆrevelations® which in spite of their abstruseness exhibit a remarkable power of imagination. Her personal influence and the activity of the Birgitta order which was centred in Vadstena, can be traced through the whole intellectual life of the North, especially in the direction of building up a national church and encouraging the use of the mother tongue. The ballad literature of the 14th and 15th centuries is not as extensive as that of Denmark or Germany, but corresponds otherwise in subject and form. Many of these lays and ballads wandered evidently from one country to the other and exist in numerous versions. More than 60 have been counted of the famous ballad (Elveskud) (translated by Herder as (Erlkings Daughters*) which describes the dangerous lure of dancing elves. The Swedish ballads have been collected by Geijer and Afzelius as (Svenska folkvisor> (new edition by Bergstrom, 1880).

Swedish thought and literature received a powerful stimulus from the gradual adoption of the Lutheran faith in the course of the 16th century. This movement is closely associated with the names of the brothers Petri, Olavus and Laurentius, and of Laurentius Andreae. All three of them contributed to the transla¬ tion of the Bible which appeared complete in Upsala in the year 1541 and which for the his¬ tory of the literary language in Sweden may claim a similar position as Luther's translation for German. Apart from a rich controversial literature called forth by the religious move¬ ment, we meet with attempts in the dramatic field, such as treatment of biblical stories, alle¬ gories and school comedies. The most versatile writer of this period is Johan Messenius who, among other things, planned a systematic dramatization of subjects taken from Swedish history but who only completed six of such plays.

The heroic century of Modern Sweden, the age of Gustavus Adolphus and Charles XII, proved to be relatively unproductive in the field of literature. The dominant influence of Renaissance poetics throughout the 17th century discouraged spontaneous expression and es¬ tablished in most European countries classicistic standards and a rule of formalism. Sweden reveres her "father of literature® in Georg Stjernhjelm (1598-1672) , a stern disciplinarian who aimed at purity of language and formal perfection. He wrote a number of epic and didactic poems of an allegorical character, among them his famous (Hercules at the Cross- road) and distinguished himself besides as a scholar and scientist in many fields. He intro¬ duced a number of classic and romantic metres into Swedish poetry and handled them with re¬ markable skill. His contemporary Gunnar Dahlstjerna

employed even the Ottave rime (with six iambic feet) in his patriotic poem (Kungaskald,) and is still appreciated as the author of (Gotha Kampevisa* in which Charles XII and Peter the Tsar are the leading

characters. The greatest metrical genius of his age was Johan Runius (d. 1713), while the Finlander Jacob Frese shows more natural poetic talent. Samuel Columbus and Jesper Svedberg contributed some of the most popular Swedish hymns. The anatomist and botanist Olaf Rudbeck (1630-1702) still arouses our smile as the author of the treatise (Atlantika) in which he tried to prove that Plato's Atlantis was identical with Sweden and that here or nowhere else must have stood the cradle of civilization. Rudbeck taught at Upsala which under the reign of Queen Christine had be¬ come a great centre of learning and attracted temporarily scholars from all parts of Europe, even men like Descartes, Hugo Grotius and others.

The literary sceptre of Stjernhjelm as dictator in the republic of letters passed later into the hands of Olof von Dalin (1708-63) who in his literary style and ambitions might be compared with the English rationalist Pope. He began his career by editing a periodical The Swedish Argus which was modeled after Addison's Spectator, and developed later into an excellent prose writer and brilliant satirist. His (Saga om Hasten > (Hale of the horse®) is still enjoyable as a specimen of rationalistic wit and allegory. While Dalin leaned at first on English models, the literary taste of the age continued on the whole to be French, first in the manner of Voltaire as in the case of the (<dioscuri® Creutz and Gyllenborg, or of Kell- gren and Leopold, later in the manner of Rousseau whose theories were introduced into Sweden by Thomas Thorild. Among the literary productions of this school deserve special mentioning Creutz' a charming idyl in the style of Gessner, Kell- gren's (Nya Skapesen* (the new creation), and Wallenberg's novel (Min Son pa Galejen) (my son on the galley), a great favorite to this day on account of its splendid humor. King Gustavus III (1771-92), nephew of Frederick the Great and one of the most gifted rulers of his age, did not only further the arts and sciences in the most generous way, but wrote several patriotic plays of considerable merit. Among Gustavus' immediate friends who at¬ tained temporary fame are Count Ehrensvard, Count Oxenstjerna, Bengt Lidner, the poet of sentiment and passion, G. Adlerbeth, author of Hngjald UlradaC the most famous Swedish tragedy of this age. The revolutionary pathos of Thomas Thorild inaugurates the new

emotionalism in Sweden which worshipped at the shine of Rousseau, Klopstock and Ossian. Before entering upon this new phase a word ought to be said about the most unique lyric poet of this century who is still dear to the hearts of his countrymen : Karl M. Bellman (1740-95). He belongs with Robert Burns, or the French vagabond Villon to the class of literary bohemians who seem to be entirely free from the shackles of school or convention, who appeal to us more like voices of nature or immediate transcripts of the life around them. Bellman's best-known poems, among them those dramatic sketches of tavern life, are contained in the collection: Fredman's epistles. They seem more like free improvisa¬ tions than finished works .of art, but it is this wonderful freshness and bold impressionistic

manner which fascinates the modern reader as much as their original audience.

The transition from the older 18th century formalism to the Romantic age in Sweden presents quite a dramatic spectacle. The first writers who showed a more adventurous spirit, were Franzen and Wallin, the latter still known as the editor of the Swedish psalm-book and as the author of a glowing ode addressed to George Washington. After the revolution of 1809 the Swedish Academy ceased to be arbiter of public taste, and soon the leading writers of the Romantic movement in Germany were eagerly studied and imitated. Two parties formed and carried on a lively feud for a num¬ ber of years : the Phosphorists, so called after their periodical 'Phosphorus,* were more in¬ terested in the speculative elements .of German mysticism, as represented by Schelling or Novalis, the Gothicists wished to strengthen national ideals and to revive the old sagas and ballads of the romantic Middle Ages. The head of the first group was Peter Atterbom (died in 1855), whose phosphorescent visions recall somewhat the ethereal, transcendent style .of Shelley or Keats. Other members were Nyberg, Dahlgren and Stagnelius, a mystic and seer, reminding of Blake. The leading minds of the Gothicists were Erik Geijer, equally great as poet and historian, Per Ling who tried to revive the old saga style, and his much greater follower Esaias Tegner, author of the Frithjofs Saga, Sweden's national epic. Somewhat independent of either school remained Karl Nicander who selected chiefly Italian subjects and themes for his poetry, Chr. Fahlcrantz, still quoted as a humorist, and Johan L. Almquist (1793-1866), an erratic genius who combined exquisite delicacy of senti¬ ment (as in his collection of lyrics: Tornrosens bok) with an extravagant, even lawless imagination and quite heterodox views on love and marriage.

The chief by-product of the Romantic move¬ ment, the historical

novel, flourished in Sweden perhaps even better than in England or Ger¬ many. Gumalius, Crusenstolpe, Ridderstad, Sparre and many others have contributed to this genre. The Finlander Topelius' so called 'Surgeon's Stories *which cover nearly tw.o centuries of Swedish history, were widely read in this country at one time, but slumber now peacefully on the shelves of our libraries side by side with Rydberg's famous novel (The Last Athenian,* and with Frederika Bremer's once so popular stories and sketches of Swedish home life. The last-named writer ap¬ pears already quite emancipated from Romantic doctrines and points toward the coming age of Realism. Swedish literature, as may have been noticed, is immensely rich in the field of lyric poetry, whereas the realistic novel of the Dickens or Eliot type is rather poorly repre¬ sented. Fr. Cederborgh, Karl Wetterberg, August Blanche, Sofie von Knorring and a few others present various aspects of Swedish life and society in their novels. The realistic note which had already been heard in the poems of Anna Lenngren (died 1817), becomes more and more prominent, and is reinforced by humor and satire in the songs of W. von Braun, Wennerberg, Sturzenbecker, and the witty im¬ provisations of Johan Wadman. But all these

minor talents disappear by the side of the greatest poetic realist of his age: Johan L. Runeberg, the pride of Finland. His chief work is a collection of patriotic poems and ballads: (Ensign Stals Tales/ which were in¬ spired by the second Finnish War in 1809, and are rightly considered the most beautiful trib¬ ute that has ever been paid, to the patriotic enthusiasm of a small nation. The idyls (Elk- hunted and (Hanna5 show the influence of Goethe's epic style and, with a large number of exquisite lyrics, give evidence of Runeberg's remarkable power to invest the simplest and most primitive aspects of life with genuine pathos and poetic dignity. He deserves to be classed in this respect with poets of the rank of Goethe or Wordsworth. Runeberg taught for many years in Borga, Finland, and died in

1.

Two years after Runeberg's death, in 1879, there appeared a novel in Sweden under the title (The Red Room) by August Strindberg, which inaugurated a new type of Realism and a new literary era. A few years later Geijerstam attempted in his first novel rErik Grane) to epitomize the great intellectual and social revolution which had gradually spread from one country to the other and was in¬ spired by three

constructive ideals: a political and social democracy, a reconciliation of science and religion, and a new aesthetic creed which subordinated beauty to truth. The command¬ ing figure in this movement is August Strind¬ berg, epochmaking in all fields of literature and at all times a seeker of truth. Most of his writings are now accessible in English translations. Gustav af Geijerstam (1858- 1909) who as a novelist has gained great popularity both in Sweden and Germany, is practically unknown to the American reader. This may be explained from the distinctly national or even provincial character of his art, partly from the peculiar inwardness and subtlety of his analysis which avoids striking plots or situations and instead delves down into the deeper strata and hidden recesses of soul life. However, such stories as (Astray in Life/ (Pastor Hallin/ or some of his short stories deserve to be translated and might ap¬ peal more than some of Strindberg's rather morbid productions. Among the younger fol¬ lowers of the new realism may be mentioned Albert Engstrom, editor of the periodical (Strix) and known through his descriptions of peasant life, sailors and fishermen. Two Swed¬ ish American novels may be added, one by Hilma Angered-Strandberg, called (The New Work/ describing the struggle and failure of two people who have come to this country, the other by Henning Berger, (IsaiP which contains a splendid description of Chicago as the great melting pot of races. The influence of Maupassant and Flaubert is noticeable in Hjalmar Soderberg's clever sketches iof Stock¬ holm society ((Historietten) and (Blunders5), as well as in his novel (Martin Birk's Youth/ a story of disillusioned youth. Sigerid Siwertz, a short story writer, seems to develop in a similar direction, as f. i., in his collection (The New Robinson/

Since 1890 the pendulum seems to have swung back in the opposite direction of an idealistic or neoromantic interpretation of life.

Such is the literary creed of Selma Lagerlof, the leading writer of the day, whose wondrous tales from Gosta Berling to the (Emperor of Portugallia) are being read in many languages. Her art certainly bears out Walter Pater's definition of the romantic as Strangeness added to beauty/ Far less known is Verner von Heidenstam, author of the (Karolinerna,5 a series of tales grouped around the heroic figure of Charles XII. This book has already be¬ come a classic. Oscar Levertin (died in 1906) may be regarded as the leading critic and essayist of this school. His earlier lyrics, like those of Heidenstam's, reveal a dreamy brood¬ ing mysticism and great delicacy of feeling. Even more elusive are Ola Hansson's inter¬ pretations of nature and soul-life in his (Sensi- tiva amorosa) and (Young Ofeg's Ditties) (transl. by G. Egerton). Per Hallstrbm has attracted attention as a stylist of pronounced individuality and a lover of southern beauty in a number

of delicately chiseled stories and sketches. His prose writings correspond some¬ what to the lyrical poetry of Count Snoilsky (died 1903), which is distinguished by great formal beauty and its rich cultural suggestive¬ ness. Quite an opposite type,' though equally great in his way, is Gustaf Froding (died 1911), who renewed the impressionism of Bellman and his model Robert Burns but covers a wider range of experience. He is an enthusiastic worshipper of life tempered by an element of irony and even cynicism. ((Guitar and Ac- cordion) 1891). The youngest generation is represented by the Finlander Gripenberg, the naturalists Baath and Bo Bergman, and Sig¬ mund Agrell, a follower of Hallstrom. Present day novelists are Sven Lidman (the life of Swedish nobility), Gustaf Tanson (cosmopoli¬ tan and visionary), Mathilde Roos (conserva¬ tive). A group of writers make Norrland, the country of sawmills, the background of their novels, like Erik Forsslund in (Storgarden,5 Martin Koch, Olaf Hogberg, L. Nordstrom. The drama, at all times strangely unproductive in Sweden, has little to show, since the days of Strindberg, but temporary successes like Hall- strom's charming (Venetian Comedy,5 Harold Morlander's (Rococo) and Soderberg's (Ger- trud) (1906). The most promising dramatist of the day is Ernst Didring.

Bibliography. — The best anthology is the (Lasebok i svensk litteratur5 by Hildebrand, Bergstadt and Bendixson (Stockholm 1897). Of older histories of literature may be mentioned Malmstrom, Grunddragen af svenska vitter- hetens historia, Oerebro 1866-69. The best modern book is the Ullustrerad svensk littera- turhistoria) by Schiick and Warburg (2d ed., 1912-16). The only English treatment of Swedish literature, but extending only to 1880, is to be found in Horn's (History of the Literature of the Scandinavian North5 (translated by Rasmus Anderson, Chicago 1884). It contains valuable and quite extensive bibliographical material, especially in the field of English translations. Very few articles have appeared in American magazines within the last 20 years, one by Har- boe, Silhouettes of some Swedish writers, in the Bookman (October 1906) ; another by Stork on Gustaf Froding (in the North American , Vol. 204). G. Brandes has written short essays on a number of modern Swedish writers which are

to be found in Vol. Ill and XVII of his <Samlade SkriftenP Runeberg is treated by Gosse in his (Northern Studies, } London 1879. For general

reference consult the svensk bok- katalog (1866 et seq.) and the arskatalog for svenska bokhandeln.

Ewald A. Boucke,

German Department, University of Michigan. SWEDISH MOVEMENT-CURE, a sys¬ tem of ˆtherapeutics devised by Pehr Henrik Ling (1776-1839), a Swedish poet, and fostered and developed by the Swedish government. It consists of remedial or localized movements of muscles to restore the normal movement of the contents of cells when it has become disar¬ ranged. This method, as variously modified by the development of modern mechanotherapy, is often associated with massage. The muscular movements (active or passive) are effected either by various machines or by the hands of the operator, which flex, extend, twist, tap, knead, rub and roll the various muscles. The Swedish movement-cure, or, to speak more broadly, the movement-cure in general, em¬ braces scientific and valuable modes of treat¬ ment. But their application requires good judg¬ ment. If properly used, mechanotherapy as thereby employed improves the nutrition of the whole body, relieves congested and engorged organs and tends to restore animal heat to its normal point. Improperly used, such methods may do much harm. See Mechanotherapy ; Therapeutics.

SWEENY, Thomas William, Irish-Ameri- can military officer: b. Cork, Ireland, 25 Dec. 1820; d. Astoria, L. I., 10 April 1892. He came to the United States in 1832 and settled in New York where, after finishing his education, he was apprenticed to the printing business. He early identified himself with the military com¬ panies of the city and at the breaking out of the Mexican War in 1846 became second lieu¬ tenant in the First New York Volunteers, com¬ manded by Col. Ward B. Burnett. Lieutenant Sweeny participated in all the battles of the campaign under Gen. Winfield Scott from the siege of Vera Cruz to the storming of Churu- busco, where he was twice severely wounded, losing his right arm 20 Aug. 1847. On his re¬ turn to New York, in 1848, he was given a re¬ ception ball at Castle Garden and was presented a medal by the Corporation of New York. He was engaged in almost constant operations against the Yuma and other Indian tribes until the fall of 1853, when he was sent to New York on recruiting duty. In 1854 he was or¬ dered to Fort Pierre, Nebraska Territory, where he took part in the Sioux campaign of 1855-56 as aide to Gen. William S. Harney. On 19 Jan. 1861 he was promoted captain, sec¬ ond infantry, and soon after was sent to Saint Louis, Mo., by order of General Scott, and placed in command of the arsenal, which he saved by threatening to explode the 40 tons of powder

stored there in case the Secessionists attacked him. He was at the capture of Camp Jackson, where he was second in command of the Union forces and, owing to the disability of General Lyon, carried on the negotiations which brought about the surrender. He became brigadier-general of Missouri Volunteers in May 1861. Previous to the battle of Wilson's Creek, when General Lyon had expressed his

intention to retreat, he prevailed upon Lyon to remain and give the enemy battle. In the subse¬ quent battle he led the Second Kansas Regiment, and was severely wounded in the right leg. He accepted the colonelcy of the 52d Illinois Volun¬ teer Infantry in January 1862 and after the capture of Fort Donelson had charge of 5,000 prisoners of war. Toward the close of the first day of the battle of Shiloh, where he com¬ manded a brigade, his command occupied a ravine, the defense of which was entrusted to him by General Sherman, who afterward said : (<He held it, and I attach more importance to that event than to any of the hundred achieve¬ ments which I have since heard (saved the dayP J) General Sweeny was commissioned brigadier-general . of volunteers 29 Nov. 1862 and was engaged in protecting the Memphis and Charleston Railroad. He was promoted major 16th United States Infantry 20 Oct. 1863 and

was present at the fighting at Iuka and the

siege of Corinth. In the Atlanta campaign he commanded the second division, 16th Corps, Army of the Tennessee. He participated in the battle of Resaca and at Lay's Ferry forced a passage across the Oostenaula River and fought a battle that compelled Gen. Joseph E. Johnston to retreat with his army. He took

part in. the battles of Dallas and Kenesaw

Mountain, the actions at Nickajack Creek, Ruff's Mills, Rome Cross Roads, Calhoun's Ferry and other engagements, and at the battle of Atlanta 22 July 1864 he repulsed the enemy with great slaughter, capturing four battle-flags and 900 prisoners. In 1866 he was engaged in the Fenian invasion of Canada. During this period he was out of the national service, but he was reinstated by the President and or¬ dered to the Department of the South, where he was in command of the post of Augusta, Ga., and, subsequently, that of Atlanta, Ga. General Sweeny was presented a sword by the city of Brooklyn in August 1862 for his serv¬ ices in the Civil War. He was finally retired from active service 11 May 1870 with the full rank of brigadier-general, United" States Army. Consult (Battles and Leaders of the Civil WarP

the foregoing: b. New York, 29 Aug. 1871. He was educated at public and private schools and academies in New York and Augusta, Ga. He has written for the press and contributed bio¬ graphical articles to Officers of the Army (Regular) who served in the Civil War > (Philadelphia 1892) ; (History of the Twelfth Regiment, N. G. N. YP (New York 1894) ; (Journal of the American-Irish Historical So¬ ciety0 (Boston 1899) ; White's (National Cyclo¬ paedia of American Biography } (New York 1901) and Lamb's (Biographical Directory of the United States) (Boston). He is the author of the (Life and Services of Thomas William Sweeny, Brigadier-General, United States Army > (New York 1907) and editor of (Sweeny's Narrative of Army Service) (1846- 53) ; (Captain Thomas Cook, a Soldier of the Revolution- (1752 —1841)) (New York 1909) and (Some Notices, Genealogical and Historical, of the Cook, Dandridge, Higginbotham, Morrison, Reagan, Refo and Sweeny Families) (in manu¬ script),

SWEET, Benjamin Jeffrey, American military officer: b. Kirkland, N. Y.. 24 April

1832; d. Washington, D. C., 1 Jan. 1874. In the Civil War he was colonel of the 21st Wis¬ consin regiment. In 1864 he was placed in command of Camp Douglas, Chicago, where 10,000 Confederates were imprisoned and suc¬ cessfully circumvented the efforts of Confeder¬ ate societies to seize Chicago and liberate their friends. He was made brigadier-general of volunteers in 1865 and in 1872 was appointed first deputy commissioner of internal revenue.

SWEET, Henry, English philologist : b. London, 1845 ; d. 30 April 1912. He was edu¬ cated at King's College, London, at Heidelberg University and at Balliol College, Oxford. He devoted himself to the study of phonetics and Old English philology and became one of the foremost authorities on both subjects. His researches into Chinese and Arabic were also of high value. From 1901 until his death he was University reader in phonetics at Oxford University. He edited numerous Old and Middle English works and was author of many papers on philology and of (A History of English Sounds) (2d ed., 1888) ; (Primer of Phonetics) (1890 ; 3d ed., 1906); (The History of Language* (1900), etc.

SWEET, John Edson, American engineer: b. Pompey, N. Y., 21 Oct. 1832; d. 8 May 1916. He was educated in the district schools, be¬ came a carpenter's apprentice and rose to be a builder and architect in 1850. He was em¬ ployed in his profession in the South until 1861 ; engaged as an inventor and mechanical draftsman until 1873; from 1873-79 was pro¬ fessor of practical mechanics at Cornell. From 1880 he was president of the Straight Line Engine Company. He founded the American Society of Mechanical Engineers, of which he was president in 1883-84, and an honorary member. On his 80th birthday in 1912, he was given a banquet by the society. He was gov¬ ernment expert and juror on machine tools at the World's Columbian Exposition in 1893 and in 1899-1901 was first president of the Engine Builder's Association of the United States. In 1904 he was given the John Fritz Medal, which is awarded by a board of 16 of the leading members of the Mining, Civil, Mechanical and Electric Engineering Societies. In 1914 Syra¬ cuse University conferred upon him the de¬ gree of Doctor of Engineering.

SWEET-BAY, the classic laurel (Laurus nobilis), or bay-tree of the Mediterranean regions, which becomes a tree of some 50 feet in its native habitat, but is cultivated^ as a shrub farther north, being often trimmed like box. (See Bay). It has handsome, lanceo¬ late evergreen leaves, dark-green and shining, which haye an aromatic odor and taste and are, therefore, employed in cookery and for pack¬ ing figs. They have also some therapeutic value and yield a thick oil which is incorporated into ointments and liniments. The sweet-bay of America is the small tree (Magnolia vir- giniana) called more frequently swamp-mag¬ nolia or swamp-laurel. See Magnolia.

SWEET-BRIER. See Eglantine.

SWEET-FERN, a low shrub (Comptonia peregrind) , with many brown branches and long linear leaves so deeply pinnatifid on either side of the midrib as to appear fern¬ like. The flowers are dioecious, without per¬

ianths, and appear when the leaves expand ; the fertile are in globose aments followed by burr¬ like fruits — bony nuts invested with awl-shaped persistent bracts. The staminate aments are longer and clustered at the ends of branches. The young foliage is pubescent, and the whole plant has a strong aromatic fragrance when bruised or under hot sunshine. It was formerly included in the genus with the spicy-bay-berry and is often found growing with it on sterile soils or on hillsides further inland. The dried leaves are sometimes used as a substitute for tobacco.

SWEET-FLAG. See Flag, Sweet.

SWEET GALE. See Candleberry.

SWEET-GRASS, a name given to certain plants, most of which are fragrant, especially in drying. The small Anthoxanthum odoratum is the sweet vernal grass and has narrow spike¬ like panicles of spreading one-flowered spike- lets. The leaves are flat. This plant has been introduced from Europe and is found in fields and meadows over nearly the whole of America, adding to the fragrance of newly mown hay. Savastana odorata is the vanilla-grass or holy- grass of Europe, which is 'strewn before the churches and religious processions. It is the material from which the Indians of the Saint Lawrence region weave their thin-walled bas¬ kets that, when made of the genuine grass, retain their odor of new mown hay indefinitely. Panicularia is a genus of grasses called sweet grass because cattle are said to be fond of P. fluitans. Another sweet-grass (Asperula odo¬ rata) does not in the least resemble grass, hav¬ ing whorls of leaves and white flowers like tiny stars in cymes. When dried it is fragrant, however.

SWEET-GUM, a large American tree (Liquidambar styracidua) , reaching its greatest size in the South Atlantic States, where it de¬ velops tall, straight trunks, branchless for 70 or 80 feet above the ground. The head is narrowly pyramidal when young, but when old and field- grown the heads are likely to become irregular and rugged. The five-lobed, star-shaped leaves form thick, dark and glossy foliage turning to brilliant hues in autumn, the young saplings especially being gorgeous in large reddish pur¬ ple leaves, bright-green beneath. The monoe¬ cious flowers are inconspicuous and without perianth. They are gathered into erect heads, the pistillate ones being succeeded by odd fruits, globose and spiked with the points of two- beaked woody capsules, which are brown and twisted and allow the scanty fertile seeds to escape through gaping orifices. They hang by long stalks far into the winter. The bark is very rough, and in young branches and saplings is peculiarly winged by numerous gray corky ridges of undulating outline, which have sug¬ gested the name of alligator-wood. The wood is smooth and satiny and would be valuable as a substitute for black walnut, were it not so liable to warp and difficult to season. It is filled with a resinous sap, which is used medicinally, and like that of Liquidambar orientate, of Asia, might be a source of gum storax. This fragrant sap has prompted the Latin-Arabic descriptive generic name. The sweet-gum is otherwise known as star-leafed gum, liquidam¬ bar, bilsted, red-gum or copalm.

SWEET MARJORAM. See Marjoram.

SWEET PEA, an annual herb (Lathyrus odorcitus) of the family Fabacece. It is sup¬ posedly a native of Ceylon, Sicily and Sardinia, the original pink-and-white and the red varieties being credited to the first country and the pure white and purple varieties to the other two islands. The known history of the plant begins in 1650, and the first record of its cultivation in 1699, when Father Franciscus Cupani grew it at Panormus, Sicily. By 1730 the seed was com¬ mercially known, and about 60 years later five varieties were offered by a London seedsman. Until Henry Eckford commenced experimenting in 1876 for the production of new varieties there were, however, rarely 12 varieties offered in any one year. Largely due to his efforts the list of varieties had risen to 150 in 1898, and the popularity of the flower had vastly extended. It has been estimated that since 1900 the aver¬ age annual crop of sweet-pea seed is about 100,000 pounds, about one-fifth of which is produced by one company in California, where nearly all the seed used in Europe and America is now grown.

The sweet pea is a hardy annual herbaceous vine with rough, winged stems, tendril-bearing leaves composed of two leaflets borne on long stalks, and fragrant papilionaceous flowers of various shades, ranging from white to blue and red through many tints, and including both double and ˆhooded® forms. The pods are about two inches long, and contain about six brown seeds. The double varieties are not regarded with favor, being rather unkempt and lacking the daintiness of the single sorts.

For best results in the garden, sweet peas should be planted very early in the spring or even during the previous late autumn. They will thus obtain an early start, and their roots will penetrate more deeply into the cool, moist soil before warm weather arrives, than if sown later. Moderately rich soil of a rather heavy nature generally gives best results; very rich soil tends to grow vine and leaf at the expense of flower; very poor ground is prone to produce small short-lived vines and little flowers which, however, are often pronouncedly fragrant. The seeds should be scattered thinly in trenches about five inches deep and four or more inches broad. The distance between rows should be about three and one-half feet, the seed covered about one inch deep, and as the plants grow the earth should be drawn toward the vines until it forms a ridge two or three inches high. When the plants are well above the surface they should be provided with supports upon which to climb. Brush and poultry netting are gen¬

erally employed. Throughout the season clean, shallow cultivation should be given and the flowers gathered daily. This last will consid¬ erably extend the season since the formation of seed tends to a cessation of growth.

Several closely related species are cultivated for ornamental purposes but are less popular than the above. The best known are probably the following: The Tangier scarlet pea (Lathy¬ rus tingitanus), an annual herb which blossoms earlier than the sweet pea and should be planted separately because of its greater strength and its tendency to crowd out the former. The perennial or everlasting pea (L. latifolius) , an odorless species with many-flowered clusters of

diversely colored blossoms. It is popular for planting among rocks, in rough places and for screens, for which its rampant growth and har¬ diness recommend it. L. rotundifolius and L. grandidorus are also called everlasting and are cultivated to some extent, as are also L. mari- timus, the sea or seaside pea, and L. palustris, the marsh or wing-stemmed pea — the latter grown in damp places.

Consult Hutchins, (All About Sweet Peas) (1894), and (Sweet Peas Up to Date} (Phila¬ delphia 1897); Bulletins 111 and 127, Cornell Agricultural Experiment Station (Ithaca 1895, 1896) ; Bailey, (Standard Cyclopedia of Horti- culture) (New York 1916).

SWEET PEPPERBUSH. See Clethra.

SWEET POTATO, a tuberous-rooted perennial herbaceous vine (Ipomce a batatas) of the family Convolvulacece. The plant is of un¬ known origin but is supposed to be a native of tropical America. It has roundish or angular heart-shaped leaves, and in cultivation rarely produces blossoms or seeds. The flowers re¬ semble those of morning-glory, but are smaller. The tubers, which are borne below the crown of the plant, are without well-defined eyes. The plant was cultivated by the natives before the landing of Columbus. It is now extensively grown in many warm and mild climates, es¬ pecially in the Southern States, California and the Atlantic Coast as far north as New Jersey. The annual crop aggregates about 50,000,000 bushels, and the yield per acre varies usually between 200 and 400 bushels, though with best management and favorable season 800 bushels or even more are occasionally obtained.

The sweet potato is propagated less by its tubers planted in the field than by sprouts ob¬ tained from the tubers in hotbeds, etc. These sprouts or <(draws® are transplanted in the field as soon as the

weather has become settled and after the land has been deeply and finely pre¬ pared by plowing and harrowing. The soil best suited to the crop is a light sandy loam not excessively rich in nitrogenous plant food but not deficient in this respect. Upon heavy soils the tubers are prone to crack because of the uneven growth under varying conditions of moisture and dryness. Plenty of moisture, warm situation and liberal manuring are essen¬ tial. The ground is kept cleanly cultivated until the vines interfere with tillage. The tubers are dug in the autumn and stored in a great variety of ways, all considered more or less unsatisfac¬ tory since the tubers usually decay badly during storage. While the plentiful yield may fre¬ quently beg a market in the autumn, the demand from mid-winter onward can rarely be supplied even at advanced figures. These troubles may be considerably reduced by proper care in har¬ vesting. The following practices are recom¬ mended: Digging before the tubers start a ((second growth,® choosing clear weather when the soil is dry, using padded baskets to reduce chance of scratching the tubers, handling so as to avoid bruising, storing only the perfect speci¬ mens and giving perfect ventilation in the stor¬ age heaps which should always be located upon knolls or otherwise dry ground. As adjuncts to these practices the beds in which the sprouts are obtained should be made upon clean fresh land with fresh manure and the plants should never be set two years in succession in the same

field ; ' three or four years is considered much better. These are all preventive and are thought to be more valuable than special methods of storage in expensive storage quar¬ ters.

Consult Georgia Experiment Station Bulle¬ tin No. 25 and Farmers' Bulletin No. 26 of United States Department of Agriculture.

SWEET-SOP, the edible fruit of an ever¬ green shrub (Annona squamosa) . It is ovate in shape, with a delicious, sweet pulp, enclosed by a thick rind having projecting scales. Although indigenous to America this tree is cultivated for its fruits in all tropical climates, and is also called sweet-apple, or, in India, custard apple — a name which properly belongs to A. reticulata.

SWEET SULTAN, a plant. See Cen-

TAUREA.

SWEET WATERS OF ASIA, a river, the ancient Aretas, flowing between Anadoli Hissar and Kandili, on the Asiatic side of the Bosphorus. The Turks call it Ghiok-suyu, (‘heavenly waters,** from the surpassing beauty of its surroundings. The valley is a favorite picnic resort in summer and autumn, when the better class Turkish families may be seen on Fridays (Mohammedan Sabbath) in their pri¬ vate caiques (boats) on the stream or scattered along the shores under luxuriant cypress, syca¬ more and plane trees.

SWEET WINES. See Wine and Wine Making.

SWELL-FISH. See Globefish ; Diodon.

SWENSSON, Carl Aaron, American Lu¬ theran theologian: b. Sugar Grove, Pa., 25 June 1857 ; d. Los Angeles, Cal., 16 Feb. 1904. He was graduated from Augustana College, Rock Island, in 1877, and in theology from Augustana Seminary in 1879; was secretary to the General Council of the Lutheran Church of North America in 1885 and its president, 1893-94. He was a member of the Kansas legislature in 1889; founded Bethany College in 1881 and was its president from 1889 till his death. He was the author of hymn books and books of travel in Swedish and English.

SWETE, swet, Henry Barclay, English theologian : b. Bristol, 14 March 1835 ; d. May 1917. He was educated at King’s College, Lon¬ don, and Gonville and Caius College, Cam¬ bridge, where he gained several prizes, and was graduated in 1858. He was professor of pastoral theology in King’s College, London, from 1882 till 1890, and examining chaplain to the bishop of Saint Albans from 1881 till 1890; and after 1890 was Regius professor of divinity at Cambridge. He was made honorary chap¬ lain to the king in 1911. His published works include (Early History of the Doctrine of the Holy Spirit } (1873) ; ˆHistory of the Doctrine of the Procession of the Holy Spirit ˆ (1876) ; Commentary of Theodore of Mopsuestia on the Minor Epistles of Saint PauP (1880-82); die Old Testament in Greeks according to the Septuagint (1887-94); (The Akhmim Frag¬ ment of the Apocryphal Gospel of Saint Peter* (1893) ; (1899) ; (Faith in Rela¬ tion to Creed, Thought and Life) (1895); Church Services and Service-books before the Reformation * (1896); Che Gospel According

to Saint Mark, and the Greek Text, with Intro¬ duction, Notes and Indices) (1898) ; (An Im troduction to the Old Testament in Greek *(1900); ˆPatriotic Study> (1902), and (Studies in the Teaching of Our Lord) (1903) ; (Works of the Ascended Christ* (1911); <The Holy Spirit in the Ancient Church *(1912) ; (The Last Discourse and Prayer of our*

Lord (1913); (The Holy Catholic Church *(1915). He also contributed articles to Smith and Wace's (Dictionary of Christian Biography,* (Vols. Ill and IV, 1882-87), and to Hasting's (Dictionary of the Bible* (Vols. II and III,

1899-1900).

SWIFT, Gustavus Franklin, American merchant: b. Sandwich, Mass., 24 June 1839; d. Chicago, Ill., 30 March 1903. At the age of 23 he opened a small butcher shop in his native town, but removed to Boston when he was less than 30 years old. He remained in Boston until 1875 when he went to Chicago, where he de¬ veloped the department of shipping live cattle to eastern markets. In 1877 he evolved plans for the first refrigerator car, and dressed meats, instead of live animals, were shipped to eastern cities. He was the pioneer in this business, and from the small plant started in 1877 de¬ veloped the great corporation bearing his name.

SWIFT, Jonathan, English clergyman, poet, political writer and satirist : b. Dublin Ireland, 30 Nov. 1667; d. Dublin, 19 Oct. 1745. Swift was the posthumous son of Jonathan Swift, the neer-do-weel of a prosperous and pietty well-known family which had numbered several preachers in its course since the time of Robert Swifte (16th century) of Yorkshire, the earliest known of Swift's ancestors. The most famous member was Swift's grandfather, Thomas Swift (b. 1595), the famous Royalist vicar of Goodrich. Through Thomas Swift's marriage to Elizabeth Dryden, great-aunt of J°hn Dryden, came Swift's relation to the poet. Swift s mother, Abigail Erick, of Leicestershire was a distant cousin of Sir William Temple and a woman of much character and wit.

Swift's life divides itself conveniently into three periods: to the death of his patron,' Tem¬ ple, in 1699; from that year, when he began to seek ecclesiastical and political preferment, to the close of his brilliant work for the Tory ministry at the death of Queen Anne, in 1714 - and from the latter year till his death, during which period he was dean of Saint Patrick's in Dublin, where he almost continuously resided.

I he story is that he was taken at the age of one year from Dublin to Whitehaven, England, by his nurse, where he lived two years, learning to read in the interval. At the age of six he entered Kilkenny School at the charge of his uncle, Godwin Swift. Entering Trinity College, Dublin, in April 1682, he was graduated four years later without distinction, and the follow¬ ing year was publicly censured for neglect of his studies and for tavern-haunting. At this time he was probably pretty much depressed in spnits and was friendless. His dependence

on the charity of his relatives was galling to his pride, and he was unhappy, but his delin¬ quencies weie not very serious. Driven from Ireland in the fall of 1688 by the rebellion of Tyrconnel, he and his mother retired to Leices- tershire, whence, in 1689, he became secretary to Temple at Moor Park, near London. His

position was a somewhat menial one, but his patron s kindness enabled him to take the de¬ gree of A.M. at Oxford in 1692. Returning to Temple but finding his position irritating, he re¬ fused the latter'.s offer to obtain for him a clerk¬ ship in the Irish Rolls, quarreled with his employer and entered the church. Ordained deacon in October 1694, and priest in January of the following year, he obtained the living at Kilroot, Ireland. Tiring of his position, how¬ ever, he applied to Temple for reinstatement, and the latter, glad of his help, called him back to a post of greater importance, early in 1696. Here Swift remained till his patron's death in January three years later.

The decade ending with that date is very im¬ portant to the life of Swift. Intellectually, he was very active and, besides his routine duties, did a prodigious amount of reading. Though he did not always understand his motives ac¬ curately, he was nevertheless not far from the truth when he described his temperament in a letter to a friend who had cautioned him to be¬ ware of a marriage that his mother feared he was about to make. Protesting that he could have no thought of matrimony until his position in the world was secure, and adding that he was very hard to please, he continued : ((How all that suits with my behaviour to the woman in hand you may easily imagine, when you know that there is something in me which must be employed, and when I am alone turns all, for want of practice, into speculation and thought; insomuch, that these seven weeks I have been here, I have writ and burnt, and writ again upon all manner of subjects, more perhaps than any man in England. And this it is which a person of great honour in Ireland (who was pleased to stoop so low as to look into my mind) used to tell me that my mind was like a conjured spirit that would do mischief if I did not give it employment.55 (To Rev. John Kendall, 11 Feb. 1691). Whatever may have been the exact truth of the matter, Swift's con¬ stitutional restlessness was aggravated by a malformation in the region of the ear, which, resulting in blood pressure, caused the attacks of giddiness and deafness to which he was always subject and which drove him to intense activity for relief (consult Craik, Appendix, XIII, and Collins, p.

237).

His first writings, however, were of no im¬ portance. Falling under the influence of Cow¬ ley, he produced his first extant poem in May 1689, a very stilted Pindaric Ode to Dr. William Sancroft, and the seven known poems, chiefly odes, which he wrote before 1698 are of no better quality; it was the fourth, (To the Athe¬ nian Society5 (1691) that, according to John¬ son, caused Dryden's damaging remark, ((Cou- sin Swift, you will never be a poet.® His vein then suddenly changed, and in (Lines written in a Lady's Ivory Table-Book) (1698) and (Mrs. Francis Harris's Petition5 (1700) he first displayed evidences of the graphic, humorous description and the complete absence of sub¬ limity which distinguish his verse.

Far more striking are the two works which opened his career as a prose writer. Among a probably large amount of writing now lost, he composed, in 1696, (The Battle of the Books5 and (A Tale of a Tub,5 both of which remained unpublished until 1704. The year 1696 may be

taken as the date when Swift abandoned his efforts to imitate the writing of other men, and leaped, full-armed, into his own peculiar and inimitable possession, satire. (The Battle of the Books,5 the one piece now read in a once famous controversy, in which Temple had en¬ gaged, as to the relative merit of the Ancients and the Moderns, is famous for its satire of affectation, pedantry and obtuseness and for its lively burlesque of the heroic manner. The other book, a much more elaborate affair, by many regarded as Swift's masterpiece, is in its narrative parts a satire against religious abuses and schism, in the persons of Peter, the Church of Rome, Martin, the Anglican Church, and Jack, the Presbyterian sect. This narrative, however, comprises no more than a third of the book; the remainder is taken up with dedica¬ tions, prefaces and digressions, which variously satirize the vanity, conventionality and affecta¬ tion of authors, the irreverence and scurrility of the wits of the day, the pedantry, the cheap¬ ness and superficiality of contemporary learn¬ ing, and, in general, fanaticism, unreasonable¬ ness, vanity and emptiness. In these two books, written before he was 30, Swift showed himself to be an unrivaled master of irony, burlesque and satire.

In the summer of 1699 Swift became secre¬ tary and chaplain to Lord Berkeley, one of the lord justices of Ireland. Disappointed in his efforts to obtain the deanship of Derry, he was made in February 1700 vicar

of Laracor, Agher and Rathbeggan, in County Meath, Ireland, livings worth about £200 a year. On the recall of Berkeley in 1701, he went with the latter to London and published his first political pam¬ phlet, <The Dissensions in Athens and in Rome,5 an attempt to show the need of harmony in poli¬ tics. Though the pamphlet gained the good¬ will of the Whigs, Swift's work for the next nine years was wholly in behalf of the Irish clergy. Four journeys to London, of an aver¬ age duration of over six months apiece, were undertaken chiefly with a view to obtaining re¬ mission of the taxes on the Irish livings, and during the same period Swift wrote a number of able pamphlets in support of the established church, of which the masterly piece of irony, (An Argument to Prove that the Abolishing of Christianity in England may, as things now stand, be attended with some inconvenience, and perhaps not produce those many good ef¬ fects proposed thereby5 (1708), and (The Sen¬ timents of a Church of England Man, with respect to Religion and Government5 (1708), are the most important. During these visits also, Swift came to know the best wits of the

time, the chief literary result of which were the famous (Bickerstaff Pamphlets5 (1709-10), a practical satire against false learning in the per¬ son of the astrologer Partridge. His principal mission, however, came to nothing; he was put off by the Whig lords, and, personally dis¬ appointed because of his failure, owing perhaps to the impression created by (A Tale of a Tub,5 to gain preferment in the Church, he gave his services to the Tory ministry which came into power in 1710.

During the next four years Swift wrote an extraordinary number of political pamphlets ; few political writers have ever done a larger amount of brilliant and powerful work. Swift's

task was threefold: to show that the cause of the Tory ministry, its desire to obtain a peace with France, was a just cause, and that its members were worthy men ; to cast ridicule on the principals and persons of the Whigs ; and to' restrain the more violent Tories from ex¬ treme measures. His first work, after a caustic (Short Character of Thomas, Earl of Wharton1 (1710), was the conduct of the Examiner, the Tory weekly, for which he did all the writing between 2 Nov. 1710 and 14 June 1711, contrib¬ uting a series of varied and able arguments and satires. His position, maintained with singular adroitness, was that the country was crying for a peace and happiness

which could be more readily obtained from the Tories than from the Whigs, especially while Marlborough and Whar¬ ton were influential. In (The Conduct of the Allies and of the Late Ministry in Beginning and Carrying on the Present War1 (Novem¬ ber 1711), commonly regarded as his master¬ piece among the writings in support of the Har¬ ley administration, his object was to strip the war of its glamor and to render it unpopular by showing that the Allies, with the connivance of the Whigs, had been systematically exploit¬ ing England. ((After ten years of war with per¬ petual successes,® he says in his preface, ((to tell us that it is impossible to have a good peace is truly surprising — [and] it is natural to inquire into our present condition ; how long we shall be able to go on at this rate ; what the conse¬ quences may be on the present and future ages ; and whether a peace, without that impracticable point which some people do so much insist on, be really ruinous in itself, or equally so with the continuance of the war.® Other important tracts were (The Importance of the Guardian Considered1 (1713), a merciless, but not un¬ provoked attack on Steele, and the savage and fairer answer to Steele's Crisis,1 the very skil¬ ful (The Publick Spirit of the Whigs.1

Besides his political writing, Swift published many pieces of a miscellaneous kind, including several papers for Steele's Tatlcr, at least one for the Spectator, some controversial satires on religious subjects, his historically interesting but philologically unsound (Proposal for Cor¬ recting, Improving, and Ascertaining the Eng¬ lish Tongue1 (1712), and the well-known jour¬ nal to Stella.1 He had made the acquaintance of Esther Johnson, then a child of eight, during his first residence at Sir William Temple's, and had been the tutor to this ward of his pa¬ tron. When he got his livings in 1700, she, with her companion, Mrs. Dingley, went to Ireland to live near him, and during his residence in England remained in Ireland. The (JournaP extends from 2 Sept. 1710 to 6 June 1713, with scarcely a break. The letters, which were dis¬ patched every two or three weeks with an en¬ try for nearly every day, are chiefly the bare narrative, expressed in simple, intimate terms, of what Swift was doing in a social way, and are singularly free from discussion of the poli¬ tics of the time. They are important as a rec¬ ord of the life and character of a busy and in¬ fluential man of the time.

As a reward for his great political services, Swift was appointed, on 23 April 1713, dean of Saint Patrick's Cathedral, Dublin, and the fol¬ lowing June went to Ireland to take charge of his new office. Returning to London in August of the same year with a view to healing the

growing breach between the Tory ministers, Oxford and Bolingbroke, he was unsuccessful and retired to Letcombe, Berkshire. On the fall of Oxford and the triumph of Bolingbroke, he adhered to the fortunes of the former and saw the close of his political career in England. On the death of Queen Anne, 1 Aug. 1714, the downfall of Bolingbroke and the complete triumph of the Whig party, he returned at once to Dublin, where he remained continuously for the next 12 years.

In Ireland he found himself very unpopu¬ lar, and in his Church had trouble with his chapter and the archbishop, King. For the next six years he lived quietly, busying himself with his duties and writing only a few pieces, chiefly short letters of advice, articles on manners, etc. In 1716 he may have married Stella. The evi¬ dence is conclusive neither way, but the prob¬ ability is against the marriage. At all events, she continued to live near him till her death in 1728, an event which caused him profound sor¬ row. Of the various, and occasionally heated, discussions that have arisen about this famous love story, the most sensible conclusion is that of Sir Leslie Stephen to the effect that the question is not practically important in deter¬ mining the character and achievement of Swift.

In 1720 Swift again became active. For the next 18 or 20 years, until he could write no longer, his very voluminous production has three main aspects: that in behalf of the op¬ pressed people in Ireland, both clergy and laity; that for the doctrines and the establishment of the Anglican Church ; and the miscellaneous hu¬ morous and satirical writing, both in prose and verse, on which his popular literary fame largely rests. Beginning with a (Proposal for the Uni¬ versal Use of Irish Manufactures1 (1720), he followed this with tracts on other subjects, and in 1724 began his most celebrated piece of po¬ lemic writing, (The Drapier's Letters.1 These very powerful, effective, but not wholly fair pamphlets . were occasioned by a patent which had been issued to one William Wood to coin £108,000 of copper for circulation as small coin in Ireland. Swift, in the first three letters, ad¬ dressed the people of Ireland, under various classes, and with much skill in the selection of arguments suitable to each class, advising them to shun the coinage which the English govern¬ ment was trying to foist upon the Irish public. Then, having prepared his ground, he launched forth, in the next three letters, against the gen¬ eral right of the English to exploit and oppress the Irish. He closed the series with a letter, not published till 1735, ((An Humble Address to both Houses of Parliament,® in which he pow¬ erfully reviewed the woes of Ireland and made proposals for remedying them. The letters caused great excitement : the printer was ar¬ rested and a reward was offered by the govern¬ ment for the apprehension of the writer; but they

produced their effect and the coinage was refused. Swift became very popular, and his position enabled him to pursue the subject of his last letter in many other tracts. The miser¬ able condition of Ireland is the burden of his political song, in such able pieces as <A Short View of Ireland1 (1727), and (Maxims Con¬ trolled in Ireland1 (1728). The most remark¬ able of these minor pieces is the very extraor¬ dinary piece of irony, <A Modest Proposal for Preventing the Children of Poor People in Ire-

land from being a Burden to their Parents or Country and for Making them Beneficial to the Public.) No more bitter or intense satire than this exists in literature : for 10 years Swift had been fighting oppression, and this is the highest pitch of his complainings. Nothing that he had previously touched on — 'the villainy of the landlords, the vanity and foppery of the women, the rigor of the English and the miserable state of the country in general — is left unexposed.

Swift's writings on religious subjects of this period are, on the whole, of less permanent in¬ terest than those just considered. They belong to a rather later date, when his interest in the general economic condition of Ireland had spent itself after its most vehement outcry, (A Modest Proposal.) These writings are on two main subjects, the economic oppression of the minor clergy in Ireland and the efforts of the various sects of dissenters to obtain greater civil rights. Of the former of these the able tract <(On the Bill for the Clergy's Residing on Their Livings® (1731-32), is representative. Specif¬ ically it is an argument against the plan of the bishops to get more powrer by compelling the lower clergy to divide their livings and to erect houses thereon at the direction of the bishops. In general, it is an acute comparison between the condition of the clergy in Ireland and in England and an exposition of the wretched con¬ dition of the former. It is said to have induced the commons to reject the bill after it had been passed by the lords. The same idea he ex¬ pressed satirically, as was usually his practice, in (An Essay on the Fates of Clergymen, > a piece which deserves a place with Hogarth's drawings of the idle and the industrious appren¬ tices. Typical of the latter class is <The Pres¬ byterians' Plea of Merit *(1730 or 1733), in which he dismembered the claim of the dissent¬ ers to meritorious services in the time of the Commonwealth and the Revolution. The same subject he treated in his ablest satirical manner in (Reasons Humbly Offered to the Parliament of Ireland for Repealing the Sacramental Test* (1733), in which he

purported to show that in all respects the Catholics were more deserving than the Dissenters and should, therefore, have religious freedom. In all the many tracts of this latter class, he argued in favor of the ac¬ tual establishment of the Anglican Church.

The third kind of work of this period con¬ sists of his miscellaneous satires, in prose and verse, and on one of these, (Gulliver's Travels, * his popular fame chiefly rests. The idea may have originated in the days of the Scriblerus Club (see Arbuthnot), but took no definite shape till after 1720. The motive of the book is thus expressed in a letter to Pope, 29 Sept. 1725: <(I like the scheme of our meeting after distresses and dispersions, but the chief aim I propose to myself in all my labours is, to vex the world rather than divert it, and if I could compass that design, without hurting my person or fortune, I would be the most indefatigable writer you have ever seen, without reading. When you think of the world give it one more lash at my request. I have ever hated all na¬ tions, professions, and communities; and all my love is toward individuals ; for instance, I hate the tribe of lawyers, but I love counsellor such a one, and judge such a one; it is so with phy¬ sicians (I will not speak of my own trade), soldiers, English, Scotch, French, and the rest.

But principally I hate and detest that animal called man; although I heartily love John, Thomas, etc.® The famous book appeared in November 1726, in London, whither Swift had gone in the spring of the same year. It was published anonymously and had instant suc¬ cess. It has since held its place as the most comprehensive and truculent satire and one of the most popular children's books in the Eng¬ lish language.

In a letter to Pope, of 12 June 1732, Swift alluded to two pieces of satire which he had in mind and which are the only ones besides (Gulliver s Travels,) which need be specifically men¬ tioned. (A Complete Collection of Genteel and Ingenious Conversation, > etc., commonly called (Polite Conversation, > appeared in 1738; it is a well-sustained satire against cant and affecta¬ tion in talk. The other, directions to Serv¬ ants, J a satire against slovenliness, remained unfinished at his death. They are about the last work that he did. During his visits to Lon¬ don he lodged near Mrs. Vanhomrigh, whose daughter Hester fell in love with Swift. She is the Vanessa of Swift's writings. She fol¬ lowed him to Ireland after her mother's death and resided near him at Celbridge. In 1723 she wrote to Stella but received a stinging re¬ buke from the dean. She died soon after. Her story is, perhaps, even more pathetic than that of the more patient Stella.

Swift's journey to London in 1726 for the sake of seeing his old friends, and one of the following year, on the death of George I, to determine whether the new ruler would aid his work for Ireland, were the only times when Swift left that country after 1714. Thence on he lived in Dublin in growing physical distress, and in 1738-39 his health began to fail seriously. For three years he was tortured with pain, and in 1742 his mind completely gave way, owing to disease which is said to have had nothing to do with his constitutional malady. Up to his death he was almost wholly imbecile.

For a long time a legend was current that Swift was buried in Saint Patrick's in the same coffin with Stella — a legend accepted by the Encyclopaedia Britannica) and the <New Inter¬ national Encyclopedia. * As a matter of fact the grave of Swift in Saint Patrick's, Dublin, is several yards distant from Stella's. In 1835 some alterations in the church disclosed Swift's coffin; a society of phrenologists happened to be in session in the city at that time, and ob¬ tained permission to examine Swift's skull and that found in a neighboring coffin, not Stella's. The lazy sexton, in returning the skulls, saved himself trouble by poking them both into Swift's coffin. A further exhumation in 1882 disclosed them together, whence the legend. For the dis¬ posal of this oft-repeated story consult article by Dr. H. J. Lawlor in the English Historical Review (March 1918).

Swift, in his maturity, is represented in the several extant portraits, of which those by Charles Jervas are the most interesting, as a man of large frame and handsome countenance. Contemporary accounts represent him as a man of much distinction of manner and powerful personality. Intellectually he was unquestion¬ ably among the greatest of his time, and his influence was uncommonly great. From the time of the (Drapier's Letters> he exercised a remarkable sway over the affections of the

Irish, and is said to have been the most popu¬ lar man in Ireland. By his friends he was greatly beloved and the charm which his per¬ sonality has exercised on most of his biogra¬ phers has frequently made them protagonists and led them to minimize some evident defects of his character, as his mercilessness to his op¬ ponents and his not infrequent coarseness, de¬ fects which he shared with many of the ablest men of his time.

Among all the able writers of the age he is surpassed by none in range and power and by none, except Defoe, in voluminousness. His known writings comprise over 230 separate prose titles, varying in length from the (Medita- tions on a Broomstick) to (Gulliver's Travels,* upward of 300 poems and some 500 letters. Within the limits of his style, which may be defined as the simple, intense and unadorned, as opposed to the ornate or the sublime, he is complete master of his medium and his sure¬ ness of touch in the large number of varied subjects that he treated, give him a place among the very greatest of English writers. Neither philosophical intricacy nor emotional appeal in¬ terested him, but as master of simple, racy Eng¬ lish, . of irony, humor, burlesque, satire and in¬ vective, he is unsurpassed, as he is also in his management of the topics with which he deals. Though he is remembered in literature chiefly for his great satires, nearly all the titles cited in the foregoing columns are models of their kind in writing. See Battle of the Books ; Gulliver's Travels; Tale of a Tub.

Bibliography. — The best editions of Swift's complete writings are still those of Sir Walter Scott in 1814 and 1824 (2d ed.) in 19 vols. The most convenient and accurate modern edi¬ tion of the prose is by Mr. Temple Scott (begun 1898) in 12 vols. of the Bohn Library. Other editions and selections of his prose and verse are too numerous to mention specifically. The principal early biographies are Orrery's Re¬ marks on the Life and Writings of Swift *(1752), Delany's Observations * (1754), Dean Swift's (Essay upon the Life, Writings, and Character of Dr. Jonathan Swift* (1755), Hawkesworth's Memoir *(1755), Johnson's in the (Lives of the Poets) (1780), Thomas Sheri¬ dan's (Life) (1784), Monck-Berkeley's < En¬ quiry* (1789), John Barrett's (An Essay on the Earlier Part of the Life of Swift *(1*808), Sir Walter Scott's (Memoirs) (prefixed to the edition of the works), all of which tell much the same story. Scott's is the best. Monck Mason's (History and Antiquities of Saint Pat¬ rick's Cathedral *(1819), contains much inter¬ esting and valuable matter. The more modern and authoritative lives begin with John For¬ ster's (The Life of Jonathan Swift, 1667-1711* (1875), unfortunately unfinished. The most complete and accurate life is, on the whole, that by Sir Henry Craik (London 1882). Sir Leslie Stephen's in (The English Men of Let¬ ters } is also good. Other lives are the enthusi¬ astic study by J. Churton Collins (1893), the less interesting (Dean Swift and His Writings) by G. P. Moriarty (1893) and the introduction to the Bohn Edition by W. E. H. Lecky. Con¬ sult also Smith, S. S., Mean Swift) (New York 1910) ; (Correspondence, *edited by E. F. Ball (ib. 1914) and <(The Bibliography of the Writings of Jonathan Swift** (in (Prose

Works,* Vol. XII, New York 1908) ; English Historical Review (March

1918).

William T. Brewster,

Professor of English, Columbia University.

SWIFT, Joseph Gardner, American mili¬ tary officer: b. Nantucket, Mass., 31 Dec. 1783; d. 1868. In 1800 he entered the army as a cadet and in 1802 became the first graduate of the Military Academy at West Point. In 1807, having attained the rank of captain of engineers, he was appointed to the command of West Point. For meritorious services in the cam¬ paigns of 1813 and 1814 on the Saint Lawrence River, and in defense of the city and harbor of New York, he was brevetted as brigadier-gen¬ eral. General Swift was afterward surveyor of the port of New York for nine years, then civil engineer of the Baltimore and Susque¬ hanna Railroad, and from 1829 to 1835, under appointment from President Jackson, superin¬ tendent of the harbor improvements on the lakes, removing to Geneva, N. Y. In 1838 he was chief engineer of the Harlem Railroad in New York, and in 1841 was sent by President Harrison on an embassy of peace to the gov¬ ernors of Canada, New Brunswick and Nova Scotia.

SWIFT, Lewis, American astronomer : b. Clarkson, N. Y., 29 Feb. 1820; d. 1913. He was graduated at Clarkson Academy in 1838. He became interested in astronomy, built his own telescope in Rochester, N. Y., and began to make observations. For years he searched the heavens for comets, and discovered the notable one of 1862. In 1869 he observed a total solar eclipse and secured valuable results. Two years later he found another comet, and in 1877-79 discovered other comets, for which he received a gold medal from the Imperial Academy of Sciences in Vienna. In 1882 he assumed the directorship of the Warner Observatory, and later took charge of the Lowe Observatory on Echo Mountain, California. Before the com¬ pletion of the Warner Observatory, Dr. Swift was presented by the people of Rochester with a 16-inch refractor costing $11,000. With this instrument he discovered 900 nubulae there and over 300 at Echo Mountain, California, and about a dozen comets at both places. In 1881 he was awarded the Lalande prize of the French Academy, and the Jackson Guill medal and gift of the Royal Astronomical Society in 1897. He also received several comet medals from the Astronomical Society of the Pacific. He wrote ‘Lessons in Astronomy* (1888).

SWIFT, Lindsay, American editor: b. Bos¬ ton, Mass., 29 July 1856. He was graduated at Harvard University in 1877 and became the editor of the Boston Public Library. Author of Massachusetts Election

Sermons *(1897) ; 'The Great Debate Between Webster and Haynes* (1898) ; 'Literary Landmarks of Bos¬ ton *(1903); (Benjamin Franklin* (1910);

(William Lloyd Garrison* (1911), etc.

SWIFT, a local name in the eastern United States for the familiar fence-lizard (Sceleporns undulatus) in reference to the celerity of its movements. See Scelf.porus.

SWIFT CREEK, or ARROWFIELD CHURCH, Engagement at. On 9 May 1864 General Butler sent an expedition from his in- trenchments at Bermuda Hundred to destroy

the railroad between Richmond and Petersburg. With a large part of the 10th and 18th corps Generals Gillmore and W. F. Smith moved out in the morning and destroyed the road from Chester Station on the north to Swift Creek on the south, a distance of six miles. Arriving at the creek and driving the Confederate skirmish¬ ers across it, the Federals found that the stream was not fordable and that the bridges were held by Hagood's and a part of B. R. Johnson's brigade, with artillery posted on the south bank. There was a sharp engagement across the stream, with artillery and infantry, in which each side lost about 150 men, and on the morn¬ ing of the 10th the expedition returned to Bermuda Hundred. Consult (Official Record* (Vol. XXXVI).

SWIFT-MOTHS, a cosmopolitan family (Hepialidcc) of large or medium-sized moths, characterized by brownish or golden wings, ex¬ ceptionally white; a jugum is present, and the neuratipn of the fore and hind legs is similar. Their jaws are vestigial in the imago, and no food is eaten by the adults. The caterpillars bore into the stems of plants, live underground, and feed on roots ; the ˆincomplete® pupae also are subterranean. The hop-moth and the Brit¬ ish ghost-moth are typical examples.

SWIFTS, birds of the family Micropodidcc (or Cypselidcc) , noted for the extreme rapidity of their flight. Their proper place in the system of ornithology has been much discussed. For¬ merly they were universally classed with the swallows, but the usual opinion among ornithol¬ ogists is that, unlike as are the swifts and hum¬ ming birds (q.v.) in general aspects, they with the nightjars form a natural assemblage, the order Cypseliformes, or its equivalent. The swifts have

a generally swallow-like aspect. The bill is very small, flat and weak, but the mouth, which is not provided with bristles, ex¬ tends far back beneath the eyes, giving a very extensive gape. Just at its base above are the nostrils partly covered by feathers. The feet are very small without any distinct scaly cover¬ ing or any comb-like claws, and they present remarkable peculiarities in the position of the hallux and the number of phalanges in the dif¬ ferent genera. The wings are extremely long, reaching far beyond the tail and crossing, but the length lies entirely in the extremely elon¬ gated primary quills, the upper segments of the arm and the secondary quills being unusually small. In the typical swifts the tail is long and forked, in others it is short, truncate and spiny; there are always 12 retrices. Among anatomical characters swifts have the salivary glands remarkably developed and of the mucous type ; the lower intestine has no caeca ; the skull lacks basipterygoid processes in those which have the palate of the passerine (cegithognath - ous) type but has them combined with the cleft-palate (shizognathous) type ; the keel of the sternum is remarkably deep and the pectoral muscles correspondingly well developed. Ex¬ cept that they shun the polar regions these strictly insectivorous birds are cosmopolitan in their distribution. There are about eight genera and 75 species divided into the subfamilies of Micro po dines or typical swifts and the Chcctur- incc, or spine-tailed swifts. The first has the tail feathers normal, the tarsi and toes feath¬ ered, the hind toe capable of being turned later¬

ally or forward and the three front toes with only three joints each. Nearly all of the spe¬ cies of this group belong to the Old World, several being South American, and one belong¬ ing to the United States. In Cypselus all four toes are directed forward. To this genus be¬ long the common swift of Europe (C . apus) and the Alpine swift (C . alpinus). The only representative of this group occurring within the United States is white-throated or rock swift (Aeronautes melanoleucus) , found in the southwestern region north to Wyoming and in winter in Mexico and Central America. The hind toe is directed laterally, not forward, and the toes are only partially feathered. The colors are black above with some white mark¬ ings and white below ; the length about seven inches and the closed wing the same. This species is gregarious and nests in extensive colonies in holes and on ledges of inaccessible cliffs. Like the European swift its flight is incredibly rapid. Among exotic species of true swifts, none are of greater interest than palm swifts (Tachornis) of Africa and the tropical Orient and the aberrant tree swifts (Macrop - teryx) of India and Ceylon, which nest in trees.

The subfamily Chccturincc has the feet more normal, but the hind toe is more or less versa¬ tile and the phalanges of the front toes, though not reduced in number, are extremely short ; the feet are unfeathered and the tail feathers have the vane wanting at the end, the produced shaft forming a stiff mucronate tip. The com¬ mon chimney swift (or erroneously swallow) (Chcctura pelagica) is an example, and is too well known to require a description. It is a migratory species and one of the very latest birds to appear in summer. It breeds as far north as Labrador and winters southward to southern Mexico. Its western limit is the cen¬ tral plains. This is one of the birds which has been reputed to hibernate at the bottom of ponds and not a few circumstantial accounts of the manner in which they entered the mud have been published. Several patient, truth-loving, zoologists have carefully investigated these re¬ ports with the expected result that they proved baseless. The nests of this swift are interest¬ ing structures of twigs glued together with a thick coating of hard varnish-like dried saliva, which also serves to attach the saucer-like struc¬ ture to the inside of an unused chimney, which at the present time are the almost ex¬ clusive nesting and sleeping sites of these birds. Formerly they occupied hollow trees and still do in unsettled parts of the country. The eggs are pure white and number four or five. Most of the life of these birds is spent in flight, and many and remarkable are their aerial per¬ formances. The only other swifts of this sub¬ family inhabiting the United States are Chcctura vauvii of the Pacific States, there re¬ placing the eastern chimney swift, and the black swift (Cypseloides niger) of the Rocky Mountain region and westward from British Columbia to Central America. It ascends to great altitudes. Several species of the latter genus occur in South America. Callocalia in¬ cludes the edible birds'-nest swifts (q.v.) of which a number of species occur from south¬ eastern Asia to Madagascar and the Marquesas.

Consult, besides the articles referred to above, and the standard works on American

Ornithology, especially Hartert, Catalogue Birds British Museum) (Vol. XVI, London 1892) and Cambridge Natural History) (Vol. IX, New York 1907).

SWIMMING, the art or practice of loco¬ motion or mode of progression in the water by using the arms and legs as paddles. Ac¬

cording to the best authorities, all animals, ex¬ cepting man, monkeys and, perhaps, the three¬ toed sloth {Brady pus Tridactylus) , either swim naturally or go through the motions of swim¬ ming when suddenly immersed in water. There are, however, a number of animals that, al¬ though they swim naturally, drown as they swim. This is the case with rabbits, mice, moles and the smaller cats. Drowning appears to be the result of the fur being saturated. Tigers, cheetahs and lions, the larger cats, are fine swimmers. It is noteworthy that the mole and the rat are equally strong swimmers, the former, however, drowns in a short time, while the latter has considerable endurance in the water and is credited with many feats of long¬ distance swimming.

The conditions under which an animal will swim well are those in which the wetted sur¬ faces are large and, therefore, afford the great¬ est power of resistance, and where the specific gravity of the object is a little greater than that of water and consequently subject to the least disadvantageous displacement. Almost all of the larger quadrupeds, especially the deer and the horse, are exceptionally fine swimmers. They simply walk in the water, the motions which serve to support and propel them in that medium being very similar to those em¬ ployed to progress on land.

On the other hand, in the swimming of man, it is necessary to consider a semi-artificial mode of progression, which is, however, sub¬ ject to and regulated by the general laws gov¬ erning aquatic locomotion in relation to the medium, the body immersed therein and to the forces exerted by that body to propel itself. The human body with a normal amount of air in the lungs is very slightly lighter than water and the movements of the limbs produce various effects, according to the direction of the effort. When they are moved horizontally and down¬ ward they tend to support and propel the body. When they are moved in an upward direction, as in diving, the body is given a tendency to descend. As to the immersed sur¬ faces, their direction tends to either float or sink the body. When a man wishes to float in the water he assumes a flat position resem¬ bling the natural position of the lower swim¬ ming forms and for purposes of propulsion and support employs the «dog paddle,® in which the motions of the hands are exactly similar to those of the forepaws of a dog in swimming or in walking; a method of swimming em¬ ployed naturally by almost all land animals.

Although a man’s initial efforts to swim re¬ sult jn positions of the body and motions of ihe limbs which closely approximate to those of the lower animals that swim naturally, he has adopted and developed artificial methods by the use of which he surpasses them in speed and

endurance.

These methods involve motions of the limbs which may be conveniently designated as the breast or front stroke, the side stroke, the

overhand stroke, swimming on the back, diving, floating and treading. In general, so long as the arms and legs move in any direction, the forces exerted tend to propel the body.

Fig. 1. — Breast Stroke.

The breast stroke consists of a broad sweep of the arms in a horizontal plane, accompanied by a frog-like motion of the legs. It is com¬ menced by placing the hands with the backs upward, the wrists being bent sideways so that the fingers point to the front and the inner sides of the wrist joints touching the breast about four inches below the surface of the water. The arms are then pushed gently for¬ ward, the palms being kept flat and the fingers closed. When the arms have been extended to their full extent, the palms of both hands are turned outward and a strong outward sweep is made by each arm, horizontally, through an angle of 90°. The arm movement is completed by bending the elbows backward and inward until they are brought close to the sides of the body and then the hands are carried edgeways, to their original position in front of the body. Simultaneously with the extending of the arms to the front, the feet are struck out backward and spread wide apart and as the arms are swept around, the lower limbs are stiffened and brought firmly together so as to grasp the water by the whole leg, thus imparting a forward movement to the swimmer and also finishing in a straight line behind the body. Then, when the arms are bent and the hands are being brought to their original position in front of the body, the knees and toes are turned outward, the heels are kept close together and the feet are carried up to the body to repeat the movements.

The breathing is effected in a natural and unrestrained manner. A full breath is taken at every stroke and regulated so as to avoid gasping on short heavings, by exhaling as the arms are being extended and inhaling as they are being swept around.

In swimming with the side stroke, the body may be turned upon either side and by chang¬ ing from one side to the other the swimmer rests his muscles somewhat. In side swimming,

the deeper immersion of the head reduces its weight and relieves, somewhat, the strain of its support from the muscles of the neck. If on the right side the right arm is thrown out in front with the palm of the hand turned downward and .kept level with the under side of the head. It is then pushed out to its full extent, kept rigid and without bending either

the wrist or the elbow, is brought down through the water in a strong movement until the hand at full stretch comes between the legs. It is then brought up along the body to the chin and the stroke repeated. The left hand, formed into a scoop, is turned outward by the wrist at right angles to the forearm and the left arm, with elbow bent, is thrown outward and executes a straight pulling stroke to the left hip. The arms act alternately and when one is executing the positive, the other is at the negative part of the stroke. The action of the legs should be long and powerful and coincident with that of the arms and shoulders. When the right arm finishes its downward stroke and the left arm is extended in front, the legs are drawn up to the body. When the left arm pulls downward, the legs are opened wide, swung around and closed, in one con¬ tinuous motion. Care is taken never to cross the legs, make any effort to raise or sink the head, or exert any sudden pull at any part whatever of the complete stroke.

In the overhand stroke, all the movements excepting those of the upper hand and arm, are similar to those of the side stroke. The left or upper arm is brought forward and ex¬ tended as far as possible out of the water in front of the head, then dipped and pulled through with a strong propelling stroke. The method gives a more lengthened reach and when properly acquired, is the most useful and easy of all the various methods of swimming; but the side stroke is the one generally em¬ ployed in loqg-distance racing.

One of the fastest strokes for short-dis¬ tance swimming is the Trudgeon stroke, intro¬ duced into England a few years ago from the South Pacific. The action of the arms con¬ sists of alternate overhand strokes, while the

legs made a frog kick simultaneously with one of the arm strokes, with the body swimming on the belly. A modification of this style was introduced a few years ago by Meffert, the American mile champion, and has been adopted by some of the best American swimmers. In it the head and the forearm are kept submerged when the body is being pushed forward and

Fig. 3. — Bracing Stroke.

the face is brought out of the water to breathe, by a turning action of the waist as the forward movement checks between the strokes. This style prevents a cramped position of the head and also allows a freer action of the body. Many racing swimmers take a breath only every other stroke, keeping the face half under water half of the time.

Fig. 4. — Swimming on the Back.

Swimming on the back is accomplished by lying in the water back downward, the hands resting on the waist, the elbows directed out¬ ward, the breath held and the chest expanded. To propel, the legs are bent and the feet are drawn up close to the trunk, the knees being directed outward with the heels close together. The legs are now struck out as wide apart as possible and then brought closely together until the great toes, inner ankles and the inner sides of both legs meet along their entire length. Greater speed may be obtained by extending the arms outward and on a level with the

body, the palms facing downward and using them as sculls.

Diving, when well performed, is a very graceful feat. The dive may be a standing or a running one. To make a good dive, the feet line and legs are kept close together, the chest inflated and the arms are swung back and forth two or three times. The lungs are then charged

Fig. 5. — Diving.

with a long, deep breath, and the dive is made just a moment before the arms and hands are raised over the head.. In springing off, all the power of the legs is used, and in mid-air the body is straightened out like an arrow from the tips of the fingers to the toes. The arms are then declined so as to enclose the head, the chest is contracted for an instant and the water is entered noiselessly and with¬ out a splash, fingers first. The moment the body is covered, the head and arms are thrown up, which brings the diver to the surface. The eyes, which instinctively close as they enter the water, should be opened under the water, in order to avoid accidents.

Floating is the position assumed by a swim¬ mer to rest. It is accomplished by holding the forehead below and the mouth and chin

above the surface of the water. The arms and legs may be stretched out as far apart as possible, as in the (<spread eagle® position or the body may be held rigid and straight with the legs crossed, the lower part of the face and the toes peeping above the water and the arms either lying at the sides or above the head with the thumbs locked.

Treading water is a method employed to maintain a perpendicular position in the water, the head being kept above the surface. It is accomplished by paddling with the hands and working the legs and feet as if going up stairs, with the soles of the feet acting as sustaining surfaces. It is the only branch of the art that approaches natural conditions and if resorted to in cases of accidental immersion, would prevent 75 per cent of the deaths due to that cause.

Expert swimmers are capable of dispensing with the use of the arms, and when treading for display, or in competitions, either hold their arms and hands above the surface or fold them across the chest. They are also capable of

floating with both legs or both arms out of the water; spinning like a top while maintaining a sitting position ; taking off the clothes on the body;. taking off the stockings, and cutting the toe nails, all of which illustrate man's command over the attending artificial conditions.

Aids to increase speed may be employed in the form of wooden plates which are attached to the palms of the hands and the soles of the feet. The most effective are those invented by R. H. Wallace Dunlop and introduced in England in 1876. Other helps, for sustaining purposes, have been employed from very early times. They were generally in the form of flat surfaces of wood, tin and water-proof fabrics, but their use is not recommended.

The Amateur Athletic Union of the United States holds championship swimming competi¬ tions in various places every year. The Hawaiian Association has a very large follow¬ ing and holds numerous contests. There are also intercollegiate, metropolitan and many local competitions.

A general idea of the speed and endurance of swimmers may be obtained from a few of the best performances on record: 100 yards — P. McGillivray (American- amateur), 54s. (in bath) ; D. P. Kah'oku (American amateur), 53s. (in open water) ; A. Wickham (Australian professional), lm. J^s. (in open water).

One mile — D. Billington (English profes¬ sional) 24m. HHs. (in open

water) ; B. Kieren (Australian amateur), 23m. 16kis. (in bath) ; G. R. Hodgson (Canadian amateur), 23m. 34p2S; (in open water). Woman's record — Fannie Durack (Australian), 26m. 8s.

Long-distance swimming — Webb, 40 miles with tide, 9h. 57m. 00s.; Mercardier. 20 miles with current, 4h.. 59m. 46s.; Miss Agnes Beck¬ with, 20 miles with current, 6h. 25m. 00s.

Long immersions — Webb, 20 miles, in¬ creased to 35 miles by tides, crossing the Eng¬ lish Channel, 21h. 45m. 00s.

. Bibliography.— The literature on swim¬ ming is quite extensive. The following-named works are among the best on the subject: Thevenot, (The Art of Swimming) (trans. London 1699) ; Bermordi, O. de, (Schwimm- kunst ubersetz> (Vienna 1797) ; Frost, J., <The Art of Swimming) (New York 1818) ; Rompel- man, H., (Het nut der Zwemkunst) (Amster¬ dam 1830) ; Fontenelle, Julia de, (Paris 1838) ; Forrest, George,

(Handbook of Swimming and Skating) (Lon¬ don 1865) ; Leahy, John, <The Art of Swim¬ ming in the Eton Style) (London 1875) ;

< Spaulding's Athletic Library,) Nos. 20-30 (New York 1894-95) ; Dalton, Capt. Davis, How to Swim) (New York 1899) ; Ameri¬ can Physical Review (Vol. IV, Cambridge Mass., 1899). Consult also Austin, H. R., <HoW to Swim) (London 1914) ; Brewster, E T (Swimming) (Boston 1910); Dalton,' F. E'

(Swimming Scientifically Taught) (New York

1912) .

SWIMMING BLADDER, AIR-BLAD- DER, or SOUND, an internal sac-like organ in fishes by which they regulate their relative buoyancy. See Fish.

SWINBURNE, Algernon Charles, Eng¬ lish poet: b. London, 5 April 1837; d. 10 April 1909. He was the son of Admiral Charles Henry Swinburne, of an old Northumbrian

family, and Jane Henrietta, a daughter of the 3d Earl of Ashburnham, a woman of high culture who exercised a marked influence on the

intellectual development of the poet during his earliest years. From Eton he went to Balliol College, Oxford, where his time was chiefly given to the study of Greek poetry and in less degree of the literatures of France and Italy. He wrote, also, for the Undergraduate Papers, a student publication, and seems to have pro¬ duced a considerable body of verse which, how¬ ever, he later characterized as worthless. He left Oxford in 1860 without taking a degree and traveled for a short time on the Con¬ tinent, visiting Walter Savage Landor in Florence, for whom he entertained a great ad¬ miration. The year of his leaving Oxford was marked by the publication of (The Queen Mother) and (Rosamond,5 which, written in the Elizabethan manner, revealed little metric talent and aroused practically no attention. In 1862 Swinburne settled in London, in the house of Dante Rossetti. In 1865 appeared his first and, according to many, his masterpiece, <Ata- lanta in Calydon,5 which was hailed as giving promise of a poetic genius of the highest rank. In the (Atalanta) Swinburne displayed for the first time that magical mastery of metrical form in which, in all English literature, he is equaled by Shelley and Milton alone, if by them. In the celebrated choruses of the poem the Eng¬ lish language is molded to an exquisiteness of lyric melody which might almost have been deemed impossible in a vernacular dominated by the stiff imperinm of the Iambic verse. (Chastelard,5 a play dealing with an incident in the life of Mary Stuart, appeared shortly after (Atalanta,5 but was received with marked disappointment. The next year, however, came the (Poems and Ballads,5 which made Swin¬ burne at once a figure of national and inter¬ national note and the centre of a hurricane of criticism aroused by what might be called the ethical tone of the volume. The (Poems and Ballads5 showed the art of the author of (Atalanta5 at its best, but they sang of themes abhorred by middle class Anglo-Saxon morality, in a manner undeniably thorough. The ani¬ mal side of sexual passion was therein depicted with a fervidness of tone and a wealth of fleshly imagery which subjected the poet to the most virulent denunciation as a glorifier of pre- Christian morality. As a matter of fact the 'Poems and Ballads5 were chiefly intended as a protest against English Philistinism and do not in any way represent the ethical standards of the poet, whose mind on the contrary turns most often to the contemplation of love ideal¬ ized, however much material beauty may in¬ spire him. The taint of Anacreontism has nevertheless lingered in Swinburne's reputation and is possiblv the most salient characteristic of his work to the casual reader. (A Song of Italy5 which appeared in 1867 definitely marks Swinburne's entrance into the field of political lyricism. He sang liberty with the same pas¬ sionate utterance, though not with the same poetic success, with which he had sung of earthly love, and the

theme is continued in his (Ode on the Proclamation of the French Re¬ public,5 (Songs before Sunrise5 (1871) and < Songs of Two Nations.5 About this time he fell under the influence of Victor Hugo, whom

he regarded with a feeling amounting almost to adoration, and indeed, in the various phases of his development, the want of measured re¬ straint is striking. (Bothwell5 (1874) is the second part of a trilogy dealing with the for¬ tunes of the unhappy Scottish queen, of which the first part is the °Chastelard,5 already men¬ tioned, and the last, (Mary Stuart,5 published in 1881. In 1876 came <Erechtheus,5 a tragedy formed after Greek models and revealing, as 'Atalanta5 had done, his marvelously sym¬ pathetic insight into the ancient Hellenic spirit. A second series of (Poems and Ballads5 ap¬ peared in 1878 and (Songs of the Springtides5 in 1880. (Tristram of Lyonesse5 (1882) con¬ tains some of Swinburne's happiest harmonic effects; the heroic couplet is there freed from its almost mathematical rigidity and precision and made to assume a vague softness of cadence that brings it near to the more flexible forms of lyric verse. Swinburne's work after 1882 shows no artistic progress as a whole. In all the perfect manner is apparent and the poet's resources never fail — and in some there are passages and sketches of an exquisite beauty equaling his best work ; but beyond the height which he had earlier attained, he does not go. These works are (A Century of Roundels5 (1883); (Marino Faliero,5 a tragedy (1885); (Locrine,5 a tragedy (1887) ; (Poems and Ballads,5 3d series (1889) ; (The Sisters5 (1892); <Astrophel5 (1894); <The Tale of Balen5 (1896), and (Rosamond, Queen of the Lombards5 (1899) ; of these Balen perhaps ranks nearest to the great works of his earlier period.

Swinburne also wrote much prose, in the field of criticism, possessing many of the char¬ acteristics of his verse, vehemence, imagery and lack of self-restraint. Although he pos¬ sessed the gift of the illuminative phrase and displays at times a profound insight, his critcism as a rule shows no refinement of judg¬ ment. It was his avowed conception of the mission of criticism not to weigh narrowly and to examine minutely, but generously to praise. But though Swinburne was so far un¬ true to his position in that he sometimes hated as well as loved, he hated and loved with un¬ restrained passion. He wrote eulogies on (Charlotte Bronte5 (1877), Shakespeare5 (1880) ; < Victor Hugo5 (1886), and <Ben Jon- son5 (1889). To Robert Buchanan's assault on the (Fleshly School of Poetry,5 including Swin¬ burne, Rossetti and Morris, the first replied in his scathing (Under the Microscope.5 Among his other works of criticism are (Essays and Studies5 (1875) ; (Miscellanies5 (1886), and

Studies in Prose and Poetry5 (1894). Men¬ tion should also be made of (The Modern Heptalogia,5 a volume of parodies on contem¬ porary poets, which appeared anonymously in 1881 and has not been, as yet, officially acknowl¬ edged as a work of Swinburne. His it was, however, by common consent and that in spite of the fact that among the most amusing bur¬ lesques is the one on himself. Swinburne's position in English literature is to be assigned him on his merits as a master of verse form and poetic rhetoric. With no especial pro¬ fundity of thought, with no definite theory of life, with no deep insight into human char¬ acter, he stood pre-eminent as a molder of

exquisite melodies. It is his manner that should give him a permanently high rank among Eng¬ lish poets. (See Atalanta in Calydon). Con¬ sult Wrateslaw, Theodore, (Algernon Charles Swinburne, a Study® (London 1900) ; Shenherd, R. H., (The Bibliography of Swinburne) (ib. 1887) ; Mackail, J. W., (Swinburne) (Oxford 1909) ; Thomas, Edward, (Swinburne) (New York 1912); Drinkwater, John, (Swinburne: An Estimate1* (ib. 1913) ; Woodberry, G. E., <Swmburne) (ib. 1905).

SWINDON, England, in Wiltshire, 29 miles northeast of Bath and 76 miles west of London, consists of two parts — old and new Swindon. The older section on a hill is picturesque and its principal buildings comprise the parish church, town-hall, assembly rooms and corn exchange. The new town on re¬ claimed lowland contains a mechanics' institute, theatre, etc., the railroad shops of the Great Western Railway employing several thousand men and an extensive park connected with these works. The town is an important railway junction. Pop. 50,751.

SWINE. General Information. — Swine are of immense importance in the commerce of the world. In the United States alone there are some 65,000,000 of swine on the farms and in the hamlets. This figures some two-thirds of a hog for every human being in this nation.

Swine products are many and various, — fats, particularly lard, is one of the chief pro¬ ductions. A real fat hog produced on corn in the pastures of the corn belt may yield as much as 50 pounds of fat in every hundred pounds of his live weight ; hams which are eaten fresh, boiled, fried, cured with hickory and other smokes, are relished the world over ; bacon, the toothsome breakfast dish of Anglo- Saxons,

has no substitute: sausages; spare ribs; pepsin extracted from pigs' stomachs for the medicinal doctoring of human stomachs ; the bristly coat is used for brushes and as filler for cushions; the bones are ground for fertilizer; the hide is made into leather; in truth every ounce is utilized, nothing goes to waste.

The source of the hog is shrouded in con¬ siderable mystery, although the true swine, the wild boar and his kind (Sus scrofa), probably developed in the Asiatic continent. Fossil re¬ mains have been found in Europe and India although not on the North American continent. The Peccaries found in Mexico and other southern countries are not to be confused with the true domesticated hog that is of such great commercial value. The Peccary is of American origin. The historic swine, therefore, that gave rise to the present day common hog may be basically considered as the wild boar (Sus scrofa) with which was infused in the early days the swine of China, Japan and eastern Asia (Sus Indicus). An eminent Chinese scholar estimates that swine were domesticated in eastern Asia about 2900 b.c., whereas the European records indicate a period of domesti¬ cation about 1500 b.c. To these early efforts of the human race we owe much for the improve¬ ment and development of the now-a-day swine.

The flesh of swine has been used by all peoples apparently who came in contact with them. The Greeks and the Romans were adepts of the fine art of preparing and serving pork.

Pork is of particular advantage to civilized peoples in that it can be preserved by salting, smoking and other forms of cures so that it may be kept in edible condition for many years. Hams rightly cured appeal more and more to the epicure as the years unfold, so that hams five and six years from the "killing® are par¬ ticularly appetizing. In the ordinary consump¬ tion of pork, however, hams seldom reach their first birthday before being eaten. Salt pork and smoked meats from the pig are shipped all over the world and many a nation owes con¬ siderable of its prosperity to its pork com¬ merce.

Types and Breeds. — The domestic hog is entirely different from his wild progenitors. And yet domestic swine are widely different even among themselves as regards their gen¬ eral body conformation. Swine have been pro¬ duced to meet the demands of the market as' well as to fit into certain environments so as to utilize the home-grown feeds to the greatest advantage. We have, therefore, two great pre¬ dominating types developed to their highest efficiency in Europe and particularly America — these being the so-called bacon and lard types. Naturally the bacon hog is fine for bacon and lean meat in

general, while the lard hog is best for fat (lard) and fatty sausage. The bacon hog flourishes in those sections where there is an abundance of small grains such as barley, oats, wheat and plenty of milk, whereas the lard hog is primarily of American origin, de¬ veloping simultaneously with Indian corn or maize, a feed most excellently adapted to the production of fat, being highly concentrated and composed of these materials, namely the starches and fats, that are converted through the pig's metabolism into the lard and corn belt pork sausages. Denmark, England and Canada are all good bacon type regions, — Denmark principally because of her milk by¬ products and England because of her excellent pastures and cereals and Canada because of her cereal grains and milk products.

Contrast the original wild hog with the every-day American lard hog. The wild hog is narrow, more like one's hand viewed edgewise, but the lard hog is wide, certainly chubby in contrast; the former is relatively small in com¬ parison. In short, the lard hog is not onlv wider and larger, but longer, better "hammed,® shorter nosed, shorter "legged,® more compact in body, shorter tusked and not nearly so ferocious and speedy of foot. Too, the lard hog has a better quality of meat and a much higher proportion of those most highly prized cuts of meat in proportion to the total weight, this being marked in the development of hams and loins, taken from the rear parts. Per¬ sistent selection of these animals for breeding purposes that most nearly approached the de¬ sired type has made it possible in the long years of endeavor to develop such a contrast in type. The development of this lard type is all the more remarkable in that the very character¬ istics which make up this type are supposedly inimical to the best health and bodily interests of the hog. Too much fat decreases vigor and vitality, and we are not surprised to find that the bacon types are much more active and virile, because they are not unduly fattened, in truth the general selection in this bacon pro-

(V I*

C 0) o W

1 The Iowa Community Sunlit Hog House. Here is a new kind of hog house — 2 The system of feeding is responsible for the d fference in size — the large shote

substantially but economically built for swine. It is a sanitary, economical and had all the corn he wanted on alfalfa pasture, and the

little one only one-fourth of a full iceable house of pleasing appearance ration. It pays to feed swine liberally

3 The Self-feeder method of feeding grains is efficient 4 The Iowa Movable Sunlit Hog House, well lighted, sanitary, convenient, economi¬

cal, serviceable and durable

1 The General Purpose type, both for bacon and for lard as shown in 2 A Lard type — Poland China Boar. Note black color and white markings

Berkshire breed by a sow 4 A Lard type — the Chester White — a white breed

3 A Bacon type — Yorkshire Gilt — a pure white breed

SWINE

ducing business has been to develop muscular tissue, the chief emphasis being placed on its proper distribution with some, not too much fat, to make the most acceptable slab of bacon and the nicest ˆtrimmest® hams, hams that do not require ((to0 much trimming away of the fat.®

The typical bacon breeds are Tamworths and Yorkshires. The Berkshires may be so classed because they yield the highest quality of bacon, but the Berkshire is sometimes placed in the general purpose class, good for bacon and good for lard. Then there is the Large Black of England.

The typical lard type breeds are Poland China, Chester White, Duroc Jersey, Victoria, Cheshire, Essex and Suffolk.

The general purpose breeds may be classed as the Berkshire, Hampshire, Mule-Foot and possibly the Middle White.

The score card method of teaching judging is in vogue in all of our leading agricultural colleges. A hundred points make up the total or the ideal, and the relative emphasis to place on the different parts is indicated by the num¬ ber of points as given for perfect. Below are

given representative score card values as used by the Iowa State College at Ames, covering the bacon and lard types in the barrows. The relative descriptions show where the emphasis is placed in each type.

Bacon Hogs.

Scale of Points — For Barrow

Perfect

score

Lard or Fat Hogs.

Scale of Points — For Barrow

Perfect

score

General appearance:

1. Weight, score according to size .

2 Form, deep, broad, low, long, symmetrical, compact, standing squarely on legs .

1. Quality, hair silky; skin fine; bone fine;

mellow covering of flesh free from lumps and wrinkles .

1. Condition, deep, even covering of flesh and

fat over all parts of the body .

Head and neck:

1. Snout, medium length, not coarse .

2. Eyes, full, mild, bright .

3. Face, short, cheeks full .

4. Ears, fine, medium size, soft .

5. Jowl, strong, neat, broad .

6. Neck, thick, medium length .

Forequarters:

1 1. Shoulder, broad, deep, full, compact on top. .

1. Legs, straight, short, strong; bone clean;

pasterns upright; feet medium size .

Body:

1. Chest, deep, broad, large girth .

2. Sides, deep, lengthy, full; ribs close and well

sprung .

1. Back, broad, straight, thickly and evenly

fleshed .

1. Loin, wide, thick, straight .

2. Belly, straight, even .

Hindquarters:

1. Hips, wide apart, smooth .

2. Rump, long, wide, evenly fleshed, straight. .

3. Ham, heavily fleshed, plump, full, deep, wide.

4. Thighs, fleshed close to hocks .

5. Legs, straight, short, strong; bone clean;

pasterns upright; feet medium size .

6

10

10

10

1

1

1

1

1

1

6

2

4

6

10

8

4

2

2

10

2

2

Total

100

General appearance:

1. Weight, 170 to 200 pounds, tne result of

thick cover of firm flesh .

1. Form, long, level, smooth, deep .

2. Quality, hair fine; skin thin; bone fine; firm

covering of flesh without any soft bunches of fat or wrinkles .

1. Condition, deep, uniform covering of flesh,

especially in region of valuable cuts .

Head and neck:

1. Snout fine . .

2. Eyes full, mild, bright .

3. Face slim .

4. Ears, trim, medium size .

5. Jowl, light, trim .

6. Neck, medium length, light .

Forequarters:

1. Shoulders, free from roughness, smooth, com¬

pact and same width as back and hind¬ quarters . . . .

1. Breast, moderately wide, full .

2. Legs, straight, short, strong, bone clean,

pasterns upright; feet medium size .

Body:

1. Chest, deep, full girth . . . . . .

2. Back, medium and uniform in width .

3. Sides, long, smooth, level from beginning of

shoulders to end of hindquarters. The side at all points should touch a straight edge running from fore to hindquarter ....

1. Ribs, deep, uniformly sprung . .

2. Belly, trim, firm, thick without any flabbi¬

ness or shrinkage at flank .

Hindquarters:

1. Hips, smooth, wide; proportionate to rest of body .

1. Rump, long, even, straight, rounded toward tail . .

1. Gammon, firm, rounded, tapering, fleshed deep and low toward hocks .

1. Legs, straight, short, strong; feet medium size; bone clean; pasterns upright .

6

10

10

10

1

1

1

1

1

1

6

2

2

4

8

10

2

10

2

2

8

2

Total

100

There are a great many swine terms that need defining. A few of the important ones used in swine husbandry are given :

Swine : General name for any or all of the domesticated, omnivorous, suoid mammals sup¬ posedly descended from the Sus scrofa or indicus, or infusion of the two, more specifically known as Duroc Jerseys, Poland Chinas, Ches¬ ter Whites, Berkshires, Hampshires, Tam¬ worths, Yorkshires and other established breeds with their various cross-bred and mongrel breedings. Untamed wild animals are referred to preferably as ((Wild swine.®

Hog: May be used synonymously with the term <(Swine® but refers preferably to market¬ able animals.

Gilt: Young, immature, prospective swine mother.

Sow : Female swine after producing young.

Boar: Well-developed male swine suitable for breeding service.

Boar Pig: Young male swine under breed¬ ing age, usually under six months old.

Stag: Swine castrated (((desexed®) after the noticeable development of the secondary sexual characters such as tusks, shields, en¬ larged sheath, crest and others. Stags are docked 70 pounds on the large markets.

Barrow: Swine castrated before the sexual characters develop to a noticeable extent.

Pig: May be used synonymously with

swine but preferably in America refers to those under three months of age. In England, Can¬ ada and Australia, pigs are swine of any age or weight.

Shote: Immature swine of either sex, ex¬ cept boar pigs, usually weighing from 60 to 175 pounds.

Weanling Pigs: Young pigs after weaning time.

Suckling Pigs: Young pigs following their mother and yet unweaned.

Pork: The dressed meat of swine used for food.

Management and Handling — In the hous¬ ing due attention must be paid to these essen¬ tials: Warmth, they do not thrive in real cold and freezing quarters; dryness, if kept in damp quarters contract various ills such as rheu¬ matism and stiffness; abundance of diffused light; much direct sunlight, appropriately so for the new-born offspring to give them strength and stamina; shade, especially in the very hot months; ventilation, to insure fresh pure air; sanitation, to prevent diseases; safety; comfort; convenience, this being true not only for the swine but for the caretaker. Swine should not be compelled to unneces¬ sarily exert themselves, unless it be at certain time when particular advantages are to be gained thereby for the herdsman ; service¬ ability sufficient size to shelter advantageously; durability; reasonably low first cost; minimum cost of maintenance; and pleasing appearance so as to harmonize with the general surround¬ ings adding by all means to the artistic and architectural beauty of the community.

In the feeding, the ration must be well bal¬ anced else the swine will not thrive. Corn alone in dry lot, even though plenty of water be sup¬ plied, together with salt, is deficient, in that it does not supply all of the nutritional factors necessary for the growth and well being of the pig. To illustrate, well-nourished swine eight months of age can be made to weigh 300 pounds, but they must have a balanced ration to do this, — such as corn, maize and milk (skim, butter or whole) ; or

corn and alfalfa or clover or rape pasture together with a little meat meal; or corn and meat meal, both being fed in separate open containers, same being kept filled with feed and before the swine at all times. ((Corn-alone fed® pigs at eight months old fed by the Iowa Experiment Station weighed 57 pounds, and yet the first three months of this feeding time the pigs had a good ration. Similar pigs fed on corn and meat meal from the packing houses weighed 225 pounds. The corn pigs required 1,447 pounds of corn for 100 pounds of gain, but the ones receiving meat meal in addition needed only 366 pounds of corn plus 48 pounds of meat meal, a total of only 414 pounds of concentrated feed. Less than a third as much feed was re¬ quired where the properly balanced ration was fed. It is wise and proper to vary the ration, giving equitable feeds in the right proportions and thereby giving the pig a chance to develop properly. Both the art and the practice of swine feeding are learned only by much ex¬ perience mellowed with keen insight into the psychology and the nutrition of interesting but oftentimes perplexing animals.

The costs of production that enter into the making of marketable hogs centre around these import items: Feed, such as the grains; pas¬ ture ; equipment covering houses, troughs, fences and other details; man labor; horse

labor; interest on the capital invested, and gen¬ eral miscellaneous or overhead expense. To give a comprehensive idea as to the distribution of these costs in the heart of the swine- fattening and producing region, namely the corn belt, there is presented herewith the dis¬ tribution of the total cost, or 100 per cent among the mentioned items:

Per

Feed grains grown and purchased . 84

Pasture to supplement grains, also lot rent . 4

Man labor . 4

Interest on the investment or capital . 4

Horse labor . 1

Equipment upkeep . l

Overhead expense . 2

Grand total expense . 100

The Swine Commission of the United States Food Administration in the year 1917 found that it took the equivalent value of 12 bushels good number two corn grain to produce for market the average hundred pounds of market¬ able hog, delivered to the Chicago, the basic and general controlling hog market of all the world. This counts the costs of all items en¬ tering into the keep of the herd. Definitely, therefore, this means that if number two corn grain is worth a dollar a bushel at Chicago that the farmer who ships to that market will not on the average make any money unless he gets over $12 a hundred pounds for the live hogs. The good farmer will of course produce them more cheaply, but when the costs can be put down to the 11-bushel basis that is very good indeed. Of course the man who feeds garbage, the kitchen waste from the cities and towns, can produce hogs more cheaply than the man who feeds high-priced grains. It takes from six to nine pounds of garbage to pro¬ duce as much pork as a pound of mixed bal¬ anced grains.

The best forage crops and pastures for swine are alfalfa, red clover, dwarf essex rape, blue grass, rye, wheat, soy beans, cow peas, and sweet clover. All of the clovers are especially good.

The best .grains are Indian corn, barley, rye, wheat, sorghum seed, kaffir corn, milo maize', oats, peanuts, soy beans, cow peas, and other of similar nature.

I he best balancers of the ordinary grains are the milks, meat meal, packing house tank- age, linseed oil meal, wheat middlings, corn oil cake meal, blood meal, peanut meal, velvet bean meal, gluten feed, together with the green, preferably leguminous and tender pastures.

To secure the greatest success in the feeding and management and marketing of swine one must look to these essentials:

First. — Locate the business where the condi¬ tions are favorable to pork production, this usually being where there is an abundance of cheap grains and other feeds suitable for swine and where the markets are relatively good and easily accessible. Go to those sections where hogs are making their owners money.

Second.— Select good, sound, healthy, prolific foundation stock of the right market as well as the right farm type.

Third. Have an ideal and work toward it in your feeding and breeding operations.

Fourth,— Feed a properly balanced ration,

one that will supply the essential nutrients at the right time.

Fifth. — House the animals in sanitary, well- lighted, comfortable convenient quarters.

Sixth. — Keep the animals healthy by sensible methods, use preventive measures to avoid cholera, the scourge of swine husbandry, this being done by immunization, using the anti¬ hog cholera serum perfected by the govern¬ ment, and purchaseable most everywhere.

Seventh. — Be a good manager, keeping everything and everybody Hined® up so that the whole scheme harmoniously work to a com¬ mon ideal of doing the right thing, in the right way, at the right time. There are many corners to watch, as in all good businesses, hence the vigilant watchful ' spirit is to be as¬ siduously cultivated.

Eighth. — To be most successful in the swine business one must like it, put his heart into it, yes, and live with it.

John M. Evard,

Professor of Anunal Husbandry, Iowa State

College.

SWING, David, American Presbyterian clergyman: b. Cincinnati, Ohio, 23 Aug. 1830; d. Chicago, Ill., 3 Oct. 1894. He was gradu¬ ated from Miami University, Oxford, Ohio, in 1852 and was for a while principal of the classical school of that institution. He after¬ ward studied theology and in 1866 became pastor of the Fourth Presbyterian Church in Chicago. In 1874 he was tried for heresy but was acquitted by the presbytery. He, however, withdrew from the denomination and becoming an independent minister was pastor of the Cen¬ tral Church in Chicago for the rest of his career. He was a pulpit orator of much power and during his long pastorate of the Central Church constantly attracted large congrega¬ tions. He was an editor of The Alliance and published (Club Essays } (1880) ; (Truths for To-day } ; (Motives of Life) and other works. Consult Newton, J. F., (David Swing, Poet-PreacheU (Chicago 1909; reprint, New York

1914).

SWINGLE, Walter Tennyson, American botanist and agriculturist : b. Canaan, Pa., 8 Jan. 1871. He was graduated at the Kansas State Agricultural College in 1890. He was ap¬ pointed special agent of the division of vege¬ table physiology and pathology of the United States Department of Agriculture in 1891. He studied in Europe in 1895—96 and again in 1898; was appointed agricultural explorer of the De¬ partment of Agriculture in 1898 and since 1902 has been in charge of crop physiology and plant breeding investigations for the depart¬ ment. He has visited the countries of southern Europe, Asia Minor, China, Japan and the Philippines in the course of his investigations. He introduced the fig insect into California, which permitted the raising of Smyrna figs there, and had charge of the introduction of date, pistachio nut, Egyptian cotton and other useful crops into America. Author of numer¬ ous papers and reports.

SWINOMISH. See Salishan Indians.

SWINTON, John, American journalist and author; brother of W. Swinton (q.v.) : b. Sal- ton, Scotland, 12 Dec. 1830; d. Brooklyn, N. Y., 15 Dec. 1901. He came to the United States in

1845, was educated at Williston Seminary, Mass., and entered the New York Medical Col¬ lege, but did not graduate. In 1860-70 he was chief of the editorial staff of the New York Times, in 1869-74 was on the staff of the Tribune; and chief of the staff of the New York Sun until 1883. He then started John S win ton's Paper, a weekly labor and reform journal, which he continued to edit until 1887; later was again on the editorial staff of the Sun. His active work in the labor movement began in 1874, when he was a workingmen's candidate for mayor of New York, but polled only a few hundred votes; after that time he was prominent as a writer, speaker and organ¬ izer in trade union and reform movements. He published (The New Issue, the Chinese- Ameri¬ can Question) (1870) ; (A Eulogy on Henry J. Raymond) (1870) ; (John Swinton's Travels) (1880) ; <An Oration on John Brown) (1881) ; and (Striking for Life* (1894); a defense of the American Railway Union and the Pull¬ man strike.

SWINTON, William, American educator: b. Salton, Scotland, 23 April 1833; d. New York, 25 Oct. 1892. He came to Canada in 1843, where he studied at Toronto and then to the United States, where he continued his studies at Amherst College. He subsequently taught at Greensboro, N. C., and in New York and during the Civil War was war correspond¬ ent of the New York Times. From 1869 to 1872 he was

professor of English language and literature in the University of California. His writings include (Rambles Among Words *; (Twelve Decisive Battles of the War* ; Cam¬ paigns of the Army of the Potomac) ; (Word Analysis *; (Studies in English literature, * and (Outlines of the World's Llistory.*

SWISS FAMILY ROBINSON, The, a

famous romance by J. R. Wyss, which was be¬ gun by his father and published as (Der Sweiz- erische Robinson.) It was translated into French and afterward into English. It is an entertaining tale written for young people, after the style of (Robinson Crusoe,) from which the author is supposed to have derived many of his ideas, and has been cleverly parodied by Owen Wister in (The New Swiss Family Rob¬ inson * (1882.)

SW ISS GUARDS. Swiss companies served in France from the time of Louis XI, who paid particular attention to cultivate the friendship of the cantons. In 1571 Charles IX created the charge of Colonel-General of the Swiss for Montmorency, who commanded all the Swiss in the kingdom, except the 100 guards of the king. The institution of the Swiss guards as a complete regiment dates from 1616. In 1714 it was composed of 12 companies, some of which had two captains. Louis XIV gave it five officers to each company. All the officers and men were Swiss, and the companies mounted guard before the king according to the rank of the cantons to which their cap¬ tains belonged. The Swiss guards followed in order of precedence after the French guards. They enjoyed liberty of worship. According to the arrangement with the Cantons, the Swiss guards could not be obliged to serve against Germany beyond the Rhine, against Italy be¬ yond the Alps, or against Spain beyond the

Pyrenees. This convention was often broken. The attachment of the Swiss guards to the king made them obnoxious to the people during the Revolution. They were repeatedly banished and recalled, and on and after 10 Aug. 1792, when they had to defend the Louvre against the mob, they were massacred without mercy. The Lion of Lucerne was designed by Thor- waldsen in memory of their heroism. At the Restoration, a Swiss Guard was formed to guard the person of the worthless Bourbon, but it was dispersed by the Revolution of 1830. The Vatican Palace, Rome, the residence of the popes, is guarded by a

company of Swiss, who are termed the Swiss Guard. Consult Stephens, H. M., (History of the French Revolution (2 vols., New York 1891) and Ternaux, (Histoire de la Terreur) (8 vols., Paris 1863-81).

SWISS LAKE DWELLINGS. See Lake

Dwellings.

SWISSHELM, Jane Grey, American re¬ former and author : b. Pittsburgh, Pa., 6 Sept. 1815; d. Swissdale, Pa., 22 July 1884. She was among the earliest advocates of woman's rights; an ardent opponent of slavery, and while editing the Saint Cloud (Minn.) Visitor had her office and press destroyed by a mob for advocating abolitionism. She was among the first to be¬ come a nurse in the Union army. Besides voluminous contributions to current periodicals, she published (Letters to Country Girls* (1853), and an autobiography (Half of a Century)

(1881).

SWITCH GRASS. See Grasses in the United States.

SWITCHBACK, an inclined railway in which the progress of the train or car on the descending route is effected partly or wholly by gravity, the car first running down a steep in¬ cline and by its momentum surmounting a lesser incline, alternate ascents and descents continu¬ ing to the end of the course. Switchback rail¬ ways are constructed also by curving a track alternately backward and forward along the side of a hill thus obtaining practicable grades for descent. The switchback method is popu¬ larized in the circular switchback railways, a common feature at pleasure resorts. The Mauch Chunk ˆSwitchback" in Pennsylvania is one of the best known of these ((gravity rail¬ roads." It was formally used to carry the coal from the anthracite mines to the valley; the coal is now transported through a tunnel, and the ((switchback" is reserved for the amusement of visitors. See Railways, Elevated.

SWITCHBOARD. See Electrical

Terms.

SWITCHMEN'S UNION OF NORTH AMERICA. See Railway Labor Organiza¬ tions, Lesser Organisations.

SWITHIN, or SWITHUN, Saint, bishop

of Winchester (about 852-862). He was tutor to King Egbert's son

Ethelwulf, a zealous builder of churches, and of conspicuous de¬ votion. He is credited with many miracles and when he died asked to be buried where (<passers-by might tread on his grave and where the rain from the eaves might fall upon it." When a century later his body was to be ex¬ humed for the purpose of being deposited in the Cathedral, on the day appointed for the

translation (15 July) it rained and for many days after so as to delay the ceremony. Hence, it was believed, originated the popular saying that if it rain on Saint Swithin's day it will be wet weather 40 days after it.

SWITZERLAND, Fr. La Suisse; It. La Svizzera; Ger. Die Schweiz; Lat. Helvetia: An ancient federal republic of Central Europe, extending between 45° 49' 2" and 47° 48' 32" N. latitude and 5° 57' 26" and 10° 29' 40" E. longitude. The superficial area is approxi¬ mately 15,983 square miles; greatest length, 226 miles; greatest breadth, 136 miles. The country is a confederation of 19 entire and six half cantons, the whole divided into 187 ad¬ ministrative districts. It is bounded on the north by Baden, with the Rhine as frontier; northeast of Bavaria and Wiirttemberg, sepa¬ rated from them by the Lake of Constance; east by Lichtenstein and the Tyrol, with the Rhine and the Grison Alps intervening; south by Italy, where the Alps and the Lake of Geneva form natural boundaries; and west and northwest by France, where the Jura Moun¬ tains and the River Doubs form the line of demarcation. ˆ The following table shows the cantons, their areas and population, and the areas in which they joined the confederation:

CANTONS

Zurich (1351) .

Berne (1353) .

Lucerne (1332) .

Uri (1291) . .

Schwyz (1291) .

Obwalden (1291) .

Nidwalden (1291) .

Glarus (1352) . . .

Zug (1352) C

Fribourg (1481) .

Solothurn (1481) .

Basel-Stadt (1501) .

Basel-Land (1501) .

Schaff hausen (1501) . [.

Appenzcll Ausser-Rhoden (1513). Appenzell Inner-Rhoden (1513). .

Saint Gall (1803) .

Grisons (1803) .] .

Aargau (1803) .

Thurgau (1803) . ’ . ! .

Ticino (1803) .

Vaud (1803) . C ! !

Valais (1815) . . ...

Neuchatel (1815) .

Geneva (1815) . . . . .

Total.

Population

534,250 660,640 172,500 22,730 59,210 17,650 13,980 33,570 28 , 940 142,690 121,240

142.870 78,550 47,270 58,670 14,860

315,160

119.860

236.860 140,540 160,680

327.870 130,750 134,910 160,960

3,877,210

Nearly all the cantons have alternative names in French and German. Thus, Lucerne is Luzern in German, while Obwalden and Nidwalden are known in French as Unter- walden-le-Haut and Unterwalden-le-Bas re¬ spectively. Zug has a French equivalent in Zoug; Solothurn in Soleure ; Grisons in Graubiinden in German; Neuchatel is Neuen-burg; Ticino, Tessin; Vaud and Valais are Waadt and Wallis, and Geneva, Geneve or Genf.

Topography. — Embracing the highest and most mountainous land on the Continent, Switzerland has aptly been styled the fortress of Europe. Its frontiers are mainly natural ones, composed of mountains, rivers and lakes. Those great mountain ranges and the large

number of easily-blocked tunnels by which alone it is possible for troops to cross them may be said to make the country absolutely impregnable in the hands of a determined gar¬ rison. During the European War, Switzerland stood as a solid rock in the midst of a turbulent sea, with four nations at war on all the four sides of it. That “fortress® was the strategic key to the mid-European battle-ground; its possession would have had an enormous mili¬ tary value for any one of the belligerent nations. Besides the lofty ranges there are gigantic glaciers, magnificent lakes and wild, romantic valleys. Though Switzerland contains the highest ranges of the Alps and the greater por¬ tion of the Jura chain, the highest peaks of both systems belong to France. Physically the country falls into four natural divisions, the High Alps, the Outer Alps (Voralpen), the Jura, and the intervening plain which makes up the rest of the territory. The High Alps, generally called “the Alps,® contain the loftiest mountain-chains, lying chiefly in the south and east. They divide the warm south from the colder north and present an imposing spectacle of towering masses of granite, mica and gneiss capped with eternal snow. An apparent laby¬ rinth of mountains possesses a remarkable nucleus or central junction in Mount Saint Gothard (10,500 feet), which forms a kind of starting-point radiating four mountain-chains to the north, south, east and west. In like manner it unites the principal watersheds of Europe and sends its waters into four large basins — north by the Rhine to the North Sea, southwest by the Rhone to the Mediterranean, southeast by the Po to the Adriatic, and east by the Danube to the Black Sea. The .other great range, the Jura (q.v.), is linked to the Alps

by the small range of the Jorat. The longest and most important valleys follow the same direction as the main ranges. They are formed by the upper courses of the Rhone and the Rhine in Switzerland, besides those of the Inn and Salza, Enns and Mur, Drave and Save, farther east. The upper Rhone traces its course through the valley bounded north and south by the principal chains of the Alps, the Bernese Alps in the north, and the Pennine and Lepontine ranges in the south. The trans¬ verse valleys are shorter and more abrupt ; they lie athwart the main line of the ranges and are distinguished by a regular succession of narrow gorges and level mountain glades. The largest are formed by the river Reuss in Switzerland, the Adige (Etsch) in the Tyrol, the Rhine between Coire (Chur) and Lake Constance, and the Rhone between Martigny and the Lake of Geneva. The glaciers (of which there are over 1,000) slide down in solid masses of snow and ice from the upper regions ; some continue their courses for 20 or 30 miles, forcing their way through the deep channels of the huge ravines by which the mountain sides are furrowed. The Alpine passes depend on the configuration of the val¬ ley systems. Several of those passes are par¬ tially the result of human labor. Some of them communicate between valleys confined to the north or Swiss side of the Alps, and of these the most celebrated are the Grimsel and Furka passes at the head .of the Rhone valley, connecting it respectively with the Haslithal or

upper part of the Bernese Oberland, and the Urserenthal, or head of the valley of the Reuss, and the Gemmi or Daube Pass (7,265 feet), a remarkable piece of engineering skill, forming the only lateral communication between the Bernese Oberland and the Rhone valley. Other passes connect Switzerland with Italy, the most important being that of the Great Saint Ber¬ nard in the Pennine Chain, that of the Simplon in the Lepontine Alps, the Saint Gothard (q.v.) at the head of the valleys of Reuss and Ticino, and those of Bernardino, Spliigen, Bernina, Septimer, and others leading from the Grisons southward. Altogether about 40 com- merical highways pierce the Alps, besides a larger number of natural passes unprovided with roads. Of the great pass-roads connect¬ ing Italy through Switzerland with southern Germany the most important in Roman times and in the Middle Ages was the Septimer Pass (7,580 feet), connecting the head of the Val Bregaglia with the Rhine valley above Chur by way of the Oberhalbstein and the Albula. The Saint Gothard was not known to the Romans, but was frequented by pilgrims in the 13th cen¬ tury. The Simplon pass (6,600 feet) was a paved Roman road ; the railway tunnel which runs under it was opened in 1906. The Great Saint Bernard pass (8,110 feet) connecting Switzerland with Italy starts on

the Swiss side at Martigny in the valley of the Drance, and ends at Aosta in the Dora Baltea valley. The famous hospice of Saint Bernard is men¬ tioned in documents of the 10th century.

The avalanches of Switzerland are famous for their destructive propensity, but on their record, year by year, they do not cause any appalling Loss of life or property. The mighty forces of nature, in storms at sea, inundations and cyclones, cause probably a much greater proportionate loss of life and property than do avalanches. Though they fall all the year round in Switzerland, spring is the great time for avalanches. During that period some .of them descend with remarkable regularity in particular places and at recognized spots. The snow piled up during the winter on the grass slopes below the (summer) snow-line, gradu¬ ally loses its cohesion as the spring melting ad¬ vances and glides down to its appointed place according to the trend of the ground. In places where huge masses of snow are collected above steep declivities terminating in narrow outlets the avalanches descend with terrific roar and pressure against the lines of defence — the forests. For this reason the forest laws of Switzerland are very strict. Every¬ thing is done to preserve the natural rampart afforded by a mass of pines, and no one is al¬ lowed to fell a tree on his own ground without government consent. Where avalanches fall regularly every year, stone galleries are built or tunnels are mined out of the solid rock to protect r.oads. Many protective devices are em¬ ployed to arrest the torrents of ice, snow and slush so that the danger from them has largely diminished. The so-called Staub-Lawine or Dust-Snow avalanche is the most dangerous on account of its suddenness, and the most dif¬ ficult to provide against. This is a collection of loose, freshly-fallen snow which has been caught up in one of those sectional tornados that spring up on the mountain slopes, and is

driven down on the wings of the wind to the valley below. The Schlag-Lawine or Stroke- Avalanche is the usual spring variety, which pour down the slopes like a swiftly-flowing river. This is the type that can be more suc¬ cessfully regulated. It has a secondary form in the Grund-Lawine or ground avalanche, which carries earth and rubbish with it and performs a beneficial task in bringing down soil from the heights to the plains. Whereas the avalanche is snow in quick movement toward the valleys, the glacier is snow (pressed into ice) in slow movement. See Glacial Period; Glacier.

Rivers and Lakes. — Owing to its moun¬ tainous nature Switzerland is naturally a land belonging to many river systems, though none of the rivers acquires such a size within its limits as to become of much navigable impor¬ tance. Its position as the centre of the princi¬ pal watersheds of Europe has been referred to. Great rivers take their origin in Switzerland and attain their chief development in other countries. Both the Rhine and the Rhone rise here, as well as the Po and the Danube. The first three spring from the Saint Gothard mountain mass, but the Rhine is formed by the junction of three distinct head-streams, the Vorder, Mittel and Hinter-Rhine. It flows north into the Lake of Constance, and thence west to Schauffhausen, where it forms the cele¬ brated falls of that name, the largest in Europe in volume. It is navigable for vessels at Coire in the canton of Gri- sons for vessels of 150 tons, but its navi¬ gation properly begins below the falls. Its prin¬ cipal affluent in Switzerland is the Aar, which, after traversing the Lakes of Brienz and Thun,' winds across the Swiss plateau to join the main stream about midway between Lake Constance and Basel. The Rhone, said to be the most rapid of the larger rivers of the world, rises in the Rhone glacier (Valais), flows northwest into the Lake of Geneva, issues thence at the town of Geneva under the name of the Arve, and quits Swiss territory about 10 miles below! The waters which the Po receives from Switz¬ erland are carried to it by the Ticino, and thereby to the eastern bay of the Mediter¬ ranean ; those which the Danube receives are carried to it by the Inn and taken thence on to the Black Sea. The lakes and mountains form a more important hydrographical feature than the rivers. The former are remarkable for their number, size, depth and the grandeur of their scenery. The largest lake, that of Geneva (also known as Lake Leman), has an area of about 220 square miles ; Lake Constance, in the northeast, has 208 square miles. Both of these, as well as Maggiore on the south side of the Alps; belong partly to other countries; but within the limits of Switzerland, and not far from its centre, are Lake Neuchatel (93 square miles), with Morat and Bienne in its vicinity. Thun with its feeder Brienz, Lucerne or Vierwaldstattersee, Sempach, Baldegg, Zug, Zurich and Wallenstattersee. All these in¬ ternal lakes belong to the basin of the Rhine The greatest depth of Lake Geneva is 1,015 feet, placing the bottom at about 200 feet above sea- level ; the bottoms of the lakes on the southern side of the Alps are below the level of the sea. Rapid mountain torrents feed nearly all the

Swiss lakes, entering their upper ends thickly charged with sediment, which is deposited when the rivers enter the lake, to leave it at the lower end as clear streams. Thus the lakes filter and regulate the

rivers, thereby protecting nearly all the lower valleys of the country from serious floods. The Aar formerly overflowed its banks, but this has been remedied by the construction of a canal to divert the river into the Lake of Bienne, by which the lower course of the stream is regulated.

Geology and Minerals — The most remark¬ able feature in the complicated geological structure of Switzerland and of the Alps gen¬ erally is the extent to which the flanks of the Alps have been folded, contorted and inverted by the tremendous forces that led to the eleva¬ tion of these mountains. A typical example is presented by the Saint Gothard, where the cen¬ tral core crops out at the summit of the ridge, and the strata on each side of it, north and south, dip inwards toward the base, so that when seen in section they would present the appearance of the ribs of a fan radiating from a single point. All the loftiest Alpine ranges have a nucleus of granite, on which gneiss and mica-slate recline generally at a high angle. On the west of the plateau the Jura give their name (Jurassic) to the rocks of which they are com¬ posed; the mountains on the east are mainly formed of gneiss and mica-schist with various slates in places, especially in the Grisons. The Swiss plateau, stretching from southwest to northeast between the Geneva and Constance lakes, may be described as an area of Tertiary (principally Miocene) deposits separating the two mountain regions composed chiefly of rocks of more ancient date. Switzerland is not rich in minerals; iron ore is found and worked at various places. Asphalt, sulphur and salt occur in certain districts, and formerly argentiferous copper and lead ore were extracted in the can¬ ton of Grisons. A profitable source of na¬ tional wealth is provided by an abundance of mineral springs. Thermal and medicinal baths are dotted all over the country. Baden (q.v.) the chief of the bath centres, enjoys a most salubrious climate and its hot springs have been celebrated since Roman times. Other cele¬ brated health resorts are those of Schinznach

T '1 ^ ' , in Saint Gall, Lcuk or

Loueche and Saxon in Valais, Saint Moritz in the > beautiful Engadine, with Bernhardin Fi- dens and Schuls-Tarasp, Alveneu and Serneus* Blumenstein, Weissenburg and others in can¬ ton Berne; Weissbad near Appenzell, Stachel- berg in Glarus, Seewen in Schwyz, and Sch- wendi-Kaltbad in Unterwalden. Altogether there are close on 400 health resorts in Switz¬ erland, many containing luxurious hotels, Ivurhauser, casinos, clubs and theatres, with numerous attractions for devotees of winter spoits. and tennis lawns. Native industry and initiative have so successfully exploited the gifts of nature that

Switzerland has become the “playground of Europe» — if not of the world.

Climate. The crest of the Alps forms a huge dividing-wall between the polar and the equatorial winds, the latter of which frequently deposit their moisture in the form of rainfall on the southern side of the range. The best- known wind is the Fohn, a warm/moist south wind that blows with great velocity in eastern

Longitude East from Greenwich.

StockAch

Zollhausen

Todtnau

＜fcj/Kavensbursr

Stuhllng«r£ 8CHAFFHAUI

J / ScXiafl'liausenrf

has1®’” a 4. J _

^-^^“yAndelfing*

empten

Miilliaiiserf

Kandern

Immenstaad

Friedrichsliaiejn

steckborn^^-s*. *

rn Kreuzlingen^^.

Wdldi° Scherzingen\^ Mullheim^y Guttlngeu' ^^WeiofcMen Ke,,v

Schopfheim

Mama

Stammbeun'

[uttwilen ^ Pfin

U 1 1 w il^^-Rom a n - *■

j/~, _ XK shorn

^ ^^VvEgnacb

Immenstadt

Klingn*-'"

Mollc

Frauen \MarIngen

Laufenburg

^Arbon*

Bregcnz

Deliel

- ○ BoncodrT^

.Courtema Lche

(8MJRG

:«reingen

'Nlederglatt yOberglatt * _oKloten 1 Seebacb-^

Bonfol

M’brawtr

Regensberc

＝^Bucb.

*,Affoltern

Lustenau

Scbitiznacfi?

JwJHˆAaraif ✓Jsuhryˆ 1

Oberstdorf

w > s

(C H

yteiKSti

/ '^-ˆrˆWetiikon n?l

k vSy""? V

% ˆ-VˆRbtr'*

Dornbirn

FlawifvXˆ

Herisau

il£? L' Z1ef«n//ff j i Breltenbacbl (/ * "

pBusseiieb w.Mcnbur”*1

s < fSAintittei

IljtrlikonCS; —

L- Zurich

rˆGrel femeA

\ YL.Oreifen s, •VT l RusnaclN-C \ V?*\a Erlenbael

J > -Teufenˆv

.Damvaht.

.Butswil r iLicbtˆnetelg-j

Hohenems

h.4 ! r

JCIJcbberk \ˆffolterrh\ ' 7\ Tbdl'

wm

J# s eta

- *v We l°chenroW

Wattwil

-<l,s St. Braix fTKSttor iSSSi

T ramelon & rr’7,‘~X. *%£!»§ ˆgelifWb'ˆ > u;ij tvel a r ■"IVttXAV/'v"

Iˆspa“achl,,"n^^yˆfr3

/IcHAii?' ,ˆH"S :J

/Neuveville yˆLhie/nnc ff\~Jea

jT >8chupfen

- roitlnzea ,y <v

»i on ■» tnl 'x A-:. 7?" o” a

syf wii / 4?Urban

Feldkirch

C-\o” nrt\Ricbter^_ swil

Noirmoj

besanoon

Wangen

-c / Langfyithai «a Herzoepnbucbeee *

4 % J)y aggj t lj al Tr-ˆ>.-/ˆye/tBfall I '■/]<• J*b f%H|risi

o , -tM Ricbi 8anˆ#ˆfciarugA'l fi&L »>J

■ ijyv-* v\,V\\Wa66i.,? '. ˆ ˆ -fScb.y an&ca /,

Bludenz

rdqpbergW 7 GachBA

.V.ˆdui

ˆuSevelen,1

VGp'nzen/

.Kriegstettoi

ˆ Buttwil

o Ruawlr ˆ Emmenbrucke ˆ_Aˆ«»nen>Z

< /

'■■ ˆ •' , %

~J "Schbderajjlipyjˆ *; -

Bcbicri"jill)!X ■

/?• J\ St. Anto’nienj $

' Morteau

it 7 n a icrsau.

Les Ponts

Mabtiu-

V\ , Rocbefort('b, 0 CbahjbfelieDˆˆ.ˆ*V » -V-ˆ.V"dr

A Hbcbetetten 1,1

— \"*ii T/ vU

/KonolfingenVˆ.'/; V-' ˆ ipsingen, Egglwˆ I >j

' AJJ/ rt\0's M0N,£GG>ˆn1w£ˆ_V '

.iii8te(B8bu'rg.vz ˆVOberhofeji ■*MMhopNeN Dnteraeen#>

)n xvwy

■Hce-rttc.

ˆGiimmeDenˆ

ˆVollenbucb/ˆ Laupen / K(K. Neuenegg

Pontarlier,

'ˆGHE I BE

A|Pfc

kiiUSli

es Wcrnerel deiSuisgc

ZX&HVI*STJ

T>t<0 B

/GisAyil-ˆ’n

renberg""*ˆ

ScbinHten ngcb'N 1

-i-V (Oi’lff \

x[oTafers /fo.irmont °

-wˆFreiburˆ

'ˆ-f~ˆ(VrU>our4)0 Guggisberj S * O' t w / vv ni

/ B U R G 5/— >- — ST<ˆ“

.uRa.77ˆfeb„ˆ

1 *A ˆ Sohwarzsecbad \ t\ _ <\ *

ˆ.■VCbatmej-ˆJauQ ˆyBonigen

-Eirt67/(.

ivin» % ,

] Ste.«CrL:i ♦,

/ fVuitebo t ˆ

/ VDauliueR

[ougnek /puCTie-rˆv.

W/. T»>

Je8enl

yx Vverd/on

tonnelojei .Charornay

•taste' i "write? i

;Zeruet

»

i§XlDnwtklrohcn’|iii,

ˆ°XVˆT oAialpˆ ji V'ˆfeeltwald ˆ VT ˆ

g: Oeschxnett ˆ

fi'X

J'V.pol'chenenl LOCK HaˆJgLei

| Dereher Moudon

.ouiont y Marsens-

Fl)isur<ˆ

ll)I>ayo/ —

rfpL’Iile ˆvCossonay j

Cbpseaux J Applet) ;Du88lgnj

Vaalruz'

Mezieres!

[Oron

ˆIn'EDERMOPN7 % 2;-|

i=i ZweiBiinmen 5 Blankonblngˆ <

Semsales

■ruyare HOCHMATTˆ

BUTjQˆW Rouˆemont * 'Chateau JV .MVOey'p 1 gummflu

jGUon

i) /- 4 y/Aˆ° L'ˆEJwt

ˆ9ˆ“%,. \V tji ■c.rˆyPrˆki

rfAjJis5'''

VTl.Vfflar.

MT’ 1 uORATj

:hatelvSt.

Morez /

‘ 4'f

tlMUNDSRUCKˆ t*

/ Saanen vr . .

L_AˆTii rbiieb thal

OjK'kXˆaueneii" Jj

v . fsi y /

Moritz

OR'TLtR

sp,i\ri£

A u bonne

NOIRMOl

■JliirtTgny it- Qprgues

reltxV,

d OOLE y. Njon/

/O.. MOnTeHATSCtrth \

'/(4 Ao Ac; litar.gpy,

\ p be«4:^_ ^ru4

,. ^vv>

\ VsXARRiAiiWSf

f nM

Mes'occo ’

' o '*1' ? '

ra Pr«n I i~//,C*y NjQiumagl ii).1' ^avert

Wf^, i i

77/ \ 'VCaiMdo^^SS^A^cffna^V

I)ivunne G'ex />

Diasca^"

| j&K

Tho'non-les-

^Bains^^-v.

.Hertnanc^

/

;Genthl ernex .

H' I IKll

J| 4cv<cian6,

[Turtmann

^?7?/

IrtverV do/ 1

D1SGRAZIA

fc\%eiSˆ¥

comb pep,

ioLXi irano

-%ssH/SKtfi2M!

Ml

,'-ˆi CbiwSra

ip. Anncinasse

Mfil i

$ Ternayaz.

SAGEROOj

~Bourg

///A(M%

La Roche

ˆ■iBcb p|5i v =r it -Mattmark ' 7- VˆVAULAˆINˆORNˆV H"

mˆˆlzˆSTRAHl- f J

ˆ '4 *Rifel,vXˆN /- • -

V>_: ˆ 4Aaa -GORNER GRATˆ V.tˆWV

-A

Bonneville

trmer.

loses

Ganobbio

«fllt»-＞PoVlezza ˆ

Lˆ Ardl

itTSWcˆO-

Bmnzi

lcQ_aggjoj

,iddes

»4T Lugano pionc'

• MT.„, /T

CEN EROSO jV

ˆ GRAND1, \

• te 'XCOMBlN

Sjmgm

. ”// j y / 1

lorcotox/' v iCanolago

v*Viral#StLo/

‘1 NXIVarese

Sallanches

Pallanzaˆ OˆTLaveno

Clusdne

Omcgna

L. 0/

Annecy

Lccco

1 Orta [Novarest

C01110

Gozzano

Cfiatillon'

Bergamo

Lorn (Baltea

puron

Albertville

Sarnico

SWITZERLAND

SCALES

Statute Milos, 18 = 1 Inch.

Kilometres, *29 = 1 Inch.

Rand McNally's New 11 x 14 Map < > f Rvntzerland. Copyright by Rand McNally & Co.

P"int

Lake v D'fseo

Yes ton

1

SWITZERLAND

145

Switzc : land and the upper valleys of the Rhine, Reuss, Rhone and Linth, and is frequently followed by heavy rain. On its approach the thermometer rises and the barometer falls rapidly; presently a fierce storm breaks out. The Fohn is calculated to blow for 17 days in spring, five days in summer and 16 days in autumn. The cold north-northeast wind, known by the French name of bise, blows in the direc¬ tion of Geneva between the Bernese Oberland the Jura, but is little noticeable in summer. Various local winds prevail at the higher levels and are of

great importance to invalids, e.g., the uniform morning wind, blowing down-hill, in regular alternation with the evening wind, blowing up-hill. The higher inhabited regions of Switzerland may be divided into three zones. The lowest of these, the hill region, between the elevations of 1,300 and 2,600 feet above sea- level, embraces the banks of the lakes in north¬ east and central Switzerland and the adjacent mountain slopes. Great heat often prevails here in summer, though a pleasant relief is afforded by the lake baths. Lake Constance is the warmest of the inland waters, with a temperature of 68° to /5° F. The second, or mountain region, extends from 2,600 to 3,900 feet, a district of numerous towns and villages. The third, or Alpine region (3,900 to 6,550 feet), presents a much lower temperature and dry,, clear weather suitable for certain classes of invalids suffering from lung disease. At Sils-Maria, in the upper part of the Engadine valley, the mean January temperature is 17ˆ2° F. ; mean July, 53°, and the mean of the whole year 34°. In general the valleys have a severer winter than mountain peaks of equal elevation, as the colder and, therefore, heavier air steadily sinks down to the bottom of the hollows. At places north of the Alps, such as Zurich and Berne, the normal winter temperature is about 30° F., the summer temperature from 50° to 64° or upwards ; at Geneva the corresponding temperatures are as high as 33° and 66°. Some of the high-lying valleys, especially those that are open to the east and closed to the west, are facetiously said to have nine months' winter and three months' cold.

Flora and Fauna. — The differences of ele¬ vation affect equally the climate and the natural productions of the soil, hence few countries in Europe, even of larger extent, can boast of a more varied vegetation than Switzerland. The flora of the Alps is one of peculiar interest. Like all great mountain ranges the Alps harbor a considerable number of plants found nowhere else, and of those which are found elsewhere the majority do not reappear in the plains and valleys below, but in distant mountains or in the Arctic regions. Out of upwards of 800 species belonging to the Alps, but not to the adjoin¬ ing lowlands, nearly one-fourth are absolutely restricted to these mountains, and nearly a fifth are found also in the Arctic regions, these be¬ ing what are hence known as Arctic-Alpine plants. As the elevation ascends there is a gradual change in the aspect of the vegetation, which has been divided into seven regions. In comparison with adjacent countries, Switzer¬ land possesses few forests, and these have lit¬ tle effect in increasing the atmospheric moist¬ ure or in moderating the extremes of tempera¬ ture. In the valleys at the base of the moun- vol. 26 — to

tains chestnut and walnut grow freely even on the north side, while in the valleys opening toward the Mediterranean lies a zone occupied by these trees while still at a considerable ele¬ vation. Higher up is the zone of the beech, maple and other ordinary foliage trees reach¬ ing to about 4,000 feet, and then the zone of hrs and pines rising about 1,000 feet higher. This region is followed by one of Alpine shrubs, among which rhododendrons (ff Alpine roses1), heaths and whortleberries are conspicu¬ ous, along with larches and two species of pine, the dwarf-pine and the cembra-pine, remark¬ able for its edible seeds and peculiar to this zone. The shrubs cease to grow at about the height of 7,000 feet, but the Alpine plants that cover the pastures intermingled with the shrubs ascend to the snow line, and even bevond in places too steep for snow to lie. Heer collected about 100 different species of flowering plants above the snow limits on the peaks of the Gnsons at about 8,500 feet; 24 species have been observed on the Grands Mulets on Mont Blanc at a height of from 9,800 to 10,600 feet; and the sides of the Pizzo Centrale on the Saint Gothard have been known in August to spread to a considerable distance the fragrance of the flowers which covered them in patches. The celebrated edelweiss, which all Alpine tourists eagerly collect, is the most retiring of these snow region plants. Of utility plants the char¬ acteristic product of the plain and lower regions is the vine, which grows up to about 1,S00 feet above sea-level. The hilly or lower mountain region up to 4,000 feet produces good crops of barley and oats and excellent pastures. Above this, in the Sub-Alpine region, up to 5,500 feet, no regular crops are grown; in the upper Al¬ pine region the vegetation becomes more stunted and the variation of the seasons is lost. Beyond lies perpetual snow. Many parts even of the lower parts of the country are stony and sterile, but no spot that can be 'turned to good account is left unoccupied. Though chieflv an agricultural country, Switzerland cannot grow enough crops to support its population, so that the majority of the foodstuffs have to.be im¬ ported. The productive land is cut up among some 300,000 peasant proprietors who raise, be¬ sides the crops already mentioned, wheat, spelt, rye, potatoes and tobacco, and manufacture cheese, condensed milk and wine. Nearly 30 per cent of the entire area is unproductive* and about 36 per cent is under grass and meadows. Considerable quantities of fruits are grown. Among domestic animals the first place belongs to the horned cattle. At the last census there were in the country 136,613 horses, 1,615.645 cattle, 171,635 sheep, 550,000 pigs and 358ˆ000 goats. In the summer the cattle are fed on the numerous mountain pastures or <(alps,)) but of their winter fodder a large proportion has to be imported. In several cantons bee-keep¬ ing and silkworm culture are carried on. Among the wild animals are

bears, wolves, chamois, goats, boars, stags, badgers, foxes! hares, otters, squirrels; birds of prey of large dimensions ; the snipe, heathcock, cuckoo, black¬ bird and woodpecker. The lakes and rivers produce a varied abundance of fish.

People — The Swiss are a mixed people as to race and language. The bulk of the popula¬ tion is of Teutonic race, but the Latin race

(partly French, partly Italian) compose nearly three-sevenths of the whole. The Swiss Teu¬ tons belong to the Alemannic stock and still speak a difficult Alemannic dialect usually called Swiss German or simply Swiss. They occupy the whole of the upper Rhine valley, as far as its extreme western angle at Basel, consequently the whole of the Helvetian highlands lying north of the Central Alps, besides the upper Rhone valley down to Sion or Sitten, under the Bernese Alps. The rest of the upper Rhone valley and the western slopes of the Jura are French, comprising the cantons of Valais, Vaud, Geneva and Neuchatel. The Italian portion is made up of those parts which belong to the basin of the Po — the whole of the canton of Ticino and the valley of Pos- chiavo in the Grisons. Along the head streams of the Rhine, in the valleys of the Grisons, and in the region between these rivers and the banks of the upper Inn, and even still farther eastwards, in some Tyrolese valleys beyond the Swiss frontier, are scattered the Rumonsh- speaking people, whose language at first sight seems like a sort of connecting link between German and Italian. These are the interesting Rhario-Romance tribes, which had long failed to receive the attention of the scientific world. Critical research has since established that Rumonsh is an entirely independent Neo-Latin tongue, standing on the same level as Spanish, Portuguese, Italian, Langue d'Oc, Moldo-Wal- lachian (Rumanian) and Langue d'O'il. Ru¬ monsh has two main dialects — the Overland dialect or Rumonsh proper, divided into two sub-dialects, the Sur-Sclvian and Sub-Selvian, and the Engadine or Ladin dialect (see Rh.etia). Yielding to the pressure of the vig¬ orous Teutonic tribes, the Rhaeto-Romance races became at last confined to the solitary upland valleys, where they still continue to eke out a laborious existence. Their speech is also steadily yielding to encroachments and is grad¬ ually being supplanted either by German or Italian. As the Swiss races differ in origin and language, so also do their temperamental characteristics vary. The French Swiss is active and vivacious; the Italian Swiss, fiery and irritable; the German Swiss, calm arid thoughtful. Yet with all their racial and spir¬

itual divergences, a fervent patriotism is com¬ mon to all of the Swiss people. Independence and liberty are the keynotes of their existence. There is no desire among the German, French or Italian Swiss to be united with their neigh¬ bors of corresponding nationalities. It has been said that the Swiss as a people often suffer in the judgment of tourists by failure to live up to their reputation as a “mountain people® — to a glorious “Alpine® character. In truth, how¬ ever, the idea that dwelling in a mountain re¬ gion has an ennobling influence on the human character is mostly fallacious. The Swiss are expected by the traveler to carry themselves in all things with the pride and dignity of people who are born and bred in the original home of European liberty. But civilizations and tra¬ ditions of human freedom have always begun on the plains — by seashore and river bank. If all the facts are taken into account, it is rather a handicap than an advantage to a race to in¬ habit a mountain country, for in the earlier stages of civilization the mountain fastnesses

have imposed upon them the duty of sheltering alike fleeing patriots and criminal fugitives from justice. In later stages, again, mountains interfere greatly with development of the ma¬ chinery of civilization. It has been facetiously pointed out that mountain air sharpens the ap¬ petite more than the wits, and there are some diseases attacking particularly the brain which are almost peculiar to mountain districts. The one favorable national circumstance of the Swiss is that their central position in regard to the great plains of Europe has put tnem in the track of all the chief currents of civilization. What they have achieved in spite of the handi¬ cap of their mountains is one of the marvelous stories of the human race. To these massive barriers they owe in the main their sense of national unity.

Industries; Chief Towns — The Swiss de¬ pend for their support on various branches of industry, to which much attention has been given of late years. There are now large silk and cotton factories, while the watch-making industry established in Geneva since the end of the 16th century has long been famous. Other industries are: Embroidery, musical boxes, chocolate (Suchard, Cailler, etc.), shoemaking, straw plaiting, wood carving, aniline dyes, pot¬ tery and aluminum. Asphalt is worked by an English company at Val de Travers and Neu¬ chatel. In the lowlands the chief occupations are agriculture, horticulture and wine growing. In the highlands almost the sole industry is the rearing of livestock. The principal imports are cereals, fruits, vegetables, colonial produce, ani¬ mal food substances, iron and mineral products. Being an inland country, Switzerland has direct commercial intercourse only with the surround¬ ing states ; but the trade with other countries, especially Great Britain and the United States’, is very

important. A source of enormous profit is the catering for the thousands of tourists who invade the country. Switzerland is noted for its hotels, and it is no exaggeration to say that the Swiss are the most expert artists in hotel-keeping. The large modern establish¬ ments at Geneva, Vevey, Zurich, Lucerne, Inter¬ laken, etc., are models of comfort and organiza¬ tion ; the smaller hotels are often equally well conducted, and indeed a really bad inn is rarely met with in French or German Switzerland. In normal times the prices are extraordinarily moderate. A flourishing occupation is that of the professional guide, who is indispensable for expeditions among the higher mountains, espe¬ cially on those which involve the passage of glaciers. As a class, these guides are intelli¬ gent and respectable men, well versed in their duties and thoroughly acquainted with the peo¬ ple and resources of the country. The town life of the Swiss is strongly affected by the hotel life of the tourists. The inhabitants are generally well educated and proficient in lan¬ guages. Offering asylum as it does to political and social rebels of all countries, Switzerland is a kind of international clearing house for thought and theory. For many years it has been the free and open laboratory in which the schemes of anarchists, Bolsheviki, Nihilists Young Egyptian and Young Turkey exiles were hatched. During the European War the coun¬ try was the mecca of diplomats, conspirators and high-born refugees. The Gallic, the Teu-

SWITZERLAND

1 Mt. Blanc

2 St. Gotthard Pass and Bridge

SWITZERLAND

1 The Matterhorn and Riffelsee

2 Lake Lucerne (Vierwaldstattersee)

SWITZERLAND

1 Lucerne

2 Thurn and the Bernese Alps

SWITZERLAND

Ionic and the Slav new thought of the day are all understood and

discussed in Switzerland, and the Swiss book stores are the most cosmo¬ politan and representative in the world. There are few important towns, the chief being Zurich, Basel, Geneva,' Bern (the federal capital), Lausanne, Saint Gallen, Chaux-de-Fonds, Lu¬ cerne, Biel Winterthur and Neuchatel. Geneva, the home of the Red Cross, was designated the capital of the League of Nations by the Allied Peace Conference of 1919.

Communications.— The state railroads of Switzerland have a length of 3,670 miles, while there are 32 miles of foreign railways within the confederation. Owing to the heavy capital charges ($465,000,000) the state railways do not show a profit. In the last normal year (1913) they carried 91,546,639 passengers. The cars on most of the lines follow the American plan. On the waterways and lakes 22 companies oper¬ ate 170 steamers and barges. The organization of the post office is highly efficient. Tourists' baggage may be transported very cheaply by parcel post ; delivery is prompt and reliable. There are over 2,000 post offices; 2,135 miles of telegraph lines and 2,390 telegraph offices. Every year there are constructed new funicular railroads and tramways leading up the moun¬ tain sides ; these produce a good profit — over 3 per cent, and are usually privately owned. In June, 1918, the Swiss National Council adopted a project of Federal subvention of a port on the Rhine at Basel, which will open that river to commercial traffic between Ger¬ many and Switzerland. To counteract the pos¬ sibility of drawing the republic within the sphere of German economic influence, an alter¬ native was proposed, by which Switzerland could be placed into direct communication with the Mediterranean via the Rhone. This river could be made navigable for the 20 miles be¬ tween Geneva and Lyons by the construction of a lock at Genissiat, just below Geneva. By this route Switzerland could obtain all the products necessary for its existence. In April 1919 it was announced that Switzerland had ac¬ quired 28 vessels, of 105,000 tons total tonnage, to be attached to the port of Cette on the French coast (Gulf of Lyons), with which a special line will connect with the Swiss rail¬ ways. The installation of a central warehouse is projected at the Etang de Thau.

Religion- and Education. — There is com¬ plete religious liberty in Switzerland. Accord¬ ing to the last census there were 2,107,814 Prot¬ estants, 1,593,538 Roman Catholics and 18,465 Jews. The order of the Jesuits is not allowed within the confederation. In 12 of the can¬ tons the Protestants form the majority; the Catholics in 10. The latter have the larger number of clerics, some 6,000, under nve bish¬ oprics, those of Basel and Lugano, Chur, Saint Gallen, Lausanne and Geneva. The Protestant Church is Calvinistic in doctrine and Presby¬

terian in form ; it is under the supervision of the cantonal magistrates. No one is called on to pay taxes specially appropriated for the sup¬ port of a creed which he does not adhere to. The foundation of religious orders or new con¬ vents are prohibited.

The Swiss educational system is both gen¬ erous and practical, with compulsory attend¬ ance (at nine years) enforced and free instruc¬ tion, books and materials provided. The ele¬

mentary school classes are mixed and contain up to 45 children. The curriculum assures to boys and girls a general elementary education including a knowledge of French, while con¬ siderable time is also devoted to physical exer¬ cise, carpentry, needlework and cookery. After a four years' course the scholars enter the sec¬ ondary schools, where they remain till 15. After a five years' advanced course in the sec¬ ondary school the scholars have the option of ultimately entering the gymnasium or the in¬ dustrial and commercial schools. Up to the age of 15 instruction is free; after that the an¬ nual fees amount to 60 francs ($12). There are great* universities in the chief cities, which are much frequented by foreign pupils. The Swiss technical schools are second to none in the world; they teach everything from waiting at table to watch-making and science. In mountain villages the schools are kept open only during the long Alpine winter. All through the summer the boys work in the fields, while the masters and teachers attend to their own farms. From the primary schools to the universities there are splendid facilities for learning. In the 4,690 primary schools there are about 530,000 pupils annually under 12,023 teachers. The cost of these institutions is lit¬ tle over $10,000,000 a year. In the 642 higher schools there are about 60,000 pupils annually under 2,000 teachers. The cost of these is about $1,500,000 a year. Besides these there are schools of agriculture, dairying, commerce, etc., while continuation commercial schools give further instruction to some 10,000 pupils yearly, who attend vacation and evening classes. In the seven universities, Basel, Zurich, Bern, Geneva, Lausanne, Fribourg and Neuchatel, there is an average of 9,000 students a year, of whom fully a third are foreigners. An aver¬ age of 15,000 children a year are treated in the correctional schools, and some 1,300 in 28 schools for the feeble-minded. There are 14 special schools for deaf-mutes, with an average of 700 pupils a year. Special attention is paid in all Swiss educational institutions to gym¬ nastics and physical culture.

Government. — As already stated, Switzer¬ land is a confederation of 19 entire and six half cantons, which have been united for fed' eral purposes since 1848. The present constitu¬ tion, which dates from 29

May 1874, vests su¬ preme legislative and executive authority in two chambers — (1) a State Council (Standerathl of 44 members, chosen two for each canton and one for each half-canton for three years; and (2) a National Council (Nationalrath) of 167 delegates of the Swiss people, chosen also for three years by direct manhood suffrage, one deputy for every 20,000 of the population. Among the various forms of government de¬ veloped in Europe that of a federal republic has been achieved by Switzerland alone. That country may claim to possess the only truly democratic government in the world. The Swiss have produced great results with small resources ; they have shown what the plain man can do in the way of government without the help of a ruling class, of gentlemen of lei¬ sure, of millionaires or of professional politi¬ cians. An ideal democratic constitution should make it impossible for political representatives to impose on the country laws which the people do not want. It should also be difficult, if not

impossible, for a small majority to impose con¬ stitutional changes to which nearly one-half of the electors are opposed. Yet these obvious re¬ quirements are conspicuously absent in demo¬ cratic countries, for it is often uncertain how far laws, which are easily carried through a parliament or congress, are really wanted by the people, and whether, if put to the popular vote, they would have even a bare majority in their favor. The expression of the will of the people as an aim of government is altogether lost sight of and party necessities become the sole motives of political action. Another re¬ quirement of democratic government is that the political machine should work as smoothly as possible, and for this end care should be taken so as to constitute the legislative and executive bodies as to avoid as far as possible the polit¬ ical crises consequent upon sudden changes of government and to minimize the turmoil and excitement produced by elections. The Swiss have solved these difficult problems with inge¬ nuity and originality ; they have evolved a polit¬ ical machine in which the frank and sure ex¬ pression of the popular will and the smooth working and stability of government are ob¬ tained to far greater extent than in any other country.

Though the cantons are united together as a confederation or “EidgenossenschafU for mu¬ tual defense, each retains its individual inde¬ pendence and governs itself according to the constitution best suited to its own requirements. In these various constitutions there are

grada¬ tions from the fullest democracy to the purest representative forms ; but pure non-representa¬ tive democracies have been adopted in the smaller cantons only, such forms of government being in fact impracticable except among small populations. The united chambers form the Federal Assembly, to which is confided the su¬ preme government. The executive authority is deputed to a Federal Council (Bundesrath) of seven members, elected for three years by the Assembly, the president and vice-president of which are elected annually, and are the first magistrates of the republic. The Council sits at Bern, which is the headquarters of the federal administration. Though ranking only fourth in point of population, Bern owes its status as capital (since 1848) partly to its central position in the Swiss tableland and partly to the historical importance of the canton, which is itself a result of that position. The principles of the referendum and of the initi¬ ative are in force. By the former, if a petition is presented by 30,000 citizens for the alteration or revocation of a measure passed by the legis¬ lature, or eight cantons demand it, the law in question must be referred to the direct vote of the nation. The latter signifies the right of any 50,000 citizens to demand a direct pop¬ ular vote on any constitutional question. The federal government alone can contract treaties or declare war; it also controls the army, postal system, finance and customs. The cantonal authorities have jurisdiction over civil and criminal law, justice, police, public works and schools. The president is elected annually and receives a salary of $2,700; he is usually suc¬ ceeded by the vice-president, whose salary is $2,400, the same remuneration paid to the other five members of the Bundesrath. These seven officials act as ministers: (1) Foreign Affairs;

(2) Interior; (3) Justice; (4) Military; (5) Finance; (6) Agriculture and Industry; (7) Posts and Railroads. The 44 members of the State Council receive about four dollars per day, more or less, as stipulated by the cantons which elect and pay them. The 167 members of the National Council are paid from federal funds at the rate of four dollars for each day of attendance and an allowance for traveling ex¬ penses. Clergymen are not eligible as deputies ; every citizen over 21 has the vote and is eligible for election. The Swiss are keen politicians and go industriously to the polls for the elec¬ tion of representatives and for the settlement of the numerous questions referred to their deci¬ sion by direct vote. Out of 839,114 electors in 1912, no fewer than 529,000 recorded their votes in a referendum held that year on the new insurance law against sickness and accidents.

Under the operation of the federal con¬ stitution the Swiss executive, unlike the British Cabinet, is not renewable all at once, but only

gradually as the term of office of each member comes to an end. Nor is it dependent for its existence (and this is a highly important point) on the vote of a majority in the Federal Assembly. Yet the Swiss executive, like the British Cabinet, but unlike the American Cabi¬ net, has the right and duty of initiating legis¬ lation; but if a measure introduced by it, or having its support, is rejected by the Assembly, that measure merely disappears for the time being. Nothing else happens. There is no political crisis and no general election. A Swiss election causes no uproar. It has be¬ come the habit of the Assembly to elect mem¬ bers of the Federal Council to the presidency in the order of their seniority on the Council, and for years past Swiss presidents have suc¬ ceeded each other as noiselessly and as surely as if they followed each other by right of heredity. With some difference, the State Council is obviously modeled on the United States Senate, but has not the power of rati¬ fying treaties. By means of the referendum the whole body of the electors throughout the country acts as a check upon the elected representatives in the Federal Assembly, and the electors can, by means of the initiative, if neces¬ sary also act as a spur. Swiss representatives have far greater freedom of action than those in other countries bearing a party label. They are not bound to any party and may speak and vote like free men, since the rejection of government measure entails no political crisis nor an election, as would be the case else¬ where. In America, where the executive is not dependent for its existence on a vote of a majority, party feeling is nevertheless as pre¬ dominant as in England : the loyal party man hopes to receive his reward in the shape of some office for himself or patronage for the benefit of friends. All such considerations are entirely absent in Switzerland, where, although party names and organizations have not alto¬ gether disappeared, their meaning and im¬ portance are negligible, and no organization, however influential and wealthy, can control politics. The referendum and initiative have broken political despotism and party govern¬ ment in Switzerland.

Local government is entirely in the hands of the cantonal authorities. In some of the

smaller cantons there is no special administra¬ tive machinery ; all the male citizens assemble in the open air at stated periods and trans¬ act the public business. These assemblies are called Landesgemeinde. The administrations differ in the larger cantons and are carried on by

popularly elected representatives; in most of them the referendum exists, while some have also the popular initiative.

Judicial System. — The Federal Tribunal or Bundes-Gericht is stationed in Lausanne and is composed of 24 members with nine supple¬ mentary judges appointed by the Federal As¬ sembly. Their term is six years, and they may be re-elected. The president and vice-presi¬ dent hold office for two years and are not eligible for re-election to those posts. The president is paid $3,200 annually; the others $3,000. Divided into three divisions, the tri¬ bunal has final jurisdiction in all national suits; private suits in cases where the value in dis¬ pute is not less than $600, and in appeal cases involving not less than the same amount. National suits are such in which constitutional or legislative matters are concerned, inter- cantonal disputes, or appeal against the deci¬ sions of federal authorities, it tries treason¬ able offenses against the confederation, the jury being popularly elected and paid two dollars a day. For ordinary civil and criminal cases each canton has its own judicial system. Capi¬ tal punishment was abolished in Switzerland by the new constitution of 1874, but since 1879 several cantons have reintroduced the death penalty, which now exists in the 10 cantons of Appenzell-Inner-Rhoden, Fribourg, Lucerne, Obwalden, Schaffhausen, Schwyz, Saint Gall, Uri, Wallis and Zug. Nevertheless, capital punishment is not referred to in the Swiss penal code.

Finance. — Switzerland derives its revenue from the alcohol monopoly, customs, railways, posts, telegraphs, state property and invest¬ ments, and military service exemption taxes. The revenue gathered for federal purposes amounts, normally, to about $32,500,000, about half from the customs and almost the rest from the public services. The production and sale of alcohol is a federal monopoly and pro¬ duces nearly $2,000,000 a year profit. The bulk of the proceeds of this latter are divided among the canton governments, wfio have to expend one-tenth of the amount received in combating alcoholism. The revenue for 1913 (the last normal year) amounted to close on $20,000,000, and the expenditure to $21,062,000. Owing to cost of mobilization and enhanced prices under war conditions the expenditure for 1917 rose to $38,645,140 and the revenue to $35,316,400. The estimates for 1918 stood at over $50,000,000 expenditure. For mobilization the government issued loans for 80,000,000 francs in 1914; 115,000,000 in 1915; 200,000,000 in 1916; 100,000.000 in 1917, and 150,000,- 000 in 1918. The public debt amounted 1 Jan. 1918 to $149,010,000; including the floating debt the total was $42,578,000. In 1914 there were 385 savings banks with 446,247 depositors and $315,000,000 in deposits. In 1917 the

total state property was valued at nearly $29,000,000. The cantons separately raise about $27,500,000 a year, while the total taxation of the country is normally about $60,-

000,000 annually. The salt monopoly produces about $7,500,000 a year. At the beginning of 1918 there were in circulation 10,880,000 gold coins of the face value of $10,520,000; 58,376 silver coins, face value $11,460,000; 143.700,000 nickel coins, face value $2,774,000 and 102,500,- 000 copper coins, face value $270,000 — a total face value of $55,024,000. The national bank, opened in 1907, has the exclusive right to issue bank notes, of which it had in circulation on 30 March 1918 to the value of $139,125,860. Switzerland is a party to the Latin Monetary Union with France, Belgium, Italy and Greece. The franc is the unit of currency; its value in terms of United States money is $0,225, roughly 20 cents, or five francs to the dollar.

Swiss Army. — Compulsory universal serv¬ ice has been the root-principle of Switzerland's military system for centuries. Since the re¬ organization completed in 1912 the army has been brought to a high state of efficiency. The striking force of the Swiss army consists of about 300,000 men, divided into the Elite (20 to 32 years), the Landwehr (33 to 40) and the Landsturm (40 to 48), which number re¬ spectively 117,530, 108,900 and 68,000 men. The supplementary services (men of from 20 to 48, who for various reasons are not entirely fit), number 205,000, and the grand total of the whole army is slightly under half a million or one-eighth of the entire population. There are few exemptions except for physical dis¬ ability and those excused or rejected pay cer¬ tain taxes instead of rendering service. Liability extends from the 20th to completion of the 48th year; service is distributed as fol¬ lows : 12 years in the Elite or ˆAuszug,® eight years in the Landwehr and eight years in the Landsturm. The longest periods of training are the recruits' courses which every man goes through in his first year of service — 65 days for the infantry, 75 for the artillery and 90 for the cavalry — besides which there are compulsory courses in shooting. The younger men (the first line) do seven other annual trainings of 11 days each (14 days in the ar¬ tillery) before passing into the Landwehr, when they are called out for 11 days every four1 years ; the Landsturm are only called up in time of war. Men convicted of grave offenses are not allowed to join the army and officers and men whose private life is unworthy of their rank and standing are court-martialed and dis¬ missed. In the strictest sense a democratic service, the Swiss army is a model institution, unique in that every would-be officer starts as a private with the ordinary recruits' course, and promotion to the commissioned and non¬ commissioned ranks is by merit and not by seniority, except that

it is conditional on four years' service in each rank. Although officers naturally have to do more work and pass through longer courses of training than the privates, instances of shirking in order to es¬ cape promotion do not occur. On the contrary, all through the army both officers and men do a large amount of extra voluntary work. In peace time there are no generals ; these are appointed only on mobilization or outbreak of war. The system of promotion from the ranks has the advantage that it obviates any danger of militarism, which always springs from an¬ tagonism between people and officers as a class ;

in Switzerland officers as well as men either belong or feel that tney belong to the people, and there is consequently no friction between them. The system also makes physical train¬ ing obligatory, for it is preceded by compulsory gymnastic training in all the schools and sup¬ plemented by a large amount of voluntary gym¬ nastics, drill and shooting practice, which last is the principal cause of the high standard of marksmanship throughout the Swiss army. But apart from target exercise (which is en¬ couraged, while at the same time mobilization is accelerated by the fact that every soldier when he is not out training keeps his rifle and equip¬ ment in his own house) the institution of an¬ nual trainings tends to produce a high state of physical efficiency throughout the nation.

The composition and organization are thor¬ oughly modern and complete. The infantry (traditionally known as Fusiliers and Car¬ bineers, but for practical purposes are divided into field and mountain infantry) is the main arm. The cavalry consists of dragoons and guides, the former being ranged in independent divisions under the direct orders of the com- mander-in-chief and the latter brigaded with those divisions. There are altogether 106 bat¬ talions, 72 field batteries, 12 howitzer batteries, nine mountain batteries, eight cavalry regiments and 12 squadrons of guides, besides the usual accompaniment of engineers, cyclist, railway and pontoon corps, telegraph section, etc. The fortifications on the southern frontier for the defense of the Saint Gothard pass and the Rhone valley are manned mainly by the Landwehr, which is organized in 56 battalions and 36 squadrons. There are six divisions in the army, each of which belongs to one of the six divisional districts into which the coun¬ try is divided and each can be worked as a separate army corps. The first consists en¬ tirely of French-speaking Swiss, recruited from the cantons of Geneva, Valais, Vaud and Neuchatel. In the second division

three- quarters of the men are French-Swiss, from Fribourg, Neuchatel and the French Jura. The third, fourth and fifth divisions consist entirely of German-speaking Swiss from the cantons of Bern, Lucerne, Soleure, Basel, Argovie, Saint Gall, Zurich and Schaffhausen. The sixth di¬ vision (Italians and Rumonsh) is recruited from Ticino, the Grisons and Saint Gall. At the beginning of the European War all six divisions were mobilized so rapidly that in the first week of August 1914 Switzerland was able to post on its frontiers over 250,000 fight¬ ing men, well armed and well drilled. The in¬ fantry are armed with the Swiss repeating rifle. The field artillery consist of 75's and 120's (howitzers) ; the mountain artillery of 75's (1906 model) and the heavy artillery of 120's, firing a shell of about 39.68 pounds.

This national militia, which is not a stand¬ ing army, is administered partly by the cantonal authorities, who have power to promote offi¬ cers up to the rank of captain. The higher appointments rest with the federal government, which has charge of all general matters of im¬ portance. The Swiss consider it an honor to serve in the army and a misfortune to be re¬ jected. 'Considering its efficiency and the fact that it is raised by conscription, the Swiss army is a comparatively cheap one. The ex¬

penditure is 11 francs ($2.20) per head of the population, while 23 francs ($4.60) per head is spent on education. All men rejected on ac¬ count of physical defects or exempted, such as teachers, clergymen, police, etc., pay a military tax according to income up to the age of 40. Service being the same for all, it is, therefore, a handicap for none. It interferes neither with personal liberty nor with the country's pros¬ perity; it imposes little burden on the national treasury and no burden at all on the national content. In proportion to population Switzer¬ land is one of the richest countries, although it has not an inch of territory beyond its borders. The vearly value of Switzerland's commerce amounts to about $162 per capita of the population, as compared with $107 in England, and the country not only bears the compulsory system, but regards with pride and affection the army which is its result. Owing to its inland position Switzerland has no navy, and no need of one. Yet a ((Swiss admiralˆ did once exist, an Englishman named Colonel Williams, who in 1799 was in the serv¬ ice of the Zurich government and commanded a small fleet on Lake Zurich, with which he was ordered to oppose the French army. When the latter, under Massena, routed the Austrians and Russians, Williams calmly watched the battle from the lake. Then, enraged at his own inaction, he discharged his crews, scuttled his vessels and took to flight.

History. — Switzerland is believed to have been first peopled by the Rhaeti, who were driven from the plains to the mountains by the Helvetii (q.v.), a Celtic tribe. The latter are the oldest inhabitants of the country mentioned in history; they were conquered by the Romans in 58 b.c. and a.d. 10, while the Rhaeti were subdued by the same conquerors in 15 b.c. The Romans built military roads over the Great Saint Bernard to Basel and over the Julier Septimer and Splugen to Bregnez and thence to Basel. The chief settlements were Aven- ticum (Avenches) in the canton of Vaud; Vin- donissa, which in the early centuries of the Christian era was the headquarters of a Ro¬ man legion with its Rhaetian cohorts at the con¬ fluence of the Reuss, Aare and Limmat; Au¬ gusta Rauracorum (Kaiser Augst) on the left of the Rhine near Basel; and Curia Rhaetorum (Coire) in the Grisons. East Switzerland as far as Pfyn in Thurgau and Pfin (ad fines) in the Upper Valais, belonged to the province of Rhaetia, while Western Switzerland formed part of Gaul. Under Roman dominion Hel¬ vetia enjoyed a flourishing trade which covered the land with cities and villages. A trace of that period still exists in the Romanic dialect spoken in some parts of Switzerland. The name Helvetii had become extinct even before the reign of Constantine. About 400 a.d. a great wave of barbarians poured through the peace¬ ful valleys of the Alps, and Huns, Burgundians, Alemanni and Ostrogoths in succession settled in different parts of the country. The Ale¬ manni occupied the whole northern part, where German is now spoken; the Burgundians the western part, where French is spoken; and ihe Ostrogoths occupied the south, where Italian and Rumonsh are the languages to-day. These races were gradually subdued by the Franks, and by the year 534, under the successors of

Clovis, Switzerland had become a part of the Frankish Empire, which did not take possession of the country with its own nationals, but governed it through appointed officials. Chris¬ tianity was introduced during this period and the monasteries- of Disentis (now a school); Saint Gallen (named for Saint Gallus, an Irish monk, and now a bishop’s residence), and Ein- siedeln (now one of the most famous pilgrim resorts in the world), were founded, and dukes and counts were appointed as vicegerents of the Frankish kings. Under the successors of Charlemagne, Switzerland was divided : the eastern half was united with the duchy of Alemannia or Swabia (Schwaben), and the western part with the kingdom of Burgundy (912). After the downfall of the latter in 1032 the whole country fell to Germany,

which governed it through vicegerents, the dukes of Zahringen. These governors in succession con¬ ducted themselves as princes, assumed the name of their castles, and compelled the free inhabit¬ ants of their Gaus (districts) to acknowledge them as their lords. They were in perpetual enmity with the Burgundian nobles and con¬ sequently favored the inhabitants of the towns. They also founded several new towns, such as Bern, Frieburg (Fribourg) and Burgdorf. Throughout the Middle Ages, Switzerland and the Swiss were always in the eye of Europe. At times they presented the spectacles of a patriot people repelling the tyrant and invader with an unearthly courage and good luck; at other times it was that of a warlike clan, safe in the great mountain fastnesses, offering their fighting abilities to the highest bidder and ren¬ dering for pay as high a courage and stubborn a fidelity as was ever inspired by love of coun¬ try. Almost every European nation felt their prowess as enemies or allies. The Swiss was found at every court in some capacity. Peter of Savoy, Prince of West Switzerland, built the great Savoy palace in London, part of which survives to-day as the Savoy Chapel, built on the site in 1505-11; he also built the famous Castle of Chillon on Lake Geneva, immortalized by Byron, and kept great affairs going in both those far-apart countries. It is recorded that Machiavelli prophesied that the Swiss would some day be masters of all Italy, a prediction reasonable enough then in the light of the re¬ markable military virtue and energy of the Swiss.

As the power of the German emperors de¬ clined, the nobles and priests grew ambitious of independence and eager to enrich themselves at the expense of their neighbors. Those of the Swiss towns and smaller communities which had preserved their freedom were compelled by considerations of safety to conclude treaties with the feudal lords of the soil. At the be¬ ginning of the 13th century the three forest cantons of Uri, Schwyz and Unterwalden were subject to the then unimportant counts of Haps- burg, who, although they were properly only imperial bailiffs (Vogte), yet regarded them¬ selves as sovereign rulers. This claim the three cantons constantly refused to admit, and event¬ ually (1291) leagued themselves together to oppose the usurpations of the house of Haps- burg. Tradition says that on the night of 7 Nov. 1307, 33 representatives, with Fiirst of Uri and his son-in-law Tell, Stauffacher of Schwyz,

and Arnold of Melchthal in Unterwalden at their head, met at Riitli, a solitary spot on the Lake of Uri, swore to maintain their ancient independence, and projected a rising of these cantons for 1 Jan. 1308. On the day fixed the rising took place, and the Austrian gov¬ ernors were deposed and expelled. But the events related of Tell are purely

legendary. (See Tell). A few years later the three cantons were invaded by the Hapsburgs ; but the signal victory at the pass of Morgarten on 15 Nov. 1315, secured the independence of the cantons. The three united cantons were joined by the cities of Lucerne (1332) and Zurich (1351), the cantons of Glarus and Zug (1352), and the city of Bern (1353). Austria, which claimed juris¬ diction over three of the newly-added members, namely, the city of Lucerne and the cantons of Glarus and Zug, again invaded the territory of the confederation, but was completely defeated at Sempach (where Arnold of Winkelried is said to have sacrificed his life for the sake of his fel¬ low-countrymen) in 1386, and in 1388 at Nafels. The canton of Appenzell joined the confedera¬ tion in 1411, and Aargau was wrested from the Austrians in 1415. The third war with Austria terminated in 1460, in favor of the confedera¬ tion, which obtained Thurgau, Austria being thus deprived of all its possessions in the regions over which Switzerland now extends. Haps- burg Castle still dominates the canton of Argau — a monument of Swiss independence. In 1474, at the instigation of Louis XI of France, the Swiss turned their arms against Charles of Burgundy, invading his country and defeating his army near Hericourt. Charles, in revenge, invaded Switzerland, but the Swiss inflicted severe defeats upon the Burgundians at the three battles of Grandson in Vaud, Morat (Murten) and Nancy in 1476 and 1477, in the last of which Charles was slain. They admitted Freiburg and Solothurn into the confederation in 1481, and about the same time they con¬ cluded defensive alliances with several of the neighboring states. Their prosperity rose to such a height that all the courts around, even Austria, sought their friendship and alliance. The last war with Austria broke out in 1498. The Swiss had to undergo a severe struggle, but, victors in six sanguinary battles, they were, by the Peace of Basel in 1499, practically sepa¬ rated from the empire, a separation to which formal and international sanction was given in 1648. That peace ended a triumphant strug¬ gle of two centuries. After this war they had no longer any enemy to fear, and their future wars were waged on behalf of foreign powers. In 1501 Basel and Schaffhausen, and in 1513 Appenzell (which had long been an ally), were admitted into full federation. The number of the cantons was thus brought up to 13, at which it remained till 1798. The town and the abbot of Saint Gall and the town of Bienne had seats and votes in the diet without being in full federation ; and there were besides six allies of the confederation not enjoying these privileges — the Grisons, Valais, Geneva, Neuf- chatel, Muhlhausen, and the bishopric of Basel. In 1516 France gave up to Switzerland the whole of the present canton of Ticino. An alli¬ ance between the two countries was formed which lasted until the French Revolution.

In 1518 the Reformation began to make its

way into Switzerland, chiefly through the efforts of Zwingli at Zurich. He fell at Kappel (1531), but his work was carried on by Calvin at Geneva. The effect of the Reformation for long was to divide Switzerland into separate camps. Aristocracy and democracy, Protestant¬ ism and Catholicism, struggled for the superior¬ ity. Internal dissensions, religious and political, continued for nearly 200 years. The last time the two great parties met in arms was at Willmergen in 1712, when victory declared itself for the Protestants. The period of tranquillity that followed was alike favorable to the progress of commerce, agriculture and manufactures, and to the arts and sciences. In almost every depart¬ ment of human knowledge the Swiss of the 18th century, both at home and abroad, acquired dis¬ tinguished reputation. In the last years of the century the ferment of the French Revolution spread to Switzerland; and in 1798 the ancient confederation was replaced by the Helvetian Republic, founded on the ruins of the ancient liberties of the nation, which lasted four years. In 1803 Napoleon I organized a new confedera¬ tion, composed of 19 cantons, by the addition of Aargau, Grisons, Saint Gall, Ticino, Thurgau and Pays de Vaud. In 1815, by the Federal Pact of Zurich Neufchatel, Geneva and Valais were admitted into the confederacy, and the number of the cantons was thus brought up to 22. This confederacy was acknowledged by the Congress of Vienna, which proclaimed the perpetual neutrality of Switzerland, and the in¬ violability of its soil. Again in 1830 and in 1848, Switzerland was affected by the revolu¬ tionary movement in France, and a new federal constitution was introduced in the latter year. During the revolutionary commotions of 1848 Neufchatel set aside its monarchical form of government and adopted a republican one, and in 1857 it was put upon the same footing with the other cantons. Since that time the annals of Switzerland have little to record beyond the fact of constant moral and material prog¬ ress. A revision of the federal constitution was adopted after a protracted agitation on 19 April 1874, from which time the cantons grad¬ ually adopted the referendum and the initiative. While this agitation was going on several of the individual cantons set the example of re¬ vising their constitutions. In this proceeding Zurich led the way, appointing a special council for the purpose in January 1868. It was fol¬ lowed by Bern, Aargau, Thurgau, Solothurn, and other cantons. All the modifications made were in a democratic direction. The chief oppo¬

sition to the project of a revision of the federal constitution proceeded from the French cantons and the Ultramontane party, the former fearing that in consequence of a revision of the consti¬ tution in the direction aimed at, that of giving more power to the central authorities, they would be gradually Germanized, the latter be¬ lieving that the influence of their party in those cantons where it was numerically strong would be curtailed. But in spite of this opposition the Federal Assembly, on 21 Dec. 1869, adopted the principle of a revision, and elected a committee to prepare a scheme for the purpose. The proj¬ ect of revision drawn up by this committee was laid before the Federal Assembly in the session of 1871-72, and after being accepted there was submitted to the people on 12 May 1872, an

article of the constitution then in force requir¬ ing that any proposed alteration of it must, before being adopted, be sanctioned by a ma¬ jority of the people and of the cantons. On this occasion the project was rejected by a small majority; but a new one was drawn up and accepted on the date already mentioned, 19 April 1874. The new constitution gives more homo¬ geneity to the confederacy by assigning to the federal authorities more power in matters re¬ lating to law, the army, the church, and educa¬ tion. The laws of the various cantons are par¬ tially assimilated; the management of the can¬ tonal contingents to the army is no longer left entirely to the cantons themselves; the ecclesi¬ astical authorities are completely subjected to the civil power; and primary education is made compulsory and secular. Since then two or three partial revisions have been carried out. A constitutional modification, for instance, was passed by the National Council in 1890 to the effect that in future when a revision of the fed¬ eral constitution, or the admission into it of a new article, is proposed by popular initiative, this proposal must be supported by the votes of at least 50,000 citizens possessed of the right of voting, and not 30,000 as previously. In 1891 the 600th anniversary of Swiss nationality was celebrated.

T he more important events in Swiss history of recent years may be briefly summarized. On the last day of 1898 Switzerland was admitted by the United States as a favored nation. In 1900 the nation rejected the ((double initi¬ ative, a scheme to elect members of the Na¬ tional Council by proportional representation. 1 he new palace of the Swiss parliament was opened in 1902. In the same year a brief rup¬ ture with Italy occurred. Agreements were arrived at during 1903 for the construction of the Jura and Simplon tunnels; a new army bill was passed in 1907, when a British military commission arrived at Basel to study the Swiss army system. In 1908 the sale and manufacture of absinthe were entirely prohibited in the country. During 1909 and

1910 serious dam¬ age was caused by floods and avalanches. Pro¬ gressive industrial development calls for a large supply of labor which Switzerland is unable to supply; becoming every year less of an agricultural country, large quantities of food have to be imported, while the number of factory hands has more than doubled in 25 years. The population of the country districts shows little increase; that of the towns is growing rapidly, mainly due to foreign immi¬ gration from Italy, France and, above all, from Germany. During the European War \he ‘po¬ sition of Switzerland was one of extreme diffi¬ culty. Need of coal and iron compelled the republic to enter into agreements with the Central Powers to supply them with foodstuffs. Besides maintaining its army on a war footing for the duration of the war, Switzerland be¬ came a clearing-house for the refugees, wounded and prisoners of all the belligerents, while international diplomats and exiled rulers made it their headquarters. A noteworthy statement of Swiss policy was made in a memo¬ randum presented in February 1919 by the hederal Council to the Peace Conference in Paris. In this document special emphasis is laid on Swiss neutrality, which «is not chosen according to circumstances, but is permanent”

— a fundamental principle of the Swiss state since the beginning of the 16th century. <(As in the past, so in the future, Switzerland must remain the faithful guardian of the passes of the Alps. . . . When all relations between

the belligerents were broken off, Switzerland was able, thanks to its neutrality, to undertake the grateful task of carrying out a philan¬ thropic activity which saved the world from an accentuation of its sufferings.® Switzerland welcomed the creation of a League of Nations and, as the oldest of existing republics, ((would deem it an honor to bring into the League of Nations the experience acquired in the course of centuries.® The determined insistence on neutrality by Switzerland — except in case of self-defense — places that country in a peculiar position with regard to the League of Nations. As pointed out by Professor Borgeaud in a pamphlet, (La Suisse et la Societe des Nations) (Geneva 1919), neutrality implies sovereignty, a principle inconsistent with the general spirit of the League — unless, indeed, the League it¬ self concedes this privilege for special interna¬ tional reasons. In a remarkable speech deliv¬ ered before the National Council in August 1918 President Calonder first called attention to this point; though supporting intervention to end the war, he declared

that Swiss neutrality pre¬ vented Switzerland from forcing itself as a peacemaker. Sturdy independence, freedom of action and avoidance of foreign entanglements or obligations is the keynote of the Swiss Re¬ public. In a state paper dated 15 Nov. 1690 occurs this passage (in French) : ((The Swiss have two religions in their country, which di¬ vide them at times ; but they have only one liberty, which they cherish above all: this re¬ unites them always, and will reunite them for ever.®

Bibliography. — (For Alps, see that head) — Adams and Cunningham, (The Swiss Con¬ federation (London 1899) ; Affolter, A., Grundziige des Schweizerischen Staatsrechts5 (Zurich 1904) ; Baedeker's (Switzerland) (Lon¬ don 1913) ; Baker F. G., (The Model Re¬ public : A History of the Rise and Progress of the Swiss People5 (London 1895) ; Benson, E. F., (Winter Sports in Switzerland5 (New York 1913) ; Brooks, R. C., Government and Politics of Switzerland5 (ib. 1918) ; Cadby, W., Switzerland in Winter5 (ib. 1914) ; Cameron, C. F., Switzerland5 (London 1918) ; Clerget, P., (La Suisse au XXe Siecle5 (Paris 1908) ; Cooper, J. Fenimore, Sketches of Switzerland5 (Philadelphia 1836) ; Crawford, V. . M., Switzerland of To-Day5 (London 1911) ; Dandliker, Dr. K., (A Short History of Switzerland5 (New York 1899) ; Dauzat, (La Suisse illustre5 (Paris 1914) ; Dawson, W. H., Social Switzerland5 (London 1897) ; Dierauer, J., (Histoire de la Confederation Suisse5 (4 vols. ; also in German: Lausanne 1911-14); Dole, N. H., (The Spell of Switzerland5 (Bos¬ ton 1914) ; Dumur, L., (Les deux Suisses5 (Paris 1918) ; Egli, K., (L'armee Suisse5 (ib. 1913) ; Fox, F., Switzerland5 (London 1914) ; Grande, J., (A Citizens' Army5 (ib. 1916) ; Gremli, A., (The Flora of Switzerland5 (5th ed., ib. 1914) ; James, E. J. (trans.), (The Federal Constitution of Switzerland5 (Phila¬ delphia 1890) ; Knapp, Borel et Attinger, (Dic- tionnaire geographique de la Suisse5 (Fr. and

Ger. Neuchatel 1902); Kuenzli, F. A., <Right and Duty; or Citizen and Soldier: Switzer¬ land prepared ... a model for the United States5 (New York 1917) ; Kuhns, L 0., Switzerland: its scenery, history and liter¬ ary associations5 (ib. 1910) ; Lampert, U., Gas schweizerische Bundesstaatsrecht5 (Zurich 1918) ; MacCracken, W. D, <The Rise of the Swiss Republic5 (London 1892) and (Romance and Teutonic Switzerland5 (2 vols., new ed., Boston 1910) ; Macmillan's Guide to Switzer¬ land5 (London) ; Moses, B., (The Federal Government of Switzerland5 (New York 1889) ; Murray's (Handbook for Switzerland5 (Lon¬ don) ; Muyden, B. van, (Histoire de la Nation Suisse5 (3 vols., Lausanne 1896-1901) ; Oechsli, W, JQuellenbuch zur Schweizer-Geschichte5 (Zurich 1918); Rook, C., Switzerland: The Country and its People5 (London 1907) ; Singleton, Esther (compiler),

Switzerland as described by great writers5 (New York 1912) ; Sowerby, J., (The Forest Cantons of Switzer¬ land5 (London 1892) ; Suter, L., (Histoire Suisse5 (Einsiedeln 1914) ; Wade, Mrs. M. H., Gur Little Swiss Cousin5 (Boston 1917) ; Webb, F., Switzerland and the Swiss5 (Lon¬ don 1909).

Henri F. Klein, Editorial Staff of The Americana &.

SWORD, The, a weapon used in personal combat for cutting or thrusting, one of the most ancient and highly esteemed of all weapons. No sooner had the art of working metals been dis¬ covered than it made its appearance, replacing almost at once the crude axe of the Stone Age. The earliest swords, of which any authentic records exist, were those of the Assyrians, the Gauls and the Greeks. These swords were double edged, straight or leaf-shaped, and were made of bronze, the art of tempering steel not having then been discovered. The Roman sword, which was made of steel, was short, straight and double edged, having its point cut at an obtuse angle. The swords of the Franks were straight, about 30 inches in length with a tapering point. None of these swords appear to have offered much protection to the hand.

During the Middle Ages the sword was lengthened, while still retaining its general Frankish shape and quillons (cross-pieces) were added for the protection of the haqd. A narrow-bladed swˆrd called the estoc, used principally for thrusting, was often carried at¬ tached to the saddle by mounted men, the heavy sword being worn upon the person at the same time. A dagger called the misericorde (dagger of mercy) was worn on the right side by knights, and used to dispatch their fallen foes.

The German lansquenets, or mercenary foot soldiers, used a two-handed sword some six feet in length. On the march this ponderous weapon was worn slung over the back. In wielding the heavy swords of the Middle Ages, the fore¬ finger was often hooked over the right quillon to strengthen the grasp. This forefinger being unprotected (except by the gauntlet) was fre¬ quently injured and so, for its protection, a little ring was placed in front of the quillon through which the finger was passed. For the sake of symmetry another ring of the same kind was added to the left quillon, the two rings being termed the <(pas d’ane.® Side rings

were next added for the protection of the hand and the right quillon was curved upward so as to form the <(knuckle bow.® A thumb ring was also sometimes added, the Germans being especially fond of this device. During the 16th century the sword became much lighter, the striking of heavy blows having become less of a necessity owing to the discarding of armor on account of the invention of gunpowder. A cup-shaped guard was added to the quillons (which were generally straight, the knuckle bow being retained as a separate piece) and the weapon became a rapier, the point of which rather than the edge was used in making an attack. With the early rapier a dagger was worn, which when fighting was held in the left hand and used for parrying. Later a cloak was used for the same purpose. As the science of fence became better understood, however, all secondary protections were dis¬ carded, and the rapier became a weapon of both offense and defense. Rapiers were often highly ornamented and the guards were fre¬ quently of fanciful design. The best of them came from Spain, Toledo being especially noted for the excellence of her blades.

Shortly before the beginning of the 18th century the rapier was supplanted to a great extent by the colichemarde, a weapon with a hilt like our modern small sword, the marked peculiarity of which was that its blade was wide for about half its length and narrow for the other half. About 1760 the colichemarde gave way to. the small sword, a very light weapon, having a small circular guard, a knuckle bow and a narrow straight blade. The foil used in fencing which represents the small sword is about 33 inches in length with a quadrangular blade and a bell or ring guard. Italian foils have quillons, French ones do not. Fhe duelling sword is a heavier kind of foil, having a triangular blade tapering to a very fine point. A broadsword is a sword that has a cutting edge. It may be either straight or curved, single or double edged. It is essentially a military weapon and is in use in all armies. In the United States army a form of sabre is used varying from 30 to 34 inches in length. In the European War the sword has come into disuse among infantry officers owing to the lack of opportunity for its employment in trench warfare and the dangerous distinctive¬ ness which it gives to those who bear it.

The sabre which is the best known form of broadsword is single edged. Its blade, which is usually somewhat curved, is thickest at the back, from whence it becomes gradually thinner toward the edge. Its guard consists of a strong knuckle bow often terminating in a solid piece, which amply protects the hand. The scimetar, a light form of sabre having a very pronouncedly curved blade is the favorite weapon of the East. Damascus was formerly noted for the ex¬ cellence of her scimetar blades. The cutlass is a short heavy broadsword which is in

use in most of the navies of the world. The machete, a weapon much used in Cuba, is shorter than the cutlass and lacks the protecting guard for the hand. The claymore, which may be called the national weapon of Scotland, is a heavy straight broadsword having a very elaborate basket hilt.

The schlaeger, the weapon used by the Ger¬

man students in their university duels, is a long straight sword with a very sharp edge, having a solid metal guard which completely encases the hand. The sword bayonet is a short sword adapted for use either with or without the rifle.

The long sword of the Japanese is a weapon some two and a half to three feet in length, with a heavily backed blade, a sharp cutting edge, a long handle and a small round guard. Their short sword is like the other but only about half as long. In olden times both of these swords were worn together thrust through the girdle by the samurai, a privileged fighting class corresponding to the knights of the Middle Ages. It was with the short sword that hara- kiri (self dispatch) was committed in order to avoid the disgrace of dying at the hands of the public executioner, the samurai being ac¬ corded this right. When fighting, the short sword served as an extra weapon in case the long sword became .lost out of the hand, or broken. (See Fencing). Consult Lacombe's (Arms and Armour5 ; Castle's (Schools and Masters of Fence5 ; Hutton's (The Sword and the Centuries.5

Fred Gilbert Blakeslee, Late Szvordmaster First Regm't C. N. G.

SWORD-DANCE, a dance in which swords and movements made by them form an important part. In the modern sword dance as practised among the Highlanders of Scotland, the performer shows his ability and skill by dancing among the blades without cutting himself.

SWORD FERN. See Filicales, under Ferns and Fern Allies.

SWORD-LILY. See Gladiolus.

SWORDFISH, an enormous mackerel-like fish (Xiphias gladius), representing alone the world-wide family Xiphiidce. It has an elongate mackerel-shaped body which may equal in size that of the largest sharks, and whose muscles are astonishingly strong. A powerful forked tail, a lofty, sail-like dorsal fin, usually divided in adults, but continuous in the young, and other strong fins, give the creature a power and speed in swimming equaled by few oceanic animals. The skin is naked, more or less rough, and the flesh red in color and rich in

flavor is greatly enjoyed when eaten. These fishes are predatory, obtaining their food by fierce forays upon flocks of lesser fishes. Their strength and sharp teeth are supplemented by the pro¬ longation of the fore part of the skull into a horizontally flattened <(sword,55 composed of the consolidated vomer, ethmoid, and pre¬ maxillary bones. The excellence of this weapon and the power of attack is attested by the fre¬ quent piercing of boats and even of large wooden ships, through which the sword has been deeply thrust before breaking off. Al¬ though occasionally seen in the Pacific, the swordfish is characteristic of and numerous only in the North Atlantic, the Mediterranean Sea, and about the Antilles, where in summer it approaches the shore, in pursuit of schools of spawning fishes, and itself becomes the object of a profitable fishery, especially in Italian waters. Along the northern seaboard of the United States this is regarded as a prime summer sport. The fishermen cruise a few miles from the coast in small schooners, hav-

ing at the extremity of the bowsprit (from which the jibboom has been removed) a small platform supporting a belt-like rail of iron at the height of a man’s waist, within which a harpooner may stand securely while his arms are free. Having sighted a swordfish, visible by its projecting backfin, the vessel is steered up to it and a barbed harpoon is thrown to which is attached a rope by which the catch is hauled aboard. Consult Goode, G. B., (Fishery Industries) (Washington 1884).

SWORDS, Order of. See Orders (Royal)

and Decorations.

SYBARIS, sib'a-ris, an ancient Greek city and colony of Lower Italy, in Lucania, on the Gulf of Tarentum, not far from the site of the later town of Thurli. Tradition ascribes its building to a colony of Achseans and Troeze- nians about 720 b.c. It rapidly rose to a high degree of prosperity, but enervated by the mild¬ ness of the climate, the richness of the soil and their great wealth, the inhabitants became pro¬ verbial for their luxury and voluptuousness. In a war with Crotona the city of Sybaris is said to have brought into the field 300,000 men, while the forces of the former amounted to but 100,000. The Crotonians, however, were victorious and totally destroyed Sybaris by turning the waters of the river Crathis against it

(510 b.c.) . The inhabitants of the town dis¬ persed themselves for the most part over the other Greek cities of Lower Italy. Sybarite is still used to signify an effeminate voluptuary. In 1879 and in 1887 excavations revealed two great cemeteries but the true site of the city remains undetermined. Consult Notizie degli Scavi (Rome 1879-88) and Orsi, P., (Atti del congresso di scienze storiche) (Vol. I, Rome

1904).

SYCAMORE, sik'a-mor, Ill., city, county- seat of DeKalb County, on the Chicago and Great Western and the Chicago and North¬ western railroads, about 55 miles west of Chi¬ cago. The city was founded in 1836. It is in an agricultural and stock-raising region and has considerable manufacturing interests. The chief manufacturing establishments are flour mills, in¬ sulated wire works, brick and tile works, soap factories, wagon and carriage works, agricul¬ tural implement works, varnish and furniture factories, canning establishments and creamer¬ ies. There are large establishments for prepar¬ ing fruit and vegetables for shipment. There are 12 churches, a young ladies' seminary and public graded schools. The national bank has a capital of $50,000; there is also a private ba<nk. Pop. about 3,800.

SYCAMORE, a name applied originally to Ficus sycomorus, a tree known in biblical times and places, and the legendary one chosen by Zacchseus to climb into for a sight of the Saviour. It is a species of fig, an evergreen timber tree, flourishing in Egypt, which sup¬ plied an inferior coarse-grained wood for ordi¬ nary purposes and for mummy cases. A famous Egyptian statue of an old man was carved out of a block of sycamore wood about 4000 b.c. The thick foliage, resembling that of the mul¬ berry, makes the sycamore a desirable shade- tree and it is still planted for this reason in Egypt. The fruit is borne directly on trunk and branches, edible and sweet-flavored and is a large item of food among the lower classes.

The ripening of the figs is hastened by making incisions in the apexes. In the Middle Ages a European maple, Acer pseudo -plant anus, was selected to represent the tree of Zacchaeus in the old miracle plays, on account of its dense foliage. It is a tall, very handsome tree of quick growth and living for perhaps 200 years. The leaves are large and have acute lobes, somewhat resembling those of the plane, and the yellowish flowers droop in terminal racemes. The bark is smooth, often peeling off in large flakes, leaving patches of lighter shade, the sap is saccharine and the wood is hard and white, although with a brownish heart, and takes a fine polish, being used by wheelwrights,

turners, cabinet-makers and wood-carvers and for musical instruments. Sycamore endures sea and mountain winds better than most timber trees and is, therefore, planted for its shade in exposed places. Certain of these trees in Scot¬ land were known as dool-trees, or grief-trees, because they formed informal gibbets on which to hang the enemies of powerful barons.

Perhaps because of the likeness in foliage and the stripping of the bark, the name of syc¬ amore has been again transferred to the Ameri¬ can plane-tree (Platanus occidentalis) better called buttonwood. This is one of the largest American trees with awkward, twisted, wide- spreading limbs which, however, when the tree is fully leaved out, forms a broad pyramidal head. The bark is smooth, that of the upper portion flaking off in pieces each year, leaving whitish patches, which are very conspicuous in winter. The large leaves range from simple coarse-toothed to distinctly deltoid and three- lobed blades. The flowers are clustered in compact round balls, with from three to eight minute petals and sepals; the fruit-heads retain this globose form and are composed of obpyra- midal nutlets, having long, nearly erect hairs at the base. They are usually solitary and swing on long peduncles during the winter, only fall¬ ing apart in the early spring. The reddish- brown wood is chiefly useful for cigar-boxes and is compact and difficult to split or to work.

The Australian sycamores are Sterculia lurida and the white sycamore Cryptocarya obo- vata, one of the native nutmegs, and a large tree yielding serviceable white timber. Melia azedarach is the false sycamore, the large tree more commonly known as the pride-of-China tree.

SYCEE (sfise') SILVER, the fine silver of China, cast into ingots weighing commonly rather more than one pound troy. They are marked with the seal of some banker or as- sayer as a guarantee of purity.

SYCOSIS, a pustular disease of the skin of the bearded. face. It is often called barbers' itch (q.v.) and may be regarded as a form of that disorder. The usual treatment consists of application of carbolic acid, zinc ointments, ichthyol, sulphur or oil of cade.

SYDENHAM, Charles Edward Poulett Thomson, 1st Baron, British statesman and governor-general of Canada : b. Wimbledon, Surrey, 13 Sept. 1799; d. Kingston, Canada, 19 Sept. 1841. He was the son of a London mer¬ chant and spent some time in Russia in con¬ nection with his father's business. He was elected to the House .of Commons

in 1826 and in 1830 became a member of the Grey Cabinet as vice-president of the board of trade, of

which he in 1834 became president and treas¬ urer of the Navy. He became a recognized authority on financial matters and he was an earnest supporter of free trade. He was ap¬ pointed governor-general of Canada in 1839 and it was under his administration that the union of Upper and Lower Canada was ef¬ fected and a new constitution established. For his services in connection with thi difficult undertaking he was in 1840 granted a peerage. He was preparing to return to England when he met his death through a hunting accident. Consult Poulett-Scrope, G. J., (Memoirs of Charles, Lord Sydenham) (1843).

SYDENHAM, Thomas (((The English Hippocrates®), English physician: b. Wynford Eagle, Dorset, 10 Sept. 1624 ; d. London, 29 Dec. 1689. _ He entered Oxford University in 1642 but his studies were interrupted by serv¬ ice as an officer in the Army of Parliament. He was graduated bachelor of medicine at Ox¬ ford in 1648 and was elected a fellow of All Souls College, but his medical studies were again interrupted by military service. He be¬ gan practice at Westminster about 1655, for some time still giving much attention to poli¬ tics. He was licensed by the Royal College of Physicians in 1663 and took his M.D. at Cam¬ bridge University in 1676. While his medical studies were much interrupted and his early practice was without a medical license he made remarkable progress. He developed powers of diagnosis amounting to genius and he followed the method of Hippocrates in watching the progress of the patient and as¬ sisting nature in its effort to throw off dis¬ ease. His theories were backed by his notable success in treating patients ; and by his strong sense and plain manner of dealing with matters hitherto cloaked with professional mystery. He also kept mainly to simple prescriptions in¬ stead of the involved sort in vogue. He re¬ ceived recognition from abroad comparatively early in his career, his fame being largely aug¬ mented by his writings; but he made* many enemies in the medical profession at home, although he also enjoyed the loyal support of many notable members of his profession. He made important contributions to medical sci¬ ence in his study of gout, of which he was a victim ; his observations of epidemic diseases through a number of seasons and distinguished several that were formerly confused; intro¬ duced the cooling method of treating smallpox; was the first to

use a tincture of opium, laud¬ anum ; and initiated the use of Peruvian bark in treating malaria. His scorn for dogmatic theories was intense and he was known in the case of a patient whose strength had been viti¬ ated by the weakening processes of the day to prescribe food instead of medicine — an unheard-of procedure. His doctrines came into full recognition in the early part of the 18th century and it was then that the custom of designating him the <(English Hippocrates® was inaugurated. However, while he felt keenly the antagonism evinced toward him by many members of his profession, he enjoyed a uniformly successful career and never suffered the ostracism endured by many pioneers in new theories of medicine. Author of (Ob- servationes medicaP (1676); (Tractatus de podagra et hydrope) (1683); (Schedula mon- ltoria de novae febris ingressu) (1686) ; < Proc¬

essus integri> (1692), etc. The best edition of his works is that of the Sydenham Society, edited by W. A. Greenhill (2d ed., 1844). Little is known of his personal life, but of the numerous sketches of his career appended to editions of his works the most interesting is his own account of his theories and practices in the introduction to (Observationes medicae) (1676). Consult also Picard, F., (Sydenham, sa vie, sa oeuvres) (Paris 1889) ; Payne, J. F., (T. SydenhanP (London 1900).

SYDNEY, sid'ni, Australia, capital of New South Wales, on Port Jackson, was the first city founded in Australia, by British colonists. Its selection was due to the beautiful site and the advantages offered by streams and adjacent bays. The principal streets are lined by hand¬ some residences and commercial houses. The important buildings include the government offices — of white stone in Italian style ; — the magnificent town-hall, with a high tower and fine organ; banks; post and telegraph offices; government house, a castellated building of fine Gothic architecture ; the university, a vast edifice, also Elizabethan Gothic ; together with the associated colleges, including the Woman's College, Saint Mary's Cathedral (Roman Cath¬ olic), a Byzantine synagogue, exchange, cus¬ tom-house, mint, parliament houses, hospitals, asylums, and the Queen Victoria Market. Do¬ main, Hyde Moore, and Centennial parks and the Botanical Gardens are extensive; the race¬ course comprises 202 acres. The Australian Museum, founded in 1836, is the oldest institu¬ tion of the kind in Australia. Its erection cost £59,000. It contains a very large botanical gar¬ den, a technological exhibit, and a library, which, together with other libraries in the city, numbers 240,743 works. The slaughter-houses and water-supply system are owned by the city and the tramway system is owned by the state. There are manufactories of

glass, pottery, wagons, boots and shoes, stoves, hardware, tobacco, etc.

The University of Sydney dates from 1852, receiving its royal charter in 1858. Women students have been admitted since 1881. Port Jackson is of vast proportions, and accessible to the largest vessels, penetrating the country for 20 miles, and sending out branches in all directions. The shores present a bold and rug¬ ged aspect. Four companies operate ferries to and from Sydney over the waters of Port Jack- son, which carry nearly 24,000,000 passengers annually. This service and equipment — the best boats are double-ended screw-boats — are said to be the equal of any in the world. Sydney is near a coal-formation extending over several hundred miles in East Australia, and is the centre of trade for the pastoral and mineral regions of the western districts, connected with an extensive railway system. The various man¬ ufacturing industries are well represented in the city, and its trade is large and growing. Sydney was founded in 1788. The discovery of gold in 1851 stimulated its development. "On 1 Jan. 1901 the installation of Earl Hopetoun as first governor-general of the Australian Common¬ wealth took place here, consummating the federation of Australia.

An outbreak of bubonic plague in 1900, sup¬ posed to have been due to the introduction of plague-stricken rats brought in foreign vessels

SYDNEY, AUSTRALIA

Photos Copyright 1908 by Underwood & Underwood

1 Sidney, looking east from George street into Bridge street 2 The beautiful residence suburb of Sydney. The house at the left of the

flag-staff, near the centre, is “ Cranbrook,” the home of the Governor of New South Wales

from afflicted ports, led, in 1901, to the forma¬ tion of a board of port overseers, called the Sydney Harbor Trust. This commission as¬ sumed control of all the wharves, docks and harbors, and considerably improved shipping at Sydney. Sydney has 103% miles of electric tramways, mostly under municipal control. Pop. 648,746.

SYDNEY, Canada, city, chief port of entry of Cape Breton Island and

capital of Cape Bre¬ ton County, province of Nova Scotia, situated on the southwest arm of Sydney harbor, 285 miles northeast of Halifax; and on the Inter¬ colonial and the Sydney and Louisburg railroads and on the Sydney and Glace Bay Electric Railway. Of these the most important is the great works of the Dominion Iron and Steel Company, employing 3,000 men and turning out 500 tons of steel rails daily. The shipping of coal is also an important industry employing great numbers of men. Among other indus¬ tries are chemical works, iron and brass foun¬ dries, railway repair shops, slag cement works, wood factories, brewery and bottling works. The value of its manufactures reach about $11,000,000 annually. There are five banks lo¬ cated in the city. The chief publications are two daily and three weekly newspapers, one of which the Mac Talla is published in pure Gaelic. There are 13 churches in the city, branches of the Y. M. C. A. and the Salvation Army, and a Catholic Young Men's Club. Among the public institutions are the county insane asylum and a large public library. . The most prominent public buildings are the customs building, the new courthouse, city hall and the new county academy. The educational facilities include a high school, Sydney Academy, School of Min¬ ing and Engineering, Catholic convent schools, and a business college. Sydney was founded in 1784 by United Empire Loyalists. It became an incorporated town in 1885 and chartered as a city in 1904. Municipal affairs are adminis¬ tered by a city council consisting of a mayor elected every year, and 10 aldermen, represent¬ ing five wards and elected for a term of two years. The city owns and operates its water¬ works. Pop. 17,723.

SYDNEY MINES, Canada, town in Cape Breton Island and County, province of Nova Scotia, on the northern arm of Sydney Harbor, three miles north-northwest of North Sydney, and connected with that city by electric rail¬ way. The town owes its existence to the Nova Scotia Steel and Coal Company, whose mines are the oldest in Canada, coal having been mined there as early as 1785. A large steel plant is also located there, and these two indus¬ tries employ 2,500 persons. The town govern¬ ment consists of a mayor, elected yearly, and a council of eight members elected every two years. Pop. 7,470.

SYENITE, as at present understood in petrography, a notocrystalline rock in which the chief feldspar is orthoclase, and in which quartz is absent. Originally it was used for a hornblendic granite such as occurs at Syene (now Assuan), Egypt, where it was quarried for obelisks. Typical syenite con¬ tains orthoclase and hornblende; those with biotite are called mica syenites. Some plagio- clase is always present, and besides this,

magnetite, apatite and zircon are invariable. See Nephelite.

SYKES, Frederick Henry, American col¬ lege president: b. Queensville, Ontario, 13 Oct. 1863; d. Cambridge, Mass., 14 Oct. 1917. He was graduated at Toronto University in 1885, and in 1891-95 was student, scholar and Fellow at Johns Hopkins University, where he took his Ph.D. in 1894. He engaged in teaching and in 1903 became professor of literature and director of extension teaching at Columbia University; and he was professor of English and director of technical education at Teachers' College, Columbia, in 1903-13. From its organization in 1913 until 1917 he was president of the Connecticut College for Women. He was general editor of Scribner's (English Clas¬ sics Series >; and author of numerous text¬ books on English composition and of (French Elements in Middle English) (1899) ; (Syllabus of Lectures on Shakespeare) (1903) ; (Lectures of the History of English Literature in the Nineteenth Century > (1904), etc.

SYKES, George, American soldier : b. Dover, Del., 9 Oct. 1822; d. Brownsville, Tex., 9 Feb. 1880. He was graduated at the United States Military Academy in 1842. He was en¬ gaged in the closing scenes of the Seminole War and later in Texas, and served through the Mexican War. He was afterward on duty at western army posts and engaged in Indian warfare, and in 1855 was promoted captain. He was commissioned major of the 14th United States Infantry soon after the outbreak of the Civil War, participated in the battle of Bull Run, was commissioned brigadier-general of volunteers 28 Sept. 1861 and major-general 29 Nov. 1862. He commanded the Fifth Army corps at the battle of Gettysburg, and in April 1864 was transferred to duty in Kansas. He was brevetted brigadier-general in the regular army in 1865 in recognition of his services at Gettysburg and throughout the war. He be¬ came colonel of the 20th Infantry in 1868, and spent the remainder of his life at different western army posts. Congress appropriated funds for his burial at West Point, where a monument was erected to him.

SYLLABUS, a document issued by Pope Pius IX, 8 Dec. 1864, which condemned 80 current doctrines of the age as heresies. It is a summary or collection of errors previously reprobated in various allocutions and encyclicals. It is a condemnation of the intellectual, social, and religious heresies, characteristic of modern times as these are in opposition to Roman Cath¬ olic doctrines. It was divided into 10 chap¬ ters each containing several propositions with reference to their previous condemnations un¬ der the following general heads: (1) Panthe¬ ism, Naturalism and Absolute Rationalism; (2) Moderate Rationalism; (3) Indifferentism and Latitudinarianism ; (4) Socialism,

Communism and Secret Societies; (5) The Assertion of the Supremacy of the Civil Power over the Church ; (6) The right of the State to interfere in Spir¬ itual things; (7) Morality independent or reli¬ gious sanction; (8) The Sufficiency of merely Civil Marriage; (9) the Denial of the Temporal Independence of the Papacy; (10) Falsely styled ˆLiberalism.® The Syllabus Errorum was the occasion of much controversy and was seized upon by the German government as a pretext of

the famous May Laws against the Roman Cath¬ olic Church in that country. The syllabus reas¬ serts all the claims of the mediaeval papacy. It provoked conflicts between the papal and the civil power in Prussia, Austria and Brazil. <(Syllabus® is the name also used for a decree of Pius X (1907), condemning modernism in 65 propositions.

SYLLOGISM, in logic, an argument stated in full logical form, so that its conclusiveness is manifest from the structure of the expres¬ sion alone, without any regard to the meaning of the terms. A perfect syllogism comprises three and not more than three propositions, the third being the one to be proved; this is called the ˆconclusion® ; the other two, called the premises,® contain the means by which the conclusion is arrived at. A syllogism may be represented thus in symbols,

All A is B,

All C is A,

.’. All C is B.

Or with words instead of symbols:

All metals are elements,

Lead is a metal,

.”. Lead is an element.

This syllogism is valid, because the conclu¬ sion logically follows from the premises. For the ((figures® and (<moods® of the syllogism and

the rules for the construction of syllogism see Logic.

SYLPHS, in ancient mythology, the name given to the elementary spirits of the air in the polytheistic-pantheistic system of the Paracelsists. The sylphs, like the other elemental spir¬ its — the salamanders or spirits of fire, the gnomes or spirits of earth and the undines or spirits of water — form the link between im¬ material and material beings, for though, like men, they eat, drink, speak, travel, sicken and beget children, they resemble the more elevated spirits in the litheness and transparency of their bodies and their rapidity of movement ; they also know more of the present and the future than man does. They have no soul, and com- sequently suffer annihilation after death. Con¬ sult Paracelsus, (Liber de Nymphis, Sylphis, Pygmseis et Salamandris et Caeterio Spiritibus) (Basel ed., 1590).

SYLT, silt, Germany, an island in the North Sea, near the coast of Schleswig- Holstein. It is 22 miles in length, and has an area of 40 square miles. It consists largely of sand dunes with some cliffs, — especially near Kampen. ˆ The Friesian inhabitants are chiefly occupied in agriculture, stock-raising and duck¬ trapping, and are renowed as stalwart sailors. The dialect is peculiar, but German is the school and church language. The principal town is Keitum ; the port is near Munkmarsh, con¬ nected by rail with Westerland. Lighthouses stand between Wenningstadt and Kampen and on the northern point of land. There is good sea-bathing. Pop. about 5,000.

SYLVANITE, a native telluride of gold and silver, containing 24.5 per cent gold and 13.4 per cent of silver. If usually occurs mas¬ sive, but is often seen in curious skeleton crystallizations, due to twinning, and somewhat resembling the written Hebrew characters, giving rise to the name, ((graphic tellurium.® Individual crystals are rare and of highly com¬

plex, monoclinic forms, with perfect clino- pinacoidal cleavage. It is brittle; fracture un¬ even; hardness only 1.5 to 2; specific gravity very high, 7.9 to 8.3; lustre brilliant, metallic; color usually silver-white or slightly yellowish; streak gray. It is an important ore of gold and silver in Transylvania (whence its name), Colorado and California.

SYLVANUS, s ll-va'nus, in Roman mythol¬ ogy, a rural deity, who is represented as half a man and half a goat.

SYLVESTER, James Joseph, English mathematician: b. London, 3 Sept. 1814; d. there, 15 March 1897. He was of Jewish parentage and was educated at Cambridge Uni¬ versity, where, however, his religion

prevented his taking his degree until after the passing of the Tests Act in 1872; but he took his degree at Trinity College, Dublin, in 1841. He became professor of natural history at the University of London in 1837 ; and in 1841 was called to the chair of mathematics at the University of Virginia. He remained there but a short time, his frank expression of his opinion of the slav¬ ery question making his stay impracticable. He was connected with a firm of actuaries in Lon¬ don in 1845-55, meantime writing brilliantly on mathematics. In 1855-70 he was professor of mathematics at the Royal Military Academy, Woolwich. In 1877-83 he was professor of mathematics at the newly-established Johns Hopkins University; and while in America founded and was the first editor of the Ameri¬ can Journal of Mathejnatics. He was called in 1883 to the Savilian chair of geometry at Oxford University and retained it until his death, although he was not on active duty from 1892, when his sight failed. From 1870 he was recognized as one of the leading mathematicians of the world. He published a vast amount of original work, chiefly in the form of contribu¬ tions to scientific periodicals and to learned societies. His researches dealt principally with algebraic forms, although he also made con¬ tributions to analytical and pure geometry, mechanics, optics and astronomy. He exerted a profound influence upon the study of higher mathematics in America as well as in Europe, and his genius as an inventor of mathematics was accompanied by remarkable facility in in¬ structing and inspiring his students. He was also an able linguist and was deeply interested in verse making, although he failed to make a name in that field. He wrote in this connec¬ tion (The Laws of Verse) (1870). He was elected a Fellow of the Royal Society in 1839 and was the recipient of many honors from universities and learned societies both at home and abroad. His mathematical works were edited by Baker, H. F., < Collected Mathematical Papers) (2 vols., New York 1904-10).

SYLVESTER, sil-ves'ter, Joshua, Eng¬ lish poet: b. 1563; d. Middleburg, Holland, 28 Sept. 1618. He is remembered by reason of his translation into English of the (Divine Weekes and Workes) of Du Bartas, a French Huguenot nobleman. It was especially popular with the Puritans in both the Old and New World, and was one of the sources of inspiration for Mil- ton s (Paradise Lost.* Anne Bradstreet, the New England wTenth Muse,® was an enthusi¬ astic admirer of Du Bartas, known to her through Sylvester’s version, and modeled her

literary style upon Sylvester’s somewhat exag¬ gerated version of the strained pedantry of the original. Sylvester, in order to gain the favor of James I, whose dislike of tobacco was well known, published in 1615 an anti-tobacco tract, (Tobacco Battered and the Pipes Shattered.* His works were edited by A. B. Grosart (2 vols., London 1878).

SYLVESTER. See Silvester.

SYLVITE, native potassium chloride, KC1, isomorpho'us with halite or common salt, crys¬ tallizing in the isometric system. Its habit is cubic, the crystals often modified by the octa¬ hedron. It usually occurs in granular or co¬ lumnar masses, or compact. The crystals have perfect cubic cleavage; fracture uneven; brittle; hardness, 2; specific gravity, 1.98; lustre vitre¬ ous; usually colorless or white; transparent when pure. It is soluble in three parts of water and tastes slightly more bitter than com¬ mon salt, like which it is highly diathermanous. It is mined in Galicia and very extensively at Stassfurt and Leopoldshall in Prussia, the pro¬ duction in 1902 amounting to 181,341 metric tons. It is used in the manufacture of potas¬ sium salts, especially the nitrate (saltpetre) and the carbonate (potash). It is also called sylvine and sylvinite. See Potassium.

SYLVIUS, Jacobus (Latinized name of Jacques Dubois), French anatomist: b. Amiens, 1478; d. Paris, 14 Jan. 1555. He early devoted himself to mathematics and the learned languages, but in middle life turned to medicine and took his degree at the University of Montpellier, later entering the University of Paris at the age of 51. He taught anatomy at the college of Treguier, and later at the Uni¬ versity of Paris. He is generallv credited with the invention of the use of injection in dissection, but while he taught it evidence points to its being known before he used it. He appears to have been an ardent disciple of Galen rather than an original investigator, but gained a great name in his profession. The Sylvian fissure, the Sylvian aqueduct and the Sylvian artery were named for him.

SYMBIOSIS, a biological term introduced by De Bary to denote intimate and comple¬ mentary partnerships between different organ¬ isms, as between the algoid and fungoid ele¬ ments in lichens, or between unicellular algae and radiolarians. A great number and variety of cases of symbiosis have been recorded among the lowest plants, but botanists find the subject more and more obscure and their de¬ cisions are by no means general. The effort to differentiate symbiosis from commensalism and parasitism has proved most baffling in many cases. The term ((social symbiosis® has been given to the association of insects found in the communities of ants, bees, termites, etc., where many small aphids, beetles, etc., not at all re¬ lated to their hosts, dwell in peace and in some cases seem to contribute to the general welfare as well as receive benefits. The subject has been discussed mainly in Germany. Consult Brandt in Archiv fiir Anatomic und Physiologic (Leipzig 18821 ; Hertwig, Oskar, (Die Sym- biosis) (Jena i883) ; Keeble, Frederick, (Plant- Animals : A Study in Symbiosis) (Cambridge

1912).

SYMBOL, a word of various meanings, de¬ rived from the Greek word symbolon, <(a sign,® or symbole, a composition. In the early pe¬ riod of Christianity the word was often applied to the Creed and is still so applied in Latin countries. It is also used to indicate, either in a religious or profane sense, an emblem, figure or type, something which specially distinguishes one regarded in a particular character, or as occupying a particular office, or holding a spe¬ cial place in legend or mythology, as, for in¬ stance, the trident which is the symbol of Nep¬ tune. See Symbols, Astronomical; Symbols, Chemical; Symbols, Mathematical.

SYMBOLIC LOGIC. See Logic, Sym¬ bolic.

SYMBOLISM. The word symbol is de¬ rived indirectly from the Greek symbolon, a sign or token. Symbolism is the art and doc¬ trine of symbols ; it is the knowledge of the treatment of symbols or of deciphering the occult intent of signs or symbols and espe¬ cially in reference to things spiritual, invisible or unable to be pictured, as an idea, a quality, etc. To the Greeks the word symbolon meant signs of such clearness that the allusion and the object were practically coincident. Among the Greeks their hospitality ended in giving their guests, or exchanging with them, a memo¬ rial of the visit in the form of a wooden tab¬ let, a die or a ring, broken into two pieces. The host retained the other half, and in case of a future meeting presentation of the halved token was a sure identification, as one half fitted exactly into the fracture of the other half of the symbola. It is claimed by authori¬ ties that the origin of symbolism is traceable to the hieroglyphics or pictorial writings of the ancient Egyptians and was transmitted from them to other nations by the Jews. The Egyp¬ tians symbolized their gods with animal forms or combinations of both human and animal form ; thus Horus, the sun-god, took the form of a sparrow-hawk, the disc was the hieroglyph of the sun, hence the winged disc {Mir), de¬ rived from the Assyrians, has its clear defini¬ tion, and expressed also the victory of good over evil. The snake (uracus) was symbol of death, hence, used as an attribute of the Egyp¬ tian kings, meant power over capital punish¬ ment, just as the handled cross (ankh) seen held by gods and kings signified life. The staff (uas) was the Nile kings' symbol of author¬ ity and has retained that significance with most nations ever since. From insect life also the Egyptians obtained such important symbols as the scarab {Scarabccus sacer), the <(sacred beetle,® which they worshipped as a symbol of divinity, carving its form on finger rings con¬ taining inscriptions to be carried as an amulet. As to the mythology of the ancient Greeks and Romans it is not clear to us whether at first they looked upon their gods as symbolic of the elements of the world surrounding them ; cer¬ tain it is that they embody a very perfect sys¬ tem of the symbolism of Creation. With Ura¬ nus, god of the heavens above them, wedded to Gaea, the broad-chested earth, bringing forth Cronus, god of the harvests, and Zeus, the light of heaven, springing forth from the heaven god; with the storm-besieged mountain top of Olympus dedicated as seat of the lightning god and realm of the divine brood, poetic symbol-

ism could get no closer to the human account¬ ing of nature. Contemporary writers appear to show the acceptance of the theogony as alle¬ goric if not symbolic, and symbolism played a big role in the mysteries and in orphism. And the Neo-Platonists under Plotinus, Porphyry, Proclus and the Emperor Julian were forced by the ridicule and logic of the Christian apolo¬ gists to acknowledge that Saturn, Jupiter, Mars, Minerva and Venus were but symbols under which with other myths they represented divine attributes and manifestations. Leaders in the modern schools of learning begin to see that it is symbolism that is expressed in the mytholo¬ gies of Egypt and India as well as of Greece and Rome. But the most universally practised worship has been that of the sun-god, whose symbol, the swastika, dates back earlier than the Sanscrit, and which symbolic cross has al¬ ways been a sacred sign and known as the ((Wheeling cross® or ((wheel of the law® with Buddhists. Representing the sun, when its hands point to the right, on its westward orbit, and symbol of the earth's revolution in easterly direction when the hands point to the left (sometimes then termed suavastika), it is found as an ancient symbol all over the American continent on pottery of our prehistoric races. In a slightly varying form this swastika, known as the fylfot, appears among the ancient Celts as a favored symbol, occurring very frequently among the Scandinavian nations of early days. Variables such as the triskelion, tetraskelion, etc., are interesting but belong to the subject of symbols, not symbolism now under discussion. The Chinese live in an atmosphere of symbol¬ ism, every decoration having symbolic motifs as the chief characteristic, and even the shapes of the vases and jugs are symbolic. Scattered all over their pottery, porcelain, bronzes and enamels we find such symbols as those of lon¬ gevity: Kylin (unicorn), kwei (tortoise), ho (crane), luh (deer). Their mystic number eight (Pa) shows forth in the Pa-pao or eieht (<precious things® ; the Pa-kwa or eight mystic trigrams, the astrologers' symbols; the Pa-chi- siang or eight Buddhist symbols, etc. From the vegetable kingdom they find symbolism in the peach (tao), token of marriage and lon¬ gevity, while the latter condition is also sym¬ bolized in the gourd (hu-lu) and the fungus (chi) ; and the bamboo (chuh), pine (sung) and plum tree (mei) are symbol of three friends. With the Japanese symbolism is a large part of their life. Among such we find: A plum, bamboo, orchid and a chrysanthemum symbolize the ((four wise men® of Confucius; a pine twig, wisp of straw and a red lobster are a New Year symbol combination; a moon, snow flake and a flower in conjunction are symbols of the changing conditions of nature.

Jewish Symbolism. — Like all other Ori¬ ental peoples the Jews

practised their system of symbolism. Many symbolic rules and for¬ mulae occurred in the building of Solomon's Temple, if the result of the researches of the Freemasons can be relied on. The rending of Jeroboam's garment by the prophet Ahijah implied the separation of Israel from Judah; the rainbow presented a sign or symbol of the pact between God and the earth; the law of circumcision was a symbol of the covenant of the body. Josephus writes that the high priest's

vestments were in every detail of symbolic intent, the coat symbolizing the earth ; the upper garment, heaven ; the bells and pomegranates, thunder and lightning; the ephod, the four ele¬ ments, and the interwoven gold, the glory of God, the 12 jewels in the breastplate, the signs of the zodiac, etc. Other instances of symbolic significance are the blood of the Paschal lamb, the shearing of the hair of the Levites, washing and bathing and anointing as a ritual, the lay¬ ing on of hands, etc.

Christian Symbolism. — While the primi¬ tive Christians in the Roman Empire used a symbolic language of signs, this was not done as a matter of choice but of necessity The persecuted sect could not safely, even in the Catacombs, express themselves in their depic¬ tions on sarcophagi or chapel walls with open comment; they had to hide their epitaphs and other written or depicted statements in forms that would not draw down destruction on them. Any originally conceived system of symbolism specially created for giving expression to Chris¬ tian doctrine would have brought suspicion among the authorities as to the intent of such strange symbols. Therefore we find these early worshippers of the cross using an eagle, Roman symbol of Jupiter; they borrowed from the signs of the zodiac, from symbols appearing in the pantheistic mysteries, etc. And when they, later, used the sign of the cross it was half hidden in combination with an anchor, a symbol used by the pagans. A crude form of a fish (now called a vesicle or a mandorla) be¬ came symbol of Christ referring to a similarity of sound, ichthus the Greek word for fish, or from the fact that the letters therein would serve as the Greek initials of the words: Jesus, Christ, Son of God, Savior. The vine (attri¬ bute of Bacchus) was adopted as a symbol of Christian promise. The lamb, the palm, the Good Shepherd, would all be understood by the heathen contemporaries in a different sense than that given to these symbols by the early Chris¬ tians. Greater safety in the use of symbols was afforded the Christians from the fact that there were other persecuted sects within the Roman Empire, who, for their forbidden cults, initiated a well-developed system of symbolism for use in public communications to their fel¬ lows, a language undecipherable to the unini¬ tiated. Inscriptions of these symbolic expres¬ sions are found

cut in the vast rock temples in Egypt, in Syria, Asia Minor, Sicily, Greece, on the Rhine and in France. A method of incul¬ cating a knowledge of this sign language, to¬ gether with the cult, was carried on unbeknown by their persecutors. They formed themselves into literary societies, guilds, burial unions, schools, etc., all under license as legal corpora¬ tions, but secretly active as congregations of doctrine propaganda instead of the supposed secular gatherings. Among the systems of sym¬ bolism adopted by the early Christians were those belonging to the Pythagorean and Pla¬ tonic doctrines and the sacred number systems among them. But from 325 a.d. such usage be¬ came a state offense. Augustine made war on the symbolic language and declared it a char¬ acteristic of the Gnostics. -This latter sect, coming into existence when Christianity was first preached openly, endeavored to combine its principles with the Greek philosophy. Under

such teachers as Saturninus, Basilides and Val¬ entine a very extensive symbolic language was created in the Byzantine period and practised by these Gnostics, but the full intent of the expressions of this cult is lost to us at this day. Byzantine art discloses a considerable propor¬ tion of their symbols, such as the Abraxas, etc. As a matter of fact there is a close connection between Byzantine Christianity and Mithraism, from which much was derived, even if in changed form. And Byzantine art is built up entirely of symbolism, even to its very archi¬ tecture, and its frequent lack of beauty from an artistic point of view is caused by its occultism in form and manners. Unlike the pagans, the Christians in their practice of symbolism al¬ ways clearly distinguished the conventional signs from the divine and sacred essence they represented in their ceremonies or sacraments. In covering the catacombs with such depicted figures as fish, lamb, shepherd, grapes, foun¬ tain and hart, ship sailing safely on rough

seas; with their x Chi Rho (<(sacred mono¬ gram®), Alpha and Omega, etc., they set up no figures for idolatrous worship, but simple allegorical symbols. Leading authorities on ecclesiastical symbolism were Hugo of Saint Victor, Richard of Saint Victor, Vincent of Beauvais, Durandus, bishop of Mende, Lan¬ guedoc, Honorius of Autun, Sicardus of Cremona, etc.

Symbolism attained its apogee in the Middle Ages, when animals, colors, plants, . lines and attitudes had their hieratic significance.

Candles, symbolic of the Light of the World, found ubiquitous use in all rituals; the vest¬ ments of the clergy, besides the ritual itself, were symbolic. The Church also had its repre¬ sentation in a woman crowned and majestic, bearing the banner of victory and the chalice, while Judaism, as unbelieving, took the form of an aged woman holding a cracked staff, the tables of the law falling to earth, her eyes bandaged and her crown toppling from off her head. Art was fond of depicting the uni¬ versality of life's uncertain tenure by illustrat¬ ing, under the title of ((The Dance of Death,® a human skeleton calling, as unwelcome visitor, on king, queen and humble peasant. The books of <(Bestiaries® afford us an insight into the allegorical or mystical significance of the most grotesque mythical animal creations of those days of superstitions. They figure on the gargoyles and in the moldings of Romanesque and Gothic structures. Much of the beauty of Gothic architectural traceries is found in the disposition of the trefoil and quatrefoil, having their symbolic intent of the Trinity and the four Evangelists. And the four Evangelists themselves enter the language of symbolism either as the <(four rivers,® or Matthew being represented as an angel, Mark as a lion, Luke as a winged ox and John as an eagle. The 12 Apostles were given each their symbol for recognition in art depiction; Saint Peter bear¬ ing a key, Saint Jude a cross, Saint Matthew a wallet, Saint Thomas a spear, Saint Simon Zelotes a saw, and so on. Alchemy, from which our science of chemistry arose, was largely a science of mysticism and symbolism. It was probably derived from the Egyptians, not the Arabs as was formerly supposed, and Hermes is. after all, likely to have been the originator.

At first the view evidently was that metals in their changeable forms (reactions) had body and soul like human beings, hence lead was called Osiris and considered by the Egyptians as the soul, or <(prima materia® of all metals. Later it was supposed that quicksilver (mer¬ cury) was the soul of metals. And in the final determining the alchemists (probably through the Babylonians) used the planetary names

for the metals thus :

Planet

Symbol

Metal

Saturn .

b .

Jupiter .

. u

. Tin

Mars .

. •

Sun .

. O •

. Gold

Venus .

. 2

Mercury .

. 5 .

. Quicksilver

Moon .

D

. Silver

And from the hermetic books sprang our first knowledge of chemistry, in which the chemical contents wrap up in philosophy and religion the search for gold and the philoso¬ pher's stone. And we learn from these students that the stone was ((the world in little, micro¬ cosm, man: one, a unity; three, mercury, sul¬ phur and salt, or spirit, soul and body.® And we find the alchemists speaking of men as metals and reading such an ancient authority as Isaak Hollandus, it is difficult to differentiate be¬ tween mankind and lead (which is called Saturn), but we are told by his interpreters that he must not be understood to speak of common lead but the lead of the philosophers. Great symbolists were the Rosicrucians, if we may believe what we read

about them. From those who claim the origin and existence of the Rosicrucian fraternity as a probable existence of the past we are informed that the writings, (Fama) and ˆonfessio,* of the early 17th century in mentioning therein the gold which they alchemistically created it was ((not the gold of the multitude but it is the living gold, the gold of God.® Symbolism, therefore, pure and simple. And later the brotherhood (in Eng¬ land) under Frizius and Fludd transform the ritual into Freemasonry and its symbolism is stated in the <(Summum Bonum.® The Re¬ naissance and Reform arrested the science of symbolism.

The science of heraldry is largely one of symbolism and the numerous crosses have in past days had authorities who deciphered the symbolic intent of their variants, as well as the meaning of many other “charges .® Symbolism has been applied to a language of flowers, as well as to colors, numbers, etc. And each of these fields of application have been more or less adopted by the Christian Church in its symbolism.

The term “symbolism® is used in the tech¬ nique of psychoanalysis to define a certain brain reflex action, as in dreams, etc. In the science of psychoanalysis there are two spheres or states of the mental process; they are desig¬ nated the ((preconscious® and the “unconscious.® Much of the unconscious brain action is what the psychoanalyst terms ((archaic,® meaning what is known to the lay world primitive or animal. Symbolism in this teaching has a very broad aspect as is disclosed by such an authority as Wm. A. White in the following expression: ((For what after all is a word but

a symbol of an idea and an idea but the symbol of a thing.® ((Whether or not we see the symbolism of a given expression, for example, depends upon the closeness of analogy between the sign and the thing signified. The closer the analogy the less the symbolism and the less evident the analogy the more pronounced the symbolism.® ((Ferenczi uses the term symbol to apply only to likenesses that have one mem¬ ber of the equation repressed in the uncon¬ scious.® <(The idea symbolizes in mental imagery the thing in the outside world and the word symbolizes the idea. From this point of view our thinking takes place by the use of symbols.® In its action, we are told, the sym¬ bolism of a word may assume dynamic force (energy). In such dynamic symbol words are included flag , patriotism, etc. This medical con¬ ception and theory of symbolism is claimed to be of

assistance in indicating the true inward¬ ness of certain neuroses, as hysteria, etc.

Bibliography. — Allen, J. R., (Early Chris¬ tian Symbolism in Great Britain and Ireland before the 13th century) (London 1887) ; Auber, C., (Histoire et theorie du symbolisme religieux avant et depuis le Christianisme) (4 vols., Paris 1870-71) ; Audsley, W. J., and Audsley, G. A., (Handbook of Christian Sym¬ bolism5 (London 1865) ; Baur, F. C., (Sym- bolik und Mythologie) (Stuttgart 1824) ; Clement, C. E., (Handbook of Legendary and Mythological Art,5 15th edition (Boston 1883) ; Collins, A. H., (Symbolism of Animals and Birds Represented in English Church Archi- t'ecture> (London 1913 and New York 1914) ; Creuzer, G. F., (Symbolik und Mythologie der alten Volker, besonders Griechen) (Leipzig 1836) ; Ditchfield, P. H., (Symbolism of the Saints) (London 1910) ; Durandus, W., (The Symbolism of Churches and Church Ornament5 (Leeds 1843) ; Evans, E. P., (Animal Symbol¬ ism in Ecclesiastical Architecture ; with a bibli¬ ography 5 (New York 1896) ; Goldsmith, E. E., (Sacred Symbols in Art5 (New York 1912); Haig, E., (The Floral Symbolism of the Great Masters) (London 1913) ; Howard, M. F., (A Study in Symbolism) (London 1916) ; Inman, T., (Ancient Pagan and Modern Christian Sym¬ bolism5 (New York 1875) ; Jenner, K. L., (Christian Symbolism5 (London 1910) ; Knight, R. P., (The Symbolical Language of Ancient Art and Mythology) (New York 1876) ; Landriot, F. A. T., (Le Symbolisme5 (Paris 1891);' Menzel, W., (Christliche Symbolic (Regensburg 1854) ; Niewbarn, M. C., (Church Symbolism 5 (translation by Iˆev. J. Water- reus, London 1910) ; Portal, P. S. F. de, Baron, (Des couleurs symboliques dans l'Antiquite, le Moyen Age et les temps modernes) (Paris 1857) ; Pottenger, M. A., (Symbolism5 (Sacra¬ mento, Cal., 1905) ; Schlesinger, M., (Geschichte des Symbols5 (Berlin 1912) ; Silberer, H., (Probleme der Mystik und ihrer Symbolik5 (Vienna 1914), translation of same by Smith, E. J., (Problems of Mysticism and Symbolism5 (New York 1917) ; Tabor, E., (Saints in Art5 (New York 1908) ; Tyrwhitt, R. St. J., (Chris¬ tian Art and Symbolism5 (London 1872) ; Twining, L., (Symbols and Emblems of Early and Mediaeval Christian Art5 (London 1885) ; White, William A., (Symbolism5 (in Psycho¬ analytic Review, New York 1916).

Clement W. Coumbe.

SYMBOLISTS, the name of a group of French writers and their imitators in other countries whose school arose in the eighties and at first was supposed to indicate a reaction against Parnassianism and realism. The school or rather style was inaugurated by Philippe Auguste Mathias Villiers de LTsle-Adam (1838-89) whose play (Axel

5 remains the typ¬ ical drama of the Symbolists. The Symbolists are so called from their habit of introducing an object or being merely as an expression of an idea. Dreams, mythology, music, are their favorite subjects, which they commonly inter¬ pret in lyric verse. Form and expression count more with them than substance. Their charac¬ ters are often degenerate, their themes repul¬ sive, their wit redolent of the gutter and their notions of art rather subversive of morality than otherwise. They were frequently called Decadents, especially the earlier followers of Baudelaire. Jean Moreas (1856-1910) was at first one of the defenders of the principles of the Symbolists, defending them from the appel¬ lation of decadent and justifying their innova¬ tions as the natural development of the prosody of Baudelaire, Mallarme and Verlaine. Later he returned to the older forms of versification and to the classical tradition. Other prominent figures among the Svmbolists were Gustave Kahn, Catulle Mendes, De Regnier, the Bel¬ gians Maeterlinck and Rodenbach, the Amer¬ icans Viele-Griffin and Stuart Merrill, the Irishmen John M. Synge and William Butler Yeats and the Englishman Aubrey Beardsley, whose unwholesome pictorial productions cer¬ tainly classify him with the Symbolists. The most beneficial innovation of the Symbolists lay in their attempts to break away from the for¬ mality and stiffness of French versification in their attempts at rhymed prose or vers brises. They abandoned rhyme and the fixed tradi¬ tional forms and reveled in assonance, repeti¬ tion and generally attempted to make their lines the visible counterpart of their themes. (See French Literature). Consult Barre, Andre, (Le Symbolisme5 (Paris 1911); Gourmont, Remy de, (Le livre des masques: portraits sym- bolistes, gloses. et documents sur les ecrivains d'hier et d'aujourd'hui5 (2 vols., ib. 1914) ; Kahn, Gustave, (Symbolistes et decadents5 (ib. 1902) ; Pellissier, G., (Etudes de litterature con- temporaine5 (ib. 1898) ; Symons, Arthur, (The Symbolist Movement in Literature5 (London

1899).

SYMBOLS, Astronomical, signs or sym¬ bols some of them very ancient, which conven¬ iently represent astronomical objects, phases of the moon, etc., and astronomical terms. They are :

SYMBOLS OF THE HEAVENLY BODIES.

Sun .

. O

Juno .

. *

Mercury .

. »

Vesta . . . .

. 4

Venus . . .

. 2

Jupiter ....

. if

Earth ....

$ or ©

Saturn . . . .

. i?

Moon .

. C

Uranus . . .

•••$ " JJC

Mars _

Neptune _ .

AAA

.... ^

Ceres .

. 2

Comet . . . .

Pallas . . . .

Star .

»

.

. ˆ

The asteroids, except the four given here, are represented by a circle with a number, thus, , designates Angelina, the sixty- fourth as¬ teroid, in order of discovery.

Lunar phases.

Moon in conjunction, or new.

Moon in eastern quadrature, or -first quarter. O Moon in opposition, or full.

(£ Moon in western quadrature, or last quarter.

SIGNS OF THE ZODIAC.

Aries .

...r

Libra .

-/■N.

Taurus .

Scorpio .

."1

Gemini . .

...h

Sagittarius .

... f

Cancer .

...25

Capricornus .

...V?

Leo . .

...ft

Aquarius .

AW

Virgo . .

Pisces .

... *

PLANETARY

POSITIONS.

Ascending node. .

... Q

Eastern Quadrature E D

Descending node . . .

... 8

West. Quadrature

W □

Conjunction .

... rf

Trine .

... A

Sextile . .

Opposition .

... 8

Quadrature . □

ASTRONOMICAL CONTRACTIONS.

Right ascension, R.A. Al, or a-

Declination, Dec. or 6.

North polar distance, N.P.D.

SYMBOLS, Chemical, letters or symbols used in chemistry to designate the various chemical elements. They are merely the first letters of the names of these elements (not in every case of their English name) ; or when the names of two or more elements begin with the same letter, two letters are used as the symbol, one of which is always the first letter of the name of the element. Generally speak¬ ing the letters comprising the symbol are taken from the English name of the element; but in some instances, specially in the cases of metals which have been long known, the symbols are derived from the Latin names: thus we have Hg, symbol for mercury, from the Latin Hydrargyrum; Fe, from the Latin Ferrum, for iron ; and so on. In a few cases the symbols are deduced from the old German names : thus K. the symbol for potassium, is the first letter of the old German word Kalium. and Na, the symbol for sodium, is from the German Natrium. However derived, whether from English, German, Latin or French, the symbols of the chemical elements are universally the same. For a considerable time French chemists employed the symbol Az to represent nitrogen, from the name Azote, which was given to this element in reference to the fact that it alone could not support life (Greek, a, privative, and zoe, life) ; but this symbol is now almost en¬ tirely superseded by the letter N. The symbols of chemical compounds are constructed by plac¬ ing together the symbols of their constituent elements, a number being attached to each

signifying how many atoms of the element enter into the composition of the amount of the compound expressed by the entire symbol. For it must be understood that chemical symbols have a quantitative as well as a qualitative meaning. When a chemist meets in a chemical treatise

with the symbol O he knows that this signifies not only oxygen but a certain definite amount by weight of oxygen, O always means 16 parts by weight of oxygen, so Fe means 56 parts by weight of iron; and so also the com¬ pound symbol FezOz means (56 X 2) + (16 X 3) — 160 parts by weight of oxide of iron. For a further account of the uses and modes of formation of chemical symbols see the article Chemistry.

SYMBOLS, Mathematical, signs or ab¬ breviations used in mathematical operations for the sake of brevity and to facilitate expression. In arithmetic and algebra there are four general kinds of symbols used ; namely, those of quan¬ tity, operation, relation and abbreviation. Quantities are generally represented by letters. Known quantities are represented by the lead¬ ing letters of the alphabet, or by the final letters with one or more accents, thus : x' , x"\ y", etc. Unknown quantities are represented by the final letters of the alphabet, as x, y, z, etc. Besides the English letters, those of the Greek alpha¬ bet are often made use of. Certain letters have come to represent certain quantities. Thus, rc generally stands for the ratio of the diameter to the circumference of circle, or the number 3.1416; e denotes the base of the Naperian sys¬ tem of logarithms, or the number 2.718281828; M denotes the modulus of any system of loga¬ rithms. The symbol °° denotes an infinitely great quantity.

Of the symbols of operation the sign -}-, plus , when written between two quantities, signifies that the second is to be added to the first ; as, a + b. The sign — , minus, when placed between two quantities, denotes that the one on the right is to be subtracted from the one on the left; as, a — b. The sign X, when placed between two quantities, denotes that the one on the left is to be multiplied by the. one on the right; as, a X b. Multiplication may be indicated by placing a point between the factors when they are both expressed by letters ; as, a. b. This method is not applicable when the factors are numbers, because, in that case the indicated product would be confounded with a mixed decimal fraction ; thus, 5.6, instead of being read, product of 5 by 6, would be read 5 and 6-tenths. There are cases, however, where the sign is used between numerical factors, as in series where the factors follow a law which it is desirable to keep before the eye: thus the general term of the binomial formula is

m -(m — 1)*(m — 2) . . . (m — n -f- 1)

1

n

an x™ — n

The sign placed between two quantities, in¬ dicates that the one on the left is to be divided by the one on the right; as, a -r- b. Division may also be indicated by writing the quantities

in place of the points; as, , or a: b, or a/b,

a\b . . . . x — ■»= — . The sign ~ denotes -J— xn

the difference between two quantities, without

implying which is to be subtracted from the

other; as, a ~ b. The sign V is called the radical or evolution sign, and when placed over a quantity indicates that its root is to be taken;

as, \/a : the degree of the root is indicated by a number written over the sign, which is called

the index of the root or radical; thus etc. The sign \/ indicates the square root. A

vinculum — , bar j, brackets [], { } , paren¬

thesis (), etc., indicate that the quantities en¬ closed by them are to be regarded together; as,

(a+&) xt ax, etc. The symbol 2 denotes that --b

the algebraic sum of several quantities of the same nature as that to which the symbol is pre¬ fixed is to be taken, thus,

q _ J_

n{n + p) p

is a formula, in which p being constant and q and n arbitrary, signifies that of the algebraic sum of any number of terms deduced by at¬ tributing values to q and n is equal to — multi-

plied by the difference of the algebraic sum of the terms, which are deduced by attributing the

same values to q and n in the expressions —

n

X

2 (9\ 2

(q)]

w

\n + pj J

and

Of the symbols of relation f, F, <p,

n -T p ‘

written before any quantity, or quantities, sepa¬ rated by commas, as F(x), f(x, y), (x , y, z), etc., denotes quantities depending upon the quantity or quantities within the parenthesis, without designating the nature of the relation. The sign of equality, =, between two quan¬ tities, denotes that those quantities are equal to each other. The sign of inequality, >, placed between two quantities, denotes that the one placed at the opening of the sign is greater than the one placed at the vertex of the sign; thus, a > b, a is greater than b, but a < b, is read: a is less than b; also, a b, a is not greater than b ; a <£ b, a is not less than b. The sign =f= is a negation of equality; as, a 4= b, a is not equal to b. The signs of proportion :, : :, :, placed between quantities, taken two and two, show that the quantities are in proportion; thus, a : b : : c : d, is read, a is to b as c is to d. The first' and third signs are signs of ratio, and the second the sign of equality, so that the above might be written

b d

a c *

Of the symbols of abbreviation the sign . * . stands for therefore or hence and *. • stands for since, or because. Other algebraic and mathematical symbols are % for per cent or °/oo per thousand; J the symbol of .integra¬ tion; the Decimal, as in 5.6 (America), 5-6 (Great

Britain), 5,6 (Continental Europe), meaning 5 and 6-tenths ; identity — .

Geometry borrows most of its symbols from those of algebra just explained. Magnitudes are represented pictorially; the symbols /, < < are pictorial representations of angle, angles. || means parallel to ; perpendicular to; A* A > represent pictorially the terms triangle and

triangles respectively; while 0, ®, represent circle, circles; 0, square , squares; 1 = 3 ,

rectangle, rectangles ; and EJ » /EJ-, rep¬ resent parallelogram and parallelograms. Arc is represented by the symbol ˆ and a designates radians ; ~ means congruent to and ~

similar to. See Notation and consult Cantor, M. B., (Vorlesungen iiber Geschichte Mathe¬ matic (Leipzig 1910) ; (Vorschlage zur Verein- heitlichtung der Mathematischen in Schilunter- richt,* in (Schiften des deutschen Ausschusses fur den mathematischen und naturwissenchaft- lichen UnterrichP (ib. 1913). This contains an extended list of symbols.

SYME, sim, James, Scottish surgeon: b. Edinburgh, 7 Nov. 1799; d. 26 June 1870. He was educated at the university of his native city, and studied anatomy under Barclay and Liston, visiting also Paris and Germany. In 1829 he opened Min to House Hospital, which he carried on for four years with great success as a surgical charity and school of clinical in¬ struction; and in 1833 was appointed professor of clinical surgery in Edinburgh University. In 1847, on Liston's death, he accepted the same professorship in University College, London; he soon, however, returned to his former chair in Edinburgh, and continued to hold it till his death. Among his numerous writings are a (Treatise on the Excision of Diseased Joints *; Principles of Surgery* ; (Diseases of the Rec¬ tum } *(1838) ; Pathology and Practice of Surgery* (1848) ; (Stricture of the Urethra > (1849). Consult Paterson, R., (Memorials of the Life of James Syme) (Edinburgh 1874).

SYMEONIS ("Simmons®), Henry, the

hero of the most persistent and unique feud in history: Oxford University having for nearly 600 years (till 1827) required every candidate for the baccalaureate to swear war, not even against Symeonis' posterity, but against allow¬ ing himself, centuries dead, to be "reconciled.® The only explanation hitherto given in a cyclo¬ paedia is an incredibly silly guess of Brian Twyne in 1608, that

Symeon had feigned bac- calaureacy before attaining it. Such a trifle would never have gibbeted him for the ages. In fact, the cause was precisely his not being a student at all. He was a wealthy citizen of Oxford, who about 1242, in the first historic “town and gown row,® killed a student and fled into exile from the vengeance of the others. Against their protest Henry III al¬ lowed him to compound for £80 (some $5,000 now) and return to stand trial. The university seems to have fought this off for nearly 20 years ; and when overborne in 1264, they made this at least one grievance for most of them removing to Northhampton. Simon de Mont- fort on mastering the king in that year re¬ called them ; presumably, therefore, Symeonis' permit was rescinded. At all events, the uni¬ versity exacted an oath from all degree men thereafter not to consent to his “reconciliation® — that is, peaceable residence in their town. It was retained after his death in terrorem, as a warning to all who might molest Oxford students; and at last mummied as part of a set of historic victories not to be canceled, though this one was long forgotten.

SYMINGTON, William, British engineer and inventor: b. Leadhills, Scotland, 1763; d. London, 22 March 1831. He was educated at the universities of Edinburgh and Glasgow, studying for the ministry, but abandoned that profession to become a civil engineer. In 1787 he took out a patent for an improved form of steam-engine, and in 1802, after years of futile attempts, he succeeded in propelling the tug¬ boat Charlotte Dundas by means of steam- engines with which he had fitted her. He gained the patronage of the Duke of Bridge- water, but the death of the duke in 1803 left him without the financial aid necessary to the promotion of his venture, and being unable to gain it elsewhere, he drifted from place to place, finally dying in poverty.

SYMMACHUS, Pope (498-514) ; b. Car- dinia (?) ; d. Rome, 19 July 514. He was baptized at Rome, entered the ranks of the clergy and was ordained deacon. He was elected and’ consecrated Pope 22 Nov. 498, suc¬ ceeding Pope Anastasius II. However, a minority of the Church, of Byzantine learnings, met on the same day and elected the Roman archpresbyter Laurentius as Pope, and a bitter dispute ensued. The matter was carried to Theodoric, the Gothic ruler of Italy, who de¬ cided in favor of Symmachus as having been elected first and by a majority. The Byzantian party, persisted in its efforts to seat Laurentius, established him in Rome and gained control of seven churches. It brought various charges against Symmachus, but after

many sittings and much controversy the Synod reached the momentous decision that the Pope is above temporal authority. In 505 or 506 Theodoric ordered Laurentius to surrender the churches held by him and his followers and the dispute came to an end. The remainder of Sym¬ machus' reign was uneventful, except in the way of quiet progress. He formulated rules for the sale of Church property which were of great benefit to the Church ; and his name is connected with the building or decoration of various churches in Rome.

SYMMACHUS, sim'a-kus, Quintus Aure¬ lius, Roman statesman of the 4th century. He was educated in Gaul ; and after serving as quaestor and praetor became corrector of Lucania and Brutii (365) and proconsul of Africa (373) and member of the pontifical college. His petition to Gratian, urged on the Senate's be¬ half, for the restoration of the altar of Vic¬ tory, proved unavailing (382), as did the ex¬ tant letter addressed by him when praefect of the city (384) to Valentinian. The failure led him to side with the pretender Maximus (387), and for so doing he was impeached of treason, but pardoned and raised to the consulship (391). There remains of his works 10 books of letters and fragments of orations. These are contained in Seeck, (Monumenta Germanise Historica : Auctores AntiquiesinP (Vol. VI, Berlin 1883). Consult Dill, S., Toman So- ciety) (London 1899) ; Dimsdale, M. S., his¬ tory of Latin Literature> (New York 1915).

SYMMES , simz, John Cleves, American soldier and author : b. Sussex County, N. J., about 1780; d. 1829. In 1802 he entered the United States army as ensign and served through the War of 1812, reaching the rank of

captain in 1813. At Niagara and the Fort Erie sortie he won distinction. After the war he lived at Newport, Ky., and passed his time in propounding his own planetary theory, which comprised the belief that planetary bodies, in¬ cluding the earth, consist of hollow concentric spheres open at their poles. The inside of the earth he believed to be inhabited, and he imag¬ ined an aperture (known since as <(Symmes' Llole^) in the earth's crqst, near latitude 82° N., communicating with the interior of the planet, where he fancied plant and animal life to exist, and which he described as being lighted with two subterranean suns, Pluto and Proserpine. Humboldt stated that he and Davy had repeatedly been invited by Symmes to descend through this hole to the earth's interior. In 1822 and in 1823 Symmes peti¬ tioned Congress for an expedition to test his theory. Jules Verne is said to have made this idea the basis for his story, (A Journey to the Centre of the Earth. } Symmes advocated his views in lectures and pamphlets, and in a work entitled (Theory of Concentric Spheres)

(1826). Consult Atlantic Monthly (April 1873, (Symmes' Theory of the Earth5).

SYMMES' HOLE. See Symmes, John Cleves.

SYMMETRY. From the Latin symmetria; proportion, symmetry; which, in turn was de¬ rived from the Greek symmetria, meaning agreement in dimensions, proportionate. In its present-day intent the word symmetry in the language of the laity can be defined as har¬ mony or balance in the proportions of parts as to the whole.

Geometry.— Two points are said to be symmetrical with respect to a straight line, when the straight line bisects at right angles the straight line joining the two points. Thus in Fig. 1 the two points P and P' are symmet¬ rical with respect to the line M N, if M N bisects P P' at right angles. In such a case the line M N is termed the axis of symmetry. Two figures are said to be symmetrical with respect to an axis when every point in one figure has its symmetrical point in the other. Thus in Fig. 2 the figures A B C, A' B' C

!P

• /

\P

Fig. 1. Fig. 2.

are symmetrical with respect to the axis M AT, if every point in the figure ABC has a sym¬ metrical point in A' B' C' with respect to the median line M N. When figures are sym¬ metrical with respect to an axis, by revolving either about the axis and superimposing one over the other, they will be found equal and similar. Two points are said to be symmetri¬ cal to a third point, when this third point bi¬ sects the straight line joining the two points. Thus in Fig. 3, P and P' are symmetrical with respect to A, if the straight line P P' is bi¬ sected at A. And the point A is called the

centre of symmetry. Two figures are said to be symmetrical with respect to a centre, when as in Fig. 4, the triangles A B C, A' B' C' are

Fig. 3. Fig. 4.

symmetrical to the centre 0, and every point in the triangle ABC has a symmetrical point in A' B' C . A figure is symmetrical with re¬ spect to an axis when it can be divided by that axis into two figures symmetrical with respect to the axis. And a figure is said to be sym¬ metrical with respect to a centre when every straight line drawn through that centre cuts the figure in twrO points symmetrical with re¬ spect to this centre. In solid geometry when two planes intersect they are said to form a diedral angle. When three or more .planes meet in a common point, they are said to form a polycdral angle at that point. Two polyedral angles are symmetrical, when the face and diedral angles of one are equal to the face and diedral angles of the other each to each, but arranged in reverse order. As example the triedral angles S A B C and S' A' B' C' (in Fig 5) are symmetrical when the face-angles

AS B, BSC, C S A are equal respectively to the face angles A' S' B,' B' S' C/ C' S' A' and the diedral angles S A, S B, S C to the diedral angles S' A / S' B/ S' C!

Symmetrical spherical triangles are those in which the sides and angles of the one are equal respectively to the sides and angles of the other, but arranged in the reverse order. Thus the spherical triangles ABC and A' B' C' (Fig. 6) are symmetrical when the vertices of

A

Fig. 6. Fig. 7.

the (One are at the ends of the diameters from the vertices of the other (antipodal). Two symmetrical triangles are mutually equilateral

and equiangular; yet in general they cannot be made to coincide.

In algebra ((a function of several quantities which is not changed when any two of the quantities are interchanged, such as 2a, a2, is called a symmetric function of the quantities. Such a function of the roots of the equation has been designated by enclosing the exponents in brackets, expressing the repetition of a num¬ ber by an exponent: thus 2a3(a32a23aia 5 — <*6 is written [322 TJ. In particular, a symmetric function of the form [K] = aki + ak2-- .... aˆn is called an elementary function® (Decker).

Physiology. — In the science of biology ani¬ mals are distinguished as Radially symmetri¬ cal ; bilaterally symmetrical ; serially symmet¬ rical ; assymmetrical. This is a division ac¬ cording to their structure internally and ex¬ ternally. In a radially symmetrical animal such as a

jelly-fish, the body can be halved by a number of vertical planes — it is symmetrical around the median vertical axis. In other words it is of the same conformation all round possessing neither right or left side. In a bilat¬ erally symmetrical body, such as that of the human, it is possible to equally divide the body in halves through one plane only. In some animals the body is marked off in transverse grooves creating a series of similar parts like the joints of the human finger or of the bam¬ boo. This is a process termed in biology meta¬ merism or serial symmetry, closely associated with the worm family. Biologists teach the theory that the evolution of these different sym¬ metrical functions are in accordance with the proportionate inertia or energy inherent in the different animals. Thus in the simple sponges, Ccelentera (see Sea-anemones; Jellyfish), and in the Echinoderms (sea-urchins, etc.), we find radial symmetry, also it is characteristic of the very common embryonic stage known as the gastrula (an oval or thimble-shaped sac which constitutes two layers of cells). Thus radial symmetry belongs to the sedentary ani¬ mal life, the life without motive energy, often floating and drifting. Whereas the animals of bilateral symmetry have the advantages of mo¬ bile activity in the search for food, as well as power of escape from their enemies by ener¬ getic motion in definite directions. In plant life we also find symmetrical qualities in the organism but only rarely in the strict sense as in animal life. It approaches the true condi¬ tion most nearly in many flowers, leaves and stems with decussating whorls. Two, three, four or a large number of symmetrically di¬ viding planes often pass through one mem¬ ber, as a shoot or root, all of which intersect in the axis of growth. These members are termed polysymmetrical. The characteristic is found in the so-called <(regular flowers,® in stems with alternating whorls and in most roots. Ferns, etc., can be divided bilaterally, showing a repetition of similar parts on either side, but the symmetry is not exact.

Mineralogy. — One of the most important branches of the science of mineralogy is crys¬ tallography which deals with the angular con¬ struction of crystals. The faces or outer sur¬ faces of crystals are arranged according to certain laws of symmetry and, based on these natural laws of symmetry, crystals are divided into groups and systems. As in geometry, the

relationships of the planes to one another are brought under thfe heads of the plane of sym¬ metry; the axis of symmetry and the centre

of symmetry. All may be combined in the same crystal, some have neither characteristic. Study of the Conditions has brought the con¬ clusion that there are 32 natural groups among crystals based upon their symmetry. As to planes of symmetry in crystals, these occur when for each face, edge or solid angle there is another similar face, edge or angle which has a like position with reference to this plane. Thus in a crystal of amphibole it is symmetrical with reference to a central plane of symmetry and, in ideal cases, it is called the right symmetry, having for every point on one side <of the plane of symmetry its corresponding point at equal distance on the other side. Each half is a mirror image of the other half. In some crys¬ tals may be found as many as nine planes of symmetry, three of one set and six of another; this is exhibited in the cube. As to axes of symmetry, these occur in crystals when, as in geometry, a solid can be revolved through a certain number of degrees about some line as an axis and, as a result, it again occupies pre¬ cisely the same position in space as at first. There are four different kinds of axes of sym¬ metry in crystals, each defined according to the degrees in angular revolution needed, in other words according to the number of times the crystal repeats itself in a complete revolu¬ tion of 360°. Thus the axes are binary, trigo¬ nal, tetragonal, etc. As to the centre of sym¬ metry, most crystals have besides planes and axes of symmetry or without either, a sym¬ metry with reference to a point, its centre, as in the triclinic crystal in which every face, edge and solid angle in one half has a face, edge and solid angle in the other half. In such crystal form the geometrical conditions are termed compound symmetry with reference to an axis of binary symmetry and a plane normal to it, if the crystal is calculated as divided into two similar halves by a plane parallel to any one of its faces and one half be revolved 180° about an axis normal to this face. Crystals are said to exhibit pseudo-sym¬ metry when their angles apparently ap¬ proximate in symmetry to the requirements of a system higher in symmetry than that to which in fact they belong. The micas show this tend¬ ency, being truly monoclinic in crystallization yet in angle appearing, at times, rhombohedral or orthorhombic. Grouping crystals according to their symmetrical forms crystallography creates the following divisions: Isometric system; te¬ tragonal system, hexagonal system, ortho¬ rhombic system, monoclinic system and triclinic system. See Crystallography.

Symmetry in Art. — In this subject, as in all art matters, we have to go back to the clas¬ sic Greeks, from whom, as we have seen, the word symmetry itself is derived. And in art circles for numerous generations the term has been the subject of much controversy, hence, according

to the evidence introduced and the strength of the theory advanced, the intent of the word among art experts has changed from period to period. As Viollet-le-Duc says, it used to mean <(precise relation between the measurements, harmony, moderated relations, calculated, in view of resulting satisfaction for

the mind and eyes. . . . Symmetry to-day

says, in the language of architects, not a ponderation, harmonious relations of the parts of a whole, but a similitude of the opposed parts, the exact reproduction on the right side ˚f an axis of that on the left.® The Roman architect Vitruvius (1st century a.d.) wrote: ((As to symmetry it is a proper accord of the members, of works among one another, and of separated parts, the relation of each of the parts with the whole, . . ,® Vitruvius de¬

fines the Greek symmetros as <(qualitas eury- thmiae.® But eurythmy means harmony, just proportion, more precisely “correct rhythm.® This is the Greek sense of the word symmetria, but the great superiority of Greek over all other art has been claimed to be the artists’ subjection to symmetry through the modulus used as a yard-stick. No doubt, both in their architecture and sculpture, the Greeks had a system, for comparative measurements abso¬ lutely prove this, but, as Viollet-le-Duc claims, the Greeks had no idea of symmetry as ((a kind of decalcomania or counterpart® ; theirs was altogether a different idea. It was <(a harmony of measures, and not a similitude or repetition of parts.® Their symmetry was “a relation be¬ tween established measurements and adopted rhythm.® In architecture of great public edifices in which the Greek classic orders figure there is generally a centre of symmetry found, as in a bisection from the apex of the pediment of the temple forms, or an axis of symmetry revolvable around the centre of the boss above the roof of the choragic monument of Lysikrates, . etc. The decorative features must, therefore, in harmony follow the similar re¬ stricted spaces framed in the right and left ends by the angles of the pediment, by opposed re¬ cumbent figures or other triangular designs. But these Attic artists and sculptors showed a freedom from mathematical preciseness that pleases and rests the eye while leaving an ap¬ pearance of the closest exactitude to measure. Treated from the aesthetic viewpoint, symmetry of geometric accuracy in art palls on the senses and, with our modern love of freedom . and revulsion against restrictions, we find the periods in art fluctuating from the stern- lines of classic masters and taking flights into fantas¬ tic opposed methods as in the case of the- rococo style or the baroque orgy of unfettered freedom and degraded license and symmetry thrown to the winds. Symmetry is

imposed on the de¬ signer of wall papers; landscapes (at times), and gardens to this day show tendencies to symmetry imitative of Dutch method of treat¬ ment of past days. And in interior decorative and furniture arrangement we find the idea of symmetry prevalent, chairs and other seats as well as mantle ornaments being in sets. Lbvers of untrammeled art look to the Far East, and especially Japan, for the breach from symmetry in art. There we find symmetrical arrange¬ ment, outside of that necessitated in archi¬ tecture, altogether absent. In the realm of Occidental painting we find the great masters freely grouping their personages in genre work, though in religious work the main figure (we had almost said the central figure) is lia¬ ble to appear in the rather exact middle point, and the surrounding figures are apt to be divided about equally on either side, giving

symmetrical balance, probably a habit formed through the many years in which such depic¬ tion was arranged to cover spaces in churches. To sum up, symmetry would seem to have a dubious place in art, outside of architecture, according to recent ideas. The asymmetric art methods of the Japanese have produced a powerful reaction in our Western aesthetic tastes and the severities of geometric propor¬ tion in art design have lost their hold on the minds of this century's artists and patrons. The conception that symmetric balance smacks of patterns quite popularly prevails and recent schools are revolutionary in accord with the times.

Clement W. Coumbe.

SYMONDS, sim'ondz or sl'mondz, E. M. (George Paston), English novelist. She has published (A Modern Amazon' (1894) ; (A Study in Prejudices) (1895) ; <The Career of Candida' (1896); (A Fair Deceived (1897); (A Writer of Books) (1898) ; (1902) ; Sidelights on the Georgian Period) (1902) ; (George Romney' (1903); (The Pharisee's Wife' (play, 1904); (R. R. Haydon and his friends' (1905) ; (Clothes and the Woman' (play, 1907) ; <Lady Mary Wortley Montagu and Her Times' (1909); (The Pope: His Life and Times' (1909); (The Naked Truths' (play, 1910); (Nobody's Daughter' (play, 1910).

SYMONDS, John Addington, English author and critic: b. Bristol, 5 Oct. 1840; d. Rome, 19 April 1893. Graduated from Balliol College, Oxford, in 1860, he was elected Fellow of Magdalen in 1862,

undertook but abandoned legal studies, and entered literature as a pro¬ fession. For many years he was compelled by ill-health to reside at Davos-Platz, canton of the Grisons, Switzerland. His studies were largely concerned with the Renaissance and the representative personages of that period. His chief work is the Renaissance in Italy' (1875- 86), a historical narrative with mingled criticism. Its scholarship is very accurate and compre¬ hensive, and its insight into the spirit of the time and movement is notably acute. If it fail in well-roundedness and system some excuse may be found in the complexity of the subject and some reparation in the brilliancy of indi¬ vidual passages. Other volumes in this general field are (An Introduction to the Study of Dante' (1872); (Shakespere's Predecessors in the English Drama' (1884), an excellent con¬ tribution to the history of English literature: lives of Sidney (1887) and Jonson (1887) in the (English Men of Letters' series; of Michel¬ angelo (1893) and Boccaccio (1895) ; and Eng¬ lish renderings of the (Sonnets of Michelangelo and Campanella' (1878) and the Autobiog¬ raphy of Benvenuto Cellini' (1888). Others of Symonds' works are (Studies of the Greek Poets' (1873-76), designed for the popular reader and approaching Hellenic literature through the individuality of the authors;

(Sketches in Italy and Greece' (1874) ;

(Sketches and Studies in Italy' (1879) ; (Es- says, Speculative and Suggestive' (1890); (In the Key of Blue,' essays (1893) ; (Walt Whit¬ man' (1893) ; and three books of verse, (Many Moods' (1878) ; (New and Old' (1880), and (Vagabunduli Libellus,' a collection of sonnets (1885). Symonds' critical work is marked by

a finished style and a distinctive note of lib¬ eral culture. Consult the (Life' prepared from correspondence by H. F. Brown (1895) ; Her¬ bert Warren in Miles' (Poets and Poetry of the Century'; Brooks, V., (J. A. Symonds: A Biographical Study' (New York 1914).

SYMONS, sim'onz, Arthur, English poet and critic: b. Milford Haven, Wales, 28 Feb. 1865. He has written introduction to the Study of Browning' (1886) ; Rays and Nights' (1888); (Silhouettes' (1892); (London Nights' (1895); (Studies in Two Literatures' (1897); (The Symbolist Movement in Literature' (1899) ; (Collected Poems' 0901) ; (Cities of Italy' (1907) ; (The Romantic Movement in English Poetry' (1909); (Knave of Hearts' (1913) ; (Figures of Several Centuries' (1915) ; (Tragedies' (1916) ; ˆTristan and Iseult' (1917). He has edited the essays of Leigh Hunt, the plays of Shakespeare, etc.

SYMONS, George Gardner, American artist : b. Chicago, 1865. He

received early training at the Art Institute, Chicago, and at Paris, Munich and London. His work was awarded numerous medals and prizes, and he was elected National Academician in 1914. He is represented by (The Opalescent River' in the Metropolitan Museum, New York City, ˆSor¬ row' in the Cincinnati Museum, (Snow Clouds' in the Corcoran Gallery, Washington, and (The Winter Sun' in the Art Institute, Chicago.

SYMPATHETIC STRIKE. See Strikes and Lockouts.

SYMPATHY, is in itself feeling felt, and became possible only after human reason began its operations. As feeling, its discussion be¬ longs to psychology; as a sociogenetic power, its consideration is sociological; as a ((motive principle of judgment" (Hoff ding), it is the concern of the moralist. In any article such as this, it is almost unavoidable to discuss the subject, without at one and the same time in¬ volving all three approaches to the considera¬ tion of the meaning of sympathy; and here no attempt will be made to avoid such a union. As feeling, sympathy is a secondary, it is a repre¬ sentative pain. It is an echo in one's self of the pains of others. Hedonism of all forms misconceives the relation that obtains between pleasure and pain as being analogous with that which obtains between heat and cold; and in¬ deed in some respects pain and pleasure are counter-parts. But they are not like heat and cold in so far as the one is not the same as the other, differing only in degree. There obtains here a difference which is one of a kind, not merely of degree.

That sympathetic pain depends for its pos¬ sibility upon the human rational powers admits of no doubt. For the syllogism of sympathy is this: (a) A given influence produces pain or pleasure in me. (b) You are like me. (c) Therefore, the same influence will produce pain or pleasure in you. True, this reasoning in and of itself, is feelingless. But to constitute a motive to activity, such as sympathy developed into altruism may exhibit, there must be first developed a reflex responsiveness, such that previously experienced sensations of pain or of pleasure caused by one influence shall be re¬ membered and revived, shall be repeated as part of a series of sensations that are caused by the influence itself.

It might be an idle speculation to attempt to ascertain the very earliest form of sympathy. However, one may feel certain that it is the reverse

of Herbert Spencer's idea which is that sympathy grew , out of ((love of the helpless.® It is, however, quite probable that ulove of the helpless® was one of the earliest manifestations of sympathy, just as light sometimes is evidence of electricity. Perhaps sympathy was first felt in the heart of woman as mother with her strong motive love for her offspring, which natural love, though in itself an entirely differ¬ ent faculty, early enough blended with or helped to create a derivative reason-born sym¬ pathy. Altruism differs from sympathy in another way. Sympathy is not necessarily a desire. It is simply a feeling, even though a feeling depending on the rational process, for its existence. True: it naturally enough sug¬ gests action. But being a pain, like other pains that are not desires J it naturally but not neces¬ sarily gives rise to a desire to act in such a way as to cause relief from pain. As such it is the concern of the sociologist. And as said before, it involves an intellectual operation, a knowl¬ edge of how one should act to attain an end. Altruism is complex, it is sympathy to which is added desire for activity. It is not only painful feeling, it is also motive. David Hume treated ,the passions as an essential part of (<human nature,® making much of sympathy, as was likewise done both by Ferguson and Adam Smith, later by Bentham, and in more recent times by Professor Hoffding, each from his own special point of view. Not a few ethical students conceive of sympathy as the parent of most all the moral sentiments ; and sympathy is then in turn derived from love of kindred. Sympathy has it seems its seat in the general emotional tracts, in the great sympathetic plexuses, of which there are so many, and of such very wide distribution in the human sys¬ tem. It is, however, as yet impossible to locate these plexuses, and assign to . them particular sentiments — a localization which of course assumes the hypothesis that the system has attained a sufficient degree of specialization to localize sentiment at all. Altruism, in so far as it is not purely biological, is without doubt rooted in sympathy. This latter, as has often been noted, is not seldom conceived, in its turn as the bases of all morality excepting race morality. One may well believe that with¬ out sympathy all moral reform would be im¬ possible. Just as (<Love of the helpless® can only be experienced by a highly rational being, so its root (not its blossom) , which is sympathy, is a product of a high rational power of intel¬ lectual activity capable not only of representing to self the painful states of others, but also of experiencing the reflex of such representations in one's self as a form ot pain. For it requires a power of putting one's self in the situation of another, to represent to one's self the pains of others. When once such power is acquired, it causes a reflex of the represented pain to self and this reflected pain felt by one representing it becomes more and more sharp and unendur¬ able as the representation becomes more vivid,

and as the general organization of a human being becomes more delicate and more refined. Such high degree of differentiation was, one may be sure, far from being attained at an early stage of human development, a fact, which, it may be

mentioned, explains such vicious and abnormal institutions as the savage subjection of women. Civilization has been, and may indeed be, measured by the capacity of men for suffering representative pain or sympathy and by their efforts to relieve it. For in the merely animal kingdom it may be suspected that there is scarcely any, if there is any, sympathy with suffering at all. And yet as the fine painting by Landseer of a (<Sick Monkey® illustrates, one may well hesitate to pronounce that feel¬ ings of sympathy are entirely alien to the animal world.

SYMPHONY, an elaborate musical com¬ position for a full orchestra, consisting usually, like the sonata, of three or four contrasted yet inwardly related movements, as an andante fol¬ lowed by an allegro, another andante varied or an adagio, a minuet with its trio or a scherzo, the whole composition closing with a lively rondo or rapid finale. The symphony, which may be regarded as the highest, kind of musical composition, was unknown in its present form before the time of Haydn, who with Mozart,- Mendelssohn and Beethoven are the most suc¬ cessful composers of this class of compositions. The nine symphonies of the latter are generally recognized as being the noblest works of their kind. The term symphony is also frequently applied to short introductory or closing instru¬ mental passages in compositions which are pre¬ dominantly vocal. See Music; Orchestra.

SYMPIESOMETER, a kind of barometer in which the weight of the air is indicated by the compression of gas in a tube, the lower part of the tube being filled with some oily fluid and the gas occupying the upper portion.

SYMPOSIUM, The. In the (Symposium* Plato tells the story (in the main fictitious, no doubt) of a banquet given by Agathon in cele¬ bration of a tragic victory on the stage. In¬ stead of the usual diversions over their cups the guests propose to entertain themselves with successive encomiums of Eros, the god of love; and of these speeches is formed the bulk of the dialogue. The most notable of the ear¬ lier discourses is that put into the mouth of Aristophanes, the comedian, in which occurs the humorous myth (not without deep significance) of the creation of man as a rounded whole, with four arms, four legs, etc., and of his. slic¬ ing afterward by Zeus into two half-beings, male and female, who are driven by love to endeavor to

reunite themselves once again into a perfect whole. When called upon last, Soc¬ rates, with his customary irony, protests his ignorance, but consents to regale the company with a tale he pretends to have heard from a certain wise woman of Mantinea. According to this prophetess, Eros is the offspring of the god Poros (((Plenty®) and the mortal Penia («Poverty®) ; he is thus not properly a god, but a mighty daemon, or intermediary being, whose office it is to form a link between the eternal bounty of heaven and the conscious imperfec¬ tion of mankind. Love, the allegory would say, is not the happiness of possession — for such happiness belongs only to the gods — but the unsatiated longing to possess. By its creative power it is man's substitute for immortality; for if the individual must perish, yet he is per¬ mitted by love to continue his existence in his children. It is the source of art, leading men

to satisfy by the creation of beautiful forms their innate longing for the absolute beauty they can never possess. It is also the cause of philosophy. He is not a philosopher, but a god, who knows the truth ; nor is he a philosopher who is unaware of his ignorance ; rather, the philosopher is he, who, being aware of his igno¬ rance, is driven on ever by the soul's thirst for the truth, to learn and to raise his life into one continual communion with the world of ideas. Whether later in date of composition or not, the <Symposium) is logically a sequel to the mythological portions of the ˆhsedrusP In the earlier dialogue Socrates tells how in some remote age the soul of man, in its winged chariot, followed the procession of the gods to the summit of the celestial vault, and from there beheld the everlasting ideas of truth and justice and beauty and the like, of which things true and just and beautiful in this world are the shadowy transient images. And so, when a man sees some fair object or person, love is awakened in his soul as a reminiscence of that half-forgotten vision. In the (Symposium* the mythical nature of love as a reminiscence is less emphasized, but its dynamic and philo¬ sophic function is developed in splendid ima¬ gery. Without this emotional quality, as it is worked out here and as it is suggested in other dialogues, the ideas of Plato would be a curious theme for the metaphysician ; with the intro¬ duction of love as the force driving us to par¬ ticipation in their divine nature, the philosophy of Plato is transformed into something that has enthralled poets and artists and entered largely into the rapture of the saints; it has become one of the molding influences of civiliza¬ tion. But it cannot be said that this influence has been

entirely for good. From this source has come the popular notion of (<Platonic love,® which has acted as a befuddling and enervating ferment in soci¬ ety. It is fair to add that Platonic love, as most of the poets have understood it, is the very reverse of what Plato himself had in mind. Petrarch, for instance, would absorb the uni¬ verse into his passion for a woman; Plato would forget the woman in his pursuit of ideal beauty. It is right to remember also that the conclusion of the <Symposium) contains the extraordinary confession of Alcibiades, in which, as if Plato was concerned to remove any misunderstanding of his doctrine, Socrates is pictured as the stalwart soldier and as a lover, proof against every seduction of the flesh, a man of iron character above all. Nevertheless Plato's language, when dealing with the pas¬ sion of beauty, is sometimes unguarded. The (Symposium) is commonly regarded as Plato's most perfect literary production, as perhaps the most perfect piece of prose composition of any age or in any tongue.

Paul Elmer More.

SYMPTOMS, in medicine, the phenomena from which are inferred the existence and nature of disease. Symptoms have their seat in the functions which are affected by the dis¬ ease so as to be raised above their usual activity, or depressed below it, or even to become changed in the nature of their action. The organs themselves are often changed in their appearance, structure, size, etc. Symptoms may be perceptible by the patient alone (for ex¬

ample, pain and all change of sensations), or by the physician also (for example, all diseased movements). The more a function or an or¬ ganic system is extended through the body, the more frequently will it be the seat of morbid phenomena. The nervous, the vascular and the cutaneous systems, for instance, are affected in most diseases; hence also irritability, the power of nutrition, etc., which extend through the whole organization, are so easily affected by diseases, and thus afford symptoms. If the latter are in the organs originally affected they are called idiopathic; but if they are caused by sympathy with other and distant parts, they are called consensual or sympathetic. The temper¬ ament, age, sex, mode of living, etc., of the patient produce a considerable variety in the symptoms of every disease. When they are indubitable signs of a particular disease, symp¬ toms are called pathognomonic.

SYNAGOGUE. See Jews and Judaism.

SYNAPTA, a genus of a group of holo- thurians distinguished by the

non-development of an ambnlacral system. Locomotion in Synap- tce is effected by the muscular contractions of the body, aided by the presence in the skin of anchor-shaped spicules of lime, which these animals use to fix one portion of the body, while the other portion is pulled forward. These animals live in muddy coasts and form mud-cases. See Holothuria.

SYNCHRONIZER, an instrument in com¬ mon use in electric-generating stations em¬ ployed to indicate the relation between the fre¬ quency of two or more alternating current gen¬ erators and especially to show when a generator is operating at the same frequency as others with wdiich it is the desire of the engineer to connect it, in the same circuit. A variety of the instrument is also employed to determine when the voltages of two circuits are in phase with each other. A common form of the instru¬ ment is a small motor the armature of which is connected to one generator and the field-wind¬ ings to another. By an arrangement of arma¬ ture coils a rotating field is produced which turns the armature in one direction or the other according to the difference in phase between the circuits. A pointer turned by the armature shows which generator is fast and which slow. Another form consists of two incandescent lamps connected in the two circuits in such a manner that they light up or remain dark when circuit is closed. Consult Jansky, C. M., (Electrical Meters* (New York 1913) and Edgcumbe, K. W. E., < Industrial Electrical Measuring Instruments) (ib. 1908).

.SYNCHRONOGRAPH. See Telegraph

SYNCHRONOUS MOTOR. See Elec¬ trical Terms.

SYNCLINE. See Fold. SYNCLINORIUM. See Fold.

SYNCOPATION, in music, an alteration of the rhythm, by driving the accent to that part of a bar not usually accented.

SYNCOPE. See Faint.

SYNCRETISTIC CONTROVERSY, the

name given in church history to the disputes which attended prolonged and repeated efforts in the 17th century to bring about the union of all Protestant churches. George Calixtus, pro-

fessor of theology at Helmstadt, was the author of the proposition, which was brought forward at intervals from 1645 to 1686, when the discus¬ sion was finally abandoned. See Lutheran¬ ism.

SYNDIC, (1) in government and com¬ merce, an officer in various countries entrusted with the affairs of a city or other community, company of art or trade, etc., who calls meet¬ ings, makes representations, etc. (2) Also a per¬ son appointed to act in some particular affair in which he has a common interest with his con¬ stituents, as when he is one among several cred¬ itors of the same debtor. Mayors of Italian towns bear the title of syndic.

SYNDICALISM, a political and industrial doctrine which demands that the means of pro¬ duction, distribution and government shall be turned over to all those workers who are ac¬ tively useful and necessary in the community. There are many different views on the subject, held by the opponents and believers in the movement, but a general description is aimed at here. It is antagonistic to every other form of control, whether by government, existing labor unions or by capital. The motivating and regenerating force of syndicalism is to come from the enthusiasm of the workers themselves. It distrusts organization, delegates and all forms of leadership except that of the propagandists. Force is the basis of society, and this weapon is to reform the world. The first objective aim is to eliminate the present owners of production. The means to accom¬ plish this vary in the theories of different expo¬ nents of the doctrine, but they may be generally outlined here. Sabotage, boycotting, strikes (qq.v.) and disturbances of all kinds are legiti¬ mate. They propose first, by anti-militarist propaganda, to avert the possibility of armed suppression, and then to use their ultimate weapon, ftthe general strike.® This demands the stoppage of every activity and the conse¬ quent crippling of the entire government, which, bereft of armed force, will be compelled to capitulate to the working class. This having been accomplished, they then propose to abolish property and masters ; level the reward of all work; and carry on trade, production and edu¬ cation by trade unions and local organizations. Syndicalism differs from socialism in that the former demands social revolution through in¬ cited labor to abolish capital; whereas the lat¬ ter expects to work reform through political agitation by gaining majorities in existing gov¬ ernments. Furthermore, Socialism aims at fur¬ ther centralization of government control and depends on rich unions with capable leaders, while Syndicalism prefers poor unions and ac¬ tual leveling of authority. It differs from the I. W. W. movement in that in its constructive policy it aims at decentralization of trade power, instead of one tremendous all-embrac¬ ing union of workers, modeled

on the lines of capitalistic organization. The movement began in France in 1892, where prior to the European War there were 600,000 avowed Syndicalists. From France it spread to Italy where it was taken over chiefly by the agriculturists who at the same period owned 200,000 acres of tillable lands farmed on the co-operative plan ; and the entire railway system was under the influence of Syndicalists.

The movement has a large following in Eng¬ land, some 60,000 being present at a confer¬ ence held before the war. In America a sim¬ ilar movement began under the direction of the I. W. W. Russia has many different classes of labor agitators, — the Bolsheviki em¬ body many Syndicalist principles. Traces of it are found also in Spain, Greece and Latin America. Consult Brooks, T. G., (American Syndicalism) (1913); MacDonald, < Syndical¬ ism) (1913) ; Lewis, A. D., Syndicalism and the General Strike) (Boston 1912) ; Clay, Sir Arthur, Syndicalism and Labor) (London

1911) ; Challaye, F., Syndicalisme revolution- naire et syndicalisme dans revolution sociale) (Paris 1908) ; Harley, J. H., Syndicalism and the Labor Unrest) (in the Contemporary Re¬ view, . March 1912) ; Kleinlein, Andreas, (Der Syndikalismus in Deutschland) (Brussels

1912) ; Lanzillo, A., (Le mouvement ouvrier en Italic) (Paris n. d.), and the works of Georges Sorel.

SYNDICATES, a name given in the United States to those combinations of capitalists or¬ ganized for the purpose of controlling produc¬ tion and raising prices. The term is also used of associations which buy a literary or artistic product outright from the author and market it to subscribers simultaneously in non-contigu- ous parts of the country. Perhaps the most familiar example of this is the colored Sunday Supplements which appear in different journals on the same day at points throughout the con¬ tinent from the Atlantic to the Pacific.

SYNDROMES, Endocrinous. The con¬ ceptions concerning the push that lies behind the metabolism of the human body even in recent years have been all too elementary and simplistic. They have, however, slowly and gradually undergone modification until the im¬ portance of a number of overlooked structures have forced themselves within the past 10 years (1910-20) almost with a rush upon the medi¬ cal horizon. These structures are the endo¬ crinous glands or the hormonopoietic system. Their study now constitutes an enormous specialty.

As early as 1828 Parry called attention to the relationship between enlarged thyroid and rapid heart beat, since which time the works of Johannes Muller, Addison, Gull, Brown-Sequard, Marie and many others have served as starting points for the building up of a rich structure which is amply recorded in a score of mono¬ graphs. The chief of these are Biedl, Unternal Secretions) (bibliography of 4,000 titles, 1913) ; Falta, (Ductless Glands) (1915) ; Parhon et Golstein, (Les Secretions Internes) (1909) ; Levy and Rothschild, (Endocrinologie) (1913) ; Gley, (Les Secretions Internes) (1914) ; Sajous, Unternal Secretions) ; Pende, (Endocrinologia,) and the special articles in Lewandowsky's (Handbuch der Neurologie) (1913). In addi¬ tion to these a large number of special mono¬ graphs upon the individual organs have been written all of which may be found in the works here quoted in the Bibliography.

Out of this prodigious development, much of which is evanescent and hastily constructed, a large amount of solid substance remains and a number of permanent acquisitions have been made. The net result has been to show much more essentially than ever before the funda-

mental physicochemical foundations of biological metabolic processes as they are utilized in the upkeep of the animal machine. The viewpoint has been attained that a marked degree of chemical interrelationship takes place between the different organs of the body. That this is automatically regulated through the vegetative nervous system (the old sympathetic) chiefly, apparently in some cases, though this is by no means clear, solely through chemical regula¬ tion. The disorders of this adjustment now constitute a special department of vegetative neurology, and are most conveniently grouped under the terms endocrinology, or the endo- crinopathies.

In the earlier period of the study of these endocrinopathies individual disease groups, uni- glandular syndromes, were isolated. Among the most accentuated of these were Addison's disease, diabetes mellitus, myxedema, cretinism and acromegaly, but of recent years it has been increasingly emphasized that whereas a certain group of symptoms, which may be linked to plus or minus activities of one or another gland may be most prominent, nevertheless other glandular modifications are bound up in them and are not to be neglected. Hence has arisen the viewpoint that most of the endocrinopathies are, strictly speaking, poly- or pluri-glandular syndromes.

For many years, even back to the earliest days of primitive animistic magic, it has been held that every living tissue yields a chemical product which will act upon other tissues. The early alchemistic studies, those of Paracelsus, to the latter work of Hahnemann, and the iso¬ therapists, are all attempts to co-ordinate a host of empirically observed facts. They are all worth rereading if the reader will put himself in sympathy with them through a comprehen¬ sion of the now strange symbols then used.

Endocrinous glands for the present purposes are those structures which yield products termed hormones and chalones having some definite or specific action related to, yet different from, enzyme activities. These structures are de¬ veloped from different embryological forma¬ tions. The hypophysis (posterior lobe) and chromaffin tissues (suparenal chiefly) are nervous; the thyroid and pituitary (anterior lobe) come from the buccal cavity; the pan¬ creas and mucosa of the small intestine from the intestine, the parathyroids and thymus from the branchial arches (old gill slits of fishes), the gonads (testes and ovary) and the inter- renal bodies from the genital ridges. Some of these, in humans, merge into one structure, as thyroid and parathyroid, as chromaffin and in- terrenal cells in the suprarenals, as hypophysis (posterior lobe) and pituitary (anterior lobe).

The present article will attempt to sketch only the general outlines of the various uni- glandular and pluriglandular syndromes. The more radical French school is followed, but at the same time attention should be called to the fact that the French school presentations con¬ tain gross fallacies, and should be read cum grano salts. Still the clinical suggestions of these writers are so rich that it is felt to be a better course to call the attention of the physi¬ cian to possible relationships rather than to take the more conservative attitude of directing at¬ tention only to that which can be indubitably

proved. This whole subject is still so largely empirical that the principle of putting the hypotheses to a test will be found to be more advantageous than that of believing only the obvious. The former attitude may result in gaining useful therapeutic truths, the latter be¬ comes monotonous and frequently encourages stupidity.

The more recent suggestive and extreme summaries of Biedl, Falta, Laignel-Lavastine, Levi and Rothschild are therefore here sum¬ marized.

Uniglandular Syndromes. — T hyroid. — Myxedema. — The chief

symptoms are arrest of. development, dwarfism, infantilism, infiltration of skin and mucous membranes, mental torpor, slow ideation, defective memory, apathy, lazi¬ ness, slowness, sleepiness, taciturn, awkward¬ ness. The pulse is usually small, rapid and ir¬ regular, at times increased tension. There are constipation, diminished urination, hypothermia and chilliness of the skin. Reflexes diminished. The voice is frequently nasal, slow, monoto¬ nous and raucous. Headache is frequent and at times epileptic attacks occur. These are all symptoms of diminished secretion.

Exophthalmic Goitre. — A more or less com¬ plete catalogue of findings for a lot of cases will include tachycardia, arrhythmia, anxiety, pulsa¬ tions in the neck, exophthalmos, epiphora, v. Graef's, Stellwag's, Mobius' symptoms, facial paresis, cramps, tremors, neuralgias, chiefly frontal and ocular, colic, hot flashes, profuse sweats, thermophobia, engorgement of the skin, dermographism, transitory edemas, pigmenta¬ tion, urticaria, alopecia, diminution of electrical resistance, albuminuria, polyuria or glycosuria, anorexia, _ bulimia, vomiting, ptyalism, hyper- chlorhydria, diarrhea, dyspnea, amenorrhea, atrophy of mammas, loss of flesh, agitation, emotional instability, volubility, insomnia, anxiety, excessive anger or reverse, maniacal excitement, marked depression, cyclothymic variations, confusion, epileptic attacks. Ep- pinger and Hess have endeavored to separate a vagotonic and sympathicotonic type.

. In ˆe vagotonic type the more prominent signs are decreased lacrymation, less exophthal¬ mos, with enlargement of the palpebral fissures, v. Graef's sign, abundant sweating, diarrhea, mild tachycardia, no alimentary glycosuria, pilo¬ carpine and oculocardiac reflexes positive. In the sympathicotonic types there are exophthal¬ mos, dryness of eyes, violent tachycardia, glycosuria, oculocardiac reflex reversed or ab¬ sent, increased reaction to adrenalin. Most cases are mixed in type. In all save infectious forms psychical influences are striking and psychotherapy is extremely valuable in the early stages, less so in chronic cases. Money worries bulk large in the etiology of the psychogenic cases.

Thyroid insufficiencies, other than those of myxedema, are infantilism, obesity, Dercum's syndromes, pseudolipomata, alopecia, precocious loss of hair, scleroderma, urticaria, pruritus, re¬ curring herpes, transitory edemas, migraine, asthma, constipation, mucous enterocolitis, acrocyanosis, Raynaud's syndrome, localized erythemas, rhinorrhea, glucose tolerance, geni¬ tal instability, chilliness, mammary hypertrophy.

Thyroid Instability (Levi and Rothschild). — From dyshypothyroidism : chilliness, baldness,

headaches, depression, crying, giddiness, passing edemas, neuralgic pains, suffocations, shivering, hot flushes, at menstrual period. With pre¬ dominant dyshyperthyroidism : thinness, in¬ crease of eyebrow development, hot flashes, palpitation, intestinal spasms, irritability, emo¬ tionalism, phobias, inquietudes, migraine, asthma, hyperidrosis dysidrosis, tremors. Mixed cases: chilliness, shivering, migraine, frequent urina¬ tion, neuralgic pains, distractable reddening of eyebrows, catamenia ; neuralgias, anxiety, dilata¬ tion of palpebral fissures, swelling of feet, varia¬ tions in volume of the feet, tremors, nervous crises, hysterical attacks.

Parathyroids. — Tetany. — This syndrome is unquestionably related to parathyroid loss or de¬ ficient Parkinson's syndrome(?). The view¬ point of Lundborg and of Gauthier is that this syndrome belongs here, and is a hyperfunction disorder, but it rests on very unstable founda¬ tions.

Thymus. — Vagotonic Symptoms of Basedow Syndrome(?): Profuse sweating, palpitation, lymphocytosis, eosinophilia, sensation of weak¬ ness.

Myasthenia of Erb-Goldflam (?) : Headache, ptosis, external ophthalmoplegia, fixed or transi¬ tory palsies principally of the face, the neck, myasthenic electrical reaction.

Thymus Loss : Idiocy of Klose and Vogt.

Tetany(?) : Basch.

Suprarenals. — Addison's Syndrome and Sup¬ rarenal Insufficiency : Asthenia, arterial hypoten¬ sion, morning nausea and vomiting, lumbar pains, melanoderma, white lines on the skin, amyotrophy, abulia, depression. At times myoclonus, epileptic attacks, tetany, periodic palsies, delirium, mental confusion, sudden death.

Suprarenal-genital Syndrome : External femi¬ nine pseudo-hermaphroditism with virile sec¬ ondary sexual characters; suprarenal virilism; amenorrhea, gynecomasty, adiposis with easy bruising, all signs of feminine maturity; hy¬ pertrophy of the clitoris,

hypertrichosis of masculine type, masculine voice, muscular and nervous hyperasthenia, active and violent sexual inversion ; arterial hypertension, arteriosclero¬ sis ; glycosuria.

Sympathetic Paraganglia. — Chromaffin cells of the solar plexus, aortic paraganglion of Zuckerkandl, cardiac paraganglion of Wiesel and Wiesner, Luschka's carotid and coccygeal glands, tympanic paraganglia. The syndromy of the affections of these glands is entirely obscure.

Pancreas. — Diabetes Mellitus : Glycosuria, polyuria, polyphagia, polydipsia ; neuralgias, pruritus, impotency, constipation, dry mouth, dry skin, diminished perspiration, atrophy of the testicles, abolition of the tendon reflexes, arterial hypertension, asthenia, headache, sus¬ ceptibility to cold, perforating ulcer of the foot, syncopies, comatose or apoplectiform attacks, paralyses, vertigos, asthmatic dyspneas, pseudo¬ angina, narcolepsy, depression, apathy, hypo¬ chondria and coma.

Hypophysis. — Froehlich's Genital Adiposity Syndrome : Adiposity, arrest of development or regression of the genital glands, of the genital organs and the corresponding secondary sexual characters ; somnolence.

Syndrome of Hypophyseal Insufficiency of

Renon and Delille : Tachycardia, instability of the pulse, arterial hypotension, insomnia, an¬ orexia, distressing sensation of heat, exaggera¬ tion of sweat secretion.

Acromegaly: ((A simple hypertrophy, not congenital, of the upper and lower extremities and also cephalic,® headache, amenorrhea, ten¬ don reflexes increased, arrhythmia, syncope, perspiration, polyuria, glycosuria, sensitiveness to cold, neuralgias, acroparesthesia, cramps, lancinating pains, lassitude, irritability, de¬ pression.

Gigantism: <(Acromegaly of the subjects in the epiphyseal cartilages which have not yet ossified,® impotency, amenorrhea, indolence, in¬ fantilism, abulia, asthenia, glycosuria, polyuria.

Diabetes Insipidus (?) : Polyuria, polydipsia.

Pineal. — Genital Macrosomia: Abnormal in¬ crease in height, premature genital and sexual development with secondary sexual characters, hypertrichosis, exaggerated mental precocity.

Pineal Adiposity: Diffuse obesity.

Choroid Plexus. — Hydrocephalus: Hyper¬ tension of the cerebrospinal fluid, rapid develop¬ ment, nervous and mental syndrome of ventric¬ ular hypertension, obnubilation, idiocy.

Ovaries. — Infantilism : Amenorrhea, absence of secondary feminine characters, obesity, de¬ ficiency of hair, childishness.

Acquired ovarian insufficiency: (a) Periph¬ eral vasodilatation, subjective crises of heat, sweating, continuous or paroxysmal tachy¬ cardia, palpitations, arterial hypertension, in¬ somnia, severe headache, facial neuralgia, lum¬ bago, neuromuscular asthenia, memory insta¬ bility, irritability, enervation, hysterical crises; exaggeration of the sexual instinct (?), more often absent or inverted; obesity, restlessness, anxiety, phobias, impulsions, gastrospasm, constipation, vomiting, vertigo, syncope.

(b) <(Vagotonic crises® before the menses and at the beginning of pregnancy, pallor, tend¬ ency to syncope, nausea, vomiting, constipation, diminished arterial tension, pulse rather slow, oculocardiac reflex positive, Samogyus' sign, psychic depression particularly connected with the development of the corpus luteum. These crises occurring before menstruation or at the beginning of pregnancy must not be confused with the reactionary dyshyperthyroidism of the menopause marked by flashes of heat, sweat¬ ing, hypertension, paroxysmal tachycardia, pal¬ pitations, anxiety.

((Hyperovaria® (Dalche) : Precocious pu¬ berty, copious menstruation, pain before and during the first days of the period, intermen- strual leucorrhea, developed sexual instinct, well-marked eyebrows, thinness, pallor, small breasts, large pelvis, rounded lower limbs con¬ trasted in size with the upper ones, arterial hypotension, craving for movement and action, enervation, tendency to loquacity, erotic crises.

Testicles. — Infantilism: Defective develop¬ ment of the male genital organs, absence of sec¬ ondary sexual characters, obesity, deficiency of hair, length of the lower limbs, small cranium, childishness.

Acquired Testicular Insufficiency: Increase in height, diminution of the pilous system, glabrous state of the body, tendency to obesity, gynecomasty, frigidity, impotency, senility, arterial hypertension (?), asthenia.

The types of testicular insufficiency accord-

ing to Rebattus and Gravier are: (a) The sterile. (b) Eunuchoid gigantism, because the internal secretion of the testicle is established late. In this case there is a prolonged infan¬ tilism. (c) Eunuchism by castration char¬ acterized by gigantism and infantile appearance. The secondary sexual characters do not appear. (d) The reversive infantilism of Gandy, where simply a sort of asexual condition is noticed, with attenuation of secondary sexual characters and a certain degree of obesity, with late testic¬ ular difficulty in the adult.

Dyshyperdiastematia : Lower limbs short and cranium very, large, pilous system well de¬ veloped, especially the mustache, thinness, per¬ sistence of youth, a degree of arterial hyper¬ tension, virile character, activity, moral and physical energy.

Prostate. — Prostatic Insufficiency: Asthenia, diminution of potency, neurasthenia, at times suicide.

Hypertrophy of Prostate: Arterial hyper¬ tension, retardation of the heart, cerebral hemorrhages, genital excitation.

Pluriglandular Syndromes. — Basedow's disease with thymic hypertrophy and vagotonic symptoms ; sclerodermia and tetany, amenor¬ rhea ; Addison's syndrome ; acromegaly, etc.

Myxedematous with Thymic Hypertrophy. Tetany, acromegaly, Addison's syndrome, amenorrhea, infantilism, mammary hypertro¬ phy, etc.

Acromegalic or ovarian insufficiencies with various disturbances, psychic, nervous, vaso¬ motor, trophic, etc., connected at one time with the myxedematous, at another with the Base- dowian series.

Ovarian Predominance. — Thyroid Reaction to Ovarian Insufficiency: Tachycardia, palpita¬ tions, perspirations, nervous irritability, vertigo, scanty urination, trembling, anxiety, etc.

The differences between these nervous mani¬ festations and the picture of the attenuated forms of exophthalmic goitre are very slight, says Laignel-Lavastine. This pathogenic con¬ ception permits of important therapeutic results ; one may ask, for example, whether the

anti- Basedowian therapy with hematothyroidin would not be of advantage in the nervous and psychic disturbances of the normal menopause which repeat one feature after another of the Basedowian series.

Dyshyperovaria of the Hypothyroid: Antici¬ pation, prolongation and copiousness of the menses, menorrhagia, metrorrhagia.

Thyro- ovarian Disturbances of the Same Significance. — Either ovarian insufficiency in the myxedematous series, or the dyshyperovarian in the Basedowian series; in either case the nervous disturbances of the dysthyroid are modified by all the factors of the ovarian rhythm, whatever they may be.

Hypophyseal Predominance. — Infantile giants, with their clinical varieties: feminism, eunuchism, cryptorchidism, feminine pseudo¬ hermaphroditism, mental infantilism.

Acromegalics with deficiency syndromes, myxedema, infantilism, amenorrhea, obesity, asthenia.

Acromegalics with syndromes of hyperactiv¬ ity, more or less vicious, synergetic or substitu¬ tive; simple or exophthalmic goitre, arterial hypertension and atheroma, lacteal secretion.

Suprarenal Predominance. — Addisonian with amenorrhea, impotence, chilliness, tetany or, on the other hand, exophthalmic goitre..

Very often Basedowians, acromegalics, giants, with spontaneous glycosuria, alimentary or merely adrenal, the latter making it possible in certain cases to suppose a certain degree of suprarenal hyperactivity.

Without Marked Predominance. — The case of Claude and Gougerot is an example: Loss of sexual characters, countenance old-looking, skin thickened, wrinkled, pigmented ; chilliness, absence of perspiration, asthenia, arterial hypo¬ tension, tetany; testicular, prostatic, suprarenal, thyroidal and perhaps parathyroidal atrophy. Consult Jelliffe and White, ˆDiseases of the Nervous System* (3d ed., 1919; chap. Ill, <The Endocrinopathies)) .

' Smith Ely Jelliffe, M.D.

SYNERGISM, the co-operation of man with God in the act of his conversion ; the term was first employed to. designate the relation of

man to the Holy Spirit in the work of conver¬ sion, as defined by Melanchthon in the (In¬ terimˆ (1548). Luther, in his commentary on Genesis, allows to man no part whatever in this act: <(In things spiritual and divine which re¬ late to the salvation of the soul, man is like the pillar of salt into which Lot's wife was transformed; nay he is like to a block and a stone, a lifeless statue which has no use of eyes, mouth, of any of the senses, or of the hearth Melanchthon's doctrine (which, how¬ ever, he soon retracted) was that <(God does not deal with man as with a block, but draws him so that his will co-operates® ; it was this term of co-operation that gave to Melanch¬ thon's doctrine the title Synergism.

SYNESIUS, si-ne'shi-us, Neoplatonist phi¬ losopher: b. Cyrene, 370 a.d. ; d. about 415. He studied in Alexandria, where he was the friend and pupil of Hypatia (q.v.). In 409 he was baptized in the Christian Church and the fol¬ lowing year consecrated bishop of Ptolemais, in North Africa. His philosophical views. are ex¬ pounded in his writings, — homilies, letters, hymns and other literary works. In these he exhibits multifarious learning, keenness of in¬ tellect and a glowing style. The Christian dog¬ mas which seem to conflict with his philosoph¬ ical views he explains allegorically. Consult Migne, (Patrologia Grseca) (Vol. 66, 1859) ; Volkmann, <Synesius von Kyrene) (1869) • Crawford, W. S., <Synesius the Hellene* (Lon¬ don 1901); Gardner, A., <Synesius of Cyrene) (lb. 1886).

SYNGE, sing, John Millington, Irish

dramatist: b. Newtown Little, near Rath- farnham, 1871 ; d. 24 March 1909. He received his education at Trinity College, Dublin, where he was graduated in 1892. For about seven years he studied music in Germany and lan¬ guages in Germany, Italy and France. He spent several years in the Latin Quarter of Paris where he gave his attention to the study of decadent French literature, especially to Baudelaire. He accomplished little in Paris but being meanwhile interested in Ireland, in 1899 William Butler Yeats persuaded him to aban¬ don his efforts as a French literary critic and study the. social types, manners and customs of the inhabitants of the Aran Islands, a people

who still retained their primitive Celtic culture. He finally settled in Dublin where he became one of the literary advisers to the Abbey Thea¬ tre and where he produced his dramas. These are remarkable

for the angry protests and dis¬ cussions which they provoked when produced in Ireland and iii the United States. His first play was (In the Shadow of the Glen) (1903) ; followed by (Riders to the SeaP (The Tink¬ er's Wedding, *although written in 1902, was not produced until 1909. ,(The Will of the Saints, * a tragic-comedy (1905), was performed in German at Berlin in 1906. In 1907 appeared (The Playboy of the Western Worlds about which there arose violent discussion and pro¬ test. Some critics hail it as the best comedy in English since Sheridan, while in Ireland it is regarded as a savagely ironical treatment of a situation more frequently found in Baudelaire than in contemporary peasant life in Ireland. These plays have a wonderful diction and set the fashion for that peasant drama which be¬ came the most prominent feature of the Abbey Theatre. In design and substance, however, Synge's dramas are of the Gallic decadence. (Riders to the Sea,* perhaps the least objection¬ able, is, mutato nomine , Pierre Loti's (Pecheurs d'lslande, *in an Irish setting. The dominant idea of (The Well of the Saints* (1905) is from a play of Clemenceau's. The story of (The Shadow of the Glen) is found in Vol¬ taire's (Zadig,* and the notorious (Playboy of the Western World) is merely a dramatization of a work of Baudelaire. The form and tone of the plays of Synge are no less foreign than the substance ; there are frequent sneers at the morals and religious practices of the Irish, and in (New York 1912). See Irish Lit¬ erary Revival; Playboy of the Western World; Riders to the Sea.

SYNGENETIC, a term applied to ore deposits that have been formed at the same time as the enclosing rocks, as for example the interbedded iron ores of the Birmingham region

in Alabama, which were formed as sediments during the Clinton (q.v.) epoch. Epigenetic deposits, on the other hand, were introduced after the enclosing rocks were formed. Any vein of ore would then obviously be epigenetic. See Ore Deposits ; Economic Geology.

SYNGNATHID2E. See Pipe-fishes.

SYNNOVE SOLBAKKEN, sinhie-ve' sol- bak'ken, a peasant-romance by Bjornstjerne Bjornson, was published in 1857. Without any knowledge of Auerbach's (Schwarzwalder Dorfgeschichten) or George Sand's country tales, Bjornson introduced this very type of the short story in Norwegian literature. His thorough knowledge of the peasant class and his study of the old sagas furnished the ma¬ terial on which his peasant stories are based. (Synnove Solbakken *met with instant acclaim and has been translated into most European languages. Thorbjorn, the hero of the story, is a peasant's son, and Synnove, the heroine, is a peasant's daughter. Thorbjorn has a fiery temper, in fact, he is something of a savage*

and must, therefore, pass through a hard or¬ deal before he can become a fit husband for the gentle and lovable Synnove. This bitter experience tests the devotion of the young peo¬ ple for one another and contributes to bring everything to a happy conclusion. Bjornson idealized the peasants of his country. This is due partly to his fondness for the old sagas, partly to his own poetic temperament. His peasant types are decidedly above the average in poetic endowment. They are often able to ex¬ press their feelings in beautiful poetry, as Synnove did when she received Thorbjorn's letter written on his sick-bed. Bjornson's peasants are noted for terse speech and this trait, too, is in imitation of the saga style, for Bjornson wanted to show that the peasants of to-day had more faithfully than any other class in modern society preserved the tradi¬ tions of a historic past. Consult Jaeger, Henrik, Ullustreret norsk Literatur historie) (II, 589- 639 and 711-768) ; Brandes, Georg, (Det Moderne Gjennebruds Maend) (pp. 1-69, trans. by Mary Morison in a volume entitled (Henrik Ibsen. Bjornstjerne Bjornson. Critical Studies, by Georg Brandes, 1899).

Joseph Alexis.

SYNOD, an ecclesiastical deliberative and legislative assembly. The word is synonymous with council, but oecumenical assemblies are commonly called councils and minor ecclesias¬ tical assemblies synods, though these are also styled councils. A diocesan synod is composed of a bishop and the clergy of a diocese; a pro¬ vincial synod, of an archbishop (or metro¬ politan) and the bishops suffragan to him; a national synod of all the metropolitans and bishops of a nation. In the Presbyterian Church synods are courts of review immediately su¬ perior to the presbyteries and consist of all the ministers and elders who are members of a number of contiguous presbyteries; the su¬ preme council of the Presbyterian Church is the General Assembly.

SYNODICAL PERIOD, is the period

between two successive conjunctions or opposi¬ tions of a planet with the sun, as observed from the earth. A synodical month is a luna¬ tion, being the period from full moon to next

full moon or from new moon to next new moon. A synodical month is 29 days, 12 hours, 44 minutes, 2.37 seconds.

SYNONYMS, words of the same language which are the precise

equivalents of each other; in popular acceptation, words sufficiently alike in general signification to be liable to be con¬ founded, but yet so different as to require to be distinguished are synonyms. The following pairs of words are pairs of synonyms : teacher, instructor; resemblance, similarity; supposition, hypothesis ; beginning, commencement. But words commonly regarded as synonymous are seldom perfectly so, as is seen in works on synonyms. There is always going on in a lan¬ guage a process of Mesynonymization® which tends to restrict one member of a synonymous pair to one meaning, the other to another. For example, <(wave® and (<billow® originally meant precisely the same thing; but <(billow® is now restricted to poetical use, while wave is used chiefly in practical matters. The study of synonyms is a valuable intellectual discipline in itself, apart from consideration of its high importance as a guide to the right use of words. <(The habit of thorough investigation into the meaning of words, and of exact discrimination in the use of them, is indispensable to precision and accuracy of thought, and it is surprising how soon the process becomes spontaneous, so that one often finds himself making nice and yet sound distinctions between particular words which he has never made the subject of critical analysis.® Consult Crabbe, George, (English Synonyms) (new ed., New York 1891): Fernald, (English Synonyms and Antonyms> (ib. 1896) ; Ordway, E. B., (Synonyms and Antonyms *(ib. 1913) ; Roget, P. M., (Thesaurus of English Words* (new ed., ib. 1914) ; Smith, C. J., (Synonyms Discriminated) (3d ed., 1908).

SYNOPTIC GOSPELS, those called of Matthew, Mark and Luke, which regard events generally from the same point of view and present strong resemblance to each other. Four hypotheses have been offered to account for the correspondences of the synoptics: (1) Derivation from some common written original. (2) Priority of one of the three and recurrence to that by the authors of the other two. (3) Derivation of all three from the same source in oral tradition. (4) Derivation of all three from the oral tradition, but consultation of Matthew's gospel by Mark ; of Matthew and Mark by Luke. See Bible.

SYNOVIAL MEMBRANE, the membrane lining the various joints or articulations and which secretes a peculiar fluid — the synovial fluid — for the due lubrication of the joint. See Joint; Membrane; Arthritis.

SYNOVITIS. See Arthritis; Joints.

SYNTAX, in grammar, proper arrange¬ ment of words under established rules and ac¬ cording to the best usage in order to express ideas. A word expresses a single notion, but by itself is little more than

an articulate sound intimating, like the cry of animals, a wish or a feeling. A succession of such sounds, properly arranged and connected for the expression of ideas, becomes language. The art of construct¬ ing sentences is, therefore, not less important than the power of speech ; it is indeed the in¬

tellectual part of language and a characteristic of reason. The first step in syntax is the analy¬ sis of sentences ; a clear perception of the mutual relations of the several members of a sentence makes the usual rules of syntax appear self-evident truths and in most cases super¬ fluous. See Grammar; Philology.

SYNTHESIS (Lat. synthesis, from Gk. ovvdeaig, combination, composition), the com¬ bination of individual objects or elements of thought into a whole. Thus, by synthesis, sepa¬ rate propositions are combined into a system, or simple concepts into compound and complex ones. In this manner one recognizes that vari¬ ous properties, taken together, constitute the characteristics of some one object. The proc¬ ess, however, does not destroy the identity of the component parts, but merely correlates them into a unity. It is, therefore, the opposite, or complement, of analysis (q.v.), which is the process of distinguishing within some given object the various characteristics of that object, without, however, destroying its unity. Hence, the name synthesis is applied in mathematics and philosophy to a process of reasoning work¬ ing to a conclusion from propositions that have already been demonstrated, or principles that have previously been assumed or established.

SYNTHESIS, Chemical. The building up or formation of chemical compounds from their elements or groups of their elements. The op¬ posite of analysis, one meaning of which is the breaking up or decomposition of a chemical compound into its elements. Thus the forma¬ tion of water from its elements hydrogen and oxygen is synthesis, while the decomposition of water into hydrogen and oxygen is analysis. Many of the most important manufacturing processes are synthetical. The synthesis of compounds from their individual elements is of great scientific but of little technical interest. However, the recent synthetical process of unit¬ ing moist nitrogen and oxygen to form nitric acid by use of the electrical discharge bids fair to be of great interest to mankind because of the use of nitrates as fertilizers. The syn¬ thesis of compounds from groups of their ele¬ ments is of very great industrial importance. Sometimes only a single and simple chemical reaction is required, as, for example, the action of water on quicklime to form slaked lime, while others, such as the manufacture of in¬ digo from naphthalene, require many and com¬ plicated

changes. There is a great difference as to the ease with which elements or groups of elements unite to form compounds. Some unite readily under ordinary atmospheric conditions of temperature and pressure, while others may require the action of heat, light, electricity, presence of water, etc. Phosphorus and iodine unite the moment they come in contact. Phos¬ phorus and oxygen unite slowly at ordinary temperatures but with violence if the tempera¬ ture is raised; sulphur and iron do not act at all at room temperature but do so when heated highly; hydrogen and chlorine do not act in the dark at ordinary temperatures but do so with explosive violence if exposed to the light; ammonia and hydrochloric acid or the mixture of bicarbonate of soda and cream of tartar used in baking powder do not react when dry but do so in the presence of water.

SYPHILIS

Up to 1828 it was thought that all organic chemical compounds, those formed in or pro¬ duced by animals and plants, could not be pre¬ pared in the laboratory by synthetical processes. The action of a ((vital principle® or ((vital force® was thought to > be necessary. Wohler showed this to be not true when (1828) he prepared urea, an organic substance produced by animals, from ammonium cyanate. Since that time an immense number of other organic substances have been prepared by synthetic processes. Some of the well-known ones are oil of winter- green, indigo, caffeine, alizarine, etc. The pro¬ cesses used in synthesis have been so thoroughly studied that the chemist has only to find out the exact chemical structure of a compound to be able to prepare it in the laboratory. Sometimes these laboratory processes are too costly to be of technical importance, but often they are of great commercial value. See Indigo; Alizarin.

Many substances are prepared by synthesis that never existed in any plant or animal. They are purely laboratory products. To this class belong most dyestuffs, many valuable medicines and a large number of perfumes and flavoring substances. Consult Berthelot, P. E. M., (La synthese chimique) (Paris 1876) ; Posner, The¬ odor, (Lehrbuch der synthetischen Methoden) (Leipzig 1903) ; Lassar-Cohn, (Arbeitsmethoden fur organisch-chemische Laboratories (2 vols., Hamburg 1907).

SYPHILIS. This is a general infectious disease, chronic in character, which may be communicated through inoculative contact or transmitted by inheritance. In the acquired form, it first produces at

the point of inocula¬ tion a specific lesion termed the chancre, fol¬ lowed by a gradual infection through the com¬ municating lymphatic vessels and eruptions upon the skin and mucous membranes. Later, there may develop in the connective tissue, or in any part of the body, adventitious new growths which may undergo suppurative or destructive changes.

The history of syphilis is shrouded in obscurity; certain writers have sought to trace its origin back to a remote antiquity. It is claimed that syphilis was well known to the ancients, and that descriptions of morbid con¬ ditions applying to this disease are found in the Bible, in Egyptian papyri, Assyrian and Baby¬ lonian inscriptions, as well as in the ancient Chinese and Japanese literature and the books of the Vedas. The evidence which connects syphilis with these ancient historic records is vague, indefinite and inconclusive. Our actual knowledge of syphilis dates from the appear¬ ance of the disease in Europe about the year 1494, and there is much evidence to show that the disease was native in South America and was brought to Europe by Columbus' sailors. There can be no question that gonorrhoea and ulcerative affections of the genital organs re¬ sulting from sexual debauch and uncleanliness were well known and frequently spoken of by ancient writers. With the irruption of syphilis in Europe toward the close of the 15th century, and its widespread extension, the identity of gonorrhoea was swallowed up in the greater importance of this newer and more formidable disease. During a long period all diseases of the genital organs were regarded as identical in origin and nature. This doctrine reigned prac¬

tically supreme for more than three centuries and was not definitely overthrown until 1838. At the present time we recognize that under the general term (<venereal® are comprehended three distinct diseases, independent in origin and na¬ ture, namely, gonorrhoea, chancroid and syphilis.

Cause. — Since 1905 the cause or etiology of syphilis has assumed an entirely new phase. Previous to that time it was very strongly sus¬ pected, especially by those who had followed the development of the science of bacteriology, that the cause must be associated with some variety of specific micro-organism, as was the case with so many other infectious diseases. The history and clinical phenomena of the dis¬ ease all pointed in that direction. Everything seemed to favor such a theory and there was apparently, nothing from the bacteriological point of view which could be urged against it. In 1905, after careful investigation of the pri¬ mary and secondary lesions in 70 successive cases of syphilis, Schaudinn announced that he had succeeded in

finding in each of them a spirillum or spirochaete which he named spiro- chaeta pallida. (This organism is also known as Treponema pallidum). This should be classified as a protozoon. When regarded as a protozoon it is described as one of the flagel¬ lated mastigophora which is characterized mor¬ phologically by a long slender body with nu¬ merous corkscrew-like coils and a flagellum at each extremity. Upon the protozoon supposi¬ tion it is the pathogenic parasite of syphilis.

The findings of Schaudinn were confirmed by Hoffman and others, and additional in¬ vestigations were made by Metchnikoff at the Pasteur Institute. Some of the higher apes were successfully inoculated with the organism, the results being especially satisfactory with the chimpanzee. Various methods of staining have been used with this organism. In the Levaditi method the spirochetae appear as dark spirals upon a pale yellow background, and when a weak counterstain is used they can frequently be detected in great numbers in the liver cells. They have also been found in the tissues of the lungs, spleen and heart.

General Course and Character of the Dis¬ ease. — Syphilis bears a certain resemblance to the infectious fevers, as smallpox, measles, etc., in its incubation, mode of development and the appearance of a characteristic eruption. In the majority of cases the phenomena of syphilis develop with a certain order or regularity which admits of its division into periods or stages, known as the primary, secondary and tertiary stages. After the introduction of the virus there is no appreciable evidence of its action during a period more or less prolonged, from two to five weeks, on the average 28 days. This period is termed the period of primary in¬ cubation or the incubation of the chancre. At the expiration of this period there appears at the point of entrance of the virus the chancre, which is termed the initial or primary lesion of syphilis. This primary lesion constitutes for a time the sole sign, the unique expression of the disease. After the appearance of the chancre there ensues a period of six to seven weeks, termed the period of secondary incubation. During this period, the lymphatic glands near¬ est the chancre undergo an indolent enlarge¬ ment, constituting what is termed the bubo of

syphilis After the second incubation the dis¬ ease is said to become constitutional, although it is not definitely known at what precise time generalization of the virus takes place. Not infrequently there is, during this period, some evidence of constitutional disturbance — head¬ ache, neuralgia and febrile disturbance, more or less pronounced — which ushers in what are recognized as the constitutional signs of syphi¬ lis, in the shape of eruptions upon the cuta¬ neous surface or the mucous membranes.

The secondary stage of syphilis is usually from 18 months to two and a half years in duration. The secondary eruptions are not continuously present, but come out in successive crops. The completion of this stage may mark the definite end of the disease, or there may succeed the tertiary stage, characterized by the appearance of gummatous formations which may affect the sub-cutaneous tissues, the peri¬ osteum, the bones and the internal organs of the body. The duration of this stage is practi¬ cally indefinite. The tertiary lesions may con¬ tinue to recur for 5, 10 to 15 years, or even dur¬ ing the lifetime of the individual. This division of syphilis into stages is somewhat artificial. It does not always pursue this regular and me¬ thodic course with an orderly procession of sec¬ ondary and tertiary lesions; there is not always a sharp limitation between the stages. Second¬ ary manifestations may continue to recur for several years.

Syphilis, as we comprehend it to-day, has a much graver significance in its relation to the health of the individual than was formerly sup¬ posed. Our conception of the range of its pathological action has been gradually enlarged with increasing knowledge of the vast com¬ plexity and far-reaching character of its morbid processes. While it was formerly known that syphilis was a constitutional disease and capable of causing changes in the internal organs, these systemic complications were regarded as few in number and of only occasional occurrence. The secondary manifestations visible upon the surface of the body were thought to constitute practically the entire expression of the disease. At the present day, these secondary manifesta¬ tions are regarded as of subsidiary importance, since they rarely compromise the integrity of any important organ. The tertiary manifesta¬ tions of the disease — cerebral, spinal, vascular, ocular, pulmonary, intestinal, hepatic and renal affections — constitute the chief significance, as well as the individual danger of the disease. The tertiary lesions of the brain and cord oc¬ cupy the first rank in frequency as well as in gravity. Of all the menaces to the life and health of the individual from syphilis, lesions of the nerve centres are the most to be feared. The pathological field of syphilis has been greatly enlarged by the inclusion of a group of affections badly termed parasyphilitic, which, though of syphilitic origin and nature, are extremely refractory to specific treatment and practically incurable. As types of this group may be mentioned locomotor ataxia and general paralysis. It has been stated that every hemi¬ plegia occurring in a man less than 40 years of age addicted to alcohol or affected with lesions of the circulatory system is, in nine cases out of 10, of syphilitic character. Practically all cases of paresis and tabes dorsalis are due to syphilis,

and the spirochete has been found in the brain spinal cord in these diseases.

Syphilitic Heredity. — From a strictly socio- biological standpoint, the hereditary conse¬ quences of syphilis are of the greatest signifi¬ cance. Its pernicious effects upon the offspring give to syphilis an especial importance as a factor in the degeneration and depopulation of the race. Syphilis is recognized as the per¬ fected type of a hereditary disease. No other disease is so susceptible of hereditary transmis¬ sion, so pronounced in its influence and so de¬ structive to the offspring. The hereditary in¬ fluence of most other diseases is manifest in the transmission to the offspring of a constitu¬ tional protoplasmic state, characterized by a feeble organization and diminished resistance to disease. In tuberculosis and leprosy, for example, the influence of heredity is limited to the creation of a predisposition to disease, from an enfeebled capacity of resistance of the or¬ ganism, which renders it readily susceptible to the action of the germs of disease. In syphilis there is a direct transmission of the specific qualities contained in the sperm or germinal cells, with the result that the normal processes of nutrition are vitiated and the produce of conception is blighted in its development or destroyed. No disease has such a murderous influence upon the offspring as syphilis.

. Syphilis may be transmitted by indirect in¬ heritance through the specifically infected sperm or ovule at the time of impregnation or through the utero-placental circulation in the course of pregnancy. Post-conception syphilis is applied to cases where the mother — or even both par¬ ents — may be healthy at the date of conception ; the wife is infected during the course of preg¬ nancy and she in turn transmits the disease to the child in utero through the vascular channels of the utero-placental circulation.

Syphilis may be transmitted directly from the father, the mother remaining healthy, al¬ though in most cases the mother is infected by the foetus in utero. It may be transmitted di¬ rectly by the mother, the father being healthy. The paternal hereditary influence is compara¬ tively restricted; the influence of maternal heredity is much more certain and pronounced. When both parents are syphilitic, the infection of the child is almost inevitable — especially,, when the disease of the parents is recent and active, ffhe percentage of deaths from mixed heredity varies from 60 per cent to 86 per cent. The quality of hereditary transmissibility is not impressed upon the syphilitic organism perma¬ nently. As the disease grows older there is a progressive enfeeblement of the transmissive power, until it finally becomes extinct. The influence of heredity is rarely manifest after

the fourth year; still, there are many well- authenticated cases in which it may be pro¬ longed five or six years or even longer. The attenuating influence of time upon syphilitic heredity is shown in a series of successive preg¬ nancies. The first pregnancies terminate in abortions, which occur at a later and later period ; then, still-born children, or children liv¬ ing at birth but which soon die; then, syphilitic children, surviving but showing evidences of specific taint; and, finally, healthy children, free from all signs of the paternal disease. Specific treatment also exercises a powerful corrective

influence upon heredity. It frequently happens that if syphilitic parents undergo active treat¬ ment before the time of pro-creation the child is born healthy. If this treatment is now sus¬ pended, the next pregnancy may result in a syphilitic child. ' Treatment seems, then, not to entirely extinguish, but rather to hold in abey¬ ance, the transmission capacity.

Hereditary Syphilis. — Death of the child in utero is the most habitual expression of ˆheredi¬ tary syphilis. More than one-third of all syphi¬ litic children born alive die within the first six months of their existence. An analysis of statis¬ tics from authenticated sources shows that only one child finally survives out of four syphilitic pregnancies. In the immense majority of cases infants with syphilitic taint begin to show signs of the disease from the second week to the second or third month. It was formerly thought that if there were no evidences of contamina¬ tion within the first year it might be assumed that the child had escaped. It is now known that even if the syphilitic child has escaped the early manifestations of the disease it may be doomed to the lesions of late hereditary syphilis, which are especially liable to appear at the period of second dentition, the period of pu¬ berty, from the 20th to the 30th year, or even later.

When a child the subject of inherited syph¬ ilis is born alive it may be apparently healthy and present no positive evidences of specific taint. Very often lesions of the osseous system are the only evidences of inherited disease mani¬ fest at birth. After a certain period, usually within a few weeks or months, the child may begin to show the stigmata of the parental dis¬ ease. The surface manifestations of inherited syphilis, like those of the secondary stage of the acquired form, are at first generalized and diffuse. Later, they become more discrete, with a tendency to localize themselves in certain regions.

Lesions of the internal organs often co¬ exist with the earliest cutaneous manifestations. Hereditary syphilis is further differentiated from the acquired form by certain lesions which are its exclusive products. They are not in their essential nature syphilitic, but rather the result of changes impressed upon the foetus in its formative or developmental stage. They present the characters of dystrophies or de¬ generations due to perversions of nutrition. These dystrophies may affect the entire body or be limited to a single organ or a system of organs.

The influence of hereditary syphilis is often manifest in a native debility or inherent inca¬ pacity for life. Many syphilitic children are endowed with a feeble vitality, so that they succumb to slight causes of disease. They die at an early age, often with no obvious signs of disease but simply from an inability to support life. They are the subjects of what may be termed “sudden, inexplicable death.”

In another class of cases there is an arrest or retardation of development; the children are stunted or dwarfed; they develop slowly physically and mentally; they are often feeble¬ minded or idiotic. The term “infantilism” has been employed to express the sum total of these characteristics. In other cases there are pre¬ sented anomalies or marked deviations from the normal development, seen in the bones of

the cranium and in the long bones, producing malformations of varied types, such as incurva¬ tion of the tibia, pigeon-breast, deformity of the thorax, curved spine, deformed pelvis, etc. These dystrophies may be expressed in such marked deviation from the normal type that the result is a monstrosity.

Heredo-Syphilis. — The effects of hereditary syphilis are not limited to the immediate de¬ scendants, but they in turn are capable of trans¬ mitting these dystrophies and organic defects to the third generation. Observation shows in the most positive manner that the influence of heredo-syphilis in determining abortions, still¬ born children and various organic defects is scarcely less marked than that of syphilis directly acquired. It would seem that while the contagious activity of the disease is entirely extinct, the nutritive disturbances set up in an organ or system of organs of the progenitors may be handed down to their offspring.

Syphilis as a Social Danger.-— It is now generally recognized that syphilis, with alcohol¬ ism and tuberculosis, are the three great plagues that afflict modern humanity. Owing to its wide prevalence and the dangers to the per¬ sonal health and life of the individuals

affected, syphilis constitutes a serious menace to the pub¬ lic health. The amount of morbidity from this cause in any country or community is an un¬ known and unknowable quantity, since owing to its secret and shameful character cases of this disease are not subject to official registra¬ tion. The spread of syphilis is favored not only by the fact that its contagious activity and transmissive power persist during a prolonged period but because it is exceedinglv prolific in its sources and modes of contagion. While it is commonly propagated through sexual rela¬ tions, syphilis is not necessarily so contracted. It may be conveyed by accidental inoculations, in the ordinary relations of life, in various industrial and professional occupations. Kiss¬ ing is a very common mode of infection and a very large number of cases of contagion occur in this way. A syphilitic infant may infect a healthy nurse, or a healthy infant may receive infection from a syphilitic nurse in the act of suckling. Syphilis may be transmitted through the intermediary of any object upon which the secretions of the syphilitic have been acciden¬ tally deposited. It may be conveyed by drink¬ ing vessels, spoons, knives and forks, household effects, pipes, toilet articles and other objects too numerous to mention. Certain occupations favor the spread of syphilis, especially that of glass blowing, where the infected blow-pipe is passed from mouth to mouth. Syphilis is not infrequently communicated in barber shops, through razor wounds or through the use of shaving brushes, soap or towels. Infections in professional life are not uncommon. Physi¬ cians and accoucheurs have acquired syphilis in the examination and treatment of syphilitic patients. Every syphilitic individual is the source of possible danger to persons with whom he comes in intimate contact. A case of syph¬ ilis in a family may be the origin of many inno¬ cent infections. The syphilitic child may infect the nurse and members of the family; these in turn may affect others. Veritable endemics of syphilis, amounting to 10, 15, 20 or more infec¬ tions, have originated in this way. It is this

quality of expansiveness, this capacity of mor¬ bid irridiation through family and social life, that gives to syphilis its superior significance as a social danger.

It is especially, however, in its relation with marriage that the ravages of syphilis as a social plague are of the highest interest and impor¬ tance. By its inhibitory influence upon the pro¬ ductive energy of the family, syphilis may seri¬ ously compromise or entirely defeat the

social aim of marriage — the raising of children. When it does not destroy the product of con¬ ception, it may blight its normal development. The subjects of inherited syphilis that survive are stamped with inferiority and compelled to pass through life bearing the stigmata of de¬ generation or disease. A syphilitic man should not marry so long as he is capable of carrying contagion to his wife or begetting syphilitic children. Since the contagious and transmis¬ sive power of the disease is gradually ex¬ hausted, syphilis constitutes only a temporary barrier to marriage, which may be removed by time ancf treatment. It may be formulated as a general rule that a syphilitic man should not marry until after a certain period (on an aver¬ age four years) has elapsed since the date of his infection, during which time he should re¬ ceive sufficient specific treatment. A still longer period of probation would afford an additional guarantee of safety. It is to be observed, how¬ ever, that there may be contra-indications tO' marriage which arise from risks to the per¬ sonal health of the individual by reason of his disease. The syphilitic man may be exposed to dangers, the consequences from his disease, which unfit him for the responsible position of head and support of a family. The possible existence of such disqualifying conditions must always be taken into consideration when the question of marriage is concerned.

Diagnosis. — The chancre or indurated ulcer whidh appears upon that portion of the body where inoculation has taken place, which may be at any point where the skin or mucous membrane has been broken or injured, has been regarded since the time of John Hunter as the distinguishing evidence that syphilis is present. The discharge or secretion from sudh a sore, as well as the blood of the individual who has the sore, both of which contain the germs of the disease are the media by which the disease is communicated, while the period during which such communication is possible may continue through several years if the disease remains untreated. These germs produce a specific antigen, by their action upon the blood and tissues, and this forms the basis for the Was- sermann test in the diagnosis of syphilis. This test works upon the theory of deviation of the complement by antigen substances contained in the syphilitic fluid blood or cerebro-spinal fluid and prevents or fails to prevent the lytic action of the hsemolysing fluid, according as syphilis is present or absent.

The Wassermann test is made in the follow¬ ing manner. Certain definite quantities of tis¬ sue, representing the antigen, are taken from the liver and spleen of a syphilitic foetus, to¬ gether with a definite volume of the blood serum of the individual upon whom the test is to be made. They are mixed in a test tube and fresh normal guinea-pig serum v/hich con¬

tains the complement is added to them. The tube is then placed in an incubator, at the temperature of the body, for one hour, after which its contents are poured into a second test tube which contains a mixture of red blood cells of a sheep, or other suitable animal, sus¬ pended in a physiological salt solution plus the serum of a rabbit which has been immunized to the before-mentioned red blood cells of the sheep. If the individual whose serum was placed in the first test tube actually has syphilis there will be no haemolysis of the red blood cells in the second tube after it has been kept in the incubator for the required period of one hour. In other words there is fixation of the complement and the reaction is said to be posi¬ tive. If, on the other hand, haemolysis of the red blood cells takes place the reaction is negative and the . individual presumably does not have syphilis, or has it in a quiescent con¬ dition. Various errors may occur with the Wassermann test, so that it is not regarded as absolutely reliable. This has resulted in the development of various modifications of the test, the one which has been regarded as most satisfactory being known as the Noguchi nodi- fication. The Wassermann test or the Noguchi modification must be repeated at intervals of a month or two for a year or more, even though it should be negative on each occasion, to de¬ termine wfiether the disease has been entirely eradicated.

Treatment.— Mercury and the iodide of potassium have until a very recent date formed the basis of most of the successful treatment of syphilis. A great deal of enthusiasm was ex- cited by the first published results of the use of salvarsan or — results which unfor¬

tunately have not been confirmed by a more extended experience. While there is no ques¬ tion of the incontestable efficacy of this remedy in causing the earlier lesions of svphilis to disappear, and even certain intractable lesions of a later stage, yet. relapses are the rule and even more common, it would appear, than after the use of mercury. The effect of a remedy in preventing the dreaded manifestations of the disease upon the nervous system and the organs essential to life is the crucial test of its cura¬ tive value. It will be necessary to wait several years before we can estimate its curative effi¬ ciency as determined by the ulterior evolution of the disease. There is reason to doubt whether any chronic infectious disease like tuberculosis, leprosy and syphilis can ever be expelled by therapeutic violence. The most refractory and difficult form of syphilis to treat is neurosyphilis, or syphilis of the nervous sys¬ tem. Neurosvphilis may give rise to a great variety of different types of disease, so great that the general practitioner can hardly bear them all in mind. Special methods of treat¬ ment are essential in these forms of syphilis Consult Jelliffe and White, < Diseases of the Nervous SystenV (3d ed., 1919).

SYR, or SIR DARYA, ser-dar'ya, Tur¬ kestan, (1) Aˆ river (the ancient Jaxartes) rising in the Fhian-Shan Mountains on the boundary of East Turkestan and flowing west and northwest into the Aral Sea. It traverse, the districts of Ferghana, Samarkand and Svr Darya and has a total length of about 1 70 0 miles. In its upper course it receives numerous

tributaries. After leaving the mountain regions in a series of rapids it flows for the rest of its course over the vast arid plains of the Syr Darya district, where it is broad, deep and tranquil, but receives few affluents. It here repeatedly divides itself and numerous irriga¬ tion canals lead from it into the surrounding country. The river is navigable for 600 miles, but the proposed line of steamers has not yet been installed. (2) A district of Turkestan with an area of 194,853 square miles. The capital is Tashkend; pop. about 150,000. The population of the district is 1,990,000.

SYRA, se'ra, Greece, (1) An island in the .2Egean Sea, the largest of the Cyclades, 13 miles south of Andros, with an area of about 32 square miles. The surface is rugged and bleak and the coast indented by numerous bays and inlets. The diversified landscape includes fertile valleys with some barren patches. The chief products are wheat, barley, cotton, wine and figs, but crops are inadequate to the de¬ mand and provisions are largely imported. Syra remained neutral during the War of Inde¬ pendence, thus becoming an important centre of commerce. The climate is salubrious. Pop. 26,856. (2) Syra, or Hermupolis, the capital,

is built in terraces rising from the bay. It is the seat of government for the Cvclades, the see of a bishop and residence of foreign con¬ suls. Its trade with the Levant is consider¬ able. It is the commercial emporium of the ˆEgean Sea, imports provisions, coal, etc., and exports emery, tobacco, sponges, valonia, etc. Pop. about 20,000.

SYRACUSE, sir-a-kus, N. Y., city and county-seat of Onondaga County, situated on the New York Central and the Delaware, Lackawanna and Western railroads, almost ex¬ actly midway between Albany and Buffalo, 148 miles either way, in lat. 43° 9' W. The New York State Barge Canal reaches it through Onondaga Lake.

Topography. — The city is at the foot of the Onondaga Valley,

through which and the city the Onondaga Creek flows into a lake of the same name north of the city, five miles long and one and one-half miles wide. The southern part is flanked by hills at the northern ends of the ranges on the east and west of the valley and extending considerable distance southward; while the northern part is upon ground which slopes upward from the Erie Canal to the northern boundary. There are several hills of volcanic formation and of geological interest. A considerable part oi the city is situated upon silt brought down from the Onondaga Valley, to a depth at one point of at least 179 feet, as proved when at that depth a salt drill passed through a cedar log. Perhaps there is no sec¬ tion of the State of New York which possesses more of geological interest than Syracuse and Onondaga County, and this is certainly true of their Indian history. The streets are generally regularly laid out, though some of the prin¬ cipal streets have independent courses creating triangular divisions of blocks. Many are 99 feet in width, but the majority are 66 feet. There are 570 streets, with a total length of 250 miles. There are nearly 1 14 miles of paved streets, mainly with brick and asphalt, and 209 miles of sewers. The area of the city is 19.18 square miles.

Transportation. — Syracuse is an import¬ ant railroad point, its roads being to its centre like the spokes of a wheel to the hub. Pas¬ senger trains to the number of 100 arrive in and depart from the city daily. Abundant freight facilities are offered by competing lines and important advantages can also be had from the improved New York State waterways. Diverging from the city are the following rail¬ roads : New York Central, West Shore, and Delaware, Lackawanna and Western. These roads not only thread some 20 counties in cen¬ tral New York, but several of them extend, with their connections, to the extremes of east, west, north and south. Of street railways, the trolley system embraces 95.72 miles of single track. This includes the mileage of track within the city .of Syracuse, also to East Syra¬ cuse and Minoa, Eastwood, Liverpool, Solvay and Rockwell Springs. The New York State Railways operate to Utica and intermediate points ; the Empire United Railways to Oswego and intermediate points ; the Rochester and Syracuse to Rochester and points beyond, such as Buffalo and Lockport. All these lines carry freight and express. Motor truck lines operate from Syracuse to Utica, Watertown, Oswego, Auburn, Cortland and Rochester.

Commerce and Industry. — Syracuse ranks fourth among the cities of the State in the num¬ ber and variety of its manufacturing plants; there are 760 industrial establishments, with an approximate invested capital of $63,957,000, and an annual production valued at $52,226,000, employing 25,000 persons. The manufacture of

typewriting machines has taken on large pro¬ portions, the combined interests representing at least $8,000,000 in popular value. The product is large and constantly increasing. Au¬ tomobiles are produced in large numbers, and among other manufactured articles are soda ash, tool steel, candles, automobile gears, farm-ˆ ing implements, tools, clothing, ohinaware, furniture, cement, chemicals, mining machinery, etc. The former leading manufacture of salt is still carried on at the brine springs on the shores of Onondaga Lake, and the extensive chemical works of the Solvay Process Company employing 5,000 hands are in a western suburb. (See History in this article). The printing industry is also extensive, more than 60 news¬ papers and periodicals being published, several of them devoted to the arts and sciences. The wholesale trade supplies hundreds of small dealers in the surrounding country in a radius of many miles. The retail trade involves an area of 38 mile radius and conservatively speak¬ ing brings 5,000 shoppers to the city each week.

Banks and Banking. — Six banks have a combined capital of slightly more than $6,600.- 000 with a large surplus. Two savings banks have 85,000 depositors and $48,000,000 of assets.

Buildings. — The business section is com¬ pactly built up .of brick and Onondaga lime¬ stone mainly; there are a number of exhibits of present-day architecture and construction, such as the Onondaga County Savings Bank building, the University buildings, City Bank building. University Club, Young Men's Chris¬ tian Association, Keith Theatre building, First Trust and Deposit building, Syracuse Trust Company, the Hunter-Tuppen Company and

Dey Brothers and Company's department stores, the high schools, courthouse, library and others. There are many stately and handsome business and public buildings, and fine private residences are seen in large numbers on all of the principal avenues. James street, it is very generally conceded, is second to no avenue in this country in point of attractiveness. The buildings of the Syracuse University, particu¬ larly the John Crouse College iof Fine Arts, are all models of good architecture, and the Hall of Languages is a fair example of the excellence of Onondaga limestone, which ex¬ ists in such vast quantities for building pur¬ poses.

Education. — The public schools are under the direction of eight

commissioners, who ap¬ point a superintendent at a salary of $4,000 per year. There are 38 public school buildings, having a valuation of $3,444,838. The number of pupils registered in the public schools for the year ended 1 July 1918, was 22,344, and in the high schools 3,358. The buildings are of brick, substantially constructed and supplied with the most modern sanitary appliances and heating apparatus. The course of study is according to the most advanced ideas, and a graduate of the high school is quite as well equipped as were graduates of most colleges half a century ago. Teachers' meetings are held monthly under the direction of the super¬ intendent, not only to preserve uniformity in the system, but also for the instruction of teachers in their general as well as special duties. The Syracuse University (q.v.), em¬ bracing the colleges of liberal arts, fine arts, law, medicine, forestry and applied science, is situated on the highlands in the southeastern part of the city and has an ample campus of 100 acres. The property, including endowments, is valued at $3,156,711. There are 3,540 students in attendance; the professors and instructors fiumber 344. It is under the control of a chan¬ cellor and board of trustees and allied reli¬ giously to the Methodist Church, though very liberal in this respect. The library comprises over 99,000 volumes and 43,000 pamphlets. An observatory is one of its essential fixtures. In the tower of the buildings of the College of Fine Arts is a chime of bells, and on an upper floor in the Hall of Languages building the Central New York Weather Observation Bu¬ reau is located and maintained by the United States government. All of the athletic sports are maintained, and the secret societies all have fine fraternity houses. There are 12 parochial schools and two non-parochical under Roman Catholic control, with 122 teachers and 5,400 pupils. They are under the general super¬ vision of the bishop of the diocese, and are mainly intended for academic instruction.

Libraries.— The Syracuse Public Library system including three branches and 34 stations centres in the Carnegie Building which was completed in 1905 at a cost of $268,000. The library contains about 140,000 books and in 1918 had a circulation of 556,437 among 43,921 bor¬ rowers. The main library is the centre of many public activities, including the Americanization work of the city. The servce of the library is free. The library of the Court of Appeals in the Court House is one of the three best libra¬ ries of the State, by which it is maintained.

The general library of Syracuse University is housed in a building donated by Mr. Carnegie and is rich in certain lines of research material. The State College of Forestry connected with Syracuse University maintains a special library for forestry students. The

College of Medicine has a well-equipped library for physicians and surgeons.

Religion and Charity. — Of churches and missions there are 116, of denominations as follows: Methodist, 23; Roman Catholic, 17; Presbyterian, 12; Baptist, 10; Episcopal, 8; Lutheran, 8; Jewish, 7; Congregational, 6; Evangelist, 2; Reformed, 2; Church of Christ, 1 ; Unitarian, 1 ; Universalist, 1 ; Scientist, 1 ; Seventh Day Adventists, 1 ; missions, 16. There are 13 cemeteries, of which Oakwaod stands first because of its rolling surface, its shading oaks, impressive entrance way and costly memorials. Burials were made within the present enclosure of one of these ceme¬ teries nearly a century ago. There are five principal hospitals, namely, the Good Shepherd, Saint Joseph's, Homeopathic, Memorial and Crouse-Irving. Each hospital has its own training school for nurses. The Syracuse Free Dispensary affords medical relief to suffering people and ministers to the need of more than 3,828 people annually, giving 20,373 treatments and 8,584 prescriptions. It is wholly supported by voluntary contributions. The Onondaga Orphan Asylum, the Saint Vincent De Paul Orphan Asylum and the House of Providence are the three principal homes for orphans or homeless children, the first being under Protest¬ ant patronage, the others having Roman Catholic support. The State Institution for Feeble-Minded Children is situated on an ele¬ vation on the western boundary of the city and is under the supervision of a superintend¬ ent and board of trustees. A small farm is connected with the institution which not only gives easy employment to a certain class of in¬ mates, but produces a considerable quantity of supplies. The buildings are of good architec¬ ture and the grounds in their vicinity covered with a variety of shade trees and shrubs. The unfortunate children are of all ages, and while the condition of the mentality of most of them is hopeless a few manifest some improvement after long and patient effort on the part of the teachers.

Public Utilities.— Water is brought from Skaneateles Lake, 20 miles away, at an eleva¬ tion of 440 feet above tidewater. The lake is J6 miles long, averaging 2 miles in width and is mainly supplied by springs. The immediate supply is from a reservoir of 17 acres 220 feet above the main level of the city, which give a hydrant pressure of 95 pounds. Almost "every part of the city is supplied; the water bureau bears the cost of connections between mains and curbs. There are 226 miles of mains and 3,042 fire hydrants. The bonded debt for the waterworks is $4,100,000. The fire department comprises five gasoline pumping engines and hose carts ; two triple gasoline pumping en¬ gines and chemical hose cart; four steam-fire engines — tractor drawn ; six gasoline combina¬ tion chemical hose wagons ;

two horse-drawn combination hose wagons ; four hook and lad¬ der trucks — tractor drawn ; one hook and ladder truck, horse drawn; one water tower;

four district chiefs' auto runabouts; one chief's car ; one motor-supply wagon ; one horse-drawn supply wagon. It is under the command of a chief, assistant chiefs and the respective cap¬ tains of the several companies. The police force comprises 250 men and a special force of de¬ tectives, all under officers of grades from chief to sergeant. The inspections and parades of the body show good drill and discipline and the force is rated as of the best. The sanitary conditions are under the observation of a board of health, the health officer being salaried. Garbage is collected by day labor and is burned in a crematory at a certain contract price. The mortuary statistics show an average annual death rate of 13.1 per 1,000 of population.

Government. — The municipal government is organized under the uniform charter for cities of the second class of the State, the executive and administrative control being vested in a mayor and common council com¬ posed of 19 aldermen, representing the same number of wards, and with the mayor elective every two years. A president of the common council, comptroller, city treasurer, four as¬ sessors and eight members of the board of education are also elective. The commissioner of public safety, having control of the fire, police and public health departments and of the bureau of water; the commissioner of pub¬ lic works, the city engineer, the corporation counsel and commissioner of charities are ap¬ pointees of the mayor. The mayor, corporation counsel, commissioner of public works, comp¬ troller and city engineer constitute the board of contract and supply, which makes all mu¬ nicipal contracts and furnishes all supplies to the various departments. The mayor, president of the common council, corporation counsel, comptroller and city engineer constitute the board of estimate and apportionment, which makes up the annual expense budget and fixes the salaries of city officers, subject to the ac¬ tion of the common council. The Municipal Court is presided over by two judges and its cases often number more than 3,000 a year. It is invested with considerable power and authority.

History.— The territory now occupied by Syracuse, also territory both north and south of it, was known to white men, as early as 1620, by the French, and subsequently by the Eng¬ lish, who came up what are

now the Oswego and Seneca rivers through Onondaga Lake, from Lake Ontario, and left present traces of their invasions throughout the central and northern parts and some in the southeastern part of Onondaga County. Possession of the territory was seriously and successfully con¬ tested by the Indians (mainly the Onondagas), and here and there abundant evidence of the fierceness of battles has been shown by the quantities of stone arrow points and hatchets found. The Iroquois were more or less in¬ volved in the invasions, but the brunt of re¬ sistance was with the Onondagas, who were in real possession of the lands. The League had been formed probably about 1580, which bound the Six Nations (q.v.) included in it to mutual assistance and some was given. The council fire was with the Onondagas, they being the strongest of the Six Nations, and it has always remained with them. By treaties with friendly

native white people and the State, the Onon¬ dagas from time to time were induced to sur¬ render their possessions, until finally they were allotted a ˆreservationˆ a few miles south of the city where they were to occupy permanent homes and makes the best of the rocky hills constituting most of their land. There the Onondagas, to the number of about 425, still exist, wedded to their habits and traditions. Many of them speak English and a few attend the Methodist or Episcopal mission and a goodly number of the children attend a school supported by the State. The religion of most of them is essentially pagan, and many of those who profess to be converted to the Christian faith find it difficult to divest themselves of pagan leanings. When emigrants began to come to the locality from New England as early as previous to the Revolutionary War, they were received kindly by the Indians, even if they recognized the fact that they were in a sense trespassers, so that when the county was created in March 1794 there was a considerable settlement scattered over most of it. As early as 1789 the Salt Springs, long known to the Indians who had produced salt from them, be¬ came known to white settlers, and they, in a crude manner, began the manufacture of salt and sent quantities of it to the Eastern market. The State assumed control of the Springs in 1797 (20 June) and leased lots and privileges to whomsoever might desire them ; during the remainder of that year 25,474 bushels of salt was produced and inspected by the State of¬ ficials, the lessees being required to pay a royalty or tax per bushel produced. The an¬ nual product increased rapidly so that in 1810 452,050 bushels were made; (1820) 458,329 bushels; (1830) 1,435,446 bushels ; (1840) 2,621,-305 bushels; (1850) 4,268,919 bushels; (1870) 8,748,115 bushels. About 1890 the annual prod¬ uct began to diminish, mainly because of com¬ petition at Warsaw and in Michigan. It was* estimated that at

one time the Springs gave employment, directly and indirectly, to one-half of the population of the city; but with their decadence, more and more attention was given to the development of manufacturing industries, which have now become very nu¬ merous, having vast capital and being the main support of the wage-earners of the city. Prin¬ cipal among these is the Solvay Process Com¬ pany, whose extensive works are situated just across the west line of the city, on the State Barge 'Canal and New York Central Railroad. The company also has branch works at Delray, Mich., near Detroit, which have a capacity of about 500 tons of alkali per day. The amount of capital invested at Syracuse is estimated at $6,000,000 and about 5,200 men employed. The principal products are soda ash, bicarbonate of soda, caustic soda and crystals, of which the daily output is estimated at 1,000 tons. This company also makes coke, tar, ammonia, car¬ bolic acid, picric acid and some other coal-tar products. Here again salt becomes both indis¬ pensable and profitable, for it is an essential element in the production of alkali, by the so- called ammonia process, which is employed here. The company obtains its brine from wells which it sunk near Tully, some 20 miles south of the city, and brings the brine to its works through iron pipes, It was in the sinking of

these wells that the source of the brine which for so many years has been utilized in Syra¬ cuse was found, in a mass of solid salt, ex¬ tending, no doubt, for many miles east and west. It was found necessary to discharge fresh water into some wells, when it would become saturated and then pumped from other wells to the pipes leading to the works. Experiments made at this point in the belief that the discov¬ ery would verify the source were justified. The supply is supposed to be absolutely inexhaustible, but singularly enough the brine is not suitable for the best quality of salt, which is still pro¬ duced from local wells to the extent of nearly 2,000,000 bushels per year. The company pro¬ cures its limestone from Split Rock, several miles southwest of its works, bringing the ma¬ terial in by means of large buckets suspended on overhead wires and moved by steam power. They run in close connection and continuously and are capable of transporting 1,000 tons in 12 hours. A vast excavation has been made in the great layer of rock, of much breadth and thick¬ ness. Much of the building stone came from this quarry before it was converted to its pres¬ ent purpose. The ®waste® product of the works has been used to fill surrounding low lands un¬ til hundreds of acres

have been covered to great depths and places of deposit are now so limited that Onondaga Lake will henceforth be used as the place of discharge. The material is white and like marl and possesses no sus¬ tenance for vegetation.

The State Fair is always a feature of the social life of Syracuse, as well as entertainment for thousands of people from abroad. The grounds, situated on the western border of the city, consisting of 100 acres, quite covered with buildings for various purposes, embrac¬ ing a very costly speeding track, are owned by the State, under an act of the legislature making the establishment permanent. Several clubs of large membership, the Century leading and much the oldest, are centres of sociability and places for business conferences among men, while there is one woman's club, the Kanatenah, and many other social organiza¬ tions.

Population. — When the county was created in 1794 the county-seat was established at Onondaga Hill, four miles southwest of the present city centre ; but the construction of the Erie Canal and development of the salt works caused a change of the county-seat to Syracuse in 1827, when the population of the village created in 1825 had increased to about 2,000 and to 6,829 in 1830. The population of Syracuse has increased steadily and very rapidly, as follows: 1850 (city incorporated in 1848), 22,271; (1860), 28,119; (1870), 43,051;

(1880), 51,792; (1890), 88,143 ; (1900), 108,374; (1910), 137,249; (1920), 171,717.

Frederick E. Norton, Secretary, Syracuse Chamber of Commerce.

SYRACUSE, ancient SVIAGOSA, Sicily, a city and seaport on the southeastern extremity of the island, 80 miles southwest of Messina. It has an excellent harbor but has greatly de¬ clined from its ancient magnitude and splendor when it had a population of 500,000 inhabitants. Ortygia, once an island, now a peninsula, at the southeastern portion, contains all that re¬ mains of the ancient city. Here arc seen ruins

of a Greek temple, dedicated to Diana or Apollo, a castle, remains of ancient baths and mediaeval palaces, a cathedral built within the columns of a Doric temple to Diana or Minerva. There is also a museum containing valuable antiquities, coins, etc. In the southern portion of the town is the fountain of Arethusa, called la Parruca by the inhabitants, whose water became salty after an earthquake. Parts of the walls of the ancient city are preserved, which formerly enclosed

the entire city on the main¬ land, also of the two great aqueducts; a Roman amphitheatre of the age of Augustus ; a Greek theatre of the 5th century b.c. ; a temple to Ceres and extensive catacombs ; the massive towers of the fortifications of the castle Euryalos in the northwest, subterranean pas¬ sages hewn through solid rock, etc., with end¬ less ramifications in all directions. The Ear of Dionysius, a deep grotto with a wonderful echo, is 170 feet long, 60 feet high and 20 to 35 feet wide. Syracuse was founded by Greek Corinthians in 734 b.c. Its early political his¬ tory is obscure; it is known that it thrived and itself sent out other colonies, becoming the largest and wealthiest city of the Old World. It had at one period a democratic government. In 215 b.c. it was invested by the Romans and defended by Archimedes, resisted for three years, but finally surrendered 212 b.c., remain¬ ing in possession of the Romans till the down¬ fall of their empire. Theocritus and Archimedes were natives of Syracuse. An increasing ex¬ port trade is carried on in olive oil, ' lemons, oranges, etc. Pop. 27,352. Consult Baedeker, C., (Southern Italy and Sicily) (16th ed., Leip¬ zig 1912) ; Freeman, E. A., (History of Sicily } (4 vols., Oxford 1894) ; Cavallari and Holm, (Topografia archeologica di Siracusa > (Palermo

1883, 1891).

SYRACUSE UNIVERSITY, located at Syracuse, N. Y., was chartered in 1870. The collegiate department, which was first opened in 1871, was the continuation of Genesee College, founded at Lima, N. Y., in 1849. In

1872 the Geneva Medical College, founded in 1835, was moved to Syracuse and became the College of Medicine of the university and in

1873 the College of Fine Arts was organized. This latter was an experiment in American education and has proved eminently success¬ ful. The College of Law was added in 1895, the College of Applied Science in 1901, the Teachers' College in 1906, the Library School in 1896, the Summer School in 1901, the Grad¬ uate School in 1911, the New York State Col¬ lege of Forestry in 1911, the College of Agri¬ culture in 1910, the School of Oratory in 1914. The Hospital of the Good Shepherd became a part of the university in 1915. The College of Liberal Arts offers one course leading to the degree of A.B. The course includes certain required studies, one major subject (six hours a week for two years), one minor subject (three hours a week for two years) and free elec¬ tives to complete the required number of hours. Instruction in Bible study is a part of the curriculum but the courses are elective. The Graduate School provides for work leading to the

degrees of A.M., M.S. and Ph.D. The College of Fine Arts offers a four years' course in architecture, leading to the degree of B.Ar., a four years' course in painting, leading to

the degree of B.P., four-year courses in piano, vocal, organ and violin, leading to the degree of B.Mus., a course in Belles-lettres leading to the degree of B.L. These courses include in¬ struction in general history, philosophy, etc., as well as in theory, history and practice of the arts. The College of Medicine offers a four years' course, leading to the degree of M.D., and the College of Law a three years' course, leading to the degree of LL.B. Two years must be spent in a college of liberal arts before the medical course is undertaken and one year before the course in law can be undertaken. Students can so arrange their electives as to complete the college and medical courses in seven years, the college and law courses in six years. The College of Ap¬ plied Science offers courses in civil, electrical, mechanical and chemical engineering, leading to the degrees of C.E., E.E., M.E. and B.S. in chemical engineering. The students main¬ tain literary, historical and scientific associa¬ tions and the Greek-letter fraternities are well represented. Physical training is a regular part of the collegiate course and there is a general interest in athletics. All business of the ath¬ letic teams is in the hands of the athletic gov¬ erning board, which includes representatives of the faculty, the students, the alumni and in¬ terested business men of the city. Dormitories for women include Winchell Hall, Haven Hall, Reid Hall and eight cottages. Sims Hall is the dormitory for men. Many of the students live in their fraternity houses. The campus contains 100 acres situated on a hill overlook¬ ing the city and surrounding country. The university farm is located a mile from the campus. ' The buildings of the university in¬ clude (1916) the Hall of Languages, the Charles Demarest Holden Observatory, the Carnegie Library, the John Crouse Memorial College (for the College of Fine Arts), the College of Medicine, the College of Law, the Archbold Stadium and Gymnasium, the Women's Gymnasium, the Esther Baker Steele Hall of Physics, the Lyman Cornelius Smith College of Applied Science (containing shops for metal and wood work), the Administration Building, Lyman Hall of Natural History, Bowne Hall of Chemistry, New York State College of Forestry building, the Photography building, the free dispensary, Margaret Olivia Slocum Teachers' College, the Joseph Slocum College of Agriculture, nearly a block of hos¬ pital buildings and the University block, one of the largest commercial buildings in the in¬

terior of New York State, erected for invest¬ ment purposes. In 1902 the United States gov¬ ernment established a weather observing sta¬ tion with complete equipment in the Hall of Languages. The library contains over 100,000 volumes, including the general library, the his¬ torical library of Leopold von Ranke, purchased in 1887 and other special libraries in economics, science, etc. The Syracuse City Library and the law library of the State Court of Appeals are open to students. The students number over 4,000, of whom 1,500 are in the College of Liberal Arts, and the faculty, 325.

James R. Day, Chancellor.

SYRIA, a country of western Asia, geo¬ graphically and anthropologically a kind of

peninsula of the Mediterranean, forming a bridge between north and south, connecting Asia Minor and Mesopotamia with Arabia and Egypt, and bounded by the sea on the west and by the desert, only some 60 miles inland (at the narrowest part) on the east. The name <(Syria® is rather a geographical expression than a geo¬ graphical fact, for the region which bears that name on our maps has been arbitrarily thus delimited by modern (Christian) geographers. The name was originally of much wider appli¬ cation than it is now, while even to-day, strictly speaking, it includes Palestine. The subjects of the Assyrian Empire, from the Black Sea to the Mediterranean, were known ’in ancient times as Assyrians or, in the abbreviated form, Syrians. These two names came at a later period to have different applications : Whereas ((Syria® once meant all the Assyrian Empire and also Mesopotamia, it became usual with the Greeks and Romans to apply that name to the more western of these regions, but in¬ cluding Palestine. Later on, Christian senti¬ ment created imaginary boundaries out of ex¬ isting landmarks and separated the <(Holy Land® from a part of itself, a proceeding that gave birth to the prevalent erroneous impression that Syria and Palestine are two distinct coun¬ tries. Geographically and geologically they cannot be separated; the mountains of Pales¬ tine, both on the western and eastern sides of the Jordan, are, respectively, the terminations of the Lebanon and Anti-Lebanon Mountains. The Jordan Valley is a continuation of the Buka Valley, and three out of the four sources of the river Jordan itself are in Syria. The district we describe as Palestine no longer means as once ((the land of the Philistines,® and always has included much which the Philistines never held ; it was never entirely held by the He¬ brews for any length of time. Its boundaries correspond with the idealized limits of Canaan as divided among the 12 tribes, with the possessions of the Hebrew kings in the

days of their greatness, and with the Palestine of New Testament history.

Syria, under Turkish rule, was divided into four vilayets and two ˆindependent sanjaks® as follows: Aleppo, 33,430 square miles, pop. 1,500,000; Syria, 37,020 square miles, pop. 1,000,- 000; Beirut, 6,180 square miles, pop. 533,500; Lebanon, 1,190 square miles, pop. 200,000; Zor, 30,110 square miles, pop. 100,000; Jerusalem, 6,600 square miles, pop. 341,600. The last two are (<sanjaks®; the whole of Palestine was in¬ cluded in that of Jerusalem and the vilayet of Lebanon. Total area, 114,530 square miles; pop. 3,675,000. Of the area, not more than 12,000 square miles comprise Palestine, to which also belong between 600,000 and 700,000 of the population. The ancient inhabitants called the country ((Aram,® of which name the Biblical ((Syria® is a translation. The Arabs called it esh-Sham (the left) north of Mecca and Me¬ dina; and Yemen (Yamin) to the right of those cities. Damascus, believed to be the most an¬ cient city in the world, was the capital of the Aramaic kingdom. While the modern inhab¬ itants use the ancient inclusive name Suriyya, the Arabs call both Syria and Damascusˆ esh- Sham ; the Turkish name is Suria (also Sham) ; the Persians call it Soristan.

Topography. — Regarded in the ordinary sense of the name, Syria is the long and nar-

row district on the eastern shore of the Mediter¬ ranean, extending from the Taurus range on the north, separating it from Asia Minor, to Egypt on the southwest, between 36° 5' and 31° N. lat. and long. 33° 30' and 39° E. The Euphra¬ tes forms the northeastern border; the Syrian Desert the eastern limits, and Arabia on the south and southwest. The Mesopotamian plains are separated by the desert from the Mediter¬ ranean coast region, which stretches nearly in a straight line from the Sinai Peninsula north¬ ward to Anatolia. The desert forms a chalk and limestone tableland rising gradually to an altitude of over 2,000 feet above sea-level, stretching away southward into the Arabian Peninsula, but on the west sinking abruptly down to the long, deep and narrow depression of El-Ghor, which forms the eastern limit of the southern section of the coast region known as Palestine. Farther north the desert merges imperceptibly in the plains of Damascus and Aleppo and thus presents no natural well-de¬ fined limits to Syria on the east. Elsewhere the boundaries are sufficiently clear. The total

length north and south is variously estimated at between 370 and 430 miles, with a mean breadth of 100 miles, narrowing in the south to 60 and expanding northward to 150 miles. Palestine is cut off by the Lower Orontes (Nahr el-Asi) and Mount Hermon from Syria proper, measuring from this point to the southern end of the Dead Sea (Bahr Lut, i.e., Lake of Lot) about 160 miles, with an average breadth of 70 miles. Geologically, Syria is a great desert- plateau only differentiated from the North Arabian Desert by a picturesque mountain- wall, split in the north into two parallel chains — the Lebanon and Anti-Lebanon, the latter falling gradually northward down to the plains of Upper Mesopotamia, while the former is continued by the less elevated Jebel-Nusarieh as far as the plain of Antioch, about the 36th parallel. North of this plain the Jebel-Nusa¬ rieh is continued by the Giaour-Dagh and Akma-Dagh to the Taurus above the Gulf of Alexandretta. These ranges condense the va¬ pors from the sea and remain snow-clad till late in summer, giving the 10 to 16 miles' breadth of the Syrian seaboard its luxuriant subtropical vegetation and Palestine its fertil¬ ity as far as its southern borders. The Leb¬ anon range runs for about 90 miles southwest and approaches at some points to within 8 or 10 miles of the Mediterranean, presenting to seaward the appearance of bare, rocky walls surmounted here and there by a few snow¬ decked peaks, Dahr-el-Kodib (10,200 feet) and Jebel-Makmal (10,020 feet). From these is de¬ rived the name of Lebanon (white moun¬ tains), which was already current in the time of Moses. Despite its rugged appearance the Lebanon contains many fertile slopes and val¬ leys, well cultivated and thickly populated. East¬ ward it is cut off from the Anti-Lebanon by the still more fertile plain of the Beka'a (Coele- syria), whose bald, rocky ramparts present more varied outlines than the coast range. The southern extremity of the Anti-Lebanon rises in the Jebel-esh-Sheikh (Mount Hermon) to an altitude of nearly 10,000 feet, the culminating point of the Syrian highlands, about 30 miles southwest of Damascus, the capital of Syria. The offshoots of the Lebanon range also stretch southward, with slight interruptions,

throughout the whole of Palestine. Where it enters that country the upper part approaches the sea and at Mount Carmel sends forth a lat¬ eral branch, which farther south is separated from the sea by a fertile plain. Within this region are situated the oldest and most famous places in Palestine, including the mountains of Naphtali, and of Ephraim and Judah. It is this range which prevents the Jordan from flowing toward the sea and compels it to fol¬ low a southern course until it loses itself in the Dead Sea. Excluding the southeastern flanks of Hermon, both the Lebanon and Anti- Lebanon ranges are of

limestone formation ; the former is a single ridge deeply marked from the effects of erosion by water, while from the latter five ridges diverge northward. The spaces between them is taken up by a plateau of from 4,000 to over 5,000 feet above sea- level. The depression of El-Ghor, referred to above, is the deepest in the earth's crust, fall¬ ing about 13,000 feet below sea-level, or more than 4,000 feet lower than the Beka'a plain. The four main streams — the Jordan, Leontes, Orontes and Abana — rise in the neighborhood of Baalbek, under the 34th parallel. They flow in four opposite directions, south to the Dead Sea, southwest and northwest to the Mediterranean, and east to the Bahr-et-el-Atei- beh, some five hours' journey beyond Damas¬ cus. The Euphrates, breaking the Taurus in a succession of cataracts and rapids, flows south and southeast, separating Mesopotamia from Syria and the deserts of Syrian Arabia, and is joined by the Tigris at Kurna. In the course of the Jordan are the lakes of Merom (El- Huleh) and Tiberias, and at its mouth is the Dead Sea. There are few perennial streams in Syria ; the rain is quickly absorbed by the stony ground. Some of the old river-beds (wady) are deeply eroded. The mountain chains divide Syria into three regions — a western, consisting of a narrow belt of low¬ land extending between the sea and the moun¬ tains, sometimes sandy, but generally fertile; a central, occupied by the principal mountains of the chain; and an eastern, consisting for the most part of a bare, arid, sandy plateau, occa¬ sionally relieved by a few oases. Above all towers Mount Hermon, visible from almost all parts of Syria and forming a valuable land¬ mark for the guidance of caravans. The <(Lit- tle Ghorˆ or plain of Gennesareth stretches west of Lake Tiberias. On the eastern border of Syria extends the interior of the country, a fertile steppe, which when artificially watered yields the most luxuriant produce. This re¬ gion, which is called the desert on account of its lack of water, stretches at a mean level of 1,900 feet to the vicinity of the Euphrates. It is inhabited by independent, nomadic Bedouins and frequently traversed by caravans. Beyond the Jordan, not far from Mount Hermon, rise the volcanic hills of Tulul. To the south of Damascus lie the ancient wheat-bearing plains of Hauran and the mountains of that name, a region in which numerous ancient inscriptions are to be found. Farther south extend the mountains of Gilead, partially wooded. The mountains of Moab form an extensive table¬ land separated from the desert toward the east by a low range of hills. Between the Hauran and the Oasis of Damascus there stretches a broad expanse of volcanic hills, the Eastern

Trachonitis (Tulul-es-Safa), toward the north¬ ern verge of which stand the stupendous ruins of Palmyra (Tudmur), supposed to have been built by Solomon. The Ala region between the vilayets of Damascus and Aleppo forms an ex¬ tensive basaltic' upland tract for many miles east of the Orontes. Here are the ruins of many ancient cities. In the extreme north the great inland plateaux of Aleppo, Umk and Ain- tab occupy all the space between the bend of the Euphrates and the coast range, and are thickly inhabited by Turkoman and Armenian agriculturists. This region marks the extreme limits of both of these races toward the south¬ west. West of the Umk plateau lies the Bahr- el-Abiad (Lake of Antioch), a fine sheet of water, eight miles by six, formed by the junc¬ tion of several steppe streams and draining to the Orontes.

Flora and Fauna. — Vegetation is much more varied and luxuriant in the north than in the south. The fertility of the soil of Syria is extolled by many ancient writers as well as in the Bible. Even the Syrian ˆdesert® consists, not of sand, but of excellent soil, which after the early rain produces a rich crop of grasses and flowering herbs, affording most valuable pasture. The whole coast-district belongs to the region of the Mediterranean Flora, which ex¬ tends around the basin of that sea, reaching in¬ land as far as the lower hill country. This vegetation is, therefore, similar to that of Spain, Algeria and Sicily, with some modifica¬ tions in the direction of Egypt. Among the principal products are corn, cotton, fruit in al¬ most endless variety, indigo, sugar cane, grapes, oranges, mulberries, olives and tobacco. The tobacco especially of the Latakia district facing Cyprus is noted for its powerful, aro¬ matic flavor. What still remains of the his¬ toric cedars of Lebanon is now found only at a solitary spot a few miles below Tripoli; far¬ ther south, the rose of Sharon is still cultivated. Inland, as the higher ground of the interior is approached, the vegetation changes to that of the Oriental type, a great variety of species with a dry and thorny undergrowth and stunted trees. The vegetation of the Jordan Valley somewhat resembles that of Nubia on the verge of the tropics. Considerable quanti¬ ties of raisins are grown round Damascus and Es-Salt. Pistachios are raised in northern Syria and nuts in central Syria, while in the desert near Damascus and east of the Jordan kali or saltwort is grown extensively. The gall apples produced by the oaks of the north are largely exported to Europe for dyeing purposes. Other products are licorice, alizari or madder, the bark of the pomegranate tree (used in tan¬ ning) and sumach, figs, citrons, pomegranates and almonds, cucumbers, onions, artichokes, egg-plant and truffles. While the cedar and cy¬ press is growing rare, the pine is common ; tamarisk and the poplar willow are frequently

met with, as well as the terebinth or turpentine tree and the Valonia oak.

Among wild animals the chief are the Syrian bear, the hyaena, jackal, boar, panther and ounce. A connecting link between the domestic and the wild animals is formed in Syria by the dog and the cat. Each town and village is in¬ fested with masterless dogs who subsist on the refuse. There are two species of the fox and the wolf is not uncommon in the Lebanon

Mountains. Gazelles are hunted in eastern Syria. The numerous caverns harbor several varieties of bats ; there are four species of hares and numerous rodents, among them the graceful jumping mouse of the desert. The domestic animals include a small but hardy race of horses; camels and mules are also used as beasts of burden, especially in the trade be¬ tween the coast and the interior. Fat-tailed sheep are plentiful, but the transplanted An¬ gora breed soon degenerates. Pigs are prac¬ tically unknown. The domestic hen is very common, but ducks are only to be found in a wild state. Partridges occur on all the hills and quail in the cornfields of the plains. The eagle and vulture are found about the Dead Sea, while storks, cranes and becassins fre¬ quent different localities. Among the few sing¬ ing birds the nightingale (bulbul) is the most notable. Fish abounds in the Jordan and Lake Tiberias as well as in almost all the perennial streams. Both Syria and Palestine are rich in ˆcreeping things® and insects. Crocodiles have been seen (though very rarely) in the marshes between Haifa and Kaisariyeh on the Palestine coast, where the climate resembles that of the Nile Delta. The common chameleon, the harm¬ less little gecko and numerous snakes, many of them poisonous, are found, as well as the land tortoise and the small-tailed water tortoise. Among the mountains occurs the dark-colored khardon of the Arabs, with its prickly tail and back. Mosquitos, wasps, wild bees, hornets, grasshoppers (or locusts) are common. Lo¬ custs are the plague of farmers, often devour¬ ing whole crops ; they are eaten only by the Bedouins. North of Beirut sponges are found on the coast, where there is a large fishing in¬ dustry.

People. — The inhabitants of Syria present a conglomeration of races united by one com¬ mon language, Arabic. They are mainly mem¬ bers of the great family named Semitic, a purely conventional term used to designate the group of peoples who are ethnographically al¬ lied by their languages — those of a peculiar construction and similar in character to the Hebrew. The dwellers of Syria consist chiefly of descendants of the ancient Syrians, Arabs, Turks, Greeks and Jews; among the most cel¬ ebrated tribes are the mysterious Druses and

Maronites, while several other nomadic tribes such as the Turkomans, dwell in the north; Kurds, on the banks of the Euphrates, and Bedouins in the Syrian Desert. Greeks, Ro¬ mans and European crusaders have all blended with the ancient Semitic stock to produce the Syrians of to-day.

From the most remote times Syria was in¬ habited by Semitic stock; the Philistines and Hittites were the only exceptions. The former, whatever their origin, were soon merged with the primaeval inhabitants, adopting both lan¬ guage and religion. In like manner the non- Semitic branch of the Hittites was absorbed. The Arab invasion in the 7th century intro¬ duced a new factor. All the people of Syria, as well as Egypt and Mesopotamia, became unified by a vigorous conquering race which left an ineradicable mark on the language and culture of the Christian and Jewish natives, to whom they were racially related, though of a different faith — Islam. That religion was even an eclectic compound of popular Christianity

and Judaism. Their language, Arabic, was most properly spoken in all Syria, while an Arabic Christian dynasty had existed in Damas¬ cus even before the invasion. These vigorous sons of the desert brought about a double proc¬ ess of assimilation. They learned eagerly from the natives, from the Persians and the Greeks. They were apt pupils who in many cases were not only able to improve upon the wisdom of their teachers, but also to absorb and mold all this foreign learning into the Arabic lan¬ guage, even to the extent of applying Arabic equivalents for the technical words of science or philosophy instead of using the Greek forms. That process of acclimatizing foreign ideas and culture is still prevalent among Syrian writers to-day. The Mohammedan invaders absorhed many of the old customs and religious tradi¬ tions of the soil and adopted the old shrines of saints in different communities and gave them Mohammedan names. Through their language they impressed their own poetry, national heroes and saints upon the people with the result that the most modern Syrian writers echo the voices and thoughts of Arabian bards and philosophers. In the Syria of to-day the Chris- tions, Mohammedans and Jews possess a com¬ mon heritage of proverbs, legends, parables and superstitions. Indeed, it is no exaggeration to say that the modern Syrians are one people with the same fundamental outlook on life, despite their different religions and sects, characteris¬ tics, clannish traits and various dialects. In this happy

blending of races the natural endow¬ ments of the people are favorably exemplified by the Christian section of the population. They form a highly intelligent people with a remark¬ able capacity for adopting European ideas. The admixture of Greek and Arabic blood seems not to have impaired the good qualities of their Phoenician and Aramaen ancestors. The inhabitants of the coast districts are still Phoe¬ nicians in their enterprising spirit, commercial skill and love of travel. In Marseilles, Liver¬ pool and Manchester, Syrian merchants are set¬ tled who promote the interests of their native land, extending their trading relations to Scan¬ dinavia and North America. Intelligent indus¬ try is responsible for the prosperous condition of the Beirut Christians. Here proverty is rare, and everyone is engaged in some branch of in¬ dustry or trade. Family life is simple and patriarchal. The women are thrifty housewives and devoted to their families, associating little with the outside world. The Druses and Turk¬ omans (qq.v.) are alien races; the old Syriac or Aramaic tongue is spoken only by the Nestor- ians of Kurdistan; the Turkish officials and soldiers under the old regime spoke their own language.

Education and Religion. — Under Turkish rule elementary education was nominally com¬ pulsory for all children of both sexes, while the Ministry of Public Instruction provided for the inspection of schools maintained by non- Moslem communities. In Syria there are many native schools and other educational institu¬ tions maintained for foreign missions. In the numerous girls' schools instruction is limited mainly to the study of French and English. The (<Sisters of Charity® conduct an excellent training school where woman's work is taught and native teachers are trained. The rival houses of the <(Sisters of Nazareth® and of the

<(Prussian Deaconesses® are highly praised for their labors, while the American missionaries aim especially at practical objects of education.

In religion the bulk of the inhabitants are Mohammedans ; the Christians make up one- fifth of the total, and are divided into Orthodox Greeks, United Greeks, Maronites (q.v.), Ro¬ man Catholics, Nestorians and Protestants. The number of Jews is estimated at about 200,000. Protestantism is making rapid progress in Beirut (where that denomination maintains a fine church, several schools and a printing establish¬ ment) and in the Lebanon. In the latter region also dwell some Bedouin (<Ishmaelites,® de¬ scended from the murderous sect of <(Assassins,® who have given a familiar word to most Eu¬ ropean languages. Quite recently large settle¬ ments of Moslem Circassians, driven from their homes by their objection to living under Chris¬ tian

Russia, have been established east of the Jordan.

Towns. — In Syria many of the most ven¬ erable cities in the world, such as Damascus, Aleppo, Emessa, Beirut and Jerusalem, still flourish and retain their ancient names in modi¬ fied but recognizable forms. Tyre, Palmyra, Baalbek and some other famous places have either disappeared or shrunk into obscure ham¬ lets. The principal seaports of Syria are still found on the coast of what was once Phoenicia, the home of the most famous navigators of antiquity. Beirut is the chief port and next to Smyrna the largest and most flourishing sea¬ port in the Levant. Two other northern ports are Latakia and Tripoli; the southern ports, Sidon, Tyre, Acre, Caesarea (Kaiseriyeh) and Ascalon, have lost their trade and importance during the centuries since the Crusades and are now little more than fishing villages with small local traffic. Jaffa (Joppa) has recovered all its former prosperity owing to the orange in¬ dustry and the Jerusalem Railway. Alexandretta (Iskandrun), in the extreme north, contains the finest harbor on that coast, but is the most fever-stricken spot in that region. Swedea (Seleucia), about 30 miles south of Alexan¬ dretta, also has a fine natural harbor. A pecu¬ liar feature of this district is that practically all the inhabitants are afflicted with the ((Aleppo Button® or the ((Baghdad Date Mark,® each the result of a boil that always lasts a year before healing. Europeans contract these diseases often during only a few days' stay. Sidon (q.v.), now called Saida, is of consider¬ able historical interest.

Communications. — Of the three great routes which have been the main thoroughfares between Europe and Asia — namely the Red Sea, the Euphrates Valley and the Caspian — the Euphrates is the most ancient and most direct. From remotest antiquity it has been the main channel by which the riches of the East have flowed to the West, and to possess this Indo-Syrian trade route has been the desire of all great European powers, for the region it traverses is the pivot of European domination in Asia. The first great traffickers between East and West were the Phoenicians, whose suc¬ cess in commerce was probably largely based on their trade connections across the Syrian Desert with the Persian Gulf. Trade continued to flourish from the 6th to the 12th centuries, the Arab irruption causing but little interfer¬ ence, Then the Mongol avalanche burst into

the Euphrates Valley and Europe lost her hold on Asia, for the land

route was severed. On the heels of the Mongols came the Turk, who laid the foundations of the Ottoman Empire on the bridge between Europe, Asia and Africa, completely strangling all Indo-European inter¬ course. The establishment of the British Le¬ vant or Turkey Company in the 16th century gave the first impulse to the revival of the old Euphrates route until, in 1750, the Indo-Syrian caravan tracks came again into a brief period of comparative prosperity. But for the discov¬ ery of an unbroken waterway to India and the cutting of the Suez Canal, this route would have remained the highway of the East. Even in the early part of the 19th century, despite the preference for sea-borne trade, the pros¬ pects of a revival of the old land-route were encouraging. The proposed Euphrates Navi¬ gation Company and Railway were outward signs of a great need which Great Britain was slow to recognize, but which Germany eventu¬ ally took up and attempted to realize in her road to the East. It is not improbable that future historians, delving in the diplomatic records of the past 25 years, will assign a prom¬ inent place among the “causes® of the Great War to the silent struggle for the command of the Mediterranean and the bridge between East and West. From Alexandretta to Aleppo the road is now accessible to wheeled traffic. From this point the pilgrims’ route to Mecca and Medina is superseded by the railroad following the Orontes Valley by Hamah and Homs to Damascus, running thence through the Hauran southward to Arabia. Geographically, the Syrian railways form a sort of southern prong of the Bagdad Railway. In Syria railway enterprise began Avith a roundabout line of 54 miles, run¬ ning from Jaffa to Jerusalem, opened in 1892. Since then great progress has been made, and altogether about 1,400 miles were in operation in 1914, with electric street cars in Damascus and Beirut. Since the end of 1906, when the section Aleppo to Hamah was opened, a French line has united the former town with Rayak on ihe line from Beirut to Damascus, with a total length of about 206 miles and a big bridge over the Orontes at Hamah. The same company owned a line from Homs to Tripoli, which was taken up to use the material elsewhere. North of Rayak the lines have the normal or “conti¬ nental® gauge; all those to the south of this point are narrow guage. Here also is the junc¬ tion of the French system, a line of about 155 miles, connecting Beirut Avith Damascus and Mezeril. Starting from Beirut Harbor, the rail¬ way climbs up the Lebanon (by cogwheel) for about 5,000 feet to a point just above Ain Sofar, winding thence down to the valley of the Bekaa, in which Rayak junction lies. From there the line runs southeastward across the plain and crosses the Anti-Lebanon to Damas¬ cus, to the south of which city the line (which was taken up during the Avar) ran almost paral¬ lel to the west of the Hedjaz Railway. The Hedjaz line was built

by the Turks with the assistance of foreign engineers, mainly for the use of pilgrims, and Avas opened for traffic as far as Medina (820 miles) in 1908. Starting from Damascus, it was never completed to Mecca or prolonged to the Red Sea coast as proposed. It has a branch (22 miles) connect¬ ing Bosra with Deraia, as well as a line to

Haifa, northAvest of Nazareth, and a 25-mile feeder from Amman to Es-Salt. From Beirut a steam tramway runs along the coast 10 miles north to Yunie.

History.— - From Egyptian records in stone and papyrus it seems that, at the earliest times known to us, Syria, or at any rate Palestine, was at times a dependency of Egypt. As regards commerce, manufactures and agriculture the country had reached a considerable degree of civilization. A record of the days of Rameses II (1300-4280 b.c.) mentions 38 fortified places in Palestine and 18 more north of Tyre. At an early period Syria became part of the Assy¬ rian Empire, and afterwards passed to the Per¬ sians under Cyrus, and the Greeks under Alex¬ ander, Avho conquered the country after the bat¬ tle of Issus in 333 b.c. Ten years later Ptolemy took possession of Syria and Palestine, and in 312 b.c. began the era of the Seleucides, when Antioch \ras founded. The Seleucide dominion lasted 248 years, when the conquering Romans made Syria a Roman province in 64 b.c. At this period the Aramaic language was chiefly spoken throughout Syria, although the Greek language and culture Avere gradually being in¬ troduced. Under the Greek and the later Roman supremacy there sprang up, even in re¬ mote parts of the country, numerous buildings of great splendor. About the beginning of our era Palmyra was particularly noted for the magnificence of its architecture. The whole of Christian Syria, including Palestine, was av rested from the Eastern Roman Empire by the Persians in a.d. 611-614. Nomadic tribes of Arabs had from time immemorial ranged over the Syrian plain as far as Mesopotamia, and certain Arab tribes from the Yemen were set¬ tled in Syria, particularly in the Hauran. For centuries before the rise of Islam the Arabs were everywhere a disturbing element to the Byzantine Empire. The new religion promul¬ gated by Mohammed produced extraordinary results. As by magic, long-standing intertribal feuds among the Arabs disappeared — they be¬ came a united nation galvanized by religious en¬ thusiasm. Shortly after the death of the Prophet the Arabs defeated the Byzantines, and Syria fell into their hands (636). It was gov¬ erned by caliphs till 883, and then passed un¬ der various masters till it was conquered by the Seljuk Turks, who gradually obtained pos¬ session of the Avhole country (1070-85). The first Crusade began in 1096; Antioch fell to the Crusaders in 1098. By 1118 the kingdom of Jerusalem had been established and the Franks

had taken Caesarea, Tripoli and Beirut. The next 140 years included the romantic period of Richard Coeur de Lion and Saladin, the latter becoming master of the Avhole of Syria except the Frankish possessions (1183). North and central Syria were conquered by the Mongols in 1 259—60 ; in 1291 the Mamelukes ended the Frank rule in Palestine and later united Syria Avith Egypt. After this period the history of Syria presents few points of interest; internal strife continued between the Mamelukes, Cir¬ cassian sultans and Mongolian governors. In 1400 came the Mongol invasion of Tamerlane, when great numbers of the inhabitants were massacred.

War broke out in 1516 between the Otto¬ man Turks and the Mamelukes; the latter were defeated by Sultan Selim, and in the following

year the whole of Syria was incorporated in the Turkish or Ottoman Empire — a connection destined 10 be severed 400 years later by the Great War. The more important events in the modern history of Syria are its conquest by Mehemet Ali of Egypt in 1833, and its subse¬ quent restoration to Turkey in 1840 by the in¬ tervention of the great European powers ; and the disturbances that broke out in the Lebanon district in 1860 between the Maronites and the Druses. A Maronite monk was found mur¬ dered, and suspicion fell upon the Druses. The latter made a general attack on the Maronite villages near Beirut and a large town under Mount Hermon. With a promise of protection the Turkish commander ordered the Maronites to lay down their arms. On this being done, they were abandoned to their enemies, who thereupon swarmed into their villages and mas¬ sacred all men, women and children. So far from rendering the promised protection, Turk¬ ish troops were said to have assisted in the butchery. France and Great Britain intervened; a French expedition was dispatched to the scene. Its active services, however, were not required. As a result of that intervention the Lebanon district was created an independent sanjak, the governor of which was required to profess the Christian religion.

During the European War in June 1917 Syria was invaded by a British force under General Allenby who captured Beersheba 31 Oct., Geza 7 Nov., and Jaffa 17 Nov. The victorious troops entered Jerusalem 9 Dec., and Palestine, separated from Syria, was created an independent sanjak under British administration.

See Antioch; Baalbek; Bashan; Beirut; Crusades; Damascus; Dead Sf.a; Druses; Gilead; Hittites ; Jaffa; Jordan; Lebanon, Mountains of; Maronites; Moab; Palestine; Palmyra; Persia, History; Petra; Samaria; Semites; Semitic Languages; Syriac Lan¬ guage; Turkey; Turkomans; Tyre; War, European — Turkish Campaigns.

Bibliography. — Baedeker's (Palestine and Syria) (Leipzig) ; Bambus, W., 'Palastina, Land and Leute) (ib. 1898) ; Bell, Miss G. L., <Syria) (new ed., London 1919) ; Bevan, E. R., (The House of Seleucus) (2 vols., London 1902) and (The Land of the Two Rivers) (ib. 1917) ; Bliss, F. J., 'The Religions of Modern Syria and Palestine) (Edinburgh 1912) ; Blunt, W. S., and Lady, (Bedouins of the Euphrates) (London 1879) ; Burton and Drake, Unex¬ plored Syria5 (1872) and Lady Burton's 'Inner Life of Syria5 (London 1875) ; Butler's 'American Archaeological Expedition to Syria5 ; Childs, W. T., 'Across Asia Minor on Foot5 (London 1917) ; Conder, 'Syrian Stone Lore5 (London) ; Cook, A. W., 'Palestine in Geog¬ raphy and History5 (2 vols., London 1901) ; Cook's Tourists' 'Handbook for Palestine and Syria5 (ib. 1906) ; Cuinet, V., 'Syrie Liban et Palestine5 (Paris 1896) ; Dassaud, R., 'Les Arabes en Syrie avant l'lslam5 (ib. 1907) ; Gallois, E., ' Asie-Mineure et Syrie5 (ib. 1909) ; Goodrich-Freer, Miss A., 'In a Syrian Saddle5 (London 1905) ; Harrer, G. A., 'Studies in the History of the Roman Province of Syria5 (Princeton 1915) ; Huntington, H., 'Palestine and its Transformation5 (London 1911) ; Jes¬ sup, H. H., 'Fifty-three Years in Syria5 (2 vols., New York 1910) ; Ivhairallah, K. T., 'La Syrie: territoire, origines ethniques et politiques,

etc.5 (Paris 1912) ; Leech, C., 'The Romance of the Holy Land5 (London 1911) ; Leary, 'Syria, the Land of Lebanon5 ; Lortet, L., 'La Syrie d'aujourd'hui5 (1884) ; Macmillan's 'Palestine and Syria5 (London 1912) ; Malech, G. D., 'History of the Syrian Nation5 (Minneapolis 1910); Maspero, G., 'Struggle of the Nations: Egypt, Syria and Assyria5 (New York 1897) ; Miller, Helen, 'Alone through Syria5 (London 1891) ; Moore, J., Jr., 'Outlying Europe and the Nearer Orient5 (Philadelphia 1880) ; Moutran, N., 'La Syrie de demain ; France et Syrie5 (Paris 1916) ; Navratzki, C., 'Die jiidische Kolonisation Palastinas5 (Munich 1914) ; Ober- hummer und Zimmer, 'Durch Syrien und Kleinasien5 (Leipzig 1898) ; Parry, O. H., 'Six Months in a Syrian Monastery5 (London 1895) ; Paton, L. B., 'The Early History of Syria and Palestine5 (ib. 1902) ; Perrot and Chipiez, 'History of Art in Judaea and Syria5 (2 vols., London 1890) ; Petrie, W. M. F., 'Syria and Egypt from the Tel-el-Amarna Letters5 (London 1898) ; Porter, J. L., 'Five Years in Damascus5 (1855) ; Post, Dr. E. G., 'The Flora of Syria5 (London 1896) and 'Essays on the Sects and Nationalities of Syria and Palestine5 (ib. 1890) ; Ramsay, Sir. W. M.,

‘Historical Geography of Asia Minor5 (ib. 1890) ; Rupin, A., ‘Syrien als Wirtschafts- gebiet5 (Berlin 1917) ; Sayce, A. H., ‘The Races of the Old Testament5 (London 1891) ; Schumacher, ‘Across the Jordan5 (ib. 1886) ; Segafl, J., ‘Travels through Northern Syria5 (ib. 1910) ; Smith, Sir G. A., ‘Historical Geography of the Holy Land5 (2 vols., London 1897) and ‘Syria and the Holy Land5 (pam¬ phlet, ib., 1918) ; Vogue de, ‘Syrie Centrale, architecture civile,5 etc. (Paris 1861-77) ; Wetz-stein, ‘Reisebericht iiber den Hauran und die Trachonen5 (Berlin 1860) ; Wood and Daw¬ kins, ‘Les mines de Palmyra5 (Paris 1812).

Henri F. Klein,

Editorial Staff of The Americana.

SYRIAC LANGUAGE AND LITERA¬ TURE, one of the members of the Semitic family of languages. It is a variation or dia¬ lect of the Aramaic tongue, which covered the districts of Mesopotamia, northern Syria, Damascus and eastern Palestine southward to Arabia Petraea. The language of Syria, es¬ pecially in its earlier form, differs very little from Chaldee or eastern Aramaic. The Latin equivalent of the name which is Sˆyriacus and its Greek equivalent mean of or pertaining to Syria or its language.

Language. — When Syriac first appeared within the view of history it must have been undoubtedly quite an ancient tongue, since its grammatical forms had assumed great definite¬ ness, though it was subject to constant linguistic influence from the powerful and highly or¬ ganized peoples by which it was surrounded. In later days it continued to be affected by Greek and still later by Arabic, the latter of which contributed to it many words. There was undoubtedly a very considerable body of pre-Christian Syriac literature; but this seems to have disappeared before the iconoclastic and missionary zeal of the Christian priests, though some of it may still be recorded from the ruins of very ancient Syraic cities. Syriac differs very considerably from Hebrew, more especially in its vocal system which is much more con-

densed than that of either Hebrew or Arabian. In the Aramaic the prefixed definite article does not exist ; it is replaced by the ending <(a* em¬ phatic, but no longer definite in the sense that the prefixed article is definite. Both Hebrew and Syriac have' 22 letters and these

are identi¬ cal in use and form, the dialectic difference of the two tongues being taken into consideration and allowed for. The Syriac tongue possesses 10 vowel sounds (aaeeiioouu) which were used during the living period of the lan-

§uage, rudicaled in the same manner as in the emitic tongues. Later on, when it was rapidly becoming a dead speech, two distinctly different methods of representing these vowels came into use. The West Syrians borrowed their's from the Greek alphabet, applying them in a some¬ what indefinite manner; while the East Syrians made use of a series of dots by which they secured a much more effective vowel designa¬ tion. The close relationship of Syriac to Hebrew and Arabic is evidenced by the fact that words having the same root in these three tongues have for the most part the same funda¬ mental vowel sounds, with occasional inter¬ change of letters and some slight and regular modifications indicative of the existing dialectic differences. In Hebrew the accent has a much greater tendency to lengthen the vowel than it has in Syriac, and the latter has a more primi¬ tive vowel system than the former. The pro¬ nominal suffixes to be found in all the mem¬ bers of the Semitic group of languages effect fewer modifications or changes of the vowels in Syriac than in Hebrew and some of the other members of the group. Syriac possesses no neuter gender, has only two numbers, singular and plural, and had early attained to much more flexibility of construction than Hebrew ; and this flexibility the Christian writers steadily increased. The Syriac verb is more regular than the Hebrew form, but it is notice¬ able for the lack of the original passive forms which have been replaced by distinct gram¬ matical inventions. Syriac has also contributed to its own flexibility by the invention of true tenses wdth the use of an auxiliary, thus at¬ taining a decided superiority over Hebrew. The use of conjunctions and prepositions shows that Syriac was working steadily in the direc¬ tion of an analytical construction. Its choice as the tongue in which so much early Christian literature was written was fortunate, since it gave very much greater facility to the expres¬ sion of thought and the presentation of ideas of so many kinds which has already begun to knock incessantly at the door of a new world of religious and philosophical imagination and reason.

Literature. — • The Syriac language is of great importance as the medium of literary ex¬ pression of so much of the activities of the early Christians and because of the numerous versions of the Bible or parts thereof written in it. The Syriac writers showed all the literary activity of their ancestors and of the Semitic races by which they were surrounded. There is no doubt but that this activity was the legiti¬ mate result of long years of literary practice during their pre-Christian

life; but unfortu¬ nately this early pagan literature has disap¬ peared. But there is plenty belonging to the Christian period still in existence. This covers every avenue of the activities of a people,

philosophy, law, science, legend, story, religion, biblical lore, poetry, church government, can¬ onical law, liturgy, biography, historical, romance and theology in all its many forms. Like the Hebrew, Christian Syriac literature shows the ever-present, ever over-brooding spirit of the religious thought which had early in the Christian era obtained such a hold upon the imagination and the affection of the Syr¬ ians. The use of Syriac in literature was spread pretty well over the centres of population of the area covered by the language itself as in¬ dicated previously in this article. Almost every Syriac city at some time in its career became more or less active in a literary way previous to the Arabic conquest of Syria (636-37) and the body of literature thus produced was large and varied within a certain field limited only by the activities of the people themselves phys¬ ically and mentally. In fact the Svriac litera¬ ture is very largely a chronicle of these racial activities. Hence it is not great in a poetical sense. The style and manner of expressing thought is frequently excellent; but Syriac imagery and imagination never rise to the sub¬ lime heights of the Hebrew _ writers. Syriac literature is at its best when it is dealing with all the phases of the Christian religion, history, biography, devotional works and the lives of the saints. Edessa seems to have been the earliest seat of the Christian-Syriac literature which spread rapidly to other parts of the country. This literary activity began probably in the 2d century though legend claims that it had begun in the time of the Apostles.

It is in fact quite probable that the translation into Syriac of the Old Testament was made in the 1st century by Syriac Jews; and in the 2d century a compilation of the first four gospels is reported to have been made by Tar- tian (q.v.) about 180. Many compilations and translations were made from the Old and the New Testaments during the following five cen¬ turies. Among the early Syriac writers is Bardesanes, the Gnostic (d. 222). Historian, philosopher and poet, he is reported to have written 150 hymns and to have been an au¬ thority on astronomy. Most of these hymns have been lost; but some of them have been preserved in the Hymns of the Soul, in the His dialogue on Destiny. > which is still extant, gives a good idea of his imagination and his clearness of thought. To the following century belong Aphrates the author of homilies popular in his day and for years afterward; Ephraem (d. 337), the most famous commentator, poet and writer of exe- getical discourses; and Aba, Balse, Zenobius and other disciples of the latter who filled much the same field as he.

The following century was one of great activity in the Christian Church for it witnessed the separation of the Mesopotamian Christian Church from, that of Rome and the division of the former into two sects, the Monophysites (q.v.) and the Nes- torians. This led to great literary activ- * ity throughout Syria within the body of the Christian society so that the 4th century marks the beginning of the great Syriac literary period which continued active until the Arabian conquest. One of the most noted writers of the 5th century was Isaac of Antioch (q.v.), abbot of a convent. He wrote many

hymns and poems and 191 metrical homi¬ lies have been credited to him. He denounced the current abuses and luxury of his times much in the mood of the Hebrew prophets of an earlier age in a forceful manner and in a style rich in imagery and marked with imagina¬ tion. A hundred or more of his poems still exist. Another writer of force belonging to this period was Narses of Maalletha. To the same century belong Ibas, bishop of Edessa, who was deposed from office on account of his Nestorian writings; Dadhisho, commentator; Narsai, ((Harp of the Holy Spirit,® poet and theological writer, many of whose poems sur¬ vive; Jacob of Serugh, poet, and Philoxenus of Mabbogh, an excellent prose writer. Among the Syriac writers of the 16th century are John of Telia; John bar Aphtonya, commentator, poet, hymn writer and biographer; Sergius of Rasain, scholar, translator and grammar¬ ian; John of Ephesus, noted church his¬ torian ; Moses of Aggel, translator and writer; Marutha of Seleucia, commentator, sermon, hymn and epistle writer of note; Bodh, logician and translator of Persian tales, and Hannana of Hedhaiyabh, commentator, contro¬ versialist and general writer of great activity. Among the historical works of interest written in Syriac are (Chronicle of Edessa, * (Chronicle of Dionysius of Tell Mahre) and the semi¬ religious works of Zacharias of Metylene. The whole body of translations made into Syriac was very large and embraced works from most of the great literatures of the day. This translation continued on into the period of Arabic domination ; but Syriac after the mid¬ dle of the 7th century began to be a dead language. After this period it became the vehicle of the Church and of scholars much as Latin was regarded in Europe. Therefore, the works written in Syriac during the period of Arabian domination are for the most part of a learned nature and the literature tends to run largely to matters ecclesiastical, historical, philosophical and scientific. Among the most noted of the classical Syriac writers are Thabit ben Korrah (9th century) ; Theodor bar C'honi (10th century) ; Dionysius bar Salibi

(12th century), who wrote the (History of the Crusades*; Michael of Melitene (12th cen¬ tury), (History of the World* ; Abulfar of Gregory (13th century), commentator, gram¬ marian and historian, and Abhdisho (14th century), critic, historical writer and author of a careful work on Syriac literature.

Bibliography. — Baumstark, A., <Die christ- lichen Literaturen des Orients *(Leipzig 1911) ; Brackelmaun, C, (Lexicon Seriacum* (Berlin 1895) ; (Grundriss der vergleichenden Gram- malik der semilischen Sprachen *(Berlin 1908- 13); (Syrische Grammatik* (Berlin 1913); Duval, R., (La Litterature syriaque *(Paris 1907) ; McLean, A. J., (Grammar of the Dia¬ lects of Vernacular Syriac* (Paris 1907) ; Nestle, E., (Syrische Grammatik *(Berlin 1888) ; Wilson, R. D., (Elements of Syriac Grammar* (New York 1891) ; Wright,' W., (History of Syriac Literature* (London 1895)!

John Hubert Cornyn, Birmingham Southern College.

SYRIAC VERSIONS OF THE BIBLE,

entire or in part, are numerous. The most im¬ portant is the Peshitto (q.v.) or ((plain** version

of the Old Testament, made probably in the 2d century, and in great part from the Hebrew text, while some of the books are rendered from the Septuagint; originally the Peshitta Old Tes¬ tament contained only the books of the Hebrew canon; the deutero-canonical books as found in the Septuagint were added later. The New Testament books in the Peshitta Version are the four Gospels, Acts, Epistles of James, 1 Peter, 1 John and 14 Pauline epistles; the early Syrian Church did not receive the other apos¬ tolic epistles nor the Apocalypse. In the 2d century Tatian compiled a Diatessaron or har¬ monized compilation of the four Gospels, the greater part of which is extant; for a time the Diatessaron displaced the four Gospels in the Syrian Church. - The Monophysites in the 4th century, dissatisfied with the Peshitta, made a complete new version from the Greek texts of the Septuagint and the New Testament. An¬ other translation of the Septuagint was made in the 7th century by Paul, bishop of Constantia; copies of this are extant in the British Museum and in the Ambrosian Library at Milan. Another version of the whole Bible is that used by the Malkites (or Melchites) in Palestine; it is written in an Aramaic dialect more akin to the language of the Jewish Targums than to the Syriac of the Peshitta. See Bible.

SYRIAN CHURCHES, those churches in Syria, Mesopotamia and

adjoining countries which use a Syriac liturgy; but with them is usually . classed the Melchite Church, whose liturgy is Greek. The principal Syrian churches are: (1) That of the Jacobites or Monophy¬ sites ; they are supposed to number 45,000 fam¬ ilies in Syria, Mesopotamia and Chaldaea; they are presided over by two patriarchs. (2) The Syrian Catholic Church, a secession from the preceding in the year 1546; it is constantly gain¬ ing accessions from the Jacobites. (3) The Nestorian Church in Kurdistan, Chaldaea and Mesopotamia; its adherents are estimated at 150,000 and are presided over by two patriarchs. (4) The Chaldaean Church in communion with the See of Rome is a secession from the Nes¬ torian Church, and is constantly gaining strength by new accessions from that body. (5) The Maronite Church, with its principal seat in the Libanus, has been in communion with the See of Rome since the 13th century; it is the most flourishing Christian community in Syria. (6) The Melchite Church, in communion with the Orthodox Greek Church. (7) Finally, the United Melchite, or Melchite Catholic Church, in communion with the Church of Rome.

SYRIAN PROTESTANT COLLEGE,

an undenominational institution of higher learn¬ ing at Beirut, Syria, opened in 1866, and the largest American educational institution outside the United States. It was chartered by New York State in 1863 and is controlled by a board of 12 trustees in New York, the faculty con¬ ducting the local government. It was the out¬ growth of a mission, and is now an independent organization. There are seven departments, preparatory, collegiate, commerce, medicine! pharmacy, training school for nurses and Biblical archaeology. It has 18 stone buildings, a 40-acre campus, nine well-equipped labora¬ tories, an anatomical observatory, a hall of science, and hospitals for women and children

and for eye diseases. The library contains about 15,000 volumes. There are about 900 students and 70 instructors. The Syrians pre¬ dominate among the students, but there is a wide representation of nationalities, usually not less than 12. Instruction is in English.

SYRJNGA, any of several shrubs. Popu¬ larly this name has been applied to the mock orange (genus Philadelphus) which has long been cultivated in gardens for its handsome flowers; generically, however,

it is the name of the lilac. These two genera belong to different families, the S.axifragaceoe and the Oleaceee, respectively. This confusion is a legacy from the old herbalists who united jasmine, mock orange and lilac under the one genus Syringa, a feat which also accounts for the use of the name jasmine for Philadelphus, among the Ger¬ mans. Jasmine belongs with lilac in the family Oleacece. The French, on the other hand, adopt Seringa as the popular name for Phila¬ delphus. See Jasmine; Lilac; Philadelphus.

SYRINX, si'rinks, in ancient mythology, a nymph beloved by Pan, and who turned into reeds when flying from him. The god is said to have constructed his pipes from those reeds. See Musical Instruments.

SYRPHUS-FLY, a fly of the family Syr- p hides, smooth or hairy insects, often seen hov¬ ering almost without motion over flowers, some of them looking like bees. The species are numerous and the larvae diverse in habits. Most of the latter feed on the roots or bulbs of plants, or live in decaying wood, mud or sewers, or in the water, or as parasites in the nests of waspS and bumble bees, or crawling over plants in quest of aphides ; hence they are sometimes called aphis-lions. The family is very nu¬ merous.

SYRTIS, ser'tis, two gulfs of the Mediter¬ ranean Sea, on the coast of Africa; the Lesser Syrte, or Gulf of Gabes, is on the east coast of Tunis, between the islands of Dschebado and Kerkenah. The Greater Syrte, or Gulf of Sydra, southeast from the latter, between Tripoli and . the plateau of Barka. They form together the most southerly part of the Mediterranean. The navigation of the Syrtes was anciently consid¬ ered very dangerous, their shores being full of quicksands and their waters impeded by sand¬ banks, shallows and sunken rocks. The only harbor is Bengasi.

SYRUP, a saturated solution of sugar in water, either simple, flavored or medicated. In preparing syrups the best refined sugar should be used, and either distilled water or filtered rain water; they will thus be less liable to spon¬ taneous decomposition, and will be transparent without undergoing the process of clarification. When vegetable infusions or solutions enter into the composition they should be made per¬ fectly transparent by filtration or clarification before being added to the sugar. The proper quantity of sugar for syrups is about two pounds for every pint of water. It is of great importance to employ as little heat as possible, as a solution of sugar, even when kept at the temperature of boiling water, undergoes slow decomposition. Syrups should be kept in a moderately cool though not a cold place. See Sugar Growing and Sugar Making.

SYRUS, si'rus, Publius, Roman author who flourished about 43 b.c. After Laberius he reigned supreme on the stage, and his mimes were full of shrewd epigrammatic wit. About 200 apothegms are still extant, under the title (Witticisms of Publius SyrusP

SYSTEM, the term applied to the rocks of a given period ; thus we say that the Cambrian system of rocks was laid down during the Cambrian period, the Tertiary system during the Tertiary period, etc.

.SYZRAN, siz-rany', Russia, a river-port near the right bank of the Volga, 90 miles southeast of Simbirsk. It has nine churches, a monastery, convent, grammar school, technical school and banks. The manufactures include leather goods and iron-wares. Trade depends upon grain, fish and salt, great quantities of grain being exported. It lies on the Rjashsk- Batonki Railway. Pop. 46,234.

SZABADKA, city on the Hungaro-Jugo- Slavian frontier, 25 miles southwest of Szegedin and 110 miles southeast of Budapest. The fashionable summer resort of Lake Palics lies within its confines. Its chief points of in¬ terest are the schools, ’hospitals, almshouse and music school. Agriculture is the chief occu¬ pation. It has considerable trade in fowls, fruit, cattle, horses, hides, wool, corn and to¬ bacco. Linens and shoes are manufactured. Pop. 94,600.

SZECHUAN, sa-choo-an', China, the largest province of the republic, in the west, with Tibet on the northwest and Yun-nan on the southwest; area, 218,480 square miles. It is traversed and watered by the Yang-tse-Kiang and its affluents, is hilly throughout, mountain¬ ous in the west and rich in natural products, including coal, iron and other minerals. Opium, silk, salt, sugar, medicines, tobacco, hides, musk, rhubarb and white wax (produced by an insect) are exported to the annual value of $25,000,000 ; and European cottons and woolens are imported to the value of $15,000,000 annu¬ ally. The capital is Cheng-tu, the chief com¬ mercial town Shung-king, which was opened to foreign trade in the end of 1889. Ichang was thrown open in 1877. Pop. of province 54,500,- 000. (See China). Consult Baber, (Travels and Researches in Western China> (London 1882) ; Bishop, (The Yang-tse Valley and Be- yond) (New York 1901) ; Hosie, (Three Years in Western China) (ib. 1890).

SZE-MA KWANG, sema' kwang', Chinese statesman and author : b. 1009 ; d. 1086. He is renowned as the author of (The Comprehen¬ sive Mirror of History,* in 294 books, the labor of 19 years. It covers a

period from the be¬ ginning of the 5th century b.c. to a.d. 960. Sze-ma is also the author of <Ki-ku-lu) or (Investigations into Antiquity, * which brings her history down to 1066 a.d. He also wrote a dictionary and numerous essays are ascribed to him. Consult Giles, H. A., (History of Chinese Literature) (New York 1901), and Remusat, (Nouveaux melanges asiatiques) (2 vols., Paris 1829).

SZE-MA TS'IEN, sˆma/ chen', Chinese author: b. 163 b.c.; d. 89 b.c. Born in Lungmun, Honan, in 110 B.c. he succeeded his father,

Sze-ma T'an, as grand recorder and astrono¬ mer, and took up the historical work begun by him. It was finished in 91 b.c. and was named (Shiki,} or (Historical Records. > It covers the period from 2697 to 104 b.c. He is also noted for reforming the calendar. The chronology settled by him still prevails in China. Con¬ sult Giles, H. A., (History of Chinese Litera¬ ture } (New York 1901), and Hirth, F., An¬ cient History of China) (ib. 1911).

SZEBEN, se'ben, NAGY, nod'y, or HER- MANNSTADT, her'man-stat, Rumania, the capital of a county of the same name in Transylvania. It lies amid beautiful surround¬ ings, among which there are several noted health resorts. The city, which is built partly on a hill, partly on a small river-plain, has handsome, well-paved streets and a large mar¬ ket place. Among the principal buildings are a large Gothic church dating from the 13th to the 16th century and now used by a Lutheran con¬ gregation, the city hall, the communal hospital, several large barracks and the palace of Bruck- enthal containing a library and collections of art and antiques. There are five institutions for higher education in the city, besides a cadet school, trade schools and a number of minor schools. The principal industries are the man¬ ufacture of cloth and blankets, soap, spirits, glue and horn articles, and there are many machine shops, tanneries and two large brew¬ eries. The inhabitants are chiefly German Protestants. The formerly important trade with the East has declined. Nagy-Szeben was the capital of Transylvania, and from the 15th to the 17th century was very strongly fortified. It was a city of Hungary until under the Peace Treaty of 1919 with part of Transylvania it was included in Rumanian territory. Pop. about 31,000.

SZEGEDIN, seg'ed-en, Hungary, capital of the county of Csongrad, on the Theiss, 100 miles southeast of Budapest. It lies in a marshy district. It has suffered the ravages of flood and fire, and is now modern in construction and buildings. Its public buildings are pre¬ possessing and include municipal buildings, courts, barracks, theatres, Franciscan monas¬ tery with a large and valuable library, museum, etc. There is a fine quay and embankment affording protection against further inundations. The river is spanned by fine bridges for railway and general traffic. The manufactures are soap, paprika, liquor, soda, tobacco, coarse cloth, etc. There is an important trade in wood, corn, wool, cattle, salt and tobacco. Many river boats are built in the yards of Szegedin. In 1526 it was taken by the Turks, who held it until 1686. Pop. 118,300.

SZENTES, sen'tesh, Hungary, in the county of Csongrad on the left bank of the Theiss, 29 miles northeast of Szegedin. It contains many good buildings, among which is a Protestant church with a fine tower, other churches and a town house. The trade depends upon corn, cattle and wood, in which it has a large trade as also in wine. It has a system of municipal tramways. Pop. 31,590.

szoln6k, sol'nok, Hungary, a river port and market town in the county of Jazygia, on the right bank of the Theiss. It is the seat of the government courts, a steamboat station and the junction of four railways. Its buildings in¬ clude a Turkish mosque now used as a chapel, the ruins of a citadel and a Franciscan monas¬ tery. It carries on an extensive trade in fruit, grain, cattle, salt and wood — especially the latter. It was the scene of a Hungarian victory over the Austrians on 5 March 1849. Pop.

28,900.

Tthe 20th letter of the English alphabet and the 16th consonant, is a sharp mute consonant to which d answers as a sonant. Its earliest form both in Greek and Latin was but little different from that which it still has; but in some Umbrian and Etrurian inscriptions it is an upright stroke with a small stroke at the top slanting right or left : in early Phoenician and in Hebrew rock inscriptions it has the form + or X or Y1 . t is usually classed as a surd or voiceless dental, but in English pronuncia¬ tion it might be classed with the cerebrals, being made with the tongue on the hard palate. In French and other languages of Continental Europe the t is a true dental, for in pronouncing the letter in those languages the tongue comes in contact with the teeth. The same difference exists between English and those other lan¬ guages in the pronunciation of d. The digraph th has two valves in English,

namely, the voice¬ less dental fricative value which it has in thank , throw , and the voiced dental fricative value in that, then : these two sounds were rep¬ resented in the Anglo-Saxon alphabet by two different characters, namely p for th in thank, throw and 6 for th in this, that : but in Old English manuscripts there was little consist¬ ency in the employment of these characters. In some variations of the Irish pronunciation of the digraph th in thin, thorn, through, etc., is a true aspirate rather than a fricative, the tip of the tongue is pressed against the upper gums and the breath emitted with force; but in correct English pronunciation of this th the tongue is brought against the back of the front teeth, with very slight contact, and the breath emitted between tongue and teeth ; and there is a similar difference between the Irish and the English pronunciation of th in that, then, this, etc. ; in the Irish pronunciation the tongue is brought into full contact with the teeth. Ti, unaccented, before a vowel is usually pro¬ nounced as sh: nation, nasliun, motion, mo shun; t before the diphthongal u (as in use), has the value of tsh; nature, natshur. — In the corre¬ sponding words of English and the languages akin to it there is interchange of t with other letters; examples: Eng. three, Ger. drei, Goth. thrais; Lat. tres, Gr. treis; Eng. thatch, Ger. Dach, Lat. tectum, Gr. teg os; Eng. brother, Ger. Bruder, Goth, brothar, Lat. f rater; Eng. dew, Ger. Thau; Eng. thank, Ger. Dank. Very usually t in an English word is represented by z in the kindred German word: Eng. two, Ger. zwei; Eng. toll; Ger. Zoll.

TNA, is an explosive substance having the formula CeHfNCXUNˆ which is derived from aniline and has the scientific name of

tetranitroaniline. Flurscheim, who, in 1910, proposed to use it as a commercial explosive as it was more powerful than any substance then in use, manufactured it from commercial dinitrobenzene by treating the latter with a solu¬ tion of sodium bisulphate and then nitrating the product thus obtained with mixed acids at 70° C. or lower. The TNA separated in yellow crystals which when washed and dried had a specific gravity of 1.867 and, when heated at the rate of 5° C. per minute, a melting point of 216° C. and an explosion point of 260° C. Its rate of detonation is 5,500 meters per second. It is an efficient agent for re-enforcing detona¬ tors and as a booster, but its stability is ques¬ tioned.

TNT or TRINITROTOLUENE. See

Trinitrotoluene.

TNX, an explosive substance having the formula (CH3)2CeH(N02)3

and whose scientific name is trinitroxylene. It is produced by nitrat¬ ing the aromatic hydrocarbon known as xylene with mixed acids and fuming nitric acid. Sev¬ eral different compounds having the same per¬ centage and radical composition may be formed but the one produced in largest amount and the one most sought is the trinitrometaxylene. This when pure crystallizes from alcohol in milk-white lamellae which when slowly heated melt at 176°-177° C. TNX is used either alone or in admixture with ammonium nitrate, as a bursting charge for high explosive shells. It has also been used as a component of blasting explosives such as monachite.

T-RAIL. See Rails and Structural Shapes, Manufacture of.

T-SQUARE, a ruler used by draftsmen, made similar to the common L-shaped square, but of wood, and in the form of a T. It is often graduated in the edges and is convenient for ruling lines at right angles to a base. Some¬ times the long arm is made adjustable, so that it may also be used for drawing angles.

TA-KU, ta'koo', China, a small, fortified town situated near the head of the Gulf of Pe-chi-li, southeast of Tien-tsing, and about 80 miles southeast of Peking. It is important as guarding the entrance to the Yung-ting River. It has beetl the scene of several engage¬ ments and was captured by the Allies in 1900, and after the war remained garrisoned by German troops.

TA-LIEN-WAN, ta'len'wan', Manchuria, a bay on the east side of the extremity of the Liao-tung Peninsula, about 40 miles northeast of Port Arthur. The British fleet occupied it in 1860. It is within the territory leased to Russia in 1898. At its head is the northern port of Dalny (q.v.) which was opened to

foreign trade in 1901. The construction of a Russian naval station was well advanced when the Russo-Japanese War broke out in 1904 and the bay became the scene of war operations. The adjoining territory passed to Japan in 1905.

TAAFFE, ta'fe, Eduard Francis Joseph von, Austrian statesman: b. Prague, 24 Feb. 1833; d. Ellischau, 29 Nov. 1895. He was of Irish descent and a Baron of Ballymote as well as Viscount of Austria; was educated at the University of Vienna and entered the civil service. Promotion followed rapidly and in 1867 he became Minister of the

Interior. In the following year he also served as acting Minister-President. He had entered politics as a German liberal, but manifested a growing tendency toward Federalism, which he regarded as the only means of reconciling warring fac¬ tions. In 1870 he joined with two of his col¬ leagues in urging upon the emperor a policy in the direction of Federalism with autonomy, but being defeated in this endeavor, he resigned. In 1871 he became governor of Tyrol and Vorarlberg. In 1879 he was again made Min¬ ister of the Interior, formed a new Cabinet and remained at its head until 1893. Devotion to the cause of the emperor was Taaffe's strongest trait, and as this involved the con¬ solidation of the antipathetic nationalities of Austria, he bent every effort in that direction. He worked not through one party, but with any party which by opportune measures could be brought to support his policy, and he re¬ lied mainly upon private efforts, for in public he was an inferior speaker. In 1893 he was defeated in his purpose to extend the fran¬ chise and his retirement from public life di¬ rectly followed.

TAAL, ta-al', Philippines, pueblo, province of Batangas, Luzon, on Balayan Bay at the mouth of the Pansipit River, 13 miles north¬ west of Batangas, and about 50 miles south of Manila. It is named after an older town on Lake Taal that was destroyed in the volcanic disturbances of 1754. The people are mostly Tagalogs. It is connected with Batangas and other towns by highway, has a well-sheltered anchorage and carries on an important coast¬ wise trade. Agriculture, stock-raising and fish¬ ing are also important industries of which Taal is the centre, and sulphur deposits are found in the vicinity. The town is well built on a terraced hill, is an important military station and one of the largest municipalities in the province. It has good schools. Pop. about

36,000.

TAAL, Philippines, a lake. See Bombon.

TAAL, Philippines, a volcano on Bombon Island in Lake Bombon or Taal, province of Batangas, Luzon, about 40 miles south of Manila. The island from which it rises is 14 miles in circumference; its greatest height is to the southwest, 1,067 feet above the level of the lake; from this point it descends and then rises to a height of 780 feet to the north. The crater is oval and the walls steep ; at the base are two steaming lagunas. It supplies large quantities of sulphur. The last eruption recorded took place in 1911; eruptions also oc¬ curred in 1709, 1715, 1716, 1731, 1747, 1754, 1808, 1873 and 1911.

TABACO, ta-ba'ko, pueblo, province of Albay, Luzon, on Tabaco Bay, east coast, 15 miles north of Albay, the provincial capital. It has the deepest and best-sheltered harbor in the province and carries on a large trade with Manila, being third port in Albay in the im¬ portance of its shipping. Pop. about 25,000.

TABARD, in the times of the Tudors, a tunic-like garment, worn over the armor, cov¬ ering the body before and behind and reaching below the loins, but open at the side from the shoulders downward; it had wide sleeves or flaps reaching to the elbow and was generally embroidered with the arms of the wearer or if worn by a herald, with those of his lord or sovereign.

TABARI, ta-ba're, Abu Jafar Mohammed Ibn Djerir, Mohammedan theologian and his¬ torian: b. Amul, Taberistan, 839; d. Bagdad, 923. During the first half of his life he widened the area of his learning and experience by traveling from one centre to another of Moslem religion and speculation between eastern Per¬ sia and Egypt, devoting himself to the perusal of the Koran and the acquisition of ail the lore which jurisprudence, tradition, history and philology had contributed to the elucidation of the Mohammedan scriptures. In about 881 he settled at Bagdad and employed the fruits of his investigation as a teacher and writer in Arabic. His principal works are the <Tefsir) or (Exegesis, y which contains a complete col¬ lection of the existing and independent com¬ mentaries of all interpreters of the Koran, with large additions, original and compiled, from abstruse sources. It filled 25 large manuscript volumes and was published in 35 numbers of the Zeitschrift der Deutschen Morgenland- ischen Gesellschaft (1881). His other work is somewhat less important, being a history of the world ((Annals*) from creation to 914 a.d.

TABASCO, ta-bas'ko, Mexico, a state situ¬ ated at the head of the Gulf of Campeachy and bounded by the states of Vera Cruz, Chia¬ pas and Campeche. It is one of the smallest states of the Confederation, its area being 10,072 square miles. The surface consists al¬ most entirely of a great flat, sloping gradually to the sea, but in many parts so low that it is subject to inundations. The streams, though numerous, are short and shallow and are gen¬ erally obstructed at their mouths by sand¬ bars. The Tabasca, or Gsijalva, River, however, is navigable for 90 miles and the Usmacinta for 175 miles. The climate is excessively hot, par¬ ticularly along the coast, and in the marshy dis¬ tricts very unhealthful. A large portion of the state is still covered with primaeval forests. The principal cultivated crops are cacao, coffee, dye-woods, vanilla, indigo, tobacco and sugar. The inhabitants are chiefly Indians. The capital is San Juan Bautista. Pop. of the state about

190,000.

TABASHEER, or TABASHIR, a re¬ markable substance occasionally found in the hollow joints of certain species of bamboo and other large grasses. It is ordinarily sought f9r by splitting open those bamboo stems which give a rattling sound when shaken. It is espe¬ cially apt to be. found in the Bambusa arun- dinacea of Indian and other related species of Japan, China, Java and the Andes Moun-

tains. During the rapid growth of the bamboo shoots, their solid joints become hollow and are partially filled with water containing silica in solution. The development of the foliage leads to active transpiration; the water ab¬ sorbed from the soil quickly disappears and tabasheer is the residue. It is at first jelly-like, but gradually solidifies into small milky-white masses. Physically and chemically these are practically identical with the hydrophane variety of the mineral opal. It is an open question whether tabasheer should be registered as be¬ longing to the mineral or the vegetable king¬ dom. It is essentially a hydrous silica, the lime and potash which are often present being doubt¬ less simply impurities. Its optical properties are most remarkable. According to Brewster, it has a lower index of refraction than any other solid or liquid, its refractive power being not only lower than water, but so much lower as to be almost intermediate between water and air. The material is isotropic, opalescent and remarkably phosphorescent. It becomes trans¬ parent when saturated with water and is re¬ markably porous. It probably possesses greater absorptive power than any other mineral, Brewster claiming that the pores occupy two and one-half times as much space as the silica itself, notwithstanding the fact that they are invisible even under very high powers of the microscope. From time immemorial it has been highly esteemed in the Orient for its supposed medicinal properties. A knowledge of the substance was introduced into Europe by the Arabian physicians and its name is of Arabic origin. Much so-called tabasheer in Turkey and Asia Minor is artificial. Consult Nature (Vol. XXXV, p. 488, 1887).

TABB, John Banister, American poet : b. Amelia County, Va., 22 March 1845; d. 1909. After private study, he was appointed in 1862 captain’s clerk to the Confederate blockade- runner R. E. Lee , but in 1864 was captured and held prisoner for seven months at Point Lookout, Md. He studied music in Baltimore, taught there, and at

Racine College, Michigan, and after courses at Saint Charles College, Ellicott City, Md., and Saint Mary's Seminary, Baltimore, was ordained in 1884 to the priest¬ hood of the Roman Catholic Church. Later he was professor of English at Saint Charles. He privately printed a book of ; <Lyrics) ; (An Octave to Mary) ;

(Rules of English Grammar) ; (Poems Grave and Gay> (1899) Two Lyrics) (1900) ; (Later Poems* (1910). Ingenious in matter, compact in form, his favorite length is the quatrain distinguished by an effectively simple diction.

TABBY, a variety of rich watered silk which has undergone the operation of tabby¬ ing or being passed through a calender, the rolls of which are made of iron or copper variously figured, which, bearing unequally on the stuff, renders the surface unequal, so as to reflect the rays of light differently, making the representation of waves thereon.

TABBYITE, a variety of asphalt, semi- brittle, semi-waxy, containing a small percent¬ age of ceresin; readily fusible, freely soluble

in carbon disulphide; used in making paint, varnish, rubber substitute and pavings. Occurs with other bitumens in Wasatch County, Utah.

TABERNACLE (from Lat. tabernaculum, a tent), theˆ tent in which the Ark of the Cove¬ nant was deposited during the. wanderings of the Israelites in the wilderness and subse¬ quently in Palestine until the erection of a permanent building at Shiloh. When this build¬ ing was erected does not appear in the Scrip¬ tures, but 1 Samuel iii, 3, clearly shows that it existed in the early days of the prophet. The building in which the Ark was is there spoken of as a temple. The sanctity which attached to the Jewish tabernacle led to the use of the word by Christians to designate places considered peculiarly sacred and in the Roman Catholic Church the name is given to the receptacle in which the consecrated ele¬ ments of the Eucharist are retained. This is a small structure of marble, metal or wood, placed over the high altar and reserved exclusively for the Eucharist. Tabernacle is also in occa¬ sional use as a designation of Protestant churches. See Ark ; Pyx.

TABERNACLES, Feast of, one of the

solemn yearly feasts of Israel, directed by the Lord, as set forth in Leviticus, ch. xxiii. It is there commanded that the 15th day of the 7th month shall be the Feast of Tabernacles, to last for seven days. On the first day there should be a holy convocation and no ser¬ vile work should be done therein. <(Seven days ye shall offer an offering made

by fire unto the Lord; on the eighth day shall be a holy convocation unto you, and ye shall offer an offering made by fire unto the Lord: it is a solemn assembly, and ye shall do no servile work therein.® The Israelites were further di¬ rected to take boughs and branches of trees and willows and to dwell in booths seven days, to remind them of the time when they dwelt in booths in the exodus from Egypt. All ortho¬ dox Hebrews observe the Feast of the Taber¬ nacles, which comes in the latter part of Sep¬ tember. See Jews and Judaism.

TABES DORSALIS, an affection of the nervous system akin to locomotor ataxia and paralysis. It is characterized by a lack of power in harmonizing the action of certain muscles, the absence of such co-ordinating power being apparent first in the lower extremities, making the gait straggling and unsteady. There is no true paralysis, but sensitiveness is diminished; the loss of power proceeds and the later stages of the malady are marked by such symptoms as disordered vision, incontinence of urine and exhaustion. The duration of the disease varies from a few months to several years. Its causes are obscure. A peculiar change in the posterior columns of the spinal cord and in the posterior or sensory roots of the spinal nerves accom¬ panies it. Prolonged exposure to cold and damp, drunkenness, sexual excesses, masturba¬ tion, etc., have been regarded as causes. Many authorities believe that it is, in many instances, or even exclusively, a remote result of syphilis. It is alleged to be more common in men than in women and subjects between the ages of 30 and 50 are said to be most liable to it. The patient has an unsteady gait and walks like a drunken person, but soon recovers his bear-

ing in some degree. A difficulty in carrying out the intents of the will is experienced and in picking up an object one hand is employed to steady the other. When the eyes are shut the patient walks with extreme difficulty. Tabes dorsalis may be distinguished from disease of the. cerebellum by absence of the characteristic pain at the back of the head, and of vomiting. The progress of the disease may bv. retarded, but the prospect of cure is nearly hopeless. The treatment is limited to improvement of the general health : warm clothing, nutritious food and rest are the chief items. Salvarsan is sometimes injected directly into the spinal column with good results. Consult Osier, Wil¬ liam, (Practice of Medicine) (New York

1912).

TABLAS, ta'blas, Philippines, the largest and most western island of Romblon province, 15 miles north of the island of Panay; length, north and south, 40 miles; width, 13 miles; area, 320 square miles. The island is moun¬ tainous ; the highest peak, in the extreme north¬ east, has an elevation of 2,405 feet; the coasts are mostly abrupt; on the west coast are sev¬ eral good anchorages for small craft; Loog has the best harbor. There are no good roads and few trails; communication between the towns, which are all on the coast, is by sea. The chief industries are agriculture, stock- raising and fishing; but these are almost entirely for domestic purposes. The island is heavily wooded, but lack of communication with larger islands has prevented the development of the forest resources. Pop. about 26.000

TABLE-LAND, or PLATEAU, an ele¬ vated flat tract of country of considerable area. In ordinary usage the term is applied to such flat areas elevated above 1,000 feet from sea- level. The level character of the plateau may be due to the horizontality of the strata com¬ posing it, the surface being formed by a re¬ sistant stratum, or it may be due to subaerial or marine denudation of a flexed and folded mountain region, the erosion having proceeded so far as to reduce the region to a nearly level tract or peneplain, which is then elevated bodily. Any portion of the ancient mountain system not worn away will rise as a peak or mountain range above the peneplain surface, and consti¬ tute a monadnock. A plateau of this type — that is, an elevated peneplain — may be readily recognized by the disagreement of the slope of the strata composing it with the level surface of the peneplain, the two not infrequently mak¬ ing an angle of 90 degrees with each other. When a young plain of deposition with horizon¬ tal strata is elevated into a plateau, and the rivers begin to cut their channels down into it, it is in the beginning of its first geographic cycle. If it remains stationary at the altitude to which it was raised, the rivers will eventually incise their channels to such a depth that their bed from ocean to head is almost perfectly graded. Then lateral erosion will widen the valley bottoms, and reduce the portions of the plateau between the river valleys until finally these separating remnants of the plateau have dwindled to such an extent that they appear as ridges or peaks rising from a level plain, which latter is the result of the confluence of all the river valleys cut into the former plateau. This is the beginning of the peneplain stage, and

continued erosion will bring the surface nearer to a perfect plain not far above sea-level. If this is reached, the first cycle of geographic de¬ velopment is complete. The second cycle is in¬ augurated by a re-elevation of the land into a new plateau, when the whole process will be repeated. In like manner a folded mountain region may be worn

down to a peneplain, and re-elevated to enter upon the next cycle of erosion. Most plateaus are probably elevated peneplains, either of horizontal strata or of more or less strongly folded and truncated strata. Into these the present drainage has in¬ cised itself more or less successfully. Thus the New England region is a peneplain plateau, of inclined strata, whose surface, moderately re¬ dissected by streams, slopes gently toward the coast. Southern New York, western Pennsyl¬ vania, Ohio and other districts are part of a plateau in which the strata are nearly horizon¬ tal and which has been more or less strongly dissected. This extends southward into Ten¬ nessee where it is known as the Cumberland plateau. It is probably past its first cycle of erosion, and appears to have been a peneplain.

Among other noteworthy plateaus of North America are the <(High Plateaus® of southern Utah, which range in elevations from 7,000 to 9,500 feet above the sea, their elevation being connected with that of the Wasatch Range of mountains. Between the Rocky and Sierra mountains extends a broad plateau from Mex¬ ico northward through British America. It averages from 3,000 to 5,000 feet in elevation, and is deeply dissected by the canons of the Colorado, the Columbia and other rivers. The portion included between the two rivers named is called the Great Basin. It is bounded on the east by the Wasatch Mountains, and on the west by the Sierra Nevada and Cascade ranges, and has a width of nearly 500 miles, with an elevation of 4,000 to 5,000 feet. It has no out¬ side drainage, and hence the streams are short, and the water bodies saline. Great Salt Lake and Mono Lake in California are respectively on the eastern and western side of this pla¬ teau, and the surface between is arid and more or less desert. Similar conditions exist in the Mexican extension of this plateau. A higher type of table-land — to which the name inter- mont plateau has been applied — is found in the great plateau of Tibet between the Himalayas and the Kuen-lun Mountains. Its altitude is about 13,000 feet, while the enclosing moun¬ tains rise from 25,000 to 29,000 feet in height. It is 1,200 miles long from east to west, and half as wide. The plateau of Quito is 10,000 feet above sea-level and surrounded by lofty peaks rising 20,000 feet or more. That of Bo¬ livia has an elevation of 12,900 feet with Lake Titicaca at 12,830 feet, and the city of Potosi at 13,330 feet elevation.

The plateau of Spain averages 2,250 feet in elevation, that of Auvergne, in France, about 1,100 feet. Bavaria is a plateau rising 1,660 feet. Persia is another from 2,000 to 4,000 feet above the sea. The Abyssinian plateau in Africa averages 7,000 feet above the sea, while much of the Sahara region is about- 1,500 feet above sea:level. The table-land character of all these regions appears only in a general

view. Owing to the dissection of the plateaus they ap¬ pear as a rule anything but level to the traveler

unless a comprehensive view from a summit is obtained. Many of the larger plateaus are also traversed by mountain ridges.

TABLE LAWN-TENNIS. See Ping-

Pong.

TABLE MOUNTAIN, Cape Colony, Af¬ rica, a flat-topped mountain with nearly per¬ pendicular sides, situated just south of Cape Town. Its height is 3,540 feet.

TABLE TURNING, in psychical phe¬ nomena, the tipping or moving of a table at a seance, usually at gatherings of believers in spiritual manifestations. A number of persons form a circle round a table, on which their outstretched fingers lightly rest. They assume a passive state, usually sitting in a dim light, and sometimes listening to soft music. After a time the table begins to move, and on some occasions to answer questions either by tilting or rapping at appropriate letters as the alpha¬ bet is repeated. Faraday was of opinion that a rotary impulse was unconsciously imparted to the table by those who stood around it, and it has been pointed out that pushing may take place without any distinct consciousness on the part of those who push, and that expectant at¬ tention is known to produce such a state of the muscles as would occasion this unconscious pushing. The principle involved is the same as in planchette and the ouija board, and has been investigated exhaustively by the Psychical Re¬ search Society. Consult Podmore, F., (Modern Spiritualism > (London 1902). See Spiritual¬ ism.

TABLEAUX VIVANTS, tab'15 ve'van (French ((living pictures”), are representations of scenes from history or fiction by means of persons grouped in the proper manner, placed in appropriate postures, and remaining silent. They are supposed to have been first introduced by Madame de Genlis, instructress of the chil¬ dren of the Duke of Orleans.

TABLES, Lunar. See Lunar Tables.

TABLINUM, in Roman antiquity, an apart¬ ment in a house in which

were deposited the genealogical records and archives, and all docu¬ ments commemorating the exploits which had been performed by members of the family, or which were connected with the high offices which any of them had filled. It was usually located opposite to the entrance.

TABOO, or TABU, a word of very ex¬ tended meaning used by South Sea Islanders, to denote something consecrated, sacred, forbid¬ den to be touched, or set aside for particular uses or persons. It is applied both to persons and things, and both to the object prohibited and to the persons against whom the prohibi¬ tion extends. Thus a consecrated piece of ground is taboo, the act of consecrating it is called taboo, and the persons who are excluded from entering are also said to be tabooed. It is taboo among certain tribes, for any inferior to touch the body of a chief living or dead, or anything belonging to him ; to eat in his pres¬ ence, or anything he has touched; to cross his threshold otherwise than on the hands or knees, or to mention his name. A particular article of food is sometimes tabooed at a cer¬ tain season in order to preserve it against a season of scarcity, etc. In the case of a serious infringement of the taboo the punishment is

death ; in less heinous cases a sort of outlawry, the neighbors being permitted to appropriate or destroy the offender's goods.

The word ˆtaboo" has been adopted into English to designate similar customs among races, apart from those from which the term was derived ; and has assumed a colloquial sense which is altogether non-religious and negative, though the word was originally used more to designate definite religious ceremonies that were obligatory upon the tribe or upon the individ¬ uals composing it. These ceremonies were ob¬ served at certain stated times and under cer¬ tain conditions, generally in connection with important undertakings. In many Indian tribes of America, the warrior who succeeded in kill¬ ing an enemy was required, on his return to his home, to undergo certain purification cere¬ monies before he could again resume his former relations with the members of his tribe. Until these ceremonies had been performed, not only were these former relationships tabooed to him, but he was himself tabooed to the tribe; and any one violating the conditions of the taboo became himself tabooed. Always during the period of duration of the taboo, the individual or individuals subject to it are denied the exer¬ cise of certain privileges. The taboo may be temporary or permanent ; it may be ceremonial, belonging to a fixed and definite period in life, or it may be occasional. Most ancient races had a particular taboo connected with birth, puberty, marriage, death, and even with periods previous to birth and after

death; with the as¬ sumption of public office and with almost every undertaking in life. Probably most of these customs had their origin in the fear of the superior power of certain deities or evil-dis¬ posed spirits and a desire to propitiate them. But in time many of them came to be of a more or less religious and formal nature, and thus many religious observances were formerly taboo in character. Very numerous are the things which have been subject to taboo; but they may be classed under a few more or less definite heads of a general nature. These in¬ clude objects unclean in their nature, or through mythical, superstitious or religious association; things supposed to belong to, to be possessed by, or to be influenced by spirits or beings feared on account of their mysterious power; strange or unknown objects or customs which it is the part of good sense to propitiate before¬ hand in case they should prove powerful and ill-disposed. The dread power of priests and rulers was especially feared for it was held lit¬ tle inferior, if any, to that of ghosts, witches, and the supernatural people in general, and superstitious animals.

Opposed to those taboos of fear were those inspired by a desire of personal advantage. Of this nature were the offerings and prayers of¬ fered to household gods and to certain deities before undertaking any enterprise of a personal nature. The priest, as the representative of the tribe or the nation, performed the same ceremonies for them and with the same end in view. In connection with these ceremonies there were certain taboos. On opening a cask or bag of wine, the first cupful was tabooed to all but the .gods of growth and fertility who made the production of the wine possible. The firstlings of the flock were given to the pro¬ tector of the herds, the ancient god of hunt-

ing; the first fish caught by the fisherman, the first game taken by the hunter, the first ripe fruit and vegetables grown by the husbandman were all, in like manner, tabooed to their pos¬ sessors. There was not a movement or inter¬ est in life without its taboo of a similar na¬ ture. Not infrequently the two ruling motives of fear and hope of personal gain are found combined in the same taboo, for a much feared and suspected superior being might, if propi¬ tiated, become a valuable ally and helper in time of need.

Taboo associations had much to do with totems and every totem had its taboo. Among many American Indian tribes, a hunter might not kill the animal represented by his totem. Among certain others only a part

of such ani¬ mal was tabooed. The moon being the goddess of fertility, her power was greatest when her full face looked toward the earth. Hence among many races, the planting of grain was tabooed except at the full of the moon. Yet potatoes and bulbous plants could be planted only when she showed the least of her face, for it was feared she might make the part above the ground grow at the expense of that beneath it. Among the forest tribes of the eastern United States and Canada the killing of the ground squirrel was tabooed because he was credited with the discovery of medicines or their introduction to man. Among the Al- gonquins the white rabbit was tabooed to the hunter because the great culture god Nanabozho frequently assumed the form of a white rab¬ bit. The white dog could not be eaten by the plains Indian because he was reserved as an offering to the great spirit. Among many primitive peoples the names of the dead were tabooed for a certain length of time lest the pronouncing of them might call their spirits back to earth or incite them to unfriendly action. To such a length was this fear of the dead carried that some tribes buried the name with the departed and in its place bestowed another by which the dead was afterward referred to and remembered. Sometimes tabooes were as wide as the tribe or the nation; and many of these ancient tabooes have survived in the shape of national feeling against the use of certain objects.

The custom of making certain places sacred to certain deities arose out of the practice of setting apart such places for the worship of these deities, or through the fact that certain places were believed to be the abode of all powerful beings. This belief tabooed such places to all but the powerful beings who it was claimed had already pre-empted them. (See Nature Worship; American Mythol¬ ogy). Consult Bancroft, (Native Races) (New York) ; Frazer, J. G., (The Golden Bough) (London and New York 1907-13) ; Gennep, (Tabou et totemisme a Madagascar) (Paris 1904); Waite, Gerland, (Anthropologie der Natur-Volker) ; Smith, W. R., <Lectures on the Religion of the Semites) (New York 1907) ; Sumner, W. G., (Folkways) (Boston 1907) ; Taylor, (Te Ika A Mauri, or New Zealand and Its Inhabitants) (London 1870).

John Hubert Cornyn, National University of Mexico.

TABOR, Horace Austin Warner, Ameri¬ can miner and capitalist; b. Holland, Vt., 30

Nov. 1830; d. Denver, Colo., 10 April 1899. He learned the stonecutter's trade in Massa¬ chusetts ; removed to Kansas in 1855, and four years later to Colorado, and settled in Cali¬ fornia Gulch, a place he later named Leadville. In 1878 he with his partners struck a

rich deposit of silver in the mine later known as Little Pittsburg. In 1879 he sold his interest in this mine for $1,000,000, with which sum he engaged in speculation and increased his for¬ tune to $9,000,000 in 10 years. He became mayor of Leadville and gave large sums, both to this place and to Denver, for the erection of public buildings. Leadville, accordingly, when hardly more than a mining camp, was given an opera house costing $500,000. In 1878 he was elected lieutenant-governor of Colorado, and from February to March 1885 was United States senator in place of Henry M. Teller, who had entered the Cabinet. From that time his fortunes began to decline and by 1897 his en¬ tire accumulations had been swept away. He returned to mining on a small scale, and in 1898 was made postmaster of Denver.

TABOR, Palestine, now called Jebel et Tur or Jebel Tor, ((the Mountain,® a remarkable hill, eight miles east of Nazareth, rising abruptly in the shape of an almost perfect cone from the northeastern arm of the plain of Esdraelon to a height of nearly 1,000 feet, or 1,840 feet above sea-level. It is well-wooded; the dark green of the walnut, the rose bushes, the yel¬ lowish-white styrax blossoms, the pistacia and oak trees — all these and many others beauti¬ fying the path to the summit, where a view is obtained, embracing Galilee, Samaria, Peraea, and reaching as far northward as the snow- crowned Hermon. The coverts afford a shel¬ ter for wolves, wild boars, lynxes and various reptiles. The isolation of this mountain doubt¬ less led to its being made by the earlier eccle¬ siastics the scene of the Transfiguration. His¬ torical data, however, shows that the summit was occupied as a stronghold from the times of Antiochus Magnus (218 b.c.) until the destruc¬ tion of Jerusalem under Vespasian. Architect¬ ural remains still exist on the summit. Consult Baedeker, Palestine and Syria.)

TABOR COLLEGE, located at Tabor, Iowa. It was chartered in 1854 as Tabor Literary Institute, and an academic department opened in 1857 ; the collegiate department was established and the name changed to Tabor College in 1866. It is non-sectarian in control ; but owes its foundation and support largely to the Congregationalists, and is endorsed by the Congregational Conference of Iowa; a com¬ mittee from this conference examines the work of the college each year. In addition to the regular collegiate courses, there is an academic department with a three years' course, and a conservatory of music. The college work is arranged according to the group system, all groups leading to the degree bachelor of arts. Diplomas are granted to graduates from the academy and the conservatory of music. The college is coeducational.

TABORITES, a group of the followers of John Huss, who was condemned as a here¬ tic by the Council of Constance, and burned at the stake, 6 July 1415, and his ashes strewn on the river Rhine. Others of the faith were

known as Hussites. These exasperated fol- lowers took cruel revenge on priests and monks of the Church. King Wenceslaus of Bohemia pacified them by granting them religious free¬ dom and the use of some of the churches. After the death' of the king in 1419, the Pope issued a command for the conversion or sup¬ pression of the Hussites, and the latter took up arms and assembled under the leadership of John Ziska on Mount Tabor. They captured Prague, burned the monasteries and defeated the imperial troops. Their success was con¬ tinuous for about 15 years until the division be¬ tween the more radical branch known as Tabor- ltes, who acknowledged the Scriptures as the only source of authority, and the Calixtines, \vho leaned to Roman Catholic principles of faith, became acute. The Calixtines came to an understanding with Rome, and the Taborites, left to fight alone, were signally defeated in 1434. The struggle with the empire terminated, however, in the concession of civil and religious freedom to Bohemia by the Emperor Sigismund in 1436, but civil war raged at intervals in Bo¬ hemia until 1485, when King Ladislas confirmed the imperial grant. See Huss, John.

TABRIZ, ta-brez', or TAVRIS, ta-vres', Persia, a city in the extreme northwest, about 50 miles from the old Russian border, capital of the province of Azerbaijan, on the left bank of the Aji, 36 miles above its entrance into Lake Urumiah. It is situated at the inner extremity of an amphitheatre, about 4,000 feet above sea- level, with hills on three sides, and an exten¬ sive plain on the fourth. It is surrounded with a wall of sun-dried brick, with bastions, and is entered by seven or eight gates. A large por¬ tion of the population resides outside the walls, and the plain around is covered with gardens, producing the finest fruits in great abundance, particularly grapes. The citadel is the most conspicuous building in the city. It was origi¬ nally a mosque, and is 600 years old. It con¬ sists of a lofty edifice of brick, and though much damaged by earthquakes, is still a noble structure. Within the walls of the citadel there are a cannon-foundry and barracks. The most interesting building in the town is the fine ruin Kabud Masjid (Blue Mosque), which is about 300 years old, and is partly covered with ara- besqued tiles. A considerable trade is carried on in the import of

European goods and sugar, the former consisting mostly of cotton manu¬ factures, principally British, petroleum from Russia, and woolen goods, chiefly from Austria and France; and in the export of raisins and other fruits, leather, carpet, silks, skins, cottons, shawls, tea, etc., principally to Russia and Tur¬ key. The imports and exports in normal years total over $10,000,000. Though still a con¬ siderable city, Tabriz has diminished in import¬ ance from what it was in ancient times ; the descriptions of old travelers, who speak of its splendid cafes and its hundreds of caravansa¬ ries and mosques, being no longer applicable; while its ancient population of 550,000 had dwindled to about 165,000 in 1881, although in 1918 estimated at 200,000. The city has been repeatedly devastated by earthquakes, the most destructive being those of the years 858, 1041 and 1721 ; on the last occasion 80,000 persons are supposed to have perished. During the

World War the city was occupied first by the Turks and later by the Russians.

TABULAR STANDARD OF VALUE,

a project for giving fixity to the value of money from time to time the amounts <of gold to be paid according to the changes in its purchasing power. The practical object which those who advocate the adoption of this stand¬ ard of value proposed is the attainment of a per¬ fectly stable currency for the payment of rents or other deferred contracts. A tabular stand¬ ard, there fore, if adopted would be simply an official index number. (See Index Number). According to Jevons it is proposed that a con¬ siderable number of commodities, say 100, should be chosen with special regard to the independence of their fluctuations one from another, and then the geometrical average of the ratios in which their gold prices have changed would be calculated logarithmically, the system involves the proposition that these average prices should constitute the legal standard for settling contracts expressed &in money — thus, if a note was signed in 1915 pledging the payment of $1,000 in gold in 1920, and it appeared that in 1920 that $1,000 would then buy upon the average of all commodities one-fourth less than it would have bought in 1915, the debtor should be compelled to pay $1,333 to the creditor in 1920 in full satisfaction

the debt; since in 1920 the sum of $1,333 will purchase only what $1,000 would purchase m i!915‘ ˆ 1S banned by its advocates that

such a standard would add a wholly new de¬ gree of stability to social relations, securing the fixed incomes of individuals and public institu¬

tions from the depreciation which they have often suffered. Speculation, too, based upon the frequent oscillations of prices, which. take place in the present state of commerce, would to a large extent be discouraged. The great obstacle to its adoption is the difficulty of getting economists to agree upon the precise manner of fixing the standard and calculating the averages of the several commodities, and even agreeing upon the inclusion of the latter. The idea of a tabular standard appears to be due to Sir George Evelyn who advocated <(a standard of Weights and Measures® before the Royal So¬ ciety in 1798. Joseph Lowe further elaborated the idea in 1823 in his ˆPresent State of Eng¬ land. J Scrope followed Lowe and nearly all economists of the 19th century were interested in the tabular standard. W. S. Jevons brought the matter into prominence in 1865, and further elaborated it in his later works. Consult Palgrave, dictionary of Political Economy) ; Anderson, B. M., <The Value of Money* (New York 1917) ; Price, (Money and its Relation to Prices J (London 1896) ; Walker, < Money > (New York 1878).

TABULARIUM, in Roman antiquity, a de¬ pository of public records ; specifically, a build¬ ing for the preservation of such records which stood «on the slope of the Capitoline Hill in Rome facing the Forum. It was built (78 b.c.) by the consul Quintus Lutatius Catulus. The masonry of many of its great vaults and columns is still intact, although another struc¬ ture has been erected on the old walls.

TACAMAHAC, the name of various oleo- resins allied to elemi, exuded by different spe-

cies of trees. East Indian tacamahac, yielded by Calophyllum inophyMum of Reunion and Madagascar, is a dark-green balsamic resin of specific gravity 1.032, melting at 75° C. A yel¬ low variety is produced by an African tree (Amyris tacamahac) , and another kind comes from the Brazilian Idea heptaphylla. The balsam poplar (Populus balsamifera) of the United States yields a similar resin.

tacanA, Guatemala, a volcano on the Mexican frontier, which rises to a height of 12,400 feet. It is one of several neighboring volcanic peaks of the Cordilleras, and is sec¬ ond in height to Tajumulco which reaches an elevation of 12,600 feet.

TACCA, the typical genus of the family Taccacece. It is represented by perennial herbs with tuberous or creeping rootstocks, large radi¬ cal leaves, and dense umbels .of flowers, brown, purple, or greenish in hue. These terminate a naked scape and have an involucre of bracts, the inner being filiform and pendulous, the outer herbaceous or colored. The fruit is a berry, usually three-angled or six-ribbed. Tacca pinnatifida is the South Sea arrowroot, or pia- plant, found in Polynesia and southeastern Asia. It is a low plant, with dissected horizontal leaves and an umbel of greenish flowers.

TACHl£, Alexandre Antonin, Canadian Roman Catholic archbishop : b. Riviere-du- Loup, Quebec, 23 July 1823; d. Winnipeg, Man¬ itoba, 22 June 1894. After graduating from the College of Saint Hyacinth and studying theol¬ ogy at Montreal, he became a member of the Order of the Oblate Fathers. He then started out as a missionary for the Northwest and there began the charitable work among the Indians of the Red River country which made him famous. He was consecrated (1850) bishop of Arath, and (1863) bishop of Saint Boniface. When the bishopric of Saint Boniface be¬ came a metropolitan see in 1871 Tache was appointed its first archbishop. In 1870 while bishop of Saint Boniface at the urgent re¬ quest of the Canadian government, he per¬ formed the service of pacifying the Metis of Manitoba, who had rebelled. Among his pub¬ lished works are (Vingt annees de missions dans le nord-ouest de rAmerique) (1866) ; (Esquisse sur le nord-ouest de l'Amerique) (1869), etc.

TACHE, Sir Etienne Paschal, Canadian politician: b. Saint Thomas, Quebec, 5 Sept. 1795; d. there, 29 July 1865. He practised medi¬ cine until 1841, when he became a member of Parliament; from 1848-49 was commissioner of public works; and from 1856-57 was speaker of the legislative council. He published (1829) ; (Reflexions sur l'organisa- tions des volontaires) (1863).

TACHEOMETRY, tak-e-om'e-tri, quick measuring, applied in surveying to a method which does away with the practice of measur¬ ing distances by a chain or tape-line and ascer¬ taining difference of level by a separate instru¬ ment, the relative position, both horizontal and vertical, of points on the earth's surface being determined by one observation. A theodolite, or a specially constructed tacheometer, of which a telescope is an important part, is employed, and along with it a staff similar to a leveling-

staff, 12 feet or so in length, and suitably marked. See Surveying.

TACHINA-FLIES, flies of the family

Tachinidaz, a large and important group re¬ sembling house flies and noted for their para¬ sitic habits. They are usually of medium or rather large size and gray, more or less striped; the wings clear, the bodies bristly.; and have a disposition to fly in the sunshine with a buzzing noise. All are parasitic and are especially fond of laying their eggs upon the backs of cater¬ pillars. For many interesting features in the life of these flies consult Howard, (The Insect- Book > (New York 1901), and the special papers there cited.

TACHYGRAPHY. See Shorthand.

TACITUS, tas'i-tus, Marcus Claudius.

Roman emperor : b. about 200 a.d. ; d. Tyana, Cappadocia, April 276. He was descended from Tacitus, the historian, whose works he depos¬ ited in all the public libraries and caused them to be transcribed 10 times a year at the public charge. On the death of Aurelian he was called to be emperor by the Senate, although against his will (275), having gained the confidence of the supreme council by his mildness, rectitude and moderation. During his short reign he pre¬ scribed many needed reforms and endeavored to restore the power of the Senate. At the age of 75 he undertook a campaign against the Alani, assuming after his victory the title “Gothicus Maximus.® He was assassinated by his own unbridled soldiers; his brother Flori- anus Tacitus, who succeeded him, shared a like fate.

TACITUS, Publius Cornelius, in the judg¬ ment of many competent critics the greatest Roman historian. Neither the time nor the place of his birth is known, but certain state¬ ments in his own works and in the letters of the younger Pliny (the two chief sources of our in¬ formation about him) make it probable that he was born about 55 a.d. His education, mar¬ riage and political career all point to a family of equestrian rank, and his father was not im¬ probably that Cornelius Tacitus who, accord¬ ing to the elder Pliny (‘Natural History, > VII, 76), was procurator of Gallia Belgica. He mar¬ ried in 78 the daughter of Gnaeus Tulius Agri¬ cola. the illustrious governor of Britain. He enjoyed the official favor of Vespasian and Titus, and, at least at first, of Domitian, under whom, in the year 88, he presided, as praetor and as a member of the ancient college of the Quindecimviri at the celebration of the secular games. After his praetorship, he was for four years absent from the capital, and was thus prevented from being present at the death of Agricola, which took place in Rome in 93. During these years he was probably acting as praetorian legate in a province, and may have gained at this time sorne personal knowledge of Germany. In 97 (possibly 98) he was appointed consul to succeed

Verginius Rufus, over whom he pronounced an eloquent funeral oration. He was an intimate friend of the younger Pliny, a few years his junior, with whom he was asso¬ ciated, in 100, in the successful prosecution of Marius Priscus, . accused of extortion by the province of Africa. According to an inscrip¬ tion discovered in 1890 at Mylasa, in Caria, laeitus reached, perhaps in the year 112-13, the highest post open to a senator, the pro-

consulship of Asia. The date of his death is not known, but, inasmuch as the extension of the empire to the Persian Gulf, which was ac¬ complished by Trajan in 115-16, is mentioned in <Annales,) Vol. II, 61, and several years were presumably required for the completion of that work, he may have lived into the reign of Hadrian, which began 117 a.d.

His earliest work is the (Dialogus de Ora- toribusp written probably under Titus, 79-81. The scene of the conversation is laid in the house of the poet Maternus, in the year 74—75, and a charming discussion of the relative merits of poetry and oratory leads up to the main theme, the decline of eloquence in modern times. The treatise abounds in true and striking re¬ flections, and exhibits the same power of subtle analysis that marks the later works. But the style is distinctly Ciceronian, and in its rounded smoothness, so different from the abrupt in¬ cisiveness of the (Histories) and (Annals,) shows the influence of Quintilian, who was then preaching a return from the style of Seneca to that of Cicero. For this reason the great Justus Lipsius, in 1574, attributed the (Dialogus) to Quintilian, and since then it has been ascribed to Suetonius, Pliny and others. But the weight of evidence is decidedly in favor of the Taci- tean authorship.

During the 15 years of the reign of Domi- tian, years whose horror finds sombre expres¬ sion in the opening chapter of the (Agricola, > Tacitus published nothing. But early in 98 there appeared, in rapid succession, the (Agri- cola) and the so-called (GermaniaP The for¬ mer, the story of the life of his father-in-law, whom he evidently loved and reverenced, is a masterpiece of biographical writing. The style is no longer Ciceronian but Sallustian, rapid, terse and piquant, rising at the close to sus¬ tained sublimity. The second monograph is commonly known as the (Germania, } but its exact title is differently given in the important manuscripts and cannot be determined with cer¬ tainty. It falls into two parts. The first 27 sections deal with the

physical characteristics of Germany and the institutions, beliefs and customs of the inhabitants as a whole ; the re¬ maining 19 describe the individual peculiarities of the separate tribes. The treatment is rhetor¬ ical and ethical rather than simply scientific, so that the purpose of the essay has often been questioned and the credibility of its statements attacked. But it is regarded as on the whole a trustworthy account of German lands and peoples, though the geography is weak and the description of the tribes in the interior may have been based upon insufficient evidence. The Germans were then the object of much interest (Trajan was in Cologne at the time of his accession) and Tacitus, writing to satisfy this curiosity, pointed out at the same time to his countrymen, the contrast between their own corrupted civilization and the vigorous sim¬ plicity of these Northern tribes, and gave a warning of possible danger.

In the introduction to the (Agricola,) Taci¬ tus announced his intention of composing memoriam prioris servitutis ac testimonium prcesentium bonorum. The first part of this plan was realized in the years 104-10 by the publication of the 'Historian consisting orig¬ inally of 14 books, or possibly only of 12, cov¬ ering the period from the death of Nero in 68

to that of Domitian in 96. But, instead of add¬ ing the reigns of Nerva and Trajan, he then wrote the ˆnnales,* in 16, or possibly 18 books, from the death of Augustus in 14 ((Ab excessu Divi August P is the actual title of the work) to the point at which the <Historiae) begin. Of this remarkable achievement, the continuous history of the empire for 82 years, there is ex¬ tant about one-half. Of the (Annales) we have books I-IV with the beginning of V and the greater part of VI, and, with a gap at the be¬ ginning and also at the end, books XI-XVI, that is, we have lost almost entirely the years 29-31 of the reign of Tiberius, the whole of the reign of Caligula, the first six years of Claudius, and the last two of Nero. The extant portion of the <Historiae) ends in the middle of book V and describes the eventful year 69 and part of 70. The treatment is obviously much more minute in the (Histories) than in the (Annals, } and this is due to the fact that Tacitus is here dealing with occurrences which came well within his own lifetime. The loss of the reign of Domitian is especially to be regretted.

Interesting as are the minor works, it is in the (Histories) and the is characterized by pregnant brevity, leading sometimes to ob¬ scurity, by deliberate avoidance of balance in the structure of the sentences and by poetic phraseology. The influence of Virgil is marked. See Germania.

Bibliography. — The standard text is that of Halm (Leipzig 1907). The <Dialogus) has been admirably edited by Peterson (Oxford 3893) and by Gudeman (Boston 1894) ; the (Agricola) (Oxford 1896), and also the (Ger- mania) by Furneaux (ib. 1894) ; the (Historiae) by Spooner (London 1891); the <Annales) by Furneaux (2 vols., Oxford 1891, 1896). There is a fine special lexicon by Gerber and Greef (Leipzig 1903). There is an excellent transla¬ tion of all the works by Church and Brodribb (London 1905) ; of (Annales,) I-VI by Ram¬ say (London 1904) ; of the (Histories) by Fyfe (Oxford 1912) ; of the <Dialogus,) (Agri- cola) and <Germania) by Fyfe (Oxford 1908) and by Peterson and Hutton (Loeb Classical Series, New York 1914). Consult also Bois- sier, (Tacitus and Other Roman Studies) (New York 1906).

Nelson G. McCrea,

Anthon Professor of the Latin Language and Literature, Columbia University.

TACKLE, among seamen an arrangement of two or more blocks, with suitable ropes, for raising or lowering weights. The combination is usually designed to increase the capacity of the available power. One block is fixed while the others are movable. Tackles are termed luff and watch, single and double Spanish bur¬ tons, Bell’s purchase, luff upon luff, etc., ac¬ cording to the arrangement of the bearings, pulleys, etc. See Block; Pulley.

TACKS. See Nails.

TACLOBAN, ta-klo'ban, Philippines, pu¬ eblo, capital of Leyte Island; on the east coast at the southern entrance to the San Juanico Strait, on the northwest extremity of San Pedro Bay. It is the northern terminus of the east coast highway, has an excellent port, with four large wharves. Pop. about 12,000.

TACNA, tak'na, Chile, (1) a province oc¬ cupying the northernmost extremity of the country. Area, 8,686 square miles. The main ridge of the Andes runs just within the eastern boundary and a lower range runs along the coast. Pop. about 30,000. (2) Its capital, a

city of about 14,000 population, of local impor¬ tance. The Chileans

defeated the Peruvians in a battle here in 1880.

TACOMA, ta-ko-ma, Wash., third city in Washington, seaport, county-seat of Pierce County, on Commencement Bay, 38 miles south of Seattle and 25 miles north of Olympia. Its phenomenal growth has given the city the name <(The City of Destiny.® It is also called the <(City of Beautiful Homes® and the (<City with a Snow-Capped Mountain in its Door- yard.® It is situated at the head of navigation on Puget Sound and is the western terminus of the Northern Pacific and the Chicago, Mil¬ waukee and Saint Paul railroads, both of which maintain large ocean docks and car re¬ pair shops. Tacoma is also the American terminus for the Osaka Shosen Kaisha, a Jap¬ anese steamship line with headquarters at Osaka, Japan. Tacoma's harbor is one of the greatest deep sea harbors in the world and be¬ cause of its similarity to the Italian city, Tacoma is often referred to as the (<Naples of America.®

Topography. — The Puyallup River empties into Commencement Bay within the city limits and is one of five waterways that help make up this modern port. The city is built on rising ground which reaches an altitude of 418 feet above the river. The best residence portion of the city is on a plateau, elevated about 200 feet above the blue waters of the beautiful harbor, and from any portion of this section may be seen stretches of gleaming water losing them¬ selves among the wooded islands; beaches, white, gray and brown, and frowning head¬ lands. The Olympic Mountains stretch along to the west, rugged, snow-flecked and myste¬ rious, while to the east rises Mount Rainier, here known as ((Mount Tacoma,® (<The Moun¬ tain that was God,® as one author calls it, an eternally snow-capped peak, 14,520 feet high. It is but <(four hours from Tacoma to the Glaciers,® from tidewater to mountain eleva¬ tion. The streets of Tacoma are level and paved, and so generously and wisely is the city laid out that it has not a street less than 60 feet wide, while it has several noble avenues

100 feet wide and a few 120 feet. Nearly every home — that of banker, merchant, manufacturer, wage-earner — is surrounded by beautiful lawns, and pretty gardens. The climate is noted for its equableness and mildness, the mean annual temperature being 50.6 u ; the mean maximum, 58° ; and the mean minimum, 43.3°. Rainfall is 43 inches, with little or no snow.

Trade and Commerce. — Because of her strategic position, Tacoma has always com¬ manded a huge water-borne commerce. In 1918 1,666 arrivals from foreign ports were recorded, with cargoes of 2,103,656 tons, while clearances for foreign ports numbered 1,803

with a tonage of 2,103,595. The total value of imports and exports was $318,613,938. Flour exports alone totaled 2,160,474 barrels, valued at $22,747,555. The dailv capacity of the flour mills is 9,000 barrels. Tacoma's wheat ware¬ houses have a storage capacity of 8,584,300 bushels. From the time in 1869 when a schooner-load of lumber from the old Hansen mill was shipped to San Francisco, Tacoma has been the leading lumber manufacturing city of the Pacific Coast. There are 52 mills in the district in addition to many allied lumber industries. In 1918 the lumber exports totaled 93,500,000 feet. The prin¬ cipal steamship lines operating to the Orient are the Osaka Shosen Kaisha of Osaka, Japan, and the Pacific Steamship Company's Ad¬ miral line. Dodwell's Blue Funnel, among other lines, also operates to Tacoma. Al¬ ready possessing superior facilities for econom¬ ical handling of cargoes, including large coal bunkers, electrically operated, a port commis¬ sion of three, elected by the city following the creation of a port district in 1918, plans the expenditure of millions in construction of new waterways and improving present port facilities. The hub for the southwestern counties of Washington, Tacoma possesses a huge whole¬ sale and jobbing trade. Her jobbing trade in 1918 totaled $160,000,000; retail trade $65,-

000,000.

Manufactures.— With 1,850 business en¬ terprises, including over 300 manufacturing plants, Tacoma has approximately 58,116 wage-earners, with a monthly pay-roll averag¬ ing $6,783,000. The value of manufactured output in 1918 was $152,000,000. Of this amount $27,900,000 represents the value of eight steel vessels and 42 wooden ships launched in the year by six shipyards. In the shipyard industry a maximum of 15,000 men were employed. The Todd Drydock and Construction Corporation alone employs about 8,000 men, and is one of the largest and best laid out steel shipvards in the country. The Tacoma Smelter employing 1,000 men had an output of 156,000,000 pounds of copper valued at $40,000,000 in 1918. This plant re¬ fines one-twelfth of the world's copper output. Next in importance, come lumber and its allied industries, including the manufacture of wood-ware, box shooks, baskets, furniture; and meat packing, flour and cereal milling, candy and food products, marble, iron and steel products, including machinery, boilers and marine engines.

_ Most of Tacoma's industries are centred on 1,500 acres of tidelands extending the width of the southern boundary of the harbor, the

A portion of the Hotel and Retail District from the Waterfront

A part of the Financial and Retail District from the Waterfront

TACOMA, WASH

*1 m

I'fffTTirwmnrrT

finiFismn

rfTrrrwMwrnri

m m

S

mt

w

■f

y<

wr'*

m

f r t *

vs-?

*• ms <

■ '«"-*•

TACOMA, WASH

Tacoma High School Stadium, built of solid concrete. Seats 40,000 persons. View taken during Stadium Day exercises

TACOMA

205

whole interlaced with railroad tracks and road¬ ways.

Banks and Banking. — ■ Tacoma has six na¬ tional and State banks. At one time there were 10, the decrease being due to mergers of the largest institutions. The deposits 1 Jan. 1919 totaled $38,139,781. The clearings for 1918 were $243,973,348, while the bank transactions amounted to $775,311,157. Postal savings de¬ posits were $1,135,732. The clearing house was established in 1889, and includes all the banks in the city, which own the buildings in which they are located.

Government and Finances. — The city adopted the commission form of government in 1910. Five commissioners, one of them mayor, all popularly elected, serve four-year terms. The city controller is the only other elective official. The police and fire depart¬ ments are well organized, the fire department being completely motorized. The city owns and operates a $2,000,000 hydro-electric power plant of 32,000 horse-power capacity; a $2,300,- 000 gravity water system with a 42,000,000 gallons daily capacity; a municipal freight and passenger dock, and a municipal street car line on 11th street serving the industrial district. The total length of paved streets is 110 miles; improved streets, 307 miles; cement sidewalks, 408 miles ; sanitary sewers, 224 miles ; storm sewers, 339 miles. Assessed valuation (50 per cent of the true valuation) is $59,508,611. The bonded indebtedness, $3,394,000. City power rate is .45 of a cent to two cents per kilowatt, according to load factor, cheapest rate in the country. Private power companies have plants with a capacity of 72,000 horse power, with practically identical rates. The streets of the city are electrically lighted. A single gas plant supplies Tacoma consumers ; also those in the city of Olympia. The parks and playgrounds are administered by the .metropolitan park board, members of which are elected by popu¬ lar vote. The acreage of parks is 1,200, includ¬ ing Point Defiance Park and Zoo, 662 acres, and Wright Park, 40 acres. In addition are park areas outside of the city limits surround¬ ing Spanaway Lake, Steilacoom Lake, Ameri¬ can Lake, and Gravelly Lake. There are four golf clubs with 18-hole courses.

Public Buildings and Clubs. — Most promi¬ nent of public buildings are Federal building (United States Post Office, custom office, internal revenue, and federal court), Pierce County Court House, City Hall, Tacoma building (owned by Tacoma Commercial Club and Chamber of Commerce and Weyerhaeuser Timber Company), National Realty building, 16 stories; Fidelity building, 12 stories ; Tacoma Theatre, Jones Block (Pantages Theatre), William L. Davis building, Perkins building, News-Tribune building, Tacoma Hotel, Olympus Hotel, Northern Pacific Headquarters building, Rhodes 'building, Provident building, National Bank of Tacoma building, Bank of California

building, Scandinavian- American Bank building, Elks Club. Prominent clubs include Elks, Union Club, University Club, Moose, Rotary Club, Kiwanis Club, all but last two owning their own buildings; Automobile Club, Y. M. C. A., Y. W. C. A., Commercial Club and Chamber of Commerce, Tacoma Country and Golf Club, Lakeside Country Club, Lochburn Golf Club, and Meadow Park Golf Club, Tacoma Yacht

Club, Tacoma Tennis Club, Soldiers and Sailors Club.

Transportation. — Six railroads have ter¬ minals or connections in the city. The Northern Pacific and Chicago, Milwaukee and Saint Paul railways have their western terminals in Tacoma, including car repair shops, and ocean docks. The Great Northern and the Oregon and Washington (Union Pacific) railroads operate in the city, and the Great Northern has connections with the Canadian Pacific and the Chicago Great Western railroads. Electric interurban trains operate between Tacoma and Seattle on a half-hour schedule; also between Tacoma and Puyallup. There is a total of 143 miles of track operated by the local traction company. Automobile stages on regular schedules operate on a dozen paved highways to every city and town in Pierce County and adjoining counties, including the cities of Seattle, Olympia, Aberdeen and Hoquiam, and Chehalis and Centralia. Local steamers operate to all points on Puget Sound, including Victoria and Vancouver, British Columbia, and to Pacific Coast and Alaskan ports.

Camp Lewis and Rainier National Park. — The largest permanent army mobilization and training cantonment in the United States is Camp Lewis, just south of Tacoma's city limits. The cantonment contains 76,000 acres and is 18 miles long and 12 miles wide. Citizens of Tacoma and Pierce County (the city pays 80 per cent of the taxes) voted $2,000,000 in bonds to purchase the land donated to the government for military purposes. In con¬ sequence, a full division of troops will be maintained at the camp permanently. Paved highways with auto transportation lead from the city to the camp. There is also steam and electric railway transportation.

From Tacoma automobiles convey a tourist in four hours over one of the finest paved highways in America to the Glaciers of Rainier National Park and to matchless Mount Rainier (or Tacoma, its local name), 14,520 feet high. The park is the most popular of those supervised by the United States govern¬ ment. Attendance in 1918 was 50,000, exceed¬ ing that of any other national park. There is transportation to the park over the Tacoma Eastern to Ashford from Tacoma, giving rail transportation to within a few miles of the park entrance.

Education. — Tacoma is the seat of the College of Puget Sound (Methodist), Pacific Lutheran Academy (Lutheran), Annie Wright Seminary (Episcopal), Academy of the Visita¬ tion and Aquinas Academy (Roman Catholic). There are eight parochial schools, six com¬ mercial or business schools, and in the public school system two magnificent high schools and 32 grammar schools. The total enrolment of the public schools is 18,904, including 2,000 attending night schools. There are 645 teachers employed. The Stadium High School has a Greek amphitheatre called Stadium which has a normal capacity of 32,500 persons, which can be increased to between 40,000 and 50,000. The Carnegie Library, with two branch libraries and branches in the high schools and grammar schools, has 85,598 volumes with a net cir¬ culation in 1918 <of 338,237. The total value of library property is $200,000, and the number of

registered borrowers 18,111. Overlooking the Stadium and opposite the high school are the Ferry Museum, with a large collection of In¬ dian curios and pioneer relics, and the stately home of the Washington State Historical Society.

Churches and Charities. — Nearly every re¬ ligious sect or denomination has a house of worship in Tacoma, the city being particularly well equipped with beautiful churches, the total number reaching 135, the principal denomina¬ tions being Methodist Episcopal, Presbyterian, Lutheran, Episcopal, Congregational, Roman Catholic, Baptist, Christian Science, Christian, Jewish, Evangelical, Friends, Adventist, United Presbyterian and Universalist ; also Salvation Army and Volunteers of America.

Charitable institutions include the Northern Pacific Hospital, County Hospital, Tacoma Gen¬ eral Hospital, Saint Joseph's Hospital, City Contagious Hospital, Western Washington Hospital for the Insane at Fort Steilacoom, a suburb; the Children's Home, City Rescue Home, Parkland Children's Home.

History. — Tacoma city was originally within the boundaries of the first ward, popu¬ larly known as Old Town, now called Old Tacoma. The city was laid out in 1868 by Gen. M. M. McCarver. In July 1873 the Northern Pacific Railroad established its Pacific Coast terminus on Commencement Bay, giving it the name New Tacoma. The city was also called Commencement City. In 1880 the new town became the

seat of Pierce County, and in 1883 Old Tacoma and New Tacoma were con¬ solidated and incorporated as a city. Since that time additional territory has been annexed on four different occasions, giving the city a total of five taxing districts. The present area of the city is 25,168 acres of land and 2,752 acres of water, or 39.81 square miles. The distance from northern to southern boundary is seven miles. The 35 wharves and docks have a lineal frontage of six miles.

Population. — Government census (1880)

720; (1885) 1,100; (1890) 36,006; (1900) 37,-

714; (1910) 83,743; (Federal census 1920)

96,965.

Edward P. Kemmer,

Managing Secretary of the Tacoma Commer¬ cial Club and Chamber of Commerce.

TACONIC (ta-kon'ik) MOUNTAINS, a

range extending nearly north and south, uniting the Green Mountains of western Massachusetts with the Highlands of the Hudson. The highest peaks are Equinox in Vermont, 3,847 feet, and Greylock in Massachusetts, 3,305 feet. The Taconic system, in geology, was named from the characteristic strata of this range, a metamorphic rock, believed to be older than the Silurian system.

TACONIC SYSTEM, a term applied by Prof. Ebenezer Emmons, in 1842, to certain azoic and palaeozoic rocks occurring in the east¬ ern part of New York and western parts of Vermont and Massachusetts. These he believed to be the equivalents of the Cambrian rocks of England. Subsequent investigations have shown that Emmons misread the geological structure of the regions studied by him, and his arrangement of the strata has, therefore, been set aside. The subject has given rise to much

discussion among American geologists. Con¬ sult Emmons, (Geology of New York,* Ameri¬ can Geology, * and (The Taconic System) ; Marcou, (On the Use of the Name Taconic) ; Walcott, laconic System of Emmons * ; Win¬ ched, (Some Objections to the Term Taconic) ; Dana, <History of Taconic Ideas) (in American Journal of Science, 3d ser., Vol. XXXVI,

1888).

TACTICS. Tactics has regard to the evo¬ lutions of an army in the actual presence of an enemy, and may be defined as the strategy of the battlefield or the science of manoeuvring and combining those military units which drill, discipline and the regimental system have brought to the perfection of machines. It was admirably described by Napoleon as the art of being the stronger— that is, of bringing an overwhelming force to bear on any given point whatever may be the relative strength of the entire armies opposed. The earliest records of battles are those of mere single combats, in which the chiefs, fighting either on foot or in chariots, performed great deeds; and the com¬ monalty, who apparently were without disci¬ pline, were held in profound contempt. With the growth of democracy arose the organiza¬ tion of the phalanx, the advance of which was irresistible; and its firmness equally so, if charged in front. It, however, changed front with great difficulty ; was much deranged by broken ground; and failed entirely in a pur¬ suit,. or if attacked in flank. Far lighter, more mobile was the Roman legion. Among Roman tactics was also the admirable intrenchment, which they scarcely ever omitted as an addi¬ tional source of strength for their position.

. Events reproduce themselves in cycles; and with decay of Roman civilization came again the mail-clad heroes and cavaliers — mounted this time on horses — who monopolize the hon¬ ors of battle, while the undisciplined footmen had an undue share of the dangers. Later in the feudal period, this disparity between knight and footmen was diminished by the employ¬ ment of bodies of archers, whose shafts car¬ ried distant death. The adoption of gunpowder for small arms altogether neutralized the su¬ periority of the armored knight. This change brought infantry into the front place in battle and threw cavalry into the status of an aux¬ iliary. The French Revolutionary Wars tended much to the development of artillery as a field weapon and Napoleon employed this terrible engine to its fullest extent, a practice followed by the best modern generals, who never risk a man where a cannon ball can do the work. Frederick the Great was considered an innova¬ tor for fighting with infantry four deep. Dur¬ ing the French war, the formation of three deep became general. Before the battle of Waterloo, the British leaders had acquired suf¬ ficient confidence in their troops to marshal them in a double line.

In the battles of Gravelotte and Sedan, the turning tactics came prominently forward. At Sedan the turning movement was complete. The losses of the tenth German division at Worth prove what a serious matter it is to make a direct attack against the breech-loader. They

amounted to about 4,000 men. It was of course necessary to make vigorous attacks on some points of the French position, so as to take

off their attention from the circular enclosing movement of the Germans. Although they (the Germans) were frequently obliged to make front attacks, the principle of the turning move¬ ment always asserted itself. In any case, how¬ ever, a direct infantry attack should always have been undertaken in sufficient force. But this was too often not the case, so that weaker forces exposed themselves to suffer great losses in long-continued doubtful conflicts, gaining at the same time but little ground.

On the defensive the shooting-tactics of the Germans consisted simply in firing at short range, a practice which always had the best results. The main position selected was gen¬ erally strongly occupied in first line. It was rightly judged that a strong development of fire at the commencement of an action was necessary and advisable. Separate strong masses in reserve, not a great many little re¬ serves, were formed. If there was sufficient time, the position was divided into sections and prepared for defense as well as possible. On the approach of the enemy the artillery was at once deployed into a connected line. The cavalry, having at first been pushed forward to check the enemy's advance was then withdrawn behind the line of defense.

To sum up the characteristic points of the infantry battle-tactics of 1870-71, it will be necessary in doing so to mention in the first place what we did not see. That is to say, no volleys in battle ; no, or at least a very few, attacks by troops in close order; if, however, a compact body ever did attack, it was always a small one, never amounting to a battalion column. But we did see great deployments of skirmishers on both sides; long continued gradually advancing musketry fights, often rolling backwards and forwards ; at last the flank of one party turned or else one side ex¬ hausted ; the other side pressing on in conse¬ quence, or a rush of dense clouds of skirmish¬ ers who endeavor at any price to dislodge their opponents; not forgetful that, in case of fail¬ ure and retreat, they are dead men. On both sides great dispersion; intermingling of troops and particularly in broken ground; hence the leader's control diminished. With the Germans — more steadiness and the habit of reserving their fire. With the French — more hurry and the habit of firing at long ranges. However great the effect of the artillery; however enor¬ mous was the loss of the French

by shells, there was still no example of a really great result being due specially to artillery. Even the plateau of Floing, which was cannonaded from all sides, had to be stormed by infantry. And the same may be said of Saint Privat.

The instances which have been given are the principal assaults in the first half of the war; they present many points of resemblance. In nearly every case the troops were drawn up in two lines of company columns and a re¬ serve. The skirmishers were sent forward, the first line followed at 150 or 200 paces dis¬ tant and then the second line. In no instance, however, does it appear that there was more than one line of skirmishers; behind them the troops marched with dogged bravery, in solid line of two ranks, shoulder to shoulder, or in company columns with platoon fronts far in¬ side the line of rapid effective fire; and they

continued this march until the fire caused a break in their lines and a retreat, or until they reached the work after enormous losses and held it as the result of a hand-to-hand fight. The skirmish line was so small in comparison with the main force that it really amounted to nothing and the attack was in fact made in solid line. The attack and the forward move¬ ment were not distinguished. This defective formation was the principal cause of the heavy losses.

In offensive tactics we may consider three general modes of attack, one of which the commander of a combined force must select as the most suitable for his purpose. (1) Frontal attack, which would mean a direct advance upon the whole of the enemy's line or position. As a general rule, this form of attack is unadvisable, as even in case of suc¬ cess the result is not decisive ; the enemy's line of retreat being unassailed, he simply falls back to a position more to the rear. There may, however, be situations when the nature of the ground prevents any other mode of operation, or where the frontal attack may be made use of to feel the enemy and ascertain his exact dispositions, in preparation for a con¬ centrated attack upon one of his weak points, as soon as they are discovered. (2) Combined attack upon front and flank. In this case the enemy is attacked in front at the same time that a portion of the force is directed at one of the flanks. An attack upon the flanks by itself unaccompanied by a front attack is not advisable, except in the case of small de¬ tachments acting against one another, or un¬ less the attack can be effected by surprise, in which case the enemy is unable to meet it in time by a change of front. Were a strong force in position attacked solely on the flank it would quickly form up its reserves to a new front, the troops of the original front coming up in support. For a flank attack, therefore, to succeed, it must, as a

general rule, be accompanied by a frontal attack, sufficient to hold the enemy to his original position. An attack upon both flanks combined with a frontal attack can only be tried under circumstances of great superiority of numbers, without which it would become a most dangerous operation, enabling the enemy to give the counter-stroke of a weak point of a straggling line and beat the assailants in detail by cutting their force into two. In engagements where the numbers are small the flank attack may be made alone. (3) Concentrated attack upon a weak point, to break through the enemy's line or force his position. This mode of attack, if the most difficult of execution, is undoubtedly in case of success the most decisive, the enemy being broken into fractions which can subse¬ quently be beaten in detail. The enemy's line of retreat may also thus be arrived at, and his communications cut before he can recover himself. The attack must alwqys be made with force sufficient to resist a counter enveloping attack on the part of the enemy; which might otherwise be disastrous in its results. The in¬ creased range of modern guns and rifles has made this attack more hazardous than ever, for a concentrated fire-action can now be brought to bear on the assailant, not only from all parts of the defense in his immediate front, but in most cases from eithqr flank as well.

Unless, therefore, the ground covers the move¬ ment in a great degree it should not be at¬ tempted.

In addition to the above primary modes of attack, a turning movement may also be con¬ sidered. This might be looked upon as almost a form of flank attack were it not that it differs from it in some essential particulars. The turning movement is more often a menace than an attack for it threatens the enemy's line of retreat so as to force him to change front or shift his position before he enters the com¬ bat. The manoeuvre differs also from a flank attack inasmuch as it removes the scene of combat from the position held by the enemy, while the flank attack takes place on one of the flanks of the position itself. The turning movement may be made, either with a portion of the force at command, or with its whole strength. In the first case, the conditions should render it improbable if not impossible that the enemy could act offensively in turn upon each fraction of the divided force. Otherwise the separate movement should not be attempted, as it must end in disaster. When the ground permits, or is favorable, cavalry and horse-artillery are specially suited to the turning movement. They should,

therefore, nearly al¬ ways form a portion and sometimes the whole of the troops employed in the service, both because they can by rapid advance produce the moral effect of surprise, and because they can more easily avoid destruction by a superior force.

The commander of a small force of the three arms should have no difficulty in prepar¬ ing his plan of attack and issuing his orders, upon receiving reports of the strength and dis¬ positions of the enemy and of the nature of the ground upon which he must act. In ordi¬ nary cases when small forces are engaged, the cavalry, which reconnoiters in advance, will bring in sufficient information for the purpose; but if the enemy should be covered by ad¬ vanced troops, it may be necessary to make a special reconnaissance, sometimes supported by guns, in order to arrive at a knowledge of his strength and intentions. With large forces this would probably be carried out by the ad¬ vanced guard the artillery of which, re-enforced where necessary from the main body, would take up what may be called a preliminary ar¬ tillery position and open fire at long range to cover the advance of the troops employed in the reconnaissance. The information required being obtained, the commander would issue his orders. In the case of very small operations or of a sudden encounter with the enemy these would be given verbally; under other conditions orders should, if possible, be written. Should the force, as it probably would, consist of de¬ tachments under various commanders, it would be necessary that there should be a general order for all, and also a special order ad¬ dressed to each commander where separate ac¬ tion is required. The general order should be clear, precise and complete, and as short as quick compliance with these requirements will permit. It should contain :

1. The conditions or circumstances of the intended action with what is known of the enemy.

2. The mode of action determined upon, and

how to be undertaken; thus for instance, to attack the enemy when he is touched on in direct advance, or, to attack the whole, or a certain part of a position.

,. The strength, composition and general division of the attacking force, with names of commanders ; this may be given more in detail in the margin of the order if thought necessary.

1. The preliminary positions to be taken up by each distinct part of the force with their directions of attack.

2. The hours at which these positions are to be assumed, and at which the forward move¬ ment or attack is to be commenced.

3. The position where the commander of the troops will be found during the action, to which all references or reports are to be made or sent.

These clauses would be sufficient for a small force, but in operations of greater magnitude it would be necessary to add :

1. The positions of the ambulance and field hospitals, and the order of march of the trains of the various columns.

It must be understood that the dispositions r troops thus indicated are only intended

for the first phases of the engagement, for, until the enemy's counter-plans are developed, the final movements which depend thereon can¬ not be defined. The special orders addressed to separate commanders should contain nothing that may tie their hands too much in matters of detail. As a rule, they should be told the thing to do, not the manner of doing it, and within safe limits, to be named, they should be allowed free action.

For the purpose of watching the phases of

combat, the position which the commander should assume during the engagement ought, if possible, be on an eminence, from which he can perceive the principal portion of the ground over which the troops are to work. He should

S0t i ˆ21* post (duly announced in the «order») without exceptionally good reasons, and if he is obliged to do so, an officer should be left behind to direct all reports or messengers to the new station of the commander.

The orders which are necessarily transmitted during an action by the commander of the troops are of much importance and should be given with great care. They should, if possible, be in general harmony with the original plan of attack, although certain modifications may become necessary. They should not descend to details which are better left to commanders of corps, nor should the commander of the troops interfere in the execution of his orders, further than to assure himself that they are carried out. He should be satisfied on this point by means of constant reports and com¬ munications which must be kept up without interruption during the action between him and the

commanders of separate corps and detach¬ ments. When the reports cannot be sent by an officer, they should be written, and in such case be numbered and dated with the exact hour and minute of dispatch. Above all other matters it is most important that the com¬ mander of the troops should be immediately informed when circumstances render it impos¬ sible for a subordinate commander to carry out the orders or instructions, as the failure

to execute these may necessitate modifications and fresh orders to replace the former ones.

By the end of the third stage it may be presumed that the enemy has been forced to show his hand sufficiently for the purposes re¬ quired of determining the best method of finally attacking him, and the commander's main dis¬ positions are either directed to be carried out in their original design or else modified to suit new ascertained conditions.

The artillery, which up to this time has con¬ tinued from its first position to support the general advance, by endeavoring to silence the enemy's guns and to draw off his fire from the infantry, is now directed to deliver barrages and to concentrate its fire upon the intended point of attack in order to prepare the way for the infantry assault. The moral effect of this fire upon the defenders will probably be very great, even if the physical effect upon troops partly behind cover of ground and ob¬ stacles be comparatively trifling.

Whenever the ground will admit, the in¬ fantry are supported on the flanks by cavalry, which advances under cover in small columns, with strong supports close at hand, and losing no opportunity of attacking any advanced troops of the enemy and warding off adverse attacks in return. The very fact of the cavalry occa¬ sionally showing itself on the flanks gives con¬ fidence to the attacking infantry and demoral¬ izes the defenders, especially if they are them¬ selves deficient or weak in that arm.

The fourth stage is now commenced, by the infantry being firmly launched at the se¬ lected points of attack, and it comprises the whole of the real action up to the moment which immediately precedes final success or failure.

The infantry here plays the principal part. It is fairly committed to the

fight and having received its final impulse in the desired direc¬ tion from the commander of the force, no power can alter or recall it, for good, during the remainder of the engagement. Its develop¬ ment of fire-action should rapidly increase as it nears the point of attack, for upon its weight of fire depends its success.

The cavalry on the flanks should be on the watch, not only to protect the infantry flanks of its own troops extended in the advance, but also to seize opportunities of approaching un¬ seen the flanks of the opposing infantry or artillery, and of throwing them into disorder or demoralizing them, if not inflicting serious injury. If repulsed and in its turn disordered, it must rally under the protection of other arms, and again return to exercise similar functions. But cavalry at this stage can only play a minor part, unless the ground be more than usually favorable to its action; with the exception, therefore, of strong supports to the cavalry acting on the flanks, the remainder of this arm would still be kept in reserve, but not so far to the rear that it could not be brought up quickly if required to make a di¬ version or demonstration on either flank.

The artillery, which during the former stages has been of first importance on ac¬ count of its long range, now falls into the sec¬ ond place. The' circumstances of the case must determine whether it shall keep up its fire on the enemy's guns to relieve its own infantry, vol. 26 — 14

or whether it shall fire on the enemy's troops. As the rule to be followed is, that it shall fire on that arm of the enemy which is for the time the most important, the enemy's infantry will in all probability be now the object. In either case, a moment may arrive during this stage when a second position more in ad¬ vance is necessary for the guns, on account of their fire becoming masked by their own advancing infantry. If a portion or the whole of the guns can, in such case, be advanced rapidly and placed in a good position (espe¬ cially on a flank, whence they can add their own fire to that of the advancing troops, which are at the moment absorbing the whole atten¬ tion of the defending infantry), the proximity to the enemy's line, of this second principal ar¬ tillery position, must not be too much limited by ordinary rules of caution. When the at¬ tack and defense are nearly matched, it is clear, that the addition of a close artillery fire on either side may turn the scale and com¬ pensate by decisive success for any loss sus¬ tained. As this close action of guns may in case of repulse. lead to confusion, it would perhaps be advisable that the whole of the available artillery should not take up this sec¬ ond advanced position, but that 'a portion be held in reserve,

massed in a favorable position, and be kept in action all the time in support of the advanced battery.

If the attack is successful and the enemy retires either before the demoralizing influence of the last steady advance, or broken by actual assault, the position he occupied is quickly as¬ sumed by the artillery and a heavy fire brought to bear on the retreating troops. The reserve cavalry, which by this time has been brought up from the rear, and probably posted on the weaker flank is now launched in pursuit ac¬ companied by horse-artillery, the superior mo¬ bility of both rendering their use peculiarly well suited to this service. The commander of the troops would move forward from his station, and take his post upon the position lately occupied by the enemy, for further direc¬ tion of the movements. The infantry meantime would recover from its first confusion, reform its ranks broken by the assault, and then fur¬ nish from its freshest troops, in all probability the reserves, a force to aid in the pursuit. The field-batteries will also push forward and harass the enemy with their fire, when he gets out of range of the position or becomes masked in his retreat by the interposing troops in pursuit.

If, on the other hand, the final assault of the position has been unsuccessful, the attacking force must retire, covered, in open ground by the cavalry and artillery, in close ground by the least disorganized portion of the infantry supported by the artillery. The latter arm now plays an important part. It must run every risk to enable the retreat to be safely effected, until a rearguard can be organized to protect the movement. With this view, the first posi¬ tion where a stand can be made close to the field of action must be taken up by the fresh¬ est of the infantry, and the guns must be posted in such manner as not only to support the in¬ fantry, but further to cover all the necessary dispositions for conducting the retreat in good order.

Should a commander of a force of the three

arms decide to stand on the defensive, he should take up the position most suitable for his purpose without delay, as the superiority to be attained by this course of action must result in great measure from the advantages attend¬ ant upon choice of ground. A good position should be such, from a tactical point of view, that the different arms could be disposed for defense in the manner most suitable to their action and that there should be facilities for concealing their strength, composition and posts from the view of the enemy, and of preserving them more or less from his direct fire during the attack. It is also of the highest import¬ ance that the front of any position selected for defense should be clear for view and fire, as should also be the flanks, unless they rest on impassable obstacles.

The first stage of the defense which was commenced with the reconnaissance of the enemy would thus comprise the selection and occupation of the position by the defenders, as well as the advanced action, if any, of the ar¬ tillery, already alluded to. Upon the selection of the ground most suitable for the artillery of the main position, will in great measure de¬ pend the exact trace of the fighting line for the infantry, the- positions for the guns so much depending upon the circumstances of each case, and more especially upon the configuration of the ground. The guns of the position should, however, if possible, be so placed as to bring the enemy's columns under fire at long range, and hence they ought to command every distant approach. They should also be able to pour a concentrated fire upon the probable positions which will be assumed by the attacking artil¬ lery, and be stationed so as to sweep the ground in front of the position from the earliest to the latest moment of attack. The defense of the flanks in the case of large forces must be spe¬ cially provided for.

It would, therefore, appear that, unless the ground is peculiarly favorable for posting guns in flanking positions, where without being ex¬ posed to enfilade they can bring a cross fire to bear upon the main attack, and a flanking one to protect the immediate front, the required conditions can only be fulfilled by the guns being placed in the front line and preferably at the salients, should an irregular contour mark the front of the position. The general distribution of the infantry would probably be in three lines; the first or fighting line of de¬ fense, the special supports, and the reserves. If time for hasty fortification is permitted some sort of entrenchment should be always prepared for the batteries, as even a low para¬ pet of earth gives protection to the gunners. Great care should, however, be taken that the newly broken earth is concealed or covered in such a manner from the enemy's

view, that it shall not serve as a mark for their artillery more distinct than would otherwise be presented by their guns alone. Shelter-trenches may also be prepared for the infantry in the fighting and supporting lines. Neither the places pre¬ pared for the batteries nor the shelter-trenches should be occupied by the guns or troops till the proper moment for action arrives.

In making these arrangements, it is of the utmost importance to secure the artillery of the main position against the fire of the enemy's

advanced skirmishers or marksmen; and with this view, the batteries ought to be covered in their immediate front by a line of extended riflemen, placed either in trenches or pits or behind natural cover, at a distance of from four to five hundred yards in advance of the guns which they defend. If the battery is on a flank, this protection should also be extended for a similar distance to the flank. The infan¬ try thus posted would remain as long as possi¬ ble in position, and only retire when, at the final stage, they are driven back by the over¬ whelming advance of the assailants. Besides their principal function, of keep-off the enemy's skirmishers from too early approach to the batteries of the defense, these advanced infantry could often bring an irritating fire to bear upon the attacking artillery at its first principal posi¬ tion, and perhaps serve to prevent the guns from approaching to the most telling ranges. This possible action would of course depend much upon the features of the ground.

It is impossible to lay down any rule for the exact position of the artillery of reserve. High ground near the exposed flank, provided facility of movement therefrom in case of necessity is presented by its features, would often be suitable. The guns should, however, in any case be well up to the front, so as to lose no advantage of range from the commence¬ ment of their fire. A position in rear which entails not only a sacrifice of some hundreds of yards range, but the necessity of firing over the heads of the defending infantry, greatly to their discomfort and demoralization, does not appear to present commensurate advantages of safety to the guns. It is evident that artillery so placed would be comparatively useless dur¬ ing the later stages of the defense, when once the attacking infantry has advanced so close that the fire of the retired batteries would be masked by the ground, or by the defending infantry lining the position. Guns so placed might be useful in defending an inner line, or for supporting a counter-stroke delivered inside the position after the assault has been made, but their action would be lost almost altogether during the period immediately preceding the final attack of the position. The previous knowledge of ranges and distances, possible to the artillery

of the defense, presents a great advantage; but if circumstances have not per¬ mitted the gunners to ascertain them during the preliminary arrangements, by aid of range¬ finders, aeroplanes, or other means, the earliest portion of the artillery action must be utilized to obtain correct estimates of the ranges to all important points, by means of trial shots.

There are certain points or portions of all positions, the possession of which would assure the assailant the greatest tactical advantages. In many cases also the conformation of the ground appears to limit the movements of an enemy to certain lines of operation. The de¬ fense should, therefore, occupy these parts of the position in force, with supports in close proximity, while still preserving the general line. Under the second condition the force should be prepared to resist advance by rapid re-en¬ forcements at any of the possible points of approach. The reserves of the third line should be placed so as to be available for strengthen¬ ing the most likely points of attack and to be

able to protect the line of retreat. Most of the cavalry, and some horse-artillery if it can be spared, would be placed with the reserves. Sometimes a portion of this force is placed in the second line for the purpose of joining in forward movements and flank attacks upon the assailants, or of covering the retreat of the troops engaged in these counter-attacks if un¬ successful.

The second stage generally commences with the opening of fire at long range from the main batteries of the position, upon the heads of the enemy's infantry to quit its order of march and deploy. The attacking artillery will probably now reply from its first principal posi¬ tion, and as the artillery of the attack is at this time the most important arm it must be answered by the guns of the defense. In this artillery duel the defenders should have the advantage, as knowing accurately the ranges to the various points which must be occupied by the enemy in his advance, and as being more¬ over entrenched while the assailants are all comparatively exposed. During the second stage the infantry of the defense are brought up into position and open long-range fire upon the advancing enemy with more or less effect.

In the third stage the advance to effective rifle range of the attacking infantry has forced the defense to show more clearly the positions for the real attack, the direction of which it is now the object of the

defending commander to discover, by every means in his power. As the supports and reserves of the assailing in¬ fantry come clearly into view, they should receive the concentrated fire of part of the artillery of the defense.

In the fourth stage the real point menaced by the attack being made clearly apparent, the commander re-enforces it to meet the assail¬ ants with a superior fire, and the artillery of the defense is directed at the opposing infantry, which now has become the principal arm in the attack. Should a counter-attack be pro¬ jected it takes place during this stage, unless it is to be delayed until after the assault. Re¬ sistance to a flank movement of the attacking troops would also now have to be made. In the case of a counter-stroke being delivered by the defense, part of the cavalry and horse- artillery might be employed in support of it. Cavalry also should generally move forward on the flanks at this part of the action to seek for opportunities of throwing the flanks of the attacking infantry into disorder, or of tak¬ ing guns too rashly advanced.

The fifth or last stage comprises the final repulse of the attack upon the position or the defenders' enforced retreat therefrom. In either case pursuit by the victors may ensue. Immediately before and during the final ad¬ vance or assault every gun of the defense should concentrate its fire upon the attacking infantry, in order to check their advance, and should the assailants retire, the guns must con¬ tinue to fire upon them, until masked by inter¬ posing troops sent forward in pursuit. Should the defenders, on the other hand, be forced to fall back, guns must cover the movement and enable the infantry to disengage itself.

The underlying idea of all infantry tactics is to close with the enemy as soon as possible and with all the units well in hand. The ideal conditions would be those making possible a

quiet, quick and orderly advance without halt¬ ing to open fire, but this is impossible with the highly developed weapons of to-day, and even though some of the attacking infantry managed to close with the enemy, there would be too few left for a bayonet fight. Therefore in order to make a successful assault, the infantry must move up under covering fire. To provide this protecting fire, it has equipped itself with the pistol, bayonet, and high-powered rifle, the one- pounder, trench mortars, the effective hand and rifle grenades, and has called to its assistance its supporting arm — the artillery. The enemy, attempting to protect himself from the terrific fire he knows will precede the infantry attack, has prepared deep dugouts and

bombproofs, in which he often hides until the last possible minute.

Despite the fact that all of the above prepara¬ tions are simply to give the bayonet man a chance to use his weapon (and to kill as many of the enemy as possible while doing it), it follows that fire action is more important than shock action, for without the fire the shock would be impossible. Therefore, the bayonet men must know how to shoot their rifles and to co-operate with the machine gun, the grenade, and the artillery, and must be so formed that during the assault they can deliver an effective rifle fire, present a solid front to the enemy in the bayonet charge, and be close enough to furnish mutual moral and physical support.

The wave attack that has been used so much in France was produced in order to furnish the greatest amount of mutual support among automatic riflemen, grenadiers, the one-pounders and riflemen, and at the same time to allow the greatest number of riflemen, (bayonet men) to close with the enemy in the best formation pos¬ sible. All of the conditions so far discussed make it imperative, that the assaulting troops be perfectly organized and that they follow their covering fire (barrage) as closely as pos¬ sible. Edward S. Farrow,

Consulting Military and Civil Engineer.

TACTICS, Naval. See Naval Tactics.

TACUBAYA, ta-koo-ba'ya, Mexico, a city in the federal district, situated three miles southwest of Mexico City. It is the principal pleasure resort of the valley of Mexico, and has many fine buildings and gardens. The national observatory is situated here, as well as the castle of Chapultepec. Pop. about 40,000.

TACULLI, an American Indian tribe of the Athapascan family, residing in British Columbia, at the headwaters of the Peace and Fraser rivers. They numbered about 750 in 1918 and lived on various small reservations. The majority of them are Roman Catholics, having been converted by French missionaries.

TADEMA, ta'de-ma, Laurence Alma.

See Alma-Tadema, Laurence.

TADOUSAC, ta-doo-zak', Canada, a town in Chicoutimi and Saguenay County, Quebec, situated at the confluence of the Saguenay River with the Saint Lawrence. It is a summer resort, and noted as being the oldest settlement in Canada. It was one of the early centres of the fur

trade, and the home for a time of Father Marquette. Remains are still visible of one of the early Jesuit establishments. Pop. 2,500.

TADPOLES. See Frog.

TAFILET, ta-fe-let', or TAFILELT,

Morocco, an oasis on the southern border of Morocco and northwestern border of the Sahara region, 200 miles south by east of Fez. It covers about 530 square miles, and has a population of about 125,000, distributed among about 150 villages, of which Abuam is the most important. The date-palm is cultivated, and silks and rugs are manufactured.

TAFT, Alphonso, American jurist: b. Townshend, Vt., 5 Nov. 1810; d. San Diego, Cal., 21 May 1891. He was graduated from Yale in 1833, became a tutor there and was admitted to the bar in 1838. In 1840 he settled in Cincinnati and took part in politics, being a member of the Republican convention in 1856. In 1865 he was appointed judge of the Superior Court of Cincinnati, serving until 1872, when he resigned to resume his law practice. On 8 March 1876 he was appointed Secretary of War but after two months was transferred to the post of Attorney-General. During 1877— 82 he practised law in Cincinnati, and in April of the latter year was sent as Envoy Extraor¬ dinary and Minister Plenipotentiary to Aus¬ tria. From 1884 to August 1885 he was Minister to Russia.

TAFT, Charles Phelps, American lawyer and editor, half-brother of President Taft: b. Cincinnati, Ohio, 21 Dec. 1843. He was graduated at Yale University in 1864, and later studied at the universities of Heidelberg, Berlin and Paris. He was admitted to the bar of Ohio in 1866 and in 1869-70 was engaged in practice in Cincinnati. In 1879 he became the principal owner of the Cincinnati Times which in 1880 he consolidated with the Star as the Times-Star, of which he has since been editor. He was a member of the Ohio House of Representatives in 1871 and served in Congress in 1895-97. He was presidential elector-at- large from Ohio in 1904, and president of the Ohio electoral college in January 1905.

TAFT, Henry Walters, American lawyer, brother of President Taft : b. Cincinnati, Ohio, 27 May 1859. He was graduated at Yale Uni¬ versity in 1880 and later studied at the Cin¬ cinnati and the Columbia Law

Schools. He was admitted to the bar in 1882 and engaged in practice in New York, where he is a member of the firm Cadwalader, Wickersham and Taft. He was special assistant to the Attorney-Gen¬ eral of the United States in the tobacco trust investigation. He was a member of the New York board of education in 1896-1900; a trus¬ tee of the College of the City of New York in 1903-05 ; and since 1908 has been a trustee of the New York Public Library. In 1907 he was appointed chairman of the Permanent Legal Advisory Board for Greater New York under the selective service regulations.

TAFT, Lorado, American sculptor: b. Elm¬ wood, Ill., 29 April 1860. Of English ancestry, settled about 1679 in Mendon now a part of Uxbridge, Mass., his father was Don Carlos Taft, professor of geology, University of Illinois (1872-82), later banker in Hanover, Kan. He graduated B.S. 1879, and M.L. 1880 at the University of Illinois; and studied at the ficole des Beaux Arts, Paris (1880-83). He opened a studio in Chicago in January 1886; from 1886-1907 was instructor and since

lecturer at the Art Institute of Chicago Uni¬ versity, extension lecturer University of Chicago (1892-1902) and since 1902 professional lecturer on the history of art. He won the designer's medal at the Columbian Exposition, Chicago (1893) ; silver medal, Pan-American Exposi¬ tion, Buffalo (1901); gold medal, Saint Louis Exposition (1904); silver medal, Panama- Pacific Exposition (1915). His work and lectures exercised a wide influence and in 1913 he received the honorary L.H.D. degree from Northwestern University. He is the author of (The History of American Sculpture) (New York 1903), and of 'Sculpture of the Nineteenth Century> (1919) in the encyclopedia. Among his notable works are (Sleep of the Flowers> ; 'Awakening of the Flower) ; Decoration of Horticultural Building, Columbian Exposition; 'The Eternal Silence, *Graceland Cemetery, Chicago; 'Solitude of the Soul,* Art Insti¬ tute, Chicago; 'Blackhawk, *Oregon, Ill.; ' Washington, > Seattle, Wash.; 'Paducah,* Paducah, Ky. ; (Trotter Memorial Fountain, *Bloomington, Ill.; 'Columbus Memorial Foun¬ tainˆ Washington, D. C. ; Ferguson, (Fountain of the Great Lakes,) Grant Park, Chicago; Ogle County 'Soldiers' Monument, * Oregon, Ill.; James Whitcomb Riley medal; 'The Fountain of Time,* Chicago; Thatcher Memorial Fountain, Denver, Col.; 'Alma Mater) for University of Illinois.

TAFT, William Howard, 27th President of the United States : b. Mount Auburn, Cin¬ cinnati, 15 Sept. 1857, son of Judge Alphonso (q.v.) and Louisa M. (Torrey) Taft. After graduating with honors from Yale (1878) he studied law in Cincinnati, being admitted to the bar in

1880. From 1881 to 1883 he was as¬ sistant prosecuting attorney in Hamilton County, Ohio, and for a time Collector of Federal In¬ ternal Revenue. From 1883 to 1887 he practised law in Cincinnati, after 1885 being assistant county solicitor. In 1886 he married Miss Helen Herron. In 1887 Governor Foraker ap¬ pointed him to fill an unexpired term as judge of the Superior Court. He was later elected for a full term; but in 1890 he was appointed solicitor-general of the United States by Presi¬ dent Harrison. In 1892 he was made a Federal judge of the sixth circuit, a position for which by temperament and training he was admirably fitted, and the work of which he found most congenial.

On 12 March 1900 President McKinley chose him to head a commission to establish civil government in the Philippines, and on 4 July 1901 he became first civil governor. Taft ac¬ cepted both appointments at the expense of his personal preference for a career on the bench, being influenced by a deep sense of respon¬ sibility toward and a genuine affection for the Filipinos. In 1902 Roosevelt twice offered him an appointment to the Supreme Bench of the United States, but he put aside what has been his chief personal ambition because he felt his immediate duty was to continue in the islands. As an executive his work was highly successful. In 1902 he conducted at Rome the important negotiations for the purchase of the Catholic Friars' lands. To a remarkable degree he won the confidence and affection of the Filipinos, though he disappointed many by his frank statement that in his judgment it might be two

generations before they would be ready for complete self-government. He believed in ((The Philippines for the Filipinos,® and opposed ex¬ ploitation primarily in the interest of American capital. He urged tariff concessions for Philip¬ pine products.

On 1 Feb. 1904 he became Roosevelt's Sec¬ retary of War, and for over four years was engaged in such important enterprises as the building of the Panama Canal. In 1906, when disorders called for American intervention, he was sent to Cuba, and for a time acted as provisional governor. In 1907 he visited Cuba and Panama, and later

Japan and China, going to the Philippines for the opening of the legis¬ lative assembly, and returning by way of Rus¬ sia. In 1906-13 he acted as president of the reorganized American Red Cross.

By 1907 Roosevelt was exerting his influence to secure the Republican nomination for his Secretary of War, whom he described as pos¬ sessing ((a standard of absolutely unflinching rectitude on every point of public duty, and a literally dauntless courage and willingness to bear responsibility,® besides a knowledge of men. tact and kindliness. Nominated on the first ballot, June 1908, Taft resigned as Secre¬ tary. The campaign with Bryan was fought largely on the issue of continuing the "Roose- velt policies,® the President declaring that Taft was "the man who I feel is in an especial sense the representative of all that in which I most believe in political life.® With this recommen¬ dation, and on the strength of his ideal train¬ ing for the office, Taft was given 321 electoral votes to Bryan's 162.

As President he lacked the magnetism and dramatic force of his predecessor. In general he took a moderate position on public questions. "We middle-of-the-road people,® he said (1911), "who are not extremists are, we believe, the real Progressives, because you do not make progress by great strides ; you make progress step by step.® His position on important issues may be summarized as follows: (1) In con¬ nection with the Payne-Aldrich Tariff Bill he used his influence in favor of downward revi¬ sion to a protective basis, just sufficient to cover the difference in cost of production be¬ tween here and abroad. Though not satisfied with some provisions, he signed and defended the law as the best ever passed. He favored further revision on the basis of reports to be made by a tariff commission; and he vetoed later revisions of several schedules largely be¬ cause they were not based on such reports. He worked for reciprocity with Canada. (2) On conservation his fundamental views were not so different from those of the Progressives as they seemed to believe. He hesitated, how¬ ever, to stretch the executive power, and Con¬ gress was slow to give him the power he re¬ quested. Unfortunately his support of Secre¬ tary Ballinger against Roosevelt's friend, Pinchot, appeared to place him in opposition to the policies of his predecessor. (3) In the matter of railroad and trust regulation he favored strict enforcement of existing law and his administration secured the dissolution of the Standard Oil and Tobacco trusts. He urged the clarification of the Sherman law and favored Federal charters for corporations doing interstate business. (4) He was opposed to the more radical schemes of direct popular

government, in particular the "recall of ju¬ dicial decisions.® (5) He

favored and ex¬ tended civil service reform, worked for effi¬ ciency and economy in government, especially urging a budget system and advocating pen¬ sions for Federal employees. (6) In foreign affairs he worked heartily for peace, negotiat¬ ing treaties for arbitration and the judicial set¬ tlement of international difficulties, which were rejected by the Senate. By “dollar diplomacy® the administration sought to secure opportuni¬ ties for trade and the investment of capital. This policy was denounced by some as leading to imperialistic interference in the affairs of weaker nations, and making government di¬ plomacy a mere agent of big business.

Some of these views were too progressive to suit the old leaders, and yet it was not long be'fore the insurgent Progressive-Republicans were denouncing the President as too friendly with reactionary party bosses and big business, and a deserter from progressive standards. Believing in the necessity of party government, the President did feel it necessary to work with and through the party majority in Congress. For a time he withheld patronage from insur¬ gent senators and representatives, and when he changed his policy the damage had been done. The defense of the Tariff Bill, the dismissal of Pinchot, the repeated vetoes of later tariff reduction bills, the veto of the grant of state¬ hood to New Mexico and Arizona because of radical provisions in their constitutions, all in¬ creased his unpopularity. The elections of 1910 gave the Democrats a majority in the House and showed a popular discontent with the old Republican rule and a drift toward Progressive Republicanism or toward the Democratic party. In Congress the insurgent Republicans often joined the Democrats to defeat the regular Republicans. In 1910 Roosevelt returned from Africa, and before long was openly taking issue with the policies of his successor. By 1911 the Progressive Republicans were planning to pre¬ vent the renomination of Taft. At first La Follette was to be their candidate, then they turned to Roosevelt. Early in 1912 he agreed to accept the nomination. In the States having direct primaries Roosevelt made a much better showing than Taft; but the control of the party machinery by the regulars brought about the President’s renomination. The Progres¬ sives started a new party, ensuring the over¬ whelming defeat of the President in November and the election of Wilson.

The outstanding feature of the adminis¬ tration was the conflict between conservative and progressive forces ; but the confusion and recrimination should not obscure important de¬ velopments during these four years. Among these were the reform of the rules of the House of Representatives (1910) ; the corpora¬ tion tax (1909) ; increased powers of the In¬ terstate Commerce Commission ; Postal

Sav¬ ings Bank (1910) and Parcel Post (1912) ; Children's Bureau (1912) and Department of Labor (1913) ; publicity for and limitation of campaign contributions (1910-11) ; submission of amendments on income tax and direct elec¬ tion of senators.

In 1913 Mr. Taft became Kent pro¬ fessor of law at Yale University, lectuiing on constitutional law in the college and the law school. He continued to take an active

interest in promoting international peace and a League of Nations. During the World War he was joint chairman of the National War Labor Conference Board.

In Tune 1921, President Harding nominated Mr. Taft to succeed the late Edward D. White as chief justice of the United States Supreme Court. His confirmation by the Senate fol¬ lowed and he took office early in July.

Arthur P. Scott,

Assistant Professor of History, The University of Chicago.

TAGABAWAS, ta-ga-ba'vas, a Philippine people living on both sides of Davao Bay, Min¬ danao, a mixture of several Malay tribes.

TAGACAOLOS, ta-ga-ka'6-los, a Philip¬ pine tribe, whose settlements are scattered among other tribes along Davao Bay, Min¬ danao.

TAGALS, ta-gals', TAGALOGS, or TAG- ALOS, a Philippine people of Malay origin, in¬ habiting chiefly Manila, the provinces of Cavite, Bataan, Bulacan, Batangas, Infanta, Laguna, and Mindoro, and scattered among other tribes in several other provinces. They are Christians and one of the leading peoples of the archipelago, both in numbers and in culture; they possessed an alphabet and considerable civilization before the arrival of the Spaniards. They were the leading element in the last insurrection against Spain, and proved troublesome after American occupation. They are, however, intelligent, shrewd and generally industrious ; and when once comprehending American ideals prove trustworthy. See Philippine Islands.

TAGANROG, ta-gan-rog', Russia, a town in the government of Ekaterinoslav, on a lofty promontory on the Sea of Azov, opposite the mouth of the Don, 28 miles west-northwest of Azov. _ There is a monument to Alexander I, who died here; also churches, exchange, gym¬ nasia, etc. It has manufactures of candles, leather, tobacco, macaroni, etc. The harbor, though the deepest in the Sea of Azov, is shal¬ low, not admitting vessels which draw more than 10 feet; but its situation secures to it a considerable trade. The principal exports are wheat, rye, barley, oats, linseed, rapeseed, wool, oil-cake, caviar and butter; the imports in¬ clude fruit, oil, machinery, hides, petroleum, dry goods, wine, etc. The annual exports pre¬ vious to the World War averaged over $50,000,000. Pop. 71,000.

TAGBANUAS, tag-ba'noo-as, native tribes of the Philippine Islands inhabiting the island of Palawan. They may be classified into five groups, some more civilized than others, ac¬ cording to the nature of the locality and the ex¬ tent of contact with the coast tribes. The Tagbanuas Apurahuanos have a peculiar writ¬ ing and alphabet. They have an elaborate sys¬ tem of government, laws for the regulation of morals and feast days. Their god is Diwata, whose principal officer and representative on this earth is called the Babailan, who may be of either sex. Consult Venturello, M. H., ban¬ ners and Customs of the Tagbanuas and Other Tribes of the Island of Palawan, Philippines *(in Smithsonian Miscellaneous Collections,* Vol. XLVIII, p. 514 et seq., Washington 1907).

TAGBILARAN, tag-be-la'ran, Philippines, pueblo, capital of the province of Bohol ; on

the southwest coast. Opposite the town is the important dependent island of Panglao, sepa¬ rated from Bohol Island by a strait one mile in width. The chief industries are agriculture and turtle fishing. Pop. 11,000.

TAGES, ta'gez, in early Italian mythology, son of a minor local deity, or genius, and grandson of Jupiter. He taught the Etruscans the arts of augury and divination, and was said to have sprung forth from a clod of earth freshly turned up by a husbandman named Tarchon, in the neighborhool of Tarquinii.

TAGGART, Marion Ames, American writer for young people : b. Haverhill, Mass., 7 May 1866. She has published (1899); (1902); (In the Days of King HaP (1902) ; (Nut- Brown Joan) (1904) ; (Pussy Cat Town) (1906) ; (Betty Gaston) (1910) ; (Nancy the Doctor's Little Partner) (1911).

TAGGART, Thomas, American congress¬ man; b. County Monaghan, Ireland, 17 Nov. 1856. He came to the United States in 1861 and settled at Xenia, Ohio. He engaged in the hotel business at Indianapolis in 1877, and since 1886 has been active in politics. He was chairman of the Democratic State Committee in 1892-94; mayor of Indianapolis in 1895-1901; and in 1916 was appointed to fill the vacancy in Congress caused by the death of B. J. Snively. He was elected to Congress in 1912 and in 1914.

TAGISH, a tribe of American Indians for¬ merly residing about the headwaters of Lewis River, Alaska. A remnant of the tribe still exists.

TAGLIONI, tal-yo'ne, Maria, Italian ballet dancer: b. Stockholm, Sweden, 23 April or 18 March 1804; d. Marseilles, France, 23 April 1884. Her father was Philippo Taglioni (b. Milan, 1777; d. 1871), a ballet master at differ¬ ent opera-houses successively in Europe. She was rigorously trained by her father and de¬ veloped a marvelous grace, so that she became the admiration of Europe in her day. She made her debut at Vienna in 1822; appeared at Paris in 1827, and at Berlin, London and other capitals later. Her style was termed <(ideal *; was chaste and refined in distinction to the ˆrealistic® dancing of her predecessors, Gar- del and Vestris. Her great successes were (La Bayadire, <La Sylphid'e,* composed for her by her father, and <La Fille du Danube.* In 1832 she was married to Count Gilbert de Voisins, and in 1847 retired from the stage. She is frequently mentioned in contemporary literature, particularly by Balzac and Thackeray.

TAGORE, ta-gor, Sir Rabindranath,

Hindu poet: b. Calcutta, 1861. His father Maharshi Devendranath Tagore was a famous spiritual leader who belonged to a family dis¬ tinguished for many generations throughout India. He was educated chiefly under private tutors and at the age of 17 visited England. By this time he was writing verse, largely imi¬ tative of the old Vaishnava poets. When he was 18 years old he published (Sandhya-San- gita *((Songs of Sunset*), and <Pravata-San- gita *((Songs of Sunrise*). In these he arises to the height of neo-romanticism in Bengali poetry. In 1884 he was married and went to

Shilaida on the banks of the Ganges to manage his father’s estate. There he came into touch with the real life of the people and wrote

poems, tales, parables and dramas dealing with their everyday affairs. His best known works of this period perhaps are (The Crescent Moon, *(The Gardener,) (Gitanjali) and (The Hungry Stones and Other Stories. > This second or Shilaida period of his life, which lasted 17 years, had a sad ending, as he lost in rapid suc¬ cession by death, his wife, daughter and the younger of his two sons. At the age of 40 in 1901 he began work at Bolpur, which centred around his school, (Shanti NiketanP or trans¬ lated, (Abode of Peaces Beginning with two or three boys it had grown in four years to 60, and in 1919 numbered over 200 boys. This _ school, while strictly Indian in its char¬ acteristics, embodied in itself, in forms modified to environmental conditions, the most advanced educational ideas of the world to-day, while retaining also the best traditions of the ancient Indian garden and forest schools. It is interest¬ ing to Americans to note that the self-govern¬ ment of his school is largely modeled after that of the George Junior Republic. Here Tagore brought the power of his personality to play upon an increasing number of young men who are making the India of to-morrow. The award of the Nobel prize in literature in 1913 brought him into world fame, and in 1915 he received the honor of knighthood. He has published in Bengali over 30 poetical works and 28 prose works, including novels, short stories, essays, sermons, dramas, etc. With a fine appreciation of the value of the English language he has made his own translations and published in English (Chitra) a play; (The Crescent Moon: Child-Poems) ; (The Gardener) ; <Gitanjali) ; 'Personality* ; (The King of the Dark Cham¬ ber } ; (Reminiscences) ; (Songs of Kabir) ;

(Sadhana: the Realization of Life) ; 'The Hungry Stones and Other Stories) ; 'The Post Office) ; (Fruit Gathering ; (Stray Birds *; (The Cycle of Spring) ; Sacrifice and Other Plays) ; 'Nationalism*; 'Mashi and Other Stories) ; 'Lover's Gift and Crossing. *Consult Rhys, E., 'Rabindranath Tagore) (1914) ; Pearson, W. W., (Shantiniketan : The Bolpur School* (1916); Roy, B. K., 'Rabindranath Tagore: The Man and His Poetry* (1916).

TAGUS, ta'gus (Spanish, Tajo ; Portuguese, Te jo), the largest river of Spain and Portugal, rising in the mountains of Albarracin, on the frontier of New Castile and Aragon, a little more than 100 miles from the Mediterranean. Pursuing first a northwesterly and then a south¬ westerly course, it passes by Aranjuez (a little south of Madrid), Toledo, Talavera and Alcan¬ tara, enters Portugal, and passes by Abrantes, Santarem, below which it begins to broaden into its fiord-like and expanding estuary, contracting again below Lisbon, and 10 miles farther down flowing into the Atlantic. Total length, 565 miles. The tide reaches nearly to Santarem, and regular navigation of the river begins at Abrantes. It flows through a mountainous country and its current is much broken by rocks and cataracts. Its principal

affluents are the Jarama, Guadarrama, Alberche, Tietar, Alagon, Elja and Zezere on the right bank; and the Guadiela, Almonte, Salor, Sever and Sorraia on the left.

TAHITI, ta-he'te, formerly OTAHEITE, the largest of the Society Islands, situated in the southern Pacific Ocean, in lat. 17° 40' S., and long. 149° 30' W. It consists of two moun¬ tainous, volcanic and roughly circular parts, united by a low, narrow neck of land, and abounds in magnificent scenery. The greatest dimension is northwest and southeast, 28 miles ; the total area is about 400 square miles, and the highest point 7,320 feet above sea-level. The climate is very agreeable. The natural vegeta¬ tion is extremely beautiful and luxuriant, but cultivation is limited to the coastal plain, where also nearly all the population is located. Copra, pearl-shell, cotton, vanilla and oranges are the chief exports, whose value in 1902 amounted to $860,000. Papeete, on the northwest coast, is the French administrative capital for all the French possessions in Polynesia. The native Tahitians were once a splendid race, noted for their simple, idyllic life. (See Tahitian Lit¬ erature). The vices introduced by contact with civilization soon brought about moral and physical degeneration, and the native inhabit¬ ants are rapidly diminishing in number. The island was discovered by a Spanish navigator, Quiros, in 1605, and visited by Captain Cook in 1769. In 1842 it came, as a native kingdom, under French protection, and in 1880 was de¬ clared a French colony. Pop. about 12,000. See Society Islands.

TAHITIAN (ta-he'ti-an) LITERATURE.

As mentioned under Tahiti, the natives of this southern Pacific island were once a beautiful race, living a natural, simple and idyllic life, as expressed in the accounts of Tahiti by Wal¬ lis, Bougainville, Cook and others, and idealized in the works of Melville, (Omoo) (The Rover) ; Stoddard, (Idylls) ; and Loti, Car¬ riage. } Notwithstanding their physical and moral degeneration since the introduction of European civilization, the evidences of the aboriginal state of existence, outside the recit¬ als of early explorers, are to be found in their traditions and legends preserved in the native songs and poems of the existing Teva family, of royal lineage, descended from Hototu, first queen of Vaieri, who married Temanutunu, the first king of Punauia. The songs, generally of love, war and lamentation, locally called himenes, are sung as a kind of choral chant with a monotonic buzzing'bass, on which a high shrill cadencing is repeated indefinitely, end¬ ing always in a long iee-i-e-e. The longer poems recite the history of the family, the various forms of etiquette and addresses for visits; shorter poems consist of soliloquies, laments, reproofs and

ceremonial topics. Among favorites of which English translations have been made are the (Coronation Song of Pomare) ; (Lament of AromaiteraP : Solilo¬ quy of Teura, a beauty asked to wed Punu, an old chief *; and Song of Reproof, at the be¬ ginning of the Wars between Teva and Puri- onu, in 1768. * Consult La Farge, 'Tahitian Literature) (p. 14389, Vol. XXIV) ; 'Warner's Library of the World's Best Literature.*

TAHLEQUAH, ta-le-kwa', Okla., town, former capital of the Cherokee Nation, in the valley of the Illinois River, about 18 miles east of Port Gibson, and 25 miles northeast of Muskogee, on the Saint Louis and San Francisco Railroad. It is in a fertile agricul-

tural region. It contains two public high schools, the Cherokee National Female Semi¬ nary and the Cherokee National Male Semi¬ nary. The latter was founded in 1847. There are two mission schools, the Baptist and the Presbyterian, and two school libraries. There is one bank and four weekly newspapers. The manufacturing is increasing, and there are grain elevators, cotton gins and flour mills. Pop. (est.) 3,000.

TAHOE, ta-ho', a lake at the base of the Sierra Nevada, on the boundary between Cali¬ fornia and Nevada, part in Placer County, Cal., and part in the counties of Douglas and Ormsby, Nev. It is about 20 miles long and from 8 to 12 miles wide, and has an altitude of 6,275 feet, and an extreme depth of 1,650 feet. The outlet is Truckee River. Lake Tahoe is noted for its beauty and the pictur¬ esque surroundings. It is a favorite and unique summer resort, on account of the cool and healthful climate and the beautiful scenery.

TAHPANHES, or TEHAPHNEHES, an

ancient city of Egypt, mentioned in the Bible (Jer. ii, 16; xliii, 7), usually identified with the Daphnse of the Greeks, situated in the north¬ eastern part of the Delta, about 30 miles south¬ west of Pelusium. In 1886 the site was ex¬ plored by Petrie (q.v.), who gives an account of the work in his 'Tanis,5 Part II (1887).

TAHR, tar, a wild goat (Hemitragus jem- laicus), found on steep tree-covered slopes along the whole range <of the Himalayas from Kash¬ mir to Bhutan. The horns are about a foot long, flattened, with a notched anterior margin; body fawn-brown; the hair of the neck, chest and shoulders hangs to the knees; the female is lighter in color with

smaller horns. Its nearest relative is the nilghiri goat of central India.

TAI-CHU, tl'chow', the former capital of Formosa (q.v.). See Tainan.

TAI-NGNAN-FU, tl'ngan'foo', China, a city in the province of Shantung, situated 35 miles southeast of Tsi-nan, on the railway to Yichau. It has a temple covering a large area, which draws many pilgrims bound for Mount Tai, which is regarded as sacred. Pop. about

75,000.

TAI-TOU, empress of Abyssinia: b. 1853; d. Addis Abeba, 11 Feb. 1918. She was a daughter of the king of Gondar and took an active part in the troublous politics of Abys¬ sinia, and was concerned in all the civil wars and intrigues which ended in the raising of Menelik, whom she had taken for *her fifth husband in 1883 when he was simply king of Shoa, to the position of Negus-Negusti (em¬ peror) in 1889. At Adowa where the Italians suffered a crushing reverse, she accompanied Menelik to battle headquarters and put her own hereditary troops in the field. During Mene-' lik's long illness she 'practically governed the country and kept it from internal disorders. On Menelik's death* in December 1913, his grandson, Lidj Jeassu. a youth of 18 and no blood relation of the empress, became emperor, but failed to maintain order, and largely on Tai-Tou's initiative he was deposed in Septem¬ ber 1916, and his aunt, Zauditu, Menelik's older daughter, was proclaimed 'empress.

TAI-YUAN-FU, ti'wan'foo', China, the capital of the province tof Shan-si, situated near the centre of the province, 260 miles south of Peking. It consists of a Chinese and a Tatar city separated by a high wall. The city has served as the residence of the emperors and contains a number of magnificent mausoleums. The surrounding region is very fertile and con¬ tains rich coal deposits. Pop. over 200,000.

TAIHOKU, Formosa, capital of the island. It has progressed rapidly since it came under Japanese government in 1898. Systematic colo¬ nization was begun in 1909, and in 1916 the population was over 100,000. See Formosa.

TAILFER, Patrick, American colonist: lived in the 18th century. He was a physician and emigrated to the newly-founded colony of Georgia in 1740. Later he removed to Charles¬ ton, S. C. He is' remembered for his joint authorship of (A True and Historical Narra¬ tive of the Colony of Georgia from the First Settlement thereof Until the Present Time) (1741). It is a severe arraignment of Gen. James

Oglethorpe's method of governing the colony and accuses the general of undue exer¬ cise of arbitrary authority and of putting his personal interests before those of the settlers. The work has been the subject of much discus¬ sion as to whether it was justified or was merely the expression of a group of malcon¬ tents.

TAILLON, Sir Louis Olivier, Canadian

statesman: b. Terrebonne, Quebec, 26 Sept. 1840. He was educated at Masson College and was called to the bar in 1865. He engaged in practice at Quebec in 1882 and became one of the leaders of the bar. He served in the Que¬ bec assembly from 1875; was speaker in 1882-84; Attorney-General in 1884-87; and in Janu¬ ary 1887 he formed an administration, but re¬ signed in two days and until 1890 was leader of the Opposition. He was appointed Minister without Portfolio in December 1891 ; was Prime Minister in 1892-96; and Postmaster-General in 1911. He was knighted in 1916 some years after his retirement to private life.

TAILOR-BIRD, an East Indian warbler (Orthotomus or Sutoria sutoria), one of many species in a large genus which exhibit a close similarity in structure and habits. They in¬ habit cultivated districts, are dressed in plain tints, feed chiefly on insects, and are peculiar mainly in their nest-making. They either sew a dead leaf to a living one or join two neigh¬ boring leaves together, so as to form a kind of hanging pouch, which remains attached to the branch by the leaf-stalk of one or both leaves. The threads which they use consist generally of twisted vegetable fibres or of ac¬ tual cotton threads, the bill serving for a needle in puncturing holes in the leaves and in draw¬ ing the threads through. Occasionally, if a large enough leaf be found, the nest may be formed by joining together the free edges of the leaf. The lower part of the pouch con¬ tains the nest, which is a cup of soft materials and is entered from above. The actual struc¬ ture of this ingenious cradle has never been scientifically observed, although tailor-birds are common. The best information is contained in Hume, (Nests and Eggs of Indian Birds* (London 1890).

TAlN B 6 CUALNGE, THE CUALNGE CATTLE-RAID

217

CUALNGE, THE CUALNGE CATTLE-RAID. The mediaeval Irish schol¬ ars catalogued their native literature under several heads', to one of which they gave the name Tain, by which they meant a <(reaving® or1 a <(driving® ofc cattle. The most important tale belonging to this

class is the subject of this article. The professional Irish story-tel¬ lers also arranged their epic tales according to cycles, one of which was known as the Ulster cycle, because the scene is always laid in Ulster ; as the cycle of Conchobar (Connor), the king round whom the Ulster warriors mustered ; as the Red Branch cycle, from the name of their banqueting hall ; and, finally, as the Cuchulainn cycle, from the name of the champion round whom the saga pivots. The has always enjoyed the reputation of being the most celebrated story of Irish antiquity.

The following is the argument of the Cualnge Cattle-Raid : One night a dispute arose between Queen Medb of Connaught and her husband, Aihll, as to the amount of their re¬ spective possessions. On matching their wealth, they were found to be equal, except that among the king's herds was a lordly bull called <(the Whitehorned.® Thereupon Medb dispatched her courier to Dare mac Fiachna, a rich landowner in Cualnge (Anglice Cooley), in Ulster, to ask for the loan of his wonderful bull, called <(the Brown of Cualnge.® Dare at first granted the queen's request but, incensed at a remark made by one of the envoys, he withdrew his promise and swore that never would he hand over the Brown Bull of Cualnge.

Medb straightway gathered a formidable army composed of allies from all parts of Ire¬ land wherewith to undertake the invasion of Ulster and to carry off Dare's bull by force.

Now it happened that the expedition took place while the Ulstermen suffered a debility which lasted all winter and the burden of de¬ fending the province fell on the shoulders of a stripling of 17 years of age, namely Cuchu¬ lainn, who was exempt from the curse which had befallen the remainder of the champions of Ulster. >

Cuchulainn confronted the foe and agreed to allow them to continue their march on con¬ dition that every day they send one of their champions to meet him in single battle. When he shall have killed his opponent, the host shall halt and pitch camp until the follow¬ ing morning. Queen Medb agrees to abide by those terms. In each of the combats which ensue, the heroic youth is victorious and slays many of the most celebrated warriors on the side of Connaught. The severest of all those single fights was the one which lasted four days and in which he had as antagonist his early friend and foster-brother, Ferdiad. Af¬ ter the death of Ferdiad, Queen Medb, im¬ patient at these delays, broke the sacred laws of ancient Irish warfare and overran Ulster with fire and sword.

By this time the Ulstermen have come out of their debility and

gathered their forces. In the final battle Medb's army is repulsed and retreats in flight into Connaught. But she had the satisfaction of carrying off with her the prize and the cause of the war, the Brown Bull of Cualnge.

The events which the (Tain Bo Cualnge > relates and its personages are ascribed by the

Irish annalists to about the time of the birth of Christ, that is to about 300 years before the introduction of Christianity into the island, ar,d such has been the constant Irish tradition. It belongs to a period when agriculture was almost unknown, when land was plenty and when the possession of kine to place upon it was of first importance and when cattle-raids were of frequent occurrence. The general con¬ dition of culture described in the saga corre¬ sponds in a remarkable way with the earlier part of the age to which archaeologists have given the name La Tene, or Late Celtic, and which terminated at the first century of our era.

The (Tain Bo Cualnge* even carries us back to one of the earliest and most widespread be¬ liefs of the great linguistic family to which we belong, to one of the most primitive as¬ pects of a world-wide nature-myth. Its great protagonist, Cuchulainn, gives us the impres¬ sion of a god, who appears to personify warmth and light struggling against the powers of cold and darkness. In the earliest version of the story, he is the son of the supreme god Lug and a mortal woman. Hence the curious com¬ bination that we find in him : On the one hand he acts like a brave and courtly warrior; on the other, his supernatural exploits exceed the course of ordinary human existence. By the time the tale had been given an historical framework and had been consigned to writing, the mythological idea from which it had sprung was, at most, but dim and uncertain. The story-tellers and their hearers regarded Cuchu¬ lainn and the other characters of the saga as real Irish men and women, and, although we are not to look for historical accuracy in the saga in every particular, it is very likely that, in the main, the events narrated really took place and the protagonists really existed.

. The whole spirit of the <Tain Bo Cualnge *is strongly pagan, which is another proof that the tale was committed to writing very early in the Christian period. It is not the work of any one man, but the epic of all Ireland, the accumulated work of generations, the last stage of a slow evolution. Its arrangement in literary form may have taken place as early as the 5th century and its shaping, substantially as we have it, dates from the first half of the 7th century, if not earlier. The earliest manu¬ scripts*

containing it probably disappeared dur¬ ing the Viking invasions, with the result that the oldest extant version dates from the year 1100. From that date till the middle of the last century a score or more of manuscripts have preserved it. Consequently, the <Tain Bo Cualnge is the most ancient epic tale of west¬ ern Europe and its composition antedates by a wide margin the epic tales of the Anglo-Sax¬ ons, the Scandinavians, the Franks and the Germans. Furthermore, it is entirely original and contains not the slightest hint of any foreign derivation.

The (Tain Bo Cualnge > is in prose inter¬ spersed here and there with verse and is not a work of art like the (Iliad) or the (Odyssey* ; it is not a finished epic, but an epic in the mak¬ ing, showing better perhaps than any other work in literature the development of popular tradition through more than a thousand years and the earlier stages of an epic. It affords a picture of an old barbaric civilization, with

all its inherent imperfections and roughness, wild phantasy and extravagance of deed and description, as it arose and developed among the people, unvarnished by poetic art. Withal it evinces poetic worth and contains some pas¬ sages which are not surpassed in any liter¬ ature.

The ‘Tain Bo Cualnge* is a great tale, one of the greatest and most curious in the world, and of the utmost importance to the philologist, the folklorist, the archaeologist and the histo¬ rian. For the first time in Europe it brings to light a high and romantic chivalry. It is a tale that is worthy of any literature in the world and no other race with which the Celts may be compared is able to produce any such ancient indigenous literary monument.

Bibliography. — The text of the Tain, from the most important manuscripts, has been pub¬ lished by Ernst Windisch, (Die Altirische Hel- densage, Tain Bo Cualnge, *Irische Texte, Ex¬ traband (Leipzig 1905), which contains com¬ plete apparatus, introduction, notes and vocab¬ ulary; Faraday, L. W., (The Cattle-Raid of Cualnge* (London 1904) is a translation based on one manuscript; Hull, E., ‘The Cuchullin Saga) (London 1898; contains a translation by Standish H. O’Grady) ; Hutton, M. A., ‘The Tain, An Irish Epic Told in English Verse) (Dublin 1907) is a paraphrase, as is Gregory, Lady A., ‘Cuchulain of Muirthemne> (London 1903) ; Dunn, J., (The Ancient Irish Epic Tale, Tain Bo Cualnge, The Cualnge Cattle-Raid> (London

1914) is the first complete version in English and (pages xxxii-xxxvi) contains a full bibliography on the subject.

Joseph Dunn,

Professor of Celtic Languages and Literatures, The Catholic University of America.

TAINAN, ti'nan', . Formosa, Japan, a city situated on a small river near the southwest coast of the island. Until 1896 it was the capital of the island. A canal connects it with For¬ mosa Channel. Under the Chinese and Japan¬ ese regimes it has had the status of a treaty port. There are a rice mill and several sugar mills. Pop. 53,790.

TAINE, tan, Hippolyte Adolphe, French

critic and historian : b. Vouziers, Ardennes, 21 April 1828; d. Paris, 5 March 1893. He was educated at the College Bourbon and the Ecole Normale, Paris, was assigned by the govern¬ ment, which thought his talent dangerous, to a provincial post as instructor, but resigned this and devoted himself to literature, writing in quick succession 'Essai sur La Fontaine *(1853; rev. ed. 1860), 'Essai sur Tite Live* (1854) and 'Philosophes Frangais du XIXe Siecle *(1856). In 1864 he was appointed to a professorship in the Ecole des Beaux-Arts, where his series of lectures on the history of art were patterns of philosophical criticism. The dissolution of the empire and the attendant troubles directed him to the study of the philosophy of history and in connection therewith he wrote his 'Orig- ines de la France contemporaine) ('Ancien Regime,* 1876, 'Revolution,* 1878-84, < Re¬

gime Moderne,* 1890 — unfinished), a work of great erudition, in which he condemns the royalists, but finds their gravest faults repeated by the republicans and makes his bitterest aL tack on Napoleon. Thus he alienated all par¬ ties, holding all responsible for the disasters

of the "Terrible Year.® A work more familiar to readers in the United States and England is his (Histoire de la litterature anglaise) (1864; Eng. trans., by Van Laun). The brilliancy of this performance is unquestioned, but the jus¬ tice of its method has beerf much discussed and while Taine became the founder of a cult in France, he found in England and America no imitators of importance. Literary criticism, aesthetics and psychology were to him sciences as exact as chemistry ; he treated them with a laboratory style of analysis and deduction. ((Little facts, well-chosen, important, significant, amply substantiated,

minutely noted® — such, in his own words, he made his material. “The whole world,® -said Bourget, “seemed to Taine matter for intellectual exploitation.® Taine judged all products of the human mind by the three inflexible standards of race, epoch and surroundings and these he manipulated as if they were mathematical formulae. He quite disregarded the factor of individuality and re¬ duced everything to that rigorous systematiza¬ tion which drew protest from Amiel. He suc¬ ceeded in pointing out certain things which no other historian had noted, but dogmatized to a degree no longer regarded as permissible. (See Origins of Contemporary France). Taine’s other published works include ‘Essais de critique et d’histoire *(1857); ‘Ecrivains ac- tuels de l’Angleterre) (1863) ; ‘IdealLme an¬ glais^ (1864), a study of Carlyle; (Positivisme anglais) (1864), a study of John Stuart Mill; ‘Nouveaux essais de critique et d’histoire> (1865); ‘Philosophic de l’art* (1865); Phi¬ losophic de l’art en Italic *(1866); ‘Voyage en Italie* (1866); ‘Notes sur Paris, ou vie et opinions de M. Frederic-Thomas Graindorge) (1867) ;. ‘L’ldeal dans l’art *(1867); lectures delivered at the Ecole des Beaux-Arts; ‘Philos¬ ophic de l’art dans les Pays-Bas> (1868) ; ‘Philosophic de l’art en Grece* (1870); ‘Du suffrage universeP (1871); ‘Notes sur l’An- gleterre) (1871), a work of considerable value; ‘Derniers essais de critique et d’histoire> (1894) and ‘Carnets de voyage: notes sur la Province> (1897). Taine was created hono¬ rary D.C.L. of Oxford in 1871 and in 1878 he was elected a member of the French Acad¬ emy. Consult Monod, ‘Les maitres de l’his- toire> (1894); Lemaitre, ‘Les contemporains) ; De Margerie, ‘H. Taine) (1894); Boutmy, M. E., ‘Taine, Scherer, Laboulaye) (Paris 1901); Giraud, V., ‘Hippolyte Taine *(ib. 1901) ; Aulard, A., ‘Taine, historien de la Revolution frangaise* (Paris 1907) ; Gummere, F. B., ‘Democracy and Poetry) (Boston 1911).

TAINTER, Charles Sumner, American in¬ ventor: b. Watertown, Mass., 25 April 1854. He has invented the graphophone and was the associate inventor of the radiophone. In 1874 he was a member of the United States expe¬ dition sent to the South Pacific to observe the transit of Venus. In 1881 he received the gold medal at the Electrical Exhibition, Paris, for his inventions in connection with the radio¬ phone and in 1889 was given the French Acad¬ emy decoration, . ‘Officier de l’lnstruction Pub- lique) for the invention of the graphophone; in 1900 he received the John Scott medal in Philadelphia for this same invention.

TAIPINGS, typings', the name given by foreigners to the insurgent followers of Hung

TAJ MAHAL, INDIA

a

0 9

A

A

a

A

w

＜4-4

o

＜D

＜4-1

＜D

O

03

C3

A

c3

N

c3

a

3

42

B

o

H

w

i

o

<n

to

p

x>

03

43

<33

H

a>

43

H

a

t<3

lx

ad

<

o

a>

«

d

3

►—i

<u

43

+-*

ft

3

a3

43

03

s

C3

H

a>

43

a

fAJ MAHAL

TAIT — TAKAHASHI

219

Hsm-ch wan, who raised a formidable rebellion in China in 1851 and who until his suppression in 1864, was looked upon by his disciples as emperor of the dynasty of Taiping — signify¬ ing Grand Peace, and the Tien Wank — Heav¬ enly King, of the T'ien Kwo — Kingdom of Heaven.

TAIT, tat, Archibald Campbell, English prelate, archbishop of Canterbury : b. Edin¬ burgh, 21 Dec. 1811; d. Addington, 1 Dec.

1882. Brought up a Presbyterian, he received his education in the schools of his native city. He entered the University of Glasgow in 1827, and having gained a Snell exhibition he matric¬ ulated at Balliol College,. Oxford, in 1830, be¬ coming about the same time a member of the Church of England. He was graduated with a first in classics in 1833, elected a Fellow of his college in the following year, ordained in 1836, and was active as tutor of Balliol for seven years. \ hile several of his intimate friends joined the Tractarian movement, he himself kept aloof from it, and joined in the protest against Tract XC. He succeeded Dr. Arnold in the headmastership of Rugby School in 1842, and retained this post till 1850, when he was appointed dean of Carlisle. He took an active part in the work of university reform at Ox¬ ford, and in 1856 he was appointed to the see of London. He declined the archbishopric of York in 1862, and in 1869 was appointed arch¬ bishop of Canterbury. He at first opposed the bill for the disestablishment of the Irish Church, but on being appealed to personally by the Queen he accepted the inevitable. He was also instrumental in securing the enactment of the Public Worship Regulation Act of 1874. His mind was of a calm statesmanlike cast, and he acted with coolness and dignity in the criti¬ cal events of his time, such as the Essays and Reviews controversy, the Colenso case and the legal prosecution of Ritualists. He was looked upon by the High Church party as a mere Eras- tian ; they accused him of unfairness, but in his latter days he vindicated his sincerity in professing charitable tolerance with unmistak¬ able clearness. Consult Davidson and Ben- ham, (Life of Archibald Campbell Tait) (1891) ; Dangin, ‘English Catholic Revival in the XIXth Century* (London 1914).

TAIT, John Robinson, American painter : b. Cincinnati, Ohio, 14 Jan. 1834; d. 1909. He was' graduated at Bethany College, Va. (1852), and studied in Florence, Italy (1853-56) ; in Dusseldorf (1859-71); and in Munich (1873- 76). He was for several years the art critic of the New York Mail and Express. Among his writings are (European Life, Legend and Landscape) (1859) and (Dolce far Niente,* poems (1859).

TAIT, Sir Melbourne McTaggart, Cana¬ dian jurist: b. Melbourne, 20 May 1842. He was educated at Saint Francis College, Rich¬ mond, and was graduated at McGill University, Montreal, in 1862. He started practice as law¬ yer in 1862 at Richmond, then joined the late Sir John Abbott (1870), remaining his law partner many years. He was created K.C. in 1882 and was elected treasurer of the Montreal bar. In 1887 he was appointed puisne judge to reside at Sweetsbury, province of Quebec, removing to Montreal in 1889. In 1906 he was made chief justice of the Supreme Court. He was knighted on the occasion of the

Queen’s

Jubilee (1897). A founder of the Children’s Memorial Hospital, he has been its president since 1905.

TAIT, Peter Guthrie, Scottish physicist: b. Dalkeith, 28 April 1831 ; d. Edinburgh, 4 July 1901. He was educated at the Edinburgh Uni¬ versity and at Saint Peter’s College, Cambridge. Elected Fellow of Peterhouse in 1852, he be¬ came professor of mathematics at Queen’s Col¬ lege, Belfast, two years later, and held that office till his appointment in 1860 to the chair of natural philosophy in the University of Edinburgh. He published (Dynamics of a Particle- *(1856) ; (Quaternions) (1867) ; .‘Thermo-Dynamics* (1868) ; (Recent Advances in Physical Science) (1876); <Heat) (1884); (Light) (1884) ; Properties of Matter *(1885) ; ‘Dynamics* (1895); ‘Newton’s Laws of Mo¬ tion *(1899), etc. He was joint-author with Lord Kelvin of a well-known ‘Treatise on Natural Philosophy* ; and also collaborated with the late Balfour Stewart in ‘The Unseen Universe.*

TAIWAN, ti-wan', the native name for Formosa (q.v.).

TAJ MAHAL, tazh, ma-hal', India, a cele¬ brated mausoleum in a beautiful garden, out¬ side the city of Agra, about a mile east of the fort. It was built by the Emperor Shah Jehan for himself and his favorite wife Mumtaz Mahal, who died in 1629. Tavernier, who saw the building in process of construction, says that 20,000 men were employed upon it contin¬ ually for 22 years. It is an octagonal building 70 feet high, with sides measuring 130' feet; and is surmounted by a dome giving an addi¬ tional height of 120 feet; total height, 190 feet. At the four corners of the platform centred by the mausoleum are minarets 133 feet high. The whole is built of white marble, and the interior decorations are of sumptuous magnificence. The screen surrounding the chamber contain¬ ing the cenotaphs of the emperor and his con¬ sort, above the sepulchral vault, is composed of 12 kinds of stones, chief of which is the valuable lapis lazuli ; the arabesque mosaic and inlaid work is described as of unsurpassed beauty. The cost of the mausoleum is vari¬ ously estimated to have been from $10,000,000 to $'50,000,000.

TAJURA, or TAJURRAH, ta-joo'ra,

northeast Africa, a bay and seaport in the French Somali Coast protectorate or territory of Obok, on the Gulf of Aden. It was ceded to France in 1884. The rising French seaport of Jibutil is at the entrance of the bay, on the south side, whence a railway extends since 1902 to

Harar. See Abyssinia.

TAK-I-KESRA. See Ctesiphon.

TAKAHASHI, ta ka-ha'she, Korekiyo, Baron, Japanese financier: b. Sendai, 7 July 1854. He studied English in Japan, then, for one year, ' in America. In 1875 he was ap¬ pointed principal of the Osaka English School, becoming (1881) official in the Department of Agriculture and Commerce. In 1892 he en¬ tered service of the Bank of Japan, becoming the following year director of its western sec¬ tion. In 1895 he entered the Yokohama Specie Bank as manager, becoming, successively, dir rector (1896), vice-president (1897), and was then appointed vice-governor of the Bank of Japan, returning (1906) to the Yokohama

Specie Bank as president while retaining his former position. From 1904-06 he negotiated important loans from England and America He was created baron in 1907.

TAKAHIRA, ta'ka-he'ra, Kogoro, Baron,

Japanese diplomat: b. Iwate, 1854. He was appointed attache to the legation at Washing¬ ton in 1879 and became secretary in 1881. Later he was made charge-d'affaires at Korea! then consul-general at Shanghai and (1887) New York, following which he was successively appointed Minister-Resident to Holland and Denmark, Minister-Plenipotentiary at Rome, Vienna and Berne. From 1901—05 he was minister at Washington, in the latter year sign¬ ing, with Baron Komura, the Peace Treaty at Portsmouth, N. H. He was Ambassador at Rome (1907), then transferred to Washington the following year, serving till 1909.

TAKAMINE, ta'ka-min, Jokichi, Japanese- American chemist: b. Takaoka, Japan, 3 Nov. 1854. He was graduated in chemical engineer¬ ing (1879) at the Engineering College of the Imperial University at Tokio, becoming Japa¬ nese government student at the Glasgow Uni¬ versity and Andersonian University, Glasgow, from 1879-81. From 1881-84 he was head chemist of the Department of Agriculture and Commerce, Tokio, then (1884-85) Imperial Japanese Commissioner to the Cotton Centen¬ nial, New Orleans. In 1887 he organized and erected the first super-phosphate works at Tokio. He came to America in 1890 where he brought a fermentation process to

practical use producing diastatic enzyone, now used in starch factories. He established a research factory in New York, and with others, formulated a proc¬ ess of extraction of the active principle of the suprarenal glands on a commercial scale, pro¬ ducing ˆadrenalin.®

TAKAMATSU, ta'ka-mat-soo, Japan, the capital of the prefecture of Kagawa, situated on the north coast of Shikoku. Pop. 40,000.

TAKAOKA, ta'ka-6'ka, Japan, a town in the prefecture of Toyama near the west coast of central Hondo. It manufactures dyes and hardware. Pop. about 40,000.

TAKASAKI, ta-ka-sa-ke, Japan, a town in the prefecture of Gumma, situated nearly in the centre of Hondo, 60 miles northwest of Tokio, with which it has railroad connection. It has cotton and silk manufactures. Pop. 34,900.

TAKATA, ta-ka'ta, Japan, a town in the prefecture of Niigata, near the west coast of central Hondo. It has extensive manufactures of cotton goods. Pop. 32,600.

TAKIGRAPHY. See Shorthand.

TAKILMAN FAMILY, a tribe of Amer¬ ican Indians occupying the country along the Rogue River in Oregon. In 1860 there were some 17 villages of this tribe but it is now scat¬ tered or extinct.

TAKOW, ta-kow', or TA-KAO, ta-ka-o', Formosa, a port on the southwest coast, con¬ nected by rail with Tainan. Its principal ex¬ port is sugar. Pop. 15,000.

TAKU, a tribe of North American Indians, residing in the vicinity of Taku Inlet, Alaska. They number about 300.

TALACOGAN, ta-la-ko'gan, Philippines, a settlement of Moros, province of Surigao, Min¬

danao, on the Agusan River, seven miles north of the outlet qf Lake Pinayat, and 96 miles south of Surigao, the provincial capital. Pop. 11,590.

TALAMANCA, tal-a-man'ka, Panama, a name formerly applied to the Atlantic Coast region of western Panama and Costa Rica. At the time of the Discovery the region was inhabited by numerous tribes with a peculiar civilization of their own. They manufactured a great variety

of ornaments of gold, in which the country was very rich. By the encroach¬ ments of the whites they were driven into the forest and mountain recesses. Here a tribe known as Talamancans still lives in practical *9 dependence and wholly unaffected by modern civilization, within a short distance of the Panama Railroad.

1 ALAVACHI, a mysterious poison for¬ merly manufactured by the Aztecs, and by them handed down to the Mexican Indians. Skil¬ fully administered, it is said to destroy the mind while leaving slight effects on the body. Ihe peculiar effect of the poison seems to be to induce monomania or epilepsy.

TALBOT, Arthur Newell, American engi¬ neer: b. Cortland, Ill., 21 Oct. 1857. He was graduated (1881) at the University of Illinois, receiving his civil engineer's . diploma in 1885. He has been engaged in engineering work on railways, sewerage, waterworks and other pub¬ lic utilities as well as in the investigation of construction material. Since 1890 he has been professor of municipal and sanitary engineering, having charge of theoretical and applied me¬ chanics for the University of Illinois. In 1918 he was elected president of the American So-

Engineers. He has written 'The Railway Transition SpiraP (1901) • (Tests of Concrete) (1906); (Tests of Col¬ umns; (1912); (Tests of Reinforced Concrete Buildings under Load* (1913).

TALBOT, Ethelbert, American Protestant Episcopal bishop: b. Fayette, Mo., 9 Oct. 1848. He was graduated from Dartmouth College 1870, and from the General Theological Semi¬ nary in 1873. He was ordained to the priest¬ hood in the year last named and was rector of Saint James, Macon, Mo, 1873-87. In 1887 he was consecrated missionary bishop of Wyom¬ ing and Idaho, and in 1897 was translated to the see of Central Pennsylvania. After administer- mg the diocese of central Pennsylvania .for seven years he accomplished its division into the diocese of Bethlehem of which he remained bishop with residence at South Bethlehem, Pa. and the diocese of Harrisburg. He is' the author of of <A Bishop Among His Flock) and <Tim: an Au¬ tobiography of a Dog.* Besides these books he has published various sermons, addresses and tracts, etc.

TALBOT, Henry Paul, American chemist: b. Boston, 15 May 1864. He was graduated (1885) at the Massachusetts Institute of Tech¬ nology and obtained Ph.D. diploma at Leipzig in 1890. He has served successively as assistant (1885-87), instructor (1887-88 and 1890-92), assistant professor (1892-95), associate pro¬ fessor (1895-98) and

professor of analytic chemistry (1898-1902) at the Massachusetts In¬ stitute of Technology, where he has since had charge of the department of chemistry and chemical engineering. He has written <In-

troductory Course of Quantitative Chemical Analysis) (1897) ; (The Electrolytic Dissocia¬ tion Theory,* in collaboration with A. A. Blanchard (1905) ; besides numerous articles published in the scientific journals.

TALBOT, John, 1st Earl of Shrews¬ bury: b. about 1380; d. Castillon, France, 17 July 1453. He was appointed lord-lieutenant of Ireland by Henry V in 1414. Five years later he began a long career in the French wars, being present at the siege of Milan in 1420, and at that of Meaux in 1421. He returned to Ire¬ land as lord-lieutenant in 1424 and was knighted in 1426, but in 1427 went again to France. After the raising of the siege of Orleans he deter¬ mined to save the town of Beaugency; but hear¬ ing that the place had already been evacuated, he retreated northward toward Patay, where he was overtaken by the French and captured (1429). He regained his freedom by exchange in 1433. In 1436 he became marshal of France, and by 1439 had become governor and lieu¬ tenant-general of France and Normandy. The capture of Harfleur in 1440 was largely due to him. In 1442 he was created Earl of Shrews¬ bury. In 1445 he conducted Queen Margaret to England, and that year went for the third time to Ireland, where to his titles were added those of Earl of Waterford and Lord of Dungarvan. In 1448 he crossed the channel again as lieu¬ tenant of Normandy. In 1453 he went to the assistance of the besiegers of Castillon, and fought against great odds until he was killed.

TALBOT, John, American Protestant Episcopal missionary: b. Wymondham, Nor¬ folk, England, 1645; d. Burlington, N. J., 29 Nov. 1727. He entered Christ's College, Cam¬ bridge, became Fellow of Peterhouse in 1664, rector of Freetherne, Gloucestershire, in 1695, and entered the employ of the English Society for the Propagation of the Gospel in Foreign Lands in 1702. He came to America, founded Saint Mary’s Church, Burlington, N. J., and was its rector 1704-22. His later loyalty to the Episcopal Church appears to have fallen into question. For the two sides of the controversy consult Hills, (History of the Church in Bur¬ lington (1876), and Perry, (History of the American Episcopal Church> (1885).

TALBOT, Silas, American naval officer: b. Dighton, Bristol County, Mass., 1751 ; d. New York, 30 June 1813. Upon the breaking out of the Revolutionary War he was commissioned captain in a Rhode Island regiment, and after participating in the siege of Boston, accom¬ panied the army in 1776 to New York. For the skill with which he directed certain operations against the British shipping in the harbor he received from Congress a major's commission. He participated in the memorable defense of Fort Mifflin, November 1777, and in 1778 ren¬ dered valuable assistance to General Sullivan by transporting the American forces from the mainland to the upper end of the island of Rhode Island. A dashing exploit of the war was his capture in 1778 of the British floating battery Pigot, of 22 guns, anchored in one of the channels commanding the approach to New¬ port. In 1779 he was commissined captain in the navy, and, after cruising with success against British commerce, was captured by a British fleet and confined in the Jersey prison ship 1780. He was afterward removed to

England, and in 1781 was exchanged. Upon the reorganization of the navy 1794, he was again called into the public service, and superintended the construction of the frigate Constitution (Old Ironsides), which in 1799 was his flagship during a cruise in the West Indies. He re¬ signed his commission in 1801, and passed the remainder of his life in New York. Consult Tuckerman, (Life of Commodore Silas TalboD

(1851).

TALBOT, William Henry Fox, English photographer and scientist : b. Lacock Abbey, near Chippenham, England, 11 Feb. 1800; d. there, 17 Sept. 1877. He was graduated from Cambridge in 1821, and represented Chippenham in Parliament 1833-34. Scientific research be¬ ing more attractive to him he gave up politics, and, devoting himself to the study of the chemi¬ cal action of light, made important discoveries in photography. In 1839 his invention of pho¬ togenic drawing was explained by Faraday to the Royal Institution, and in 1841 he patented the calotype process. He is still referred to as an authority whose statements are sound. Sub¬ sequently Talbot devoted himself to antiqua¬ rian research, being one of the first decipherers of the cuneiform inscriptions from Nineveh. His publications include (Chemical Changes of Color *(Phil. Magazine 1828) ; (Legendary Tales* (1830) ; (Hermes, or Classical and An¬ tiquarian Researches *(1838-39) ; (The Pencil of Nature* (6 vols. on photography 1844-46) ;

(Assyrian Texts Translated) (1856), etc.

TALBOT, or OLD SOUTHERN HOUND, a race of dogs, probably extinct, which seems to have been the original stock from which the various breeds of hounds sprang. The color was pure white ; large head, very broad muzzle, long pendulous ears and rough hair on the belly. Talbot is the family name of the English house of Shrewsbury which has a talbot for badge and two talbots for supporters.

TALC, one of the commonest and most . important of the non-metallic minerals. It is usually massive or foliated, the laminae being flexible but not elastic. It is number one in Mohs scale of hardness, and like most very soft minerals it has a greasy feel. Its lustre is pearly and glimmering, and its usual colors are green, gray or white. Foliated varieties are often quite transparent, while the massive is translucent. It is of average specific gravity, about 2.7. It is acid magnesium silicate, HzMgaShOw. Talc, like the related mineral ser¬ pentine, is of secondary origin, having been formed by the alteration of various magnesian minerals such as tremolite, pyroxene and en- statite. It occurs in metamorphic rocks all over the world, being the most prominent mineral in the rock known as talcose schist, and sometimes forms extensive beds, occurring thus in most of the Atlantic Coast states. Although very soft, it is almost indestructible, not being attacked by acids nor injuriously affected by intense heat. Its common, massive form, popularly known as <(soapstone, **is the <(steatite** of mineralogy. Some soapstone is, however, a massive pyro- phyllite (q.v.) and the term soapstone is applied loosely by miners to almost any soft rock or mineral with a greasy feel. Talc is used in the arts either powdered as <(flour talc,® or in sawed pieces. Flour talc is employed as a base

for fireproof paints, in boiler and steampipe coverings, and foundry facings, for electric in¬ sulators, in the manufacture of dynamite, and of wall papers to which it imparts a glossy surface ; it is very extensively used in the manu¬ facture of toilet powders, and cheap soaps, for dressing leathers and skins, and as a base for lubricants. About half a million dollars' worth of ((fibrous talc® is produced annually in the single county of Saint Lawrence in New York. This material is a mixture of talc and fibrous tremolite and is used in making paper. When ground the fibres cause the retention of the flour talc in the paper pulp, thus adding ma¬ terially to the strength and weight of the paper. The supply of pure, compact soapstone, the most valuable variety of talc, comes largely from western North Carolina

and Virginia. It is sawred into slate pencils and crayons and is manufactured into the tips of gas burners. The chief uses of soapstone are for stationary wash- tubs, sinks, acid tanks, hearth-stones, fire bricks, mantels, griddles and many other articles of everyday use. <(French chalk® is a fine-granular talc used as a crayon by tailors. In China and Japan a fine compact talc is carved into various ornaments, household gods and pagodas, though considerable of the material thus used is agal- matalite (q.v.) or pyrophyllite. See Mineral Production of the United States.

TALCA, tal'ka, Chile, the capital of the province of the same name, on the Rio Claro, about 180 miles south of Valparaiso, on the rail¬ way from Curico to Concepcion. It is a fine city, with handsome churches and a lyceum. Weaving is the chief manufacturing industry. Pop. (1916) 41,618. The province has an area of 3,864 square miles and the population is

131,058.

TALCAHUANO, tal-ka-wa'no, Chile, a seaport in . the province of Concepcion, situated 260 miles south of Valparaiso, and eight miles west of the city of Concepcion, with which it has railroad connection. It has a lighthouse, a new custom-house, a wireless station, and large warehouses and docks. The harbor is being fortified. It is the principal export town for wheat in southern Chile. It suffered severely from earthquake in 1835, but was rebuilt. Pop.

21,876.

TALE OF A TUB, A, and THE BATTLE OF THE BOOKS. Swift's <A Tale of a Tub) was written for the most part about 1696, but was not published till 1704, when it appeared in a volume with (The Battle of the Books. * The author wittily dedicated it to Prince Posterity, and to this day it has gen¬ erally been regarded as one of the two or three great prose satires in English. Not the least interesting parts of it are the digressive chap¬ ters on critics and criticism and on madness, in which the theory is advanced that happiness consists in being well deceived. Its most fruit¬ ful fancy is of the sect who took the tailor for their idol, and held the universe to be a large suit of clothes — the germ of Carlyle's (Sartor Resartus.* The allegorical narrative presents the fortunes of three brothers, Peter, Martin and Jack, standing respectively for the Roman, the Anglican, and the Dissenting churches. Their father on his death-bed bequeathes them each a coat with two virtues : <(One is, that with good wearing they will last you as long as you

live. The other is, that they will grow in the same proportion with your bodies.® For a time the boys wear their coats in accordance with their father's will. Later they come up to town and fall in love with the three ladies then most in reputation, the Duchess d'Argent, Madame de Grands Titres and the Countess d'Orgueil. Desiring to be in the fashion they violate their father's will, covering their coats with shoulder-knots, silver fringe and figured embroidery. Peter becomes dictatorial and in¬ sists on being addressed by his brothers as Mr. Peter, Father Peter and finally- as My Lord Peter. Martin and Jack revolt from his au¬ thority, and, in token of repentance, attempt to remove the embellishments from their coats, in which process Martin, reforming with moderation, restores his garment to something like its original state, but Jack in a fanatical fury rends his from top to bottom. Swift as¬ serted that he had written as a good church¬ man, ridiculing only Popery and Dissent. The wits were delighted with his attack; but sober Anglicans were alarmed at its implications ; and it is undeniable that its disgusting coarseness and brutal levity were inimical to every form of religious reverence. The satire was assailed and explained by William Wotton ; but his ex¬ planations were maliciously seized upon and made to serve as annotations in subsequent editions. As an old man Swift is said to have exclaimed : ((Good God, what a genius I had when I wrote that book.®

(The Battle of the Books, *written about 1697, was Swift's contribution to the famous literary controversy of the 17th century re¬ garding the relative merits of ancient and modern writers. In England the discussion was rendered rather insignificant by the curious confusion of the champions, the wits of the day appearing as defenders of the ancients, and the great classical scholar of the age as a leader of the moderns. The conflict was opened over the (Letters of Phalaris,* which Sir Wil¬ liam Temple, in his < Essay Upon the Ancient and Modern Learning) (1692), declared ((have more of grace, more spirit, more force of wit and genius than any others I have seen, either ancient or modern®— yet the 'Letters of Phalaris, *said Temple, is one of the two most ancient books in prose that we possess. Wil¬ liam Wotton, championing the moderns, replied in 1694 with Reflections Upon Ancient and Modern Learning.* In 169S Charles Boyle brought out an edition of the extolled Letters, in behalf of the ancients. In 1697 Wotton pub¬ lished a second edition of the Reflections, *in¬ cluding an essay by the learned Richard Bent¬ ley, showing that the Retters of Phalaris* were forgeries and, relatively, modern. At about this point Swift comes in with his Rat¬ tle of the Books,* written for the defense of the ancients and in support of his patron, Temple, the immediate object being to turn tne laughter of the town upon Wotton and Bent¬ ley. Swift was on the wrong side with

respect to the Phalaris question and with respect to the scholarship of the enemy. But he releases a flight of nicely pointed arrows against pedantry and sour-tempered criticism and the vanity and egotism of the modern spirit. In the course of the dispute between the Spider and the Bee he strikes out an idea and a phrase which Matthew Arnold adopted and popularized

as the epitome of his gospel of culture — (<sweetness and light.® Consult lives of Swift by Samuel Johnson, Sir W. Scott, J. Forster, H. Craik, L. .Stephen, P. M. S imon, etc. ; also Saintsbury's (History of Criticism) ; Spingarn's f Critical Essays of the Seventeenth Century*; (Cambridge History of English Literature) (Vol. IX). Stuart P. Sherman,

Professor of English, University of Illinois. TALE OF TWO CITIES, A, published in 1859, was the second of Dickens' historical novels and is to-day more popular than the author's earlier novel of the same kind, (Barnaby Rudge) (1841). The reason lies partly in the fact that the French Revolution is a more permanently interesting historical event than the anti-Catholic agitation and the Gordon riots in London. The chief purpose of the novel is to give an impression, — in this case a very English impression with its roots in the anti-Napoleonic tradition, — of the days of the old Regime and the French Revolution, in which cynicism, arrogance and cruelty, on the one hand, and uncouthness, violence and guillotining, on the other hand, were the prominent features. No account is suggested of the intellectual causes of the Revolution. It is a picture of action. The turbulence of Paris compared with the dignified and law-abiding ways of London give the book its title. The story is the account of the escape from France of the emigre, Saint Evremonde, or Charles Darnay, of his return to France, his arrest, con¬ demnation through the unwitting evidence of his own father-in-law, Dr. Manette, and his final escape through the self-sacrifice of Sid¬ ney Carton. This last is the most famous part of the book, both ethically and episodically. Sidney Carton, the real hero, takes advantage of his resemblance to Charles Darnay to mount the scaffold in place of the latter, who is mean¬ while hurrying disguised to England with his family. The story is a moving one and is almost wholly lacking in the usual humorous scenes and characters of the author. It has been successfully dramatized. Certain of the scenes, as notably the flight from Paris, the death of Carton, and the women knitting in¬ differently at the executions, have become famous. William T. Brewster.

TALENT, the name of a weight and de¬ nomination of money among the ancient Greeks, and also applied by Greek writers to various standard weights and denominations of money of different nations ; the weight and value dif¬ fering in the various nations and at various times. The Attic talent as a weight contained 60 Attic minae or 6,000 Attic drachmae, equal to 56 pounds, 11 ounces, British troy weight. As a denomination of silver money it was equal to $1,220. The great talent of the Romans is computed to be equal to $500, and the little talent to $375. A Hebrew weight and denomi¬ nation of money, equivalent to 3,000 shekels, also receives this name. As a weight it was equal to about 93 pounds avoirdupois; as a denomination of silver it has been variously estimated at from $1,500 to $1,880.

TALES OF THE ARGONAUTS, The.

(The Tales of the Argonauts) is a volume of short sketches collected and published by [Francis] Bret Harte in 1875; but the title is sometimes loosely applied to all this author's

stories of early California. Nothing in the (Tales of the Argonauts *proper quite equals in merit (The Luck of Roaring Camp,* (The Out¬ casts of Poker Flap and (Tennessee's Partner, * which had appeared in an earlier collection ; but (An Iliad of Sandy Bar, *(How Santa Claus Came to Simpson's Bar,* and some others have been deservedly popular. The Argonauts are of course the gold-seekers of 1849 and the years immediately following. These adventurers came from all quarters of the globe and all ranks of society, and they had in common only the possession of the strength and determina¬ tion necessary to reach the new Colchis. Here they lived, at first, wholly free from the con¬ ventional restraints imposed by an organized society, and each man showed himself for what he was. Many of these primitive social con¬ ditions still existed when Harte went to Cali¬ fornia in 1854, and they made a great impres¬ sion on the observant boy. He did not use them in literature, however, until he was able to look back on them in the light of a man's experience. Californians objected that his pictures were unreal ; but they give the im¬ pression of essential truth to life — an impres¬ sion not spoiled by his persistent habit of showing the good elements in even the lowest and most debased characters. Harte occasion¬ ally seems to have adopted some of the less fortunate devices of Dickens, but his manner was chiefly his own. He lacks literary finish, though he was painstaking in regard to style ; but in these early tales he has a sure command of humor and pathos, and a complete mastery of his unique material.

William B. Cairns.

TALES OF THE CRUSADERS, two

novels by Sir Walter Scott, respectively entitled (The Talisman> and (The Betrothed.*

TALES OF A GRANDFATHER, a col¬ lection of stories dealing with the history of Scotland, by Sir Walter Scott, and published in four series in 1827-30.

TALES OF HOFFMAN (Les Contes d'Hoffman) , Opera comique in prologue and three acts by Jacques Offenbach (libretto by Barbier), first produced at Paris, 10 Feb. 1881, several months after the composer's death. In spite of the unparalleled success which Offen¬ bach had achieved with his light-hearted, clever and unfailingly melodious operas bouffes, he evidently desired to bequeath to posterity a work of more serious artistic import; and he spent his most ambitious efforts and years of his life on the (Tales of Hoffman. * As his end approached, he begged the manager to produce it in time for him to witness the premiere. While he did not live to see it, the public took to the work no less heartily than to the operettas and it will undoubtedly outlive them. The story is novel and cleverly put together. The pro¬ logue shows Hoffman and his fellow students in Luther's Inn at Nuremburg; he is persuaded to tell of his three love encounters and these form the three succeeding acts. The opera ends as it began, Hoffman acclaimed a hero by his admiring friends. Inspired by its romance and fantasy, Offenbach has written a genuinely attractive score, which displays his talent for melody-making and ingenious characterization at its best. The barcarolle, in the second act, once heard, is never to be forgotten. Alone it

would have made the opera, but there are many other numbers worthy of recall — the burlesque ballad of Kleinzach, sung by Hoff¬ man in the prologue and epilogue, Nicklausse's song of the doll, the automaton's song, ((Les oiseaux dans la charmille," Antonia's romance, (<Elle a fui," and the trio finale of the third act. Offenbach's treatment of the dramatic situa¬ tions is always clever and at times subtle. The orchestration, while simple, is refined and the general artistic level of the work greatly above that on which he was usually content to stand. In Europe, (Tales of Hoffman' lias been pur¬ sued by superstitious fear on the part of the managers owing to the fact that its first per¬ formance at the Ring Theatre in Vienna was the occasion of

a conflagration which caused great loss of life. Its revival in New York by Oscar Hammerstein in 1907 proved that its original appeal is still potent.

Lewis M. Isaacs.

TALES OF MY LANDLORD, a name applied to four series of Scott's novels, the first embracing <01d Mortality) and (The Black Dwarf' ; the second, (The Heart of Midlo¬ thian' ; the third, (The Bride of Lammermoor,' and (A Legend of Montrose' ; and the fourth Count Robert of Paris,' and (Castle Dangerous.'

TALES OF A TRAVELLER, a well-

known work by Washington Irving, published in 1824. It is a delightful medley of humorous and tragic elements and the author himself de¬ clares them to be «moral tales," with the moral disguised as much as possible by sweets and spices."

TALES OF A WAYSIDE INN. The

I ales of a Wayside Inn,' by Henry Wads¬ worth _ Longfellow, was published in three parts, in 1863, 18/2 and 18/3, respectively. The poet followed the old plan of presenting a ... , as told by different persons —

l ?ase by friends of the author who, though they were not named, were so plainly characterized as to be easily recognizable. Among those of wider fame are Ole Bull, the violinist, and Thomas William Parsons, the poet and translator of Dante. The "Wayside Inn" was the old Red Horse Inn at Sudbury, 20 miles from Cambridge — a favorite resort for parties from Harvard College. Each of the three parts has a prelude and a finale, and there are interludes which link together the tales and introduce the narrators. Most of the stories were derived by Longfellow from his wide reading — many of them from the legends of continental Europe, a few from American sources. The <Birds of Killing- worth' was developed from so slight a hint that it may fairly be said to be of' the poet's own invention. Longfellow, while not a poor story-teller, was hardly at his best in narrative, particularly in narrative with vigorous action* and the (Tales of a Wayside Inn,' taken as a whole, is not to be listed among his most distinguished works. A few of the Tales have however, won a place for themselves. Among these are <Paul Revere's Ride,' told by the Landlord, and (Iving Robert of Sicily,' which is ascribed to the Sicilian.

William B. Cairns.

TALESMAN. From the Latin talis, such, or ot such a kind and quality. A talesman is a juror summoned to fill up a panel for the

trial of a particular case. A default of jurors appears to have but one immediate remedy in common law, that is to select tales de circum-standibus (those bystanders who are compe¬ tent) in sufficient number to make up the jury. A number of statutes forbid summoning by¬ standers but the procedure is maintained in most jurisdictions, and the method is considered legal unless forbidden by statute. There ap¬ pears to be no set limit as to the extent of the emergency requiring talesmen beyond that of the panel being exhausted and deficiency of jurors existing. Talesmen can only be sum¬ moned for a single trial, not for a circuit. Talesmen are considered strictly as additional jurors, not called to form a new panel. In some States it has been held that the jury may be made up entirely of talesmen when all the panel has been discharged or taken on to some other case or when a ((challenge to the array" has been sustained, but such right of action has been denied and the usual method employed is to issue a new venire.

TALFOURD, tal'ferd, Sir Thomas Noon,

English poet: b. Reading, 26 May 1795; d. Staf¬ ford, 13 March 1854. He was called to the bar in 1821, but in early life mainly supported him¬ self by literary labors, as a contributor to various periodicals. In 1835 and 1837 he was returned to Parliament as one of the members for Reading; and between these years produced at Covent Garden his> tragedy of Hon.' The tragedies subsequently written by him were (The Athenian Captive' ; <Glencoe, or the Fate of the Macdonalds' ; and the (Castihan.' None of these had the same success as the first. As a dramatist his excellence lies more in beauty of language and sentiment than in power of dramatic action. In 1849 he was raised to the bench in the Court of Common Pleas and knighted. He died suddenly while charging a grand jury. Besides the dramas above referred to, he was the author of (Life of Charles Lamb' (1837) ; and the same in a much en¬ larged edition (1848).

TALIAFERRO, tol'i-ver, William Booth,

American soldier and lawyer: b Belleville Gloucester County, Va., 28 Dec. 1822; d. there] 27 Feb 1898. He was educated at Harvard and at William and Mary College, being grad¬ uated from the latter in 1841. He then studied law, and was engaged in the practice of his profession until 1847, when he became captain in the United States infantry j later he was promoted major; and in August 1848 was mus- tered out

and resumed his law practice. At the outbreak of the Civil War he became colonel in the provisional army of Virginia; in 1862 he was promoted brigadier-general in the Con¬ federate army and in 1865 major-general He commanded at Gloucester Point, Va., took part in most of the battles of the Army of Northern Virginia until March 1863, when he was given charge of the district of Savannah, Ga. In July 1863 he was in command of the troops and defenses on Morris Island, and gallantly defended bort Wagner (q.v.) against a com¬ bined land and naval attack. Later he was in command of the district of South Carolina. Atter the war he was elected to the State legis¬ lature and served 10 years during the Recon¬ struction period. He was prominent in the Masomc fraternity and was Grand Master of the Masons of Virginia in 1876-77.

TALIESIN, British bard or minstrel of the 6th century. To him are attributed about

poems, which many critics consider of later origin. Consult Skene, (Four Ancient Books of Wales) (1868) ; Guest, <Mabinogion) (1877).

. TALIM, ta-lem', an island of the Philip¬ pines, in the centre of the Bay Lagoon, Luzon, separated from a peninsula on the southern coast of the province of Rizal by a channel about half a mile wide; length from north to south, 10 miles ; width, four miles ; area, 20 square miles. A central mountain range tra¬ verses the island from north to south; there are villages along the coast on each side. Build¬ ing stone is obtained in the mountains and sent to Manila.

TALIPOT, a palm (Corypha umbraculifera) of Ceylon and India, remarkable for possessing the largest inflorescence of any plant. The straight, cylindrical trunk takes over 50 years to attain its full height ; during 30 of those years the leaves spring from near the ground, but afterward the palm grows rapidly until it is 70 feet tall. It then sends up from the centre of the crown a gigantic, pyramidal flower- panicle, with a main rachis over 30 feet long, and a dozen branches reaching so far out that the base of the panicle also is about 30 feet across. These branches terminate in many branchlets and twigs, and are covered with possibly 100,000 greenish-yellow, dioecious blos¬ soms, which have so powerful and disagreeable an odor that the tree i§ often cut down at this stage. As soon as the tree begins to bloom the leaves fade, and by the time the flowering period (about a month) has ended,

they have often all fallen off, leaving the bare, ringed trunk crowned only by the inflorescence. After a year's time the fruits, which are inedible, are matured and fall in great quantities, and the whole tree dies down, having lived to produce only this single exhausting crop.

The leaves also are gigantic, one alone being capable of sheltering 10 persons comfortably. They have prickly stalks six or seven feet long and are more or less circular, with radiating ribs of the texture and strength of rattan, and plaited, narrow segments which are joined to¬ gether nearly to the tips, and can be folded like a fan. They can be easily marked with a metal point and are used as writing material to some extent by the natives and Buddhists. They are of coriaceous texture when dry, and are valuable for thatching houses, for umbrel¬ las, fans and basketry, and are carried before Singhalese of rank. In times of famine the trunks are felled, for the sake of their pith, which produces a kind of sago.

TALI.SAY, ta-le'si, Philippines, pueblo, province of Cebu, on the east coast, six miles southwest of Cebu, the provincial capital. It is on a short branch of the coast highway con¬ necting it with towns to the north and south. Pop. 19,000.

There are also two smaller pueblos of the same name: (1) in the province of Ambos Camarines, Luzon, two miles northwest of Daet; pop. 3,560; (2) in the province of Ba- tangas, Luzon, on the north shore of Lake Bornbon (Taal), 26 miles north of Batangas; it is near a pass from Batangas to Cavite; the chief industry is fishing; pop. 8,200.

TALISMAN, a small object presumed to possess an astrological or mystical charm that vol. 26 — 15

may protect or guard the owner in some way. It was usually of stone or metal and bore an engraved figure, and gained its suggested value because of certain ceremonies, at some particu¬ lar moment, as at the culmination of a certain star or at the conjunction of certain planets. The talisman was supposed to exercise super¬ natural influences over the bearer or owner, par¬ ticularly in averting disease. The nature of the talisman has been very different among dif¬ ferent nations. The Egyptians made use of images of their gods and of sacred animals, such as the ibis and the scarabaeus; the Jews used the phylacteries inscribed with passages from the Old Testament (a section of the cabala is devoted to teaching the construction of talis¬ mans) ; the Greeks used little tablets having written upon them various magical words, such as the Ephesian words, or those written on the feet, the girdle and the crown of the statue of Artemis at Ephesus; the Romans

employed various idols, which they suspended upon the body by chains; the Arabians and Turks made use of sentences from the Koran; and we also find in the East medals of particular metals struck under a particular constellation and marked with magical signs. In the Middle Ages astrology and the knowledge of the vir¬ tues of talismans and amulets formed an im¬ portant part of medical science; and the quacks of modern times sometimes have recourse to similar means. The talisman differs from the amulet, in that it does not require to be worn or carried, but like Aladdin's lamp will work wonders. See Fetish.

TALKING MACHINE. The wonderful, though natural, growth in popularity of the talking machine has caused its manufacture and sale in the few years that have passed since its perfection to become a truly great industry. Its utility for entertainment purposes in the home no doubt aids in the absorption of most of the instruments constructed in the compet¬ ing factories, but the use of talking machines in commercial life (dictaphone perhaps in par¬ ticular), greatly aids the numerical demand and it is found a valuable aid in teaching foreign languages. History mentions talking machines as early as the 13th century, when Albertus Magnus, the philosopher and scholar, is said to have produced a mechanism that reproduced the human voice. A queen of Sweden is said to have had a head which talked automatically in Hebrew, Greek, Latin and French. The Reverend John Wesley writes in his journal at date 26 April 1762, that he saw an invention at Lurgan, Ireland, of startling capabilities. It was <(an automaton of an old man in a case over against a clock . . . Every time the

clock struck he opened the door with one hand, drew back the curtain with the other, turned his head, . . . then said with a clear, loud

articulate voice, (Past one, two, three) and so on.® The invention was contrived by a man named Miller. But so many visitors called from foreign parts to see this wonder, and no one offered to purchase it, that it took up his time so much he nearly failed in business and he <(took the whole machine to pieces.® This Miller told the preacher later he had made very successful experiments and could make a man who could talk and sing hymns, but he was too busy on other work. In 1783 Abbe Mical presented to the French Academy of

Sciences an invention that talked, but he later broke it up, having religious scruples.

In 1877 Thomas Alva Edison brought out his first talking machine. The contrivance was of the simplest, being merely a steel point fixed to the centre of a flexible disc and a revolving cylinder behind the point. It was first dis¬ played in Paris. The invention was enclosed in a little box about a foot square and the rec¬ ord was made on a piece of tin-foil. As a wonderfully clever toy sold at small expense it created great admiration. In 1888 Edison con¬ structed his phonograph with its diaphragm having the lateral movement instead of the cyl¬ inder and the sheet of tin-foil was discarded in favor of a cylinder of wax, the vibrations being recorded with a tiny chisel. Edison is said to have gained his incipient conception of a talking machine while working with auto¬ matic telegraphs operating at high speeds. He made some experiments with embossed strips impressed with dashes and dots thereon which were moved rapidly beneath a stylus to vibrate it. He observed the stylus made audible sounds while vibrating, and as the great inven¬ tor never passed by mechanical facts, however trivial they might appear to the ordinary in¬ vestigator, he became interested in this curious sound phenomenon. He was about this time working on telephone experiments and the idea of a new sound developer occurred to him as a possibility. The conception of developing a talking machine soon grew in his mind and under his expert hands he soon had his first talking machine — getting his first patent 19 Feb. 1878, No. 200,521, with its tin-foil records.

The graphophone was an outcome of much experimentation by laboratory experts and at its inception the sewing machine was becoming a highly popular home machine. Therefore the manufacturers at first used the sewing- machine stand (frame, treadle and table top) in their first output, as motive power which was manufactured in the East Bridgeport vacated building of the Home Sewing Machine Com¬ pany. It met with poor success and the spring motor was invented which made it portable and sales grew rapidly. Next the cylinder form of record was discarded for the disc form of record. The listener had been using a pair of tubes for the ears, these gave way to the horn for the dissemination of the sound leaving the ears naked and the sound audible at a distance. Later again the ungainly horn and all the mechanism was enclosed in a box or a cabinet.

Emil Berliner invented the gramophone apparatus in 1892 with a smoked disc and stylus to produce sound vibrations. See Gramophone, Graphophone, Phonograph, etc.

TALL FESCUE. See Grasses in the United States.

TALL OAT-GRASS. See Grasses in the United States.

TALLADEGA, tal-a-de'ga, Ala., city, county-seat of Talladega County, on the Southern, the Birmingham and Alabama, the Louisville and Nashville and Atlanta, Birming¬ ham and Atlantic railroads, about 70 miles east of Birmingham and 100 miles north of Mont¬ gomery. In the place where the city now stands, General Jackson had an encounter in 1813 with a large band of Cherokee warriors. Jackson was victorious. The city is in a fer¬

tile agricultural region, in which there is also considerable mining. The chief industrial es¬ tablishments are three cotton factories, two machine shops and grist mills, the $200,000 chemical plant, cottonseed-oil mill, three lumber and planing mills. There is considerable trade in grain and cotton. The educational institutions are the Synodical Female College, Alabama Academy for the Blind, Alabama School for the Deaf-Mutes, Alabama Institution for Deaf, Dumb and Blind Colored Children, Talladega College (colored), opened in 1869, under the auspices of the Congregational Church, and public schools. There are several churches and one orphanage. The two national banks have a combined capital of $150,000, State bank $50,000, deposits over $1,000,000. Pop. (1920)

6,546.

TALLADEGA, Battle of, in the War of

1. On 7 Nov. 1813, four days after the battle at Tallishatchee Jackson learned that 160 friendly Creek Indians in Lashly's Fort at Talladega, about 30 miles south of Fort . Strother, were besieged by 1,080 hostile warriors and were in danger of capture. Ac¬ cordingly, with 1,200 infantry and 800 cavalry, he set out and on the 9th had approached within 80 yards of the Indians before he was discovered. Jackson arranged his plan of bat¬ tle so that the Indians would be surrounded, but in the fight three companies of militia gave way and allowed many Indians to escape. Jackson's victory was decisive, 290 of the enemy being found dead on the field while his own loss was 15 killed and 85 wounded. Jack- son returned to Fort Strother 10 November where he was forced to remain idle until the battle of Emuckfaw (q.v.). Consult Bracken- ridge, H. M., (History of the Late War, 5 pp. 190-191; Lossing, pp. 763-766; Wiley and Rines, <The United States,5 Vol. V, pp. 448-449; biographies of

Jackson by Parton (Vol. I, pp. 440-444) ; Buell (Vol. I, pp. 306-310) and Frost (pp. 142-346).

TALLADEGA COLLEGE, located at Talladega, Ala. It is open to all persons with¬ out regard to color or race, but is practically for the education of the negro race, and its work is arranged to meet their needs. It was founded in 1867 by the American Missionary Association (Congregational), aided by the Freedman's Bureau; and was the first college open to colored pupils in Alabama ; the charter was obtained in 1869. A farm was bought in 1877, additions to it were made in 1887 and 1902 until the land owned by the college includes about 800 acres. The college is coeducational and aims to secure the best development of social character by the association of students of both sexes under the same general discipline and careful supervision. The college organiza¬ tion includes seven departments. The theologi¬ cal department offers three courses, the clas¬ sical course including the study of the Bible in Hebrew and Greek, leading to the degree of D.D. ; the English course, the same as the classical without the study of the Bible in the original languages ; the Bible training course, of two years, including almost entirely special study of the Bible without the other studies of the usual theological course. The college de¬ partment offers two courses, the classical and the scientific, leading to the degrees of A.B.

and BS. ; and the college preparatory depart¬ ment has two corresponding courses of three years, differing only in the last year. The normal course requires four years' work be¬ yond the grammar grades, the first year being the same as the first year of the college pre¬ paratory ; it includes practice work in the pri¬ mary and intermediate grades. In the depart¬ ment of music singing lessons are a part of the curriculum in all grades, in addition to which there is more advanced work in vocal music and in pianoforte. Industrial training has always received attention at the college. Students do the greater part of the work on the farm and in the care of the dormitories, laundry, etc., some give the day to this work and study in night classes. There are also printing and car¬ pentry work provided; student labor has had a part in the erection of most of the buildings. Different groups of girls in the college depart¬ ment have entire charge of the housekeeping in Foy Cottage, the girls' industrial house. In addition to this instruction is given the boys in the third to seventh grades in woodwork¬ ing and drafting, in the eighth grade in forg¬

ing, and to the girls in the third to seventh grades in sewing and dressmaking . and in the eighth grade in cooking. Instruction is also given to students in the preparatory and normal departments in agricultural sub¬ jects and in nurse training. The col¬ lege buildings are situated on high ground about half a mile from the city; they include Swayne Hall (the main college building), Graves Hall (theological building), Foster Hall (women's dormitory), Stone Hall (men's dor¬ mitory), Cassedy School (primary and inter¬ mediate grades), Foy Cottage (girls' industrial house), the Slater Shop (for boys' industrial work), a library building, the De Forest Me¬ morial Chapel, also the laundry, printing office and houses for teachers. The college ranks among the leading negro educational institutions in the South, and has won the respect and con¬ fidence <of the white men of the community. Its productive funds in 1917 amounted to $256,000; it is also assisted by the American Missionary Association ; the library contained 16,500 vol¬ umes ; the students numbered 707, and the faculty 40.

TALLAHASSEE, tal-a-has'e, Fla., city, capital of the State, county-seat of Leon County, on the Dixie highway and the Old Spanish Trail highway, on the Georgia, Florida and Alabama and the Seaboard Air Line railroads, 205 miles east of Pensacola, Fla., and 163 miles west of Jacksonville. It is in an agricultural, stock and fruit-growing region and ships con¬ siderable fruit. The chief industries are cotton compresses, cotton gins, railroad shops, novelty works and cigar factories. There are 10 churches, six of which are for the colored people. The educational institutions are Florida State College for Women which has a teachers' normal school attached, founded in 1857 ; West Florida Seminary, University, founded in 1884, separate public schools for white and colored children. There are three libraries. Tallahas¬ see has five banks, three State banks and two private banks, capital $220,000; surplus $56,250. The water-supply, for domestic purposes, comes from artesian wells. The city owns the gas, water and electric light plants. Franchise for

an electric street and interurban railway was granted in 1916. Temperature in summer ranges from 82° to 98°. Tallahassee is 21 miles from Saint Marks on the Gulf, where there is fresh and salt water fishing; much large game still abounds in this section. Pop.

(1920) 5,637.

TALLAHATCHIE, tal-a-hach'i, a river which has its rise in Tippah County, in north¬ ern Mississippi, flows southwest, and unites at Greenwood with the Yocona to form the Yazoo River. It is about 220

miles long and navigable for 100 miles.

TALLAHATCHIE, Battle of, in the War

of 1812. When news of the massacre at Fort Mims (q.v.) 30 Aug. 1813 reached Nashville. Tenn., Gen. Andrew Jackson (q.v.) collected 2,500 infantry and 1,000 cavalry, crossed Ten¬ nessee into what is now Alabama, on 23 Oct. 1813 established a camp called Fort Deposit and early in November reached the headwaters of the Coosa. Learning that the Indians had posted themselves at Tallishatchee on the south side of the Coosa, about 13 miles distant, Jack- son sent Col. John Coffee with 920 troops to destroy them. By a rapid march Coffee reached the Indian camp 3 November and was boldly charged by the Indians but repulsed them and killed all, ahout 200 in number, with a loss to himself of 5 killed and 41 wounded. Jackson then moved toward Talladega (q.v.). Consult Brackenridge, H. M., (History of the Late War, *(p. 190) ; Fay, H. A., (Official Accounts* (pp. 143-145) ; Lossing, (War of 1812) (pp. 758-763) ; Wiley and Rines, (The United States) (Vol. V, pp. 447-448) ; biographies of Jackson by Parton (Vol. I, pp. 43CM38), Buell (Vol. If pp. 302-304) and Frost (p. 132 et seq.).

TALLAPOOSA, tal-a-poo'sa,' Ga., city in Haralson County, on the Southern Railroad near the Alabama line, about 53 miles west of Atlanta. It is in an agricultural region, in the vicinity of pine forests. There is considerable iron ore in the vicinity and near the city .are large vineyards. Its industries are connected with the culture and shipping ,of grapes, with cotton, farm and lumber products, and mining. There are banking facilities and newspapers. Pop. 3,000.

TALLAPOOSA, a river which has its rise in Paulding County, Ga., and flows southwest into Alabama. It unites with the Coosa about five miles north of Montgomery and forms the Alabama River. It is about 245 miles long and navigable for 40 miles.

TALLEGALLA. See Megapodes.

TALLEYRAND-PˆRIGORD, tal-a-ron (Eng. tal'I-rand) pa-re-gor', Charles Maurice de, French diplomatist: b. Paris, 13 Feb. 1754; d. there, 17 May 1838. Although the eldest of three brothers he was, in consequence of lame¬ ness, prevented from entering the army and destined, against his will, for the priesthood. He commenced his studies at the College d'Har- court, continued them at the Seminary of Saint Sulpice and at the Sorbonne, and completed them at Rheims, where an uncle of his was archbishop. His life of restless activity is naturally divided into three parts: namely, from his consecration as

bishop (1789) to his banish¬ ment by the Convention; from that period to the Peace of Paris 1815; and from the return

of constitutional government to his death. In 1780, when only 26, he was appointed general agent to the clergy, and in 1789 he was con¬ secrated bishop of Autun. As, he found his spiritual functions inadequate to satisfy his ambition, he attached himself to Mirabeau, then connected with the Minister of Finance, Ca- lonne. Here his political career began Mirabeau recommended the abbe to the Minister. Hith¬ erto Talleyrand, at the court of Versailles, had displayed all the qualities of a polished, witty and gallant courtier. But he now left the court party and joined the Republicans, and on the meeting of the States-General was elected deputy for Autun, and voted soon after they opened for merging the three estates into one national assembly. In vain the court tried to stop him in his career. After the storming of the Bastille he was chosen by the national as¬ sembly one of the committee which was to is¬ sue an account of their proceedings. His popu¬ larity was greatly increased by the leading part which he took in urging the confiscation of cler¬ ical property. At this time he founded, in con¬ cert with Lameth, Barnave, Lafayette, Mira¬ beau, Sieyes, and Sailly, the Society of the Friends of the Constitution, out of which the Jacobin Club afterward arose. He soon retired from it, however, as too extreme, and in 1789 founded the society known as the Club des Feuillants. Here he exerted himself for a mon¬ archy, surrounded by democratic institutions. On 16 Feb. 1790, he was elected president tof the national assembly, and on 14 July of that year, the first anniversary of the fall of the Bastille, presided In that capacity at the memorable solemnity of national federation in the Champ de Mars. About this time he was the au¬ thor of various important administrative pro¬ posals, a registration scheme which was adopted, and forms the basis of that still in force in France, and a plan of a system of public edu¬ cation which was of great service to the sub¬ sequent assemblies which took up the problem. When the civil constitution of the clergy was framed he gave his adhesion to it and he or¬ dained the first constitutional clergy. For this he was immediately excommunicated by a Papal brief, and embraced the opportunity to renounce his episcopal functions (April 1791). On two occasions in 1792 he was sent to London charged with diplomatic functions, although bearing no official position. After his return on the second occasion (August 1792), he was accused of cherishing royalist sympathies, but Danton rescued him and sent him back to Lon¬ don

(September). But the charges against him gained strength ; and by a decree of the Con¬ vention he was placed on the list of emigrants, which precluded his return to France. His power under the Directory was now forever lost, although by the intervention of Madame de Stael the decree against him was recalled in 1795. After his arrival in Paris the opposition which he met with from Carnot prevented him from being employed, and kept him in bad odor. At last, by exerting himself in the Constitutional Club, he succeeded in 1797 in gaining the Min¬ istry of Foreign Affairs ; but being suspected of keeping up an understanding with the agents of Louis XVIII he was obliged to resign in July 1799, and his downfall as a republican was com¬ plete. But he had early recognized Bonaparte as the coming man in France and after the lat¬

ter's return from Egypt did much toward bring¬ ing on the critical event of the 18th Brumaire (10 Nov. 1799), when the Directory fell and the Consulate began. Appointed Minister of Foreign Affairs, he took the lead in the negotiations for the Treaties of Luneville and Amiens. In 1803 he married a Mrs Grand, with whom he had been living for some years. They separated in 1815. He became an uncompromising promoter of the Napoleonic idea, was a chief instigator of the murder of the Due d'Enghien in March, and after the establishment of the empire in 1804 was appointed to the office of grand- chamberlain. In December 1805, after the con¬ clusion of the campaign against Austria, he negotiated the Peace of Presburg, and in the following year exerted himself for the elevation of Louis Bonaparte to the Dutch throne. On 6 July 1806, he was created Prince of Benevento. After the battle of Jena he was very active, and concluded the Peace of Tilsit with Russia and Prussia (July 1807). From this time, from what cause is not well known, a coolness arose between him and Napoleon, and became more and more marked. In 1808 he secretly joined a Royalist committee, and in conjunction with Fouche began to intrigue for Napoleon's down¬ fall. On the first news of the unsuccessful issue of the Russian expedition, he placed him¬ self in communication with Louis XVIII, joined the Congress of Chatillion, received thei Emperor of Russia into his hotel, and on 1 April 1814, established a provisional government, placed himself at the head of it, and procured Napo¬ leon's abdication. He afterward exerted himself very effectually in re-establishing Louis XVIII on the throne of his ancestors. He was at the Congress of Vienna when news arrived that Napoleon had landed from Elba. He took part in the declaration then issued characterizing Napoleon as a disturber of the peace. When in 1815 the Allies again entered Paris he again became president of the council with the port¬ folio of Foreign Affairs; but as he refused to

sign the second Peace of Paris he gave in his resignation.

With the commencement of constitutional government in France and the internal struggles connected with it Talleyrand's principal career was properly concluded. In the first years of the Restoration he often appeared at the palace and gave good counsel, of which the reigning party made no use. In the house of peers he often voted with the opposition, defended the freedom of the press, and condemned the Span¬ ish campaign of 1823.

When he saw the rocks on which the Resto¬ ration would be wrecked he retired to Valen¬ cy* keeping open house, and giving a welcome reception to all who had distinguished them¬ selves either by literary or political service. In his. social intercourse Talleyrand always ex¬ hibited the grandee of olden times. Naturally indolent he worked as little as possible, but he was well acquainted with the art of turning others to account and getting them to work for him. In ordinary business he managed with ease, and skilfully skimmed the surface of things, but he did not possess the talent of speaking on the spur of the moment on im¬ portant emergencies. Probably this defect led him to the adoption of one of his fundamental axioms, never to explain one's self at the mo¬ ment. He was accustomed to say, what how-

ever had been often said long before him, that language had been given to man to en¬ able him to conceal his thoughts. On the occa¬ sion of the July Revolution of 1830 he at first kept entirely aloof. Louis Philippe, however, before accepting the throne, asked his advice, and received the short answer that he should take it. When, 'by the revolutions in Belgium and Poland, in connection with other circum¬ stances, the July throne became endangered, Talleyrand at last came forward, and finally abandoning the old dynasty and his own work united with Louis Phillippe for the maintenance of the peace of Europe. In September 1830 he went as Ambassador to London, and made all kinds of exertions calculated to show off the peaceable intentions of the July dynasty. To him mainly was it owing that Austria and Prus¬ sia joined the conferences of the three powers which had decided the fate of Greece, and that after endless protocols the powers united in their views with regard to Belgium. After these results he turned to what had long been his favorite idea, the formation of a combina¬ tion of France, Britain and Austria against Russia. The plan was partly successful when in 1834 he subscribed the quadruple alliance (the parties to which were France, England, Spain and Portugal), which was intended above all to guard the

constitutional principle in West¬ ern Europe. He returned from London in 1835, and repeatedly made his appearance at the court of the citizen-king, where he was re¬ ceived with great distinction, and revered by the ladies as an oracle. It is said that before his death he was reconciled with the Church. The principal part of his immense property, esti¬ mated at about 18,000,000 francs, he left to his niece, the Duchess of Dino. He left memoirs in manuscript which were to remain unpublished till 30 years after his death. They have proved of little value. Consult Correspondence Be¬ tween Talleyrand and Louis XVIIP (1881); Lamartine, ; Blanc, <His- toire de Dix Ans* ; Guizot, ; and Blennerhasset, <Talleyrand) (1894) ; McCabe, Jos., <Talleyrand) (London 1906).

TALLIEN, Jean Lambert, zhon laii-bar ta-le-an, Frenbh revolutionist: b. Paris, 1769; d. there, 16 Nov. 1820. He first made himself widely known by publishing a revolutionary journal called 'Ami du Citoyen. He soon became one of the most popular men of the revolu¬ tionary party, and was concerned in the commo¬ tions of 10 Aug. 1792. Nominated a deputy to the Convention from the department of Seine and Oise, he distinguished himself in that body by his violence in the process against Louis XVI, even objecting to the king's being allowed counsel to defend him. He took part in most of the sanguinary proceedings which occurred during the ascendency of Robespierre, and in 1794 was sent on a mission to Bordeaux. Here he was checked in his sanguinary career by the influence of Madame de Fontenay, a woman re¬ markable for her beauty, who, having been im¬ prisoned at Bordeaux as she was going to join her family in Spain, owed her life to Tallien. He took her with him to Paris, whither he went to defend himself before the Convention against the charge of moderation. After the fall of Danton and his party, Tallien perceived that he should become one of the next vic¬ tims of Robespierre if he did not strike the first

blow. Accordingly, at the sitting of the Con¬ vention of the 9th of Thermidor (27 July 1794) he vehemently assailed Robespierre, and it was mainly by his influence that the latter with his friends was brought to the guillotine. At this period he married his protegee, Madame de Fontenay. Having been nominated a member of the committee of public safety, he used all his influence against his former associates, Fou- quier-Tinville, Carrier, Lebon, etc., and de¬ manded the suppression of all the revolution¬ ary committees. In 1795 he was sent as com¬ missioner of the Convention to the army of Hoche in Brittany. He subsequently became a member of the Council of Five

Hundred, but his influence gradually declined. In 1798 he ac¬ companied Bonaparte's Egyptian expedition. The vessel in which he sailed to return to France was captured by the British, and he was taken to London. On finally reaching France he found his importance altogether gone, and was glad to accept the office of French consul at Alicante. The last five years of his life were spent in poverty in Paris.

TALLIS, or TALLYS, Thomas, English composer of cathedral music: b. about 1514; d. 23 Nov. 1585. He was the author of some of the finest chants in the cathedral serv¬ ice of the English Church, and filled the position of organist of the chapel royal in the reigns of Edward VI, Mary and Elizabeth. William Byrd, the distinguished musician, was his pupil, and the two published in 1575 a collection of motets and hymns. Tallis composed settings to the (Venite Exultemus,* Magnificats the (Nunc Dimittis) and other canticles and to the (Te Deum) as used in the English service, and his works fill a large space in the church music catalogue of Novello.

TALLMADGE, tal'maj, Benjamin, Amer¬ ican soldier: b. Setauket, N. Y., 25 Feb. 1754; d. Litchfield, Conn., 7 March 1835. He was grad¬ uated from Yale in 1773 and became principal of a high school in Wethersfield, Conn. He en¬ listed at the outbreak of the Revolution and rapidly attained the rank of major. In 1779 he crossed Long Island Sound and captured 500 Tories at Lloyd's Neck, L. I., and in 1780 suc¬ cessfully planned the capture of Fort George at Oyster Bay. He was given the custody of Major Andre and had charge of his execution. Later he settled in Litchfield, Conn., and he was member of Congress from 1801-17. Consult Memoirs* by his son (1859).

TALLMADGE, Nathaniel Pitcher, Amer¬ ican legislator: b. Chatham, N. Y., 8 Feb. 1795; d. Battle Creek, Mich., 2 Nov. 1864. He was graduated (1815) at Union College, then studied law and (1818) was admitted to the bar. He commenced practice at Poughkeepsie, and was sent to the assembly in 1828, serving as State senator from 1836-33, when he was elected to the United States Senate. He was appointed by President Tyler governor of the Territory of Wisconsin in 1844, retiring within a year from office and practising his profession at Fond du Lac. His last years were spent at Battle Creek, Mich.

TALLOW, a somewhat, indefinite mixture of the harder and less fusible fats, which is chiefly prepared from the natural fat of sheep and oxen. It consists mainly of stearin, olein, and palmitin, and it is nearly colorless and taste-

less when pure, although the commercial prod¬ uct is commonly yellow. Until the cellular tis¬ sues are removed it is termed suet. In the manufacture of tallow the animal fats are cut into pieces and boiled with water, the fatty matter then melting and rising to the surface, whence it is removed by skimming. The cellular tissues of the natural fat remain behind, sensibly unaffected ; but they are afterward treated by great pressure, to express whatever tallow they may have retained after treatment by the boil¬ ing process. The whiter and purer portions of the tallow are used in the manufacture of candles, and the softer and yellower grades are used in the manufacture of soap, as well as for dressing leather, and as a lubricant for heavy machinery. The melting point of tallow varies with the composition of the substance, com¬ monly ranging from 100° F. to 120° F. The specific gravity is usually about 0.93.

TALLOW, Mineral, a waxy solid formed of a mixture of the higher hydrocarbons, usually of the paraffin or methane series. Commonly called ozokerite, earth wax or hatchettite. It may be considered a solid petroleum. It oc¬ curs in irregular seams and masses in the earth, in Galicia, in the Caucasus, and in Colorado. After purification it gives a product called ceresine, very similar to beeswax in physical properties. It is used in the manufacture of candles, of insulating materials, of bottles to contain hydrofluoric acid, and as an adulterant for beeswax.

TALLOW TREE, any of several trees which yield rather dense fatty substances used like tallow for making candles and soap. The tallow tree or butter-and-tallow tree of Sierra Leone (Pentadesma butyracea) is a member of the family Gut t if erce ; the oil obtained from its fruit is used like butter. The tallow-tree of Malabar (Vateria indie, a) belongs to the family Dipterocarpacea and is noted for its large leathery leaves sometimes 10 feet long, its panicles of fragrant white flowers, for the hard, white, scentless tallow of its seeds, and for the «East Indian copal® which is obtained from incisions made in its large trunks. The candle- nut (q.v.) is often called tallow tree. In America the tallow tree of China (Sapium sebiferum), a member of the family Euphor- biacece, is probably best known. It has become naturalized in the Southern States, having been introduced in the vicinity of Charleston and Savannah whence it has extended. It is a large tree with long-stemmed, .smooth, ovate pointed leaves, about two inches long; inconspicuous flowers in straight terminal spikes; and hard, smooth, brown three-celled capsules about half an inch in diameter. The hemispherical seeds are covered with a white waxy tallow, and after the capsule bursts, hang by threads among the bright red leaves

of autumn. They are gathered by the Chinese, crushed and boiled (the cap¬ sules also), and the tallow skimmed off. Wax is often added to increase the consistency, about three pounds to 10 being the usual proportion. For ages this tree has furnished the Chinese with their candles. . Vermilion is often added to color the otherwise white wax.

TALLQVIST, tal'kvist, Knut L., Swedish Orientalist : b. Kyrksliitt, 16 March 1865. He studied at the Swedish Normal Lyceum and the

University, Helsingfors, then at the universities at Leipzig and Berlin. Student from 1883, he was candidate in philosophy (1887), licentiate (1890) and regular doctor in 1894. He was docent of Assyriology and Semitic languages (1891-99) . becoming professor of Oriental literature in the latter year. He wrote <Die Sprache der Contracte of Nabunaid) (1890);

1 Babylonische Schenkungsbriefe) (1891); (Die assyrische Beschworrungsserie Maqlu) (1895) ; (1897); (Ibn Sa'id Kitab almugrib, Book IV> (1899) • (N eubabylonisches Namenbuch> (1905).

TALLY, a stick divided longitudinally through the middle, formerly in general use as a medium for recording accounts. One-half was kept by the debtor and one by the creditor, and when any debt or payment was recorded the two halves were adjusted together, and a notch or some other mark made on them both. This method, however inconvenient in other respects, was an excellentˆ security against forgery, since it would be difficult, if not impossible, for a person to make a false tally correspond with the counter-tally, in all respects in which the forger wished them to correspond, so accurately as not to be detected as false. When a debt was entirely cleared off, the creditor’s tally was

?oVi!n tC> tbe debtor- Tallies were in use till the 18th century for keeping accounts in the ex¬ chequer of England. In modern usage any mark made to record a score may be termed a ta y. A common method of keeping such a tally, as in counting votes, is to make a stroke for every vote, and draw every fifth stroke across the preceding four, to separate the strokes into groups of five, for easy counting buch a group of marks is also called a tally.

-*■ xˆicuicois josepn, iran-swa zho-

jmaiTFˆench iraSedian : b. Paris, 15 Jan.

1ˆ87 he made his dfbˆat the Theatre Frangais in the character of Seide in Voltaire s (Mahomet> and was re¬ ceived with applause. Talma

rendered an im- poitant service to the French stage by intro¬ ducing dressing in accordance with the time and country of the character represented. Chenier's tragedy of Charles IX, or Saint Bartholomew's was brought forward in 1789, and Talma, after studying the character of Charles in history and his person in medals and portraits, exhibited them with such truth and life that his reputa- tion as the first French tragedian was estab- hshed beyond dispute. The principal parts which he created or carried to the highest per¬ fection, were Seide, Othello, Hamlet. Sylla Regulus, the grandmaster of the templars] Chiles IX, Charles VI, Manlius and Orestes. He did 9ot generally excel in comedv, but appeared in 1823 with great success in the char-

v)le;iiˆr L PaTlle in Delavigne's (Ecole des Vieillards. Talma was the great favorite of

Pex? rr!51-0r1Iiapoˆeon and accompanied him to Erfurt in 1808 and to Dresden in 1813. He

was the author of a small but very interesting v?rk' ™A,tled Reflections sur Lekain et sur Art Theat ral, •* and of an autobiography after¬ ward edited and published by Dumas (1849-50).

TALMAGE, James Edward, American geologist and theologian : b. Hungerford, Eng- 1862. In 1876 he emigrated to Utah with his parents who had embraced the

faith of the Latter-day Saints. He was a student at Lehigh University 1882-83 ; at Johns Hopkins University 1883-84, and was graduated as B.S. in chemistry from the former in 1891 and received honorary D.Sc. from the same institution in 1912; also honorary D.Sc. and didactics from Church of Jesus Christ of Lat¬ ter-day Saints 1890. He was professor of chemistry and geology, Brigham Young Uni¬ versity 1884—88; president Latter-day Saints LJniversity, Salt Lake City 1888-93 ; president University of Utah 1894—97; professor of ge¬ ology and mineralogy, University of Utah 1894-1907 ; consulting and mining geologist 1907—1 1 ; director Deseret Museum, Salt Lake City, since 1891. He was one of two dele¬ gates from the Royal Society of Edinburgh to International Geological Congress, Russia, 1897. In the Church of Jesus Christ of Latter- day Saints he was ordained deacon 1873, teacher 1877, elder 1880, high priest 1884 and as one of the council of the 12 apostles of the Church 1911. He is a life fellow of

American Asso¬ ciation for the Advancement of Science; Royal Scottish Geographical Society; Royal Micro¬ scopical Society, London ; Geological Society, London ; Geological Society of America ; Royal Society of Edinburgh; life associate of Philo¬ sophical Society of Great Britain. He is the author of <First Book of Nature) ; <Domestic Science*; (Tables for Blowpipe Determina¬ tion of Minerals) ; (The Great Salt Lake Present and Past* ; (Account of the Origin of The Book of Mormon) ; (The Articles of Faith) ; (The Story and Philosophy of Mor- monism *; (The Philosophical Basis of Mor- monism* ; (The Great Apostasy) ; (The House of the Lord) ; (Jesus the Christ,* etc.

TALMAGE, Thomas De Witt, American Presbyterian clergyman: b. Bound Brook, N. J., 7 Jan. 1832; d. Washington, D. C., 12 April 1902. He was graduated from the New Brunswick Theological Seminary in 1856 and was ordained pastor of the Reformed Dutch Church, Belleville, N. J., in that year. He held Reformed (Dutch) pastorates in Syracuse, N. Y., in 1859-62, and Philadelphia, in 1862-69; was a chaplain in the Union army during the Civil War, and in 1869 became pastor of the Central Presbyterian Church in Brooklyn, N. Y. His congregation erected in 1870 a new church known as the Brooklyn Tabernacle, which was burned in 1872. It was rebuilt in 1874, but twice again was destroyed by fire. After the third fire in 1894 Dr. Talmage resigned his pastorate and traveled abroad. In 1895 he ac¬ cepted a call as associate pastor of the First Presbyterian Church of Washington, D. C., later becoming full pastor, a charge which he resigned in 1899 in order to devote himself to literary work. He was editor of The Christian at Work, New York, in 1873-76, of The Ad¬ vance, Chicago, in 1877-78, of Frank Leslie's Sunday Magazine in 1879-89, and of the Chris¬ tian Herald, New York, from 1890. For 30 years his sermons were printed weekly in reli¬ gious and secular papers, and in 1901 it was estimated that they were published in 3,600 newspapers in various languages. He also ap¬ peared weekly for many years as a lyceurn lec¬ turer. Among his many publications are (The Almond Tree in Blossom* (1870) ; (The Brooklyn Tabernacle) (1884); (From the

Pyramids to the Acropolis* (1892); (From Manger to Throne) (1894), etc. Consult Adams, (Life and Sermons of T. DeWitt Tal- mage) (1902) ; Wilkinson, W. C., (Modern Masters of Pulpit Discourse> (1905).

TALMUD, a code or digest of Jewish laws and opinions. See Jews and Judaism ; The Talmud.

TALON, ta'lon, Jean Baptiste, French Canadian administrator: b. Picardy, France, 1625; d. 1691. In 1663 he was made chief offi¬ cer of

justice, police and finance in the French possessions in America. He encourageˆ trade by building ships and sending exploring parties to Hudsons Bay and the Upper Lakes. Three of his seigniories were erected into baronies and he assumed the title of Count d'Orsainville. His memoirs form a valuable source of infor¬ mation with regard to early Canadian history. Consult Talon, (Memoire a sa majeste sur l'etat present du Canada* (1667).

TALTAL, tal-tal', Chile, a seaport in the province of Antofagasta, situated near the southern boundary of the province. It has railroad connection with the minine regions of the interior, and exports considerable quantities of nitre and some metals. Pop. about 7,000.

TALtfK, ta-look', or TALOUK, a term applied to land tenure in India, and having dif¬ ferent meanings in different parts of the coun¬ try, but generally describing an estate subject to some control intermediate between the gov¬ ernment and the proprietor. The word itself in Arabic signifies dependence, and this indi¬ cates the usual sense of the term as applied to land. In Bengal it is an ownership subordinate to the Zemindars, who were originally tax- farmers for native princes, but whom the Brit¬ ish authorities in India elevated to a sort of lordship over the property whose taxes they gathered in. In the Northwestern Provinces it is an inferior estate, or part of an estate, pay¬ ing revenue through a superior proprietor. In Oude and Madras the word means a district set off for revenue purposes, evidently a deri¬ vation from the old meaning of an estate held under tax-farmers. One who administers such a district is a talukdar.

TALUS, accumulations of debris at the foot of steep slopes or cliffs. It may be mate¬ rial broken off by frost, by gravity, or by any other agency. It accumulates, at the foot of the slope as a result of gravity. These talus slopes or cones are often of enormous size and consist mostly of coarse angular blocks. When cemented together this forms Talus Breccia. See Breccia.

TAM O'SHANTER. Composed, it is said, in the course of a single day, (Tam o'Shanter *was written at Ellisland in 1790, while Burns was struggling with the difficulties of farming and the duties of exciseman. In no other poem does his peculiar genius find fuller expression. Scott said of it: ((I verily believe (Tam o'Shanter* to be inimitable.® Inimitable it is in its imaginative audacity: the vivid realism of the alehouse ((bousing® ; the weird terrors of Tam's midnight ride; the grim grotesques of the Kirk-Alloway revels, with <(auld Nick — a towsie tyke® ; the triumphantly serio-comic denouement. And blent with this fantasy there is the keen, humorous sympathy of his charac-

terizations: of <(our sulky, sullen dame, nursing her wrath to keep it warm® ; of Souter Johnny, (<his ancient, trusty, drouthy crony® ; of Tam himself, ((the blethering, blustering, drunken blellum.® And as in (Tam o'Shanter) the imagination of Burns is unmarred by the mor¬ alizing and sentimentalizing that so often beset him, so the style, terse, racy, picturesque, illus¬ trates his mastery over his native idiom. Burns himself said of this poem that it <(shewed a finishing polish® that he ((despaired of ever excelling.® And we may echo his verdict that the unique quality of (Tam o'Shanter* is one that he never did excel. Consult Henderson, T. F. (in (Cambridge History of English Lit¬ erature, > Vol. XI, and bibliography).

Frances W. Cutler.

TAM-SUI, tam-soo'e, Formosa, a seaport on the northern coast of the island at the mouth of the Tam-sui River, 10 miles north¬ west of Tai-pe, the capital. It is the chief ex¬ port town of the island, and the principal sta¬ ples are tea, rice, sugar, coal, jute, camphor, etc. Pop. about 7,000.

TAM-TAM, tarn tarn. See Tom-tom.

TAMA, ta'ma, Iowa, city in Tama County; on the Iowa River, and on the Chicago, Mil¬ waukee and Saint Paul, and the Chicago and Northwestern railroads, about 63 miles north¬ east of Des Moines and 18 miles east by south of Marshalltown. It is in an agricultural and stock-raising region. An Indian reservation (Sac and Fox) is nearby. The chief manufac¬ turing establishments are flour mills, paper and lumber mills, broom factories, machine shops and cigar factories. The shipments consist chiefly of flour, brooms, poultry, livestock, eggs, vegetables and grain. There are seven churches, public and parish schools, two banks and a library. Pop. 2,800.

TAMAGNO, Francesco, Italian operatic tenor: b. Turin, 1851; d. Varese, 1905. His debut on the operatic stage occurred (1873) in (Un Ballo in Maschero,* at Palermo. Under Abbey he first appeared on the New York stage in the season 1889-90 when his name in Europe was a word to conjure with among his patrons. Under Abbey and Grau, season 1894- 95, he was again on the boards in New York at the Metropolitan Opera House and Ameri¬ cans were treated to his rendering of his greatest role, which had made such fame in Milan. He

retired from the stage in 1902.

TAMANDUA. See Ant-eater.

TAMANOIR, the great ant-eater (q.v.).

TAMAQUA, ta-ma'kwa, Pa., borough in Schuylkill County, on the Little Schuylkill River, and on the Philadelphia and Reading, and the Central of New Jersey railroads, about 35 miles north of Reading and 15 miles west of Mauch Chunk. It is in a region noted for the quantity and quality of coal deposits. It was settled in 1799, and became a borough in 1833. The chief manufacturing establishments are flour mills, foundries, machine shops, a powder mill and planing mills. It has large coal yards. There are about 70 factories, pay¬ ing wages of over $300,000 annually, with products of over $1,000,000. There are 12 churches, a high school, elementary schools, a

business college and a library. There are sev¬ eral banks and newspapers. Pop. (1920) 12,363.

TAMAR, ta'mar, (1) a southern river of England, flowing between the counties of Corn¬ wall and Devonshire; and emptying through the Hamoaze into Plymouth Sound, two miles above Plymouth; length about 60 miles. (2) A river of Tasmania, iormed by the union of the North and .South Esk, and flowing into Bass' Straits at Fort Dalrymple.

TAMARACK. See Larch.

TAMARAO, a sturdily built dwarf buffalo (Bos mindorensis) of the Philippines, which stands about three and one-half feet high at the shoulders and has coarse, thick, blackish brown hair. (<The horns,® says Lydekker, ((although massive, are comparatively short, and rise up¬ ward in the plane of the face with a lyrate curvature ; they are distinctly triangular, with the largest face in front, and are somewhat roughened. In its massive horns, thick legs and uniform coloration, this species comes nearer to the Indian buffalo than to the anoa.®

TAMARIN. See Marmoset.

TAMARIND, a leguminous tree (Tama- rindus indica) and its fruit. It is supposed to have originated in eastern tropical Africa, but is now universally cultivated in the tropics. It reaches a height of 80 feet, and has a crown of widespreading branches and thick foliage. The leaves are abruptly pinnate, the flowers fra¬ grant, red and yellow, with three perfect petals, and four sepals and colored caducous bracts. They are gathered in terminal racemes. The bean-like fruits are indehiscent flattened pods, and have a brittle brown shell. The seeds are flat, angular and shining, and are embedded in a dark-hued fibrous juicy pulp, which is pleas¬ antly acid, laxative and cooling. This fruit is used to prepare tamarind fish, to make acidu¬ lous cooling drinks,

and! is also an article of commerce, with or without being preserved in sugar. Every part of the tree is used for medicinal purposes, except the yellowish-white, purple mottled wood, which is valuable for turnery, being hard and heavy. The seeds are astringent, the leaves are employed for curries and for a yellow or red dye. Velvet, or brown, or black tamarinds, are the product of a small leguminous tree (Dialium guineense) , of Africa. It has pinnate leaves on slender branches, and downy black pods, of about the size and shape of a hazel-nut, containing seeds embedded in an edible, farinaceous pulp. The tamarind of New South Wales is a 'slender sapinaceous tree (Cupania anacardioides) of Australia, has an acid fruit and coarse-grained, whitish wood. Wild tamarind is a large tree of Jamaica (Pithecolobium filicif olium) , having twice- pinnate leaves; Pithecolobium dulce is the sweet-pulped Manila tamarind. Certain leguminous trees of Central America and the West Indies, Pentaclethra filamentosa and Acacia znllosa c are respectively the wild and the yellow tamarind.

TAMARISK, any member of the genus Tamarix, which is represented by shrubs, also called flowering cypress,® inhabiting warm arid regions, but not hardy in America as far north as Massachusetts. They are salt-loving plants often growing so near the sea that the spray of high breakers dashes over them, and are,

therefore, admirable for maritime planting. Like some other plants living near salt-water, or on arid steppes, certain species of Tamarix bear foliage with a punctate appearance, caused by minute pits. These leaves excrete saline solutions, which in rainless seasons serve to attract moisture during the cool nights, and facilitate its absorption by special cells at the bottom of the tiny cavities. In the daytime, the dried salts cover the leaves with a crust, which protects the plants from excessive evaporation under the desert sun. The tama¬ risk salt-tree (T. articulata) of the Indo- Chinese region is a bush or small tree looking somewhat like a conifer, which secretes enough salt to be useful in a culinary way; it is also the source of tamarisk-galls employed for medi¬ cine and for dyeing, since they contain 50 per cent of tannin ; also an astringent bark.

Tamarisks are generally planted for orna¬ ment but are sometimes killed in hard winters quite to the ground. They are of unusual feathery aspect, with widely spreading, some¬ what wand-like

branches, crowded with small leaves like scales. In the axils of these are many dormant branch-buds, so that the plant readily sends out new shoots. The flowers are small and pink, in close spike-like racemes which are often panicled, and are softened by the many protruding stamens. One of the most widely known (T. gallica) reaches 15 or 20 feet in height, with panicled racemes bloom¬ ing in late summer ; it is very easily propagated and furnishes good fire-wood. A species of the Levant (T. mannifera) when punctured by a scale-insect (Coccus manniferus) exudes honey¬ like drops of sap that harden in the morning coolness; this is gathered and sold to Syrian pilgrims as manna (q.v.). The German tama¬ risk is Myricaria germanica. It has wand-like branches, bluish foliage, and many racemes of light pink flowers, terminating lateral branches.

TAMATAVE, ta-ma-tav', the capital of Madagascar, situated on a peninsula slightly north of the middle of the east coast. It is the principal port of the island and has a good harbor protected by a natural breakwater, and fortifications. A railroad connects it with Antananarivo, which was the capital up to 1902. There is also canal transportation. Hides, gold dust, rice and rafia fibre are the leading articles of export. There is cable communication with Mozambique, Mauritius, Reunion and Aden. There are good banking facilities. Pop. 8,647.

TAMAULIPAS, ta-mow-le'pas, Mexico, a state on the Gulf coast, occupying the north¬ eastern corner of the country. Its area is about 32,128 square miles. The southwestern part of the state is traversed by the eastern Sierra Madre, but the greater portion belongs to the tertiary coastal plain, and is a rolling country, sloping gradually to the coast. The latter is lined with lagoons and sand-bars. The state is traversed by several large streams, and the Rio Grande forms the northern boundary. The cli¬ mate on the coast is hot, and the northeastern plains are semi-arid. The population is chiefly centred on the lower mountain slopes, where the rain is sufficient. There are three railway lines. Agriculture and grazing are the chief industries. Cotton, sugar and cattle products are exported. Tampico (q.v.) is the chief sea¬ port, whence steamships connect with Pensa¬

cola, Baltimore, New York and Havana. The capital is Ciudad Victoria. Pop. 249,641.

TAMAYO Y BAUS, ta-ma'yo e ba-oos, Manuel, Spanish dramatist: b. Madrid, 1829; d. 1898. His parents were actors and the boy traveled about with them and early learned to play his parts on the stage ; and thus early gained an insight into the nature and structure of the

drama. The natural result was that he soon began writing dramas himself. His first dramatic production, an adaptation of Genevieve de Brabant, y was produced success¬ fully when he was only 11 years of age. In this play his mother and himself took leading parts, the first production taking place in Gran¬ ada. From this time on he continued to write for the stage and to acquire an increasing reputa¬ tion as a dramatist. At the age of 29 he was elected a member of the Spanish Royal Academy, and for the last 14 years of his life he was director of the National Library and chief of the board of archivists, librarians and antiquarians. Among his best-known dramas are (La locura de amor> (1855) ; (Lances de honor-* (1863) ; (Un drama unevo) (1867). The latter, which has been translated into Eng¬ lish under the title of (A New Drama) by J. D. Fitz-Gerald and T. H. Guild (New York 1915) is considered his best drama. Consult Cotarello y Mori, E., (Historia Literaria) (Vol. I, Madrid 1901) ; Sicaras y Salvado, N., (Manuel Tamayo y Baus) (Barcelona 1906) ; Tonnenberg, Boris de., ˆEspagne litteraire) (Paris 1903).

TAMBERLIK, tam-ber-lek', Enrico, Ital¬ ian operatic singer: b. Rome, Italy, 16 March 1820; d. Paris, 15 March 1889. He began his career at Naples as tenor singer in 1841, and in 1850 went to England, where he enjoyed great popularity for 24 years. . He visited the United States in 1857. ˆ After his retirement from the stage he lived in Madrid, where he engaged in the manufacture of small arms.

TAMBOBONG, tam-bo'bong, Philippines, pueblo, province .of Rizal; in the northwestern part of the province, near the coast of Manila Bay; five miles north of Manila. It has a large sugar refinery and a cigar factory; the weaving of cotton cloth and the fisheries are also im¬ portant industries. It is connected with Manila by steam tramway, and carries on a consider¬ able trade. Pop. 25,000.

TAMBOUR-WORK, a species of embroid¬ ery introduced into Great Britain in the 18th century, now little used. A single tambour worker usually sits at a low circular frame, over the top of which the silk, linen or muslin is stretched by means of a hoop, much in the same way as the head of a drum is tightened. A frame of different construction is used when several workers are employed on the same fabric, consisting principally of two rollers, which, when properly fixed, stretch the linen, etc., to the necessary degree of tension. As the work proceeds the finished part is wound over one roller, while a fresh surface is at the same time unwound from the other. The needle, which is about one-half inch in length, terminates in a small hook with the point curv¬ ing inward. This is fixed in a handle of bone, ivory or wood, of the thickness of a quill, by means of a small screw

on the side. The

worker, holding the thread on the under side of the frame, passes the needle through the muslin, etc., from the upper side, and by a con¬ tinued series of loops interwoven together, suc¬ ceeds in producing a very minute and beautiful chain line, with which she traverses the outline of any pattern previously sketched upon the fabric she is employed to ornament.

TAMBOURA, the name applied in Persia and Turkey to a musical instrument of the guitar type, with strings of wire struck with a plectrum. The neck is long and the body, of gourd-shape, is often beautifully ornamented.

TAMBOURINE, tam-boo-reffi, a musical instrument of the drum type, much used among the Italian peasants and negro minstrels. It consists of a piece of parchment stretched over the top of a broad hoop, which is furnished with little bells. It is sounded by sliding the fingers along the parchment or by striking it with the back of the hand or with the fist, elbow, etc.

TAMBOV, tam-bof', Russia, capital of the government of that name, on the left bank of the Tzna, at the confluence of the Studenetz, 263 miles by rail southeast of Moscow. It was founded in 1636 and was then fortified, and is yet surrounded by a dilapidated rampart, and is built chiefly of wood. It has a gymnasium, military school, ecclesiastical seminary, female institute, house of correction and infirmary; is the residence of a governor, the see of a bishop and the seat of several important courts and public offices. There are breeding studs, manufactures of woolens and sailcloth, leather, soap, tallow, alum and vitriol, and a consider¬ able trade with Moscow and Petrograd in tal¬ low, leather, wool and provisions. Pop. 71,400. The government or province is 25,710 square miles in area and the population (1915) is 3,555,000. It is a rich agricultural region.

TAMERLANE, tam-er-lan'. See Timur.

TAMIL, or TAMIR, a branch of the Dra- vidian stock to which the original inhabitants of India belonged. They inhabit the extreme south of India, and have remained compara- tively free from admixture with the Sanskrit¬ speaking Indo-Europeans and other invading races of subsequent arrival. Retaining their own tongue they adopted and

developed the civilization of their conquerors and are much more enlightened than other races of Dravidian stock. The Tamil language is spoken over a large section in the extreme south of India; it. is spoken to a great extent in Ceylon; it is spoken also by a majority of the Indian settlers in places farther east, as Pegu, Penang, etc. ; and in many parts of southern India] even where it is not the vernacular, it is spoken by the better class of Hindus. The structure of the language is very simple. It has two dialects : the higher (Shen-tamil), now used in poetry, is the more ancient of the two ; the lower (Kodun-tamil) is the language of com¬ mon life. The literature of the Tamil language, the earliest extant works of which are sup¬ posed to be as old as the 9th century of our era, embraces nearly every branch of the knowl¬ edge of northern India. Consult Pope, (First Lessons in TamiP (Oxford, 7th ed., 1904) See India,

TAMING OF THE SHREW, The. That the Katharine- Petruchio scenes were recast by him is agreed, but many critics refer the scenes dealing with the lovers of Bianca to an unknown second reviser. No particular reason for the last as¬ sumption exists beyond the unwillingness to credit Shakespeare with work not manifestly beyond the abilities of his contemporaries. This, of course, is a correct criterion only where it is clear that the author is exerting his full power. In the case of the present play it is logical to suppose that the entire revision was done by Shakespeare, who handled the main plot with enthusiasm and retouched the sub¬ ordinate scenes with independence and ade¬ quacy, but in a somewhat perfunctory spirit. The notable Induction, with the character of Sly, is not primarily Shakespeare's contribu¬ tion; it occurs in the earlier version, where indeed Sly continues on the stage through the entire performance and offers frequent com¬ ments like those of Revenge and Andrea's Ghost in 'The Spanish Tragedy. } Shakespeare, apparently in the interests of simplification, allows him to be forgotten after the first scene of Act I, but he has made the Induction pecu¬ liarly his own by the insertion of Warwick¬ shire place names and allusions. On 26 Nov. 1633 'The Taming of the Shrew > was acted at Saint James' Palace before Charles I and the queen. . It is noted that the play was "liked.® Two nights later it was followed by a per¬ formance of Fletcher's sequel, 'The Tamer Tamed, > in which Petruchio's second wife turns the tables. Various adaptations of Shakes¬ peare's play were popular in the 17th and 18th centuries. In 1754 Garrick produced a three- act abridgment called 'Katherine and Petru- chio,} which for a century or more supplanted the original. The complete play was revived by Augustin Daly in 1887 with deserved suc¬ cess. John Drew played Petruchio, Otis Skin¬ ner Lucentio and Ada Rehan Katharine. One hundred performances were

given between 18 January and 13 April.

Tucker Brooke,

TAMMANY HALL. See Tammany So¬ ciety.

TAMMANY SOCIETY, or COLUM¬ BIAN ORDER, The, was founded 12 May 1789 by William Mooney, ex-Revolutionary soldier (two weeks after the national govern¬ ment was established), as ((a fraternity of patriots solemnly consecrated to the independ¬ ence, the popular liberty and the federal union of the country.® It had for its objects (1) the perpetuity of democratic-republican institu¬ tions ; (2) benevolent care of Revolutionary soldiers and others of its members, ((their widows and orphans, and others who may be proper objects of their charity.® The member¬ ship was composed of those who were known before the Revolution as <(Sons of Liberty® and ((Sons of Saint Tammany® ; societies formed to promote the cause of independence. The society was opposed to the Saint George, Saint David and Saint Andrew societies, whose Tory members openly proclaimed fealty to George III. After the Revolution, Alexander Hamilton (q.v.) removed the political disabilities of these Tories (1787) and they became the foundation of the Federalist party, and being rich and influential fought corruptly for Hamil¬ ton's scheme of a Federal President and Senate, to hold office for life, who should appoint the State governments and dominate Congress. Many of these Loyalist Tories were elevated to office immediately on their enfranchisement. This enraged the <(Liberty Boys® who fought England's soldiers, and suffered repeated be¬ trayal by these same Loyalists whose plots were many against the patriots. Many of these Tory conspiracies were successful and sent numbers of patriots to the charnel prison ships to meet death; others failed, as when the Tory mayor of New York, Mathews, plotted to kidnap Washington and assassinate his staff. The hatred bred by these and kindred infamies was fanned to flame by the disfranchisement of Revolutionary soldiers whose means and prop¬ erty were meagre. In 1777 the constitutions drafted and operative in New York State gave the right to vote only to those who owned freehold to the value of 100 pounds, free of all debts.® This gave full political power to the rich Loyalist Tories who monopolized trade and banking privileges, while it disqualified the bulk of those who fought in the patriot army and those who were punished by poverty for nobly sustaining the Revolutionary cause. The founding of the Society of the

Cincinnati (q.v.) augumented the existing bitterness and hatred. Jefferson and others pointed out its menace to the liberties of the people and its monarchial plan to found an order of hereditary nobles, with militarism as a basis. The Tammany Society was founded as a crowning protest to these portentous happenings and to discredit Alexander Hamilton's prophecy that the demo¬ cratic-republican scheme of government was doomed to disastrous failure.

Early History. — The Tammany Society was divided into 13 tribes corresponding to the 13 original States. The Society adopted Indian titles and ceremonials and the forms and usages of the aborigines to the fullest extent practical. The wigwam was the term applied to the So¬ ciety's place of meeting. Indian symbols and

mottoes were used to designate the 13 tribes, as follows :

The Eagle Tribe, New York State.

The Otter Tribe, New Hampshire.

The Panther Tribe, Massachusetts.

The Beaver Tribe, Rhode Island.

The Bear Tribe. Connecticut.

The Tortoise Tribe, New Jersey.

The Tiger Tribe, Delaware.

The Rattlesnake Tribe, Pennsylvania.

The Fox Tribe. Maryland.

The Deer Tribei Virginia.

The Buffalo Tribe, North Carolina.

The Raccoon Tribe, South Carolina.

The Wolf Tribe Georgia.

The 13 sachems (or. trustees) annually elected a grand sachem or president. The kitchi okeinaw, or great grand sachem, was an honorary office conferred upon the following Presidents of the United States : Washington, John Adams, Jefferson, Madison, Monroe, John Quincy Adams and Jackson. The office was abolished after General

Jackson's incumbency. The Sagamore was the master of ceremonies and the Wiskinskie the sergeant-at-arms. Ac¬ cording to the true Indian fashion the year was divided into seasons and these subdivided into moons. The era began with the discovery of America by Columbus and included the year of the Declaration of Independence and of the founding of the Society. (New York City, 3 Dec. 1903, is written by the Society thus : Man¬ hattan Season of Snows, 12th moon, year of discovery 411th, of Independence 127th and of Institution 114th). The Society motto is ((Free- dom our Rock.® The following toasts at the 4 July 1789 banquet illustrate the Society's sentiments from its formation. Thirteen cannon shots followed each toast. These are the two first toasts: (1) (<May honor, virtue and patri¬ otism ever be the distinguished characteristics of the Sons of Saint Tammany.® (2) (<The head men and chiefs of the Grand Council of the Thirteen United Fires — may they convince our foes not only of their courage to lift, pru¬ dence to direct, and clemency to withhold the hatchet, but of their power to inflict.it in their country's cause.®

Achievements. — The national government repeatedly failed to conclude a treaty of peace with the warlike Creek Indians whom the Fed¬ eral government was anxious to placate. The Tammany Society undertook the conciliation. The Celtic half-breed chief McGillivray, who led the Creek tribe of Indians, with 28 of his chiefs and warriors were brought to New York by Tammany and given a banquet 2 Aug. 1790. The Tammany braves were in full Indian cos¬ tume when they escorted McGillivray and his warriors to President Washington. The treaty was signed 13 Aug. 1790. The Society in June

1790 founded a museum for ((the preservation, collection, and study of Indian relics, etc.® In

1791 the Society, under the direction of John Pintard, its first sagamore, founded many edu¬ cational and progressive institutions which later developed great efficiency under the Society's fostering care. Two of these institutions have since merited national recognition, namely, New York Historical Society (q.v.) and the Acad¬ emy of Design (q.v.). In 1793, when France in desperation struggled to overthrow feudal op¬ pression, the Tammany Society's sympathy and moral support was prompt, enthusiastic and enduring. Sentiments and sympathies of politi¬ cal and other associations were usually expressed

by toasts at a banquet specially held for that purpose. Until about 1840 these ((public din¬ ners® were the chief means of announcing the policies, booms and sentiments of political and social bodies. On 12 May 1793 the Tammany Society, at its annual dinner, gave the toast, 'Success to the Armies of France, and wisdom concord, and firmness to the Convention.® This was greeted with roars of applause for many minutes. The society suffered a flood of vitu¬ peration, abuse and threats of grave harm from the Tories and Federalists. In 1800 the society bought real estate collectively to comply with the property qualifications imposed on the voter. On 13 April 1808 the society marched in a body to Wallabout (((Wallabocht®) Bay, where the foundation stones were laid by them of the receiving vault, for the bones of 11,600 patriots, victims of England's brutality. The society ^^Ted 11 hogsheads of bones along the beach of vv allabout Bay of those who died of hunger, disease and cold in the awful English prison ships. Tammany interred these bones in a tomb near the present navy yard with imposing mili¬ tary and civil ceremonials. In 1812 the Tam¬ many Society loudly called for war with Eng¬ land, pledging «their lives, fortunes and sacred honor® in support of the government for the waging of <(that just and necessary war.® At every stage of the conflict the Society gave full and loyal support. Tammany Hall in Nassau street became the headquarters of the war party where they hoisted the flag to proclaim each victory and celebrated the success of the Ameri¬ can forces in loyal manner. Tammany also gave a fighting force to the nation, which de¬ veloped later three able generals and a colonel In August 1814 about 1,200 members of Tam¬ many Hall went in a body to Brooklyn and erected earthworks and other defenses. On 29 June 1814 members of the Tammany Society mobbed a large Federalist meeting gathered to celebrate the return of the Bourbon dynasty to the throne of France. In 1817 the Society with high patriotic speeches and ceremonial made imposing interment of General Montgomery in Saint Paul's churchyard. On 23 Feb. 1819 Tammany gave a banquet in honor of Gen. Andrew Jackson at which they launched a boom in his behalf for the Presidency.

Manhood Suffrage — From the moment of its foundation in 1789, the Tammany Society fought for manhood suffrage and against «im-prisonment for debt.® On 1 Dec. 1820 a Tam¬ many Hall mass meeting resolved: <(That the distinction of the electoral rights; the mode of appointment to office and the union of the judiciary and legislative functions were objec¬ tionable and highly pernicious.® The meeting urged the legislature to pass the reform meas¬ ures they advocated and when the legislature overwhelmingly advocated the

extension of the suffrage, Tammany celebrated the victory for reform 14 June 1821, at Tammany Hall with democratic jubilation. The sentiment dominant at this gathering is tersely expressed by one of their members : «We would rather be ruled by a . man without an estate than by an estate without a man.®

On 4 March 1822 a banquet was given at Tammany Hall for the purpose of expressing their utmost joy at ((the extension of the right of suffrage and the abolition of those cumber¬ some relics of old centralizing methods, the

Council of Appointment and the Council of Revision.® The function of the former was expressed in its title; that of the latter was to give final approval or disapproval of all legislation. The «Toasts» at this banquet ap¬ propriately express the Tammany sentiment of the participants. Here are two illustrations : ((The right of suffrage — corruption in its exer¬ cise most to be apprehended from its limitation a few.® This was another: <(The young and rising politician — may integrity and prin¬ ciple guide him — studying the public good, not popularity.® The extension of the suf- rage greatly increased the voting power of Tammany and augmented its political pres¬ tige. In 1820 manhood suffrage in full became a fact ; Tammany's political power having vastly increased, in this year Tammany succeeded in abolishing the last vestige of property qualifica¬ tion to the right of suffrage by an overwhelm¬ ingly large popular vote. In 1826-27 Tammany forced the fight for the five-year limitation for the acquisition of citizenship. In 1827 a Tam¬ many delegation visited General Jackson at New Orleans to present an anniversary address on the famous battle in which he humbled Eng¬ land, and to urge his candidacy for the Presi¬ dency in the coming year. Martin Van Buren (who was a member of the Tammany Society) visited New York later in the year and organ¬ ized the sentiment of the Society for Jackson. To offset this sentiment and the large alien vote of Tammany, the "Native American Party® was formed, whose battle cry was (<Political privileges should belong exclusively to the na¬ tives of the country.® In 1828 Tammany gave General Jackson nearly 6,000 majority in a total vote of nearly 25,000. This was the first na¬ tional election held wherein the State of New York chose Presidential electors by popular vote Mid-Century History.— On 26 Nov. 1830 Tammany Hall held high festival in honor of the French Revolution. President Alonroe though in feeble health, reviewed the Tammany parade and later presided at the banquet at iammany Hall. Patriotic speeches for democ¬ racy v ere delivered and elaborate fireworks concluded the celebration. In 1831 Tammany abolished "imprisonment for debt,® where the f btor was a resident by New York City. On 3 March 1831, Tammany, by a unanimous

reso¬ lution, declared the renomina<ion of General Jackson and the nomination of its Grand Sachem of the Eagle Tribe, Martin Van Buren for Vice-President. In 1832 Tammany gave General Jackson 5,620 of a majority in a total vote of 30,474, despite the flagrant corruption and frauds openly used to defeat Jackson in this national election. The United States Bank and a lied financial interests denounced Jackson as a Revolutionist,® whose “despotism® would spread throughout the nation “the fearful con¬ sequences of anarchy.® The bank officials pub¬ licly gave $6 a vote, and as their resources seemed unlimited, raised the bribe in particular

?Q??Vyet faii!Td \° defeat Jackson. On 13 June 1833 General Jackson exhibited his gratitude to iammany Hall by a ceremonious visit to the wigwam, . accompanied by Governor Marcy Vice-President Van Buren, the Secretary of State Woodbury and the mayor and common council of the city. In 1833, through Tam¬ many s persistence, sustained by the public opin¬ ion which it aroused, the State legislature was

forced to pass as a reform measure an act per¬ mitting New York City to elect its mayor. In 1834 Tammany Hall for the first time in United States history elected a mayor by popular vote. Tammany’s candidate was Cornelius W. Lau¬ rence. The United States Bank and the com¬ bined money powers of the period bent every energy to defeat Laurence. All the newspapers were subsidized, and alarmed the citizens with inflammatory editorials predicting (<Universal disaster,® <(general destitution,® ((trade paralysis® and ((appalling panic.® Agents of the banks hired thugs and bred riots. Serious disorder and daily scenes of violence preceded the elec¬ tion. Every form of coercion was employed on the business element and actual trade suspension was artfully produced. Yet, despite all these artificial and real terrors and their influence on the timid and greedy, Tammany elected her candidate and gave an enduring argument for the spread of manhood suffrage throughout the nation. In June 1861, Grand Sachem William D. Kennedy took to the front a regiment com¬ posed of members of Tammany Hall, which had been raised and equipped by the Tammany Society. This regiment, the 42d New York Infantry, distinguished itself for valor in 36 battles and engagements. In 1864 Tammany presented General McClellan’s name at the Chi¬ cago convention as the Presidential candidate of the Democratic party. General McClellan received, in the ensuing election, from Tam¬

many's efforts, a majority of over 37.600 in a total vote of about 110,000. In 1870 Tweed, having gained an ascendancy in Tammany Hall, committed the organization to many extrava¬ gant expenditures, thus bringing much scandal upon the wigwaip. He was forced to retire from his leadership and was driven out of the country, a prey to ruin and disgrace. Since that time Tammany has ceased to stand for high policies and has become emblematic of boss rule and policies for ((what there is in it.® Later History. — In 1872 the reform of the organization was undertaken by a group of Democrats under the guidance of Samuel J. Tilden. Tammany came to the front again with John Kelly as its leader. . It became a factor in city, State and national politics. Under Mr. Kelly, Tammany largely regained the confidence and respect of the Democracy. Upon his death, in 1886, Tammany was gov¬ erned by a committee consisting of Richard Croker, James J. Martin, Hugh J. Grant and Thomas F. Gilroy. This government even¬ tuated in the absolute leadership of Richard Croker. Under the influence of Mr. Croker, Tammany in 1888 won a series of brilliant po¬ litical victories, establishing democracy firmly in the city and State. It was due to Mr. Croker's skilful management that all of the so-called Democratic organizations in opposi¬ tion to Tammany Hall were put out of exist¬ ence and Tammany left the sole representative of Democracy in this, the greatest city in the United States. In 1900, after the defeat of the Democracy in the country at large, Mr. Croker ceased to take an active interest in Tammany affairs. He resigned his leadership after the municipal defeat in 1892, and the Hon. Lewis Nixon, a protege of Mr. Croker's, was placed in command. Mr. Nixon's training had been for the navy. His knowledge of poli¬

tics was purely academic, and his leadership was naturally very brief. The organization then drifted along under the leadership of a committee consisting of Daniel F. McMahon, Louis F. Haffen and Charles F. Murphy. In 1903 Mr. Murphy assumed the leadership upon the vote of the executive committee. Mayor George B. McClellan and the entire Tammany ticket were elected in November 1903.

He was re-elected, and in 1910 William J. Gaynor was elected by Tammany. While Mr. Gaynor was markedly independent, yet Tam¬ many held its grip on most of New York's political activities. In 1913 the fusion candi¬ date, John Purroy Mitchell, beat the Tammany forces, and there was a partial return to Re¬ publican rule. However, notwithstanding Mitchell's acknowledged abilitv and popularity, Tammany beat Him in 1917, with an almost un¬ known candidate, John F. Hylan. Tammany maintains in Manhattan probably the strongest and best organized political machine in the world. While there are Democratic organiza¬ tions and leaders in the outlying

boroughs, they are known to be subservient to Tammany, and the assembly districts all have Tammany leaders — the very name of Democratic organi¬ zation is lost. Permanent headquarters and leaders exist in each of the 23 assembly dis¬ tricts and subordinates handle the details like a great army. They are in business all the year around and every day in the vear, aiming to maintain their hold in all the political offices and all the expenditure of public moneys that they possibly can. The fact that they have been able to place many judges on the bench as well as to control most of the executive of¬ fices has at times been the subject of great scandal. Yet membership in the organization includes very many men of high character and patriotism, and their influence at times is apparent.

Tammany for many years has catered to and largely held the votes of the poorer classes — charity has been dispensed widely from the district offices ; bureaus are maintained to give work to those who can be depended upon to vote with the organization ; excursions, parties and dances are given freely; those who have a bad habit of getting into jail for small offenses are systematically bailed. Notwithstanding that, members and followers have been charged time and again with catering to vice, even dis¬ cussing it and trafficking in it; with dishonesty and wastefulness of public funds; with placing and keeping incompetents in office, and the en¬ tire list of political mistakes, weaknesses and crimes, yet after every exposure and temporary reform, the same old Tammany comes back to power and dominates the politics of the world's largest city. Consult Breen, (Thirty Years of New York Politics5 (1899) ; Lewis, (Richard Croker5 (1901); Riordon, (Plunkett of Tam¬ many Hall5 (1905) ; Forrest, J. W., Tam¬ many's Treason5 (Albany 1913).

TAMMERFORS, tam'mer-fors (Finnish, Tampere), Finland, a town in the government of Tavastehus, about 80 miles northeast of Abo, on the railway from the Gulf of Finland to the Gulf of Bothnia. It is the third largest town in Finland, and the principal manufactur¬ ing centre. Its industries include cotton and linen spinning and weaving, and the manufac-

ture of paper, iron and steel mills, locomotive works and shipyards. Pop. 45,213.

TAMMUZ, tam'uz, a Babylonian deity, wor¬ shipped by Jews who

drifted into idolatry, and mentioned in Scripture, in Ezekiel viii, 14: (<Then he brought me to the door of the gate of the Lord's house which was toward the north; and, behold, there sat women weeping for Tammuz.® According to Sayce (in Has¬ tings' Dictionary of the Bible) Tammuz was originally the sun-god, and was a Babylonian deity whose worship was early imported into the West, the name being in Sumerian Dumu-zi, <(the son of life.® In Canaan Tammuz was ad¬ dressed as Adonai, ((my lord,® whence the Greek Adonis; and as Tammuz was originally associated with the Babylonian goddess Istar (Astarte), so Adonis was associated with Aphrodite. The Vulgate agrees with this ex¬ planation by its rendering of Tammuz as Adonis. This worship was much practised among the Phoenicians, and was celebrated chiefly at the Phoenician town of Byblus. The ceremonial was prolonged through different scenes. Adonis was supposed to have been killed by a boar; search was made for him, a wooden image being provided to represent Adonis, and on his being found, wild and licen¬ tious orgies began, and the burial of the idol terminated the first portion of the pageant. The river of Adonis, or Nahr Ibrahim, at the season of the year at which this worship took place, becomes discolored from the heavy rains on Lebanon, and in the popular superstition the stream was stained by the blood of Adonis.

The resurrection of Adonis next followed in the ritual, and was celebrated with frantic rejoicings. This idolatry appears to have been originally symbolical, connected with the sun's decline in the winter and his returning strength in summer, or with the death of nature and its revival in spring. The festival seems to have been held at the summer solstice. Movers and Hitzig place it at the autumnal equinox ; but Tammuz is with the Jews the name of the fourth or midsummer month. Jerome also as¬ serts that the anniversary of the death and resurrection of the fabulous Adonis was cele¬ brated in the month of June. It was, however, in the sixth month that Ezekiel's vision hap¬ pened. The period of celebration might per¬ haps vary, or the time of the prophet's vision might not be coincident with the actual cele¬ bration of the festival. The worship of Adonis was suppressed by Constantine. Consult Lang- don, S., 'Tammuz and Ishtar) (Oxford 1914).

TAMPA, Fla., city, port of entry, county- seat of Hillsborough County, at the mouth of Hillsborough River at its entrance to Tampa Bay, and on the Atlantic Coast Line and Sea¬ board Line railroads, beine the Gulf terminus of both, about 29 miles from the Gulf of Mex¬ ico. It has a harbor, the best on the western coast oj Florida, and it has regular steamer connection with all the large Gulf ports, large ports of the West Indies and with New York and a number of other Atlantic

ports. In the vicinity are large mines of phosphate. Lumber and naval stores are largely produced and shipped.

Manufacturing. — The chief manufacturing industry of Tampa is connected with tobacco products. In 1914 the number of factories was

over 200 (three-fourths of them being cigar fac¬ tories), the capital invested $9,858,000, and the value of the product for the year $14,039,000. The wages paid to workmen are more than $6,500,000 annually. The tobacco used in the factories is nearly all imported from Havana, Cuba. The manufacturing of tobacco in Tampa is largely done by Cuban immigrants. The Sumatra (<wrapper leaf® grown in Florida is said to be superior in quality to that grown in Sumatra, and is used to some extent.

Commerce. — The amount of tobacco leaf imported into the port of Tampa from Havana has for several years exceeded that of any other United States port except New York. The internal revenue paid by the city exceeds $1,000,000 annually, and the custom collections for the district are about $9,000,000. Phosphate comes next after tobacco, and over $3,000,000 is sometimes shipped abroad in a single year. The quantity of fruits and vegetables which are being shipped to Northern markets is in¬ creasing.

Buildings and Municipal Improvements. —

Since 1886, when Tampa was made a port of entry, it has grown rapidly. To accommodate its late number of winter guests, many large and beautiful hotels have been erected. Other fine public buildings are the custom-house, the churches, the schools, the banks and many of the business blocks.

The electric car lines connect the suburban sections with the different parts of the city. The water supply comes from springs ; the daily use is 7,000,000 gallons. The pumping capacity of works is 10,000,000 gallons.

Churches, Schools, Etc.— There are 18 church buildings. There are 12 public school buildings, including the Hillsborough County High School, established in 1886. Another high school is in charge of the Sisters of the Holy Name, who conduct three parish schools in Tampa and one in each of the nearby sub¬ urbs, West Tampa and Port Tampa. There is a college for boys, under the management of the Society of Jesus, and five private schools. There are three daily and five weekly news¬ papers. The six banks have a combined cap¬ ital of

$1,000,000, and deposits amounting to over $6,000,000.

Government. — The government is vested in a mayor and a city council, elected by the peo¬ ple for terms of two years. The council has 1 1 members, three being elected at large. There are police, sanitary and public works departments, including a board of health with ample powers to protect the city's interests.

History.— Tampa is the historical landing place of Narvaez and De Soto, of ill-fated early Spanish expeditions. Its first settlement began with the establishment of the United States military post of Fort Brooke, during the wars with the Seminole Indians. It was the seat of small shipbuilding and salt works dur¬ ing the Civil War, and was captured by Fed¬ eral gunboats.. Its recent rapid growth dates from the coming of railroads and cigar facto¬ ries in 1886. Pop. (1910) 37,782; (1920)

5 1 ,608.

TAMPA, a bay on the west coast of Flor¬ ida, an inlet of the Gulf of Mexico. The northern part is divided into an eastern arm, Hillsboro Bay, and a western arm, Old Tampa

TANAGERS

American Scarlet Tanager (Pyranga rubra), with a female (below) and immature males (above >

Bay. The harbor is protected by a line of keys forming barriers against the west winds. A point of land extending south almost closes the inner harbor.' The bay is about 35 miles long and from 5 to 15 miles wide. At the entrance, on Egmont Key, lat. 27° 36' N., long. 82° 45; 15" W., is a lighthouse nearly 90 feet in height. This was the landing place of the Spanish ex¬ plorers De Soto and De Narvaez. On its shore the United States government maintained Fort Brooke for many years previous to the Civil War. During the Spanish-American War this bay was the principal point of embarcation for United States troops to Cuba.

TAMPAN. A poisonous tick found in Angola and other parts of southern Africa. It is about the size of a pea and when filled with blood is dark blue in color. It usually bites the parts between the toes

or fingers and causes a disagreeable itching which gradually ascends the limbs till it reaches the abdomen when vomiting or fever occur.

TAMPICO, tam-pe'ko, Mexico, a town in the state of Tamaulipas, situated in the south¬ eastern corner of the state at the mouth of the Panuco River. It is an old Aztec city, built in a low, unhealthful locality, surrounded by lagoons and marshes. The streets are broad and regular, with large market places, and there are several fine buildings. The harbor has been improved by jetties and a breakwater, and the town rivals Vera Cruz as a commercial port. Its development during recent years is largely due to the finding of petroleum near by. It is the terminus of two railroads, and the commercial outlet for all the Northeastern States, all steamship lines of the vicinity mak¬ ing this port. The exports are petroleum, min¬ ing and grazing products, wood, honey, wool and hemp to the total of nearly $100,000,000 annually. The imports are of about one-half this value, being mostly manufactured articles from the United States. Pop. about 36,000.

TAMPICO FIBRE. See Istle.

TAMWORTH, Australia, an inland town of New South Wales, in the northeastern part of the state, on the railroad from Sydney to Brisbane. It is the centre of an agricultural and mining district. Pop. about 7,750.

TAMWORTH, England, a borough of Staffordshire, on the Tarne River, 110 miles northeast of London ; the site of interesting old ruins, dating from the 8th century. Pop. 7,500.

TANA, ta'na, British East Africa, a river rising on the slopes of Mount Kenia, and flow¬ ing southeast into the Indian Ocean. It is navigable for light-draught vessels about 350 miles to Hameye, just below the Hargazo Falls.

TANA. See Tree-shrew.

TANA, Lake. See Dembea.

TANAGER, a family of perching birds (Tanagridce) , allied to the finches. They are distinguished by the bill being of triangular shape at its base and arched toward its tip. The upper mandible may exhibit a notched appear¬ ance; the wings are pointed and of moderate length ; the feet short and slender. The hinder toe is strong and elongated, all the digits being provided with strong curved claws. These birds are chiefly found in the tropical parts of Amer¬ ica and include several genera and many species,

all of brilliant coloration and usually capable of fine singing. One of the best known is the organist tanager (Euphonia musica) of the West Indies, so named from the pleasing and varied nature of the song. The Antilles possess sev¬ eral peculiar species. Three or four species of the genus Pyranga are regular migrants to the United States in summer, one, the scarlet tanager, or black-winged fire-bird (P . rubra), being familiar at that season throughout all the Northern and Eastern States and southern Can¬ ada. It is of less size than the robin, and a bird of the woods and orchards rather than of open lands, and almost never seen upon the ground. The male is everywhere rich scarlet except his wings and tail which are pure black. This full plumage is not acquired, however, until the fourth year, the young males being dull yellow, more or less reddened according to age; while the females are always clothed in an inconspicu¬ ous dress of mottled green. The song of the male is loud, vigorous and merry, and is heard later in the summer than that of most other birds. The nest is a rather rude structure placed in a tree, and containing greenish, brown-spotted eggs. In the Southern States another species, the summer redbird (P. csstiva) is of more pink¬ ish and glowing hue than the scarlet tanager, and lacks the black on wings and tail ; it has a Western variety (Coo peri). The males of another Western species, the Louisiana tanager (P. ladomciana) are yellow and black, with the head red; and a fourth darker species (P. hepatica) is mainly Mexican. Consult Ridgway, (Birds of North and Middle America^ Part II, (Washington 1902), and standard books on American birds.

TANAGRA, tan'a-gra, Greece, an ancient town of Bceotia, on the left bank of the Asopos, 15 miles east of Thebes, the scene of a battle in 455 b.c. between the Athenians and the Spar¬ tans, in which the latter were victorious. Tana- gra, now called Gremada, is a scene of ruins. Excavations since 1873 have brought many in¬ teresting objects to light, especially the beautiful painted terra cotta, draped female figures from six to nine inches in height, known as Tanagra figurines.

TANANARIVO, ta-na-na-re'vo. Capital of the island of Madagascar. Its most promi¬ nent building is the royal palace which is lo¬ cated at the top of a hill. The place has no commerce but has a few industries and many new buildings, among which are two cathedrals, a mosque, several colleges and hospitals and a number of churches. Pop. about 95,000.

TANARO, ta-na'ro, a river of Italy known anciently as Tanarus. It rises in the Ligurian Alps, in northwestern Italy, flows northeast past Asti and Alessandria, and empties into the Po 10 miles northeast of Alessandria; length 125 miles.

TANAUAN, ta-na'wan, Philippines, (1) Pueblo, province of Batangas, Luzon, in the northeastern part of the province, 24 miles north of Batangas.. It is on the- main road to Manila, and was wiped out by a volcanic erup¬ tion of Taal, in 1754, but rebuilt. It is the centre of sugar and tobacco raising and fruit growing country, and has large markets. There are good schools. Pop. 20,040. (2) Pueblo,

province of Leyte, on the northeastern coast, on

San Pedro and San Pablo Bay, nine miles south of Tacloban. It is on the coast road. Pop. 18,510.

TANCHEL, or TANQUELIN, a fanatic who arose in the Netherlands about 1115, who proclaimed himself Son of God, and had many followers. He was killed at Antwerp in 1125 and those who believed in him, known as Tan- chelmians, or Tanquelinians, were converted back to the Roman Catholic faith.

TANCRED, tang'kred, soldier and Cru¬ sader: b. about 1068; d. 5 Dec. 1112. His father was a Sicilian or Italian marquis named Odo or Ottobonus ; his mother the sister of the celebrated Norman, Robert Guiscard, whose eldest son, Bohemond, was the friend and brother-in-arms of Tancred. (See Guiscard). In 1096 the two heroes embarked for Epirus, and thence marched to Macedonia. At the siege of Nicaea (1097) Tancred first appears among the heroes who directed the course of events, and he also took a conspicuous part in the battle of Dorylaeum (July 1097). He now ad¬ vanced, with Godfrey's brother Baldwin, over the Taurus toward Jerusalem. Tancred first pentrated through the passes of the mountains, and obtained possession of Tarsus by capitu¬ lation. The perfidious conduct of Baldwin caused a quarrel between him and Tancred, but it terminated in the reconciliation of the chiefs, who now joined the main army which was then marching upon Antioch. On the march to Jerusalem, Tancred had command of the ad¬ vance guard, and he was the first to storm the walls of the town. During the scenes of horror which attended the capture of Jerusalem (July 1099) he conducted himself with hu¬ manity. The Sultan of Egypt advanced to at¬ tempt the recovery of Jerusalem, but was totally defeated by Godfrey of Bouillon and Tancred before Ascalon (12 August). Tancred captured Tiberias, besieged Jaffa and, after the death of Godfrey, endeavored to effect the elec¬ tion of Bohemond as king of Jerusalem ; but the unworthy

Baldwin obtained the throne. Tan¬ cred subsequently conducted the defense of Antioch, and after Bohemond's death in 1111 obtained that principality. He is represented by Tasso in the Jerusalem Delivered) as a brilliant and blameless hero. He is also celebrated in Rossini's opera (1813). Consult Guizot, Collection des Memoires-Gesta Tan- credP ; Delabarre, (Histoire de Tancrede*

(1822).

TANDOLANOS, tan-do-la'nos, a wild Phil¬ ippine tribe of Malay origin living on the west coast of Palawan, between Punta Diente and Punta Tularan.

TANDUBATO, tan-doo-ba-to', Philippines, one of the smaller islands of the Tawi Tawi group, of the Sulu Archipelago, lying off the northeast coast of the island of Tawi Tawi; length, north and south, six miles ; greatest width, five miles. The island is mountainous, Tandubato peak being the highest point. See Tawi Tawi.

TANDY, James Napper, Irish patriot: b. 1740; d. Bordeaux, France, 1803. As a Protestant leader of the popular movement he took zealous action in corporation politics, free trade agitation and volunteering affairs, and was elected the first secretary to the United

Irishmen of Dublin. In 1792 he sent a challenge to the solicitor-general, Toler, and was con¬ demned to prison till the close of the session by the House of Commons. As the viceroy had offered a reward for his arrest, he raised a formal action for illegality against him and his privy-councillors, which was dismissed at the final hearing. For distributing in County Louth a seditious pamphlet, he was about to be tried in 1793, when the government discovered that he had met the Defenders and taken their oath, with the view of effecting a coalition between them and the United Irishmen. Tandy fled to .the United States, but crossed to France in 1798, where he was raised to the rank of a general of division in the French army. He joined the ill-fated invasion of Ireland, and made a futile landing at Rutland Island 16 Sept. 1798. He escaped to Hamburg, the senate of which city handed him over to the English government. On 12 Feb. 1800, he was put on trial at Dublin, and acquitted. He was again put on trial (1801) for the treasonable landing on Rutland Island. This time he was sentenced to death, but, from motives of policy, was permitted to make his way to France, where he spent the rest of his days. He was the hero of the familiar Irish song, (The Wearing of the Green. >

TANEIEV, Serge Ivanovitch, Russian composer: b. 1856; d. Petrograd,

20 June 1915. He was son of a Russian government official and, while quite young, was studying the piano¬ forte at Moscow Conservatory under Lange. He was next sent to the public school but later it was decided to continue his music studies under Nicholas Rubinstein. He studied fugue under Hubert, leaving the conservatory (1875) with the award of the first gold medal. He played in Paris.1877-78, then performed through the Baltic provinces, next returning to Moscow, where he was appointed professor of instru¬ mentation, succeeding Tschaikowsky (q.v.). On Rubinstein's death he became professor of the pianoforte but displayed his talents rarely be¬ fore the public. He composed ˆresteia5 a tril¬ ogy in eight acts (1895) ; (J°hn of Damascus,* a cantata (1884), many choruses, some sym¬ phonies and quartets. He arranged for the Piano works of Tschaikowsky, Glazounoff, Arinsky and others.

. TANEY, ta-m, Roger Brooke, American

jurist : b Calvert County, Md., 17 March 1777; d. Washington, D. C., 12 Oct. 1864. He was descended from a leading Roman Catholic family, was graduated in 1795 from Dickinson College, read law in Annapolis, began practice in 1799 and was immediately elected to the house of delegates as a Federalist. Defeated in 1801 and again in 1803, he returned to the prac¬ tice of law. He was married in 1806 to Anne Phoebe Charlton Key, a Protestant, the sister of Francis Scott Key. Though a Federalist, he supported the government during the War of 1812 and was an unsuccessful candidate for Congress. In 1816 he was elected to the State senate. From 1815 to 1831 as one of Maryland' ' leading lawyers he was engaged in many of th important cases that came before the Unite* States Supreme Court. After the break up o his party, he became a Democrat. In 1827 he was attorney-general of Maryland; and in 1831 was appointed Attorney-General of the United States and was the trusted adviser of Jacksor

ROGER BROOKE TANEY

Chief Justice of the United States Supreme Court, 1836-1864

During the Bank controversy the Secretaiy of the Treasury refusing to remove the govern¬ ment deposits from the United States Bank, 1 aney, who had advised the removal, was trans¬ ferred (1833) to the office of Secretary of the 1 reasury. He then removed the deposits and

for this was fiercely criticised as being a “tool® of Jackson, the Senate in 1834 refusing to con- firrn his nomination, the first instance of the rejection of a Cabinet officer. In 1835 Jackson nominated him for associate justice of the Su¬ preme Court, but again the Senate refused to confirm. In 1836 the personnel of the Senate having changed, Taney was nominated and con¬ firmed as chief justice to succeed John Marshall, but not without strong opposition from Henry Clay and others. Taney at once showed tenden¬ cies toward strict construction and reversed several of Marshall’s decisions. This angered the associate justices, some of whom threatened to resign. Taney was. a strict constructionist rather than a States rights lawyer and judge. In the case of Prigg v. Pennsylvania the chief justice for the first time declared a State law unconstitutional. This was one of the “personal liberty0 laws. In 1850, a similar law of Wis¬ consin was declared invalid. These decisions of the Supreme Court called forth States rights expressions from Northern legislatures. Taney’s best-known decision was made in the Dred Scott case. The only point really decided was that Dred Scott was a slave, but the opinion of the court written by Taney also declared: (1) that negroes had not been regarded as citizens by the framers of the Constitution and hence could not become citizens of the United States nor have a standing in Federal courts; (2) that the Missouri Compromise was unconstitu¬ tional because Congress was bound to protect property, and the Constitution having recog¬ nized slaves as property, Congress was bound to protect slavery in the Territories. During the Civil War the Supreme Court ceased to have influence. Taney in the Merryman case (1861) denied the power of the President to suspend the writ of habeas corpus, and during the next three years opposed with no effect the arbitrary methods of the administration. As a lawyer, Taney never avoided the unpopular side. In 1811 he made himself disliked by de¬ fending Gen. James Wilkinson. In 1819 he de¬ fended a Northern Methodist minister indicted for inciting slaves to insurrection. During the trial of this case he said : “A hard necessity compels us to endure the evil of slavery for a time; yet while it continues it is a blot on our national character.0 He emancipated his slaves, providing for their welfare. As chief justice, he brought system into the procedure of the Supreme Court which it had lacked under Marshall. Weak sight and bad health made writing difficult for him and the opinions of the court were usually written by one of his am¬ bitious associates. He retained his mental powers to the last, in spite of wretched health. In person he was tall and thin, with an ap¬ pearance of great physical weakness ; in dis¬ position quite, cheerful and studious, devoted to his family and friends. Consult Van Sant- voord, ‘Sketches of the Lives and Judicial Serv¬ ices of the Chief Justice of the United States) (1853); Tyler, S.,

‘Memoir of Roger Brooke Taney* (1876). Taney wrote an autobiography, vol. 26 — 16

which ended with 1801 and forms chapter I of Tyler’s Memoir.

Walter L. Fleming,

Professor of History, West Virginia University.

TANGANYIKA, ta-gan-ye'ka, central Africa, a large lake on the boundary between the Kongo Free State and what was German East Africa., touching with its southern extrem¬ ity on British Rhodesia. It lies in the Great

•j Valley > 1S ov#er 400 miles long, 30 miles wide, and extends in a south-southeast direction from lat. 3 20 to 8° 44’ S. The shores are somewhat irregular but there are few islands or reefs. The lake is hemmed in on both sides by lofty, precipitous mountains, through a break in which the water is discharged by the Lukuga into the Kongo, when the water is high, but in low years there is little or no discharge. Nearly all the surface is navigable, and sound¬ ings at some points have gone below 2,000 feet. The sudden storms of the locality are, however, a real danger to navigation.' The water is slightly brackish and swarms with fish, crocodiles and hippopotami and some marine mollusks, whose presence suggests former connection with the ocean. English and other steamers ply on the lake; Ujiji is the principal trading station on the shores. The Jake was discovered by Speke and Burton in 1858, and later explored by Livingstone and Stanley. It was mapped by E. C. Hore about 1880, and the outline considerably corrected by later explorers. The first steamship was the Good News, launched by the London Missionary Society in 1884, and a half dozen now ply the waters. Consult Burton and Speke, Livings stone and Stanley’s works : Hore, E. C., ‘Lake Tanganyika* (London 1892) ; Moore, J. E. S., ‘The Tanganyika Problem > (London 1903).

TANGANYIKA TERRITORY. See East Africa, German.

TANGENT, a straight line of indefinite length, which touches but does not cut a curve ; also the length of a straight line which touches a curve measured from the point of tangency to the point where it meets a diameter of the curve; one of the trigonometrical functions. Tan¬ gent to a curve is the limiting position of a secant. Suppose a straight line as cutting a curve in two points near to one another, and then suppose the line to move so that the points approach each other; at the instant when the points coincide the line is a tangent to the

curve. Let a b be any arc less than 90°, draw a h touch¬ ing the arc at a; from the cen¬ tre c draw c b h, cutting a h in h ; the length a h is the tangent of the arc a b. It is now considered best to make a E| distinction between the tangent of an arc and the tangent of an angle. An arc is a curved line of certain length ; an angle is not measured by the length of

arc, for the measure of a certain angle is so many degrees, whatever may be the length in inches of the circular arc subtending it. The tangent of an angle is called a trigonometrical ratio, because it is the fraction formed by di¬ viding the number representing the length of one side of a right-angled triangle by that repre-

senting the length of the other side. Consider the triangle h c a, the tangent of the angle

$$\frac{A\ H}{c\ A}$$

h c a is - ; this fraction is the same whatever

the lengths of a h and c a. (See Trigonom¬ etry). A plane is said to be tangent to a curved surface when three points of the plane coin¬ cide with three points very close together of the surface. A list of the properties involving tangents may be obtained from works on analytical geometry.

TANGHIN, a poison yielded by the seeds of Cerbera (Tanghimia) venenifera, a tree of Madagascar, which is itself called tanghin. The oblanceolate smooth leaves are crowded at the ends of the branches, whence spring also cymes of small flowers. The smooth, roundish, yel¬ low fruits contain a fibrous nut, enclosing a poisonous kernel about the size of an almond. This was employed as an ordeal nut by the natives of Madagascar, to detect witch-craft, or to determine whether or not an accused person were innocent. The seed was pounded and ad¬ ministered to him; if it acted as an emetic, his innocence was established, and no great harm ensued; if he retained the poison he died quickly — a sufficient evidence of his guilt. It has been said, however, that the issue was ar¬ ranged beforehand, and a

strong emetic was given to the suspected criminal not doomed to death.

TANGIER, tan-jer', or TANJA, tan'ja,

Morocco, a seaport town on the Atlantic Ocean, near the western entrance of the Strait of Gibraltar, southeast of Cape Spartel. It stands on a height near a spacious bay, and presents a striking appearance when approached from the sea. It is surrounded by walls, and is de¬ fended by a castle and several forts ; but con¬ sists mostly of wretched houses, huddled to¬ gether in narrow, dirty lanes. The residences of the European consuls, and those of a few wealthy merchants are exceptions, and the gradual introduction of good hotels, European stores, electric lighting, etc., is effecting a notable change. The principal building is the castle, occupying a commanding height, but in a very dilapidated state. The total value of the imports, chiefly from Great Britain, France (and before the war Austria and Germany), in 1914 was $4,260,000; of the exports, $2,825,- 000, chiefly to Spain, Great Britain, Egypt, France and the United States. The principal articles of export are eggs, oxen, slippers, wax, woolens, goat skins and carpets. The internal traffic is chiefly with Tetuan and Fez. In the time of the Roman Empire, Tangier, under the name of Tingis, was the capital of western Mauretania. It afterward came into the pos¬ session of. the Vandals, Byzantines and Arabs in succession. From the last it was taken by the Portuguese in 1471, and in 1662 was an¬ nexed to the English Crown as part of the dowry of the Infanta of Portugal. In 1684 it was abandoned by the English on account of the expense necessary to keep it up. It was bombarded by the Spaniards in 1790, and by the French in 1844. Pop. estimated at 40,000, including over 9,000 Jews, and about 10,000 Europeans.

TANGIER, a sandy island of Virginia about five miles long, in Chesapeake Bay,

southeast of the mouth of the Potomac River. Tangier Sound, which washes the north shore, is noted for its large oyster beds.

TANGLEWOOD TALES, a volume of juvenile stories published by Hawthorne (1853). The narrations are based on Greek mythology and are told by a certain Eustace Bright, the supposed narrator of the stories in Hawthorne’s (Wonder BookP

TANGUAY, taii'ga, Cyprien, Canadian

clergyman and genealogist: b. Quebec, 1819; d. 1902. He was

graduated (1839) at Quebec Seminary and ordained to the Catholic Church in 1843. In 1860 he founded Rimouski Col¬ lege and the Notre Dame Convent at Saint Germain. He was appointed (1867) by the Canadian government to make researches in Paris as to Canadian history, and again, in 1887, to search Europe's archives for Canadian data. He was one of the earliest Fellows of the Royal Society of Canada. He compiled (Dictionnaire genealogique, des families ca- nadiennes) (1871-90, 7 vols.) ; <Le repertoire du clerge canadien par ordre chronoloerique* (1893, 2d ed.).

TANHAY, tan-hi', town, province of Ne¬ gros Oriental, on the Tanhay River, about two miles inland from its mouth, 15 miles north of Dumaguete. It is near the south entrance to Tanon Strait, and on the coast road. Pop.

12,410.

TANI.S, ta'ms (Hebrew, Zoan), ancient Egyptian city, south of the Delta, before the founding of Alexandria, the chief commercial city of Egypt, capital of the Hyksos kings about 2100 b.c., and of Rameses II and Mere- neptah of the 19th dynasty, who built there a great temple to Set, the god of war. It was a great city for probably 2,000 years, but its pros¬ perity was destroyed by the silting up of the Tanitic mouth of the Nile, which was named from it, and it was destroyed for rebellion in 174 a.d. The filling up of the delta has resulted in its being left far inland, so there was no inducement to rebuild it. Numerous excava¬ tions have been made of the ruins and 14 obelisks in all were uncovered, as well as enor¬ mous temples and much statuary. Tanis has been identified with Zoan, mentioned in Num¬ bers xiii, 22, and also with Rameses. The ruins near the fishing village on San el Hager, near the south shore of the Lake of Manzaleh, were explored first by Mariette in 1860, and in 1883- 84 by Flinders Petrie (q.v.). Consult Petrie, <Tanis) (1885) ; Breasted, J. H., (Ancient Rec¬ ords of Egypt* (1907).

TANJORE, tan-jor', India, capital of the district of the same name, in Madras, on the Cauvery, about 45 miles from the sea and 170 miles southwest of Madras. It is a junction station on the Great Southern Railway of India. The fortified town, about four miles in circuit, contains the palace of the rajah, numerous pagodas and irregular streets. Outside of it are other quarters, an English church, the British residency and a remarkable pagoda, with a tower 200 feet in height and a sculptured bull, which is one of the triumphs of Hindu art. Tan j ore is an educational centre renowned for Sanskrit literature, and has a college, three

high schools, a medical school, etc. Manufac¬ tures of silk muslin and cotton are carried on to a considerable extent. The town was be¬ sieged and taken by the British in 1773. It was afterward restored to the rajah, from one of whose successors it was acquired by treaty in 1799. Pop. 60,341. (2) The district of Tanjore has an area of 3,654 square miles and a popula¬ tion about 2,400,000. It is fertile and is re¬ garded as the granary of the Madras terri¬ tories. It is for the most part covered with rice-grounds, with cocoanut groves inter¬ spersed. It is noted for its good roads. Hindu institutions still prevail here in great perfection.

TANK. An engine of war first used by the British in their attack on the Somme (France) 15 Sept. 1916. It was invented by Maj.-Gen. E. D. Swinton, of the British army, using the propelling principle of the "caterpillar® farm tractor, invented about 1900 by Benjamin Holt, of Stockton, Cal. It was afterward adopted in various forms by French, United States and German armies. Essentially a motor-driven armored vehicle, carrying machine guns or other light pieces, it is capable of traversing muddy ground, trenches, shell craters, etc., and making its way over obstacles such as trees, parapets and debris of buildings. The tank is a land battleship for the protection of attacking troops. Like the ancient Roman testudo, or tortoise, it was invented to over¬ come the great firing power of defending forces, themselves sheltered from infantry fire. The German general staff had learned the de¬ fensive value of the machine gun as demon¬ strated at Port Arthur and elsewhere during the Russo-Japanese War and had not only ac¬ cumulated thousands of these weapons but had great numbers ot trained units to handle them. During the first years of the war machine guns, both on attack and defense, proved tre¬ mendously destructive to the Allies, and as action settled down into trench warfare their effectiveness was even increased. Hidden un¬ derground during the artillery preparation for an attack, they could be brought out at the last moment to take an enormous toll in lives. Major-General E. D. Swinton, of the Royal Engineers, and later of the British War Cabinet, was the famous "Eye-witness® of the early months of the war, officially commissioned to report daily fighting for the press and public. This position gave him exceptional opportunity for observation all along the western front. The "caterpillar® tractor used by the British army for towing huge guns over difficult fields suggested to him the idea of a self-propelled fort heavy enough to withstand all but the heaviest-calibred enemy fire and yet mobile

under the worst conditions. During the course of a visit paid Mr. Holt by General Swinton in 1918, the tank inventor told the story: “In July 1914 a friend of mine, a mining engineer, was looking for a cheap system of transpor¬ tation. He wrote me and said, (I struck a Yankee machine in Antwerp that they call a Holt caterpillar tractor. This machine climbs like hellP I had known of soldiers wanting just such a machine ever since the time of Julius Caesar. I thought, if this tractor climbs like hell, what we want is something that will climb to beat hell. At the beginning of the war I had a peculiar position, with a knowledge

of the needs and the chance of discovering many new things. One thing was that the Germans had secretly armed themselves with thousands of machine guns. The machine gun is the most perfect man-killing gun ever made. The Germans manufactured it in England un¬ der a British royalty. For a time before the war broke out they did not pay any royalties or submit any accounts. They knew the war was coming and they started it with 50,000 of these guns ready. They used them like artists. Our men went out against them and were mowed down by thousands.

“It appeared that the idea I had in July 1914 might produce a machine that would climb, which was . absolutely right. It was obvious that launching assaults on enemy positions un¬ less they were first blown to dust was merely to throw infantry into a maze of barbed wire in which they would be caught helpless, like flies on (tanglefoot, > and mown down by rifle or machine-gun fire poured in at short range from all directions. We had to have something to go across trenches and over barbed wire.

“The machine gun was proving a disease against humanity. It was invented by the late Hiram Maxim, so you Americans have the credit of producing that disease. But you have the credit of producing the antidote, too — the (caterpillar) tractor, invented by Benjamin Holt. We started out to make that climbing machine, the machine-gun destroyer. We made a large number of them between August 1916 and March 1917, and kept it a secret. It had been whispered around that they were reser¬ voirs to take water to our troops in Egypt. <Reservoirs) was good camouflage, but it was a long word, and (tank) was better. The name stuck. They were a surprise to the Germans. They have taken thousands of prisoners and have saved thousands of lives. Frederick Palmer, the American war correspondent, esti¬ mated that they saved 20,000 lives on the Somme and as many more at Cambrai, in 1917. Not only have the tanks saved life by the moral effect of their approach and by the

number of machine guns put out of action — they them¬ selves have taken thousands of lives.®

The tanks owe their success to two essen¬ tials, first, the internal combustion engine, which has also made feasible the use in war of the airplane, submarine and motorized artillery, and, second, the traction or propelling device devel¬ oped by Holt and established throughout the world as a commercial success without definite forethought as to its application in war. The main features of this mechanism are a track on either side of the machine, composed of a series of steel shoes suitably linked together, with joints protected from mud and dust; idler pulleys for laying the shoes down in front and driving sprockets for picking them up again in the rear; and uprights on the inner surface of the shoes to form continuous rail-like bands upon which roll the truck wheels carrying the weight of the machine. “Caterpillar® and tank have this much in common, that they lay down their own rails and roll over them. Aside from that their purpose and construction are quite different. The tractor is a towing machine, used in war for the rapid, certain handling of guns and supplies, not completely armored and not intended for trench-line duty. The war

tractor is practically a mere duplicate of those used on thousands of farms and industrial lo¬ cations throughout the world. The British, Russian, French and American armies, how¬ ever, adopted it as the one feasible means of moving heavy mobile artillery over difficult ground, and over a decade of commercial and military experience together perfected the trac¬ tion mechanism to the point of making the tank possible. The great weight of the machine is distributed over a long and fairly broad sur¬ face resting on the ground, hence the pressure of a 12-ton tractor on the soil is actually less per square inch than that of an ordinary man’s shoe, a matter of three to six pounds per square inch. Not only is the effect of weight reduced, but the large area in contact with the ground develops enormous useful friction, or ground-grip, which is intensified usually by cor¬ rugations on the shoes or by removable lugs or grouters. The first British tanks, viewed from the side, were rather diamond-shaped, the ex¬ treme front being the height of a man off the ground. Since the track belts run lengthwise clear around the body, this shape brings addi¬ tional track surface into contact with the ground during the ascent from a shell crater or ditch. The earliest type is about 34 feet long, 12 feet wide and 10 feet high, and weighs around 32 to 35 tons. A sleeve-valve

motor of 120 horse power furnishes power for a road speed up to seven or eight miles per hour. Close-fitting armor sufficient to turn anything except a direct hit from a big shell protects everything but the track itself. The (<male® tanks are equipped with light, quick-firing guns capable of firing shell and are essentially destroyers of machine guns. The <(female® car¬ ries machine guns only, and is used entirely against enemy personnel. Guns are usually mounted front and rear, but barbettes on the sides of the tank give the widest range of aim to the battery amidships. All available wall space is packed with pigeonholes for ammuni¬ tion. Six to eight men usually form the crew, an engineer, mechanician, two steersmen and two to four men at the guns, one of whom may be the tank commander. Separate clutches drive the two sides of the track, and steering is done by disengaging the clutch on that side toward which it is desired to turn. The other belt then tends to turn the tank about on a pivot. The tank is grotesque in its movements, lumbering along with little outward show of motion ; poking its nose suddenly down into a deep crater and as suddenly rearing upright as it climbs a bank or parapet ; wallowing through the mud ; tipping at apparently perilous angles ; climbing over or through ruined walls, smash¬ ing trees, or flattening out machine-gun nests. The noise within the tank is terrific and the heat stifling. The huge shape forms a target which is almost irresistible and draws a hail of bullets which would prove more effective against attacking troops. The tanks were first used on the Somme in a surprise attack at dawn — one without artillery preparation. Their success was instant and complete and their dramatic appearance not only proved the sensation of the war up to that time but gave tremendous encouragement to the Allied forces. A similar attack at. Cambrai in May 1917 gave the British forces a crushing victory, which, however, was turned into a severe defeat through no fault

of the Tank Corps. The French army adopted in 1917 a tank of quite different type, mounting an armored body on what was virtually the conventional tractor propelling mechanism, only considerably longer than that of the <(caterpil- lar® itself. This type gave better protection to the track than the British machine, and mounted even heavier guns. During the spring of 1918 the British scored another surprise in the form of smaller and very fast tanks, called (<whippets,® after the breed of racing dogs. These little terrors attacked like the cavalry of past wars, outrunning and cutting down the fleeing enemy, charging machine gun emplace¬ ments, twisting and turning with all the agility of a polo pony and clearing the way for the troops behind. The French followed with even smaller machines, known as the Renault Type, manned by two men each and

traveling 10 to 12 miles per hour. A large number of these were built in American factories.

The Germans produced some large tanks, rather copying the French type than the British, but had achieved indifferent success up to the summer of 1918, when the offensive passed to the Allies. Bombs placed in their path were found an easy means of overturning them and putting them out of commission. Captured German tanks were lacking in mechanical re¬ finement, proving that Allied initiative in the matter of tanks carried with it a superiority of inestimable value. The Allied tanks probably did more than any other single factor to offset the advantage in man power and centralized command held by the Central Powers during the second and third years of the 'war. The engineers who perfected the <(caterpillar® as a tractor for the American farmer and industrial user, notably Pliny E. Holt, William Turnbull and E. P. Norelius, together with the resources of the plants which supplied thousands of Holt tractors to the British and French artillery divisions, were placed at the disposal of the United States War Department after America entered the fight. The tractor in Antwerp that <(climbed like hell® was only the beginning of a remarkable development that proved to be one of America's great mechanical strokes toward the winning of the war. See Tractor, Cater¬ pillar.

TANKAGE. Fertilizer produced from the offal of the abattoirs. Waste material such as tendons, intestines, lungs, hair, trimmings of hides, bones, horns, hoofs and some blood are the chief component parts of tankage. Hair and hide trimmings are now barred because they are practically indestructible and retain their form in the soil for years. It is treated with superheated steam under pressure to remove fat and gelatine, then mixed with a little slaked lime to prevent rapid fermentation. It is then dried and crushed. If little or no bone is present the product is termed meat tankage. Tankage varies considerably in its composition, sometimes containing as much as 12 per cent nitrogen in meat tankage and in bone tankage up to 9 per cent nitrogen with 7 per cent phosphoric acid. Tankage is a slow-acting excellent fertilizer; in bone tankage its value as a direct crop-producer is dependent largely on the fineness of the grinding. Of course the nitrogen acts in exactly the same manner on the soil as meat. Comparatively

tankage contains less nitrogen than dried blood but more phosphoric acid. The considerable variation in its composition is exposed by the following table, taken from Snyder's (Soils and Fertilizers,* all from one factory:

1st Year 2d Year 3d Year

Moisture percent 10.5 9.8

Nitrogen " " 5.7 7.6

Phosphoric Acid " " 12.2 10.6

10.9

6.4

11.7

In a general way 5 to 8 per cent of nitro¬ gen can be expected and from 5 to 12 per cent phosphoric acid. In its action on the soil it is slower than dried blood. It is an excellent garden fertilizer and is also used for field crops in proper rotation and as a top-screening for sod land. As tankage in its full strength should not be allowed to come in contact with seed it is usually applied several days before planting operations, or else a special fertilizer and seed drill is used which places it near but not in contact with the seed. Two hundred and fifty pounds per acre is computed as a good dressing, but as high as 400 pounds can be safely applied under certain conditions. In dry weather an excessive application (say 800 pounds) will destroy vegetation. Of course the strength of fertilizer advisable must be calculated according to the composition of the soil ; where the soil is badly impoverished a larger proportion of tankage can be usefully applied than on one kept up in good quality. Because of its comparatively slow action tank¬ age should be used in as finely ground condition as possible and should be applied to the soil with a view to its permanent benefit rather than as a direct food for a certain crop. Tank¬ age of a certain type and content is also utilized as a hog-feed with good results when mixed with corn or other food rich in carbo¬ hydrates or fats but poor in protein content. It is also used for feeding dairy-cows and in preparing beef cattle for market. See Fertil¬ izers; Live Stock, The Feeding of.

TANNAHILL, tan'a-hil, Robert, Scottish song writer: ib. Paisley, 3 June 1774; d. there, 17 May 1810. He received little education, hav¬ ing been apprenticed to a weaver at an early age, and wrote some of his songs while work¬ ing at the loom. In 1802 he made the acquaint¬

ance of Robert Archibald Smith, a Scottish composer, who set a number of his songs to music. In 1807 he published the first edition of his (Poems and Songs> ; a second edition being declined by the publisher, Tannahill be¬ came despondent and drowned himself. In 1838 appeared a complete collection of his writ¬ ings, with a memoir by Ramsay.

TANNER, tan'er, Benjamin Tucker, Afri¬ can Methodist bishop : b. Pittsburgh, Pa., 25 Dec. 1835. He was educated at Avery College, Allegheny, Pa., and at Western Theological Seminary. He was editor of . the Christian Recorder for 16 years, founded and was for four years editor of the A. M. E. Church Review, and in 1888 was appointed bishop. He was a delegate to the third Ecumenical Meth¬ odist Conference held in London in 1901, and has published (The Origin of the Negro) (1869); (The Negro in Holy Writ) ; (The Color of Solomon — What?,* etc.

TANNER, Henry Ossawa, American artist, son of B. T. Tanner (q.v.) : b. Pitts¬

burgh, Pa., 21 June 1859. He studied under Thomas Eakins at the Pennsylvania Academy of Fine Arts subsequently removing to Paris he became the pupil of Jean Paul Laurens and Benjamin Constant. In the Salon of 1896 he received honorable mention aqd a third class medal in 1897. He was awarded the Walter Lippincott Prize, Philadelphia, in 1900; Second Medal, Paris Exposition, in the same year ; and medals at the Buffalo, Saint Louis and San Francisco expositions. He is repre¬ sented by paintings in the Luxembourg, the Wilstach Collection, and at the Pennsylvania Academy of Fine Arts, Philadelphia.

TANNER, James, American lawyer and public official : b. Richmondville, N. Y., 4 April 1844. He enlisted in the 87th New York vol¬ unteers and was soon promoted its corporal. Losing both legs in the second battle of Bull Run, he returned to New York, studied law, and was admitted to the bar in 1869. He re¬ ceived an appointment at the New York cus¬ tom house and became deputy collector. From 1877-85 he was tax collector of Brooklyn and in 1889 was appointed United States commis¬ sioner of pensions, but later resigned to be¬ come a pension attorney, prosecuting claims against the government 1889-1904. On 1 April 1904 he was appointed register of wills, Dis¬ trict of Columbia by President Roosevelt. From 1876 he was deputy-commander of the Grand Army of the Republic, New York, and 1905-06, commander-in-chief.

TANNER, John Riley, American soldier and statesman : b. Warwick

County, Ind., 4 April 1844; d. Springfield, Ill., 23 May 1901. He enlisted in the 98th Illinois volunteers in 1863, and was with Sherman's army during its active campaign in Georgia, Tennessee and Alabama. Returning to Illinois after the war, he engaged in farming and selling fruit trees, entered politics in 1870, as Republican candi¬ date for sheriff, was elected, and held there¬ after the offices of circuit clerk 1872-76, State senator 1880-83, United States marshal 1883- 85, State treasurer 1886-88, assistant United States treasurer, Chicago, 1892-93 governor of Illinois 1896-1900. He was the recognized leader of the Republican party in Illinois, was the first in Illinois to speak openly for a single gold standard, declaring himself thereon early in 1895, and as governor his administration was able, efficient and economical. Immediately after the blowing up of the Maine in Havana Harbor, he secured the passage of resolutions in the legislature, tendering to the national government the material and moral support of Illinois in the event of war with Spain, and within 36 hours after the call for troops he had mobilized 10,000 men at Springfield, thus procuring for Illinois the honor of having the first regiment ready for muster into the na¬ tional service. His vigorous stand against the importation of contract labor under arms at the time of the Virden riots brought about a storm of protests that his acts were without precedent and unconstitutional. These were met with the answer that he would make pre¬ cedents and construe the Constitution and the law for the welfare of the State.

TANNHAUSER, tan'hoi-zer, German min¬ nesinger, probably of Salzburg or Bavaria, who

in the 13th century appears at the court of Frederick the Warlike and other princes. He led a wandering and adventurous life, and taking Neidhart (q.v.) as his model, celebrated in song the loves of the Bavarian peasantry. A didactic poem (Hofzucht) (Court Behavior) is also attributed to him. He is credited with the original tale of Tannhauser the knight. This chivalrous knight in the course of his wanderings meets a sage named Hilario, who instructs him in secret lore. At the same city a lady called Lisaura conceives a violent passion for him which he returns. Gradually, however, the tales of his instructor regarding spiritual beings lead him to desire association with some beautiful spirit in mortal form. Hilario assures him that he may attain this at Venusberg, a hill near Freiburg, where Venus holds her court in the midst of all de¬ lights. Tannhauser starts for the haunt

of the goddess, on hearing of which Lisaura kills herself. For a long time the knight remains in Venusberg, but at last his conscience touches him, he thinks with regret of Lisaura, and listens to the Virgin Mary, who calls upon him to return. The goddess allows him to de¬ part, when he proceeds to Rome to seek from Pope Urban absolution for his sins. The Pope, however, declares to him that it is as impossible for him to obtain the grace of God, as it is for the staff which he holds in his hand to bud and bring forth green leaves. Despair¬ ing, the knight retires and enters the Venus¬ berg once more. Meanwhile the Pope's staff has actually begun to sprout, and Urban, taking this as a sign from God that there is still an opportunity of pardon and salvation for the knight, hastily sends messengers into all lands to seek for him. But Tannhauser is no longer to be found, and never again appears on earth. The Tannhauser legend has frequently received poetic treatment, and Richard Wagner has adopted it (with modifications) as the subject of one of his operas. Consult Zander, (Die Tannhausersage und der Minnesinger Tann¬ hauser } (1858) ; Baring-Gould, (Popular Myths of the Middle Ages.*

TANNING, broadly speaking, the art of converting the skins of animals into leather. The skin of most of the higher animals con¬ sists from the tanner's point of view of two layers, the outer containing coloring matter, the roots of the hair or fur, and being cellular in structure ; the inner being thicker and of fibrous structure. The outer layer is decom¬ posed much more easily than the inner by the action of alkalis ; the latter is only soluble in water after protracted boiling, yielding a solu¬ tion which gelatinizes upon cooling. Moist skin undergoes putrefaction when exposed to the air for some time. Dried skin is hard and brittle. In preparing leather the object of the tanner is, in the first place, to remove the outer layer of the skin together with all adhering hair, and, in the second place, to bring about such a change in the under layer as shall prevent it from putrefying in moist air, and at the same time render it indifferent to moisture, without, however, altering its tenacity and sup¬ pleness. The process of tanning, therefore, divides itself into two parts: (1) Cleansing the skin and removing the outer layer; (2) con¬ verting the inner layer into leather. Techni¬

cally only the second part of this process merits the title of tanning. As supplementary to these there is involved the process of dressing and currying the leather. The skins used by the tanner are principally those of cattle; but the skins of horses, asses, pigs, goats, dogs, alligators and many other animals are also converted into leather. The quality of the hide varies in different species of animals, and also in the same species, depending upon the quality and amount of the food consumed, and to a still greater degree upon the vicissitudes of

climate in which they are reared. Wild cattle are said to furnish hides superior to those of domestic cattle.

In the first stage of the process the skins, having been thoroughly washed and trimmed of tails, shanks and pates are soaked in water until they are sufficiently soft to allow of the adhering flesh and muscle being scraped off by means of a blunt knife; this softening process is generally aided by beating the hides with hammers or sticks worked by machinery. It is of great importance that the water be soft, or if necessary softened with borax. If the hides are green, 24 hours are allowed for the first soaking, and an equal period for a second soaking in a fresh bath. They are usually halved lengthwise between the two soakings. Dry hides are soaked 24 hours in water con¬ taining sodium sulphide, then halved and run through a dry mill for nearly an hour and then stacked up in piles for another 24 hours. They are then put back into the same bath for 24 hours more, again milled, then fleshed and put into clean, cold water overnight. If the soaking is too prolonged the skin cannot be made into good leather. The hides are now generally placed in pits with milk of lime, whereby the hair and upper layer of skin is gradually loosened. This operation requires about six days, the hides being changed daily to a fresh lime bath. They are then again subjected to the action of the dressing knife. The final process preparatory to tanning con¬ sists in bating the hides in a very dilute acid liquid in which a mild putrefactive fermenta- tion is going on. This bath is commonly made with lactic acid and glucose, the latter furnishing the fermentative ingredient. In this bath, which continues for six days, the lime is entirely removed and ' the hides are con¬ siderably softened and swollen. The pre¬ pared hides may now be tanned — that is, en¬ abled to withstand putrefaction without loss of suppleness — by the action of different materials. These materials may be broadly grouped as (1) tannin, (2) metallic salts, (3) oily matters. When tannin is used the process is always called tanning. When metallic salts are used the process is in some localities called tawing; and when oily matters are used, shamoying or oil-tawing.

Vegetable Tanning. — The sources of' tan¬ nin used in the vegetable tanning processes are chiefly oak bark and hemlock bark. The former is taken from the yellow and red oaks, though all oaks carry a proportion of tannin which may be available in some circumstances. The tannin content of the best oak bark ranges from 9 to 14 per cent. Hemlock bark is in much larger supply, and, therefore, is more largely used. It carries from 7 to 8 per cent

of tannin. Chestnut wood is used to a con¬ siderable extent in the South, and an extract of this wood is marketed in other parts of the country showing a tannin content of from 28 to 32 per cent. The quebracho wood of South America is one of the largest sources of tan¬ nin, the dry wood yielding 18 to 24 per cent. The extract of quebracho, the form in which it is generally marketed, carries from 62 to 65 per cent of tannin. Other important sources are: Sicilian sumac, with 25 to 30 per cent tannin; gambier, a dry extract of the plant, with 60 per cent tannin ; myrabolans — the dried fruit of a tree of India — with 30 to 38 per cent tannin; Mexican mangrove bark, 30 per cent, and African mangrove bark, 40 per cent tannin; valonia — the acorn cups of an Asia Minor oak — 30 to 40 per cent tannin ; and palmetto extract, from the roots of. the palmetto tree, about 20 per cent tannin. The amount of tanning materials which the United States normally imports is shown by the figures for the fiscal year ended 30 June 1916 — before the entry of the United States into the war caused a dearth of merchant shipping. In that year the amount of quebracho was 106,864 tons, valued at $1,598,465 ; of mangrove bark was 21,186 tons, valued at $582,992; and of all other tanning materials and extracts, a value of $668,166. The annual consumption of do¬ mestic tanning materials is about 900,000 tons of hemlock bark, 400,000 tons of oak bark and 500,000 cords of chestnut wood.

Leather tanned with oak bark or its ex¬ tract is of a light fawn color, regarded as the most desirable. Hemlock produces a reddish leather; quebracho a yellowish tint; chestnut, a brown color; and mangrove a still deeper brown. Hemlock is rarely used alone, being too harsh ; it is commonly combined with quebracho, with which it yields a fine, soft and pliable product of superior color. Quebracho and palmetto are used together to advantage in both quality and color of the leather. A highly approved process combines hemlock, chestnut and quebracho extracts for a primary tanning, and quebracho and gambier in com¬ bination for retanning. This formula is par¬ ticularly suitable for large and heavy hides. All hemlock-tanned leather is improved by retanning with gambier, or gambier and sumac combined. Chestnut tannings are much im¬ proved by retanning with sumac. Thick and heavy hides are usually tanned ((in the bark>:> as it is termed ; thinner hides <(in liquor. w In the former process a layer of spent bark is spread upon the bottom of a wood-lined pit, upon this are piled successive layers of hides and fresh bark, the whole is covered with spent bark and the pit is filled with water. After 8 to 10 weeks the hides are removed to a second tank containing less bark, from which, after three to four months, they are again removed to a third tank containing a yet

smaller quantity of bark, where they remain for four to five mouths. If necessary the process is repeated several times. The hides increase in weight from 10 to 12 per cent during this process. The total quantity of bark required averages six times the weight of the dry hides. Tanning (<in liquor** consists in placing the hides successively in solutions of tannin of

gradually increasing strength. The tannin is thus caused to penetrate the hides completely. The thinner hides must be immersed for 6 or 8 weeks, the thicker for 12 or 24 weeks in the tanning liquor. A more rapid process is ob¬ tained by combining the tanning agents. A liquor compound with quebracho extract and palmetto extract is one of the quickest, and the leather may be pressed and' split and the grains retanned after 18 to 20 days. The modern tanner divides his work into three stages : in the first the hides are colored by immersion for 24 hours in a weak liquor, activated by one part of hemlock to two parts of que¬ bracho; in the second stage the tanning proc¬ ess is carried forward by strenghtening the liquor by fresh additions twice daily until it tests 30° (barkometer) ; the third stage fallows the pressing to remove superfluous liquor and the splitting of the hide into grains, and is a retanning process with a strong gam¬ bier and sumac liquor ; for about one hour. The entire process may be completed within eight days.

Mineral Tanning. — This process depends upon the action of chromic acid instead of tan¬ nic acid. Of very recent introduction the chrome process has extensively displaced the much slower tannic acid processes and its prod¬ uct seems equally durable and acceptable in the industries. After the hides are bated and washed they are pickled with sulphuric acid and salt or with aluminum sulphate and salt. They are then put into a solution of salt in a vat with paddles, and the paddles run for half an hour. The chrome liquor, a compound of potassium bichromate and sulphuric or muri¬ atic acid, is then added until the bath reaches 50° B., the paddles being run for one hour. More of the chrome liquor is then added, and the paddles run for three hours longer. The remainder of the chrome is then added and the hides left until the tanning is complete, which will take about six hours. They are left in the liquor for 12 hours longer and then pressed and placed in a second bath of sulphurous acid and finally washed with a solution of borax, when they are ready for splitting and retan¬ ning with gambier or palmetto. This is the process commonly employed in making calfskin, goatskin and sheepskin leathers, though they are often tanned with alum. In the latter case, when the skins have been washed and prepared by being submitted to processes closely resembling those already described they are separately soaked

in a tepid bath containing alum and common salt dissolved in water ; they are then, without being dried, placed in heaps for a few days, after which they are wrung out and dried slowly by exposure to air. The alum bath for 10 skins is usually prepared by dissolving 0.70 kilos of alum and 0.30 kilos of common salt in _ 22.5 litres of boiling water. Aluminium chloride is produced by the mutual action of the salt and alum, and is absorbed largely by the skins ; the excess of salt appears also to aid in the conversion of the skins into leather. The tawed and dried skins are soft¬ ened by being damped and stretched between a curved iron and a movable steel plate, after which they are again dried. Heavy hides are sometimes tawed for the use of the saddler by steeping them in a bath containing a larger

quantity of alum and salt than that mentioned above, drying them and then rubbing them with tallow before a charcoal fire. A very strong leather may thus be prepared in a com¬ paratively short time. The more delicate kinds of leather — especially that for making kid gloves, kid shoes, etc., are tawed by immersion in a bath containing alum, salt, yolk of eggs, wheaten flour and water. The oil contained in the egg yolks confers upon the leather a great degree of softness, the gluten of the flour seems to aid the skin in the absorption of alu¬ minium chloride. The skins are stretched by hand and rapidly dried in the open air; they are then damped, placed between linen cloths and trodden upon until they become soft. They are finally polished by rubbing with a glass disc smeared with white of egg or a solu¬ tion of gum, etc.

Oil tawing. — So called wash leather or chamois leather is prepared from the skins of deer, sheep, calves, etc., by tawing them with oil. The skins having been washed, limed, etc., in the ordinary way, are repeatedly rubbed with animal oil, exposed to the beaters of a fulling machine, and dried. The oil employed is tur¬ key red oil, made by treating castor oil with sulphuric acid. Other oils have been employed, but castor oil remains the only oil which has been successfully sulphonated. A small quan¬ tity of carbolic acid is sometimes added. The skins are stretched and sprinkled with oil, which is gently rubbed in with tne hand ; they are then placed in bundles in the fulling ma¬ chine and exposed to the action of the beaters for several hours. After exposure to the air the skins are again rubbed with oil and again placed under the beaters; these processes are repeated until the fleshy odor of the original skin is no longer perceptible. By exposure to a

warm atmosphere a process of gentle fermen¬ tation is originated within the skins, whereby the pores are dilated and the oil is enabled to penetrate the mass more thoroughly. The ex¬ cess of oil is finally removed by washing with a dilute warm caustic lye; the skins are then dried and dressed. Wash-leather is much used for making military belts, gloves, socks, etc., for surgical applications, for cleaning glass and porcelain and for polishing jewelry. A great variety of other processes are in use for tan¬ ning, many of them being patented. These formulas call for such ingredients as witch hazel, horse chestnut, poke-root, crane's bill, blackberry roots, persimmon bark, nicotin, for¬ mic aldehyde, sodium nitrate, chromium chlo¬ ride, iron sulphate, zinc sulphate, etc. For spe¬ cific purposes these may have their uses, but the basic processes of tanning have remained unchanged for many years.

The manner in which tanning is conducted in different establishment varies much in detail, though the general principles are the same. Instead of that uniformity in the commoner processes which might be expected from accu¬ rate knowledge, each tanner treasures his secret as to the best process for bringing about the chemical transformation which it is their com¬ mon object to effect; and these secret methods, the value of which as the result of a limited experience is inevitably overestimated by those whose knowledge is confined to that experi¬ ence, prevent comparison and the rejection of superfluous and perhaps injurious operations.

The trade of tanning may, however, be said to be still in its infancy, and it must be admitted that the chemical processes involved are far from being solved. It was only at the end of the 18th century that scientific methods began to be applied to leather-making, and although not much progress has hitherto been made, con¬ siderable activity has been shown in the pursuit of improvement. The extreme slowness of the process of leather making by any of the ordi¬ nary processes of tanning has afforded a strong motive for inquiry as to the possibility of hastening it by additional contrivances. Much time has been saved by splitting the leather as it comes from the lime pits, and tanning the thinner splits individually. The necessity of preserving the solidity and tenacity of unsplit hides seems to militate against any rapid method of progress in the passage of the tan¬ ning agents through and through them.

Bibliography. — Flemming, L. A., Practi¬ cal Tanning5 (Philadelphia 1916) ; Jacobsen Publishing Company, (Modern American Tan- ning) (Chicago 1916) ; La Croix, F. W., (The Leather Specimen Book ; and How Leather is Tanned5 (Milwaukee, Wis., 1917) ; Proctor, H. R.,

(Leather Industries: Laboratory Book5 (London 1908) ; Trotman, S. R., ˆLeather Trades Chemistry5 (London 1908) ; Watt, A., (Leather Manufacture5 (London 1906) ; Wood, J. T., (The Puering, Bating and Drenching of Skins5 (London 1912) ; United States Chemis¬ try Bureau Circular 110, (Identification of

Tanned Skins5 (Washington 1913) ; United States Foreign and Domestic Commerce Bu¬ reau: Special Agents Series, No. 165, (Tanning Materials of Latin America5 (Washington 1918). See Leather.

TANNINS, or TANNIC ACIDS, are com¬ pounds of high molecular weight, widely dis¬ tributed in the vegetable kingdom. Some varie¬ ties are found in diseased vegetable tissues or in abnormal growths, while others are present in the different parts of the healthy plant. Gallotannic acid is present in gall-nuts, caf- fetannic acid in coffee beans, morringa-tannin in yellow wood, quercitannic acid in oak-bark, ellagitannic acid in pomegranate rind, etc. These tannins are not by any means identical in all their physical properties and their chemi¬ cal conduct ; still they possess some characteris¬ tics in common. They are usually amorphous, have an astringent taste, dissolve in hot water, convert animal hide into leather and yield dark- blue or green precipitates with ferric salts. Of these varieties gallotannic acid — the chief con¬ stituent of the commercial product — has. more than any other tannin, received the attention of investigators. The statements in this article refer chiefly to this compound.

Gallotannic acid is extracted from powdered galls by treatment with aqueous or alcoholic ether. On standing the liquid separates into an upper layer containing gallic acid and other impurities and into a lower layer, from which crude tannic acid is obtained by spon¬ taneous evaporation. From this product im¬ purities may be further removed by treatment with dry ether in which the acid is insoluble. Ethyl acetate and acetone have also been used quite extensively for the extraction and puri¬ fication of tannic acid. The compound has further been purified by treating its water

solution or suspension with lead acetate. This reagent precipitates a lead salt which is readily decomposed with hydrogen sulphide.

Gallotannic acid is an amorphous substance with an astringent taste,

soluble in water, or¬ dinary alcohol, glycerine, ethyl acetate and acetone; almost insoluble in dry ether, chloro¬ form, benzene, carbon bisulphide and petroleum benzine. Its aqueous solution gives an acid reaction with litmus, although its acidity can¬ not be determined by direct titration, an indi¬ cator being practically valueless. With pure ferrous salts aqueous solutions of tannic acid give no coloration at first, but a color is soon developed by atmospheric oxidation and a blue- black precipitate is ultimately formed. With ferric salts a bluish-black precipitate is at once formed ; this reaction is taken as a basis for the use of the compound in the preparation of blue-black inks. Cold alkaline solutions of tannic acid absorb atmospheric oxygen very readily, forming highly-colored oxidation prod¬ ucts. Tannic acid solutions form precipitates with many metallic salts, with a number of mineral acids, with nearly all alkaloids and glucosides and with gelatin, albumin and starch. Animal hide kept in a solution of the acid is gradually converted into leather. At 215° C. tannic acid decomposes into water, carbon dioxide, pyrogallol and metagallic acid and with boiling dilute sulphuric acid it is hydro¬ lysed into gallic acid.

Tannic acid is extensively employed in the process of tanning, in the manufacture of gallic and pyrogallic acids, in the preparation of inks and as a mordant in dyeing. With formalde¬ hyde it forms a condensation product which is used in the manufacture of hygienic fabrics. Tannic acid has also found extensive applica¬ tion in medicine. It is recommended as an anti¬ dote to metallic poisons with which it usually forms insoluble precipitates. It is employed as an astringent to prevent excessive secretion in ulcers and sores and to check bleeding. Tan- nigen (tannyl triacetate), tannocol (gelatin tannate), tannalbin and bismuth tannate have been prepared and employed in intestinal ca¬ tarrh. Mercurous tannate has been used in syphilis, tannochrom in skin diseases, tanno- bromine in the treatment of scalp diseases.

Although oak-bark, gall-nuts and other natural sources of tannic acid had been used by the ancients, the compound was first isolated and described by Scheele in 1787. Berzilius (1827) assigned to it the formula CisHisO^. Liebig (1834) modified this to 'CmHmOm. In 1850 Mulder called attention to the hydrolysis of the compound into gallic acid. Strecker (1852) claimed that tannic acid was a glu- coside in which three molecules of gallic acid combined with one molecule of glucose; while others up to the present day have contended that the purified substance contains no sugar. In 1870 Schiff claimed to have converted gallic acid into tannic acid by a process of condensa¬ tion. He called his product digallic acid and assigned to it the formula CwHioOa, which had also been adopted by some earlier investigators.

Schiff's digallic acid formula remained unques¬ tioned for many years, but in 1890 Ph. van Tieghem, C. Scheibler and others made the observation that tannic acid was optically active, a property that rendered Schiff's digallic acid

formula improbable. After several years of study Nierenstein (1908) announced the con¬ viction that tannic acid was a mixture of Schiff's digallic acid and optically active leuco- tannin. While Emil Fischer's researches with the carefully purified substance pointed to the conclusion that tannic acid might be considered as a compound of one molecule of glucose with 10 molecules of gallic acid. The hydrolysis of the compound into glucose and gallic acid, as well as its synthesis, are cited as possible confirmations of this view. At the same time it is frankly admitted that the question of struc¬ ture has not received its final settlement.

Of late years compounds showing the prop¬ erties of tannic acid have been prepared by synthetic processes. Of these so-called «Syn- tans,)} Neradol and Neradol D deserve men¬ tion. They are obtained by heating phenol sul- phonic acids with formaldehyde. It is claimed that the amount of Neradol required to tan skin is less than of any other vegetable tannin.

V. S. Babasinian, Lehigh University. TANOAN, ta'no-an, or TAHA.NO, FAM¬ ILY, a linguistic stock of American Indians in¬ habiting a group of pueblo villages in the upper Rio Grande Valley, New Mexico. The chief of the modern villages are Isleta, Jemez, Picuris, Pojoaque, San Ildefonso, San Juan, Sandia, Santa Clara and Taos. They are con¬ sidered the most representative pueblo group, and are probably the most ancient of the pueblo settlements. The villagers who number about 3,000 have not perceptibly advanced in civiliza¬ tion, from the descriptions given of them by Spanish explorers who first visited the villages over three centuries ago. Deriving their name from Tahano, the Indian name of the chief Tano pueblo, they then inhabited a number of other villages, now in ruins, in Mexico, Texas and Arizona grouped under the names Tano, Tewa, Tigua and Piro. Consult Bandelier, H. F. A., (The Indians of the Southwestern United States, 1880-85) (Boston 1890-92).

TANON, ta-non', a strait in the Philippine Islands between Cebu on the east and Negros on the west; the northern entrance is 20 miles wide and the southern entrance five miles ; the length is 103 miles. The shores are steep and generally free from obstructions; there are a number of important towns on its coasts.

TANREC, or TENREC, a genus (Cen - tetes) of insectivorous mammals, distinguished by the elongated muzzle and the short rounded ears. The body is covered on the upper sur¬ face with spines and bristles ; no tail exists. These animals inhabit Madagascar, the most familiar species being the centetes ecaudatus, while other species are the tendrac or spiny tanrec (C . spinosus) and the banded tanrec (C . madagascariensis) . The C. ecaudatus is an animal of about the size of the European hedgehog, but with a larger body, the legs being also more elongated. The quills or spines are yellowish at their bases and black toward the tips. These animals hibernate like the European hedgehogs and live in burrows, which they excavate by means of their strong claws. They do not, however, possess the power of rolling themselves up into a ball-like form for defense. The food consists of insects, rep-

tiles, etc. All three species are eaten by the natives of Madagascar.

TANSY, a composite herb (Tanacetum vulgare), introduced into America from the northern Old World. It is a familiar weed of waste lands and roadsides, probably escaped from old herb gardens and maintaining its station with vigor — a characteristic which is said to have suggested the Greek name Athanasia, ˆimmortality,® which has been cor¬ rupted into ((tansy.® It is a handsome plant, with dark-green, deeply cleft and pinnatifid, fern-like leaves, numerous on an erect stem about three feet high, which is topped by some¬ what dense corymbs of flat, button-like, gold- colored heads of rayless florets. It has a rank odor and bitter, aromatic flavor, which caused it to be used formerly as a seasoning herb, a practice now practically obsolete. The acid juice contains a volatile oil that is very poison¬ ous, yet tansy was a popular anthelmintic and stomachic drug and still holds a place in materia medica as an aromatic bitter and irri¬ tant narcotic ; it is employed to relieve the pain of ulcers, bruises and rheumatism. White tansy is the sneezewort, and several other plants of similar aspect are also called tansy; while Argentina anserina is the goose-tansy.

TANTA, or TANTAH, tan'ta, Egypt, capi¬ tal of the province of Gharbieh, in the Delta, about 55 miles by rail north of Cairo. It has large public buildings, a palace of the Khedive, bazaars and three important annual fairs. The centre of education is the Mosque of El Ahmadi where in 1914 2,860 students and 113 professors were

registered. Pop. about

59,000.

TANTALITE. A rare mineral consisting of tantalite of iron and manganese, with 72.4 per cent of tantalum wrhen pure. An important source of that metal, at one time used ex¬ tensively for filaments for incandescent elec¬ tric lamps ; obtained in Black Hills of South Dakota and in Virginia.

TANTALUM, chemical symbal Ta, atomic weight 183, is a rare element found by Ekeberg (1803) in a mineral afterward called tantalite (FeTa206) obtained from Finland. It is also found in the minerals samarskite, yttrotantalite and fergusonite. The other rare element co- lumbium is usually found with it. The metal is obtained by heating the potassium and tantalum fluoride with metallic potassium and extracting the potassium fluoride with water. It is a black substance with a metallic lustre, insoluble in sulphuric, hydrochloric or nitric acids or aqua regia, but soluble in hydrofluoric acid. Like columbium it ignites when heated in the air, forming tantalum oxide, Ta205. This oxide unites with certain metallic oxides or hydroxides to form compounds called tantalates which may be considered as derived from hypo¬ thetical acids called tantalic acids. Tantalum is used in the manufacture of electric lamps. It is found in pegmatite veins in the Black Hills of South Dakota and at other places in the United States. The chief supply comes from Australia and Scandinavia.

TANTALUS, tan'ta-lus, in Greek myth¬ ology, king of Phrygia or Lydia; son of Zeus or Tmolus. Tradition does not agree as to the crime by which he forfeited the favor of

Zeus and merited condign punishment. Ac¬ cording to one account he offended Zeus by his perfidy; according to another he stole away the nectar and ambrosia from heaven, and a third story is that he murdered his own son Pelops and served him up for some of the gods. Homer represents him as standing up to his throat in water, with the most delicious fruits hanging over his head, which, when he attempts to quench his thirst or to appease his hunger, elude his grasp. According to Pindar a great rock is suspended over his head, which constantly threatens to fall and crush him.

TANTIA TOPI, tan'te-a to'pe (((the weaver who became an artilleryman®) : b. Bithur, near Cawnpore, India, about 1819; d. 18 April 1859. Rebel leader during the Indian Mutiny of 1857. He

displayed marked ability; beginning as a lieutenant of Nana Sahib, after the flight of the latter into Nepal, he assumed command and continued the war for months, putting the English to no end of trouble, being the last rebel in the field. He was finally cap¬ tured, tried and hanged in April 1859.

TANTRA, the name given in Hindu reli¬ gious lore, to dialogues between the god Siva and his bride in one of her many forms, but chiefly as Uma and Parvati. The Tantrikas or followers of the Tantras, consider them a fifth Veda and attribute to them equal antiquity and superior authority. In them is found in¬ struction in the methods of acquiring six su¬ perior faculties, as what would now be termed clairvoyance, second sight, observation on the astral plane, leaving of the physical .body, etc. Meditation and its results is dealt with at great length, breathing instructions are given that suggest modern Yogi practice and there is instruction in the languages of animals. Con¬ sult (The Tantra of the Great Liberator) (trans. London 1913). See India.

TANTUM ERGO, tan-tum er'go, the hymn sung in the Roman Catholic Church at bene¬ diction with the Holy Sacrament.

TANZIMAT. See Turkey, Government.

TAO TE KING. Laotze, author of the (Tao Te Ki'ng,> «Book of the Way and Virtue,® lived in the 6th century b.c., and was keeper of the archives at the capital of the Chau, where Kongtse (Confucius) visited him. Later many legends, borrowed from Buddhism, gathered around his memory, until he became chief deity of the Taoists and his (Tao Te King* their chief scripture. (See Taoism). The (Tao Te King) treats the world, man, morality and politics in reference to Tao, variously translated Way, Word, Reason, Nature, God. An understanding of the (Tao Te King) is greatly aided by familiarity with Brahmanic and other mysticism, and Douglas even supposes that Laotze derived his doctrine from India; but if so he thoroughly assimilated it to the Chinese mind, while his references to Chinese antiquity indicate originality. In any case, Tao is distinguished from the ontological Brahma by the characteristic Chinese stress upon its ethical content. Tao is the Absolute which unfolds its mysterious nature into Shang- ti (the Chinese personal god), the rational world and moral man ; and will finally with¬ draw all three again into itself. After introduc¬ ing his Tao, Laotze passes from one theme

to another without logical sequence, but always meaning to exemplify the working of Tao, limited, as usual with the Chinese, to the moral and political spheres. Laotze was no philosophic dreamer; but, like his great rival, Kongtse, was offering a remedy for the troublous times in which they lived. Laotze's remedy was a re¬ turn to Arcadian simplicity, such as existed be¬ fore rules and laws were devised or needed. With this pessimistic rejection of entire human culture, Laotze constantly joins rejection of its base features, such as ambition, pride, loquacity and greed ; while he commends its obscure and weak but indispensable elements. In the course of this exposition, many a gem of insight is brought to light, though often embedded in dull earth.

Selections from the (Tao Te King*. — (<Therefore the sage, in the exercise of his government, empties the peoples' minds, fills their bellies, weakens their wills, strengthens their bones. He constantly tries to keep them without knowledge and without desire, and where there are those who have knowledge, to keep them from presuming to act on it. Where there is this abstinence from action, good order is universal.®

((There is no guilt greater than to sanction ambition, no calamity greater than to be dis¬ contented with one's lot, no fault greater than the wish to be getting. Therefore the suffi¬ ciency of contentment is an enduring and un¬ changing sufficiency.®

((To those who are good to me, I am good; and to those who are not good to me, I am also good, and thus all get to be good. To those who are sincere with me, I am sincere; and to those who are not sincere with me, I am also sincere, and thus all get to be sincere. The sage does not accumulate for himself. The more that he expends for others, the more does he possess of his own ; the more that he gives to others, the more does he have himself.® Consult Legge, (The Texts of Taoism) (2 vols., in (Sacred Books of the East*).

Edmund Buckley.

TAOISM. Taoism ranks with Confucian¬ ism and Buddhism as the three great religions of China, which amount in practice to one re¬ ligious compound, wherein Confucianism is politico-moral and ceremonial, Taoism is re¬ ligious and magical, while Buddhism deals in metempsychosis and the future life. Only the priests are exclusive followers of either Taoism or Buddhism. There are even ((temples of the three doctrines,® where idols of Buddha and Laotze stand on either side of Kongtze. The Chinese ask about a religion not, <(Is it true?® but «Is it moral?® Tested thus, all their re¬ ligions seem to the

Chinese acceptable.

Taoism is the folk-faith of the Chinese, primitive but receiving various accretions through the centuries, such as a corrupted form of Laotze's doctrine of the Tao (from which Taoism takes its name) in the 6th century b.c., a magician deified as Yu Hwang in the 7th century a.d. and Kwanti a soldier deified as War-god only in 1828. Especially in the three centuries b.c., emperors and folk alike, under the leadership of Taoist priests, neglected labor to search for the elixir of life and for power to transmute base metals into gold. Thus Taoism came to include most of the national

hero-worship and nature-worship (of a type lower than Confucianism) and most of the divination and magic, the latter including fangshui, the Chinese geomancy, according to which the location of a house or a grave de¬ pends on supposed magnetic currents, the azure dragon, the white tiger and the like. This folly is strong enough to form the chief obstacle to civil engineering in China, as when a telegraph pole would disturb the fangshui of a region or a railway that of a cemetery!

The gods of Taoism furnish a good index to its heterogeneous origin. The San Ching, ((Three Pure Ones,® are simply a triplication of Laotze, done to correspond with a Buddhist triplet. But, since these are sunk in contem¬ plation, the superintendence of mundane affairs falls to Yu Hwang Shang Ti, ((Gemmeous Sovereign God.® The first elements have souls which rose to become the five planets and thus divine. Many stars are deified. The Dragon- king, a familiar feature of Chinese processions, seen even in America, represents water in its varied forms and, therefore, has numerous temples beside seas and rivers and is discerned among rain clouds. Sun cult survives in the bonfires of the spring festival. Licentious fes¬ tivals were long ago suppressed in accord with the politico-ethical nature of the dominant Con¬ fucianism. Sacred animals are the fox, snake, hedgehog and weasel; sacred trees are the cas¬ sia, willow, banyan, pine and peach. To the ancestral tablets and an image or picture of the Kitchen-god (originally a Fire-god) found in every Chinese house the Taoist adds certain other figures according to locality, trade and preference.

Taoism worships also certain culture-gods who preside over various vocations. Thus, students revere Wan-chang (a deified scholar) as God of Letters, soldiers worship a deified soldier as Kwanti the God of War, and trades¬ people worship Tsai-Shin, God of Riches. Be¬ sides such great gods there are innumerable shin <(spirits,® of whom Chinese live in dread by day and especially night.

The priests of Taoism are probably cognate with the shaman of Siberia, but its monks, nuns, pope, monasteries and temples were copied from Buddhism. These priests conduct the ritual for the city and State gods, purify streets, houses and persons from evil spirits, and prepare paper amulets for pasting on door¬ ways to exclude spirits. Though Taoist priests marry, their vocation is not hereditary, they are recruited from the lowest classes, are ignorant and immoral, and are generally despised by the literati, the learned officials of China. From these priest-magicians one must distinguish the monks who observe Laotze's principles by celibacy, seclusion and mystical communing.

The Taoist scripture is far less the recondite (Tao Te King* (q.v.) of Laotze than <(The Tractate of Actions and their Retributions,® an anonymous tract composed about the 11th cen¬ tury a.d., which is universally popular. Its 212 brief statements fall into five sections. The first of these declares that happiness follows virtue as misery follows vice; the second states that (<spirits in heaven and earth,® in ((the great Bear constellation® and within ((men's person® execute this earthly theodicy by deducting some days from a man's life; the third specifies the

virtues man must practice and their reward in making him an (<immortal® ; the fourth, and by far the longest, names the vices he must shun; while the fifth provides for repentance and enacts a new rule of theodicy. The tract is characteristically Chinese, agreeing with Con¬ fucianism in its stress upon morality and in its belief in an earthly theodicy; but its doctrine of the immortals probably originated from Bud¬ dhism. Another popular religious tract, the ((Book of Secret Blessings,® expresses in 541 words brief moral rules with a flavor equally of Taoism, Confucianism and Buddhism, by all of which indeed it is approved. In subsequent centuries Taoism further adopted from Bud¬ dhism its doctrine of hells and it exhibits in its temples realistic figures of the damned under torture. Foreigners name such a temple <(Chamber of Horrors,® and its gruesome spectacles are well adapted to terrorize the ob¬ tuse minds of the Chinese masses.

Consult Mayers, W. F., <The Chinese Reader's' Manual } (1874) ; Edkins, J., (Religion in China *(1884) ; Douglas, R. K., Con¬ fucianism*

and Taoism (1887); Legge, J., (The Texts of Taoism, *2 vols., in (Sacred Books of the East.*

Edmund Buckley.

TAPAJOS, ta-pa-zhos', Brazil, a tributary of the Amazon, formed by the confluence of the Arinos and Juruena, which rise on the edge of the Brazilian plateau in the state of Matto Grosso. The main stream is at first hemmed in by mountains and obstructed at intervals by rapids, but after it enters the state of Para it is a broad and deep stream. It enters the Amazon at Santarem in about long. 54° 30' W. A few miles above its mouth it broadens into a lake-like expansion 12 miles wide and 75 miles long. The river is 1,040 miles long and steam¬ ers ply on it for 210 miles.

TAPESTRIES. The peristromata of the ancient Babylonians were highly praised by Lucretius, Plautus, Stichus, Martial and Italicus and have been considered as tapestry work of some Kind. That they were a costly and greatly admired product is proven by such facts as that Metullus Scipio paid 800,000 sesterces (about $40,000) of their money for such work and Nero 4,000,000 (about $200,000). Homer writes of tapestries of great beauty woven by the Greeks; the Book of Exodus speaks of textile hangings done by the Hebrews. But all these may have been embroideries and not woven on a loom, for it is certain the <(Sarrazinois carpets,® made earlier than the 12th century, were of embroidery work, not woven. The walls of many European Con¬ tinental churches and princely palaces were covered with high warp (haute lisse) tapestry hangings by the 13th century. And the tenter¬ hooks are found on the walls of halls in man¬ sions of the 14th century from which the tapestries were suspended. Certain textile fabrics have been unearthed from the remains of the ancient Panopolis (Fayoum) which are true tapestries in our modern sense of the word. The history of their production is in doubt but they have been called ((Coptic tapes¬ tries.® They date from different periods rang¬ ing from the 2d to the 8th or 9th centuries and have always been discovered in the form of narrow strips attached to clothing as a border

decoration. These very ancient pieces display crude decorative designs in several colors.

Gothic Tapestries. — By the 13th century, incited by the Oriental works of art brought back by the returning Crusaders, Europe started an era of industrial art work. Flanders progressed most rapidly in the art of weaving tapestries and her <(imaged cloths® (draps images)

produced at Arras quickly became famous ; so much so that the term ((arras® soon became the familiar name for tapestry and still remains so in some languages. Brus¬ sels became the next centre of this industry to be followed by Valenciennes and Tournay. From the last half of the 15th century to the middle of the 16th century the richness and pure beauty of the (<Gothic® weavings produced have caused the period to be termed the Golden Age of tapestry; it is frequently referred to as the <(Gothic-Renaissance.® Arras and Paris were now vieing with each other as the prin¬ cipal centres of production. Every royal court and every baron and knight showed en¬ thusiastic energy in acquiring these lovely coverings to hide the bareness of the stone walls and to act as curtains for the door open¬ ings of their castle interiors. The work of the tapestry ateliers was pushed strenuously to meet the great demand; and when Paris fell to the British arms whole Flemish provinces were given over to the industry to meet the still greater demand. But the persecutions of Charles the Bold drove the weavers (1477) from Flanders to bring a more flourishing in¬ dustry to Brussels and Bruges to the loss of Arras and Liege. The tapestry products dating from 1483 to 1515 are generally considered by connoisseurs as the greatest achievements of the weavers' looms known from the point of pure art. But these beautiful hangings were not confined to the castles of royalty and nobility, for the wealth" merchants acquired them and displayed them from windows and balconies for the admiration of the passing crowd when the streets were decorated in honor of royal and civic processions and fetes. The lists, at tournaments, were gay with such rich decorations. With the advance of time we find primitive stiffness in depiction, entailed with the Byzantine influence and ecclesiastical demands, gradually pass to the soft curves of naturalistic egression. The great space, for¬ merly divided up into numerous scenes by quaint separating motifs of Gothic columns and arches, now becomes one of scenes blending into one another, later to be given over to one main scenic picture. The backgrounds that in the early Gothic weaves were occupied by dense masses of plant life (an Oriental decora¬ tive method, doubtless acquired through the Crusades) and known to us as <(verdures,® pass to landscapes and castles lacking in perspec¬ tive. These verdures are known to the auc¬ tioneer and his catalogue as ((mille-fleurs® on account of the many little blossoms peeping out from the leafage. Another distinctive style was called «a personnages® crowded in the background with persons streaming from hills, churches, palaces. Belonging to this early period of unequaled art we find such talented tapissiers as Nicolas (or Colin) Bataille, the Parisian, of the 14th century, who worked in France and Flanders; Jacques Dourdin, who worked under the Duke of Burgundy. A

clever tapestry designer was Jan van Room (Jean de Rome) in Gothic-Renaissance style, i hese figure-decorated pieces are known as (fhistoriated.” .

Renaissance. — The decadence of the tap¬ estry art sets in with the 16th century; the textile now attempts to imitate the painted can¬ vas, the weave in wool to simulate brush work in pigments. To get this strictly artificial effect the few simple woolen dyes have to be multi¬ plied into innumerable hundreds of color tones and shades. The genius of a Raphael is called into play to design (1515) the ((Acts of the Apostles” set of cartoons for tapestries to adorn the Sistine Chapel at Rome. In about four years Peter van Aelst, at Brussels, had reproduced the great work into color in the loom. They cost Pope Leo over $130,000, in money of that date. This ended the pure method of tapestry treatment in the Flemish ateliers and Renaissance painting in wool takes the place of Gothic, for the weavers of Brussels and other northern centres now got cartoons from Mantegna, Paolo Veronese, Andre del Sarto, Giulio Romano and other Italian artists to follow out on their looms. The ((Acts of the Apostles” designs were later reproduced in most European centres. Wilhelm de Panne- maker was noted for his work in this period and style, as were the Pannemaker family. With the enormously increased demand the ateliers grew vastly in numbers and we have centres in Brussels, Arras, Tournai, Bruges, Enghien, Oudenarde, Middlebourg, Lille, Ant¬ werp and Delft. As might be expected with a pressing demand much greater than the supply, haste and deterioration set in from careless execution. Low warp (basse lisses) were started. Rubens was making cartoons for the Netherlands now.

Italian Tapestry Factories. — Already in 1420 Johannes Thomae de Francia (French) was managing, at Mantua, an atelier for the Gonzaga family. Succeeding him came Nicolas, Guidone, Adamante (all French). Flemings were employed about 1450 (Rinaldo Boteram of Brussels, and one Rubichetto). Giovanni dei C'onradi and Andre Mantegna did cartoons. In Venice looms were started by John of Bruges and Valentine of Arras in 1421. Boteram set up looms also in Siena. Renault de Maincourt (about 1455) did (<The Creation of the World” for Pope Nicolas V. In 1441 Ferrara had looms worked by the Flemings Pietro di Andrea and Giacomo de Angelo; while Nicolas and John Karcher worked there with Lucas Cornelisz the designer. Rost and five other Flemings arrived, a school was opened and a local

artist, Battista Dosso, de¬ signed <(Life of Hercules," ((Scenes from Metamorphoses" and other beautiful work. Extant pieces of this school are (in Ferrara Cathedral) ((Story of Saint George and Saint Maurelius" and (in Como Cathedral) ((Story of the Virgin." In Florence the Medici estab¬ lished an atelier called ((Arrezaria Medicea" (1546-1737), under Karcher and Rost. Johan van der Straaten was director about 1570 and did prolific work. Many pieces are in the Florence Tapestry Museum, including the Kar¬ cher and Rost best productions <(The Story of Joseph" in 20 pieces. Cartoons were designed by Jacopo Sansovino, Bacchiacca and others. Master weavers (17th century) were Papini,

van Asselt, Lefevre, Pollastri, the two Termini, Bartoli, Manzi, C'avalieri, Bucci. In Rome, Cardinal Barberini (1633) established an atelier with Jean Frangois Romanelli as art director, Giacomo della Riviera director of works, M. Wauters (of Flanders) was a creator. (<Scenes from the Life of Christ," in 11 pieces, in the Cathedral of Saint John the Divine, New York, are from this factory. Fn the Hospitale Saint Michele, Rome, Pope Clem¬ ent XI started (1710) an atelier with Jean Simonet of Paris manager, and A. Procaccini art director. Ferloni was manager from 1717 to 1770. In Naples (1737), the Florence Medici factory having closed, its weavers started here and ran till 1799. Under Benedetto da Milano the Vigevano works started (16th century) and produced the ((Triulse Months" for Marshal Triulse, now in this family's Milan palace.

German Factories. — Otto-Heinrich had an atelier at Launingen in the 16th century. Peter Candid designed and Hans van de Biest wove (17th century) ((The Four Seasons" and <(Day" and ((Night," six pieces, in the Munich Museum.

French Factories. — Frangois Premier, after his Italian campaign, started an atelier (about 1535) at Fontainebleau. The ((History of Diana" was done in honor of Diana of Poi¬ tiers. Under his son (Henri II) it became de¬ funct; but (1551) Henri opened an atelier at the orphan asylum, La Trinite, employing the children on the work. The ((History of Mausolus and Artemisia" (15 pieces) were made here by Maurice du Bourg, its chief, from the designs of Larembert and Caron. Other factories have reproduced it. Henri IV started both high and low warp looms in 1597 in faubourg Saint Antoine ateliers, under du Bourg and Daurent; and, about 1601, Flemish artisans were invited to Paris. Frans van den Planken came from Oudenarde and Marc de Coomans from Brussels and started an atelier in Paris with branches in Tours and Amiens. Henri IV decided to accelerate the industry still more by installing du Bourg and Laurent in the Louvre and de la

Planche (van den Planken) with C'oomans in Les Tournelles palace. The latter works was moved to faubourg Saint Marceau, Paris. Louis XIV patronized the industry and Pierre Lefevre and his son Jean (Florence weavers) came to Paris in 1647. The high warp looms of Tours got Cardinal Richelieu's patronage. Rheims, under direction of Daniel Pepersack, produced (<The Story of Christ" and other works. Fouquet of Vaux let Maincy start an atelier (1658) on his estate and Le Brun drew cartoons for it (((The Hunt of Meleager") ; Louis Blammaert di¬ rected the Flemish weavers. When Fouquet, as successor of Mazarin, fell in disgrace, the Maincy factory was closed, after only three years' operation.

Beauvais Tapestry. — Minister Colbert (1664) persuaded Louis Hinert, owner of Flanders ateliers, to move his looms to Beauvais under such attractions as a subsidy, assurance of Court orders and 30 years' privi¬ lege. Hinert was bankrupt by 1684 and was succeeded by Philipe Behagle, who started mak¬ ing full-sized figure pieces. High and low warp looms were operated, but the large pieces showed very little demand. Behagle started a school of design under management of Le Pape and many of the small pieces (low warp),

of great beauty, for furniture, came from de¬ signs of this class. On Behagle's death his sons failed and the brothers Filleul took over the business only to fail likewise. In 1 722 the atelier was run by Sieur de Merou, who en¬ gaged Jean-Baptiste Oudry (from the Gobe¬ lins). Oudry's genius in designing cartoons and management made Beauvais noted. Per¬ fect workmanship marks this period; verdures are delightful, cute ducks, pheasants, foxes, dogs charm connoisseurs. Charles Natoire (of Gobelins) used his talent on furniture. Merou's financial losses brought Nicholas Besnier as successor. Noted designers of Beauvais pieces are Frangois Boucher, Leprince, Casanova, etc. Low warp pieces predominate. Besnier's death in 1753, followed by the death of Oudry two years later, injured art values of future Beauvais pieces although, under the auspices of Andre-Charlemagne Charron (1753-1780) the factory was quite a success. From 1780 Sieur de Merou (from Aubusson) was director, and introduced the fabrication of pile rugs (Savon- nerie style). The Revolution injured the in¬ dustry and for one year it was closed but the factory has been kept running ever since. Among extant Beauvais pieces are "Conquests of Louis the Great® (two pieces only) in Florence; Raphael's (<Acts of the Apostles® (eight pieces), one set in Beauvais Cathedral, another in the

French National Collection; <(Adventures of Telemachus® (six pieces) in Royal Spanish Collection, several in Paris ; ((Battles of Charles XII of Sweden® (four pieces) in Royal Swedish Collection. Oudry's ((Fables of La Fontaine® designs for chairs gained great popularity and were reproduced prolifically. In the archbishop's palace at Aix- en-Provence are a set of Natoire's (<Don Quixote® (10 pieces). Quite a large number of Boucher's pieces are in the United States.

Aubusson Tapestry. — The origin of this factory is in doubt, but the Duchess of Valen- tinois' will (dated 1507) mentions the (<tap- picerie de Felletin,® and Felletin is a town near Aubusson. Henry IV (late 16th century) lent the Felletin and Aubusson ateliers assistance by forbidding Flemish tapestry imports. Savary's <Dictionnaire du Commerce) (1641) says: <(There are also two other French tapestry fac¬ tories, one at Aubusson in Auvergne, and the other at Felletin in La Marche.® In 1637 Au¬ busson had about 2,000 operatives, but both material and designs were of a low order as well as the dyes, and weavers were leaving. Colbert promised a talented artist and an ex¬ pert dyer. But they never came. The king permitted the use of the title ((Royal Manufac¬ ture® and promised a good painter, who did not appear. Financial conditions at the Court were bad. However, the factory continued. But in 1685 the revocation of the Edict of Nantes set the best weavers in flight, for they were Protestants, much to the injury of the factory. Louis XV in 1731 sent the efficient dyer (Sieur Fizameau from the Gobelins) and the promised painter (Jean-Joseph Dumons). Dumons' designs were a success. Fizameau was soon succeeded by Pierre de Montezert. An ordinance of 1732 enforced the weaving of the initials of the town and weaver into the blue border. The Revolution closed the factory, but ever since it has been running with suc¬

cess. Aubusson looms are all low warp. The product is furniture tapestry.

Savonnerie Tapestry. — The textile pro¬ duced at this factory is not what is known gen¬ erally under the name of tapestry because it has a velvet-like pile. It is a decorative ma¬ terial which originated in the East and had been called longue laine (long wool) or a la faqon Perse, also after the fashion of Turkey. Pierre Dupont and Simon Lourdet started looms for this work in 1627 in the Louvre with royal license "to weave carpets in the style of the Orient, with gold and silver.® The plant was moved in 1631 to the old soap works (savon¬ nerie) at Chaillot. Louis XIV permitted (1712) the works to assume the title "Manu- facture royale des Meubles de la Couronne et des Tapis fagon

de Perse et du Levant.® They gained the same privileges as the Gobe¬ lins. The king and his successors, Louis XV and XVI, patronized the industry and gave ex¬ tensive orders. While the process was that of knotted work cut to pile, it has ever been classed as tapestry. Much of the product has been used on furniture as upholstery though prop¬ erly being a carpet textile. Designs run to branched foliage and architectural motifs with a medallion or other centre.

Other French factories were as follows: Fontainebleau ; a tapestry atelier was started here (about 1535) by Frangois Premier with Philibert Babou as manager and Sebastian Serlio (Italian architect) as art director. Le Primatice drew the cartoons. It was discon¬ tinued as unprofitable while under the direc¬ tion of Philibert Delorme during the reign of Henry II. A factory was opened by Raphael de la Planche (son of Frans van den Planken) at rue de la Chaise, faubourg Saint Germain, Paris, on the death of his father. An atelier at Vaux (17th century) had the honor of having to work on the (<Story of Constantine® and <(Hunts of Meleager® designed for it by Le¬ brun, director of the Gobelins.

English Tapestries. — An existing piece of tapestry containing the coat-of-arms of the first Earl of Pembroke proves that the industry was established here already in the 16th cen¬ tury. It was woven by Richard Hyckes of Barcheston, who had another atelier at Weston. There are two tapestry maps from this weaver's hands in the Oxford Bodleian Library. The Sheldon family continued the work into the next century. William Benood (1670) had an atelier at Lambeth, London, of whose work Haddon Hall holds the ((Vulcan and Venus® set (four pieces). Glenham Hall owns four "Indo-Chinese® pieces from the loom of John Vanderbank (end of 17th century), ((manager of the King's Wardrobe,® who also produced "The Elements®- (three pieces) at Burley House; his atelier was in Great Queen street, Soho, London. Early in the 18th century Stephen Demay wove the "Hero and Leander® panels and ((Acts of the Apostles,® still extant, and Peter Parisot, in the same period, had an atelier at Fulham, London. The name Brad¬ shaw is woven in a sofa covering of this cen¬ tury at Belton House.

Mortlake. — King James I smuggled into England 50 expert Flemish weavers and es¬ tablished, in 1619, a tapestry factory at Mort¬ lake. Sir Francis Crane was the instigator of the movement. Orphans from the <(Foundlings

•• V; V'*

• ’ , ft ' ^

• > . ' \

1 Gothic Tapestry (15th Century)

2 “Flora” — Flemish Tapestry (17th Century)

3 “ Summer.” American Tapestry from the Baumgarten Ateliers

4 Flemish Verdure (17th Century)

(By courtesy of Win, Baumgarteu & Co.)

I

TAPESTRIES

255

Hospital® were apprenticed under the superin¬ tendence of Philip de Maecht, a Fleming. His productions were marked P. D. M. often. De¬ signs were done by Francis Clein (or Cleyn) from Denmark. The king’s promised financial assistance was not forthcoming and Sir Fran¬ cis, having sunk all his capital, made an appeal to his sovereign for cash to pay overdue wages of his weavers. The Prince of Wales gave financial assistance and obtained some funds from the king. On the king’s death (1625) his successor, Charles I, aided further (as when Prince) and Crane was repaid his cash losses and given lands, while the factory became a financial success. England produced the finest wool ever used on tapestry work (it was always in great demand in Flanders and France), and now with Italian art designs and Flemish oper¬ ators Mortlake, for 10 years, brought forth the grandest tapestry pieces the world ever saw. Capt. Richard Crane, on the founder’s death (1636) carried on the work unsuccessfully; civil war and the beheading of the king injured the quality and quantity of. the work. Sir Gil¬ bert Pickering, under the Commonwealth, be¬ came head of the factory. A Hampton Court copy of Mantegna’s (<Triumph of Caesar® was duplicated. Cheaper and poorer tapestries from France and the Netherlands were more popular with a war-impoverished people, however, and the factory closed in 1703. Mortlake repro¬ duced Raphael’s great “Acts of the Apostles® with border designs by Van Dyck; Rubens’ ((Story of Achilles® in six pieces ; Cleyn’s ((Story of Vulcan® and ((History of Hero and Leander.® “Vulcan’s Complaint to

Jupiter® is in an American collection (loaned to the Metro¬ politan Museum of Art, New York) ; the Swedish Royal collection owns ((Hero and Leander® (five pieces) ; <(Vulcan and Venus® pieces are in the French National Collection and in America; “N&val Battle of Soleby® (three pieces) is in Hampton Court; three sets of Mortlake “Acts of the Apostles® are in the French collection.

Merton. — In 1881 William Morris founded the Merton Works, “The Goose Girl,® from a Walter Crane cartoon, being the first produc¬ tion. Designs by Burne-Jones were next car¬ ried out. Among the best known Merton pieces are <(Story of the Holy Grail® (in Stanmore Hall) ; “The Seasons® (Victoria and Albert Museum) ; “Star of Bethlehem® (in Oxford) ; <(Primavera,® ((Flora,® ((Pomona,® etc. Merton tapestries are of coarse weave, 10 to 16 ribs per inch.

Spanish Looms. — The Santa Barbara (Mad¬ rid) atelier opened, in 1720, under patronage of Philip V, with the Jacques Vandergoten family, from Antwerp, as experts. Some of the noted 18th century 92 pieces, woven from 45 designs of Francisco de Goya, are in Escurial Palace, others in the Prado. The factory is still in operation.

Russian Looms. — In 1716 the Imperial

Tapestry Works was founded by Peter the Great, with Behacle and Beauvais operators as experts.

Japanese Tapestries are of very delicate and beautiful design, but very rare, hence few are discoverable in connoisseurs’ collections.

American Looms. — William Baumgarten, in 1893, started some tapestry looms at 321

Fifth avenue, New York City, with M. Fousa- dier as manager. After several pieces had been finished (one in the Field Columbian Museum, Chicago), the industry was moved to Williams- bridge, a suburb, and more weavers, from Aubusson, were engaged. A $20,000 set of wall panels and furniture coverings (after Boucher) was produced for P. A. B. Widener of Phila¬ delphia. It took 13 months to execute. Next were some wall panels in the directors’ room of the New York Life Insurance Company. Beau¬ tiful work has been done for such patrons as Mrs. Sheperd of Scarborough, Jacob H. Schiff, Charles M. Schwab, J. B. Ford, D. G. Reid, etc. Here also are produced floor pieces in Aubusson pile style.

Extant Masterpieces. — Of Gothic verdures we have in America (Metropolitan Museum, New York and elsewhere) “Baillee des

Roses,® ‘■Capture of Jerusalem by Titus®; Cluny Mu¬ seum has “Lady of the Unicorn® ; Victoria and Albert Museum (London) has four “Hunt¬ ing Scenes®; before the World War Rheims Cathedral had “Coronation of Clovis,® “Capture of Soissons,® “Story of the Wonderful Stag,® “Victory over Gondebout,® etc. Of Gothic tap¬ estries dating from the 12th to 15th centuries there are in the Cathedral at Angiers a set of seven “Apocalypse® ; in the Brussels Museum were “Four Philosophers,® “Abraham and Isaac,® “Presentation of Infant Jesus in the Temple®; in Halberstadt Cathedral, “Christ and Apostles®; pieces (fragments) from the Saint Gereon Church, Cologne, are in museums at London, Lyons, Nuremberg. Arras productions of this period, known and identified, had be¬ come reduced to a single set before the war; the “Story qf Saint Piat and Saint Eleuther- ius® in Tournay Cathedral. Late Gothic ex¬ amples are in the Louvre, “Last Judgment,® “Combat of the Vices and the Virtues,® “Crea¬ tion,® “Triumph of Christ,® “Christ Inspiring Faith,® “Scenes® from New Testament, “Crea¬ tion® ; two David tapestries in Brussels Mu¬ seum; “Story of David® in Cluny Museum. Transition Gothic-Renaissance pieces extant: in Rheims were “Story of Saint Remi,® “Story of the Virgin®; “Story of Saint Stephen® (nine pieces) is in Cluny Museum ; “Life of Christ® in Aix-en-Provence Cathedral; “Life of Christ® in La Chaise-Dieu (both latter 14 pieces). All are without borders. Renaissance pieces are “Acts of the Apostles® in 10 pieces in Beauvais Cathedral, French National Collection, Hamp¬ ton Court, Dresden Museum, Berlin Museum, Imperial Austrian Collection, Royal Spanish Collection, and in Loretto Cathedral. Many other splendid examples are in private Ameri¬ can collections. Fragments of the 15th century Burgundian “Sacraments® (J. P. Morgan dona¬ tion) are in the Metropolitan Museum, New York.

Tapestry Characteristics. — In identifying the location of the weave special attention is given to the border, because special borders were designed for replicas of the noted pieces. The tape border or binding, known as the “gal¬ loon® often contains the marks of the weavers, but they are often absent. The primitive design is a characteristic of Gothic tapestry, such as the Byzantine “stiffness® of expression and folds in clothing, the flatness or absence of what artists term “atmosphere,® the lack of perspec-

tive. Early works (14th and 15th centuries) usually have but a single subject, few person¬ ages. Pointed Gothic architecture in the piece

places its period, as do the capitals and shafts of columns. Of course, Renaissance tapestries display florid columns. The earliest pieces have no border — these verdures have simple flowers filling spaces. To find dates the costume is of great assistance; when armor appears the style affords a good clue. Much may be proven by the makeup of the lettering. Renaissance pieces are devoted to classic subjects, battle scenes, kings, queens and their courts. Borders are a due ; earliest were of woven tape (galloon) in a single tone. Then came frames of fruit, flowers, foliage (also ribbons sometimes), they are Gothic. Next we arrive at scenes depicted in square divisions, they are Renaissance. The relative value of the border keeps growing as well as the size, and, by the 18th century, we have the central subject actually crowded for space to make room for the elaborated border subjects. In Louis XV tapestries we arrive at actual gold picture frames in textile, moldings and all.

Tapestry Marks. — The first producers' marks appeared in 1528, when Brussels passed the ordinance by which each piece had to have the town mark, "a heraldic shield between two E's® in either capitals or minuscules. The two B's either face the same way or, sometimes, the left B is depicted backwards. It appears on the galloon and generally in a lighter tone than the body. There was also the merchant's mark. This law only affected those pieces of about 13 feet or over, not the small ones (which were few in early days). In the pieces from the Spanish ateliers of Wilhelm de Pan- nemaker his W P is found in several confusing combinations, and the number 4 frequently is found combined with the W. The initials J G are said to be the weave mark of Jacques Geubel. The Bruges ateliers used two B's traversed by a crown. A gyronne of four in a shield or circle was the mark of Pierre of Enghien. In the 17th century we find initials frequently, as two C's intertwined for Charles Coomans ; A. C. monogram for Alexander Coomans; J. F. for Jean Lefevre; P with a fleur-de-lis stood for Paris. A fowl roasting on a spit was the Jean Rost sign; Florence used a lily; Mortlake a shield with a cross en¬ tire; Tournay a castellated tower; Lille a pecu¬ liar shield charged with a lily and side initials L and F; Amiens used a double S entwined; Beauvais a red heart, white pale and two B's; Munich a shield charged with a child standing with arms outstretched on white background (field).

Bibliography. — Baumgarten, W., tapes¬ try; a short resume of the History) (New York 1897) ; Castella, A., <(Les tapisseries,» in (Paris 1892) ; id., (La tapisserie en France et ses applications) (Paris 1887) ; Havard, H., ((La tapisserie, » in 'Les Arts de l'Ameublement> (Paris 1897); Houday, J, Les tapisseries de Haute-Lisse; Histoire de la

fabrication lilloise du 14e siecle) (Lille 1871); Hunter, G. L., tapestries: Their Origin, His¬ tory and Renaissance) (New York 1912) ; Jubinal, M. L. A., (Recherches sur l'usage et origine des tapisseries a personnages dites his- toriees) (Paris 1840) ; Gerspach, E., 'Les tap¬ isseries coptes) (Paris 1890); Muntz, E., 'La tap¬ isserie) (Paris 1883) ; id., 'Histoire de la tap¬ isserie en Italie, en Allemagne, en Angleterre, en Espagne, &c.) (Paris 1878-84) ; id., 'Les tapisseries de Raphael au Vatican et dans les principaux musees ou collections de l'Europe) (Paris 1897) ; Laking, G. F., the Furniture of Windsor Castle) (London 1905) ; Pinchart, A., 'Histoire de la tapisserie dans les Flan- dres) (Paris 1878-35) ; Thomson, W. G., tap¬ estry Weaving in England from the Earliest Times to the End of the 18th Century) (New York 1915). See also Gobelins.

Clement W. Coumbe.

TAPESTRIES, Manufacture of. The di¬ rect history of tapestries has been studied and written by many European and by a very few American savants. The rise and fall of nu¬ merous ateliers and of tapestry-weaving centres have been traced, quantities of marks and mon¬ ograms deciphered, long lists of master-weavers discovered and the technical processes of weav¬ ing at the different eras defined, but the collat¬ eral history of these art products remains to a great extent unwritten. In evidence of the in¬ teresting results researches in this direction may unfold, the arguments of a learned French¬ man in an essay which appeared some years ago almost tempt one to believe that the tapestries woven by Helen and Andromache, to represent the principal episodes in the siege of Troy, actually inspired the 'Iliad) and the 'Odyssey.) We have become fairly well acquainted with the social position tapestries occupied in different nations since the dawn of civilization, by study¬ ing the impressions they made upon the popular taste from age to age and by reading the history of the roles they filled on hundreds of occa¬ sions of pomp and ceremony during many succeeding centuries. We have also become fairly well acquainted with the changes made in their style and character from the infancy to the maturity of the art, and with the alterations in the ideas they expressed throughout the same period, by patient research among documents from the great centres of production, by glean¬ ings from the inventories of princes and other potentates and from newly discovered material concerning individual ateliers the existence of which had been long forgotten, but above all by careful study of the existing specimens wherever they can be found. Guiffrey, Muentz, Pinchart and Wauters have long since proven that tapestries often exhibit the finest and loftiest conceptions of many of the great mas¬ ters, that at all epochs the most eminent artists designed models for

them, and that they fre¬ quently constitute the only surviving examples of whole schools of paintings which without them would have been lost to the world. In addition they are as trustworthy interpreta¬ tions of the characteristics and mannerisms of both schools and individuals as are paintings, and are more faithful exponents of the national ideas and sentiments of the country and era in which they were created, and, therefore, it is no

longer possible to separate the history of paint¬ ings from that of storied tapestries.

Weaving. — Tapestries, or calling them by their classical name — ((Arras® — are decorative pictures or designs in tissue which are made by interweaving variously colored woof threads with undyed warp threads after the latter have been extended either vertically or horizontally upon a loom. This interweaving is done with an implement called a (<broche® in French, which is neither a shuttle nor a bobbin, but partakes of the character of both and for which there is no equivalent word in English. The picture represented is developed upon the warp by the different colors of the woof threads. Needles are never used in weaving tapestries. In the process of weaving the woof becomes practi¬ cally an integral portion of the completed struc¬ ture. Art tapestries can only be woven by trained artists who, in the best periods of the art, always interpreted and never copied a model. Their work cannot be altered nor im¬ proved to any important extent as they go along except by destroying and re-weaving a defective part. There is no similarity whatever in hand-woven tapestries and machine-woven fabrics which masquerade under the same name, since tapestries are woven in an entirely differ¬ ent manner from fabrics; since they have no nap ; since each piece possesses a distinct orig¬ inality and is not a mechanical repetition of the same subject; and since every thread of the warp is so completely encased by those of the woof, that the warp is invisible on either side. There are two kinds of tapestries, (<haute- lisse® and ((basse-lisse.® Translated liberally, the former means (<upright warp® and the latter <(horizontal warp,® since the first kind are woven on upright and the second kind on horizontal looms. At Gobelins they weave only in haute- lisse, and at Beauvais, Aubusson and Malines, only in basse-lisse. In both kinds the warp threads are stretched on rollers so that they may be kept taut and parallel like the strings of a harp, but naturally very much closed to¬ gether, as there are usually 22 to 26 of

them to the inch. In the process of weaving both kinds about an ell in width of the warp forms a breadth of relay, and the weaver uses as many different broches as there are different tones and shades of color. In haute-lisse one end of a string is attached to every other warp thread in each relay, at a slight distance above the weaver's hands, and the other end is fas¬ tened to a crossbar above his head so that all these strings hang in loops within easy reach. By the assistance of these strings called ((lisses® he manipulates the warp threads backward and forward with his left hand and passes the broche from right to left between as many or as few of them as he desires with his right hand. In basse-lisse these strings are attached by a mechanical contrivance to pedals at the base of the loom so that the weaver raises and depresses the warp threads with his feet, and having both hands free to pass the broche, he weaves about one-third faster than the weaver in haute-lisse.

Rapidity and Cost of Weaving. — The

number of warp threads which are covered by one pass of the broche and one thread of the woof are only as many as are included in a single shade or tone of color. In background vol. 26 — 17

scenes and skies the woof-thread may cover at each pass from 30 to 60 warp threads, but when personages or their costumes are repre¬ sented it rarely covers more than two or three of them. In short, it is the manifold changes in the coloring, the lights and shadows, the half-tones, and so on, which determine how many threads of the warp shall be covered by a thread of the woof at each pass of the broche.

Hatching the Colors. — In high art haute- lisses tapestries, well filled with personages, the artist-weaver can weave only about a yard square in a year. At the Gobelins, to-day, this yard square costs about $880, which does not include taxes, insurance, interest on cost of plant, rental for the apartments of the weavers, etc. The weaver passes from light to dark colors and from one shade or tone to another by weaving in threads of intermediate shades or tones in formations like the teeth of a comb and thus avoids the mosaic effect which would follow weaving two different colors side by side. This process is termed hatching the colors, and is one of the most difficult feats in tapestry weaving. In valuable antique tapestries the colors are usually hatched with such skill that the untrained eye does not readily discover where the different shades of the same color begin or end.

Difficulties of Weaving. — In both haute and basse-lisse the weaver works on the wrong side and the finished part faces away from instead

of toward him. Consequently he is unable to criticize the progress of his work unless he walks around to the front of his loom in haute-lisse, and unless he raises it from its horizontal position in basse-lisse. In haute-lisse the cartoon is placed behind the weaver, and in basse-lisse it is placed beneath the warp. The weaver in haute-lisse translates the cartoon by sight, with nothing to direct his eye but the outlines of it that he has traced upon the warp, but he can, by walking round to the front of the tapestry, or by the aid of a mirror while seated take constant note of his work, and even make slight modifications in it. The weaver in basse-lisse, seeing but imperfectly what he translates, as the warp threads hide the cartoon to a certain ex¬ tent, cannot examine his work, except at considerable trouble, until the tapestry is finished, when it is too late to remedy any defects. Naturally, therefore, the artist in haute-lisse has greater opportunities for no¬ ticing the effect of light and shadow and can more readily interpret or idealize the cartoons according to his own conceptions than can his brother in basse-lisse. For these reasons haute-lisse tapestries possess as a rule greater artistic value than basse-lisse. It may be said in a few words that haute-lisse are mostly creations from, and basse-lisse are mostly reproductions of, their respective cartoons.

The precautions taken by the weaver to verify the correctness and excellence of his work are, however, of little advantage if he does not possess the specially developed tal¬ ents as well as the necessary skill and experi¬ ence to insure success in his interpretations. He uses dry and supple materials which cannot be manipulated as readily as the semi-liquid colors of the painter, nor can the thickness of

these materials be increased or diminished at will as can paints upon canvas. He cannot cor¬ rect nor alter, nor even materially modify what he has done, nor erase and reproduce it with facility, as can the painter. He cannot varnish his production, nor employ any other of the multiplied accessories of the brush and the palette. His work grows almost imperceptibly and he is, therefore, unable to sieze the general effect of the entire composition in any other way than mentally. He cannot obtain trans¬ parency and harmony except by the complicated process of hatching the colors, and must be exact in choosing them and measurably correct in his drawing, although working on the wrong side. He can improve slight faults by packing the woof threads more or less closely together with a special kind of comb, but he cannot change faults in color or in drawing except by

unweaving the defective part and renewing it totally. Is it any wonder that it requires at least 12 to 15 years to educate a novice in all the mysteries of the profession and that it took several generations of master-weavers to per¬ fect the art of weaving storied tapestries? The tyro will not be able to tell a haute-lisse from a basse-lisse tapestry, and the amateur even is often at fault unless there should be a mani¬ fest defect visible, like a mark, monogram or inscription running backward. Since the car¬ toon in basse-lisse is placed beneath the warp, it faces the finished tapestry, and its subject is, therefore, reversed in the process of weaving, just as your signature or any other bit of writ¬ ing is reversed on the blotting pad with which you dry it. No marks, monograms or inscrip¬ tions were usually painted upon the cartoon, consequently the weaver often made the mis¬ take of weaving some of them in as he would write them, which naturally made them run backward in the finished tapestry. In basse and haute-lisse interpretations of the same cartoon, the subject faces the spectator in the former in an opposite direction from which it faces him in the latter. To avoid this difference it has been usual for a long time to furnish the basse-lisse weaver with a reversed model of the cartoon so that the scheme of the tapestry when fin¬ ished should run as it would if woven in haute- lisse. Any one can, however, occasionally de¬ tect a basse-lisse tapestry on closely scru¬ tinizing it with a microscope on the wrong side, by finding here and there the hairs from a man's beard. This may seem ludicrous, but the ancient basse-lisse weaver, according to existing illustrations, usually wore a full beard, and when he bent over his work to catch glimpses of the carton beneath the warp, he occasionally caught a hair or two of it between the threads of the warp and the woof. There are a number of embroideries mis¬ called tapestries, notably the historical Bay- eux frieze which many authorities assert was made by Queen Matilda of Normandy, and her maids of honor, although there are many excellent reasons for doubting such assertions. It is needlework, and in no sense a tapestry.

History of Weaving. — The art of weaving tapestries was understood in the remotest ages, and was discovered but little later than the art of painting on walls or wooden panels, for the spirit of decoration manifested itself almost everywhere long before the dawn of civilization.

It is a long way from the coarse and crude ex¬ ample used in ancient times by many wander¬ ing tribes in the decoration of their tents, to the sumptuous and refined textile paintings uni¬ versally employed by the rich and noble in the 15th, 16th and 17th centuries to enhance the splendor of their palaces ; nevertheless the stu¬ dent will find ample

opportunity for serious thought and gratification in everything that elucidates the progressive steps in the pro¬ longed march. In short he will find that the study of tapestries will lead him into fields which were practically closed for 100 years, and that it will open his eyes to new visions of beauty of the existence of which he had scarcely a suspicion. Until recently an ornamental decoration on a Grecian vase repre¬ senting Penelope at her loom was presumed to be the most ancient visible evidence of the man¬ ner of weaving tapestries, but the discovery upon the walls of the hypogeum of Beni-Has- san el-Gadin of a painting finished about 3,000 years before the birth of Christ, upsets all pre¬ vious calculations, since it represents two per¬ sons weaving at a loom very similar in many respects to those now in use at the Gobelins. There is a tradition among the Hebrews that the art was invented by the daughter of Noah; but some of the ancient philosophers and many of the ancient poets claim that the honor be¬ longs to Pamphile, daughter of Apollo. Al¬ though Pliny describes in graphic language the sumptuous beauty of the industrial and decora¬ tive products of his era, yet he is unfortunately silent upon the manner in which they were woven, and the probable inventors of weaving them. Ovid, on the contrary, is delightfully explicit and not only gives the mythological origin of the art, in his description of the fabulous contest in tapestry weaving between the Lydian maiden and the goddess Minerva, but judging by his technical explanation of the process, one could well believe that he describes the manner in which tapestries are woven at the Gobelins to-day. According to the story Arachne was exceedingly vain of her dexterity in weaving and challenged Minerva to a trial of skill. The outraged goddess ac¬ cepted, but vowed vengeance on the pre¬ sumptuous damsel. Each attached the warp to the beam, and passed the slender broches in and out among the threads. Minerva wrought the scenes of her contests with Neptune, and Arachne the love exploits of Jupiter. The goddess could not forbear admiring the handi¬ work of the maiden, although enraged that a mortal should have dared to compete with an immortal. In her anger she destroyed the tapestry of Arachne, struck the damsel on the forehead with her broche, metamorphosed her into a spider, and bade her weave on forever.

Oldest Tapestries. — The oldest existing mural tapestries are no doubt the fragments from the Church of Saint Gereon in Cologne, which were woven in Europe in the 11th or 12th century. The oldest of all existing tap¬ estries are no doubt those discovered in the Crimea by Stephani, the archaeologian, who be¬ lieves they were woven in Asia 400 years before the Christian era. The oldest I have ever seen are of Coptic origin and were found in the tombs of ancient Panopolis. They

were woven in haute-lisse and are presumed to date from

the 2d to the 9th centuries. Coptic tapestries were all used, in so far as known, in decorating costumesˆ as there is no evidence that any were woven t6 ornament houses. In conse¬ quence many have been preserved until this day because they were buried with the bodies of those who had worn them. They are mostly shaped like bands and were sewn around the bottoms of garments or made into chasubles, or worn around the neck and wrists like the lace collars and cuffs of the Hollanders in the Rembrandt and Hale portraits.

As Mural Decorations. — Throughout the history of art from the earliest records, tap¬ estries have ranked as the most magnificent of mural decorations, and the most important fac¬ tor in crowning with pomp and splendor grand tournaments, funerals of exalted personages, receptions to famous generals or renowned prelates, triumphal entries of sovereigns or distinguished conquerors, royal and princely marriages, and coronations of popes, emperors and kings. Everywhere they occupied the places of honor and were relied upon to create the profoundest effect and arouse the highest enthusiasm. Great generals carried them to the wars, and princes and monarchs did not hesitate to borrow from each other whenever they de¬ sired to give an entertainment of unusual magni¬ ficence. In patrician homes their rich warm colors brought out in exquisite relief the classi¬ cal purity of the architecture and the beauty of the statuary, bronzes and gilded furniture. In churches, as Muentz poetically declares, they sifted the sunlight and thereby added to the mysterious shadows of these sanctuaries. When we read of the glorious role they played on hundreds of grand occasions, none of which can be referred to in the limited space of this article, we are at first fascinated and then amazed, for the facts so far outrun our live¬ liest imagination that they prove as thrilling as any romance of chivalric days, and as ab¬ sorbing as any epic of ancient or modern times.

Nationalization of Weaving. — In no coun¬ tries of Europe except France and Flanders did the art of weaving tapestries ever be¬ come thoroughly nationalized. There were many important ateliers established elsewhere, but nearly all had a comparatively ephemeral existence and rarely survived their founders. All connoisseurs regret the short life of the Mortlake atelier of England, for its ((History of Vulcan® ranks among the most important series in existence. The

Medicean ateliers of Florence lasted about a century and some of the superb specimens in the Florentine galleries issued from them. Of those founded under the aegis of the popes, that by Cardinal Frangois Barberini was maintained by the family for nearly 50 years and created several magnifi¬ cent series.

Tapestry Museums. — There are only two museums in Europe devoted exclusively to the exhibition of tapestries and textile products, to wit: the Gobelins in Paris, and the Crocetta in Florence. In all other cities, although some of them possess remarkable collections, their tap¬ estries are displayed either in the royal or imperial palaces, or in the museums among the other objects of art. Those exposed at the Gobelins have been selected with especial care so that each piece shall be an object lesson to

the student, enable him to distinguish the modifications in the methods of weaving at dif- . ferent epochs, criticize the results, and become acquainted with the changes from the first foun¬ dation of the Gobelins in 1603 to the present day. The most valuable and important state collections of storied tapestries are those in Paris, Madrid, Florence and Vienna. In each collection, except the last named, there are about 600 pieces. That in Paris is largely com¬ posed of tapestries woven in France and is un¬ rivaled in its magnificent specimens of Gobelins and Beauvais manufacture. That in Madrid is largely composed of those woven in Flanders, and is remarkable for its wealth of superb Flemish specimens. That in Vienna is not as large nor as valuable as those in Florence, Paris or Madrid, but includes tapestries woven in all the great centres of production, although, as in Madrid, those woven in Flanders are in the majority. That in Florence is composed in nearer equal proportions of the products of France and Flanders than any of the rest, al¬ though the Italians claim that almost one-third of it was woven in Italy.

Flemish Art. — The work of the Flemish ateliers, studied in its entirety, constitutes an immense epic in warp and woof, illustrating religious and profane history, mythological epi¬ sodes, legends of the saints, creations of the poets and novelists and celebrated acts of great men of all ages. Her master-weavers, how¬ ever, did not confine themselves to these inex¬ haustible sources, but made admirable repre¬ sentations of nature's models, for, the truth¬ fulness of their landscapes, the repose, soft¬ ness and veracity of their background scenes, and the purity and reality of their garlands of flowers and fruits have received the unbounded admiration of connoisseurs for generations. Some of the historians of tapestries have failed to award Flanders her just rank as the greatest of all centres of tapestry

weaving. For over three centuries she eclipsed all others in the magnificence and excellence of her products and in future ages when the tapestries of the latter part of the 18th and all of the 19th century have passed into oblivion, amateurs and connoisseurs will still recall the glory of her ateliers and still go into raptures over the tapestries which is¬ sued from them during the 15th, 16th and 17th centuries. During these 300 years she led the world in the production of practically perfect examples of textile painting, that is, tapestries which are rich in color, strong in decorative effect, graceful in drawing and with subjects adapted to the exigencies of the loom and the aesthetic requirements of wall decorations. Her tapestries of the first half of this period rarely contain more than 30 to 50 different tones and shades of color, the half tints and graduations having been made by hatching one color into another. In the 16th century Flemish tapes¬ tries reached their apogee. Her master-weav¬ ers, from their profound love of their art, wove as if inspired and painted both grandly and broadly in tissue. By careful and intelli¬ gent study they absorbed and interpreted even the motives to which the artists yielded when they designed the models and <(often further idealized the latter's ideals.® Naturally, there¬ fore, the productions of Flanders outrivaled those of any other part of Europe, but about the middle of the 17th century she was obliged

to bow her proud head to her rival — Paris.

. As the taste and demand for tapestries grew, most of the sovereigns of Europe determined to establish ateliers for weaving them in their respective territories, but nearly all were obliged to depend upon Flanders for master-weavers capable of carrying their resolutions into effect. France was the only exception of any note, for the art of weaving tapestries had been intro¬ duced in that country at probably the same pe¬ riod as in Flanders. Although the French ateliers had languished all through the long years of her wars with England, yet the best of them had not succumbed. Under the foster¬ ing succor of Francis I and Henry II they showed renewed signs of life; under the wise policy of Henry IV and Louis XIII they gathered additional strength, and under the magnificent support of Louis XIV they out¬ rivaled all competitors. Nevertheless Henry IV summoned celebrated Flemish master- weavers to France, loaded them with honors and showered inestimable privileges upon them, which Louis XIII and Louis XIV gladly con¬ tinued and extended. The object of the French

kings was to increase the demand for tapestries by introducing the cheaper methods of weav¬ ing then known in Flanders, as the lessened cost would bring them within the reach of the middle classes, whereas they had heretofore found purchasers only among the rich and the great. Finally, as these kings expected, French ideas and taste prevailed and the ateliers of France grew in importance and reputation as the character and prestige of those of Flanders faded away, until all the latter were closed, leaving the field entirely to their French com¬ petitors. See Tapestries ; Gobelins, etc.

Charles M. Ffoulke,

Lecturer and Writer on Antique Art Tapestries.

TAPEWORM. An elongate flattened rib¬ bon-like parasitic worm belonging to the class Cestoda (q.v.) of the phylum Plathelminthes. In the large majority of forms the body is divided tranversely by septa into links, seg¬ ments or proglottids which are usually con¬ spicuous externally although in a -few less common genera such partitions are lacking and there are rare species in which the body con¬ sists of but a single joint or section.

The tapeworms are common in all verte¬ brates and from their considerable size and length are the most conspicuous of all parasites. Three of the 24 species found in man are 10 meters or more in length and yet certain other species are so insignificant that they have long been overlooked. The large human tapeworms were known to the Greek and Egyptian phy¬ sicians although all were regarded as of one kind and it was 1602 before the famous Basel clinician, Felix Plater, distinguished two kinds of tapeworms from man. The large bladder-worms from various domestic animals were also well known to Greek writers on medicine but were considered as growths until Redi in Italy demonstrated their animal nature. They were, however, placed in a special class (Cystici) until about 1850 Kiichenmeister by feeding experiments established their relation as larval or immature forms of certain tape¬ worms. The proscription placed by Moses on the use of certain flesh had its ground un¬ questionably in the prevalence in such animals

of bladder-worms. Hippocrates writes of the evacuation of pumpkin-seed-like fragments as diagnostic of tapeworm and Aristotle showed that in contrast with round worms which are free the tapeworm is attached to the wall of the alimentary canal by means of its head.

The body of a tapeworm has at one end a bulbous enlargement known

as the head or scolex which in other types has a different con¬ struction but is oval with two elongate grooves in the fish tapeworm of man and more rounded with four cup-shaped suckers in the beef and

A B

Fig. 1. — The Beef Tapeworm. A, the head; B, head and

part of the body.

pork tapeworms of man. (Cf. Figs 1 and 3). Following the scolex comes a very slender region, usually undivided ; this is the neck. It changes very gradually into the jointed body which becomes heavier and more conspicuously divided toward the large end where in the full grown intestinal parasites pro¬ glottids are being regularly set free and evacu¬ ated from the intestine of the host. Since the body is highly muscular and has no hard skele¬ ton, it varies constantly and conspicuously in shape, especially at and near the scolex and neck so that the entire appearance of the an¬ terior may be radically modified. (Fig. 1). The head may be armed with hooks as well as suckers, as in the human parasite often designated the pork tapeworm.

Most tapeworms are found in the intestine and in man this is the only normal location ; the reports of their occurrence in the stomach being purely imaginary or due to reversal of the normal movement of the alimentary canal. They have been found in the bile duct and with the scolex embedded in the wall of the intes¬ tine, but all such occurrences are rare and rank as abnormal. The effect of this parasite on the host is measured first by the loss of nutriment which must be relatively great as the tapeworm is large and grows with striking rapidity. In the beef tapeworm the growth measures about 72 millimeters per diem which is equivalent to the formation of 13 to 14 proglottids daily. This factor is, however, inadequate to explain the results produced by the presence at times of only a single parasite. These symp¬ toms are prominently of a reflex nervous character and are usually explained on the sup¬ position that the tapeworms produce toxic

substances which are absorbed by the host and induce a marked toxemia. One human tape¬ worm produces a severe anaemia of the per¬ nicious type recognized as characteristic of the presence of this

species.

The symptoms of tapeworm disease are rather general and not well defined so that a

in successive segments. The large bush-like masses are ovaries and the slender flattened structure near the posterior margin is the yolk gland. Between it and the ovaries lies the small spherical Mehlis gland formerly known as the shell gland, but incorrectly designated as such since investigations show that the material

Authority

Country

Parona .

Milan

Parona .

Italy

Krabbe .

Dp.nmarlf

Krabbe .

Denmark-

Krabbe .

Dp.nmark

Stiles .

United States.

Dates of records

Total number of cases

Taenia

saginata

Taenia

solium

1899

150

121

11

1868-99

513

397

71

1869

100

37

53

1869-87

200

153

24

1887-95

100

89

1897

Many

Rare

Diboth-

riocepha-

lus

Dipylidi- um cani- num

Hymeno-

lepisdim-

inuta

Indet.

4

14

19

26

9

1

16

8

5

6

3

i

diagnosis must be made by the demonstration in the faeces of loose proglottids which are discharged either singly or in groups of three or four. The abundance and distribution of tapeworms are not accurately known and statistical data exist only for a few localities and for selected groups such as hospital patients, inmates of public institutions and soldiers.

The French maritime hospitals reported in 1890 about 1.5 per cent of all cases were treated for tapeworm infections and the United States hospital service during the Civil War recorded only 0.012 per cent treated for tapeworm, a record that is certainly much lower than the true degree of infection in this country.

The bladder worm, or larval stage in the life history of the tapeworm, is found encysted in the flesh of a great variety of hosts. It gains entrance to the final host when the flesh containing the cysts is ingested. When set free by digestion the bladder-worm everts the head and neck region which were formed in inverted fashion on the inside of the hollow spherical or oval larva. The bladder itself is digested but the chain of proglottids grows out from the neck.

The beef tapeworm {Tania saginata), also called the unarmed tapeworm of man because the scolex is devoid of hooklets, inhabits the small intestine of man but has not been found in any other host. The bladder-worm (Cysti - cercus bovis) occurs in the muscles and viscera of cattle. As is natural from the cosmopolitan distribution of both hosts this parasite occurs over the entire world but is more common in those regions where the habit prevails of eat¬ ing beef underdone or rare. It is also increas¬ ing in frequency as shown by the' statistics of the French maritime hospitals which report 33 cases among 130,927 or 0.2 per 1,000 during 1861-65 ; and 1886-90, 2,253 were infected among 152,352, or nearly 75 times as many as at the earlier date. Attention has already been called to the head of this tapeworm which with the neck is highly muscular and variable in form. The reproductive organs are not visible except as faint strands of tissue in full grown pro¬ glottids; they have the form represented in Fig. 2. The numerous small round masses are the testes which communicate by branching vessels with the common sexual pore at the side. Generally speaking these pores alternate

for the shell comes from the so-called yolk gland or vitellarium. At this stage of develop¬ ment the uterus appears as a median sausage¬ shaped receptacle. When the eggs accumulate it is increased in size so greatly that numerous lateral branches are formed extending almost to

Fig. 2. — Sexual organs in a tapeworm segment {Tania

saginata).

the margin of the proglottid, giving the aspect shown in Fig. 3.

The segments of this tapeworm when evacuated are little more than sacs covering the much branched uterus which is crowded with eggs. They possess considerable power of independent movement and are frequently found at some distance from the point of de¬ posit. The eggs have several coverings which

serve to protect them even after the disintegra¬ tion of the proglottid. Distributed by chance an egg reaches the stomach of an ox with the food or drink of the animal. Under the stimulus of the gastric juice the membranes are ruptured and spherical six-hooked larva escape. It bores its way through the wall of the alimen¬ tary canal and comes to rest in the connective tissue. When it reaches a suitable location it

develops by growth and the accumulation of a considerable amount of fluid in the centre to a bladder-worm. A thickening of the wall of the bladder produces an ingrowth in which is formed in reverse the head of the future tape¬ worm. Growth is slow and in six months the worm measures only six millimeters or less in diameter. If the flesh containing the bladder- worm is consumed by man while the parasite is still living the head of the bladder-worm is everted and it attaches itself to the wall of the intestine and begins to grow into a mature speci¬ men. This period of growth requires no more than 9 or 10 weeks for the production of mature proglottids. Since a moderate tem¬ perature is unfavorable to the 'bladder-worm well-cooked meat cannot possibly carry the in¬ fection. Exposure to cold storage conditions for three weeks is also adequate to destroy all the bladder-worms contained in a piece of beef.

The pork tapeworm {Tania solium) is known as the armed tapeworm of man because of the crown of minute hooklets which is found on the anterior face of the scolex. Like the preceding species it is confined in the adult condition to the small intestine of man. Its bladder worm (Cysticercus celluloses) occurs in the muscles and viscera ordinarily of the pig from whence the common name of the parasite. It also occurs in the dog, cat, rat, ape and rarely, also, in man. While the dis¬ tribution of both parasite and bladder-worm is as broad as that of the previous species yet there are certain parts of the world where it is entirely wanting, i.e., among those people who do not eat the flesh of the pig. The species is common in European countries where pork is consumed in the smoked but uncooked condition and is very uncommon in the United States because of the general practice of eating pork well done. The parasite is somewhat more slender than the beef tapeworm. The terminal proglottids (Fig. 3) show that the branches of the uterus are less numerous and heavier than those of that species, but to dis¬ tinguish between them is not always easy. A positive determination can readily be made when the scolex is obtained because of the presence of hooks in a double circle in which they alternate regularly in size. In general the pork tapeworm is less muscular and more transparent. Its life history is similar except that the eggs find opportunity for hatching and development in the pig rather than in cattle. The species is more dangerous than the preced¬ ing form because of the fact that the bladder- worm may develop in the human host. Appar¬ ently the brain and the eye are the points in which they have been more frequently observed and the cerebral cysticerci are most dangerous because they produce naturally conditions similar to brain tumors and are not infre¬ quently the cause of sudden death. There are

no special symptoms connected with their presence and usually it is not possible to dis¬ tinguish between them and tumors of different origin. The bladder-worm displays in some situations a marked longevity as the same in¬ dividual has been followed by means of the opthalmoscope for 20 years in the human eye. Because of the campaign against the use of pork except when well cooked this parasite has grown much rarer within recent years.

The dwarf tapeworm (Hymenolepis nana) is the most numerous parasite of this group found in man in North America. It is regarded by some as identical with a species that oc¬ curs in rats and mice. On account of its small size it was not discovered until the middle of the last century and while even yet it is fre¬ quently overlooked it is present at times in enormous numbers. It may justly be considered cosmopolitan in its distribution. Cases occur in general under unfavorable hygienic sur¬ roundings and infection is probably traceable to contamination of food by rats and mice. The worms are usually found in considerable numbers and excite digestive disturbances of marked severity. Diagnosis is made by micro¬ scopical demonstration of eggs in the faeces and treatment should be at the hands of a physician. The records of Ransom concerning North American cases indicate the great frequency of the parasite in children and especially in infants.

One of the smallest of tapeworms is Tania echinococcus which is a parasite of the dog. The chain consists of only three or four proglottids. The parasite is important because of the character of its larva or bladder-worm which is known as an hydatid {Echinococcus polymorphus) * This bladder-worm develops in a very large number of hosts and produces a complex, structure with secondary and tertiary bladders in great numbers so that the entire mass assumes enormous proportions. Speci¬ mens found in the human host have attained a mass equal to 30 or 40 pounds. The liver is the preferred seat of the bladder worm in man and its serious character depends upon this fact because the tissues involved may be of a

Fig. 4.— Dibothriocephalus latus; A, Scolex X 15, B, Larvae from fish, in extended and contracted condition.

character to prevent surgical treatment and bring about the death of the host. In addition to the general practice of removing the hydatid by surgical means other methods of treatment have recently been tried with some success. This and numerous othet parasites owe their

abundance and distribution to the frequence and movements of stray dogs.

The broad tapeworm, Dibothriocephalus latns, is also knowu as the fish tapeworm of man. 1 he adult occurs in the small intestine of man and of the dog. The larva is found in the muscles and viscera of numerous fish : pike, burbot, grayling and trout. This is the largest common human parasite, reaching often a length of 20 meters. The head (Fig. 4) is provided with a pair of lateral sucking grooves which distinguish it readily from the other forms discussed previously. The uterus forms a rosette (Fig. 5) in the thickened centre of the proglottid and the species is recognized readily by both of these features. The para-

FiG. 5. — Mature proglottid of Dibothriocephalus latus, show¬ ing female reproductive organs. Note characteristic uter¬ ine rosette centre.

site is very abundant about the shores of the Baltic and also occurs in isolated spots as around a lake near Munich and in the vicinity of Lakes Geneva, Neuchatel and Bienne in Switzerland. Larvae have been found abun¬ dantly in fresh fish from markets near the Baltic and living specimens were obtained from smoked, salted and frozen fish as well as from salted roes used as caviar. The species is com¬ mon in Japan and perhaps in some other parts of Asia where the larval host is said to be a salmon eaten raw as a delicacy by the natives. It has been introduced many times into the United States and seems to have established itself in small areas around certain lakes in northern Michigan, Wisconsin and Minnesota where an abundant foreign population has in¬ troduced from the Old World the habit of eat¬ ing smoked fish without cooking. For further data consult Nuttall, G. H. F., (The Poisons Given off by Parasitic Worms in Man and Animals) (American Naturalist, Vol. XXXIII, 1899, pp. 247-49) ; Stiles, C. W, and Hassall, Albert, (The Inspection of Meats for Animal Parasites) (United States Department of Agri¬ culture, Bureau Animal Industry, Bull. 19) ; Ward, H. B., (Cestodes in Reference Handbook of Medical Sciences* (New York 1913).

Henry B. Ward,

Professor of Zoology, University of Illinois.

TAPIOCA, a starchy product manufac¬ tured from the rootstocks of

cassava or manioc (Manihot nianihot), which belongs to the family Euphorbiacece. The plant is a perennial herb or shrub which grows about three feet tall, bears long-petioled, deeply lobed leaves, and axillary panicles or racemes of monoecious flowers followed by three-celled capsules con¬ taining three seeds. The fleshy, cylindrical rootstocks are often three feet long and weigh 25 or more pounds. In the tropics, especially of South America, where the plant is native, manihot is extensively cultivated, and in Florida and other parts of the Southern States it is also

grown. The usual practice in the West Indies is to plunge pieces of stem about 30 inches long into the ground, preferably a sandy loam, and let it care for itself, except for an occasional hoeing to kill weeds. At harvest time the root¬ stocks are dug, washed and rasped or grated to set the starch free. The fibre is removed as in potato-starch making, by maceration in water. The powder is then dried by heating it upon iron plates, a process which results in the fa¬ miliar form of <(pearl tapioca,® seen in North¬ ern markets. Tapioca is highly esteemed for making puddings with or without fruit, etc.

TAPIR, a member of a family (Tapirida ?) of hoofed mammals, allied to the horses and rhinoceroses and chiefly distinguished by the fact that the nose is prolonged to form a short proboscis or trunk and the front feet have each four toes, the hind feet possessing three toes only. The little toes of the front feet are un- symmetrical and do not touch the ground, while all the toes are (<hoofed.® They are adapted to live in swamps and rarely leave the dense forests covering such wet places. The tapirs possess a very wide distribution and inhabit both the Old and the New World. The best- known species is the South American tapir (T. americanus), which inhabits tropical America and is chiefly found living on the banks of rivers, in which it swims and dives with great ease. It is chiefly a nocturnal animal, feeding on roots, fruits and leaves. The adult is colored brown, the young being variegated with lighter spots and stripes on a darker ground. The hair is short and thick, but the neck possesses a short black mane. The average length is from four to six feet. A second species of South American tapir is the T. villosus, which is distinguished chiefly by the greater length of its hair, due to the fact that it inhabits elevated foot-hills of the Andes, where the climate is cold.

The only other distinct species is the Ma¬ layan tapir (T . Malayanus or Indicus), found in Malacca and Sumatra and known by the white color of the hinder part of its body, the head and anterior portions being black. The proboscis is larger in the Malayan species than in the South American forms and the former has no mane. It is usually of

larger size than the New World forms and appears to be a shy, retiring animal, inhabiting clumps of brushwood.

The existing tapirs seem to approximate more closely than any other perissodactyls to the primitive (Eocene) type of that group. The family, as at present defined, dates back to the Lower Miocene and its remains are found in the White River beds of that age in the Rocky Mountain region. The earliest are separated as the genus Tapiravus{ but typical tapirs soon appear. <(It is thus evident,® remarks Wood¬ ward, ((that during Miocene and Pliocene times these animals ranged over most of the warm and temperate lands of the Northern hemi¬ sphere. Hence is explained the remarkable dis¬ tribution of the existing tapirs, which are con¬ fined to two widely separated areas, namely (1) certain portions of the Indo-Malayan region, and (2) the tropical parts of America. Like the surviving dipnoan fishes they are an illustration of a once dominant race nearly ex¬ terminated, but still struggling for existence

where competition happens to be least severe in their particular case.®

TAPPAN, tap'an, Arthur, American phi¬ lanthropist: b. Northampton, Mass., 22 May 1786; d. New Haven, Conn., 23 July 1865. He accumulated a fortune in the dry-goods busi¬ ness in New York and became noted for phi¬ lanthropy. He was a founder of the Ameri¬ can Tract Society; founded Oberlin College, endowed the Lake Seminary in Cincinnati and aided other educational institutions. In 1828 he founded the New York Journal of Com¬ merce and in 1833 established The Emancipa¬ tor. He was an ardent abolitionist and a presi¬ dent of the American Anti-Slavery Society, to which at one period he contributed $1,000 a month. He aided fugitive slaves to escape from the country and procured the release of Wil¬ liam Lloyd Garrison when the latter was im¬ prisoned in Baltimore, by paying his fine.

TAPPAN, Benjamin, American naval of¬ ficer: b. New Orleans, La., 10 April 1856; d. 18 Dec. 1919. He was graduated at the Naval Academy 1876 and in 1886 was commissioned lieutenant. From 1888-91 he served in the office of the Bureau of Naval Intelligence and from 1891-94 on the Miantonomah. He was stationed at the Brooklyn navy yard 1895-96 and while on board the Raleigh participated in the

battle of Manila (1898). During the attack on the city of Manila he captured a Spanish battery and for this act was advanced five numbers by President McKinley.

TAPPAN, Eva March, American educator and author : b. Blackstone, Mass., 26 Dec. 1854. She was graduated from Vassar College in 1875 and was a Fellow of the University of Pennsylvania 1895-96. She has published (Charles Lamb, the Man and the Author *(1896); (In the Days of Alfred the Great* (1900); (Our Country's Story> (1902); <In the Days of Queen Victoria) (1903) ; (Canada's Story* (1903), etc.

TAPPAN, Lewis, American merchant and philanthropist: b. Northampton, Mass., 23 May 1788; d. Brooklyn, N. Y., 21 June 1873. He spent several years in commercial life at Bos¬ ton, then (1827) settled in New York as part¬ ner of his brother, Arthur. Both took a very active part in the anti-slavery cause. Lewis and his brother were among the founders of the Journal of Commerce (1827) and (1828—31) Lewis was sole proprietor. The pro-slavery mob, in 1834, sacked his residence. He aided in the organization of the American Mis¬ sionary Association, acting as treasurer and president for a number of years. His firm failed in the crisis of 1837, but later met all indebtedness. After the failure he established the first mercantile agency in this country and remained its head for a number of years. He published his brother Arthur's (Life* (1871).

TAPPAN BAY, or TAPPAN SEA, the

names given to the expansion of the Hudson River near Ossining and Tarrytown, N. Y. See Hudson River.

TAPPEN, Frederick Dobbs, American financier : b. New York, 29 Jan. 1829; d, Lakewood, N. J.., 28 Feb. 1902. He was edu¬ cated at Columbia Grammar School and New York University, graduating in 1849. Next

year he entered the National Bank of New York as clerk, rising, by 1857, to cashier. The bank was reorganized (1865) as the Gallatin National and Tappen became president in 1868. He became member of the conference com¬ mittee with the New York Clearing House in 1869 and member of the committee in 1872 and was appointed (1873) member of a commit¬ tee to suggest financial reforms in operations between banks. Then and later he brought about clearing-house, reforms in practice to this day. In the 1893 crisis Tappen rendered mosi important service ; by June business was paralyzed and business corporations, banks, rail¬ roads., etc., had a $2,000,000,000

liability with gold in the treasury at low ebb, but the Clear¬ ing-House Association decided the bank loans could be maintained by extension of credit and disaster was averted. Later he rendered equally useful service in times of panic.

TAPTI, tap'te, India, a river rising in Bombay province in the Mahadeo hills and flowing westward into the Gulf of Cambay. It is 430 miles long and navigable for only a short distance.

TAPUL, ta-pool', a group of islands of the Sulu Archipelago, Philippines, lying between the Sulu group on the northeast and the Tawi Tawi group on the southwest, consisting of 38 charted and named islands and some unnamed islets; area, 77 square miles. The more im¬ portant islands of the group are: (1) Siasi (q.v.), the largest, in the southern part of the group; (2) Bolipongpong, the most northwest¬ erly of the group, heavily wooded ; elevation, 955 feet; area, eight square, miles ; (3) Lapac, west of Siasi, from which it is separated by a narrow channel, with a very rugged surface; highest / *e7aiion' 1 > 344 feet; area, seven square miles; (4) Tapul, the name island, the most northerly of the group, fertile and under cultivation; highest elevation, 1,636 feet; area, six square miles. Though all tropical products and vegeta¬ tion flourish in the larger islands, the chief industry is mother-of-pearl, pearl and turtle fishing; there are cocoanut plantations of value on one of the islands. Trade is carried on with Sulu, Tawi Tawi and Borneo. Pop. (estimated) 3,000. See Sulu.

TAR, a thick, very dark liquid obtained by the dry destructive distillation of various or¬ ganic substances. That obtained from coal peat, bituminous shale, etc., is called coal-tar| while that from wood is named wood-tar. They are both very complex mixtures of organic substances. The substance popularly known as tar is wood-tar.

Coal-tar is collected from the hydraulic main and condensers of the gasworks as a black, oily, bad-smelling liquid somewhat heavier than water. It was formerly considered useless and a great nuisance, but, since the discovery of the value of its constituents, it has been made the starting material in many important industries. Coal tar is a very complex mixture of hydro¬ carbons, acid and basic bodies. Its components are first separated in a rough way by fractional distillation and then each fraction is subjected to an extensive chemical treatment to separate and purify each substance therein. The hydro¬ carbons occur in largest proportion and' they are the most valuable. Some of the important

ones are benzene (or benzol), toluene, xylene and anthracene. Of the acid bodies phenol or carbolic acid is the most important. The value of these substances lies not in themselves but in the compounds to which the chemist may pass from them. Nearly all of the varied and beautiful dye-stuffs now used are obtained from the substances mentioned above. The coal-tar colors are of exceeding brilliancy, but many are lacking in permanency (see Dyeing).

Wood-tar is a thick, dark colored, viscous material, obtained as a by-product in the de¬ structive distillation of wood in the manufac¬ ture of pyroligneous acid (wood vinegar) and methyl alcohol (wood alcohol). It varies some¬ what in character with the kind of wood used. Wood-tar has many ingredients in common with coal-tar. The hydrocarbons mentioned above are present in small quantities ; small amounts of carbolic acid are found with much larger quantities of homologous substances, the cresols (the whole mixture being called creo¬ sote). Products arising from the pyroligneous acid and methyl alcohol are also found, such as acetone, methyl acetate, etc. Wood-tar is prepared in large quantities in northern Europe by a very crude and wasteful process. A hole in the ground or side hill is lined with turf and then filled with wood (usually of coniferous trees), which is afterward nearly covered with turf. The wood is burned slowly with little access to air. The tar collects in the bottom, being usually caught in an iron pan provided with an exit tube. Wood-tar has valuable anti¬ septic properties because of the creosote it con¬ tains. This is often separated, but the wood- tar itself is much used for coating and pre¬ serving timber in exposed places.

Tar is a stimulant and antiseptic to the skin and mucous membrane. It is used externally for skin diseases in an ointment, lotion or soap. It is found in many cough mixtures and its va/por is frequently inhaled for pulmonary troubles.

TAR HEEL STATE, a popular nickname applied to North Carolina (q.v.).

TARA, ta'ra, Ireland, a hill in County Meath, six miles east of Trim. According to tradition the fes of Tara, the triennial con¬ vention here, was established by Ollam Fod- lah or Ollav Fola (b.c. 900 or 950). After the decisions of the meeting the princes and others present held a banquet, each guest seated be¬ neath his shield which the heralds

had sus¬ pended on the walls of the great hall. The palace of Tara, tradition says, was 900 feet square and had 150 apartments and 150 dormi¬ tories. The hall had a capacity for entertaining 1,000 guests daily. It was here the early kings of Ireland were crowned. King Cormac Mac Art (3d century a.d.) is said to have founded schools here of military science, law and litera¬ ture. In the days of Saint Patrick, Tara is said to have been the principal seat of Druidism and idolatry and (about 560 a.d.) fell under the curse of Saint Ruadan and had to be aban¬ doned as a royal residence. A battle here is said to have caused the fall of Danish rule in Meath in 980. In 1798 the Royalist troops, 400 strong, defeated 4,000 Irish insurgents, killing 500. Daniel O'Connell held a monster meeting here 15 Aug. 1843, at which it is said 250,000 persons attended. The so-called re¬

mains of the royal palace are represented by six rat hs or circular earthworks, of which the rath-na-riogh (king's rath), which is the most extensive, contains the forradh (meeting place) which consists of an elevation having a level summit. The ((stone of destiny,® on which the kings are said to have been crowned, is lo¬ cated here. Certain earthworks enclosing a space about 759 feet by 46 feet and having breaches at intervals supposed to have been the entrances are considered as having been the banqueting hall. Thomas Moore rendered the Tara tradition imperishable with his poem ((The Harp That Once Through Tara's Halls.®

TARAI, tci-ri, or TERAI, India, a moist, jungly and unhealthful tract of land running for several hundred miles along the southern base of the central Himalaya. See Himalaya.

TARANTELLA, a swift, whirling Italian dance; so-called because it was popularly thought to be a remedy against the supposed poisonous bite of the tarantula spider, which was said to set people dancing.

TARANTISM, or TARANTISMUS,

dancing disease (q.v.).

TARANTO, ta-ran'to (Latin, Tarentum ; Greek, Taras), southern Italy, a city in the province of Lecce, at the northern angle of the Gulf of Taranto, on a rocky tongue of land which separates the ancient inner harbor, a sort of lagoon called the Mare Piccolo (Little Sea), on the east, from the open sea on the west. The side has been made an island by a canal on the southeast, crossed by an iron swing-bridge, which admits the largest war vessels; another bridge at the northwest end also connects it with the mainland. Two islands, Saint Paolo, with a

fort and a lighthouse, and Saint Pietro, guard the entrance to the outer harbor. The streets are very narrow, the three principal being the Strada Garibaldi along the Mare Piccolo, inhabited chiefly by fishermen ; the Strada Maggiore, in the heart of the town, the main business thoroughfare; and the Strada Vittorio Emanuele, along the sea-front, a fine promenade. The 11th century cathedral, now wholly modernized, and the old castle are the chief objects of interest in the town proper. The Borgo Nuovo, a suburb on the mainland to the southeast, occupying the site of ancient Tarentum, contains a large arsenal and naval hospital and various harbor works have been constructed. The fortifications of the town have been much strengthened since 1895. There is an export trade in oil, wine, licorice, fruit, etc. ; and coals, grain, petroleum, etc., are imported. Tarentum was founded by Greeks in 707 b.c., and rapidly became the chief city of Magna Grsecia. It was noted for weav¬ ing and for the purple dye obtained from a species of mussel. It reached its greatest pros¬ perity under Archytas, the philosopher, in the 4th century b.c., after which luxury and vice caused it to decline. It was compelled to seek the assistance of Greek kings in its wars with the Lucanians and when attacked by the Romans it was assisted by Pyrrhus of Epirus. In 272 b.c., however, it was taken by the Romans and the conquest was repeated in 209, after the city had supported Hannibal in the Second Punic War. It passed later under Byzantine sway, was destroyed by the Saracens

in 927 a.d. and later belonged to the Norman kingdom in South Italy. In 1861 it became included in the kingdom of Italy and the Italian government strongly fortified the place, establishing there a torpedo base. It is now one of the four important naval centres of Italy. Pop. about 56,000.

TARANTULA, a large spider (Lycosa tarantula) with a body about an inch in length; its bite was formerly supposed to produce a kind of frenzy in human subjects called tarant- ism. The nervous actions of those victims are supposed to be imitated in the wild musical dance known among the Italians as Tarantella.® Doubtless in some cases its bite produces dis¬ agreeable symptoms. The species named is a native of Italy, but varieties, or closely allied species, are found throughout the south of Europe. The so-called tarantulas of Texas and adjacent countries are large species of My gale.

TARANTULA-KILLER, a very large burrowing wasp (Pompilus formosus) of Texas and southwestward, which stings tarantulas, depositing its eggs in their bodies and carrying the paralyzed spider off to its nest. See Wasps.

TARAPACA, ta-ra-pa-ka', Chile, a prov¬ ince in the northern part of the country, be¬ tween Bolivia and the Pacific Ocean. Area, 16,689 square miles. The main range of the Andes forms the eastern boundary, while a lower range runs along the coast. The entire intervening country is a rainless desert trav¬ ersed by a few streams in narrow valleys. The importance of the province lies in its immense deposits of nitrate of soda. These are found in the interior deserts and railroads are built from the coast to reach them. There are also some silver mines in the coast range. The capital and chief port is Iquique. The prov¬ ince was occupied by Chilean troops in 1879 and was ceded to Chile by Peru by the Treaty of Peace in 1883. Pop. 125,961.

TARASCO, an ancient tribe of American Indians which formerly spread over all of the Mexican states of Michoacan, in Guana¬ juato and Quaretaro. The Tarascos have been absorbed largely in the half-breed population, but Lumholtz states that he came across the pure stock nearly 200,000 strong, in 1896, still living in the mountains of Michoacan. Ac¬ cording to their traditions they must have come from the northern regions, as did the Nahuat- lans. They do not call themselves Tarascos but name their tribe Purepecha. In conse¬ quence of their absorption with other races their original customs, in most sections, are fast disappearing, They never mention the sun except as Our Father Sun and they trans¬ act no business nor will they shell corn after sun-down. They worshipped the Southern Cross constellation. In each house they place in the best room pictures of a saint or saints, which are said to inhabit that room, while they, out of reverence to the saint, sleep in the kitchen ; but they allow strangers to occupy that room. The entire series of their saints is called Tata Dios, Father God. Copal in¬ cense is burned before the house deity, and the. visitor, before mentioning the cause of his arrival, first kisses the saint’s picture. The tribe has a great love for music and almost every

individual has his guitar. They are hard work¬ ers, especially the women, who are badly treated. Like most Indian tribes, the Tarascos are clever potters. Consult Lumholtz, K. S., (Unknown Mexico) (New York 1902).

TARASCON, ta-ras-kon, France, a town in the department of Bouches-du-Rhone, on the left bank of the Rhone, opposite Beaucaire, with

which it is connected by a suspension- bridge, 55 miles north-northwest of Marseilles. It is surrounded by walls, flanked with towers and entered by three gates. The streets are wide and regular and one of them is lined with arcades. The principal buildings are the old castle, seated on a height overhanging the river; the church, a handsome Gothic structure of the 11th century, with a finely sculptured portal; the town-house, courthouse, theatre, general hospital and public library. Woolen cloth, serge, silk goods, hempen and cotton cloth, vermicelli, soap, starch and cordage are manufactured and there are also brandy dis¬ tilleries, wax refineries, tanneries, brickworks and building-yards for barges. The trade is in wine, brandy, oil, hemp, wool, wood, coal, medicinal plants, lucerne-seed and madder. Tarascon is the Roman Tarasco and is an in¬ teresting type of the mediaeval town. It is the locale of Daudet's (Tartarin de Tarascon. > Pop. 8,631.

TARAXACIN, a crystallizable substance found by Pollex in the milky juice of the root of the ordinary dandelion. It is bitter and acrid in taste. Used somewhat as an alterative and tonic.

TARBELL, Edmund C., American artist: b. West Groton, Mass., 1862. He was a pupil in the Boston Museum of Fine Arts and going to Paris was taught by Boulanger and Le- febvre. In 1900 he took the Clark prize at the National Academy of Design; the Shaw Fund, Society of American Artists (1893) ; medal at the Columbian Exposition and other awards at Philadelphia, Boston and Paris (bronze medal 1900). In 1906 he was elected to the National Academy. For many years he was instructor at the Boston Museum. His pictures are dis¬ tinguished by fine atmosphere and color and the bold truthfulness of his outdoor work borders on impressionism.

TARBELL, Frank Bigelow, American

archaeologist: b. Groton, Mass., 1 Jan. 1853. He was graduated at Yale in 1873 and was as¬ sistant professor of Greek and instructor of logic there 1883-87 and was instructor of Greek at Harvard University 1889-92. He has been professor of classical archaeology in the Uni¬ versity of Chicago from 1894 and has pub¬ lished The Philippics of Demosthenes) (1880); (A History of Greek Art> (1896); < Catalogue of Bronzes, etc., in Field Museum of National History> (1909).

TARBELL, Ida Minerva, American biog¬ rapher: b. Erie County, Pa., 5 Nov. 1857. She was graduated from Allegheny Col¬ lege, Meadville, Pa. ; was associate editor of The Chautauquan 1883-91; studied at the Sor- bonne and College de France, 1891-94; from 1894 to 1906 was

on the editorial staff of McClure's Magazine; from 1906 to 1915, as¬ sociate editor of The American Magazine. Her publications include a (Short Life of Napoleon

Bonaparte) (1895) ; (Life of Madame Roland) (1896) ; (Early Life of Abraham Lincoln> (with J. M. Davis, 1896) ; (Life of Abraham Lincoln> (1900) ; (History of the Standard Oil Company) (1904); (He Knew Lincoln5 (1908); (Father Abraham 5 (1909) ; (The Tariff in our Times) (1911) ; <The Business of Being a Woman5 (1913) ; (The Ways of Women5 (1915); (New Ideals in Business) (1916); (Making Men at Ford's5 (1916).

TARBES, tarb, France, capital of the de¬ partment of Hautes-Pyrenees, 25 miles east of Pau, on the Adour, here crossed by a handsome bridge. The cathedral is a modern structure, erected on the site of the old castle of the counts of Bigorre, of whose territory Tarbes was the capital ; other buildings are the church of Saint John, the church of the Carmelites, with a remarkable spire ; the prefecture, occu¬ pying the old episcopal palace; the civil hos¬ pital, college and barracks. Leather and paper are manufactured and the trade includes, in addition to these articles, wine, iron, cattle and agricultural produce. Tarbes is mentioned by Caesar under the name of Bigorra. A famous battle was fought here 20 Nov. 1814, the Eng¬ lish routing the French. Pop. of the commune,

28,615.

TARDE, tard, Gabriel, French philoso¬ pher: b. Sarlat, Dordogne, 1843; d. Paris, 1904. He studied law, became juge d' instruction in his native town and held this position for nearly 19 years. He began his contribution to the Revue Philosophique in 1880 and between 1882 and 1884 published in it his first studies of the law of universal repetition and imitation. In 1894 he was called to Paris to assume control of the Bureau of Statistics of the Ministry of Justice. He relinquished this post in 1900 and became professor of modern philosophy in the College de France; in that year, also, he was elected to the Institute of France. His writ¬ ings deal largely with the laws that govern mankind in their social relations; how new ideas are brought out, developed and are ac¬ cepted as custom. He was a thorough believer in the theory that 99 men are imitators to one original. His studies in criminology contain similar views. His

publications, several of which have been translated into English, in¬ clude (Les Lois de 1'Imitation5 (1890) ; (La Criminalite comparee and La Philosophic penale5 (1891) ; (La Logique sociale> (1895) ; (L'Opposition universelle5 (1897) and (LesLois sociales) (1898) ; (Essais et Melanges Socio- logiques5 '(1895) ; (L'Opinion et la Foule) (1901); (Psychologie Economique5 (1901); Underground Man5 (1905). Consult (Gabriel Tardi,5 with preface by Bergson (1909).

TARDIEU, tar'dye, Andre Pierre Ga¬ briel Amedee, French publicist and administra¬ tor : b. 22 Sept. 1876. He passed out first in his year from the Ecole Normale and entered the diplomatic service, being attached to the French embassy in Berlin in 1897. He served a while in the Foreign Office and as secretary in the presidency of the Council of Ministers 1899— 1902. He was editor of the Revue des Deux-Mondes and became foreign editor of the Temps. He paid a visit to the United States in 1908 and recorded his impressions of that country in a book, (Notes sur les Etats-Unis5 (Paris 1908). Of President Roosevelt, whom

he interviewed, he wrote then, ((What particu¬ larly characterizes his policy is its essential and emphatic Americanism, 5> an estimate corrobo¬ rated by all Americans on the death of that statesman 11 years later. M. Tardieu entered politics in the general election preceding the out¬ break of the war. He was made chief censor, a post he soon left for active service in the trenches. Incapacitated by a severe attack of pneumonia, brought on by exposure, he was appointed head of the French commission to the United States in 1917. He labored at Washington and elsewhere for the business efficiency of the Allies and the co-ordination of their economic strength. Returning to France shortly after the formation of the Clemenceau ministry, he later made another important trip to America and subsequently remained in Paris as high commissioner for all matters concern¬ ing France and the United States. He was the youngest delegate to the Peace Conference in Paris. He wrote several excellent books on European politics; his Questions diplomatiques de l'annee 19045 was ((crowned55 by the French Academy. A remarkable work is his (Le Mystere d' Agadir, 5 dealing with Morocco and Germany. He also wrote (La Conference d'Algesiras5 and 'France et les Alliances5 (Paris 1907).

TARDIGRADA, tar'di-gra'da, a term in zoology applied (1) to the group of sloths and (2) to a group of microscopic animals also known as water-bears, which are usually classed with the Arachnida. The water-bears have a cylindrical body bearing four pairs of short clawed feet, while the mouth is furnished with two stylet-like rods. The

nervous system is much like that of annelids; circulatory and respiratory organs are lacking. These animals are hermaphrodic, and when the eggs are fer¬ tilized the skin of the body is shed, the eggs remaining in it. The development is more like that of the annelids than like that of the arachnids, and the relation of these animals to the spiders is more than doubtful. The species all live in fresh water, being common in moss and fresh-water algae. Most of the species will stand prolonged drying and will revive upon being placed in water.

TARDIVEL, tar'de-vel, Jules Paul, Cana¬ dian journalist: b. Covington, Ky., 1851; d. 1905. He went to Canada in his 17th year and was educated at Saint Hyacinth College. He entered the service of La Minerve and Le Camdien and (1881) established La Verite of Quebec, being its editor as well as proprietor for a lengthy period. As a staunch Catholic he propagated the creed in political matters, op¬ posing liberalism and Freemasonry. He was an advocate for entire independence of the province of Quebec and secession from the Canadian Confederation. He wrote ‘Vie du Pape Pie IX, ses oeuvres et ses douleurs5 (1878) ; ‘Notes de voyage5 (1890) ; (Pour le patrie *(1895),* a novel attacking Freema¬ sonry.

TARE, any of several plants. The tare mentioned in the Bible (Matt, xiii, 25) is sup¬ posed to be darnel (Lolium temulentum) , since the Greek word (L&via («wild rice55) is used in the oldest Greek manuscript. Darnel is related to the wild rice and eating its seeds was for-

merly supposed to produce stupefaction. The modern tares are all members of the family Fabac&oe. The name is most commonly used for Vida sativa, better known in England and America as the common vetch. This plant is cultivated to some extent in Europe because it will thrive upon poor soils and produce forage where other plants usually fail. Its yield is small, but in such places is deemed worth while. It is also used as a green manure for improving poor land. Its close relative, the wild vetch (V. hirsuta), also loosely called tare, is similarly named and used, but it is more often ranked as a weed.

TARE, in commercial technology, is an al¬ lowance for the outside packages of goods which cannot be packed without detriment, which is deducted from the weight if he buys by the pound. Obviously the papers, threads, bands, etc., that enclose or bind any goods im¬

ported loose cannot be conveniently separated for weighing nor, in many cases, can casks or chests be weighed separately from their con¬ tents.

TARENTUM, ta-ren'tum, Pa., borough in Allegheny County, on the Allegheny River, and on the Pennsylvania and the Allegheny Valley railroads, about 20 miles northeast of Pitts¬ burgh. It is in an agricultural and coal mining region. The chief manufacturing establish¬ ments are paper mills, glass factories, found¬ ries, machine shops, flour mills and planing mills. It is a typical manufacturing town and its 65 factories turn out about $3,000,000 in products annually. There are banks and news¬ papers. The educational institutions are a pub¬ lic high school, public and parish elementary schools and a public library. Pop. (1920) 8,925.

TARENTUM. See Taranto.

TARGUM, the translation of the Old Tes¬ tament Scriptures into Aramaic. This version originated at a time when Hebrew had given way to Aramaic as the popular language of the Jews. The need of explaining the old Scrip¬ tures to the people after their subjugation by the Persians is suggested by Nehemiah viii, 8, where we read that Ezra read the law to the people, while it was interpreted by his assist¬ ants, interpreters — Meturgemans as they were called. As the Targum was not committed to writing, little of it has survived. There are indeed three Targums of the Pentateuch and one of the Prophets, as well as of the Psalms, Job, Proverbs, the Song of Songs, Ruth, Lamentations, Esther and Ecclesiastes. The Targum is not of much critical value, but throws considerable light on the life of the Jews at the time it was composed. Consult Berliner, A., (Targum Ontales) (Berlin 1884) ; Lagarde, (Prophetae ChaldaiiP (Leipzig 1872).

TARIFF. The taxation of goods by the imposition of customs duties upon passing the national boundary line or some fixed point is an ancient method of raising revenue. The earliest form of this tax was probably the transit duty imposed on goods passing through a district and was justified as a payment for protection or for special facilities. The ex¬ port duty, levied on goods as they leave the taxing territory, came next in historical order. What in fact could be more just, it was thought,

than a tax upon goods of whose use the home community would be deprived and the burden of which would be borne by the foreign con¬ sumer. Finally there developed import duties which are made use of in practically every civilized state to-day. Transit duties have dis¬

appeared as a form of national finance; export duties are of fiscal importance to-day only in Turkey and India. But import duties contribute a large though variable proportion of the revenues of the United States and of the lead¬ ing European states. In the United States be¬ fore the imposition of the income tax they made up nearly one-half of the Federal re¬ ceipts ; before the European War they consti¬ tuted about one-half of the net receipts of the German Empire ; about one-quarter of the total revenues of England; and about 15 per cent of those of France and Italy.

Among the civilized nations of antiquity tariffs for revenue purposes were generally used. The Greeks, and more especially the Athenians, levied customs duties upon both imports and exports, the usual rate being about 2 per cent. The Roman state also resorted regularly to this form of taxation. With the breakdown of centralized government during the Middle Ages the feudal lords claimed the right of imposing transit duties on all goods passing through their domains, nominally as a payment for protection. When feudalism in turn gave way to strong monarchies the rights of the lords in this regard were exercised by the kings and to local tariffs were added national ones. Every European country was covered with a network of customs lines which greatly hindered trade, but were not productive of commensurate revenues. The history of modern tariff legislation has been the simpli¬ fication of this complicated system.

In England a complex system of import and export duties had slowly developed by the con¬ stant addition of new objects of taxation and by . the confusing practice of assigning the proceeds of each new duty to a different pur¬ pose or fund, In 1787 Pitt consolidated all of the tariff duties into one general fund. At this time about 1,200 articles were subject to import duties and about 50 to export duties. The next step in the direction of simplifica¬ tion of the tariff was effected in 1824 by Huskis- son, who abolished most of the export duties, freed raw materials of their burdens and con¬ solidated a mass of tariff acts. The real be¬ ginning of modern English free trade was made during the period 1842-60, when some 938 articles were placed on the free list. Prac¬ tically the only articles upon which import du¬ ties were collected after 1860 were sugar, cocoa, coffee, chicory, dried fruit, tea, tobacco, wine, beer and spirits. In spite of the decrease in the number of dutiable articles the revenues from the few remaining ones steadily increased, with a corresponding reduction in cost and simpli¬ fication of administration. With the increasing competition of German and American manu¬ factures, especially since about 1900, a reaction in favor of protection has arisen in some quar¬ ters. Since the outbreak of the European War this movement has taken the form of a de¬ mand

for preferential treatment of the colonies.

In France the diverse and multifarious pro¬ vincial tariffs were swept away in 1790 and the following year a common and uniform tariff

against foreign countries was established. For the first time France now had economic unity. Duties were at first moderate, but under Napoleon they were made highly protective, a system which was continued under the Resto¬ ration and extended to agriculture as well as manufactures. Under the monarchy of Louis Philippe the government was administered in the interest of the middle class and conse¬ quently no changes were made in this policy. But with the establishment of the empire a more liberal policy was introduced which cul¬ minated in the Commercial Treaty of 1860 with England. By 1881 the pendulum had swung in the other direction again, and the new tariff of that year was much more protective. A decade later protection was extended to agri¬ culture and since that time France has main¬ tained a policy of all-around protection and national self-sufficiency.

Germany's tariff policy has moved along somewhat different lines. At the beginning of the 19th century the former German Empire was a group of mutually antagonistic states so far as their tariff relations were concerned. The great problem was to unite them under a common external tariff and' to abolish the local interstate tariffs. This was finally accomplished under the leadership of Prussia by the Zoll-verein, which continued from 1834 to the es¬ tablishment of the German Empire in 1871, when complete economic unity was effected. The tariffs under the Zollverein had been mod¬ erate and now they moved' still further in the direction of free trade, but in 1878 a change was made to protection which afterward was carried further, covering agriculture as well as manufactures. The tariff has been made to serve political ends as well as industrial and fiscal purposes in Germany.

In the United States customs duties have been used from the earliest colonial period. Nearly every colonial assembly levied import duties for its own treasury in addition to those imposed by Great Britain in the execution of the Navigation Acts. They seem to have been levied for sumptuary, retaliatory or protective purposes quite as much as for fiscal ends. These colonial tariffs have been classified un¬ der the following four heads: (1) tonnage duties or taxes on shipping; (2)

export duties on tobacco and other colonial staples; (3) im¬ port duties on slaves; (4) regular tariff sched¬ ules in which wines and liquors were the most prominent items. These duties were generally low ad valorem duties ranging from 1 to 5 per cent, but even with these rates seem to have been largely evaded.

A national tariff act was made possible by the adoption of the Constitution and t-he first piece of legislation by Congress was the passage on 4 July 1789 of such an act. The main pur¬ pose of this was revenue, but protection was also extended to certain industries which it was desired to encourage, as glass and earthen¬ ware. The average rate of duty, however, was low, being about 8j4 per cent, but in those days distance was a more effective barrier than it is to-day. No important changes were made until the Act of 1816, but in the meantime the Embargo and Non-intercourse acts and the War of 1812, which had interrupted foreign trade, had called into being manufactures of which it was now felt care should be taken. Ac¬

cordingly this tariff act gave a substantial meas¬ ure of protection to those industries most ex¬ posed to foreign competition, namely, textiles, hats, cabinet wares, leather and paper. By 1824 other industries were demanding protec¬ tion such as iron, wool, hemp, glass and lead and a general revision was made in the tariff, resulting in a raising of rates throughout the list but especially in the case of the articles named. For the next few years there was con¬ tinuous agitation of the tariff question, led by the woolen manufacturers who wished further protection. A convention of the friends of protection was held in Harrisburg in 1827 and systematic propaganda was carried on. The result was the tariff of 1828 which granted the highest protection yet accorded in any act, the chief beneficiaries being the cot¬ ton and woolen industries. This ((tariff of abominations,® as it was called, caused intense opposition both in the North and in the South, and it was replaced in 1832 by a more moderate act which eliminated the worst features of the previous tariff and put the duties back at about the point where they were in 1824.

The opposition of the South, however, was too great to be appeased by any half-way meas¬ ures and in the next year it flamed out in nullification. South Carolina declared the Tariff Acts of 1828 and 1832 null and void and not binding upon the State or its citizens. In order to placate the opponents of protection and at the same time prevent too sudden and radical a revision of duties, Clay introduced the so-called Compromise Tariff of 1833. This pro¬ vided for a gradual reduction of all duties over 20 per cent to a 20 per cent level by an annual excision of one-tenth per cent until 1842 when they were all to

be placed at that point. This agreement was carried out and the reductions took place according to schedule. Hardly had this been effected, however, than the protec¬ tionists seized upon the decline in revenues which had followed the panic of 1837 as an excuse for another revision of the tariff, this time in the direction of much higher duties; in general, the Act of 1842 returned to about the level of the Act of 1832. By 1846 good times had returned, there was a surplus in the treasury and a Democratic President and Con¬ gress were in office. They decided to make a radical change in the tariff policy which they enacted into law in the Act of 1846. This has often been called a free trade tariff, but it still retained a considerable protectionist flavor although the rates on the great bulk of com¬ mercial products were reduced to between 15 and 30 per cent. The next few years were years of unparalleled business prosperity and commercial expansion and the revenues from import duties increased by leaps and bounds. The need of a reduction of revenue was so obvious that in 1857 another tariff measure was enacted lowering many of the duties and enlarging the free list. Before this act was fairly in effect, however, the panic of 1857 cut down importations to such an extent that a deficit resulted and accordingly in 1861 the previous duties were restored.

When the Civil War broke out the necessity for revenue outweighed all other considera¬ tions. Heavy excise duties were placed upon domestic manufactures and to compensate these the import duties were raised correspondingly

and in some cases a little more. This was done in 1862, the average rate being raised to 37 per cent. The same procedure was fol¬ lowed again in 1864 except that a somewhat greater amount of protection was granted, the average rates being increased by this act to 47 per cent. After the war efforts to reduce the tariff to the ante-bellum basis met with resistance from the protected interests and prac¬ tically nothing was done until 1870. In that year the duties on articles like tea, coffee, wine, sugar, molasses and spices, which did not affect domestic industries, were reduced. Again in 1872 a general revision was avoided by making a 10 per cent horizontal reduction of all duties and abolishing entirely those on tea and coffee and a few other articles. The loss of revenue resulting from the sacrifice of duties, amounting to about $20,000,000 from tea and coffee, and the shrinkage of other receipts as a result of the panic of 1873, resulted in

a deficit of about $50,000,000 and in 1875 the 10 per cent horizontal reduction was repealed. The period of depression came to an end about 1878 and with the return of prosperity a sur¬ plus began to heap up in the treasury again. In 1882 a tariff commission was appointed to propose changes, but their recommendations for a reduction of the tariff were rejected by Con¬ gress. Internal revenue duties were abolished or reduced, but the import duties were on the whole increased.

This action called forth strong protest from the Democrats, and in 1887 President Cleveland brought the issue to a head by a vehement message urging tariff reform and the necessity of reducing the surplus. Up to this time the surplus revenues had been applied to the payment of the debt, but all available bonds had now been paid. The Democratic House passed the Mills bill providing for a general reduction of the tariff, but the Republican Senate replied by proposing further cuts in internal revenue duties. In the ensuing elec¬ tions the Republicans were victorious and pro¬ ceeded to solve the problem of the surplus by the double process of spending it and raising the import duties by the McKinley Act so as to discourage importations. Extravagant pen¬ sion legislation was inaugurated and a bounty of two cents a pound given to domestic sugar producers ; at the same time imported sugar was admitted free, thus sacrificing an annual revenue of $56,000,000. These actions effectually removed the surplus and indeed paved the way for a deficit, which occurred when the panic of 1893 broke upon the country. The Demo¬ cratic tariff of 1894 reduced the duties on many protected commodities, added to the free list, restored the duty on sugar and provided for an income tax. The failure of the income tax section, however, by being declared unconstitu¬ tional, and the continuing depression led to embarrassing deficits, and when the Republi¬ cans were returned to power in 1896 they promptly reversed this policy by the passage of the Dingley Tariff in 1897, raiding the general average of duties to the highest point since the Civil War, namely, 57 per cent. This was an increase from 37 per cent in 1883 and 49.5 per cent in 1890.

The tariff now remained undisturbed for 12 years, but dissatisfaction with the existing

duties grew strong, especially with the burdens on raw materials and the favors to monopolized industries. Efforts were made within the Re¬ publican party itself, especially by members representing the Middle West, to secure a re¬ vision of those duties favorable to the trusts, though without success, but finally in 1908 a campaign pledge was made by this party to re¬ vise the tariff. The Payne-Aldrich Tariff

of 1909 was an attempt to redeem this pledge, but the protected interests succeeded in prevent¬ ing any serious reductions in schedules. This repudiation of party pledges led to an insur¬ gent movement which found expression in the Progressive party and swept the Democrats into power at the next election. The Under¬ wood Tariff of 1913 made important changes, especially in the iron and steel schedules; free wool was provided for, a gradual reduction of the sugar duty with ultimate free sugar, and in general free raw materials for manufactures. The outbreak of the European War the follow¬ ing year necessitated the suspension of the re¬ duction of sugar duties, thus saving a revenue of some $45,000,000 a year. The enormous revenues needed to defray our expenditures after the entry of the United States into the war were provided for, as in the case of the Spanish War in 1898, by increasing the internal revenue taxes and by income, inheritance and excess profits taxes. An expert tariff commission was provided for by the War Revenue Act of 8 Sept. 1916,, to supply the machinery and the informa¬ tion for the scientific solution of the difficult problems of tariff adjustment after the war.

In May 1921 an emergency tariff was en¬ acted at the extra session of Congress. This bill carried anti-dumping and American valua¬ tion clauses. A bill (Fordney Bill) providing for a permanent tariff was introduced in Con¬ gress 30 June 1921.

Bibliography.— Ashley, P., < Modern Tariff History) (London 1904) ; Bolles, A. S., finan¬ cial History of the United States) (3 vols., 4th ed., New York 1894-96) ; Dewey, D. R., financial History of the United States) (5th ed., New York 1915) ; Taussig, F. W., (Tariff History of the United States) (6th ed., New York 1914).

Ernest L. Bogart,

Professor of Economics, University of Illinois.

TARIFF ADMINISTRATION IN THE UNITED STATES. The administration of the tariff laws, which comes within the prov¬ ince of the Treasury Department, is directly under the care of the Secretary of the Treasury and one of his assistant secretaries. The ma' chinery furnished by the department and the government for its execution is comprehen¬ sive, complicated and far-reaching. All articles imported must follow a certain prescribed and unchangeable routine which begins with the re¬ quirement of a certificate of value made before a United States consular office abroad, for every shipment of foreign merchandise des¬ tined for entry into the United States. The exact methods of entry of goods, the valua¬ tion of the same, their

classification and the rate of duties to be paid, in each case, are minutely and exhaustively prescribed; and pro¬ vision is made for appeal against the interpre¬ tation of the Tariff Law, the classification of articles, the tariff charges or duties and, in fact,

any other injustice or irregularity that may arise in connection with the administration of the tariff. This system of appeal is very elabo¬ rate and is at the service of the importers and the government alike. Naturally the tariff administration takes charge of the collection duties. This it does directly notwithstanding the fact that the extent and importance of the import duties would seem not only to justify but to demand, as in the case of the internal revenue, a separate customs bureau. The di¬ vision of the country into customs districts facilitates the collection of customs through the various ports of entry. These ports of entry are themselves subject to strict routine regu¬ lations and are provided each with an adminis¬ trative staff adequate to its needs. This staff, in the larger and more important ports of entry, includes a collector, appraiser, sur- gaugers, inspectors, a naval officer and officials in accordance with the importance of the port. By law no goods destined for im¬ port into the country may be presented at any other place than one of these ports of entry, where the government has provided for the storage and warehousing of goods for the moment or for longer periods of time in case the importer should not wish to make use of the goods imported. The latter may defer the payment of duties, if he so desire, until it is convenient for him to take the goods out of the warehouse. The unloading of all goods destined for importation must be done under the supervision of the customs officials and accomplished within a certain specified time. This is facilitated by the requirement which exacts from every vessel arriving at a port of entry, from a foreign country, a manifest of the nature of the cargo, the names of the con¬ signees, ports of shipment and other informa¬ tion of a like nature, which must be submitted to the revenue officers before reaching the dock, if so desired, and delivered to the collec¬ tor, upon reaching port, in order to secure his permit to take possession of the cargo, upon the presentation, by the consignee, of a complete and detailed statement of the value and nature of the goods. This statement or invoice forms the basis on which the duty is fixed by the appraisers and the port collec¬ tor. In case the consignee is dissatisfied with the appraisement, a new one may be ordered, or, in case this is denied at the port, an appeal may be made to the board of general apprais¬ ers for a reconsideration of

the valuation. The United States Court of Customs Appeals handles appeals as to classification and other similar matters. This permits the remedy of errors, and injustices of. all kinds in the ad¬ ministration of the tariff laws and regula¬ tions ; and this makes the United States tariff administration very efficient and just to all. The collector receives the duties and pays them over to the Treasury Department. (See Tariff Administration). Consult Bolles, A. S., financial History of the United States *(1886); Dewey, D. R., financial History of the United States* (1903) ; Goss, J. D., his¬ tory of Tariff Administration in the United States) (1891).

TARIFF LAWS, the various enactments of Congress, extending from 1789 to 1913, to regu¬ late import duties. Those of recent date are:

The Morrill Tariff Act (1861) ; McKinley Tariff Act (1890) ; Wilson-Gorman Tariff (1894) ; Dingley Tariff Act (1897); Payne- Aldrich Tariff Act (1909) ; Underwood Tariff Act (1913). See Tariff Administration in the United States.

TARIJA, ta-re'ha, Bolivia, the capital of the department of the same name, situated among the mountains near the Argentine fron¬ tier, and having an area of 31,567 square miles. It lies on a fertile mountain plain and has a pleasant climate. The town has a handsome church, and there is considerable transit trade with Argentina. Pop. of town, about 10,000; department, about 165,000.

TARIM, ta-rem', central Asia, a river of East Turkestan, formed by the confluence of the Aksu, Yarkand and Khotan-Darya at the southern base of the western Tyan-Shan ranges, 60 miles southeast of Aksu. Thence it flows east and finally southeast, losing itself in the group of lakes and salt marshes known as Lob-nor, at the northern base of the Kuen-Lun range. With its main headstream, the Yar¬ kand, the Tarim River encircles the vast des¬ ert plain of Turkestan, receiving nearly all its tributaries from the surrounding mountains on its left bank. The Tarim and its basin were first thoroughly explored and mapped by Hedin, during the last years of the 19th century.

TARKINGTON, (Newton) Booth, Amer¬ ican novelist: b. Indiana, 29 July 1869. He was graduated from Princeton in 1893 and his first novel, (The Gentleman from Indiana- *(1899), attracted widespread and favorable attention. Thenceforth he followed literature, with the exception of serving one term in the Indiana legislature in 1903. His next works were (Monsieur Beaucaire) (1900) ; (The Two Van- revels* (1902); (1905); (Gust of Quesmay) (1908); (Beauty and the Jacobin> (1911); <The Flirt *(1913); Penrod1* (1914) ; <Seventeen) (1916) ; (Tur- moiP

(1917) ; (Robert Cortes Holliday* (1918) ; (The Magnificent Ambersons) (1918). He has also written several plays, the most successful being (Monsieur Beaucaire) (after the novel), in which he collaborated with Harry L. Wilson.

TARKIO (tar'ke-o). COLLEGE, located at Tarkio, Mo. It was established by private initiative in 1883 under the name of Tarkio Valley College and Normal Institute. A new charter was obtained in 1884 by which the name was changed to Tarkio College and the institu¬ tion came under the control of the United Presbyterian Church. The college has been from the first coeducational. Its organization includes a collegiate department, a normal de¬ partment, a preparatory department, a musical department and a commercial department. The collegiate department offers two courses leading to a degree, the classical (degree of A.B.), and the scientific (B.S.), and a third course, the literary, for the completion of which a diploma is granted; this latter omits one year of the work of the scientific course. The normal course occupies four years; stu¬ dents are allowed to pursue the studies they most need. Students in both this and the com-

mcrcial department can take additional studies in any of the collegiate courses. Bible study is a part of the curriculum in the preparatory and collegiate courses. The college has a campus of 20 acres a little above the town ; the chief buildings are the main building, Marshall Hall (women's dormitory) and Gentlemen's Hall. In 1901 David Rankin gave $53,000 to¬ ward the increase of the permanent endowment, and the productive funds were in 1917 $163,000. The library in 1917 contained 8,300 volumes ; the students numbered 235 and the faculty 23.

TARLAC, tar'lak, Philippines, (1) Pueblo, capital of the province of Tarlac, Luzon, on the Bolso River at the point where its name changes to Tarlac, and on the Manila and Da- gupan Railroad, 73 miles northwest of Manila. In addition to the railroad it has excellent high¬ way facilities, and is the centre of trade for the surrounding country. Pop. 12,340. (2)

An interior province in the southwestern part of northern Luzon, bounded on the north by Pangasinan, on the east by Nueva Ecija, on the south by Pampanga and on the west by Zambales; area, 1,295 square miles. In shape it is approximately square, measuring 37 miles

from north to south and 39 miles from east to west ; the eastern part is level, while the west¬ ern part includes the eastern slopes of the Cor¬ dillera de Cabusetan, the highest peak being Mount Iba, 1,604 feet. The province is watered by numerous rivers. Rice is the most import¬ ant product; sugar is also raised in large quan¬ tities, and tobacco and corn on the higher levels. The forests are valuable, and the timber is easily obtained on account of the numerous rivers, and their proximity to the forest lands. There are a few mechanical industries for do¬ mestic use only. The province is traversed by the Manila and Dagupan Railroad, the main highways and numerous lesser roads; the rivers also are navigable for native boats, so that the facilities for trade are excellent. Pop. about

135,000.

TARLATAN, a thin and fine species of open, transparent muslin, mostly used for women's wear, originally esteemed as high grade, but later deteriorated. The chief seat of the manufacture is Tarare, in France.

TARLETON, Sir Banastre, English sol¬ dier in the Revolution: b. Liverpool, 1754; d. Leintwardine, Shropshire, 25 Jan. 1833. In 1775 he entered the English army as cornet in the king's dragoon guards, and obtained leave to accompany Lord Cornwallis to North Amer¬ ica, as volunteer. He was present with Clin¬ ton's army at the attack on Charleston and other operations, then served with Sir William Erskine's cavalry, attacking and capturing New York (September 1776), Fort Washington and Fort Lee in November. He commanded the ad¬ vance guard under Harcourt and captured General Lee (13 December) and was present in operations around Brunswick, Princeton and Trenton (1 777). In 1780 he fought around Charleston capturing (by surprise) three regi¬ ments of American cavalry with their stores, just before the capitulation of Charleston. He aided in the capture of Camden. In the South he had to retreat, after Morgan's victory at Cowpens, to Hamilton Ford. Joining Leslie in January 1780 they returned and successfully at¬

tacked Morgan. But in spite of Tarleton's nu¬ merous successes the attacxs of Lafayette and Wayne rendered the Cornwallis position hope¬ less and, with the surrender to Washington, Tarleton returned to England (1782) on parole. He was made lieutenant-colonel of light dragoons in December, then entered Parliament (1790) representing Liverpool, retaining his seat till 1807. In 1807 he was again elected to sit till 1812, giving his seat to Canning. He was pro¬ moted (1790) to colonel, then to major-general (1794) and lieutenant-general (1801).

After several short commissions to Ireland and else¬ where he was made (1808) governor of Ber¬ wick and Holy Island. In 1812 he was pro¬ moted to general and was created baronet in 1815. He was certainly a clever, daring and successful leader of cavalry, but history would give him the blame for unnecessary cruelty, resorting at times to butchery. He wrote (History of the Campaigns of 1780 and 1781 in the Southern Provinces of North America) (London 1787).

TARN, tarn (ancient Tarnis), a river of France, which rises on the south slope of Mount Lozere, near Florae, in the department of Lozere. It flows west-southwest, crosses the departments of Averyron and Tarn, passing Alby, turns northwest through Haute-Garonne into Tarn-et-Garonne, where it passes Montau- ban, turning almost due west, passes Moissac, and joins the Garonne on the right a few miles below. Its whole course is 230 miles, of which about 100 miles, beginning at Alby, are navi¬ gable.

TARNOPOL, tar'nd-pol, Poland, town in Galicia, on the left bank of the Sereth, 80 miles east-southeast of Lemberg, near the Russian border. It has a Roman Catholic and a Greek Catholic church, an old castle, now used as barracks, a new castle, a Jesuit college, a gym¬ nasium, a Polish real-school and several other schools. A thriving trade in refining and brew¬ ing, horses, grain, wax, honey, etc., is carried on. Pop. about 35,200.

TARO, a plant (Colocasia antiquorum es- culenta and related forms) of the arum family, widely grown for food in tropical regions, es¬ pecially in the islands of the Pacific. The plant has very large heart-shaped leaves, from thick tuberous roots, and small greenish flowers, re¬ sembling those of the calla, to which it is re¬ lated. A form, still grown in Egypt and used as food by the laboring classes, is known to be of great antiquity. In the Pacific region hun¬ dreds of forms of taro are recognized by the natives. Taro is used in Hawaii chiefly in the form of poi, a paste made by boiling and grinding the roots and allowing them to fer¬ ment for a day of two. The roots are used in many other ways, like the potato. The leaves, also, when cooked to destroy their acridity, are used for food.

TARPAN, a local name for the Asiatic wild ass.

TARPAULIN, originally a broad piece of canvas, thoroughly coated with tar, and used to cover the hatchways of a ship at sea, to prevent the penetration of the rain or sea¬ water which may at times rush over the decks; now any heavy waterproof canvas for pro¬ tecting goods from water.

TARPEIAN (tar-pe'yan) ROCK, Italy, a portion of the Capitol at Rome, so named from the tradition that during a war with the Sa¬ bines, larpeia, the daughter of the governor of the citadel of Rome, promised to open the gates of the city to the Sabines, provided they gave her what they carried on their left hands, meaning their gold bracelets. The Sabines consented, and as they entered the gates threw not their bracelets but their shields upon Tar- peia, who was crushed to death under the weight. She was buried in the Capitol, which from her was called the Tarpeian Rock; and there Roman malefactors were afterward thrown down a deep precipice. See Rome.

TARPON, or SILVER KING, a great and powerful fish (Tarpon atlanticus, or Mega¬ lops thrissoides) , known from Virginia to Brazil, and regarded by anglers as the finest of American game fishes. It is related to the herrings and resembles them in general out¬ line, but is sometimes six feet long. Its special marks are the long filamentous appendage of the posterior margin of the dorsal fin and the huge, round, shining scales, which encase the body in an armor of glittering silver, and make the name <(silver king® peculiarly appropriate for this noble fish. Among the French and Spanish fishermen about the Gulf of Mexico and West Indies it is called grande ecaille, sabalo , savalle, etc.; while tarpium, jewfish and big-eyed herring are also heard. Its scales, as large as or larger than a silver dollar, are ex¬ tensively used in fabricating ornaments, and the flesh is good to eat; but the fish is principally of interest for the sport it affords to the angler with rod and line, who seeks it best by going in a boat, with an experienced man at the oars, among the islands or into the bays of the coast of the Gulf of Mexico, within the Florida reefs or around the shores of Porto Rico, where it spawns. Then may be felt as well as seen the astonishing force and strength which this fish daily puts forth as he chases the swift and agile fishes upon which he subsists. Having seized the angler’s baited hook, a struggle begins which taxes tackle and skill to the utmost. The mo¬ ment the tarpon feels the steel point in his mouth and finds his progress checked, he leaps high into the air, shaking himself violently in hope of casting off the hook — and he often succeeds. Failing, he leaps again and again; (<with all the frenzy of the wild horse when he first feels the lasso, he springs through the air and dashes through the water.® An hour or more of the most delicate manipulation, and at the same time of severe labor, is often re¬ quired to subdue a large tarpon.

TARQUINIUS, tar-kwm'i-us, Lucius (sur- named Priscus), in legendary history the fifth king of Rome. His family was of Greek ex¬ traction, his father, Demaratus, being a Co¬ rinthian, who crossed to Italy and settled in Tarquinii, a city of Etruria. He introduced among the Etruscans the knowledge of the alphabet. He had married Tanaquil, a Tus¬ can lady of rank, by whom he had two sons, but on account of foreign extraction he was excluded from public employment. He accord¬ ingly removed to Rome, where he was wel¬ comed and admitted to Roman citizenship. He took the name of Lucius Tarquinius. The surname Priscus, the elder, may be considered vol. 26 — 18

as a historical distinction. Tarquinius became the confidant of the king of Rome, Ancus Mar- tius, who appointed him the guardian of his children. On the death of Ancus, Tarquinius was elected his successor. He made war on the Latins and Sabines, from whom he took numer¬ ous towns, and his reign was distinguished by the erection of great public works. The Roman Cloacae (q.v.) are the greatest of the works attributed to him. He constructed the Circus Maximus in the valley redeemed by his system of drainage, and instituted the great Roman games. He began the wall around the city. He is also said to have projected or begun the Capitol in honor of Jupiter, Juno and Minerva. For the political changes which he instituted see Rome. After a reign of 36 years, or 38 according to the legends, he was killed by assassins employed by the sons of Ancus Martius in 578 b.c.

TARQUINIUS, Lucius (surnamed Su¬ perbus), last of the legendary kings of Rome, was the son of Lucius Tarquinius Priscus. Tarquinius Priscus left two sons, who were too young to succeed him, and his son- in-law, Servius Tullius, excited the patricians against him by extensive constitutional reforms, and Tarquin, on reaching man's estate, mur¬ dered his son-in-law and assumed the regal dignity as a hereditary right. As a king he developed all the distinguishing traits of a tyrant. He abolished the privileges conferred by his predecessor on the plebeians ; but did not favor the patricians. He banished or put to death the senators whom he suspected. He continued the great works of his father, and compelled the populace to labor in them for inadequate pay. While he thus established his tyranny at home he advanced the power of Rome abroad. By the marriage of his daugh¬ ter with Octavius Mamilius of Tusculum, he caused himself to be recognized as the head of the Latin confederacy. Through a stratagem of his son Sextus he obtained possession of Gabii, a Latin city, which resisted him. He made war on the Volscians, and took the city of Suessa Pomcetia, the spoils of which he used to build and decorate the Capitol. He formed also a close alliance with the Etrurian cities. To

keep down the Volscians, he founded the colonies of Signia and Circeii. It was he who deposited the Sibylline books in the vault of the Capitol. After a reign of nearly 25 years he was engaged in besieging Ardea when the conspiracy broke out by which he was exiled from Rome 510 b.c. The cause and nature of the conspiracy are referred to in the articles Brutus (Lucius Junius) and Lucretia. Tar¬ quin first took refuge at Gere and Etruria. The Etruscan cities of Tarquinii and Veil first espoused his cause, then Lars Porsenna of Clusium, and afterward the Latin states. When all these had been vanquished, according to Roman accounts, Tarquinius, whose sons had perished in the wars, fled to Cumae, where he died. The chronology of the story of the Tar- quins is incompatible with strict historical accuracy, and neither criticism nor comparison of accounts has enabled historians to disentangle the truth from fiction. Some, as Niebuhr and K. O. Muller, hold that the history of the Tar- quins points to an Etruscan conquest of Rome. Others accept the main incidents as historical.

TARR, Ralph Stockman, American geolo¬ gist: b. Gloucester, Mass., 15 Jan. 1864; d. 1912. He was graduated from Harvard in 1891, and was assistant in geology there 1890-91. From 1892-97 he was assistant in geology at Cornell University, and thereafter professor of dynamic geology there until his demise. He has pub¬ lished (Economic Geology of the United States) (1893); (Elementary Physical Geog¬ raphy) (1895); (Elementary Geology) (1897); Physical Geography of New York > (1902) ;

(Geography of Science) (1905); < Alaskan

Glacier Studies) (1914) ; (College Physiog¬ raphy) (1914).

TARRAGON, a culinary herb. See Arte¬ misia.

TARRAGONA, tar-ra-gd'na, Spain, a sea¬ port town on the Mediterranean, capitol of a province of the same name, in Catalonia, 60 miles west-southwest of Barcelona, at the east¬ ern end of the fertile Campo de Tarragona, which is watered by the river Francoli. The old town, situated on a high rocky site, once surmounted by a citadel, has narrow, irregular streets. The chief features are the splendid cathedral, dating from the 12th to 13th century, with a fine west facade and cloisters of great beauty, the archiepiscopal palace, with an an¬ cient tower, and a seminary for priests. The Plaza de la

Fuente, on the site of the Roman Circus, separates the old town from the more regular new town to the southwest, which, near where it joins the old town, is crossed by two broad tree-shaded streets. The Paseo de Santa Clara is a fine promenade on the re¬ mains of the old Roman walls. The other edi¬ fices include the presido or prison, the Torreon de Pilatos, also a prison, the Casa Provincial de Beneficencia, artillery arsenal, < infantry bar¬ racks, etc. The town and its neighborhood are rich in Roman remains. The spacious harbor is sheltered by a long mole, and has been recently improved. Tarragona was known to the Ro¬ mans as Tarraco. It was captured by the Romans 218 b.c. during the Second Punic War, and made their headquarters in Spain. It is also associated with Julius Caesar and Augustus, the latter of whom made it the capital of the province of Hispania Tarraconensis. It was taken by the Visigoths in 475 a.d., and by the Moors in 713. On 29 June 1811 it was captured and plundered by the French under Suchet. Its archbishop shares with the archbishop of Toledo the title of primate of Spain. Pop., town, 24,548; province, 336,763.

TARRYTOWN (from the Dutch, Terwen Dorp, «Wheat Town®), N. Y., village, West¬ chester County, on the Hudson River, or the expansion of the river called Tappan Sea, and on the New York Central and Hudson River Railroad, about 25 miles north of New York and 130 miles south of Albany. A ferry, which connects the village with Nyack on the west bank of the Hudson, gives Tariytown the ad¬ vantages of the West Shore Railroad.

Tarrytown is one of the oldest settlements in New York; its position on the Hudson made it a convenient landing place for boats going from New York to Albany, and gradually it became a trading post. Its first incorporation included Irvington (q.v.). During the Revolutionary War Tarrytown was a centre of importance;

every prominent hill in the vicinity was the scene of an encounter or a fortification. In Tarrytown Andre was captured. On Broadway, one of the prominent streets, about half way to Sleepy Hollow (q.v.) stands a monument com¬ memorating this event so important in the War for Independence. The first monument erected was a small obelisk, raised in 1853 by the in¬ habitants of the county, and bearing upon its pedestal an inscription which told that it marked the (<spot® where, on 25 Sept. 1780, the spy, Maj. John Andre, was captured by <(John Paulding, David Williams, and Isaac Van Wert, All Natives of this County.® In 1880, the cen¬ tennial anniversary of this capture, there was added a bronze statue of John Paulding; and a bronze panel, upon which was pictured, by Theodore Bauer, the capture of Andre. The

additions of 1880 were the gift of John Ander¬ son. The little stream nearby is called Andre Brook, and a large whitewood, which formerly stood near the monument, was called Andre's tree. In 1777 Vaughan's troops landed here; and here, at the tavern kept by Elizabeth Van Tassel, occurred the capture of the British by Major Hunt and a force of volunteers. The village is well known on account of being the birthplace and home of Washington Irving (q.v.). On the north is Sleepy Hollow (q.v.), where he was buried, on the south of the vil¬ lage is Sunnyside (q.v.), where his home still stands. Other points of historic interest are <(Lyndehurst,® formerly «Paulding Manor,® the Phihpse manor house, erected in 1683 ; a monu¬ ment to the Revolutionary soldiers of the manor, unveiled in 1894; and the summer resi¬ dences of many of the noted men of New York.

Tarrytown is in an agricultural region, but it has about 100 manufacturing establishments with a large annual output. The principal pub¬ lic buildings are the Institution of Mercy, an orphanage for boys; the churches, schools and business blocks. The educational institutions are the Washington Irving High School, Irving Institute, Miss C. E. Mason's School, The Knox School, Hackley School, Mary Mount School, public and parish schools, three public libraries and several private schools. The na¬ tional bank has a capital of $100,000, the sav¬ ings bank has deposits amounting to about $2,000,000. Pop. (1920) 5,807; including North Tarrytown, 5,927, which is industrially a part of the village; total, 11,734.

• TARSHISH, a place frequently mentioned in the Old Testament. It was formerly be¬ lieved to be Tarsus in Cicilia, but is now gen¬ erally identified by Biblical critics with the Tartessus of the Greek and Roman writers. This name was applied to a district in the south of Spain, lying to the west of the Columns of Hercules. Others regard it as some unidenti¬ fied European coast west of Greece.

TARSIA (Ital. Intarsia). Wood inlay; especially that done in Italy at the close of the Middle Ages and during the era of the Renais¬ sance. The word is received into English as being the only one describing inlay of that era and character as distinguished from that of others. Thus nearly all Tarsia work is done with dark wood like walnut, on which straight lines and curves are incised rather deeply and the incisions then filled with light colored wood, producing, when the work is complete, a general

effect of yellow on brown. These lines and curves make scrolls of different patterns which terminate in small flowers and clumps of foli¬ age, and in this way help to carry out the great scheme of arabesque decoration which we. asso¬ ciate with Renaissance proper in all the schools of Italy. Heavy furniture, such as cupboards and cabinets, ornamental chests for the storing of clothing, and the like, are adorned in this way ; but the most effective examples of the art are in the wooden fittings of church choirs and the long rows of cupboards and closets (am¬ bries) which line some of the sacristies of the churches in central and northern Italy.

Wood inlay of later times and of the North is not often called Tarsia, but the process is the same, and the effects produced differ only according to the style of the time. The most interesting wood inlay out of Italy is that of the Dutch — chests of drawers, wardrobe and writing tables in which spirited little bouquets and flowers are relieved on a dark ground. This, and all northern inlaid work, disappear in the 17th century in what we call Marquetry (q.v.), which is a mosaic of veneers rather than an inlay. Consult Jackson, F. Hamilton, Hntarsia and Marquetry* (1903).

TARSIER, a small lemur of the genus Tarsius, having extremely long hind legs, es¬ pecially in the thin tarsal portion, large, slender toes and enormous eyes. These grotesque little creatures inhabit tropical Africa and the East¬ ern Archipelago. They are for the most part of nocturnal habits and feed on fruits and in¬ sects found in the tree-tops where they spend their lives. The tarsier (T. spectrum) is a rep¬ resentative species of this genus, occurring in Borneo, Celebes, the Philippine Islands, etc. It is grayish-brown, with olive tints over the body, and dark tints on the face, forehead and back of the head. The tail is destitute of hairs, but possesses a tuft at its tip.

TARSUS, Asia Minor, an ancient city, the capital of Cilicia, now in the Turkish province of Adana, connected by rail with Adana and the port of Mersina on the Mediterranean. An¬ ciently it was adorned by a number of magnifi¬ cent buildings. Its inhabitants enjoyed the priv¬ ileges of Roman citizens, and the city rose to such distinction as to rival Athens, Antioch and Alexandria in wealth and grandeur, as well as in the arts and sciences. It is the birthplace of Saint Paul. It was situated on both banks of the Cydnus, which flowed into a lagoon con¬ nected with the sea, which formed its port, but is now silted up. Its origin is ascribed to Sar- danapalus. It was early colonized by the Greeks. It is mentioned in the (Anabasis* of Xenophon as a great and wealthy city. Tarsus was visited by Cyrus in his expedition against his brother Artaxerxes, and partially plundered by his troops. It yielded

without resistance to Alexander the Great. Tarsus belonged in gen¬ eral to the empire of the Seleucidae, but was for a short time connected with Egypt under the second and third Ptolemy, Pompey made Cilicia a Roman province. Out of compliment to Caesar, who visited the city, the inhabitants changed its name to Juliopolis. It was plun¬ dered by Cassius, but Antony and Augustus heaped favors on it. It became a place of im¬ portance in the wars of the Romans with the Parthians and the Persians. It was taken by

the Saracens in 640, after which its importance declined. The most important remains of the ancient city is the Dunuk Tash or “Tomb of Sardanapalus,® presumably part of a Graeco- Roman temple. The heterogeneous population of Mohammedans, Armenians, Greeks, Per¬ sians, etc., in the modern town is estimated at

25,000.

TARSUS (in anatomy). See Anatomy; Foot; Osteology.

TARTAGLIA, tar-tal'ya, Nicola, Italian mathematician: b. Brescia, about 1500; d. Ven¬ ice, 13 Dec. 1557. His family name was Fon¬ tana and he was given the name of “Tartaglia,® the “stutterer,® from a defect of utterance con¬ tracted during his neglected childhood. From the year 1530 he taught mathematics at Verona and Vicenza, was appointed professor of mathe¬ matics at Brescia and in 1534 was called to the same post in Venice. He discovered the method of solving the cubic equation containing the 1st and 3d powers of the unknown quantity, and in repeated contests with the ablest mathe¬ maticians of his time defeated them, being able to solve all their problems, while his own re¬ mained unsolved. In 1539 and 1540 Cardan, under the promise of strict secrecy, obtained from him his discovery, and afterward, in vio¬ lation of his promise, published it in his (Ars Magna. * This led to a violent controversy and a public mathematical contest, in which Cardan being worsted, his townsmen raised a mob and prevented a continuance of it. But the solution is still known as Cardan’s rule. His chief work is (Generale Trattato de’ Numeri e Misure) (1560). He also published a treatise on gun¬ nery, (Nuova Scienza, *which has been trans¬ lated into English by Lucar; the first Italian translation of Euclid; and seven or eight other mathematical works, the best known of which is (Quesiti ed invenzioni diversi* (1550).

TARTAN, the typical Scottish plaid; a thin worsted cloth having alternate bands of different colors, forming a checkered pattern, which has been highly specialized by Scotch weavers for the dress of the Scottish High¬ landers, each clan having its own peculiar pat¬ tern.

The well-known Stewart tartan is scar¬ let in the centres, with dark scarlet crossings and wide-spaced dark independent lines. An endless variety of fancy tartans are now manu¬ factured, some of wool, others of silk or of mixed material. The term is also applied to the checkered patterns themselves.

TARTAR. See Argol.

TARTARAGA, a South American turtle of the family Pelomedusidce ; specifically the great “arrau® or river-turtle (Podocnemis ex- pansa) of the Amazon Basin, the female of which has a shell sometimes, measuring three feet in length. This turtle is of great com¬ mercial importance throughout northern South America, on account of the eggs, which are periodically collected from the sand banks where they are buried in great quantities, chiefly for the oil to be pressed from them. This is either eaten, like the eggs themselves, or is burned in lamps alone or mixed with tar. The turtles are likewise eaten by man and many animals.

TARTARIC ACID, Dihydroxysuccinic CHOHCOOH

Acid, | exists in four stereoiso-

CHOHCOOH

meric modifications; these are known as (1) Dextrotartaric acid, or Ordinary tartaric acid, (2) Laevotartaric acid, (3) Racemic acid and (4) Mesotartaric acid.

1. Dextrotartaric Acid and some of its salts are widely distributed in the vegetable kingdom, its acid potassium salt being present in large quantities in grape juice. When grape juice is fermented, the acid salt, being only sparingly soluble in the alcohol produced, forms a dirty-white crust or sediment in the fermenta¬ tion casks ; this deposit is known as “argol® or “lees,® Cream of tartar and ordinary tartaric acid are usually obtained from this source. For the preparation of cream of tartar, argol is simply freed from impurities by treatment with animal charcoal and by subsequent crystal¬ lization. For the manufacture of ordinary tartaric acid, argol is boiled with dilute hydro¬ chloric acid and then precipitated as calcium tartrate with calcium hydroxide. The yield is increased by adding

calcium chloride to the mother-liquor. From the calcium salt thus pre¬ cipitated tartaric acid is liberated with dilute sulphuric acid.

A number of synthetic methods are also in common use for the manufacture of tartaric acid. According to British Patent 12,467, the compound may be obtained by the elec¬ trolytic reduction of glyoxylic acid or its derivatives; the glyoxylic acid used in this process being formed from oxalic acid by the action of amalgams. The method of L. Baekeland (United States Patent 1,190,845) consists in building up the acid from the oxides of carbon by converting them into formates; from these, oxalates are obtained at high tem¬ peratures and pressures ; the oxalates are re¬ duced to glyoxylates, and the latter electrolyzed into tartrates. Tartaric acid has also been ob¬ tained by the oxidation of carbohvdrates in the presence of catalyzers (British 108,494).

Dextrotartaric acid crystallizes in trans¬ parent prisms, free from water of crystalliza¬ tion. It melts at 170° C. ; above this tempera¬ ture it yields pyrotartaric acid, acetone, acetaldehyde and other decomposition products. It is very soluble in water and alcohol, but is insoluble in ether. In aqueous solution it turns the plane of polarization to the right, reduces ammoniacal silver compounds, is readily de¬ composed into glyoxal and other products in the presence of uranium, salts, and yields large quantities of carbonic acid and acetaldehyde in the presence of manganese dioxide at or above 35° C. Under the influence of ultra-violet rays tartaric acid evolves carbon dioxide. The crystals of the acid show triboluminescence. In the form of its acid potassium salt the com¬ pound has been used by the ancients. The pure acid was first described by Scheele in 1769.

1. Laevotartaric Acid differs from the dex- tro compound in that its aqueous solutions turn the plane of polarization to the left. It was first prepared by Pasteur from sodium am¬ monium racemate. When this salt is allowed to crystallize it deposits two sets of crystals from which dextro- and kevo-tartaric acids may be obtained. Pasteur's observations showed in¬

cidentally that the molecule of racemic acid is a complex of dextro- and laevo-tartaric acids. Pasteur also found that when the cinchonine salt of racemic acid is allowed to crystallize, the first crystals consist of the cinchonine derivative of laevotartaric acid. The physical and chemi¬ cal properties of this compound are practically those of dextrotartaric acid.

1. Racemic Acid occurs with ordinary tar¬ taric acid in the grapes of certain districts. It may be prepared (1) by mixing strong equimolecular solutions of dextro- and laevo-tar- taric acids, (2) by the saponification of glyoxal cyanhydrin, (3) by heating dextrotartaric acid for a number of hours with caustic alkalis, and by other methods. It separates in triclinic crystals with one molecule of water. It melts at 205-206° C. It is only moderately soluble in cold water or alcohol. Solutions of racemic acid do not show optical activity, the compound being inactive by external compensation.

2. Mesotartaric Acid is formed together with racemic acid when a solution of ordinary tartaric acid is heated with caustic alkalis. It has also been prepared synthetically by heating dibromsuceinic acid with wrater or silver oxide. It crystallizes in long prisms with one molecule of water. The dehydrated acid melts at 140° C. It is optically inactive by internal compensation.

Of the four tartaric acids described in this article, ordinary or dextrotartaric acid is a most important compound. It is extensively employed in dyeing, bleaching, calico-printing, in the preparation of effervescent drinks, in the manufacture of baking powders, seidlitz powders, in photography, and in medicine. Sodium potassium tartrate, or Rochelle salt, forms Fehling's solution wdth copper sulphate and is used in urine analysis ; potassium acid tartrate, or cream of tartar, is a mild cathartic; potassium antimonyl tartrate, or tartar emetic, is occasionally used as a counter-irritant in the form of an ointment, and finds extensive appli¬ cation as a mordant; potassium magnesium tar¬ trate is used as a purgative; iron and potas¬ sium tartrate as a mild chalybeate ; morphine tartrate has been recommended for hypodermic injection; dimethyl piperazine tartrate as a solvent for uric acid in chronic and acute gout; and paraphenetidin acid tartrate as an anti¬ pyretic.

V. S. Babasinian, Lehigh U niversity.

TARTARIN. (Tartarin de Tarascon5 (1872), (Tartarin sur les Alpes) (1886) and (Port-Tarascon) (1890) present Daudet's best remembered characterization, a typical French¬ man of the Midi, such as he has himself described in speaking of his other notable son of the South, Numa Roumestan : "pompous, theatrical, loving parade, costume, the plat¬ form, banners, flags, trumpets, clannish, tradi¬ tional, caressing, feline, with an eloquence bril¬ liant, excited yet colorless, quick to anger and yet giving anger a sham expression even w?hen it is

sincere.® Looking back on his creation after many years, Daudet wrote: “It seems to me that (Tartarin) has qualities of youth, vitality, truth, — a truth from over the Loire, that may swell and exaggerate facts, but never really lies.®

This presentation of “truth from its humorous side,® in the phrase of Daudet’s fel-

lew Provengal, Zola, developed out of observa¬ tion of a traveling companion on a journey to Algeria, Corsica and Sardinia, in 1865. The writing was begun in 1868, but this ((rinemato- graph of the Midi® first showed its subtle caricature of Gascon temperament in 1872. The time, just after the disastrous war with Ger¬ many, was unpropitious, and the serial publica¬ tion in the Petit Moniteur met so cold a wel¬ come that it was abandoned. The hero’s name was then Chapatin. With its change to Tar- tarin, but with none in the temper and spirit of the work, the playful satire, under other aus¬ pices, was sustained through three volumes and 18 years; and, though the jest was carried further than any other French author has cared to venture in like case, Frenchmen are generally agreed in recognizing in the three volumes together a classic of <(admirable fool¬ ing.®

<Tartarin,) says Daudet, had two quite dis¬ tinct characters, the soul of Don Quixote, the body of Sancho Panza. He planned for travels and adventures so vividly that he half believed he had experienced them, his favorite reading supplying the local color for the self-deception that made <(of a man who had missed going to Shanghai one who had been there.® <(The Southerner’s falsehood,® explains Daudet, <(is not a lie but a kind of mental mirage.® This Tartarin, who dreamed of daring deeds in exotic lands, till he was 45 had never slept out of his home town. The Quixote in him was always exclaiming : <(I go® ; the Sancho : ((I stay.® (<Tartarin cover yourself with glory,® said Quixote. (<Cover yourself with flannel, Tartarin,® said Sancho. <(Give me a toma¬ hawk,® cries Quixote. <(Jeanette, my chocolate,® says Sancho. A lion seen at a circus fires his fancy. At last he feels he must go to Africa to maintain his self-esteem and reputation at home. Elaborate preparations keep his fantasy at fever heat till he sets out for Algeria. Illusion and disillusion follow, in amusing suc¬ cession, his landing in exotic equipment among the very Europeanized denizens of Algiers. Mistaking a plantation of artichokes for a desert, he shoots a donkey for a lion, where rabbits are the

customary game, beguiles him¬ self and is beguiled with Oriental pleasures, is recalled to his Quixotic self by a paragraph in a home journal, turns his face resolutely south¬ ward, encounters a tame and blind lion, imagines he has fired at another, is robbed by his com¬ panion, an alleged prince, shoots the tame lion and returns with a melancholy camel, whom he sought to abandon in Algiers but who re¬ fused to stay lost, much poorer in purse but having earned the privilege of dazzling his fel¬ low-townsmen with tales that he, confirmed by the skin of the tame lion, himself half believes to be true.

So ends this delightful bit of Provencal persiflage. Often, as obvious, it grazes the burlesque, but is always saved with unfailing tact from mere buffoonery. In (Tartarin on the Alps) the spirit and method are the same, the satiric art a little mellower and more mature. It is also more readily appreciated, as the scene is more generally familiar. The pub¬ lic and the critics join in pronouncing it the masterpiece of French humor in the 19th cen¬ tury. The opening scene where Tartarin,

equipped as for the Himalayas with ice-axe, climbing irons, snow-glasses and the rest, makes his entry into the palatial hotel on the Rigi, with its 600 very prosaic tourists, is unforget- able; so, too, is the tale of Tartarin's hunt of the tame chamois, trained to attract strangers and fed in the hotel kitchen. The Swiss Ex¬ ploitation Trust, creation of the exuberant fancy of Tartarin's fellow Tarasconian Bom- pard, is itself most genially exploited; and nothing in any of the Tartarin books surpasses the scene of mild mountain climbing where each of these comrades supposes he has sacri¬ ficed the life of the other to his own safety by cutting the cord that bound them, while both are safe and sound. In the afterpiece to this episode Tartarin enters the Tarascon Alpine Club as Bompard is narrating how the partner of his daring perished.

Port-Taraseon, many of whose extrav¬ agances were suggested and rivalled by the facts of an actual colonizing enterprise some years before at Port-Breton, depends for its full appreciation on fuller knowledge of French political conditions and aspirations than most foreigners possess. Daudet himself prob¬ ably felt that the once rich vein had been worked a little thin, for here he brings Tartarin to a not unworthy death, after carrying him through strange adventures as head of colonist fellow-townsmen in Polynesia and then, after his enforced return, through a trial whose hilarious humor involves a masterly discrimina¬ tion between the calculating falsehood of the Nord and the effervescent imagination of the <(fecund

improvisators® of the Midi, ((intoxi- cated with sap and light, carried away by their own inventions.® For translations of (Tartarin de Tarascon) and (Tartarin sur les Alpes5 con¬ sult (Everyman's Library.* (Port Tarascon) has been well rendered by Henry James.

Benjamin W. Wells, Author of (Modern French Literature ?

TARTARS. See Tatars.

TARTARUS, tar'ta-rus, according to clas¬ sical antiquity, a deep pit which extends under the surface of the earth as completely as heaven extends over it, holding within closed portals Kronos and the Titans in their prison house. It was the jail established by the mythical gods for those whom they had driven from the supernal world, just as Erebus was a similar prison for men. Later the term came to signify the whole underworld in which the wicked undergo the punishment of their crimes, the exact opposite to the Elysian fields, the afterworld of the good. Tartarus, as a per¬ sonification, is the son of Hither and Ge (air and land), and father of the giant Typhceus by his own mother, Ge.

TARTARY, tar'ta-ri, or TA'TARY, a name applied in the Middle Ages to the coun¬ tries from which the Tartars came or in which they lived, that is, central Asia and what is now southeastern Russia, western and eastern Turkestan, Mongolia and Manchuria. In a narrower sense it includes only southeast Rus¬ sia and Chinese Turkestan.

TARTE, tart, Joseph Israel, Canadian stateman : b. Lanoraie, Quebec, 11 Jan. 1848; d. 1909. He was educated at L'Assomption College, was a member of the Quebec assem-

bly in 1877-81 and was returned to the Cana¬ dian Parliament for Montmorency in 1890. He was unseated by petition in 1891, as a re¬ sult of his insistive attacks in the administra¬ tion of Macdonald, whose ministers he charged with corruption, but in 1893-96 was member for L'Islet. He was later, under the Laurier administration, Minister of Public Works, and has also edited, at Montreal, Le Cultivateur, and La Patrie.

TARTUFFE, a comedy of Moliere in five acts in rhymed verse, the first three acts of which were presented for the first time before the king and queen at Versailles, 12 May 1664, when the author was 38 years old. The play made enemies everywhere. There were those among the

Jansenists and Jesuits who each thought that the others were aimed at, and a violent attack was written by the curate Pierre Roulle under the title <(Le Roy glorieux au monde® (Paris 1664), which upon Moliere's protest was censured by the king. The latter nevertheless forbade the play to be presented again until finished. On 5 Aug. 1667, a second version of the play was presented at the Palais-Royal under the title ˆL'lmposteur." Moliere, apparently upon the suggestion of the papal legate and his entourage, had softened it in several respects ; for instance, the original Tartuffe was no longer in ecclesiastical garb. Nevertheless its presentation was stopped, in the king's absence, by the first president of Parliament and interdicted by the archbishop of Paris. The king, despite his prohibition, had shown his favor by taking Moliere's play¬ ers under his patronage in 1665. It was only on 5 Feb. 1669, however, that a third version, the only one known to us now, was acted at the Palais-Royal by the king's permission under the original title, and the poet's long years of waiting for a hearing were rewarded by extraordinary success. The plot of the play, which is masterly in its simplicity and logic, concerns the entrance of one Tartuffe (or Tartufe or Tartufle), a self-seeking ad¬ venturer hiding his greed behind the mask of piety, into the house of Orgon, a well-to-do burgher, whose docile daughter, Mariane, has been affianced to Valere. Orgon (played by Moliere) and his opinionated old mother, Ma¬ dame Pernelle, fall completely under the sway of Tartuffe over the protest of the rest of the family, including a rather hot-headed son, Damis, and a sensible and even-tempered brother-in-law, Cleante. Orgon goes even so far as to make a deed of gift to Tartuffe and to promise his daughter to him, despite a pre¬ vious promise to Valere. It was not on the daughter, however, but on Orgon's second wife, Elmire, young and comely, that Tartuffe had cast longing eyes. To save her step-children, Elmire (played by Moliere's wife) consents to lure Tartuffe into an avowal which her hus¬ band in hiding may overhear. This scheme be¬ ing successful, the impostor throws off the mask and impudently claims the house under the deed of gift. Orgon's ruin is narrowly averted by the intervention of Louis XIV, a veritable deus ex machina, whose messenger restores the house to Orgon and hales the villain off to prison. It is not only for the singularity and boldness of the subject or the skill in with which it is treated that this play

merits approval. The first scene is as happy as it is new, as full of simplicity as of life. Instead of those mutual confidences which are so commonly made use of in this place, an old grandmother, offended at what she has seen amiss in her granddaughter, is introduced giv¬ ing a severe lecture to those who belong to the house, in which she draws

the characters of them all ; for we distinguish the truth even through the language of prejudice. From this moment everything is in motion and the action gradually increases to the end. The fine raillery of Dorine (played by Madeleine Be- jart), a maid, in the scene with her master, gives us a clear idea of Orgon and prepares us for Tartuffe in the picture of hypocrite, which Cleante opposes to that of the truly devout. Tartuffe, who is only talked of in the first two acts, makes his appearance in the third, when the plot being then more animated receives equal vivacity from the new schemes employed against this villain and from the address with which he turns everything attempted against him to his own advantage. The infatuation of Orgon, which increases in proportion to the measures taken to cure it, gives occasion to that singular and admirable scene of the fourth act, which the necessity of unmasking a vice so abominable as that of hy¬ pocrisy renders indispensable/. The panegy¬ ric of Louis XIV, put in the mouth of the exempt at the end of the play, could not justify the fault of the unraveling in the eyes of the critics. Here indeed is the insuperable diffi¬ culty. It is impossible to set on the stage a religious hypocrite and not lend him the lan¬ guage of piety. Consequently an attempt to tear the mask off religious hypocrisy must necessarily take on the occasional aspect of an assault on religion itself. This was the basis of the opposition to the play, and that it was in a measure justified is borne out by the sub¬ sequent use of <Tartuffe) by aggressive enemies of any form of ecclesiasticism as though it were an assault on religion itself. There is an extremely clever translation of (Tartu ffe,) with the French text en regard, in the fifth volume of the works of Moliere published by John Watts (London 1748).

Herbert F. Wright.

TASCHEREAU, tash'e'ro, Sir Henri El- zear, Canadian jurist: b. 7 Oct. 1836; d. 1909. He was called to the Quebec bar in 1857, and was made queen's counsel in 1867. From 1861-67 he sat in the Canadian Legislative Assembly representing Beance County. In 1871 he was appointed judge of the Quebec Superior Court, and (1878) judge of the Su¬ preme Court of Canada. He was created knight in 1902 and from 1902-06 was chief justice of the Supreme Court of Canada.

TASCHEREAU, Jules Antoine, French author and politician : b. Tours, 1801 ; d. Paris, 11 Nov. 1874. He studied law at Orleans, and entered journalism in Paris. After the overthrow of the Bourbons in 1830, to which he had contributed, he was named general secretary to the prefect of the Seine ; and in 1837 he entered the Chamber of' Depu¬ ties. Meantime he had established and con¬ tinued to edit the Revue retrospective. He was among the early supporters of Louis Na-

poleon, and after the coup d'etat was rewarded with the post of assistant director of the Na¬ tional Library. In 1858 he was given the chief directorship. His permanent literary work consists of critical biographies of Moliere, Corneille and Diderot.

TASHKEND, tash-kend\ or TASH¬ KENT, Asia, the capital of Russian Turkestan and of the province of Sir-Daria, formerly in the khanate of Khokand, a few miles from the Chirchik and about 40 miles from its confluence with the Sir-Daria or Jaxartes, in a fertile oasis. It is the most important city in Asiatic Russia, and is a main-line station of the Transcaspian Railway, with di¬ rect rail route to the Caspian Sea and to Orenburg. It consists of an old town and a new Russian quarter. Its former walls, which were 12 miles in circuit, are now in ruins. The streets in the old town are very narrow, not, however, in consequence of the crowding of the houses, but of the number of gardens and vineyards, whose walls aproach so nearly as to leave only lanes between them. The water led from the river by canals furnishes a copi¬ ous supply to numerous fountains, and almost every house has its cistern and its bath. The principal buildings include several large mosques, a very extensive bazaar, numerous colleges and a number of old temples surmounted by cupolas. The Russian district of the city has broad streets lined with trees, electrically lighted and traversed by trolley lines, and con¬ tains gymnasia, a public library, observatory, museum, a citadel, various civil and military establishments, arsenals, etc. The inhabitants are employed in weaving silk and cotton goods, making articles in leather and felt, etc. The trade in corn, cotton, rice, etc., is very extensive. Tashkend was taken by Russia . in 1865 ; about one-sixth of the present population of 272,000 is Russian.

TASK, The, a descriptive poem written by William Cowper (q.v.) in the summer of 1783, and published two years later in a volume con¬ taining also <(An Epistle to Joseph Hill, Esq., *ˆTirocinium,* and <(John Gilpin *(q.v.). It is in blank verse of excellent quality, though at times echoing Milton a bit too plainly, and it is distributed into six books, the aggregate number of lines being somewhat over 5,000. The metrical form and the theme with which he begins, ((the sofa,* are said to have been taken by the poet from Lady Austen, who also told him the story of ((John Gilpin, *and the title commemorates the fact that in writing he was obeying her injunction. The scenery, the descriptions of which have per¬ haps done more than anything else to make the poem a classic standing not far below the great elaborate poems of the language, is that of*

Olney, in Buckinghamshire, and the neigh¬ boring Weston. <(The Task set the seal on Cowper's popularity with his own generation and that succeeding, and without it, despite the extraordinary and too little recognized ex¬ cellence of his shorter pieces, notable in range and quality, he would perhaps not rank so high as a poet to-day, although it is to be feared that too many readers know his master¬ piece only through quotations, such as wGod

made the country, and man made the town. *"Variety's the very spice of life,* "the cups that cheer but not inebriate, *and the like, or else through selections such as the pathetic description of "Crazy Kate,* or the patriotic "England, with all thy faults I love thee still, *or the picture of the postman outside in the winter evening, while all is domestic comfort within, or the poignant bit of autobiography that begins <(I was a stricken deer.* That the desultory and somewhat spun out ((Task *with its longueurs, its exhibitions of intellectual narrowness and religious bigotry, its compara- • tive lack of high and sustained imagination, should tempt to skimming and even to tast¬ ing by selections does not afford matter for surprise; yet the admirer of Cowper and the student of English poetry must contend that so to treat ((The Task* is to stand in one's own light. The ease and skill of the transi¬ tions make the very desultoriness of the poem an exhibition of art, Cowper at his narrowest is still perhaps the most urbane of our poets, the descriptions of scenery are scarcely equaled, as etchings in words, whether by Thomson or by Wordsworth, and, although there is little of the latter's philosophic insight into the heart of nature and into that of man, there is in compensation the absolutely sin¬ cere expression of the observations, reflections and emotions of a sensitive poetic genius un¬ spoiled by literary or social sophistication. When in addition we think of Cowper's play¬ ful humor, his feeling for domesticity, his hu- manitarianism, his satiric power — witness the passage on the excise in the fourth book — as exhibited in <(The Task,* we are led to wonder whether our great-grandfathers in their hearty appreciation of the poem as a whole were not wiser than we are in our res¬ ervations and in our glib phrases with regard to Cowper's services as a precursor of the Geor¬ gian romantics.

William P. Trent.

TASMAN, tas'man, Abel Janssen (Jans- zen, Janzoon), Dutch navigator: b. Hoorn, North Holland, about 1602; d. Batavia, Java, October 1659. He was engaged in voyages of discovery in the Pacific and Indian oceans in 1639-42 under the patronage of Van Diemen, governor-general of the Dutch West Indies, and in the latter year was sent to circumnavi¬ gate Australia. He sailed from Batavia 14 Aug. 1642, discovered on 24 November the island which he called Van

Diemen's Land, but which has since been named Tasmania, and later discovered the southern island of New Zealand, the Friendly Islands, and the Fiji Islands and returned to Batavia 5 June 1643. Details concerning a subsequent voyage along the coasts of New Guinea and north and north¬ western Australia are exceedingly scanty. He set out on 29 Jan. 1644, discovered the Gulf of Carpentaria, made other important dis¬ coveries, and returned to Batavia, but further information is lacking. He ranks as one of the greatest navigators of the 17th century. He published a narrative of his first voyage which was reprinted in 1722 and in 1860. Con¬ sult his rLife) by Walker (Hobart, Tasmania

1896).

TASMAN (taz'man) SEA, Oceanica, that part of the Pacific Ocean lying between Tas¬ mania (and southeast Australia) and New Zealand. It is 1,500 miles across, and is crossed by a submarine cable from Sydney to Welling¬ ton.

TASMANIA, taz-ma'm-a, Australia, the smallest state of the commonwealth, consisting of the island of Tasmania and its adjacent islets, and situated 140 miles south of the south¬ eastern extremity of the Australian continent, from which it is separated by Bass Strait. The area of the state is 26,385 square miles, and of the main island 24,339 square miles. The main island is heart-shaped, about 180 miles long from north to south, and 175 miles at the wid¬ est. The coasts are bold and much indented, forming a number of excellent harbors. The interior is a plateau intersected in various di¬ rections by a number of rough and precipitous mountain ranges, rising in Cradle Mountain to a height of 5,069 feet. Some of the interven¬ ing basins contain large and beautiful lakes, and rivers are numerous. The geology is characterized by considerable outcrops of palae¬ ozoic rocks and extensive flows of tertiary ba¬ salt. The mineral wealth is great and mining is the principal industry. The annual value of mineral products is about $4,000,000, mostly gold, silver, copper and tin. The imports in 1916 totaled nearly $5,000,000 and the exports less than $4,000,000. The largest farm crop is oats, 2,000,000 bushels annually, wheat follow¬ ing with 1,000,000 bushels. The climate is tem¬ perate, and the rainfall in general sufficient. The flora and fauna are similar to those of southern Australia. There are two remarkable animals peculiar to the island, the Tasmanian wolf and the

(<Tasmanian devilˆ (Thylacinus and Dasyurns), sometimes called the native tiger. The soil is very fertile, especially in the basaltic regions, and well adapted for wheat, which is the principal crop. Grazing has de¬ clined, and the manufactures are inconsider¬ able. The volume of trade amounts to over $20,000,000 annually. The chief exports are copper, fruits, silver, wool, tin, gold, timber, hides and grain. Hobart, the chief port on the southeastern coast, has regular steamship con¬ nection with Europe, Australia and New Zea¬ land. There are about 600 miles of railroads. Education is compulsory. There are 16 col¬ leges, and at the head of the educational system is the University of Tasmania. The capital of the state is Hobart with 38,000 population.

Tasmania was discovered in 1642 by the Dutch navigator, Tasman, who named it Van Diemen's Land, after his patron. In 1804 Eng¬ land established a penal colony on the island. This was maintained until 1853, when Tasmania was declared a British colony. In 1900 it be¬ came a state of the commonwealth of Aus¬ tralia. The aboriginal inhabitants are almost extinct. There is a remarkable regular shifting of the population between Tasmania and Southern Australia, more than 40,000 emi¬ grants and over 40,000 immigrants being offi¬ cially recorded every year. Consult Statistics of Tasmania* (Hobart, Australia). See Aus¬ tralia.

TASMANIAN WOLF, DEVIL, ZE¬ BRA-WOLF, etc. See Dasyure.

TASSAERT, ta-sart, Nicolas Frangois Octave, French painter: b. Paris, 1800; d. there by suicide, 1874. He entered the studios of Girard and Lethiere and made it his especial artistic aim to portray (Les Miserables) of Paris — the poor, the suffering, the unfortu¬ nate. The exaggerated sentimentality of his pictures was much admired at the time and his realism appealed even to Delacroix and Rous¬ seau. Among his best-known works are (The Old Musician> ; (A Family of the Unhappy) ; (The Slave Merchant ; and (Death of HeloiseP

TASSIE, tas'i, James, English gem en¬ graver: b. Polloshaws, near Glasgow, 15 July 1735; d. London, 1 June 1799. During his early life he worked as a stonemason, then went to Glasgow where he studied art and became asso¬ ciated with Dr. Quin in gem engraving. With him Tassie perfected the discovery of a white ˆenamel,** a hard vitreous paste, especially adapted to the formation of gems and medal¬ lions. Going to London in 1766 he became successful through the precision and beauty of his work, copied many of the most artistic gems of ancient and modern times and also made a series of large medallion portraits of many of the famous men of his time. These medallions are of great historic interest and are considered his most

valuable work.

TASSO, tas'so (Eng. tas'o), Bernardo, Italian poet: b. Venice, 11 Nov. 1493; d. Ostig- lia, 5 Sept. 1569. His education began in Padua, and was continued during his visits to Rome, Ferrara and Venice. He was already known as a poet throughout Italy when Guido Rangone, general of the Pope and a patron of learning, took him into his service and em¬ ployed him in negotiations with Clement VII at Rome and Francis I in France. He subse¬ quently entered the service of Renata, Duchess of Ferrara, but soon left her court for Padua and Venice. Ferrante Sanseverino, Prince of Salerno, engaged him, in 1531, as secretary, and when that prince followed Charles V to Tunis, Tasso accompanied him, and after his return was sent on public business to Spain. In 1539 he married the rich, beautiful and intellectual Porzia de Rossi, and retired to Sorrento, where he lived till 1547. But the misfortunes of his master, whose estates had been seized by Charles V on account of his opposition to the introduction of the Inquisition into Naples, compelled the poet, at the invitation of the Duke of Urbino, to take up his residence at Pessaro. The leisure which he now enjoyed was employed in finishing his ˆmadigi, *which he published at Venice in 1560. In 1563 the Duke of Mantua appointed him governor of Ostiglia. He was buried at Mantua under a monument erected by the duke, with the in¬ scription «Ossa Bernardi Tassi,» but his son Torquato afterward removed his remains to Ferrara. His chief work, (L'Amadigi di Gaula,* a romantic epic, displays much talent and art. His other works, in five books, are among the best Italian lyric and elegiac poems of the time. Consult Pasolini, (I Genitori di Torquato Tasso) (1895).

TASSO, Torquato, tor'kwa'to, son of the preceding, Italian epic poet: b. Sorrento, 11 March 1544; d. Rome, 25 April 1595. He was

early sent to the school ot the Jesuits at Na¬ ples, and his father being absent from home, his education was at first superintended by his mother, whom he quitted at 10 years of age to rejoin his father at Rome, and never saw her again. At this time he could recite from mem¬ ory the great Greek and Latin poets. He sub¬ sequently pursued his studies under his father's superintendence at Rome, Bergamo, Urbino, Pesaro and Venice. Before the age of 16 he was employed by his father to revise and com¬ plete his poem <L'Amadigi,) and

eventually sent to Padua to study law. Tasso, a born poet, found his legal studies a sore burden, but man¬ aged to steal time for more congenial pursuits, and at 17, to the surprise of Italy and the in¬ dignation of his father, produced the <Rinaldo,) an epic poem in 12 cantos. The disappointment of the father yielded at length to genuine ad¬ miration of this really remarkable production, and he consented to allow his son to abandon law for literature. The reputation of the young poet meanwhile procured for him an in¬ vitation to the University of Bologna, where he displayed an aptitude for the study of phi¬ losophy, especially that of Plato. He left Bo¬ logna on account of a lampoon, which he was unjustly charged with writing. After visiting friends at Castelvetro, Modena and Correggio, he returned to Padua on the invitation of Scipio di Gonzaga. Here he continued the study of Plato, and wrote three (Discorsi del Poema EroicoP He determined no longer to imitate Ariosto but take Virgil for his model. He began to construct the plan of his (Gerusa- lemme Liberata, } which he at first called (God- fredoP The plan of this poem was of a highly prudential character. By celebrating all the great European houses as having taken part in the crusade of Godfrey, he hoped to make him¬ self many powerful friends, and while he was elaborating this project he secured a patron in Cardinal Luigi d'Este, to whom he had dedi¬ cated his 'RinaldoP The princes of Italy at this time deemed it their chief honor to be esteemed the patrons of art and literature, and the cardinal retained 500 gentlemen in his ret¬ inue, one of whom was Tasso, who was also introduced by the cardinal to the court of Fer¬ rara. The Academy of Ferrara supplied learned associates with whom he engaged in philosoph¬ ical discussions ; the courtiers were easily trans¬ formed into paladins, and the court ladies into heroines, whose imaginary achievements the poet recorded with daily diligence. Thus the ˆerusalemme5 grew at the court of Ferrara. That nothing might be wanting to his experi¬ ence, the bard engaged in a course of love-making on his own account. There were at the court of Ferrara two sisters of the reigning duke, Lucrezia, the wife of the Duke of Ur¬ bino, and Leonora, the younger, a virgin of 30, and about nine years his senior. Their brother Alfonso served to the poet as model for his ˆodfredoP In high favor with the ladies, by whom his attentions were received as the gal¬ lantries of a courtier and a poet, it would be impossible to imagine a more blissful slave than the poet had now become. In 1571 he accom¬ panied the cardinal on an embassy from the Pope to Charles IX of France. He was re¬ ceived with distinction at the court of France, which he followed to Blois, Tours and Chenon-ceaux. Ronsard (q.v.) received him in the most

friendly spirit. A quarrel with his patron drove him from the French

court, and he re¬ turned to Ferrara, where Alfonso, at the solici¬ tation of his sisters, received the penniless poet into his own service. In the spring of 1573 his ‘Aminta,* a pastoral drama, was represented at the court of Ferrara. It is still considered the most graceful Italian work of the kind, al¬ though many prefer the (Pastor Fido) of Guarini. In April 1575 he announced the completion of the (GerusalemmeP Alfonso was eager for its immediate publication, but this judicious counsel was not heeded by the poet, whose sensitive mind dreaded censure, especially the censure of the Church, even more than it coveted applause. He, therefore, sent his poem to his friend Scipio Gonzaga, now a cardinal at Rome, requesting his judgment. Scipio as¬ sembled a consulta of churchmen and critics against whose censures, literary and ecclesias¬ tical, the poet was forced to defend himself and to amend and modify his work to meet their views. He was told he ought to be content with monks and nuns as his auditors, and to renounce all mythology, romance and chival¬ rous adventure, and his mind, divided between art and religion, gave way. To add to his dis¬ traction his work at this time was printed pi- ratically without his own revisions. Alfonso wrote a vigorous protest against this disgrace¬ ful proceeding to all the Italian courts, but doubts of his favor at court began also to fill the mind of Tasso. He believed that he was persistently calumniated at court, and systemat¬ ically misrepresented to the Inquisition. On 17 June 1577, he drew his poignard in the apart¬ ment of the Duchess of Urbino. He was ar¬ rested, but set at liberty after two days and recommended to retire to his country-seat. In spite of strong reassurances he still suspected the office at Rome. He was now received into the convent of Saint Francis at Ferrara, but on the 20th July he started in disguise for his native place where he stayed with his sister Cornelia, till the end of summer. In the au¬ tumn he solicited leave to return to Ferrara, and obsequiously accepted a conditional acqui¬ escence to his request. Alfonso is accused of imprisoning him, first, from offense at the ad¬ dresses paid to his sister; secondly, from jeal¬ ousy of the Medici, from whom the poet had received an offer; and thirdly, from fear that the poet would strike the glory of the house of Este out of his work. For some years Tasso had lived on intimate terms with Alionso and his two sisters, especially Lucrezia, who. dis¬ missed by her husband, kept him as her con¬ stant companion. He had hesitated about ac¬ cepting the offer of the Medici, but in 1557 he put away, out of gratitude to the Este family, all thoughts of other service. After many complaints of ill-treatment he again left Fer¬ rara, and wandered, sometimes in want, through Padua, Venice, Urbino and Piedmont, and finally returned to Ferrara (21 Feb. 1579), on the eve of the duke’s second marriage. Finding himself treated with complete neglect, he broke out in loud

complaint and was impris¬ oned as a madman in the hospital of Saint Anne of Ferrara. At this time his work was condemned by the Academy della Crusca, to whom he replied with moderation. He re¬ mained in the hospital of Saint Anne till July 1586, when he was released at the solicitation

of Vincent di Gonzaga, who took him to his es¬ tates. Tasso now resided at Mantua, and wrote the tragedy of Torrismondo, which with a genealogical poem he dedicated to Vincent di Gonzaga. Finding that Mantua did not agree with him, he proceeded to Naples, the climate of which he found most congenial, and where he fixed his favorite residence at the monastery of Mount Olivetto. Here he composed the (Gerusalemme ConquistataP which he dedicated to Cardinal Aldobrandini. It is a reconstruc¬ tion of the (Gerusalemme LiberataP in which he rejects the chief mystical and chivalrous ornaments of the previous poem, and plumes himself on a precise and slavish imitation of the HliadP He wished it to supersede the (Liber- ataP but posterity has reversed his decision as to its superiority. Aldobrandini solicited and obtained from the Pope the laurel crown on be¬ half of Tasso. Urged by his patron, Tasso re¬ paired to Rome, although he declared it was to die. Amid the preparations for the ceremony his health gave way. He retired from the plaudits of the public to the convent of Santo Onofrio, where he expired. (See Aminta; Jerusalem Delivered). Tasso's chief works include (Gerusalemme Liberata) ; the The <Gerusalemme) was translated into English by Edward Fairfax in 1600. In Italian literature the (Gerusalemme) shares with the <Orlando) of Ariosto the place of the greatest epic. Both are full of poetic beauties and admirable for the interest and variety of the narrative. Consult Albertazzi, A.,

(Torquato Tasso > (Modena 1911) ; Boulting, W., <Tasso and his Times) (New York 1907) ; Milman, R., (Life of Tasso) (2 vols., London 1850) ; Ferrazzi, <T. Tasso, studi biografici- critici-bibliograficP (1880) ; Serassi, <La vita di T. Tasso) (3d ed., with notes by Guasti 1858) ;

(Complete Works > (33 vols., Pisa 1821-32) ; Tasso's (Lettere e Dialoghip edited by Guasti (Florence 1852-59) ; (Prose diverse> (1875) ; Solerti, A., (Vita di Torquato Tasso) (3 vols., Turin 1895) ; de Sanctis, F., (Storia della let- teratura italiana) (2 vols., Bari 1912) ; Sainati, A., cLa lirica di Torquato Tasso) (Pisa 1912) ; Scopia, (Le fonti

del mondo creato di Tor¬ quato Tasso > (Naples 1907) ; Wagner, Hedwig, (Tasso daheim und in Deutschland *(Berlin 1905) ; Woodberry, G. E., <The Inspiration uf Poetry* (New York 1910).

TASTE, in (esthetics, appreciation of the beautiful ; the faculty of discriminating the qualities of beauty, harmony, etc., and exercis¬ ing them, particularly in art and literature, joined to a capacity for appreciating and en¬ joying excellence. See Esthetics.

TASTE. See Senses.

TATARS, or TARTARS, a nomadic peo¬ ple anciently spoken of as Scythians, known for their incursions and conquests among neighbor-ingnations over a wide extent of territory ; their local seat being found both in ancient and mod¬ ern times in the steppes or uncultivated regions which connect Europe and Asia, as well as on the north of China, in Turkestan and on the shores of the Caspian and Black seas. Tartar, Tatar or Ta-ta appears to have been the name of a tribe of Mongols who occupied about the 9th century a district of Chinese Tartary on the upper Amur. This tribe was dispersed by

the attacks of neighboring Mongols, and carry¬ ing the terror of its arms in different directions its name came to be applied by the Chinese to various hordes of Mongol robbers. The true Tatars formed part of the horde of Genghis Khan, when that conqueror carried his arms from the country known as Chinese Tartary to Europe, and through some accidental circum¬ stance the name came to be applied to the whole Mongol horde, as well as to the successive hordes of similar origin who followed in their footsteps, and to the districts from which they came, or in which they settled ; hence the names of Chinese Tartary, Independent Tartary (see Turkestan) and European or Little Tartary, comprising most of the Russian governments of Orenburg, Astrakhan, Ekater.inoslav, the Cos¬ sack provinces and the Crimea. For the incur¬ sions and conquests of these peoples see Genghis Khan; Mongolia; Russia, etc. The name Tatar has, for reasons similar to those already given, been long applied in Europe to the Manchu conquerors of China. The Man- chus are Tatars in the generic sense of the term. See Manchuria.

TATE, tat, Alexander Norman, English analytical chemist : b. Wells, Somerset, 24 Feb. 1837; d. Orton, Cheshire, 22 July 1892. He studied chemistry in Liverpool, where he estab¬ lished an analytical and consulting laboratory in 1863, and there became known to the world of industrial science in connection with the study of the recently introduced American petroleum. He wrote (Petroleum and its Prod-

ucts * (1863), and superintended the erection and management of oil-refining works in the Isle of Man and in Flintshire until 1869. He finally settled at Hackins Hey and increased his reputation as an expert in the analyses of oils and fats, and as a teacher of science in the technical schools at Liverpool. He was editor of the scientific magazine Research (1888-90) and a contributor to scientific periodicals.

TATE, George, English archaeologist and naturalist : b. Alnwick, 1805; d. there, 7 June 1871. He was a linen draper and subsequently postmaster of his native town and became cele¬ brated for his scientific researches and his pub¬ lications. These include (The Old Celtic Town oi Greaves Ash *; the (Hut-circles and Forts on Yeverling BelP ; among the long list of valu¬ able papers on the ancient remains of the dis¬ trict, its geology, ilora and fauna, and * Sculp¬ tured Rocks of Northumberland and Eastern Borders (1865) and (History of Alnwick*

TATE, Henry, English merchant and phi¬ lanthropist: b. Chorley, Lancashire, 1819; d. Streatham, 5 Dec. 1899. He was a sugar mer¬ chant in Liverpool and amassed a fortune through the invention of loaf sugar. He re¬ moved to London in 1880 and became famous or his benefactions, giving £42,000 to the Liver¬ pool University College, a still larger sum to Liverpool hospitals and four free libraries to the parish of Lambeth. He established a large private gallery of modern paintings at Streat- ham and afterward presented it to the public bui dmg for the collection a gallery near Vaux- hall Bridge, at a cost of £80,000. The insti- *utl(ˆ~knowr} as the <(Tate Gallery,® was opened - 1897, and its donor was created a baronet in

TATTOOING

1, Sudanese Negro Woman. 2,3. Maoris of New Zealand. 4. Caroline Islander 5, 6. Hand and Foot of a Dyak of Borneo. 7. Japanese.

TATE, Nahum, English poet: b. 1652; d. 1715. Son of a Dublin clergyman, he was edu¬ cated at Trinity College. In 1690 he succeeded Shadwell as poet-laureate. Oldys calls him ((a free, good-natured, fuddling companion.® His name has survived through his metrical version (1696) of the Psalms, which he wrote in collaboration with Nicholas Brady, certain portions of which appeal to the reader, but most of which has no poetic value. He also wrote dramatic pieces,

as (King Lear) (an adaptation) ; (Panacea or a Poem on Tea) ;

(Miscellanea Sacra *; (Innocent Epicure * ; etc. The Supplement to the New Version* (1703) may have been due solely to his pen, in which the world-renowned ((While Shepherds Watched® is ascribed to Tate.

TATIAN, ta/shi-an, Christian apologist: b. 2d century in Assyria ; d. Edessa, 180. He studied Greek philosophy and became dissatis¬ fied with the pagan systems of his time. At Rome about 150 he was converted to Chris¬ tianity by the teachings of Justin Martyr (q.v.). His only surviving controversial work, Ad¬ dress to the Greeks, > was written 176 and after the death of Justin Martyr he adopted Gnostic Dualism and unchristian conceptions regarding God, the demiurge and the world of aeons, and admitted the existence of contradictions in the Scriptures. In practical matters he rejected the use of wine and of animal food, and used only water in celebrating the Eucharist. He was also opposed to marriage, and he gave in his ad¬ hesion to the sect of the Encratites. He was answered by Tertullian, Clement of Alexan¬ dria, Hippolytus, Origen and others. His <Diatessaron) was a kind of harmony of the four gospels. In 1876 Dr. Moesinger published at Venice a Latin translation of a commen¬ tary on the <Diatessaron) which had been writ¬ ten by Ephraim Syrus. The translation had been made in 1841 by Aucher, a Mechitarist monk, not from the original Syriac of Ephraim, for that is not extant, but from an Armenian version ascribed to the 5th century. . In 1881 Zahn published his (Tatian's Diatessaron, *in which he sought to restore the work from the available materials. _ An Arabic version found in Egypt was edited in 1888 by Agostino Ciasca. The original language of the (Diatessaron* may have been Syriac; Harnack believes that it was Greek. Consult Otto, (Corpus Apolo- getarum *(1882); Hamphill, (The Literature of the 2d Century) (1891); Harris, (The Diatessaron of Tatian* (1890) ; Hill, (The Ear¬ liest Life of Christ* (1893).

TATIUS, ta'shi-us, Achilles. See Achil¬ les Tatius.

TATLER, The, a paper published by Sir Richard Steele in London, from April 1709 to January 1711. The name, Steele asserted, was invented in honor of the fair sex, and he wrote in it under the pseudonym of (<Isaac Bicker- staff,® used by Swift previously in his joke upon the almanac-maker, Partridge. Its an¬ nouncement indicated its purpose to present "accounts of gallantry, pleasure and entertain¬ ment,® and it may be taken as the first venture in magazine literature in English. Steele wrote 188 of the 271 papers issued, Addison 41, and together they produced most of the others.

The Tatler was succeeded by The Spec¬ tator (q.v.).

TATTERSALL'S, tat'er-salz, located in Knightsbridge Green, London, England, is the great metropolitan mart for horses, of which there is an auction every Monday throughout the year and every Thursday in spring. It has acquired greater celebrity as the head¬ quarters of betting men.

TATTI, tat'te, Jacopo. See Sansovino, Jacopo.

TATTNALL, tat'nal, Josiah, American naval officer : b. Bonaventure, near Savannah, Ga., 9 Nov. 1795; d. Savannah, Ga., 14 June 1871. He was educated in England and in 1811 returned to the United States, where the next year he was appointed midshipman in the navy. He was engaged in the battle of Bladensburg and served in the Algerine war in Decatur's squadron. He was promoted lieutenant in 1818 and was engaged in the suppression of the West Indian piracy under Porter in 1823-24. He was promoted commander in 1838, placed in charge of the Boston navy yard and at the outbreak of the Mexican War was assigned to the command of the Spitfire and joined the squadron at Vera Cruz. He took charge of the Mosquito division, with which he covered Jthe landing of General Scott's troops, and after the fall of Vera Cruz led the attack on the forts at Tuspan. He became captain in 1850 and in 1857 was appointed flag-officer of the Asiatic squadron, where he participated in an attack with the French and British on the Chinese. Although a violation of neutrality, he was sustained by public opinion and also by the government. In 1861 he resigned from the United States navy and offered his services to the governor of Georgia. He was appointed captain in the Confederate navy, took command of the Merrimac after the engagement with the Monitor in 1862 and set out for Hampton Roads. After the surrender of Norfolk and the navy yard he withdrew with the Merrimac, and on 11 May 1862 to prevent her capture sunk her off Craney Island. The court-martial, which he requested, after a thorough investi¬ gation acquitted him from all blame. He then engaged in the defense of Savannah River, but in 1865 was compelled to destroy his ves¬ sels. In 1870 he returned home and was ap¬ pointed inspector of the port of Savannah, a post which he occupied until his death. Con¬ sult Jones, C. C., (Life of Commodore Tatt- nall> (1878).

TATTOOING, a word of Polynesian ori¬ gin, anglicized from the Tahitian tatu, denot¬ ing' the practice of making permanent colored designs or figures in the skin by means of small punctures or incisions, which receive various dyes or pigments. The coloring is mainly dark blue and dull red. A similar custom, known as cicatrization or scar-

tattooing, consists in repeatedly cutting the skin at the same place so that in healing a raised scar is left. Both varieties of tattooing may be found among the same people, as in the case of the natives of the South Sea Islands. Among the Ad¬ miralty Islanders, the Fijians, the Gonds and the Todas of India, the inhabitants of the Liu- Kiu Islands and other races, color-tattooing is, or was, confined to the women, and the Latuka

of the upper Nile Valley are an example of a people among whom scar-tattooing is prac¬ tised upon women only. Color-tattooing is gen¬ erally ornamental, but scar-tattooing is more frequently used to produce distinguishing tribal marks. The latter variety is practised by a number of native African peoples, while the Bangala of the Middle Kongo scar the whole body for ornamental purposes. In some races there is a connection between tattooing and marriage. Thus, in the Solomon Islands a girl is not eligible for marriage until she has been subjected to an atrociously cruel process of tat¬ tooing on the face and chest, and the native Australians inflict fearful scars on the backs of their young girls before marriage. The Formo¬ sans tattoo the faces of girls prior to marriage; and among the Papuans of New Guinea un¬ married girls are tattooed all over, except on the face, which is adorned in this way at the time of their marriage. Color-tattooing of an ornamental kind reached its most artistic de¬ velopment among the Maoris of New Zealand and the Japanese, but both these peoples, like several others, have largely abandoned the prac¬ tice under the influence of civilization. With the Malays tattooing appears to have been a reward of the successful head-hunter. Sailors and some other classes in civilized countries do some tattooing, mainly in one color, making figures, as stars, flags, etc., on their hands, arms, chests, etc. Consult Robley, H. G., (Moko, or Maori Tattooing) (London 1896).

TAUCHNITZ, towH'nlts, Christian Bern- hard, Freiherr von, German publisher : b. Schleinitz, near Naumburg, 25 Aug. 1816; d. 13 Aug. 1895. In 1837 he founded his well- known publishing establishment in Leipzig; in 1860 was created a hereditary noble ; in 1866 was appointed consul-general for Great Britain in the kingdom of Saxony; and in 1877 was made a life member of the Saxon first chamber. The firm is best known for its Collection of British and American Authors, > generally called the (<Tauchnitz Edition,® begun in 1841 and at present extending to about 4,000 volumes.

TAUCHNITZ, Karl Christoph Traugott,

German printer and bookseller : b. Grosspardau, near Grimma, 29 Oct. 1761 ; d. 14 Jan. 1834. In

1797 he set up a printing shop at Leipzig, which he enlarged by the addition of a book-shop in

1798 and a type-foundry in 1800, the style of the firm being Karl Tauchnitz. He first intro¬ duced stereotyping into Germany, and won a high reputation by his musical publications, his editions of the Bible and the Koran and his remarkably correct series of Greek and Latin classics.

TAULER, tow'ler, Johann, German mys¬ tic: b. Strasburg, about 1300; d. there, 16 June 1361. At 18 he renounced a fortune to enter the Dominican cloister, where he studied the scholastic theology, and returning to Strasburg came under the influence of Master Eckhart, whose vernacular sermons then attracted thronging audiences. He was the more im¬ pelled to mystical and fervent piety by the vio¬ lence of the war between Pope John XXII and the Emperor Louis the Bavarian, when the bishop of Strasburg forbade the clergy to open their churches. He became one of the so-called (< friends of God,® an unorganized brotherhood, including priests, nobles and burghers in all

the large cities, who represented the height of mysticism, denied the special prerogative of the clergy except in the celebration of the sacra¬ ments, and with anti-sacerdotal tendencies dwelt upon worship in the heart and life. He preached with wonderful success in Strasburg and in the neighboring towns, villages and con¬ vents. Notwithstanding the papal interdict and amid the ravages of the black death (1348-49) he bestowed the consolations of religion on the forsaken people, preaching in German mingled with Latin. He published in German a treatise on (Following the Lowly Life of Christ) ; ad¬ dressed a remonstrance to the clergy against leaving the dying untended and unabsolved; and denounced ecclesiastical abuses while main¬ taining the claims of the electors. His mys¬ ticism, though it pronounced silence and suffer¬ ing the most perfect work, was rather active than passive, taught explicitly the love of others, tended not to asceticism but to the amelioration of society, recommended the discharge of all ecclesiastical duties as a preparation for a higher stage of spiritual perfection and was opposed to the pantheistic tenets of Eckhart and the Beguins. The best of the early edi¬ tions of his sermons are those of 1498, 1521-22, 1523 and 1543. The hymns and treatise on German theology which have been

attributed to him are of doubtful authenticity. Consult Schmidt, (Johannes Tauler von Strasburg) (1841); Winkworth, (1857) ; Junot, (Le-s Amis de Dieu au XlVe Siecle> (1870).

TAUNTON, tan'ton, England, a market town of Somerset, on the Tone, 36 miles by rail south-southwest of Bristol. The principal buildings and institutions are the parish churches of Saint James and Saint Mary Mag¬ dalene; an old grammar-school, reconstructed; a Wesleyan Methodist and a Congregational College; a mechanics' institute; and the castle, still in good preservation, and containing the museum of the Somersetshire Archaeological and Natural History Society. The industrial establishments include silk-factories, glove and paper-box works, iron and brass foundries, coach-works, breweries, etc. Taunton is of great antiquity, and from the discovery of urns containing Roman coins appears to have been a Roman station. During the Civil War it was defended by the Parliamentarians against the Royalists. The inhabitants suffered much from the rebellion of Monmouth, whose cause they espoused, and who assumed the title of king here on 20 June 1685. Jeffrey (q.v.) held his bloody assize here in the same year. Pop.

22,563.

TAUNTON, Mass., city, county-seat of Bristol County, at the head of naviga¬ tion on the Taunton River, and on the New York, New Haven and Hartford Rail¬ road, about 36 miles southeast of Boston and 16 miles north of Fall River. Over 100 passenger trains and about 100 freight trains enter the city daily. The Fall River line of steamers, which have daily connection with New York and other places, are so easily reached that practically Taunton has daily communication by water with many of the Atlantic ports. The city gets its coal, iron and lumber at tide water, and freight rates to and

from Taunton are lesj than for inland cities. Electric lines connect the nearby villages and towns with the city, more than 700 cars leav¬ ing centre of the city daily.

The city is noted for the extent and variety of its manufacturing industries. The govern¬ ment census of 1910 gives the leading manufac¬ turing establishments of the city as follows: seven cotton mills, with $4,410,390 invested, and employing 3,151 persons, to

whom were paid annually $1,125,679. The cost of the material used annually was $2,651,502, and the value of the yearly products was $4,592,466. There were 14 foundries and machine shops, with capital invested, $2,679,203; the value of their yearly products, $2,636,390. The total number of manu¬ factories (1909) was 146; the total capital in¬ vested, $16,504,000; the annual average number of employees, 7,835 ; the annual amount of wages, $4,535,000; the cost of material used, $7,775,000; and the value of the products, $15,380,000. The principal manufactures, be¬ sides cotton products, are cutlery, machinists' tools, eyelets, tacks, nails, jewelry, machinery for cotton manufactories, silver and britannia ware, brick, oil-cloth, copper and yellow metal goods, printing presses, stoves, stove linings and kitchen utensils. The city is the distributing centre for a large part of Bristol and adjoin¬ ing counties; coal is shipped from here to the markets of the interior, and grain, vegetables, poultry and manufactures to outside markets.

The principal public buildings are the State Insane Hospital, a massive group of buildings, situated in a tract of 140 acres, which accommo¬ date over 1,000 patients; the county courthouse (cost over $300,000) ; Registry building (cost $125,000) ; the government building ($100,000) ; city hall; Taunton jail; theatre; Odd Fellows' Hall; Historical Hall; Morton Hospital, the gift of Susan Tillinghast Morton Kimball; Old Ladies' Home, opened January 1871 ; club build¬ ings, banks, business blocks, schools and churches. There are six each of Congregational and Roman Catholic churches, four Methodist, one each of Unitarian, Baptist, Presbyterian, Christian Scientist, Adventist, Protestant Epis¬ copal and Universalist. The educational insti¬ tutions are Bristol Academy, opened 18 July 1793; Saint Mary's Academy (Roman Catholic); headquarters of the Old Colony Historical So¬ ciety, incorporated 4 May 1853 ; a high school, public and parish schools, graded elementary schools and a public library containing about 55,000 volumes. The city is well supplied with bank institutions; the two national banks had, 1 Sept. 1910, a combined capital of $700,000 ; the combined surplus of two savings banks was $8,335,000; and five co-operative banks had a combined capital of over $3,000,000. The gov¬ ernment of the city is vested in a mayor and nine councilmen chosen by popular vote. Pop.

(1920) 37,137.

History.— The first white settlement was made by Elizabeth Pole, an Englishwoman, in 1637. She found here an Indian village called Tecticutt (<(great river®) on the Tecticutt River. Miss Pole bought land from the Indians for a plantation on the east side of the river,

within the present limits of Ward Four. The place was first called Cohannet, but when it was incorporated in 1639 it was called by its present name, after Taunton, England. In June

1639 Taunton sent deputies to the General Court assembled at Plymouth. The names which ap¬ pear on the Taunton records — of men con¬ nected with the surveys and the granting of titles — are names of men who were among the history makers of the nation. The early set¬ tlers of Taunton recognized the rights of the Indians, and the records show that Miss Pole and others purchased lands from Massasoit and other Indians. William Hooke, the first minister, returned to England as domestic chaplain to Oliver Cromwell. The first men¬ tion of a schoolmaster is that of Master Bishop, who was one of the early settlers. Other schoolmasters were William Pole, Mr. Adams, James Green, and in 1683, Samuel Danforth, a minister, was selected to keep a <(Gramer scole here in Taunton.® In 1647 an act was passed which made the public schools free and the support of the schools compulsory. In 1682 Taunton received from the court £3 from the funds of the fishing excise of the Cape, for keeping a free colonial, classical and elementary school. In 1701-02 100 acres of land, on both sides of the river, were set apart for school purposes. The history of educa¬ tion in Taunton is an almost complete history of the city. A grist mill was erected in 1639- 40; in 1653 the first successful iron works in America were established. Some of the prod¬ ucts of the iron works were used as money, as may be seen from the following order:

To the Clerk of the Iron Works,

Ensign Thomas Leonard please pay to Bar' Tipping nine shillings and three pence in iron money.

From yr friend,

Richard Williams.

Taunton 16th 1st — 1685.

In 1659-60 a saw-mill was built, and before 1700 brick making, shipbuilding and many other industries had been begun. The ruins and sites of many of the old manufactories are pointed out as of historic interest; for they mark the beginnings of the mighty industries of the Taunton of the present. On 6 Nov. 1746 the place was made a ((shire town,® and on 2 Jan. 1865 was incorporated as a city. The first crucibles in America were made here ; the cop¬ per blank discs for copper cents were supplied to the government, in large amounts,

by the Taunton Manufacturing Company. Taunton has always furnished promptly more than its quota of soldiers when the country called for defenders. In 1774 the people unfurled from the liberty pole on (<Taunton Green® a flag, on which was inscribed ((Liberty and Union® ; and among the <(minnit men® at Lexington, 19 April 1775, was a brave band from Taunton. They were among the first to go and the last to re¬ turn. Robert Treat Paine, one of the signers of the Declaration of Independence, resided here, for whom a statue has been erected in front of the city hall. Consult Waterman, < History of Taunton Schools) ; Emery, his¬ tory of Taunton* (1893); (Quarter-Millennial Celebration of the City of Taunton. >

TAUNUS, tow'noos, Germany, a mountain range mainly in the Prussian province of Hesse- Nassau, extending eastward from the Rhine, north of the Main, separating the basin of that river from that of the Lahn. The highest sum¬ mit, Grosser Feldberg, is 2,886 feet in ele¬ vation. The district is well wooded, and ex-

Dibits much picturesque scenery, as well as ruined castles, etc., and antiquarian remains dat¬ ing from Roman times. Its scenery and mineral waters attract many visitors ; and some of the finest German wines are grown on the south side. The point of most historical interest in the region is the ancient Roman fort uncovered at Saalburg, showing fortifications dating back to the year 200. West of Saalburg the Ger¬ mans erected a colossal statue of Germania to celebrate their victory over France in 1870-71.

TAURIDA, tow're-da, a government of the Ukraine, bounded north by Ekaterinoslav ; east by the Sea of Azov ; southeast, south and west by the Black Sea ; and northwest by the government of Kherson, from which it is separated by the Dnieper; area, 23,312 square miles. It is irregular in shape, and being united to the land only on its boundary with Ekateri¬ noslav for about 90 miles, may be regarded as one large peninsula, subdivided again into two minor peninsulas, of which that in the south, now called the Crimea, and well known in an¬ cient times as the Chersonesus, is the more per¬ fect ; the isthmus which connects it with the northern portion being at its narrowest not more than eight miles. The northern peninsula con¬ sists almost entirely of an extensive steppe, which stretches across into the southern penin¬ sula. It is generally without a tree, and in many parts composed of parched and saline sands, where vegetation is almost extinct; but in

other parts is composed of fertile loams, capable of raising any kind of crop, and often covered with verdant pastures. Simferopol is the capital city. (See also the article Crimea). Pop. about 2,133,000.

TAURUS, ta'rus, Asiatic Turkey (or Asia Minor), a mountain chain or series of mountain groups usually considered as beginning in the east on the Euphrates, at the Nushar Cataract, in the pashalic of Marash, whence it stretches west, nearly parallel to the coast of the Mediter¬ ranean, for above 500 miles, terminating to the north of the Gulf of Adalia. In the east it takes the name of Jebel-Kurim, or sometimes Anti-Taurus Mountains, in the west that of Ramadan Oglou Balakar. It sends off several branches, of which the most remarkable are Alma-Dagh, which proceeds south into Syria, and becomes linked with the chain of Lebanon ; and the Anti-Taurus, which proceeds northeast, sending out ramifications which become linked with Ararat, Elburz and Caucasus. Many of the Eastern peaks are above 10,000 feet.

TAURUS, the Bull, in astronomy, a name given the second of the zodiacal constellations. It contains the star of the first magnitude Aldebaran (in the eye), the group of the Pleiades (in the neck), and the Hyades (in the face).

TAUSEN, Hans, Danish reformer: b. Birkende, on Fiinen Island, 1494; d. Ribe, 11 Nov. 1561. He studied at Wittenberg and was preacher, from 1525, at Viborg, then, from 1529, at Copenhagen. He edited, with col¬ laborators (1530), ((The 43d Copenhagen Arti¬ cle.ˆ In 1535 he published a prayer-b6ok and a book of homilies. He was appointed reading- master of the university (1537) and (1542) bishop of Ribe. Instead of Latin he used his native language in his sermons and books. A selection of his works was brought out by

Rordam (Copenhagen 1870). Consult Ron, (Skiagraphia Lutheri Danici M. Johannis> (1757); Schmitt, L., (Johannis Tausen, oder der danische Luther) (Koln 1894).

TAUSIG, Karl, German pianist: b. War¬ saw, 4 Nov. 1841; d. Leipzig, 17 July 1871. First he was under his father's tuition, then studied under Bocklet, Thalberg and Liszt in Vienna. He made art tours, then lived in Dresden and later (1861-62) in Vienna. From 1866 he was royal court pianist at Berlin and led, till 1870, an academy of pianoforte play¬ ing. As a virtuoso he was equally interpreter of classic as of modern piano-music, but as composer he produced few works. Note¬ worthy of his productions is his edition of Clementis' (Gradus ad ParnassumP His piano score of Wagner's <Meistersinger) became very popular. His (Technischen Studien) was pub¬ lished by

H. Ehrlich. Consult Weitzmann, (Der letzte der Virtuosen) (Berlin 1868).

TAUSSIG, tows'ig, Edward David, Amer¬ ican naval officer: b. Saint Louis, Mo., 20 Nov. 1847. On graduating from the United States Naval Academy in 1867, he was appointed suc¬ cessively ensign, master and lieutenant, being made lieutenant-commander 19 June 1892. He has served on the European and Pacific stations and in the coast survey. He took possession of Wake Island for the United States and was placed in charge of Guam 1 Feb. 1899. He was on duty in the Philippines and during the summer of 1900 in North China. He has com¬ manded the Bennington and the Yorktown.

TAUSSIG, Frank William, American polit¬ ical economist: b. Saint Louis, Mo., 28 Dec. 1859. He was graduated at Harvard in 1879, and has been full professor of political economy there since 1892. He has written (Tariff His¬ tory of the United States *(1st ed., 1888; 6th ed., 1914) ; (Silver Situation in the United States* (1892) ; (Wages and Capital *(1896) ; Principles of Economics* (1911) ; (Some As¬ pects of the Tariff Question) (1915) ; (In- ventors and Moneymakers* (1915), and has been editor-in-chief of The Quarterly Journal of Economics.

TAUTOG, a marine fish (Tautoga onitis) of the Atlantic Coast of the United States, related to the dinners and wrasses of the family Labridce, and locally known as blackfish or oysterfish. It is from two to three feet in length, when large, blackish or greenish in color, the young with about three pairs of ob¬ scure dark bars; chin white; eye greenish. It abounds about weedy rocks, oyster reefs, etc., near shore, feeding on mollusks, barnacles, etc., and is easily caught. It is one of the best table- fishes of the American coast. The annual catch off the New England coast is about 750 tons.

TAVERN, a name common especially in the rural districts of Great Britain and the United States for a village inn or hotel. Oc¬ casionally some city hotel has borne the name.

TAVERNIER, ta-ver-ne-a, Jean Baptiste,

Baron d'Aubonne, French traveler: b. Paris, about 1605; d. Copenhagen, 1689. Before his 21st year he had visited a considerable portion of Europe. He subsequently traveled through Turkey, Persia and other Eastern countries, six times by different routes, trading as a dia-

mond merchant, and studying manners and cus¬ toms. Of his journeys he gave an account, with the assistance of a literary friend. In 1689, having realized a large fortune and ob¬ tained a patent of nobility, he retired to the estate of Aubonne, in the Genevese territories, with the view of passing there the remainder of his life. But altering his determination, he was preparing to start once more for the East, when he was suddenly overtaken by death. His travels, (Voyages en Turquie, en Perse, et aux Indes,* of which there are translations in Eng¬ lish (1678 and 1684), Dutch (1682) and Ger¬ man (1684), have gone through several editions in the original French.

TAVOY, ta-voi', Burma, (1) a town in Tenasserim, on the river of the same name, capital of a district, 35 miles from its mouth, 230 miles southeast of Rangoon. It is situated on Tavoy River, about 30 miles from the har¬ bor sheltered by Tavoy Point, a conspicuous peninsula on the Burma coast. It lies in a low situation, which, during the rainy season, be¬ comes almost a swamp. It is laid out in straight streets, and the houses are mostly built of tim¬ ber and thatched with palm leaves. The trade is inconsiderable. Near the town a mass of native loadstone occurs, and at a short distance from it is a hill entirely composed of specular iron ore. Pop. about 25,063. (2) An execu¬

tive district which has been under British con¬ trol since 1824, with an area of 5,308 square miles; pop. about 110,000. (3) An island about

75 miles south of the town of the same name, the largest and most northern of the extensive chain which is called the Mergui or Tenasserim Archipelago. It is about 18 miles long and two broad, and its* southern part is surrounded by numerous shoals and small islands, which make navigation dangerous. On the eastern side there is a good and well-sheltered harbor, which has received the name of Port Owen.

TAWAS (ta'was) CITY, Mich., village, county-seat of Iosco County, on Tawas Bay (an inlet of Lake Huron), at the mouth of the Tawas River, and on the Detroit and Mackinac Railroad, about 66 miles north of Bay City. It has a good harbor and steamer connection with many of the lake ports. It is in an agri¬ cultural and lumbering region, and nearby are large salt deposits. Its industries are con¬ nected chiefly with the manufacturing of lum¬ ber, and the shipment of salt, lumber and farm products. There is one bank. Pop. about

1,018.

TAWI TAWI, ta'we ta'we, Philippines, (1) A group of islands of the Sulu Archipelago, forming the extreme southwestern part of the Philippines, consisting of 88 islands; area, 462 square miles. Some of the islands, though charted, are unnamed; the others are divided into three sub-groups or clusters; (a) the Cina- pusan or Kinapusan cluster; (b) the Tawi Tawi cluster; and (c) the Laparan cluster. The larger islands are mountainous, but of moderate height; the valleys and plains are fertile and covered with tropical vegetation. Rice, corn, hemp and coffee are cultivated, but only for domestic use; the forest wealth is considerable, but is not of commercial value on account of lack of means of transportation. The chief in¬ dustry is fishing, pearl fishing and gathering of mother-of-pearl, etc. The islands are sparsely

populated and, as many are very inaccessible, have been for many years the hiding places of pirates; the few settlements were mostly estab¬ lished by the Spaniards. (2) The largest and name island of the Tawi Tawi group; length from northeast to southwest, 35 miles; greatest width, 15 miles; area, 187 square miles. It is mountainous, and of volcanic formation; they are three groups of two peaks each, one at the southern end, one at the northern end and the third in the east central part ; greatest elevation, 1,941 feet. The soil is generally fertile, and the island well wooded; the chief industry, as in the rest of the group, is fishing. The chief settlement is Tatan, on the northwest coast, on a small bay.

TAWNEY, James A., congressman : b. near Gettysburg, Pa., 3 Jan. 1855; d. Excelsior Springs, Mo., 12 June 1919. He was educated at the common schools and learned the black¬ smith's and machinist's trade. He went to Winona, Minn., in 1877 and worked there as a machinist for four vears. He was admitted to the bar there in 1882 and practised law until 1890, when he was elected to the State senate of Minnesota. In 1893 he was elected to the 53d Congress and served continuously until 1911, when he was defeated by the Progressive party. Mr. Tawney was appointed by ex- President Taft to the International Joint Com¬ mission created by treaty with Great Britain for the settlement of disputes between the United States and Canada, and was chairman of the United States section of the commission un¬ til his death. Mr. Tawney had great political power in Minnesota, and took an active part in anti-trust legislation. In 1906 he was vice- chairman of the Republican Congressional Cam¬ paign Committee. He was known in the Re¬ publican party as an insurgent and continually surprised the Republican machine while in Con¬ gress by bolting. He was an orator of great power. He was chairman of the House Ap¬ propriations Committee until 1910, and long championed a Federal budget system. Tawney was defeated for re-election in 1910, when he opposed reform

of the power of the speaker of the House. In 1910 he opposed the efforts of the Republicans to increase appropriations for the army and navy.

TAX ASSESSORS. See Taxation.

TAX-DEED, an instrument or conveyance whereby the proper officer of the law undertakes to convey the title of the rightful owner to the purchaser at a tax sale or a sale of the land for non-payment of taxes. This deed, according to the principles of the common law, is simply a link in the chain of the purchaser's title. It does not of itself transfer the title of the owner, as in grants from the government of deeds, or as do conveyances between individuals. The deed is not the title itself, or even evidence of it, its recitals not being binding. No presump¬ tion arises upon the mere production of the deed that the facts upon which it is based really existed, but when it is shown that the officers of the law have performed every duty imposed upon them the deed becomes conclusive evidence of the title in the purchaser.

TAXALES. See Paleobotany.

TAXATION. What Is a Tax? — A dis¬ tinction must be made between a tax and the

exercise of the power of taxation. Property- may be taken from individuals by the govern¬ ment in the exercise of various sovereign pow¬ ers, such as the power of eminent domain, the penal power, the police power and the taxing power. Where the purpose of the compulsory payment is neither to exercise the right of eminent domain nor to inflict punishment nor primarily for purposes of regulation, we have to deal with the power of taxation. The power of taxation may be exercised, however, in sev¬ eral ways. The government may perform a service for the individual from which a speci¬ fic benefit is received and where the cost of the service is presumed to be covered by the payment. Such payments are called fees or tolls. Or, again, the government may, with or without the consent of the individual, make an improvement which increases the value of his real estate and may impose what is technically called a special assessment or a betterment charge. Finally, the government may impose a payment on the individual where the special benefit, if any, is merely incidental. Such a pay¬ ment is called a tax. Taxes in

the narrower sense are to be distinguished, therefore, not only from fines and penalties as well as from prices (charges made by the government when it carries on a commercial or industrial under¬ taking) but also from fees or tolls and from special assessments, both of which are equally manifestations of the taxing power, but which are distinguished from taxes in the narrower sense in that the special benefit accruing to the individual is both positive and measurable.

A tax may, therefore, be defined as a com¬ pulsory contribution from the person to the government to defray the expenses incurred in the common interest of all, without refer¬ ence to special benefits conferred. Each word in this definition is significant. A tax is a con¬ tribution, whether in money or in kind ; it is compulsory (to distinguish it from a gift) ; it is paid by a person — either a natural person, like an individual, or an artificial person, like a corporation ; it is paid to the government in any of its forms, whether local, State, Federal or international; the expense must be incurred in the common interest of all or, in legal parlance, it must be for a public purpose ; otherwise it is confiscation, not tax¬ ation. Finally, it must be paid without ref¬ erence to special benefits conferred. It is levied for the common benefit, not for any special benefit.

The Reason of Taxation. — By the reason of taxation is meant the ground or the philo¬ sophical justification of taxation. The older theory may be called the exchange or the con¬ tract or the reciprocity theory. It was con¬ nected with the 18th-century contract theory of the state. This theory holds that taxes are a mere exchange between the individual and the government, that the government performs cer¬ tain services like that of protection, for the individual and that the individual gives the government something in return. This theory has been completely superseded by the more modern political philosophy. The modern the¬ ory may be called the organic theory of tax¬ ation. It does indeed not deny the obligation of the government to do something for the community in return for the payment exacted

from the community. In this sense, there is, indeed, reciprocity; but it is an exchange be¬ tween the community as a whole and the gov¬ ernment which represents the community. It is not an exchange of any kind between the state and the individual. Modern political philosophy does not recognize the contract theory. The individual does not contract or bargain with the state. He is born into the state, or, if he transfers his political allegiance, he does so without any reservations. In this sense the state is as much a part of the individual as the family is a part of the individual. Just as the individual involuntarily assumes certain obli¬ gations to his family, so he

assumes obliga¬ tions to the state of which he is a member. It is, therefore, as much his duty to support the state as it is to support his family. In fact, we may go further. The state or politi¬ cally organized community is indispensable to modern civilized man. We cannot conceive of any one living outside of the state. Since no one can throw off the obligations of the state — which can in the last instance demand a man's very life — it is as much the duty of the in¬ dividual to support the state as it is to sup¬ port himself. The obligation to pay taxes may, therefore, be declared in modern times to be a natural obligation and the state is everywhere justified in converting this moral obligation into a legal obligation.

The Function of Taxation. — The primary

function of taxation, therefore, is to raise rev¬ enue. This may be declared to be the fiscal function of taxation. As a matter of fact, however, taxation has always been used for other purposes which may be declared to be secondary or incidental in character. Such a function may be declared the social, rather than the fiscal, function of taxation. Taxation has been at various times employed to check, to prohibit, to destroy or to foster economic ac¬ tivity. At the present time, in the United States, for instance, we have a tax which com¬ pletely prohibits the issue of State bank notes and certain kinds of future sales on the cotton exchange. We have a tax designed materially to check the import of opium. We have a tax which has utterly destroyed the production of phosphorus matches. We have, or have had, taxes designed to foster or protect certain forms of domestic industry. In this respect there have been two extreme schools of thought, the one represented in the United States by statesmen like Calhoun or publicists like David A. Wells, who have contended that the only function of taxation is fiscal and that protec¬ tion, for instance, means confiscation. The other extreme represented by certain socialists and by professorial socialists like Adolf Wag¬ ner, have maintained that the primary purpose of taxation is to effect changes in distribution. A logical corollary of this position would be that no payment can be considered a tax unless it seeks to effect social changes. The more modern and more moderate position is that while the primary function of taxation must be the fiscal function, there is no reason for refusing to bring about, incidentally, through taxation, desirable social reforms that are recog¬ nized as such by the community.

The Nature of Taxation. — Is taxation a good or a bad thing? Is it a benefit or an

evil? Here again we have two schools of thought. The older writers, of whom Jean Baptiste Say is a good example, adopted the so-called consumption theory of public finance, and held that governmental functions ought to be reduced to a minimum and that the exercise of governmental power represents the unpro¬ ductive consumption of the community. The consequence is that all government expendi¬ tures should be reduced to a minimum and that, as it has been said, the best tax is the smallest tax. At the other extreme is found the state¬ ment which is based upon the productivity theory of public finance. According to this the state is, or ought to be, the chief productive force in the community because, at all events, it is designed to lay the foundations for the exercise of all individual production. Every¬ thing extracted from the individual and spent by the government would from this point of view, as it has been put, return in a fertilizing shower to the community. Taxation would, therefore, be the best form of investment.

Here again the modern position is midway between the two extremes. It is undeniable that a tax involves a burden or a sacrifice and in this sense it is something which to that extent represents an evil. But it is equally true that the result of the tax is, or may be, to enable the government to accomplish something which is of undeniable advantage to the com¬ munity as a whole, even though the particular benefit which accrues to the individual may not always be definitely measureable. The real question, therefore, is: what is the result of the expenditure or what does the government do with the tax? If the expenditure is a foolish or a wasteful one, if no care has been taken in limiting either the end or the means, there can be no doubt that the tax represents an evil. But if the object to be attained is economically or socially desirable, if the money is economically spent and if the balance of the social advantage over the social sacrifice is clear — if, in other words, the government is effi¬ ciently carrying out a wise mandate of the peo¬ ple — then the tax represents a good and not an evil. To say that the best tax is the least in amount would bring us back to primitive savagery. On the contrary, the distinguishing mark of modern civilization is the growing pro¬ portion between the satisfaction of collective wants on the one hand as over against the satisfaction of individual wants on the other. The more civilized the community the greater, not only absolutely but relatively, will be the amount of taxation as compared with the total social income. While, therefore, it is by no means true that every tax is a good tax or that every expenditure is a wise expenditure, it is nevertheless a fact that in the sense indi¬ cated above taxation is a good rather than an evil

because it is a necessary means of accom¬ plishing certain desirable political and social aims. The nearer, in other words, every tax comes to being an ideal tax, the more will it represent a balance of benefits over disad¬ vantages.

The Limits of Taxation.— Even though taxation in the above sense may be declared to be good, there is another sense in which there is a definite limit upon the possible ad¬ vantages of taxation. We have here to con¬ sider taxation not, as above, in relation to the

returns to be expected, but in relation to the source from which taxes are derived. It is a question not what do you do with the tax, but from what source do you get the tax? In other words, no matter how ideal in other re¬ spects a tax is, it may impose too heavy a burden upon the community. The limits of taxation may be legal, political or economic. The legal limitations upon taxation are crea¬ tures of positive law. The government, in the United States for instance, is enjoined from levying a tax on exports. The State govern¬ ments are prohibited from levying any taxes which will interfere with interstate commerce. Both State and local governments are fre¬ quently enjoined from levying more than a maximum rate of taxation. The political limits of taxation may be illustrated by the provision of American law, that all taxes must be for a public purpose. The exact formula of what constitutes public purpose is something which has given great trouble to our judges and publicists. The economic limits of taxation are seen when we reflect that the ultimate source of all taxes is the social income and that the demands preferred by government in the form of taxation may trench unduly upon this income. We have had numerous ex¬ amples both of megalomania and of unwise ex¬ penditure in the history of American finance, especially State and local finance. Not a few communities have even become bankrupt through the impossibility of raising sufficient revenue by taxation to defray the present and past expenditures of the community. In the last resort, the community, like the individual, must cut its coat according to its cloth. It may conceivably levy taxes up to the limit of the social income, but if it exceeds that income or trenches upon the capital-replacement fund of the community, it marks the beginning of a backward step in economic progress.

The History of Taxation. — In the history of taxation there is discernible the influence of four sets of causes. First and most sig¬ nificant are the general economic conditions. The fiscal system is always in large part a reflex of the economic system. When economic

conditions are simple, the forms of taxation are apt to be simple. Where there is a prepon¬ derance of certain economic factors, the tax system will vary accordingly. Thus, in the American colonies, there were three funda¬ mentally different systems of taxation, corre¬ sponding to the system of small farms and petty industry in the New England colonies, to the dominance of business interests in the middle colonies and to the plantation system in the Southern colonies. The fiscal system of the feudal ages rested largely upon land. The success of the tax on personal property was and is very different in the towns from what it was in the country. The growth of modern forms of business has brought with it an en¬ tirely new system of taxation. Second to be emphasized is the influence of democratic fac¬ tors. Modern democracy and the changed atti¬ tude to the laboring classes has brought with it a considerable alteration in the kinds of taxes and in the proportion between the so-called di¬ rect and indirect taxes. The same influence is attributable to the introduction of the modern system of progressive taxation. In the third place, we note the development of the idea of

faculty or ability to pay. More and more the system of taxation has been molded by the de¬ sire to fit the burden to the capacity of the con¬ tributors and the tests that have been progres¬ sively employed to measure faculty have, as will be seen below, undergone a continual modifica¬ tion. In the fourth place, side by side with the adoption of individual faculty we note the sub¬ stitution of the social for the individual treat¬ ment in taxation, that is, a system modified by a study of the social consequences and economic effects of the tax system upon the various economic classes in the community as a whole.

Influence and Effects of Taxation. — The effects on production. Here again two theories stand opposed to each other. A former school contended that taxes stimulate production. It had been claimed by some that a new tax evokes a new ability to bear the tax and that in this sense an increase in the seeming burdens may really augment the industry of the people. It has been argued that if industry in general is the result of coping with the natural disad¬ vantages, such as the inclemencies or difficulties of nature, why should not the same result be brought about by artificial disadvantage, like taxation? Attention is directed to the period of the Napoleonic wars where the increase of British taxes seemed to result in greater power to bear the taxes. On the other hand, we find the contention that all taxes are injurious, or, as in the case of the Single Taxers, that all taxes excepting the land value tax exercise a deleterious influence because they are taxes on labor and industry and, therefore, check or repress labor or industry.

The truth again lies in the midway. It is undoubtedly a fact that some taxes seem to increase industry. But if regarded more at¬ tentively it will be seen that the tax is the oc¬ casion, rather than the cause, of the redoubled activity and in that in almost all cases the lure of profit rather than the fear of loss is the real stimulus to productivity and invention. It is undoubtedly far more frequent that industry is injuriously affected, rather than benefited, by the burden. But it by no means follows that every tax exerts an injurious result. If certain principles of equality are observed, it is pos¬ sible for a tax to be innocuous so far as the producer is concerned, and, at the same time, to have the consumer benefit more from the results of the government outlay than he suffers from the tax. There is no broad generalization to be framed in this respect. According to the character of the particular impost, taxation may be said to have educational, destructive or regu¬ lative effects. There are two points of more general influence. One is connected with the inequality of taxation. If an exclusive or un¬ equal tax is imposed upon some permanent source

of revenue, the tax or the excess of the tax over the normal rate will be amortized or capitalized into the diminution of the selling value. If 1 per cent is assessed upon securities, for instance, which bear 5 per cent interest and have been selling at par, the new purchaser will pay only about 80. This is known as the capitalization of taxation. The same 'tendency of things to seek their level is found in the imposition of a new tax in general. A French writer, Canard, had laid down the principle that every new tax is a bad tax and every old tax is a good tax. What he meant was that the

disturbance of industry by the imposition of a new tax often takes some time to allay itself. This of course must not be misinterpreted into the belief that a tax which is inherently bad can ever become good through the lapse of time. The effect of taxation on exchange of wealth is marked. The chief reason, for instance, why there is no large class of real estate dealers in Paris as compared with New York is the exist¬ ence of a high tax on the transfer of land. It has sometimes been alleged that the downfall of Spain is due to the universal tax on sales, alcavala, in the Middle Ages. An important principle connected with the influence of taxa¬ tion on exchange is the so-called excess-of-price doctrine. In its original form the doc¬ trine held that every time a taxed commodity changed hands the tax grows in arithmetical proportion, for as the profits of each dealer are added to the price, the tax is imposed in each case successively on the new price, includ¬ ing the profits. This alleged principle, how¬ ever, is open to the objection that according to modern economic theory, profits are not a part of price, but the result of price and that the price is always fixed at the point of minimum cost. The element of truth contained in the principle is due to the fact that interest is a part of cost and that to the extent that interest on the successive prices is of any importance, the tax tends to be cumulative. The influence of taxation on distribution is indisputable. Many taxes are designed to have such an effect, as high inheritance taxes, graduated income taxes, but many taxes also have unexpected effects on distribution. One of the older theories or Heave-them-as-you-find-them® doctrine states that the ideal tax ought to leave every indi¬ vidual in the same relative position as before the imposition of the tax. This is no longer accepted as an ideal.

The influence of taxes on consumption is of less importance than in former times. In the Middle Ages sumptuary taxes were very common. It was, however, not luxurious consumption, but necessary consumption, which was frequently sought to be hit. The ease with which taxes of certain kinds may be made to check consumption are so pronounced that it is primarily in periods of war finance that recourse is taken to this medium.

The political effects of taxation are no less important than the economic. The history of free government itself has been intimately in¬ fluenced by the effects of taxation.

Incidence of Taxation. — By the incidence of a tax is meant its final resting place. We must distinguish between the impact of a tax or its original assessment, the shifting of a tax or its transfer, and the incidence of a tax or its final resting place. Shifting is the process, incidence is the result. The person who bears the tax is not always the one who pays the tax in the first instance. This has led some writers to lay down the so-called equal-diffusion theory of taxation, the theory, namely, that the body economic is like any organism and that if a liquid is injected into the veins at any point it will at once be diffused throughout the body. The tax, therefore, no matter where imposed, will be shifted to the community at large. This theory suffers from undue generalization. It is true that certain taxes give rise to such changes in economic relations that they may in a sense

be said to be ultimately spread over the com¬ munity. There are, on the other hand, many taxes which do not lead to this phenomena and some taxes which are not shifted at all. A dis¬ tinction must furthermore be observed between capitalization and shifting. If a tax is shifted, it cannot be capitalized; if it is capitalized, it cannot be shifted. There are certain conditions which predispose to the shifting of taxation. The more general a tax is the less likely is it to be shifted because the smaller the tax the less the field to which the individual can betake himself. Where commodities are produced un¬ der varying conditions, much depends upon whether the tax is imposed upon the marginal or the intra-marginal producer. Where a tax is imposed upon land which produced a com¬ modity with a local market, the tendency is for the taxto be shifted to the consumer. If the tax is imposed on the North Dakota farmer whose wheat is sold in Liverpool, the shifting of the tax depends upon the relative cost of producing Argentine or Russian wheat and upon the existence or absence of equal taxes in those countries. Where a tax is imposed not upon commodities or property in particular, but upon profits or income in general, the tendency to shift is much less pronounced. With taxes upon a particular kind of commodity or upon a particular kind of income, the situation is different.

The shifting of the tax is of importance not only as between producer

and consumer, but also as between borrower and lender. In taxes imposed upon mortgages or upon funds bor¬ rowed the incidence of the tax depends to a large extent on whether the tax is general or exclusive. If the tax is levied as a part of a general income tax, it will not be shifted; if, however, it is an exclusive or unequal tax, either by law or in actual operation, the tax will ordinarily be shifted from the borrower to the lender. A complete study of the shift¬ ing of taxation would involve a treatise on the formation and distribution of wealth.

Principles of Taxation. — There are four different sets of principles of taxation, fiscal, administrative, economic and ethical. The fiscal principles are those of adequacy and elasticity. Unless a tax is sufficient to bring in the revenue that is needed or expected, it cannot be pronounced successful. Again, un¬ less a tax is so elastic as to respond to the varying changes in economic conditions, it is also to be deprecated. The administrative principles of taxation are those of certainty, of convenience and of economy. Unless a tax law is certain in its provisions, it is a bad law. There is a great difference, for instance, be¬ tween the certainty of a land tax and the un¬ certainty of a comprehensive or of a compli¬ cated income tax. The principle of conven¬ ience of taxation includes the question of how the tax is to be paid, when it is to be paid, where it is to be paid, and under what condi¬ tions, inquisitorial or otherwise, it is to be paid. The economy of taxation implies that a tax should take out of the pocket of the peo¬ ple as little as possible above what it brings into the government, or, in other words, that the cost of collection should be low. The eco¬ nomic principles of taxation may be declared to be innocuity and efficiency. The innocuity

or harmlessness of a tax is a most desirable attribute. All taxes, indeed, represent a burden but, as has been pointed out above, certain taxes have a far more destructive effect than others. Other things being equal, the legislator must chose the most innocuous tax. By the efficiency of taxation is meant the capacity of a tax to accomplish the desired result. Many a tax is admirable in other respects, but can be made to work in practice only with diffi¬ culty. The present property tax, for instance, in the United States is to-day no longer an efficient tax. The ethical principles of taxation are those of uniformity and universality. As these are the most important, they will be dis¬ cussed separately.

Uniformity or Equality of Taxation. —

By equality is of course not meant absolute numerical equality, but relatively proportional equality. Uniformity, in other words, means

relative uniformity. The question then arises as to the relation involved. To what should taxes be relative, in order to be equal? In former times the answer was that the real basis of taxation should be either the cost of service to the government or the value of the service to the individual. The more modern theory maintains that taxes should be in some relation to the faculty or the ability of the indi¬ vidual to pay. Much time has been spent upon the problem of what constituted the real ele¬ ments of faculty. For a long time faculty was stated in terms of sacrifice. By equality of taxation there is meant an equality in the sacri¬ fice imposed upon the individual. In more recent times, however, emphasis has been put upon another aspect of the problem. Sacrifice has to deal with the phenomenon of parting with one's wealth. It involves the question of what is left for immediate consumption after the tax has been paid. But economic life deals not only with consumption, but with production. When we come to consider the production of wealth rather than the consumption of wealth we are confronted by the facts of opportunity or privilege in the amassing of wealth. A man's ability to pay a tax, therefore, must be considered not only from the point of view of consumption but from that of production. In other words, the two elements of faculty are privilege and sacrifice : the easier it is for a man to make his money, the more ability he has to pay taxes; the harder it is for a man to be deprived of his money, the less ability he has to pay taxes.

The Norm of Taxation. — By the norm of taxation is meant the test of faculty. There have been no less than five such tests disclosed in the history of taxation: (1) The first test of faculty was polls. Everyone was supposed to have an equal ability to pay. In a primitive form of society the poll tax was legitimate. It has virtually disappeared to-day except in a few democratic communities like the United States, where it still lingers as a survival of a former and more primitive equality. (2) Ex¬ penditure. The advantage of expenditure as a test is that no one can escape because every¬ one spends something. The disadvantage of expenditure as a sole test of faculty is that some people must spend all they make, while others can save most of what they make. Ex¬ penditure thus becomes an increasingly unsatis-

factory test of faculty; (3) Property. In a comparatively early form of society wealth in terms of property is an excellent test of faculty. The general property tax is accordingly found everywhere at a certain stage of development. The more complicated and the more differen¬

tiated the society, the more apparent, however, are the shortcomings of this test. The chief modem defects of property as a test of equal¬ ity in taxation are the following: (a) While it is generally true that capital is nothing but capitalized income, there is in modern times frequently a discrepancy between the property and the yield or produce of the property. This may be due to speculation, to chance or to other accidents of economic life; (b) In mod¬ ern times more and more wealth is derived from personal earnings rather than from prop¬ erty. The property tax would hit the owner of a $10,000 farm but leave untaxed the recipi¬ ent of a $100,000 professional income; (c) There is a great difference between the legal and economic concept of property. Economi¬ cally a man's wealth measured in terms of cap¬ ital is his surplus over debts. Legally, prop¬ erty is independent of the debts. I may own a $10,000 farm even though I have borrowed $8,000 on the farm. The property tax fre¬ quently fails to make allowance for debts; (d) The concept of property fails to distinguish between consumption and production property. The property tax makes no distinction between the lawyer's library which contributes to his income and a bibliophile's library which may be a source of expense. 4. Product. The diffi¬ culties with the concept of property as a test of faculty led to the substitution of yield or produce as the proper test. Almost every¬ where at a certain time the general property tax on the individual was, therefore, replaced by a series of taxes on the things themselves, meas¬ ured by their product. Instead of a general property tax we now find a land tax, a capital tax, a business tax, a wage tax, etc. Produce is in some respects a more satisfactory test of faculty than property : it gets closer to the reali¬ ties. But in the course of time a weakness dis¬ closed itself in that not enough attention could be paid to the individual conditions of the re¬ cipient of the produce. 5. Income. The mod¬ ern world has, therefore, come in large measure to an acceptance of the fifth test of faculty, which is that of income rather than of prop¬ erty or of produce. The tendency is accord¬ ingly strong for the replacement of the older taxes by modern taxes on individual income and business profits.

Graduated Taxation. — A further refine¬ ment, however, of the idea of faculty is seen in the growth of graduated or progressive taxa¬ tion. Proportional taxation is giving way to graduated or progressive taxation because of the realization of the fact that graduation, al¬ though a technical breach of uniformity, really involves a higher uniformity. Progressive taxation is now almost everywhere recognized even in American jurisprudence, as involving no inequality of taxation. A graduated tax is a tax the rate of which increases with every unit of the base. The entering wedge of the theory of progress in

taxation is found in the minimum-of-subsistence doctrine, the doctrine, namely, that a certain amount of income should

be exempt from taxation because that minimum is indispensable to existence. This wedge was soon pushed further in so that emphasis was placed upon the element of sacrifice. The sac¬ rifice involved in taking by taxation $100 from a man with a $1,000 income was recognized to be far greater than the sacrifice involved in taking $10,000 from the man with a $100,000 income. In one case the tax trenches upon the necessities and in the other it affects only superfluities. After some time, however, the conception of sacrifice was re-enforced by that of privilege. The difficulty of making the first $1,000 of a man's fortune is far greater than that of making subsequent accretions. All modern democracies are accordingly fast devel¬ oping graduated or progressive taxes.

Differentiated Taxation. — The principle of faculty in taxation results not only in gradu¬ ated taxation but in what is called differentiated taxation. Graduated taxation implies a change in the rate according to the amount of the in¬ come of property; differentiated taxation im¬ plies a change in the rate according to the kind of income of the property. The chief example of differentiated taxation is the distinction be¬ tween what Great Britain calls earned and un¬ earned incomes, i.e., taxation from property at a higher rate than income from labor. Other Countries, however, like Italy, pursue the idea somewhat further and distinguish between property incomes, mixed incomes and labor in¬ comes, — mixed incomes being incomes from business where both capital and enterprise are needed. The Federal income tax of the United States embodies the principle of graduated taxation, but has not yet accepted that of dif¬ ferentiated taxation. Where the distinction is made in the property tax rather than in the income tax, we are in the habit of calling it classification of taxation rather than differen¬ tiation of taxation. The movement for a clas¬ sified property tax in lieu of the general prop¬ erty tax is making great headway in the United States. Classification for purposes of taxation has been upheld by the United States Supreme Court as involving no derogation from the con¬ stitutional principle of uniformity or equality of taxation.

Principle of Universality. — The other out¬ come of the doctrine of faculty is universality of taxation. Equality of taxation means among other things that all people should bear their burdens; that everyone should be taxed, and that no one, in contradistinction to his neigh¬ bor, should be taxed more than once. The modern world permits exemptions from taxa¬ tion, but modern exemptions are different

from those of former times.. The medieval exemp¬ tions were class exemptions and were, therefore, reprehensible. Modern exemptions rest upon presumed lack of ability to pay or upon con¬ siderations of public policy. They are per¬ mitted, not primarily for the benefit of the indi¬ vidual, but for the benefit of the community. While, with the exception of these justifiable exemptions, everyone should be taxed, it is equally important to avoid double taxation. Double taxation, or duplicate taxation, is of two kinds. It may be imposed by the same jurisdiction or by competing jurisdictions. An example of double taxation by the same juris¬ diction is the simultaneous taxation of property

and income. Ordinarily, to tax property is vir¬ tually to tax the income of the property. To tax the income again will then be double taxa¬ tion. Where the purpose is to distinguish between earned or unearned incomes or to se¬ cure differentiation of taxation, where, in other words, the design is to tax property incomes more than other incomes, this form of double taxation is legitimate. Another example of double taxation is to tax the corporation and also the shareholder or to tax both the property and the mortgage on the property, because under the ordinary conditions of American life a tax on the lender will be shifted to the bor¬ rower so that the borrower will pay the tax not only on his own property but on that of the lender. Double taxation by competing ju¬ risdictions is found when the same individual or piece of property is simultaneously taxed by different jurisdictions. An Englishman receiv¬ ing his income from an American business may be taxed in the United States because the income is earned there; and taxed in Great Britain because he resides there. An American who dies in one State owning railway shares deposited with a trust company in another State, the chief office of the railway being in a third State and the railway line itself running through a fourth State, may conceivably be subject to taxation on the same property in all four States. The avoidance of such double or multiple taxation is possible either, on the one hand, by international agreement or the exer¬ cise of interstate comity or, on the other hand, as in some federal governments, by a federal law or ruling which apportions the tax among several states according to equitable principles.

Classification of Taxes. — There are many different ways in which taxes can be classi¬ fied, according to the criterion employed. If emphasis is put upon property in which taxes are paid, we have taxes

in kind and taxes in money. If the criterion is frequency of pay¬ ment, they may be classified in terms of ordi¬ nary and extraordinary taxes. If the criterion is the rate of taxation, we may distinguish be¬ tween apportioned and percentage taxes. A percentage tax is a tax like the income tax where the rate or percentage is known in ad¬ vance; an apportioned tax is a tax like the real estate tax in the United States where the rate is arrived at as the result of an apportionment. According to the mode of levy, we may distin¬ guish between taxes on persons and taxes on things. According to the method of measure¬ ment we may distinguish between assessed and expenditure taxes or between taxes on acqui¬ sition, on possession or on consumption. Ac¬ cording to the methods and results of payment we may distinguish between direct and indirect taxes. This distinction is not very exact. It originated in the idea that where the taxpayer and the taxbearer were the same individual, the tax was a direct tax and, if they were different individuals, it was an indirect tax. The difficulty with this, however, is that the individual who would ordinarily transfer a commodity to someone else might consume it himself. The suggestion was, therefore, made to relegate the distinction to the intention of the legislator. Here again, however, we are met with the fact that the legislator frequently has no intention in the matter or that his in¬

tention is unknown. Some European writers, therefore, have contended that the criterion should be found in the permanence of the tax. If the tax is a recurring tax or if the phenome¬ non on which the tax is imposed is recurring, it is indirect, otherwise it is direct. In general, however, it may be said that by direct taxes are meant taxes on polio, property or income, and by indirect taxes are meant taxes on con¬ sumption and on transactions.

The American Tax System. — The Ameri¬ can tax system is composed of two elements — the State and local system and the Federal system. The State and local system has gone through several stages. At the end of the 18th century the slight revenue that was needed by the States and localities was derived chiefly from fees, together with poll taxes, taxes on land and taxes on a few articles of personal property. The land taxes were levied first ac¬ cording to quantity, then on gross produce or location and finally according to selling value. The separate property taxes gradually developed into a general property tax, which became the chief source of State and local revenue — the State tax being added to the local tax before the annual rate of taxation was determined. With the progress of society and especially with the growth of intangible personalty, personal property slowly slipped out of the assessment lists, so that the general property tax again became in fact, if not in law, a real property tax in great

measure. This led, in the third quarter of the century, to an attempt to tax per¬ sonal property through special taxes on certain corporations. Toward the close of t'he century the corporation taxes were supplemented by inheritance taxes. In several States liquor license taxes were added. Only in the Southern States do we also find a system of business or occupation or so-called privilege tax, as a sur¬ vival of the Slavery system, where the planta¬ tion owners attempted to roll off the taxes on urban occupation.

The addition of corporation and inheritance taxes did not entirely solve the problem of the personal property tax. A two-fold movement accordingly developed in the 20th century. On the one hand we find the tendency toward the classified property tax, with lower rates for certain classes of personalty like money, securi¬ ties, mortgages, etc. On the other hand came the movement for the replacement of the per¬ sonal property tax by the income tax. Wis¬ consin took the lead in 1911, Massachusetts followed in part in 1915 and New York im¬ posed a corporate income tax in 1916 and a personal income tax in 1919. Several other States have followed their example. The trend is now strongly toward a system whereby real estate will be taxed for local purposes and the State revenues be derived from an income tax, an inheritance tax and a corporation tax, part of the proceeds of which will be distributed to the local divisions.

The Federal tax system has also gone through several stages. At the beginning the Federal revenues were derived from import duties as well as from a variety of internal ex¬ cises — including for a short time also a direct tax on land and on slaves. The advent to power of the Anti-Federalists in 1802 caused an abandonment of the so-called internal reve-

nue taxes. From that year until the Civil War the sole reliance of the government was on im¬ port duties, except during the period of the war with England when the internal revenue taxes were restored. Shortly after the outbreak of the Civil War a comprehensive system of in¬ ternal revenue taxes was initiated. These were abandoned one by one after the close of the war until only the taxes on tobacco and liquor remained. This system of import duties to¬ gether with a few internal excises existed, with a slight interruption during the Spanish War, until 1909. In that year began the fourth period — the supplementing of the tariff by direct as well as by indirect internal

taxes. First came the corporation tax in 1909, then the in¬ come tax in 1913. With the advent of the World War, finally, there came not only the re- introduction of many indirect internal taxes but also the inheritance tax and the excess profits tax as well as taxes on expenditure. Of these the two former are likely to remain per¬ manently.

Thus while the land tax will continue to be levied primarily by the States, while import duties can be imposed only by the Federal gov¬ ernment, and while internal taxes on com¬ modities will probably be reserved more or less exclusively by the Federal government, the in¬ come tax, the inheritance tax, the business or excess profits tax and the corporation tax will probably be imposed by both Federal and State governments. The great problem of the future will thus be the fiscal, relation of State and Nation.

Bibliography.— Adams, H. C., <The Science of Finance5 (New York 1899) ; Plehn, C. C., introduction to the Science of Finance5 (New York 1910) ; Bullock, C. J., (Readings in Public Finance) (New York 1908) ; Seligman, E. R. A., (Essays in Taxation) (8th ed., New York 1913) ; id., (The Shifting and Incidence of Taxation5 (3d ed., New York 1910) ; id., Progressive Taxation in Theory and Practice5 (2d ed., New York 1908) ; id., (The Income Tax5 (2d ed., New York 1914) ; Weston, S. J.,

(Justice in Taxation5 (New York 1905) ; Lutz, S. J., (State Tax Commissions5 (New York 1918) ; Proceedings of the National Tax Association5 (New York 1907-20) ; Bastable, C‘. F., Public Finance5 (3d ed., London 1903) ; Stamp, C. A., (The Income Tax5 (London 1915) ; Cannan, E., (The History of Local Taxation5 (2d ed., London 1912).

Edwin R. A. Seligman, McVickar Professor of Political Economy and Finance, Columbia University.

TAXIDERMY is the art of stuffing and mounting the skins of animals, or their heads, so as to appear natural and lifelike. It is no longer a question of filling out a skin, but rather of making a statue of a creature long since dead, which will exactly fit the skin of that particular creature, stand erect and pose as the counterpart of life. ((Taxidermy, the hand¬ maid of zoology,55 said Dr. J. A. Allen, «has already become one of the fine arts, requiring the skill and other qualities of both the sculptor and the painter, and capable of yielding results comparable with the masterpieces of either.55 It is, however, one of the newest of the arts, and there is serious need of a well-

established school of taxidermy in connection with some

one of our great museums. Prior to 1880 only one American museum (the National) main¬ tained a corps of taxidermists, and the ma¬ jority of the mounted birds and mammals which found their way into other American museums were mounted at Ward's Natural Science Establishment, by men from France and Germany. Methods were crude and results were far below the standards attained a few years later. Much of the work produced prior to 1880 has since been either dismounted and remounted or else destroyed.

In March 1880, at Ward's establishment in Rochester, N. Y., Messrs. Hornaday, Webster, Lucas, Martens, ˆ Bailly, Critchley and Fraine organized the National Society of American Taxidermists and seriously began the task of developing taxidermy up to the level of the fine arts.. All jealousy and exclusiveness were swept aside and the three competitive exhibi¬ tions that were held in Rochester, Boston and New York finally opened the eyes of scientific men and of the general public also to the pos¬ sibilities of scholarly taxidermy, when prop¬ erly encouraged and paid for/ The upward impetus then gained has already carried Ameri¬ can taxidermy beyond the original hopes of the founders of the society and the museums of America are now being filled with mounted vertebrates that in large measure are not only of real educational value but are also agreeable to the eye. No modern American museum is now complete withou-t a well-equipped depart¬ ment of taxidermy, in charge of a chief taxider¬ mist on a salary, which in 1880 would have been considered unattainable.

In a modern, high-class taxidermist, the first requisite is not a knowledge of methods in mounting, but the thorough education of the eye in animal forms and expressions. This must be secured by courses in drawing, model¬ ing, carving and painting. The skeletons and external muscles of animals must be well studied, the latter from life. Besides the mak¬ ing of numberless sketches from life, hundreds of live-animal photographs should be collected and arranged for reference.. Casts of heads and special parts of dead animals are of great importance and should be diligently collected. At all times must the natural history of the vertebrates be studied and kept in mind. When this preparatory work has been accomplished the aspirant for taxidermic honors must secure admission to the laboratory of some master- taxidermist and work with him to acquire a knowledge of methods.

A comparison of American with European taxidermy is of but passing interest, chiefly for the reason that without an international ex¬

hibition it is impossible to draw parallels of positive value. From three inspections of European zoological museums, made in 1876 1ˆ96 and 1902, it is the opinion of the writer that the best of our museum taxidermy is now decidedly in advance of the best to be found in Europe. The groups of mammals, great and small, that now are so intensely interesting to vis1 tors in the museums of Washington, New York Pittsburgh, Chicago, Milwaukee and at the University of Kansas, have no counterparts m Europe. The British Museum of Natural History at South Kensington contains a fine series of groups of birds, mounted with natural

accessories. In the museum of the Amsterdam (<Natura Artis Magistral there are a number of excellent groups of birds. In the museums of the American cities mentioned above the huge family groups representing the bison, moose, elk, caribou, musk-ox, deer, antelope, eland, zebra and other animals, all provided with carefully-studied natural accessories, con¬ stitute enduring monuments to the skill of American taxidermists.

Of all museum officers who have actively promoted the development of American taxi¬ dermy, Prof. Spencer F. Baird and Dr. G. Brown Goode stand first. As early as 1880 they advocated the attainment of perfection in results, regardless of time or cost. It was by their consent and co-operation that the National Museum set the pace in the development of large groups of mammals, which really began in 1887 with the group of American bison. In this connection honorable mention is due Prof. Henry A. Ward, founder of Ward's Natural Science Establishment, for the far-reaching in¬ fluence exerted by him for the improvement of taxidermic methods generally and the co¬ operation which he extended to the Society of American Taxidermists.

With the improvements noted in museum taxidermy, equal advances have been made in the class of what is known as custom taxidermy. The number of trophy heads of large mammals that are now mounted annually in the United States cannot be less than about 1,800. About two-thirds are heads of deer and the remainder consist of moose, mountain-sheep, caribou, elk, antelope, mountain-goat, buffalo, musk-ox and bear, about in the order named. Twenty-five years ago a finely-mounted head was a rarity, but to-day, outside of the workshops of ama¬ teurs, a badly-mounted head is seldom seen. The standards of excellence have risen very greatly. The demands of patrons are more

in¬ telligent and good work is better compensated than heretofore.

As the world's mammals, birds and other vertebrates decrease, museums multiply, and the desire to provide fine collections becomes more earnest and insistent. Taxidermy now offers a good field for a limited number of young men of real artistic instincts who can bring to it adequate education and training and unlimited capacity for hard work.

Some important American works on taxi¬ dermy should be enumerated: Hornaday, (Taxidermy and Zoological Collecting) (1892) ; Davie, (Methods in the Art of Taxidermy y (1894) ; Rowley, (Art of Taxidermy > (1900) ; Reed, C. K., (Guide to Taxidermy) (Worcester

1908).

W. T. Hornaday,

Director New York Zoological Park.

TAXING DISTRICT. See District.

TAXONOMY IN PLANTS, derived from the Greek words rafig taxis, meaning arrangement, and vo/zof, nomos, law. Called sometimes taxology. It is the study of classi¬ fication, especially from a biological aspect, and treating of the morphology of plant life. Ray (1703) divided the vegetable kingdom into two general classes : the Flowering and the Flower¬ less, basing everything on one single character¬ istic. Endlicher, a little over a century later,

formed the plant world into two groups : Cormophyta and Thallophyta, but the division was very imperfect and overlapping. Later we find two groupings by Linnaeus under the titles : Phanerogamia and Cryptogamia, the former having flowers with stamens and pistils, the latter flowerless, seedless and propagated by spores. But the designation Cryptogamia, still retained by a few, their generative method being no longer cryptic (occult) or hidden from our present advanced knowledge. Thallophyta, still remaining in general use, no longer de¬ scribes the class formerly considered by the ex¬ pression. Thus with ever-increasing knowl¬ edge of the life-workings of the plant realm bringing new facts we have had to change re¬ peatedly the system in taxonomy to bring the additional facts into close relation. And so the system of Ray gave way to the Endlicher, the latter to the greatly improved system of Lin¬ naeus (1735) with its 24 classes divided accord¬ ing to the number and disposition of the stamens, with variant orders according to the number of styles or

stigmas, etc. This method of systematization, proving its deficiencies ever more with a deeper investigation of plant nature, had to give way (1813) to the Candolle system, soon to be displaced by the Sachs method of classification with its seven divisions, Protophyta, Zygophyta, Oophyta, Carpophyta, Bryophyta, Pteridophyta, Phanerogamia. The Sachs system is much in use to this day, but the most recent classification of botan¬ ists, based on the great advances brought about by microscopic and other researches into the plant structure, which keep disclosing weaknesses of the former system, are the following four main classifying divisions :

(1) Thallophyta; (2) Bryophyta; (3) Pteridophyta; (4) Spermaphyta. The first three belong to the Cryptograms, the latter to the Phanerogams. It is an improvement gen¬ erally considered better suited to the enlarged range of the botanist's vision; but already criticism is creeping in and taxonomy in plants may be subjected soon authoritatively to a fur¬ ther revision.

(1) Thallophyta. This division includes all of the four primary classes, the uni-cellular organic growth, having root, stem and leaf un¬ defined. Under this head come the algae, fungi, bacteria and lichens. (See Botany).

(2) Bryophyta. These include the mosses and liverworts (hepatica) , with distinct sexual organs in some, but in this division (as above stated) is the liverwort and other plants of the thallus type. (See Bryophyllum) . (3) Pterido¬ phyta. These are often termed vascular cryptogams and include, chiefly, the ferns with their propagation by spores. Their stem, leaf and root are clearly defined. (See Pterido¬ phyta). (4) Spermophyta or Phanerogams. These are lately being divided into angiosperms and gymnosperms and the angiosperms are sub¬ divided into dicotyledons and monocotyledons. The Spermophyta are the highest division of plants including those having true flowers and seeds. They are for the most part land plants, while many of the former divisions are aquatic. Their female cell (oospore) is fertilized in propagation and, protected by the ovule, be¬ comes a seed, the seed formation being the characteristic of this group (termed also seed-

plants). Gymnosperms of this division have unisexual flowers, naked ovules with direct pollen fertilization, etc. (See Gymnosperm).

Angiosperms have a closed seed vessel (carpel) and other distinguishing characteristics. See Plants, Classification of.

TAY, ta, (1) a river in Scotland, in the county of Perth, formed by two head-streams, the one issuing from the northeast end of Loch Tay and the other from Loch Lyon, a small lake on the borders of Argyllshire. The two streams unite about two miles northeast of Loch Tay, whence the river flows past Aber- feldy, Dunkeld and Perth, at which last town it widens out into an estuary from one to three miles in breadth, becoming the northern bound¬ ary of the county of Fife. The whole length is 120 miles and the area of basin 2,250 square miles. Vessels of 500 tons ascend to New¬ burgh and those drawing nine feet to Perth. Its principal tributaries are the Tummel and Isla on the left and the Bran, Almond and Earn on the right. During the upper part of its course the Tay flows with a rapid current through a wild and highly romantic country and subsequently, after entering Strathmore, through the richest and finest valley in Scot¬ land. In the summer of 1878 a railway bridge spanning the estuary of the Tay at Dundee was opened for traffic, but on 28 Dec. 1879 13 spans, crossing the navigable part of the river, were blown down in a violent storm, a passenger train, which then happened to be crossing, be-

precipitated at the same time into the river. A second bridge, over two miles long, with 85 spans and carrying two lines of rail, was opened in 1887. (2) A loch in the county of

Perth, a picturesque sheet of water 15 miles long and about one mile broad ; receiving at its southwest end (near Killin) the Lochay and the Dochart and discharging at its northeast ehd at Kenmore by the Tay. It is 100 to 600 feet deep and is well supplied with fish. On its northwest shore rises Ben Lawers.

TAYABAS, ta-ya'bas, Philippines, (1) Pueblo province of Tayabas; on Tayabas River, five miles inland, 65 miles southeast of Manila. Under Spanish jurisdiction it was the capital of the province, and is the largest town. It is an important road centre and carries on a large trade. Pop. 15,000. (2) Province, form¬

ing the western part of southern Luzon ; bounded on the north by the Pacific Ocean' and Lamon Bay and Ambos Camarines, on the east by Ambos Camarines and the Visayan Sea, on the south by the Mindoro Sea, and on the west by Batangas and Laguna; area, about 5,000 square miles. The outline is very irregular; its extreme length from Point Piapi in the northwest to Point Pagsanjan in the southeast is 102 miles ; and the distance from the northeastern boundary to Sandoval

Point on the southwest is 47 miles. Its coasts are indented by three of the largest bays of the Philippines, Lamon on the north, Ragay on the east and Tayabas on the south. The province is generally mountainous, the main central extends from northwest to southeast, and this range sends out spurs on each side, rhere are numerous small rivers and streams, rhe soil of the valleys is fertile; on the lower levels rice, sugar and coffee are raised and grain on the higher levels ; a special product

is a seed called lumbang from which an oil is made ; the cocoanut is grown in large quanti¬ ties. The forests contain a variety of woods for building purposes, besides gum and resin trees; and large quantities of timber and forest products are exported. The mechanical indus¬ tries of this province are of considerable im¬ portance; the manufactures include hats, cigar cases and boxes and native fabrics ; there are also mills for extracting cocoanut oil and a number of boat-building yards for the con¬ struction of native boats. Stock-raising is also of some importance. The province has good communication by water with all parts of the Philippines, and is traversed by the main highway from Sorsogon to Manila; there are also several other roads and trails. The inhab¬ itants of the western part of the province are Tagalogs, those of the eastern part are Bicols. Civil government was established in March 1901, in accordance with the law of the Philip¬ pine Commission. Pop. about 150,000.

. TAYGETUS, ta-ij'e-tus, Greece, a moun¬ tain range running down the central peninsula of southern Morea. It is a steep and unbroken ridge rising in Hagios Elias to a height of 7,904 feet. It separated ancient Sparta from Messenia and was known in the Middle Ages as Pentedaktylon.

1 id lur, vjames; J3a.ya.ru, /Ymcn-

can writer: b. Kennett Square, Pa., 11 Jan. 1825; d. Berlin, Germany, 19 Dec. 1878. ‘He had a secondary education at West Chester and Unionville, and in 1842 was apprenticed to a printer in the former town, but did not serve out his apprenticeship. In 1844 he set sail for Liverpool, and during the next two years he traveled, chiefly on foot, in Great Britain, Bel¬ gium, Germany, Austria, Italy and France. He described his journeys for several American newspapers, his letters being collected and pub¬ lished on his return under the title (Views

/ˆoxˆur°TPe Seen with Knapsack and Staff (1846). In 1847 he received an appoint- ment on the staff of the New York Tribune and two years later went to California as Sp(ijlaJ corresPondent of that newspaper at

the

focn ,ˆetters being republished in i85U as /Eldorado, or Adventures in the Path

0 j i1ˆire,) *ˆ51 he was again in Europe, ???, , fo-rˆ returning to the United States in 1854 he visited Egypt, Asia Minor, India, Hong¬ kong, China and Japan. Among the literary results of this tour were (A Journey to Central O854) ; (1854) and (1844); <Rhymes oi 1 ravel, Ballads, and Other Poems) (1848);

/iociB\°°k Romances, Lyrics and Songs > (1851), and (Poems of the Orient *(1855); and in 1855 he published a collective edition of these under the title <Poems of Home and Travel. (Northern Travel* (1857) contains an account of a visit to Sweden, Denmark and Lapland. In 1862-63 he was secretary of le°-a- tion and for a time charge-d'affaires at Saint Petersburg, and in 1870 he lectured at Cornell University on German literature. He became United States Ambassador at Berlin in May

1. In addition to works already mentioned the following may be enumerated: (At Home and Abroad) (1859-62); (Byways and Europe0 (1869) ; a translation of Goethe's (1879), and (Essays and Notes) (1880). It is by his translation of <Faust,) one of the finest attempts of the kind in any literature, that Taylor is generally known; yet as an original poet he stands well up in the second rank of Americans. His (Poems of the Orient' and his Pennsylvania ballads com¬ prise his best work. His verse is finished and sonorous, but at times over-rhetorical. Con¬ sult the (Life and Letters) by his wife and H. E. Scudder (1884).

TAYLOR, Bert Leston, American author: b. Goshen, Mass., 13 Nov. 1866. His column headed (A Line o'Type or Two) in the Chicago Daily Tribune, conducted humorously, attracts much popularity. He has written (The Well in the Wood) (1904) ; (The Charlatans-* (1906) ; (A Line-o'-Verse or Two) (1911) ; (The Pipesmoke Carry' (1912) ; (Motley Measures) (1913) ; also two booklets, (The Bilioustine) and (The Book Booster' (1901).

TAYLOR, Brook, English mathematician: b. Edmonton, 18 Aug. 1685 ; d. 29 Dec. 1731. He was educated at Saint John's College, Cam¬

bridge; in 1712 chosen a Fellow of the Royal Society, and in January 1714 appointed its sec¬ retary. The most important of Taylor's works, published in 1715, is entitled (Methoduis Incre- mentorum Directa et Inversa.' It contains, among other theorems of less consequence, a celebrated one, which is hence called (Taylor's Theorem, ' the importance of which was first recognized by Lagrange, who proposed to make it . the foundation of the differential calculus. His other works include two treatises on linear perspective, besides contributions to the Philo¬ sophical Transactions.)

TAYLOR, Charles Fayette, American surgeon : b. Williston, Vt., 25 April 1827 ; d. Los Angeles, Cal., 25 Jan. 1899. He was edu¬ cated in the public schools and was graduated (1856) at the University of Vermont. He next settled in New York studying the new (Swedish movement' system which he learned from Dr. Roth in London. His specialization became treatment of the deformed and crippled in which he achieved a great reputation and founded the New York Orthopedic Dispensary. He invented the Taylor splint for spinal diseases, also the long extension hip splint. Among his works are (The Theory and Prac¬ tice of the Movement Cure,1* (Mechanical Treatment of Hip Joint Disease,' etc.

TAYLOR, Charles Henry, American jour¬ nalist : b. Boston, 14 July 1846; d. there 22 June 1921. He started as a printer and reporter and was private secretary to the governor of Massachusetts for three years. He served dur¬ ing the Civil War with the 38th Massachusetts Regiment and was lieutenant-colonel on the staff of Governor Claflin. He was member of

the legislature in 1872, and in 1873 became manager and editor of the Boston Daily Globe. He built up the property and made it one of the most influential journals of New England.

TAYLOR, Charles Jay, American artist : b. New York, 11 Aug. 1855. Attended College City of New York, afterward graduated at Law School, Columbia University (1874), LL.B., subsequently studied art, National Academy Design, Art Students League and in London and Paris. Has illustrated many books, contributed drawings to prominent periodicals and exhibited at the National Academy of De¬ sign, Pennsylvania Academy Fine Arts, World's Fair, Chicago ; Exposition Universelle, Paris ; Pan-American, Buffalo, where awarded medal ; Carnegie Institute, Pittsburgh, and at Panama-Pacific Exposition, San Francisco. He served on advisory committee on Fine Arts for the Panama-Pacific, representing Pennsylvania ; also was one of the Inter¬ national Jury of Awards, Section of Fine Arts, for the same exposition.

From 1911, pro¬ fessor of fine arts, Carnegie Institute of Technology, Pittsburgh.

TAYLOR, David Watson, American naval constructor: b. Louisa County, Va., 4 March, 1864. He was graduated at the United States Naval Academy in 1885, with the highest rec¬ ord ever made there. At Greenwich, England, • in 1885, he received the highest honors of the Royal College, repeating the record in 1888. He was made captain, United States navy, in 1901 and, by 1917, was promoted to rear-admiral. In 1914 he became chief constructor of the United States navy and chief of the Bureau of Construction and Repair.

TAYLOR, Edward Thompson, American Methodist missionary: b. Richmond, Va., December 1793; d. Boston, Mass., 6 April 1871. At the age of seven he ran away to sea, and followed the sea until the age of 17. During the War of 1812 he was captured on a pri¬ vateer of war, the Black Hawk, and was taken to England, being confined in Dartmoor prison. Being converted, he acted as chaplain in the prison and after his release, for a time was a tin and iron peddler, then a buyer of rags and a farmer. In 1819 he became a Methodist minister, and in 1828 was appointed missionary to the Seamen's Bethel in Boston, where he served for many years, attaining a wide repu¬ tation. Here he was called ((Father Taylor® and was greatly loved by the sailors. In his ser¬ mons, which he delivered in the common lan¬ guage of his day, he made free uise of nautical terms, and possessed a genial wit. In 1832 he visited Europe, and delivered many addresses. In 1842 he visited Palestine, and was chosen chaplain of the United States frigate Macedonia, when it sailed with relief in 1846, for famine stricken Ireland. Consult (Father Taylor the Sailor Preacher' (1872).

TAYLOR, Sir Frederick Williams, Cana¬ dian financier: b. Moncton, New Brunswick, 1863. He entered the Bank of Montreal in 1878, becoming successively assistant in¬ spector at head office (1897), joint manager at Chicago (1903), manager of London branch (1906), and general manager at Montreal (1913). He carried through huge banking loans to Canada during his London services.

He is a director of the Allen Line Steamship Company, Ltd., vice-president of the Canadian Bankers' Association, etc. For valuable serv¬ ices he was knighted in 1913.

TAYLOR, Frederick Winslow, American efficiency engineer: b. Germantown, Phila., 20 March 1856; d. 21 March 1915. Educated at Phillips Exeter Academy, but left on account of eyesight trouble, and was grad¬ uated (1883) at Stevens Institute of Technology. In 1878 he entered service at the Midvale Steel Company, Philadelphia, becoming, successively gang-boss, assistant foreman, foreman of machine shop,. master mechanic, chief draughts¬ man and (1889) chief engineer. In the latter year he commenced his notable career of effi¬ ciency expert reorganizing manufacturing plants (shop accounting and sales departments) of which the Bethlehem Steel Company, Cramps' Shipbuilding Company, etc., were ex¬ amples. He was the inventor of the Taylor- White process of treating modern high-speed tools, receiving a personal gold medal at Paris Exposition, 1900. Patents granted to him num¬ ber over 100. He was president of the Ameri¬ can Society of Mechanical Engineers, 1905-06. He wrote Concrete, Plain and Reinforced) (1905), in collaboration with S. E. Thompson; (Art of Cutting Metals) (1905) ; Principles of Scientific Management (1911) ; (Shop Man¬ agement (1911), and contributed numerous articles on his special topic to Proceedings of American Society of Mechanical Engineers.

TAYLOR, George, American statesman, one of the signers of the Declaration of Inde¬ pendence : b. Ireland, 1716; d. Easton, Pa., 23 Feb. 1781. Disliking the medical profession, for which he was destined, he came to America as a <(redemptioner,** and on arriving bound him¬ self for a term of years to an iron manufac¬ turer at Durham, Pa. His education and intelli¬ gence being discovered, his employer made him his clerk, and after his death Taylor married his widow and became master of the establish¬ ment. He was a member of the provincial as¬ sembly in 1764— 70, when he was a judge of the County Court and colonel of militia. In Octo¬ ber 1775 he was again elected to the provincial assembly and was active in the promotion of revolutionary measures. The action of some of the members of the Continental Congress the next year in refusing assent to the Declaration of Independence, led to the election of new members, 20 July 1776, of whom Taylor was one. He signed the Declaration on 2 August ; subsequently negotiated a treaty with several of the Indian tribes on behalf of the United States, and in March 1777 retired from Con¬ gress to private life.

TAYLOR, Graham, American sociologist: b. Schenectady, N. Y., 2 May 1851. He was graduated (1870) at Rutgers College and at the Reformed Theological Seminary, New Bruns¬ wick, N. J., in 1873. He was ordained for the Dutch Reformed ministry in 1873, becoming pastor at Hopewell, N. Y. From 1880-92 he filled the pulpit of the

Fourth Congregational Church, Hartford, Conn. He acted as profes¬ sor of practical theology at Hartford Theologi¬ cal Seminary from 1888-92, and, since 1892, has served as professor of social economics at the Chicago Theological Seminary. He was founder

of the Chicago Commons Social Settlement and has been resident warden since 1894. He is president of the Chicago School of Civics and Philanthropy and associate editor of The Sur¬ vey. He has written (Religion in Social Ac¬ tion* (1913), besides numerous editorial con¬ tributions to the Chicago Daily News, etc.

TAYLOR, Hannis, American diplomat: b. Newberne, N. C., 12 Sept. 1851. He was edu¬ cated at the University of North Carolina and was Minister to Spain, 1893-97. From 1892 he was professor of constitutional and interna¬ tional law at Columbia; special counsel for the United States government before the Spanish Treaty Claims Commission in 1902, and counsel for the United States before the Alaskan Boun¬ dary Commission in 1903. He published (The Origin and Growth of the English Constitution *; ˆInternational Public Law* (1902); (Jurisdic- tion and Procedure of the Supreme Court of the United States: The Science of Jurispru- dence) (1908) ; (The Origin and Growth of the American Constitution (1916); Cicero — A Sketch of His Life and Works *(1916) ; (Due Process of Law* (1916).

TAYLOR, Sir Henry, English poet and es¬ sayist : b. Bishop-Middleham, Durham, 18 Oct. 1800; d. Bournemouth, 27 March 1886. At 14 he entered the navy as midshipman, but re¬ turned after a few months. In 1817-20 he held a small appointment in London. Returning to his father's country home, he gave himself to serious study, and in 1822 wrote an article on Moore that was published in the Quarterly Review. He went to London, and in 1824 received a clerkship in the Colonial Office, with which he retained his connection for 48 years. He mingled with the intellectual life of the city, contributed to the Quarterly Review and wrote his first tragedy, (Isaac Comnenus,) in 1827. He was favorably reviewed by Southey, but failed to attract popular notice. From 1828 to 1834 he was engaged upon another poetic diama, (P hi lip van Artevelde, *his principal achievement in literature. It was formed upon Elizabethan models, and its style is marked by dignity and refinement. His other works in¬ clude (The Statesman * (1836), containing prose commentaries on official life and the con¬ duct of business; <Edwin the Fair* (1842), a histoi ical drama; (The Eve of the Conquest and other Poems *(1847); <Notes from Life* (1847) ; <The Virgin Widow, * a comedy after¬ ward called (A Sicilian Summer *(1856), and (Saint Clement's Eve* (1862), a romantic oo?13' aut°biography was published in

1. Consult his < Works *(1878), and Cor¬ respondence,* edited by Dowden (1888).

TAYLOR, Henry Ling, American sur¬ geon: b. New York, 17 March 1857. He was graduated (1877) at Sheffield Scientific School and obtained his diploma at the College of Phy¬ sicians and Surgeons (Columbia) in 1881. Like his father, Charles Fayette Taylor (q.v.), he specializes on orthopedic branches and was professor of orthopedic surgery (1902-17) at Post-Graduate Medical School and Hospital, New York. He is consulting orthopedic sur¬ geon at Mountainside Hospital, Montclair, N. J., and associate surgeon at the Hospital' for Kuptured and Crippled. He was president American Orthopedic Association in 1908. He

has written (Orthopedic Surgery for Practi¬ tioners J (1900).

TAYLOR, Henry Osborn, American au¬ thor : b. New York, 5 Dec. 1856. He was grad¬ uated from Harvard in 1878, received the de¬ gree of LL.B. at Columbia in 1881 and that of Litt.D. at Harvard in 1912. He has published 'Treatise on the Law of Private Corporations) (5th ed., 1902); (Ancient Ideals: A Study of Intellectual and Spiritual Growth from Early Times to the Establishment of Christianity) (2 vols., 2d ed., 1913) ; 'The Classical Heritage of the Middle Ages> (3d ed., 1912) ; 'The Mediaeval Mind) (2 vols., 2d ed., 1914) ; de¬ liverance — The Freeing of the Spirit in the Ancient World* (1915). Mr. Taylor is a mem¬ ber of the National Institute of Arts and Let¬ ters.

TAYLOR, Isaac (known as Taylor of Ongar), English Congregational clergyman and author: b. London, 1759; d. Ongar, Essex, 11 Dec. 1829. He was originally an engraver, but entered the ministry and was pastor at Colches¬ ter, 1796-1810 and at Ongar, Essex, 1811-29. He published many works, chiefly books for the young, among which are 'Advice to the Teens) ; 'Beginnings of British Biography * ; 'Beginnings of European Biography *; 'Biography of a Brown Loaf* ; 'Book of Martyrs for the Young) ; 'Bunyan Explained to a Child *; 'Child's Life of Christ*; 'Mirabilia; or, The Wonders of Nature and Art* ; 'Scenes in America, in Asia, in Europe, in Foreign Lands. >

TAYLOR, Isaac, English writer, son of the preceding: b. Levenham, Suffolk, 17 Aug. 1787; d. Stanford Rivers, 28 June 1865. His life was

almost entirely passed in retirement at the place where he died, and is only remark¬ able for the literary work which he produced. His first book is entitled 'Elements of Thought *(1823). It was succeeded by numer¬ ous others, most of which are of a partly philo¬ sophical, partly religious cast. The principal are 'The Natural History of Enthusiasm* (1829) ; 'The Natural History of Fanaticism) (1833) ; 'Spiritual Despotism * (1835) ; 'Physi¬ cal Theory of Another Life) (1836) ; 'Ancient Christianity *(1839-43) ; 'Loyola and Jesuit- ism) (1849) ; 'Wesley and Methodism) (1851) ; 'Restoration of Belief* (1855) ; 'World of Mind* (1857) ; 'Ultimate Civilization (1860), and 'Spirit of Hebrew Poetry> (1861). The first of these works is that by which his name is chiefly known, although originally published anonymously. The work on ancient Christian¬ ity was composed with the view of correcting the errors which the author believed many were likely to fall into in consequence of the appeals of the writers of the Oxford tracts to the au¬ thority and practice of the early Church.

TAYLOR, Isaac, English scholar, son of the author of 'The Natural History of Enthu¬ siasm J : b. Stanford Rivers, Essex, 2 May 1829; d. Settrington, Yorkshire, 18 Oct. 1901. He was graduated from Trinity College, Cambridge, and in the following year issued a translation of Bekker's 'Charicles.* He was ordained in 1857, and in 1860 published 'The Liturgy and the Dissenters.' In the latter year he became a curate in London, and in 1864 published the first of the works by which he is chiefly re¬ membered, 'Words and Places, or Etymologi¬

cal Illustrations of History, Ethnology and Geography. *In 1865-69 he held a curacy in a Bethnal Green parish, and his arduous labors there are described in 'The Burden of the Poor.* He became vicar of Holy Trinity, Twickenham, in 1869, and in 1875 w£s pre¬ sented to the rectory of Settrington, near Mal- ton, in Yorkshire, which he retained until his death. In 1879 he first propounded the theory of the Greek origin of runes in a work entitled Greeks and Goths: A Study on the Runes*; and he published in German a treatise 'Ueber den ursprung des glagolitischen Alphabets,* but his magnum opus, 'The Alphabet: an Account of the Origin and Development of Letters, *did not appear until 1883. In 1885 he was appointed canon of York. His other works include 'The Family Pen: Memorials, Biographical and Lit¬ erary, of the Taylors of Ongar* (1867); 'Etruscan Researches) (1874); 'Leaves from an Egyptian Note-Book) (1888); 'The Origin of the Aryans) (1889); and 'Names and their Histones: A Handbook of Historical Geog¬ raphy and Topographical Nomenclature)

(1896).

TAYLOR, Isaac Ebenezer, American phy¬ sician : b. Philadelphia, 25 April 1812; d. New York, 30 Oct. 1889. He was graduated from Rutgers. College in 1830, and in medicine from the University of Pennsylvania in 1834. He subsequently studied in Europe, settled in New York, and had charge of the department of women's diseases at the City, Eastern, North¬ ern and Demitt dispensaries for seven years each. In 1851 he was elected physician to Belle¬ vue Hospital, where he initiated important re¬ forms, secured the foundation of the hospital college, and became its head, 1861. He was subsequently president of the medical board of the hospital ; attending physician and head of the medical board of the Charity Hospital, and obstetrical physician to the Maternity Hospital. He was the first American to introduce uterine auscultation, helped introduce the hypodermic method of treatment by morphia and strychnia, and was the earliest in this country to use the speculum in diseases of women and children. He published a monograph on this subject in

1.

TAYLOR, James Knox, American archi¬ tect: b. Knoxville, Ill., 11 Oct. 1857. He took a special course (1877-79) in architecture at the Massachusetts Institute of Technology, then served in New York architects' office three and a half years. From 1882-92 he practised at Saint Paul and at Philadelphia from 1892-1905. In 1895 he was appointed senior draughtsman at the United States architect's office and then, till 1897, principal draughtsman. From 1897-1912 he was supervising architect and since 1912 has been director of architecture at the Massachusetts Institute of Technology, Boston.

TAYLOR, James Munroe, American edu¬ cator: b. Brooklyn, N. Y., 5 Aug. 1848; d. 19 Dec. 1916. Graduated at the University of Rochester in 1868, he was pastor of a Baptist church in South Norwalk, Conn., 1873-82, and at Providence, R. I., 1882-86. From 1886 to Febru¬ ary 1914 he was professor of ethics and presi¬ dent of Vassar College. He published 'Psy¬ chology *(1893) ; 'New World and Old Gospel* (1900); 'Practical or Ideal* ' (1901) ; 'Before

Vassar Opened *(1914); (Vassar: A History*

(1915).

TAYLOR, Jane, English poet and author, daughter of Isaac Taylor,

1759-1829 (q.v.) : b. London, 23 Sept. 1783; d. Ongar, Essex, 12 April t823. She was educated under the super¬ vision of her father and early displayed lit¬ erary ability. Her work, which was very suc¬ cessful, bears some similarity in thought to that of Cowper. Her first work was (Tlje Beg¬ gar Boy *(1804) and in conjunction with her sister Ann (Mrs. Gilbert, of Nottingham, 1783— 1824), she published (Original Poems) and (Hymns for Infant Minds. * Her other work includes (Display,* a didactic tale (1815); As¬ says in Rhymes) (1816), and (published posthumously) Contributions of Q. Q. to a Periodical* (1826) ; (Correspondence * (1825), etc. Consult Taylor, Isaac, (Memorials of the Taylor Family) (1867).

TAYLOR, Jeremy, English prelate and au¬ thor : b. Cambridge, 1613 ; d. Lisburn, County Antrim, Ireland, 13 Aug. 1667. After gradua¬ tion in 1630 from Caius College, Cambridge, he was ordained in 1634, attracted some atten¬ tion by his divinity lectures at Saint Paul's and was sent by Laud to Oxford, where he was admitted perpetual Fellow in 1636. He was presented to the rectory of Uppingham, Rut¬ land, in 1638, to that of Overstone, Northamp¬ tonshire, in 1643. By this time he had made much of a reputation by his casuistical dis¬ courses. In the civil war he was committed to the Royalist party. As chaplain in ordinary to the king, he accompanied the army and was taken prisoner by the Parlimentarians in the battle before Cardigan Castle (1645). Soon released, he remained in Wales, having found, as he later said, that the <(great storm® had Mashed the vessel of the church all in pieces.® While chaplain to Richard Vaughan, Earl of Carbery, at Golden Grove, Carmarthenshire, he did some of his best literary work, includ¬ ing (The Liberty of Prophesying) (1646) ; (Holy Living* (1650), and (Holy Dying) (1651). He was twice imprisoned at Chepstow, occasionally preached to small Episcopalian con¬ gregations in London and in 1658 was appointed to a weekly lectureship at Lisburn, County Antrim. In April 1660 he signed the ((declara- tion® of the Loyalists and in August following the Restoration was made bishop of Down and Connor. He found the diocese a troublesome one, owing to difficulties with the Presbyterian leaders, who refused to recognize Episcopal jurisdiction. At his first visitation he declared 36 churches vacant, their incumbents not having been episcopally ordained. Contrary to his pur¬ pose, he contributed greatly toward the estab¬ lishment of Loyalist Presbyterians in northern Ireland as an independent ecclesiastical or¬ ganization. Of his works, the best known is probably the (Liberty of Prophesying) — by which he meant expounding — a defense of tol¬ eration. He rests this plea for private judgment on the uncertainty and inadequacy of tradi¬ tion, the fallibility of any arbiter that may be

selected on points of controversy, and the diffi¬ culty of expounding the Scriptures. Coleridge thought the result of the argument was that (<so much can be said for every opinion and sect® that appeal must be made to <(some posi¬ tive jurisdiction on earth.® Perhaps Taylor's

was merely a ((legal settlement.® At any rate, it is otherwise inconsistent with his procedure in Ireland. But he was at his best not as an accurate theologian or polemic but as a preacher of righteousness. His literary genius is gen¬ erally thought to be seen to best advantage in his sermons. They do not lack rhetorical faults — redundancy, diffuseness, a burdensome ex¬ tent of quotation and illustration; but they are always eloquent, with a certain vividness, dig¬ nity and solidity for which many critics have been unable to find an equal in Enelish prose. His devotional works, inspiring for their deep piety, are also highly valued for their useful¬ ness. Next to the (Liberty of Prophesying> they are most famous among Taylor's writ¬ ings and now the most widely read. There are collected editions by Bishop Heber (1820- 22) and by Eden (1847-54). (See Holy Liv¬ ing; Holy Dying). Consult Coleridge's (Literary Remains> ; Hunt, (Religious Thought in England) (1870) ; Tulloch, (Rational The¬ ology } (1872); Barry, (Classic Preachers)

(1878) ; Dowden, (Puritan and Anglican> (1901); (1904).

TAYLOR, John, English poet: b. Glouces¬ tershire, 24 Aug. 1580; d. London, 25 July 1653. When young he was taken to London and apprenticed to a waterman, hence the title of <(water-poet,® by which he is commonly known. He was at the taking of Cadiz, under the Earl of Essex, in 1596, and afterward visited Germany and Scotland. At home he was many years collector for the lieutenant of the Tower of London and his fees of the wines from all the ships which brought them up the Thames. When the civil war broke out he retired to Oxford, where he kept a common victualing house, and wrote pasquinades upon the Round- heads. He afterward kept a public house at Westminster. Certain of his works are pub¬ lished under the title <A11 the Works of John Taylor, the Water-Poet, being Sixty and Three in Number, collected into one volume by the author, with sundry new Additions, corrected, revised, and newly imprinted) (1630). His pieces were subsequently increased to more than double that number. They are not destitute of natural humor and of the jingling wit which prevailed so much during the reign of James I. As a mirror of the coarse manners of his times they are invaluable to the historian and antiquary.

TAYLOR, John, Mormon president : b. Milnthorp, Westmoreland County, England, 1 Nov. 1808; d. Salt Lake City, Utah, 25 July 1887. He was born of parents professing the faith of the Church of England, but while a youth became a Methodist local preacher. In 1832 he emigrated to Canada and in 1835 was converted to the Mormon faith during the mis¬ sionary tour of Porley P. Pratt. He was or¬ dained a high priest by Joseph Smith in 1837 and in 1840 went as a Mormon missionary to various parts of the British Isles. The follow¬ ing year he returned and settled at Nauvoo, Ill., where in 1844, in company with several other Mormon leaders, charges of sedition and disloyalty were brought against him. The Carthage jail where the prisoners were con¬ fined was attacked by a mob, two of his com¬ panions were killed and he was severely

wounded. Returning from a second mission to England in 1846 he went to the new Mormon settlement in Salt Lake City and in 1849 was elected an associate judge of the Mormon State of Deseret. He subsequently translated and published the (Book of Mormon) in French and German. In 1854 he was elected a mem¬ ber of the legislative council and the next year began a mission in New York, published The Mormon and took charge of Mormon follow¬ ers in the East. From 1877 to 1880 he was president of the Twelve Apostles and in the latter year organized the first presidency of the Church anew and took the chief place himself. In March 1885 he was among those indicted by a Federal grand jury under the Edmunds Law ; but remained in concealment until his death.

TAYLOR, John Louis, American jurist: b. London, England, 1 March 1769; d. Raleigh, N. C., 29 Jan. 1829. Arriving in this country in his 12th year he gained an education at William and Mary College, Virginia, and was admitted to the bar after reading law with¬ out tuition. He settled at Fayetteville and be¬ came member of the legislature (1792-95). Moving to Newbern (1796) he was appointed (1798) judge of the Superior Court, a posi¬ tion he held for 20 years, being chief justice 10 years of the time. In 1818 he was elected as the first chief justice of the Supreme Court of North Carolina. He was appointed (1817), jointly with Judge Henry Potter, to revise the statute laws of the State, which caused publication of the work (Potter's RevisaP (1821), which work he continued and pub¬ lished (1825), known as (Taylor's RevisalP He also wrote (Treatise on Executors and Administrators) (1825).

TAYLOR, Mary Imlay, American novel¬ ist: b. Washington, D. C. She has published (An Imperial LoveU ; (A Yankee Volun¬ teer (1898) ; ‘The Cardinal’s Musketeer (1900) ; The Cobbler of Nimes) (1900) ;

(Anne Scarlett *(1901); (Little Mistress Good Hope* (1902) ; The Rebellion of the Princes *(1903) ; (On the Red Staircase) (1906) ; (The Impersonator (1906); (My Lady Clancarty) (1907) ; The Reaping) (1908) ; (Caleb French * (1910) ; (The Long Way* (1913). She is also the author of the photoplays, (The Plough¬ shareˆ, (Friend Wilson*; ‘Daughter,* etc.

TAYLOR, Nathaniel William, American Congregational clergyman: b. New Milford, Conn., 23 June 1786; d. New Haven, Conn., 10 March 1858. He was graduated at Yale in 1807 and five years later became the pastor of the First Congregational Church at New Haven, in which position he continued until 1822, when he resigned to become professor of theology at Yale. This chair he held during the remainder of his life. . He maintained the “New Haven theology,** and especially on the doctrine of total depravity, which was regarded as heretical, led him into a controversy with the less liberal branch of the Congregational church in 1828-30. His works were edited and published by Noah Porter (1858-59).

TAYLOR, Philip Meadows, English mili¬ tary officer and author: b. Liverpool, 25 Sept. 1808; d. Mentone, France, 13 May 1876. He entered the Nizam’s army in India in 1824 and

in 1841 was made administrator of the state of Shorapore, subduing its rebellious ruler. He rendered valuable service in keeping order during the berar mutiny in 1857, for which he was promoted to the rank of colonel. He pub¬ lished Confessions of a Thug) (1839) ; <Tara) (1863); (Ralph DarnelP (1865); ‘Manual of the History of India *(1870) ; ‘A Noble Queen* (1878), and other works. His autobiography was published in 1877.

TAYLOR, Richard, American soldier, son of Zachary Taylor (q.v.) : b. New Orleans, La., 27 Jan. 1826; d. New York, 12 April 1879. He was graduated from Yale in 1845, after which he went to his father’s camp on the Rio Grande and was present at Palo Alto and Resaca de_ la Palma. He sat in the Louisiana senate in 1856— 60 and was a member of the Louisiana Seces¬ sion Convention. He aided in the organization of the Confederate troops, commanded a brig¬ ade under “Stonewall** Jackson and fought at Front Royal, Middletown, Winchester, Stras- burg, Cross Keys, Port Republic and also in the seven days’ battle before Richmond. He was then promoted major-

general and assigned to the command of Louisiana, where he suc¬ ceeded in strengthening the Confederate posi¬ tion, an advantage which was lost by the fall of Vicksburg in 1863. On 8 April 1864 he met and defeated General Banks at Sabine Cross- Roads, but on the following day lost his advantage and was in his turn defeated. He was pro¬ moted lieutenant-general in 1864 and placed in command of the Department of Alabama and Mississippi. After the surrender of Lee and Johnston he capitulated to General Canby at Citronelle, 8 May 1865. He published destruc¬ tion and Reconstruction (1879).

TAYLOR, Robert William, American physician: b. London, England, 11 Aug. 1842; d. 1908. He was graduated at the College of Physicians and Surgeons, New York (1868) and started practice in that city. He was pro¬ fessor of diseases of the skin at Woman's Medi¬ cal College, New York, and in the medical department of the University of Vermont; also surgeon in the venereal department of Charity Hospital, Bellevue Hospital Dispensary, New York Dispensary, etc. He wrote 'A Practical Treatise on Sexual Disorders of the Male and Female) (New York, 3d ed., 19053.

TAYLOR, Rowland, English martyr: b. Rothbury, Northumberland; d. Hadleigh, Suf¬ folk, 9 Feb. 1555. He was graduated at Cam¬ bridge University and appointed by Cranmer, to whom he was domestic chaplain, rector of Hadleigh and he became archdeacon of Exeter and a canon of Rochester. Under Mary he was imprisoned, as a heretic, for more than a 12-month and on being condemned to the stake suffered at Hadleigh. Consult Cooper, (Athenae Cantabrigienses) (1858).

TAYLOR, Thomas, English scholar: b. London, 15 May 1758; d. Walworth, 1 Nov. 1835. He was educated (with the idea of be¬ coming a Dissenting minister) at Saint Paul's School, London, but entered a banking house as clerk, and subsequently served for several years as assistant secretary to the Society for the Encouragement of Arts, Manufactures and Commerce. On the condition of his devoting himself to literary work for the last 40 years

of his life he received during that period a pension of $500 a year from his friend, W. Meredith, who also defrayed the expenses of publishing his translation of <Aristotle) in 10 volumes (1806-12). His edition of (Plato) in English (1804) was published at the expense of the Duke of Norfolk, who locked up nearly the whole edition in his

own house, where it remained until 1848 when it was sold by auc¬ tion. Taylor's works comprise about 60 volumes and include treatises on arithmetic and geom¬ etry and translations of Proclus and Plotinus. Opinions differ as to the exactness of his scholarship, but he well deserved his title of "Platonist® and did good service to British philosophy and literature by introducing to the public as completely as possible the masters of Greek thought in an English garb.

TAYLOR, Sir Thomas Wardlaw, Cana¬ dian jurist: b. Auchtermuchty, Fifeshire, Scot¬ land, 25 March 1833. He was educated at Edinburgh University, removed to Canada and in 1858 was admitted to the bar of Upper Canada. He was master in chancery, 1872-83 and puisne judge of Queen's Bench of Mani¬ toba, 1883-87. From 1887 to 1899 he was chief justice of Manitoba and administrator of the government of that province in 1890 and 1893. His specialty is equity jurisprudence and he has published Commentaries on Equity Juris- prudence) (1875) ; Chancery Statutes and Orders) ; 'Public Statutes Relating to the Presbyterian Church. >

TAYLOR, Tom, English dramatist and journalist: b. Bishop-Wearmouth (Sunder¬ land), 19 Oct. 1817; d. Wandsworth, 12 July 1880. He was educated at the University of Glasgow and at Trinity College, Cambridge, graduating from the latter in 1840. He was elected a Fellow of his college in 1842 and in 1845-47 he was professor of the English lan¬ guage and literature in University College, London. Called to the bar in 1846, he was on the northern circuit for a time, but in 1850 was appointed assistant secretary, in 1854 sec¬ retary to the board of health. On the forma¬ tion of the local government board he was made secretary of the sanitary department and when his post was abolished in 1871 he re¬ tired with a pension. He engaged in journalis¬ tic work at an early stage in his career and in 1844 began his connection with Punch , which continued until his death; in 1874 he succeeded Shirley Brooks as editor. He was the author of a large number of successful plays, including 'To Parents and Guardians) (1845) ; 'Masks and Faces) (1852), in collabo¬ ration with Charles Reade, 'To Oblige Benson> (1854), an adaptation from the French; 'Our American Cousin > (1858), first produced at

Laura Keane's theatre. New York, when Sothern created the character of Lord Dun¬ dreary; 'New Men and Old Acres *(1859), partly by A. W. Dubourg; 'The Overland Route) (1860) ; 'The Ticket-of-Leave Man> (1863), based upon a French work; 'The Fool's Revenge* (1869), based upon Hugo's 'Le Roi S'Amuse) ; 'Twixt Axe and Crown> (1870), adapted from the German; 'Joan of Arc* (1871); 'Lady Clancartv) (1874), and 'Settling Day) (1877). He wrote a striking poem on the

death of Lincoln eulogizing the martyr

and atoning for the past critical offenses of Punch.

TAYLOR, William, American Methodist bishop: b. Rockbridge County, Va., 2 May 1821 ; d. Palo Alto, Cal., 18 May 1902. He became a Methodist preacher in 1842, served as an itinerant until 1849 and was then sent as mis¬ sionary to California. He was engaged in that field until 1856 after which he spent five years in Canada and in the eastern States. In 1862 he went out as an evangelist and continued his work for many years in Australia, Asia,. Africa and South America. He was particularly suc¬ cessful in his work among the Kaffirs in South Africa, where he established numerous inde¬ pendent mission churches and in 1884 was elected missionary bishop for Africa. He is said to have visited in the course of his mis¬ sionary work every English-speaking country in the world. After his elevation to the office of bishop he went to Central Africa where he established a chain of 36 mission stations along the Kongo. He published ‘Seven Years Preach¬ ing in San Francisco) (1856); ‘Infancy and Manhood of Christian Life> (1867) ; ‘The Story of My Life *(1882); ‘Pauline Methods of Missionary Work* (1889), etc.

TAYLOR, William Ladd, American ar¬ tist and illustrator : b. Grafton, Mass., 10 Dec. 1854. He was educated at Worcester, Mass., and studied art at Boston and New York schools and under the tuition of Baulanger and Lefebvre, Paris, from 1884-85. Since that time he has been painter and illustrator. Some of his best works are Selections from Long¬ fellow’s poems; a series of illustrations de¬ picting 19th century New England, his ‘Pioneer West) series, ‘Psalms) series, pictures from the Old Testament, etc.

TAYLOR, William Mackergo, American

Congregational clergyman : b. Kilmarnock, Scotland, 23 Oct. 1829; d. 8 Feb. 1895. He was graduated at the University of Glasgow and studied theology at Divinity Hall of the United Presbyterian Church, Edinburgh, till 1852. < He then was ordained and became pastor at Kilmaurs till his fame called him (1855) to a new congregation at Bootle, Liverpool, where he preached till 1871, obtaining a great and growing congregation. In the latter year he accepted the invitation to fill the pulpit of the Rev. Dr. Storrs, Brooklyn, for a vacation season, which caused his call to the Broadway Tabernacle Church, New York, where he gained great popularity. He wrote much for the Scottish Review and over 30 of his works were published. He was for four years edi¬ tor-in-chief of Christian at Work. 'Yale and Amherst (1872)

conferred the degree of D.D. and (1883) the College of New Jersey gave him its LL.D. diploma.

TAYLOR, Zachary, 12th President of the United States: b. Orange Qounty, Va., 24 Sept. 1784; d. 9 July 1850. His father, Col. Richard Taylor, served under Washington and he held a number of important offices in Kentucky where he migrated soon after the birth of Zachary. Young Taylor grew up in the vicinity of Louisville in the midst of its exciting fron¬ tier life. In 1808 aroused by the Chesapeake outrage, Taylor asked for a commission in the army and in May was commissioned first

lieutenant in the Seventh United States infantry. In 1812 he was made a captain and in the War of 1812 gained distinction in defeating an Indian attack on Fort Harrison, for which success he was breveted a major. In May 1814 he received a regular commission as major but left the service at the close of the war on being reduced to the rank of captain. He re-entered the army in 1816 and in 1819 was promoted to a lieutenant-colonelcy. For the next few years he was stationed at differ¬ ent frontier posts but in 1832 during the Black Hawk War, as colonel, received the surrender of the Indian chieftain. In 1832 he was ordered to Florida in the Seminole campaign and at the battle of Okeechobee (25 Dec. 1837) won a decisive victory over the Indians, for which he was breveted a brigadier-general. Taylor spent the next four years in Florida and was then given command of the First Department of the army with headquarters at Fort Jessup, La. On 28 May 1845 Taylor, in command of the army of the Southwest, was ordered to hold himself in readiness to defend Texas from a possible invasion should the latter State ac¬ cept the terms of annexation. On 30 July 1845 he was ordered to ((occupy, protect and de¬ fend Texas,® and to approach the Rio Grande which was ((claimed to be the boundary be¬ tween the two countries® (Texas and Mexico). At the same time he was cautioned to keep away from the Mexican settlements and posts. In August, Taylor selected a position at Corpus Christi on the Nueces. Then followed a series of ambiguous orders from the War Depart¬ ment commanding him to check any Mexican army endeavoring to cross the Rio Grande or any attempt to do so. Taylor reported there was no concentration of Mexicans on the Rio Grande nor any signs of war; but, beginning to understand what the administration de¬ sired of him, asked for definite orders to ad¬ vance. This the War Department refused to give and for a few months

a delay ensued while the administration renewed its negotia¬ tions with the Mexican government. At last, in obedience to instructions from Washington, on 11 March 1846 Taylor began his advance from Corpus Christi to the Rio Grande. On the 28th he arrived opposite the Mexican town of Matamoras and began the construction of Fort Texas, afterward called Fort Brown, upon the present site of Brownsville. Taylor blocked the mouth of the Rio Grande with a view of cutting off all supplies from Matamoras and thus forcing the Mexican troops stationed there either to withdraw or to assume the offensive. On 12 April General Ampudia summoned him to retire beyond the Nueces, and with Taylor's refusal to do so the first conflict occurred on 24 April when a party of dragoons were am¬ bushed by the Mexicans. President Polk at once sent a message to Congress recommend¬ ing a declaration of war, asserting that (<Mexico has passed the boundary of the United States, has invaded our territory and shed American blood upon the American soil.®

The war on Mexico began with the advance of Taylor's forces. On 8 and 9 May, Taylor defeated the Mexicans at the battle of Palo Alto and Resaca de la Palma and forced them to cross the Rio Grande. Following in quick pursuit, Taylor occupied Matamoras (18 May)

With the refusal of Mexico to negotiate, Polk determined to conquer the northern provinces and in August, Taylor resumed his advance and after a three days' battle captured the city of Monterey (21-23 September). By this time Polk began to distrust Taylor on account of his supposed Whig affiliations. It was em¬ barrassing for a Democratic administration to have a Whig general reaping all the glory, and with a view toward checking his operations Polk detached most of Taylor's experienced troops for the intended advance upon Vera Cruz under Gen. Winfield Scott. Santa Anna, the Mexican commander-in-chief, learning of Taylor's weakened condition rapidly concen¬ trated 20,000 men and marched northward to crush him. To retire to the Rio Grande meant a loss of all the prestige so far gained and, therefore, Taylor decided to fight. He took a position at the hacienda Buena Vista, five miles south of Saltillo. Here after three unsuccess¬ ful attempts by Santa Anna, Taylor gained the most decisive victory of the whole war and remained in undisputed possession of the region. Taylor's brilliant victory, handicapped as he had been by the authorities in Washing¬ ton, suggested him as a possible Presidential candidate to the Whig politicians. Thurlow Weed learned from the <(general's brother that Taylor had always been an admirer of Clay and preferred home-made goods to foreign im¬ portations.® Taylor meetings became the fashion throughout the country; he was nomi¬ nated at public assemblies in Ohio, Kentucky, Virginia, Pennsylvania

and elsewhere, and al¬ though he had never even voted and had no views on political topics, supported by Weed, Crittenden and Stephens, he gained the nomi¬ nation at the Whig Convention (May 1848) over the claims of Webster and Clay. In the succeeding campaign Taylor carried eight slave States while his opponent secured seven. The one all-absorbing question after the inaugura¬ tion of Taylor was the question of what should be done with slavery in the Territories. Both parties, in the campaign had side-stepped the issue, the Whigs having adopted no platform and the Democrats having trusted to the well- known views of their candidate, Lewis Cass. President Taylor, although master of a planta¬ tion in Louisiana, admitted anti-slavery leaders in the Whig party to his counsel and William H. Seward became his confidential adviser. The Wilmot proviso, the question of the or¬ ganization of the Territory of Oregon and the admission of California already had demanded immediate attention. Accordingly the first message of the President was awaited with interest. Taylor already had made up his mind to recommend the admission of California as a free State and his fatherly message breathed with devotion to the Union. But Clay and Webster determined to take matters into their own hands and in January Clay offered his plan of compromising the sectional issue. Tay¬ lor characterized the Territorial portion of Clay's measures as the <(Omnibus Bill® and was preparing to oppose them when he died on 9 July 1850.

Bibliography.— Stoddard, W. O., <Zachary Taylor) ; Howard, O. O., (Zachary Taylor) (in (Great Commanders Series,* 1892).

R. C. McGrane.

TAYLOR, Pa., town in Lackawanna County, on the Central Railroad of New Jer¬ sey and the Delaware and Lackawanna Rail¬ road. It is situated three miles southwest of Scranton, its chief industries being coal-min¬ ing and silk-mills. Pop. in 1900 was 4,215 and in 1920, 9,876.

TAYLOR, Tex., town in Williamson County, on the Missouri, Kanasas and Texas and the International and Great Northern rail¬ roads, about 30 miles northeast of Austin, the capital of the State. It is in an agricultural and stockraising section. The chief manu¬ facturing establishments are cottonseed-oil mills, cotton-compresses, railroad

shops, flour and planing mills. There are about 75 manu¬ factories, with an annual output of over $500,- 000. There are good banking facilities and newspapers. There are large shipments of grain, vegetables, cotton products, fruit and livestock. Pop. 5,965.

TAYLOR INSTITUTION, Oxford Eng¬ land, connected with the university, is de¬ signed mainly for the promotion of the study of modern European languages. It owes its foundation to a bequest of Sir Robert Taylor. The building belonging to it was erected in 1848. The institution comprises four teacher- ships of modern European languages and a library, and there are in connection with it a scholarship and an exhibition. It is under the management of nine curators, all of whom must be members of convocation. The library is open free to all members of the university, and other literary persons may be admitted by special permission. The curators of the in¬ stitution have also the administration of a fund bequeathed by William Thomas Horner for the encouragement of the study of the Polish and other Slavonic languages.

TAYLOR UNIVERSITY, located at Up¬ land, Ind. The forerunner of the uni¬ versity was the Fort Wayne Female College, organized in 1846 at Fort Wayne, Ind. In 1852 this college united with the Collegiate In¬ stitution at the same place, and became a co¬ educational school. The name was changed to Taylor University in 1890. In 1893 a new charter was obtained, and the university moved to its present site, the citizens of Upland donating 10 acres of ground and $10,000. It is under the control of the National Associa¬ tion of Local Preachers of the Methodist Episcopal Church. It was named for Bishop Taylor, the first Methodist missionary bishop to Africa, who had a part in its organization. The departments of the university are the col¬ lege of liberal arts, the academy, commissioned by the State as a high school, the Reade theological seminary, the school of music, the school of expression, the normal department and the commercial department. The college offers two courses, classical and scientific, lead¬ ing respectively to the degrees of A.B. and B.S. A part of the work of each course is elective. The theological school offers two courses ; the English Bible and the seminary course, leading to the degree of B.D. A very strong school of music accredited by the State Teachers' Training Board has a separate building. The course in expression requires four years. . The commercial department

offers two courses : bookkeeping and stenog¬ raphy. The spirit of the college is markedly religious, a number of graduates every year become missionaries; and the students' reli¬ gious organizations are strong. The library contains 7,000 volumes. The students average

annually 340 and the faculty 19.

TAYLORVILLE, Ill., city, county-seat of Christian County, on the South Fork of the Sangamon River, and on the Wabash and the Baltimore and Ohio Southwestern railroads, about 24 miles southeast of Springfield and 27 miles southwest of Decatur. It is in an agri¬ cultural and coal-mining region, and has con¬ siderable manufacturing interests. There is an iron foundry, paper mill and manufactories of wagons, agricultural implements, chemicals, brick and tile. The chief shipments are coal, hay, livestock and manufactures. There are eight churches, a high school, graded schools and a public library. There are three banks, one national with a capital of $80,000, and two private banks. Pop. (1920) 5,806.

TAYRA, tl-ra, a brown, elongated, weasel¬ like fur-bearer (Galictis barber a) of Mexico and South America, which sometimes gathers in large bands. It has a long bushy tail.

TAYTAY, tl-ti', Philippines, (1) pueblo, province of Paragua, island of Palawan, on the northeast coast on Taytay Bay. It is the chief town of the province and is protected by a fort mounting several guns and capable of accommodating a garrison of 700. Agricul¬ ture and fishing are the chief industries. Pop. (estimated) 7,420. (2) Pueblo, province of

Rizal, Luzon, 10 miles east of Manila. Pop.

6,800.

TAYUG, ta-yoog', Philippines, pueblo, province of Pangasinan, Luzon, in the extreme northeast of the province, near the Agno River, 34 miles east of Lingayen. It is on the high¬ way from San Quintin to Asengan. Pop.

19,612.

TCHAD, chad, or CHAD, Africa, a large lake in the Sudan, situated at the common junction of Kamerun, British Nigeria and French Sahara, lat. 13° N., long. 14° E. It lies about 750 feet above sea-level. Its area during the rainy season is about 30,000 square miles, but in the dry season it shrinks to less than 7,000 square miles, and is then surrounded by vast marshes, while the remaining water is very shallow. The water is drinkable, although the lake has no apparent outlet ; it appears to be gradually drying up and liable eventually to be a desert. Rarely is more than 20 feet of water to be encountered, and the marshy areas increase in size.

TCHAIKOVSKY, chl-kof'ske, Peter, Ilich, the greatest of Russian composers : b. Votinsk, government of Viatka, 7 May (not 25 Dec.) 1840; d. Saint Petersburgh, 6 Nov. 1893, of cholera. His father, a mining engineer, had no intention of making a musician of him, but had him educated at the Technological In¬ stitute in Saint Petersburg, after leaving which he obtained a post in the Ministry of Justice. But Peter was a gifted amateur, whose playing in social circles was much appreciated. In 1861 he wrote to his sister: (<I told you I was studying the theory of music with considerable

success. It is generally agreed that with my uncommon talents (I hope you will not take this for mere boasting) it would be a pity not to try my luck in this career.® Shortly there¬ after he entered the Conservatory, where he soon attracted the attention of Anton Rubin¬ stein, who relates that once he gave the young man a theme and asked him to write a set of variations on it. He expected about a dozen, but Tchaikovsky brought him over 200! From Rubinstein he also took lessons in orchestra¬ tion; the instruments on which he practised were the piano and the organ ; also the flute, of which he afterward made such admirable use in his (Nutcracker Suite *and other works. His talent was ere long generally appreciated; in 1865 Laroche, afterward an eminent critic, referred to him as (<the future star of Russian music" ; this led to his being sent to Moscow in 1866 to teach the theory of music at the newly opened Conservatory. Although he disliked giving lessons, he proved a conscientious and useful teacher. Thenceforth he devoted most of his spare time to composing; but although he had ((an almost feminine craving for ap¬ proval and encouragement,® his experiences were little more than a series of disappoint¬ ments. His worldly prospects nevertheless steadily improved and in 1877 he married, to the surprise of his friends. The hasty mar¬ riage had a tragic sequel. The union was not a happy one, and the pair soon separated. The composer was so despondent that he attempted to commit suicide in such a way as to avoid scandal by standing up to his chest in the icy river one night, in the hope of catching a deadly cold. In the following year another woman influenced his life, in a happier way. He did not know her, and she preferred to keep her identity concealed, but she put aside for his benefit a sum of money which made it possible for him to give up his Conservatory classes and save his energy for his creative work. Many master-works now came from his pen. He had never cared for society and de¬ tested city life, so his friends were not sur¬ prised when, in 1885, he took a house near the village of Klin, where he was isolated as com¬ pletely from the world as was Wagner when he wrote his*

(Meistersinger score in his villa near Lucerne. He became known as <(the Hermit of Klin,® and refused to see any one but friends and such musicians as he chose now and then to invite for a party. By constitution he was strong, wiry and not easily fatigued; he was fond of outdoor exercise and many of his musical ideas came to him on his walks. He aged much as he neared his 50's; his scant hair grew white and his face lined. In May 1891 he visited America and gave concerts in New York and other cities. Two years later he conducted some of his works at Oxford and received the degree of doctor of music from the university. In the autumn of 1893 the world was startled by the news of his death. He succumbed to an attack of cholera, after a short illness. There were rumors of his having committed suicide, but his friend and biographer Kashkin discountenances them.

The suicide rumors were strengthened by the character of his last symphony, which is now known throughout the world as the Bathetic,* the most lugubrious of all sym- vol. 26 — 20

phonic works. A more heart-rending wail of grief than its adagio lamentoso has never been heard; and as this slow movement, contrary to all precedent, closes the symphony, it seemed like an intentional farewell to the world. <(This music,® says Huneker, (<is a page torn from Ecclesiastes ; it is the cosmos in crape.® Schubert once said that the world liked best those of his songs which were born of sorrow. It was the doleful sixth symphony that made Tchaikovsky famous. Seldom has a work so great and deep won so instantaneous a success

a success so remarkable as to unduly over¬ shadow his other five symphonies except, to some extent, the fifth, whidi resembles the sixth in mood and music. Like Beethoven, Tchaikovsky is greatest in his orchestral works, which include, beside the six symphonies, seven symphonic poems: (The Tempest' ; 'Francesca da Rimini*; 'Manfred*; (Romeo and Juliet*; 'Hamlet* ; 'Fatum *; (Le Voyevode.* In these, which contain some of his best and most mature music, he manifests his sympathy with Liszt and modern program music. Among his other orchestral works the three that have become most famous are the c 1812 * overture, the 'Marche Slave *and the 'Nutcracker Suite,* which contains the best musical numbers of one of his three ballets. His 11 operas are much less modern in spirit and structure than his symphonic works and the only one of them that has attracted much attention outside of Russia is the fourth, (Eugene Onegin. *It has been said of his operas that "just as the gra¬ cious beauty of Italian melody seemed doomed to pass away under a new dispensation, it was reincarnated in the works of this northern composer.® There is much beautiful melody also in some of his 100 lyric songs; the best- known of*

them are the (Spanish Serenade, ‘None but a Lonely Heart, *(Why so Pale are the Roses.* Not a few of the songs are pot¬ boilers and the same is true of many of his pianoforte pieces, the best of which, however, deserve to be better known. Pianists neglect them because of their awkward technique. Three pianoforte concertos, a violin concerto, a string sextet and other pieces of chamber music must be added to the list of his com¬ positions. His work as a whole is characterized by a remarkable variety; now it is classical, even old-fashioned, now ultra-modern; now Russian, now cosmopolitan. German critics have described his symphonies as rough, patchy, barbarous, nihilistic ; but music lovers the world over are showing a keener insight and are learning to love this Russian music as they learned Jo love the Polish music of Chopin, the Hungarian of Liszt, the Norwegian of Greig. The authoritative life of Tchaikovsky has been written by his brother Modest. A shorter volume (in English) by Rosa New- mardh, includes extracts from his critical writings and diaries. Consult also Kashkin, Reminiscences*; Huneker, (Mezzotints in Modern Music* ; Riemann, ‘Geschichte der Musik seit Beethoven. *A (Catalogue Them- atique* of the compositions is issued by Jur- genson, Moscow.

Henry T. Finck,

Musical Editor New York ‘ Evening Postd

TCHEKHOV, Anton P. See Chekhoff; Cherry Orchard, The; and Sea Gull, The.

TCHIKUN, an American Indian tribe of the Apache (q.v.) family, formerly residing at Hot Springs, N. Mex.

TE DEUM LAUDAMUS, te de'iim la-da'- mus, or more abbreviated, TE DEUM, is the beginning of the hymn of praise usually as¬ cribed to Saint Ambrose and Saint Augustine, although it cannot be traced farther back than the end of the 5th century, while Saint Augus¬ tine died in 430. The opening words, meaning, ((We praise thee as God,® show that it was originally a hymn to Christ, but it is now al¬ ways regarded as a hymn to the Father, the English version beginning, <(We praise thee, O God.® In addition to its place in church serv¬ ices it is often sung on particular occasions, as on the news of victories and on high festival days. . Among the great composers of music for this hymn are Hasse, Naumann, Haydn and Handel.

TEA, an evergreen shrub or small tree (Camellia tiled) of the order (T crnstrcemiacece) . The plant naturally attains a height of 30 feet, but under cultivation is pruned so that it rarely exceeds five feet. It bears lanceolate leaves about four inches long and rather large fragrant white flowers singly or in twos or threes, mostly in the axils of the leaves. It is a native of India and China, and has been cultivated in the latter country more than 2,000 years. Of several recognized species, only two have be¬ come commercially valuable: C. thea, var. B'ohea, and C. thea, var. viridis. The latter is indigenous to India, the former recognized as a hybrid of Chinese species, probably with the original India variety.

Cultivation. — - The ground on which a plan¬ tation of tea is to be set out is dug over in trenches to the depth of at least 18 inches, and 24 inches is preferred if the expense — about double — is not deterrent. As the plantation is of a permanent character, in¬ tended for a productive period of probably 30 years, every effort is made to have the soil in the best of condition, and well manured. The plants are taken from a nursery \yhere they have been grown from seed for from six to 12 months, and set four feet apart both ways for (<hill® culture. Where the ground is especially favorable they are set five feet apart. On poor soil the (<hcdge® system is practised, the plants being three feet apart in the hedge, and the hedges five feet apart. The plant has a tap-root descending eight to 10 feet into the earth. From this the feeding roots ramify in all directions. The cultivation consists in keeping the ground loose and free from weeds by surface hoeing, and once a year trenching the soil — from 18 inches in depth between the rows to nine inches next the “collar® of the plants. This is done in the late autumn, just after pruning, and the primings along with green manure, preferably from leguminous plants, are spaded under. These primings are estimated to restore to the soil 95 pounds of combined nitrogen, 56 pounds of potash and 19.6 pounds of phosphoric acid per acre. The pruning is done while the plant is passive, usually in December. On the hill plantations pruning is done annually: on level gardens, every other year or every third year — the practice being to prune alternately one- half or one-third of the plantation. The un¬ pruned trees furnish the smaller leaves and,

therefore, the higher grade tea, and their flushes come earlier, thus extending the picking season. On new plantations pruning begins when the trees are 12 to 18 months old, at which time the centre stem is cut down to within nine inches or even six inches above the ground — the object being to produce a growth of many branches and twigs, and thus a larger bulk of leafage which may be plucked without injuiy to the plant. The second pruning takes off every¬ thing to a level of 18

inches above the ground. As much of the tea is picked by children, the height of the plants in such localities is re¬ stricted to 30 inches. A very small plucking is made the second year, and the third year the yield is about 150 pounds per acre. The full yield of about 400 pounds per acre begins with the fifth year. The plant continues to yield well until its 10th year, when it is cut down and new sprouts developed from the trunk. This process is repeated until the plantation is 30 years old, when it is removed and new plants set out.

Plucking. — Plucking is an operation neces¬ sarily done by hand, and requires judgment as to the amount of leafage that maybe removed at one picking without halting the normal growth of the plant. The plucking follows the <(flush,® that is, the springing into leafage of the ter¬ minal buds after the winter rest. The second flush in the season is the leafing out of the top axillary buds on the stumps of the terminal bud-stems removed at the first picking. The succeeding flushes are not well marked, but there are generally 10 and sometimes 15 in the course of the growing season. In a well-or¬ dered plantation the trees are plucked over about 30 times during the season, with the in¬ tent of getting the leaves while in their very best condition. The bud produces the finest quality of finished tea; the partly opened leaf next below it, being slightly less valuable, and the next leaves below distinctly coarser. The usual practice is to pluck the bud with the two adjacent open leaves. Plantations which pro¬ duce only the highest grade of tea pluck the bud and one leaf. Many growers, however, pluck the bud and the first three leaves. The first few crops are thus very large, but the endurance of the plantation is seriously af¬ fected, and the net profits very decidedly re¬ duced. Ihe quality, however, does not depend wholly upon the plucking: much depends upon the soil and the climate. The average yield is about two and one-half ounces of finished tea per plant per season.

Processing.— The handling of the tea leaves after plucking is determined by the kind of finished tea to be produced. In the case of black tea the leaves are wilted or withered on trays in a draught of dry cool air often pro¬ duced by fans. This is continued until the leaf is soft and flaccid. The average time required for withering is 18 hours: less than that does not allow sufficient development of the peculiar enzyme required for the subsequent fermenta¬ tion upon which the flavor of the finished tea so largely depends. Withering is followed by rolling on tables of granite, the motion of the rollers being to crush the cells of the leaf with¬ out breaking its structure. In this process of rolling the leaves incidentally receive the char¬ acteristic twist noticeable in finished tea. The

TEA

time occupied in rolling is from 20 to 40 min¬ utes. The leaves are then run through a sifter which grades them into sizes, and then are spread upon glass or glazed-tile tables to fer¬ ment. During this process they are covered with cloths freshly wrung out of cold water. The time required for proper fermentation de¬ pends upon the previous development of the ferment during withering, and may take from two to six hours. The temperature is kept scrupulously to 85° F., or slightly below, and the time of completion is determined by the odor, which at first resembles chopped cabbage, but becomes fruity, resembling that of fine ripe apples. Lightly fermented tea yields when finished a pale, pungent infusion, the pun- gence due to an excess of unfermented tannin. Fully fermented tea yields a deep-colored, soft-flavored liquor of good body. The best tea is that which receives a medium fermentation and has in consequence a brisk taste, with high flavor and aroma. The final step in the process is drying the leaves rapidly to check further fermentation. The trays go first to a position near the furnace where the temperature is 260° and thence travel away from the source of heat, finishing where the heat is at 100°. In many factories a second firing is given after a few days, and this is considered to enhance the ultimate quality of the tea as it comes into the market after overseas trans¬ portation.

Before packing the finished tea is sorted over by hand, and vagrant bits of stalks and red leaves are removed. It is then sifted into grades. In the ordinary factory these are five : Broken Orange Pekoe, Orange Pekoe, Pekoe, Pekoe Souchong and Pekoe Fannings. The first is composed almost wholly of terminal buds and broken portions of the youngest and tenderest first leaves ; the second is of the smallest leaves and a few buds ; the third and fourth grades are of the coarser leaves, and the Souchong is usually chopped up to show a smaller range of size in the market. The Fannings are the finer fragments and dust, used chiefly in the manu¬ facture of caffeine, or of ((brick tea.®

Green Tea. — In the manufacture of green tea the freshly plucked leaves are thrown di¬ rectly into a roasting pan at a temperature of 250° and are kept tossing about until flaccid, when they are emptied upon a mat of bamboo and rolled by hand. They are then dried quickly over a charcoal fire. The older leaves are deficient in proper color and are treated with small quantities of Prussian blue, indigo or soapstone. The former teas are called (<natural green,® or ˆunfinished green,® in con¬ trast with the doctored leaves, which go under the title of (<true green® or (<finished green.®

Oolong tea is prepared by a combination of the two methods, being slightly withered and lightly fermented and then treated as for green tea.

Brick Tea is a condensed preparation of the coarser leaves and even the prunings of the plantation. These are panned and steamed, and then placed in piles under cloth covers. A peculiar ferment resembling a black fungus spreads through the mass, which is then sorted, mixed with a glutinous rice paste, lightly steamed and then pressed into molds four feet long, nine and one-fourth inches wide and

four and one-fourth inches deep. Three <(bricks® are made in this depth, containing when dry four and one-half pounds each. An¬ other form of brick tea is made into tablet form, four and one-half inches square and one and one-fourth inches thick and weighing half a pound each.

Tea Culture in the United States. — In the

United States the first tea shrub was planted at Middleton Barony, S. C., in 1800 by the French botanist Micheaux. It was still living at the close of the 19th century, when it was about 15 feet high. In 1848 experiments were made upon an extensive scale by Junius Smith of Green¬ ville, S. C., and in 1858 the government engaged Robert Fortune to collect tea seed for distribu¬ tion in the South. These experiments were cut short, the former by the death of the experi¬ menter, the latter by the Civil War. About 1880, the United States Department of Agri¬ culture commenced experiments which were abandoned owing to various changes in the staff and the distance from the managing headquar¬ ters. About 10 years later Dr. Charles U. Shepard of Summerville, . S. G, devoted his private means to tea experimentation. His opin¬ ion was that the previous experiments had not been conclusive and that the production of high grade teas at a profit to the grower could be accomplished in many Southern States and that a demonstration would attract capital to the in¬ dustry. Once demonstrated as profitable he be¬ lieved that the industry would furnish employ¬ ment to many thousands of people, especially women and children, and would make valuable large areas of land which yielded little or noth¬ ing. In 1900 he had about 60 acres planted to this crop, a factory fully equipped, a trained band of pickers and facilities for meeting every requisite from planting to final sale. In 1900 the yield was about 5,000 pounds and when the present area reaches full bearing the annual output should be more than 12,000 pounds.

The tea plant, though a native of a sub¬ tropical climate, will succeed at high elevations in tropical countries and some of the numerous varieties will even withstand frost. In South Carolina the plants have resisted a temperature of zero, but the yield was lessened for the next two years. This is the lowest recorded tem¬ perature in that locality during 150 years. Ample water, especially during the leaf-forming season, is essential. This is supplied in the East by copious rains, but in the United States, where the rainfall is less than one-half the Eastern annual average, the deficiency is made up by improved methods of tillage or by arti¬ ficial irrigation or both. In the East the tea gardens are generally planted on high ground or slopes so as to permit the excess water to seep away; in America they are planted on rather low ground such as well-drained pond- beds and swamps. Such lands are also natur¬ ally rich as a rule and, therefore, demand less initial application of fertilizers.

History. — The history of the tea-growing industry is said to have commenced in Korea before the 4th century before Christ, and to have reached Japan more than 1,000 years later. Tea was unknown to Europeans until the 16th century when Maffel, a Portuguese, mentions it in his <Historiae Indicae) as a product of Japan and China. Not until 1615, however, was

it mentioned by an Englishman, when Wickman wrote about it in a letter now owned by the East India Company. During that century small quantities found their way as presents to wealthy Londoners or later into the markets where they commanded £10 or £5 a pound. In 1657 a considerable quantity was purchased by Thomas Garraway, who opened a sort of res¬ taurant where the beverage was served. As the importations increased, the customs and the excise each affixed duties. At one time (1660- 89) a duty of 8d a gallon was levied upon the beverage. And somewhat later 5s. plus an ad valorem duty of 5 per cent was also opera¬ tive. The American tea trade began in 1784 and within three years had developed to more than 1,000,000 pounds. The first direct impor¬ tation from Japan came from Yokohama to San Francisco in 1868. Since 1870 the annual aver¬ age importation is somewhat in excess of

$15,000,000.

From the beginning of the commerce in tea, China has held first place

as a producing and exporting country. The choicest grades, how¬ ever, are probably unknown in America, but are consumed mostly at home or in Russia, where they command enormous prices. The reasons assigned for the non-exportation to distant countries are that the quality usually deterio¬ rates during long transportation, and that some kinds do not keep well unless highly “fired,® a process which impairs their flavor. The in¬ dustry attracted the attention of the English in India and in 1836 Royle and Falooner, British botanists, commenced in Ceylon to experiment upon an extensive scale. The result was sev¬ eral brands of tea which were superior to many of the Chinese teas. Ceylon began to market tea in 1873 and the industry there has continued to thrive. Tea has been grown more or less in other sub-tropical and tropical climates, notably in South Africa, where somewhat more than a domestic supply is raised.

The large number of plants whose leaves have been used as substitutes for tea may be grouped as resembling or not resembling the real plant in composition. The best known of the former are as follows: Mate, Paraguay tea, Jesuits’ or Saint Bartholomew’s tea, which is obtained from the leaves of a South Ameri¬ can species of holly (Ilex Paraguay ensis) . This is extensively used in various South Amer¬ ican countries, especially in the Argentine Re¬ public, where the annual consumption is esti¬ mated at 13 pounds per capita, or about 27,000,- 000 pounds. Kola nut, coffee leaves and guar- ana are also used, but to a smaller extent. The principal substitutes unlike tea are probably Siberian tea (Saxifraga crassifolia) , Chilean tea (Eugenia ugni) , Appalachian tea (Prinos glabra), Trinidad tea (Eugenia pimenta) , Lab¬ rador tea (Ledum buxifolium) , and New Jersey tea (Ceanothus am eric anus) . The last was used during the War of Independence and also during the War of the Rebellion. It is de¬ scribed as (<a good substitute for indifferent black tea.® The leaves of the partridge berry (Mitchella repens) are sometimes used in America.

In conservatories and greenhouses tea is often grown as ornamental plants and as ob¬ jects of interest. The plants are managed like their close relatives, the camellias, but are less

popular because more limited in their uses, es¬ pecially because their flowers are axillary and hence less useful for cutting than those of the camellias.

Production. — The world’s annual produc¬ tion of finished tea amounts to something over 800,000,000 pounds. The World War so affected production and shipment of the crop that it is necessary to take the figures of production for 1912, as being the latest complete

record under normal conditions, to form an accurate idea of the tea-growing industry. In that year the areas devoted to tea were as follows: China, 5,120,- 000 acres (approximately) ; India, 575,000 acres, of which 354,276 acres were in Assam ; Ceylon, about 395,000 acres; Java, nearly 100,000 acres; Japan, about 100,000 acres; South Africa (Natal and Nyassaland) about 4,600 acres. The crops sold in the world's markets from these producing countries amounted to a grand total of 731,000,000 pounds, contributed thus: India, 295,000,000 pounds; Ceylon, 193,000,000 pounds; China 112,000,000 pounds; Java, 63,000,000 pounds; Japan, 43,000,000 pounds; Formosa, 25,- 000,000 pounds.

Consumption. — The chief purchasing coun¬ ties of ˆ12 crop were : United Kingdom, 295,000,000 pounds; Russia, 147,000,000 pounds; Umted States, 83,000,000 pounds; Canada, 34,- 000,000 pounds; Australia, 29,000,000 pounds; Holland, 12,000,000 pounds; Germany, 9,000,000 P°ru9ds; New Zealand, 7,000,000 pounds; South Africa, 7,000,000 pounds. In per capita con- sumption the British Empire as a whole was in remarkable, degree the largest consumer, the average being 6.2 pounds, about 10 times the per capita consumption of all the rest of the world put together (excluding the United States). For the individual countries the per capita consumption figures were: New Zea- land, 7.4 pounds ; Australia, 6.8 pounds ; United Kingdom, 6.4 pounds ; Canada, 4.3 pounds ; Hol- land, 2.1 pounds; South Africa, 1.2 pounds; United States, 0.9 pound; Russia, 0.9 pound; Germany, 0.1 pound; France, 0.07 pound.

. Infusion. — As found in the market tea yields from 31 to 49 per cent of its substance to an infusion with boiling water, the Indian teas giving slightly more than the Ceylon teas, and the China teas slightly less. In this water ex¬ tract the tannin constituent ranges from 14.33 per cent in India teas and 12.29 per cent in Ceylon teas to 9.50 per cent in China teas. (With thorough fermentation the proportion ot tanning would fall below 5 per cent). Caf¬ feine varies from 2.78 to 3.84 per cent in India teas, and ranges up to 4.14 per cent in Ceylon tea and 4.91 per cent in tea dust. In making the infusion for beverage purposes the finest flavored tea is produced by pouring fresh and actively boiling water upon the dry leaves and allowing it to stand not longer than one and one-half minutes, when the infusion should be immediately poured off the grounds. This brief infusion is sufficiently long to absorb prac¬ tically all of the delicate essential oil which gives the tea its particular flavor. It is also long enough to dissolve out sufficient of the tannic acid to make the taste sprightly, without being astringent. The infusion will also con¬ tain about four-fifths of the contained caffeine. The strong, biting quality preferred by some tea

drinkers is gained by a five-minute infusion,

which dissolves a large proportion of tannin, but at the expense of the volatile oil of the tea which is dissipated by the continued heat. In moderate quantities tea as a beverage is not considered harmful, the average dose of caf¬ feine being mildly stimulating, and the tannin, owing to its transformation to gallic acid in the intestinal tract, being innocuous. There is also a valuable proportion of albuminoid extractives in the infusion, and the water im¬ bibed is a necessity to the continued health of the system.

Imports. — The imports of tea into the United States for the fiscal year ended 30 June 1918 reached the record figure of 151,314,932 pounds, despite the great difficulties of a scarce and expensive ocean tonnage. The value of the importation was $30,889,030. Of the whole, 52,996,474 pounds came from Japan; 44,540,467 pounds from India and Ceylon, and 21,082,866 pounds from China.

Bibliography. — Bald, C., Hndian Tea: Its Culture and Manufacture> (Calcutta 1917) ; Browne, E. A., (Tea) (London 1912) ; Gray, A., (The Little Tea Book) (New York 1903) ; Jumelle, H., (Les Cultures Coloniales) (Paris 1913) ; Planters' Association, (Tea in Ceylon) (Kandy, Ceylon, 1912) ; Tea and Coffee Trade Journal, (Table of the Principal Kinds of Teas> (Vol. X, pp. 196-197, New York 1906) ; United States Plant Industry Bureau Bulletin 234, (The Culture and Manufacture of Tea in the United States> (Washington 1912).

M. G. Kains, Crop Expert.

TEA, Varieties of. Teas were named mostly after the place of origin, as Japanese tea, including all from that country, but more specifically a brownish-green leaf tea, well- twisted. The qualities are indicated as long- leaf, wiry or well-curled, light-colored, etc. Ceylon tea is named mostly after the large plantations there; the varieties are termed pekoes, pekoe souchongs, souchong, congou, broken leaf, etc. ; the congou is black, the souchong a black inclining to red, the pekoe black with yellowish tips, while the red leaf is known as kaisow. The hyson is a large-leaved green tea ; the hyson skin is the remnants dis¬ covered in putting up hyson. Oolong is a greenish yellow tea, and Twankay a green tea lightly or imperfectly rolled. Bohea is a stand¬ ard black tea gathered three times a year from old plants, The variety

largely advertised as ˆEnglish breakfast® is souchong, while imperial is any good bluish-green tea, long leaf, tight- rolled. Imperfect teas are named in the trade as broken leaf, dust, ends, fannings, etc.

TEA IN AMERICA. About 1880 the United States Department of Agriculture estab¬ lished a small tea-growing plantation near Sum¬ merville, S. C., and various varieties were raised in an experimental way. Later the plan was extended and the Pinehurst Tea Gardens opened in the suburbs, being supplied with native tea grown on a tract of about 100 acres and manufactured and cured by competent people. Further experiments were made at a place christened Tea, in Colleton County, S. C., and at Pierce, Texas. While it was found possible to grow good teas and to cure them satisfac¬ torily, it was apparently impossible to produce them in competition with the teas of China and

Japan, cured by cheap Oriental labor. Hence the experiments were wholly negative commer¬ cially.

TEˆˆREE, a name applied not c-nly to the Thea bushes (see Tea), but to various species of Leptospermum and Melaleuca — myrtaceous shrubs found from China to Aus¬ tralia, New Zealand and Tasmania. The tea-tree forms a common and almost impenetrable scrub of Victoria, in moist situations. It is a SuUu varying height and dark-green color, the branches bushy and growing perpendicu¬ larly, the leaves resembling the needles of a fir. I he stems are straight, the wood hard and valuable for many bush purposes. Several of the tea-trees belonging to the genus Melaleuca furnish the aromatic, pungent cajeput oil (see Cajeput) of commerce. It is especially ob- tained from M. Icucadcfidvou , a tree reaching 30 feet in height, with terminal spikes of white flowers, and elliptical to lanceolate leaves, from which the oil is distilled. It has a crooked trunk, papery bark, employed in packing, and yields a wood which is white, close-grained, hard and durable, even under the ground. M. squarrosa or swamp tea-tree has a thin barffi and the thin, spongy cortex of M. axillaris can be used as a filter or blotting paper. The New Zealand tea-tree or tea-scrub is Lepto¬ spermum scoparium, a heather or juniper-like shrub with leathery foliage, like needles, and many small white blossoms. The common name is said to have been derived from the use of the foliage of this shrub and that of L. lanigerum by Captain Cook for tea, but the native name of the former is <(ti.» The white tea-tree is L. ericoides, of New Zealand. Other tea-trees are the bottle-green Kunzea corifolia, and the broad-leaved Callistemon salignus, both of Australia and Tasmania; the Ceylon, Eloeodendron glaucum, and the red scrub tea, Rhodamnia trinervia, several of which are myrtaceous and have hard, heavy close-grained wood.

TEACH, or THATCH, Edward (<(Black- beard the Pirate®), American pirate: b. Bris¬ tol (?), England; d. on the James River, Va., 22 Nov. 1718. He is supposed to have gone out to the West Indies during the war of the Spanish succession, engaged as a privateer, and to have turned pirate in 1713 when the pri¬ vateers refused to recognize the peace. He is first heard of in 1716 and from that time he cruised among the West Indies, along the Spanish Main, and the coasts of Virginia and Carolina, in his sloop, Queen Anne's Revenge, capturing numerous prizes and making his name a terror wherever known. In June 1718, his sloop was wrecked off North Carolina, and Thatch with some 30 of his men surrendered to the king's proclamation. He made an ally of the governor, Eden, who afterward counte¬ nanced his piracy in view of a certain share in the spoils, and for a time led a rollicking life, forcing the planters to supply his wants and exacting toll from all vessels which came up or down the river. The planters at length ap¬ pealed to Col. Alexander Spottiswood, lieu- tenant-governor of Virginia, who fitted out an expedition against the pirate, and on '22 Nov. 1718 the sloops moved up the river. Every man in the commander's boat was killed, and

the captain, Robert Maynard, slew Thatch in a hand-to-hand struggle. His career is one of the most romantic in the history of American piracy, ((Blackbeard the Pirate" being con¬ sidered the ideal type of the pirate of fiction. Consult his (Life) in Charles Johnson's (Lives of the Pyrates) (1724).

TEACHERS, Professional Training of.

Richard Mulcaster of London advocated the professional training of teachers as early as 1561 and suggested that a teachers' college be organized as a department in a university. Nothing definite or permanent appears to have come from this suggestion. The first genuine effort for the professional training of teachers undertaken in the world was undoubtedly by Jean-Baptiste de La Salle at Rheims in 1681. Three years later the institution which he founded at Rheims became known as the "In- stitute of the Brothers of the Christian Schools." He later established a similar school at Paris. In this school he organized a regu¬ lar, systematic course of instruction for the preparation of teachers for their professional work. Augustus Hermann Francke conducted an orphans' school at Halle and in 1697 he selected certain poor students in attendance upon this school and

organized them into a “teachers’ class.” The members of this class gave instruction to the other pupils in the orphans’ school, and for this service Francke allowed them free tuition and board. Twelve years later Francke selected 12 students from the pupils in his orphan asylum to be trained as teachers. These students were selected upon “their piety, knowledge, and aptness to teach.” Francke called this institution a “Teachers’ Seminary.” Hecker — a pupil of Francke — has the honor of establishing the first regularly organized institution devoted to the special work of training teachers. This school was established at Pomerania, Prussia, in 1735 and Hecker gave to it the name used by Francke and called it a teachers’ seminary. Hecker es¬ tablished a second school of this type at Berlin in 1748. Frederick the Great gave official en¬ dorsement to the effort to provide special training for those who were to be employed as teachers in the schools, by raising Hecker’s school at Berlin to the rank of a royal primary school for the purpose of training parish clerks and teachers. He gave this school further royal favor by directing that all parish clerks and all teachers appointed by the Crown should be selected from its students. Little progress was made in the establishment of institutions of this kind or in the training of teachers in Europe until after the French Revolution. At the be¬ ginning of the 19th century, the development of institutions to train teachers took on new life and the Prussian system of normal schools was firmly established. Six normal schools had been organized in that country.

It was about this time that the subject of preparing teachers for public schools began to receive attention in America. Men inter¬ ested in public education began to discuss the subject. The manner in which these men first treated the subject does not indicate that they were familiar with what had been done in Europe in the training of teachers or with the system of normal schools which Prussia had established. The papers prepared by these men

reveal a consciousness of the necessity of es¬ tablishing adequate educational facilities in America and of preparing teachers to take charge of such schools as should be estab¬ lished. The papers written by these men indi¬ cate that these writers were speaking from the experiences _ and needs of the nation and not from historical knowledge of what had taken place in other countries. Among the numerous articles which appeared at this time and which exerted great influence in developing the idea that teachers should be professionally trained were the address of Denison Olmstead in 1816 on the “State of Education in Connecticut,” the pamphlet issued in 1823 by William Russell, principal of the New Haven Academy, on the subject of “Suggestions on Education,” the publication entitled

“Lectures on School-keep¬ ing” issued in 1829 by Samuel R. Hall who founded a school for training teachers at Con¬ cord, Vt., in 1823, the articles published by James G. Carter in the Boston Patriot in the fTlnXer„of lg24-25, the paper of Rev. Thomas H. Gallaudet in 1825 on a “Plan of a Seminary for the Education of the Instructors of Youth » the pamphlet of Walter R. Johnson of German¬ town, Pa., issued in 1825, on “Observations of the Improvement of Seminaries of Learning in the United States, with suggestions for its Accomplishment,” and many others. These articles gave to the public much valuable litera¬ ture on the subject of education in general as well as upon the importance of special training for those who were to teach. The democracy of the nation was developing and with this de¬ velopment came a demand for schools. In the beginning of the 19th century 15 States either established systems of schools or reorganized existing systems. New York provided for State supervision of her schools in 1812 and 11 other States soon followed in making similar provision. The expansion, enlargement and im¬ provement of educational facilities has always been coupled with a demand for better teachers.

The type of teachers employed in the schools in many cases was a potent argument in behalf of a system of training teachers. The men employed as teachers in the academies and col¬ leges were generally men of education and character. This was not true of the men em¬ ployed in the elementary schools. Often these teachers possessed little education, had received, of course, no training and had no intention of remaining permanently in the teaching service. Men often sent their sons to Europe to be edu¬ cated and sometimes imported teachers from Europe to instruct their sons. Men who were unable to get other employment because of their l3ck of education or of proper ch3.r3.cter often enlisted in the teaching ranks. But even m this demoralized situation, able young men who were either working their way through college or had completed their college courses and intended to enter either the professions of the law, medicine, or ministry, or business careers, taught a few terms or years. Among the many men of this type, the following may be mentioned: John Adams, Eli Whitney, Daniel Webster, William Ellery Channing, Wil¬ liam H Seward, Salmon P. Chase, and in later times James G. Blaine and Elihu Root. As late as 1837 Horace Mann stated that, of the teachers employed in the State of Massachu-

setts outside of the city of Boston, about 200 expected to devote

themselves to teaching and that the others were not generally qualified and that some of them thought more of what they were to get at the end of the term than they did of what they were to give during the term. Leading men in public affairs in all parts of the country recognized this condition in educa¬ tional matters and gave it consideration.

In 1794 the teachers of New York City formed an organization known as the “Society of Associated Teachers.® The purpose of this society was to promote the interests of its mem¬ bers and of education generally. Members were elected to the society by ballot, and a three-fourths vote vvas necessary to an election. This society did much of the work now per¬ formed by the professional supervisory staff of a school system. It passed upon the qualifi¬ cations of teachers, upon textbooks, upon the proper professional decorum of teachers and discussed the pedagogical questions of that early date. It had been a voluntary organiza¬ tion without legal status. Several of its mem¬ bers petitioned the legislature of the State for a charter incorporating the <(Society of Teachers in New York City.® The petition was honored and the original society of 1794 discontinued. The charter granted the organiza¬ tion stated, in the following language, the ob¬ ject of the society:

V Tor the relief and benefit of decayed teachers and their families, widows and children of deceased teachers, and for the discussion of literary subjects and for the promotion of science among the members of the society.”

The society immediately entered upon a program for the intellectual improvement of its members, and its official reports show that prior to 1815 and for several years subsequent thereto the society gave special work to train and equip young men for the teaching service in New York City. This society was undoubtedly the first agency in America which gave definite work to the training of teachers for public schools.

In 1805 through the initiative and influence of DeWitt Clinton, the legislature of New York incorporated ((A Society for establishing a free school in the city of New York for the education of such poor children as do not be¬ long to or are not provided for by any reli¬ gious society.® This society became known as the Free School Society of New York City. Its annual report for 1814 contains the follow¬ ing statement:

“ From the commencement of the society it has been an object of great interest to train up young men for the office of teachers in similar

institutions. The realization of their wishes in this respect is in part accomplished.”

Mr. Fitzpatrick in his work on DeWitt Clinton states that a youth educated in this school was superintending a similar school in New Brunswick, N. J., and that the society had received an application from Newburgh, N. Y., for a teacher. The Free School Society adopted the Lancasterian system of schools. The re¬ port of the Free School Society for 1819 gives an account of what the society was doing to train teachers and specifically states that those who desire to become teachers are invited to attend its school where they may be properly instructed in six or eight weeks to become com¬ petent teachers of the Lancasterian system. Here is a second organization endeavoring to

train teachers for public schools. See article Lancasterian Schools, Vol. 16, p. 687.

. The official records do not indicate the pre¬ cise year in which the academies in New York State first began to train teachers for the com¬ mon schools. The academies did this work before legislation had been enacted authorizing the establishment of teachers’ training classes. The report of the Regents to the legislature in 1821 contains the announcement that the acade¬ mies were training teachers for the common schools and the Regents expressed the opinion that the schools of the State must look to the academies for their supply of teachers. In the annual report of the Regents for 1823 the statement is made that because of the dis¬ tribution of public funds under its direction to the academies subject to its supervision, such action “insures a supply of competent teachers for the common schools.® New York was un¬ doubtedly the first State which took specific action to solve the problem of providing trained teachers for the common schools. One of the vital questions in the establishing of agencies for the training of teachers was bitterly con¬ tested in New York. This question was, Shall the. established educational institutions be utilized for this purpose or shall separate in¬ stitutions devoted solely to such work be organized?. The academies in New York were numerous, influential and under the control of the Regents. The friends of these institutions were zealous in their efforts to have the academies designated to train teachers. The State was giving these institutions financial support from the literature fund. The acade¬ mies began to give special training to those who were going out to teach as early at least as 1.821 and such instruction has been given con¬ tinuously since that date. The friends of the academies endeavored to increase the amount of State aid to these institutions and based their argument upon the service which the academies were rendering the State in

training teachers. They were successful in 1827 and not only succeeded in obtaining larger financial support but also obtained statutory recognition to train teachers without specifying how such service should be performed. The Regents, however, at once designated certain academies for this purpose and other academies continued to do such work voluntarily. The academies still pressed their interests at the legislature and in 1834 obtained the enactment of a law specifically authorizing the Regents to designate academies in which training classes should be organized. These training classes have been continued since that time and 80 were main¬ tained in the year 1918-19. Through this agency about 25,000 teachers have been supplied the rural schools of the State.

In 1823 Rev. Samuel Hall opened a school at Concord, Vt., for the training of teachers. He was sent to this town, as a preacher by the Domestic Missionary Society of Vermont. He consented to remain upon the distinct under¬ standing that he should be allowed to organize a school for the training of teachers. He ad¬ mitted to his school a class of young pupils for the purpose of having the opportunity of showing those whom he was training the best methods of teaching and of disciplining and governing a school. The literature relative to this school shows that Mr. Hall had no

textbooks, periodical or other helps or equip¬ ment, and that he conducted the school on his own knowledge and judgment of educational methods of procedure and his experience in teaching. Growing out of his experience in this school he gave a series of lectures on school keeping? There was a great demand for this work and the supply was soon ex¬ hausted. The State of New York purchased 10,000 copies of this volume and put one in each of the school districts of the State.

While those who believed it was not neces¬ sary to establish separate institutions to train teachers and that adequate provision could be afforded for such work in existing institutions had won a victory in the State of New York, the question was not permanently settled. The training of teachers . was being considered in a broad, comprehensive manner by thoughtful educators, by State supervisory school officers, by governors and by State legislatures. The strong presentation of the subject by Walter R. Johnson of Germantown, Pa., published in

1825 and of Rev. Thomas H. Gallaudet in the same year had made a deep impression upon those who were specifically interested in the solution of the problem. Dr. Philip Lindsley in his inaugural address as president of Cum¬ berland College, Nashville, Tenn., in 1825, stated that the teacher needed training for his work as much as a lawyer or doctor and urged the establishment of teachers' seminaries and in

1826 he appeared before the legislature of that State and advocated the establishment of such seminaries. In the same year Gov. DeWitt Clinton in his message to the legislature of New York also advocated the establishment of a seminary for teachers. In 1826 State Super¬ intendent Spencer in a special report to the senate of New York also urged the plan of teachers' seminaries. Governor Lincoln of Massachusetts in his messages of 1826 and 1827 to the legislature of that State urged the import¬ ance of making provision for the training of teachers. The American Institute of Instruc¬ tion petitioned the legislature of Massachusetts upon the same subject in 1827. Dr. George J unkin, president of Lafayette College, and Rev. Chauncey Colton, president of Bristol College, in 1833 urged upon the legislature of Pennsyl¬ vania the establishment of courses in colleges for the training of teachers and that the com¬ mon schools in the town should be used as practice departments. In December 1829, 57 citizens of Rochester, N. Y„ called a public meeting in that city to consider the educational needs of the times. This committee prepared a report which was adopted by the meeting and among the recommendations was one for a State seminary to train teachers. A compre¬ hensive plan was proposed for the administra¬ tion of the seminary and for the course of study. This plan proposed (<a farm of 100 to 200 acres, under the direction of an intelligent but practical farmer, a garden and a nursery under the direction of a practical gardener and nurseryman and a mechanics' shop with a gen¬ eral assortment of tools, such as the miscella¬ neous business of the farm and garden may require.® In 1836 a public meeting of citizens in Philadelphia recommended the establishment of a .teachers' .seminary as an independent in¬ stitution containing a three years' course of

study and a model school. In the same year State Superintendent Burrowes of Pennsyl¬ vania recommended an appropriation of $10,000 for the establishment of two institutions — one in the eastern part of the State and the other in the western part, for the training of teach¬ ers. In 1829 the (Annals of Education edited by Woodbridge published a translation from a German periodical giving an account of the Prussian seminaries for the training of teach¬ ers. Articles on and translations of Cousin's (Report on Public Instruction in Germany* appeared between 1830 and 1835. These were published extensively

by the newspapers in all parts of the country. It was out of all these discussions and proposals that the normal school idea developed in America. There were two men in Massachusetts who rendered a vital service in the successful effort to establish a normal school. These men were Mr. Charles Brooks and Mr. James G. Carter. Mr. Brooks made a careful study, of the Prussian system of normal schools and in a Thanksgiving sermon in 1835 at Hingham he explained that system. He prepared three lectures on the subject which he delivered in various parts of the State. He issued a circular inviting citizens of Plymouth County to meet him to consider the subject. This invitation included every board of select¬ men, every school committee and every clergy¬ man in the county. A large audience greeted him at the courthouse. The address so im¬ pressed Ichabod Morton that he offered to con¬ tribute $1,000 for the establishment of a normal school at Plymouth. Mr. Brooks traveled over 2,000 miles, delivering addresses in the State, and contributed a continuous series of articles on the subject to the newspapers. The house of representatives invited him to address that body, and, in January 1837, he addressed that house twice. He also addressed the legislatures of Vermont, New Hampshire, Maine and New Jersey, and many cities and villages in other States. Mr. Carter, who has often been called the ((Father of Normal Schools,® had given a comprehensive outline of his plan for training teachers in the articles which he wrote for the Boston Patriot in 1.824—25. He specified three essential elements in the work of a normal school. These were: (1) the development of sound. scholarship; (2) a course of study upon the science and art of education; (3) a model or practice school. Nearly a century later these three points are the vital features of the normal schools of America. The people of the town of Lancaster, Mass., offered to aid him in the establishment of a school in Lancaster, but later put obstacles in his way and the project failed. In 1835 Mr. Carter was elected to the legislature, and in 1836 he was made chairman of the committee on education. He urged the legislature to establish a seminary to train teachers, but failed in his efforts. He drew the bill providing for a State Board of Educa¬ tion, which became a law in 1837, and in 1838 his generalship and addresses brought about the enactment of the Normal School Law. Horace Mann, who was president of the Massachusetts senate, was chosen the first secretary of the State Board of Education in 1837. Mr. Mann was a strong advocate of the establishment of State normal schools. He obtained a promise from Edmund Dwight to provide $10,000 for

the establishment of institutions to train teach¬ ers if the State would appropriate an addi¬ tional $10,000. Mr. Mann communicated this proposition to the legislature 12 March 1838, and on 22 March a joint committee which had considered the subject reported a resolution appropriating $10,000 to the State Board of Education for the training of teachers, but conditioned on an additional $10,000 being paid to said board to aid in the enterprise. Governor Edward Everett gave executive approval to the resolution 19 April. The State Board was not restricted in the type of institution which it should establish. The action of the legisla¬ ture gave that body the right to exercise its discretion. The State Board decided to estab¬ lish three normal schools. The first of these institutions was opened at Lexington on 3 July 1839, with three pupils. The school was later removed to Framingham, and of course has the distinction of being the first normal school established in America. The second school was established at Barre in the same year, but was later removed to Westfield. Mr. Cyrus Pierce was the first principal of the Lexington school. The wisdom, the energy and the diplomacy of Horace Mann and of Principal Pierce made possible the success of this initial effort to establish a normal school in the United States. The third school was estab¬ lished at Bridgewater in 1840. The real battle ground for the establishment of normal schools was in Massachusetts and New York. Al¬ though those who favored the organization of training classes in New York had won a tem¬ porary victory, the campaign for a separate institution devoted solely to the training of teachers was continued in that State. The work accomplished in these training classes had not proved satisfactory. State Superintendent Spencer in 1840 appointed Dr. Alonzo Potter of Union College, later Bishop Potter of Phila¬ delphia, and Hon. D. H. Little, a committee to examine these classes. The report of Dr. Pot¬ ter was adverse to the training classes and rec¬ ommended the establishment of a normal school. Superintendent Spencer had long been an advocate of training teachers in the acad¬ emies and did not, therefore, agree with the re¬ port of Dr. Potter. Spencer was succeeded in office by Col. Samuel Young, a warm advocate of the normal school idea. Young was sup¬ ported by Governor Seward and Governor Bouck. He made speeches throughout the State in favor of organizing a normal school and called a State meeting of deputy superin¬ tendents, similar to county superintendents, at Utica in 1842. This was a notable meeting. Gen. John A. Dix, who later became Secretary of War, Secretary of State and governor of New York; Hon. John C. Spencer, Secretary of War; Horace Mann, secretary of the Massa¬ chusetts State Board of Education; Dr. George B. Emerson of Boston, and Rev. Wil¬ liam Gallaudet of Connecticut, attended this meeting. These distinguished

guests from New England came upon invitation to express their views upon the normal school idea. The convention endorsed indirectly the plan to or¬ ganize a normal school. Hon. C. T. Hulburd, chairman of the assembly committee on com¬ mon schools, submitted an exhaustive report to the legislature of 1844 favoring the estab¬

lishment of a normal school. A measure au¬ thorizing the establishment of such a school at Albany was passed by the legislature in 1844 appropriating $10,000 annually for a period of five years. The establishment of these schools in Massachusetts and in New York, did not prevent their enemies from opposing the continuation or development of such schools. Governor Dix of New York who had been friendly to the academies for many years was decidedly hostile to such schools in his message of 1874, and Governor Robinson in his messages of 1877 and 1879 made a direct attack upon normal schools and stated that they were ((wholly useless.)} In the same year the legislature authorized an inves¬ tigation of such schools. In 1840 the house of representatives of Massachusetts directed the committee on education to consider the ex¬ pedience of abolishing the State Board of Edu¬ cation and the State normal schools. A major¬ ity of that committee prepared a report rec¬ ommending that both should be abolished and presented a bill to carry out such recommenda¬ tion. The measure failed to pass. It is in the face of such determined opposition as above outlined that the normal schools have arisen in America. The success of these first institu¬ tions in Massachusetts and of the Albany school made it possible to develop the system of nor¬ mal schools now in existence in the United States. Others were gradually established. The New Britain school was organized in 1849, the Ypsilanti in 1852 and about 70 others pre¬ vious to 1875. At the present time there are 237 public State normal schools, and before the war the number of students in attendance upon such institutions preparing to become teachers was nearly 100,000. There are also 45 private normal schools attended by nearly 6,000 pupils.

These schools are supported by State appro¬ priations. In some States they are wholly under the supervision of the State educational authorities. In others they are only partially under such supervision and in some the State exercises practically no supervision or control whatever. The age of admission is generally 16 years. The courses of study are generally either two years or four years, depending upon the qualifications of the students when they enter. In some schools, as those of New York, the requirements for admission are graduation from a four-years' approved high school course. In such normal schools the course is two years and is devoted to professional work. In many schools a student is admitted from the elementary schools and

for such students the course is generally four years. When normal schools were first organized, their courses of study included much academic instruction. The development of high schools throughout the country has resulted in decreasing the aca¬ demic work in normal schools and in increas¬ ing the professional work. The present tend¬ ency is to lengthen the courses so as to cover three or four years. In New York the Board of Regents have recently authorized three-year courses in all the normal schools of that State. In many of these schools special courses such as kindergarten, drawing, music, manual train¬ ing, home making, rural school and other courses are given. Practice departments or

model schools are maintained in all the normal schools and in many cases the normal schools use the public schools for practice departments. These schools generally train teachers for the elementary schools, although some prepare teachers for secondary schools also. Some of the normal schools give extension courses on Saturdays and during vacation periods and some take their students into the rural schools for practice work and for demonstration.

The State College for Teachers at Albany prepares teachers for secondary schools only. The courses cover a period of four years, and the admission requirements are the completion of a four-years' approved high school course. The work in this institution is of collegiate grade and degrees are conferred upon those who complete prescribed courses. There are 800 students in this institution preparing to teach in the high schools of the State.

The Education Law in New York has re¬ quired since 1895 that all teachers employed in the cities and in the villages having a popula¬ tion of 5,000 or more shall have graduated from a four-years' high school course and thereafter from a two-years' professional course. (Chapter 1031, Laws of 1895). In many cities of the other States a similar re¬ quirement is prescribed. Normal schools are unable to meet the demand for teachers and many cities have organized city training or city normal schools. These schools generally main¬ tain entrance requirements and courses of study equivalent to those of the normal schools. These schools prepare teachers for the kinder¬ garten and the elementary schools. New York maintains three of these schools, Philadelphia, two, and a school of this type is maintained in Albany, Buffalo, Rochester, Syracuse, Sche¬ nectady, Yonkers, Boston,

Pittsburgh, Cin¬ cinnati and in most of the large cities of the country.

Within the last 25 years there has been a demand in all parts of the country for better trained teachers in the rural schools. About one-third of the teachers employed in these schools have had no training whatever. This demand has resulted in the establishment of agencies of various types in about one-half of the States for training teachers for rural schools. In New York the training classes maintained in high schools have supplied these teachers for years. Missouri, Vermont and several other States have organized similar classes in their high schools for training rural school teachers. In Michigan, county normal training classes have been organized, but these do not differ materially from the training classes in these other States. Wisconsin has organ¬ ized not only this type of training class in her high schools, but she has also organized county training schools. These county training schools are in no way connected with other schools, but are generally maintained in separate build¬ ings and have an independent organization. The requirements for admission to these classes vary. In New York it is high school gradua¬ tion. In most States it is the completion of two years' high school work. In other States the last year of the high school course is devoted to teacher training. In other States students are admitted from the elementary schools. The course of study usually covers one year and the age of admission is from 16 to 17 years. Many

of the State normal schools maintain special courses for rural teachers.

Several efforts were made to establish chairs of pedagogy or colleges of education in the universities which would take rank with the department of law, medicine or engineering. New York University established a chair of the philosophy of education for educating teachers of common schools in 1832. Thomas H. Gallaudet occupied this chair from 1832 to 1834. It seems to have been abandoned at that time. Brown University established a similar course in 1850, but discontinued it in 1855. Horace Mann included as an elective study in the regular course of Antioch Col¬ lege, Ohio, in 1853 the theory and practice of teaching. From 1853 to 1873 Iowa University offered courses for teachers and in 1878 * opened its college of normal instruction.

On the recommendation of President An- gell, Michigan University established in 1879 a ((chair of the science and art of teaching® for the following purposes: ((To fit university stu¬ dents for the higher positions in the public school service; to promote educational science; to teach the history of education and of educa¬ tional doctrine ; to

secure to teaching the rights, prerogatives and advantages of a profession; to give a more perfect unity to the State educa¬ tional system by bringing the secondary schools into closer relation with the university.® A plan was proposed for giving instruction in the science and art of teaching in Columbia Uni¬ versity in 1858, but was not carried out at that time. In 1880 the college opened certain courses for training teachers and in 1888 Teach¬ ers' College was founded and in 1889 chartered. Doctor Nicholas Murray Butler, now president of Columbia University, was the first head of this new institution and as president of Co¬ lumbia is now president of Teachers' College. This college is one of the notable institu¬ tions of the world. It trains teachers, super¬ visors, directors and superintendents for all the higher technical and professional positions in the teaching and supervisory staffs of the city and State school systems of the country. Sev¬ eral thousand > students are annually enrolled in this institution. All the leading universities of the country now maintain departments of education or colleges which are rapidly taking rank with the departments or colleges' of law medicine and engineering and are meeting the demand for specialists which the developing public educational systems of the country re¬ quire.

Summer schools have become a strong and influential factor in the training of teachers. Harvard University was one of the pioneer institutions in America to give summer courses. Harvard has given such courses for 48 years. Martha s Vineyai d Summer Institute, organized at Cottage City, Mass., in 1878 by Col. Homer Sprague, has been one of the notable institu¬ tions of this type. It was closed in 1905. In 1879 the Sunday School Assembly at Chautau¬ qua, N. Y., organized a summer course of psy¬ chology and pedagogy which soon became an important centre for teachers. The courses for teachers was increased and the summer sessions now held at Chautauqua give several courses for teachers. After these and some other in¬ stitutions had been successful in holding sum¬ mer sessions the work was rapidly taken up by

normal schools, colleges and universities, and the most of these important institutions in the country now hold summer sessions. About 800 summer schools were held in 1919 and the at¬ tendance upon these was approximately 300,000. The enrolment at Columbia University ex¬ ceeded 10,000.

Teachers' institutes were established in this country about the same time that normal schools were organized. In 1837 Mr. Stephen R. Sweet opened a temporary school ((for qualifying teachers for the winter schools® at Watertown, N. Y. Mr. Sweet contemplated holding a similar school in the late winter or early spring for the purpose of "qualifying teachers for summer schools.® These schools were in session for eight weeks. In 1842 Mr. Sweet opened one of these temporary schools in the Kingsboro Academy, New York, and he called the school the ((Kingsboro Temporary Normal School.® The work which he did in this temporary school is quite similar to that which was later done in teachers' institutes. The schools organized by Mr. Sweet became known very generally as temporary schools for training teachers, or temporary normal schools. It is quite probable that Mr. Sweet obtained his idea of this temporary school from the work which was being done to train teachers in the training classes which had been organ¬ ized in academies in New York.

In 1839 and 1840 Dr. Henry Barnard of Connecticut held a convention of teachers at Hartford. The purpose of these conventions was to improve the scholarship of those who were to teach and to discuss methods of pres¬ entation of subjects in the classroom. The work which was done in these conventions was also quite similar to that which was later done in teachers' institutes.

The term ((teachers' institute,® however, was first used in New York in 1843. This undoubt¬ edly was the first institute organized in Amer¬ ica. It was held at Ithaca and was organized by J. S. Denman, the county superintendent of Tompkins County. The fame of this institute became known and others were organized in different parts of the State. Within three years teachers' institutes were organized in Massachusetts, Ohio, Rhode Island, Indiana, Michigan, New Hampshire and Vermont. It is probable that New York and Pennsylvania organized a more thorough system of institutes than was organized in other States. Institutes were abolished in New York State in 1912, and teachers' conferences under the direction of district superintendents were substituted there¬ for. The law defining the power of a district superintendent in connection with these confer¬ ences is as follows :

" To assemble all the teachers of his district by towns or otherwise for the purpose of conferences on courses of study, for reports of and advice and counsel in relation to discipline, school management, and other school work, and for promoting the general good of all the schools of the district."

Institutes are held in many States. In Pennsylvania and Ohio they form an important feature of the teacher training process. They are organized and managed generally by the superintendent of the supervisory district, county or city. Schools are closed for the period of the institute, which is generally two days in the cities and one week in the rural

districts. Appropriations are made in some instances by the State • and in others by the county to meet expenses. Fees are also paid by teachers. Attendance is usually compulsory. The method of instruction is generally the lec¬ ture system. These lectures are upon subject matter, school discipline, school organization, school management, methods of instruction and popular and inspirational themes. In some in¬ stances they depart from the primary purposes of an institute which is to improve the teaching force and take the form of community centres. In such cases they have become mass meetings instead of classrooms for instruction.

In 1895 the Paulist Fathers in New York organized an institute for the general improve¬ ment of the teachers in Catholic schools. It is called the National Catholic Teachers' Institute, and under the general management of this or¬ ganization provision is made for the mainte¬ nance of local institutes in various parts of the country for the benefit of the teaching orders connected with Catholic schools.

Teachers' reading circles have exerted a strong influence in developing a professional spirit among the teaching fraternity. The first circle was probably organized in Ohio in 1883 upon the suggestion of Mrs. D. L. Williams, a teacher in that State. The circle was formu¬ lated somewhat upon the plan of the Chautau¬ qua literary course. Many of the other States of the. Central West and West have organized such circles. These circles are under the man¬ agement of the State Teachers' Association or the State Education Department. In some States the circle is under the joint management of such authority. A definite course of reading is prescribed, textbooks suggested and examina¬ tions prescribed. Many States give some credit in their plan of certification to those who have done successful work in the circle. In 1915 the National Rural Teachers' Reading Circle was organized under the direction of the Bureau of Education at Washington.

Bibliography. — Burnham, Ernest, (Rural Teacher Preparation in State Normal Schools) (Bureau of Education Bulletin, 1918, No. 27) ; Coffman, Lotus Delta, (Rural Training Schools in Minnesota) (General Education Board) ; Finegan, Thomas E., (Agencies for the Train¬ ing of Teachers in New York) (State Educa¬ tion Department, Albany, N.

Y.), also some of New York's contributions to the Develop¬ ment and Standardization of State Normal Schools (Oswego State Normal School) ; Foght, H. W., (Rural Teacher Preparation in County Training Schools and High Schools' (Bureau of Education Bulletin, 1917, No. 13) ; Gordy, J. P., 'Rise and Growth of the Normal School Idea in the United States' (Bureau of Education Bulletin, 1891, No. 8) ; Hinsdale, B. A., (The Training of Teachers' (Mono¬ graphs of Education in the United States by President Nicholas Murray Butler, No. 8) ; Johnson, Charles Hughes, (Progress of Teacher Training' (Report of United States Commis¬ sioner of Education, 1913, Vol. I, Chap. 14) ; Judd and Parker, 'Problems Involved in Stand¬ ardizing State Normal Schools' (Bureau of Education Bulletin, 1916, No. 12) ; Larson, W. E., (The Wisconsin County Training Schools for Teachers in Rural Schools' (Bureau of Education Bulletin, 1919, No. 17) ; Many, Frank A., 'City Training Schools for Teachers'

(Bureau of Education Bulletin 1914, No. 47) • Parker, Samuel Chester, (The Training of Teachers > (Report of the United States Com¬ missioner of Education, 1915, Vol. I, Chap. 7) • Reynolds, Annie, (The Training of Teachers for the Country Schools of Wisconsin (Wis- consin State Department of Education). c t . . , Thomas E. Finegan,

Superintendent of Public Instruction , State of Pennsylvania ; F ornier Deputy Commissioner of Education, State of New York.

TEACHERS' COLLEGE, a school for the training of teachers, affiliated with Columbia University For several years the college has maintained courses for teachers in the New York schools, and since 1897 has made these courses an integral part of the regular college courses The continual increase in the number of teachers taking these courses led to the organization of an extension department in 1903 which includes the entire university sys- tern. The university accepts courses in edu¬ cation as part of the requirement for the de¬ grees of A.B., A.M. and Ph.D. The college diploma is conferred upon students who have successfully completed some one of the general coin ses, and a departmental diploma upon those who have fitted themselves for particular branches of school work. Under-graduate stu- , of Columbia and Barnard colleges may obtain the diploma of Teachers' College when they receive the degree of bachelor of arts.

These are the undergraduate courses: Secondary course leading to the

degree of A.B and the college diploma; general course leading to the college diploma in elementary teaching; general course leading to the college diploma m kindergarten teaching. Then there are several courses leading to the college diploma in art, domestic art, domestic science and manual training. Candidates for the first of these courses must be either college gradu¬ ates or candidates for the degree of A.B. , in Columbia University. There is a combined course of study prescribed for the degree of in, Columbia University and the diploma of Teachers' College.

TEACHERS' EMPLOYMENT AGEN¬ CIES. Teachers' employment agencies are of two classes, viz.: (1) Those that carry on the work in a commercial wny and collect fees from teachers for the service rendered in ob¬ taining positions; (2) those managed by in¬ stitutions of learning, as colleges and normal schools, that obtain positions for their own students or graduates without pa}mient other than general tuition fees. Commercial agencies have existed since. 1855 but did not become a prominent factor in the employment of teach¬ ers prior to 1880. At the present time there are agencies in most of the prominent cities of the country, some doing a local business, others being national in the scope of their activity. The methods employed by all com¬ mercial agencies are quite similar. A teacher enrolls by paying the required fee; making a written statement of his age, education, ex¬ perience and general qualifications, and giving references. The agency on receipt of the statement writes to the references for further data. When a call for a teacher is received by the agency, two or three of the enrolled teach¬

ers best qualified for the place are asked to make application, and the strongest candidate is usually recommended by the agency. If the agency's candidate is elected to the position he usually pays the agency a fee of 5 per cent of the first year's salary. A well-managed agency becomes an important factor in placing teachers in the positions for which they are best qualified. Probably the most valuable service rendered by agencies, however, is the proper placing of teachers with special and unusual qualifications.

Horatio M. Pollock.

TEACHERS' INSTITUTES. See Teach¬ ers, Professional Training of.

TEACHING METHODS AND SYS¬ TEMS. Teaching, or the imparting of knowl¬ edge by the means of lessons or example, has been a matter of study, of discussion, of ac¬ ceptance or rejection of methods and plans through the entire history of educational science. Talleyrand

said that methods are the masters of teachers — ((les methodes sont les maitres des maitres.® The present trend of educational workers is to make method an aid to instruction. Two general basic schemes for the acquisition of knowledge have long pre¬ vailed. The inductive lesson is used in early childhood where associations are made into classes, groups or families of things which are alike in use, structure and appearances. The child easily gains a percept of a chair when shown a piece of simple furniture with four legs, a seat and a back. He may find in process of time that various articles appear in !f.s construction, wood, grass, wire, cloth and different shapes have been evolved — low, broad, deep— -but from his early percept he is able to classify all as chairs. On the other hand a thing he cannot understand, he cannot “ft. he cannot classify, is useless to him When a general idea or principle, which ap¬ plies to several concrete or individual instances so as to explain or give them meaning, is ob- tamed through the study of concrete or in¬ dividual instances, the process of thought is inductive.® Deduction is the opposite of in¬ duction , instead of forming one’s own conclu¬ sions from a series of facts, the student here employs those principles already reached out of his own experience or that established bv

° llrSh The ,teacher employs the deductive method when he asks pupils to answer ques¬ tions, to solve problems, to master situations by referring to rules, laws and axioms; the child uses it when he reduces a fraction to its lowest terms; by applying the rule that a frac- ˆ)e reduced to its lowest terms by dividing both numerator and denominator bv their common factors until no common factor remains. In the process of deduction, rules winch apply may not always readily appear. Different ones may be tried, schemes searched out, tried, rejected — ((guiding principles must sometimes be sought long and earnestly before they are found.®

,. .ˆe specific methods of the class period divide themselves into three fundamentals, testing, drilling, teaching. Testing the pupils’ knowledge provides the instructor a starting point, showing the achievement of the class and its progress, and giving opportunity for

classification and adjustment. Skilful tests, oral or written, help the teacher to individual¬ ize pupils’ needs in such a way as to enable her not only to offer definite instruction to the individual but class instruction as well. Care¬ ful observation and a record of mistakes

show the direction and nature of the pupils' errors. This test of knowledge lends itself admirably to schemes for review in that proper emphasis may be placed on the needs of the section.

Drilling in the use of the tools of the trade is as essential to the student as it is to the laborer. ˆHabit,® James tells us, ((is the result of oft-repeated action in the same line.® There are certain fundamentals in educational pro¬ cedure which must be acquired in such a way as to be habitual. The formation of letters in writing, the acquisition of the multiplica¬ tion table, the ability to recognize easily a noun or a verb, the familiarity with the paradigms and conjugations of a foreign lan¬ guage, ready application of axioms and laws, all results from oft-repeated action in the same line. They are reached by drill — constant, steady, repeated drill. Instruction without drill leads to chaos, loss of time, inefficiency, edu¬ cational disaster. Drill should be constant. The multiplication table should be repeated so often that reaction is instant. Methods employed may be flash cards, group recital, simple problems, etc. Drill should be accurate. James again points out that to break an undesirable habit it was necessary never to lapse into it. This implies correct copy, clearly presented and easy of imitation, given under such environ¬ ment as will lead to skill.

Progress in the career of the student is made by the addition of new knowledge. Knowledge may be imparted by teaching stu¬ dents new facts, varying in method from brief comment to the formal lecture. Comments and explanations are part of most recitations; the danger lies in the fact that the teacher con¬ sumes too much time and loses sight of the fact that one large way for a child to learn is to tell what he knows to someone else. The teacher using this method should never lose sight of the fact that children learn to write by writing — to do by doing, to acquire ability in expres¬ sion and understanding of fact by relating their experience to someone else. New knowledge may be obtained by notetaking, from dictation, from jotting down of facts, from individual research. New knowledge is acquired by illus¬ tration and object teaching, by dramatization in literature, by the use of apparatus in physical science, by pictures and maps in history and geographical science, by stimulation of thought in mathematics.

The question and answer method is employed largely in aiding students to formulate their knowledge, to aid them in their expression, to ripen their judgment, and to form correct con¬ clusions. This method is being introduced with the greatest success in language teaching, where spaking practice is essential if the pupil is to ac¬ quire anything more than a mere bowing ac¬ quaintance with the language under study. Questions and answers are planned so that the

teacher speaks very little and the pupils a great deal. The question should be correct in form, definite in meaning, framed in simple terms within the comprehension and adapted to the

knowledge of the pupil, stimulating to the thought, addressed to the class and framed so as to draw forth a complete expression. The question and answer method should lead naturally into the topical method which encourages pupils in freedom of expression and gives opportunity as strength comes to discuss topics and make reports on as¬ signed subjects calling for mastery of the subject and independence of thought. This develops skill in organization of ideas, pro¬ vides powers of expression and furnishes prac¬ tice in alertness, systematic thinking, and es¬ tablishes confidence in one's self. This method can be successfully used in the development of all new topics where the new matter is to be connected to the old in the mind of the learner. It may be a half-formed conversation between teacher and class, directed by the teacher and commanding such full and free expression as will fulfil the mastery and development of the topic.

Lesson plans carefully considered and clearly formulated are of great practical value. In the daily plan the teacher considers the sub¬ ject matter of the review and advance lesson and the class procedure. The daily plan finds its place in the term scheme and the term scheme is a unit of the syllabus for the year. This daily planning prevents a haphazard course and provides for regular orderly progress. A well-organized plan involves a definite aim, bringing to its aid the proper method, which economizes time and effort.

Results obtained by supervised study have become so successful that a brief survey of this method should arouse the interest of school men in such a way as to lead to its wide adoption. By means of it the teacher is en¬ abled to present the subject matter in such a clear, concise way that every pupil is afforded an adequate opportunity to understand and to master the various daily problems of the sub¬ ject. It is an elaborate and complete assign¬ ment of the next lesson, made so clear that the details present themselves so plainly and logically that all have a maximum opportunity to learn the lesson. It has the advantage of giving aid when aid is most needed, of econo¬ mizing time and effort and forming correct habits of attack and application of principles. With the modern trend of social conditions in the city, crowded part time and frequent abundant attraction, some method and super¬ vision should reach into the home to grip parent and student alike. Frequent reports of progress should go to parents ; specific direc¬ tion given in study; students held to the definite performance of certain tasks and an effort made to train in such

economy of time and effort as to make school work a delight ; this can be accomplished by carefully scheduled program at home and at school.

John Manville Sayles, Professor of Education, State College for Teachers, Albany, N. Y.

TEACHING OF THE TWELVE APOS¬ TLES, a part of the Apostolic Constitutions (q.v.) enunciating principles of Christian faith and practice. It was first (1873) discovered by Bryennius, metropolitan of Nicomedia, in a manuscript of the 11th century and was pub¬ lished in 1875; since which it has been the oc-

casion of much discussion. Consult Harnack, (Texte und Untersuchungen zur Altchristlichen Literatur) (1886) ; Schaff, (The Teaching of the Twelve Apostles* (1885).

TEAK, a large, verbenaceous forest tree (Tectona grandis), native to southern Asia and to the Malayan Islands, which furnishes the val¬ uable lumber known as teak. The heartwood is golden-brown when first cut, but when aged darkens to the tint of black walnut. It is very durable, examples in house-timbers having al¬ ready survived for hundreds of years, is straight in grain and easily worked. It takes a high polish and if properly seasoned will not warp or split. Teak is used for house-building, fur¬ niture and wood-carving and is one of the most valuable woods for shipbuilding, espe¬ cially for decking and for backing the metal plates of iron-clads, since it contains a resinous oil, which prevents it from corroding iron; it is also in demand for car-wheels, gun-carriages, railway ties and engineering works. Although the natural supply of teak, throughout its range was great, as it occurred in mixed forests, most luxuriantly in Burma and adjacent regions, it was rapidly disappearing on account of the unceasing demand and lack of replanting. Great Britain has checked this waste by efficient pro¬ tection and forest-administration in its Indian and Burmese dominions. The timber is mostly consumed in India. The tree is not usually found in pure forests, but mixed with bamboo, which it overtops and which seems necessary for its growth. It requires a light soil with good sub-drainage. The leaves, which are nearly 10 inches long and resemble those of the to¬ bacco, are somewhat drooping and coriaceous and appear as soon as the rainy season opens. They yield a red dye. Teak trees may easily be distinguished for some time during

the rains, by their broad terminal panicles of flowers, which are small, white and fragrant, on slender branchlets. The seeds are oily, in a hard nut covered with a felt of matted hairs and further enclosed in an enlarged membranous calyx. These feathery panicles render the tree again conspicuous during the dry season, when it is leafless. The seeds are plentiful and would soon restore the forests, were it not for the forest-fires, raging just about the time when the nuts are falling. Many of the seeds, how¬ ever, are washed down by the first heavy rains of the monsoon, into the valleys, where the trees are principally found. Although many logs of teak have cracks or hollows running up through the centre from the butt, that are probably caused by the fires, the market value of the teak, which is greater than that of any other wood except mahogany, depends upon the regular cylindrical shape of the log. This should be without knots or other irregularities and great care is taken in the plantations to rid the trees of creepers which, by their cling¬ ing habit, distort the trunks. Teak trees may reach a height of from 100 to 150 feet and a circumference of from 20 to 25 feet; to attain the latter girth, a tree grown under natural conditions must have lived at least 100 years. In the plantations growth is quicker. To get these great logs out of the Burmese forests to ihe coast it is necessary to raft them down the rivers, but, since green teak will not float and if felled to dry on the ground, the result

is uneven seasoning and the lumber still does not float readily, the old Burmese method of drying the wood when standing is still the best available. This is done by girding, a broad annual strip of bark and sapwood is taken off, completely encircling the trunk and the cuts striking down quite into the heart wood. The supply of sap of the upper portion of the trees is of course entirely cut off and the tree dies above the girdle. It stands in that con¬ dition for two or three years, according to its size, seasoning evenly and completely, being exposed to the weather on all sides. The logs will then float easily and are sent down the water-ways, sometimes one by one, until they reach a river large enough for them to be formed into a raft. When they reach the lum¬ ber yards, elephants are often employed to move the teak about and stack up the logs.

TEAL, a small fresh-water wild duck of the genus Querquedula, Nett ion, or some closely related genus, many species of which occur in various parts of the world. The three North American species are the blue-winged (Q. dis- cors), the cinnamon (Q . cyanoptera) and the green-winged (Nettion carolinensis) . The first and last are of common occurrence all over the Continent and breed in suitable places through¬ out the northern United States and Canada. The males are noted for their brilliance of plumage, as compared with the

sober dress of the little females; hence almost any small and gaudy duck is likely to be called a teal in the books of unscientific sportsmen and travelers.

TEARS. See Eye.

TEARS OF SAINT LAWRENCE. See

Shoottng Stars.

TEAS DALE, Sara (Mrs E. B. Filsinger), American poetess: b. Saint Louis, Mo., 8 Aug. 1884. She received her education at private schools in Saint Louis and spent several years in European travel. Her 'published works, marked by a charming lyric quality and a fine rythmic feeling, include (Sonnets to Duse and Other Poems) (1907); (Helen of Troy and Other Poems > (1911); <River to the Sea) (1915); (Love Songs) (1917).

TEASEL, any member of the genus Dip- sacus, botanically not far removed from the campanulus. They are tall, rough, hairy or prickly herbs, the most important species being the fuller's teasel (D. fullonum), a stout bien¬ nial, with sessile, lanceolate to pinnatifid leaves, which are opposite and often connate. The pale lilac, tubular flowers are gathered into dense, terminal, oblong heads, subtended by an involucre and many-bracted. The flowers open, a few at a time, in horizontal zones. Both bracts and involucre are rigid and tipped with spines, the latter being hooked and re¬ maining in fruit. They are then brown and thickly set, radiating from every side of the head, become cylindrical and are very suitable for raising the nap upon woolen cloths or <(teazing» them. The heads are fixed for this purpose around the circumference of a broad wheel or on flat cards. The teasel is cultivated and is suspected to be only a variety of the wild D. sylvestris, which differs chiefly in the spines of the bracts, which are straight.

TECHE (tesh) BAYOU, in the southern part ot Louisiana, a small tide-water channel,

west of Grand Lake, which flows generally south by east into Atchafalaya Bay. It was °*lce the outlet or the main channel, by which tfle Red River discharged its waters into the Gulf oi Mexico. The land through which the Bayou Teche now flows has been formed from the

sediment brought down by the rivers and by the overflows. It contains some of the richest soils of the State. On it are raised large quan¬ tities of cotton, sugarcane and rice. The Teche is. navigable to Saint Martinsville, about 100 miles, and above that point for small boats, when there is high water.

TECHNICAL EDUCATION. See Edu¬ cation, Technical.

TECHNOLOGY, Schools of. Schools of technology in the United States are of compara¬ tively recent date. The earliest was the Rens¬ selaer Polytechnic Institute of Troy, N. Y. (q.v.), founded in 1824; then followed the Massachusetts Institute of Technology, Boston, Mass., 1861 ; the Worcester Polytechnic Insti¬ tute, Worcester, Mass., 1868; Lehigh University, 1866; Stevens Institute of Technology, 1871, and the Case School of Applied Science, in 1880 (qq.v.). From that time on the number increased rapidly and in 1900 there were 43 institutions in the United States classed as schools of the technology by the Commissioner of Education. Among these are privately-en¬ dowed institutions, like the Stevens Institute of Technology; State institutions, like the Sib¬ ley College of Cornell University; scientific departments of older universities and schools partly industrial, like the Pratt and the Armour institutes.

Technical schools in Germany have long been graded as (1) elementary industrial schools; (2) secondary industrial schools; (3) higher polytechnic institutes. The tendency in the United States is along the same lines, pro¬ viding all needed forms of education, includ¬ ing more or less technical training, in con¬ nection with universities, colleges and schools already existing. Many of the State colleges are affording in one institution the 'whole range of pure and applied science. The requirements for entrance to most of the technical schools of the United States are algebra, plane geom¬ etry, English literature, the history of the United States, French and a knowledge of the common English branches. Some schools re¬ quire solid geometry, plane trigonometry, ele¬ mentary physics and chemistry and some re¬ quire Latin in addition to the above. The gen¬ eral courses of study pursued are civil engi¬ neering, mechanical engineering, electrical en¬ gineering, railway engineering, mining engi- eering, chemical engineering, sanitary engineer¬ ing, architecture, pharmacy and chemistry. The length of each course is usually four" years. Marine engineering forms an additional course in the University of Maine, University of Michi¬ gan, Cornell, Columbia and New York uni¬ versities. Naval architecture is offered as a course in the Massachusetts Institute of Tech¬ nology, in Columbia, New York and Cornell universities and in the University of Michigan, etc.

Schools of forestry are connected with Yale, Michigan, Cornell and Syracuse universi¬ ties; with the University of Nebraska and the Ohio State University. Horticulture is taught in Harvard University. Ohio State University,

Iowa State College, University of Nebraska, etc. Domestic art, domestic science and the fine arts, in addition to steam and machine design and applied electricity are given prom¬ inence in Pratt Institute, Brooklyn, N. Y. At the Armour Institute, Chicago Ill., typewrit¬ ing, music and domestic art are added to the usual engineering courses. The universities and colleges of the United States have so univer¬ sally added technological courses to their sys¬ tems of instruction that it is no longer possible to separate the technological 'schools. The United States Commissioner of Education has ceased to classify them separately and only a few are known as distinctly polytechnic insti¬ tutions.

Schools of Agriculture and Mechanic Arts. — The pioneers of technical education in the United States were privately endowed schools of technology, but technical education received its greatest impulse by the (<Land Grant Act® and <(Morrill Bill® of Congress from the year 1862 to 1890. (See Colleges, Land Grants). Under these acts the Federal government has given more than 13,000,000 acres of public lands for the establishment and maintenance of colleges of agriculture and mechanic arts. The name has not always been retained as acts of State legislatures and private benefactions and other causes have led to a change or to an affiliation with State in¬ stitutions. But as a result, at least one such institution has been established and is now in operation in each State and Territory of the United States, except Alaska. The "interna¬ tional Typographical Union has established a large school of typography at Indianapolis and the International Printing Pressmen and As¬ sistant's Union, a school of presswork, near Rogersville, Tenn. Other trade unions are initiating the method and in this way many very important trade schools are developing. Of the institutions that have been organized under these acts, 51 are colleges of agriculture and mechanic arts, having in 1917 over 5,000 instructors; 54,931 white men students; 14,460 white women students, and 4,405 colored men and. 6,208 colored women students. Separate institutions for colored students have been established in most southern States. The courses of study pursued in these schools are agriculture, all the branches of engineering, textile engineering (in North. Carolina and Mississippi.) ; forestry (in Michigan), and hor¬ ticulture (in Washington and Virginia). Clem- son Agricultural College, in South Carolina, has a full equipment of cotton machinery for illustrating the manufacture of yarn and woven fabrics. Requirements

for entrance differ very greatly in different States. (For detailed infor¬ mation regarding technical education in the United States, see Education, Engineering; Manual Training; Technical, Education; Trade Schools). Consult also (Annual Report of the United States Commissioner of Educa¬ tion ; <Report of the United States Commis¬ sioner of Labor on Trade and Technical Edu¬ cationˆ (Annual Reports of the Society of Mechanical Engineers. 5

TECTONIC GEOLOGY. See Geology - Structural Geology.

TECUMSEH, te-kum'se, Shawnee chief : b. near Springfield, Ohio, about 1768; d. 5 Oct.

1. About 1805 he formed the design of uniting the tribes of western Indians against the whites. He claimed that the land-treaties between individual tribes and the settlers were void, inasmuch as the land was the common property of all the tribes and could be alienated only by unanimous assent. British agents fanned the dissatisfaction, which was likewise increased by the ejectment of Indians by speculators. Gen. W. H. Harrison (q.v.) warned him to discontinue his scheme and held a parley with him without result near Vincennes, Ind. He was aided in his plans by a brother, Tensk- watawa, who was reverenced by the Indians as a prophet. Tenskwatawa directed the at¬ tack at Tippecanoe (q.v.) 4 Nov. 1811, though he remained on a hill during its progress. Tecumseh was not present. He incited the Creeks in their futile revolt, joined the British, was made a brigadier-general, led 2,000 Indians at the siege of Fort Meigs, commanded the right wing at the Thames and was killed there. He possessed great qualities of leadership. Con¬ sult Drake, (Life of Tecumseh.*

TECUMSEH, Mich., village in Lenawee County, on the Raisin River and on the Lake Shore and Michigan Southern and the Chicago, Jackson and Missouri railroads, about 35 miles northwest of Toledo and nine miles northeast of Adrian. It is in an agricultural region noted for its fruit, especially peaches. The chief manufactures are flour, furniture, wagons, car¬ riages, brick, tile, paper, lumber, foundry and machine-shop products and dairy products. It has a high school, graded schools and a public library. The two State banks have a combined capital of $70,000. Pop. about 2,432.

TECUMSEH, Neb., city, county-seat of Johnson County, on the Big Nemaha River and on the Burlington and Missouri River Railroad, about 45 miles southeast of Lincoln and 60 miles south of Omaha. It is in a rich agricul¬ tural region. It is the commercial centre of a large portion of the county; the chief ship¬ ments are grain, livestock, vegetables and fruit. The city has eight churches, a high school, four public school buildings and a public library. There are two banks, a national and a State, with a combined capital of $100,000. Pop.

1,748.

TEES, tez, a river in northern England, which rises east of Cross Fell forming along its entire course the boundary between Dur¬ ham and the North Riding of Yorkshire, passes by Barnard Castle, becomes navigable between Dalton and Yarm, and, after flowing a distance of 70 miles, empties into the North Sea at Middleborough, forming the Tees Bay.

TEETH, hard structures developed in the mouth and adjacent parts of vertebrated ani¬ mals and concerned in the obtaining and masti¬ cation of food and secondarily in a variety of other functions. ((They present,® says Owen, (<many varieties as to number, size, form, struc¬ ture, position and mode of attachment, but are principally adapted for seizing, tearing, divid¬ ing, pounding or grinding the food. In some species they are modified to serve as formidable weapons of offense and defense; in others, as aids in locomotion, means of anchorage, instru¬ ments for uprooting or cutting down trees or for transport and working of building materials.

They are characteristic of age and sex; and in man they have secondary relations, subservient to beauty and to speech. Teeth are always inti¬ mately related to the food and habits of the animal and are, therefore, highly interesting to the physiologist ; they form, for the same reason, important guides to the naturalist in the classification of animals.® For further infor¬ mation as to the development of the varied forms of teeth in relation to use, see Kine-

TOGENESIS.

Teeth are a production of skin, and homolo¬ gous with the scales of fishes, and various other hardenings of the surface; in some of the fishes and lower invertebrates there is an insensible gradation from one to the other. In one large class, the birds (q.v.), they are now wholly absent, their functions being performed by the horny covering of the jaws (bill) or by the giz¬ zard, or both ; but in the earliest

extinct birds they were present in both jaws and had a close resemblance to those of reptiles. Turtles, also, and many amphibians are toothless ; and in some of the inferior mammals teeth are present only as embryonic rudiments, which disappear before or soon after birth. Many small, sharp hardened structures in the worms, echinoderms, mollusks, insects and other invertebrate animals, which are more or less concerned in biting, are popularly spoken of as teeth, but, strictly speak¬ ing, should be otherwise designated. In general the present article will treat of the teeth as found in the mouth of man and the higher vertebrates, where they arise from the gum or covering of the jaw-bones, each rooted in a socket or sockets of its own formed by the alveolar processes of the maxillary bone.

Structure of Teeth.— A tooth begins, early in embryonic life, by the development from the mucous membrane of the gum of a group of modified epithelial cells which dip down into the substance of the gum and form an organ, the germ of the tooth, which will furnish the enamel needed. Below that there next develops a mass of special tissue which takes the shape of the future tooth. In due time it begins to calcify upon the surface, and this process pro¬ ceeds, downward and inward, until all of the substance of the papilla has been changed into solid dentine except a central cavity which re¬ mains filled with growing tissue (pulp), sup¬ plied with blood and nerves. This dentine is the principal constituent of the greater number of teeth, and is seen to best advantage in the massive ivory of the tusks of the elephant and walrus, and consists of an organic basis richly impregnated with mineral (chiefly phosphate of lime) disposed in the form of minute tubes, each open at its inner end and occupied by a fibril of living nutritive tissue connected with the pulp. In the ordinary case these dentinal tubes radiate from the pulp cavity in a slightly wavy course to the outer surface. «The hard substance of the tooth is thus arranged in hol¬ low columns, perpendicular to the plane of pres¬ sure, and a certain elasticity results from these curves ; they are upright where the grinding surface of the crown receives the appulse of the opposing tooth, and are horizontal where they have to resist the pressure of contiguous teeth. The tubuli also receive the plasma transuded from the remains of the vascular pulp, which circulates by anastomosing branches

°f the tubuli through the dentine, maintaining a sufficient though languid vitality of the sys¬ tem. The delicate nerve branches on the

pulp's surface convey sensations of impressions affect¬ ing the dentine — every one has experienced the acute sensations when decay has affected the dentine or when mechanical or chemical stimuli have <(set the teeth on edge.® When a part of the primitive vascular pulp from which the dentine is developed remains per¬ manently uncalcified, red blood is carried by ˆvascular canals® into the substance of the tissue. Such dentine is called vaso-dentine and is often combined with true dentine in the same tooth, as, for example, in the large incisors of certain rodents, the tusks of the elephant, and the molars of the extinct megatherium. When the cellular basis is arranged in concentric layers around the vascular canals, and con¬ tains ((radiated cells,® like those of bone, this is termed osteo-dentine, and resembles true bone very closely.

While this dentine is developing the tissue around the tooth-germ is forming a capsule or wall called the tooth-sac, the inner layer of which ossifies, forming a bony coat, the crusta petrosa or cement, on the external surface of the tooth. It is often found only as a thin layer on the surface of the root, which develops downward as the tooth grows, forcing the tooth upward, through and above the gum ; but some¬ times, as in the molar teeth of the horse, ele¬ phant and mastodon, it is a structure which plays a very important part covering and filling in the interstices between the folds of the enamel. It is much like true bone in its con¬ stitution. Meanwhile the epithelial cells of the superficial layer of the skin over the tooth- germ are depositing upon the dentine of the upper part of the tooth, which is to be exposed, an extremely hard bluish white, translucent, protective layer, composed of about 96 per cent of mineral matter, called the enamel, and destined to resist the wear to which teeth are subjected in their work. It is the hardest organic substance known.

Teeth are of various forms, but reducible to two types, of which the simpler and more primitive is represented on a large scaffi by the tusk (incisor) of the elephant or beaver, in which the pulp retains its conical form and activity, or is "persistent,® and continues to supply dentine at the base of the tooth, which thus grows throughout life to compensate for its wearing away at the tip. These teeth are said to be "rootless.® The other type, ex¬ emplified in man, is called (<rooted,® and in this case, after the ((crown,® or exposed part of the tooth has been fully formed, the pulp within the "neck,® or that part just beneath the sur¬ face of the gum, begins to fill with dentine, and to form a downward growing pointed mass, the <(root® or ((fang,® which at last is solid ex¬ cept for a narrow central canal in which the contracted remainder of the pulp persists, largely supplied with nervous filaments from the pair of cranial nerves. Various

intermedi¬ ate conditions between these two types exist.

In form teeth vary from a simple spine-like or conical shape, to many chisel-like or massive and complicated forms, all of which are de¬ termined in the germ, and before the tooth makes its appearance above the gum or is ((cut ,® vol. 26 — 21

which in mammals never normally occurs be¬ fore birth. This appearance in some, as the seals, may take place all at once ; but in most cases occurs at intervals, the front teeth usually showing before the back ones, which sometimes are not cut (for example, the <(wisdom teeth® in man) until several years later. In man and higher mammals two sets of teeth are de¬ veloped : the early, milk, or deciduous teeth, and the permanent set. Such forms are, there¬ fore, named diphyodont ; while those in which one set only is developed are named mono- phyodont. When more than one set occurs those of the second are developed in precisely the same place and manner as the first, except as to certain details of the enamel germs. The milk or temporary teeth are .gradually displaced from below by the upward growth of the permanent teeth, the fangs of the milk teeth being ab¬ sorbed, and the latter falling out as their successors are more fully developed. This ar¬ rangement is adaptive to the growth of the animal's jaws, among other advantages. The milk set in man consists of 20 teeth ; and num¬ bers four incisors, two canines, and four pre¬ molars or bicuspids in each jaw. The per¬ manent set includes, in addition to the forego¬ ing teeth, six true molars in each jaw — the latter being thus unrepresented in the milk set. The milk-teeth begin to appear about the sixth month of life, and continue to be developed till about the end of the second year. The permanent teeth begin to appear about the sixth year of life, the first being the front molar of each side, while the last molars or wisdom- teeth are not usually developed until adult life has been attained. Man has thus 32 teeth in his permanent set — 16 in each jaw.

The incisors or front teeth are single-fanged, and have chisel-shaped crowns, suitable for bit¬ ing. To the incisors succeeds on each side the single canine tooth, which has also a single root and a more pointed crown. This is a piercing, holding or tearing instrument, most highly de¬ veloped in the dog (canis) and other beasts of prey. The fourth and fifth teeth, premolars or bicuspids, derive their latter name from the presence of two pointed cusps or tubercles on their crowns. The fourth tooth, or first pre¬ molar, shows a tendency to become double-fanged, while the fifth, or second premolar, is double rooted, and the crowns of both are broad. The molars — three on each side of each jaw — have the broadest crowns of all, and possess each two or three

fangs, each growing from a separate pulp and rooted in its own socket. The sixth upper molar is the largest tooth of the whole set. These massive teeth crush or grind the food, and vary greatly in the character of the surface of the crown according to the nature of the food. Thus in the insectivorous mammals, as the shrews, the crowns are covered with numerous sharp edges and points which, working against one another, like shears, as the lower and upper molars are closed together in chewing, cut up the hard shells of insects into little pieces fit for swal¬ lowing and digestion. Such a type of crown is called secodont. Another type, the bunodont, is seen in the molars of omnivorous animals, such as man, monkeys, pigs, etc., where the sur¬ face of the crown is broad, flattened, and ele¬ vated into rounded tubercles. In the herbivores

the crown is crossed by parallel ridges, which are greatly varied and complicated, up to the huge molars ot the elephant family; in these cases the ridges are formed by partition-like infoldings of the enamel and the interspaces are filled with cement. When such a tooth wears away at the surface, the different density of the layers of the substances of which it is composed — enamel, cement and dentine — causes them to wear unequally, the hard enamel ridges projecting beyond the others and thus, as Flower says, <(giving rise to a grinding sur¬ face of great mechanical advantage." The pat¬ terns of these ridges are characteristic of species ; and by the changes of pattern which occur as they wear down, the age of the animal ma}' often be closely estimated, a fact con¬ stantly utilized in the case of horses. This in¬ folding of the enamel reached its highest com¬ plication in the curious ˆlabyrinthodont" teeth of the ancient stegocephalian reptiles.

The dentition of any animal is expressed by a dental formula. That of man runs thus :

2 — 2 1—1 2—2 3—3

I. - : C - : P.M - : M - =32.

2—2 1—1 2—2 3—3

This means that the incisors (I.) number two on each side of each jaw — the numbers above the horizontal line corresponding to the teeth in the upper jaw, those below the line indicating those of the lower jaw;

while the further sub¬ division of the teeth above and below the line is meant to indicate the numbers in each side of each jaw respectively. The other signs and numbers, therefore, read that the canines (C.), premolars (P.M.) and molars (M.) number two, four and six in each jaw; making a total of 32 teeth. Similarly the dental formula of a ruminant (q.v.) such as the sheep would run thus :

0 — 0 0 — 0 3 — 3 3 — 3

I. - : C - : P.M - : M - =32.

3 — 3 1 — 1 3 — 3 3 — 3

It is presumed by this notation that each tooth has its strict homologue, in all kinds of mam¬ mals at least; and if any are missing their char¬ acter or name may be accurately defined. This theory encounters difficulties, for example, in comparing the dentition of marsupials with the higher mammals; but it serves conveniently in the description of ordinary animals.

Among the lower vertebrates teeth appear in great variety, as to number, form and func¬ tional modification. Those of fishes and fish-eating animals as the dolphins, are simple sharp- curved cones, useful in seizing and holding their slippery prey, which is usually swallowed whole. In fishes and most reptiles the teeth are usually attached by ligaments, and shed and renewed, not once only, as in mammals, but frequently during the whole course of their lives. In sharks the teeth are placed in a common groove, and row after row may be developed in fishes as the front and older teeth are worn away or destroyed. Fishes and amphibians may have teeth in two rows in each jaw, and also on the back part of the mouth and on the skull or even on the tongue, gillarches {Perch), pharyngeal bones, sides of the mouth and in other situations. The lower vertebrates have the teeth fastened in various ways to the jaws, and not implanted in sockets as in man. In reptiles, as a general rule, the base of the tooth

is anchylosed to the bone which supports it. The completion of a tooth is soon followed by preparation for its removal and succession, the faculty of developing new tooth germs being apparently unlimited in this class. The teeth of crocodiles grow successively, a new one aris¬ ing inside the pulp-cavity of the old one and displacing it. In many lizards teeth become anchylosed to the summit of the jaw (acrodont dentition), or to the outer side of the bone (pleurodont). Reptilian teeth sometimes un¬ dergo great modifications, as in the hinged poison-fangs of vipers and rattlesnakes (qq.v.). Extraordinary

modifications among mammals are seen in the horny pseudo-teeth of the duck¬ bill ; the entire absence of teeth of some eden¬ tates; the transitory teeth of the baleen whales succeeded by whalebone ; the ˆhorn” of the nar¬ whal, the tusks of the elephant, walrus, wild boar, etc., each in relation to peculiar habits.

There is also a close connection between the articulation or joint of the lower jaw and the nature of the food used by the animal. Thus, in purely carnivorous animals, in which the teeth simply tear and cut the food, no grinding motion is required, and the jaw is capable only of a simple hinge-motion in the vertical plane; while in herbivorous animals the joint is so constructed as to allow of extensive sliding and lateral motion of the lower molar teeth upon the upper. In man both the form of this articu¬ lation and the general character of the teeth point to an intermediate position in relation to food, and form a physiological argument for the mixed diet which general custom has de¬ cided to be most natural to our species.

Diseases of the Teeth. — Decay (caries) is by far the most common of the diseases which affect the teeth, and consist in a gradual and progressive disintegration of the tooth sub¬ stance. Among the chief predisposing causes are hereditary defects of quality; imperfect calcification ; pits and grooves in the enamel ; overcrowding of the teeth, facilitating the reten¬ tion of particles of food between them ; con¬ stitutional disorders affecting the digestive or¬ gans and debilitating causes generally. Dental caries consists in the decalcification of the teeth by lactic acid generated in the mouth by fer¬ mentation due to micro-organisms. Decay is rarely met with on smooth surfaces exposed to the friction of food and the direct washings of the saliva. It usually begins in some pit or groove in the enamel or between the teeth, such points forming a lodgment for the development of the organisms. Once the enamel has been penetrated the decay proceeds more rapidly, spreading laterally beneath the as yet healthy enamel and toward the pulp. The more dense the structure of the tooth the more directly does the decay penetrate in the direction of the pulp, though its process is not so rapid and its tendency to spread is less. Caries is most common in early life, by far the greater num¬ ber of cavities making their appearance be¬ tween the ages of 6 and 18. The treatment of caries can only be undertaken by the dentist, and varies with the extent and character of the disease.

Periostitis and Alveolar Abscess. — Peri¬ ostitis is an inflammation of the membrane (periosteum) which covers the roots of the teeth and lines their sockets. By far the most common cause is the presence of a dead nerve,

the poisonous products of which cause violent inflammation at the end of the root. When acute periostitis has fairly set in, it and its usual accompaniment, alveolar abscess, are perhaps the most painful affections to which the teeth are subject.

Alveolar « abscess may be defined as a sup¬ puration around the root or roots of a tooth. Its causes are those of periostitis which pre¬ cedes it, the continuous and throbbing nature of the pain indicating the formation of matter (pus) within the surrounding bone. The face, with the glands about the neck, swell, and the glands exhibit tenderness on touch. The pent- up pus forces its way through the bone to reach the surface of the gum at the point of least re¬ sistance, which is most often opposite the end of the root or roots (this is popularly known as a ((gum boil®). With the escape of pus there is a marked abatement in the intensity of the pain, which generally disappears in a few hours and the swelling in a few days.

Impaction and Difficult Eruption. — It is not uncommon to find certain of the temporary teeth firmly set in the adult jaw, and occupying the place of the permanent ones. In such cases the permanent tooth is usually present in the body of the jaw, but it has been retarded in eruption by being too deeply embedded in the bone. Impaction may also be due to abnormal direction of growth. Such teeth may appear late in life after all the others are lost, and the bone overlying them has been absorbed and so exposed them. When these cases do occur they are responsible for the popular but incorrect idea of a third set of teeth. An impacted tooth seldom gives rise to any trouble, unless it be an upper or lower wisdom, particularly the latter. The cutting of these teeth is sometimes accom¬ panied by distressing symptoms, which may be protracted for months or years, unless they are removed by extraction of the tooth. This con¬ dition is usually due to imperfect development of the jaw. The tooth usually takes its natural vertical direction, but, being wedged in between the tooth in front and the ascending portion of the jaw behind, only a small portion of the crown is visible. The overlying gum is apt to be bruised by the occlusion of the opposing tooth in the upper jaw; inflammation is there¬ upon set up, and being maintained by biting may extend to the surrounding parts. Swallow¬ ing becomes painful and the motion of the jaws restricted. When it is evident that there is in¬ sufficient accommodation in the jaw for the erupting tooth it should be removed.

Inflammation of the gums, though not a dis¬ ease of the teeth proper, is one of the most common causes of the premature loss. It may arise from constitutional causes — chronic dys¬ pepsia, rheumatism or gout — or from the ad¬ ministration of such drugs as mercury or iodide of potassium. Most often, however, it results from the presence of tartar about the necks of the teeth, and lack of thorough cleansing. When due to constitutional causes, their ap¬ propriate remedies are called for; but when due to the presence of tartar, this deposit should be carefully removed.

Toothache. — Other diseases of the teeth are less commonly suffered, and more obscure. The advice of a dentist should be sought on sus¬ picion that the teeth are in any respect out of order. An aching tooth is a symptom of dis¬

ease which requires instant attention. When due to caries with or without simple exposure of the pulp, the attack is brought on by taking hot or cold, sweet or acid fluids, and is seldom of long duration. To afford relief in such cases as these, gently wash out the cavity with a solu¬ tion of carbonate of soda ; then, drying it care¬ fully with a piece of cotton-wool, take a very small pellet of wool dipped in eucalyptus oil and place it in the bottom of the cavity; over this place a piece of cotton wool large enough to fill the cavity and saturated with the following solution : one dram of mastic in one and one- half ounces of eau de Cologne. . This should be changed daily. When the pain is caused by the forming of an alveolar abscess the tooth will be found insensitive to change of temperature but very susceptible to pressure. The patient now becomes feverish, and the pain, which is at first of a dull heavy character, becomes more intense, throbbing, and continues, till pus has been formed and discharged through the gum. Provided the tooth is likely to prove useful and the patient cannot consult a dentist, the gum should be carefully painted with tincture of iodine, or the old-fashioned plan of placing a roasted fig over the root may be resorted to; at the same time it is well to give an aperient such as Epsom salts, followed by a full dose of quinine — • six to eight grains for an adult. Great relief follows this treatment, which is, of course, only temporary. If an abscess shows signs of pointing on the gums it may with ad¬ vantage be lanced. Poultices should never be applied to the face, for heat tends to draw the pus outward. Abscesses in connection with the lower wisdoms often assume a very serious character unless cut short by extraction of the tooth.

Hygienic Care of the Teeth. — Many of the diseases of the teeth and gums might be pre¬ vented or greatly retarded by proper attention to

the cleansing of these organs. The imple¬ ments best fitted for this purpose comprise the quill toothpick, waxed silk thread and brushes, with suitable powders. The toothpick ought to be used after every meal, but it should be sup¬ plemented by the use, between the teeth, of floss silk, which will remove deposits accumulating where contiguous teeth touch. The brush is used to remove all deposits solid and mucous, and it gives the teeth a bright and polished ap¬ pearance; its mechanical friction, too, stimulates the gums to more healthful action. An excel¬ lent tooth powder is composed of precipitated chalk, two ounces ; light magnesia, two ounces ; oil of cinnamon, eight drops ; thymol crystals, four grains; otto of roses, 10 drops. The teeth should be brushed twice daily, in the morning and in the evening. The manner of using the brush is more important than many people sup¬ pose. The general method is to brush horizon¬ tally, but a moment's reflection will show that this leaves untouched the very situations most in need of cleansing. The brush, used properly, should be pressed against the teeth and the handle rotated so as to make the bristles sweep vertically between and over them ; this coupled with an up-and-down motion will thoroughly cleanse the interspaces; the inner surfaces of the back teeth are best cleaned in a like man¬ ner, while the corresponding parts of the upper and lower incisors are effectually reached by a vertical drawing movement. The brush should

be of medium texture, and the bristles of un¬ equal length, and not too closely placed. A hard-and-fast rule cannot, of course, be laid down for every one to follow, but in the ma¬ jority of cases it is advisable to use the powder in the morning and a mouth wash with the brush in the evening. For the latter purpose the following is good (especially where a tend¬ ency to inflammation exists) — tannic acid, four grains; rose water, one ounce; tincture of pyrethrum, one-half dram; oil of cinnamon, 10 drops. Over-brushing must be guarded against as carefully as under-brushing, lest the gums and the necks of the teeth be injured. During an illness these precautions are doubly necessary as the corrosive effects of many medicines are then added to the evil results of a weakened vitality. The use of a glass tube in taking medicine that contains mineral acids and iron is usually supposed to be a sufficient precaution against the action of such drugs on the teeth, but this is quite erroneous ; the only sure preventive being a weak solution of ordi¬ nary baking soda, with which the mouth should be rinsed after every dose. The choice of a tooth powder

should be left to the dentist, for many dentifrices which, no doubt, whiten the teeth, do so by the action of some agent which is as deadly to the tooth substance as to the impurities it is meant to remove. Charcoal (so much used) is quite unsuitable because of its gritty nature. As far as the ordinary individual is concerned, the use of brush and toothpick is the limit up to which one can take of one's own teeth, so that a thorough examination of the mouth once or twice a year by a trust¬ worthy professional man is necessary to check the diseases of the teeth before they have gone so far as to be irreparable. Especially should this be attended to in children. It is almost impossible to overrate the importance of fol¬ lowing, at least in the main if not in detail, the hints given above, for when we consider that the teeth are placed at the very gateway of life, it is not surprising that their neglect should be answerable for many of the disorders of the system. Surely precaution is better than cure. See also Dentistry.

TEFFT, Benjamin Franklin, American Methodist Episcopal clergyman, college presi¬ dent and diplomat : b. Floyd, N. Y., 20 Aug. 1813; d. Brewer, Me., 16 Sept. 1885. He was graduated at the Wesleyan University in 1835 and in 1839 entered the Methodist Episcopal ministry. He held pastorates at Bangor and at Boston and in 1843-46 he was professor of Greek and Hebrew at Asbury, Ind. (now De Pauw), University. He edited the Ladies' Re¬ pository in 1846-52; was president of Genesee College, Lima, N. Y., in 185D54, also editing the Northern New Yorker in 1852-54; and held pastorates at Bangor in 1858-61. He was appointed United States Consul at Stockholm and acting Minister to Sweden in 1861 ; and in 1864 was made commissioner of immigration from northern Europe for the State of Maine. In 1873-78 he edited the Northern Border at Bangor. Author of (Prison Life) (1847) ; (Hungary and Kossuth *(1852) ; (Webster and His Masterpieces) (2 vols., 1854) ; Metho¬ dism Successful* (1860) ; (Evolution and

Christianity) (1895), etc.

TEGEA, Arcadia, city of ancient Greece whose site was near the modern Tripolitza. It was situated on the southern portion of a plateau nearly enclosed by mountains, the northern half being occupied by Mantineia. It was a highly fertile region, but was subject to floods because of an insufficiency of outlets through its mountain barriers and together with Mantineia was dependent upon underground drainage conduits. This common dependency was a cause of frequent wars with Mantineia, while Tegea's natural position controlling the chief roads leading from Laconia to Argus and the Isthmus made her for long a bulwark be¬ tween Arcadia and Sparta and caused many

wars with the Spartans. Sparta, however, sub¬ dued Tegea about 550 b.c. and forced the city to join the Spartan League but did not other¬ wise deprive it of its independence. Later it joined the Arcadian and Argive League against Sparta, but after a decisive defeat about 468-467 r.c. it again became Sparta's ally. It was a member of the Arcadian Confederacy after the battle of Leuctra in 371 b.c. and later be¬ longed to the 2Etolian League. It remained a place of importance after the Roman conquest of Greece, but in 400 a.d. it was destroyed by Alaric. The excavation of its ruins was be¬ gun in 1879. Its most important building was the temple Athena Alea, rebuilt by the sculptor Sc'opas in 395 b.c. It was a combination of Doric, Ionic and Corinthian architecture 72 by 154 feet; the sculptures also were by Scopas and represented the slaying of the Calydonian bear and the combat of Telephus and Achilles. While these are in fragments they were evi¬ dently in the best manner of Scopas. Consult Curtius, E., (Peloponnesos *(1851) ; Mendel, G., 1 Bulletin de correspondence hellenique*

(Vol. XXV, 1901); Gardener, E. A., frag¬ ments of Greek Sculpture) (1915).

TEGERNSEE, Germany, village and moun¬ tain lake resort in the province of Upper Ba¬ varia, on Lake Tegernsee, 32 miles southeast of Munich, 2,390 feet above sea-level. It has a castle which originally was a monastery founded in 719; a parish church of the 15th century; and an ophthalmic hospital founded by Duke Charles Theodore of Bavaria. It is much frequented as a summer resort, the lake and the fine mountain scenery offering many attractions. Pop. about 1,900.

TEGNER, teng-nar', Esaias, Swedish poet : b. Kirkerud, Wermland, 1782; d. Wexio, Smaland, 1846. He was graduated at the Uni¬ versity of Lund in 1803, became (1812) pro¬ fessor of Greek literature and member of the Swedish Academy, was ordained priest and in 1824 was appointed bishop of Wexio. As a poet he struck out a new path in Swedish liter¬ ature. His first attempts did not meet with much acceptance, but at length he came to be regarded as the greatest poet of Sweden. His poetry is characterized by inexhaustible wit, rich, fancy and lively feeling. His most notable work and the direct cause of his promotion to the bishopric was (Frithjof's Saga,> a species of

epic, repeatedly translated into English. Its great value lies in its accurate reproduction of the legends that are included. He also wrote the national song <The Gotha Lion* and (The Children of the Lord's Supper, } translated by Longfellow. His works were collected and

published by Bottiger, his biographer (1847— 50; jubilee ed. 1882--85). The later years of his life were spent in a retreat for the insane and on a paralytic couch. (See Frith jof's Saga). Consult Boyesen, H. H., (Essays on Scandinavian Literature) (New York 1895) ; Erdmann, (Esaias TegneU (Stockholm 1896).

TEGUCIGALPA, ta-goo-se-gal'pa, Hon¬ duras, the capital of the republic since 1880 and of the department of the same name, sit¬ uated on the Choluteca River, 60 miles north¬ east of the Gulf of Fonseca. It is one of the old Aztec cities and lies on a plateau 3,250 feet high. An imposing bridge connects it with the suburb of Comayagua. The government maintains a central institute with subsidized colleges and five normal schools. Its cathedral is the finest building in the country and there are besideˆ five other churches, a university and other less pretentious public buildings. Gold and silver mines are worked in the neighbor¬ hood, which is also a fertile agricultural dis¬ trict. Pop. 28,950.

TEGUEXIN, t£-gek'sin, a lizard. See Teju.

TEHERAN, teh-e-ran', Persia, (1) Capital of a province of the same name, at the north¬ east and about 66 miles south of the Caspian Sea. It lies on an elevated plain, with the lofty ranges of Elburz and Demavend rising at the north and east, 20,000 feet being the eleva¬ tion reached by the latter volcanic peak. The old fortifications were demolished and others were completed in 1874. A fine promenade was made on the site of the old walls and the new fortifications are much more extensive, enclosing an area of about 10 miles. The prin¬ cipal streets extend from the 12 gates to the central bazaar, which displays a great variety of domestic and foreign goods. The ark is the principal feature and is the name given to the citadel and its enclosures, chief of which is the handsome palace of the shah, with its extensive grounds and fountains. There are various schools, including a Koran school and a college conducted by European professors. Besides numerous mosques, the buildings of the British legation and of other legations are worthy of notice and the suburbs lying at the foot

of the Elburz hills, contain many charm¬ ing villas resorted to by the wealthier class in warm weather. The ruins of Rei, in the vi¬ cinity, are among the most remarkable of Persia. Water supplied to the town by 30 sub¬ terranean canals, is brought from the north¬ ern slopes and in 1866 a tramway was con¬ structed to Shah Abdul Azim, a place of pil¬ grimage south of Teheran and others were built connecting various sections of the town. Gas was first used in 1892 to light the city. Harun- el-Raschid was born in the vicinity. The man¬ ufactures include carpets, silks, cotton goods and ironware. In 1913 the police service of Teheran was turned over to the control of Swedish officials, the Swedes having largely officered the Persian army. Pop. (est.) 280,000. (2) The province of Teheran comprises six districts, containing much fine agricultural land and numerous villages, two of which are held in fief by the British and Russian governments respectively. There are fine coal fields in Kas- ran and streams abounding in fish. Veramin District is watered by the Jajrud River. The

chief products are fruit and grain, wheat, barley and rice. A railway, passing through Meso¬ potamia, connects the Mediterranean with the Black Sea and the Gulf of Persia. It furnishes an all-rail route from Calcutta to the British Channel and shortens the distance from Te¬ heran to Constantinople by two weeks.

TEHUANTEPEC, ta-wan-ta-pek', City of, situated in the state of Oaxaca, Mexico, 18 miles from the Pacific Ocean, is the centre of a fertile and productive country in which coffee, sugar and other tropical products are largely grown. It has a considerable trade in cattle which are raised on adjacent lands. The city is an important station of the new inter-oceanic railway. Pop. about 18,000, including a large number of persons of Indian extraction.

TEHUANTEPEC, Isthmus of, comprises that section of the Republic of Mexico within the states of Vera Cruz and Oaxaca where the Gulf of Mexico and the Pacific Ocean approach nearest one another, the distance from the mouth of the Coatzacoalcos River, on the east, to the port of Salina Cruz, on the west, being \43J/2 miles. This point is one of the rare instances where a depression exists in that vast chain of mountains which extends from north to south along the western shores of both American continents. At Tarifa, the lowest point of the summit level, the altitude is but 754 feet above the sea. Cortes, searching for a safe harbor for his ships, discovered the Coatzacoalcos River, wide and deep where it empties into the Gulf, and pronounced it the finest in Mexico. Informed of the narrow strip separating the two oceans, the conqueror was evidently impressed and at once

grasped the idea of inter-oceanic communication at this point. With prophetic insight and influenced by the enormous advantages which were cer¬ tain to result to the isthmus by the construc¬ tion of a ship canal, Cortes located a vast land grant, presented by his sovereign, in close proximity, and chose for a title <(Marquis of Tehuantepec.® His successors caused super¬ ficial surveys of the route to be made and were convinced that no serious obstacles pre¬ vented building a ship canal and, considering the diminutive proportions of vessels at that period, the enterprise was well within the engi¬ neering capacity of the 16th century. It was proposed to employ native slave labor in its construction. Political and strategic considera¬ tions prevented the Spanish government from ever encouraging the enterprise. When Mexico became independent it was too much engaged in restoring order to give attention to internal improvements and it was not until 1842 that a concession for opening a line of communication by canal or railway, or both, was granted to Don Jose de Garay, a citizen of that country. Accurate surveys were made and a practicable route selected, but, for lack of financial en¬ couragement, the concession was afterward sur¬ rendered. Until 1852 capitalists of the United States betrayed no special interest in the enter¬ prise, but when the permanent development of California and Oregon was assured, the im¬ portance of more rapid communication between the East and West was quickly realized. In that year the Barnard and Williams expedition was dispatched to the isthmus to survey a route for an inter-oceanic railway. These explorers

made very careful surveys of the entire route and pronounced the enterprise perfectly fea¬ sible, but were subsequently ordered out of the country, the introduction of American capital not being encouraged by the Mexican govern¬ ment, so soon after the war between the two countries. In 1871 the expedition under Com¬ modore Shufeldt was dispatched to the isth¬ mus by the United States government to make a final survey and finally determine whether a ship canal could be built over the route or not. The result of the survey was a decision that a ship canal, capacious enough for mod¬ ern vessels, was not practicable owing to in¬ sufficient water supply for the upper levels. This expedition also reported adversely to the lagoons, which indent the western coast and were considered the natural location for a terminal harbor, on account of certain unfa¬ vorable physical conditions there existing. A new location for a terminal was chosen at Sa- lina Cruz, a few miles westward of the

mouth of Tehuantepec River, where greater depth of water was afforded, as well as more complete shelter from the prevailing winds.

Henceforward all projects for building a ship canal over the Isthmus of Tehuantepec were abandoned, but the Mexican government readily granted concession after concession to parties, mostly Americans, to construct rail¬ ways; but owing to powerful influences every attempt was frustrated and the liberal grants suffered to lapse or were withdrawn.

The Eads Ship Railway. — In 1883 James B. Eads, a distinguished engineer, conceived a plan for the construction of a railway over the isthmus by which vessels of the largest dimen¬ sions could be transported by rail at a speed of 10 miles an hour. The details contemplated the deepening of the Coatzacoalcos River for a dis¬ tance of 20 miles to the town of Minatitlan, which was to be the eastern terminus. The western terminus was to be at Salina Cruz. At these points giant pontoon docks were to be lo¬ cated and three lines of railway of standard gauge connected the two points. As a vessel sailed into the pontoons it rested upon a railway carriage, secured from all strain by ingeniously contrived supports. Raised to the level of the tracks the carriage was connected to three pow¬ erful locomotives and with its load carried across the isthmus and deposited into the sea at the other terminal. The length of the rail¬ way was to be 165 miles, with a very substantial roadbed and with not greater than 20-mile curves. Where abrupt curves existed, they were to be avoided by turntables at five different points. Vessels in transit were thus always in a straight line. The plan after being sub¬ jected to much criticism was at last endorsed by the highest engineering authority in the world and would probably have been built but for the death of its projector in 1887. Its cost was estimated at $75,000,000. Mexico granted 1,000,000 acres of public land in its aid. Thus for three and a half centuries every plan conceived for the attainment of communi¬ cation over the isthmus having failed, Mexico determined upon the construction of the rail¬ way as a national work and spent $20,000,000. Finally about 1907 the railway was opened to a length of 192 miles, but the impending opening of the Panama Canal greatly reduced its im¬ portance.

TEIXEIRA DE MATTOS, ta-sha ra da mat'tos, Alexander Louis, English journalist and translator : b. Amsterdam, Holland, 9 April 1865. He settled in England in 1874, was educated at Beaumont College, Old Windsor, and entered journalism. He has been engaged as correspondent and as associate editor on various periodicals and has published transla¬ tions of Melati van Java’s Resident’s Daugh¬ ter

Zola's <Curee) ; (Memoirs of Chateau- briand) and of the plays: Zola's <Therese) ; Josine Holland's (Leida) ; (The Cradle) (from the Flemish) and some of Maeterlinck's tales.

TEJU, or TEGUEXIN, a large lizard (Tupinambis teguexin), inhabiting tropical America. The upper parts are deep-black, mot¬ tled with green and yellow ; the sides show two rows of white spots ; and the under parts are yellow, marked with black stripes'. A full- grown specimen may be three feet in length, mostly tail. These lizards frequent forests and plantations, are carnivorous and their strength and speed enable them to catch a great variety of animals, including barnyard chickens and eggs. They are consequently hunted, not only as pests, but because they are themselves good to eat. They dwell in burrows, lay hard-shelled eggs in the ground and defend themselves by vigorous lashing of the tail. Their general re¬ semblance to the Egyptian Varanus gives them the borrowed name ˆsalvator® in some places. This lizard represents an American family, the Tejidcu, with long forked tongues largely cov¬ ered with scale-like papillae. The teeth are solid and implanted almost on the edge of the jaw and are therefore intermediate between acrodont and pleurodont. The body is covered with small scales (osteoderms are absent) or the skin may be simply granular above; the under surface is covered with larger scales, generally arranged in transverse rows. ((This large family,® says Gadow, ((which comprises nearly 40 genera with more than 100 specres, exhibits great diversity of form. Some are inhabitants of forests and are arboreal, while others are strictly terrestrial, preferring hot and sandy plains, or they dwell below the surface and are transformed into almost limbless and blindworm-shaped creatures.® Representatives of the family are spread from Texas and Utah to the borders of Patagonia.

TEKELI, tek'e-li, or TOKOLY, te'kel-yi, Emmerich, Count of, Hungarian noble : b. about the middle of the 1 7th century; d. Nico- media, Asia Minor, 1705. His father had headed an insurrectionary movement against Austria and he himself was chosen by the Hun¬ garians in 1678 their commander-in-chief. He broke into Upper Hungary, captured several fortresses and towns, devastated Moravia and penetrated into Upper Austria. The emperor consented to redress several grievances at the Diet of Oedenburg (1681) ; but the insurgents were not satisfied and refused to lay down their arms. Tekeli now put himself under the protection of the Sultan Mohammed IV, by whom he was declared king of Hungary. A war between the emperor and the Porte ensued in which the Turks advanced (1683) as far as Vienna, but were totally defeated before that city by John Sobieski, king of Poland (12 Sept. 1683). The count continued the

war, but with¬ out success. He fell under the suspicion of the

Turks, who sent him a prisoner to Adrianople (1685). Meanwhile his wife was besieged by the Austrians in the castle of Munkacs, where she held out for three years, until she was com¬ pelled by famine to surrender (January 1688). The Turks discovered the groundlessness of their suspicions of Tekeli and he once more re¬ ceived the support of the sultan, who designated him prince of Transylvania. He penetrated into that country and routed the imperial gen¬ eral (1690) ; but in the same year he was com¬ pelled by Louis, margrave of Baden, to retire. He continued in all the struggles between Aus¬ tria and Turkey till 1697, when the Peace of Carlovitz was concluded, in which Turkey re¬ nounced the cause of the Hungarians. Tekeli then retired to the dominions of the sultan, who conferred upon him several estates, with the title of prince of Widdin.

TEL EL AMARNA. See Tell el Amarna.

TEL EL KEBIR. See Tell el Kebir.

TELAUTOGRAPH, an instrument for the instantaneous transmission of a facsimile copy of writing or pen drawing. Telautograph was the name given by Elisha Gray, who invented the apparatus to his particular form, but it has been extended to cover varieties of ma¬ chines having the same purpose. In Gray's ap¬ paratus the transmitting pen is connected by silk cords to mechanism by means of which the motions of the pen cause a pulsatory cur¬ rent to pass into two telegraph wires. These pulsatory currents produce rapid pulsatory mo¬ tion of the armature of a system of electro¬ magnets by means of which the receiving pen is caused to follow the motions of the trans¬ mitter. Another electro-magnetic arrangement lifts the receiving pen off of the paper at the end of each line, while still another moves the paper forward to receive the next line from the pen. As commonly used a pencil is employed instead of a pen for transmitting and a con¬ tinuous roll of paper is provided at both the transmitter and receiver. The writer or sender of the message pulls a little lever to shift his paper and the motion is conveyed electrically to the paper roll at the receiver. The receiving pen is a capillary glass tube at the junction of two light metal arms. This glass fountain pen¬ cil repeats automatically all the movements of the sending pencil, so that either words, pic¬ tures or signs are accurately duplicated. This apparatus

can be used on the same wires as a telephone without disturbing the use of the latter, does not require an operator at the re¬ ceiving end, and interception of the message by wire tapping is impossible.

In a modified form of telautograph known as the telechirograph, invented by Gruhn, a rad¬ ically different receiving apparatus is used. The transmitted currents influence two electro-mag¬ nets which in turn cause a small concave mirror to move; a light ray from a small incandescent lamp falls upon the mirror whence it is re¬ flected to a sheet of sensitized paper. The mir¬ ror is attached by means of cement to a small iron plate in the form of a triangle, one corner of which rests upon a set screw upon which the mirror can oscillate. Beneath the two other corners extend two armatures subjected to the attraction of the electro-magnets. These arma¬ tures undergo oscillations corresponding to the component movements of the transmitting pen¬

cil ; they are carried by flat springs, and the os¬ cillations are given to the iron plate and, of course, to the mirror fastened to it. Before the message can be delivered the receiving sheet must be developed; the apparatus for this is simple : when the message is completed a small electric motor operated by an independent bat¬ tery in the receiving room is set in motion ; this motor works a train of wheels or rollers which draw the portion of the film written upon by the light ray through a developing bath and out again through a pair of rubber drying rolls. The completed message is delivered in less than 35 seconds after the transmitting operator has placed his pencil in its rest.

TELECHIROGRAPH. See Telauto¬ graph.

TELEDU, a badger (Mydaus meliceps) of Java, which is skunk-like in its habits, and in the copious and far-reaching vileness of the se¬ cretion in its anal glands.

TELEGONY, the inheritance by offspring of the characteristics of some previous mate of one or both parents. That such inheritances existed was long the belief of breeders of live¬ stock, who spoke of the phenomenon as ((throw- ing back.)} Until about 1890 scientific men gen¬ erally lent their support to this theory, although Weismann long ago expressed serious doubts. About 1895 Ewart began a series of careful experiments at Penicuik, near Edinburgh, Scot¬ land, and certain others were undertaken in Germany and Brazil, the outcome of which was to show that the phenomena noticed were evidences of atavism, or reversion or variation, and that no such a thing as telegony existed. See Heredity.

TELEGRAPH BATTALIONS. The gen¬ eral duty of signal troops is to collect and transmit information, to asist in providing se¬ curity for troops, to assist in directing fire attack during combat, to provide means for ready verbal and written communication be¬ tween distant commanders and troop leaders, to facilitate the transmission of verbal and written messages and orders, to insure the secrecy of such messages when necessary by means of codes and ciphers, to exercise super¬ vision over the character of matter transmitted by means under its control, and when circum¬ stances make it neccessary, to fight in order to accomplish any of these objects.

The work of signal troops assigned to lines of information in war varies with the nature of the lines which they control, viz. (1) The maintenance and operation of electrical lines of information from the capital of the nation to the headquarters of the armies in the field. (2) The construction, maintenance and opera¬ tion of the radio stations and central permanent telegraph and telephone lines connecting the headquarters of each army in the field with its various divisions and other units, and the necessary camp telephone and telegraph lines within these armies. These lines are included in the zone of the advance.

The signal organizations assigned to both these classes of duties are called Telegraph Battalions. In the first class they are distrib¬ uted along the lines and at stations as required for construction, maintenance and operation without being supplied with the special technical equipment and transportation required in the.

field. They operate the telegraph cable and radio offices and the telephone systems with substantially the same apparatus used in times of peace. These lines extend from the seat of government through the zone of the line of communications up to army headquarters. For maintenance, repair and extension the ma¬ terial and equipment supplied is the same as in commercial practice.

In the second class of work signal troops must instal and operate lines under quite differ¬ ent conditions. The poles and wire must be light and the instruments of special design for a service unlike that encountered in commercial practice. For administrative purposes the tele¬ graph battalions employed in this class of work are organized into companies, and these in turn into sections, each equipped with

supplies and transportation for installation of a com¬ plete telegraph or telephone system in the mobile units with which they serve. The tele¬ graph battalion prescribed in the tables of or¬ ganization consists of two companies. Each company has six sections — three telegraph and three telephone. A telegraph section is equipped to instal 20 miles of wire on lances with three telegraph offices. The equipment is carried in one wagon of the escort type and one lance truck. The 10 men of the section furnish the linemen, operators and messengers necessary for the construction, maintenance and opera¬ tion of 20 miles of line. The telegraph equip¬ ment and personnel of the company is sufficient for 60 miles of line and that of the battalion for 120 miles. A telephone section is supplied with material for the installation of a tele¬ phone system of 20 telephones connected with a field switchboard and 20 miles of insulated wire laid on the ground or supported on lance poles. The equipment is carried in two tele¬ phone wagons of the escort type and the lance truck. Twenty-one men make up the switchboard operators, linemen and messengers needed. The equipment of the telegraph bat¬ talion is necessarily bulky and heavy and its mobility in general is limited to that of the supply train.

TELEGRAPHONE, a recording tele¬ phone, the invention of Valdemar Poulsen, of Copenhagen. He devised a magnet of sufficient delicacy to limit the magnetizing of a metal plate to the direct point of contact, no matter how minute that point might be. His magnet, in tracing its course over a steel disc, magnet¬ izes only the molecules of the steel with which it comes into direct contact. Thus localized and defined, electro-magnetism becomes con¬ trollable. The result was a mechanism that recorded the sounds given into a telephone re¬ ceiver, on discs that could be mailed like letters, and reproduced by the recipient. This inter¬ esting machine failed of commercial success. Consult Scientific American Sup. (Vol. LXIII No. 1625, 23 Feb. 1907).

TELEGRAPHY. The word telegraph is

derived from the Greek, tele, <(afar off,® and graph, ((to write.® In the modern practice of telegraphy, however, the term has a wider meaning and is used to signify any means by which intelligence is transmitted to a dis¬ tance by signs or sounds. In this sense the word would also include the transmission of speech electrically to a distance, but inas¬

much as that highly important art possesses its own appellation (telephony) such a use of the word is unnecessary.

From remotest times methods of com¬ municating intelligence to a

distance have been employed for purposes of war and defense. The Greeks were perhaps the first to adopt systematic methods of telegraphing, and a description of a telegraph system that was em¬ ployed 300 b.c. is to be found in the writings of the Greek General Polybius.

Polybius Telegraph. — The operation of this system was as follows : At each station there were two walls about seven feet in length and about six feet in height, separated by a space of three feet. At night one or more torches, as desired, but not exceeding five in all, were placed on top of the walls, and certain combinations of the torches rep¬ resented the letters of the Greek alphabet. A tablet showing the combinations of torches for the various letters was provided at each station. For instance, two torches on the right-hand wall and three on the left wall would represent the letter H. Five torches on the right wall and four on the left, Y, and so on. When it was desired to signal a sta¬ tion, two torches were set on a wall, which signal was answered by a similar arrange¬ ment of torches at the other station. The operator then proceeded to spell out his message by placing the torches in the re¬ quired combinations, one letter at a time. The tablet mentioned was divided into five ver¬ tical and five horizontal rows of squares, each letter of the alphabet being allotted a certain square, beginning at the upper left-hand corner with A, and running horizontally across the tablet. Any letter could thus be found by giving the number of vertical and horizontal rows at the intersection of which was the square allotted to that letter. For instance, the letter Y would be at the inter¬ section of the fourth horizontal and the fifth vertical rows. The code thus formed, in a more or less modified form, is in use to-dav by the military departments of various coun¬ tries as a means of telegraphing maps of a locality.

Fire and Smoke Signals. — The use of fires by night and smoke by day has long been practised by even the most uncivilized races, as a means of communicating intelligence to a distance. In numerous places in this coun¬ try there still remain evidences of this prac¬ tice by the aborigines, in the shape of mounds on hill tops and other points of advantage, on which the accumulated ashes of beacon fires of bygone years may be found beneath the roots of trees of gigantic size. In the country be¬ tween Chillicothe and Columbus, Ohio, for in¬ stance, may be traced over 20 such mounds, so related to one another that if all the trees were removed fire signals might be transmitted trom one end of the valley to the other in a few minutes. To this day the Indians of North America practise this method of signaling the approach of enemies in their territory; and up to within a comparatively short time beacon fires were the most favored methods of sig¬ naling the

approach of an enemy in Great Iiri6nn and other parts of Europe.

Semaphore Systems. — It was not until the end of the 18th century that any comprehensive

plan of signaling was employed in Europe or in this country. The plan then introduced was that known as the Chappe semaphore system of signaling. This semaphore resembled the sema¬ phore so common on all railways to-day, con¬ sisting of an upright post, on the top of which movable arms or blades are pivoted, but in the Chappe semaphore the arms were arranged quite differently from those of the ordinary railroad device. Thus the crossarm on the top of the post was 14 feet in length, and at each end of this arm a shorter arm was pivoted at right angles to the longer arm. By a sys¬ tem of ropes and pulleys these arms could be manipulated by the operator and placed in many different positions, certain positions of the arms representing given letters of the al¬ phabet. Hence by appropriately placing the arms, the manipulator could spell out words and messages which an operator at a distant station could read and, if necessary, retransmit to another station further on. These sema¬ phores were placed on substantial stone towers at distances apart ranging from six to 10 miles, and their use spread rapidly throughout Europe. In France, Germany and Russia especially the system was widely used. For example, a string of 220 semaphore towers, extending from the Prussian frontier to Petrograd, via Warsaw, a distance of over 1,200 miles, and employing over 1,300 operators was erected at great ex¬ pense. In Prussia also a line of semaphore stations from Berlin to Treves, via Potsdam, Magdeburg, Cologne and Coblenz, was estab¬ lished in 1832, at a cost of 170,000 thalers. In France there was a semaphore line from Paris to Toulon, 475 miles apart, and requiring 120 stations.

The transmission of signals by semaphore systems was necessarily slow (about one signal per minute), inasmuch as each signal was veri¬ fied by the receiving station before another was transmitted. The time taken in transmit¬ ting a signal or letter from Paris to Toulon was, however, comparatively speedy, namely, 10 to 12 minutes.

Semaphore signaling is still usefully em¬ ployed in some countries for communicating from ship to shore, between coast-guard sta¬ tions, at rifle ranges, etc. One plan of this kind consists in the use of two small

flags, one held in each hand. The flags are about 18 inches square, the staff is about three feet in length. The letters of the alphabet are repre¬ sented by the positions in which the flags or the arms are held. With the aid of a telescope, signals may be transmitted by this method to a distance of three miles in fair weather. Messages may also be read by the use of the arms alone, employing the same alphabet, in which case this is termed the human sema¬ phore.

Electric Telegraph Systems.— Although up

to 1852 a number of visual systems of teleg¬ raphy, such as the semaphore system, were, as stated, in quite extensive use, electricity had been utilized experimentally long prior to that date for purposes of telegraphy but its growth in this direction was slow and the scepticism with which its commercial utility was at first regarded is evidenced by the ex¬ tensive establishment of semaphore stations, just mentioned, long after the possibility of

electric telegraphy had been more or less clearly indicated.

In 1774, Lesage of Geneva constructed an electric telegraph system which employed in its operation 24 line wires, one for each letter of the alphabet. At the terminal of each wire pith balls were suitably suspended, and, taking advantage of the well-known repellant effect that follows the similar electrification of such light substances, Lesage, by the use of fric¬ tional electricity applied to the wires, trans¬ mitted intelligible signals over them. In 1815 Francis Ronalds of England improved on this arrangement. A revolving dial, operated by clock-work, was employed at each end of a wire. The dials rotated synchronously. A notch was cut in each dial, behind which the letters of the alphabet were placed in a circle, so that as the dial revolved one letter at a time was seen through the notch. Pith balls were electrically connected at each end of the wire.. At a given signal the dials were set in rotation and as the notch arrived at a desired letter the pith balls were actuated electrically. The letter was noted and in that way messages were transmitted. In 1774 Volta had discov¬ ered that electricity could be generated by means of the ˆvoltaic® battery, and availing of the current from such a battery efforts were made, with more or less success, between the years 1806 and 1830, to utilize the electrolytic property of an electric current to decompose chemical solutions at the distant end of a wire to indicate telegraph signals. These experi¬ ments were the precursors of others more suc¬ cessful in the line of electrochemical telegraph systems of later years, and to which further reference will be made herein.

Needle Telegraph Systems. — Availing of Oersted[s discovery that a pivoted magnetic needle is deflected from its normal position, parallel to a wire, when an electric current passes in that wire needle telegraph systems came into existence and were extensively em¬ ployed in Europe at one time and are yet in use there. For this purpose a magnetic needle is pivoted in the centre of a coil of wire, and a pointer suitably attached to the needle, swings in front of a dial. The needle and with it the pointer can be deflected to the right or left by changing the direction of the current through the coil. Certain deflections of the needle to the right or left, or combinations of deflections to the right and left represent the letters of the alphabet, and these deflections are produced by sending over the wire current pulsations in positive or negative direction, or alterations of both, as required by the letter to be transmitted. For instance, if the Morse alphabet were used, a motion to the right would represent a dot; one to the left a dash. The alterations of polarity are transmitted by a ˆdrop-handle® or a ((tapper.® The tapper is similar to the double-sending key used in sub¬ marine telegraphy. (See Fig. 15). A needle sys¬ tem employing two needles has also been used. This required two wires, but gives a higher rate of speed — about 15 to 20 words per minute. The operator reads incoming signals by observ¬ ing the movements of the needle or needles.

Bright's Bell. — A modification of the nee¬ dle telegraph is that known as "Bright's Bell,® in which two bells of difL.cnt tone are struck

by a hammer, one tone representing, for in¬ stance, a dot ; the other, a dash. In other instances, the needle of the needle system is caused to strike metal tubes of different tones, one tone indicating a deflection in one direc¬ tion, the other tone a deflection in the opposite direction. These have been termed acoustic telegraphs.

Electric Chemical Telegraphs. — See Auto¬ matic Telegraph Systems in this article.

Morse Electro-Magnetic Telegraph. — In

1824 Sturgeon of England discovered that when a current of electricity is caused to flow in an insulated coil of wire, surrounding a bar of soft iron (that is, well-annealed iron), the bar takes on magnetic

properties, and when the cur¬ rent ceases to flow in the coil the iron at once loses its magnetism. Employing these electro¬ magnetic phenomena, Morse, in 1837, invented the telegraph system which bears his name, and which to-day is in extensive use in one form or another in every part of the world. It was then known that when a piece of soft iron is placed near a magnet there is a mutual mag¬ netic attraction which tends to draw them to¬ gether. This fact is also availed of in the Morse telegraph system as will be shown in the case of the Morse relay and sounder.

To obtain the flow of current in the coil of wire required to magnetize the iron bar, the circuit must be complete, and a source of electromotive force must be provided.

An electric ˆcircuit® may be represented, as in Fig. 1, by a line or wire, W ; battery, B, the

thin and thick lines of which in the figure con¬ ventionally represent the positive and negative plates or elements of a primary chemical bat¬ tery. The source of electromotive force in telegraphy for many years in this country was the ˆMilestone® or <(gravity® battery, the ele¬ ments of which are zinc and copper in a solu¬ tion of sulphate of copper in a glass jar. These cells are arranged in series; two or three for local circuits and from 25 to 350 for main line batteries. Of recent years these batteries and the bichromate primary batteries employed in Europe, have given way largely to storage bat¬ teries and dynamo machines as a source of elec¬ tromotive force.

When dynamos are employed they are in some cases designed to develop about 70 volts each. Several of these machines are connected in series so that by tapping the machines at different points an electromotive force of 70, 140, 210 volts, etc., may be obtained. In other cases dynamos developing 70, 140, 300 volts, respectively, are employed. Two sets of such machines are provided, one set to furnish posi¬ tive polarity, the other negative polarity, inas¬ much as it is essential in the practice of teleg¬ raphy to utilize currents of opposite direction or polarity; instances of which will be noted

in connection with the descriptions of duplex and quadruplex telegraphy in this article.

Reverting to Fig. 1, G is a galvanometer, an instrument to indicate the presence of an electric current in a circuit, and which is con¬ structed on the principle of the indicating needle of needle telegraph systems previously mentioned. The direction of the current in the circuit is

assumed to be from the positive pole of the battery B to the galvanometer G, and back to the negative pole of the battery. The key K affords a ready means of ((opening® and (<closing,® or of (<making® and ((breaking® the circuit. When the key is closed, or down, the circuit is complete and current flows; when the key is ((open® or up, the circuit is open or broken, and no current flows therein. An ordinary telegraph circuit without instruments is indicated in Fig. 2. This is termed a ground

X Y

Ohmujtfi

Fig. 2. — Ground Return Circuit.

return circuit. A circuit like that indicated in Fig. 1 is termed a (<round® or metallic circuit. In the case of a ground return circuit the earth acts virtually as though it were a wire of inappreciable electrical resistance, com¬ pleting the circuit from end to end.

In the Morse telegraph system signals are transmitted electrically from one station to another by the opening and closing of the circuit, or wire, by means of the key, for short and long intervals, which acts operate the Morse relay and sounder or register, and cause them to produce sounds or printed characters corresponding to dots and dashes of what is known as the Morse telegraph alphabet.

In Fig. 3 is shown theoretically the essen¬ tial apparatus of a Morse telegraph equip¬ ment at two terminal stations, X, Y. B is the battery; K is the Morse key. S' is an iron core or bar, arranged in the shape of a horse¬ shoe, around which a coil of fine wire is wound. A is a small piece of iron, termed the <(armature,® which is mounted on a

pivoted lever r. A retractile spring x with¬ draws the armature from the ends of the core when the latter is demagnetized. The play of the lever is limited by the stops c c ; the front one of which c, is a contact point that acts as a key for a local circuit in which are included small battery B' and the coils of the sounder s'. The relay R consists essentially of the iron core, S, the coil of wire and the lever r. It also has devices for adjusting the

—

position of the armature relative to the ends of the core, and screw posts for facilitating the connections of the wires leading into and out of the instrument. (See Fig. 5).

The object in using the sounder s' in Morse telegraphy is to obtain louder sound than is practicable with the Morse relay. The magnetism developed in a given electro-magnet, such as a relay or sounder, increases with the strength of current, also with the number of convolutions of wire in the coils, within certain limits. In fact, up to the point of magnetic saturation of the iron, the resulting magnetism is directly proportional to the product of the current strength in amperes by the number of convolutions, or turns, of wire ; which product is termed the (<ampere turns.® Saturation is, however, seldom or never reached in the mag¬ nets used in telegraphy. Again, with a given electromotive force the current strength is inversely proportional to the resistance of the circuit, and as the resistance of a wire of given diameter increases directly with its length, the longer the wire, the weaker will be the current. It is found that to produce the clear, loud click of the ordinary Morse sounder, about .25 am¬ pere is required, while a main line relay will operate freely with .040 ampere (40 milliam- peres). To operate a sounder placed in a main line having 1,200 ohms resistance would require an electromotive force of about 300 volts. It is, therefore, more economical and in other ways better to employ a lower electromotive force, about 60 volts in this case, and a relay having many turns of finer wire than the sounder (about No. 30 B & S gauge) and a light arma¬ ture, not designed to produce a large volume of sound, which relay by means of its armature lever and a ˆlogical® battery is then caused to operate a sounder as indicated in Fig. 1.

The sounder is constructed on the same prin¬ ciples as the relay, but the wire with which it is wound is larger, about No. 24 B & S gauge, and its armature and lever are heavier. Since the lever r of the relay controls the local cir¬ cuit of the sounder it follows that as the main line is closed and opened, thereby closing and opening the relay, the local circuit will be similarly closed and opened, by which actions the electromagnet of the sounder will be cor¬ respondingly alternately magnetized and de¬ magnetized, and the armature lever will be at¬ tracted by the magnetism and withdrawn by its retractile spring. The motions of the sounder thus produced cause the long and short sounds which are translated into letters of the alphabet by an expert operator. When a Morse register or ink recorder is used in place of the sounder these dots and dashes are embossed or printed on strips of paper from which the message may then be trans¬ cribed by any one familiar with the dot and dash code. Plainly many more relays may be placed

in the main circuit than are shown in Fig. 3. It is not uncommon in this country to have 30 or 40 relays in one Morse telegraph line, and with but two main 'batteries, one at each end. When any one of the keys of a Morse telegraph circuit is open none of the remaining keys can close the circuit, and when any one key is operated all the relays on the same wire will be operated concurrently, by reason of the opening and closing of the circuit by that key. Any attempt to operate

two keys at once on this circuit results in the clashing of signals. Such circuits are termed ((single® or (<simplex,® inasmuch as but one message at a time can be sent over them. This fact distinguishes simplex from multiplex cir¬ cuits over which two or more messages can be transmitted simultaneously, instances of which will be given herein.

The arrangement of Morse circuits just described is termed the ((closed circuit® method of operation, from the fact that the circuit is normally closed with current on the line. In Europe the Morse circuits have generally been operated on what is termed the ((open circuit® plan, which consists in so arranging the appa¬ ratus that the battery shall only be placed to the line when a message is to be transmitted; at other times the battery is disconnected from the line. For this purpose a key with front and back contacts is used, similar to K in Fig. 12; battery being placed as there shown, and the receiving instrument being placed in the circuit of the back contact at x in that figure. In the open circuit method battery is necessary at every station.

Telegraph Alphabets — The American Morse code or alphabet which is in general use on overland Morse telegraph lines in the United States and Canada is composed of dots and dashes and of combinations of dots, dashes and spaces. Letters made up partly of spaces are termed <(spaced® letters. The let¬ ters C and R are instances of spaced letters. (See illustration below). Dots, dashes and spaces are formed by the length of time dur¬ ing which the key or other transmitting in¬ strument may be held closed or open; the

LETTERS.

MOUSE.

CONTINENTAL.

A

—

• mmmm

A

• MM • «MM|

A or A

  • — ■ "■

B

  • ◯

—

C

— -

— -

Ch

— -

D

— - -

— --

E

•

  •

F

  • — -

  • ◯

G

  • ◯
  • ◯

H

—

I

--

- ◯

J

K

- —

— - —

L

—

- ◯

M

—

— —

N

- -

_ m

0**

N

— — - — —

O • •

— —

— - -

0

p

— -

Q

- ○
- — .

E

- — -

S

—

—

T

—

—

V

—

— -

u

—

y

- —
- ◯

w

x

- — —
- ◯

Y

-- —

- —

Z

- ◯

• ○ ,

&

mm tm mm m

MORSE.

1 -

2 -

3 -

4 -

5 -

6 -

7 -

8 -

9 -

NUMERALS.

CONTINENTAL.

. Period : Colon ; Semi-colon , Comma ? Interrogation 1 Exclamation

time of making a dot being taken as one, or one (<time unit.® In length or duration a dash is theoretically equal to three time units. The space between the elements of a non- spaced letter is equal to one time unit ; the space between letters of a word is equal to three time units ; the space between words, to five time units ; the interval in spaced let¬ ters is equal to three time units. The object of the framers of this alphabet in utilizing spaces in some of the letters was to minimize the length of the letters and thus practically to increase the speed of transmission by this alphabet. It was found, however, in auto¬ matic telegraphy that the use of spaced letters increased the liability to errors, and hence an alphabet, known as the Continental or

Universal Code, was adopted in Europe in which spaced letters are not used. This alphabet is now employed universally in Morse telegraphy outside of the United States and Canada. The; American Morse and Continental Morse alphabets or codes are given on preceding page.

Morse Telegraph Apparatus Manual Transmitting Keys — As previously intimated, the characters of the Morse alphabet are formed by the manipulation of a suitable key. The key originally employed by Morse was a cumbersome piece of apparatus. The key now employed in the United States could not well be made lighter. Its construction will readily be grasped by reference to Fig. 4. A steel

Fig. 4. — Morse Telegraph Key.

lever 1, is pivoted at 2. Metal legs 5, 5 pro¬ ject through the desk or table, and are held securely thereto by the clamps shown. The right leg is connected directly to the metal base 6; the left leg passes through the base

and is insulated therefrom by a hard-rubber bushing. On its top there is a cone-shaped cap, termed the anvil, carrying a small platinum contact point, 7. A small strip of metal ex¬ tends out from the cap. At a point on its under side, directly above the contact 7, the lever 1 is provided with a platinum contact 8, termed the hammer. A curved strip of metal 9, the <(circuit closer,® is pivoted on the base 6. When the circuit closer is pushed under the strip projecting from the cap 7, it closes the circuit, regardless of the opening between the anvil and the hammer. The lever 1 and the circuit closer 9 are supplied with hard-rubber finger tips, or knobs, by which they may be handled freely without danger of shocks. A spring adjustable by a set screw 4, normally lifts the lever 1 from the anvil. When the operator is about to <(send,® the circuit closer must be first pushed out from 7 so that the lever when operated may open and close the circuit ; for it will be seen that when the ham¬ mer is brought into contact with the anvil the circuit is closed at that point. Platinum is employed at all important contacts because of its durability and freedom from oxidation due to the sparking which usually occurs when electric circuits are broken. The manually operated Morse keys employed in Great Britain and Europe are practically similar to that shown here, but they are larger and heavier.

Morse Telegraph Relay. — The electro¬ magnet which Morse first employed in teleg¬ raphy weighed over 300 pounds. In 1844, how¬ ever, the weight of this instrument had been reduced to 185 pounds. Within 15 years from that time many improvements had been made in

the instrument and it then weighed but little more than the modern main-line relay (typified in Fig. 5), about three pounds. As late as 1867 relays were wound to 1,100 ohms; the present standard resistance of this instru¬ ment is about 150 ohms. In the case of what are termed <(low resistance® relays the coils are wound to 37.5 ohms. These relays are utilized in a number of instances where many relays are employed on one circuit, as on rail¬ way telegraph lines and the total reduction of resistance brought about by their use is found to effect a very beneficial result in the opera¬ tion of the circuits in wet and foggy weather. The obvious explanation of this result is that, since the electric current seeks the path of least resistance, the lower the resistance of the wire circuit the less will be the tendency of the current to escape by the ((leaks® to ground, where foliage, trees, etc., touch the wire.

Fig. 5. — Morse Telegraph Relay.

In Fig. 5, the two coils sursounding the U-shaped, soft iron cores are shown at 1, 1'.

1 hese coils are covered by hard rubber sleeves. The armature 2 in this type of relay is a part of the iron lever 9\ These relays are adjusted in two ways; either by drawing the cores away from the armature by means of the screw 4, or by means of the retractile spring 6 attached to the armature, the tension of which is variable by the winding device 7. This winding screw is movable toward or from the relay coils by aid of the post 12 through which the supporting piece of 7 passes. The main line wires are connected to the screw posts 8, 8', from which small wires lead to the coil 1, 1'. The local, or sounder, circuit wires are brought to screw posts IT, 11, from which posts wires lead to the armature lever 2, and to the front contact 10. The object of the relay being to repeat or relay the signals passing on the main line to the sounder, the play of the armature lever (which latter is pivoted at 3, 3'), should not be large. This play is regulated by the front stop screw, that is, the stop next the coils, and by the back stop screw, which is insulated.

Telegraph Sounder. — Many different styles of sounders are in use. A well-known form is illustrated in Fig. 6. In this B, B are the

Fig. 6. — Morse Telegraph Sounder.

binding posts; 1 represents the electromag¬ nets; 2 the lever, pivoted on the support 4; a spring adjustable by the screw 5 gives the left end of the lever a tendency to rest on the upper stop 6. Magnetism in the cores draws the armature down, and with it, the lever, until the stop 7 meets the metal support 8. The base is designed to give resonant effects. When used on primary battery circuits these sounders are wound to 4 ohms ; when em¬ ployed on dynamo circuits they are often wound to 20 and 40 ohms.

Telegraph Transmitters. — With the object of obtaining a simple and speedier method of transmitting the characters of his alphabet than the manually operated key method, Morse devised several mechanical arrange¬ ments. One of these consisted of a plate of ebonite or wood on the surface of which were placed in a vertical row short and long strips of metal, corresponding to the letters of his alphabet. These strips were all me¬ tallically connected under the plate by a wire which led to the battery, relay and ground. The line wire was connected by an insulated wire to a metal stylus. This stylus was held in the hand of the operator and in transmit¬ ting a message he would run the point of the stylus over the metal strips representing the

given letters, thereby closing and opening the circuit, in a manner corresponding to the manual transmission of the letter. Another somewhat similar device, also due to Morse, consisted of a metal cylinder on the surface of which the characters of the Morse alphabet were arranged in a practically similar way. A keyboard was arranged over this cylinder and the depression of a key brought a metal brush into contact with the cylinder. At the same time the cylinder was caused to make a partial revolution. The characters on the cyl¬ inder being connected to the line, and the brush to the earth, the foregoing described actions resulted in the transmission of Morse charac¬ ters. These transmitters did not go into wide use at that time, but within the past four or five years a keyboard transmitter, termed the <(Yet-man® transmitter, which is a much improved form of the Morse cylinder transmitter, has been largely adopted by telegraph operators in this country. The employment of this device was no doubt encouraged by the recent em¬ ployment by operators of the typewriters as a means of transcribing received messages, which gave the receiving operator an advantage over the sending operator who could only send from 30 to 40 words per minute at best speed. By means of the keyboard transmitter a speed of transmission approaching the speed of tran¬ scription by the typewriter is obtained. This use of the typewriter was accompanied by a new arrangement of the sounder, which is now placed in a box, or resonator, mounted on an adjustable rod that brings the sounder in

close proximity to the ear of the operator.

Lightning Arresters. — Lightning discharges tend to follow telegraph wires into cables across rivers, and into the telegraph offices, causing damage to the cables and instruments. Damage is sometimes caused also by the con¬ tact of telegraph wires with electric light and power wires. To prevent as far as possible damage from these causes, lightning arresters and fuses are placed at points just outside of cables and at points where the wires enter offices. A combination lightning arrester and

Fig. 7. — Lightning Arrester and Fuse Wire.

fuse wire is shown in Fig. 7. F is a small fuse wire carried on a strip of mica m which is tipped with metal at each end, and held by metal clips n' n'. C represents two small blocks of carbon separated by a thin sheet of mica, and held in position by metal tension springs n n. The left-hand block is connected to ground at the post G; the right-hand block is connected to the screw A from which a wire leads to the apparatus. The line wire is con¬ nected to the screw L. A strong current pass¬ ing through the fine wire F will fuse it ; a lightning discharge will jump to ground by way of the carbon blocks ; in either case pro¬ tecting the cable or instruments.

Automatic Telegraph Repeaters. — The function of a Morse automatic repeater is to take, as it were, the message from one wire

and «relay® it to another wire without the in¬ tervention of an operator. Some of the rea¬ sons that render repeaters necessary are, first, that the resistance of the wire increases _ di¬ rectly with its length, which tends to a diminu¬ tion of current strength ; second, the escape of current from the line wire at points where it makes contact with trees is greater on a wire of high resistance than one of low resistance (see Relays) ; third, the speed of signaling decreases as the electrostatic capacity is in¬ creased and this capacity increases with the length of the wire. Hence it is found desirable in practice to limit the direct length of a tele¬ graph circuit to a maximum of about 500 miles in this country.

The apparatus and circuits of an automatic telegraph repeater at an intermediate station are outlined theoretically in Fig. 8. This is

Fig. 8. — The Toye Repeater.

known as the <(Toye)> repeater, which was at one time much in use, and is chosen for illus¬ tration because of its comparative simplicity. It may be noticed that relay R controls the “continuity preserving® transmitter T by means of its armature lever m, and local battery b; while relay R' controls T' by means of lever m' and battery b'. Also that transmitter T controls the western main circuit at x; while T controls the eastern circuit at x. In prac¬ tice T' is the “opposite® transmitter to relay R, and T is the “opposite® transmitter to R'. In the operation of an automatic repeater the de¬ sideratum is automatically to keep the “oppo¬ site® transmitter passive while its circuit is being repeated into, in shop phrase. The oper¬ ation of the Toye repeater is as follows : As¬ sume that the East is sending to the West. When the eastern operator opens his key, thereby opening the eastern circuit, relay R opens, as in the figure. This opens transmitter T, and in consequence the western circuit is opened at x. At the instant, however, that the western circuit is opened at x, the circuit which includes the relay R' and main battery MB' is closed via the lever of T, through a resistance Rh equal to that of the eastern circuit. As this transposition or substitution of circuits maintains the current passing through relay R' at the same strength as before the change of circuits was made that relay, and, conse¬ quently, the transmitter T' remains closed. In this way the <(opposite® transmitter is auto¬ matically kept passive. When the eastern operator again closes his key, relay R, and in turn T, are likewise closed, resulting in the closing of the western circuit at x. When the

West sends to the East the described actions are reversed.

Among the other automatic repeaters now in use may be mentioned, the Milliken, the Neilson, the Weiny, the Maver-Gardanier, the Atkinson, the Ghegan and the Varley.

Automatic Telegraph Systems. — Auto¬ matic telegraphy consists of arrangements of apparatus whereby Morse characters are trans¬ mitted at a rate of speed ranging from 80 to 2,000 or 3,000 words per minute. As the rate of speed by hand transmission of Morse char¬ acters is from, say, 15 to 40 words per minute, it is obvious that by the use of a rapid auto¬ matic system many more messages may be transmitted over one wire in a given time than by the manual method; and since the cost of construction and maintenance of the wires is a large portion of the expense of a telegraph equipment, if everything else were equal, the advantage would be largely in favor of the automatic systems. But, as fre¬ quently happens, everything else is not

equal. In the first place, every message sent by an automatic Morse system has to be manually prepared for transmission by the automatic machinery, and every message received must be transcribed manually before its delivery to the addressee. This involves a larger force of operatives than is necessary to handle an equal number of messages manually. There is also greater delay in the handling of a mes¬ sage by reason of the additional number of clerks through whose hands it must pass. There is for the same and other reasons greater liability to errors by automatic transmission than by manual transmission. Nevertheless certain automatic systems, like the Wheatstone, for instance, are found of much utility.

There are two general types of automatic telegraph systems, namely, chemical auto¬ matic and ink recording, or embossing, auto¬ matic systems. The former relates to systems in which electrochemical action produces the records of the signals, the latter to systems in which, as the term implies, the signals are re¬ corded by ink recorders.

Chemical Automatic Telegraphs. — At one time in Europe and in the United States chem¬ ical automatic telegraph systems were largely employed in commercial telegraphy, but at the present time its use is confined almost exclu¬ sively to recording signals in police, fire alarm and similar systems. (See Electric Signal¬ ing). The message for transmission by chem¬ ical telegraphy is usually prepared by perforat¬ ing, in a paper strip, holes corresponding to the characters of the Morse alphabet. This strip is then drawn over a metal roller on which rests a steel needle or brush ; the needles and the roller being made a part of the circuit in which there is a primary battery or other suit¬ able source of electromotive force. As the paper is drawn along, the needle, or brush, drops into the holes in the paper, making con¬ tact with the roller and completing the circuit. In this way current pulsations corresponding in duration to dots and dashes are sent over the wire. At the receiving station there is a practically similar arrangement, except that the perforated paper is not used, but, instead, a strip of paper that has been immersed in a chemical solution is drawn over a roller.

Wheatstone Automatic Telegraph — This is an ink recording system. Its apparatus con¬ sists of a perforating machine by which mes¬ sages are prepared for transmission ; a trans¬ mitter which utilizes the perforated paper to transmit messages thus prepared, and a re¬ ceiver

which, being actuated by the electrical pulsations set up by the transmitter, records them in ink, on stiff paper tape, as dots and dashes. The perforator consists of small hol¬ low cylinders with keen edges, in close prox¬ imity to which the paper to be perforated is caused to pass. Three discs, connected with these cylinders and representing the dot, dash and space, are depressed by the stroke of a mallet in the hands of an operator, Twith the result that holes of a certain order are punched in the paper. Thus when the dot disc is depressed, three vertical holes are cut; when the dash disc is depressed two vertical and two horizontal holes are cut, and when the space disc is depressed one central hole is cut, virtually as shown at the left of Fig. 9. The transmitter in its operation takes the place of the operator's hand and formulates dots and dashes with an accuracy superior to and at a speed 10 to 15 times greater than the most expert operator can attain. That por¬ tion of the transmitter apparatus actually em¬ ployed in transmitting signals is outlined in Fig. 9. L' L are vertical rods attached at their lower ends to crank-levers A' A, respec¬ tively. By means of adjusting screws F , F, L' is set to the left of L a distance equal to the space between any two horizontal central holes in the paper. The crank-levers are pro-

Fig. 9. — Wheatstone Automatic Transmitter.

vided with horizontal connecting rods H, H\ the right ends of which pass through holes in a centrally pivoted lever M and through sup¬ porting sleeves x x. H, H' are provided with collets C, C' which at certain times alter¬ nately engage with ends P' D of lever M and push them over. The springs s s' give the rods L L' a constant tendency upward, but their upward motion is checked by the pins R' R on the rocking beam V , which by suitable mechanism within the box on which the ap¬ paratus is supported is given a rocking mo¬ tion. When the right end of the beam moves upward the spring s' causes rod L to follow pin R, and at the same time the connecting rod H pushes the strip P' on M against the upper contact 2 on a metal strip N ; while concurrently the end D of M is brought into contact with the lower contact 3 on a metal strip P. The positive pole of a battery B is brought to strip P, the negative pole to strip N. The "groundˆ is connected with the lower

end D of M ; the line wire to the upper end P' ; D and P' being insulated from one another. The lever M is really a pole-changing key and the rods and levers simply displace the operator's fingers, causing that key to reverse the poles of the battery. In the present posi¬ tion of M in the figure the negative pole of the battery is placed to the line. The per¬ forated paper is shown by a single line and the rod L has

passed through a hole in the paper. A revolving star-wheel W meshes with the central rows of holes in the paper and draws it along at a uniform rate of speed. Assuming there is another hole in the paper immediately opposite that one through which L has just passed, when the lever L' moves upward it will pass through that hole, the paper having been moved forward by the star-wheel just enough to bring the hole op¬ posite L'. At the same time, by the down¬ ward motion of L the collet C has been with¬ drawn, giving collet C' on H' free scope to push D against its right contact, 4, and P' against the contact 1 which it will be seen reverses the polarity of the battery to line. If a succession of dot holes were punched on the paper, a succession of short positive and negative currents would pass over the line. When, however, a set of diagonal holes, as at V in Fig. 9, is punched on the paper, the result is different, for at the first upward movement of L it will pass through the hole, pushing end P' of M to the right, but at the following upward movement of L' it meets the paper at a point opposite the hole through which L had just passed and its further up¬ ward motion is arrested. Hence M is not pushed over and the battery is not reversed. At the next upward movement of L its motion is similarly arrested and the polarity of the battery is still unchanged, until at the next upward movement of L' it comes opposite and passes through the hole M, causing the collet C to push D against contact 4, thereby revers¬ ing the poles of the battery to line. This delay in the reversal of the battery is sufficient to make an appreciable difference in the length of the signal recorded, and constitutes a dash. The effect of these different actions is that, depending on the position of the perforations in the paper strip, dots and dashes are trans¬ mitted by the pole-changer M.

The Wheatstone automatic receiver, or ink recorder, consists of a polarized relay (see Polar Duplex in this article), the armature lever of which is extended at a right angle at its upper end, and this extension at certain times is caused to impinge against a light rod pivoted at one end. On the end of this rod is a small circular disc, the lower portion of whose periphery is immersed in an ink well; an upper portion of its periphery is placed very near the stiff paper tape previously men¬ tioned. The axle of this disc is given a slight tension away from the paper. When, however, a current of positive polarity, designed to re¬ cord a dot or dash on the paper, actuates the polarized relay, its extended armature lever presses against the axle of the disc causing it to deposit a mark on the moving paper tape. A negative current causes the withdrawal of the disc from the paper. The positive current in this system is termed a ˆmarking® current; the negative current a ˆspacing” current, when

it is operated by the <(double current® or re¬ versal of polarity method ; to which further reference will be made in connection with Du¬ plex Telegraphy, also in this article. The circular disc is kept in rotation by simple clock¬ work mechanism and thus constantly renews its supply of ink. The paper strip is drawn for¬ ward at a desired rate by rollers operated by mechanism within the box.

The Wheatstone automatic telegraph may be worked duplex by using a differentially wound relay and the other necessary appa¬ ratus of a duplex system. When worked as a duplex it gives a wire of moderate length, in which there are no very long submarine or underground cables, a capacity of from 200 to 350 words in each direction. On a 1,000-mile duplex circuit, such as from New York to Chicago, with one repeater station at Buffalo, a speed of about 125 words per minute in each direction is now obtainable.

Writing Telegraph Systems. — Writing or automatic telegraph systems transmit and record facsimiles of letters or characters while they are being formed by the stylus or pen in the hand of the operator. The first to produce a writing telegraph system was probably Mr. A. E. Cowper, of England, who employed in the operation of his system the principle of the parallelogram of forces, whereby by com¬ pounding the movements of a point in two di¬ rections, the one at an angle to the other, the actual movement of the point is the resultant of the two movements. The Telautograph (q.v.) also operates on this principle. In the Cowper system the receiving pen depends for its movements upon variations of the magnet¬ ism of two electromagnets placed at right angles to one another, which variations produce changes in their magnetic fields, to which changes an armature carrying the receiving pen is free to respond. The magnets are placed in separate circuits. The variations in the mag¬ netic strength of the magnets are caused by variations of the current strength in their cir¬ cuits, which variations are brought about by means of a pencil which when moved by the operator in the act of# writing is caused to switch resistance coils in and out of the re¬ spective circuits.

Duplex Telegraphy. — This consists in the sending of two messages over one wire in opposite directions at the same time. Since on an ordinary Morse telegraph circuit it is not possible to send more than one message at a time over a wire, it is essential, in order to make duplex telegraphy possible, that the signals transmitted from the

sending station shall not interfere with the signals to be re¬ ceived at that station. The receiving instru¬ ments must, therefore, be so constructed or so placed that while ready to respond to all signals from the distant station they shall not respond to signals from the near or home sta¬ tion. These requirements are met in two ways in practice ; one method being known as the “differential,® the other as the “bridge® method. The differential plan is used almost exclusively on land line duplex telegraphy; the bridge plan is utilized exclusively on long submarine cable telegraphy. The “differential® plan avails of the fact that if a soft iron bar or core, B

Fig. 10, be wound with two coils of wire — oppositely wound as shown — a current from a battery h will flow in opposite directions around

the iron bar, and as each current tends to set up opposite magnetic poles in the iron, one current will neutralize the other and no mag¬ netic effects will be produced in the core. If, however, another battery or source of electro¬ motive force should be placed in the circuit of wire 1 at its distant or right-hand end, a greater amount of current will flow in coil 1 than in coil 2, and in consequence the core will 'be magnetized to a degree depending on the difference in the strength of currents flowing in the respective coils; hence the term differential, and a relay wound in this way is termed a differential relay. The theory of the “bridge® plan is outlined in Fig. 11. The battery, and

wires 1 and 2 remain as before, but the iron bar B is now connected between them and is wound with but one coil, a', b' are coils of resistance, termed the arms of the “bridge® (Wheatstone bridge). Assuming the resistance of wires a', b' and wires 1 and 2 to be equal, the electric pressure due to battery b, at the terminals of the bridge wire, will be equal and opposite, and hence no current will flow in the bridge wire.

There are two systems of duplex teleg¬ raphy in use in this country and elsewhere, namely, the “Stearns® duplex and the “Polar® duplex, and these combined comprise the Edi¬ son “Quadruplex,® described later.

The Stearns Duplex. — The Stearns du¬ plex is operated by increment and decrement of current on the line, virtually as the single Morse system is operated, namely, by send¬ ing a current over the line to actuate the distant relay, which attracts its armature ; and by removing the current from the line, where¬ upon the armature is withdrawn by its re¬ tractile spring. The near or home battery is

prevented from affecting the near relay by winding the relays differentially. The theory

of the Stearns duplex is shown in Fig. 12, which represents the apparatus at two sta¬ tions, A and B. The relays M, M' , are wound with two coils in opposite directions around the cores ; one of the coils of each relay being connected to the main line and the other to a rheostat, or resistance coils, R, R\ K and Kf are transmitting keys. When key K is closed it puts a positive electromotive force to the line ; when key K' is closed it puts a negative electromotive force to the line. When the keys are (<open® the line wire is placed to ground. Since the battery current will di¬ vide between the two coils of the relay in proportion to the resistance of the circuits attached to each coil, a means must be pro¬ vided to make those circuits of equal resist¬ ance, otherwise unequal currents will flow through the coils and the relays will be oper¬ ated by the home battery. It is the function of the rheostats R to provide a resistance equal to that of the main line and the main line coil 1, of the distant relay, so that there will be a ˆbalance.® In the figure, key K being closed and key K' open, a current flows as indicated by the arrows from A to B. As equal currents are flowing in opposite direc¬ tions around the core of relay M its armature is not attracted. On the other hand, as there is a direct path for the current at B to earth, via the back contact of key K' , no current from A will flow through coil 2 of relay M' . Consequently, the core of M' is magnetized

Fig. 12. — Theory of Steams Duplex.

and attracts its armature a as shown. If now key K' should be closed this would add 100 volts negative polarity to the main line circuit, making 200 volts on the main line, while it would place only 100 volts to the arti¬ ficial line coil at B. Hence double the amount of current will flow in the line coils 1, of each relay, that flows through the artificial line coils 1 and 2. Thus the armature a' of M' is now attracted and armature a of M continues to be attracted.

The Polar Duplex. — This system also em¬ ploys differential wound relays, transmitting keys and main and artificial lines similar to those of the Stearns duplex and for the same purposes, but the type of transmitting keys and relays is different in the two systems.

The relay employed in this system is termed a polarized relay (E, E' , Fig. 13) and is based on the fact that unlike magnetic poles attract one another, and that like poles repel one an¬ other. Then if one pole of a bar permanent magnet a, say its north pole N, be so pivoted that it may move freely toward the south pole

s of an electromagnet E, it will follow that by changing the direction of the current flow¬ ing in the coils of the electromagnet, the per¬ manent magnet a will oscillate between the poles in response to the changes of polarity in the electromagnet. If the permanent magnet a, which is virtually the armature of a polar¬ ized relay, be given control of a local circuit containing a sounder D and battery b, it may be caused to record signals in a manner prac¬ tically similar to that in which the Stearns'

Fig. 13. — Theory of Polar Duplex.

relay records them. It is only necessary to pro¬ vide a pole-changing key F F' to reverse the direction of the current flowing in the line, to bring about this result. Fig. 13 represents in theory the circuits and apparatus of a differ¬ ential polar duplex; the apparatus and arrange¬ ment of circuits at the terminal stations A and B being indicated. When the <(pole-changer® F is <(closed® as at A, a positive pole of a battery is placed to the line and the direction of the current is as indicated by the arrows. When the key F' at B is closed, a negative pole of a battery is placed to the line. In these positions of the keys the direction of the cur¬ rents in the main and artificial lines is as shown by the arrows, and the relays at both ends of the line are recording a signal, the sounders being attracted. This is due to the fact that an excess of current is flowing in the line coils of each relay in a direction to produce magnetic poles in the cores of the relays as marked. If now, for instance, the key F' at B should be opened the effect would be to place a positive pole of the battery to the line. The effect of this is that each end of the main line is placed at equal and like potentials, and hence no cur¬ rent flows over the main line or in the main line coils of the relays. A positive current from the battery at A with a strength of say 1 will still flow through artificial line coil at A, but in a direction which will reverse the previous polarity of the core; consequently the armature a of the relay is attracted to the left side and the local circuit of sounder D is opened. An examination of the conditions will show in every case that when the pole-changer at either end is opened or closed, the local circuits controlled by the armature of the dis¬ tant relays will also be <(opened® or

<(closed.® From which it follows that dots and dashes may be transmitted from both ends of the line simultaneously by a proper manipulation of the pole changers.

The instrument C C shown at A and B is an electrical condenser. It performs a very

useful function in duplex and quadru¬ plex telegraphy as follows. The artificial line coils R R which are used to ((balance>:> with are usually composed of spools of fine German silver wire, wound double, or non- inductively, so that they may not possess any perceptible magnetic effect or inductance. These coils have no static capacity. The main line it is known does possess static capacity. Hence at the moment of charging and dis¬ charging the line there is a momentary inrush and outrush of current into and from the line greater than that due to the ohmic resistance of the line. This would produce a momentary inequality in the current in the coils of the relays unless equal capacity were given to the artificial line. This is done by adding the condensers C C' to the artificial line. These condensers are adjustable and by means of metal plugs more or less capacity may be added until a static balance is obtained. The rheo¬ stats are also adjustable in order that the re¬ sistance balance may be readily obtained.

The Quadruplex (Edison). — The Stearns duplex depends for its operation upon the in¬ crease or decrease of the strength of current on the line, regardless of the direction (polarity) of the current, whilst the polar duplex depends upon changes in the direction of the current re¬ gardless of current strength. In the operation of the Edison quadruplex system both of these principles are combined on one wire; the in¬ struments used being the transmitting key (transmitter) and Morse relay (the neutral relay) of the Stearns duplex, and the pole-changer and polarized relay of the polar duplex.

The relays are wound differentially for the purpose stated previously and rheostats, con¬ densers, etc., are employed, as in the duplex systems described. In the Stearns duplex, when the transmitter is open there is no electro¬ motive force to the lifte, the wire in that case being placed directly to ground. Since the polar duplex depends for its operation upon the reversal of polarity, provision is made for this requirement in the quadruplex by so arranging the connections of the

transmitter K that when the latter is ˆopen® a small por¬ tion, 1, of battery B is left in the circuit to be operated by the pole-changer PC. When K is closed, the full battery B is reversed by the

Fig. 14. — Theory of Edison Quadruplex.

pole-changer. On the other hand, when the small portion 1 of battery B is to the line, and only a weak current is traversing the line, the adjustment of the retractile spring is such that the armature a is withdrawn from the core; while, when the key K is closed, and the

full strength of battery passes to line, the arma¬ ture is attracted. Both stations are similarly equipped. Thus an operator may manipulate key K and the consequent increase and decrease in the current strength will operate the distant neutral relay N. But the operation of key K will not practically affect the distant polarized relay P, inasmuch as that key does not alter the direction of current on the line. On the other hand the pole-changer PC will operate the distant polarized relay, but will not oper¬ ate the distant neutral relay. Thus two mes¬ sages may be sent in opposite directions at once over a quadruplex circuit; this system, there¬ fore, giving the equivalent of four wires from one. The three wires thus gained are termed ˆphantom® wires.

Many details of apparatus required in practice are, for lack of space, omitted here, but complete details of these systems are given in the author's (American Telegraphy and Encyclopedia of the Telegraph,* from which work a number of the diagrams used in this article are reproduced with the consent of the publishers.

Submarine Cable Telegraphy. — The speed of signaling through an electrical conductor is inversely proportional to the product of its electrostatic capacity and the resistance. The capacity and resistance of a conductor increases directly with its length. The capacity also varies with the material comprising the in¬ sulating medium (see Electric Condenser). The high electrostatic capacity and the great length of submarine cables conduce to slow signaling. When a long cable is connected with a source of electromotive force the charge is communicated to the distant end almost im¬ mediately, but the amount of charge at first arriving is extremely small and the charge or current rises slowly thereafter to its maximum. The discharge is approximately as gradual as the charge. _ Hence a desideratum in submarine telegraphy is a receiving instrument that will respond to a very feeble current, for the weaker the current required the shorter will be the time of charging and discharging the cable, and the more rapid will be the rate of signal¬ ing. The first most successful

receiving in¬ strument devised for this work was the Thom¬ son mirror galvanometer (see Galvanometer). The light from a lamp is thrown upon the mirror and the light is reflected back upon a screen. The mirror is carried on a suspension system including several very small magnetic needles, which are in the centre of a coil of fine wire, the coil being in the circuit of the cable. Minute pulsations of current cause the needles to be deflected to the right or left ac¬ cording to the direction of the currents. This causes the spot of light on the screen to be de¬ flected to the right or left. A deflection to the right constitutes a dash, one to the left a dot. The direction of the deflections is regulated by a special form of key (K , Fig. 15) at the sending end (a tapper) by means of which positive and negative currents may be trans¬ mitted. The mirror receiver gives no record of the message, the signals being written down by the operator as they are received.

A later invention, the Siphon recorder, also due to Sir Wm. Thomson (Lord Kelvin) over¬ comes this objection. This instrument, out-

lined in Fig. 15, consists of a coil of fine copper wire, A, which is suspended between the poles of a powerful magnet, M, in such a manner that when a current passes through the coil it, like the needles in the mirror galvanometer, tends to place itself at right angles to the lines of force of the magnetic field. When no cur¬ rent is flowing in the coil, two small weights, w, suspended from the lower end of the coil, hold it in the plane of the magnetic lines of force of the magnet. A siphon C consisting of a very small glass tube is attached to the coil

Fig. 15. — Theory of Submarine Cable Telegraphy.

by a fine wire. The lower and bent end of the siphon is placed directly over the centre, or imaginary zero, of a paper ribbon P. The double pole-changing key K sets up momen¬ tary pulsations of positive and negative cur¬ rents through the coil the movements of which cause the lower end of the siphon to move to one side or other of the zero line of the paper. The upper end of the siphon dips in an ink-well B. and, by an ingenious electrical arrangement, not shown in the figure, the ink is caused to spurt out at the lower end of the siphon upon the paper strip as a succession of very fine dots. Thus it is not needful that the siphon should touch the paper and in this way friction is avoided. A specimen of the signals as recorded by the siphon recorder is shown at the top of the figure.

For reasons not well known the earth's electric potential varies at different parts of the earth. Hence there is usually a difference of potential between the terminals of a long cable. This would tend to produce a current in a sensitive receiving instrument, which would deflect it to the detriment of signaling. To avoid this difficulty a condenser p is placed be¬ tween the cable and the earth. This, so to speak, breaks the continuity of the circuit for slow changes of potential. When the condenser is once charged with the earth's potential, cur¬ rent ceases to flow into the cable and the re¬ ceiving instrument comes to zero. The changes in the earth's potential occur comparatively slowly — from maximum positive to negative in perhaps five minutes. Consequently these changes are scarcely perceptible on the receiv¬ ing instrument. The quick changes of poten¬ tial due to the transmitter, however, produce currents of charge and discharge that operate that instrument.

Long submarine cables are usually du¬ plexed, the "bridge" method of preventing the effect of the home transmitting key upon the home receiving instruments, being employed. An artificial cable consisting of strips of tin

foil arranged to give resistance and capacity equal to the actual cable is employed instead of the rheostats and condenser used for the artificial line in overland duplex telegraphy.

Signals are now usually transmitted over long submarine cables by automatic trans¬ mitters somewhat similar to the Wheatstone transmitter; the messages being perforated in advance on a strip of paper. A speed of about 40 words per minute in each direction is reached on some of the newer Atlantic cables.

Simultaneous Telegraphy and Telephony. — This is sometimes erroneously termed "com¬ posite telegraphy." The art relates to telegraph¬ ing and telephoning over one wire at the one time.

When a telephone receiver is inserted in an ordinary telegraph circuit the operation of the Morse keys deflects the diaphragm abruptly and produces loud noises in the tele¬ phone which render the reception of speech nearly impossible. Van Rysselberghe, of Belgium, discovered that if the rise and fall of the telegraph currents were made gradual no disturbing sounds would be heard in the telephone. > To bring about this result he in¬ troduced into the telegraph circuit a combi¬ nation of electromagnets and condensers, which by retarding the rise and prolonging the fall of the telegraph currents merely in¬ flect the diaphragm of the telephone, but do not produce any sound thereby.

When this result is obtained the telephone currents may then be superposed upon the telegraph cur¬ rents without impairing the efficiency of the telegraph signals. Simultaneous telegraphy and telephony is now in successful use in the United States on a large scale; two telegraph circuits being operated as one telephone metallic (two wire) circuit, on circuits up to 400 miles in length.

Synchronous Multiplex Telegraphy. — It

is known that 500 pulsations of electricity per second can be transmitted on an overhead wire of moderate length. A telegraph oper¬ ator at his best speed is not capable of trans¬ mitting more than an average of 10 dots per second. Hence it was thought that if means were devised whereby a number of operators should consecutively be given exclusive con¬ trol of a wire for brief intervals of time the same wire might be utilized to transmit four, six or more messages at practically the same time. In order that this might be done satis¬ factorily it was evident that the correspond¬ ing transmitting and receiving instruments at the near and distant stations should be placed in connection with the wire at identical instants. This entailed the construction of de¬ vices for obtaining exact synchronism; hence the name of the system.

The apparatus for obtaining synchronism and for apportioning the wire among a num¬ ber of operators consists of a revolving wheel at each end of the telegraph line, the wheels revolving as nearly as possible at a uniform rate. Each wheel is driven by an electric motor whose motion is controlled by a vibrating reed at each station, which reeds are attuned to the same rate of vibration, as closely as pos¬ sible. This wheel is supported on a vertical shaft. Below it is a stationary circular disc made up chiefly of a large number of metal

segments (84) radiating from near the centre of the disc, and insulated from one another by suitable material. The shaft supporting the wheel passes through the centre of the disc. The shaft carries by a suitable projection a brush or trailer, which, as the wheel revolves, is swept oyer the segments in rapid succession. As the trailer makes three revolutions per sec¬ ond it comes in contact with each segment three times per second. If it is desired to transmit six messages at once, 72 segments are set apart for the purpose, and each of six desks at each end of the wire are allotted 12 segments. That is, starting from any

given point on the disc, the first segment will be given to desk No. 1 ; the second segment to desk No. 2, and so on to the sixth segment, where two segments are skipped, being re¬ served for synchronizing purposes. A second series of six segments is then connected to desks Nos. 1, 2, 3, and so on around the disc. The line wire is connected to the shaft or trailer of the revolving wheel at each station, and, consequently, as the trailers make three rev¬ olutions per second, each desk of the six is placed in contact with the line, and with its corresponding desk at the distant station, 36 times per second. As an operator cannot make a dot in less than the one-twelfth of a second it follows that in that time the trailer will have given him contact with the line thrice. Hence each one of six operators may transmit messages as though he had entire control of the line. . As each character received at any one desk is formed of a number of pulsations an ar¬ rangement o f relays with a contact on the “back-stop” is employed which delivers the signals virtually unbroken at the receiving end. Synchronism is maintained by means of the two segments referred to which send “cor¬ recting” impulses that retard or accelerate the speed of the wheel that carries the trailer.

Dial Telegraphs — Variously known as dial, A, B, C, and pointer telegraph system ; due to Breguet, Kramer, Frischen, Wheatstone and Siemens-Halske. These systems employ a dial carrying on an outer circle the letters of the alphabet and on an inner circle figures and punctuation marks. A pointer operated by suitable mechanism within a case moves like Tie minute hand of a clock around the dial in response to pulsations of electricity from a sending instrument. The sending in¬ strument has a similar dial and is equipped with a key which is movable around the face of the dial. As the key is thus moved it opens or closes a circuit, or it causes the movement of a magnet before coils of wire within the case, that transmits pulsations of electricity over the line, which in turn actuate, by means of an electromagnet, an escape wheel that moves the pointer as stated. The operator moves the transmitting key uniformly around the dial. As he does so the pointer on the receiving instru¬ ment moves a corresponding distance. When the key arrives at a desired letter the operator pauses. The receiving operator or attendant notes the letter ; the sender moves his key to the next desired letter, and so on, in this man¬ ner spelling out his message. This system is slow,, but it possesses the advantage of requir¬ ing little or no skill on the part of the user for its operation. Hence, especially before the days of the telephone, it was in favor as a

means of communication between police and fire headquarters, on railroads, etc. As else¬ where stated telegraphs of this order are still in

use in other countries.

Military and Naval Telegraph. — Heliog- raphy is quite extensively employed by the army and navy of this and other countries. The distance covered between any two sta¬ tions is about 25 miles. Signals are trans¬ mitted by reflections of the rays of the sun, the duration of the reflections being made to correspond to dots and dashes of the Morse or any other prearranged code. One form of heliograph consists ot a mirror freely mov¬ able in a socket and supported on the upper end of a tripod. The reflections are thrown in the direction of. the distant station and signals are sent by interposing the hand or a screen before the mirror. When the sun is not in a suitable position to admit of its direct reflection in a desired direction, two mirrors are employed, one facing the sun, which re¬ flects the sun's rays upon the mirror facing the distant station.

Flag-signaling, termed wig-wagging and flash signaling by lanterns and search lights, also by horns, whistles and sirens are em¬ ployed by the various armies and navies of the world. Also Morse telegraphy and wireless telegraphy (q.v.). Torches at' night take the place of the flag in signaling. In flag and torch signaling, as well as in heliography and lantern signaling the Continental Morse alphabet is now used. Arbitrary characters of this general type have long been used in needle telegraph systems in which a deflection to the left is represented by the figure "1"; a deflection to the right by the figure "3." Thus A would be represented by "33" in one such alphabet, or two deflections to the right.

In wigwagging or torch signaling the flag¬ man faces exactly toward the distant station; staff is vertical in front of centre of body, but at height of waist. When the Morse alphabet is employed, a dot is represented by a motion of flag or torch to right ; the dash, a motion to the left; the space by a "front" motion. See Semaphore.

Printing Telegraphy, Stock Tickers.—

1 rinting telegraphy relates to those telegraph systems in which telegrams are printed as re¬ ceived on strips or sheets of paper. Generally speaking printing telegraph systems of the stock ticker type depend for their, operation upon the synchronous rotation of a wheel or cylinder at a receiving station with a type- wheel at a receiving station. If, for example, two wheels of equal size having on their peripheries typesetters of the alphabet are placed side by side and are caused to rotate it is obvious that if they start with a similar letter at a given point, each wheel will continue to present a similar letter at the

given point as long as the wheels rotate at equal speeds. It is, however, a difficult matter to obtain a con¬ tinuous synchronous rotation of two or more such wheels or cylinders, especially when they are revolving at a high rate of speed, unless their movements are under control of some master wheel or transmitter. Consequently, in electrical printing telegraphy, controlling de¬ vices of this nature are employed. For in¬ stance, in the well-known “ticker” systems the type-wheels of the tickers in the various offices

are placed under control of a transmitter which maintains them in synchronism by a <(step-by- stepˆ movement, so called. In certain other printing telegraph systems, such as the Hughes, largely used in Europe, the uniform rotation of the transmitting and receiving wheels is maintained by a nearly synchronous rotation of the motors at each end of the circuit, and, in addition, by a ˆcorrecting® device applied to the type-wheel. See Synchronous Multiplex Telegraph in this article.

A theoretical diagram of a simple <(step-by- step® printing telegraph system is shown in Fig. 16. The transmitting apparatus consists of a long cylinder T. A metal segmental W is rigidly mounted on the same shaft as the cvlinder. An electric motor is mounted by friction bearings on the same shaft. The ob¬ ject of using the friction bearings is to permit stopping the cylinder instantly, without stopping the motor. Cylinder T carries a set of blunt pins, p, p, projecting in a spiral row from its surface. A keyboard is placed above the cylinder, with the keys directly over the pins as indicated; one key for each pin. When a particular key is depressed, its spur, or catch, moves into the path of a corresponding pin,

Pig. 16. — Theory of “ Ticker ” Telegraph.

thereby instantly arresting the cylinder. The wheel W is insulated in two parts or segments as indicated by the zig-zag line i. As the wheel rotates, portions of the respective segments (s, s') alternately pass under brush B, with the result that momentary currents pass al¬ ternately from positive and negative batteries b, b', giving the equivalent of an alternating current on the line.

The receiving apparatus or ((ticker® proper, RS , consists of a polarized relay PR (see sec¬ tion Polar Duplex) ; an electromagnet,

termed the <(press® magnet PM; a typewheel TW , and an escape-wheel ElV. A drum D by its weight F tends to rotate the shaft A on which TW and EW are mounted. The escape E is connected rigidly with an armature A of PR, and is pivoted at P. Relays PM and PR are in the same circuit, as shown. The line pulsations are of sufficient strength to oscillate rapidly the armature of the polarized relay, in con¬ sequence of which the escapement E allows the escape wheel and type-wheel to revolve

rapidly. Owing to the greater inertia of the press magnet lever it does not respond to these rapid pulsations of current. When, however, the cylinder T is brought to rest, the steady current operates PM and its lever is sharply attracted and prints a letter.

Assuming that the wheel W sends out 32 electrical pulsations in one revolution these pulsations will cause one revolution of the type-wheel. Thus, if the transmitter be set in motion with brush B resting on the seg¬ ment that is in line with, say, the pin under key A; while the letter A on the type-wheel is opposite the platen P on the end of the lever of the press-magnet, it follows that for every revolution, or part of a revolution, of the cylinder just enough pulsations will be transmitted to cause the type-wheel to pre¬ sent a letter opposite the platen corresponding to the key depressed. If the transmitter and type-wheel do not start with corresponding letters in the required position misprints fol¬ low. This is obviated by devices which bring the apparatus to a ((unison® point after a few revolutions of the cylinder. The speed of rotation of this apparatus is about 120 revolu¬ tions per minute.

The apparatus shown prints letters only. When figures are to be printed, a figure wheel is placed on the shaft, side by side with the letter wheel, and a ((shifting® device is em¬ ployed which shifts the letter or figure wheel under the printing platen when a letter or figure is to be printed. Usually two wires are employed in the latter case, one to operate the ((shift® apparatus.

In printing telegraph systems of the kind just mentioned, considerable loss of time en¬ sues from the fact that frequently it is neces¬ sary to rotate the type-wheel the greater part of a revolution in order to print one letter. Thus, if the letter A follows B in a given word, it will require 31 pulsations of current to print A, assuming that there are 32 letters and punctua¬ tion marks on the type-wheel. If R follows C', 15 pulsations will be necessary. This conduces to a low rate of speed, perhaps an average of 30 to 40 words per minute; the message being printed on a paper strip.

Hughes' Printing Telegraph. — An under¬ standing of the operation of this system may be gathered in a general way from the im¬ mediately preceding remarks. It is not, how¬ ever, a step-by-step system, but depends for its operation on the synchronous rotation of two wheels, one at each end. When a key of the keyboard is depressed at the sending station it catches a pin on a rotating wheel, or chariot, but does not stop the wheel. The pin so caught, however, at that instant causes the transmission of an electric current over the line. This pulsation in turn instantly operates an elec¬ tromagnet at the receiving end which trips a device that throws the paper strip against the letter on a type-wheel which at that moment is in the printing position, and, assuming the transmitting and receiving apparatus to be in synchronism, a letter corresponding to the key depressed will be printed at the receiving station. The synchronous rotation of the wheels is obtained primarily by means of a pendulum at each station which is adjusted and arranged to ensure a proximate rate of rotation

to the respective wheels, but as the pendulums alone cannot be depended upon to maintain proper synchronism, a cam arrangement is pro¬ vided which, every time a letter is printed, moves into a receptacle on the edge of the printing wheel and corrects the synchronism of the wheel, putting the wheel slightly forward or backward, as may be necessary. Pulsations of current are thus only transmitted over the line when a letter is to be printed.

Buckingham Page Printer.— To avoid the loss of time due to the rotation of a single type-wheel with many characters the Buck¬ ingham printer (in one of its forms) em¬ ploys four very small octagonal type-wheels mounted side by side on one shaft. On the periphery of each wheel eight letters and other characters are placed, 32 in all. The shaft on which these type-wheels are mounted is so arranged that by an ingenious dispo¬ sition of five electro-mechanically operated levers, it may be given both a lateral and a rotary motion such that any one of the 32 characters on the type-wheels may be placed before a given point for printing, by five pulsations of current. The selection and printing of any letter or punctuation mark are brought about by a cycle of six pulsations of current in all — that is, three alternations of

polarity. These pulsations are of varying length, akin in this respect to the Morse alphabet. For example, the letter A will be selected by a

dash, short space, dot, short space, dot; B by a dot, long space, dash, long space, dot, dots and dashes being made by positive currents, spaces by negative cur¬ rents, as in the Wheatstone automatic tele¬ graph (q.v.). The combinations of dots, dashes and Spaces representing the different letters comprise what is known as the Buck¬ ingham alphabet. For the actual printing of a character the sixth pulse, corresponding to the space between letters and words in" the Morse and Wheatstone systems, is utilized. This is always a negative pulsation. In the preparation of messages for transmission, and in the actual transmission of messages this system is almost identical with the " Wheat¬ stone automatic telegraph, and if the Wheat¬ stone receiver were employed the messages would be recorded as dots, dashes and spaces.

The transmission of the six pulses of al¬ ternating polarity for each letter of the Buck¬ ingham alphabet operates a polarized relay in the mam line at the receiving station, which

relay by its armature controls two local cir¬ cuits, in which are a governing relay, a unison magnet and an escapement magnet, the latter imparting, by means of an escapement, a step- by-step motion to a ˆsunflower,® or distributor, of peculiar construction, to such purpose that, with the co-operation of the governing relay, and depending on the duration of the received pulses and the order of their arrival, one or more selecting relays are operated, and these, in turn, cause the operation of the type-moving levers which bring a desired letter on the type- wheel to the printing position. Hence the Buckingham printer is a positive or «step-by- stepw . system in which an escape-wheel, and with it the sunflower, is caused by a cycle of six pulses of current, one or more of which are prolonged, to undergo a cycle of six steps for each letter or character selected and printed. Consult author's (American Telegraphy and Encyclopedia of the Telegraph > for details of this system).

A lie Ddiuay -rage printer. — ims system is a modification of the Buckingham page printer just briefly described. The operation of the Barclay printer up to the selecting re¬ lays is virtually similar to that of the Buck¬ ingham. At this point, in the Barclay arrange¬ ment the selecting relays, instead of operating the type-wheel shaft, are caused to select a given one of 30 or 32 electromagnets, each of which controls or operates a certain type of a typewriter which prints the letter; the message being printed by the typewriter in the ordinary way, by the aid of electrical devices. Messages may be transmitted by this system by means of a keyboard manipulated by an operator, or by means of perforated paper.

Murray Page Printer.— This printer is being used on the lines of the British Post- office. The messages to be transmitted are prepared somewhat as in the case of the method utilized in the Wheatstone automatic system. The perforated paper sends certain combinations of electrical pulsations for any given letter over a main line and these pulsa¬ tions in turn operate apparatus at the receiv¬ ing station which perforates a paper strip in a manner corresponding to the letters trans¬ mitted. This paper is then caused to pass before a set of metal strips which in their operation, and depending on the combination of perforations in the paper, select a certain letter of a typewriter, the message being thereby printed in page form. This system depends on synchronous movements of the ti ansmitting and receiving apparatus, which is maintained by the action of the received pulsations upon apparatus in a local circuit at the receiving station. The speed of this system is about 103 words per minute. Consult Trans. Am. Inst. El. Engrs. 1901 . Baudot Multiple Printer.— This system is in successful operation on many of the tele- graph lines of the French government. For its multiplex feature it employs devices prac¬ tically similar to those described herein rela¬ tive to Synchronous Multiplex Telegraphy. A keyboard is used,, and letters are transmitted by depressing a. given key which sends out the necessary combination of pulsations to repro- [uce a given letter at the receiving end, where by suitable selecting relays the given letter is selected and printed. The rate of signaling by

this system is about 120 words per minute on one circuit. Consult Thomas' (Traite de Telegraphique Electrique) ; also Electrical Re¬ view , New York, 12 April 1899.

The Multiplex Printing Telegraph System. — In this country and in Great Britain a suc¬ cessful printing telegraph system based largely on the Baudot and Murray systems has been recently developed and by means of which eight and 12 messages are sent on one wire simul¬ taneously at a rate of 40 and 30 words respec¬ tively, per minute.

A brief description of this system may be essayed here. In one respect it resembles the synchronous multiplex system previously de¬ scribed herein.

Thus it employs a number of insulated seg¬ ments arranged circularly at each end of the circuit and over which a revolving brush or trailer

is caused to pass. Instead of attaching a Morse key and relay to alternate segments of the circular disc, however, each of five con¬ secutive segments of such a disc are connected at the transmitting end with a key, each key controlling a source of electromotive force, while at the receiving end of the circuit each of five corresponding consecutive segments of a segmental disc or ring is connected with a relay. There are four series of such consecu¬ tively connected keys and relays on the seg¬ mental discs. One or more of each series of kgys may be depressed to form a certain com¬ bination of electric impulses representing a given letter, which impulses are transmitted by the trailer over the circuit and in turn these impulses operate a corresponding series of re¬ lays at the receiving station. These relays by their armature operate mechanism whereby a desired given letter is selected and printed in page form. As there are four series of keys and relays attached to the segmental discs it will be clear that four letters of four different given words or messages may be transmitted at every revolution of the trailer around the disc. The rate of transmission of words will then depend on the speed of rotation of the trailers, and this in turn is largely controlled by the mechanical and electrical limitations of the apparatus and line. In the Baudot system a keyboard is used to transmit a prearranged combination of electric impulses to form a letter. In the multiplex printing telegraph sys¬ tem under consideration the messages are transmitted by perforated paper strips, operat¬ ing a transmitter, somewhat as described herein in the case of the Wheatstone automatic sys¬ tem. In the multiplex printer the paper is per¬ forated by a keyboard perforator manipulated by an operator at a speed slightly greater than that of the automatic transmitter of the printer, and the paper there prepared is fed directly from the perforating machine into the said transmitter. By the foregoing arrangement four ˆchannels® are provided on one wire and as the wire is duplexed in the manner described herein in connection with the Morse duplex sys¬ tem the equivalent of eight channels is obtained on one wire. As each channel may be operated at the rate of 40 words per minute a total of 320 words per minute is thus obtainable in practice on long circuits, the messages being printed in Roman letters on regular telegraph blanks in page form. Means are provided for

the maintenance of exact synchronism between the transmitting and receiving trailers over their respective segmental discs — analogously as in the synchronous multiplex Morse system, but greater refinement of apparatus and oper¬ ation is necessary in the multiplex printer. Obviously this must be so from the fact that in the multiplex printer means are provided for operating the typewriter carriage, printing the

letters, etc.

The code or alphabet employed in this mul¬ tiplex printing telegraph system is virtually similar to the Baudot alphabet. It is known as a five equal unit alphabet, that is, five im¬ pulses of positive or negative current are com¬ bined to form a given letter. Thus the letter A is assigned two positive and three negative impulses, B one positive, two negative and two positive units. Each current impulse in the Baudot code is of equal length and by different combinations of the five impulses it is possible to form 31 letters or characters. In the Morse code the dots and dashes representing letters and figures are of varying lengths, and hence a letter of the Morse code may consist of from 1 to 12 units. The average number of units in a letter of the continental Morse code is prac¬ tically nine units per letter. It has been cal¬ culated that this disparity in the two codes results in an advantage for the Baudot alphabet in practice of about 65 per cent over the Conti¬ nental Morse alphabet in the rate of transmis¬ sion over circuits of equal length.

This multiplex printer rendered most efficient service in France under the direction of the United States Signal Corps.

Miscellaneous Telegraph Systems. — In ad¬ dition to the telegraph systems referred to herein, many others have been in actual op¬ eration during the past century, either ex¬ perimentally or commercially, among which may be mentioned the electrostatic systems of Lomond, Reusse, Reizen, Don Silva, Be¬ tancourt, Cavallo ; Ronald's synchronous sys¬ tem ; the electrolytic systems of Soemmering and Coxe; the chemical facsimile systems of Caselli, Bakewell, Denison and Bonelli's chem¬ ical printer; the chemical dot and dash systems of Bain, Morse, Anderson, Delany, Dyar ; the electromagnetic systems of Alexander, Gauss and Weber, Steinheil, Schweiger; the needle systems of Wheatstone and Cooke, Davy; the dial systems of Siemens, Breguet, Kramer ; the printers of House, Hughes, Phelps; the Meyer multiplex; the Mercadier multiplex and the Alteneck mechanical automatic system.

Telegraph Systems in Practical Opera¬ tion. — Wherever the electric telegraph is em¬ ployed the Morse system is the one most gener¬ ally utilized. In some countries such as the United States and Canada, Sweden, Portugal, Switzerland, Egypt, Bulgaria, New. Zealand, India, Australia and South America, the Morse system is used almost exclusively. In Great Britain, Italy, Russia, France, China, Japan, the Morse and the Wheatstone automatic, which is simply a fast Morse system, are largely employed. In Austria, Belgium, Great Britain,

Hungary, Sweden, Russia, France, the Hughes printer is in extensive use. In France the Baudot printer is utilized ; also in Italy, Holland and Switzer¬ land to a limited, extent. In Great Britain, about 750 Morse ink recorders; 925 Bright's

Bell; 5,000 ABC telegraph, 30 Delany multi¬ plex and 4,700 single needle apparatus are in operation. All told there are approximately 70,000 Morse sets in operation in the United States and Canada, and 45,000 in all other parts of the world.. There are in Europe about 1,700 Hughes apparatus, and in Europe and else¬ where about 530 Wheatstone automatic sets in operation. Needle systems; ABC and Bell apparatus are quite largely used in Europe on the railroad and commercial telegraph lines. A page printing telegraph system, termed Mork- rum Printer, is also in extensive use in the United States.

It may be remarked that there is a desire on the part of the telegraphing public in all countries to receive telegrams in type and in page form, and as far as practicable the vari¬ ous telegraph administrations are endeavoring to comply therewith. In the United States, as already intimated, the Morse operators in nu¬ merous instances transcribe messages by the typewriter as received. In Great Britain the Murray page printer has been adopted by the government, and in Europe generally, where messages are received on paper strips as by the Hughes and Baudot systems, the strips are pasted on blanks in page form, for delivery.

Speed of Different Systems. — The average speed of transmission by the Morse manual telegraph may be placed at about 20 to 25 words per minute, although skilful operators attain a speed of 45 and 50 words per minute. The speed by the Wheatstone system on short lines is about 500 to 600 words per minute. By the Hughes an average of about 30 words per minute in one direction is obtained. This sys¬ tem may be duplexed, giving 50 words per min¬ ute on one wire. By the Baudot system, oper¬ ating as a quadruplex, 120 words per minute; as a sextuplex, 180 words per minute. By the Buckingham and the Barclay systems a speed of 80 words per minute, in each direction, may be obtained on circuits from New York to Chi¬ cago, with repeaters midway. By the Murray printer, about 80 to 100 words per minute in each direction may be obtained.

Mileage of Telegraph Lines, Wires and Submarine Cables. — In the

United States the total amount of pole lines is about 238,000 miles, on which about 1,270,000 miles of copper and iron wire are erected. In Canada there are about 35,000 miles of lines and 84,500 miles of wire. In both cases the various railroad companies also operate a considerable amount of telegraph line (about 250,000 miles of wire) for the movement of trains, etc. In all other parts of the world there are approximately 435,000 miles of telegraph pole line and 1,450,000 miles of wire, exclusive of about 48,000 miles of pole lffies and 216,000 miles of wire con¬ trolled by railroads. The average size of the copper wire used on telegraph pole lines is No. 12 or 14 B. & S. gauge; that of iron wire, No. 6 or 8. The nature and size of the poles varies in different countries. Cedar is largely used in the United States and Canada; fir in Europe. Poles 30 to 40 feet long and set five feet in the earth are used. Thirty to 40 poles to the mile has been common practice, but the tendency in this country is toward the use of 45, 50 and more poles per mile to obtain greater

security against sleet and wind storms. Iron telegraph poles are used in some countries.

The amount of submarine cables in all parts of the world is about 200,000 miles. Of this amount about 27,500 miles are owned and controlled by governments; the remainder is owned and operated by private companies. In all there are about 1,000 submarine cables of varying length in different parts of the globe.

While, as stated, the telegraph systemsˆ of the United States and Canada are mainly operated by private companiesˆ the govern¬ ments of both of these countries have con¬ structed and laid for their own purposes many miles of overhead lines and submarine cables, Thus the United States government has con¬ structed its own telegraph lines and cables in Alaska and the Philippines. The Alaskan lines extend from Seattle, Wash., to Nome, Alaska, a distance of 3,625 miles, including 1,439 miles of land lines, 2,079 miles of sub¬ marine cable and a wireless circuits of 107 miles in length. The government handles private commercial messages on these lines at a regu¬ lar fixed charge. The Canadian government owns and operates about 3,900 miles of land lines and cables. The bulletins giving the movements of fish in the waters of the Gulf of Saint Lawrence and other shore lines, to¬ gether with messages relating to weather, quar¬ antine and signal service, are transmitted free of charge.

Administration of the Telegraph. — The

administration of the telegraph is to-day in the hands of the

government in all parts of the world. The actual management of the tele¬ graph systems of the various countries of the world is, of course, in the hands of the proper authorities of those countries, but, in general, the disposition of all matters that relate to the regulation of international telegraph traffic, such, for instance, as the maximum number of letters that shall constitute a word, the alphabet to be used, etc., is reposed in the hands of the International Bureau of Telegraph Adminis¬ trations, Berne, Switzerland. In fact, however, even the United States and Canada incidentally come under the control of this bureau in so far as relates to the intercommunication of tele¬ grams with countries under the jurisdiction of the bureau. Thus if the bureau decides that the maximum number of letters in a word for telegraph purposes shall be 10, the countries mentioned must perforce comply with that reg¬ ulation as regards telegrams that may be des¬ tined for or that may emanate from territory wholly within the jurisdiction of the interna¬ tional bureau.

William Maver, Jr.,

Author of (American Telegraphy and Ency¬ clopedia of the Telegraph P

TELEGRAPHY, Submarine Sound, a

system of communication between steamships at sea by sound telegraph through water. In 1901 A. J. Mundy tested an experimental boat in Boston Harbor, based on experiments in the conductivity of sound through liquids by Prof. Elisha Gray. Experiments by J. B. Millet proved remarkably successful. Signals were exchanged between lightship bell and a ship seven miles distant at sea. Sound travels faster through water or liquids than air, and this is taken advantage of in a practical way. In

the ship at sea are two sound receivers, one upon each side in the hold, located approxi¬ mately 20 feet below the surface of the water. 1 he lightship has the sounding bell hung through a well in the centre of the ship, about 25 feet below the bottom. It also has a receiv¬ ing apparatus.' Near the lighthouse on shore is a buoy from which depends a bell, with a pipe leading to the shore to a compressed-air reservoir in the lighthouse. The bell is sus¬ pended by a main chain, while a second operat¬ ing chain is attached at its lower end to the

hell crank of the hammer, and the upper end to a pneumatic piston, which is operated by com¬ pressed air either from the anchored lightship or the lighthouse, as the case may be, or it may be operated by a direct upward pull by manual power if desired. It has been ascertained that the receiver for collecting the sound vibrations need not be located on the outside of the vessel, but operates as well when clamped on the inside against the inner surface of the outer hull, especially in iron ships. The sound vibration from the bell passing through the water is communicated to the side of the ship's hull, and that in turn to the liquid or water in the receiver; which is a cup-shaped metal cyl¬ inder having the open end clamped against the side of the hull. Inserted in the top of the receiver is an electric transmitter, something on the order of a telephone transmitter, from which wires are run to the pilot-house of the ship. As the sound travels through the water in every direction from its source, it is found that the impulse will be stronger and louder on the side of the ship nearest to the source. By this means the direction of the sounding bell is ascertained, for by listening to the telephone receiver attached to the starboard side water receiver, and then switching over to the port side and listening to that telephone receiver, the ear detects at once which is the louder sound of the two. This was determined experimen¬ tally by turning the ship around in a large circle. In foggy weather, signals of this kind are readily heard, regardless of which way the wind is 'blowing. The usefulness of the system in safeguarding ships against collisions at sea at night or in a fog is evident. Simon Lake, in¬ ventor of the Lake submarine boat, has experi¬ mented with under-water telephony with con¬ siderable success and applied it to his undersea craft.

TELEGRAPHY, Wireless. During the past 20 years attempts have been made, with more or less success, to avail of electromag¬ netic induction for signaling to a distance without wires, by means of what have been termed induction telegraph systems. Such systems employ in their operation the well- known principle that when an electric current is rising or falling in one wire it will develop by induction a current in a neighboring parallel wire. Phelps and Edison have employed this principle in signaling to and from moving trains. These systems were in operation for a time on several railroads in this country, but were eventually abandoned for lack of patronage. Preece also, in Great Britain, de¬ vised and had in operation a wireless induction telegraph system. In the Preece system a wire several miles in length is strung on poles along the coast of the mainland, a parallel wire

being erected on poles along the shore of an island. These wires are

placed in the earth, or ˆgrounded,® at their respective terminals. By employing a battery, an induction coil and a Morse telegraph key in one of the wires, and a telephone receiver in the other, it is feasible to transmit signals by induction (pos¬ sibly assisted by conduction through the water), without connecting wires, across an interven¬ ing space of two to four miles. In the opera¬ tion of these induction telegraph systems from 50 to 300 electromagnetic pulsations or waves per second are utilized.

Notable as the results obtained by induc¬ tion telegraph systems were considered at one time, they have been completely overshadowed by those systems in which electric waves or oscillations of a much higher order, namely, from many thousands to several millions per second, are utilized, and to which systems the term <(wireless telegraphy® is now generally ap¬ plied. The term (<radio telegraphy® is, however, also much used.

The growth of present-day electric wireless telegraphy has been comparatively slow and the discovery and development of the art can scarcely be placed to the credit of any one mind. In 1864 Clerk-Maxwell demonstrated mathematically the electromagnetic theory of light, which in effect is that electromagnetic manifestations are due to undulations of the all-pervading ether, of a nature more or less similar to the undulations of the ether which produce the manifestations of light, and that, in so far as they differ, it is mainly a difference as to the number of oscillations per second, the undulations that produce the sensation of light occurring, for instance, at the rate of from four hundred million of millions per second, to seven hundred million of millions per second; while, as just intimated, the electric undula¬ tions may not exceed a few millions per second.

After the announcement of the electromag¬ netic theory of light, which involved the exist¬ ence of electric waves in free space, many scientists endeavored to demonstrate experi¬ mentally the truth of the theory. This honor fell to Prof. H. Hertz in 1887. It had been shown by Professor Henry in 1842 and by Sir William Thomson (Lord Kelvin) in 1853 that when a Leyden jar or other highly insu¬ lated condenser is discharged, the previous charge is not dissipated in one rush, but grad¬ ually, in a series of oscillations.

It is well known that in an electric circuit containing coils of wire the current is per¬ ceptibly retarded in rising and falling, which fact is due to a property termed inductance, which all conductors possess. On the contrary, when a wire possesses electro-static capacity the current is assisted in rising and accelerated in falling. The property of

inductance is usu¬ ally likened to inertia,, while capacity is likened to elasticity, in mechanics. The shortest elec¬ tric wave thus far produced is about .15 inch in length. This is still much longer than the longest light-wave and 60 or 70 times longer than the longest dark heat wave yet measured. In the electric circuits employed in wireless telegraphy the resistance is small. In fact, if the resistance be too great the discharge will not be oscillatory. The time of an oscilla¬ tion period is expressed by the formula

T — 2 tt\/KL; where T is the time in seconds, Tris ratio of circumference to diameter (3.1416), K is capacity in farads, and L the inductance in henrys; resistance R being neglected.

In proceeding with his experiments, Hertz reasoned that, analogously as light-waves affect the eye when they fall upon it, so should elec¬ tric waves in the ether affect a suitable ((eyew or detector when they fall upon it. The apparatus employed by Hertz to show the existence of electric waves in the ether of free space con¬ sisted of an electric oscillator for setting up electric waves in the ether, and an electric resonator to detect the waves. The circuit in which electric oscillations are set up emit elec¬ tric waves in the ether. The Hertz oscillator and detector are shown in Fig. 1. The gen-

Oerator of the oscillations con¬ sists of an induction coil I, the terminals of its secondary wire being connected to small metal balls b, b, to which short metal cylinders, or wings, w w are attached. The balls are sepa¬ rated by a small air space, or spark-gap across which

sparks jump when the coil is in operation. The vibrations of the interrupter a set up pulsa¬ te ,, < ‘ \ -ii tions of current, due to battery IGand De?ectOT. °r B> in the primary circuit of the induction coil, which pulsa¬ tions, by magnetic induction, cause alterna¬ tions of greatly enhanced electromotive force in the secondary circuit. When the electric pressure rises to a point sufficient to break down the resistance of the air space between the balls b, ˆoscillations surge back and forth in the oscillating circuit w, b, s, b, w, the rate of which oscillations will vary with the elec¬ trical dimensions of the circuit, namely, induc¬ tance, capacity and resistance. The rate at which the interrupter of an induction coil vibrates may vary from 50 or less to hundreds of vibrations per second. The oscillations of the electric oscillator may be many millions per second. It is evident, therefore,

that the induction coil, or other alternating current generator, merely serves to strike the blow, so to speak, that sets up the rapid electric oscil¬ lations in the oscillating circuit, analogously as when we wish to keep a tuning-fork in vibra¬ tion we must strike it at intervals. As a detec¬ tor, Hertz employed a copper wire of circu¬ lar shape, _ but broken at one point. On the ends of this wire he placed small metal knobs, d, the distance between which could be regu¬ lated by a micrometer screw. This wire was supported on an insulating stand in a darkened room and small sparks could be seen passing between the knobs d when oscillations were established in the oscillating circuit w, b, s, b, w. The results of this experiment were held to demonstrate the existence of electric waves in the ether, as predicted by Maxwell.

The distance at which electric waves are detected by the Hertz devices is very limited, perhaps not more than 10 or 12 feet at most. These devices, however, demonstrated the pos¬ sibility of signaling to a distance by electric waves. Not long after the announcement of Hertz's experiments, Dr. Branly discovered that metal filings, when thrown together loosely and

made part of an electric circuit, have normally a high resistance, but under the influence of electric oscillations they lose this resistance and become good conductors of an electric current. It is assumed in explanation of this effect that the electromotive forces that accompany the electric oscillations in the circuit cause the filings, by electrostatic attraction, to cohere, thereby making a better electrical contact with one another, thus reducing, the resistance of the circuit ; hence the application of the term "coherer^ to this type of electric wave de¬ tector. It was also found that when the filings had cohered they retained their electrical con¬ ductivity until they were jarred, or otherwise mechanically disturbed.

In 1894 Dr. O. Lodge (now Sir O. Lodge), in a lecture before the Royal Society, Lon¬ don, showed that the filings coherer could be used to transmit signals telegraphically by placing them in a glass tube and making them part of an electric circuit in which were a battery and a telegraph receiver. In this ex¬ periment when the induction coil was operated at a distance of some yards from the coherer the latter was actuated. In order that the filings should not remain cohered after the oscillations had ceased, the hammer of a bell operated by clock-work was caused to strike or tap the glass tube as long as the electric oscillations continued. An electric bell has gen¬ erally been employed in the later use of the filings coherer. In 1895-96 Popoff and others utilized the filings coherer as a means of detect¬ ing atmospheric electricity, employing for this purpose a vertical wire extending- many

feet into the air, the coherer being placed between the lower end of the vertical wire and the earth.

Theories of Electric Wave Propagation. — Obviously substances opaque to light obstruct the passage of the luminiferous ether waves. Analogously it was thought in the early days of electric wireless telegraphy, that the curva¬ ture of the earth or sea between points sev¬ eral hundred miles apart would prove a bar¬ rier to electric waves traveling, like light-waves, in straight lines, inasmuch as it would not be practicable to obtain masts, or other means of support for vertical wires, of sufficient height to overlook the barrier. Later experiments showed that with wires only 200 feet high signals could be transmitted to points between which there was a wall of earth or water 15 or 20 miles in height, due to the curva¬ ture of the earth. A number of theories have been advanced in explanation of this fact. For example, that the waves are propagated around the earth by diffraction or reflection, but these theories are not generally held to be tenable. A theory that meets with most acceptance at present is that the electric waves are propa¬ gated as sliding waves over the surface of the earth or sea.

Brief allusion may be made to the supposed action that takes place in and around the Hertz oscillator in the production of free electric waves in the ether. The Hertz oscillator cor¬ responds to a condenser with widely separated plates. In the act of electricallv charging the arms or rods of the oscillator, lines of force or strain spring out all around the rods in the dielectric, that is, the air surrounding the rods. To fix ideas these lines of force may be likened

Typical power plant of a Marconi long-distance station, showing aerial wires leading into the building

YorkˆHarbo1ˆ66 ˆalvage Association's tug Forward, which sends ashore the press reports to the vicinity of New

to highly elastic hoops, partially flattened out, and with their ends resting on the rods. One end of the lines #of force is assumed to be posi¬ tive, the other negative. These hoops or lines resist straightening out and their resistance to the strain increases the further they are straightened out, [until their back pressure equals the charging force.

According to Max- well's. theory of displacement currents in di¬ electrics, during the process of applying this strain a displacement current flows in the cir¬ cuit, and when the counter pressure of the lines equals that of the charging force the displace¬ ment current ceases to flow. At this time the rods of the oscillating circuit have acquired the potential of the charging electromotive force. When the external electromotive force reaches a point where it breaks down the resistance of the air gap, the energy stored in the dielectric is returned to the circuit and a current flows across the gap and the strain in the dielectric is thereby relieved, concurrently (Poynting) with which the ends of the lines of strain con¬ tract, one end sliding down the rod, the other gliding up the rod toward the air gap. The ex¬ treme outside portion of the lines also tend to contract, but as such portions of the lines move more slowly than the ends, the latter meet, and as they cannot pass one another, the lines are snapped or whipped off, perhaps like rings of smoke from the smoke-stack of a locomotive, forming closed electric lines of force which are radiated into space. Coincidentally also with, and as a result of, the collapse of the electric lines of force, magnetic lines of force are set up concentric with the Hertz rods and at right angles to the electric lines of force. When the magnetic lines of force reach their maximum the electric lines of strain will have vanished. Immediately, however, the magnetic lines of force now begin to collapse and are detached, their collapse setting up new electric lines of strain. These processes are repeated until the oscillations cease, to be renewed when the rods are again charged and the spark gap again breaks down. The detached lines of force thus jointly constitute electric radiation, or free electric waves which are propagated as ever- expanding electromagnetic waves in free space. Any portion of these waves on reaching a receiving vertical wire excite therein the elec¬ tric oscillations which affect the coherer or other detector.

Theory shows that the grounded vertical wire may be considered to be equal to one-half of a Hertz oscillator (Fig: 1). The other half being the ground itself. On this assumption the earth is a perfect conductor — *therefore a reflector of high frequency electric waves — and the vertical wire may be supposed to have a reflected counterpart below it, virtually like the image seen under a pencil standing* vertically on the surface of a mirror lying* horizontally on a table. This is in accordance with what is termed the image theory, advanced by Del- aricci and Blondel. The electric oscillations in such a system may then correspond to those in the Hertz oscillator, a complete oscillation con¬ sisting in a wave from the spark-gap to the top of the antenna back to the spark-gap, thence to the foot of the reflected or imaginary wire and back to the spark-

gap, which constitutes a wave length four times that of the vertical wire proper.

Marconi's Early Experiments and Work.

— The Lodge experiments in 1894 were fol¬ lowed by those of G. Marconi of Italy in 1895. In these experiments Marconi employed an in¬ duction coil, a Morse telegraph key, batteries and vertical wire, for the transmission of sig¬ nals, and for the reception of signals, a filings coherer, a telegraph relay, batteries and vertical wire. The general arrangement of Marconi's simplest apparatus is outlined in Figs 2 and 3. In Fig 2, I is the induction coil, a is its inter¬ rupter, p is the primary wire, s is the secondary wire of induction coil, B is a storage battery of about five cells. K is the Morse key; b b' are the spark balls. The vertical wire A at its lower end is connected to ball b; the other ball b is connected with a wire leading to the earth. Balls b b' of the oscillator are thus in series with the vertical wire. The terminals w w of the secondary wire are also connected respec¬ tively to b and b'. The receiving apparatus is

outlined in Fig. 3. The Marconi filings co¬ herer is shown at k. It consists of a glass tube, suitably upheld, about 1.57 inches long and .1 inch inside diameter. The filings, a mixture of 90 per cent nickel and 10 per cent silver filings, are inserted in a small space between two plugs n, which fit snugly into the tube which is ex¬ hausted of air. Small wires extend from these plugs to the outside of the tube. One of these wires is connected with the vertical wire A, the other with a wire leading to the earth. Hence the coherer is in series with the vertical wire. The relay R is in a shunt circuit with a single cell of battery b and the coherer, as shown. The armature lever l of this relay controls the local circuits of the electric bell T and an ink recording register E, which are operated by local battery b' of four or six cells.

The actual transmission of messages is ef¬ fected by means of key K, Fig. 2. Each time the key is closed the vibrator a starts into operation with the result that electric oscilla¬ tions are set up in the vertical wire and a train of electric waves is radiated therefrom in the ether. Thus by opening and closing the key for a shorter or longer time the train of waves is broken up into signals corresponding to dots and dashes which are received as such at the receiving* station. The operation at the receiv¬ ing station is practically. as follows: Normally the armature lever / of the tapper T is given a tension which holds it against the contact c. Normally, also, the armature lever / of' relay R is on its back stop x. Hence at this time the local circuit of battery b' is open. When then the electric waves set up by the oscillator

arrive and electric oscillations are thereby ex¬ cited in the vertical wire at the receiving station, the resistance of the coherer drops suf¬ ficiently to allow the battery b to energize the relay R and its lever / moves over to contact x' , closing thereby the circuit of battery b' , whereupon the electromagnet of tapper T at¬ tracts its armature which act opens its own circuit at contact point c. At once the arma¬ ture of T flies back on its contact point, at the same time striking the tube, decohering the filings and demagnetizing relay R, whose arma¬ ture lever returns to its back stop .v. Immedi¬ ately, however,, the filings again cohere (as¬ suming that the oscillations continue), with the result that R is again magnetized, the actions just described being repeated many times in a second. Hence, while the oscillations are being received the tapper keeps up a buzz or hum, which stops when the oscillations cease. Like¬ wise, while the oscillations continue in the receiving vertical wire the inking register E is actuated and dots and dashes are imprinted on the paper strip. The paper strip is started and stopped automatically, by devices well known in telegraphy, when signals commence and when they cease. Consult Maver, Ameri¬ can Telegraphy and Encyclopaedia of the Tele¬ graph* (p. 373).

Detectors. — It was early evident to those most concerned in the practical operation of wireless telegraphy that a detector which would ˆopen® on the occurrence of electric oscillations and (without tapping when the oscilla¬ tions ceased was desirable. Such devices were not long in forthcoming. They are termed detectors.

One of the first detectors used in wireless tetegraphy is due to Castelli. Detectors have also been devised by Marconi, DeForest, Fes¬ senden and others. The Castelli detector is outlined in Fig. 4. It consists of a glass tube

Fig. 4. — Castelli Detector.

K, 1.7 inches in length, a carbon rod c, a plug of iron i within the tube, and a small drop of mercury m, placed between c and i. The rod c and plug i are adjustable within the tube by the screws li, h. A is the vertical wire which is made a part of the coherer circuit. A tele¬ phone receiver t and a small battery b are placed in a shunt circuit around the detector. Normally, the imperfect contact between the mercury and the carbon causes a high resist¬ ance in the detector, but when electric oscilla¬ tions occur in the circuit the mercury* and the

carbon cohere and the resistance falls. The consequent variations of current in the shunt circuit produce sounds in the telephone receiver of long and short duration corresponding to the dashes and dots transmitted. This detector was used extensively in the Italian navy and was used by Marconi in some of his trans-Atlantic experiments.

Among other detectors are the carborun¬ dum, due to General Dunwoody of Washing¬ ton, D. C. ; the DeForest Audion, and the Sili¬ con detector of Mr. G. W- Pickard of Ames-

bury, Mass. The Dunwoody detector consists of a small crystal of carborundum clamped at its edges between two metal electrodes or ter¬ minals. It is placed in circdft with a small battery and a telephone receiver. Its opera¬ tion appears to depend on the development of heat, due to the local battery, at the minute points of contact, which heat reduces the resist¬ ance of the carborundum. Incoming oscilla¬ tions affect this resistance and thus produce sounds in the telephone. The sensitiveness of this detector is somewhat greater than the fil¬ ings coherer. It possesses the advantage for shipboard use that jarring does not disturb its operation.

The Silicon Detector. — Detectors of this type are now termed crystal detectors. This detector employs in its operation the principal of the thermo-electric couple. (See Thermo¬ electricity). The electrodes or thermo-elec¬ tric couple employed by Mr. Pickard in this re¬ ceiver are pure silicon and a metallic element of low resistance under a certain mechanical pressure. This couple is placed in the receiv¬ ing oscillation circuit in which is also placed a telephone receiver, but no battery. According to the inventor the received oscillations are converted into heat at the thermo-electric couple, the amount of heat developed being in accordance with the C2R law, the energy of which is converted into direct electric currents which are heard in the telephone receiver as sounds. Tests by Pickard of a number of the best known electric wave detectors show the amount of energy required to give a just au¬ dible dot (or sound) in the telephone receiver to be as follows : Electrolytic detector, .000364 to .000400 Erg.; Magnetic detector, .000400 to .000410 Erg.; Silicon detector, .000430 to .000450 Erg. ; Carborundum detector, .009000 to .014000 Erg.

Vacuum Tube Detectors. — The most use¬ ful detector of wireless telegraph and telephone signals to-day is the vacuum tube detector. It has been known for a number of years that the air or gas surrounding an incandescent wire or filament is ionized due to electrons escaping from the incandescent body. The Edison '^effect *discovered in the last century was due to this fact, but the correct explanation was not*

forthcoming at that time. Thus in Hous¬ ton's (Electrical Directory, > published in 1892, the Edison effect is defined as follows : <(An electric discharge which occurs between one of the terminals of the incandescent filament of an electric lamp placed near the filament but dis¬ connected therefrom, as soon as a certain dif¬ ference of potential is reached between the lamp terminals. The effect of the discharge is to produce a. current in a circuit connected to one pole, of the lamp terminals and the me¬ tallic plate, as may be shown by means of a galvonometer. The vacuum tube detector is based primarily on the Edison effect. Appa¬ ratus and circuits to show this effect are out¬ lined in Fig. 5. An electric current from a battery A heats the filament or wire F to a de¬ sired temperature when it is found that the platinum plate W adjacent to, but not touch¬ ing F, becomes positively electrified to a few volts, as shown by a galvanometer G, this indi¬ cating that the intermediate gas is ionized or rendered electrically conducting. In the later use of vacuum tubes for X-ray work, wireless

telegraphy and telephony, very high vacuums are used which give a pure electron discharge, with greatly improved results, especially perhaps in X-ray work.

The number of electrons flowing from the filament to the plate in a high vacuum tube

Fig. 5. — 'Theory of " Edison Effect."

depends on the temperature of the filament and the potential or space charge of the plate. The amount of current in the filament to plate cir¬ cuit depends on the number of electrons re¬ leased or emitted from the filament and has been calculated to correspond to 1019 electrons per ampere. After a certain increase in the temperature of the filament, which is limited by the strength of its material, and at a certain positive potential of the plate, saturation is reached. The flow of electrons, which are as¬ sumed to be negatively electrically charged par¬ ticles, is apparently from the filament to the plate, which is charged with positive potential, while the current flow is from the plate to the filament.

As already noted the bulbs used in this serv¬ ice require an exceedingly high vacuum for their proper operation. It is also important that the filament and other. metallic elements of the tube

be free of gas.

Fleming Valve Detector. — Fleming im¬ proved upon and utilized the foregoing Edison device by making it a wireless detector known as the Fleming valve or current rectifier, Fig. 6. In the figure A is the aerial ; p-, s are the

Fig. 6. — Fleming Valve Detector.

primary and secondary coils of the receiving transformer L. TC is a variable condenser. VT is the vacuum tube detector. Plate W is

part of an oscillation circuit S , C, F, IV. Fila¬ ment F is brought to incandescence by the battery B ; this releasing electrons at the fila¬ ment. Incoming oscillations from the aerial due to arriving Morse signals set up alternations of positive and negative potential on plate W. When the plate is charged positively the nega¬ tive electrons are drawn over from the fila¬ ment, increasing the potential on W which in turn charges the condenser C at that instant. When the plate W is charged by incoming negative oscillations electrons do not pass from F. Hence positive or uni-directional currents only are allowed to pass. Between the positive charges of plate W, the condenser C discharges through the telephone receiver T, thereby re¬ producing the transmitted dot and dash signals.

The De Forest Audion. — To the Fleming valve de Forest added a metal grid G (Fig. 7) between the filament F and the plate P, mak¬ ing it a three electrode tube VT. He also added a potential battery PB to plate P, which combination produces remarkable results. De forest termed this device the audion, from the words audible and ion. A is an aerial ; p, s, are the primary and secondary coils of the tun¬ ing coil or receiving transformer L. TC is a variable, or adjustable, tuning condenser. C is the grid condenser. The grid G intercepts the electrons flowing from F to P, and it is found that a given variation of voltage in the grid produces a greater variation in the plate currents than is effected by a similar variation of potential on the plate P with the grid re¬ moved.. The incoming oscillations from the aerial in the grid-filament circuit are repeated or relayed into the grid-plate circuit more or less amplified. This fact constitutes the audion an amplifier of current and consequently of sounds, and because of this relaying property the audion is also termed an electron relay.

Fig. 7. — De Forest Audion.

Figs. 6 and 7 may be regarded as showing theo¬ retically the ordinary

wireless receiving cir¬ cuits in which the respective detectors indi¬ cated are employed.

Another way of regarding the operation of the vacuum tube is to assume that the heated filament sets up a negative electromotive force due to the presence of negative electrons. The potential battery PB produces a positive poten¬ tial at the plate. The conventional explanation then would be that the current flows from the positive potential at the plate to the negative potential at the filament ; the battery in this case providing the supply of electrons or, in other words, the current. On this hypothesis a re¬ duction of the negative potential, at the filament, the potential at the plate remaining the same, will cause a reduction of current between F and P. Similarly a reduction in the positive poten¬ tial at the plate will reduce the current. By obtaining control of the potential of the plate

and grid a variation in the output of the tube is obtained. The grid element in the tube pro¬ vides a means of varying the plate potential, and reversely a variation in the plate potential affects in an opposite sense the potential of the grid.

The three electrode vacuum tube has re¬ cently undergone great improvements at the hands of many experimenters, and it is now not only utilized as a detector and amplifier of wireless telegraph and telephone currents, but also as. a generator of high frequency electrical oscillations and a modulator of radio waves in Wireless Telephony (q.v.). This tube is also employed as a repeater or relay in long dis¬ tance wire telephony and indeed it is largely due to the amplifying and relaying properties of this instrument that trans-continental tele¬ phony is commercially possible.

There are at least three variations of this tube now in use, termed, respectively: The kenotron, the pliotron and the dynatron. “The kenotron rectifier utilizes the unidirec¬ tional property of the current between a hot and cold electrode in vacuum. The pliotron utilizes the space charge property of this cur¬ rent which allows the current to be controlled by the electrostatic effect of a grid. The dyna¬ tron utilizes the secondary emission of elec¬ trons by a plate upon which the primary elec¬ trons fall; it is, as its name indicates, a gener¬ ator of electric power and feeds energy into any circuit to which it is connected.® For fuller information on this subject the reader is re¬

ferred to the <Proceedings) of the Institute of Radio Engineers, September 1915, and to the bibliography appended thereto. For details re¬ lating to and for other examples of circuits in which the three electrode tube is utilized see Telephony, Wireless.

The Vertical Wire or Aerial. — Marconi's first experiments in wireless telegraphy were made with a vertical wire 20 feet high at the sending and receiving stations. With this height of wire he transmitted signals one mile. With wires 40 feet high signals were transmitted four miles and with wires 80 feet high 16 miles.

Many different arrangements of the aerial wires are now employed. For instance, in a number of wireless installations 20 wires about No. 16 gauge are suspended from a long strip of wood, which is upheld by insulators sup¬ ported by a rope between the tops of two masts about 150 or 200 feet high. The wires, two feet apart, drop vertically to a similar wooden strip, where the wires are joined together and led into the instrument room. In other cases the wires are suspended from towers by well- insulated arms and are kept apart by wooden spreaders until near the ground, where the wires are connected and thence are carried into the operating room. In still other cases a single mast is employed, from the top of which a number of wires are suspended. Each wire is attached, at a distance of about 50 feet from the top of the mast, to a guy-rope, which is itself attached to an anchor post in the earth, 40 feet or more from the base of the mast. The guy-rope thus first draws the wires away obliquely from the mast, then at its point of connection with the guy-rope each wire is drawn toward the foot of the mast, where all the wires converge and are thence led into the operating room; the wires forming a *>, with

the mast as a base and no spreaders are re¬ quired.

In Fig. 8 are shown various ways in which two or more aerial wires may be employed as antennae. The wires may be of varying length depending on requirements. In the figure, a may represent two wires open or closed at top, c indicates a four-wire arrangement; / is a cage arrangement of four, six or more wires in which the wires are held apart by hoops; <7 isj a box method in which the wires are separated by a wooden frame. The plan shown at c is much used. The wires in this case are held apart by wooden spreaders

Fig. 8. — Some Forms of Aerials.

at the top and bottom and also at the middle if the wires are very long; a represents an Eddy Kite arrangement for supporting an aerial ;

two or more of these kites may be used in tandem.

Again two high masts or towers 100 and more feet apart are employed, having a num¬ ber of horizontal wires strung between them at their tops. Vertical wires are attached to the horizontal wires and are dropped to a wooden strip and thence are led into the in¬ strument room. On shipboard horizontal wares are usually strung between the tops of one fore-mast and one aft-mast, from which hori¬ zontal wires the vertical wires of the antennae are conducted to the operating room.

For the very powerful wireless stations much more elaborate antennae than those described are necessary. For instance, at the Belmar, N. J., station on the Atlantic Coast four iron masts are usually arranged in alignment at right angles to the coast. These masts are 300 feet high and are about one-quarter of a mile apart. Horizontal wires are supported by these masts and vertical wires are connected therewith, which are led into the station.

Kites and captive balloons for supporting the vertical wires have frequently been availed of for temporary use and for military opera¬ tions. The material of the vertical wire does not appear to affect the results. Iron, copper and aluminum wires have been used. Wire netting has also been employed. The insulation of the vertical wires from the mast is, however, very important. Good earth connection for the verti¬ cal wire has been found very essential in prac¬ tice, especially at the transmitting end. Cop¬ per plates 30 feet long and 4 feet wide, em¬ bedded two or three feet in damp earth, giv¬ ing about 2,400 feet of plate surface, are some¬ times used for this purpose. When feasible the ground plate is sunk in the sea. On ship¬ board the “earth® is. secured by attaching a wire to bolts on the iron frame of the vessel.

The main object in employing a number of aerial wires or antennae has been to obtain increased capacity, wherein to store electrical energy to be radiated as -electric waves, the vertical wires being virtually one plate of a condenser, the earth the other plate and the air the insulating medium. The effective ca«

pacity of closely adjacent parallel wires is not, however, proportional to the number of such wires, but is equal, roughly, to the square root

°f the number of wires. The capacity of a vertical wire .1 inch in diameter and 100 feet in length is .0002 micro-farad (Fleming).

For ordinary service the grounded antenna has been found to operate satisfactorily, but for tuned circuits the direct earth connection possesses some disadvantages. Thus variations m the resistance of the earth connections have introduced difficulties in the way of maintain¬ ing exact tuning or syntony. (Described sub¬ sequently).

In shipboard practice the aerials A are frequently extended in a sort of cage ar¬ rangement C from the heads of the fore- and aft-masts as outlined in Fig. 9. The cage con-

C

sists of wires held apart by insulated hoops or spreaders. This cage arrangement is also used in land or shore stations. In this case the cage is about 20 feet in length and consists of six or eight wires. The upper end of the cage is attached in the usual way to the top of the mast or tower; a single wire suspended more or less obliquely connects the cage with the wireless apparatus.

On shipboard when the available masts are low the number of wires must be increased to obtain capacity in the radiating system. A type of aerial much used on ships and at shore stations is that known as the T or L aerial. An L aerial is indicated in Fig. 10, in which between two masts six horizontal wires W are supported and from which 6 vertical wires W' held apart by wooden spreaders S are dropped

Fig. 10. — Shipboard L Aerial.

to a point near the deck where they converge and after being cabled are led into an operating room C. In a T aerial the vertical wires are attached to the horizontal wires at X. In the L

arrangement the horizontal wires, which pos¬ sibly give a directive tendency to the aerial waves, are connected at the far end. The horizontal wires are supported by corrugated insulators R, about two feet in length, and are attached to the masthead M by suitable tackle T, which upholds the spar P 15 feet in length and to which the insulators are fastened. The horizontal wires are two and five feet apart.

_ Condensers. — The condensers used in trans¬ mitting circuits for installations up to one or two kilowatts are generally of the Leyden jar- type. Such jars, 16 inches high by 5.25 inches in diameter, have a

capacity of .004 micro¬ farad. For more powerful installations, large plate-glass condensers immersed in oil, con¬ tained in insulated tanks, have been used by Marconi, De Forest, Fessenden and others.

Generators of Electric Oscillations. — The need of greater radiating power in long dis¬ tance wireless transmission than is obtainable from the ordinary induction coil, as well as the unreliability of the interrupters of such coils, when used with large currents, which soon wear out the contact points, has led to the adoption of special types of transformers. In¬ stead of battery power also, alternating cur¬ rent generators are employed as the source of electromotive force for these transformers. The power of the generators may vary from 1 kilowatt to 300 or more kilowatts. The rate of alternations of the transformer depends on the frequency of the generator. The electro¬ motive force in the primary circuit of the trans¬ former may be from 50 to 200 volts, which is greatly increased at the secondary terminals of the transformer; in some cases to 20,000 or 50,000 volts. In the case of the New Bruns¬ wick, N. J., transatlantic station a 60-cycle 24,000-volt current in the secondary circuit of the transformers is employed to charge the large glass condensers, which in discharging produce the high frequency oscillations thrown upon the aerial wire.

In addition to the spark gap method of generating high frequency oscillation in wire¬ less telegraphy, as described in the foregoing, by means of induction coils, several other methods are now employed, namely, the Poul- sen arc generator, the high frequency machine alternator and the three-electrode vacuum tube oscillator, to which reference will be found in article on (Wireless Telephony (q.v.). Consult Anderson and Elliott, (Poulsen AnP (Electric Work, 30 Aug. 1919); <(Trans- At¬ lantic Radio Communication® (Proceedings, > American Institute of Electrical Engineers, 1 Oct. 1919). Marconi has also developed a suc¬ cessful method of obtaining sustained oscilla¬ tions by means of rapidly rotating metal discs which by suitable arrangements of capacities and inductances set up rapid charges in an oscillation circuit. For a description of this oscillator consult transactions, > Royal Institu¬ tion (London, March 1908) or Maver, (Wireless Telegraphy and Telephony* (Part 2, page 9).

Syntony or Tuning. — An important defect of wireless telegraphy in the simple form thus far described consists in the fact that but one message can be sent at one time, for the reason that if it is attempted to send two messages at once in the same vicinity, the signals will clash. Many inventors have striven to overcome this

defect, among others Lodge, Marconi and Slaby. The plan followed by these workers has been that of employing a syntonic or tuning method ; that is, a method by which the trans¬ mitting and receiving circuits are adjusted or attuned to a fundamental rate of electric oscil¬ lations, to which rate of oscillations and no other the receiver so attuned will respond. This is done by taking advantage of the fact that the rate of oscillations, or the frequency of an electric circuit is proportional, as already noted, to the inductance, capacity and resist¬ ance of the circuit. Hence by varying the ca¬ pacity or inductance of the tuning circuits any desired rate of oscillation is obtainable. Tuned circuits are termed selective circuits, since by sending out a given rate of waves any desired tuned circuit within signaling distance may be selected as the receiving station.

Tuning also possesses the advantage that the benefits of resonance may be obtained by its use as follows : It is known that a vertical wire grounded directly at its lower end is an excel¬ lent radiator of electric waves, but as it pos¬ sesses very little capacity its oscillations are quickly damped as indicated in Fig. 11 and

Fig. 11. — Quickly damped Fig. 12. — -Persistent

Radiator Radiator.

it is only the first few oscillations that are of sufficient strength to affect a receiver. When capacity and inductance are added to a circuit in certain proportions it may be made a persist¬ ent vibrator (Fig. 12) and consequently a given amount of electrical energy expended at the transmitter in producing a succession of waves of more uniform amplitude will have a cumula¬ tive or resonant effect upon a receiving circuit of equal capacity and inductance, and will even¬ tually cause it to respond to the waves emitted by the transmitter; while an untuned receiving circuit containing a detector as sensitive as the first one, would probably not respond to those particular oscillations. In the case of tuned circuits, this is doubtless because the faintest oscillations, or electromotive forces, excited in the receiving circuit are resonantly amplified by the incoming waves of a selected frequency until they affect the detector.

As a rule, the spark-gap and the receiving apparatus of untuned circuits are connected directly to earth as indicated in Fig. 13, in which A is the antenna ; b b are the spark balls or knobs ; s is the spark-gap ; S is the secondary

Fig. 13. — .Open Fig. 14. — Closed

Circuit. Circuit.

and P is the primary of an induction coil or transformer. In such an oscillating circuit (A, b, b), the oscillations are quickly damped. In the case of tuned circuits, or where, at

least, the effects of resonance are desired, there is provided a closed oscillating circuit which is separated from the vertical wire by a trans¬ former. Such an arrangement is outlined in Fig. 14. The closed circuit in this case con¬ sists <of the spark-gap, condensers c c, and the primary of transformer T. In practice the con¬ densers and the inductance coils are made ad¬ justable, so that the capacity and the inductance may be varied at will. Best results are obtained when the oscillating circuit and the vertical wire have equal fundamental oscillation periods ; or when the one is a multiple of the other. Oscillating circuits arranged as in Fig 13 are said to be tightly coupled. When arranged as in Fig. 14 they are said to be loosely coupled.

In addition to the fact that the oscillations in an ordinary vertical wire are quickly damped, there is the further fact to be considered that the oscillations set up by a spark-gap trans¬ mitter are not continuous in the strict meaning of the word, since there is a perceptible time, while the oscillation circuit is being charged to the breaking down point of the air-gap, during which the oscillations tend to die out. Several inventors have striven to obtain a transmitter capable of supplying undamped or practically uniform oscillations to the oscillation circuit. Poulsen has developed some improvements in this direction by a modification of the Duddell singing arc (described in his British patent No. 21,629). (See Telephony, Wireless). Briefly, it consists of an arrangement in which an arc lamp supplied by a direct current is placed in parallel with a capacity and an inductance. When the capacity and inductance are^ suitably chosen, rapidly alternating currents are set up in this arc which produce a tone — hence the name singing arc. In Poulsen's modification of this arrangement the negative electrode of the arc is carbon, while the positive electrode is copper, the arc being enclosed in a box con¬ taining hydrogen gas. The arc is shunted by a capacity and inductance and rapidly alternating currents are continuously set up which are thrown on to the vertical wire in the usual way. With the Duddell arrangement the frequency of oscillation was about 10,000 to 15,000 periods per second — too low for utilization in wireless telegraphy. A much higher - frequency is ob¬ tained by the Poulsen arrangement which is attributable to the

atmosphere of hydrogen. To further the cooling of the electrodes (an essen¬ tial first noted by Elihu Thomson, in United States Patent No. 500,630), the copper electrode is made in the shape of a hollow ring through which water is passed. Tests have demon¬ strated that by this method of setting up un¬ damped oscillations it is possible to signal to greater distances with much less electrical energy than is required with the spark-gap method.

Quenched Spark Transmitter. — Wein in 1906 discovered that very powerful discharges possessing advantageous properties for wireless telegraphy could be obtained from very short spark-gaps To avail of this discovery Von Lepel employed as an oscillation generator, a device consisting of a metal box having a parti¬ tion of two copper plates separated by a very thin sheet of paper provided with a small aper¬ ture in its centre. The terminals of the usual charging electromotive force are each connected

with one of the plates and the arc is formed at the small aperture between the plates, which arc slowly burns away the paper which must be renewed at intervals. The arc is shunted by the usual inductance and capacity. This arrange¬ ment produces very rapid quenching of the spark at the' electrodes. Hence the primary oscillation circuit ceases to give out energy after the first blow, so to speak, while the secondary or aerial oscillation circuit continues to oscillate. It has been found in practice that with such rapidly damped primary oscillation circuits in coupled circuits, only one set. of oscillations is radiated, whereas in less rapidly damped primary circuits the radiation of more than one set of radiations is not uncommon. Forms of quenched spark transmitters other than the Von Lepel arrangement have also been employed.

Electric Wave Meters. — It is very essential at times to measures the wave lengths or fre¬ quencies of wireless telegraph circuits. For this purpose a number of wave meters have been devised. These wave meters are based primarily ion the fact that with an exciting cur¬ rent in proximity to a secondary circuit a maxi¬ mum current will be induced in the secondary circuit when the two circuits are in resonance, which will be when they possess corresponding capacity and inductance. If the capacity and in¬ ductance of the secondary are known, the fre¬ quency and wave length are deducible. The period T of a complete electric oscillation varies with the inductance and

capacity of the circuit,

according to the formula T = 2n"\/ K L when T is the time in seconds, tt is the ratio of cir¬ cumference to diameter, K is capacity in farads and L the inductance in Henrys — or

T = 6.2832 V K L. Hence it is evident that the frequency n of the oscillations (number per second) will be equal to 1 divided by T ; that

is, n — . The velocity V of propagation of the

T

oscillations or waves being equal to that of light waves, 186,000 miles per. second, the wave length then equals velocity divided by frequency V

— , or wave length equals,

T V VK L = 2*r V V K L

In ordinary practice resonance is indicated by the loudness of received signals in the tele¬ phone receiver.

One of the early wave meters, the Domtz, is shown in Fig. 15. A brief description of the device will explain the general principle on which wave meters operate. The Donitz wave meter consists of a ooil of wire C, about eight inches in diameter that may be placed in the vicinity of the oscillation circuit to be measured, for instance, coil C' which may be a loop in an aerial circuit. Coil C is in series with a con¬ denser K and another coil of wire c . c is in inductive relation to a smaller secondary wire W in the circuit of which is a small heat wire H, placed in one end of a U-shaped tube T, partly filled with a colored liquid. The capacity K consists of two sets of semi-circular metal plates, one set fixed, the other set movable to or from the fixed plates , the whole being contained in a glass case and immersed in oil. The mov¬ able plates are operated by means of a knob N voL. 26 — 23

to which is also attached a pointer P, which moves around a graduated scale .S'. The capac¬ ity K of this oscillation circuit varies with the

adjustment of the condenser plates. This capacity is then adjusted until the circuit is in resonance with the external circuit C', which will be indicated when the liquid in the left arm of the tube T is forced to a maximum height by expansion of the air or gas in the right arm of the

tube due to heat wire H. At this time the pointer P will be opposite a given point on the calibrated scale that indicates the wave length or frequency corresponding to the induct¬ ance and capacity of the wave meter cir¬ cuit at that time, which also corresponds with the frequency of the external oscillation circuit C. Ordinarily the coil C is placed concentri¬ cally within coil C. For more accurate results and to avoid reactance effects from coil C, the coils should be separated about one inch. If re¬ moved too far, the adjustment for resonance will not be so accurate. This wave meter is quite compact, the containing box being about one foot square.

Marconi's Tuned Wireless Telegraph Sys¬ tem. — One early arrangement of Marconi's tuned or syntonic transmitting and receiving cir¬ cuits is shown theoretically in Figs. 16 and 17. Fig. 16 represents the transmitting apparatus and circuits. In this A is the vertical wire in which is inserted a coil w, the number of turns of which, in use, may be varied by a sliding con¬ tact x. By this means the period of a vertical wire may be adjusted to correspond with that of the closed oscillating circuit p, c, b, b. The

condenser c, usually Leyden jars, of about .25 micro-farad capacity, may also be adjustable. I is an induction coil. K is a Morse key and B is a storage battery of five or six cells. The re¬ ceiving apparatus and circuits are illustrated in Fig. 17. As in Fig. 16, A is the vertical wire, attached at its lower end to an inductance coil w. The coils p and 3" ˆ constitute what is termed a "jigger," or hoister ; it is in fact a type of "step

up® transformer and is used tc increase the effi¬ ciency of the apparatus by enhancing the electro¬ motive forces acting upon the coherer; availing of the fact that there is a ˆnode® of electro¬ motive force and a ((loop)) of current at the foot of the vertical wire — that is, at that point the electrostatic energy is at minimum while electro¬ magnetic energy is at maximum. K is the Marconi filings coherer, which is in series with the secondary coil j j of the jigger. A small condenser c is connected as shown, forming a short path for the oscillatory currents via the coherer, since for momentary currents the con¬ denser is practically a conductor, ck ck are small choke coils (really inductance coils), which, being virtually opaque to rapid oscilla¬ tions of current, direct the oscillatory currents across condenser c, thereby precluding any diversion of these currents

through the relay R. This is a polarized relay of from 1,200 to 10,000 ohms resistance, in the circuit of which is a single cell b. The relay is usually inclosed in a cylindrical case to exclude dust. Some of the relays used for this work will respond to a current of subim of an ampere. In practice this relay, the jigger, the coherer and tapper are en¬ closed in a metal sheathed box to prevent the ac¬ tion of external electric waves upon the coherer. For the same reason the local contacts of the re¬ lay and tapper are shunted with resistances, not shown in the figure. The Morse key employed is massive, with front and back contacts which are insulated from one another. It is provided with a large vertical ebonite handle to protect the operator against shocks. The use of the coherer for commercial use has been displaced by more modern devices.

The Fleming Long Distance Transmitting Circuit. — In Fig. 18 is shown diagrammaticalby

Fig. 18. — Fleming's Transmitting Circuits.

an arrangement, designed by Prof. J..A. Flem¬ ing for the Marconi Wireless Telegraph Com¬ pany, to be used in long distance transmission. In the figure, D is a 500 or 1,000 volt alternating current generator of 10 or 20 kilowatts capacity, and having a frequency of about 50 per second. T, T' and T 2 are transformers. The primary circuit of T is in series with the generator D, and the coils i, i. The transformer T raises the electromotive force to about 20,000 volts, charging the condensers C, which discharge across spark-gap S, setting up oscillations of a high order in the oscillating circuit O , S, C, T'. These oscillations are again transformed to higher voltage in the secondary of T 2, which in turn charges condenser C' , and this, in discharg¬ ing in the oscillating circuit O', S', C' , T 2, still further increases the electromotive force thrown upon the vertical wire or wires A. The esti¬ mated electromotive force obtained at the verti¬ cal wire in this way is about 100,000 volts. These condensers are of glass immersed in oil and the

transformers are of special construction to withstand these high pressures and to give the desired capacity and inductance. To avoid directly opening and closing the primary cir¬ cuit of the transformer T, the two choke coils i. i , having movable iron cores, m, m , are placed in that circuit. The iron core m of x is so ad¬ justed that as much current as may safely be passed through the primary of T shall normally flow in the circuit. The core m of i is inserted to its full length in the coil, and its inductance is sufficient to stop all flow of alternating cur¬ rent in the circuit. This coil may, however, be short-

circuited by the key K, in dot and dash signaling, at which times the current attains its full value. Hence the circuit is not opened in the usual sense, but to avoid sparking the con¬ tact points of key K may be immersed in oil.

In Fig. 18a is shown theoretically a type of transmitting apparatus and circuits now em¬ ployed in ordinary ship and land stations. G M

Fig. 18a. — Modern Transm itting Circuit. Land or Ship'

board Station.

is a motor-generator controlled by a motor starter not shown. The motor is usually sup¬ plied with current at 110 volts pressure. The gen¬ erator G may develop from 110 to 500 or more volts as desired. QS is the spark-gap (quenched gap type), K is a Morse key in the primary cir¬ cuit of the transformer T. Specially designed keys for this work will open the circuit without excessive sparking with a current of 25 amperes and 110 volts. The voltage in the oscillation circuit C,»OT, QS, may be raised to 10,000 volts or more by the transformer T. C represents a battery of Leyden jars or condensers. The oscillation circuit is connected by loose coupling to the aerial A, by means of oscillation trans¬ formers OT. The oscillation transformers in some cases consist of two independent coils of heavy bar copper wire with widely separated spirals and with one of the coils movable out¬ side of the other for varying the coupling. Clips m are also provided whereby more or less of the coils may be connected in the circuit for tuning. I is a tuning inductance in the aerial. C' is a condenser used for short wave signaling. It may be cut out as in the figure by the switch CS. A is a hot wire ammeter placed in the aerial to show when oscillations are being thrown upon the aerial and to indicate the strength of current therein. Resonance is indi¬ cated between the circuits when the current in h is at maximum. 5 is a safety device designed to discharge excess current in the oscillation circuit to ground. A motor starting arrange¬ ment for the motor-generator is shown and described in the author's work (Wireless Teleg¬ raphy and Telephony) (page 103).

. Wave Motion, Directive Signaling and Direction Finders. — In ordinary wireless tele¬ graph signaling the electric waves are radiated from the antenna in every direction, as, for in¬ stance, the light waves

from a lamp on a pole are radiated in every direction. Attempts have been made to reflect and direct electric waves as light is reflected, but by means of metallic mirrors. These attempts were not successful owing to the difficulty in meeting the require¬ ment that the diameter of the reflecting mirror must be large in comparison with the length of the electric wave to be radiated, and that the reflector must not be further than a quarter wave length from the oscillator or source of oscillations. This difficulty results from the great length of the electric waves used in wire¬ less telegraphy and telephony. For instance, in the case of oscillations of 100,000 per second, over 9,840 feet. On the contrary the length of light waves is so infinitesimal that the smallest mirrors possible to construct, or even particles of air, are large by comparison with light waves. Some success has been met with in the matter of directive signaling by methods differ¬ ent from the mirror reflection method. Before describing some of these methods it may be not amiss to refer briefly to the theory of wave motion.

Wave undulations or oscillations of simple harmonic form are frequently shown graphic¬ ally as a sinusoidal curve, or sine wave, de¬ rived, for example, from the motion of a point on the surface of a rolling wheel, or from the tracing made by the movement of a pencil point in a rectangular slot, under which a strip of paper is drawn with a uniform motion, the oscillatory movement of the pencil correspond¬ ing to a point moving back and forth along the diameter of a circle. In Fig. 19, the vertical lines m n may represent such a back and forth

Fig. 19. — Sine Wave Graphic.

motion, the line AB the forward motion of the wheel, or wave, and x the distance covered by one revolution of the wheel, this correspond¬ ing to a wave length. If the vertical lines in¬ dicate the to and fro motions of the medium in which waves are occurring, the length of a vertical line between the zero line AB and the point of intersection of the curve will represent the extent of a motion of a given particle of the wave at a given point and instant. This is graphically shown by the horizontal lines t from vertical lines C C' in the circle, to points b a; a b' on the curve. When used to represent an alternating current wave these lines indicate the strength of current or the E.M.F. at any given point and instant of the cycle. The period of a wave is the time taken by a particle to move from a given point, say, x, around the circle to point x again; or for the pencil point in the slot to perform one to and fro motion. On the solid horizontal line this as stated would

correspond to the distance x x .■ In wave motion it is understood that the particles of the medium do not move forward with the wave, but

merely rise and fall like chips on the surface of a pond as the waves pass under them. As the wave progresses each particle of the medium in turn rises to the crest and drops to the trough of the wave. In an elastic medium it is assumed that the particle is displaced from its zero position by a force or strain which it resists with a counter force termed stress, the stress varying with the extent of the displacement, and tending to restore the particle to zero position. The position of a point or particle at a given in¬ stant relative to any fixed position is termed the phase, and the difference of position of a given point or particle relative to another particle dur¬ ing its motion over a circle is termed phase difference. _ Thus a particle at b will pass through point C in advance of particle a, the direction of motion being as shown by the arrow, and their phase difference when meas¬ ured as an angle will be equal to the difference of the angles made by their radii with a fixed line A x. For example, the difference of phase between a particle at C and one at x is 90°, or one-quarter wave length ; while a particle at C and one at C' will have a phase difference of 180° or one-half wave length. When two par¬ ticles pass through the same point at the same time they have no phase difference. Any two particles one wave length apart are said to be in the same phase, and two waves of the same frequency whose corresponding parts are mov¬ ing in opposite directions with the same velocity are said to have a phase difference of 180°. For present purposes the broken curved line in Fig. 19 may be considered to represent the contour of an electric wave, while that portion of the curve above the line x x' may represent an electric positive force or sign; that below the lines a negative force or sign, and the magni¬ tude of the force of the wave at a given point and instant may be represented by the length of the vertical lines between .*• x and their in¬ tersection with the curve. In this view, waves of different or equal phase and magnitude and agreeing or opposing in direction or sign may be caused to assist or neutralize one another, more or less; some instance of which will be given herein, and analogous instances of which may be found in textbooks on light and sound.

Electric Wave Localizer. — A device due to John Stone Stone for determining the direction from which wireless telegraph signals are emanating is shown in Fig. 20, theoretically. In the figure V V represents vertical wires placed on a common axis a, and in series with which are coils of wire x y respectively. These coils are so wound that when oscillations of equal strength and direction simultaneousjy pass through them from wires V V the* coil z, which is in inductive relation to those coils, will not be affected. When the oscillations in coils x y are in opposite directions or differ in strength coil z will be

affected. Coil z is in series with detector d, condenser C and tele¬ phone receiver t. In order to obtain the maxi¬ mum effects of the wave energy the wires V V in this arrangement are placed the distance of half a wave length apart, which distance can be ascertained by means of a wave meter. As¬ suming the length of the arriving waves to be

50 feet, the wires 25 feet apart, and that their plane is in the line of motion of the advancing wave, the wires will receive the waves at a phase difference of 180° or half a wave length. Hence the oscillations in the wires due thereto will be of equal strength, say, 10, as indicated in the figure, but opposite in sign, or direction, in coils x y, and the coil z will be inductively affected to a maximum extent. If the wires

Pig. 20. — Stone Localizer.

are so moved that the distance between them is less than half a wave length the sign in the re¬ spective wires may still be opposite, but the strength in each will not be equal. Thus, if wire V is moved to the point indicated by dotted line n, the force of the wave at V will still be 10+, while at V' it will be less than 10' — and the oscillation current strength in coil x will be greater than that in coil y, and detector d will be energized. Or keeping the wires half a wave length apart, but rotating them on the axis a until this plane is perpendicular to. the front of an advancing wave having at a given instant a force of, say, 10+, it will fall on both wires as indicated by line m where the force and sign are equal. Oscillations of equal

upon z are zero which will be when the plane of the wires is at right angles to the direction of the arriving waves. According to Mr. Stone the apparatus of this device has never been used with a wave length exactly twice the dis¬ tance between the two aerials or vertical wires V V' . The object in having the wave length equal to twice the said distance is that such an arrangement gives maximum intensity of sig¬ nals, the signals under all conditions being a maximum when the plane of the waves is at right angles to a plane down through the two antennae; the signals being canceled in the coils x y when the plane of the waves is parallel with the plane passing through the vertical wires. Consult U. S. Patent No. 716,135, 1902, covering this device.

Bent Antennae in Directive Wireless Sig¬ naling. — • De Forest states

that by using a vertical wire to which is attached a pivoted horizontal wire signals are received by means of the detector in the vertical wire, the strength of which signals appear to vary according as the position of the wires approach or depart from a position of parallelism with the direc¬ tion of travel of the waves. The various ar¬ rangements of T and L antennae so largely em¬ ployed for capacity on shipboard and in land stations correspond more or less to the fore¬ going device but practical experience does not definitely indicate that in ordinary shipboard working the signals are affected favorably or otherwise as regards the directive effect on sig¬ naling by such arrangement of the aerial wires.

Marconi has made numerous experiments relative to directive wireless signaling and has found that by placing a large number of wires, arranged as an L aerial, or bent antennae, and with the open end pointing away from the dis¬ tant station the direction of effective radiation may be largely controlled ; also that by using a similar antennae the reception of signals is much improved. Braun, Artorn and others have also experimented with directive wireless telegraph devices, an account of which may be found in textbooks on wireless telegraphy.

Bellini-Tosi Directive Wireless Signal System and Direction Finder. — These in¬ ventors began their experiments in France, using

Bellini-Tosi Direction Finder. Using Goniometer.

strength and direction will then be set up in the vertical wires, the effect of which on the coil z is nil, owing to the differential winding of the coils x y. To determine then, the direction of arriving waves it is only necessary to turn the wires V , V, on their axis a until the com¬ bined forces of the oscillations in coils x y

a triangular nearly closed aerial circuit capable of rotation on its axis, . using a transmitter and receiver somewhat similar to those already de¬ scribed. Like other experimenters Bellini and Tosi found that the strength of received sig¬ nals was a maximum when the plane of the triangular transmitting circuit was placed in the

direction of the receiving station, and that upon turning the triangle on its axis directing its plane away from that station the strength of signals gradually weakened and was always zero when the plane was

at right angles to that station. To avoid the difficulties involved in the use of movable aerials for directive pur¬ poses the inventors devised the plan of using two sets of triangular aerials, placed at right angles to one another, as outlined in Figs. 21, 22, 23 in which W E indicate the two upper sides of one triangle and N S' similar sides of the other triangle. In connection with this ar¬ rangement of aerials a device termed a radio¬ goniometer n w C is utilized in which will be seen a certain resemblance to the Stone localizer previously described. The radio-goniometer consists of two fixed coils n w at right angles to one other, and of a central coil C moyable on a pivot in any direction within the coils n w. When used for transmitting, the coil C, Figs. 21, 23, is the primary of an oscillation transformer with two secondaries, n w. When used for reception of signals, as in Fig. 22, coil C becomes the secondary of two primaries n w. The fixed coil n is connected with aerial wires N S ; fixed coil w with aerials W E. When the device is used as a transmitter, if it is desired to transmit signals in the direction of the plane, of say N S , the primary coil C is turned on its pivot until it is parallel with coil n, at which time inductive effects will be inappreci¬ able in coil w, but will be a maximum in coil n, and the direction of transmission will be N S. If the primary coil be placed parallel with coil w the direction of radiation will be W E. If it is desired to send signals in any direction be¬ tween W N or E S, this is effected by placing coil C in the desired position in which case each coil n w will be acted upon proportionately to its angle with coil C, and the direction of radi¬ ation will be a resultant due to the combination of the two electromagnetic forces developed by the coils n w, virtually according to the law of the parallelogram of forces. In Fig. 21, for instance, with coil as shown, the resultant direc¬ tion would be as indicated by the dotted lines r. The length of the thick lines N E, respec¬ tively, represent the assumed magnitude of the component forces in the direction indicated by those lines; or if the coil C be turned in the direction of dotted or resultant line t, the mag¬ nitude of the component force due to coil w would be reduced by the amount indicated by the intersecting dotted line at t' , while the com¬ ponent force due to coil n would be indicated by the dotted line n . Reversely when the radio¬ goniometer is used as a receiver or direction finder, Fig. 22, the incoming wave fronts will fall on the closed aerial oscillation circuits, virtually as stated in connection with Fig. 20. Thus if an arriving wave front is in the plane of N S , coil n only will be affected and coil C is turned bv the operator until maximum cur¬ rent or signals are obtained. If, on the other hand, the wave front is advancing from a direc¬ tion midway between N and E, the coils n w will be equally affected and the best position for coil C will be as indicated by the dotted line n in Fig. 21. The foregoing

described de¬ vice derives added importance from the fact that it forms the basis of the now well-known Marconi-Bellini-Tosi Direction Finder. (Con¬

sult Weagent, (Static Eliminator)). This and other direction finders are likely to be of great utility in enabling the navigators of air ships to obtain their bearings when in fogs, etc., etc. For example, assuming that certain land stations are instructed to send out prearranged signals, the navigator by means of a direction finder on his ship can quickly ascertain his direction.

Statics and Atmospheric Interference in Wireless Telegraphy. — Marconi found during his experiments that daylight was inimical to long distance wireless telegraphy. In other words, that signals could be received at a much greater distance at night than in the daytime. It is supposed that this is because ionization of the air is greater in daylight than at night and that the ionized air of the atmosphere absorbs more or less of the long waves employed in trans-oceanic wireless telegraphy. Marconi ob¬ served that the effect of ionization of the atmosphere was not noticeable to an injurious degree at distances less than 500 miles.

It has long been known that atmospheric electricity can be drawn from points above the earth’s surface by means of a wire upheld in the air. This is due to the fact that the upper layers of the atmosphere are statically charged with electricity to a point of electric potential differing from that at the earth’s surface. The grounded aerial wire tends to equalize this dif¬ ference of potential and currents of electricity discharge through it to earth. The aerial wire used in wireless telegraphy similarly acts as a medium of discharge for atmospheric elec¬ tricity, and in so doing produces currents of elec¬ tricity that have been the source of much inter¬ ference with the operation of wireless teleg¬ raphy and telephony. This particular source of external interference can be measurably obviated by disconnecting the wireless aerial from the cable. Lightning storms and snow¬ storms also set up interference, but they do not constitute a very serious obstacle to the opera¬ tion of wireless telegraphy. The foregoing and other electrical disturbances encountered in wireless telegraphy, are known under the gen¬ eral names of “statics,® “X’s® or “strays,® and certain types of such disturbances have hitherto made the successful operation of trans-oceanic and long distance wireless telegraphy generally, very difficult. The effect of the discharge of atmospheric electricity by way of the aerial wire to earth is termed “hissing.® Other types "of static interference are termed respectively “clicks® and “grinders.®

An electrical source of interference due to “strays® or electromagnetic waves, probably caused by variations in the electrical condition of the atmosphere, produces disturbances in the wireless receiving apparatus sufficient to render signals unreadable while the disturbances last. These effects are very pronounced in the tropics and are much less noticeable in winter than in summer or temperate zones.

A number of devices have been used to par¬ tially eliminate the effects of statics, the most common being the placing of a small air gap in the aerial wire, across which the static cur¬ rents pass, thereby diverting them from the re¬ ceiving apparatus. For short distances this de¬ vice is of use.

To avoid static effects, Fessenden devised the plan of divided circuits shown in Fig. 24.

A is the aerial. B B' are branched circuits from the aerial, coupled differentially, to a detector circuit C, C, C. T is a head telephone receiver. The assumed operation of this device was that if one of the branch circuits, say B, be attuned to arriving signals and the other branch, B' be not so attuned, the attuned circuit would re¬ spond to arriving signals while the untuned branch would not so respond, and, further, that the static currents, being forced vibrations, would pass through both branches in equal strength and would, therefore, cancel each other in the differented coils. It has been pointed out, however, that the static currents are also re-

Fig. 24. — Fessenden Interference Preventer.

sponsive to tuning of the branches to different rates of oscillation which prevents the desired cancellation of the static currents in B Br, hence the static noises will be heard in the receiver. Consequently, any apparent benefit derived from this arrangement must be due to the loose coupling of the circuits, which diminishes the strength of the static currents.

Dieckman designed a protective shield of wires to be placed over and around the wires of an L antenna to cut off the static currents from the aerial and divert them to the earth. This device is expensive since it practically du¬ plicates the regular antennae, but it largely, di¬ verts atmospheric currents from the aerial proper. It does not, however, divert horizontal electromagnetic strays from the antenna.

Weagent Anti-Static Device. — The prin¬ ciple involved in this device is the outcome of Weagent's remarkable discovery that the statics producing the greatest interference in wireless telegraphy are not parallel with the waves due to radiation from wireless telegraph stations, but are vertical in direction. It is beyond the scope of this article to give more than a brief description of the methods which Mr. Weagent has invented to avail of this discovery. For a full description thereof the reader is referred to the Journal of the Institute of Radio Engi¬ neers, March 1919.

Granting the accuracy of Mr. Weagent's assumption as to the vertical direction of static currents or waves the direction of their propa¬ gation will be at right angles to that of ad¬ vancing wireless telegraph waves. The problem was then to separate the wireless signal waves from those due to statics in the antenna cir¬ cuit.

The Weagent arrangement of circuits and apparatus to effect this result is shown theoreti¬ cally in Fig. 25, the explanation of which will

perhaps be simplified by reference to the de¬ scription of the Stone Direction Finder, and the Bellini-Tosi goniometer, herein. For his purpose Mr. Weagent arranged two loops L L' of aerial wires supported on poles, the receiv¬ ing station being at X. The length of each loop is, say, three miles, although the inventor has

Fig. 25. — Weagent Anti-Static System. Two-Wire Aerials.

experimented with loops of varying lengths less than three miles. The sustaining poles are 30 feet high. The wires of the loops are spaced 15 feet apart on the poles. Each loop is connected at X in series with a condenser C and one primary coil p, p' of a radio goni¬ ometer, the secondary coil s of which in turn is coupled with the tuning coil tc of a wireless receiving circuit containing the usual variable condenser m, detector d, battery b and tele¬ phone receiver T. Variable inductances i and resistances r are placed in the loops L L' for adjustment purposes. The coil s may be rotated into a desired position.

The vertically moving static waves are in¬ dicated by the downward arrows a a, the elec¬ tromagnetic waves due to wireless signals are indicated by the horizontal arrows a a. Since the static waves cut both of the loops simul¬ taneously the currents set up by them in the primary coils p p' of the goniometer (being wound oppositely to each other) are in phase and produce no effect on the secondary coil ˆ of that apparatus. But the arriving signaling waves cut the respective

loops at different times with the result that the currents set up thereby are not in phase and a preponderating current is produced in one or other of the primary coils of the goniometer, which induces a current in the secondary j of those coils that is heard in the detector circuit as in ordinary wireless telegraph operation.

Mr. Weagent in his paper states that to obtain tuning in the loops an inductance coil i, i of 30 millihenrys is placed in the upper wire of each loop and best results are obtained when this inductance is placed near the mid¬ dle, when the tuning is at a maximum. A similar coil placed in the lower wire of a loop effects no change in tuning. Experiments showed that a coil of 30 millihenrys was best for a wavelength of 12,000 meters while a coil of five millihenrys gave best results for a 6,000- meter wave. Both values, however, were satis¬ factory for either length of wave with loops three miles in length.

While the foregoing device was efficacious in _ getting rid of the vertical statics termed grinders, it was found, in long-continued tests

made by Mn Weagent with a two-wire aerial system installed at Lakewood, N. J., that the interference due to clicks or horizontal waves could not be altogether eliminated by the two-wire loop arrangement. Mr. Weagent defines the interference termed grinders as that which produces in the telephone receiver a continuous rattle with occasional crashes, and it is more noticeable in warm than in cold sea¬ sons. On the other hand clicks, which are widely spaced crashes in the telephone, are more noticeable in .cold weather, but they are not so continuous in their action as grinders. For instance, it was found that with the two- wire loop arrangement clicks interfered ma¬ terially with the reception of signals emanating from such comparatively low power stations as Clifden, Ireland, and the Eiffel tower, and that any plan devised to reduce the effect of the clicks also weakened the signals. On the other hand the clicks were not of sufficient strength unduly to impair . signals received from the more powerful stations at Carnarvon, Wales, or Nauen, Germany.

By means of another device due to Mr. Weagent and shown in Fig. 26, it became pos-

coils i', resistances r and condensers C shown, are made to neutralize or balance the static and click currents picked up by the receiving

aerial L, L, before reaching the vacuum tube detector circuit A. The rotary goniometer coil S is coupled to the detector circuit A at a' and to the receiving aerial L L at a. Circuit A is also coupled to the receiving aerial L via a' and a. This device allows the current signals from distant stations to be received at normal strength and without static or click interfer¬ ence, during all hours of the day.

It is claimed by Mr. Weagent that con¬ tinued use of his static eliminator has shown beyond question that its performance is not occasional or. accidental, but is reliable and consistent. With this system of reception trans- Atlantic radio telegraphy can now be carried on free from interruptions caused by statics of any kind, excepting only that due to local lightning. Further, the barrier in the way of radio telephony is by means of this system also removed,, inasmuch as statics have interfered with radio telephony to a much greater extent than with radio telegraphy. Improvements have been lately perfected by means of which radio

Fig. 26. — Weagent Three-Wire Aerial Static Eliminator System.

- tt — - -

sible to eliminate the statics due to clicks to the extent that the signals from the weaker Euro¬ pean stations were easily readable. Since it was demonstrated by the experiments referred to that the two-loop aerial picked up vertical static waves and horizontal electromagnetic waves, Mr. Weagent conceived the idea of utilizing the two-loop aerial as a tank or re¬ ceptacle for the static waves that produce grinders and clicks, and then avail of these waves at a given instant to balance out by suitable means the practically similar waves developed in a third aerial that would con¬ stitute the receiving circuit proper in the manner now to be described.

In Fig. 26 SL SL comprise the two-wire aerial tanks for this purpose. The instruments and circuits at the receiving station are indi¬ cated within the dashes. The receiving aerial proper is the long horizontal wire L L, which is suspended on the same poles as the tank aerials SL SL. The function of SL SL as intimated is to accumulate and supply at a de¬ sired instant currents due to grinders and clicks which by suitable adjustment of a goniometer S, P, P', and of the inductance

messages may be successfully received from across the Atlantic Ocean, with apparatus, in¬ cluding the entire equipment, and miniature aerials, so comparatively diminutive that they may be placed on a lecture platform.

Comments on Trans-Atlantic Wireless Telegraphy. — The Great War interfered ma¬ terially with the free use of wireless telegraphy and during the term of the war the govern¬ ments of the various nations of the world exercised complete control of its operation over land and sea. The following remarks con¬ cerning the status of trans-Atlantic Wireless telegraphy are drawn from an article in the international Cable Register Supplement,* by E. B. Pillsbury.

<(Regular message traffic has been trans¬ mitted between Europe and America by Wireless telegraphy continuously . for over eight years by means of a duplex circuit between Clifden, Ireland, and Glace Bay, Cape Breton, that is, messages between those points are transmitted in either direction simultaneously. The trans¬ mitting and receiving apparatus are not placed in one station but in separate stations a num¬ ber of miles apart, connected by land lines,

which make it possible to localize the sending and receiving operators in the one room. The receiving instruments are coupled to two dis¬ tinct aerials, one of which is used for receiving, while the other, known as the balancing aerial, is so arranged that it is practically unaffected by .the. signals from the distant station from which it is expected to receive. The effect pro¬ duced by the balancing aerial on the receiving apparatus by the adjacent transmitter is equal and opposite to that produced thereby through the receiving aerial which is tuned to the wave¬ length of the signals it is desired to receive. The latest type of the Marconi receiving ap¬ paratus greatly minimizes the atmosphere inter¬ ference to which wireless transmission over long distance was particularly exposed in the early days. The signals arriving in Glace Bay from Clifden ar-e as a rule easily read through any ordinary electric atmospheric disturbance. The strengthening of received signals has made possible the employment of recording instru¬ ments which not only give a permanent record of the received messages, but are also capable of operation at a much higher rate of speed than would be obtainable by an operator re¬ ceiving by sound or sight. The method em¬ ployed for this purpose is to insert into a gramo¬ phone the wireless telephone whereby the re¬ ceived dot and dash signals are impressed on the wax cylinder. These signals may thus be recorded at maximum speed and afterward be removed to another gramophone that may be speeded down to the capacity of the receiving operator. A high rate of transmission of sig¬ nals is attained by the used of a Wheatstone au¬ tomatic transmitter (see Telegraphy)

using perforated paper tape.®

While the war has interrupted the free use of wireless telegraphy and telephony it has at the same time made demands upon the engineers of this country. and Europe in the direction of im¬ provements in these arts that have no doubt pro¬ duced practical results that would not other¬ wise have been forthcoming in years. This has been remarkably true with regard to the improvements in vacuum-tube apparatus and the results obtained thereby in the service of the United States Signal Corps. For this serv¬ ice alone the production of high quality stand¬ ardized tubes has been at the rate of over 1,000,000 per annum. For interesting data on this subject consult a lecture given by Maj.-Gen. George O. Squier before the American Insti¬ tute of Electrical Engineers, 10 Jan. 1919, on <(Aeronautics in the United States from the Beginning of the War to the Present Time.® The Marconi Wireless Telegraph Station at Belmar, N. J. — The building shown in the foreground is the operating-room of the station. It is over 82 feet in length. This station is intended to communicate with the high power' station at Carnarvon, Wales. The masts shown are 300 feet in height and extend westward one mile from the shore. The room containing the tuning apparatus is over 80 feet long. The messages received and transmitted from this station are sent to and from the Marconi offices in Broad street, New York, by automatic tele¬ graph apparatus. . Similarly, messages are re¬ ceived and transmitted from the Marconi office in London to the high power station at Carnar¬ von.

|

j

k

Marconi Wireless Station at Belmar, N. J.

Proposed Pan-American Wireless Chain of Stations. — It has recently been announced that the largest wireless station in the world is to be constructed near Buenos Aires, South America. This will be one of a series of wire¬ less stations designed to connect the United States with all the important countries of South America, including Argentina, Brazil, Uruguay, Chile, Peru and Ecuador. Mexico and Cuba are also to be placed in wireless communication

. It is understood that the lofty towers from which the aer¬ ials will be swung in the South American station will be of the self-supporting

type, somewhat similar to the Arlington towers here illustrated.

with these countries. The South American wireless system will connect at New York with trans-Atlantic wireless to Great Britain, Scandinavia and Russia and at San Francisco with the Hawaiian Islands and thence with the Orient. In the United States the system will

connect with the 25,000 stations of the Western Union land lines.

The aerials of the proposed station at Buenos Aires will be supported by self-supporting towers corresponding to the towers of the powerful station at Arlington, Va., which are illustrated in the accompanying illustration. Further details of this projected chain of wire¬ less stations will be found in The Wireless Age (August 1918).

Bibliography. — Proceedings of Institute of Radio Engineers; Bucher, E. E., (Practical Wireless Telegraphy) and (Vacuum Tubes in Wireless Communication ; Fleming, Principles of Electric-Wave Telegraphy) ; ib., (Elementary Manual of Radio Telegraphy and Radio Tele- phony) ; Maver, William, Jr., (Wireless Teleg¬ raphy and Telephony. }

William Maver, Jr., Author of (American Telegraphy F

TELEKI, Samuel, Count, African ex¬ plorer: b. Saromberke, Eastern Transylvania, 1845 ; d. March 1916. He won a distinguished place on the roll of African explorers by his expedition of 1886-89, during which Lake Rudolf, fourth in size of the great lakes of Equatorial Africa, was for the first time sighted by white men. The existence of a great lake in the unknown area between the Victoria Nyanza and Abyssinia had for some years been rumored, and after the route in this direction had been opened up by Joseph Thomson’s journey through Masailand, Count Teleki was the first to take advantage of this open road. He not only made his way to the lake, but traced it to its northern extremity, bringing back valuable observations on the geography, geology and ethnology of the country traversed. He made various subsequent journeys in Africa and the East, but resulting in no further geographical discovery.

TELEMACHUS, te-lem'a-kus, in the Ho¬ meric Trojan War cycle, a son of Ulysses (q.v.) and Penelope. He was still in the cradle when his father went to the Trojan War. When his father had been absent from home about 20 years, Telemachus was urged by Athena (Minerva),

who appeared to him in the guise of Mentor, a friend of Ulysses, to go and seek him ; and as the place of his residence and the cause of his long absence were then unknown, he visited the courts of Nestor and Menelaus to obtain information. He afterward returned to Ithaca, where the suitors of his mother, Penel¬ ope, had conspired to murder him; but he escaped their treachery. His father had arrived in the island two days before him, and was then in the house of Eumseus, a faithful swineherd. Telemachus is the hero of Fenelon's famous romance (Les Aventures de Telemaque) from which the word ˆMentor® has been adopted into proverbial use. See TeLemaque.

TELEMACHUS, a Syrian monk, who, in the time of the Emperor Honorius, about 400 a.d., leaped into the arena of the Coliseum and attempted to separate the gladiators. He lost his life at the hands of the enraged populace, but the occurrence is said to have influenced Honorius to discontinue gladiatorial combats, which he did soon afterward.

TlSLEMAQUE, a romance by Fenelon. (Telemaque) is in form a novel, and relates the adventures of Telemachus in search of his

father, Ulysses. In its flowery poetic style, however, and in its division into 24 books, it suggests the epic poem rather than the modern novel. It is based upon the Odyssey of Homer, and uses the mythology and introduces many of the characters of that poem. Its intention was primarily didactic. It was one of several works that Fenelon wrote for the instruction of the young Due de Bourgogne, grandson of Louis XIV, whose tutor he was (1689-95). By his experiences and observation during his wan¬ derings, in various lands and among different peoples, aided especially by the wise comments and interpretations of Minerva, who accom¬ panies him in the form of Mentor, the young -Telemachus, future ruler of Ithaca, and through him the future ruler of France, received those lessons on the proper conduct of life and es¬ pecially on the duties of a king and on sound principles of government, which were calcu¬ lated to prepare them for the responsibilities of their high stations. It is a striking mark of the honesty and independence of Fenelon that these lessons are singularly liberal and modern, and contain implicitly a sweeping in¬ dictment of the government and policies of Louis XIV. (Telemaque) has often been trans¬ lated into English. Arthur G. Canfield.

TELEMETER, any one of various instru¬ ments designed to measure the distance of ob¬ jects more or less remote. It is used by sur¬ veyors and engineers, where rapid work is necessary and a fair amount of accuracy re¬ quired, on the battlefield to determine ranges, etc.,

where it is usually called a range-finder. One form is a recording apparatus elec¬ trically connected with a distant meteoro¬ logical or other instrument. The surveyor's telemeter is better known as a stadia, and consists of a mounted telescope with horizontal cross-wires, which, when in use, intercept the divisions upon a graduated rod held by an assistant at the distant point. The reading multiplied by the ˆfactor" of the instrument gives the distance.

TELEOCEPHALI, that is, (Gr. reheog complete (Gr. /ceˆa/iG) head. A name applied by some authorities to a group of fishes em¬ bracing most of the teleosts, or true bony fishes, especially those bearing a full complement of cranial and opercular bones, with the anterior vertebrae separate.

TELEOLOGY (Greek, telos, «end» or ˆpurpose®) denotes a mode of explanation in accordance with which the world as a whole, or particular forms within it, are regarded as due to the realization of some end or purpose on the part of some intelligence existing either in the world or outside it. Thus we might account for the various arrangements of the physical uni¬ verse — the distribution of land and water, the movements of the heavenly bodies, the changes of the seasons — by referring them to some end that the governing power of the universe is thereby achieving, as, for example, the preserva¬ tion and comfort of mankind. Or we might ex¬ plain the structure of an organism or of any of its parts by reference to the purpose that it serves, as, for example, the presence of fish in the sea through their usefulness to man as food, or the structure of the eye through the actual service that it renders. It is natural to assume that everything has been made for man and to

regard all things as existing for his service and convenience, that ((even the cork-trees,® as Hegel remarked in satirizing this view, <(have been produced in order that we may have stop¬ pers for our bottles.® Teleology does not al¬ ways adopt this narrowly anthropocentric point of view. But the very essence of its procedure is to postulate the existence of some intelligible ends or purposes in the world, and to read the various natural phenomena by reference to these ends. It is thus explanation in terms of final causality, rather than in terms of efficient causes or mechanism. Teleology seeks to make things intelligible by showing their relation to an end that is being realized; it answers the question ((Why?® or, <(For what

purpose?® Mechanism, or explanation by efficient causes, on the other hand, knows nothing of a purpose. It shows how the result has actually been pro¬ duced by the operation of natural causes, acting according to invariable laws. It explains by answering the question (<How?® It is well known that there has been a constant conflict, throughout the whole history of thought, be¬ tween teleological and mechanical modes of ex¬ planation. Indeed, this may be said to be the supreme question at issue in all philosophy. Is the world and all that it contains merely the natural product of efficient causes acting with¬ out any intelligent guidance, or is there some purpose or system of purposes being realized?

The terms in which the conflict between teleology and mechanism are expressed have 'been modified in recent times, and it is per¬ haps well to note some fundamental differences between the thought of the present time and the earlier mode of conceiving teleology. The older teleology regarded God (or the gods) as a being outside of the world who in an external way was accomplishing some purpose through it, as the mechanician uses a machine to accomplish his purposes. From the modern point of view, God is identical with the ultimate principle of things. The purpose of the world, if any intel¬ ligible purpose exists, is not something super¬ imposed on it from without, but an inner or immanent purpose to which it naturally and everywhere gives expression. The general ac¬ ceptance of the modern doctrine of evolution, with its natural explanation of organic forms and modifications, at first appeared to overthrow teleology. For it was from the phenomena of organic life that the defenders of the older teleology had drawn their strongest proofs. Living forms and processes did not seem ex¬ plicable by mechanical process, and here, at particular points, it was supposed one could trace the operation and determining influence of the teleological factor. The Darwinian theory doubtless destroys the possibility of conceiving teleology as a particular influence that occa¬ sionally intervenes at special points in the proc¬ ess of the world, superseding and doing the work of efficient causes. But modern thought has come to realize that the end or purpose is not something that operates here or there, at particular points, but as immanent principle is the underlying basis of the world-process as a whole. In other words, there is no conflict be¬ tween teleology and mechanism — between ex¬ plantation by means of final and that by means of efficient causes — when the proper sphere and limitations of each are understood, ’but it is

rather true that as mutually complementary con¬ ceptions they presuppose each other. Modern teleology admits to the full the rights of me¬ chanical explanation in every field. But it in¬ sists that the

facts of experience and the nature of our intelligence demand that we shall every¬ where go beyond this standpoint and recognize an underlying system of purposes in the world- process. The two modes of explanation are thus on different planes, and opposition between them only arises from failure to recognize this fact. As Lotze says: <(The true source of the life of science is to be found in showing how absolutely universal is the extent, and at the same time how completely limited the signifi¬ cance of the mission which mechanism has to fulfil in the structure of the universe.®

Both a mechanical and a teleological view of the world was developed by Greek philosophy, the former by the Atomists, of whom Democri¬ tus is chief, the latter mainly by Plato and Aristotle. The influence of the latter thinkers, united with the general spirit of the Christian doctrines, made the teleological the prevailing mode of explanation during the Middle Ages. The pioneers of modern thought, — Galileo, Ba¬ con, Descartes, Gassendi, Hobbes, Spinoza — worked out anew the mechanical theory, mak¬ ing it a powerful instrument of research by , basing it on exact mathematical principles. They were strongly opposed to teleology, which they regarded as entirely unable to furnish scientific explanations of natural occurrences. Leibnitz was perhaps the first thinker in modern times who saw that teleology and mechanism can be reconciled by properly distinguishing the planes where each principle has its valid application. For Kant (whose treatment of teleology is very important), mechanism is the only principle that we can confidently apply in science as objec¬ tively determining phenomena. Teleology, on the other hand, although a necessary subjective thought when we are dealing with organic phe¬ nomena, cannot be affirmed to have objective application. Living things must appear to us as if they were determined by some end, but we can never say that this purpose is actually present outside our minds in the objective phe¬ nomena themselves. At the same time, while mechanism is and must remain the sole prin¬ ciple of determination in the phenomenal world, Kant teaches that we are obliged to postulate a world of noumenal or more ultimate reality where teleology, by recognition of a moral purpose in the world, becomes the final deter¬ mining principle. (See also Mechanism). Con¬ sult Adler, Max, (Kausalitat und Teleologie im Streite und die WissenschafD (in Marx Studien, Vol. I, Vienna 1904); Bosanquet, B., (Meaning of Teleology > (in (Proceedings> of the British Academy, London 1906) ; Erhardt, Franz, ‘Mechanismus unde Teleologie) (Leip¬ zig 1890) ; Janet, Paul, {Final Causes> (Eng. trans. by W. Affleck, New York 1883) ; Windel- band, (Historyof Philosophy*; Hoffding, his¬ tory of Modern Philosophy) ; Spinoza, (Ethics* (Appendix to Part I);

Kant, (Critique of Pure Reason *(latter part of transcendental Dialectic*); (Critique of Judgment (Second Part) ; Shoup, (Mechanism and Teleology* (1891). J. E. Creighton,

Professor of Philosophy and Dean of the Grad¬ uate School, Cornell University.

TELEOSAURUS, or TELEOSAU- RIDiE, an extinct genus and family of croco¬ diles (T. cadomcnsis) found in Mesozoic de¬ posits. See Crocodile, Fossils.

TELEOSTOMI. See Ichthyology.

TELEPATHY, the transfer of thought from one mind to another at a distance, es¬ pecially the sending and receiving of definite ideas and information from the mind of one person to the mind of another person, beyond the reach of any of the five senses, without any mechanical aid. The sympathetic com¬ munion of mind with mind is more or less ap¬ parent to all, 'but whether this can be expanded to the full extent of the definition is doubted by some physicists, and regarded as not proven by others. Within recent years, the study of clairvoyance, spiritual mediumship, hypno¬ tism, mind-reading and thought transference in general have led some eminent scientists to commit themselves definitely to the existence of such phenomena. It appears also that all mystics, yogis, theosophists, clairvoyants, im-pressional mediums, and seers believe in telep¬ athy, and many of them have written volumes of their experiences and those of which they have made record.

There is seemingly no end to records of ex¬ periences of individuals which go to prove telepathy, but these records, to be found in every large library, have no effect on the mind of the materialist who insists that he be shown — that it be made apparent to one of his five senses that such a thing exists. In the very nature of the case it ought to be apparent that communica¬ tion by means outside of the five senses cannot be brought and put upon a table and exhibited for the benefit of people who want to see and feel them. The evidence can come only from those people who have developed their powers of mind and thought to the extent of being able to take part in a telepathic communication, either to send or receive one, or both. Even then, a sender may have to depend much on the veracity of the receiver, and

the receiver on the veracity of the sender, as they put together their experiences, to obtain the proof of telep¬ athy. When two persons conclude that they have had telepathic communication, and tell others about it they are sure to be discredited by most of their acquaintances, who conclude that these things are hallucinations. No pos¬ sible physical proof as yet can be adduced of such experiences. If telepathy be a fact, and we live on after death, it should be possible to communicate telepathically with the dead. And this is just what spiritualists and many psychi¬ cal researches believe happens. It is a curious fact that those who doubt communication with discarnate intelligences, as by the Ouija board or through a medium, are always claiming that the phenomena are probably produced by the minds of some one who knows the facts of the messages and influences the medium. Ob¬ viously if mind can act on mind, telepathy is a fact, and should furnish a bridge for communi¬ cation between the world of the dead and the living. And that is exactly what Sir Oliver Lodge, Camille Flammarion, Cesare Lombroso, Conan Doyle and other people of great intelli¬ gence have been trying to inform the public for a number of years. But because the evidence

cannot be handed out like a Sunday newspaper, or put into a receipe so that anybody can tele¬ path, the ((material scientists® have largely re¬ fused credence. Their attitude is changing, however, and largely through the work of the Psychical Research Society, which was started with the idea (in many minds) of wholly dis¬ proving spiritualistic phenomena, and has after 35 or 40 years convinced probably all of its active members that the dead live on, and that more or less communication is all the time taking place between the two worlds. It was under their auspices, a few years ago, that Prof. Henry Sedgwick investigated 17,000 cases of appari¬ tions of dead persons seen and recognized by friends at a distance at the time of decease. He reported that the result showed <(coin- cidences® 440 times as numerous as they should have been under the law of chance.

Thought is a power, as is seen when great orators sway audiences, or as history discloses to us through the progression of an idea; hence it is logical that thought should be able to manifest itself at a distance, as do the vibra¬ tions in radiography. For success in telep¬ athy two minds in rapport are required, or as the radiographer would say <(in tune® ; and it seems that these minds usually must belong to egos sufficiently advanced that they know they possess minds that they can control, and who have practised this control until they can concentrate on a given thing for a period of many minutes, in some cases hours. Having acquired this power of concentration, the telep-ather must then send a definite sharply de¬ fined thought to a receptive individual, or one who is in known harmony, and preferably who has arranged to have his mind receptive at a given time. The message sent should consist of concrete ideas rather than specifically formed sentences in words. Probably meaningless num¬ bers are the hardest things to convey telepathi¬ cally, and yet members of the Psychical Re¬ search Society met with considerable success in sending numbers, and a lady of the writer's acquaintance found the combination of a safe and opened it, though previously she knew so little about safes that she did not understand that the knob was to be turned alternately to the right and left. Consult Proceedings of the Society for Psychical Researchˆ ; Besant, A., (Thought Power) (1900) ; Rider, F., (Are the Dead Alive ?) (New York 1909). See Hypnotism ; Psychical Research.

Charles H. Cochrane.

TELEPHONE, The. Introductory. — The

word ˆtelephone,® derived from the Greek, means <(a voice from afar.® Although the word has sometimes been applied to non-electrical devices for conveying sound by mechanical vi¬ brations, transmitted through tightly stretched strings or wires by means of diaphragms con¬ nected thereto, the term has now generally come to mean the electric speaking telephone. In all electrical telephone systems the acoustic waves of condensation and rarefaction, set up in the air by the speaker's voice, are directed against the diaphragm of a transmitting instru¬ ment. This transmitter converts these acoustic waves into electrical waves of the same fre¬ quency and shape. The latter travel as an elec¬ tric current of varying strength over the tele¬ phone line to the receiving instrument. In the

receiver the electrical waves pass through a coil on a magnet. The varying field of magnetic force which they produce causes motion of the iron diaphragm of the receiver, acting as the armature of the magnet. The motion of the receiver diaphragm sets up acoustic waves in the air, similar in frequency and form to the waves produced in the air at the sending end by the voice of the speaker. These acoustic waves, impinging upon the ear of the person at the receiving end of the line, reproduce the words of the speaker. (Fig. 1).

Invention of the Telephone by Professor Bell. — Not only is the use of the telephone greater in America than in any other portion of the world, but telephony is notably an Ameri¬ can art. The telephone was invented in Amer¬ ica by Alexander Graham Bell and substanti¬ ally all of the important contributions to the development of the telephone art have been made by Americans. > Professor Bell was a teacher, at Boston University, of a system of visible speech for deaf mutes, devised by his father, who had studied the science of acous¬ tics deeply. Father and son had made together numerous researches into the relations which existed between the different elements of speech, and the musical relations of the vowels. Pro¬ fessor Bell was a close student of the researches of Helmholtz, and his studies of the latter's experiments concerning the artificial repro¬ duction of vowel sounds by means of electric tuning forks led him into the study of the ap¬ plication of electricity to acoustic instruments. While teaching at Boston University, Professor Bell occupied his spare time in efforts to realize his dream of the telephone, and also in experi¬ menting upon a system of harmonic telegraphy designed to send several differently tuned, and therefore, non-conflicting telegraph messages, over a single wire at one time. While experi¬ menting on the harmonic telegraph, Professor Bell had before him continually a vision of transmitting speech electrically. In the summer of 1874 he made a sketch of his conception of a speaking telephone which, although not tried at that time, became a part of, and was shown in, his first patent of 7 March 1876. (Fig. 2).

Fig. 2. — Bell's conception of a speaking telephone in the summer of 1874. Known as the "Figure 7 " telephone because so designated in Bell's patent of 7 March 1876.

His conception was that the vibrations of the air produced by the voice speaking into mouth¬ piece A would cause membrane D, connected to steel reed C, to vibrate, thus inducing an undulating electric current to flow from coil B, over line E, through coil F at the

receiving end to ground. This would cause the steel reed at the receiving end to vibrate and to transmit its vibrations to the receiving membrane I, causing the latter to produce air waves corresponding exactly to those formed by the voice at the sending end.

On 2 June 1875, while experimenting on his harmonic telegraph, a demonstration of the principle on which he had based his proposed speaking telephone of 1874 was suddenly re¬ vealed to him. In tuning the harmonic receiver (Fig. 3) it was Professor Bell's habit to press

Fig. 3. — Type of Harmonic Telegraph Receiver which un¬ expectedly reproduced for Professor Bell, on 2 June 1875, the twang of the spring of a similar instrument in another room, thus proving its capability as a telephone receiver.

the reed closely to his ear to determine the ac¬ curacy of the tuning. While doing this he was startled to hear the. twang of the vibration of a steel spring. Going quickly to the sending in¬ struments in an adjoining room, he found that his assistant, Mr. Thos. A. Watson, had snapped one of the springs in order to free it and put it into vibration again. It was the vibration of this spring that Professor Bell had heard, the snapped spring having generated an alternating current in the coils of the sending instrument which, traversing the line and passing through

Fig- 4-— Cross-section of Bell's first real telephone. Known as the " Gallows" type.

the coils of the receiving instrument, had caused the tuned reed to reproduce the sound made by the reed at the sending end. Thus was the speaking telephone born. As Professor Bell well knew that the instruments which could transmit all the complex vibrations of one sound

Oscillograph Record Showing Changes in the Electrical Current when the word " New York " i

telephone

I

sa cali,ns A -

Fig. 15 — Bell Box Wall Telephone, August, 1877, with po'e- aLnght anSles to the magnet. This first com¬ mercial form of wall telephone was used both as transmitter and receiver

Fig. 12 — Cross-section of Wooden Hand Telephone made in May, 1877, frequent y called the “ Butter Stamp ” receiver. First commercial form of Bell Hand Telephone. Used both as a transmitter and receiver

Fig. 14 — Cross-section of modern Bi-po!ar Receiver

TELEPHONE

Fig. 24 — Magneto Telephone Ringer or Call Bell, invented by Thomas A. Watson in 1878. Used in the first commercial Bell sub¬ scribers’ sets

Fig. 25 — First Magneto Tele¬ phone Generator. Designed by Thomas A. Watson in 1878

Fig. 29 — Modern Desk Set with automatic switchhook

Fig. 18

Fig. 19

— Blake Transmitter, open

— Cross-section of Blake Transmitter

Fig. 28 — Early form of Telephone with auto¬ matic Hook-switch

TELEPHONE

365

would do the same for any sound, even that of speech, this experiment revealed to him the pos¬ sibility of accomplishing the desired results. The next day he gave instructions for the making of his first real telephone, known as the ((Gallows)) type. (Fig. 4). It consisted of a framework' carrying an electro-magnet with its reed armature, the free end of which was attached to the centre of a small drumhead of gold-beater’s skin. A mouthpiece was provided

Fig. 5.— The Liquid Transmitter. The first instrument to transmit a complete articulate telephone message.

for speaking purposes. With this instrument, speech sounds were transmitted over a short line and heard by means of a second instrument of like character. From this time on, many forms of receivers and transmitters were ex¬ perimented with until, on 10 March 1876, the first articulate complete sentences were trans¬

mitted. Professor Bell was then experimenting with his liquid transmitter. (Fig. 5). This instrument consisted essentially of a diaphragm, capable of being vibrated by the voice, to the centre of which was attached a small conduct-

i

V

Fig. 6. — Cross-section of Bell's Tuned Harmonic Receiver.

ing rod dipping into acidulated water con¬ tained within a small cup A large flaring mouthpiece was provided and the whole was suitably mounted on a frame and base with connecting terminals. This transmitter was connected in series with a battery and a tuned harmonic receiver. (Fig. 6). Undulating current was produced by the change in re¬ sistance of the circuit as more or less of the rod was immersed due to the vibration of the

diaphragm. With these instruments, Professor Bell speaking, and Mr. Watson listening, the first complete articulate telephone message was transmitted.

On 9 Oct. 1876 the first reciprocal conversa¬ tion took place over an outdoor line, two miles long, between Boston and Cambridgeport, Mass. The instruments (Fig. 7) had, as diaphragms,

.

i

BOSTON _ _ _ 2 MlLtS _ CAWtHtOOCfOMT

Fig. 7. — Circuit and instruments used by Professor Bell, 9 Oct. 1876. The first time that satisfactory and sus¬ tained conversation was carried on by electrical means between persons miles apart.

thin iron discs which responded to the voice vibrations. Close to, but not touching, the cen¬ tre of the diaphragm was the core of an electro¬ magnet, the windings of which were connected in series with a battery, the line and a similar instrument at the other end. With these instru¬ ments was carried on a sustained conversation which was fully reported in the next morning's papers as the latest startling scientific achieve¬ ment.

Fig. 8. — Bell's Centennial Iron Box Receiver, 1876.

Professor Bell exhibited his telephone inven¬ tions at the Centennial Exposition in Philadel¬ phia in 1876. There he demonstrated, before the judges of the exposition and a large number

Fig. 9. — Bell's Single Pole Membrane Telephone. Demon¬ strated before the judges at the Centennial Exposition, 25 June 1876. This instrument was used as a transmitter, the receiver used being the Iron Box instrument shown in Fig. 8.

of people, his liquid transmitter (Fig. 5) ; iron box receiver (Fig. 8) ; single pole membrane telephone (Fig. 9), and other types of instru¬ ments. As a result of this exhibition of the telephone its fame spread rapidly.

Work of Early Investigators Preceding Bell. — The idea of applying electricity for the transmission of sound arose as soon as the effects of electric telegraphy were observed. Page, in 1837, discovered that a magnetic bar could emit sounds when rapidly magnetized and demagnetized. Electric vibrators devised by Macaulay, Wagner and Neef and adapted to produce musical sounds by Froment and Petrina in 1847 to 1852, showed that the transmission of sound to a distance was not impossible. Bourseul, in 1854, suggested that if one spoke near a movable disc sufficiently flexible to lose none of the vibrations of the voice, this disc, by alternately making and breaking the current from a battery, might cause another disc, at a distance, to execute the same vibrations simul¬ taneously. Reis, in 1870, invented a musical telephone that, by alternately making and break¬ ing an electric circuit, could transmit musical tones over a wire to a distant point. Reis' work, although urged as an anticipation of Bell, never found favor in the courts during the ex¬ tensive patent litigation that followed Bell's invention because his scheme was based on mak¬ ing and breaking a current, which cannot trans¬ mit speech. The United States Supreme Court said (<to follow Reis is to fail, but to follow Bell is to succeed.® The publication of Profes¬ sor Bell's invention brought forth many claim¬ ants to priority. After years of litigation in which the state of the art and the claims of others were considered exhaustively, priority for the invention of the telephone was finally awarded to Professor Bell. While Professor Bell, by means of lectures on the telephone, was arousing public interest in his invention, devel¬ opment work was begun to make the instru¬ ments more practical for general use. The box type (Figs. 10 and 11), which was the best form

thus far devised, was not adapted to be held in the hand. The inconvenience of the box telephone led to the development of a style of instrument which could be held in the hand readily and used for transmitting or receiving as desired.

The Receiver. — Several forms of receiver (hand telephone) employing wood for the con¬ taining case were produced and placed in pub¬ lic use in the early days. Fig. 12 illustrates one of these. This type was subsequently improved in design and hard rubber replaced wood for the handle and ear-piece. (Fig. 13). Thus far the receiver had one pole-piece and coil placed on the end of a permanent magnet. In 1890 the first type of receiver having two pole-pieces and coils was developed. The bi¬ polar receiver has passed through a long period of evolution, each successive step in the de¬ velopment increasing its talking efficiency or improving the mechanical features of its design. Fig. 14 shows the bi-polar receiver in use at the present time in the Bell System. Two per¬ manent magnets are used. To their poles are welded soft iron pole-pieces which constitute the cores of the electro-magnetic coils. The

supporting cup, of non-magnetic material, is welded to the magnets and cores, thus form¬ ing a rigid unit which is mount¬ ed within a hard rubber case and ear cap. The lat¬ ter clamps the diaphragm firav ly in place close to, but not touch¬ ing, the pole- pieces. Every part is made of carefully select¬ ed material, manufactured to extremely accu¬ rate dimensions, and the whole is assembled and tested with the utmost care in order that in¬ struments of the greatest attain- a b 1 e efficiency and mechanical strength may be secured. In all, over 50 different

Fig. 13. — Cross-section of improved types and Styles Hand Telephone, with hard rubber of receivers have handle and ear-piece. been developed

for use in the Bell System. Practically all of these have been abandoned in favor of the latest improved type. While great improve¬ ments have been made in the design and effi¬ ciency of the telephone receiver, its funda¬ mental electrical principle is the same to-day

as when in¬ vented by Pro¬ fessor Bell. Outside the Bell System several differ¬ ent types of re¬ ceivers operat¬ ing on the same principle, but differing some¬ what in details of construction, are used.

The Trans¬ mitter. — In the beginning, the hand receiver type of

instru¬ ment was also used as a trans¬ mitter. This was shortly de¬ veloped into the magneto box transmitter. (Fig. 15). Except for very short lines, this magneto type of transmitter was not sufficiently power¬ ful. The solution of the vitally important prob¬ lem of improving this part of the telephone system grew out of the invention of the vari¬ able contact resistance transmitter.

Fig. 16. — Early form of Berliner Transmitter.

Ih 18/7 Emile Berliner inverted a transmit¬ ter (Fig-. 16) having, in contact, two pieces of metal ; one stationary, the other capable of be¬ ing vibrated by the voice. The principle was this : with two bodies in contact and forming part of an electric circuit, if the pressure on the contact be' increased, the electrical resistance of the circuit is diminished and more current flows, whereas, if the pressure be diminished the resistance increases and less current flows. In the figure, A is a metallic diaphragm capable of being vibrated by the voice. This diaphragm at its centre is in contact with a metal ball C. The essential contact is at a. Vibration of the diaphragm, as explained above, causes corres¬ ponding undulations in the current flowing in a circuit including the contact, a battery, the line and the receiving instrument. In later forms of the Berliner transmitter, carbon contacts were employed instead of metal.

In 1877 Edison invented a transmitter (Fig. 17) in which the current varying element con¬ sisted of a small disc of carbon (lamp black) placed between two plates so arranged that the vibration of a dia¬ phragm varied the con¬ tact pressure.

In 1878 Francis Blake invented an im¬ portant improvement in contact or microphone transmitters. He em-| ployed a platinum point

platinum point is forced against the diaphragm centre under considerable pressure from spring S. The commercial form of this instrument

Fig. 17. — Cross-section of Edison Carbon Transmitter.

Later type.

bearing against a hard carbon surface. Fig. 18 is a cross-section of a Blake transmitter. The platinum point K is borne by a light spring A.

The hard carbon disc C, mounted in a brass cup W , is supported by a substantial spring S. The platinum and carbon are first brought into light contact with each other after which the

Fig. 20. — Cross-section of early form of Long Distance Transmitter

Fig. 21. — Cross-section of modern Solid Back Transmitter.

(Fig. 19) displaced the Berliner and Edison types and was extensively used for a long time as the Bell System standard.

In 1880 an English clergyman, Henry Hun- nings, invented a transmitter employing granu¬ lar carbon to secure a large number of points of microphonic contact. The essential feature was a thin platinum diaphragm in contact with a mass of granular carbon enclosed within a chamber having at the rear a plate of metal or carbon in contact with, the granular carbon. In 1885 Bell engineers improved the Hunnings transmitter (Fig. 20) By using a horizontal plat¬ inum diaphragm A and a gold-plated electrode C . dipping into the granular carbon. While this transmitter operated well when at its best, after being used for some time the large quan¬ tity of granular carbon produced an insensitive condition that seriously affected its efficiency.

To overcome this, A. C. White, in 1890, working in the Bell laboratories, invented the solid back transmitter (Fig. 21) in which the contact element is in the form of a small cham¬ ber (termed the ((button):>) containing two car¬ bon disc electrodes; one fixed, the other free to vibrate. These electrodes are separated by a small space partially filled with granular car¬ bon. The. fixed electrode is rigidly supported by the solid backing afforded by a stout metal bridge. The movable electrode is firmly at¬ tached to the centre of the diaphragm. The function of the granular carbon is the same as in the Hunnings type but the defects of the latter are overcome. This instru¬ ment has proved so perfect in its operation and so satisfactory in its general design that it has formed the basis of all the best types of trans¬ mitter. A number of modifications from the original design have, how¬ ever, been made to improve its elec¬ trical and mechanical features. Fig. 22 shows the construction of fhe ˆbutton® of the modern common- battery solid back transmitter. Over 70 different types and styles of trans¬ mitter have been developed and placed in service by the Bell system. Practically all of them have been displaced by the type just described. Transmitters employed by independ¬ ent companies operate on the same general principle as the type just

described and resemble it in appear¬ ance.

The Induction Coil. — Coincidently with the introduction of the variable contact (micro¬ phone) transmitter came the application of the induction coil to the telephone. Fig. 23 shows

Fig. 22. Cross-section of Granular Button or Cell for Solid

Back Transmitter.

D. Diaphragm. H. Plunger.

C. Carbon facing of cell. E. Granular material.

I. Flexible ring of mica, clos¬ ing joint between plunger and cell walls.

the original telephone circuit and two important steps in the evolution of telephony whereby it became possible to talk over greater distances than formerly. In the simple magneto tele¬ phone circuit A , the amount of electrical energy transmitted depended on the ability of the telephone, when spoken into, to generate a current independent of any outside source. This current was limited in strength to the small amount obtainable from the vibration of the diaphragm by the voice. B in Fig. 23 shows a circuit in which the variable contact transmit¬ ters, the receivers, the line and the source of

— , i.-q

A

Bertery

Fig. 23. — Three steps in the evolution of the telephone

circuit.

energy (battery) were connected together in series. With this arrangement better results were obtained, the extent of improvement de¬ pending on the voltage of the battery, the con¬ ductivity of the line and the current changing

capabilities of the transmitter. In this circuit the transmitter acted as a valve to vary the energy furnished by the battery. C in Fig. 23 shows

the use of the induction coil, the latter consisting of a bundle of iron wires surrounded by two separate wire windings. Each transmit¬ ter is placed in series with a battery and the primary winding of an induction coil consisting of a few turns of large wire. The secondary winding of the induction coil, consisting of many turns of relatively fine wire, is connected in series with the line and the receivers. Plac¬ ing the transmitter in a local circuit, independ¬ ent of the line circuit, permitted the use of a low voltage battery and allowed the variation in resistance produced by the transmitter to be large in comparison with the total resistance of the primary circuit. The induction coil operates as a transformer. The relatively large variable current at low voltage in the primary circuit is transformed into a small current at high vol¬ tage in the secondary circuit by reason of the large ratio of the number of turns in the sec¬ ondary winding to those in the primary wind¬ ing. The secondary current traverses the line with less loss than would be the case if the current were of lower voltage but larger.

Signalling Systems. — When the box tele¬ phone was first employed, the custom was to tap on the diaphragm with a pencil as a method of calling the party at the other end of the line. Later this was superseded by a hand-operated hammer mechanism which gave a vigorous blow on the diaphragm that was transmitted telephonically to the station at the other end of the line (Fig. 11). Tap bells were also em-

Fig. 26.— Diagram of Magneto Telephone Generator.

ployed for signalling as were ordinary electric vibrating bells and telegraph sounders. The need for a reliable and efficient method of sig¬ nalling was realized at an early date and Wat¬ son developed a ringer and magneto-generator to meet this need. The ringer (Fig. 24) con¬ sisted of an electro-magnet having a centrally- pivoted polarized armature carrying the striker

which played between two gongs. Polarizing the armature made it responsive to the rever¬ sals in polarity of the magnet when alternating current passed through the coils of the latter. To furnish the alternating current, a small magneto-electric generator (Fig. 25) was pro¬ vided, consisting of a powerful permanent magnet carrying an armature capable of being rotated by a wheel which the calling party turnedby means of a crank. Figs. 26 and 27 show, in

diagrammatic form, the principles of the latest types of generator and ringer.

Automatic Switchhook. — It was early ap¬ parent that some means should be provided for switching, to and from the line, the signalling and talking circuits at the substation whenever it was desired to do so. At first, hand-operated switches were used for this purpose but it was

soon found desirable to make the switching operation automatic, as users would frequently leave the hand-operated switch in the wrong position. To attain this end, a lever switch upon which to hang the receiver was invented by H. L. Roosevelt. The switch was operated by the weight of the receiver. Fig. 28 shows an early set arranged to accomplish the desired purpose. The hook-switch, in its downward position, left the circuit free for the incoming signal ; in its upward position, which it assumed when the receiver was removed from it, the necessary contacts for talking were closed. Figs. 29 and 30 illustrate the switchhook ar¬ rangement for the present telephone. Figs. 31 and 32 show the circuits controlled by the Switchhook for a standard magneto and com¬ mon-battery substation circuit respectively.

Series and Bridging Bells. — In the early days, after the development of the magneto-bell,

JERIES «IL

or (< ringer,® it was the practice, on party lines, to connect the sets in series, as shown in Fig. 33. To enable the ringer to operate effectively it was necessary to provide it with a large num-

PiG. 30. — Switchhook for Modern Telephone, showing

contacts.

ber of turns of wire. As a result these ringers possessed considerable impedance, i.e., they of¬ fered substantial obstruction to the telephone

Induction

current, seriously affecting the service between any two talking stations. The more ringers in the circuit, the poorer was the talk. To improve

Fig. 32. — Common-Battery Substation Circuit.

this condition, in 1889, John J. Carty, who at that time was known as one of the chief techni¬ cal experts, and who has since become the rec-

ognized engineering leader in telephony, in¬ vented the bridging bell. In this arrangement (Fig. 34) the bell, or ® ringer,® has a high impe¬ dance winding which, while responsive to the relatively low frequency ringing current, does not permit the talking current to pass over the

stalled at New Haven, Conn., in January 1878. (Fig. 36). This small board accommodated only a few lines. It did away with the block and plug method of connection, substituting, for the latter, pivoted strips of metal adapted to be rotated into contact with metallic buttons, all

Fig. 34. — Party Line Circuit with Bridging Bell.

ringer circuit, but does allow it to pass over the line from one station to another. It was this invention which made possible the successful use of party lines.

Switchboards. — If its use had been re¬ stricted to isolated lines only, the telephone would undoubtedly have remained scarcely more than an interesting scientific curiosity. With the development of the instruments themselves, the necessity for connecting one telephone sta¬ tion with another, by means of some switching device, at once became apparent.

The first interconnection of telephone lines by means of a switchboard took place at Bos¬ ton in 1877. A few burglar-alarm lines were equipped at the station ends with box telephones. At the burglar-alarm office, each line was con¬ nected to a small metal block. These blocks were so arranged, in relation to other metal

being mounted on a wooden board. Each line was connected through the pivot, with one of the rotatable metal strips. Every other line was connected with a metal button, these buttons being so placed, around the circumference of a circle, that, by rotating the strip, connection could be made with any desired button and line.

Shortly following this, many different types of switchboards were made employing either plugs or button switches in various arrange¬ ments for making the connections. Fig. 37 shows one of these types.

An important step was taken when the flexi¬ ble connecting cord, terminating at each end in a plug, adapted to connect with any line, was adopted as a substitute for the hand switch described above. Fig. 38 shows an early type of board employing connecting cords. In this style of board each subscriber's line was pro-

Fig. 36. — First Telephone Switchboard. Used in New Haven, Conn., for eight

subscribers.

blocks placed closely beside them, that metal plugs could be employed to connect the blocks together in various ways, thus permitting the lines to be interconnected as desired. (Fig.

35).

The first commercial switchboard was in-

vided with an electromagnetic annunciator the shutter or index of which moved, when a sub¬ scriber operated the magneto-generator at his station, thus attracting the operator's attention to the fact that a connection was desired. Each subscriber's line was also connected at the

TELEPHONE

mum

wwn*

• . - r j r? > m T -. j- TTTTTinrfT

. I ■ * va&smxmm at

■mfWMKwaiaimM -a _ _

'mmMim t a •«. / . ..»• «■ 4rfvt « »

KKffmsitˆWi mam * . -

m&ismmt-m . ■ i»i mittm »

l * r#'.i I- • > M'.I 1 «l l:i •< l «.:■•;»! »■ « : t f Jtn* ;

. . . : . ..-j: i. jij- i Mi*, i. tt»L

f. iMimatiSiiibtiMHt mtnvmuiK}

jr-<n«;-Ti-rm

mtwsiimm'wvMAsmmwm w mx

fTJtlilUli

tUtMtMKCMMiftftMMftii

Fig. 43 — Typical Private Branch Exchange

Fig. 44-A — Dial on Subscriber's Set used with Automatic System

Fig. 37 — Early form of Switchboard

Fig. 44 — Subscriber's Set use! with Automatic System

Fig. 38 — Early form of Switchboard with Flexi¬ ble Cords for making the connections

Fig. 35 — Arrangement used at Boston to connect together Burglar-Alarm Lines

TELEPHONE

Fig. 51-B — Cable Loading Coil and Section. Wire Core Type

Fig. 52 Underground Manhole showing Pots containing Loading Coils, and connections from coils to cables

Fig. 53 Loading Coils in Iron Cases connected to an Open Wire Line

i

Fig. 48 — Cross-section of 1200 Pair Cable

p

Fig. 55 — Vacuum Tube Repeater Bulb and Socket

TELEPHONE

371

switchboard to a device known as a <(spring- jack.® The insertion of one plug of a con¬ necting cord into the spring-jack associated with the line of the calling subscriber and the plug at the other end of the

same cord into the jack of the line of the called subscriber, placed these subscribers in , connection so that they could talk with each other. The cords were provided with listening and ringing keys. The former enabled the operator to communicate with the calling subscriber to ascertain the line with which connection was desired. The latter per¬ mitted the operator to send alternating current over the called line for the purpose of ringing the called subscriber's bell. An electromagnetic disconnect annunciator in each cord circuit enabled either subscriber, by operating his mag¬ neto-generator, to signal to the operator that the conversation had ended.

as the ˆtransfer® board. As the number of lines grew, it gave less satisfactory service and it was seen that, unless something better was developed, the switchboard would be a serious limitation on the growth of the business. The solution was found by multiplying the points of access to each subscriber's line so that a means of access (spring-jack) to each sub¬ scriber's line in the office appeared in the face of the switchboard within reach of every operator, thus obviating the necessity for trunking calls between operators in the same office. The switchboard in which this <(mul- tiple® principle was first used was known as the <(series multiple® board. The invention of the multiple was made by L. B. Firman. A simplified diagram of the wiring of this board is shown in Fig. 39, which also illustrates the construction of the spring-jack. In this ar-

Line 1

Switchboards of this general type were used until the number of lines terminating in a telephone central office had grown so large as to exceed the ability of one operator to com¬ plete all of the connections. This situation was met by placing two or more switchboards side by side, the operators completing the connec¬ tions by reaching across, with their flexible cords, from one board to another. As the number of sections of switchboard placed side by side increased still further, the distance to which an operator could reach was exceeded. The next step was to join the sections of switchboard by metal strips or wires. An operator could then connect a calling sub¬ scriber with a certain strip and request another operator, more conveniently situated, to connect the called subscriber to the same strip. These strips constituted the first use of the so-called ®trunk line® between switch¬ boards. The practice led to much confusion, due to the operators calling out the desired numbers, and resulted in the development of means enabling the operators to communicate along the switchboard by telephoning one another. This type of switchboard was known

rangement each subscriber's line was carried through the board with branching taps to the ring (outer contact) of the jack associated with the line at each operator's position. The other side of the line was carried through the board in series with the cut-off spring contact of each jack associated with the line. The ob¬ ject of the spring contact was to disconnect the line signal from the line while talking was going on.

As even* line appeared at several points, so as to be accessible to every operator, it be¬ came necessary to provide some means for in¬ dicating to the operator desiring to complete a connection, whether or not the called line was already in use. To accomplish this Charles E. Scribner, for many years chief engineer of the Western Electric Company — the manufactur¬ ing department of the Bell Telephone System — invented the click busy test. The circuits were so arranged by him that when one opera¬ tor had inserted a plug in the jack of any line, an electrical potential was placed on the rings of all of the jacks of that line which were multipled before the operators. Any operator desiring to complete a connection with a line

was required to touch the tip of the connecting plug against the ring of the jack with which connection was desired before completely in¬ serting the plug into the jack. If the desired line was already in use, the potential on the ring of its jack would cause the operator to hear a "click® in her head telephone, thus in¬ dicating that the line was already in use through a connection established at some other part of the switchboard. These two very im¬ portant principles — the multiple and the' busy test — have persisted, in one form or another, in every large switchboard up to the present time. A serious objection to the -series type of board was that dirt or dust, accidentally lodg¬ ing in the spring jack contacts, would introduce high resistance into the line, or even cause the circuit to become open, thus interfering with or quite preventing conversation over the line. Another objection to. the series board was that the circuit in the switchboard was unbalanced. To overcome these defects Scribner, applying Carty's bridging principle to switchboards, de¬ vised the "branch terminal® multiple board. (Fig. 40). With this arrangement of circuits, Line I

two wire system, the switchboard had to be adapted throughout to the new plan of working. This meant a wholesale displacement of exist¬ ing grounded line switchboards by boards of the newer metallic circuit

type.

For a long time after multiple switchboards came into use, batteries were required at each telephone station to furnish the current for actuating the transmitter, and magneto-genera¬ tors, operated by turning a crank, were em¬ ployed for signaling the central office when¬ ever a connection was desired. The generator was also used for signalling “disconnect,® and was not wholly satisfactory for this purpose, as subscribers frequently neglected to give the dis¬ connect signal,, making it necessary for opera¬ tors to “listen in® on. connections and ask “Are you through?® The invention and development of the common battery system did away with the batteries and magneto-generators at the telephone stations. With this system the only battery required was a large centralized or common storage battery at the central office. This system, furthermore, did away with all mechanical line and disconnect signals in the

bridged multiple taps were provided from each side of the line to springs in the jacks in the multiple before the operators, and the line sig¬ nals were wound to a high impedance. By doing this, and adding a locking winding to prevent false operation, the need for disconnect¬ ing the line signals from the circuit when the line was in use was avoided. A feature added at this time was the “self-restoring® drop (line signal) which provided for the automatic re¬ storing of the annunciator to its original posi¬ tion upon the insertion of a plug in the answer¬ ing jack of the calling line. Before this time, the annunciators had to be restored by the operators by hand.

The metallic circuit principle (described be¬ low) was introduced in switchboards at an early date, for as soon as any of the lines in a telephone office were changed to the metallic, or

switchboard by enabling tiny electric lamps governed by relays, to be substituted for them] this was one of the most impprtant improve¬ ments ever made in _ telephone switchboards. 1 he subscriber, connected with a common bat¬ tery. board, calls the central office by merely re- moving his receiver from the hook, the motion of the latter, causing a lamp associated with his line to light before the operator. Com¬ pletion of the conversation is indicated to the operator by suitable lamp signals in the cord circuit, when the receiver is replaced upon its hook. The circuits of common battery switch¬ boards are of two types, — the impedance coil type and the repeating coil type. Fig. 41 shows typical circuit diagram of the latter type, which is the more generally employed. Fig.’ 42-A shows the front view of a modern com¬ mon-battery switchboard. The operators sit on

chairs in front of the switchboard. Fig. 42-B shows the detail of a single position. Where the telephone message is the unit of service charge, each subscriber's line is provided, at the central

Fig. 41. — Simplified Circuit Diagram of Modern Common- Battery System. (Operator's telephone shown in position to be connected for " busy test").

Ri — Liˆie Relay. Operates on removing receiver at sub¬ scriber's station, S.

Li — Line Lamp. Lighted when Ri is operated.

R2 — Cut-off Relay. Operated by completion of sleeve circuit when plug, P, is inserted in jack, J. Operation opens circuit through Ri and puts out Li.

R3 — Supervisory Relay. Operated when receiver is off hook and plug is inserted in jack. Operation puts out L2 by shunting it by resistance, r.

L2 — Supervisory Lamp. Lighted when plug is inserted and Rs not operated.

B — Battery.

G — Ground.

T — Repeating Coil in operator's cord circuit.

office, with an accurate message registering device, by means of which each completed con¬ nection can be recorded.

Trunking Systems. — In large cities it is impracticable to concentrate all subscribers' lines at one central office on account of the dis¬ tances involved, which affect both the resistance of the lines and their cost, and also on account of the fact that more than one switchboard would generally be required. Where several central offices are required in one city, connec¬ tions from subscribers whose lines terminate at one office to subscribers whose lines terminate at another office must be completed with the aid of trunk lines connecting the offices. In the early days, an operator, initiating a trunked connection, by applying

the busy test, selected an idle trunk line over which she called the operator at the distant office by ring¬ ing as though the trunk were a subscriber's line. When, in response to a signal operated by the ringing current, the operator at the distant office answered, the first-mentioned operator transmitted to her the number of the line with which connection was desired and this line was then connected by her to the trunk line.

Trunking was greatly improved by the ad¬ vent of the reverse call-wire method. With this method the operator at the office where the call originates (known as the ((A® operator), by depressing a push button key, of which she has one for each central office in the district, establishes connection with a call circuit per¬ manently connected with the head telephone of

the operator at the distant office (known as the ((B)) operator). The number of the de¬ sired line is then transmitted over the call cir¬ cuit to the ((B® operator, who, by visual in¬ spection, selects an idle trunk line and trans¬ mits back its number to the ((A® operator, who at once connects the calling party with that trunk line, the <(B® operator meanwhile estab¬ lishing connection between the other end of the same trunk line and the line of the called party. The call circuits are used for no other purpose than communication between operators.

Trunk circuits have been designed, and are in general use, which allow the ((A® operator to supervise a connection completed in a distant office as readily as would be the case with a connection completed in her own office. The same is true of machine ringing circuits whereby the bell of the called subscriber at the distant office begins to ring automatically as soon as the trunk line plug is inserted in the jack of his line without the ((B® operator being required to operate a ringing key.

Toll Boards. — 'The term ((toll connection® is applied to connections between subscribers so far removed telephonically from each other that a special toll charge is made for the con¬ nection. On account of the fact that the toll lines between one place and another have to be grouped together for efficient operation and that each toll message has to be carefully timed and a ticket record made of the call, toll con¬ nections generally require special switchboard circuits and apparatus at the central office and the service of special operators. In the case of the smaller central offices the toll switchboard is sometimes combined with a portion of the local switchboard. In larger places, to enable adequate toll service to be given, separate large and complicated toll switchboards are ordinarily required. These toll switchboards are

usually centralized at one point in the city and are connected by special trunk lines with the local switchboards in the several central offices of the city. In cities of the largest size more than one toll switchboard centre may be required.

Party Lines. — Serving more than one tele¬ phone user by means of a single line (party line) enables those having but little use for the telephone to obtain service on a basis which otherwise would be impracticable. The suc¬ cessful operation of the party line depends upon the Carty bridging bell principle already de¬ scribed. The extensive use of party lines to serve farmer's or rural stations, by destroying the isolation of the farmer, has produced a wonderful improvement in his economic and social life by placing him in constant touch with markets and sources of supply, and with the weather bureau, and has provided for his family a means of communication available not only for social purposes, but also ready at all times for summoning help in the event of sick¬ ness or danger. On party lines equipped with two stations, and on some equipped with four stations, means have been devised whereby the bell at a given party line station may be rung, the others meanwhile remaining silent.

Private Branch Exchanges. — Important adjuncts to the telephone central office are the private branch exchanges. These consist of switchboards, generally of small size, located in such places as hotels, apartment buildings or large business houses and having connected to

them all the subscriber's lines in such estab¬ lishments. Private branch exchanges are also connected with the nearest telephone central office by a sufficient number of trunk lines to handle the traffic arising from and flowing to them. Calls originating within the establishment where the private branch exchange is located, for parties within the same establishment, are completed by the private branch exchange operator without passing through the telephone central office. The introduction of the common battery system greatly facilitated the operation of private branch exchanges and enabled the necessary talking current to be supplied over trunk lines from the central office. Fig. 43 shows a typical private branch exchange of moderate size. Some of the largest private branch exchange switchboards are comparable in size to central office switchboards serving large communities.

Automatic Systems. — Throughout the de¬ velopment of the manually

operated switch¬ board, the tendency was continually toward in¬ creasing the use of automatic labor-saving ma¬ chinery. In the most modern forms of manually operated boards a complete analysis of all the operations involved shows that a large proportion of them are performed auto¬ matically. The term ˆautomatic,® or (<machine switching,® is, however, applied to systems in which the number of operators required at the central office is reduced to a relatively small number, the switching functions otherwise per¬ formed by operators being, to a greater or less extent, performed by electro-mechanical ap¬ pliances. During recent years there has been extensive development of machine switching systems. The apparatus is highly complex and ingeniously devised.

In what is knowm as the full automatic sys¬ tem, the subscriber puts the automatic mechan¬ ism at the central office in motion and directs it so as to obtain the desired connection by suitably operating a movable numerical dial at¬ tached to the base of his substation set. Fig. 44 shows a typical set with the dial. The face of the dial is shown in Fig. 44-A.

Briefly the operation is as follows : Assume connection is desired with subscriber's line 753. The calling subscriber places his finger-tip in the hole of the dial, on his set, over figure 7 and turns the movable part of the dial in the direction of the hands of a clock, until his finger reaches the crescent-shaped stop. He then releases the dial which is automatically moved back, in the opposite direction, by a spring. This motion, by making and breaking a current on the line seven times, sets in opera¬ tion in the central office an electro-mechanical device known as a selector, whose function it is to select some idle trunk line in the 7 00 group. These trunk lines terminate in other selectors of a similar type. By repeating the dialling operation, this time for figure 5, con¬ nection is established with the fifties in the 700 group. By dialling once again, this time for figure 3, the line of the calling subscriber is placed in connection with line 753. The selectors are made in a great variety of forms. In one form the terminals of the trunks and sub¬ scribers lines are arranged in panels, one above another, with selector rods moving vertically in front of these panels. Tn another form the terminals are arranged in layers around an arc,

contact being established by a central arm capable of being raised to the proper level and then rotated.

In both forms suitable means are provided for automatically ringing the called subscriber's bell and for indicating to the calling party when the called line is already in use.

In the semi-automatic system the subscriber removes his telephone from the hook and trans¬ mits the desired number by telephone to the central office operator, as in the manual system. Thereafter, however, the operator makes use of automatic machinery at the central office to complete the connection, instead of performing the switching operations manually.

In modern telephone engineering the par¬ ticular factors, surrounding each case where new central office equipment is to be recom¬ mended, are carefully studied in order to de¬ cide whether a manual, semi-automatic or full automatic system is, in view of all the circum¬ stances, the best. The names of Keith, Lori- mer, McQuarrie and Strowger are prominent among those who have contributed to automatic switchboard development.

Telephone Lines. Early Lines Similar to Telegraph Lines. — The first telephone line was a copy of the best telegraph line of the day. It was a single iron wire using the ground for a return circuit. In addition to electrical dis¬ turbances, coming from no one knew where, picked up by these early grounded lines, and frequently causing noises in the telephone so loud as to destroy conversation, it was dis¬ covered that iron wire was not as good a con¬ ductor for the telephone current as it was for the telegraph current. The talking distance, therefore, was limited by the imperfect carry¬ ing power of the conductor. It was realized that, if the telephone system was to grow, something better than iron wire would be re¬ quired. Various metals and alloys were studied and it was found that copper best met fhe electrical requirements. But copper made into wire according to the then state of the art was too weak in mechanical strength. T. B. Doo¬ little conceived the idea that if a copper rod could be drawn cold through a series of dies, the resulting wire would acquire a degree of tensile strength much greater than that of the soft, annealed wire which was the only copper wire then known to the trade. He conducted a series of experiments which resulted in the production of oommercial hard drawn copper wire having substantially all of the favorable electrical characteristics of soft copper wire, coupled with a tensile strength nearly double that of the soft wire, and fully equal to the strength of ordinary iron wire of the same size.

An experimental line, the first long distance telephone line in the world, was constructed in 1884 between New York and Boston, carry¬ ing two hard drawn copper wires 0.104 inches in diameter. The satisfactory conversations conducted over this line demonstrated the com¬ mercial feasibility of the new type of wire. In the following year, 1885, another line, built between New York and Philadelphia,

was equipped with 24 hard drawn copper wires of various sizes. Careful experiments conducted on this line established the properties and qualities of the new product and the relative efficiencies of different sizes and variations,

Following this development, the use of hard drawn copper wire became the standard for long telephone lines, first in the Bell Telephone System, and later the world .over, greatly ex¬ tending the range of transmission. In 1892, New York was placed in telephonic communi¬ cation with Chicago. The wire employed for

this circuit, which first realized the commercial 1,000-mile talk, was of hard drawn copper No. 8 B. W. G. in size (0.165 inches in diameter). The pair of wires required to connect Chicago with New York weighed about 870,000 pounds — a full load for a 22 car freight train.

Before the local service wires in cities had

reached such numbers as to necessitate plac¬ ing them underground they had been strung on poles and roof tops. This was objectionable on account of the corrosion of the iron wires by chimney gases, wires breaking when loaded with sleet, the cost of roof-repairing, the un¬ sightliness of the construction and the lack of room for more wires. It was, how¬ ever, the only possible way known at that period. The overhead method was soon outgrown. Some streets in the larger cities had become black with wires. Poles had risen to 50 feet in height, then 60, 70 and 80. Finally, the highest of all pole lines was built along West street, New York City, using 90 foot poles of Norway pine, and carrying 30 crossarms and 300 wires. (Fig. 45). This condition of wire crowding was overcome by the development of cables, later described.

Telephone Grounded Circuit. Dif¬ ficulties. — When the ground was used for the return circuit, not only was the talking distance limited by the confus¬ ing effect of all sorts of disturbing cur¬ rents from the atmosphere and from neighboring telegraph wires, but also, when a second telephone wire was strung alongside of the first, even though perfectly insulated from it, con¬ versation carried on over one of these wires could be heard plainly on the other.

The Balanced Metallic Circuit. Open Wire Lines. — In 1883, it was

discovered that the bad effects of these disturbing currents could be greatly lessened by severing the earth connec¬ tion from the ends of each wire, and substituting a second wire for the re¬ turn circuit through the earth. The new arrangement was known as the <(metallic circuit.® For the reason that the ((metallic circuit® principle involved rebuilding practically the entire plant, telephone engineers sought less costly methods of reducing the electrical dis¬ turbances.

Between 1885 and 1892, large numbers of so-called anti-induction devices were proposed and investigated. None of them proved sufficiently successful to warrant adoption. Those that killed in¬ duction killed transmission as well. A system using a Common return wire for a number of telephone circuits was used to a considerable extent. It re¬ duced the disturbances due to ground potentials but was not effective against induced currents. The reconstruction of the telephone plant on the metallic cir¬ cuits basis was carried out largely be¬ tween 1890 and 1900.

To aid further in rendering metallic cir¬ cuits free from induction from power circuits and from crosstalk, the wires were transposed (i.e., interchanged in position on the cross- arm) at periodic intervals of space.

The first transposition scheme was worked out in 1886.

Fig. 45. — Highest Pole Line ever built, on West street, New York City. Poles were 90 feet long and some of them carried as many as 30 crossarms.

Fig. 46 shows a typical transposition dia¬ gram for the 10 wires carried on one crossarm of a line. On this diagram the vertical lines represent poles 1,300 feet apart, that is, about every 10th pole. The interchange in position of the wires is indicated by the crossing of the horizontal lines which represent the wires. At the points indicated by small circles, special types of transpositions are placed to admit of phantom circuit working (described below). To ensure quiet circuits, the apparatus used with metallic circuits has to be carefully balanced when arranged for talking. Wherever a ground connection is used, as in some forms of signalling, it has to be placed at a neutral point in the telephone circuit.

Balance in the line circuits is attained by uniformity in the wire used and by suitable arrangements in its installation and main-

simultaneously over the two wires of a circuit, they produce no sound in the telephones as¬ sociated with that circuit. Fig. 47 shows how

1

- II

» -

T -

J

\\l tl

lit - - if

E

Fig. 47. — Diagram showing use of Phantom Repeating Coils.

the phantom current is equally divided, by means of connections to the middle points of repeating coil windings, so that it traverses

E t

< 67:

z-

'0-

=~ *t*~:

-» — — 1 — • — i — ^ i — 4 — ^4— t-

4=

f-1 1 U

3jC .j . .

it

PfC 1 yz

ptdcpjc 3J = £

= F

DjCOˆDfC

z$$z Indicates a transposition to be cut in when the circuit is phantomed

The figure at each phantom trans¬ position indicates the type

Fig. 46. — Typical Transposition Diagram for Transposition Sections over 21,120 feet in length.

and 7-10.

Phantoms on pins 1-4

tenance. Any slight imperfection in the balance of the line conductors in phantomed circuits manifests itself by crosstalk be¬ tween the phantom and its constituent cir¬ cuits. While the metallic circuit, trans¬ posed according to the methods first de- jvised by the Bell engineers, eliminated the out¬ side disturbances that existed at the time, this was not the state of affairs for long. Power¬ ful electric light and power circuits began to spring up and methods which had formerly been successful in protecting the telephone from disturbing currents were not effective against these new high powers. Years and years of work have been devoted to safeguarding the telephone circuit from these disturbances, and each new success which the telephone engineer has accomplished in this direction has been fol¬ lowed by a further advance in high potential and high current on the part of the power cir¬ cuits. It has been said with truth that if these high power circuits had been discovered and in use before the telephone was invented, the re¬ sults obtained from the first telephone lines would have been so utterly impracticable that it is hard to think of any one being rash enough to regard the telephone as having any commercial value.

Phantom Circuits. — It is possible to make a third circuit out of two metallic circuits by connecting them together, with suitable appa¬ ratus, in a peculiar way. (Fig. 47). The third circuit is termed a ˆphantom® circuit. Con¬ versations can go on over a phantom circuit without disturbing, or being disturbed by, simul¬ taneous conversations over the two metallic cir¬ cuits from which the phantom circuit is formed. The operation of the phantom circuit depends upon the principle that if two currents of exactly the same

strength, and similar in all respects as to form, are transmitted

simultaneously both sides of the upper circuit in parallel, as described above, returning in a similar manner over both sides of the lower circuit. So far as the phantom is concerned, the two wires of the upper and lower circuits, respectively, work together each as one side of the phantom circuit. While the phantom cir¬ cuit was first proposed about 1884, it was not until important work had been done in de¬ veloping highly perfected and balanced repeat¬ ing coils, and in working out with great pre¬ cision the balancing of the circuits themselves, that the phantom principle came into success¬ ful commercial use.

Aerial and Underground Cables. Early Construction. — In 1881, the first experimental underground cables were laid alongside a rail¬ road track at Attleboro, Mass. The best insula¬ tion known at that time, rubber or guttapercha, was found to be unsuited for telephone use. Conversation conducted through cables using that kind of insulation was muffled, and the overhearing from one circuit to another was troublesome. In 1882 several cables were laid at Boston, Mass., the longest of which was about 1,500 feet. It was found that yˆhen these cables were used in connection with lines reaching to the suburbs, the voice became, so indistinct that, unless the difficulty were re¬ moved, the connection with points outside the city would have been almost, if not quite, use¬ less to those whose wires were underground. Type, after type of cable was installed only to be withdrawn in a few years and replaced by something better.

The use of rubber insulated cable was fol¬ lowed by the development of a cable in which the individual wires were covered with cotton insulation and drawn into a pipe which was then filled with oil. This oil-filled cable carried the telephone business through half

Fig. 42-A — Front View of a Modern Common-Battery “A” Switchboard

Fig. 42-B — Front View of Single Position of Modern Common-Battery “A” Switchboard

a dozen years but by no means was it the final type.

This was followed by the use of cotton cov¬ ered wires having the cotton impregnated with a moisture-proof compound, the insulated wires being drawn into lead pipes, each section about 20 feet long. ' When the cable was laid the sections were connected by means of plumbers' joints. The next development resulted in the use of cable wires insulated with dry cotton, it having been found that cotton baked dry, so as to expel all moisture, was a good insulator if placed in a lead pipe and promptly sealed. This was an important development as cotton had formerly been considered a bad insulator. Moulding hot lead in a continuous sheath around the cable core of twisted wires was found to be an advantage as it meant a tight covering with fewer sleeves and splices and ultimately did away with the use of oil or moisture-proof compounds. By 1887 the in¬ troduction of twisted pair construction for con¬ ductors in cable began. This type of construc¬ tion carried out the application of the trans¬ posed metallic circuit principle to cables. It obviated interference from overhearing (known in the art as <(crosstalk») between circuits in the same cable. This improvement meant the abandonment of the entire existing cable plant and the introduction of the new type, without which the telephone system, as it is known to¬ day, would have been an impossibility.

Insulated Dry-Core Paper Cable. — More development work, extending over several years, constantly aiming to reduce the specific in¬ ductive capacity of the insulating material, led to experiments with paper twine. This proved too flimsy and methods were devised for put¬ ting paper on the wire flat, crumpling it around the wire instead of winding it tightly. This resulted in the production of the best type of insulating material known for telephone cables, namely, dry paper hermetically sealed in a con¬ tinuous lead sheath. In 1890, ˆdry-core® cable, the first of the modern type, was laid in Phil¬ adelphia. The conductors, wound with loose paper, were really cushioned largely with air, the best insulator known. This was the best talking cable that had ever been made up to that time. The first dry-core paper cables con¬ tained 50 pairs of wires No. 18, B. & S. G. in size (0.0403 inches in diameter). By 1891, the use of wires No. 19, B. & S. G. in size (0.0359 inches in diameter) was settled upon. Subse¬ quent progress in cables employing this size of wire has been largely in the direction of in¬ creasing the number of pairs of wires that can he placed in a full-sized sheath. This has been accomplished chiefly through improvements in the insulating paper and in the methods of ap¬ plying the paper to the wires. The progress made is shown in the following table which gives, for cables of No. 19 gauge wires, about

iy2 inches in outside diameter, the date when a cable of the given number of pairs was made available for commercial use :

Number of pairs of

date No. 19 gauge wires

1 892 . 100 pairs of wires

1895 . 120 pairs of wires

1896 . 150 pairs of wires

1 898 . 200 pairs of wires

1903 . , . , . . 300 pairs of wires

Fine Wire Cable. — The extraordinary in¬ crease in the number of the telephone wires, and the difficulty in many places of obtaining additional space underground led to the de¬ velopment of the so-called (<fine wire® type of cable employing wires No. 22, B. & S. G. in size (0.0253 inches in diameter). The progress made in this development is shown in the fol¬ lowing table which gives, for cables of No. 22 gauge wires, about 2*4 inches in outside diame¬ ter, the date when a cable of the given number of pairs was made available for commercial

use.

Number of pairs of

date No. 22 gauge wires

1900 . 300 and 400 pairs of wires

1 903 . 600 pairs of wires

1912 . 900 pairs of wires

During 1914, there was developed a type of un¬ derground cable carrying 1,200 pairs (2,400 wires) No. 24 B. & S. G. in size (0.0201) inches in diameter). Fig. 48 shows a cross-section (reduced in size) of this cable. The improve¬ ment which it represents may be understood when it is known that to carry the same num¬ ber of open wires on poles would require 8 huge pole lines of the size shown in Fig. 45. The economies accomplished by these improve¬ ments are not limited to the cables themselves, but extend to the underground duct systems

whose capacity is multiplied enormously by the increase in the number of wires which each cable may carry.

It was early found that lead alone did not possess the requisite corrosion-resisting and strength properties for underground cable sheaths. Aerial cables, furthermore, are subject to peculiar conditions causing vibration in the cable, and a tendency to crystallization of the sheath if pure lead is employed. For a long period, cable sheaths having the proper qualities were made of lead alloyed with about 3 per cent of tin. Considerable increases in the cost of tin led to experimental investigations of a wide range of other alloys. This resulted in finding, in 1912, a cheaper and at least equally efficient alloy in which the lead was alloyed with a very small amount of antimony.

Early Interurban Cables. — In the earliest interurban cables every effort of the engineers was bent toward improving transmission effi¬ ciency by using wires of large size so arranged in cabling as to secure a soft core giving the lowest practicable mutual electrostatic capacity between the wires of a pair. Wires as large as 0.095 inches in diameter were used and cables of this character as long as 25 miles were placed. In European practice, the use of wires even larger than this continued for many years. In the United States, the development was in the direction of using smaller wires provided with means for improving their transmission efficiency so that it not only equaled, but con¬ siderably exceeded that obtainable with the larger and more expensive wires. By 1902, the art had so advanced, by the use of Pupin load¬ ing coils (described below) and other improve¬ ments, that a loaded cable for suburban toll service was successfully installed between New York and Newark. By 1905, a loaded cable 20 miles long had been extended from New York in the direction of Philadelphia, and by 1906, a cable 90 miles long was successfully operated

between those two cities, but in the then state of the art, that cable could not be used beyond Philadelphia or New York.

Boston- Washington Underground Cable. — During the year 1913 such advances were made in the art of loading and balancing under¬ ground circuits, and such improvements in the use of repeaters (described below) that it be¬ came possible to talk satisfactorily by

under¬ ground wires from Boston to Washington, a distance of about 450 miles, employing a cable (Fig. 49) so designed that the phantom prin-

Fig. 49. — Diagrammatic Cross-section of Boston-Washing- ton Underground Cable. (Outside diameter, 2 9-16 inches) .

ciple could be employed in it. At the pres¬ ent time, there are underground cables along this whole route, furnishing service of the highest reliability between many important cities, the number of cables varying from two to four, depending on the density of the telephone traffic. Loading is used on all the circuits in these cables, and repeaters are applied to a large proportion of the circuits over 60 miles in length. The Boston-Washington telephone cable is several times longer than any other in the world. These developments tended to increase greatly the long-distance traffic and to ac¬ complish enormous savings in the amounts of copper which otherwise would have been re¬ quired to establish communication between re¬ mote points.

Telephone Transmission Theory. — In teleph¬ ony, as already described, mechanical vibra¬ tions of the transmitter diaphragm set up elec¬ trical oscillations. These are transmitted over the circuit and set up corresponding mechanical vibrations of the receiver diaphragm. The fol¬ lowing section deals with the electrical charac¬ teristics of the telephone circuit and the trans¬ mission of telephone currents over it.

To develop the principles of telephone trans¬ mission, it is necessary to know the character of the speech waves. For ordinary practical working, satisfactory results are obtained on the basis that speech waves, largely the over¬ tones of the voice, consist of a varying mixture of single frequency tones ranging from about 400 cycles per second (in musical sound, equiva¬

lent to G above middle C) to about 2,000 cycles per second (approximately the octave above high C), and that each frequency persists in a constant state for a sufficient length of time to follow the same electrical laws as though it persisted for a long time. This basis is by no means exact, since frequencies outside the above range are of some importance in speech, and speech is so irregular and discontinuous in char¬ acter that the transient oscillations, which are produced by the rapidly changing speech waves, are in many cases of considerable importance.

A telephone line possesses four <(hnear con¬ stants® on which depend the character of trans¬ mission over it. These, with the symbols em¬ ployed to represent them in the formulae which follow, are :

Resistance in series with the line. Symbol R.

Inductance in series with the line : Symbol L.

Capacitance shunted across the line : Sym¬ bol C.

Conductance shunted across the line : Sym¬ bol G.

The differential equation determining the trans¬ mission of current over the line with these con¬ stants is as follows, (<i® standing for the cur¬ rent, <(x® for the distance measured along the line and *1® for the time :

d2i

dx2

d2

dt2

•

RC + LG

dt

• RG i

For a current of a given frequency f=--

cycles per second, there may be deduced, from the above equation, the following ex¬ pression for the current at any point in a Jong line, when the current at the sending end is Iosin pt.

— ax

i = Ioe fsin(pt — /?x)

-jf&Z

In this expression are used two constants, a and /?, known

respectively as the ((attenua- tion constant,® and the <(wave length constant.® The expressions for these constants are as follows :

a~ \/i V (L2P2 + R2)(C2p2-f G2) + i(RG — p2LC)

‘3 = =]h\/ (L2p2 + R2) (C2p2 + G2) — i (RG — p2LC)

The first of these constants determines the rate at which the current diminishes in ampli¬ tude as it passes along the line. The second determines the velocity at which electrical phase is propagated along the line. Another important constant of a line is its so-called ((character- istic impedance,® which is the ratio of the volt¬ age applied to a line to the current entering the line. In terms of the above noted constants, the expression for it is :

Z = J* ± ikP

\G + jCp

Where a line is not electrically long, and is terminated with an impedance differing from the characteristic impedance of the line, then the formula as given for the current at any point

plan of core.

DIAGRAM OF WINOIN6

along the line must be modified to take account of the (<reflection effects® which take place due to this difference in impedance. Such reflection effects may be reduced, in practical cases, by placing a transformer of proper ratio between two lines, of between a line and terminal ap¬ paratus of different impedance. An analysis of the above formulae will show that not only is the energy in the speech waves attenuated as they pass over the line, but that differ¬ ent frequencies of speech are attenu¬ ated at different rates, the higher fre¬ quencies generally undergoing the higher attenuations. Therefore, not only is the volume of energy received less than that transmitted, but the char¬ acter, or Equality,® of the speech wave is distorted. In addition to this distor¬ tion of speech waves, there is further distortion, due to transient effects al¬ ready referred to.

Loaded Lines. — <(Loading® is a prac¬ tical method for increasing

the effici¬ ency of long telephone circuits by in¬ creasing the inductance of the circuit.

The mathematical possibility of doing this had long been realized but no one Fig 51_A

was able to point out any practical - method of increasing the distributed induct¬ ance of a telephone circuit without bring¬ ing difficulties of one kind or another which were fatal. Vaschy, Heaviside and others either suggested or unsuccessfully tested the insertion of self-induction in coils on ac¬ tual lines as a means of increasing their transmission efficiency. No practical results followed from their work and no actual progress was made in the matter of using lumped inductance to improve the transmission efficiency of telephone circuits until the year 1900, when the patents of Prof. Michael I.

Pupin, dealing with the reducing of attenuation of electrical waves, were issued. Professor Pupin and Dr. George A. Campbell of the Bell Telephone Research Staff, who had also worked on this problem, have published several papers dealing with it. These authors discuss fully the mathematical theory of loading and establish the fact that inductance in coils suitably spaced along a telephone circuit will produce the same effects as uniformly distributed inductance.

They also show how to locate these inductance coils suitably. The matter of properly spacing the inductance coils is of vital importance and must be kept in mind because the spacing of the coils is the key to the use of lumped inductance and it was from the failure to establish this fact and give due weight to it that the earlier work¬ ers failed.

Fig. 50 shows, in a diagrammatic form, the

numbers of such coils are contained in a single case as shown in Fig. 52. Fig. 53 shows a typical form of loading coil of the kind applied to open wire lines.

The function of these coils is to reduce at¬ tenuation losses in the line. They bring in no supply of new energy, but make the line a better conductor for telephone currents. On open wire lines they are placed at intervals of about eight miles. On cable circuits they are placed

Winding Gore

Cross Section of Core on d Winding on A • B

Diagrams of Cable Loading Coil.

Fig. 50. — Diagram of Loading Coil Windings and method of connecting into line.

manner in which the lumped inductance coils (((loading® coils) are connected into the tele¬ phone circuit. Figs. 51-A and 51-B show a coil of the type applied to cable circuits. Large

at intervals of from one to two miles depending upon the size of the cable conductor to be loaded and the character of the loading. The use of these coils approximately doubles the range of transmission practicable with open wires of a given size and increases the range of cable transmission three to four-fold. In other words, by means of loading, it became possible to talk over cable circuits three to four times as far as formerly, with equally good transmission results.

The fundamental principles of loading, as disclosed in the patents of Pupin, were in mathematical form. The development work re¬ quired to embody the theory of loading in prac¬ tical loading coils has been a task constituting the work of years of a large group of highly trained scientific men on the technical staff of the Bell system. The application of loading has comparatively recently been extended to phantom circuits so that it is now. possible to load not only the physical or side circuits com¬ posing a phantom circuit, but also the phantom circuit itself. Phantom loading is applicable to suitably constructed cables (called duplex or Squadded® cables) as well as to open wire lines.

Telephone Repeaters. — A highly important method of improving the transmission efficiency of telephone circuits is the insertion into them of devices known as “telephone repeaters,® which increase the amplitudes, or strength, of the telephone currents that pass through them, without changing the effective form of the waves. The energy added by the repeaters is drawn from a battery associated with the re¬ peater itself.

The telephone repeater may be considered as consisting of two parts: (a) the repeater ((ele- ment,® that is, the amplifying device itself ; and (b) the circuits and associated apparatus for connecting the repeater element, or elements, into the line.

The first form of repeater element to come into commercial use was the so-called “median-

ical» type consisting, in principle, of a telephone receiver acting directly into a telephone trans¬ mitter. A simplified diagram of this repeater is shown in Fig. 54. Currents received from the line flow through the winding of a receiver magnet acting upon a diaphragm carrying one electrode of a transmitter 'button, thus causing to be put out currents of approximately the

Magnetising Circuit

stituting an electric current. The grid, so termed from its grid-like structure, is main¬ tained generally at a potential negative to the filament by battery C. The incoming voltage sets up variations in potential difference between the grid and filament, and the electrical field thus produced causes corresponding changes in the current between the filament and plate, thus

Fig. 54.— Simplified Diagram of Mechanical Type Repeater Element.

same form as the incoming waves, but of greater amplitude.

The preferred form of telephone repeater element is now the ((vaeuum tube" type. This was developed by the Bell engineers from a device known as the (<audion," invented by DeForest for other uses. The structure of this type of element is shown in Figs. 55 and 56. It

Fig. 56. Diagram of Vacuum Tube Repeater. (The grid and plate at the left hand side of the filament are omitted for the sake of clearness).

consists of a highly evacuated glass bulb in which are placed three parts, known as filament, grid and plate. Referring to Fig. 56, the fila¬ ment is composed of materials which, when heated by current from battery A, give off electrons actively. Under the action of battery B, these electrons pass from the filament to the flat electrode, known as the opiate," thus con-

setting up amplified waves of the same form in the transmitting circuit.

The circuits for connecting the repeater ele¬ ments into the line to give transmission in both directions are of various types, the two com¬ monest forms being shown in Figs. 57 and 58. The first includes a single repeater element which amplifies the energy for transmission in either direction. The second includes a separate repeater element for transmission in each of the two directions. An important feature in these circuits is the balanced condition which is essential.

The circuit diagrams show certain auxiliary apparatus such as the ((balancing network," a combination of coils and condensers to simulate the actual line for balancing purposes ; the ˆpotentiometer," a device for adjusting poten¬ tials ; and the ((filter," which serves to blot out certain undesirable current elements.

Referring to Fig. 57, it will be noted that, if the lines in both directions are similar, and have, therefore, similar impedance, the ampli¬ fied currents, leaving the repeater element, will cause no current to be set up in the receiving circuit of the repeater element. If, however, the circuits are sufficiently dissimilar, the bal¬ ance is imperfect, and current put out by the repeater element will cause currents in the re¬ ceiving circuit of the element which will again be amplified, thus setting up a circulating path m which current will flow. If the unbalance is sufficiently great, a steady state of oscillation may be set up that will prevent the use of the circuit. On the other hand, if the unbalance is not so great as to produce steady oscillations there may still be considerable distortion caused by it.

In the case of the second circuit (Fig. 58), similar conditions hold, except that in this case

each line is balanced against an artificial line as indicated. If the unbalances at these points are not kept small, sustained oscillations may be set up as in the case of the other circuit, but in this case the circulating currents must flow through the two unbalances in series. If either balance is very good, the other unbalance may be large without unfavorable results.

The balances noted above must be obtained for all of the frequencies important in telephone

advances recently made, it is now possible to carry on satisfactory talks over wires in cables more than 1,000 miles in length, where com¬ mercial conditions will justify them, employing practically no more copper in each circuit than was used 35 years ago in cables which caused serious interference with transmission when em¬ ployed in lengths of only a fraction of a mile.

Interference from Other Electrical Sys¬ tems. — Telephone lines, except those in under¬

line

East

transmission. The impedance of a circuit, measured at any point, is affected by every part of the circuit, the amount of the effect caused by any part being dependent on the amount of attenuation between the part being considered and the point at which the impedance is being measured. It is, therefore, evident that these balance conditions are affected by every part of a circuit on which the repeaters are used, so that every part of a circuit containing repeat¬ ers must be carefully designed with respect to this characteristic. For high grade repeater elements, the improvement obtainable under any particular circumstances is dependent, almost wholly, on line conditions.

Transcontinental Circuits. — The best known circuits on which repeaters are used are those which place the cities along the Atlantic seaboard in telephonic communication with the cities along the Pacific Coast. Without loading and repeaters it would be impossible to talk 1,000 miles with the same grade of transmission that is actually obtained over these circuits 3,000 miles in length.

Further Advances. — By the joint operation of loading and repeaters, coupled with other

ground cable, are generally subject to disturb¬ ances from lightning, and to the possibility of accidental contact with ordinary electric light and power distribution wires. When these con¬ ditions exist, protectors are successfully used on the telephone lines to minimize the hazard to persons and property. It is not practicable to use protectors which will handle, the large amounts of energy that would be imposed on telephone lines by high voltage transmission circuits coming in contact with them. Protec¬ tion from such circuits is obtained by keeping them separated from the telephone circuits wherever practicable and, where adequate sepa¬ ration is not practicable, by building the lines of high strength so as to prevent contact.

Multiplex Telephony. — The only type of multiplex telephone apparatus that has been developed into form suitable for commercial use is known as the carrier current multiplex system with which it has been found com¬ mercially practicable to transmit five telephone conversations simultaneously over the same pair of wires. This requires sending over the line five different currents at the same time and provid¬ ing means, at the end of the line, whereby these currents may be completely separated from each

other so that each current, coming from one particular telephone at one end, may go to a particular telephone at the other end, although on the line the five currents have all been mixed together. This is done by combining each or¬ dinary telephone current with a current of definite higher frequency, termed a ((carrier current.® The frequency of each of the carrier currents is different from that of the other

connections being completed within that switch¬ board. Large cities have a number of switch¬ boards, connected together by trunk lines, all of the more important central offices having trunk lines connecting each switchboard with every other important switchboard in the city. To reach the smaller central offices, in outlying sec¬ tions of a large city, from central offices, par¬ ticularly those in a distant portion of the city,

carrier currents used on the same pair of wires and is adjusted to the separating devices at the distant end of the line. The arrangement is applicable on lines of such length that the in¬ stallation of the necessary apparatus gives a saving in cost compared with erecting new circuits.

Telephone Systems.— The Bell System con¬ sists of nearly 11,000,000 telephone stations scat¬ tered all over the United States. Each station is enabled to connect with the nearest central office, of which there are upwards of 5,700, by a pair of wires called the subscriber's line, or <(exchange circuit.® Due to party lines and private branch exchanges, about 3,700,000 ex¬ change circuits serve to connect all the stations with the central offices. In places of moderate size there is usually one switchboard, to which all of the subscribers' lines are brought, local

it is sometimes necessary to make use of two or more trunk lines, connected together by in¬ termediate operators for the purpose of corn¬ er such a call. In the business portions of the largest cities where the telephonic density is at the highest, more than one switchboard is sometimes placed in a central office building.

In New York City, the largest exchange sys¬ tem in the world, there are upwards of 800 000 telephone stations, connected by more than 400,000 lines with 87 central offices which are inter-connected by more than 50,000 trunk lines handling local calls only.

Connections between exchanges in different cities are completed over toll and long distance lines. More than 3,000,000 miles of wire are in use for this purpose. Special trunk lines are usually employed for connecting central offices with toll and long distance switchboards.

Statistics — Number of Telephone Stations in United States.

YEAR

(1 Jan.)

Bell system

Independent

Total

Bell and independent

Population

Stations per 100 popula¬ tion

Owned

stations

Connected

stations

Total

1880 .

1885 . .

1890 . : .

1895 .

1900 .

1905 .

1910 .

1915 .

1919 .

•

30,872 147,715 211,503 270,381 666 , 733 1,838,034 3,522,079 5,584,853 7,201,757

10,000

167,213

1,620,613

3,064,140

3,790,568

30,872

147,715

211,503

270,381

676,733

2,005,247

5,142,692

8,648,993

10,992,325

15,000

328,000

1,348,000

1,853,000

1.397,425

1,085,312

30,872

147,715

211,503

285,381

1,004,733

3,353,247

6,995,692

10,046,418

12,077,637

49,673,000 56,069,000 62 , 464 , 000 68 , 988 , 000 75,511,000 83,411,000 91,500,000 99,590,000 106,062,000

0 06 0.26 0. 34 0.41 1.33 4.02 7.65 10.09 11.39

/About 3,400 trunk lines are used for this pur¬ pose in New York City alone.

There are, in the Bell System, about 200,000 employees. _ It is impossible to describe, in an article of limited length, many matters of im¬ portance in the operation of telephone systems, such as traffic and commercial features.

Telephone Wire Mileage of the World

(1 Jan. 1914)*

, Per cent

country Miles of wire of total

United States . 22,137,000 59 3

Canada . 1,149,000 3 1

Europe . 11,800,000 31.6

All other countries . 2,251,000 6.0

Total . 37,337,000 100.0

Number of Telephone Stations in the World

(1 Jan. 1914)*

Number of

Per cent of total

Stations per 100 popula-

Popula¬ tion per square

COUNTRY

stations

world

tion

mile

United States. . . .

9,542,000

64.09

9.7

33

Canada .

499 , 800

3.36

6.5

2

Central America .

7,900

.05

1. 1

27

Mexico .

41,900

.28

0.3

20

Other North American places

2,300

.02

0.7

0.4

Cuba .

16,100

.11

0.7

49

Porto Rico .

4,400

.03

0.4

342

Other West Indies places .

6,600

.04

1. 1

114

South America. . .

166,300

1.12

0.3

8

Europe .

4,012,700

26.95

0.8

121

Asia .

306, 100

2.05

0.04

53

Africa .

65,100

.44

0.05

12

Oceania .

217,400

1.46

0.4

13

Total .

14,888,600

100.0

0.9

33

- No complete European statistics of a later date than 1914 are available.

Bibliography.— Abbott, A. V., (Telephony : Manual of the Design, Construction and Op¬ eration of Telephone Exchanges *(New York 1903-05) ; Atkins, W., (The Principles of Auto¬ matic Telephony) (in The Electrician, Lon¬ don 1914) ; Carty, J. J., (Telephone Service in America* (International Conference of Euro¬ pean Telephone and Telegraph Administrations, Paris 1910) ; Casson, H. N., (The History of the Telephone) (Chicago 1910) ; Cum¬ mings, G. W., (Cyclopedia of Telephony and Telegraphy) (Chicago 1911) ; Fairman, J. F.,

(Standard Telephone Wiring for Common Bat¬ tery and Magneto Systems * (New York 1905) ; Fleming, J. A., (The Propagation of Electric Current in Telephone and Telegraph Conduct¬ orsˆ (London 1912) ; Hershey, H. E., (Auto¬ matic Telephone Practice) (Saint Paul 1917) ; Holcombe, A. N., (Public Ownership of Tele¬ phones on the Continent of Europe1 *(Cam¬ bridge, Mass., 1911) ; Jansky, C. M., and Faber, D. G, Principles of the Telephone* (New York 1916) ; Kingsbury, J. E., (The Telephone and Telephone Exchanges, Their Invention and Development *(London 1915) ; McMeen, S. G., and Miller, K. B., (Telephony* (Chicago 1917) ; Miller, K. B., American Telephone Practice *(4th ed., New York 1905) ; Pernat, F. E., (Electrical Phenomena in Parallel Con¬ ductors* (New York 1918) ; Shepardson, G. D., telephone Apparatus, an Introduction to the Development and Theory *(New York 1917) ; Smith, A. B., and Campbell, W. L., (Automatic Telephony* (New York 1914) ; Weaver, W. D.,

(Catalogue of the Wheeler gift of books, pam¬ phlets and periodicals in the Library of the American Institute of Electrical Engi¬ neers, with introduction, descriptive and critical notes by Brother Potamian *(New York 1909) ; Webb, H. L., (The Development of the Telephone in Europe* (London 1911). Peri¬ odical and Society Publications : Bell, A. G., ˆResearches in Telephony *(Am. A. of A. and S. p. 1, 1876) ; id., Researches in Electric Telephony* (Soc. Tele. Eng. Jour., p. 385, 1877) • Campbell, G. A., (On Loaded Lines in lelephomc Transmissions* {Phil. Mag., series X1' Vo!- V, p. 313, March 1903); Carty, J. J.,

Inductive Disturbances in Telephone Circuits*

■ (p. 100, 1891) ; id., (Telephone Engineering*

(p. 81, 1906) ; Friendly and Burns, (Automatic Methods in Long Distance Telephone Operation (p. 1305, June 1913) ; Gherardi, Bancroft, (The Commercial Loading of Telephone Circuits in the Bell System (p. 1743, 1911) ; Kennedy and Nukiyama, Electromagnetic Theory of the Telephone Receiver with special reference to motional impedance (p. 491, 1919); Lock- wood, T. D., (The Evolution of the Telephone Switchboard (p. 3, 1903) ; Osborne, H. S„ (The Design of Transpositions for Parallel Power and Telephone Circuits (p. 897, June 1918) ; id., (Review of Work of Sub-Committee on Wave Shape Standard, of the Standards Committee (p. 1, January 1919) ; Pupin, M. I., Propagation of Long Electrical Waves (p. 93, March 1899),; id., (Wave Propagation over Non-uniform Cables and Long Distance Air Lines (p. 385, May 1900) ; Rhodes, F. L., (The Wiring of Large Buildings for Telephone Serv¬ ice (p. 1367, 1912) ; Warren, H. S., 'Inductive Effects of Alternating Current Railroads on Communication Circuits (p. 503, April 1918); Watson, T. A., 'How Bell Invented the Tele¬ phone (p. 1011, August 1915).

Bancroft Gherardi,

Chief Engineer, American Telephone and Tele¬ graph Company.

Frederick L. Rhodes,

Outside Plant Development Engineer, Ameri¬ can Telephone and Telegraph Company.

TELEPHONE SYSTEMS, Cost of In¬ stalling and Maintaining. See Telephone Systems, Independent.

TELEPHONE SYSTEMS, Independent.

Under this designation are placed all those tele¬ phones not owned by Bell system companies, such as certain telephones used for military purposes, some of the telephones in those cities where there are two or more exchanges existing and operating side by side, such interior tele¬ phones as are used solely for inter-communica¬ tion in buildings, hotels, factories, etc., and some of the farm or rural telephones.

The original Bell patents expired in 1893 and for 17 years prior thereto the patents granted to the first inventor of the telephone were up¬ held in the United States and all telephones in commercial use were supplied under license by the predecessors of the American Telephone and Telegraph Company. Upon the expiration of the original Bell patents, numerous manufac¬ turers began to supply

telephone instruments and considerable numbers of these came into use especially in the rural districts.

♦Transactions of American Institute of Electrical Engi¬ neers.

For many years the independent develop¬ ment of the telephone business has been in progress largely in the rural districts where local co-operative and rural independent com¬ panies are established. A large proportion of these now have -connection contracts with the Bell system. These lines are found in every part of the country, uniting homes, factories and camps. by means of party lines, which allow con¬ versation between the different stations of the line as well as from any station to a central exchange.

Up to the present time the independent tele¬ phone movement has placed more than 800,000 American farmers, timbermen and miners in touch with their markets, their own communi¬ ties and towns and cities near them. The move¬ ment has been especially active in the Middle and Western States. These telephones are used not only for general purposes of communi¬ cation, and in numerous ways for securing in¬ formation regarding market quotations, but also in gaining information of financial value and advantage. The independent telephone business, however, is not limited to the coun¬ try or isolated districts but has established it¬ self in a number of cases in towns and cities.

In . many cases, where two systems have come into existence, side by side, arrangements have, been made to consolidate the systems by one interest disposing of its plant to the other. Such consolidations have very generally met with the approval of regulatory bodies and in this way many telephone users have had their range of communication greatly extended.

The growth of the independent systems in¬ creased over 250 per cent in the decade begin¬ ning about 1902 and ending in 1912. In the year first named there were reported in opera¬ tion 9,092 independent systems and lines with 1,512,527 miles of wire. The number of tele¬ phones operated on these systems was 1,053,866 and the number of messages or conversations per annum was estimated at 1,996,024,493. In the year 1912 the independent systems had in¬ creased to 32,157 with 5,115,140 miles of wire and operating

3,642,565 telephone instruments. The estimated number of messages or conver¬ sations over these independent systems in the latter year was 4,602,431,409. Of the total num¬ ber of stations in the Bell system, in 1918 (10,992,325), 3,790,568 were owned by local co¬ operative and rural independent companies or associations having sublicense or connection contracts with the Bell system. There are in the United States 9,338 independent companies whose telephone systems connect with the Bell system, and about 1,600 independent companies whose telephone systems do not connect with the Bell system. There are also a large number of rural lines and systems which connect with the telephone systems of these companies, over 26,000 of which are connected with the Bell system. There are about 1,000,000 stations owned by independent companies not connected with the Bell system.

The exigencies of war service emphasized the great adaptability of the telephone to many situations and there was an increased call for telephone systems for reporting enemy opera¬ tions, directing the movements of troops, muni¬ tions and supplies, controlling artillery fire and in numerous other ways increasing the effective¬ ness of the armed forces.

The scientific investigation of electromag¬ netic waves has resulted in a clear understand¬ ing of the generation, propagation and detec¬ tion of these waves and in the development of wireless telephony. The requirements of suc¬ cessful radio-telephony began with a generator of undamped waves of very high frequency, so that the wave trains when received were above the range of audibility. Wireless telephony owes much to the work of the engineers of the American Telephone and Telegraph Company, who, in the latter part of 1915, succeeded in telephoning by wireless from Washington, D. C., to Paris, and from Washington to Hawaii, the latter a distance of 4,900 miles. The great ex¬ pense, of installations for long-distance work may limit competitive systems, but it is safe to look for the widespread employment of inde¬ pendent short-distance wireless telephone sets.

Armies in the field employ portable wire¬ less sets for insuring communication between scattered commands. Some sets for use in rug¬ ged country are arranged to be carried on mule- back and are known as pack sets ; but the most common wireless sets are those mounted on two wagons, one for the generating equipment and the other for the wireless apparatus proper. The European War gave especial impetus to wireless telephony, especially as applied to air craft. In designing radio apparatus for airships and aeroplanes due consideration must be given to the extremely limited space available

on such craft and the limited weight that can be carried. On board airships of the Zeppelin or the flexible types it is possible to employ more powerful apparatus, hence a greater range can be covered.

A typical airship installation consists of a transformer, quenched spark gap, capacity and inductance, aerial wire lowered down from a winch, ammeter, rapid-change switch for differ¬ ent wave-lengths and an alternating current generator driven off one of the engines of the airship. Such a set weighs about 55 pounds without the alternator and has a range between 60 and 120 miles. The aerial wire is over 600 feet long when fully paid out.

TELEPHONE TRANSMITTERS. See

Telephone.

TELEPHONES, Electrical. See Tele¬ phone.

TELEPHONES, Farm. See Telephone

Systems, Independent.

TELEPHONY, Wireless. Prior to the transmission of speech without wires by means of ether waves developed electrically several more or less successful wireless methods of transmitting speech were utilized experimentally; For instance, a device termed the photophone

Fig. 1. — Bell's Photophone

was employed by Bell, the inventor of the tele¬ phone, in which light rays were utilized. In this device, Fig. 1, a beam of light is concen¬ trated by means of a lens / upon a small con¬ cave mirror carried on the exact centre of a diaphragm attached to a mouthpiece P. The

rays reflected from the mirror are directed upon a receiving apparatus by a double convex mirror Z1 suitably positioned. In the receiving appara¬ tus a small selenium cell is placed in the focus of a parabolic reflector l2. This cell is made part of an electric circuit consisting of a tele¬ phone receiver t and an ordinary dry cell b. Selenium possesses the property of varying its electrical resistance with the variations of light to which it is exposed. Hence when speech is uttered at the mouthpiece the diaphragm vi¬ brates in consonance with the sound

waves of the voice. These vibrations cause variations in the light rays reflected from the small mirror, which variations are reproduced at the selenium cell. This in turn causes variations in the re¬ sistance and current of the telephone circuit and the speech spoken at the mouthpiece is repro¬ duced in the telephone receiver.

The rate of air vibrations or oscillations due to speech ranges from about 20 to 20,000 per second. As the length of an electric wave or oscillation is equal to the speed of electricity, 186,000 miles per second, divided by the number of oscillations per second, it is evident that the length of electrical oscillations of 20 to 20,000 per second is comparatively great. Hence to attempt to transmit without wires electrical os¬ cillations set up primarily by the voice by means of a telephone transmitter, aerial wires about 15 miles in length would be necessary, which is not feasible.

For reasons that will become obvious it may not be amiss to refer here to the Van Ryssel- berghe system of Simultaneous Telegraphy and Telephony which for years has been in serv¬ ice on a large scale in this country. This sys¬ tem is briefly described in the article on Teleg¬ raphy. Any action of the telegraph sig¬ nals upon the telephone receiver is prevented by placing induction coils in the circuit which makes the rise and fall of the telegraph currents so gradual that the diaphragm of the telephone re¬ ceiver is merely deflected and does not produce an appreciable sound. Upon this gradual rise and fall of the telegraph current is superposed the rapid vibrations of the speech waves set up by the telephone transmitter on the same wire. These minute vibrations do not affect the tele¬ graph instruments. Quoting from Maver, W., (American Telegraphy,* p. 347, (<the the¬ ory of the operation of simultaneous telegraphy and telephony may be briefly outlined as fol¬ lows : Assuming, for example only, the

strength of the telegraph current to be 2,000 and that of the telephone current to be 1. If, while the diaphragm of the telephone receiver is attracted or in process of gradual attraction by a telegraph current of positive direction, a tele¬ phone current of similar direction be trans¬ mitted the total current will be suddenly in¬ creased to 2,001 and the diaphragm will be given a sudden minute impulse toward its mag¬ net. Should then a negative telephone current follow, the telegraph current remaining as be¬ fore, the current on the line will be suddenly reduced to 1,999 and the diaphragm by its own tension recedes rapidly from its magnet. In the actual operation of these systems many hun¬ dreds of pulsatory currents might be sent dur¬ ing the time taken to transmit one telegraphic signal, and thus, while the diaphragm is being gradually attracted to or is gradually receding vol.

from its magnet owing to variations in the tele¬ graph current, at the same time it may be mak¬ ing hundreds of intermediate forward and backward movements of less amplitude, due to the variations of the line currents caused by the telephone transmitter in transmitting speech waves.** In present day language the foregoing would be termed a modulation of the telegraph current in accordance with the variations of current due to voice waves.

It was recognized by the early workers in wireless telegraphy and telephony that if it should be found practicable to modify or modu¬ late the high frequency ether waves utilized in wireless telegraph operation, it would be pos¬ sible to transmit speech without wires to a dis¬ tance approximating that of wireless telegraphy. A difficulty, however, in availing of high fre¬ quency electromagnetic waves for this purpose has been that as ordinarily obtained from the discharges of a condenser at the spark gap in wireless telegraphy such waves are intermit¬ tent and their amplitude is not uniform, but is quickly damped, as noted in the article Wire¬ less Telegraphy. Thus, in case of an alter¬ nating current generator developing a current of, say, 60 cycles, or 120 alterations per sec¬ ond, there will be 120 sparks per second at the gap if at each alternation the oscillation circuit is charged to sparking potential, which is not always the case. Assume that each dis¬ charge of the oscillation circuits gives rise to oscillations of a frequency of one million per second in that circuit, with a consequent wave length of 300 meters. The exact number of os¬ cillations and wave length depends on the in- ductance and capacity of the oscillation circuit. (To conform to the word inductance the capac¬ ity of a circuit is now frequently termed capac¬ itance). As the capacitance of the aerial is usually supplied by the aerial wires and is not readily variable, the frequency rate is varied by placing an adjustable inductance in the aerial circuit in the shape of a spiral coil of wire more or less of which may be inserted in or removed from the circuit. The capacity of the aerial is sometimes reduced, for short wave signaling, by placing a condenser (capacity) in the aerial circuit. In electrical diagrams a variable or adjust¬ able condenser or inductance is conventionally indicated by an arrow through the apparatus. In the case in point if the oscillations were maintained throughout the interval between dis¬ charges there would be 8,334 oscillations per spark, that is, the quotient of 1,000,000 divided by 120. Since, however, the oscillations in such a circuit die out very rapidly, due to the damp¬ ing effects mentioned in the article Wireless Telegraphy, there are only two or three strong oscillations for each discharge in highly damped circuits and 10, 20 or 30 strong

oscillations in less strongly damped circuits. Hence oscilla¬ tions are only maintained during a brief inter¬ val between spark discharges, leaving approxi¬ mately the one hundred and twentieth of a second between such discharges during which there are no oscillations in the oscillation circuit and at that time no waves are radiated from the aerial. In wireless telegraphy these inter¬ mittent or group oscillations after reception by a detector are observable in the telephone head receiver as a continuous .tone or buzz which is broken into dots and dashes of the Morse alpha-

bet by a telegraph key. If the attempt were made to superpose vibrations corresponding to voice waves upon these intermittent or broken oscillations, it is evident that portions of the voice waves set up by the transmitter would be lost.

Kennelly has mathematically demonstrated that speech might be transmitted telephonically v/ith harmonics, or overtones, not exceeding 2,000 per second, but Fessenden has found by experiment that for satisfactory speech a fre¬ quency of at least 20,000 per second must be employed, otherwise disagreeable noises will be heard in the telephone receiver. Therefore, continuous or sustained oscillations of a fairly high frequency and uniform amplitude are es¬ sential upon which to superpose the voice fre¬ quencies for successful wireless telephony. To this end fairly successful efforts have been made by different inventors to produce a machine generator, or alternator, capable of delivering an alternating current of very high frequency notably by Fessenden, Goldsmith and Alexan- derson. Owing to the mechanical difficulties of construction of such machines it is perhaps a question if they will prove commercially suc¬ cessful in general use. Nevertheless such ma¬ chines have given and are giving good service in a number of instances. An idea of the dif¬ ficulties of construction of high frequency alter¬ nators will be obtained when it is pointed out that to obtain 100,000 oscillations per second in a 600-pole rotor having a diameter of two feet, a speed of 20,000 revolutions per minute is necessary. Fairly full descriptions of high frequency machine generators will be found in books mentioned in Bibliography. Consult paper by Alexanderson, Proceedings American Institute Electrical Engineers (October 1919).

Another method of obtaining sustained elec¬ trical oscillations is known as the singing arc, due to Duddell, who discovered that when

an arc lamp is in shunt with a capacity and an in¬ ductance of given proportions, a musical tone is set up in the arc. Ultimately Duddell ob¬ tained frequencies of 40,000 per second from this source. An explanation of this phenomenon is that when the shunt circuit is completed a cur¬ rent flows from the arc circuit into the conden¬ ser or capacity circuit which decreases the cur¬ rent flowing in the arc. This increases the electromotive force between the terminals of the arc, causing still more current to flow in the condenser circuit raising its electromotive force above the normal voltage of the arc. Con¬ sequently the condenser begins to discharge back into the arc, increasing the current therein and reducing the electromotive force between its terminals, when the reverse process is set up, and in this way continuous oscillations are maintained in the arc and shunt circuits.

When sustained oscillations are compara¬ tively uniform in amplitude and their frequency is above audibility these oscillations are not heard in the telephone receiver. But, while the telephone receiver or at least the human ear will not respond to such high frequencies, if the amplitude or contour of the oscillation waves be modulated by speaking into a micro- phonic transmitter placed in the oscillation cir¬ cuit, or in the aerial circuit of a wireless syS' tern, a telephone receiver will under proper con¬ ditions reproduce the speech spoken at the

transmitter, virtually as speech is reproduced by modulating the amplitude of a beam of light, or a telegraph current in the case previously cited The terms <(radio frequencyˆ and ((audio frequencyˆ are now commonly used to indicate the inaudible high frequency oscillations and the audible or low frequency oscillations, respec¬ tively, in wireless telephony.

The discovery of the oscillating arc paved the way for the use of sustained oscillations of high frequency and by means of modifications of Duddell’s device much progress has been made in wireless telegraphy and wireless tele¬ phony. Such devices are now sometimes termed arc radio transmitters or arc converters.

An important improvement in the Duddell oscillating arc is that due to Poulsen. In the Poulsen arrangement the positive electrode of the arc is a water-cooled copper cylinder. The negative electrode is carbon. The arc is placed in a strong magnetic field which tends to blow out the arc, after the Elihu Thomson effect. The source of current supply for the arc is a direct current generator supplying from five kilowatts to 100 kilowatts at 500 to 600 volts. The arc converts the energy of the direct cur¬ rent machine into alternating currents of a fre¬ quency

of say 60,000 per second. The practical efficiency of the arc converter is 33 per cent to 50 per cent of the input. For further inter¬ esting details of this arc converter and its util¬ ity in Wireless Telegraphy, consult an article in Electrical World (30 Aug. 1919, p. 452).

A very important source of sustained high frequency oscillations in wireless telegraphy and telephony of more recent origin is the three electrode high vacuum tube to which more ex¬ tended reference will be made herein.

A great advantage of sustained oscillations in wireless telephony and wireless telegraphy also is that the property of resonance may be more fully availed of than when more or less intermittent oscillations are employed. It may be noted that in wireless telegraph and wire¬ less telephone operation the receiving appa¬ ratus is practically the same. In wireless teleg¬ raphy the full effect of the radiated waves from maximum to zero is available, whereas in wireless telephony only a small portion of the emitted wave energy is available, namely, that due to the modulation of the wave energy caused by the action of the telephone trans¬ mitter, estimated to be about 5 per cent of the total energy radiated. This, however, in view of the amplifying powers of the high vacuum tube detector is not now of so much import¬ ance. See Telegraphy, Wireless.

De Forest Wireless Telephone. — In Fig. 2 is outlined an arrangement of the De Forest wire¬ less telephone system employed in 1909 and pos¬ sibly prior thereto. A singing arc a is em¬ ployed as the source of sustained high fre¬ quency oscillations. C is a variable condenser, L is a transformer or tuning coil, the secondary soil ˆ of which is in series with the aerial wire A, and a microphone transmitter M. a is an arc with copper-carbon electrodes, burning in the flame of an alcohol lamp m. The arc is supplied with a 220 or 440 volt direct current supplied by a generator indicated at G. K K are choke coils, or inductances, in the supply circuit, used to shut out the high frequency oscillations of the arc from the generator. The

arc a sets up in the circuit a , C, p sustained oscillations that are radiated as electric waves from the aerial wire A. Speech spoken into transmitter M modulates the amplitude of these waves practically in a manner equivalent to the action of the voice currents in the Van Rysselberghe'simultaneous system of telegraphy and telephony upon

the telegraph currents therein. There is, of course, the difference that in the latter case it is the slow telegraph impulses of current that are modulated by the

Fig. 2. — De Forest Wireless Telephone Transmitter Circuit.

voice currents, whereas in the case under con¬ sideration it is the high frequency radio cur¬ rents that are modulated by the voice currents. It is now the practice to term the modulated high-frequency waves employed in wireless telephony, and it may be added, in wire tel¬ ephony also, carrier waves, since they virtually carry the voice waves.

The receiving circuits of the said De Forest telephone system are shown in Fig. 3. A is the aerial, L is the tuning coil, C is a variable condenser. The detector employed is the De

Fig. 3. — De Forest Wireless Telephone Receiver.

Forest audion. (See Telegraphy, Wireless). It comprises a tantalum lamp filament F, a grid G of No. 22 platinum wire and a small platinum plate P, all within an exhausted bulb b, resembling a six-volt incandescent lamp. The filament is lighted or heated by a three-cell storage battery B, the current strength of which is regulated by a variable resistance r. PR is a potential battery of 10 to 30 volts, adjustable as to potential by a potentiometer, not shown. One terminal of the oscillation circuit L, C is connected to the grid, the other terminal to the filament, as in the figure.

When the heating battery and the potential battery are properly adjusted the audion is very sensitive and produces amplified sounds

in the telephone receiver. The incoming high frequency, or radio sustained oscillations, as stated, do not perceptibly affect the telephone receiver owing to their regularity, uniformity of amplitude and high frequency, but the modu¬ lations of the amplitude of the incoming audio oscillations due to the microphone transmitter, being within the range of the human ear, are heard in the telephone receiver as articulate speech.

Wireless Telephone Transmitters. — The transmitters for this work necessarily require high current strength in the transmitter circuit. This develops heat in the carbon granules of the microphone transmitter, which leads to packing of the carbon. This impairs or stops the transmission of voice waves. The packing can be broken up by tapping the transmitter at suitable intervals, and De Forest provides a special device for this purpose. In other cases a device consisting of

a number of tubes leading from a single mouthpiece to a number of transmitters, all acting upon the one circuit, is employed. Fessenden uses a special trans¬ mitter for this work, by means of which a current strength of 15 amperes is modulated successfully. For aeroplane service during the war transmitters of special design were found to be necessary if successful results were to be obtained. In this service, besides difficulties due to packing, precautions had to be taken to annul engine, propeller and other external noises. To this end the diaphragm of one type of transmitter is so constructed as not to re¬ spond readily to air vibrations below 200 or above 2,000 per second. In another type a perforated plate is interposed between the speaker's mouth and the diaphragm of the transmitter, which device baffles the movement of extraneous sound waves toward the dia¬ phragm while the voice waves spoken directly into the mouthpiece are not impeded. Still another device employed in this service con¬ sists in leaving the back of the transmitter open in such a way that exterior noises impinge on the back and front of the diaphragm of the transmitter with equal strength, effecting no result, whereas the voice waves hit the dia¬ phragm in one direction only and thus set up the required variations in the transmitter cir¬ cuit, even although at such times the pilot or observer cannot hear his own voice.

Three Electrode Vacuum Tube Oscillator. — As previously intimated the De Forest three electrode vacuum tube is now used as a source of high frequency sustained oscillations, and many different arrangements of circuits ' have been designed to utilize this remarkable feature of these tubes, now in practice fre¬ quently designated vacuum tubes or VT's. One such arrangement of circuits to obtain sustained oscillations is shown in simple form in Fig. 4, termed a vacuum tube oscillator. It illustrates the ((feed back® or ˆregenerative® coupling of circuits, perhaps first devised by Armstrong. F is the usual filament, G is the grid, P is the plate of the tube proper. FIB is the heating or lighting battery, r, r' are re¬ generative or feed-back tuning coils. C is a condenser across the filament grid-circuit. Closing the circuit or jarring the tube will cause an initial impulse or oscillation in the grid-plate circuit, including coil r'. This

oscillation in turn reacts on the grid-filament and r circuit, which again reacts on the former circuit, thereby producing a feed-back or re¬ generative oscillating current in the tube that may be termed self-

perpetuating. After a brief interval a steady sustained oscillation is pro¬ duced. The coils r, r' and condenser C are adjusted to oscillate at a desired frequency in the usual way. By means of this tube oscilla¬ tions from one-half cycle to 20,000,000 per sec¬ ond are now obtainable.

It has been noted by another writer in ex¬ pounding the oscillating feature of these tubes that <(in order to set tube circuits into a state of radio frequency oscillation it is necessary that the connections be so made that the grid end of the grid inductance will be alternately negative and positive, as the plate end of the plate inductance is positive and negative. When the grid and plate radio frequency cir¬ cuits are coupled with the proper phase relation any variation in voltage in either the grid or plate circuits will cause minute disturbance in the oscillation circuits, setting them into oscil¬ lation at whatever frequency they may happen to be adjusted to. For example, a slight varia¬ tion of voltage in the plate circuit by any means whatever will cause its resonant circuit to oscillate at radio frequency, and the resultant current will act upon the grid circuit, setting it into action at the same frequency. The result¬ ing radio frequency fluctuations of the grid potential will act upon the plate at the right time to keep the plate resonance circuit in a state of oscillation, and this state of affairs will continue so long as the proper supply of voltage and filament current is maintained, but not otherwise. The tube is able to generate alternating currents because of its amplifying properties. The energy delivered to the grid circuit in accordance with the actions just out¬ lined will gradually increase in value until a maximum is reached, which is the maximum output the valve is capable of delivering.® Consult The Wireless Age, June 1919, p. 15, article on ((Wireless Telephone Transmitter for Seaplanes.®

In general De Forest gives the explanation of the vacuum tube oscillator as follows : “There is only one oscillating circuit. This circuit is such that a sudden change of poten¬ tial impressed on the plate produces in turn a change in the potential impressed on the grid of such a character as to produce in its turn an opposite change of value of potential

on the plate. Thus the to and fro action is reciprocal and self-sustaining.®

In some respects the operation of the vacuum tube oscillator is perhaps analogous to the oscillator previously described. Another example of a self-perpetuating oscillation cir¬ cuit is that due to placing a telephone receiver before the mouthpiece of a telephone

trans¬ mitter when a shrill whistle or howling is often established. This phenomenon is especially no¬ ticeable in the transmitter and receiver of the acousticon type. This effect is seemingly due to a series of reactions somewhat similar to, but much more complex than those that occur in an electric door bell, another device which self-perpetuates its own vibration; when its circuit is closed by the push-button. In the case of the telephone howler let us assume in explanation of its action that a movement of the diaphragm of the receiver toward its mag¬ net tends to weaken the air pressure on the diaphragm of the transmitter, and hence weak¬ ens the pressure of the carbon of the trans¬ mitter. This causes a weakening of the cur¬ rent allowing the diaphragm of the receiver to fall away, with the further result that the air column is compressed, this tending to increase the pressure on the carbon again and also in¬ creasing the current strength in the circuit, whereby the diaphragm of the receiver is again attracted, which actions are repeated over and over. Investigation of this phenomenon indi¬ cates, as might be expected, that it is dependent upon the fundamental set of vibration of the receiver and transmitter, the length of the air column enclosed between them and also the oscillation period of this circuit. The above references to the attraction of the diaphragm of the receiver and to its falling away are perhaps rather broad terms, when it is con¬ sidered that as near as can be calculated the amplitude of vibration of the said diaphragm in reproducing speech is about the one twenty millionth of an inch. While this phenomenon has no direct bearing on the vacuum tube oscil¬ lator it is interesting as somewhat analogous thereto and hence may tend to simplify the explanation of the device.

Colpitts' Vacuum Tube Oscillator, Modulator and Repeater. — In Fig. 5 is shown an arrange¬ ment due to Colpitts of a vacuum tube and telephone transmitter with other circuits and apparatus for providing a high frequency vacuum tube oscillator, modulator and repeater of radio and audio frequencies. In vacuum tube operation the circuits into which energy is put is termed the input circuits; those that give, out energy, the output circuit. In Fig. 5 the input circuit consists of the grid G of the vacuum tube VT, modulator coil r' , battery B and filament F, as indicated by the letter i. The output circuit indicated by letter o con¬ sists of the plate P, filament F, condensers C C and the primary coils of repeating coils or transformers T, T\ and battery B' , which bat¬ tery supplies current to plate P, through an in¬ ductance or choke coil K ; b is the usual heat¬ ing battery. The secondary winding .S' of the repeating coil or transformer T' is connected through condenser C' with the input circuit, rhe primary winding p of transformer T2 is in series with the secondary of another trans¬

former P which latter is coupled with the

telephone transmitter circuit TC as shown. The arrangement acts as a generator of high frequency currents by reason of the inter-action of the input and output circuits through the transformer T' and the circuit 5" C' . These high grequency currents are modulated by the audio frequency currents due to the operation of telephone transmitter TC through the trans¬ formers T 3, T2, and are transmitted by the transformer or repeating coil T into the line

frequency is practically impossible, since very grave difficulties are met with in keeping it from howling or oscillating. It is, however, quite practicable to amplify a radio signal at its radio frequency, _ pass it through a detector tube and then amplify the resulting audio frequency cur¬ rent. This not only gives the increase due both to the radio and the audio frequency ampli¬ fiers, but in addition increases the detector tube efficiency since within limits the efficiency of

TC

Fig. 5. — Colpitts' Oscillator, Modulator and Repeating Device.

or aerial A to which the secondary coil of T may be connected. Consult Colpitts' United States Patent No. 1,137,884, 1915.

Tzvo or More Stage Vacuum Tube Cir¬ cuits. — A combination of a transformer and amplifier tube is termed a one-stage amplifier. The number of transformers and amplifiers, in series can be further increased, but since static and other stray currents are also amplified a practical limit is soon reached. In practice seven stage amplifiers have been successfully utilized and a much greater number of ampli¬ fiers in series have been employed experi¬ mentally.

In Fig. 6 is shown a vacuum tube receiv¬ ing circuit with a detector tube VT and a two- stage amplifier method, T' VT' ; T 2 VT2, em¬ ployed in the United States Signal Corps serv¬

detection increases with the signal strength. Thus the receiver usually works out best in seven stages, three raido, one detector and three audio stages. Properly designed sets of this kind operated non-oscillating and without re¬ generation, will give signals more than 1014 times as strong as would be obtained with a simple one tube

detector. By using a regenera¬ tive feed back much higher amplification can be realized, but the operation becomes less stable.®

The degree of amplification due to the vacuum tube amplifier varies under different conditions of battery, circuit connections, etc. In the case of an amplifier made for the United States Signal Corps, the power of the output signal was from 40,000 to 60,000 times that of the input signal. In general it may be taken

Fig. 6. — Receiving Circuit with Detector and Two-Stage Amplifier.

ice. The incoming oscillations are detected by tube VT and are successively transformed and amplified by transforming T' , vacuum tube VT' , and T~ V2 ; telegraph or telephone signals being received in the telephone receiver TR.

As noted in an article on (<Radio Frequency Amplifiers® (in Electrical World, p. 570, 22 March 1919), (<to build a reliable and efficient amplifier of more than three stages at any one

that the increase in audibility is according to the square of six per amplifier. Thus if one amplifier increases audibility six times, two am¬ plifiers will increase it 36 times, and so on. It has been stated that by ((the use of successive vacuum tube amplifications, energy increases of 10.000,000,000,000 times have been obtained and that a six stage amplifier permits the feeble energy derived from a telephone receiver

when employed as a transmitter to light an ordinary tungsten lamp, or to produce a spark¬ ing potential of several thousand volts.® The amplifying power of the vacuum tube is, how¬ ever, not an instance in which something is seemingly obtained for nothing. In this re¬ spect it is not comparable to the microscope or telescope. Rather, as pointed out by Batsel, its amplifying effects are obtained in a man¬ ner analogous to the increase of power in a direct current generator due to an increase of current or potential in the field circuit of the machine, which in turn increases the density of the magnetc field in which the armature rotates. . The increased power in the dynamo output is disproportionately greater than the increase of current in the field circuit and is supplied by drawing upon the mechanical energy that revolves the shaft of the dynamo. Analogously the batteries that supply the heat for the filament and the electric potential for the plate are drawn upon to supply the power developed by the vacuum tube.

In the case of the direct current generator the power is con¬ trolled by the magnetic field; in the vacuum tube the output is controlled by the grid

potential through the agency of an electric field.

The transmitting and receiving vacuum tubes employed in wireless telegraphy and telephony are differently constructed and require varying amounts of current. Thus one type of receiv¬ ing tube used by the United States Signal Corps requires for filament operation 1.1 ampere sup¬ plied by a four-volt storage battery, while the plate circuit is supplied by a 30-volt dry bat¬ tery of 15 cells. The filament in the trans¬ mitting tube takes normally 1.36 amperes at seven volts. The battery for the plate circuit of this tube ranges from 250 to 350 volts. The power output of this tube is three to five watts. Consult article by Bown (Electrical World, 22 Feb. 1919).

Wireless Telephony in Aerial Service. —

The exigencies of the Great War led to rapid development in wireless telephone apparatus and methods for army and navy needs in this country and abroad. There was especial need for wireless telephony in the aerial service and great progress was made in meeting these de¬ mands. For the latter purpose apparatus of minimum weight was necessary. The dimen¬ sions, for example, of a complete outfit for the use of the United States Signal Crops, con¬ taining vacuum tubes, transformers and plate circuit dry batteries are nine inches by seven inches by five inches, and it weighs eight pounds. The input transformer used in this set is of the shell type, wound with 6,000 feet of No. 40 enameled wire with paper insulation be¬ tween the layers of wire, and weighs two pounds.

In Figs. 7, 8, respectiveˆ, are given illus¬ trations of transmitting and receiving types of three electrode vacuum tubes used by the United States Army and Navy signaling de¬ partments in the late war. In Figs. 9, 10 are illustrations of airplane transmitting and re¬ ceiving wireless telephone sets utilized by the United States Signal Corps. Wireless tele¬

phone communication between flying machines in the air and between the planes and ground stations ; also by means of wire telephony be¬ tween the men in the airplane itself, was daily

Fig. 7. — Receiving Type Vacuum Tube.

becoming of more importance toward the close of the war, and many

valuable improvements were developed to facilitate this communica-

Fig. 8.— Transmitting Type Vacuum Tube.

tion Consult a paper on (<Radio Telephony® by Craft and Colpitts (American Institute Electrical Engineers, 21 Feb. 1919).

TELEPHONY, WIRELESS

Multiple Wireless Telephony. — In wire telegraphy the term duplex telegraphy signifies a system in which two messages are sent over one wire simultaneously in opposite directions. By diplex telegraphy is meant the sending of two messages in the same direction over one wire simultaneously. The term multiplex teleg¬ raphy usually covers telegraph systems by which more than two messages are transmitted over one circuit at the same time in either di¬ rection. In wireless telegraphy the term <(du- plex telegraphy® is applied to means by which two wireless messages are sent in opposite directions at once from two wires on one sup¬ porting tower, or preferably from two wires on separate towers, and again preferably with the respective transmitting and receiving aerials

By means of this system it is possible to trans¬ mit over one wire simultaneously four or more messages by means of electrical vibrations. In this system four tuning forks of different rates of vibration, say, 264, 320, etc., per second, are each given control of a battery by contact points suitably fixed on the forks. These bat¬ teries are arranged in series in a main line circuit. The tuning forks are kept in constant vibration by an electromagnetic device similar to that of the ordinary electric door bell, the forks being used as the armature of the mag¬ net. When in operation these forks open and dose the circuits of their respective batteries at a rate corresponding to the fundamental vibration of the forks, and thereby set up four different trains of electric impulses in

Fig. 9. Fig. 10.

Airplane Transmitting and Receiving Set adopted by the United States Signal Corps.

separated a distance of 25 or 50 miles, in which latter case the transmitting and receiv¬ ing apparatus are connected by land wires, thus making it possible to localize the trans¬ mitting and receiving operators in one room. This is termed remote or distant control. The

actual adjustments of the wireless apparatus are made by attendants at the transmitting and receiving antennae. Utilizing remote control methods during the late war, the high-power wireless transmitter stations at Annapolis, Md., Tuckerton, N. J., New Brunswick, N. J., and Sayville, L. I., were operated by four operators in one room in the Navy Department building, Washington, D. C.

The term multiplex wireless telephony may also be utilized as mentioned in the case of duplex wireless telephony, but preferably it refers to the sending of two or more wireless messages simultaneously from different antennae at nearby stations, say, ships of a fleet, and their reception on the antennae of different ships of a fleet at a distance. One of the best known multiplex telephone systems for this purpose is due to R. A. Heising. The description of this S3'Stem will perhaps be simplified by the inter¬ polation of a brief allusion to the Gray Har¬ monic Multiplex Telegraph system, formerly in use on land lines.

The Gray Harmonic Multiplex Telegraph. —

the main line circuity of frequencies equal to those of the respective vibrating forks. A Morse telegraph key is arranged to control the impulses set up by each fork in such a manner that a series of short and long electric pulsa¬ tions corresponding to the dots and dashes of the Morse telegraph alphabet may be trans¬ mitted over the main lines by each key.

At a receiving station four electromagnets are placed in series in the main line circuit. The armatures of these instruments are iron reeds, fastened at one end, and attuned to vibrate at rates corresponding with their respective vibrat¬ ing forks at the transmitting station. Hence, each reed will select and respond only to the pulsations of current transmitted by its respec¬ tive vibrating fork. Contact points controlling a local current are also attached to the arma¬ tures of the receiving magnets and by this means the transmitted dots and dashes are re¬ ceived by a Morse telegraph sounder in prac¬ tically the usual way.

Obviously, when all of these differing rates of current impulses are being transmitted at one time over one wire the resultant com¬ posite wave must be complex to a degree. Yet the Gray Harmonic telegraph system was in successful operation for several years between New York and Chicago on the lines of the Postal Telegraph Company. Indeed the degree

of complexity of the resultant current referred to did not end with the operation of the func¬ tions outlined in the foregoing remarks. For, in addition to the four pulsatory circuits men¬ tioned, an ordinary Morse duplex system was superposed on the vibrating system,, this giving a sixtuplex telegraph system capable of trans¬ mitting six messages over one wire simul¬ taneously.

The Heising Multiplex Wireless Telephone System. — In this system an arrangement meas¬ urably analogous to the foregoing is employed for setting up electric oscillations of different frequencies, which differing rates of oscilla¬ tions are simultaneously radiated as a com¬ pound wave in space from the aerials of nearby transmitting stations and are selected and received at the receiving stations by suit¬ ably attuned wireless apparatus, in a manner to be described.

This system was installed experimentally on three or more ships of the United States navy, but owing to the declaration of war with Ger¬ many the tests were prematurely discontinued. The transmitting apparatus on one ship is out¬ lined in Fig. 11. The apparatus on all the ships was similar, but certain of the tuning circuits on each ship were adjusted to different rates of oscillation. The plan employed is to trans¬ mit from the three ships a carrier wave of say 2,000,000 cycles (150 meters). Then on one ship to modulate this frequency with an intermediate wave of 25,000 cycles, which fre¬ quency in turn is modulated with the waves due to speech. On another ship the same pro¬ cedure is followed except that an intermediate wave of 35,000 cycles is employed and on the third ship an intermediate wave of 45,000 cycles is utilized.

Let Fig. 11 (represent the ship (A) using

wave modulates at R the amplitude of the 25,000 cycle frequency set up by the oscillator-tube VT'. In turn this modulated 25,000 cycle fre¬ quency after amplification in power tube VT2 is, through transformer T2 caused, at condenser C, to modulate the 2,000,000 cycle carrier wave developed by oscillator FT3. This doubly- modified carrier wave after increased power amplification by the tube VT* is delivered by the transformer T 4 to the antenna A. The batteries and other devices used in this system are not shown in the figure.

To avail of this arrangement each of the three ships or other stations

equipped with this apparatus will transmit a carrier wave of 2,000,000 cycles. But one ship, say A, will modulate this wave with a 25,000-cycle wave. B will modulate it with a 35,000-cycle wave, and C with a 45,000-cycle wave. The receiving ship A' will tune his apparatus to a 2,000,000- cycle wave and to an intermediate frequency of 25,000 cycles. Ship B' will tune his appara¬ tus to a 2,000,000-cycle wave and to an inter¬ mediate wave of 35,000 cycles, and ship C' to a 2,000,000-cycle wave and to an intermediate wave of 45,000 cycles. The receiving apparatus is indicated in Fig. 12. A is the aerial. The bracket m encloses the 2,000,000-wave detector tube and the appropriate tuning coils TC, trans¬ formers RC and condensers C. Bracket n en¬ closes the intermediate frequency and voice detector tube VT', the telephone receiver R and the usual filament and potential batteries. It is plain then that the receiving apparatus of the ships A', B' , C will only respond to the 25,000, 35,000 and 45,000 speech modulated radio waves, respectively, while all three will receive and detect the 2,000,000 carrier wave, practically as the vibrating reeds in the Gray Harmonic Telegraph system respond only to

VT

Fig. 11. — Heising Multiplex Telephone Transmitter System.

fie speech modulated wave of 25,000 fre¬ quency. T is a microphone transmitter. The speech waves set up by this transmitter is repeated by the transformer or repeater coil RC into an amplifier VT. This amplified speech

the particular train cf impulses to which they are attuned.

This system of non-interfering multiplex wireless telephony is not, howrever, limited to the sending of three messages or conversations

simultaneously in the same neighborhoods. For, by using carrier waves of say, 189 and 239 meters in length, in addition to the wave length of ISO meters, and by modulating each of these two additional carrier waves with intermediate frequences of 25.000, 35,000 and 45,000 cycles .it will be feasible to carry on nine separate wireless conversations simul-

tubes VT', the output circuits of which in turn, are coupled through

transformer RC2 to the input circuits, of a battery of three power tubes VT2. Similarly the output circuits of the latter tubes are coupled through the trans¬ former RC 3 to the aerial A, from which the modulated high frequency oscillations ampli¬ fied and increased in power are radiated into

Fig. 12. Multiplex Wireless Telephone Receiving Circuits.

taneously between the ships equipped and placed as indicated in the foregoing.

Tests with apparatus somewhat similar to that just described showed that two-way wire¬ less telephone conversations could be carried on between ships at a distance of about 40 miles, the power of the outfits being low. The limit of speaking distance was about 150 miles. By two-way conversation is meant the ability to converse in either direction, one speaker at a time on one circuit. Apparatus to permit this two-way conversation was provided on the ships. The object in resorting to the short¬ wave lengths of 150 and 189 meters in the tests just described was to avoid interference or clashing with the regular wireless telegraph operation of the ships of the navy which use wave lengths of 600 to 1,200 meters.

In Fig. 13 is shown an arrangement of

space. BB in the figure indicate the usual heat¬ ing and potential batteries. The power tubes, it will be noted, are connected in quantity or multiple and not in series or cascade as* in the case of amplifier tubes. See Fig. 6.

Long Distance Wireless Telephony. — An epochal series of experiments in long-distance wireless telephony was in 1915 conducted by the American Telephone Company in conjunc¬ tion with the Western Electric Company and representatives of the United States navy and the French army. The most notable of these tests were perhaps those made between Arling¬ ton, Va., and the Eiffel Tower, Paris. Tests had been previously made between Arlington and Darien, 2,100 miles oversea, and between Arlington and Mare Island, near San Fran¬ cisco, 2,500 miles overland. In the Arlington- Darien 'experiments speech was transmitted

Fig. 13. — Transmitting Circuit Showing Amplifying and Power Vacuum Tubes.

amplifying and power tubes such as referred to in the description of Fig. 11. G is a gen¬ erator of high frequency Oscillations which after

transformation by coils RC may be modulated by the microphone transmitter T. These modulated oscillations are amplified by the tube VT, the output circuit of which is coupled through transformer RC' to the input circuits of a battery of two power vacuum

from New York City by land lines to Arling¬ ton, whence it was transmitted by wireless telephony to Darien. In the Arlington-Paris experiments difficulty was found in obtaining the use of the Eiffel Tower station, owing to the exigencies of the Great War which was then in progress. In these tests the Eiffel Tower station was used only for receiving. On 22 Oct. 1915, however, speech transmitted from

Arlington was clearly received in Paris, a dis¬ tance of 3,600 miles. The radio-wave length employed was 6,000 meters. The antenna cur¬ rent employed at the Arlington station was about 50 amperes. The speech transmitted on this and other occasions was also received, and the voice of the speaker clearly recognized, by the wireless operator in Honolulu, 4,500 miles from Arlington.

The general plan of transmission adopted at Arlington was somewhat similar to that indicated in Fig. 12, but of course the number and capacity of the amplifier and power tubes used at Arlington was greatly in excess of that used in shipboard or ordinary wireless tele¬ phone practice.

The Future of Wireless Telephony. — In

view of the rapid development of wireless telephony within the past 8 or 10 years it would be unwise to attempt to place a limita¬ tion upon the extent of the use of this art within the next decade. The possibility of transmitting wireless telegraph messages a dis¬ tance of 12,000 miles, namely, from Carnarvon, Wales, to Sydney, Australia, has been demon¬ strated (2 Oct. 1918). Likewise the possibility of transmitting speech by ether waves a dis¬ tance of 4,500 miles has been shown. These results are obtainable by the use of the vacuum- tube oscillators and amplifiers. As a distance of 12,000 miles is half way around the earth and as the ether waves in traveling that distance • traverse both sides of the earth, it follows that this is equivalent to transmitting a message from one point to any other point on the earth. Since also it appears evident that by means of the three-electrode vacuum tube speech may be transmitted .to any distance reached by radio-telegraph

waves, it would seem that un¬ der favorable conditions it may be said that world-wide wireless telephony is now a possi¬ bility.

The high cost of very high-power vacuum tubes together with their low efficiency and limited durability is at present, however, likely to militate against their general use, but im¬ provements in methods of construction of this apparatus will doubtless reduce its cost and in¬ crease its durability. The existing need of high and very expensive aerial wires in long distance wireless telegraphy and telephony is also a limiting factor to the extensive employment of those arts to very long distances.

Some of the chief obstacles to the exten¬ sive and successful use of wireless telegraphy and telephony in the past have been those due to statics and interference between or clashing of signals from different sending stations at nearby or even at remote stations. A great forward step toward the solution of the statics problem is that due to the Weagent anti-static devices. (See Telegraphy, Wireless). The interference problem is still to be solved.

As already noted, by the use of selective tuning devices which only transmit and re¬ spond to waves or oscillations of a certain frequency, stations may cut out waves of other frequencies and thus avoid interference. Thus by the use of a standard wave length for cer¬ tain circuits, as, following land telegraph prac¬ tice, the ether route used by different wireless stations may be termed non-interfering; ether

circuits may be and in fact are established very generally at the present time. Thus the regular wave lengths for a given trans-Atlantic circuit may be set at, say, 10,000 meters. Other stations using that wave length in the vicinity of that circuit to which the 10,000-meter wave length is assigned, would set up interference or clashing of signals. It is known, however, that a difference of 300 to 400 meters in the wave length is ample to avoid interference between such stations. For instance, a circuit Employing a 10,000-meter wave length could operate side by side with a circuit employing a 10,400-meter wave length. For long-distance wireless telegraph and telephone operation, or, in other words, for high-power station work, long wave lengths are essential. The present minimum and maximum available wave leneths are, say, from 10,000 to 20,000 meters for long distance signaling. Since the signals from the very high-power stations are now received all over the world, it is obvious that if a difference of, say 400 meters, is required to prevent in¬ terference between any two such wireless cir¬ cuits, the total number of available world¬ wide circuits would be limited to say 25.

It may be noted that for short-distance wire¬ less signaling a difference in the respective wave lengths of about 20 meters is found sufficient to prevent interferences between cir¬ cuits. Even in short distance signaling, how¬ ever, were all stations to adhere rigidly to an allotted wave length in any designated zone the number of available wave lengths would ultimately be reached. While the foregoing conditions continue the limitations to wireless telegraphy and telephony will exist.

It is, however, not unlikely that improve¬ ments in this branch of electrical signaling will render it possible to operate transoceanic wireless telegraphy and telephony on a much closer margin than 400 meters. Indeed it has been noted by Alexanderson in the paper re¬ ferred to that by improved arrangements of apparatus and circuits it will be possible to operate such circuits with a difference of but 1 per cent of the total frequency, instead of 4 per cent as at present. This would make it possible to increase the number of trans¬ oceanic circuits to, say, 100, roughly speaking. Again, by means of improved methods of di¬ rective signaling the number of parallel wire¬ less circuits on one wave length will be in¬ creased by five. These improvements together with an increase in the speed of signaling to 100 words per minute generally, instead of 20 words as at present, will, it is estimated, increase the total capacity of the radio trans- . oceanic traffic of the world 175 times.

In wire telephony interference of this nature does not occur as measures are taken to prevent such interference (termed inductive interference between circuits) by using two parallel wires suitably transposed for each telephone circuit. (See Telephone). The ef¬ fect of induction between parallel Morse and printing telegraph circuits is not pronounced inasmuch as the receiving instruments em¬ ployed on those systems are comparatively in¬ sensitive to weak induction currents from other lines.

Notwithstanding the real difficulties in the

way of what may be termed universal wireless telephony for social, commercial and other pur¬ poses it is confidently expected by competent telephone engineers and inventors that its ulti¬ mate consummation is not beyond the possibil¬ ity of practical realization. In the meantime wireless telephony if only available, com¬ mercially,

for comparatively short distances, obviously could be installed to great advantage in the officer's room of every ship that floats ocean, lake, river or harbor, because of the fact that telephony requires no specially trained operator.

Bibliography. — Bucher, ; Goldsmith, (Radio Telephony1* ; Maver, (Wireless Teleg¬ raphy and Telephony.)

William Maver, Jr.,

Author (American Telegraphy and Encyclo¬ pedia of the Telegraph?

eters. A second instrument had the power of eight diameters and a later one 30.

The many and widely varying forms of telescopes may all be grouped simply as tubes (Milton, seeing Galileo's in Florence, called it the <(Optik Tube®), in which are placed the several combinations of lenses or reflectors ; each combination, however, producing the one result, namely, first, gathering the light from the object and concentrating it at the focus in a brilliantly illuminated but small image; and, second, magnifying this image with a micro¬ scope called an eye-piece. One of the common types is the refracting astronomical telescope (Fig. 1), in which A is the object-glass or objective, and F the focus, where the small image is formed. The two lenses, C and D, form the microscopic eye-piece, which mag¬ nifies this image. The first reflecting telescope was the Gregorian, invented in 1663 by James Gregory. It has not survived. Fig. 2 repre-

Fig. 1. — Astronomical Telescope.

TELEPHOT, or TELEPHOTE, any one

of several theoretical instruments designed to reproduce scenes at a distance by photography and the aid of electricity. Telephotography has been an interesting field for inventors, but no commercially successful machine has been developed.

TELESCOPE. The telescope is an optical instrument by which the image of »a distant

sents the reflecting astronomical telescope as invented in 1669 by Sir Isaac Newton, and called the Newtonian Reflector. In this the light traverses the entire length of the tube, at the lower end of which it strikes the con¬ cave reflector A, which sends it back as a cone of rays to the diagonal reflector B ; thence it travels to the focus F, where it is

magnified by the eye-piece E, as in the refracting tele¬ scope. Fig. 3 represents the most popular

object is magnified so that it may be examined as if it were but a fraction of its actual dis¬ tance from the observer. This instrument was invented by the Dutch optician, Lippershey, early in the 17th century. The first use of it for astronomical observations was made in Florence, by Galileo, who in 1609 invented the

form of reflecting telescope, called the Casse- grainian, invented by Cassegrain in 1672. The optical principles here are the same as in the Newtonian form except that the convergent cone of rays from the mirror A is intercepted by a convex reflector B and sent back through an opening in the centre of the mirror A to

type known as the Galilean telescope. His first instrument was constructed of two spec¬ tacle lenses set at the ends of a section of a leaden organ-pipe. Its power was three diam-

the focus F, where the image is magnified by the eye-piece as before. The Herschelian re¬ flector was invented by Sir William Herschel (q.v.) in 1780. His great telescope, built in

1789, had a mirror 48 inches in diameter and a tube 40 feet in length.

In these forms of telescope the image of the object as seen through the eye-piece is necessarily inverted, which is, of course, un¬ important in astronomical observations, but is a defect to be overcome in the terrestrial instru¬ ment. The most common type of terrestrial

A

in this telescope, the power resulting will be 672 diameters, and eye-pieces of longer or shorter focus will give correspondingly lower or higher powers. The practical limit of power in telescopes of the highest degree of accuracy is usually considered to be about 100 diameters per inch of aperture. Thus the 36-inch Lick telescope may be practically used with an eye-

FOCAL PLANE .

kJ

r

3 > r

Fig.* 4. — Terrestrial Telescope (spy glass).

telescope is the Spy Glass (Fig. 4). The ob¬ jective A has the same office as in the refract¬ ing astronomical telescope, and forms an il¬ lumined image of the object at the focus F. This image is then magnified by a compound eye-piece made up of several lenses B, C, D and E, which carry the light to the eye in such manner as to erect the image and show it in its natural position. Fig. 5 represents the

piece which would .give a power of 3,600 di¬ ameters. Such high powers are, however, sel¬ dom required and can be used only in the clearest atmosphere. By far the larger pro¬ portion of astronomical observations are made with powers of less than 1,000 diameters. In telescope observations, the two elements “power® and “light,® while equally important, are always in opposition. Thus an object viewed with a

Fig. S. -—Galilean Telescope (opera glass).

Galilean telescope, which is the same in prin¬ ciple as the ordinary opera glass. In this case the objective A condenses the light from the object observed, and would naturally make a small image at F, but the cone of rays, before reaching the focus, is intercepted by the double concave eye-piece C, and thence conveyed to the eye in erect position. Fig. 6 shows the Porro Prism instrument, the most modern and efficient form of terrestrial telescope. The objective and the lenses are in the same rela¬ tion to each other as was first illustrated in the astronomical telescope, Fig. 1. Two double- reflecting, 90-degree prisms are inserted within the cone of rays between the eye-piece and the objective (Fig. 6) ; their mission being to erect the image which, in the ordinary refracting telescope, is shown inverted. This system was the invention of the Italian engineer, Porro, who patented it in France about 1850.

The magnifying power of telescopes is usu¬ ally expressed in diameters and is indicated by the ratio of the focal length of the objective to that of the combination of lenses forming the eye-piece. For example, the Lick telescope has a focal length of 56 feet or 672 inches. If, therefore, an eye-piece of one inch focus is used

power of 100 diameters is four times as bril¬ liantly illuminated as would be the case if an eye-piece giving 200 diameters were used. It

follows, therefore, that the observer will use the power best adapted to his purpose, both as to magnification and light.

The telescope giving the minimum power is the opera glass, usually magnifying two and one-half or three diameters, which is sufficient for indoor use, while for outdoor use the Gali¬ lean binocular has a power of four or five diameters, and the prism binocular of six, eight, 10 or even 12 diameters. The eight- power is, however, considered as high as can be held in the hands with sufficient steadiness to give the best results. The power used in terrestrial telescopes steadily mounted on a tripod usually ranges from 15 to 100 diameters, depending on the condition of the atmosphere.

The most important element in a refracting telescope is the objective, and, in a reflecting telescope, the mirror or speculum. The objec¬ tive of the early refracting telescope was a double-convex lens, which could not give a dis¬ tinct image because it separated each ray of light into its various prismatic colors, and each color, having a refracting power different from

telescope

Yerkes Telescope

Eye End of Yerkes Telescope Mounting of Yerkes Telescope

TELESCOPE

TELESCOPE

The 100-foot Dome, Mount Wilson Solar Observatory, Pasadena, Calif.

TELESCOPE

The 100-inch Hooker Telescope, Mount Wilson Observatory, Pasadena, Calif,

TELESCOPE

the others, found a focus of its own. The red ray, being most refracted, reached its focus first ; next came the yellow ray, then the green and last and nearest of all to the eye-piece, the blue ray made its image. When a star is viewed with such a telescope the image seen consists of a yellowish point at the centre, sur¬ rounded by a mixture of green

and blue light, with red outside. This difficulty in refracting telescopes, called chromatic aberration, checked the progress of astronomy for 150 years, until, in 1750, the English optician, Dolland, invented the achromatic objective as shown in Fig. 1. In this diagram E is a double-convex lens of crown glass and D a flint-glass lens of nearly plano-concave form. The difference between the crown and flint material in light refraction and dispersion, together with the compensating form of the two lenses, results in clear and distinct "definition,® the image of the star being sharply outlined and colorless. Optical glass for such lenses is of special manufacture. The world's supply comes from three makers, one each in England, France and Germany. The newer objectives are made of several thin len¬ ses cemented together, usually four in number and alternately crown and flint glass. Some makers are using five lenses successfully, though which much difficulty. The mirror or *

speculum of the reflecting telescope is made from a casting of ordinary glass of sufficient thickness to be handled without flexure, pref¬ erably one-sixth of the diameter of the disc, although one-eighth is a commonly accepted pro¬

portion in the case of very large discs. The reflecting surface is ground and polished, with great precision, to a parabolic form of the focus required, and then, by a chemical process, coated with silver, which may be easily renewed when tarnished or otherwise injured.

The making of the optical parts of tele¬ scopes is a rare art, which, however, has been cultivated with peculiar success in America. Alvan Clark and Sons of Cambridge, Mass., attained world-wide fame in this connection during the lifetime of the gifted men composing the firm. At the present time the largest repu¬ tation as a maker of large telescopic objectives belongs to John A. Brashear of Pittsburgh, Pa.

The telescope tube is usually carried by an equatorial mounting. This form of instrument has its principal or polar axis set parallel to the axis of the earth, its inclination, therefore, corresponding to the latitude of the observa¬ tory. At right angles to the polar axis is the declination axis, which, in turn, carries the telescope tube at right angles to itself. Each axis is supplied with a graduated circle, indi¬ cating, respectively, the position of the star in hours, minutes and seconds of right ascension, and in degrees, minutes and seconds of declina¬ tion. It will be evident that when the tube is pointed to a star in any part of the visible heav¬ ens, a revolution of the polar axis from east to west, in sidereal time, will make the telescope follow the apparent motion of the star. A driv¬ ing clock, which is usually

located inside the column of the instrument, controls the revolu¬ tions of the polar axis so that the star observed remains steadily in the field of vision. The equatorial principle has been applied to photo¬ graphic telescopes in such manner as to allow the continuous exposure of the photographic plate during the entire night, if desired. One of the most ingenious forms of mounting is the Equatorial Coude. In this instrument the polar axis is enlarged so as to serve as the main tube of the telescope, the eye-piece being at the upper end where the observer can sit comfortably in his warm room and observe any star in the visible heavens as easily as he uses his mi¬ croscope.

An elbow is rigidly attached to the lower end of the tube. At the intersection is an ac¬ curately polished mirror set at an angle of 45 degrees. At the outer end of the elbow is another mirror, similarly set. The objective is so placed that the light it gathers from the star is reflected by the mirrors through the tube to the eye-piece. The combined movements of the polar axis (the telescope tube) and the objec¬ tive and mirror carried on the elbow enable the observer to bring into view any star in the visible heavens. The polar axis, with its elbow carrying the objective and revolving in sidereal time by means of a driving clock, follows the apparent motion of the star in the usual way. Two of these instruments are in successful use in the Paris Observatory.

It will be evident that the equatorial tele¬ scope with its various modifications as above de¬ scribed, while giving facilities for examining and photographing the heavenly bodies, does not enable the astronomer to determine with re¬ quired accuracy the positions of the stars and planets. These fine measurements are secured only by special forms of telescopes. The Me-

ridian Circle is one of the most approved in¬ struments for this purpose. From the middle of the tube trunnions extend on either side, car¬ rying finely graduated circles and terminating in accurately ground pivots which are exactly at right angles to the optical axis of the tube. Two piers are so set as to form a rigid and accurate support for these pivots, east and west, carrying the tube so that the movement of the telescope is in the true meridian only. In the exact focus of the telescope a fixed system of cross-hairs or wires is placed. The best ma¬ terials for this purpose are taken from the cocoon of the field spider, the web being only one five-thousandths of an inch in

diameter. Finely drawn platinum wires are also used, lhese vertical spider webs are equally spaced and so adjusted that the central wire is exactly in the optical axis of the telescope as measured east and west. A horizontal wire is adjusted exactly in the optical axis as measured north and south. Parallel to these central wires there are two movable wires, one horizontal and one vertical, each governed by a micrometer screw.

In measuring transits of stars for determin¬ ing right ascension, or for time, the telescope, by means of the graduated circles, is set to the declination of the star required, and when the star appears, its transit across each of the wires is recorded on a chronograph, by the observer tapping an electric key. In determin¬ ing declinations, the telescope, by means of the graduated circles, is set to the approximate declination of the star to be observed, and when the star appears at the edge of the field, the observer carefully adjusts the telescope until the star seems to be exactly bisected by the horizontal wire as it threads its way across the field. By reading the fine circle the declination of the star is obtained. Other types of tele¬ scopes for similar observations are known as transits, zenith telescopes, mural circles, etc., but the illustrations given will suffice.

Even with all the caution used in the con¬ struction of these delicate instruments, errors are sure to develop, due to refraction, flexure of the tube, variation resulting from changes in temperature and other contributing causes, for all of which allowance must be made in the final reduction of the observations. About the middle of the last century Professor Airy, then Astronomer Royal at Greenwich, designed and constructed a vertical telescope, which he be¬ lieved would eliminate the errors so manifest in his other instruments. He named it the (<Reflex Zenith Tube.® The principle is shown in Fig.

1. Every part of the instrument is stationary and no part need be touched when in use by the astronomer. The light from the star as it passes the zenith is concentrated by the objec¬ tive upon a surface of mercury in the base of the column, by which it is reflected back through a hole in the objective; the cone of rays then meets a diagonal prism, is reflected at right angles and enters the eye-piece to be observed as in other instruments. Contrary to the ex¬ pectations of the Astronomer Royal, errors in the observed position of the stars were still manifest and the most careful investigations failed to trace them to their source. The in¬ strument was, therefore, discarded. Fifty years later, Professor Chandler, of Cambridge, Mass., discovered that the pole of the earth “wobbles® slightly, causing a variation in

latitude. The

results of his observations were compared with the Airy observations of a half century before, and the supposed errors of the “Reflex Zenith

Fig. 7. — Reflex Zenith Telescope. |

Tube® were at once traced to the variation in latitude. The old instrument which had been condemned is thus proven to be correct both in theory and practice. It, therefore, represents the latest development in astronomical tele¬ scopes, and a large Reflex Zenith Tube is now in the service of the University of Pennsyl¬ vania.

In recent years the mounting of great equa¬ torial has passed from the domain of the in¬ strument-maker to that of the engineer, who finds abundant scope for ingenuity and technical expertness in combining very massive and so, rigid, construction with very delicate mechanism. At the present time the largest telescopes in the world are owned and made in America.

The table on following page gives a list of the larger ref i acting telescopes in the equipment the more important American observatories. Whil'e the refracting telescope still holds its advantages for photographic astronomical work the tendency of late years has reverted to the reflecting telescope for visual work. Astrono¬ mers prefer it because of the much clearer images obtained, due in large part to the entire absence of the secondary spectrum The unages formed by the best refractors have a turbid quality as compared with the clean crispness of the reflector. As in the case of the refracting instruments, America boasts- the largest reflectors. The largest of all is the

Name of Observatory

Aperature

of

telescope

Maker of objective

Maker of mounting

Yerkes (University of Chicago) .

Lick (University of California) .

United States Naval .

University of Virginia .

Lowell (Harvard University) .

Princeton .

University of Pennsylvania .

Northwestern University .

Carleton College .

Mount Wilson Observatory .

I nches

40

36

26

26

24

23

20

18*

16

100f

Alvan Clark and Sons .

Alvan Ciark and Sons .

Alvan Clark and Sons .

Alvan Clark and Sons .

Alvan Clark and Sons

Alvan Clark and Sons .

John A. Brashear .

Alvan Clark and Sons ....

John A. Brashear .

Warner and Swasey Warner and Swasey Warner and Swasey Warner and Swasey Alvan Clark and Sons Alvan Clark and Sons Warner and Swasey Alvan Clark and Sons Warner and Swasey

Hooker reflecting telescope of the Mount Wil¬ son Observatory, Pasadena, Cal., with a clear aperture of 100J6 inches (2.549 meters) and a primary focal length of 507.5 inches (12.891 meters) ; it can be used directly on the axis either (a) as a focal plane instrument, or (b) in the Newtonian form; at its secondary foci it may be used (c) as a Cassegrain instrument with a focal length of 1,606 inches (40,792 meters), or (d) as a Coude with focal length of 3,011 inches (76.480 meters). Celestial objects from 65° north to 53u south declination can be observed at the principal focus. The telescope is mounted after the English fashion, the skeleton tube containing the mirror at its lower end swinging between the sides of the open polar axis yoke which has a bearing at either end resting on cast-iron pedestals built up from the rpain concrete pier below. The mounting was designed by Mr. Pease and other members of the observatory staff, assisted by Prof. Peter Schwamb of the Massachusetts Institute of Technology. The pier is 33 feet high while the intersection of the axes is 50 feet above ground. Both the declination and right ascension bearings are composite; in part, of spherical type, serving to define the axes, while the remainder carries the load. The declination load is carried by means of counter¬ weight systems while the polar axis is sup¬ ported by means of steel drums built integral with the axis and floating in cast-iron tanks filled with mercury. The tube complete weighs 35 tons and the total moving parts weigh 100 tons. They are constructed of cast and struc¬ tural steel throughout and in as large units as could be machined as a whole. The larger por¬ tions of the mounting, some weighing 10 tons, were made in Quincy, Mass., and their trans¬ portation up Mount Wilson to an elevation of 5,700 feet was a difficult feature in the erection of this instrument. The mirror is 101.2 inches diameter, 12J4

inches thick and weighs about 9,000 pounds. It was cast in Saint Gobain, France, and figured by G. W. Ritchey in the observatory optical shops. It is mounted on a counterweight support system in the rear and on four edge arcs at the sides. To control its temperature it is surrounded with a lining of cork board built integral with its cell, and a system of piping is installed within this through which liquid at any desired temperature may be circulated from tanks in the pier below, bans serve to equalize the temperature around mirror and coils. When it becomes necessary to resilver the mirror it is removed from the tube and lowered in its cell by an electric

elevator into the pier, where all apparatus and material is at hand and where the temperature may be controlled. The telescope has motor-driven fast and slow motions, while the diurnal motion is supplied by the typical form of driv¬ ing clock having a conical pendulum isochronously governing a falling weight. This operates through a worm and a worm wheel (17 feet in diameter) cut and ground with high precision. The instrument is controlled, settings are made and the dome is turned from a station on the pier at which the readings of the circles are made; the ˆremote® system of electrical con¬ trol is used throughout, and most of the opera¬ tions are duplicated by auxiliary controls at the three observing stations or foci. To reach the principal focus an observing platform is pro¬ vided which travels along the shutter opening. The dome is of structural steel throughout, 100 feet in diameter, 100 feet high and weighs 730 tons. The rotating portion weighing 500 tons is carried on 28 trucks and is traction driven by two motors at opposite sides. The trucks and rails are carefully machined to coni¬ cal surfaces to eliminate vibration at the tele¬ scope when the dome is moved. The shutter is in halves which open sideways and permit free working of the telescope from the zenith to the horizon. The walls and dome are of double construction and are ventilated at the top to prevent excess heating during the sum¬ mer. A 10-ton crane is provided to assist in the erection and in the transfer of the various auxiliary sections of the tube.

The second largest reflector in the world is the 72-inch instrument set up in 1918 on Little Saanich Mountain on Vancouver Island, British Columbia, in the Dominion Observatory there. The mirror of this instrument was ground by the John A. Brashear Company of Pittsburgh, from a disc of glass cast in Bel¬ gium and shipped out of that country two days before the war broke out. The mirror is par¬ abolic, 13 inches thick at the rim with a hole 10ˆ6 inches in diameter through its centre. It weighs 4,340 pounds and has a focal length of 30 feet. Observations may be made from the side of the upper part of the tube, from the side at the lower end or through the opening at the

centre of the mirror. The telescope with all its fittings weighs 55 tons and is moved by an amount of electric current barely sufficient to light a 16-candle power electric lamp. The mounting was built by Warner and Swazey. The only other telescope of this size in existence is that of Lord Rosse set up upon his estate in Ireland in 1842. Its first mirror was of specu-

lum metal and was replaced by a 72-inch silvered glass mirror in after years. For a long period it was the largest telescope in the world; but was abandoned for optical reasons.

There are three 60-inch reflectors in the Western Hemisphere, the newest one erected at the National Observatory of the Argentine Re¬ public near Cordoba. The mirror was made by the John A. Brashear Company in 1916. In 1904 Harvard University secured the 60-inch reflector made by Dr. A. A. Common of Ealing, England. This instrument is of the Casse- grainian type and has a rectangular tube. The mounting is peculiar, the telescope being sup¬ ported in position upon the end of a hollow cylinder which floats in a well or deep basin of water. The cylindrical float is 18 feet long and seven and two-thirds feet in diameter and arranged to float constantly at an angle with the horizon equal to the elevation of the celes¬ tial pole at Cambridge — about 45 degrees. The instrument weighs over 20 tons, but is so delicately balanced that it may be moved in any direction with the greatest ease by its elec¬ trical controls. The eye-piece of the instrument is detached from the telescope and housed in the second story of an adjacent building, the light from the principal mirror being directed to it by accessory mirrors.

The 60-inch reflector of the Mount Wilson Observatory, constructed by Dr. Ritchey in 1908, was placed in commission in December of that year. The instrument complete weighs 21ˆ2 tons, nearly all of which is ingeniously supported upon a float in a basin of mercury, of which it displaces the equivalent of 50 cubic feet, although the entire amount of mercury in the basin is but 635 pounds. The controls are electric and may be manipulated from several stations about the instrument.

Another fine telescope which should be men¬ tioned in. this connection is the 48-inch re¬ flector built by Sir Howard Grubb and located at Melbourne, Australia.

For more detailed descriptions of these wonderful instruments and their achievements the files of the astronomical journals are rec¬ ommended.

Worcester Reed Warner, F.R.A.S., Of the Warner and Swasey Company, Cleve¬ land, Ohio.

TELFORD, tel'ford, Thomas, Scottish en¬ gineer: b. Eskdale, Dumfriesshire, 9 Aug. 1757; d. Westminster, 2 Sept. 1834. At 14 he was ap¬ prenticed to a mason and on the expiration of his time worked as a journeyman at that trade, but subsequently removed to Edinburgh and there applied himself to the study of architec¬ ture. In 1782 he went to London, where he was befriended by Sir William Pulteney, through whom he was appointed surveyor of the public works in Shropshire. He now be¬ came a civil engineer and in 1793 was entrusted with the construction of the Ellesmere Canal, to connect the Mersey, Dee and Severn. In 1803 and 1804 the Parliamentary commissioners for making roads and building bridges in the Highlands of Scotland, and also for making the Caledonian Canal, appointed him their en¬ gineer. Under the former board 1,200 bridges, two of 150 feet span, were built and 1,000 miles of new road were made; and under the latter board the Caledonian Canal was constructed.

Under other commissioners he built over 30 harbors, some of which, as at Aberdeen and Dundee, are upon an extensive scale. He was also employed in England, superintending the construction of five large bridges over the Severn, of eight canals, and the execution of numerous important works for the metropolis. In 1808 he was employed by the Swedish gov¬ ernment to lay out a system of inland naviga¬ tion through the central parts of Sweden and to form a direct communication by water be¬ tween the North Sea and the Baltic. He also built the road between Warsaw and Brest- Litovski in Poland. The greatest monument of his engineering skill is the Menai Suspension bridge, connecting Caernarvonshire with the island of Anglesea, which was opened on 30 Jan. 1826. In 1828-30 he superintended the drainage of nearly 50,000 acres of the Fen country. He invented the Telford pavement. See Roads, Improvement of.

TELHARMONIUM, an electrical instru¬ ment devised to produce music at any distance from a central station. The device was in¬ vented by Dr. Thaddeus Cahill (q.v.) and operates on the principle of the telephone, but the receiving instrument is not held to the ear. The music is produced through the medium of dynamos transmitting vibrations to any number of receiving stations. The operator plays on a keyboard similar to that of an organ, the keys controlling electric

currents at varying speeds of alternation and producing the notes of practically any instrument with great purity and sweetness.

TELL, tel, William, Swiss peasant of Burglen, near Altorf, celebrated in legend for his resistance to the tyranny of the Austrian governor, Gessler. The stories connected with him, with those relating to the origin of the Swiss Confederation, first appear in the 15th century. According to them, Gessler, the ty¬ rannical Austrian bailiff of Uri, one of the forest cantons, pushed his insolence so far as to require the Swiss to uncover their heads before his hat (as an emblem of the Austrian sover¬ eignty), and condemned Tell, who refused to comply with this mandate, to shoot an apple from the head of his own son. Tell was suc¬ cessful in his attempt, but confessed that a sec¬ ond arrow, which he bore about his person, was intended, in case he had failed, for the punishment of the tyrant, and was, therefore, retained prisoner. While he was crossing the Lake of the Four Cantons, or Lake of Lucerne, in the same boat with Gessler, a violent storm threatened the destruction of the skiff. Tell, as the most vigorous and skilful helmsman, was set free, and he conducted the boat successfully near the shore, but seized the opportunity to spring upon a rock, pushing off the bark. He had fortunately taken his bow with him, and when the governor finally escaped the storm, and reached a rocky defile on the road to Kiissnacht, Tell shot him dead. The death of Gessler was the signal for a most obstinate war between the Swiss and Austrians, which was not brought to a close until 1499. Tell was present at the battle of Morgarten, and is sup¬ posed to have lost his life in an inundation in 1350 while attempting to save a friend. Such is the legendary story of William Tell. Inves¬ tigation has broken down the proofs of his ex-

istence. There is no mention of him by any contemporaneous historian ; his name is first met with in the chronicles of the second half of the 15th century, and none of the Tell bal¬ lads are of an earlier date. Similar stories in regard to the shooting of the apple occur in Saxo Grammaticus, the Danish historian, and in Icelandic literature, not to mention the old English ballad of Adam Bel, Clym of the Cloughe and Wyllyam of Cloudesle. Besides, the many contradictions between the various personages, dates and places, and the widely differing representations of the event, show the gradual development of the legend. The untir¬ ing industry of historical scholars has not been rewarded by the finding of the name of Tell in the archives and

church registers of Uri, and although an uninterrupted series of charters exists relative to the bailiffs or governors of Kiissnacht in the 14th century, there is no Gess- ler among them. The Tell chapels were erected or called by his name generations after his death; the document which speaks of the as¬ semblage in 1388 of 114 persons who knew him personally, and of the erection at that. time of a Tell chapel on the shore of the Lake of Lucerne, was not known until 1759. Consult Hisely's (Recherches Critiques> (1843) ; Roch- holz's (Tell und Gessler in Sage und Ge- schichte) (1877) ; Gisler's <Die Tellfrage: Ver- such ihrer Geschichte und Losung) (1895). See Switzerland, History.

TELL CITY, lnd., city in Perry County, on the Ohio River, 125 miles southwest of In¬ dianapolis, on the Southern Railroad. There are deposits of coal and clay in the vicinity, and manufactures include furniture, iron prod¬ ucts, woolens, flour and tobacco. The city was founded by the Swiss Colonization Society in 1857. Pop. (1920) 4,086.

TELL EL AMARNA, Egypt, a district near the east bank of the Nile, 190 miles above Cairo, comprising the site and environs of the ancient city of Akhenaton, known also as Ekhaton and Akhet-Aton, built by Amenophis IV, who later was known as Akhenaton or Ikhnaton. The city was built by Amenophis about 1360 b.c. as a new capital of the empire in place of Thebes after he had abandoned the religion of Ammon for that of Aton. It grew rapidly but was abandoned upon the death of Amenophis, the court returning to Thebes as its capital and to the worship of Ammon. The most important ruins are those of the palace and the House of Rolls, and there are remains of the temple. About 300 clay tablets contain¬ ing valuable records of the time of Amenophis and his father were discovered in the House of Rolls in 1887. To the northeast and to the south of the ruined city are tombs hewn in the sides of the hills which abound in sculptured scenes picturing mainly the worship of the sungod. The tomb of Meri-Ra, high priest of the sun, has two spacious chambers and a fagade nearly 100 feet long. The tomb sup¬ posed to be that of Amenophis is in a ravine about midway between the north and the south tombs. Consult Petrie, F., (Tell el-Amarna) (1894) ; Davies, N. de G., (Rock Tombs of Tell el Amarna) (1903-08) ; Petrie, W. M. F.,

(Syria and Egypt from the Tell el Amarna Letters) (1898).

VOL. 26 — 26

TELL EL KEBIR, Egypt, village in the northeastern portion of the country, on the Sweetwater Canal, 18 miles southeast of Zag- azig. It

was the scene 13 Sept. 1882 of a bat¬ tle between the English forces commanded by Sir Garnet (later Lord) Wolseley and the Egyptians under Arabi Pasha, which resulted m the utter defeat of the Egyptians.

TELLER, tel'er, Henry Moore, American senator : b. Granger, Allegany County, N. Y., 23 May 1830; d. Denver, Colo., 23 Feb. 1914. He was educated at Alfred University, New tLork, taught school, and after admission to the bar practised law in Illinois and Colorado. He was United States senator from Colorado 1876-82, Secretary of the Interior 1882-85, and was a member of the national Senate from 1885, except for a brief interval 1896-97, up to 1909. He was especially prominent as a silver advocate, and had the unusual experience of serving his constituents as a nominee of the Republican and later of the Democratic party.

TELLEZ, tel'yath, Gabriel, Spanish dra¬ matic author, better known by his pseudonym, El Maestro Tirso de Molina: b. Madrid between 1570 and 1572; d. Soria, 12 March 1648. He studied at Alcala and remained for some time at Toledo, whence some of his works are dated, also in Galicia and in Seville. The date of his profession as a Brother of Charity is unknown, but we know that he had become superior by 1619. In 1634 he was named De- fimdor general of Castille. His first poetical work, (Los Cigarrales de Toledo > (1624) is a collection of tales in which there is a sem¬ blance of the influence of Boccaccio. This in¬ fluence is clearer in (Los tres maridos burla- dos, * which is an admirable adaptation of the (Decameron. > Instead of a second part of the (Cigarrales > promised by the author there appeared in 1635 a new collection ((Deleitar aprovechando)) of religious stories mixed with (Autos, J of which (E1 Colmenero divino) is one of the best efforts in religious drama. For a long time Tellez devoted himself to this spe¬ cies of composition. In 1620 he dedicated to his friend Lope de Vega an admirable scenic portrayal of the legend of Don Juan, which, although univer¬ sal as proved by Farinelli, has taken on the character of a purely Spanish legend through this work of Tellez, which has been widely imitated in other literatures. It is his best work and in order of importance may be men¬ tioned (La prudencia en la mujer) ; <Marta la piadosa) ; <E1 vergonzoso en Palacio) ; (Don Gil de las calzas verdes) ; <E1 amor y la amis- tadˆ and (La vijlana de . VallecasP It has been said that his feminine characters are

lacking in amiable traits. He was to a great extent free from the

stylistic vices of his period and was often imitated by Calderon. It is dif¬ ficult to comprehend the obscurity into which his works and reputation fell soon after his demise. To-day we possess about 80 of the 400 pieces we know came from his hand. He also wrote historical works including (La Genealogia del Conde de Sastago) (1640) ; (La Cronica) of the Brothers of Charity. (See El Burlador de Sevilla). The best editions of his works are those of Augustin Duran, of Hart-zenbusch, (12 vols., 1831^11) ; by Romanos (1848) ; and Rivadeneira (Comedias escogidas de fray Gabriel Tellez. *Consult Cotarelo, C., tirso de Molina: Investigaciones bio-bibliograficas* (Madrid 1883) ; Morel-Fatio, A., (Etudes sur le theatre de Tirso de Molina *(in Bulletin hispanique 1900) ; (Nueva biblioteca de autores espanoles* (Madrid 1906-07) ; Armesto, (La leyenda de Don Juan* (ib. 1908).

TELLICHERRY, tel-i-cher'I, or TELLI- CHERRI, India, a seaport and garrison town in the Malabar district of Madras, 45 miles northwest of Calicut. The main buildings in¬ clude the castle — now a jail — the North Mala¬ bar district court, custom-house, churches and government offices. The entire area, on a picturesque site, covers about five square miles. The principal exports are sandal wood, coffee and cardamons, spices, cocoa and cocoanuts. The factory of the East India Company was founded in 1683. There are missions and other schools ; also Brennan College founded in 1862. Pop. 27,883.

TELLURIUM, an element discovered by Mueller von Reichenstein (1782) in a specimen of gold ore from Austria. Klaproth named it from the Latin tellus, meaning the earth. Tel¬ lurium occurs fre.e, but most commonly in company with gold, silver, lead and bismuth. Native tellurium is found in considerable quantity in Boulder County, Colo. The other important minerals containing tellurium are sylvanite, calaverite, pelzite, hessite and tetra- dymite. They are found principally in Aus¬ tria, and in the United States in Colorado and adjacent States.

Tellurium is a silver white metal, atomic weight 127.6, melting point about 453° C. and specific gravity 6.25. It is brittle, not changed by exposure to the air and when heated a little above its melting point it boils and condenses again in the cool portion of the retort as metal¬ lic drops. In chemical properties it is very like sulphur. It unites with chlorine readily, forming TeCb and TeCE The oxides TeO* and Te03 are analogous, yet differ considerably from S02 and S03. Tellurious and telluric acids and the salts derived from them are also known. Tellurium forms a compound with hydrogen analogous to H2S and possessing an even more disagreeable odor.

This element resembles sulphur in impart¬ ing very undesirable properties to metals even when present in very small amount. If tellu¬ rium and any of its compounds are introduced into the human system they give the breath a very strong and disagreeable garlic-like odor. To obtain the free element the ore is digested first with sulphuric acid; hydrochloric acid is then added in small quantity and the whole

treated with sulphurous acid which precipitates the tellurium.

TELPHERAGE, aerial transportation, as in a cable or elevated railway, by electric power, arranged for automatic operation. Both the system and the word ˆtelpherage,® which means ((distance carrying,® were introduced by the late Fleeming Jenkin. He recognized the ease with which the electric motor could be adapted to automatic transportation of mate¬ rials and he devised a system which when put into service gave satisfaction. This consisted of two overhead cables, mounted on stout poles, along which light carriers were hauled by means of one or more electric motors. To transmit current to the motors the cables were cut into sections, adjacent sections of one cable being insulated from each other, but cross- converted with sections of the other cable so as to form two continuous conductors, each lying alternately on the right and on the left of the system. The trains were somewhat longer than the sections of cable so that one end rested on one conductor while the other vvas on the second, thus completing the electric circuit.

Modern telpherage systems are more elab¬ orate than Jenkins'. As usually constructed, a light steel framework supports a system of light elevated rails, from which buckets or carriers are suspended, hanging on wheels on the rail or rails. Small electric motors are placed on the carriers. The current is transmitted to the motors by means of a small trolley wire erected over the running cable or rail. Sometimes a double trolley system is adopted. The telpher or towing vehicle is usually equipped with two motors. These may be placed on opposite sides of the cable or side by side. The driving wheels are mounted directly on the motor shafts, as gearings are not used. The carrier way is attached to the telpher or to a trailer and is often fitted with a third motor for hoist¬ ing the load. When heavy loads are to be carried two supports may be used, each having one or more running wheels. When the sys¬ tem is not automatic it is controlled from one station or an operator is carried with the train. Where the weights to be transported are light, wire cable is employed, and often the cable is supported between the posts by a sus¬ pension cable. In any case a rail is used in¬ stead of a cable when a corner is to be turned and in running through buildings where the cable construction would be difficult; or

where the weight and traffic is sufficient to warrant the cost.

The advantages claimed for the telpherage system are economy in cost of transporting and a capacity for moving large quantities of material with a low cost of construction as compared with a railway. Further, the system may be erected overhead and out of the way. Telpherage systems are now used in industrial works of all kinds for carrying materials in a building as well as outside. The system may also be adapted to other work, such as excavat- T'ff trenches, canal construction, etc. Consult Clark, Chas. M., (Telpherage> ; transactions American Institute Electrical Engineers* (Vol XIX, p. 391).

TELUGU, tel'oo-goo, or TELINGA, a language of India, belonging to the Dravidian

group and spoken by about 20,000,000 of people in Madras, Hyderabad, Mysore, Bombay, Cen¬ tral Provinces, Burma, Berar and other parts. The Telugu are the most numerous branch of the Dravidian race, but are less enterprising than the Tamils, who occupy the country to the south of them. The language is allied in roots to the Tamil language, but differs considerably otherwise. See India; Tamil.

TEMBULAND, fem'boo-land, South Af¬ rica, a district or dependency of the Cape Colony, in the east of which it is situated, on the Indian Ocean, one of the Transkei districts, adjoining Pondoland and Griqualand East; chief town Umtata. Pop. 232,000 (5,179 Euro¬ peans).

TEMENOS, anciently a sacred plot of ground; a piece of land marked off and conse¬ crated to God. Any tract of land allotted to a temple or sanctuary.

TEMESVAR, ' tem'esh-var, Rumania, on the Bega Canal, 75 miles northeast of Belgrade. It comprises a citadel and suburbs — four in number. Noteworthy are the castle, cathedral, synagogue, bishop's residence and town-house. The manufactures include woolen goods, oil, paper, tobacco, leather, etc., and there are grain- mills, distilleries, etc. The fortress has sus¬ tained many sieges; memorable is that of 1849, when it was invested and bombarded by the in¬ surgents. Pop. about 72,500.

TEMPE, tem'pe, Vale of, Greece, in Thes¬ saly, a beautiful valley on

the Peneus, flanked by Olympus at the north and Mount Ossa at the south. It has been immortalized by the classical poets.

TEMPERA. See Distemper; Mural Painting; Painting, Technique of.

TEMPERAMENT, in music , the system or principle of tuning voices or instruments in accord with the rule of fixed tones, uni¬ versally adopted since the middle of the 19th century and first advocated by J. Sebastian Bach (q.v.) early in the 18th century. In the system of equal or even temperament, the standard interval is the mean semitone, that is the 12th part of an octave. This neutralizes the “wolf® or harsh discords of uneven tem¬ perament which otherwise exist, among all the tones of voice or instrument, so that the only exactly true intervals become octaves and the number of key scales 12, the relative pitch of the tones of the ideal scale being fixed with mathematical precision. The voice or in¬ strument using the intervals of such a scale is said to be modulated or tuned in pure or just temperament. No further adjustment is required if these tones only are used. Modu¬ lation into another key, however, requires that some other tone than the original one shall be the keynote and one or more passing notes are necessary to arrive at the key desired (see Modulation. For the superseded System of tuning see Meantone or Mesotone Tempera¬ ment; Mode; also Well-Tempered Clavier). Consult Groves, dictionary of Music and Mu¬ sicians) (Vol. V, pp. 53-65, New York 1911).

TEMPERANCE. This word has long been used to characterize the movement for the temperate use of intoxicants and for the activities of societies of abstainers and those favoring a restriction of the use and sale of

alcoholic beverages. The records of all the early peoples of the world contain references to the evils of intoxication. The Buddhists, Taoists and Confucians taught temperance. “Look not thou upon the wine when it is red . . . At the last it biteth like a serpent, — and stingeth like an adder.® (Prov. xxiii, 31-32). The ancient philosophers and founders of the great world religions neither taught nor prac¬ tised total abstinence and these conditions fur¬ nished the religious reasons for advocating “temperance® rather than “total abstinence® from intoxicants. With the development of the manufacture of spirituous or distilled liquors, containing a much larger percent¬ age of alcohol than those of natural fer¬ mentation, the evils of intoxication multiplied and temperance sentiment developed and in¬ creased. At first the agitation against liquor was sporadic, yet there was a pronounced sentiment developed in both Europe and Amer¬ ica in the 18th century. In 1743 Lord Lonsdale made a speech in the English

House of Lords, urging the necessity for a temperance reform. In 1760 Smollett called the attention of the English people to the signs “Drunk for Id® and “Dead drunk for 2d.® He made an urgent appeal for improvement in the condition of the low alehouses. Yet it was not until 1829 that record is found of a temperance society in Great Britain, at New Ross, County Wexford, Ireland. In 1830 several temperance societies came into being in English cities and the Brit¬ ish and Foreign Temperance Society was founded in 1831. It lasted until 1850, but in the meantime its work was taken up by others. Father Theobald Mathew (q.v.), of Cork, Ire¬ land, began his campaign for temperance about 1838 and within three years he gathered about him more than 4,000,000 followers. The best evidence of the thoroughness of his work is that the consumption of liquors in Ireland fell off one-half during the period of his activity. In 1843 he was called to England and in 1850 to America, where he founded the numerous Father Mathew Total Abstinence Societies.

There had been considerable temperance agitation in the States before Father Mat¬ hew’s arrival. The Washingtonian move¬ ment started in Baltimore in 1840 and John B. Gough (q.v.) had begun his wonderful talks for temperance.. The influence of Mathew and Gough was evident in the formation of the Independent Order of Good Templars, founded in 1851 in Utica, and spreading rapidly all over the United States and to foreign countries. A woman’s crusade for temperance started about 1870 and crystallized in the National Woman’s Christian Temperance Union, founded in Cleveland in 1874 and now having 12,000 local unions throughout the United States. Frances E. Willard (q.v.) who was prominent in the work, founded the world’s Woman’s Christian Temperance Union in 1883, and it has become the largest and most influential movement for temperance and prohibition. It can scarcely be said, however, that the United States has led in temperance societies. Great Britain and her colonies far exceeded America in the num¬ ber of societies organized, doubtless partly be¬ cause her territory is so widely distributed. A list of prominent temperance societies in 1905 included United Kingdom 62, Germany 12, Australia 11, Switzerland 11, United States 10,

Austria-Hungary 8, Holland 6, Sweden 6, Den¬ mark 5, France 4, Belgium 2, etc.

Temperance agitation has influenced legis¬ lation for 75 years, but

still the use of intoxi¬ cants has gone on with little interference ex¬ cept locally. As a result temperance agitators have gradually come out stronger and stronger for prohibition of both the manufacture and sale of intoxicants and the temperance move¬ ment has merged into the Prohibition move¬ ment, though in its inception Prohibition was the work of the more radical reformers. See Prohibition.

Temperance Legislation. — Legislation against the liquor evil in America dates from 1642, when the colony of Maryland passed a law making drunkenness a misdemeanor, pun¬ ishable by a fine of 100 pounds of tobacco. As sentiment against intoxication developed the license system was adopted, as a temperance measure, being popular in communities also be¬ cause it furnished a revenue for the local gov¬ ernment. Soon the license system won the approval of the liquor sellers, for it stopped competition in their business, resulted in uni¬ form prices and, therefore, contributed to money-making. Though advanced and intro¬ duced by advocates of temperance, the license system was fostered and grew directly through the efforts of the liquor-sellers. Temperance workers then began to advocate no license and a vast amount of legislation developed in the different States over licenses, their revocation or suspension, at the will of the people. Re¬ strictive legislation took the form of local option laws and after the War of 1861—65 the local struggles at the polls of half the cities and towns in the country for years were centred mainly about the question of license or no-license. The establishing of local option in a community had a tendency to drive the lovers of liquor to the neighboring towns where there was license; thus the temperance towns lost their license fees, and saw their bibulous citizens going to other places to drink and also to trade. Often the result was that the finan¬ cial pressure caused a return to license. There was great wavering between license and no¬ license almost all over the country. The first State to recognize that this irregular system could be overcome only by the States acting as a unit was Maine, which in 1851, under the influence of the Gough and Mathew move¬ ments, adopted State local option, and as a State continued to refuse to license the liquor traffic. Kansas and North and South Dakota followed, and in 1881 Maine placed the pro¬ hibitory clause in her constitution and ended the agitation for a return to licensed liquor-selling.

B*ut in other States the contests at the polls continued regularly. Indiana was the first State to pass a local option law in 1832, and several other States had followed by 1850. By 1900 one-third of the country was under local option, and in 1911 local option existed by enactment in 33 of the States. Between 1890 and 1910 ap¬ pears to

have been the most active years with State legislatures in passing laws to restrict and regulate the liquor traffic. Most of the States passed Sunday closing laws, though al¬ lowing the hotels to sell liquor to their cus¬ tomers with meals. There was legislation per¬ mitting wives and children of drunkards to bring civil suits against any selling liquor to

their provider. There were laws against the locating of saloons within so many feet of churches, schools or polling places. But these laws were largely honored in the breach. Sun¬ day closing never was effective in the large cities, except spasmodically, as some mayor or chief of police became active. Public sentiment condoned the open backdoor as a rule, and it remained to the end the common practice with saloons in large cities. In country liquor shops the selling on Sunday was confined to those who were known personally to the proprietor to be safe.

The effort to improve conditions by high license was equally ineffective. When this was proposed the argument was that nine-tenths of the saloons would go out of business, and that the evil would be confined to those who had the liquor habit and who would drink anyway. This proved to be sophistry. The communities got more money by the high license system and it caused the liquor forces to become more active in politics, until in very many cities and towns a man could rarely be chosen to public office unless he was acceptable to the liquor interests.

A perpetual difficulty with obtaining temper¬ ance by all these various methods of legislation was that they failed to strike at the manufac¬ ture or the transportation of liquor. Though Maine prohibited liquor selling for years, the agents of the United States government ob¬ tained large sums in revenue from liquor that went into Maine, carried there with no attempt to stop it, by the express companies. And this form of nullifying the no-license law in local option communities was notoriously common. The no-license law only stopped the sale of liquor as a beverage over the counter; the indi¬ vidual still had a right to buy it by the barrel, and have it expressed to his home, and give it to his friends, and the best hotels were per¬ mitted to place it on their tables as part of the food supplied. The fact that some thousands of statutes in the different States were useless in attaining the end of temperance at length became apparent to the most obtuse. The man¬ ufacture and consumption of liquors in the United States had a slow and steady increase all through these years of antagonistic legisla¬ tion, up to 1913, after which date there was no¬ ticed a very slight per capita reduction. The per capita consumption of

malt liquors during the past 100 years in the United States slowly and steadily increased up to 1907, after which it fell off a small fraction. The per capita con¬ sumption of distilled liquors had a slight but steady decrease from 1865 to 1896. Thereafter it increased until 1907, after which it was var¬ iable. But this trifling decrease in distilled liquors was evidently but a change to malt liquors, for the latter grew as the former re¬ duced, and the whole calculation is based on per capita use, the volume of liquors made and sold being always on the increase up to 1907, and the falling off then appeared to be due more to financial stringency than to moral suasion or obedience to law. All these experiences with legislation that accomplished little or nothing taught the public that they were being fooled, and that the powerful financial interests in the liquor trade were always able to guide legisla¬ tion or block it, or prevent its enforcement, so that in the end the trade was unharmed. As a

result agitation for temperance legislation prac¬ tically ceased, and those who opposed the liquor traffic worked for Prohibition (q.v.).

TEMPERANCE, Sons of, or THE OR¬ DER OF THE SONS OF TEMPERANCE,

was organized in the city of New York, 29 Sept. 1842. It is composed of subordinate, grand and national divisions. It has four na¬ tional divisions — one for North America, one for Great Britain and Ireland and two for Aus¬ tralia. In the course of its existence it has had nearly 4,000,000 members on its rolls. Its fundamental and inalienable principle is total abstinence from all intoxicating liquors and bev¬ erages.

TEMPERANCE LEGISLATION. See

Temperance.

TEMPERANCE SOCIETIES. See Tem¬ perance; Temperance, Sons of, or The Order of the Sons of Temperance.

TEMPERATURE. See Heat; Ther¬ mometer; Thermometry; Thermoydynamics ; Zero.

TEMPERATURE OF THE BODY. See

Animal Heat.

TEMPERATURE VARIETIES. See

Variation.

TEMPERATURES, Underground. See

Underground Temperatures.

TEMPERING, the art of imparting to metals, by means of heat treatment, a definite degree of hardness. The term is now applied almost exclusively to certain kinds of steel, which are used in the manufacture of tools. It is said that the ancients could harden and tem¬ per copper; but this art, if it ever really existed, is now lost. The effects of thermal changes upon steel vary greatly with the quality of the steel and with the exact nature of the treat¬ ment. It is necessary to distinguish clearly between ˆannealing,® ˆhardening® and <(temper- ing.® Any steel (except those varieties that are alloyed with silicon, tungsten and certain other elements) may be annealed, but it is es¬ sential that the steel shall contain a certain amount of carbon, in order that it may be ca¬ pable of being hardened and tempered. If steel is raised to a red heat and is then allowed to cool very slowly, it becomes relatively soft, so that it can be filed and turned in a lathe. This process is called (<annealing,® and it has usually been held that the slowness of the cooling is the essential thing in the softening process. There is excellent reason for believing, how¬ ever, that the exact temperature to which the steel is exposed before it is cooled has a much greater influence than the rapidity of the cool¬ ing. It has been shown, for example, by the researches of Brinel, Tschernoff, Le Chatelier, Heyn, Ridsdale, Stead and others that steel which has acquired a dangerously crystalline character from annealing for a long time at too low a temperature in a slightly oxidizing atmosphere, or from long continued heating at high tem¬ peratures, may have its original structure and properties restored by the simple artifice of heating it to a certain critical temperature (which is about 1,600° F.), and then allowing it to cool ; the rate of cooling, in this case, being a matter of comparative unimportance. Steels may sometimes be had which do not need special treatment to render them fit for use in

certain classes of tools ; the tool being ready for use after it has been forged and allowed to cool by natural exposure to the air. In general, how¬ ever, a tool steel must receive special treatment in order to fit it for the work in hand; this treatment being given after the tool has

been forged to shape. The process of tempering then consists of two steps, the first of which consists in imparting to the cutting edge of the tool a degree of hardness that is too great for the work for which the tool is to be used, while the second step consists in reducing (or <(tem- pering®) this hardness, until it attains a value that experience has shown to be satisfactory. The tempering of an ordinary tool may be de¬ scribed as follows : The finished tool is heated to a bright red, care being taken to have the heat extend back some distance from the cutting edge. The cutting edge of the tool is then immersed in. water to a slight depth and kept there until it has cooled sufficiently to remain wet when withdrawn from the water. By this means the steel is rendered exceedingly hard throughout the chilled part; that is, in the vicinity of the cutting edge. If it were used in this condition, however, the edge would be too brittle and would be likely to break in service. To reduce the hardness to the proper value, the tool, immediately after being with¬ drawn from the water, is brightened up near the cutting edge with a piece of emery cloth, or in some similar manner, and the cleaned area is then watched while the heat from the un¬ quenched part spreads toward the cutting edge. The oxidization of the steel, as the edge be¬ comes hotter and hotter from conduction, causes a play of color to become visible, which serves as an index of the temperature. These colors run from the hot portion of the tool toward the quenched cutting edge. In the order in which they proceed, they may be described as pale yellow, straw yellow, brownish yellow, light purple, dark purple and blue. When the proper color reaches the cutting edge, the whole piece is again quenched, and the ˆtempering® is com¬ plete. The colors that are used for different implements are as indicated below:

Very pale yellow (about 430° F.) : Steel- engraving tools, turning tools, hammer faces, planer tools, wood-engraving tools.

Straw yellow (about 460° F.) : Dies, taps, drills, punches, reamers.

Brown yellow (about 500° F.) : Gouges, plane irons, twist drills, cooper tools, wood¬ boring cutters.

Light purple (about 530° F.) : Augurs, sur¬ gical instruments, cold chisels, edging cutters.

Dark purple (about 550° F.) : Axes, gim¬ lets, needles, hack-saws, screwdrivers, springs, wood saws.

Some tools are of such a shape that they cannot be tempered in the manner here de¬ scribed, but must have their temper ((drawn® to the

desired color by reheating the piece be¬ tween hot iron plates, or in a hot iron ring. Springs are often tempered by a different method, known as ((oil tempering.® In carrying out this method, the piece is first hardened by heating to a bright red heat and then quenching by plunging the whole piece in water or in oil. The article to be tempered is then wetted with oil and gradually and uniformly heated until the oil upon it blazes up, when the piece is again quenched in the oil. This process of

heating to the ignition point of the oil and then quenching is repeated until it has been per¬ formed three times, after which the piece is said to be <(oil tempered,® and is ready for use.

In the early days of steel-working in the United States, it was common to import water in casks from Sheffield, England, for hardening and tempering purposes, as it was believed that there is some special virtue in the water that had been used for so long, and with such eminent success, in that city. There was prob¬ ably little or no foundation for this belief, and yet it is known that substances that may be in solution in the water that is used for quenching often have an important influence upon the product. Many artisans dissolve salt or cyanide of potassium in the water that they use for this purpose, and there is considerable ground for the belief that such dissolved substances do exert an influence upon the character of the product, which is out of all apparent proportion to the strength of the solutions containing them. In particular, it may be noted that there is a deeply-rooted belief among blacksmiths and other artisans who work with metals that a piece of steel cannot be hardened by heating it and then quenching it in water that contains soap, even in small amounts.

The art of tempering cannot be adequately presented in a short article, and those who are skilled at it maintain (probably quite justifiably) that the only way to learn it is by actual ex¬ perience in the shop. Different steels may require radically different treatment, and special implements (razors, for example) may call for years of study before they can be tem¬ pered satisfactorily.

. Allan D. Risteen.

TEMPEST, The. Although certain inter¬ nal evidence, notably the verse-test, has caused most scholars to believe that (The Winter's Tale)

was the last of Shakespeare's plays, there will always be reason in thinking that (The Tempest *(written in 1610 or 1611) best represents the final mood of Shakespeare as he turned from the writing of his plays to the last years of his life in Stratford. It is certainly one of the group of romantic comedies which Shakespeare wrote after the completion of his tragedies ; and in the <$ar- acter of Prospero we are warranted in seeing an adumbration of Shakespeare's personality as he looked out upon the world from the heights of his later years. He, like Prospero, broke his wand and buried his book deeper than did ever plummet sound. After all, while life may be tragical as presented in the series of plays from (Hamlet) to (Timon of Athens,* it is also full of sunshine and humor and the for¬ giveness of enemies and the reconciliation of the forces of good and evil. (The Tempest* is such a representation of life. While some of the scenes of the play suggest definitely Milan and Naples, Tunis and the intervening Medi¬ terranean Sea, the enchanted island upon which Prospero lived is on none other than the uncharted deep that voyagers were bring¬ ing within the compass of man's imagina¬ tion. In the grotesque figure of Caliban, the magic of Prospero and the spirit-like world of Ariel, there is the atmosphere of the strange world that stood out in definite con¬ trast with the fixed limits of the European

world. More particularly, Shakespeare was indebted to the story of a fleet of ships that had set out from England in 1609, was wrecked in the Bermudas a few weeks after and finally reached the newly-established colony in Virginia. While, as has been suggested, he might have heard from returning seamen stories of this wreck and of the strange hap¬ penings in the New World, he was especially indebted to Silvester Jourdan's (The Dis¬ covery of the Bermudas,* published in 1610. Professor Alden has recently made good his contention that the real source for the de¬ scription of the storm and for the incidents that take place upon the strange island is found in a letter written by William Strachey, dated 15 July 1610, and which, though not pub¬ lished until 1625, was, from contemporary evi¬ dence, seen by Shakespeare. The parallelisms between the play and the letter are most strik¬ ing and certainly tend to show that the author's indebtedness to contemporary sources was far greater than has been generally supposed. The ideal commonwealth suggested by Gonzalo, while _ based upon Florio's translation of Montaigne's essays, a new edition of which was published in 1610, bears a striking re¬ semblance to conditions in the Virginia colony as portrayed in the letter.

However far one may go in the acceptance of these parallels, the play is none the less the creation of Shakespeare's genius. While it is lacking in the perfect technique of some of his plays, and especially in

the closeness of dra¬ matic structure, it is a great poem and it lends itself to allegorical interpretation as do few of the plays. Caliban is a monumental repre¬ sentation of a primitive type of humanity, re¬ joicing in unrestricted freedom and in the saturnalia of license. Ariel, more than Puck, represents the spiritual forces of nature under the domination of superior wisdom and for the service of man. Prospero, both in his magical art and in his intellectual and spiritual greatness, is an anticipation of the triumphant victory of man at his best over all the forces of the world. There is no greater utterance of Shakespeare than the words in which Prospero, looking out from the serene heights which he has reached, expresses the ultimate truth about man and the universe :

“We are such stuff

As dreams are made on, and our tittle life

Is rounded with a sleep.”

Edwin Mims.

TEMPLAR, Knights. See Masonic Fra¬ ternity, THE.

TEMPLE, Frederick, English prelate, archbishop of Canterbury: b. Santa Maura, Ionian Islands, 30 Nov. 1821; d. London, 23 Dec. 1902. He was the son of an English army officer who died while he was a child, and under his mother’s care was well educated in youth, so that he obtained a <(double first® at Oxford and was elected Fellow and tutor of his college. After his ordination in 1846 he took charge of Kneller Hall, Twickenham, and from 1848 to 1858 was school inspector. In the latter year he was made headmaster of Rugby and became one of the most powerful and in¬ fluential successors of Arnold. The publica¬ tion of (Essays and Reviews,* in which series Temple led off with (The Education of the

World/ roused a storm of acrimonious con¬ troversy, but did not shake confidence in the headmaster of Rugby, who was appointed bishop of Exeter in 1869, was translated to London in 1885 and succeeded Archbishop Ben¬ son in 1896. Equally as schoolmaster and as bishop he 'was a strict disciplinarian, an un¬ tiring worker, a blunt, just and sincere man whose plainness of address did not obscure the massive learning with which his mind was stored. The great

controversial storms of the century had spent their fury in the English Church before he reached the primacy, but his incumbency was not uneventful. The Tractarian movement was in its last phase of ritualism, and Temple handled ritualists with firmness and moderation. He took part in the queen's diamond jubilee (1897) and in 1902 placed the crown on the head of her successor. His writings are (Sermons in Rugby ChapeP and Bampton Lectures for 1884 on (The Rela¬ tions between Religion and Science/ of which it may be said that they were up to the standard set by previous lecturers and were not un¬ worthy of the future primate of All England. He died in harness, never recovering from the effort he made in a strong appeal in the House of Lords uttered in favor of the public education bill.

TEMPLE, Oliver Perry, American law¬ yer and author : b. Green County, Tenn., 27 Jan. 1820. He was graduated from Washing¬ ton College, Tenn., in 1844, and admitted to the bar in 1846. He was a Union leader in East Tennessee during the Civil War; was a chan¬ cellor of Tennessee, 1866-78, and retired from the bar in 1881. His publications include (The Covenanter/ (The Cavalier and the Puritan) (1897) ; (Union Leaders of East Tennessee) (1903), etc.

TEMPLE, Richard Carnac, English civil servant and antiquary: b. Allahabad, India, 15 Oct. 1850. He was educated at Cambridge University. He served in the Burma War 1887— 89 and received a medal for bravery. From 1887-93 he was engaged by the Indian govern¬ ment to raise and fit out volunteer regiments. He has published (Wide Awake Stories5 (1884) ; (Legends of the Panjab) (1883-90), etc., and is a member of philological and other learned societies.

TEMPLE, Sir William, English states¬ man : b. London. 1628; d. Moor Park, Surrey, 27 Jan. 1699. He was educated at Cambridge, spent six years on the Continent and returning in 1654, and not choosing to accept any office under Cromwell, occupied himself in the study of history and philosophy. On the Restora¬ tion he was chosen a member of the Irish con¬ vention, and in 1661 was returned for the county of Carlow. The following year he was nominated one of the commissioners from the Irish Parliament to the king, and removed to London. On the breaking out of the Dutch War, he was employed in a secret mission to the bishop of Munster which he executed so much to the satisfaction of the ministers that in the following year he was appointed resident at Brussels, and received a baronetcy. With De Witt he concluded the treaty between Eng¬ land, Holland and Sweden (February 1668), with a view to oblige France to restore her

conquests in the Netherlands. He also at¬ tended, as Ambassador Extraordinary, when peace was concluded between France and Spain at Aix-la-Chapelle, and subsequently residing at The Hague as Ambassador, enjoyed the friendship of De Witt, and also of the Prince of Orange, afterward William III. A change of politics led to the recall of Temple in 1671, who, refusing to assist in the intended breach with Holland, retired from public business, and employed himself in writing his Observa¬ tions on the United Provinces/ and part of his (Miscellanies/ In 1674 Temple was again Ambassador to the States-General, in order to negotiate a general pacification. Previously to its termination in the Treaty of Nimeguen (in 1678), he was instrumental in promoting the marriage of the Prince of Orange with Mary, eldest daughter of the Duke of York, which took place in 1677. In 1679 he was recalled from The Hague, and shortly afterward was elected to represent the University of Cam¬ bridge in Parliament. In 1681 he retired from public life altogether. He was on friendly terms with William III who occasionally visited him. (For his relations with Swift see Swift, Jonathan). His Memoirs5 are import¬ ant as regards the history of the times, as are likewise his (Letters/ published by Swift after his death. His (Miscellanies) consist of essays on various subjects: (Gardening/ (The Cure of the Gout/ (Ancient and Modern Learning5, (which provoked much controversy at the time), health and Long Life/ (Different Conditions of Life and Fortune/ Hntroduc- tion to the History of England/ (Poems and Translations/ etc. Consult Courtenay, (Life of Temple5 (1836) ; Macaulay's (Essay 5 and For¬ ster, (Life of Swift5 (Vol. I, 1875).

TEMPLE, Tex., city in Bell County, on the Gulf, Colorado and Santa Fe and the Mis¬ souri, Kansas and Texas railroads, about 220 miles northwest of Galveston, and 35 miles southwest of Waco. It was founded in 1882 bj' the Gulf, Colorado and Santa Fe Railroad, and was chartered as a city the same year. It is in an agricultural and stock-raising region and has considerable manufacturing interests. The chief manufacturing establishments are agricultural-implement works, cottonseed-oil mills and cotton compresses, flour mills, chew¬ ing gum and candy factory and lumber mills. The city has handsome churches, public and parish schools, Saint Mary's Academy, two kindergartens, a business college, three large hospitals and a public library. The four banks have a combined capital of $580,000. Pop.

(1920) 11,033.

TEMPLE, London, England, a district of the city lying between Fleet street and the Thames, and divided by Middle Temple Lane into the Inner and the Middle Temple, belong¬ ing to separate societies (see

Inns of Court), each with its hall, library and gardens. The name is derived from the Knights Templars, who had their headquarters in England here. The two temples are separated by a wall from the rest of the city, and have entrance gates which are closed at night. The district is oc¬ cupied, with few exceptions, exclusively by barristers and solicitors. In former times the members of the Temple were famous for the

masques, revels and banquets which they gave in their halls. To these entertainments there are many allusions in the old poets ; kings at¬ tended them, the benchers joined in them and directed the students to dance. Among famous members of the Temple have been Beaumont, Sir Walter Raleigh, John Ford, Wycherley, Congreve, Cowper, Blackstone, Sheridan, Coke, Littleton, Clarendon, Somers and Eldon. Gold¬ smith and Johnson had chambers here, and here Charles Lamb was born and passed the first seven years of his life.

TEMPLE, a name applied in religious his¬ tory particularly to the temple built by Solo¬ mon at Jerusalem as a House of the Lord, and to the temples which succeeded it, more espe¬ cially the magnificent structure, erected by Herod the Great, which is often mentioned in the New Testament. Solomon's Temple was built with the aid of an architect and skilled workmen from Phoenicia. The temple was an oblong stone building, 60 cubits in length, 20 in width and 30 in height. On three sides were corridors, rising above each other to the height of three stories, and containing rooms in which were preserved the holy utensils and treasures. The fourth or front side was open, and was ornamented with a portico, 10 cubits in width, supported by two brazen pillars, Jachin and Boaz (stability and strength). The interior was divided into the most holy place or oracle, 20 cubits long, which contained the ark of the covenant, and was separated by a curtain or veil from the sanctuary or holy place, in which were the golden candlesticks, the table of the shew-bread, and the altar of incense. The walls of both apartments and the roof and ceiling of the most holy place were overlaid with wood work, skilfully carved. None but the high- priest was permitted to enter the latter, and only the priests devoted to the temple service the former. The temple was surrounded by an inner court, which contained the altar of burnt- offering, the brazen sea and lavers, and such instruments and utensils as were used in the sacrifices, which, as well as the prayers, were offered here. Colonnades, with brazen gates, separated this court of the priests from

the outer court, which was likewise surrounded by a wall. This temple was destroyed about 586 b.c. by the Assyrians, and after the return from the Babylonish captivity some 70 years later, a second temple of the same form, but much inferior in splendor, was erected. Herod the Great rebuilt it, beginning the work about 20 b.c., of a larger size, surrounding it with four courts, rising above each other like ter¬ races. This being the temple of the time of Christ possesses great interest. The lower court was 500 cubits square, on three sides sur¬ rounded by a double, and on the fourth by a triple row of columns and was called the court of the Gentiles, because individuals of all na¬ tions were admitted into it indiscriminately. A high wall separated the court of the women, 135 cubits square, in which the Jewish females assembled to perform their devotions, from the court of the Gentiles. From the court of the women 15 steps led to the court of the temple, which was enclosed by a colonnade, and divided by trellis-work into the court of the Jewish men and the court of the priests. In the mid¬ dle of this enclosure stood the temple, of white

marble richly gilt, 100 cubits long and wide, and 60 cubits high, with a porch 100 cubits wide, and three galleries like the first temple, which it resembled in the interior, except that the most holy place was empty, and the height of Herod's temple was double the height of Solo¬ mon's. Rooms appropriated for different pur¬ poses filled the upper story above the roof of the inner temple. This edifice was destroyed by the Romans in 70 a.d., and for many cen¬ turies the long-consecrated height has been oc¬ cupied by the Mosque of Omar.

The Egyptians, Greeks, Romans, Persians, and other ancient nations had temples for the worship of their gods, and the Mexicans and Peruvians, at the time of the arrival of the Spaniards in the New World, had splendid temples. On the sacrificial platforms of Aztec temples thousands of victims perished annually. The Greek and Roman temples were, as a rule, models of architectural grandeur and beauty. The word < <temple)) is sometimes, but not often, applied to Christian places of worship as a spe¬ cial designation, although frequently used in a figurative sense. The Mormons designate as "The Temple,® the large structure in which they worship at Salt Lake City. Consult Fer- gusson, James, (The Temple of the Jews) (1878) ; Smith, G. A., Jerusalem* (1908). See Architecture.

TEMPLE, Order of the. See Orders,

Royal.

TEMPLE BAR, London, England, an arched gateway which formerly

stood between Fleet street and the Strand, and divided the city from the liberty of Westminster. (See London). It was a structure of the Corinthian order, designed by Sir C. Wren, and built in 1670 of Portland stone. Over the gateway, on the east side, were statues of Queen Elizabeth and James I; and on the west side, of Charles I and II. The heads of persons executed for high treason were formerly exhibited on this gate. Here, also, on particular occasions, the corporation of London received the royal family, the heralds' proclamations, or any dis¬ tinguished visitors. When the sovereign came in state the lord-mayor here delivered to him the sword of state, which was returned, and after this he rode bareheaded, immediately in front of the royal procession. As the gate seriously obstructed a crowded thoroughfare, it was removed in 1878, its site now being marked by the heraldic monster, a ˆgriffin.® The gate has been re-erected at Theobald's Park, Cheshunt.

TEMPLE UNIVERSITY, an institution of higher learning founded at Philadelphia in 1884 by Russell H. Conwell, pastor of the Bap¬ tist Temple. It was chartered by the State in 1888, and empowered to grant degrees in 1891, its name being changed from Temple College to Temple University in 1907. It was designed to offer instruction to young men whose occupa¬ tions kept them busy during the day, and at first only evening instruction was offered; in 1891 a day school also was added. There are 18 departments with a range from kindergarten and academic to the highest university courses. Instruction is arranged in morning, afternoon and evening classes in all branches except medi¬ cine and dentistry, in which there are only day classes. The university is non-sectarian,

blit is of a strongly religious atmosphere, and accomplishes a notable work in assisting those who could not otherwise obtain high educa¬ tional advantages. In 1918 there were 321 in¬ structors; 2,192 students attending and 306 with the colors.

TEMPO (time), in music, the relative rate of movement or degree of quickness with which a piece of music is to be executed. The de¬ grees of time are indicated by certain words such as lento (slow), adagio or largo (leisurely) andante (walking pace), allegro (gay or quick), presto (rapid), prestissimo (very rapid), etc. A tempo is the proper time. (See Music). The word is also used in chess to indicate the period of a move, especially when the move is wasted.

TEMPORAL BONE See Anatomy; Skull.

TEMPORAL POWER (of the Pope) . By this expression, in its generally received sig¬ nification, is understood the sovereign civil rule which was exercised by the popes over the states of the Church with varying vicissitudes from the middle of the 8th century down to the year 1870, when the last remnant of the papal states was annexed to the United Kingdom of Italy.

The formal establishment of the temporal power dates from the year 754, when Pepin, king of the Franks, bestowed upon Pope Stephen II (who had sought his aid against the oppression of the Lombards) independent sov¬ ereignty over some 20 cities, thus constituting what was henceforth known as the state or patrimony of Saint Peter. Though apparently a new departure — one possibly unlooked for on the part of the Pope himself — this addition of a temporal to the spiritual rule of the bishop of Rome was in reality but the natural outcome of pre-existing civil and political conditions. Among these may be mentioned the fact that the Roman Church was already in possession of numerous and extensive landed estates or patrimonies situated for the most part within the bounds of the Italian peninsula, and which were controlled or administered by the popes through their agents.

This state of things had gradually developed from very early beginnings, for we find that even during the period of the persecutions, the local church of Rome (whether organized le¬ gally as a burial society, or simply as a body corporate, holding property under the general laws of the empire) possessed not only the great cemeteries now known as the Catacombs, but also other property, as is clear from the edict of Milan. By a law of 321, the Emperor Constantine granted to all persons capable of making a will the right to bequeath property to the Church, and he himself gave an example of generosity in this respect by endowing.munif- icently the various basilicas of Rome. Similar bequests in one form or another were made by wealthy Christians throughout the empire, one of the principal uses to which the property thus acquired was applied being to relieve the dis¬ tress occasioned by the depredations of the bar¬ barians who began to overrun Italy from the beginning of the 5th century. In this way the Roman Church had become very wealthy, and the popes were already great landed proprie¬ tors, owning vast estates in various parts of

Italy and elsewhere long before any form of political papal sovereignty had been thought of. Meanwhile, . through the favorable legislation of

the Christian emperors, the political role of the popes and of bishops in general, was assum¬ ing an ever-growing importance. The bishop of a city was not only the official protector of the poor, of prisoners and of slaves; he had also in virtue of his office a voice concerning various points of civic administration. Even in pro¬ vincial affairs he enjoyed important rights and privileges. Thus, among other things, we find that appeal could be made from the decision of an imperial magistrate to the tribunal of the bishop. Such being the political status of bish¬ ops generally, it is easy to understand that the powers granted to and exercised by the Roman pontiffs were still more extensive. To them, in particular, recourse was had against the exac¬ tions of the rapacious Byzantine governors who ruled in the different Italian provinces, and in this connection, as well as in other ways, the vigilant protection of the popes proved bene¬ ficial to the people. It must be remembered that during this period the civil and political situation throughout the peninsula was in a con¬ dition bordering on the chaotic. The chronic state of unrest and insecurity which resulted from the incursions of the barbarians and the deplorable inefficiency of the imperial adminis¬ tration, made the interference of the popes in civil matters a real practical necessity. Theirs was the only authority that commanded gen¬ eral respect, and the common weal demanded that they should look after the material as well as the spiritual interests of their flock. That such was the true condition of affairs is amply shown forth in the papal correspondence of the time, especially in the letters of Gregory the Great (590-604). It is also worth noting that though they had ever-growing reasons to be dissatisfied with Byzantine rule, the popes (even those who succeeded Gregory) continued to remain faithful to the idea of a world-wide Christian empire, and exercised their influence to maintain in Italy its authority and prestige. But, as is well known, many of the emperors of that period were more preoccupied with theology than with matters pertaining to civil administration, and their repeated attempts to impose upon the bishops of the West subtle formulas of orthodoxy led to frequent conflicts, in some of which popes were violently dragged away to prison or death. Thus Silverius and Vigilius, Pelagius and Martin became the victims of imperial tyranny. On the refusal of Sergius I to accept the decrees of the Emperor Justinian II the latter commanded the proto- spatharius Zachary to arrest the Pope and bring him a prisoner to Constantinople, but the pub¬ lic spirit in Italy was already in revolt against this arrogant, high-handed policy, and the army interfered to prevent the execution of the im¬ perial mandate. Again, in 727, Leo the Isaurian sent his edict against the use of images to Pope Gregory II with orders for his deposition in case he should refuse to comply. Gregory re¬ sponded by denouncing the

edict and excom¬ municating the exarch ; again the soldiers arose in his defense, and the efforts of the imperial officers to carry out their instructions cost them their lives. In 733 the emperor confiscated all the Church's estates in Sicily, Bruttium, Lu- cania, Calabria and Naples; others were con-

fiscated by the Lombards, and no security re¬ mained even for the inhabitants of Rome. The empire was unable to defend its subjects — worse than that, it even oppressed and plundered them. The only refuge left to the Romans and their spiritual as well as actually temporal head was to seek the aid of the friendly king of the Franks. It is not clear whether Pope Stephen II in taking this step had already in view the establishment of a civil principality under his own rule or not, but be that as it may, just then the relations between the papacy and the emperor were further strained by the publication of a fresh edict against the use of images emanating from a synod of Constanti¬ nople. A continuation of the old regime seemed no longer possible, the army of Pepin arrived in Italy in the summer of 754, and the independent state of Saint Peter was established, with the Pope as its civil ruler, in the same year. In view of the circumstances, it may be truly said that this distinction was bestowed upon the bishop of Rome in recognition of a twofold prerogative, namely, his prestige as head of the Church and defender of orthodoxy against Eastern aggression, and his character of na¬ tional benefactor.

The papal dominion as constituted by the grant of Pepin comprised the cities of Ravenna, Rimini, Pesaro, Fano, Casena, Forli Comma- chio and 15 other towns. In 1053 the duchy of Benevento was annexed, and between that period and the end of the 13th century the au¬ thority of the Roman See was acknowledged by many other free towns in Italy. In 1278 the Emperor Rudolf I confirmed the acquisitions made thus far, defined the boundaries of the papal states, and -recognized the Pope's exclu¬ sive authority over them by absolving the in¬ habitants from their oath of allegiance to the empire. The papal dominion then included Pe¬ rugia, Bologna, Bertinoro, the duchy of Spoleto, the exarchy of Ravenna and the marche of An¬ cona, but many of the towns were more or less independent. The Romagna was annexed at the end of the 15th century. Under Alexander

VI and Julius II were added Faenza, Parma, Placentia and Reggio, and

the papal states re¬ ceived their final additions in the 17th century, namely, Urbino, Ronciglione and the duchy of Castro. In 1797 the Romagna was seized by Napoleon and incorporated into the Cisalpine Republic. The following year Rome itself was taken by. the French and the papal states were erected into the Roman Republic. Pius VII regained possession of his states in 1800, but they were soon retaken by the French, and finally (1809) incorporated with France, Rome being reckoned the second city of the empire. After the downfall of Napoleon (1814) Pius

VII returned to Rome and was formally rein¬ stated in his office of temporal ruler by the treaty of Vienna, mainly through the friendly support of the non-Catholic powers Russia, Prussia and England. In 1830 a rebellion broke out in Ancona and Bologna, the reason alleged by the insurgents being that the clerical rule in the provinces contrasted too unfavorably with the preceding French administration. This re¬ volt was quelled through the aid of Austria, but another uprising occurred soon after, and the Austrians took occasion thereby to occupy the northern legations, while at the same time the French placed a garrison in Ancona. Oc¬

casional minor disturbances occurred between these events and 1848, when Pius IX, on account of an insurrection, was obliged to flee to Gaeta and Rome was declared a republic. The Pope was again restored to power through the armed intervention of France, Austria, Spain and Na¬ ples, and the Austrians occupied the northern legations or Romagna on his behalf until 1859, when their army was withdrawn. Soon after the province repudiated its allegiance to the Pope and its annexation to Sardinia was pro¬ claimed. The French still continued to hold Rome in subjection to papal authority and Pius IX, with a view to withstand any further en¬ croachments upon *his dominions, raised an army, which was placed under the leadership of the able French general, Lamoriciere. In the meantime Garibaldi and his followers, whose aim was the political unification of the Italian states under the rule of Victor Emmanuel, were conducting a successful campaign in Sicily and Naples. The news of this caused an outbreak in Urbino and the Marches in favor of Victor Emmanuel. The Sardinian troops came to the aid of the insurgents and after two encounters with the troops under Lamoriciere compelled the latter to surrender with his whole army after a week's siege in Ancona (1860). The revolted provinces of Umbria, Urbino and the Marches, as well as the isolated provinces of Benevento and Pontecorvo, situated within the kingdom of Naples, were immediatelv annexed to Sardinia. Finally, on 20 Dec. 1870, the French troops having been withdrawn on ac¬ count of the war with Prussia, Rome was en¬ tered practically without resistance by the

troops of Victor Emmanuel, and the last vestige of temporal power disappeared. Victor Em¬ manuel having been proclaimed king .over united Italy, took up his residence in the papal palace of the Quirinal and Pius IX withdrew to a life of seclusion (in the Vatican), consider¬ ing himself as a prisoner unable to leave his retreat without compromising his dignity as head of the Church, or even giving occasion to riots and bloodshed. He never ceased to pro¬ test emphatically against the spoliation of his rights as a temporal ruler and against the pres¬ ence of the king and his court in the papal city. Leo XIII, though departing in many respects from the policy of his predecessor, maintained nevertheless throughout the same uncompromis¬ ing attitude toward the question of the tem¬ poral power, and the same policy was stead¬ fastly affirmed by his successor, Pius X. Such are, in briefest outline, the main facts pertain¬ ing to the origin and history of this ecclesias- tico-civil institution. It is beyond the scope of the present article to appreciate or criticize the motives either of those who labored to maintain it or of those who more or less directly sought its abolition. Still less per¬ tinent to the purpose in view would be a specu¬ lation on the probable restoration of the same in the future. It must be granted that, con¬ sidering the present political situation in Europe, the probability of a restoration of the temporal power, at least in its ancient form, seems rather remote. For all practical intents and purposes the different powers recognize as a fait accompli the incorporation of the papal dominions into the kingdom of Italy; though, on the other hand, it still remains true that this state of affairs has never yet received any for-

mal, international ratification. Furthermore, the necessity, or even the utility, of such a restoration is a point concerning which there is considerable divergence of opinion even among Roman Catholics. It is a question concerning which no authoritative dogmatic pronouncement has been formulated by the Church ; however, the firm and unmistakable attitude of the popes toward it cannot be looked upon by Catholics otherwise than deeply significant. All, even the most ultra-montane, must, of course, admit that the possession of a temporal sovereignty is not an essential prerogative of the successor of Saint Peter, since for so many centuries before it was established the Church was able to de¬ velop and fulfil so efficiently her mission in the world. Yet this temporal sovereignty is re¬ garded by many as the means providentially es¬ tablished to protect the necessary independence of the Pope and the free exercise of his func¬ tions as

spiritual head of the Church. Others, while admitting the main principle involved (namely, that the Pope should be free in his spiritual capacity) take a somewhat different view of the case. They remind us that the temporal power was the outcome of peculiar and to a great extent abnormal conditions. It was the best and perhaps the only solution at the time, and for centuries afterward of a vexed problem, partly political, partly reli¬ gious ; but at the same time it is not proved that had the conditions been otherwise some other regime of papal supremacy just as satisfactory would not have developed. But be that as it may, it is claimed that at least in the present social and political conditions of the Christian world, so different from those of the Middle Ages, the desired independence in spiritual matters can be secured without imposing on the Pope the burden of a temporal as well as a spiritual sovereignty. When, however, it is asked how this can be done, no very clear or satisfactory answer is forthcoming. It is plain from the nature of the case, as well as from past experience — notably the sojourn of the papacy at Avignon — that to have the Pope under the control or protection of any secular prince is dangerous for the best interests of re¬ ligion. If the head of the Church be not him¬ self an independent sovereign, it is hard to conceive a situation in which he would be free from undue political or national influence, es¬ pecially if he is to be either the subject or guest of some temporal ruler. It is for a similar reason that the founders of the Ameri¬ can Republic wisely determined that the seat of the central or federal government should be located not in any of the States, but in a sepa¬ rate independent district, exempted from State jurisdiction, thus insuring greater freedom of action to the governing body whose duty it is to legislate impartially in the interests of the en¬ tire nation. These and other reasons are urged by the advocates of the temporal power and when it is not unreasonably objected that dur¬ ing the third of a century that has elapsed since the occupation of Rome by Victor Em¬ manuel the Pope has always enjoyed full free¬ dom in the exercise of his spiritual jurisdiction; that never before has the moral influence of the papacy been so powerful and far-reaching, etc., the answer is made that while all this is true, there is nevertheless no sufficient guaranty that' this liberty will continue to be granted in

the future; that, moreover, the present situa¬ tion of the papacy is certainly abnormal, and that the increase of moral influence is due in great part to the fact that the popes have main¬ tained a firm attitude, refusing to become the allies of the Italian government. Not a few are of the opiniqn that in the present political status of the civilized world a system of inter¬ national guaranties would be a much more effectual means of securing for the Pope the permanent free exercise of his

spiritual juris¬ diction than could result from a restoration of the temporal power. However that may be, the most thoughtful statesmen allow that the prob¬ lem is complicated and delicate — that no solu¬ tion thus far arrived at or suggested is free from grave practical difficulties. The temporal power of mediaeval and later times was cer¬ tainly not without grave drawbacks and disad¬ vantages as regards the interests of both rulers and subjects. That it has been the occasion of many evils and abuses, that it has often been a real impediment to the spiritual efficiency of the papacy few impartial students of history will venture to deny; yet it will doubtless be as readily admitted that being given the circum¬ stances of the period the temporal power was a most useful, even necessary, factor in the evo¬ lution of Christianity; and whatever may be thought of its adaptability to future contin¬ gencies it will not be a matter for surprise to find that so many are still convinced of its per¬ manent necessity, at least until something better shall have been devised to meet the exigencies of the case, and shall have demonstrated its superiority by actual experience.

Bibliography — Barry, W. F., the Papal Monarchy from Saint Gregory the Great to Boniface VIIP (New York 1902) ; Brosch, (Geschichte des Kirchenstaates) (2 vols., Gotha 1882) ; Bryce, James, the Holy Roman Em¬ pire' (new ed., New York 1911) ; Csesare, R. de, in North American Review (Vol. CLXXI, p. 869, 1901) ; Crispolti (Marquis), Filippo, in International Quarterly (March-June 1904) ; Dollinger, J. J. I. von, (Papstthum und Kir- chenstaat' (Munich 1861) ; Duchesne, L. M. O., beginnings of the Temporal Sovereignty of the Popes, a.d. 754-1073' (Chicago 1908); Greenwood, A. D., the Empire and the Papacy in the Middle Ages' (London 1902) ; Gustine, G., (La loi des garanties' (Paris 1901) ; Gug- genberger, A., the Papacy and the Empire' (Saint Louis 1911) ; Hassett, M., in Catholic University Bulletin (January 1904) ; Hergen- rother, Joseph, <Der Kirchenstaat seit der franzosischen Revolution' (Freiburg 1860) ; Ireland, John, in North American Review (Vol. CLXXI, p. 337, 1901) ; Manning, H. E., tem¬ poral Power of the Pope' (London 1871); Pastor, Ludwig, (History of the Popes from the Close of the Middle Ages' (English trans. by Antrobus and Kerr, 12 vols., London 1906-12) ; Probyn, J. W., Utaly from 1815 to 1890' (Lon¬ don 1891) ; Reumont, A. von, (Geschichte der Stadt Rom' (Berlin 1870) ; Stillman, W. J., the Union of Italy, 1815-1895' (new ed., New York 1909) ; Tout, F. T., the Empire and the Papacy 913-1273' (new ed., London 1901) ; Valois, (La France et le grand schisme d'occi- dent' (Paris 1896-1902).

James F. Driscoll, D.D., Rector , Saint Gabriel's Church, New Rochelle, N. Y.

TEN COMMANDMENTS. See Deca¬

logue.

TEN KATE, Jan Jacob Ludewijk, Dutch poet: b. The Hague, 1819; d. 1889. See Kate Jan Jacob Ludewijk Ten.

TEN THOUSAND A YEAR, a novel by Samuel C. Warren (q.v.) published in 1841. Ihis story, though regarded by critics as ridiculously exaggerated and liable to the sus¬ picion of being a satire on the middle classes, » has held a certain place in fiction for more than half a century. The plot is ingenious, the legal complications are managed in a way that won the admiration of accomplished lawyers and the story with all its faults contrived to arouse and maintain the reader's interest. In 1902 it was reissued in an abridged form as 'Tittlebat Titmouse. >

TENACITY, the property or quality of re¬ sistance to disrupting force; the quality by which the molecules of a body resist either tensile or crushing strain. When the tenacity is slight the object may be brittle, when it is great it adheres together firmly. Compare Tensile. See Strength of Materials.

TENAFLY, N J., borough in Bergen County, 16 miles northwest of New York on the Erie Railroad. The Happy Land and Beth- more summer outing homes for children are situated here as well as the Mary Fisher Home for the Aged. It is a residential town, form- n<r a suburb of New York, and tberˆ rˆ?nu- actures of decorative burlaps. Pop. (1920) 5,650.

TENAINO, te-nl'no. See Shahaptian Indians.

TENANCY, a beneficial interest in some form of real property, or the relation of the lessee of land to the lessor of the same. This relation may be established without that the lessor be the holder in fee simple of the realty in question. At the present time the status of a tenant is usually created by a form of convey¬ ance known as a lease; this is now required to be in writing in most jurisdictions. It usually contains covenants or stipulations respecting the use to which the realty may be put, the rent or compensation to be paid the lessor, the making of repairs, etc. The law also regulates the rela¬ tions of the tenant to his landlord in some im¬ portant respects. Thus the tenant is protected

against eviction by the landlord. The tenancy may be sub-leased unless there is a restriction in this regard in the lease. A surrender or breach of the lease terminates a tenancy. See Landlord and Tenant.

TENANT. See Rent, Law of.

TENANT-RIGHT, in British law, a right possessed by the tenant, at the expiration of his tenancy, for reimbursement for improvements, and often of considerable monetary value. It is largely governed in England by statute. Ten¬ ant-right prevailed in some parts of Ireland by custom for many years, and was formally in¬ corporated into the law by an act passed in 1870.

It is also applied to the preference given to old tenants over strangers in leases from the Church, the Crown or corporations.

TENASSERIM, te-nas'e-rim, India, a maritime division of lower Burma, stretching in a narrow strip from the Salwin River 500 miles southward into the Malay Peninsula, be¬

tween Siam and the Bay of Bengal. Area, 36,086 square miles. It is for the greater part a mountainous wilderness. Within its territory are the Mergui Archipelago. Maulmain is the chief town on the north and Tavoy in the cen¬ tral area. The chief product is rice, though the mountains are rich in minerals. The natives are chiefly Burmese Buddhists. Pop. about

1,400,000.

TENCH, a small cyprinoid fish (Tinea vul¬ garis), familiar in European fresh waters, es¬ pecially slow-running and muddy rivers. The color is a greenish olive, tinted with a golden hue; the average length about 12 inches. The flesh is soft and rather insipid.

TENDA PASS, or COL DE TENDA,

Italy, a pass of the Maritime Alps, Piedmont, in the province of Cuneo, between Tenda and Limone, on the carriage road from Nice to Cuneo. Its highest point is 6,195 feet above sea-level.

TENDER, in law, a formal offer of com¬ pensation or damages made in a money action. A tender may be made through an authorized agent, and to make it valid the money must be actually produced. Making a tender may have the effect of freeing the defender from subse¬ quent expenses if the tender is found sufficient. A tender made to one of several joint claimants is held as made to all. A legal tender

is one of legal money of the country, originally confined to coin, but extended to authorized paper money. A payment in foreign notes or ((trade» dollars, or a large sum in bronze pennies, is not a legal tender.

TENDON, or SINEW, a band of white fibrous tissues by which a muscle is attached to a bone or other hard part. Tendons are dis¬ posed in elastic bands or layers flattened or rounded, and more or less elongated. When very much flattened and membraneous, they are called aponeuproses and sometimes fascise. They glide smoothly in sheaths, especially in the extremities; in some cases many are enveloped in a single sheath, in other situations they are kept in place by an annular ligament, as in the wrist and ankle. One of the most important is the Achilles tendon (q.v.), at the heel. One of the most beautiful contrivances in the human body is the manner in which the superficial flexor tendons in the fingers stop short at the middle phalanx and divide to allow the tendons of the deep flexor to pass through to the ter¬ minal phalanx, thus securing compactness and beauty of shape, with freedom and extent of motion. Contractions of tendons are frequently remedied by subcutaneous tenotomy; torticollis (q.v.) is also benefited by the division of the tendon of the sternomastoid muscles. Inflam¬ mation of the tendon sheaths, or tenosynovitis, about the wrist or ankle is a common and pain¬ ful affection usually due to strain or over exer¬ cise. Rest and mild counter irritation are the principal elements in the treatment. The violent strain of a tendon, less than a rupture, is called a sprain (q.v.). When a tendon is ruptured or cut nature makes an effort to rejoin it by growing or depositing new tissue in the gap. TENDRAC. See Tanrec.

TENEBRˆE, in the Roman Catholic Church the matins and lauds of Wednesday, Thursday and Friday of Holy Week, sung on

the preceding evenings. The ceremony dates from the 8th century. The services begin with 15 lighted candles which are extinguished one by one until the last, which is hidden, the church meantime being darkened. The growing darkness as a candle is extinguished after each hymn betokens the fading light of the world as Christ was leaving it, while the light of the hidden candle brought forth at the end of the service indicates the coming resurrection and that death could only appear to triumph over Christ. In English mediaeval churches 24 can¬

dles were used at the service.

TENEDOS, ten'e-dos, Asia Minor, an island in the 2Egean Sea, off the Troas Coast, belonging to Greece. It lies at the entrance to the Dardanelles, hence has figured in naval operations on several occasions. It is six miles long by three miles wide, is of volcanic forma¬ tion, with rugged surface, but highly fertile, and celebrated for its wine. Pop. 5,000.

TENEMENT HOUSE, a multiple dwell¬ ing arranged for the occupation of several families, each of which can live independently and do its cooking within its apartment. The legal definition varies somewhat in different cities. In New York, Philadelphia, Washing¬ ton, Buffalo and other cities, it is such a house for more than two families. In Chicago, Boston and Saint Louis the line is drawn at more than three families. Tenement house is a generic term, including what are popularly called apart¬ ment houses and flat houses or flats, as well as tenements. The attempt has sometimes been made in framing tenement-house laws or regu¬ lations to distinguish between apartment and tenement houses, but no satisfactory line of separation has ever been suggested, nor is there any legal regulation properly applicable to ten¬ ement houses, as popularly defined, which should not equally apply to apartment houses, or which presumably would not be adopted by intelligent owners of such houses from motives of self-interest.

Tenement-House Reform. — A movement to better the housing conditions of the working classes in cities, which originated about the middle of the 19th century and has gradually become national in character in the United States and Great Britain. In the United States it has taken the form of the regulation by State law or city ordinance of the construction, main¬ tenance and care of tenement houses, whence its

A tenement with no room opening on a court narrower than 12' 6", with every room light and well ventilated, and with separate water-closets for each apartment and baths for some

title. In Great Britain this movement has been directed to all kinds of houses, including tene¬ ment houses, and is usually called by its more generic title of ˆHousing Reform.” The initia¬

tive of the movement has been benevolent im¬ pulse, but the strong forces behind it which have given impulse to that initiative and have united to carry the movement forward have been the same which

have evolved sanitary and building regulations and are founded quite as much on self-interest as altruism.

History. — The movement for tenement- house reform in the United States naturally be¬ gan in New York, its largest city, where the need for regulation first became apparent, and may be said to date from 1842, when Dr. John H. Griscome, the city inspector of the board of health, called attention to tenement conditions in a special report on the sanitation of the city. It has. since extended to almost all large cities in which tenement houses have been erected, and has taken the form sometimes of State law, as in New York and Massachusetts, or more often of city ordinance, as in Chicago and Phil¬ adelphia. The legislation in New York is the result of the investigations and recommenda¬ tions of successive State commissions, and the scope of inquiry of the last commission, which is typical, has been <(To make a careful exam¬ ination into the tenement houses in cities of the first class; their condition as to the construc¬ tion, healthfulness, safety, rentals and the ef¬ fect of tenement-house life on health, education, savings and morals of those who live in tene¬ ment houses and all phases of the so-called tenement-house question in these cities that can affect the public welfare." The chief subjects of tenement-house regulation may be grouped under three general classes : protection against fire and means of escape in case of fire, light and ventilation and sanitary protection, the lat¬ ter including water supply, water-closet accom¬ modation and the prevention of overcrowding.

Fire Protection — Protection against fire is almost universal. Structural provisions directed to this end are contained in the building laws of all cities. In New York, Philadelphia, San Francisco, Jersey City, Providence, Syracuse and Nashville all tenements must have fire escapes. All tenements over two stories in height must have fire escapes in Saint Louis, Baltimore, Louisville. Minneapolis, Saint Paul, Denver, Toledo and Columbus. In Chicago, Cleveland and Cincinnati this rule only applies to tenements over three stories in height. In many cities tenements must be fire-proof throughout when over a certain height. In Philadelphia this is true of all over four stories; in Washington of those over five stories; in New York, Buf¬ falo, Louisville, Minneapolis and Denver of those over six stories in height. In Boston the limit is 65 feet.

Light and Ventilation are protected by minimum open spaces and by a limitation of the percentage of a lot which can be occupied by a building. In Philadelphia there must be open spaces at the side or rear, equal to one-fifth of the lot area, and the minimum width of all spaces is eight feet. In Buffalo, under the local law in force before the general

State act of 1901 was passed, the minimum width of any outer court was six feet in two-story build¬ ings, eight feet in three- and four-story build¬ ings and one additional foot in width for each additional story. The minimum interior court was 8 by 10. In Boston, a clear open space at the rear must be left equal to one-half the

width of the street on which the tenement fronts and there must be two open spaces at least 10 feet wide. In some cities the required court area is expressed in square feet, without regard to minimum width or length and in¬ creases proportionately with the height of the building. This principle is adopted in New York, where the minimum width of exterior courts in buildings five stories high is six feet on the lot line and 12 feet between wings and the minimum area of interior courts on the lot line in buildings of the same height is 12 by 24. These dimensions are increased or decreased according as the building is higher or lower. Tenement houses in New York must have an open yard at least 12 feet wide in the rear. The maximum percentage of lot area which may be occupied by the building differs, properly, according as the lot is an interior or a corner lot. As respects interior lots, this limitation in New York and Buffalo is 70 per cent; in Boston 65 per cent; in Philadelphia 80 per cent. The height of rooms is almost universally regulated, the minimum usually being eight feet. The height of tenements is limited in many cities. In New York it is limited to one and one-half times the width of the street on which it faces.

Water Supply. — In New York water must be furnished on each floor. In Philadelphia and Buffalo, on each floor, for each set of rooms. In Boston, Chicago, Jersey City and Kansas City, in one or more places in the house or yard. Water-closet accommodation is very generally prescribed. In Philadelphia and in New York, under the law of 1901, there must be one for every apartment. Under the prev¬ ious law in New York, there must be one for every two families. In other cities the unit is the number of persons. It is 20 persons in Boston, Baltimore and Denver; 10 persons in Rochester.

Law Enforcement — The enforcement of Tenement-House Law in American cities is usually vested in existing city departments to which it is most germane. These provisions, which relate to the construction of new build¬ ings and the alteration of old ones, are natur¬ ally enforced by a building department or by whatever part of a city government has charge of the enforcement of building regulations.

Sanitary regulations are, for a like reason, usually enforced by a board of health or by whatever city officer supervises the enforcement of health laws in general. In the city of New York previous to 1901 the enforcement of such regulations was divided between the building department, the health department, the fire de¬ partment and the police department. Under such divided responsibility many of them were not enforced at all, and the enforcement of others was extremely lax. Moreover, the tene¬ ment-house problem in New York was an ex¬ ceptionally large one. Of its population at that time of nearly 3,500,000, nearly 2,500,000, or more than two thirds, lived in tenement houses as legally defined. Under these circumstances the State commission of 1900 recommended the establishment of a separate tenement-house de¬ partment in the city of New York. This de¬ partment was established under the new charter of the city which went into operation in 1902 and centres in itself all the municipal duties

toward tenement houses and their inmates, as such, which were previously divided among the other city departments.

Model Tenements. — The erection of model tenements, so-called, of large size, from mo¬ tives primarily philanthropic, has been less frequent in the United States than in Great Britain. The best known and earliest are the <(Home Buildings" and (<Tower Buildings," which were erected by Alfred T. White in Brooklyn; the first named in 1879. The erection of these buildings, which have been financially success¬ ful from the start, was an epoch in the cause of tenement reform. It led indirectly to the Tene¬ ment-House Law of 1879. Among the most successful model tenements are those of the City and Suburban Homes Company of New York. In the United States 616 cities now take an active interest in housing, and in 124 model housing enterprises have been launched.

Great Britain. — The movement for hous¬ ing reform in Great Britain has had a some¬ what different direction from its American counterpart. The evils there have been more largely slum conditions than those resulting from tall buildings and unventilated and un¬ lighted rooms. The particular evils of the tall tenement practically exist only in Edinburgh and Glasgow. Consequently English and Scotch effort has been directed mainly toward the demolition of unsanitary areas and more recently, the erection of municipal tenements by the city governments themselves. These movements, at first local, and authorized under local acts, such as the Glasgow Improvement Act of 1866 and the Liverpool Sanitary Amend¬ ment Act of 1868, have been made general by the Housing of the Working

Classes Act of 1890 and many slum areas have been destroyed and municipal tenements built in their place, notably in the cities of London, Glasgow, Man¬ chester, Liverpool and Edinburgh. Tenement-house regulation in Great Britain emphasizes the same general subjects and follows the same lines as American regulation. Limitations upon height are general and more drastic than in America. Such houses are limited in London to 80 feet, without special consent of the coun¬ cil and may not exceed the distance between the front wall of the building and the opposite 'side of the street in streets less than 50 feet wide. In Edinburgh they are limited to one and one-quarter times the width of the street; m Liverpool and Glasgow to the actual width of the street; in Manchester to two stories in streets of less than 30 feet in width and to three stories in wider streets up to a width of 36 feet. Tenement regulations on the Con¬ tinent usually form part of the general build¬ ing regulations. The regulations for Paris and Berlin are very elaborate, but proceed under the same general lines as in English and Ameri¬ can cities. In Berlin, houses fronting on the street may only be as high as the width of the street. In Paris a somewhat greater lati¬ tude is allowed in this particular.

No American city has imitated the English example of building municipal tenements, nor has^ such action ever been seriously proposed. Serious objections to any such extension of the sphere of municipal activity would exist in any American city. Moreover, municipal build¬ ing would discourage and restrict building by

private enterprise, which has proved sufficient to meet the demand. The problem is too large for any American city to deal with it success¬ fully by the use of any amount of public funds likely to be put at its disposal for such pur¬ poses. Halfway measures by preventing private enterprise would only increase the evil which they sought to remedy.

Bibliography. — De Forest and Veiller, <The Tenement House Problem) (1903) ; Gould, (The Housing of the Working People *(1895) ; Riis, (How the Other Half Lives) (1890) ; id., (The Battle with the Slum) (1899) ; <First Report of the New York Tenement House De¬ partment (1904); Veiller, Lawrence, (Model Tenement House Law) (1910) ; George, Wil¬ liam, (The Law of Apartments, Flats and Tenements) (New York 1908) ; Dinwiddie, E. W., (Housing Conditions in Philadelphia*;

Clode, W. B., (The Law Relating to Tenement Houses> (London 1889)

; Waldo, F. L., (Good Housing that Pays) (Philadelphia 1917) ; Aronovici, Carol, <Housing Conditions in Saint PauP (1917) ; Poole, Ernest, (The Plague in its Stronghold) (New York 1903) ; Chicago School of Civics and Philanthropy, <The Hous¬ ing Problem, Literature in Chicago Libraries) (Chicago 1912) ; (Housing Problems in Amer- ica) (Proceedings of the Seventh National Conference on Housing, Boston, 25, 26 and 27 Nov. 1918) ; Proceedings of the International Housing Congress) (Paris 1900 et seq.) ; Price, G. M., <The Tenement House Inspector1* (New York 1917).

TENERIFFE, ten-er-if', the largest of the Canary Islands. It is 60 miles long, 10 to 25 miles wide and has an area of 782 square miles. The coasts are precipitous and the in¬ terior rises in the volcanic Peak of Teneriffe or Pico de Teyde, to a height of 12,192 feet. This mountain has been quiescent for two centuries. The soil is very fertile and produces dates, coco-palms, fruit, grain, cotton, sugar and grapes. The chief town and the capital of the Canary Islands is Santa Cruz de Ten¬ erife, situated on the northeastern coast. The Spanish government has established there a large wireless telegraph station. Pop. of the island about 180,000. See Canary Islands.

TENIERS, ten'yerz (Fr. ta-ne-ar), David, the Elder, Flemish artist: b. Antwerp, 1582; d. there, 29 July 1649. Having studied under Rubens, he went to Rome and remained there 10 years. On his return to his native country he occupied himself principally in the delinea¬ tion of fairs, shops, rustic sports and drink¬ ing parties, which he exhibited with such truth, humor and originality, that he may be con¬ sidered the founder of a style of painting which his son afterward brought to perfection. He also painted some landscapes with scriptural or mythological figures in the foreground. A pic¬ ture from his hand was sold in 1886 for $2,275. His (Dutch Kitchen) in the New York Metro¬ politan Museum gives a fair example of his style. This canvas is 45ˆ4 by 39 inches and, therefore, much larger than the majority of his pictures.

TENIERS, David, the Younger (son of the preceding), Flemish artist: b. Antwerp, 15 Dec. 1610; d. Brussels, 25 April 1690. He received his early instruction in his art from his father and his style was improved by copy¬

ing 200 pictures in the gallery of Archduke Leopold William to whom he had been ap¬ pointed painter. This copying degenerated into servile imitation and he produced such perfect facsimiles that they deceived even connoisseurs, and he has been styled the <(Ape of Painting.® Yet he had also a strong vein of originality and his

paintings of low life in Flanders are excellent examples of genre. Although refined in mind and manners and patronized by such men as Prince John of Austria, son of the Emperor Charles V, he preferred to immor¬ talize by his brush the card table and drinking party of boors and was to the last the en¬ thusiastic painter of the pot-house and the guard-room with its rollicking soldiery. There are at least 2,000 of his pictures at present in existence, six of them being hung in the New York Metropolitan Museum of Art, though none of these latter excepting <A Marriage Festival, *can be called representative of the artist's style and quality. Like Rubens, some of whose manner he inherited from the teach¬ ing of his father, a pupil of the former, he was a rapid executant ; many of his works are mere sketches, others elaborated with exquisite virtuosity. His touch is light but sure and his coloring exceptionally fine, while for animation and power of expression he remains the first of Flemish genre painters. His works are highly prized and his (Village Fete* was sold in 1850 for $15,750. Consult Rosenberg, <Ten-iers der Jiingere.*

TENNANTITE, an isometric, metallic mineral, isomorphous with tetrahedrite. It is essentially a copper sulph-arsenite, differing from tetrahedrite into which it passes by in¬ sensible gradations, only in the preponderance of arsenic instead of the antimony which dis¬ tinguishes the latter. Its color and streak are usually iron-black; it often has a brilliant me¬ tallic lustre; its hardness varies widely from 3 to 4.5 ; its specific gravity is also quite variable, 4.4 to 5.1. It occurs in fine specimens in the mines of Cornwall, England, in Bolivia and Colorado. When sufficiently abundant it con¬ stitutes a valuable copper ore.

TENNESSEE, ten-nes-se (<(The Volun¬ teer State**), a southern-central State of the United States. Kentucky and Virginia lie to the north; North Carolina to the east; Georgia, Alabama and Mississippi to the south; and Arkansas and Missouri to the west. Its length on the northern side is 436 miles; that on the southern side is 100 miles less. The area is approximately 42,050 square miles, of which something like 300 miles are covered by the water of streams. The southern boundary of Tennessee was intended to follow the 35th parallel, but all parts of it lie from a fraction of a mile to a mile south of that line, excepting the 45 miles east of Tennessee River, between Alabama and Tennessee. That part of the northern boundary between Tennessee and Mis¬ sissippi rivers is on the parallel of 36° 30'. Immediately east of Tennessee River, the north¬ ern boundary is \2y2 miles north of parallel 36° 30'. Eastward from this point the bound¬ ary is not straight but on the whole approaches that line, coming within approximately five miles of it, in the middle of Claiborne County.

Here there is a jog of about a mile to the north. There is a similar but somewhat greater one in

the eastern part of Sullivan County. It was the intention to make the crest of the Great Smoky or Unaka Mountains the eastern bound¬ ary between Tennessee and North Carolina. The most eastern point of the State is in John¬ son County, and is approximately 81° 41 V\ W. longitude. The western boundary is the mid¬ dle of the Mississippi River as the channel ran m 1763, at the time of a treaty between the British and French. The most western point *n Shelby County and is approximately 90° 28' W. longitude.

i?u»rˆace features. — Tennessee has eight well-defined natural divisions: (1) On its eastern borders rises in great ridge-like masses and treeless domes the main axis of the Ap¬ palachian chain, the loftiest peaks of which reach an elevation of 6,600 feet above the sea. Many beautiful valleys and coves nestle amid this grand range of mountains, which is known as the Unaka or Smoky Mountains, and which has an area, approximately, of 2,000 square miles. (2) Adjoining these mountains on the west is the second natural division, called the Valley of East Tennessee, which lies between the Unakas on the southeast and the Cumber¬ land Mountains on the northwest. This valley has a fluted bottom, made up of a succession of minor ridges and valleys with a northeast- southwest trend. Viewed from the mountains on either side, these minor ridges and valleys melt into a common plain. This valley has an area of 9,200 square miles and is of great agricultural value. It is the southwestward extension of Shenandoah Valley of Virginia. (3) Next in order, going westward, is the Cumberland Plateau, which rises 2,000 feet and more above the sea, and 1,000 feet above the last-mentioned division. It forms a bold es¬ carpment, on its eastern edge presenting a gray, rocky, formidable rampart. Its western edge is irregular and jagged, notched and scalloped by re-entrant coves and valleys which are separated by finger-like spurs, pointing for the most part in a northwesterly direction. Most of the northern part of the plateau is cut to pieces by deep, narrow ravines, between which are sharp-topped ridges. The southern half is divided lengthwise into two parts by the deep- cut Sequatchie Valley. The area of this divi¬ sion is 5,100 square miles. (4) Resting against the western edge of the Cumberland tableland and including the elevations bordering the Ten¬ nessee River in its return across the State are the Highlands, or Rimlands, having an average

elevation of 900 feet above the sea. For the most part this division is a flat plain furrowed by numerous ravines traversed by streams. Its area is 9,300 square miles and it surrounds in an irregular circle, the next division. (5) Sur¬ rounded by these Highlands lies the Central Basin, elliptical in shape, with an area of 5,450 square miles. It is the finest agricultural region in the State, and is on an average of 300 feet lower than the Highlands that border it. (6) The valley of the Tennessee River comes next on the west. Its surface is broken and irregu¬ lar, and it stretches across the State from south to north on both sides of Tennessee River. It has an average width of 12 miles and an elevation of 350 feet. Its area is approxi¬ mately 1,200 square miles. (7) The slope of West Tennessee constitutes the seventh natural division and differs from all the other divisions

mentioned in having but few hard rocks, these occurring only in a narrow belt north of Savan¬ nah and bordering the Tennessee River. It is a great plain, that with the exception of a belt about 20 miles wide next to Tennessee River, slopes gradually toward the Mississippi. For the most part, the surface is gently rolling, but in places is furrowed with low valleys border¬ ing streams that flow in sluggish currents to the Mississippi. Its area is 8,850 square miles, with an average elevation of 500 feet. It abruptly terminates in a line of bluffs that over¬ looks the great alluvial plain or bottom lands of the Mississippi River, next to be mentioned. (8) The Mississippi Bottoms constitute the eighth and last of the natural divisions of the State. It is a low, flat plain, studded with lakes and originally clothed with dark forests. Much of its area lies below the high water of the Mississippi, and as a result there are many swamps and marshes. The area of this division is 950 square miles, and its elevation above the sea is 300 feet.

A very singular topographic feature already referred to is Sequatchie Valley, which is a deep trough extending in a northeasterly direc¬ tion from the south boundary of the State, dividing the southern end of the Cumberland tableland into two unequal arms, the eastern one being known as Walden's Ridge. The valley has its head about midway between the north¬ ern and southern boundaries of the State, and is about 60 miles long and from three to five miles wide. It is enclosed by rocky walls approximately 1,000 feet high, and through its centre flows the beautiful Sequatchie River.

The highest point in the State appears to be Mount Guyot, which is near the corner of Cocke and Sevier counties, and which stands 6,636 feet above sea-level. Other points that exceed 6,000 feet are Mount Henry, Roan Mountain, Clingmans Dome, High Knob, Mount Le

Conte, Alount Curtis, Alount Safford and Master Knob. They all, with few exceptions, are on or near the line that separates Tennessee from North Carolina. There are a few points near the eastern border of the Cumberland Plateau which rise above 3,000 feet.

The Allegany range of Pennsylvania and Virginia becomes the Cumberland Plateau in lennessee, and Sand Mountain in Alabama. Ihe Blue Ridge of Pennsylvania, Virginia and North Carolina takes the name of Unaka or Smoky Mountains in Tennessee. Many of the long, straight valleys of the valley of East Tennessee lying between the parallel ridges and overlooked by them are rich, populous and beautiful - centres of industry, intelligence and a diversified system of agriculture. Taking the State altogether it will be seen that the topog¬ raphy is greatly diversified. The great ele- on the east are offset by the low vallev of the Mississippi on the west/ Between these are three great plateaus and two marvelously fruitful valleys, all differing in height, area soils, climate and products. It is indeed a State of the greatest variety in natural features.

Drainage.— The Mississippi, the Tennessee and the Cumberland form the great drainage basins of the State. The Tennessee and Lumberland are tributaries of the Ohio which m turn flows into the Mississippi so that all the streams which drain the State, with the exception of a few insignificant ones that flow

TENNESSEE.

Estimated population, 2,288,004

Pop.

17,717 12,667 22,452 6,329 20,809 16,336 27,387 10,825 23,971 19,838 10,540 9,090 23,504 9,009 19,399 15,625 16,076 9,327

149,478 Davidson 8

Anderson 013

Bedford . . . . . H 9

Benton . ci

Bledsoe . . H 11

Blount . h 14

Bradley . j 12

Campbell - V.'.'g 13

Cannon . h 9

Carroll H 5

Carter . <317

Cheatham . g 7

Chester . 14

Claiborne . G 14

Clay . f 10

Cocke . H 15

Coffee . 19

Crockett . HI

Cumberland . G 13

COUNTIES Pop.

19-993 Decatur'. . . ' . ' . ' . ' . ' . ' ,'h 5

15.434 Dekalb . H 10

19,955 Dickson . G7

27,721 Dyer . G 3

30,257 Fayette . I 3

7,446 Fentress . G 12

20,491 Franklin . 19

41,630 Gibson . G 3

32,629 Giles . 17

13,888 Grainger . G 14

31,083 Greene . G 16

8,322 Grundy . 110

13,650 Hamblen . G 15

89,267 Hamilton . in

10,778 Hancock . G 15

23,011 Hardeman . I 3

17,521 Hardin . I 5

23,587 Hawkins . G 15

25.910 Haywood . h 3

17,030 Henderson . h 5

25.434 Henry . G 5

16,527 Hickman . h 7

6,224 Houston . G 6

13,908 Humphreys . G 6

15,036 Jackson . . . . G 10

5,210 James . Ill

17,755 Jefferson . g 15

13,191 Johnson . G 18

94,187 Knox . G 14

8,704 21.105 17,569 6,033 25,908 13,612 21,046

16.356 14,559

39.357 18,820 16,872 40,456

6,131

20,716

33,672

4,800

11,458

29.946 15,854

8,815

5,087

14,116

20,023

15,410

22,860

25,466

33,199

12.947 4,202

22,296

191,439

Lake . g 2

Lauderdale . h 2

Lawrence . 17

Lewis . 17

Lincoln . is

Loudon . ii 13

McMinn . 1 12

McNairy . 14

Macon . <3 10

Madison . h 4

Marion . 110

Marshall . ! . I 8

Maury . h 7

Meigs . ..112

Monroe . 1 13

Montgomery . .... G 7

Moore . 19

Morgan . g 1 2

Obion . g 3

Overton . Gil

Perry . h 6

Pickett . Fll

Polk . 1 12

Putnam . g 1 1

Rhea . H12

Roane . H12

Robertson . G 8

Rutherford . H 9

Scott . G 12

Sequatchie . I 11

Sevier . H15

Shelby . 12

18,548 Smith . Gjio

14,860 Stewart . G6

28,120 Sullivan . G 17

25.621 Sumner . q 8

29,459 Tipton . 12

5,874 Trousdale . G 9

7,201 Unicoi . G 17

11,414 Union . g 14

2,784 Van Buren . H 11

16,534 Warren . H 10

28,968 Washington . G 17

12,062 Wayne . 16

31,929 Weakley . G 4

15,420 White . H 11

24,213 Williamson . H8

25,394 Wilson . G9

2,381 Maryville . H 14

391 Mason . H 2

192 Mayland,

Cumberland . . . G 11

320 Medina . H 4

148,995 Memphis . II

273 Middleton . 14

1,605 Milan . h 4

554 Millington . I 1

1,107 Monterey . G 11

149 Morrison . H 10

4,007 Morristown . G 15

211 Moscow . 13

592 Mountain City . ,G 18 1,436 Mountain View,

Knox . G 14

1,973 Mt. Pleasant . 17

329 Munford, Tipton ..12

4,679 Murfreesboro . H 9

117,057 Nashville . G8

1,602 Newbern . G3

2,003 Newport . H 15

1,293 Obion . g 3

700 Oliver Springs ... G 12

653 Orme . 1 10

5,126 Park, Knox . G 14

3,881 Paris . g 5

379 Petersburg . 18

227 Pleasant Hill. ...Hll

579 Portland . F 9

2,928 Pulaski . 17

254 Puryear . G5

240 Raleigh . I 1

481 Ravenscroft . H 11

154 Rheatown, Greene G 16 324 Richard City,

Marion . igio

1,500 Ridgedale . I 11

519 Ridgely . G 2

43 Ridgetop . G 8

2,011 Ripley . H 2

468 Rives . G 3

3,660 Rockwood . H 12

1,242 Rogers ville . G 16

142 Ross ville . 13

766 Rutherford . G3

111 Samburg . G3

435 Sardis . 15

199 Saulsbury . 13

529 Selmer . 14

675 Sevierville . H 15

608 Sharon . G4

2,869 Shelbyville . H8

1,387 Somerville . 13

1,391 South Fulton, Obion G2 2,106 South Pittsburg ..I 10

1,409 Sparta . H 10

210 Spencer . H 11

1,039 Spring City . H 12

2,085 Springfield . F8

695 Spring Hill, Maury H 7 2,426 St. Elmo.HamiltonI 11

400 Summertown . 17

1,850 Sweetwater . H 13

886 Tazewell . G 14

391 Thomastown, Shelby 1 2

843 Tiptonville . G2

245 Toone . 14

2,402 Trenton . G 4

556 Trimble . G 3

529 Troy . G 3

3,049 Tullahoma . 19

4,389 Union City . G 3

659 Wartrace . 19 •

517 Watertown . G9

947 Waverly . H 6

357 Waynesboro ..... .1 6 298 Westmoreland,

Sumner . G 8

370 West Point ..... I 6

419 White Bluff . G 7

741 White ville . 13

1,351 Winchester . 19

604 Woodbury . H 9

Incorporated Cities, Towns, Etc.

fan -A-dams • * ' ; . G 8 58 Ellendale . 12

499 Allens Creek . 1 6 943 Erin . G 6

rIi7 . 12 LI49 Erwin . G 17

2 2fil Athinnd City - vQ * 1,685 Etowah, McMinn .1 12

. 112 3*439 Fayetteville . 18

110 gafgeg . 1 2 304 Finley, Dyer . G 3

Ififi 8 2,924 Franklin . H8

RˆUCkle . g 9 408 Gainesboro . G 10

W . ri3 2>399 Gallatin . F9

1 Big Sandy, Benton H 5 292 Gates . H 2

1,673 Binghamton, Shelbyl 2 247 Germantown . I 2

iaa « (P.O.Memphls) 233 Gibson . H4

166 Bloomington Springs, 388 Gleason . G4

c,n rj,P;i,tˆPa . G 11 422 Gordonsburg, Lewis I 7

1 070 Clty . G 17 245 Gordonsville ... .G 10

gogYSJ . w1 4 491 Grand Junction ...13

7 ils g?£ag . g 11 522 Green Brier . G 8

Bristol . . . . G 17 1,920 Greeneville . G 16

2(882 Brownsville •••:•• H 3 1-516 Greenfield . G 4

858 Brushy Mountain. 882 Halls . H3

-QQ Morgan : . G 12 3,061 Harriman . H 13

499 guiler* Johnson .G 18 1,087 Henderson . I 4

161 Cades, Gibson - G 3 582 Henning . H 2

oof £ai?£en . G 5 198 Henry . . G 5

994 Carthage . G 10 3,446 Humboldt . H 4

1 oq7 Sell4na . . . G 10 1,112 Huntingdon . H 5

1'°2Z Centerville . H 7 253 Isoline . G 11

on o7a ££agotte . g 1 834 Jacksboro . G 13

« Chattanooga . I 17 17,807 Jackson . H 8

?’®48 Clarksville . F 2 1,328 Jefferson City . . .G 14

5(349 glfveland . I 16 1,862 Jellico . G 13

Clifton . 11 io,925 Johnson City .... G 17

1 non White. . . .H 13 806 Jonesboro . G 16

*j999 Clinton . . G 13 815 Kenton . ..*G3

1 so? G13 824 Kingston . H 13

- 22? Collierville . 1 8 38,676 Knoxville . H 13

5(754 Columbia . HI 2,816 La Follette . G 13

1(848 Cookeville . G 18 308 La Grange . 13

299 CornersvUle . 1 5 1,687 Lawrenceburg . 17

Cottage Grove - G2 £3,659 Lebanon . G9

2(999 Covington . HI t 3,392 Lenoir City . H 13

763 Crossville . H 14 1,830 Lewisburg . H 8

347 Cumberland Gap . G 15 r 1,497 Lexington _ H 5

, 447 Dandridge . G 11 EM21 Livingston . G 11

1(991 Dayton . I 12 163 Longview, Bedford, H 8

, 195 gecatur . I 19 2,391 Lonsdale, Knox..G 14

1,022 Decherd . 1 6 631 Lookout Mountain,

1,850 Dickson . ..H4 57- Hamilton _ Ill

708 Dresden . G 1 £ [995 Loudon . H 13

1,166 Dunlap . I 16 §£ 408 Lynchburg ... 19

1,166 Dyer . G3 F[596 Lynnville . I 7

4,149 Dyersburg . G 3 p® 661 McEwen . G 6

81 Eades . 12 1 1,322 McKenzie . G5

334 Eastland, White. H 11 £ 2,299 McMinnville . H 10

2,478 Elizabethton ... .G 17 963 Manchester . I 10

179 Elkton, Giles . 1 7 2,228 Martin . G4

iturte West from Greenwich.

Wilmington.

KENTUCKY and

TENNESSEE

Greeriburg

■Chillicotho

Hillsboro

J* onief<

Statute Miles, 59-1 Inch.

0 _ 10 _ 20 30 -10 50 60

[ton*"

1 ndepend4ace/o\ BOONE A

Rich wooil Vi/ , !

ˆVaitoSMj? *3

.California

Tjˆlentor

ˆrtMoscow*

ˆBedford

iAL LATIN] ileneo

PENDteToUˆ

» Tr //l uliuolith l

'Crecm C/fBfiOl

lledrord € fS.Ki'v'i.l-Vi'

WRIMBLtX Q^ofronje- —

pbcl tSU/d / / a to?

sc o if t

<n^i^S H E U B |Y/'/fl^v\kCi4ul), n|!

1 ' NOhriBllaol^. L' , tKlAHV/TN. /Del.

u*-

(XWT^HSffTurjVv s %'s U (Ts.-M^

' J avlopsl . . . ~ — A v ■ '.*<r-

tOB£RTU/«if 2.jr*/MaUiaU /oUeboro

g^fcSflK&LLg Wis

j Lynjt° W

*' UrOenup^

.GREENuJ

■-;.. < MurelA

Centralia

Guyandot

Myenpnir*

]>^TarIi<

plillerBbunj [rJ lC.HpLA5>;

frilfcW

u|Sl//t^p

Sj Loulwiltfft

StrawXcyrvl

v&to — v?\s*

uq CAW A N •P/roJ» £«■• R

V s.«ly

JEFFERSON |

i Wilson V }

MRatchff \ 0 Wcbbrilio ' o Cherokee LAWRENCEf]lA'itfuin« r “

MC|NT'

Conet

‘ANDERASOfT

vJ{fnndcnlH‘

Chester

°RedijUsfrr + n* ±

OfTiittO

JOHNSON

ˆWoUrY:- ii«> Beui'h Juet® >

udkllle

Jmartin

.'I'anu’U CV. J’rostondiur® •

£Holt «>03?5d

K-loverport

H:\rdliiahuflrg o\n.

a— jˆiarrt»id <y

IREOACINRIDGF /,

POWI

ˆc-Campfy wot F E

roakea Jlarroc

.Valter Rill 'Si

ftSHIˆGrON

ZE1 Doradj

White Post iVw dllamaon

GARRAROˆ

XhiuicoKtej

ionaaza

yv > Y apringfleli

spˆesssi

VT. jark&onA

ˆeTathitt

bnc’ ,c*

BiKo4Vi/|c”1u"» \r mffjSiserr-

CaacyviueSfe&*'\ˆˆˆJyril < k»

-it i o B B

syT\eSfZnJ Mjˆy\XTo. > -U

“so Hcpton/1 ˆN,\y

l,scritte(noen

ˆJlarlouf Protf»2S2|Mfta iso n V ..

»&{ em ,-IJ O P K l i

\ TrwctoP . _ -

y Sr"i l o Jrtts f\ ˆlumm-vlllo

• O w s L E Y\ Crockett

Junctiot

tsCilTS’

' YMo K i ii noyAj*

CBrodhNea5ˆ. MˆVhknOJ

•A^'SKlnEil MountninV-ON.

- QroV- jˆ.r c AST -Wayn*«yiˆ|V«iti \ Li yiuˆatoniEˆ0"1

/ˆTE,lbaok Green*\?ju f

91 Floyd N &

- jtpuliUiki

^^AYShiaˆ

'Clever

llatonl

LA R-U-E.

G R AJY SO N4j/vS-Jˆ»../ '

ˆ ˆ-lnnoda0 u'-W oV

\&mth WcJtorfOBi ! •/g>»1 “““Vw

- c * Us - — ˆ ˆ ‘HnJiipffr. H A/R I yPiiitcw

troffiljn SjiriY) \31mifordl-' ^^*Si?s*,ur-

V ˆ odLter

~-t , .* _ V •XytTavc 051V .

AjSmHk *Gr Se.Jiefa&‘* - ?' — \E<ln

' Aˆsknr Ei tJ y Glasgow B °Siiek Rock 'W&fsfl %CP A R R E N,t METCAl

/. ... * r'ˆlˆ-VR 1 ,S«»«

pTooaiumˆ UVatmiV LjQmUU 1

p™rt > 4 A L L E NUfc.fl«™™ > 2SS

Kapi,U E."P''llt,r/ . ^ o'Vv1 (

■ V^»a/S,jTMONRDr

^'•er n np ,. r D«nv

"onrv os > 5?

Carr si

binfton (J

l .a h"]

fCnrrOllloil,

$plety Creole I/°Shoai\ Ijj^Benge °AinMi» MaiMoc' !,r®i A/c Wort/wr llydcn* ° ^c'r

US,.. B“™° *J«i„ Or»*“'

'Ulackey

mpton°

!■

Ai id landM'yDoniralTc i rt Vof r

HUHLE/nIbERG

■V PunnlowuC^ ° Quality fall*

1Z ..^Sh^*^fi3SpCavc UlU\ V

Bayou JUill Smithian

ngru— S. IBer/int. iPittabui

Cntahin^

lehostei

JN orton -p]

iJL.aci

TMannlnˆW lEmplre [Crofton r

«ring Cruk) •>«■»'<

n . V 4 HostcinatvQ V\

Burnside.

Warbranj

5JVBentonAlt

I ll’tmltt Y*

[MARSiHALL \ [Olaaol

Aurora

tooN<J,y 0

\Cantofi o

.Rock t\K> Ji-o-#* \e

VV 1! lia insb are ˆ*vT9jN

[REAR Y.l •<'"

Wliltley «w hXit le

&? k#H

Hickory IJkOter

i Q R A/V E sl

1 pulah J3 M*yfl

in SˆTrJ,or° *ill Y J*ˆrmingU>nD| >7 Win go j L.y\Vatcr e*a«j*

dX*'JW EB0„rJ

Caledonia

I G.G |CW

Roaring0! fY ttofonte Spring H«i Ddon> mhhL La Fapeifc x)0>

' ^Dexter \ Shillo7,o |

A lino I

ALLfoWAY,-^^

o ^YJTurray

^ r j OChorry °

Hegira ,

^Ufarti •!. < "

futhri^

'i iera

V

3m| Pro lidcucf

S\

Iprlng^M 0 NJCw

Adams

SristoL

■\v,0^ °I > o«Ileyl ^(jmrltsvlllun

^fjVl ERT-1

.Cedar Hill Mulloyt»0 \v DR-CS«ringfleId / \ ^BESRTSO Nfe >

yJr~ rain tun snTstov.u

inpuS0P»ll Mi.lL ^LitlfoCrnb

55Gufcri > »* o

JOHNSON,

"I > uke \

fayroeadj

[McConnell Vet Elm Tre>

Puryear/ Cottager oOrove /Chester

H E\N R Y

Purist. L

JbanyV'V Til =*\

je7r-^i^JUW_C it y '

^1 PinTy w^tsj

WASH (N g\tD N* A

fly camp/be ll b . yVOirlloiioP*

V s/^acksktffb

dSSJIlmta

([UbbiuBA^x

Ro®/^]Yp .^T VV >S L“^fc

Bjm Bright 9 Aj prnncb

iv j;

MO RKJiA N \

'Xouiael

i. Jamestotvki

i oAlUrdu

cArmnlhwiiito, l

Ntress3/ Lb UlenfBffl;

lOUSDALt

SjtMleUfc

^JdgetopTK . Plonuil* V

sJT c 1 (Sodletta V: fN>^. AslJmid City

. , >AyM »ij* wood A

pkett r llside •» naron]

Marlon ^i&nd Far.

• Charlotte*

3T< SON

eo'fLw«'s 3

Cllea ans

/ v \l oabeim

ircEI o« w^VjoU.^

W*fD“drJ GfcTm'lW

ftte c

iRankiiu^oi'Ccnucky

fsTurVuEn^llbli

rruaurW Q (\ C K E// CX

I i Am - J ■ =

ti rimble I Y *\

fe Ml ;fci",d{k*

D.yo'rabii rgDyer IhJ;

'lU Ellen G I 6\S

iGreenfielt

(-..rrytont

Coxetest

AN 0£ PSION

CHuto«t4)

Sjlvia|, >/ J" ST. L?

!seS .<4. v> <V-

yˆni>eiry

'Boma bitty a t

iˆ-r Kansas EFFER8CN,

OLneiUa ge\

loffton

igatfˆ aa,>d Cainevillt

Bellevj

ll/SMBEHLANQ

;ucapitie

ˆ Huntingdon'

ˆARROU

Jmˆrk3bu!<df-

I

me IVood

ˆMilanj

Doridvl

Aubu]£ Smith vU'c V

WORD

Murfr/esbnro pitfZufi f, WinsJd Row,*n!&

I 7>, ai CAN NON {ˆDavenport p Chri9Ina Mriinnvlllrˆ-f/ A *h l o| pW0A r/R E N .VJr Smartt r Morrloon

Sainville Altaaiont'3 .. GRU&N

ilirli«|ter. Grutˆt

o3V amei

ii _ , <ˆ>ˆCantrell ,

PlyGraham/_LIok 0r.o I

siisisirˆi

r «/ 7Au'cr< >r

Ml Kˆf:/ BonjLˆV*®“«

JJingh.nn ipereJbrk w

rfiatletti

[CROC KENT LMau.y City!

° Si-v\le. v>lir o j

S eWˆRJ

V °W«ar* v »U A ill.H lO'ij

.rXldv nd

[Denson 1

■fj>kPUe | O

wsoNf, ˆ 1

ˆexIngtonO

lJccatur<ill<ˆ

a. 5 JJp*m ckTp

< o Sardie ˆ

kimfl

QOrndj

Carets T‘

iP E RE

Perry -/i

JV- .X

K-HV66 /

o Toulon /"yv?

"•»«« i- */]!;' »rya •gˆv* |

HAYVyOOD K

hepards

T,° JH

ckle 1 mmitvillcj

uy r i p,

YvJ| jVtokajr t_) Tip tony .4, KetTvilleˆ/ˆ1 ihingtongO’ dr// l«o<k

Mocutnri

Athens/

LMercer

Butherfordt

Chapel °

A «jarvTn,

ra,ly-\C Co2

Al/ (levrl/nml X Xyrilctywn yi, *e/(

lnmJ£

Mtlkd"

%\ R V]

ayVV hUeviqˆˆ A filers ˆ

HAR*D5/MAN(U#e/:*\

-ft S(,lll«-,|||C y«n i. J|",.. Or. I

feij

■AM /y i Vˆ'V'- N.uw#V

|iaXˆ,aˆ P0I Ethridge! inf rente?, , j

Ui#n ˆ’enU3

“fLAˆREII

Jarretta

.UarwellYf

ˆ7/amtmrg

Vˆrw'icA i Iwaylam

Dunn ..

./ spen Hilin

y Busby Lcstorsl

/'Loretto J'rtJspect St*. J St. Joseph 2ietM ° 4

Lincoln ,

vx.

\‘T

Hernando

Corinth

CohuttJ

Springs

Greenville

Stevenson

J) alto ir

Longitude West, from Greenwicl

TENNESSEE

417

through a small area next to the Georgia line nd their way through the Mississippi into the ~ 11 * °fuMeSlco- Of all the streams in the Mate, the Tennessee and its affluents, the Holston, the C linch, the French Broad, the Elk and Duck rivers may be considered the main arterial currents and with their tributaries they drain over 40,000 square miles, about 32,000 of which are in the State of Tennessee. The lennessee River is formed by the junction of the Holston and French Broad rivers, four and one-half miles above Knoxville, Tenn., flows thence southwest into and through northern Alabama and from the northeast corner of Mississippi, nearly due north, entering the Ohio at Paducah, 652 miles from the junction of b rench Broad and Holston rivers. Its principal tributaries are the Clinch, navigable for 60 miles, the Hiwassee, navigable 41 miles, the Little Tennessee, the Duck and the Elk. The Tennessee is navigable from the junction of the French Broad and Holston rivers to its mouth, except during extreme low water of late summer and fall. Formerly the three main obstructions to navigation at low water were Hale s Bar, 33 miles below Chattanooga, Muscle Shoals, six and one-half miles above Florence, Ala., and the Calbert and Bee Tree Shoals, Riverton, Ala. The Hale's Bar lock and dam, built at a cost of about $11,000,000, dam of solid concrete, 1,200 feet long and about 52 feet average height, lock 60 feet by 267 feet, lift at low water 37.5 feet, forming a pool which gives a depth of 6 feet in front of Chattanooga, 33 miles up the river, was com¬ pleted and opened to navigation in 1913. This lock and dam was built largely by the Chatta¬ nooga and Tennessee Power Company and supplies an enormous amount of electric energy. There is now a lateral canal having fa. depth of five feet, in two sections, around Muscle Shoals, and a canal with a depth of seven feet around Colbert and Bee Tree Shoals. The river is now navigable the entire year from Riverton to the mouth, 226 miles, for steam¬ boats of three feet draft. There are other shorter sections in which navigation is possible the year round. The traffic on the river in 1914 was 967,528 tons, valued at $21,120,489, con¬ sisting principally of general merchandise, live¬ stock, farm products, timber, ore, sand and gravel. The Cumberland River was given its name by a party of Virginians, under Dr. Thomas Walker. They penetrated this section in 1748 and gave the name Cumberland to the river, mountains and gap of that name, in honor of the royal

English Duke of Cumberland, then Prime Minister. The Indians called it the Warioto, and the early French traders the Chauvanon (the river of the Shawnees).

The Cumberland River rises in the Cumber¬ land Mountains in Harlan County, southeastern Kentucky, near the Virginia line, and flows ■ thence in a devious great U-shaped course down into Tennessee, curving thence up again into Kentucky, entering into the Ohio near Smith- land, Ky., 688 miles from its source. After leaving its mountain sources it flows westerly through the highlands of southeastern Kentucky. Where it cuts its way from the highlands it forms the beautiful Cumberland Falls with a drop of 66 feet. A few miles below these falls it passes over Smith Shoals through a wild gorge, with side walls about 300 feet in height.

VOL. 26—27

The scenery along the Cumberland from Car¬ thage, lenn., to its head is amongst the finest m America. .Two hundred and twenty miles of this section, i.e., from Carthage to Burnside, Ky., has good steamboat passenger service for six months of winter and spring. On this navigable stretch may be seen the old Indian town site and the old burial caverns at the mouth of Caney Fork, rugged Sand Shoals, beven Sisters (a stretch of seven towering cliffs in Clay County, Tenn.), the Natural Bridge near Burksville, Ky., the historic battlefield of rishing Creek, where the Confederate General, Zolhcoffer, lost his life. It is a quaint river. Nearly every one of its beautiful scenic reaches has its legendary story. This portion of the navigable river above Carthage reaches that in¬ teresting mountain and highland section, the home of the moonshiners. It is like stepping back into the language, thought and customs of the 18th century.

The Cumberland is navigable from Burnside,

r ci o 1 ˆount/’ KV> to its mouth, a distance o± 518 miles, for about six months in the year for boats of three feet draft, and nine months for gasoline boats drawing one foot. From Lock 21 to Burnside, Ky., a distance of about fmcPu’ A is navigable the year round. In 1908 the Federal government completed a series of seven locks and dams which rendered the river navigable for the entire year from Nash- Tenn-’ to Carthage, Tenn., a distance of 120 miles, and since 1914 has locked and dammed the entire stretch from Nashville to the mouth of the river, a distance of 193 miles. The traffic on Cumberland River for year 1914 was 467*- 486 tons, value, $9,023,206. This consisted prin¬ cipally of corn, wheat, livestock, general mer¬ chandise,

lumber, logs, sand and gravel.

The Mississippi River supplies approximately to the State 200 miles of navigation. The Holston, French Broad, Clinch, Elk and Duck rivers, all tributaries of the Tennessee, are floatable in high tide for logs and flatboats for many miles, though rarely navigable for steamboats. Obeys River and Caney Fork tributaries of the Cumberland, and the Obion,' Forked Deer,, the Hatchie, tributaries of the Mississippi River,, are navigable for 20 miles or more at high tides. Tennessee has approxi¬ mately 1,200 miles of navigable waters. See also Water Power Resources of Tennessee in this article.

Geology. — Contrary to the popular opinion, all the rocks of Tennessee that show at the surface are of sedimentary origin excepting some. in three small areas near the North Caro¬ lina line, in the northeastern part of the State, which are of igneous origin. Being of sedi¬ mentary origin, they are in layers or beds, and consist of sandstones, conglomerates or pudding stones, limestones, shales, slates, sand and clay. In the Smoky Mountains and the valley of East Tennessee, these beds by the slow but enormous pressure that has been brought to bear upon them from the southeast have had their original horizontal position replaced by great folds that extend in a northeast-southwest direction. Though this pressure was slow, at times and in places it was exerted so fast that the rock beds could not adjust themselves to it by bend¬ ing, but instead snapped along lines parallel with the folds, thus permitting those beds on the southeast side, little by little, to be shoved

up on those of the opposite side. Thus layers that originally were hundreds or in places even thousands of feet apart vertically now rests with their broken edges in contact with each other. Such displacements are known as faults, and there are many of them in the Great Valley of East Tennessee scores of miles long. Indeed some of them run the whole length of the valley, and into the other States at either end. It is this folding and faulting that gives direc¬ tion to the Great Smoky Mountains themselves, to the valley of East Tennessee and the ridges and minor valleys within it, and to the eastern escarpment of Cumberland Plateau.

The general lay of the rock beds beneath the Cumberland Plateau is that of a syncline or trough,ˆ with gradually sloping sides, but this

simplicity of structure is broken in the south half by a pronounced arched or anticlinal struc¬ ture. It is along this arch that Sequatchie River has carved out the valley of the same name.

The general lay of the rocks beneath and bordering the Central Basin is that of an ellipti¬ cal flat dome with its highest part in the centre of Rutherford County. The direction of the major axis of this dome is northwest-southeast, or roughly parallel with the folds of East Tennessee and the direction of Cumberland Plateau. The sides do not slope uniformly, but are billowy. This dome is the counterpart of a similar one in Kentucky and adjoining territory in southwestern Ohio and southeastern Indiana. In the southeastern corner of Stewart County there is a small structural dome upon which a depression, known as Wells Creek Basin, some two miles wide, has been excavated by the same natural processes that formed the Central Basin. The rock layers on the sides of this dome stand at a much higher angle than those beneath the Central Basin, of which it otherwise is a miniature duplication. The lay of the hard rock beds in West Tennessee, which there are far beneath the surface, is not known, but they probably dip at a low angle to the west, as do the unhardened beds of sand •and clay, above them.

The oldest rocks of the State are of Archeo¬ zoic Age, and occupy three small areas along the border in Johnson, Carter and Unicoi counties. They include several formations and consist, for the most part, of gneiss, schist and granite. The remainder of the Great Smoky Mountains is composed of rocks of Cambrian Age of which there are several formations. They consist of sandstones, quartzites, conglomerates, lime¬ stones, shales and slates. Without the disturb¬ ance that has affected the region, these rocks would be overlain in the valley of East Ten¬ nessee by the younger Ordovician ones, but the folding, faulting and denudation the area has suffered has in places brought these to the sur¬ face in long, narrow belts and smaller irregu¬ lar patches. Of the Ordovician formations in East Tennessee there are several, the oldest being the upper part of the Knox dolomite, a formation that in places exceeds 3,000 feet in thickness. The lower part is of Cambrian Age. Like the Cambrian rocks, and for the same reason, those of Ordovician Age in the valley of East Tennessee lie for the most part in northeast-southwest belts. Because of the Se¬ quatchie anticline and the erosion upon it, rocks of Ordovician Age are exposed in the floor of

the valley as they are in that of the Central Basin, and for the same reasons. Those of East Tennessee are limestone, marble and shale, while those in the Central Basin, which include 12 formations, are

nearly all limestone. The Knox dolomite occurs nowhere at the sur¬ face in the Central Basin, but owing to greater uplift and probably to reduction in thickness of the overlying formations, it does occur in Wells Creek Basin. Limestone of Silurian Age occurs in narrow belts in the valley of East Tennessee, along the eastern escarpment of Cumberland Plateau, on the western side of the Central Basin, along the streams that flow through the western part of the Highland Rim and along Tennessee River. Black shale of Devonian Age, known as the Chattanooga shale, overlies the Silurian limestone and has the same distribution, except that it occurs in cer¬ tain places where the former is absent, as on the northern, eastern and southern borders of the Central Basin. The rocks of the Highland Rim and the lower ones of the Cumberland Plateau are of Mississippian Age and consist of chert, shale and limestone. Those of the upper part of the Cumberland Plateau are of Pennsylvanian Age and are composed of shale, sandstone, conglomerate and coal beds.

West of the Tennessee, most of the for¬ mations are unconsolidated sand and clay. The lowest and oldest is of Cretaceous Age. Of these there are four formations, which out¬ crop in north-south belts, within 30 miles of the Tennessee. Westward from the Cretaceous border the surface formations are of Eocene Age, with the exception of the loess and the alluvium bordering the streams. The former, which covers a belt of 30 miles wide next to the Mississippi bluffs, is of Pleistocene Age, and the latter is Recent. The thickness of the Cre¬ taceous and Eocene beds is not known, but a well reported to be 2,000 feet deep on the edge of Reelfoot Lake did not reach through them.

The geological history of Tennessee like that of all other land areas, is one of many changed conditions. At times possibly all of it was land. At others most or all of it was be¬ neath the sea. At still others some parts were above and some beneath the sea. When above, the land was being worn away; when below, the material that forms the rocks was put down in the ocean bed, in layers. There are long periods which are not represented by rocks anywhere in the State and others represented only in part, depending upon whether the State was all land or part land and part water. In Lower Cambrian times, the area probably was all land excepting the part covered by the val¬ ley of East Tennessee; in Upper Cambrian, it probably was all sea ; in the very long period covered by Ordovician, Silurian, Devonian, Mississippian and Pennsylvanian times, there were many changes that brought more or less of the area, now above the sea, now beneath it. During Triassic and Jurassic and Lower Cretaceous times, the area probably was land. In Upper Cretaceous times, the western third of the State, possibly more, was beneath the sea, as was West Tennessee

in Eocene times. Since Eocene times, none of the State has been submerged, excepting possibly the western part for only a relatively short time.

Mineral Resources.— Tennessee is rich in

mineral resources. In the order of their im¬ portance the 10 leading minerals are coal, cop¬ per, zinc, iron, cement, clay, marble, phosphate, limestone and barytes. Coal is mined in the Cumberland Plateau; pig iron is produced in Past Tennessee and on the western Highland Rim, in Middle Tennessee; copper, at Duck- town in the southeastern corner of the State ; cement, at Richard City and Kingsport; phos¬ phate, in Middle Tennessee; sulphuric acid at Ducktown; brick and tile, in all parts of the State; marble in East Tennessee; gas, coke and the by-products, in East Tennessee; zinc in East Tennessee. Besides these, there are at least 12 others of importance and 20 that are known to occur, though not in commercial amount. There is a large reserve of coal, iron, copper, marble, phosphate rock and zinc. Clay, cement material and many other products of lesser importance, are inexhaustible. Seven million tons of coal are mined yearly. The State produces more copper than all States cast of the Rocky Mountains except Michigan. The best ball clay in America is found in inexhaustible quantities in the western portion. One million dollars worth of iron is mined yearly, with one-half billion tons in reserve. Tennessee produces more marble than any State except Vermont or Georgia. One Tennessee plant makes more lime than either North Caro¬ lina, South Carolina, Georgia, Florida, Missis¬ sippi, Louisiana or Kentucky. There is more phosphate rock in Tennessee than in all States east of the Rocky Mountains together.

Forestry, Fish and Game. Forestry. — The forests of Tennessee contain untold wealth in various hardwoods. Prior to 1907 but little at¬ tention had been given to this valuable asset. The fifty-fifth general assembly enacted the first general Forestry Law (chap. 397, Acts 1907). This measure received the highest com¬ mendation of the Forestry Department at Wash¬ ington and has proved of inestimable benefit in checking and suppressing forest fires in the State. Under its requirements railroad rights of way were cleaned up and thus ceased to be a constant menace to private property. Prior to 1907 a majority of the forest fires were traceable directly to these railroad rights of way which had grown up in grass and brush liable to be ignited by

any passing train. Ten¬ nessee is divided into three grand divisions : the western division largely bottom lands, the middle division uplands and the eastern division moun¬ tain lands. The rich alluvial lands of the western division produce a heavy timber growth differing from the forests of other sections and consist mainly of oak, cottonwood, hickory and gum. Along some of the water courses in the overflow region are found cypress trees of great value. The upland forest of the middle division consists of mixed hardwoods, largely oak. The best timber has been culled during the process * of cultivation of the soil. The tree growth of value is largely to be found in woodlots, the remainder of the land being devoted to agri¬ culture. Large bodies of timber are rare. Great diversity of tree species is found in the eastern

division — the mountain region of Tennessee _

due largely to differences in elevation, abundant rainfall and different exposures. Three types may be noted: ridge, slope and cove. In the first type is found chestnut, white oak, black oak, black gum short leaf pine and black locust.

On some of the high ridges are found balsam and spruce and at lesser elevations black, red and post oak. The slope type consists largely of chestnut, oak, white, black, post oak and hickory. There is also to be found some short leaf pine, sour wood and black gum. The cove type represents the heaviest growth and great¬ est variety. Topography and soil both favoring. Here is found yellow poplar, basswood, mag¬ nolias and black walnut. In addition chestnut, white oak, beech, sugar maple, hemlock, red cak and hickory, together with a sprinkling of black birch, bitternut, locust, ash, buckeye, sour wood, elm, cherry, sassafras and sycamore. Cer¬ tain coves contain many of the above species and others few. Forest fires prior to 1907 were very destructive but are not to be com¬ pared to those of the Northwest. The neces¬ sary brevity of this article leaves much of in¬ terest unsaid.

Game. In the early days Middle Tennessee was termed by the Indians the “Happy Hunt¬ ing Grounds.® Until some years after the war the whole State was blessed with an abundance of game of many species, deer, 'bear, wild tur¬ key, grouse and quail. Among the migratory birds, ducks, geese, snipe and plover were found in great numbers during the winter and spring, months. By the year 1900, however, conditions had been so changed through the activities of market hunters, ((game hogs® and game dealers that it was difficult to find game sufficient to afford any sport. This fact im¬ pressed upon conservationists the necessity of some law to prevent extermination.

The first general Game Law (chap. 169, Acts 1903) met with violent opposition in the general assembly and passed by a narrow margin. The act to protect non-game birds (chap. 118, Acts 1903) was also passed at this session. The benefits of the Game Law, however, were speedily made ■so manifest that by 1905 the legislature created the Department of Game, Fish and Forestry (chap. 455, Acts 1905) and added to the law of 1903 many important features (chap. 515, Acts 1905). By 1907 game had greatly increased, A close season on deer was established and several hundred deer in a private park near Nashville were purchased and freed. They soon scattered and under protection have greatly increased. Public sentiment now secured the passage of the first general Fish Law (chap. 489, Acts 1907) and Forestry Law (chap. 397, Acts 1907). Both of these measures had been <(side- tracked® in the preceding legislature. In 1909 an attempt was made to legislate the State warden out of office. The Supreme Court de¬ clared the measure unconstitutional (14 Cates, 43). In 1915 another like effort was made and* again the Supreme Court sustained the incum¬ bent of the office (Howser v. Fullton). Ten¬ nessee is cursed with factional politics. Reel- foot Lake, now the property of the State, can be made one of the finest game and fish pre¬ serves in the country. It has long been an El Dorado for hunters and fishermen. Public senti¬ ment now strongly favors game and fish laws.

It is necessary for their enforcement. Without public sentiment back of it, any law is practi¬ cally a «dead letter.® With the establishment and operation of the game farm, the outlook for game in Tennessee is encouraging.

Fish, hew States in the Union have as numerous streams so well adapted for fish as

Tennessee. Many flowing into the rivers are fed by cold springs and are unexcelled for bass, trout, land-locked salmon and perch. Prior to the movement in 1903 for the protection of game and fish, little attention was given this valuable asset. Seining was frequent and dyna¬ miting not uncommon. Little attention was ever paid to local laws. It was not until 1907 that the general Fish Law was passed (chap. 489, Acts 1907). This law was sought to be amended in 1915 (chap. 152, Acts 1915) and the State warden also removed from office. The Supreme Court held this could not be done, but did not pass upon the other features of the bill.

It has been a hard struggle to protect fish in Tennessee. The people have not been educated to the need of their protection. The fine waters, and particularly Reelfoot Lake, should supply fish food in greatest abundance at reasonable cost. The introduction of German carp, like the English sparrow, has been a great misfortune. Eradication of either seems impossible. There has also been a decrease of fish from the pollu¬ tion of streams. This is a common act, but most uncivilized practice. The agencies at work are too varied for enumeration. The develop¬ ment of manufacturing industries with no re¬ strictions upon disposal of waste is fast ruining many fine streams and the fish have become uneatable from the tainting of the water. The mountain streams of the eastern division, where the population is not sufficient to cause damage by sewage, are often affected by sawdust. Seining, dynamiting and pollution are combin¬ ing to destroy the fish of the State. Drastic measures must be adopted. It is feasible to keep wastes out of the waters and it is pos¬ sible to turn them into profit through valu¬ able by-products. A campaign of education as well as law is essential to accomplish the needed results.

Soils. — The soils of the Great Smoky Mountains are mostly rich clays and loams. Those of the valley of East Tennessee are mainly red to brown clay and loam that are very productive, though there are narrow belts derived from certain formations that are poor. Those of the Cumberland Plateau are in parts sandy and in others clayey. The former are not productive and should never be cleared; the latter are not strong, but are susceptible of great improvement. Those of the Highland Rim are in parts fairly good, in others poor, but all can be improved and brought to a high state of cultivation. Those of the Central Basin are very productive clays and loams, and most of the area is in a high state of cultivation. The soils of the western slope vary from those that are sandy and of little worth, through loams and clays that are fairly good and sus¬ ceptible of great improvement to the rich loess area near the Mississippi, and the rich though narrow alluvial bottoms of the Mississippi, Tennessee and smaller streams.

Agriculture. — The area of Tennessee is 42,02 2 square miles, or 26,912,000 acres, of which 21,000,000 are farm lands and more than one- half of this is improved.

Principal Crops and Stock. — Diversified farming is general throughout the State, al¬ though specialization is practised in some sec¬ tions. Corn, cotton and wheat are the great staples, leading in importance in the order

■named. Clover, timothy, soy beans, cow peas, herd's grass,

lespedeza, vetch and alfalfa are grown for hay.

The production of strawberries and toma¬ toes has become one of the paying features, especially in Gibson and adjoining counties. From these and other points vast quantities of vegetables and fruits are shipped to the North¬ ern markets. The entire State offers the conditions necessary to successful fruit culture.

Stock are fed and fattened on a large scale, and this industry is increasing in importance. Hogs are an important product. Poultry rais¬ ing is extensive, and dairying is generally fol¬ lowed near the larger cities and towns.

Stock raising in all its branches is generally followed, but this industry is far short of its possibilities. Some advantages the stock raiser enjoys in this State are an agreeable climate, an abundance of excellent food, easily produced, a long outdoor grazing season and a market in which the demand is always in excess of the supply. In short, as a stock-raising country, Tennessee has no superior and but few equals among the States of this Union. The blue- grass section of the State has bred some of the fastest running and the finest harness horses in the world.

Agricultural Department. — The office of commissioner of agriculture of Tennessee was established 14 Dec. 1871. It was then known as the Bureau of Agriculture. W. H. Jackson was elected president and J. B. Killebrew secre¬ tary. These men in 1874 issued a comprehen¬ sive report of nearly 1,200 pages, with (The Resources of Tennessee1* as its title. The growth of the department has been steady and has become of supreme importance to the State, in view of the fact that of a population of 2,279,- 000, 80 per cent are farmers and planters who more than ever before have become interested in scientific farming and farming not only as a means of livelihood but as a prosperous business.

The soils of Tennessee are well adapted to diversified farming and respond bountifully to modern methods. In fact, as an all-around crop-producing State Tennessee is not ex¬ celled in any other region in the United States in the variety, profusion, character and quality of its farm products. Wonderful possibilities exist in the soils, climate, physical structure and drainage of the agricultural areas. Fre¬ quent demonstrations of great crops are re¬ ported to the Agricultural Department from each of the three grand divisions of the State, some¬ times made on ordinary soils with ordinary cultivations, sometimes on the richest soils with intensive methods applied in the prepara¬ tion of the land and the cultivation of the croft exemplifying the versatility

and capacity of such lands and the progress of their develop¬ ment.

There are three assistant commissioners of agriculture, who hold office by appointment of the commissioner, and whose work is under his direction. The appropriations by the State to cover the salaries and expenses of the various offices under the commissioner's direction ap¬ proximate $35,000.

Scientific farming is making rapid strides in Tennessee, and the State's splendid citizenship has become fully awakened to the truism that "co-operation is essential to success.® This is

State Capitol at Nashville

lully demonstrated at the farmers' institutes, one great meeting being held annually in each of the three grand divisions of the State — East Tennessee in May, West Tennessee in Sep¬ tember and Middle Tennessee in December. It has been truthfully said that there is a (<new- born intelligence in even the most secluded rural districts® ; farmers who were averse to changing methods of agriculture which have prevailed for ages have awakened to the sense of isolation ; they are discarding the old methods and adopting the new. In their homes they are establishing new conditions, making them places not merely of shelter but of com¬ fort and luxury. The tractor and the auto¬ mobile are rapidly displacing the old-time im¬ plements and the buggy. The annual value of farm products approximates $150,000,000; value of domestic animals, $107,000,000; value of all farm property, $614,000,000. It is worthy of note that every crop scheduled in the Federal census is grown to some extent in Tennessee.

Industries.— Although Tennessee has always been, and still is, essentially an agricultural State, the progress it has been making in man¬ ufactures strongly indicates marked pre-emi¬ nence in industries in the years to come. This pre-eminence would seem to be a necessary corollary to the development of its great natural resources; and it is to be noted that its present progress is along these lines. Approximately $175,000,000 is the capital invested in Tennessee manufacturing generally.

According to the census of 1909 the total number of industries in the

State of Tennessee was 4,609, and of these 1,917 were represented by establishments making lumber and timber products. If to these be added the industries that use these products, such as car and car¬ riage factories, approximately one-half of the manufacturing establishments of this State de¬ pend upon the natural resources of timber. The inference naturally is that Tennessee is a well-wooded State, and such is the fact. Of the more than 26,000,000 acres in Tennessee, approx¬ imately 15,000,000 are woodlands. Three coun¬ ties have each more than 200,000 acres of virgin forests; and while much of the wooded area of the State is second and third growth, there is still an enormous quantity of virgin trees in the less accessible areas; so much as doubtless to furnish material for the manufacture of lumber and wood products for many years to come. Tennessee has $16,000,000 capital in¬ vested in the timber business and 1,500,000 board feet are cut yearly.

In value of products, the flour-mill and grist¬ mill industry stands but little below that of lumber and timber products. The soil and climatic conditions of the State are conducive to the production of wheat and corn; but this in¬ dustry does not depend upon local supplies of raw material ; for much wheat and corn are shipped into Tennessee mills from the West and the Northwest, and the milling in transit privilege enjoyed for many years by Nashville, Tennessee's largest milling centre, has tended to stimulate this industry and place it upon a permanent and stable basis.

Other manufacturing industries of Tennes¬ see in the order of their importance are: Foun¬ dry and machine-shop products; printing and publishing; cars and general shop construction and repairs by steam railroad companies; oil, cottonseed and coke; iron and steel blast fur¬

naces ; textiles, and a very large list of other ini Stnes a&Sr.eSa6nS 4,775 establishments in 1914 and covering almost all articles manufac¬ tured to meet the ordinary demands of modern life.

The summary of the manufactures of Ten¬ nessee for 1914, prepared by the Bureau of Census, gives the following statistics: Number of establishments, 4,775; persons engaged in manufactures, 88,514; proprietors and firm menfbers, 5,142; salaried employees, 8,999; wage-earners (average number employed dur-

oofoft6 yea.r); H373; primary horse power, 286,857 ; capital, $211,423,000; services, $44,910,-

S2nfecludmg .saIaries $11,828,000, wages $33,- 082,000) ; materials,

$123,430,000; value of prod¬ ucts, $212,071,000; value added by manufac- o£ Products less cost of materials),

$88,641,000.

This summary shows a consistent increase in the census report of 1914 as compared with that of 1909. In the order of their importance, from a percentage point of view, the increases for the several items named are as follows: Salaries, 28.8 per cent ; capital, 25.9 per cent ; materials, 18.7 per cent; primary horse power, 18.4 per cent; value of products, 17.7 per cent ; wages, 17.1 per cent; value added by manufac¬ ture, l6-3 per cent lt must be borne in mind that the United States census with reference to manufactures excludes hand trades, building trades and neighborhood industries and takes account only of establishments conducted under the factory, system. Furthermore, they cover only establishments having annual products valued at more than $500. The four large cities °£ Nashville, Memphis, Chattanooga

and Knoxville, have more than one-fourth of the total establishments of the State. In these cities are most of the very large manufacturing enterprises,, such as the following in Nashville : Milling, printing, car-shop construction, stoves and ranges, fertilizer, tobacco and lumber. In Memphis . lumber and allied wood-working in- dustries, industries connected with cotton, par¬ ticularly cottonseed oil mills, molasses mills. In Chattanooga iron and steel manufactures, hosiery mills, knitting mills, wood-working plants. In Knoxville marble enterprises, wood¬ working establishments, hosiery mills, knitting mills. Speaking generally, the outlook for man¬ ufactures in Tennessee is exceedingly encour- a&jn§‘. and it. is likely that in the years to come this State , will be a very large manufacturing State. This result will be brought about largely by two. causes, cheap hydro-electric power and proximity to great natural resources.

Transportation. — Growing out of the agita¬ tion for internal improvements about the year 1830, the State undertook with enthusiasm the promotion of railroad development. The South Carolina Railroad, chartered in 1828, the con¬ struction of which began in 1829, doubtless fur¬ nished an impulse to the movement The desire was for an outlet to some Southern port for the products of agriculture and industry. The first railroad chartered in the State was the Memphis Railroad Company, a proposed line from Memphis to Pulaski, on 12 Dec. 1831. The line was never built. In 1836 the Hiwasse Railroad was chartered and ground broken in 1837, probably the first work ever done on a railroad in the State. This line now forms a part of the Southern Railway between Knox¬ ville and Chattanooga

and was completed in

1. In 1845 the Nashville and Chattanooga Railroad Company was chartered and the track between Nashville and Chattanooga was finished in 1853, the first complete line of railroad operated in the State. In 1845 a great com¬ mercial convention was held at Memphis, over which John C. Calhoun presided, out of which grew the Memphis and Charleston Railroad, now a part of the Southern Railway.

The steam railroad mileage of the State for the fiscal year ended 30 June 1914, exclusive of switching and terminal companies, was 4,105.55, or 1.63 per cent of the total mileage of the United States. The State had 9.85 miles of line for each hundred square miles of territory and 18.42 miles of line for each 10,000 in¬ habitants. In 1870, with 1,492 miles, it ranked 12th in its proportion to the total mileage, In 1914 its standing in this respect was 29th, while as to mileage on the basis of territory it was 28th and on population 38th. Prior to the Constitutional Convention of 1870, the State gave large aid to railroad development and up to the Civil War period, had issued bonds for that purpose amounting to approxi¬ mately $15,000,000.

For the calendar year 1914 the State levied taxes against 39 railroad corporations, having an assessed value of distributable and localized property of $90,787,256.25, upon which the tax for State purposes alone was $317,755.40. Ex¬ cluding the special excise taxes of the govern¬ ment, the railroads in the State pay in annual taxes approximately $448 per mile of road. The six railroads of the State operating or con¬ trolling more than 50 miles of line, and which embrace about three-fourths of the total mile¬ age, are as follows: Louisville and Nashville Railroad Company, 1,888 miles, including the Nashville, Chattanooga and Saint Louis Rail¬ way, with 899 miles; the Southern Railway Company, 985 miles, including the Mobile and Ohio Railroad Company with 119 miles, and the Virginia Southwestern Railway with 101 miles;

Summary of the Water Power Available Within Tennessee. Minimum Horse Pi

the Illinois Central Railroad Company with 351 miles; the Tennessee Central Railroad Com¬ pany, with 294 miles; the Cincinnati, New

Orleans and Texas Pacific Railroad Company with 143 miles, and the Carolina, Clinchfield and Ohio Railroad with 55 miles. The freight rates of the State are equitable and the ma¬ jority of the railroads have a maximum pas¬ senger rate of two and a half cents per mile. For the most part, the railroads are assisting to an unusual degree in the development of the resources along their lines.

The street railway mileage in the State in 1914 was 389.9, and had an assessed value for taxation of $14,607,388.89.

The Water-Power Resources of Tennessee. — To state in definite figures the amount of power which can and ultimately will be obT tained from the rivers of Tennessee is an im¬ possibility. Any comprehensive scheme of water-power development must, for its realiza¬ tion, ignore political boundaries. For this reason it is not possible to segregate the water¬ power resources of one State from those of the neighboring States. Furthermore, the quantity of power to be obtained from any given stream is wholly a question of the extent of possible storage of water in reservoirs, the construction of which forms an essential part of the water-power development. This ques¬ tion of reservoirs is itself complex, for it in¬ volves questions of vested rights, the agri¬ cultural value of lands to be flooded, the re¬ location of railroads which are already so situ¬ ated as to render a great many otherwise attractive water-power projects impossible of realization, and other questions of a technical nature no less vital to even an estimate of the amount of power potential in a single river.

Such figures, therefore, as may be pre¬ sented are to be regarded merely as estimates, and the following table, which has been com¬ piled with great care from all the data avail¬ able, must be so interpreted.

for Development, Without Storage, Wholly

wer During the Six High-Water Months.

STREAM

Location

Horse power

Tennessee River .

Shellmound to Chattanooga

58.800 *50,000

69 , 490 55,230 35,080 8,400 4,190

12.360 87,550 60,000

4,000

6,320

16.360

67.500 22,600 56,000

13.500

39.800 32,340 74,000 15,370

40,000

Tennessee River .

Chattanooga to Knoxville

Hiwasse River .

From Ocoee River to State Line

Ocoee River .

From mouth to State Line

Clinch River .

From Emorv Creek t.o State Tine

Powell River .

From mouth to State Line

Little River .

From mouth to source . .

Tellico River .

From mouth to source

Little Tennessee River .

From mouth to State Line

French Broad River .

From mouth to State Line

Citico Creek .

From mouth to source

Abrams Creek .

From mouth to source

Little Pigeon River .

From mouth to source

Nolichucky River and tributaries .

From mouth to State Line

Pigeon River .

From mouth to State Line

Holston River .

From mouth to South Fork

South Fork Holston River .

From mouth to State Line

Watauga River and tributaries .

From mouth to State Line

Small tributaries of Tennessee River .

Tributaries of Cumberland River .

•

Minor additional streams .

Small water powers not considered by United States Geological Survey t .

Total .

828,890 1 .020,000

Total available for two-thirds of the time .

... ,The. United States Geological Survey ascribes 175,000 horse power to the Tennessee River from Chattanooga to Knox¬

ville; but inasmuch as the interests of navigation would not permit of the development of all of this power, this figure has been reduced to 50,000. According to the rep9rt of the chief of engineers of the United States army, 20,000 horse power could economically be developed at a point about six miles from Knoxville.

. + J- ˆ-,Switzer has estimated the small water powers of the State capable of being developed by individual farmers in units of 25 horse power and less to total 75,000 horse power. (Consult " Resources of Tennessee ” Vol I No D For the purpose of this summary this figure has been reduced to 40,000 horse power.

The total amount of power which a com¬ prehensive plan of development, such for in¬ stance as will be necessitated in the future by the exhaustion of cheap coal, will render available is undoubtedly more than double the above figure ; quite probably more than triple the figure.

Present Development. — The large develop¬ ments already completed within the State are comprised in the following table :

indebtedness was converted into and sold as serial bonds, running 40 years bearing 4 per cent and 4 Vi per cent interest, averaging 4.28 per cent interest.

Bonds held by charitable and educational in¬ stitutions :

5 per cent certificates of indebtedness . $14,000

6 per cent certificates of indebtedness . 622,000

Total . $636,000

COMPANY

Location

River

Installed capacity

Chattanooga and Tennessee River Power Co.

Tennessee Power Co. (two plants) .

Tennessee Eastern Electric Co .

Watauga Power Co .

Hales Bar .

Parksville and Caney Creek .

Near Greenville .

Near Elizabethton .

Tennessee .

Ocoee .

Nolichucky .

Watauga

58,800 horse power 45,000 horse power 16,000 horse power 3 , 200 horse power

The Tennessee Power Company has con¬ structed a third water-power plant, to develop 80,000 horse power, located on Caney Fork, a tributary of the Cumberland River.

Undoubtedly the dominant power interests in the State are those of the Tennessee Power Company. This company, beside owning the three water powers above, leases the plant of the Chattanooga and Tennessee River Power Company at Hales Bar. owns the steam, power- plants of the Chattanooga Railway and Light Company, the Nashville Railway and Light Company and a third steam plant at

Cleveland. It also holds an undeveloped water-power site, above the two already mentioned, on the Ocoee River. It has the most extensive transmission line in the State. This line connects all of the power-houses with each other and with the cities of Chattanooga, Nashville, Cleveland and Knoxville; and the company has a practical monopoly of the power business in the three first named places and it furnishes power to the Knoxville Railway and Light Company, which supplies the power requirements of Knoxville. Its transmission lines total over 300 miles.

The Tennessee Eastern Electric Company furnishes power to Greenville, Jonesboro and Johnson City; it has steam plants at Greenville and Johnson City and it operates the street car system of the last named place. The Aluminum Company of America, operating under the name of the Knoxville Power Company, has constructed a series of water-power plants on the Little Tennessee River which yield ap¬ proximately 400,000 horse power. Of these plants, only one is located within Tennessee, the rest being situated in North Carolina, but almost all the power is utilized in the com¬ pany's reduction works, located at Maryville, Tenn.

State Finances. — 1. Bonded Indebtedness of the State. — The status of interest-bearing debt of State up to 1 July 1915 and 1 Oct. 1915

was as follows :

41 per cent temporary loan refunding bonds,

1 July 1915 . $9,381,000

6 per cent temporary loan refunding bonds,

1 Oct. 1915 . 1,400,000

Short term notes, issued in 1915, 3 per cent

interest, 1 July 1915 . 1,000,000

Total . $11,781,000

July and October 1915, being maturity dates, at which time refunding was due. The above

1. State Tax. — Both personal property and real estate, 35 cents.

2. Aggregate assessed valuation of property in Tennessee for

1913-14 was $560,997,621.

3. Sinking Fund. — Upon the adoption of the serial plan of retirement of bonded indebted¬ ness, which of course provides for the semi¬ annual payment of interest and a portion of the principal, the sinking fund plan was abandoned. The interest payment and proportional pay¬ ment of principal is stipulated1 in serial plan or contract, which obligation cannot be postponed by legislation and obviates the necessity of a sinking fund.

Assessment of 1913-14, railroad, telegraph, telephone and street railways:

Railroads . $90,787,256

Telephone and telegraph . 6 , 362 , 425

Street railways . 14,607,388

Increase 1915 combined properties . 2,253,000

Total . $114,010,069

The estimated value of propertv owned by the State in 1883 was $1,579,475; estimated value in 1914, $5,316,378.

Sources of Revenue. — Taxes on polls, on property, on incomes, on sales, of land, on ex¬ ercise of privileges, on litigations, from fines and forfeitures, from merchants, from peddlers and from collateral inheritance tax. All taxes must be uniform.

Exemptions. — One thousand dollars, per¬ sonal property, each resident taxpayer; United States, State and municipal property not used for rental ; religious, charitable, scientific, liter¬ ary and educational property, subject to cer¬ tain minor limitations; agricultural and me¬ chanical associations worth less than $10,000; all public thoroughfares and parks dedicated to public use; all growing crops, direct product of the soil.

Banks and Banking. — The following fig¬ ures largely exhibit the condition of banks in Tennessee in March 1916:

National State

Number of banks . 107 406

Capital paid in . $14,570,000 $14,216,359 02

Surplus and undivided profits 8,715,000 5,445,373 85

Actual cash . 5,004,000 4,126,099 71

Total reserve . 18,569,000 26,684,153 41

Deposits . 76,035,000 74,712,165 89

Total resources . 129,228,000 102,040,044 78

Tennessee has a modern banking law. The State banks are regarded with exceptional con-

fidence by the public. It is optional with the State banks to assume double liability of stock¬ holders. The State under its constitution can¬ not become the owner in whole or in part of any bank.

Government.— The separation of the powers of government into legislative, executive and judicial departments was specifically recognized in 1776, 1834 and 1870; and the 1796 constitu¬ tion, also, without mentioning it, so organizes the government. Under the 1776 constitution the legislature elected the governor, who was given no veto power until 1870. Until 1853 the judges of the principal courts were elected by the legislature. Not until after 1834 were the justices of the peace elected by the people. The North Carolina and early Tennessee courts adopted with little hesitation the doctrine of judicial review of legislation. The power of the legislature has been made subject to gradu¬ ally increasing limitations, both procedural and relating to the variety and scope of its enact¬ ments. In 1870 the reaction against the arbi¬ trary acts of the reconstruction governors re¬ sulted in a decrease of the powers accorded the governor.

The constitution of Tennessee has reflected its economic and social history. The simple agricultural commonwealths of the 18th cen¬ tury, after securing the people against the en¬ croachments upon their “rights® which had become so frequent under royal governors, de¬ manded only an outline of the frame of gov¬ ernment and a few other elementary provisions such as the regulation of the suffrage. The power of the land speculators showed itself clearly in the requirement of a specific land tax in 1796. The enthusiasm for internal improve¬ ments was apparent in the constitution of 1834; reaction against its abuse, and against prevalent careless methods of dealing with

corporations, in the constitution of 1870. The relative de¬ cline of agriculture and the vast increase of mining and manufacturing interests, as well as the trend of population city-ward furnish the economic background for a new convention.

Education. — The public school system con¬ trolled by a State board of education; the de¬ nominational schools and colleges, the private preparatory schools and the several city sys¬ tems constitute the means of education. Edu¬ cational upbuilding has been marked since 1873 which is the time of the beginning of the three chief agencies within the State, namely: (1) The system of public schools, inaugurated by the State legislature; (2) The establishment of George Peabody College for Teachers by the Peabody Board of Trust, and (3) The founding of Vanderbilt University. The general growth of education has been from the eastern bound¬ ary of the State toward the west. Of the three grand divisions — East, Middle, West — East Tennessee has had the highest and most general development, while Middle Tennessee is second and West Tennessee the lowest.

Public Schools. — The University of Tennes¬ see is the head of the public school system with all departments located at Knoxville, except the medical and dental colleges which are at Memphis. The department of agriculture main¬ tains, jointly with the United States Depart¬ ment of Agriculture and the State department of agriculture, an extension division which

takes to every county experts of every kind needed for farm development. Farm demon¬ stration agents are employed in the counties receiving this service. Support is received from the Morrill Act Fund of 1890; the Nelson Fund, Act of 1907 ; the Land Grant Fund, Act of 1862 ; the Hatch Fund, Act of 1887 ; the Adams Fund, Act of 1906, and from the appro¬ priations of the State legislature — aggregating an annual expenditure of from $350,000 to $400,000. An attendance of 1,000 students is maintained beyond that of the Summer School of the South which annually registers 1,500 at¬ tendance. Control of the university is centered in a board of trustees appointed by the gover¬ nor, one from each Congressional district of the State.

The State board of education has under its direction the normal schools, the high schools and elementary schools through the officers of instruction. This board is appointed by the governor and consists of nine members, with the stipulation that not more than three mem¬ bers shall be from any one grand division of the State. The offices filled by the board are : The State superintendent of public instruction,

State high school inspector, presidents of the normal schools, teachers of the normal schools, supervisors of elementary schools, conductors of teachers' institutes and the examiners of teachers' examination papers. Other duties of the board are : Examine teachers under a uniform State law; examine applicants for the position of county superintendent of schools; apportion the school fund as outlined by law; adopt schoolbooks, both elementary and high school; outline all courses of study; certificate all teachers, county superintendents and gradu¬ ates of the elementary and high schools, and to issue such regulations as may be needed under legal provisions in the general super¬ vision of the public school system.

The school fund is derived from county levies, which vary in amount, and are collected bv the county trustees. However, one and one- half mills on the dollar of assessed property are mandatory for all counties through a State enactment. Also, the general education fund established in 1909 provides that 33H per cent of the gross revenues of the State be expended for school purposes, same to be divided as fol¬ lows : 61 per cent for elementary schools ap¬ portioned to the counties on a per capita basis ; 10 per cent for . county supervisions, consoli¬ dated schools, industrial work, salaries of county superintendents; 6 per cent to county high schools; 2 per cent to the Cookeville Poly¬ technic Institute; 1 per cent to school libraries; 13 per cent to normal schools; 7 per cent to the State University. A poll tax of $2 sup¬ plements this fund. The aggregate fund is approximately $8,000,000— apportioned by the State Board of Education to a school popuVation ol /(SO, 000 with 12,000 teachers whose average salary is $50 per month for a term of 130 days. Four normal schools are maintained, one of which is for negroes — with an annual total enrolment of 2,500. Seventy-one counties of 96 have county high schools with an enrolment of 12,500.

The Roman Catholic Church maintains 25 parochial schools, with 4,170 pupils, one college ioi boys with 350 students, five academies for

girls with 619 pupils, two orphan asylums with

, orphans, making a total of 5,464 young peo¬ ple now under Catholic care out of a Catholic population of 19,000.

Private Schools. — The famous Webb School at Bellbuckleˆis the pioneer of college prepara¬ tory schools in the territory southwest of the river Ohio. Others of the same type whose special purpose is to train boys for college are Branham and Hughes School at Spring Hill; Morgan School at Fayetteville ; Hawkins School Gallatin ; Castle Heights, Lebanon; Battle Ground Academy, Franklin; McTyeire School, McKenzie; McFerrin School, Martin; Massey School, Pulaski; Peoples-Tucker School, Springfield; Montgomery Bell Acad¬ emy, Nashville; Duncan School, Nashville; Bowen School, Nashville; Wallace School', Aashville; Baylor School, Chattanooga; Mc- Callie School, Chattanooga ; Columbia Military Academy; University School, Memphis; Se¬ wage Military Academy; Industrial School, Huntingdon.

Higher Institutions. — The following colleges are strongly supported and enjoying prosperous administrations: Vanderbilt University, Nash¬ ville; George Peabody College for Teach¬ ers (General Education Board), Nashville* University of Chattanooga (Methodist) ; Car- son-Newman College, Jefferson City (Bap¬ tist); Milligan College (Disciple), Tusculum, (Presbyterian), Greeneville; Washington Col¬ lege (Presbyterian) ; University of Tennessee, Knoxville (State) ; Cumberland University, Lebanon (Presbyterian) ; Southwestern Presby¬ terian University, Clarksville (Presbyterian) ; Union University, Jackson (Baptist); Tennes¬ see College, Murfreesboro (Baptist) ; Univer¬ sity of the South, Sewanee (Episcopal) ; Mary¬ ville College, Maryville (Presbyterian) ; Co'l- • • lege of the Christian Brothers, Memphis (R. C.) ; Saint 'Cecilia's Academy, Nashville (R C.) ; Sacred Heart Institute, Memphis (R. C.).

Junior Colleges— Several institutions have organized regular junior college curricula as follows: Ward-Belmont, Nashville; Buford

College, Nashville; Martin College, Pulaski; Hiˆwassee College, Madisonville, and the State ˆ normal schools at Murfreesboro, Johnson City and Memphis.

Higher Institutions for Negroes. — The highest standards of efficiency are attained in the colored institutions which take their place alongside similar schools for the white race. Fisk University, Nashville (Congregational); Roger Williams,. Nashville (Baptist) ; Walden University, Nashville (Methodist) ; Lane Col¬ lege, Jackson (Methodist); Knoxville College* Turner College, Shelbyville ; Industrial Normal School, Nashville (State) ; Academy and Indus¬ trial School of the Immaculate Mother, Nash¬ ville (R. C).

Charitable Institutions. — The following in¬ stitutions receive their

support from the State: The Central Hospital for Insane located near Nashville; the Western Hospital for Insane located at Boliver; the Eastern Hospital for Insane located at Bearden; the Reformatory for Boys located near Nashville; the Tennes¬ see Industrial School located near Nashville; the Tennessee Confederate Soldiers' Home at Hermitage ; three of the larger counties in

Tennessee have their iOwn industrial schools, namely, Shelby, Knox and Hamilton.

Throughout the State are a great many in¬ stitutions which derive their support through voluntary contributions from individuals, or through societies organized for that purpose, such as the Masonic Home located near Nash- vule, the Odd Fellows Home at Clarksville and the Old Woman's Home at Nashville. Many counties in the State maintain charity institutions such as county asylums, poor- houses. The State has also in the past given aid to private institutions such as the Ten¬ nessee Children's Home, Finding Society and the School for Blind Girls.

PenM Institutions. — Penal institutions are t e penitentiary, or State prison, to which per¬ sons convicted of felonies are sentenced ; and county jails used for the detention of persons awaiting trial, or those who have been convicted of felony and are temporarily held until they may be conveyed to the penitentiary. Sentences for terms less than one year are to the county jan, and persons fined by the criminal courts and failing to pay such fines are also im¬ prisoned therein. Under the law a county jail may be declared to be a workhouse, in which case the prisoners may be worked on the high¬ ways during the term of their sentences, or until their fines shall be paid according to a ˆfiyˆule of valuation placed upon their labor. The cities also have workhouses for the punishment of infractions of city ordinances authorized by State law. Workhouse prisoners may be transferred from one county to an¬ other, and hence the labor of prisoners from several counties may be applied to highways in one county together, an arrangement due to the fact that in most counties there are very few county prisoners.

The penitentiary, or State prison, was es¬ tablished under an act passed in 1829, and be¬ gan to receive prisoners in 1831. It was con¬ ducted under the direct management of the State until 1870, except when held by the United States military forces from 1862 to 1865, and except when under an abortive lease in 1867-68. From 1870 to 1897 the lease system was in force, although the State at the same time employed a superintendent, wardens and physicians, to look

after the interests of the prisoners and State, as well as could be done under the system.

The act of 1893 provided for a change to the State account system, with a provision permitting the hiring out of a part of the con¬ victs at the main prison under contracts for lahor by the day; also for the purchase of farm and coal lands. A farm of 1,100 acres, lying in a large bend of the river six miles below Nashville, was bought and a commodious modern prison was erected thereon. Later 2,400 acres were added to this prison farm. For coal mining purposes the State purchased the Brushy Mountain tract of 12,000 acres in Morgan and Anderson counties, and later pur¬ chased ((Herbert Domain® of 10,000 acres in Bledsoe and partly in Cumberland, White and Van Buren counties. This latter tract is sup¬ posed to contain good coal, but it has not been opened. In the same act the State is forbid¬ den to mine by convict labor except in the State's mine. A large number ,of convicts are

employed at Brushy Mountain, the number on 1 Dec. 1914 being 616, while those in the main prison at the same time were 1,243; total, 1,859. White convicts were 651, colored 1,208. Fe¬ males 62, all at Nashville.

At the main prison two-thirds of the con¬ victs are employed in manufacture, black- smithing, farming, clerical and domestic work, etc., under direct management; one-third are similarly . employed under contracts with out¬ side parties, but all are kept under the eye of trusted State officials to see that the humane provisions of the law are carried out.

During 1915-16 200 convicts were hired to Campbell County, and 50 to Williamson, and employed in working on public roads at 10 cents an hour. This new departure seems to be successful ; there is a strong movement so to employ the mass of the convicts in the future. The Indeterminate Sentence Law is in force.

In 1915 an act was passed creating the Board of Control, with its office at Nashville, whereby the several public institutions of the State, as the penitentiary, State Reformatory, Tennessee Industrial School, asylums for the insane, deaf, dumb and blind schools, are brought under one board for their better and more uniform management. The

statistics of the operations of this board have not been issued for 1915-16.

For a number of years following 1897, when the new system for the prison went into effect, profits over expenses were large, often running over $200,000 net profits a year, but in more recent years the receipts have not much ex¬ ceeded expenses.

While the convicts were employed under the lease system and many of them confined in the old prison which was, from 1887 to 1897, within the city limits of Nashville, the death rate was high, being at times over 3 per cent ; the re¬ port to the end of 1914 shows a death rate of 9.3 per cent.

There are two institutions which are semi- penal in character, the Tennessee Reformatory for Boys and the Tennessee Industrial School. The reformatory is in a different part of Davidson County from the main prison, but is in a way connected with it, and to it are com¬ mitted young convicts with a view to reforma¬ tion and schooling. The judges of the Crimi¬ nal Courts may send any convict under 18 years of age to this reformatory, and nearly all such are so disposed of. The population of the reformatory is 497.

The industrial school is designed for the care of young persons who are without the care of guardians or provident parents and such as are found wandering or loitering in company of evil repute. The pupils or in¬ mates .of the industrial school number 860. Several different counties maintain institutions of the same kind, and they are recognized by the courts. The discipline is of great value, and thqre are many pupils who have not been placed in the school by reason of any com¬ plaint against them.

The act of 1911 establishes the Juvenile Court and divides young offenders and un¬ fortunates into two main classes, namely, de¬ linquent and dependent. Delinquents are those who have committed some penal offense, while

dependents are such as have been mentioned herein in connection with the industrial school. The heads of the Juvenile Courts in the largest cities are the city judges, but in nearly all the counties this position is assigned to the judge or chairman of the County Court. No person under the age of 16 years can now be tried and sentenced, in the first instance, to the peni¬ tentiary, jail or workhouse, it being the duty of the judge of the Criminal Court whenever a person of such age is indicted to turn such youth over to the Juvenile Court. The Juvenile

Court shall send him to the reforma¬ tory, industrial school or other institution of the kind, or may commit him to the care of a guardian, for a definite period ; and shall re¬ tain supervision until the youth shall be of age. The person accused has free legal counsel, and his parents may defend for him. If the youth prove totally intractable, after due effort at ref¬ ormation, he may be tried later as any other criminal and sentenced to prison. By the act of 1915 capital punishment was abolished.

Archaeology. Eolithic and paleolithic Man. — When and from whence primitive man first came into the section now known as Tennessee is still undecided. It is claimed, and also denied, that remains of man of same geological age and culture as that of the earliest and rudest of eolithic and palaeolithic man of Europe have been found in several sections of the United States, but no well-authenticated finds of such have been made in Tennessee. If. eolithic or palaeolithic man ever existed on this continent, the caverns and rock-shelters of the Cumberland and Tennessee valleys offered ideal places for their abodes. These were about the right distance below the great ice fields — which reached to the Ohio River, at or ‘ near the end of the last great Ice Age — to offer practically the same climate and shelter in which eolithic and palaeolithic man were found in Europe.

The Mound Builders. — Formerly it was be¬ lieved that the ancient mounds and fortifications of this section were built by a long-vanished people, of lighter complexion and different race from the Indians. This belief originated from some of the early Indians telling the whites that the Indians did not build ' the mounds, but they were built by an earlier white race, who lived here before the Indians came, and the Indians conquered and exterminated them. Modern research has proved this to be untrue. It is now well established that these great earthworks were built by Indians.

The contents of these mounds show them to have been erected by men of the same habits of life, same degree of barbarism, same reli¬ gious customs as the Indians found here by the first whites. In fact manv of these mounds con¬ tain articles of European make, which the In¬ dians had .obtained from the whites. DeSoto in 1540 found the southern Indians using these mounds for sites for their religious houses, and for the residences of their chief men.

Scattered along the larger water courses of Tennessee are probably over 100 .of these ancient mounds. Each mound is usually accompanied by a village site and hundreds of ancient graves. These remains are of widely different ages and show somewhat different

artifacts and customs. It is probably true that

there are as many ancient Indian graves in Tennessee as there are white graves. The ancient population of Tennessee was probably never, at any one time, over 20,000 ; but In¬ dians have roved over this section, changing town sites in some instances, for several thousand years, giving rise to the many re¬ mains of widely different ages. *

Principal Indian Tribes. — At the time the whites first visited this section Cherokees, Shawnees and Chickasaws were the principal tribes inhabiting Tennessee.

The Cherokees. — The Cherokees were a strong separate tribe of the Iroquoian stock. They at one time held the entire southern Al¬ legheny region in southwestern Virginia, western North Carolina, west-South Carolina, northern Georgia, northeastern Alabama and East Tenn¬ essee. De Soto found them in this section as early as 1540 and they probably had been here long before. The Cherokees also claimed all the land between Tennessee and the Cumber¬ land River and on to the Ohio River, but had few or no towns in that region. The Cherokees aided by the Chickasaws drove the Shawnees from the region around Nashville, about the year 1710. The Shawnees gradually moved north of the Ohio. The feud between the Chero¬ kees and the Shawnees continuing, both parties ceased to hunt or live to any large extent in the disputed territory in Middle Tennessee. So, for nearly 60 years after 1710, this fertile sec¬ tion was unoccupied and became full of game. The whites were attracted by the game, rich soil and comparative freedom from Indians, and began settlements under General Robertson, at what is now Nashville, about 1779. The Cherokees were gradually forced to give up their lands and emigrate to Texas and the In- * dian Territory, while a few remained in the mountains of western North Carolina, and 1,376 are now living on Qualla Reservation in Swain County, N. C., and 300 on Cheowah Reservation in Graham County, N. C.

The Shawnees. — The Shawnees have a most interesting history. They originally came from the north and were of Algonquian stock. In the year 1669 when wTe first begin to have any authentic history of them, we find a part of the tribe living in the Cumberland Valley in Middle Tennessee, and ranging from the Tennessee River <on the south to

the Ken¬ tucky River cn the north. One of their prin¬ cipal towns was on the present site of Nash¬ ville; another, and earlier one, at what is now Castalian Springs, in Summer County, Tenn. The Shawnees at this time were living in friendship with the Cherokees, and it is claimed by the Cherokees that the Shawnees were occupying this territory by their per¬ mission. About 1707 war arose between the Shawnees and the more powerful Cherokees. In consequence small bodies of Shawnees were continually leaving and seeking their friends and kindred north .of the Ohio River. The last of the Shawnees left in the Cumberland Valley attempted to leave their home at Nash¬ ville, and join their brethren in the north about 1710. These were ambushed by the Cherokees and their allies — the Chickasaws — on Cum¬ berland River just above the mouth of the Harpeth, and practically all this body of Shaw¬ nees were slain. Some of the Shawnees from

the Cumberland, after living for a time in Kentucky, formed a settlement at Shawnee- town, Ill. About 1730 these removed to Ohio and joined other Shawnees. About 1750 these western Shawnees were joined by the eastern branch of the tribe. This eastern branch had originated in the north, later emigrated to the headwaters of the Santee and Peedee rivers in South Carolina. Gradually driven thence by the warlike Catawbas, during the period 1690 to 1720, they drifted north, building the old Shawnee towns of Winchester, Va., and Old-town, Md., on their way. They finally es¬ tablished themselves in Lancaster County, Pa. They made a treaty with William Penn in 1701. It is said they had a copy of this treaty 50 years later. The eastern and western branches of the tribe having joined in Ohio, they became the allies .of the French, and for nearly 40 years were constantly at war with the English, ,or the citizens of the newly-formed United States. Many of the expeditions sent to the country north of the Ohio during the War of the Revolution were against the Shaw¬ nees, and most of the bloody work in northern Kentucky was done by the Shawnees. When peace had been declared after the War of Revolution a considerable body accepted the invitation of the Spanish government to set¬ tle near Cape Girardeau, Mo., in what was then Spanish territory. Another party of Shawnees settled on White River in Indiana. From this last section of the tribe sprang the great Tecumseh and his twin brother, Tenskwatawa, the Prophet. The Prophet was defeated by Harrison at the battle of Tippe¬ canoe in 1811. The warlike spirit of the Shaw¬ nees was broken by this overwhelming defeat. About 1825 the various sections of the tribe began moving west to a reservation in Kansas. About 1845 a large part of the Kansas section moved to the Canadian River country of the Indian Territory.

Military History. — Tennessee is designated the “Volunteer® State —

a name acquired in the war with Mexico. Her military history be¬ gins at King's Mountain during the Revolution. Creasy in his (Fifteen Decisive Battles of the World, J says the battle of Saratoga is the decisive one in our Revolutionary struggle; if that is so, King's Mountain is second in im¬ portance to that engagement alone.

This -battle was fought on 25 Sept. 1780. The force was under the command of Cols. John Sevier, Isaac Shelby and William Camp¬ bell, and composed entirely of East Tennessee mountaineers, whp rendezvoused at Sycamore Falls on the Watauga River, several days be¬ fore their departure to intercept the British forces under the command of Col. Patrick Fer¬ guson, who was advancing from the Carolinas to join the army of Lord Cornwallis in Vir¬ ginia. The victory of the Tennesseans was com¬ plete. Ferguson was killed and his whole army either killed or captured. His sword and sash are among the relics in the Tennessee Historical Society at Nashville, also the gun with which he was killed. This battle prevented the junc¬ tion of the two British forces and hastened the surrender of Cornwallis to General Wash¬ ington at Yorktown, which ended the war and gave us our independence.

Tennessee became a State in 1796. Since

that date it has taken an active and leading part in all the wars in which the country has been engaged. In the War of 1812 she fur¬ nished 28,000 troops and had double the num¬ ber of any other State in the battle of New Orleans, fought by General Jackson — one of her sons — on the 8 Jan. 1815, in which the British commander, General Packenham, was killed. In the several Indian wars east of the Mississippi — in the States of Florida, Georgia, Alabama and Tennessee — she fur¬ nished nearly all of the soldiers engaged, as well as the commanding officers — Jackson, Houston, Coffee and Carroll. The happy -end¬ ing of these wars gave peace and security to life and property to the people of these States against the torch, tomahawk and scalping knife of the cruel, treacherous and relentless savage.

The principal battles in these Indian wars were Tallahatchee, Tuscaloosa, Emuckfau, Erotochapco, on the Tallapoosa River, and the decisive battle of the Horseshoe, which ended the Creek War — their noted chief and leader, Red Eagle, being captured.

The next link in her military history is the part she took in the Mexican War of the 40's. Under proclamation of President Polk, Gov. Aaron V. Brown called for the enlist¬ ment of 2,800 troops. The number of 30,000 immediately responded, which gave gave to her the title of the ˆVolunteer® State. Two regiments of infantry were accepted, the First Tennessee, under Col. William B. Camp¬ bell, and the Second, under Col. William T. Haskell, together with several cavalry com¬ panies. She furnished one major-general, Gideon J. Pillow. The principal battles in which her troops took part were Cerro Gordo, Cherubusco, Molino del Rey and Chepultepec, entering the city of Mexico under the com¬ mand of Gen. Winfield Scott. During our Civil War Tennessee was one of the principal battle grounds, Virginia being the other. Her geographical limits and location between the two contending sections — extending rhomboidal in shape ■ — nearly 500 miles, from the Great Smoky range on the east to the Mississippi River on the west — necessarily made her soil the theatre of action of the two hostile armies and for numerous raids and engagements of cavalry and mounted infantry of both sections. The result was there were 454 engagements or affairs-at-arms within her borders, more than in any other State, during her fighting period, from 12 Dec. 1861, when the first clash of arms occurred at Morristown in East Tennessee, till the last engagement on 12 June 1865 at Plum Butte.

These affairs-at-arms include such conflicts as the battles of Forts Henry and Donelson — the former on the Tennessee, the latter on the Cumberland — Shiloh, Murfreesboro, Fort Pil¬ low, Island Ten, the naval battle at Memphis, the two battlesof Missionary Ridge, the closing scenes of Chickamauga and the battles of Franklin and Nashville in December 1864.

Her regiments of infantry reached the num¬ ber of 84. The total number of troops furnished to both armies were 145,000, 30,000 of which were in the Union army. She had 27 regiments,

15 battalions and 84 miscellaneous companies of cavalry, making a total of 126 cavalry com¬ mands and 28 companies of light or field ar¬ tillery; thus showing that Tennessee furnished

more soldiers during our Civil War than any other Southern State, North Carolina furnish¬ ing a few thousand more to the armies of the South than she did.

She had in active service 1 lieutenant- general, 9 major-generals, 33 brigadier-gen¬ erals and 153 colonels, with lieutenant-colonels and majors in proportion. She had nine general officers killed in battle —

to wit: Zollicoffer, Hatton, Smith, Tyler, Strahl, Carter, McCul¬ loch, Adams and Rains.

The semi-military organizations of bivouacs and chapters had their origin in Nashville. The celebrated Ku Klux-Klan (q.v.), which worked for peace and security, not only for her own people, but for the entire South, also orig¬ inated in one of her towns — Pulaski — in the county of Giles.

To show to what extent Tennessee was the theatre of active hostilities from 1861 to 1865, the general government maintains seven cemeteries in the State, in which 42,000 Federal soldiers are buried.

— - .... ~ vvim many in II1C

btates gross quota was placed at 22,158; enlist¬ ment credits totaled 7,592; total enlistments, 11,899; the net quota, 14,528. The total number of registrants under the Selective Service Law was 188,946, of whom 54,827 were called for ex¬ amination. Of these 15,909 were accepted, mak- Jffi? the ratio to those called for examination 29.02 per cent. There were 34,069 colored reg¬ istrants, of whom 7,940 were called for exami¬ nation and 2,866 were accepted. The aliens from Entente countries, who registered, num¬ bered 794; 73 were from neutral states; 44 were alien enemies.

State Formation.— The State of Tennes¬ see was formed out of the western half of ˆlorth Carolina. The first white men of whom we have any account to set foot on Tennessee soil were De Soto and his band of adventurers m L41 In 1662 La Salle built a fort which he called Prudhomme, where Memphis now stands. Fort Loudon on the Little Tennessee River, 30 miles below Knoxville, was built and occupied by the British in 1756. In 1760 it was sur¬ rendered to the Indians on condition that the troops and their families should be allowed to return to the Eastern settlements, but most of them were treacherously massacred the morning after leaving the fort. In 1769 Capt. W m. Bean and his family built a cabin at the mouth of Boon's Creek. His son Russell was probably the first white child to be born in 1 ennessee. Within a few months a number of families from eastern North Carolina and Vir- TulawCated m the same vicinity. It was called Ihe Watauga Settlement. In 1771 Parker and Carter set up a store to trade with the Indians where Rogersville now is. This was called The Carter Settlement. The next year Jacob Brown established a store on the Nollichucky River. In a short time many settlers built cabins around these stores. Another settlement was made on the Holston River, which soon be¬ came an important centre. These pioneers

being far from the mother State, without gov¬ ernment and without protection, in 1772 or¬ ganized themselves into the Watauga Associa¬ tion, the purpose of which was to protect them¬ selves and to dispense justice among the col¬ onists. The leaders were John Sevier and James Robertson. The Watauga Association

vˆas die foundation of the Commonwealth of t enncssee. Roosevelt says that these were the first white men of America to establish a free and independent community on the continent. In the Spring of 1776 Nancy Ward — a friendly Indian woman — informed the whites that 700 Indian warriors who had been supplied by the British with arms and ammunition for the pur¬ pose, under Dragging Canoe and Old Abraham, were preparing to attack Heaton's and the Watauga forts and destroy the settlers. The Indians were defeated in two battles. The set¬ tlers, when the Revolutionary War began, named their country Washington District and voted themselves indebted to the United Col¬ onies for their share of the general expenses of the war. In August 1776 113 of the pioneers signed a petition to be annexed to North Caro¬ lina. All but two of these signed with their own hands. Two made their ˆmarks.ˆ In No¬ vember following four delegates from Wash¬ ington District were sent to the Provincial Congress of North Carolina. In 1777 Wash¬ ington District became Washington County and embraced all of what is now Tennessee. The battle of King's Mountain 3 Oct. 1780, which has been termed the turning point in the Revolutionary War, was chiefly won by the Tennessee patriots under John Sevier and Isaac Shelby. In 1784 North Carolina ceded to the United States that part of her territory which is embraced by the present State of Tennessee and gave Congress one year in which to accept or reject the grant. No arrangements satisfactory to the frontiersmen were made for a government, which caused great dissatisfac¬ tion among the people who decided to set up a government of their own. At this time there were three counties, Washington, Sullivan and Greene. Each county selected delegates who met at Jonesborough, the oldest town in the Territory August 1784 and elected John Sevier president, and Landon Carter secretary. The convention resolved to form a new State and provided for another convention to form a constitution and start the new government. Instead of a new constitution the convention adopted that of North Carolina. The new State was given the name Franklin. Sevier was elected governor and all other officers, civil and military, were elected. The governor of North Carolina issued his proclamation

ordering the people to disband and return to their allegiance to the mother State. The peo¬ ple were divided, some favoring Franklin and others North Carolina. This division in pub¬ lic sentiment engendered much bad feeling and strife. Sevier tried to persuade North Caro¬ lina to agree to the independence of Franklin and to have Congress recognize it, but failed in both. In 1788 Sevier was arrested and Frank¬ lin collapsed. A general pardon was granted to the disaffected people. Sevier was elected to the 'senate of North Carolina and was re¬ stored to his former office of brigadier-gen¬ eral of Washington District.

A party of men called <(the long hunters® explored Middle Tennessee — the Cumberland country — in 1778. They made a clearing at Bledsoe's Lick and planted corn the following year. In 1779 James Robertson, called <(the Father of Middle Tennessee,® with a number of others, settled where Nashville now is. Their

families came by water, down the Holston, the Tennessee, up the Ohio and the Cumber¬ land, a distance of a thousand miles the next spring. Several other settlements were made the same year. On 13 May 1780 each settle¬ ment sent representatives to Nashborough where a compact of government was entered into and signed by 256 men, only one of whom was unable to sign his name. James Robert¬ son was chosen chairman and was practically the governor of the new settlements. In 1783 the Cumberland settlements were organized into Davidson County, N. C. The county em¬ braced all of Middle Tennessee north of Duck River. A court was established. Nash¬ borough was changed to Nashville and was made the seat of government for the county in 1784. At that time Spain claimed Alabama, Mississippi, Tennessee and western Kentucky and closed the Mississippi River to the com¬ merce of the settlers whom the Spanish treated as intruders. The Spanish supplied the In¬ dians with arms and ammunition and incited them to acts of hostility against the whites From the summer of 1780 to 1794 the frontier people were in constant danger, many of them, men, women and children, being killed aˆd much property destroyed or stolen. After the cession by North Carolina and its accept¬ ance by Congress in 1790, Robertson was made brigadier-general of the district. Governor Blount was ordered by the President to per¬ mit no attacks on the Indians. The Spanish became angered and refused ' to complete a treaty for the free navigation of the Missis¬ sippi. Robertson learned that the Spanish trad¬ ers were buying American scalps from the In¬ dians and were instigating raids on his peo- P?f- His brother, his son and many others were killed and others wounded. These last acts so incensed the whites that Robertson ordered an attack on the Cherokee towns below

Chatta¬ nooga. Five towns were destroyed and many Indians killed. Then came peace for the pio¬ neers. The Secretary of War severely con¬ demned this act of just retribution, which in¬ justice so incensed the people in the West that many of them favored setting up a sepa¬ rate government, or casting their lot with Spain. One of the first acts of North Carolina, after becoming a State of the Union, was to make to Congress a second cession of her west¬ ern territory. This was on 25 Feb. 1790. The cession was accepted on 2 April. On 8 June President Washington commissioned William Blount governor of the Territory belonging to the United States south of the river Ohio. In 1775 an enumeration disclosed the fact that there were more than 60,000 inhabitants in the Territory. A constitutional convention was called and completed its labors 6 February and the people asked to be admitted into the Union as a State. The act admitting Tennessee was approved by Washington on 1 June 1796.

Constitutional History.— Tennessee as al¬ ready stated was originally the Western Terri¬ tory recognized as belonging to North Caro¬ lina and, during its early settlement, lived un¬ der the nominal jurisdiction of that province anxi later of that State, whose political insti¬ tutions it was to inherit. In several instances temporary compacts were drawn up by isolated communities until the jurisdiction of North

Carolina could in fact be extended to them. The insurrectionary state of Franklin adopted the constitution which North Carolina had framed on declaring its independence in 1776. After the cession of North Carolina's western possessions to the United States, the organic law of the land was the act of Congress for the government of the Territory Northwest of the River Ohio, made applicable to the South¬ west Territory by a separate act.

With this experience in constitution-making and having before them the newly-adopted Con¬ stitution of the United States, the people of Tennessee sent their representatives to a con¬ vention at Knoxville in 1796 to form the con¬ stitution under which they were to live as a State of the Union so soon as Congress should recognize their demand for Statehood. Like the North Carolina constitution, it was adopted in committee and not submitted to popular vote. William • Blount, governor of the Southwest Territory, was president of the convention and Andrew Jackson, a prominent member, is said to have suggested that the name of the new State should be Tennessee.

The constitution of 1796 remained un¬ changed until 1834 when another convention, with William B. Carter as chairman, met in response to a genuine popular demand for alterations that would bring the constitution in accord with growth of the State and the spirit of the times. A new instrument was drawn up and submitted for adoption to the electorate as established by it.

Amendments were adopted in 1853 and 1865 and in 1869 a convention to meet the following year was called by the legislature. John C. Brown was made president by the convention. In 1897 a proposal by the legislature to hold another election was disapproved by the voters and in 1904 a number of amendments submitted by the legislature were likewise rejected.

Aside from the inevitable constitutional evo¬ lution through court decisions, legislative and administrative action and the changing concep¬ tions of the people, the rapidly changing politi¬ cal and social life of the last generation has met with no constitutional response. Previous to the Civil War, however, the naturally gradual development of the Tennessee constitution cor¬ responded with the growth of State consti¬ tutions generally. In length and complexity it advanced from the less than 5,000-word in¬ strument adopted by North Carolina in 1776 to the 14,000-word constitution of 1870. The North Carolina constitution placed property qualifications on both voting and office-holding. In 1796 what amounted to manhood suffrage was established for freemen. The 1834 consti¬ tution omitted all property qualifications but disfranchised free negroes. The 1870 consti¬ tution contains much added detail, but few changes of general importance. The 18th cen¬ tury declarations of the rights of individuals have continued almost unchanged to the present.

Civil and Political History. — During the early years of Statehood the two problems of chief importance were the danger from the Indians and the settlement of land titles. The two early centres of Tennessee were far apart, divided by rough mountainous country. It was many years before one could journey from Knoxville to Nashville without crossing land

in the possession of Indian tribes. Strip by strip was bought from the Indians by the United States government. The region between the Tennessee and the Mississippi rivers known as <(the Western District® was not open to white settlement until 1818; the last lands held by the Cherokees, constituting the southeastern corner of the State, were not purchased until the treaty of New Echota.

Land titles were derived from North Caro¬ lina. Ownership was acquired through military warrants by which the State undertook to pay its soldiers in land, or by purchase, through which means much of the North Carolina paper currency was redeemed. Liberal rights of pre¬ emption were given to squatters. Upon the cession of the Tennessee country to the United States, and the later erection of the State of Tennessee, there arose a long and complicated dispute to which North Carolina, Tennessee and the United States government were parties. This matter of the public lands gravely affected the development of public support of education, internal improvement and banking. In the earlier period speculation in land also was a noteworthy factor.

For many years John Sevier was the most prominent figure in the State's life. His in¬ fluence was identified with East Tennessee, the oldest section of the State. As the middle and western parts were settled, Indian wars and national affairs brought into prominence the personality of Andrew Jackson, but when Jack- son became President resentment against some of his actions and against his efforts to continue domination over Tennessee politics led to the rise of a vigorous Whig party, which usually prevailed in national elections. From 1835 to 1855 Tennessee was a bitterly contested State. Its relatively large population and the closeness of its vote gave it a prominence in national politics. Hugh Lawson White, John Bell, Andrew J. Donelson were nominees for the Presidency or Vice-Presidency who were un¬ successful. James K. Polk was elected Presi¬ dent in 1844, and Andrew Johnson Vice-Presi¬ dent in 1864. The prominence of these, and a host of other men, was due to the fact that Ten¬ nessee in this period constituted a type and was a true representative of the West.

Within the State, matters of internal im¬ provement, especially railroads, banking, edu¬ cation, were prominent in political discussion. The State was almost entirely agricultural, the population of the towns being relatively very small. Slavery existed all over the State. In East Tennessee, however, there arose a de¬ cided anti-slavery movement which ran its course when the most active opponents of the system emigrated from the State. Physical differences left a positive stamp upon the atti¬ tude of the different parts of the State toward slavery. East Tennessee had relatively few slaves : the western district, on the contrary, developed like Mississippi. Sentiment in the State was conservative and devoted to the Union. Secession was refused by popular vote until after Lincoln's call for troops ; then a fever of sympathy with the States of the South swept over Tennessee with the exception of the eastern region where Andrew Johnson and William

G. (ˆParson®) Brownlow, always hitherto the bitterest political enemies, now

joined in support of the Union. The course of military events soon led to the domination of East Tennessee, strongly Unionist in sym¬ pathy, by Confederate forces who kept open the line of communication from the Southwest to Richmond, while the Federal successes at Fort Pillow and Fort Donelson threw Middle and West Tennessee into the possession of the Fed¬ eral authorities under whom Andrew Johnson was appointed governor. The regime of Union¬ ist East Tennessee was perpetuated after the war in the administration of Governor Brown-low, which was characterized by enormous addi¬ tions to the State debt and by rigorous repres¬ sion of those formerly in control of the politi¬ cal affairs of the State. This state of affairs did not come to an end until 1870, when the Democratic party again came into control. Since then Republican East Tennessee has been dominated by the Democratic remainder of the State, except when some particular question such as the settlement of the State debt or the establishment of State-wide prohibition have divided the Democratic party and brought about the election of a Republican governor. In politics, in recent years, the prohibition question occupied first place, and other matters did not receive due attention. The consti¬ tution has not been amended since 1870. A notable advance was made, however, in the field of public education with the establishment of a system of county high schools and State normal schools.

List of Governors.

William Blount .

T erritorial governor till . . 1796

John Sevier .

Democratic-Republican. 1796-1801

Archibald Roan .

U

“ . 1801-03

John Sevier .

it

“ . 1803-09

Willie Blount .

u

“ . 1809-15

Joseph McMinn .

u

“ . 1815-21

William Carroll .

u

“ . 1821-27

Sam Houston .

u

“ . 1827-29

William Hall (acting) . .

William Carroll .

Democrat . . . .

. 1829-35

Newton Cannon .

States- Rights Democrat. 1836-39

James K. Polk .

Democrat . . . .

. 1839-41

James C. Jones .

Whig .

. 1841-45

Aaron V. Brown .

Democrat . . . .

. 1845-47

Neil S. Brown .

Whig .

. 1847-49

William Trousdale ....

Democrat . . . .

. 1849-51

William B. Campbell. .

Whig .

. 1851-53

Andrew Johnson .

Democrat . . . .

. 1853-57

Isham G. Harris .

U

. 1857-62

Andrew Johnson .

Military .

. 1862-65

Interregnum .

4th March, 5th April. . . . 1865

William G. Brownlow.

Republican . . .

. 1865-69

UeWritt C. Senter .

Conservative-Republican 1869-71

John C. Brown .

Democrat . . . .

. 1871-75

James D. Porter .

U

. 1875-79

Albert S. Marks .

u

. 1879-81

Alvin Hawkins .

Republican . . .

. 1881-83

William B. Bate .

Democrat ....

. 1883-87

Robert L. Taylor .

U

. 1887-91

John P. Buchanan ....

u

. 1891-93

Peter Turney .

a

. 1893-97

Robert L. Taylor .

u

. 1897-99

Benton McMillin .

a

. 1899-1903

James B. Frazier .

u

. 1903-05

John B. Cox .

a

. 1905-07

Malcolm R. Patterson.

u

. 1907-11

Ben W. Hooper .

Republican . . .

. 1911-15

Thomas C. Rye .

Democrat ....

. 1915-19

A. H. Roberts .

U

. . 1919-21

Alfred A. Taylor. .....

Republican . . .

. 1921-23

Population. — Tennessee has a population of 2,184,789 (census 1910). Government figures show that of this population about 80 per cent are of the farming class. Of the entire population of the State, 20 per cent reside in the cities of 2,500 and upward. Of the total popu¬ lation 78.3 per cent are white and 21.7 per cent negroes. In the total population of the

State there are 1,081,290 females and 1,103,491 males. The total voting population is 552,668, 78 per cent being white. The total number of children of school age (6 to 20 years) is 738,- 478. The total number of illiterates in the State (over 10 years) is 221,071, representing 13.6 per cent of the total population, as com¬ pared to 20.7 per cent in 1900. The total num¬ ber of dwellings in Tennessee is 444,814. Total number of families, 462,553. Population (Fed¬ eral census 1920) 2,337,885.

Immigration. — Immigrants to the State are heartily welcomed with that geniality and hos¬ pitality which the new South has inherited from the old. Tennessee is not dominated by the arrogance of wealth, neither is it overbalanced by its city population. Prejudice of the coun¬ try against the town or of town against country is a thing of the past. The numerous commer¬ cial organizations offer inducements to capital with the assurance that though a stone wall might be built about the State, yet its resources are so great and diversified that even then 10 times its present population would have avail¬ able every necessity, every comfort and every luxury. In conclusion, it may be

said truly that Tennessee is large in area, in wealth, in industries and truly magnificent in its possibili¬ ties, and the day for indulging provincialism is forever gone.

Bibliography.— Allison, (Drop-Stitches in Tennessee History > ; Caldwell, J. W., (Constitu¬ tional History of Tennessee) ; Clayton, (History of Davidson County) ; Colyar, (Life and Times of Andrew Jackson) ; Free, (History of Ten- nessee) ; Garrett and Goodpasture, (History of Tennessee) ; Gilmore, (The Advance Guard of Western Civilization ; Godwin, (Tennessee, Resources of the State) ; Guild, (01d Times in Tennessee) ; Hale and Merritt, 'History of Tennessee) ; Haywood, (Civil and Political His¬ tory of Tennessee*; Goodwin, 'History of An¬ drew Jackson ; Killebrew, (Resources of Ten- nessee) ; Lindsey, (Military Annals of Tennes¬ see } ; McClure, W., (State Constitution-Mak¬ ing* ; Miller, 'Official and Political Manual of Tennessee) ; Parton, 'Life of Andrew Jackson ; Phelan, 'The History of Tennessee) ; Pilcher, Mrs., (History of Gov. William B. Campbell *; Putnam, 'History of Middle Tennessee) ; Saf- ford, 'Geology of Tennessee) ; Sanford, E. T., (The Constitution of 1796) ; Scott, (Memoirs of Hugh Lawson White) ; Shannon, (The Con¬ stitution of Tennessee.*

Acknowledgment is made by the collaborator to the following members of the Tennessee His¬ torical Society for their valuable contributions in this article: Prof. W. E. Meyer (Anthropol¬ ogy) ; M. K. Bryson (Agriculture) ; J. G. Gisco (State Formation); St. George L. Sioussat (Civil and Political History) ; Jos. H. Acklen (Game, Fish and Forestry) ; George C. Porter (deceased) and Miss Susie Gentry (Military) ; W. R. Bourne (Educational) ; Wallace Mc¬ Clure (Constitutional) ; J. G. Peyton (de¬ ceased) (Railroads) ; A. P. Foster (Indus¬ trial) ; Thomas W. Wrenne (Financial) ; Park Marshall and Mrs. T. M. Steger (Penal In¬ stitutions) ; Paul Hunter (Bibliographical) ; Rev. Isadore Lewinthal and Mrs. B. D. Bell (Charitable Institutions) ; Dr. A. H. Purdue (deceased) (Geology).

George C. Porter.

TENNESSEE, a large river formed by the Holston from Virginia and the French Broad from North Carolina, which unite near Knox¬ ville, in eastern Tennessee. It flows southwest, entering Alabama in the northeastern part of the State and continuing southwest to the centre of Marshall County, where it turns northwest and flows across the

northern part of Alabama, re-entering Tennessee in Hardin County. From here the course of the river is nearly due north across the State of Tennessee and the western part of Kentucky, to the Ohio River, which it enters at Paducah, Ky. The length of the river is about 800 miles ; from the source of the Holston to the mouth of the Tennessee is about 1,200 miles; the area drained is about 40,000 square miles. It is navigable, without artificial aid, to Florence, in Lauderdale County, Ala., a distance of 280 miles from Paducah. Just above Florence are the Muscle Shoals, about 20 miles long, which are navigable for about one month in the spring. A canal has been built to overcome this obstruction to navi¬ gation. Above the Shoals, the river is navigable for light-draft steamers nearly all the year. The navigable waters of the upper course of the river, together with the Holston, are about 930 miles. The principal tributaries are the Clinch, Duck, Elk, Hiawassee and Sequatchie rivers. The Tennessee is the largest tributary of the Ohio River, entering the Ohio 10 miles from the mouth of the Cumberland River. See Boundaries of the United States.

TENNESSEE, Army of the, one of the

divisions of the Federal army in the Civil War. After the battle of Shiloh (q.v.) it was com¬ manded by General Halleck and later by Grant, Sherman and others.

TENNESSEE, University of, the State university located at Knoxville, Tenn. It was established in 1794 as Blount College, a non¬ sectarian institution and was incorporated by the first general assembly of the Territory southwest of the Ohio ; in 1807 the name was changed to East Tennessee College and in 1840 to East Tennessee University. In 1869 the State legislature gave to the university the control of the Congressional land grant of 1862; in 1879 it was further recognized as a State institution by an act connecting it with the public schools of the State, and in that year its name was changed to the University of Tennessee. The board of trustees consists of 14 members appointed by the governor and con¬ firmed by the senate for a term of 12 years from each Congressional district and two each from Knoxville and Memphis ; the governor, the commissioner of agriculture and superintendent of public instruction are additional members ex officio. The university is coeducational. It comprises colleges of liberal arts, agriculture, including experiment stations, engineering and law at Knoxville; colleges of medicine, of dentistry and school of pharmacy at Memphis. Military science and drill are a part of the cur¬ riculum and are required of the men students in the freshmen and sophomore classes. In 1902 a teachers' summer school was opened on the university grounds with the co-operation of the university authorities.

(See Summer School of the South). The university has a division of extension, including agriculture,

home economics, public health, rural engineer¬ ing and education. Short winter courses are given in the agricultural, home economics and engineering departments. The campus proper at Knoxville contains 39.9 acres, at Memphis 1.7 acres, and the university farms contain 1,634 acres; there are 18 buildings, including dormitories on the campus. The productive funds amount to $427,000; the annual income to approximately $500,000; the library contains 40,000 volumes. The students number 2,000 to 2,500 normally and the faculty over 200.

TENNESSEE CENTENNIAL EXPO¬ SITION, held at Nashville, Tenn., in celebra¬ tion of the State's 100th anniversary of its entrance into the Union. Its dominant pur¬ pose was to show the history and development of the State and to emphasize its resources. The site chosen was West Side Park, a former race-course, a tract of about 200 acres. More than 100 buildings were erected, and the de¬ partments included agriculture, art, commerce, customs, education and hygiene, government, history, machinery, minerals, forestry, trans¬ portation, women's work, etc. The president of the exposition was John W. Thomas. The total attendance was 1,786,714; the receipts were $1,101,285, exceeding by $39 the dis¬ bursements. Consult Justi, (The Official His¬ tory of the Tennessee Centennial Exposition

(1898).

TENNIEL, ten-nel', Sir John, English car¬ toonist: b. London, 1820; d. 1914. He received no regular art training. In 1845 he was se¬ lected by open competition to paint a fresco in the Houses of Parliament at Westminster, but he is better known as a book-illustrator and a cartoonist in Punch, on whose staff he worked during the 50 years 1851-1901. He also illus¬ trated a number of important books. He was knighted in 1893. His cartoons are unique as contributions to a comic paper, being of classic severity in line and expression and often tinged with a tragic seriousness of meaning which ex¬ hibits their author as not only a great cari¬ caturist but also a great painter. Yet nothing can be more powerful than the political satire which characterizes the majority of them, a ' satire whose geniality neither deadens the life nor blunts the point of their irresistible humor.

TENNIS. See Lawn Tennis; Rackets.

TENNYSON, Alfred, Lord, English poet: b. Somersby, Lincolnshire, 6

Aug. 1809 ; d. Aid- worth, near Haslemere, on the border of Sus¬ sex and Surrey, 6 Oct. 1892. His boyhood was passed at his father's country rectory, in an at¬ mosphere that was full of poetry and music; and at a very early age he began to try his wings in verse. Some of his youthful efforts were published in partnership with his elder brother Charles, in 1827, in a volume entitled (Poems by Two Brothers. } Two years later he entered Trinity College, Cambridge, and be¬ came a member of an intimate society called (The Apostles, *which included some of the most brilliant young men in England. Among them was Arthur Henry Hallam, the closest friend of Tennyson. In 1829 he won the Chancellor's Medal with a poem in blank-verse called ˆTimbuctoo* ; and in the following year he published (Poems, Chief! }r Lyrical,* a slender volume of new and delicate melodies.

ALFRED TENNYSON

"■■■mm.

.

TENNYSON

433

Soon after his father's death in 1831, he left college without taking his degree, and for 60 years that followed he gave himself to a poet's life with a clear resolution which never wavered.

His volume of poems published in 1832 marked a distinct growth in strength and skill. It was but a tiny book, but there was a quality in it which more than made good a lack of quantity. (The Lady of ShalottC (CEnone,) (The Lotos-Eaters, > (The Palace of Art, *and (A Dream of Fair Women,) revealed the presence of a true dreamer of dreams, gifted with the magic which translates visions into music. (The Miller's Daughter, } (The May Queen, > and (New Year's Eve,* showed the touch of one who felt the charm of English rural scenery and common life with a senti¬ ment, so fresh and pure and deep that he might soon be able to lay his hand upon the very heart of the people.

But before this highest potency of the poet's gift could come to Tennyson, there was need of a baptism of conflict and sorrow, to purify him from the mere love of art for art's sake, to save him from becoming an over-dainty weaver of exquisite verse, and to consecrate his genius to the severe and noble service of humanity and truth. This liberating and up¬ lifting experience was enfolded in the pro¬ found grief which fell upon him in Arthur Hal- lam's sudden death at

Vienna, in 1833. How deeply this irretrievable loss shook the poet's heart, how closely and how strenuously it forced him to face the mystery and the mean¬ ing of life in lonely spiritual wrestling, was fully disclosed, after 17 years, in the famous elegy, (In MemoriamP But the traces of the conflict and some of its fine results were seen even earlier, in the two volumes of 'Poems' which appeared in 1842, as the fruitage of a decade of silence. <Ulysses,) 'Morte d' Arthur, ' (St. Simeon Stylites,' 'Dora,' (Locksley Hall,' (A Vision of Sin,' 'The Two Voices, ' and that immortal lyric, (Break, Break, Breaks were not the work of

"An idle singer of an empty day."

A new soul had entered into his poetry. His Muse had been born again, from above. He took his place with the master-minstrels who sing with a full voice out of a full heart, not for a coterie, but for the age and for the race.

It was the recognition that Tennyson really belonged to this higher class of poets — a recognition which at first was confined to a clear-sighted circle, but spread by degrees to the wider reading public — that prepared an expectant audience for his first long poem, 'The Princess,' which appeared in 1847. The sub¬ ject was the eternal "woman question,® treated in the form of an epic, half heroic and half humorous; the story of a king's daughter who sought to emancipate (and even to separate) her sex from man, by founding a wonderful woman's college, but was conquered at last (or at least modified), by the love of an amorous, chivalrous, dreamy prince, who wooed and married her. The story is un¬ convincing. The blank verse in which it is told has beauty, though it is often too ornate. The conclusion of the poem is a superb tribute vol. 26 — 28

to ((the eternal womanly.® But the little in¬ terludes of song which are scattered through the epic shine as the chief jewels in a setting which is not all of pure gold.

In 1850 the long-delayed and nobly-labored elegy on the death of Hallam was given to the world. It is hardly too much to say that (In MemorianP stands out, in present vision, as the most illustrious poem of the 19th centnry. Cer¬ tainly it has been the most frequently trans¬ lated, the most widely quoted, and the most deeply loved. It is far more than a splendid monument to the memory of a friend. It is an utterance of the imperishable hopes and aspira¬ tions of the human soul passing through the valley of the shadow of death. It is a unique group of lyrics, finished with an exquisite artist's care, which is only

surpassed by the intense and steady passion which fuses them into a single poem. It is the English classic on the love of immortality and the immortality of love.

In the same year with the appearance of this poem happened the two most important events of Tennyson's career. He was married in June to Miss Emily Sellwood, a lady of rare and beautiful endowments, who proved herself through a long life of unselfish devotion the true partner of a poet's existence. And he was appointed in November to succeed Words¬ worth as poet laureate.

His first official poem was the stately (Ode on the Death of' the Duke of Wellington,' in 1852. The majestic march of the verse, its freedom, its organ-toned music, its patriotic vigor, and the lofty solemnity with which it closes, give it a higher place than can be claimed for any other poetical production of an English laureate for a public occasion. (The Charge of the Light Brigade,' written in 1854, was a trumpet-note that rang through England and echoed around the world.

(Maud) was published in 1855. It is a lyrical monodrama, in which the hero, a sensi¬ tive and morbid man, with hereditary tend¬ ency to madness, tells the story of his re¬ demption from misanthropy and despair by the power of a pure love, unhappy but victorious. The variety of the metrical forms in this poem, the passionate tenderness of the love songs, the beautiful truth of the descriptive passages, and the intense personality of its spirit give it a singular charm, which is felt most deeply perhaps by those who are young and in love. Tennyson himself said ((I think 'Maud' is one of my most original poems.®

In 1859 began the publication of the epical sequence called the (Idylls of the King' ; the largest and in some respects the most import¬ ant of the works of Tennyson. The first group contained 'Enid,' 'Vivien,' Blaine5 and Guin¬ everˆ The second group appeared in 1870, and consisted of (The Coming of Arthur,' 'The Holy Grail,' (Pelleas and Ettare) and 'The Passing of Arthur.' In 1872 Gareth and Lynette> and (The Last Tournament' were published; and in 1885 (Balin and Balan) was printed in the volume entitled (Tiresias and Other Poems.' The division of <Enid) into two parts — 'The Marriage of Geraint' and Geraint and Enid) — makes the epic, as it now stands, consist of 12 idylls. Each of these clothes an ancient lecend from the Arthurian

Cycle in the richest and most harmonious of modern blank verse. The idylls are so far in¬ dependent that any one of them might stand alone as a complete poem. But there is a connecting thread running through them all in the threefold love-story of Arthur, Guinevere and Lancelot, and in the history of the Round Table. The underlying motive of the whole series is to shadow forth the war of Sense against Soul. The idylls are to be interpreted, therefore, as movements in a symphony, the theme of which is the rightful royalty of man's spiritual nature, seeking to establish itself in a settled reign of law, and constantly opposed by the disorderly and disintegrating elements of humanity. In (The Coming of Arthur *it is doubt that threatens the kingdom; in (Gareth and Lynette* the conflict is with false ambition ; in (The Marriage of Geraint, *with pride; in (Geraint and Enid,* with jealousy; in (Balin and Balan, *with suspicion; in (Merlin and Vivien,* with lust; in (The Holy Grail,* with superstition ; until at last the poison of unlawful love has crept through all the court, and Arthur's Round Table is dissolved in ruin — but not without a vision of peace for the king who has kept his soul unstained, and a dim promise of new hope for some future age, when he shall return to bloodless victory.

Tennyson has not allowed the ethical pur¬ pose of these poems to confuse their interest or bedim their beauty. They are not in any sense an allegory. The tales of love and knight- errantry, of tournament and battle and quest, are vividly told in the true romantic spirit, lighting up the olden story with the thoughts and feelings of to-day. There is perhaps a touch of over-elaborateness in the style; but after all the figures stand out as distinctly as they ought to do in such a large tapestry. In the finer idylls, like (Guinevere *and (The Passing of Arthur,* the blank verse moves with a grandeur and dignity, a broad, measured, fluent harmony, unrivaled in England since Milton's organ voice was stilled.

The rest of Tennyson's poetical work in¬ cludes his dramas — (Queen Mary, *(Harold,* (Becket, *<The Cup and the Falcon,* and a few others — and several volumes of miscellaneous poems: (Enoch Arden *(1864); (The Lover's Tale* (1879); <Ballads *(1880); (Tiresias* (1885) ; (Locksley Hall Sixty Years After *(1886); (Demeter* (1889) and (The Death of GEnone,* published posthumously in 1892. The great age to which his life was prolonged, the unswerving fidelity with which he devoted him¬ self to the sole pursuit of his chosen art, the freshness of spirit which made him delight in labor to the very last, and the fine versatility of mind with which he turned from one field of production to another — brought it to pass that both in amount and in variety of works Tenny¬ son stands in the front rank of English poets ; but two can be thought of — Shakespeare and Robert Browning — who

produced more.

In 1883 a title of nobility was offered to Tennyson through Mr. Gladstone. This honor, which he had declined at least once before, he now accepted; and in January 1884 he was admitted (we can hardly say elevated) to the peerage — taking his title, Baron of Aldworth. and Farringford, from his two country houses, in Sussex and in the Isle of Wight.

It would be difficult, of course, to character¬ ize the style and estimate the value of such a varied and fertile poet in a brief essay. But there are certain qualities in the poetiˆ of Tennyson which are unmistakable and vital.

1. His diction is singularly lucid, smooth and melodious. He avoids sharp and strident effects. Not only in his choice of metres, but also in his choice of words and cadences, we feel a musical influence controlling his verse. Sometimes this results in a loss of force or definiteness. But it makes his poetry, whether in the long swinging lines of (Locksley Hall,* or in the brief simple measures of the shorter songs, eminently read¬ able. Any one who recites it aloud will find how natural it is to fall, as Tennyson always did, into a rhythmical tone, almost like chanting. This close relation of his poetry to music may be felt also in the quality of subtle suggestive¬ ness, of intimate and indefinable charm, which makes his brief lyrics as perfect as anything of their kind in the world's literature. He has the power of expressing the vague, delicate, yet potent emotions, the feelings that belong to the twilight of the heart, where the glow of love and the shadow of regret are mingled, in verbal melodies as simple and as magical as the chime of far-off bells, or the echoes of a bugle-call dying among the hills.

2. He has an extraordinary truthfulness and delicacy of touch in natural description. This appears equally in minute, pre-Raphaelite work, where he speaks of the color of the buds on different trees in early spring, or in the way in which a wave-crest is reflected in the smooth hollow before it breaks; and in wide, vague landscapes, where he renders the turbulence of the coming storm, or the still glory of an autumnal morning, in a few broad lines. Add to this the quality of blending and interfusing all his epithets and descriptions with the senti¬ ment of the poem, so that they do not distract the feeling but enhance and deepen it, and you have one of the traits by which the poetry of Tennyson is most eagerly distinguished.

3. His range of imaginative sympathy, as shown in his ballads and character pieces, is very wide; but it moves' for the most part along natural and normal rather than strange and eccentric lines. His dramatic lyrics differ in this respect from those of Browning. Tennyson ex¬ presses the feeling of the philosopher in Lucre¬ tius, *of the peasant in (Rizpah,* of the child in {The Children's Hospital, *of the old sea- fighter in (The Revenge,* of the intellectual ad¬ venturer in (Ulysses,* in order to bring out in each, not that which is exceptional and rare, but that which is most deeply human and typical.

4. His work reflects with singular fidelity the scientific and social movements of the age. The discoveries and inventions of modern times are translated into poetic language and turned to poetic use. In his verse the earth moves, the planets are molded of star-dust and the mystery of an unfinished creation is still in evolution. It is possible, often, to assign dates to his poems by an allusion to some newly-seen moon or comet, or some critical event in the social his¬ tory of mankind. It is true that he mistrusts many of the new devices to bring in the millen¬ nium. He takes a dark view of some of the elements of 19th century civilization. But still he feels .the forward movement of the world;

and his poetry mirrors truly the spirit of mod¬ ern optimism — with shadows.

1. As in its form, so in its spirit, the verse of Tennyson expresses a constant and controll¬ ing sense of law and order. He is in the opposite camp from the poets of revolt. Har¬ mony is essential to his conception of beauty. His patriotism is sober, steadfast, thoughtful, law-abiding. His love moves within the bounds of order, purity and reverence. His conception of power is never akin to blind force, but car¬ ries within itself the higher elements of intelli¬ gence and voluntary restraint.

Self-reverence, self-knowledge, self-control, —

These three alone lead life to sovereign power.

1. The poetry of Tennyson is pervaded by a profound religious spirit. His view of the world — his view even of the smallest

flower that blossoms in the world — is illuminated through and through by his faith in the Divine presence and goodness and beauty. He cannot conceive of a purely physical universe. Nothing that he .has written could have been written as it is, if he had been an atheist or an agnostic. Even his poems of doubt and conflict are the resurgent protests of the heart against the cold negations which destroy personal trust in the unseen God, in whom we live and move and have our being. His method of dealing with religious subjects is not theological, like that of Milton or Wordsworth; nor philosophical, like that of Browning or Arnold or Clough. Tenny¬ son speaks more from the side of the feelings, the ultimate spiritual instincts and cravings of humanity. The strongest of these is the desire and hope of a life beyond the grave. To this passion for immortality he gives full play, and if evokes some of the strongest and sweetest tones of his music. From bhe Deserted House) to (Crossing the Bar,) his poetry is an evidence of his conviction that death cannot end all. This faith in the life that is to come elevates and purifies his conception of the life that now is. It gives a new meaning to duty and to love. And when we think of the many noble poems in which it has found expression, — (The Two Voices,) (The May Queen,) bocksley Hall,) (Enoch Arden,) (The Leper's Bride,) Guin¬ everˆ (In Memoriam,) (Vastness,) <Wages,) — we may well call Tennyson the poet of the endless life.

His influence upon the thought and feeling of the age has been far-reaching and potent. He has stood among the doubts and confusions of these latter days as a witness for the things that are invisible and eternal, — the things that men may forget if they will, but if they forget them, their hearts wither and the springs of poesy run dry. His verse has brought new cheer and courage to the youth of to-day who would fain defend their spiritual heritage against the invasions of materialism. In the vital conflict for the enlargement of faith to embrace the real results of science, he stood forth as a leader. In the great silent reaction of our age from the desperate solitude of a consistent skepticism, his voice was a clear- toned bell, calling the unwilling exiles of belief to turn again. And when he passed away from his quiet home at Aldworth, with the moonlight falling on closed eyes and voiceless lips, the world mourned for him as for a mighty prophet, and rejoiced for him as a poet who had finished

his course and kept the faith. See Enoch Arden ; Idylls of the King ; In Memoriam ; Locksley Hall; Maud; Princess, The.

Bibliography. — Editions : Standard edi¬ tions of Tennyson are the Cambridge edition by W. J. Rolfe (Boston 1898) ; Cabinet edition (1 vol., ib. 1899; id., 12 vols., ib. 1902) ; House¬ hold edition (ib. 1899) ; Riverside edition (7 vols., ib. 1904) ; New Popular edition (3 vols., ib. 1906) ; Globe edition (New York 1907) ; Eversley edition, by Hallam, Lord Tennyson (6 vols., ib. 1908) ; Everyman's Library (ib. 1910) ; (Works of Tennyson, with Notes by the Author,) edited with Memoir by Hallam, Lord Tennyson (ib. 1913) ; The Farringford edition, by Eugene Parsons; Athenaeum Press edition (select poems), by Henry Van Dyke and D. L. Chambers (1903). Concordances and Bibli¬ ographies: Baker, A. E., (Concordance to the Poetical and Dramatic Works of Alfred, Lord Tennyson) (London 1914) ; Brightwell, D. B.,

(Concordance to the Entire Works of Alfred Tennyson) (ib. 1870) ; Sheppard, R. H., bibli¬ ography of Tennyson } (ib. 1896) ; Thomson, J. C., bibliography of the Writings of Tenny¬ son) (New York 1905) ; Wise, T. J., bibliog¬ raphy of the Writings of Alfred, Lord Tenny¬ son) (2 vols., London 1908). Biography and Criticism: Benson, A. C., < Alfred Tennyson) (London 1907) ; Bradley, (Commentary on In Memoriam) (ib. 1901) ; Brooke, Stopford A., bennyson: His Art and Relation to Modern Life) (2d ed., London 1894) ; id., <(Browning and Tennyson,® in boetry of Robert Brown¬ ing) (ib. 1903); Cary, E. L., (Tennyson: His Homes, His Friends and His Work) (New York 1898) ; Collins, J. C., (Early Poems of Tennyson, with Bibliography and Various Read¬ ings) (London 1900) ; Dowden, Edward, ((Ten- nyson and Browning)) in (Studies in Litera¬ ture) (5th ed., ib. 1889) ; Genung, ˆTennyson's In Memoriam) (ib. 1884); Gosse, E. W., (Por- traits and Sketches) (ib. 1912) ; 'Hallam, Lord Tennyson, 'Alfred, Lord Tennyson: A Me¬ moir) (2 vols., New York 1898; new ed., ib. 1905; in 1 vol., ib. 1911), the authorized life of Tennyson; id., bennyson and his Friends) (London 1912) ; Harrison, Frederic, 'benny- son, Ruskin, Mill and other Literary Estimates) (New York 1900) ; Huckel, Oliver, (Through England with Tennyson) (ib. 1913) ; Hutton, R. H., "Tennyson,® in biterary Essays) (Lon¬ don 1893) ; Jacobs, (Tennyson and In Me¬ moriam) (ib. 1892) ; Jones, bhe Growth of the Idylls of the King) (ib. 1895) ; King, (A Critical Study of In Memoriam) (ib. 1898) ; Lang, Andrew, 'Alfred Tennyson) (London 1901) ; Littledale, bssays on Tennyson's Idylls of the King) (ib. 1893) ; Luce, Morton, band- book to the Works of Alfred, Lord Tennyson) (New York 1908) ; Lyall, A. C., (Tennyson,) in English Men of Letters Series (London

1902) ; Lounsbury, T. R., bhe Life and Times of Tennyson from 1809 to 1850) (New Haven 1915) ; Masterman, bennyson as a Religious Teacher) (1900); More, ‘Shelburne Essays) (7th series, New York 1910) ; Napier, (Homes and Haunts of Tennyson) (1892); Rawnsley, H. D., ‘Memories of the Tennysons) (New York 1912) ; Ritchie, (Mrs.) A. T., ‘Records of Tennyson, Ruskin and Browning) (London 1896) ; id., bennyson and his Friends) (ib 1893) ; Saintsbury, G. E. B., (Corrected Im-

pressions) (New York 1895) ; Scudder, V. D., (Life of the Spirit in the Modern English Poets) (Boston 1897) ; Sneath, E. H., (The Mind of Tennyson > (New York 1900) ; Sted- man, (Victorian Poets) (rev. ed., 1887) ; Strong, A. H., (Great Poets and their The- ology) (Philadelphia 1899) ; Turnbull, A., (Life and Writings of Lord Tennyson > (London 1915) ; van Dyke, Henry, (The Poetry of Ten¬ nyson } (10th ed., New York 1898); Walters, J. C, (Tennyson: Poet, Philosopher, IdealisD (London 1893).

Henry van Dyke,

Professor of English Literature, Princeton Uni¬ versity, and former United States Minister to the N etherlands and Luxembourg.

TENNYSON, Frederick, English poet: b. Louth, 5 June 1807 ; d. Kensington, 26 Feb. 1898. He was elder brother of Alfred Tennyson (q.v.). He published several volumes of poems of considerable merit, namely: (Days and Hours) (1854) ; (The Isles of Greece* (1890) ; (Daphne and Other Poems * (1891) ; and

(Poems of the Day and Year* (1895).

TENNYSON-TURNER, Charles, Eng¬ lish poet: b. Somersby, Lincolnshire, 4 July 1808; d. Cheltenham, 25 April 1879. He was an elder brother of Alfred Tennyson (q.v.), with whom he collaborated in the <Poems) of 1827. He took the additional name of Turner by royal license on succeeding to property at the death of a great-uncle. He became vicar of Grasby, Lincolnshire, in 1837, and published (1864); ‘Small Tableaux *(1868), and bon¬ nets, Lyrics and Translations) (1873). In 1880 these were republished with additions, under the title Collected Sonnets, Old and New.* These writings manifest that he possessed much poetic genius. His greater brother re¬ garded some of his sonnets as among the finest in the language, among them being (The Rook¬ ery*

; (Letty's Globe) ; <Orion) ; and (The Lion's Skeleton.)

TENOCHTITLAN, ten-och-tet-lan', the ancient name of the City of Mexico. See Mexico.

TENOR, the highest natural adult male voice. Its compass generally extends from C in the bass to G or A in the treble. Profes¬ sional singers may take from C to C. The qualities of the tenor render it suitable to the expression of tender and delicate sentiments. In a vocal composition of four parts the tenor forms the second middle part, deeper than the alto, but higher than the bass ; but in the song of four male voices the teno> , as the first voice, leads the chief melody, and as the second is the higher middle voice. The clef of this voice is the C clef on the fourth line of the stave, but the treble or G clef is commonly used, though an octave too high. A singer having a high-pitched voice, or a musical part for such a voice, is also termed tenor, and sometimes a viola tuned between the bass and the alto is so named. See Voice and Voice Culture.

TENORITE, the native black oxide of copper, CuO. It occurs on the lavas of Vesu¬ vius in small black scales of brilliant metallic lustre. Melaconite is an earthy, massive variety, resembling wad, formed by the decom¬ position of chalcopyrite and other copper ores.

It occurs in Ducktown, Tenn. ; Morenci, Ariz., and elsewhere.

TENOS, te'nos, Greece. See Tinos.

TENSAS, a river in the southwestern part of Alabama, the eastern channel through which the united waters of the Tombigbee and the Alabama rivers pass to Mobile Bay. The west¬ ern channel is called Mobile River (q.v.). At the mouth of the Tensas is Fort Blakely where took place an engagement between the Union forces and the Confederates, 25 March 1865. See Fort Blakely, Siege and Capture of.

TEN.SKWATAWA. See Tecumseh.

TENT, a portable dwelling-place formed of flexible material, as blankets, hides or more commonly canvas, stretched with cords on poles. Tents are chiefly used in Europe and the United States as shelters for soldiers, although the first hunters in this country, following the Indians, made partial use of them. The most common form of tent is the A tent, having a ridge-pole, across which a canvas is slung and sloped to form the main roof, the sides being fastened by cords to stakes in the ground, and flies or wings being hung for sides. When a hoop is used instead of a ridge-pole as the main support it is a

bell-tent. The circus tent usually has two, three or more main masts, with ridge-poles or ropes between them, and a vast spread of canvas reaching to the ground.

TENT-CATERPILLARS, caterpillars of some moth of the genus Clisiocampa, specifi¬ cally the apple-tree or spring species (C . am er¬ ic ana) of the northeastern States. The moth is of medium size and plain colors. Its eggs are laid in autumn in the form of bands of 300 to 400 glued about the twigs of fruit-trees. They hatch early in spring, and the caterpillars begin to spin across nearby forking twigs a triangular silken web or tent, in which they take shelter and grow; many other trees as well as those of the orchard are affected. They go out in the daytime to feed on foliage and at night gather inside the web, which should be burned at night when it is populous, or destroyed by a spray of kerosene. The caterpillars become full grown in June, and then are about two inches long, hairy, with a white dorsal stripe and with numerous fine crinkled black lines on a yellow ground, united below into a common black band, with a blue spot on the side of each ring. Then the caterpillars spin their dense white fuzzy cocoons behind the loose bark, or boards, and the moths appear about July 1. Another spe¬ cies, often very destructive to the foliage of shade-trees, is the forest tent-caterpillar moth (C. disstria), whose caterpillars are to be dis¬ tinguished by a row of spots instead of a line along the back. The more common tent-cater¬ pillars of the Pacific Coast are the larvae of the early C. californica and of the later C. con- stricta, both orchard-pests. The last-named live in colonies but do not make tents.

TENTACULIFERA, a sub-class of the Infusoria having no cilia in the adult condition but provided with them during the embryonic period. The distinguishing feature of the group is found in the so-called tentacles which are very highly differentiated organs, some adapted for sucking and some for piercing, while some again are adhesive. They are emit¬ ted from the entire surface of the body or occur

in groups at the angles. Such tentacles are elongate, capable of protrusion and retraction, and usually have the distal end expanded into a sucker. In structure a tentacle is tubular with a semi-fluid plasm in the axis and a firm outer portion. When partly retracted a band of con¬ tractile protoplasm appears as a spiral ridge around the outside. There are several branch¬ ing forms such as Dendrocometes, sessile

on the gill plates of small fresh-water Crustacea, and Dendrosoma, a larger colony, attaining sometimes a length of two millimeters and presenting superficially an extraordinary resem¬ blance to a zoophyte. In the latter the nucleus extends as an axial structure branching throughout the entire colony. Young forms are produced by division or gemmation, and are free-swimming by virtue of a ciliary covering which is replaced by the tentacles when the organism settles down in a permanent environ¬ ment.

TENTH CENTURY. The tenth is com¬ monly rated ih history as one of the lowest of centuries in achievement. Undoubtedly fewer monuments and documents representing physi¬ cal or intellectual accomplishment have come down to us from it than from corresponding periods. The principal reason for this is to be found in the almost continuous invasions of the Northmen who at this time disturbed most of the western European countries. They estab¬ lished themselves in France under Rollo in the early part of the century. They landed on the English coast in larger numbers than ever, they invaded Ireland and destroyed particularly the monasteries and schools. They sailed around into the Mediterranean and made in¬ cursions on the cities and established themselves in Sicily and southern Italy. No wonder that the monastic chroniclers were not active and that men were discouraged over making at¬ tempts at progress. While these sea robbers came from the North the Saracens from Arabia were making similar incursions in the East and the eastern portion of the Mediterranean. It was the state of unsettledness of mind induced by the attacks of these two sets of invaders and the inhibitions set up by their savage cruelties and not, as is sometimes said, the persuasion that the world was to come to an end in the year 1000 which dulled the efforts of the generations of the time.

The 10th century was, notwithstanding, a significant transition period in which occurred many events that were to be fundamentally con¬ structive for modern history. The Northmen consolidated their power in Russia and are usually said to have given a name and a certain stability to the government of the country at this time. They explored Greenland and prob¬ ably landed on the American continent in the region known as Vineland, somewhere south of Labrador, before the year 1000. Their in¬ vasion of England was to lead to the establish¬ ment of Canute's empire in the next century and their presence brought about a consolida¬ tion of some of the warring peoples of Europe and an improvement in political conditions. They introduced a new racial element into the life of what we know as France and the Nor¬ mans, as they were called, became an extremely important factor in the subsequent history of Europe. At the same time the Arabs

in Spain

became leaders in the intellectual life of Europe and their schools in Cordova of geometry, chemistry, astronomy and medicine made that city a centre of learning famous throughout the world. Cordova laid the foundation of that profound Arabic interest in science and medicine which in the following two centuries gave us Abulcasis., Avenzoar, Averroes and Avicenne and was to mean so much for the stimulation of the scientific spirit of Europe. There was a great Arabian physician in the East too, Rhazes, the first to describe smallpox, whose books are still famous in the history of medicine.

In spite of the ever recurring incursions of the Northmen the political development of Europe at this time is of special interest to modern history. The 9th century saw the breaking up of Charlemagne's Empire by di¬ visions among his sons as well as among the sons of succeeding rulers to whom unfortu¬ nately the government by the Frankish custom was parceled out. The result was that France without a firm central authority was in a highly disturbed state all during the 10th century. The feature of European history most inter¬ esting for our time is the bitter rivalry between the Germans and the French over the possession of Lorraine which culminated nearly a thou¬ sand years ago. The German emperor of that time, Otto, invaded and devastated all the country of the Franks almost to Paris, then was forced to make a disastrous retreat and the greater part of his army perished in a battle on the Aisne.

England after the magnificent reign of Al¬ fred continued for some time to grow in peace and prosperity. Alfred's son Edward (reigned 901-25) conquered Mercia and East Anglia, strengthened the government and protected his people against invasion by the building of many strongholds. He encouraged town de¬ velopment and patronized learning, founding schools, though the tradition of any connection between the Saxon schools of this time and Oxford or Cambridge is mythical.

ˆEthelstan (925-40) further extended the Saxon rule so that all of the old Saxon Hep¬ tarchy (seven kingdoms) came under his dominion. He commanded in the <(great battle0 famous in subsequent history against an allied army of Danes, Scots, Gaels and warriors from the Orkney Islands. These Northern peoples with their great claymores always struck terror into their enemies before this but Saxon troops proved capable of withstanding their charge. ˆEthelstan came to be looked upon as one of the most important kings of Europe and royal alliances with his family were eagerly sought, his sisters Edwina and

Editha marrying the kings of France and Germany. He may be called the first king of all England. In the second half of the century, however, the North¬ men landed in England in large numbers and gradually secured a firm foothold. The Danes under their king, Sweyn, threatened to overrun the country and their withdrawal was obtained only by paying a ransom. Needless to say this only proved to be a bait for more invaders from the Northern countries.

A more hopeful development came at the end of the century with the introduction of Hungary into European history. Stephen, one

of the chiefs of the Hungarians, was with his father received into the Church and proceeded to make his people Christian. He was crowned as king (997) and his reign is mainly in the next century, but the spirit which led him to correspond with Bruno of Querfort and Odilo of Cluny and to found a series of hospices for pilgrims in Jerusalem, Rome, Ravenna and Constantinople so that travelers from his country might have a refuge when they visited these cities, was a product of the 10th century. He encouraged learning and did much to break the savage spirit of his people. His court be¬ came a refuge for the English royal family when Canute conquered the English and he deeply influenced Saint Margaret of Scotland. The tradition of social helpfulness established by him culminated in Saint Elizabeth of Hungary in the next century.

The one country in western Europe in which the Northmen were unable to gain foothold was Spain.1 When the Northmen landed at Ga¬ licia they devastated the country for a while, but were defeated and almost exterminated learning a lesson that kept Spain from being seriously disturbed by the Scandinavians after this. This century witnessed also the beginning of the expulsion of the Moors. The foundation of the little Christian kingdom of Leon was the initial step in this and the prelude to the heroic age celebrated in the Spanish chronicles and ballads. Abderrahman III (891-961) under whom as caliph of Cordova, Mohammedan power in Spain rose to its greatest height, was defeated in 940 by Ramiar II, king of Leon and Asturias (died 950), in the great battle on the plain of Simancas (31 July 939). After this the Christians continued to advance in power and the Arabs to recede.

The most interesting character of the period is Dunstan, archbishop of

Canterbury, pro¬ claimed saint by popular estimation of the good work he did for his people. He was probably born early in the century of a well-to-do family. In his youth he was a favorite at court until jealousy led to his banishment. Disillusioned with worldly success he became a hermit at Glastonbury but after a time the fame of his life as. a solitary led the king to recall him as an adviser. Dunstan took advantage of his place at court to encourage learning and patron¬ ize art. He himself was deeply interested in the arts and crafts and the making of beautiful things and after his death he became the patron saint of the goldsmiths' guild. He is said to have taken part in the making of bells and organs as well as the altar vessels. Nothing delighted him more than the teaching of boy$ in the cathedral school and he encouraged manual training as well as intellectual develop¬ ment. The rich who saw his good work pro¬ vided him with funds in abundance and he used them for the building and restoring of churches and the establishment of schools. He reformed monastic life which had suffered severely dur¬ ing the disturbed period while the Northmen were landing in England. Dunstan was most famous., however, for his care of the poor and the needy. He was often called upon to act as judge in law suits and his maintenance of the rights of widows and orphans made him popu¬ lar. He died in 988 and until the martyrdom of

Saint Thomas of Canterbury was the favorite saint of the English people.

The most significant intellectual event of the century was the writing of a series of plays by Hroswitha, a Benedictine nun of Ganders- heim, South Germany. Her reasons for writing them, as given in the preface, makes it very clear that there must have been much more of interest in literature, classic and recent, at this time than is usually thought. Hroswitha de¬ clared: ((There are many Christians (and we cannot relieve ourselves entirely of this re¬ proach) who charmed by the choice eloquence of the language, prefer the vanity of secular books to the wisdom of the Holy Scripture. There are others who though attached to the sacred writings and full of contempt for other pagan productions, yet cannot keep from read¬ ing time and again the fictions of Terence and won by his charm of diction stain their souls by the knowledge of criminal actions. It is for this that I, (the strong voice of Ganders- heim, *do not hesitate to imitate in my writ¬ ings a man whom so many permit themselves to read in order to celebrate in the measure of my feeble intellect the virtues of Christian women*while employing the same form of com¬ position which served the ancients to describe shameful conduct.®

The ideas thus expressed are so modern that it is surprising to find them thus simply set forth in the 10th century. Hroswitha called her plays comedies because they end happily, though the happiness comes in heaven through martyrdom. They were probably meant, as the preface would seem to indicate, more for read¬ ing than presentation, though they are some comic scenes that would tempt the employment of the actors' art. One of Hroswitha's comedies anticipates the morality plays of subsequent cen¬ turies in their introduction of abstract char¬ acters personified. Wisdom, the mother, and her three daughters, Faith, Hope and Charity, came to Rome to influence the citizens for good and are put to death by the Emperor Adrian. Be¬ sides the dramas Hroswitha wrote a series of poems in Latin verse, one. of which is the story of Theophilus who sold his soul to the devil and is one of the early forms of the Faust legend. She also wrote a chronicle and seems to have been in high favor at court. The editio princcps of Hroswitha is by Celtes (1501). At first he was suspected of having written most of the plays, but there is no doubt now of their antiquity. The work throws light on the feminine education of the time. Mani¬ festly the convents, of which there were many in the Rhineland, contained a number of re¬ ligious women deeply interested in the intel¬ lectual as well as the spiritual life.

The beginnings of some of the important de¬ velopments in commerce date from this century. Merchants were honored by iEthelstan who conferred the rank of Thane on anyone who had made three voyages over the sea with a ship and cargo of his own. The British fleet organized by Alfred at the end of the 9th cen¬ tury developed and in King Edgar's time (959-75) some 360 sail in three squadrons made a circuit of the island. Even this sea power was not able to protect England from invasion by the Danes, however, who under Sweyn gained a foothold (circa 985) and in the next

century England was ruled by Canute. Flan¬ ders became the seat of manufactures of linens and woolens for Europe and the republics of Venice and Genoa began their great com¬ mercial careers in connection with the trade from the East. The Moors in Spain under Abderrahman III built some beautiful buildings and adorned their cities and set an example which was to prove an inspiration for the many students who came down to the Spanish Peninsula to make their studies at famous Moorish schools.

Principal Events of the Tenth Century.

1. Edward the Elder, King of the Angles and Saxons, second son of Alfred the Great, makes peace with the Danes settled in East Anglia and Northumbria, and establishes the “ Laws of Edward and Guthrum.”

2. Northmen from Norway and Denmark, from this year on, through the century, continue to ravage the Russian, German, British, Irish and French coasts, and although disastrously repulsed from Spain, extend their depre¬ dations to Italy. They establish colonies in Normandy, France, under Rollo, in England and in the northern Scottish islands.

3. Conrad, duke of Franconia is elected emperor of the Franks.

4. Henry the Fowler becomes Henry I., King of Germany.

5. Germany and north Italy are divided into dukedoms and principalities. The third or Saxon dynasty com¬ mences. Henry I extends his territory; increases civic rights; creates several margravates. The silver mines of Hertsburg are discovered. Industry and wealth in¬ crease. Edward the Elder, King of the Angles and Saxons, is “ chosen as father and lord ” by Scots, Northumbrians, Danes, Norwegians and Welsh after victorous campaigns.

6. Edward the Elder dies and is succeeded by Aithelstan who consolidates the Saxon Heptarchy.

7. Otto of Germany, eldest son of Henry I, marries Edith, daughter of Edward the Elder, and sister of -iKthelstan, King of England.

8. Henry I of Germany stems the Hungarian invasion. 936. Otto I, the Great succeeds his father Henry I as King of Germany.

9. Otto concludes peace with Louis IV of France after war over Lorraine.

10. War again breaks out over Lorraine and is ended by Otto’s brother Bruno, Archbishop of Cologne.

11. The Hungarians are finally driven out of Germany, Otto defeating them in a brilliant victory at Lechfeld. Otto also defeats the Slavs who had ravaged Saxony. 959. Hugh Capet is made Duke of France.

12. Hroswitha, dramatist, Benedictine religious, and “ the strong voice of Gandersheim,” presents her ‘ Carmen de gestis Oddonis ’ to the emperors Otto I and Otto II.

971 Edward the Martyr becomes King of England.

1. Edward is assassinated at the instigation of his step¬ mother.

2. Greenland is colonized from Iceland by Northmen who send Christian missionaries there. They also reach Vineland on the North American continent.

3. On the dissolution of the Franconian Empire and the termination of the second dynasty, Hugh Capet the founder of the third dynasty is elected King of France.

4. Saint Dunstan, archbishop of Canterbury, dies.

5. Stephen I is crowned King of Hungary and enters into friendly relations with Christian leaders of Western Europe.

6. Austria becomes a Margravate. The Grecian Empire loses territory to the Bulgarians on Mount Haemus and resists Russian invasion. The Turks in possession of Egypt and Syria extend their empire and give the title of Sultan to their rulers.

7. Civilization advances. Villainage or serfdom is abolished in Western Europe. The principal towns become republics. Hereditary estates on a military basis are established. The dukes and counts become kings. Arabic learning attains a high standard. The Institutions for education founded by Charlemange are almost obliterated in the upheavals of the Franconian Empire, but faith and learning are safeguarded by the Church, for the intellectual advance and uplift of humanity.

James J. Walsh,

Author of (The Thirteenth Greatest of Cen¬ turies.)

TENURE is a legal term denoting the manner in which the title to real estate is held. It originated during the feudal system of Eng¬ land and defined the relation which existed be¬

tween the lord of the manor and the tenant. The term tenure in its modern signification is extensive and may import mere possession of real property, or the particular manner by which same may be held. A

tenure paid for in services was formerly known as socage. See also Feudal System.

TENURE OF OFFICE, the manner by which an office is held, as well as the duration of its term.

TENURE OF OFFICE ACTS. (1) An

act of 15 May 1820 which provided a four- year term for certain officers, such as collectors of customs, etc. (2) An act of Congress passed in 1867, vetoed by President Andrew Ja-ckson L and passed over his veto on 2 March. The chief provision of the act was that requiring the consent of the Senate to the removal of any officer appointed with its advice and con¬ sent. In case of the misconduct of officers thus appointed, except judges, when the Senate was not in session, the President might suspend such officer and designate another to perform his duties until the Senate should act in the case. Many other objectionable provisions were included in the bill, which was aimed at limiting the power of President Johnson. The latter's disregard of the act in removing E. M. Stanton from the Secretaryship of State was one of the main grounds of his impeachment. Under Grant's administration in 1869 many sections of the act were stricken out, and in 1887 it was practically repealed altogether. (See Johnson, Andrew). Consult McLaughlin and Hart, Cy¬ clopedia of American Government > (New York 1914), and ˆStatutes at Large) (III, 582; XIV, 430; XVI, 6; XXIV, 500).

TEOCALLIS, te-6-kal'is, the ancient tem¬ ples of Mexico, of which there are extensive remains. They are distinguished by a pyra¬ midal base, square in plan, and rising in stories or terraces, or in an incline of 45 degrees, to an upper platform, on which the temple stands. The most extensive is the pyramid of Cholula, near Mexico, said to have been built before the arrival of the Aztecs. In plan it measures 1,440 feet each way, and has four terraces, reaching a height of 177 feet. Its area is nearly four times that of the great Egyptian pyramid, but in strength of material and skill of work¬ manship it is vastly inferior, and is now merely a mass of ruins. At Palenque, in Yucatan, is a better-preserved temple. The pyramid rises in an incline, consisting of an unbroken flight of steps, 280 feet square and 60 feet high. The temple is 76 feet wide in front and 26 feet deep and is ornamented with bas-reliefs in stucco and hieroglyphic tablets.

TEOSINTE, a fodder-plant. See Grasses of the United States.

TEPHROITE. A mineral consisting of manganese ortho-silicate

2Mn0.Si02, contains 70 per cent MnO. ; abundant at Franklin Fur¬ nace and Sterling Hill, N. J.

TEPIC, ta-pek', Mexico, (1) A territory on the Pacific Coast between the states of Jalisco and Sinaloa, organized under Mexican govern¬ ment in 1889; area, 11,275 square miles. It is a mountainous country inhabited by tribes of semi-independent Indians. It includes the vol¬ cano of Ceboruco, still active. The Santiago and Mezquital rivers flow through it. There are

\ A

i V

-t -2 i

rich mineral deposits, little operated. Pop. about 175,000. (2) The capital, Tepic, lies about 25 miles inland from the port of San Bias, with which it is connected by a railroad. It stands on a commanding plateau, and manufactures cotton-cloth and tobacco, and has a population of about 17,000.

TEPLITZ, tep'lits, or TOPLITZ, tep'lits, Bohemia, a watering place in a mountain valley, 30 miles southeast of Dresden. Its interesting features are the castle with its beautiful grounds, the town church, bathing establish¬ ment, Rathhaus, etc. Its mineral baths are the most celebrated of the country. They consist of 12 hot springs, alkalo-saline, and are of great efficacy in rheumatic affections. The Triple Alliance between Austria, Russia and Prussia against France was signed here in 1813. Pop. 27,000.

TERAMO, ta'ra-mo, Italy. (1) Capital of the province of its own name, at the confluence of the Tordino and Vezzola, 40 miles northwest of Chieti. It is a bishop’s see, and the cathe¬ dral dates from the 14th century. Municipal offices and the exchange are the principal buildings. The remnants of Roman baths, theatre, temples and aqueducts indicate the site of the ancient Interamna. The manufactures include wax, pottery, leather, straw hats, orna¬ mental furniture and cream-of-tartar. The ascent of the Gran Sasso is made from this point. In 1460 a fierce battle was fought here between the Milanese allies of the king of Spain and the forces of the Duke of Anjou of France. The ruins of the castle of San Flaviano, in the plains

nearby, mark the site of this conflict. Pop. of the commune about 25,070. (2) The

province lies in southern Italy, and is traversed on the west by the Abruzzi Mountains. Several streams flow through the province to the Adri¬ atic. Wine, grain, oil and silk are the chief products, and the fisheries are important. The Ancona-Brindisi Railway follows the coast, with a branch to Teramo, the capital. Pop.

320,000.

TERAPHIM, small images or objects similar to the household gods of the Romans, and which are mentioned in several places in the Bible. The reverence paid to them appears to have been very ancient. They were human in form, and from being merely venerated, or used as aids to devotion, might easily become objects of idolatry. The earliest mention of teraphim is in Genesis (ch. xxxi, 19), where Rachel is said to have stolen her father's teraphim, which Laban (ver. 30) calls his gods. In the story of Micah (Judge xv, 5) the word occurs in our Authorized Version. It was a teraph that Michal, David's wife, put into the bed (1 Sam. xix, 33) to deceive the messengers of Saul. Josiah is represented (2 Ki. xxiii, 24) as putting away the teraphim. In Ezek. xxi, 21 they are represented as used by the king of Babylon for purposes of divination. Con¬ sult Benziger, I., (Hebraische Archaologie' (Tubingen 1907).

TERATOLOGY, that branch of biological and anatomical science which treats of abnor¬ malities or monstrous growths in the structure of plants and animals. While ancient writers dealt with such deviations from normal types of structure, malformations appealed to their

imagination as portentous objects of satanic origin, rather than to their deficient scientific sense as subjects of investigation. Early in the 18th century superstition began to give way to physical observation, and the study of character and causation in monstrosities became an im¬ portant branch of natural history. Defect in the germ is regarded by many embryologists as the original cause of some human anomalies, hereditary persistence of certain deformities in numerous cases resulting. Other malformations are believed to be due to diseased organs, as the brain or the uterus, and to various foetal disorders. Consult Moquin Tandon, Elements de teratologie vegetale) (1841); Fisher, (Dip- loteratologyP in transactions1 *of the Medi¬ cal Society of the State of New York, 1865— 66-67-68; Masters, (Vegetable Teratology* (1869) ; Penzig, <Pflanzenteratologie) (1890-

94).

TERBIUM, one of the <(rare earth® ele¬ ments found chiefly in the minerals samarskite and gadolinite. It belongs to the yttrium group and has an atomic weight of 158.8. Its symbol is Tb.

TERBORCH, ter'boorn, Gerard. See

Terburg, G£rard.

TERBURG, ter'boorg, Gerard, Dutch painter: b. Zwoll, near Overyssel, 1608; d. Deventer, 1681. His father, a historical painter, who had resided some time at Rome, gave him his first lessons in painting. He continued the study of his art at Haarlem, and afterward visited Germany, Italy, Spain, England and France, leaving everywhere proofs of his tal¬ ents as a painter of portraits and of interiors. On the meeting of the European Peace Con¬ gress at Munster he painted in 1648 (The Plenipotentiaries Discussing the Treaty) which contains 69 portraits; it is now in the English National Gallery. The Spanish Ambassador at the congress took him to Madrid, where he painted the king and many of the nobles. From Spain he went to London, and afterward to Paris. He then returned to Overyssel, married one of his nieces and became burgomaster of Deventer. His portraits are remarkable for elegance. He excelled in painting textile fabric, particularly satin and velvet. His interiors are mostly of the houses of the rich. Few of his pictures are to be found and they are exceed¬ ingly costly, his (Glass of Lemonade,* a small canvas, 25ˆ4 by 20J4, fetching in 1878 the price of $9,720.

TERCEIRA, ter'sa'ra, the third in size of the Azores Islands, situated 84 miles northwest of Saint Michaels; area 225 square miles. It is volcanic and mountainous, with steep cliffs along the shores, the highest point being about 3,500 feet. The soil is fertile, producing wheat, corn and grapes. The capital is Angra, with a pop. of 11,000. Pop. of the island about

50,000.

TERCENTENNIAL EXPOSITION AT JAMESTOWN. See Jamestown Tercen¬ tennial Exposition.

TEREBRATULA, a genus of brachiopods (q.v.). The shell exhibits a punctated struc¬ ture, due to the presence of numerous minute canals in the shell-structure itself. The ventral valve has a prominent (<beak,» which is per-

forated for the stalk. Some species still exist in our seas, although the genus dates back to the Devonian age.

TEREDO, or SHIP-WORM, a small marine bivalve boring mollusk (Teredo navalis), which excavates burrows in wood under (salt) water, attacking the timbers of piers and ves¬ sels in immense numbers, and riddling them to such an extent that they are rendered utterly useless, in a surprisingly short time, if left un¬ protected. It abounds destructively throughout the Mediterranean and Baltic seas, and on both shores of the Atlantic. Its steady burrowings once almost caused the inundation of a large part of Holland. Along the sea-front had been built a system of dikes, made principally of timber. In three years breaks were being patched up ; in five, whole sections gave way. Only the heroic efforts of the whole seaside population saved the Dutch from one of the worst catastrophes in their history. The tim¬ bers were completely honeycombed, so rotten that the wood could be crushed in the hand.

North America suffers as much as Europe from this pest. All down the New England Coast piles are attacked and destroyed. In this region two years forms the average life of a piece of submerged timber. Channel buoys are left in the water only six months in the year, then a new set is put in and the old one dried. The zone of the ship-worm's devastation is comparatively large. Wood is attacked between points well above low-water mark and points 10 or more feet below it. The hardest oak offers no more difficulty than the softest pine, and the toughest knots are traversed. Teak alone resists the attack.

The agent of this vast amount of damage much resembles a worm, but is a true mollusk. Its long, whitish body, tapering toward the posterior end, is found imbedded in a shell-lined burrow. Individuals of this species sometimes attain the length of 10 inches, are one-quarter inch in diameter. Such size, however, is rare, four inches being the average length.

The ((head® end of the animal is covered with a white bivalve shell. This protects the vital organs of the little creature, and from its interior opening projects a short Moot® which is probably the instrument by which the burrow is dug and lined with its pearly coating. Two pallets shaped and fastened to the pos¬ terior end of the body, much as leaves are fastened to the stem, close the teredo's hole,

and protect from attacks the soft portions of the animal. Between these two plates lie the siphon tubes — used for inhaling and exhaling water. Through the lower of these (bronchial) is drawn the water breathed by the animal, and likewise those minute animalcules which serve it for food. The dorsal tube serves as the or¬ gan of excretion. Through it passes a stream of vitiated water carrying along the faeces and the wood excavated. Surrounding both the pallets and the siphon tubes is a much wrinkled muscular band, by which the teredo adheres to its {<burrow.®

The appearance of the teredo burrow is very peculiar. Outwardly the piece of timber in¬ fested shows a number of very small holes. Inwardly it resembles nothing more than a Swiss cheese. The channels run in all direc¬

tions, sometimes so close to each other that the wood separating them is as thin as paper. But between the holes there is always a partition, for the animals never interfere with each other. Their sense of hearing seems to enable them to tell when they are approaching the outside of the wood or are nearing another burrow and they turn aside. The holes are always lined with irregularly laid shell and they generally go with the grain. Like many other mollusca the teredo passes through a long series of com¬ plicated metamorphoses before arriving at full maturity. The eggs, from the beginning of the breeding season in May, are confined in the gill cavity. Here they have their first period of growth. From the gill cavity the embryos are discharged in the form of free-swimming ani¬ mals covered with vibrating cilia or hairs, by which they swim. In this stage they are almost exactly like ciliated infusoria. Next they lose these locomotive filaments and develop a rudi¬ mentary bivalve shell. In the third stage their relation to other bivalves is apparent in their resemblance to the common mussel. They have a mantle and shell covering their entire body and another sort of cilia replaces those lost. This bivalve character is further accentuated by the development of a long foot used for creeping and by the appearance of eyes and organs for hearing. These eyes, however, dis¬ appear as the animal elongates and the loco¬ motive cilia are lost. In this stage the young teredo, settling on some convenient piece of wood and starting with a hole about the size of a pin-head, begins his burrow, and enlarges it as he goes on, until he has reached his full growth.

The fact that the ship-worm does not use as food the wood it excavates, but simply passes it through its body, has much to do with the failure of many attempts to make wood teredo- proof by poisons. Up to date creosote and dead oils are the remedies which have given

the best results. The piece of lumber to be so treated is first steamed. Next the air is ex¬ hausted and the poisonous or noxious com¬ pound is forced in under a pressure of 400 pounds to the square inch. Usually, however, this system fajls of the desired result. At Christiania, timbers poisoned in this manner were found to be, three years later, quite riddled with teredo. In some instances, how¬ ever, piles so treated have been known to re¬ main free from ship-worms for as many as 15 to 20 years.

Although poisoned timbers are often used for such structures as government docks (which must be as permanent as possible), for ordinary piers and for submerged work, the expense of so treating the wood is generally greater than the cost of periodical renewal. Of course the most thorough defense would be one which pre¬ vented the entrance of the young animal. Cop¬ per-sheathed vessels are quite free from its at¬ tacks, while copper paint, creosote or coal tar frequently applied has the same effect. Piles may be defended by broad-headed nails closely driven, for the ship-worm seems to avoid enter¬ ing any wood impregnated with iron rust.

A large species of teredo (T. gigantea), from Sumatra, has been found to measure from four to six feet, and to have a diameter of about three inches. It bores into the solid mud, and

does not appear to destroy timber like its smaller neighbor. Consult Cooke, <Mollusca *(London 1898) ; Verrill invertebrates of Vineyard Sound* (Washington 1875).

TEREK, te-rek', Russia, a river in Circassia, which rises in Mount Kasbek, at the north of the Caucasus, among icy glaciers. It follows a northwesterly course through a narrow valley, then turns east and after dividing into nu¬ merous branches enters the Caspian Sea by a delta. Its entire length is nearly 400 miles, only a small distance being navigable. The main tributaries are the Ardon, Uruch, Malka and Baskan on the left; the Sunsha, Assa and Argun, on the right. A series of small forti¬ fications for protection against the mountain tribes are built along the river from Mosdok to the foot of the pass over the Great Caucasus, where the descent is made into Georgia.

TERENCE, ter'ens (Publius Terentius Afer), Roman writer of comedies: b.. Carthage, Africa, between 185 and 195 b.c. ; d. probably in Greece,

159 b.c. While yet a child he was bought by Publius Terentius Lucanus, a Roman senator, who took him to Rome and gave him a good education. His master having emanci¬ pated him the young African now assumed the name of his benefactor. Lselius and Scipio Africanus (the destroyer of Carthage and Numantia) admitted him to their intimacy, and as some aver, assisted him in the composition of his plays. About the year 161 he went to Greece, where he is said to have translated 108 of Menander's (q.v.) comedies. Six comedies of Terence's alone are extant — the <Andria,) the (Eunuchus, *(Heautontimorumenos,* (Phor- mio, *(Hecyra) and the <Adelphi,) his last piece, brought out in Rome the year before his death. The comedies of Terence were much admired by the cultivated Romans for their exquisite style, the language of Cicero, Gesar and the orators, and were likewise esteemed for their maxims and moral sentences. If we com¬ pare him with Plautus, his only important predecessor, we miss what Caesar styled the ((vis comica,** that sparkling wit and humor which made Plautus the model of Moliere. On the other hand Terence has the finer vein of sentiment, the more subtle power of character¬ ization and the purer latinity. He was indeed the founder of polite comedy, the comedy of society in Europe and his influence has been felt throughout the whole history of literature. Most of his plays follow closely the originals of Menander, but from the fragments of Menander which remain they do not appear to be mere translations. The comedies of Ter¬ ence have been translated into English by the elder Coleman and several others. (See Adel- phi) . Consult The edition of Bentley (1726); Vollbehr (1846) ; Dziatzko (1884), and Con- radt, (Die metrische Composition der Comodien des Terentius) (1876).

TERESA, te-re'sa (Sp. ta-ra'sa) Saint (properly Theresia), Spanish conventional re former: b. Avila, Old Castile, 28 March 1515; d. Alba, 4 Oct. 1582. Her attention was drawn in childhood to lives of saints and martyrs and when she and her brother were children under 1C they set off into the country of the Moors in hopes that some infidel would seize and kill

them on account of their faith and that they would thus obtain the crown of martyrdom. Defeated in their object they attempted to be¬ come hermits. Her father, a nobleman, Don de Cepeda, placed her, after the death of her devout mother, in a monastery of the Carmelites at Avila when she was 16 and though she lived for. some years there without any of her early religious enthusiasm, a change came over her at 20 and she took the veil. Her new spirit of devotion was deepened by reading the Con¬ fessions of Saint Augustine) and being much distressed by the apparent decay of discipline which she saw around her, she founded in 1562 another convent at Avila, dedicating it to

Saint Joseph and introducing a new order, the Dis¬ eased or Barefooted Carmelites, also called Teresians. She began by making this a gen¬ uinely mendicant order, but modified this detail of the rule in obedience to her superiors. From this mother house there sprang 16 other in¬ stitutions of the same order. She spent the later part of her life in traveling from one to another of these branch houses and the staff, cross and rosary she wore on these pil¬ grimages are still preserved at Avila. She was seized with her last illness in the palace of the Duchess of Avila, but at her own request was carried to her convent of San Jose, where she expired surrounded by her followers. Gregory XV canonized her (1622) and appointed 15 October as her festival and Philip III declared her the second patron saint of the monarchy, Saint James (Santiago) being the first. This decree was confirmed by the Cortes in 1812. She also has a worldwide reputation as a mystic, and among the most famous books of devotion which the Roman Catholic Church can boast are her five works: (Discourso o Re-lacion de Su Vida *(1562) ; (E1 Camino de la Perfection* (1563) ; <E1 Libro de las Funda- ciones) ; (1577), and (Santos Conceptos del Amor de Dios. *These have been translated into most of the lan¬ guages of Europe. Consult < Saint Theresa* (edited by Cardinal Manning, 1865) ; Graham,

(Santa Teresa> (1894); Jameson, (Legends of the Monastic Orders*; Senonville, <Sainte Therese et son Mysticisone* (1893); Tolv (Saint Teresa *(1903) ; <Vie de Sainte Therese' Ecrete par Elle-Meme* (15th edition, edited by Jules Peyre, 1904).

TERHUNE, ter-hurfl, Albert Payson,

American fiction writer, traveler and journalist: b. Newark, N. J., 21 Dec. 1872. He was gradu¬ ated from Columbia in 1893 and in 1893-94 traveled on horseback through Syria, investi¬ gating leper settlements, living among the Bed¬ ouins, etc. He has been connected with the New York Evening World since 1895 and is an expert writer on historical topics. His publica¬ tions include (Syria from the Saddle) (1896) ; (Dr. Dale: a Story Without a MoraP (with his mother, «Marion Harland, *1900) ; < Caleb Conover> (1907); (The Fighter (1909)- (Dad* (1914); (Damon and Pythias*; < Co¬ lumbia Stories * ; 'Stories of the Superwomen* ; (lhe Woman *(1912); (Dollars and Cents* (1915); (The Years of the Locust* (1915), etc. He is originator and author of the New York World's famous Popular Ed-ucational Senes that was run in 50 American newspapers from 1906 to 1919.

TERHUNE, Mary Virginia Hawes

(<(Marion Harland55), American novelist and writer on domestic science : b. Amelia County, Va., 31 Dec. 1831. She began to write for the press when 14 and in 1856 was married to Ed¬ ward Payson, Terhune. She conducted Baby¬ hood, for two years, established the Home- Maker in 1888, was a department editor on the staff of Saint Nicholas and Wide-Awake and later on the staff of the Philadelphia North American. Her novels have enjoyed a wide popularity and her cook-books and articles on household management are of practical value and extensively circulated. The latter include (Common Sense in the Household) (1872) ; (The Dinner Year-Book) (1877) ; ˆMarion Har- land's Model Housewife) ; etc. She was the originator of the movement to finish the monu¬ ment over Mary Washington's grave and wrote in furtherance of her purpose (The Story of Mary Washington1 *(1892). Her other works include (Alone5 (1854); (The Hidden Path5 (1855) ; Nemesis1* (1860) ; (Husbands and Homes5 (1868) ; (Loiterings in Pleasant Paths5 (1880) ; (His Great Self5 (1892) ; (More Colo¬ nial Homesteads5 (1899) ; (Dr. Dale,5 with her son, A. P. Terhune (1900) ; (Distractions of Martha5 (1906) ; (Where Ghosts Walk5

(1910) ; (The Long Lane5 (1915), etc.

TERLINGUAITE, a native oxychloride of mercury, occurring in minute monoclinic crystals in the recently-discovered mercury de¬ posits of Terlingua, Texas. It is transparent, has a sulphur-yellow color, brilliant adaman¬ tine lustre, hardness between 2 and 3, specific gravity 8.7. It is intimately associated with the other new mercury minerals, eglestonite and montroydite. See American Journal of Science IV, Vol. XVI, September 1903.

TERM, in law , (1) a limited or specific extent of time. (2) The time during which a court may legally transact business. In the United States terms vary according to the volume of judicial business and the available judges. (3) The time set for the payment of rents. (4) An interest or estate in land for a fixed time, as a year. If the term is for life it is a freehold and, therefore, treated as realty in law ; if for years only, it is merely a per¬ sonal interest and, therefore, personalty. (5) In Scots law, the period within which a party is compelled to produce evidence to support the allegations in his pleading.

TERMINAL MORAINE. See Moraine.

TERMINI IMERESE, Sicily, in the prov¬ ince of Palermo, 23 miles southeast of the city of Palermo, a seaport, on the northern coast, on a high and fertile point, near the San Leonardo River. It contains a museum, where are preserved antiquities of the ancient Thermce Himerensis, founded 408 b.c., by the Carthagin¬ ians. Some ruins of the once-famous baths, as well as fragments of a theatre and an aqueduct, still exist. The chief products and exports in¬ clude macaroni, corn, oil, olives, etc. There are important fisheries and good thermal saline baths. There is a school of navigation and a technical school, also a picture gallery. Pop.

21,000.

TERMINUS, a boundary stone or land¬ mark, personified as the god who guards bound¬ ary lines and landed property. Jupiter was wor¬

shipped in Italy as Jupiter Terminus. The ori¬ gin of this worship was attributed to Numa, who ordered that every one should mark the boundaries of his land by stones consecrated to Jupiter Terminus and should offer upon them every year at the festival of the Terminalia sacrifices of cakes, meal and fruit. This law also applied to the state, but the public termini were neglected in the later period of Roman history, while the termini of private property long retained their sacred character. A ter¬ minus stood in the temple of Jupiter in the capitol. On Roman coins a Terminus is rep¬ resented like the Greek Hermae, a square column surmounted by a head.

TERMITES, WHITE ANTS, or DUCK- ANTS, a family of insects composing the order Isoptera, which have a superficial resemblance to ants, though far removed from them in structure, being allied to the Mayflies. They also resemble ants in being social insects, living in colonies and building ((nests55 or ((hills.55 They are widely distributed in tropical countries, but also occur in the temperate parts of North and South America and a few have established themselves in Europe. Their food consists for the most part of wood, especially in a state of incipient decay, but they also eat a great variety of substances, including dead comrades and excrement. The termite society consists for the most part of wingless, sexually im¬ mature individuals, children, potentially of both sexes, which do not grow up. Besides these workers there is a less numerous caste of large- headed, blind, strong-jawed soldiers, but these are not so well differentiated as among the true ants. The workers collect food, form bur¬ rows and tunnels, build (<hills55 and care for the males, females, eggs and larvae. The males and females have wings, which the latter lose after impregnation. Then, indeed, the female or queen undergoes a

remarkable change, be¬ coming enormously distended with eggs and sometimes attaining a length of two to five inches or more — ((a large cylindrical package, in shape like a sausage and as white as a bolster.55 As only the abdomen swells, the re¬ sulting disproportion between anterior and pos¬ terior parts is very striking. The queen is ex¬ tremely prolific, having been known to lay 60 eggs in a minute or about 80,000 eggs in a day. In the royal chamber a male is also kept. It is hardly necessary to say that the queen could not leave if she would. But to under¬ stand this imprisonment we must notice that in spring the young winged males and females leave the nest in a swarm, after which pairing takes place ; the survivors becoming the im¬ prisoned ((rulers55 and parents of new colonies.

Fritz Muller has shown that besides the winged males and females there are (in many cases) wingless males and females which never leave the termitary in which they are born, being kept as complementary or reserve re¬ productive members, useful should not a winged royal pair be forthcoming. Sometimes this casualty occurs and then the wingless pairs be¬ come parents. The complementary kings die before winter; their mates live on, widowed, but still maternal, till at least another summer. Muller points out that, though the production and parentage of wingless males and females involves less mortality, the winged males and

females probably cross with those from other nests, thus securing the advantages of cross¬ fertilization. The workers are diligent in tend¬ ing the king and queen, in removing the laid eggs and in feeding the larvae.

In general appearance and size a wingless termite is ant-like, but the winged forms are much larger and flatter and their wings are quite different. The workers have large, broad heads and strong jaws adapted for gnawing; the soldiers have still larger heads and longer jaws. Besides the jaws and the two pairs of maxillae the head bears a pair of beaded anten¬ nae, two eyes and two ocelli, but the workers and soldiers are blind. The thorax has the usual three segments and bears simple legs; the ab¬ domen consists of nine segments.

The most remarkable termitaries are those of Termes bellicosus , abundant on the west coast of Africa and called ((ant hills.® They are sugar-loaf-like in shape, 10 to 20 feet in height, and, though built of

cemented particles of earth, are strong enough to bear a man's weight. Internally there are several stories and many chambers, some for the workers, one for the king and queen, others for the eggs and young, others for storing supplies of com¬ pacted minced wood. But the termites do not all build such gigantic nests; although some build homes on the branches of trees, out of masticated woody material, which are larger than barrels.

In Africa Termes bellicosus and T. arborum are common species. A few species, all prob¬ ably introduced, occur in Europe. In America only one species is known in the eastern United States, the almost ubiquitous T. flavipes, which does an enormous amount of damage by eating out the interior of beams and floors, in old houses ; destroying furniture, boring galleries through and through stored books and papers and ruining many other articles in which their presence is not suspected until no more than a shell remains.

Bibliography. — Hagen, (Monographie der Termitiden) in (Vols. VII-IX, 1873-75) ; Grassi, (Memoria sulla Societa dei TermitP (Accad. Lincei, Roma, 1892) ; Sharp, Cambridge Natu¬ ral History) (New York 1895) ; Howard. Un¬ sect Book' (New York, new ed., 1914).

TERMS OF OFFICE. See Electoral Qualifications.

TERN, or SEA-SWALLOW, any of many small gulls (q.v. ; also Laridce) distinguished by the long, slender and straight bill and by the narrow nostrils, which exist at its base. The wings are long and pointed and the tail is forked. The common tern (Sterna hirundo) is a familiar visitant to North Atlantic coasts. It is a very active bird, seeming to have a ceaseless flight, and feeding upon small fishes. Its average length is 15 inches, the long forked tail constituting a considerable element in this measurement. The color is black on the head and neck and ashy gray on the upper parts generally. The under parts are white, the legs, feet and bill being red. These birds have, how¬ ever, nearly disappeared from the eastern shores of the United States, owing to their

ceaseless persecution in their breeding places by egg-hunters and plume-hunters. About 80 species of terns exist in various parts of the world.

TERN ATE (ter-na'te) ISLANDS. See

Moluccas, or Spice Islands.

TERNI, ter'ne, Italy, in the province of Perugia, on an island, 50 miles

north of Rome, in the midst of the Apennines, anciently known as Interamna. It is surrounded by the Nera River. The main buildings are the cathedral and other churches, convents and some Roman antiquities, chief of which is an amphitheatre. The celebrated falls or cascades of Velino or Terni near the city, 800 feet high, constitute the main attraction for visitors. They were con¬ structed by the Romans to prevent inundations of the Velino River, by forming an outlet for the surplus water. Terni is a prosperous manu¬ facturing town and it has important iron and steel works. The chief products of its works are silk and woolen goods, armor-plate, pro¬ jectiles, steel castings, rails, guns, etc. This is the birth-place of Tacitus, the historian, and of the emperors Tacitus and Florian. Pop. 33,000.

TERPANDER, Greek musician : b. Antissa, Lesbos, 7th century b.c. ; d. probably in Sparta. He was reputed to have gone to Sparta at the command of the Delphic Oracle. He was awarded the prize in the musical feasts of the festival of Apollo Carneius in 676 or 672 b.c. He is considered the founder of Greek classical music and was the originator of lyric poetry. He is reputed t) have increased the number of strings on the lyre from four to seven, but this is probably an error, as evidence indicates an earlier date . for that change. He was famous also as a teacher and a composer.

TERPENES, ter'pens, a member of a class of hydrocarbons having the common formula CioHie, and found in the natural essential or ethereal oils obtained from a great variety of plants. They are usually liquids boiling between 340° and 375° F., of an aromatic odor and but slightly soluble in water. Two of the most important are pinene, the chief constituent of oil of turpentine, and limonene, which is found largely in the oils of orange, lemon, citron, bergamot, etc. Camphene is a solid terpene obtained by abstracting the elements of water from camphor. The camphors, two important examples of which are ordinary camphor and menthol, are oxygen derivatives of certain ter- penes. See Hydrocarbons.

TERPSICHORE, terp-sik'6-re (((delight- ing in the dance®), one of the Muses, the originator and patroness of the art of dancing as accessory to the singing or recitation of lyrical poetry. She is generally represented with the lyre and plectrum, crowned with flowers and in a mirthful attitude.

TERRA ALTA, W. Va., city situated at the extreme western edge of the Allegheny plateau, 60 miles west of Cumberland, on the main line of the Baltimore and Ohio Railroad. It lies at an altitude of 2,500 feet, overlooking the beautiful Cheat River region, and is fast becoming a

popular summer resort. There are two banks with combined resources of $1,100,- 000. The value of the city's taxable property is placed at $1,200,000. Its educational estab-

ART IN TERRACOTTA

cn

O

Ut

W

C

.2

'55

t*.

c

o

•o

<u

bD

a

o

W *H

G 2

O 4h

43 £

43 co

• «-l -*-»

<D

5 «*

to -*-•

o co

CO

G o

6 7,

o 2

Ih Ch M-l O

u b

a) X!

X! g

-H §

~ aj

a

<U

XJ

a

i

&>

a

^ <

W ~

rt

.5 S

■S «>

o S

o C«

C nb

4> <3

00 ® O H

e«

•a

c«

P

a

ctf

o

S

o

T3

0

o

a;

T3

o

• M

CO

o

0

0

a

o

Vh

0

o

w

CO

/0

Mm

-*->

1

O

u

3

T3

o

CCS

0

A

K

0

5

c

a

4->

O

o

-4->

HH

o

cd

*M

M-»

G

Ih

Jm

u.

0

0

i2

43

-*->

3

-4—*

T3

G

0

G

o

p

CO

a

0

B

-*-»

CO

G

bo

o

CJ3

»M

Mm

G

ctf

4sJ

0

a

0

CO

0

G

o

lM

Pi 0

Tf >-0 C h

ctf

u.

G

CO

G

a)

u

-+-»

0

43

tuO

.s

is

3

o

a

0

3

o

G

CO

0

G

o

43

T3

G

ctf

o c

*a - o°

w

3

c

•xs

＜u

:a CO

0 -M

a ＜a 6 ＜o

£V "ft

^ £

5 ®

o

£ * g 6

o £

CL '4-1

'f <u i O

(U ■ =

•*■ > g £ o

6 U

M CJ C3

.

.

' II*

lishments comprise a public and a high school. The annual receipts and expenses of the munic¬ ipality amount to about $7,500. Pop. 2,000.

TERRA BAIXA. See Marta of the Low¬ lands.

TERRA COTTA, hard baked clay or earthenware of exceptionally good quality, of uniform texture, hard and durable. The Eng¬ lish Dictionary of Architecture,5 completed be¬ fore there was much use in England of ma¬ terials made with cement, speaks of it as arti¬ ficial stone; but the term has also been used largely for that ancient earthenware of which are made the painted Greek vases which are so important in the history of art, and the inferior but still interesting, pieces of Etruria. In com¬ mon usage, however, the term is employed for such baked clay as is used in connection with architecture, whether in actual building, as where a hollow mass of the baked clay takes the place of a stone, or where a solid casting in the same material is used for molded string¬ courses and the like, in this way replacing bricks. It differs from brick in being harder, of better quality

and molded to some special form or ornament.

Terra cotta is exposed without a coating of glaze or enamel, and its brown color constitutes the typical article. Japanese figures — groups, vases and the like — which were called imita¬ tion bronze55 when they were first brought to western countries are really terra cotta.. They are often very beautiful in design, having the same vigor of modeling and perfect finish of all their parts which is found in the Japanese bronzes. The raku-yaki, that interesting brown ware which is used for tea-jars and tea-bowls and is the joy of the collector, is also a variety of terra cotta.

In the European Middle Ages terra cotta, unglazed, and also covered by a colored enamel, was used for roof tiles, and also for the much more elaborate pieces employed for crestings, and especially for those finials (in French epis) which are used where the hips of the roof meet the ridge and where in this way a salient point is produced. These finials often include the wind-vane which, however, would be com¬ monly of wrought iron. The custom of using terra cotta in these ways lasted into the time of the revival of classic architecture, and some of the most interesting pieces are French of the 16th century; the custom not disappearing until the complete establishment of pseudo¬ classic uniformity of design throughout Europe. Chimney tops pierced with decorative openings through which the smoke might issue were also made of terra cotta and the custom still lingers in those simply built houses of Italy, Greece and Switzerland, where chimneys are built of hard baked earthenware tiles set in strong cement mortar and in this way made very light and

thin. . .

Purely decorative pieces were also made of this material ; but in the way of architectural adornment the most important development was in that Della Robbia ware (q.v.) which, how¬ ever, is not often spoken of as terra cotta be¬ cause it is covered completely by an opaque enamel which receives a most brilliant and effective polychromy, adding in this way color to sculpture in the most emphatic and interesting way known since antiquity. Still such pieces as

the door-heads of many churches in Florence and elsewhere and the magnificent altar-backs ; the lavabos or washing-fountains and the like throughout central Italy are among the most effective pieces to be found in that region. The most extensive and splendid work in Della

Rob¬ bia ware is the broad frieze of the Hospital at Pistoja.

In the 18th century terra cotta, which had always been used by the French sculptors for the permanent form of many works of art, re¬ ceived a fresh impulse from the practice of Jean Antoine Houdon (q.v., see also United States, Sculptors of), Claude Michel (q.v.) (called Clodion) and others, among whom should be named certain makers of medallions as well worthy of study as the bronze medal¬ lions of the Italian Renaissance. In modern French practice portrait busts are very fre¬ quently made in baked clay, the same artistic quality being given them as to works in bronze or marble. The difficulty caused by the shrink¬ ing of the piece in the drying and subsequent baking is only to be met by extreme care in the selection and preparation of the material. The piece shrinks, but it may be made to shrink uniformly and without disturbing the symmetry.

Modern architectural terra cotta continually comes to the front as a material allowing ot much richer treatment at a reasonable price than carved stone; but for some reason it never becomes very general in its application. A large business building in New York had its roof brackets or consols made of this material before 1855. The old Boston Museum of Fine Arts contained much decorative terra cotta brought from England and this front was com¬ pleted about 1865. The constant demand for fireproof materials by means of which the ex¬ terior of a large building may remain without serious damage in spite of a hot fire across the street has made concrete, brick and terra cotta the obvious material for the facing; but stone, marble and granite still retain their places in many structures.

In making monumental figures, groups, de¬ signs, etc., of terra cotta the steps are: Mixing and kneading the clay; molding; retouching, for taking off any blemishes; baking; coloring and sometimes gilding. Modeling by hand is now rare, except in designing for a mold. The high grade work acquires its perfection largely by careful retouching. Baking requires to be performed slowly to permit evaporation of the moisture without injury. The coloring is mostly done after firing, solid body colors be¬ ing employed, as browns, blues and reds, with occasional black or bright colors for sane de¬ tail. Some of the Roman terra cottas are in a fine state of preservation, though dating back •2,000 or more years.

Within recent years there has been a marked increase in the use of terra cotta, often colored, for ornamenting steel and concrete buildings and for roof-tiles. Consult Strack, H., (Brick and Terra Cotta Work During the Middle Ages) (Boston 1914) ; Walters, H. B., (The

Art of the Greeks) (London 1906) and the (Annual of British School at Athens.5

TERRA DI LAVORO, ter-ra de la-vc/ro.

See Caserta.

TERRA VERDE, or VERTE (Italian ((green earth55), a green mineral pigment used

by painters in oil. A deposit of this earth is found in the neighborhood of Verona, Italy. There is a similar deposit in the island of Cyprus. The native green found in Italy is a silicious earth colored by protoxide or iron of which it contains about 20 per cent, and it is of extreme value as a permanent and brilliant tint in landscape painting.

TERRACES, successive benches or levels along the sides of valleys. A valley may show one or several terraces, varying greatly in height and in width. If composed of rock they are known as rock terraces. These may re¬ sult from the presence of hard layers of flat- lying rock, as on the sides of the Grand Ca/iyon of the Colorado. In other cases they are the results of successive uplifts, a narrower valley each time being incised within the broader older valley, leaving a remnant of the older valley bottom as the terrace. Alluvial terraces are composed of stratified gravel, sand or clay. Their history is usually more complex. After a given valley has been eroded, the first step is the filling of its basin with alluvium to some depth. This may be brought about by many causes. Particularly did it occur during glacial times, when the streams flowing away from the ice front were overloaded, filling their valleys with glacial outwash. Any cause which, after the valley is filled, will start the rivers to eroding, will obviously leave a gravel bench on one or both sides of the river. This renewed erosive activity may, in the case of glaciation, be merely the melting away of the glaciers, with the consequent return to normal conditions. It may be the result of uplift and rejuvenation of the streams, or it may result from climatic or other causes.

TERRACINA, ter-ra-che'ne, Italy, in the province of Rome, on a gulf of the same name, near the Pontine marshes, about 18 miles north¬ west of Gaeta, and 56 miles southeast of Rome. It is a historical town lying on the Appian Way. It was sacked in 409 and again in 595. It is the see of a bishop and has a cathedral and handsome episcopal palace.

The cathedral is built in the Italo-Byzantine style and in¬ corporates the pillars of an ancient temple. Ex¬ cavations have revealed the remains of a splendid temple of Venus. The main occupa¬ tion consists in the fisheries. Pop. of the com¬ mune about 12,000.

TERRAPIN. See Diamond-back Ter¬ rapin; Turtles.

TERRAPIN, ter'a-pm, a tortoise of the family Emydidce. There a*-e several different members of the family, all of which are fresh¬ water or tide-water. The name is also applied to the ((elephant terrapin® of the Golapagos. Terrapin is held in great favor by epicures,' especially in the United States.

TERRE HAUTE, ter'e hot, Ind., city, county-seat of Vigo County, on the Wabash River, and on the Pennsylvania, Chicago and Eastern Illinois, the Evansville and Terre Haute, the Evansville and Indianapolis, the Chicago' Terre Haute and Southeastern, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is 178 miles south of Chi¬ cago, 163 miles northeast of Saint Louis, 182 miles northwest of Cincinnati, and 72 miles west of Indianapolis. There are more than a

dozen lines of railroads entering the city, two of which were built in 1905. It is one of the most prominent railroad and manufacturing cities of the Middle West. Terre Haute is one of the oldest settlements in the State ; in 1816 it was laid out as a city, and in 1833 was chartered.

Topography. — The city is beautifully laid out on an elevated plateau, amid picturesque surroundings. It is connected with the west side of the river by several handsome railroad bridges, and for the use of the general public there was constructed a fine bridge (contract price, $27,000). There are several parks; the broad streets in summer time present a forest appearance. The residential part has many fine edifices in most beautiful surroundings.

Industries. — The city is in a rich agricul¬ tural region and in the centre of coal fields comprising over 2,000 square miles, containing a fuel supply which, at the present rate of con¬ sumption, will not be exhausted for 200 years. Coal is shipped from here to points within a radius of 400 miles, and it is a distributing point for about 1,500 carloads per day. The city is the industrial and commercial centre for a large portion of the western part of Indiana and the eastern part of Illinois. The manu¬ facturing industries embrace rolling mills, foundries, wheel works, malleable castings, mining machinery, flour mills, hominy mills, car works, railroad shops, glass factories,

stamping works, feed mills, tool works and' fencing works. In the vicinity are large de¬ posits of shale and clay and a number of clay plants are in operation nearby. In 1910 (gov¬ ernment census) the total number of manufac¬ turing establishments was 170; total capital in¬ vested in plants, $10,371,000; average em¬ ployees yearly, 5,017; annual wages paid to em¬ ployees, $3,219,000; cost of material used dur¬ ing year, $8,657,000; total annual value of prod¬ ucts, $21,793,000. Owing to the failure of the natural gas supply in many places, there has been since 1910 an influx of manufacturing in¬ dustries to take advantage of the cheap fuel and the railroad facilities.

Public Buildings. — The prominent public buildings are the government building, the county courthouse, city hall, opera house, the Union station, the schools, churches, charitable institutions, hotels and several business houses.

Charitable Institutions and Organizations. — The Rose Ladies' Aid Society cares for a large number of the poor, and has charge of the Home for Old Ladies. This home has an endowment of $100,000. The other institutions and organizations for the relief of the needy are Saint Anthony's Hospital (building cost $410,000) in charge of the Sisters of Saint Francis ; Saint Ann's Orphan Asylum, in charge of Sisters of Providence; Rose Orphan Home endowment, $200,000, building, $130,000; Union Hospital (Protestant), endowment, $25,000* Rose Dispensary, endowment, $200,000; and a number of church aid societies.

Education. — The educational institutions are the Indiana State Normal School, which annually enrolls over 1,000 pupils; the Rose Polytechnic Institute, founded b> Chauncey Rose and opened in 1883 ; two high schools, 26 public elementary schools, Roman Catholic and Lutheran parish schools; Saint Joseph's

Academy (Roman Catholic) ; Saint Mary's of the Woods, a school for girls; a public library and libraries connected with the Normal School, and the Polytechnic Institute.

Banks and Finances. — There are in Terre Haute three national banks, three trust com¬ panies, three State banks and one savings bank, with a capitalization of over $4,000,000. The resources of these banks for

the year ending 31 Dec. 1920 amounted to $37,408,390.55 and the deposits were $28,167,818.36. The cost of mu¬ nicipal maintenance and operation for the city for 1920, including fire and police department, was $915,807.85. The public schools during the year 1920 cost $1,241,986.09, of which about $500,000 was paid out for teachers' salaries.

Government. — The city is governed by a charter granted by the State legislature. The mayor, city judge, city clerk and school trus¬ tees are elected by the people. The mayor ap¬ points all other officials including the comp¬ troller and city engineer. Pop. (1920) 66,083.

TERRELL, ter'el, Joseph Meriwether,

American politician: b. Greenville, Ga., 6 June 1861. He was admitted to the bar in February 1882, and in 1884 and 1886 was elected to the Georgia house of representatives. He was chosen United States Senator from Georgia in 1890, and was attorney-general for that State 1892-1900. He resigned in 1902 to accept the nomination for governor of Georgia, to which office he was elected in October of that year.

TERRELL, Tex., city in Kaufman County on the Texas Midland and the Texas and Pacific railroads, about 30 miles east of Dallas. It was settled in 1872 by Robert Terrell. It is an agricultural and stock-raising region, being one of the largest wagon cotton markets in the world. Chief manufacturing establishments are the Texas Midland Railroad shops, cottonseed- oil mills, cotton gins, cotton compresses, flour mills and factory for the manufacture of ladies' house dresses, sun bonnets and aprons. There is a large trade in wheat, oats, cotton, vegetables, fruits and livestock. The principal buildings are the North Texas Hospital for the Insane, schools, Carnegie Library, Elks Home, Federal building and city hall. There are eight churches. The educational institutions are the Texas Military College, a select train¬ ing school for boys with both cavalry and in¬ fantry drill; two high schools (one for white and one for negro students), graded and ward schools and one private primary school. Three banks, with a combined capital of $600,000. The city has commission form of government, with initiative, referendum and recall features and government in hands of commission of five, one from each of the three wards of the city and two from the city at large, the functions of mayor being invested in the chairman of the commission. Commissioners elected for two years, two being elected one year and three the next. Pop. 8,500.

TERRES MAUDITES. See La Barraca.

TERRESTRIAL, or CONTINENTAL, DEPOSITS, those laid down on land in con¬ trast to marine sediments laid down in the ocean. They may be alluvial, formed by rivers on flood plains; glacial, formed by glaciers; eolian, wind-blown material such as sand

dunes; or lacustrine, laid down in lakes. Ter¬ restrial deposits, like marine, may consist of gravels, sands and clays, forming conglomerates, sandstones and shales. Terrestrial limestones are rare, though they may form in swamps, or as wind-blown shell fragments, as the eolian limestones of Bermuda. Continental deposits are not likely to be as extensive or as regular in composition as marine beds, since the con¬ ditions under which they are formed are more variable. They are often marked by rain prints and sun cracks and by fossils of land plants and animals. See section on Sedimentary Rocks, in article on Rocks.

TERRESTRIAL MAGNETISM. See

Magnetism.

TERRIER, the name of several small breeds of dogs. Terriers were originally used for unearthing the fox and for killing fats and other vermin, and several kinds are still em¬ ployed in these and similar occupations. Some are good watch-dogs, and others are useful as retrievers. The most popular variety is the fox terrier, which came into fashion about 1863. It is generally white, with a smooth, dense, hard coat; its chest is deep and not broad; neck fairly long; nose black; ears small, V- shaped, pendulous. The maximum weight is about 20 pounds, and in accordance with a cruel practice the tail is frequently docked. There is also a wire-haired variety of the fox terrier. The bull terrier, for show purposes all white since 1860, is a larger animal produced by crossing a terrier with a bulldog. It has a long, tapering head, black nose, long and slightly arched neck, wide and deep chest, short, close, stiff, glossy coat and a comparatively short, tapering tail. The Boston terrier is a new and popular American breed, of great docility, kindness and quality. The Irish ter¬ rier, a trifle larger than the fox terrier, is of a reddish-yellow, wheaten or light-brown color inclining to gray, with a hard, wiry coat free from silkiness. Its chest is deep and medium wide ; head long and flat ; nose black ; ears V-shaped and pendulous ; neck long and slightly arched; and its tail usually docked and carried high. The Scotch terrier, a smaller ani¬ mal, has a rather short, wiry, very dense coat of various colors, such as steel-gray, brindle or grizzled, black, sandy and wheaten. It has a tapering muzzle, black nose, small, prick or half-prick, sharp-pointed ears, short thick neck, broad and deep chest, uncut tail carried high

with slight bend. The Skye terrier, the small¬ est of useful terriers, may be of any color. Its coat is double, the under part consisting of short, dose, soft hair, and the outer part of long, hard hairs, free from curl or crisp. It has a long head, black muzzle, prick or pen¬ dent ears, deep chest, long and gently crested neck and short legs, and its tail may be car¬ ried either high or low. The Clydesdale or Paisley terrier is a kind of prick-eared, silky- coated Skye terrier. One of the modern varie¬ ties is the Welsh terrier, about the size of the fox terrier, with a close, wiry coat of a black- and-tan or black, grizzle and tan color. There is also an English white terrier, not unlike a small bull terrier. The Dandie Dinmont is a favorite small one, of a pepper or mustard color, with a moderately long coat consisting

of hardish and soft hair mixed but without wiriness. Its large head is covered with soft, silky hair; nose black or dark; ears large and pendulous ; tail of moderate length, with a regular upward curve. The Bedlington terrier is a slightly larger form, somewhat similar to the Dandie Dinmont. The black-and-tan or Manchester terrier has the head long, flat, tapering; nose black; ears small, V-shaped, hanging; neck long and tapering; chest narrow and deep; tail of moderate length, tapering; coat close, smooth, short, glossy; color jet- black and mahogany tan in different parts. He was produced by long years of skilful selection by the Manchester mill-hands of Eng¬ land, and is one of the smartest, pluckiest ver¬ min-killers and most interesting pets on the list. The Schipperke resembles it, but is of German origin. One of the largest of the ter¬ riers is the Airedale, with pendulous ears, deep chest, high tail, hard and wiry coat, lying straight and close, and of a tan, black or dark grizzle color. The Yorkshire is the best known of the small top terriers. Consult Lee's (Modern Dogs) (1896) ; Huntington, (The Show Dog in America) (Providence 1901). See Dogs.

TERRIGENOUS, derived directly from the land, a term applied to those marine sedi¬ ments like sands and clays, which are of di¬ rect land origin, as contrasted with pelagic de¬ posits accumulating in the deep sea as the result of organic agencies, which extract their substance from solution in sea water. See sec¬ tion on Sedimentary Rocks in article on Rocks.

TERRITORIAL COURTS. See Court.

TERRITORIAL EXPANSION. See

United States — Territorial Expansion of the.

TERRITORIAL WATERS. See Inter¬ national Law.

TERRITORIES, in the United States, cer¬ tain parts of the national domain which have not been formed into States. Starting with 13 States it has been the policy of the United States in taking in new territory to require of the inhabitants evidences of fitness for self-government. This nation first added to its ter¬ ritory by the Louisiana Purchase, in 1803, 828,- 000 square miles. Florida and another terri¬ tory to the total of 72,000 square miles were annexed in 1819; Texas in 1845; Oregon in 1846; the Mexican cession in 1848; Gadsden Purchase (30,000 square miles) in 1853; Alaska (591,000 square miles) in 1867; the Hawaiian Islands in 1891 ; Philippines, Guam and Porto Rico in 1898 and later (about 125,000 square miles) ; the Panama Canal Zone (436 square miles) in 1904; the Danish West Indies (now the Virgin Islands) of 142 square miles in

1.

Of the above only the District of Columbia, Alaska and Hawaii are regarded technically as ˆterritories.® The others that have not been granted Statehood are held as ˆpossessions,® it having been decided by the United States Supreme Court in 1901, in the <(Insular Cases,® that Congress can create appropriate forms of government in regions outside the States and legislate differently for such possessions.

The Philippines are at present governed by

a commission of seven members appointed by the President. The commission is vested with the power of legislation and administration sub¬ ject to the veto power of Congress. As yet no legislature has been established but the act of Congress passed in June 1902, under which the Philippines are now governed, provides that within two years following the date of the enactment of the said law, if a state of pacifi¬ cation exists in the island, an election shall be held for members of a legislative assembly of which the upper house is to consist of the mem¬ bers of the Philippine Commission. As soon as this is done the powers of local legislation now exercised by the Philippine Commission will pass to the legislative assembly. As yet no great degree of local self-government is allowed nor are the islands represented at Washington either by a commissioner or dele¬ gate. The inhabitants are not citizens of the United States and the determination of their political and civil status is left to Congress. The Samoan Islands and Guam are governed by military and naval

governors, respectively. Of the unorganized domestic Territories Alaska has a governor, judiciary and other officers, ap¬ pointed by the President, but has neither legis¬ lature nor delegate in Congress. A measure of local self-government has recently been allowed incorporated towns of 300 inhabitants. The District of Columbia is governed by three com¬ missioners, two of whom are appointed by the President from civil life and the third is de¬ tailed from the engineer corps. They have general charge of the administration of the District, including the appointment of local officers. The law-making body, as in the case of Alaska and the Philippine Islands, is Con¬ gress, but the District has no delegate in the House of Representatives. Half the expense of governing is borne by the United States, the other half by residents.

Hawaii has obligated itself to incorporate the inhabitants into the American Union as soon as consistent with the principles of the Constitution. All the States thus far formed out of territory acquired from foreign nations except Texas and California have passed through the territorial stage. No general rule exists as to the period of pupilage through which the inchoate State shall be required to pass. In some instances, as in the case of Kan¬ sas, it has been as short as four years, while on the other hand Arizona and New Mexico after 60 years of territorial status were finally admitted as States. The nearest approach to a general rule is the requirement that the population of the Territory shall be as great as the ratio of representation in Congress, but this has often been disregarded, usually for po¬ litical reasons. Thus Nevada was admitted for political purposes when its population scarcely exceeded 20,000, while Utah was refused admis¬ sion long after its population exceeded the Congressional ratio. For a more detailed dis¬ cussion of this subject see the articles on each separate State and Territory.

TERROR, Mount, Antarctic Regions, a vol¬ canic mountain situated close to Mount Erebus (q.v.) on the coast of Victoria Land, in lat. 77° 30' S. and long. 167° E. Its height is 10,883 feet. It was discovered in 1841 by Sir James Ross and named after one of his ships.

TERROR, Reign of, the period of the French Revolution extending from the down¬ fall of the Girondists, June 1793, to that of Robespierre (q.v.), 27 July 1794. For an ac¬ count of it see France — History b.c. 58 to a.d.

1.

TERROR^ The White, the period of Bour- bonist reprisals at the second Restoration. (See Louis XVIII). It was so called from the white flag (le drapeau blanc) of the Royalists. An ((Edict of Amnesty® was published on 24 July 1815 but 57 were exempted from it — 19 to be tried by courts-martial on capital charges and 38 to be either exiled or brought to justice, as might be determined. In southern France there was rioting, assassination and pillage. This was especially true in Nismes and the sur¬ rounding region, where the victims were largely of the Reformed faith. The government was slow to intervene and the Allies were compelled to take matters into their own hands, a detach¬ ment of Austrian troops occupying the de¬ partment of the Gard. In other districts there were similar outbreaks. Consult Vaulabelle, (Histoire des Deux Restaurations) (1844 et seq.), and Daudet, L. M. E., <La Terreur Blanche* (1878).

TERRY, ter'i, Alfred Howe, American soldier: b. Hartford, Conn., 10 Nov. 1827; d. New Haven, 16 Dec. 1890. He was educated at Yale Law School and began practice in 1849. He had been a member of the State militia prior to the Civil War and at the call for vol¬ unteers he with his regiment, the 2d Connecti¬ cut, responded and was engaged in the battle of Bull Run. Being made a brigadier-general, he served in 1862-63 in the operations near Charleston. He commanded a corps in the Army of the James and fought at Chester Sta¬ tion, Drewry's Bluff and the siege of Peters¬ burg and was entrusted with the military part of the second attempt on Fort Fisher, Janu¬ ary 1865, co-operating with the admiral. The successful storming of the fort resulted in his being made a brigadier-general in the regular army. He captured Wilmington and was a de¬ partmental commander after the war. General Terry became major-general in 1886 and retired in 1888.

TERRY, Benjamin Stuytes, American edu¬ cator and historian : b. Saint Paul, Minn., 9 April 1857. He was educated at Colgate Uni¬ versity (A.B. 1878; A.M. 1881) and pursued theological studies at Hamilton and Rochester seminaries, resulting in his ordination as a Baptist minister 31 Aug. 1881. He occupied pulpits at Perry, N. Y. (1881-83) and at Fair- port, N. Y. (1883-85). From 1885 to 1892 he was professor of history at Colgate Uni¬ versity and took the degree of Ph.D. at Frei¬ burg in the latter year. Directly thereafter he assumed the chair of English history at the University of Chicago. He is member of several historical societies and author of many historical articles in standard magazines. His best-known books are (A History of England from the Earliest Times to the Death of Vic¬ toria *(1901) and (A History of England for Schools* (1903).

TERRY, Charles Sanford, British histori¬ cal writer: b. 1864. He was educated at Kings College school and Clare College, Cambridge, VOL. 26 — 29

graduating B.A. 1886, and M.A. 1891. He lectured in history in several noted schools and was professor in the University of Aberdeen in 1898-1903. He became a well-known writer and authority on historical subjects, his best known publications being (Life and Campaigns of Alexander Leslie, First Earl of Levin *(1899); (The Rising of 1745> (1900; new ed., 1903) ; (The Chevalier de Saint George) (1901) ; (The Oromwellian Union) (1902) ; <The Young Pretender* (1903) ; (John Graham of Claverhouse) (1905) ; (The Scottish Par¬ liament (1906) ; (Craig's De Unione,* trans. with notes (1909) ; (A Short History of Eu- rope) (3 vols., 1911-15) ; (Bach's Chorals) (2 vols., 1915) ; (The Army of the Solemn League and Covenant (2 vols., 1917). He also prepared catalogs of the publications of the Scottish historical clubs and an index of papers relating to Scotland.

TERRY, David S., American jurist: b. Todd County, Ky., 1823; d.. Lathrop, Cal., 14 Aug. 1889. He served in the Texan War against Mexico under Gen. Sam Houston and in the war between the United States and Mexico; went to Calaveras County on the discovery of gold in California; and after some experience in mining studied law and began practice in Stockton. Elected an associate-justice of the California State Supreme Court in 1855, he be¬ came chief justice in 1857. He strongly opposed the procedure oL the ((vigilance committee.® In 1859 he killed Senator D. C. Broderick in a duel near San Francisco. Broderick had been an uncompromising opponent of the extension of slavery, particularly in Kan¬ sas, had taken active part in the bitter Cali¬ fornia campaign of 1859 and in one of his speeches made certain strictures resulting in a challenge. After service in the Confederate army during the Civil War Terry resumed prac¬ tice in San Francisco.

TERRY, Ellen Alice, English actress : b. Coventry, Warwickshire, 27 Feb. 1848. Her parents were both actors and she made her first appearance at the age of eight, under the management of Mrs. Charles Kean at the Prin¬ cess Theatre, London. A little later she won high praise as the young Prince Arthur in (King John.* During the periods of 1860-63 and 1867-68 she acted with various stock com¬ panies, first appearing with Henry Irving in 1867, as Katherine to his Petruchio in (The Taming of the Shrewd She was married early in life to G. F. Watts, the painter, but the union was shortly dissolved, and she was married to E. A. Wardell in 1864, and again on 3 May 1907 to James Carew. She was absent from the stage 1868-74 and in 1875

won her first great success as Portia in a revival of (The Mer¬ chant of Venice> at the old Prince of Wales Theatre. This she shortly followed with the title role in W. G. Will's play, (Oliviaˆ the result being that Henry Irving made her his leading lady and the long artistic partnership at the Lyceum Theatre was commenced. Some of her impersonations at the Lyceum have been Ophelia, Portia, Desdemona, Juliet, Beatrice, Lady Macbeth, Cordelia, Margaret in Will's <Faust,) the Queen in Will's (Charles V Pauline in (The Lady of Lyons, * etc. In com¬ pany with Irving she has several times visited

(he United States and has been invariably suc¬ cessful. While still with Irving she joined Mrs. Kendal and Beerbohm Tree in a revival of (The Merry Wives of Windsor) at Her Majesty's Theatre in 1902. She was honored by a jubilee performance at Drury Lane The¬ atre, London, in 1906. She published (The Rus¬ sian Ballet *(1913). Consult her autobiography, (Story of My Life* (New York 1908).

TERRY, Henry Taylor, American lawyer: b. Hartford, Conn., 19 Sept. 1847. He was graduated from Yale in 1869 and was admitted to the bar in 1872. In 1878 he became professor of law at the Imperial University, Tokio, Japan, but returned to New York in 1884 and re¬ sumed practice the following year. In 1894 he again went to Japan and resumed his former position of professor of law. In 1912 he re¬ signed his professorship and was made pro¬ fessor emeritus. He returned to the United States but did not resume active pratice. He is the author of (First Principles of Law) '(Tokio 1879) ; (Leading Principles of Anglo-American Law) (Philadelphia 1884) ; (The Common Law) (Tokio 1895), besides vari¬ ous articles in American and English legal jour¬ nals. He received decorations from the em¬ peror of Japan, the Order of the Sacred Treas¬ ure (II) and of the Rising Sun (III).

TERRY, Milton Spenser, Episcopal cler¬ gyman : b. Coeymans, N. Y., 22 Feb. 1840; d. 1914. He was educated at the Charlotteville Seminary and at the Yale Divinity School. He held various pastorates near New York be¬ tween 1863 and 1884 when he was made head of the department of Hebrew and Old Testa¬ ment exegesis and professor of Christian doc¬ trine in the Garrett Biblical Institute at Evanston, Ill. Wesleyan University gave him the degree of S.T.D. in 1879; in 1871 he was made a member of the American Oriental So¬ ciety and in 1883 of the Society of Biblical Literature and Exegesis. In

1881 he published (Man's Antiquity and 'Language, > which was followed by a number of scholarly publications in steady succession, notably (Biblical Her¬ meneutics *(1883) ; (Sibylline Oracles) (1890) ; (The New Apologetic (1892) ; (Biblical Apocolyphics) (1898); (Moses and the Proph- ets> (1901) ; (The New and Living Way* (1904); (The Mediation of Jesus Christ *(1902) ; (The Primer of Christian Doctrine1* (1906); (Biblical Dogmatics *(1907); (The Shinto Cult* (1910) ; (Baccalaureate Sermons and Addresses* (1914). He also published sev¬ eral Biblical commentaries.

TERTIARIES, ter'shi-a-riz, members of the Third Order of various religious societies in the Roman Catholic Church. They are gen¬ erally lay members of religious orders who follow ordinary avocations and duties in their communities, yet participate in certain work of a given order. Shortly after the institution of the Franciscan Order by Saint Francis of Assisi in the beginning of the 13th century, numbers of lay people were affiliated with the Franciscans under certain rules and restrictions, which bound them more systematically to a life of penance and devotion than ordinary per¬ sons living in the world. In the course of time many of these Tertiaries desired to take solemn vows, live in community and still follow the

regulations of the Third Order. In this way rose various Tertiary congregations, which gradually united under the one government. Benedict XIII in the beginning of the 18th cen¬ tury recognized these Tertiary congregations and the laity affiliated with them as (<a true and proper order, uniting in one seculars scattered all over the world and regulars living in com¬ munity.** Leo XIII recommended the Third Order in an especial manner to the faithful throughout the world, as a means of personal sanctification to be embraced by lay people who desired to lead a more devout life.

The Dominicans also had their Tertiaries, instituted by Saint Dominic himself, though in what year is uncertain. It was known as the Military Order of Christ, originally composed of knights and noblemen, whose duty it was to wage war against heretics. After the death of the founder this became the order of the penitents of Saint Dominic, for both sexes, and constituted the third order of Dominicans. These Tertiarians, without making any solemn vows, had the assurance of great spiritual priv¬ ileges through the observance of a few fasts and prayers; they continued, also, in the enjoy¬ ment of their civil and domestic relations. Some few companies of Dominican sisters of the Third Order, particularly in Italy, united in a monastic life, and became regular nuns ; the most celebrated of whom is Saint Catharine of Sienna. Other religious orders after the ex¬ ample of the

Franciscans and Dominicans also established tertiary affiliations ; the Augustinian hermits in the beginning of the 15th century, and later on the Minims, the Servites, the Carmelites and the Trappists. At the present time there are numbers of the laity throughout the world affiliated with the third orders and observing their regulations while still following their secular vocations in the world. See Dominicans.

TERTIARY PERIOD, the space of time, geologically considered, immediately preceding the present, and occupying the earlier and larger part of the Cenozoic era; also the rock system then formed. It is preceded by the Cretaceous. Tertiary strata were at first con¬ founded with the superficial alluviums of Europe and it was long before their real char¬ acters were realized. They occur most gen¬ erally in patches, — some of them of marine origin, others of fresh-water or of continental derivation. Rocks of this age were first de¬ scribed by Cuvier and Bronginart in 1810 from the Paris Basin, where they are well developed and highly fossiliferous. The shells found in these deposits were recognized as different from those of the modern time, though related to them, while the bones of quadrupeds were found to be of extinct species. Similar strata from many other parts of Europe were subsequently found. Those of Italy were found in low hills flanking the Apennines on b<pth sides from the plains of the Po to Calabria and called by Basterot, who. studied them, the Subapennines. The fossils of these beds were of a more modern type than those of Paris or London. In the neighborhood of Bordeaux, in the south of France, another series of Tertiary strata were discovered and described by M. de Basterot in 1825. The several hundred species of shells described from these beds were found to differ

mostly from those of the Paris Basin and those of the Subapennines, and to possess an inter¬ mediate character between the two. Subse¬ quently it was found that strata contemporane¬ ous with those of Bordeaux overlie the Parisian formation in the valley of the Loire, and under¬ lie the Subapennine beds in Piedmont.

In 1828 and 1829 Lyell conceived the idea that the Tertiary beds might be subdivided ac¬ cording to the percentage of living species in each. For this purpose, he and M. Deshayes, a well-known French conchologist, compared some 3,000 Tertiary with about 5,000 living species. The result arrived at was, that in the lower strata, or those of London and Paris, there were about 3ˆ4 per cent of recent species, in

the middle Tertiary of the Loire, Bordeaux, etc., about 17 per cent of recent species and in the upper Subapennine Tertiary from 35 to 50 per cent of living species. These results were published in 1833. In formations still more modern, which Lyell studied in Sicily, where they attain a vast thickness, the per¬ centage of living species was found to be 90 or 95. To these four series Lyell applied the names Eocene, Miocene, Older Pliocene and Newer Pliocene. A still later formation (Post- Tertiary) was called Pleistocene, in which the shells were all of recent types, but the mam¬ mals partly of extinct species. The most im¬ portant recent modification of this nomenclature has been the introduction of the term Oligocene by Beyrish to include strata formerly classed partly as Upper Eocene and partly as Lower Miocene. The generally recognized divisions from the base up are now given as Eocene Oligo¬ cene, Miocene and Pliocene. At present much less stress is laid upon the numerical method of subdivision employed by Lyell and Deshayes. As the various deposits of the typical Tertiary beds of Paris, London, the Loire Basin and the Subapennine series became well known, a standard of comparison became established, by which similar deposits of other regions could be determined. This is the method employed to-day in deciding to which division a given deposit should belong.

The general characteristics of geography, vegetation and animal life of the Tertiary were similar to those of the present time, but land areas were of less extent and were more largely occupied by interior fresh-water basins. The climate of the early Tertiary was evidently warmer and more moist than that of the period following it, types of plants now strictly tropi¬ cal then covering areas now under Arctic latitudes and influences. In the United States the Atlantic and Gulf costal plain under¬ went repeated submergence and emergence. During the first half of the period, the site of the Pacific Coast Ranges was largely under water, but in mid-Tertiary the Coast Ranges were upheaved, and the coast line took nearly its present form. The great western interior had undergone upheaval at the close of the pre¬ ceding period (Cretaceous) in the formation of the Rocky Mountains. During Tertiary these underwent extensive erosion, building, on the great plains and in the intermontane basins, fairly thick beds of terrestrial gravel, sand and clay. A few lake deposits were also formed. Volcanoes were active during much of the period, from the Rocky Mountains westward, forming thick beds of ash and very extensive

lava flows, as on the Columbia Plateau in Oregon and Washington. Marine Tertiary beds are found on the Atlantic and Pacific coasts. The most important of these are the strata of the Atlantic coastal plain with its expansion in the Gulf of Mexico. On the Atlantic Coast the

Eocene beds are mostly clays and greensands which rest unconformably upon the Cretaceous strata and are unconform¬ ably overlain by the Miocene beds. All of these beds are highly fossiliferous, shells predomi¬ nating. In the Miocene is a great bed of diatomaceous earth (q.v.) from 200 to 300 feet thick. In South Carolina, Pliocene beds make their appearance. No Oligocene strata are known from the Atlantic Coast. On the Gulf Coast the Eocene is well represented and rests upon the Cretaceous. It consists mainly of marls, greensands, clays and sands. Both Oligocene and Miocene are represented on the Gulf Coast. The Oligocene is characterized by a warm-water or subtropical fauna. The Mio¬ cene beds of the Gulf States represent the ad¬ vent of the colder water fauna from the North. Pliocene beds of the age of those formed in South Carolina are extensively developed in Florida.

Tertiary deposits are well developed in the interior of the United States between the Mis¬ sissippi River and the Rocky Mountains. They consist of non-marine strata, partly lacustrine, partly eolian and partly made up of wash from the mountain sides in the form of coarse alluvial cones or fans. In these deposits nu¬ merous bones of extinct mammalia are found, of which extensive collections have been gath¬ ered in the various museums of the country, particularly in the American Museum of Natu¬ ral History in New York. Most of the deposits are in isolated basins, and can only be correlated by their vertebrate fauna. On the Pacific Coast, all the epochs of the Tertiary are represented, being in part marine, in part terrestrial.

Life of the Tertiary. — At the close of the Cretaceous period all the flying reptiles and dinosaurs, and most of the marine reptiles, seem to have become extinct; and the Tertiary formations, so far as known, yield only forms of Vertebrata essentially similar to those of the present day. Among fishes, all of the ex¬ isting suborders and many of the existing families or even genera seem to occur in the Eocene. Among the invertebrates, ammonites, belemnites and most of the crinoids had passed away when the Tertiary era began; and forms came in, whose descendants are now familiar to us. The Mammalia suddenly appeared as the dominant type on all the continents and the evolution of many of the minor groups can be traced. Primitive tapirs and primitive horses, with four toes (Orohippus and Eohippus) oc¬ cur. Among the Oligocene mammals may be mentioned the Mesohippus, or horse with only three functional toes. The peculiar Oreodon occurs in beds above the Titanotherium and represents a type intermediate between hog and deer in structure. Early camels, the ear¬ liest true carnivores, early bats, squirrels and rodents and marsupials also occur in these beds. Miohippus, a still more modified

horse, occurs in the John Day and the Deep River beds; in the latter also occurs the oldest mastodon. In the Loup Fork beds occur Procamelus, Mastodon and dogs of the genus Cams. Con-

suit Dana, ˆManual of Geology) (New York 1895) ; Zittell, (Textbook of Paleontology) (New York 1900-04) ; Cope, (Vertebrata of the Tertiary Formations of the West> (Wash¬ ington 1884) ; Williams, (Geological Biology5 (New York 1895) ; Woodward, (Vertebrate Palaeontology5 (London 1898, which contains an extensive bibliography). See Cenozoic Era; Chesapeake Stage; Claiborne Stage; Eocene; Miocene.

Charles Laurence Dake.

TERTIUS GAUDENS (Lat), a diplo¬ matic phrase meaning a mischief-maker; a third party who rejoices while two others are quarreling and hopes to profit by their dis¬ sensions.

TERTULLIAN (Quintus Septimius Florens Tertullianus), ecclesiastical writer: b. Carthage, c. 160; d. c. 250. The son of a pagan centurion in the proconsular service, he re¬ ceived a fine literary education and became as conversant with Greek as with Latin. He studied law and probably practised it, his writings disclosing intimate knowledge with juristic terms and methods. In early man¬ hood (not later than the year 197) he was con¬ verted to Christianity by the admirable cour¬ age of the martyrs, although the precise date is not known. He was married, but this did not prevent him from being ordained priest, prob¬ ably of the church at Carthage. About the middle of his career he publicly joined the Montanists and the vigor which he had dis¬ played in defense of the faith against paganism was then displayed against the Church. Saint Jerome mentions certain affronts of the Roman clergy which may have provoked the fall of the great apologist. Since Tertullian was of a fiery nature, extreme and inclined to rigorism, the new prophecy (as Montanism was styled) with its severity in morals and in discipline had a natural and powerful attraction for him. But his restless spirit could not long be satis¬ fied with Montanism and he became the leader of a separate sect, called after him Tertullian- ists. Tertullian was the most fecund, original and powerful genius in all the history of Christian Latin literature, which he in fact cre¬ ated. Nearly all of his works are of a polemic character and this brings out strikingly his penetrating intelligence, vast

knowledge and inspiring eloquence. His style is energetic and concise, sometimes at the expense of clearness. Saint Jerome says that he is full of ideas but difficult to read. However, his works were seldom quoted until after the 16th century renaissance. It is not easy to draw a hard and fast line between Tertullian's Catholic and Montanistic works. To the years 197-198 be¬ long the apologetic writings (Ad nationes) (2 books), (Apologeticum,5 (Ad martyres,5 (De testimonio animae) and (Adversus Judaeos.5 Other works of approximately the same pe¬ riod, but of less certain date, are (De prsescrip- tione haereticorum,5 (De oratione,5 (De bap- tismo,5 (De pcenitentia,5 (De spectaculis,5 (De cultu feminarum/ (2 books), (De idololatria,5 (De patientia5 and (Ad uxorem) (2 books). The Montanistic writings, including those tinged with Montanism as well as those wholeheartedly Mon¬ tanistic, are (De corona militis, } (De fuga in persecutions, 5 (De exhortatione castitatis,5 (De yirginibus velandis,5 ˆdversus Hermogenem,5

(Adversus Valentinianos,5 (Adversus Marci- onem) (5 books), (De animal (De carne Christi,5 (De resurrectione carnis,5 (Adversus Praxean,5 (De pallio,5 (De pudicitia,5 (De monogamia,5 (Scorpiace,5 (De jejunio) and (Ad Scapulam.5 Tertullian's (Apologeticum,) ad¬ dressed about the year 197 to the governors of the provinces of the empire in favor of the Christians, if not the first of the Latin apolo¬ gies in point of time (see Felix, Marcus Min- ucius), is one of the first in the importance of its subject and its literary beauty. Some im¬ portant works of Tertullian have been lost, notably the lengthy Montanistic work (De ex- stasi.5 The Vienna (Corpus script, eccl. lat. > contains an edition of Tertullian's works and the (Ante-Nicene Library) contains translations of nearly all of his works.

Bibliography. — The patrologies of Barden- hewer and others and the bibliography of Chevalier; D'Ales, (La theologie de Tertullien5 (Paris 1905) ; Monceaux, (Histoire litteraire de l'Afrique chretienne5 (Vol. I, Paris 1901) ; Turmel, (Tertullien) (Paris 1905) ; Hoppe, (Syntax und Stil deis Tertullian) (Leipzig 1903) ; Fuller, John Mee, tertullianus5 (in Smith and Wace's (A Dictionary of Christian Biography,5 Vol. IV, London 1887).

Herbert F. Wright,

Sometime of the Department of Latin , Cath¬ olic University of America.

TESLA, tez'la, Nicola: b. in Smiljan, Lika, then in Austrian Croatia, in 1857 ; early education in Gospich ; graduated from Real Schule, Karlstadt, in 1873 ; studied at Poly¬ technic School, Gratz, capital of

Croatia, with the intention of becoming a professor of mathe¬ matics and physics, but became interested in electricity and took up and completed an engi¬ neering course. He afterward studied phi¬ losophy and languages at Prague and Buda¬ pest, keeping up meantime his electrical and engineering studies. For some time he was employed in the government telegraph engineer¬ ing department as an assistant and while there invented several improvements which attracted notice. Then he became engineer for a large lighting company in Paris and next turned his attention to the United States as a promising field for electrical talent and experience. Here he formed a connection with the Edison Com¬ pany at Orange, N. J., but gave up this engage¬ ment in order to be entirely free in his electrical work. He has made himself well known by his many practical inventions and the boldness and brilliancy of his ideas as to the possibilities of electrical science. These ideas, which have aroused widespread interest, have also in some degree diverted attention from the many useful contributions of Tesla to the world's fund of scientific achievement, most of which have been developed in the Tesla laboratory in New York, which he established for the purpose of inde¬ pendent electrical research.

Tesla's researches in electrical oscillation created a new field of electrical investigation, the full possibilities of which have by no means been exhausted. He was the first electrician to conceive an effective method of utilizing the undulating current, converting electrical into mechanical energy more simply, effectively and economically than by the direct current. He invented the modern principle of the rotary

magnetic field, embodied in the apparatus used in the transmission of power from Niagara Falls. He has also invented many new forms of dynamos, transformers, induction coils, con¬ densers, arc and incandescent lamps, the oscil¬ lator combining steam-engine and dynamo, etc. Consult Martin, T. C., inventions, Researches and Writings of Nicola Tesla) (1894) and the files of electrical trade journals.

TESORETTO. See Treasury, The Little.

TESS OF THE D'URBERVILLES, the

best known of the novels of Thomas Hardy, was published in 1891. The sub-title, <(A Pure Woman Faithfully Presented,® explains Hardy's thesis. Though technically guilty of an of¬ fense against society and ultimately hanged for the murder of her seducer, the heroine, Tess, is represented throughout as the victim of circumstance or, more exactly and more characteristically of the author, as the victim of a constant and malignant fate. This is per¬ sonified in the brutal and emotional Aiec D'Urberville, but it is also quite as destructive in the egoistic temperament of her husband, Angel Clare. The main point appears in the oft-quoted phrase in the last paragraph of the book, ˆJustice? was done and the President of the Immortals (in vEschylean phrase) had ended his sport with Tess.® The tragedy, as in all of Hardy's more sombre stories, is in¬ tense and powerful. As in the best of the author's novels, there is the usual fully and delicately drawn background of local scenery and custom. The characters are carefully drawn and are vivid portraits of local types and individuals. The novel is rich in rural and farming scenes, of which the description in the second of the seven ˆphases® of the book is extraordinarily skilful and beautiful. On pub¬ lication, (Tess of the D'Urbervilles) attracted a great deal of attention by reason of its sub¬ ject, the treatment of which was thought to be over frank and too searching an attack on conventions, but the literary and poetical skill of the author has been never better displayed than in the descriptions of customs, life and character.

William T. Brewster.

TEST-PAPER, slips of unsized paper soaked in solutions of vegetable coloring mat¬ ters, used as. indicators of the presence of acids or of alkalis, and, in some instances, of special chemical compounds. The most common test- paper are litmus and turmeric papers ; the former papers are colored with an aqueous solution of a blue substance obtained from various species of lichens, the latter with a solution in spirit of a yellow powder obtained by grinding the roots of a species of Curcuma cultivated in India and Java. Blue litmus is reddened by acids, the blue color being again restored by alkalis ; turmeric is turned brown by alkalis. There are also pheno-phthalein and amido-benzol paper, which cannot be classed as vegetable coloring matters, though organic, while the use of papers soaked in inorganic compounds is not infrequent in analytical laboratories.

TESTAMENT. See Bible.

TESTICLE, one of the two genital glands of the male in which the spermatozoa and some other of the constituents of the semen are

formed; a testis. The term is also applied to either of the posterior tubercles of the optic lobes or corpora quadrigemina. The testicle proper lies in the scrotum, is of an oval form and is mostly invested with a pouch or closed sac of serous membrane, the tunica vaginalis, derived from the peritoneum during the descent of the gland from the abdomen into the scrotum. The organ consists of a central por¬ tion or body, an upper enlarged extremity, the globus major or head, and a lower extremity, the globus minor or tail. Lying upon the pos¬ terior border of the testicle is a long narrow flattened body, the epididymis. To this border is attached the spermatic cord, composed of arteries, veins, lymphatics and nerves, con¬ nected together by areolar tissues and invested with fasciae. This cord ends in the internal abdominal ring. It is accompanied by the vas deferens, the excretory duct of the testis (a continuation of the epididymis), which passes through the ring into the pelvis to the base of the bladder, where it unites with the duct of the vesicula seminalis to form the ejaculatory duct, which terminates in a slit-like orifice in the prostatic portion of the urethra. Underneath the tunica vaginalis is the tunica albuginea, or fibrous covering of the testicle, and beneath this coat is the tunica vasculosa, or vascular tunic, composed of a plexus of blood vessels held together by delicate areolar tissue. The glandu¬ lar structure of the testis consists of from 250 to 400 lobules, each composed of from one to three or more minute convoluted tubes, the tubuli seminiferi. These tubules unite into larger tubes, which carry the seminal fluid from the testis to the epididymis.

The testicle is subject to hypertrophy, atrophy, injuries, acute or chronic inflammation, cystic diseases, fibroma, malignant disease and neuralgia. Inflammation of the testicle (or¬ chitis), as that of the epididymis (epididymitis, q.v.), is usually attended with much pain and swelling and a feeling of weight and great dis¬ comfort. The use of a properly fitting sus¬ pensory bandage affords much relief ; but the treatment of diseases or disorders of the testicle should be entrusted to a physician. (See also Spermatozoa). The removal of both testicles renders a man impotent — a eunuch. Castra¬ tion is the surgical operation of removing the testicles, and is performed on horses, steers, etc., to render them more docile and tractable. It is generally recognized that castration re¬ duces the will power and interferes with various brain functions.

TESTIMONY, in general, the evidence

given by a witness orally in a legal proceeding; from the Latin testimonium (testimony) ; testis, a witness. It may be secured during a trial in court, or before a duly authorized com¬ mission. Although

commonly so used ((testi- mony® is not synonymous with ((evidence® which is of broader significance and may in¬ clude papers marked in a proceeding. Testi¬ mony is usually deduced through questions asked directly by counsel which may be fol¬ lowed by cross-examination and redirect ex¬ amining. (See Evidence). Consult Wellman, F., (The Art of Cross-Examining) (New York 1903) ; Wrottesley, F., (The Examination of Witnesses in Court* (London 1910, rev. cd.).

TESTIMONY, Psychology of. Applied

psychology recognizes three groups of problems bearing on certain evidence in law. These deal with the report of a witness; the possibility of learning if he is concealing important facts; and the mental condition of the accused. Both lawyers and judges understand that differences in evidence given when both perception and memory are concerned do not necessarily imply dishonesty. Psychology shows that individual differences may be expected and that by care¬ fully comparing the effect of such differences a fair amount of accuracy may be attained. By carefully questioning observers of an enacted scene it has been found that errorless reports are an exception, that a narrative form gives greater accuracy and that both range and ac¬ curacy in reporting increase with practice and may be thus made nearly perfect. The “reac¬ tion® experiment has given excellent results but still lacks perfection. If it is desired to learn whether the mind of a witness or accused person is normal, the usual mental tests may be applied with good success. See Crimin¬ ology. Consult Gross, H., (Criminal Psy- chology) (Boston 1911); Jung, C. J., (The Association Method) (in American Journal of Psychology, Vol. XXI, Worcester 1910) ; Munsterberg, H., (On the Witness Stand* (New York 1908) ; id., Psychology, General and Applied> (New York 1914) ; Whipple, G. M., (The Observer as Reported (in Psycho¬ logical Bulletin, Vol. VI, Baltimore 1909).

TESTING, in chemistry. See Analysis.

TESTING MACHINES. Testing ma¬ chines are employed to determine the physical properties of metals, and other materials such as cement, used for engineering and structural purposes. They are used especially in the test¬ ing of steel. The prime requisite of a material to be used in engineering operations is the property termed “strength,® which is its

capa¬ bility to withstand the action of forces that might be applied to it in various ways so as to produce tensile, compressive, bending, shear¬ ing and twisting strains. Very often the force applied is a combination of two or more of these strains or stresses, and the metal is called to withstand also the effects of abrasion or wear. Physical tests are of two general classes — those made to determine the suitability of a grade of material for a particular purpose, and those by which the effects of differences in chemical composition, and different methods of manufacture, on the properties of the material, are studied scientifically.

The most satisfactory method that may be employed for this purpose is to actually load a specimen of the material under test and gradually increase that load up to the breaking weight, and observe the effects thus produced. Such a method, however, is too slow and cumbersome, since the loads required for even the simplest commercial tests are very seldom less than 50,000 pounds, and loads ranging from 150,000 to 250,000 pounds are commonly used, and make the direct application of weight impracticable in most cases. Therefore, various machines have been devised by which any load, from the small¬ est that will perceptibly affect the specimen, up to the breaking load, may be readily applied and its weight accurately determined.

Of these three are two general types — those

by which the specimen is loaded by means of a hydraulic press, and those employing a screw generally combined with a train of gearing.

The most perfect testing machine, for straining, rupturing or crushing pieces of metal, without injury to the machine, while exactly measuring or weighing the strains, is the Emery testing machine, which has frictionless hydrau¬ lic weighing heads, and is large and expansive of construction. It is used for government tests of important materials. Its disadvantages are due to the difficulty of keeping the heads filled with a suitable liquid, the difficulty of keeping the packing of the plungers in good order and the intermittent application of the load by the strokes of the pump.

In both types the load is applied in such a way that it acts through some form of weighing machine which enables the operator to deter¬ mine instantly the weight of the load or the amount of the force being applied.

The general construction of the screw ma¬ chine is shown by the accompanying illustration of the Riehle machine, which may be

readily used to subject a suitable specimen to any one of the three classes of strains — direct tension, direct compression and the transverse or bend¬ ing, so that the weight of the load can be ac¬ curately determined.

Riehl6 Testing Machine.

Referring to the illustration, the operation of the machine may be described as follows : The sliding head (a) may be moved up or down by the two screws (bb) which are operated by power derived from any convenient source and transmitted by belts on the pulleys (cc). These pulleys are loose on their shafts, and being pro¬ vided with a cross belt on one and an open belt on the other rotate in opposite directions. The lever (d) actuates friction clutches which con¬ nect either of the pulleys with its shaft, so that the motion is communicated to the screws by gearing and thus raises or lowers the sliding head (a). By using the lever (e) and the hand wheel (f), the gears may be so combined as to give various speeds to the sliding head (a) as may be required in different classes of tests. The stationary head (g) is supported by col¬ umns (hh) which rest upon the platform (k) of the scale. The weighing beam (1) of the scale carries a movable counterpoise (m) which works on rollers along the beam. A hand wheel (n) operates a screw or chain which lies along the top of the beam and enables the operator tc

move the poise out along the beam gradually as the load is increased and thus observe con¬ stantly the weight of the load being applied. In some cases the poise may be arranged to be moved automatically by means of gearing op¬ erated by electrical connections, the circuit be¬ ing made or broken by the action of the beam as it rises or falls.

In making a tensile test, the specimen is held between two pairs of jaws, one in each of the heads (a) and (g), as shown at (t). The head (a) is then drawn down by the screws, and the pull on the specimen presses the stand¬ ards of the head (g) down upon the platform of the scales and causes the weighing beam to rise. In a compression test, the specimen is placed upon the platform of the scale and the sliding head is drawn down upon it. In a transverse or •bending test, the specimen is placed on two supports carried by a heavy frame which is placed upon the platform of the scale, and the load is applied by means of a projection on the under side of the sliding head which presses upon

the centre of the specimen when the head is drawn down.

Another machine of the screw type in exten¬ sive use is that built by Tinius Olsen. It is similar in principle to the Riehle, but it employs four screws to operate the sliding head.

These machines are not only used to test metal specimens, but may also be used to test wood, cement and other classes of building ma¬ terial. In testing cement, small briquets of the material are made with a predetermined cross- sectional area at the centre and are then sub¬ jected to the tests as any other specimen.

In the testing of metals, the tensile test gives the simplest and most reliable data ’for deter¬ mining the properties of the greatest interest in engineering operations.

TESTUDINATA, an order or sub-class of Reptilia (q.v.) containing the turtles or tor¬ toises. See Chelonia.

TESTUDO, among the ancient Romans a cover or screen which a body of troops formed with their oblong shields, by holding them over their heads when standing close to each other. This cover somewhat resembled the back of a tortoise, and served to shelter the men from missiles thrown from above. The name was also given to a structure movable on wheels or rollers for protecting sappers in under¬ mining the defenses of an enemy.

TETANUS, a disease characterized by spasm of some or all of the voluntary muscles. The spasms vary in rigidity, and strong ex¬ acerbations attend their recurrence. Tetanus is a true toxaemia, and occurs in several varie¬ ties, the most familiar of which is lockjaw (trimus), whence it is commonly called by this name. The disease in all its forms (tetanus ne¬ onatorum, puerperal tetanus, idiopathic, trau¬ matic and rheumatic tetanus) is caused by the tetanus bacillus, which was discovered by Nicolaier in 1884. Kitasato cultivated it in 1889. The bacillus is a slender rod, round- ended, existing in surface soil, dust, manure, etc., and as a rule occurring singly except in cultures. It lodges in some wound, often a slight and unnoticed wound, and the produc¬ tion of the disease is always a proof of its presence. Except in rare instances, the bacil¬ lus does not pass beyond the point of infection

into the body. The reai nature of the tetanus poison has not yet been determined, but its virulence is deadly in the extreme, and it is rapidly absorbed -by the body in which it has found lodgment. It is carried

through the body in the blood.

In milder cases the spasm of tetanus may be localized in certain muscles. Various the¬ ories regarding the action of the poison have been held by pathologists and the satisfactory explanation is still being sought by specialists in bacteriology and toxicology. Following childbirth, tetanus may infect both mother and child, and the average death rate from this disease, always high, is especially so among children. Surgical operations are sometimes fol¬ lowed by tetanus, but antiseptic surgery has doubtless lessened its frequency, and among diseases it is regarded as rare. Within about 10 days after an injury resulting in the infec¬ tion, it sets in, the muscles at the back of the neck and those of mastication being usually first affected. The patient can neither masti¬ cate nor freely open his mouth. Often the progress to general rigidity of the muscles is very rapid, and convulsions of extreme vio¬ lence ensue. Respiration is arrested, and death is often caused by this suspension. In other cases it results from spasm of the glottis, or from exhaustion produced by the violence of spasms.

There is no satisfactory treatment of tet¬ anus, but such as physicians adopt is both local and general. Nothing is more important than careful cleansing of wounds, however slight, for precautionary purposes. Antitoxic disin¬ fectants must be used, capable of destroying the poison produced by the bacilli as well as the bacilli themselves. Iodine solutions should be thoroughly applied to every tetanus wound. Potassium bromide, chloral, calabar bean, mor¬ phine and antimony produce good results, and opium and chloroform are employed for their quieting effects. Amputation is sometimes re¬ sorted to. Increase of fluids in the body by drinking or by intravenous injection, and cor¬ responding increase of diuresis aid in elimi¬ nating the poison. Antitoxin serum (see Serum Therapy), prepared from the blood of the immunized horse, has proved a true remedy for tetanus, and many cures have been affected by its early administration. Preventive meth¬ ods, especially those of inoculation, are now receiving the earnest attention of specialists. Consult Wallace, (Indian Medical Record' (1891) ; Roux, (Annales de l'lnstitut Pasteur' (1893); Bassano, (Recherches experimentales sur l'origine microbienne du Tetanos' (1900) ; Moschcowitz, "Tetanus" in (Annals of. Sur¬ gery' (1900), Osier, W., (Annals of Medicine' (New York 1915).

TETON MOUNTAINS, Wyoming, a very high and rugged granite range on the west side of Jackson Hole south of Yellowstone Park in the northwestern part of the State. The highest peak. Grand Teton, is 13,747 feet above sea-level. It is 17 feet higher than Fre¬ mont Peak and 38 feet lower than Gannett Peak of the Wind River range, the

latter the highest point in Wyoming and the northern Rocky Mountain region.

TETRACHORD, in music, a scale-series of four notes. The word in its present use

signifies a half of the octave scale. The fun¬ damental system in ancient music was the tetra- chord, or system of four sounds, of which the extremes were at the interval of a fourth. It was superseded by the hexachord. See Music.

TETRADYMITE, a native bismuth tellu- ride, often containing some sulphur and a trace of selenium. It occurs in pale steel-gray, me¬ tallic, foliated masses, in scales or more rarely in small rhombohedral crystals. It is soft enough to mark paper, its hardness being 1.5 to 2; while its specific gravity is high, 7.2 to 7.6. It occurs in Austria, Sweden and various localities in Virginia, North and South Caro¬ lina, Georgia, Arizona and Montana. It is also called telluric bismuth.

TETRAGRAMMATON, a Greek term meaning (<the word of four letters,® and ap¬ plied to the sacred Hebrew name of the Deity. It was considered improper to pronounce the divine name, and, therefore, an abbreviation of four letters was substituted, the most fa¬ vored being <(Y H W H,® which occurs 5,989 times in the Masoretic text of the Bible. The true name of God was uttered by the ancient Jewish priests only during worship in the temple. On the day of atonement the service required the high priest to pronounce it 10 times; but it was held to be impious to pronounce the sacred name promiscuously, hence this tetra- grammaton ('Y H W H® came to be pronounced by readers as Ya be, Iabe, Yave, Yahn, Iae, Yah, etc. For some reason it also became cus¬ tomary in reading aloud to say <(Adonai® when the four letters occurred and this led to the substitution of Adonai for Y H W H. Ac¬ cording to the best authority it should be pro¬ nounced as if written <(Yahweh.® The letters of the tetragrammaton were made use of in various magic rites. Several illuminating arti¬ cles on the names of God will be found in the Jewish Encyclopedia. Consult also Her- zog-Hauck, (Real-Encyclopadie) (Vol. VIII) ; Jacob, (Im Namen Gottes) (Berlin 1903). Hence applied to other words of four letters expressive of a Godhead.

TETRAHEDRITE, or GRAY COPPER,

a common and valuable ore of copper and silver. It is essentially a copper sulphantimon- ite, differing from tennantite into which it passes by insensible gradations only in the pre¬ ponderance of antimony instead of the arsenic which distinguishes the latter. Its color and streak are usually steel gray; it often has a brilliant metallic lustre; its hardness varies widely from 3 to 4.5 ; its specific gravity is also quite variable, being from 4.6 to 5.1 in ordinary tetrahedrite, 4.5 to 5 in the argentifer¬ ous varieties (freibergite), 4.7 to 5.03 in the mercurial varieties (schwatzite). It crystal¬ lizes in the isometric system and owes its name to the fact that its crystals are invariably of tetrahedral habit. It occurs in fine specimens at many localities in Austria, Germany, Eng¬ land and Colorado, and is very widely dis¬ tributed in massive form in copper and silver mines all over the world.

TETRARCH, tet'rark or te'trark (Greek tctrarches), a term which meant the ruler of one-fourth of a country, but which was applied by the Romans to subordinate princes with

small territories, especially in Palestine and other parts of Syria in the early years of Christianity. The two sons of Herod the Great, Philip and Herod Antipas, who received the lesser shares of his realm, were called tetrarchs, while Archelaus, who received the principal portion, had the title of ethnarch.

TETRAZZINI, Luisa, Italian soprano : b. Florence, 1874. While yet a child she learned perfectly several operas from hearing an elder sister (afterward wife of Campanini) practice them. She studied at the Liceo Musicale in Florence and after but three months training made her debut in (L'Africaine) in 1895, taking the part of (Inez. > She afterward sang in several Italian cities and her continental suc¬ cesses were so great that she was called ((the second Patti.® Finally she made such furor at Covent Garden that Oscar Hammerstein secured her in 1908 for the Manhattan Opera House in New York. Her operatic triumphs were continuous and she made a number of successful concert tours. As a singer she is noted for a voice of phenomenal power and great flexibility, coupled with unequaled ability as a coloratura soprano.

TETUAN, tet-oo-an', Morocco, a town on the northern coast of Africa, 33 miles south¬ east of Tangiers. It is defended by a castle. It is the only open port of the country on the Mediterranean, and lies a short distance south of Gibraltar. It is well built and many of the handsome private residences are the homes of Moorish exiles from Spain. The town is sur¬ rounded by fine vineyards, groves and orchards. The Hebrew merchants carry on a lively trade in fruit, wool, silk, girdles,

leather and cotton. Provisions are exported to Ceuta. Pop. 25,000.

TETZEL, tet'sel, or TEZEL, Johann,

agent for papal indulgences : b. Leipzig, about 1455; d. there, August 1519. He entered in 1489 the order of the Dominicans, and was ordained priest toward the end of the century. He soon began to appear in public as a preacher and gained a great reputation for his oratori¬ cal gifts. When in 1514 Leo X issued a bull granting an indulgence to all who would con¬ tribute to the building of Saint Peter's Church at Rome, Tetzel was selected to preach it in those provinces subject to the jurisdiction of the archbishop of Mainz. Luther came out in 1517 with his theses against this practice. These were answered by Tetzel and the stu¬ dents of Wittenberg burned the answers in the market place. Tetzel himself received a severe reprimand from the papal chamberlain, who was sent to settle the dispute, but was vindicated at Rome from the charges that had been brought against him. He died of the plague in the Dominican Convent at Leipzig. His life has been the occasion of much con¬ troversy owing to the part he took at the out¬ break of the Reformation, but recent historical investigation has done much to rehabilitate his character. His life has been written by Hoff¬ mann (1840); by Korner (1880), and on the Roman Catholic side by Grone (I860) and Hermann (1883).

TETRYL. Tetryl is an explosive sub¬ stance having the formula NCLCeHs.N.CHs. NO2, whose scientific name is tetranitrous thyl-aniline or preferably trinitrophenyline thylni-

tramine. Another common name in use for it is tetralite. It is prepared by dissolving dime¬ thyl aniline in sulphuric acid and treating this solution with nitric acid. Pure tetryl looks like flour with a faint yellow tint. It fuses about 130° C. and solidifies at 128.7°. Its heat of formation is — 40.8 calories. It is more pow¬ erful than TNT or picric acid but more sen¬ sitive than either. It is used as reinforcement in fulminate detonators, as the explosive core in detonating fuse, as a booster for high ex¬ plosive shells and as a component of some ammonium nitrate explosives such as Fortex but is too costly for general use.. It is some¬ what poisonous, producing an irritation of the skin.

TEUFFEL, toTf'fel, Blanche Willis How¬ ard, Baroness von, American novelist : b. Ban¬ gor, Me., 21 July 1847; d. Munich, Germany,

7 Oct. 1898. She was educated in New York, but in 1878 she removed to Stuttgart, Germany, where she engaged in teaching and also edited for several years a magazine printed in Eng¬ lish. She was married to Baron von Teuffel in 1890. Her publications include a book of travel, (One Year Abroad' (1877), and among her novels are (One Summer' (1875) ; (Aunt Serena-* (1886) ; (No Heroes,' a story for boys (1893) ; (Seven on the Highway,' short stories (1897), etc.; and her works published posthumously are (Dionysius the Weaver's Heart's Dearest' (1899), and (Garden of Eden' (1900).

TEUTOBURGER WALD, toit'6-boorg-er

valt, Germany, in Westphalia, a series of wooded hills, which begin on the left bank of the Diemel, near Warburg, and pass north¬ ward in the direction of Driburg, then north¬ west toward Orlinghausen, Bielefeld and Halle, finally Lengerich and Tecklenburg, and disap¬ pear in broken hills near Bevergern. Under the name of Egge they are steep and high and appear like a long wall; the highest point is Volmerstod (1,400 feet). There are, however, two lower parallel ranges. The sec¬ ond part is the Lippische Wald, also called Osning, believed by some authorities to be the real Teutobiirger Wald. The third sec¬ tion includes the Ravensberg, Osnabriicken and Tecklenburg Mountains. The name is taken from Tacitus' annals, where an account is given of the defeat of the Roman general Quinctilius Varus by Arminius in the 1st century a.d. The Hermann monument on the Grotenburg com¬ memorates this victory.

TEUTONES, tu-to-nez. See Germany.

TEUTONIC KNIGHTS, one of the three great military and religious orders which origi¬ nated at the time of the Crusades. Its name was derived from a German hospital founded at Jerusalem in 1128. The Teutonic order adopted the Augustine rule of life, and, in addition to the ordinary monastic vows, the members took upon themselves special obliga¬ tions to fight against enemies of the Christian faith, and to attend sick and wounded pilgrims. The order received charters from the Pope and the emperor entitling it to the same priv¬ ileges as the Templars and Knights of Saint John. The distinguishing garb of the order was a white mantle with a black cross. The members were required to be Germans of hon¬

orable birth. Its first seat was at Acre, but it soon acquired, by gift and

conquests, consider¬ able territories in Germany, including a large part of what is now the kingdom of Prussia. When Prussia became a secular duchy the order continued to exist as an ecclesiastical body, possessing 11 bailiwicks in different parts of Europe, with a total area of 850 square miles, and 88,000 population. France seized the territories of the order, west of the Rhine, in 1801, and Napoleon suppressed the order in 1809, its lands being annexed to the states within which they were situated. About 1840 the order was revived in Austria, where it has since engaged in ambulance service in time of war. The bailiwick of Utrecht still exists, hav¬ ing survived the decree of Napoleon, but the Dutch representatives of the order have be¬ come Protestants. See Crusades; Germany; Prussia; Orders, Religious.

TEUTONIC LANGUAGES. The Teu¬ tonic, or Germanic, languages are unmistakably of a common origin. They comprise English, German, Frisian, Flemish, Dutch, Swedish, Danish, Norwegian, Icelandic and Gothic. The latter prevailed from the 4th to the 7th cen¬ turies a.d. over a large portion of the south¬ west and southeast of Europe, and in it we find the oldest written documents ; however, both the Goths themselves and Gothic are now wholly extinct. German again includes both High and Low German, with their varying dia¬ lects, often differing very materially in their structure from each other. All these tongues, though deriving as they do from a common source, have differentiated greatly in historic times, so much so that most of them are quite unintelligible to the members of the other branches. Again, as far as written records are concerned, these date from very different pe¬ riods. Thus, we know the Bible translation of Bishop Ulfilas (Wolf) of the Ostrogoths, parts of which in a fair state of preservation are kept in the University Library of Upsala, Sweden, and dating from the 4th century. This trans¬ lation manifestly shows that Gothic even at that early time was a highly articulate language. Anglo-Saxon literature takes its rise in the 7th century, though some earlier fragments are probably incorporated in later works. The earliest German records date from the 8th and that of the Dutch from the 9th century. Fri¬ sian, a subdivision of certain very marked char¬ acteristics, does not become known to us by as much as a line till the 12th century, and in that century, too, the Scandinavian tongues for the first time make an appearance in preserved records, though it is not till the 15th century really that much of this is visible. Not until the last-mentioned period, either, do Swedish, Danish and Norwegian begin _ to contrast sharply in their interior “construction and pho¬ netics. Icelandic went its own course, on the other hand, being little influenced, by reason of geographical remoteness, by the cognate tongues further south. However, these north¬ ern idioms are at least

rich in comparatively early inscriptions, in Runic characters, and afford much food to the philological searcher. Likewise both inscriptions and other early lit¬ erary remnants discovered in the northern lands exhibit all the various stages of develop¬ ment, back even to a few types (like Icelandic),

more archaic and rude than Gothic and dating from as early as the 3d century a.d. More¬ over, some deductions as to the general style of the various early Teutonic dialects spoken by those tribes with whom the Romans came into contact from b.c. 150 to about a.d. 350 may be drawn from the proper names, of the chiefs and other men of prominence, as these names were usually emblematic and compounded of descriptive adjectives or nouns, and these would show that on the whole during these 500 years the Teutonic vernaculars were fairly con¬ stant and not subject to rapid changes.

Certainly, the Germanic languages stand out clear and well-defined as a separate group of the Indo-European family, their nearest rela¬ tionship being, in some respects, with the Italic and Celtic, in others with the Slavic tongues, and forming part of the western division. Most characteristic for the Teutonic idioms, from the philological point of view, is their manner of using the Indo-European explosive sounds. In some combinations consonants were lost or new consonants injected; n, for ex¬ ample, was eliminated before the x; final ex¬ plosives and nasals were thrown out ; their vowel system was in a general way a close as¬ similation to that of most other Aryan lan¬ guages. The accent in the Teutonic tongues shifted, after remaining indeterminate for ages, to the first syllable. This must have been as early as about b.c. 100. Alliteration was em¬ ployed a great deal, both in ordinary prose and in poetry, and this as far back as the time of the Cheruski, during the Augustean era of Rome. Alliteration also served to distinguish leading families or tribes from each other, the letter s, for instance, serving the Sigambri as a special mark of this nature. It was similar in the case of other Teutonic idioms. The phonetic characteristics, too, seem to have be¬ come fixed about the beginning of the Christian era. Dialectical differences existed even then, but were not nearly so pronounced as they have become since, a fact which the most ancient Runic inscriptions emphasize. On the whole, the Teutonic languages in their most primitive forms with which we are

acquainted were more melodious, certainly richer in full vowels and not so overburdened with conso¬ nants as we find them now. Gothic, which at a very early stage became separated from the body of the language by reason of far wander¬ ings and long-continued influences exercised on it by the adjoining and surrounding Latin and Greek populations, underwent a number of im¬ portant euphonic changes. So much so indeed that after the lapse of some three or four cen¬ turies of this influence Gothic, as spoken both by Ostrogoths and Visigoths, as also by the Vandals, Gepidse and other eastern Teutonic tribes, must have become scarcely intelligible to their kin who had remained on Germanic soil. This becomes reasonably certain by com¬ paring the Bible translation of Ulfilas with con¬ temporaneous specimens of German or Scandi¬ navian. The latter two linguistic bodies, how¬ ever, seem to have undergone their greatest in¬ ternal alterations during the 6th and 7th centu¬ ries a.d. The vernacular of the Vandals, Gepidae, etc., does not appear to have seriously differed from the Gothic. As for the chief parts of the early Germanic grammar, of the

three numbers in vogue in Indo-European lan¬ guages, the dual does not seem to have ever been used in the Teutonic idioms. Of the eight cases taken over from early Aryan, the voca¬ tive, the instrumental and the locative were made use of sparingly. As to the conjugation' of verbs, the Teutonic system was simpler than in most of the Indo-European languages. The old Middle Voice is absent. In the early forms of the verb the Teutonic languages employ but two tenses, the present and the preterite; in lieu of the future a periphrase, a preposition or a perfective verb had to do duty. On the whole, therefore, it is undeniable that the Teu¬ tonic group of languages shows many peculi¬ arities setting it apart from all others. Of course, side by side with those joint features set forth above, went on the process of individ¬ ual development for each of the dialects and separate idioms, these growing at last into dis¬ tinct languages. Most plainly this process of individualization may be observed in the com¬ paratively rapid growth of the Scandinavian tongues. In the early Middle Ages the inhabit¬ ants of Scandinavia all spoke nearly alike and understood each other without serious trouble. Within the space of two centuries complete differentiation had been effected. In a sense, the Flemish and Dutch idioms show in their grammar forms an arrested development, due in a measure to political separation from the neighboring parent stock; in phonetics both differ very materially from the German.

Bibliography.— Bulbring, K. O., <Alten- glisches Elementarbuch) (Heidelberg 1902) ; Braune, W., (Gotische Grammatik) (4th ed., Halle

1895) ; (Althochdeutsche Grammatik*

(2d ed.. ib. 1891) ; Brugmann, K., and Del- briick, B., (Grundriss der vergleichenden Gram- matik der indogermanischen Sprachen) (Strass- burg 1886-90) ; Comparative Grammar of the Indo-Germanic Languages *(London 1888— 95) ; Dieter, F., Bethge, R., Bremer, O., Hartmann, F., and Schliiter, W., (Leipzig 1900) ; Grimm, J., (Deutsche Gram- matik) (Gottingen 1819-37; Berlin, 1870-78; Gütersloh 1890) ; Kluge, F., (Nominelle Stamm- bildungslehre der altgermanischen Dialekte) (Halle 1896) ; Noreen, A., (Altnordische Gram- matik' (2d ed.; Halle 1892) ; (Abriss der ur- germanischen Lautlehre* (Strassburg 1894) ; Paul, H., (Grundriss der germanischen Philolo¬ gies Vol. I (2d ed., Strassburg 1898) ; Schade, O., (Altdeutsches Worterbuch* (Halle 1872— 82) ; Siebs, Th., (Geschichte der friesischen Sprache) (2d ed., Strassburg 1898) ; Streit- berg, W., (Urgermanische Grammatik) (Hei¬ delberg 1897) ; Verner, K., (Afhandlinger og Breve) (Copenhagen 1903).

Wolf von Schierbrand, Author of c America, Asia, and the Pacified etc.

TEUTONIC ORDER, The. See Orders, Royal.

TEUTONIC RACE. See Germany.

TEWFIK PASHA, tu'fik pash'a, MO¬ HAMMED, khedive of Egypt: b. 15 Nov. 1852; d. 7 Jan. 1892. He was declared heir apparent in 1866, when the sultan granted the right of primogeniture to the Egyptian reigning family, and in 1879 he succeeded to the throne on the abdication of his father, Ismail Pasha.

He was a ruler chiefly in name, the control of the government being virtually in the hands of foreign powers. A national party was formed of which Arabi Pasha, Minister of War, was at the head, and the friction between the khedive, who favored the English, and Arabi resulted in an insurrection in 1882. Through the inter¬ vention of England the uprising was quelled and a species of constitutional monarchy was adopted, giving an English financial adviser a place in the council in 1883. During the Mahdi troubles in 1884 Tewfik was forced to give up the Sudan. He was a man of simple tastes, married but one wife and was deeply interested in educational advancement and in the improve¬ ment of public works.

TEWKSBURY, Mass., town in Middlesex County, on the Boston and Maine Railroad, five miles south of Lowell. It has large horti¬ cultural interests, a chemical factory and con¬ tains the State infirmary. It was founded in 1654 and formed a part of the town of Billerica from which it was taken and incorporated 23 Dec. 1734, being named after the ancient town in Gloucestershire, England, famous for its abbey. Pop. 5,265.

TEXARKANA, teks-ar-kan'a, Ark., and Tex., twin city, one in Bowie County, Tex., the other the county-seat of Miller County, Ark., on the Saint Louis, Iron Mountain and Southern, Kansas City Southern, or «Port Arthur Route,® Saint Louis Southwestern, or (<Cotton Belt Route,® Texas and Pacific, Tex¬ arkana and Fort Smith and the Memphis, Dallas and Gulf railroads, about 180 miles southwest of Little Rock, the capital of Arkansas, and 28 miles north of the Louisiana boundary. The cities are separated by the boundary between Texas and Arkansas, but they are one com¬ mercially, industrially and in all except the city governments. The name indicates unity; the first syllable is from the first syllable in Texas, the second from the first syllable in Arkansas, the last two from the last two syllables in Louisiana. Both the cities were settled in 1873 ; became incorporated towns in 1880 and cities of the second class in 1887. Texarkana, Ark., became a city of the first class in 1904. The post office serves for both cities and is des¬ ignated as ((Texarkana, Ark.-Tex.® The cities are in an agricultural and lumbering region and are an important distributing centre for a large extent of country. The chief industrial estab¬ lishments are railroads and railroad shops, em¬ ploying about 1,500 persons, lumber works, 500 employees, and other manufacturing establish¬ ments are numerous. Two large creosoting plants are near the city. Cotton and cotton products, lumber, grain and livestock are shipped from Texarkana in large amounts. The principal public buildings are the Govern¬ ment building, the Miller County, Ark., court¬ house and jail, the Y. M. C. A. building, Rail¬ road Hospital (cost $200,000), sanatoriums and the churches and schools. The United States court for the Western District of Kansas and United States court for the Eastern District of Texas, each hold annually two regular terms in the city within the district.

There are 31 churches, representing 17 dif¬ ferent denominations. In each city are a high school, grammar schools, kindergartens and parish schools. Saint Agnes Academy, in

Arkansas, was established in 1877; Saint Rose of Lima Academy is in Texas; Texarkana In¬ dustrial College opened in 1904. There are excellent banking facilities and good news¬ papers. The majority of

the inhabitants are American born; about 650 foreign born and 4,200 of negro descent. Pop. (Ark.), (1890) 3,528; (1900) 4,914; (Tex.), (1890) 2,852; (1900) 5,256. Since 1900 the cities have grown considerably and the United States census of 1910 showed the population to be about 9,790; that of 1920 (Ark.) 8,257; Tex., 11,480.

TEXAS, the most centrally located of the southern tier of the United States, is much the largest in the Union and is popularly known as the ((Lone Star State.® It is bounded on the southeast by the Gulf of Mexico, on the east by Louisiana, on the east and north by Arkansas, on the north and east by Oklahoma, on the west and north by New Mexico on the southwest by Mexico. It lies between lat. 25° 51' and 36° 30' N. and between long. 93° 30' and 106° 40' W. and extends, therefore, east and west nearly 800 miles, north and south nearly 750. Its land area is 262,400 square miles and its coast line nearly 400 miles. According to United States census returns it had a popu¬ lation of 4,663,228 in 1920 and a total wealth of $6,859,909,141 in 1912. Texas is divided into 252 counties and is a political but not a physical geographic unit. The State was admitted into the Union in 1845, having been for 10 years previously an independent republic.

Topography. — The general surface slopes upward fairly uniformly toward the northwest from sea-level to 4,000 feet and more. The Gulf deepens but slowly off shore and long bar¬ rier islands enclose along most of the coast shallow lagoons and bays whose total area is about 3,500 square miles. Padre, Galveston and Matagorda islands and Matagorda Peninsula are the longest of these barriers. Dredged channels aided by jetties allow large vessels to enter Galveston and Corpus Christi bays and Sabine Lake. The southeastern and eastern third of the State is quite flat but is diversified by very low hills along its northwestern bound¬ ary which rises to 500 or 600 feet above sea-level and which is marked toward the south by the Balcones Scarp and toward the north by the White Rock Scarp. The middle third of Texas is mainly level or nearly level country, but is marked by numerous hills which, chiefly in the southwest, cluster thickly enough to make large areas of rather rough contour. Ex¬ cept for the Trans-Pecos region west of the Pecos River, the northwestern third of Texas, rising northwesterly from about 2,000 feet on the east to 4,000 feet on the west, is a part of the almost level great plains, but is cut more or less toward the east by the head streams of the larger rivers. West of the Pecos and nearer the Rio Grande, upon a plateau with an altitude of 3,000 to 4,000 feet, rise the Guada¬ lupe, Franklin, Quitman, Davis, Organ, Chinati, Chisos and other mountains. Two peaks con¬ siderably exceed 8,000 feet and 18 are higher than any east of the Mississippi. The mean elevation of Texas is 1,700 feet.

Rivers. — As a consequence of the north¬ westerly rise all the rivers flow in a general southeasterly direction. The Canadian and the Rio Grande, with its tributary, the Pecos, rise

in the Rockies outside Texas. The Red, the Brazos and the Colorado rivers rise on the Staked Plains. The Sabine, the Neches and the Trinity rise in the northeast, the Guada¬ lupe, the San Antonio and the Nueces rise in the central part of the State. The Canadian and the Red rivers are parts of the Mississippi River system. The other rivers discharge into the Gulf along the Texas coast, all except the Brazos emptying into bays which they are silt¬ ing up. Owing to slight and irregular rainfall over their upper drainage areas, the larger rivers are not well adapted to navigation, nor do the streams in general afford much constant water power. The Rio Grande divides Texas from Mexico, the Red and Sabine rivers di¬ viding Texas partially from Oklahoma, Arkan¬ sas and Louisiana.

Geology.— Archeozoic rocks are repre¬ sented only in the Llano, Van Horn and El Paso regions where, and in the Marathon re¬ gion, limited exposure of Cambrian and Ordo¬ vician strata are to be found. Scarcely any Silurian and no certain Devonian rocks have been discovered. In north central Texas, Car¬ boniferous strata estimated to contain 8,000,- 000,000 tons of bituminous coal and a vast quantity of recently discovered petroleum out¬ crop over an area of 13,500 square miles. West of the coal-bearing area the Permian Red Beds outcrop over 25,000 square miles. The Jura- Trias system is unimportant, outcropping only along the scarps of the Staked Plains. In the Trans-Pecos region are lesser outcrops of the Carboniferous, Permian and Jura-Trias. Ex¬ ception being made of the Llano region and the Permian-Carboniferous areas, the middle third of Texas from the Rio Grande to the Red River is covered by Upper and Lower Creta¬ ceous areas in the proportion of two to five. The long Balcones Scarp marks a fault which divides the Upper Cretaceous on the east from the Lower on the west. The Eocene and Pleistocene, separated by a narrow Oligocene and a Miocene-Pliocene strip, occupy all of southern and eastern Texas in about equal areas. West of the Lower Cretaceous and the Permian outcrop, northwestern Texas is almost wholly occupied by later Cenozoic strata. Erup¬ tive lava sheets are to be found in the Trans- Pecos, where the mountains are of the Basin Range type; basaltic outbursts are to be found widely but sparsely scattered through the southern Upper Cretaceous. In the Llano re¬

gion vast masses of granite are exposed. Some 23,000,000,000 tons of lignite are estimated to lie in the Eocene Beds. The marine Neocene of the Coastal Plain contains immense petroleum deposits, but petroleum has also been found in large quantities in the Eocene, Cretaceous and even the Carboniferous. Over a thousand square miles of the Eocene are some easily accessible beds of good limonite.

Climate. — The lines of equal rainfall run nearly north and south, the rainfall diminish¬ ing from 55 inches in the east to less than 10 inches in the west. The average for the State is not far from 33 inches. Wide variations from annual averages are common and very wide departures from monthly averages are almost the rule. Evaporation steadily increases from 45 inches at the east to 90 inches at the west. Obviously Texas ranges from humid to

arid. Eastern Texas has about 60 per cent, western Texas over 70 per cent of the possible sunshine. The mean annual temperatures range from 55° (35° in winter, 75° in summer) in the extreme north (Panhandle country) to 72° (60° in winter, 84° in summer) in the extreme south. Over most of southern and eastern Texas the mean summer temperature is about 81°. Tem¬ peratures of 95° are not infrequent, the Texas extremes being 115° and — 16°. In winter the mean temperatures at Amarillo and Browns¬ ville differ by 24°, in summer by 9°. High temperatures are much modified by the high evaporation and by the Atlantic trade winds, which blow regularly through the summer but are frequently interrupted in winter by the oppositely directed northers which blow with great violence, sending the temperature down sometimes as much as 50° in a few hours. Snow and freezing occur along the coast only during the severer northers and last only a day or so. The climate on the whole is quite healthful.

Flora. — The large size, varied rainfalls and temperatures of Texas unite to produce a wide variety of plants and animals. A trace of the Canadian Life Zone is to be found on the tops of the highest western mountains, surrounded lower down by more abundant specimens of the Transition Zone. The Staked Plains, a narrow and irregular strip extending southeast to Kerr County, and most of the Trans-Pecos above 4,000 feet are in the Upper Sonoran Zone. The remaining nine-tenths of the State is in the Lower Austral (cotton producing) Zone. The western and larger half of the Lower Austral is Lower Sonoran, the rest is Austro- riparian. There is a semi-tropical Gulf Strip of the Lower Austral as well as arid and semi- arid areas in the Lower Sonoran. Cypress, tupelo, palmetto, hickory, magnolia, gums, oaks, osage orange, sycamore, willow, long, short and loblolly pine abound in eastern Texas. Elms, pecans, cottonwoods and willows along the

streams with oaks, cedars, hackberries and mesquite elsewhere characterize the rest of Texas east of the treeless areas. Many species of cacti, especially the prickly pear, grow in the Lower Sonoran area. Wild flowers abound in species and individuals. The various native grasses largely support the great livestock industry.

Fauna. — Prairie dogs, jack-rabbits, cotton¬ tail rabbits, skunks, rats and mice and opossums are the commoner animals. The coyote is still not rare and deer, protected by law, are main¬ taining their numbers. The wild buffalo is ex¬ tinct and the antelope, bear, panther and peccary are nearly so. Armadilloes are common in the south. A great majority of the North Amer¬ ican species of birds have been found in Texas. Characteristic and common birds are the scis- sortailed fly-catcher, mocking bird, lark finch, red bird, meadow lark, swallows, doves, quails and turkey buzzards. The wild turkey is now rare. Ihirty varieties of lizards and 30' of snakes are known. The horned toad is the most interesting lizard. Poisonous rattle-snakes, moccasins and coral snakes and the harmless garter, black, pilot, coachwhip and bull snakes are. widely distributed. There is a remarkable variety of fish in the lower coastal streams where small alligators are still fairly common.

TEXAS.

Estimated population, 4,429,566 COUNTIES

Pop.

29,650 975 17,705

2,106 Aransas 6,525 Archer 2,682 Armstrong

10,004 Atascosa . 16

17,699 Austin . K 5

312 Bailey . El

4.921 Bandera . H 5

25,344 Bastrop . J 4

8,411 Baylor . HI

12,090 Bee . J 6

49,186 Bell . J 3

119,676 Bexar . 15

4,311 Blanco . 14

1,386 Borden . F 2

19,013 Bosque.... . J3

34.827 Bowie . Ml

13,299 Brazoria . L5

18,919 Brazos . K 4

5,220 Brewster . D5

2,162 Briscoe . . . C 2 and F 1 . . . Brooks (Pop. inch in Hidalgo, Starr and Zapata Cos.) B 6

22,935

Brown . . .

18,687

Burleson .

. iv 4

10,755

Burnet . . .

. 14

24,237

Caldwell . .

. J 5

3,635

Calhoun . .

. K 6

12,973

Callahan . .

. H 2

27,158

Cameron . .

. C 7

9,551

Camp . . . .

. M2

2,127

Carson . . .

. Cl

27,587

Cass .

. Ml

1,850

Castro ....

. B 2 and E 1

4,234

Chambers .

. M 5

29,038

Cherokee . .

. L 3

9,538

Childress. .

D 2 and G 1

17,043

Clay .

. 11

65

Cochran . .

. El

6,412

Coke .

. G 3

22,618

Coleman . ,

. H 3

49,021

Collin . . . .

. K 1

5,224

Collingsworth .... D 2

18,897

Colorado . .

. K 5

8,434

Comal ....

. 15

27,186

Comanche

. 13

6654

Concho . . .

. H 3

26,603

Cooke. . . .

. J 1

21,703

Coryell . . .

4,396

Cottle . . . .

. G 1

331

Crane . . . .

. E 3

1,296

Crockett .

. F 4

1,765

Crosby . . . .

. FI

Culberson

(Pop.

inch in El Paso

Co.) .

. C 3

4,001

Dallam . . .

. A 1

135,748 Dallas . . .

. K 2

2,320

Dawson. . .

. F 2

3,942

Deaf Smith . A 2

14,566

Delta .

31,258

Denton. . .

23,501

Dewitt . . .

3,092

Dickens . . .

. G 1

3,460

Dimmit . .

. H 6

5,284

Donley . . .

. C 2

8,964

Duval. . . .

. 17

23,421

Eastland .

. 12

1,178

Ector .

. E 3

3.768

Edwards .

. G 4

53,629

Ellis .

52,599

El Paso . . .

32,095

Erath . . . .

35,649

Falls .

. K 3

44,801

Fannin . . .

. K 1

29,796

Fayette ..

12,596

Fisher . . . .

4,638

Floyd ....

5,726

Foard . . . .

18,168

Fort Bend

9,331

Franklin .

. LI

20.557

Freestone

. K 3

8,895

Frio .

. H 6

1,255

Gaines. . . .

. E 2

44,479

Galveston .

1,995

Garza .

9,447

Gillespie. .

1,143

Glasscock

. F 3

9,909

Goliad . . .

28,055

Gonzales .

3,405

Gray .

65,996

Grayson ..

14,140

Gregg ....

21,205

Grimes . . .

24,913

Guadalupe

7,566

Hale .

8,279

Hall .

C 2 and G 1

15,315

Hamilton.

935

Hansford . .

11,213

Hardeman

. II 1

12,947

Hardin . . .

115,693

, Harris ...

37,243

Harrison . .

1,298

Hartley. . .

. A 1

Pop

16,249 Haskell . HI

15,518 Hays . 15

3,170 Hemphill . D 1

20,131 Henderson . L2

13,728 Hidalgo . B7

46,760 Hill . J 3

137 Hockley . El

10,008 Hood . J 2

31,038 Hopkins . LI

29,564 Houston . L 3

8,881 Howard . F2

. Hudspeth . B 3

(Pop. inch in El Paso Co.)

48,116 Hunt . K 2

892 Hutchinson . Cl

1,283 Irion . G 3

11,817 Jack . II

6,471 Jackson . K5

14,000 Jasper . N 4

1,678 Jeff Davis . C4

38,182 Jefferson . M 5

. . . . Jim Hogg (Pop. inch

in Brooks Co.) . .B 6 . . . . Jim Wells (Pop. inch

in Nueces Co.)'. I 7

34,460 Johnson . . . . . J 2

24,299 Jones . H 2

14,942 Karnes . J 6

35,323 Kaufman . K 2

4,517 Kendall . 14

2,655 Kent . G 1

5,505 Kerr . H 4

3,261 Kimble . H 4

810 King . G 1

3,401 Kinney . G 5

_ Kleberg (Pop. inch

in Nueces Co . . . . J 7

9,625 Knox . HI

46,544 Lamar . LI

540 Lamb . El

9,532 Lampasas . 13

4,747 La Salle . H 6

26,418 Lavaca . K 5

13,132 Lee . K 4

16,583 Leon . K 3

10,686 Liberty . M4

34,621 Limestone . K 3

2,634 Lipscomb . D 1

3,442 Live Oak . 16

6,520 Llano . 14

249 Loving . D 3

3,624 Lubbock . FI

1,713 Lynn . F 2

13.405 McCulloch . H 3

73,250 McLennan . J 3

1,091 McMullen . 16

10,318 Madison . L3

10,472 Marion . M2

1,549 Martin . F2

5,683 Mason . H4

13,594 Matagorda . K 6

5,151 Maverick . G6

13,415 Medina . -. H 5

2,707 Menard . H 4

3,464 Midland . E 3

36,780 Milam . J 4

9,694 Mills . 13

8,956 Mitchell . G2

25,123 Montague . J 1

15,679 Montgomery . L4

561 Moore . B 1

10,439 Morris . Ml

2,396 Motley . G 1

27.406 Nacogdoches . M3

47,070 Navarro . K 3

10,850 Newton . N4

11,999 Nolan . G 2

21.955 Nueces . J 7

1,602 Ochiltree . D 6

812 Oldham . A 1

9,528 Orange . N 4

19,506 Palo Pinto . 12

20.424 Panola . M2

26,331 Parker . J 2

1,555 Parmer. . . .A 2 and E 1

2,071 Pecos. . E 4

17,459 Polk . M 4

12.424 Potter . B 1

5,218 Presidio . C4

6,787 Rains . L2

3,312 Randall . B 2

392 Reagan . F 3

.... Real (Pop. inch in

Edwards Co.) . . . H 5

28,564 Red River . Ml

4,392 Reeves . D 3

2,814 Refugio . J 6

950 Roberts . C 1

27,454 Robertson . K 3

8,072 Rockwall . K 2

20,858 Runnels . H 3

26,946 Rusk . M2

8,582 Sabine . N 3

11,264 San Augustine. .. .M 3

9,542 San Jacinto . L4

7,307 San Patricio . J 7

Anderson . L 3

Andrews . E 2

Angelina . . . . , . M3

K 6 I 1 C 2

11,245

San Saba .

...13

1,893

Schleicher .

,.G4

10,924

Scurry .

. .G 2

4,201

Shackelford . . . .

,.H2

26,423

Shelby .

..M3

1,376

Sherman .

. B 1

41,746

Smith .

3,931

Somervell .

. . .J 2

13,151

Starr .

. B 6

7,980

Stephens .

1,493

Sterling .

. . G 3

5,320

Stonewall .

G 2

1,569

Sutton .

. .G 4

' 4,012

Swisher. . . ,B 2 and F 1

108,572 Tarrant .

J 2

26,293

Taylor .

. .H 2

1,430

Terrell .

,..E5

1,474

Terry .

..El

4,563

Throckmorton . .

. .H 2

16,422

Titus .

. M 1

17,882

Tom Green .

. . .G 3

55,620

Travis .

. . .J 4

12,768 Trinity . L3

10,250 Tyler . M 4

19,960 Upshur . M2

501

11,233

8,613

25,651

14,990

16,061

12,138

2,389

25,561

22,503

21,123

5,258

16,094

12,000

42,228

17,066

442

26,450

23,417

602

13,657

3,809

1,889

Upton . E 3

Uvalde . H 5

Valverde . F 5

Van Zandt . L 2

Victoria . K 6

Walker . L4

Waller . K 5

Ward . D 3

Washington . K 4

Webb . H 7

Wharton . K 5

Wheeler . D 1

Wichita . II

Wilbarger . HI

Willacy (Pop. inch in Cameron Co.) . C 6

Williamson Wilson Winkler . .

Wise .

Wood .

Yoakum . . Young . . . . Zapata . . . Zavalla . . .

.J 4

.1 5

E 3 .J 1 L 2 E 1

.1 1

A 6 H 6

Incorporated Cities, Towns, Villages, Etc.

14,238

2.136 672

1.155 1,453

19,124

1,842

1,197

825

1,794

2,261

1,604

34,814

1,710

3,536

512

1,857

1,707

3.156 27,711

3,269

181

699

496

4,164

4,102

903

871

886

4,844

2,874

2,669

401

4,718

2,000

635

13,163

6,967

4,132

981

1,476

2.579 3,263 1,648 1,400

479

821

724

503

1,684

3,818

1.207

2,410

1.946 2,065

692

12,259

1.137 100 495

3,046

791

1,840

2,756

2,818

1,374

505

1,513

10,432

10,022

1,880

516

3.947 1,341 3,109

2.580 124,52

803

1,651

1,015

14,779

4,732

1,042

289

Abilene .

H 2

Alice .

..17

Alto .

I, 3

Alvarado .

K 2

Alvin, Brazoria . .

.L 5

Amarillo .

C 7

Anson .

. H 2

Aransas Pass ....

.K 7

Archer City .

.11

Arlington .

.K 2

Athens .

Atlanta .

.M 1

Austin .

,1 4

Baird .

.H 2

Ballinger .

G 3

Bangs. Brown .

• •13

Bartlett .

Bastrop .

Bay City .

Beaumont .

Beeville .

,.l 6

Belcherville .

...11

Bellevue .

K ft

Bells .

.K 1

Belton .

. .J 3

Big Spring .

,F2

Blooming Grove .

.K 3

Blossom .

Rnprnfi .

Bonham .

.K 1

Rnwifi .

. . J 1

Brady .

H 3

Brandon .

Brenham .

.K 5

Bridgeport .

,.l 1

Bronte .

.G 3

Brownsville .

. D 7

Brown wood .

H 3

Bryan .

Burnet .

Caldwell .

.K 4

Calvert .

K 4

Cameron .

Canadian .

.D 1

Canyon .

. .B 2

Carbon .

Celeste .

.K 1

Celina, Collin . . . .

. K 1

Cement, Dallas. .

.K 2

Center .

.M 3

Childress .

.D 8

Chillicothe .

.H 1

Cisco , .

..12

Clarendon .

C 2

Clarksville .

.M 1

Claude . .

(! 2

Cleburne .

Clifton .

J 3

Clinton, Hunt...

.K 2

Clyde .

Coleman .

Collinsville .

Colorado .

Comanche .

..13

Commerce . .

Conroe .

Coolidge.LimestoneK 3

Cooper .

Corpus Christi . .

. . J 7

Corsicana .

Cotulla .

Crawford .

Crockett .

Crowell .

Hncro .

Dalhart .

.B 1

7Dallas .

. K 2

Dawson .

. K 3

Decatur .

De Leon .

Denison .

.K 1

Denton .

Devine .

.H b

Dodd City .

..L 1

2,551

Dublin .

T 3

1,717

Eagle Lake .

. K 5

3,536

Eagle Pass .

. G 6

855

Eastland .

.1 2

404

Ector .

K 1

1,778

El Campo .

K 5

640

Electra .

.1 1

1,707

Elgin .

.J 4

63,705

El Paso .

.A 3

326

Enloe, Delta .

.L 1

5,669

Ennis .

.K 2

1,848

Farmersville . . . .

.K 2

274

Fayetteville .

K 5

1,233

Ferris .

.K 2

886

Flatonia .

.K 5

1,398

Floresville .

.1 6

664

Floydada .

.F 1

1,114

Forney .

. K 2

104,562

! Fort Worth .

. J 2

332

Frisco, Collin . . . .

. Iv 2

702

Frost .

.K 3

7,624

Gains ville .

.J 1

41,863

Galveston .

.M 5

558

Ganado .

.K 5

804

Garland .

.K 2

627

Garrison .

.M 3

1,929

Gatesville .

. .J 3

3,096

Georgetown .

1,484

Gilmer .

.M 2

1,129

Goldthwaite ....

3,139

Gonzales .

. .J 5

609

Gordan .

.12

963

Gorman .

1,569

Graham .

. .1 2

1,336

Granbury .

1,065

Grand Saline .

1,018

Grandview .

,1 2

1,708

Granger .

681

Grapevine .

10,099

Greenville .

1,454

Groesbeck .

1,379

Halletsville .

.K 5

1,548

Hamilton .

. . J 3

1,978

Hamlin .

.G 2

2,436

Haskell .

2,352

Hearne .

.K 4

2,104

Henrietta .

1,750

Hereford .

.B 2

1,437

Hico . .

.13

769

Higgins .

.D 1

6,115

Hillsboro .

778

Holland .

2,300

Honey Grove. . . .

.K 1

112,307 Houston .

.L 5

6,984

Houston Heights,

Harris .

.L 5

581

Howe .

.K -

1,843

Hubbard .

.K

2,072

Huntsville .

,1.4

603

lowapark .

..11

1,149

Italy .

.K 3

1,356

Itasca .

1,480

Jacksboro .

•12

2,875

Jacksonville .

.L 3

314

Jayton .

G 1

2,515

Jefferson .

.M 2

586

Jewett .

. K 3

1,959

Kaufman .

K 2

1,147

Kenedy .

, 1 6

945

Kerens .

K 3

1,843

Kerrville .

.H 5

1,265

Killeen .

764

Kosse .

.K 3

742

Kyle .

. J 5

1,293

Ladonla .

.K 1

1,850

La Grange .

,1 5

2,119

Lampasas .

..14

1,115

Lancaster .

.K 2

678

Laporte .

.M 5

15,749

Laredo .

. H 7

990

Leonard .

.K 1

980

Liberty .

658

Lindale .

1,687

Llano .

.<J 7

Texid

Chi <lress®sˆtv Tel ° Kirkland

Arkadelphia

Olton_

SNfprthfleld 9-

ur LakcS\ BAILEY' (j 'Monume-

Socorro

Goodland

LOU.

Portales

KuhvilU

AiUo

Swearingen

CO • x > i£ Ginsite

£?0T‘ of

Ardmore

Qbrd,

SONNEl

7-EA >

K-'lV ; I!' .

iwell^Thaliao \ F o//P* 0 ^ j SavUlaO

ioottTrf^S

If Center

< L 5.i

Abernat!

WILBARGERp <

iRonda0 J Osborne ° J

CASAS AMARIt OB YtUOW HQ

San Martial

Roaring fjpi

.atjunaG

|\ Estacad)

.UBBOCKc

r QAftori"jz >

‘b! TiTn,

follida JyfiTk

Wuemada

V. Bonita*

MlONTAGUl

Digue® :

-Lynn Ti

k t* g|

Guthrie BUZZAB0^1 PE** Kn

Carrlzozo.

Capita a

LnH

HOCKLEY 1 madog*^ 0\$©|

NLW a b

X L~Bomart < 57. t 0 " ree_ -j .

■ ! Monday^/

BoycUef

I V r H

[l?— ^Utliaiul

,D\indec >

[COCHRAN

•Lagunas Cot

Lo! IlnsvilU

/Burns'^

Pose'

datfifeSUl

IXtblaud

iuenoa

Uarnum

• jpring CreeKN;

throck- V

T irockmovtoi

Wlie't Farter

BuV4gJ_\

P Loytog vvTˆ —

Jacksboj rahiUtLyˆripi > 1

■Clairtnuoˆfˆ J'- tS-T N AbueriU'

\ o CASS “

.Marietta J

ˆ"crficldj

’I rldg® Trinaa.

Tokio

TuhokaˆjA.

i) U. YTN n

j aits keen

TI mThC’ Uon i

Plains-

Browi , YOAKUM

Haskell

MORTON

fftliiUtiv

/Cyirttutk/wi

Tfi&U-H

llaSi ™ro«J k&l >4 jpUJFMMH0' yJpT^^Kai

'®ogordo

Seograves orcf'* ' t Blythe P.0. Parkiusom

Ml

tlindiuan

vd. \ Dcrmutl NX \ Scurry S Csˆ R R

kmnlteisNt II \ L underskirt

OYN e 8 T] y oAusonl

fst?XT-

v>°'> X,;„' 4

/ 1 s o\ iMarshl

G A I N QE S To Sgˆaie \Semi„oje

_ Lakes \

Robyˆ,

Longwortb; N» Esk/

, VAN ZANOTˆJ"ˆ ifinanCoUnio j* ■ eWi™ O Canton f

mi) Owlet OicenoLTˆvS i0J#ttBeo\Vheeiero ˆ

A * ˆloce OKaDTVr-1

aptpEN D.E-R 3'0 N

] sOtˆAthens Bull '^4j*TNO' Baxter .

:reveport

i/t h

,P 'Akron

Trier

iN *juMidlotˆlan*

Shatter

Lus Cruces A*

£7 Tatum

/ naruion yQ »,

CovertonHlU *

ˆHendi

L Long Branll [dA RAJ.S K V .u,3 oU».ˆ 1 / F.nJe.ort

Ci

iroiral o ˆ

(Uca‘llahan

o Cotton wi > o < i0 Ci»m Plnlna °"

Carlsbad

Tolar1

LS/ta/tfrs Z. ke f\ ,

ANDREWS f'

Andrews ®

llarveˆ h./»

PfNolano . N(P LAN

«5 Hjltm.

ˆEaatlani iTLANO 1 asˆVvicj*ˆ mpnˆˆLiaj

oahorua /S'* MITCHELL

lus&eld

d/S°pp«,r

[r"udAii

,PASO

Ft. Bliss

1 Paso

GtiAQALOUPEj

■PEAK

»oeto7 >

&• / . \ ETNRTnrro .Jjp*rTaica\ — pfiffurdoji C&J ˆYnirhUnjJfˆrn 0 £ TBr nldoo a A ob \ • ' C ajU 1 Betltfl d W»f/a

Sˆ/l >7 DirwHOD >Touˆo r> . .

”frcˆ~rAHubbard 'Stfs/ r

\ _® faif figlqLˆ

fc/yArtoH Canftaif/\e*,Tr\Tenguo 1 o

gˆSbˆLj M ES-l/Ofˆ E\ VwnfjKˆ1

fCroesheekX?fˆfW'|

’rTffenaha. | ,S hlE LB Y o \ “Mentcr

TABLE fMTe.'v

• . Nnnhatue I STERLING

Novice ˆ so Silver

Ihndbournei

Biootel

, X.DlntVilL Knskj

JHEROKEE I

P 1,1,1 fVjvˆN

%.8 0 SYC U E* Cliftou\o o V)

lˆ/li ˆWillow Spring °

[GLASS KOC

L

(.anh-ii

| citrT0*o

Ciudad. Juarez

H LfDS PETH

A BˆCK

'prtdnV'L

PatroJe'

Hermoeaˆ

Tojah

mil to i

ON ✓

F.lkbart

ater Valle/, Uqˆ

/iSLMuIUA M I CM. s Sin

Regency

ˆo.AGoldtl

Ohioˆ

-’rooociitDp(j rapetand j'sl

i oD»'VNSt»rkRnt. lifl |, \ H O iU $ T_ OjjA;

jPrauohgf <?.

ˆTr d) crane

y . Qreat falls jt

ranˆfall s ˆ0

. Santa Lucia *

/ Horsehead Crossingˆ

Q Irvin ve

Daugherty. ˆ f

CUCEJ5RS0N

aOˆ „< > — P

Staej

©Stiles

REAGAN5

C.Blg Lako

8ABINE

? Burke / f ANGELIN' r Manning

.cePStrgent' JU <baa

E/V E S

•fuiope Olto JiOineta > -

LAMPASAS L NixˆQglee

tllbj MADISON \ ˆ I t" T Mndlst

QUITMAN\^7'g

Ft. Quitin^jt^;?

MOUNT

sEdruvera

Haldrid g sjt *

Guilds

o^ffort Stockton

° CaseyN,. 77 1

I J v/ti Phantom a^iSa I Z«Ae N^ I Limpia o

q A V ! s

y r I*

I Briggs

*P RN E tr

iliiTtiid

^^rlnnA.

OJmbleTLl

SCHLEIOHE tT j

Eldorado® ^

° Kaffir Ft. McKavetl o.

inrnold'j

Leggett

iP'tuuVF Val^y 8p\

liesseruer °itr,Z ^ b’

A^S O N Xlano0^^v m Tl:WO! t|»LA N (yJ\r $)d Ci i stall Ringslatid^Ttf^lf

ufreL« _ jk

1y9 Willow „ |«Bio«»af<i

J Q l L L ES P I E f Jolmsonil

ejlpksburgtf""”11 j BLAt«W _

Springs

CROCKETT

ShefflelX

\cW\spa

7XJ E F

lidsprtntjN Tsan i jacin-

f bbepordi

"mCf'9 d‘

""TtaU

!onr oV«'

incastel

J- FUotvwm*

HA\R01N'Tv--_ vKonnticvˆOt r, vj WlUs5\

V'Vˆ.r“u,gV

Ozonn

yy/ ttLy a

if London0

/ , BLUEˆfe.1

l f-

,T,b _ Mxvilleo

Owenvill

SUTTON-

p, el and

MONTGOMERY led ley 5 K.

rˆVˆay Hill

VASHIˆNGTON i

Harris.

lountflin

—Home

Nil m«tfl\l(0 to;

hNvA r V7'/

jrese X' TSi >. A\dii)«

Junoo

o Pecan Spring

. VERDE

. Camp Muns.'

Shafter

[SipkWnsr.

Ak$tPoint>:

Casa Jiedra

<EFFETis01

I La BrfteO I uuie Sulnnl

1C Pass'

SVyWnllis V.j

XtOiWELL

Taring / San iUareps /JJi /COMA LNsUW jyJlonfne ˆnntepjˆy

ringsU Coiby^^TNL^^

,6 E 1ˆA<H J9 Hu ,*0«Z aY E

O mirˆWiaJtVri ghUboro oh"

ˆJx/fS-AbUANT O N Ip7 .* o ˆ0ˆ,! a3

Rorksprangs

BREWSTER\N,

Medina

B A N D E\R A VaˆRa Banilora^5i0„rftri jtokjy-- _

° '•"I'laMedinˆTy I

HEOIN AWpJ

Barksdale

Presidio

(Moulton

sSBreslavJi

Presidio del Norte

Guavanga,

Spring

Montellf lowles0 '

1 V A L

ˆeHthoff Pjˆp/ itO rhrˆ '

&'

Romaatog

.Nursery^

Moore/ Iukalr

'f y^i'awkinsrilU t^MAVtAGORDA

Chikuiiliua

,Darlln(

I / Jottrt

(\ O

(Derby

Palotna

on Same Scale

The P^HA^DXE of TEX AS

Ciudad

Cu in)> be l[\tO“Vy

Obri.tiwei V

’ C,o«,h^p

iiartz

A Biew<5b

gs Coti i,

,afd^da ie *

SV* ivoli Y

Rcfmcio

villft M1W L l\V E;

WeetN^dt

DInerov7

OAK

Asberton 1

SfTumk

VArtesia

iWeUst:

'Atlaa

.TJOSEOrfˆ

! hadeland,

ados .

jejnoldfl/J

lBOOlls_jf7

:77,c;

J Port Aransaa, >

IMCs’taNO'TTˆZ

CTdOdei.?ˆ

3Iatlock1

'Cactus

rpn8/0'>rUtl N U/E C E S Bishop

’ˆ/N _

flLKing*i1He /j%£ B E Gfh G

essf nERMˆs,

Brunl

Wheeler0/ *\°TT Eˆ.|

aHorrla!

Altavista

J I M

Randado

1 CorralltaB j

ZAPATA

Lampazos

Ad juntas

° Guerra . S ..

o Aeua Nueva

a Cueviiaa _4 _ Arm9

Santa Cruz of °R- l-ae ’ / Santarita

TAR RSlfiH'

v !Wu d Aq

:cr,t' / ?MonlVt'li3

gliicgrande 1 ^6

t.areyis I -£■ > /-

. odS.lla

©Zapata

Goo'lnigm

Las

Animas

Escorbaha'

/Raymond- J 3\ vllie %

'uburg^Huir^

Vameron

& °3oY*'V

kQw

Su'nmerlield.

issssiaw

i"-

J02

HI

,r«ood

Lyot

F-cillett

Perry ton

Texune

7Cjy£r S > ' | Mulockc

^ftflERWAN HANSFORD

at to

nil tree

LIPSCOMB I Haifa © I Lipscomb I HigginM

Mawaka o OCHILTREE Jincs &

I Coldwater | !oi-d t! berlTn Hal'*'0 1 I - - 3 Uu^ — - -

a 11am

sCbtx

Dal hi

J lazier rf < 5 «|

I— v^yVlear C®ok

Adob.

HUTCHINSON

V alls _ _

Caoadl

ROBERTS

Codman'tL--^

Middle

Babin aa

Canadlnn^s-L, _ ERTS H/tMPHlLL a. /Meadota

ater ./*.

TL &IX

Dumas

"ft — lb p front

/ i m| O O R E r Ch'antiing Test'u

Miami

u ' I

M..l»eetl7|j

WHEELER)| a ®>Yi4'eler Vc* * v

?ampa

Lefors

Tldd

T&3.-oeu

White Deer

0 L D H ArM-

0 t Adrian lfc

MTftld

Panhandle

Alanrccd

-ATTˆ

oDozicr

COLLINGS-

Aberdeen o

C- R. »

Boyustoa

' DEAr -SN!.'TH'-i -

TEXAS

SCALE

fˆahyon ARMSTR;

WORTH

Clifford

iiles

—

L'larondon'-'.«f

IliiiiL'ton

ssler

Dodson ville

ST. S®*W v F.nchmWˆ'SlIrfoaTS is

/ ' , r.y * I £ > /•_ LakevU

CASTRO. T„li\, ..*4 >2£9ˆ*

® 8 SWIS.\HER Ab h » E Istelli

Hereford

_4rZi«so

Friona

lied

ewlin

u&a*

i i oT

stelhne

L L c

ZHILORES!

Kirk land

Statute Miles, GS = 1 Inch.

0 5 10 20 30 10 50 60 70 60 90 _ ICO

m

Dinfinltt

— "Hart

•tvujiKSa. Ns'hgp" S*

I Y/f\ rt ivi c

■..i Far we 1 1

rew

Wright *4';,- n ■nˆ-voSTpu-ie

ˆ _ <Juitnquj^_ _ "

Hour o CVAtˆuiKorthfie

Rand McNally’s New 11 x 14 Map of Texas Copyright by Rand McNally & Co.

izLNorthfield

106°

N 442 D

2,945 Lockhart . J

750 Lockney . F

756 Lone Oak . . L

5,155 Longview . M

633 Loraine . G

1,021 Lott . J

1.938 Lubbock . F

2,749 Lufkin . M

? 1,404 Luling . J

1,194 Lyra, Palo Pinto.. I

1,864 McGregor . J

4,714 McKinney . K

633 McLean . C

627 Mansfield . J

1,061 Marble Falls . I

3,878 Marlin . K

13,712 Marshall . M

2.939 Mart, McLennan. .J

1,936 Memphis . C

1,209 Mercedes . C

718 Meridian . J

2,008 Merkel . H

687 Mesquite, Dallas . . K

2.694 Mexia . K

2,192 Midland . E

8 68 Midlothian . K

1,302 Miles . G

766 Milford . J

1,706 Mineola . L

3,950 Mineral Wells . I

284 Montague . J

983 Moody . J

831 Morgan . J

575 Mount Calm . K

3,137 Mount Pleasant . .M 956 Munday, Knox...H

3,369 Nacogdoches . M

1,178 Naples . M

3,284 Navasota . L

510 Nevada . K

3,165 New Braunfels I

1,338 Nocona . J

906 Oakwood . L

1,095 Olney . I

5,527 Orange . N

1,350 Paducah . G

1,389 Palacios . K

11,854 Palestine . L

605 Palmer . K

521 Panhandle . C

12,469 Paris . L

1,799 Pearsall . ,..H

1,856 Pecos . D

467 Peniel, Hunt . K

517 Petrolia, Clay . I

1,371 Pilotpoint . K

1,916 Pittsburg . L

2,829 Plain view . F

1,258 Plano . K

7,663 Port Arthur . N

1,699 Port Lavaca . K

313 Pottsboro . K

3,127 Quanah . H

388 Queen City . N

537 Quinlan, Hunt...K 280 Ravenna, Fannin. .K

773 Refugio . J

1,371 Richmond . L

640 Rising Star . I

2,073 Rockdale . J

1,382 Rockport . . . K

1,136 Rockwall . K

1,275 Rogers . J

941 Roscoe . G

1,472 Rosebud . K

1,198 Rosenberg . L

1,126 Rotan . G

136 Round Top,

Fayette . . K 5

1,210 Royse City . K 2

891 Rule . H 1

1,558 Rusk . L 3

1,640 Sabinal . * • .H 5

400 Sabine Pass . M 5

10,321 San Angelo . G3

123,831 San Antonio . 15

1.204 San Augustine. ...N3

834 San Elizario . B 3

206 San Felipe, Austin, K 5

4,071 San Marcos ..... I 5

453 Sansom, Uvalde. .H 5

1,478 Santa Anna . H 3

328 Savoy . K 1

1,091 Schulenburg . K 5

3,116 Seguin . J 5

2.029 Seymour . HI

13,667 Sherman . K 1

1,096 Shiner . J 5

3,167 Smith ville . J 5

2,514 Snyder . G 2

1,147 Socorro. El Paso. .B 3

3,902 Stamford . H 2

822 St. Jo . J 1

2,561 Stephen ville . 13

520 Stratford . B 1

5,151 Sulphur Springs ...LI

4,176 Sweetwater . G2

5.314 Taylor . J 4

3,288 Teague . . . K 3

425 Tehuacana, Lime¬ stone . K 3

13,504 Temple . J 4

491 Tenaha . M3

7,050 Terrell . K 2

12,640 Texarkana . N 1

678 Thornton . K 3

1,528 Timpson . M3

797 Tioga . K 1

455 Tolar . J 2

288 Tom Bean, Gray¬ son . K 1

1,052 Toyah . D 3

550 Trenton . K 1

1,126 Troup . L 2

1,216 Tulia . C 8

11,865 Tyler . L 2

3,998 Uvalde . H 6

708 Valley Mills . J 3

1,441 Van Alstyne . K 1

495 Venus . K 2

3,195 Vernon . H 1

3,673 Victoria . J 6

33,385 Waco . J 3

1,340 Walnut Springs . . . J 3

476 Waterman . M3

6.205 Waxahachie . K 2

5.074 Weatherford . J 2

906 Weimar . K 4

779 Weinert, Haskell. .H 1

576 Wellington . D 2

1,645 West, McLennan ..J 3

1,505 Wharton . K 5

1,219 Whitesboro . K 1

1,563 Whitewright . K 1

766 Whitney . J 3

12,124 Wichita Falls . II

1,398 Wills Point . L2

1,741 Winnsboro . L2

1,347 Winters . G 3

1,402 Wolfe City . LI

899 Wortham . K 3

620 Wylie . K 2

4,657 Yoakum . J 5

1,180 Yorktown . J 6

5

1

2

2

2

3

1

3

5

2

3

1

1

2

4

3

2

3

2

7

3

2

2

3

3

2

3

3

2

2

1

3

3

3

1

1

3

1

4

5

1

1

4

1

6

3

2

2

1

6

3

2

1

1

2

1

2

5

6

1

1

1

2

1

6

5

2

4

7

2

4

2

3

5

2

TEXAS

461

The ordinary Gulf fauna abounds off the coast where, as a consequence, very fine fishing is to be had. Tarantulas, centipedes and large red ants are the most commonly noticed inverte¬ brates.

Agriculture and Stock Raising— Although

occupying a decreasing percentage of the popu¬ lation, as time goes on these industries still occupy 60 per cent of the male workers. About a sixth (28,000,000 acres) of the State is planted to crops each year, the remaining five-sixths mainly furnishing pasturage for stock. The number of farms, nearly 450,000 in 1916, has nearly doubled and the improved acreage has increased 50 per cent since 1890. The Black Prairie of the Upper Cretaceous is the most densely populated farming

region, but the Permian Red Beds, and the Eocene and Neocene areas furnish large bodies of im¬ mensely fertile soil. Perhaps two-thirds of Texas is easily tillable. The use of fertilizers is still uncommon. Variations in rainfall and frost dates produce wide variations in the crop productions per acre. Very large crops and large sized fruits and vegetables are common. The average value of the crops is about $20 per acre. Intensive agriculture is beginning; the crops of the thousands of contestants for the annual prizes of the Texas Industrial Con¬ gress average about three times the State aver¬ age.

The total value of farm property, $962,000,- 000 in 1900, $2,219,000,000 in 1910, has nearly trebled since 1900 and has quintupled since 1890. The total wealth of Texas was $6,860,- 000,000 in 1912, $2,836,000,000 in 1904, $2,106,- 000,000 in 1890. On the average, out of a thousand farmers, 425 are white owners, 408 are white tenants, 51 are negro owners and 116 are negro tenants.

The chief crop is cotton, about equal in value to all the other crops combined and raised over three-fourths of Texas. In 1912 the maximum crop so far, 4,880,000 bales, was pro¬ duced. The value of the annual cotton crop ranges between 200 and 350 millions of dollars, Texas producing about a sixth of the world's crop. The corn crop averages, 100,000,000 bushels with wide variations. Wheat and oats vary much in amounts planted and in yields per acre — for wheat 12.8 bushels per acre and a 15,000,000 bushel crop and for oats 29.1 bushels per acre and a 40,000,000 bushel crop are averages. Nearly 10,000,000 bushels of rice are grown annually on 300,000 irrigated acres. The annual value of the Kafir corn, milo maize, sorghum and other forage crops is not far from $25,000,000. The production of sugar has de¬ clined to a few thousand tons. The fruit and vegetable crop exceeds $40,000,000 in value. Peaches, sweet potatoes, watermelons, tomatoes, onions, cabbages are raised in large amounts and Texas is by far the leading State in native pecans. Most of the other standard fruits and vegetables are raised in lesser amounts and there is the beginning of a citrus fruit indus¬ try along the coast. In 1917 the production of cotton was 3,125,000 bales which, excluding the seed, were valued at $375,000,000. The pro¬ duction in 1917 of the other principal crops in thousands of bushels and thousands of dollars was corn, 77,825, of value $129,968; wheat, 16,- 200, value $34,020; oats, 37,050, value $30,381;

potatoes, 9,312, value $13,869; hypothetical value of all crops (United States Department of Agriculture) $684,856; average for five years, $421,277, over 20 per cent greater than any other State. The 1917 wool clip amounted to 10,045,000 pounds.

First in cotton and pecans Texas is also first among the States in cattle, sheep and goats. The United States estimates for 1918 are 1,128,- 000 dairy cows valued at $64,038,000; 4,660,000 other cattle at $179,667,000 ; 1,212,000 horses at $93,324,000; 808,000 mules at $86,456,000; 2,188,- 000 sheep at $16,410,000 and 3,068,000 swine at $43,259,000. Sheep and goat raising is largely confined to southwest Texas. Since 1890 the population of Texas has doubled, the number of mules and goats has more than trebled, the number of horses, swine and milch cows has remained nearly stationary, the number; of sheep has decreased 50 per cent and the num¬ ber of ((other)) cattle has decreased nearly as much.

Irrigation. — Plants fall into two fairly well-marked divisions — (a) numerous small plants widely scattered but chiefly in the west, which use the water from rivers, springs and waterholes to raise a wide variety of crops and (b) large plants, chiefly along the lower parts of the rivers, which irrigate thousands of acres under one management and sell water to indi¬ vidual farmers. In the southeast these large plants are almost exclusively rice producing; along the Rio Grande they raise everything but rice. The Elephant Butte Dam on the Rio Grande in New Mexico above El Paso is the only United States reclamation project directly affecting Texas where it will irrigate about 100,000 acres. Perhaps 5,000,000 acres in Texas are irrigable. About a million acres are under ditch and 600,000 acres irrigated an¬ nually, half in rice. Most of the water is pumped to the fields, the total capacity of the pumps being over 6,000,000 gallons per minute. Rice irrigation on a large scale is scarcely 15 years old and the acreage irrigated for other crops has quintupled since 1900. Farms irrigating for rice numbered 73 in 1900 and 1,088 in 1910; farms irrigating for other crops num¬ bered 1,252 in 1900 and 4,150 in 1910. In arid Texas small irrigating plants have existed for centuries. Irrigation development has been particularly rapid since 1910 in the lower Rio Grande Valley but has not been without its backsets. The recently finished Medina Dam near San Antonio renders 60,000 acres ir¬ rigable. Between Hereford and Lubbock lies an area where irrigation water may be ob¬ tained from shallow wells. Similar but small areas exist elsewhere. There is an Artesian Belt in South Texas and various wells are sources of water for domestic uses.

Overflow lands amounting to 3,000,000 acres and swamp lands amounting to 5,000,000 acres exist. Drainage districts covering 2,000,000 acres have already been organized and 150 miles of levees have been built under a recent law authorizing community action in such matters.

Mining. — This industry is making great progress. The production of petroleum, which practically began at Corsicana in 1895, owing to the discovery ot the rich Spindle Top field in 1901 and of other great fields in the succeeding years, has increased immensely but

has been subject to considerable fluctuations. In the last two years the production of the older coastal and north Texas oil fields has increased and immense quantities of oil have been found in the central carboniferous region. Produc¬ tion leaped from 27,644,605 barrels in 1916 to 60,000,000 barrels in 1919. Oil and gas prospect¬ ing has been going on vigorously, stimulated by frequent successes. The production of most of the other minerals has had a slow but fairly uniform growth. In 1914 the total mineral production was $30,363,426, including 20,068,184 barrels of petroleum at $14,942,848 ; 2,24 7,773 tons of coal and lignite at $3,922,459; 12,433,- 639 M. cubic feet natural gas at $2,469,770; 2,100,341 barrels of cement at $1,947,016. Clay products, lime, gypsum, cinnabar, salt, sulphur and various other minerals amount to the re¬ maining $7,081,333.

Manufacturing.— Since 1900 the ((value added by manufacturingˆ to the Texas raw products has nearly trebled. In proportion to population, in 1900 Texas manufactured a sixth, in 1915 a fourth, as much as the United States as a whole. Manufacturing has arisen chiefly in response to demands made by the immense raw products but has been retarded by scarcity of fuel and skilled labor. The major manu¬ facturing industries are naturally based upon the major raw products. The large cotton crop supports nearly 4,000 gins (some very large) and 200 cotton-seed oil mills but only 20 cotton spinning establishments. Flour, grist and rice mills handle the entire crop of cereals but canning and preserving are far behind the opportunities offered by the large fruit and vegetable crops. There are a few large meat packeries slaughtering close to 1,500,000 animals a year. A few large petroleum refineries with a total capacity of 250,000 barrels per day are handling also much Oklahoma and Louisiana oil transported by pipe lines. The lumber area in the east, chiefly southeast, of over 50,000 square miles, upon which there is an estimated stand of 40,000,000,000 board feet of yellow pine and 20,000,000,000 hardwoods, supports about 400 sawmills and 400 other woodworking plants. About 2,000,000,000 feet of the yellow pine is being cut annually but the hardwood cut is scarcely 5 per cent of this amount.

The major industries just listed include about two-thirds of the total manufacturing which, in general, is of a kind that involves only simple processes which may be done by machinery.

The manufacture of bricks and other clay products is widely and numerously scattered. Much ice is made in every town. No distilled spirits are made and no wool or mohair is woven. Dallas is second only to Nashville as a Southern publication centre. Dallas and Hous¬ ton are somewhat ahead of Fort Worth and San Antonio as manufacturing places. The im¬ portant manufactures of Dallas are cotton gin machinery, meat packing, flour and grist milling, cotton-seed oil and cake, leather and printing. In Houston, cotton seed, 'meat packing, rice cleaning, railway car repairing and brewing are the chief industries. Fort Worth leads in meat packing and flour milling, San Antonio led in brewing. In these four largest cities a third of the total manufacturing is done. Of the wage earners, 6 per cent are women, 2 per cent are children under 16 years.

The 1914 United States census statistics for Texas manufacturing are as follows:

Number of establishments .

Persons engaged in manufacture . .

Primary horse power . . .

Capital .

Salaries and wages . . .

Value of finished products .

Value added to raw product by manufacture . . .

5,084

91,114

335,791

283,544,000

59,179,000

361,279,000

108,135,000

Statistics for those industries where

INDUSTRY

Lumber products .

Printing and publishing .

Car repairing steam railroads. Slaughtering and meat pack¬ ing .

Oil, cotton-seed and cake . . .

Liquors, malt .

Flour and grist mill products. Foundry and machine shop

products .

Ice manufactured .

Bread and other bakery

products .

Brick and other clay products

:acture ws :

was in

excess of

Number

of estab-

Number

Value

lish-

of wage

added by

ments

earners

manufacture

587

19,956

$17,101,000

1,188

4,690

11,054,000

63

10,915

9,298,000

21

3,491

8,533,000

233

4,471

5,768,000

13

958

5,542,000

191

1,300

5,537,000

174

3,026

4,743,000

255

1,926

3,668,000

530

1,949

3,361,000

81

1,811

1,444,000

Cement, confectionery, sheet metal, cotton goods, artificial gas, leather and mineral waters are the other chief manufactures; the value added by manufacture in each case is slightly in excess of $1,000,000.

Transportation. — Befpre the Civil War less than 500 miles of railway were built. In 1919 there were over 15,800 miles in operation, not including 4,200 miles of side tracks. Rail¬ way building was greatly promoted by land grants until the public lands were exhausted in 1882. The leading systems are the Southern Pacific (mileage, 3,000), the Gould System, in¬ cluding the International and Great Northern and the Texas and Pacific (mileage, 3,000), the Santa Fe (mileage, 2,000) and the Missouri, Kansas and Texas (mileage, 1,500). The Texas Railroad Commission has authority to fix rates and otherwise to control intrastate railway traffic. The issuance of railway stocks and bonds is strictly controlled. Te.xas is first among the States in railway mileage, having half again as much per inhabitant and two- thirds as much per square mile as the United States as a whole. Numerous steamship lines connect Galveston with the great ports of the world. Some 500 miles of interurban and 700 miles of urban electric lines are in operation. From $10,000,000 to $15,000,000 are being spent each year upon the roads.

Commerce. — - Cotton lint is the principal ex¬ port, exceeding in

value all the other exports combined. Most of this cotton goes to Europe via Houston and Galveston. In descending order the other chief exports are petroleum, cotton-seed products, cattle, lumber, horses, mules, rice, wool and mohair. The imports are chiefly machinery, clothing, vehicles, furniture and a wide variety of other manufactured goods. Pork, sugar, potatoes and a host of other foodstuffs are imported in considerable amounts. Strong efforts are being made to reduce such food importations by raising an increasing amount of crops other than cotton, reduce such food importations by raising an consumption about balance, cotton lint being

TEXAS

State Capitol at Austin

TEXAS

•

■

1 The Alamo, San Antonio, built in 1718

2 The Mission San Jos6, near San Antonio, built in 1718

TEXAS

463

omitted from the count. This lint produces a balance of trade in favor of Texas of over $200,000,000 a year. Galveston is one of the 15 principal ports of the world; her imports and exports are mostly but not exclusively of Texas destination and origin.

Banks and Banking. — Law and public opin¬ ion opposing governmental banks, private banks, some of which are still flourishing, prevailed until 1865 when the first national bank was chartered at Galveston. In 1918 there were 511 national banks, with one of the 12 regional reserve banks at Dallas. The total capitaliza¬ tion of these banks is above $35,000,000; the total surplus is above $20,000,000; the total de¬ posits are over $200,000,000. A State bank¬ ing law went into effect in 1905 under which nearly 900 State banks have gone into successful operation. Their total capitalization is over $23,000,000, their surplus is over $12,000,000, their deposits are about $165,000,000. De¬ positors are protected either by a bonding sys¬ tem or by a State guaranty fund maintained by assessments on

the banks collectively. Ten national banks have deposits in excess of $4,- 000,000 each ; 10 State banks have deposits of over $1,000,000 each. There is no overwhelm¬ ingly preponderant bank. Interest rates are still rather high, kept up by rapidly rising land values, by large business profits and by other causes.

Government. — The present constitution was adopted in 1876 and has not been extensively amended since. The chief elective officials are the governor, attorney-general, treasurer, com¬ missioner of the general land office, superin¬ tendent of public instruction and commissioner of agriculture, together with three railroad commissioners. The chief officials appointed by the governor are the secretary of state, adju¬ tant-general, three penitentiary commissioners and 14 other officers whose duties relate to insurance and banking, taxes, revenues, public health, State purchasing, game, public buildings, labor, mines, pure foods, reclamation of lands, pensions, fires and masonry inspection. The judiciary is elective. In ascending order there are Justice and Municipal Courts, County Courts, District Courts, each with one judge or presid¬ ing official. Above these are nine Courts of Civil Appeals above which are the Court of Criminal Appeals and the Supreme Court. Each of these higher courts has three judges elected in rotation every two years for six- year terms. The legislature meets biennially and consists of a senate of 31 members elected alternately every two years for four-year terms and a house of 142 members elected for two- year terms. There have been numerous called sessions. The State is divided into four United States judicial districts and into 16 Congres¬ sional. Of the 18 congressmen two are, there¬ fore, elected at large. Voting is restricted to males over 21 who have paid the poll tax and have lived one year in the State and the last six months in the district or county where the voting is to be done. The old convention system of selecting officials has been largely replaced by the general primary. The salaries of the State officials are not large. The gov¬ ernor has somewhat more power than is usual in the other States and he controls a consider¬ able amount of patronage. He appoints nearly

40 State boards and a two-thirds vote of both house and senate is required to overcome his veto. In general the county is the local unit of government. Spanish influence has caused some civil law to be incorporated into the com¬ mon law. Law and equity are not dif¬ ferentiated, common-law forms of pleading have been abolished, and a Penal Code and a Code of Criminal Procedure dates from 1856. Texas has been the pioneer in adopting the community property system, in exempting the homestead from liens, in the commission form of city government, in the regulation of rail¬ way stocks and

bonds, in the regulation of farm tenant rents.

State Finances. — In 1915 the total assessed valuation was $2,755,171,793, upon which was levied a total State ad valorem tax of 55 cents on the $100. This tax, together with charter fees, poll and occupation taxes, etc., produced a total revenue from taxation of about $13,240,- 000. To this should be added an income of $2,140,170 arising from the State Permanent School Fund of nearly $68,000,000. The uni¬ versity and the Agricultural and Mechanical College possess endowments derived, like the Permanent School Fund, from the sale of State lands set apart for the schools in early days, which yielded an income of about $260,- 000. Expenditures were as follows : State de¬ partments, $1,633,505; judiciary, $1,057,197; eleemosynary institutions, $2,861,876; Con¬ federate pensions and homes, $1,558,171 ; mis¬ cellaneous, $262,821 ; higher education, $1,754,- 077 ; public schools, $7,999,059. Income and ex¬ penditures are increasing at least 5 per cent a year. Of the ad valorem tax of 55 cents, five cents is specifically set aside for Confederate pensions, 20 cents for the public schools. The State debt is negligible, but the total debt of the counties exceeds $30,000,000; of the cities it is about $60,000,000. County tax rates are gen¬ erally under $1 on $100 but in some cases the city rates reach $2.

Education. — To the $7,999,059 spent by the State on the public schools in 1915 should be added $6,387,866 raised by local taxation in counties, districts and cities and $518,628 de¬ rived as income from Permanent County School Funds, similar to the State Permanent Fund, and amounting to nearly $13,000,000. On about 1,100.000 children of free school age Texas spent in 1915 about $14 per child. There are nearly 25,000 teachers, of whom scarcely 1,500 hold college degrees, of whom about 3,000 hold certificates that would admit to standard colleges. The rural schools are open scarcely six months per year. There is such pressing need of improving rural education that the legislature of 1915 appropriated $1,000,000 for the purpose and it is probable that this amount will be increased in future. A compulsory law now going into effect will cause a much needed improvement in attendance. The high schools, between 500 and 750 in number, are of very un¬ equal merit but are improving fairly rapidly. The training and the salaries of teachers are in¬ creasing. The value of the public school buildings exceeds $30,000,000. Receipts from sales of school building bonds were $2,847,891 in 1915, the amount collected by local taxation for redemption and interest on bonds was $1,719,682. There are numerous private second-

ary schools. The native white illiteracy was 6.1 per cent in 1900, 4.3 per cent in 1910; of negro illiteracy 24.6 per cent in 1910, 38.6 per cent in 1900.

There are State normals at Huntsville, Den¬ ton, San Marcos, Canyon City, Commerce and Alpine for whites and at Prairie View for negroes. The Girls' Industrial College is at Denton, the Agricultural and Mechanical College (which has income from the United States and from other sources not enumerated above) for boys is at Brjˆan, the University of Texas is at Austin with the exception of the medical depart¬ ment which is at Galveston and a school of mines at El Paso. These State higher schools, whose total enrolment, regular session, exceeds 8,000, are almost wholly supported by biennial legislative appropriations. There are nearly 50 private and denominational colleges of various grades, with an attendance in excess of 14,000. Chief among these are the new Southern Metho¬ dist University at Dallas and the Rice Institute (endowment over $10,000,000) at Houston, to¬ gether with the much older Baylor University (Baptist) at Waco, Southwestern University (Methodist) at Georgetown, Austin College (Presbyterian, for boys) at Sherman, Trinity (Presbyterian) at Waxahachie and Texas Christian University at Fort Worth.

Charities and Corrections. — Three insane asylums, with a total of 4,000 inmates, are located at Terrell, Austin and San Antonio. There is an epileptic colony at Abilene; a blind institute, a deaf, dumb and blind institute for negroes, a deaf and dumb institute, a Con¬ federate home, a woman's Confederate home and a farm colony for feeble-minded are at Austin; an orphan's home is at Corsicana; a juvenile training school for boys is at Gates- ville and for girls at Gainesville; a tuberculosis sanitarium is at Carlsbad. In addition to these State-maintained institutions there are numerous denominational and private hospitals and retreats of very various kinds. The State penitentiaries, containing usually from 4,000 to 5,000 inmates, are at Rusk and at Huntsville, and, mainly through farming, are designed to be self-supporting, but have in recent years created large deficits.

Religion. — Accurate recent statistics do not exist. The best approximations are as fol¬ lows: Baptists, 490,000; Catholics, 375,000; Methodists, 375,000; Presbyterians, 85,000; Disciples of Christ, 60,000; Lutherans, 35,000; Protestant Episcopals, 20,000; Jewish, 15,000; all other denominations, 45,000. Most of the negroes are either Baptists or Methodists. Other approximate church statistics are as fol¬ lows : Churches, 9,500; church organizations, 12,500;

Sunday-school teachers, 65,000; Sun¬ day-school pupils, 600,000; value of church property, $27,000,000; seating capacity of the churches, 3,000,000; church debts, $1,350,000. The Y. M. C. A. and Y. W. C. A. hold property worth $1,700,000.

Population. — The first United States cen¬ sus taken was that of 1850 when the population was 212,592. Tn 1870 the population was 818,-579 ; in 1910 it was 3,896,542 ; in 1920 it was 4,663,228. The present rate of increase is about 85,000 a year; Native white Americans form 73 per cent of the population, 51 of this 73 being native white Texans. Foreign born

Europeans number 3 per cent, Mexicans 7 per cent, negroes 17.7 per cent (20.4 per cent in 1900). A large German element in the popula¬ tion of South Texas dates from 1848. In general Texas is Southern with a strong flavor of the West. The occupation percentages for the male workers (who number about 1,330,000 in 1915) are: Agriculture and stock raising, 60 per cent; manufacturing and mining, 14 per cent; trade and transportation, 15 per cent; pro¬ fessions, 3 per cent ; all other occupations, 8 per cent. White farm tenantry and the percent¬ age of women at work are increasing. The towns are increasing much faster than the country, 68 per cent as compared with 19 per cent during the last census decade. The five largest cities increased 107 per cent. Only 19 per cent of the people live in towns of more than 10, (XX) population. Sixty-six per cent of the population is rural. According to the re¬ turns of the United States census for 1920, Dallas, San Antonio, Houston and Fort Worth have passed 100,000. El Paso is 77,543 and Galveston 44,255 ; Austin, Waco, Wichita Falls and Beaumont have passed or are nearing 40,000. Between 25,000 and 10,000 in approximately de¬ scending order are Laredo, Denison, Sherman, Amarillo, Marshall, Paris, Abilene, Temple, Brownsville, Tyler, Texarkana, Cleburne, Palestine, Corsicana, Corpus Christi and Green¬ ville.

History. — The first explorers were Span¬ iards, Cabeza de Vaca, 1528-36, and Francisco Vasquez de Coronado, 1540-42. Other Span¬ ish gold hunters traversed the State occasion¬ ally during the next 140 years but it was not till 1682 that a still-existing Indian pueblo under Spanish auspices was found at Ysleta near modern El Paso, 200 years younger. La Salle, driven west by a storm while searching for the mouth of the Mississippi down which he had sailed three years previously, built in 1685 near Matagorda Bay a fort which was soon destroyed by the Indians. Four French¬ men found refuge among the more peaceable Tejas Indians who, as a result, have their tribal name perpetuated as “Texas.® Alarmed by this accidental and unsuccessful

French in¬ vasion, the Spaniards of Mexico established in 1690 the Mission San Francisco de los Tejas, near modern Nacogdoches, but this far-away mission was soon abandoned. Later various other scattered missions and forts were estab¬ lished, but in 1800 those at San Antonio, Na¬ cogdoches and Goliad were the chief results of over 200 years of Spanish colonization. San Antonio, begun in 1718, became in 1730 the first civil European settlement in Texas.

The history of modern Texas begins in 1821. The Spaniards having failed really to settle the country, three abortive invasions be¬ tween 1800 and 1821 by Anglo-Americans were shadows of coming events. In 1821 Mexico finished successfully her war of independence begun with Spain in 1810; in 1821 the United States gave up a claim to Texas arising from the purchase of Louisiana from France in 1803; in 1821 Moses Austin obtained permission to locate 300 American families but, dying, his son Stephen established the first permanent Anglo- American settlement at San Felipe de Austin on the lower Brazos River in December 1821. During the next 15 years probably 30,000

Americans came to Texas, settling mainly along the rivers between San Antonio and Nacog¬ doches southward to the coast. They came, sometimes bringing their slaves with them, be¬ cause a fertile and unoccupied land was calling to them, not because, as has sometimes been maintained without evidence, they specifically planned to extend the slave-holding area. Re¬ mote from real Mexico, they practically gov¬ erned themselves and formed no close or genuine ties with their adopted country. A federal Mexican republic resulting in 1824, Texas and Coahuila became one state divided into the departments of Saltillo, Monclova and Texas. Revolution and disorder prevailing con¬ tinually in Mexico, when Santa Anna estab¬ lished there a dictatorship in 1835, the American Texans proclaimed a provisional government and declared in favor of a union with the Mexican liberals together with a restoration of the Federal Constitution of 1824. Santa Anna sent troops into Texas and war began. The desperate defense of the Alamo at San Antonio by 183 Texans under W. B. Travis in which the defenders were killed to a man and the battle of San Jacinto in which Santa Anna was defeated and captured by a Texan army under Sam Houston were the outstanding events of the war. Practical independence re¬ sulted and between 1836 and 1845 Texas was an independent republic, a unique experience for one of the States of the

Union. In 1845, after a long conflict over slavery, Texas was annexed to the United States, retaining all her public lands and the right to subdivide into not more than five States. Claims to a portion of New Mexico were abandoned later for $10,000,000 which were used to pay the debts that the Republic of Texas had accumulated. The annexation of Texas brought on the war between the United States and Mexico which made the Rio Grande an international boundary. After a decade of peaceful statehood Texas abandoned the Union for the Southern Con¬ federacy, furnishing probably 100,000 soldiers. The last battle of the Civil War was fought at Palmito, near Palo Alto, on the Rio Grande, 13 May 1865. Texas was not the scene of very active military operations; Federal troops at¬ tacked the coast but could not penetrate further. A reconstruction government of the usual type prevailed until 1874 when Gov. E. J. Davis was driven from office.

Since 1874 Texas has been Democratic by large majorities. The carpet bag constitution of 1869 was replaced in 1876 by the consti¬ tution now in force. In 1874 the Texas Rang¬ ers, a famous State constabulary, was organized to protect the frontier from Indians. The debt left by the Davis administration was paid during the succeeding Coke, Hubbard and Roberts administrations. In 1884 fence cutting wars that arose because of the rapid spread of barb wire demanded special and drastic legislative action. The old Capitol burned down in 1881 and 3,000,000 of acres of Panhandle public land was paid for a new granite Capitol begun in 1885. The most important struggle since Re¬ construction days was that of 1892 when Gov. J. S. Hogg fought and won a hotly-contested campaign which resulted in the establishment of a railroad commission with large powers and the passage of anti-trust laws and laws re- vol. 26 — 30

striding the alien ownership of land. Prohi¬ bition, first voted on in a State election in 1887, soon developed into a much-fought issue. Prior to prohibition the State was under well-en¬ forced local option laws. In 1896 the United States Supreme Court fixed finally the boundary of Texas by awarding Greer County in the forks of the Red River to what is now Okla¬ homa. Texas from time to time has suffered from river floods and from tropical storms along the coast. At Galveston in 1900 thousands of lives and much property were lost in a storm. Out of this calamity grew the Galveston Sea Wall and the commission form of city govern¬ ment. flhe supremacy of the Democratic party, threatened for a few years by Populism*before the Democrats adopted free silver in 1896, shows no signs of failure. The political prob¬ lems now before Texas are the development of a more efficient system of public schools, the reduction of farm tenantry, compulsory invest¬ ment of life insurance funds in Texas securities, abolition of the fee system of

paying county officials, penitentiary reform, reforms in legal procedure and better public roads.

Presidents of, the Republic.

David G. Burnet, ad interim . 1'836

Sam Houston . 1836-38

Mirabeau B. Lamar . 1838-41

Sam Houston . 1841-44

Anson Jones . 1844-46

Governors of the State.

J. Pinckney Henderson .

George T. Wood .

P. Hansborough Bell .

James W. Henderson (acting) . . .

Elisha M. Pease .

Hardin R. Runnels . .

Sam Houston . Independent

Edward Clark (acting) .

Francis R. Lubbock .

Pendleton Murrah, .

Interregnum .

Andrew J. Hamilton, Prov., ap¬ pointed .

James W. Throckmorton .

Elisha M. Pease .

Interregnum .

Edmund J. Davis .

Richard Coke .

Richard B . Hubbard .

Oran M. Roberts .

John Ireland .

Lawrence S. Ross .

James S. Hogg .

Charles A. Culberson .

Joseph D. Sayers .

S. W. T. Lanham .

Thomas M. Campbell .

Oscar B. Colquitt .

James E. Ferguson .

William P. Hobby .

Pat M. Neff .

Democrat .

and Unionist Democrat .

Conservative

U

Appointed

Republican

Democrat

li

ll

1846- 47

1847- 49 1849-53 1853 1853-57 1857-59 1859-61 1861 1861-63 1863-65 1865

1865- 66

1866- 67

1867- 69

1869- 70

1870- 74 1874-77 1877-79 1879-83 1883-87 1887-91 1891-95 1895-99 1899-1903 1903-07 1907-11 1911-15 1915-17 191 7-21

1921-

Bibliography. — United States . Census and Department of Agriculture statistical reports : Texas Almanac of the Galveston-Dallas News, various editions 1857 to 1914; Miller, finan¬ cial History of Texas) ; Townes, (Civil Gov¬ ernment of Texas) ; various histories of Texas by Edwards (1836), Kennedy (1841), Yoakum (1856), Thrall (1878), Brown (1892), Wooten (1898), Garrison (1903); Roberts, description of Texas } ; Benedict and Lomax, (Book of Texas) ; Eagleton, (Writers and Writings of Texas} ; Williams, (Sam Houston and the War of Independenceˆ ; Simonds, (Geography of Texas) ; Smithwick, ‘Evolution of a State*; Quarterly of the Texas Historical Association; Southwestern Historical Quarterly; Annual Reports Texas Geological Survey, Mineral Sur-

vey and Bureau of Economic Geology; Annual Report United States Geological Survey; North American Fauna 25, United States Depart¬ ment of Agriculture.

H. Y. Benedict, Dean, University of Texas.

TEXAS, The University of, the head of the public school system of the State, is located at Austin, except the medical department at Galveston and a loosely connected school of mines at El Paso. The first step toward its establishment was taken in 1839 when the Congress of the republic set aside 40 acres for a campus in the future city of Austin and 50 leagueˆof public land as an endowment. In 1858 the legislature increased the endowment by adding $100,000 of United

States bonds and lands amounting to 10 per cent of all the public lands granted to railways. The constitu¬ tion of 1876 replaced this 10 per cent by 1,000,000 acres, to which the legislature added another 1,000,000 in 1883. The university was finally organized in 1881, located by a popular vote and opened to students in 1883. Before this the Agricultural and Mechanical College had been opened and although vaguely made a branch of the university by the constitution of 1876, has existed separately under its own board of directors. From its 2,000,000 acres, which are in West Texas and leased to cattle¬ men, the university has an income of nearly $170,000; fees and interest on $650,000 derived chiefly from land sales amount to about $50,000 more. The annual appropriation for running expenses from the legislature for 1919-20 is $950,000. The constitution prohibits the use of legislative aporopriations to pay for build¬ ings, and the act establishing the university limits the matriculation fee to $30, admits men and women on equal terms and prohibits any sectarian instruction or religious tests for offi¬ cers or students. The government is in the control of a board of nine regents appointed by the governor with the consent of the senate, three every two years for terms of six years. The departments of the university are (1) the college of arts, (2) the department of law, (3) the department of engineering, (4) the depart¬ ment of medicine, including pharmacy and nursing, (5) the department of education, (6) the graduate department, (7) the summer school and summer normal, (8) the department of extension, (9) the bureau of economic geol¬ ogy and technology. The B.A., B.S., M.A., Ph.D., LL.B., LL.M., C.E., E.E., M.E., and M.D. degress are conferred. Provision is made for taking the B.A. and M.D. in seven years, the B.A. and LL.B. in six. Twenty courses, some¬ what elective under a system of grouped studies, are required for the B.A. Fourteen and one- half high school units are required for admis¬ sion, the department of law requiring in addition 10 college courses, the medical department also requiring 10. The LL.B. requires three years, the M.D. four years of nine months each. The summer school offers during the summer session of three months as many as possible of the courses of the regular session. In addition to the older collegiate subjects, courses in journalism, home economics, business administration, music and Slavic language are offered. The usual col¬ legiate clubs, fraternities, associations, fellow¬ ships and scholarships abound, and an unusu¬

ally broad system of student government pre¬ vails, accompanied by the honor system on ex¬ aminations. The campus at Austin is sur¬ rounded by churches and an association of reli¬ gious teachers give courses which are allowed to count toward the B.A. At Austin are the

Main, Law and Engineering buildings, the li¬ brary, two dormitories, a power-house, a chemi¬ cal laboratoy and about 25 ˆshacks,® cheap frame buildings which growth has necessitated and which are used for various purposes. At Galveston are the Medical College building, the five buildings of the John Sealy Hospital, a dormtory for women and a nurses' home. The library has over 150,000 bound volumes, including a number of rare first editions. The laboratories are well equipped. There are various funds, mostly small, and numerous spe¬ cial collections. During the regular session about 4,000 students are in attendance. In addition. 500 other individuals attend the sum¬ mer school, 500 the summer normal and 700 doing correspondence work. The attendance has more than doubled since 1908. The vot¬ ing faculty numbers 150, the whole staff over 350, the affiliated high schools nearly 300. Most of the Texas colleges officially use the affiliated list of the university.

TEXAS AGRICULTURAL AND ME¬ CHANICAL COLLEGE, located at College

Station, Brazos County, Tex. It was estab¬ lished in 1871, receiving as an endowment 180,000 acres of land from the National gov¬ ernment, in accordance with the Morrill Land Grant Act of 1862. Opened for the reception of students 4 Oct. 1876. The government of the college is vested in a board of nine di¬ rectors, appointed by the governor for terms of six years. It offers 11 four-year courses leading to the degree of B.S., as follows: Agriculture, architecture, architectural engi¬ neering, chemical engineering, civil engineer¬ ing, electrical engineering, general engineer¬ ing, mechanical engineering, military engi¬ neering, textile engineering. A four-year course in veterinary medicine leading to the degree of D.V.M. is also offered. Two-year courses in agriculture and engineering are pro¬ vided for students with limited preparation, who are over 18 years of age. Graduate work in agriculture and engineering is also provided. The college farm and grounds contain 2,500 acres, of which 750 are under cultivation ; the grounds and buildings in 1916 were valued at $2,000,000; in 1915 and 1916 buildings to the value of $375,000 were erected, including a hos¬ pital, an assembly hall, a veterinary building, a stock judging pavilion and a steam plant. The library in 1916 contained 25,000 volumes; the enrolment for 1915-16 was 1,415, the faculty

1.

TEXAS BLUEGRASS. See Grasses in

the United States.

TEXAS CHRISTIAN UNIVERSITY,

located at Fort Worth, Tex. It was founded as a private institution in Thorp Springs, Tex., in 1875, and chartered under the name of the Add Ran College ; in 1890 the college became the property of the Christian Church of Texas, and in 1895 was moved to Waco, Tex., and the name was changed to Texas Christian Uni¬ versity. In the spring of 1910 the college was burned at Waco, and it was moved to Fort

Worth, Tex., that year, where it opened in the fall of 1910. The university now includes the following departments: (1) The Add Ran College of Arts and Sciences; (2) the College of the Bible; (3) the College of Business; (4) the College of Music; (5) the School of Ora¬ tory; (6) the School of Art; (7) the Prepara¬ tory School ; (8) the department of domestic science; (9) the department of law; and (10) the College of Medicine, located at Fort Worth, Tex. The university is coeducational and is the school of the Disciples of Christ in Texas; no secret societies are permitted but the stu¬ dents maintain four literary societies and an athletic association besides other art and reli¬ gious societies. The campus contains 50 acres on high ground above the city. The buildings include the Girls' Home (Jarvis Hall) ; Worth Hall, Clark Hall, Goode Hall, Brite College and the Medical College. The income is about $100,000 yearly; the library contains over 12,000 volumes and is a government depository; the students in all departments in 1915-16 num¬ bered 710 and the faculty 78.

TEXAS FEVER, in cattle. See Rinder¬ pest.

TEXCOCO, tas-ko'kd. See Tezcuco.

TEXEL, tek'sel, Netherlands, an island, the largest in the West Friesian group, that separates Zuyder Zee from the North Sea. It is separated from North Holland by the Strait of Mars-Diep. Its area contains about 75 square miles, mostly fertile lands, which afford fine pasturage and fields for the growing of crops. Stupendous dikes protect the island. Sheep-raising is the chief industry, and the wool and cheese are noted products. Texel has an interesting war record. It was here that the celebrated victory of Admiral Blake was won over the Dutch in 1653. Another important battle was fought (1673) between united France and England against Holland. In 1797 the island was blockaded, and the Dutch fleet sur¬ rendered to Admiral Mitchell in 1799. Pop. about

6,500.

TEXIER, tes-ya, Charles Felix Marie,

French traveler and archaeologist: b. Versailles, France, 29 Aug. 1802; d. Paris, 1 July 1871. His works comprise description de l'Asie Mineure> (1839-48) and description de l'Armenie, de la Perse, et de la Mesopotamie)

(1842-45).

TEXTBOOK AND ORAL TEACHING.

See Education, Elementary.

TEXTILE DESIGNING. This term is used for the designing of textiles in which the pattern is obtained in the weaving and not by subsequent printing. The simplest patterns are in stripes and checks. By running 5 or 10 white threads and 5 or 10 gray threads alter¬ nately in the warp, stripes would be made. If the same thing was done also with the weft or filling, a checkered pattern would result. In arranging a pattern the designer first considers the weight of cloth desired and calculates what size of thread or "yarn® he will use, and how many threads there will be to the inch. He usually bases his design on the inch. Having an intimate knowledge of the loom harness, which determines the arrangement of the threads or "weave,® he knows its limitations and just what combinations are practicable. If

he uses a plain weave, in which the threads interlace alternately, it is very easy to design checks and plaids. He may decide to use the twill, in which the shuttle carries the woof- threads over one and under two or. more warp- threads. By carrying this twill principle a little farther, he may produce a diagonal cloth. If he is dealing with silk, and wants a glossy surface, he may decide on a satin weave, which reduces the number of crossings of warp and weft, permitting a close texture and a glossy finish on one side. Successful designs deter¬ mine largely the stability of the cloth, for users judge a fabric mainly by the effect at first sight. The patterns must be harmonious or with artistic contrasts to please the various tastes. To sell at certain prices, they must have definite weights per yard, as buyers of large quantities will require 10, 12, 14, etc., ounces to the yard. The designing of silk, linen, wool and other fabrics involves many differences, which must be thoroughly under¬ stood. And carpet and rug designing is a different business, requiring complete knowl¬ edge of their manufacture. The designers of rugs try to imitate the higher priced hand-made rugs from the

Orient, and often succeed ad¬ mirably. Consult Beaumont, (Color in Woven Desi,gn) (new ed., 1912). See Weaving.

TEXTILE INDUSTRY. American.— In

1800 there were no textile mills, as the term is now understood, in the United States. What¬ ever the American people did in the way of manufacturing their own clothing was mostly done in the household ; the spinning wheel and the handloom were utensils as familiar in the old-fashioned kitchens as the pots and kettles of the housewife. The homespun garments worn by our forefathers were fashioned out of wool grown on the home farm, carded by hand- cards, washed in tubs, spun and woven by hand, fulled and finished at home, cut up and sewed — all by the joint labor of husband, wife, sons and daughters. The finer clothes worn in those days were all imported ; and as the colonies grew and multiplied, and their consumption of English textiles increased, the manufacturers of the mother-country foresaw a wondrous new market opening up before them. The desire to retain and increase that market for textiles, in the manufacture of which England already led the world, was far more prominent among the causes leading up to the American Revo¬ lution than its historians have yet discovered.

Colonial Homespun. — The homespun gar¬ ments of colonial days were plain, and wore like iron; their ingredients were indicated in the name commonly applied to the cloth — “linsey woolsey.® It was a fabric of woolen weft, woven on a linen warp. Linen was much more commonly produced in the household than cotton fabrics, and wool was more in use than all other fibres combined. Cotton was a scarce commodity in Colonial America until long after the Revolution. It possessed a value equal to that of wool, and sometimes very much higher. What little of it was used prior to the 19th century was mostly imported from Barbados. When Samuel Slater started the first American cotton mill at Pawtucket, in 1793, he insisted upon using cotton from the Indies, because of the poor quality of the cotton then raised at home. No one dreamed, when the “Shipping

and Commercial List and New York Price Cur¬ rent® first made its appearance, that America was destined to become the cotton-producing country of the world; nor did Slater’s little mill of 250. spindles, which had then been in operation five years, give signs that

it was the germ of an American industry which would consume annually within 100 years more cotton than all the world was then growing. The his¬ tory of the textile industries during the colonial period is nowhere suggestive of the develop¬ ment which confronts and amazes the student at the opening of the 20th century, who finds them, with their subsidiary industries, employ¬ ing more capital and creating a greater value of annual product than any other group, except iron and steel.

Expedients of the Colonists. — Our fore¬ fathers realized how important it was that the colonists should learn to clothe themselves. They resorted to all sorts of expedients, some of which smack strongly of state socialisms, to overcome the difficulties in the way. They offered bounties to increase the number of sheep and promote the growth of flax. In Massa¬ chusetts laws were passed making it compul¬ sory that each family should spin a given quantity of yarn every year, under penalties of heavy fines. Gradually the household textile in¬ dustries assumed an importance which alarmed the mother-country, and the Lords of Trade at¬ tempted by various restrictive orders to pre¬ vent and harass a development which threat¬ ened to destroy the colonial market for the chief products of British industry. Parliament passed an act in 1774 — which was shortly after the Arkwright inventions had inaugurated the modern factory system — forbidding the ex¬ portation, under heavy penalties, of any of the machines used in the cotton, silk, woolen or linen manufacture. This statute, which re¬ mained in force, with certain modifications, until 1845, was evidence of a puerile hope that the English people could keep the fruits of inventive genius bottled up in their little island, while England permitted her sons to carry their inventive ideas across the water.

First Woolen Factory. — Slater brought here his spinning machinery ideas ; in the same way Arthur Scholfield, three years later, invented the first wool-carding machine, which he built and put into operation at Byfield, Mass., in 1794, thus fixing the date of the beginning of the fac¬ tory manufacture of wool by machinery oper¬ ated by power in the United States. American machinists and inventors did the rest. It is not to be denied, however, that the English statute did retard, embarrass and make trebly difficult the early development of our textile factories. A century ago the American textile industries were easily 100 years behind those of Great Britain.

Steps of Evolution. — It would be interesting to follow the evolution of the household indus¬ try, by slow and gradual steps, into the highly organized factory system of America to-day. First came the

neighborhood fulling-mill utiliz¬ ing the friendly services of the adjacent stream, and relieving the housewife of the labor of full¬ ing and finishing the cloths and blankets accu¬ mulated by the busy shuttle during the long winter evenings. Then the carding-machine was added to the fulling-mill ; the farmers for miles

about brought their wool to be converted into rolls ready for the spinning-wheel. After Slater had successfully applied the Arkwright invention to the spinning of cotton at Pawtucket, here and there throughout New England little mills gradually appeared which spun both cot¬ ton and woolen yarns by water power. Hand- looms were still used in all these mills until 1813, when the invention of a power-loom by Francis C. Lowell led to the building of the Waltham cotton factory by the Boston Manu¬ facturing Company, and the American textile mill first took on the characteristics which have since increasingly distinguished it. Power spin¬ ning and weaving machines were rapidly ap¬ plied to the manufacture of woolens, and it be¬ gan to be seen that the household manufacture of textiles was disappearing before the greater economy and efficiency of the factory system. The transition was not rapid, and the ups and downs of our first textile mills were numerous and discouraging.

War of 1812. — The outbreak of the War of 1812, and the non-intercourse acts and embargo which preceded it, were the most potent factors in completing the transition. The total suspen¬ sion of importations threw our people suddenly upon their own resources for their entire supply of clothing. Cotton and woolen mills were quickly built. High prices and the promise of quick fortunes drew many men with little or no knowledge of manufacturing into the business. All went well enough until the war ended; then followed collapse and ruin. The work of laying the solid foundations of textile manufacturing had all to be done over again. Imported cot¬ tons and woolens again invaded the market with a rush, and the domestic manufacturers found it impossible to compete with them either in quality or in price. Labor was unskilled and hard to get; knowledge and experience were sadly wanting; machinery was clumsy and de¬ fective; the country was poverty-stricken, and trade and the national finances thoroughly demoralized.

First Protective Tariff. — Then first began the great battle in Congress, which was waged more or less intermittently ever since, for the protection of the domestic manufactures by means of tariff laws. _ The Tariff Act of 1816 — the first of the series in which the principle of protection was recognized in the rates fixed as a distinct purpose of the law, conjointly with the raising of revenue — was much more

favor¬ able to the cotton than to the wool manufac¬ ture, because it applied the minimum principle to cotton cloths, which was in effect a specific duty of 6J4 cents a yard, while the simple ad valorem rate of 25 per cent was applied gen¬ erally to woolen goods. From the date of that law the cotton manufacture began a healthy de¬ velopment, and it naturally grew much faster than the wool manufacture. The later tariffs were in like degree, as a rule, more favorable to cotton than to woolens; partly owing to this fact and partly to other causes, such as the much more delicate, complicated and expensive operations incident to the latter, the cotton m.ai.iuˆacˆure ˆas a* times except during the Civil War shown a greater prosperity and on the whole a more rapid development than its sister industry. But in both industries for many years it was an up-hill struggle against

great odds. Few fortunes were made; many were lost, and the courage and tenacity of those early textile manufacturers deserve to be remembered.

From 1850. — In the last half of the 19th century there was an increase in the value of products of about six times, and not less than 10 times if it were possible to measure this product by quantity instead of by value. Even the largest figures convey an inadequate idea of the relative importance of our textile mills in the industrial economy of the nation, for these mills supply the materials for a great group of subsidiary factory industries, such as the wholesale clothing manufacture, the shirt manufacture, etc. When we aggregate these, and add to them the value of the products of the linen, jute, hemp and bagging mills of the country, we find that the product of our textile mills is larger in value than that of any single line of related industries, iron and steel ex¬ cepted. The products of the textile mills and the factory products growing out of them are equal in value to more than one-ninth of all our manufactures.

Machinery and Diminished Cost. — The de¬ crease in the cost of goods during the last half century has been one of the most striking phases of the development. This decrease is due in some measure, of course, to the de¬ creased price of the raw materials from which they are made ; but in even larger measure is it due to the remarkable advance in the methods of manufacture — to the new and more perfect machinery employed, in the invention of which American mechanical genius has contributed certainly as much as that of any

other people, and perhaps more. All the fundamental in¬ ventions in spinning machinery were of Eng¬ lish origin; so was the combing machine and the power loom. The English have a remark¬ able record in this respect, and the French and the Germans have also done much in the in¬ vention of labor-saving textile machinery. But the American record may be shown to surpass them all. The wool-carding machinery of all countries owes its chief improvements over the machines of a century ago to the invention of John Goulding of Worcester, Mass., whose patent, dated 1826, dispensed with the splicing- billy and produced the endless roll or sliver. Michel Alcan, the distinguished French writer, describes it as <(the most important advance in the wool manufacture of the 19th century." It was not a step," he says, "but a flight." The modern cotton spindle, making 10,000 revolu¬ tions a minute, is an evolution of our own mechanics. It has been shown that the saving effected by the new forms of spindle invented and adopted in the United States since 1870, when 5,000 revolutions a minute was the average speed, has been more than equal to the capacity of all the warp-spinning machinery in use in this country in that year, and to-day more than three times as much warp-yarn is spun in the United States as in 1870, a rate of increase without parallel since the earliest introduction of the cotton manufacture. The Lowell loom was the first successful application of power to the weaving of cotton, the Crompton loom to the weaving of fancy woolens and the Bigelow loom to the weaving of carpets. "Not a yard of fancy woolens," wrote Samuel Lawrence,

"had ever been woven by power looms in any country until it was done by George Crompton at the Middlesex Mills in 1840." Every carpet ever woven was woven by hand until the power loom of Erastus Brigham Bigelow revolution¬ ized the industry. Beyond these fundamental machines the American mechanisms for ex¬ pediting processes, for automatic devices, for dispensing with intermediate help, have been so numerous that they have completely trans¬ formed the modus operandi of textile mills throughout the world. These mechanisms are more generally in use to-day in the best American textile mills . than in those of any other country. So far as mechanical equip¬ ment is concerned, our best mills, whether cot¬ ton or woolen, are fairly equal to the best in any foreign country. It does not follow that textile manufacturing is done here, as a rule, with equal economy in cost.

Mills and Equipments. — In structural equipment the modern American mill is in some respects superior to the average foreign mill. It is not so massive a structure, nor so solidly built, brick being used here, while the English generally use stone ; but in the lightness and

airiness of its rooms, in economy of arrange¬ ment and in general completeness of equipment and care for the comfort and convenience of the operatives, it is usually superior. The lesson is fast being learned by our textile manufac¬ turers that in these days of close competition and small profits successful manufacturing re¬ quires that buildings shall be of the latest design and the most approved management, and that machinery shall not only be modern in make, with every latest improvement, but must also be kept in perfect condition by constant renewal. Many parts of the machinery required for the equipment of our textile mills are still necessarily imported from England, because not made, or less perfectly made, in the United States. Our machine manufacturers have been advancing as rapidly in recent years as the textile mills themselves, and the time cannot now be far distant when every new mill built in America will be equipped throughout with American-made machinery. But here again the United States shows a firm grip and exports have reached beyond the million dollar mark. Textile machinery in 1914 was being made in 241 establishments valued at $30,437,689. In that year machinery was exported to the value of $1,308,048.

Variety of Fabrics.— The American textile mills now supply practically every variety of fabric made in the world, with the exception of linens and the very finest grades of other fabrics. Great sums of money have from time to time been invested by daring manufacturers in constructing plants for the manufacture of linen fabrics. The result has often been dis¬ appointment and failure. These obstacles are climatic in the first instance, flax being a fibre which requires more moisture than any other for its successful manipulation. Again, there is difficulty in obtaining a home supply of suit¬ able raw material. Years of high protection have failed to persuade the American farmer into growing flax for fibre. The history of the linen manufacture in other countries seems to establish the fact that it is the one textile manu¬ facture likely to remain segregated in a few

localities like Holland and Ireland, where the fibre is grown on the spot, where the climate is peculiarly adapted and where the help has ac¬ quired an expertness born of generations of experience. Moreover, linen is the one textile the consumption of which has not appreciably increased with the growing perfection of textile machinery. The other fibres, less difficult to handle, more susceptible to cheap manipulation, continually encroach upon its uses.

Silk Industry.— Perhaps the most striking contrast to our experience with linen is that afforded by the silk manufacture. At first sight it would appear that this must be the particular textile industry which could not flourish in America. Since last century's whirlwind of speculative mania to cultivate the silkworm which swept New England in the thirties, and wrecked the fortunes of many too credulous farmers, we have settled down to the convic¬ tion that America cannot grow raw silk in com¬ petition with China, Japan and Italy. More¬ over, the silk manufacture, like the linen, has always been highly specialized and localized. The city of Lyons, in France, had well nigh monopolized the manufacture, so far as it had escaped from the hand processes of the Eastern

grain dress silks was then started, and at the present time brocaded silks and satins are manufactured on a large scale; indeed there is no form of fabric into which silk enters which is not now produced in great variety. Especially noteworthy has been the recent de¬ velopment in the manufacture of silk plushes and all varieties of upholstery goods. The value of home-made silk goods was in 1880 just about equal to the foreign value of the goods im¬ ported. In 1890 the product had so grown that it was nearly double the value of the imports, and more than double the value of the product in 1880. During the next decade the rate of in¬ crease was accelerated. In Paterson is the larg¬ est silk-ribbon mill in the world. Another mill in that city, an outgrowth of the little mill oper¬ ated by John Ryle, covers an acre and a half, and can nowhere be surpassed for size or com¬ pleteness of equipment. See Silk and Silk Industry (History of the Industry in the United States).

The consumption of raw silk in recent years is as follows (in pounds): 1914, 25,021,945 ;

1909, 17,729,306; 1904, 11,572,783; 1899, 9,760,-

1. Statistics of the silk industry are given below :

ESTABLISHMENTS

Wage-

earners

Capital

Wages

Cost of material

Value of product

1914

1909

902 .

108,170

99,037

$210,072,000

152,158,000

$47,109,000

38,570,000

$144,442,000

196,912,000

$109,569

89,145

852 .

nations. The skill and taste of generations have been concentrated upon the production at these centres, of fabrics which in beauty of design, in richness of coloring, in delicacy of workmanship, alone among the fabrics made by modern machinery, rival the splendors of mediaeval textile art. England has for centuries struggled in vain to place her silk manufac¬ ture on equal terms with it. Nevertheless we have built up in America, in the last 45 years, a silk industry which among machine-using nations is second only to that of France, and is to-day supplying our people with the bulk of the silken fabrics consumed by them. We owe this great achievement largely to the energy and the genius of the Cheney family, father and sons, of South Manchester, Conn. The Cheneys began the manufacture of spun silk nearly half a century ago. About the same time, John Ryle, sometimes called the father of the American silk industry, had become superintendent of a little silk mill in Paterson, N. J., which he

afterward purchased and gradu¬ ally enlarged. At first sewing silks only were made, then ribbons were added, and in 1842 Mr. Ryle built a number of looms for silk piece-goods — the first to be successfully oper¬ ated in America ; and the industry in all its branches has since developed so rapidly there that Paterson, which calls itself the Lyons of America, now occupies to this industry the same relation that Fall River does to the cot¬ ton manufacture and Philadelphia to the wool manufacture. During the Civil War the high duties stimulated the silk industry and diversi¬ fied its product. The making of plain gros-

Other important statistics in the silk industry are the following : Amounts of spindles in use: Throwing (raw silk) in 1914, 677,960; 1909, 637,565; 1904, 624,686; 1899, 442,410. Spinning and Twisting in 1914, 2,023,491; 1909, 1,647,415. Spinning of Spun Silk in 1914, 107,251; 1909, 130,547. Thrown and spun silk in 1904 and 1899 amounted respectively to $1,394,020 and

$1,213,493.

LOOMS 1914 1909 1904 1899

40 inches or less . 26,431 28,426]

Over 40 inches . 44,549 35,214ˆ50,449 36,989

Velvet . 2,524 1,196 J

Ribbon . 11,554 10,570 .

Jacquard looms . 6,826 8,985 .

Cotton. — In the textile industry King Cotton still maintains supremacy. And the United States holds a proud position among her fel¬ low-nations. The industry has shown a marvelous growth in the last quarter of a century, but the centres of production have shown frequent reduction of output in indi¬ vidual mills while collectively the advance has been aggressively steady. The first cotton mills were in New England but by 1860 the indus¬ try had spread into scattered sections as is shown by the following table which gives New England 52 per cent of establishments and 75 per cent of spindles:

Cotton Manufactures 1860.

ESTABLISHMENTS New England, 572 . Middle States, 540 .

South, 159 .

West, 22 .

Cotton used in pounds

283,700,000

87,100,000

43,900,000

7,900,000

Value of Spindles product

3,800,000 $79,400,000 1,000,000 26,500,000

300,000 8,100,000

40,000 1,600,000

TEXTILE INDUSTRY

471

I his New England industry was centralized in Massachusetts and Rhode Island and fac¬ tories were grouped largely at Providence, Fall River and Lowell with Manchester, N. H., also prominent and Philadelphia the largest cotton

A general survey of the progress of the United States in its cotton industry is best told by the statistics. Thus we have for woven goods in square yards and values the follow¬ ing figures :*

•

1899

1904

1909

1914

Square yards .

4,485,605,418

$239,668,011

5,056,779,590

$317,539,626

6,267,561,279

$447,167,319

6,810,712,349

$488,728,054

Valued at .

manufacturing city. This before the Civil War. The general technical growth up to 1890 has been briefly given above (more de¬ tails of machinery can be found under title Loom) with its greatly improved machinery inventions thus allowing larger output per man power, higher wages, and competition with European imports. But the radical changes occurring in the industry are shown by the fact that New England's 570 establishments in 1860 had fallen to 308 in 1905, though the number of spindles had increased from 3,859,- 000 to 13,911,000 in those years from the tendency of the smaller factories to lose ground and the rapid growth of the more prominent and highly capitalized mills. Then came the sudden mushroom-like growth of the Southern mills and the Northern cotton-mill owners feared that their industry was threatened by the competing field with its low-priced labor. From 1890 to 1905 we get the following statis¬ tics which show that the advance of the North¬ ern industry maintained a healthy advance :

Value of Product.

1890 1900 1905

Fall River . $24,925,000 $29,286,000 $32,538,000

New Bedford... 8,185,000 16,748,000 22,412,000

Lowell . 19,789,000 17,046,000 19,384,000

Manchester.... 10,957,000 11,723,000 14,366,000

Pawtucket . 3,955,000 5,635,000 10,099,000

Lawrence . 6,047,000 8,151,000 5,745,000

Taunton . 2,748,000 4,593,000 6,141,000

New England. . $181,112,000 $191,690,000 $224,072,000

The number of establishments in the South¬ ern States in 1860 was 165 ; by 1900, 550 and of much larger size; and the table following shows the extraordinary growth to 1910:

Other interesting figures are : The cotton consumption in the textile mills in pounds :

1914 . 2,679,934,778

1909 . 2,465,225,572

1904 . 1,981,804,446

1899 . 1,923,704,600

Cotton manufactures in 1914 were valued at $701,300,933; in 1909 at $628,391,813; 1904 at $450,467,704; 1899, $339,200,320. The equip¬

ment of spindles producing the above output was in 1914, 30,887,489; 1909, 27,425,608; 1904, 23,195,143; 1899, 19.050,952. These were used on the following number of looms (all classes) :

1914, 676,661; 1909, 665,049; 1904, 559,296; 1899, 455,752.

Improved Spinning. — The improvements in spinning have been so rapid since 1870 that most of our large corporations have been com¬

pelled to replace their spinning-frames two or three times in that interval. A similar state¬ ment can be made regarding no other branch of textile manufacture; and it is probably true that if the American woolen mills had been forced, as the cotton mills have been, to abandon machinery as soon as it became in any degree obsolete, their ability to face foreign competition would be more nearly in keeping with that shown by our cotton manufacturers.

Large Corporations. — The conditions here narrated have thrown the cotton manufacture more and more into the hands of large cor¬ porations, which now almost universally con¬ duct it. The wool manufacture, on the other hand, while it numbers some of the greatest corporations in the land, is still largely in the hands of individuals and partnerships, and the bulk of the mills are comparatively small in

STATE

Establishments

Spindles

Looms

1880

1910

1880

1910

1880

1910

South Carolina . . .

14

145

82 , 000

4,019,000

1,700

88,427

North Carolina .

49

292

92,000

3,174,000

1,800

50,979

Georgia .

40

139

199,000

1,939,000

4 , 500

35 , 069

Alabama .

16

61

49 , 000

947,000

900

15,853

Tennessee .

16

29

36,000

293,000

800

4,391

Virginia .

8

14

44,000

329,000

1,300

8,694

Mississippi .

8

19

19,000

177,000

600

3 , 586

Texas .

2

16

3,000

112,000

100

2,331

All other .

11

16

37,000

241,000

600

2,942

Total .

164

731

561,000

11,231,000

12,300

212,272

The product of the Southern mills has been chiefly coarse yarn and cloth while the North has maintained its hold on the finer goods, and it still produces great output of coarse goods.

- Not including lace, tape, webbing and “other cotton products,” which give an added value of $44,186,551 for 1914; $36,936,969 for 1913; $26,454,297 for 1904, and $25.-297,385 for 1903.

capacity. The more recent tendency in the wool manufacture, tor obvious reasons, is strongly in the direction of the corporate form of management.

Fine Cottons. — The quantity of fine cotton goods made in American mills continues to be very small in comparison with the whole pro¬ duction, and in the bulk of our consumption of this class of cottons is still imported. So there is ample room remaining for further develop¬ ment of the American cotton manufacture. Into this field we are entering with character¬ istic Yankee energy. Within comparatively few years mills have been successfully estab¬ lished in New England which spin yarns as fine as Nos. 150 or 200; and there are mills at New Bedford, Taunton and elsewhere which make, in wonderful variety, fabrics as delicate in texture and as artistic in design and coloring as any which reach this country from the machine-using nations of Europe.

Wool. — The range of products made in American wool factories is as wide as the multiform uses to which this most valuable of all the fibres is put. They divide themselves naturally into four great groups, leaving the hosiery and knit goods out of the classification : woolen mills, worsted mills, carpet mills and felting mills. There are the various sub¬ classifications of spinning, weaving, dyeing and finishing mills, although, as a rule, all these separate processes of the manufacture of wool continue to be carried on jointly in this coun¬ try, as the related parts of the one operation of manufacturing.

men who find the ultimate market for all the specialists who have been thus employed upon the goods. In this specialization of the dif¬ ferent branches of the work exists the char¬ acteristic distinction between the American and the foreign textile mills of to-day. In¬ vestigation appears to show that the English method is far superior to the American, and that ultimately we must gravitate into the former, if we are to cut any figure in com¬ petition for the world's market. The manufac¬ turer who devotes his whole energies to one particular thing, and studies to do that one thing as cheaply and as well as it can be done, can do it better and more cheaply than the manufacturer who is doing half a dozen differ¬ ent things at the same time. This is not a theoretical deduction, but an axiom founded upon prolonged experiment and experience. Bradford manufacturers who have tried both methods say there is always a gain in economy when the weaver buys his yarns, instead of spinning them himself. Obviously the English method requires a smaller investment in plant, secures a simpler and more perfect autonomy in operation, involves less waste and avoids the accumulation of superfluous raw material. The American woolen mill was evolved from conditions which rendered specialization orig¬ inally impossible. It was situated in some isolated spot, drawn thither by a superior water power, with no railroad to facilitate quick transportation, and was necessarily a com¬ plete

mechanical entity, however crude its machinery. In a word, it must perform under

Wool Manufactures, Including Worsteds, Felts, Carpets, Etc.

- (

1914

1909

1904

1899

Number of establishments .

979

203,716

195,285

$497,699,293

93,357,880

298,063,498

464,249,813

502,857,333

1,124

209,882

202,029

$506,205,584

87,962,669

322,441,043

507.166.710

552.503.710

1,213 186,699 186,699 $370,861,691 70,797,524 242,561 ,096 380,934,003 483,526,095

1,414

164,713

164,713

$310,179,749

57,933,817

181,159,127

296,990,484

394,369,523

Persons engaged .

W age-earners .

Capital .

Wages .

Cost of material .

Value of product .

Manufactured product .

Specialization. — In the wool manufacture, as in the cotton and silk manufacture, we have many establishments which, in completeness of structure, in perfection of machinery, in all the details of mechanical equipment, and in sagac¬ ity of management, are nowhere in the world surpassed. Indeed, it is only in this country that we find, on a very large scale, textile mills in which are performed all the separate processes for the manufacture of great varie¬ ties of goods. Elsewhere they have learned that the greatest economy and the best practical results are secured by specializing the processes. Thus in Bradford, England, are enormous es¬ tablishments which do nothing but comb wool into tops, either on commission or for sale. Other great mills do nothing but spin tops into yarn, and generally they confine their opera¬ tions to a limited variety of yarns. Still others, buying their yarn, devote themselves exclusively to weaving. And, finally, a fourth

class of establishments take the woven goods and dye and finish them for the merchants, who are the

one roof all the processes necessary to convert the greasy wool into the finished cloth ready for the market. Thus there sprang up all over the country little woolen mills, each one inde¬ pendent in itself ; as the country grew some of these little mills became large mills; other large mills grew up beside them ; gradually grew centres in which the wool manufacture predominated; but conditions were long in ap¬ pearing which tended to that specialization of processes which has marked the English method from the very introduction of automatic machinery. It followed that the American mill- owner, even of a small mill, was compelled to make a variety of goods, in order to use up advantageously all the grades of material which grew out of the sorting of his wool. Naturally he could not produce a variety of products as cheaply and as successfully as he could have manufactured one particular line upon which his whole attention was centred. These habits of manufacturing, forced upon us originally by the logic of the situation, are tenacious. We

have been slowly breaking away from them, blit it will be years yet before it is possible fully to outgrow them. In Philadelphia, which is the largest centre of wool manufacture, the progress of the evolution is very perceptible. There they have top-makers, yarn-makers, dyers and finishers, who do nothing else. And the result is apparent in the large number of

Woolen

the home market, and of which their production has been enormous. Many of these goods are woven upon a cotton warp, and into some of them enters more or less of the revamped wool known as ˆshoddy.ˆ We have much to learn, however, in the handling of this class of materials, ' before we shall equal the ex¬ pertness of foreign manufacturers.

Goods.

YEAR

Establish¬

ments

Wage-

earners

Capital

Wages

Cost of material

Value of product

1914 .

1909 .

1904 .

1899 .

1889 .

1879 .

1869 .

1849 .

501

587

792

1,035

1,311

1,990

2,891

1,559

49,165

52,180

72,747

68,893

76,915

86,504

80,053

39,252

$107,872,000

120,320,000

140,302,000

124,386,000

130,990,000

96,096,000

98,824,000

28,119,000

$24,204,000

22,575,000

28,828,000

24,757,000

26,139,000

25,836,000

26,878,000

$63,696,000

65,652,000

87,831,000

71,012,000

82,270,000

100,846,000

96,433,000

$103,816,000

107,119,000

142,197,000

118,430,000

133,578,000

160,607,000

61,895,000

small manufacturers in that city. The small amount of capital required to equip a little weave-shed permits enterprising superintend¬ ents and operatives to start in business for themselves. The comparative cheapness of pro¬ duction under such conditions enables them to hold their own against the big establishments with unlimited capital at their back.

American Woolen Specialties. — The bulk of the small wool manufacturing establish¬ ments in the United States are woolen mills proper, as distinguished from worsted mills. It is noticeable that the number and product of these woolen mills decrease from census to census as the worsted manufacture gets more firmly established here, and the more popular worsted fabric comes into wider use. But there are certain lines of woolen goods in the manufacture of which American mills have earned a world-wide pre-eminence. Prominent among them are flannels and blankets of every grade and variety. The American wools are peculiarly suited for these goods, and for many years past our American mills have practically supplied the home market. Other mills make a specialty of woolen dress goods for ladies' wear with equal success. The bulk of our woolen mills are, however, engaged upon the

Worsteds. — The worsted manufacture was late in getting lodgment in

the United States and has been slow in assuming proportions com¬ mensurate with its importance abroad. Early in the forties there were two or three large worsted mills erected in New England for the production of worsted fabrics or stuff goods for women's wear; but the manufacturer made little headway until after the close of the Civil War, and it was not until about 1870 that we began making men's wear worsted goods. Since then the development of the manufacture along both lines has been phenomenal. In the manufacture of fine men's wear goods, both in woolens and worsted, a few American mills have been equally successful; their products sell side by side with the best makes of foreign goods. Another obstacle is the high cost, of labor, which counts more strongly in fine wool goods than in the cheaper grades or in cottons and silks, because of the much greater care and skill and labor that must be bestowed upon their finishing. Woolen goods are from carded wool, worsted from combed wool. The popu¬ larity shown to worsteds has resulted in a great growth in that class of goods, checking the advance of the manufacture of woolen goods as is shown by the following tables :

Worsted Goods.

YEAR

Establishments

Wage-earners

Capital

Wages

Cost of material

Value of product

1914 .

298

109,527

111,012

69,251

$28 1,78 1,000 295,058,000 162,465,000

$51,749,000

$182,801,000

$92,897,000

1909 .

324

47,152,000

207,787,000

104,837,000

1904 .

226

26,270,000

109,658,000

56,087,000

1899 .

186

67,008

18,803

12,920

132,168,000

77,075,000

120,314,000

43,239,000

1879 .

76

20,374,000

5,683,000

22,014,000

11,536,000

1869 .

102

10,086,000

4,369,000

14,308,000

7,782,000

1859 .

3

2,378

3,230,000

544,000

2,443,000

1,258,000

manufacture of cloths for the million — cassi- meres, beavers, satinets, cheviots, etc., the cheaper grades which enter into the consump¬ tion of the wholesale clothing houses, goods in which, under the weight duties of recent tariffs, our American manufacturers have controlled

Felted Wool. — The manufacture of felted wool is comparatively small here and elsewhere and the importations are comparatively insig¬ nificant in volume. Felted wool was the earliest form into which this fibre was manufactured, the primitive races discovering, before they had

learned to spin and weave, that peculiar char¬ acteristic of wool which causes it to mat to¬ gether, by the application of heat, moisture and pressure, into a firm and smooth texture, sus¬ ceptible of a great variety of uses. Modern machinery has utilized this peculiarity for many purposes which, while limited, are economically important. Tablecloths and floor coverings, and hats for men's and women's wear, are the most ordinary; but they are also used for shoe linings, sheathing materials, polishing pur¬ poses, etc. The hat manufacture, formerly confined to wool for its raw material, has found that fur is better suited for this use; and the processes of manufacture are so differ¬ ent from those employed in spinning and weaving mills that the hat-manufacturing es¬ tablishments, in which the United States has always been pre-eminent, are not ordinarily classed among the textile mills.

Carpets. — Perhaps our most notable achieve-

i

the base of all the power-loom carpet-weaving now done in Europe. Subsequent inventors have greatly improved them and have added new inventions, such as those for weaving Axminsters and Smyrna rugs. By their skill and enterprise the American carpet manufac¬ turers have not only retained the control of their own market, except in the matter of the Eastern hand-made rugs, but they have in some instances successfully forced their products upon the European markets.

In 1914 there were 97 establishments in the United States producing carpets and rugs of other than rags, keeping 33,100 persons en¬ gaged; the wage-earners numbered 31,309 and were paid $14,715,615. Capital employed was $85,153,828. Jute carpets and rugs were made to the added value of $1,172,257. Rag carpets produced had a value of $2,786,439. The growth of the industry is shown by the fol¬ lowing figures :

1914

1908

1904

1899

Carpets and rugs (other than rag)

Square yards .

66,340, 274 $64,683,322

102, 238 110, 090 34, 434

9,821

31

81,218,881

$66,966,338

94,798

116,674

40,624

11,796

207

82,670,843

$56,861,775

} 211,331

44,016

) 13,853

76,410,050

$43,551,158

Value .

Spindles

Spinning mule .

Spinning frame .

167,123

Doubling and twisting .

42,083

Carpet and rug looms

Power .

Hand .

12,511

)

ment in the textile line has been in the carpet manufacture. Beyond question the United States is the greatest carpet-manufacturing na¬ tion in the world; if we leave out of account the hand-loom productions of the Eastern countries we excel all others not only in the quantity of our production, but in the variety of our carpets, in the excellence of design and workmanship, and in general adaptability to popular needs. The production includes two- ply and three-ply ingrains, Brussels, moquettes, tapestries, velvets, Smyrnas and the highest grades of Axminsters and Aubussons. The annual consumption of this product by the American people begins to approach 100,000,000 square yards. The popular reason assigned for this unique development is the general pros¬ perity of our people, the high wages earned permitting families of all grades of life to indulge in the luxury of floor coverings to an extent elsewhere unknown. Stimulated by the lucrative market thus offered, American manu¬ factures have made larger and more important contributions to the mechanism of the carpet manufacture than those of all other nations combined. The real development of the ma¬ chine industry dates from the successful ap¬ plication of power to the weaving of ingrain carpets by the late Erastus B. Bigelow in 1844. Subsequently he invented Jacquard looms for weaving Brussels and Wiltons, which produced carpets pronounced by the jury at the London Exposition of 1851 to be ((better and more per¬ fectly woven than any hand-loom carpets that have ever come under the notice of the jury.® A still later invention of Bigelow's was for weaving tapestry carpets. His inventions are at

Hosiery and Knit Goods. — In one other branch of the textile industry progress in the United States has outstripped the world — the hosiery and knit-goods manufacture. More machine-made knitted goods are turned out an¬ nually here than in all other countries com¬ bined. The explanation is somewhat the same as in the case of carpets. Our

people wear' more underwear than other people ; they are not only obliged to wear more for climatic reasons, but they can afford to wear more; and the gen¬ eral desire for personal comfort in wearing ap¬ parel results in an enormous distribution of the products of these mills. The beginnings of the industry are well within the lifetime of many manufacturers still living. Until 1832 the knit¬ ting of socks and stockings remained mostly a household industry — the only form of textile work which the machine had not wrested from the housewife. In that year Egbert Egberts successfully applied the principle of knitting by power, at Cohoes, N. Y. His machine was sim¬ ply the square stocking-frame of William Lee adapted to power. From that adaptation dates a revolution in underwear, which had previ¬ ously consisted wholly of flannel, fashioned and sewed at home, according to the individual needs. The revolution gathered momentum gradually, as invention after invention — almost all of American origin — perfected the knitting- machine ; but once the new industry was fairly an<i firmly established, it spread with amazing rapidity. The great variety of goods made fa¬ cilitates the tendency, peculiar to this industry, toward the building of comparatively small mills, requiring but moderate capital ; and it happens in consequence that these mills spring

up all over the country and can now be found in nearly every State. Many of them employ only cotton as a raw material ; others use chiefly wool ; and still others manufacture what are known as merino knit goods or mixed goods — cotton mixed with wool in proportions varying from 50 to 75 and 90 per cent of cotton, ac¬ cording to the particular market sought. The

ever since, as the statistics show. One draw¬ back has been the difficulty of getting the American agriculturist to grow a flax crop, in spite of placing a high tariff on the raw stuff to tempt the grower. Matters have, how¬ ever changed considerably already, the industry has obtained a firm foothold and the statistics show steady growth.

Knit Goods.

YEAR

Establishments

Wage-

earners

Capital

Wages

Cost of material

Value of product

1. .

1,491

150,145

$215,357,000

$59,605,000

$146,291,000

$111,750,000

1. .

1,264

128,708

162,855,000

44,527,000

109,416,000

89,156,000

1. .

1,079

103,715

106,663,000

31,536,000

76,594,000

59,964,000

Power machines

1. .

921

83,387

81,861,000

24,358,000

51,072,000

44,411,000

1. .

796

59,588

50,608,000

16,578,000

35,862,000

31,379,000

1. .

359

28,885

15.579,000

6,701,000

15,211,000

13,956,000

1. .

131

375

469,000

153,000

872,000

476,000

1. .

110

567

786,000

214,000

1,572,000

747,000

Hand machines

1. .

65

377

280 , 000

79,000

518,000

323,000

1. .

85

304

205,000

76,000

351,000

288,000

1. .

39

1,814

153,000

138,000

447,000

208,000

tendency to the larger use of cotton in these goods is perceptible, not necessarily because of greater cheapness or a desire to adulterate, but because the liability of wool to shrink, and its excessive warmth, lead many to prefer under¬ garments in which cotton is an equal or pre¬ dominating material. In 1858 E. E. Kilbourne invented a machine for automatically knitting full-fashioned underwear; and this mathine has gradually wrought a second revolution in the industry. The amount of hand labor now done is reduced to the minimum — to the mere sew¬ ing on of buttons, so to speak.

Statistics. — The value'of all textile products in the United States for 1850 was $128,769,971 and this had increased to $931,494,566 in 1900. The census report for 1900 shows the fol¬ lowing:

The number of cotton spindles in operation in 1900 was 19,008,352, as compared with 14,- 188,103 in 1890, and 10,653,435 in 1880. This striking increase is due in a large measure to the wonderful growth of the industry in the South since 1880, as before that date the cotton manufacturing industry existed there only on a most restricted scale. In fact, the growth of

«

Linens.

YEAR

Establishments

Wage-

earners

Capital

Wages

4

Cost of material

Value of product

1914 .

21

3,567

$8,810,000

$1,386,000

$4,289,000

$6,960,000

1909 .

15

3,573

7,457,000

1,213,000

3,967,000

6,385,000

1904 .

15

3,811

6,294,000

1,325,000

3,741,000

5,856,000

1899 .

18

3,283

5,689,000

1,037,000

2,551,000

4,368,000

1 889 .

5

1,940

2,734,000

528,000

1,595,000

2,880,000

1879 .

6

1,414

907,000

384,000

1 , 132,000

1,892,000

1869 .

10

1,746

2,325,000

424,000

1,121,000

2,179, 000

1859 .

11

689

840,000

134,000

388,000

840,000

Linens. — The line of textiles which has found the greatest obstruction in the United States to advance has been linens. The finan¬ cial condition of this branch was unremuner- ative and its output, till 1890, when the manu¬ facture of the flax product took on new energy, was nominal. But it has maintained headway

the industry in the South may be regarded as the one great fact in its history during the past decade. It has been fairly continuous and re¬ markably steady.

The totals of manufactures in the United States products, etc., in the textile industries follow :

YEAR

Establishments

Wage-

earners

Capital

Wages

Cost of material

Value of product

1914 .

22,995

21,723

17,042

17,647

1,496,644

1,438,446

1,156,305

1,022,123

$2,810,848,000

2,488,463,000

1,744,169,000

1 ,340,634,000

$672,351,000

592,261,000

419,842,000

341,652,000

$1 ,993,058,000 1,745,516,000 1,246,562,000 894,846,000

$3,414,615

3,060,199

2,147,441

1,628,606

1909 .

1904 .

1899 .

The extraordinary growth of the exports Trade Schools. — In the centres where the of textiles from the United States of America textile industry has grown to be the predomi- is shown in the following table : nating commercial factor the necessity of hav-

1908

1912

1914

1916

1918

Silk, manufactures of .

Cotton, manufactures of:

Cloth .

Knit goods .

Woolens:

Carpets .

$720,368

14,268,083

1,482,751

63,074

$1,992,765

31,388,998

1,858,836

57,152

$2,307,605

28,844,627

2,546,822

$5,204,813

46,381,390

20,546,822

$12,140,750

103,416,102

15,353,165

The wonderful strides given in these fig¬ ures for 1916-18, of course, reflect the conse¬ quences of the war cutting off Europe from her exports and the consequent enormous increase of our products in demand from South Amer¬ ica and other foreign states.

Future Needs. — The American textile manu¬ facturers have left little to be desired in the direction of cheapening textile products with¬ out deteriorating quality. They have built and equipped mills which rank with any in the world. They have planted on this continent machinery enough to supply all the textile wants of our people, except in a comparatively few lines of very fine fabrics. They have man¬ aged these mills with rare business sagacity, and as a rule with notable financial success. They have taken one specialty after another which

had never been attempted here, and transported its manufacture from across the water, literally inventing anew the necessary machinery, as in the case of braids and plush goods, when they could not obtain it otherwise. They have taken these several textile indus- tries^ which have been localized and specialized in Europe for generations, and in less than a century have made them one of the chief corner-stones of our national wealth. They have contributed far more than their share to the mechanical development which makes the labor of a single operative stand for that of a regiment of hand-workers in the 18th century. They have fallen short only in contributing to the artistic side of textile industry. They have been imitators instead of originators, although there are among them many striking and grati¬ fying exceptions to this rule. But American- made goods do not bear, generally speaking, any distinctive artistic characteristics which dis¬ tinguish them as American-made ; and, gener¬ ally speaking, they are inferior in this respect to the best products of foreign looms. All this is natural — natural to a new country in which utility everywhere predominates over the orna¬ mental. The next great forward step in our textile manufactures must be in the artistic rather than the mechanical direction, for there we recognize its weakest point. In the design¬ ing of patterns, in the use and application of dyes, in all that goes to impart to fabrics the artistic element, to lift the manufacture into an art, our textile mills are still far from the top of the ladder. This deficiency is not in any sense peculiar to the textile industries. It is an educational deficiency in which our people as a whole may be said to share. It is inci¬ dental to a crude country of limited facilities in art directions. What needs to be done is to supply more facilities.

ing training schools for operative artisans in recent years became obvious to the manufac¬ turers. With the increasing size of the in¬ dustrial establishments labor became more specialized and operators learned nothing of the technique outside of the special task of tending a machine or some other single re¬ stricted sphere of action, quick pace being the compass of the individual operative. Europe had long since filled the need for training ex¬ pert artisans in all-round textile work to fill the place of chemists, designers, dyers, machinists, overseers, superintendents, etc. In 1872 the Lowell School of Practical Design was established. The Philadelphia Textile School was incorporated at Philadelphia in 1876 and gives a three-year course in all the various processes connected with the manu¬ facture of cotton, wool and silk, including chemistry, dyeing and an ingrain-carpet course. In 1872 the Lowell School of Practical Design was established at Boston, and in 1878 the Rhode Island School for Design was formed in Providence, R. I., to teach technical design¬ ing for the textile

trade. The Lowell Textile School, at Lowell, Mas-s., was organized in 1896 to teach all the branches of tire industry. The New Bedford Textile School, at New Bedford, Mass., was formed in 1895 and opened in 1899. The Fall River institution called Bradford, Durfee Textile School was founded in 1900. The Industrial School at Lawrence opened in 1907 and provides the workingman with a practical education in the textile trade. And in the South several col¬ leges have opened textile departments such as Clemson College, South Carolina (1898), the North Carolina College of Agriculture and Mechanical Arts, the Georgia School of Technology (1899), the Mississippi Agricul¬ tural and Mechanical College (1901) and the Agricultural and Mechanical College of Texas (1905). For further particulars see under Technical Education.

Foreign Textiles.— J. A. Hunter, a Halifax expert, said in 1915: “There are 145,000,000 spindles in the world spinning cotton; 56,000,- 000 are in England, 11,500,000 in Germany. The mule or intermittent spinning machine is the staple producer in England; the ring frame, or continuous machine, accounts for about half the spindles in Germany. ... In 1907 Ger¬ many had an outturn of cotton yarn valued at $157,500,000, the British production $395,000,- 000 ... In 1907 (according to the 1907 cen¬ sus) Great Britain wove 397,000,000 yards woolen cloth, Germany 270,000,000 yards. The mule is used in spinning finer yarns and the English, making fine goods, use more spindles,

viz. : in 1909 England used 39,000,000 mule spindles against 7,900,000 ring spindles.® In that country ' spinning and weaving are gen¬ erally products of different mills whereas the two processes are generally combined in the United States mills. In the ring-frame less skilled labor is required than with the mule hence the former is better adapted to this country. Again the output is greater upon the ring spindle giving, therefore, more output besides allowing cheaper labor.

In 1907 England’s output of woolen tissues (all wool or mixed) amounted to 188,125,000 yards valued at $88,000,000. Her worsted tis¬ sues (all wool or mixed) were 209,109,000 yards valued at $86, 65a, 000. Other products for that year w,ere :

Value

Damask, tapestry and other

furniture stuffs (yds.) .

Flannels and delaines (yds.) . . .

Carpets (yds.) .

Rugs (yds.) .

Blankets (pairs) .

Shawls (by number) .

Other woolen fabrics as cover¬ lid lets, braids, etc .

6,901,000

50,566,000

25,766,000

3,813,000

3,130,000

1,142,000

$3,805,000

9,290,000

16,295,000

3,195,000

7,380,000

1,220,000

224,425,000

Of England's cotton product we have figures : for 1907 : Piece goods 7,087,000 yards valued at about $411,620,000, of which were bleached goods (not dyed or printed) 2,200,- 062,000 yards; dyed, but not printed 1,142,524,- 000 yards; printed (dyed or not) 1,326,059,000. Her silks amounted to the following figures :

broadstuffs Yards Value

Wholly silk (net or spun) . 10,527,000 $4,345,000

Mixed . 7,941,000 3,600,000

Made-up goods (neckties, etc.) . 3 , 255 , 000

Ribbons, trimmings, etc . 6 , 790 , 000

underwear Value

Shirts, pants, vests, etc . $13,615,000

Fancy hosiery (including cardigans, sweaters,

etc.) . 4,525,000

Hose, half hose, etc . 22 , 040 , 000

Other hosiery . 860,000

Gloves (cotton, wool, silk, etc.) . 2,150,000

Entire quantity of hose made in 1907 . 72 , 045 , 000

England’s exports were :

1916 1917

Cotton piece goods .

Other cottons .

Wool manufactures .

Silk .

Other manufactured fabrics.

$443,939,450

74,175,115

234,528,245

12,030,590

79,089,715

$564,052,485

78,434,900

264,238,370

10,090,280

84,719,850

In 1840 Germany had 658,358 spindles work¬ ing which grew by 1860 to about 2,000,000. A recent report gave her 10,920,426 spindles for cotton spinning. In Crefeld, the centre of Germany's silk industry, were at last reports (1914) 65 factories making silk cloths and 28 factories producing velvets. The total Ger¬ man silk product has been estimated at about

$29,013,833.

According to the last statistics available France had 7,500,000 cotton spindles. These were chiefly located, before the war, at Lille, Roubaix, Tourcoing, Epinal, Saint Die, and in Normandy, at Rouen, etc. They employed about 130 power looms and 40,000 hand. Her silks were chiefly produced at Lyons for high quality goods. Silks of fine quality were also made at Saint Etienne and in Picardy. The Lyons industry employed from 85,000 to 90,000 operatives on over 20,000 power looms. They

produced 2,500,000 kilograms of wrought silk and 1,000,000 kilograms raw silk. Production follows :

Products valued at

Lyons . 409,000,000 fr. $81,800,000

Saint Etienne . 8,205, 000 1,641, 000

Picardy . 4,600,000 920,000

in all about $84,361,000.

F oreign Schools.— England's textile opera¬ tives are supplied with technical training in such schools as Bolton Technical School, Brad¬ ford Municipal Technical College, Coventry Municipal Technical Institute, Halifax Munic¬ ipal Technical School, Huddersfield

Technical College, Keighley Institute, Yorkshire College at Leeds, Oldham Mutual Technical School, Rochdale Municipal Technical School, Salford Royal Technical Institute, etc. Germany has textile schools at Aix-la-Chapelle, Crefeld, Cottbus, Falkenburg, Muhlheim-on-Rhine, Ber¬ lin, Muhlhaus, etc. In France technical edu¬ cation for the textile industries is given at Elbeuf, Tourcoing, Roubaix, Saint Etienne, Lyons, Flers, Sedan, Bohain. In Austria are textile schools at Asch, Schoenberg, Warnsdorf, Ruthenberg, - etc. In Switzer¬ land are textile schools at Wattwyl, Zurich, etc. In Italy we find such at Prato, Arguno, etc.

TEXTILE PRINTING. The decorating of fabrics by printing is one of the oldest of the arts. There are evidences that it was prac¬ tised in Egypt 2000 b.c., and it was used in ancient Assyria, India and China. Opinions are divided as to the country of its origin, but there is no question that it came to mediaeval Europe from India. Rich patterns of both silk and cotton were brought by early traders to the leading ports of Europe and inland. Ger¬ man manufacture appears to have begun in the 13th century. They printed principally silks and linens, and were addicted to gilt and silver designs. In the course of time the art spread to Switzerland, France and England. The print works at Jouy, near Versailles, France, were the first to become famous there. It is be¬ lieved that fabrics were printed in England as early as 1620, but the first record of syste¬ matic manufacture was at Richmond-on-Thames in 1690. All this early printing was done from blocks by a method very similar to block printing for books. The designs were cut in the surface of a block, and if many fine lines were desired, the surface of the wood was cut away and thin strips of copper twisted and cut to the required form for the lines, and forced tight into the wood until the top of the copper was at the desired level. If a large solid surface of color was required, it was found better to surface the wood with felt, as it carried the ink better than the wood. That very beautiful results can be had by block printing on fabrics is evidenced by the fact that it is still practised by amateurs as a fad and by a few artistic workmen in large cities. Block printing was long done entirely by hand, the cloth being laid on the inked block, covered with felt or the like and impressed with a mallet or by rubbing. But presses for block printing be¬ came common in England in the 18th century and continued to be used long after the cylinder method of textile printing came into use. Sev-

eral had the idea of printing with a roller, but Thomas Bell, of England, was the first to bring out a practicable cylinder machine, in 1783. His object was twofold, to print several colors at once and to do away with bad joints, which were all too common in block printing, wher¬ ever the pattern repeated. In 1785 he patented a six-cylinder machine, which was the proto¬ type of the modern cylinder cloth-printing machines. Though vastly superior, the inven¬ tion was accepted slowly, and in 1840 it is re¬ ported that there were but 516 cylinder ma¬ chines in Great Britain as against 14,000 tables for block printing. Engraving on the cylinders was for a long time tedious and expensive, the first radical improvement here being Gormetz's engraving machine in 1828. The pantagraph machine for duplicating patterns on cylinders in enlarged size came in 1834, and thereafter the art of textile printing advanced very rapidly. The patterns or designs are now made on paper and transferred to the cylinders, and either cut in with the pantagraph or etched on copper. They are also^ sometimes made in soft steel and later hardened. A modern cylinder textile press has a great central drum around which the cloth travels. About this drum are a series of engraved cylinders with inking apparatus. The cloth is led in from a reel and passes under perhaps six or eight cylinders, receiving a color impression from each, in exact register, and is then led to a drying apparatus, that is commonly an enormous reel, with adjustments for keeping the printed surfaces apart until quite dry. Commonly the colors are put on lightly for surface effect, and in other cases the color is forced through the cloth, so as to get an effect on the reverse side. Most ex¬ quisite printing is done on silks, linens, woolens and cottons, as can be seen by any one who will visit the counters of any large dry-goods store. The tapestries, draperies, figured dress goods, cloths for upholstery, etc., produced by this process are endless, inyolving all the colors of the rainbow ; in fact the perfection attained in the art is truly amazing. Consult Rothwell, (Printing of the Textile Fabrics) (Philadelphia 1892) ; United States Bureau of Manufactures, <Reports) on Cotton Goods (1912) ; Knecht and Fothergill, Principles and Practice of the Tex¬ tile Printing) (London 1912) ; Beaumont, (Color in Woven Designs) (1912). See Textiles ; Weaving.

TEXTILES, or TEXTILE FABRICS.

Stuffs made by the weaving together of threads of any sort, so as to produce a material with a nearly solid surface. A fishing-net or the like is not a textile fabric because the cords which compose it are not woven together, but cross one another at equally distant intervals and are strongly knotted at those points. But mosquito-netting is a textile, although very open, because the threads are merely held by their own

friction. On the other hand, if a basket is made by weaving together strips of wood or bamboo, such a material is hardly cal¬ led a textile, but this merely because of its to¬ tally different usage. The cane seat of a chair is as truly woven as a piece of muslin or silk.

Textiles in the usual sense are made of the twisted fibres spun into thread of flax or linen, cotton, hemp, jute, silk or wool. The sim¬ plest weaving is that which produces our com¬

mon cotton and linen cloth ; that is to say, the threads are merely woven together, one up and one down, and all in the same manner, except that at the edge on either side of the piece what is called a selvage is produced to prevent the raveling out of the threads. From this to the most complicated fabric like brocade the differ¬ ences are almost infinite, and it is only with the most elaborate diagrams and the fullest expla¬ nations that the process of weaving a figured broche silk or a velvet with patterns of pile upon pile can be explained. Carpet weaving (see Carpet) differs somewhat from ordinary textiles, and tapestry differs yet more and is often excluded from textile fabrics altogether.

The general nature of a loom is that the threads of the warp are divided into two sets, one of which is thrown upward, while the other is thrown down, and at the same moment a shuttle carrying a thread of the woof is driven through between the two sets of warp threads. The next movement of the loom reverses the two sets of warp threads, throwing the upper one down and the lower one up, compressing and drawing tight the woof thread into the loops which show on the surface of the stuff and go to form the surface, and the shuttle is driven through again in the opposite direction. The constant repetition of this forward and backward movement of the shuttle gives a strip of woven fabric which continually grows broader; and as each movement of the shuttle is made, an appliance drives the last thread of the woof back against the others, so that this growing strip of woven stuff is kept at a uni¬ form state of firmness and solidity. It is in this way that the simplest fabrics of linens and cottons are made. If it be desired to produce a somewhat more elaborate weave, such as twilled material, this is done by raising two threads of the warp and dropping one; or by raising three threads of the warp and dropping one, and so on. In this way, as is evident, the threads of the woof are seen lying in loops or what seems to be stitches longer than those of the simplest weave, and these longer loops arrange themselves in a steplike diagonal across the woof of the stuff. It is clear that, by the increasing complications of such alternate lift¬ ings and lowerings of the warp threads, more patterns may be made. If, then, the threads of the woof

are of a different color from those of the warp, there is produced a surface whose general color is half way between the two colors of warp and woof. If we take a step further in complexity and use three or four warp threads say, of red, while the rest remain white, and do the same thing with the woof threads, we produce stripes three or four threads wide ; and where these stripes cross one another there will be a little square of the solid color of the three or four threads, while the stripes elsewhere remain of the half¬ way tint alluded to. Again if three threads of different colors are passed by the shuttle at one time, the threads of the warp also being grouped in threes, there will result a simple alternating pattern, which is often very attractive. In¬ deed, much of the primitive designing of early races is based upon such very simple produc¬ tions of the loom ; for it seems that the mind of man is never tired of a pattern produced by up and down, in and out, in their different

combinations. In the most complicated pattern of a brocade, such as the Japanese send us occasionally, in which a row of dragons will alternate with a row of representations of ((the sacred pearl® with its flames, and those again with a row of kylins or other fabulous mon¬ sters, all being interspersed with elaborate leaf¬ age, open flowers of the camellia and bursting fruits of the pomegranate, the same being re¬ produced in many colors — even in such a com¬ plex pattern it is readily seen that these figures are arranged in regular sequence, and that the colors are introduced in a definite and unalter¬ able succession. Thus a blue thread of the woof may not appear more than once in each flower, of a certain row across a piece of stuff, and this appearance of the blue thread may be for a loop of a quarter of an inch long only, . while all the rest of that blue thread is found to be hanging loose behind the finished fabric. Again this blue thread may not appear at all in six or seven inches of the length of the stuff, and then it may supply a wholly different detail of the pattern. Still that blue loop in the de¬ sign as seen from the front or ((right side® is found in each one of the flowers or animals which form the cross row of the pattern ; and in the next row of similar flowers or animals (which may be two feet away in the length of the piece) this blue thread may be replaced by a crimson one, which will also appear at ex¬ actly the same intervals and at exactly the same point in each one of the flowers, or of a unit of design. It is interesting to take a piece of very rich fabric with an elaborate pat¬ tern and to examine it with a view to just such peculiarities of weave. Anyone who has watched a

simple loom at work and has mas¬ tered the process may then understand in great measure the workings of the far more elaborate loom of the silk weaver, who is producing pat¬ terned fabrics.

In such weaving of patterns it is here as¬ sumed that the threads are dyed before the weaving is begun. The matter of printing colors upon calico, thin silk or the like is en¬ tirely apart from the consideration of textile fabrics. Printing is done from blocks with color, almost exactly as if the material receiving the pattern were paper instead of a woven stuff.

The simplest weave made in this way with colored threads is gingham, the name of which comes from the East, probably from India, with the invention of the weave itself. Checks, plaids and stripes are the natural patterns of gingham, but it is also practicable to produce various zig-zag and frets, and the stripes them¬ selves may be variegated by patterns .on their surface. Weaves of Persian and Chinese origin with threads and softer and more woolly than European twisted cotton threads are sometimes very attractive in color effect, woven exactly as gingham is woven.

Damask linen, such as is used for table¬ cloths and napkins, is peculiar in that the pat¬ tern is an elaborate twilled fabric in which the twill is arranged to make a pattern — often even of flowers and leaves. These patterns are seen merely by the difference of reflection of light upon the threads of the linen ; for those threads which lie parallel im one direction seem bril¬ liant from a given point of view, while those lying in the other direction look dusky. A change of the position of the beholder reverses

this effect of light and dark. Moreover it is common that the same pattern is seen in re¬ verse on the other side of the fabric. There is nothing to prevent damask linen being woven with dyed threads in parts of the composition, and occasionally tablecloths of such material come into fashion.

Brocade, a term generally used for very splendid material, means primarily a stuff — composed in part of threads which lie on the surface of the finished stuff (French broches), appearing where the particular color is needed and disappearing again, as explained in the paragraph above. A brocade may be composed of threads all of one color. Thus the silks called damasse (French Damasses, or Damas- sees) have perhaps a pattern of dark green leaves relieved in shining threads upon a back¬ ground of exactly the same dye, but looking different because of the different and less glis¬ tening character of the

threads ; this being caused not by the silk being differently spun, but because of the different treatment of the thread in the loom, the long loops lying flat and loosely, and reflecting the light in a differ¬ ent way from the hard pulled threads of the background.

Satin is a material with a silken surface of unusual and uniform glossiness, which is pro¬ duced by alternately <(raising and depressing four yarns of the warp across the whole of which the weft is thrown by the shuttle.® It will be noted that this is a modification of twill¬ ing, and the threads of satin are seen to lie in the same way as those of a twilled cotton. It is evident that such a surface is capable of many modifications. Thus there are some fab¬ rics of silk and wool, or silk and cotton, in which the silk threads are thrown to the sur¬ face, lying in very narrow stripes or bands, which show glossy on the background, which also show only in very narrow stripes between the others. These fabrics take different names from year to year.

Again, there are Eastern brocades in which the background is composed entirely of the warp threads in a satin weave of one color; while the flowers of the pattern are made up entirely of the woof threads and these in many colors with gold.

There remains to be mentioned those weaves in which the warp threads only are seen in the finished stuff. The most common form of this is ordinary ribbed silk, in which the warp threads form loops (silks called gros-grain and by other special names), giving a rib running across the stuff. Thus a silk in longitudinal stripes of darker and lighter green, - buff and brown, has all its woof threads of a dull brown ; while the warp threads of the four colors named form visible ribs in which the colors are alternated in a very elaborate fash¬ ion, so that one stripe is made up of a small check in two colors, another is plain and solid, of one color ; and in all this the only effect of the dark woof is to modify slightly the hues of the stripes by showing between the warp threads.

Velvet is made by carrying the threads of the warp over a rod called a needle, so as to produce a series of ridges or <(ribs,® much as in the last paragraph; and then cutting all these ridges by a sharp instrument passed in as the (<needle® is withdrawn. This cutting leaves the

threads standing up to form the nap or pile, but they are left of

different lengths or heights, and, therefore, the whole surface is most care¬ fully sheared and sometimes this shearing is helped by singeing. Fustian, velveteen and corduroy are made by the same process. Plush is a material of the same character and pro¬ duced in nearly the same way. When the ribbed surface is left without being cut, the term “un¬ cut velvet® is used. This may be used for a part of the surface, while other parts are fully cut and brought to the smooth surface com¬ mon to velvet. In this way most elaborate patterns are produced — figures being in the velvet pile upon the ground of uncut velvet. Again this may be carried further in producing what is called “pile upon pile® velvet, in which the pile of one part of the pattern is relieved upon the shorter pile of another part of the pattern and this again upon the uncut back¬ ground. It is evident that such stuffs are of great cost. The beauty of the pattern may also be enhanced by the use of different colors. Thus the velvets of Genoa and of Venice of the 17th century and modern copies of the same may have a general surface or back¬ ground of a satin-like texture, upon which the flowers and leaves of the pattern are raised in uncut velvet in ridges made of projecting loops, and upon this again is relieved a pat¬ tern of cut velvet, smooth and uniform 'in sur¬ face; both these surfaces, the uncut and the cut velvet, being woven with three, four or five colors, the threads being dyed beforehand in dark and light green, crimson, buff and the like. The resulting pattern will be of extraor¬ dinary richness, effective at a distance and also near at hand. Such pieces made in Ven¬ ice at the close of the 19th century would cost about 60 francs a yard when woven 20 inches wide.

The further elaboration of decorative weav¬ ing by the introduction of other materials than those of twisted threads, is also of importance. Thus “gold thread,® as it is called, is commonly made of silver wire gilded and then pulled out or “drawn,® the silver and gold together, until it is very fine. This is apt to tarnish, the ex¬ tremely thin gold disappearing with wear, and the silver not having the power of resisting im¬ purities in the air. To avoid this, where a per¬ manently metallic effect is desired, gold paper is used by the Orientals, the paper being some¬ times brown, as it shows on the reverse side of the stuff, and the gilded surface showing on the right side. The less expensive Japanese brocaded silks are often woven in this way. On the other hand, the tarnishing of the me¬ tallic gold thread often adds a special charm to the effect of ancient stuffs.

As textile fabrics have been used by all men more advanced than the most degraded savages, the history of textiles is of infinite extent. Even textiles of decorative purpose, those woven in a somewhat complicated way, are of unknown antiquity. Decorative stuffs have

been found in Egyptian tombs of very early epochs. The tombs of the lost races of South America have been found to contain beautiful weaves. The earliest painted vases found in Egypt show boats with sails, and although some of these sails were perhaps of skin, there are others in which the evident

purpose has been to show a woven material. Western Asia has always been the home of the most beautiful designs in weaving, for at a very early time the people of the great plain through which the Tigris and the Euphrates run were producing fabrics with the most varied and splendid patterns. This tendency to use the Asiatic feeling for color decoration in work with the loom took two different forms in later times. The carpets and rugs woven with pile were brought from Syria into Europe at least as early as the 8th century a.d., and at a later time they were somewhat common in Europe, as is clear from the earlier Italian paintings, in which rugs of unmistakably Eastern design are seen to cover the foot-stool or the throne of a sacred personage. Other heavy stuffs used in the West for floor cloths and also for door and window curtains under the general name of kelim are woven with¬ out pile, the patterns being, therefore, much simpler, akin to those described above in con¬ nection with gingham and especially with twilled materials. Brocades of different kinds, and also solidly woven, very durable silk stuffs made with threads dyed of different colors, but woven in such minute patterns that the thread nowhere shows as broche on the surface, have been made for so many hundred 3ˆears that the time of their introduction is hardly ascertained. Cotton stuffs woven in a similar fashion with very pretty effects of simple patterns are but little imported to Europe, but their use in the East adds a great charm to the popular cos¬ tume. Finally the printing of cotton cloths with wood blocks has been practised for cen¬ turies, the pattern being admirably drawn and composed and the colors always interesting ex¬ cept where the effect of European commerce has been, first, to substitute the cheaper chemi¬ cal dyes of Europe for the more permanent and more beautiful dyes of the East, and, secondly, to debase the color design through the orders given by the agents of Western import¬ ing houses. The growth of a beautiful textile industry in Europe and the United States is made difficult by the rapid changes of fashion which themselves are brought about by the great desire of large manufacturers to produce the material and the effect which will attract buyers. This tendency is aggravated by the un¬ willingness of the great dealers to keep in stock fabrics which are out of fashion, because they are very numerous, because a considerable stock of any one would be a troublesome thing to house and to show on occasion, and because “it costs too much to sell® goods that are not in constant

demand. Everyone knows how often the material which at a certain time he found to be exactly what he needed cannot possibly be obtained a few years later. See Weaving.

Bibliography.— The greater number of the books devoted to this subject are collections of plates, often in color and beautifully printed. These, however, give merely the design, while the nature of the stuff can only be guessed. It is rare that any discussion of the fabric or of the manufacture accompanies the plates. The best of these books *is Fischbach's (Ornamente der Gewebe.* The works on Costume (q.v.) often contain much of the same material. For Eastern carpets, Lessing's (Alt Orientalische

Teppichmuster> (Berlin 1877) gives a number of fine designs collected from paintings of the Renaissance. .Vincent Robinson's (Eastern Carpets' (London 1882), and the second series of the same (London 1883), present a number of admirable specimens belonging to the author, who was a dealer on a large scale and also a collector on his own account. The colored prints are from excellent original drawings. Several books on Eastern mgs have been published during the last few years, of which we name Mumford's (Oriental Rugs) (New York 1900). The beautiful stuffs known to have been used during the Middle Ages are treated by Francisque-Michel in (Recherches sur le commerceˆ etc., (Des etoffes de soie, *etc. (2 vols., Paris 1852), and by Dr. Daniel Rock, in (Textile Fabrics,* the South Ken¬ sington illustrated catalogue (London 1870). The same author has supplied the (South Ken¬ sington Handbook (London 1876). Fr. Bock's (Geschichte der liturgischen Gewander des Mittelalters) (Bonn 1859-71) is the standard work on the subject of church ceremonial gar¬ ments, constantly cited by all writers. One of the most valuable works for the student of the technical side of textiles is (The Draper's Dictionary, *by William S. Beck (London n.d.), and the modern fabrics in common use are intelligently treated by Caulfield and Sa- ward in the dictionary of Needlework) (Lon¬ don 1885), and also by Lady M. Alford in (Needlework as an Art* (London 1886) ; Mat¬ thews, J. M., (Textile Fabrics: Their Physi¬ cal, Microscopical and Chemical Properties) (2d ed., New York 1907) ; Kinne and Cooley (Clothing and Textiles* (ib. 1913) ; Woolman and McGowan, (Textiles : A Handbook for the Student and Consumed (ib. 1913).

Russell Sturgis.

TEXTUAL CRITICISM, the science by which the texts of ancient writings are exam¬ ined so as to decide upon- their authenticity, their completeness and the degree of exacti¬ tude with which they represent the original words of the assumed author. This is some¬ times called the Lower Criticism as distinct from the Higher Criticism; the former is de¬ structive, or at least negative, in its results. The Higher Critic is constructive and builds up a theory regarding the nature, object, origin and authorship of a literary monument founded upon the material furnished by the Lower or Textual Critic. (See Bible — Text Criticism, Vol. 3, pp. 629-651; Biblical Criticism. Vol. 3, pp. 669-671 ; Eschatology, Vol. 10, pp. 49G- 493, and related references). Consult their bibliographies, also Cheyne, T. K., (Critica Biblica* (1903) ; Driver, S. R., Hntroduction to the Literature of the Old Testament (1891; 6th ed., 1897) ; Ginsburg, C. D., (The Massorah)

(1880—85) and Hntroduction to the Masoretico- critical edition of the Bible) (1897) ; Langlois, C. V., and Seignolos, C., Hntroduction to the Study of History) (1898) ; Loisy, A., (Histoire critique du texte et des versions de la bible) (1892) ; Orr, J., (The Problem of the Old Tes¬ tament considered with reference to Recent Criticism *(1906) ; Smith, G. A., (Modern Crit¬ icism and the Preaching of the Old Testament* (1901); also Barnes, H. E., (History: Its Rise and Development,* Vol. 14, pp. 205-264; and VOL. 26 — 31

Walsh, J. J., the histories of each century from the 1st a.d., to the 20th, in this work.

TEXTURE, as a term applied to rocks, signifies the size and mode of aggregation of the mineral particles that make up the rock, in contrast to structure, which applies to larger features, such as bedding, joints, etc. A brief description of those textures which are par¬ ticularly useful in classifying rocks will be found in the article on Rocks, in the section on Igneous Rocks.

TEZCUCO, tas-koo'ko, or TEXCOCO,

Mexico, a town in the state of Mexico, situ¬ ated on the northeast shore of Tezcuco Lake, 16 miles northeast of the national capital. The modern town has many handsome buildings, a number of manufacturing establishments and railroad repair shops. Cortes stopped here for a period in 1521 when he besieged Mexico. 1 ezcuco was one of the three confederated Aztec pueblos of the valley of Mexico, and for a time was the chief among them, yielding later the first place to Tenochtitlan. In its neigh¬ borhood are several ancient ruins, including re¬ mains of teocallis. Pop. about 6,000; (2)

commune surrounding the town ; pop. 16,000. (3) District in the state of Mexico, separated from the capital by a large lagoon; pop. about 60,000. (4) _ Lake or lagoon about four miles

east of Mexico City, 13 by 9 miles, very shallow and surrounded by swamps.

TEZIUTLAN, ta-se-oot-lan', Mexico, the capital of a district of the same name in Puebla state, 50 miles from the Gulf and 12 miles east of Zacapoaxtla. Pop. of town, 8,200; of dis¬ trict, about 25,000.

THACH, Charles Coleman, American edu¬ cator : b. Athens, Ala., 15 March 1860. He was educated in the schools of North Alabama and at the Alabama Polytechnic Institute from which he was graduated in 1877. He also pur¬ sued graduate work at Johns Hopkins Univer¬ sity 1880-81. In 1881-82 he was professor of modern languages in Austin College, Texas, and from 1885 librarian and professor of Eng¬ lish in the Alabama Polytechnic Institute. In 1902 he was chosen president of his alma mater which has long been the foremost scientific in¬ stitution of the Southern States. President Thach has greatly expanded the institution since he became president. He was a member of the Alabama History Commission 1898-1900, whose report resulted in the establishment of a Department of Archives and History for Ala¬ bama. He is also a member of the State text¬ book commission and the Rhodes scholarship commission.

THACHER, James, American physician and surgeon : b. Barnstable, Mass., 14 Feb. 1754; d. Plymouth, Mass., 26 May 1844. He studied with Dr. Abner Hersey in Barnstable and in 1775 was appointed surgeon’s mate in the Cambridge Hospital under Dr. John War¬ ren. The following year he was made sur¬ geon’s mate in a regiment stationed on Pros¬ pect Hill and marched with it to Ticonderoga where he was attached to the general hospital while the place was held by the Continental army, retiring with it in charge of the sick and wounded to Fort Edward and to Albany. He was transferred to the field service at his own request, was made chief surgeon to the

First Virginia regiment in 1778 and the fol¬ lowing year was transferred to a New England regiment. He was with the Continental army until the surrender of Cornwallis and was noted for his skill as a surgeon and for his lofty patriotism. On retiring from the army after

the war he practised in Plymouth and became well known by his scientific and literary pur¬ suits. He was the author of much professional and literary work. His (Military Journal dur¬ ing the American Revolutionary War5 (1823) is an authority on that troublous time and is notable for the vindication of Washington for his conduct toward Andre. Other noteworthy publications are Observations on LJydrophobia5 (Plymouth 1812) ; American Modern Practice) (Boston 1817) * Practical Treatise on the Management of Pus) (1829) ; (American Medi¬ cal Biography5 (2 vols., 1828) ; (Essay on Demonology, Ghosts, Apparitions and Popular Superstitions) (1831) ; (History of the Town of Plymouth (1832) ; Observations Relative to the Execution of Major John Andre as a Spy> (1834).

THACHER, John Boyd, American writer: b. Ballston, Saratoga County, N. Y., 11

Sept. 1847; d. 1909. He was graduated from Williams College in 1869, and was a New York State senator 1884-85, and mayor of Albany, N. Y., 1886, 1887, 1896, 1897. He was an officer of the World's Columbian Ex¬ position and became chief of its bureau of awards. His publications include <The Conti¬ nent of America, Its Discovery and Its Bap¬ tism5 (1896); (Charlecote — Or the Trial of William Shakespeare5 (1896) ; (Little Speeches5 ; (Awards5 ; (Christopher Columbus, His Life, His Work, His Remains5 (3 vols., 1903-04) ; (Outlines of the French Revolution Told in Autographs5 (1905), etc.

THACHER, Thomas Anthony, American educator: b. Hartford, Conn., 11 Jan. 1815; d. New Haven, Conn., 11 April 1886. He was graduated from Yale College in 1835 and for three years taught in Connecticut and Georgia schools. In 1838 he became a tutor in Yale where he was chosen as professor of Latin in 1842 which position he retained until his death. During a sojourn in Germany he taught Eng¬ lish to the Crown Prince of Prussia and to his cousin Prince Frederick Charles. Returning to Yale in 1845 he became active in college work and an important member of the faculty. He was famed as a classical scholar and wrote fre¬ quently on his specialty for various periodicals. He assisted in the compilation of Webster's dictionary and edited many Latin classics, not¬ ably Cicero's (De officiis5 which he annotated (New York 1850). He also translated Med- vigs' (Latin Grammar5 and he wrote a (Sketch of the Life of Edward T. Herrick5 (New Haven

1862).

THACKERAY, William Makepeace, Eng¬ lish novelist: b. Calcutta, 18 July 1811; d. Lon¬ don, 24 Dec. 1863. His father, Richmond

Thackeray, who was a judge and collector of revenues in India, came of a good Yorkshire family. His mother was Anne Becher, a Cal¬ cutta beauty belonging to a family well known in the India civil service. Richmond Thackeray died in 1816; William, his only child, remained with his mother for a year and was then sent

to England to be educated. Five years later his mother, who had married Maj. Henry Carmichael Smyth, came to England with her second husband. Thackeray's relations with both were in later years exceedingly charming.

The little boy, who during his voyage had seen Napoleon at Saint Helena, was placed in charge of an aunt, and soon showed precocity. He was put to school under a Dr. Turner, where he is said to have got hints for the open¬ ing of (Vanity Fair,5 and in 1822 he was en¬ tered at the famous Charterhouse. Here he remained six years, imbibing loyalty to the memory of such former scholars as Addison and Steele, watching and engaging in fights such as he described later — in one of these his friend George Stovin Venables broke the nose of the future novelist, who was growing up to his great height of six feet, three inches — reading and writing poetry, devouring novels, and making sketches — in short, doing every¬ thing but grounding himself in the classics as his schoolmasters wanted him to do. Although he was a good Horatian, he remained to the end a strictly modern spirit.

After studying a little under his stepfather and, perhaps, having some of the experiences described in the early pages of (Pendennis,5 he went up to Cambridge in February 1829, ma¬ triculating in Trinity College. Here he read widely, particularly in the literature of his favorite 18th century; but he evidently pre¬ ferred to the regular academic routine supper- parties the society of such fellow-students as the Tennysons, Arthur Hallam, Spedding and R. C. Trench (q.v.). He also tried his hand at college journalism, writing parodies and other skits in the weekly Snob. In short, he went his own gait, which was a trifle, but not injuriously, unsteady. He left Cam¬ bridge after two years of residence without taking a degree.

He had already during his vacations sub¬ mitted to the charms of Paris, and, with his natural turn for art, he had little inclination to follow his relatives' advice that he should study law. His income from a fortune left by his father, perhaps £500 a year, was ample for his needs, so he resolved to travel and study on the Continent. In 1830 he spent some months in Weimar, where he saw Goethe and learned enough of the ways of natives and travelers to describe (Pumpernickel5 in after years. His studies, whether of literature or of

the civil law, do not seem to have been exhaustive or ex¬ hausting.

By the close of 1831 he had returned to Eng¬ land and began the study of law in the Middle Temple. Trips to Cambridge, visits to the theatre, pipes with Alfred Tennyson and Ed¬ ward FitzGerald (q.v.), and light reading seem to have distracted his attention from Black-stone, but the Temple itself impressed him as every reader of (Pendennis5 knows. He also did some electioneering for his friend, Charles Buller, and formed an acquaintance with that interesting writer, William Maginn (q.v.), which probably led later to his introduction to the group of men who were making Fraser's Magazine popular. When he came of age he closed his law books and spent some time in Paris. Then he took up definitely a literary career, becoming interested early in 1833 in the

National Standard. He soon bought it and went to Paris to act as its correspondent, con¬ tributing also- stories and reviews, which in re¬ cent times have been unnecessarily exhumed. The venture proved unsuccessful, and Thacke¬ ray, who had lost money by it as well as by bank failures and by gambling (he had met his own (<Mr. Deuceace®) seems to have felt compelled to try seriously to make his living. He had always had a turn for drawing, inher¬ ited probably from his father, and he deter¬ mined that the life of an artist in Paris would suit him admirably. Accordingly in 1834 he established himself in that city, and although he acquired no great skill in his new profession, he enjoyed the society of relatives and friends and laid up knowledge of the French capital which he afterward put to good use in his (Paris Sketch Book) and in an early study precluding (Catherine) and 'Barry Lyndon.) Early in 1836 he was working on a Paris news¬ paper; then, again in conjunction with his stepfather, he helped to start a new newspaper in London, The Constitutional, which did not survive a year. Thackeray, who had previously issued his first separate publication, the eight satirical drawings entitled 'Flore et Zephyre) (1836) acted as Paris correspondent once more, and seems to have taken his duties quite seri¬ ously. It was time, for on 20 Aug. 1836 he had married at the British embassy at Paris a young lady of Irish family who had fascinated him by her singing. Miss Isabella Gethen Creagh Shawe. The imprudence of the mar¬ riage became all the more apparent when it was found that The Constitutional had swal¬ lowed

the remains of Thackeray’s fortune; but he would never admit his rashness and he worked hard enough ever after in support of his wife and children to be absolved from all reproaches.

He appears to have written for Galignani's Messenger, and then to have gone to London, where his first daughter (afterward Mrs. Ritchie [q.v.]) was born. He reviewed books for The Times and contributed articles and stories to Fraser's and other magazines, dis¬ playing an abundance of energy and cleverness, but, partly through anonymity and the use of ’ pseudonyms, attracting little attention. From November 1837, to August 1838, the ‘Yellowplush Correspondence > appeared in Fraser's and later in the latter year was pirated in America, a country which appreciated Thackeray before England did. There was surely enough humor and satiric power in his early work to have gained it more cordial rec¬ ognition ; but there was also much irony, which rarely makes a writer popular, and there were attacks on favorite authors like Bulwer that could not have been relished in some quarters. At any rate it seems certain that when in 1839 N. P. Willis (q.v.) engaged him to write for The Corsair, a short-lived New York weekly, Thackeray was almost as unknown as his younger rival, Charles Dickens, was famous. The ironical Catherine, > which finished its Course in Fraser's in February 1840, and ought

to have shown contemporaries how well its author knew the 18th century and could follow the lead of Fielding, the two volumes of the ‘Paris Sketch Book) (1840), and the abruptly ended (Shabby Genteel Story, > the germ of (Philip, J were all creditable to (Mr. Michael Angelo Titmarshp as Thackeray had begun to sign himself, but were not yet unmistakable products of a mature genius.

‘A Shabby Genteel Story) was cut short by the severe illness of Mrs. Thackeray, which fol¬ lowed the birth of her third daughter, later Mrs. Leslie Stephen. On returning from a trip to Belgium her husband found her strangely changed in mind. There were hopes that she might recover, and Thackeray gave her very constant attention, at home, in Ireland and on the Continent ; but it was of no avail. She was finally placed with a kind family and survived her husband about 30 years. The two little girls, for one daughter had died in infancy (cf. ‘The Great Hoggarty Diamond,) 1841) were sent to his mother in Paris, and Thackeray set himself to work all the harder in order that he might ensure their support and that of his wife, should his own life be cut short. He had no thought of freeing himself by law, and, al¬ though suffering deeply as such a tender-hearted man was bound to do, he went about his work cheerfully, solacing himself as well as he could with club life and enjoying Bohemian haunts such as the

<(Cave of Harmony, » described in ‘The NewcomesP

In 1841 he published his interesting small volume (The Second Funeral of Napoleon) and collected his ‘Comic Tales and Sketches, > un¬ successfully in both cases. In 1842 he made a tour of Ireland, which yielded materials for his ‘Irish Sketch Book) of 1843, and also for a much better book finished at Malta in 1844 at the end of the voyage to the East described in (Notes of a Journey from Cornhill to Grand Cairo) (1846). This better book was a story which has never been widely popular, but which competent judges have pronounced to be the best of Thackeray’s works, (The Luck of Barry Lyndon.) It was published in Fraser's in 1844 and did not meet with enough favor to warrant its being put between covers until 1856, long after its author had become famous, when it appeared in the third volume of Miscel¬ lanies in Prose and Verse. } The public has never liked a villain for a hero and is uncom¬ fortable in the presence of a writer with a genius for irony, hence Thackeray’s masterly memoir of an irrepressible Irish rascal, although it gives a brilliant picture of European life, high and low, in the 18th century and is per¬ haps inferior only to ‘Jonathan Wild) as a piece of sustained irony, will probably con¬ tinue to be praised by the critics and eschewed by the general reader.

Meanwhile Thackeray had formed a connec¬ tion that gave him not only a reliable source of income, but also an organ in which he could publish anything he cared to draw or write, with the result that his creative faculty was stimu¬ lated and made copious. From June 1842 until 1851 he was one of the most important members of the staff of Punch, which had begun its career in July 1841. ‘Miss Tickletoby’s Lec¬ tures on English History, > with which his con¬ tributions practically began, naturally fell rather

flat, but his copy improved, his sketches were generally appreciated and no one was more at home at the famous ‘Punch *dinners, where the policy of the journal was shaped. His first great success was made with ‘Jeames’s Diary, * November 1845. This satire on railway-stock gambling was followed by the famous ‘Snobs of England, by One of Themselves, > which began on 28 Feb. 1846 and ran for a year. Thackeray discovered snobs in altogether too many quarters, perhaps, and he has been accused of overlooking one at home; but it was only natural that he should work a good vein to the point of exhaustion and some of his papers were very clever. Most of them were reprinted as ‘The Book of Snobs) in 1848. His*

next series, to-day more attractive to some readers, was his 'Prize Novelists, excellent burlesques, which ran from April to October 1847, and took off, without malice and with very great clever¬ ness, such popular writers as Bulwer, Disraeli, G. P. R. James, Lever and Cooper. One, 'Crinoline, by Je — mes PI — sh, Esq.* was a takeoff of Thackeray himself. These were only the leading things he contributed to Punch. Probably they are not so attractive to many readers to-day as some of his ballads and songs — particularly such a perfect piece of occasional poetry as 'The Cane-Bottomed Chair. *

His increasing success enabled him in 1846 to take a house and bring his daughters back from Paris to a home of their own. In this house, 13 Young street, he wrote 'Vanity Fair,* which was published, as the fashion then was, in monthly parts. In January 1847, it began to appear in yellow-covered pamphlets issued by the publishers of Punch, and it ran till July 1848, when a double number was given. This method of publication was bad, because it did not force the author to complete his work and thus get the opportunity to see and criticize it as a whole before committing himself to type. It conduced also to spasmodic writing and to pad¬ ding. Most of Thackeray's longer stories show the evil effects of the part system, and so do the novels of Dickens and Lever.

At first 'Vanity Fair) did not greatly attract the public, although now the opening chapters that introduce Becky Sharp are usually found very interesting. Contemporaries, of course, could have no idea that she was destined to be¬ come one of the great heroines of fiction, and they knew Thackeray, not as a distinguished novelist, but as a clever satirist and burlesquer and draftsman. Before 1848, however, readers were awake to the fact that they had another great novelist in their midst. Charlotte Bronte and the Edinburgh Review acclaimed him, and he became something of a literary lion. To this day 'Vanity Fair> is regarded by many people as his most important though not his most artistic work, and readers still divide into partisans of Dickens and of Thackeray, the latter usually winning the suffrages of the more critical.

Meanwhile Thackeray, again rivaling Dick¬ ens — the rivalry was of the friendliest kind save for one episode to be mentioned later — had published several Chrismas books: 'Mrs. Perkins's BalP (December 1846) the success of which is said to have helped 'Vanity Fair,* 'Our Street > (1847), 'Dr. Birch and His Young Friends 5 (1848), 'Rebecca and Rowena>

(1849), the clever but perhaps superfluous skit upon 'Ivanhoe,* and

‘The Kickleburys on the Rhine) (1850), which was attacked in The Times and effectively defended in a preface to the second edition.

In November 1848 the first part of ‘Penden- nis *appeared. It was not concluded until De¬ cember 1850, owing to a severe illness which Thackeray had in the autumn of 1849. It is the most autobiographical of his novels, and much ingenuity has been displayed in discovering the supposed originals of his characters. Maginn, for example, is thought to have been repre¬ sented in Captain Shandon. It is more certain that ‘Pendennis) is an effective presentation of literary life in London in Thackeray’s day, and that he had no intention of running down his brother authors, as some critics accused him of doing. With all its merits ‘Pendennis) suffers, as do ‘Vanity Fair,* ‘The New- comes, } and ‘The Virginians,* from its sprawl¬ ing length.

Efforts had been made to supply Thackeray with a permanent, definite income by securing him an appointment as a magistrate or in the postal service; but his well-meaning friends had failed. In 1851, disliking the stand taken by Punch against Napoleon III, he resigned from the staff. Although he still continued to con¬ tribute, it seemed advisable to secure another source of income. This he found in lecturing. In May and June 1851 he delivered six lectures before distinguished audiences in Willis’s Rooms, on his favorite humorists of the 18th century. They were successful when de¬ livered, and, in their collected form (1853), rank high among his works, for their charm of style and their rare sympathy. They were sub¬ sequently delivered in other places in Great Britain, and then, on 30 Oct. 1852, Thackeray sailed (in company with A. H. Clough (q.v.) and James Russell Lowell) to deliver them in America.

Just as he was starting he received a copy of the novel he had been working upon for months, reading in the British Museum for ma¬ terials and laboring carefully upon his style. ‘The History of Henry Esmond, Esq. *was not published in parts, and hence is the most artistic of Thackeray’s novels, with the exception of ‘Barry Lyndon. > Its subtle study of feminine character, its nice balancing of romance and the realism that accompanies a minute knowledge of a period such as Thackeray possessed of the 18th century and particularly of the reign of Queen Anne, its attractive though perhaps some¬ what over-labored style, and above all its pervading atmosphere of tender sentiment, have made it not only a classic historical romance but the favorite book of many Thackerayans, to whom it is idle to point out that perhaps the novel is after all masterly tour-de-force, that the essential vigor of Thackeray’s genius is better displayed in the superb irony of ‘Barry Lyndon* and in the unflinching portrayal of human vices and follies that makes ‘Vanity Fair) memorable.

In America, Thackeray was most cordially received, and by his genial manners he won many friends. He lectured in the chief cities North and South and sailed for home in April 1853, much richer in purse (£2,500). Fortu¬ nately he did not attempt to turn his visit to

greater account by writing a book upon it, as Dickens had done years before.

The next two years were spent in good part on the Continent. The idea of (The New- comes) came to him in Switzerland, and during a protracted stay in Rome, where he had a bad attack of fever, he wrote that charming bur¬ lesque for children (The Rose and the Ring* (1854). The novel for older children, with its delightful old-child figure, Colonel Newcome, was published in monthly parts from October 1853 to August 1855 inclusive; and is said to have netted Thackeray £4,000. The spasmodic mode of composition affected the structure det¬ rimentally, but Thackeray's satiric power and his increasing mellowness of sentiment were ex¬ cellently blended, and the book may fairly be called a masterly presentation of domestic life. The character of Colonel Newcome, who has some of the traits of Thackeray's stepfather, is said by late critics to be grossly exaggerated. <(Charmingly idealized® would seem a better phrase in view of the appeal the old man has made and still makes to thousands of hearts.

In October 1855 Thackeray again sailed to the United States, where he again remained until the following April, lecturing on <The Four Georges) with great success and repeat¬ ing with less (The English Humorists. *In 1856 he delivered the (Georges) throughout England and Scotland, and enjoyed the society of his children and his numerous friends, mak¬ ing other lives bright, although his own was somewhat clouded by the precarious state of his health. In July 1857 he stood as the Liberal candidate for Parliament from Oxford and was defeated by a small majority, accepting his dis¬ appointment gracefully. In November 1857 the quasi-sequel to (Esmond,* for which he had gathered material in America, the only partially successful Wirginians,* began to appear and ran its course in monthly numbers until Octo¬ ber 1859. It was at least a notable link between the mother and the daughter country and, al¬ though. it shows plainly the effects of Thack¬ eray's increasing bodily sufferings, it probably deserves more praise than it usually receives.

At this time one of the most unpleasant in¬ cidents in Thackeray's life occurred. Edmund Yates (q.v.), a rising journalist, published in June 1858 a sketch of Thackeray that was not altogether pleasing to the latter. Thackeray re¬ plied in a stinging letter; Dickens was unfor¬ tunately drawn into the affair on Yates' side; Thackeray laid the correspondence before the committee of the Garrick Club; the committee and the club took it too seriously; and Yates, refusing to apologize, was dropped from the club. Dickens seems to have been in the right, Thackeray unintentionally in the wrong. Alienation between the two ensued; fortunately a few days before Thackeray's death, they met by accident and shook hands spontaneously.

In 1860 a long-cherished desire of Thack¬ eray's was fulfilled. His publishers, Smith and Elder, began to issue The Cornliill Magazine in January, and made him editor. The first number had an enormous sale and he was as delighted as a boy. He secured Anthony Trol¬ lope and other good contributors, but for his own part was forced to content himself with printing (The Adventures of Philip) instead of a great historical romance of the age of Henry V about which he had dreamed. Neither

<Philip) (1861, 1862) nor (Lovel the Widower* (1860, 1861) was altogether worthy of his genius, but the delightful essays known as (Roundabout Papers) (collected, 1863), and to a less extent (The Four Georges) (not re¬ printed until they appeared in the Collected Works, 1867-69) surely were. Thackeray soon found the cares of editorship — especially the duty of refusing contributions even from a writer like Mrs. Browning, too onerous, and he was too old to become methodical; so he re¬ signed in April 1862. His health steadily de¬ clined — though one finds little trace of the fact in the admirable chapters of (Dennis Duval * (1867), which was running in The

Cornliill at the time of his death. In Novem¬ ber 1862 he was seriously ill. With his white hair he passed for an old man, although he was about 52ˆ4 years on that fatal night of 23 Dec. 1863, when he went early to bed without suspecting that death was so near. An effusion of blood took place in his brain, and he was found dead in the morning. On 30 Dec. 1863 he was buried simply at Kensal Green.

Thackeray, as has been said, was very tall — <(a colossal infant,® Motley called him, with <(white, shiny, ringletty hair . . .a round¬

ish face® and <(a little dab of a nose upon which it is a perpetual wonder how he keeps his spec¬ tacles.® He was as attractive to his friends as he still is to the admirers of his genius. Per¬ haps he was

too much of a Bohemian in some respects, but as a father and a genial, kind- hearted man it would be hard to name his su¬ perior. As a man of letters his rank is, of course, very high. Besides being one of the chief of English novelists, he was a draftsman of ability, though not of genius, an excellent writer of society and satiric verse, an eminent lecturer, a charming letter writer, one of the best of the English essayists, a born provider of burlesques and comic skits for the public of his day — in brief, he was an author of varied and copious genius, a master of humor, of satire, and of sentiment, and in addition a critic of lim¬ ited though by no means small intellectual powers and an admirable stylist. Unfortunately the task of appraising the value of his work has been rendered difficult by the extravagant wor¬ ship of his partisans. Many of the volumes that have been added to his works since his death represent merely his talents as a journal¬ ist, not his genius as a writer, and even his best books are often defective in structure or in strength. We are still too near him to be able to tell whether he will finally outrank Dickens as a creative force in literature or whether he will rank with Fielding as a portrayer of char¬ acters and manners. We are not too near to perceive that he is not so important in the evolution of fiction or so cosmopolitan and heroic a figure as Sir Walter Scott. But his place is certainly with this small group of illustrious novelists. See Barry Lyndon; Henry Esmond; Newcomes, The; Pendennis; Vanity Fair.

Bibliography. — Thackeray's works have ap¬ peared in many editions — notably that of lgg3_84 in 26 volumes, and the (Biographical Edition,* with valuable introductions of Mrs. Richmond Ritchie, 13 volumes, 1898-99. Quite a Thackeray revival occurred after the publica¬ tion of Mrs. Ritchie's edition — editions being

superintended by Mr. Lewis Melville (im¬ portant for completeness, faithfulness to the older texts, and bibliographical information), by Mr. Walter Jerrold, and by W. P. Trent and J. B. Henneman (the Cornhill Edition, 1904, 30 vols., with introductions and bibliography). The chief lives of Thackeray are those by Anthony Trollope ('English Men of Letters,) 1879), by Herman Merivale and F. T. Marzials ((Great Writers,) 1891), by Lewis Melville (2 vols., 1899) and by Charles Whibley (1903). There are numerous volumes of Thackerayana and separate reprints of early works, as well as several special bibliographies, such as M. H. Spielmann's (The Hitherto Unidentified Con¬ tributions of W. M. Thackeray to Punch) (1900).

His correspondence with the Brook- fields was collected in 1887. Consult also the article by Leslie Stephen in the dictionary of National Biography,) and for criticism, W. C. Brownell's essay in (Victorian Prose Masters) (New York 1901) ; Benjamin, L. S., (Some Aspects of Thackeray) (Boston 1911).

William P. Trent,

Professor of English Literature, Columbia Uni¬ versity.

THAI, an East Indian word meaning "free,® and the general designation of certain peoples of Farther India, including the Thos, Muongs, Shans, Laotians and Siamese. Although widely diverging in certain characteristics, they speak languages derived from the same stock, and are evidently of common descent. The Siamese, the best known and most civilized of the Thai group, are considerably mixed with Malays, Hindus and other races, and are of medium stature and broad-headed. The Laotians are shorter in stature than the Siamese, and their skulls are less distinctly of the broad-headed type. Consult Diguet, (Etude de la Langue Tai} (Paris 1896). See Laos; Shan States; Siam.

THAIS, tha'is, a Greek hetaera: b. at Athens, who accompanied Alexander the Great on his expedition to Asia. She is said to have instigated Alexander to set fire to the citadel of Persepolis, the residence of the Persian kings, in revenge for the injuries done to her native city by Xerxes ; but this anecdote, though im¬ mortalized by Dryden, is probably untrue, as we know on > the authority of Arrian that it was his intention to sack the place and burn the citadel on grounds of state policy. After the death of Alexander, Thais became the mis¬ tress of Ptolemy Lagi, and, according to Athenseus, was afterward married to him. She was celebrated for wit and repartee, and many anecdotes are recorded of her talent.

THALBERG, tal'berg, Sigismund, Swiss

pianist: b. Geneva, 7 Jan. 1812; d. Naples, 27 April 1871. He was the natural son of Prince Moritz Dietrichstein and Baroness von Witzlar. He studied piano playing. At 14 was an ac¬ complished player. In 1830 he made his first concert tour in Germany and in 1835-45 toured in Belgium, Holland, England, Russia and Spain, while in 1855-56 he visited South America and the United States. His playing was notable for its beauty of tone and the charm of its legato, rather than for brilliancy or fire. To him belong certain innovations in playing, accepted on account of his prominence though not original with him ;

such for instance

as that of playing the cantilena in strongly ac¬ cented notes by the thumbs, while the disen¬ gaged hand plays arpeggios or octave-passages above and below the melody. His operas, Florinda5 (1851) and ‘Cristina di Suezia) (1855) were both failures. He composed many piano pieces, including fantasies on themes from various operas. His ‘Studies) for the pianoforte are highly valued by teachers.

THALENITE, a native yttrium silicate, having the formula H2Y4SL1O15, recently dis¬ covered in Osterby, Sweden. It occurs in tabular, monoclinic crystals of a flesh-red color; hardness 6.5 ; specific gravity 4.23.

THALER, ta'ler. See Dollar.

THALES, tha'lez, Greek philosopher : b. Miletus, Asia Minor, about 625 to 640; d. about 543 b.c. He was the earliest philosopher of Greece, and founder of the Ionian school. He traveled in Crete, Phoenicia and Egypt, where he calculated the heights of the pyramids, and received instructions from the priests. From them he probably acquired a knowledge of geometry, in which he excelled his teachers. He is the father of abstract geometry, being the first to demonstrate that a circle is bisected by its diameter; that the angles at the base of an isosceles triangle are equal ; that two straight lines cutting each other produce opposite and equal angles; that the angle of a semi-circle is a right angle, etc. After his return from Egypt he was reckoned among the seven wise men, and his sayings such as yvudi reavrdv (((know thyself®) were in the highest repute among the ancients. To the Ionians he gave the wise counsel to form a general confederacy for the purpose of resisting the Persian power, and to make Teos the seat of the union. He also dis¬ suaded the Milesians from entering into an alliance with Croesus against Cyrus. His philosophical doctrines were preserved only by oral tradition, until Aristotle committed them to writing several hundred years after his death. He considered water the element of all things. His most important pupils were Anaximander, Anaximenes and Pherecydes. Consult Allman, G. J., ‘Greek Geometry from Thales to Euclid) (1877); Diels, H., ‘Parmenides LehrgedichP (Berlin 1897).

THALIA, tha-li'a, “the blooming one,® one of the nine Muses. She was the Muse of comedy and pastoral poetry, and is usually represented with the comic mask and the shep¬ herd’s crook in her hand. One of the Graces was also called Thalia. See Graces.

THALLIUM, a metallic element discov¬ ered by Sir William Crookes (1862) in a de¬ posit obtained from the lead chambers of a sulphuric acid works at Tilkerrode in the Harz. On examining this deposit with the spectroscope the discoverer observed a single sharp and bril¬ liant green line, which was afterward shown to be characteristic of this element. Crookes gave the element the name of thallium from the Greek thallus, a green twig. Thallium is found in many natural sulphides such as those of iron, copper, zinc, bismuth, etc. An important mineral containing it is Crookesite, a compound of sulphur, copper, silver and thallium. When iron or zinc sulphide is burned in the process of making sulphuric acid, the thallium burns to its oxide which collects in the flues or in

the lead chambers. To obtain metallic thallium from this flue dust, it is dissolved in dilute sulphuric acid, filtered, and hydrochloric acid added. The slightly soluble thallium chloride separates. This is changed to the sulphate, purified at the various elements accompanying thallium and the thallium sulphate decomposed by electrolysis or by action of zinc. Thallium, symbol Tl, has an atomic weight of 204.18, spe¬ cific gravity 11.19 and fuses at 561° F. A freshly cut surface has a brilliant silver white lustre which is quickly lost by the oxidizing action of the air. It is softer than lead and is malleable. The metal dissolves readily in sul¬ phuric or nitric acids, but only slightly in hydrochloric acid. It forms two classes of compounds : the thallous compounds derived from the oxide TbO, and the thallic compounds from TI2O3. The salts of the first class re¬ semble the corresponding salts of potassium and sodium. The chloride, however, resem¬ bles those of silver and lead in its insolubility in water. Thallium compounds give a green color to a non-luminous name. They are very poisonous, resembling lead in physiological ac¬ tion. Thallium and its compounds are used in the manufacture of thallium glass, the high refractive power of which makes it valuable in the preparation of optical instruments and of artificial gems.

THALLOPHYTA. See Botany; Paleo¬ botany.

THALWEG, the lowest line of any val¬ ley or drainage course. In valleys with rivers, it is the actual stream course, in dry valleys it is the gully through which storm waters run off.

THAMES, temz, Canada, a river in the southwestern part of Ontario,

rising in Perth County, and flowing southwest, 160 miles, into Lake Saint Clair, about 30 miles east of De¬ troit, Mich. It is navigable, 18 miles to Chat¬ ham, by boats of considerable size, but has a difficult bar at the mouth. On the banks of this river, about 30 miles above Chatham, a final stand was made by General Proctor and Tecumseh, when pursued by General Harrison in the War of 1812. The position chosen was poor and very favorable to the American ad¬ vance. On 5 Oct. 1813 Harrison with 3,000 men attacked and by a vigorous charge of cav¬ alry under Colonel Johnson drove the British in great confusion from the field. Tecumseh was slain and General Proctor himself barely escaped capture. The Americans lost 47 and the British 48, besides 33 Indians; 477 prisoners were captured. The results of the battle were: the Indian Northwestern Confederacy was de¬ stroyed; the British power in Upper Canada was broken and practically all that had been lost by the Americans at Detroit was regained.

THAMES, thamz, Conn., a river in the southeastern part of the State, formed by the junction of the Quinebaug, Shetucket and Yan- tic rivers at Norwich, whence it flows south about 15 miles to the Long Island Sound. Near its mouth on the right bank lies the city of New London. It is really a tidal estuary, a wide and beautiful waterway navigable for large vessels to its head, and an important ave¬ nue of local commerce.

THAMES, temz, England, the most import¬ ant and famous river in Great Britain, rising

in Gloucestershire, and flowing in an irregular eastward course into the North Sea. It sepa¬ rates the counties of Gloucester, Oxford, Buckingham, Middlesex and Essex on the north from Wilts, Berks, Surrey and Kent on the south. Its total length, measured from the Nore Light, is 217 miles, of which 180 miles are navigable. The upper waters around Ox¬ ford are known to the poets as Isis. The river passes the cities of Oxford, Reading, Maiden- .head, Windsor, Chertsey, Kingston, and passes through the heart of London. Below London it widens gradually into an estuary, which, at the mouth, is 27 miles wide. The river is navi¬ gable for the largest vessels up to the east end of London, where the great Victoria, Albert and West India docks have been constructed. The upper course is connected by an extensive canal system with the Severn River and the middle counties. Pike, perch, roach, dace and other fish are caught in quantities. The sur¬ face of the Thames from Oxford is largely taken up by pleasure craft on holidays in fine weather, and the regattas held then are world famous. The Medway is the largest tributary. The Cherwell flows in at historic Oxford 112 miles up stream; the Pang flows in at Pang-

bourne 51 miles from the mouth, and the Ken- net at Reading, six miles farther down. The water supply of London is taken mainly from the Thames. The natural flow is about 350,- 000,000 gallons a day, and the water companies take about 130,000,000 of this. Naturally the utmost care is taken to preserve the water from pollution by sewage. In passing through Lon¬ don the water front of the river is vastly in¬ creased by the method of constructing docks cut out in rectangles from the land. In no other way could the 40 miles of water front be made to serve the enormous business of London.

THAMES, Battle of the, in the War of

1. On 12 Sept. 1813 General Harrison, who was still at Seneca on the Sandusky River (see Frenchtown, Battle of), received word of Perry's victory on Lake Erie (see Erie, Lake, Battle of; Perry, O. H.) and began to pre¬ pare for his campaign against Detroit. By dint of hard work Harrison recruited his army to 6,500 troops, commanded by Brig.-Gens. Dun¬ can McArthur and Lewis Cass, Lieut.-Col. James V. Ball, Gov. Isaac Shelby of Kentucky and Col. Richard M. Johnson (qq.v.). At Malden and Detroit Proctor had 983 British regulars and at Amherstburg were 3,500 In¬ dians, but when Harrison landed at Middle Sister Island, Proctor burned the public prop¬ erty at Detroit, and on 24 September withdrew to Sandwich. Three days later Harrison occu¬ pied Malden, then entered Sandwich, Proctor having evacuated, and began energetically to pursue the retreating British, who on 5 October made a stand on the Thames River, a mile from the Moravian town and about 30 miles above Chatham. The British formed with their left near the road to Detroit, and their reserve with a six pounder between the road and the river, while the Indians were on the right near a swamp. Harrison divided his troops as follows : Gen. George Trotter's brigade of 500 men in front, with right on the road and left on the swamp; Gen. John E. King's brigade 150 yards to the rear; and still

further in the rear David Chile's brigade as reserve, the whole under Maj.-Gen. William Henry. En po fence on Trotter's left were Gen. Joseph Desha's three brigades, facing the In¬ dians in the swamp. In front, directly facing the British, was R. M. Johnson's mounted regi¬ ment. Johnson divided his regiment, sending half under his brother,

James, to take the can¬ non. So impetuous was the charge that James' cavalry broke through the first British line ■and penetrated to the rear of the second, almost capturing Proctor and taking many prisoners. R. M. Johnson meanwhile crossed to attack the Indians but owing to the underbrush was forced to dismount his men. He drove the Indians toward Shelby's Kentuckians who poured such a terrific fire into them that, after Tecumseh had fallen, they gave way on all sides and were pursued a considerable distance. This ended the battle. The Americans loss was 17 killed and 30 wounded; the British lost 48 killed and wounded and 33 Indians, besides 477 prisoners. Proctor's shattered army fled 100 miles to An- caster where on 17 October the fugitives were stopped. This destroyed the Northwestern In¬ dian Confederacy; broke the British power in Upper Canada ; regained for the Americans all they had previously lost at Detroit, and enabled Harrison to reinforce the army at Buffalo, then preparing to invade Canada from that point. (See York; Fort George; Stony Creek; Chrystler's Farm, etc.). Harrison returned to Detroit and later Cass was ap¬ pointed by the President governor of Michigan Territory. Consult Wiley and Rines, (The United States *(Vol. V, pp. 398-401) ; Adams, Henry, Administrations of Jefferson and Madi- son) (Vol. VII, pp. 128-143) ; Young, Bennett H., <Battle of the Thames,* in (Fison Club Publications, *No. XVIII; American State Papers, Military Affairs) (Vol. I) ; Montgom¬ ery, Henry, <Life of Harrison) ; histories of the war by McAfee, Breckenridge, Richardson, Lossing, Ingersoll ; Dawson, <Battles of the United States) ; Armstrong, John, 'Notices* ; Brown, S. R., 'Campaigns *; McMullen, <His- tory of Canada) ; Slocum, 'The Ohio Coun¬ try* ; Brannan, 'Official Letters) ; Fay, Official Accounts* ; biographies of Cass, by Hickman, Smith and McLaughlin.

THANATOPSIS (<(a view of death®), the earliest American poem to present a thoroughly noble thought in a thoroughly noble form, was written by William Cullen Bryant — then about 16 — in 1810, published, without the poet's knowledge, in the North American Review in 1817 and greatly revised for Bryant's 'Poems* of 1821. From the first it was regarded as a masterpiece, and it speedily won a hold upon the popular mind which has hardly been sur¬ passed by that of any other serious native poem. Without question, the large, simple idea of the piece has had much to do with its fame. There is consolation for most human beings in the reflection that death, though unavoidable, is also common to all, and that the whole of man¬ kind shail eventually lie in the splendid earth. Perhaps Bryant's qnswer to the question which had been tormenting him — How can one be reconciled with death? — is more stoical, more pantheistic, than many of his readers have suspected : he offers no promise of immortality

and refers to no deity higher than nature. But

the sincerity and eloquence of ‘Thanatopsis* lift it above argument. Its language is pellucid and harmonious, its diction full of felicity, its images — especially those derived from Ameri¬ can landscape — magnificently outlined, its blank verse stately, its rhythms in close ac¬ companiment with its swelling emotions. It is the distilled essence of late Puritanism, pre¬ occupied still, as the Puritans had been, with the thought of death, and yet so far freed from their particular doctrines and biases as to be able to utter a universal thought in universal terms.

Carl Van Doren.

THANE, the name of an ancient rank among the English or Anglo-Saxons. A free¬ man not noble was raised to the rank of a thane by acquiring a certain portion of land (five hides for a lesser thane), by making three voyages at sea or by receiving holy orders. Offices, whether connected with the constant personal service of the king or only during his residence in the thane’s district or with the administration of justice, were entrusted only to the thane, whose landed property was a guarantee for his conduct. The Anglo-Saxon thanes were the predecessors of the Norman barons.

THANKSGIVING DAY, in the. United

States, an annual festival of thanksgiving for the mercies of the closing year. The day is fixed by proclamation of the President and the governors of States. The President’s proclama- ti<pn makes the day a legal holiday in the Dis¬ trict of Columbia and in the Territories. In 1789 the Episcopal Church formally recognized the civil government’s authority to appoint such a feast and in 1888 the Roman Catholic Church also decided to honor a festival which had long been nearly universally observed — though no¬ where with such zest as in the New England States, where it ranks as the great annual fam¬ ily festival, taking the place which in England is accorded to Christmas. The earliest harvest thanksgiving in America was kept by the Pik grim Fathers at Plymouth in 1621 and was repeated often during that and the ensuing century; Congress recommended days of thanksgiving annually during the Revolution and in 1784 for the return of peace — as did President Madison in 1815. Washington ap¬ pointed such a day in 1789 after the adoption of the Constitution and in 1795 for the general benefits and welfare of the nation. Since 1863 the Presidents have always issued proclama¬ tions appointing the last Thursday in Novem¬ ber as Thanksgiving Day.

THAPSIA, a genus of umbelliferous plants, either perennial or biennial. The decom¬ pound leaves are doubly or trebly pinnatifid, the flowers are small, yellow, white and purple, in many-rayed compound umbels, without in¬ volucre, and often without the small-bracted involucels. The most important Thapsia is the deadly carrot (T . garganica) , supposed to have been the source of the gummy accretion called asadulcis** by the ancients and esteemed by them as a drug. A resin is obtained by evap¬ orating the tincture, and the amber-colored resin produced in Algeria is called bon-nafa. I hapsia was formerly employed as an acrid counter-irritant in plasters, for rheumatic and similar pains. T. decipiens is the black parsley

of Maderia, with a thick umbrella, or palm¬ like, crown of finely-cut foliage three or four feet across.

THASO, tha'so, or THASOS, an island at the northern end of the yEgean Sea, off the coast of Macedonia. Its area is 167 square miles. It is nearly round and about 16 miles in diameter. Excepting some low strips along the shore adapted to agriculture, it is covered by thickly wooded mountains, which in ancient times yielded gold and marble. The forests contain wool valuable for shipbuilding. Corn, fruit, oil and wine are produced; wax, honey and a superior marble are exported. It was settled by the Greeks about 700 b.c. About 463 the Athenians captured the city, razed the walls and took away the shipping. The Romans freed the territory after the battle of Cynos- cephalae, 197 b.c. The Phoenicians were at¬ tracted to the island at an early epoch by the gold-mines ; and an Ionic colony settled there in 8 a.d. The island since then has changed hands several times and now has an Egyptian ruler. The capital, ruins of which are still to be seen, was on the northern coast, on the site of the present landing-place of Limena. The population is distributed mainly through 10 villages and totals about 12,000.

THATCHER, thach'er, Henry Knox,

American naval officer : b. Thomaston, Me., 26 May 1806; d. Boston, Mass., 5 April 1880. In 1823 he entered the navy as midshipman and became a lieutenant 1833. In both attacks on Fort Fisher in 1862 he commanded the first division of Commodore Porter’s fleet. After the Civil War he commanded the Gulf squadron until 1866 and the squadron of the Pacific from 1866-68. He was made rear-admiral in

1866 and was retired 1868.

THAUN, or THAON, Philippe de, early

Anglo-Norman poet: b. probably near Caen, France, about 1100. He wrote a versified eccle¬ siastical calendar known as (Li Cumpoz> and his is the earliest work of this period (about 1115) that is known. His most important work was written about 10 years later and is known as (Fi Bestiare) or ˆhysiologus. *This also was in rhyme and but* one copy is known. In it the creatures are grouped and treated symbolically. The manuscript was dedicated to Adelaide, queen of Henry I, and the work is valued chiefly as a linguistic relic. Consult Walberg's (La Bestiare de Philippe de Thaiin) (Paris 1900).

THAW CASE, a criminal trial noted in

legal annals as (<the most notorious case in the recent history of American criminal law.® Harry Kendall Thaw, son of a distinguished and wealthy Pittsburgh, Pa., family, 25 June 1906, shot and killed Stanford White, a dis¬ tinguished architect, in the roof garden of Madison Square Theatre, New York. The murder was the outcome of Thaw's marriage to Evelyn Nesbit, an artist's model and actress, who accused White of abusing her. A long- drawn-out trial resulted, notable for Thaw's plea of insanity, his escape from Matteawan State Hospital for the Insane, his flight into Canada, his ejectment from the country and subsequent arrest in New Hampshire and re¬ peated trials following. In the original trial Thaw was sent to Matteawan, 1 Feb. 1908,

and was kept there until 17 Aug. 1913, when he escaped by alleged conspiracy with his keep¬ ers. After a long legal battle, in which noted lawyers were concerned, Thaw finally was brought back to New York State, indicted for conspiracy and acquitted. Later he was de¬ clared sane and taken to his Pennsylvania home where he remained because of the refusal of the local authorities to agree to his extradition.

THAXTER, thaks'ter, Celia Laighton,

American poet: b. Portsmouth, N. H., 29 June 1835; d. island of Appledore, Isles of Shoals, 26 Aug. 1894. She spent her childhood and much of her later life at the Isles of Shoals. In 1851 she was married to Levi Lincoln Thaxter, who was accustomed to visit the island long before they had become a popular summer resort. Her first published poem, (Landlocked, > was printed by Lowell in the Atlantic. The motive of sub¬ sequent verse is also generally the sea and coast

scenery, though the arts, particularly music, claimed some of her attention. Its note is one of much original power. Her works are <Poems *(1872); < Among the Isles of Shoals,* prose sketches (1873); (1886) ; (Idyls and Pastorals1 *(1886) ; (The Yule Log* (1889) ; (An Island Garden, *a prose diary (1894); (Letters* (1895); Sto¬ ries and Poems for Children *(1895). A col¬ lected edition of the (Poems* appeared in 1896. Consult the (Letters* ; also an article in the New England Magazine (Vol. 24, pp. 166-72).

THAXTER, Roland, American botanist : b. Newton, Mass., 28 Aug. 1858. After receiv¬ ing a Harvard education and securing his Ph.D. there, in 1888 he became a professor of biology and botany in the university and a noted au¬ thority on the fungous diseases of animals and on cryptogamic botany. From 1885 to 1891 he was expert mycologist of the Connecticut Agri¬ cultural Experiment Station. He was chosen American editor of the British < Annals of Bot¬ any* ; elected president of the American Botan¬ ical Society and in 1912 made a member of the National Academy of Science. He has con¬ tributed to many scientific publications dealing with his specialties.

THAYER, thar, Abbott Handerson, Amer¬ ican figure, animal and landscape painter: b. Boston, 12 Aug. 1849; d. Dublin, N. H., 29 May 1921. He was a student at the Ecole des Beaux Arts under Lehman and Gerome from 1875 to 1879. Upon his return to America he was. made president of the Society of American Artists. He was the discoverer in 1894 of the Laws which underlie Concealing Coloration ; and published in 1909 (Concealing Coloration in the Animal Kingdom *(written by his son, Ger¬ ald H. Thayer). He was a member of the Na¬ tional Academy of Design, of the American Academy of Arts and Letters and of the L'ln- signe Reale Accademia Romana delle Belle Arti Denominata di San Luca. Among his pop¬ ular works are (A Young Woman* (in the Met¬ ropolitan Museum, New York) ; <A Virgin* (National Gallery, Washington, D. C.) ;

(Winged Figure *(Albright Gallery, Buffalo) ; and (Caritas* (in the Boston Museum).

THAYER, Alexander Wheelock, Ameri¬ can biographer: b. South Natick, Mass., 22 Oct.

1817; d. Trieste, Austria, 15 July 1897. He was graduated from

Harvard in 1843 and from the Law School in 1848. For a time he was assistant in the Harvard Library, and while there determined to write a life of Beethoven. In 1849 he went to Europe to collect material for this work and lived abroad the greater part of his life. In 1859-82 he was United States con¬ sul at Trieste, Austria, and after that devoted himself entirely to his literary work. The first volume of his (Life of Beethoven) appeared in 1866; the second in 1872; the third in 1879 and the fourth was nearly completed at the time of his death; it was published in German, although originally written in English. It deals with the life and character of the man Beethoven rather than with his musical work; and is very detailed, exact and impartial. Thayer also wrote (Signor MasonP (1862), and <The He¬ brews and the Red Sea) (1883).

THAYER, Benjamin Bowditch, American

mining engineer : b. San Francisco, Cal., 20 Oct. 1862. He was educated in the Harvard Scien¬ tific School and on graduating in 1885 at once began active work in connection with the Ana¬ conda Copper Companjr, of which he became president. He later was made vice-president of the Amalgamated Company which absorbed it. He was president of the American Institute of Mining Engineers in 1914 and the following year was named on the United States Naval Consulting Board, where he did much good work.

THAYER, Eli, American educator and in¬ ventor: b. Mendon, Mass., 11 June 1819; d. Worcester, Mass., 15 April 1899. He was grad¬ uated from Brown University in 1845; became principal of the Worcester Academy; and in 1848 founded The Oread, an institute for young ladies in Worcester. He was a member of the State legislature, 1853-54, and of Congress, 1856-61, and conducted an <(Emigrant Aid Com¬ pany® which settled portions of Kansas on the anti-slavery basis. Subsequently he ac¬ quired manufacturing interests in Massachu¬ setts and received patents for a section safety steam boiler, a boiler-cleaner and a hydraulic elevator. Besides his Congressional speeches (1860), he published a volume of ˆLectures* (1886), and (The History of the Kansas Cru- sade) (1889).

THAYER, Ezra Ripley, American advocate and educator: b. Milton, Mass., 21 Feb. 1866; d. September 1915. He took his LL.B. degree at Harvard in 1891 and was admitted to the bar in Boston directly afterward. His progress was rapid and he became Dane professor of law at the university and dean of the Law School. He was a member of a noted firm of attorneys and was particularly interested in raising the stand¬ ards of his profession.

THAYER, James Bradley, American

author and lawyer: b. Haverhill, Mass., 15 Jan. 1831 ; d. Cambridge, Mass., 14 Feb. 1902. He was educated in local schools and graduated at Harvard in 1852. He devoted his life to teach¬ ing but after securing his LL.B. degree from the university in 1856 rose speedily in the law, to which he was admitted in that year. In 1873— 93 he was Royall professor in Harvard and from 1893 to 1902 held the chair of World professor. Iowa University gave him its LL.D.

degree in 1891 ; Harvard in 1901. In 1861-65 he was secretary of the Loyal Publication So¬ ciety, and was also fellow of the American Academy of Arts and Sciences and a member of the Massachusetts Historical Society. Be¬ sides many contributions to scientific publica¬ tions he was author of (Letters of Chauncey Wright *(1877); (A Western Journey with Emerson > (1884) ; (Cases on Evidence* (1892) ; (The Origin and Scope of the American Doc¬ trine in Constitutional Law *(1893); (The Teaching of English Law in Universities* (1895) ; (Cases in Constitutional Law) (2 vols., 1895) ; (The Development of Trial by Jury *(1896); Preliminary Treatise on Evidence at the Common Law* (1898), etc.

THAYER, John Adams, American pub¬ lisher: b. Boston, 20 Feb. 1861. He had a com¬ mon school education in Cambridge and be¬ came a noted printer and typefounder. In various responsible capacities he was connected with such representative publications as the Ladies' Home Journal, Munsey's Magazine , the Delineator, etc. After a residence in Paris from 1906 to 1911 he again became a publisher, notably to the Smart Set Magazine. His best known publication is (A Publisher's Life Story) (1910; rev. ed., 1912).

THAYER, John Milton, American soldier, lawyer and politician: b. Bellingham, Mass., 24 Jan. 1820; d. 1906. He graduated at Brown University in 1841 and became a member of the Massachusetts bar, removing in 1854 to Nebraska where he was made a member of the territorial legislature in 1860. Previous to entering on political life he was a territorial brigadier-general and fought successful Indian campaigns, placing the Pawnees on a reserva¬ tion in 1859. In the Civil War he also was a brigadier-general and led a Nebraska regiment For services at Vicksburg, he was brevetted major-general. Returning to Nebraska in 1865 he was elected to the United States Senate (1867) and afterward was appointed by Grant as governor of Wyoming Territory. In 1866 he was elected governor of Nebraska and also was made department commander of the G. A. R. for his State. Brown University con¬ ferred on him the honorary A.M. degree in 1847 and

the University of Nebraska gave him its LL.D. in 1902.

- jusepn j-iciiry,

tor: b. Boston, Mass., 7 Nov. 1828; d. Cam¬ bridge, Mass., 26 Nov. 1901. He was gradu- ated from Harvard in 1850, from Andover i hcological Seminary in 1857, and was pastor • ˆ Congregational Church at Salem, Mass.,

in 1859-64, being absent from his charge for nine months in 1862 when he served as a Chap¬ in111 in the Union army. In 1864 he accepted the chair of sacred literature at Andover, which he resigned in 1882 to become professor of New 1 estament criticism at Harvard. He published A Greek- English Lexicon of the New Testa- (!869) ; <A Biographical Sketch of Ezra Abbot (1884); (The Change of Attitude Toward the Bible* (1891); <Books and Their Use) (1893); etc.

THAYER, Sylvanus, American soldier- b. Braintree, Mass., 9 June 1785; d. South Braintree, 7 Sept. 1872. He was graduated at Dartmouth in 1807, and at West Point in

1. For four years he was occupied, chiefly around Boston and New York, in the construc¬ tion of coast-defenses. During the War of 1812 he served as chief engineer of the North¬ ern army on the Niagara frontier and at Lake Champlain, and as chief engineer and brigade- major in the defense of Norfolk, Va. After a tour of observation in Europe, where he studied fortifications and military schools, he became superintendent at West Point, a posi¬ tion which he held from 1819 to 1833. He was made president of the board of engineers, and placed in charge of the construction of defenses and harbor improvements around Bos* ton. Upon these duties he was occupied during the remainder of his active service. He was retired 1 June 1863, having been commissioned colonel in the preceding March. He gave funds for a public library and an academy in his na¬ tive town, and for founding the Thayer School of Civil Engineering at Dartmouth. In 1877 his remains were taken from South Brain¬ tree, where they were first buried, and interred at West Point, where in 1833 a statue was erected in his honor, bearing an inscription in which he is called the <(Father of the United States Military Academy.®

THAYER (WHITNEY), Eugene, Amer¬ ican organist and composer: b. Mendon, Mass., 11 Dec. 1838; d. Burlington, Vt., 27 June 1888. He was for nearly 20 years a resident in Bos¬ ton, where in April 1869 he gave the first free organ recital in the United States, and removing to New York in 1881 became organist of the Fifth Avenue Presbyterian Church. Besides a (Festival Cantata5 he composed a mass in E flat, many organ pieces and much vocal music. He received the degree of doctor of music from Oxford.

THAYER, William Makepeace, American Congregationalist author: b. Franklin, Mass., 23 Feb. 1820; d. Franklin, 7 April 1898. He was graduated from Brown University in 1843, and was pastor of the Congregational Church in Ashland, Mass., from 1849 until 1857, at which date he resigned and devoted himself to writing. He was a member of the State as¬ sembly 1857-58 and 1863-64, and engaged in edi¬ torial work 1858-72. His publications, very popular in their day and chiefly for juvenile reading, include (The Bobbin Boy5 (1859) ; c Youth's History of the Rebellion (1863-65); (Men Who Win5 and (Women Who Win5 (1869); (From Log Cabin to White House5; <From Tannery to the White House5 (1885).

THAYER, William Roscoe, American author: b. Boston, 16 Jan. 1859. He was gradu¬ ated from Harvard in 1881 ; was assistant editor of the Philadelphia Evening Bulletin 1882-85; and was editor of the Harvard Graduates Magazine 1892-1915. He has published Con¬ fessions of Hermes5 (1884) ; <Hesper5 (1888) ; (The Dawn of Italian Independence5 (1893); (Poems: New and Old5 (1894); (Throne Makers5 (1899); (History and Customs of Harvard University5 (1898) ; (A Short His¬ tory of Venice5 (1903) ; (The Life and Times of Cavour5 (2 vols., 1911) ; (The Life and Letters of John Hay5 (2 vols., 1915) ; (Ger- many versus Civilization5 (1916) ; (Letters of John Holmes5 (1917) ; Cut of Their Own Mouths5 (1917) ; Collapse of Superman5

(1917) ; (Theodore Roosevelt5 (1919). He is an overseer of Harvard College ; vice- president American Historical Association; member National Institute of Arts and Let¬ ters ; Fellow, American Academy of Arts and Letters; Fellow, American Academy of Arts and Sciences, and corresponding secretary, Massa¬ chusetts Historical Society.

THAYER, William Sydney, American physician: b. Milton, Mass., 23 June 1864. He was graduated at Harvard in 1885 and took his degree as doctor of medicine there in 1889. He was for some time a member of the medi¬ cal. staff of the Johns Hopkins University and visiting physician at the hospital there. He is a member of several medical

societies at home and abroad, and has made valuable researches in fevers and was first to report the third heart sound at his clinics. In 1917—18 he was with the Russian mission to Petrograd. He is the author of several medical and surgical works, notably (Lectures on Malarial Fever5 (1897).

THAYER SCHOOL OF CIVIL ENGI¬ NEERING, a department of Dartmouth Col¬ lege (q.v.).

THEAGENES (the-aj'e-nez) AND CHARICLEA, kar-i-kle'a, a Greek romance written by Heliodorus, bishop of Trikka, in the 4th century. The story recounts the love and adventures of Theagenes, a Thessalian and Chariclea, daughter of the queen of Ethiopia, and is the foundation of many later romances both by the early Greek fablers and the later French novelists, including Achilles Tatius among the former, and Gomberville, Scudery and D'Urfe among the latter. It was trans¬ lated into English by Thomas Underdown (1577), and into French by Jacques Amyot (1586). y

THEATINES. See Orders, Religious.

THEATRE (Greek, <(a place for seeing,55 from QeaaOai , to regard or look at), literally any building used for purposes of exhibition, but now generally applied to a place in which dramatic and musical performances are given. The theatre may be considered as a form of architecture which found its earliest expres¬ sion in the classic ages of Greece and Rome, and after a long eclipse has again become im¬ portant within the last 250 years. The term theatre also comprises the whole mass of dra¬ matic literature and its theatrical representa¬ tion. In this article it is proposed to deal (1) with the theatre as an architectural edifice from its earliest beginnings down to the pres¬ ent. For the treatment of the theatre as a form of artistic expression see Drama.

The Theatre in Architecture. — The thea¬ tre had its origin among the Greeks. Its germ was the ring in which dithyrambs and phallic songs were performed by choruses in honor of Dionysus. These were performed in an orchestra or circular dancing place, on all sides of which the spectators were ranged. Later a table was introduced, on which the leader of the chorus stood while he carried on a dialogue with the rest of the choreutce in the intervals between the choral odes. This table was the first and most rudimentary form of stage and the date of its introduction is about 560 b.c. Next an actor, a single actor, was introduced by Thespis and, as he played many different

parts, a tent had to be erected in which he should be able to change his mask and dress. Out of this tent arose ultimately the stage buildings of the Greeks, which, even after they became elaborate structures of stone, retained the name skene, <(tent or booth® (cf. English scene).

Greek Theatrical Architecture. — From the remains of various Greek theatres which have been excavated it is possible to reconstruct, at least in its main features, one of these edifices. In the centre the orchestra formed an exact circle in the middle of which stood the altar of Dionysus. Later the circle was cut on the side next the stage. Round the orchestra, in size rather more than a semi-circle, the seats for the audience rose tier upon tier like a modern baseball field-stand. These seats were at first of wood, but owing to a collapse of the benches in 499 b.c., it was resolved at Athens to erect a permanent stone theatre. This was the theatre of Dionysus, which exists to¬ day, although it has been partly reconstructed. It consists of three parts — the orchestra, stage buildings and the auditorium. The orchestra was occupied solely by the chorus. Behind it rose the stage buildings, usually a long, narrow rectangle, facing the audience; the most an¬ cient one at Athens was 55 yards long and only 11 yards deep. But then little scenery was used. In front the buildings represented a palace or a temple. There were usually three doors opening on to the stage, which was a wooden platform, standing 8 or 10 feet above the orchestra. On it the actors appeared. The auditorium was of great extent as the theatre was intended to accommodate practically the whole population of the city in which it stood. The rows of seats in consequence were of enormous size, the theatre of Dionysus at Athens holding 27,500 persons, and that at Megalopolis being computed to seat 44,000. In order to obtain the necessary slope for the tiers of seats as well as a natural substructure for the same the Greeks always chose some natural hollow, where the shape of the ground aided the design of the architect. Tiers of seats rose one above another, divided vertically by passages for access and in many cases hori¬ zontally also. The lowest or first row of seats at Athens is of marble, and was reserved for persons of distinction; the rest are of ordinary stone. Between the auditorium and the stage were the passages of entrance (parodoi) which in some instances were of great breadth. The back-wall was called the scena, the side-walls, or wings, in each of which was an entrance door being called paraskenia. The stage was called the proscenium. A flight of steps, later two, con¬ nected the stage

with the orchestra and these steps, continued out of sight beneath the or¬ chestra floor, were the means by which appari¬ tions from the lower world ascended. The front of the stage nearest the orchestra was called the 7ioyelov\ (log cum). The back- wall represented a suitable background or setting for the play, and, before the performance, was covered by a curtain (aulaia) which was let down, not drawn up as is usual to-day. When the action of the play required a different scene, the back of the stage was covered with painted curtains or boards. At either end of the stage were large revolving triangular prisms, each side of which bore a different scene, thus pro¬

viding three sets of wings. In dealing with the early Greek theatre it must always be re¬ membered that the stage was only of second¬ ary importance, the orchestra being deemed the chief point of interest. There was a cer¬ tain amount of machinery, of which the most famous was a species of crane by which a god could be let down from on high or drawn up again as occasion required. The Greek theatre was open to the sky and attendance at it was a species of religious observance; performances took place only on festal days, when the whole population turned out to wit¬ ness them. The acoustic properties appear to have received little attention. Actors used a species of megaphone device, concealed in their masks, in order to make their voices carry to a distance. Besides the theatre at Athens Greek theatres existed also at Epidaurus, Delphi, Syracuse and Megalopolis.

Roman Theatres. — The Roman theatre was largely founded on Greek models. It was long before a permanent theatre was erected in Rome because it was thought that such a costly display was not in harmony with the simplicity of the republic. At an early period dramatic performances took place in temporary wooden structures and amid such surroundings the comedies of Plautus and Terence were first pro¬ duced. Toward the close of the republic vast wooden theatres were erected in Rome. Pom- pey was the first to construct one of stone. His theatre, which may be taken as the Roman model, near the Campus Martius differs struc¬ turally from the Greek model. The orchestra was a semi-circle and there was no altar. Sing¬ ing and dancing were transferred to the stage and the orchestra space was occupied by seats for prominent persons. The stage was enlarged. The seats were built of masonry, not excavated out of a hill side or planted on a natural slope. The use of the arch and of concrete by the Romans facilitated this mode of building and under Roman hands the theatre first became an architectural unit, with auditorium, stage and stage buildings, all joined in a single •structure. There are extensive remains of Roman theatres; among the most celebrated are those of Rome,

Orange, France, Ephesus, Miletus, Cnidus, Tauromenium and Nimes. Roman theatres were frequently much smaller than the Greek and there were frequently ar¬ rangements to protect the audience from the sun's rays by an awning.

The Roman theatre of the empire period degenerated into sheer lasciviousness and the rise of Christianity brought a new and redoubt¬ able foe to this kind of spectacle. The Fathers inveighed against the public spectacles and clerics were forbidden to be present. Thus gradually the new morality gained headway and the theatre ceased to be a feature of the social life of the people.

Middle Ages. — During this period the drama existed only in the form of mysteries and miracle plays and was under the management of the Church. Theatres were not required. Plays were . presented generally in cathedrals or monasteries, and the most elaborate scenery used was a three-story scaffold representing heaven, earth and hell. Strolling players also gave performances in temporary booths. This period is, therefore, entirely barren as re¬ gards theatrical architecture.

From the Renaissance to the Present. — With the revival of learning in the 16th century came also a revival of the drama, and theatres began to be built. The earliest was probably a playhouse of some sort in the Hotel de Bourgogne, Paris, which was built about 1548 for the Confraternity of the Passion; but the first regular theatre was that which Bramante constructed at Rome in the Grand Court of the Vatican about 1580. Then came the Teatro Olimpico at Vicenza, designed by Palladio, and finished in 1584; while the earliest theatre built on modern lines was constructed by Aleotti at Parma in 1618. In all the early Continental theatres, the construction was founded on Greek models, but in England a simpler idea served. Here the earliest dramatic perform¬ ances took place in booths, tennis-courts or in the open courtyards of inns; and it was not till the end of the 16th century that the first permanent building was erected for theatrical purposes. This was «The Theatre,® built by Burbage in Shoreditch in 1576, which was founded not on any classical model, but on the innyards, in which the actors had been accustomed to play. The stage was literally a stage — a platform erected against one side of the building — and on three sides of this platform the spectators stood or sat in the pit (then called the yard), while all round it ran the galleries or boxes (then called rooms) exactly like the galleries of an innyard. There was

no provision for scenery. The door at the back of the stage, which communicated with the dressing-rooms, etc., and was the general entrance for the actors, was hung with curtains, and there seem to have been curtains running on rods, some distance up the stage which could be drawn and undrawn to indicate an inner apartment, but the locality in which the scene was laid was indicated only by a placard stuck up bearing such an inscription as <(A garden,® <(This is a forest,® etc. Properties, or furniture were, however, largely used to give verisimilitude to the action. These prop¬ erties seem to have been pushed on the stage in the calmest fashion. Thus in Middleton's (Chaste Maid in Cheapside,* one stage direc¬ tion runs, (In the stage there were traps ap¬ parently to a considerable extent; while behind and on a higher level was a platform which did duty for any elevated part of the supposed scene. In the Elizabethan theatre the stage was strewed with rushes, or, upon very special occasions, was matted; and on it the young ((bucks® or gallants sat on stools, showing their dress and figure to the audience, and effectually destroying anything resembling dramatic illu¬ sion. After the Restoration, under Charles II, who was familiar with the French stage, the English theatre came more into line with the Continental. The stage was gradually with¬ drawn closer and closer to the proscenium opening, until, by 1750, the appearance of the interior of Drury Lane was not seriously dif¬ ferent from that of to-day. Movable scenery, which was invented by Baldassare Peruzzi early in the 16th century, had long been used in masques, but it was not till 1661 that it was used to illustrate a regular stage-play in Eng¬

land. Meanwhile theatrical architecture was developing on the Continent along classic lines.

The first theatre in America was opened at Williamsburg, Va., 5 Sept. 1752. Others followed at Annapolis, Md., and in Nassau street, New York, in 1753, Albany, 1769, Balti¬ more, 1773, Charleston, S. C., 1774, New- bern, N. C., 1778, and Boston, 1792. Modern theatres are comparatively small because it has been found that the voice cannot be dis¬ tinctly heard without straining more than 90 feet in front of the speaker. Little change was made in theatrical architecture during the 19th century. In the latter half of the century sumptuous houses were erected on the Con¬ tinent and in England and America, of which the most celebrated was the Paris Grand Opera. Notwithstanding the vast size of the building, the auditorium contains only 2,194 seats. By far the greater part of the building is occu¬ pied by a vast number of rooms, halls, stair¬ cases, shops, etc., appurtenances designed for the convenience and pleasure of the

spectators and of those connected with the theatre. In magnificence and costliness the Paris Grand Opera was easily the first theatre of the 19th century. In the opening decades of the 20th century several monumental playhouses were erected in England, and in the United States ; of these one of the most remarkable if not the most beautiful in design and appointments is the Century Theatre, New York. In this century also playhouses began to be constructed once more as isolated buildings in which ex¬ terior design played a large part. The interior arrangements of modern American theatres are superior in comfort and convenience to those of Europe, although the latter are often lavishly decorated. In America, seating, heating, ventila¬ tion, exits and fireproof construction receive the most careful attention. The largest theatre in America is the New York Hippodrome, which seats over 5,000 and is used for spectacu¬ lar entertainments. The modern theatre con¬ tains like its prototypes the two essentials of auditorium and the stage. To the auditorium are now appended corridors, foyers, lounging- rooms, etc., also an outer lobby, vestibule and approaches. The auditorium is generally of the horseshoe type, but in many recent construc¬ tions the rows of seats on the ground floor and balcony are kept straight. A special de¬ velopment is the modern opera-house with as many as five balconies and a large number of boxes. In the modern playhouse there are few boxes ; the ground floor has a steep pitch so that the spectators in each row may view the stage clearly over the heads of those .in the row in front. The first balcony is more steeply pitched than the ground floor, and the second and succeeding balconies still more. Lavish decoration after the Italian and French models is giving way to straight lines and bare walls with a simple color scheme. The acoustic problem is one of the most serious with which the architect of theatres has to deal. The stage is now the most elaborate part of the theatre. The opening on the auditorium is from 25 to 35 or 40 feet wide and from 14 to 22 feet high. The stage is frequently twice the height of the proscenium so that all scenery (((drops,® etc.) may be hung above the proscenium opening when not in use. The set-scene is now in very general use and to a great extent eliminates

the necessity for a high stage. The set-scene is built so solidly and reproduces the condi¬ tions of nature with such completeness as scarcely to make any demands on the imagina¬ tive faculty of the spectators. If a room is represented, the walls and ceiling are built with marvelous solidity, a chandelier hangs from the centre of the ceiling; the doors shut with an unmistakable bang; the windows open and close better than they sometimes do in actual life. In elaborate plays whole pieces of scenery are raised through large transverse openings in the stage by means of platforms called bridges. These work in and out of the well or cellar, a space under the stage nearly as deep as the proscenium opening is high. Above the stages are the flies, larger lateral gal¬ leries, in which the scene-men (((fly-men®) work their ropes and pulleys. Higher still is the Grid-iron, an open line of strong beams from which various borders or drops are hung. Above this is the barrel-loft or rigging-loft, in which are the drums, pulleys or windlasses by which the curtains and clothes are worked. With the extensive use _ of elaborate scenes and the demand for rapid shifting there has been developed the revolving stage, which is a circular platform about 40 feet in diameter and revolving on a shaft embedded in concrete. This circular platform is capable of holding about four sets which can be brought before the audience by revolving the platform. The sliding stage is one of double width and which is moved laterally so that on the concealed half the following scene may be set up while the play proceeds on the exposed half.

Perhaps the greatest change in the modern as compared with the older theatres is in the lighting arrangement due to the introduction of electricity. The lights in the trough below are called footlights, those above border lights. There are sets of bulbs in white and in two or more colors. Dimmers are used to lower the intensity of the bulbs. All lights (except perhaps the spotlights) are now con¬ trolled from a single switchboard at the side of the stage. Recently several open-air theatres have been constructed in America. Some of these are of the ancient type, as that at Berke¬ ley, Cal., while others are of the so-called garden type in which the landscape architect plays a leading role. There is a good example of the garden type at Vassar College. Among recent innovations in theatrical structure are the little theatres, some of which seat only 100, and the portmanteau theatre, an approach to the mediaeval traveling theatre, but more artistic and better adapted to the present-day intimate form of drama.

Bibliography. — Haigh, A. E., (The Attic Theatre> (3d ed., revised by A. W. Pickard, Oxford 1907) ; Barnett, L. D., (The Greek Drama) (London 1900) ; Smith, William, dic¬ tionary of Greek and Roman Antiquities *(3d ed., London 1891) ; Mau, A., (Pompeii * (2d ed., New York 1902) ; Ddrpfeld and Reisch, (Das griechische Theater* (Athens 1896) ; Bethe,

(Prolegomena zur Geschichte der Theaters im Altertum* (Leipzig 1896) ; Malone, Edmund,

(History of the Stage *(London 1821) ; Dun¬ lap, W., (History of the American Theatre* (New York 1832) ; Gamier, (Le nouvel opera de Paris) (Paris 1876) ; Ordish, T. F., (Early London Theatres) (London 1899) ; Suchs and

Woodrow (Modern Opera Houses and The- atres) (3 vols., London 1898) ; Birkmire, (The Planning and Construction of American The- atres) (New York 1896) ; Hammitzsch, M., (2 vols., Berlin 1906) ; Meloy, Arthur S., (Theatres and Pic¬ ture Houses* (New York 1916).

THEATRE, The American. In order to

convey to the reader a fair understanding of the progress of the American theatre since 1795 it is perhaps necessary to state something about its beginnings, which, indeed, previous to 1750, are involved in much obscurity. Tony Aston, an English stroller of some celebrity, visited the Southern and Middle colonies about 1730, and gave entertainments at New York and perhaps other places; and there is some evidence that a company of comedians acted plays in New York in 1732; but it was not until 1749 that an organization came into existence of which we can form any definite judgment. This company attempted to open a playhouse in Philadelphia, and Addison's <Cato) was actually performed; but the performers were arrested and admon¬ ished by Recorder Allen to give up the under¬ taking. Thomas Kean was the principal actor in both tragedy and comedy, and one Murray seems to have been associated with him in the management. Finding Philadelphia too inhos¬ pitable, the players went to New York, where they were advertised as the company of come¬ dians from Philadelphia, and gave the first the¬ atrical season of which we have any connected account. The performances were given in a <(convenient room® in a house belonging to Rip Van Dam in Nassau street, and extended over a period of more than a year — from 5 March 1750 to 8 July 1751. The first play was Rich¬ ard III,* in which Kean played Richard. So far as is known, the company appeared in 15 plays and nine farces. Although Mr. Kean formally announced his

withdrawal from the stage to resume his business of writing, he was with a company called the <(Virginian Comedi¬ ans® at Annapolis in the summer of 1752, when Lewis Hallam and his London players arrived at Williamsburg, Va. Besides Mr. Kean there were other members of the New York company among these “Virginia Comedians.® Perhaps this disposes of the claim usually made for Hallam’s company as being the first regular theatrical organization in America.

Lewis Hallam, who brought a company of comedians from London in 1752, was not an actor of any consequence in England, nor is it likely that his wife, known to the American stage successively as Mrs. Hallam and Mrs. Douglass, was an actress of recognized ability there.

The Hallam company reached Yorktown in June 1752, and began playing at Williamsburg on 5 September following, the opening pieces being (The Merchant of Venice* and (Lethe. * The only other play the Hallam company is known to have performed at Williamsburg was (Othello, } 9 Nov. 1752. From Williamsburg Hallam went to New York, where he arrived in June 1753, and played until the following March. Mrs. Hallam played the leading parts in both tragedy and comedy, while her daughter, Miss Hallam, was put forward in farces. Hallam seldom appeared. The great Shakespeare roles were divided between Malone and Rigby, the

former playing Shylock and Lear, and the latter Richard and Romeo. From New York the com¬ pany went to Philadelphia, where the engage¬ ment was limited to 25 performances. This ended the theatrical campaign of Lewis Hallam the elder, who retired with his family to Jamaica, where he died soon afterward.

A year or two after Mr. Hallam’ s death his widow married David Douglass, who organized a theatrical company in Jamaica in 1758 for another American campaign, with Mrs. Douglass as his chief attraction. Besides his mother, young Lewis Hallam was the only member of Mr. Douglass’ company who had previously ap¬ peared in the New York and Philadelphia the¬ atres. He had already become a full-fledged tragedian, although he was only in his 20th year, sharing the leading parts in tragedy and comedy with Mr. Harman, as Rigby had previously shared them with Malone. Mrs. Harman, who was a daughter of Charlotte Charke and a granddaughter of Colley Cibber,

was also with the company, and next in consequence to Mrs. Douglass. The low comedian was Owen Mor¬ ris, who was identified with the American theatre for a full half century — 1759-1809. After his arrival in New York, Douglass had much difficulty in obtaining permission to open the theatre that he had built on what was called Cruger's Wharf, and it was not until 28 Dec. 1758 that he began a brief season with the tragedy of (Jane Shore. }

During the following spring and summer Mr. Douglass built a theatre at Vernon and Smith streets in Philadelphia, which he opened 25 June 1759, and maintained with considerable regularity until the close of the year. He had obtained authority to act from Governor Denny, and the compact was kept, although the opposi¬ tion to the theatre was so great in the province that an act prohibiting plays was passed by the assembly to go into effect 1 Jan. 1760. After Philadelphia was closed against him, Mr. Doug¬ lass went to Annapolis, where he played an engagement. The company also performed in other Maryland towns, and at Newport and Providence in 1761. In the autumn Mr. Doug¬ lass built another theatre in New York, in what was then Chapel (now Beekman) street, where he gave performances from 19 Nov. 1761 to 26 April 1762. This ended his first attempt to achieve the mastery of the colonial stage. In his few years of management Douglass had become an actor of considerable authority, at¬ tempting such parts as Sir John Falstaff in In the latter young Hallam played the lover to his mother's Juliet. In the last New York engagement, Mrs. Hallam, the wife of the youthful tragedian, was seen in a few parts, but the pair separated soon afterward.

It has always been understood that after his retirement from New York in 1762 Mr. Doug¬ lass did not venture upon the continent again until 1766, when he built the Southwark The¬ atre in Philadelphia. On the contrary, he ap¬ peared in Charleston in November 1 765 and remained there until the following April. Lewis Hallam was not with the company, and, with the exception of Mrs. Douglass and Miss Hallam, the performers were all new to the stage. Only three of the new players were still with Doug¬ lass when he reached Philadelphia — Messrs. Woolls and Wall and Miss Wainwright. With

the opening of the new theatre in Southwark, Philadelphia, began the theatrical organization afterward known as the ((01d American Com¬ pany.® Lewis Hallam was once more in the lead. Mr. Morris and Mrs. Harman were again with the company. During this season a so- called comic opera, (The Disappointment, } said to have been written by Col. Thomas Forrest, afterward a distinguished officer in the Revo¬ lutionary army, was announced for production, but it was withdrawn

because it contained Hocal reflections.® As a recompense for its with¬ drawal, (The Prince of Parthia,* by Thomas Godfrey, Jr., was produced 24 April 1767. This was the first tragedy written and played in America. The season was noteworthy for the first appearance in America of John Henry, who was the partner of Lewis Hallam after the Revolution in the management of the Old American Company.

While the company was playing in Philadel¬ phia, Mr. Douglass built a new theatre in John street, New York, which was the second of the permanent theatres in the colonies, the South¬ wark being the first. The first season at the John street house lasted from 7 Dec. 1767 to 2 July 1768. The company alternated between these two theatres down to the time of the Revolution ; but Mr. Douglass found the patron¬ age of the two cities inadequate as early as 1770-71. In the latter year he made a tour to the southward as far as Williamsburg, Va., playing at Fredericksburg, Suffolk and other towns, and building a theatre at Annapolis, where the company played an engagement in the autumn of 1771. In 1773 Douglass also built a theatre at Charleston, S. C., which was the last of the many buildings he erected for theatrical purposes. The company played at Charleston from 22 Dec. 1773 to 19 May 1774. In October following the Continental Congress passed a resolution forbidding theatrical per¬ formances, in view of the impending Revolu¬ tion, and the organization was disbanded. Hal¬ lam went to England, where he appealed to the London public at Covent Garden Theatre as Hamlet in 1775. His mother, Mrs. Douglass, died in Philadelphia at the close of 1774, and Mr. Douglass returned to Jamaica, where he became a magistrate.

It is an interesting fact, showing the theatri¬ cal activity before the Revolution, that while the American Company was acting in New York and Philadelphia in 1766-69 there was a com¬ pany in the South giving performances at An¬ napolis and Williamsburg. This company was known as the “Virginia Comedians® in 1768, when it gave a long season at the Virginia capital; but it assumed the name of the “New American Company® when it was at Annapolis from January to June 1769. The leading spirits of the Virginia Comedians were Messrs. Ver-ling and Bromadge, and Mrs. Osborne, who had played with Douglass at Charleston in 1765-66, and Mr. Godwin, who was with the American Company at the Southwark in Phila¬ delphia in 1766-67. All these were with the New American Company, with the exception of Mr. Bromadge. A number of bills of the Vir¬ ginia Comedians at Williamsburg in 1768 have been preserved.

The most important annals relating to the American stage that have escaped the destroy¬ ing hand of time are a collection of playbills

made by Thomas Llewellyn Lechmere Wall — Mr. Wall of Douglass' company. These cover 40 years of the theatrical life of the actor and are especially valuable for the complete infor¬ mation they afford in regard to the Baltimore Company, organized 'by Wall and Lindsay in 1782. Wall was perhaps the only member of the American Company who remained behind when Douglass returned to Jamaica in 1774. He was also the only manager who undertook to produce plays before the dose of the Revo¬ lution. In 1781 he was at Annapolis giving entertainments with the assistance of his wife and daughter when the French army was on the march to Yorktown. For one of his per¬ formances at that time he succeeded in securing the services of the band belonging to the regi¬ ment of Count de Chaleur. Later in the year he went to Baltimore, where he repeated his Annapolis entertainments, and in conjunction with Adam Lindsay, a tavern-keeper at Fell's Point, built a theatre, of which Lindsay and Wall were the nominal managers, with Wall as the stage director. The company was formed on what was afterward known as the ((common- wealth plan.® The theatre was opened 15 Jan. 1782 and continued open without important in¬ terruptions until 9 July — 42 nights. In all 19 plays and 14 farces were produced, and the total receipts for the season were $14,209, an average of $338.50 per night. With the ex¬ ception of the Walls the players were all new to the American stage, and, it may be assumed, were all amateurs.

The second season at the Baltimore theatre extended to 7 Feb. 1783. On the third night of the season at Baltimore, Mr. and Mrs. Dennis Ryan appeared in (Douglass. } Ryan dominated the company from the outset, and when Wall retired from the management, 7 Feb. 1783, he assumed the reins, keeping the theatre open from 11 February to 9 June. From Baltimore Ryan carried his company to New York and opened the theatre in John street. Wall was with Ryan's company, which remained until the British evacuation, giving two performances in October 1783, while the military players gave a performance for Mrs. Ryan's benefit. In the winter Ryan again opened the Baltimore the¬ atre, the season extending from 7 Dec. 1783 to 14 Feb. 1784. The only noteworthy event of this season was the first production of the (School for ScandaP in America, 3 Feb. 1784, with Mrs. Ryan as Lady Teazle. After the close of the Baltimore season in 1784, Ryan took the company to Richmond, where he played a long engagement. Mr. Heard, who was the original Sir Peter Teazle in this country, joined the forces of Hallam and Henry, while other members of the

organization found professional employment in the South during the rest of the century.

After the Revolution both Lewis Hallam and John Henry sought to control the theatres that had been built by Douglass ; but Hallam was the first to present a company of comedians to the New York public, opening the John Street Theatre 24 Aug. 1785. Hallam proposed a part¬ nership with Henry, and the firm of Hallam and Henry, which ruled the American stage during the next seven years, came into exist¬ ence. The John Street Theatre reopened under their management 21 Nov. 1785. Henry engaged in England a number of capable actors

and actresses whose names are part of the his¬ tory of the American stage, while Wignell not only succeeded in building in Philadelphia the first really handsome and complete theatre in the United States, but put into it the best company of players that had as yet been tempted to cross the Atlantic.

An incident of the Hallam and Henry part¬ nership, previous to the reorganization of the company, that needs to be noted here is the production of the first American comedy, (The Contrast, > by Royall Tyler. This piece, which was first produced in New York 18 April 1787, was written for Wignell, who wished to play a Yankee character. Wignell's Jonathan deserves remembrance as the forerunner of the long series of stage Yankees that afterward became popular with American audiences. The comedy was printed in Philadelphia, and was often played by strolling companies before the close of the century.

The only really important recruits engaged by Mr. Henry in England were Mr. and Mrs. Hodgkinson, of the Bath and Bristol theatres, and Mrs. Wrighten, who had long been a favor¬ ite singer and actress at Drury Lane. Hodg¬ kinson was a man of great talent and versatility, and the best actor seen in America up to that time and for many years-afterward. He made his debut as Don Felix in (The Wonder, > at Philadelphia, 26 Sept. 1792, succeeded Henry as one of the managers of the Old American Company in 1794, and was active as actor and manager in New York until after the opening season at the New Theatre in 1798. Mrs. Hodgkinson, known at Bath and Bristol as Miss Brett, was an actress of merit, and in this country eclipsed both Mrs. Henry and Mrs. Hallam, the wives of the managers by whom the Hodgkinsons were engaged. Mrs. Wrigh¬ ten was known in America as Mrs. Pownall. She died at Charleston in 1796, after introduc¬ ing her two daughters to the stage in this country. One of them, Caroline,

married Alex¬ ander Placide, who had been a rope dancer in England. She was the mother of the famous Placide family of actors. It was during this period that William Dunlap became prominent as a dramatist and adapter of plays. His first comedy, (The Father,) was produced at the old John Street Theatre, 7 Sept. 1789. Dunlap became associated with Hallam and Hodgkinson in the management of the New York company in 1796, and he was afterward for a brief period the sole manager of the New Theatre, better known as the Park.

After leaving the Old American Company, in the beginning of 1792, Thomas Wignell asso¬ ciated himself with A. Reinagle, a musician who came to American in 1786, in the project of building the New Theatre in Philadelphia, after¬ ward known as the Chestnut Street Theatre. The house was modeled after the theatre at Bath, and was completed early in 1793; but owing to the yellow-fever epidemic it was not opened by the company of players engaged by Wignell until 17 Feb. 1794. Among the actors and actresses comprising the Philadelphia com¬ pany were Mr. Fennell, a young tragedian of much promise ; Mr. and Mrs. Whitlock, the lat¬ ter a sister of Mrs. Siddons ; and Miss George, who was the wife of Sir John Oldmixon, and was known to our stage as Mrs. Oldmixon. This company remained intact without any im-

portant changes or additions for three years, playing alternately in Philadelphia and Balti¬ more; but in, the autumn of 1796 Mr. Wig-nell brought three important recruits from Eng¬ land — Mrs. Merry, the famous Miss Brunton of Covent Garden Theatre, who had become the wife of Robert Merry, the Della Cruscan poet; Thomas Althorpe Cooper, then a young man of 20 but destined to be the manager of the New York theatre for many years; and William Warren, who had been a strolling player in England, and who became the successor of Wignell in the management of the Philadelphia theatre. Mrs. Merry became a widow in 1798. She soon afterward married Wignell, and after his death she became the wife of Warren, who survived her many years.

A fortnight before the formal opening of the Philadelphia theatre by Wignell's company a new theatre in Boston, scarcely inferior to the Philadelphia house, was opened by an English company engaged and brought over by Charles Powell. This theatre was in Federal street and was built by subscription. It was destroyed by fire in 1798. Powell's

company was a feeble one, and he closed his second season in 1795. Powell was succeeded by Col. John S. Tyler, a brother of Royall Tyler, the author of (The Contrast,) who managed the house on behalf of the stockholders from January to May 1796. The season proved a failure; but the theatre was reopened in September by John Brown Williamson, an English actor, whose wife was popular in London as Miss Fontenelle; but neither he nor his wife nor a stronger com¬ pany than had as yet been seen in Boston availed to make the season successful. One reason for this was that a new theatre, known as the Haymarket, had been built through the exertions of Charles Powell, and opened by him for the first time 26 Dec. 1796. Among Powell's English recruits for the Boston Hay- market were Mr. and Mrs. Giles L. Barrett, the parents of the famous New York comedian, George H. Barrett; Mr. and Mrs. Simpson, afterward New York favorites; and Mrs. Simpson's three daughters, the Misses Wes- tray, of whom Juliana became Mrs. William B. Wood; Eliza, successively, Mrs. Villiers and Mrs. Twaits; and Ellen, Mrs. Darley. Powell again failed at the Haymarket, and the house passed into the control of Hodgkinson, Hallam and Dunlap, under the personal direction of Hodgkinson. The New York company occupied it in the summer of 1797, after which it was abandoned. The Haymarket deserves to be re¬ membered for the production of two American war plays — (Bunker Hill, } by John Daly Burke, 20 Feb. 1797; and (West Point Pre¬ served, *the first of the Andre pieces, by Wil¬ liam Brown, on 17 April following. Dunlap's (Andre* was not produced in New York until 30 March 1798. This epoch, 1792-98, was also remarkable for theatrical activity in the South. Not only had the Baltimore company, including Mr. and Mrs. Ryan and Mr. Wall, played a long engagement at Richmond as early as 1784, but in 1790 John Bignall and Thomas Ward West were the managers of a company called the <(Virginia Comedians.** This organization maintained its existence for many years, its circuit extending from Richmond and Norfolk to Charleston. Bignall, who was held by his Southern admirers to be the best actor on the

continent, died in 1794. His real name was Moneypenny, and he had been a stroller in England in the same company with William Warren, of the Philadelphia theatre. After Bignall's death West became the sole manager of the company and piloted it over the South¬ ern circuit for a number of years. In 1795 there was a rival theatre in Charleston, con¬ ducted by Mr. Jones, who had been previously at the Boston Theatre. His principal actress was Mrs. Whitlock, who had just retired from the Philadelphia company. A Frenchman, M. Sollee, succeeded to the management of this theatre, and organized a company in Boston

to play in Charleston for the season of 1795-96. Mr. and Mrs. Whitlock, Mr. and Mrs. Placide and Mrs. Arnold — afterward Mrs. Poe and the mother of Edgar Allan Poe — were in the company.

The prosperity which had given to America three splendid theatres within five years — the Chestnut Street in Philadelphia, the Park in New York, and the Boston Theatre in Federal street, Boston, rebuilt immediately after its destruction in 1798 — was followed by a period of depression that was severely felt over all the country. At the close of the century Wignell was in jail for debts incurred through the Philadelphia theatre, and Dunlap, who had undertaken the sole management of the New York theatre to retrieve previous losses in New York and New England, lost his entire private fortune in the venture. Mr. Barrett was in¬ duced to undertake the management of the new Boston Theatre in 1799, but he failed dis¬ mally.

In all these cities theatrical enterprises were experimental for several years, but in every case a manager was finally found in the local company who succeeded in placing the theatre on a sound business and artistic basis. Mr. Warren, after he became Wignell's successor in Philadelphia, associated with himself in the direction of the Chestnut Street Theatre a popular young member of the company, William Burke Wood. This partnership lasted until 1825. In New York the young tragedian Cooper retrieved the fortunes of the Park Theatre and made the house a paying one for a number of years. In Boston, Snelling Powell, a brother of Charles Powell, secured control after other attempts had failed, including the assumption of the management of the Boston Theatre by Charles Whitlock in 1800. John Bernard, an English actor of some repute who joined the Philadelphia company in 1797, was for a while Snelling Powell's associate in directing the Federal Street Theatre; but for many years Powell's partner was Mr. Dickenson, who was an actor of moderate ability, but a man of sound judgment and an excellent manager. These were the dominating theatres in the United States during the first quarter of the century, and their influence in giving tone and character to theatrical enterprises in the country was felt down to 1850.

The Old American Company was designed to be permanent in organization, but all the early managers, from Douglass to Wignell and Hodgkinson, aimed at controlling a circuit of playhouses modeled after the provincial circuits in England. The building of the new theatres in Philadelphia, New York and Boston resulted in giving companies that were permanent in

organization permanence of home. These were the real stock-company days, but a tendency toward the star system was manifested almost from the outset. In 1796 Mrs. Whitlock played what was essentially a star engagement at the Boston Theatre; it was limited to 12 nights, for which she was paid $450 and allowed a benefit. Hodgkinson played star engagements in all the leading cities between 1798 and 1805, and Cooper followed Hodgkinson's example, and was a star from youth to old age. But the first star to shine with extraordinary effulgence in the American theatrical firmament was George Frederick Cooke. He was the first English actor of great reputation who came to America to play the leading roles of tragedy and comedy with the stock companies in the principal cities. In view of this the star sys¬ tem, as it ruled in the American theatres for the next half century, may be said to date from his appearance here in 1810—11.

Simultaneously with Cooke's performances in the theatres of Philadelphia, New York and . Boston were the star engagements of John Howard Payne. Cooke played three engage¬ ments in Philadelphia — in all 39 nights. His highest receipts for any one night were $1,475, his lowest $474. His average for his last Philadelphia engagement of 12 nights in 1811 was $807.50. Payne played to an average about the same time of $442, while Cooper's Philadel¬ phia average was $509. Young Payne's popu¬ larity rapidly diminished, and in 1812 he per¬ formed to receipts that fell as low as $255. After Cooke the next English star to appear in America was Holman, in 1812; but he came at a time of serious depression in consequence of the war with Great Britain, and the impres¬ sion that he made fell far below his expecta¬ tions. Then came Incledon and Phillips as musical stars, and after them the Wallacks, Henry and James W., and finally, to close the first decade of the star system in America, 1810-20, Edmund Kean. The great English stars who came to this country during the next three decades were Junius Brutus Booth and William Charles Macready, 1820-30; Fanny Kemble and her father, Charles Kemble, and Charles Kean, 1830-40; and Tyrone Power, James R. Anderson and Macready, again in the fullness of his fame, 1840-50. This long period had developed only two American stars of sur¬ passing brilliancy — Edwin Forrest and Char¬ lotte Cushman.

The century opened with about half a score of theatres in the leading American cities, only three of which, as already described, were worthy of the name or of the drama. Between 1800 and 1850 about 20 theatres were built in New York, none of them superior to the Park, and only one, the Bowery, in any sense its rival, until Burton

established himself in Chambers street in the last decade of the epoch. The only new theatres of importance in Philadelphia dur¬ ing the same period were the Walnut Street and the Arch Street theatres, the former erected for a circus in 1808 and fitted up for theatrical uses in 1820, and the latter built in 1826. The theatres built in Boston in these 50 years were the Tremont, the American Amphitheatre, — afterward the Warren and National — Kimball's Museum, the Eagle and the Howard Athenaeum. Baltimore had nothing better than the old

Holliday Street Theatre during this epoch, and Washington was without a place of amusement worthy of the drama until 1835. The theatre builder of the period in the South and South¬ west was James H. Caldwell. He built the American Theatre in New Orleans in 1823, and afterward erected the Camp Street and Charles Street theatres. Mr. Caldwell also built theatres in Cincinnati, Saint Louis, Natchez, Hunisville, Nashville and Petersburg. Another manager, John S. Potter, was concerned in building as many, or more, theatres in the South and Southwest; but, after all, the theatrical activity of a century resulted in an approximate num¬ ber of theatres in actual use at its close not ex¬ ceeding 50.

The figures that show the periods of pros¬ perity and the intervening periods of depression are not easily obtainable, those that are in exist¬ ence being widely scattered through books and newspapers or in private hands. The losses were sometimes heavy even in the early enter¬ prises. The Philadelphia company in 1797 played 14 weeks in New York with a loss of $2,350; but, on the other hand, Caldwell, in 1818, cleared $10,000 in four months in Peters¬ burg, Va. The receipts of the Park Theatre, New York, for the season of 1832-33 reached nearly $150,000, Fanny Kemble and her father drawing $56,000 for 60 nights, an average of $933 per night. In 1833-34, when the receipts at the Park fell to $135,000 for the season, the Kembles averaged $732 per night ; but in 1834 — 35, without the Kembles, the season's total was over $160,000. At this time the star system was at its height of favor, with both managers and the public; but its effects were disastrous in cities where there were rival theatres outbid¬ ding one another for the best stars. This was especially true of the managers of the three rival theatres in Philadelphia who for nearly 20 years continued to cut one another's throats for the benefit of stars of no great magnitude. Wood, in his Recollections, } cites an example of the effects of the system. One of Fanny Ellsler's engagements in Philadelphia yielded $10,869.25, out of which the danseuse received $6,436. The money paid to the other dancers, the ballet and for the ordinary expenses of the house brought the expenditures up to

$11,826, involving a loss to the manager of $1,000 for 10 nights. This system finally culminated about 1846, when nearly all the theatres in the coun¬ try were ruined. But it was divided patronage as well as the excessive percentages of the stars that made the theatres in Philadelphia, New York and Boston unprofitable; for in the South, where Caldwell had a monopoly in his own field from Richmond to New Orleans the profits were very large, notwithstanding the frequent engagement of stars like Cooper, Booth and Forrest. This contrast receives ad¬ ditional emphasis from the fact that Caldwell was the only manager produced by the first cen¬ tury of the American theatre who died rich.

The closing years of the 19th century wit¬ nessed a partial revival of the old stock com¬ panies in their purity and simplicity, without the intervention of great, stars, and it has also witnessed the nearly complete abolition of this form of theatrical organization. In the theatres managed by William Wheatley, John S. Clarke, and, for a time, by Mrs. John Drew in Phila-

delphia, by James H. Wallack in New York, and by Moses Kimball in Boston, stock com¬ panies were maintained. Later on, Lester Wal¬ lack, Augustin Daly, M. H. Mallory, Daniel Frohman, Charles Frohman and A. M. Palmer in New York, and R. M. Field in Boston, kept together for years organizations which were managed upon the pure stock system. Through¬ out the country generally the theatres for a while employed stock companies, but mainly for the purpose of supporting traveling stars. This continued until after the close of the Civil War, when the impetus given to business enter¬ prises of all kinds was felt in renewed theatrical activity not only in the cities, but all over the country. What is known as the combination system (that is, a traveling company made up of a star and a supporting company), which began about 1869 and reached its highest de¬ velopment before 1876, involving the destruc¬ tion of the stock companies in all except a few theatres, was the consequence of this theatrical revival. Nearly every inland town and city from Maine to California built a theatre, with the expectation that traveling companies would occupy it at intervals. The demand thus created could be supplied only by the combina¬ tions.

One of the first results of this new state of things was the banishment from the managerial office of all, or nearly all, the actor-managers.

Their places were filled by business men, who, while they may have lowered, in a sense, the artistic character of the theatre* have raised its financial standing to a point which, during the first century of its existence, seemed beyond its reach. The theatre in America was no longer a haphazard thing, living from day to day on uncertainty. It became a business conducted on the principles which govern other forms of commercial enterprise, and is as stable, as sound and as certain of adequate rewards as any. Indeed, so abnormal has been the de¬ velopment of the business character of the thea¬ tre that it has excluded from general managerial attainments everything else. Very few of the managers throughout the country ever under¬ take the original production of plays, or take the trouble to acquire the artistic knowledge requisite for . this kind of work. New York chiefly, and in a lesser degree Chicago and Boston, are the play-producing centres. A few New York managers and the play-producing stars select and bring forth all the plays and gather together all the companies which, supple¬ mented by the imported attractions, keep the theatres of the country supplied with entertain¬ ment during the season. The advantage of this system is that playgoers everywhere are furnished with well-trained and perfectly equipped companies, appearing in plays which have been tried and found to be worthy. The local manager, free from the worries and cares incident to stage-work, devotes his time and at¬ tention to the comfort bf his patrons at the front of the house, and to the strict conduct of business there. The results are well-regulated and comfortable auditoriums and good order in all the business departments of the theatre.

A remarkable aspect of the American theatre, from a commercial point of view, is the enormous profit it has yielded and continues to yield to home and foreign celebrities. Among American actors, Edwin Forrest acquired and

left behind him a great estate, from the remnant of which was established the Forrest Home, near Philadelphia, a retreat for aged actors, noble in its purpose and efficient in its bene¬ faction ; Charlotte Cushman, resting for long periods in England and Italy, left a fortune of $600,000; Edwin Booth, having made and lost more than one competency, renewed his finan¬ cial successes in his declining years, and left $750,000 to his heirs, after having founded the Players' Club at a cost of $200,000; Mary Ander¬ son retired from the stage after a few seasons of brilliant and uninterrupted triumph, to enjoy a happy marriage in her youth, her labors hav¬ ing brought her a fortune of $500,000; Joseph Jefferson, blessed with that continuous vitality often found among the children of the stage, had in 1902 acquired a fortune of $1,000,000. Among foreign actors, William C.

Macready owed to America the realization of his dream of retirement from a profession he affected to loathe ; Sarah Bernhardt acquired here a fortune which enabled her to defy the authority of the house of Moliere and to establish a thea¬ tre of her own in beautiful Paris; Tommaso Salvini, adding his great earnings here to his modest ones in other lands, became the richest actor Italy has ever known ; and Henry Irving has found in his frequent visits to our country a public eager and willing to fill his coffers to overflowing with the rewards so justly due to his unequaled managerial achievements and to his undoubted genius as an actor. In the mov¬ ing picture field Charlie Chaplin passed every¬ body else, and his income is stated to be fully $1,000,000 annually. The list of the well-re¬ warded favorites of the public might be greatly extended, but this glimpse of results is sufficient to make clear the profits and prosperity of the American stage, and to indicate the extent of its commercial advancement during the century.

The development of the theatre in all its de¬ partments, especially since 1860, has been vast. From not more than 100 in 1800, and fewer than 800 in 1860, the number of actors and actresses in the United States increased so im¬ mensely that in 1888 it was estimated at 4,500, and now probably exceeds 10,000. This number represents only the performers engaged in pre¬ senting the drama in its higher forms. If does not include the managers, who number several hundred, as compared with 25 or 30 in 1850 and six or eight in 1800. If the exponents of variety and vaudeville and the other employees in the amusement business are added, the num¬ ber of people who gain a livelihood by giving public entertainments will not fall below 30,000; including stage hands and all the persons who derive their support from the theatre, the num¬ ber may be roughly estimated at 100,000. This vast army of workers is well organized, gen¬ erally well paid and reasonably prosperous. It has numerous charitable and social organiza¬ tions, which are models of their kind. The Actors' Fund, the Actors' Order of Friendship, the Players' Club, the Green Room Club, the Lambs' Club, the Professional Women's League, are institutions of which any profession might well be proud; and there are numberless others of equal merit supported by the amusement makers of the United States. There are about 1,000 regularly organized theatrical companies on tour through the United States during the

season, and the number of theatres of all kinds is 10,000.

In New York City there were in 1918, the following theatres : in Manhattan borough, about 50 theatres worthy of the name, the lar¬ gest being the Hippodrome (seating 5,000), followed by the Manhattan Opera House (3,500), Metropolitan Opera House (3,366) and Century (2,890) ; and about 50 vaudeville and motion picture houses of the best class, the larger ones being the Capitol (5,000), the old Academy of Music (3,400), Strand (3,300) and Audubon (2,653). In Brooklyn borough there are about a score of good theatres and some 30 first-class vaudeville and motion picture houses, the largest being the Halsey, Keeney, Ridgewood and Prospect, each of them seating 2,500. There are perhaps a thousand other minor theatres and picture houses.

The improvement which has taken place in the construction of theatres in America within the past 35 years is worthy of especial notice. The tragic disaster in Brooklyn on the night of 5 Dec. 1876 awakened the attention of man¬ agers and of the public authorities in the differ¬ ent States to the flimsiness of construction which marked even the best theatres of the period. The result was the passage of new and most stringent laws, involving requirements which, while they seemed onerous, perhaps, have re¬ sulted in giving to America the best and safest theatres in the world. Even the older theatres, built before the new regulations, have been so altered under the direction of the au¬ thorities that they are now comparatively free from danger. In New York, where these regu¬ lations are perhaps the strictest, there is a larger number of absolutely safe theatres than in any city in the world ; while for beauty and convenience combined with safety it is im¬ possible to find elsewhere such theatres as the Century, Strand, Gaiety, New Amsterdam, Victoria, New York, Knickerbocker, Empire, American and Metropolitan Opera House. As the older houses pass away they are replaced by absolutely fireproof structures if replaced at all.

Perhaps the most marked change that has taken place in the American theatre during the last hundred years is in the character and number of its patrons. Attendance upon the theatre was looked upon even 60 years ago by at least seven-tenths of the people of the United States as almost a sin. The fashionable un¬ godly and the lowest and most depraved made up the audiences. We have seen how, in the Revolutionary period, theatres were closed by act of Congress, doubtless because, in those days of danger, the fathers of our country felt that they would help their cause by propitiating the Almighty, who was supposed to frown upon godless amusements. But in the last three or four decades this unreasonable prejudice against the most enjoyable and least harmful of all forms of amusement has so

materially lessened that it is estimated by a good au¬ thority that not more than one-tenth of the people refuse to patronize the theatres as a mat¬ ter of principle. It is true that a clergyman now and then inveighs against the stage in the old- fashioned, puritanical way; but his words, in all likelihood, fall upon ears that the night be¬ fore were listening to the sorrows of <Camille) or were taking in the laughter-provoking catch¬

lines of (The Private Secretary.* Indeed, the element of moral usefulness in the theatre is no longer successfully derided.

The phenomenal development of the moving picture theatre has made many changes in the stage since the dawn of the 20th century. Those theatre managers who clung to the regularly staged productions of the old school suffered in business, and there were years of depression and numerous failures. Some tried to bring back the crowds by going the limit in presenting plays exhibiting crime, and for a few seasons there was scant decency in many American playhouses. When this failed, the more sen¬ sible managers accepted the moving picture as an adjunct, and many utilized it as a vaudeville feature. The war also had a disintegrating in¬ fluence; many of the younger actors put on the uniform and were lost to the profession. War plays were called for, and a few strong pro¬ ductions resulted. The number of new plays produced in America is small, however. About 100 are staged annually in New York City, and perhaps a dozen in other cities. Those that run more than 100 nights are voted to be great successes. The remainder of the performances in New York are either reproductions of Euro¬ pean authors, or old plays revived. It is not possible to catalogue the best plays that come and go, though many of them will be found by reference to Drama. See also Moving Pictures.

Names of Some Professional

Abingdon, Wm. L .

Abott, Bessie .

Adams, Maude .

Albani, Mme .

Alda, Frances .

Alexander, Srr George .

Allen, Viola .

Anderson, Mary .

Anglin, Margaret .

Arliss, George .

Arthur, Julia .

Ashley, Minnie . . j

Baird, Dorothea .

Barrymore, Ethel .

Barrymore, John. . .• .

Bateman, Kate .

Bates, Blanche .

Bentley, Irene .

Bernard, Sam .

Bernhardt, Sarah .

Blair, Eugenie .

Blauvelt, Lillian Evans .

Booth, Rachel .

Buffalo Bill .

Burke, Billie . ' ' '

Burnett, Frances H .

Burroughs, Marie .

Burt, Laura .

Busley, Jessie .

Cahill, Marie . .

Calv6, Emma .

Cameron, Beatrice .

Cameron, Violet .

Campbell, Mrs. Patrick. . . . . !

Carle, Richard .

Carter, Mrs. Leslie . . ’ ’ ’

Carus, Emma . ’

Castle. Vernon .

Cavalieri, Lina .

Chase, Pauline .

Claire, Ina .

Claxton, Kate . !

Coghlan, Gertrude .

Coghlan, Rose . ’ ’ ’

Conquest, Ida . ’

Corinne . * "

Cowl, Jane .

Crosman, Henrietta. . . . .

Dale, Alan .

D’Arville, Camille _ !!!!!!!

Davis, Fay .

Dazie, Mile .

Famous Actors.

Real

Pilgrim, Wm. Lepper.

Story, Mrs. T. W. Kiskadden, Maude.

Gye, Mrs. Ernest. Gatti-Casazza, Mrs. G. Sampson, Sir George. Duryea, Mrs. Peter. Navarro, Mrs. A. F. de. Hull, Mrs. Howard. Arliss-Andrews, George. Cheney, Mrs. Benj. P. Chanler, Mrs. Wm. A. Irving, Mrs. Henry B.

Colt, Mrs. Russell G. Blythe, John.

Crowe, Mrs. George.

Creel, Mrs. George.

Smith, Mrs. Harry B. Barneti, Sam.

Damala, Mme.

Downing, Mrs. Eugenia. Pendleton, Mrs. W. F. Powers, Mrs. Jas. T.

Cody, William F.

Ziegfeld, Mrs. Florenz. Townsend, Mrs. S. Livingston, Mrs. Francis M. Stamford, Mrs. Hy. B.

Joy, Mrs. E. C.

Arthur, Mrs. Daniel V. Gaspari, Mme. Alnor. Mansfield, Mrs. Richard.

De Bensaude, Mrs.

West, Mrs. G. Cornwallis. Carleton, Chas. N.

Payne, Mrs. Wm. L.

Everall, Mrs. Harry J. Blythe, Vernon Castle. Muratore, Mrs. L. Drummond, Mrs. Alex. Fagan, Miss.

Stevenson, Mrs. Chas. A. Pitou, Mrs. A., Jr.

Sullivan, Mrs. John.

Bertelli, Mrs. Riccardo. Flaherty, Corinne K. Klauber, Mrs. Adolph. Campbell, Mrs. Maurice. Cohen, Alfred J.

Crellin, Mrs. E. W. Lawrence, Mrs. Gerald. Fellowes, Mrs. Cornelius.

THEATRE, THE AMERICAN

Names of Some Famous Actors — Continued.

Professional

De Silva, N .

Dockstader, Lew .

Doro, Marie .

D'Orsay, Lawrance .

Dorr, Dorothy .

Dressier, Marie .

Duse, Eleanora .

Eames, Emma .

Elliot, Gertrude .

Ellsler, Effie .

Eltinge, Julian .

Farrar, Geraldine .

Fealy, Maude .

Ferguson, Elsie .

Filkins, Grace .

Fischer, Alice .

Fiske, Minnie Maddern .

Forbes-Robertson, Beatrice. .

Fornia, Rita .

Foy, Eddie .

Gadski, Johanna .

George, Grace .

Gilman, Mabelle .

Glaser, Lulu .

Gluck, Alma .

Gordon, Kitty .

Guilbert, Yvette .

Hare, Sir John .

Harned, Virginia .

Haswell, Percy .

Herne, James A .

Heron, Bijou .

Holland, Mildred .

Hopper, Edna Wallace .

Illington, Margaret .

Irving, Isabel .

Irwin, May .

Janis, Elsie .

Jeffreys, Ellis .

Joyce, Alice .

Karl, Tom .

Kelcey, Herbert .

Kellermann, Annette .

Kendal, William H .

Kendal, Mrs. W. H .

Kidder, Kathryn .

Langtry, Mrs .

Lewis, Ada .

Lipman, Clara .

Loftus, Cissie . ; .

Lohr, Marie .

Lotta _ .

Lloyd, Alice .

Lloyd, Marie . . .

Macdonald, Christie .

Mack, Andrew .

Mannering, Mary .

Marlowe, Julia .

Marr, Pauline .

Martinot, Sadie .

Matthison, Edith Wynne

May, Edna .

Mayhew, Stella .

Mayo, Margaret .

McCarthy, Lillah .

McLean, R. D .

Melba, Mme .

Millard, Evelyn .

Millward, Jessie .

Mitchell, Maggie .

Moore, Mary .

Moore, Eva .

Morris, Clara .

Murray, Alma .

Nazimova, Alla .

Neilson, Julia . .

Neilson-Terry, Phyllis .

Nevada, Emma .

Nielsen, Alice . _. .

Nilsson, Christine .

Noria, Jane .

Olcott, Chauncey .

Opp, Julie .

O'Neill, Anne .

O'Neill, Nance .

Palmer, Minnie .

Parker. Flora .

Patti, Adelina . .

Phillips, Frank .

Pickford, Mary .

Polaire, Mile .

P well, Maud . .

Rankin, Phyllis .

Reeve, Ada .

Rice, Fannie .

Real

Harvey, Mrs. Martin. Clapp, Geo. Alfred.

Dexter, Mrs. Elliott. Dorset, Wm. Lawrance. Dam, Mrs. Hy. J. W. Dalton, Mrs. Jas. H.

Cecci, Signora.

Gogorza, Mme. Emilio de. Forbes-Robertson, Lady. Weston, Mrs. Frank. Dalton, William. Lou-Tellegen, Mrs.

Durkin, Mrs. James. Clarke, Mrs. Thomas B. Marix, Mrs. Adolph. Harcourt, Mrs. Wm.

Fiske, Mrs. Harrison Grey. Hale, Mrs. Swinburne. Laboy, Mrs. James P. Fitzgerald, Edward. Tauscher, Mme. H.

Brady, Mrs. W. A.

Corey, Mrs. W. E. Richards, Mrs. Thos. D. Zimbaiist, Mrs. Efram. Beresford, Mrs. Harry. Schiller, Mrs. Max.

Fairs, Sir John.

Courtenay, Mrs. Wm. Fawcett, Mrs. Geo.

Ahem, James.

Miller, Mrs. Henry.

White, Mrs. Edw. C. Brown, Mrs. A. O.

Bowes, Mrs. Edward J. Thompson, Mrs. W. H. Eisfeldt, Mrs. Kurt. Bierbower, Elsie Janis. Skelton, Mrs. H. Sleatn. Moore, Mrs. Tom.

Carroll, Thomas.

Lamb, Herbert.

Sullivan, Mrs. Jas. R. Grimston, W. H.

Grimston, Mrs. W. H. Anspacher, Mrs. L. K.

De Bathe, Lady Hugo G. Paar, Mrs. John.

Mann, Mrs. Louis. Waterman, Mrs. A. H. Prinsep, Mrs. A. L. V. Crabtree, Charlotte. MacNaughton, Mrs. Tom. Dillon, Mrs. B.

Gillespie, Mrs. Henry L. McAloon, William A. Wadswortn, Mrs. Fred E. Sothern, Mrs. E. H.

Collier, Mrs. Wm. Nethersole, Mrs. Louis. Kennedy, Mrs. C. R. Lewisohn, Mrs. O.

Taylor, Mrs. Billie.

Selwyn, Mrs. Edgar. Barker, Mrs. H. Granville. Shepherd, R. D.

Armstrong, Mrs. N. Coulter, Mrs. Robt. P. Glendinning, Mrs. J. Abbott, Mrs. Chas.

Albery, Mrs. James. Esmond, Mrs. H. V. Harriott, Mrs. F. C. Forman, Mrs. Alfred. Bryant, Mrs. Chas. E. Terry, Mrs. Frederick. King, Mrs. Cecil.

Palmer, Mrs. Raymond. Nentwig, Mrs. Benj. Miranda, Comtesse de. Centanini, Mrs. G. P. Olcott, Chancellor J. Faversham, Mrs. W. F. Thomas, Mrs. A. M. Hickman, Mrs. Alfred. Rogers, Mrs. John R.

De Haven, Mrs. Carter. Cederstrom, Baroness.

Fein, Philip.

Fairbanks, Mrs. Douglas. Zouze, Emillie.

Turner, Mrs. H. Godfrey. Davenport, Mrs. Henry L. Cotton, Mrs. Wilfred. Ryder, Mrs. Paul W.

Names of Some Famous Actors — Concluded.

Professional

Ring, Blanche .

Ritchie, Adele .

Robson, Eleanor .

Robson, May .

Rorke, Kate .

Rorke, Mary .

Ross, Chas. J .

Russell, Annie. . .

Russell, Lillian .

Sanderson, Julia .

Sembrich, Marcella _

Shannon, Effie .

Simone, Mme .

Stahl, Rose .

Stanhope, Adeline .

Stirling, Mme. A .

Stuart, Cosmo .

Summerville, Amelia. .

Taliaferro, Mabel .

Tanguay, Eva .

Taylor, Laurette .

Tempest, Marie .

Templeton, Fay .

Terry, Ellen .

Tetrazzini, Luisa .

Tilley, Vesta .

Titheradge, Madge. . . . Tree, Sir H. Beerbohm

Trevelyan, Hilda .

Truax, Sarah .

Tyler, Odette .

Vanbrugn, Violet .

Victoria, Vesta .

Vincent, Ruth .

Wain wright, Marie. . . .

Walker, Charlotte .

Ward, Fannie .

Ward, Genevieve .

Ware, Helen .

Waring, Herbert .

Real

Winninger, Mrs. Chas.

Post, Mrs. Guy Bates. Belmont, Mrs. August. Brown, Mrs. Augustus H. Cree, Mrs. Douglas.

St. Aubyn, Mrs. F. W.

Kelly, Chas. J.

Yorke, Mrs. Oswald.

Moore, Mrs.

Barnette, Mrs. B.

Stengel, Mme. Guillaume. Lamb, Mrs. Herbert.

Perier, Mme. Casimir. Bonelli, Mrs. Wm. Wheatcroft, Mrs. N. Mackinlay, Mrs. J. Gordon-Lennox, Cosmo. Stepan, Mrs. Max E. Corrigan, Mrs. Thos. J.

Ford, Mrs. John W. Manners, Mrs. J. H. Gordon-Lennox, Mrs. Cosmo Patterson, Mrs. William. Carew, Mrs. James.

Bazelli, Sra.

De Frece, Mrs. W. Quartermaine, Mrs. Chas. Bimbaum, Henry.

Blow, Mrs. Sydney.

Albert, Mrs. Chas. S. Shepherd, Mrs. R. D. Bourchier, Mrs. Arthur. Terry, Mrs. Herbert.

Fraser, Mrs. John.

Roberts, Mrs. Franklyn. Walter, Mrs. Eugene.

Dean, Mrs. Jack, de Guerbel, Countess.

Remer, Miss Helen.

Rutty, Herbert W.

Famous Moving Picture Actors.

Name

Ahern, George .

Allison, May .

Ashley, Arthur H .

Baggot, King .

Baird, Leah .

Banks, Perry .

Bara, Theda .

Barriscale, Bessie .

Bayne, Beverly .

Beaumont, Harry .

Boardman, True .

Borzage, Frank .

Brady, Alice .

Brice, Rosetta .

Briscoe, Lottie .

“ Bud ” (A. E. Duncan) Bushman, Francis X . . . Carroll, William Arthur. Castle, Mrs. Vernon. . . .

Chaplin, Charlie .

Chatterton, Thomas. . . .

Childers, Naomi .

Clark, Harvey .

Clayton, Marguerite _

Cloy, May .

Corbett, James J .

Costello, Maurice .

Courtot, Margaret .

Cranston, Mary .

Cruze, James .

Cunard, Grace .

Dana, Viola .

Daniels, Bebe .

Darling, Grace .

Daw, Marjorie .

Dearbolt, Ashton .

Dill, Max M .

Drew, Lillian .

Drew, Sidney .

Dunaew, Nicholas .

Eagels, Jeanne .

Edmondson, Harry B . . Fairbanks, Douglas. . . .

Finch, Flora .

Ford, Francis .

Forman, Tom . .

Fox, Harry .

Fuller, Mary .

Gebhart, George .

Gibson, Helen .

Born

Newark, Cal., 1888.

Georgia, 1895.

Brooklyn, N. Y., 1886.

Saint Louis, Mo., 1879. Chicago, Ill., 1887.

Victoria, B. C., 1877.

Sahara, Africa, 1890.

New York Citr*’, 1891. Minneapolis, Minn., 1893. Abilene, Kan., 1888.

Oaidand, Cal., 1885.

Salt Lake City, Utah, 1893. New York City, 1892. Sunbury, Pa., 1892.

Saint Louis, Mo., 1893. Brooklyn, N. Y., 1886. Norfolk, Va., 1885.

New York City, 1877.

New Rochelle, N. Y., 1892. London, England, 1890. Geneva, N. Y., 1881. Pottstown, Pa., 1885.

Boston, Mass., 1886.

Salt Lake City, Utah, 1892 Minneapolis, Minn., 1893.

San Francisco, 1866. Pittsburgh, Pa., 1877. Summit, N. J., 1897.

Chicago, Ill., 1893.

Ogden, Utah, 1884.

Paris, France, 1894.

Brooklyn, N. Y.

Dallas, Tex., 1901.

New York City, 1896. Colorado Springs, Colo., 1901. Milwaukee, Wis., 1894. Cleveland, Ohio, 1877. Chicago, Ill., 1886.

New York City, 1864. Moscow, Russia, 1884. Kansas City, Mo., 1894. Baltimore. Md., 1873. Denver, Colo., 1883. England, 1877.

Portland, Me., 1883.

Texas, 1893.

Pomona, Cal., 1886. Washington, D. C., 1893. Basle, Switzerland, 1879. Cleveland, Ohio, 1894.

Famous Moving Picture Actors — Concluded.

Name

Gish, Lillian .

Gough, John .

Gray, Robert .

Green, Dorothy .

Hahn, Philip .

“ Ham ” (L. V. Hamilton) . . .

Hatton, Raymond .

Hay aka wa, Sessue .

Henley, Hobart .

Hollis, Hylda .

Hulette, Gladys .

Johnson, Arthur .

Joy, Ernest .

Joyce, Alice .

Joyner, Francis .

Kane, Gail .

Kellard, Ralph .

Kennedy, Mary .

Kenyon, Doris .

Kerrigan, J. Warren .

King, Anita .

Kirby, Ollie .

Kolb, C. William .

La Badie, Florence .

Larkin, George .

Lloyd, Harold .

Lockwood, Harold .

MacDermott, Marc .

Marshall, Betty .

Martin, Vivian .

McCabe, Harry .

McRae, Duncan .

Meighan, Thomas .

Mersereau, Violet .

Millarde, Harry. . .

Minter, Mary Miles .

Moore, Tom .

Moreno, Antonio .

Morrison, Adrienne .

Morrison, Chick .

Murnane, Allan .

Neilson, Anna .

Newton, Charles .

Ogle, Charles .

Oland, Warner .

Ostriche, Muriel .

Overton, Evart. .

Pearson, Virginia .

Pennington, Ann .

Periolat, George E .

Petrova, Olga .

Phillips, Dorothy .

Pickford, Mary .

Pretty, Arline .

Rale, W. W .

Reichenbach, Harry .

Reid, Wallace .

Ridgely, Cleo .

Ritchie, Billie. . .

Robbins, Edwina .

Rossou, Helene .

Russell, Wm, F .

Sais, Martin .

Sears, Laura .

Shafer, Mollie .

Shelby, Margaret .

Sherrill, Jack .

Shot well, Marie .

Snow, Marguerite .

Spingler, Harry .

Stewart, Anita .

Storey, Edith .

Stowell, Wm. H .

Talmadge, Constance .

Tedmarsh, W. J .

Thomas, Lizette .

Van Tassell, Marie .

Vernon, Agnes .

Walcamp, Marie .

Walker, Lillian .

Warwick, Robert .

Washburn, Bryant .

Wells, Kittie .

White, Pearl .

Williams. Earle .

Yost, Herbert .

Young, Clara Kimball .

Born

Springfield, Mo., 1896. Boston, Mass., 1897.

Maine, 1888.

Moscow, Russia, 1895. Amsterdam, Holland, 1884. Oakland, Cal., 1891.

Iowa, 1887.

Tokio, Japan, 1889. Louisville, Ky., 1886. Philadelphia, Pa., 1880. Arcade, N. Y., 1899. Cincinnati, Ohio, 1876. Minneapolis, Minn., 1891. Kansas City, Mo., 1889.

New Orleans, La., 1887. Philadelphia, Pa., 1887.

New York City, 1887.

Florida, 1897.

Bridgeport, Conn., 1897. Louisville, Ky., 1890.

Chicago, Ill., 1892. Philadelphia, Pa., 1896. Cleveland, Ohio, 1875. Montreal, Canada, 1894.

New York City, 1892. Burchard, Neb., 1893. Brooklyn, N. Y., 1888. London, England, 1881. Brooklyn, N. Y., 1890. Sparta, Mich., 1898.

Chicago, Ill., 1879.

London, England, 1881. Pittsburgh, Pa., 1884.

New York City, 1896. Cincinnati, Ohio, 1889. Shreveport, La., 1902.

Ireland, 1887.

Madrid, Spain, 1888.

New York City, 1887.

Mount Morrison, Colo., 1878. Philadelphia, Pa., 1882. Stockholm, Sweden, 1890. Rochester, N. Y., 1874. Zanesville, Ohio, 1865. Sweden, 1880.

New York City, 1898. Osborne, Ohio, 1889. Louisville, Ky.

Camden, N. J.

Chicago, Ill., 1873.

Warsaw, Poland, 1885. Baltimore, Md., 1892. Toronto, Canada, 1893. Washington, D. C., 1893. Russia, 1868.

Cumberland, Md., 1883.

Saint Louis, Mo., 1892.

New York City, 1893. Glasgow, Scotland, 1877. Hoboken, N. J., 1886. Newport, R. I., 1898.

New York City, 1886. California, 1893.

Staten Island, N. Y., 1893. Woodland, Cal., 1874.

San Antonio, Tex., 1900.

New York City, 1897.

New York City, 1886. Savannah, Ga., 1892.

Buffalo, N. Y., 1889. Brooklyn, N. Y., 1895.

New York City, 1892.

Boston, Mass., 1883. Brooklyn, N. Y., 1899. London, England, 1876. Birmingham, England, 1889. Fort Edward, N. Y., 1880. Oregon, 1896.

Dennison, Ohio, 1894. Brooklyn, N. Y., 1888.

New York City, 1882. Chicago, Ill., 1889. Shreveport, La., 1894.

Missouri, 1889.

Sacramento, Cal., 1880. Cincinnati, Ohio, 1883 Benton Harbor, Mich., 1891.

THEATRE, Stage Mechanics of. A

theatre stage is that visible part of a platform arranged at one end of an auditorium which is enclosed by scenery and framed within and viewed through an opening or arch. The stage

and all that may be arranged upon it should be preservative of the lines of sight and hearing of the spectator and auditor.

From earliest times either an elevation or platform, or a depression or pit, have been usual for representation or entertainment before spectators. The earliest choral dances in the circle or pit evolved into the Greek classic theatre, with its skene or house of two or three stories, which filled the background of the scene, the action being within the semi-circular chorus place or pit in front.

The mechanism of the ancient theatre was very exact in every respect. The religious char¬ acter of the performance established fixed and usually theologic meanings for everything done or said in the play. The scenery was probably limited to painted curtains at the back and re¬ volving triangular prisms at entrances. Machin¬ ery for startling effects was, however, usual. The Roman invasion resulted in the extension of the stage more and more forward, until it became a platform sufficiently large to hold the chorus and entire group of performers.

The ancient Greeks bore the same relation in art and theatricals to the world of their time as the modern French do to-day; consequently even the traveling companies of the various na¬ tions followed crudely the methods of perform¬ ances usual with the Greeks, and, indeed, the general conduct and character of the modern theatre has in many important respects followed the original classic traditions. The entrances and exits on the modern stage, much of the symbolic values of parts of the stage and the arrangement of stage movement are directly inherited from the old Greek theatre : In later mediaeval times a portable stage or cart was used. But little advance can be noted in stage mechanism until after the time of Shakespeare and of Moliere, when modern inventions began to appear. Richard Wagner and the Germans revolutionized stage settings and theatrical architecture, as notable in Wagner's Theatre in Baireuth and the Burg

Theatre in Vienna. The Germans' leadership in applying science to and otherwise improving stage mechanics has been followed by every European, nation, notably in England, by Sir Henry Irving, whose system of lighting is especially remarkable in the con¬ veyance of the feeling of atmosphere to the senses of the spectators. In America Steele Mackaye was progressive in improving the mechanism of the stage. Later, the proprietors of the New York Hippodrome developed most elaborate and complicated mechanisms for spec¬ tacular productions.

While the use of gas and movement of scen¬ ery in grooves had been universal during the past century until 1875, yet in many theatres to-day such modes of lighting and scene shift¬ ing are still retained. In the theatres of to-day, where electricity and the most modern ma¬ chinery are employed, the following are the terms and uses of the stage machinery:

The Stage.

Rake, The. — The scale or rise of the stage floor, from the curtain line to the back wall. A modern stage is generally built. with a. slight downward incline toward the audience. The Rake " of the scenery is the perspective line; a gradual decrease in the height of each piece of the sides of a scene representing an interior or room and extending up stage.

Proscenium Arch, The. — The architectural arch and sides behind which descends the curtain — as it were a massive frame to the picture which the cui tain-rise reveals.

Bridge. — A longitudinal section of stage, built as a trussed bridge so that it- can be taken out, raised or lowered as necessary for effects. Bridges are counterbalanced like elevators, and designed to carry much live weight.

Apron, The. — That space of the stage from the curtain line down to the footlights. A distance usually of four or five feet. The apron in modern theatres is often almost eliminated.

Tormentor, The. — The foremost piece of scenery stand¬ ing slightly out, both sides of the stage, back of the proscenium sides. It is often red and intended as the matting to the picture framed.

Front Drapery, The. — A short curtain stretching across the proscenium arch, intended to blend with the tormentors at the required height from the ground, once the curtain has risen, thus forming an arch matting to the picture.

, Fly Galleries, The. — Galleries that are built along the side walls of the stage. The height of these galleries above the stage varies according to the proportions of the stage and building. On an average they are erected some 30 feet from the ground. One of these side galleries is occupied — ordinarily the left side gallery — by the fly-men, a crew of men employed there to operate the ropes (called lines) whereby the divers pieces of scenery are either raised or lowered into position.

. Painter's Gallery, The — ■ A long narrow bridge extend¬ ing from one fly gallery to the other alongside the back wall of the stage. It is always movable and can be hoisted or lowered down any distance by means of ropes and is for the purpose of touching up scenery which may necessitate fresh daubs of paint. The scenery to be painted is hung or set flat against the back wall of the stage, and the painter's bridge is then raised or lowered in front of it, according to necessity.

Rigging Loft, The. — A timber flooring some few feet beneath the roof above the stage: a network of small beams for the purpose of attaching pulleys thereto — whereby pieces of scenery, borders, etc., may be raised from the ground or lowered. The rigging loft is ordinarily built 50 feet above the stage, _ sometimes even higher; this to afford more room for the hoisting and retention of stacks of scenery above the setting. The pulleys are attached to the iigging loft in rows of threes, from the front of the stage to the back of the stage. In each row one pulley occupies the centre of the rigging loft; the two others occupy the left and the right of the central pulley and are stationed half way between the central one and the edge of the rigging loft. To each of these numerous rows of pulleys are affixed long ropes, one end of which is carried down by a small weight, while the other end is securely fastened in the fly galleries, usually the left gallery.

Pins, Counterweights, Sand-bags.— The " Pin " is a bar of cast iron, 15 inches long by 1^ inches in diameter. Pins, sand-bags and counterweights are attached to the loose end of the rope which drops toward the stage from the rigging loft. These weights are usually removed when a piece of scenery is fastened to the rope in their place.

Noise Machines. — A tumble-box filled with old iron, stones, etc., that can be made to deliver almost any degree of loud noises. Also a sheet

iron apparatus that when shaken resembles thunder in the souna emitted.

Snow Machine. — A mechanism for dropping a shower of small bits of white paper to imitate falling snow.

Lines. — The ropes that are thus held in the rigging loft and manipulated from the fly gallery.

Centre Line, The. — The rope attached to the pulley stationed in the centre of the rigging loft, and dropping toward the centre of the stage.

Long Line, The. — The rope attached to that pulley which is farthest from the side from where it is being manip¬ ulated in the fly gallery.

Short Line, The. — That rope which is nearest the side from which it is manipulated in the fly gallery.

Set of Lines, One. — The short, centre and long line of one row of pulleys. The sets of lines are usually fastened together on the pegs in the fly gallery.

Traps. — A concealed opening in the floor of the stage.

r ***

Stage Positions.

The stage is divided into imaginary lines and spaces — which enable the performers to cross, inter-cross and

t UP STAGE

circle around each other without confusion — and as well the stage carpenter to erect his scene, and the stage-hands to set their furniture in the proper places.

It is assumed that there are four entrances. These are counted 1, 2, 3, 4, from down Stage up.

. N. B. — -Though there may be but one entrance on one side of the interior setting — direction may possibly be given to set a fireplace or window R.2. (right second); that is to say, where right second entrance should have been had it existed.

Explanation of the Abbreviations.

R. 1. E. — Right first entrance.

R. 2. E. — Right second entrance.

R. 3. E. — Right third entrance.

R. 4. E. — Right fourth entrance.

L. 1. E. — Left first entrance.

L. 2. E. — Left second entrance.

L. 3. E. — Left third entrance.

L. 4. E. — Left fourth entrance.

C. — Centre of stage.

D. C. — Down centre line.

U. C. — Up centre line.

U. R. C.— Up right centre line.

R. C. — Right centre line.

D. R. C. — Down right centre line.

U. L. C. — Up left centre line.

L. C. — Left centre line.

D. L. C. — Down left centre line.

D. R. — Down right of stage.

D. L. — - Down left of stage.

L. — That side of the stage which is left of a person fac¬ ing the audience.

R. — That side of the stage which is right of a person facing the audience.

U. R. — Up right of stage.

U. L. — Up left of stage.

The Scenery.

Wing, A. — A single piece of scenery, ordinarily 5 feet 4 inches wide by 18 feet high.

Flat, A. — A double wing, either hinged or battened together.

Borders. — Strips of canvas hung crosswise above the stage by means of a set of lines. These may either represent the sky, the branches of trees and fouage, etc.

Ceiling.— A square of canvas set to a light frame of wood which is lowered by means of a double set of lines — • one set “ up stage ” (back of stage), the other “ down ” (front of stage), until it rests squarely upon the interior set.

Box Set, A. — A complete interior setting.

Drop, A. — A large canvas representing the back-ground of the setting. In the case of a complete exterior setting, the drop extends the full width of the back of the stage; in the case of an interior setting, where, for example, only a window and a door present a view of the outside, the drop may be much narrower.

Tab, A. — A narrow drop, hung by a single line.

Jog, A. — A narrow piece of scenery, wherewith two flats or wings of an interior setting may be joined, either for extension or to form a quadrangle.

Return Pieces. — Two wings affixed to an interior setting, which turn off stage, back of each side of the pro¬ scenium opening.

Backings. — Either a wing, or two wings hinged to¬ gether, set back of some opening, window or door.

Masking Pieces. — A piece of scenery, tab, drop or wing, set behind an opening to conceal either the scenery or the bare stage immediately behind it.

Braces. — Two narrow strips of wood, five feet long, either permitted to slip alongside each other or made fast to each other by means of a turn-screw once the desired extension is reached. The top end has a small iron giip attached, in the shape of a ram’s horns; the lower has a narrow short blade of steel intended to trail flat upon the ground and containing a hole sufficiently large to admit a screw-pin. The grip at

the top of the brace is first intro¬ duced into a screw-eye attached to the back of a piece of scenery; then the desired length of the brace is secured by means of the centre screw, so that it reaches the ground obliquely; lastly, then, the screw-pin fastens the brace securely to the ground: and thus may scenery be held in position.

Lashlines. — Pieces of light rope fastened at the side of the wooden frame near the top of a wing or flat, for the purpose of fastening this wing or flat to the next one.

The Lights.

Footlights (of the stage.) — Rows of lights along the front edge of the stage.

Border Lights. — The illumination of a series of electric bulbs in a long tin reflector, extending the full width of the stage and hung up in the air, by means of a set of lines, back of the canvas borders. There are usually four border lights, moie or less, according to the depth of the stage and the style of the play: No. 1 border light is hung close to the curtain down stage; No. 4 is hung well back of stage; the other two, Nos. 2 and 3, occupy the intersecting positions.

; Strips. — Several electric bulbs set to a narrow strip of wood, varying in length according to necessity — usually

our feet long, wnicn may be movable and hung anywhere back of the setting.

Bunch Light. — Several electric bulbs inside of circular and movable tin-reflector.

Box Calcium. — An oval, sheet-iron box with an open front 18 inches by 14 inches, set upon a long steel rod encased in a tubing — for the purpose of raising or lowering. The box is painted white within and contains carbon holders and carbon sticks — and is for the purpose of throwing a wide flood of white or colored light.

Mediums. — A lignt frame of wood, tne size of the open¬ ing of the box calcium. The space within this frame is filled with a thin sheet of gelatine: the gelatine being colored either red, blue, green, amber, etc. Thus sunset glow, moonlight, sunlight effects may be secured by the

use of a different medium.

Lenses. — A sheet-iron hood, set to a steel rod and operated in the same way as the box calcium, but for the purpose of throwing a shaft of light: that is, a moonbeam, a sunbeam.

Pockets. — Concealed, safety, steel pockets in the floor of the stage, on both sides, for the purpose of connecting wires, leading to calciums, bunch lights, etc. Usually there are three pockets on each side of the stage.

The Switch-Board. — The electric board — usually on the prompt side — where all connections are made for the electricians to operate all the lights from a single place.

For greater detail consult Gerhardt, W. P., ‘Theatres: Their Safety, Comfort and Health- fulness) (New York 1915).

J. M. Edgar Hart,

Instructor of the American Academy of Dra¬ matic Arts.

THEATRE FRANQAIS, ta-atr fran-sa. See Comedie Francaise.

THEATRE LIBRE, lebr, in France, a theatre for the populace, subsidized by the gov¬ ernment and admission to which is practically free to all citizens of the republic.

THEATRICALS, Amateur. See Amateur Theatricals.

THEBAN CYCLE. ˆ A series of old Greek epic poems dealing with Theban legends. They include <Thebais,) which tells the story of the house of Labdacus and the attack of the Seven on Thebas; the ‘Epigone,* which relates the capture of the city, and the ‘ CEdipcedia, * which tells the story of the hero Odipus. The poems average about 6,000 lines each.

THEBES, thebz (Egyptian Net, the No of the Bible; Greek Thebai or Diospolis), Egypt, a famous ancient city, whose ruins are situated on the banks of the Nile, 350 miles southeast of Cairo, near the modern villages of Karnak and Luxor. The ruins are among the most mag¬ nificent in the world. The largest is the great temple of Ammon at Karnak on the east bank of the river. It was begun during the Twelfth Dynasty and enlarged by the kings of the suc¬ ceeding dynasties down to the time of the Ptolemies. It stands within a large enclosure which also contains several minor temples. An avenue of sphinxes leads to

the main entrance, which is a huge pylon, 142 feet high. This leads into a court measuring 276 by 338 feet, and traversed by a double line of colossal columns. A second pylon leads into the great hall or hypostyle, whose roof was supported by 134 columns in 16 rows. The columns of the two central rows are 78 feet high and 33 feet in circumference. All were brilliantly painted and sculptured, and many of the columns still retain their bright colors. Other pylons lead into the inner courts, one of which contains two obelisks 97ˆ4 feet high and a colossal statue of Osiris. One of the obelisks is still erect. The entire structure is 1,200 feet long and about 350 feet wide. At Luxor, also on the east bank of the

river, and a short distance south of Karnak, there are fine ruins of another temple of Am¬ mon, built by Amenophis III and his succes¬ sors. On the west bank the principal ruins are the Tombs of the Kings, hewn into the solid rocks of the hillside; the Ramesseum, a temple of Ammon built by Rameses II, and containing a colossal statue of that king; and the two Colossi of Memnon, 64 feet in height. One of these is the celebrated "vocal statue. *Numer¬ ous other remains of tombs and temples are scattered over the neighborhood on both sides of the river. After the expulsion of the Hyksos Thebes became the capital of Egypt and re¬ mained so until the beginning of the Twenty- first Dynasty. It declined in importance after this with the exception of a short period in the 7th century b.c., when it was again the capital. The Ptolemies repaired its great build¬ ings and so did the Romans. In 27 b.c. an earthquake worked havoc with its ancient ruins. Since then Thebes is nothing more than a col¬ lection of ruins inhabited by a few Arab families of Fellahin, who obtained a precari¬ ous livelihood by guiding travelers over the ruins or rifling the tombs for antiquities. Con¬ sult Davies, N. de G., 'Five Theban Tombs (in Archaeological Survey of Egypt, 'Memoir 21,* London 1913) ; Bulletin of the Metropoli¬ tan Museum of Art (New York 1914) ; Lepsius, Karl, 'Denkmaler Aus Aegvpten und Aethiopen *(Berlin 1850-59) ; Mariette, A. E., 'Monuments of Upper Egypt* (London 1877) ; Naville, E. H., 'Deir El-Bahari* (London 1894-1906). See also Egypt.

THEBES (Greek, Thebai), Greece, the principal city of Bceotia, was situated on an elevated plateau, south of Mount Phaga, its site now being occupied by the unimportant modern town of Thivae (pop. 3,500), at the junction of the road leading north from Athens, with the transversal road leading from the Strait of Euripos on the east to the Gulf of Corinth on the west. It was one of the most celebrated cities of Greece, the birthplace of Pindar, Epaminon- das, and Pelopidas. Cadmus, leading thither a Phoenician colony, is said to have founded the city by building the citadel called Cadmeia (1500 b. c.). The principal name in the legendary history of Thebes is that of CEdipus.

The first recorded event in its history took place in 728 b.c., when Philolaus drew up a code of laws for the Thebans. During the Persian wars it lost much of its influence in Greece through its perfidious leagues with the Persians. In the Peloponnesian War the Thebans rendered im¬ portant services to the Spartans; but they after¬ ward, through jealousy of the Spartan power, joined the confederacy against them in 394. In 382, though peace then prevailed, Phcebidas, the Spartan commander, treacherously possessed himself of the Cadmeia, which was held by the Spartans until Pelopidas and ; Epaminondas headed a conspiracy which resulted in the death of the tyrants (378 b.c.). Open war now broke out between Sparta and Thebes, which resulted in the humiliation of the former by the crushing defeat of Leuctra (371). Thebes, under the brilliant leadership of Epaminondas and Pelopi¬ das was now the leading state in Greece, but its supremacy departed when the former fell at the battle of Mantinea (362 b.c.). On the rise of the Macedonian power Thebes entered

into an alliance with the Athenians and other Greeks against Philip. After the battle of Chaeronea (338 b.c.) it was obliged to receive a Macedonian garrison. On Philip's death an insurrection broke out in Thebes and an at¬ tempt was made to drive the Macedonians from the Cadmeia. But Alexander hastened to their relief, captured and destroyed (336 b.c.) the city, and reduced the inhabitants to slavery. Twenty years afterward Cassander rebuilt Thebes ; but it never recovered its former im¬ portance. In the war of the Romans against Mithridates, king of Pontus, it joined the latter out of gratitude to Athens, and was severely chastised by the Romans under Sulla. From this time the Thebans as a power in Greece gradually disappear from history. In the 11th and 12th centuries it was again in a prosperous condition as a result of the introduction of silk manufacturing. It was sacked by the Normans in 1146. Consult Baedeker, Karl, <Greece) (4th Eng. ed., Leipzig 1909) ; Fabricius, E., <Theben) (Freiburg 1890) ; Muller, M., (Geschichte The- bens) (Leipzig 1879) ; Stern, E. von, <Ge- schichte der spartanischen und thebanischen Hegemonic* (Dorpat 1884).

THECLA, thek'la, Saint, the female pro¬ tomartyr of the Church. Born of a noble family of Iconium in Lycaonia, she was con¬ verted by the preaching of Saint Paul, followed him to Antioch and devoted herself to a life of virginity. As a consequence, she suffered a series of persecutions from her fiance and her parents, who eventually

denounced her to the authorities as a Christian, and she was thrown to the wild beasts in the theatre; but the fierce animals refused to hurt her, and she also es¬ caped unscathed from the flames to which she was subsequently exposed. After the death of Saint Paul she lived to a ripe old age in a cell near Seleucia. She is the heroine of a Chris¬ tian romance of the 2d century called (The Acts of Paul and TheclaP (See Apocrypha). Consult Schlan, (Die Akten des Paulus und die altere Theklalegende) (1877) ; Schmidt, C., Acta Pauli* (Leipzig 1905) ; Ramsay, (The Church in the Roman Empire) (London 1893).

THECOPHORA, a suborder of Cheloma (q.v.), containing all except the leathery turtles (Athecce). It is defined by anatomical charac¬ ters, the most conspicuous of which is the ex¬ clusive possession of horny epidermal shields or plates on the shell. Consult Gadow, Am¬ phibia and Reptiles) (New York 1901).

THEFT, is a term sometimes used as sy¬ nonymous with larceny, although it is less tech¬ nical, and a wider term, and signifies the secret and felonious abstraction of the property of another with the intention of converting it to the taker's use, and without the consent of the owner. See Larceny.

THEINE, CsHioN402, more often called caf¬ feine, an alkaloid found in tea, coffee, Para¬ guay tea, guarana, etc. It may be prepared synthetically by action of methyl iodide on theobromine. Usually obtained from tea dust which contains from 2 to 4 per cent white silky needles, slightly soluble in cold water and alcohol, possessing a somewhat bitter taste, and forming salts with acids. It is used in medicine as a nerve stimulant.

THEISM, the doctrine of the existence of a God or Gods. It may take the form either of monotheism or polytheism and is opposed only to atheism, which denies the existence of such divine beings. From its use to express the belief of cultured Christian peoples, the term has been given a more restricted meaning. Thus, theism has been identified with monothe¬ ism, as implying belief in one God, and hence is distinguished from all forms of polytheism. Further, theism is distinguished from pantheism, on the one hand and deism on the other. Pantheism (q.v.) merges God with the world- process and thus practically denies his person¬ ality. Deism (q.v.) emphasizes the personality of God, but conceives him as existing apart from the world of his creation. Theism en¬ deavors to rise above both of these extremes and embrace the truth contained in each. On the one hand it maintains the personality of God and his transcendence of the world. On the other it insists upon the immanence of God, upon his presence

in the world as its controlling and life-giving agency. Thus the God of the¬ ism is at once the Author and the Preserver of the world. In every age and among every people of history some form of theism is to be found as the basis of religious observance. This belief is refined and developed with the prog¬ ress of thought and civilization and the direc¬ tion of this development is generally in the line above mentioned, from polytheism to mono¬ theism, and on to a comprehensive theism. Thus the traditional polytheism of Greece broke down under the influence of philosophic reflec¬ tion; but this reflection itself culminated in the dieistic philosophy of Aristotle. As the theoret¬ ical basis of religion and the ultimate explana¬ tion of the universe, theism has always had a prominent place in systematic reflection. In the earlier centuries of the Christian era it was the topic of supreme importance and the best effort of theologians and philosophers was given to its discussion and exposition. As a result, cer¬ tain proofs for the existence of God were for¬ mulated, the most important of which possess considerable historic interest. We may men¬ tion three of these arguments: (1) The Onto¬ logical argument, first proposed by Anselm, in¬ fers the existence of God from the idea of a most Perfect Being. The presence of this idea in the human mind entails the existence of such a Being, for existence is one of the perfections necessarily contained in the idea of Most Per¬ fect Being. (2) The Cosmological argument was adapted from Aristotle, and proceeds upon the principle that every effect must -have a cause. The world is such an effect. It is im¬ possible to suppose that the series of natural causes goes back to infinity, and consequently we are . compelled to assume the existence of a Divine First Cause, adequate to account for the existence of the world. (3) The Teleological argument is based upon the evidences of design in the world, and infers therefrom the exist¬ ence of a designing mind as its Author. These formal arguments were subjected to a destruc¬ tive criticism by the philosopher Kant at the end of the 18th century. He attempted to show how they depended one upon the other, and all contained contradictions and inconsistencies. Kant held that the moral argument was the only possible proof for the existence of God. This

argument maintains that the existence of right and duty presupposes the existence of a God who will ultimately proportion happiness to virtue and vice versa. Kant's criticism was effective in destroying the force of the three above-mentioned proofs in their traditional for¬ mulation. Evolutionary science has also con¬ tributed to lessen the

force of the cosmological and teleological arguments in their earlier and cruder statement. If the present complex con¬ dition of the world is the result of a slow process of development from a simpler con¬ dition, the need for a First Cause of the present world is less apparent. If present organic structures owe their existence to their utility •(that is, are the result of natural selection), their purposiveness is explained by natural causes. But all such criticism, including that of Kant, is effective rather against the form than the substance of theistic argument. It has led only to a reconstruction of old argu¬ ments and their statement in a more adequate and convincing manner. Thus it would seem that the arguments for the existence of God are rather stronger than weaker, as the result of criticism. We can only indicate in outline what form some of these arguments have taken in recent years. (1) Belief in God is justified by the needs of human thought. The constant endeavor of the human mind, in its thought, is to introduce more perfect unity, more complete system, into its knowledge. The idea of God by virtue of its all-inclusiveness, is required as the final instrument of organization to make this unity complete; for by it the self and the world are adjusted as elements of one universal life. Thus the idea of God proves its own reality by its function in knowledge. (2) The existence of God is evidenced by the nature and development of the world. In the natural world we have a series of events related as cause and effect, and each dependent upon the other. Since each component part is dependent upon and determined by some other part, it is impossible to conceive the whole series as stand¬ ing alone. It is rather by its very nature de¬ pendent, and requires for its existence and sup¬ port some ground or underlying principle that is self-determined. From the nature of the world as dependent and relative, therefore, we are led to believe in the existence of an Under¬ lying Principle that is self-determined and absolute. If we consider next the development which the natural world has undergone we see its culmination in man with his intelligence and civilization. The character of the underlying principle or ground of any process will, of necessity, be more completely manifested as the process unfolds. Thus the intelligence and personality of man, as the outcome of the natural order, reveal to us the intelligence and ersonality of its Ground. (3) The ideals of uman activity, both theoretical and practical, presuppose the existence of a God. The thought of man has an ideal, Truth, for which it ever strives. Yet Truth exists in no single human mind, neither is it the possession of the race. Truth as an end is too real to be imaginary, but if real it must exist somewhere. We are forced then to assume a divine mind in which Truth exists in all completeness. The same is true of the Good, the ideal of human conduct. That Good which, as moral ideal,

exercises absolute authority over all men, is relative neither to in¬

dividual desires nor to the desires of a society of individuals. Here, too, we are obliged to assume a Divine Personality whose plans are realized in the moral order and whose purposes are represented in the moral ideal.

Bibliography. — Balfour, A. J., <Theism and Humanism' (New York 1915) ; Bowne, B. P., (7th ed., Edinburgh 1889) ; Fraser, (Philosophy of Theism' ; Mill, J. S., (Nature, the Utility of Religion and Theism' (3d ed., London 1885) ; Romanes, G. J., (Candid Examination of Theism' (3d ed., ib. 1892) ; Royce, J., (The Concept of God' ; Schurman, (Belief in God' ; Ward, James, <The Realm of Ends; or, Pluralism and Theism' (Cambridge 1911).

H. W. Wright, Cornell University.

THEISS, tis, or TISZA, tis'o, Hungary, the largest tributary of the Danube and one of the most important of the country, rises in the Carpathians, being formed by the junction of numerous small mountain streams. Its course is first northwest, then southwest and west, until, after a circuitous course, it empties into the Danube. Its entire length is 800 miles, 300 of which are parallel to the Danube. The prin¬ cipal affluents are the Maros and Bodrog. The cities on its route are Tokay, Szolnok and Sze- gedin, which frequently suffer from its over¬ flow. A memorable inundation was that of 1879, when Szegedin was overwhelmed and the entire population -lost everything; the loss in¬ cluding many lives. Tokay is at the head of navigation. A canal connects its lower course with the Danube while the Bega Canal connects it with the Temesvar. Its basin has an area of 56,600 square miles, covering eastern Hungary and part of Rumania and Jugo-Slavia.

THELLUSSON, tel'lus-son (Fr. ta-lii- son), Peter, London merchant: b. Paris, 27 June 1737; d. London, 21 July 1797. He settled in London in 1762 and opened a commission house, and later acquired a large fortune by trade with the West Indies. The singular terms of his will, dated 2 April 1796, gave oc¬ casion to the passing of an act of Parliament known as the Thellusson Act. He left to his widow and familv about £100,000, and the re¬ mainder, amounting to more than £600,000, he left to trustees, to accumulate during the lives of his three sons, and the lives of their sons. On the death of the last survivor the estate was to be divided equally among the eldest male lineal descendants of his three sons then living. If there were no heir the property was to go to the extinction of the national debt. This will, being contested by the heirs at law, was finally established by a

decision of the House of Lords 25 June 1805. An act ‘of Parliament, however, was soon after passed (39th and 40th George III, ch. xcviii), restraining the power of devising property, for the purpose of accu¬ mulation, to 21 years after the death of the testator. Thellusson’s last surviving grandson

died in 1856 and the final disposal of the prop¬ erty was not settled without an expensive and protracted lawsuit . lasting until 1859; when in consequence of mismanagement and the costs of litigation the surviving heirs received but a small sum.

THEME, in music, is the subject or lead¬ ing melody in a composition ; in a fugue it is successively repeated or imitated in the same or in a different key by the various parts. Originally simple, themes are frequently more or less disguised by groups of ornamental notes, called variations, which serve too often merely to show off the performer’s flexibility of voice or nimbleness of fingers. See Music.

THEMIS, the'mis, in Greek mythology, a Titaness, daughter of Uranus and Ge (Heaven and Earth) ; according to some, of Helios, or the Sun. Possessed of the gift of prophecy she was for a time a dweller in the oracular temple at Delphi, but she left it to become consort to Zeus. She became bv him the mother of the Hours (Horae) and the Fates (Moirae). The guardian of divine law and order, as established by the gods, she relentlessly pursues all who encroach on the rights of others, and her daughter Dike, the goddess of justice, is often confounded with her. She was honored at Athens, Rhamnus, Delphi and other Greek cities. In art she is pictured as a stately per¬ sonality, with the cornucopiae and scales. Con¬ sult Ahrens, (Ueber der Gottin Themis *(1864) ; Harrison, J. E., (Themis : A Study of the Social Origins of Greek Religion) (Cambridge 1912) ; Hirzel, R., (Themis, Dike und Ver- wandtes* (Leipzig 1907).

THEMISTOCLES, the-mis'to-klez, Greek general and statesman: b. Athens, about 514 b.c. ; d. Magnesia, Asia Minor, 449 b.c. He early displayed unusual ability and great ambi¬ tion. The ostracism of Aristides in 483 was in part due to his influence, and he thereupon be¬ came the political leader in Athens. He was elected archon eponymus in 481, and when the second invasion of Greece by Xerxes was threatened he obtained command of the Athen¬ ian fleet, which through his exertions had been built from the income derived from the

Lau- rium silver mines. He consented to fight under the Spartan commander in the battle off Arte- misium and when, through neglect of his ad¬ vice, the pass of Thermopylae was forced and the Persian hordes overran Boeotia and ad¬ vanced upon Athens, he persuaded the Athen¬ ians to convey their women and children to places of safety, abandon the city to the Per¬ sians and those capable of bearing arms to take to the ships. The exiles, among whom was Aristides, were recalled and the command of the Greek fleet was entrusted to a Spartan, Eurybiades. The battle of Salamis (480) re¬ sulted in a signal victory for the Greeks and Themistocles, to whom the success was mainly due, now became the leader not only of Athens but of Greece. One of his greatest services to his country was the skilful manner in which, by diplomacy and artful parleying with the Spartans, he gained time for the rebuilding of the walls of Athens. From this time the glory of Themistocles declines. He had gained the hatred of the Spartans by building the walls of Athens so strongly and he was now accused by them of treasonable negotiations with the Per¬

sians. He was acquitted of this charge, though he was ostracized in 471 by his countrymen, who had become aware of his unscrupulous character and his inordinate love of riches, which he was accused of gratifying by unjust means. He retired to Argos, thence fled to Epirus, and ultimately sought protection at the Persian court, where he gained high favor with the reigning monarch, Artaxerxes Longimanus. He was deeply engaged in plans for the sub¬ jugation of Greece by the Persians, which he had promised Artaxerxes to compass, when, knowing the impossibility of fulfilling his prom¬ ises, according to some accounts, he took poison ; others, however, ascribe his death to natural causes. His career shows a curious admixture of noble and sagacious statesmanship and sor¬ did ambition. He was possessed of great elo¬ quence and was undoubtedly the savior of Athens and Greece at the crisis of Salamis. Consult Bauer, (Themistokles> (Merseburg 1881) ; Grote, (History of Greece) (1907) ; Wecklein, (Ueber Themistokles> (Munich 1892) ; also any standard history of Greece.

THˆNARD, ta-nar, Louis Jacques, French chemist: b. Louptiere, Champagne, 4 May 1777; <1 Paris, 21 June 1857. He studied chemistry in Paris under Fourcroy and Vauquelin, becom¬ ing the assistant of the latter, who procured him a professorship at the College de France (1804). Subsequently he succeeded Fourcroy in the chair of chemistry at the Ecole Poly¬ technique, as well as in his seat in the Academy. In 1825 he was made a baron by Charles X and in 1832 a peer of France by Louis Phil¬ ippe. It was while attempting to verify a the¬ ory he had propounded in the lecture-room that he made his

important discovery of the perox¬ ide of hydrogen. He worked with the chemist Gay-Lussac (q.v.), and made noteworthy orig¬ inal investigations, including those of the com¬ pound ethers, of bile and of sebacic acid. He discovered the method of preparation of a cheap cobalt blue, since known as (<Thenard's blue.® His chief publications are a (Treatise on Elementary Chemistry) (4 vols., 1813-16) and (Physico-Chemical Researches) (with Gay- Lussac, 1816).

THENARDITE, a mineral identical in composition with the artificial sodium sulphate, Na2S04. It is brittle, of vitreous lustre, white color, transparent to translucent, hardness 2 to 3, and specific gravity 2.68. It crystallizes in the orthorhombic system, often in tabular, cross-twinned forms, with distinct basal cleavage. It is entirely soluble in water; natural crystals speedily absorb water and effloresce. It -often occurs dissolved in the waters of salt lakes, from which it is separated in crystal form dur¬ ing the summer season by evaporation. The most important American localities of this type are Borax Lake, California, and Rhodes Marsh, Nevada. Vast deposits exist on the Rio Verde in Arizona. It is of value in the preparation of soda.

THEOBALD, the'6-bald, Lewis, English

dramatist and Shakespearean scholar: b. Sit- tingbourne, Kent, 2 April 1688; d. London, 18 Sept. 1744. His classical attainments were con¬ siderable and by 1715 he had published trans¬ lations of Plato's (Phsedo) ; the Plectra, *(Ajax> and (CEdipus Rex) of Sophocles and the and 'Clouds* of Aristophanes. He

made attempts at verse and tragedy, but suc¬ ceeded in neither. In 1725 Pope published his edition of Shakespeare and in 1726 Theobald appeared with a work entitled (Shakespeare Restored, or a Specimen of the many Errors as well Committed as Unamended by Mr. Pope in his late edition of this Poet : designed not only to correct the said Edition, but to restore the true Reading of Shakespeare in all the Edi¬ tions ever published.) Though Pope made grudging use of the manifestly improved read¬ ings suggested by Theobald in his second edi¬ tion, he never forgave the detection of his in¬ competence as an editor and in the first edition of the <Dunciad) Theobald figured as hero. In 1733-34 Theobald published an edition of Shakespeare in seven volumes, in the prepara¬ tion of which he had the assistance of Con- canen, Thirlby and Warburton. Textual criti¬ cism of

Shakespeare owes much to him, for he was the first to discard corrupted readings and in his emendations displayed knowledge, tact and good sense. Subsequent editors have de¬ pended much upon him and have adopted his corrections. At the time of his death he was engaged on an edition of the works of Beau¬ mont and Fletcher, six plays of which he had already completed. Consult Collins, (Essays and. Studies) (London 1895) ; Nichols, illus¬ trations of Literature* (Vol. II, pp. 204-654).

THEOBROMA CACAO. See Cocoa.

THEOBROMINE, CiHsˆO,, a white crys- tallizable alkaloid found in the chocolate pre¬ pared from the seeds of the cocoa tree. It forms salts with acids, is bitter, soluble in alcohol, slightly so in water. . It is closely re¬ lated to caffeine, the active principle of tea and coffee, into which it can be readily changed. Caffeine may be considered as theobromine in which one hydrogen atom has been replaced by the methyl group (CH3). It is not used to any extent in medicine, although it has a slight seda¬ tive action on the nervous system.

THEOCRACY (from Gr. Tlieos, God, and kratos, power) is that government of which the chief is, or is believed to be, God himself, and the laws the commandments of God. The priests in such a government are the promul¬ gators and expounders of the divine com¬ mands, the representatives of the invisible Ruler. The most notable theocratic govern¬ ment of all times was that established by Moses among the Israelites. The Puritan govern¬ ment of Massachusetts was also called a theocracy, owing to the claim that it was con¬ ducted on the principle of obedience to divine laws, and the requirement that all should con¬ tribute to the support of the Church and attend church services.

THEOCRITUS, the-ok'ri-tus, Greek bu¬ colic poet : b. Syracuse, according to others at Cos, and flourished about 280 b.c. He was a pupil of Philetas at Cos. Having gone to Egypt, he was treated with much distinction by Ptolemy Philadelphus, in whose praise he wrote Idyls 14, 15 and 17, but afterward returned to Syracuse, where he appears to have been on terms of some intimacy with Hiero II. We have under his name 30 idyls, or pastoral poems, of which, however, several are probably by other authors. The most doubtful are 12, 23, 26, 27, 29. He is to be considered the creator of this species of poetry as a branch of Greek

literature, though the elements of it existed be¬ fore his time among the Dorians both of Sicily and Greece. Most of his idyls have a

dramatic form and consist of the alternate re¬ sponses of musical shepherds. They present fresh and vivid pictures (udvXfaa, little pic¬ tures) of common life in Sicily, and are marked by considerable comic and, though to a less extent, tragic power. They are of a different sort from the affected compositions represent¬ ing the ˆimaginary shepherds of a fictitious Arcadia.® Writing generally in the Doric, though in two cases (Idyls 28, 29) in the ˆEolic, dialect, which is peculiarly adapted to the sim¬ plicity of rural life, his language is strong and harmonious. His metre is chiefly the heroic hexameter. Besides the idyls he wrote a poem called Berenice,* of which only five lines and a word are extant, and 22 epigrams in the Greek .Anthology. He was imitated by Virgil (q.v.) in the (1882) ; Wright, W. C., (A Short History of Greek Literature> (New York 1907).

THEOCRITUS, BION, AND MOS¬ CHUS, Idyls of. Theocritus is one of the great names contributed by Greece to the literature of the world. He is the most excellent of pastoral poets, and to those later born he has always been <(the glass of fashion and the mold of form® — to Bion, to Moschus, to Virgil, to the English, Italian, Spanish and French poets of the Renaissance (and there were many), who were pleased to write of shepherds, their pipes, their loves and their lamentations. His are the flowers from which all the bucolic poets of Europe have sucked their honey. He lived in Sicily in the earlier part of the 3d century b.c. An epigram, written in his name, probably by some one else, says : «I, Theocritus, who wrote these idyls, am a citizen of Syracuse, a man of the people, the son of Praxagoras and Philinna.® It also appears certain from ref¬ erences in his poems that he lived for a time in Alexandria, then the intellectual capital of the Hellenic world, and also on the island of Cos. Beyond this nothing is known of him.

The poems that have come down to us under his name are 32 idyls, not all complete, usually classified as bucolics, mimes, epics and lyrics and 20 odd epigrams. The term idyl comes from a Greek word which is itself a diminutive of another Greek word meaning “form® or ((style,® or merely (<poem,® and only a few of these idyls are what we call pastorals,

the others are little pictures or sketches on various subjects. His first idyl is a dialogue between Thyrsis and a goat herd, in which Thyrsis sings the famous (Lament for Daphnis.* Ihe second tells how a passionate, jilted woman attempts by magic rites to regain the love of

her deserting lover. The next declares a goatherd's love for Amaryllis. Three are poetic contests between herdsmen. Two, VI and XI, are about the love of the Cyclops, Polyphemus, for the sea nymph Galatea; an¬ other is about Hercules and Hylas. Two

others are eulogies on Hiero, lord of Syracuse, and on Ptolemy Philadelphus, king of Egypt. Number XIX is a very brief poem that tells how a bee stung the little god Eros; and sev¬ eral others are probably spurious.

Perhaps the most famous are the 1st,

2d and 15th. The first because of the

(Lament for Daphnis, *which served as a model for Bion's (Dirge of Adonis,) for Milton's (Lycidas,* for Shelley's <Adonais) and Mat¬ thew Arnold's <Thyrsis.) The second, in the opinion of Sir Gilbert Murray, is ((realistic, beautiful, tragic, strangely humorous and ut¬ terly unforgettable, and has remained a unique masterpiece in literature.® The 15th is

probably the most interesting to English read¬ ers ; it is certainly the most entertaining. Mat¬ thew Arnold calls it <(one of the best and happiest of Theocritus's idyls.® It is really a little play, of which the two chief dramatis per¬ sonae are Syracusan women, living in Alexandria. One comes to get the other to go with her to a notable religious celebration in honor of Adonis, which the queen of Egypt has ar¬ ranged with unusual magnificence. The cele¬ bration is to be in the palace, where a beauti¬ ful picture of Adonis is to be exhibited and a famous prima donna is to sing a hymn to Aphrodite and Adonis. The two women and their maids make their way through the crowded streets, squeeze into the palace with difficulty and hear the hymn. The scene is most lifelike.

And it is mainly this quality of lifelikeness that, in the bucolic idyls, distinguishes Theoc¬ ritus from Virgil and all his other imitators. We need not suppose that Sicilian shepherds really spoke as Thyrsis and Daphnis speak, or even like the less elegant Battus and Corydon. But Theocritus uses language not too far from truth and depicts the Sicilian country, with its flowers and rustic objects, in a realistic way; whereas his imitators are all artificial, and many, especially during the Renaissance, ridiculously so forsaking all semblance of reality. The scenes in which their Phyllises and Corydons make love or lamentation might well be in Marie Antoinette's drawing room ; but his shepherds drive their flocks afield in the meadows near Girgenti,

or over the plains of Catania.

No translation of Theocritus can give more than a rude idea of the original. Strictly speaking, poetry cannot be translated; and in a translation of Theocritus not only is the music gone, but his words are so accurately chosen that the foreign equivalents are merely makeshifts. For English readers perhaps the best translation of the 15th idyl is that in Matthew Arnold's essay on (Pagan and Mediaeval Religious Sentiment, * and for the

other idyls, the prose versions by Andrew Lang. Edmund Clarance Stedman translated four, the I, X, XIII and XIX, following the hexameters of the originals. Many other translators in prose and verse have tried their hands, and some with a reasonable measure of success.

Bion is an imitator of Theocritus. Little that he wrote remains: there is the (Dirge of Adonis, * half a dozen short idyls and some fragments; he himself is a shadow. From the poem, a ˆLament for Bion, *attributed to Moschus, it appears that Bion was born in Asia Minor near Smyrna, and possibly that he traveled in Thrace and Macedonia, also that he lived in Sicily and died by poisoning, and that Theocritus mourned him. But modern criticism denies that the (Lament* was written by Moschus, denies the story of poisoning, and puts Bion about 150 b.c. The (Dirge of Adonis *is by far the most celebrated of his poems; for if the earliest suggestion for (Lycidas,* (Adonais *and (Thyrsis* comes from the (Lament for Daphnis, *it certainly comes by way of the (Dirge of Adonis.* The poem is a lament by Aphrodite over the dead Adonis; in part it is passionate to frenzy, with an element of Asiatic extravagance, but in other parts florid, pretty, elegant and artificial. His other poems, for the most part, are love songs, delicate, sweet and elegant.

Moschus seems more shadowy still. His fame is united to that of Theocritus and Bion, as one of the three chief pastoral poets of Sicily ; and this union in renown has been strengthened by the common practice of pub¬ lishing their works together. To Moschus were usually attributed six or seven idyls, (Eros, *(The Runaway,* (Europa, *the (Lament for Bion,* (Megara, the Wife of Hercules, *and others. The (Lament for Bion* is the poem on which his fame has chiefly rested. It represents the poet as Bion's pupil, and is framed upon the models of the (Lament for Daphnis *and the (Dirge of Adonis,* it is pathetic, delicate and imagina¬ tive. But the style is too ornate to befit a contemporary of Theocritus, and seems to prove that the poem belongs to a later age. Modern criticism, therefore, takes away its authorship from Moschus and that of the Megara as well. Moschus

himself is now be¬ lieved to have lived at Syracuse about 150 b.c. The authoritative text of (Bion and Moschus *is that by U. von Wilamowitz-Mollendorff, (Scriptorum Classicorum Bibliotheca* (Ox¬ ford 1905).

No translation of any of these poems' gives more than a rough and ready idea of the original. The more imaginative the poet, the more delicate his workmanship, the less the translator can imitate him. This is as true of Bion and Moschus, or whoever wrote the (Lament for Bion,* as it is of Theocritus.

Henry D. Sedgwick, Author (Essays on Great Writers ,* etc.

THEODICY, a term of Leibnitzian philoso¬ phy, in which the existence of physical and moral evil is made reconcilable with the exist¬ ence of a righteous God, the controlling provi¬ dence of the best of possible worlds. See Leibnitz.

THEODOLITE. See Surveying.

THEODORA, the-o-do'ra, Byzantine em¬ press consort of Justinian I: b. 508 a.d. ; d. 548. She was, according to the dubious evi¬ dence of Procopius, the daughter of Acacius, a bear-ward at Constantinople, and had already been by turns actress, dancer and harlot, when she won the heart of the austere and ambitious Justinian, to become in succession his mistress, his wife and the sharer of his throne (527). Never thereafter did the breath of scandal touch her name; she became Justinian's trusti¬ est counsellor, bore a chief share in the work of government, and saved the throne by her high courage at the crisis of the Nika riots (532). (<Now every man must die once,® said she in council, ((and for a king death is better than dethronement and exile. ... If you wish, O emperor, to save your life, nothing is easier; there are your ships and the sea. But I agree with the old saying that (empire is the best winding-sheet.' " She lavished her bounty on the poor. Consult Debidour, Antonin, (LTmperatrice Theodora) (Paris 1885) ; Diehl, Charles, (Justinien et la civilization byzantine au sixieme siecle' (Paris 1901) ; id., Theo¬ dora, imperatrice de Byzance) (3d ed., Paris 1904) ; Gibbon, Edward, (Decline and Fall of the Roman Empire) (ed. by J. B. Bury, Vols. IV and V, 1912) ; Mallet, C. E., The Empress Theodore) (in English Historical Review, Vol. II, London 1886).

THEODORE I, the'd-do-r, of Corsica, otherwise Baron Theodore de

Neuhoff, Ger¬ man adventurer: b. Metz, about 1686; d. Lon¬ don, 11 Dec. 1756. He was the son of a West¬ phalian nobleman and engaged in the French, Swedish and Spanish service successively. In 1732 he went to Florence as charge-d'affaires for Emperor Charles VI, and taking part in a Corsican uprising against Genoa through funds furnished by the Bey of Tunis, was proclaimed king of Corsica in 1736. Soon after, however, he was driven to flight, but made two subse¬ quent attempts to reinstate himself in 1738 and in 1743. In 1749 he settled in London, where his creditors put him in prison ; but his release was gained through the support of Walpole. By his wife, an Irish lady whom he robbed and deserted, he had one son known later as Colonel Frederick, author of (Memoires pour servir a l'histoire de Corse* (1768). Consult Fitzgerald, (King Theodore of Corsica> (Lon¬ don 1890).

THEODORE II, or NEGUS, king of

Abyssinia: b. province of Kwara, 1818; d. Magdala, 14 April 1868. Originally named Kasa or Kassai, he led a revolt in 1854 against Ras Ali, ruler of Abyssinia, whom he de¬ feated. Later he was crowned, under the title of Theodorus, king of kings, of Ethiopia. He was a man of strong personality, an enemy of Islamism, a ruler and a reformer. He be¬ came intolerant of any power other than his own and with the quick suspicions of a bar¬ barian took offense at what he considered as slights. His quarrel with Great Britain was brought on by the injudicious conduct of the English consul, Captain Cameron, sent to him in 1861 and by the failure of the English gov¬ ernment to respond to his overtures regard¬ ing the reception of his Ambassador at the English court. He finally imprisoned Cameron

and also Hormuzd Rassam, a Turk but an English subject, sent to treat with him con¬ cerning Cameron's release. As a condition of setting the prisoners at liberty Theodore re¬ quested that certain skilled artisans be sent him, together with presents that he had been led to expect. The English detained the ar¬ tisans and presents at Massowah, awaiting the release of the prisoners ; but as they were not delivered up, war was declared, and an ex¬ pedition under Sir Robert Napier began a progress toward Magdala in the latter part of 1867. The city was reached, and active hostili¬ ties began on 10 April 1868. On the 14th the city was taken and Theodore was found dead. The besiegers were informed that he had com¬ mitted suicide. See Abyssinia and consult W estminster Review, New Series, No. 65.

THEODORE OF MOPSUESTIA, Greek

ecclesiastical writer: b. Antioch, about 350; d. 428. He studied rhetoric under Libanius, phi¬ losophy under Andragathus and sacred litera¬ ture under Flavianus of Antioch, Diodorus of Tarsus and others. Early in life he followed the example of his fellow-student and inti¬ mate friend, John Chrysostom, in turning monk, although he had been on the point of marry¬ ing a lady of Antioch named Hermione. After being ordained priest he distinguished himself as an opponent of Arius Apollinaris and others. From Antioch he removed to Tarsus and in 392 was chosen bishop of Mopsuestia in Cilicia. In 394 he preached before the Emperor Theo¬ dosius at Constantinople and was present at the council held in that city at that date. He was a voluminous writer, the most important of his works being commentaries on the Bible and polemical treatises. These were held in great repute among the Syrian churches and many of them were translated into Syriac, Arabic and Persian. His views approximated to those of Pelagius, and Nestorius was to be his disciple. In the Eastern Church, accordingly, he was condemned as a heretic at the Fifth Ecumenical Council, held at Constantinople 553. For fragments of Theodore's works con¬ sult Migne, (Patrologia Graeca' (Vol. LXVI. Consult also Harnack, A., (History of Dogma' (Vols. Ill, IV; Boston 1898) ; Kihn, H., Theo¬ dore von Mopsuestia' (Freiburg 1880) ; Wace and Piercy (eds.), 'Smith's Dictionary of Christian Biography' (Boston 1911) ; Wright, W., 'Syriac Literature' (London 1894).

THEODORET, the-od'6-ret (Greek, Qeodupr/Tog), church historian and theological writer: b. Antioch, late in the 4th century; d. 457. He was educated in a monastery near Antioch, where he had Nestorius and John of Antioch for fellow-pupils. After 25 years' study and retirement he succeeded Isidorus (423) as bishop of Cyrus, a city about two days' journey from Antioch. He endeavored to play the part of mediator between Nestorius and Cyril of Alexandria, but could effect no reconciliation. In 431 Nestorius was deposed by the Council of Ephesus, an act which Theod- oret at first protested against, but later on excused. When the Nestorians were prosecuted with relentless severity, he stood forth as the champion of Nestorius against Cyril and his successor Dioscurus. The latter accused Theod- oret of Nestorianism, pronounced a public anathema upon him in the church of Alex-

andria and (449) procured his deposition at the so-called robber council of Ephesus, a sen¬ tence which was reversed by the general

coun- cil of Chalcedon (451). The most important °i his works, of which a complete edition was published by Schulze and Nosselt (1769-74) , consist of commentaries on the Old Testament and on the Pauline epistles; Ecclesiastical His¬ tory,) in five books, beginning with the history of Arianism under Constantine the Great and ending with the death of Theodore of Mop- suestia; (Religious History,) a narrative of the lives of the hermits, called the Fathers of the Desert; ‘Eranistes,' three dialogues against the Eutychians, and ‘History of Heresies.' Consult Binder Etudes sur Theodoret' (Ge¬ neva 1844) ; ‘Gaisford, (Theodoreti Historia Ecclesiastica' (1854) ; Harnack, A., ‘History of Dogma' (Vol. IV, Boston 1898) ; ‘The Nicene Fathers' (ed. by Schaff and Wace, Vol. Ill New York 1892).

THEODORIC I, the-od’o,-rik, king of the Visigoths. He was chosen successor to Wallia about 419 a.d., and became desirous of extending his kingdom, especially so as to em¬ brace the neighboring Roman cities of Arles and Narbonne. For this purpose he made war against the Romans after the death of Honorius in 4 2o and continued with varying results until 437, when he entered into an al¬ liance whose exact terms are unknown. By 450 he came into closer alliance with the • Romans in the endeavor to check the advance of Attila, who led his barbarian army across Lorraine and Champagne and captured the city of Orleans. Theodoric and Aetius, the Roman general, encountered Attila near the village of M'oirey, a few miles from Troyes, and fought the battle generally known in history as that of Chalons-sur-Marne, in 451. Theodoric was killed by an arrow; but the progress of Attila was checked and western Europe was saved from the domination of barbarism.

THEODORIC II, son of Theodoric I. He was a member of the party who wished to remain on terms of peace with Rome and when his brother, Thorismund, who had suc¬ ceeded Theodoric I, began to levy war against the Romans he took part in a rebellion that ended in the murder of Thorismund and his own elevation to the throne. As vassal of the Roman emperor Avitus he made an expedition against the Sueves, conquered and put to death their king and was in a fair way of completing the conquest of Spain, when Avitus was de¬ posed and killed and Theodoric ceased his efforts. In 466 he was murdered by his younger brother, Euric. *

THEODORIC THE GREAT, king of the Ostrogoths: b. about 454; d. 526. His father, Theodemer, was one of the three brothers who jointly ruled the Ostrogoths set¬ tled in Pannonia, and he sent him, when only eight years of age, to Constantinople as a hostage, to secure the conditions of a treaty between the Goths and the Emperor Leo. After

residing 10 years with that emperor he was restored to his father, then sole monarch of the Ostrogoths. On the death of Theodemer, about 474, he succeeded to the crown and be¬ gan a course which, after menacing the safety of the Greek empire, and Constantinople itself, terminated in an expedition against Odoacer,

who had assumed the title of king of Italy. After several bloody engagements the latter was finally induced to yield, on condition that he and Theodoric should govern Italy with equal authority (493). The murder of Odoacer at a banquet soon followed this agreement ; on which Theodoric caused himself to be pro¬ claimed king of Italy, and he governed with extraordinary vigor and ability. He attached his soldiers by assigning them a third part of the lands of Italy, on the tenure of military service; among his Italian subjects he encour¬ aged industry and the arts of peace. He im¬ proved the administration of justice, issued edicts to protect the public monuments at Rome and elsewhere, and assigned revenues for the repair of the public edifices. Like his ancestors he was an Arian, but was indifferent to con¬ troversy and never violated the peace or privi¬ leges of the Roman Catholic Church. The par¬ ticulars of the government of this memorable prince, who shed a short-lived lustre on the Gothic name, are recorded in 12 books by his secretary, the senator Cassiodorus, a man of learning, who induced his illiterate master to become a patron of letters. The senators Boe¬ thius and Symmachus were both put to death on the mere suspicion of an intrigue between a senatorial party and the imperial court. This cruel act had no sooner been perpetrated than Theodoric was seized with remorse, and a fever ensued, which terminated his life in three days. The ordinary residence of this king was at Ra¬ venna, above which city his daughter Amalasun- tha erected a splendid monument to his mem¬ ory. Consult Dahn, Felix, ‘Die Konige der Germanen' (Vol. Ill, Wurzburg 1866) ; Gib¬ bon, Edward, ‘Decline and Fall of the Roman Empire' (Vol. .IV, ed. by J. B. Bury, London 1912) ; Hodgkin, Thomas, Estrogothic In¬ vasion' (in ‘Italy and Her Invaders,' Vol. Ill London 1885) ; id., ‘Theodoric the Goth' (New York 1893).

THEODOSIA. See Feodosia.

THEODOSIUS (the-d-dc/shi-us) THE ELDER, Roman general : d. Carthage, 376. He was the father of the Emperor Theodosius I (q.v.), called “The Great." By birth a Spaniard, he rose to high rank in the Roman army and in 367 was sent by Valentinian I to Britain, where he repelled the invasions of the Piets and Scots, strengthened the military defenses and restored order. He formed the country be¬ tween Hadrian’s wall and the Forth and Clyde into a new province, which he

named Valentia, and then returned to Rome. He was later sta¬ tioned on the Upper Danube, where he was victorious over the Alemanni, and in • 372 he quelled the revolt in Africa led by the formid¬ able Moorish chieftain Firmus. He was be¬ headed at Carthage in 376 by order of Valens, on some unknown and probably unjust charge!

THEODOSIUS (surnamed The Great), Roman emperor: b. Spain, about 346; d. Milan, 17 Jan. 395. At a very early age he obtained a separate command; but on the execution of his father he sought retirement, until selected by the Emperor Gratian, in 379, for his partner in the empire. To his care were submitted Thrace and the eastern provinces, which he delivered from an invasion of the Goths, whom he signally defeated in two battles, concluding a peace with them in 382. On the defeat and

death of Maximus at Aquileia (388) he became the sole head of the empire, Gratian having been previously killed in the war against Maxi¬ mus. He administered the affairs of the West in the name of Valentinian, the son of Gratian, then a minor. He entered Rome in triumph in 389, and passed three years in Italy. In 390 a sedition took place in Thessalonica, which resulted in the murder of the governor and several of his officers. The resentment of Theo¬ dosius was natural and merited ; but the manner in which he displayed it was in the highest de¬ gree detestable and inhuman. An invitation was given in the emperor's name to the people of Thessalonica to an exhibition at the circus, and when a great concourse of spectators had as¬ sembled they were massacred by a body of barbarian soldiery to the number, according to the lowest computation, of 7,000. Theodosius was at this time at Milan, of which Saint Am¬ brose was bishop, and this prelate, on account of such an atrocious proceeding, resolutely re¬ fused him communion for eight months. About this time the emperor crowned his merits, as a foe to paganism, by demolishing the celebrated temple of Serapis and all the other heathen temples of Egypt, and he issued a final edict prohibiting the ancient worship altogether. On the murder of Valentinian by Arbogastes and the advancement of Eugenius in his place (392), the emperor carried on a war against the latter, which finally terminated in his defeat and death. Theodosius did not long survive this success. Consult Gibbon, (Decline and Fall of the Ro¬ man Empire) (London 1912) ; Hodgkin, T., Htaly and her Invaders* (Oxford 1892).

THEODOSIUS II, Roman emperor, son of Arcadius and grandson of Theodosius I : b. 401 ; d. 450. He became emperor in 408, but proved a weak ruler, and the actual govern¬ ment was in the hands of his sister and of his wife during the greater part of his reign, in which the Theodosian code of laws was com¬ piled. He was killed by a fall from his horse and was succeeded by his sister, Pulcheria.

THEODOSIUS III, emperor of Constan¬ tinople. He held the unimportant post of col¬ lector of the revenue when he was nominated to succeed Anastasius, and he was crowned in 716. He resigned in favor of Leo the Isaurian In 717 and retired to a monastery. Consult Gibbon, E., (Decline and Fall of the Roman Empire) and Cambridge Mediaeval History) (Vol. I, New York 1911).

THEOGNIS (the-og'ms) OF MEGARA,

Greek elegiac poet. He lived between 540 and 500 b.c. There are 1,389 verses preserved un¬ der his name, of importance in enabling us to understand the state of parties and the prob¬ lems of society in the Greece of that time. They were translated by Frere (1842) and are found in the original in Bergk's . (Poetae Lyrici GraeciP

THEOGONY, a poem treating of the gen¬ eration and descent of the gods. The most ancient Greek theogony known to us is that of Hesiod, the earlier Theogonies of Musaeus and Orpheus having perished.

THEOLOGICAL DETERMINISM.

See Determinism.

THEOLOGICAL EDUCATION. See

Education, Theological.

THEOLOGICAL SEMINARY OF THE REFORMED CHURCH OF AMERICA,

New Brunswick, N. J., originally located in New York City from its organization (1784), afterward at Flatbush, L. I. (1796), was es¬ tablished on the present site in 1810. The general Synod conducts it and it now has an endowment of nearly $1,000,000. Its buildings include the Peter Herzog Hall for dormitory purposes; the James Suydam Hall, used for lecture rooms, gymnasium and museum, and the Gardner A. Sage Library which contains nearly 60,000 volumes. There also are several build¬ ings for the teaching force.

THEOLOGY, the science of religion. This term, together with the corresponding personal term, antedates the Christian era, having been used by classic writers both Greek and Roman. In the view of Aristotle, Cicero and others the man who appeared to be specially conversant with the divine nature was fitly called a the¬ ologian. Among those honored with this name were Pherecydes of Syros and Epimenides of Crete.

Definition and Scope. — In the modern use of the term a narrower and a broader signifi¬ cation may be distinguished. The former, pay¬ ing special respect to the etymology of the word, includes in theology simply discourse about God. It was in this restricted sense that the word was employed by the classic writers and a corresponding usage had place in the first • Christian age, when, for example, the evangelist, John, on the ground of his relatively full refer¬ ence to the divinity of the Christ, was called ((the theologian.® It was understood that the subject matter of theology pertains to such tran¬ scendent themes as the Logos and the Trinity. In the broader signification theology includes not only discourse about God, but also an ex¬ position of whatever in man's nature seems to bring him into distinct relation with God ; like¬ wise an exposition of whatever in man's ex¬ perience and destiny may be regarded as founded on this relation. In this sense it is the theoretical counterpart of religion, and corresponds very well to the following descrip¬ tion by Gladstone : <(Theology is ordered knowl¬ edge, representing in the region of the intellect what religion represents in the heart and life of man.® While resort is still occasionally made to the restricted sense, as when, for in¬ stance, theology is put in antithesis with anthro¬ pology, the broader signification is far more commonly the one intended in current usage.

It is evidently, therefore, the signification which should give the standard for the present dis¬ cussion.

In a precise determination of the scope of theology a question will arise, in the first place, as to the measure of consideration which it is appropriate to bestow upon the ethnic religions. Manifestly, if theology is the theoretical coun¬ terpart of religion, it will not do to neglect so large an area of religious facts as is included in the ethnic systems. A secure and well-rounded theory of religion must take account of all ac¬ cessible religious facts, whether inside or out¬ side of the pale of historical Christianity. At the same time it is to be noticed that the central tenets of Christianity, as they appear in the sacred oracles and have generally been held, unmistakably presume upon the pre-eminence

and finality of the Christian religion. Anyone therefore, who regards himself as scientifically obligated to accept these tenets, on the score of a clear preponderance of evidence in their be¬ half, will of necessity be convinced that he ful¬ fils the demands of a scientific theology in tak¬ ing subordinate account of the ethnic systems, that is, so far as respects formal recognition of them within his own theological structure. It. is not needful, indeed, that he should deal with these systems in a tone of radical dis¬ paragement. As a matter of fact, the indus¬ trious research which for the last quarter of a century or more has been bestowed upon the great ethnic religions, such as Zoroastrianism, Buddhism, Brahmanism and Confucianism, has served distinctly to enlarge appreciation for their contents. At the same time, the farther this research has proceeded the more indubitable has it made the proof that Christianity has no occasion to look to any outside religious prov¬ ince for an appreciable supplement to its teach¬ ings. The conclusion follows that the Chris¬ tian theologian deals normally with the ethnic systems when he simply accords to them a place in branches auxiliary to some of the main divisions of theology. In so far as they have modified Christian history they make matter for a branch auxiliary to historical theology. In so far as they supply data for a philosophy of religion they help to constitute a branch auxil¬ iary to systematic theology.

A second important question under the theme of scope or province concerns the relation of theology to philosophy. That the one is under practical compulsion to enter the domain of the other is apparent upon both rational and his¬ torical grounds. Their tasks are closely related. Philosophy may be defined as an attempt to get at ultimate truth by rational processes. The¬ ology attempts, within limits, the same thing. It undertakes to get at ultimate truth in so far as that truth has religious worth or significance. Theology may enter upon its task with a more positive presumption in favor of written revela¬ tion than that which belongs to the philosophical starting-point. Still, if it is to maintain a scien¬ tific character, it cannot take that presumption as a mere matter of course. On the contrary, it must treat the same as a subject for searching inspection. Now this inspection will naturally lead sooner or later to the great problem of the conditions of rational certainty. Thus the in¬ itial task of theology in approving or rating the authority of sacred oracles conducts into a prov¬ ince of philosophical inquiry. And what occurs at this point is repeated at various other points.

I he development of the deeper themes of the¬ ology involves in general a use of philosophical premises, either metaphysical, psychological or ethical. A veto against such use is impotent. A Tertullian may exclaim, (<What has Athens to do with Jerusalem? What concord is there be¬ tween the Academy and the Church?® But be¬ fore the echo of his voice has died away he will be likely to get onto the ground of Athens, and to be borrowing from the Academy or some kindred source. From beginning to end Chris-- tian history testifies to the tendency of theolog¬ ical construction to utilize philosophical points of view. Among the early Fathers the more speculative were manifestly influenced by the Platonic philosophy. A little later the Neo-Pla- vol. 26 — S3

tonic philosophy became an appreciable factor in theological thinking, and through the writings of the pseudo-Dionysius was introduced to the thinkers of the mediaeval period. At the crown¬ ing period of mediaeval scholasticism Aristo- telianism was decidedly in the ascendant, inso¬ much that Aristotle was often cited under the simple designation of ((the philosopher.® In the modern period the Cartesian philosophy, the Leibnitz- Wollfian, the Lockian, the Kantian, the Hegelian and others have unmistakably claimed spheres of influence in the theological domain. It appears, therefore, that a discreet choice of philosophical affiliations is the best that the¬ ology can do. It may enter into too close an alliance with a specific philosophy. It may fail to observe the due balance between a speculative bent and a sane regard for historical data. But it will and must draw largely from the resources of philosophy if it is to be fundamental and comprehensive.

A further question on the scope of theology concerns the relation of this branch to the domain of natural science. That a relation ob¬ tains to which a measure of significance may be attached is undeniable. It is not to be over¬ looked, however, that the field of natural science comes into less extensive contact with theology than does the field of philosophy. In so far as science moves in a physical or sub-human range, it touches upon matters that are of only subor¬ dinate theological import. It may enforce a re¬ vision of the theory of creation which has been read into or elicited from the biblical narrative; but of how small theological consequence is a conclusion on the precise method of creation, so long as God in his absolute supremacy and man in his dignity and worth are left to the con¬ templation! It may enlarge the view of the operation of secondary causes in the production of organic forms, and so may require some modification of the putting of the argument from design; but that involves no challenge to any theological tenet or interest, since the vast range of orderly results in nature must still be seen, as many of

the most eminent naturalists confess, to demand ultimately an ordering in¬ telligence. In short a close scrutiny of the sub¬ ject will reveal that the findings of the physical sciences can neither displace the foundations of the central tenets of theology nor supply foundations to these tenets. Their function is exhausted in modifying one and another peri¬ pheral matter or adjunct of the theological system. Probably the greatest result which has come from that quarter is an offspring of the doctrine of evolution and consists in an en¬ larged tendency of the theological mind to ex¬ pect, in relation to the kingdom of God in the world, tokens of the law of consecution and graduated progress. Undoubtedly the theologian does well to take note of the approved findings of natural science; but large expectations of contributions from that quarter are not likely to be fulfilled. It is in the constitution and experi¬ ences of man, and in the philosophical interpre¬ tation of both the world of nature and of per¬ sonality, that theology must find its principal basis. Among the human experiences that come into the account those which make up the sub¬ stance of sacred history may of course claim a distinct primacy. In other words, the Bible may be rated as the foremost treasury of theo¬ logical data.

Scientific Value and Rank. — One and an¬ other system of theology, as actually developed, may be remote from a scientific character. But intrinsically scientific construction is just as fea¬ sible and appropriate in the field of theology as in any other field. Where a contrary impres¬ sion has obtained it has generally been due to one of three causes. Either the agnostic maxim that religion has the unknown for its proper field has been adopted, and in consequence theology, as the theoretical side of religion, has been pictured as devoid of substantial founda¬ tion; or theology has been associated with arbi¬ trary authority; or a strained antithesis between reason and faith has been contemplated.

As respects the maxim which embodies the first of these grounds of objection, it must be pronounced a gratuitous negation of religion. It is a negation of religion, for sheer mystery offers no means of attachment. In the words of Pfleiderer, <(a religion of nothing but mystery is an absurdity.® The maxim is also per¬ fectly gratuitous. As John Fiske has said: <(None can deny that religion is the largest and most ubiquitous fact connected with the ex¬ istence of mankind upon earth.® Is so vast a department of human experience to be regarded as

utterly incompetent to supply any valid grounds of induction? Are the concurring thoughts, aspirations and satisfactions of the elect spirits of the race to be rated as void of all rational suggestions? Is no sure basis of conviction to be found in the illuminated and transcendent consciousness of the Christ? Such questions need no formal reply. Theology doubtless has a great border-land of mystery. And so has biology. Indeed it is characteristic of most of the sciences that they impinge upon mystery. Alongside a domain of certainty they include areas which can claim at best only a high degree of probability. On the score of mystery, therefore, no good reason is apparent for expelling theology from scientific fellow¬ ship.

The second ground of objection of the scien¬ tific character of theology is sufficiently met by the affirmation that arbitrary authority is an interloper in the theological domain. If it has ever installed itself there, it has been in the exercise of rank usurpation. Theology in its true character has no partnership with arbitrary authority. While it may make large account of positive revelation, it does not turn that revela¬ tion into a fence against investigation but uses its content for what it proves itself to be under the tests of mental scrutiny and prolonged ap¬ plication to the exigencies of man's deeper life.

To the third objection a reply of similar tenor is to be made. The assumption of an antagonism between reason and faith, and of an obligation to sacrifice the former to the latter, is an assumption which a sane theology must emphatically repudiate. It is very true, doubt¬ less, that reason cannot take the place of faith, any more than theory can take the place of action. But it is equally true that faith cannot endure to be in known antagonism to reason. An assent which, from the standpoint of the one rendering the same, does not appear to be sanctioned by reason, is no real assent. Only that which is competent to take captive man's rational personality is able to induce a faith that is anything more than a sham or a shadow. Quite as much as any other branch of learning

theology is free to emphasize the demand for rationality in faith. The challenge to its scien¬ tific character is thus seen to fail as respects each of the cardinal objections mentioned.

In an unbiased valuation of theology too rigid an association will not be made between substance and form. Integrity of substance is compatible with a variety of forms. Theology in no wise rebels against a poetic garb. Far as are the picturesque discourses of Jesus from the scholastic form, they are deeply based in theology. Filling all their background is one of the most pronounced conceptions of God, as well

as the most beautiful that was ever set be¬ fore the contemplation of men. All religious discourse which is to avoid the charge of empti¬ ness and impotency must in like manner enclose a substantial theological content. As Phillips Brooks has said, <(No exhortation to a good life, that does not put behind it some truth as deep as eternity, can seize and hold the conscience.®

Even in its formal character theology may be rated as second in interest to no department of thought and study. The facts and truths with which it more directly deals are the deep¬ est in man's being and the highest above the human plane. It utilizes the most significant findings of a large proportion of the branches of learning. It takes into consideration the greatest treasures of past history, and gathers up the data for the farthest possible outlook into future destiny. It gives ample room for speculative acumen, but at the same time in¬ cludes the themes that are of all the most in¬ tensely practical.

The Organic Arrangement of Subject Matter. — The best arrangement of the several divisions and branches of theology is obviously the one which is characterized by simplicity as well as by comprehensiveness and self-consist¬ ency. The very subtle scheme is likely to please its inventor in a much higher degree than the theological world at large. Among plans of ar¬ rangement which meet in good measure the combined demands of simplicity and compre¬ hensiveness those of Heinrici and Hagenbach are worthy of special mention. The former draws a distinction between ((historical® and ((normative® branches, the one being made to include the specifically biblical branches as well as the history of Christianity since biblical times, and the other comprising, as principal subdivisions, Systematic Theology and Prac¬ tical Theology. The idea of the historical branches is to exhibit the whole deposit of religious truth and fact; the idea of the norma¬ tive branches is to afford means of guidance in religious teaching and work. That there is a certain fitness in the distinction between the two lines of study is undeniable. Still the dis¬ tinction is not beyond criticism. One who accredits a high degree of authority to the Bible may well be reluctant to exclude the designation of <(normative® from one and an¬ other biblical branch. Especially may he hesi¬ tate to exclude that designation from Biblical Dogmatics. In view of this ground of excep¬ tion to Heinrici's nomenclature the plan of Hagenbach — which divides the whole theologi¬ cal domain between Exegetical, Historical, Sys¬ tematic and Practical Theology — 'may be re- • garded as having at least an equal claim to ap¬ preciation. Aside from its intrinsic merits, a motive for giving this plan the preferred place

m the present connection is found in the fact that it is very largely reflected in the curricula of theological institutions.

Each of the divisions in the fourfold scheme of Hagenbach contains a somewhat indetermin¬ ate number of specific branches. A measurably complete list for Exegetical Theology may be given as follows: (1) Biblical Philology or Linguistics, which treats not only of the biblical languages, but also of languages so far cognate with the biblical as to be able to furnish means of understanding the peculiarities of the latter. (2) Biblical Archaeology or the science of Bibli¬ cal Antiquities. (3) Canonics, or the branch which gives the history of the canon, or col¬ lection of sacred books, and also the principles which enter into the determination of the proper compass of that collection. (4) Biblical Criticism, which in one division is textual, and in another literary and historical. The former seeks to ascertain the true and original text; the latter is occupied with the investigation of the biblical books for the purpose of ascertain¬ ing their authorship, their date, their relation to other writings, canonical or uncanonical, the degree of their historical trustworthiness and the special stage which any one of them may represent in the development of the biblical religion. The two forms of criticism are fre¬ quently distinguished as the Lower and the Higher. (5) Biblical Introduction, in which the fruits of criticism are utilized for a more or less detailed characterization of each of the two Testaments and also of the individual books which they contain. (6) Hermeneutics, or the science of biblical interpretation. (7) Exegesis, or the presentation in detail of the results of an examination into the meaning of biblical texts.

Historical Theology includes in its biblical part the following divisions: (1) Old Testa¬ ment History; (2) the Life of Christ; (3) the History of the Apostolic Age; (4) Biblical Theology of the Old Testament; (5) Biblical Theology of the New Testament. Etymologi¬ cally considered Biblical Theology might denote other than a historical branch, being taken as the equivalent of Biblical Dogmatics. But as actually treated it is a historical discipline, its object being to set forth the genesis of doctrine and its movements through the various stages which may be discerned in the Old and the New Testament respectively. In its post-biblical part Historical Theology falls into two main divi¬ sions, General Church History, and the History of Christian Doctrine. The former admits of a great number of subdivisions, it being possi¬ ble to award a monographic treatment to

such themes as missions, polity, discipline, worship, and art. In its earlier section General Church History includes in particular Patristics and Christian Archaeology, of which the former gives an account of the lives and writings of the fathers (usually of the first six centuries), and the latter furnishes a systematic presenta¬ tion of monumental and documentary evidence on the art, institutions, rites, customs and char¬ acteristic modes of thought and feeling in the early Christian community. To the History of Doctrine the most important subsidiary branch is Symbolics, or that which treats of the creeds. As an auxiliary branch the History of Philosophy takes the first rank.

Systematic Theology, which has, in its Chris¬ tian character, the office of furnishing an or¬ derly presentation and justification of the whole body of teachings or beliefs which belong to the Christian religion, includes three principal branches, namely, Apologetics, Christian Dog¬ matics and Christian Ethics. It may also in¬ clude Biblical Dogmatics, Polemics and Irenics, though the subject matter covered by these titles can conveniently be appropriated within other branches. . An auxiliary to Systematic Theology of special significance is found in the Philosophy of Religion. Of the several branches named, Christian Dogmatics is so far central and prominent as often to be styled Systematic 1 heology. Being free to gather its evidence from every field, and aiming to present in organic form the whole doctrinal content of the true religion, it commands in the field of theology the maximum intellectual interest.

In Practical Theology the leading branches are Liturgies, Homiletics and Pastoral The¬ ology. The last-named is of wide compass, in¬ cluding besides the general theme of pastoral care such subsidiary branches as Catechetics, Ecclesiastical Polity, Ecclesiastical Discipline, and Theory of Missionary Work. Recently the interest in sociological study has created a motive to subjoin a branch which might be en¬ titled Christian Sociology.

Prominent Stages and Representatives.— In the broad view three great epochs in the progress of theology are distinguishable, namely, the Greek, the Latin and the Modern. The last might also be called with relative propriety the Protestant, since the motive-power for its developments has been supplied in large part from within the domain which bears that title. The development of the Latin type was in part contemporary with the shaping and manifestation of the Greek type; still the former appears clearly second in order, since its initial stages were synchronous with the culminating stages of the latter. Greek theology had run its course and come essentially to a standstill before the more characteristic sys¬ tems of Latin theology were elaborated

by the mediaeval scholastics. The two undoubtedly had very much in common. The same great creeds were acknowledged in the Latin as ob¬ tained in the Greek division of Christendom, and the dogmatic grounds which were alleged ultimately .for the severance of fellowship were of subordinate import. Still Greek theology stood in measurable contrast with Latin. It took on the whole a more genial view of the divine relation to the non-Christian world. It was less inclined to a sombre conception of man's native guilt and moral impotency. It ac¬ centuated to a special degree the thought of a divine incarnation and of the intimate connec¬ tion between God and man provided for by means of the incarnation. The same thought was by no means foreign to Latin theology, but in its domain it was given, relatively speak¬ ing, less prominence, since it was made to share the field with the greatly emphasized con¬ ception of divine rulership. The standpoint of the one affiliated with a mystical theory of an interior life; the standpoint of the other was more legal and governmental. Both admitted the ideas of priestly mediation and sacramental efficacy, at least after the initial stage; but it

accorded with the genius of Latin theology to work out the most consummate expression of these ideas in a thoroughly elaborated hierarchi¬ cal and sacramental system. In the one au¬ thority came to be regarded as specially resi¬ dent in the creeds and formularies of the past, in the other great prominence came to be as¬ signed to the hierarchy, and especially to its head, as the perpetual embodiment of infallible authority. While this line of contrasts may legitimately be affirmed, it is to be understood that one and another point of difference cannot be taken too strictly, since in neither the Latin nor the Greek domain was theological thinking entirely uniform or homogeneous.

The Protestant era was initiated in a revi¬ sion of the principle of authority which had been transmitted in Latin Christianity; and a fundamental feature of the theological activity of that era has consisted in carrying out this revision to its logical results. Original Protes¬ tantism accepted in common with the Latin communion the great outlines of doctrine con¬ tained in the ancient creeds, especially the Nicene and the Chalcedonian. But it accepted them upon a revised basis. What was that basis? In the last analysis it must be defined as the principle of free rational induction, in opposition to the principle of judicial determi¬ nation by official authority. The primary appeal

was indeed to the scriptural content and to the doctrine of justification by faith. But since no infallible tribunal was set over the Scriptures, the appeal thereto amounted practically to a transference of the main emphasis to the free rational process. As respects the doctrine of justification by faith, it looked evidently in the same direction, since it profoundly qualified the necessity of priestly mediation or of depend¬ ence upon the hierarchy. The assertion of this revised conception of authority, it is needless to say, was not designed to imply any challenge to the idea of supernatural revelation. Logic¬ ally, too, the Protestant principle involves no necessity to challenge that idea. What it shuts out is official monopoly of revelation and au¬ thoritative determination of its import by official prerogative. In place of this it installs, as the proper ground of theological convictions, free rational induction, an induction which, to be properly carried out, must take full account of the data of history, reason and experience. The advocates of the Protestant principle ad¬ mit the great difficulty of the task of ideal theological construction on the basis of that principle; but it is their conviction that exemp¬ tion from the labor of a thorough-going induc¬ tion ought not to be sought in the religious sphere any more than in other spheres. The seeking of relief in the attachment of infallible authority to some perpetual office in the Church they regard as quite useless and mistaken, since it is less difficult to accredit, on the basis of history, reason and experience, any worthy element of belief, than it is to prove the con¬ tinuous existence of an infallible tribunal.

In a closer review of the progress of the¬ ology it would be necessary to notice a number of significant developments in each of the great epochs mentioned. Account would need to be taken of the^ peculiarities of the early Alex- an jr'?n' ^e. ^ aPPadocian the later Alexandrian and the Antiochian schools in the Greek Church.

In relation to the Latin Church attention would need to be given to the long history of the antithesis between Augustinian and anti-Augustinian tendencies ; to the struggle between Jansenism and Jesuitism; to the conflict between Gallicanism and Ultramontan- ism. Within the Protestant domain there would be occasion to consider the early creative period of the Lutheran theology; the scholastic period in the 17th century; the Pietistic and Rational¬ istic movements in Germany; the implication of Lutheran theology with successive philosophies since the dawn of the 18th century; the con¬ troversies between Calvinism and Arminian- ism; the contrasts between High Church, Low Church and Broad Church parties in the Angli¬ can Establishment ; the wide-reaching tenden¬ cies born of the Wesleyan revival; the initiation in Germany of the great movement of biblical

criticism and its extension to other countries ; and the rise and influence of the Ritschlian theology.

yvmong tneoiogical writers eminent for their representative position, or breadth of influence, or both, we may specify, in the Greek Church, Origen, Athanasius, Basil, Gregory Nazianzen, Gregory of Nyssa, Cyril of Alexandria, Theo- doret and John of Damascus; in the Latin or Roman Church Augustine, Anselm, Peter Lom¬ bard, Alexander Hales, Albertus Magnus, Thomas Aquinas, Bonaventura, Duns Scotus, Suarez, Bellarmin, Petavius and Perrone; in the Lutheran Church, Luther, Melanchthon, Chem¬ nitz, Gerhard and Schleiermacher ; in the Re¬ formed Church on the Continent, Zwingli, Cal¬ vin, Bullinger, Turretin, and Arminius ; in Eng¬ land and her dependencies, Hooker Chilling- worth, Pearson, Bull, Baxter, Owen, Howe, Butler, Wesley and Edwards.

Bibliography.— Briggs, ‘General Introduc¬ tion to the Study of Holy Scripture) ; Cave < Introduction to Theology > ; Crooks and Hurst,

J heological Encyclopaedia and Methodology) ; Heinrici, (I heologische Encyclopedic) ; Rabiger . Encyclopaedia of Theology > ; Schaff, ‘Theolog- ica1 Propaedeutic); Allen, ‘The Continuity of Christian Thought); Fisher, (History of Chris¬ tian Doctrine); Hagenbach, ‘Manual of Doc- ti-ma! History) ; Harnack, 'Historv of Dogma) * Loofs, ‘ Symbol, k> ; Schaff, < Creeds of Christen- dom> ; Sheldon, (History of Christian Doctrine) ; Dillmann, (Handbuch der alttestamentlichen Theologie>; Oehler, <Theology of the Old Tes¬ tament ; Schultz, ‘Old Testament Theology) • Adeney, ‘Theology of the New Testament) *Beyschlag, ‘New Testament Theology)* Holtz- mann ‘Lehrbuch der neutestamentlichen The- ologie) ; Stevens, ‘Theology of the New Testa¬ ment ; Weiss, 'Biblical Theology of the New testament) ; Bovon, ‘Dogmatique Chretienne) • Brown ‘ChHstian Theology in Outline) Clarke, ‘Outline of Christian Theology) ; Dor-

<iV5ySlei? ˚£, C1/ristian Doctrine) ; ‘Heinrich, Lehrbuch der kathohschen Dogmatic ; Hodge Systematic Theology); Kaftan, ‘Dogmatic ; Martensen, ‘Christian Dogmatics) ; Maurice, Theological Essays); Miley, ‘Systematic The¬ ology) ; Nitzsch, ‘Lehrbuch der evangelischen Dogmatik.) ; Pope ‘Compendium of Christian heology ; Ritschl, ‘The Doctrine of Justifica¬ tion and Reconciliation) ; Shedd, ‘Dogmatic Theology' ; Sheldon, 'System of Christian Doc- tune , Smith, 'System of Christian Theology);

Stearns, (Present-Day Theology *; Strong, (Sys¬ tematic Theology) ; Van Oosterzee, (Christian Dogmatics.* .

Henry C. Sheldon,

Professor of Systematic Theology , Boston Uni¬ versity.

Greek philosopher: c. 3/2-287 b.c. ; was a student of Plato and successor to Aristotle as head of the Peripatetic school of philosophy. He conducted the school with much success for 35 years, and was highly honored at home and abroad. He was greatly interested in natural history and won renown for his writings on botanical subjects. His (History of Plants > and < Theoretical Botany > are preserved as also are fragments of his works on (Mineralogy, > a series of sketches which has repeatedly been translated. Consult Zeller, E., (Aristotle and the Earlier Peripatetics *(Eng. trans., London 1897); Gomperz, T., <Greek Thinkers* (Vol. IV, Eng trans. by Berry, New York 1912) and others. An especially notable edition of Characters*

0897)ˆ Philological Society

THEOREM. See Geometry.

THEORETICAL MECHANICS. See

Mechanics.

THEORY OF ASSEMBLAGES. See

Assemblages, General Theory of.

THEORY OF CURVES. See Curves of Double Curvature.

THEORY OF EQUATIONS. See Equa¬ tions, General Theory of.

THEORY OF FUNCTIONS VARIA¬ BLE. See Complex Variable, General The¬ ory of Functions of.

THEORY OF GROUPS. See Groups,

Theory of.

THEORY OF NUMBERS. See Num¬ bers, Theory of.

THEORY OF PROBABILITY. See

Probability, Theory of.

THEORY OF SURFACE. See Surface, Theory of.

THEOSOPHY, as its Greek derivatives signify, means Divine Wisdom — wisdom con¬ cerning God. It is that general system of thought which has appeared in all ages shaping itself in one form and another and which has attempted to explain the nature of God, the uni¬ verse and man's relation thereto. Among the Orientals it is conspicuous in the philosophic systems of China, India and Egypt. It is seen in the works of the Gnostics, the Neo-Platon- ists and the Cabalists, and in the speculations of Boh me, Schelling, Eckhart and in the teach¬ ing of Kapila and Shankaracharya, Pythagoras and Plato, Valentinus and Plotinus, Simon Magus and Apollonius of Tyana, Paracelsus and Bruno. It represents a body of tradition which has been preserved from earliest times and is not only found in the philosophic and speculative writings of those above mentioned and many others, but has been taught from time to time by sundry religious and mystical orders, — in the Far East by the Gurus and Initiates, and in Greece by the various schools of the mysteries. During the Middle Ages traces of the teaching are to be found in Masonry and

Mediaeval Mysticism, and later in the Order of Rosicrucians, and it has at all times comprised the esoteric side of the great religions of the world.

The Theosophical Society. — In modern times this name is given to an amalgam of occult, Indian and modern spiritualism made by a Russian named Helena Petrovna Blavatsky (q.v.) who, on 17 Nov. 1875, aided by Col. Henry Steel Olcott of New York, founded in that city the *1 heosophical Society, and modern theosophical thought owes its origin and propa¬ ganda to the writings and efforts of herself and her colleagues in this society. The objects of the society as originally declared were to collect a library and diffuse information con¬ cerning secret laws of nature. Later these objects were remodeled, and as now framed are :

1. To form a nucleus of the universal brotherhood of humanity, without distinction of race, creed, sex, caste or color.

2. To encourage the study of comparative religion, philosophy and science; and

3. To investigate the unexplained laws of nature and the powers latent in man.

“Assent to or sympathy with the first of these objects required for membership, the re¬ maining two being optional and intended to subserve the first. The society has no dogmas or creed, is entirely non-sectarian, and includes in its membership adherents of all faiths and of none, exacting only from each member the tolerance for the beliefs of others that he would wish them to exhibit toward his own. Their bond of union is not the profession of a com¬ mon belief, but a common search and aspiration for truth. They hold that truth should be sought by study, by reflection, by purity of life, by devotion to high ideals, and they regard it as a prize to be striven tor, not as a dogma to be imposed by authority. They consider that belief should be the result of individual study or intution, and not its antecedent, and should rest on knowledge, not on assertion. They extend tolerance to all, even to the intolerant, not as a privilege they bestow, but as a duty they perform, and they seek to remove ignorance, not to punish it. They see every religion as an expression of the Divine Wisdom, and prefer its study to its condemnation, and its practice to proselytism. Peace is their watchword as truth is their aim. **((There is no religion higher than Truth** is the motto of the society. The general headquarters of the societ}' are at Adyar, Madras, India, the resi¬ dence of Colonel Olcott, its president-founder.

Its Aims.—- It is stated that in the founda¬ tion of the Theosophical Society and in the writing of her various works, Madame Blavatsky was directed and aided by certain Eastern adepts or sages, whose pupil she had been for many years, and that the purpose of the movement was to stem the tide of material¬ ism and agnosticism, which then threatened to engulf the thought of the age, and to stimulate transcendental research. Doubtless the fullest and the most authoritative statement of the ends which the modern theosophical movement were intended to accomplish is to be found in the following letter written by one of those adepts to one of his Western pupils:

(<You can do immense good by helping to give the Western nations a secure basis upon

which to reconstruct their crumbling faith. And what they need is the evidence that Asiatic psychology alone supplies. Give this and you will confer happiness of mind on thousands.

. This is the moment to guide the re¬ current impulse which must

soon come, and which will push the age toward extreme atheism, or drag it back to extreme sacerdotal¬ ism, if it is not lead to the primitive soul- satisfying philosophy of the Aryans. . .

Tou and your colleagues may help to furnish the materials for a needed universal religious philosophy; one impregnable to scientific as¬ sault, because itself the finality of absolute science ; and a religion that is indeed worthy of the name since it includes the relations of man physical to man psychical, and of the two to all that is above and below them. ... Its (the society's) chief aim is to extirpate current superstitions and skepticism, and from long- sealed ancient fountains to. draw the proof that man may shape his own future destiny, and know for a certainty that he can live hereafter.® Since then a considerable literature has sprung up within the society 'which, it is believed, has to no slight extent influenced the thought of the closing decades of the 19th century and made possible the almost popular interest in the unseen world. Among the leaders of theo- sophical thought after the death of Madame Blavatsky were Mrs. Annie Besant, C. W. Leadbeater, A. P. Sinnett and G. R. S. Mead,

— Mrs. Besant being Madame Blavatsky's suc¬ cessor in the esoteric as well as in the exoteric work of the society. Through the writings of these theosophists the so-called theosophical theories, which for centuries have seemed vague and speculative, besides being greatly amplified, have been presented in a form more definite than at any other time in the history of such thought, the teachings now no longer resting upon tradition and intuition, if indeed they ever did wholly so, but largely upon investigations made into the supra-physical realms of nature by highly developed men whose trained powers enable them to respond sympathetically to vibrations of a finer order than those which the normal man is able to sense, and to come thus into conscious relations with subtler regions of nature within and extending vastly beyond the physical world. The training whereby these powers are gained is begun in the esoteric de¬ partment of the Theosophical Society and falls more especially under its third object, which deals with the unexplained laws of nature and the powers latent in man.

Fundamental Principles. — Among the facts asserted by some theosophical writers as being known to themselves and capable of verification by those who are willing to make the necessary sacrifices to gain the required powers are: (a) the existence of a few highly evolved men, called Adepts or Masters — not solely of any one nation, but of any of the advanced nations

— who have gained these divine powers in their fullness; that they exist now as in the past; that they are substantially omniscient so far as the laws and conditions of oUr own solar system extend, and that their high stage of progress entitles them to advancement beyond human conditions, but that they of their own free will have chosen to remain in touch with humanity in physical incarnation, that they may aid in its evolution; that it is from the brother¬

hood of these great adepts that from time to time have come into the outer world the great world teachers and that in their keeping has been the Wisdom-tradition, which in every age they have caused to be expressed in suitable form; that there have always been pupils of these men, and that theosophical teaching is published to the world to-day at their instiga¬ tion and through a few of their pupils; (b) the existence ot a very subtle order of matter, far finer than the ether which transmits light, upon which is impressed photographically, so to speak, in the form of living pictures, every scene or happening, however great or small, which has ever occurred from the very begin¬ ning of things and throughout the extent of the universe; that to this subtle material has been given the name of the Akashic Records, or the Memory of Nature; that not only does the trained observer who has acquired the power of sensing these conditions of the subtler medium of the universe, or of responding sym¬ pathetically to its vibrations, see vividly the particular occurrence to which he turns his attention, but he hears and feels, etc., just as did the actors in any particular event which may be under review, perceiving their thoughts and feelings as well as seeing and hearing the outward conditions of the scene ; that thus he can accurately, in proportion to his powers of observation, perceive any occurrence of the past, no matter when it mav have happened, and in this way can know the true events of history; that he may also direct his vision to any period in the life of a planet and trace out its various evolutionary processes, and that he may thus enter a limitless field of observation wherein he may learn at first hand of the obscurer laws of nature; (c) that by the exercise of their highly evolved powers the Adepts or Masters of Wisdom can make definite experimental re¬ search into the Akashic Records in quite as real a sense as the physicist makes his investi¬ gations within the physical world, and that they are, with these and other powers possessed by them, enabled to ascertain and teach certain general principles as definite facts, all of which are now and have ever been known to them, and very many of said facts have to a more or less extent, been proven by the investigations of those of their pupils who have fitted them¬ selves to do such work. In (The Secret Doc¬ trineˆ Madame Blavatsky mentions three such principles as

being the fundamentals of theoso¬ phy; they are:

1. An Omnipresent, Eternal, Boundless and Immutable Principle, on which all speculation is impossible, since it transcends the power of human conception and can only be dwarfed by any human expression or similitude. It is bcvond the range and reach of thought — un¬ thinkable and unspeakable.

2. The Eternity of the Universe in toto as a boundless plane; periodically (<the playground of numberless universes incessantly manifesting and disappearing® called ((the manifesting stars,® and the <(sparks of Eternity.®

3. The fundamental identity of all souls with the Universal Over-Soul, the latter being itself an aspect of the Unknown Root ; and the obli¬ gatory pilgrimage for every soul — a spark of the former — through the cycle of incarnation, or necessity, in accordance with cyclic and Kar¬ mic law, during the whole term.

Cosmogenesis.— According to the theoso- phist all manifestation has its origin in the Ab¬ solute, of whom naught can be said save that (He is.ˆ As Mrs. Besant eloquently describes it in (The Ancient Wisdom,* ((Coming forth from the depth of the One Existence, from the One beyond all thought and all speech, a Logos, by imposing on himself a limit circum¬ scribing voluntarily the range of His own Being, becomes the Manifested God, and tracing the limiting sphere of His activity, thus outlines the area of His Universe. Within that sphere the Universe is born, is evolved and dies ; it lives, it moves, it has its being in Him; its matter is His emanation; its forces and energies are currents of His life; He is immanent in every atom ; all-pervading; all-sustaining, all- evolving; He is its source and its end, its cause and its object, its centre and circum¬ ference; it is built on Him as its sure founda¬ tion,. it breathes in Him as its encircling space; He is in everything and everything in Him. Thus have the sages of the Ancient Wisdom taught us of the beginning of the manifested worlds. From the same source we learn of the self-unfolding of the Logos into a threefold form; the First Logos, the Root of all Being; from Him the second, manifesting the two as¬ pects of life and form, the primal duality, mak¬ ing the two poles of nature between which the wet) of the universe is to be woven — Life-Form, Spirit-Matter, Positive-

Negative, Active-Recep¬ tive, Father-Mother of the worlds. Then the Third Logos, the Universal Mind, that in which all archetypically exists, the source of beings, the fount of fashioning energies, the treasure- house in which are stored up all the archetypal forms, which are to be brought forth and elabo¬ rated in lower kinds of matter during the evolu¬ tion of the universe. These are the fruits of past universes, brought over as seeds for the present. ˆ From the Third Logos comes forth the seven Great Logoi, sometimes called the Seven Spirits before the throne of God; and as the divine outbreathing pours itself ever further outward and downward, from each of these we have upon the next plane Seven Logoi also, together making up on that plane 49. Omit¬ ting the detail of intermediate hierarchies, it is said that to each of these 49 Logoi belong millions of solar systems, each energized and controlled by its own solar Logos. Thus the difference is vast between the Great Logoi, the Trinity standing next to the Absolute, and the Logos of a single solar system, though the latter is far greater and more sublime than mankind has ever yet conceived the Deity to be. It is said that what happens at the begin¬ ning of a solar system (such as our own) is, allowing for certain obvious differences in the surrounding conditions, identical with what happens at the reawakening after one of the great periods of cosmic rest. Before a solar system comes into existence we have on its future, site, so to speak, nothing but the ordinary conditions of interstellar space, that is, the seven subdivisions of the lowest cosmic or uni¬ versal plane. These, from the viewpoint within our system, are identical with the matter of the highest, or the atomic subplanes of each of our planes. Upon this matter is poured out the energy of the third aspect of the Logos of the system, called the Third Logos, resulting in the quickening of the vitality which pervades

all matter, so that when electrified by it the atoms of the various planes develop all sorts of previously latent attractions and repulsions, and enter into combinations of all kinds, thus by degrees bringing into existence all the lower subplanes of each plane, that is, the six planes below the atomic subplane, until we have before us in full action the marvelous complexity of the seven planes of nature and their respective seven subdivisions as they exist to-day. These planes represent both the physical and the un¬ seen parts of the system, the former being its most densified phase and each plane of the lat¬ ter being made up of matter of a gradually ascending scale of fineness. These planes are called respectively, (1) the physical plane, (2) the astral plane, (3) the mental plane, (4) the buddhic plane, (5) the nirvanic plane, (6) the paranirvanic plane and (7) the mahaparanir-vanic plane, each being a definite region of the system, and their

various subdivisions appear¬ ing in a general way, the same as the subdivi¬ sions of the matter of the physical plane, namely, as solids, liquids, gases and four states of ether. . The matter of the subtler planes, however, is permeable, one order freely inter¬ penetrating another and all extending both within and without the physical. The properties' of each plane are also said to have an additional dimension to the one next preceding it ‘ in density. Thus the physical plane having three, the astral has four, the mental five, and so on. As stated, the highest or seventh subdivision of each plane is the atomic matter of that plane, that is, is homogeneous and cannot be further subdivided without .undergoing an entire change of properties. Thus in breaking up the ulti¬ mate physical atom, it assumes the properties of the matter of the complex lowest subplane of the astral plane; in breaking up the astral atom it becomes of the lowest grade of matter of the mental plane, and so on. After the mat¬ ter of all the subplanes of the system is by the action of the Third Logos formed and vivified, there is poured out upon it the energy of the second aspect of the Logos of the system, called the Second Logos, and is sometimes known as the monadic essence. The effect of this outpouring is to build the forms of the seven kingdoms of nature — the three elemen¬ tal or pre-mineral, the mineral, the vegetable, the animal and the human. On the downward arc of its mighty curve this monadic essence simply aggregates round itself the different kinds of matter of the various planes, so that all may be accustomed and adapted to act as its vehicles ; but when it has reached the lowest point of its involution or immeshing in matter and turns to begin the grand upward sweep of evolution toward divinity, its object is to de¬ velop consciousness in each of these grades of matter in turn, beginning with the physical — the lowest. When in the highest animal life this monadic essence or evolving soul mass reaches the ultimate limit of evolution in that type of forms, it is met by a third outpouring of Logic energy, that of the first aspect of the Logos of the system, called the First Logos, resulting by this union in the formation of the numberless human Egos — the individualization of the One Self in man. It is the presence within man of this third outpouring of the Divine Life, this spark of the One Self, that guarantees to’ him immortality, which, from this point on, the Ego,

or real man, wins through innumerable incar¬ nations in physical bodies.

Anthropogenesis. — As the worlds are sep¬ tenary in their constitution, so also is man. He has on the physical plane (1) a physical body, the dense or visible portion of which is com¬ posed of solids, liquids and gases, and the etheric portion thereof is formed of the four subdivisions of ether. Pervading these is (2) vitality, derived from the sun and specialized by the etheric part. On the astral plane he has (3) i an astral or desire body. And on the lower four levels of the mental plane he has (4) a mind body. These four principles constitute the personality, or what is often called the lower quaternary. On the three upper levels of the mental plane he has (5) a causal or higher mental body, the storehouse of all his experi¬ ences, past, present and future ; on the Buddhic plane, (6) a buddhic or bliss body, wherein the inherent unity of all life is directly perceived, not as an intellectual concept, but as a sublime experience, and on the nirvanic plane he has (7) a nirvanic or Atmic body, the body of abso¬ lute reality. These last three constitute the Reincarnating Ego, the individuality, the soul which lives and grows throughout the period of solar manifestation. The other two planes may be termed the planes of the Self, or pure spirit. The matter of the various planes of nature entering into the composition of man's sundry bodies is vivified with the involving life of the monadic essence, the law of whose progress is to sink deeper and deeper into matter, while the law. of the evolution of the Self using these bodies as vehicles of his consciousness is up- , ward and out of matter. This apparent opposi¬ tion of forces in man gives rise to the usual ideas concerning his lower and higher natures, and explains the meaning of evil. One's de¬ sires, thoughts and emotions are not himself, but the changing phantasmagoria of the living essence of his lesser vehicles which it is his business to learn to control and purify, until they become perfect instruments for his use, — for the real man within is none other than the changeless, eternal Self.

When the human Egos began their long pil¬ grimage of incarnations they at first took bodies on planets other than the one on which we now live. There are in our solar system seven plane¬ tary schemes of evolution, each the realm of a planetary Logos, and they are called, in the order of their distance from the sun, (1) the Neptune scheme, (2) the Uranus scheme, (3) the Saturn scheme, (4) the Jupiter scheme, (5) the Earth scheme, (6) the Venus scheme and . (7) the Vulcan scheme. Each scheme consists of a chain of seven planets and each proceeds on independent lines, there being no intermingling of their activities

during their normal course. The first and fifth of this series have each three physical planets, the others one each. The two physical planets of the first scheme besides Neptune are as yet unseen by the telescope. The two of the fifth, in addition to our earth, are Mars and Mercury. The non¬ physical planets in the schemes are of the mat¬ ter of the astral and mental planes. Each scheme of evolution is worked out by means of seven Manvantaras or periods of manifestation, each manvantara consisting of seven Rounds, each round consisting of seven World Periods (following each other on seven planets in suc¬

cession) and each world period consisting of seven Root Race Periods,

any one of the latter covering periods of millions of years. The present humanity on this planet has passed four times around the planets of its chain, and through a fraction over four root race periods. The last planet occupied by us during the pres¬ ent round was Mars and the next will be Mer¬ cury. The two root races next before the present fifth root race of this planet were the Atlantean and the Lemurian races. The fifth root race has thus for developed as far as its fifth subrace and it stated that the beginnings of a new subrace, the sixth, may be found to-day in America.

Reincarnation and Karma. — Omitting all mention of the interesting career of the reincar¬ nating egos through the primigenous condi¬ tions of the first three rounds of our own plane¬ tary chain and even of the first four root races of this present fourth round, it will suffice to show that among the undeveloped subraces of the present fifth root race reincarnation takes place within a brief period after the death of the body; that after each death there is a stay of more or less duration on the astral plane followed quickly by another physical incarna¬ tion. Later on as the life experiences bring greater growth to the incarnating soul, when he has developed some of the finer emotions, ˆ1S invisible world is prolonged by

an additional period in a specially protected and blissful region of the mental plane called . devachan,® the heaven world. Here his stay is proportional to the degree of his nobler earth experiences, usually lasting, for the average man of substantial attainments who has lived to a good age, . about 15 centuries. Upon the eni mgu of this devachanic life there remains only the reincarnating ego, the lower bodies constituting the personality having disin¬ tegrated on their respective planes; but the principles or qualities animating them have meanwhile left their impress upon the ego. In sending forth his next personality the action of the ego is colored and limited by the stamp upon it of these characteristics developed bv the previous personality, so that the new per¬ sonality begins his life cycle at the highest stage of growth reached by the previous one. This process of reincarnation goes on in «the three worlds® for vast periods of time, not on one planet alone, but on many, as the human life- wave passes from one to' another — from one whose life processes have begun to wane to another more fitted to be the field of higher human possibilities, until at length the end is attained for which all manifestation seems to have been caused — the perfect growth of the soul, the unf oldment of all his potential divinity Ihe ethical law which governs the conditions of our hves, physical and supra-physical, is called Kaima, and it is inqradicably operative in Reincarnation. It may be defined as the law of action and result. By virtue of the operation of this law, effects

which cannot be ascribed to any immediate cause may be traced to causes existing m other incarnations of the same ego, thus establishing one's ultimate, personal re¬ sponsibility for . whatever may befall him. hurthei more, owing to this law, one may and does at each moment of his present life pro¬ duce by his own actions, feelings and thoughts definite effects in the subtler order of things,

resulting in conditions for his next earth life wholly of his own making.

Thoughts build character,

Desires make opportunities,

Actions make environments.

So that whatever one may suffer or enjoy, attain to or fall from is brought about as the result of his own action, in obedience to this law of absolute justice. It is the alternate experience of pleasure and pain which man encounters during his stages of ignorance that develops within him wisdom; and the oppor¬ tunities guaranteed to him for the accomplish¬ ment of this end through Reincarnation and Karma are well nigh limitless. These two doc¬ trines are perhaps the most far-reaching of all the theosophic teaching, as they seem to clear up a host of perplexing questions and establish the basis for a satisfying philosophy.

Propaganda. — Among the results of theo¬ sophic propaganda is the restoration to the Western world of the said doctrines of Rein¬ carnation and Karma, and the elimination of the many perversions of them existing in the East. Another is the occult proof produced of the definite objective reality and potency of thoughts and emotions, showing that these forces are as to their respective planes as visible and real as physical objects are on the physical plane, and that every thought is a living, active entity, persisting for a length of time proportional to the strength that is put into its creation and wields a greater or less influence on those with whom it may come into touch. (See Mr. Leadbeater's (Man Visible and Invisible,' illus¬ trated, and Mrs. Besant's (Thought Forms,' illustrated). Still another is the order which it has brought out of the chaos of the appar¬ ently unrelated data of metaphysics, mysticism and the neo-psychology, including the facts of clairvoyance, clairaudience, mesmerism, hypno¬ tism,

telepathy, astrology, apparitions, psychom- etry and the like. And still another is the establishment by irresistible evidence of the basic unity of all the great wTorld religions and their fundamental relation to an unprejudiced and open-minded science. To help the religions to clear away their non-essential accretions, to sink into insignificance doctrinal differences, to bring to the fore their points of unity, to study their doctrines and traditions in the spirit of brotherliness and to help each from his own particular standpoint is one of the chief ends to which the theosophist bends his efforts. He does not seek to found a religion, but to ex¬ pound those we already have, and so give them a deeper meaning and a richer life. While the theosophist limits himself to no particular form of creed, yet the following three truths may be said approximately to include the broad scope of his belief :

1. God exists, and He is good. He is the great lifegiver who dwells within us and with¬ out us, is undying and eternally beneficent. He is not heard, nor seen, nor touched, yet is per¬ ceived by the man who desires perception.

2. Man is immortal and his future is one whose glory and splendor have no limit.

3. A Divine law of absolute justice rules the world, so that each man is in truth his own judge, the dispenser of glory or gloom to him¬ self, the decreer of his life, his reward, his punishment.

Occultism. — Unless he finds the religion to which he happens to be connected insufficient to meet the demands of his higher nature, the theosophist is apt to seek through the esoteric side of his philosophy the gateway of Occult¬ ism, in order that he may prepare himself for a more serious religions life. Occultism, -as dis¬ tinguished from the Occult Arts, or Magic, is that system of endeavor which, teaching the methods whereby the personality, or lesser, or more human side of man may be made to expand and embrace his higher or divine nature, leads its votaries along a difficult and narrow pathway of rigid virtue and mental and emo¬ tional control, and so requires a firm moral foundation upon which to build the extraordi¬ nary powers pertaining to the unseen world. The true Occultist possesses unselfishness, jus¬ tice and true knowledge ; he has compassion and wisdom ; his desire nature is purified and his habit of mental concentration fixed ; ((the con¬ tents of his consciousness are something more than his five-sense perceptions plus the deduc¬ tions he draws from them by his reason, and such vague ideas and intuitions as he may possess.”

Through Occultism the aspirant, wearying of the phenomenal world,

seeks to outstrip his fellows in evolution and within a few strenuous incarnations to accomplish what the mass of humanity in the normal course will only attain to in long reaches of time, namely, the highest adeptship or liberation from the ((wheel of re¬ birth." In doing so he treads a path which, according to occult teaching, has three great divisions :

1. The probationary period, before any defi¬ nite pledges are taken or initiations (in the full sense of the word) are given. This carries a man to the level necessary to pass successfully through what in theosophical books is usually called the critical period of the fifth round.

2. The period of pledged discipleship, or the path proper, whose four stages are often spoken of in Oriental books as the four paths of holi¬ ness. At the end of this the pupil obtains adept-ship — the level which humanity should reach at the close of the seventh round.

3. What may be called the official period, in which the adept takes a definite part (under the great Cosmic Law) in the government of the world, and holds special office connected therewith, but none of the details of this period can be made known.

The probationary path has five stages but the division between its stages are less de¬ cidedly marked than those of the higher groups, and perfection is not required in anything dur¬ ing this period, only a serious effort toward it. In the first stage the candidate for adeptship acquires a firm intellectual conviction of the im¬ permanence of mere earthly aims ; in the second a perfect indifference to the fruits of his own action; in the third (a) perfect control of mind, (b) of conduct, (c) a generous tolerance, (d) endurance, (e) one-pointedness, (f) confidence in his Master and himself ; in the fourth an in¬ tense desire for union with the highest; and in the fifth he gathers up and strengthens his previous acquisitions for the next great step, which will set his feet upon the path proper as an accepted pupil. During his life on the pro¬ bationary path the pupil will have received much teaching from his Master, usually imparted

during the sleep of his physical body, while he himself is clad in his astral body in full con¬ sciousness on the astral plane. He will also

have been taught while thus functioning in the astral world to bring help, instruction and com¬ fort to the inhabitants of that world, who hav¬ ing laid aside their physical bodies at the gateway of death have passed beyond the phys¬ ical plane. This phase of occult work is some¬ times called that of the Invisible Helpers and is performed, be it understood, by men still having physical bodies and who have developed this power of functioning consciously outside the same on inner planes. The pupil will fur¬ ther have been trained in mediation, and this effective practice both in waking consciousness and outside the physical body during its sleep will have quickened and brought into active exercise many of the higher powers.

When the pupil has developed the fifth qualification of the probationary path he is ready for initiation upon the part proper, hence¬ forth to serve his Master, whom he now meets face to face, in helping forward the evolution of the race, his life, <(to be offered up on the altar of humanity, a glad sacrifice of all he is, to be used for the common good.® This path consists of four distinct stages and the entrance • to each is guarded by an initiation. Ere the second initiation can be passed the pupil must lose the sense that the separated, personal self is a reality, and must feel himself one with all ; he must destroy doubt and superstition by knowledge; ere he passes the third he must bring into full working order the inner facul¬ ties, those belonging to the subtler bodies ; now he needs to incarnate but once again ; ere the fourth is passed he rids himself of desire and aversion and sees the One Self in all. At this stage he needs to return no more. The fourth initiation admits him to the last stage of the path where he throws off all clinging to life in form and all longing for even formless life. Then he casts off the <(I-making® faculty — pride, irritability and ignorance, and henceforth dwells on the plane of unity. The man is then perfect, is free, the liberated one. He has won Nirvana. <(He has completed man's ascent, he touches the limit of humanity; above him there stretches hosts of Mighty Beings, but they are superhuman ; the crucifixion in flesh is over, the hour of liberation has struck and the triumphant (It is Finished) rings from the conqueror's lips,

. . he has vanished into light nirvanic.

But being now Master of Compassion as well as Master of Wisdom, he returns from that light to earth, henceforth to devote himself to the service of humanity with mightier forces at his command than he wielded while he trod the path of discipleship, bending all his sublime powers to the quickening of the evolution of the world. Such an one was the Buddha — such the Christ and such the few Great Souls who tread the earth to-day, secluded from its ex¬ ternal strife, yet pouring

down upon mankind from the great heights of their sublime advance¬ ment inestimable blessings, guiding by means of their divine powers whole races and nations, but unknown to all but the few earnest souls who come to them through the ancient gateway of Occultism, the portal of which has through¬ out all time stood ajar for the resolute pilgrim.® Before the cycle of time shall close and all manifestation cease, the greater portion of man¬

kind will have reached this high stage of growth. And then shall all be gathered unto Him for the great Cosmic rest only after aeons and aeons of time, to emerge again with Him, to be the Architects and Builders of future universes. Such are a few of the teachings of the Ancient Wisdom, given forth at this time as Theosophy and Occultism.

Bibliography. — Anderson, <Reincarnation) (San Francisco 1896) ; id., (Septennary Man5 (ib. 1895) ; Blavatsky, H. P., (Isis Unveiled5 (2d ed., 2 vols., Point Loma, Cal., 1910) ; (The Key to Theosophy5 (3d ed., 1913) ; (The Voice of the Silence5 ; (First Steps in Occultism5 ; (The Secret Doctrine5 (2 vols., Point Loma, Cal., 1909) ; Besant, Annie, (The Ancient Wis¬ dom5 (new ed., London 1910) ; (The Seven Principles of Man5 (new ed., New York 1904) ; Walker, E. D., (Reincarnation5 (New York 1904) ; id., (Karma5 (ib. 1905) ; (Death and After5 (London 1901) ; (Man and His Bodies5 ; (The Building of the Kosmos5 ; (The Self and Its Sheaths5 ; (Man, Whence and Whither5 (Madras 1913) ; (Evolution of Life and Form5 ; (The Birth and Evolution of the Soul5 ; (A Study in Consciousness5 ; (Four Great Reli¬ gions5 ; (The Religious Problem in India5 ; (Thought Power: Its Control and Culture5; (Theosophy and the New Psychology5 (rev. ed., London 1909) ; (Esoteric Christianity5 (New York 1910) ; (Avataras5 ; (In the Outer Court5 ; (The Path of Discipleship5 ; (Ancient Ideals in Modern Life5 ; Hartmann, Franz, (Magic Black and White5 (7th ed., New York 1904) ; Ingalese, Richard, (From Incarnation to Incarnation5 (rev. ed., id. 1908) ; Fussel, J. H., Uncidents in the History of the Theosophical Movement5 (Point Loma 1910) ; (Bhagavad Gita5 (trans.) ; Sinnett, A. P., (Esoteric Budd¬ hism5 (Boston 1884) ; (Growth of the Soul5 (Boston 1885) ; (Occult World5 (London 1896); Mead, G. R. S., fragments of a Faith For¬ gotten5 ; (Orpheus5 ; (Pistis Sofia5; (Simon Magus5 ; Leadbeater, C. W., (An Outline of Theosophy5 ; (The Astral Plane5 ; (The De- vachanic Plane5 ; (Clairvoyance5 ; invisible

Helpers5 ; (Dreams5 ; (Man Visible and Invis¬ ible5 (illustrated); (The Christian Creed5; (The Other Side of Death5 ; (Some Glimpses of Occultism5 ; Collins, Mabel, (Light on the Path5 ; Judge, W. Q., < Ocean of Theosophy5 (Los Angeles 1915) ; id., (Echoes from the

Orient5 (1910); Scott-Eliott, W., <Story of Atlantis5 ; Williamson, William, <The Great Law5 ; Olcott, H. S., (Theosophy, Religion and Occult Science5 ; <01d Diary Leaves5 (Vols. I, II, III) ; Cooper-Oakley, Mrs., (Traces of a Hidden Tradition,5 etc.; Hinton, C. H., (The Fourth Dimension5 ; Edgar, Lillian, (Elements of Theosophy5; Lillie, A., (Madame Blavatsky and her ˆTheosophy®5 (London 1895) ; Olcott, H. S., (01d Diary Leaves5 (3d series. New York 1895-1907).

The materials for the above sketch have been drawn more or less literally from the above-mentioned works.

A. P. Warrington, Fellow of the Theosophical Society.

THEOTOKOS, a title given to the Virgin Mary by a decree of the Third Ecumenical Coun¬ cil, which met at Ephesus 431 to condemn the Nestorian heresy. The term means ((bringing forth God® and is intended to formulate the

fact implied in the annunciation of the angel to Mary (<that holy thing which shall be born of thee shall be called the son of God.® Theo¬ tokos (Latin, Deipara) implies that the child of Mary was of divine nature from the moment of his conception ; that he was not born mere man, to whom, as Nestorius taught, the divine nature was subsequently imparted.

THERA, tha'ra or the'ra, an island in the yEgean Sea, belonging to the Grecian Archi¬ pelago, the most southerly of the Cyclades. It is of volcanic formation and presents many in¬ teresting phases. New islands are formed from time to time, by its volcanic action, notably the last in 1866. Scientists have given the island considerable attention and many observations have been made and records kept. The soil is very fertile.

THERAMENES, the-ram'e-nez, Athenian politician of the 5th century b.c. He first be¬ came prominent in 411 as a member of the Council of 400, but perceiving the inevitable downfall of that government he joined the opposing party and assisted in its overthrow. In 410 b.c. he was in command of a portion of the Athenian fleet, with which he cruised about and exacted tribute from the neighboring is¬ lands, and later he joined the fleet under Thrasybulus, with whom he took part in the battle of Cyzicus. He subsequently served with Alcibiades, participated in the siege of Chal- cedon in 408 b.c. and in the capture

of By¬ zantium. After the battle of Arginusse, in 406, he repaired to Athens, and in order to exculpate himself for not saving the crews of the ships accused his colleagues of neglect, and through his testimony they were sentenced to death. In 404 b.c., when Athens was besieged by the Spartan general Lysander, Theramenes was sent as an envoy to negotiate terms with Sparta. He purposely remained on his mission for three months, during which time Athens was reduced to dire extremity and was forced to make peace upon such terms as to place her at the mercy of the Lacedaemonians. He was elected one of the Thirty Tyrants (q.v.) after the peace, and at first heartily supported the measures of the government. The violent measures of Critias and his colleagues, how¬ ever, induced him to form an opposing party, which rapidly increased in strength. He was accused by Critias of being a public enemy, dragged to prison and forced to drink the hemlock.

THERAPEUTICS, that branch of medicine which deals with the treatment of disease. Natures cures; physicians treat. This is an old dogma as true to-day as it was when uttered over 2,000 years ago by a famous Greek physi¬ cian. Scientists have termed that power of the human body the vis medicatrix natures, by means of which nature tends to right her own disordered organs, and it is important to recog¬ nize this all-important function of the body, and not to interfere by overzealousness in the use of potent agents with nature's own slowly ac¬ quired powers of self-restoration. An innocu¬ ous and half-hearted therapy, however, is not the logical system, even if such reconstructive powers of nature are granted. The modern conception of disease does not admit of ready characterization. In the articles on disease and pathology (q.v.) it is attempted to define what

is meant by disease, but such definitions are far from being satisfactory because of the im¬ mense variety of diseased conditions, their manifold causation and their devious progres¬ sions. In all disease certain groups of physio¬ logical functions are altered, and in the at¬ tempt to aid nature to bring these disturbed physiological activities to a normal condition the chief work of the therapeutist lies. It makes little or no difference what the agencies may be that are used — often, as has been said, none are necessary — yet the ideal of the thera¬ peutic art is to restore to normal condition, as far and as quickly as possible, the disturbed bodily functions. While it is true that the physician of to-day employs many of the agents used by physicians thousands of years ago, there is a far greater precision and a much more comprehensive series of ideas concerned in their use by the well-equipDed modern thera¬ peutist than was possible to his early predeces¬ sors. The one aim of the physician throughout the centuries has been the alleviation of suffer¬ ing and the restoration of the

diseased to health or to comfort ; and notwithstanding the many small cliques and divergences of opinion, the progress toward scientific therapeutics has been steady and increasingly satisfactory. At the outset of this summary of therapeutics it may be well to consider for a moment the different classes of agents at hand by the use of which, singly or combined, the physiological functions of the body may be modified, and thus be made useful in the healing art.

Expressed categorically, the different thera¬ peutic agents or systems are: (1) Suggestion- therapy; (2) Dietotherapy ; (3) Physicotherapy ; (4) Mechanotherapy; (5) Pharmacotherapy; (6) Surgicotherapy. Each of these will be briefly discussed.

Unquestionably the oldest and yet strongest therapeutic agent is suggestion. The power to heal by faith is not the special property of any sect or class, nor the exclusive right of any sys¬ tem. Belief in gods and goddesses, prayer to idols of wood, of stone, of gossamer fiction, faith in the doctor, belief in ourselves engen¬ dered from within or from without — these are all expressions of the great therapeutic value for healing that resides in the influence of mental states on bodily functions. These will not move mountains ; they cannot cure consump¬ tion ; they do not influence a broken leg, nor an organic paralysis ; but suggestion, in its various forms, may be and is one of the strongest aids to all therapeutic measures. Of its abuse by designing hypnotists, blackmailers, clairvoyants and a motley crew of parasites, space does not permit particularization. The human mind is credulous — it believes what it wants or wills to believe; and the use of suggestion in thera¬ peutics is one of great power for good and for evil.

The treatment of disease by diet constitutes another large branch of the therapeutic art. Modern chemistry has resolved all foods and drinks into their elements, and has given the physician valuable aids in the treatment of a large number of diseases. Many obscure dis¬ orders, such as diabetes, gout, myxeedema, obes¬ ity, etc., are closely allied with certain defects in the metabolism of certain physiological systems of the body. Many of these are best treated by

a dietary regimen, combined, it may be, with other means. Many of the minor disorders of the digestive tract (see Digestion) are best treated by regulation of the diet.

By physicotherapy is meant the use of cer¬ tain physical agents such as heat, cold, light, electricity, etc. Certain forms of application of the agents are termed (a) hydrotherapy (q.v.), in which heat and cold are applied by means of water; (b) phototherapy (q.v.), in which light is used in the treatment of disease. Sunlight, electric light, ultra-violet rays (Finsen's light), X-rays, radio-active substances — these all exert on the tissues of the body certain influences that, properly applied, may bring about restoration of disordered functions, and thus aid nature in curing disease.

Mechanotherapy is the use of mechanical movements in treatment. Massage, vibration, gymnastics, Swedish movements, etc., are some of the different forms in use. Under the name of osteopathy (q.v.) it is attempted to elevate one of the oldest aids to treatment, in use by the Greeks, Chinese, etc., to the rank of an exclu¬ sive system.

Under the terms pharmacotherapy and surgi- cotherapy are included the treatment of disease by drugs, so-called, and by surgical means. So far as treatment by means of drugs is con¬ cerned, it is interesting to note that practically all drugs act on the tissues of the body in some chemical or physicochemical manner. They may have a certain selective action on certain tis¬ sues of the body. Thus the large group of the alcohols, comprising ethers, aldehydes, chloro¬ form, hypnotics — such as trional, sulphonal, veronal, urethane and a large number of others — have a selective action on the nervous tissues of the brain, benumbing their activities and causing drunkenness or anaesthesia or sleep, ac¬ cording to the dose or other conditions. Others act on sensory nerves, diminishing pain ; such are cocaine, opium, antipyrin, acetanilid, phe- nacetin, cannabis, etc. Again, other remedies are chiefly on the intestines, giving the large group of cathartics, and so the entire list of drugs might be analyzed. Given a knowledge of the selective or generalized action of the drugs, the power that they may exert in correct¬ ing abnormal physiological activities is solely a matter of application and in accordance with the correct interpretation of the cause of the dis¬ turbed functions will the therapeutic applica¬ tion be of direct value or not. In other words, drugs are nothing more than chemical agents which may be used to modify certain physiolog¬ ical activities ; if by their well-known power in modifying these activities other morbid activi¬ ties may be corrected, they are agents for good. For a consideration of surgicotherapy, see Surgery, History of General.

One other phase of therapeutics remains to be considered. It has been pointed out that nature has resources of her own for overcom¬ ing certain types of disease. Can these natural powers be so played upon

or affected as to in¬ crease their operation? Along this line new paths have been opened up since the recogni¬ tion of a large class of diseases known as in¬ fectious. Bacteriology (q.v.) has taught that disease organisms (bacteria) cause the disturb¬ ance (disease) in the body not so much by their physical presence as by the extremely virulent

poisons that they form. It is the struggle of the human body to get rid both of bacteria and poisons that makes the disturbance which is called the disease. Thus the diarrhoea of typhoid is one of nature's efforts to throw off poisons; the high temperature and crisis of pneumonia is a supreme effort of the body, which sometimes succumbs under it, to deal a death-blow to the pneumococcus, the micro¬ organism that causes the disease. The high temperature in malaria (q.v.) unquestionably kills off a great many of the parasites in the blood.

But in addition to these larger and more palpable efforts on the part of nature to over¬ come the invader, a series of subtle and intri¬ cate defenses are at work in the blood-serum, some of the elements of which are known. Thus in some diseases there is elaborated in the blood-serum a direct chemical antidote, an anti-toxin, to the poisons of the invading bac¬ teria. Such a protective power is found in diphtheria (q.v.). (See Antitoxin). Vaccina¬ tion, the discovery of which was almost the result of an accident, is a form of serum-treat¬ ment. (See Serum-Therapy). The details of the reasons why immunity is conferred by the modified smallpox of the cow are not yet known, as the true cause of smallpox is not indubitably proven, but the time is not far off when the different factors herein involved will be un¬ earthed. A large number of other questions are concerned in this great question of natural and acquired immunity (q.v.).

Human progress has been likened to the advance of a drunken man, and it is certain that the ups and downs and side-lurches and backward steps in the path of therapeutics have been many; but withal there has been a broad blaze of progress. That which has been tried and been found to be true has been grasped and has become the heritage of the whole com¬ munity. The physician class have shared with the people at large in the general movements; there have been many side-tracks from the broad road of therapeutics ; innumerable pathies have had their little day or their 100 years; each in its turn has contributed what kernel of truth it possessed to the progress of the mass.

Bibliography.- — Bernheim, (Suggestive Ther¬ apeutics — Dietetics)

; Hutchinson-Thompson,

(Physicotherapy, Mechanotherapy) ; Cohen’

(System of Physiologic Therapeutics — Phar¬ macotherapy* ; Brunton, (The Action of Medi- cines) ; Cushny, A. R., (Pharmacology and

Therapeutics> (6th ed., Philadelphia 1915) ; Forchheimer, F., ‘Therapeusis of Internal Dis¬ uses *(2d ed., 5 vols., New York 1914) ; Hare, H. A., ‘Modern Treatment (2 vols., Philadel¬ phia 1911); id, (Textbook of Practical Therapeutics* (15th ed, ib. 1914) ; Schmiede- berg, (Arzneimittellehre *; ‘Surgery*; Mikulicz- Bruns, edited by W. T. Bull, ‘Immunity *; Roger, (Infectious Diseases*; Ehrlich, ‘Seiten- kettetheorie *; Vaughan and Novy, ‘Cellular I oxins.*

Smith Ely Jelliffe, M.D, bditor of ‘ Journal of Nervous and Mental Diseases. *

THERAPIA, a health resort on the Bos¬ porus nine miles north-northeast of Constan¬ tinople, of which city it is a suburb. It is the ancient Pharmacia (“drug-cure®) where tradi-

tion says Medea spread her drugs. One of the earlier patriarchs of Constantinople changed the name to Therapia (((cure®). It marks the limit between what is locally called the Upper Bosporus and the Lower Bosporus. Here are the summer residences of European ambassadors, Turkish officials and' wealthy Levantines.

THERESA, Saint. See Teresa, Saint.

THERESIOPEL, ter-a'ze-6-pel, or MA- RIA-THERESIOPEL, ma re'a-ter-a'ze-6-pel (Hung. Szabadka), Hungary, a free town in the county of Bacs-Bodrog, 25 miles south¬ west of Szegedin, in a broad plain between the Danube, and the Theiss. The buildings worthy of notice are the churches of Saint Theresa, church of the Franciscans, a beautiful Greek church, town-house, etc., theatre, barracks, gymnasium and music-school. The industrial works include tanneries, linen and leather manu¬ factories and dyeworks. Wheat, tobacco, wine and fruits are grown and cattle-raising is im¬ portant. There is a brisk trade in horses, cat¬ tle, sheep, hogs, hides and wool. There is a fashionable watering-place in the vicinity. Pop.

94,610.

THERIAC, or THERIACA, a compound said to have been first prepared by Androm- achus of Crete, who was physician to the Emperor Nero. It was supposed to be an anti¬ dote to poison, and continued in use throughout the Middle Ages. As prepared in Venice and other places it was a compound of 64 drugs, pulverized and reduced by means of honey to an electuary.

THERIODONTIA, a sub-order of the Theromorpha (q.v.), large extinct carnivorous reptiles, with shortened coracoid and double¬ headed ribs.

THERMAE, ther'me (from the Greek thermal, signifying originally warm or hot springs), properly warm baths, but also applied generally to the baths of the ancients. During the Roman Empire the buildings for this pur¬ pose were constructed with great splendor and adorrfed with paintings, statuary, libraries, gym¬ nasia and public walks. . The baths of Nero, Titus, Caracalla and Diocletian at Rome were distinguished for the magnificence and luxury displayed in their construction. See Bath Houses.

THERMAL SPRINGS. See Spring.

THERMIC FEVER. See Sunstroke.

THERMIDOR, ther-mi-dor' (Fr. ter-me- dor), the 11th month of the year in the cal¬ endar of the first French republic. It com¬ menced on 19 July and ended on 17 August. See Calendar.

THERMIT, a name given by Goldschmitt to a mixture of fine aluminum filings or pow¬ der and iron oxide. When this mixture is ignited by some suitable means the aluminum unites vigorously with the oxygen of the iron oxide, forming a very pure variety of steel and a slag consisting mostly of aluminum oxide. This union of finely divided aluminum with oxygen gives a very intense heat,. about 3,000° C. Besides the ordinary thermit (iron oxide and aluminum filings) other mixtures may be prepared from aluminum and the oxides of nickel, cobalt, chromium, manganese, etc.

When these are ignited in a properly prepared crucible violent reaction takes place, the oxy¬ gen of the oxide being taken up by the alumi¬ num, leaving a very pure metal, nickel, cobalt, etc. This process is now much used to get metals from those oxides that heretofore have resisted all ordinary methods of reduction. When ordinary thermit is ignited the temper¬ ature produced is so high that

the iron and the slag are left in a molten and highly-heated condition. If this iron is allowed to flow on to another piece of iron or steel it will heat it enought to soften it and the whole will harden to a homogeneous mass. In this way it can be used to replace broken parts of machinery, to mend broken or cracked propeller shafts, to weld together railroad rails so as to form one continuous rail, etc. Some of the im¬ portant features in this process are its cheap¬ ness, ease of execution and the fact that ma¬ chinery, etc., can be repaired in position. The method is to surround the part to be repaired with an ordinary mold box ; a magnesia-lined crucible with a plug in the bottom is placed over the opening; the thermit is placed in the cru¬ cible, ignited and as soon as the violent re¬ action has subsided the plug is pulled and the white hot metal allowed to flow into the mold. Iron tubes can be welded together by placing the ends in a mold and allowing the thermit product to flow in in such a way that the liquid slag first comes in contact with the tubes. The slag forms a protective covering which prevents the hot iron from uniting with them, though it does allow the tube ends to become hot enough to unite as one piece. Railway rails can be . joined where they lie on the track, and large pieces of broken machinery in mines or on shipboard can be readily repaired without removal.

THERMO BAROMETER. See Ther¬ mometer.

THERMO-CHEMISTRY, or THER¬ MAL CHEMISTRY, that branch of physical chemistry which deals with the thermal changes which occur when chemical reactions take place or when a body or system (such as a solution) undergoes certain kinds of physical change. Its precise limits are not easy to define, since the subject merges into ordinary chemistry on the one hand and into thermodynamics on the other. Any chemical operation can be con¬ sidered from two points of view, according as we are interested in the modification that it produces in the nature of the substances that are involved or in the quantity of energy which is absorbed, liberated or otherwise transformed at the same time. It is the province of thermo¬ chemistry to investigate the transformations of energy that occur in such cases. The com¬ plete discussion of the energy-transformations that accompany a given chemical change should include the consideration of every type or form of energy which may be present; but the in¬ vestigations which have hitherto been made have related chiefly to the quantities of heat which are liberated or absorbed, and it is to this circumstance that the science owes its pres¬ ent name, ˆthermo-chemistry.®

The quantity of heat that is liberated or ab¬ sorbed during a proposed chemical reaction can be determined by causing the given reaction to

take place in the interior of a calorimeter. The

particular form of calorimeter that is to be used will naturally depend to a considerable extent upon the nature of the reaction that is to be studied. If the problem consists in the deter¬ mination of the quantity of heat that is liber¬ ated when two given liquids are mixed, the calorimeter commonly consists of a platinum vessel, capable of containing from 500 to 1,000 cubic centimeters, placed inside of another ves¬ sel of silver; the space between the two vessels being filled with water. The liquids that are to be examined are brought to the same tempera¬ ture as nearly as possible, and are then mixed in the platinum vessel. The rise of temperature of the calorimeter being noted, and the masses and specific heats of the various parts of the calorimeter (and its contents) being determined by separate experiments, we are then in posi¬ tion to calculate the quantity of heat energy lib¬ erated by the reaction. For detailed informa¬ tion with regard to the various kinds of calori¬ meters that are used, and for a discussion of the sources of error to which such instruments are liable, reference must be made to extended works upon heat and thermo-chemistry. (See the references at the end of this article).

In thermo-chemical work, the unit of mass is almost invariably the gram ; and the gram is always understood, when no other unit is specifically mentioned. The unit of heat is also understood to be the calorie, which, for thermo-chemical purposes, is defined as the quantity of heat required to raise the tempera¬ ture of one gram of water by one Centigrade degree, when the temperature of the water is in the vicinity of 18° or 20° C. The notation that is employed in expressing the results of a thermo-chemical experiment upon the heat that is developed by a given chemical reaction is simple. The formulae of the substances that react are written within square brackets, and separated by a comma or a colon; it being understood that the number of grams that are present of any one substance is equal to the molecular weight of that substance. A sign of equality is written after the bracketed for¬ mulae, and on the right hand side of this sign the number of calories of heat generated or absorbed by the reaction is written ; a positive sign being prefixed (or suffixed) when heat is evolved, and a negative sign when it is ab¬ sorbed. The indices that are attached to the symbols of the various elements are written above those symbols, instead of below. For example,

[H2,0] = + 68,360

signifies that when two grams of hydrogen and 16 grams of oxygen, both at about 18° C. and under ordinary atmospheric pressure, combine to produce 18 grams of water (also at 18° C.), the quantity of heat that is evolved is sufficient to raise the temperature of 68,360 grams of water by one Centigrade degree; the temperature of the water being about 18° C. When a compound is broken up into its constitutent parts, the bracketed formulas are pre¬ ceded by a negative sign. Thus the expres¬ sion,

— [H,C1] = — 22,000

signifies that when, by any means, 36.5 grams of hydrochloric acid are decomposed so as to set free 1 gram of hydrogen and 35.5 irrams of

chlorine, the change is accompanied by the ab¬ sorption of a quantity of heat that would be sufficient to raise the temperature of 22,000 grams of water by 1° C.

The “heat of formation® of a substance is the quantity of heat given out when the sub¬ stance is formed from its constituents ; it being taken as negative when the formation of the substance is accompanied by the absorption of heat. In general, any given substance may be prepared in various ways, from different mate¬ rials or constituents ; and in such cases the heat of formation will be different, according to the particular substances that are regarded as con¬ stituents. For example, sulphuric acid might be prepared from sulphur, oxygen and. water, according to the equation

S + 30 + H20 = H,S04,

or from sulphur dioxide, oxygen and water, ac¬ cording to the formula

S02 + O + h2o = h2so4,

or from sulphur trioxide and water, according to the equation

SOa + H20 = H2S04 ;

and the heat of formation will be different in these several cases, if we regard the immediate materials from which the acid is prepared as the “constituents® of the acid. But if the acid is prepared from the elements sulphur, hydro¬ gen and oxygen (all three being taken in

certain standard initial physical states in each instance), then the heat of formation will be the same, whether these elements combine di¬ rectly to form the acid, or whether the oxides of sulphur and hydrogen are first produced, and these subsequently combine to form the acid. In fact, the principle of the conserva¬ tion of energy shows that when a body or a system of bodies passes through a succession of changes, either physical or chemical in nature, so as to pass from one given initial state to another given final state, the total change in the internal energy of the body or system is identi¬ cally the same, whatever the nature of the transformations may be, by which the change is effected. Hence it follows that whenever the heat that is emitted or absorbed in the course of a reaction represents nothing but the decrease or increase in the internal energy of the system, the total quantity of heat that is emitted or absorbed will be entirely inde¬ pendent of the way in which the transforma¬ tion takes place. If, however, the system per¬ forms external mechanical work in passing from its initial state to its final state, the heat energy that is actually given off will be less than that corresponding to the change in the internal energy by the amount which is ex¬ pended in performing the external work. In many of the reactions that are considered in thermo-chemistry, the external work that is performed is too. small to be of any material significance,, and in these cases the heat energy that is emitted or absorbed in the passage from one state to another may be logically regarded as independent of the kind of trans¬ formation that the transition involves. In some cases, however, and particularly when the systems under consideration are partly or wholly gaseous, the external work that is per¬ formed is great enough to require serious con-

sideration, and to obtain accurate results this work must be estimated and allowed.

The application of the principle of the con¬ servation of energy to the determination of the heat of formation of a substance, when that heat cannot be directly observed, may be illus¬ trated by the case of phosphorus. We have, when ordinary phosphorus is burned to the pentoxide,

[P2,05] = + 369,100;

which signifies that when 62 grams of or¬ dinary phosphorus (the

atomic weight of that element being 31) are burned to pentoxide, 369,100 calories of heat are emitted. A similar experiment with amorphous phosphorus gives the corresponding relation

[P2,05] = + 326,800.

Evidently the internal energy of the amorphous variety is less than that of the ordinary variety, since when both are converted into the same thing the amorphous phosphorus gives out sen¬ sibly less heat. The difference of the fore¬ going numbers is 42,300; and dividing this by 2 (since the foregoing numbers apply to 62 grams of the phosphorus), we reach the final conclusion that when 31 grams of ordinary phosphorus are converted into the same mass of amorphous phosphorus, the conversion is attended by the emission of 21,150 calories of heat. Similar experiments have been per¬ formed in great number upon compounds that are isomeric with one another; and yet the data that are available do not warrant any but the broadest generalizations. It appears, for example, that the internal energy of a com¬ pound that admits of isomeric modifications de¬ pends (1) upon the symmetry of structure of the molecule, (2) upon the natures of the atoms which are directly joined in the mole¬ cule, and (3) upon whether or not each mole¬ cule in the compound exhibits its maximum valency toward the molecules of other kinds with which it may be associated. Thomsen en¬ deavored to discover, by thermo-chemical meth¬ ods, whether a single bond between two ad¬ jacent carbon atoms is stronger or weaker than a double or triple bond. His methods and conclusions are perhaps not always beyond crit¬ icism, but he was led to believe, from his ex¬ periments, that a triple bond between two ad¬ jacent carbon atoms constitutes a much weaker connection than either the single or the double bond. This particular conclusion, it may be said, is in harmony with evidence on this point that has been collected in many other ways.

The methods of thermo-chemistry have been applied extensively to the investigation of prob¬ lems in the theory of solutions, to the study of the affinity between acids and bases, and to the elucidation of many of the difficult points of physical chemistry. These applications, how¬ ever, assume a knowledge not only of experi¬ mental and theoretical physics and chemistry, but also, and more particularly, a sound under¬ standing of thermodynamics. Consult Muir and Wilson, (Elements of Thermal Chemistry1 *; Thomsen, (Thermochemische Untersuchun- gen* ; Naumann, ˆhermochemie1* ; Planck, (Grundriss der Allgemeinen ThermochemieP

Allan D. Risteen,

Director Technical Research, The Travelers In¬ surance Company, Hartford, Conn.

THERMO-DYNAMIC ENGINE, a name

applied to any form of steam engine or gas engine.

THERMODYNAMICS, or THE ME¬ CHANICAL THEORY OF HEAT, that branch of physical science which treats of the relation of heat energy to energy of other kinds, and particularly of the convertibility of heat energy into mechanical energy, and the converse. In order to discuss, quantitatively, the conversion of one kind of energy into another kind, we must first have a definite method of measuring each of them. Mechanical energy (see Energetics) is measured by de¬ termining the amount of work that a given quantity of it can perform ; the customary unit employed for this purpose being the <(foot pound **or the <(metre-kilogram® in engineering practice and the ((erg® in scientific work; the ((erg** being defined as the quantity of work done in overcoming a resistance of one dyne, through a distance of one centimeter. The unit employed in the measurement of heat is almost universally the quantity of heat required to raise the temperature of some definite mass of water through one degree, on some stated part of the thermometric scale. The ordinary <(British thermal unit,® which is used in engi¬ neering practice in English-speaking countries, is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree; and in countries that use the metric system, the engineering unit is the quantity of heat required to raise the tem¬ perature of one kilogram of water through one centigrade degree. As the specific heat (q.v.) of water varies slightly at different tempera¬ tures, these definitions are not absolutely defi¬ nite, unless the part of the thermometric scale at which the experiment is to be performed is specified. Unfortunately there is no general agreement among engineers on this point; and for most purposes in practical engineering it is customary to ignore the slight variation in the specific heat of water and to consider the foregoing definitions to be sufficiently precise as they stand. For scientific purposes, where the greatest possible accuracy is required, this course is not permissible, and it becomes neces¬ sary to specify the particular degree through which the temperature of the water is to be raised. Even here there is no definitely estab¬ lished convention; but there appears to be a growing tendency to adopt the degree that ex¬ tends from 14.5° C. to 15.5° C. In scientific work, too, it is customary to define the thermal unit in terms of a gram of water, instead of a kilogram; and the scientific heat unit (which is called the ((small calorie,® to distinguish it from the ((greater calorie® that is

used in engineer¬ ing) may be defined as the quantity of heat re¬ quired to raise the temperature of one gram of water from 14.5° C. to 15.5° C. The quan¬ tity of heat required to raise the temperature of one gram of water from 3.5° C. to 4.5° C. — 4.0° being the temperature at which water has its maximum density — is also known as the <(therm.®

The science of thermodynamics is founded upon two general, fundamental laws, which, so far as we are aware, are absolutely rigorous and which are respectively known as the ((first®

and <(second® laws. These we shall consider in order.

The (Joule did a vast amount of experimental work for the purpose of determining the exact value of the (<me- chanical equivalent of heat,® as the constant is called, which expresses the number of units of mec'hanical energy that are equivalent to one unit of heat; and in the course of his labors he tried many different experimental methods. (Consult (The Scientific Papers of James Pres¬ cott Joule-*). His best known method consisted in stirring a known mass of water and measur¬ ing the rise in temperature so produced as well as the quantity of mechanical work expended in the stirring. He concluded that the tempera¬ ture of one pound of water is raised by one Fahrenheit degree by the expenditure of 772 foot-pounds of mechanical energy. This con¬ stant, which is known as <(Joule's equivalent® and is denoted by the symbol J , has played an all-important part in engineering and scientific work for more than half a century. A better value of it was obtained by Rowland in 1879 (consult (The Physical Papers of Henry Augustus Rowlandˆ ; but the prestige of Joule was so great that the superiority of Rowland's work was not generally recognized for many years. Rowland's method was similar to that of Joule, but he worked with far better appara¬ tus, and took advantage of the advances that had been made since Joule's work was done, both in calorimetry and in thermometry. It was in the course of this work that Rowland made the discovery that when temperature is defined in accordance with the scale of the normal, constant-volume air thermometer, the specific heat of water has a minimum value at a little above 30° C., — a discovery which im¬ plies a high degree of precision in the ex¬ perimental methods employed, and which has been abundantly verified by later investigators. Rowland's value of the mechanical equivalent of heat may be stated as

follows: Taking as the unit of heat the quantity of heat required to raise the temperature of one kilogram of water from 14.5° C. to 15.5° C., the mechanical equivalent is 427.4 kilogram-metres at sea-level in the latitude of Baltimore. If the unit of heat is the quantity of heat required to raise the temperature of a pound of water from 59° F. to 60° F., then the mechanical equivalent is 779.0 foot-pounds. If the unit of heat is the quantity of heat required to raise the tem¬ perature of one gram of water from 14.5° C. to 15.5° C., then the mechanical equivalent is

41,890,000 ergs. Numerous other experimenters have made determinations of the mechanical equivalent, both by the method followed by Joule and Rowland, and by other methods. Prominent among these is Griffiths, who heated the water in his calorimeter mainly by means of a known electrical current, traversing a known resistance, and hence giving out a known quantity of heat. Taking as a unit of heat the quantity of heat required to raise the tempera¬ ture of a kilogram of water from 14.5° C. to 15.5° C., Griffiths found the mechanical equiva¬ lent to be 427.45 kilogram-metres at sea-level in the latitude of Greenwich. Rowland's value, when expressed in these same units and cor¬ rected to the latitude of Greenwich, is 427.0. For further details concerning the experimental determination of the mechanical equivalent, consult Preston, (Theory of Heat} ; and for numerous interesting illustrations of the first law of thermodynamics, consult Tyndall, (Heat a Mode of Motion. }

The ((second law of thermodynamics® is hard to explain in a limited space, or without the use of higher mathematics ; and, as Ran- kine remarked, its exposition has been much neglected by the writers of popular works, so that ((the consequence is that most of those who depend altogether on such works for their scientific information remain in ignorance, not only of the second law, but of the fact that there is a second law; and knowing the first law only, imagine that they know the whole principles of thermodynamics.® In its simplest form, the ((second law® merely states that heat always tends to pass from a hotter body to a colder one. This fact is obvious enough in its simpler manifestations ; for every housewife knows that to make the kettle boil she must put it on the stove and not in the refrigerator. It is not so evident, however, that there are no conditions whatever under which heat will pass of its own natural tendency from a lower tem¬ perature to a higher one. It is not evident at first thought, for example, that we cannot make a burning glass big enough to give a tempera¬ ture, at its focus, which shall be higher than the temperature of the sun; yet we cannot do so, if the second law of thermodynamics is true, for the heat at the focus of the glass cer¬ tainly comes from the sun,

and if that focus were hotter than the sun, we should have a case in which heat is passing by its own natural radiative tendency from a cooler body (the sun) to a hotter one (the focus of the glass). The second law was first proposed, as a broad principle of nature, by Clausius; and although numerous distinguished mathematicians and physicists have questioned its validity from time to time, it is now recognized as a great, universal truth, applicable to all classes of phenomena, without exception, so long as we are dealing with large masses of matter. We cannot undertake, here, to discuss the seeming exceptions that occur in connection with par¬ ticles microscopic or less in size. (See Brown¬ ian Movement). It is indeed true that heat can be abstracted from a body and made to pass into a warmer one, and this is actually done on a commercial scale in cold storage plants and in the manufacture of artificial ice ; but the point is that this feat cannot be accom¬ plished without the expenditure of energy. We are to think of heat, in its tendency to pass

from a higher temperature to a lower one, in much the samp way as we think of water tend- mg to run down hill. Water will not run up hill of its own accord, but it may be forced to pass from a lower level to a higher one by the expenditure of energy upon a pump or other equivalent device. The correctness of Clausius' hypothesis with regard to heat is substantiated by the fact that no case has yet been discovered in which it is demonstrably violated. On the other hand, many previously unknown phe¬ nomena of nature have been predicted by its aid, and in every instance subsequent experiment has borne out the prediction in every respect. For a short account of some of the better known objections that have been urged against the soundness of the ((second law,® consult the latter portion of Browne's translation of Clau¬ sius's (Mechanical Theory of HeatF

In studying the transformation of heat- energy into mechanical energy (or the re¬ verse), it is customary to think of the con¬ version as being performed by a suitable type of heat-engine; for this conception helps to make the problem definite, so that the mind can readily grasp the principles involved. The imaginary engine is usually conceived to be perfect in construction, so as to run without friction and without losses by radiation or con¬ duction. In fact, the material of which the engine is composed is assumed to be incapable of absorbing any heat at all. Some of its parts may, however, be assumed to be perfectly transparent to heat, and others to be absolutely opaque to it ; and we

may make such other extravagant assumptions as may be convenient for the discussion of the problem in hand, the only office of the imaginary engine being to assist the mind in the presentation and discussion of the es¬ sential facts, whatever those may be. These Active engines are usually assumed, further¬ more, to be ˆperfectly reversible,® so that when, by the expenditure of mechanical power, they are forced to run backwards, all of the normal operations of the engine take place precisely as before, but in a contrary sense. If, for ex¬ ample, the engine, at some instant in its for¬ ward motion, absorbed a quantity Q of heat from an outside body whose temperature was T, then when the engine reaches the corre¬ sponding state in its reversed motion, it must give out this same quantity, Q, of heat, and muˆ give it out again to the same body from which it originally abstracted it, and at the same temperature, T. An engine which ful¬ fils all of these various conditions is called a ˆperfectly reversible engine®; or, more briefly, an aideal engine.®

Carnot's Theorem. — In 1824 Carnot gave a remarkable theorem (consult his Reflections on the Motive Power of Heat,* Thurston's translation), which may be stated in the fol¬ lowing language: Of all the possible kinds of heat engine, which run by converting heat-energy into mechanical energy, and which take in their heat all at one given temperature and give out all that they do give out (if any) at another given temperature, there is none that is more efficient than the ideal, reversible engine; ((efficiency® being defined as the fraction of the absorbed heat-energy that is converted into mechanical work. This theorem is of exceeding VOL. 26 — 34

importance, as it holds true not only for the untold thousands of kinds of ideal engines that we might be able to think of at the present time, but also for any others that may depend upon principles of nature as yet undiscovered; always supposing that the two fundamental laws of thermodynamics, as stated above, are true. In Carnot's time, heat was believed to be a substance ; and Carnot's proof of his theorem is based upon this view. After the newer con¬ ception of heat had been attained, however, Clausius proved that Carnot's theorem is cap¬ able of equally sound demonstration in accord¬ ance with the two thermodynamical laws now admitted. The proof is as follows: Let us assume that the theorem is false, and that there is some other engine, which we will designate a.s which is more efficient than some par¬ ticular ideal reversible engine, A, which runs between the same two temperature limits. Let 7\ be the temperature at which both engines take in their heat, and let Ti be the temperature at which each rejects such heat (if any) as it does not transform into work. Let Hi and Hi, respectively, be the quantities of heat taken in and rejected, during a

given time, by the reversible engine, A, and let H\ and H'i be the quantities taken in and rejected, respectively, by the other engine B. The quantities of heat that are transformed into work by A and B, respectively, are then (Hi — Hi) and (H\ — H'i) ; and the efficiencies are respectively (Hi— Hi) /Hi and (H'i—H'i)/Hr i. The condition that we are assuming, in violation of the theorem, is that the efficiency of the engine B is greater than that of A; that is, (H\ — H'i) /H > (Hi — Hi) /Hi ; or, what is the same thing, Hi(H\ — H'i) > H'i (Hi — Hi). Now suppose that the two. engines are coupled together so that the engine B runs forward and drives the re¬ versible engine, A, backward. Then A, owing to its reversibility, for every (Hi — Hi) units of mechanical work that it absorbs, takes in Hi units of heat at the temperature Ti, and re¬ jects Hi units of heat at the higher tempera¬ ture, Ti; while the other engine, B, for every (//'i — H'i) units of mechanical work that it performs, takes in H\ units of heat at the higher temperature Ti, and rejects H'i at the lower temperature Ti. Now in the case supposed, where one of the engines, drives the other one backward, the mechanical energy devoleped by the engine B is entirely absorbed by the reversed engine, A. Hence we have (H'i — H'i) = (Hi — Hi) ; and this equation, taken in connection with the fore¬ going inequality, gives Hi^H'i. That is,- the heat delivered by the doubled engine to the source whose temperature is Ti, is greater than the heat that is being withdrawn from that source.; so that if we regard the doubled engine as a single machine, we have a case in which heat is passing, by its own natural tendency and without external compulsion, from a tempera¬ ture Ti to a higher temperature, 7Y But this is contrary to the second law of thermo¬ dynamics; and hence if that law is sound, it must be that no such engine as B exists. In other words, there is no engine which takes its heat all at a temperature Th and rejects what it does reject at a lower temperature T? which has a higher efficiency than the ideal re¬ versible engine running between these same

temperature limits. It will be observed that in case both of the engines are reversible, the foregoing proof can easily be made to show that neither one is more efficient than the other one. It follows, therefore, that all ideal re¬ versible engines which take in no heat except at 7\, and reject none except at 7k, have the same identical efficiency; and this efficiency can, therefore, depend upon nothing but the two temperatures 7k and 7k. In the language of mathematics, the efficiency of an ideal reversible engine which runs as here described is

a func¬ tion® of the temperatures at which heat is absorbed and rejected, and of nothing else. In the foregoing demonstration it was as¬ sumed that all of the heat taken in by the engine B is either transformed into mechanical energy or rejected at the temperature T2. If the engine B is of such a kind that this con¬ dition is not fulfilled, by reason of the engine losing some of its heat at temperatures inter¬ mediate to 7k and T2 (or by reason of any other imperf action in design or construction), then the theorem is still true ; for the assump¬ tion that we have made above is the one that is least favorable to the demonstration.

Absolute Temperature. — Let us consider an ideal, reversible engine, which in each unit of time takes in Hi units of heat at the tem¬ perature Ti, and rejects H2 units of heat at the temperature T2. Then the efficiency of the en¬ gine is (Hi — Hi) /Hi; and this (as we have seen) must be equal to some function of Ti and Ti. It will be more convenient, however, to write the efficiency in the form 1 — (Hi/Hi) ; which is obviously permissible. Since this is a function of the two temperatures, so also is Hi/ H2 ; and we may write Hi/H2 — f(Ti, Ti). Now Hi, being the heat rejected by the given engine at the temperature Ti, may be used again in a second ideal reversible engine, which we may assume to take its heat at T2, and to reject what it does reject (if any) at some still lower temperature, Ti. The second en¬ gine, considered separately, would give a second equation entirely analogous to the one already written ; and we should have Hi/Hi — f (Ti, Ti). But we might consider the two engines, coupled together, to con¬ stitute a single ideal reversible engine, taking in a quantity Hi of heat at Ti, and rejecting a quantity Ha at the temperature T3. From this point of view we could write H1/H1 — f (Ti, Ti). But if we multiply Hi/Hi by Hi/Hi, we obtain Hi/Ha] and hence we see that the function f must be of such a nature that we have the identical relation

/ (Ti, Ti). f (Ti, 7k) = / (7k, 7k),

whatever the values of Tt, T2 and Ta. Exam¬ ination of this equation will show that the dis¬ appearance of Ti by the multiplication of the two terms in the first member involves that the function f shall be of the form

f (Ti, T2) = F(Ti)/F(T2).

Hence we have the general relation

Hi/Hi = F(Ti)/F(Ti)-,

Hi and Hi being, respectively, the quantities of heat absorbed and emitted by any ideal re¬ versible engine, at the temperatures 7k and 7k; the engine being supposed to absorb no heat except at 7k, and to reject none except at 7k. The algebraic form of the function F(T) will

depend, evidently, upon the kind of thermome¬ ter that is used in defining the temperature T ; but whatever the form of the function may be, its numerical value will always be the same for any fixed temperature, no matter what the na¬ ture of the thermometric scale may be, from which it is obtained. This follows from the fact that the last equation above must always hold true, and Hi and Hi are not dependent in any way upon any thermometric scale. The independence of the numerical value of F (T) of all arbitrary thermometric scales suggested to Lord Kelvin the possibility of computing the numerical values of the function, and basing upon these values a new thermometric scale, which he called the <(absolute scale,® since its readings would be <(absolute,® in the sense of being independent of the properties of any par¬ ticular kind of matter. Preliminary investiga¬ tions of the quantities of heat absorbed and rejected by an ideal reversible engine in which the work is performed by the expansion of air indicated that the numerical values of the func¬ tion F(T) can be expressed in the form F (T)—T~FC--x, when T is the temperature accord¬ ing to the normal, constant-volume air ther¬ mometer (see Thermometry) ; C being a con¬ stant and x a small variable term, whose value, between the freezing and boiling points of water, never exceeds a very small fraction of a degree. For the details of the method by which the numerical values of the function F(T) are evaluated, reference must be made to special works on thermodynamics, and to papers on the subject of absolute temperature. (See Heat). It is sufficient, here, to say that by the applica¬ tion of the two fundamental principles of ther¬ modynamics to the phenomena that occur when a mass of gas changes its state by an infinitesi¬ mal amount, it is possible to deduce a differen¬ tial equation which, when integrated for the conditions that prevail in a constant-volume thermometer filled with the kind of gas under consideration, will give a finite relation between the scale of the gas thermometer and the <(abso- lute scale.® One of the most important terms in this differential equation relates to the change of internal energy experienced by a gas when the volume of the gas changes while the tem¬ perature remains constant. In order to evaluate this term, special experiments are necessary, in which the gas is caused to change its volume, while the temperature is constant. Joule and Kelvin were the first to devise an experiment capable of yielding accurate results of this char¬ acter, and the work that they

did along these lines more than half a century ago has never yet been adequately verified, although it con¬ stitutes the only secure basis of all that we know, to-day, about the numerical corrections that must be applied to the readings of a gas thermometer, in order to reduce those readings to the absolute scale. In their experiments, the gas was caused to expand through a porous plug, and the quantity of energy that must be added to it in order to prevent any change of temperature by this <(free expansion® was de¬ termined by calculation. It is impossible to enter, in this place, upon the details of their work; but the writer of the present article has made a careful examination of the data given by Joule and Kelvin, and he finds that when the temperature is measured by the normal constant- volume hydrogen or nitrogen thermometer, in

which the pressure at the freezing point of water is that due to one metre of mercury, and which is graduated according to the Centigrade scale so as to read 0° at the freezing point of water and 100° at the boiling point, (1) there must be a constant term of 273.10° added to the reading of the thermometer in order to obtain the reading of the instrument on the absolute scale, and also (2) a small variable term, whose values are given in the second and third columns of the accompanying table.

TEMPERATURE BY GAS THERMOMETER

Variable part of the correction to reduce to the absolute scale

Nitrogen

thermometer

Hydrogen

thermometer

0° C .

0.000°

0.000°

10° .

— 0.003

- 0.006

20u .

— 0 006

-(- 0 006

30° .

— 0 007

-f 0 007

40° .

— 0 008

- 0 004

50° .

— 0 008

0 000

60° .

— 0.007

— 0.003

70° .

— 0 006

— 0.006

80° .

— 0 004

— 0 007

90° .

— 0.002

— 0.005

L00° .

0.000

0.000

The corrections here given are different from those usually quoted, but it is believed that they are more accurate. In the case of the hydrogen thermometer, it will be observed that from 0° C. to 50° C. the corrections are positive, while from 50° C. to 100° C. they are negative. However improbable this change of sign may appear, it is certain that the differences between the readings of the hydrogen and nitrogen ther¬ mometers, as deduced from the corrections here given, correspond very faithfully with the actual differences as observed at the Interna¬ tional Bureau of Weights and Measures at Paris. Owing to the smallness of the variable part of the correction, it is usualy, in writings upon engineering topics and upon thermodynamics generally, to take note only of the large con¬ stant term that is to be added, and to treat absolute temperature as though it were identical with the temperature as read from a constant- volume gas thermometer, save for the addition of the constant, 273.10° C. In other words, if t is the absolute temperature corresponding to a given reading T on the scale of a gas ther¬ mometer, it is customary to assume that t = T--273.\Q° , if the thermometer is graduated on the Centigrade plan, or C = T + 459.58°, if the graduation is according to Fahrenheit.

Students of thermodynamics are often greatly confused by the introduction of the idea of “entropy® ; and while this subject re¬ quires the higher mathematics for its adequate discussion, a few words may be given to it here. When a body whose state at any given instant is completely defined by two independ¬ ent variables, undergoes any infinitesimal but reversible change on account of corresponding infinitesimal changes in the two defining vari¬ ables, it will, in general, absorb or reject a certain infinitesimal amount of heat, and it is easy to form a differential equation of the first order and degree, which will express the quan¬ tity of heat that is absorbed ; the expression being taken negative, if there is rejection of heat instead of absorption. We know, from

the theory of -differential equations, that the equation so formed can always be multiplied by some factor (the “integrating factor®) which

shall cause it to become an exact differential of some function of the variables whose differ¬ entials it contains ; but, so far as pure mathe¬ matics is concerned, it is impossible to say, in advance, what that integrating factor will be, or what the nature of the function may prove to be, of which the modified expression is the exact differential. By the aid of the second law of thermodynamics, however, it may be shown that the reciprocal of the absolute tem¬ perature at which the infinitesimal transforma¬ tion takes place is always an integrating factor of the differential equation in question. In other words, having written the differential ex¬ pression for the quantity of heat absorbed by the body, we know that we only have to divide it by the absolute temperature of the body, in order to cause it to become the exact differential of some function of the variables. The function whose existence is thus indicated is called the “entropy® of the body, and in the study of ther¬ modynamics this function is a very convenient thing, because its introduction simplifies the treatment of many problems. The main diffi¬ culty thaf students experience in connection with it is the difficulty of assigning to “entropy® any precise physical significance. It is probably better not to try to give any physical interpreta¬ tion of this sort; for it is sufficient for many purposes merely to recognize the existence of the function, the very fact of its existence sug¬ gesting certain mathematical transformations which are exceedingly useful. The suggestion has sometimes been made, that it may prove to be possible to devise an instrument which shall enable us to measure the value of the entropy of a body directly, just as a thermometer meas¬ ures the value of a temperature. If this could be done, the imagination of the student of thermodynamics would doubtless be greatly assisted; but it does not appear that the hope of discovering an instrument of this sort is at all well founded.

In studying the thermodynamic behavior of a body, the state of the body is defined by giv¬ ing as many of its measurable attributes as may be necessary in order to fix the condition of the body absolutely. These measurable at¬ tributes are represented by letters, and are taken as independent variables. Then, by treating these independent variables by known mathematical methods, we can deduce certain conclusions with regard to the behavior of the body itself. Theoretically, there is no reason why the num¬ ber of independent variables may not be as great as we please ; but in all of the more im¬ portant applications of thermodynamics it is found to be sufficient to take two independent variables. In the case of a gas, for example, it is usually sufficient to take two such vari¬ ables, provided the gas is in a quiescent con¬ dition and homogeneous throughout. When the possibility of internal motions is admitted or the gas differs in

composition or in other re¬ spects in its different parts, it is necessary to take more than two variables ; but these cases will not be considered in the present article. (Gibbs, in his classical papers on the (Equilib¬ rium of Heterogeneous Substances,* published in the transactions of the Connecticut Acad¬ emy of Sciences > just previous to 1880, dis-

cussed many of the problems that arise when the composition of the substance under con¬ sideration departs from uniformity and homo¬ geneity in any respect). Some latitude is per¬ missible as to the variables that are selected for representing the state of the gas, but for the present we shall consider the state as being thoroughly defined when we know the pressure, P , that it exerts upon each unit of area of the wall of its containing vessel and also the vol¬ ume, V , occupied by each unit of its mass. Other attributes of the gas may indeed vary, as well as P and V ; but if P and V are really suffi¬ cient to define the state of the gas completely, then these other attributes that are capable of variation at the same time must all be ex¬ pressible as functions of the two variables P and V. The temperature of the gas is one of the most notable physical attributes which is capable of variation; and it follows that there must be a relation connecting the temperature, T, with the variables P and V. This equation, which is called the Characteristic equation® or sometimes the Clastic equation,® may be writ¬ ten, tentatively, in the general form T — F(P} V). While we know that an equation of this nature must exist, we do not know the exact form of the function F for any actual substance. For gases, however, we know its approximate form, throughout certain ranges of the variables P and V. Robert Boyle showed that so long as the temperature of the gas is kept constant and the gas is not too highly compressed nor too near to its point of lique¬ faction, the volume varies very nearly as the reciprocal of the pressure, and Charles discov¬ ered (to express it in modern language) that so long as the pressure upon the gas remains constant, the volume is nearly proportional to the absolute temperature. Taking these two laws into account, it is evident that the form of the function F must be such that, for such values of the variables P and V as prevail un¬ der the conditions in which the laws of Boyle and Charles are nearly true, we must have

RT

T — kPV , or P — - ;

V

T being the absolute temperature and k and R being constants whose values are to be deter¬ mined by experiment. For many practical pur¬ poses, this relation between P , V and T is suffi¬ ciently exact. When the gas is highly com¬ pressed, however, or when it is near to the point of liquefaction, the foregoing equation is found to depart very materially from the facts as experimentally observed. Many attempts have been made to find a more gen¬ eral law connecting the temperature, pressure and volume, and such equations have been given by Rankine, Van der Waals, Clausius, Sarrau and other writers. As the equation of Van der Waals has been of special service and has figured to a great extent in the thermodynami¬ cal literature of recent times, it may be cited as an example of the attempts that have been made to find a superior form of elastic equation. The equation in question has the form

RT a

where R, T, V and P have the same signifi¬ cance as before, and a and b are very small con¬

stants. If a and b are both zero, this equation reduces to the form previously given, and the same is true if V is very large indeed (that is, if the gas is very rare), since in that case the effects of the small constants a and b are neg¬ ligible. If we assign to T any constant value that we please, we may, from Van der Waals' equation, trace all the possible relations that P and V can have, at this one temperature. That is, when a, b and R are known, and we have assigned a fixed arbitrary value to T, we may then select any number of values of V, and compute the value of P that corresponds to each one of them. If we plot the values _so

VOLUME. (Vj _

Fig. 1. — Isothermals of Van der Waals' Equation.

computed, by laying off horizontal distances to represent the values of V , and vertical distances to represent the corresponding values of P , we shall obtain a series of points representing the various states that the gas is capable of as¬ suming, while T keeps its fixed value, and if we make the calculated points numerous enough, we may draw through them a curved line, which may be taken to represent the continuous series of states through which the gas passes, as the

pressure is continuously varied, while the temperature remains constant. Such lines are called ((isothermals,® on account of the con¬ stancy of the temperature along them. Sev¬ eral such lines, as computed for as many dif¬ ferent values of T from Van der Waals' equa¬ tion, are shown in Fig. 1. If the temperature is high (as at TT), the isothermal line may be indistinguishable in form from the correspond¬ ing line as computed from the elastic equation of Boyle and Charles. If, on the other hand, the temperature is sufficiently low, as is indi¬ cated at T\, the isothermal line will have a very different shape. To trace the significance of this shape, let us begin at the right-hand end of the isothermal T1} and see what happens when the pressure upon the gas is continuously increased. As the pressure grows greater, the volume of the gas diminishes ; but there is no notable change of any other sort until a cer¬ tain point A is reached. When this point is attained, any attempt to further increase the pressure merely results in the condensation of a part of the gas ; the pressure remaining con¬ stant (as indicated by the horizontal line ADB) until, at B, the gas is entirely condensed into the liquid form. Further application of pressure

then causes but a slight reduction of volume ; a fact which is indicated by the steepness of the isothermal line above B. We have here described what actually happens when the gas is compressed along the isothermal Ti ; but it must be noted that the plot of this isothermal from Van der Waals' equation does not give a straight part, ADB, but a reversed curve between A and B, as indicated by the dotted line. If we could actually make the gas follow this dotted line, we could cause it to pass from the gaseous condition into the liquid condition, without any discontinuity in state; that is, in such a manner that it would never be partly liquid and partly gaseous, and so that we should not be able to see when the conversion from one state to the other took place. It can be shown, however, that the states of the gas which correspond to the dotted part of the isothermal are essentially unstable, so that the attempt to make the gas follow the dotted portion of the theoretical isothermal is like trying to balance a pyramid upon its point. The line ADB which the gas actually follows in preference to the double loop, is in such a position that the areas of the two shaded loops are equal, as was first shown by Maxwell. A portion of the dotted loops in the immediate vicinity of A and B can be actually realized in the laboratory, by careful experiment; but

often convenient, however, to assume the ex¬ istence of a gas of this sort, for the purpose of illustrating general principles, or of obtaining approximate solutions of thermodynamical problems; and the ideal (but non-existent) gas which fulfils the relation of Boyle and Charles absolutely and under all circumstances is com¬ monly called a ((perfect gas,® though ((ideal gas® would appear to be a preferable name. In ap¬ plying the conception of a perfect gas, it is customary to assume the further condition that when a gas of this sort changes its volume at constant temperature, the heat that it absorbs is exactly equivalent to the external work that the gas does, in expanding _ against the external pressure that the containing vessel exerts upon it. In other words, it is customary to assume that the perfect gas, in addition to obeying the laws of Boyle and Charles perfectly, is also so constituted that its internal energy depends upon nothing but the temperature of the gas. The characteristic equations of Van der Waals and others are decided improvements upon the equation of Boyle and Charles, and they repre¬ sent, very well, the nature of the phenomena that occur in a gas in the vicinity of the critical point. None of them takes any account, how¬ ever, of the fact that a body is capable of ex¬ isting in the solid state, as well as in the liquid and gaseous states; and the first characteristic

Fig. 2.

the instability speedily becomes too marked to permit of the experiments being carried far. At temperatures intermediate between 7\ and Ti the isothermals have a character intermedi¬ ate between those shown for those tem¬ peratures. As we proceed upward from Ti, the loops on the isothermals grow less and less pronounced, as is indicated by the partial, dotted isothermal, and we presently arrive at one particular isothermal, T2, where the loops just cease to exist. At any temperature higher than Ti it is, therefore, impossible to liquefy the gas by the application of any pressure what¬ ever, no matter how great. Hence the tempera¬ ture Ti is the ˆcritical temperature® of the gas. (See Critical Point). There is one point on this critical isothermal (marked C(C. P.®), at which the isothermal is precisely horizontal and where it also has a point of inflection; and this point corresponds to the critical point of the gas; its temperature being the critical tempera¬ ture, its volume the critical volume and its pressure the critical pressure.

Although gases obey the characteristic equa¬ tion of Boyle and Charles very closely when they are not too highly compressed and not too near to condensation, there is no gas which obeys it rigorously under all conditions. It is

equation complete enough to take the solid state into account also, has yet to be proposed.

When a body passes from one condition of pressure and density to another, it either ab¬ sorbs or emits heat, unless certain special condi¬ tions are fulfilled. To avoid circumlocution, we may speak of it as always <(absorbing® heat ; the emission of heat being considered to be merely a case of negative absorption. Suppose, for example, that a body is in the state corre¬ sponding to A, in Fig. 2 ; and for definiteness let us suppose that the body under consideration is a gas, although the reasoning will apply equally well to a liquid or to a homogeneous, isotropic solid. The height of A above the horizontal reference line then represents, on some con¬ venient scale, the pressure to which each unit of the bounding surface of the gas is exposed; and the distance of A from the vertical refer¬ ence line at the left corresponds, upon some other convenient scale, to the volume occupied by a unit mass of the gas. Now if the gas be caused to pass from the condition represented by A to that which is represented by B, by pass¬ ing through all the intermediate conditions that are represented by the points that are intermedi¬ ate to A and B on the line ACB, the gas is said to pass from the state A to the state B along

the “path® ACB. In general a change of this sort will be accompanied by an absorption of heat; the heat which is absorbed being partly expended in increasing the internal energy of the gas, and partly in the performance of ex¬ ternal work. It is a consequence of the first law of thermodynamics that the change in the in¬ ternal energy of the gas is entirely independent of the shape of the path ACB, and depends only upon the positions of the points A and B. That portion of the absorbed heat which goes to increase the internal energy of the gas, there¬ fore, depends upon nothing but the positions of A and B. The case is different, however, with that portion of the absorbed heat which is con¬ sumed in the performance of external work. Consider, for example, the state of the gas at the point C. The pressure upon the gas, per unit of area of the containing vessel, is repre¬ sented by the vertical line CE; and when the volume of the gas increases by the slight amount EF, the external work that the gas does is represented by the product of the pressure and the increase in volume ; that is, it is repre¬ sented by the area of the little rectangle CDFE. We may regard the area ACBNM as made up of an infinite number of infinitesimal rectangles, each of which is typified by the little rectangle that is

shown ; and hence it follows that the total quantity of external work done by the gas as it passes from the condition A to the condi¬ tion B, along the path ACB, is represented by the area included between the curve ACB and the straight lines AM, MN and NB. Obviously this area depends upon the form of the path ACB ; and hence the external work that is done by the gas also depends upon the form of that path, and so also does that part of the heat absorbed along ACB, which is consumed in per¬ forming this work.

When a gas (or other body) describes a closed path, such as is shown in Fig. 3, and returns finally to its original state, then the internal energy of the gas also returns to its original value ; and the total quantity of heat that is absorbed by the gas during its passage around the closed path is therefore represented entirely by the external work that the gas does. That is, it is represented by the area of the closed path, as shown shaded in Fig. 3. A closed path of this sort is called a “cycle,® and the consideration of cycles of various kinds is very important in many branches of thermo¬ dynamical reasoning. If AB and DC, in Fig. 3, represent isothermal lines, and AD and BC represent adiabatic lines (that is, lines along which there is no absorption or rejection of heat by the gas), then the cycle ABCDA is called a <(Carnot cycle,® because it is the kind of a cycle that Carnot imagined his ideal, reversible engine to describe. (See Carnot’s principle, enunciated in the earlier part of this article).

When a gas is heated from a temperature Ti to another temperature Ti , the quantity of heat absorbed in the process will depend upon the precise way in which the passage from one of these temperatures to the other is effected. Thus let A, in Fig. 4, represent the initial state of the gas, and let the curved lines, Ti and Ti, represent the isothermals corresponding to the temperatures Ti and Ti. If we cause the gas to pass from the isothermal Ti to the isothermal Ti along the horizontal line AC, we are heating the gas while its pressure remains constant;

and if we cause it to pass from Ti to Ti along the vertical line AB, we are heating it while its volume remains constant. If the difference in temperature between Ti and Ti is one degree, and the mass of the gas is (as we have already assumed) unity, then the quantity of heat ab¬ sorbed along AB is the ((specific heat at con¬ stant volume,® and the quantity absorbed along AC is the (<specific heat at constant pressure.® That these two specific heats are really different will be evident from the fact (1) that the in¬ ternal energy of the gas in the states B and C are not necessarily the same, unless the gas is a “perfect gas® ; and also from the fact (2) that the heat that is absorbed along the path AC has to be partially expended in doing the external work

represented by the shaded area; while along the path AB there is no external work done.

The fact that in an ideal reversible heat en¬ gine the efficiency does not depend at all upon the nature of the substance whose expansion does the work, is sometimes hard for the be¬ ginner in thermodynamical reasoning to under¬ stand, for the reason that objections occur to him which appear to controvert the principle, and to be themselves unanswerable. There is an answer, however, to every objection that can be urged. One of the commonest of the diffi¬ culties is this : In a steam engine, water is pumped into the boiler, and is then evaporated by the expenditure of a large amount of heat. The steam is next passed to the cylinder of the engine and expanded, after which it is turned into the condenser and re-converted into water. The quantity of heat which is expended upon the water in merely converting it into steam (and which is known as the “latent heat of vaporization®) appears to be wasted in large measure, because the greater part of it is not converted into mechanical energy by the engine, but is merely rejected into the condenser. En¬ gines have been designed and built, in which the water that is commonly used is replaced by some other liquid (such as ether or carbon disulphide) which has a much smaller latent heat of vaporization, in the belief that this ap¬ parently large source of loss could be avoided ; but such engines have invariably proved disap¬ pointing, any trifling superiority that they may have shown from time to time being attributable to other causes than the smaller latent heat of vaporization of the working fluid. The reason for this is, that there is an intimate relation between the pressure of a saturated vapor at a given temperature, and the latent heat of vapor¬ ization of the liquid. This relation is sometimes known as the “second thermodynamic relation,® and sometimes as “Clapeyron’s equation.® The elucidation of this matter requires a knowledge of the infinitesimal calculus, and reference must be made for it to the standard works on thermodynamics. Much of the practical experi¬ mental work that has been done upon the hot-air engine has probably been inspired by igno¬ rance of the existence, or at least of the sig¬ nificance, of this “second thermodynamic rela¬ tion.® See Heat; Specific Heat; Thermome¬ ter; Thermometry; Gases, Kinetic Theory of; and other similar articles in this encyclo¬ pedia.

Bibliography. — Bryan, (Thermodynamics) ; Clausius, (Mechanical Theory of Heat5 (Browne’s translation) ; Findlay, (The Phase

Rule ; Mach, (Principien der Warmelehre) ; Magie, (lhe Second Principle of Thermody- namics> ; Maxwell, (Theory of Heat) ; Poincare (Thermodynamique) ; Preston, <Theory of Heat) ; Tyndall, (Heat as a Mode of Motion.)

Allan D. Risteen,

Director Technical Research, The Travelers

Insurance Company, Hartford, Conn.

. THERMO-ELECTRICITY. If an elec¬ trical circuit is constructed partly of one metal and partly of another, and one of the points of junction between the dissimilar metals is heated while the other is kept cool, a current of elec¬ tricity will be caused to flow in the circuit. This fundamental fact was discovered by See- beck in 1821. The electricity thus generated is not in any wise different from that which is generated by an ordinary galvanic battery; but on account of its mode of production it is called ˆthermo-electricity.® The electromotive force that is set up in a circuit under the cir¬ cumstances here described is always quite small, and its intensity depends (1) upon the nature of the metals of which the circuit is composed, (2) upon the difference in temperature between the two junctions where the dissimilar metals come together and (3) upon the average tem¬ perature of these junctions. For the sake of definiteness, let the two metals of which the circuit is composed be designated by the letters X and Y. The phenomena of thermo-electricky may then be described in the following mathe¬ matical language: It is known from experiment that when the two metals X and Y are brought together so that their point of contact has the temperature T, an electromotive force exists be¬ tween the two, which tends to send a current (say) from X into Y ; and it is also known that the magnitude of this electromotive force can be expressed as a parabolic function of the temperature, T. Thus if E is the electromotive force in question, the facts of experiment can be adequately expressed by a relation of the form E — a + bT + cT1 \ where a, b and c are constants whose values depend upon the natures of the metals X and Y. In the actual circuit there are necessarity two junctions across which electromotive forces of this character exist. Let the temperatures of these junctions be respectively Ti and 7\ Then the foregoing formula shows that across the junction whose temperature is Ti there is an electromotive force of intensity, Ei — aJr bT i + cT\ tending to send a current from X into Y ; and across the junction whose temperature is Ti there is a

similar electromotive force of intensity

Ei~ a -- bTi + cT\

also tending to send a current from X into Y. These electromotive forces being opposed to each other, so far as the production of a current around the circuit is concerned, the effective electromotive force around the circuit is the difference between Ei and £2; and if we denote this effective electromotive force by the letter F, we have

F = Et — Ei = b (T2—T1) + c(Tt—Tl),

or

7 = (T2—T1) [b + c(T* + Ti)].

From this last equation it is evident that so long as the average temperature of the two junctions is constant (or, in other words, so long as Ti--T\ is constant), the electromotive

force will be proportional to the difference in temperature between the two junctions. But it is also evident that when the average tem¬ perature of the two junctions is such that the relation

b + c(Ti + TT) = 0

is fulfilled (or, in other words, when the aver¬ age temperature of the two junctions is numer¬ ically equal to — b/2c), there will be no ther¬ mo-electromotive force in the circuit (and, therefore, no current), no matter what the difference in temperature between the two junctions may be. This average temperature, for which there is no thermo-electric effect in a circuit, has a definite value for every pair of metals, and is known as the <(neutral tem¬ perature® for that pair. The values of the constants b and c, in the foregoing formulae, could be determined experimentally, and recorded in tabular form for various pairs of metals. It is usual, however, to record the experimental data in a somewhat different man¬ ner, as we proceed to explain. If the average of the two temperatures 7i and T2 be denoted by To, then the formula for the effective elec¬ tromotive force, F, may be written

7 = (Ti — Ti) (b + 2cTo).

The constants b and c r.efer, it will be un¬ derstood, to a particular pair of metals; but it is found that their values can be satisfactorily represented as the differences between constants which can be stated

for the two metals sep¬ arately. Thus b can be expressed in the form b — B' — B" and 2c can be expressed in the form 2c — C — C" ; B' and C' being constants whose values depend solely upon the metal X, and B" and C" being constants whose values depend, in a similar manner, solely upon the metal Y. The expression for the effective electromotive force F can, there¬ fore, be written thus :

7 = (72— 7i) [(B'—B") + (C— C") To].

The values of the constants B and C for the different metals vary somewhat with the phys¬ ical conditions of the metals ; but the data given in the accompanying table will show the general nature of these constants, and will also suffice to represent, with some degree of ap¬ proximation, the actual magnitude of the ther¬ mo-electric effects that may be expected from circuits composed of the metals there repre¬ sented. In applying this table, temperatures are supposed to be expressed on the ordinary Centigrade scale, which defines the freezing point of water to be 0°, and the boiling point to be 100° ; and the results are expressed in hundred-millionths of a volt, so that to re¬ duce them to volts it is necessary to divide them by 100,000,000.

To illustrate the use of this table, let us compute the electromotive force of a circuit composed of iron and copper, when one of the junctions is kept at 0° C., and the other at 100° C. For iron we have B — + 1734 and C = — 4.87; and for copper we have B — -- 136 and C— + 0.95. Hence we see that for this pair of metals fr = +1734 — 136 = + 1598, and 2c — — 4.87 — 0.95 = — 5.82. The thermo-elec¬ tromotive force in the circuit is therefore,

F = (Ti — Tx) (1593-5.8270).

But we have assumed that T2 = 100° and Ti =

0° ; hence Ti — Ti — 100, and To—S0°, and we have F— 100(1598 — 5.82 X 50) = 130,700. Di¬ viding this by 100,000,000 to reduce it to volts, the final conclusion is, that a thermo-electric couple of the kind described will give an elec¬ tromotive force of about 0.00131 of a volt (in round numbers). To find the <(neutral point® of an iron-copper couple, we merely have to set the expression 1598 — 5.8275, equal to zero, and solve the equation for To. Proceeding in this manner, we find that the desired neutral tem¬ perature is 274° C.

Thermo-electric Constants of Metals.

METAL

B

C

Iron .

-1- 1734 + 1139

— 61

- 260 + 244

— 1207

— 4 87

Steel .

— 3.28

Soft platinum .

— 1.10

Hard platinum .

— 0.75

— 0.95

— 5.12

- 2.40 + 1.50 + 1.02 + 0.95

0.00 + 0.55 + 0.39

Magnesium .

German silver . .

Zinc .

- 234

- 214

-I- 283

- 136

0

— 43

— 77

Silver .

Gold .

Copper .

Lead .

Tin .

Aluminum .

Nickel is not included in the foregoing table, . because its behavior is anomalous. From — 18° C. to 175° C. its constants are B = — 2204 and C — — 5.12; but a short distance above 175° C. their values change profoundly, so that between 250° C. and 310° C. we have B — — 8449 and C— +24.1. Above 340° C. we have, for this metal, the values B — — 307 and C — — 5.12. Antimony and bismuth are commonly used as the two metals in experimental thermo-electric circuits, since they yield an electromotive force which is larger than is obtainable under similar conditions by other metallic pairs. The thermo¬ electric constants of antimony and bismuth do not appear to have been determined with pre¬ cision, however. When the average tempera¬ ture of the two junctions (To) is about 20° C., the values of B + CT0 are approximately as follows : Bismuth, pressed commercial wire, — 9700; bismuth, pure pressed wire, — 8900; bismuth crystal, axially, — 6500; bismuth crys¬ tal, equatorially, — 4500. Antimony, pressed commercial wire, + 600; antimony, pure pressed wire, + 280 ; antimony crystal, axially, + 2260 ; antimony crystal, equatorially, + 2640.

When a thermo-electric couple is generating an electrical current, heat is absorbed at the hot junction, and given out at the cold one. If an electric current is caused to flow across the junction of any two

dissimilar metals, heat is either evolved or absorbed at the junction; and if an evolution of heat is observed when the current flows across from the metal X to the metal Y, there will be an absorption of heat when the current is made to flow from V to X. This phenomenon, which was discovered by Peltier, is known as the ((Peltier effect.® Lord Kelvin showed that in a thermo-electric circuit the reversible heat effects are not confined to the junctions themselves. He showed, in fact, that when an electrical current is caused to flow through a wire that is locally heated by a gas flame or otherwise, the current tends to

cause a displacement, along the length of the wire, of the point of maximum temperature. The effect may be illustrated by thinking of the wire as a tube conveying a stream of some real fluid; the fluid taking up more or less of the heat, and carrying it along in such a way as to shift the point at which the temperature is greatest. The analogy is imperfect, how¬ ever, because in the case of electricity the heat travels with the current in some metals, and against it in others. This phenomenon (which is known as the <(Thomson effect®) has an im¬ portant bearing upon the theory of thermo¬ electricity, because in a thermo-electrical cir¬ cuit the temperature is necessarily variable from point to point, and, therefore, the ˆThomson effect® may (and in fact does) modify the phenomena considerably. The effect is zero in lead, but in nearly every conductor it is quite sensible. The consequences of the ((Thomson effect® are discussed in two papers in the first volume of Lord Kelvin's Mathe¬ matical and Physical Papers. y

When a circuit contains several thermo¬ electric couples, with their successive junctions alternately heated and cooled, the total electro¬ motive force that is produced is sensibly equal to the sum of all the electromotive forces that the several couples would produce, if each ex¬ isted separately. Advantage is taken of this fact in the instrument known as the <(thermo- pile,® which consists of a series of small bars of antimony and bismuth (often about 25 pairs altogether), disposed side by side so as to form an approximate cube and insulated from one another by strips of paper or other non¬ conductor. These bars are soldered together at the ends so that a current, in order to traverse the system, must pass back and forth through alternate bars of bismuth and of antimony; the passage of the current from bismuth into anti¬ mony being always effected (let us say) at the right hand end of the little pile of bars, while the passage from antimony into bismuth is always effected at the left hand end. The two free ends of the thermo-pile being connected by a wire, a current of electricity flows through the circuit so formed, when either of the sur¬ faces containing the soldered junctions is warmed, while the opposite one is

kept cool. This instrument is used to a considerable ex¬ tent for the detection and even for the approxi¬ mate . estimation of radiant heat; the current that it produces and which is measured by a delicate galvanometer in the external part of the circuit being taken as the index of the amount of the radiation. (Consult Tyndall, Contributions to Molecular Physics In the Domain of Radiant Heap). The thermo-pile was invented by Nobili, but it was so greatly improved by Melloni that it is commonly cred¬ ited to him.

Many attempts have been made to construct a thermo-electric combination that would yield a current of electricity intense enough to be of commercial utility; but while such attempts have been partially successful, there is no great reason to suppose that thermo-electric genera¬ tors will ever be of much practical value. The difficulties are partly structural and partly the¬ oretical. In order to realize any considerable electromotive force, the number of elements must be large ; and the experience heretofore

has been that a complicated thermo-pile is not particularly durable. Even if this objection can be overcome, there remains the serious one that there are theoretical reasons, based upon thermodynamics (q.v.), for believing that the efficiency of the thermo-pile, as an instru¬ ment for converting heat energy into electri¬ cal energy, can never be high. In a particular case that was investigated by Lord Rayleigh, the maximum possible efficiency was found to be 6 per cent; and it is not likely that an efficiency materially greater than this will ever be actually attained with a thermo-pile that is large enough and durable enough to be of commercial value.

Allan D. Risteen,

Director of Technical Research, The Travelers

Insurance Company, Hartford, Conn.

THERMOGRAPH (Greek, <(heat-writing):>), any form of self-registering thermometer (q.v.) , by which an automatic record of varia¬ tions of temperature is kept. Many different types of thermograph have been made, of which the following may be especially noted: (1) Photographic thermographs, in which the posi¬ tion of the mercury thread in an ordinary ther¬ mometer is photographed upon a moving sen¬ sitive film, either continuously or

at short in¬ tervals of time; the moving sensitive film be¬ ing actuated by clockwork, so that the time at which any given impression was made can be nicely determined. (2) Metallic-strip thermo¬ graphs, in which a recording pen is actuated by a strip of metal composed of two substances of differing expansibility, riveted or soldered together. When a strip of this kind is heated, one of its sides expands more than the other, and the result is that the strip becomes curved by an amount which serves as a measure of the temperature to which the strip has been exposed. The pen which makes the record moves radially on a disc of paper which is caused to revolve at a steady rate by means of clockwork. (3) Electric-contact thermo¬ graphs, in which a fine platinum wire is caused to descend, at intervals, into the open upper end of the capillary tube of a sensitive mercu¬ rial thermometer. When the wire touches the mercury column, it completes an electrical cir¬ cuit, and by this means the position of the mercury thread in the thermometer is recorded. (4) The manometric thermograph, in which the pressure in a closed vessel filled with a gas is taken as the index of the temperature; the pressure being recorded automatically, and the temperature being afterward inferred from the recorded pressure, by means of a theoretical formula, or else by direct comparison of the in¬ strument, at different temperatures, with a standard thermometer. (The pressure of an isolated mass of gas of this kind is known to be sensibly proportional to the absolute tem¬ perature of the gas, so long as the volume is kept constant).

THERMOMETER (Greek ((heat-meas- urer®), an instrument for determining the tem¬ peratures of bodies. The general problem of thermometry is considered, in this encyclopedia, under the heading Thermometry; and the present article will be devoted mainly to the consideration of the common mercury-in-glass form of the instrument, and to certain of its modifications, The mercury-in-glass thermom¬

eter depends for its action upon the fact that mercury expands about seven times as much as glass, for a given rise in temperature; so that when mercury is enclosed in a glass vessel, its apparent expansion is quite considerable. The mercury-in-glass thermometer consists essen¬ tially of four parts, these being (1) the mer¬ cury, (2) the spherical or cylindrical bulb of glass which contains it, (3) the fine tube which is attached to the bulb and which serves to make the expansion of the mercury evident, and (4) the graduated scale which is affixed to the capil¬ lary tube and from which the indications of the instrument are read. In the manufacture of thei mometers which are intended for accurate work, the mercury is carefully purified by fil¬ tration through leather under pressure, and by subsequent distillation, and, in many cases, by chemical treatment also; and immediately before the

mercury is placed in the thermometer it should be boiled so that it may be rendered free from moisture and from air. In the man¬ ufacture of the capillary stems of thermometers, some kind of glass which experience indicates to be adapted to this end is melted and the op¬ erator takes up a ball of it on the end of his blowpipe, blowing it out gradually and adding more glass to the mass from time to time. When the ball of molten glass has thus been brought to a convenient size, a second workman attaches his blowpipe to, it also, and the two, still blowing, walk apart, so that the sphere of glass is drawn out into a very long and fine tube, which, when it has cooled, is cut into lengths and annealed. The calibre of each of these lengths is subsequently measured under the microscope, so that the instrument maker may know how large a bulb must be attached to each piece, in order that the degree-spaces on the finished thermometer may be of approxi¬ mately the desired size. The bulb of the ther¬ mometer is usually made of a different kind of glass from the stem; and the process of mak¬ ing it consists simply in fusing to one end of the open stem a knob of special glass and then blowing it to size through the stem. In ther¬ mometers that are to be used for accurate sci¬ entific work, the bulbs should always be made of one of the three kinds of glass that are re¬ spectively known as ((verre dur,® Jena 16111 and Jena 59m. The first of these is a French glass, which has been demonstrated to be peculiarly adapted for use in thermometer bulbs, by the elaborate experiments made at the International Bureau of Weights and Meas¬ ures, at Paris. The other two are made at Jena, Germany, and have been similarly proved to be adapted for use in accurate thermometers, by the experiments made at the Reichsanstalt, in Berlin. Since 1917 American glasses are manu¬ factured that are well suited to the construction of accurate thermometers ; but the problem to be solved is a difficult one and it will require much study and experiment. The stem and bulb of the thermometer being thus completed, the next step consists in cleaning them thor¬ oughly on the inside. For this purpose they are washed out with hot nitric acid, with distilled water and with ether. They are then thoroughly dried, preferably by repeatedly exhausting them, while hot, with an air pump, and then filling them again with air that has been carefully dried. The next operation consists in filling the thermometer with pure mercury. In order

to do this the bulb is heated until the air that it contains is partially expelled and the open end of the stem is then dipped beneath the

mercury. As the bulb cools, the air remaining within it contracts and mercury rises through the stem until the bulb has become partially filled; this operation being repeated until the bulb is full. The instrument is next heated to a temperature considerably higher than the highest temper¬ ature to which it is to be exposed in use, the mercury that it contains becoming thereby so much expanded that it fills the entire stem and runs over at the top; and while the stem is still filled in this manner it is sealed off at the end by means of a blowpipe. In the higher grades of thermometers, a tiny pear-shaped bulb is left at the top of the stem, partly as a precaution against the destruction of the thermometer in case it is accidentally exposed to too high a temperature in its subsequent service and partly as an aid in the calibration of the stem. When such a pear-shaped bulb is provided, the stem may be sealed off at the end while the in¬ ternal space is exhausted by means of an air pump, instead of while it is filled with mercury ; or the tube may be filled, above the mercury column, with dry nitrogen or some other inert gas. The glass part of the instrument having been completed, it remains to affix the scale to the stem. In high grade thermometers, the scale is engraved upon the stem directly ; but in the cheaper forms it is usually engraved or stamped upon a pitfce of metal or of wood, to which the thermometer is finally secured. Let us consider the high grade instruments first and the cheaper ones afterward. Instruments of the former class are graduated by finding, experimentally, two definite points upon the stem, corresponding to two known tempera¬ tures ; the two known temperatures which are selected for this purpose being the boiling point and freezing point of water. When these two points are found, the space between them is divided into a certain number of equal parts, which are called degrees. In determining the position of the boiling point upon a thermom¬ eter, the instrument is placed in steam that is rising from water that is boiling freely under a barometric pressure equal to that which would be produced by a column of pure, ice-cold mercury, 760 millimeters high, at sea-level in latitude 45°. When the mercury column in the thermometer ceases rising and becomes station¬ ary, the point opposite which it stands is marked upon the stem and is called the ((boiling point." If the barometric pressure under which the ex¬ periment is performed is not identically equal to the value assumed above, allowance must be made for that fact by the aid of the experiments of Regnault (or others) upon the variation of the boiling point of water per millimeter of change of barometric pressure. The boiling point having been marked upon the thermom¬ eter as here indicated, the instrument is then placed in a mixture of water and finely pulver¬ ized ice, as quickly as this can be safely done ; and the point to which the mercury sinks is marked and

called the ((freezing points The distance, on the stem, between the boiling and freezing points, is then marked off, by means of a dividing engine, into as many equal spaces as there are degrees between the freezing and boiling points of water and (save for the affix¬ ing of numbers to the degree-marks) the

thermometer is complete. It may be, of course, that the thermometer is to be divided into half degrees, or into tenths ; but the operation is precisely the same, in this case, as it is when the division is to be made to degrees only.

We could evidently divide the space between the boiling point and the freezing point into as many equal “degrees” as we chose; for there is no reason, in the nature of things, why a “de¬ gree” could not have any one size, just as well as any other size. It is desirable, however, to have some uniform practice in this respect, and hence the manufacturers of thermometers in¬ variably conform to one or the other of three • standard systems. In France, and also for scientific work in nearly every country, it is customary to follow the plan introduced by Professor Celsius of Upsala, which consists in dividing the fundamental interval between the two fixed points into 100 equal parts, the freez¬ ing point being called “zero,® or 0°, and the boiling point 100°. This method of graduation is known as the “Centigrade” (or “hundred- degree”) system. For general purposes in the Lnited States and in England, it is far com¬ moner io graduate thermometers according to the system introduced by Fahrenheit of Dantzig, about 1714. In this system the interval between the freezing and boiling points is divided into 180 equal spaces, or “degrees” ; but the freezing point is here called 32° and the boiling point 212° (32° + 180° =212°). There has been

much discussion as to the reason that Fahren¬ heit had for dividing the fundamental interval into 180 equal parts; but there can be no doubt but that his zero point was intended to repre¬ sent the greatest cold that was known in his day, this being obtained by mixing salt and snow. By adopting this lowest temperature as his zero, he probably sought to avoid the use of negative temperatures; but in these days when temperatures several hundred degrees lower than his zero can be produced, the significance of the 32 is lost, and we now adhere to it sim¬ ply from custom. The third thermometric sys¬ tem that has been used to a considerable extent is that due to Reaumur. In this system the fundamental interval is divided into 80 equal • degrees, and the freezing and boiling points are marked 0° and 80°, respectively. This method of graduation is extensively used in Germany upon thermometers intended for household purposes; but for

most other pur¬ poses in that country it has given way to the Centigrade system.

After a thermometer that is to be used for precise measurement has been made and grad¬ uated, it is subjected to certain experimental in¬ vestigations, for the purpose of ascertaining the errors to which it may be liable. One of the most important of these investigations relates to the “calibration error,” which is due to such irregularities of calibre as the bore of the stem may possess. In order to determine the calibra¬ tion errors, a thread of mercury of suitable length is detached temporarily from the column in the stem, by shaking the instrument. An expert in this kind of work can usually detach a thread of almost any length that he pleases, whether it be long or short. The instrument is then inclined so that the detached thread may be brought into various positions in the stem ; and in certain of these positions its length is

observed with great care. The volume of the thread being constant, it is plain that its length will be greater where the calibre of the tube is small than it will be where the calibre is rela¬ tively large. The details of the operation of determining the calibration errors of a ther¬ mometer are very involved; but the general plan consists in observing the lengths of de¬ tached threads of mercury at different points of the stem and then computing from these ob¬ served lengths, the relative areas of cross-sec¬ tion of the stem-calibre at various points. It is then possible to calculate a table of calibration corrections, by the aid of which it will be easy to correct any given reading of the instrument, so as to find what reading would have been ob¬ tained if the item had been of absolutely uni¬ form calibre throughout.

Prominent among the other sources of er¬ ror, there are four that merit special attention. (1) In the measurement of a temperature, the bulb of the thermometer is supposed to be fully exposed to that temperature; but since the mercury in the stem must be seen in order to be read, it often happens that the stem of an instru¬ ment is necessarily exposed to conditions of temperature that are materially different from those to which the bulb is subjected. Hence there is often a <(stem error® to a thermometer, due to the fact that the mercury thread in the stem is colder (or hotter) than that in the bulb, and, therefore, shorter (or longer) than it really ought to be. The magnitude of this stem error will obviously vary with the conditions

under which the thermometer is used. It is always uncertain in amount and hence it is customary, in well-executed scientific work, to design the apparatus that is to be used (including the thermometer itself), with special reference to the desirability of keeping the stem error as small as possible. (2) When the barometric pressure upon the bulb of the thermometer varies, the bulb yields elastically to these vari¬ ations and often to an extent quite sufficient to influence the reading of the instrument by an amount that cannot be neglected. The error due to this cause can be determined and elimi¬ nated by means of the <(external pressure co¬ efficient,® which is obtained by subjecting the thermometer, at some fixed temperature, to a known change of external pressure and noting the alteration of the reading that this variation of pressure produces. (3) The pressure of the mercury upon the inner surface of the bulb may vary from several causes, one of which is the position of the thermometer itself. If the stem is in a vertical position, the bulb will be sub¬ jected to a pressure due to the height of the column of mercury in the stem ; and when the thermometer is horizontal, this static pressure will be absent. In small thermometers the erroiˆ due to this cause is unimportant; but in instru¬ ments of high precision, in which the stem may be several feet in length, it must receive due consideration. The constant which is used for correcting for this source of error and which is to be determined by experimenting with the thermometer in different positions but at the same constant temperature is called the ((in-ternal pressure coefficient.® (4) It is found that the glass of which a thermometer is composed exhibits certain anomalies in its expansion and contraction, when its temperature is altered. These result in an apparent variation in the po¬

sition of the (<zero point® of the thermometer, which is very troublesome when measurements of the highest precision are to be made. It is on account of this anomalous variation in the position of the zero point that the three kinds of glass mentioned in the earlier part of this article are recommended for the manufacture of the bulb; the variation of the zero having been studied in the case of these species of glass with great care. The phenomena as ob¬ served in the case of ((verre dur® are thus described by Guillaume : ((When a verre dur thermometer is quickly exposed to a tempera¬ ture of 100° C., after having reposed for a con¬ siderable time at the ordinary temperature of the laboratory, its zero point falls with such rapidity that after an exposure of one minute at 100° C. the displacement is practicalˆ com¬ plete. If the thermometer is then placed in ice-water, its zero ascends, for the first few moments, at the rate of about 0.001° C. per minute ; but this rate diminishes rapidly. When a thermometer

is maintained at a constant temperature, its zero point rises little by little and the change can be traced plainly for sev¬ eral years. For thermometers of verre dur, the gradual rise at constant temperature amounts to about 0.001° C. per month when the ther¬ mometer is two years old; and at the end of four or five years the motion is found to have diminished to about 0.0002° C. per annum.® The ideal way of measuring a temperature, with a thermometer made of one of the three glasses mentioned above, is as follows: The thermometer is exposed to the temperature that is to be measured, and its zero point falls to a certain (presumably unknown) position. Af¬ ter the instrument has been read, it is intro¬ duced, as quickly as is consistent with its safety, into a mixture of water and pulverized ice. The mercury sinks at once and soon at¬ tains a stable position, which, on account of the slowness of the change of zero with falling temperature, is taken to be the zero corresponding to the higher temperature to which the instrument has been previously ex¬ posed. In accordance with this plan, the temperature to be measured is found by sub¬ tracting the subsequent reading in ice-water from the reading obtained at the temperature to be determined. The method here outlined, for eliminating the effect of variations in the zero point of a thermometer, is known as the ((method of movable zeros,® and is now adopted at practically all of the centres of ac¬ curate thermometry except Kew, for tempera¬ tures between the freezing and boiling points. It is not yet possible, by any method of pro¬ cedure, to determine temperatures more than a few degrees below the freezing point, or more than a hundred degrees (Centigrade) above the boiling point, by the aid of a mercury-in-glass thermometer, with a precision comparable with that which is attainable within the fundamental interval that lies between 0° C. and 100° C.

It is to be understood that in the foregoing discussion of the errors of the mercurv-in-glass thermometer, we have been treating of the de¬ termination of temperatures to such a degree of precision that the final error is not to exceed (say) 0.005° C. No such elaborate care is re¬ quired, if the only object of the measurement is

to determine the temperature to the nearest degree, or half-degree.

Passing now to the consideration of the ordinary thermometers that are used about the household and by amateur meteorological ob¬ servers, it may be pointed out, first, that in the manufacture of a

thermometer that is to be sold at retail for (say) 50 cents, it is not commer¬ cially possible to engrave a special scale for each instrument. In making cheap thermom¬ eters it is customary to stamp out the scales in large numbers and then to blow the bulb of each instrument to such a size that the scale will be as nearly as practicable adapted to the finished thermometer. This can be done, by an experienced glass-worker, with greater accu¬ racy than might be supposed ; but it is evident that no high degree of precision can be at¬ tained in this way. The scale and the rest of the thermometer being adapted to each other au nearly as 3s commercially practicable, the thermometer is adjusted with respect to the scale by ˆexposing it to some known temperature (say 70° F.) in the vicinity of the tempera¬ tures at which it is most likely to be used and then securing it in such a position that the point on the. stem to which the mercury rises comes opposite the proper mark on the scale. Such a theremometer will give readings that are not greatly in error at temperatures near the one at which it is standardized ; but at other temperatures any two such thermometers will necessarily diverge by an amount which de¬ pends upon the judgment and skill of the work¬ men, who blew the bulbs and who endeavored to give them capacities adapted to the sizes of the degrees upon their respective graduated scales.

For further information concerning the methods that are used in precise thermometry consult Guillaume, (Thermometrie de Preci¬ sion } ; and for the historical aspect of the sub¬ ject consult H. Carrington Bolton, (Evolution ?f the Thermometer. > Consult, also, Preston, (Theory of HeatP

Gas Thermometer.— A thermometer in which the temperature is measured by the change of volume, or pressure, of a mass of gas enclosed in a glass envelope. The gases that are most commonly employed for this purpose are air, hydrogen and nitrogen; and thermom¬ eters. containing these several gases are re¬ spectively called “air thermometers,® “hydro- gen thermometers® and “nitrogen thermom¬ eters.® See Thermometry.

Alcohol Thermometer. — A thermometer in which the temperature is indicated by the expan¬ sion of alcohol (instead of mercury) ; coloring matter of some kind being dissolved in the al¬ cohol, so that the column of fluid in the stem of the instrument may be distinctly visible. Al¬ cohol has a larger coefficient of expansion than mercury, and hence, for the same sizes of bulb and stem, the degrees are longer upon a ther¬ mometer containing it. Alcohol can also be used at temperatures that are low enough to destroy an ordinary thermometer, by the freez¬ ing of the mercury. No great degree of

preci¬ sion can be attained with the alcohol thermom¬ eter, however, partly because the liquid wets the glass and thereby causes the instrument to read too low when the temperature is falling, and partly for other reasons. For the measurement

of temperatures approaching the freezing point of mercury (37.8° F. below zero) the Interna¬ tional Bureau of Weights and Measures pre¬ fers a thermometer filled with toluene to one that is filled with alcohol; the toluene ther¬ mometer being apparently capable of yielding much more accurate results. Owing to the fact that alcohol boils at a much lower temperature than water, the alcohol thermometer can hardly be graduated by the method given for the mer¬ cury instrument, since exposure to a tempera¬ ture of 212° F. would cause the alcohol to have a vapor pressure so high that the bulb would be likely to burst. These thermometers are, therefore., graduated, most commonly, by direct comparison with a standard mercury-in¬ glass instrument. The expansion of alcohol by heat is not strictly proportional to that of mercury and hence if the scale of the mercury thermometer is taken as the standard, the de¬ gree marks upon the alcohol thermometer will not be spaced at uniform intervals. These spaces are in fact smaller at low temperatures than at higher ones, as will be seen by examin¬ ing any good alcohol thermometer that is adapted for observing a considerable range of temperature.

Maximum and Minimum Thermometers

are thermometers which automatically record the highest or lowest temperatures to which they have been exposed during a given period. In the Rutherford maximum thermometer the capillary stem of the instrument is placed nearly horizontal and as the mercury rises it pushes before it a tiny index of iron or steel, placed within the tube ; and the index, being left at the most extreme position attained by the mercury, indicates the highest temperature to which the instrument has been exposed. In the Ruther¬ ford minimum thermometer a similar index is used, but the thermometric column is here com¬ posed of alcohol and the index lies within the alcohol. When the temperature falls, the free end of the column of alcohol in the stem ad- heres to the index and drags it toward the bulb ; but when the temperature rises again, the alcohol flows around the little index (which does not fill the capillary tube), and so leaves it in the position to which it had been drawn at the moment when the temperature was low¬ est. In both forms of thermometer the index is returned to a suitable position for making a new observation by the aid of a small mag¬ net. In the Negretti and Zambra maximum thermometer the capillary tube is partially ob- sti ucted near the bulb so that although

the mercury flows outward readily enough as the temperature rises, a fall of temperature at any moment causes the mercury thread in the stem #to break at the obstruction, so that the maxi¬ mum temperature to which the thermometer has been exposed can be read directly, in the usual manner. The broken thread can easily be returned to the partially empty bulb by jar¬ ring the instrument, or by whirling it sharply in a circle.

Clinical Thermometer.— A form of the Ne-

and Zambra maximum thermometer, Which is used by physicians for determining the temperature of the human bodv.

dhe graduation on these instruments is fine, so that the temperature. can be read to the 10th of a degiee or so; and the entire interval cov-

ered by the graduation rarely extends below 95° F., or abqve 115° F., the normal tempera¬ ture of the body being about 98° F. In using the instrument, the bulb is placed under the patient's tongue or in the arm-pit.

Radiation Thermometer. — A form of ther¬ mometer designed to indicate the intensity of solar or terrestial radiation. The solar radia¬ tion instrument consists of a thermometer with a blackened bulb, the stem being sealed into an exhausted sphere of glass, so that the black¬ ened bulb comes in the centre of the sphere. When sunlight is allowed to fall upon this thermometer and also upon a similar one with a bulb that is silvered and polished, the black bulb absorbs most of the radiant heat, while the polished one reflects most of it. The dif¬ ference in the readings of the two instruments is assumed to indicate the intensity of the radi¬ ant energy falling upon them.

Upsetting Thermometer. — A form of thermometer provided with a constriction in the stem .similar to that used with the Negretti and Zambra maximum thermometer, and so designed that when the instrument is inverted the mer¬ cury thread breaks at the constriction and runs down into the stem. These instruments are graduated so as to read correctly when they are held upside down. By upsetting a ther¬ mometer of this kind by means of clockwork, the temperature that prevails at any particular hour can be recorded.

Deep-Sea Thermometer. — An instrument commonly of the upsetting

type, for observing temperature at various depths in the sea. It is enclosed in a very strong case, and is reversed at the depth at which the temperature is de¬ sired. At moderate depths the reversal is ef¬ fected by sending a weight down along the sounding wire ; but at greater depths the up¬ setting mechanism is usually actuated by a small propeller which is arranged so as to begin its rotation when the thermometer starts on its return to the surface of the sea.

Registering Thermometer.— Any thermom¬ eter which automatically records its own read¬ ings.

Dew-Point Thermometer. — A thermometer adapted to the determination of the tempera¬ ture at which dew will be deposited from the air. The most accurate form of the instrument is that devised by Regnault. This consists of a pair of thin receptacles of polished silver, shaped somewhat like ordinary chemical test-tubes. A thermometer is placed in each of these, and one of the tubes is then partially filled with ether, or some other volatile liquid. When a current of air is passed through the ether by means of an aspirator, the rapid evaporation cools the silver tube and its contents (including the ther¬ mometer) ; and the observation consists in not¬ ing the temperature of the ether, when the polished exterior of the silver tube containing it is first dimmed by the deposition of dew. The second tube of silver, which is not cooled, assists the eye in judging when the dew is first deposited upon the other one ; and the thermome¬ ter that the uncooled tube contains is used merely to record the temperature of the air at the time of the experiment.

Differential Thermometer. — An instru¬ ment for measuring or detecting differences of temperature, without reference to the absolute

values of the temperatures that are compared. Sir John Leslie's form, as improved by Ruin- ford, consists of a horizontal tube, turned up¬ ward at the two ends, and there provided with a pair of equal bulbs of considerable size. The bulbs are filled with air, and a small quantity of colored liquid is placed in the horizontal tube which joins them; the liquid serving to separate the air masses that the bulbs contain, and also as an index for reading the instrument. So long as the temperatures of the two bulbs remain equal, the pressure of the air will be the same in each, and the liquid index will not move. If one of the bulbs is warmed slightly more than the other one, however, the air that it contains expands and forces the liquid index toward the cooler bulb; the amount of this displacement indicating the difference in the temperatures of the bulbs. This form of dif¬ ferential thermometer is not used to any great extent at the present time, the thermo-pile (see

Thermo-electricity) and the platinum resist¬ ance thermometer (see Thermometry) having almost entirely displaced it.

Wet Bulb Thermometer.— A thermometer whose bulb is covered with thin wet muslin, and which is used for determining the amount of moisture in the air. In practice, the wet bulb thermometer is used in connection with a similar thermometer having a dry bulb, the two being whirled through the air together, or hav¬ ing a current of air directed upon them by a fan, or otherwise. The evaporation of the moisture about the wet bulb causes that instru¬ ment to become cooler than the other one; and the difference in the readings of the two ther¬ mometers, when taken in connection with the reading of the dry one, enables the observer to determine the degree of saturation of the air at the time the experiment is made. Tables for this purpose are published by the Weather Bureau.

Weight Thermometer.— A thermometer consisting of a bulb provided with a capillary outlet in the place of the usual stem. In using this instrument, the bulb is first weighed while empty, and again when filled with ice-cold mer¬ cury. It is next heated to the boiling point of water, and the mercury which escapes from it on account of the expansion is collected and weighed. These data enable the observer to cal¬ culate the fraction of the original weight of ice-cold mercury that is lost upon heating the bulb to the boiling point. To determine any other temperature, he fills the bulb, as before, with ice-cold mercury, and then exposes it to the temperature that is to be measured (this temperature being assumed to be higher than the freezing point of water). Collecting the mercury that runs out of the bulb, and express¬ ing its weight as a fraction of the weight of cold mercury that was present at the outset, he has only to compare the fraction so obtained with the fraction obtained in the first experi¬ ment, in order to be able to calculate, by a simple proportion, the temperature desired. The weight thermometer is not a convenient instru¬ ment to use, but it is simple in theory, and is free from certain of the errors to which ordi¬ nary thermometers are liable.

Metallic Thermometer.— An instrument in which temperature is determined by noting the change of form or of length that a metallic

strip experiences when it is heated. In Brc- guet's instrument, three thin strips composed respectively* of platinum, gold and silver aie

rolled together into the form of a single rib¬ bon, the gold being in the centre. The ribbon is then coiled into a spiral, with the silver on the concave side. When one end of such a spiral is fixed, a rise of temperature causes the spiral to partially unwind, owing to the fact that the coefficient of expansion of silver is greater than that of gold, while the coefficient of gold is also greater than that of platinum. The free end of the spiral is caused to actuate a pointer, by which the temperature is indicated.

Platinum Resistance Thermometer. — An

instrument for determining temperature, by noting the variation of the electrical resistance of a wire or strip of platinum. (See Ther¬ mometry).

Allan D. Risteen,

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

THERMOMETRIC ANALYSIS. See

Chemical Analysis.

THERMOMETRY, the art of measuring temperatures. The “measurement® of temper¬ ature is quite a different thing from the meas¬ urement of a time, or a length, or a mass, and it consists merely in assigning to each temper¬ ature that may come up for consideration a definite place upon some sort of a numerical scale. The scale itself may be perfectly arbi¬ trary, so that an interval of temperature upon one part of the scale cannot be said to be “equal,® in any physical sense, to an interval on some other part, even though the two are ex¬ pressed by the same number of “degrees.® The chief essentials of a practical thermemetric scale are (1) that it shall be perfectly definite, so that when the same temperature is “measured® on several different occasions, the same identi¬ cal result will be obtained each time, at least to a degree of approximation sufficient for the purposes for which the temperature is being determined; and (2) that it shall be possible for two or more different observers, provided with distinct instruments of measurement, to measure the same temperature, and obtain re¬ sults that are identical, at least to the same degree of approximation as noted above. So long as these essential conditions are fulfilled, we may make use, for the purpose of establish¬ ing a thermometric scale, of any measurable property of matter, which varies in a determi¬ nate way with temperature ; the

“temperature,® in any such case, being defined as proportional to the atttribute that is measured, or to any continuous function of that attribute. We may, therefore, have as many different “scales® of temperature as we please, and any one of these will be just as defensible, and just as “correct,® as any other one, although no two of them will be in perfect agreement. In practice it is found that four particular kinds of thermo¬ metric scales are er.pecially useful. These are based, respectively, upon (1) the expansion of some substance that is subjected to an unvary¬ ing pressure; (2) the increase in pressure of a gas which is kept rigorously constant in vol¬ ume; (3) the variation of the electrical resist¬ ance of a conductor ; and (4) the electromo¬ tive force of a thermo-electric couple (see

I’n ermo-electricity) , one of whose junctions is kept at a constant temperature, while the other is exposed to the temperature that is to be measured. Of these four general methods, the first two have been longest and most com¬ monly employed ; and the particular instru¬ ments that have been most extensively used for putting them into practice are known respec¬ tively as the “mercury-in-glass thermometer® and as the “gas thermometer.® The mercury- in-glass instrument is described under Ther¬ mometer, and the gas thermometer is described in the present article, below.

The gas thermometer was probably the first form of thermometer to be constructed. The mercury-in-glass instrument followed, and for many years was used almost exclusively for the measurement of temperatures, doubtless on ac¬ count of its simplicity and the ease with which it can be used. But as the science of thermom¬ etry developed, and increasing refinement in temperature determinations was demanded, it was found that the mercury-in-glass thermom¬ eter is liable to serious errors on account of the anomalous expansions and contractions of the glass envelope; errors which were of little or no importance when a determination of tem¬ perature to the nearest quarter of a degree or so was considered sufficiently accurate, but which were of paramount importance when it was proposed to determine a temperature to the hundredth or thousandth of a degree. The errors due to the cause in question can now be elirninated in large measure by making temper¬ ature determinations by the “movable zero® method (see Thermometer) ; but physicists nevertheless prefer to follow the lead of Reg- nault, who, in his celebrated (Fourth Memoiffi (1847), recommended the employment of the gas thermometer as the standard for the es¬ tablishment of the temperature scale; and the gas thermometer is still the standard in all work of high precision. The great advantage of the gas thermometer consists in the fact that the coefficients of expansion of gases are many

times greater than that of mercury, and the effects of anomalous changes of size in the glass bulb are of correspondingly less import¬ ance.

The gas thermometer is made in two gen¬ eral forms, according as it is desired to meas¬ ure the temperature by the expansion of the gas at some constant pressure, or by the in¬ crease in the pressure of the gas at some com slant volume. The latter plan being the one that is now by far the commoner in accurate work, we shall describe it first, and at some length.

The constant-volume gas thermometer is shown, in its essential features, in the accom¬ panying illustration. It consists of a bulb, A, of considerable size, wffiich is connected, by means of a capillary tube, with a mercury manometer, M. At a there is a mark upon the tube leading to the gas bulb, and care is taken, whenever an observation of any kind is made, to have the level of the mercury in the short arm of the manometer stand exactly at a, in order that the volume of the thermometric gas may always be rigorously the same. A movable reservoir of mercury, V, is connected with the column M for this purpose, by means of a flexible tube; so that by raising or lowering V the mercury

in M may be brought to any desired level. Any gas that we please may be used in the bulb A, but hydrogen, nitrogen and air are the ones most commonly employed. In the filling of the bulb, the most elaborate precautions are taken, not only to have the gas that is used pure, but also, and more particularly, to have it per¬ fectly dry. For this purpose the bulb is first exhausted by the aid of an air-pump, and is heated while in the exhausted condition, and allowed to stand for a time, so that any mois¬ ture that may adhere to the walls of the bulb may be driven off and removed. The bulb is then filled with gas that has been carefully dried by calcium chloride or other drying agents, and is then exhausted again and heated ; the operations of exhausting and refilling being repeated several times, until there can be no doubt about the dryness and purity of the gas which is finally allowed to remain. Temper¬ ature, according to this instrument, is defined as being rigorously proportional to the pressure that prevails in the bulb A, so long as the

volume of the gas in the bulb remains constant. It will be observed

that there is here no as¬ sumption that the thermometric gas obeys the laws of Boyle and Charles (see Thermody¬ namics) ; the relation which has just been as¬ sumed being the definition of the term <(tem- perature,® according to the constant-volume gas thermometer. If T be the temperature as thus defined, and P is the pressure prevailing within

the bulb A, then we have, from the definition of temperature, T= CP, where C is a constant for the particular thermometer under consid¬ eration. (It is to be observed that P is the total pressure to which the gas in A is sub¬ jected. It includes not only the pressure that is read from the manometer M, but also that barometric pressure that prevails at the same time in the air of the laboratory; for this baro¬ metric pressure acts upon the 'top of the mer¬ cury column, and it is, therefore, to be added to the reading of the manometer M). To de¬ duce the value of the constant C, we may sub¬ ject the bulb A successively to the steam from boiling water, and to a mixture of ice and water, as described under Thermometer. The total pressure upon the gas in the bulb being noted m each case, let us suppose that it is Po at the freezing point, _ and Pioo at the boiling point. Then the foregoing equation, when applied to these two cases, takes the following forms, respectively: T0=ˆCP0, 7'100= CP wo ; To being the temperature of the freezing point according to the scale of this thermometer, and Two being that of the boiling point. We may define either To or Two however we please, and then find the corresponding value of C ; but it is desir¬ able that the scale of the gas thermometer shall be as closely as possible like that of the ordi¬ nary mercury-in-glass instrument; and in order to fulfil this condition it is found to be best to subject the gas thermometer scale to the condition that the difference between To and Two, as determined by the gas thermometer, shall be numerically the same as the difference between the freezing and boiling points, on the ordinary mercury-in-glass scale. In other words, it is found to be best to have the aver¬ age size of the degrees the same on the two instruments. In scientific work the Centigrade scale is used in practically every instance; and if we adopt itQ here, we shall have the relation Two — T 100°, if the condition just men¬

tioned is to be fulfilled. From this and the preceding equations we easily find that C(Pwo Po) ~ 100°, or C= 100/(Pioo — Po) ; so that when we know the values of Pwo and P0 by direct observation, we are prepared to deter¬ mine C at once, and hence to calculate the gas-temperature, T, corresponding to any given pressure P, by means of the relation T~CP. It will be seen that the zero of the gas ther¬ mometer scale does not coincide with the freez¬ ing point of water,

but that it is very much lower. The gas thermometer could not give T = 0, for example, unless P = 0; that is, not unless the temperature was so low as to cause the gaseous pressure to disappear altogether. The zero point from which the indications of the gas thermometer are counted, according to the formula given above, is called the ((natural zero® of the instrument; and in order to be able to compare the gas scale with the scale of the ordinary mercury-in-glass thermometer, it becomes necessary to know what the temper¬ ature of freezing water is, as read from the gas scale. To determine this, we make use of the relation T0 = CP0. Substituting in this the value of C as already found, we find that

T* = lOO/V (P 100 - Po). Now the quantity

(Pioo — Po)/Po is known as the ˆcoefficient of expansion at constant volume® for the gas. (The name is somewhat absurd, it is true, be-

cause there is no expansion at all, if there is no change of volume ; and it would be more accu¬ rate to designate this fraction as the “coefficient of increase of pressure® at constant volume). It appears, therefore, that the temperature of melting ice, on the scale of the constant-volume gas thermometer, is numerically equal to 100 times the reciprocal of the coefficient of ex¬ pansion of the gas at constant volume. Having found To, we have only to subtract it from every reading of the gas thermometer, in order to reduce that reading to its corresponding value as reckoned from the freezing point of water. If we call the values of T — To, as computed for any given gas thermometer, the ((reduced readings® of that thermometer, then we find that the reduced readings of the nitro¬ gen, hydrogen, air and carbon dioxide constant- volume thermometers are all nearly identical, and that they are all closely comparable with the readings of the ordinary mercury-in-glass thermometer. If two constant-volume gas thermometers be filled with the same gas in dif¬ ferent states of density, then the reduced read¬ ings of the two are very nearly equal, but yet not necessarily identical.

The coefficients of expansion at constant volume of certain of the more important ther¬ mometric gases are given in Table 1, as de¬ duced from a careful analysis of the data given by Chappuis, Regnault and numerous other ex¬ perimenters of high standing. The <(initial pressure® signifies the pressure on the gas in the thermometric bulb,

when the bulb is sur¬ rounded by ice and water ; this pressure being given as the most convenient way of fixing the density for which the coefficients were deter¬ mined. Two coefficients are given for air at each initial pressure, because it appears to be

1. — Coefficients of Expansion at Constant

Volume.

GAS

Initial pressure = 1,000 mm.

Initial pressure = 760 mm.

Coefficient

of

expansion

To

Coefficient

of

expansion

To

Hydrogen .

0.0036624

273.04°

0.0036624

273.04°

Nitrogen .

0.0036745

272.15

0.0036716

272.36

Carbon dioxide. .

0.0037258

268.40

0.0037106

269.50

Air .

0.0036746

272.14

0.0036716

272.36

Air .

0.0036720

272.33

0.0036697

272.50

impossible to decide, from the observations thus far made, which one of these values is most likely to be correct, the available measures falling into two general groups, one of which favors one of the foregoing values, while the second favors the other one. In Table 1 the values of To are also given, for convenience of reference.

The International Committee of Weights and Measures, in consideration of the differ¬ ences that exist even between the reduced read¬ ings of constant-volume gas thermometers, adopted the following standard scale for the measurement of temperature, calling it their (<normal thermometric scale.® The scffie adopted is the Centigrade scale of the con¬ stant-volume hydrogen thermometer, in which the hydrogen has a density such that its

pressure, at the freezing point of water, is equal to that due to a

column of ice-cold mercury, one metre (1,000 mm.) high. The tempera¬ tures are understood to be <(reduced,® as de¬ scribed above, so that the thermometer reads 0° at the freezing point and 100° at the boiling point. The ideal scale would of course be the absolute thermodynamic scale (see Thermody¬ namics) ; but the corrections that are required in order to reduce gas thermometer readings to this scale are still too uncertain to be definitely adopted in precise thermometry.

1. — Comparative Readings of Constant-

volume Gas Thermometers and the Mer-

CURY-VERRE DUR SCALE (((REDUCED® TEMPERA¬ TURES).

Hydrogen

Nitrogen (or air)

Carbon

dioxide

Mercury

— 10° C.

— 10.007°

— 10.032°

—10.077°

0

0.000

0.000

0.000

- 10
- 10.006
- 10.025

+10.051

- 20
- 20.010
- 20.043

+20.084

- 30
- 30.011
- 30.054

+30. 102

- 40
- 40.011
- 40.059

+40.112

- 50
- 50.009
- 50.059

+50. 104

- 60
- 60.005
- 60.053

+60.084

- 70
- 70.001
- 70.044
- 80

- 79.998
- 80.031
- 90
- 79.997
- 90.016
- 100
- 100.000
- 100.000

100.000

In Table 2 comparative readings are given, of the mercury-in-glass (<(verre dur® ; see Thermometer) scale, and the scales of the con¬ stant-volume hydrogen, nitrogen and carbon dioxide thermometers, in which the “initial pres¬ sures® are 1,000 millimetres of mercury. The significance of the table will be made plain by the following example: If all of these ther¬ mometers were exposed to a temperature at which the “reduced® reading of the hydrogen instrument was 30° C., then the nitrogen ther¬ mometer would read 30.011°, the carbon dioxide thermometer would read 30.054° and mercury- in-glass thermometer would read 30.102°. The readings given in the second column were ob¬ tained from experiments made upon the nitro¬ gen thermometer; but Chappuis states that the reduced readings of the air thermometer and of the nitrogen thermometer are practically in¬ distinguishable; and hence this column will serve for each of them.

In the constant-pressure gas thermometer, temperature is defined as proportional to the volume of a fixed mass of gas which is allowed to expand in such a manner that its pressure remains constant. Regnault experimented with thermometers of this class, and considered them to he distinctly inferior in accuracy to those in which the volume is constant, and which we have already described. This judgment pro¬ nounced by Regnault has met with the approval of nearly every subsequent authority upon ex¬ perimental physics, and hence the constant- pressure gas thermometer has not been at all extensively used in practical work. Professor H. L. Callendar, in fact, is almost the only prominent advocate of the constant-pressure in¬ strument at the present time. He claims that the constant-pressure gas thermometer is capable of yielding results even superior to those of the constant-

volume thermometer ; and

he has devised a very ingenious form of the constant-pressure instrument, which certainly appears to overcome most of the objections that have been urged against it in the past. (Con¬ sult his paper entitled (On a Practical Ther¬ mometric Standard,) in the Philosophical Magazine, for 1899, Vol. 48, page 519. Consult also, Proceedings of the Royal Society, > Vol. 50, 1892, page 247, and Preston, (Theory of Heap). To facilitate computations connected with the constant-pressure gas thermometer, we present, in Table 3, the coefficients of expansion of the principal thermometric gases at the con¬ stant pressure of 1,000 millimeters of mercury and also at 760 millimeters. These are obtained by a careful comparison of the best determina¬ tions that have yet been made.

1. — Coefficients of Expansion of Gases at Constant Pressure.

GAS

Pressure = 1000 mm.

Pressure = 760 mm.

Coefficient

of

expansion

To

Coefficient

of

expansion

To

Hydrogen .

0.0036600

0.0036731

0.0037422

0.0036734

273.22°

272.25

267.22

272.23

0.0036606

0.0036707

0.0037247

0.0036706

273.18°

272.43 268.48

272.44

Nitrogen .

Carbon dioxide . . Air .

The coefficient of expansion of carbon dioxid at a constant pressure of 760 millimeters of mercury must be considered as still somewhat uncertain, though the value given in the table appears to be the best now attainable. The <(natural zero® of the constant-pressure ther¬ mometer lies in about the same general region as the natural zero of the constant-volume in¬ strument. The temperature of melting ice, as referred to the ((natural zero® of the scales of the several constant-pressure gas thermometers, is given in Table 3, in the columns headed ((To.® No extensive and accurate comparisons have yet been made between the constant-pres¬ sure and constant-volume thermometers, either for the same gas or for different ones.

In the platinum-resistance thermometer, tem¬ perature is defined as proportional to the elec¬ trical resistance of a coil of pure, annealed platinum wire. The ((thermometer® itself con¬ sists of a coil of the wire, wound upon a sheet or strip of mica, and placed in one of the arms of a Wheatstone's bridge, so that its resistance may be accurately determined. It is usual to denote a temperature as defined by the plati¬ num-resistance thermometer by the symbol a/>/® (((platinum temperature®). We have, therefore, pt^CR, where R is the observed resistance of the coil at the temperature denoted by pt and C is a constant whose value is to be determined. If Ro and pU and R ioo and phoo are the respective resistances and platinum-resistance tempera¬ tures at the freezing and boiling points of water, then we have, precisely as in the case of the constant-volume gas thermometer, pt — 100 R/(Rioo — Ro), as the platinum-resistance temperature, as reckoned from the ((natural zero® of the platinum-resistance thermometer. The "reduced platinum temperature,® obtained by subtracting pto from the temperature pt as VOL. 26 — 35

here computed, is the one that is commonly used, however; and Callendar and Harker and Chappuis have shown that the reduced plati¬ num-temperature can be expressed in term of the reduced gas thermometer scale by means of a simple equation of the form:

T (T)

pt = T + A. - \ - l

100 (100)

A being a constant whose value is to be deter¬ mined experimentally. Callendar and Griffiths, for the purpose of determining A, recommend that the resistance of the platinum coil of the thermometer be observed at the temperature of boiling sulphur ; the “reduced temperature® of this boiling point being, according to their ex¬ periments with the constant-pressure air ther¬ mometer, 444.53° C. (Eumorfopoulos states that the boiling point of sulphur on this scale is between 443.58° and 443.62° C. See Proceed¬ ings of the Royal Society, > 1908 A, 81, p. 339. Compare, also, Callendar and Moss, in the same publication, 1909 A, 83, p. 106). The platinum- resistance thermometer gives great promise of being a highly valuable instrument in the future. Indeed, it is so already; but it does not yet appear to be capable of determining the abso¬ luteˆ values of temperatures closer than to 0.01° C. It may be used as a differential ther¬ mometer, however, so as to give results of a far higher order of accuracy. For this pur¬ pose two similar coils or strips of platinum are used, these being placed in two of the arms of a Wheatstone’s bridge, so that the smallest de¬ parture from equality in their resistances can be observed. (See Resistance, Electrical). Langley’s, bolometer is an instrument of this sort. It is used to explore the solar spectrum, and consists of two strips of platinum foil, which are placed across the spectrum to be examined, with their edges toward the source of the light. The two strips are placed in the two arms of a sensitive Wheatstone’s bridge, and so long as both the strips are exposed to radiation of the same intensity, the balance of the bridge is preserved. When one of the strips coincides with a Fraunhofer line, how¬ ever, while the other is still exposed to the full radiative power of the source of light, the balance is destroyed, and the existence of the line is thereby demonstrated, even though the line be in the infra-red, where it is not visible to the eye.

Thermo-electric couples have been used to a considerable extent for the measurement of temperature, and Regnault experimented with them somewhat, but showed that they are dis¬ tinctly inferior in accuracy to the other known methods of determining temperature. At ex¬ ceedingly low temperatures, however, they are often of great value. Wroblewski, for example, made use of thermo-couples quite extensively for temperature measurements in his researches on the critical points of the gases which are liquefiable only at extremely low temperatures. The platinum resistance thermometer is more generally favored, however, for this purpose; though it cannot be used for temperatures too close to the absolute zero on account of the anomalous and sudden changes of resistance that occur in that region. (See Resistance, Electrical). At these extremely low tempera-

tures the helium thermometer is still useful, however.

Consult Guillaume, (Thermometrie de Pre¬ cision, } and Preston, (Theory of HeatP See, also, the numerous scientific papers of Kamerlingh-Onnes relating to low-temperature re¬ search.

Allan D. Risteen,

Director Technical Research, The Travelers Insurance Company, Hartford, Conn.

THERMOPHONE, a resistance thermom¬ eter (see Thermometry), in which the galva¬ nometer that is most commonly employed is re¬ placed by a telephone. Two coils of platinum wire, which are exposed to the respective tem¬ peratures that are to be compared, are intro¬ duced into two of the arms of a Wheatstone's bridge whose remaining arms contain known resistances. The telephone is placed in the cross-arm of the bridge. An alternating or pulsating current of low frequency is used in making the observation, and when the bridge is in balance, this fact is indicated by the silence of the telephone. See Warren and Whipple, (The Thermophone, > in The Technology Quar¬ terly, Vol. VIII, page 125.

THERMOPOLIS, Wyo., town and county- seat of Hot Springs County, on the Chicago, Burlington and Quincy Railroad, and on the west bank of the Bighorn River. It is noted for the large hot springs which issue along the river bank at this place. These springs are considered curative for rheumatism and simi¬ lar ailments. They are protected as a State reservation. Pop. (1920) 2,095.

THERMOPYLAE (Gk. Sep/noTTvˆat hot gates), in classical geography, a pass on the southeastern frontier of AEniania, Greece, lead¬ ing from Thessaly into Locris, and on the route of the only good road from Thessaly to central Greece. It was situated between the range of Mount Gita and an inaccessible morass which bordered the Maliac Gulf ; and in breadth it was a narrow tract of perhaps some 50 feet. Its name was derived from the pres¬ ence of thermal springs. As the only means by which a hostile army might penetrate from northern into southern Greece, it held a pecu¬ liar strategic value in Grecian history. It is celebrated as the scene of the defense by Leonidas (q.v.) and the 300 Spartans against the vast host of Xerxes ' (q.v.) in August 480 b.c. The account of this battle given by He¬ rodotus has been

generally followed. Xerxes, ridiculing the numbers of the Hellenic de¬ fenders (5,200, not counting the Locrians, whose numbers are not known), sent against them the Medes and Cissians with instructions to take them prisoners and bring them before him. When, after a day's fighting, these were unsuc¬ cessful, the picked 10,000, called the "Immor¬ tals,® were sent forward; but, handicapped by the shortness of their spears, they were no match for the Hellenes, of whom few fell, while the Persian loss was on both days excessive. Xerxes was now in great perplexity, when Ephialtes, a Malian, came (<to tell him of the pathway which led across the mountain to Thermopylae.® This path ascended the gorge of the river Asopus, and the hill Anopae ; then passed over the crest of Gtta and to the rear of 1 hermopylae. The Persians arrived in the rear

of Thermopylae soon after mid-day of the third day. Tidings of their coming had already been brought to the Greeks by scouts and Persian deserters. Most of the Greeks withdrew, but the Spartans and the Thespians (700) remained, and the Thebans (400) were compelled to stay. Of the Spartans and Thespians, all fell; and of the Thebans, few escaped. To the complaint that the Persian arrows darkened the sky the Spartan Dieneces is said to have answered, "Good; then we shall fight in the shade.®

Through deposits from the Spercheius and other streams, great alterations have taken place at Thermopylae, so that it is not now a pass but a swampy plain. Consult Schliemann, (Untersuchungen der Thermopylen) (1883) and various standard histories of Greece. See also Greece, Ancient — History.

THERMOPYLAE OF AMERICA, a title

applied to Fort Alamo, Texas. See Alamo, The.

THERMOSCOPE (Greek, <(to show heat®), any instrument for indicating tempera¬ ture. The term is commonly applied, however, to such instruments as indicate one tempera¬ ture only, or a very limited number of temper¬ atures; or to those which are used for indicat¬ ing changes or difference of temperature, with¬ out giving the magnitude of these changes or differences. The forms that have been given to instruments of this kind are so manifold as to be almost past numeration. As a single illus¬ tration, the instrument may be cited, whose in¬ dications depend upon the melting points of alloys. An instrument or device of this sort contains buttons or wires of a number of alloys, whose several melting points are known; and in the observation of temperature by this method, the instrument is exposed

to the temperature under examination, and a note is made of which of the alloys melt, and of which remain un¬ melted. If Ti is the melting point of the least fusible of the alloys that have melted, and T2 is the melting point of the most fusible of the alloys that have not melted, we can then assert that the temperature under consideration is higher than Ti, but lower than T2. For many purposes in the arts, it is quite sufficient to know, in this manner, that a temperature is between certain limits. A thermoscope which can only indicate certain limits between which a temperature lies is called a “discontinuous thermoscope.® Continuous thermoscopes, which are capable of affording an actual measurement of any temperature within their range, are now commonly called “thermometers,® whether they resemble the ordinary mercury-in-glass ther¬ mometer or not. A thermoscope in which tem¬ perature is inferred by noting the electrical re¬ sistance of a coil of platinum wire, for ex¬ ample, is called a “platinum resistance ther¬ mometer.® See Pyrometer; Thermometer; and Thermometry. .

THERMOSTAT, a device in which the va¬ riation of heat is utilized to expand and con¬ tract a long strip of metal, so that its motion can be utilized to regulate a damper or to main¬ tain approximately uniform steam pressure.

THERMOTAXIS, the regulation of the temperature of the body. The principal sources of animal heat are muscular exercise and the combustion of food, involving absorption of

oxygen and liberation of carbon dioxide. Body temperature remains about normal under many trying circumstances through the balance main¬ tained by the nervous system between its pro¬ duction and its dissipation. The chief avenues of dissipation are radiation from the surface of the body, the expired air and the excreta. Feb¬ rile action or fever is believed to be due to an overproduction of heat, to an underelimination or to both. The overproduction is believed to result from an increased combustion especially of albuminous substances of the body, with an increased discharge of carbon dioxide and the nitrogeneous wastes, urea, creatine and crea¬ tinine. When fever prevails the action of the heart is accelerated, the secretions of glands are impaired and the intricate process of metabol¬ ism is deranged. Heat-regulation, effected by reciprocal changes in heat-production and heat- dissipation and depending essentially upon the influence of

cutaneous impulses and the tem¬ perature of the blood, is governed, it is gener¬ ally believed, by two nerve-centres, one control¬ ling heat-production, the other heat-dissipation.

THERMOTROPISM, a tendency toward warmth, exhibited in the reactions of animals. An example is found in the care with which ants move their eggs and larvae from place to place in order to secure a proper and equable temperature for their welfare. Compare Helio-tropism, with which tendency this is somewhat confused.

THERMORPHA, or ANOMODONTIA,

an order of extinct (Triassic and Perman) reptiles. ((The dominant group among the ear¬ liest reptiles in each quarter of the globe where they have as yet been discovered,® say Wood¬ ward, ((is directly intermediate in skeletal char¬ acters between the highest labyrinthodonts (Mastododonsaurus and its allies) and the lower mammals (Monotremata) . Its members first received the name Anomodontia in allusion to the varied modifications of the dentition, so unusual among reptiles. They were afterward named Theromorphia or Therornora . . .

in allusion to the many obvious resemblances in their skeleton to that of monotreme mammals.® These similarities are chiefly of the dentition, zygomatic arch, pelvis, cruro-tarsal joint, scapula and occasional doubling of the occipital condyle. The general shape of the skull is often closely mammalian, but its details show its unquestion¬ able reptilian features. Three suborders are recognized — Pareiosauria, Theriodontia and Anomodontia.

The theromorphs were all land-reptiles with short, stout limbs and powerful jaws. Some were massive and of great size, like great alli¬ gators with turtle-like or even dog-like heads ; others small and probably as agile as a weasel. They were the predatory beasts of their age, and were adapted in powers and characteristics to the pursuit of a large variety of animal prey. The most unreptile-like were those of the sub¬ order Theriodontia.

It is a natural suggestion that the race of mammals, undoubtedly of reptilian origin, must have descended from this group, whose bones (numerous in the Triassic rocks of the western United States) show so many mammalian fea¬ tures; but thus far no direct connection can be shown. The dinosaurs, however, seem cer¬ tainly to have descended from this stock.

Consult Woodward, (Vertebrate Palaeontology* (London 1898) ; Gadow, (Amphibia and Rep- tiles) (New York 1901), wherein many further references to details will be found.

THEROPODA, a sub-order of dinosaurs (q.v.).

THERSITES, ther-si'tez, according to Homer, the ugliest man in the whole Grecian army that beleagured Troy. He was a mali¬ cious and slanderous brawler whom Ulysses publicly beat and brought to tears for his in¬ sulting attack on Aganon. He was eventually slain by Achilles for piercing with his spear the eye of the dead queen of the Amazons, Pen- thesilea, whom he had also spoken of with contumely.

THERY, Edmund, French writer on eco¬ nomics: b. Ragnac, France, 1854. He is a com¬ mander of the Legion of Honor, member of numerous societies interested in his line of work and has represented his government in various economic missions to several countries. His writings include (Europe et Etats-Unis dAmerique *(1899) ; (La France economique et financiere pendant le dernier quat de siecle* (1900) ; (La Banque de France de 1897 a 1909) (1910) ; (L'Europe economique* (1911) ; (Le regime actuel des chemins de fer en Russie) (1913), etc.

THESEUM, the-seum, or THESEION,

the-se'on, a temple in ancient Athens dedicated to the commemoration of Theseus and his ex¬ ploits. It stood on an elevated site north of the Areopagus (q.v.) and in early Christian times was used as the church of Saint George of Cappadocia. Within its precincts Cimon is said to have deposited the bones of the hero which he had brought from the island of Scyros, but archaeologists do not support this claim. The temple was begun 465 b.c. Many consider it to have been originally dedicated to Heracles or Hephaestus, but there is no rea¬ son to doubt that it is actually a Theseum. It was constructed of Pentelic marble in the purest Doric style and is technically to be de¬ scribed as an amphiprostyle, hexastyle perip¬ teral temple, with pronaos, and opisthodomos or epinaos. The fagade and rear pediment have each six columns; the sides 13 each; their height being about 30 feet. A fragment of the portico and the roof of the Stella are still stand¬ ing. There are also some noteworthy remains of the statuary with which the building was adorned by sculptors of the school of Phidias. On the metope are set forth the exploits of Theseus and Heracles and the frieze of the cella is also in part standing. The dimensions of the building are roughly to be estimated at 104 x 45^2 feet. Consult Stuart and Revett Antiquities of Athens) (London 1762-1816) ; Leake, (Topography of Athens* (London 1841) ; Dyer, Ancient Athens, Its

History, Topography and Remains) (London 1873).

THESEUS, the'sus or the'se-us, in Greek legend, a king of Athens and national hero of Attica, son of 2Egeus by TEthra, the daughter of Pittheus of Troezen, in Peloponnesus. He was educated at Troezen, at the house of Pittheus, and passed for the son of Poseidon (Neptune). When he came to years of maturity he was sent by his mother to his father, and a sword and sandals were given him by which he might make

himself known to TEgeus (q.v.) in a private manner. On arriving at Athens he narrowly escaped being poisoned by Medea, the sorceress, but his father recognized the sword, and re¬ ceived Theseus as his successor on the throne. He next caught alive the wild Marathonian bull ; but a much more important service was the slaying of the Minotaur and the freeing of Athens from the tribute of seven youths and seven maidens annually sent to Crete to be de¬ voured by that monster. (See Minotaur) - Fear¬ ing his son had perished while in Crete TEgeus destroyed himself ; hence Theseus on his return succeeded his father as ruler of Athens. The Athenians were governed with mildness, and Theseus made new regulations and enacted new laws. The number of the inhabitants of Athens was increased : a court was instituted, which had the care of all civil affairs; and Theseus made the government democratic, while he reserved for himself only the com¬ mand of the armies. To him also the Athenians ascribed the union of the towns of Attica into a single state, with Athens at the head, and the division of the people into the three classes of Eupatridae, Geomori and Demiurgi (nobles, hus¬ bandmen and mechanics). Perhaps the most celebrated of the events in the career of Theseus after the slaying of the Minotaur was his war with the Amazons. He is said to have invaded their territory and carried off their queen, Antiope (according to another account, that with which the readers of Chaucer and Shakespeare are familiar, Hippolyta). The Amazons in their turn invaded Attica, and a battle was fought in the city of Athens itself. Theseus was victorious, and the Amazons driven out of Attica. He was absent from Athens on various expeditions, and when he returned the Athenians had forgotten his serv¬ ices. He retired to the court of Lycomedes, king of Scyros, who threw him down a deep precipice. In 469 b.c. his bones, as supposed, were found by Cimon in Scyros, and brought to Athens, where they received a magnificent burial. Statues and a temple (the Theseum, q.v.) were

raised; and festivals and games were publicly instituted to commemorate his actions. A portion of the temple still remains standing. What shreds of history, if any, there may be in the accounts of Theseus cannot be ascer¬ tained. Consult Harrison, J. E., (Mythology and Monuments of Ancient Athens) (London 1890) ; Liibker, F., (Reallexikon des Klassischen Altertums) (Leipzig 1914) ; Schultz, A., (De Theseo) (Breslau 1874).

THESMOPHORIA, a pagan festival of

ancient Greece. It was celebrated only by women, in honor of Demeter Thesmophoros ((<the lawgiver®) as foundress of agriculture, and thereby of orderly social life and the mar¬ riage. At Athens the festival extended to three days, beginning with 24 October. On the first day there was a procession to the temple' of Demeter at Halimos, southeast of the city; on the second a fast ; and on the third day, called Kalligeneia ((<the bearer of a fair off¬ spring®), general and often licentious indul¬ gence.

THESMOTHETE, thes'mo-thet (from a Greek word meaning lawgiver), one of the six inferior archons at Athens who presided at the election of the lower magistrates, received

criminal informations, decided civil causes, took the votes at elections .and performed other duties.

THE.SPESIUS, also called Claosaurus, a dinosaur whose fossil remains found in the upper Cretaceous strata in Wyoming, Montana and Colorado show it to have resembled the Iguanodon. It was upwards of 30 feet long and stood from 10 to 25 feet high. Like others of its species it was herbivorous and balanced its long forward body by its heavy tail. Com¬ plete sketches of the animal are found in the principal museums. (See Dinosaur). Consult Marsh, O. C., (The reconstruction of the Cre¬ taceous Dinosaur > (in Transactions of the Con¬ necticut Academy of Sciences, Vol. XI, New Haven 1902).

THESPIS, Greek author. He was a native of Icaria, a deme of Attica, lived in the time of Solon, in the 6th century b.c., and is considered the inventor of tragedy, as he added to the dithyrambic choruses of the feats of Bacchus an actor, who, when the chorus was silent, gener¬ ally recited a mythical story; and probably car¬ ried on dialogues with the leader of the chorus, appearing successively in different characters in a piece. This was a decided step toward the drama.

THESSALONIANS, Epistles to the. Authorship. — While Paul’s

authorship of the First Epistle to the Thessalonians has occa¬ sionally been questioned, the consensus of critical opinion is at the present time so nearly unanimous in favor of its genuineness that it seems needless to argue the question at all. The external evidence is strongly favorable; the style and vocabulary are admittedly Paul¬ ine; the doctrinal content, while not very full, is in harmony with Paul's teachings elsewhere; above all, in its whole tone and temper it is unmistakably and inimitably an outpouring of the very heart and soul of the great Apostle. As concerns the Second Epistle the case stands somewhat differently. Though the external evi¬ dence is even stronger than for the First Epistle, yet its Pauline authorship has been far more disputed. The difficulties which have been raised grow mainly out of its relation to the First Epistle, and practically reduce to three: (1) the resemblance in portions of the two letters, considered by some to be too close to permit us to think of the second as an inde¬ pendent composition ; in answer to which it is said that this likeness covers no more than a third of the letter, and may easily be explained in any of many ways, as, for instance, that just before writing Paul might have glanced at a copy of his first letter; (2) the difference in tone and temper of the two letters, Paul seem¬ ing in the second more formal and less cordial and affectionate, a fact for which several ex¬ planations have been offered, as that if the first letter had failed helpfully to affect some of the Thessalonians, he might naturall> speak in a more formal and distant way in his second letter, or, as Harnack has suggested, this letter may have been intended solely for the Jewish section of the church, while the other was for the main body of the church, which was Gentile in ongin, and more loyal to Paul ; and (3) the difference in the eschatological teaching, which, however, does not amount to a contradiction, but is to be regarded partly as a correction of a

misunderstanding of the teaching in the first Letter, which misunderstanding seems in spite of the correction still to continue in some circles, and partly is an addition of certain elements in Paul's doctrine of the Last Things which had not come out earlier, resulting in an apparent change of emphasis, but not in a real inconsistency. Certainly the difficulties in the way of explaining the letter as a forgery have been, found greater than of accepting it as genuine, and consequently the later criticism seems decisively to favor the Pauline author¬ ship of both Epistles.

Date and Place. — From the First Epistle itself in comparison with Acts it is easy to ascertain the date and place of composition. On his second great missionary journey, the second European city in which Paul worked was Thessalonica, the modern Saloniki. Here he established a church at once, but his very success caused him to be driven from the city after a stay possibly of only three weeks, almost certainly of only about as many months. From there Paul went to Greece, making a short stay at Athens and establishing himself for a year and a half at Corinth. It is plain that Timothy, who was sent back from Athens to visit, comfort and confirm the Thes- salonian Church, rejoined Paul at Corinth with his. report, and the first letter must have been written almost at once. According to some the second letter followed the first even without waiting for an answer and in any case the interval cannot have been long, a few weeks at most. The most common dating is in the spring of 51, but chronologists vary two or three years either way so far as the years to be assigned to the various events of Paul's work are concerned. These Epistles are accord¬ ingly among the very earliest New Testament books, only James and Galatians being con¬ sidered by any to be earlier.

Conditions of Composition. — It is plain from 1 Thessalonians as well as from Acts that the reception of Paul and of his teaching at Thessalonica was peculiarly prompt and cordial. In a very short time a church was established, consisting partly of Jews, but mainly of proselytes and Gentiles, including some of the principal men and women of the city. Paul turned back to Thessalonica as a place where his work had been a peculiar de¬ light, and the mutual affection of the Apostle and his converts must have been unusual. But his stay at the longest had been brief, and in spite of his plans and endeavors he had found it impossible to return, while at the same time he had reason to fear that misrepresentations were being circulated touching both his failure to revisit them and his purposes in his mis¬ sionary work and his relations to his converts. From the report of his messenger Timothy, and possibly from a letter to Paul from the church, quotations from which some have thought they found embedded in this letter, it appeared that on the one hand a certain fanaticism showing itself in immorality and on the other hand a certain doctrinal and spiritual uncertainty had grown up in the Church. It was to remedy those conditions that Paul wrote his first letter. The second is a natural pendent to the first. It is usually held that Paul's letter mainly ac¬ complished its purposes, but that either by the return of the messenger who carried it or by

written response from the Thessalonians them¬ selves, Paul learned that some disorders con¬ tinued and that his teaching about the Last

Things needed supplementing to correct mis¬ understandings, and thus arose the Second Epistle.

Contents. — These letters are peculiar in that two of Paul's fellow-workers, Silas and Timothy, are associated with him in the address (i, 1), though it is plain that in composition and in thought as well as in personal relations it is definitely his own letter. In 1 Thess., he first gives an explanation of his failure to return to them, adding an assurance of his strong affec¬ tion for them and an assurance of his confidence i'n their affection for him and their continuing faith in Christ, all so put as to answer any mis¬ representations of him and his work which might be current (i, 2— iii, 13). Then come va¬ rious moral injunctions, first, to chastity, and then to brotherly love, with which is associated the duty of diligent labor (iv, 1-12). There follows the correction of the painful misun¬ derstanding of some of the Christians as to their friends who had lately died, by the as¬ surance that through their resurrection they would be at no disadvantage when Christ should return, and encouragement for all in reference to the same return (iv, 13-v, 11), and, finally, warnings against various disorders, couched in brief injunctions, and a few salutations (12-28). In the second letter, after a brief greeting (i, 1, 2), Paul gives utterance to a remarkable expression of thanksgiving and prayer (i, 3-12) ; then corrects the misunderstanding of what he had said in his first letter, assuring them that before the <(Day of the Lord® there was much history to be made, including a great apostacy (ii, 1-12) ; a brief encouragement to faint¬ hearted brethren follows (ii, 13— iii, 5), and warnings to the idle and dissolute (iii, 6-15), the Epistle ending with a word of explanation of how the Apostle added to his dictated let¬ ters a certificate in his own handwriting and the benediction with which he commonly closed his letters (iii, 16-18).

Bibliography. — Frame, J. E., Commentary on the Epistle of Saint Paul to the Thessalo¬ nians > (International Critical Commentary, 1912) ; Lake, K., (The Earlier Epistle of Saint PauP (1911); Milligan, George, (Saint Paul's Epistle to the Thessalonians) (1908); Moffatt, James, { First and Second Epistles to the Thes- salonians) (Expositor's Greek Testament, 1910).

David Foster Estes,

Professor of New Testament Interpretation , Colgate University .

THESSALONICA. See Salonica.

THESSALY, thesVli, or THESSALIA,

the northeastern division of ancient Greece proper, bounded on the north by the Cam- bunian Mountains, separating it from Mace¬ donia; on the west by the chains of Pindus and Tymphrestus, separating it from Epirus; on the south by Mount (Eta, separating it from yEtolia, Doris and Locris; and on the east by the 2Egean Sea. The rich plain enclosed be¬ tween these mountains belongs almost entirely to one river basin, that of the Peneios (Salam- bria), which traverses it from west to east, and finds an outlet into the Thermaic Gulf through the vale of Tempe. It was especially famed for its fine breed of horses and its skilful horse-

men. The name of Thessaly was derived from the Thessali, a Greek people who are said to have come into this land from the west, and who became the governing class in the country. Thessaly was broken up into separate states loosely united under a tagus, and long exerted no important influence on the affairs of Greece generally; but it rose for a brief period to a position of greater consequence when (about 375 b.c.) Jason of Pherae, having been elected tagus, brought the whole of Thessaly com¬ pletely under his power, and began to threaten the rest of Greece, but the confederacy was again weakened after his assassination in 370 b.c. Thessaly afterward became dependent on Macedonia, and finally was incorporated with the Roman Empire. In 1393, after the fall of the Byzantine Empire, Thessaly came, with the rest of the imperial dominions, into the hands of the Turks, and till recently formed a part of the Ottoman Empire. The greater portion of it passed to Greece in 1881, and -the remainder in 1919. The Greco-Turkish War of 1897 was fought principally within the borders of Thessaly. Consult Baedeker, K., (Greece) (4th English ed., Leipzig 1909) ; Kent, R. G., (A History of Thessaly from the Earliest Histori¬ cal Times to the Accession of Philip V of Macedon> (Lancaster, Pa., 1904) ; Leake, W. M., (Travels in Northern Greece) (4 vols., Lon¬ don 1835) ; Philippson, A., (Thessalien und Epirus5 (Berlin 1897) ; Wace and Thompson, (Prehistoric Thessaly5 (Cambridge 1912).

THETFORD MINES, Canada, town in Megantic County, on the Quebec Central Rail¬ way, about 76 miles south of the city of Quebec. It is chiefly known for the deposits of asbestos in the neighborhood. There are numerous small industries. Pop. about 7,500.

THETIS, the'tls, in Greek mythology, a daughter of Nereus and Doris,

therefore one of the Nereids. Her nuptials with Peleus were celebrated on Mount Pelion, and were honored by the presence of all the gods except Eris or Discord, who was not invited, and who, to avenge the slight, threw in among the com¬ pany the apple of discord. By Peleus she be¬ came the mother of Achilles (q.v.).

THEURGY, from the Greek theourgia, meaning divine work, and used among the an¬ cients to signify supernatural agency in indi¬ vidual human affairs, or in the government of the world. Hence the act or. art of invoking deities or spirits, or by their intervention con¬ juring up visions, interpreting dreams, receiv¬ ing or explaining oracles, etc. ; the power of obtaining from the gods, by means of certain observances, words, symbols or the like, a knowledge of the secrets which surpass the power of reason, to lay open the future, etc. The word also means that species of magic which more modern professors of the art allege to produce its effects by supernatural agency, as contradistinguished from natural magic. Also a system of supernatural knowledge or power believed by the Egyptian Platonists to have been divinely communicated to a hierarchy, and by them handed down from generation to genera¬ tion.

THEURIET, Claude Andre, French poet and novelist: b. Marly-le-Roi, 8 Oct. 1833; d. 23 April 1907. He studied law in Paris, received his licentiate in 1857 and in that year entered the

department of the Ministry of Finance. Soon, however, he turned his attention to literature. In 1896 he was elected a member of the French Academy, having received the prix Vitet in 1890. His poems include (Le chemin des bois5 (1867) ; (1871) ; (Le maison des deux Barbeaux5 (1885), and (Jour d’ete (1901).

THIAN-SHAN (te-an'shan') MOUN¬ TAINS, central Asia. See Tyan-Shan.

THIAZOL DYESTUFFS. See Coal-tar Colors.

THIBAULT, Jacques Anatole France,

critic and novelist : b. Paris, 16 April 1844. He is known wherever French is read and the Latin genius appreciated as Anatole France, and was called by Lemaitre, one of the shrewd¬ est of his contemporaries, ((the ultimate flower¬ ing of the Latin genius.55 Son of a Parisian bookseller, another ((France55 and a veteran of the body-guard of Charles X, Anatole grew up in the bookish atmosphere which he has con¬ veyed marvelously into several of his stories as he has also his

father’s character. A Parisian of the Parisians, he was named officer of the Legion of Honor in 1895 and received into the Academy in 1896. For the rest the story of his life is in his writing. Besides early verses his well-nigh 50 volumes embrace charming books of autobiographic ((truth and fiction55 such as (Le livre de mon ami5 (1895), (Pierre Nozaire5 (1900) and (Les desirs de Jean Sevier5 (1912) ; books of philosophic criticism, themselves, as he openly professes, evidencing his own way of thinking in noting the ways of others, chief among them articles collected from Le Temps in five volumes of (La vie litteraire5 (1888-93) and (Le genie latin5 (1913); dramatic experiments, among which (Thais5 is best known; an extended controver¬ sial biography. (La vie de Jeanne d’Arc5 (1908) ; expressions of fervid patriotism in stress of war, such as <Sur la voie glorieuse5 (1915), and, finally and chiefly, a long series of books which in the guise of fiction express all the manifold phases of his political observa¬ tions, his social aspirations and indignations, his philosophic speculations and the play of his recreative imagination in evoking the thought and life of a long out-lived past. This fiction, taken chronologically, gives the clue to the development of France out from the dilettant scepticism of Renan, through epicureanism, in its higher and also its lower sense, into an earnest, though still ironic, socialism, with oc¬ casional glints of fierce intolerance for ob¬ scurantists, reactionary or clerical. Outstand¬ ing among these books is first (Le crime de Sylvestre Bonnard5 (1881), his second novel, whose genial sympathy with childhood and large-hearted irony have attracted writers of distinction, among them Lafcadio Hearn, to at¬ tempt its translation. (Balthasar5 (1900) and

THIBAUT

THIERRY

551

(Thai's > (1900), a mediaeval and an early

Christian study, show a curiously subtle (<piety of imagination with impiety of thought.”

Nearer to his own mind were (La Rotisserie de la Reine Pedauque) (1893) and (Les opinions de Jerome Coignard) (1893) in which the

ascetic, epicurean and courtesan figures of

Thais reappear in 18th century dress and an

abbe becomes playful mouthpiece for the ironic expression of a scepticism more radical in France than any since Montaigne. Each book, without plot, is a chain of sparkling epigrams in which the laughing philosopher unmasks the pettinesses and inconsistencies of private and public morals and life. French politics are the unobtruded theme of four notable volumes of Histoire contemporaine, (L'orme du maiP (1896); (Le mannequin d'osier* (1897); (L'anneau d'amethyste) (1899) and (M. Bergeret a Paris) (1901), all jewels of grace¬ ful perversity. Then France's thought takes a more serious bent as he is drawn into the lists with Zola against ■ militarist and religious re¬ action as reveajed in the Dreyfus case. Of this good evidence is seen in (Crainquebille) (1903) ; (Les contes de Jacques Touxnebioche) (1908) and the political satires (LTle des pingouins) (1908) and (Les dieux ont soif) (1912) as well as in (1908) and in (Opinions sociales) (1902). All these books, whatever their form, are in effect criti¬ cism of contemporary life. He has himself said that he counts criticism as possibly the ultimate evolution of literary expression, well suited to a highly civilized society which is rich in old traditions, the last in date of all literary forms and destined to absorb all. All of them illustrate an idea of style which he has put admirably in (Le jardin d'Epicure) (1894). (CA simple style," he says, ((is like white light ; it is complex but does not seem so. In writ¬ ing what appears a beautiful and pleasant sim¬ plicity is really the result of careful arrange¬ ment and strict economy in the use of the various parts of speech." In this art of hiding his art France is almost supreme. See Le Crime de Sylvestre Bonnard. Consult an English translation of <Works) edited by Frederic Chapman (London 1908-19) already embracing 27 volumes. Of separate works there are many other versions. For criticism consult Michaut, G., (Anatole France/ (Paris 1913), also works by Brandes, G. (London 1908), by George, W. L. (New York 1915), and Shanks, L. P. (Chicago 1919).

Benjamin W. Wells.

THIBAUT, te-bo, or THEOBALD I,

king of Navarre : b. France, about 1200; d. 1253. He was educated at the court of Philip Augustus. As the Count of Champagne he is said to have been a lover of the queen of Louis VIII, whose death in 1226 Thibaut was suspected of having caused. He succeeded to the throne of Navarre on the death of his uncle, Sancho the Strong, in 1234. Going in 1239 to Palestine, he suffered defeat at Gaza. He left a reputation in literature as a trouvere whom even Petrarch and Dante, and other great poets praised. His poems, first pub¬ lished by Levesque de la Ravalliere (2 vols., Paris 1742), have appeared in

several later edi¬ tions. Consult Delbarre, (Vie de Thibaut* (1850), and Lavisse, Ernest, (Histoire de France) (Vol. Ill, part VI, Paris 1901).

THIBET, ti-bet'. See Tibet.

THIBODEAUX, teb-6-do', La., town, parish-seat of Lafourche Parish, on Bayou La¬ fourche, and on the Southern Pacific Railroad, 47 miles west by south of New Orleans and 60 miles south by east ot Baton Rouge. It is in an agricultural region in which the principal products are rice, sugarcane and cotton. The industries are connected chiefly with the cultiva¬ tion and shipment of cotton, rice, sugarcane and vegetables. It contains foundries, can¬ neries and ice plants. There are several private schools, among them Mount Carmel Academy, Thibodeaux College, and Guion Academy. Pop. 3,824.

THICKHEAD, a South American cater¬ pillar-eating bird of the family Capitonidce, so named because of the full-feathered and ap¬ parently excessive size of the head. The family is a large and handsome one, closely allied to the puff-birds, and sometimes united with them under the general term <(barbet." In other parts of the world <(thickhead" is applied to various other birds, especially in South Africa to the stonecurlew (Gidicnemns) of that region, translating the local Dutch name dikkop.

THIEF, one who steals or is guilty of theft; one who takes the goods or personal property of another without his knowledge or consent, and without any intention of returning them ; one who deprives another of property secretly or without open force, as opposed to a robber, who uses open force or violence. A burglar is a thief who forces an entrance into a building.

THIEF RIVER FALLS, Minn, city, county-seat of Pennington County, on the Great Northern and the Minneapolis, Saint Paul and Sainte Marie railroads, about 50 miles northeast of Crookton on the Red Lake and Thief rivers. It lies in an agricultural sec¬ tion which raises much wheat, has a flour mill, foundry, sash and door factory and iron works. The notable buildings are the Carnegie library and the municipal auditorium. Pop. (1920) 4,685.

THIERRY, ti-er'i (Fr. te-a-re), Amedee Simon Dominique, French historian and poli¬ tician: b. Blois, 2 Aug. 1797; d. Peris, 26 March 1873. As a young man he entered the service of the Minister o± Marine, and in 1828 became professor of history at Besangon. His ideas being ultra-liberal, his course was suspended by the Minister of Public Instruction. In 1830 he became prefect of the department of

Haute- Saone, and in 1838 returned to Paris, where he was appointed master of petitions addressed to the council of state. He held various other political appointments ; but continued his his¬ torical investigations in the special field he had chosen: the origins of French national history; the early peoples and the neighboring races ; and the conquest of the Gauls by the Romans. In 1841 he was elected a member of the 'nsti- tute; in 1860 he became a senator, and in 1868 he received the cross of the Legion of Honor. His works include (Histoire des Gaulois) (1828) ; (Histoire de la Gaule sous l'administration romaine *1 (1840-47); (Histoire d'Attila) (1856); /Tableaux de l'empire romaine) (1862); Recits de l'histoire romaine au Ve siecle* (1860) ; (Saint-Jerome) (1867), and ˆhrysostome et Eudoxie) (1873).

THIERRY, Jacques Nicolas Augustin,

French historian: b. Blois, 10 May 1795; d. Paris, 22 May 1856. He was educated in the Normal School at Paris in 1811, and in 1813 became teacher in a provincial school. The following year he quit this occupation and returned to Paris, where he embraced the so¬ cialistic views of Saint Simon, and became his secretary and his coadjutor in literary work, and in 1816 published a treatise of his own, (Des nations et de leurs rapports mutuelsP Perceiving the theoretical vagaries of his mas¬ ter, he separated from him in 1817, and became one of the conductors of the journal Le Cen- seur Europeen. Shortly afterward he became a contributor to the Courrier Frangais, in which, in 1820, he published 10 letters on the history of France, which attracted attention. His celebrated work on the Norman conquest of England, (Histoire de la conquete de l'An- gleterre par les Normands, *was published in 1825, and by the interest of the narrative, bril¬ liance of style and novel mode of treating the subject, attained great success both in France and in England. From his close application to work M. Thierry became in the following year almost entirely blind, and at the same time was attacked by a nervous disorder, but still pur¬ sued his literary labors. An enlarged edition of the letters formerly written by him for the Courrier appeared in 1827, under the title of (Lettres sur l'histoire de la France.) In 1830 he was elected a member of the Academy of Inscriptions and in 1834 published (Dix ans d'Etudes historiquesP About this time he was entrusted by Guizot, then Minister of Public Instruction, with the editing of the (Recueil des monuments inedits de l'histoire du tiers-etat,* for the collection of documents relative to the history of France. To this publication he pre¬ fixed an (Essai sur l'histoire de la formation du

tiers-etatp separately published in 1853. In 1840 he published (Recits des temps metrovin- giensP which gained for him the Gobert prize of the Academy of Inscriptions. There exist translations of his chief works in English. There is a complete edition of his works (10 vols., 1856-60). Consult Valentin, (Augustin Thierry) (Paris 1895).

THIERS, te-ar, Louis Adolphe, French statesman and historian: b. Marseilles, 15 April 1797 ; d. Saint Germain, Paris, 3 Sept. 1877. He studied law at Aix, and was admitted to the bar there in 1818. Desirous of a larger theatre for his ambition he went to Paris in 1821, and hav¬ ing got an appointment on the staff of the Con- stitutionnel, then the leading Parisian journal, he soon attracted attention by his articles in that paper. Journalism soon ceased, however, to supply sufficient stimulus to his active intellect, and he undertook his (Histoire de la Revolu¬ tion frangaiseP having as colleague Felix Bodin, whose name appeared with his in the first two volumes. The work was completed in 10 volumes in 1827. On the formation of the Polignac Cabinet, Thiers founded with Ar- mand Carrel and Mignet, the National, whose first number appeared on 1 Jan. 1830. The new democratic organ exercised a decisive influence on public opinion, and the famous ordinances, the signal for the revolution of July, were now issued. Upon this Thiers counseled the issuing by the journalists of a revolutionary manifesto.

It was signed by 43 names. To escape arrest Thiers fled, on the night of the 28th, to the neighborhood of Saint Denis, accompanied by Mignet and Armand Carrel. Louis-Philippe, becoming king of the French, Thiers was soon made councillor of state and attached to the department of finance. He was elected deputy for Aix, and after the death of Casimir Perier became Minister of the Interior in the Cabinet of Soult, October 1832. He next filled the offices of Minister of Commerce and Minister of Public Works and again became Minister of the Interior, but in consequence of differences with Soult and Gerard gave in his demission 11 Nov. 1834, but soon resumed office under Mortier. He again retired in February 1836, but a few days after returned to power as for¬ eign minister and president of the council. These offices, after many vicissitudes, he again held in March 1840. Taking a strong interest in the Eastern question he declared in favor of Mehemet Ali of Egypt against Turkey; but neither the king nor the chambers wished to resort to extremities, and the policy of Thiers having received a grave check he retired from the Cabinet 29 Oct. 1840. He now devoted him¬ self to historical pursuits, and his Ulistoire du Consulat et de 1'EmpireP begun in 1845, was completed in 1862, in 20 volumes. The revolu¬ tion of February, 1848, found him prepared to accept the republic; and he was a member, first of the

Constituent and then of the National As¬ sembly. After the coup d'etat of 1851 he was banished from France, but returned in August, 1852. After an absence of 12 years from public life he was chosen in the elections of 1863 dep¬ uty for the department of the Seine, and re¬ acted in 1869. In this position he regained much of his early popularity. He combated energeti¬ cally the project of war against Prussia, because France was unprepared, and after the disaster of Sedan visited the courts of London, Vienna, Saint Petersburg and Florence to seek assistance against Prussia, but all that he could obtain was a promise that the four great powers would support the proposal of an armistice. Thiers accordingly proceeded to the headquarters of the king of Prussia at Versailles to open nego¬ tiations for peace. But he was unsuccessful, and Prussia proceeded to a war a out ranee. On 17 Feb. 1871 he was elected chief of the execu¬ tive power of the republic, and on the 21st opened negotiations with Bismarck, which re¬ sulted in the peace with Germany. On 31 Au¬ gust the title of president was bestowed upon him and his term of office fixed at three years. He resigned 24 May 1873, whereupon Marshal MacMahon was appointed president. When MacMahon began to put himself in opposition to the republic, Thiers acted in complete har¬ mony with the republican chiefs of the two chambers, notably with M. Gambetta, to whom, on 3 Sept. 1877, he gave a meeting at Paris to read to him, and to several other politicians, a manifesto which he had just completed. But that very day he was attacked with congestion of the brain and died at night. Thiers was par excellence the representative of his country; a witty writer; and an accomplished debater. He was also genial, unselfish, large-hearted; and to establish the glory of France was the main secret of his measures and counsels.

THIEVES' ISLANDS

Besides the works already named Thiers vvas the author of (Histoire de la loi) (1826, English trans. 1859) ; (De la propriety (1848) ; AL Homme et la matiere> (1875). Consult Atkinson, F. M., (Memoirs of M. Thiers >

(Lew \ork 1916) ; Belot, C., (Le pouvoir exec- VA\osOUS le gouvernement de M. Thiers } (Biion 1908) ; Le Golf, Francois, (The Life of Louis Adolphe Thiers> (New York 1879) ; Hanotaux, G., (Le gouvernment de M. Thiers *(Paris 1903) ; Marcere, E. de, (L'Assemblee nationale de 1871> (ib. 1904); Simon, P. F., < Adolphe 1 hiers : chef du pouvoir executif et president de la Republique Frangaise* (Paris 1911) ; Zevort, Edgar, (Thiers * (ib. 1892) ; Mazade, (M. Thiers: cinquante annees d'histoire con- temporaine) (1884); Simon, <Thiers, Guizot Remusat *(1885); Remusat, P. L. E. de, (A. Thiers* (English trans. 1892).

THIEVES' ISLANDS. See Ladrones.

THILLY, Frank, American writer and educator: b. Cincinnati, Ohio, 1865. He was educated in the Ohio University where he grad¬ uated in 1887, and completed his studies in Ber¬ lin and Heidelberg. For several years he de¬ voted himself to teaching philosophy in Mis¬ souri University (1893-1904); psychology at Princeton (1904-06); philosophy at Cornell from 1906 on, finally becoming dean of the Col¬ lege of Arts. He edited the International Jour¬ nal of Ethics (1909) and was president of the American Philosophical Society (1912). He is the author of (Leibnitz' Controversy with Locke* (1891) ; Untroduction to Ethics) (1900) ; (The Proceeds of Inductive Infer¬ ence } (1904) ; (A History of Philosophy)

(1914). He also has translated Weber's his¬ tory of Philosophy ; (1896); <Poulsen's Intro¬ duction to Philosophy * (1885) and (A System of Ethics* (1899).

THIMBLE, a small metallic sheath or cap used to protect the end of the finger in sewing. Seamstresses use a thimble having a rounded end. Those used by tailors are open at the end. In the manufacture of thimbles coin silver is mostly used, generally silver dollars, which are melted and cast into solid ingots. These are rolled into the required thickness, and cut by a stamp into discs of any required size. A solid metal bar the size of the inside of the intended thimble, moved by powerful machinery up and down in a bottomless mold of the size of the outside of the thimble, bends the circular discs into the thimble shape as fast as they can be placed under the descending bar. The work of brightening, polishing and decorating is done on a lathe. Thimbles are said to have been found at Herculaneum, and were used by the Chinese at a very early period. Their invention in Europe is traditionally ascribed to Nicholas van Benschoten, of Amsterdam, in the 17th century. In mechanics, the name thimble is applied to various fixtures, such as a tubular lining through which a bolt passes, etc.

THIMBLE-EYE, a fish, the chub-mack¬ erel (q.v.).

THIMBLE RIG, or SHELL-GAME, a

sleight-of-hand or gambling trick, performed by means of three thimbles and a pea or three nut shells and a small wooden tube or box. The pea being placed on a table and covered

with one of the thimbles, the performer pro¬ ceeds to shift the

thimbles, covering the pea now with one, now with another, and offers to bet any bystander that no one can tell under which thimble the pea is. The person betting is seldom allowed to win, the pea being ab¬ stracted by sleight-of-hand. In the United States the trick is commonly known as the shell-game and is frequently played at race¬ track meetings, rural fairs and other gatherings.

THIONVILLE, te-oh-yel, or DIEDEN- HOFEN, de'den-hd-fen, Lorraine, an import¬ ant railway centre. 18 miles north of Metz. It stands in a level plain on the Moselle River. Its manufactures comprise gloves, thread and nets ; and there are sawmills and tanneries. Thionville is the seat of the Lorraine iron in¬ dustry. There is some trade in corn, hemp, flax, fruit, vegetables, grain, wine and wood. An important fair is held annually. In the Franco-German \War of 1870-71 Thionville was invested after the battle of Gravelotte, and after the fall of Metz it was besieged with vigor. On 25 Nov. 1870, it was occupied by the Ger¬ mans. It suffered severely by the siege. It was restored to France under the terms of the armistice of 11 Nov. 1918 and confirmed by the Treaty of Paris of 1919. Pop. 14,184.

THIRD CENTURY. The central interest of this period lies in the fact that the Roman Empire at the climax of its power and extent, just when presumably it ought to be consolidat¬ ing itself for a still greater .future, began slowly but surely to crumble under the attacks of the barbarians. Toward th6 end of the century the Goths in Dacia gave the first hints of that power to defeat Roman armies which portended so clearly the fall of the empire. In the last decade the Saracens, a predatory Arab tribe, who are usually supposed to come into history much later than this, began to make themselves felt. Inspired by Mohammed and unified by religious fanaticism in the 7th cen¬ tury they were to prove more fatal to the empire than even the Goths. The success of the barbarians was favored by the disorder consequent on elections of emperors by the Praetorian guards. Septimius Severus (em¬ peror 193-211) halted the barbarians for a while but Rome's decline and fall was inevi¬ table. Severus reigned with vigor as became ((the soldiers' emperor,** defeating his com¬ petitors Niger and Albinus, but cruelly putting to death large numbers of the adherents of his riyals, thus further demoralizing the time. His reign came in the midst of a financial crisis for the empire during which the government re¬ sorted to debasement of the coinage to bolster up its credit. Severus was the first of Rome's rulers to lay the foundation of a great private fortune. As emperor he was an extremely hard worker, always at w.ork by dawn, and de¬ voted long hours every day to the duties of his position. On his return to Rome in 202 he was greeted with a popular reception but refused a triumph and in spite of his

fortune always lived very modestly. Like Marcus Aurelius he attempted to found a dynasty and when he died at York (Britain), he bequeathed the em¬ pire to his two sons, Caracalla and Geta. Caracalla, having killed his brother, gave a frightful example of imperial misrule. Un¬ doubtedly insane,— nothing else could account

for his utter cruelty, — Gibbon terms him ((a common enemy of mankind.® During their father's lifetime the two sons had used the family fortune in racing and gaming, caring only to associate with gladiators and chariot drivers from the cirCus. To distract them Septimius planned the conquest of Caledonia and it was this that brought him to Britain, where he erected the wall known by his name between the Forth and the Clyde. After C'aracalla had expended the family fortune he went to the greatest length of cruelty and in¬ justice to secure more. One good result of his desire for money was the granting of Roman citizenship to all the provinces so as to secure the right to levy direct taxes and imposts on inheritances (215). In imitation of his father Caracalla visited the various provinces of the empire, but instead of benefiting from his stay, each in turn became the scene of his rapine and cruelties. Having heard that the citizens of Alexandria disapproved his mode of life he ordered a general massacre of the in¬ habitants. He was finally put to death by his soldiers in the East and was followed by a series of emperors in rapid succession, most of whom met violent deaths. Macrinus, who succeeded Caracalla, was put to death within a year by the soldiers. A feminine intrigue then seated Heliogabalus, an Oriental priest, on the throne. He was worse, if possible, than Cara¬ calla and his name has become a byword for utter viciousness. After four years he was succeeded by - Alexander Severus, who meant well and accomplished much, but the rule of Rome was now become a difficult task. He tried the expedient of paying an annual tribute to the Goths to keep them from molesting the empire. This token of weakness had, as might have been expected, exactly the opposite effect. Severus was murdered by a mutiny in the army (235) and was succeeded by Maximinus who bravely led his army against the Dacians and defeated them, but was assassinated by his own people near Aquilia the next year. Bal- binus and Gordian reigned very briefly, though Gordian defeated the Persians under Sapor before meeting death from Philip the Arabian who succeeded him in 244.

In 248 Philip was succeeded by Decius who bitterly persecuted the

Christians and was slain by the Goths who Invaded the empire the fol¬ lowing year. The Huns on the Caspian Sea come into history at this time as a new set of enemies for the empire. Emperors continued to succeed each other nearly every year — Gal- lus (251), ZEmilianus (253), Valerian (254) who five years later was defeated, made prisoner and flayed alive by the Persians. Then came Gallienus and the era of the Thirty Tyrants, none of whom deserve particular men¬ tion.

The most interesting character of the 3d century is Zenobia, queen of Palmyra (died 274). Her husband, Odeanthus, had set him¬ self up as ruler of Palmyra during the weak¬ ness of the empire in the time of the Thirty Tyrants, and she survived to continue his rule. Zenobia claimed to be a descendant from Cleopatra and her beauty was such that, if tradition be true, she far outrivaled the Egyp¬ tian queen. For a time during the disturbed state of the Roman Empire, she exercised sway over a large territory, boldly proclaimed

herself Queen of the East and bade defiance to Rome. The ruins of Palmyra were among the first to be excavated and studied in modern times and this gave the town a special interest. The Arabs had for long told wonderful tales of a ruined city in the Syrian Desert, but their description was of remains so extensive and magnificent that it seemed that there must be Oriental exaggeration in* their accounts. At the end of the 17th century, European travelers reached the site of Palmyra, however, and found that the Arabian stories minimized rather t-han exaggerated the truth. There was, for instance, a colonnade stretching almost a mile in length and many of the marble columns constituting it are still standing amid the sand of the desert.

Palmyra, as the inscribed monuments show, came into prominence about the beginning of the 2d century. Adrian took the city under his protection and on the occasion of his visit the name was changed to Adrianopolis. It was extremely prosperous a century later, its posi¬ tion between Parthia and Rome enabling it to trade with both. Under Caracalla, Palmyra received the jus italicum and became a Roman colony. After this, it was known as an im¬ portant military post on the eastern confines. When the emperors in the 3d century led armies to the eastern frontiers, Palmyra was a favorite stopping place. Some of the citizens received even the honors of Roman senatorship and one of them, in the disturbed times after the middle of the 3d century, made himself ruler of the city and came to be recognized even by the Romans as having a certain inde¬ pendence. Odeanthus made himself extremely useful in the wars against the Persians and the Syrians and was rewarded by a tacit recognition at least of his domination over all

the country from Armenia to Arabia. When absent on his expeditions, his wife, Zenobia, ad¬ ministered the government of Palmyra very successfully. Indeed, Aurelian, in one of his letters, ascribes to her the chief part in all her husband's successful career. She was an Arabian of dark beauty, black flashing eyes, pearly teeth and a strength which enabled her to accomplish marvels of physical endurance. She was as famous, however, for her intel¬ lectual talents as for her beauty. She knew a number of Eastern languages as well as Latin and Greek. Longinus, the famous Greek rhetorician whose Essay on the Sublime is so well known, had been her tutor in Greek. He had been invited to the court and remained faithful to her even in her misfortunes, suffer¬ ing death for his fidelity.

Odeanthus was assassinated probably at the instigation of the Roman Emperor Gallienus, and Rome proceeded to subdue the Palmyrenes who had ventured defiantly to style their ruler aKing of Kings and Restorer of the State.® Zenobia, nothing daunted, and used to admin¬ istrative emergency, took up the unequal contest with the Roman Empire. She held Egypt, Svria, Mesopotamia and Asia Minor as far as Ancyra. Other portions of the East were about to join her when the Roman army under Aurelian made its appearance and prevented further defections. In two great battles that were fought, Romans in Zenobia's forces bore the brunt of the losses. Summoned to sur¬ render after the second defeat, she made light

of her losses, saying that so far all who had fallen were Romans. Finally, she had to with¬ draw within the walls of Palmyra and Aure-han, in spite of the handicap of the desert, succeeded in maintaining the siege of the city! Finding further resistance hopeless, Zenobia at¬ tempted to escape, hoping to find a refuge in I ersia, but betrayed by the influence of Roman gold she was captured. Then Palmyra capitu¬ lated. All the treasures of the city were seized but the inhabitants were spared. Zenobia was taken to Rome to grace the conqueror's triumph but after this, instead of being put to death, she was given a villa outside of the city of Rome where she lived peacefully, with her children till her death, making many friends among the Roman nobility of the time. It is probably to her taste that is due the construc¬ tion of the beautiful architectural monuments ?f Palmyra which have made the city the sub¬ ject of so much of interest, while her own life tinged it with romance.

The end of the 3d century, after a long period of anarchy, was occupied by the firm reign of Diocletian, a self-made man, the son of poor parents, who owed his advance to his military genius. He reigned for some 21 years (284—305) and then (see Fourth Cen¬ tury) resigned and retired to a pleasant country estate not far from Dioclea, his birthplace in Asia Minor. When in the midst of the critical times for the empire which followed his abdica¬ tion, Maximilian, one of his successors, urged him to take up the imperial mantle again, he re¬ plied : «If you could but see the cabbages which I raise in my garden with my own hands, you would no longer talk to me of abandoning this happy spot for the Empire.® As might well be expected, the man who was capable of this could and did give the Roman Empire years of peace and prosperity, stained unfortunately by the persecution of the Christians, but that did not come until the beginning of the 4th cen¬ tury and under the influence of those who shared the empire with him.

While the 3d century produced no great authors a series of men wrote books that have attracted attention ever since. Plotinus (204- 270), the well-known Neoplatonic philosopher who studied at Alexandria and afterward taught philosophy in Rome, wrote his <Enneads) about, the middle of the century. He was an eclectic, borrowing from many sources, and is a Neo-Aristotelian as well as a Platonist and de¬ serves the name of Neo-philosopher His disciple Porphyry (233-305) wrote a life of Plotinus and also of Pythagoras, but is best known for his treatise «Against the Christians,® which was answered by Eusebius at the be¬ ginning of the 4th century. It is known to us only from Jerome's commentary and other Christian criticisms. Longinus (210-273), the author of the essay (On the Sublime) also be¬ longs to this time and spent most of his mature life at the court of Zenobia in Palmyra. He was . as we have said her chief counsellor and the instructor of her children but on the fall of Zenobia he was put to death as a traitor by the Emperor Aurelian. Jebb declared the es¬ say (On the Sublime) one of the best pieces of literary criticism in the Greek language. (See On the Sublime). Papinian, the greatest civil lawyer of antiquity, and Dio Cassius (155-230),

the Greek historian of Rome, both flourished during the first quarter of the century. Dio's whole work in 80 books was in existence

yywt 10th century> only some 25 books AAVI to LX now remain nearly complete with but fragments of the others.

Principal Events of the Third Century.

1. Septimus Severus invades Caledonia after conquest and 011 eatadllshment of military government in Britain.

Zii. Septimus Severus builds wall across Britain to exclude tneJNorthem Piets.

1. Assassination of Caracalla.

90ˆ’ Seliˆabaius ?*a“V. Alexander Severus reigns.

226 founded*1 Empire dlssolved- Sassanian Persian Empire

1. Death of Dio Cassius, the Greek historian of Rome.

2. Alexander Severus slain. Maximinus, a herdsman becomes emperor.

3. Goths invade the Roman Empire, defeat and kill the emperor Decius.

mu6 Persians take Valerian prisoner and flay him alive. 261. The Persians capture Antioch.

1. Germans invade Italy Claudius defeats the Goths. revoltnS mva<ˆe ˆsia ˆdlnor* Odeanthus and Zenobia

theˆtˆnneaˆls'ˆnUS’ ˆeopkltordc philosopher, author of

972* -r ar wdb Zenobia, queen of the East.

1. Longinus, philosopher and counsellor to Zenobia put to death by Aurelian.

V£- rvrCwn subdues Zenobia; yields Daria to the Goths. Z84. Luocletian and Maximinus joint emperors. The second Roman embassy reaches China. ool' £hf CeltS ˆFranks settle on the left bank of the Rhine. 292. Valerius and Constantius become coadjutors to Dio¬ cletian and Maximinus. The Roman empire divided into four parts.

1. Siege of Alexandria.

. . „ James J. Walsh,

Author of (The Thirteenth Greatest of Cen¬ turies, .>

THIRD ESTATE. See Tiers-Etat.

THIRD ORDER. See Tertiaries.

THIRD PARTIES. See - Vote, Voters, Voting.

THIRD RAIL. See Electrical Terms.

THIRD-RAIL SYSTEM, in electric rail¬ way construction, a method of supplying trains on an electric railway with current sent through a conductor located on the track and termed u ˆjr.d raˆ‘ the first electric system for

handling heavy traffic, it possesses unusual in¬ terest. In starting a train of five cars by elec¬ tricity, from 500 to 1,200 amperes are required

L

] -

// ˆ

r

1 tf il \

it m l

BSrr-l - 9—9 — 1

—

~9 - f - 1 — 8 - JT

“» » l » — r

Fig. 1.— Diagram showing typical load carried at power house of Metropolitan Elevated Railway, Chicago for 24 hours. ’

If such currents were passed through a trolley wheel, very excessive arcing would be caused due to the fact that the wheel touches the’

wire at only one point. The contact surface is not sufficient to carry this current, and burn¬ ing of the wheel and trolley wire would result.

With a sliding shoe, however, instead of a sin¬ gle point of contact, there is a surface about six inches long by two inches wide, and two of these in use at once under normal conditions. The third-rail system differs from the ordinary trolley road only in detail, the principle of oper¬ ation being similar. These details, however, are such as to make possible the application of electric traction to heavier trains than has been found practicable with the overhead trolley, and the system has thus broadened the field for the application of electricity to railway work, so as to bring it into successful competition with steam for the heaviest classes of service. The reasons for its general adoption on ele¬ vated roads were on account of the advantages peculiar to electric traction itself, namely:

1. Reduction in cost of power for handling trains.

2. Increase in passenger handling capacity.

3. A service more attractive to the public generally.

The reduction in the cost of power is ob¬ tained largely from the generation of power in a single central steam plant, instead of a great number of smaller plants, as with the steam locomotive system. On this point of economy the fuel bill is one of the large items in the operation of a railroad. With steam locomo¬ tives, such as were formerly used on the Chi¬ cago elevated roads, the only fuel available cost in the neighborhood of $3.50 to $5.50 per ton, whereas, in the modern power house, designed for electric railway systems, coal ranging from $1.25 to $1.75 a ton was burned with entire success during the period of low prices for coal. When to this is added the enormous loss in radiation from a large number of steam loco¬ motives, exposed as they are in running over the line of the road, and we compare this with the relatively small loss experienced with a well-constructed stationary boiler plant, it is not surprising that the cost for coal per car mile on the electric railways in Chicago is about one- third the cost per car mile with steam loco¬ motives. The comparison is particularly favor¬ able in Chicago on account of the ability to obtain a very cheap grade of coal directly from the Illinois and Indiana coal fields. In New York and other eastern cities, this difference is not so great, as coal delivered at those points is necessarily higher in price on account of larger freight charges. Besides the saving in the coal bill, there is a further gain by the use of large compound-condensing engine units. These large steam units having a comparatively steady load, develop power with a very much lower steam consumption than the small engines of a locomotive with their constant starting and stopping, and consequent cooling of

cylinders, etc. Another item in which a considerable sav¬ ing is made is in the cost of repairs and re¬ newals to the motor equipment as compared with locomotives.

The second advantage — increase in capacity for handling passengers — • is due, first, to the fact that with electric motors a much higher rate of acceleration can be obtained in starting trains, thereby increasing the average speed over a given line of road. The trains can also be handled with so much greater accuracy and precision that a much shorter interval is per¬

fectly safe, all of these directly contributing to the end of greater capacity.

The third item — service more attractive to the public generally — is proved by the facts of the absence of smoke and steam, and the great reduction in noise, these being especially impor¬ tant in systems passing through the heart of a large city, as is the case with elevated roads. In regard to the use of the third-rail system on interurban roads, the same general consider¬ ations apply as to the economy of operation, except that, trains being less frequent, the econ¬ omy in the power generation is not so great an item. There is another field for the third-rail electric railway system, which has been de¬ veloped by the New York, New Haven and Hartford steam road, and that is the use of light trains for suburban and interurban serv¬ ice on many of their branch lines.

One of the most difficult problems in equip¬ ping an electric railway system is the propor¬ tioning of the total capacity of a power house to the number of cars run, and the subdivision of this total capacity into proper-sized units. In order to determine these points, it is necessary to be able to estimate the maximum loads that will have to be carried during the rush hours and the minimum loads during midday and mid¬ night. The maximum load does not always de¬ pend upon the total number of trains run, as on some lines more than half of these trains will be running light in one direction in order to carry the crowds back on their return or vice versa. In subdividing the total capacity of a power house, it is desirable to have a single unit which will carry the minimum light load with reasonable economy. The load on a power house operating in connection with an elevated railway system varies not only from a maxi¬ mum during rush hours to a minimum during off hours, but also momentarily during the start¬ ing and stopping of trains, these fluctuations being most violent when the least number of

Hg. 2. Diagram showing fluctuations in the consumption of electrical energy on the Metropolitan Elevated Rail¬ way, Chicago, at short intervals from 5 a.m. to 9:30 A.M., ranging from 1,700 to 7,000 amperes.

trains are in service. Under the worst condi¬ tions, this rate will vary from 300 amperes to 4,000 in 15 seconds, or the reverse. It is neces¬ sary, therefore, that all parts of the engine

should be especially heavy, particularly the fly¬ wheel, in order that sudden changes in the load should not interfere with the proper regulation of the engine speed.

The accompanying diagram, Fig. 1, shows a typical load curve at the power-house. Curve A is that of the trains in service. Curve B shows the additional amount of energy for heating the cars, with heaters only partly turned on during the rush hours ; while curve C gives the total load with heaters turned on full dur¬ ing the rush hours. The high peaks of the curve occur at the rush hours of travel.

The second diagram, Fig. 2, shows the vio¬ lent fluctuations in the demand for electrical energy for operating the trains.

In the third-rail system the use of the ordi¬ nary track rail for the conductor was largely a matter of convenience in the first case, as rails were the easiest form of steel to obtain in rea¬ sonable lengths, and their shape was such as to lend themselves to the various requirements of attaching bonds, angle bars and insulating sup¬ ports. The value of an ordinary commercial steel rail as an electric conductor, as compared with copper, is about 10 or 12 to 1, with of course the additional disadvantage against the rail of the necessity of the frequent bonding, the rails usually coming in 30-foot lengths. To offset this lower carrying capacity, however, compare rails at $17 per ton with copper at $360 per ton, and it can be seen that one can afford to put in the larger amount of steel re¬ quired for a given electrical capacity and still have a good margin in favor of the rails. A commercial 80-pound track rail has a carrying capacity about equal to an 800,000 centimeter copper cable. In purchasing the contact rails for the extension of a western railway line, they were made of steel of a special chemical composition, having a higher electrical carrying capacity than the ordinary commercial steel rail. The com¬ position

was obtained after a series of experi¬ ments conducted for the Manhattan Railway in New York, with a view to getting the best possible conductor with a composition of steel that could be successfully rolled into rails. The use of this composition results in a steel rail so soft as to be unfit for ordinary railway serv¬ ice, but the conductivity is raised so that, com¬ pared with copper, the ratio is about 8 to 1, as against 12 to 1 for ordinary commercial steel rails.

THIRLMERE, therl-mer, England, a long and narrow lake in the mountains of Cumber¬ land County, in the centre of the Lake District, northwest of Mount Helvellyn, between Der- wentwater and Grasmere. It is three miles long by a quarter of a mile wide. The city of Man¬ chester bought and converted it into a reservoir for its water supply, and the system, begun in 1886, was completed in 1894 at enormous expense.

THIRLWALL, therl'wal, Connop, English prelate and historian: b. Stepney, Middlesex, 11 Jan. 1797; d. Bath, 27 July 1875. He was edu¬ cated at the Charter-house and at Trinity Col¬ lege, Cambridge, where he obtained a Fellow¬ ship. He afterward studied for the law and was called to the bar in 1825. Having ex¬ changed the law for the church he was ordained in 1828, and some years after received the living of Kirby Underdale, in Yorkshire. Here

he added to his pastoral duties a variety of literary labors. The first of his works, pub¬ lished by himself (his father had previously issued a number of essays and poems written by him in extreme youth), was a translation of Schleiermacher's (Gospel of Saint Luke,> to which he prefixed an introduction. This work appeared anonymously in 1825. His next work was a translation of the first two volumes of Niebuhr s c History of Rome,' with Archdeacon Hare (1828— 31). Then followed the work to which he chiefly owes his reputation, his 'ˆHis¬ tory of Greece,) the first edition of which ap¬ peared in Lardner's (Cabinet Cyclopaedia, J in eight volumes, between 1835 and 1844. It was well received, and before the appearance of Grote s history (the first two volumes of which were published in 1846) was without a rival in the English language. Grote himself praises it for the learning, sagacity and candor it dis¬ plays, and said that if it had appeared a few years earlier he should probably never have conceived the design of his own work. In 1840 Thirlwall was presented by Lord Melbourne to the Welsh bishopric of Saint David's, which he resigned a little more than a year before his death. He was for a time one of the editors of the Cambridge (Philological Museum, > and during the closing years of his life was a mem¬ ber of the committee for the revision of the Old Testament. He was one of the bishops who spoke and voted for

Gladstone's bill for the disestablishment of the Irish Church. Con¬ sult Perowne, (Remains, Literary and Theo¬ logical, of Connop ThirlwalP (London 1877- 80) ; Thirlwall, (Essays, Speeches, and Ser- mons) (1880); Stanley, (Thirlwall's Letters to a Friend > (London 1882) ; Morgan, (Four Bio¬ graphical Sketches) (1892); Clark, (01d Friends at Cambridge and Elsewhere) (1900).

THIRST, a craving for water or other drink. As appetite shows a need for the intro¬ duction of food into the system, so thirst is a sensation indicating the necessity of an in¬ creased supply of water. This sensation is referred to the throat, yet it is not a purely local feeling, but an index of the wants of the tissues at large, for thirst cannot be allayed unless the water swallowed reaches the stom¬ ach, is absorbed and Carried into the blood. Thirst may also be relieved by the direct intro¬ duction of water into blood-vessels or by rectal injections of it, or by its absorption through the skin. How long the demands of thirst may be successfully withstood cannot be stated defi¬ nitely, since human beings as well as the lower animals differ among themselves, and under varying circumstances of climate, etc., as to the degree of tolerance. Certain it is that of all substances a regular supply of water is most essential to the maintenance of life. If de¬ prived of it for even 8 or 10 hours, greater in¬ convenience, pain and debility are suffered by an individual than from an equal deprivation of solid food. As thirst is but the expression of a dearth of water in the tissues, any condition which causes a more rapid elimination of water than usual will increase thirst. Such is the effect of severe muscular exercise, especially, for example, the exertion in a heated atmos¬ phere habitual with stokers, iron-puddlers, etc. Thirst is also increased by certain articles of food, excess of salt or sugar, for example: in

febrile disorders; in severe diarrhoeas and haemorrhages; in diabetes; in acute gastritis; in polyuria; in certain forms of hysteria, etc.

For allaying thirst nothing is so grateful as pure cool water, sipped a little at a time. Sweet drinKS are not as effective in relieving thirst; but the vegetable acids in oranges, lemons, grapes, limes, etc., have a tendency to allay thirst, and to lessen the desire for large quan¬ tities of fluid, since the acid provokes an in¬ creased flow of saliva. Toast-water, small pieces of ice, effervescent drinks and dilute phosphoric acid alone or combined with a little aromatic bitter are also of value. In fever, cleansing the mouth, and swabbing it with glycerine, borax

and water is of more service sometimes than drinking large quantities of water.

THIRTEENTH AMENDMENT. See

Constitution of the United States; Con¬ stitutional Amendments, History of.

THIRTEENTH CENTURY. John Fiske in (The Beginnings of New England) terms this period ((The glorious thirteenth century"

. . . <(a wonderful time, but after all less

memorable as the culmination of mediaeval empire and mediaeval church than as the dawn¬ ing of the new era in which we live to-day." John Morley said, ((I want to know what men thought and did in the thirteenth century — be¬ cause the thirteenth century is at the root of what men do in the nineteenth century." Free¬ man (The Norman Conquest* calls it <(The age of wonders . . . which wrought the body

politic of England into a shape which left future ages nothing to do but to improve in detail." Frederick Harrison in (A Survey of the Thirteenth Century) declared ((Of all the epochs of effort after a new life that of the age of Aquinas, Roger Bacon, Saint Francis, Saint Louis, Giotto and Dante is the most spiritual, the most really instructive, and in¬ deed the most truly philosophical." It would be hard to find a group of men so different in character, ways of looking at things and in¬ dividual intellectuality, so concordant in their estimate of an important period of history as these expressions indicate, but similar apprecia¬ tion might be quoted from Macaulay, Green, Bishop Stubbs, Carlyle, Walter Scott and many others.

The century has been hailed by many as the greatest in the history of humanity. Nothing shows more clearly the recent change in estima¬ tion of the Middle Ages than this. No phase of human achievement in the intellectual and artistic side of man is lacking in this age; many are represented by products that surpass all others. In painting and sculpture, in archi¬ tecture, in the minor arts and crafts, in litera¬ ture, in philosophy, in education, in social work, even in the building of hospitals and the care of the ailing, and most surprising of all in medical education and surgery, there was a wonderful accomplishment at this time, the history of which was concealed from us until compara¬ tively recent years by an exaggeration of in¬ terest in classical antiquity and in the Renais¬ sance. Just in proportion as we have become deeply interested once more in art, architecture, the

arts and crafts, in sculpture and handsome public buildings, in the home and the city beautiful, we have learned to realize how many

of the ideals we are striving for now Were accomplished marvelously in this late mediseval century. Generations which themselves had lost or impaired these higher interests, affected to condemn this old time. It was grouped among the “Dark Ages,” though we now know it to have been in John Fiske’s expression one of the <(Bright Ages.”

The central interest of the century and its greatest triumph was the Gothic cathedrals. In England and France particularly, but also in Germany and Italy there arose in the early part of the century some of the most beautiful edifices ever built by man. The generations solved the architectural engineering problems of these huge constructions with absolute suc¬ cess. The decoration of them made a universal appeal and for sheer beauty and suitability has never been excelled. The sculpture on the fagade of many of these Gothic cathedrals as at Amiens, Chartres, Rheims, is among the greatest plastic work in the history of art. The figure of Christ over the main door at Amiens has been declared the most beautiful presenta¬ tion of the human form divine ever made. Every phase of cathedral decoration took on the perfection of its sculpture. The carved stone work, the hammered iron of the gates and grilles, the very hinges and latches of the doors, the brass and bronze work in connection with the altar, the bells, the stained glass, all approached perfection so closely that they have been objects of deep admiration ever since whenever men have been profoundly interested in the arts and crafts. The stained glass has never .been excelled and is still an object of al¬ most reverential respect, some of it unapproach¬ able in its beauty.

All the fittings and furnishings of the cathe¬ dral, even the least obtrusive, partook of the same surpassing qualities. Dark corners were not left unfinished for it was the house of God. Every detail was the object of loving devotion. The needlework of the time is probably the best in history. The cope of Ascoli (circa IzbU) is looked upon as the most beautiful ever made. The church vestments and hangings were charmingly worked. The precious vessels for the altar were gems of the metal workers’ art of exquisite line and form, delicately finished and appropriately set with jewels. The Mass books, as well as the Books of Hours, used by the educated worshippers, were so beautifully illuminated that they have been marvels ever since and command high prices in the auction-rooms. Manifestly, there was nothing that the people of the time wanted to do well which they did not accomplish with a marvelous perfection. Their domestic and municipal furnishings partook of the same ex¬ cellence. The very

utensils in the kitchen were beautiful as well as useful and the combination of the two qualities in ordinary life has been declared the criterion of culture in the hearts of a people.

The historic life of the century centres around the cathedrals very much as their social hfe centred around it in the cities and towns, iheir education came into existence as the de¬ velopment of cathedral schools and these were usually placed under the rectorship of the chancellor of the cathedral. The stadia qcvi- eralia, as the universities were called

because they provided education in so many different subjects, grew into their modern form- during the courses of the cen¬ tury. At the beginning a few cities, Salerno, Montpelier, Bologna and Paris and one or two others, had rather important schools of special subjects around which various faculties gradu¬ ally gathered. By the end of the century there were some 20 important universities in our modern sense of the word with large under¬ graduate departments and as a rule the three graduate departments of theology, law and medicine. The course of study for under¬ graduates was summed up by Huxley in his in¬ augural address as rector of Aberdeen Uni¬ versity: <(I doubt if the curriculum of any modern university shows so clear and generous a comprehension of what is meant by culture as this old trivium and quadrivium A The seven liberal arts, as the trivium and quadrivium were also called, constituted the undergraduate university studies of grammar, logic and rhetoric, geometry, astronomy, theology and music.

All of these subjects were treated from a scientific standpoint and these were really scientific universities. The study of the classics as the basis ot undergraduate education did not come in until the Renaissance time. Hence Huxley's candid admiration for these old-time universities so that he did not hesitate to say that <(their work brought them face to face with all the leading aspects of the many-sided mind of man.® The philosophical teaching particularly anticipated many modern ideas. Matter and form as the explanation of the composition of matter resembles the modern physical chemistry theory that all matter con¬ sists of an underlying substratum the same in everything and differentiated into various sub¬ stances by the dynamic elements which enter into it. The scholastics taught that matter and force could be annihilated by the power that brought them

to existence, but not destroyed by any human agency, thus anticipating the modern experimental demonstration of the in-destructibilitv of matter and the conservation of energy. They faced the ethical problems of mankind, especially those which concern social relations, exactly in the same spirit which the modern world, after a rather long interval of failure to recognize human rights as superior to those of propertv, has come around to again. In writing on capital and labor for our time Pope Leo XIII quoted the ethics of Saint Thomas Aquinas, drawn up more than six cen¬ turies before.

The numbers in attendance at the universi¬ ties at the end of this century were probably larger in proportion to the population of the various countries than at any time in the his¬ tory of education down to our own day. The universities of Bologna and of Paris had, dur¬ ing the last quarter of the century, more students than any university of modern times. Oxford and Cambridge were more numerously attended than at any time afterward. Some of the students were boys of 12 or 13 but gradua¬ tion was earlier than with us as it is still in most foreign countries. On the other hand many mature students remained at the univer¬ sity for years listening to a favorite professor or working up some special theme. The literary output of the universities in philosophy and

theology as well as from the graduate depart¬ ments generally was extensive. Original work was encouraged, though it was the subject of severe criticism. Groups at various universities were engaged in encyclopedic research and publication. A series of summas of knowledge in general and of special departments was made.

The discipline of the immense numbers of students represented a problem which was solved by sharing disciplinary regulation with students committees chosen by the Nations, that is, the organizations of the students from particular parts of Europe in attendance at the university. The Nations were fraternal unions which helped the student when he first came to the university to orient himself and get settled for his university work. They protected students against impositions and furnished in¬ formation with regard to courses and pro¬ fessors. Many of the features of modern life at our universities were thus anticipated. Initia¬ tions accompanied by hazing were common practices and the Nations provided recreation of various kinds. On the other hand when students were ailing or when remittances from home were delayed by the vicissitudes of the times, help was provided and students were tided over crises in their affairs. A number of abuses crept into university life through these organizations and conflicts between town and gown are noted before

the end of the 13th cen¬ tury, but it was later in the historv of univer¬ sities that these became so intolerable as to demand correction. In the early history of the universities the students were as important a factor at least as the faculty and new univer¬ sities were often founded by the withdrawal of dissatisfied students to some other town.

The graduate schools were the most im¬ portant departments of the universities. In theology, Saint Thomas of Aquin or Aquinas has been an authority ever since and the con¬ tributions which he made to philosophy have been the subject of enduring interest. There was a magnificent development of law through¬ out the various countries and a corresponding evolution of the teaching of law. Canon law particularly was taught with a scientific thor¬ oughness unequalled before and unsurpassed since. It became the basis of all European law. The medical schools are, however, the special surprise for our time. Early in the century the Emperor Frederick II made a law for the Two Sicilies requiring students of medicine to spend some three years at the university pre¬ liminary to their medical studies, and then four years at medicine, followed by a year of prac¬ tice with a physician before they were allowed to practise for themselves. That is a modern standard re-established but recently after a long interreguum. Salerno, the first university medical school, set the example in teaching and insisted on the employment of the natural means of cure, fresh air, water, diet, exercise and oc¬ cupation and diversion of mind. These are all emphasized in the famous Regimen Sqnitatis Salernitanum, issued at Salerno about the be¬ ginning of the century and published in some 300 editions since the invention of printing. It was the most read popular book on medicine for centuries, republished many times even in the last century. The textbooks in surgery extant from this time have been a revelation. The surgery of the four masters of Salerno

who collaborated in the work quite after the modern fashion of textbook writing is surpris¬ ing in its anticipation of modern surgery. We have* besides, the book of Theodoric of Lucca and of Bruno of Longoburgo as well as of William of Salicet, Lanfranc and Mondeville. In these, anaesthesia,— through mandrake and opium, antisepsis by the use of strong wine — they boasted of union by first intention — and a great many of the operations, especially a whole series of intra-abdominal and intra¬ cranial operations, as well as many instruments

and modes of treatment considered to be modern are described. In the large, very well- planned hospitals of the time, with' finely organized nursing, many operations undreamt of in the intervening centuries until our gen¬ eration were successfully accomplished, 1 not merely as emergency interventions, but to save suffering and prolong life.

The names of the teachers in these gradu¬ ate schools, Albertus Magnus, Thomas Aquinas, Roger Bacon, Bonaventure, Duns Scotus and Alexander of Hales, are probably better known than any group of teachers in history. In¬ stead of losing prestige in the course of time they have gained repute in recent years with increase of interest in the mediaeval period. Albertus Magnus is the only scholar in history with whose name the adjective great has become incorporated as if it were a family name. He was a man of the widest interests, intent on testing all knowledge carefully. Humboldt pointed out how much he knew about physical geography, physics, climatology and the phvsiol- ogv of plants. Meyer the historian of botany declared ((No botanist who lived before Al¬ bertus could be compared with him unless Theophrastus with whom he was not acquainted, and after him none has studied plants so pro¬ foundly until the time of Conrad Gesner and Caesalpino.® Albert discussed scientifically the Milky Way and its significance, the irregulari¬ ties. in the moon's surface, lunar rainbows, various kinds of refraction and many other problems supposed to be modern. His great pupil Aquinas, adopting Aristotle, laid down the metaphysical principles which are now coming to be recognized as fundamental ideas in the physical and social sciences. Hence a great re¬ vival of study of his works. Even more im¬ mediately interesting than these to the modern world is Roger Bacon, the international cele¬ bration of whose 700th birthday attracted so much attention at Oxford in June 1914. Bacon probably invented gunpowder, suggested that explosives might be used for motor pur¬ poses, — boats running without oars or sails and carriages without horses,— discussed the theory of lenses, declared that mathematics and experiment were the two important factors for advance in science; anticipated modern ideas as to Biblical revision, insisted on the value of Greek and Hebrew for education, declared that light travels with appreciable velocity and spoke with assurance of aviation. It is clearer than ever now why the people of his time called him Doctor Admirabilis, the admirable teacher.

A feature of 13th century education most interesting for our time is the feminine educa¬ tion of the period. At Salerno in southern Italy women were encouraged to study even medicine during the 12th century and the department of

women's diseases was in their charge. We have many licenses to practise medicine in the Two Siciles granted to women at that time still ex- tai.it. At Bologna at the end of the 12th century the daughter of Irnerius the great teacher of law became an instructor in the law school. All of the Italian universities had women teachers on their staff. The unfortunate Heloise and Abelard incident at Paris seems to have given a serious setback to feminine education in the universities of the west of Europe, but in Italy the custom established in the 13th continued, and there have been women professors at the Italian universities every century since.

The literature of the century is the proof of the intellectual quality of the time, for it was not only great but widely read. Its value will be best recognized from the fact that prob¬ ably well-read people know the works of the 13th century better than of any other, except their own, though they are often not quite con¬ scious of the fact, not having noted the dates. The enduring work of the time begins with the Arthur legends put into fine literary form by Walter Map or Mapes, just as the century be¬ gins. To him we owe Lancelot. ((Like Paris, handsome, and like Hector, brave, }) but with a fault that makes him even more appealing, so that probably he is the most interesting charac¬ ter of fiction ever created. Then came the ballads of the Cid in Spain, followed by the Nib el ungen lied with the Meistersingers and Minnesingers and then the Troubadours and Trouveres with the Romance of the Rose and Renard the Fox in what we call France and, finally, the Trovatori in Italy, cul¬ minating in Dante who, the greatest of the Trovatori, was just ready to write what has often been proclaimed the great¬ est poem of all literature, as the century closed. Such other writers as Villehardouin Joinville, Matthew of Paris, the earliest en¬ cyclopedists, Vincent of Beauvais, Thomas of Cantimprato, Bartholomew the Englishman and such works as that of William of Durandus and Jacobus de Voragine of the Golden Legend are perennially interesting. The century has also the greatest of the Latin hymns, the (Dies ~ras»). ˆhe *Stabat Mater, } the marvelously beautiful religious poetry of Saint Francis him¬ self of Saint Thomas Aquinas, of Bernard of Morlaix and of Saint Bonaventure.

The century saw the publication of what must be considered the first of encyclopedias. Vincent of Beauvais, under the patronage of Louis IX, with the aid of a great many young assistants of the Dominican Order whose ex¬ penses were generously defrayed by the king, was enabled to gather an immense amount of information for his time. In spite of the dif¬ ficulty of hand transcription, his work extends to over 50 of our volumes octavo. The matter is well chosen and of wide interest, and the surprise is how many things supposed to be much

more modern in human knowledge are to he found in Vincent. Pagel declared «the reading of the work easily becomes absorbing*

The century provided a magnificent series of contributions by explorers to the knowledge of the world at that time. Travelers in the Near and the Far East told the stories of how other people lived and their books still extant demon-

strate what excellent observers they were. The greatest of these explorers was Marco Polo, whose name > was for so long a by-word for credulity and tendency to exaggeration, who proves now, like Herodotus, to have had a basis ® PI? J5pth for ull that he told. He visited the Christian kingdom of Abyssinia as well as China and nearly all the world between He told of Burmah, of Siam, of Cochin China, of Japan, of Java, of Ceylon and India and he had heard interesting accounts of the coast of Zan¬ zibar and distant Madagascar and at the oppo¬ site end of the world of Siberia and the shores of the Arctic Ocean. Colonel Yule, a modern authority on the literature of travel, can scarcely find words to praise Polo enough. There were many other famous travelers whose works have come down to us from the century and are republished in recent years. Friar John of Car- pini went on a mission to the Tatar emperor of the time, across the Ural Mountains and River past the northern part of the Caspian Sea[across the Jaxartes, along the Dzungarian lakes to the Imperial camp near the Orkhon River. Friar William of Rubruk or Rubruquis, the account of whose travels was printed by Hak¬ luyt in his collection of voyages at the end of the 16th century, went even further. Some of his. observations, as for instance on Chinese writing, are surprising enough, but he has many details of Asiatic nature, ethnography, manners, morals, commercial customs, that were true to life. Friar Oderic a little later traveled through India and then through China to Nan¬ kin and Peking, reached the Great Wall, en¬ tered Tibet and appears to have visited Lhasa. Sir John Mandeville (15th century) borrowed much from him, as well as from the Prsemon- stratensian monk Hayton. Most of the men who thu9 wandered in distant lands were gradu¬ ates of the universities of the time and while they were credulous with regard to what they heard, very much as Herodotus himself, they could be absolutely depended on for informa¬ tion with regard to things which they them¬ selves had seen.

Besides the intellectual education which came in the cathedral schools

and their develop¬ ments at the universities there was a great phase of popular education along artistic lines which was initiated in the midst of the build¬ ing of the cathedrals. Most of the beautiful things in the great Gothic churches were made by workmen of the little mediaeval towns in which they were built. None of these had more than a few thousand and probably did not average 10,000 inhabitants. Somehow ar¬ tistic artisans to do all the beautiful work de¬ manded were found and there was the popu¬ lar taste to appreciate and the diffusion of lib¬ eral . education to patronize and encourage the making of such beautiful things. There are receipted bills for the payment to village black¬ smiths and village carpenters, for iron and woodwork, which we now rank as artistic mas¬ terpieces. Practically all the decorations and fittings of their cathedrals were executed by the townsmen themselves and even their bells and stained glass were made at home, not brought from a distance. Transportation diffi¬ culties threw them back on themselves and compelled technical developments while trans¬ portation facilities in our time have had an

opposite effect. To secure the making of such beautiful things there had to be a skilled and We,,iaineci &rouP of artisans. There has probably never been a time when the arts and crafts, in our modern sense of that term, have r>een so appreciated and cultivated. In this culture the working classes were probably the most important factor. Technical training was provided by the guilds. Boys were ap- pi enticed to trades and crafts of various kinds, and after four or five years of training became join neymen and traveled from place to place to learn the secrets and customs of their craft in the various regions. After two or three >ears of this on the presentation and accept¬ ance of an example of their work called a masterpiece — this is where this old English word comes from — they were admitted as master workmen into the guild. This repre¬ sented a degree in technics. The guild training was practically a technical school and as the guilds existed everywhere opportunities for arts and crafts education abounded. Any growing youth who had taste or talent for any form of artistic work could easily secure the opportunity for its development and then, more important still, obtain the chance to do his work in conditions where encouragement and appreciation would come to him. In England at the end of the Middle Ages there were 30,000 guilds (Toulmin Smith), the county of Nor¬ folk alone having 900, the small town of Wy- mondham having 11 still known by name. One of them possessed a guild hall. All the guilds of the town are said to have been «well en¬ dowed with lands and tenements.® In Bury Saint Edmunds, Suffolk, there were 23 guilds; Boston, Lincolnshire, had 14

of which the titles and particulars are known and London had a large number. The guild had increased in num¬ ber greatly from the 13th century but there is definite evidence that most of the important guilds in existence in England at the end of the 15th century had been in existence for several hundred years. During this time they had accumulated very large amounts of money and invested funds of various kinds, not so much from the fees paid by their members as from bequests of various kinds made to them because it was felt that they were doing great good work. Unfortunately it was this accumu¬ lation of money that led to their legal destruc¬ tion, though a few of the London guilds which were spared in the time of Henry VIII on the plea that they were trading or secular associa¬ tions and not religious organizations have at the present time an income of over $50,000 per year each. The old guilds were trades unions, social clubs, insurance societies, civic organizations, popular entertainment commit¬ tees, but withal religious sodalities enforcing fulfilment of religious duties yet not permit¬ ting the clergy to hold office or dominate policy.

The social history of the time is its most interesting feature for our era. The beginning of the period saw the rise of the two great mendicant orders, the Begging Friars, the Fran¬ ciscans and Dominicans. A world so deeply intent on commerce as to give rise to Hansa and the great Italian commercial cities was afforded the example of two large bodies of men who took voluntary poverty for their lot so as to be free to do better 'things in life.

The coming of the Friars in such an age pro¬ duced a deep impression. Saint Francis is one of the most lovable men of all history. A young man who, during convalescence from a severe illness, learns in Dean Stanley's words that <(the world looks very different when viewed from the horizontal,® gets up from it, resolved that the fascination of trifles shall not obscure the good things of life. He proceeded to for¬ get all about himself and his personal interests and found that all the world began to think of him. He got so close to the heart of nature that it is not surprising that we have legends that the birds and the fishes, and even the wolf of Gubbio h-arkened to him. He gathered around him a group of men forever famous for their absolute simplicity of life and for their refusal to let selfish motives rule them in any way. Such a life might seem too ideal to have any practical influence over man¬ kind, and, above all, too mystical to make any appeal except to a mediaeval world, yet literally dozens of

lives of Saint Francis have been written in our very busy practical age. Prob¬ ably never since his own time has there been so many people, and above all so many whose opinion is of value, ready to proclaim Saint Francis one of the most wonderful characters of humanity as in our era of crowded interests. The love for Lady Poverty of the ((little poor man of God,» as he loved to call himself, has appealed to all religious and poetic souls ever since. No wonder that Dante has made such a brave figure of him in the < Divine Comedy, } and placed beside him as equal in influence and power the great founder of the Dominicans.

The development of hospitals in the 13th century has been the subject of much study in the modern time. Virchow particularly has shown that there was probably scarcely a town of 5,000 inhabitants or more in Germany which did not have a hospital. He attributes this great development, more marked even in other countries than in Germany, to Pope Innocent III who founded <(the hospital of the Santo Spirito by the old bridge across the Tiber and blessed and dedicated it as the future centre of a universal humanitarian organization.® Pope Innocent summoned Guy of Montpelier to Rome, having heard that he was in charge of the best organized hospital of the time, built Santo Spirito under his direction and then when bishops come to Rome, as they had at regular intervals, he commended the hospital of Santo Spirito to their study and recommended, where it was virtually a command, that there should be a hospital as far as possible like that, ac¬ cording to conditions in each locality, in every diocese in the world. Many of these hospitals were beautifully built. Municipalities con¬ structed them for their citizens and they were public buildings, part of the scheme of the city beautiful which so many mediaeval cities cherished. In smaller places hospitals were often built by the nobility and Virchow has called attention to the number of them con¬ structed under the patronage of the family to which Saint Elizabeth of Hungary belonged. Her hospital at Marburg not far from where the beautiful church erected in her honor a few years after her death now stands, was a model for others. The hospital in Siena, added to (14th century) in memory of Saint Cath¬

erine, was another centre of charitable influ¬ ence. The sister of Saint Louis of France, Marguerite of Bourgogne, built a beautiful hospital at Tonnerre, which Viollet le Due has figured in his dictionary of Architecture.* This shows how well these hospitals solved the problems of hospital construction which we have realized again in the modern time. There was a fine organization of nursing in these hos¬ pitals under the care of religious orders of men and women, especially the Augustinians. How well their work was done can be best ap¬

preciated from the great development of sur¬ gery which took place at this time, for good surgery is impossible without good hospitals and good nursing. Portions of many of these hospitals remain as evidence for what they were.

With a notable development of social serv¬ ice during the century and the opportunity afforded for feminine education, it is not sur- p rising that the names of a series of women of this time are well known, indeed their prestige has been growing constantly in this last genera¬ tion just in proportion as similar opportunities are afforded in this century. Saint Elizabeth ˚f Hungary is probably the most famous and the beautiful cathedral erected in her honor at Marburg within a few years after her death, one of the handsomest monuments ever raised to a woman, is the testimony of her generation to their affectionate regard for the «dear Mrs Samt Elizabeth® (Frau Heilige Elisabeth) as they quaintly called her because she was just a Wife and the mother of four children who though she died at 24, had found time to do great good work for the poor around her. Queen Blanche of Castile, the mother of Saint Louis of France, was another wonderful mother of the time. Her great son attributed all that he was to his mother's training. She was an administrator of high ability who lifted France out of a period of threatened anarchy to pre- serye his kingdom for her boy, and yet declared that she would rather see him dead at her teet than know that he had committed a mortal sin 1 he great women of the time came not only on thrones but also among the middle classes. Another mother of the time whose name is lecalled in veneration was the wife of a London tradesman, Mabel Rich, whose son, saint Edmund of Canterbury, one of the most sterling characters of the time, a scholarly churchman, made archbishop, went into exile rather than submit to a tyrant king. Edmund tells how the poor around his mother's home in London blessed her for her charity and was quite frank that he owed nearly everything in life to her. Another distinguished English¬ woman whose name has come down to us from this time is Isabella, the famous Countess of Arundel. She did not hesitate to admonish even the king himself, Henry III, when he was violating the liberties of England. Matthew Paris says that with a dignity which was more than that of woman she reminded the king that many times he had extorted money from his subjects and not kept his word and the rights of Englishmen were written down and he was violating them. With the revival of interest in Saint Francis there has come a parallel rebirth of admiration for Saint Clare of Assisi who at the age of 17 left home to have Saint Francis teach her how to live a life

that would not be wasted in worldliness. Her mother and sister, who had opposed her voca¬ tion originally, joined her in the second order of Franciscans in a few years.

The military and political events of the cen¬ tury have a special significance because as a rule their influence still lives. The Crusades came to an end, the fourth under Boniface, Marquis of Montferrat (1222), the fifth led by King Andrew II (1228), the sixth (1248) and the seventh and last (1270), under Louis IX of France. The Children's Crusade (1212) was one of the sad interludes of an enthusiasm which went beyond reason. Most of the many thousands of children crusaders perished mis¬ erably or were sold into slavery by designing leaders. In 1230 the Teutonic Knights in a crusade against the pagan tribes of the Baltic region established themselves in Prussia and laid the foundation of what at the Reforma¬ tion, through the ambition of a grand master, was to become a duchy, the beginning of mod¬ ern Prussia. In 1282, Rudolph of Hapsburg, a Swiss noble, elected emperor in the first elec¬ tion held after the reform of the Imperial Elec¬ torate and the creation of seven electors, con¬ ferred on his sons the duchies of Austria and laid the foundation of the Hapsburg dynasty. All during the century the kings of Aragon were extending their sway over the Spanish Peninsula and the Balearic Islands (1230). After the Sicilian Vespers, a massacre of the French in Sicily by the Sicilians, so-called from its commencement at vespers on Easter Monday (1282), the kingdom of Sicily passed to them. Less than 20 years before (1265) the French under the House of Anjou had ascended the throne of the Two Sicilies. In 1235 the duchy of Brunswick was formed under the House of Guelph. Five centuries afterward, when reign¬ ing in Hanover, the Guelphs were to succeed to the throne of England (George I) where they still reign. The century saw the rise of Flor¬ ence in importance, the decline of the republic of Pisa, the increase of Venice in power under an aristocracy which became hereditary toward the end of the period and the enfranchisement of the serfs at Bologna. The closing year of the century Pooe Boniface VIII proclaimed the first jubilee and the crowds who flocked to Rome to celebrate it were so large that they could not cross the bridge to the Vatican until the rule of the road of keeping to the right was pro¬ claimed, the first time in history there is men¬ tion of it.

Everywhere political events were occurring destined to far-reaching significance. Edward I of England to whom the contest between Robert Bruce and John Baliol for the crown of Scot¬ land had been referred as umpire, conferred it upon Baliol on condition that he

should receive it as a vassal of England. The Scotch refused to acknowledge any such dependence, for Scot¬ land, to which Magnus of Norway (1266) had ceded the Hebrides, felt its nationality at stake. Baliol was dethroned and fled to Edward who attempted to enforce his rights. William Wal¬ lace, the famous hero of Scottish popular poetry, led an insurrection that was joined by Sir William Douglas and Robert Bruce who gathered round them most of the Scots. They were defeated by Edward at Falkirk (1299), but Robert Bruce was proclaimed king and suc¬

ceeded in maintaining himself until the defeat of Edward II at the great battle of Bannock¬ burn (1306) settled him firmly on the throne.

The foundation of the Ottoman or Turkish Empire (1299) under Othman I in Bithynia led to the consolidation of Mohammedan power to the serious disturbance of Europe. The Turks are historically relatives of the Mongols who had already created the splendid empire of the Seljuks and who from the 11th to the 13th century governed the greater part of the caliphs' dominions in Asia and thus prepared the way for the Ottomans, their successors. The nucleus of their empire was formed in Asia Minor toward the end of the century under Er- Toghrul. Osman or Othman or Ottoman, his son, is looked upon as the founder of the empire.

The century saw the career of the best ruler of all time, Louis IX of France, or Saint Louis as he came to be called. It has been said of him, (<Of all the rulers of men of whom we have record in history, he probably took his duties the most seriously with most regard for others and least for himself and his family.® The watchword of his rule was justice, though he made it the aim of his life that men should have justice and education, and when for any misfortune they needed it — charity. For an unjust judge there was short shrift. The old tree at Versailles under which he used to hear the causes of the poor who appealed to him stood for many centuries the living reminder of Louis' efforts to make the dispensing of justice equal to all men. Voltaire, unsympathetic in so many ways, said of him, ((Louis IX appeared to be a prince destined to reform Europe if she could have been reformed, to render France triumphant and civilized and to be in all things a pattern for men. A far-reaching policy was combined with strict justice and he is perhaps the only sovereign who is entitled to this praise; prudent and firm in counsel, intrepid without rashness in his wars, he was as compassionate as if he had always been unhappy. No man could have carried virtue further.® Guizot, the French statesman and historian, so little ap¬ pealed to by the mediaeval, said <(The world has seen more profound politicians on the throne, greater generals, men of more mighty and bril¬ liant intellect, princes that have exercised more powerful influence over later generations ; but it has never seen such a king as this Saint Louis, never seen a man possessing sovereign power and yet not contracting the vices and passions which attend it, displaying upon the throne in such a high degree every human vir¬ tue, purified and ennobled by Christian faith. He was an ideal man, king and Christian, an isolated figure without *any peer among his suc¬ cessors or contemporaries.® His reign is the history of France for nearly 50 years (1226-70). He influenced not alone France but the other peoples of his time deeply. He was chosen as the umpire in disputes in foreign countries.

Louis' instructions to his son, so emphatic of justice as the great law among men, his deep interest in education, his foundation of the Sorbonne, his beneficence to the University of Paris, his encouragement of art and architec¬ ture, La Sainte Chapelle is his monument, as well as his scholarly patronage of men of letters in friendly intercourse, all stamp him as one of the most broad-minded of men.

Two great Spanish monarchs deserve to be mentioned beside Saint Louis. They are Fer¬ dinand (1200-52), the Saint, king of Castile and Leon, whose mother, Berengaria, was the sister of Blanche of Castile, the mother of Saint Louis. To him is due the collection of trans¬ lations in the vernacular of the Forum Judicum or Code of Visigothic laws, which is one of the oldest specimens of Castillian prose extant and the foundation of Spanish jurisprudence. His son, Alfonso X (1221-84) the Wise, is also known as the astronomer because of the Alfon- sine tables, a series of astronomical observa¬ tions compiled by his direction, but better known as the author of the code Las Siete Partidas, the basis of modern Spanish law. Ticknor ((History of Spanish Literature*) declared that Alfonso ((first made Castilian a national language by causing the Bible to be translated into it and by requiring it to be used in all legal proceedings.® Under these two great mon¬ archs, Spanish literature began its magnificent course, the ballads of the Cid and of Bernardo del Carpio becoming the common property of the people.

Surprisingly enough one phase of political history outside of Europe in the century is as important as anything in Europe. Genghis Khan founded the Mogul or Mongol Empire. He was a Tartar (Tatar) chieftain, by name, Temuchin, who on the death of his father suc¬ ceeded to the Mongol throne at the age of 13 (1175). The chiefs who owed him allegiance were turbulent and restless, and had been re¬ strained by the iron rule of his father. They refused to submit to a mere boy, but' Temuchin's mother had the courage and vigor to repress many of them and keep them to their alle¬ giance until Temuchin showed before long that he could rule them himself. He soon extended his sway over neighboring chiefs and in 1206 proclaimed himself emperor, invaded northern China and securing firm footing within the Great Wall soon conquered most of the country. He then turned westward, defeated the Moham¬ medans who had beheaded his envoys, over¬ whelming an immense army of nearly

half a million, of whom 160,000 were left dead on the field. Pressing westward he besieged Bokhara, capturing it and Samarcand, and then Merv', all of which were sacked and burned. Astrakan was taken, the Russians defeated and Great Bulgaria ravaged. His troops conquered more of India and most of China, so that this one¬ time chief of a petty Mongol tribe Hived to see his armies victorious from the China Sea to the banks of the Dnieper; and though the empire which he created ultimately dwindled away in the hands of his degenerate descendants, leav¬ ing not a wrack behincf, we have in the presence of the Turks in Europe a consequence of his rule, since it was the advance of his armies which drove their Osmanli ancestors from their original home in northern Asia and thus led to their invasion of Bithynia under Othman and finally their advance into Europe under Amurath I.®

Representative government developed during the century parallel with other achievements. Magna Charta was signed in 1215; the con¬ cluding sentence of chapter 1 runs: ((We have also granted to all free men of our kingdom, for us and for our heirs forever; all the un¬ derwritten liberties to be had and held by them

and their heirs of us and our heirs forever.® Whatever the original intention, this became eventually a grant to all free Englishmen. In 1257 the Provisions of Oxford under King Henry III established the stated recurrence of the great national council of Parliament. In 1265 the Knights of the Shire and the representa¬ tives of the townspeople who formed later the House of Commons were admitted to Parlia¬ ment, while those personally summoned to at¬ tend by the king from the great nobles formed the House of Lords. Beginning with 1295, under Edward I, the attendance of the town members became regular, making Parliament really representative of the country. In the meantime, Bracton's (Digest of the English Common Law* (1282) secured the legal rights of Englishmen of all classes, and forms the basis of law down to our own time in all English-speaking countries.

Nothing of all the accomplishment of the century probably possesses livelier interest for our commercial age than their organization of business in spite of what must have seemed in¬ superable difficulties to less enterprising times. Trade combinations and municipal affiliations as well as commerce facilities among distant, different peoples were rendered possible and even easy. Some 'even of the most modern developments of international intercourse were anticipated. Miss Zimmern (<The Hanseatic League,* Stories of the Nations Series) said: "There is scarcely a more remarkable chapter in history than that which deals with the trading alliance or association known

as the Hanseatic League. The league has long since passed away, having served its time and fulfilled its purpose. The needs and circumstances of man¬ kind have changed and new methods and new instruments have been devised for carrying on the commerce of the world. Yet, if the league has disappeared, the beneficial results of its action survive to Europe, though they have be¬ come so completely a part of our ' daily life that we accept them as matters of course, and .do not stop to inquire into their origin.®

The condition of the great mass of people as the result of the growth of genuine democ¬ racy in this period is particularly interesting for our time. Good authorities have declared it the happiest century of human existence. More men and women than probably at any other time enjoyed the blessedness of having found their work and that work eminently satis¬ fying, because it represented an interest of the mind or soul rather than the body. Artistic power and the art impulse were never so wide¬ spread, and triumphs of arts and crafts work were made even in very small towns. As for those without special talent the manual workers, Thorold Rogers, in his (Economic Interpreta¬ tion of History, * says: «On the whole there were none of those extremes of poverty and wealth which have excited the astonishment of philanthropists and the indignation of working men. The age, it is true, had its discontents . . . but of poverty that perishes unheeded, of willingness to do honest work and a lack of opportunity, there was little or none.®

Wages were very low, according to our ˆ and money values, but the necessaries of life were proportionately cheap, and the ratio between wages and prices is the all-important consideration. The social improvement which

marked the 13th century led to the fixing by statute in the time of Edward III in the early 14th century' of the minimum wage of four pence a day and set maximum prices for neces¬ saries of life. A pair of hand-made shoes was four pence, a fat goose two and one-half pence, a fat sheep a shilling and two pence, and a stall- fed ox only 24 shillings. Needless to say this ratio between wages and prices secured the workman against want. An act of Parliament in the 14th century names <(beef, pork, mutton and veal as the food of the poorer sort.® Holi¬ days were frequent. Besides the Sundays there were some 35 holy days during the year on which no work was done, and Saturday

after¬ noon was free after the vesper hour, 2 p.m., as also the vigils of all first-class feasts. Standish O'Grady declared this abundance of leisure a source of the greatness of the time. Twice in the world's history, in the 5th cen¬ tury b.c. in Greece and the 13th century a.d., men have spent one-third of their time in leis¬ ure in preparation for and in celebration of religious mysteries. In both periods they had the time and the energy to create artistic and intellectual monuments which the world will never willingly let die.

Principal Events of the Thirteenth Century.

1. The Fourth Crusade led by Boniface, Marquis of Montferrat.

2. Conquest of Normandy. Constantinople is besieged and taken by the French and Venetians. Baldwin, Count of Flanders, elected emperor of the East. Seat of the Greek empire removed to Nicaea.

3. Genghis Khan, the Mongol emperor, begins his career of conquest, extending his expeditions from China to Bulgaria.

4. Pope Innocent III lays an interdict on England. The Albigensian Crusade.

5. The Inquisition instituted at Avignon to check heresy.

6. Defeat of the Saracens at Tolosa, Spain. Contests

between Moors and Christians arouse the spirit of chivalry. Goths divide into three kingdoms, Castile, Aragon and Portugal. The ill-starred Children's Crusade.

1. The liberties of Oxford University confirmed by papal authority.

2. General revolt against the king of England. John I of England forced to sign Magna Charta. Rise of trade guilds and labor unions.

3. Venice becomes independent. Golden period of com¬ merce. Cities of Venice, Genoa and Pisa furnish ships for the Crusades. Architecture, fine arts and the indus¬ tries flourish throughout western Europe.

4. Louis IX, afterward known as Saint Louis, ascends the throne of France. Saint Francis of Assisi, founder of the Franciscan Order, dies.

5. Death of Genghis Khan.

6. The Fifth Crusade led by King Andrew II.

7. Teutonic knights establish themselves in Prussia

8. Saint Elizabeth of Hungary dies.

9. Tatars invade Russia.

10. Alexander of Hales, the “ Irrefragable Doctor of English theology, dies.

11. Saint Louis IX of France leads the Sixth Crusade.

12. Death of Ferdinand the Saint, king of Castile and Leon.

13. The Jews are expelled from France.

14. The Provisions of Oxford formulated.

15. Michael Palaeologus founds a family of distinguished Eastern emperors.

16. Recovers Constantinople from Western domination.

17. The Barons’ War in England.

18. Sir John de Baliol founds Baliol College, Oxford.

19. Vincent of Beauvais, the encyclopedist of the Middle Ages dies.

20. Henry III of England reigns. Deputies of the Commons first summoned to Parliament. The kingdom of the Two Sicilies comes under French domination.

21. The Mongol-Tatars invade China.

22. The Seventh and last Crusade. Death of Saint Louis

of France. , , , , , ,

1. Marco Polo’s travels extend the knowledge of the

world.

1. Edward I crowned king of England. .

2. Saint Thomas of Aquinas, ‘Prince of Scholastics,

dies.

1. Albertus Magnus, the " Doctor Universalis ” of Ger¬ man philosophy, dies.

2. The Mongol-Tatars conquer China, overthrow the Southern Sung dynasty and establish the dynasty of Yuen. Under Kublai Khan, grandson of Genghis, the grand canal of China is dug.

3. The Sicilian Vespers. Massacre of the French in Sicily. Conquest of Wales by the English.

4. Death of Alfonso X, the Wise, of Spain.

5. Philip IV reigns in France.

6. The Jews are expelled from England.

7. Roger Bacon, the “ Doctor Admirabilis ” of English science, dies.

8. The English Parliament is organized.

9. Edward I takes the coronation chair and the records of Scotland to London.

10. Scotch defeat at Falkirk. The Ottoman or Turkish Empire founded. JAMES J. WALSH,

Author of cThe Thirteenth Greatest of Cen¬ turies. >

THIRTY-NINE ARTICLES, The. See

Articles, The Thirty-nine.

THIRTY TYRANTS, (1) a body of Athenian aristocrats, headed by Critias and Theramenes, who undertook to administer the affairs of Athens at the close of the Pelopon¬ nesian War, 404 b.c. They put to death their opponents, and set a Spartan garrison in the Acropolis. Later Thrasybulus led the exiled citizens against Athens, defeated the forces of the Thirty, and slew Critias. Democratic gov¬ ernment was restored and soon afterward recognized by Sparta. (2) The Thirty Tyrants of Rome were a band of revolutionists who tried to secure the Imperial power during the reigns of Valerian and Gallienus (qq. v.).

THIRTY YEARS’ WAR, so called be¬ cause it lasted from 1618 to

1648, was at first a struggle between Protestants and Roman Catho¬ lics, north Germany supporting the former, and southern Germany, with Austria at its head, the latter cause. It gave the Swedes an opportunity to extend their dominion south of the Baltic, it reduced the resources and weakened the power of Austria, and it gained for the northern states of Germany the breathing space needed to develop independent existence. Few wars, however, have been more calamitous in their general effect on the mass of the people and the happiness and progress of mankind. Apart from the horrors which attended the capture of Magdeburg, and other barbarous scenes of the struggle, it reduced the peasantry and most of the townspeople to abject misery; it may be said to have effaced for a time literature and art in Germany, and it magnified the system of petty principalities, since partly effaced as a result of the Napoleonic wars, but still a powerful obstacle in the way of complete Ger¬ man progress.

On the one side were Austria, nearly all the Roman Catholic princes of Germany, and Spain ; on the other side were, at different times, the Protestant powers and France. The occasion of this war is to be found in the fact that Ger¬ many had been distracted ever since the Refor¬ mation by the mutual jealousy of Roman Catholics, Lutherans and Calvinists, which led the Protestant princes to form the Evangelical Union in 1608, against which the Roman Catho¬ lic League was formed the following year. Certain concessions had been made to the Protestants of Bohemia by the Emperor Ru¬ dolph II (1609), but these were withdrawn by his successor Matthias in 1614, and four years afterward the Bohemian Protestants were in rebellion. Thus began the first part of the long

war, the part that is known as the Bohemian War. The Protestant Bohemians were led by the Count of Thurn, and the Union sent an auxiliary corps into Bohemia, under the com¬ mand of the brave Ernest, count of Mansfeld. Their leaders drove the imperial troops from Bohemia, invaded the archduchy of Austria, and advanced to the gates of Vienna, but un¬ favorable weather and want of resources com¬ pelled the invaders to retreat. Soon after, Ferdinand, with the title of Ferdinand II, was chosen emperor (28 Aug. 1619). He had borne the title of king of Bohemia since the resig¬ nation of his cousin Matthias in 1617. The Bohemians, knowing his hostility to Protestant¬ ism, had already declared his title to the Bo¬ hemian crown void, and offered it to the elector palatine, Frederick V, the head of the Prot¬

estant Union, and husband of Elizabeth, daugh ¬ ter of James I of England. Frederick accepted the crown, but he was ill fitted to cope with the difficulties before him, and the great victory of the troops of the League (8 Nov. 1620), under Maximilian of Bavaria, on the Weissenberg (White Mountain), near Prague, which was followed by the flight of the new king, put an end to the Bohemian rebellion, and crushed the Protestant cause in that quarter. Frederick was put under the ban of the empire, his territory was taken from him and bestowed on Maxi¬ milian of Bavaria.

Ferdinand had now a favorable opportunity of concluding a peace on moderate terms. But his unsparing treatment of the conquered, and the reactionary proceedings against the Prot¬ estants generally, all of whom had been expelled from Bohemia, at last roused the determined opposition of the Protestant princes, who sought and obtained foreign assistance. Aided by sup¬ plies of money from England, and by a body of troops from Holland, Count Mansfeld, Chris¬ tian of Brunswick, and the Margrave of Baden again took the field, and they were joined by Christian IV of Denmark. Mansfeld was de¬ feated by the imperial general Wallenstein at Dessau (25 April 1626), and after a difficult march through Hungary to the lower Danube, died in Bosnia on 30 November in the same year. Meanwhile Christian of Brunswick had also died, and Christian of Denmark had been defeated by Tilly at Lutter am Barenberg (27 Aug. 1626) and compelled to withdraw to his own territory. The allies of Denmark, the dukes of Mecklenburg, were now obliged to flee from their territories, which were taken possession by Wallenstein with the consent of the emperor. Holstein, Schleswig and Jutland also soon fell into the hands of the imperial troops. Pomerania and Brandenburg had de¬ tachments forced upon them by Wallenstein. The power of the emperor extended to the Bal¬ tic, and to secure this power an attempt was made to seize all the important towns on the coast. Straslund .alone made serious resistance, and during a ten-weeks' siege, which was car¬ ried on with furious energy (May to July 1628), it baffled all the attacks of Wallenstein, who was at last forced to retreat with great loss. This check thwarted the plans of Wallenstein, and led to a short interruption of the war. In the peace of Liibeck (12 May 1629) Christian of Denmark received back all the territories belonging to him that had been occupied and devastated by the imperial troops, on the condi¬

tion of promising to interfere no more in the affairs of Germany.

Austria was once more victorious ; but the greater its victory the more complete was to be the triumph of the Roman Catholic Church. With this object the emperor issued the Edict of Restitution, in virtue of

which all the eccle¬ siastical foundations and other church property that had been ' confiscated for the behoof of Protestants since the religious peace of Passau (1552) were to be restored to the Roman Church, and the Calvinists were to be excluded from the benefits of that peace. This ordinance, which threatened to take a large number of bishoprics, and almost all the abbeys and other ecclesiastical foundations of north Germany, out of the hands of those who then held them, filled all Protestant Germany with alarm and pro¬ longed the war. Many princes and towns re¬ fused to obey it, and the emperor was obliged, in order to give effect to it, to keep his forces in the field. But these forces did not long re¬ main under the command of Wallenstein. At a meeting of the Electoral College of the empire in August 1630, Ferdinand found it expedient to yield to the general demand for his deposi¬ tion, and the supreme command of the imperial armies was given to Tilly, who thereupon marched against Magdeburg, which had refused to carry out the edict.

In the meantime a new belligerent appeared on the scene, one whose exploits form the most interesting episode of the whole war. This was Gustavus Adolphus, king of Sweden, who landed on the coast of Pomerania on 24 June 1630. The inducements which led him to mix himself up with the struggle were the desire of protecting Protestantism in Germany, that of establishing the power of Sweden on the coast of the Baltic and that of checking the advance of the power of Austria in north Germany. For this last reason he had the secret support of the French minister Richelieu, who was jealous of the growing power of the house of Haps- burg. Gustavus Adolphus was generally hailed by the inhabitants of the Protestant states of Germany as their deliverer, but the Protestant princes did not extend to him so eager a wel¬ come. Fearing the revenge of the emperor they for the most part refused his offered alliance, and at the diet of Leipzig resolved to maintain a neutral attitude. The old Duke of Pomerania, whose territory had been terribly devastated by the imperial troops, had at once opened his land to him, but the electors of Brandenburg and Saxony refused him a passage through their territories, and while the time was consumed in negotiations the town of Magdeburg, after repeated assaults, was taken and destroyed (20 May 1631). Tilly now threatened Saxony, and the elector, John George I, hastened to con¬ clude, in his own defense, the alliance which he refused in the interests of the Protestant cause. On 17 September (O. S. 7 September) the forces of Tilly and Gustavus Adolphus met at Breitenfeld, close to Leipzig, when the former were completely' defeated. Tilly re¬ treated to the south while the Swedish king advanced to the Main and Rhine. Before the end of winter the latter had made himself mas¬ ter of the

bishopric of Wurzburg and the greater part of the Lower Palatinate, as well as of the towns on the Rhine. In the spring of 1632 he marched by way of Nuremberg to the

Lech, on the banks of which Tilly had taken lip a strong position. On 15 April 1632 this position was forced by the Swedes and Tilly was mortally wounded during the engagement. After placing a garrison in Augsburg, Gus- tavus Adolphus, accompanied by the former Elector Palatine, Frederic V, advanced as far as Munich, the Bavarian capital. Meantime the emperor had in his distress again turned to Wallenstein and induced him by entreaties and great concessions to undertake to levy and com¬ mand a new army. After a successful opera¬ tion against the Saxons, Wallenstein joined the Bavarian troops in Bohemia and marched with them into Franconia, where the Swedes had posted themselves strongly not far from Nu¬ remberg. On arriving there Wallenstein took up another strong position in the neighborhood and fortified a camp. Here the two armies lay for months facing each other without coming to a pitched battle ; until at last Gustavus found that the resources of the neighborhood were exhausted and resolved to venture upon an at¬ tack on the enemy's camp. But in spite of the bravery of the assailants, the attack, again and again renewed, was always repulsed. Gustavus Adolphus was obliged to give up the hope of success in his attempt and soon after he led his troops into Saxony. Thither Wallenstein fol¬ lowed him, and on 16 Nov. (O. S. 6 Nov.) 1632, a battle was fought at Liitzen, near Leipzig, in which Wallenstein was defeated, but in which the victorious Swedes lost their king and leader.

After the death of Gustavus Adolphus the direction of the war was assumed by the Swedish Chancellor Axel Oxenstierna, who, in the first place, got the Protestant princes and towns of the Franconian, Swabian and the two Rhenish circles of the Germanic empire to promise in the Heilbronn Convention to uphold the Swedes until the victory of the Protestant cause should be secure. The principal generals who acted under him were Bernhard von Weimar and the Swedish general Horn. France furnished supplies of money. Bavaria was laid waste by the Swedes, who since the death of their king carried on the war in as barbarous a manner as the Imperial troops, who were now quartered in Silesia. In this province and in Bohemia Wallenstein lingered without exhibit¬ ing any of the energy that was demanded of him by the imperial court. This slackness, to¬ gether

with other circumstances, caused him to be suspected of entering into treasonable nego¬ tiations with the enemy, and Ferdinand ulti¬ mately deposed him and placed him under the ban of the empire, in consequence of which he was murdered by some of his own officers (25 Feb. 1634). After this the imperial army moved into Bavaria, and on 6 Sept. 1634, gained a complete victory over Bernhard von Weimar at Nordlingen. Several German princes, the principal of whom was the Elector of Saxony, who had never been well inclined to the Swedes, now thought it convenient to conclude separate peaces with the emperor, and the people gen¬ erally began to cherish the hope of soon seeing the termination of the war. The separate peace with Saxony, the peace of Prague, was con¬ cluded 30 May 1635, and in it Saxony received the whole of Lusatia as a hereditary posses¬ sion, while the emperor virtually gave up the edict of restitution.

The hopes raised among the people of Ger¬ many by this and other separate peaces were far from being confirmed. Germany itself was almost unanimous in desiring peace, but the Swedes thought it to their interest to continue the war in order not to lose the advantages they had gained, and France now determined to take a more active part in the war, with the view of abasing the house of Hapsburg and ex¬ tending the French frontier to the Rhine. Richelieu promised to the Swedes important aid in money and troops, and the war was renewed with greater vigor than had been shown since the death of Gustavus Adolphus. The Swedish general Baner conquered and rendered desolate Saxony and Thuringia (1636) ; Bernhard von Weimar took Rheinfelden, Freiburg and Brei- sach (1638), and formed the scheme of creating for himself an independent principality on both banks of the Rhine, but was stopped short in his career by death in July 1639. In the midst of these events the emperor had died (February 1637), and had been followed by his son Ferdinand III, a man of milder and less energetic temper than his father, but as firmly attached to the Catholic faith, and equally in¬ clined to force it on his subjects.

In the autumn of 1640 the new emperor assembled a diet at Ratisbon to deliberate over the best method of conducting the war, and while this council was sitting, Baner, who had for the last few years been constantly engaged in the east of Germany, conceived the audacious plan of leaving his winter quarters and taking the whole council, along with the emperor, pris¬ oners (January 1641). A sudden thaw pre¬ vented the execution of this scheme by melting the ice on which he had hoped to cross the rivers. Baner died during the retreat. He was succeeded in the command of the Swedish army by Torstenson, the ablest of the generals who proceeded from the school of Gustavus Adolphus. Although generally confined by the gout to a sedan chair,

he astonished the world by the rapidity of his movements. He van¬ quished the imperial armies near Leipzig (Breitenfeld 1642), advanced into Moravia with the intention of penetrating into Austria and at¬ tacking the emperor in his capital, then sud¬ denly appeared in Schleswig and Holstein and put to flight Christian IV of Denmark, who had lately allied himself with the emperor and brought an army into the field (1643). Later (August 1645), Wrangel, another Swedish gen¬ eral, forced Christian to accept a disadvan¬ tageous peace. After his victory over Chris¬ tian IV, Torstenson again turned south, and having destroyed two imperial armies, one under Gallas and the other under Hatzfeld and Gotz, in conjunction with Rakoczy, prince of Transylvania, once more threatened Vienna (1645). But the emperor was again delivered from the danger. The withdrawal of Rakoczy obliged Torstenson to give up his design ; and in the following year, worn out bv disease, he resigned his command, which was taken up by Wrangel. Meantime the French had been operating on the Rhine and in the west of Ger¬ many. After the death of Bernhard von Weimar they had taken his army into their pay. At the head of this army Guobriant obtained several successes, but toward the close of 1643 suffered a severe defeat in which his army was

in great part destroyed. He himself was mortally wounded soon after. In the following year neither of the French generals Enghien and Turenne was able to gain any considerable advantage ; but on 3 Aug. 1645, the Austrian general Mercy was defeated at Allersheim, near Nordlingen, after which the junction of the French and Swedes was inevitable. Late in the summer of 1646 their united armies ad¬ vanced through Swabia and Bavaria, and in the armistice of Ulm (March 1647) compelled Maximilian of Bavaria to fall away from the emperor. In the following year further suc¬ cesses were gained and Wrangel was on the point of uniting his forces with those of the other Swedish general Konigsmark who had penetrated into Bohemia, when the news reached the armies that the Peace of West¬ phalia, which had been negotiating for five years at Munster and Osnabriick, was con¬ cluded. By a singular coincidence it happened that the last blow of the war was struck at the place where the war originated, Prague. Konigsmark had taken one part of the town and was preparing to attack the other when he was stopped by the news of peace. See Aus¬ tria-Hungary; Denmark; France; German Language and Literature; Germany; Ger¬ man Catholics; Gustavus II Adolphus; Spain; Sweden; Wallenstein.

Bibliography. — (Cambridge Modern His¬ tory) (Vol. IV, New York 1906) ; Gardinier, S. R., (Thirty Years' War > (London 1874) ; Ward, A. W., (Thirty Years' War > (1869) and Ger¬ man works by Barthold, Gindely, Schiller and others.

THISBE. See Pyramus and Thisbe.

THISTLE, a composite plant of the genera Carduus, Cirsium, Centaurea, Onopordon or Sonchus. Other related plants are the golden thistle or Spanish oyster-plant (Scolymus his- panicus) whose roots are used as a vegetable like salsify and parsnip, which they resemble somewhat closely in flavor; globe-thistles (Echinops), often planted in shrubberies and herbaceous borders for their striking effects; blessed thistle (Cnicus benedictus) a hardy an¬ nual herb useful for rockeries and wild gar¬ dens, but commonly regarded as a weed in the Mediterranean region where it is native, and in California where it has escaped cultivation ; and the milk-thistle, also called blessed or holy thistle (see Silybum), often grown in European gardens for its edible roots, leaves and heads and also for its ornamental qualities. Several plants of other families have sometimes been called thistle from their apparent resemblance to true thistles. The best known of these are probably the blue thistle (Echium vulgare) of the Boraginacece, and the fuller's or clothier's teasel (Dipsacus fullonum) and its few related species of the family Dipsacacece.

Among the best known genera the following species are probably most widely recognized. The Scotch or cotton thistle (Onopordon acanthium) is a biennial occasionally grown in America and sometimes seen wild in the East¬ ern States. It has cottony white spiny foliage and large solitary terminal heads of pale purple flowers. 1 he plants are often six feet tall and are planted in front of dark colored shrubbery.

I hey seem unlikely to prove troublesome as weeds in America, Some of its other popular

names are Queen Mary's, silver, Argentine, oat, asses' and down thistle. The Scottish emblem seems more likely to be really the stemless this¬ tle (Cirsium acaule) which is common in Scot¬ land. The so-called Canada thistle (Cirsium arvense) is a native of Europe. It has become a troublesome weed in fields where methods of cultivation and rotation are faulty, spreading both by its seeds and its perennial creeping root-stocks, every fragment of which is capable of propagating a new plant. Prevention of leaf formation by persistent cultivation is a sure remedy as well as a safeguard. The plant is a

slender herb about three feet tall and has numerous small purplish pink flower heads. The bull thistle (C . lanceolatum) and the yellow thistle (C . horridulum) are also well-known relatives found along roadsides and in fields, especially pastures. The pasture thistle {Cir¬ sium odoratmn) is found in similar places. The star thistle {Centaurea calcitrapa, etc.) bears a resemblance to the blessed thistle. Several related species, notably the corn flower, blue bottle, bachelor's button or bluet {C. cyanus) and the dusty miller {C. cineraria) are popular garden plants. Three species of sow thistles the common {Sonchus oleraceus), the field {S. arvensis) and the spiny leaved {S. asper) — are well-known weeds in the United States and. the Carline thistle {Carlina vulgaris) plays a similar role upon poor soils in Europe. The last was so named because tradi¬ tion says that Charlemagne used its roots medicinally.

THISTLE, Order of the. See Orders,

Royal.

THISTLE-BIRD, the American goldfinch (q.v.).

THISTLE CROWN, the name of a gold coin of James V I of Scotland, of the value of 97.3 cents. It bore on the obverse a rose and on the reverse a thistle, both crowned.

THISTLEWOOD, Arthur, English con¬ spirator: b. Fupholm, Lincolnshire, 1770- d. London, 1 May 1820. He is said to have im¬ bibed anarchistic doctrines from the writings of Paine and from a visit to France before the fall of Robespierre. He entered the army in 1/98 and rose to the rank of a lieutenant. After various misfortunes, both natural and the result of gambling and dissipation, he became an active member of the society formed by Thomas Spence, which aimed at revolutionizing all social institutions. He attempted to organize a revolution in 1816 which failed through the efforts of informers, and in 1817 was indicted for treason, but escaped conviction. In 1818-19 he suffered a year's imprisonment for a threatened breach of the peace. After his re¬ lease he became the principal agent in the memorable Cato Street conspiracy (so called from the meeting-place of the conspirators in London), the object of which was to murder several of the members of the administration

r'tu-?i > Caˆlnet ˆn.ner» attack either Coutts's or Child s bank, seize the Tower and Mansion House and set up a provisional government, ihe day selected for carrying out the plot was that fixed for the funeral of George III at Windsor, when all the military would be out of London

to take part in the funeral proces¬ sion. This absurd scheme was betrayed by a

man who was ostensibly one of the conspirators and the. deepest in Thistlewood' s confidence, the projectors were arrested just as they were about to proceed to the execution of their pur¬ pose 23 Feb. 1820. Being tried and condemned as a traitor, Thistlewood, with four of his co¬ adjutors, was hanged and decapitated.

THISTLEWOOD CONSPIRACY. See

Cato Street Conspiracy ; Thistlewood, Arthur.

THIViE, the've. See Thebes, Greece

THOBURN, Isabella, American missionary and educator : b. near Saint Clairsville, Ohio, 29 March 1840; d. Lucknow, India, 1 Sept. 1901. She came of Scotch-Irish parentage. She was educated in the Wheeling Female Seminary, supplemented by a year in the study of art at the Cincinnati Academy of Design. After teaching in the public schools for several years, she spent a year as an instructor in a private school at New Castle, Pa., and, in 1866, became preceptress of the Western Reserve Seminary at West Farmington, Ohio. In 1869, at the or¬ ganization of the Woman's Foreign Missionary Society of the Methodist Episcopal Church, she was selected as its first missionary, being assigned to work in India, whither her brother, James M. Thoburn (q.v.), had gone 10 years before. In April 1870 she organized a school for native girls at Lucknow with but six pupils and herself as the only teacher. She also en¬ gaged in evangelistic, Sunday school and zenana work. The grade of the school thus established was gradually raised as its attendance increased until a full high school course was offered. In response to a demand for still more ad¬ vanced courses of instruction, classes in the lower, collegiate grades were offered in 1887 and, in 1895, after having complied with the rigid requirements of the British Indian gov¬ ernment, it was granted a charter as the Luck¬ now Woman's College. Climatic conditions, which seriously impaired her health, necessi¬ tated several extended furloughs, the years 1880-82, 1886-90 and 1899-1900 being spent in America, though they were years filled with activity in behalf of the cause to which her life had been devoted. The name of the Lucknow Woman's College was subsequently changed to that of the Isabella

Thoburn Woman's College. Consult Thoburn, Bishop J. M., (Life of Isa¬ bella Thoburn. }

THOBURN, James Mills, American Methodist Episcopal bishop: b. Saint Clairs¬ ville, Ohio, 7 March 1836. He was graduated at Allegheny College, Meadville, Pa., in 1857, and soon after entered the ministry. In 1859 he was sent as a missionary to India and until 1908, when he retired, was identified with work in that region. He was elected bishop of India and Malaysia in 1888 ana was for six years the editor of the Indian Witness. His writings in¬ clude ˆMissionary Addresses) (1887); Hndia and Malaysia > (1893) : (The Deaconess and Her Vocation) (1893); (Christless Nations) (1895) ; (The Church of Pentecost *(1901) ; (Life of Isabella Thoburn * (1903) and (The Christian Conquest of India.*

THOBURN, Joseph, American soldier: b. Carrickfergus, Ireland, 29 April 1825; d. Cedar Creek, 19 Oct. 1864. In August follow¬ ing his parents emigrated to America, settling on a farm in Belmont County, Ohio. His edu¬

cation was obtained in the primitive rural schools of the period, supplemented by diligent private study. He became a teacher in the public schools at the age of 17 and later, having advanced to the principalship of a village school, he began the study of medicine. He was graduated from Starling Medical College, Columbus, Ohio, in 1850. After a term as an interne in hospital service, he located for the practice of his profession at Wheel- ling, (West) Va. At the outbreak of the Civil War he was commissioned surgeon of the first regiment raised in Virginia for the Union service. At theˆ battle of Philippi, its colonel (Benjamin F. Kelley) was seriously wounded and, the other field officers not being available for duty, the command of the regiment de¬ volved upon the surgeon, who continued to act in that capacity until the expiration of its 100- day term of service. When the regiment re¬ enlisted for three years he was commissioned as its colonel. After a year of service as a regi¬ mental commander, he was assigned to the command of the Fourth Brigade, Second Di¬ vision, Third Army Corps, Army of the Poto¬ mac, but had to be given an extended leave on account of a severe wound. He was with his regiment throughout the spring and summer of 1862, later being transferred to the Department of West Virginia, where he was again assigned to the command of a brigade. In May 1864 he took part in the disastrous Lynchburg raid. On 22 July 1864 he was assigned to the command of the First Division of the Department of the Kanawha (later known as the Army of West Virginia and also as the Eighth Army Corps), in which capacity he participated in most of the active

movements of the Shenandoah campaign, including the battles of Kernstown, Opequan and Fisher's Hill. In the disposition of the forces at Cedar Creek by Gen. Horatio G. Wright (in the absence of General Sheridan) Colonel Thoburn's division was placed in a peculiarly exposed position, over his protest. In the surprise attack with which the battle of Cedar Creek began (19 Oct. 1864), his com¬ mand was driven from its camp in utter rout at dawn and, while striving to rally his men for defensive action, he fell mortally wounded. A commission as brigadier-general of volun¬ teers was made out to him the day of his death. His remains were buried with full military honors at Wheeling. Consult (Official Records of the Union and Confederate Armics) (Series I, Vols. 12, 25, 27, 29, 33, 37, 43, 51) and Pond, George E., (Personal Memoirs of General Philip H. Sheridan* and (The Shenandoah Campaign.)

THOBURN, Joseph Bradfield, American writer: b. Bellaire, Ohio, 8 Aug. 1866. In 1871 his parents removed to Marion County, Kan., where he was reared on a farm and at¬ tended the public schools. He learned the printer's trade and did some newspaper work, after which he entered the Kansas Agricultural College from which he was graduated in 1893. In 1899 he removed to Oklahoma City, where he engaged in newspaper work. He served as secretary of the Oklahoma Territorial Board of Agriculture from December 1902 until July 1905. Since 1907 he has devoted himself largely to the work of research and writing along the lines of local and western history.

From 1913 to 1917 he was connected with the University of Oklahoma as a specialist in re¬ search, field-work and collections in local his¬ tory and anthropology. During this time he did considerable work in the way of excavating prehistoric earth-works, cave dwellings, tumuli, etc., in Oklahoma. In the course of these in¬ vestigations he secured positive evidence that the natural mounds, so called, which are so abundant in the region immediately west of the lower half of the valley of the Mississippi, the origin of which had long been a subject of dis¬ pute among scientists, are of human origin, each tumulus, so far as examined, proving to be the ruin of a timber-framed, dome-shaped, earth-covered human habitation. He has been in the service of the Oklahoma Historical So¬ ciety since July 1917, being engaged in re¬ search, field collections and editorial work. He is the author of a comprehensive history of Oklahoma, published in 1916.

THOLEN, to'len, Netherlands, an island in the province of Zeeland, north of the Ooster Schelde and 21 miles northwest of Antwerp, contains 47 square miles. It is protected by dikes. The soil is productive and the prin¬ cipal products are wheat, rye, barley, oats, flax, madder, beans and potatoes. Tholen is also the name of the chief town. Pop. 3,254.

THOM, tom, James, Scottish sculptor: b. Ayrshire, Scotland, 1799; d. New York, 17 April 1850. He was by trade a stonemason and suddenly leaped into notice by his group (Tam o' Shanter and Souter Johnny,* cut in the sand¬ stone on which he was accustomed to work. This group now forms part of the Burns monu¬ ment at Doon, near Ayr. It was first exhibited in Edinburgh (1828) and by its success the sculptor was led to move to London, but in 1837 sailed for the United States, where his genius found at last a liberal recognition. Among his best known works is 'Old Mortal- ity) now in Laurel Hill Cemetery, Philadelphia, of which he was induced to make many replicas.

THOMA, to'ma, Ludwig, German satiric novelist and dramatist: b. Oberammergau, 21 Jan. 1867. He attended gymnasia at Munich and Landshut, the Forestry School at Aschaf- fenburg, and, in order to study law, the uni¬ versities of Munich and Erlangen, thus obtain¬ ing his entire education in Bavaria. For a short time he practised law at Dachau, later at Munich (1897-98), soon relinquishing this career for that of literature. The general tone of his literary work is well indicated by the fact that he has been connected with the hu¬ morous and oppositional weekly Simplicissimus (q.v.) at Munich, as editor, since 1899. Mars, a more serious periodical (bi-monthly), has also for a time been under his editorship. The cartoons and quips of Simplicissimus were one of the mainstays of the German liberals in their fight with the Imperial Government, and it was one of the great disappointments of 1914 to behold the paper assume a more and more chauvinistic attitude after the events of August in that year, supporting the preda¬ tory and imperialistic policy of the German government where resistance would have been the proper attitude of a liberal organ. Thoma's own policy presented a similar change : caught in the great wave of chauvinism which the government had efficiently launched, he took

part in the patriotic shouting, and incidentally engaged in polemic correspondence with a num¬ ber of American writers, including George Haven Putnam, who published some of the interchanges of views in American newspapers. But Thoma is too critical and subtle a man to become a chauvinist of the worst type. In his literary work his opposition is directed chiefly against petty social prejudices and, in

the politi¬ cal field, to the Roman Catholic Church; in the latter respect he resembles Anzengruber (q.v.) and Rosegger (q.v.), both of whom, like Thoma, bitterly attack the abuses of the petty clergy, not from a Protestant standpoint, but from the usual hostile position of the laity in Catholic countries. The most notable satires on the clergy are the short story (Der heilige Hies *(Munich 1904), and the bitter novel (An¬ dreas Vost> (ib. 1905, 13th ed., 1910). His three best plays, which are very popular on the German stage, are 'Die Lokalbahn,* a comedy (1902); ' Moral, > comedy (1909), and 'Magda¬ lena, *a popular tragedy (' Volksstiick,* 1912). Each has as its theme one of the defi¬ ciencies of provincial life. 'Die Lokalbahn) pictures the officious bustle of gossiping town officials, who never achieve any results ; (MoraP reveals the low morality of a group of persons who have joined a society for moral uplift in order to be the more effectively cloaked from each other; 'Magdalena* is the story of a girl's gradual shifting from a love- life that is frank and unselfish, and which, therefore, meets with no disapproval from the villagers, to one that is governed by considera¬ tions of money, thus causing her ostracism and death. No man has better depicted the life of the small peasant and country townsman in Bavaria than has Thoma.

Other works are 'Agricola *(1897) ; 'As¬ sessor Karlchen* (1900); 'Witwen *and (Die Medaille,* comedies (1901); (Hochzeit,> short stories (1901); 'Grobheiten, *poems (1901); (Die Wilderer,* short story (1903); 'Lausbu- bengeschichten, *burlesques of child life (1904* 25th 1,000,. 1907) ; (Peter SchlemihP (1906) ; (Tanta Frieda) (like 'Lausbubengeschichten, *1906 ; 30th ed., 1910) ; a novel (1911); 'Josef Filsers Brief- wechsel,* a satire (1912) ; (Das Sauglingsheim, *burlesque^1913). In the 'German Classics> (Vol. XIX, New York 1914), appears a trans¬ lation of 'Der heilige Hies* (Matt the Holy).

Jacob Wittmer Hartmann. THOMAS, Saint, also called DIDYMUS (Tomas being the Aramaic; Didymus, the Greek word signifying "twin"), one of the Twelve Apostles known as The Doubter. He is said to have been a native of Antioch the twin brother of a sister Lysias, children of Diophanes and Rhoa. Eusebius implies that he was a stepbrother of Jesus and that his real name was Judas. The scene in the Gospel, m which the doubts were at last dissipated, that Thomas had expressed with great vehemence as to the fact of the resurrection, is the chief of the three occasions on which he is prominent (consult John xx, 24-29; Luke ?cxlv» 36-49). After the crucifixion of Christ it fell to the lot of Saint Thomas to proselytize India, and tradition relates with great cir-

cumstantiakty that he hesitated to travel there until Jesus appeared to him in a vision and ordered him to go to Gondophares, the Indo-Parthian King, who ruled over the Kabul Val¬ ley and the Punjab, and to build him a palace. Saint Thomas accordingly went to India, and converted and baptized the King Gunda- phoras or Gondophares whose name is known to archaeologists through many inscriptions and coins as reigning from a.d. 21 to 52 at Peshawar on the Indus. Later traditions state that Thomas went farther south and east than the Punjab; founded the Church of the Christians of Saint Thomas in Malabar, and was mar¬ tyred on Mount Saint Thomas near Madras. (See Christians of Saint Thomas). In Cey¬ lon, Saint Thomas shares with Buddha the honor of the footprint on Adam's Peak, reputed as left on. his ascension into heaven. His re¬ mains were transferred to Edessa where Chrysostom mentions his grave as one of the four genuine tombs of the apostles, the other three being those of Peter, Paul and John. An apocryphal, (Gospel of Thomas,* is pub¬ lished in Tischendorf's (Evangelia Apocrypha. * In his (Zoological Mythology) (1872), Guber- natis states that in the Middle Ages the Ger¬ mans of Westphalia made the ass the symbol of Thomas the incredulous apostle to apply to all unbelievers and for a long time, even among German youth, the boy who was last to enter school on Saint (Thomas) day was called the ((ass Thomas.® See Apocrypha.

THOMAS, Albert Ellsworth, American dramatist : b. Chester, Mass., 18 Sept. 1872. He was graduated at Brown University in 1894, and took his A.M. degree in 1895, becoming a newspaper writer directly afterward. He was employed on leading New York papers, in¬ cluding the Tribune, Post, Times and Sun be¬ tween the years 1895 and 1909, when he be¬ came a dramatic writer and also published a novel (Cynthia's Rebellion) (1904). His plays include (Her Husband's Wife) (1910) ; (The Divorce Fund) (1911); (Little Boy Blue> (1911); (The Big Idea) (1914), etc.

THOMAS, to-ma, Ambroise Charles Louis, French musical composer: b. Metz, 5 Aug. 1811; d. Paris, 12 Feb. 1896. He studied in the Paris Conservatoire, and in 1832 gained the Grand Prix de Rome, which enabled him to continue his studies in Italy. Returning to France he began to write for the Opera Com- ique, his first opera being <La double Echelle *(1837). Among his early operas may be cited also (Betty) (1846); <Le Caid* (1849), and opera bouffe; and (Le Roman d' Elvire) (1860). He is best remembered, however, by the more serious works of his later years, (Mignon) (1866) ; (Hamlet *(1868), and (Frangoise de Rimini* (1882). He was appointed professor of composition at the Paris

Conservatoire in 1852, and in 1871 succeeded Auber as director. His non-operatic works include a (Messe Solennelle) (1857), a (Marche Religieuse) (1865), cantatas, and chamber music.

THOMAS AQUINAS. See Aquinas,

Thomas.

THOMAS, Arthur Goring, English com¬ poser: b. Ralton Park, Sussex. 20 Nov. 1850; d, 20 March 189Z He studied at Haileybury College and his musical education was received

at Paris, and at the Royal Academy of Music. His opera, (The Light of the Harem, *was given with acceptance while he was still a student at the academy. In 1883 his second opera Esmer¬ alda* was produced at Drury Lane Theatre and was warmly received. In 1885 followed (Na- deshda *and (The Golden Web,* the latter being completed by S. P. Waddington and produced at Liverpool in 1893. Besides his operas he composed (The Sun Worshippers, *a choral ode, (Out of the Deep,* and (The Swan and the Skylark,* both cantatas, the latter one be¬ ing finished by Sir C. V. Stanford. He is com¬ memorated by the Goring Thomas scholarship at the Royal Academy of Music.

THOMAS, Augustus, American playwright: b. Saint Louis, Mo., 8 Jan. 1859. He was a special writer and illustrator on Saint Louis, Kansas City and New York newspapers, and became editor and proprietor of the Kansas City Mirror in 1889. He soon left the field of journalism and became a playwright. He is the author of the popular dramas, (Arizona, *(In Mizzoura,* <The Burglar, *(The Man Up¬ stairs,* (On the Quiet, *(The Earl of Paw¬ tucket,* (The Other Girl, *(Mrs, Leffingwell's Boots,* (The Education of Mr. Pipp, *(Jim Delancey,* (The Embassy Ball, *(The Witch¬ ing Hour,* (The Harvest Moon, *(As a Man Thinks,* Undian Summer, *' (That Overcoat,* (The Hoosier Doctor, *(The Rio Grande,* (The Copperhead,* etc. He is a member of the American Academy of Arts and Letters and of the National Institute of Arts and Letters, of which he became president in 1914, and from which he received a gold medal for his services to the drama. In 1914 he received the degree of A.M. from Williams College.

THOMAS, Becket. See Becket, Thomas.

THOMAS, Calvin, American college pro¬ fessor: b. near Lapeer, Mich., 28 Oct. 1854; d. New York, 4 Nov. 1919. He was graduated at the University of Michigan in 1874, taking his A.B. degree the same year and the degree of LL.D. in 1904. He taught Latin and Greek at the

Grand Rapids High School for a while, after which he studied philology at Leipzig in 1877-78. Following this course he devoted him¬ self to the teaching of German, and was pro¬ fessor of that language at Columbia University. He edited a number of the standard German classics for school and college use and wrote extensively on philological subjects for edu¬ cational and literary publications, besides as¬ sisting in the compilation of the New Standard Dictionary. In 1909 he edited an (Anthology of German literature.*

THOMAS, Charles Spaulding, American lawyer and politician: b. Darien, Ga., Dec. 6, 1849. He removed his family to Michigan in his youth, and was educated in the State uni¬ versity, taking his LL.D. there 1871. He prac¬ tised law in Colorado, and was chairman of the Democratic national convention at Kansas in 1900. From 1899-1901 he was governor of Colorado, and in 1913 was chosen United States Senator to fill the unexpired term of Charles J. Hughes, deceased. He was re¬ elected for the term 1915-21.

THOMAS, Cyrus, American archaeologist and entomologist: b. Kingsport, Tenn., 27 Tilly 1825; d. 1910. He was admitted to the bar in

1851 and practised law for several years, finally entering the Lutheran ministry in 1864. He was naturalist on the United States Geological Survey 1869-74, and professor of natural sciences in the Southern Illinois Normal Uni¬ versity 1874-77. He was State entomologist of Illinois 1875-82, and in 1882 he became ethnolo¬ gist in the United States bureau of ethnology in charge of mound explorations. Of special interest in this latter line are his (Study of the Manuscript Troano) (1882) ; (1884) ; (Mound Exploration (1888) ; Pre¬ historic Works East of the Rocky Mountains1 ; ˆIndians of North America in Historic Times) (with W. J. McGee 1903).

THOMAS, Edith Matilda, American poet: b. Chatham, Ohio, 12 Aug, 1854. She was edu¬ cated at the State Normal School, Geneva, Ohio. Much of her verse is distinctly above the average, displaying not only very subtle feeling, but great delicacy of expression. She contributed to many periodicals and published in book form (A New Year's Masque, etc.1 (1885); (The Round Year1 (1886); (Lyrics and Sonnets1 (1887) ; (The Inverted Torch1 (1890) ; (Fair Shadow Land1 (1893) ; (In Sunshine Land1 (1895) ; (In the Young World1 (1895) ; CA Winter

Swallow and Other Verse1 (1896); (The Dancers1 (1903); (Cassia and Other Verse1 (1905) ; (The Guest at the Gate1 (verse, 1909) ; (The White Mes¬ senger1 ; (The Flower from the Ashes1 (1915).

THOMAS, George Henry, American sol¬ dier: b. Southampton County, Va., 31

July 1816; d. San Francisco, Cal., 28 March 1870. On his father's side he was of Welsh and English ancestry. His mother was of Huguenot descent. He received this early edu¬ cation at Southampton Academy, near his home, and soon after his graduation was appointed to a cadetship at the West Point Military Academy, by the Hon. John Y. Mason, member of Congress from the Southampton district. He was graduated at West Point in 1840, standing 12th in a class of 42 members, W. T. Sherman being sixth. He was a thoughtful and industrious student at the academy, a char¬ acteristic that followed him throughout his later military career. In 1840 he was appointed lieutenant in the Third artillery. He served in the war against the Seminoles in Florida, and later in the Mexican War, and was brevetted captain and major for meritorious services at Monterey and Buena Vista. He was instructor at the Military Academy in 1851-54. In 1852 he was united in marriage with Miss Frances Kellogg of Troy, N. Y. He was commissioned major of the Second cavalry in 1855, and for some years saw duty on the western frontier, and engaged in campaigning against hostile Indians.

Upon the breaking out of the Civil War he espoused the cause of the Union, and was ap¬ pointed brigadier-general of United States Vol¬ unteers. It has been stated that early in 1861, during the period of suspense and uncertainty that preceded the war, he was vacillating in his loyalty to the government, and that he applied for services in the Southern army ; but this is not true, as is clearly shown by the facts presented by his biographers, Van Horne, Piatt and Coppee. In June 1861, he was assigned to

the command of General Patterson, with the United States forces in the Valley of Virginia, but was soon transferred to the west, and was placed in command of the first division of the Union army in Kentucky. On 19-20 Jan. 1862, he won the first important victory gained by the government forces in the west, signally defeating the Confederates under General Zollicoffer, at the battle of Mill Springs (q.v.), in Kentucky, and was promoted to the rank of major-general of volunteers and thanked by President Lincoln in a complimentary order. At the battle of Stone River (q.v.), near Mur¬ freesboro, his command held the centre of the Union line, where he gave additional

evidences of his abilities as a commander, and of his stay¬ ing qualities as a fighter. At the battle of Chick- amauga (q.v.), in September 1863. Thomas commanded the 14th corps composed of three divisions of Rosecrans' army, and at the crisis of the engagement on 20 September he held the left of the general line, and successfully re¬ sisted the repeated attacks of the Confed¬ erates. About noon the right wing of the army, weakened by the withdrawal of troops to pro¬ tect Thomas' left flank, gave way before the assaults of Hood and Longstreet. The right of the army was routed, but Thomas reformed his troops on Snodgrass Hill, and with the aid of reinforcements brought forward by General Gordon Granger, and other detachments, checked the onslaught of the victorious Con- fedrates, repelled their repeated attacks, and held the position until nightfall, when he safely withdrew his' forces to Rossville. His defense of Snodgrass Hill was one of the most dra¬ matic events and one of the most deadly struggles of the Civil War. He fairly won the title of the ((Rock of Chickamauga,11 by which he is so well known.

In the engagement of November 1863, in front of Chattanooga (q.v.), General Thomas' forces stormed the heights of Missionary Ridge and drove General Bragg's army from its strong position on the crest, gaining a com¬ plete victory over the Confederates. In the campaign against Atlanta (q.v.) in 1864 Thomas was second in command to General W. T. Sherman, and ably co-operated with that great soldier in accomplishing the brilliant series of successes achieved by the Union army. When General Sherman left Atlanta and marched with his army through Georgia to the sea, General Thomas took command of the Federal forces remaining in Georgia, Alabama and Tennessee, and prepared to meet the Confederate forces under General Hood, then threatening an ad¬ vance into Tennessee. General Thomas then began the concentration of his forces at Nash¬ ville (q.v.). His troops under Schofield and Stanley stayed Hood's advance at Franklin, Term., and inflicted terrible losses upon the Confederates, but Hood soon appeared before Nashville and threatened to attack the city. General Thomas was now reinforced by Gen. A. J. Smith's command from Missouri, and a large force of cavalry under Gen. J. H. Wilson. Time was needed for equipping the cavalry and reorganizing the troops. Severe winter weather had set in, and the hills about Nashville were covered with ice and sleet — thus delaying military operations. Meantime the authorities at Washington became impatient at the delay,

and ordered Thomas to attack Hood. General Thomas explained and remonstrated, and took due time for' preparation. Orders were issued finally relieving Thomas from the command, hut before they could be executed he attacked Hood's army and gained one of the most com¬ plete and brilliant victories of the war, routing and almost dispersing Hood's forces. General Thomas, by these results, fully vindicated his judgment against all criticism, and received the thanks of the President and Congress for his splendid victory. He was also commissioned a major-general in the regular army.

At the close of the war he was in command of the Department of the Cumberland at Nash¬ ville, and was most useful in reorganizing and sustaining the civil laws and government in Tennessee and the adjacent States. His high personal character, executive ability and good judgment were instrumental in establishing peace and good order throughout that section. General Thomas must be credited with a very high order of military ability, and a most hon¬ orable place in the history of the Civil War. He made no serious military mistakes, and can be charged with no defeats.

After the closing of the war he was as¬ signed to the command of the Military Division of the Pacific, with headquarters at San Fran¬ cisco, where he died. His wife survived him but a few years. They had no children. Con¬ sult Coppee, Henry, (Life of General Thomas5 (New York 1893) ; Bradford, Gamaliel, <Union Portraits5 (Boston 1916) ; Van Horne, T. B., (Life of Major-General G. H. Thomas5 (New York 1882).

THOMAS, George Housman, English illustrator and engraver: b. 7 Dec. 1824; d. Boulogne, France, 21 July 1868. He began life as an apprentice to a wood engraver, and prac¬ tised that art in Paris, but gave the greater part of his time to book illustration, in which he became very proficient. He lived in the United States in 1846-47, and made designs for bank¬ notes. After his return to England he became draftsman on the Illustrated London News. His notable pictures are (The Queen Giving Medals to Crimean Heroes,5 and (The Queen and Prince Albert at Aldershot.5

THOMAS, Isaiah, American printer and bookseller: b. Boston, 19 Jan. 1749; d. Worces¬ ter, 4 April 1831. He was apprenticed to Zachariah Fowles, a Boston printer, with whom he established the Massachusetts Spy, of which he soon became sole proprietor. So bold were his Whig editorials that in 1771 he was sum¬ moned to appear for alleged sedition. He re¬ fused, and the attorney-general, when ordered to prosecute, failed to obtain a bill of indict¬ ment from the grand jury.

After participation in the skirmish at Lexington, he continued the publication of the Spy at Worcester, where it thereafter appeared with the exception of a brief period in 1776-77. In 1788 he opened a book¬ shop in Boston, with branches in various parts of the United States. Among his publications were the Massachusetts Magazine (8 vols., 1789-95) ; a folio Bible (1791) ; and several edi¬ tions of Watts' (Psalms and Hymns.5 He was the founder (1812), first president, and most liberal patron of the American Antiquarian Society. He published a (History of Printing5 (1810), which contains much valuable mate¬

rial. This was reprinted in 1874 by the Anti¬ quarian Society. Consult Lincoln, (History of Worcester5 (1837) ; Thomas, B. F., (Memoir of Isaiah Thomas5 (Boston 1874) ; Hill (in Antiquarian Society transactions.5 Vols. IX and X, Worcester 1909).

THOMAS, Jesse Burgess, American Bap¬ tist clergyman: b. Edwardsville. Ill., 29 July 1832; d. 7 June 1915. He was graduated from Kenyon College in 1850, and practised law in Chicago 1857-62. He was pastor of the First Baptist Church, Brooklyn, 1864-69, of the Michigan Avenue Baptist Church, Chicago, 1869-74, and from 1874-88 was pastor of the First Church, San Francisco. From 1888 he was professor of church history at the Newton Theological Seminary. He published the Old Bible and the New Science5 ; the Mould of Doctrine,5 etc.

THOMAS, John, American physician and soldier: b. Marshfield, Mass., 1725; d. Chambly, province of Quebec, 22 June 1776. He was sent as surgeon to the army in Nova Scotia in 1746; was on the medical staff of General Shir¬ ley's regiment in 1747; but secured an appoint¬ ment as lieutenant in 1759. In 1760, while commanding a regiment under Amherst, he was engaged in operations against the French at Lake Champlain and at Montreal. He was a delegate to the Massachusetts provincial con¬ gress 1774-75 and having, during the Revolution raised a regiment of volunteers, was appointed brigadier-general. He took part in the siege of Boston; forced the British to evacuate Dor¬ chester; and participated in the Canadian campaign.

THOMAS, John Jacob, American writer on agricultural topics and authority on horti¬ culture : b. near Lake Cayuga, 1810; d. 1895. He became widely known for editorial work and was a recognized authority on farm topics. His best known publication is (The American Fruit Culturist5 (1845), the twenty-first edition of which was reprinted in 1909. He also is¬ sued a book on (Farm Implements and Ma¬ chinery5 (1869) and a work on (Rural Affairs5 (9 vols., 1855—81) ; writings greatly valued in his day.

THOMAS, Joseph, American lexicographer: b. Cayuga County, N. Y., 23 Sept. 1811; d. Philadelphia, 24 Dec. 1891. He was educated at Rensselaer Polytechnic Institute, Troy, N. Y., and at Yale, was graduated in medicine at Philadelphia, and engaged in practice there. He was in India in 1857-58, where he made a study of Oriental languages and later spent four months in Egypt in the study of Arabic. He was subsequently professor of Latin and Greek at Haverford College, Pennsylvania. He was associate editor with Thomas Baldwin of (A Pronouncing Gazetteer5 (1845), which was revised and published as (A Complete Pronouncing Gazetteer or Geographical Dictionary of the World5 (1855); (A New and Complete Gazetteer of the United States5 (1854), etc. He also wrote (A First Book of Etymology5 (1851-52) ; (Travels in Egypt and Palestine5 (1853) ; (A Comprehensive Medical Dictionary5 (1864; rev. ed., 1886); (Universal Pronounc¬ ing Dictionary of Biography and Mythology5 (1870-71; 3d ed., rev., 1905) ; and other works,

He contributed the pronouncing vocabulary of proper names to ‘Webster’s Unabridged Dic¬ tionary.)

THOMAS, Kempis. See Kempis, Thomas a.

THOMAS, Lorenzo, American soldier: b. Newcastle, Del., 26 Oct. 1804; d. Washing¬ ton, D. C., 2 March 1875. He was graduated from the United States Military Academy in 1823. At the organization of the Adjutant- General’s Department he received a major’s commission and served as chief of staff of the army in Florida (1839-40) and in the same capacity on the staff of General Butler during the Mexican War. In 1861 he became brigadier- general and adjutant-general of the army and was retired from active service in 1869. He was named Secretary of War by President Johnson in 1868, but did not take office because of the refusal of Stanton to vacate.

THOMAS, Martha Carey, American wo¬ man educator and writer: b. Baltimore, Ohio, 2 Jan. 1857. She was educated at Cornell Uni¬ versity, where she was graduated in 1877 ; studied in Johns Hopkins and Leipzig and took the Ph.D. degree at the University of Zurich in 1883. The Western University of Pennsyl¬ vania and Brown University have conferred on her the honorary degree of LL.D. She taught English branches in Bryn Mawr College of which she was chosen president in 1895. She also was elected a trustee of Cornell University. She has

published ‘Sir Gawayne and the Green Knight) (1883); (The Educa¬ tion of Women } (1900), and many articles on the higher education of women contributed to standard magazines. Mrs. Mary Garret, a bene¬ factress of Bryn Mawr, left her for educational uses $15,000,000.

THOMAS, Seth, American manufacturer: b. Plymouth Hollow (now Thomaston), Conn.,

1 Dec. 1816; d. there, 28 April 1888. He was the son of Seth Thomas (1786-1859), in whose honor Thomaston was named and who began the manufacture of metal-movement clocks. The son greatly enlarged the business, intro¬ ducing his clocks throughout the world. He manufactured all sorts of timepieces.

THOMAS, Theodore, American musician: b. Esens, East Friesland, 11 Oct. 1835; d. Chi¬ cago, Ill., 4 Jan. 1905. He played the violin in public at the age of six and when only 10 made his first public appearance in New York. In his early concert and operatic engagements he appeared with Jenny Lind, Sontag, Grisi and Mario. During 1855-69 he was associated with Mosenthal, Bergmann, Matzka, Bergner and William Mason in successive seasons of cham¬ ber-music concerts. In 1864, having organized the orchestra which long went under his name, he began his symphony concerts in New York. These were continued, excepting the interval from 1869 to 1872, until 1878, when he went to Cincinnati to become director of the College of Music. With an orchestra, sometimes of 40 and later enlarged to 60 pieces, he visited the large cities of the East and West, giving concerts of both popular and classical music and did much for the development of musical taste. With his name were associated the bien¬ nial musical festivals held in Cincinnati from 1873 to 1898. Festivals of a similar character were held under his direction in Chicago in

1882 and 1884 and in New York in 1882. As early as 1862 he was appointed conductor of the Brooklyn Philharmonic Society; when the New York Philharmonic Society was organized he was chosen its leader, and both positions he retained until 1891 when he made his residence in Chicago and became leader of the permanent orchestra in that city. In 1893 he was appointed musical director of the World’s Columbian Ex¬ position. Consult Thomas, Rose Fay, (Our Mountain Garden > (New York 1904; new ed., 1915) and Upton, G. P. (editor), ‘Theodore Thomas: A Musical Autobiography > (2 vols., Chicago 1905).

THOMAS, Theodore Gaillard, American physician: b. Edisto Island, S.

Cv 21 Nov. 1831 ; d. 1903. He was educated at Charleston College, graduating as a physician in 1852, speedily moving to New York where he served in Bellevue Hospital and became professor of diseases of women in The College of Physicians and Surgeons. He also was surgeon to the. Women's Hospital and consulting physician to the Children's Hospital and to Saint Mary's Hospital of Brooklyn. He was a distinguished gynaecologist and president of the American Society of Gynaecologists; honorary member of the London Obstetrical Society and correspond¬ ing secretary of the Obstetrical Society of Berlin. He performed the first ovarian opera¬ tion in the United States and published an account of it in 1870. His work on the (Dis¬ eases of Women) (Philadelphia 1868) ran into six editions and was translated into the five modern languages, including the Chinese.

inviymo, vvimam nenry urittith, Eng¬ lish theologian : b. England, 1861. He was edu¬ cated at King's College, London, and Christ Church, Oxford, and was ordained a priest of the Church of England in 1885. From 1896- 1905 he was vicar of Saint Paul's, London; principal of Wyckliffe Hall, Oxford, 1905-10; was appointed professor of Old Testament the¬ ology in Wyckliffe College, Toronto, 1910. He 1S author of ' Methods of Biblical Study > (1902); 'A Commentary on Genesis) (3 vols. 1907-08) ; (The Power of Peace) (1908) • 'Christianity in Christ) (1909); 'A Commen¬ tary on Romans) (3 vols., 1911-12) ; 'Work of the Ministry) (1911); 'The Prayers of Saint PauP (1914), etc.

THOMAS, William Widgery, American Ambassador: b. Portland, Me., 26 Aug 1839 He was graduated at Bowdoin College in I860 and in 1862 became bearer of dispatches for the government of the United States. He carried a treaty to Turkey; became vice-consul-general at Constantinople and subsequently was ap¬ pointed acting consul at Galatz, Moldavia, and war-consul at Gothenburg, Sweden. In 1865 he resigned and in the following year was ad¬ mitted to the Maine bar. In 1869 Mr. Thomas was made commissioner of public lands for the State of Maine and in 1870-73 served as State commissioner of immigration. In 1870 he vis- ited Sweden, returning to America with 51 Swedish colonists and settling them in north¬ ern Maine, founding the colony of New Sweden. In 1883-85 Mr. Thomas was Minister Resident of the United States to Sweden and Norway and in 1889-94 and 1897-1905 was Envoy Extraordinary and Minister Plenipo¬ tentiary to Sweden and Norway. In 1873-75 he

was member of the Maine house of representa¬ tives and of. the State senate in 1879. He is a public orator of note and has taken part in many celebrations in Sweden and at home ; secured Swedish participation in the Louisiana Purchase Exposition of 1904. He has published (Sweden and the Swedes) (2 vols., 1891) ; trans¬ lation of Victor Rydberg's (The Last Athenian5 (1869), and is corresponding member of the Royal Swedish Academy for Literature, His¬ tory and Antiquities.

THOMAS, W. Va., city, situated in the Fairfax district of Tucker County, near the summits of the Allegheny Mountains and on the Western Maryland Railroad. Mining is the chief industry. The local bank has resources amounting to $500,000. The value of taxable property within the city limits is $1,000,000. The educational establishments include graded and high schools. The city has a modern fire department with motor equipment and has over one mile of brick pavement. The annual re¬ ceipts and expenses average approximately $11,000. Pop. 3,500.

THOMAS, Gospel of, one of the New Testament apocryphal books written in the early half of the 2d century. It treats of the boyhood of Jesus and represents him as performing miracles ; it was used by the Gnostics, and probably in its original form was much more strongly Gnostic in doctrine than now, having been subject to an orthodox revision. The book in its present form is fragmentary. There is a Latin translation and a Syriac version with English translation was published in 1875. See Apocrypha.

THOMAS OF CELANO, religious poet: b. Celano in the Abruzzi about 1200; d. about 1255. He was among the earliest followers of Saint Francis d'Assisi, and in 1221 was warden of the Minorite houses of Worms, Mayence and Cologne and provincial of the order for Ger¬ many. He returned to Assisi in 1230. There is much reason for thinking that he was the author of (Dies Irae, Dies Ilia5 (q.v.). He also wrote the two sequences, (Fregit Victor Virtu- alis5 ; and (Sanctitatis Nova Signa.5 Consult Lisco, <Dies Irae, Hymnus auf das Weltgericht5

(1844).

THOMAS OF LONDON. See Becket,

Thomas a.

THOMAS THE RHYMER. See Rhymer,

Thomas.

THOMASIUS, to'-ma'ze-oos, Christian,

German philosopher and jurist: b. Leipzig, 1 Jan. 1655 ; d. Halle, Germany, 23 Sept. 1728. He was educated at Frankfort-on-the-Oder, and became professor of law at Leipzig in 1684. In 1687 he substituted the German language for Latin in his lectures, and in the following year established a scientific magazine published in German. The caustic wit with which he criti¬ cized educational methods and religious topics of the day, together with his advance views, on theology in particular, aroused a storm of oppo¬ sition, and he was forced to leave Leipzig. He went first to Berlin and thence to Halle in 1690, where he became one of the founders of the university, in which from 1694 until his death he was professor of jurisprudence. He was among the first to break away from traditional ped¬ antry and mediaeval terminology, introduced

improved methods of study into various de¬ partments of learning and as a jurist took a firm stand against trial and torture for witch¬ craft. He wrote (History of Wisdom and Folly5 (3 vols., 1693) ; (Thoughts and Remi¬ niscences5 (1723-26), and other important works. Consult works concerning him by Luden (1805) ; Wagner (Berlin 1872) ; Nicoladini (ib. 1888) ; Kayser (Hamburg 1900) ; also White, A. D., (Seven Great Statesmen in the Warfare of Humanity with Unreason* (New York 1910).

THOMASIUS, Gottfried, German theo¬ logical writer : b. Egenhausen, Wurttemberg, 1802; d. 1875. He was educated at Halle and Berlin and occupied the chair of theology at Erlangen University from 1842 until he died. He is author of (Origines5 (1837); (Christi Person und Werke5 (1852-61; 3d ed., 1886-88) ; (Christlichen Dogmengeschichte5 (1874-76; 2d ed., 1886-89) and various similar works. Con¬ sult von Stahlin, (Lohe, Thomasius, Harless5 (Leipzig 1887).

THOMASTON, Conn., town in Litchfield County, on the New York, New Haven and Hartford Railroad, 10 miles north of Water- bury on the Naugatuck River. It was built up by the noted clockmaker, Seth Thomas, who removed there in 1813 and established his busi¬ ness. The great clock for Independence Hall, Philadelphia, was made there in 1876. The town has clock and watch factories, a brass rolling mill and cutlery manufactures. Pop.

(1920) 3,993.

THOMAS VILLE, tom'as-vil, Ga., town and county-seat of Thomas

County, on the Atlanta, Birmingham and Atlantic, the Florida Central and the Atlantic Coast Line railroads ; about 10 miles from the Florida boundary and 55 miles south of Albany. It is in an agricultural and stock-raising region. The chief industrial es¬ tablishments are cotton compresses, cigar fac¬ tories and creameries. There is a large trade in cotton, pine, tobacco, wool, fruit, vegetables and grain. A branch of the State University, called the South Georgia Agricultural and Me¬ chanical College, is located here. Other edu¬ cational institutions are the Young's College for Women, founded in 1869, opened in 1871 ; the Vashti Industrial School for girls, sup¬ ported by the Women's Home Missionary So¬ ciety of the Methodist Episcopal Church, South ; a normal school for negroes ; the graded schools and a public library. Thomasville was settled in the 19th century and received its pres¬ ent charter in 1889. Pop. (1920) 8,196.

THOMASVILLE, N. C., city in Davison County, on the Southern and the Carolina and Yadkin railroads, 22 miles southeast of Greens¬ boro. A Baptist orphanage is located here. The city has cotton mills, machine shops and furniture and woodworking factories and is growing. Pop. (1920) 5,676.

THOMISM, to'mizm, one of the two great schools of scholasticism, the other being Scotism (q.v.). It derived its name from its founder, Saint Thomas Aquinas, the great Dominican doctor; while Thomism and Scotism are both scholastic in their fundamentals they differ in various conclusions and corollaries chiefly as follows: (1) on the nature of universal; (2) the principle of individuation; (3) the manner

in which grace acts on the human will ; (4) the proof of immortality of the soul; (5) free¬ dom from original sin in the case of the mother of Christ; (6) the effects of the merits of the Incarnation; (7) certain points on the mode of the efficacy of the sacraments; (8) whether an action may be morally indifferent; (9) on the question of toleration. See Aquinas, Thomas.

THOMPSON, Augustus Charles, Amer¬ ican Congregational clergyman : b. Goshen, Conn., 30 April 1812; d. 1901. He was edu¬ cated at Yale University, at Hartford Theologi¬ cal Seminary and at the University of Berlin. His ordination as a Congregational pastor at Roxbury, Mass., took place 27 July 1842. With the Rev. Dr. Rufus Anderson he visited India in 1854 with a deputation from the American Board of Missions

and was delegate to the London Missionary Conference in 1878. He lectured on Foreign Missions at Andover Theo¬ logical Seminary (1877-80), at Boston Univer¬ sity (1882) and at Hartford Theological Sem¬ inary (1885-86). He is author of numerous memorials including those of Mrs. A. J. Waters (1854) ; H. M. Mill (1856) and Rev. Dr. An¬ derson (1880). His larger publications include (Moravian Missions) (1882) ; (Foreign Mis¬ sions > (1889) ; (Protestant Missions) (1894), and 'The Eliot Memorial } (1900). He also published translations in the Marathi and Tamil tongues.

THOMPSON, Benjamin, Count Rumford, American physicist: b. North Woburn, Mass., 26 March 1753; d. Auteuil, near Paris, 21 Aug. 1814. He entered a Salem counting-house in 1766, later was made major of New Hamp¬ shire militia by the English governor, Went¬ worth, but, charged with being a Tory, fled to Boston, where he was associated with the British officers. He went to England in 1776 as bearer of certain dispatches, and as a reward for his services obtained a situation in the For¬ eign Office under Lord George Germain. He became Under-Secretary for the Colonies in 1780, and was shortly afterward appointed lieu¬ tenant-colonel of the King's American dra¬ goons. Returning to England in 1783, he retired on half-pay. In 1784 he was knighted and went to the Continent. Through the rec¬ ommendation of the Prince of Zweibrucken (afterward king of Bavaria) he entered into the service of the reigning elector-palatine and Duke of Bavaria, where he effected many im¬ portant and useful reforms in both the civil and military departments of the state, the latter of which he practically reorganized. As the re¬ ward of his success he received from the sov¬ ereign of Bavaria various orders of knight¬ hood, was made a lieutenant-general and created count of the Holy Roman Empire, choosing the title Count Rumford from the name of his wife's native town (now Concord, N. H.). He left Bavaria in 1795, and returned to England, where he employed himself in making experi¬ ments on the nature and application of heat and on other subjects of economical and phil¬ osophical research. He clearly recognized that heat is a mode of motion, and that by a given amount of mechanical work a definite amount of heat may be produced. Among the objects which engaged his attention was the search for a remedy for smoky chimneys, which at that time formed one of the greatest nuisances in

the country; and he succeeded in discovering the principles upon which fireplaces and chim¬ neys have since been constructed. He likewise suggested the plan and assisted in the founda¬ tion of the Royal Institution, which led to other establishments of a similar description. In 1804 he removed to Paris, where he took up his resi¬

dence; and, his wife being dead, he married the widow of the celebrated Lavoisier; but the union proved unfortunate and a separation ere long took place. Count Rumford then retired to a country house at Auteuil, about four miles from Paris, and there devoted his time to the embellishment of his domain and to the cultiva¬ tion of chemistry and experimental philosophy. His investigations respecting the strength of materials and the force of gunpowder led to considerable improvements in artillery, and he also made discoveries in connection with light and illumination. Count Rumford was by no means a man of extensive learning, but he was familiar with the discoveries and improvements of contemporary science, and the industry and perseverance with which he pursued his in¬ quiries enabled him to make some considerable additions to the knowledge of chemistry and practical philosophy. He was the founder and first recipient of the Rumford medal of the Royal Society, and also founder of the Rum¬ ford medal of the American Academy of Arts and Sciences, and of the Rumford professor¬ ship in Harvard University. His complete works, with a memoir by George E. Ellis, were published by the American Academy of Arts and Sciences (Boston 1870-75). Consult also Slosson, E. E., in ‘Leading American Men of Science> (ed. by D.' S. Jordan, New York 1910).

ixiumrouiN, ˆnaries Miner, American editor and author : b. Montpelier, Vt., 24 March 1864. ˆ Following his graduation from Harvard in 1886 he became literary editor of the Boston Advertiser (1887-90); associate editor of the Youth’s Companion (1890-1911) and later a part owner and the editor of that journal. He is noted as a writer of stories for boys. His publications include ‘The Nimble 'Dollar) (1895); ‘The Calico CaD (1908); ‘An Army Mule) (1910).

THOMPSON, Daniel Greenleaf, American

lawyer, psychological and sociological writer: b. Montpelier, Vt., 9 Feb. 1850; d. New York, 10 July 1897. He was graduated from Am¬ herst and was admitted to the bar in New York in 1872 but devoted himself chiefly to sociologi¬ cal work. Amherst conferred on him the Ph.D. degree in 1894. He became noted as a contro¬ versial writer and is known chiefly for ‘A Sys¬ tem of Psychology) (2 vols., 1884); ‘Religious Sentiments of the Human Mind) (1888)- ‘So¬ cial Progress) (1889); ‘The Philosophy of ruction in Literature) (1890), and ‘Politics in a Democracy) (1893). The latter publication was translated into the Dutch language.

THOMPSON, Daniel Pierce, American

author, lecturer, lawyer and politician : b Charlestown, Mass., 1 Oct 1795; d. Montpelier, Vt., 6 June 1868. He was educated at Middleburg College, where he was graduated in 1820. He began life, as a private tutor in Virginia where he studied law and was admitted to the bar in 1823. He settled in Montpelier the fol¬ lowing year, held various judicial offices from that time to 1835 when he was authorized by

the legislature to compile the laws of Vermont from 1824 to 1834 (1835) and was elected sec¬ retary of state (1853-55). He edited the Green Mountain Freenuan (1849-56) and proved a vol¬ uminous writer. His publications include (The Advocates of Timothy Peacock, Esq. *(1835), a satire on the Anti-Masonic agitation; (May Martin or the Money Diggers) (1835), a prize story afterward reprinted in London; (The Green Mountain Boys) (1840) ; (The Rangers1* (1857) ; (Tales of the Green Mountains *(1852) ; (Gant Gurley or the Trapper of Lake Umbagog* (1857) ; (The Doomed Chief *(1860), founded on the story of King Philip, and other tales based on Revolutionary stories. He left an unfinished novel, (The Honest Lawyer.*

THOMPSON, David, Canadian explorer: b. London, 30 April 1770; d. Longueuil, 16 Feb. 1857. He was educated at Christ Hospital School and at Oxford. When but 19 he came to America and took service with the Hudson Bay Company in 1789, beginning work as an explorer in the Great Lakes country. In 1798 he discovered Turtle Lake, one of the sources of the Mississippi ; in 1807 he crossed the Rocky Mountains and explored the Columbia River. From 1816-26 he was surveying for the Cana¬ dian-United States Boundary Commission. His greatest work aside from his surveys was a map of the Canadian Northwest made in 1814. The last years of his life were spent near Lon¬ gueuil where he died.

THOMPSON, Denman, American actor: b. near Girard, Pa., 1833; d. 1911. His youth was passed in Swanzy, N. H., and he made his debut in Lowell, Mass., in 1852 in the (French Spy, *in which he played a small part. His success was made in (Joshua Whitcomb* in 1875, and his greatest popularity won in the (01d Homestead, *in which he introduced again the character of ((Josh Whitcomb in country life. This had a run of four seasons in New York alone and its success caused Thompson to tour the country. Consult McKay and Win¬ gate, (Famous American Actors of Today* (New York 1896).

THOMPSON, Sir Edward Maunde, Eng¬ lish palaeographist and bibliographer: b. Ja¬ maica, 4 May 1840. He was educated at Rugby and University College, Oxford, was appointed assistant in the British Museum in 1861, assist¬ ant-keeper of manuscripts in 1871, in 1878 keeper of manuscripts and Egerton librarian, and from 1888 until 1909 he was principal librarian and secretary. In 1898 his official title as a servant of the British Museum was changed to director and principal librarian. He was Sandars reader in bibliography, Cambridge (1895-96; 1905-06). He was knighted in 1895. For the (Rolls Series *he has edited (Chroni- con Anglia;, 1328-1388* (1874); (Chronicon

Galfridi le Baker de Swynebroke *(1889), and (Adae Murimuth Continuatio Chronicorum* to¬ gether with (Robertus de Avesbury de Gestis Mirabilibus Regis Edwardi Tertii *(1889); for the Camden Society, (Letters of Humphrey Prideaux* (1875) and (Correspondence of the Family of Hatton *(1878) ; for the Hakluyt Society, (Diary of Richard Cocks in Japan* (1883) ; for the Royal Society of Literature, (Chronicon Adae de Usk* (1876) and for the Hellenic Society, with Sir R. C. Jebb, a fac¬

simile of the (Laurentian Sophocles *(1885). In 1893 appeared his (Handbook of Greek and Latin Palaeography.* He has also written (An Introduction to Greek and Latin Paloeography *(1912); (Shakespeare Handwriting* (1916).

THOMPSON, Elizabeth Rowell, Ameri¬ can philanthropist: b. Lyndon, Vt., 21 Feb. 1821; d. Littleton, N. H., 20 July 1899. She was married to Thomas Thompson, a Boston millionaire, in 1845, and during his life engaged with him in philanthropic work. On his death in 1869 she inherited the entire income from his estate, and continued her charitable labors. She was an advocate of temperance reform, wrote a tract, (Figures of Hell, *which was widely read, and contributed large sums for the furtherance of the cause. She gave $10,000 for an investigation of yellow fever in the South, and purchased and presented to Congress Car¬ penter's painting, (Signing of the Emancipation Proclamation by President Lincoln in the Pres¬ ence of his Cabinet.* She invested more than 100,000 in establishing heads of families in usiness, founded the town of Long Mont, Kan., and gave to each colonist 640 acres of land and $300. She contributed to the purchase of the Vassar College telescope, and was a generous benefactor of the American Associa¬ tion for the Advancement of Science, of which she was made the first patron. She was stricken with paralysis in 1888 and was afterward unable to continue her philanthropic work. In 1891 she was pronounced insane by a Kansas City jury, and a curator was appointed to the charge of her property in Missouri. She left an estate appraised at $400,000 with

no public bequests.

THOMPSON, Francis, English poet: b. Ashton, Lancashire, 1860; d. London, 13 Nov. 1907. He was the son of a Lancashire phy¬ sician, was educated at Ushaw Roman Catholic College, near Durham, and studied medicine at Owens College, Manchester. He took no in¬ terest in medicine, and turning his attention to literary work he went to London. Here after a struggle with poverty and hardship for some five years his work was brought to the attention of Alice Meynell (q.v.) through whose assist¬ ance and that of her husband, Wilfred Meynell, Thompson soon achieved reputation as a poet, and his fame steadily increased. Truly an ascetic, he stood alone among contemporary poets both for purity of thought and beauty of expression. He contributed to the critical re¬ views and published <Poems *(1893) ; (Sister Songs* (1895), and (New Poems *(1897). Of his prose works, published posthumously, may be mentioned (Life of Saint Ignatius Loyola* (1909) ; <A Renegade Poet, and Other Essays *(1910); (Life of John Baptist de la Galle* (1911). Consult his (Works *(3 vols., New York 1913) ; also Beacock, G. A., (Francis Thompson* (Marburg 1912) ; Meynell, E., 'Lifeˆof Francis Thompson *(New York 1913); Rooker, K., (Francis Thompson* (London

1913).

THOMPSON, George, English reformer: b. Liverpool, England, 18 June 1804; d. 7 Oct. 1878. He acquired notoriety during the anti¬ slavery agitation by lecturing in the British Colonies. His subsequent tour in the United States produced great excitement and caused President Jackson to denounce him in a mes¬ sage to Congress. He was a friend of Garri-

son, Whittier and others in the anti-slavery movement and visited America several times. His influence aided materially in preventing the recognition of the South by Great Britain dur¬ ing the Civil War. He also took a prominent part in the Anti-corn Law League and the British India Association to secure better gov¬ ernment for India; was a member of the British Parliamentary Reform Association, and was elected member of Parliament 1847-52.

THOMPSON, Sir Henry, English sur¬ geon: b. Framlingham, Suffolk, 6 Aug. 1820; d. London, 18 April 1904. He was educated at University

College, London, and was awarded the Jacksonian prize in 1852 for an essay on (The Pathology and Treatment of Stricture of the Urethra, > and again in 1860 for an essay on (The Healthy and Morbid Anatomy of the Prostate Gland. > In 1853 he became assistant surgeon to University College Hospital, sur¬ geon 10 years later, professor of clinical surg¬ ery in 1866, and consulting surgeon in 1847. In 1884 he was professor of pathology and surgery to the Royal College of Surgeons. He received numerous honors from foreign countries, was knighted in 1867, and created a baronet in 1899. His works treat mostly of the urinary organs and their diseases, of cremation, and of diet. Among them may be mentioned (Clinical Lec¬ tures on Diseases of the Urinary Organs) (8th ed., 1888) ; (The Preventive Treatment of Cal¬ culus Disease) (1888) ; (Tumors of the Blad¬ der } (1884) ; (Cremation, or the Treatment of the Body after Death) (1874); (Modern Crema¬ tion, its History and Practice* (4th ed., 1901), in which he advocates the substitution of crema¬ tion for the present method of sepulture; (On Food and Feeding) (11th ed., 1901). He was also an artist of note, a pupil of Alma Tadema and others, and exhibited pictures at the Royal Academy, the Salon and elsewhere.

THOMPSON, Jacob, American politician: b. Caswell County, N. C., 15 May 1810; d. Mem¬ phis, Term., 24 March 1885. He was graduated at the University of North Carolina in 1831, admitted to the bar in 1834 and engaged in law practice in Chickasaw County, Miss., in 1835. He was a member of Congress in 1839-51, and opposed the Compromise of 1850 as not suffi¬ ciently favorable to the South. He was appointed Secretary of the Interior by President Buchanan in 1857, and in December 1860, while still hold¬ ing that office, he was appointed a commissioner from Mississippi to urge upon North Carolina the adoption of a secession ordinance. In Janu¬ ary 1861 he resigned from the Cabinet in con¬ sequence of the action of President Buchanan in sending reinforcements to Fort Sumpter, which he declared to be a violation of an understand¬ ing with the Cabinet that the order should not be given without the knowledge of that body. He took an active part in the subsequent seces¬ sion movement, was governor of Mississippi in 1862-64 and later served as aide to General Beauregard and inspector-general for the De¬ partment of Mississippi. He was Confederate commissioner to Canada in 1864, and a promoter of the plan to seize Chicago and release the prisoners at Camp Douglas near that city. He was accused of being the instigator of plots to burn various Northern cities, also of complicity in the assassination of President Lincoln. A price was put upon his head and he fled to

Europe. He returned to the United States, but was not brought to trial.

THOMPSON, James Maurice, American author: b. Fairfield, Ind., 9 Sept. 1844; d. 15 Feb. 1901. He was educated in Georgia, and served in the Confederate army during the Civil War. Afterward he settled in Indiana and prac¬ tised law and civil engineering at Crawfords- ville. Out-door life was his passion, and from 1885 to 1889 he was State geologist of Indiana and chief of the Department of Natural History. In 1890 he joined the staff of the New York Independent. His books' are the records and observations of a nature-lover rather than a scientist, the product of his trips to the lake and swamp regions of Florida and Louisiana and to the hills of Alabama, Mississippi and Georgia. He was expert with the bow and arrow, with which he hunted instead of a gun. He wrote (The Witchery of Archery) (1878); (His Second Campaign *(1882) ; < By-Ways and Bird Notes) (1885) ; (The Boy's Book of Sport* (1886); (Sylvan Secrets) (1887); (Poems)

(1892) ; (The Ocala Boy *(1895) ; (My Winter Garden* (1900); (Alice of Old Vincennes)

(1900).

THOMPSON, Sir John David Sparrow,

Canadian jurist and for some time Premier of the Dominion: b. Halifax, 10 Nov. 1844; d. Windsor, England, 12 Dec. 1894. His father, who had come from Waterford, Ireland, held the office of queen's printer. Thompson was educated at the common school, Halifax, and was called to the bar in that city in 1865. He joined the Roman Catholic Church in 1871. After holding several municipal offices, he was elected to the Nova Scotia assembly for Antig- onish (1877). His success at the bar earned him the dignity of queen's counsel in 1879. He was attorney-general in 1878 and premier of the province in 1879. After the defeat of his government in the same year Thompson was made a judge of the Supreme Court of Nova Scotia. This position he resigned to accept the portfolio of Minister of Justice in Sir John A. Macdonald's Cabinet (1885), entering the Do¬ minion Parliament as member for Antigonish. He remained Minister of Justice until 1892, dis¬ tinguishing himself by his oratorical power and his untiring industry. In 1887 he visited Wash¬ ington as one of the commissioners on the fisheries question. The honor of knighthood was conferred on him in August 1888. Sir John again visited Washington as one of the representatives of his government in the unsuc¬ cessful reciprocity negotiations of 1891 and 1892. He is understood to have been of¬ fered the position of Premier on the death of Sir John A. Macdonald (1891), but preferred to remain as Minister of Justice under the leadership of Sir J. J. C. Abbott. On the re¬ tirement of the

latter (December 1892) Sir John 1 hompson became Prime Minister. His incessant Parliamentary labors rapidly under¬ mined his health and brought about his death under singularly tragic circumstances. Visiting England in 1894 to be sworn in as a member of the privy council, he expired suddenly of syncope almost immediately after the ceremony.

C onsult Hopkins, (Life and Work of the Rt. Hon. Sir John Thompson) (Toronto 1895).

THOMPSON, John Reuben, American journalist and poet: b. Richmond, Va., 23 Oct.

1823; d. 30 Oct. 1873. He was graduated from the University of . Virginia in 1844; practised law in Richmbnd in 1847, but soon entered on a literary career and for 12 years edited the Southern Literary Messenger to which Donald G. Mitchell contributed his (Reveries of a Bachelor.* Ill health caused his removal to Augusta, Ga., where in 1859 he edited the Field and Fireside magazine. Driven to London by events of the Civil War he actively defended the Confederacy in contributions to English magazines. At the close of the war he returned to America and became editor of the New York Evening Post. He was author of several poems which were popular at the time.

THOMPSON, Joseph Parrish, American clergyman and Oriental scholar: b. Philadelphia, 7 Aug. 1819; d. Berlin, Germany, 20 Sept. 1879. He was graduated at Yale 1838, studied the¬ ology at Andover and Yale seminaries (1839- 40) and was ordained Congregational minister the latter year. He became pastor in New Haven (1840-45) ; New York, Broadway Taber¬ nacle (1845-71). He lectured on Egyptology at Andover in 1871. In 1872 he assisted in estab¬ lishing The Independent ; Harvard gave him the degree of D.D. in 1856; The University of New York the degree of Ph.D. in 1857. He pur¬ sued his Oriental studies in Berlin (1872-79) and died there. He published several memoirs, including those of Timothy Dwight and David Hale. Also fectures to Young Men) (1846) ; (Egypt Past and Present* (1856) ; <Genesis and Geology) (1869); (Church and State in the United States) (1874) ; (The United States as a Nation) (1877) ; (The Workman: His False and His True Friends) (1879). His political and social essays were collected and published under the title of {American Comments on European Questions * (1884).

THOMPSON, Launt, American sculptor: b. Abbeyleix, Ireland, 8 Feb. 1833; d. Middle- town, N. Y., 26 Sept. 1894. He arrived in the United States 1847, and began his study of sculpture under Erastus Dow Palmer in Albany. In 1857 he removed to New York where he opened a studio ; he became an associate of the Academy of Design in 1859; an academician in 1862 and vice-president in 1874. He traveled extensively, visiting Rome (1867-68) ; and being again in Italy (1875-87), residing the greater part of the time in Florence. His works in¬ clude (Elaine) (a bust) ; (Morning Glory > (a medallion), and portrait of Gen. John A. Dix; statues of Napoleon (Metropolitan Mu¬ seum, New York 1867) ; Abraham Pierson (Yale 1874) and of Winfield Scott (Washing¬ ton, D. C.) ; portrait busts of William C. Bryant, Edwin Booth as Hamlet, Charles L. Elliott, etc.

THOMPSON, Mortimer M., American journalist and humorist: b. Riga, N. Y., 2 Sept. 1832; d. New York, 25 June 1875. He was educated at the University of Michigan, was for a time connected with the stage, settled in •New York in 1852 and shortly after began writing there for the press. He subsequently became a popular lecturer and continued humor¬ ous contributions to the weekly newspapers. His books, written under the pseudonym of (<Q. K. Philander Doesticks, P.B. **(<(Queer Fritter, Philander Doesticks, Perfect Brick**), include (Doesticks — What he Says) (1855);

(Plu-ri-bus-tah *(1856), a travesty of Long¬ fellow's (Hiawatha) ; (Nothing to Say* (1857), and others.

THOMPSON, Richard Wigginton, Ameri¬ can lawyer: b. Culpeper County, Va., 9 June 1809; d. Terre Haute, Ind., 9 Feb. 1900. He was admitted to the bar of Lawrence County, Ind.., in 1834. He served in both houses of the State legislature, and in 1840 was elected to C ongress. He declined an appointment as Minister to Austria in 1849, and later the post of solicitor-general of the Land Office, which President Fillmore offered him. In 1867 he became judge of the Fifth Indiana Circuit Court, and in 1877-81 was Secretary of the Navy. He resigned this post before the com¬ pletion of his term in order to become chair¬ man of the American committee of the Panama Canal Company. He published <The Papacy and the Civil Power *(1877) ; (History of the Protective Tariff* (1888) ; footprints of the Jesuits* (1894) and (Recollections of Sixteen Presidents, from Washington to Lincoln) (1894).

THOMPSON, Robert Ellis, American educator: b. near Lurgan, Ireland, 5 April 1844. He was graduated at the University of Penn¬ sylvania in 1865 and from 1868 to 1892 held successively in that institution

professorships in Latin and mathematics, social science, history and English literature. He has held lecture¬ ships at Harvard, Yale and Princeton Theologi¬ cal Seminary, and has contributed editorially to the Penn Monthly, the American, the Irish World and the Sunday School Times. In 1874 he was ordained to the Presbyterian ministry. Since 1894 he has been principal of the Cen¬ tral High School of Philadelphia. His publica¬ tions include (Social Science and National Economy *(1875); <De Civitate DeP ; (The Divine Order of Human Society * (1891), being his Stone lectures at Princeton; (History of the Presbyterian Churches of America) (1895) ; 'Protection to Home Industry) (1885), being his Harvard lectures; 'The Hand of God in American History* (1902) ; (The Historic Episcopate *(1910) and (The History of the Dwelling House and its Future) (1914). He has edited Duffield's (Latin Hymn-writers and Their Hymns* (1889) ; (Political Economy for High Schools *(1895) ; 'The Apostles as Every¬ day Men* (1912).

THOMPSON, Silvanus Phillips, English physicist: b. York, 19 June 1851; d. 1916. He was educated at Bootham School, York, at Flounders' Institute, Pontefract, and at the Royal School of Mines. In 1876-85 he held the professorship of experimental physics at Uni¬ versity College, Bristol, and in 1885 became principal and professor of physics in the City and Guilds Technical College, Finsbury. He was president of the Physical Society; of the Institution of Electrical Engineers and of the Rontgen Society. His works include (Elemen¬ tary Lessons in Electricity and Magnetism * (1881; rev. ed., 1915); (Dynamo- Electric Ma¬ chinery *(1886 ; 7th ed., 1904); fight, Visible and Invisible> (1897; 2d ed., 1910); (Michael Faraday0 (1898); 'The Life of Lord Kelvin*

(1910).

THOMPSON, Smith, American jurist: b. Stanford, N. Y., 17 Jan. 1768; d. Poughkeep¬ sie, N. Y., .13 Dec. 1843. He was graduated at Princeton in 1788, admitted to the bar in 1792

and several years later established a law prac¬ tice in New York. He was chosen to the legis¬ lature in 1800, was associate justice of the State Supreme Court in 1802-14, chief justice in 1814—18. In 1818 he became Secretary of the Navy under President Monroe, and from 1823 until his death was a justice of the Supreme Court of the United States.

THOMPSON, Vance, American journal¬ ist and playwright: b. 17 April 1863. He was graduated at Princeton in 1883, studied in Ger¬ many and was a dramatic critic in New York in 1890-97 His dramas include (In Old Japan, ' 'The Dresden Shepherdess, > 'Florian's Dream, > etc. ; and among his books are (French Portraits: Being Appreciations of the Writers of Young France) (1900); 'Diplomatic Mys- tenes> (1905); 'The Spinners of Life) ; 'Life and Letters of Ethelbert Nevin' (1913); 'The Night Watchman and Other Poems' (1914) • 'The Ego Book) (1914) ; 'Eat and Grow Thin' (1914); 'Drink and be Sober' (1915); 'The Carnival of Destiny) (1916); 'The Peace GirP (a romantic comedy drama) (1916) * 'Woman' (1917).

THOMPSON, Waddy, American lawyer: b. Pickensville, S. C., 8 Sept. 1798; d. Talla¬ hassee, Fla., 23 Nov. 1868. He was graduated at the South Carolina College in 1814, admitted to the bar in 1819 and in 1826-30 served in the State legislature. He became solicitor of the Western Circuit in 1830, was elected brigadier- general of militia at the time of the Nullifica¬ tion excitement and in 1835-41 was a Whig member of Congress. In 1840 he was chair¬ man of the Committee on Military Affairs. He was appointed Minister to Mexico in 1842, and while on this mission concluded two important treaties and procured the liberation of more l*lan ,?00. Texan prisoners. He published Recollections of Mexico' (1846).

. THOMPSON, William, American Revolu¬ tionary soldier: b. Ireland, about 1725; d. near Carlisle, Pa., 4 Sept. 1781. He served as cap¬ tain of militia in the French and Indian War (1759-60) and was made colonel of eight Penn¬ sylvania companies in June 1775. The follow¬ ing year he took the same rank in the Conti¬ nental Army and later became brigadier-gen¬ eral. He relieved Gen. Charles Lee at New York and in April led 14 regiments to Canada to re-enforce General Thomas, during whose illness he commanded until General Sullivan ar¬ rived. By the latter's orders he led an unsuc¬ cessful attack on the British at Trois Rivieres on 6 June and was captured but immediate! v paroled.

THOMPSON, William Hale, American mayor: b. Boston, Mass., 14 May 1869. In in¬ fancy he was removed by his parents to Chi¬ cago, where he was educated in the public schools. He spent five seasons on the ranches of the Standard Cattle Company in Colorado, Montana and Wyoming; was for three years manager of a cattle ranch in Nebraska. Since his father s death Mr. Thompson has managed the real estate interests left by his father and other real estate interests of his own. In 1900- r hˆ,s.ervecl alderman from the second ward of

Chicago; in 1902-04 was county commis1- sioner of Cook County and in 1915 and 1919 was elected mayor of Chicago.

THOMPSON, William Howard, Ameri¬ can lawyer and legislator: b. Crawfordsville, Ind., 14 Oct. 1871. The family moved to Kan¬ sas while he was a child and he was educated at. the Seneca Normal School. He studied law with his father and was admitted to the Kan¬ sas bar in 1894. He was clerk of the Court of Appeals (1906-13) and was elected United States senator in 1913. In 1916 he served as delegate to the Democratic National Conven¬ tion.

THOMPSON, William Tappan, American

newspaperman and humorist : b. Ravenna, Ohio, 31 Aug. 1812; d. Savannah, Ga., 24 March 1882! He lived for a time in Philadelphia where he worked on the Chronicle ; afterward was secre¬ tary to James D. Westcott while Territorial governor of Florida, and studied law under his charge. He became assistant editor of The State Rights Sentinel, was a volunteer in the Semmole War (1835-36), and established The Mirror in Augusta, Ga., afterward merged with The homily Companion. Thereafter he was attached to several papers and won reputation as a humorist by the “Major Jones Letters” written for The Miscellany which he estab¬ lished in Madison. He . was associated with 1 ark Benjamin in publishing at Baltimore; served on the staff of Governor Brown in the OvilWar, and also as a Confederate volunteer.

r Saˆ *9 the Constitutional Convention

of his State. His many publications were popu¬ lar and were collected and issued by his daugh¬ ter after his death. He wrote several success¬ ful plays, including a dramatization of the ‘Vicar of Wakefield.’

xxxyxvxx-owiN, worasworth, American

artist : b. Baltimore, Md., 27 May 1840; d. Sum- mit, N. J., 28 Aug. 1896. He began to sketch soldiers and battle scenes in 1861, and his work proved popular with the newspapers He went to Pans and studied in the ficole des Beaux Arts, and exhibited ‘The Morelands of Au- Fargi’ m the Salon of 1865. In 1868 he settled in New York, but made several trips abroad at lat|r interval.s- His painting, ‘Desolation’ (18/8), won him an associate membership in the National Academy. In 1877 he became a full- fledged academician ; in 1878 he was made a

•1(Vo-rn i 01 ˆie Society 0f American Artists; m 1879 he won a gold medal at the Paris Ex¬ position. Among his noted paintings are ‘An-napohs in 1776’ (owned by the Buffalo Fine Arts Academy) ; ‘Passing the Outpost’ (owaed by the Union League Club, New York) ; ‘The I arting Guest’ (owned by the New York His- loncal Society) ; ‘A Midsummer Day on Long Island ; ‘A May Day on Fifth Avenue,’ etc.

THOMPSON, Conn., town in Windham County, on the French and Quinebaug rivers and on the New York, New Haven and Hart- ˆaiir°ad. Within the town limits are the villages of Grosvenor Dale, North Grosvenor

W. = e;ˆ,eW B°St°ˆ’r Thompson, East Thompson, West Thompson, Wilsonville, Mechanicsville and Uuinebaug. It is in an agricultural region. The chiei manufacturing establishments are cotton and wooten mills flour and grist mill, planing mills, a boot and shoe factory and machine shops i nompson was originallv a part of Killingly but became a parish in 1728, and in 1785 was in¬ corporated as a town. Pop. 4,804.

THOMPSON INDIANS. See Salishan. THOMPSON’S STATION, Battle of.

After the battle of Stone River (q.v.) the Con¬ federate cavalry were active on Rosecrans’ flanks and rear, and late in February 1863 Gen. Earl Van Dorn, with over 6,000 men, crossed the Tennessee River at Florence and marched northward to Columbia, on. Duck River, threat¬ ening Franklin, about 28 miles nearly west of Murfreesboro. On 4 March General Rose¬ crans ordered a general reconnoissance in front of his lines to ascertain the Confederate strength and, if possible, the enemy’s intention. One of these reconnoitering columns was sent from Franklin. It was under command of Col. John Coburn and consisted of his brigade — 33d and 85th Indiana, 19th Michigan and 22d Wisconsin — the 124th Ohio, 600 cavalry under Col. T. J. Jordan and Aleshire’s Ohio battery of six guns ; in all 2,837 officers and men. A train of 101 wagons accompanied the expedition, 80 of which were to collect forage. Coburn was instructed to advance the first day to Spring Hill, where he was to halt for the night of the 4th, and next day divide his force, send¬ ing part of it to Rally Hill, on the left, to meet a co-operating cavalry column from Murfrees¬ boro, and the other part toward Columbia, each to return to Spring Hill at night, unless

the detachment at Rally Hill should be joined by the cavalry expected from Murfreesboro. Colo¬ nel Jordan, with the cavalry and battery, led the advance and when three miles out of Frank¬ lin met Gen. W. H. Jackson's cavalry division of two brigades and King's battery moving north. Both parties formed for battle, Ale- shire opened with his guns, King's guns re¬ plied, the skirmishers became engaged, and after a brisk engagement of an hour Jackson withdrew toward Spring Hill and Coburn went into camp four miles south of Franklin. One of Aleshire's guns had been disabled and with the forage train of 80 wagons, half of them loaded, was sent back to Franklin. Van Dorn had started from Columbia that morning with the five brigades of Gens. N. B. Forrest, W. T. Martin, G. B. Cosby, F. C. Armstrong and Col. J. W. Whitfield, 6,000 men and 12 guns, and when Jackson with the two brigades of Arm¬ strong and Whitfield fell back after the engage¬ ment, Van Dorn formed line at Thompson's Station, nine miles south of Franklin, and awaited Coburn's advance. Jackson's division was posted on a range of hills crossing the Franklin pike, with King's battery on the ex¬ treme left and Forrest's brigade, with a battery, was on Jackson's right. On the morning of the 5th Coburn advanced cautiously and on nearing Thompson's Station Jordan charged with his cavalry, drove a small Confederate force from the station and seized a range of hills near it. Coburn followed with the infantry to near the station, when, on entering a pass, with hills on either side, he was arrested by shells from the Confederate artillery on his right and left, en¬ filading his line. It was necessary to dislodge King's battery on his right and he formed his line for the attack; Aleshire's guns on opposite sides of the turnpike and railroad which ran close to each other, the guns supported by the cavalry, and the 33d and 85th Indiana advanced down the hill against King's battery, when sud¬ denly the Confederate guns ceased firing and from behind a stone wall Whitfield's brigade,

reinforced by a regiment of Armstrong's, opened a fire that drove the two regiments back up the hill. Whitfield followed, and when nearing the summit he was charged and driven back, made a stand behind the depot of Thomp¬ son's Station and with the assistance of two of King's guns compelled Coburn's men to fall back beyond the hill. At about the same time Coburn was informed that about 1,000 cavalry had been discovered on the left and he resolved to retreat ; but it was first necessary to check the Confederate advance. The movement in retreat was to be covered by the battery and the cavalry, but when Jordan saw the signs of a movement in retreat and the probability of be¬ ing cut off by Forrest's cavalry on the left, he ordered the wagon train and its guard to the rear, to be followed by the battery, Jordan fol¬ lowing

the battery after a slight resistance to Forrest. Meanwhile Armstrong and Whitfield had been ordered to assault Coburn's left and Forrest to reach his rear. Armstrong, Whit¬ field and part of Forrest charged, and after a fierce struggle for the crest of the hill were again driven from it with great loss. Again the Confederates charged; Coburn was forced back; Forrest, with two regiments, gaining his rear, charged him ; and after a few volleys at close quarters Coburn surrendered. His loss, as officially reported, was 48 killed, 247 wounded and 1,151 captured or missing. Van Dorn's loss was 56 killed, 289 wounded and 12 missing. Meanwhile other columns had pushed out from Murfreesboro and driven other bodies of Con¬ federate cavalry across Duck River and Gen. Gordon Granger, commanding the reserve corps of Rosecrans' army, upon hearing of Coburn's defeat, strengthened Franklin and concentrated a column at that place to move upon Van Dorn, at Spring Hill and Thompson's Station. Granger moved on the 9th, attacked and drove Armstrong's cavalry brigade from Thompson's Station and advanced to Spring Hill, Van Dorn having fallen back during the day to recross Duck River at Columbia. On the next day Granger's cavalry pushed Armstrong across Rutherford's Creek near Columbia ; and Van Dorn's main body recrossed Duck River. Pur¬ suit was suspended and on the 11th the various commands engaged in the general reconnois¬ sance returned to their former positions. Con¬ sult (Official Records *(Vol. XXIII) ; Van Horne, (History of the Army of the Cumber¬ land (Vol. I) ; Wyeth, <Life of Gen. N. B. Forrest.*

E. A. Carman.

THOMSON, tom'son, Charles, American patriot: b. Maghera, County Derry, Ireland, 29 Nov. 1729; d. Lower Merion, Pa.4 16 Aug. 1824. He came to America in 1740, was educated in the academy at Thunder Hill, Md., and became a teacher in the Friends' Academy, Newcastle, Del , afterward taught in Philadelphia, and then engaged in business in that city. He acted as commissioner among the Indians and in 1756 was adopted into the Delaware tribe as the <(Truth Teller.® From the first he ardently es¬ poused the cause of the colonies, and in 1774 was made secretary of the Continental Con¬ gress, a post he occupied until 1789. Upon Washington's election to the Presidency he was sent to Mount Vernon to inform him of the event. He then retired from public life and afterward occupied himself with literary labors.

He published (An Enquiry into the Causes of the Alienation of the

Delaware and Shawanese Indians) (1759) ; (The Holy Bible, containing the Old and New Covenant, translated from the Greek [the Old Covenant from the Septua- gint] > (1808), and (A Synopsis of the Four Evangelists* (1815). Consult Harley, (The Life of Charles Thomson) (1900).

THOMSON, Sir Charles Wyville, Scot¬ tish naturalist : b. Bonsyde, Linlithgow, 5 March 1830; d. there, 10 March 1882. He vas edu¬ cated at the University of Edinburgh, where he took the medical course and showed great ability in botany and natural history. He was appointed lecturer on botany in King's College, Aberdeen, in 1850 and professor at Marischal College in 1851. He filled the chair of natural history in Queen's College, Cork, in 1853 and in 1854 went to Queen's College, Belfast, as professor of mineralogy and geology. In 1860 he was transferred to the chair of natural science in the same college and in 1868 became in addition professor of botany in the Royal College of Science at Dublin. He returned to Scotland in 1870 to become professor of natural history in the University of Edinburgh. He took an active part in the scientific investiga¬ tion of the British seas by the Lightning and Porcupine expeditions and published (The Depth of the Sea) (1873). He was appointed in 1872 chief of the scientific staff of the Chal¬ lenger Expedition (q.v.), and on its return in 1876 was knighted. In (The Voyage of the Challenger: the Atlantic (1877) he gave a general account of part of the investigations carried out on the famous voyage.

THOMSON, Edward, American Metho¬ dist Episcopal bishop : b. Portsea, England, 12 Oct. 1810; d. Wheeling, W. Va., 22 March 1870. He came to the United States in 1819, was graduated in medicine at the University of Pennsylvania in 1829 and practised in Jerome- ville and Wooster, Ohio. In 1832 he united with the Methodist Church and in the following year was admitted into the Ohio Conference. He was pastor of a church in Detroit, Mich., in 1836 and in 1838-43 was principal of the Nor¬ walk Seminary. He was the first president of the Ohio Wesleyan University at Delaware, in 1846-60, and in 1864 he was elected bishop, in which office he continued until his death. He edited the Ladies' Repository at Cincinnati 1844-46, the Christian Advocate and Journal, New York 1860-64, made a missionary tour of the world and published < Moral and Religious Essays *(1856); Sketches, Biographical and IncidentaP (1856) ; (Our Oriental Missions) (1870); (Evidences of Revealed Religion* (1872), and other works.

THOMSON, Edward William, Ameri¬ can civil engineer and author: b. Toronto, Ont., 12 Feb. 1849. He was educated in Trinity College Grammar School and by his own exertions. When but 16 he enlisted

and served (1864-65) in the Third and Fourth Pennsylyania regiments ; and in the Queen's Own Rifles in 1866. He became a political writer on the Toronto Globe (1879-91); was editor of the Youth's Companion, Boston (1891-1901), afterward becoming a special writer on Canadian politics. He was also the traveling correspondent of the Evening Tran¬ script, Boston. His published works include

(01d Man Savarin *(1895), (Between Earth and Sky* (1897), (Aucassin and Nicolette> (1895, versified from the translation) ; (When Lincoln Died, and other poems) (1909), etc.

THOMSON, Elihu, American inventor and electrician : b. Manchester, England, 29 March 1853. In 1858 he came to the United States, was educated in the public schools in Philadelphia and from 1870 to 1880 was professor of chemis¬ try and mechanics in the Central High School there. After a visit to the Paris Exposition in 1878 he became interested in the subject of lighting by electricity and his experiments, car¬ ried on with the aid of E. J. Houston, resulted in patents secured in 1878 and 1879. The fol¬ lowing year he became electrician to the Ameri¬ can Electric Company, afterward known as the Thomson-Houston Electric Company. This, by consolidation with the Edison Company in 1892, became the General Electric Company, the largest plant for producing electrical ma¬ chinery in the world. His patented inventions in electrical appliances number over 600 and many of them have come into universal use. Among these are the three-coil armature for dynamos and motors ; the induction-coil sys¬ tem of distribution ; the induction motor ; the constant-current regulator for arc-lighting dynamos; the process of welding metals by electricity; the magnetic blow-out for switches and fuses and the electric meter for direct and alternating currents. Since 1892, when the Gen¬ eral Electric Company established its plant in Lynn, Mass., he has resided there, retaining his connection as consulting electrical engineer. In 1889 he became president of the American Institute of' Electrical Engineers, and in 1890 received from the Paris commission half the prize of 10,000 francs for his meter. He was decorated in 1889 for electrical inventions by the French government as Officer et Chavalier de la legion d'Honneur; given the honorary degrees of A. M., Yale, D.Sc., Harvard and Ph.D., 1 lifts; has received many medals and awards, among which is the Rumford Medal, and was awarded Grand Prix at Paris expositions of 1889 and 1900. He is past president of the American Institute of Electrical Engineers, Fellow of American Academy of Arts and Sciences, member of the Institution of Civil Engineers, London, the American Chemical So¬ ciety, the American Physical Society, the Na¬ tional Academy of Sciences and of many other societies, and was official United States delegate to Chamber of

Delegates, Electrical Congress, in 1893 at Chicago. He has been for many years a Fellow of the American Association f9r the Advancement of Science, serving as vice-president at the Columbus meeting, Sec¬ tion B, Physics; and has been vice-president of the American Physical Society. He was president of the International Electrical Con¬ gress at Saint Louis in 1904 and also president of the Chamber of Official Delegates at the said Congress. He was elected honorary mem¬ ber of the Institution of Electrical Engineers of Great Britain in 1904. In 1909 he was elected president of the International Electrotechnical Commission, succeeding the late Lord Kelvin in that capacity upon the decease of the latter. Professor Thomson was the first recipient of the Edison medal and also received the award of the Eliott Cresson gold medal by the Frank-

1m Institute, Philadelphia, for his electrical work. Among the most notable of his papers prepared for scientific societies are that on ˆElectric Welding,) read before the Boston Society of Arts in 1886, and one prepared for the American Institute of Electrical Engineers in 1887, on (Novel Phenomena of Alternating Currents.)

THOMSON, Frank, American engineer and railroad president : b. Chambersburg, Pa., 5 July 1841; d. Merion, Pa., 5 June 1899. As a student he acquired a thorough practical and scientific knowledge of mechanical engineering, so that when he quit the shops of the Penn¬ sylvania Railroad at Altoona, he was able to build a locomotive. As chief assistant to the Assistant Secretary of War he constructed roads and bridges and superintended the trans¬ portation of troops during the Civil War; after which he was appointed superintendent of the eastern division of the Philadelphia and Erie Railroad. He re-entered the service of the Pennsylvania Railroad in 1873 and as superin¬ tendent of the eastern system constructed the excellent road-bed and introduced the standard track. From 1897 until his death he was presi¬ dent of the company.

THOMSON, George, Scottish song col¬ lector: b. Limekilns, Scotland, 4 March 1757; d. Leith, Scotland, 18 Feb. 1851. He was edu¬ cated at Banff and in 1780 removed to Edin¬ burgh where he became junior clerk to the board of trustees for the Encouragement of Arts and Manufactures. He was subsequently promoted to be chief clerk, an office he held until his retirement in 1839. In 1792 he con¬ ceived the plan of making a complete collec¬ tion of Scottish airs, secured the

services of such well-known authors as Campbell, Scott and Burns to supply words for the melodies where necessary and since there was neither prelude nor coda to the songs he engaged Pleyel, Haydn, Beethoven, Mozart and others of note to remedy the deficiency and also to compose accompaniments for them. The results of his labors were published as follows : Scottish airs (6 vols., 1793-1841) ; Welsh (3 vols., 1809-14), and Irish (2 vols., 1814-16).

THOMSON, James, Scottish poet: b. Ednam, Roxburghshire, 11 Sept. 1700; d. Rich¬ mond, Surrey, 27 Aug. 1748. He was educated at the University of Edinburgh in 1715 and at first intended to enter the ministry, but in 1725 went to London to devote himself to literature. TTis poem on (Winter } was published in the following year, in 1727 it was followed by (Summer, > appeared in 1728 and in 1730 the series was completed and published qs (The Seasons. } It was very successful and was followed by his play (SophonisbaP pro¬ duced at Drury Lane in 1730. For two years he was on the Continent as traveling tutor to the son of Charles Talbot, afterward Lord Chan¬ cellor, and on the death of his pupil in 1733 was appointed by the young man's father to a sinecure office with a salary of £300 a year. He published a patriotic poem entitled <Liberty) (1734— 36), included in 1736 in the volume with (Sophonisba) and (Britannia.) His famous song, (Rule Britannia,) formed part of (The Masque of Alfred* (1740), written by him with his friend, David Mallet, to music composed

by Dr. Arne. In 1744 Lord Lyttelton conferred upon him the sinecure office of surveyor-gen¬ eral of the Leeward Islands, worth £300 a year. In the same year he issued a new edition of (The Seasons * with extensive additions and alterations, and in 1748 appeared (The Castle of Indolence: An Allegorical Poem, *a fine imitation of Spenser. He was buried in the parish church of Richmond. Among his works not already mentioned are (Agamemnon) (1738), a play; (Edward and Eleanora) (1739), a play which was published but rejected by the censor; (Tancred and SigismundaP a tragedy (1745), his most successful play, and (Coriolanus) (1749), a posthumously acted play. (The Seasons* marks the dawn of a new era in English poetry, an era characterized by a de¬ parture from the formation and artificiality of Pope and his school in favor of simplicity and truthfulness to nature. The impulse gathered strength in Gray and Cowper, and reached its fullest expression in Wordsworth. The work found warm admirers in France and other coun¬ tries and is still read. A good recent edition of Thomson's works is the (Aldine> (1897) by Tovey. (See Seasons, The). Consult Morel, L., (James Thomson, sa Vie et ses CEuvres) (Paris 1895) ; (Life *in Tovev's edition; Bayne, (Thomson* (<Famous Scots SeriesP 1898); Macaulay, G. C.,

(James Thomson) (New York 1908).

THOMSON, James, British professor of engineering: b. Belfast, 16 Feb. 1822; d. Glas¬ gow, 8 May 1892. He was a brother of William Thomson, Lord Kelvin, and was graduated from the University of Glasgow in 1839. In 1851 he settled at Belfast as civil engineer and in 1857 became Crown professor of civil engi¬ neering at Queen's College. Here he remained unil 1873, when he was called to the similar chair at Glasgow. _ In early life he was devoted to various inventive purposes, his first being a mechanism for feathering the floats of steamer paddles. More practical was his in¬ vention in 1850 of a "vortex water-wheel,* *and later of a jet-pump used in draining lowlands, a centrifugal pump and improvements in tur¬ bines and in the action of blowing-fans. For many years he was engaged in investigations of the plasticity of ice, his first contribution to the subject (1848) being a paper communicated to the Royal Society of Edinburgh on (The Effect of Pressure in Lowering the Freezing- point of Water.* The most important of his contributions to this subject dealt with ˆcrys¬ tallization and liquefaction as influenced by stresses tending to change of form in crystals.® He also published researches on currents of atmospheric circulation; on the flow of water in rivers and on the jointed prismatic structure seen at the Giants' Causeway. Failure of eye¬ sight caused him to resign his chair in 1889.

THOMSON, James, Scottish poet: b. Port-Glasgow, 23 Nov. 1834; d. London, 3 June 1882. He was trained at Chelsea for the calling of army schoolmaster and after teaching at various regimental centres was discharged from the army with several others for a breach of discipline in 1862. He had gained the friend¬ ship of Charles Bradlaugh (q.v.) and con¬ tributed to his National Reformer over the signature B. V. In 1872 he was in Colorado as agent of a mining company and in the follow-

ing year went to Spain as a war correspondent for the New York World. In 1874 (March to May) he contributed to the National Reformer his most famous poem, (The City of Dreadful Night5 (printed in book form, with other poems, 1880), a finished, sombre work, in which his gloomy temperament clearly shows itself. His other publications include Wane's Story, Weddah and Om-el-Bonain and other Poems> (1881); (Essays and Phantasies) (1881); (A Voice from the Nile and other Poems) (1884) ; (Satires and Profanities5 (1884),

and (Poems, Essays and Fragments) (1892). His <Poetical Works5 were issued in two volumes in 1895 and a volume of biographical and Critical Studies5 appeared in 1896. (See City of Dread¬ ful Night, The). Consult the (Life5 by Salt (1889; rev. ed., 1898); also Ward, < Eng¬ lish Poets5 (2d ed., Vol. IV, 1883).

THOMSON, John, Scottish painter: b. Dailly, Ayrshire, 1 Sept. 1778; d. Duddingston, 30 Oct. 1840. He studied for the ministry in Glasgow University for a year, in 1793 entered the University of Edinburgh and on his father's death in 1799 succeeded him as minister of his native parish. In 1805 he was presented to the parish of Duddingston, near Edinburgh, and here he rapidly acquired fame as a landscape- painter and developed a close friendship with Sir Walter Scott. His pictures were much in demand and he exhibited frequently in Edin¬ burgh. On the foundation of the Scottish Acad¬ emy in 1830 he was elected an honorary mem¬ ber, after declining ordinary membership. Many of his pictures are in the National Gallery of Scotland, but a considerable number are hung in private collections. Among the former are bruce's Castle of Turnberry5 ; bavensheugh Castle5; (Scene on the Clyde5; (The Tros- sachs5 ; (Aberlady Bay,5 and <Trees on the Bank of a Stream.5 The National Gallery in London contains (Loch an Eilan5 and the South Kensington Museum has a water-color of < Duddingston Loch.5 He felt throughout his artistic life the want of early and systematic training, but he holds a distinct place in the history and development of British art, as the first painter to grasp and express the wildness and power of Scottish scenery. Consult Baird (John Thomson5 (1895).

THOMSON, Joseph, Scottish explorer in Africa: b. Penpont, Dumfriesshire, 14 Feb. 1858; d. London, 3 Aug. 1895. He was edu¬ cated at the University of Edinburgh and there distinguished himself so highly that he was appointed in 1878 geologist and naturalist to the exploring expedition sent out to East Cen¬ tral Africa by the Royal Geographical Society under the command of Alexander Keith John¬ ston. When Johnston died, 28 June 1879, Thom¬ son assumed the leadership of the party and conducted it to Lake Tanganyika and near the head-waters of the Kongo. A mutiny of his followers prevented him from proceeding farther and he returned by way of Lake Leo¬ pold, reaching the coastlO July 1880. In 1882 he set out on a great journey from the east coast of Africa to Victoria Nyanza. This was undertaken on behalf of the Royal Geographi¬ cal Society and during it he visited Kilimanjaro and Mount Kenia and proceeded through the country of the Masai by way of Lakes Naivasha and Baringo to Victoria Nyanza. In 1885 he

was awarded the founder's medal of the Royal Geographical Society and in the same year trav¬ eled in Nigeria on behalf of the National Africa Company in order to conclude treaties with the kings of Sokoto and Gando. In 1888 he ex¬ plored the Atlas Mountains in Morocco and in 1 890—9 1 traveled on behalf of the British South Africa Company in the territory of the Central Africa Protectorate. His travels are described in his works <To the Central African Lakes and Back : the narrative of the Royal Geo¬ graphical Society's East Central African Ex¬ pedition, 1878-80 5 (1881); 'Through Masai

Land: a Journey o-f Exploration Among the Snowclad Volcanic Mountains and Strange Tribes of Eastern Equatorial Africa5 (1885); 'Travels in the Atlas and Southern Morocco: a Narrative of Exploration5 (1889). He also wrote a work on 'Mungo Park and the Niger5 (1890) and a novel (Ulu,5 with Miss Harris- Smith. Consult 'Life5 by J. B. Thomson

(1896).

THOMSON, Sir Joseph John, English

physicist : b. Manchester, 18 Dec. 1856. He was educated at Owens College, Manchester, and at Trinity College, Cambridge; was lecturer at Trinity in 1883 and since 1884 has been pro¬ fessor of experimental physics at Cambridge. His researches and lectures tend far toward establishing the theory of ions. He has also been an active member of the Society for Psychical Research. He has published (A Treatise on the 'Motion of Vortex Rings5 (1884) ; (Recent Researches in Electricity and Magnetism5 (1892); ' Elements of the Mathe¬ matical Theory of Electricity and Magnetism5 (1895); Conduction of Electricity through Gases5 (1903) ; Corpuscular Theory of Mat¬ ter5 (1907) ; thermochemistry5 (1915), etc. In 1906 he received the Nobel prize in physics and in 1908 he was knighted.

THOMSON, Thomas, Scottish antiquary, elder brother of Rev. John Thomas, the painter: b. Dailly, Ayrshire, 10 Nov. 1768; d. Edinburgh, 2 Oct. 1852. He was graduated from Glasgow University in 1789 and adopting law as his profession, went to Edinburgh and was admitted an advocate in 1793. He acquired a large practice, but gradually devoted himself more and more to the study of legal antiquities. In 1832 he succeeded Sir Walter Scott, who was one of his close friends, as president of the Bannatyne Club. Among his numerous publi¬ cations are Che Acts of the Parliament of Scotland, 1424— 17075 (10 vols., 1814-24); 'Reg- i strum Magni Sigilli Regum Scotorum, 1306-14245 (1814) ; 'The Acts of the Lords Auditors of Causes and

Complaints, 1466-945 (1839), and (Acts of the Lords of Council in Civil Causes, 1 478 — 95 5 (1839); ‘Forms of Process in the Court of Session during the Earlier Periods, with the later variations5 (1839) * Chamberlain Rolls5 (3 vols., 1817 and 1845) ’; Memoirs of Sir George Mackenzie5 (1821) Consult < Memoir5 (1854) by Cosmo Innes.

r ■ Ur TV , ,’ ˆriusn chemist : b.

?rileˆ’oeo ˆpnl 1773 ; d. near Holy Loch, 2 July 1852. He was educated at Crieff, Stirling

??nn the ,Universlty of Saint Andrews, and in 1799 graduated M.D. at Edinburgh. He edited the supplement to the third edition of the Encyclopaedia Britannica,5 to which he con¬ tributed the articles Chemistry,5 (Mineralogy5

THOMSON

585

and (Vegetable, Animal and Dyeing Sub¬ stances. ’ In the article (Mineralogy) he used the system of symbolic representation, but it is incorrect to describe him as the introducertof this auxiliary of chemical science. In 1800 on the completion of the Encyclopaedia, } he began a course of lectures on chemistry, which he continued till 1811, opening, in addition, a lab¬ oratory for practical instruction in chemistry, about the first institution of the kind in Great Britain. In 1802 he published the first edition of his (System of Chemistry, > which obtained rapid success both in Great Britain and on the Continent. In 1810 he published his Elements of Chemistry. 5 His < History of the Royal Society) appeared in 1812. In 1813 he went to London and began there a scientific journal, the Annals of Philosophy, which he con¬ tinued to edit till the end of 1820. The lec¬ tureship in chemistry in the University of Glas¬ gow was conferred on him in 1817, the office being shortly afterward raised to a professor¬ ship, and he himself created regius professor of chemistry in 1818. His work on the atomic theory was published in two volumes in 1825, under the title of (Attempt to Establish the First Principles of Chemistry by Experiment.) The accuracy of the work was severely crit¬ icized by the Swedish chemist Berzelius. Thomson discovered a large number of chem¬ ical compounds, such as hyposulphurous acid, chlorochromic acid and a great variety of salts. In 1830-31 he published his (History of Chemistry, > and in 1836 appeared his In 1846 he re¬ tired from his professional duties.

THOMSON, William, English archbishop: b. Whitehaven, 11 Feb. 1819; d. York, 25 Dec. 1890. He was educated at Queen's College, Oxford, of which he was successively Fellow, tutor and head. Ordained deacon in 1842, he was curate at Saint Nicholas, Guildford and Cuddesdon, near Oxford, 1842-47, when he was made tutor of his college, of which he became provost in 1855. In 1861 he edited a series of essays by various writers under the title (Aids to Faith,) intended as a counterblast to Essays and Reviews) ; and in that year was appointed bishop of Gloucester and Bristol. In February 1863 he became archbishop of York. He was the author of (An Outline of the Necessary Laws of Thought } (1842) ; (The Atoning

Work of Christ, viewed in Relation to some Current Theories) (1853); (Crime and its Ex- cuses) (in Oxford Essays, 1855) ; Eife in the Light of God's Word *; Eimits of Philosophi¬ cal Inquiry) ; (Design in Nature) ; and a series of essays entitled (Word, Work and Will.*

THOMSON, William, 1st Lord Kelvin, British mathematician and physicist: b. Belfast, 26 June 1824; d. Glasgow, Scotland, 17 Dec. 1907. He was graduated from Cambridge in 1845, and in 1841 published a paper (On the Uniform Motion of Heat in Homogeneous Solid Bodies, and in Connection with the Mathematical Theory of Electricity,* contrib¬ uted to the Cambridge Mathematical Journal. In 1845 he became first editor of the Cam¬ bridge and Dublin Mathematical Journal, a post which he held for seven years. He was appointed professor of natural philosophy in the University of Glasgow in 1846, and oc¬

cupied this position for 53 years, till his resigna¬ tion in 1899. His jubilee as a professor was celebrated in 1896 by many brilliant university functions and distinguished men of science came from many countries to do him honor. Lord Kelvin's contributions to physical science and its applications are very numerous. In all the domains of dynamics, sound, light, heat, magnetism and electricity there are achieve¬ ments to his credit. The form in which the mariner's compass is now generally employed was patented by him in 1876, and the siphon recorder used in connection with almost all submarine cables was introduced by him in 1867. His extremely delicate mirror galvanom¬ eter was also originally invented for the pur¬ poses of submarine telegraphy, and in this con¬ nection his automatic curb sender is also worthy of notice. His quadrant and absolute electrom¬ eters are well known to the student of electrostatics, and his portable electrometer and water-dropping apparatus are of great use in practical meteorology. He published important papers on the theory of magnetism, and the theory of

electric images with the associated method of electric inversions is due to him. Lord Kelvin was the first to direct the atten¬ tion of scientific men to Sadi Carnot's pioneer work in thermodynamics, and it is mainly to his researches and those of Rankine and Clausius that we owe the present advanced condition of that science. The absolute scale of tempera¬ ture based on the second law of thermo¬ dynamics was first proposed by Lord Kelvin. In the building up of the great modern doc¬ trine of the conservation of energy Lord Kelvin took an important part, and the portion of that doctrine known as the dissipation of energy is almost entirely due to him. He also pro¬ pounded a modified atomic theory in which the atoms are conceived as vortices, and he threw much light on such questions as the age of the earth, cosmic evolutions and geological time. Lord Kelvin, then William Thomson, was associated as electrician with the company which undertook the laying of an Atlantic cable in 1857, and was largely responsible for the suc¬ cess which ultimately crowned this pioneer effort of submarine telegraphy in 1866. He might, indeed, be called the first electrical en¬ gineer. He was knighted in 1866. and in 1892 was raised to the peerage as Baron Kelvin of Netherall, Largs, Ayrshire. He was president of the Royal Society from 1890 to 1895, and was awarded the Copley and Royal medals. In 1871 he presided over the meetings of the British Association at Edinburgh. "He was Rede lecturer at Cambridge in 1866 and was many times elected president of the Royal So¬ ciety of Edinburgh. He was awarded the Prix Poncelet by the Institute of France in 1874, and the Helmholtz medal by Germany in 1892. Lie received so many honors that there is not space to enumerate them. Perhaps the most notable was the jubilee celebration of his pro¬ fessorship at Glasgow University in 1896. The gathering was attended by 2,500 distinguished guests; the ceremonies and jubilation lasted three days. The Grand Cross of the Royal Victorian Order was conferred on him. The city officials joined in the event, cable com¬ panies all over the world sent congratulations and a message was sent from the university

half around the world, via Newfoundland, New York, San Francisco, New Orleans, Washing¬ ton and back to London and Glasgow, being received by Lord Kevlin in seven and one-half minutes. Lord Kelvin's most important pub¬ lished work is the well-known treatise on Natural Philosophy) (Part I, 1867; new ed., 1879), written with Professor Tait. An abridged edition has also been published. His other works are (Papers on Electrostatics and Magnetism) (1873) ;

Mathematical and Physi¬ cal Papers) (1882, 1884, 1890); Eopular Lec¬ tures and Addresses,) and articles in the 9th edition of the Encyclopaedia Britannica,) some of which have been also published separately. He visited the United States in 1884, in 1892 and again in 1902. Consult his (Life) by An¬ drew Gray (1908), and by Thompson, S. P.,

(1910).

THOMSONITE, one of the zeolite family of minerals (HˆNaˆCaGAhShOn). It usu¬ ally occurs in columnar forms or radiated con¬ cretions of snow-white color; less frequently in distinct orthorhombic crystals (comptonite) . It is a hydrous silicate of aluminum, sodium and calcium. It is found filling cavities in igneous rocks in Scotland, the Faroe Islands, Nova Scotia, at Golden in Colorado, and else¬ where. Much so-called thomsonite, including the pebbles of Grand Marais, Minnesota, is mesolite.

THOR, thor or tor, in Norse mythology, the god of thunder, son of Odin by Jord (the earth). He was represented as a powerful man in the prime of life, with a red beard, girt with his girdle of strength, and armed with his mighty hammer Miolnir («the smasher®). He was the foe of the giant demons, and friendly to man. Some have thought him identical with Jupiter; others identify him with the Anglo- Saxon, Thonar. Sacrifices were offered up to him under oaks. Thursday has its name from him. Consult Uhland, (Der Mythus vom Thor)

(1868).

THORACIC DUCT, a vertical canal lying in fr?nt the spine, and receiving the ter¬ minations of the lacteal and lymphatic vessels. It is the receptacle for the materials which go to renovate the blood, these materials being derived from the digestion of food and from the elaborated products of the lymphatic glands. From the thoracic duct the chyle or nutrient matter is poured directly into the current of the circulation, the duct opening into the great veins (internal jugular and subclavian veins) lying at the root of the neck on the left side.

A second and smaller lymphatic or thoracic duct lies on the right side of the body, and re¬ ceives the contents of the lymphatics of the right arm and right side of the head. The chief thoracic duct is dilated at its lower ex¬ tremity, at the junction of the loins and back, into the receptaculum chyli. The contents of the thoracic duct contain the elements of the blood already elaborated.

THORAH, tc/ra, or TORAH, in Hebrew literature, a definite commandment laid down by recognized authority. When used with the definite article the word refers specifically to the Mosaic law, that is the Pentateuch; and often to the Ten Commandments.

THORAX, that part of the trunk in higher vertebrates between the neck and abdomen con¬ taining the heart, lungs and other .viscera, en¬ cased by the ribs, sternum and thoracic ver¬ tebrae. Sometimes the term is restricted to the bony structure that forms the chest. The term is also applied to those segments of the body in Arthropoda which lie between the head and the abdomen. Thus in insects there are three seg¬ ments forming the thorax, named, respectively, the prothorax, mesothorax and metathorax. The prothorax bears the first pair of legs, the mesothorax the second pair of legs and first pair of wings, while the metathorax bears the third pair of legs and second pair of wings. In crustaceans and spiders the head and chest seg¬ ments are united together to form a single mass, named the cephalothorax. In man and higher vertebrates the thorax is formed by the ster¬ num or breast-bone in part and by the ribs and spine, laterally and behind. In mammals alone is the thorax and its cavity completely shut off from the cavity of the abdomen bv a complete diaphragm or midriff. See Anatomy; Oste¬ ology, Human ; Torso.

THOREAU, tho'ro, Henry David, Ameri¬ can ((poet-naturalist)) : b. Concord, Mass., 12 July 1817 ; d. there, 6 May 1862. He was grad¬ uated at Harvard in 1837 and began in that year the copious journal with which in 1850-60 he filled 30 manuscript volumes, did some teach¬ ing at Concord and on Staten Island, N. Y., ap¬ peared occasionally as a lyceum lecturer in Con¬ cord and other New England towns that chanced to call him, and, until his death, practised at intervals and with great skill his art of pen¬ cil-manufacture, making, Emerson said, as good an article as the best English. In 1839 he took the excursion recorded in <A Week on the Concord and Merrimac Rivers,) which was pub¬ lished in 1849 in an edition of 1,000; the return of 700 as unsalable (1853) afforded him the humorous boast that he had now a fair-sized library all of his own writing. In the course of the voyage there are many phases for specula¬ tion and opinion, the result being less a narra¬ te than a collection of essays and discussions. Chiefly for the preparation of this work, but also to undertake an experiment in simplicity of living, and to have opportunity for his ob- sei vation of wild nature, he lived alone, in a house built by himself, from July 1845 to Sep¬ tember 1847, at Walden Pond, not far from Concord village. There, too, he wrote several of his papers and gathered material for his Walden, or Life in the Woods) (1854), the best known and probably the most

nearly classic ot his books. After this episode, which some folk professed to think very odd, ((he preferred ® says Emerson, ((short work,® ’building boats, grafting, surveying and other odd jobs, writing meanwhile for current periodicals. In 1846, 1853 and 1857 he went to the Maine woods, and his accounts, partially printed in magazines in his lifetime, were posthumously collected in constituting what is Perhaps, after Walden,) his most interesting work. Other jaunts to Cape Cod (1849) and Canada (1850) were also described. The titles of these pos- thiimous volumes are Excursions) (1863) • TQh,e Ma,ˆe Woods) (1864); <Cape Cod5’ /looix ’ , <Ear*y Spring in Massachusetts) (1881); (Summer) (1884); WVinter) (1888);

'Autumn1 (1892); ‘Miscellanies' (1894).

The First and Last Journeys of Thoreau! lately discovered among his unpublished Jour¬ nals and Manuscriˆ edited by Sanborn (Bos¬ ton 1905). He refused in 1841 to pay taxes to a government concerned in slavery and war, and was jailed for a few hours. He was said to a.1?eˆ escaPe of fugitive slaves when at Walden. At any rate he sounded the bell to announce Emerson's first anti-slavery address at Concord, and on 30 Oct. 1859 made there a bold public defense of John Brown, later re¬ peated in Boston. As a scientist, it is said that he made few discoveries. His exact knowledge in this domain, however, was gained at first hand ; his works abound in interesting observa¬ tion and fragments of natural history; notwith¬ standing that when he came to report nature he seems to have valued it largely for what it interpreted to him. He was much of a poet hut lacked metrical facility, and wrote little. some of his work in verse, such as (Smoke, > which Emerson thought finer than anything of Simonides, is of a high order. In prose, de¬ spite exaggerations and other rhetorical defects, he attained greater certainty of expression. Ihroughout his writings there is a tonic quality which may in part arise from what John Bur¬ roughs, the chief later representative of the school of literary naturalists which Thoreau inaugurated, calls his “stimulating contrariness.® The 20th century has brought a greater appre¬ ciation of Thoreau, especially of his prose works, which now appear destined to outlive those of his contemporaries. (See Walden). There is a (Riverside) complete edition (1893) ; an edition of the (Letters' by Sanborn (1894). A complete edition appeared in 1906. Consult also Channing, W. E., (Thoreau, the Poet- Naturalist-* (1873; new ed., 1902); Sanborn’s (New York 1916) ; Torrey, Brad¬ ford, (Friends on the Shelf> (Boston 1906) ; an

essay by Burroughs in <Literary Values' (1903), and also lives of Emerson, A. Bronson Alcott and Hawthorne.

THORIANITE, a mineral consisting chiefly of thorium and uranium oxides, about 71 per cent of the former and 12 per cent of the latter, occurs at Norris, Madison County, Mont.

THORITE, a rare but important mineral found almost exclusively in Norway. Theoret¬ ically it is an anhydrous thorium silicate, ThSiOi, but all analyses show the presence of considerable water and more or less uranium, lead and iron. The variety orangite, which is of a bright orange to lemon-yellow color, is the richest known thorium ore, containing by analy¬ sis 71.65 per cent of thoria. Uranothorite has a dark reddish-brown color and contains 9 to 10 per cent of uranium sesquioxide. Thorite proper is black or very dark brown. It crystallizes in tetragonal crystals isomorphous with zircon, the

usual habit being a square prism terminated by a square pyramid. Prismatic cleavage is distinct and the fracture is conchoidal. Its hardness is 4.5 to 5, and the specific gravity ranges from 4.2 in some uranothorite to 5.4 in some orangite. It is transparent in thin splinters to nearly opaque in large or altered masses. Its lustre is resinous, streak yellow to dark brown. 1 horite was formerly one of the chief sources of supply of the rare earth thoria and is still of much value for that purpose, though its use has been supplanted.

THORIUM, one of the most valuable of the rare elements. It was discovered by Ber¬ zelius in a Swedish mineral and called by him Thorium® after the ancient Swedish god Thor, hound in the minerals thorite, orangite, euxen- lte, aureite and in monazite sand. This latter substance is found in considerable quantity in Brazil and in North Carolina and is one of the most valuable sources of thorium and of a number of other rare elements related to it ihonum, symbol Th, atomic weight 232, is a grayish metallic element that can be separated in an elementary condition by heating the chloride, ThCL, with metallic potassium or sodium It is soluble in mineral acids and burns brilliantly to the oxide ThCL, thoria, when heated in the air. This oxide is the most im¬ portant compound of thorium as it is used to¬ gether with the oxides of certain other rare elements to form the “mantles® for the Wels- bach incandescent gas lights. See Mineral Production of the United States.

THORN, torn, Republic of Poland, in the former province of West Prussia, on the Vis¬ tula, 51 miles southwest of Marienbad. Under the German regime an important strong¬ hold, a railway junction,

surrounded by de¬ tached forts, and has withstood many sieges the last being in 1915. It dates from 1231, and. its principal buildings comprise the ancient castle, town-house and other gabled and handsome edifices ; there is also a statue to Copernicus, who was born there. It was taken from Poland by Prussia in 1793. Its manufac¬ tures include machinery, castings, soap and a special gingerbread. There is considerable trade in corn and timber, besides wood, linen, hides, bark and ashes. An important conference was held in 1645 to reconcile Protestant and Catholic differences, presided over by German and Polish churchmen, but was far from meet¬ ing with success. Pop. 46,227.

THORN-APPLE. See Datura.

THORNDIKE, Edward Lee, American psychologist: b. Williamsburg, Mass., 31 Aug. 1874. He was educated at Wesleyan University (A.B 1895) Harvard (A.B., 1896), Columbia (Ph.D., 1898), and taught in the Western Re¬ serve University (1898-99). He became in¬ structor in psychology in Columbia University (1899-1904) and has been professor there since the latter year. He is author of ˆEducational Psychology> (1903); <Mental and Social Meas¬ urements' (1904); (Animal Intelligence'

(19H) ; (The Original Nature of Man' (1913) • (The Psychology of Learning' (1914) and many monographs on similar subjects.

w THORNE, Joseph, American inventor: b. Marlborough, N. Y, 17 Feb. 1826; d. Sing Sing N. Y., 4 May 1897. He served through the

Mexican War. Becoming an engineer he asso¬ ciated himself with Elias Howe while the latter was perfecting his sewing-machine. Afterward he was connected with the Singer Company and later established a factory in Scotland. He invented a typewriter, a sewing machine and a typesetting and distributing machine, which bear his name. This last machine was developed in Hartford, Conn. See Composing Machines.

THORNHEADED WORMS, or ACAN- THOCEPHALA, a group of parasitic round- worms (q.v.) of the genus Echinorhynchus, having the proboscis armed with a circle of hooks.

THORNHILL, Sir James, English painter: b. Melcombe Regis, 1676; d.

Thornhill, Dorset, 13 May 1734. Queen Anne appointed him her sergeant-painter and he was much engaged in the decoration of palaces and public buildings, in which his chief works are to be found. Among his best efforts may be mentioned the dome of Saint Paul's, Great Hall at Greenwich Hospital and some rooms at Hampton Court. He also painted the altar-pieces at All Souls and Queen's colleges, Oxford. His forte was in the treatment of allegorical subjects. He was confirmed in his position sergeant-painter by King George I in 1720 and "knighted in the same year. Hogarth clandestinely married Thornhill's daughter in 1729, and always ex¬ pressed great admiration for that painter's works which show invention, even genius, al¬ though living critics have not confirmed' the favorable verdict of George I and his con¬ temporaries.

THORNS AND SPINES IN PLANTS,

acute-pointed projections from the trunks, branches or twigs of plants. A thorn arises from the wood of which it is an outgrowth, whereas a prickle or spine is an outgrowth of the bark and can be removed when the bark is peeled off. The raspberry and the rose are good examples of prickle-covered plants; the hawthorn and some wild plums of plants covered with thorns. Prickles and spines are believed to be useful to the plants which bear them, either as protections against the brows¬ ing of animals, as auxiliaries in climbing, hold¬ ing their position, etc.; thorns are considered to be abortive branches, a deduction based upon the facts that in nature they often bear leaves, and under domestication may develop into branches. Various hawthorns exhibit the for¬ mer phenomenon and the apple and pear the latter.

THORNTON, Sir Edward, English diplo¬ mat: b. London, 13 July 1817; d. there, 26 Jan. 1906. He was educated at King's College, London, and at Cambridge University and in 1842 was appointed attache at Turin. He was engaged in important diplomatic missions to Mexico and the South American states in 1845- 65, and in 1865-67 was Minister to Brazil. In 1867 he was appointed Minister to the United States, served on the commission to adjust the Alabama Claims in 1871 and was arbitrator in the commission on the United States and Mexican claims in 1873. He became Ambas¬ sador to Russia in 1881, to Turkey in 1884 and in 1887 retired from the diplomatic service.

THORNTON, John Wingate, American author: b. Saco, Me., 12 Aug. 1818; d. Scar-

boro, Me, 6 June 1878. He took his LL.B. degree at Harvard in 1840;

was admitted to the bar and practised in Boston. The honorary A.M. degree was conferred on him bv Bowdoin College in 1860. He was the founder of the New England Genealogical Society and was vice-president of the American Static Associa¬ tion. His published works chiefly include genealogical memoirs of distinguished men and families, including a (Life of John Bowles,*

(Ancient Pemaquid,* (Pulpits of the American Revolution (1860) and the historical Re¬ lations of New England to the English Com¬ monwealth; (1874) Consult 'Memoirs of John Wingate Thornton (Boston 1879).

THORNTON, Matthew, American legis¬ lator, signer of the Declaration of Independ¬ ence: b. Ireland, 1714; d. Newburyport, Mass, -4 June 1803.ˆ He came with his parents to America in 1717, lived for a time at Wiscas- set, Me, removed to Worcester, Mass, and there received his education. Entering the pro¬ fession of medicine, he practised at London¬ derry, N. H, and in the Louisburg expedition under Sir William Pepperell (1745) served as surgeon. He presided over the provincial con- vention of 1775; in 1776 became a delegate to the Continental Congress; and although he did not take his seat until November, and had not been elected when the Declaration of Independ- ence was adopted, he was granted the special privilege of signing it. He had already been chief justice of the Court of Common Pleas in New Hampshire when in 1776 he was made a judge of the Supreme Court, and this office he held until 1782.

THORNTON, William, American archi- tect and physician : b. Tortola, West Indies, 1762 * d. Washington, D. C,1827. He was educated as a physician and resided for a number of years m Philadelphia where he was well known for his scientific attainments and was a member of the American Philosophical Society. He was a skilled architect and designed the Philadelphia Library building. Later he removed to Wash¬ ington and planned the Capitol, of which he partly supervised the construction. He was the first commissioner of public buildings at the national capital and also was first Com¬ missioner of the patent office, to which he \vas named in 1802. He wrote (Cadmus or the

°f Written Language* (Philadel¬ phia 1913).

THORNWELL, James Henley, American

educator : b. Marlborough District, S. C. 9 Dec 1812; d. Charlotte, S. C , 1 Aug. 1862. He was graduated in 1831 from the South Carolina Col¬ lege and studied law but declined to practise and finally was

ordained by the Bethel Presby¬ tery in 1834 and became pastor of the Lancaster Court House congregation. He was professor of logic, belles lettres and metaphysics in the South Carolina College (1837-39), pastor at Columbus, S. C. (1840), returning to the col¬ icˆ Is Professor of literature (1842-52). In 1841 he visited Europe. He served as presi¬ dent of the South Carolina College (1852-55). He was author of a number of works treating of theological subjects and his writings, edited by Rev J B. Adger were published in 1874. Consult Palmer, Ben, (Life and Letters> (Rich¬ mond 1875).

THORNYCROFT, Sir John Isaac, Eng¬ lish engineer and naval architect: b. Rome, Italy, 1 Feb. 1843. He was graduated from the engineering department of Glasgow University and studied shipbuilding at Govan on the Clyde. He became a builder of torpedo boats and has constructed many such boats for English and other European governments. He is the in¬ ventor of the turbine-propeller for use in shal¬ low-draft vessels; and was knighted in 1902.

THORNYCROFT, William Hamo, Eng¬ lish sculptor: b. London, 9 March 1850. He received his education at University College School, London, and entered the Royal Acad¬ emy schools in 1869. He first exhibited at the Academy in 1871 and in the same year went to Italy. He gained a gold medal from the Acad¬ emy in 1875 for a group representing (A War¬ rior Bearing a Wounded Youth From the Field of Battle) and in 1880 he completed his ‘Arte- mis> for the Duke of Westminster. He be¬ came R.A. in 1888. He was made an honorary member of the Royal Academy of Munich in 1889 and he received a medaille d’honneur at the Paris Exhibition of 1900. His principal works include, in addition to those mentioned, ‘Teucer5 (1881), now in the Tate Gallery; ‘The Mower5 (1884) ; a memorial of the poet Gray (1885) at Pembroke College, Cambridge; a bust of S. T. Coleridge (1885), in Westmin¬ ster Abbey; ‘The Sower } (1886) ; the National Memorial to General Gordon in Trafalgar Square, London; <Medca) (1888); a statue of John Bright (1890) in Rochdale; (The Bather5 (1898); (Lot’s Wife) ; and many monumental statues, including those, of Queen Victoria, Archbishop Thomson (York Minster) and W. E. Gladstone (1902). The style of this sculp¬ tor shows a return from pictorial realism to¬ ward the severity of Greek idealism. His mon¬ umental statues, the best of which is that of Gordon, are some of the noblest in English art, and his heroic figures, such as <Teucer,) are instinct with life, while exhibiting some¬ thing of the purity of line

and classic grace which belong to the Periclean age of sculp¬ ture.

THORODDSEN, thor'o-d-sen, Thorvald, Icelandic physicist: b. Flatey, Breidifjord, West Iceland, 6 June 1855. He was educated at the College of Reykjavik and the University of Copenhagen and was a teacher at the first- named institution, 1885-95. Since the last-named date he has resided in Copenhagen, spending his summers in Iceland, and has made a geo¬ logical survey of the entire island. Among his publications are (History of Icelandic Geog¬ raphy) (1892-1902) ; (Geological Map of Ice¬ land } (1901) ; Earthquakes in Iceland5 (1899) ;

(History of Icelandic Volcanoes) (1882).

THOROGUMMITE, a rare mineral found only in Lano County, Tex. It is essentially a hydrated thoro-silicate of uranium, contain¬ ing also ceria, yttria, lead, etc. It is regarded as made up of three molecules of thorite, linked with one of uranic oxide. It is highly valuable as an ore of uranium and thorium. It occurs massive or in crude crystals resembling thorite in form. Its color is dull yellowish-brown; hardness, 4 to 4.5 ; specific gravity, 4.43 to 4.54.

THOROLD, Canada, town in the province of Ontario, on the Grand Trunk Railroad

(Welland branch) and the Niagara, Saint Catherine and Toronto Electric Railway, 26 miles northwest of Buffalo, N. Y. It has four churches, several big flouring mills, a foundry, cement, woodworking and paper mills, knitting, printing and publishing establishments, tele¬ graph offices and ample hotels, a bank and a public library. Pop. about 2,500.

THOROUGHWORT. See Eupatorium.

THORPE, thorp, Francis Newton, Ameri¬ can author and jurist: b. Swampscott, Mass., 16 April 1857. He was educated at Lake Shore Seminary, at Syracuse University (Ph.D., 1883; LL.D., 1907). He was Fellow and professor of American constitutional his¬ tory of the University of Pennsylvania (1885— 98) and University of Pennsylvania Law School (1885-86) ; has been professor of politi¬ cal science and constitutional law, University of Pittsburgh, since 1910. Mr. Thorpe is au¬ thor of ‘The Story of the Constitution (1891); ‘A Constitutional History of the American People, 1776-18505 (2 vols., 1898) ; ‘The Con¬ stitutional History of the United States, 1 765— 1895) (3 vols., 1901) ; (A Social and Industrial History of the

American People) (1901) ; (A History of the United States for Schools5 (1902) ; ‘A Short Constitutional History of the United States5 (1904); ‘The Civil War: The National View) (1906); (History: The Career of Man on the Earth5 (1909) ; ‘The Govern¬ ment of the People of the United States5 (1889); (A Course in Civil Government5 (1894); ‘The Government of Pennsylvania) (1894) ; (The Constitution of the United States With Bibliography for Students of Political Science) (1894) ; ‘The Statesmanship of An¬ drew Jackson5 (1909) ; (The Federal and State Constitutions, Colonial Charters and Other Or¬ ganic Laws of the States, Territories and Col¬ onies Now or Heretofore Forming the United States of America5 (7 vols., published by Act of Congress, 1909); ‘Benjamin Franklin and the University of Pennsylvania5 (1893); ‘Franklin’s Influence in American Education5 (1903) ; ‘The Home and the Household5 (1910); ‘Business5 (1910); ‘William Pepper, M.D., LL.D., Provost of the University of Pennsylvania5 (1904) ; ‘William Hickling Pres¬ cott5 (in ‘Studies of Great Authors,5 1899) ; ‘The Spoils of Empire5 (1903) ; ‘The Divining Rod5 (1905); ‘An American Fruit-Farm: Its Selection and Management for Pleasure and for Profit5 (1915) ; ‘The Essentials of Ameri¬ can Constitutional Law5 (1917), etc.

THORPE, Rosa Hartwick, American au¬ thor: b. Mishawaka, Ind., 18 July 1850. She was graduated from the high school, Litchfield, Mich., in 1868, and was married to E. C. Thorpe in 1871. She is widely known by her poem ‘Curfew Shall not Ring To-night.5 She has published among other works ‘Fred’s Dark Days5 (1881) ; ‘The Year’s Best Days5 (1889) ; ‘Ringing Ballads5 (1887) ; ‘Sweet Song Stories5 (1898).

THORWALDSEN, tor'wald-sen, Albert Bartholomew (Bertel), Danish sculptor: b. Copenhagen, 19 Nov. 1770; d. there, 24 March 1844. His father, an Icelander, was employed in the royal dockyard at Copenhagen in cutting figure-heads for vessels, and little Thor-waldsen’s first employment was in helping his

father. In his 11th }ˆear he entered the Acad¬ emy of Arts, where he gained in 1793, along with a medal, the privilege of studying three years abroad. He resolved to visit Rome, where he arrived in November 1797, and under the inspiration of Canova and Carstens the painter devoted himself to reproducing that ideal beauty of ancient statuary, which became ever after the one object of his artistic life. It

was not until 1803 that he became at all widely known. He had finished a model of Jason without finding a purchaser, when the well-known and wealthy Thomas Hope called at his studio and arranged with him to have it executed in marble. The fortune of its designer was now made. Commissions flowed rapidly in upon him, new creations from his hand followed in quick succession and his abilities as a sculptor became everywhere recognized. In 1819 he returned to Denmark, and his journey through Germany and his reception at Copen¬ hagen bore the appearance of a triumph. His first works in this city were the busts of the king and queen. He was next employed by the commissioners for the rebuilding of' the b ruekirke or church of Our Lady, to design the decorations for the same, which now form its main ornament. In 1820 he returned to Rome, visiting on his way Berlin, Dresden, Warsaw and Vienna, and receiving numerous orders for works. He remained at Rome till 1838, when he undertook another journey to Copenhagen, being principally moved to this step by the contemplated establishment in that cit\ of a museum of his works and art treas¬ ures. His return was a true national festival, both for Copenhagen and the whole of Den¬ mark. With the exception of a short visit to Rome the remainder of his life was spent in the Danish capital, and he both took a vivid interest in the establishment of the Thorwald- sen Museum (q.v.) and enriched it by im¬ portant contributions. Consult Thiele, (Thor- waldsen's Biographie) (1856); Plon,' (1867); both of these works have been translated into Eng¬ lish ; Hammerich, (Thorwaldsen und seine Kunst) (1876).

THORWALDSEN MUSEUM, a build¬ ing and art collection at Copenhagen raised from funds left by the sculptor Thorwaldsen. The building was constructed after a plan fur¬ nished by the architect Bindesboll, and is purely Greek in style. In contains the models and works bequeathed by the sculptor to his native city, which comprise 80 statues from his hand • three long alto-relievos and 130 busts. In the centre of the building is the highly decorated tomb of Thorwaldsen. The museum was opened in 1846.

THOTH, thoth or tort, an Egyptian deity identified by the Greeks with Hermes. He was originally the moon-god, and the invention of letters, arts and sciences was attributed to him. The ibis was sacred to him and he is repre¬ sented with the head of that bird, and with the tau ci oss in his hand, flhe dog-headed ape is also one of his attributes, and he is frequently depicted with a dog's head. There were 42 sacred books bearing his name, which were under the guardianship of the Egyptian priests.

1 hese books lie is said to have composed; and

he accordingly appears m the monuments with tables and stylus. He has been identified with the Greek Hermes. See Hermes Trismegistus.

THOTHMES, thoth'mez or tot'mez (son of Thoth) ; the name of four Egyptian kings. Under Thothmes I, Egypt saw its darkest days come to end with the expulsion of the Hyksos, and the revival of truly national art and* civil¬ ization and of national power. The era of for¬ eign invasion, with the consequent enrichment of the royal treasury, began. Ethiopia was made a tributary state, and eastward the limits of Egyptian power were pushed as far as to the Euphrates. At his death Thothmes I was suc¬ ceeded by Thothmes II, his eldest son, with Hatasu, his daughter, and Thothmes III, his younger son, as coregents. Thothmes II beautified Thebes, but his reign was brief and insignificant. Thothmes III was the Alexander of Egyptian history. After the death of Hatasu he entered upon that series of wars which comprised 14 campaigns, in the course of which he subdued Palestine, Syria, Mesopotamia in part, and large tracts of territory between the Euphrates and the Mediterranean. The names of the cities he took, including Megiddo and Tyre, are inscribed in his triumphant self¬ eulogy on the walls of Karnak. He added ex¬ tensively to the architectural glories of Thebes. As Hatasu, the Semiramis of Egypt, erased the name of the Thothmes II, her half-brother, from his monument at Karnak, so was her name eiased with the record of her cam¬ paigns, during which she appeared in male at- fiie, from the recording inscriptions by Ihothmes III. He reigned from 1503 to 1449 n.c. He was succeeded by Amenhotep II at whose death Thothmes IV began his reign. The latter waged war in Ethiopia, Syria and Phoenicia, but his career was without national oi political significance. Consult Breasted,

(New' Yorifl908)Of Anden* Egyptians>

inuu, too, Jacques Auguste de (in Latin,

I huanus) French magistrate and historian: b. Pans 8 Oct. 1553; d. 7 Mav 1617. On the revolt of Pans, produced by the violence of the League, he adhered to Henry III, and after the assassination of the Duke of Guise, was principally instrumental in reconciling Henrv vvfih the kmg of Navarre. In 1595 he suc¬ ceeded his uncle as chief justice, and im- mediately registered in anticipation of the Edict ot Nantes, which he assisted in preparing, the Edict of Saint Germains in favor of the 1 rotestants. In the regency of Mary de Medici ie was appointed one of the directors-general

Sim nnnCe' and ot.herwi?e employed in nice and difficult matters, in

which he was conspicuous oi integrity and ability. His greatest literary abo.r was the composition in Latin of a vo¬ luminous (Historia sui TemporisC of which the first part appeared in 1604. When finished

from" I1 l|icdf °fiAn378 bTool5s' comprising events m 1545 to 1607. It is remarkable for its

general impartiality. To this he added Com¬ mentaries or memoirs of his own life, com-

oZt 111 Sanie spirit The most complete

don ?„ 17« h R TV 1S that Published in Lon- r by BVˆley' ln seven volumes. Con-

Coflh7°un> 'Vfe. of Thuanus, with some Account of his Wntings) (1807).

THOUGHT, a cognitive relation other than that of direct awareness, born by the mind either toward an object which is believed to exist, or toward a so-called <(abstract object, ® such as a universal, concerning which the question of existence has no meaning. This latter feature distinguishes thought from imagination in the narrower sense which is directed toward objects capable of existence, without involving any belief in their existence. Since it differs from mere presentation, the thought-relation, so far as it furnishes us with any knowledge of its objects, furnishes us with what Bertrand Russell calls knowledge by description — knowledge that is, which may be expressed by propositions. On this account thought can be conveyed by language, for lan¬ guage, though totally unable to transmit an im¬ mediate presentation, is well adapted as a vehicle for the relations between presentations, as embodied in propositions. This intimate as¬ sociation between thought and language leads to the nominalist identification of the two, which possesses all the defects inherent in every form of nominalism (q.v.). A more vicious form of this nominalism pervades a large part of the modern psychology of rea¬ soning and consists in the recognition in the mental life of nothing but particulars. The fundamental method of psychology is, of course, introspection. Now, the psychologist receives his training in introspection in the domain of the senses. Here introspection means for the most part the formation of an inventory of the sense-data constituting a given experience. The psychologist consequently ac¬

quires the tendency to consider the analysis of consciousness complete when all the mental states of the level of sense-data are checked off and tagged. When he approaches an act of thought, or the consciousness of a universal, or any similar experience, he is likely to find such mental states as he is accustomed to ex¬ amine, entirely absent, except for a few vague residual organic or kinsesthetic sensations and verbal images. He, therefore, identifies these with the thought-conseiousness or universal¬ consciousness and either concludes that these forms of consciousness add to the mind no constituent elements not already found in sensation, memory, imagination and feeling, or postulates the existence of some substantive mental state not involving images or emotions. Unable to explain how such a barren mental state can be so pregnant with meaning, he has recourse to such unexplanatory phrases as ((con-scious attitudes. w The true reason for the ability of a vague picture of a particular tri¬ angle to convey the entire meaning of triangu¬ larity, or for power of a verbal image of the law of gravitation to symbolize the law itself, is that the mind is a structure and no struc¬ ture is exhausted by its inventory.

There is no doubt on earth that whether the consistency or the correspondence theory of truth be valid, a necessary condition of true thinking is that the pattern of thought should agree with the pattern of things. Now, if two patterns agree, we do not have the relations of the parts of one pattern symbolized by the parts of the other, but precisely by the rela¬ tions between those parts. Accordingly, it is only reasonable to suppose that relations are

conveyed in the mind, not by items, but by relations ; that qualities are conveyed by qualities ; that facts are conveyed by facts. The muscular strain in the orbits that may be the only substantive state in my mind when I think of a certain mathematical theorem is not my consciousness of that theorem, but merely a sort of a mental chalk-mark with which I make myself aware of my reference to the theorem. To call my true consciousness of the theorem either imageful or imageless involves a gross confusion of categories. (See Logic; Meaning; Psychology). Consult James, W., Principles of Psychology) (New York 1890) ; Messer, A., (Empfindung und Denken) (Leipzig 1908) ; Psychology) (Stuttgart 1904) ; Ogden, R. M., (Introduction to General Psychology) (New York 1910) ; Titchener, E. B., (Experimental Psychology of the Thought- Processes) (New York 1909).

THOUGHT TRANSFERENCE. See

Telepathy.

THOUSAND ISLANDS, a group of islands in the Saint Lawrence River (q.v.), near Lake Ontario. For about 40 miles east of Ontario the Saint Lawrence has a width of three to seven miles and here there are about seven large and 1,600 small islands. The belt of Laurentian gneiss which extends from the Adirondacks in New York into Canada is here crossed by the Saint Lawrence River. The crystalline rock and glacial deposit forming the river bed presents an uneven surface; some of the points being above the water- form islands. A large number of the islands belong to Canada, the others to the State of New York. Hand¬ some summer residences have been erected on many of the islands and large hotels furnish accommodations for the many city people who visit the place each summer.

THOUSAND AND ONE NIGHTS, The.

See Arabian Nights, The.

THRACE, thras, anciently a part of the Balkan Peninsula, whose territory was some¬ what indefinite, but which comprised the region north of Macedonia, including Scythia. Its territory was understood differently at differ¬ ent times by the ancients, but was later limited to the country between the northern boundary of Macedonia and the Danube and that which lies between the Black Sea, the Bosporus, the Propontis and the Hellespont, the Higean Sea and the Strymon River. The Balkans divided it into two parts — the Romans recognized only the southern division as Thrace. The land was inhabited by wild tribes, abounded in mines, had fertile lands and produced celebrated horses. The chief mountains were the Haemus (Balkan), Rhodope and Pangasus. The largest river, the Hebrus or Maritza. The chief towns, Abdera where Democritus -was born; Sestos and Byzantium. The mythological founders of Greek poetry, music and philosophy are sup¬ posed to have come from Thrace. The Thracians were classed as barbarians up to about 475 b.c., when Xerxes invaded the. coun¬ try and introduced some Eastern customs. His rule was short, but Philip of Macedon in the 4th century occupied a portion of the territory, and in 133 B.c. it came under the power of Rome. Native kings maintained a nominal rule, however, for several centuries. About 335 a.d.

. Constantine sent a colony of Sarmatians to Thrace and continued to colonize the country. A few years later Thrace was overrun by the Goths and later by Attila and his Huns. In the following centuries a

Bulgarian population developed, and about 1450 the country came under Turkish rule. For history see Balkan Peninsula; Bulgaria; Greece; Serbia.

The Thracians can hardly be regarded as a distinct race, being a mixed people much con¬ fused with the Illyrians. The early tribes were low in morals and addicted to phallic worship. Their dialects were closely allied to the Greek. The native deities were Ares, Bendis and Dionysius. See Illyria.

THRASHER, one of the large, thrush¬ like wrens of the American genus Harpo- rhynchus, of which the familiar Eastern spe¬ cies is the brown thrasher (H . rufus), one of the most pleasing of American migratory birds. It is about 10 to 12 inches in length, slender, with a long bill and tail, rufous upper parts and a cream-white breast sharply marked with arrow-shaped streaks. A frequenter of orchard and shade-trees, it is as likely to make its nest on the ground or upon bush-piles near the house as at the edge of the woods, and its oblong pepper-and-salt sprinkled eggs are famil¬ iar to every country boy. The thrasher in spring utters a highly varied song, so bril¬ liant and full of startling phrases of melody and apparent mimicry that it fairly rivals the performance of the mocking-bird itself. While it eats some grain, it is tolerated because it is destructive to various grasshoppers, worms and bugs. The genus contains several other well- marked and interesting species of the West and Southwest. Consult Coues, < Birds of the Southwest (Washington 1879) ; Forbush, E. H., (Useful Birds) (Boston 1913) and orni¬ thologies of the United States generally.

THRASYBULUS, thras-i-bu'lus, Athenian general and democratic leader: d. about 390 b.c. He was a friend of Alcibiades, whose recall from exile he obtained. In 411 b.c. he com¬ manded a galley in the fleet at Samos, joined in the opposition to the oligarchy of the Four Hundred and exacted an oath from the Athe¬ nians in the fleet to uphold democratic gov¬ ernment. At the battle of Cynossema he com¬ manded the right wing and secured the victory by a sudden attack upon the Peloponnesians. In 407 b.c., with a fleet of 30 ships, he reduced most of the revolted cities on the coast of Thrace, to submission and about the same time was with Alcibiades elected one of the new generals. Banished on the establishment of the Thirty Tyrants, he seized, with the aid of some Thebans, the fortress of Phyle and with an increased force occupied the Piraeus. Af¬ ter the accession of the Ten he was defeated by Lysander and Libys, but, together with all who had joined him, was saved from punish¬ ment by the contrivance of Pausanias. In 395 b.c. he led an army to the assistance of the Thebans, then menaced by Sparta, and five years

later was sent with 40 ships to aid the Rhodians against Teleutias, restored the Athe¬ nian interest in Byzantium, secured several new alliances and reduced Methymna and other towns in Lesbos. Afterward sailing south, he anchored in the Eurymedon, near Aspendus in

Pamphylia, when the inhabitants, exasperated by some act of his soldiers, fell upon him in the night and killed him.

THREAD. The filaments of fibrous sub¬ stances spun out for weaving are in a general sense called threads, the specific name of such filaments being yarn. Thread in a specific sense consists of two or more filaments of yarn twisted together for greater strength ; when the filaments do not exceed two this is called doubling and the manufacturing process is doubling and twisting. Doubled yarn or thread is used in some sorts of weaving, espe¬ cially in that called bobbin net, but its principal use is for sewing. When manufactured for this purpose it is specifically known as sewing thread. A large proportion of sewing thread is simply doubled yarn and the processes of yarn doubling and of the manufacture of sew¬ ing thread are substantially the same, but thread for sewing purposes often requires to be stronger and firmer in texture than doubled yarn and then three, four and six strands of yarn of fineness proportioned to the thickness of the thread required are used to produce it. The manufacture of sewing thread in the United States is very extensive. The chief seat of the cotton thread manufacture in Scot¬ land is Paisley; in England, Manchester. Linen thread is manufactured, largely in Ireland. Cot¬ ton was first used in the manufacture of sew¬ ing thread at Pawtucket, R. I., by Samuel Salter in 1794. Flax had always been used everywhere, but as Mrs. Salter was spinning cotton she noticed the fineness of the fibre and at once conceived that it would make smooth thread. The idea was put into prac¬ tice. The operation of “spinning® cotton is really making thread for weaving. A loose cotton called a “roving® is drawn out into a filament or yarn and twisted and wound on bobbins that later go to the weaving machine. See Cotton Manufactures in the United States.

TIIREADCELLS. See Nematocysts. THREADNEEDLE STREET, London,

England, the short thoroughfare faced by the Bank of England, which is proverbially called (<The Old Lad}' of Threadneedle Street.® The name is supposed to be derived from the three needles on the coat-of-arms of the Needle- makers’ Guild.

THREADWORM, a common name often used for any of the Nematoda

(q.v.). It is distinctly inappropriate when applied to the thick fleshy species like Ascaris and belongs properly to filiform nematodes, especially the Filariidse. In medical usage the term ordi¬ narily designates the pinworm (Oxyuris) or the whipworm (Trichuris) , common intestinal parasites of man. See Roundworms.

THREAT is defined in law as a menace of destruction or injury to the lives or property of those against whom it is made and may be the subject of a civil action for damages or fre¬ quently an equitable action may be maintained to restrain threats and intimidations. One who is induced by threats to enter into an agree- ment, pay money or do any other act, which in itselt is lawful, may by proper means avoid the consequences of such act, same having been performed under duress. One who threatens

to do another a bodily harm or to take the life oi another may be required to give bond to keep the peace ; to threaten a court, or any¬ one under its immediate protection, is punish¬ able; and in some jurisdictions to obtain a pe¬ cuniary advantage by threat is a punishable offense, as is also a threat to accuse one of a crime for the purpose of obtaining money. In many of the United States the offense of sending threatening letters for the purpose of obtaining money is punishable and it is con¬ trary to the postal laws of the United States to send upon the outside of any mailable mat¬ ter any printed or written threatening lan¬ guage and one is punishable who assists know¬ ingly in forwarding threatening letters. See Blackmail; Corrupt Practices Acts.

THREE-COLOR PROCESS. See Color

Printing ; Printing ; Engravings.

THREE FATES, The. See Norns.

THREE HOURS' AGONY, or THREE HOURS' SERVICE, a devotion practised on Good Friday, from noon till 3 o'clock in the Roman Catholic and some Protestant Episcopal churches in commemoration of the Passion. It was introduced by Father Messia, S.J., of Lima, about 1730, and reached Rome in 1738. It was introduced into the English Church about 1865 and was rendered legal by the Act of Uni¬ formity

Amendment Act (1872), which per¬ mits additional services, consisting of any pray¬ ers from the Liturgy or Bible, with address or sermon and hymns.

THREE KINGS, the men who came from the East to adore the Infant Jesus (Matt, ii, 1-12). They are probably called kings from Psalm lxxii, 10, which verse is used in the serv¬ ices of Epiphany. They brought offerings of gold, frankincense and myrrh and according to tradition their names were Gaspar, Melchior and Balthasar. On their return to the East they received baptism. The Empress Helena is said to have brought their bones to Con¬ stantinople, whence they were removed to Mi¬ lan, and afterward to Cologne. In the chapel of the Three Kings, built by the Emperor Maximilian (1459-1519), in Cologne Cathedral, are exhibited their crowns and the shrine is supposed to contain their relics.

THREE-MILE LIMIT. See Interna¬ tional Law.

THREE MUSKETEERS, The. If a vote were taken in Europe and America as to the best historical romance ever penned there can be little doubt that it would favor (The Three Musketeers) ((Les trois Mousquetaires)) of Alexandre Dumas. Published in 1844, just three decades after ^^averleyC this work ex¬ emplified Scott's theory of the historical novel to perfection. It focussed interest upon cer¬ tain minor figures whose fate was linked with that of famous personages and great move¬ ments of a bygone day. Unlike the fictions of Scott, however, it freely ordered and changed the facts of history, implying the romancer's emancipation from actuality and his right to shape his story at will so long as it should reflect in general the spirit of the time represented. Dumas had read the (Memoires de M. d'Artagnan, > by Gatien Courtilz de Sandras (Cologne, 1701-02). His imagination, thus incited, played over the pe- vol. 26 — 38

riod of Richelieu's ascendancy, ana with un¬ flagging verve and brilliance he described what might have happened to a more courageous and chivalrous d'Artagnan caught in the counter-currents of amorous and political in¬ trigue in 1628.

The plot turns upon the enmity between the queen of Louis XIII and his Minister, Richelieu. The latter seeks to control the queen through his knowledge of her love for Buck¬ ingham, attested by her bestowal upon the Eng¬ lish lord of certain diamonds, the gift of her husband. Richelieu, for his own ends, arouses the jealousy of the king, who demands that the queen wear the diamonds at a state ball. It behooves the queen, therefore, to recover the gems in all haste, and the difficult

mission is undertaken by d'Artagnan and his gallant friends, the three guardsmen. After encoun¬ tering well-nigh insuperable obstacles d'Artag¬ nan succeeds, but he incurs the enmity of Richelieu's most dangerous agent, Milady Cla- ˆk- He falls enamored of her, yet escapes her toils — assassination and poison — only to learn that she is the cardinal's emissary sent to England to threaten Buckingham with ex¬ posure unless he will cease his efforts to aid the besieged Huguenots of La Rochelle. D Artagnan and the musketeers, thereupon, thwart Milady, who, languishing in prison, ere long prevails upon her Puritan jailer to re¬ lease her and to achieve the murder of Buck¬ ingham. Then she contrives to poison d'Artag- nan's sweetheart, but, pursued by the avenging guardsmen, is overtaken and adjudged to suf¬ fer death for her many crimes. Richelieu, secretly pleased to be relieved of so wicked an ally, pardons d'Artagnan and commissions him a lieutenant of the musketeers.

From first to last, the romance moves at a rapid pace in a world of passion and daring, of hot blood and ready swords, of intrigue and revenge, of jaunty heroism, of splendid loyalty and of dauntless love and friendship. It kicks up its heels, too, now and then, in the mood of rollicking humor. For all its de¬ partures from historic fact, it paints in vivid colors a living picture of France in the 1 7th century. Especially memorable are its portraits. Though Milady prove the villain of melodrama in petticoats, she is far from being a mere lay figure; and Buckingham, Richelieu, the queen, even the lackeys of d'Artagnan and the musketeers, above all these gallant gentlemen themselves, are vital creations. D'Artagnan, the impetuous and generous Gascon, is well matched by his friends, the shrewd and dainty Aramis, the boastful and dandified Porthos, and the melancholy Athos. It is small wonder that the four should have enthralled the minds of readers of every race and clime, and that Dumas, yielding to popular demand, should have continued their adventures in (Twenty Years After *(1845) and the (Vicomte de Brage- lonne* (1848-50). These sequels and (The Three Musketeers *are discussed in monographs on Dumas, in French, by Glinel (1884), de Bury (1885), Parigot (1902) and Lecomte (1904), and in English by Fitzgerald (1873), Spurr (1902) and Davidson (1902). The re¬ lation of Dumas to Scott is made clear in Louis Maigron's <Roman historique en France*

(1898).

Frank W. Chandler.

THREE-PHASE SYSTEM. See Electri¬ cal Terms.

THREE RIVERS, Canada, city, port of entry and county-seat of Saint Maurice County, Quebec, on the north bank of the Saint Law¬ rence River at its junction with the Saint Maurice, 90 miles below Montreal, 66 miles above Quebec, and on the Canadian Pacific, and connected by ferry with the Grand Trunk Railway. By the French generally named Trois Rivieres. It has a large export trade in lum¬ ber and wood-pulp, the Shawanegan and other falls of the Saint Maurice being extensively utilized as water power for these industries; a large iron works, and important manufac¬ tures of foundry products and machinery, and other manufactures. The Roman Catholic cathedral is an imposing structure ; other handsome buildings are the bishop's palace, the college aiM several convents, schools, and churches. The city is lighted by gas and elec¬ tric lights and has hotels, banks and semi¬ weekly and weekly newspapers. Three Rivers was founded by Champlain in 1634, and a battle was fought here, 8 June 1776, between the Americans and British. The former were outnumbered and defeated. Pop. 13,691.

THREE RIVERS, Mich., manufacturing town in Saint Joseph County, on the Michigan Central Railroad, and at the junction of the Saint Joseph, Portage and Rocky rivers. It has car-building shops, railroad-supply factories, manufactures marine engines, knit goods, tools and paper pulp, and has foundries and brass and machine shops. There is a handsome Car¬ negie library. Pop. 5,209.

THREE-WIRE SYSTEM. See Electri¬ cal Terms.

THREMMATOLOGY. A term proposed by Ray Lancaster (from the Greek thremma, a nursling) to cover the principles and practices connected with the improvement of domesti¬ cated animals and plants. It is distinct from evolution in general in that its ultimate purpose is utilitarian. The breeder is interested in definite results, whereas nature is supposed to be indifferent to everything but the "survival of the fittest.® The purpose then in thremma¬ tology is not to make the creature "fit® the con¬ ditions of life, but rather to bring both the creature and conditions to harmonize with the highest needs and purposes of man.

This brings to the surface in thremmatol¬ ogy, as a question of prime importance, one that is curious rather than otherwise in evolu¬ tion, namely: Can the conditions of life be employed directly to influence deviation in the desired direction independently of selection; in other words, can individual modification be¬ come hereditary, or as the

expression goes in general evolution, are acquired characters in¬ herited ?

All students agree that the development of individuals is strongly modified by the condi¬ tions of life, that is, the environment. Out in nature if these modifications are not inherited it implies only a little more work for selection, and the final result is the same whether they are inherited or not. The answer to the ques¬ tion is interesting, therefore, rather than vital so long as the study is confined to general evolution ; but in thremmatology the answer involves a vital principle because the breeder,

especially of animals, cannot afford unlimited selection. All the animals represent money, and the owner is interested in getting results with a minimum destruction of values. He is in¬ terested, too, in securing improvements as rapidly as possible, because time is money, and man cannot afford the “countless ages® of nature. If, therefore, individual modifications are inherited, even to the slightest degree, the effect is rapidly cumulative, much time is gained and the necessity for selection is largely re¬ duced, — both important considerations from a business standpoint. Upon the answer to this question will depend the kind of soil and climate employed in plant breeding, the daily care, the shelter, the amount and character of feed pro¬ vided for breeding animals, as well as the mat¬ ter of exercise and training where speed or in¬ telligence are involved. That these are import¬ ant in the development cjf the individual all are agreed, but it is also necessary that they be provided for breeding stock for the sake of the offspring?

Evolutionists in general are interested prima¬ rily in form, while the thremmatologist is con¬ cerned very largely, if not mainly, with func¬ tion. The size or shape of the cow is of less importance than her ability to convert large amounts of feed into milk and do it econom¬ ically. This faculty depends directly upon the functional ability of a very limited portion of the body and not so much upon the general form. The ability of the horse to attain high speed depends not only upon his conformation but quite as much upon the “quality® of his motor parts, whether active or sluggish, and the mental make-up, whether well balanced or erratic. Functional activity is, therefore, of much more interest in thremmatology than in general evolution, and functional variation is recognized as one of the principal opportunities for improvement.

The systematic study of thremmatology in¬ volves the following topics:

1. A working knowledge of the ordinary theories and concepts of general evolution.

2. The kinds of variation; namely, qualita¬ tive, relating merely to size ; meristic, relating to pattern ; and functional, relating to organic activities.

3. Continuous variation in which all values are presented for selection, and discontinuous variation in which some values seldom or never

ˆ the case of sports, in polymor¬ phism and as it is involved in the idea of orthogenesis.

1. The causes of variation, first, as between different individuals of the same generation; second, as between different individuals of the

Parenta8e but of different generations ; third, as between different individuals of the same parentage and the same generation, as with twins, litters, etc., without regard to parent- ase , fourth, as between succeeding generations of the same species, representing deviation of the race , fifth, modifications in the individual during its development plainly due to the condi¬ tions of life, rather than to heredity. These different uses of the term variation should be kept distinctly in mind, and even then it is better t° us,?/,the word “deviation® for the fourth and “modification® for the fifth form of what is usually called variation. These causes will drop into two groups; first, selective mating, raising

questions touching the basis of selection ; sec-

°t ’ If16 envˆronmenh raising all questions of the effect of the conditions of life, acclimati¬ zation and the inheritance of modifications or acquired characters.

1. Statistical studies of heredity in order to construct the array, eliminate chance, determine the skew, study the laws of regression and pro¬ gression and the relative influence of parents.

2. Correlation, as determined by correlation tables, and useful as

indexes of valuable char¬ acters.

3. The practical selection of breeders ac¬ companied by a full appreciation of the finan¬ cial considerations involved, and the relation between performance and breeding powers as exhibited by livestock records.

4. The testing of sires as a final basis of selection.

5. The importance of selecting for prolific strains, among both animals and plants, and the advantages of vigor and longevity.

6. The disturbing effect of fashion, and the best methods of meeting its demands in breed¬ ing without sacrificing real quality.

It is important in the study of this phase of evolution that the breeder have in mind fairly comprehensive ideas of general evolu¬ tion ; that he be not a blind adherent of any peculiar dogma, and that he free his mind from a mass of traditions that serve only to cloud the judgment and deter progress. For exam¬ ple it has been held as a general principle that inbreeding is necessarily fatal to fecundity and to vigor; yet wheat, one of our most vigorous and prolific crops, is systematically inbred. One of the first lessons the breeder should learn, therefore, is that what is true of one species is not necessarily true of all species.

What has been accomplished by way of im¬ provement, and it is much, has been gained al¬ most exclusively by selection, and under disad¬ vantageous circumstances. For example, among plants increase is so rapid as to compel sweep¬ ing selections merely for reduction of numbers, not affording opportunity for as good a basis of judgment as if more space and time were at hand. In this way some of the best things are lost. On the other hand among animals numbers are too few for the best selection and the oft-repeated attempt «to establish a small herd of high-class animals® has been as often a failure for the reason that numbers are too few to afford material for proper selection even to maintain the initial standard, to say nothing of improvement.

The well-nigh universal practice of using young sires is fatal to the most rapid progress, for in such cases the selection has been made before full development. Thus some of the worst specimens are accepted because prepos¬ sessing at an early age and many of the best are discarded which if given time to fully ma¬ ture would prove their right to exist.

The practice among the better breeders to¬ day is tending toward larger numbers, better conditions of life, the selection of more ma¬ ture animals, followed by an actual breeding test resulting in older sires, emphasis of those ˆpoints® that have their basis in utility, and withal an ideal standard that, once adopted, is changed but slowly, if at all.

As would be expected the most rapid prog-

less has been made in those breeds or varieties of animals and plants in which practically all the individuals can be put to the performance test. For example, it is comparatively easy to get a record from a cow or a speed horse and to know what the one can do at the pail or the other on the track. On the other hand it is impossible to put the meat animals to the actual test without sacrificing the individual as a breeder. Accordingly breeders of beef cattle, swine and other meat-producing animals have been working somewhat in the dark and to relieve the situation many have felt obliged to sacrifice on the block some of their best bred animals in order to test their standards of selection and verify their methods of breeding.

The improvement of animals and plants is a difficult and often a money-losing enterprise, but it is fascinating because of what is possible. By breeding, the sugar content of beets has been increased from 3 or 4 per cent to 12 and even 20 or more per cent. Corn has been bred richer in nitrogen than is wheat, and its oil con¬ tent is raised or lowered at will. So far as is known any character may be substantially im¬ proved and the upper limit of improvement has never yet been reached with any animal or plant.

Many plants, and some animals, have re¬ ceived little attention at the hands of the breeder, and have either become extinct or else exist among us with little or no improvement, except such as has naturally followed upon better general conditions. Conspicuous ex¬ amples are clover and alfalfa among legumes ; timothy and other non-grain producing grasses ; asparagus, salsify and many other vegetables and most shade and ornamental trees.

Cats breed without attention and their varia¬ tions do not, therefore, become fixed. The American bison was allowed to become extinct, not because he would not have become useful if carefully bred, but because he was too near like common cattle to repay the trouble of do¬ mestication. In the same way the common hen prevented the domestication of the prairie chicken, but fortunately no real rival stood in the way of that truly American bird, the turkey.

Thus has thremmatology lost much valuable material, but notwithstanding this there is yet at hand awaiting the attention of the master much that is full of undeveloped possibilities, and with the development of our knowledge of the principles underlying heredity and varia¬ tion great improvements in methods of breed¬ ing may be confidently expected.

Eugene Davenport,

Dean of the College of Agriculture, Univer¬ sity of Illinois.

THRESHER SHARK, or FOX SHARK,

a well-known shark (Alopias vulpes), with a short conical snout and less formidable jaws than the. white shark. The upper lobe of the tail fin is very elongated, being nearly equal in length to the rest of the body, and is used as a weapon by which this shark is able to kill or disable many fishes in a school, when he rushes into the midst of the crowd and lays about him. Tail included, the thresher attains a length of 13 feet. It inhabits the Atlantic and the Mediterranean.

THRESHING MACHINES. See Farm Machinery.

THRIFT, a stemless fleshy herb (Statice armeria) of the seacoasts of the world. It has tufted rosettes of linear leaves with no perceptible difference between blade and petiole and white, pink or purple five-parted flowers, with clawed petals. These blossoms are nearly or quite sessile in compact heads terminating an almost naked scape, and are subtended by brown, dry bracts, the two lowest reflexed, and partly united into a sheath. Thrift is otherwise known as sea-pink or lady's cushion, and is occasionally cultivated for flower-borders.

THRING, Edward, English schoolmaster and author: b. Alford, Somersetshire, 29 Nov. 1821 ; d. 22 Oct. 1887. He was educated at Eton and King's College, Cambridge, and after taking holy orders and serving as curate at Gloucester and elsewhere, in 1853 was ap¬ pointed head master of Uppingham School. From an institution run down in efficiency and reputation he made it one of the healthiest, best equipped and flourishing public schools of Eng¬ land. No schoolmaster since Arnold was more successful in imprinting on the characters of his pupils a high ideal of duty as the great end of life. His own earnestness and honesty, his firm discipline and stern

denunciation of cowardice and wrong gave character and repu¬ tation to the school. Among his published works are (Thoughts on Life Science5 (1869) ; (The Theory and Practice of Teaching) (1883) ; (Uppingham Sermons) (1886) ; (Poems and Translations) (1887); and (Uppingham and

School Songs and Borth Lyrics5 (1887). Consult Parkin, (A Memory of Edward Thring) (1898) ; Skrine, (Uppingham by the Sea5

(1878).

THRIPS, a genus of minute insects, order Hemiptera, suborder Homoptera, closely allied to the Aphides. They are extremely agile and seem to leap rather than fly, whence the com¬ mon name ˆleaf-hopper.® They live on flowers, plants and under the bark of trees. T. cere- alium is a common species, scarcely a line in length or in extent of wing, residing in the spathes and husks of cereals, especially wheat, to which it is most injurious.

THROAT, the front of the neck, including the structures below the chin and above the collarbone, and also, by an extended usage, the passage from the mouth to the stomach (fauces, pharynx and oesophagus), and the passage from the mouth to the lungs (larynx and trachea or windpipe), these being the pas¬ sages for food and breath. The throat and its various structures are subject to many diseases, some of which are among the most difficult with which medicine has to deal. See Nose and Throat, Diseases of.

THROMBOSIS, the formation or devel¬ opment of a thrombus (q.v.) in the heart, blood-vessels, lymphatics or other ducts. It is essentially the coagulation of fibrinogen and is usually induced by some condition which re¬ tards the flow of the blood, lymph, etc., such as roughness or other structural change in the lining membrane of a vessel or the presence of some foreign body or some alteration in the constitution of the blood, lymph, etc. In the heart and arteries it seldom occurs unless their

lining membranes are roughened or their mus¬ cular tone is so much impaired that the blood is not forcibly and readily propelled onward. It is most frequent in veins, where the circu¬ lation is naturally slow, and it rarely occurs in capillaries. The thrombi formed may shrink and dry into leather-like masses or calcify, forming phleboliths (in veins) or soften and be absorbed or suppurate ; or they may organ¬ ize, as after the ligaturing of an artery. Some of the causes of thrombosis are: wounds and other injuries, inflammation (see Phlebitis; Phlegmasia),

pr.essure on a vessel, failure of the propelling power of the heart, as in cases of marasmus and exhausting diseases and bac¬ terial infection of the blood. The symptoms of thrombosis are those of the arrest of the circu¬ lation and differ according to the vessel affected. They include passive hyperaemia, venous dilata¬ tion, swelling of adjacent parts, gangrene, anasarca of an extremity, etc. The treatment varies according to the seat of the affection. See Pathology.

THROMBUS, in anatomy, a plug or clot formed in a vessel and partially or totally closing it. If it remains at its place of origin it is called a primary thrombus; if it has grown beyond its original limits it is a propa¬ gated thrombus ; carried by the blood-current from a distant blood vessel and forced into a smaller one, obstructing the circulation, it be¬ comes an embolus. A thrombus consists of coagulated fibrin entangling in its meshes red and white blood-corpuscles or of coagulated lymph, in lymphatics, and the term has been applied (milk thrombus), to an accumulation of curdled milk in a lactiferous tube. Thrombi are designated by various names according to their color, causation, shape, etc. Thus a white thrombus is one which contains no pigment or is composed chiefly of leucocytes ; red, one colored by red blood; traumatic, one which results from an injury; infective, one occurring as the result of septic or bacterial poisoning; annular, one which has an opening through its centre, the circumference being attached to the wall of the vessel ; and laminated or mixed, one whose substance is disposed in layers, which may differ in material. Thrombi, if small and remaining at the point of origin, may do little or no harm, but they are liable to be swept away and to become dangerous embofl. If they block up the lumen of a vessel they give rise to pam and swelling and to loss of func¬ tion in parts of the body more or less remote. See Thrombosis.

THRONE, a chair of state or superior seat occupied by a sovereign, bishop or other dig¬ nitary. The modern throne is usually a deco¬ rated arm-chair of great size, raised on a dais and covered with a canopy, more or less orna¬ mented. Anciently the throne was very elabo¬ rate ; was made of marble, decorated with precious stones, and was frequently supported by pillars or figures representing beasts or men.

THROOP, Enos Thompson, American

jurist, governor and diplomat: b. Johnstown, N. Y, 21 Aug. 1784; d. Auburn, N. Y., 1 Nov. 1874. He studied law at Albany and while there began a life-long friendship with Martin Van Buren. He took up practice of law at Auburn in 1807 where he soon entered public

life as postmaster and county clerk. He was elected member of Congress in 1814 and in 1823 appointed circuit judge. It fell to his lot to try the Morgan abduction case and his serv¬ ice on the bench gave general satisfaction. Yielding to urgent request, he resigned to allow his name to be placed on the State ticket with Van Buren in 1828 and on the latter's becoming Secretary of State to Presi¬ dent Jackson in March 1829, Throop became governor and was re-elected the following year. He served as naval officer at the port of New York, 1833-38, when he was sent by Presi¬ dent Van Buren as charge-d'affaires to the kingdom of the Two Sicilies (Naples). Re¬ lieved from this post on the election of Harri¬ son, he spent two years at Paris and then re¬ turned home to private life. From 1847 to 1857 he brought a farm of 800 acres at Kala¬ mazoo, Mich., to high cultivation. In the lat¬ ter year he retired from activity to his former residence, Willowbrook, Auburn, N. Y., where with his nephew, E. T. Throop Martin, and family he shared the friendship of Secretary Seward and entertained such prominent visitors as Washington Irving, Jenny Lind and mem¬ bers of the diplomatic corps at Washington.

THROOP, Montgomery Hunt, American jurist: b. Auburn, N. Y., 26 Jan. 1827; d. Albany, N. Y., 11 Sept. 1892. He was educated at Hobart College in 1846; was admitted to the bar in 1848 and practised in Utica with his uncle, Ward Hunt (1854-56), and with Roscoe Conkling (1856-64). He removed to New York City in 1864; was appointed commis¬ sioner to revise the State statutes (1870); was chairman of the commission to revise the Code of Civil Procedure (1877) and removed to Albany in 1880 to devote himself to the publi¬ cation of law books. He published (The Future; a Political Essay) (1864); (The Validity of Verbal Arguments) (1870) ; (The New York Justices ManuaP (1880) ; cDigest of Decisions of the Supreme Judicial Court of Massachusetts) (1887) ; (Revised Statutes of New York State) (1888).

THROOP, Pa., borough in Lackawanna County, near Scranton, and served by the New York, Ontario and Western and the Delaware, Lackawanna and Western railroads. Coal-min¬ ing is the chief industry and there is also a silk mill in operation. Pop. 5,133.

THROOP (troop) POLYTECHNIC IN¬ STITUTE, located at Pasadena, Cal. It was founded in 1891 by Amos G. Throop to provide a liberal and practical education for both sexes. It is entirely non-sectarian, the charter provid¬ ing that a majority of the trustees ffshall not belong to

any one religious denomination. ® Its organization comprises five schools: (1) the grammar school; (2) the academy; (3) the commercial school; (4) the normal school; (5) the college. The academy offers three courses, classical, literary and scientific; and the col¬ lege three courses, chemistry, electrical, engineering and natural science, all leading to the degree of B.S. Some studies in each course are required, and some elective. Throughout the grammar and high school grades manual training is a regular part of the curriculum; instruction is given in wood carving, sloyd, carpentering, forging, machine- shop work, clay modeling, mechanical and free¬

hand drawing, sewing and domestic science. The commercial school provides a two years' course; and the normal school three two years' courses in manual training, domestic economy, free-hand drawing and designing, all of which include psychology, pedagogy and his¬ tory of education. There is also a summer school of art and manual training, designed mainly for teachers ; work done in this school is credited toward a normal diploma. The in¬ stitute (1904) occupies two buildings, Poly¬ technic Hall and East Hall. The library in 1917 contained 7,000 volumes; and the Pasadena Public Library is also open to students. The productive funds amounted to $600,000, the students numbered 154 and the instructors 38.

THROSTLE, a Scotch name, like ˆmavis®, for the British song-thrush (q.v.).

THRUSH,, a bird of the passerine family Turdidce , a family which contains some of the most familiar and attractive birds, and most of the best songsters of the world. They are characteristically but not entirely migratory. A few are only five or six inches in length, but the American robin (q.v.), eight inches is a typical form; and most of them are elegant in form and pleasingly but not gaudily colored. The thrushes are divisible into five subfamilies. The thrushes proper (Turdince) are represented by such familiar forms as the American blue¬ bird, robin, woodthrush, shy northern hermit and olive-backed thrushes, noted for their richly melodious songs, the English blackbird, song-thrush, missel-thrush and fieldfare, besides the nightingale, robin-redbreast, hedgesparrow and many related forms in other parts of the world, most of which are elsewhere described under their names. Three American thrushes of this group call for brief mention, namely, the hermit thrush (Hylocichla pallasii), which is migrant through the Eastern States, breeding in the far north, and is noted for its grand song, which has been said to express <(serene religious beatitude® ; the olive-back or Swain- son's thrush (Hylocichla ustulata), distin¬ guished by the olive tint of its upper parts, and also

a sweet-voiced emigrant; and the tawny thrush (see Veery). In all of these the young are spotted, although the adults may be uniformly colored.

The second subfamily is composed of the genera Myiodectes and Cichlopsis. The third contains the Old World warblers (Sylviincc), fantails, kinglets (qq.v.) and the like; the fourth (Polioptilince) , the gnat-catchers (q.v.) ; and the fifth (Mimince), the mocking-birds, thrashers (qq.v.) and related forms, many of which seem to imitate other birds, composing their own songs out of a medley of other notes, although the report of this tendency has usually been exaggerated; this last subfamily is by the most modern ornithologists separated from the thrushes and put with the wrens. Consult Evans, (Birds> (New York 1901).

THRUSH, a form of parasitic stomatitis, due to the presence in the mouth of the thrush-fungus, white-moutte or sprue. (See Mouth). The disease usually occurs in in¬ fants, but may appear later in life, even in old age, in association with some severe acute ill¬ ness or some wasting disease, as pulmonary tuberculosis. The patches of thrush (techni-

cally aphthae) are most commonly found on the dorsum and edges of the tongue, on the hard palate and on the inside of the lips and cheeks, and resemble curdled milk. Although the fungus may enter and even be formed in a healthy mouth, it will not flourish there. In-flammation or other abnormal condition of the mucous surface, and acid secretions, cause it to grow and develop. Thrush may be propa¬ gated by contagion, and in some institutions is at times almost endemic. It may be conveyed from one babe to another through an infected nipple of a nurse, or by means o.f infected spoons, feeding-bottles, teats, etc. Usually the mucous membrane of the mouth underlying the fungous patches is of a bright or livid red, but when the system of the patient is much dete¬ riorated, and the mycelium has penetrated deeply, shallow ulcerations may result. Some¬ times the fungus of thrush is found in diphthe¬ ritic membranes. Any doubt as to the nature of white patches in the mouth should be settled by a microscopic examination.

Of itself thrush is not dangerous, but it is usually significant of a deteriorated state of health. Occurring in apparently healthy chil¬ dren, it lasts but a few days ; in children having gastro-intestinal catarrh and diarrhoea, and who are jnuch debilitated, it may last for weeks, fresh spots appearing as others vanish. The redness and

excoriation around the anus and adjacent skin of infants so affected is vulgarly regarded as an indication that the ((thrush has run through the patient,® and if the mouth condition has improved it is considered a favor¬ able sign. While the thrush-fungus has. been found in the oesophagus, and even lower in the alimentary canal, there is no reason to believe that it is the cause of the redness and excoria¬ tion above referred to, which are rather due to a superficial dermatitis resulting from an ex¬ cess of starchy food and a vitiated blood state.

Strict attention to diet is necessary in treat¬ ment; diminish the amount of sugar and starchy food, and give milk and lime-water. The mouth must be kept clean, and the chance of acidity diminished by dilute alkaline fluid,s, such as limewater or Vichy. A solution of borax and glycerine, or of sulphite of sodium, should be frequently sprayed upon the patches or ap¬ plied with the finger, covered with soft cloth. The general health is to be maintained by tonics, hygienic measures and relief of debili¬ tating ailments.

THRUSH, in veterinary surgery, a diseased condition of the frog of the horse's foot ap¬ pearing as a severe and acute inflammation, which usually proceeds to ulceration, and which is accompanied by a fetid discharge. It is most frequently seen in horses of unsound constitu¬ tion, and especially appears in stables where drainage and cleanliness are deficient. The best application for it is mineral tar. Calomel dressing is to be substituted for the tar in severe and intractable cases, and ulcerated and loose parts of the frog are to be carefully re¬ moved. Consult (Report on Diseases of the Horse) (United States Bureau of Animal In¬ dustry, Washington 1911).

THRUST FAULT. See Fault.

THRUSTON, Lucy Meacham, American

novelist: b. King and Queen County, Va., 29

March 1862. She was graduated from the Maryland State Normal School in 1880, and was married to Julius Thruston in 1887. She has published (Mistress Brent *(1901) ; (A Girl of Virginia* (1902) ; (Jack and His Island) (1902); (Where the Tide Comes In *(1904); (Called to the Field) (1906) ; < Jenifer* (1907) ; (The Heavens of the Unexpected) (1910).

THUCYDIDES, thu-sid'i-dez, Greek his¬ torian: b. Attica, about 460 b.c. ; d. about 400 b.c. His father's name was Olorus, his moth¬ er's Hegesipyle. He possessed gold mines in Thrace opposite the island of

Thasos, and was in consequence one of the richest and most in¬ fluential men in Thrace. In 431 b.c. the Pel¬ oponnesian War, which forms the subject of his work, was begun. In 430 the plague broke out in Athens. Thucydides took it, but recov¬ ered, and in 424 b.c. commanded a squadron of seven ships at Thasos. The Spartan gen¬ eral Brasidas besieged Amphipolis, and Eucles, who commanded in that important post, sent to Thucydides for aid. Thucydides made all haste in preparing to answer the summons, and seems to have used his private means to for¬ ward his equipment, but Brasidas, apprehensive of the approaching relief, offered favorable terms to Eucles, which were accepted, and Thucydides only arrived the day after the sur¬ render. Yet he was in time to save Eion from falling into the hands of the enemies. Whether this transaction led to the banishment of Thu¬ cydides, or whether he exiled himself to escape death as its probable consequence, is not known; but from this time he became an exile, and the duration of his exile, according to his own ac¬ count, was 20 years. Before the conclusion of this term the war terminated (404 b.c.), and all political exiles were permitted to return. Thu¬ cydides returned to Athens in the following year; and met a violent death a year or two later, but at what exact time, and whether in Thrace or Athens, is not known. During his exile he remained close to the theatre of the war, of which he was a diligent observer, and as he could not remain in the Athenian domin¬ ion he may have passed this oeriod of his life, or the greater part of it. within the domains of the Spartan alliance: It is also probable that he visited Sicily and southern Italy. His his¬ tory consists of eight books, the last of which differs from the others in containing none of the political speeches which form so striking a feature of the rest, and is also generally sup¬ posed to be inferior to them in style. Hence it has been thought by various critics to be the work of a different author, of Xenophon, of Theopompus, or of a daughter of Thucydides; but it is more probable that it is the author's own without his final revision. The history is incomplete, the 8th book stopping abruptly in the middle of the 21st year of the war. As a historian Thucydides holds the foremost place. He was painstaking and indefatigable in col¬ lecting and sifting facts, brief and terse in riarrating them. His style is full of dignity and replete with condensed meaning. It is, how¬ ever, sometimes harsh and obscure from over¬ condensation. He is unsurpassed in the power of analyzing character and action, of tracing events to their causes, of appreciating the mo¬ tives of individual agents and of combining in their just relations all the threads of the tan-

gled web of history, and his work has been styled the ˆStatesman's

Handbook.® It is to the superiority and impartiality of his judg¬ ment tha.t he Owed the power of producing a work which should be, as he himself said, a possession for posterity. Among the most val¬ uable editions of Thucydides are those of Bekker (3 vols., Berlin 1821) ; Classen (8 vols., Berlin 1862-78); Poppo (1821-38) ; and Stahl (1873-74). There are English translations by Dale (Bohn Classical Library), and Benjamin Jowett (with introduction and historical notes, 2 vols., London 1881; Boston 1883). Consult Bury, J. B., (Ancient Greek Historians) (New \ork 1909); Cornford, F. M., (Thucydides Mythohistoricus) (ib. 1907) ; Grundy, G. B., 'Thucydides and the History of his Age> (Lon¬ don 1911), also standard histories of Greece.

THUGS, or THAGS, a vast fraternity of murderers that formerly existed in India until the British government undertook to crush it out in the early '30s of the 19th century. The practitioners of Thuggee claimed to be a re¬ ligious sect devoted to the goddess Kali, or Deve or Bhowanee, as she was indifferently called. Composed of Mohammedans and Hindus — mostly the former — the Thugs com¬ bined robbery with assassination; they strangled their victims and interred the bodies. They operated in companies of from two to 200, with scouts, (<inveiglers,)) apprentices and pro¬ fessional stranglers. Some believe that the organization dates back to the days of Alex¬ ander or even Xerxes; but more probably it originated with the wild camp-followers and plunderers who followed the Moslem armies of conquest. The craft was hereditary; its fol¬ lowers were divided into Burkas, or persons fully instructed in the art, and Kuboolas, or novices. They were first employed as scouts, then as Sextons, then as shumseeas or holders of hands, and lastly as Bhurtotes or Burkas. The novice became a cheyla or disciple to a high priest of the cult, a gooroo, who con¬ ferred the rank or ordination upon the quali¬ fied student. The Thugs traveled along the roads as traders or pilgrims, or as Sepoys seek¬ ing or returning from service. Sometimes one of their number figured as a rajah with a large retinue of followers. Scouts gathered informa¬ tion about travelers, and (<inveiglers® wormed themselves into the confidence of their intended victims. The crimes were usually committed when all were encamped, and two Thugs were appointed to each person to be murdered. Oc¬ casions have been known where as many as 60 persons were strangled in one party. The rules of the Thugs forbade the killing of women, fakirs, musicians, dancers, sweepers, oil- vendors, carpenters, blacksmiths, maimed and leprous persons, and Ganges water-carriers. Despite the prohibitions, however, women were frequently strangled. They did not murder white people on account of investigations ac¬ companied by

punishment that would surely result. This circumstance accounts for the fact that, although Thuggee was known to exist in the 16th century, it was not partially unravelled till about 1812. At that time there were at least 10,000 Thugs plying their hideous trade; some 30,000 natives vanished annually, leaving no trace behind. In the midst of this reign of terror a savior suddenly appeared in the per¬

son of Captain (afterward Maj.-Gen. Sir Wil¬ liam) Sleeman, a junior official in the service of the East India Company. He began Thug¬ hunting in 1830, with the title of <(General Superintendent of Operations against Thuggee,® conferred on him by Lord William Bentinck. An Irishman, Molony, had captured a roving band of 115 Thugs in 1823, while another gang was seized in 1826. Within five years Sleeman had thousands of them in prison ; 20 Thugs confessed to him that they had participated in 5,120 murders; one, Buhram, who had been a strangler for 40 years, had 931 murders to his discredit; Ramzan had 604, and Futty Khan 508. Sleeman broke the back of the organiza¬ tion. Up to October 1835 no fewer than 1 ,562 Thugs had been committed; 382 were hanged and 986 transported or imprisoned for life. As a sect they no longer exist, though isolated cases still occur. Consult the annual (Reports on the working of the Thagi and Dakaiti De¬ partment of the Indian Government, > from 1860; (Ramaseeana : a Vocabulary of the peculiar language used by the Thugs) (Cal¬ cutta 1836) ; Quarterly Review, January 1857 and October 1901 ; Hutton's 'Thugs and Dacoits) (London 1857) ; Meadows-Taylor, 'Confessions of a Thug> (London 1879) ; Slee¬ man, Sir W., (The Thugs or Phansigars of India) (Philadelphia 1839) ; and the same author's 'Report on the Depredations com¬ mitted by the Thug Gangs of Upper and Cen¬ tral India) (Calcutta 1840) and "Rambles and Recollections of an Indian OfficiaP (London 1844; new ed., August 1915); Sue, Eugene, (The Wandering Jew) (1844-45).

Henri F. Klein,

Editorial Staff of The Americana.

THULE, thu'le (Greek, Qovxv), a name given by the ancients to an island or group of islands in the ocean to the northwest of Europe. It was thought to be the northernmost inhabited region of the earth. It is believed to have been _ the Shetland Islands, though some have identified it with Iceland, and others with both Norway and Jutland. The term "ultima Thule® was used by the Romans whenever reference was made to the farthest distant un¬ known land.

THULITE, a rose-pink variety of the mineral xoisite (q.v.).

THULSTRUP, Thure de, American artist : b. Sweden, 1848. Graduated from the National Military Academy at Stockholm, he entered the Swedish army in 1865; served in the Franco- Prussian War and was present at both battles of Lyons. He served also in Algeria as an officer in the French army. After studying drawing in Paris he went to Canada, later com¬ ing to the United States. In 1872 he joined the staff of the Graphic as illustrator; was con¬ nected with the Frank Leslie publishing house in the same capacity from 1876 to 1880; when he entered the emplov of Harper Brothers. He is especially well known as a military and his¬ torical illustrator.

THUMANN, too'man, Paul, German painter: b. Tschacksdorf, Brandenburg, 5 Oct. 1834; d. 1908. He was a student in the Academy of Berlin from 1853 to 1855 and sub¬ sequently worked under Julius Hubner in Dresden till the year 1860. At Weimar he stud-

ied with Ferdinand Pauwels and in 1866 was appointed professor in the art school of that city. From 1875 to 1887 he filled the duties of professor in the Art Academy of Berlin. He was mainly occupied in the illustration of Auerbach's <Kalender) ; Goethe's (Dichtung und Wahrheit5 ; Tennyson's (Enoch Arden) ; Chamisso's works; and Heine's (Buch der Lieder,5 etc. His success in this work was due to the powerful drawing, thoughtfulness, and genuine feeling which characterized his style; yet latterly he lapsed into a certain sickly senti¬ mentality and frivolity of treatment which in¬ jured the reputation won by his early produc¬ tions. Among his paintings the best are five canvases which illustrate the life of Luther, executed for the castle of Wartburg; <The Wedding of Luther) ; (The Return of Hermann from the Battle of Teutoburg Forest) ; and (The Three Fates.5

THUN, toon, Switzerland, (1) a lake in the canton of Bern, 10 miles long by two miles broad. Its surface is over 1,800 feet above sea- level and its greatest depth 712 feet. It forms the outlet of the Aar, which leaves it at the northwest. The lake is enclosed by gentle slopes, covered with villas and orchards, except beyond Sigriswyl, where the north bank is more precipitous. The scenery is idyllic. Fish are plentiful, especially eels, carp, pike, etc. Steamers run from Thun to Interlaken, and an old road follows the coast toward the south, a new one toward the north. The im¬ portant towns along the banks are Oberhofen (health resort), Spiez and Simmerthal. The first steamer on

the lake was launched in 1835. (2) The town of Thun in the canton of Bern is one mile distant, and is the station for travelers touring the Bernese Oberland. It is the principal military arsenal of Switzerland and here is located a military institution for army officers. The noteworthy buildings are the Gothic church and the old 12th century castle. The manufacture of bricks and pottery forms the main industry. Thun was the capital of the canton of Oberland of the Helvetian Re¬ public (1798-1802). Pop. 7,885.

THUNDER. See Lightning and Light¬ ning-Rods.

THUNDER-BIRD, an imaginary bird occurring in the mythology of races of low cul¬ ture, and personifying thunder or its cause. Among the Caribs, Brazilians, Algonkins and various other North American Indians and among the Karens of Siam, the South African Bechuanas and Basutos, and other aborigines, there are legends of a flapping or flashing thunder-bird, which seem to translate into myth the thought ot thunder and lightning descend¬ ing from the upper regions of the air, the home of the eagle and the vulture.

THUNDER CLOUD, Mohawk Indian chief and army scout : b. Caughnioga, Canada, about 1856; d. Rochester, N. Y., 1916. He be¬ came noted during the Indian troubles (1872— 76) and rendered valuable assistance to the United States army, being one of those who helped to capture Chief Red Cloud. In civil life he became celebrated as an artist's model and posed for the leading painters of Indians and Indian scenes. Frederick Remington used him frequently and he appears in various hisr

torical groups in the capitol at Saint Paul, Minn., the work of Millet and others. His head appears on the gold coin of the United States for which Victor Brenner selected his profile.

THUNDERBOLT, The, a comedy in four acts, by Sir Arthur Wing Pinero, represents the mature work of one of the most skilful of con¬ temporary English dramatists. In it he dis¬ cards most of the theatrical conventions which constitute the common stock in trade of the playwright's craft and which he knows how to use with consummate ease and dexterity. He himself modestly describes (The Thunderbolt5 as ((an episode in the history of a provincial family.® We are introduced in the first act into a family conclave of the Mortimores. Edward, the only member who has achieved wealth, lies dead upstairs. He was a bachelor and although he had been estranged from his brothers and sister for many years, they are his ((next of kin® and presumably his heirs, for, to their delighted surprise, he has ap¬

parently left no will nor made any provision whatever for the young woman who is known to be his daughter and whom he has educated and supported lavishly and affectionately. The reactions of the various members of the family to this situation as it develops are portrayed with a ruthless truth and simplicity which remind one rather of Balzac than of the author of (Sweet Lavender,5 <The Magistrate5 and (The Second Mrs. Tanqueray.5 One feels the influence of the conversational play of Shaw and Granville Barker but in (The Thunderbolt5 it is real talk of quite ordinary people, always forwarding the movement of the drama, never halting it for philosophical discussion or bril¬ liant monologue. Pinero is so enamored of his new realistic method that he sacrifices to it the opportunity of an effective <(curtain® in the third act. The family is again in council and the thunderbolt has fallen; there was a will leaving everything to the daughter, Helen. Thaddeus, having just been forced to confess that it was his wife, not himself, who had found and destroyed this will, flings out of the room with a frantic but futile appeal to the family and the lawyers : (<Oh, my God, let me get her away! . . . Don't you harm a hair

of her head ! Don't you touch her ! She's been a good wife to me!® Instead of ending the scene on this poignant note, Pinero makes us linger to watch the exasperated family quarrel and lament over the money thev see slipping through their greedy fingers. But greedy and selfish and petty as they are, they are very human, and James' frank statement in the last act of what the money really means to them reconciles one to the solution by which they all get a share, although Helen's magnanimity is perhaps the least natural thing in the play. She is not a very appealing heroine and all the other characters are people one would avoid if possible in real life. There is no love in¬ terest, no sex problem, no fun, and but little action. In view of the lack of these elements of popular appeal it is not surprising that (The Thunderbolt5 has not been one of Pinero's conspicuous successes on the stage but to the real lover of the drama and to the student of life, it is his most important play. It was first

produced in London in 1908 and was presented at the New Theatre, New York, in 1910.

, Grace R. Robinson.

THUNDERING LEGION. See Legion, The Thundering.

THUNEN, tu'nen, Johann Heinrich von,

German economist : b. Oldenburg, 1783; d. 1850. He received a thorough education in agriculture and also studied at Gottingen. In 1810 he bought an estate in Mecklenburg-Schwerin, which he developed into a model farm. He is known now principally for the economic views expressed in (Der isolirte Staat in Beziehung auf Landwirtschaft und Nationalokonomie) (3 vols., 1820-63). In this work he sets down simple premises in regard to wages and land, production, markets, etc. His law of wages has found favor among more recent economists. Consult Palgrave, dictionary of Political Economy > (3 vols., London 1899) ; and Schu¬ macher, H., (J. H. von Thiinen, ein Forscher- leben) (2d ed., Rostock 1883).

THURBER, George, American naturalist and writer: b. Providence, R. I., 2 Sept. 1821; d. Passaic, N. J., 2 April 1890. He was edu¬ cated at the classical and engineering school at Providence; he became a pharmacist and a lec¬ turer on chemistry, finally securing an appoint¬ ment (1850) with the commission to settle the boundary between the United States and Mexico. He made an important collection of plants and on his return to Providence was given the degree of A.M. by Brown University. He secured an appointment in the Assay Office in New York, lectured on botany in Cooper Institute and on botany and materia medica in The New York College of Pharmacy. Later he occupied the chair of botany and horticul¬ ture in the Michigan College of Agriculture but returned again to New York and to lecture at the College of Pharmacy and finally became editor of the American Agriculturist for 24 years. In 1880 he visited Europe. He was life member of the Royal Horticultural Society, life member of the American Pomological So¬ ciety, an active member of the New York Academy of Sciences and corresponding mem¬ ber of the Philadelphia Academy. His collec¬ tion of Western plants is in the Gray Her¬ barium at Harvard.

THURGAU, toor'gow, Switzerland, a can¬ ton at the northeast, with an area of 381 square miles. Unlike most Swiss cantons it has no high elevations, but a diversified surface, most of which is productive. It belongs to the Rhine Basin and is chiefly watered by the Thur and affluents. There are extensive forests, and the arable lands yield a limited amount of grain and potatoes and grapes — fruit is abundant. Stock-raising and dairying are also carried on. Manufactures consist of linen and hempen cloth, ribbons, lace, hosiery, muslin, buttons and wooden articles. There is consid¬ erable trade, owing partly to Lake Constance and the Rhine on its borders. The canton was organized in 1798, although it had been in pos¬ session of the Swiss from 1460.

For nearly 200 years prior to that time it belonged to the house of Hapsburg. The capital is Fravenfeld. Pop. of canton 140,540. See Switzerland,

THURIBLE. See Censer,

THURIFER, in Roman Catholic Church services, the attendant at High Mass, Solemn Vespers and Benediction, who uses the thurible, either by simply waving it to and fro or for in¬ censing the clergy, choir and congregation, and who at certain times presents it to the officiating priest that he may incense the altar or the Host. Strictly speaking, the office of thurifer belongs to the acolyte, the highest of the four Minor Orders, but all the functions of the acolyte are now freely performed by laymen.

THURINGERWALD, tii'nng-er-valt, or FOREST OF THURINGIA, Germany, a series of mountain ranges centrally located, ex¬ tending from the Werra near Eisenach south¬ ward as far as the valley of the Rodach. The ramifications toward the southeast and the west connect it with the Frankenwald and the Rhon Mountains. The highest elevations are found in the Grosser Beerberg (3,228 feet), and the Schneekopf (3,201 feet), west of Zelle. The entire mountain range is covered to its summit with evergreens and leafy trees and its slopes and valleys present charming landscape and views. The principal streams are the Gera, Wipper, Ilm and Schwarza, flowing into the Unstrut and Saale ; the Rodach, Haslach, Steinach and Itz; and the Werra with its affluents — .the Horsel and Leine. There are rich deposits of iron, copper, cobalt, lead and, in the neighborhood of Friedrichroda, ala¬ baster. The valleys and slopes are the scene of an active industry, including porcelain factories, glass-works, wooden manufactures, especially toys, slate, meerschaum and other pipes, fire¬ arms and celebrated pottery. Thuringerwald is much frequented by tourists, and the trans¬ portation and other facilities are unsurpassed.

THURINGIA, Germany, a state of the republic, comprising the smaller states of Saxe- Weimar-Eisenach, Saxe-Meiningen, Gotha, Saxe-Altenburg, Reuss, Schwartzburg-Rudol- stadt and Schwartzburg-Sonderhausen. Area, 4,546 square miles. The name was derived from the tribe which occupied it in the the 5th century. Much of its area is covered by the Thuringerwald (q.v.). Erfurt is the largest city. The region has had a chequered history, falling in turn to Thuringian, Frank and Carlovingian. It was in turn a kingdom, duchy and mark. (See Saxe-Weimar) . Con¬ sult. Devrient, Ernst, (Leipzig 1907) ; Knockenhauer, Thomas, (Ge- schichte Thiiringens in der

karolingischen und sachsischen Zeit> (Gotha 1863) ; (Geschichte Thiiringens zur Zeit des ersten Landgrafen- hauses) (ib. 1871).

THURLOE, John, English statesman : b. Essex County, 12 June 1616; d. Lon¬ don, 21 Feb. 1668. He studied law, was ad¬ mitted to Lincoln's Inn in 1647 and was ap¬ pointed to a government post in 1648. He took no part in the political events leading to the king's death. On 29 March 1652 he was ap¬ pointed Secretary to the Council of State under Cromwell; and was also given control of the intelligence department, which duties he per¬ formed so remarkably well that it was said that the enemies of the Protector made no move without detection by Thurloe or his assistants. He stood high in Cromwell's regard and en¬ joyed his confidence to a greater extent than any other adviser. He served in the Parlia-

ments of 1654 and 1656, and was reappointed Secretary of Cromwell's Council of State in 1657. He became chancellor of Glasgow Uni¬ versity in 1658. He supported Richard Crom¬ well's succession after the death of Oliver Cromwell, sat in the Parliament of 1659, con¬ tinued prominent in government affairs and in 1660 was reappointed Secretary of the Council of State. After the Restoration he was ar¬ rested on a charge of high treason 15 May 1660, but was freed subject to attending the secretaries of state whenever they should re¬ quire his services. His correspondence is in the Bodleian Library, Oxford, and is an important source of historical information. A part of it was published with a biographical sketch by T. Birch (1742).

THURLOW, ther'lo, Edward, Lord, Eng- glish lord-chancellor: b. Bracon Ash, Norfolk, 9 Dec. 1731 ; d. Brighton, Sussex, 12 Sept. 1806. He was educated at Caius College, Cambridge, subsequently entered the Middle Temple and in 1754 was called to the bar. In 1761 he at¬ tained the rank of king's counsel, and was em¬ ployed to prepare the evidence for the appeal in the great Douglas cause, which, however, did not. come on for hearing in the House of Lords until 1769. In 1768 he was returned as mem¬ ber of Parliament for Tamworth, and became a constant supporter of Lord North's administra¬ tion. In 1770 he was made solicitor-general, and Attorney-General in 1771. In 1778 he was appointed lord-chancellor, and raised to the peerage as Baron Thurlow. The personal favor of the king retained him in office during the Rockingham administration, whose meas¬ ures he actively opposed, but he was compelled to resign on the dissolution of the

ministry in 1783. He was still considered the confidential adviser of the king, and on the dissolution of the coalition ministry at the close of the year the great seal was restored to him by Pitt. In 1788 the king's illness rendered it necessary to consider the contingency of a regency and Pitt suspected Thurlow of intriguing with the Prince of Wales. Thurlow then began publicly to oppose the measures of his colleagues, par¬ ticularly Pitt's scheme for maintaining the sinking-fund, in the House of Lords, where¬ upon Pitt demanded his dismissal, to which the king at once agreed. Consult Campbell, (Lives of the Chancellors) ; Foss, (Judges of Eng- land) (London 1848-64).

THURMAN, ther'man, Allen Granbery,

American lawyer and politician : b. Lynchburg, Va., 13 Nov. 1813; d. Columbus, Ohio, 12 Dec. 1895. He was brought, in childhood, to Chilli- cothe, Ohio, and there received an academic education. After teaching for a time he studied law in the office of his uncle, William Allen (q.v.) ; in 1835 was admitted to the bar and forming a partnership with his uncle soon at¬ tained success as a practising lawyer. At the same time that he began his legal career he be¬ came active in politics as a member of the Democratic party, but held no political office until 1844 when he was elected to Congress. He was one of the earnest supporters of the administration in the conduct of the Mexican War; though a Democrat and opposed to any change in the Missouri Compromise (q.v.), he, with the most of the Northern Democrats, voted

for the Wilmot Proviso (q.v.), and replied to Southern criticism of this act in a soeech stat¬ ing, forcibly, the reasons of the North for op¬ posing the extension of slave territory. At the close of his Congressional term he resumed the practice of law, and in 1851 was elected one of the judges of the Ohio Supreme Court; here his learned and able decisions won him wide reputation as a jurist. When his term of of¬ fice expired in 1856 he again took up the practice of his profession, this time in Colum¬ bus. He took no active part in .politics until 1867, when he was nominated by the Democrats as governor of Ohio ; he conductd a vigorous campaign, and though defeated by a small plu¬ rality, the Democratic party carried the legis¬ lature. In the next year he was elected to the United States Senate and re-elected in 1874. His ability in debate won him immediate recog¬ nition, and he was appointed a member of the Judiciary Committee, and became the leader of his party in the Senate ; during his last term he was elected president pro tern. He favored a liberal policy of reconstruction, introduced the so-called Thurman Bill compelling the Pacific Railroad to comply with the conditions of their franchise, and succeeded in

effecting the pas¬ sage of this bill against a powerful opposition. In 1876 he was a member of the Electoral Com¬ mission (q.v.), and steadfastly supported the claims of Tilden. He was a candidate for the Democratic Presidential nomination in 1876, 1880 and 1884; in 1881 he was appointed a member of the Paris Monetary Conference. In 1888 he was the Democratic nominee for Vice-President and took active part in the cam¬ paign; after the defeat of his party in that year, he retired from political life. Consult Hensel and Parker, (Lives and Public Services of Grover Cleveland and Allen G. Thurman > (Philadelphia 1892).

THURN, Henry Matthias, Count, Bo¬ hemian Protestant military leader: b. 1580; 28 Jan. 1640. He served in the Turkish War and for his services was made Burgrave of Karl- stein, Bohemia, by Emperor Rudolph I ; he was deprived of his estates, however, after he was named one of the Thirty Defenders of the Faith by the Bohemian estates. He was the leader of the Bohemian Protestant insurgents at the be¬ ginning of the Thirty Years' War in 1618; in¬ vaded Austria and unsuccessfully besieged Vienna in 1619; and was decisively defeated at White Hill in 1620. He afterward served in the Swedish army; and in 1632 fought under Wallenstein at the defeat of Liitzen.

THURSDAY, the fifth day of the week, so called from the old Teutonic god of thunder, Thor, the northern Jupiter. The German name Donnerstag is of similar origin; and Thor, Donner, are equivalent to English thunder! Ascension-day is often called Holy Thursday.

THURSDAY ISLAND, Queensland, a small island in Torres Strait, 30 miles from Cape York. It has an excellent harbor, Port Kennedy, which is a port of call and trade depot. Pop. about 2,000.

THURSTON, John Mellen, American

statesman; b. Montpelier, Vt., 21 Aug 1847- d. Omaha, Neb., 9 Aug. 1916. His parents took him to Wisconsin, where he was educated in the public schools. He received his educa-

tion at Way land Academy at Beaver Dam, Wis., and in 1869 was admitted to the bar. Soon afterward he went to Omaha, Neb., where he spent most of his life. About 1873 he was a member of the city council and was city attorney in 1874— 77. In 1875 he was elected to the Nebraska legislature as a Republican and was a presidential

elector in 1880. Soon after¬ ward he became counsel for the Union Pacific Railroad. In 1893 the Republican caucus nomi¬ nated him for United States Senator, but he did not go to Washington until 1895. He re¬ mained until 1901. He seconded the nomi¬ nation of William McKinley for President in 1896, vacating the chair at that convention to do it. From 1889 to 1891 he was president of the Presidential Republican League. In 1901 he became a commissioner of the Saint Louis Exposition.

THURSTON, Robert Henry, American engineer and educator: b. Providence, R. I., 25 Oct. 1839; d. Ithaca, N. Y., 25 Oct. 1903. He was graduated from Brown University in 1859, and received his mechanical training in his father's engine-building shops. In 1861 he joined the engineer corps of the navy, served during the Civil War, was twice promoted, and in 1865 was appointed assistant professor of natural philosophy at the United States Naval Academy. In 1872 he resigned his commission in the navy, and accepted the professorship of mechanical engineering at the Stevens Institute of Technol¬ ogy. He was appointed a member of the United States scientific commission to the Vienna Exhibition in 1873; and in 1885 became the director of Sibley College, the engineering department of Cornell University, and univer¬ sity professor of mechanical engineering. The excellence of the Sibley College curriculum is largely due to his ability as an organizer, and his administration made the college one of the foremost engineering schools of the country. As an inventor he was known for his mag¬ nesium burning lamps, army and navy signal apparatus, various forms of testing machines for iron and other metals, and an engine-gov¬ ernor and other improvements on the steam- engine. In scientific research his most note¬ worthy work was done in investigating the commercial economy of the steam-engine, and in determining the useful qualities of various alloys. His contributions to engineering and scientific literature are also of value, being marked by a clearness of statement unusual in technical writing. The more important of his publications are (Materials of Engineering) (3 vols., 1884; new ed., 1907-10); (Manual of the Steam Engine) (1890-1902) ; (Manual of Steam Boilers) (1888-1901); (Engine and Boiler Trials) (1890-1903) ; (History of the Steam Engine1 *(1878-1902). Others are (Friction and Lubrication* (1884) ; (Materials of Construction *(1890-1900); Stationary Steam Engines* (1885) ; (Friction and Lost Work in Machinery and Mill Work *(1885— 1903); (Heat as a Form of Energy* (1890); <Life of Robert Fulton *(1891) and numerous scientific papers. Consult Durand, W. F., < Robert Henry Thurston* (Washington 1904).

THUSNELDA, wife of Arminius (q.v.), chief of the Cherusci, a German

tribe which drove the Romans from the Elbe and the Weser in 9 a.l. In 14 a.d. the Roman legions

again penetrated the German interior, and Thusnelda was taken captive to Rome by the Roman conqueror, Germanicus Caesar (q.v.).

THWAITES, thwats, Reuben Gold, Amer¬ ican historian and editor: b. Dorchester, Mass., 15 May 1853; d. 1913. He was educated at the high school of his native town and in 1874-75 took a postgraduate course at Yale. From 1876 to 1886 he was managing editor of the Wiscon¬ sin State Journal. He published Town His¬ toric Waterways *(1888; rev. ed. 1902) ; (The Story of Wisconsin* (1890) ; (The Colonies, 1492-1750 *(1891); (Afloat on the Ohio*

(1897) ; (Daniel Boone *(1902) ; (Father Mar¬ quette* (1902) ; (Brief History of Rocky

Mountain Exploration* (1904) ; (France in

America* (1905) ; (School History of the

United States *(1912). He also edited (The Jesuit Relations* (73 vols. 1896-1901) ; Orig¬ inal Journals of Lewis and Clark *(7 vols., 1905) ; <Early Western Travels, 1748-1846* (32 vols., 1904—07), and other works. Consult Turner, F. J., (Reuben Gold Thwaites* (Madi¬ son, Wis., 1914).

THWING, twing, Charles Franklin,

American college president: b. New Sharon, Me., 9 Nov. 1853. He was graduated at Har¬ vard in 1876, and at Andover Theological Seminary in 1879 ; received the honorary de- ees of S.T.D., from Chicago Theological eminary in 1889, LL.D., from Marietta College in 1894, from Illinois College in 1894, from Waynesburgh College in 1901, from Washing¬ ton and Jefferson College in 1902, and from Kenyon College in 1910; was ordained Con¬ gregational minister in 1879; was pastor of North Avenue Congregational Church in Cam¬ bridge, Mass., 1879-86, of Plymouth Church in Minneapolis, 1886-90, and president of Western Reserve University and Adelbert College since 1890. He is associate editor of Bibliotheca Sacra since 1884, secretary of the Carnegie Foundation for the Advancement of Teaching, and president of the Intercollegiate Peace As¬ sociation. President Thwing is the author of (American Colleges: Their Students and Work *(1878) ; <The Reading of Books* (1883) ; (The Working Church *(1894) ; (Within College Walls* (1894); (The College Woman *(1894); (The American College in American Life* (1900) ; (College Administration *(1900) ; (The*

Best Life (1900); <The Choice of a College *(1901); (God in His World* (1902); (The Youth's Dream of Life *(1902) ; (If I were a College Student* (1902) ; (A Liberal Education and a Liberal Faith *(1903) ; Col¬ lege Training and the Business Man* (1906) ; (Higher Education in America, A History *(1906); (Education in the Far East* (1909); (History of Education in the United States since the Civil War *(1910) ; (Universities of the World* (1911); (Letters from a Father to His Son entering College *(1912) ; ˆLetters from a Father to His Daughter entering Col¬ lege* (1913) ; (The Co-Ordinate System in the Higher Education *(1913); (The Family: An Historical and Social Study* (1886 in collabora¬ tion with Carrie Butler Thwing, revised 1913) ; (Education according to Some Modern Masters* (1916) and contributions to maga¬ zines.

THYESTES, thi-es'tez. See Atreus.

THYLACINE, an Anglicization of the generic term Thylacinus given to the predatory marsupial called Tasmanian or zebra wolf, and described under Dasyure (q.v.).

THYME, one of the species of the labiate genus Thymus, small, shrubby, perennial herbs of the Old World, cultivated on account of their aromatic foliage as flavoring herbs, or for orna¬ ment. T. vulgaris, an erect, or somewhat de¬ cumbent plant, from one to two feet high, has sessile linear-lanceolate leaves with revolute margins. The pale-lilac flowers are small, and in interrupted spikes at the ends of the branches. Thyme has a very strong and pungent odor, and was formerly employed for seasoning. It is a favorite food of bees, and that of the Grecian hills produced the famous honey of Mount Hymettus. Another thyme, sometimes grown as a culinary herb, but more often to cover rock-work and waste places, is the creeping thyme or mother-of-thyme (T. serpylliformis) . Its internodes are short, so that the plant is very leafy, and it grows in dense, broad tufts. One of its varieties (citriodorus) , is the lemon- scented thyme. Oil of thyme is distilled from these plants, especially in France, where they are very abundant, and may be used in per¬ fumery instead of the oil of origanum, and is of utility in veterinary practice. Thymol is a solid, acrid stearoptene obtained from this oil, and is used, chiefly externally in alcoholic solution, for a stimulant and powerful antiseptic in the treat¬ ment of wounds and sores. Other labiates called thyme, from their aroma, are Calamintha acinos, and C. nepeta, the basil thyme, and C. clino-podium, the horse-thyme. The cat-thyme is the herb-mastic, or

Teucrium marum, a powerful sternutatory, useful for its scent. Virginian thyme is Koellia virginiana.

THYME OIL, a volatile oil obtained by distilling the leaves and flowering tops of Thymus vulgaris, or garden thyme, with water. Colorless when pure, sparingly soluble in water, easily so in alcohol. It contains two hydro¬ carbons pinene, CioHis, and cymene, C 10H14, as well as a phenol-like body thymol. Used in liniments and dressings as a stimulant and anti¬ septic.

THYMOL, in chemistry, CioHˆO, a color¬ less crystalline compound obtained from the oil of thyme, horse mint, etc. Often called thyme camphor. Its chemical nature is anal¬ ogous to that of phenol, or carbolic acid, though it has but little of the caustic properties of that body. It crystallizes in plates, is almost insoluble in water, soluble in alcohol, melts at 44° C., and is very easily attacked by many chemical agents. It has a very strong odor and is used as an antiseptic and disinfectant. Iodine and caustic potash convert it into di-iodo- thymol, which is the well-known antiseptic aristol.

THYMUS GLAND, one of the ductless glands, existing as a temporary organ, de¬ veloped to its full size about the end of the second year of life and decreasing in size after that period. At puberty it almost or wholly disappears. At its full development it appears to consist of two lobes or halves, situated in the middle line, and placed partly in the neck, extending from the cartilage of the fourth rib upward as high as the inferior edge or border

of the thyroid gland (q.v.). It is covered in front by the breastbone, and by the sternohyoid and sternothyroid muscles. It rests upon the pericardium or heartsac, and lies on the neck on the front and sides of the trachea or wind¬ pipe. This gland is of a pink-gray color, ex¬ hibits a lobulated appearance, and is of soft consistence. Its weight at birth is about half an ounce. Its microscopic structure exhibits a composition of lobules, each lobule being formed of regularly disposed masses of what is termed lymphoid tissue, consisting of a mesh- work of exceedingly delicate connective tissue, the meshes being crowded with round cells identical with the white corpuscles of the blood and lymph corpuscles. The functions of this gland are still undetermined. It is placed in the same category as the thyroid gland and spleen ; and the most probable theory as to its use is that which assigns to it the work of elaborating the elements of the blood, especi¬ ally in the earlier years of life. It is generally believed to exert a strong influence on growth and development. It is employed in organ¬ otherapy (q.v.). The well-known ˆweatbread® is the thymus gland of a calf or lamb.

THYRIDOPTERYX, a genus of foliage-

destroying insects. See Bagworm.

THYROID GLAND, a structure having no outlet or duct, and classified with the spleen, thymus gland and suprarenal capsules under the general name of ductless glands. In man the thyroid gland is situated at the upper part of the trachea or windpipe and consists of two halves or lobes, placed one on each side of the windpipe, and united by a narrow bridge of substance — the isthmus of the gland. It is covered in front by the muscles of the neck and its sides lie in contact with the common carotid artery. Its under surfaces embrace the windpipe and larynx. This gland is of a red¬ dish color. It is larger in women than in men, and weighs, on an average, about one and one- half ounces. It may become enormously en¬ larged, as in goitre. Its structure consists of numerous small shut sacs, surrounded by a net¬ work of capillary blood-vessels. Each vesicle or shut sac is lined internally by a single layer of columnar cells, and is filled with a glairy mucoid substance. The blood-vessels of the gland are derived from the superior and in¬ ferior thyroid arteries and its nerves come from the pneumogastric and sympathetic trunks. The use of this gland is not quite clear, but is gen¬ erally held to be the production of a secretion which has a great influence on alimentation. Its business is connected with the maintenance of a proper quality of blood, either by the re¬ moval of certain effete substances from the blood, or by the addition of certain elements to it. Its complete extirpation or atrophy is attended with disease. The thyroid gland of the sheep is used in the treatment of myxee- dema, the complication resulting from the loss of function of the gland.

THYROID GLAND, Diseases of. Several

varieties of enlargement have been noticed in the thyroid and are generally grouped under the general term goitre (q.v.). Myxoedema is the condition resulting when the gland ceases to function either because of atrophy or of the excision of the organ. The thyroid gland of th$

sheep is used in the preparation of an extract which is efficacious in the relief of this con¬ dition. See Cretinism; Secretions, Internal; Thyroid Gland.

THYRSE, thers, a form of inflorescence consisting of a compact panicle in which the middle pedicels are the longest, giving the whole an ovate shape. The primary pedicels are centripetal, and the secondary centrifugal. The horse-chestnut and lilac furnish examples.

THYSANURA, an order of neuropteroid insects. See Bristletails.

TIAHUANACO, te-a-wa-na'ko, Bolivia, the ruins of a prehistoric city, near the south shore of Lake Titicaca, in lat. 16° 42' S., long. 68° 42' W., about 40 miles west of La Paz city. The ruins stand on an eminence 12,930 feet above sea-level, which, from the water marks around it, seems to have been formerly an island in Lake Titicaca. The level of the lake, however, is now 135 feet lower, and its shores two miles distant. This fact, in conjunction with others, warrants the belief that these re¬ mains antedate any others known in America ; they indicate a different and higher order of art than was found to exist at the time of the Spanish conquest, in any other part of that Continent. The ancient Peruvians had but the vaguest traditions concerning them, believing that the structures of which they are the re¬ mains were raised in remote ages, by giants, in a single night. The chroniclers of the Spanish conquest have described them, and their ac¬ counts do not differ materially from those of modern travelers. They are in a state of ex¬ treme dilapidation. Some of the structures seem to have been built on a pyramidal plan, and to have covered several acres; but the most remarkable features still remaining are mono¬ lithic doorways, pillars and statutes of stone, elaborately sculptored in a style wholly dif¬ ferent from any other remains of art yet found in America. One of these doorways is 10 feet high, 13 feet broad, with an opening six feet four inches by three feet two inches, the whole cut from a single stone. Its east front has a cornice in the centre of which is a human figure of strange form, crowned with rays, interspersed with serpents with crested heads. On each side of this figure are three rows of square compartments, filled with human and other figures, of apparently sym¬ bolic design. The statues are broken, so that it is difficult to state their original dimensions ; but these may be inferred from the size of the head of one, which is four feet in length and of proportionate width. The whole neighbor¬ hood is strewn with vast blocks of stone elab¬ orately wrought, some of which measure three feet in length by 18 feet in width, and six feet in thickness. Some of these stones have been found to weigh as much as 400 tons and were transported many miles. No mortar was used in the masonry; stones grooved and tongued were held together with clamps and bronze pins. Dressing and carving of stones was done with stone and bronze tools. On some of the islands of Lake Titicaca are other monuments, of great extent, but of true Peru¬ vian type, apparently the remains of temples

destroyed on the arrival of the Spaniards. Those of the island of Coati, however, have many features in common with the ruins of

Tiahuanaco, and probably belong to the same epoch, and are to be ascribed to the same un¬ known and mysterious people who preceded the Peruvians, as the Tulhuatecas or Toltecs did the Aztecs. Not far distant from the ancient site stands the present town of the same name, largely built from stones taken from the old ruins. Consult Stiibel and Uhle, (Die Ruinenstatte von Tiahuanaco) (Breslau 1892).

TIARA, the crown of the Pope, a cylindrical diadem with three crowns and a pointed top surmounted by a mound and a cross of gold, which the Pope wears as a symbol of sover¬ eignty. It is placed upon the Pope's head at his coronation by the second cardinal deacon, with the words, aReceive the tiara adorned with three crowns, and know that thou art Father of princes and kings, Ruler of the world and Vicar of our Saviour, Jesus Christ.® The tiara is not worn upon purely spiritual occasions, the Pope then wearing the mitre of a bishop. The first crown is said to have been added to the mitre by Nicholas I (858-867) as a symbol of uniting the princely crown with it; the second crown was added by Boniface VIII (1294-1303) ; and the third, first appears on the monument of Benedict XII (1334-42).

TIBALDI, te-bal'de, Pellegrino, Italian painter and architect: b. Bologna, 1527; d. Milan, 1598. In 1547 he commenced his pro¬ found study of Michelangelo at Rome and painted for Cardinal Poggi, in his palace at Bologna, the (History of Ulysses. > When Caracci saw these pictures, in which the style of Michelangelo appeared in a softened and refined form he pronounced Tibaldi il Michel¬ angelo Riformato — an improved version of Michelangelo. He also decorated the chapel of Saint James for the Augustinians. Among his architectural works are the palace of Cardinal Borromeo at Pavia (1562) ; the Church of Saint Fidelis at Milan, and the new fagade of the cathedral in that city. He likewise fur¬ nished Philip II who had summond him to Spain in 1586, with the plan for the Escorial, and painted the ceiling of the library in that palace. Consult Gurlitt, (Der Barockstil in Italien) (Stuttgart 1887) ; Zanotti, (Le pitture di Pellegrino Tibaldi > (Venice 1756).

TIBER, ti'ber (Italian, Tevere), Italy, a river rising in the Apennines of Tuscany, in central Italy, about 11 miles north of Pieve San Stefano, some 4,000 feet abQve sea-level. It is one of the largest and most celebrated rivers of the country, has a winding course, flows 244 miles and empties into the Mediter¬ ranean, passing many noted cities on its way to the sea, which enters by two branches — the Fiumicino and

Fiumara. It is navigable for small craft as far as the mouth of the Nera, a distance of about 90 miles, but for small steamers only as far as Rome where it attains a breadth of about 250 feet. Its principal tribu¬ taries are the Nera and Paglia, which also re¬ ceive their own affluents. The upper course is precipitous and the mountain streams which supply its water are the cause of its frequent overflow and consequent inundations. The chief cities on its route are Perugia, Orvieto, Ostia and Rome. The swift current carries along a vast amount of sediment from which condition arose the name ((ydl°\v Tiber,® flavus

Tibcris , alluded to by Virgil. Consult Smith, S. A., (The Tiber and its Tributaries) (Lon¬ don 1877).

TIBERIAS, ti-be'ri-as, Sea of. See Gali¬ lee, Sea of.

TIBERIUS, ti-be'ri-us (TIBERIUS CLAUDIUS NERO C.ZESAR), Roman em¬ peror, son of Tiberius Claudius Nero, and Livia Drusilla, who was afterward married to the Emperor Augustus : b. 16 Nov. 42 b.c. ; d. Misenum, 31 March 37 a.d. Brought up in the imperial household, Tiberius had by his conquests in Germany and Gaul gained the con¬ fidence of Augustus, by whom he was made a Roman consul. In 11 a.d. he was compelled, in order to retain the favor of Augustus, to divorce his wife, Vipsania Agrippina, and to marry Julia, the emperor's daughter, and in 14 a.d., shortly before the death of the emperor, he was formally adopted as his heir. Accord¬ ing to Tacitus, the reign of Tiberius, although marked by cruelty and infamy which could have been possible to only the most profligate and dissolute of men, was rendered less tyran¬ nous than might have been expected, by the strict maintenance of justice in matters of taxation and at times by a certain respect for the privileges of the Senate, and the rights of the common people, a course to be commended in a period of absolute despotism. The atro¬ cious disregard of human life and liberty where-ever his own private interests were at stake could, however, scarcely have been equaled. It was in this reign that the crime of <(laesa ma-jestas® was established. Consult Jerome, T. S., (The Tacitean Tiberius) (in Classical Phi¬ lology, > Vol. VII, Chicago 1912) ; Mommsen, (The Roman Provinces from Augustus to Diocletian) (1886); Schiller, H., (Geschichte der romischen KaizerzeiC (Gotha 1883); Tar¬ ver, J. C., (Tiberius the Tyrant* (New York

1902).

TIBERIUS CONSTANTINE (Tiberius II), emperor of Byzantium: b. Thrace; d. Byzantium, 582 a.d. He was brought up by the Emperor Justin II whom he succeeded on the throne of the Eastern Empire in 578. It was during his reign that the great influx of Huns and Slavs in the north and east, and that of the Lombards in the west, began seri¬ ously to threaten the Roman empire.

TIBET, tib'et or ti-bet, or THIBET, a country of central Asia, under Chinese suze¬ rainty, lying between latitude 28° and 36° N., ahd between long. 79° and 103° E. It is bounded on the north by East (Chinese) Tur¬ kestan, on the east by China proper, on the south by British India, Bhutan and Nepal and on the west by the Indian state of Kashmir. The area is estimated at about 463,200 square miles. Tibet forms the most extensive and loftiest plateau region in the world. It is structurally a complex of faulted mountains whose inter¬ vening valleys have been filled up with detritus, converting them into plains whose general level lies from 10,000 to 17,000 feet above the sea, while the mountains tower almost as high again above them. The main Himalaya .range runs along the southwestern boundary and the Kara- * koram with its outrunners traverses the west¬ ern part of the country. These ranges have numerous peaks between .20,000 and 29,000 feet

in height. On the northern boundary runs the Kuen-Lun Range, sending numerous spurs and offshots into the plateau. The eastern half of Tibet is traversed by a system of more or less parallel ranges with a southeast trend. The en¬ closed plains in western and northern Tibet form closed drainage basins, very poorly watered, and containing salt lakes. The eastern longi¬ tudinal valleys are drained by the headwaters of the Yang-tse-kiang, Hoang-ho and Salwin rivers and in the south, along the northern base of the Himalayas, run the Indus to the west and the Brahmaputra to the east. The climate is excessively dry, with great and sud¬ den fluctuations in temperature, and severe cold and biting north winds in winter. The vegetation is scanty and characteristic of desert and al¬ pine regions. There are green meadows only along the streams and in the eastern mountains are forests of birch, poplar and coniferous trees. Wild animals are very numerous along the watered regions and antelopes, yak oxen and wild asses are characteristic of the steppes.

The inhabitants, who number about 2,000,000, are of a semi-civilized Mongolian race some¬ what akin to the Burmese. In the north they are nomadic, but in the south they are settled in substantial houses of

stone or sun-dried brick, and cultivate the soil along the river valleys. The industries are not important, but there is a considerable trade with China, and wool, furs, musk, gold, borax and salt are exported. The language of the people is simi¬ lar to the Chinese, but has taken on poly¬ syllabic characters. A considerable amount of literature, mainly religious, has been accumu¬ lated, and printing has been practised for centu¬ ries. The prevailing religion is Buddhism, of the form known as Lamaism. The priesthood is exceedingly numerous and the government is a theocracy. At its head is the Grand Lama or Dalai Lama, who resides at Lhasa (q.v.), the capital, and who claims to be the head of the Buddhist world. This priest government has enforced a strict exclusion of non-Buddhist foreigners, particularly from the capital. A Chinese resident was permanently stationed at Lhasa. Russian diplomatic influence seemed to have gained a foothold in Tibet when, in 1903, the British Indian government took the occasion of the non-compliance of the Tibetans with the terms of the treaties of 1890 and 1893, governing frontier trade relations, to send a military expedition across the boundary. The avowed purpose was to negotiate with the Tibetan government, but the latter declined to negotiate and the British column pushed on toward Lhasa. On 31 March 1904 at Guru where the Tibetans had built a wall across the highway to oppose the advance, 1,500 of their soldiers were flanked and effectively enclosed in a circle. An attempt to disperse them, and make them retire without firing on them,' was met by the Tibetan general wounding a Sikh by a pistol shot which was the signal for a general onslaught by the Tibetans. A terrible magazine rifle fire, and the bringing into ac¬ tion of a mountain battery resulted in the slaughter of about 400 of their soldiers, the British subsequently occupying their camp, advance also met with serious opposition and at Gyantse jong or castle, where for a' time they were besieged by thou-

sands of Tibetans. The expedition eventually ieached Lhasa; after long negotiations, ended only by the threat of enforcing compliance, Colonel Y ounghusband concluded a treaty which was afterward censured by the Indian government as in excess of his instruction. Protest from the Chinese government led to the Anglo-Chinese convention in 1906, whereby Biitish evacuation of Chumbi Valley was se- cured and China, as Suzerain power of Tibet, paid an indemnity of 2,500,000 rupees. The agieement entered into between the two coun¬ tries at this time was further strengthened by the conclusion of trade regulations between India and Tibet (1908). At the time of the

Chinese Revolution in 1911 the Tib'etans ex¬ pelled the Chinese garrison, and an expedition subsequently sent out from Szechuan and Yun¬ nan was withdrawn because of Great Britain's disapproval. In 1912 the British government outlined its attitude toward the Tibetan ques¬ tion, in accordance with the provisions of the treaty of 1906, objecting to Chinese assertion of sovereignty over Tibet. A tripartite con¬ ference was opened at Simla in 1913, but was dissolved without reaching any satisfactory agreement. Since that time Great Britain has declined to reopen negotiations. Consult Coales, O., (Eastern Tibet) (in Geographical Journal, April 1919); Gerard, F., <Tibet: The Country and its Inhabitants) (tr. from French, London 1904); Landon, P., (Lhasa: The Tibet Expedition, 1903A345 (2d ed., London 1906) ; Lansdell, H., < Chinese Central Asia5 (2 vols., London 1893) ; Rijnhart, S. C., (With the Tibe¬ tans in Tent and Temple5 (London 1901); Younghusband, F. E., (India and Tibet5 (Lon¬ don 1910).

TIBET DOG, or TIBET MASTIFF, a

breed of dogs about the size of a Newfound¬ land dog, but with a head resembling that of the mastiff, and having the flews large and pen¬ dent. The color is usually deep black, with a bright brown spot over each eye; the hair is long and the tail bushy and well curled. This variety is extremely savage, and has been known from classic times, when it was employed by the Romans, especially under the emperors, in the games of the circus.

TIBIA. See Anatomy; Osteology, Hu¬ man.

TIBULLUS, Albius, Roman poet: b. about 54 ; d. about 19 b.c. He belonged to the eques¬ trian order, and was on intimate terms with Messala (q.v.), whom in 31 he accompanied in a campaign in Aquitanian Gaul. He set out with him thence to the East also, but was forced through ill-health to land and be left behind at Corcyra. Henceforth he lived on his estate, between Tibur and Prseneste. Horace was warmly attached to him and addresses to him one of his epistles, in which he credits his friend with the possession of a -tender heart, beauty, wealth, good health and good taste in enjoying life. There are four books of elegies under his name, but the third and a part of the fourth are spurious. These poems are among the most perfect of their kind which have come down to us from classical antiquity. The ele¬ gies of Tibullus are characterized by agreeable simplicity and tender feeling, and are free from the insipid prolixity into which Ovid frequently falls. The chief editions are those of Bahrens

(Leipzig 1878) ; and Hiller (ib. 1885) ; Lach-

: .MU,ler <ib- 1885)i Postgate There is a translation by Cranstoun (1872). Consult Duff, J. W., (A Literary His- tory of Rome5 (New York 1909); Sellar, W. Y., (Horace and the Elegiac Poets5 (Ox- ford 1892) ; Teuffel, W. S.. (Geschichte der romschen Literatur5 (Vol. II, 3d ed., Munich

TIBURON, te-boo-ron, Mexico, an island m the Gulf of California, situated in the upper part of the gulf, 230 miles from the mouth of the Colorado River, and separated from the coast of Sonora by a channel from two to five miles wide. It is 30 miles long and from 10 to 20 miles wide, and covered with grass and desert vegetation. It is inhabited by the C'eris or Seris Indians, who have been left almost wholly to themselves by the Mexican govern¬ ment, and still live in a primitive state of nature. They are warlike and feared by the neighboring tribes on the mainland; use poisoned arrows, and are said to practise cannibalism.

TIC-DOULOUREUX, tik'doo-loo-re'. See Facial Neuralgia; Neuralgia.

TICAO, te-kow', Philippines, one of the islands of Masbate province, lying northeast of Masbate Island, and southwest of Sorsogon, Luzon, aj'ea 140 square miles ; with dependent islands 149 square miles. It is long and nar¬ row, extending 23 miles from northwest to southeast, and narrowing gradually from a width of eight miles in the north to the south¬ ern point Cape San Rafael ; the surface is rugged with many small mountain groups, and single peaks ; the highest elevation in the north¬ west is 1,525 feet. The west coast is steep and rugged, the east coast indented by several small bays. Hemp, rice, sugarcane, cotton and chocolate are raised in small quantities; and gold is obtained from the river sands. The more important occupations of the people are stock-raising, weaving, fishing and hunting. Pop. 10,183.

TICHBORNE (tich'born) TRIAL, a fa¬ mous English lawsuit in which was contested the validity of the claim of one Thomas Castro that he was Roger Charles Tichborne, heir of the Tichborne estates. Roger Charles, the eldest son of Sir Alfred Joseph Tichborne, died at sea in 1854 and upon the death of the second son, in 1866, the youngest was acknowledged heir. But Lady Tichborne was not satisfied that her eldest son was really dead, and so she advertised for him. Castro, a butcher from Wagga Wagga, Australia, also known as Arthur Orton, of Wapping, came forward and claimed to be Roger, the rightful heir. He was ac¬ cepted by Lady Tichborne, who, however, died before his suit to recover the estate began. The trial lasted 103 days and was ended

by Castro being non-suited, 6 March 1872. He was ar¬ rested and charged with perjury and a trial of 188 days followed, a verdict of guilty being found 28 Feb. 1874. Castro was sentenced to 14 years' imprisonment with hard labor. He was discharged on a ticket-of-leave in 1884, confessed his imposture in 1895, and died in poverty and oblivion in 1898. The second trial, which was the longest in the history of the English courts, cost £55,315. Consult (The Tichborne Romance5 (Manchester 1871).

TICINO, te-che'no (German T essin) , Switzerland, a canton situated on the southern frontier of the republic, and bounded on the east, south and west by Italy. Area, 1,088 square miles. The Saint Gotthard group of the Lepontine Alps forms the northern and the Adula Alps the eastern boundary. Ramifica¬ tions of these fill up the canton, but are cut by the valley of the Ticino River. The latter drains practically the whole canton, and empties into Lake Maggiore, which extends some dis¬ tance across the southern boundary. The can¬ ton thus belongs to the basin of the Po. The upper mountain regions are rocky, but the southern part of the canton is very fertile, producing grain, fruits and grapes. Large num¬ bers of goats are raised in the mountains. The principal mining industries are granite and mar¬ ble quarrying. Commerce and manufactures are unimportant, although there is a consider¬ able tourist traffic over the Saint Gotthard Railroad, which traverses the canton. The capital is Bellinzona (q.v.). In 1803 the canton of Ticino was formed by the union of the can¬ tons of Bellinzona and Lugano, formerly part of the Helvetian Republic, and it was received as a full member of the Swiss Confederation. Pop. 158,556. See Switzerland.

TICINO (German and French, Tessin), river of Switzerland and northern Italy, rising on Mount Saint Gotthard. and flowing in a general southeast direction, first as a rapid tor¬ rent through the canton of Ticino, then through Lake Maggiore, and finally as a clear, navigable stream on the boundary between Piedmont and Lombardy. After passing Pavia it joins the Po. Length, exclusive of Lake Maggiore, 108 miles.

TICKELL, Thomas, English poet: b. Bridekirk, Cumberland, 1686; d. Bath, Somer¬ set, 23 April 1740. He was educated at Queen's College, Oxford, a fellowship of which he held 1710-26. He. was the friend of Addison, who introduced him both into the world of letters and public

life, and on becoming in 1717 sec¬ retary of state made Tickell under-secretary. He held the office of secretary to the Lords Justices of Ireland from about 1724 till his death. He translated the first book of the (Iliad, about the time of the appearance of the first part of Pope's 'Homer. > Addison de¬ clared that Tickell's version was the best, while Pope professed to believe it the work of Addi¬ son himself and wrote in reply the famous satire on Atticus. But without doubt Tickell made his own translation, which Addison cor¬ rected. Tickell's longest poem is (Kensington Gardens* (1722) ; his most popular, the ballad of 'Colin and Lucy) ; while his finest is the elegy to Addison prefixed to his edition of Addison's .works (1721). Consult Johnson, Samuel, 'Lives of the Pocts> (Oxford 1905).

TICKET-OF-LEAVE, a written license granted by the English government, whereby a penal convict was given his liberty for good behavior before the expiration of his sentence.

It originated in the permit granted to prisoners transferred to the colonies, but it came into do¬ mestic use in England after 1840, when the colonies refused to receive more convicts. Cer¬ tain restrictions were imposed on the recipient, requiring that he report to the police at stated

intervals until his term expired, that he should not make change of address without notifying the police, etc. The system was much abused and it was said that in 1856, 2,666 convicts were thus liberated. The number of crimes committed increased and the necessity for more stringent measures led to the adoption of the mark system, under which only those convicts, sentenced for terms of more than two years and whose marks for good behavior and in¬ dustry showed that they were entitled to it, were granted the license. The effectiveness of such a system is greatly increased by the co¬ operation of many charitable organizations which use every possible means to re-establish the ex-convict and to enable him to lead an honest, industrious life.

TICKNOR, Francis Orrey, American

physician and poet: b. Baldwin County, Ga., 1822; d. near Columbus, Ga., 1874. He studied medicine and engaged in practice near Colum¬ bus. His verse, particularly that concerning the Civil War, was highly popular throughout the South. Several of his poems are in Sted- man's 'Anthology,* and after his death his verses were collected and published with a bio¬ graphical sketch by P. H. Hayne, (Virginians of the Valley, and Other Poems) (1879).

TICKNOR, George, American historian: b. Boston, 1 Aug. 1791 ; d. there, 26 Jan. 1871. He was graduated at Dartmouth in 1807, and was admitted to the bar in 1813, but never adopted the law as an active profession. He lived in Europe 1815-19 for the purpose of pursuing his studies, and on his return was appointed to the Smith professorship of modern languages and literature in Harvard. In 1835 he resigned his professorship, and for the next three years traveled in Europe. On his return he devoted himself to writing a (History of Spanish Literature. *published in 1849, in three volumes,, a corrected and enlarged edition ap¬ pearing in 1863. Its value was at once recog¬ nized by scholars and it was translated into Spanish, French and German. He produced in 1863 a 'Memoir of Prescott,) the historian. He also wrote 'Outline of the Principal Events in the Life of General Lafayette) (1825) ; (Re¬ marks on Changes lately Proposed or Adopted in Harvard University* (1825); 'Remarks on the Life and Writings of Daniel Webster *(1831); 'Lecture on the Best Methods of Teaching the Living Languages* (1832). Con¬ sult Hillard,. George S., and Ticknor, Mrs. Anna and Ticknor, Anna Eliot, 'Life, Letters and Journals of George Ticknor* (2 vols. 1876), critical ed., by Ferris Greenlet (1909).

TICKS AND MITES, small arthropods usually considered to be an order (Acarida) of the class Araclinida (q.v.). They have the regions of the body the most completely coa¬ lesced of any articulated animals, for not only are the head and thorax more or less united to form a cephalothorax, but the latter is contin¬ uous with the abdomen, often without the slightest indication of the line of union, and except in a few cases the abdomen is entirely unsegmented. The mouth-parts usually form a piercing and suctorial proboscis composed of the chehcerae and pedipalpi, the latter being made up in part of a jointed, usually tactile palpus, while the chelicerae may be stiliform and un-

TICKS AND MITES

1 Follicle Mite or "Blackhead" (Demodex homonis) 5 Water Mite (Atax spinipes)

2 Cheese Mite (Tyroglyphus siro) 6 Pigeon Tick (Argas reflexus)

3 Tick (Ixodes reduvius) 7 Itch Mite (Sarcoptes hominis)

4 Scarlet Mites (Trombidium holosericeum) 8 Tick (Ixodes ricinus)

9 A Beetle Mite (Gamasus coleoptratorum) at the left shown enlarged; at the right, devouring a beetle

TICKS AND MITES

jointed or two-jointed and clawed or chelate. Typically the mature forms or imagoes have four pairs of walking legs of from five to eight joints terminated by variously arranged claws, stalked or sessile suckers or pads; but the legs may be variously modified, reduced to mere tubercles, to two pairs or disappear altogether in some parasitic forms. Respiration is ef¬ fected by means of simple or branched tracheae opening by from one to three pairs of stigmatae at the bases of the legs, or by means of a pair of air-sacs opening at the base of the proboscis or on the back or, in the absence of all special respiratory organs, may be purely integumen¬ tary. The alimentary canal is commonly a spa¬ cious sac which may be forked or much branched. In most cases there is no blood- vascular system. The sexes are separated, the generative ducts open on the base of the abdo¬ men, and fertilization is accomplished through copulation. A few are parthenogenetic and sexual dimorphism is frequent. They are ovi¬ parous, ovo-viviparous or viviparous. The larvae frequently differ greatly from the ima¬ goes in appearance and habits and almost al¬ ways have three pairs of legs. After a few molts, usually two, they form nymphs or pupae which also may be very different, and after a single molt metamorphose into the mature form or imago.

Mites and ticks are found in all parts of the world and under every variety of environment. Many are parasitic either temporarily or per¬ manently, and on both animals and plants, a few are commensals in ants' nests, etc., others are predaceous, and seize and suck the juices from weaker animals, some live in decaying vegetable substances, many in damp earth, in moss or under the bark of trees, many are aquatic either in fresh water or the sea, and some of the marine forms descend to great depths. While most of the members of this order have no direct relation to human affairs, many affect our interests in important and manifold ways. Some, like the itch-mites, are the cause of annoying diseases of man and ani¬ mals, some like the cattle ticks are the bearers of disease-producing parasites, some are seri¬ ously destructive to our crops or to manufac¬ tured food-products, etc. ; and many are bene¬ ficial as destroyers of harmful insects and their eggs. Owing to their great powers of repro¬ duction and their tenacity of life, the harmful species are difficult to combat, preparations of sulphur and lime or powerful insecticides ap¬ plied directly to the colonies being the most effective remedies. The number of known spe¬ cies already amounts to thousands, although the smaller mites have been little studied out¬ side of Europe. They vary in size from the microscopic mites to the large cattle ticks about an inch in length. Differing greatly not only in habits and appearance but also in

structure, the Acarida are divided by systematists into numerous families and subfamilies, of which a few representatives may be mentioned.

The Oribatidce is an extensive family of 20 genera and 200 to 300 species of free-living forms with hard skins and robust bodies and usually three pairs of stalked stigmatae and simple tracheae. They are mostly vegetable feeders, never parasitic and with the exception vol. 26 — 39

of a few aquatic forms lives in damp earth under leaves, bark, etc.

The Gamasidce are somewhat similar, with rounded bodies and a hard skin, but have only a single pair of stigmatae at the base of the second pair of legs. The blood system is well developed. They often swarm on the under side of rove-beetles, carrion-beetles and other insects and some are parasitic on bats and birds; 35 genera and perhaps 200 species are already known.

The Ixodidoz are the ticks, large blood-suck¬ ing species, with ovoid bodies and leathery skin capable of great extension. They are temporary parasites of vertebrates, chiefly of birds and mammals. As a rule the eggs are depos¬ ited in the ground; the newly hatched larvse have three pairs of long clawed legs with which they attach themselves to a host, insert the beak and suck the fluids. When ready to slough they may drop off, seek concealment until the skin is changed, when the same maneuver is repeated. After passing the larval and nymphal states the imagoes live among herbage and shrubbery and upon opportunity again attach themselves, but usually in pairs, to some warm-blooded host, inserting the strong beak and drawing blood while copula¬ tion takes place. The fertilized female becomes greatly distended, often to a spherical form, drops off and deposits her eggs, often to the number of 20,000 to 30,000. The large cattle- tick (Boophilus bovis) of the western ranges, now known to be the intermediate host of the parasite of Texas fever and a great scourge to cattle and other animals, is an ex¬ ample. Others are the wood-tick (Ixodes uni- punctata), so common in New England, and certain European species, one a parasite of poultry and introduced into the United States, as the related dove-tick also has been.

The Hydrachnidce are the attractive and familiar water-mites, another large group of 40 genera and about 500 species. The adults, re¬ markable for their sexual dimorphism and bril¬ liant colors, suck the juices of small crustaceans while the young are parasitic on aquatic insects and mussels. The brilliant scarlet eggs of some species are

frequently found attached to aquatic plants and stones in a mass of jelly. A related family containing mostly marine predaceous forms is the Halacaridce. An allied family is the Trombxdiidce , including the scarlet mites and the red spiders so well known to horticultur¬ ists. A very common one is Tetrarhynchus tele- arius, which spins a web on the under side of leaves and is very destructive to plants during hot dry weather. Others cause great damage to orange and lemon groves. The young are parasitic on insects.

The disgusting itch-mites form a family (Sarcoptidce) of short, rounded forms which lack eyes, tracheae and stigmatae altogether. They are microscopic and burrow in the skin of various animals, causing the diseases known as itch and mange, which are very difficult to eradicate but usually yield to persistent applica¬ tions of sulphur washes. No less than 68 genera and 550 species parasitic on mammals, birds and insects have been described. (See Itch). Sheep-scab and mange in various domestic animals are caused by related mites of the genera Psoroptes and Symbiotes. They all

have the feet wonderfully provided with ad¬ hesive organs in the form of hooks, bristles and sucking cups. Closely allied are the Tyrogly- phidfB , comprising perhaps 50 species of minute forms with biting jaws. They are chiefly re¬ markable for their great reproductive capacity and the enormous numbers in which they occur in slowly decomposing vegetable substances, etc. Here belong the cheese-mites (Tyroglyphus siro and T. longior) which are cultivated and sown in certain cheeses in order to give them an ap¬ pearance of maturity and an acid flavor. Manv similar species infest stored grain, dried fruits, etc., and some, like Aleurobius and Rhizogly- phus, destroy living roots, bulbs and grains. Another one abounds in unrefined sugars.

Two strictly parasitic families in which the body has become elongated and worm-like and otherwise degenerate are Demodicidce and Erio- phydida. The former live in the hair follicles and skin glands of man and domesticated ani¬ mals. Demodex folliculorum sometimes causes the ((blackheads)) which appear about the human nose; similar species infest the pig, dog, sheep, ox and other animals. That of the ox some¬ times so perforates the skin that it has little value for leather. In these forms the legs are very small and degenerated and one pair may be lost. The second family is that of the gall- mites which have but two pairs of legs, the posterior being sometimes represented by

bris¬ tles. They form galls in the buds and leaves of plants whose juices they suck. Most of the species are confined to a particular species of plant, so that the 235 which have been described are probably but a small representation ot those actually in existence. Some are parasitic in the galls made by others, recalling the in-quihnes. among the gall flies.

Bibliography. — Trouessart, (Revue sciences naturelles de 1'OuesP (1892); Michael 'British Oribatidse) (London 1883-87) ; <British Tyroglyphidae) (London 1901); Banks, trans¬ actions American Entomological Society, *XXI; Walcott, (Berlin) ; Murray, (Economic Entomologv Aptera* (London).

J. Percy Moore, University of Pennsylvania. TICONDEROGA, ti-kon-de -ro-'ga, N. Y., village, Essex County, on the stream which is the outlet of Lake George, and on the Delaware and Hudson and the Rutland railroads, about 95 miles north by east of Albany, and a short distance from lakes Champlain and George.

In the vicinity are rich deposits of crystalline graphite, the chief source of the supply in the United States. The village is in an agricul¬ tural region. The good water power is utilized to some extent for manufacturing. The chief manufactures are lumber products, wood pulp, paper and dairy products.

The history of Ticonderoga and vicinity be- ' gins with the early settlement of Vermont and noithern New York. In 1755 a fort was built here, by the French. They called it Fort Caril¬

lon, on account of the caroling or chiming of the waters. The value of the site, near the head of Lake Champlain and at the entrance to Lake George which, with a short portage, formed a waterway to the Hudson, was' recognized by both the French and English. Two years after the erection of Fort Carillon it was garrisoned by a force of 9,000 men under Montcalm. Wishing to extend the power secured by so advantageous a position, Mont¬ calm attacked and captured Fort William Henry on Lake George. In July the following year General Abercrombie attempted to capture Fort Carillon, and although he had a force of 15,000 he was unsuccessful; his loss was about 2,000.' In 1759 another and successful effort was made to wrest the fort from the French; General Amherst with a force of 12,000 captured both Carillon and Crown Point. After the be¬ ginning of the Revolutionary War, the whole region bordering on Lake Champlain, Lake George and the Hudson River became a battle ground. On 10 May 1775, a small force of Americans, less than 100 in number and known as ((Green

Mountain Boys, **under Ethan Allen (q.v.), demanded the British commander to surrender «in the name of the Great Tehovah and the Continental Congress !** and thus, despite the fact that Allen held no commission and also that the Continental Congress had not yet convened, captured the tort, then called l iconderoga. Burgoyne's plan of campaign in¬ cluded regaining this fort, and on 30 June 1777 he endeavored to capture the Americans, but failed. On 5 July of the same year, he made another attempt and this time succeeded. Later other engagements took place here and in the vicinity, but the English kept possession until after the surrender of Burgoyne. In 1780 an Lnglish force occupied the fort for a short time At the close of the wars with England the tort ceased to be of importance, and as it was not occupied it soon became a ruin. Near the village stands a part of the gray stone walls of the old fort. Many tourists visit the village each > ear, and it has some note as a summer resort. Pop. 2,918.

TICONDEROGA, Expedition Against, an

incident in the American Revolutionary War bee Allen, Ethan; Ticonderoga.

p TICPOLONGA, the name in Ceylon of Russell s viper (Daboia russellii) common in the south of India, Ceylon and Burma. See Russell s Viper.

oyaaxiiuim. contractions of muscles especially those which occur in the muscles of t ie face. Such affections are characterized bv painful muscular twitching. The term tic as referring to facial spasm, is especially applied to tic-douloureux. See Facial Neuralgia.

TICUNA, te-koo'na, or TUCUNA, too-

koona, a tribe of aboriginal Indians found in t ie forests of Brazil and Peru, around the con¬ fluence of the Javary and Maranon or Upper Amazon. They are of slender but good phv- sique, have dark skins, and live in a state of nature, their sole adornments being feather armlets and monkey teeth necklets. Thev live by fishing and hunting, and are distinguished for their honesty and straightforward dealings.

heir birth, death and other ceremonials and customs are interesting. Earlv in the 18th cen-

tury the Jesuits established missions among these people. Consult Chamberlain, A. F., in Journal de la Societe des Americanistes de Paris) (Vol. VII, Paris 1910).

TIDE-MILL, a water-mill so constructed as to utilize the action of the tide. This is usually accomplished by one of two methods. The first consists of shutting off the water in a reservoir at flood tide, its escape through a race-way giving the motion to the mill. In such tide-mills the return of the tide through the sluice may also be utilized. The other and less expensive method involves the placing of a horizontal wheel in the water to be turned by the current either in ebb or flow. The motion of this mill is not uniform; it attains its great¬ est velocity at half tide and is suspended en¬ tirely at the turn of the tide; but with excep¬ tion of this suspension a uniform velocity can be obtained through the use of regulative machinery. The old London tide-mills, in use in the river Thames, were built on a platform which was entirely afloat, water-wheel, mill- room and all. Tide-mills have never attained any great success owing to the inconvenience of so irregular a motive power. But in recently projected mills an attempt is made to obviate this difficulty by the use of an ingeniously con¬ structed tidal-motor.

TIDEMAND, Adolph, Norwegian painter: b. Mandal, 1814; d. Christiania, 1876. He studied at Copenhagen and at Diisseldorf under Schadow, afterward going to Munich and Rome. Among his works are the large histori¬ cal compositions (Gustavus Vasa Addressing the Dalecarlians) and (Devotional Meeting of the Haugainer, *and many genre subjects, such as the cycle of 10 pictures illustrating Nor¬ wegian Peasant Life) ; Grandmother's Bridal Crown,* and (The Wolf Hunter's Tale.* He was for many years painter to the king.

TIDES. 1. Introductory. — Persons living along the seashore are familiar with a semi¬ daily rising and falling of the waters, which, although generally amounting to only a few feet, often suffices to cover and bare by turns wide stretches of the sea-shore. Without tide tables, or any knowledge of the moon's posi¬ tion, the approximate time of the tide can be foretold from its observed time of occurrence on a previous day, by allowing 50 minutes for its daily retardation. Toward and after the time of Caesar, the Romans were well acquainted with ocean tides as the writings of Caesar, Sen¬ eca, Pliny the Elder, Claudianus, and others clearly show. By referring the tides to the attraction of the moon and sun, Newton took the first important step in their explanation. Since his time important investigations of the laws of the tides have been made by Laplace, Airy, Kelvin, G. H. Darwin, H. Poincare and many others.

1. Definitions, etc. — The tide is the periodic rising and falling of oceanic and other large bodies of water, due mainly to the attraction of the moon and sun as the earth rotates upon its axis. Remarkable stages of the water level at a given place, whether due to earthquakes, gales or other causes which probably have no definite law of recurrence, although popularly known as ((tidal waves,® cannot be regarded as belonging to tidal phenomena. The rising and falling is accompanied by, and depends upon,

lateral or horizontal movements of the waters called tidal currents or tidal streams or the flow and ebb. Their periodic character distinguishes them from ordinary ocean currents. The tide rises until it reaches a maximum height called high water and then falls until it reaches a minimum height called low water. The differ¬ ence in height between a high and a low water is called a range of tide. At most, ports two high waters and two low waters occur each lunar day. The average length of a lunar day is 24 hours 50 minutes 28 seconds. The inter¬ val of time between the transit of the moon across the meridian and the occurrence of high or low water is called a lunitidal interval. The average value of the high-water lunitidal inter¬ val at any seaport is sometimes called the cor¬ rected establishment to distinguish it from the high-water lunitidal interval on the days of new and full moon, which is known as the es¬ tablishment, or the vulgar establishment, of the port.

At the times of new and full moon the tidal forces of the moon and sun act in the same direction, whereas at first and last quarters they oppose each other. When they unite their forces we have spring tides, characterized by large ranges of the tide ; when they are opposed, neap tides, having small ranges. The spring and neap tides usually occur soon after the cor¬ responding phases of the moon. The interval is called the retard or age of the tide, or age of the phase inequality, and is usually less than 60 hours. The lunitidal intervals have their mean values at the times of spring and neap tides; the tides occur a fraction of an hour earlier between spring and neap tides, and later between neap and springs. Other things being equal, the range of tide is greater than usual by about one-sixth part when the moon is near perigee and about as much less than usual when near apogee. An increase or de¬ crease of about one-tenth part of the range oc¬ curs when the moon is near the equator or near its point of extreme declination, respectively.

Diurnal inequalities among the four tides of a day are due to the presence of a diurnal wave or partial tide, whose period is approxi¬

mately 24 hours. The cause of this wave lies in the fact that if the moon is north or south of the equator, its tidal forces are somewhat different both in magnitude and in direction when two times half a lunar day apart are compared.

1. The Tidal Forces. — All particles of the earth (the seas included) will continue to oc¬ cupy positions fixed relatively to one another if no other forces are impressed upon them than the following: The earth's attraction; its centrifugal force of axial rotation ; and a force acting upon all of its particles alike, for exam¬ ple, the centrifugal force due to the revolution of the earth about the centre of gravity of earth and moon. If an extraneous force does not act upon all particles alike, then motions will be set up in the yielding parts. The at¬ traction of the moon upon a given particle (near the surface, say) is along a line drawn (at any given instant) from the particle to the moon's centre; its intensity, which is inversely proportional to the square of the distance, and its local direction (that is, direction with re¬ spect to the earth's surface) continually change

as the earth rotates upon its axis. The attrac¬ tion of the moon upon a particle at the earth's centre (or upon the earth as a whole) is along a line drawn from the earth's centre to that of the moon; it is independent of the earth's axial rotation. Because the action of the moon upon the surface particle differs from its action upon the particle at the earth's centre there re¬ sults a tendency to produce motion relatively to the earth's centre. A consideration of this tendency will enable us to answer the question why there should be two high waters each lunar day, instead of only one high water. In a sin¬ gle sentence, the reason is that the moon at¬ tracts the waters on the hemisphere facing the moon more powerfully than it does the earth; but attracts the earth in general more power¬ fully than it does the waters on the far¬ ther side *of the earth. The difference be¬ tween the action of the moon at any point of the ocean and its action on the centre of the earth is the tide-producing force at the specified point. It is not difficult to show that, to higher powers of the small quantity a/r, the vertical and horizontal components of the moon's tide-producing force are very nearly

£ r 3 £ cos 0 — 1) and y -g— g sin 2 0 respec¬ tively, where M denotes the mass of the moon, E that of the earth, g the force of

gravity, a the mean radius of the earth, r the

distance between centres of earth and moon, and 0 the zenith distance of the moon cor¬ rected for parallax. The numerical value of M a3 .

g- when r has its mean value, is

0.000000056; and so the vertical force has a range of 0.000000168(7, as has also the horizon¬ tal force. The solar tidal force is 46 per cent that of the lunar. The tides are mainly due to the horizontal component of the forces. These are the forces which deflect a plumb line, although by an amount so small that it can hardly be measured. The deviation, in case of the moon, amounts to only 0."017 either way from the mean vertical. For a sufficiently deep body of water extending 163 nautical miles along the equator the range of tide at either end will be one inch.

The system of arrows in Figs. 1, 2, 3 are intended to represent the horizontal component of the moon s tide-producing force at various

places on the earth's surface. The arrows lo¬ cated upon the same small circle are supposed to be of equal length, and all arrows are sup¬ posed to lie in a system of great circles which meet in a point directly under the moon and, of course, in the antipodal point. At these two points and along a great circle midway between them the length of the arrows is zero ; in other words, the force vanishes. The system of ar¬

rows is fixed with respect to the moon, and so sweeps over the surface of the earth as- the moon performs her apparent daily revolution. The system shifts somewhat when the moon is north or south of the equator. At any point P on the earth s surface, the moon being upon the equator, the horizontal forces are equal in

magnitude and direction to the horizontal forces at P', a point upon the same parallel of latitude as P, but 180° distant in longitude; or, what amounts to the same thing, they repeat them¬ selves at any given point P every half lunar day, or 12h. 25m. 14s. on an average. But when the moon is not upon the equator, the forces are generally not the same at P and P\ either in magnitude or in direction, and so do not ex¬ actly repeat themselves every half lunar day. This alternation of the forces gives rise to a diurnal inequality in the tides. It will be no¬ ticed that for places situated upon either side of the equator, the forces have, when the moon is upon the equator, a meridional component directed from the poles toward the equator,

and

that this component nowhere points from the equator toward the poles; consequently the ex¬ istence of the moon causes the water (half-tide level) at the equator to be higher than it would otherwise have been. The moon's movement in declination, therefore, causes a fortnightly fluc¬ tuation in half-tide level. Similarly the sun produces a semi-annual fluctuation.

1. Real Equilibrium Tides.— If in the case of any body of water, its free period be several times smaller than the period of the tidal forces, say less than three or four hours, the surface will at every instant be normal to the plumb line as disturbed by these forces. In particular, consider the mean lunar semi-diurnal tide of a deep lake situated in north latitude. Upon referring to Fig. 4 it may be inferred that high water will occur at a point south of the no-tide point when the moon is on meridian; at a point west of the no-tide point at 3 o'clock, lunar time; at a point north of it, at 6 o'clock; at a point east of it, at 9 o'clock. The no-tide point is the centre of gravity of the surface. This theory nearly explains the tides found in Lake Superior and the semi-diurnal tide in the eastern portion of the Mediterranean Sea; it partially explains the semi-diurnal tides in the Gulf of Mexico and the Caribbean Sea, and the diurnal tides in the Atlantic Ocean east of the United States.

2. Hypothetical Equilibrium Tides.— If a

spherical body like the earth were entirely cov¬ ered by an ocean so deep that its free period of oscillation would be several times smaller than the period of the tidal forces, the tidal forces of the moon would cause the surface of the ocean to assume the form of an ellipsoid of revolution with the longer axis pointing to¬ ward the moon's centre. For any zenith dis¬ tance d of the moon the height of the tide above the undisturbed spherical surface becomes 1 M a3 a .

l~Er* f— £ / <5e COS ° ~ where a de_

notes the density of the water and de that of the earth. The numerical value of

M CL *

jj - '3 is 1.17 feet. The corresponding value for

the sun is 0.54 foot. If the o / de = 0, the range of the hypothetical lunar tide becomes 1.8 feet; if ff / fie= 1, the range becomes 4.4 feet. In case of the earth o / de = TaT.

The hypothetical tide just described can be easily calculated for any time and place and is known as the uncorrected equilibrium tide. It bears no resemblance to the actual tide of our oceans.

1. Some Dynamical Questions Involved in the Subject. — Because the requirements for equilibrium tides are seldom found in the oceans, their waters must be treated as aggre¬ gates of heavy particles performing some kind of oscillatory motion. A progressive free wave in a canal has as its velocity of propagation

\/g h and for the maximum velocity of the

water particles A Vf- where h denotes the

undisturbed depth of the water and A the am¬ plitude of the vertical movement. The longest or fundamental period of free oscillation of a rectangular area or sheet of water is

. twice length of sheet period = - j= - *

Sheets tapered or sharpened at the ends oscil¬ late more rapidly than do rectangular ones of the same length, while sheets narrowed at the middle or broadened at the ends oscillate less rapidly. The free oscillations of a given body of water can often be approximately deter¬ mined by comparing with a more simple body whose motion is known. The given body need not have a strictly uniform depth nor be com¬ pletely surrounded by land.

The general equations of motion for matter upon a rotating sphere show that a moving par¬ ticle of unit mass is deflected or accelerated relatively to the earth's surface, toward the right in north latitude, toward the left in south latitude, as if by a force whose numerical value is velocity X0.0001458 sin (latitude), the veloc¬ ity being expressed in feet per second and the force in poundals (Ferrel's law). This divided by g or 32.1722 gives the transverse slope which a river, or strait through which there is a cur¬ rent, will assume on account of the deflecting force of the earth's rotation.

1. Hypothetical Dynamical Tides. — The

case of an equatorial canal encircling the earth is simple and instructive, although bearing no resemblance to any existing tidal body. If the depth of the water be greater than 67,000 feet, high water will occur when the moon is on meridian (above or below the horizon) ; if less than 67,000 feet, low water will occur when the moon is on meridian. For the depth 67,000 feet the range of tide will become very large. If this depth be greatly increased, the range will approach its equilibrium value, which is 1.8 feet for the lunar tide; if this depth be greatly di¬ minished, the range will approach the value 0.000,026 h, h denoting the depth. In the latter case the amplitude of the horizontal displace¬ ment will be 137 feet. For the depth of 10,000 feet the range of tide is 0.31 foot and the am¬ plitude of the horizontal displacement 161 feet; for the depth of 20,000 feet the corresponding quantities are 0.74 foot and 196 feet, respec¬ tively. If friction proportional to the velocity be introduced, the effect will be to displace the crests of the lunar and solar wave with refer¬ ence to the mopn and sun, but by unequal amounts. To this has been attributed the age of the tide. *

1. Partial Explanation of Ocean Tides. —

From §§ 3, 4 an idea of the magnitude of the equilibrium tide can be obtained. It represents the direct effect of the action of the moon upon the waters where the body is so small and deep that its motion can be ignored. In a larger body whose free period is quite different from that of the tidal forces it is reasonable to sup¬ pose that tides even smaller, than the equilib¬ rium tides will be raised. In § 7 this was found to be the case for an equatorial canal of mod¬ erate depth encircling the earth. Again, if a canal, bounded at each end, be so shallow that a wave-length (A) extends through only a few degrees of a great circle, then even if its length approximates to A the tides are obviously small because the tidal forces act very nearly alike on both halves, while the particles move in opposite directions in the two halves. Re¬ sults like these contrasted with those obtained from observing the tides of the oceans lead to the belief that, as a rule, the ocean tides as we know them are so great that they can be pro-

duced only by successive actions of the tidal forces upon oscillating systems each having, as free period, approximately the period of the forces, and each perfect enough to preserve the general character of its motion during sev-

90' ft

to" ft

TO' *

6 < r h

fO’ft

: 40' ft

JO' ft

to' ft

./O’ At

eat/Are > r

V \ W'

\V\7 >

\ \ jr i \ 1

1

^ •

•

/ TV 1

/ / /\ •

/ / '

/y/ V

m

Fig. 4. — Semi-diurnal and Diurnal Tidal Forces.

eral such periods were the forces to cease their action.

That oscillations according to one of the free periods may persist for a long time can be

seen in the case of some seiches; for, although probably started by a meteorological disturb¬ ance and sustained by no periodic force, yet in some harbors, straits, or bays they execute a large number of oscillations before dying out, and their periods are fairly constant in such cases. If a suitable harbor can continue to oscillate for possibly a day or two because of the inertia of the water, it is clear that an oscil¬ lation can be sustained in a large body, like a portion of one of the oceans, by a very small periodic force provided that the free period of the body is nearly equal to the period of the forces and that the boundaries are such that no great amount of energy is carried away by progressive waves or otherwise.

Suppose the oceans by reason of their depths and the configuration of shore lines to contain several such systems whose free periods are nearly the periods of the tidal forces. These systems generally consist of still more simple sheets having like periods and which may be styled ˆareas.® The times of tide can be found by means of the following rule :

If to the particles of water in a given oscil¬ lating system, each area of uniform depth, and wherein the resistances are proportional to the velocities of the particles, a series of simple harmonic forces having for period the free period of the body of water be applied, and a permanent state established, then must the time of elongation be simultaneous with the time when the virtual work of the external periodic forces upon the system becomes zero.

The forces in various parts of the system and at various times or hours are those of Fig. 4. projected upon the lines of motion of the par¬ ticles. The virtual displacements are the same at each assumed hour, but differ in different parts of the system.

1. Cotidal Lines. — Although the cotidal lines in the ocean are generally real and distinct, they seldom indicate the progression of a wave at the rate due to depth ; such progressions, how¬ ever, exist in many shallow arms of the sea, particularly in tidal rivers. Because the prin¬ cipal ocean tides are due chieflv to stationary oscillations, as has just been pointed out, we may expect to find extensive regions character¬ ized throughout by nearly simultaneous tides. For that portion of the Atlantic Coast of America extending from Rhode Island to the Bahamas and Haiti, high water occurs almost simultaneously. The same is true for south¬ eastern Alaska and the Gulf of Alaska; for the Pacific Coast of Central America, and for the eastern coast of the Philippines. The time of tide changes but little along the Atlantic Coast of Morocco and Portugal. In localities like these the rise and fall amounts to several feet even off shore and in deep water.

The Arctic Ocean is characterized by pro¬ gressive tides of small range derived from the Atlantic Ocean.

In the oceans, in certain arms of the sea, and in certain lakes are to be found a con¬ siderable number of no-tide points due to vari¬ ous causes. From a point of this kind radiate all cotidal lines belonging to a tidal period; and so these lines, or the tide which they repre¬ sent, are there said to be ˆamphidromic.®

Excluding lakes and seas not communicating tidally with the ocean, and considering only the

semi-daily tides, about 25 no-tide points can be enumerated; a large percentage of these are to be round in gtraits and sounds.

A lake whose longest free period of oscilla¬ tion is several times less than the period of the tidal forces will experience equilibrium tides and possess a no-tide point situated at the centre of gravity of the surface of the lake. Ihe sequence of the cotidal lines about the point

vail be the same as that of the tidal forces. (Pig. 4). For semi-daily tides the numbers will increase in the clockwise or counter-clockwise sense according as the point lies in north or south latitude.

In a strait or sound a nodal line is re¬ duced to a no-tide point through the deflecting force described in § 6; around such a point the sequence of the tide is the reverse of that of the forces. If a no-tide point is due to the overlapping of two systems, the sequence de¬ pends upon the tidal hours of the systems.

1. Peculiarities of Tides.— The distance be- tween the Antarctic Continent and Australia be- mg more nearly equal to the half length of a solar wave than of a lunar, causes the solar wave to be comparatively large along the south¬ ern coast of Australia. The same is true, but in a lesser degree, for the region between the Antarctic Continent and South Africa. The distance from the Antarctic Continent to the Atlantic Coast of the United States being a lit¬ tle more than one and one-half lunar wave¬ lengths causes the ratio of the solar to the lunar wave to be comparatively small along this coast. If the ocean oscillate differently for different constituents, we can readily see rea¬ sons for considerable differences of epoch and so for remarkable “ages® of the tides.

If a tidal river be so shallow that the range of tide is a considerable fraction of the depth, ordinary wave-like oscillations of the water are no longer possible. The result is that as the wave progresses, the duration of the rise will be shortened and that of the fall lengthened. An extreme case results in a phenomenon called a bore — an advancing wall of water, which may be several feet in height, flowing up the bed of a river. A bore (q.v.) occurs in the Petitco- diac River, an affluent of the Bay of Fundy, its height at Moncton being three or four feet. Bores occur in several of the rivers of India, in several of western Europe, in the Amazon River, in the Tsien-tang Kiang and in Turn-again Arm, Alaska. Various other peculiarities in the shape of the wave are due to the shal¬ lowness of the water. A much contracted en¬ trance to a bay not only reduces the range within, but alters the shape of the wave.

On the other hand, the range may increase as the tide passes up a funnel-shaped bay or estuary, and especially may this be the case when the bay has a large stationary oscillation related to the waters outside. The Bay of Fundy has at its head a spring range of nearly 50 feet, which fact depends upon both of these circumstances. But the large tides in Bristol Channel, England, and in Bristol Bay, Alaska, are

due chiefly to the contracting and shoaling of these bodies.

As a rule strong tidal currents occur in straits, tidal rivers, over shoals, and off capes.

Along the open coast and in the ocean at large, tidal currents generally set successively

in all directions, the motion being elliptically harmonic or nearly so. This horizontal motion having two degrees of freedom is much harder to specify than is the tide, or motion defined ˆ the rise and fall of the surface. Points at which the velocity ellipses or hydographs be¬ come circles may be styled ((circular points. ®

1. Tides in the Earth's Crust. — By these are meant the rise and fall experienced by the surface of the apparently solid earth due primarily to the tide-producing forces of the moon and sun acting upon the earth's crust and all matter within.

With the exception of § 5, we have made n° of the attraction of the tidally dis¬

turbed waters upon themselves because the density of water is only 2/11 that of the "solid® earth, and the depth of the ocean is but a small fraction of the earth's radius. In the produc¬ tion of body tides not only is the direct disturb¬ ing action of the tidal forces involved, but also the attraction of the matter, however, disturbed upon itself.

Let ag denote the rise and fall of the oceans surface as measured from the earth's centre and expressed in terms of the earth's radius, ae the rise and fall of the surface of the "solid® earth similarly measured; then the actually observed rise and fall of the waters surface relatively to the land is ag — ae — m. The value of ae is required. From theoretical considerations of the direct and indirect effect of the tidal forces,

, W 1— kcke

where a denotes the range of the equilibrium tide in an ocean of small density covering the earth, due to the direct action of the tidal forces; ke and kc are two moduli depending respectively upon the elasticity and internal constitution of the earth; kea denotes the range of the deformation in the surface of the "solid® earth due to the direct action of the tidal forces.

Assuming that the day has not altered in length since the earth was in

a fluid state, or when ke = 1, we have observed ellipticity of

meridian =— ellipticity due directly to

diurnal rotation. That is,

1 1 1

297 l—kc *578' whence kc — 0.486.1

The value of ke can be determined by com¬ paring the observed period of the movement of the axis of figure about the axis of rotation with the period of free precession (or 305 sidereal davs) obtained upon the assumption of a rigid earth.

Another determination of ke is obtained by comparing the observed range of the monthly or fortnightly tide with the equilibrium range due to the direct action of the tidal forces. This ratio or m/a is found to be about 2/z Daily or semi-dailv tides in a deep lake or in a buried pipe also give a determination of m/a. The actual deviation of the vertical from its mean position, due to the daily or semi-daily tidal forces, and obtained by means of a hori¬ zontal . pendulum, gives, upon comparison with the direct theoretical deviation, another de¬ termination of the ratio m/a. If kc be taken as 0.5, and m as 2/3, then by the above equation.

ke =0.5 and aeˆYz a; that is, the actual rise and fall of the surface of the ˆsolid" earth is about Yz of the rise and fall of the surface of an ocean of small density surrounding a rigid sphere. If the latter be 1.8 feet (§ 5), the former will be about 1.2 feet. [This mode of treatment is due to Ch. Lallemand.]

1. Observation of Tides.— The height of the tide, or water surface, at any given time can be directly observed upon a graduated fixed staff if the water be tolerably smooth. A long box fixed in a vertical position, having a small opening near the lower end, and usually sup¬ plied with a float, enables one to observe during stormy weather as well. In some instances only the times and heights of the high and low waters are observed and recorded. But a more satisfactory record is obtained by reading the gauge at regular intervals one hour or one-half hour apart.

Automatic or self-registering gauges are usually constructed for drawing a continuous curve. Such a gauge consists of a float and box, a time-piece, and some form of recording apparatus. The record from an automatic gauge can be procured with comparatively little trouble; it shows clearly the peculiarities of the tide; and it furnishes material for a thorough analysis or discussion.

The velocities and directions of tidal streams are usually ascertained by aid of a float and line or some form of current-metre. Such observa¬ tions are attended with considerable difficulty because they must generally be made at some distance off shore.

1. Analysis of Observations. — If only the

high and low waters are to be treated, they are first referred to the moon's transit for obtain¬ ing lunitidal intervals. The ranges of tide are found at the same time. The intervals and the heights or the. ranges are next classified accord¬ ing to certain astronomical arguments for the purpose of bringing out the corresponding tidal inequalities.

. The harmonic analysis rests upon Laplace's principle of forced oscillations, namely:

The state of any system of bodies, in which the primitive conditions of the motion have dis¬ appeared through the resistances zvliich the mo¬ tion encounters, is coperiodic with the forces acting on the system.

Here is the clue to what oscillations ought to be found in the tidal wave; for, there ought to be an oscillation corresponding to each term of the causes producing the tide. Such terms follow from the development of the tide pro¬ ducing potentials of the moon and sun. Their arguments and ˆspeeds" involve simple com¬ binations of the mean longitudes and mean mo¬ tions of the local meridian projected on the celestial sphere, the moon, the sun, the equinox, the lunar perigee, the solar perigee, and the moon's node. There are. three principal classes of terms : semi-diurnal, diurnal and long-period.

If for a sufficiently long time the observation curve be read and summed with reference to any constituent or component defined by its ˆs.peed," the effects of the other components will gradually disappear and the final sums will pertain. only to the one sought (including, of course, it.s harmonics). To avoid reading

u6 Cl!rvie .wˆ reference to each component, the tabulation according

to mean solar time is

made to serve for all. This is done by dis¬ tributing the (solar) hourly heights among tne component hours as nearly as possible. Tables showing the proper distribution of houily heights as well as blank forms into which the heights are to be copied have been used quite extensively. For about 30 years perforated sheets, known as stencils, have been used for pointing out which hourly heights of the tabula¬ tion go with the various hours of the com¬ ponent sought. These enable one to dispense with the labor involved in copying into the various forms. Some years ago a set of mov¬ able scales or strips was devised upon which the hourly heights are copied once for all sum¬ mations. Several machines have been devised or constructed for facilitating the work of analysis, but they have not vet come into actual use.

Through the 24 partial sums or means finally obtained for a given component (and its har¬ monics) imagine a curve to be drawn. It may be represented by a Fourier series whose coef¬ ficients and initial phases can be found without difficulty. Then by taking the initial phases from the proper astronomical arguments for that time, the required epochs will be obtained.

. 14. Prediction of Tides.— At most ports the time of tide can be roughly predicted by adding to the time of the moon's transit, upper or lower, the average value of the lunitidal inter¬ val or ˆestablishment" for the port. Where the diurnal wave is not large, the height of high water above mean sea-level is roughly equal to half of the mean range of tide; the low water is as much below this plane or datum.

Where great refinement is desired, the proc¬ ess just referred to involves much labor, and can best be carried out after a tolerably com¬ plete harmonic analysis has been made. This done we have only to add together a series of cosine terms for obtaining the height of the surface of the sea at any given time. But the number of these terms is so great that such a computation would soon become laborious, since it must be made for many assumed times in each day s predictions. Several predicting in¬ struments have been designed or constructed. Generally speaking, the object of such an in¬ strument or machine is to produce simple har¬ monic motions of suitable periods, phase and amplitude and to combine the results into one compound wave, or perhaps into two com¬ pound waves. The simplest form may be described thus: Upon one or more shafts, driven by hand or by clockwork, are fixed a number of wheels which mesh into other

wheels, causing the latter (or wheels moved by them) to revolve with angular velocities hav- 1T^g given ratios to the angular velocities of the shafts. These ratios are taken, as nearly as possible, proportional to the speeds of particular tidal components. Rigidly connected to these wheels are cranks carrying pulleys, or pins working in slots and which impart to vertical rods carrying pulleys rectilineal harmonic mo¬ tions. At one end of the machine a chain or flexible wire is made fast; thence it is laid alter¬ nately over and under the pulleys. Near the other, end of the chain or wire is attached a marking, point which, when moved transversely to the line of motion of the paper roll, traces the tidal curve. It is evident that the machine continually sums a series of cosine terms.

• J/ the instrument include a set of cranks at

KMhe^vmlf n°l|thoSe 8iV'ng the tide Curve' *°-

Srp th» h ? levs aniJ a summation chain or kin!! ’fu mo,vemen‘ of a point on the chain place,of the tracing point) across a

lew*! -U t ,'na'k,: corresponding to mean sea- Ie\el, will show the time when a high or low water occurs.

The original and simplest form of instru- en is that due to Kelvin. The one designed py 'errel is somewhat complicated, inasmuch as it separates out the principal lunar component it was used in the office of the United States Coast and Geodetic Survey for about 30 years. Its chief advantage consists in indicating upon hs face the times and heights of the tides. The office has recently completed and put in opera- tion a machine which besides tracing a curve, as does Kelvin’s indicates upon its face the times and heights of the tides,— the times be¬ coming known through the additional mechan¬ ism just described.

Bibliography. — Newton, (Principia > (Bk. I Prop. 66; Bk. Ill, Props. 24, 36 and 67) ; La¬ place, (Bks. IV ?Anu XI,lIa) ; Sir J°hn W- Lubbock, Rev. Wm.

Whewell, and others

in the Philosophical

Transactions' (1830 et seq.) ; Airy, ˆTide's ‘and Waves } (Enc. Met.) ; Thomson and Tait (Nat- ural Philosophy > (2d ed., §§ 804-848 and Appen¬ dix B) ; Ferrel, (Tidal Researches) (United State Coast Survey); Lamb, (Hydrodynamics • *; Darwin, (The Tides and Kindred Phenomena in the Solar System > ; Scientific Papers® ; Maurice Levy, ; H. Poincare (Legons de Mecanique Celeste* ; United States Coast and Geodetic Survey Reports • Ap¬ pendixes by A. D. Bache, Chas. A. Schott, Henry Mitchell, Wm. Ferrel, R. A. Harris and others.

Annual. Tide Tables issued by the govern¬ ments of Great Britain, France, Germany, the United States and other countries.

Rollin' A. Harris, Author of (Manual of Tides 2

TIDEWATER, arms of the sea, bays, creeks and rivers where the tide ebbs and flows are public, and all persons may use the same for the purpose of navigation and fishing, un¬ less restrained by law ; in such waters the tide must actually ebb and flow. It is the rise and fall of the water, and not the proportion of salt water to fresh that determines whether or not the particular portion of a stream is within tide¬ water ; the same determination applies to small streams as well as large ones. Open sea is the property of all nations; the rights and privileges therein, if any, being restricted to a specified distance from the shore — generally three miles. In the United States the titles to tidewaters and lands are vested in the States abutting thereon, or of its citizens, but are subject, however, to the constitutional rights of the United States. The Congress of the United States, under its power to regulate commerce, has the control of all navigable waters, and for such purposes they arc the public property of the nation and subject to legislation; the test of navigability being whether or no the waters form a con¬ tinued highway over which commerce may be carried on.

At various bathing beaches where the ocean frontage has become very valuable, private

paities and owners of bathing pavilions often occupy the region between high and low water, and shut out or try to shut the public there¬ from. This they have no right to do. Neither has any. municipality a right to construct a bridge over a tidewater stream so as to ob- struct navigation, which is the right of the public. The mariner also has the right to land wherever the shore connects with a public highway. Owners of land or a tidal shore have a right to build a pier or wharf for convenience m landing and embarking, but they must allow passage along the tide line, and must not block navigation. The right of fishing in tidal waters

Cnnn˚u • .st˚PPˆ by any adjacent landowner, though, it is subject to local enactment for the protection of fish. Oyster beds often lie in tidal waters, and have been the subject of much dispute. See Riparian Rights.

TIECK, Johann Ludwig, German drama¬ tist and novelist of the Romantic School, known also under the pseudonyms, Peter Lebrecht and Gottlieb Farber: b. Berlin 31 May 1773; d. Berlin, 28 April 1853. He was of lowly origin, his father being a poor ropemaker. Prom 1782 to 1792 he attended the Friedrichs- werder Gymnasium in his native city, coming under the influence of teachers with literary inclinations (Rambach, A. F. Bernhardi), and beginning a friendship with Wackenroder that was to last until the latter's death. His wish to become an actor was denied by his parents, and he was obliged to go to the Uni- versity of Halle (1792) to study theology and an,ˆ t0 the University of Gottingen (1/92-95), where he took up modern philology and literature. In 1797 he wrote cheap stories for the apostle of enlightenment at Berlin, Nico¬ lai, and, during a short stay in Hamburg, made the acquaintance of Klopstock and Schroder, and became engaged to Miss Alberti (d. 1837)' whom he married the following year. He be¬ came thoroughly well acquainted with all the members of the early romantic school in Ger¬ many, in 1798-1800, while living in the univer¬ sity town of Jena (the two Schlegels, Novalis. LLhte, Brentano, Gries), as well as with Goethe and Schiller, who were living at Weimar, a short walk from Jena. For 15 years, begin¬ ning 1802, Tieck and his wife lived, with few interruptions, on the Ziebingen estate (near Frankfort on the Oder) of his intimate friend, Wilhelm von Burgsdorff (really the property of the latter's uncle, Count Finkenstein). He traveled in Italy (1804-06) with his sister Sofie 0755-1833), who had married Bernhardi, and in various libraries on this journey he became acquainted with important manuscripts of me¬ diaeval German poems ONibelungenliedP (Konig Rother, > etc.). In 1819 he settled in Dresden, where he became (1825) manager of the Court Theatre, with the title of Hofrat. The last years of his life were spent chiefly at Berlin, to which city he was called (1840) by King Fred¬ erick William IV of Prussia, who greatly ad¬ mired his work, and who granted him an annual pension of 3,000 thalers. Together with Fried¬ rich Schlegel (q.v.) and August Wilhelm Schlegel (q.v.), Tieck was the founder of the Romantic School in Germany, and while he was not the most profound or original writer of this movement, he certainly was its most versatile member. His connection with C. A. Nicolai

did not last long, and Tieck's first independent venture in literature was the romance of wild adventure, (William Lovell5 (Berlin 1795-96), an imitation of Restif de la Bretonne (q.v.). In 1797, in his (Volksmarchen,5 appeared the satir¬ ical comedy (Der gestiefelte Kater5 (((Puss in Boots®), an outrageous and ingenious burlesque on the taste of the Berlin public in dramatic literature, which is not unlike some of the comedies of George Bernard Shaw. But Tieck's romantic productions begin with his collabora¬ tion with Wackenroder on the (Herzensergies- sungen eines kunstliebenden Klosterbruders) (1797) and (Franz Sternbalds Wanderungen) (1799), romances of artistic journeys through Germany, which first opened the eyes of Ger¬ mans to the beauties of the architecture and the spirit of the Middle Ages; also (Phantasien fiber die Kunst) (Hamburg 1799), in which the same views are expressed in the form of criti¬ cism. His art demands are best embodied in a number of plays appearing from 1799 to 1804 ((Prinz Zerbino,5 <Der blonde Eckbert,5 (Geno- vevap Raiser Octavianus)), in which Tieck consciously pursues a tendency new in literature, namely, the emohasis on feel¬ ing, longing and mood, and the attempt to bring about a different attitude toward art as well as toward the past (particularly the Middle Ages). Tieck had considerable literary scholarship, aside from his productive work, and he was the editor of a number of old German poems and the translator of (Berlin 1812-16) ; his poems (Dresden 1821-23) ; and his short stories (novellen) , whose literary influence is by no means limited to their own day. The best of the latter are (1835), and (Des Lebens Ueberfluss5 (1839). He was less successful in his long two-volume novel, <Vittoria Accorom- bona5 (Breslau 1840). For editions of his works consult Novellen5 (7 vols., Berlin 1823- 28) ; (Gesammelte Novellen5 (14 vols., Berlin 1835-42) ; (Ausgewahlte Werke5 (Stuttgart 1886-88) ; (Ausgewahlte Werke,5 with biogra¬ phy, by Witkowski (Stuttgart 1903) ; <Tiecks Werke, Auswahl5 (6 vols., Berlin 1908) ; Tieck's correspondence with various persons (Raumer, Solger, Bernhardi) has also been published in separate editions. Translations of (Puss in Boots,5 <Fair Eckbert,5 and (The Elves5 are given in (German Classics5 (Vol. IV, New York 1913). Consult also Kopke, Rudolf, (Ludwig Tieck5 (2 vols., Leipzig 1855) ; Hoffmann, J. L., <Ludwig Tieck5 (Nfirnberg 1856) ; Kaiser, Oskar, <Der Dual- ismus liecks als Dramatiker und Dramaturg5 (Leipzig 1885) ; Fischer, L. H., (Aus Berlins Vergangenheit5 (Berlin 1891); Danton, H. G., (The Nature Sense in the Poetry of Ludwig Tieck5 (New York 1906) ; Marchard, L., Res deux sources du Sternbald5 (in Revue ger- manique, Vol. II, p. 522) ; Hemmer, H., (Die Anfange Ludwig Tiecks5

(Strassburg 1908).

Jacob Wittmer Hartmann. TIED ISLANDS. See Shore Line.

TIEDEMANN, te'de-man, Christopher Gustavus, American legal writer: b. Charles¬ ton, S. C., 16 July 1857; d. Buffalo, N. Y., 25 Aug. 1903. He was graduated from the Col¬ lege of Charleston in 1876 and from Columbia Law School in 1879 and was professor of law for 10 years in the University of Missouri and six in New York Universit}ˆ. From May 1902 he had been dean of the Buffalo Law School. Among his publications are (The Law of Real Property5 (1883) ; limitations of Police Power5 (1889) ; (The Unwritten Constitution of the United States5 (1890) ; (State and Fed¬ eral Control of Persons and Property5 (1900).

TIEDEMANN, Diedrich, German philoso¬ pher: b. Bremerworde, 3 April 1748; d. Mar¬ burg, 24 Sept. 1803. _ He was professor of phi¬ losophy in the University of Marburg from 1776 and published Researches on the Origin of Languages5 (1772); (System of the Stoic Philosophy 5 (1777) ; (The First Philosophers of Greece 5 (1780) ; (Origin of the Magic Arts5 (1787) ; (Spirit of Speculative Philosophy from Thales to Berkeley5 (1790-97), his principal work; (Thesetetus; or, Human Knowledge5

(1794).

TIEDGE, ted'ge, Christoph August, Ger¬ man poet : b. Gardelegen, Prussia, 14 Dec. 1752; d. Dresden, Saxony, 8 March 1841. He enjoys distinction as the author of (Urania,5 a lyric-didactic poem (1800), and (Mirror for Women.5 He also wrote (Wanderings through Life s Market,5 and (Elegies.5 His admirers have been many, and his poetry has sometimes been compared with that of Cowper. The year following his death the Tiedge Foundation was established for the purpose of assisting poets and artists or their widows and children, and also for the care of the poet’s grave. Consult Kern, <Beitrage zu einer Charakteristik des Dichters Tiedge5 (Berlin 1896).

TIEFLAND. See Marta of the Low¬ lands.

T I EG HEM, te-gan, Philippe-Eduard Ee°n ˆan French botanist : b. Bailleul, 19 April 1839; d. Pans, 30 April 1914. He was maitre de conferences at l’Lcole Normale (1864); member of the Academy of Sciences (1877) ; professor of botany at the Museum (1879) • professor of the Institute National Agrono- mique (1900). He greatly advanced the knowl¬ edge of the anatomy of the vegetable kingdom

and pioposed a new classification of the vege- ˆ.e estabhshed divisions among the Phanerogamia according to the character of the ovule. He wrote (Traite de botanique5

i<£o?S i189-9 ; <Elements de botanique5 (Paris 1898), besides numerous works on his studies of myxomycetes, ascomycetes, bacteria, fer¬ mentation, etc. His articles are numerous in the Journal de Botanique and Annales des Sci¬ ences Naturelles.

TIELE, te'le, Cornells Petrus, Dutch

writer on comparative religion : b. Leyden, 16 L ec. 1830; d. there, 14 Jan. 1902. He was edu¬ cated at Leyden and Amsterdam, in 1853 be- came pastor of the Remonstrant congregation at Moordrecht, and in 1856 removed to Rot- terdam where he became closely associated wdh Albert Reville (q.v.), whose liberalism in theological matters he fully shared. He was director of the Remonstrant theological semi-

nary at Leyden from 1873 till his death, and during 1877-1901 held the professorship of the history and philosophy of religion in the Uni¬ versity of Leyden, a chair specially created for him.. In 1896-98 he delivered the Gifford lectures in the University of Edinburgh, pub- lished as (Elements of the Science of Religion) (2 vols., 1897-99). He was one of the pioneers in the study of comparative and historical re¬ ligion, and among his chief works are <The Religion of Zoroaster *(1864); Comparative / ˆ ie Egyptian and Semitic Religions* ˆ); ˆHistory of Religion, in Antiquity) (1892-96 ; 2d ed., 1901); (Western Asia in the Light of Most Recent Discovery) (1894). Consult Jordan, L. H., Comparative Religion1* (New York 1905).

TIEMANNITE, native mercuric selenide. It is a gray, metallic mineral of high specific gravity, 8.2 to 8.5 ; and a hardness of 2.5. It occurs massive with chalcopyrite in the Harz Mountains in Germany, and in choice iso¬ metric-tetrahedral crystals at Marysvale, Utah.

TIENTSIN, te-en'tsen', China, a city and treaty port in the province of Chili, situated on the Peiho River, 70 miles by water from its mouth in the Gulf of Pechili. The old city is . a square surrounded by walls and ditches and traversed by broad, straight streets. Two miles to the south lies the European quarter. Tientsin is southeast of Peking with which it is connected by rail and also with the Manchurian Railroad. It is the river port of the capital, although large ves¬ sels cannot

ascend the river. Its position at the northern terminus of the Grand Im¬ perial Canal, however, makes it one of the principal trade centres of the empire. The total volume of imports amounted (1916) to about $59,017,093, of which more than one-third represented imports from foreign countries; exports totaled $34,097,085. Tientsin was be¬ sieged by a detachment of Taiping rebels in 1853. The Taiping army was on the way to Peking, and the defeat at Tientsin saved the capital from attack. In June 1900, during the Boxer troubles, Tientsin was occupied, after severe fighting, by the allied troops. Pop. es¬ timated at 800,000. See China.

TIEPOLO, te-a'po-lo-, Giovanni Battista,

(((Il Tiepoletto*), Italian painter: b. San Piero di Castello, near Venice, 5 April 1696; d. Madrid, 22 March 1770. He was a pupil of Gregory Lazzarini and followed as closely as he could in the footsteps of Paul Veronese, whose style he reproduced in numerous wall and ceiling pictures. Many churches and pal¬ aces of Venice were decorated by his hand. In 1750 he was summoned to Wurzburg, where for three years he worked in the arch¬ bishop's palace on the wall paintings in fresco (Olympus, (Four Quarters of the Earthy and (Life of Frederick Barbarossa.* In 1754 he returned to Venice as director of the Art Academy. In 1763 King Charles III sum¬ moned him to Spain to decorate the royal palace. Here he painted (Smithy of Vulcan, *

(Apotheosis of Spain* and the ceiling frescoes (Spain and her Provinces. * He was the last great master of the Venetian school. His coloring was superb, and his designs spiritual and expressive even when the drawing was

incorrect. Among Tiepolo's easel pictures may be named (Christ in the Garden *; (Adoration ?a Kings* (Imperial Gallery, Vienna) ;

After the Bath *(Berlin Museum); (Immacu- late Conception* (Vicenza and Madrid). Many of his altar pieces are in the churches of Venice. A few of his paintings are in the Metropolitan Museum, New York. Consult Chennevieres, H. de, <Les Tiepolo *(Paris 1898) ; Gheltof, Urbanide, (Tiepolo in Ispagna* (Venice 1881); Molmenti, P. G., (G. B. Tie¬ polo* (Milan 1910) ; 'Masters in Art) (Vol. VI, Boston 1907).

TIERNAN, Frances Fisher (((Christian Reid*), American novelist: b. Salisbury, N. C., 5 July 1846. Among her many works are (Valerie Aylmer (1870); (Morton • House) (1871); 'Nina's Atonement* (1873); (A Daughter of Bohemia *(1873); 'A Question of Honor* (1875) ; 'The Land of the Sky, *a volume of travel (1875) ; 'Bonny Kate* (1878) ; 'Hearts of

Steel *(1882); 'Miss Churchill* (1887); (Philip's Restitution *(1888); (Armine* (1884) ; (The Land of the Sun *(1894) ; (The Picture of Las Cruces* (1895); 'The Man of the Family *(1898) ; (Weighed in the Balance* (1901); (A Daughter of the Sierra *(1903); 'Princess Nadino* (1908); (The Light of the Vision *(1912) ; (The Daughter of a Star* (1913); (A Far-Away Princess *(1914); 'The Secret Bequest* (1915). In 1909 Mrs. Tiernan was awarded the Lsetare Medal by the Uni¬ versity of Notre Dame.

TIERRA DEL FUEGO, te-er'ra del fwa'- go, an archipelago at the extreme south of South America, separated from the mainland by the Strait of Magellan which forms its boundary on the north and northwest, while the Atlantic Ocean bounds it on the east and the Pacific Ocean on the southwest; total area about 19,299 square miles. Politically, it is divided into two parts, each of which will be briefly described. (1) The western part, the area of which is 11,000 square miles, belongs to Chile and is included in the extensive Chilean territory of Magallanes, whose capital, the little town of Punta Arenas, stands on the western (mainland) shores of the strait, and is a port of call for steamships of some Euro¬ pean and Australian lines (Hamburg to Cal¬ lao, etc.). The lands belong to the state. (2) The eastern part, area, 8, 299 square miles and population about 1,000 whites and several thou¬ sand Indians, belongs to Argentina and forms a territory of that republic, its capital being Ushuaia. Of this region about 1,000,000 acres have passed into private ownership and only a small proportion is rented. In the north there are fertile valleys and roads connecting the villages lead through Chilean territory to ports on the southern coast of the Strait of Magel¬ lan. The interior is mountainous or hilly, &but well adapted to stock-raising. (<The climate of this region, **it is said, ((though cold, is not severe, inasmuch as the mean temperature, maximum and minimum, as taken during sev¬ eral years, is + 5° C. and — 10° C., respec¬ tively. Calm days are frequent in winter. Rain increases in the autumn, and in the sum¬ mer dry winds from the southwest and west prevail, and occasionally are of terrific force.** (Consult ' Argentine Republic: a Geographical Sketch,* issued by the International Bureau of

American Republics, Washington 1903). There are no navigable rivers, but many streams of moderate size and a number of lagoons. The oldest and in some respects still the most in¬ teresting description of the region of the fa¬ mous strait (of which both shores are now held

by Chile) is that one written by Anthony Pigafetta, who accompanied Magellan and told of what they saw in October 1520, mentioning the characteristic storms, the <(very great and high mountains covered with snow® surround¬ ing the strait, and finally saying : ((In it we found at every half league a good port and place for anchoring, good waters, wood all of cedar and fish like sardines, missiglioni, and a very sweet herb named appio (celery). There is also some of the same kind which is bitter. This herb grows near the springs and from not finding anything else we ate of it for several days. I think that there is not in the world a more beautiful country or a bet¬ ter strait than this one.® Pigafetta's sketch map of Magellan's Strait proves that he regarded Tierra del Fuego as a great southern continent stretching toward the antarctic pole. Consult Lord Stanley of Alderley, 'The First Voyage Round the World, > printed for the Hakluyt Society.

TIERS-ETAT, te-ar-za-ta, the third estate, a name early given in France to the free bour¬ geoisie, to distinguish them from the nobility and the clergy, the other two estates. The three estates together formed the etats-gen- eraux or States-General, a legislative body which might be compared to the English Par¬ liament. The third estate became famous in the political upheaval in France at the end of the 18th century, when, in the last States- General, it claimed power equal to that of both of the other orders. In 1789 it assumed the name of the National Assembly, and by its subsequent assumption of supreme power con¬ summated the French Revolution. See France — History from Revolution to Empire.

TIETJENS, tet'yens.or TITIENS, Therese Johanna Alexandra, German soprano singer of Hungarian descent: b. Hamburg, 17 July 1831 ; d. London, England, 3 Oct. 1877. She made her debut in her native city as Lucrezia in the opera of 'Lucrezia Borgia) in 1849, and her after career was one of great success, as she not only possessed a voice of great power and purity, but was an actress of much ability likewise. She made her home in London after 1858. In 1875 she visited the United States singing in /Don Giovanni* and other grand operas.

TIFFANY, Charles Comfort, American Protestant Episcopal clergyman: b. Baltimore, Md., 1829; d. 20 Aug. 1907. He was educated at Dickinson College, Andover Theological Semi¬ nary and the universities of Halle, Heidelberg and Berlin and took orders in the Episcopal Church in 1866. He was rector of the Church of the Atonement, New York, 1874-80, and of Zion Church there, 1880—90. He was arch¬ deacon of New York (1893-1902). He pub- b*!recJ (Expression in Church Architecture> ; 'Modern Atheism > ; 'History of the Protestant Church > (1895); 'The Prayer Book and the

Christian Ltfe) (1897).

TIFFANY, Charles Lewis, American manufacturer:, b. Killingly, Conn., 15 Feb. 1812; d. New York, 18 Feb. 1902. In 1837 he began his business career in New York, where in partnership with John B. Young he opened a stationer's store, to which were added Chinese and Japanese works of art and later French jewelry. The business founded on bor¬ rowed capital of $1,000 grew rapidly, the jew¬ elry trade soon becoming the most important. In 1848 the firm began to deal exclusively in jewels, bronzes and other articles of virtu, and to manufacture gold and silver ware. The same year when the value of the diamond was so depreciated because of the unsettled condi¬ tions in Europe, Tiffany instructed his partner, at the time being in France, to buy as many diamonds as he could. Through this venture the reputation of the house among leading dia¬ mond merchants was established." In 1851 the name became Tiffany and Company, and the firm was incorporated in 1868. Changing con¬ ditions from time to time necessitated re¬ movals farther uptown, until the business was located at the present site in 1905. Mr. Tiffany was known as the chief diamond merchant in the United States, and established branch houses, also well known in London and Paris. The standard for sterling silver, 0.925 fine, now recognized throughout the entire country, was adopted by him in 1851. He was a liberal patron of the fine arts.

in i i, " vuiuiuu, -rviIICllCiiH

artist and decorator; b. New York City, 18 Feb. 1848. In early life he evinced a strong inclina¬ tion toward the fine arts; hence his parents wisely gratified his tastes and educated him for an artist. He first studied with George Inness and Samuel Coleman in New York, then with Leon Bailly in Paris. He spent five years in Europe and the Orient, and besides working in water colors and oils, devoted much of his time to the study of the decorative arts. He became inteiested in glass and its possibilities in the early / 0 s and revived the mosaic theory in the construction of colored glass windows. Believing that work executed upon this principle would give the best artistic re¬ sults, but finding that the glass in the markets did not have the range of color and texture necessary to carry out his ideas, he began a series of experiments through existing' glass houses, but as these failed to grasp his thoughts he established works of his own. He succeeded in producing not only many of the finest effects that were obtained in the past, but also dis¬ covered new formulas by which he could make glass unlimited in its range of color and texture V\ith this glass, which is known as "Tiffany lavrile glass® he has not only made windows of great beauty, but also vases and different objects o ai tistic interest

which at once commanded the admiration of the world. In 1878 he organized a company under the title of Louis C. Tiffany and Associated Artists, for the purpose of pro¬ moting the decorative arts in America and particularly the developing the making of colored-glass' windows. This was the founda-

! oc J16 bllv,neuSSb The glass biowing branch was first established as the Stourbridge Glass

Company, and subsequently the Tiffany Fur- naces. I he general manufacturing and mer¬ chandising began under the name of the Tiffany

G ass Company, which in the development and broadening of its business became the Tiffany V ass and Decorating Company and the Allied Arts Company which are now more generally known as the Tiffany Studios. One of his most notable works in mosaic is the Chancel 3F ?r-Vpt in the Cathedral of Saint John the Divine in New York, executed in glass mosaisc and semi-precious stones. Another recent example is the interior decoration of the new Madison Square Presbyterian Church in New York. . But while there are hundreds of churches with Tiffany windows and many of them entirely decorated by his artists, eccle¬ siastical work is only one of the many branches of his varied artistic achievements. In domes¬ tic decorative work his two dwellings, the city home at Madison avenue and 72 d street. New York, and <(Laurelton, *his country house at Oyster Bay, L. I., are varied examples of his individuality, and taste. Many of the most notable residences, university halls, hotels, theatres and other buildings in New York, Bos¬ ton, Chicago and other large centres have been decorated by his art workers. Louis C. Tiffany is perhaps more widely known through his work in glass, mosaics and interior decorations, as these naturally appeal to the popular taste and attract attention by their exposure to public view. His genius, however, has not been re¬ stricted even to these varied fields, but he has constantly sought employment wherever artistic feeling could give expression. His studies in chemistry and his exhaustive laboratory work revealed new possibilities beyond the realms of ' glass. He has worked successfully in tapestry, rugs and other materials, pottery, metallic lus¬ tres, enamels and in. later years he has given much thought to art jewelry and silverware, all of which, however, have not weaned him from his early love of the brush. He was from the first, and is to-day, a painter and works with his brush not only in his studios in town and coun¬ try, but also on*

his annual trips abroad. After one of his winter sojourns in Egypt he brought home in 1906 over 23 water colors which he ex¬ ecuted while sailing in his dahabiah«on the Nile. His water colors and pictures in oil are fre¬ quently seen in the galleries of the art clubs and at other exhibitions. Among his principal can¬ vases are <Dock Scene (1869); (Spring) (1874) ; (Wading at Seabright, N. J. (1876) ; (Street Scene in Tangiers *(1876); <Study of Quimper, Brittany* (1877) ; (Duane Street, New York) (1878) ; <In the Fields at Irvington, N. YP (1879) ; (The Cobblers at Boufarick) (1888); . (Feeding the Flamingoes) (1888);

(Church in Morlaix, Brittany *(1890) ; (Market Day at Nuremberg) (1892); 'Street Scene in Algiers* (1895); 'Algerian Shops* (1895). Mr. Tiffany is art director of the Tiffany Studios, president and art director of the Tif¬ fany Furnaces and vice-president and art di¬ rector of Tiffany and Company, the jewelry house founded by his father. He was made a member of the Water-Color Society in 1870, an associate of the National Academy of Design in 1871 and an academician in 1880. He is also a member of the Society of American Artists, the Architectural League, the New York So¬ ciety of Fine Arts, the Societe Nationale des Beaux Arts of Paris and the Imperial Art So¬ ciety of Japan. In 1900 he received a gold

medal and the decoration of Chevalier of the • e?nnI? H˚nor from the French government, •n ifiAi a ˆ me<ˆaˆ M the Dresden Exposition in 1902 a special diploma from the Turin Ex¬ position and in 1903 Yale University conferred upon him the degree of A.M. In addition to these honors and decorations the art work, notably in glass, made under his direction re¬ ceived numerous awards at international expo-

Stˆns- . 9onsu>t 'The Art Work of Louis C. Iiffany* (Garden City, N. Y., 1914).

TIFFANYITE. Certain bluish or bluish- white diamonds, principally from Brazil al- though a few have been found in India' and ooiith Africa, phosphoresce for a considerable time after having been exposed to bright sun- light, electric light, or other brilliant rays this property results from the inclusion in the diamond of a hydrocarbon or a rare earth, and .or this class of diamonds the New York Academy of Sciences (1890) has given it the name "tiffanyite.**

TIFFIN, Edward, American physician, preacher and politician : b. Carlisle, England, 19 June 1776; d. Chillicothe, Ohio, 9' Aug. 1829.

• went to Charlestown, Va., and

in 1789 was graduated in medicine at the Uni¬ versity of Pennsylvania. Three years later he became a local preacher in the Methodist Church, likewise studying law and continuing the practice of medicine. About 1797 he re¬ moved to Chillicothe, in what was then the Northwest Territory, was elected to the Terri¬ torial legislature and in 1799 was speaker. He was chosen president of the convention which framed the State constitution (1802) and be¬ came first governor (1803-07) of Ohio. The town of Tiffin in that State was named for him. He arrested the Burr-Blennerhassett expedition m 1805. (See Blennerhassett, Harman- Burr, Aaron). He was a United States sena¬ tor in 1807-09, resigned in the latter year to assume the speakership of the Ohio legislature. He was the first commissioner of the General Land Office (1812), and at the burning of the National Capitol by the British in 1814 saved the papers from destruction. In 1815 he was made surveyor-general of the Northwest Territory and continued in that office almost until the end of his life.

TIFFIN, Ohio, city, county-seat of Seneca County, on the Sandusky River and on the Baltimore and Ohio, the Pennsylvania and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 80 miles north by west of Columbus, the State capital and 40 miles south¬ east of Toledo. It was settled in 1817 by Eras- tus Bowe, and incorporated in 1835. In 1836 it was chartered as a city. It is the commercial and industrial centre for a large portion *of the country, in which are many fine farms. In the vicinity of Tiffin are deposits of clay and glass- sand. The chief manufacturing establishments of the city are machine shops, glass works, pot¬ teries, wagon and carriage works, motor truck works, glove and mitten works, candy factories iron works, planing and sash mills, emery- wheel works, flour mills and furniture factory There are about 5,000 employees in the city's manufactories. The principal public buildings are the county courthouse, the municipal build¬ ings, the churches and schools. There are 16 churches, representing 10 denominations, and

Saint Francis Hospital and Home. The educa¬ tional institutions are Heidelberg University (Reformed), opened in 1850 (nearly 650 stu¬ dents in 1915), Ursuline College, public and parish schools and two libraries. Tiffin is the location of the national home of the Junior Order of United American Mechanics, contain¬ ing about 400 children. The four banks have a combined capital of $500,000; the annual busi¬ ness done through the banks amounts to over

$3,000,000. The government is administered under a board of public safety, board of public service and council of seven members elected by wards and at large. Pop. 14,375.

TIFLIS, tides', Russia, the capital of the government of Tiflis in the general government of Caucasia (see Transcaucasia), situated at the southern base of the Caucasus about mid¬ way between the Black and the Caspian seas. It is picturesquely built on terraces rising from the valley of the Kur, and surrounded by orchards and vineyards. Some walls and tow¬ ers of the old fortifications remain, and there are several parks and a botanical garden. Among the numerous churches the most in¬ teresting is the cathedral of Zion, dating in part from the 5th century. Other notable buildings are the palace of the governor-general, the Caucasian museum and library. The educa¬ tional institutions include nearly a dozen high schools, besides numerous technical schools, one of the foremost of which is the finely equipped school of commerce. The chief industries are the manufacture of leather, oil, silk, woolens, carpets and tobacco. There is also a cotton-mill and several breweries and distilleries. Com¬ merce has declined somewhat, though the city is connected by rail with both the Black and the Caspian Sea. Pop. 327,800.

TIGER, the largest and most admirable of the cats (Felis tigris). In size and power it surpasses the lion, as it does in beauty, and ex¬ presses the highest type of feline structure. (See Felidae). The ground color of the body is a bright tawny yellow, bearing black stripes running at right angles with the general axis of the body and limbs. The under parts and inner aspect of the limbs are white, as also are the throat and chest. On these white parts the stripes are lighter, and gradually merge into the white color. The tail is not tufted at its extremity, and is usually of lighter hue than the body, with dark rings. White or albino varieties of the tiger have been found, as also black ones. The maximum length, including the tail, is about 11 feet, and the largest weigh about 500 pounds. The tiger attains its full development in India, the Bengal variety being the largest and most typical ; but it also occurs in southern Siberia, Turkestan, Persia, Java, Sumatra, China and Japan, encountering a range of climate from tropical to sub-arctic conditions. In habits these animals are far more active and agile than the lion, and exhibit a large amount of fierce cunning. They gener¬ ally select the neighborhood of water-courses as their habitat, and spring upon the animals that approach to drink, then drag them to a more retired spot to be devoured. The march of the animal through the thick brushwood of the jungles in which it lives is noiseless and stealthy, and it appears rather to avoid than to court danger, although, when brought to bay,

no animal presents a fiercer front than the tiger. Where deer, antelopes and wild hogs are abun¬ dant, domestic animals are comparatively safe, but otherwise the tiger is ready enough to prey on the latter. When pressed by hunger or en¬ feebled by age and incapable of dealing with larger prey, like buffaloes, the tiger prowls around villages, and, having once tasted human flesh, becomes a confirmed cattle-lifter and man-eater, sometimes causing the temporary abandonment of a large district by the terror- stricken inhabitants ; and in several historic in¬ stances districts of country in southern India, Indo-China and the adjacent islands have been deserted premanently because so infested with tigers harbored by neighboring swamps and jungles. The number of persons killed by tigers each year in India averages about 930, mostly in Bengal, Madras, Central Provinces, Assam and Burma. About 32,000 head of cattle are also killed annually in India by tigers.

The natives destroy tigers by traps, pitfalls, spring-guns and poisoned arrows, but the ortho¬ dox method of keeping down their numbers as pursued by Europeans is to employ natives to beat the bush while the game, when started, is shot by the sportsmen seated on elephants. The sport is exciting, but dangerous ; for a wounded tiger has been known to spring on an elephant and to inflict serious wounds on the driver and occupants of the howdah, before it could be dispatched. A safer and more com¬ mon method is to tether a live goat, or other¬ wise set a bait in a place where a tiger may be expected, then erect a platform on poles or in a tree near by, and await the animal's apnroach on a night when moon or stars shed light enough to enable the watcher to shoot his prey.

These great cats have always been kept in captivity by Oriental rulers, and now and then have been completely tamed. They have been a feature of every menagerie and animal trainer's show since such collections began to be formed, and as they readily breed in cap¬ tivity the supply will easily be maintained. Con¬ sult Baker, (Wild Beasts and their Ways *(London 1890) ; Blanford, (Mammals of India * (ib. 1888) ; Lydekker, R. (The Game Animals of India* (ib. 1907) ; Porter, <Wild Beasts) (New York 1894), and books on sport and travel in India and the East Indies.

TIGER-BEETLE, a beetle of the family CicindelidcB, in which the head is wider than the thorax, and the terminal hook of the maxil¬ lary jaws is jointed at its base. This insect is swift and active, and preys upon other insects. It is very often found in sandy places and the larvae live in straight deep burrows in the ground. The color varies, corresponding as a rule to the general coloring of the surround¬ ings.

This beetle is more common in the trop¬ ics. Over 1,500 species are known, less than 100 of which have been found in the United States. Some species are wingless. See plate accompanying the article Insects.

TIGER-CAT, a name of not very definite signification, sometimes given to those animals of the family Felidcu which are of medium size, and somewhat resemble the tiger in form or markings, _ such as the chati, margay, serval, etc. In America the ocelot (q.v.) is most often meant. The marbled tiger-cat is a small beau-

ti_i.llv \ai legated species (Fells marmorata) oi the eastern Himalayan region.

TIGER-EYE, a semi-precious, chatoyant .time, oi blue, yellow or brown color, which exmbits a charming change of colors when re¬ volved. It is a silicious pseudomorph after crocidohte.ˆ The original mineral is changed a infiltration of silica and when accompanied by the oxidation of its iron its blue color is altered to yellow or brown. It is extensively cut into watch charms, cuff buttons and many tancy articles which are largely sold at many tourist resorts, often, though fraudulently, as of local origin, the mineral being found only in Gnqualand, South Africa. See Crocidolite.

TIGER-FLOWER, a Mexican plant (Tig -) iclia pdvonia) of the iris family, frequently cultivated for the brilliance and oddity of its flowers. These are solitary, terminal and cup¬ shaped in the centre, but have a wide-spread¬ ing limb, formed by the three obovate clawed segments of the perianth, which are the largest, and are brilliant red at the outer edge, shading to yellow, spotted with reds and purples at the base. The three inner segments are fiddle¬ shaped. The flowers are fugacious, lasting only a day, but there is a long succession of them. There are many varieties of these Ti- * gridias, in which the hues of the corollas range through various shades of yellow to white. The stem is about a foot high, slightly zigzag and branched ; and it bears a few alternate dis¬ tant leaves, the greater number of the leaves being radical and sword-shaped. The tunicated corms need to be lifted into a dry place out of reach of frost during the winter, as they are not hardy in the northern United States. Tigndias are propagated by seeds or offsets. There are other species of the genus, which are not so handsome or conspicuous as T. pavonia; some of them have bluish flowers.

TIGER LAKE. TIGER-LILY.

See Nahuel-Huapi. See Lily.

TIGER-MOTH, one of the large moths of the genus Arctia, the caterpillars of which are known as (<woolly bearsM because of their heavy covering of black and brown hairs.

TIGER SHARKS, a shark (Stegostoma tigrinum) common in the Indian Ocean. The full-grown fish, from 10 to 15 feet long, fre¬ quent the open sea. The color is a yellowish- brown, with black or dark brown transverse bands or spots.

TIGER-SNAKE, a large blackish, yellow marked elapine poisonous serpent (Notechis sculatus) , widely disseminated in Australia and Tasmania, and very numerous.

TIGHE, ti, Mary (Blachford), Irish poet: b. Dublin, 9 Oct. 1772; d. Woodstock, County Kilkenny, 24 March 1810. She was married to her cousin, Henry Tighe, in 1793. Though her poem, (Psyche, or the Legend of Love,* was privately printed (1805), it was only after her death that her complete writings were published. The first edition was in 1811, and they have been several times reprinted. The is written in the Spenserian stanza and is founded on the story of Cupid and Psyche as narrated in cThe Golden Ass} of Apuleius. Her other poems are chiefly of a religious cast. It is probably as the subject of Moore's lyric, t(I

saw thy, form in youthful pride.)) and of Mrs. Hemans (Grave of a Poetess, > that Mrs. Tighe will be longest remembered.

• TIGRANES (tig-ra'nez) I, king of Arme¬ nia, 96 to 55 b.c. A descendant of Artaxias, the rounder of the Armenian kingdom, he brought under his rule large accessions of territory" in oyria and Mesopotamia, and in 83 b c. had ac¬ quired most of the provinces of Syria from the Euphrates to the sea. By his marriage with the daughter of Mithridates, king of Pontus, he formed an alliance with that monarch disas¬ trous to the smaller kingdoms of Asia Minor. He invaded Cappadocia in 78 and completely SUˆ inhabitants. Other wars followed

and 1 lgranes became the mightiest king in Asia He built the new capital, Tigranocerta, whither he transplanted the inhabitants of many captive places, including Cappadocia, Syria and Cilicia His possessions were wrested from him by the Koman general Lucullus, but were nearly all re¬ covered by Tigranes, only to be lost again to 1 ompey in

66. In the final defeat of Tigranes 1 ompey was aided by the rebel son of the Armenian king, who claimed the provinces of Gordyene and Sophene for himself. Tigranes was able to retain only Armenia proper for which he was obliged to pay P ompey an enormous sum and to subsidize the entire Roman troops under him. Tigranes was suc¬ ceeded by his second son, Artavastes. Consult Reinach, T., (Mithridate Eupator roi de Pont* (Paris 1890).

- TIGRIS, ti gris, Asia, an important river which rises near the Euphrates (q.v.) from two sources The western and chief branch rises near Kharput, and under the name of Dejleh or Shatt, flows southeast. After passing Diarbekir it receives the eastern branch, flows past Mosul and Bagdad and joins the Euphrates at Kurna; together they form the Shattel-Arab and thus enter the Persian Gulf. The stream waters the ancient Nineveh, and separates Assyria from Mesopotamia on its way to Bagdad. It is only navigable tor small boats and its entire length is 1,150 miles.. Iveleks, or large rafts, supported by inflated skins, are much in use for the trans¬ portation of freight. The chief tributaries are the Greater and Lesser Zab and the Diyala. The biblical name of the river is Hiddekel'.

TILDEN, Douglas, American sculptor: b Chico,. Butte County, Cal., 1 May 1860. He lost his hearing in early life and was gradu¬ ated from the State Institution for the Deaf in Berkeley, Cal. (1879). Taking up the study of sculpture in 1887 at the National Academy of Design, New York, and later abroad, he was appointed a member of the jury on sculpture at the World's Columbian Exposition in Chicago. He was elected a member of the National Sculpture Society, the New York Art Club, the San Francisco Art Association, etc., and was professor of sculpture at the Mark Hopkins Art Institute (1894-1900). His works include (Base-Ball Player) ; ; Undian Bear Hunt) ; ˆFootball Players,* etc.

TILDEN, Samuel Jones, American law¬ yer and statesman: b. New Lebanon, N. Y 9 Feb 1814; d Greystone on the Hudson, near Yonkers, N. Y., 4 Aug. 1886. He was educated at Yale and at New York University being graduated from the latter in 1837. He then

studied law and was admitted to the bar in 1841. He attained the first rank in his profes¬ sion, being particularly successful in reorganiz¬

ing corporations involved in litigation, and amassing one of the largest fortunes ever gained in the practice of law. While a student in college, he had taken an active part in politics, writing and speaking in favor of Mar¬ tin Van Buren's policy; in 1845 was elected to the New York State legislature and was a mem¬ ber of a special committee to consider the settlement of anti-rent troubles, his report on the subject forming the basis of subsequent legislation. In 1846 he was a member of the State constitutional convention and in 1848 was one of the delegates of the Free Soil faction of the Democratic party to the National Conven¬ tion, but his political activity then slackened until after the Civil War. During the war, how¬ ever, he was several times consulted by Presi¬ dent Lincoln ; he believed that the war, once begun, must be carried through by the Federal government, but opposed some acts of the ad¬ ministration as unconstitutional. In 1866 he was made chairman of the Democratic State committee and in 1867 was a member of the State constitutional convention. As chairman of the State committee he took a leading part in the overthrow of the Tweed Ring, opposing their delegates in the State conventions and be¬ ing active in collecting evidence against their leaders and bringing them to prosecution; in 1872, having been elected to the State legisla¬ ture, he was the leader in the impeachment of two of the Tweed judges. (See Tammany Society; Tweed, W. M.). In 1873 he resigned as chairman of the State committee; but in 1874 was nominated and elected Governor of New York. His administration was notable for his successful exposure of the <(canal ring,® an association made up of persons who obtained contracts for canal work which they never ful¬ filled, but for which they were paid, and their political supporters. Governor Tilden em¬ ployed a skilled engineer to examine their work and then surprised the legislature by . a wholly unexpected special message setting forth in detail the fraudulent methods of the "ring.® This served as a direct appeal to the people; and so aroused public opinion that the legis¬ lature was forced to authorize the governor to appoint a canal commission. The reports of this commission resulted in a marked diminu¬ tion in the appropriation for canals and the indictment of several officials for defrauding the State. In 1876 Tilden was the Democratic nominee for President of the United States, and received the largest popular vote, but lacked one electoral vote necessary for his election. As the electoral votes from several States were contested on account of alleged fraud, the mat¬ ter was referred to a special Electoral Com¬ mission, which decided in favor of the Repub¬ lican candidate, Rutherford B. Haves. (See Electoral Commission). Popular excitement had run high and many Democrats still claimed Tilden's election, but he urged his supporters quietly to accept the decision of

the commis¬ sion. In 1880 and 1884 his partv again wished to nominate him for the Presidency, but each time he declined the nomination. He be¬ queathed the most of his fortune to establish a public library in New York; but the will was contested by the heirs and only a part of the

bequest came into the city's possession. (See Tilden Foundation). Consult (Writings and Speeches of Samuel J. Tilden) (ed. by John Bigelow, 2 vols., New York 1885) ; 'Letters and Literary Memorials of Samuel I. Tilden) (ed. by John Bigelow, 2 vols., ib. 1908) ; Bigelow, J;. 'Life of Samuel J. Tilden) (2 vols., ib. 1895) ; Haworth, 'Disputed Presidential Elec¬ tion of 1876> (Cleveland 1906).

TILDEN, (Sir) William Augustus, English

scientist; b. London, 15 Aug. 1842. He was a graduate of various schools and of the Royal College of Chemistry; in 1864 became demon¬ strator of the Pharmaceutical Society; from 1872-80 science master at Clifton College; pro¬ fessor of chemistry, Mason College, Birming¬ ham, 1880-94; president of the Institute of Chemistry, 1891—94 ; treasurer of the Chemical Society, 1899-1903 and president, 1903-05 ; pro¬ fessor of chemistry, Royal College of Science, London, 1894-1909, and dean of the college 1905; emeritus professor in the Imperial Col¬ lege of Science and Technology from 1909. In 1908 he was awarded the Humphrey Davy medal of the Royal Society. He published numerous scientific papers and in book form 'Introduction to Chemical Philosophy *(1876) ; 'Practical Chemistry) (1880); 'Hints on Teach¬ ing Chemistry* (1895) ; 'A Manual of Chem- istry) (1896) ; 'A Short History of the Prog¬ ress of Scientific Chemistry * (1899) ; 'The

Elements* (1910) ; 'Chemical Discovery and Invention in the Twentieth Century) (1917) and 'Sir William Ramsay) (1918).

TILDEN FOUNDATION, The, one of

the integral components of the New York Public Library Fund. By the will of Samuel J. Tilden (q.v.) the bulk of his property was left for the establishment of the Tilden Trust, to found a free public library and reading room in New York. This will was contested in a long suit in the courts and was broken in 1891, the property being decreed to the heirs. Mrs. William B. Hazard, one of the latter, was en¬ titled by this decision to half of the estate, but she relinquished about $2,000,000 of her portion in order that Tilden's wishes might be carried out to some extent. In 1895 an agreement was reached whereby the trustees of the Tilden Trust Fund, the Astor Library and the Lenox Library agreed to

unite their properties, form¬ ing a single "New York Public Library — Astor, Lenox and Tilden Foundations.® The city of New York subsequently agreed to erect on the site of the old reservoir, in Bryant Park, 40th to 42d streets on Fifth avenue, a hand¬ some . and spacious structure for these great libraries. The. work was begun in June 1899 and completed in May 1911. See also Libraries.

TILEFISH, a large oceanic fish (Lophala - tilus charnel e ontic e p s) , allied to the cods, and belonging to the family Malacanthidce, repre¬ sented by the blanquilla and other well-known food-fishes of the Pacific Coast. It weighs from 10 to 40 pounds and is big-headed and brilliantly colored, with a curious triangular fatty protuberance on the top of the head in advance of the long low dorsal fin. Its flesh is excellent and it is caught in the same manner as are cod. The curious story of this fish is thus sketched by Lucas : "This fish, belonging to a tropical family having its headquarters in the Gulf of Mexico, was discovered in 1879 in

moderately deep water to the southward of Massachusetts and on the edge of the Gulf Stream, where it was taken in considerable num¬ bers. In the spring of 1882 vessels arriving at New York reported having passed through great numbers of dead and dying fishes, the water being thickly dotted with them for miles. From samples brought in, it was found that the ma¬ jority of these were tilefish, while from the re¬ ports of various vessels it was shown that the area covered by dead fish amounted to some¬ where between 5,000 and 7,500 square miles, and the total number of dead was estimated at not far from a billion. This enormous and widespread destruction is believed to have been caused by an unwonted duration of northerly and easterly winds, which drove the cold arctic current inshore and southward, chilling the warm belt in which the tilefish resided and killing all in that locality. It was thought pos¬ sible that the entire race might have been de¬ stroyed, but, while none were taken for many years, in 1899 and 1900 a number were caught, showing that the species was beginning to re¬ occupy the waters from which it had been driven years before.® Consult Lucas, (Animals of the Past) (New York 1902) and Reports' and 'Bulletins* of the United States Fish Com¬ mission, especially for 1884 and 1899.

TILES are stone, metal or composition slabs for use in covering a roof to keep out the water. Since the most common material is baked clay,

and this same clay is used to form drain pipe, the word tile has been extended in meaning to cover clay pipes termed drain-tile. This same baked clay is often colored and fused on one side, giving it a glazed finish often of great beauty. Such colored and glazed tiles are used for interior walls, dados, floors, man¬ tles, etc. Drainage tiles are made of native clay and usually glazed inside. Each tile has at one end an extended rim which overlaps the small end of the tile next to it, thus forming a continuous pipe. Roofing tiles take the form either of flat shingle or slate-like slabs or of pantiles. A section through a pantile shows a horizontal-like curve, one side of the tile being concave and the other convex — the latter curve fitting over the concave curve of the next tile, and so on. In this manner there is no opening left open to the weather. The same principle is often applied to the flat tiles and to ridge tiles, which bear on one edge a semi-circular convex lip, and on the other a concave one. Ridge tiles are made in angles to fit and cap the ridge-pole of a roof, to turn corners and to ornament pro¬ jections. Roof tiles are glazed or dull, accord¬ ing to the maker's fancy, and are used in varie¬ ties of colors. Modern taste seems to prefer either highly glazed saffron or terra-cotta pantiles, or else dark, dull flat ones. But dur¬ ing the Renaissance and until recent years highly colored glazed roof tiles either in the flat or corrugated style were in large demand throughout southern and central Europe. Fine examples of decorative roofs are preserved from the Middle Ages, a notable instance being the roof ot Saint Stephen's Cathedral in Vienna. Such tiles are often enameled and are thus rendered waterproof. Slate, marble and metal roof-tiles are occasionally employed.

Interior tiles are made in great varieties of shapes and sizes, colors and materials, ranging

from fine brick-clay tiles to those of enameled and painted porcelain. They are used for pavements, flooring and revetments to walls. Old houses in the south of Europe were com¬ monly paved with red brick-tiles baked hard and sometimes glazed. The method of decora¬ tion usually employed was to inlay clays of different colors in the bodies of the tiles, pro¬ ducing designs often of great beauty. Enameled tiles were used in the 15th and 16th centuries for the pavings of interiors of importance, such as. chapels, chambers of honor, etc. These thin, enameled tiles broke easily and only a few examples are to-day preserved in the cathedrals and castles of France and Italy. The use of tiles for wall revetments and for dados was not general during these periods but has grown in recent years. Modern wall tiles are usually painted or glazed and are of various fine clays, not infrequently of

porcelain. Large wall spaces are covered with painted tiles in pic¬ torial or decorative composition, the work of Theodore Deck affording some fine examples. Tiles with slightly raised figures are also used, the style having been borrowed from the Per¬ sians who are masters of their manufacture. A recent, effective use of colored clay tiles may be seen in the subway stations in New York, where especially pleasing effects have been in¬ expensively produced by the judicious selection and blending of colors. Modern usage does not follow the example of the Middle Ages in the employment of carved and leaded marble tiles. In these latter the variously shaped slabs of stone were incised with intricate and elaborate designs and the incisions filled with lead or colored compositions and sometimes with fine mosaic work. Consult Church, W. A.,

(Patterns of Inlaid Tiles, *etc. (1845) ; Herdtle, H., (Vorlagen fur das polychrome Dach- ornament* (1885) ; Jones, Owen, 'Designs in Mosaiq and Tessellated Pavements, *etc. (1842) ; Monceaux, Henri, 'Les cartelages histories du moye.n-age et de la renaissance,* etc. (1887) ; Wallis, Henry, 'Italian Ceramic Art,* etc. (1902) and the papers of Ricardo, H. R., on Architect's Use of Enameled Tiles) (in The Architectural Review for 1902, Vol. XI).

TILGHMAN, til'man, Mathew, American patriot: b. Queen Anne County, Md., 17 Feb. 1718; d. Talbot County, Md., 4 May 1790. He was a member of the Maryland assembly in 1751 and as a magistrate and prominent mem¬ ber of Talbot County was a member of the committee which drew up the Maryland pro¬ test. to the Stamp Act. In 1774 he was made president of the Provincial Congress or Con¬ vention which controlled the affairs of the colony until its statehood, and in 1777 repre¬ sented Talbot County in the Provincial Senate. He was a delegate to the Continental Congress, 1775-77 and was throughout the entire pre- Revolutionary period a staunch defender of the cause of independence and an able advocate of civil rights.

TILGHMAN, Tench, American soldier, nephew of M. Tilghman (q.v.) : b. Talbot County, Md., 25 Dec. 1744; d. Baltimore, Md., 18 April 1786. His career as a merchant in Philadelphia was interrupted by the Revolu¬ tion. He joined the Continental army at the outbreak of the war and was one of the offi¬ cers sent to confer with the Six Nations. In

1776 he was appointed aide-de-camp to Wash¬ ington, in which position he continued to the close of the war and in this capacity was en¬ trusted with the bearing of the surrender of Cornwallis to Congress on 19 Oct. 1781. In May 1781 he was made lieutenant-colonel to take rank from 1 April 1777. At the close of the war he settled in Baltimore, where he again took up a mercantile life. Consult (Memoir of Tench Tilghman) (Albany 1876).

TILIACE.7E, a family of trees, the lindens, with some shrubs and a few herbs, mostly in¬ digenous to the tropics, especially in South America and Asia. A few are natives of the north temperate zone. The chief genus is Tilia, characterized by alternate, simple leaves; soli¬ tary or variously grouped axillary flowers with four or five sepals and petals, numerous stamens with two-celled anthers ; and several-celled cap¬ sules or drupes. One of the most striking pe¬ culiarities of the family is the abundance of mucilaginous substances in various parts of the plants, particularly in the young twigs, inner bark and buds. On this account several species are valued for stock-food. Many of the species are noted for their tough fibrous bast, often used for making cordage, bagging and even fine fabrics, as in the case of jute. Some species furnish edible fruits, for instance, Grewia denticulata, which yields large quanti¬ ties of acid drupes about half an inch in di¬ ameter. The linden and the basswood are par¬ ticularly useful trees in the cool temperate zone, where they are employed for timber, street and park planting and as forage for bees, their abundant nectar furnishing one of the finest grades of honey. See Linden ; Corchorus ; Fibre; Jute; Lime.

TILL, a heterogeneous mixture of clay, boulders, sand, gravel and rock flour, covering generally the surface of the rocks in the gla¬ ciated region. It represents the ground mo¬ raine of the great Pleistocene ice sheet, which finally slid over it and compacted it more or less firmly. It sometimes rises locally in com¬ pressed dome-shaped eminences known as drumlins. Till or boulder clay is unstratified, in contrast to glacio-fluvial deposits, or modi¬ fied drift. Till that has become consolidated is known as tillite. See Glacial Period; Drift.

. TILL EULENSPIEGEL. In Friedrich Lienhard exemplifies his fa¬ vorite method of treating, with manifest applica¬ tion to his own time, an old genuinely German subject conceived in a way that is no less novel than poetic. The work is in three parts. The first. (Eulenspiegels Ausfahrt> (<(Eulenspiegel's Departure®), and the third, (Eulenspiegels Heimkehr> (<(Eulenspiegel's Return Home®), were brought out together in 1896; the second, (Der Fremde) (((The Stranger,® 1900), is an episode capable — as is also the first part —

of separate representation.

The traditional coarse and rascally practical joker of the 15th century (see Eulenspiegel) is transformed in Lienhard's drama into an idealist. He is no hero; he lacks the poise of a humorist, he has too much sentiment to be a cynic; knowing the worth of life, he rebels against pettiness and narrowness, but he has no other weapon than somewhat hollow laughter, and no other plan of campaign than somewhat

I

boorish mischief-making. The transformation is not unlike that of the 16th century Faust at the hands of Goethe; but the scope of Lien- hard's subject is naturally narrow in compari¬ son with Goethe's and the setting of his action is more specifically historical. There is a melancholy suggestiveness in the fact that Lien- hard's Till meets his end in the Peasants' Re¬ volt, and in the further fact that Lienhard dig¬ nifies him with the approval of Hans Sachs — giving, as it were, to the individualist who, in a contemptible time, could find no better place than that of court fool, the sanction of the Nuremberg shoemaker's optimistic faith in social regeneration.

. That Hans Sachs should be brought into this action at all is enough to indicate that Lienhard was less concerned for the probabil¬ ity of his plot than for its atmosphere. If it is probable that in Eulenspiegel's community there should be so sane and resolute a peasant girl as Gertrude, to whom he is sincerely de¬ voted, it is improbable that his love for her should not have sufficed to steady him. As the <(stranger® of the episode he finds — meanwhile oblivious of Gertrude — a kindred spirit in the daughter of an innkeeper. But when a wager has carried him from an artful pretense to the point of realizing this spiritual kinship, he seems to see no incongruity in abandoning the girl to the commonplace lover whom she has promised to marry, in case she loses the bet. However, neither the plot nor the farcical comedy, of which there is no lack, gives this work its chief significance. The modernized Eulenspiegel is a Diogenes. It is hardly his fault if, in his search for an honest man he does not even find himself.

William G. Howard.

TILLAGE. See Agriculture in the United States.

, TILLETT, Benjamin, English labor leader: b. Bristol, 1859. He was employed in coal pits and brickyards from the age of eight years, went

to sea at 12 and served in the navy for two years after he was 17, being then invalided out of the service. He later became a tea coopei and in 18S7 w*as one of the organizers of the Tea Cooper's and General Laborers Association. He was also associated with the organization of the Dock, Wharf and General Workers Union of Great Britain and Ireland ancl became its secretary. He was one of the leaders of the Great Dock Strike of 1888 * for many years an alderman of the London County Council, and was several times an un¬ successful candidate for Parliament. He wˆas a loyal worker for maximum production during t le European W ar and wras one of the labor leaders sent to visit the Western battle front. , .Jl* °J of /* Trades Unions and Socialism* \r i ' > History °f the London Transport Workers Strike, 191 P (1912).

a: a. .i i • ' y v " lean ivietno

th£ol°glan : b- Henderson, N. C., 25 Aug 1854. He was graduated from Randolph-Macoi College in 1877 and from Princeton Theologi cal Seminary in 1880. He held a pastorate a an wile, Va., 1880-82 and has been professo; of systematic theology at Vanderbilt University since 1884 and vice-chancellor there from 1886 He has published (Our Hymns and Their Au thors (1889); < Discussions in Theology :

(1890); (Personal Salvation> (1902); (The Doctrines of Methodism/ (1903) ; <A Statement ol the haith of Worldwide Methodism* (1906) ; (Hymns and Hymn Writers of the Church * (with C. S. Nutter, 1911).

TILLEULENSPIEGEL, til'oi"len-spe-gel, a series of stories collected and first published in Low Dutch, in the year 1483. See Eulen- spiegel; Till Eulenspiegel.

TILLITE, a rock consisting of a hetero¬ geneous or non-stratified mixture of boulders and sand, supposed to have been glacial till originally. The name was applied by Davis to beds in the South African Permian succes¬ sion believed to have been of glacial origin. Shantum tillite is a member of Roxburg Con¬ glomerate in eastern Massachusetts of Car¬ boniferous, possibly Permian, age. See Till.

TILLMAN, Benjamin Ryan, American legislator: b. Edgefield County, S. C., 11 Aug. 1847; d. Washington, D. C., 3 July 1918. He received his education at Bethany Academy, entered the Confederate army on the outbreak of the Civil War, but was obliged to forego active service

owing to a severe illness. The close of the war found him undertaking the management of his mother's farm in the back country, a farmer in spirit and life. During the troubled days of Reconstruction he played his part in the reprisals of the whites. In the '80's a curious political situation developed in South Carolina, which finally landed Tillman in the governorship. The aftermath of war and the persistence of caste lines put a widening gulf between the aristocrats of the seaboard plain and the back country people of the mountains. With the overturning of the Republican domina¬ tion the patrician class began to resume once more oligarchic rule of the State. There were mutterings of discontent among the moun¬ taineers and farmers in the backwater districts. As champion of the latter Tillman suddenly found himself thrust forward. In 1890 in the most bitter campaign in the State's history he was elected governor. From the day of his inauguration to the end of his second term South Carolina was a constant ferment. The one incident of his rule that stands out among all the other turbulent affairs was his promul¬ gation of the famous dispensary law and the events following it. This law gave sheriffs and constables the power to enter stores and private houses and to seize any liquors found there which did not bear the stamp of the State. Riots occurred; Tillman ordered out the militia; some companies refusing to obey this summons were publicly degraded, and . condi¬ tions bordering on anarchy existed, but the law stayed and the governor was triumphant. Tillman soon became a national figure. He took a prominent part in the State Constitutional Convention of 1895, which set an educational qualification for the franchise, and by his vio¬ lent attitude against the negro he became the object of attack by Northern sentimentalists. He was a bitter opponent of Cleveland ; his speeches against the latter gaining him the name of ((Pitchfork Ben.® In the national Dem¬ ocratic conventions of 1896, 1900 and 1904 Till¬ man was the stormy petrel who raged at all who opposed his views. In 1894 he was elected to the United States Senate and was re-elected in 1900, 1906 and 1912. His terms in the Senate

were marked chiefly by the quarrels he had. Cleveland he had hated and it was not in the realm of possibility that he and Roosevelt could be other than enemies and enemies they frankly were during Roosevelt's incumbency of the Presidency. In his later years Tillman became less and less the bugaboo in the eyes of the people who had at first opposed him with all of the bitterness of caste and class. As he broadened into a national figure and in the Senate fought the fight of the whole South with untiring vigor, he came first to be tol¬ erated, then respected by all the people of his State. I he closing years of his life found him chairman of the Senate Committee on Naval Affairs,

perhaps the second most important governing body in the country, and as such he worked incessantly for the building up of the navy. He advocated a greater navy, gov¬ ernment armor-making plants, etc., and warned manufacturers that the government would force them to act fairly. He supported hi.s friend, Secretary Daniels, maintaining in pub¬ lic and private that Daniels was a misunder¬ stood, much underestimated man who would prove his worth in time.

TILLMAN, Samuel Escue, American soldier and author: b. near Shelbyville, Tenn., 2 Oct. 1847. He was graduated from West Point in 1869, and assigned to frontier duty. In the following year he was called to West Point as assistant professor of chemistry, and was later appointed professor of mineralogy and geology. He continued to teach ’in the Military Academy for many years, being re¬ tired by operation of law on 2 Oot. 1911. In 1874-75 he served as a member of the United States expedition to Tasmania to witness the transit of Venus. He was recalled to active duty on 6 June 1917 and assigned to duty as superintendent of the United States Military Academy. He is the author of <Essential Principles of Chemistry *(1884); (Elementary Mineralogy* (1894) ; (Elementary Lessons in Heat) (1889) ; (Descriptive General Chemistry) (1899) ; important Minerals and Rocks) (1900), and other textbooks.

TILLODONTIA, a group of extinct mammals, chiefly of the North American Eocene rocks. They were large plantigrade, five-toed land animals, whose skeleton presents charac¬ ters intermediate between those of Carnivora and Rodentia. The brain is small and slightly furrowed. The dentition was complete and marked by large, rodent-like incisors. A promi¬ nent genus was Tillotherium. See Rodentia.

TILLOTSON, til'ot-son, John, English prelate, archbishop of Canterbury: b. Sowerby, Yorkshire, October 1630; d. 22 Nov. 1694. His father, a strict Calvinist, brought up his son in the same principles. He was graduated at Cam¬ bridge and elected a Fellow of Clare Hall in 1651. In 1666 appeared his (Rule of Faith,* a reply to a work by John Sergeant, an English clergyman, who had become a convert to the Catholic faith. In 1670 he became prebendary of Canterbury. When Charles II, in 1672, issued a declaration for liberty of conscience for the purpose of favoring the Roman Catho¬ lics, he preached strongly against it, but was, nevertheless, advanced to the deanery of Can¬ terbury, and three years after (1675) presented to a prebend in Saint Paul’s. On the accom-

plishment of the revolution he was taken into favor by King William, and in 1689 he was ap¬ pointed dean of Saint Paul's. On the suspension of Archbishop Sancroft as a non-juror he was appointed to exercise the archiepiscopal juris¬ diction, and in 1691 accepted the archbishopric itself. He had previously formed an abortive scheme for the comprehension of the Presby¬ terians within the Church, and had also failed in another design for forming a new book of homilies. When, therefore, he accepted the primacy, a large party assailed him with great animosity. He bore these attacks in silence, and even prevented some prosecutions for libel against him, directed by the Crown. He was also charged with Socinianism ; in answer to which he republished four of his sermons on the Hncarnation and Divinity of Our Saviour. > The only class to whom he did not show a mild and tolerant spirit was the Roman Catholics, toward whom he had a strong aversion. Tillot- son's sermons were for half a century the most popular of that class of compositions in the English language but have since fallen into neglect and even disesteem. In other respects than that of style they are generally commended for benignity of spirit rather than depth or richness of thought. An edition of his sermons was published by his chaplain, Dr. Ralph Barker (14 vols., London 1695-1704). Consult also Birch, Thomas, (Life) (London 1752).

TILLY, til l (Fr. te-ye), Johann Tserklaes,

Count of, Bavarian commander : b. Castle Tilly, Brabant, near Belgium, February 1559; d. Ingolstadt, Bavaria, 30 April 1632. He received a strict Jesuit education, but preferring life in the army he became a soldier of fortune in the service of Spain, and later in that of Austria, after which he attached himself permanently to the Bavarian army, and under the banner of its king, the head of the Catholic League, en¬ tered upon the Thirty Years' War. His' first signal victory was that of White Mountain, 6 Nov. 1620, when he defeated the Protestants in Bohemia. He was victorious over Christian of Brunswick at Hochst (1622) and Stadtlohn (1623), thus gaining the title of Count of the Empire. In 1626 he compelled Christian of Denmark, who had joined the Protestant forces in Saxony, to retire into his own domain. In 1630 he was made commander of the Imperial army and in 1631 won the famous battle of Magdeburg against Gustavus Augustus of Sweden and the Saxon Protestants. In the fol¬ lowing September the Bavarian troops were, however, completely routed by the Swedes at Breitenfeld, and in the engagement upon the river Lech, April 1652, Tilly, who had been victorious in 36 battles in the religious wars of Germany, was mortally wounded. Consult Klopp, O., (Tilly in

Dreissigjahrigen Krieg) (Stuttgart 1861); Villermont, (Tilly, ou La Guerre de trente ans) (Tournay 1859) ; Wittich, K., (Magdeburg, Gustav Adolf und Tilly 5 (Berlin 1874).

TILSIT, Germany, a town in East Prussia, at the confluence of the Memel or Niemen, and the 1 ilse, 65 miles northeast of Konigsberg. Its principal buildings are the gymnasium, real- school, churches, theatre, barracks, castle ruins and benevolent institutions. The chief manu¬ factures are iron castings, machinery, paper, soaP > glass, oils, snuff, chemicals, cloth, cheese

and leather. The eel and salmon fisheries are important, as well as the large stock-markets. At Tilsit the famous peace ending the Russian-French-Prussian War was concluded (1807), by various concessions, changes of territorial gov¬ ernment, Napoleon largely dictating the terms. In the early days of the European War in 1914 Tilsit was taken by the Russians, but later abandoned. See War, European. Pop. 40,000.

TILTON, Theodore, American journalist: b. New York, 2 Oct. 1835; d. Paris, France, 25 May 1907. He was graduated from the Col¬ lege of the City of New York in 1855 and be¬ came a journalist on the New York Observer. In 1856 he joined the editorial staff of the Independent, and in 1863 became its editor-in- chief. In 1871 he became an editor of the Brooklyn Union, but shortly after established a weekly periodical, the Golden Age , which he discontinued in 1874. In 1874 he caused great con¬ sternation in Plymouth Church, Brooklyn, and a sensation throughout the country, by accusing the Rev. Henry Ward Beecher of criminal in¬ timacy with his wife. The trial which resulted in the disagreement of the jury, covered a period of six months. After 1883 he lived abroad. He was the author of several volumes of verse, The Sexton's Tale and Other Poems) (1867) ; Thou and I * (1880) ; (Swabian Stories > (1882); The Chameleon's Dish) (1883); (1894) ; a novel, entitled Tem¬ pest-Tossed* (1873) ; The Fading of the May¬ flower: A Poem) (1906).

TIMARU, a New Zealand town on South Island in Geraldine County, on the east coast, 100 miles by rail southwest of Churchtown. It is an important railroad centre, being situated at the very junction of the Fairlie line. The principal exports are flour, wool and frozen meats. Timaru has a fine harbor. Pop. about

TIMBER AND STONE LAW. On 3

June 1878 Congress passed the Timber and Stone Law which wTith

certain amendatory acts is now in force. Under this law all unreserved unappropriated, non-mineral surveyed public lands within the public land States^ which are chiefly valuable for the timber or stone thereon and unfit for cultivation at the date of sale, may be sold at their appraised value but in no case less than $2.50 per acre. One timber and stone entry may be made for not more than 160 acres (a) by any person who is a citizen of the United States or who has declared his intention to become such citizen, if he is not under 21 years of age and has not already ex¬ hausted his right by reason of a former appli¬ cation for an entry under this act or has not already acquired title to or is not claiming under the other public lands laws any other lands which with the land for which he ap¬ plies would aggregate more than 320 acres or (b) by an association of such persons or (c) by a corporation each of whose stockholders is so qualified. Provision is made for a careful appraisement of the value of the timber and stone on the land in question and the appli¬ cant must make payment in accordance with such appraisal.

TIMBREL, a musical instrument much re¬ sembling a tambourine (q.v.), has been in use since the earliest times. It is mentioned in the

first book of the Old Testament (Ex. xv, 20), and seems to have been known to all ancient peoples. It is also known as the tabor, tabret, tambor, etc., and its form varies from the- bottle-shaped drum of Egypt or the lone nar¬ row drum of Provence, to the modern tam¬ bourine of Spain.

TIMBUKTU, tim-buk'too (also spelled Tomboucton and Timbuctoo), French Sudan, a celebrated trading station situated on the great bend of the Niger River, on the southern border of the Sahara, in lat. 16° 43' N., and long. 2° 57' W. The city lies in a desert region about nine miles from the banks of the river, and 800 feet above sea-level. It measures three miles in circumference, and consists of adobe houses without windows. In the centre are three large mosques, and on the northern out¬ skirts two forts. The commerce by caravans across the Sahara was formerly enormous, is still considerable and again increasing, being estimated at $4,000,000 annually. The "trade is chiefly salt, fabrics, hardware, ostrich feathers rubber, cotton, tobacco, sugar and gold. Recent excavations have disclosed ancient Egyptian architecture pointing to a prehistoric founda¬ tion. The modern city was founded toward the end of the 11th century, and became known to Europeans

in 1353. Owing to its former difficulty of access Timbuktu was long an ob¬ ject of curiosity for travelers. The sultan of Morocco captured the city and adjacent ter¬ ritory in 1590, deposing the native Songhoi rulers. After a time the Moroccan rule was thrown off, and various tribes controlled the city until the French took possession of it in 1893. A telegraph line connects with Algeria. A French military territory has its headquarters there. Pop. (1917) about 16,000, almost all Mohammedans. Consult Dubois, (Timbuctoo, the Mysterious > (1896) ; Lady Lugard, (A

Tropical Dependency) (London 1905).

TIMBY, Theodore Ruggles, American in¬ ventor : b. Dover, Dutchess County, N. Y., 5 April 1822; d. Brooklyn, N. Y., 1909. He <(was an inventor from childhood,® says Parton, and at 16 invented the floating dry dock. Among his other inventions are those of floating bat¬ teries of iron and steel for coast-defense; a method of sighting and firing heavy guns by electricity, patented in 1862 at Washington, afterward adopted by the United States govern¬ ment, and now used in all leading countries ; the American turbine wheel; the first portable barometer; the process of printing terrestrial globes in colors ; and a process for quickly ripening coffee. He was the first to advocate the modern use of iron in the construction of warships, and his most famous invention is the revolving turret which was first introduced in the original Monitor (see Monitor, The; Monitor and Merrimac), and has since been adopted in naval architecture throughout the world. This invention, through official neglect and other failure to recognize and proclaim Timby's contribution to the national defenses that gave victory in (<the battle upon which hinged the fate of the Civil War,® has been wrongly ascribed to John Ericsson (q.v.), chief engineer of the Monitor. But the true history of the case shows that as early as 1841 Timby exhibited at the War Department a model and plans of a revolving battery, to be

made of iron, the idea of which was suggested to him when first he observed the circular form of Castle William on Governor's Island, New York harbor. In 1843 he is said to have filed his preliminary specification of the model and plans in the United States Patent Office, and Caleb Cushing the same year sent a duplicate model to China. (See illustration under Monitor). The published records of the office reveal patent No. 3,673 sealed to Theo¬ dore R. Timby of Cato, N. Y., in 1844 for an improved waterwheel, also patent 4,845, 10

Nov. 1846, for its further improvement, and this is recorded as expired in 1861. On 31 Dec. 1844 a patent was granted to John

Ericsson for propelling ships. But there is no record of the revolving floating or coastal battery by either inventor. It is interesting to note, how¬ ever, that 11 Aug. 1841 a patent was granted to Prosper Martin of Philadelphia, Pa., for floating batteries; and 11 Oct. 1841 to Daniel Fitzgerald, New York, for submarine gun¬ boats. Timby, from 1851 to 1861, is said to have urged the importance of the revolving floating battery on Emperor Napoleon III. Meanwhile, having developed improvements in his invention, the outbreak of the Civil War was his opportunity, and on 8 July 1862 patents Nos. 35,846 and 35,847 were granted to Theo¬ dore R. Timby of Worcester, Mass., for (a) revolving battery tower, (b) discharging guns in revolving tower by electricity, and (c) No. 36,593, 30 Sept. 1862 improved revolving bat¬ tery tower. Incidentally in 1862-63 he re¬ ceived patents for portable warming apparatus; for mercurial barometers; for solar time globe and solar timepieces. The only records of patents to John Ericsson around these dates are three in 1863 comprising (a) instruments for taking soundings; (b) port-stopper for vessels of war; (c) operating gun carriages. Under his revolving battery tower and related patents, Timby entered into an agreement with the builders of the Monitor, including Ericsson as supervising engineer, for its use in the con¬ struction of that vessel, and received therefor $5,000. He also received $5,000 royalty for each of the two subsequent vessels built by that company. Although this American inven¬ tor received no compensation and no official recognition of his services to the country, his claims were not officially disputed. His invention of the revolving turret, as well as of the <(Timby system® of coast-defense adopted by many nations, has been acknowledged by military and naval authorities at home; the legislature of New York passed (1890) a concurrent resolu¬ tion declaring it to be the <(duty of Congress to make such investigation ... as shall do ample justice in the premises and vindicate the genius that contributed so largely in rescuing the country from a grave peril during the dark¬ est days of its existence® ; and influences were brought to bear on Congress and elsewhere to secure full acknowledgment of his patent rights and remuneration for his work from the United States government. Bills to this end were introduced in the national Senate in 1893 by the senators from New York, but apparently without result. An interesting applicable com¬ mentary on such conditions may be found in the report of Charles M. Keller, examiner of patents for the year 1844 (Doc. No. 78, p. 507) :

<(It is a matter of surprise that society at large which has been and

must continue to be so much benefited by inventions and the progress of the useful arts should pay so little atten¬ tion to this subject. The fruits of the labors of inventors are. enjoyed and recognized by the world at large, but the authors of all these benefits pass through the world unnoticed, and in most cases unrewarded. It is to be re¬ gretted that literary men do not turn their attention to the progress of the useful, and, with the pen of fancy, add ornament and beauty to the solid edifice. Mr. Timby received patents for a mole and tower system of defense (1880) ; a subterranean sys¬ tem of defense (1881); and a revolving tower and shield system (1884). In his later years he was a resident of Brooklyn, N. Y., where he occupied himself with various literary and other avocations, being especially interested in scientific and philosophical pursuits. Among his writings is a volume entitled (Lighted Lore for Gentle Folk) (1902), which contains his reflections on a variety of subjects. Consult New York Herald and New York Evening Post, 7 June 1843; Harper's Monthly, January 1863, pp. 241-248; (American Annual Cyclo¬ paedia^ 1864, <(Revolving Turrents,® pp. 719- 723; Todd, (Nuts for Boys to Crack) (1866), p. 166; Parton, (The People's Book of Biography — Lives of the Most Interesting Persons of All Ages and Countries, } containing a sketch of Timby and an account of his con¬ nection with the Monitor; King, ((Theodore R. Timby® (in Successful Americans, January 1902) ; American Shipbuilder, 23 Oct. 1902, ((A Half-forgotten Hero® ; and Memorial of the Patriotic League of the Revolution to the 57th Congress, presented by Virginia Chandler Tit- comb, 1902.

John H. Clifford,

C. Leonard- Stuart, Editorial Staff of The Americana.

TIME, that dimension of the world which we express in terms of before and after. Our experience of time is in general analogous with our experiences of space (q.v.), but it has cer¬ tain important differences from the latter. These reside primarily in the fact that whereas it is customary for us to think only of the physical order of things in spatial terms, the temporal sequence pervades mind and matter alike. For this reason many philosophers who have treated of space as something secondary and derived have assigned to time a very fundamental status. This has been especially the case among such idealists as Berkeley. In Leibnitz's philosophy time appears as the backgound, so to speak, of the pre-established harmony between the monads, while space is merely the confused perception of their logi¬ cal relations. Royce, like most of the Abso¬ lutist disciples of Hegel, holds a view of time which makes it prior to all finite minds, form¬ ing their natural environment, as it were, while for the Absolute

Experience it is merely a phase of mental content. Bergson considers time the only true dimension of Being, when this is perceived in the truest manner by intui¬ tion, while he considers space as an artificial in- tellectualization of the time process.

These views of the nature of time are op¬ posed to those which assimilate it to space.

Kant, for example, makes time the form of the internal sense and space the form of the external sense. The time of the natural scientist has always partaken of the nature of space and now partakes of this nature more than ever, for it is considered by the advocates of the theory of relativity (q.v.) that a moving body carries with it a temporal system entirely dif¬ ferent from that of the world with reference to which it is at rest and that the true units of both time and space are neither points nor moments, but moments-in-the-history-of-a-point. The grand problem in the philosophy of time consists in the harmonization of these physical time theories with the apparent differences be¬ tween time and space.

The first step toward the closing of this breach is the analysis of our experience of time. This has been done with great care by William James (q.v.) in his Principles of Psychology.1* He finds that within a definite, limited interval of duration, known as the specious present, there is a direct perception of the temporal re¬ lations. After an event has passed beyond the specious present, it can only enter into con¬ sciousness by reproductive memory. As James says, (<The object of memory is only an object imagined in the past to which the emotion of belief adheres.® One might add in the same way that our cognition of the future is only cognition by anticipation and that the object of anticipation is only an object imagined in the future to which the emotion of belief adheres.

We thus see from James' account that our temporal experience is divided into three quali¬ tatively distinct intervals: the remembered past, the perceived specious present and the anticipated future. By means of this tripartite division, we are able to orient our present selves in the temporal stream of our own ex¬ perience. However, we do not merely have at our disposal the temporal order generated by our present experience, but the memory of the temporal orders of past experiences, and the expectation of the temporal orders of future experiences. These temporal orders are them¬ selves subject to a correlation and a temporal arrangement, for two temporal orders not too remote from one another will possess in com¬ mon certain items by which they may be com¬ pared and the order of their specious

presents be determined. As a consequence, it is pos¬ sible to construct a secondary temporal order of the immediately given temporal orders of our experience and it results directly from this that we can construct a temporal arrangement of our specious presents and their contents. We thus see how it is possible for time to have its roots in experience and yet to be a dimension in which experiences and their con¬ tents are arranged.

Now, it has been shown in the article on space that the ease with which space under¬ goes scientific manipulation is due to the fact that the space of science is a construction from the spatial data of our experience which is largely determined by considerations of scien¬ tific convenience. As we have just seen, the fact that experiences are arranged in time does not prevent the stuff from which time is made fj °m being of the nature of experience-data. There is consequently no obstacle to a treat¬ ment of this material in a manner entirely

parallel to the physical treatment of space, or to the combination of time-data with space- data and other empirical data into a single universe which' is not separable into purely spatial and purely temporal dimensions, as in the case of the theory of relativity. Of course, the time of science, like the space of science, is a construction which is largely arbitrary and so in a sense a fiction, but there is reason to believe that the time of the unscientific man. of Bergson himself, owes its homogeneity, its unique, definite direction of flow, its continuity, to more or less unconscious acts of construc¬ tion which differ in degree, not in nature, from those of the scientist. There is no reason to believe that our time data, taken raw, un¬ ordered, unschematized, indicate of themselves a single series into which all events fit in a definite order; indeed, there is good reason to believe that the laws which we unquestioningly associate with time are outlined only in the vaguest way in our definite temporal experi¬ ences.

Before leaving the subject of the phi¬ losophy of time, a word or two must be said concerning the Zenonian paradoxes. These have to do with the flying arrow, which cannot remain where it is, nor be where it is not, and with Archiles, who, though the swiftest of men, cannot catch up with the slow tortoise except by occupying an infinity of positions, and with other similar matters. In fact, though these paradoxes seem to deal with space and time, they deal with the

properties of infinite assemblages (see Assemblages, General Theory of) and dense series and were in truth unanswerable until the recent thoroughgoing mathematical treat¬ ment of these matters, though they have now been completely solved. (For a more detailed treatment of these paradoxes see Zeno of Elea). Here it is only necessary to state that Bergson mistakenly regards these difficulties as insur¬ mountable on an intellectualistic view of time and that James turns them to use in proving his theory that time is discontinuous.

Bibliography. — Bergson, H., (Time and Free Will* (trans. London 1910) ; Bcodin, J. E., (Time and Reality) (New York 1904) ; James, W., Principles of Psychology) (New York 1890) ; Robb, A. A., (A Theory of Time and Space) (Cambridge 1914) ; Royce, J., (The World and the IndividuaP (New York 1900- 01); Russell, B. A. W., (Our Knowledge of the External World as a Field for Scientific Method in Philosophy y (Chicago 1914).

TIME, Measurement of. All our meas¬ ures of time depend primarily upon the motion of the earth upon its axis and around the sun. The first motion enables us to count off the suc¬ cessive days ; the other the successive years. The measurement of time thus becomes a most important branch of practical astronomy in the affairs of men. It falls into two distinct classes, the determination of the years and that of the days or fractions of a day. Other units of time than this may be regarded as subsidiary. Centuries are determined by the count of years ; weeks and months by a count of days ; hours, minutes and seconds by dividing the day into fractions.

The primary object of a measure of time is the expression or determination of the moment

or date of any event. This is expressed by the period of time elapsed since some standard moment or epoch. Long intervals, expressed in years, are measured from some great epoch, chosen by a nation — in all Christian nations the birth of Christ is taken for this purpose. The general subject of measuring or expressing long intervals of time is treated in our article Chronology (q.v.). The present article deals mainly with fractions of a day, or with what is commonly called the <(time of day.®

To express the time of day we must have a moment at which we consider the day to be¬ gin and from which we count the hours and minutes. The natural moment for this purpose is that when the sun crosses the meridian, be¬ cause it can be more easily observed than any other phenomenon growing out of the earth’s rotation. This

moment is actually taken as the beginning of the day by astronomers on shore and, to a large extent, by navigators at sea. The latter usage grew out of the fact that at noon the navigator determines the latitude of his ship. But, to express the moment of an event, navigators are now beginning to count from midnight, as landsmen habitually do. The Jews formerly considered the day to begin at sunset and the practice in ancient times was to divide the 24 hours into two parts, the day and the night. Each of these parts was divided into 12 hours. Thus men had the first, second and third hour of the night, etc., and the corre¬ sponding hours of the day, as we see in the Bible. Owing to the inequality in the length of the day at different seasons of the year, the hours thus employed were of unequal length. In an age when the modern clock was unknown and there was no accurate instrument for meas¬ uring time in universal use, this inequality was of little importance. But when an accurate measure was once obtained, a more uniform measure of the hours became necessary. For obvious reasons midnight became the most con¬ venient time to begin the day of 24 hours. Thus arose the system of setting the clocks at 12 when the sun crosses the meridian, be¬ ginning a new day 12 hours later when the clock marks midnight and dividing the hours into a.m. and p.m. This system was adopted without change until the introduction of rail¬ ways showed its defects and made a slight modification necessary.

The first inconvenience felt from the system arose from the fact that the intervals between successive noons, as indicated by the passage of the sun across the meridian, are not equal. To show the nature and effect of the inequality, let us suppose a perfect clock so regulated as to go always at the same rate and to be set at noon on 1 January of any year at the moment when the sun crosses the meridian and to be so ex¬ actly regulated as to again show noon on 1 Jan¬ uary of the year following. It will be found that, during the month of January, the clock will continually gain on the sun at a rate of 28 seconds a day at the beginning of the month, which rate will continually diminish to eight seconds at the end of the month and will change to a losing rate about the middle of February. The effect of the accumulation will be that, at the latter date, the clock will be found to be more than 10 minutes ahead of noon when the sun crosses the meridian. Then it will begin

to fall back for several months until, in May, it will be seven minutes slower than the sun. Then it will forge ahead again and again fall

behind until, when January again comes around, it will once more coincide with the sun.

This inequality between the moments of the sun's successive transits over the meridian is due to two causes; the obliquity of the ecliptic and the eccentricity of the earth's orbit. If, in¬ stead of using the sun, we measured time by the apparent diurnal motion of the stars, no inequality would be noticeable. The effect of the eccentricity is that the sun seems to move forward among the stars more rapidly in the winter months than in those of summer. And the effect of the obliquity of the ecliptic is a still larger inequality, going through its cycle of changes twice in a year.

So long as an error of modern fractions of an hour was of no importance, people in gen¬ eral had no occasion to trouble themselves with this inequality; but when time had to be meas¬ ured to a minute, it became intolerable, and the system of mean time had to be introduced. The latter is defined by the going of a perfect clock in the manner already supposed, and so set that, in the average of the whole year, it shall be as much ahead of the sun as behind it. The greatest difference between the clock and the sun will then be about 16 minutes, which difference occurs in one direction early in November, and in the other about the middle of February. The difference is called the equation of time and is given for each day in the house¬ hold almanac, thus enabling the household clock to be set by the sun. Some such system as this is now used in all civilized countries where ex¬ act time is of importance.

Besides true solar time and mean solar time, a species of time of great importance to the astronomer is sidefeal time. Sidereal time is measured by the stars, or rather by the daily motion of that point in the equator from which the true right ascension of the stars is reckoned, called the vernal equinox. Two suc¬ cessive upper transits of the vernal equinox over the same meridian determine a sidereal day, which is nearly 3 minutes and 36 seconds shorter than a mean solar day, but divided, like it, into 24 hours. About 21 March are sidereal and mean times agree; the former gains on the latter an entire day in the year. The sidereal day commences at the instant the vernal equinox makes its upper transit, and, therefore, changes in 12 months through the entire 24 hours. The hours are counted from 0 to 24.

Time may be determined by observations on the sun or stars with a sextant, or an altazi¬ muth for rough purposes, or with a transit adjusted to the meridian, for refined work. With the last instrument a chronograph is fre¬ quently used for recording the observations. The

telescope usually has from 5 to 11 equi¬ distant lines ruled on glass (or spider lines), which are placed in the common focus of the eye-piece and object glass, the centre line being adjusted to the optical axis of the telescope and set in the meridian. When ready for observa¬ tions, the observer sets the telescope at the proper angle to observe the passage of the star across the meridian, and records on the chrono¬ graph the transit over each line by interrupting the circuit with an observing key held in the

hand and electrically connected with the chro¬ nograph, on which a break-circuit chronometer is making a continuous record. The chrono¬ graph sheet is read by means of a scale.

A relation which was of little immediate importance in former generations, but which became very important when railways began to run, was that of the relation of time to longi¬ tude. We readily see that, as the earth re¬ volves, the various meridians on its surface are brought into line with the sun. Another way of conceiving the case is to think of noon as continually traveling around the earth from east to west. The rate of motion is one hour for every 15 degrees of longitude. What is true of noon is true of any other hour of the day. Any such hour is about three hours cross¬ ing the continent from the Atlantic Coast to San Francisco. The result of this is that if a passenger with a good watch travels westward, he will find his watch continually ahead of the time at the places he reaches. Of course the opposite effect is produced when he travels east. Before 1883 this relation of time was produc¬ tive of endless confusion on railways every¬ where. Conductors could not be changing their watches every minute as they traveled east or west, and thus every railroad had to adopt some meridian as that by which it kept its time. _ There were, therefore, almost as many meridians as railroads, and passengers frequently missed their trains by not knowing what time to go by.

In 1883 was introduced our present zone system, which is now used over almost the en¬ tire country, and is rapidly being introduced into Europe. _ This system consists in dividing the country into zones by meridians of longitude, 15 degrees, or one hour apart. The central merid¬ ians of the zones used in the United States and Canada are those of 60 degrees west of Green¬ wich,. 75 degrees, 90 degrees, 105 degrees and 120 degrees, known respectively as Colonial or Atlantic, Eastern, Central Mountain and Pacific time. The lines dividing one zone from the next are arranged, as nearly as convenient, to run about midway between these meridians. Within each zone one and the same time is used.

The result of this system is that, so long as a traveler journeys only within a single zone he finds the time to be everywhere the same. But when he crosses the line from one zone to the next, the time suddenly changes by one hour. In traveling from New York to San Francisco he crosses three of the zone lines, so that, on arriving at his destination, the time will be three hours slower than in New York.

It should be carefully understood that in this system of expressing time, which we now use throughout almost our entire country, the time actually used is not the true time of day, as indicated by the sun, except on the standard meridians. It does not correspond to sunrise or sunset, as given in the almanacs. At mid¬ way points, Cincinnati, for example, the time used is necessarily in error by almost half an hour in one direction or the other. But the in¬ convenience thus arising is very slight. Con¬ sequently, if any one determines his time by the passage of the sun across the meridian, he must correct it according to his longitude, from his standard meridian, in order to obtain the stand-

TIMGAD, ALGERIA

1 The Forum and Capitol

2 General View from the Summit of the Theatre

TIM GAD, ALGERIA

1 The Arch of Trajan

2 Mosaic Pavement in the Court of the Baths

aid time. The inconvenience thus arising is very small compared with the advantages of the Uniformity to which the system gives rise.

Similar systems are in use in all European countries except Ireland, Holland, Russia and Greece, which retain the time of their capitals, except in the case of the Russian railroads, which take their time from Pulkova. All other European countries take their time from merid¬ ians differing by an integral multiple of 15° or 7/2 from that of Greenwich. This is in accord¬ ance with the method of reckoning time for in¬ ternational purposes, agreed to by the Interna¬ tional Conference held at Washington, D. C., in 1883. Universal time is reckoned from mean noon, the day commencing at midnight, and di¬ vided into 24 (instead of into two portions of 12) hours each. Local time will still be used for local purposes ; but the method of fixing it will be changed. Since the earth is divided into 360° and the day in 24 hours every 15° will represent the difference of an hour in time. If the earth be divided into 24 equal parts, at every 15th meridian, and if the local mean noon of such meridians be adopted as the standard noon of all places *74° each side of it, it will follow that when it is noon at Greenwich and at all places within 7*4° of Greenwich, it will be 11 o'clock by local (but still noon by universal) time for all places between 7ˆ4° and 22ˆ4° west of Greenwich, and 13 o'clock by local (but still noon by universal) time for all places between *74° and 22*4° east of Greenwich, and so on throughout the world. Universal time will be the same universally, and local time will differ from it only by even hours, instead of by the various odd minutes by which local standards differ from each other at the present time; while in no case will the difference between standard noon and absolute noon at any place exceed half an hour, since a difference of 7ˆ4 degrees of longitude equals a difference of half an hour in time.

Time Signals. — Many observatories send out time signals either daily, hourly or some¬ times continuously every second, or every other second, to various parts of the country for the purpose of giving accurate time to all sorts of industries. They are sent out over the

tele¬ graph lines, the wires being permanently run into the observatories for the purpose, and the signals are generally sent automatically by a distributing clock which is kept as near the exact time as possible. An electric current passes through the clock and is broken or closed regularly ,by a toothed wheel on the second hand arbor of the clock. Perhaps the best known set of time signals is that sent out by the Naval Observatory at Washington. It is as follows : three or four minutes before noon, whenever the telegraph companies switch in the loops to the observatory, the clock begins to send out make-circuit signals every second over the various lines, the minutes being indicated by leaving out the seconds 55, 56, 57, 58 and 59 in each, and the half minutes by leaving out the 29th second of each. The click following such a one-second gap then always indicates the be¬ ginning of a half-minute and the first following a gap of five seconds indicates the beginning of a minute, except at the exact noon. Just before this there is a gap of 10 seconds, and then ex¬ actly at noon the circuit closes and remains

closed for just a whole second, the beginning of the marks indicating exact noon. The closing for a whole second is in order to make sure that that particular mark goes through all the tele¬ graph lines, for this particular signal is made to do a great many things at different places, such as the dropping of time balls, and it is. more important that this particular second be distinctly sent than any of the others. After the break at the close of the noon signal the telegraph companies quickly switch out the loops to the observatory, and the lines immediately resume their normal work. In the city of Washington this particular noon signal drops a time ball on the top of the State, War and Navy Department Building, and it also auto¬ matically corrects, by setting forwrard or back exactly to 0 hours 0 minutes 0 seconds, all the clocks in the department buildings of the gov¬ ernment, no matter how much they may have gained or lost since the preceding noon.

In recent years an artifical regulation of time, consists in arbitrarily setting forward all public clocks by the amount of one hour on the first of May of each year, the hour being again dropped in the month of October. The principal advantage of this proceeding is that during the summer months the time of artificial lighting is lessened, with a consequent large aggregate saving in expenditure. Up to the year 1916, this regulation had been adopted in England, Germany, France, Austria, Holland, Denmark, Norway, Italy and Portugal. It was adopted as a war measure in the United States in 1918-19, but was repealed in the latter year.

TIMGAD, Algeria, the ancient Roman city Thamugadi, in the

department of Constantine, near Lambeze, about 25 miles southeast of Batna on the Philippeville-Biskra Railroad, is approached through a valley bounded by the Aures Mountains and stands on the northern fringe of the African Desert. It was a forti¬ fied frontier town at the junction of six roads, and was founded in 100 a.d. by Lucius Munatius Gallus. It flourished for three centuries and then underwent various vicissitudes, owing to native insurrections and the incursions of the Vandals, in 535 being partially destroyed. Four years later, under the Byzantine general Solo¬ mon, it was restored and had another period of prosperity until the Arab invasion of 646, when the Christian governor, Gregory of Tim- gad, was defeated and killed, the town being subsequently abandoned, falling into ruins and gradually becoming buried beneath the desert sands. Recent excavations undertaken by the French government have revealed ruins, which for beauty, architecture and magnificent extent have gained for Timgad the title of the ((Afri- can Pompeii. ˆ Nearly the whole of the city has been laid bare (see illustrations) and ex¬ hibits the usual Roman platting, two main streets, the Decumanus Maximus extending east and west and the Cardo Maximus intersecting at right angles, upon and around which the city was built. The principal buildings are on the main streets and among the prominent civic features are the magnificent triumphal arch of Trajan, the Forum (seating 3,500), with the theatre, basilica, library and other buildings surrounding it, the temple of Jupiter Capi- tolinus, statues of the Roman emperors, a Byzantine fort, the Christian basilica and ca-

thedral erected by Gregory, the governor al¬ ready mentioned, houses and stores, markets and annexes, thermae and latrinae. The arch of Trajan, the finest Roman construction of its kind in northern Africa and the dominat¬ ing attraction of Timgad, bears an inscription which translated reads :

. “The Emperor Caesar Nerva Trajan Augustus Germa- mus, son of the divine Nerva, sovereign pontiff, four times tribune, three times consul, father of his country, founded the Marcian colony, Trajan of Thamugadi, by the help of > the third Augustus Legion, Lucius Munatius Gallus being the legal imperial proprietor.”

The epigraphic wealth of the city is con¬ siderable, including inscriptions to early Chris¬ tians, showing that they were persecuted and underwent martyrdom, while others bear such historical names as

Novatus, a member of the Council of Carthage in 258; Sextus in 320; Faustinius, opponent of Gaudentius the Dona- tist, in 411, and Secundus, bishop of Numidia, exiled by Huneric in 484. Consult Ballu, A., 'Guide Illustre de Timgad) (Paris 1911).

TIMOLEON, ti-mo'le-on, Grecian com *mander and liberator of Sicily: b. Corinth, about 400 to 395 b.c. ; d. Syracuse, 337 b.c. He was accused of having caused the death of his brother, Timophanes, the head of the state, and is said to have exiled himself from Corinth for 20 years in consequence. Little is known of his life until he entered the service of the Greek cities of Sicily in the effort to expel their Carthaginian invaders, an undertaking in which he met with signal success. In 343 he drove Dionysius from Syracuse and in 339, with only 12,000 men, met and conquered a force of 70,000 Carthaginians and allies under Hasdrubal and Hamilcar, at the Crimissus. Thereafter he se¬ cured a treaty by which the Carthaginians were confined to the territory east of the Halycus. In the cities thus freed from their ehemy, he restored democratic government, and " was looked upon as the defender of their liberties. In Syracuse he. not only restored ancient rights, but gave its citizens a new and yet more liberal constitution. Consult Plutarch's 'Lives.*

TIMON, tl'mon, Athenian misanthrope: b. near Athens. He flourished in the later part of the 5th century b.c., and the ingratitude of his. friends so greatly embittered him that he retired into solitude.. His name has become proverbial as descriptive of a misanthrope. He formed the subject of a famous dialogue by Lucian and his story is familiar 'through Shake¬ speare's tragedy.

TIMON OF ATHENS. Very little has yet been discovered concerning (Timon of Athens. *There is no record of any early performance or any edition other than the strangely imperfect one in the folio of 1623. On the evidence of style the play is dated about 1607 and thus referred to the same period as the three other tragedies with which it has most in common, 'King Lear,* (Antony and Cleopatra) and 'Coriolanus. *It is generally agreed that the best parts of Timon are not only Shakespeare's but must be counted among his highest achievements in poetry — "poetry, as a recent writer has said, "coming short of Lear,* perhaps in poignancy of diction and ceitamly in pathos of situation, but surpassing even 'Lear *or 'Coriolanus* in the sheer force of that emotion which, in different forms, is

common to the three piays (Wright). On the other hand, many of the un-Shakcspearcan scenes are of almost unaccountable poorness, by no means justifying Masefield's verdict that they were written by ((a man of genius, a skilled writer for the stage, and of a marked per¬ sonality.

The best supported modern view is that something over half the play is by Shake¬ speare and the rest the unintelligent addition of an unknown reviser. Fleay thought that the Shakespearean fragment was hastily expanded in 1623 for the express purpose of making it fill a gap in the Folio volume, caused by the decision to remove (Troilus and Cressida) from * the number of tragedies. One of the sources is certainly the brief account of Timon in Plutarch's 'Life of Mark Antony, *whence Shakespeare derived most of his material for 'Antony and Cleopatra.* This may have been supplemented by a similar, but much longer narrative in Painter's (Palace of Pleasured The introduction of incidents not found in either of the foregoing works seems to estab¬ lish the use also of an anonymous earlier Timon play (a comedy), and perhaps of Lucian's dia¬ logue of Timon. There are yet unsolved diffi¬ culties about explaining how the last two writ¬ ings became known to Shakespeare, for the Timon comedy seems neither to have been printed in Shakespeare's day nor to have been acted in London, whereas Lucian's dialogue was not accessible in English. In 1678 the Restora¬ tion dramatist, Thomas Shadwell, brought out a revision of 'Timon of Athens, *of which he boasted, «I have made it into a play.® The claim may be allowed, for Shadwell's play had reasonable success and there exists no posi¬ tive proof that 'Timon of Athens* had ever been acted previously. A later adaptation, made by Richard Cumberland in 1768, was acted by Garrick in 1771. Cumberland omitted large por¬ tions of the original, added the character of Evanthe, Timon's daughter, romanticized that of her lover, Alcibiades, and much lightened the gloom of the play's close. This piece was a \ Horace Walpole remarked sardoni¬ cally that Cumberland's alteration was Mar¬ vellously well done, for he has caught the man¬ ner and diction of the original so exactly, that 1 think it is full as bad a play as it was before he corrected it. The best recent discussion of 'Timon of Athens *is by E. H. Wright ('The Authorship of Timon of Athens,* 1910).

Tucker Brooke.

xxmvˆ, re-mor, an island of the Malay Archipelago the most eastern and largest of "V- lesser Sunda Islands, 700 miles southeast of Borneo and 500 miles west by south of Papua or New Guinea; length, 300 miles; width 60 miles; area, 12,450 square miles. Coasts are steep and generally difficult of access on ac¬ count of coral reefs; the island is traversed by a mountain chain everywhere giving evidence

°f V° aha °Jigin ; ?ne peak' Mount Atlas, is over 12,000 feet; the

interior is very little

known. The vegetation is less luxuriant and less varied than in the other islands of the East indies. I he coast lands are cultivated to some extent the northern part of the island being more favorable to agriculture than the south¬ ern. Coffee, rice, sugar and cocoanuts are grown, but mostly for domestic use ; some coffee is exported, also sandalwood, wax, trepang and

tortoise shell. Horses, ponies and cattle are rˆlse<ˆ and a few exported. There is consider¬ able mineral wealth, but it has not been de¬ veloped. The people are mainly Papuan, with Malayan. Polynesian and Negrito mixture, with a few Chinese, who control the trade. Many of the people are savage, being classed as «head-hunters.55 The island politically is divided be¬ tween Portugal and Holland, the northern part (7,350 square miles) being Portuguese, the southern part (5,120 square miles), Dutch. This division was first made by treaty in 1859, and the boundaries and relationship of the two countries more exactly defined by another treaty in 1893. In 1908 another treaty was ratified and some territory exchanged between these governments. The Dutch capital is Kupang (9,000 pop.), the Portuguese Dilli (3,000 pop.). The Portuguese population of the island (1915) was 378,000; the Dutch between 200,000 and 300,000; but only a few hundred of these are Europeans.

TIMORLAUT, te-mdr'lowt, also called Tenimbar, a group of islands of the Malay Archipelago, lying about 300 miles east by north of Timor Island and 150 miles west by south of the Aru Islands, all being southwest of New Guinea. The group consists of Yamdena (or Timerlaut), 1,151 square miles in area, Selaru, Larat, Vordat, Molu and Maro and a number of small uninhabited islands, with a total area of oyer 2,000 square miles. The larger islands are hilly, the maximum elevation being 820 feet ; the others are low and flat, of coral formation. Agriculture is carried on in a primitive fash¬ ion ; some cattle are raised ; turtle fishing is an industry of some importance, and turtle and trepang are exported. The population is esti¬ mated at 20,000, mostly Papuans.

TIMOTHEUS, Athenian general: b. about the end of the 5th century; d. Chalcis in Euboea, about 354 b.c. In 378 he was made commander of the fleet sent out by the Athenian Confed¬ eracy to gain the alliance

of the Peloponnesian cities and of those along the coast of Laco¬ nia, and defeated a Spartan fleet in 375. Peace having been declared with Sparta, he was re¬ called to Athens. In 372, having been sent to the coast of Asia Minor to aid the satrap of Phrygia, he secured the island of Samos, and by the further acquisition of Sestus and Crithote gained for Athens the control of the Helles¬ pont. In 356 he was appointed, with Chares and Iphicrates, to the command of an expedition against Byzantium, but, refusing to engage in a battle in what he deemed an unpropitious mo¬ ment, he was accused by Chares of causing the Athenian defeat, and was deposed from power.

TIMOTHEUS, ti-mo'theus, Greek dithy- rambic poet : d. 357 b.c. He was the most famous lyric poet of his day. An ancient Greek manuscript of about 100 lines of his <Nomos,) discovered at Abusir, in Egypt, in 1902, is be¬ lieved to be the oldest Greek writing in ex¬ istence, and is thought to have been copied in the 3d century b.c. It is in the Attic poetic dialect, display originality in metre and re¬ counts the defeat of the Persians at Salamis. Timotheus was also remarkable as a musician, improving his instrument, the cithera, and dis¬ playing a knowledge of harmonic principles. A collection of the fragments of his poems are

to be found in Bergk's <Poetae Lyrici Grseci.5 Consult also Smyth, H. W., (Greek Melic Poets5 . (New York 1900) ; Wright, W. C., (Short History of Greek Literature5 (New York 1907).

TIMOTHY, a disciple of Saint Paul: b. in Lycaonia, Asia Minor, probably at Lystra, of a Gentile father and Jewish mother. His father's name is unknown; his mother's was Eunice, his grandmother's Lois. By his mother and grandmother he was early made familiar with the Old Testament Scriptures, and it seems likely that by them also he was first instructed in the Christian faith, which they had probably been won over to on Saint Paul's first mission¬ ary visit to Lystra, while Timothy was still very young. When Saint Paul, along with Silas, vis¬ ited Lystra on his second missionary journey, seven years after the first, Timothy became an active fellow-worker with the apostle, and he accompanied him and Silas in the further course of their mission. Timothy accompanied Paul to Philippi and Bercea ; but he is not mentioned as being with Paul at Thessalonica, which the apostle visited after Philippi and before Bercea. He was then left in the last mentioned city alone, but rejoined Paul at Athens, from which city he was sent back to Thessalonica. After remaining there some time he once more joined his master at Corinth. No further mention is made of Timothy till at least five years later, when he is found with Paul at Ephesus on his third missionary journey. From Ephesus he was sent

along with Erastus into Macedonia and Achaia to prepare the churches there for the visit that Paul himself was meditating (Acts xix, 22). Timothy met the apostle again in Macedonia, and was among those who preceded him on his journey to Jerusalem. We lose sight of him for the next two or three years ; but he appears at Rome with Paul at the time when the epistles to the Colossians, Philippians and Philemon were written. From the third verse of the first chapter of the first epistle to Timothy we learn that Timothy was on one occasion left at Ephesus when Paul went into Macedonia, and it is supposed that this was after Paul had been released from the confinement in which he was placed when he was sent to Rome from Jeru¬ salem. Tradition makes Timothy the first bishop of Ephesus. He is said to have been martyred in the reign of Domitian or Nerva.

TIMOTHY AND TITUS, Epistles to. Pastoral Epistles. — The two letters which pur¬ port to have been written by the Apostle Paul to his young friend and assistant Timothy and the letter which in the same way purports to have been written to his fellow-worker Titus are commonly called from the nature of their contents the <(Pastoral Epistles.55 They sustain so many resemblances to each other that it is simplest and most helpful to treat them as a group, as, indeed, is commonly done.

Arguments as to Paul's Authorship.— Be¬ fore touching on their contents and significance, it is best to take up the much debated problem of their authorship. External -evidence in favor of Paul s having written them, consist¬ ing of quotations and citations by name, is abundant from the earliest times, going back, in fact, to Polycarp and Ignatius (before 120) ' if not to Clement of Rome (95). The one case of rejection, that by Marcion, is plausibly ex-

plained on the ground of antagonism to the doctrines taught. This strong attestation caused them to be unhesitatingly accepted as from Paul down to about the beginning of the last century, but since that time scarcely any point in New Testament criticism has been more constantly and strenuously disputed, and at present there is no point on which critics who deserve consideration are more evenly divided. (1) The first objection to be noted is that these letters cannot be from Paul's pen because the circumstances implied do not agree with the conditions otherwise known to have existed at any time in the apostle's life. It is admitted on all sides that there is no period

described in Acts into which these letters fit, but the latest criticism, under the influence of Har- nack, holds that Acts was written before the end of Paul's imprisonment at Rome and, if so, it is as legitimate to hold that he was released as that he was put to death soon after the time reached in the story of Acts. This re¬ lease is rendered plausible by the facts that there was no charge against him on which he could have been fairly condemned (cf. Acts xxvi, 32) ; that Paul certainly not only hoped but expected release (Phil, i, 25; Philemon 22) ; and that what ancient tradition exists on the subject is to the effect that he visited Spain as he earlier intended, which would imply re¬ lease from his first imprisonment. The ques¬ tion of the genuineness of these letters must be settled apart from this point. (2) Another argument against the Pauline authorship is that the vocabulary, the formation of the sentences and the way in which they are related to each other vary irreconcilably from Paul's acknowl¬ edged writings. A difference on these points must certainly be recognized, but when we con¬ sider the difference in the topics discussed, the lapse of time, which, if not more than five years since the composition of Philippians, might have brought many new circumstances to influence language, and the possible freedom with which Paul's amanuensis may have re-produced what he gave out, it is held by many critics of acuteness and standing that the dif¬ ferences may be harmonized with Pauline au¬ thorship. It is interesting to note in this rela¬ tion that it has lately been urged that the language and style of the "Pastorals® approach in many points those of Luke and that, as it is said in 2 Timothy that he was Paul's only companion when that letter was written, it is presumable that he put that letter on paper, and if so, almost certainly the other two, a fact which would go far to explain the differences under consideration. It is also to be taken into account that the peculiarities of vocabu¬ lary and style are equally, if not more, diffi¬ cult to explain on the theory that the letters were fabricated in direct imitation of Paul's genuine letters, since such a literary artist would naturally have avoided such striking deviations from Paul's previous usage as are recognized to exist. (3) It is also urged that the doc¬ trinal content of these Epistles is inconsistent with Paul's -teaching in other letters, and it should be recognized that a difference at least in the form of presentation of truth actually exists. But when it is taken into account that the opponents of Pauline authorship commonly hold that these letters were written by a "Paul- imst,» probably by a disciple who felt that he

was merely reproducing his master's ideas, it must also be recognized, as it generally is, that no doctrinal contradiction or essential in¬ consistency exists between the two types of teaching. When the

variations in Paul's pre¬ sentation of his theological views in his ac¬ knowledged Epistles, as in 1 Thessalonians, Gala¬ tians, 1 Corinthians and Colossians, are taken into account, it should equally be recognized that in the circumstances presupposed in these Epistles Paul might have given the teaching which stands in them. (4) It is also insisted that the conditions which are implied as ex¬ isting in the churches, alike as to heresies and as to church government, require a later date than can fall in the lifetime of Paul. But it is answered that the government of the churches is by no means so advanced as is sometimes asserted, and that there is no ground for deny¬ ing that this stage of ecclesiastical development and also such a prevalence of error as is im¬ plied, might have been reached by the year 65. (5) It is also objected that the tone of these letters is more formal and distant than it is in the other Epistles, though they were sent to churches; that directions are given to Timothy which are unnatural, as in relation to affairs at Ephesus when Paul had himself just been on the ground, as is implied in 1 Timothy, or when he urges his leaving his work imme¬ diately, as in 2 Timothy, and that it is incon¬ ceivable that Paul should have addressed Tim¬ othy as a youth and a weakling. In answer it is argued that the letters, especially 1 Timothy and Titus, were in reality "open letters,® in¬ tended to be read to the churches at Ephesus and in Crete; that 1 Timothy i, 3 does not imply that Paul had himself been lately at Ephesus ; that as Timothy might be unavoidably delayed in leaving at Paul's request, directions might well be given to apply in case of such hindrance; that it is not unnatural that Paul, who years before had called himself "the aged,® should still think of Timothy as a youth, it being a not uncommon characteristic of elderly men to think of men of the next genera¬ tion as more youthful than they really are; and that it is by no means unreasonable to hold that. Timothy may have needed the strengthening and heartening of the appeals in these letters, as Paul the strong may personally have been especially drawn to him by the very traits which would show as weakness when he had to live his own independent life as a church leader. It is also to be noted that almost every one of these points tells as strongly against the supposition of fabrication, since a fabricator would naturally avoid these diffi¬ culties, and, in particular, would not have in¬ serted anything which might seem to reflect discreditably upon Timothv.

Critical Conclusion.— So far as the above contentions are concerned, it may reasonably be held that neither side has advanced decisive arguments, but that, while the character of the letters does not demonstrate Paul's authorship on the other hand, the letters have not been proved to be by another hand. Perhaps it should also be

remarked that many critics who do not accept Pauline authorship for the letters as they now stand find themselves obliged to tecognize that many of the historical notices, especially in 2 Timothy, are genuinely Pauline. Various attempts have been made to show how

these fragments could have been woven into documents otherwise fabricated, but thus far all attempts to give a plausible explanation of such an unparalleled literary phenomenon have failed, and it is to be recognized that, in view of the acknowledged relationship of these letters to each other, any attestation of one, as this of 2 limothy, in some sense attests them all. In the end the decision of the problem of the genuineness of these letters will probably be found to depend on the weight to be given to their acceptance and attestation by the early Church, and it may be said to be true to-day as it was in the time of the Muratorian Frag¬ ment (perhaps 175) : «An Epistle to Titus and two to Timothy, written out of personal feeling and regard, are still honored in the respect of the Catholic Church in the arrange¬ ment of ecclesiastical discipline.®

Occasion and Order of Epistles.— If not Pauline, critics hold that these letters were worked up to confirm the traditional views of the Church against errorists of the author's own time, many holding that 2 Timothy was first composed on the basis of genuinely Paul¬ ine memoranda, so to speak, and on this theory, although much later dates have sometimes been suggested, they could hardlv have been written after 100 or before 80, while the place of com¬ position would be absolutely indefinite. If ac¬ cepted as written by Paul, all is much clearer.

1 Timothy was written to Timothy at Ephesus to strengthen him in his position as represent¬ ative of Paul in the superintendency of the churches, probably in 65 or 66; Titus was written presumably soon after to Titus, who was in Crete in a position similar to Timothy's, to advise and confirm him in his work; and

2 Timothy was sent perhaps in 67 from the prison in Rome where Paul lay chained and facing death not remotely, to express to Timo¬ thy his thoughts in view of this situation, and to urge him to come to Rome as soon as possible.

Value. — If these epistles are not genuine Pauline letters, they yet

have a certain value as testifying to the conditions in the Church during the last decades of the 1st century in regard to both erroneous thought and needed methods of administration. If genuine, they have a much greater value still as setting forth the last thoughts of the great Apostie in refer¬ ence to dangerous errors of the time and the importance of both right thinking and right living, and, above all, his thoughts in view of death, constituting what we might call his last will and testament for the benefit, not of Tim¬ othy alone, but of the Church universal.

Bibliography. — Findlay, G. G., Additional Essay in Sabatier's Apostle Paul *(5th ed., 1903) ; Moffatt, James, introduction to the Literature of the New Testament* (1911); Scott, Robert, (The Pauline Epistles1 *(1909) ; Shaw, R. D., (The Pauline Epistles* (1903) ; Zahn, Theodor, introduction to the New Testament* (Eng. trans., Vol. I, 1909).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

TIMOTHY. See Grasses in the United States.

TIMROD, Henry, American poet : b. Charleston, S. C., 8 Dec. 1829; d. Columbia,

S. C., 6 Oct. 1867. After study at the Univer¬ sity of Georgia and some legal education, he was for a time a tutor, at the outbreak of the Civil War became war correspondent of the Charleston Mercury , and in 1864 was made as¬ sistant editor of the South Carolinian at Colum¬ bia. 1 he destruction of Columbia by Sherman was the ruin of his occupation, and his subse¬ quent career was unfortunate. Just previous to the war-time, Timrod and P. H. Hayne (q.v.) were brilliant members of that Southern literary coterie in which W. G. Simms was the most prominent. In 1860 a small volume of his poems appeared, but with little recognition. Done under unfavorable conditions, Timrod's poetry has many excellent qualities, and in some cases attains real elevation. Among his best pieces are cAt Magnolia Cemetery *; Charles¬ ton* and (The Cotton Boll.* A memorial to him was placed in Washington square, Charles¬ ton, in 1901. His verse was collected and pub¬ lished, with a biographical sketch, by Hayne in 1873. An edition, with memoir, in 1899, was followed in 1901 by the so-called memorial edition.

TIMUQUOMAN FAMILY, a group of American Indians formerly occupying central and northern Florida. In 1527 — when first known

to the Spaniards — these Indians had some 50 settlements along the Saint John's River. There were five original tribes speaking as many dialects. Wars of other tribes and the inroads of the English from Carolina gradu¬ ally reduced the tribes in numbers, and they fled to Volusia County, at the headwater of the Saint John's. The territory thus abandoned was afterward occupied by the Seminoles (q.v.).

TIMUR, te-moor' (TIMUR BEG, TIMUR LENG, TAMERLANE, the latter a. corrup¬ tion of Timur Leng, «Timur the Lame*), *Mon¬ gol conqueror : b. Kesh, near Samarcand, about 1336; d. Otrar, 17 Feb. 1405. He was a descend¬ ant of Genghis Khan and became chief of his tribe in 1370, having previously reigned jointly for some years with his brother-in-law, Hussien, of whom he became jealous and whom he put to death, after defeating him in a short civil war. He established a firm government in his dominions and then embarked on his career of conquest. He subdued Persia and the whole of central Asia from the Great Wall of China to Moscow, and in 1398 invaded India, which he mastered from the Indus to the mouth of the Ganges. His cruelty knew no bounds. On one occasion, it is recorded, he massacred 100,000 prisoners, while on the banks of the Ganges he was called by the emperor of the East and other princes to aid in repelling the Turks under Bajazet. He wrested Syria from the Mamelukes on his return journey, overran the sultan's dominions with his vast army and on 20 June 1402 met Bajazet on the plain of Angora, routed his immense army and took him pris¬ oner. In 1404 he began preparations for an expedition into China, and early in 1405 began the advance which was stopped by his death. Timur, however, was not a mere barbarian. He was an able administrator, with many states¬ manlike traits, a patron of science and art and is also reputed to have been an author, though on dubious evidence. Consult Howorth, his¬ tory of the Mongols* ; Jean de Bee, (Tambur-

lain *(1586; Eng. trans., 1595) ; Malcolm, his¬ tory of Persia.*

TIN, a hard, white, ductile metal, obtained by smelting tin-stone or cassiterite — so-called from the Cassiterides, islands from which it was first brought into European markets. Tin appears to have been known in the time of Moses; and at a somewhat later period in Jew¬ ish history it was brought by the ships of Tars- hish from the islands east of the Persian Gulf. The Phoenicians traded largely in the tin ores of Cornwall, which was then, as now, celebrated for its mineral wealth. The mountains which separate Galicia from Portugal were also very

productive of tin in ancient times, and still con¬ tinue unexhausted. The mountains between Saxony and Bohemia have been wrought as tin mines for several centuries and still con¬ tinue productive. Mines of it occur in the Peninsula of Malacca, in India, in Chile, in Mex¬ ico, in Peru, etc. Large deposits of tin-stone have been discovered in Queensland, New South Wales and Tasmania.

Tin-stone. — Tin-stone or tin dioxide (Sn02) is the only ore used for obtaining me¬ tallic tin. Its chemical composition is oxygen 21.4 per cent, tin 78.6 per cent. It is found dis¬ seminated throughout the alluvium of valleys or in lode at considerable depths beneath the surface; the former deposits yield what is called stream-tin, while from the latter mine-tin is ob¬ tained. The first process to which the ore is subjected is grinding. The ground ore is then washed, which removes the impurities ; for the specific gravity is so high that it is easy to wash away the earthy matter, and even some of the foreign metallic ores with which it is often mingled. But there are other bodies so nearly of the same specific gravity of the tin ore that they cannot be thus removed. The ore is then roasted in a reverberatory furnace, whereby most of the sulphur and arsenic are expelled. The ore, thus freed as much as possible from foreign matter, is mixed with from 15 to 20 per cent of its weight of pulverized anthracite coal and a small proportion of flux, generally lime¬ stone, and heated strongly in a reverberatory furnace, so as to bring the whole into the state of fusion which is kept up with gradually in¬ creasing temperature for about eight hours. The lime unites with the earthy matters still mixed with the ore and flows with them into a liquid slag, while the coal reduces the oxide of tin to the metallic state. The reduced tin falls by its own weight to the bottom, and is, at the end of about eight hours, let out by tapping a hole in the furnace which had been filled with clay.

Refining Process. — The tin thus obtained is still very impure; it contains generally iron, copper, arsenic and tungsten. In order to purify it the blocks of tin are placed in a reverberatory furnace and moderately heated to the point where the tin melts and flows into the refining basins, while the greater part of the foreign metals remains in the solid state. The molten tin in the refining basins is then stirred with poles of green wood, whence gases are given off, and the metal is maintained in a state of artificial ebullition. The upper parts of the contents of the basin are oxidized and removed from the surface, while the greater part of the foreign metals collects at the bottom. The

metal is allowed to partially cool, during which process it separates into zones, the upper part consisting of nearly pure tin, while the under is so impure that it must be returned to the fur¬ nace and again

melted. The upper layer of tin is removed into molds, containing each about three hundredweight, in which it is allowed to solidify; it is then sent into the market as block- tin, the purest specimens being called refined tin.

Characteristics. — Tin, when pure, has a fine white color like silver but with a slightly bluish hue, and when newly melted its brilliancy is great. It has a slightly disagreeable taste, and emits a peculiar smell when rubbed. Its hardness is between that of gold and lead. Specific gravity, 7.28. It is very malleable ; tin leaf, or tin-foil as it is called, is about one one-thousandth part of an inch thick; and it might be beaten out into leaves as thin again, if such were wanted for the purposes of art. Its ductility and tenac¬ ity are much inferior to those of most of the metals known in early times ; a bar of tin a quarter of an inch in diameter will not support a greater weight than 294 pounds. Tin is very flexible and produces, while bending, a remark¬ able creaking noise, known as the «cry of tin. **It melts at about 460° F. When cooled slowly it may be obtained cˆstallized in the form of a rhombodial prism. By washing the surface of a mass of tin with warm dilute aqua regina it becomes covered with a number of crystals, which, from their unequal action upon light, give an appearance to the metal somewhat re¬ sembling that of watered silk. After a short exposure to the air tin loses its lustre and as¬ sumes a grayish-black color, but undergoes no further alteration. Neither is it sensibly altered byQ being kept under water. When cooled to 54° below zero it undergoes a transformation into what is called ((gray tin.** In this form it is very brittle and has lost all its metallic properties. When tin is melted in an open ves¬ sel its surface becomes very soon covered with a gray powder, which is an oxide of the metal. If the heat be continued the color of the powder gradually changes, and at last it becomes yellow.

Tin Ores.— These are but two in number, tin ore and tin pyrites, known respectively by the technical names of cassiterite and stannite. The first of these occurs crystallized, and in a great variety of forms, which may all be de¬ rived from an octahedron with a square base, the angle over the apex being 112° 10'. The majority of the crystals have the general figure of a right square prism, with four-sided pyra¬ mids at each extremity. They occur often in twin form, the twin crystals forming an elbow. The cleavages take place parallel with the sides of this prism and with both its diagonals. The crystals may be cleaved also parallel to the sides of the above-named octahedron, but with difficulty. The prisms are sometimes vertically streaked. Lustre adamantine ; color various shades of white, gray, yellow, red, brown and black; streak pale gray, in some varieties pale brown; semi-

transparent, sometimes almost transparent, and in others opaque; brittle; hard¬ ness six to seven, about that of feldspar, specific gravity, 6.96. Tin ore presents itself in a great variety of compound or macled crystals. It also occurs reniform, rarely in botryoidal shapes, and massive, with a granular or columnar

composition, the individuals being strongly connected and the fracture uneven. The wood- tin of the Cornish mines is a mere variety of tin ore. It is so-called because of its resem¬ blance to a cross section of the trunk of a tree, with the concentric rings of annual growth. In color it is dark reddish to brown. The follow¬ ing ingredients were found in specimens of crystallized, massive and wood-tin ore : _

Crystallized

Massive

Wood-tin

Oxide of tin .

99.00

0.25

0.75

95.00

5.00

0.00

85.14

13.42

1.03

Oxide of iron .

Silica .

In its greatest purity cassiterite contains noth¬ ing but oxide of tin. Alone it does not melt before the blowpipe, but is reducible when in contact with charcoal. It occurs disseminated through granite, also in beds and veins, in lode mines. It also occurs in the beds and al¬ luvial deposits of streams in the form of rolled pebbles and is extracted in this shape as Jstream-tin® by placer works and dredges. The variety called wood-tin has hitherto been found only in these repositories, but is occasion¬ ally found in pockets in rock formations. Tin pyrites (Cu2S.FeS.SnS), the other ore of tin, occurs massive, with a granular composition; fracture uneven, imperfectly conchoidal ; lustre metallic ; color steel-gray, inclining to yellow ; streak black; opaque; brittle; hardness about that of fluor-spar; specific gravity, 4.35. Be¬ fore the blowpipe sulphur is driven off and the mineral melts into a blackish scoria, without yielding a metallic button. It is soluble in nitro-muriatic acid, with precipitation of part of the sulphur. It contains from 14 to 30 per cent of tin. It is found at Saint Agnes in Corn¬ wall, in Saxony and in Bolivia and in Virginia, Idaho and Montana in the United States.

Production. — The world's production of tin in the calendar year 1916 amounted to 135,- 360 short tons. Of this total, 49,130 tons (about 36 per cent) came from the Federated Malay States; 23,500 tons from Bolivia; 14,- 000 tons from Banca, Dutch East Indies; 9,400 tons from Siam; 8,400 tons from China; 5,980 tons from Australia ; 5,680 tons from Nigeria; 5,500 tons from Billiton and Singkep, Dutch East Indies; 5,260 tons from Cornwall, Eng¬ land; 4,900 tons from the British Protected Malay States; 2,100 tons from the Union of South Africa; and 1,500 tons from all other countries. About 33,000 tons were lode tin — from Bolivia, Cornwall, South Africa and Australia — and the remainder from placer workings. The total is 10,870 tons less than for 1913, just preceding the war. Incomplete figures indicate that the output for 1917 is about 2,000 tons more than for 1916, in spite of the serious decrease of nearly 5,000 tons from the Federated Malay States; a condition resulting from an increase of 5,800 tons in the output of Bolivia. Although the complete blockade of Germany left that nation's usual consumption, amounting to 21,000 tons annually, free upon the market, the price of tin rose enormously during 1917 — from 44.19 cents per pound in January to 85.35 cents per pound in December. These figures are to be compared

with an average price of about 44 cents per pound for the years immediately preceding the war. During the first years of the conflict the price fell below 31 cents.

The contribution of the United States to the 1916 total was about 140

short tons, derived almost entirely from Alaska, and chiefly the product of dredges operating in the York dis¬ trict, in the western part of the Seward Penin¬ sula. The output of this district was 162 tons of ((stream tin® estimated to average 60 per cent of metallic tin. Nearly two-thirds of the whole Alaskan output was sent to Singapore to be smelted and refined. The United States output for 1917 was but 90 tons. Nearly all of the production is from placer workings, the one lode mine worked being the Lost River mine, in Alaska. The other tin producing lo¬ calities in the United States are in Lander and Humboldt counties, Nevada; the Black Hills in Pennington County, South Dakota; near Lmcolnton in North Carolina; near Gaffney, South Carolina; and in the Franklin Moun¬ tains, north of El Paso, Texas. In all of these localities the ore is cassiterite. This ore has been found in small quantities also in the Te- mescal Mountains of California, near Corona — a deposit which produced 135 tons of tin in 1890-91 ; in Virginia, in Rockbridge and Nelson counties; in Washington, at Silver Hill, near Spokane; in Maine, at Winslow, and several other localities; and in New Hampshire, at Jackson. Wood-tin has been found in the gold- bearing gravel of Panther Creek, Idaho; and in the Big Prickly Pear Creek district of Mon¬ tana. There was in 1916 but one smelter in the United States handling tin ores, the plant of the American Smelting and Refining Com¬ pany at Perth Amboy, N. J. Its capacity is about 14,000 tons of tin per year and it works almost solely upon Bolivian concentrates. Be¬ fore the war a large percentage of the Bolivian tin concentrates was sent to Germany for smelt¬ ing. With the cessation of this service a large smelting plant was built in Chile and another plant erected in the United States.

In 1917 there was imported into the United States for consumption a total of 77,866 short tons of metallic tin, having an aggregate value of $68,603,439. Thus it appears that the United States consumed nearly 57 per cent of the en¬ tire world's output of tin for the year.

Uses. — The principal use of tin in the United States is in the production of tin-plate lor the manufacture of tinware and of terne-plate for roofing and building purposes. In terne-plate the tin used to plate the iron sheets carries a percentage of lead. Tin is used also in the manufacture of cheap mirrors, the «sil- vering® compound consisting of an amalgam of tin and mercury. It is also used largely in the technical arts in various alloys; as in Britan¬ nia metal, type metal, solder, pewter, bell metal and several bronzes.

Bibliography — CharUtcm, A. G., <Tin : Chief Methods of Mining, Dressing and Smelt- mg1 (1884) ; Fawns, S., (1905); Hess, F. L., and E., bibliog¬ raphy of the Geology and Mineralogy of Tin) (Washington

1912) ; Neumann, B., (1904); Ressing, A., <Geschichte der Metalle) (1901). For general statistics and industrial information consult (annually; New York).

TIN HORN WAR. See United States, The Wars of the.

TIN-MOUTH, a fish. See Crappie.

TIN PLATE, Manufacture of. The manu¬ facture of tin plate was probably begun in Bohemia, about the beginning of the 16th cen¬ tury, and was first attempted in England about 1670. The early crude methods consisted of the simple expedient of dipping the plates of iron into a vat of molten tin and allowing the surplus metal to drain off. In 1865 Mr. More- wood, of South Wales, England, invented a machine which gave tin plate manufacture its start, greatly reducing the cost of production. At the surface of the pot he placed a pair of steel rods which seized the plate as it came up and rolled off the superfluous tin ; thus leaving the coating of the plate smooth and even. Since then many improvements have been made in the methods of manufacture, making the product more serviceable and reducing materi¬ ally the manufacturing expenses. The modern method is as follows :

After the bars of steel have reached the rolling mill they are first cut into accurate lengths, then placed in the sheet-mill furnace, brought to a cherry-red heat, taken out in pairs and given three or four passes through rough¬ ing rolls, each bar being fed through sidewise and rolled singly. After cooling they are again heated, placed one upon the other, and in pairs are again rolled. The doubler then grasps the plates at one end with a pair of large tongs and brings the two ends together. The loose ends are then shorn off square, and the fold is flat¬ tened by means of a powerful press, thus mak¬ ing four thicknesses or plates, one end of each being free, the other still forming the bend. The plates are again heated, passed through the roughing rolls, taken by the doubler, opened back to the bend, and once more doubled. The first bend is snipped off when the ends are squared, thus making one free end for each sheet in the pack. This is done to prevent buckling and to insure a perfect finished plate. They are then heated for the fourth time, passed two or three times more through the finishing rolls and are then ready for the pickier.

After the sheets have been separated and examined for possible flaws, they are sent to the black pickier, where they are immersed in a strong solution of acid and hot water to re¬ move all dirt, after which they are rinsed and allowed to drain. All perfect plates, in order to make them sufficiently soft for general use, are sent to the annealing furnace, which opens the pores and toughens the plate. After be¬ ing heated there thoroughly for a period of about 12 hours the plates are cooled off and carried to the cold rolls through which they are passed singly. The re-squarer then trims the four edges and restacks the plates in the annealing box ; they are again annealed and put into the white pickier, in which the acid solu¬ tion is much weaker than in the first bath.

Having been pickled and rinsed, the plates are placed in water boshes; immersed in a bath of melted palm-oil ; placed in a pot con¬ taining molten tin and lead; and finally dipped into another pot of tin of lower temperature than the previous one. From the tinning pot they are put into the grease pot, the thickness

of the coating being determined by the length of time they remain therein. After cooling they are cleaned by passing through bran and dust. This completes the process and the plates are ready for the market.

According to the census of 1905 there were in the United States 36 establishments engaged in the manufacture of tin plate, employing $10,813,239 capital and 4,847 persons; paying $2,383,070 for wages and $31,375,714 for mate¬ rials; and having an aggregate output valued at $35,283,360. The business has largely in¬ creased since, and the present method of figur¬ ing the production is by boxes. Of these the production in 1914 was 20,271,683, 1915 22,925,- 437, 1916 26,979,994 and 1917 32,898,597. The tremendous increase, due to war orders, can¬ not be maintained unless there is an increase in the production of tin, which is not expected.

Consult Louis, H., (Metallurgy of Tin)

(1911) ; Schnabel, C., (Handbook of Metal¬ lurgy) (2d ed., 2 vols., London 1905-07).

TIN WEDDING. See Wedding Anni¬ versaries.

TINAMOU, a South American game-bird, the Crypturi, called ˆpartridge® by European colonists because of its superficial likeness to those birds, but structurally occupying a dis¬ tinct place, the

determination of which has greatly puzzled ornithologists. The view now prevails that they are a <(very distinct group of birds, which though not to be removed from the Carinatcz present so much resemblance to the Ratitcz as to indicate them to be the bond of union between those two great divisions. Many genera and species are known in southern South America ana two or three forms extend northward into Mexico. They vary in size from that of a quail to a guinea hen. The head is small, neck slender, bill elongated and plumage close and inconspicuous, usually brown¬ ish or bluish, with few ornamental markings. The wings are short and rounded, and the tail so short and soft as in some species to appear absent altogether. Some of them inhabit forests and others ,more open country, and show very little skill or courage in avoiding the gun or escaping capture. Their flesh is delicious. They nest upon the ground and lay very remarkable eggs, since the shell Hooks as if it were of highly burnished metal or glazed porcelain, pre¬ senting also various colors, which seem to be constant in the particular species, from pale primrose to sage-green, or light indigo, or from chocolate brown to pink-orange.® The fact that the male alone incubates the eggs is one of many ratite characteristics of this antique and curious group of birds. Consult Newton,

1 Dictionary of Birds) (New York 1896) wherein will be found many references to special au¬ thorities.

TINCAL, or TINKAL, a common trade name for borax (q.v.) in the crude state.

TINCKER, Mary Agnes, American novel¬ ist: b. Ellsworth, Me., 18 July 1833. In her earlier days she taught in a Roman Catholic parochial school and from 1873 to 1887 lived in Italy. Her best known novel is (Signor Mon- aldini's Niece) (1878) ; others are <By the Tiber) (1881); (The Jewel in the Lotus) (1884) ; (Aurora) (1885) ; (Autumn Leaves)

TINCTURE, in pharmacy, an alcoholic solution of some medicinal substance, prepared by digestion, maceration or percolation. It may be a solution >of some chemical element as iodine, of some single chemical compound as chloride of iron, or a solution of that part of some plant which will dissolve in the solvent used : example, tincture of cinchona bark. Sim¬ ple tinctures are those obtained from a single

drug, compound tinctures from many. The solvents (menstrua) are various; pure alcohol, mixtures of alcohol and water or of alcohol and ether, alcoholic solutions containing am¬ monia, etc.

TINDAL, Matthew, English controversial¬ ist: b. Beer Ferris, in Devonshire, about 1653; <L 16 Aug. 1733. He was graduated from Lincoln College, Oxford, in 1676, in 1678 was elected a Fellow of All Souls' College, and afterward became a Doctor of Civil Law, and an advocate of Doctor's Commons. In the reign of James II he turned Roman Catholic, but in 1688 returned to the Church of England. He published several pieces, political and theo¬ logical, among which were a 'Letter to the Clergymen of the two Universities, on the sub¬ ject of the Trinity and Athanasian Creeds and a treatise, (The Rights of the Christian Church asserted against Priests) (1706). This work excited a sensation among the high church clergy, who attacked it with great vigor. Tindal published two defenses of it, which the House of Commons ordered to be burned by the com¬ mon hangman, with the original treatise. In 1730 he published his Christianity as Old as the Creation, or the Gospel a Republication of the Religion of Nature^ in which his object was to show that there cannot be any revelation distinct from the internal revelation of the law of nature in the hearts of mankind. This de- istical or rationalist work — by which his name is chiefly known — received a great many answers.

TINDALL, or TYNDALE, William, Eng¬ lish reformer and translator of the Bible: b. near Welsh borders, about 1490; d. Vilvoorden, Belgium, 6 Aug. 1536. He entered the Univer¬ sity of Oxford in 1510, and was graduated in 1512. He subsequently went to Cambridge, where he resided till 1521, and about this latter date became tutor to the children of Sir John Walsh, a landed gentleman in Gloucestershire. He preached with great acceptance in the neigh¬ borhood, but soon got into trouble owing to his unorthodox views. In 1523 he went to London, where he came under the influence of Luther's teaching. It was at this time that he began his translation of the New Testament, but find¬ ing it unsafe to carry out such a work in Eng¬ land, he went to Hamburg in 1524, and immedi¬ ately afterward to Luther at Wittenberg, where he remained till April 1525. During this time he was proceeding with his translation, with the assistance of one William Roy, and the printing of it was begun at Cologne in 1525. A Roman Catholic clergyman, John Cochlseus, came to know of this, and obtained an injunction order¬ ing the stoppage of the work, whereupon Tin¬ dall went to Worms and had the work printed there. It was smuggled into England in 1526, and at once Archbishop Warham and Bishop Tunstall took the lead in seizing and burning copies. Attempts were also made to get hold vol. 26 — 41

of Tindall, but he fled to Marburg, where he enjoyed the protection of the landgrave of Hesse. Here he became a Zwinglian in his attitude on the Eucharist, and published some of his most important original works, including The Parable of the Wicked Mammon* (1528) ; (The Obedience of a Christian Man,> and 'How Christian Rulers Ought to Govern) (1528), and (The Practyse of Prelates) (1530). He also engaged in a vigorous polemic with Sir Thomas More. From Marburg he went to the Netherlands, and for several years resided in Antwerp, but toward 1533 left the city for a time, owing to Henry VIII's efforts to seize him. In 1535 he was captured at Antwerp by the imperial officers, assisted by an English Roman Catholic student named Phillips who orofessed to adopt his reforming opinions. He was lodged in the state prison at Vilvoorden, near Brussels, and despite some efforts to save him, made by Cromwell and others, he was tried for heresy, condemned, degraded from holy orders, then strangled and his body burned. A fragment of the interrupted Cologne print of his New Testament translation is in the British Museum, and there are two extant copies of the first edition of his complete New Testa¬ ment (1525), one (practically complete) in the Baptist College, Bristol, the other (incomplete) in Saint Paul's Cathedral. A revised edition was issued by him at Antwerp in 1534, and a further revision in the following year. His translation of the Pentateuch appeared at Mar¬ burg in 1529-30, and that of Jonah at Antwerp in 1531 ; a copy of each is in the British Mu¬ seum. Tindall's translation is of much import¬ ance in the history of the English style and English literature, and formed the basis, as far as it went, of the Authorized Version of nearly a century later. There is an edition of Tindall's original works by the Parker Society (3 vols., 1848-50). Consult Demaus, 'Life of William TindalP (1886) ; Price, I. M., 'Ancestry of Our English Bible> (Phila. 1907).

TINDER, a dry substance that readily ig¬ nites from a spark; before the introduction of friction matches, it was in common use as a means of starting a fire. It consisted usually of charred linen which caught the spark from a flint and steel; since the tinder did not flame, the fire was started by touching a match dipped in sulphur to the ignited tinder. Tinder-boxes were boxes in which tinder was kept ready for use; they were usually provided with a flint and steel, the latter often fastened to the cover of the box in such a manner that the flint when struck against it sent sparks into the tinder within. "German tinder® or amadou con¬ sisted of the more solid portions of certain fungi, mainly tree-growing polyfores, prepared by boiling in water and drying. Sometimes saltpetre, or even a little gunpowder, is added. Amadou has been used to stop bleeding and also in surgery as a

support and for pressure and protection. “Spanish tinder® was a stuff prepared from the pubescence of the flower- heads, stems and leaves of globe-thistle. The use of the word tinder has been extended to denote any substance easily inflammable.

TINEIDZE, a family of moths, prominently represented by several small species whose cat¬ erpillars are destructive to woolen fabrics, furs and various stored products. See Clothes-

moth; Flour and Meal Insects; Grain In¬ sects; Moths, etc.

TINGLEY, Katherine, American theoso- phist: b. Newburyport, Mass., 6 July 1852. She married P. B. Tingley in 1889. She was for some years an assistant to W. Q. Judge, who with H. P. Blavatsky were active in es¬ tablishing theosophy as a philosophy and re¬ ligion and on his death she founded, 18 Feb. 1898, a new branch called the Universal Brotherhood and Theosophical Society, which has branches in many cities and countries and headquarters at Point Loma, Cal. She has edited Century Path for a number of years and has written (The Mysteries of the Heart Doctrine) (1902) ; (Nosegay of Everlastings *(1913); (Theosophy and Some of the Vital Problems of the Day* (1915). See Theosophy.

TINOCERAS, ti-nos'e -ras, a genus of mammals now extinct, found in the Eocene of Wyoming (Bridger beds) and representing the order Dinocerata. The individuals were all large, some of them nearly equaling the ele¬ phants, and differed little from, if, indeed, they were not identical with, Uintaiherium.

TINOS, te'nds, or TENOS, te'nos, Greece, an island in the monarchy of the Cyclades, im¬ mediately southeast of Andros. It is 18 miles long by eight miles broad and has an area of 81 square miles. It is traversed by high moun¬ tains, the terraced slopes of which yield wine, wheat, melons, figs, etc. Marble and silk goods are the chief exports. Tenos or Hagios Niko- laos, the chief town, on the south coast, is the see of a Roman Catholic bishop, has two Ro¬ man Catholic churches and a small harbor. North of the town is the white marble church of Penagia Evangelistria, a famous pilgrim re¬ sort. Excavations in 1902 on the site of ancient Tenos revealed remains of the temple of Posei¬ don. Tenos was prominent in the wars with the Persians and during the Greek Revolution 1821-27. Pop. 12,000.

TINTERN ABBEY, England, a ruin of unrivaled beauty in Monmouthshire, on the Wye, eight miles south of Monmouth. It was founded in 1131 by the Cistercian monks — the church in 1287. It is well preserved and is a noble specimen of the transition from Early English to the Decorated. The open work of the windows is one of its chief beauties. Under Henry VIII the abbey was dismantled and its lands bestowed upon the earl of Worcester.

TINTERN ABBEY, (Lines Composed a Few Miles above Tintern Abbey, on Revisiting the Banks of the Wye during a Tour, July 13, 1798 *a reflective poem in 159 lines of blank- verse, by William Wordsworth, was composed in 1798, and was published that same year in the famous volume entitled (Lyrical Ballads. > The clumsy title has long since been shortened by the public to (Tintern Abbey* — in itself misleading, since the poem has nothing to do with the abbey, which is used simply to identify the landscape that serves as a basis for the poet's reflections. Wordsworth had visited the region alone and on foot in 1793 ; upon his second visit, five years later, he recalls the first and compares his feeling for nature at that time with what it is now. His theme in general is the inter-relation between nature and the spirit of man, each as an interpreter and revealer of the other : the

contemplation of nature gives an insight into the invisible world that comprehends both na¬ ture and man ; nature has the power to throw light upon the mystery of human life; she can console and sustain ; man's own emotional ex¬ periences, in turn, reveal and interpret nature. Primarily reflective, (Tintern Abbey) is at the same time intensely subjective, and hence is al¬ most as lyrical in essence as Wordsworth's so- called (Ode on Immortality, *with the ideas of which it has so much in common. The two in both thought and style are Wordsworth's great¬ est poems ; each complements the other ; and taken together they form the locus classicus of the Wordsworthian faith and doctrine. The Platonism that informs the (Ode,* though less fundamental to (Tintern Abbey, * yet colors the latter throughout.

The poet distinguishes three successive periods in his attitude toward nature : his first, and merely animal delight, grows into a sen¬ suous appreciation of natural beauty, and this in turn finally develops into a moral and con¬ templative attitude and brings the (<philosophic mind® that identifies nature, man and God (compare <The Prelude, *Book VIII, lines 340-356). Perhaps none of the ideas in the poem, taken singly, was new to the world; but certainly never before had they been fused into a whole and stated with such impressiveness and splendor as the utterance of one great per¬ sonality. The style of the poem, though it un¬ deniably drops toward the end in the poet's ad¬ dress to his sister, is in the*

main superb. Here is Wordsworth's ((grand manner,® as in the (Ode, no less appropriate and perfect in its way than the beautiful simplicity of his <Mi- chaeP (q.v.). No other of his poems contains so many of his most felicitous lines, such as

" the still, sad music of humanity ",

" the little, nameless, unremembered acts of kindness and of love ",

"nature never did betray the heart that loved her".

Its faith in the entire beneficence of nature is of course the obvious weakness of the poem considered philosophically. How far 19th cen¬ tury theories and discoveries have invalidated its teaching cannot be discussed here. It is doubtful whether the average reader is at all affected by Wordsworth's failure to see the other side of nature, by his lack of scientific vision. Here he speaks simply as a seer; and the passage in which he declares his sense of the Power ((whose dwelling is the light of setting suns® is perhaps as moving and sublime as any in the whole range of English poetry, as incom¬ parable, at least in style, as anything in Shakes¬ peare or Shelley. Whether considered as the self-revealing utterance of a great personality, or as the statement of a doctrine that has im¬ mensely influenced the course of modern poetic thought, or simply as an example of magnificent diction, (Tintern Abbey) has a permanent place among the supreme achievements of modern poetry.

Marion Tucker.

TINTORETTO, ten-td-ret'to, Jacopo Ro- busti, son of a dyer (Italian, tintore), whence his usual surname, Italian painter: b. Venice, 16 Sept. 1518; d. there, 31 May 1594. He was a pupil of Titian, but was soon dismissed by his master, perhaps through fear of rivalry. He thereupon worked without a master, taking as

TINEID MOTHS (much magnified)

1, 2, 3 Feathered Moths

4, 5, 6 Common Moths

Other figures are details of the scales

i(lcal in painting a union of the design of Michelangelo with the coloring of Titian. He painted with such extraordinary facility and ra-puhty as to gain the epithet “II Furioso.55 An¬ nibale Carracci said that he was sometimes equal to Titian, often inferior to Tintoretto. He treated Scripture subjects in a perfectly natural¬ istic spirit, but at times this became decidedly coarse. Ruskin estimates Tintoretto very highly, and places him among the supreme painters. The greater number of his works are to be found in his native city, and of these the following may be named: In the Palace of the Doges: ‘Paradise,5 the largest oil-paint¬ ing in the world, with a very large number of figures; ‘The Delivery of the Doge’s Insignia to Niccolo da Ponte } ; ‘Recapture of Zara) ; (Forge of Vulcan) ; (Mercury with the Graces5 ; (Minerva driving back Mars5; (Descent from the Cross5 ; etc. In the Academy: < Saint Mark descending to the Rescue of a Condemned Christian Slave ; ; ‘Adoration of the Kings) ; etc. In the church of Madonna dell’ Orto : ‘The Last Judgment5 ; ‘Adoration of the Golden Calf5 ; ‘Miracle of Saint Agnes, > and ‘Presentation in the Temple. 5 The Uffizi gallery at Florence contains some of his works, including ‘Abra¬ ham’s Sacrifice5 and a ‘Marriage at Cana) ; and the Pitti Palace contains among others, a ‘Descent from the Cross) ; ‘Vulcan with Venus and Cupid,5 and a ‘Madonna.5 The Prado Museum at Madrid is rich in works by Tinto¬ retto, among them being many portraits ; and others are to be seen in the National Gallery at London (‘Saint George Destroying the Dragon) ; ‘Christ Washing the Feet of His Disciples5), Berlin, Dresden, Vienna, Paris, etc. Consult Ruskin, ‘Stones of Venice) ; ‘Modern Painters5 ; etc.; Osier, ‘Tintoretto5 (1879); Stearns, ‘Jacopo Robusti5 (1895); and the ‘Lives5 by Bonsusan (1907) and Philipps

(1911).

TINWORTH, George, English sculptor: b. London, England, 5 Nov. 1843. He was the son of a wheelwright and in his father’s shop began the practice of wood carving. In 1861 he took lessons in an art school at Lambeth and in 1864 entered the Royal Academy schools. After exhibiting figures and groups of figures at the Royal Academy, he obtained an appoint¬ ment in the Doulton art pottery (1867). The productions by which he became famous were mainly terra-cotta panels with groups of figures in high relief illustrating scenes from sacred history, which combine originality of design, with dramatic effectiveness and devout feeling. His most important work is the reredos in York Minster, with 28 terra-cotta panels.

TIONONTAIC, an American Indian tribe formerly residing near Nottawasaga Bay, On¬ tario, Canada. When first discovered by the French in 1616, they were called the Tobacco Nation, from their large

fields of tobacco. In 1670, the remnants of the tribe joined the Wyandottes (q.v.).

TIPPECANOE, a nickname of Gen. Wil¬ liam Henry Harrison, given to him on account of his victory in the battle of Tippecanoe (q.v.). In the presidential campaign of 1840, which resulted in the election of Harrison and Tyler, “Tippecanoe and Tyler too55 was the party war-cry of the Whigs.

TIPPECANOE, Battle of, fought 7 Nov. 1811 near the site of the present village of Battle Ground, on the Tippecanoe River, in Tippecanoe County, Ind., between about 900 Americans under William Henry Harrison (q.v.), who was then governor of the Territory of Indiana and a force of Indians nominally under “the Prophet,55 brother of Tecumseh (q.v.), but actually commanded by three chiefs, Stone Eater, White Loon and Winnemac. The Indians were estimated by Harrison at about 6,000, but were probably much less in number. Harrison encamped on the night of 6 November near the Indian village on the Tippecanoe River and while his men were asleep in the early morning of the 7th the Indians fell upon them with great fury and were only defeated and driven from the field after several hours of desperate fighting, in which the whites lost about 185 in killed and wounded, the loss of the Indians being unknown, though they left 40 dead on the field. The village was found on the 8th deserted and was burned by Harrison’s men. For reasons of prudence Harrison then fell back to Vincennes. Consult Pirtle, ‘The Battle of Tippecanoe5 (1900), No. 15 of the “Filson Club Publications.55

TIPPERARY, tip-e-ra'ri, Ireland, a town and the county-seat of the famous county of Tipperary in Munster. The town is situated 42 miles northwest of Cork and 110 miles south¬ west of Dublin. It has a large grammar school, several religious schools and butter and pro¬ vision markets.

TIPPLE, Ezra Squier, American Metho¬ dist Episcopal clergyman: b. Camden, N. Y., 23 Jan. 1861. He was graduated at Syracuse University in 1884, took his Ph.D. there in 1886 and was graduated at Drew Theological Seminary in 1887. He served as a pastor in New York in 1887-1905, when he became pro¬ fessor of practical theology at Drew Theologi¬ cal Seminary. Since 1912 he has been president of that institution. He is a trustee of Syra¬ cuse University and is author of ‘The Heart of Asbury’s Journal5 (1905); ‘The Life of Free¬ born Garrettson5 (1910); ‘Francis Asbury5 (1916) ; ‘The Drew Theological Seminary, 1867- 19175 (1917), etc.

TIPPOO (or TIPU) SAHIB, ti-poo' sa'- hib, sultan of Mysore: b. 19 Nov. 1749; d. Seringapatam, Mysore, 4 May 1799. He was the son of Hyder Ali Khan, whom he succeeded in 1782. During the operations of the English troops under General Mathews in Malabar, he checked the advance of the British at Bednor, April 1783 and temporarily wrested Mangalore from its western invaders. In the following autumn he was compelled to surrender this province to Great Britain. In 1784 he was forced to sign a treaty of peace; but, con¬ tinuing to intrigue, war was declared against him in 1790 and in 1791 he was defeated by Lord Cornwallis and obliged to surrender half of his domain and to pay 33,000,000 rupees to his English conquerors. In 1799 he was sus¬ pected of an alliance with France and again defeated by the British and their allies, the Mahrattas. He was killed while fighting in this campaign. Consult Bowring, 'Haider Ali and Tipu Sultan5 (1893).

TIPTON, England, town in Staffordshire, situated six miles northwest of Birmingham. Ii has coal and iron mines, iron foundries, steam boiler and structural iron works, red and white-lead factories, cement works and brick¬ yards. Pop. about 32,000.

TIPULIDZE, the family of craneflies (q.v.).

TIRABOSCHI, te-ra-bos'ke, Girolamo, Italian literary historian : b. Bergamo, 28 Dec. 1731 ; d. Modena, 3 July 1794. He was edu¬ cated by the Jesuits, afterward joining their order and was for many years a professor in the University of Milan. He was a scholar of note, his greatest work being the <Storia della Letteratura Italiana) (1772-93) in 13 volumes. He also published (Biblioteca Modenese) (6 vols., 1781 — 86), and (Memorie storiche modenesP (1793-94). He was librarian to Francis III, duke of Modena, from 1770.

TIRAILLEUR, ti-ra-lyer, a skirmisher, sharpshooter; the title was first employed by the French in 1792, to denote light-armed troops thrown out from the main body to do skirmish work, feel the enemy, cover the movement of the main body, etc.

TIRASPOL, te-ras-poly', Ukraine, a river- port in the government of Cherson, on the Dniester, 60 miles northwest of Odessa. It possesses five churches, two synagogues and a state bank. One of its chief attractions is its gardens. The principal industries are tobacco¬ raising and fruit culture. There are four fac¬ tories and some trade is carried

on.

TIRE, the outer band placed around the felloes of a wheel, made in various forms, for several purposes. The common tire for a wooden-carriage wheel is made of iron or steel and serves the double purpose of holding to¬ gether the parts of the wheel and resisting wear in traversing the ground. The continuous steel tire is an American invention and consists of a flat hoop of steel usually of the same width and formed so to fit tightly over the felloes; it is expanded by heating and put on in a heated condition; upon cooling it shrinks and tightly compresses the wheel. It is further secured by sunk-bolts through the felloes. The wire wheel made on a suspension principle, as in the bicycle, has a steel felloe with a concave outer surface for holding a rubber tire or a pneu- matice tire. These have been highly developed in the bicycle (q.v.) and the automobile (q.v.) ; car wheels and locomotive wheels of cast iron or cast steel have usually tires of tough wrought steel shrunk on, so that the wearing surface may be as durable as possible. See Rubber Tires.

TIREBUCK, William Edwards, English novelist: b. Liverpool, 1854. He was for some years a writer on the staff of the Liverpool Mail and the Yorkshire Post, but in 1888 re¬ tired from newspaper life and devoted himself to writing fiction. His best-known novels in¬ clude (Saint MargareP (1888); <Dorrie) (1891) and (Miss Grace of All Souls) (1895). He is also the author of an estimate of (Dante Gabriel RosettP (1882) and of a later work entitled (1888), etc.

TIRE.SIAS, ti-re'si-as, according to Greek mythology, a soothsayer of Thebes, reputed to

have been struck blind either because he had revealed to men things which they ought not to know, or because he had seen Athene bathing. Athene conferred upon him the power to under¬ stand the language of birds, while Zeus gave him the gift of prophecy and long life. Tenny-. son has a poem on the subject of <Tiresias)4 (1885), who also figures in many Greek legends.

TIRLEMONT (Flemish, Thienen or Tie- ncn), Belgium, town in the province of Brabant, on the Geete River, 11 miles southeast of Lou¬ vain and 29 miles east of Brussels. There are two churches dating from the 12th century, Notre Dame du Lac and that of Saint Ger¬ main. Saint Germain has a fine altar-piece by \ appers. The town was taken by the Duke of Marlborough in 1705; on 16 March 1793 it was the scene of a_ victory by the French over the Austrians, and in the European War it was occupied by the Germans soon after the out¬

break of the war in 1914, remaining in their hands until the armistice. Industries include brewing and the manufacture of leather, woolens, soap and engines. Pop. 17,581.

TIRPITZ, Alfred von, German admiral : b.

ivustnn, 1849. Graduating from the Marine Academy when only 17 years of age, he ad¬ vanced rapidly, and in 1896 was State Secre- tary of the Navy and in 1898 Minister of State of Prussia. In 1911 came his promotion to the post of Lord High Admiral. He took great interest in the development of the submarine and had immense faith in this arm of the navy. He is credited with having organized and planned the submarine blockade of the British Isles in 1915-16. . When he carried his policy to the extent of sinking unarmed vessels, culmi¬ nating in the torpedoing of the Lusitania (q.v.), he aroused such indignation in neutral coun¬ tries that the unwisdom of the policy was ap¬ parent and his resignation was arranged for though the assigned reason was his illness' bee War, European.

-> " V Y; OICCLe> in Argons, 10 miles southeast of Mycenae, an ancient city on

a rocky height which formed the Acropolis- beneath which another city extended along the plain. The town was destroyed 468 b.c.

luch of the citadel and of the cyclopean wails with their pointed gates are still standing to- gether with some interior passages or galleries of similar construction. The excavations con¬ ducted by Schliemann in 1884-85 resulted in the discovery of a magnificent palace, com¬ prising various buildings and approached bv a peristyle The complete arrangement of public halls and private apartments is apparent. Con- suit Schhemann, (1886) ; Perrot and

tVol'evT I?ao',°cre 1eJ'Art dans l'Antiquite> (Vol. VI, 1894) and Baedeker's <Greece.)

TISCHBEIN, tish-bin, Johann Friedrich August, German painter: b. Maestricht, 1750 - d Heidelberg ,1812. He studied with Johann Heinrich Tischbein and in Paris and Italy After serving as court painter in Waldeck he

i'?mmeurdlreC-t01 j°f the LeiPziff Academy in • i He painted many noteworthy portraits including nine of the princes and princesses of brange-Nassau (Amsterdam) and that of bchiller, which he finished in 1804.

TISCHBEIN, Johann Heinrich, German painter: b. Plaina, 3 Oct. 1722; d. Cassel, 22

Aug. 1789. He studied under the court painter Freese in his native town and under Boucher, Van Loo and Watteau in Paris. He entered the studio of Piazzetta in Venice 1748, re¬ turned to Cassel in 1751, was made court painter to the landgrave and in 1776 became director of the New Academy. He painted numerous portraits and historical pictures, which, although not possessing great strength, were considered among the best produced in Germany at that period. Among them may be mentioned (Less- ingˆ (1760) ; (Count Waldner von Freund-

steiiP (1761) ; (Augustus and Cleopatra) (1769), and <Belisarius) (1786).

TISCHBEIN, Johann Heinrich Wilhelm,

German painter and etcher, called <(the Neapoli¬ tan® : b. Haina, 15 Feb. 1751 ; d. Eutin, 26 July 1829. He was a nephew of Johann Heinrich Tischbein and the most famous of the Tischbein family. He studied under his uncle and other relatives and in Hamburg, Bremen and Holland. Goethe assisted him in going to Italy and in 1787 the two went together to Naples, where Tischbein enjoyed the patronage of Sir William Hamil¬ ton and from 1789 to 1799 was director of the Academy. In 1809 he became court painter to the Duke of Oldenburg. The 43 cele¬ brated in Goethe's verse were painted by Tisch¬ bein at Eutin. To different publications he con¬ tributed over 150 etchings and engravings and his paintings include (Conradin of Swabia Hearing his Sentence) (1784) ; (An Italian Landscape) (1819) ; a portrait of Goethe, and a portrait of the artist himself. Consult Michel, (Etude biographique sur lcs Tischbeins) (1881).

TISCHENDORF, tish'en-dorf, Konstan¬ tin von, German biblical critic : b. Lengenfeld, Saxony, 18 Jan. 1815; d. Leipzig, 7 Dec. 1874. He was educated at Leipzig, where he qualified as a lecturer in 1840. In the latter year he went to Paris and deciphered the (Codex EphraemP and soon afterward he began to travel extensively in Europe, Egypt, Sinai and Palestine in search of biblical manuscripts. In 1844 he saved from the flames in the Con¬ vent of Saint Catharine on Mount Sinai a valuable manuscript of the Old Testament, but failed to get possession

of more than a part of it. This part he published in facsimile in 1846 as the (Codex Friderico-AugustanusC so named in honor of his patron, the king of Saxony. He was appointed in 1845 extraordi¬ nary professor, in 1850 ordinary honorary professor and in 1859 ordinary professor of theology and biblical palaeography at Leipzig. He again visited the East in 1853 and in 1859 he made a third visit at the cost of the Russian government. On the third journey to Sinai he brought back the rest of his (Codex Friderico-AugustanusP better known as the (Codex SinaiticusP the oldest Greek manu¬ script of the Bible, containing the entire New Testament and the Epistle of Barnabas, be¬ sides much of the Old Testament. (See Codex Sinaiticus) . A magnificent facsimile edition was published in four volumes at Saint Peters¬ burg in 1862. In 1869 Tischendorf was ennobled by the emperor. Among his contributions to the textual criticsm of the New and the Greek Old Testament are 10 editions between 1843 and 1870, the largest being (Monumenta Sacra Inedita: Nova Collectio) (1855-70). He is¬ sued several editions of the Greek New Testa¬

ment, of which the eighth critical edition (two vols., 1864-72) is of great importance. In his (Novum Testamentum TriglottunP (1854) he printed together his Greek text, the Latin of Jerome and the German of Luther. His (Synopsis Evangelica5 (5th ed. 1854) should also be mentioned in connection with this part of his work. He edited the Septuagint with critical appendix (1850; 7th ed. 1887) and on the New Testament apocrypha and pseudepi- grapha published (De Evangeliorum Apocry- phorum, Origine et UstP (1851) ; (Acta Apos- tolorum Apocrypha) (1851); (Evangelia Apocrypha) (1853) ; and (Apocalypses Apocry¬ phaˆ (1866). (In wann wurden unsere Evan- gelien verfasst?) (1865; Eng. trans.) he shows a strongly conservative tendency. He described his travels in the works <Reise in den Orient J (1845-46) and (Aus dem Heiligen Lande)

(1862).

TISHRI, a month in the Jewish calendar, the first of the civil year and the seventh of the ecclesiastical. It corresponds to portions of our September and October and contains the Jewish Day of Atonement as well as the Feast of Tab¬ ernacles. It is frequently mentioned in the Old Testament and in 1 Kings xiii, 2 it is related that ((. . . all the men of Israel assembled

themselves unto King Solomon at the feast in the month Ethanim, which is the seventh month® ; the term Ethanim, used instead of Tishri, signifies streaming rivers, the result of the September floods. The name tishri occurs in the Palmyrene inscriptions and, therefore,

was probably not confined to the Jews.

TISSANDIER, te-san-de-a, Gaston, French aeronaut: b. Paris, France, 21 Nov. 1843. He was the inventor of a dirigible bal¬ loon in which he made an ascent of five and one- third miles, from Paris in 1875 ; he alone surviv¬ ing of the members of the aeronautic experi¬ ment. Besides his written contributions to the subject of aeronautics he has contributed to the (Library of Wonders > series, well-known vol¬ umes on the subjects of light, water, coal and fossils.

TISSERAND, Frangois Felix, French as¬ tronomer: b. Nuits-Saint-Georges, Cote-d'Or, 15 Jan. 1845; d. Paris, 20 Oct. 1896. He was educated at the Ecole Normale Superieure and in 1866 he became adjunct professor at the Paris Observatory. He took his doctor's degree in 1868 with a thesis which was a bril¬ liant extension of the scope of the method of Delaunay. He went to Malacca to observe the solar eclipse of 18 Aug. 1868 and in 1873 be¬ came director of the Observatory at Toulouse. He was a member of the French expeditions observing the transit of Venus, in Japan, in 1874 and in Martinique in 1882. He was elected to the Academy of Sciences in 1878; in 1883 became professor of celestial mechanics at the Sorbonne; and in 1892 was appointed di¬ rector of the Paris Observatory. He made many valuable investigations in the field of celestial mechanics and wrote brilliantly on the subject. The results of his own labors and that of others in this field are set forth with masterly grasp and simplicity in his <Traite de mecanique celeste* (4 vols., 1886-96). He re¬ vised Lalande's catalogue and was editor of the Bulletin Astronomique.

TISSOT, te-sd, Claude Joseph, French phi¬ losopher: b. Fourgs (Doubs), 26 Nov. 1801; d. Dijon, 7 Oct. 1876. He translated the larger part of Kant's writings into French. Among his original works are (Of the Beautiful, Espe¬ cially in Literature > (1830) ; (Short History of Philosophy) (1840) ; (The Mania of Sui¬ cide and of Revolt y (1840) ; (Parceling of the Land and Division of Property > (1842) ; Principles of Morality > (1866); Catholicism and Public Instruction (1874) ; < Insanity Con¬ sidered Especially in its Relations to Normal Psychology > (1876).

•.r TISSOT, James> French painter: b. Nantes, 15 Oct. 1836; d. Abbey of Bouillon, 8 Aug. 1902 He was a pupil of Ingres, studied in London under Seymour Haden, and attracted attention by his brilliant pictures

of fashionable women, actresses and grisettes, as in his Promenade in the Snow) (1859). His series of etchings Parisian Women *was very popu- lar. Jde suddenly changed his whole artistic aim in life under the stress of a sudden be¬ reavement and went to Palestine (1890) where he studied for six years the scenery and build¬ ings and rural activities of the Holy Land for the purpose of producing a set of pictures il¬ lustrating the life of Christ. These paintings were subsequently reproduced by Lemercier in Paris under the title <La vie de notre Seigneur Jesus-Christ* ; and a parallel publication of them has been issued in this country. The original drawings and paintings, 540 in all, are now in the Brooklyn Institute of Art. Just be¬ fore his death he began his paintings illustrat¬ ing the Old Testament.

TISSUE, in biology , a group of similar cells in an animal body (or a plant) which form a definite fabric, having the same origin and discharging the same function. Tissues are classified according to their structure when completely developed, in accordance with their functions, or with reference to their mode or origin. A common •classification of animal tissues includes cellular tissue, connective tissue (q.v.), epithelial tissue (see Epithe¬ lium), muscular tissue (see Muscular Sys¬ tem, Development of), nerve-tissue (see Ner¬ vous System, Evolution of the), etc. Fatty tissue consists of a meshwork of white fibrous tissue in which fat-cells are imbedded. It is found beneath the skin, around various internal organs, in the marrow of bones, and elsewhere, < and is both protective and heat- retaining in its function. Mucous tissue is merely a stage in the development of ordinary connective tissue. Adenoid tissue, found in the glands, consists of a network of very delicate connective tissue, in which white cells of vari¬ ous sizes are entangled. The cartilage (q.v.) or gristle of the joints is one of the primary animal tissues. See Anatomy, Comparative* Plants, Structure of; Bone; Cartilage; His¬ tology ; Parenchyma.

TISSUE PAPER. See Paper; Paper In¬ dustry in America.

TISZA, tis'o, Koloman Borosjeno von,

Hunganan statesman : b. Grosswardein, 16 Dec. 1830; d. Budapest, Hungary, 23 March 1902. He was educated for the law, but entered the civil service in 1848, and took a prominent part in educational affairs. Although not at first

identified with the revolutionary movement, the attempt of Austria to control ecclesiastical mat¬ ters in Hungary in 1859 brought him forward as the leader of the party which stood for Protestant

autonomy. In 1860 he was elected to the Hungarian Parliament, where he opposed the conciliatory measures offered by the impe¬ rial government in the proposal to relinquish absolute authority and to yield the right of rep¬ resentation to the Magyar provinces, and stood resolutely and persistently for independence. In 1861 he succeeded Count Telsky as the leader of the Constitutional party. He was subsequently instrumental in uniting the mod¬ erate Radicals with the Liberal party, but was at all times opposed to the socialistic and agra¬ rian demands of the revolutionists. In 1875 he was appointed Minister of the Interior, and some months later became Prime Minister. He resigned his office in 1890, but continued until his death to direct the affairs of his party and to control legislation.

TISZA, Stephan, Count, Hungarian states¬ man: b. Budapest, 1861; d. 31 Oct. 1918. He was educated at the universities of Berlin, Heidelberg and Vienna and was appointed to a post in the Hungarian Ministry of the Interior in 1882. He was elected to the Hungarian Parliament in 1886, and was conspicuous for his strong support of close relations with Austria. He was Premier and Minister of the Interior in 1903- 06, losing his seat in Parliament at the same time that his ministry fell. He was again ap¬ pointed., Premier 10 June 1913, and occupied that office at the outbreak of the European War in 1914. He was thoroughly in sympathy with the war and was regarded as one of its chief authors. Growing dissatisfaction with the continuation of the war, and overwhelming demands for suffrage and other reforms which Tisza was unwilling to grant resulted in efforts to bring about the fall of his Cabinet in 1917 and he resigned 13 May 1917. In 1918 he was assassinated.

iiiAiNiA, according to Ovid, a name of Latona, a daughter of the Titan Coius. ohakespeare in ˆ Midsummer Night's Dream * gives the name to the wife of Oberon.

TITANIFEROUS IRON ORES are

chiefly varieties of the minerals ilmenite, hema- Ute and magnetite. Ilmenite (q.v.) is often called titanic iron ore and is richer in titanium than either of the others. The value of these ores for both iron and titanium, which was long questioned, seems at last to be established. The remarkable attraction of titanium for nitrogen suggests its use in freeing iron and steel of blow-holes, while titanium steel is known to possess remarkable toughness and tensile strength. < Much excellent work has been done by Rossi in pointing out the merits of titanium steel and in developing processes for the reduc¬ tion of titamferous iron ores. The most im¬ portant known occurrences of these ores are

in Norway, Quebec and the Adirondack Moun¬ tains, in each of which regions there are beds of vast extent. These occurrences have been

andJSTVeKemeSCnbed ˆ PaperS by R P°pe

TITANITE, a mineral occurring in mono- clinic crystals, often wedge-shaped and twinned.

having the composition of calcium silico-titan- ate. Its lustre is adamantine to resinous; hard¬ ness, 5 to 5.5 ; specific gravity about 3.5. Part¬ ing is often prominent, while prismatic cleav¬ age is less distinct. Its colors vary greatly. Dark brown to black crystals, sometimes sev¬ eral inches in diameter, occur mostly in lime¬ stone in Saint Lawrence County, New York, and in Canada. The variety sphene is usually bright green or golden yellow, and often occurs in gneiss or chloride schists in transparent or translucent twin crystals. Owing to the high refractive and dispersive power of such crystals, gems of rare beauty and inferior to none but the diamond in their play of colors, may be cut from them, though they lack durability owing to their low degree of hardness. The finest of these gem sphenes are from Switzerland, the Tyrol, Delaware County, Pennsylvania and Tilly Foster, New York.

TITANIUM. See Electro-chemical In¬ dustries; Mineral Production of the United States.

TITANOSAURUS, a genus of huge sauro- podous dinosaurs. See Dinosauria.

TITANOTHERIUM. See Brontothe- rium.

TITANS, ti'tanz, in Greek mythology, six sons and six daughters of Uranus and Ge, namely Oceanus, Koius, Krelius, Hyperion, Iapetus and Kronus ; Theia, Rhea, Themis, Mnemosyne, Phcebe and Tethys. Uranus hav¬ ing banished to Tartarus the Hekatoncheires (wthe hundred-handedˆ) and the Cyclops, Gaia called the Titans to avenge their brothers. They rose and freed them,' deposed Uranus, and set Kronus in his place. Kronus and the Titans were in their turn put down by the sons of Kronus and Rhea, named the Olympii, with Zeus at their head, but not till after a long struggle, in which Zeus brought to his aid the Cyclops and Hekatoncheires, whom Kronus had again imprisoned in Tartarus. Zeus quelled the Titans with the lightning

given him by the Cyclops, hurled them to Tartarus, placing them under the care of the Hekatoncheires. This struggle, called the Titanomachia, was regarded as sym¬ bolic of the conflict of reason and order with the rude forces of nature. Consult Mayer, (Die Giganten und Titanen in der antiken Sage und KunsC (1887).

TITCHENER, tich'en-er, Edward Brad¬ ford, American psychologist : b. Chichester, England, 11 Jan. 1867. He was graduated from Oxford in 1890, and afterward studied in Leip¬ zig. He returned to Oxford as extension lec¬ turer in biology, but was called to Cornell University, Ithaca, N. Y., in 1892, as assistant professor of psychology, and in 1895 became Sage professor of psychology there. His writ¬ ings include (A Primer of Psychology) (1898) ; Experimental Psychology y (1901) ; (Text Book of Psychology* (1910); (A Beginner's Psychology) (1915). He is also editor of the American Journal of Psychology.

TITE, Sir William, British architect: b. London, Feb. 1798; d. 23 April 1873. He shared in the work of rebuilding the body of Saint-Dunstan-in-the-East in 1817-20; was en¬ gaged in building the Scottish Church in Regent square in 1827-28; and was one of the de¬ signers of the London and Westminster Bank,

Lothbury, in 1838. He rebuilt the Royal Ex¬ change in 1841-44, a work which is considered his greatest achievement as an architect. He designed the earlier English railways stations as well as those on the line from Havre to Paris, France. He planned the Woking Cemetery in 1853-54; was a member of Parliament from 1855 until his death ; : nd was knighted in 1869. Author of (A Catalogue and Description of the Antiquities Found in the Excavations for the Royal Exchange * (1848).

TITHES, taxes, either voluntary or com¬ pulsory, consisting of one-tenth of the income taxed. Usually tithes were one-tenth of the annual profit of the land and were paid for purposes of church support. The custom is of extreme antiquity. In Genesis xiv, 20, Abra¬ ham allows a tenth of the spoils taken from four kings to their victor. Moses allowed tithes for the support of the Levites and for service in the temple (Lev. xxvii, and Num. xviii). In 778 Charlemagne commanded tithes to be collected within all the portions of the old Roman empire over which he ruled; this was for the support of the Christian Church. These tithes were by him allotted to four dif¬ ferent uses : one part was for the maintenance of the edifice of the church, and the other three, severally, for the support of the bishop, the clergy and the poor. Ecclesiastical tithes were always more or less oppressive in their opera¬ tion, being unevenly imposed, but after their introduction into Great Britain they were systematized. They were first enjoined in

England in 786 and in 794. Offa, king of Mercia, gave the Church all the tithes of his kingdom, and this law was sub¬ sequently made general for all England by Ethelwulf. When dioceses were divided into parishes the tithes of each parish were allotted to its minister, at first by common consent, but afterward, about 1200, by the law of the land in England. The custom of paying tithes be¬ came established in Germany and France about the same time, the 9th century, and in the Scandinavian countries in the 11th century. At first the payment of the tax was always in kind, that is, in grain, livestock, wool, etc., and such tithes were known under three heads, namely, praedial, or those which arise im¬ mediately from the soil, as grain, fruits and wood; mixed, or those consisting of natural products but nurtured by the care of man, as calves, lambs, eggs, cheeses, wool, etc. ; and personal, or those arising from the profits of personal industry as in the pursuit of some pro¬ fession, or some trade of livelihood. With regard to their value tithes were divided into great and small ; great tithes being grain .and wood, and belonging to the rector, and small tithes being the other praedial tithes with the mixed and the personal tithes, and belonging to the vicar.

Tithes proved a source of great trouble in every country in which they were collected and a constant cause of bickering between the clergy and the people. They have, therefore, been aban¬ doned in nearly all countries except England, where they are still retained. There they have been the cause of constant friction between the people on the one hand and the officers of the law and the clergy on the other. Under Henry VIII, the owners of certain great estates

were relieved of the duty and this increased the feeling of the tithe-payers that their burden was an unjust one. In three-fourths of Ireland it was found impossible to collect tithes, for long periods at a time, and the enforcement of the law, especially in cases of non-members of the Church, was not infrequently accom¬ panied by riot and revolt. Finally, an act of commutation was passed by which tithes were assessed in money, the value being based on the average price of corn for a preceding term of years. The matter has been the subject of much legislation by Parliament, which has generally established in lieu of the old system a fixed money rent charge payable annually. Con¬ sult Clarke, H. W., ‘History of Tithes) (1891) ; Degge, S. ‘The Parson’s Counsellor with the Law of Tithes) (1820), and Selden, J ‘History of Tithes) (1618).

TITHING, an old English subdivision of the population. It consisted of a company of about 10 households, one of the integral parts of a hundred (see Shire), who were regarded as a distinct political division for some pur¬ poses of police and civil regulation. At its head was the tithing-man, who was directly respon¬ sible to the officers of the Crown, the several members of the tithing being bound for the peaceable behavior of each other. The institu¬ tion of the tithing has passed away, the tithing- man has evolved into the police constable, but in some parts of England British conservatism still preserves the name and the corresponding territorial distinction.

TITHING MAN. See Town and Town

Meetings.

TITHONU.S, ti-tho'nus, a son or nephew of Laomedon, king of Troy. He was beloved of Eos (Aurora, Morning), who induced Zeus to make him immortal. Her prayer was granted but she had neglected to ask for perpetual youth, and in time her lover took on all the signs of extreme age. Tithonus prayed to the gods to be relieved of this (<cruel immortality® and was metamorphosed into a grasshopper. Tennyson has written a remarkable poem, <Tithonus,) on this mythological incident.

TITIAN (Tiziano Vecelu), the greatest painter of the Venetian school and one of the world's greatest painters: b. Pieve in Cadore, a district in the Venetian or Carnic Alps, 1477 ; d. Venice, 27 Aug. 1576. He was the son of Gregorio di Conte Vecelli, a descendant of an ancient family and a man of some note in his province. It was the custom of this family to follow arms or the law, but young Titian showed such genius for art that at the age of nine or 10 he was sent to Venice to learn paint¬ ing. He studied under Gentile Bellini and afterward with Giovanni Bellini and then at¬ tached himself to Giorgione, who was the idol of the day. Master and pupil worked together on the outside fresco.es for the new Fondaco dei Tedeschi, the exchange of the German mer¬ chants in Venice. After Giorgione's sudden death by the plague in 1510, Titian completed several of his master's works. Titian's pic¬ tures of this period show much similarity to Giorgione's and are often referred to as "Giorgionesque Titians.® One of the most famous is 'Sacred and Profane Love> (in the Borghese Gallery in Rome), about which so

much has been written. To this period also belong the 'Virgin and Child } (Vienna Gal¬ lery), popularly called 'La Zingarella) ; the Bishop of Paphos, or 'Baffo> (Antwerp Gal¬ lery) ; 'Saint Mark *(in the*

Salute, Venice); the 'Three Ages) (Bridgewater Gallery, Eng¬ land) ; (Madonna of the Cherries) (Vienna Gallery) ; daughter of Herodias (Doria Gal¬ lery, Rome); ' Christ with the Tribute Money > (Dresden Gallery); and (Noli me Tangere) (National Gallery, London).

In 1511 Titian went to Padua to paint a series of frescoes in the Senola di S. Angelo and returned to Venice in 1513, where he be¬ came superintendent of government works and was ordered to complete the paintings left un¬ finished by Giovanni Bellini in the Hall of the Great Council of the Doge's Palace. Here he painted the portraits of five successive Doges. In 1514 he was invited to the Court of Alfonso, Duke of Ferrara, for whom he painted many charming works, including the 'Worship of Venus > and the 'Bacchanel, *with Ariadne dozing over her wine-cup (both in the Prado, Madrid), and the superb 'Bacchus and Ariadne> (in the National Gallery, London). At Ferrara he formed a friendship with Ariosto and Aretino, whose portraits he painted. In 1516, while painting these delightfully decorative and pagan triumphs of Bacchus and Venus he began work on the 'Assunte,* or 'Assumption of the Virgin, > for the church of S. Marie Gloriosa dei Frari, Venice (now in the Venice Academy). This was finished in 1518 and cre¬ ated a sensation, for it was considered the most astonishing performance in color on a grand scale that had as yet been executed. The same gallery now preserves the famous 'Presentation of the Virgin, *a large and much restored picture, and one of Titian's masterpieces of masterpieces. In 1526 he completed the 'Pesaro Madonna,* on which he had worked for seven years. This is still in the church of the Frari and represents the Madonna en¬ throned with adoring saints, including Saint George, and members of the aristocratic Pesaro family beneath the group. The 'Cornaro Fam¬ ily, > belonging to the Duke of Northumberland, is a work of the same general character. The 'Entombment of Christ *(in the Louvre) is another early work, and 'Christ Crowned with Thorns* (also in the Louvre) still shows the influence of Giorgione.

In 1525 Titian married. Nothing is known about his wife, who died in 1530, leaving three children, one the infant Lavinia, of whom Titian painted so many beautiful portraits. Titian now removed to a fine house in the Biri Grande, a fashionable suburb of Venice, where he had beautiful gardens sweeping down to the sea. Here he had his sister do the honors of his establishment and here he entertained lavishly and charmingly. In 1532 he painted a portrait of Charles V, the emperor, in Bologna, and was, in consequence, created a Count Palatine and a Knight of the Golden Spur. His two sons were also made nobles of the empire — a most unusual honor for a painter. From this time onward Titian enjoyed a worldly success greater than that any other painters ever had accorded to them, with the exception

of Raphael, Michelangelo and Rubens. In 1540 D Avalos, Marquis del Vasto, gave him a

pension and Charles V an annuity of 2 000

o£°MiL(aI wrard- doubCd> on the treasury riven tE' VISltl"g,Ron'e in 1546 he was

DrinteH .hefrfed°m °£ the. dty- In 1550 he

painted the famous portrait of Philip II of Spam, which helped his suit for the hand of Queen Mary of England. Notwithstanding the many statements that Titian visited Spain, mod- ern authorities affirm that he never was there, fie traveled much in Italy and went to Augs-

t r?c??duwas at the Council of Trent in 1555. In 1565 he went to Cadore to design decora¬ tions ter the church at Pieve, his native town. He spent most of his life, however, in Venice, where he worked until the last moments of his nte. Vasari saw him with brushes in hand painting furiously. Titian was, according to most authorities, 99 when he died of the plague

the"rffg Venice. Vasari gives his birth as MSO, but Titian, writing to Philip II in 1571 smd he was 95. He was buried in the church

a 6 Frai-1 ^?ear J?1S fam°us painting, the Madonna di Casa Pesaro.* Canova's monu-

aITa roT m,arks hisf grave. His son, Oragio, died of the plague a few days after Titian. He

too was a painter, but overshadowed by his father s greatness. In the confusion and riotous days of the plague Titian's splendid villa was entered and plundered by thieves. Titian's last painting was a 'Pieta,* which was finished by Palma Giovine. Although Titian lived in grand style and had many orders, he seems to have had much trouble in collecting his payments: tor his correspondence is full of appeals to his debtors. He gave splendid entertainments and attracted the most brilliant men of the age It is related that when Henri III of France passed through Venice on his way from Poland to take the French throne, he called on Titian with his suite of noblemen and that the painter presented him as a gift with all the pictures of which he

inquired the price.

Even allowing for the abnormal length of his professional career, Titian's prolific faculty is amazing. More than a thousand pictures in European and American galleries are attributed to Titian. Of these 250 are spurious or doubt¬ ful. The largest collection (41 works) is in the Prado, Madrid. The Uffizi has 18; the Pitti 16; Naples Museum, seven; the Venice Acad¬ emy, eight; the Louvre, 18 and the National Gallery, London, six. Some critics accord the famous C oncert * in the Louvre, which has long been considered a Giorgione, to Titian.

((Titian was a man of correct features and handsome person,** writes William M. Rossetti, "with an uncommon air of penetrating observa¬ tion and self-possessed composure — a Venetian presence worthy to pair with any of those most potent, grave and reserved signors, whom his brush has transmitted to posterity. He was highly distinguished, courteous and winning in society, personally unassuming and a fine speaker, enjoying (as is said by Vasari, who saw him in the spring of 1566) health and prosperity unequaled. He was not a man of universal genius or varied faculty and accom¬ plished like Leonardo da Vinci and Michel- angelo . his one great and supreme endowment was that of painting. Titian may properly be regarded as the greatest manipulator of paint in relation to color, tone, luminosity, richness texture, softness, surface and harmony and with a view to the production of a pictorial whole

converging to the eye, a true, dignified and beautiful impression of its general subject matter and of the objects of sense which form its constituent parts. In this sense Titian has never been deposed from his sovereignty in painting. Titian's pictures abound with mem¬ ories of his home country and of the region which led from the hill summits of Cadore to the Queen City of the Adriatic. He was al¬ most the first great painter to exhibit an ap¬ preciation of mountains, mainly those of a turretted type, as exemplified in the Dolomites. Indeed he gave to landscape a new and original vitality, expressing the quality of the objects oi nature. and their control over the sentiments and imagination with a force that had never been before approached. The earliest Italian picture expressly designated as <landscape) was one which Titian sent in 1552 to Philip II. Naturally a good deal of attention has been given by artists, connoisseurs and experts to probing the secret of how Titian managed to obtain such extraordinary results in color and surface His figures were put in with the brush dipped in a brown solution and then altered and worked up as his intention de¬ veloped. In his earlier pictures the gamut of color rests mainly upon red and green ; in the later ones upon deep yellow

and blue. The pigments which he used were nothing unusual ; indeed they were both few and common. Palma Giovine records that Vecelli would set pictures aside for months and afterward ex¬ amining them as if they were his mortal ene¬ mies would set to work upon them like a man possessed. Also that he left many pictures in progress at the same time, turning from one to the other, and that, in his final operations he worked far more with the finger than with the brush.f Titian seems to have taken Palma Vecchio as his model for softness and Giorgi¬ one as his model for richness. He distanced all his predecessors in the study of color as ap¬ plied to draperies.

Titian excelled in every style. The 'Assump- non of the Virgin *is ranked as one of the world s greatest pictures and the 'Entombment of Christ,* the 'Christ Crowned with Thorns *(Louvre), the (Ecce Homo* (Vienna Gallery) in which Aretino posed for Pilate, the 'Sup¬ per at Emmaus *(Louvre), 'Saint Mark* (Salute, Venice), the 'Presentation in the Temple, *'Christ in the Garden* (Madrid) 'Noli me Tangere. *(London) and 'Saint Jerome > (Barera, Milan) attest his power in religious subjects. An exuberant fancy and dash characterizes his delightful mythological production such as 'Bacchus and Ariadne* (National Gallery), 'Bacchenal *and 'Worship of Venus,* 'Diana and Actaeon, *'Callisto * 'Jupiter and Antiope,* 'Europa *'Venus* (Pondo), 'Venus and Cupid *(Florence) 'Danae* and 'Venus and Adonis *painted for Philip II, 'Venus Anadyomene* (Bridgewater Gallery), the 'Madonna of the Cherries *(Vienna) and the 'Madonna of the Rabbit* or 'Madonna del Consiglio *(Louvre) prove that his Virgin and Child * can stand comparison with any other great master in Italian art As a portrait painter Titian is unequaled Ac¬ cording to Vasari "There has scarcely been a noble of high rank, scarcely a prince or lady of great name, whose portrait has not been taken by Titian.** His list of famous men and

women is long. Perhaps at the very top stands the unknown (Man with the Glove) (Louvre), young, handsome and charming. Many times was the Duchess of Urbino painted, the most famous being the <Bella) in the Uffizi, Florence. Many times also his daughter, Lavinia, smiles down the centuries. Sometimes she is holding a dish of fruit (Berlin), sometimes a jeweled casket (Lord Cowper) and sometimes a fan (Dresden). The Uffizi contains four superb studies: Catarina Cornaro, Queen of Cyprus, Sandovino, Francesco, Duke of Urbino and Eleanora, the Duchess of Urbino. Charles V on horseback at the battle of Muhlberg, now in the Prado, Madrid, shows for all ages what kind of man the emperor was. Titian painted three portraits of himself : one in early life (Vienna), one in middle age (Berlin) and one in old age (Prado, Madrid). Francis I (Louvre), though a great portrait, was not painted from life, for Titian never saw this sovereign. The famous work in the Louvre called (Titian and his Mistress) represents Alphonso, Duke of Ferrara and his wife Laura di Dianti. Pope Paul III was another fine sub¬ ject. The great in which Charles V appears, was so loved by the emperor that he had it in his room during his last illness and kept his eyes fastened on it till the last. Titian also painted one great historical work in 1539, (The Battle of Cadore) representing the moment when the Venetian captain, facing the enemy, dashed into the rush¬ ing stream with men and horses. All are rep¬ resented life size. This picture perished by fire in 1577 and is only known to-day by Fontana's engraving and a sketch by Titian in the Uffizi.

ˆTitian,® writes Kugler, <(was born in grand Alpine scenery amidst a sturdy and vigorous race; and it is in the combination of these ante¬ cedents with the gorgeous color and stately forms of Venetian life that we trace that breadth of qualities so conducive to the develop¬ ment of art in which he takes precedence of every other painter. Two forms of nature es¬ pecially courted his pencil — landscape and portraiture; and in each he revealed to the world treasures of truth and poetry not worked out before. For Titian is not only the painter of humanity in its largest distinctions — in the beauty of woman, the dignity of man and the artlessness of childhood — but he is especially the delineator of all those under every aspect of the high born and the affluently placed classes of society. Sir Joshua Reynolds says of him whatever he touched by a kind of magic he invested with grandeur and importance. The intellectual, the noble, the splendid, the well- formed, the well-fed, the well-dressed were the mutual subjects of his art. His type accord¬ ingly of Christ, John the Baptist and the Magdalen — characters in whom the pride of life and the abnegation of self are incompatible qualities — cannot satisfy those who look for the realization of a sacred idea. Titian can, therefore, hardly rank as a

painter of religious feeling except in his earliest works when he was still under the influence of Giorgione.®

Bibliography. — Crowe and Cavaleaselle, (Titian: his Life and Times) (2 vols., London 1877) ; Gronau, G., <Titian) (Berlin 1900; Eng. trans., London 1904) ; Hamel, Maurice, (Bos¬

ton 1901) ; Heath, R. F., (Titian> (London 1885) ; Phillips, Claude, (The Earlier Work of Titian) and (The Later Work of Titian) (Portfolio, No. 34 and No. 37), and Gilbert, Josiah, (Cadore or Titian's Country) (Lon¬ don 1889).

Esther Singleton.

TITICACA, te-te-ka'ka, the largest lake in South America and one of the most remarkable on the globe, situated on the southeastern boundary of Peru, its eastern shores belonging to Bolivia. It is about 130 miles long and 30 miles wide through most of its length, though 43 miles at one point. It lies at an altitude of 12,635 feet, in a large plateau basin between the two main cordilleras of the Andes. It is of irregular shape, and contains several islands. Copacabana Peninsular almost cuts it in two at the southeast extremity. The greatest depth is 720 feet. Its surplus water is discharged southward by the river Desaguadero, which flows into Lake Aullagas, and thence disappears in the Salinas Grandes, so that the water of the lake does not reach the ocean. Lake Titicaca was formerly much larger than now, and is still decreasing in area. There are geo¬ logic evidences that it formerly discharged into the Amazon watershed, in the eastern side of the Cordillera Real. In spite of the high alti¬ tude the shores are inhabited, and steamers ply on its waters. The largest island in the lake also bears the name Titicaca. Puno is the largest town on its shores. The locality was the seat of a prehistoric civilization of great interest, and the islands and the regions around the lake contain some of the most interesting architectural remains of ancient Peru.

TITLARK, a small lark-like bird of the family Motacillidce, many species of which in¬ habit most parts of the world in every variety of region, some being migratory, others per¬ manent residents. The nest is made upon the ground, or dry grass and stalks, lined with finer plants and hair, and the eggs are four to six. The American titlark (Anthus rubescens) is six and one-half inches long and 11 in wing extent; olive brown above, each feather darkest in the middle; beneath yellowish brown, the sides of the neck spotted longitudinally with dark brown ; round eyes and superciliary stripe yellowish; central tail feathers like back, the others blackish brown, the external one mostly

white and a white spot at the end of the second ; primaries edged with whitish, and the other quills with pale brownish; bill and feet black. It is very generally distributed over North America, extending to the Pacific and to Green¬ land, and is accidental in Europe. The flight is exceedingly easy and graceful ; it occurs in flocks of tens or hundreds, running fast on the ground, vibrating the tail whenever it stops, not squatting like the larks, but moving the body on the upper joints of the legs. It is found in the fields, on the prairies, along rivers, and on the seashore ; the notes are clear and sharp tweets, the last much prolonged; it breeds in the East only north of the Saint Lawrence River, and especially in the coastal districts of Labrador; but in the Rocky Mountain region spends the summer much farther south, but at c°o1 elevations. This bird is very similar to the A. ob scums and spinoletta of Europe, though the latter has a longer bill and less slender tarsi

and toes, and has no yellowish superciliary stripe- the outer tail feathers are not white and the spots are less distinct below. Among the European 'species the most extensively dis¬ tributed is the meadow titlark or pipit (A prat crisis), which is a favorite field-bird in breat Britain. The tree-pipit or titlark (A. arboreus) is another favorite. Both are kept as cage-birds. Consult general works, and

ˆl'esi (Birds of the Northwest (Washington 1 i>74) .

TITLE-DEED, a paper, or one of several papers, written or printed, or partly written and partly printed, describing a property in detail, and through what ownership or author- ty it came into the present custody, by virtue oi which a person claims ownership or title. The term is often used in the plural to denote ihe several muniments of title turned over by grantor on delivering the property to the grantee or his agent and in this sense title- deeds are any documents containing evidence of the title or any part of the title to real estate or other property so granted. Every owner of property is supposed to have his own title-deeds, but the modern system of register¬ ing real estate transfers requires an official copy of the title-deeds to be entered in the office of the registrar or of whatever public agent assumes the duties of registrar, and there be open to the public inspection.

. TITLE INSURANCE is effected in coun¬ tries having public offices for

the record of titles to real estate through the agency of title guaranty companies. This business has as¬ sumed importance in the United States where the system is most fully developed. In this country law requires all transfers of real estate, all mortgages, wills, judgments, etc., to be entered in official registers open to public in¬ spection. In the larger cities these records soon became so voluminous that the matter of verifying title became a cumbersome affair call- fng for the prolonged services of expert realty lawyers. Moreover such research was attended with long delay and with great expense; yet this had to be repeated every time a fresh transfer or mortgage took place, since the vendee or mortgagee was not apt to accept the property without assurance of its being un¬ encumbered and sound in title. Finally in 1876 a Philadelphia company was organized to guarantee titles, and the plan proved so suc¬ cessful that companies have since been organ¬ ized in nearly every large city in the country. The plan of operation of these companies calls for large capital, for in order to be independent of the clumsy and sometimes inaccurate meth¬ ods of public record offices the title insurance companies form their own records of real estate titles in the locality in which they oper¬ ate, and must maintain for this purpose a large staff of expert title examiners. On ac¬ count of the size of its force a well-equipped company can make the first examination and guaranty of a title in less than a week, whereas from one to three months was sometimes re¬ quired by the practising attorneys. The fee required in this first instance is usually about the same as that charged by a reliable lawyer, or, in case of a long examination, about one- half per cent of the value of the property negotiated ; but it has the added advantage

of guaranteeing against loss if there is any inaccuracy of the search. After a property has been once examined and its title guaranteed, the noting of future transactions affecting it is a simple matter, and subsequent guaranties are issued upon short notice and for a small fee.

TITLE TO PROPERTY. See Realty.

TITLE REGISTRATION> a SyStem of public records under which titles to real prop¬ erty are recorded in public offices for the pur¬ pose of expediting the process of transfer and of giving legal notice to claims of ownership to lands so entered. In England the registra¬ tion of titles is of comparatively recent intro¬ duction, the system being due to the land trans¬ fer acts of 1875, under which it was first suc¬ cessfully practised. The office of record in that country is conducted by a registrar ap¬ pointed by the lord chancellor, who also fixes the fees for the various services of the office. These fees, paid in the form of stamps, pro¬ vide the emoluments of office from which the registrar

draws his pay. Under the act of 1875 the registrar must approve of the title sub¬ mitted and in case of a sale the vendor must make affidavit that he has produced all the deeds, wills and other instruments of title as well as all the evidences of encumbrances on the land, in order that the registrar can make a fair entry. When once a title is registered no adverse title will acquire any advantage by length of possession, but any person claiming an adverse interest can lodge a caution of that fact and be entitled to notice of all further transactions on the property. When the regis¬ tered land is sold the name of the transferee is entered on the register and he is issued a certificate of title. The law is not compulsory in England, but is being gradually adopted be¬ cause of its advantages over the old system.

In the United States it early became cus¬ tomary to register titles, mortgages and notices of transfer of interest, encumbrances, etc., in public offices, usually in the office of the county clerk of the court. This officer has no judicial or discretionary powers and is empowered only to register official copies of deeds, mortgages, agreements, etc. In place of the issuance of a certificate the clerk notes on the original or a duplicate deed that a true copy has been entered on the official register and this copy becomes legal notice of claim of title to all the world. The clerk of the court, who is a county officer in the United States, and elected, not appointed, frequently delegates this part of his work to an appointed assistant known as the registrar of deeds. Between the par¬ ties of a conveyance the recording or non¬ recording of the instrument is of no moment, but conveyances made after the first is re¬ corded are void, and any conveyance not re¬ corded is void as against a subsequent convey¬ ance to a bona fide purchase from the person in whose favor a recorded conveyance has been executed. State regulations, however, usually govern the matter of registration in regard to its effect as constructive notice. For the ((Aus- tralian systemˆ of national land registration, see Torrens System.

TITLES, words or phrases bestowed on in¬ dividuals as a mark of distinction, rank or

dignity, and in some cases implying office or vocation. Titles may be official, honorary, civil, military, temporal or ecclesiastical. The use of titles is as old as civilization and seems to have arisen from titles bestowed for some public service, and only later to have been

bestowed in virtue of the dignity of the office or em¬ ployment of the recipient, and even later to have become hereditary. As used by the Greeks and Romans, however, titles conformed to the first and the last customs — they were be¬ stowed for service and were hereditary. Later, Roman offices carried their titles with them irrespective of the merits of the holders, for ex¬ ample, the names Caesar and Augustus, and the phrase pater patrice, all of which came to be applied to the imperial throne regardless of the character of the occupant.

Titles to-day in existence in Europe are in¬ teresting relics of the feudal period. First came the titles of count and duke. Counts (comites , companions) were the followers of the feudal lords and the dukes (dux, leader), the military leaders.

Placed at the head of provinces, their roles were the same, to administer their territory, de¬ fend it against depredations and forays from without, and to organize and lead its man¬ power in the military service of the overlord when the latter went forth to battle. Later came the appellation marquis to denote those in charge of the “marches,” marshes, usually on the frontiers or border lands. Under the count came his lieutenants with the title of viscounts. As regards the title baron, which signifies man par excellence, it was at first applied only to the higher feudal personages, the great tenants- in-chief of the Crown. The knight was he who had received an order of chivalry or knight¬ hood, and so on through the several grades of feudal society.

Among modern rulers the titles king and emperor with the feminines and in the case of the late Russian Empire that of tsar, are the titles of supreme heads of government. The title king harks back to a period when its bearer bore it by right of kinship as the head of his tribe. The later rex and its d®rivatives in the Romance languages denotes a ruler. And the word emperor, which is used in the same sense, originally denoted the ruler of an empire or a confederation of several states, each of which had a king at its head. In this respect the word was advisedly applied to Wil¬ liam II, late emperor of Germany. Meanwhile it had become customary to add to the titles signifying the office, honorary qualifying titles. Henry IV of England was called “Grace® ; Edward IV, “Most High and Mighty Prince”; Henry VII, “Highness” ; and Henry VIII, “Majesty.” This latter title was universally adopted by the sovereigns of Europe, and was subsequently subjected to further qualification, as in the case of James I, who was called “His Sacred Majesty of England,” and was formally addressed as “James, by the Grace of God, King of Great Britain, France and Ireland, Defender of the Faith,” etc. Catholic rulers, meanwhile, had assumed such titles as “Catholic” for Spain, “Most

Faithful” for Portugal, etc. The present ruler of Great Britain receives the title, “George V, by the Grace of God, of the United Kingdom of Great

Britain and Ireland and of the British Do¬ minions beyond the Seas King, Defender of the Faith, Emperor of India,” etc. The eldest son of the British sovereign is styled the Prince of Wales, and the eldest daughter the Princess Royal; the other sons and daughters are styled prince and princess, and all, together with the children of the sons of the reigning sovereign, are addressed as Royal Highness. The five orders of nobility in Britain are dis¬ tinguished by the titles of honor — duke marquis, earl, viscount and baron. These nobles have several titles, granted by district patents, in their progressive steps in the peerage. A duke may thus be a marquis, an earl, a vis¬ count, and a baron. One of the inferior titles is permitted as a matter of social dignity to be assumed by the eldest son. Thus the eldest son of the Duke of Sutherland takes the courtesy title, as it is called, of Marquis of Stafford. Courtesy titles do not raise their bearers above the rank of commoners, and consequently the eldest sons of peers are eligible for election as members of the House of Commons. The lowest hereditary title is that of baronet, which, besides its name, which is placed after the name and surname of its bearer, entitles him to the prefix Sir. The dig¬ nity of knighthood is not hereditary. The titles of esquire and master (Mr.) are now given indiscriminately to nearly all classes of per¬ sons. The Continental titles of prince, duke, marquis, count, viscount and baron often differ considerably from the corresponding titles in England. Thus in England the title prince is confined to members of the royal family; Austria has, or had, archdukes but no dukes, Russia had only grand dukes.

It is an axiom that hereditary titles lose their value in proportion as they become com¬ mon. In England this latter danger is obviated by the rule of primogeniture which insures that there shall be but one bearer of a title in a generation, while in France all the sons re¬ ceive titles, the eldest the highest title, for in¬ stance, that of duke, the second son, a mar- quisate, and so on. In Mohammedan lands the only hereditary title is that of sherif, except in the ruling houses. Pasha and bey, at first purely military titles, are now conferred on civilians, but are not hereditary. Japan had a system of titles closely resembling that of Europe, and like the latter, based on her old feudal system. China, under the empire, en¬ nobled the ancestors of the person to be honored and usually made the title hereditary for a stated number of generations. The Turk¬ ish sultan is styled padishah (lord king) and as head of Islam he is “the Commander of the Faithful.” The ruling houses of India have a graduated system of titles closely akin to that

of Europe. The Pope of Rome is distinguished by the title “His Holiness,” and addressed as “Your Holiness”; cardinals by the title “His Eminence” ; bishops as “Monsignor,” and in England as “My Lord.” The title of bishops is

“The Lord Bishop of - ,” of archbishops

“The Most Reverend the Lord Archbishop of

- ,” deans are addressed as “Very Reverend,”

and archdeacons as “Venerable.” All clergy¬ men and ministers of the Christian and Jewish faiths are now generally styled “Reverend.” Titles in the United States.— Hereditary

tides and other titles of nobility are forbidden by the bederal Constitution and the citizen of another country who bears such a title when he becomes a citizen of the United States must relinquish his title. Various offices of dignity and trust carry with them certain forms of ad- f!ress’ kUt forms of address pertain to

the offices alone, and the holders of these offices have no claims to the prescribed form of ad- dress after their terms of service have ex¬ pired. The President, governors of States, and ministers of foreign nations are addressed, and spoken of, as your or his ((Excellency,» save m the case of speaking to the President, who should be addressed as «Mr. President.” The vice-president members of the Cabinet and members of Congress, heads of departments assistant secretaries, comptrollers and auditors of the treasury, clerks of the Senate and House of Representatives, State senators, law judges mayors of cities, etc., are entitled “Honorable.” Military, naval, ecclesiastical and other pro¬ fessional dignities are distinguished by the titles common to the English-speaking peoples of the world. Consult the (Almanach de Gotha^; (Burkes Peerage > ; Cokayne, G. E., Complete Peerage> (new ed., 1910) ; Phillips, Walter Alison, (Titles of Honor> (in Encyclo¬ pedia Britannica') Vo1- XXVI, Cambridge

TITLES OF HONOR. See Orders (Royal) and Decorations; Titles.

TITMARSH, M. A., or Michael Angelo,

a pseudonym employed by Thackeray when con¬ tributing his <

Paris Sketch Book,> (Yellow- plush Papers,) etc., to Fraser's Magazine.

TITMOUSE, one of the diminutive birds of the subfamily Parince, family Paridce, which are among the most interesting of passerine birds. There are more than 75 known species, ranging widely over most parts of the world except Australia, but most abundant in the temperate and colder regions of the northern hemisphere. None of them are really migra¬ tory, though they roam widely during the winter in search of food, nor are they gregari¬ ous, though in this particular also stress of weather frequently causes them to gather in flocks, often with other small birds, — as red¬ polls, finches, etc. They are not songsters, though most of them 'have characteristic, and frequently musical, call notes, and during the breeding season they sing after a fashion, rather weakly. They are very active, restless, familiar birds, usually showing little fear of man and oftentimes coming about houses in their continual search for food. They eat everything, from seeds to. the eggs and young of other birds. The nesting habits are varied, but they lay numerous eggs and raise two or more broods each season. The plumage is never brilliant, though occasionally striking, but is most frequently plain, though very taste¬ ful.

Structurally the titmice, aside from their small size, are hard to distinguish from the jays, to which birds their habits also ally them in many ways. The bill is short and stout, straight and unnotched, and there are no rictal bristles, but the base is covered by tufts of bristly feathers, directed forward, entirely con¬ cealing the nostrils. The feet are stout, with scutellate tarsi and short toes. The wing is

rounded, with 10 primaries, of which the first is exceedingly short. The tail as long as or longer than the wing is composed of 12 feathers, and usually rounded or graduated. The plum¬ age of the body, long, soft and loose.

. Of the 75 species of titmice, one-fifth occur m America all of these having been taken within the limits of the United States. About two-thirds of all the species belong in the genus Parus, and the same proportion holds among our American forms. The most abundant and familiar of our species is the black-capped tit¬ mouse (P. atricapillus) , widely distributed and known everywhere as the chickadee. The tvpical form ranges in eastern America from typical form ranges in eastern, but closely allied sub-species, or species, occupy practically all the rest of the Continent. The general color is ashy- gray, .the back with a brownish tinge, the under parts white, or nearly so; the crown,

nape, chin and throat black, with the cheeks white. In size, the various forms range from four and one-half to five and one-half inches, of which the tail is about half. The chickadee is a very active, tireless little bird, retiring to the woods and swamps during the summer, but in winter very abundant in our villages and parks and about houses. It can easily be attracted to any spot where food is provided, and if unmolested by cats or other¬ wise will soon become very familiar. Although it eats bread and crumbs and other articles of a vegetarian s diet, its tastes are carnivorous and it is especially fond of “meat-on-the-bone ” When foraging for themselves, chickadees eat an enormous number of insects and thus justify their existence, if that were necessary. As a matter of fact chickadees are so familiar, so daintily clothed, so cheerful even in the severest weather, and so courageous, and their usual call note «chick-a-dee-dee,» is so pleasing, none of our birds is more universally loved and en-

J2yedUIn the sprinffi when the mating begins, the chickadee has another note, a plaintive though not drawled, ((pe-we.” The nest is a mass of moss, feathers, wool, plant down, etc., placed in a hole in a stump, tree or fence' post,' usually not far from the ground. The eggs are five to eight in number in each of the two broods, and are white, spotted with reddish- brown. The chickadee of the South Atlantic States (P. carolinensis) is said to have notes quite different from the northern species. In the southeastern United States, ranging north to New Jersey, but rarely further, is another very abundant titmouse, quite different from the chickadee in both color and form, known as the tufted titmouse (Parus bicolor). It is a gray bird, with a black forehead, and a con¬ spicuous crest, an inch longer than the chicka¬ dee and not so attractive. The notes are not so attractive as those of the chickadee and be¬ come monotonous; the most common rendering in words is “peto, peto, peto ,» but it also has other calls. The tufted titmouse is not so familiar or confiding as the chickadee and is distinctly a woodland bird, seldom seen about houses. It is not shy and is readily ap¬ proached, while the prominent crest makes it easy to recognize. The nesting habits and the eggs are similar to those of the chickadee, but the latter are considerably larger. A tufted titmouse occurring in the valley of the Rio

Grande (Pants atricristatus) is notable for its glossy black crest, while the bridled titmouse (P . wollueberi) is a related species occurring in the southwestern United States, and is remark¬ able for the very

conspicuous black and white markings on the head. Besides several other interesting species of Pams, the southwestern United States is the home of four or five very small titmice, belonging to the genera Psaltri- pams and Auriparns. The former are called “bush-tits® and though very plainly colored with black, brown and plumbeous, their very small size, four inches or even less, and their large, woven, pensile nests, with lateral entrance, make them an interesting group. The gold tit (Auriparus daviceps) is of about the same size, but is notable for the rich yellow head, the other upper parts being ashy and lower parts whitish. These little birds build great globular nests of twigs, in the bushes, lining them with down and feathers. The eggs are pale bluish speckled with brown.

Of the tits of the Old World, seven species occur in Great Britain, but one of them, the crested tit (Parus cristatus) , is only an acciden¬ tal visitor. The great tit (P. major) is the largest European species, though only about the size of our tufted titmouse. The general color is yellowish and gray, with white cheeks and black head and throat. The blue tit (P. cceruleus) and the cole tit (P. ater) are the commonest of the English species. The former has the top of the head light blue and a bluish cast to the rest of the plumage. It is the species usually called “tom-tit.® The azure tit (P. cvanus) of Siberia, which is sky-blue and white, and the large Japanese tit (P. varius), which is handsomely marked with chestnut, will serve as examples of the more brightly colored titmice. The long-tailed tits of the genus TEgithalos are remarkable not merely for their excessively long tails but because they build very elaborate cozy nests, which are purse¬ shaped and hang free or are attached along one side to the trunk of a tree. The eggs are very numerous, as many as 20 having been found in one nest.

Consult in addition to standard ornithologies, Cones, (Birds of the Northwest (Washington 1874) ; and (Birds of the Colorado Valley *(Washington 1887), and Evans, A. H., <Birds) (in Cambridge Natural History,* Vol. IX New York 1900).

TITTLEBAT TITMOUSE, the name of a London shop clerk who figures as the hero of “Ten Thousand a Year,® a novel by Samuel Warren (q.v.).

TITULAR BISHOP, an episcopal title in the Roman Catholic Church substituted by Pope Leo XIII for the older one of bishop in parti- bus infidelium.

TITULAR CHURCH, a name given to the parish churches of Rome, as distinct from the patriarchal churches, which belong to the Pope, and

from the oratories. Each titular church is under a cardinal priest, has a district assigned to it, and a font for baptism in case of necessity.

TITUS, companion and well-loved friend of Saint Paul. He was converted by the apostle (Tit. i, 4), at Antioch 50 or 51 a.d., and in the same year accompanied him to Jerusalem,

and was present at that first council which recognized Gentile converts as part of the Church, and exempted them from the burden of the Mosaic ritual (cf. Acts xv, 1 — 35 with Gal. ii, 1-3). Paul soon afterward carried out the liberty thus accorded by refusing to require Titus, a Greek, to be circumcised (Gal. ii, 3-5). Titus was subsequently with Paul at Ephesus (56), whence the former was sent on a special mission to the Corinthians, carrying with him Paul's second epistle to that church (2 Cor. viii, 6, 22, 23; xii, 18). When Titus returned (57 a.d.) he found the apostle in Macedonia (2 Cor. vii, 5-6, 13-15). Subsequently (65 or 66 a.d.) he was left in Crete to arrange the affairs of the Church and "ordain elders in every city® (Tit. i, 5). Returning thence to Rome he was dispatched by Paul (66 or 67) to Dalmatia (2 Tim. iv, 10). Titus returned to his work in Crete, and died at an advanced age. See also Titus, Epistle to.

TITUS, Flavius Sabinus Vespasianus,

Roman emperor : b. 40 a.d. ; d. Reate, 13 Sept. 81 a.d. He was the son of Vespasian, whom he succeeded as emperor in 79 a.d., and was brought up at the court of Nero with his friend Britannicus, whom he accompanied in his wars in Germany and Britain. Later he commanded a legion in the war of Vespasian against the Jews, conducting the campaign in Judaea in 69 in the place of his father, who was then called to the imperial throne. At the end of a long and cruel siege Jerusalem was taken by Titus 8 Sept. 70. Titus returned to Rome in 71, where he was rewarded with the title of Caesar and given a part in the government of the empire. He early manifested the qualities of a humane and able ruler and he became the idol of the Roman people. The Colosseum, begun by Ves¬ pasian, was completed under his direction, and the public baths named in his honor, and other institutions for the public benefit were estab¬ lished by him

TITUS, Epistle to, one of the epistles of Saint Paul, stated to have been written to Titus, as bishop over the Cretans, from Nicop- olis in Macedonia. It is known as one of the "Pastoral Epistles,® because devoted chiefly to admonitions on the subject of pastoral duties. i eP^st^e Saint Paul describes what a

bishop ought to be, and applies severe language to certain of the Cretans. This, and the two epistles Jo Timothy, have been subjected to much discussion. See Timothy and Titus Epistles to.

TITUS ANDRONICUS. Several plays of the Shakespeare canon preserve a mystery due to almost total absence of external evidence; in the case of <Andronicus) the tantalizing un¬ certainty arises from the existence of an unusu¬ ally large mass of data. Shakespeare's substantial concern in the tragedy is avouched by the double testimony of Meres, who in 1598 lists (Titus Andronicus) among Shakespeare's tragedies, and of Hemmings and Condell. who included the play in the Shakespeare rolio. On the other hand, three quarto edi¬ tions are anonymous, and though this is natural enough in the case of the first (1594), it is

iAir?nSing that the Publishers of the 1600 and 1611 quartos should not have mentioned bhakespeare s then popular name. Moreover,

a large majority of the best critics have been cif°ing in tˆleir conviction that the marks of Shakespeare's mind are not evident in the plot, the characterization, or the language of this play. There is little of the unevenness here which one finds in works written by inferior authors and revised by Shakespeare ; in versi¬ fication as in dramatic power this tragedy is pretty consistent throughout, and it bears much more affinity to the work of Kyd or Peele than to Shakespeare's. The problem is complicated by references to what may conceivably have been earlier versions of our plav. A drama called (Titus and Vespacia) (Vespasian?) was acted for the first timev 11 April 1592. We cannot positively determine whether this was an old form of (Titus Andronicus) or, as the title more naturally suggests, a quite unrelated work on the subject of two historical Roman emperors. Another work, called by Henslowe (Titus and Andronicus *or (Andronicus,* was put on the stage as a new work in January 1594, by the Earl of Sussex's company and revived in June of the same year by the Lord Admiral's and Lord Chamberlain's (the last Shakespeare's company). On 6 Feb. 1594, was licensed to John Danter, and in the same year our play, called (The Most Lamentable Roman Tragedy of Titus Andronicus, *was printed by Danter for Edward White and Thomas .Millington. The subsequent quarto editions in 1600 and 1611 were printed for W hite, and all three were sold at the same shop. . Without entering into fuller discussion of this evidence and of ot-her entries in the Stationers' Register,*

it may be said that the records seem to establish the identity of Hens-lowe's (Titus and Andronicus) with our play as printed in 1594. (The contrary conclusions of Prof. G. P. Baker, Publications of Modern Language Association 66—76, 1901, have been invalidated by the discovery in 1905 of the 1594 quarto). If we eliminate Henslowe's ear¬ lier as probably unre¬ lated, there seems little reason to believe that any version of (Titus Andronicus existed in Shakespeare's lifetime which differed essentially from that we possess. Danter licensed <Titus Andronicus* for publication. (6 Feb. 1594) on the same day on which Sussex's company is last recorded as . acting it, and his manuscript, printed later in the year, would seem to be that which they acted. We have no reason to be¬ lieve that Shakespeare revised any plays either for this company or for Pembroke's company, which is said also to have performed the piece. The text of the play in the Shakespeare Folio of 1623 must, on the other hand, be that acted by the Lord Chamberlain's company in June, 1594, or later. Since the differences between these versions, however, are relatively quite un¬ important (Act III, sc. ii is. added in the Folio), it appears as likely on bibliographical as on stylistic grounds that Shakespeare had no more than a slight part in the play.

No direct source for (Titus Andronicus> has been discovered. Its relation to two later continental works, (Aran en Titus) (Aaron and Titus) by the Dutch poet Jan Vos (printed 1641) and a German play of Titus Andronicus and the arrogant empress (ca. 1620), has been learnedly discussed by H. De W. Fuller (Pub -

[Rations Modern Language Association 1-65, 19U1) , but it seems probable that these foreign

Wu-if' as weˆ. as another German play of which traces exist, are based upon perversions of the extant <Titus Andronicus *text, as dis¬ seminated by traveling English actors, and not, as buller argues, upon two hypothetical earlier English plays. . Early 1 7 th century allusions to (Titus Andronicus,* though not very numerous, are such as to prove that the play was popular with the masses of the public. Later, John Downes, writing of the performances of Sir William Davenant's company after the Resto¬ ration, mentions (Titus Andronicus *among several others which <(being old plays, were acted but now and then; yet being well per¬ formed were very satisfactory to the town. In 1687 Edward Ravenscroft published an adaptation cTitus Andronicus, or the Rape of Lavinia. Acted at the Theatre Royal,* with a preface, containing some important remarks concerning the old play. Among the more un¬ conventional modern theories regarding the authorship of (Titus Andronicus *may be*

noted Grosarts argument that it was written by Greene, <Englische Studien (1896) ; J. M. Robertson's that it is essentially Peele's *(Did Shakespeare write Titus Andronicus* (1905), rˆarV ill_consicierecl recent hypothesis of H. D. Gray that, the play was originally by Shakespeare, revised by Greene and Peele (Flugel Memorial Volume* (1916).

Tucker Brooke.

TITUSVILLE, Pa., city in Crawford County, On Oil Creek and on the Pennsylvania and the New York Central railroads, 100 miles north of Pittsburgh and 50 miles southeast of ,.rlG A a- The city is on a plain which slopes slightly, toward the south and east. The natu¬ ral drainage is supplemented by an excellent system of sewerage. The water is obtained from artesian wells. The broad streets are largely paved and tree-lined. Electric trolley lines traverse the principal streets. The manu¬ facturing industries consist of one of the larg¬ est iron works in the country, a high grade steel works, machine shops and foundries, large oil refineries, paraffine works, large branch of the American radiator works, large branch of the Bethlehem Steel Company, chemical works, planing mills, specialty works, cutlery works *and an electric light and power plant. The out¬ put consists of iron, car tanks, steam engines and boilers, forgings, oil well machinery and fittings, gasoline engines, refined oils, gasoline, etc- There are large oil fields in the vicinity an5J j e. first w.eˆ sunk for petroleum was drilled just outside of the city limits in the summer of 1859, striking oil on 27 August of that year. There are three banks consist- ing of a. national bank, a commercial bank and a trust company. One of the finest banking buildings in the State was erected in 1918 Among other public buildings are 12 large edi¬ fices and two halls for religious services a high school with a four-year course, four graded public schools and a kindergarten all under one superintendent ; Saint Joseph's Acad¬ emy, kindergarten and parish school. The city has also an excellent library, «Benson Memo¬ rial. Library,** an excellent Young Men's Christian Association and Young Women's Christian Association and the Titusville Hospi-

tal. Titusville was first settled in 1796, becom¬ ing a borough in 1847 and chartered as a city in 1866. The town was laid out in streets in 1809. It suffered great damage from flood and fire 5 June 1892 which destroyed one-third of the city with a loss of 60 lives. The city owns and operates the waterworks and one of the electric light plants. The government is vested in the mayor and five commissioners, the mayor

being elected for four years and the commis¬ sioners for two years. The majority of the people are native born, the predominating for¬ eign element consisting of Scandinavians, Irish and Germans. Pop. 8,550.

TIUI, te-we', or TIVI, te've, Philippines, pueblo, province of Albay: on Lagano Bay, on the northeast coast, 23 miles north by west from the pueblo of Albay. It is the centre of a hemp growing region, and exports hemp by way of Tabaco. It is especially celebrated for its thermal springs of iron and sulphur waters with medicinal properties, which are visited by large numbers of natives. Pop, about 11,000.

TIUMEKf, tyoo-meny', Russia, in Siberia, government of Tobolsk, 120 miles southwest of Tobolsk, on the Tura River. It is an important centre of trade, lying on several commercial routes, with railroad communication. It has a large technical school. Its principal manufac¬ tures are leather, soap, candles, carpets, pot¬ tery and woolen goods. These articles are ex¬ ported to China, the Kirghiz steppe, Bokhara and everywhere in Siberia. The Tiumen and woven carpets are especially renowned. In Tieumen was located a famous exile prison. Pop. about 35,000.

TIVERTON, R. I., town in Newport County, on Narragansett Bay, near Fall River, Mass., and on the New York, New Haven and Hartford Railroad. There are cotton manufac¬ tories and oyster and fishing industries. Pop. 4,032. y

TIVOLI, te'vo-le, Italy, in the province and district of Rome, on the Teverone or Aniene, 16 miles northeast of the capital. Its position on a rocky height overlooking the river is ex¬ tremely picturesque. Tivoli commands a fine view of Rome and the Campagna. It contains a fine modern cathedral which contrasts sadly with the other town buildings. Its antiquities are numerous and interesting, and include a temple of the Tiburtine sybil, temple of Vesta, villa of Hadrian, etc. The artificial cascades formed by the Teverone constitute an interest¬ ing feature of the landscape and supply power for the electric lighting of Rome, and for vari¬ ous factories. The old Latin name was Tibur, important in the Latin Confederation. It be¬ came subject to Rome in 338 b.c. The popula¬ tion of the commune is about 15,000. Consult Baedecker's (Central Italy and RomeP

TLAPALLAN, the mythical home of the Toltecs, and the land from which came their great culture god, Quetzalcoatl, and to which he returned when his mission on earth was done. See Quetzalcoatl ; Mexico — Mythology : Cholula.

TLAXCALA, tlas-ka'la, or TLASCALA,

Mexico, the smallest state in the republic, situ¬ ated between the states of Puebla, Hidalgo and Mexico Area, 1,534 square miles. The capital,

1 laxcala, located about 60 miles east of Mexico

City, was in ancient time a large city, but its 1919 population is only 2,800. It has a bishop's palace and a statehouse that retains much of their former grandeur. The holy well of Ocot- lan, in the suburbs, is covered by a costly and imposing sanctuary. The state lies within the plateau region, and its surface is broken by high mountains. The principal occupations are agriculture and some manufacture of cloth, though iron and silver are found in the moun¬ tains. Tlaxcala was at the time of the Discov¬ ery, a powerful native state which had main¬ tained its independence of the Aztecs. It be¬ came an ally of Cortes and retained its own government for a time under the Spaniards. Pop. about 192,000, almost all Indians.

TLEMCEN, tlem-sen', Algeria, in the prov¬ ince of Oran, 70 miles southwest of the city of Oran, and 30 miles from the Mediterranean. It js a walled town with nine gates, and is divided into three sections, namely, the citadel and military establishment; the business por¬ tion, containing the residences of foreigners; and the native section. The town stands on a mountain slope at an elevation of 2,500 feet, amid olive-groves and vineyards. It has 32 mosques, Protestant and Catholic churches, a museum and Jewish synagogue. The manufac¬ tures comprise textiles, carpets and leather articles, burnooses, etc. Trade is important, especially with Morocco. It is a historic city, some of the mosques dating from the 11th cen¬ tury. At the height of its . prosperity, in the 13th and 14th centuries, it is reputed to have had 125,000 population. Pop. 39,874.

TLINKET, or TLINKIT, a group of

tribes which constitute a distinct linguistic stock known as Kolushan. They inhabit the coast and islands of southern Alaska. Previous to the advent of the white men their houses were rudely constructed, and their trade car¬ ried on with neighboring tribes. The exchange of slaves was carried on extensively, and they were treated by their masters with the greatest cruelty. They have greatly diminished of late years, till there now remain but about 5,000, a large number of them being employed in the canning industry.

TO A SKYLARK. Shelley's ˆSkylark* perhaps the most famous of English lyrics was written at Leghorn, Italy, and published 'with Prometheus Unbound > in 1820. It is com¬ posed of 21 five-line stanzas, each of which ends Wlth a line that represents the brief pause of the bird on the wing as it prepares for yet higher flight. Mrs. Shelley says : «In the spring we spent a week or two at Leghorn, borrowing the house of some friends who were absent on a journey to England. It was on a beautiful summer evening while wandering among the lanes, whose myrtle hedges were the bowers of the fireflies that we heard the carolling of the skylark which inspired one of the most beautiful of his poems.® This exquisite lyric Has been used in generations of school head¬ ers® and "selections,® but even such familiar hand mg has not served to tarnish the peculiar qualities in which it still remains matchless

Wn "napPrJ),achable . *Shelley's skylark, unlike Wordsworths, loses itself in the empyrean* it is a spirit not a bird, an embodied voice, 'an ampliation It is beside the mark to urge that the poem has "the defects of its qualities® ; for.

from the standpoint of what the poet meant to do, it has no defects. It is a perfect work of art, having a worthy purpose which it perfectly attains. The poem pursues the flight and the song, of the bird swiftly up to the blue; four exquisite similes liken the lark to the poet, to the maiden, to the glow-worm and to the rose; the song of the bird sings itself in the heart of the poet ; at the end comes the pathos of the infinite and unsatisfied desire never absent from Shelley's nature lyrics. The criticism of almost a century has applied to the (Skylark) the epi¬ thets which have long since become banal but which seem inevitable: it is melodious, exquisite, ethereal, ecstatic. As such it is unsurpassed and is probably unsurpassable. Wordsworth's (Sky- lark) represents a more human point of view; Keats (Ode to a Nightingale,-* an equally con¬ summate achievement of a different kind.

Marion Tucker.

TOAD, an amphibian of the anourous family Bufonidce or some related family in the series Arcifera , in allusion to the structure of the shoulder girdle. The Bufonidce present the following distinctive features : The tongue is well developed, fixed to the front of the mouth, and has the hind end free. The result of this arrangement is

that it can be filliped by means of appropriate muscles with the greatest speed and precision, and thus serves these usually totally toothless animals in the capture of in¬ sects which adhere to this mucous-coated organ. Teeth are always absent from the jaws, but may be present on the vomer in a few foreign gen¬ era. The hind toes are more or less webbed, the front toes webless and the ends of the toes are neither clawed nor furnished with adhesive discs. In all cases the vertebrae are proccelous or have their bodies hollowed in front, the transverse processes of the sacrum are ex¬ panded and ribs are absent. This family is an extensive one of about 15 .genera and 100 species and is cosmopolitan, but is especially well rep¬ resented in tropical America. The species differ considerably in habits, most of them being ter¬ restrial burrowers, but some are aquatic, others arboreal.

Within the United States, Bnfo is the only genus, being represented by 9 or 10 species, most of which belong to the southwestern United States and Mexico. The common east¬ ern toad (B. lentiginosus) is found in one or ether of its sub-species throughout the eastern United States and Canada. The familiar roughness and wartiness of the skin of toads is due to the presence of glands and, especially on the head, to bony deposits. They are chiefly terrestrial and nocturnal, and feed upon in¬ sects of which they destroy large numbers. Toads visit the water in March or April, their breeding season, for the purpose of depositing their eggs, which are in long strings and are fertilized by the male upon their extrusion. During the mating season the males are very noisy at night and so pugnacious that they sometimes kill one another in "their encounters. Development takes place rapidly and the tad¬ pole-stage is passed in three or four months, when the young toads leave the water in mul¬ titudes. The popular repugnance to these per¬ fectly harmless animals has no doubt arisen from their unprepossessing aspect and outward appearance. No venom or poison apparatus of vol. 26 — 42

any kind exists in these creatures; and save that the secretions of the skin may be of acrid or irritant nature when brought in contact with cut or exposed surfaces, they are utterly harm¬ less to man. There is a swelling above the eyes covered with pores and large, thick and prominent enlargements behind the eyes which secrete an acrid fluid, which protects these animals from the attack of carnivorous mam¬ mals. They also swell up with air when at¬ tacked by snakes. When handled, toads fre¬ quently eject urine from the vent, but the wide¬ spread belief that the contact of this fluid with the skin produces warts is utterly un¬ founded. Toads are extremely tenacious of life and can exist a long time without food; their hibernation in mud, cracks and holes has prob- ably given rise to the stories of their being found in

places where they must have existed for . centuries without food and air. These stories, however, have no foundation in fact, for Dr. Buckland proved, by direct experiment, that no toad can live for two years if deprived of food and air. Another common belief that toads, are often rained down is probably to be explained by the fact that great numbers of young toads frequently leave, during showers of rain, the vicinity of pools in which their larval life was spent. Toads are really extremely interesting animals, and much entertainment can be derived from their observation.

Among foreign toads are the great Bufo ciguci, large enough to fill a quart measure, of the West Indies and South America; the green toad (B. viridis) of Europe, noted for its change of color ; the long-tongued toad (Rhino - phrynus dorsalis) of Mexico, which feeds on termites; the European fire-toad (Bombinator igneus), so called from its brilliant red under parts and belonging to the family Discoglos- sidoz ; and the remarkable Surinam toads, which are tongueless and carry the young in little cavities on the back. The last belongs to the distinct family Pip idee. The spade-foot toad (q.v.) and the tree-toads or tree-frogs (q.v.) belong respectively to the families Scapliiopidce and Hylidce. Many of the toads have remark¬ able and interesting breeding habits, for ac¬ counts of which reference must be made to works of herpetology. Consult Boulanger, E. G-., c Reptiles and Batrachians *(New York 1914) ; Cope, E. D., (Batrachia of North Amer¬ ica^ (Washington 1889) ; Boulenger, G. A., (Tailless Betrachia) (London 1892) ; Dicker- son, M. C., (The Frog Book-* (New York 1914) ; Gadow, (Amphibia and Reptiles) (New York and London 1901); Kirkland, ‘Habits, Food and Economic Value of the American Toad) (in Bull. 6, Hatch Exper. Sta., Amherst, Mass., 1897) ; Sampson, ‘American Naturalise

(1900).

TOAD-FLAX, a common roadside weed (Linaria linaria) belonging to the family Scruphidariacece. It somewhat resembles a snap-dragon, but is smooth and has many linear leaves, either alternate or opposite and vertic- illate on the lower portions of the stem, and very pale green. The stem is prolonged by a terminal bracted densely flowered raceme. The blossoms are pale yellow with a short spur, a two-lipped corolla, the lower lip spreading and three-lobed, with a base so enlarged as nearly to close the throat with an orange-colored

palate. This combination of orange and yellow has given rise to the name ˆbutter-and-eggs.® It is also called ramstead. The plant has been naturalized from Europe and is rather pretty, but it is very tenacious and very difficult to eradicate.

A native toad-flax is L. canadensis, a slender plant, with blue flowers and with a tendency toward oppositeness. The Kenilworth ivy (Cymbalaria cymbalaria) is also called ivy- leafed toad-flax and is a glabrous trailing peren¬ nial, with reniform-orbicular leaves and bluish flowers. L. triornithophora, a European plant, is peculiar for its purple, long-spurred flowers blooming in whorls of three and resembling birds, which has suggested the Latin name, ˆthree-birds® toad-flax. The American bastard toad-flax (Comandra umbellata) is a delicate, pale green, smooth plant of the sandal-wood family, with greenish white or purplish, cam- panulate corollas and oblong leaves quite unlike the Linaria. In England Thesium linophyllum, with leaves like those of toad-flax, is known by the same name as Comandra.

TOADFISH, any fish of the genus Batra- chus, so called from the large head, wide gape and generally toad-like appearance. The com¬ mon toad-fish (B . tau) is from eight inches to a foot long, light brown marbled with black. There are about 12 species, dwelling principally in tropical and sub-tropical seas.

TOADSTONE, (1) in geology , an old Eng¬ lish name for certain amygdaloidal basaltic rocks occurring in Cumberland, England. The name is also applied to a mottled, apparently spherulitic felsite, found near Boston. (2) Fragments of rocks or precious stones, re¬ sembling toads either in color or form, also fossils of various kinds, supposed- to possess special therapeutic virtues. Such objects were for many centuries highly prized in Europe, being worn as rings or amulets.

TOADSTOOLS, properly fungi of the family Agaricacece , which includes the edible mushrooms. See Fungi.

TOASPERN, Otto, American artist: b. Brooklyn, N. Y., 26 March 1863. He was grad¬ uated at the Royal Academy of Fine Arts, Munich (1888) ; was the pupil of N. Gysis and P. Nauen; and became an instructor in the National Academy of Design, New York. He is best known as an illustrator of Life ; Ladies' Home Journal; Century; Harper's and several leading European periodicals.

TOAST, originally bread dried or scorched before the fire. In the 16th

century it became the fashion in England to add toasted bread to drinks. From this habit the term toast came to be applied to a drink of honor proposed to some person or sentiment during the course or at the conclusion of a meal. The growth of social drinking in the 17th century greatly in¬ creased the custom of toasting, and it became common to toast not only the reigning mon- archs, the hosts and the flag, but each person of the assembled company, absent friends and numerous sentiments. Finally the term came to denote not only the drink but the person or sentiment toasted, and in this dual sense the word is used to-day. Toasts are properly drunk standing, and it is the modern custom to have some person present reply to the sentiment pro¬

posed in an appropriate speech. Consult Cham¬ ber's <Book of Days) and Valpy's (History of Toasting) (1881).

TOBACCO, the common name applied (1) to plants of the genus Nicotiana, of which there are a large number of species, and (2) to the dried leaves of these plants prepared in various ways for smoking, chewing or snuffing. Originating in America, the use of tobacco has been extended into practically all parts of the world and, indeed, it has come to be incom¬ parably the most generally used of all narcotics. It appears that the name tobacco was derived from the word tabaco, originally employed by the natives of Haiti to designate the tube used by them in smoking or taking snuff and adopted by the Spaniards as the name of the product most generally used in smoking; although other products than true tobacco were taken by the na¬ tives in the form of snuff. The habit-forming properties or narcotic effects of' tobacco are due to its content of nicotine and related alkaloids. •

The tobacco plant belongs to the family of Solanaceae and is thus related to the tomato, potato, eggplant, red pepper and jimson weed. There are some 50 or more species of Nicotiana but only two of these, N. tabacum and N. rustica, are of economic importance. The Indians of western North America, however, held N. quadrivalvis in high esteem for smok¬ ing purposes. Also, N. sylvestris, N. alata and a few others are used to some extent for orna¬ mental purposes. Additional well-known spe¬ cies are glauca, longiflora, glutinosa, trigono- pliylla. Nearly all species of Nicotiana are native to America, but N. suavolens appears to be indigenous to Australia. All of the more important commercial types of tobacco are pro¬ duced from N. tabacum. This is a coarse, rank¬ growing annual, reaching three to six feet or more in height. The leaves are simple, alter¬ nately arranged on the stem, very large but quite varied in size, ovate to lanceolate in shape, entire or with wavy margin, petiolated or sessile and decurrent. The number of

leaves varies markedly in the different varieties but is not much affected by differences of environ¬ ment. The green portions of the plant are covered with soft hairs either branched or single stalked, some of which are capitate and glandular, secreting a viscid, gummy substance. Stomata occur on both surfaces of the leaf. The inflorescence is a terminal panicle pro¬ ducing large flowers ranging in color from deep red through various shades of pink to white, a light pink being the more common color. Under favorable conditions flowering branches also develop from buds borne in the leaf-axils. The calyx of the flower is bell¬ shaped, four or five-cleft. The corolla tube is funnel-shaped with spreading and pointed lobes. The blossom is normally self-fertilized. The five stamens are attached to the base of the corolla tube. The stigma is capitate. The cap¬ sule is two to four-valved, bearing a very large number of seed. The seed are small, there being 300,000 to 400,000 in an ounce. There are nu¬ merous distinctive varieties of N. tabacum and of the leading commercial varieties there are many sub-varieties or local strains bearing dis¬ tinctive names but usually differing among themselves only in minor details. In some in¬ stances, however, important commercial types

of tobacco are produced from mixtures of dis¬ tinct sorts designated collectively by the type name rather than by distinctive varietal names, ihis is notably true of Cuban and Turkish tobaccos. N. rustica is an annual with a much branched stem and large, ovate leaves with petiole. The corolla tube of the blossom is cylindrical with rounded lobes and is greenish 3*ellow in color. The seed are about three times the size of those of tabacum. Rustica is decidedly earlier in maturing than is tabacum. It is not grown commercially in America but is extensively cultivated in India and in certain sections of Asia Minor and Russia, and to some extent in other European countries.

History. — Tobacco was widely used by the Indians at the time of the discovery of Amer¬ ica by Columbus and relics of "the Mound Builders show that pipe smoking was a very ancient custom among the aborigines. On land¬ ing in the West Indies in 1492 members of Co¬ lumbus' crew observed that the natives smoked rolls of dried tobacco leaves. When the Spaniards landed in Mexico in 1519 they found the natives cultivating tobacco with care and skill. It was believed by them to possess great curative powers for such diseases as bronchitis, asthma and rheumatism. Other aromatic ma¬ terials such as liquidambar were frequently mixed with tobacco for smoking

purposes. The natives of the Orinoco forests of Venezuela understood the use of tobacco and the prepara¬ tion and use of tobacco by the natives of Brazil are described in detail by Andre Thevet who visited that region in 1555. For smoking, the dried leaves were rolled into a small cylinder enclosed in a leaf of corn or palm. Similarly, when Cartier discovered what is now Canada he found the Indians drying tobacco leaves in the sun. The powdered leaves were smoked in pipes made of stone or wood. Early explorers traveling through the interior of the country found the habit of smoking very general among the aborigines from the Great Lakes to the Gulf of Mexico. The pipe of peace carried by the Indian tribes, which was an elaborately carved and decorated object, was smoked in common by those attending grand councils and was held very sacred. The tobacco cultivated by the Indians of North America to the east of the Mississippi was N. rustica while in Central and South America N. tabacum was the species principally grown. It has already been made clear that the American aborigines used to¬ bacco in the form of cigars and for pipe smok¬ ing and, moreover, it is recorded that chewing the leaf was practised in some sections, while in South America the manufacture of snuff had reached a perfection which in some respects has never been surpassed. Thus, the American Indians had evolved methods of cultivating to¬ bacco and preparing it in all forms which are now used. Finally, it is stated that a great North American tribe which dwelt near Lake Huron engaged in the cultivation of tobacco on a commercial scale, the product being sold to other tribes. According to early authorities, the Spaniards began the culture of tobacco in Haiti prior to 1535. Shortly afterward it was extended to the island of Trinidad whose prod¬ uct soon became famous in Europe. Tobacco culture was soon developed on a large scale in the West Indies and in Venezuela and Brazil.

At least four distinct varieties of N. tabacum were grown, viz.: (1) A large broad-leaf type;

(2) a long narrow-leaf ˆOx-tongue® form ;

(3) a type resembling (2) but with broader leaves ; (4) a type with very small leaves. Thus, prior to the settlement of Jamestown, the Span¬ iards and Portuguese had developed an import¬ ant trade in tobacco between Europe and the West Indies and South America. John Rolfe began the culture of tobacco at Jamestown in 1612 from seed brought from South America or the West Indies and in 1619 20,000 pounds were shipped to England. The growing of tobacco in Maryland began about 1631 and soon became an important enterprise. These two States have continued to grow tobacco in large quantities up to

the present day. The Virginia colonists at first grew the crop on the bottom lands of the tide-water region. As the settlers moved further inland, however, it was found that the more elevated and somewhat heavier soils produced tobacco better suited to trade requirements. Overproduction of tobacco soon became a serious menace to the welfare of the colonists and an inspection service was estab¬ lished in order to prevent the export of dam¬ aged or inferior leaf. Attempts were made also to limit the acreage grown but with in¬ different success. It appears that the growers learned at a very early date the influence of the soil and the cultural and curing methods on the character of leaf tobacco produced. Thus, the selection of suitable soils, the proper spacing of the plants in the field, use of certain methods of manuring and following definite practices of topping, ˆsuckering,® harvesting and curing came to be recognized in the first few decades of practical culture as being of fundamental importance. In the main, present- day cultural methods, therefore, differ from those of the early colonists in details rather than in fundamental principles. The exports of tobacco from Virginia had reached 18,000,000 pounds in 1700, and about 40,000,000 pounds in 1750 while at the outbreak of the Revolution the combined exports of Virginia and Maryland amounted to 100,000,000 pounds. Prior to the Revolutionary War the production of tobacco in the other colonies was not of much import¬ ance, but during the past century there was an enormous expansion in total production in the United States. New centres of production were developed and the crop as a whole became dif¬ ferentiated into a number of distinctive types. After the close of the Revolution pioneer set¬ tlers from Virginia and Maryland carried the culture of tobacco into Tennessee, Kentucky, Missouri and Ohio. The tobacco produced in western Kentucky and Tennessee, however, found its way to market through New Orleans while the product of eastern Ohio was sent to Baltimore. Missouri at one time became a ’leading tobacco-producing State although in recent years the production has fallen off to a nominal figure. During the first quarter of the last century the culture of cigar leaf to¬ bacco began to assume importance in the Con¬ necticut Valley and by the middle of the century the cigar tobacco districts of the Miami Valley of Ohio, the Gadsden area in Florida and the New York areas had become established. Next came the development of the Lancaster, Pa., district and, beginning about 1870, the

culture of cigar leaf developed very rapidly in southern Wisconsin. As

tobacco culture in Virginia was pushed forward onto the gray lands of the south central border counties and into North Carolina a lighter and finer-textured product was obtained. About 1825 began the use of charcoal in curing which had the effect of further improving the quality of the light- colored leaf and subsequently the charcoal was replaced by a system of flues for leading out of the barn the smoke from the fuel used in curing. In this manner began the development of the vast bright flue-cured tobacco industry. During the latter part of the century this in¬ dustry spread into eastern North Carolina and South Carolina. Tobacco culture had been in¬ troduced into the Blue Grass region of Kentucky at an early date but the discovery of the White Burley variety in Brown County, Ohio, in 1864 revolutionized the industry in central Ken¬ tucky and southern Ohio and the Burley type soon came to be produced in enormous quan¬ tities. The outstanding event of the past quar¬ ter century in the industry is the development in the Connecticut Valley and in western Florida of the shade-grown cigar wrapper leaf industry, a very intensive and highly special¬ ized agricultural enterprise. Turning to the introduction of tobacco into foreign countries, it appears that the plant was first grown in France in 1556 by Andre Thevet from seed taken back by him on his return from Brazil. The plant attracted little attention, however, till introduced and exploited at the royal court by Jean Nicot, Ambassador to Portugal, whose name became immortalized in the generic name of tobacco, Nicotiana. Tobacco also was first grown in Portugal and in Spain at about this time, and almost immediately was introduced into Belgium, the Netherlands and Rome. Upon his return to England from Virginia in 1585 Sir Richard Grenville introduced pipe smoking as practised by the Indians. For a full half century after its introduction into Europe to¬ bacco was used almost exclusively as a medici¬ nal agent and it was generally believed to pos¬ sess wonderful curative properties. During the first half of the 17th century however, indulgence in tobacco became very general in most of Europe although in some instances strenuous efforts were made by the authorities to prevent its use. Amsterdam and Rotterdam became at the outset the leading distributing centres for American-grown tobacco. The cul¬ ture and the use of tobacco were introduced into India, Persia and other Asiatic countries early in the 17th century.

Commercial Types of Tobacco.— The dif¬ ferentiation of leaf tobacco into types has ref¬ erence primarily to the different uses of the leaf in manufacture. A further distinction is fre¬ quently made as to the district or locality in which the product is grown. In the United* States there are eight important commercial types of tobacco, viz.: (1) cigar leaf; (2) dark fire-cured export; (3) White Burley; (4) bright flue-cured

or yellow tobacco; (5) dark air- cured manufacturing; (6) Maryland and east¬ ern Ohio export; (7) Virginia sun-cured; (8) perique. The cigar leaf type is used almost exclusively in the domestic manufacture of cigars. There are three sub-types of cigar to¬ bacco : (1) wrapper leaf used as the outer

covering of the cigar; (2) binder leaf used for holding the cigar's shape; (3) filler leaf which makes up the body of the cigar. Wrapper leaf is grown chiefly in the Connecticut and Housatonic valleys of New England and in the Gadsden-Decatur district of Florida and Georgia. Binder leaf is produced mainly in Dane, Rock, Vernon and Crawford counties of Wisconsin and in the Big Flats district of New York. The leading centres for the pro¬ duction of filler leaf are the Lancaster area of Pennsylvania, the Miami Valley district of Ohio and the Onondaga district of New York. The dark fire-cured type is exported to the extent of. about 80 per cent of the total production, being unsuited for domestic manufacture except in making snuff and for limited use as a plug wrapper. This type is grown in some 20 counties of central Virginia, in the Clarksville and Hopkinsville, and the Paducah districts of western Kentucky and Tennessee and the Henderson or Stemming district of Kentucky. Great Britain is the heaviest purchaser of fire-cured leaf and the other principal foreign pur¬ chasers have been Italy, Germany, France, Spain, Austria and Belgium. This type of leaf is of heavy body, dark in color, rich in nicotine and possesses a distinctive creosotic or smoky smell and taste because of the combustion prod¬ ucts absorbed from the smoke used in the proc¬ ess of curing. The White Burley is distinctly a domestic manufacturing type, but little of it being exported.. It burns well, is of light body, rather neutral in flavor and yields a large pro¬ portion of light colored leaf. Its one most important characteristic, however, is its remark¬ able capacity for absorbing the liquid sweeten- ing materials or sauces used in the manufacture of the sweetened type of plug chewing tobacco. For this purpose the Burley has no equal. It is also used very extensively in the manufacture of cut-plug smoking and fine-cut chewing to¬ baccos and in the production of cigarettes. White Burley is grown chiefly on the rich lime¬ stone soils of central and northern Kentucky and in southern Ohio. Considerable quantities, also, are produced in a few counties of west¬ ern West Virginia and southeastern Indiana. The bright flue-cured or yellow tobacco has come to be the world's most important type in point of quantity consumed. In domestic manufacture the chief uses of this type are in the production of granulated smoking tobaccos, cigarettes and the flat type of plug chewing tobacco. It is our most important cigarette type. In recent years flue-cured leaf has been a very aggressive type in

foreign markets and at the present time more than half the total production is exported, the largest foreign buyers being England, China and Canada. There are two subdivisions of the flue-cured producing district, namely, the Old Belt section, embracing the northern central counties of North Carolina and adjoining border counties of Virginia, all in the Piedmont region, and the New Belt section of eastern North Carolina and South Carolina, lying in the Coastal Plain region. The most distinctive characteristic of topical flue-cured tobacco is its lemon or orange yellow color. In the region of Kentucky and lennessee lying between the Burley section to the east and the dark fire-cured section on the west there are two districts known as the One-

sucker and the Green River which produce large quantities of dark air-cured tobaccos used both ior domestic manufacture and for export. The one-sucker tobqcco is used for the domestic manufacture of twist chewing tobacco and for the so-called rehandling export trade with South Africa, the West Indies and Central and South American countries. The Green River tobacco is used for the manufacture of long-cut chew¬ ing and for export to England. The Maryland and eastern Ohio tobaccos have been exported to Europe for centuries, France and The Netherlands being the chief purchasers. The Maryland leaf also is used to some extent in domestic manufacture. This tobacco is com¬ paratively light in body and color, dry and chaffy and has good burning qualities but is rather characterless in aroma. In the eastern Ohio district the old piebald or spangled type has been largely replaced in recent years by White Burley. In a few counties in the vicinity of Richmond, Va., a dark type of leaf known as sun-cured is produced although in late years the old method of partially curing the leaf in direct sunlight has been largely abandoned in favor of air-curing. This to¬ bacco is used in the manufacture of the flat type of chewing tobacco. Perique tobacco is grown only in Saint James Parish, La., and the total production is not large. This type deserves mention because of its distinctive aroma, due primarily to the unique method of curing employed by the growers. Perique is chiefly used in the preparation of fancy smok* ing mixtures to which it adds aroma. To the above-named domestic types entering into com¬ merce must be added at least three foreign types of special importance, namely, the Cuban, the Sumatra and Java and the so-called Turkish. In a small area of Cuba located in the province of Pinar del Rio in the vicinity of San Juan y Martinez is grown the world's finest cigar leaf, noted for

its remarkable aroma. This district is known as the Vuelta de Abajo and the outlying tobacco-producing territory is designated as Semi-vuelta. Other leading Cuban districts are the Partidos of Habana province and the Remedios of Santa Clara prov¬ ince. Porto Rico, the Bahia district of Brazil and portions of the Philippines also produce cigar tobacco of high merit though they do not equal the best Cuban. On the east coast of Sumatra and in portions of Java a very fine grade of cigar wrapper leaf is grown and sev¬ eral million pounds of this product are imported into this country each year for the manufacture of lower and medium-priced cigars. Because of the thinness of leaf, fineness of texture and veins and general uniformity of the grades this tobacco has a great wrapping capacity per pound. In the portion of southern Macedonia around the port of Cavalla and other nearby towns and in the Smyrna, Trebizond and Sam- soun districts of Asia Minor are grown the finest cigarette tobaccos in the world. The so-called Turkish cigarettes are made from blends of these tobaccos. Egyptian cigarettes also are made from the Turkish types and tobacco is not grown in Egypt. The Macedonian, Smyrna and Samsoun tobaccos are imported into the United States in large quantities.

Culture of Tobacco. — The tobacco plant may be grown under a wide range of soil and

climatic conditions but, on the other hand, the characteristics of the leaf of commercial im¬ portance are greatly influenced by both soil and climate. These facts explain the existence of so many different commercial types of to¬ bacco each suited to special purposes of manu¬ facture. Cultural methods, also, affect the character of leaf obtained so that these methods are modified in the different districts according to the special requirements of the type grown, although certain general features are common to all sections. The tobacco seedlings must be grown in a specially prepared seed bed which may be either a hotbed or more commonly a cold frame. The soil must be mellow and friable and must be made rich. The time of planting ranges from January in the South through the month of April in Northern dis¬ tricts. > The seed are sown at the rate of about a heaping teaspoonful to 25 square yards of seed bed and are covered only very lightly. The beds are covered with glass or with <(tobacco cloth® to protect the young seedlings. When the seedlings have attained sufficient size, usually 6 to 10 weeks after the seed have been planted, they are transplanted to the field either by hand or machine. At the time of trans¬ planting each plant must be watered unless the soil is wet. The plants are set in rows three to four feet apart while the distance allowed between the plants in the row varies from 14 to 16 inches for some of the cigar tobaccos up to three and one-half to four

feet for the fire-cured type. The character and condition of the soil used for tobacco is of special import¬ ance. Good drainage is essential in all cases. Broadly speaking, cigar wrapper and binder leaf, Maryland tobacco and the flue-cured type are grown on light sandy and sandy loam soils, with sandy or sandy clay subsoils. In New Eng¬ land the Merrimac series of soils are widely used, while in Maryland the Norfolk and in the flue-cured district the Norfolk and Durham series are of special importance for tobacco. In the cigar filler district of Pennsylvania and in the Burley region of Kentucky fertile loams of limestone origin, particularly the Hagerstown loam, . are # chiefly used. Clay loams of the Miami series are typical tobacco soils of the Ohio cigar filler district. The dark fire-cured and air-cured export and manufacturing to¬ baccos are grown on rather heavy silt and clay loams usually reddish or brownish in color, with clay subsoils. Both the kind and the quantity of fertilizer applied to the tobacco crop are important. An excess of nitrogen injures the quality of the leaf, especially in the case of the flue-cured type. At least a part of the nitrogen should be derived from organic sources such as cotton-seed meal or dried blood. A liberal supply of potash in the form of sulphate or carbonate favors good burning qualities and reduces susceptibility to ‘leaf spot diseases. Chlorine tends to hinder free combustion in the cured tobacco. Only quickly available forms of phosphoric acid should be used in order to ensure proper “ripening® of the leaf. In Connecticut heavy applications of fertilizers furnishing 100 to 150 pounds each of nitrogen, phosphoric, acid and potash per acre are com¬ monly employed while in Southern districts 20 to 40 pounds of nitrogen and potash and 40 to 80 pounds of phosphoric acid per acre are ap-

plied to the crop. Barn manure, also, is widely- used in Northern districts. Liming is less es¬ sential for tobacco than for many other crops though possibly beneficial under some condi¬ tions. The soil is tilled for tobacco about the same as for corn or cotton. When the flower head begins to develop or somewhat later the plants are ˆtopped” by breaking off the top of the stalk carrying the flower head and upper leaves, in order to force a better development of the leaves remaining on the plant. Cigar wrapper and binder tobaccos, White Burley and Maryland tobacco are topped high, leaving 16 to 20 leaves on the plant, while the heavy fire- cured type is topped to only 10 to 14 leaves and other types are topped to intermediate heights. The suckers or branches which develop in the axils of the leaf also must be

broken off by hand. It is important to harvest the crop at the right stage of maturity. As the leaves ripen they take on a lighter green color and become more or less mottled with light-colored flecks. They also tend to crack when folded between the fingers. There are two methods in general use in harvesting the crop. In the first method the stalk is cut off near the ground and the inverted plants are attached to four-foot sticks either by means of cord or hooks properly spaced on the sticks, or by forcing the stick through the butts of the stalks by means of a removable metal spear head, or, finally, by splitting the stalks from the top to near the base and simply placing the plants astride the sticks. Each stick carries six to 10 plants and thus laden the sticks are arranged 6 to 12 inches apart on the tier poles of the barn. In the second method the leaves are plucked from the plant as they ripen, beginning at the bottom and taking two to five leaves at each picking. The field is thus gone over three to five times at intervals of a week or 10 days. The leaves are strung on cord by piercing the base of the midrib with a needle or the cord is merely looped around the basal ends of the leaves. The free ends of the cord are attached to either end of a four-foot stick, each stick and cord carrying 20 to 40 leaves. Curing, which must be carried out under proper conditions of tem¬ perature and moisture supply, is effected in specially constructed curing barns. Three dis¬ tinctive methods are practised, known as air¬ curing, flue-curing and fire-curing. In all cases the process must be so regulated as to develop the desired properties in the tobacco leaf. In air-curing natural atmospheric conditions are largely depended upon and little or no artificial heat is employed. The barns are comparatively large and are provided with a maximum of ven¬ tilation. From three to 12 weeks are required to complete the process of air-curing. This method is applied to all cigar tobaccos, Mary¬ land tobacco, White Burley and the dark manufacturing types. For flue-curing the barns are small in size, tightly constructed and are provided with a system of metal pipes by means of which artificial heat may be freely applied without allowing smoke to come in contact with the tobacco. Heat is applied throughout the curing and the temperature is carefully regu¬ lated, beginning with 90-100° F. and ending with 180° or even 220° F. The whole process is completed in three to five days. In fire-cur¬ ing heat is supplied by making open fires on the

floor of the barn, thus allowing the smoke to come in contact with the tobacco, to which it imparts a characteristic odor. The barns should be tightly constructed but they should be pro¬ vided with ventilators. In practice heat is not applied until the tobacco has been hanging in the barn for two or three days and the fires are kept going for only a few days at a time. Alter¬ nate periods of air-curing and firing are thus

continued till the curing process is completed. After curing in the barn is completed the to¬ bacco leaf is too brittle to handle without break¬ ing except after a period of damp weather or when moisture is applied artificially. Under suitable moisture conditions the leaf becomes pliable so that the crop can be handled in prep¬ aration for market. After the leaves have been stripped from the stalks they are separated into various grades according to size, color and other important elements of quality. The number of grades made by the grower ranges from two to 10 or more, according to the type and value of the crop. After the grading is completed the leaves are tied into small bundles or ((hands" by securely wrapping a folded leaf around the butt ends of the leaves in the bundle. There are several different methods of marketing the various types of leaf tobacco. In the case of cigar tobaccos and, to a limited extent, the dark air-cured and fire-cured types, the buyer in¬ spects and bargains for the crop on the farm, the grower delivering the tobacco at the buyer's receiving warehouse. In the South and, to an increasing extent, in the Western districts the "loose leaf auction system" prevails. Under this system the various grades of the grower ai e placed in separate lots on the warehouse floor at market centres and sold at auction on a commission basis. In a third system which has been extensively employed, the tobacco, put up in standard containers, is sold from carefully drawn samples without the buyer having seen the contents of the package until delivery has been effected. The sale is made either by auction or by private bargaining. There are three standard containers in which leaf tobacco is de¬ livered to the manufacturers, namelv, the box or case, the bale and the hogshead. Cigar tobaccos are packed in cases and bales and lurkish tobacco, also, is put up in bales, while the bulk of other tobaccos is packed in hogs¬ heads. In all cases, after having been packed, the tobacco goes through an important fermentative or aging process which develops the aroma and otherwise improves the quality. In some cases, however, the tobacco is put through a preliminary, more active fermenta¬ tion in large heaps or bulks before it is packed for storage or transportation. The extent or degree of the fermentation is controlled largely by regulating the moisture contents of "the tobacco. The tobacco plant throughout its period of growth is subject to injury by numer¬ ous inseet pests and parasitic diseases. Among the more important insect enemies are the cut¬ worm, wireworm, flea-beetle, hornworm and budworm. The cutworm and wireworm are best controlled by rotation of crops and the hornworm and budworm by the use of arsenical insecticides or by hand picking, while no effec¬ tive remedy has been found for the flea-beetle. The tobacco-beetle (not the tobacco flea-beetle) a serious pest in all forms of cured leaf and

manufactured tobacco, is best controlled by the use of heat under certain conditions or by fumi¬ gation. A.s important diseases of the tobacco should be mentioned bacterial wilt, con¬ trolled by rotation of crops; root rot, the most effective remedy for which is the use of re¬ sistant varieties; a fusanum root disease, for \vhich a remedy has not yet been developed;

sore shank,® a decay of the stem, most ef¬ fectively combated by rotation of crops ; mosaic, an infectious disease disseminated by plant lice and other insects and through the handling of diseased ˆ plants by laborers j frenching, a malnutrition disease, the exact nature of which has not been determined; leaf spot, of which there are several forms, becoming destructive only under certain environmental conditions. During the curing process and in all subsequent stages tobacco is subject to injury by molds or decay, which _ usually can be prevented by proper regulation of the moisture supply.

Production, Trade Movement and Con¬ sumption of Tobacco. — The estimated normal production of tobacco for all countries growing notable quantities is shown in Table I.

Table I. — World's Production of Tobacco.

country	Production (pounds)
Canada	15,000,000
United States (Continental)	1 , 150 , 000 , 000
Cuba	75,000,000
Santo Domingo	25 , 000 , 000
Porto Rico	10,000,000
Mexico	35,000,000
Argentina	35 , 000 , 000
Brazil	100,000,000

Colombia . 20,000,000

Paraguay . 15,000,000

Russia . 250,000,000

Austria-Hungary . 175, 000 , 000

Germany . 60,000,000

France . 50,000,000

Bulgaria . 30,000,000

Belgium . 20,000,000

Greece . 20,000,000

Italy . 20,000,000

Rumania . 20,000,000

British India . 1 , 000 , 000 , 000

China.... . 500,000,000

Dutch East Indies . 200,000,000

Japan . 120,000,000

Philippines . 100, 000 , 000

Turkey . 90,000,000

Korea . 35,000,000

Algeria . 20 , 000 , 000

Union of South Africa . 15,000,000

Total . 4,205,000,000

The average annual acreage, production and value of tobacco for the 10-year period ending with 1918 in each of the leading tobacco-grow¬ ing States is shown in Table II.

Table II. — Production of Tobacco in the

United States, by States.

STATE

Acreage

Production

(pounds)

Value

per

acre

Massachusetts. . .

6,600

10,650,000

$356

00

Connecticut . .

. ... 19,550

31,050,000

381

00

New York .

4,200

5,200,000

170

00

Pennsylvania .

40,100

54,900,000

167

00

Ohio .

97,200

86,950,000

118

00

Wisconsin .

42,850

49,650,000

150

00

Maryland .

26,000

18,400,000

94

00

Kentucky .

442,500

376,250,000

104

00

Tennessee .

92 , 850

71,100,000

76

00

West Virginia. . . .

..: 14,000

10,900,000

114

00

Indiana .

17,650

15,600,000

115

00

Virginia .

185,600

134,000,000

100

00

North Carolina. . .

262,100

167,000,000

113

00

South Carolina. . .

46,000

31,800,000

96

00

Florida .

3 , 600

3,300,000

316

00

The production of tobacco in the United States by types for the year 1918 is found in Table III.

Table III. — Production of Tobacco by Types

in 1918.

TYPE AND DISTRICT

I. Cigar types:

New England .

New York .

Pennsylvania . .

Ohio-Miami Valley .

Wisconsin .

Georgia and Florida .

II. Chewing, smoking, snuff and export types:

Burley . .

Paducah .

Henderson or Stemming .

One-sucker . .

Clarksville and Hopkinsville .

Virginia sun-cured .

Virginia fire-cured .

Flue-cured, old belt. . .

Flue-cured, new belt .

Maryland and eastern Ohio export. . . ,

Perique-Louisiana .

The present normal production of tobacco in the United States is placed at 1,150,000,000 pounds, grown on 1,400,000 acres and having a farm value of $1,380,000,000. Nearly all of this crop is grown in 15 States. Kentucky pro¬ duces fully a third of the entire crop and Virginia and North Carolina together produce nearly another third. Lancaster County, Pa, with a production of nearly 40,000,000 pounds, is the banner tobacco-growing county of the United States. The crop as a whole is made up approximately of 28 per cent flue-cured, 25 per cent White Burley and 20 per cent each of cigar leaf and the dark fire- cured export type, the remainder consisting of Maryland export and dark-air-cured manufac¬ turing leaf. Considerable quantities of fine cigar and cigarette leaf tobacco are imported into the United States from foreign countries and shipped in from non-contiguous territory. The imports for 1914 as given in Table IV may be taken as representing approximately the nor¬ mal pre-war import requirements of the tobacco industry. The war proved a disturbing factor in the tobacco trade and while the demand was greater than ever before it was not reflected in the imports.

Table IV. — Imports and Shipments from Non-contiguous Territories of Tobacco for the Year 1914.

imports Quantity Value

Leaf tobacco:

Netherlands (Sumatra and Java

leaf), pounds . 7,688,514 $9', 744, 750

Cuba . 25,725,202 14,706,246

Turkey in Europe . 9,564,203 5,210,546

Turkey in Asia . 11,577,199 3,804,066

Shipments from Porto Rico :

Leaf tobacco, pounds . 6,353,528 2,805,532

Stems and trimmings . 1,975,231 222,416

From the earliest days of the colonies, tobacco has always been an important article of export in the international trade of the United States. For many years Great Britain has been the heaviest foreign purchaser of American tobacco. Statistics for the year 1913 may be taken as indicating the normal distribution of our exports of leaf tobacco. The data are shown in detail in Table V.

Production

(pounds)

52,500,000

3,760,000

64,750,000

67,300,000

65,100,000

7,080,000

269,100,000

76,000,000

85,000,000

45,000,000

77,000,000

11,200,000

57,050,000

171,800,000

248,500,000

28,700,000

125,000

664

TOBACCO

Table V. — Exports of Leaf Tobacco for the

Year 1913.

EXPORTS

Quantity

Value

United Kingdom, pounds. . .

175,026,020

$20,638,282

France .

48,154,511

4,152,502

Italy .

40,567,680

5,517,813

Germany .

31,697,427

3,972,062

Netherlands .

28,997,185

2,908,392

Spain .

21 ,384,529

1,405,988

Canada .

18,975,921

3,291,268

China .

11,940,865

2,044,615

Belgium .

11,302,150

1,358,866

Japan .

5,038,389

726,561

All other countries .

51,286,989

6,921,545

Total .

444,371,661

$52,937,849

The international trade of the United States in tobacco manufactures, also, is considerable, the chief items being the imports of cigars from the Philippines and Cuba and t'he exports of cigarettes to Asiatic countries. In 1917 the im¬ ports of Manila cigars were, in round numbers, 200,000,000, worth $3,863,000. The normal im¬ ports of cigars from Cuba amount from 40,000,- 000 to 45,000,000 annually, valued at $3,500,000 to $4,000,000. Approximately 175,000,000 cigars are shipped into continental United States each year from Porto Rico and these cigars are valued at about $6,500,000. Nearly 5,000,000,- 000 cigarettes having a value of $9,600,000 were

Table VI. — Leaf Tobacco Used in the Domes¬ tic Manufacture of Cigars, Cigarettes, Chewing and Smoking Tobacco and Snuff.

Chewing

and

smoking tobacco and snuff

YEAR

Cigars

Cigarettes

Total

1. . .

2. . .

3. . .

4. . .

5. . .

6. . .

7. . . 1910. . .

8. . .

9. . .

pounds

169,575,949

159,067,912

146,448,331

158,757,457

162,985,758

149,690,650

149,917,245

141,116,460

136,670,104

130,440,248

pounds

133,505,911

93,338,243

66,791,387

62,209,366

56,558,868

47,117,111

38,598,128

31,272,319

23,714,845

20,665,921

1

pounds

354,984,236

349,198,684

338,448,062

333,883,676

338,870,673

350,549,373

346,544,032

350,480,904

344,325,030

331,907,336

pounds

658,066,105

601,604,839

551,687,780

554,850,499

558,415,299

547,357,134

535,059,444

425,869,679

504,709,975

483,013,505

exported to China in 1917 and in 1918 the num¬ ber had increased to some 7,500,000,000, worth over $12,000,000. More than a billion cigarettes, also, are exported annually to the Straits Settle¬ ments. Total exports of plug tobacco and

smoking tobacco amount to some 5,000,000 and 2,500,000 pounds, respectively. Our export trade in cigars is of little importance. It now remains to consider the quantity of leaf tobacco consumed in domestic

manufactures. The quantities thus used in the manufacture of cigars, cigarettes, smoking and chewing tobacco and snuff are shown in Table VI, for the 10- year period ending with 1917. These figures, which are based on reports of the Buieau of Internal Revenue, do not include the quantities of leaf tobacco consumed in bonded manufac¬ turing warehouses. The tobacco consumed in these establishments in 1917 amounted to nearly 18,000,000 pounds.

Ihe output of the various forms of manu¬ factured tobacco produced from the quantities of leaf tobacco consumed, as above indicated, is set forth in Table VII. In addition to the tobacco leaf large quantities of licorice, sugar and other materials are used in the manufac¬ ture of chewing and smoking tobacco. The figures show more or less of an increase in most forms of manufactured tobacco but the outstanding feature of the table is the enormous increase from year to year in the output of cigarettes. In addition to the quantities given in Table VII, which are based on reports of the commissioner of internal revenue, the various forms of tobacco were manufactured to some extent in bonded manufacturing warehouses. There were thus manufactured in 1916 4,594,- 662,940 cigarettes and 87,654,149 cigars, making a total output of 29,907,149,551 cigarettes and 8,020,264,340 cigars for that year. Thus, the indicated total of cigarettes manufactured in 1917 is in excess of 40,000,000,000.

In 1914 there were 13,951 establishments, with a capital of $303,840,000, engaged in the manufacture of tobacco in the United States. Salaries and wages paid to 195,694 persons en- . gaged in the industry amounted to $99,980,000 and the total value of manufactured products was $490,165,000. Manufactured tobacco is an important source of governmental revenue in the United States. During the decade ending with 1917 the internal revenue collected on tobacco ranged from $49,862,754 in 1908 to $88,063,948 in 1916 and 8103,201,592 in 1917.

Bibliography.— Allard, H. A., <The Mosaic Disease of Tobacco) (United States Depart¬ ment of Agriculture Bui. 40, 1914) ; Billings,

E. R., (Tobacco, Its Culture, Manufacture and Usˆ (Hartford, Conn., 1875) ; Comes, O., <Histoire, Geographie, Statistique Du Tabac)

Table VII. Production of Cigars, Cigarettes, Snuff and Tobacco.

YEAR

Cigars

Cigarettes

Tobacco

Plug

Twist

Fine-cut

Smoking

Snuff

1917 .

number

8,527,119,269 7,932,610,191 7,564,323,265 8.248,891 ,047 8,530,916,995 8,099,488,730 8,262,337,873 7,928,234,051 7,710,798,474 7,561 ,419,809

number

35,355,860,177 25,312,486,611 17,980,164,482 16,869,520,463 15,570,798,437 13, 183,693,899 10,486,379,819 8,663.709,480 6,836,652,435 5,760,501,296

pounds

179,413,107

165,630,918

150,658,608

156,502,776

160,338,510

160,248,195

160,895,589

170,352,625

173,418,223

164,712,863

pounds

15,174,350

15,998.082

14,829,376

15,987,339

14,893,789

15,531,133

13.845,761

14,580,022

14,625,975

14,476,734

pounds

pounds

pounds

1916 .

11,286,561

243,586,164

33,516.802

1915 .

10,846,358

239,720,776

33,969.594

1914 .

10,045,001

234,927,827

31,898.407

1913 .

10,961,100

226.88S.866

30 , 595 . 640

1912 .

10,934,526

220,809,688

32.808,056

1911 .

11,006,561

217,330,409

31 .363,651

1910 .

1909 .

1908 .

11,027,986

12,857,930

12,481,100

12,086,725

209,367,475

214,056,402

202,370,654

192,229,890

28,943,754 31,445.178 28,454,958 24 , 035 , 738

(Naples 1900); Fairholt, F. W., ‘Tobacco: Its History and Associations) (London 1876) • Garner, W. W., Bacon, C. W„ Foubert, C. L.’ 'Research Studies on the Curing of Leaf Tobacco } (United States Agricultural Depart¬ ment Bui. 79, 1914) ; Hayes, H. K., East, E. M., Beinhart, E. G., 'Tobacco Breeding in Con¬ necticut’ (Connecticut Agricultural Experiment Station Bui. 176, 1913) ; Killebrew, J. B., 'Re¬ port on the Culture and Curing of Tobacco in the United States) (Tenth United States Cen¬ sus, Vol. Ill, pp. 583-880, 1880) ; Kissling, R, 'Handbuch der Tabakkunde, dcs Tabakbaues und der Tabakfabrikation) (Berlin 1905) ; Loew, Oscar, 'Curing and Fermentation of Cigar Leaf TobacaP (United States Depart¬ ment of Agriculture Report 59, 1899) ; Mathew- son, E. H., 'The Export and Manufacturing Tobaccos of the United States, with brief Reference to the Cigar Types) (United States Department of Agriculture, Bureau Plant In¬ dustry Bui. 244, 1912); Tatham, William, 'An Historical and Practical Essay on the Culture and Commerce of Tobacco) (London 1800) ; 'Stocks of Leaf Tobacco and the American Production, Import, Export, and Consumption of Tobacco and Tobacco Products) (United States Department of Commerce, Bureau of the Census Bui. 136, Washington 1917).

Wightman W. Garner, Physiologist in Charge of Tobacco Investiga¬ tions, Bureau of Plant Industry, United

States Department of Agriculture.

TOBAGO, to-ba'gd, British West Indies, an island of the Lesser Antilles, situated 20 miles northeast of Trinidad. It is about 24 miles long by seven miles wide, with an area of 114 square miles. It is hilly, rising at one point to a height of 2,000 feet. The soil is fertile and well cultivated. The chief products are sugar, rum, cocoanuts, rubber, cacao, cotton and tobacco. The capital and chief port is Scar¬ borough, on the south coast, where steamships to Guira make stops. The island has been in British possession since 1814, and in 1889 it was united with the colony of Trinidad. Pop. about 21,000.

TOBASCO, a meat sauce made of peppers, originally manufactured in Louisiana by Col. John Mcllhenny in 1868.

TOBIKHAR, to-bik-har'. See Shosho- nean Indians.

TOBIT, Book of, one of the Old Testa¬ ment books rejected as apocryphal by the Jews and Protestants, but received into the canon by the Roman Catholics. It contains an account of some remarkable events in the life of Tobit, a Jew carried captive to Nineveh, and his son, who is named Tobias. Ewald ascribes the book to a Palestinian Jew who wrote in Hebrew, and suggests as the date of its composition the middle of the 4th century before Christ. The earliest known text is in Greek. See Bible.

TOBOGGAN, a sled-like vehicle, often formed of a single piece of broad flat wood, of birch or basswood, curved up and backward at the front end, and used for sliding down slopes of snow. It is commonly from five to eight feet long, about 15 or 16 inches in width if formed of one piece, or wider if formed of two or more. The curved portion in front is usually fastened by thongs of hide or gut, and

the toboggan is strengthened by cross-pieces of hard wood strapped to the body at short dis¬ tances. Toboggans originated with the In¬ dians, who used them for hauling packs over the snow, and the name is still applied to a class of sleds drawn by dogs. But the toboggan of to-day is chiefly used in the sport of coast¬ ing down prepared slides, a popular pastime in Canada and other countries in high latitudes.

TOBOL, to*-b61', Asia, a river of Siberia, tributary to the Irtish, which rises in the south¬ ern Ural slopes, in Russian central Asia, flows northeast, and after a course of 750 miles emp¬ ties into the Irtish opposite Tobolsk. It is navi¬ gable for more than half its length, but is cov¬ ered with ice from November to May; its chief affluents are the Uj-Isset, Tura and Tawda. Theˆ Trans-Siberian Railway crosses the river at Kurgan.

TOBOLSK, to'-bolsk', Asia, in Siberia, (1) capital of a government of the same name, on the Irtish where it joins the Tobol, about 350 miles northwest of Omsk. The principal build¬ ings are the churches, governor’s residence, bishop’s palace, municipal offices, arsenal, bar¬ racks, bazaar and hospital ; besides a prison used as a depot for Siberian exiles, assembled from all parts of the country, an episcopal seminary, theatre, gymnasium, etc. The manufactures include bricks, soap and tallow. The trade is unimportant. The town is partly fortified. Pop. 25,200. (2) The government of Tobolsk,

in northwestern Siberia, contains an area of 535,739 square miles. The Arctic Ocean bor¬ ders the northern coast; the principal rivers are the Obi and Irtish, which are navigable when not frozen over. The chief occupation of the inhabitants is agriculture and cattle-rais¬ ing;

fishing and hunting in the north. Pop.

2,885,700.

TOCANTINS, to-kan-tenz', Brazil, a river rising in the southern part of the state of Goyaz, and flowing north through Goyaz, Cayapo and Para, emptying into the Atlantic Ocean through the Rio Para, the southern es¬ tuary of the Amazon delta. On the northern boundary of Goyaz the river receives from the left the Araguaya, which is considerably larger than the main stream. From the source of the Araguaya in the Cayapo Mountains in Matto Grosso to the Atlantic Ocean is fully 2,200 miles, constituting one of the great rivers of the world. The Tocantins is 1,600 miles long, and though interrupted by falls and rapids, it is navigable in stretches aggregating 1,100 miles. Its estuary is 140 miles long, and re¬ ceives numerous channels from the Amazon, together with which it separates the island of Marajo from the mainland. The country through which these great twin rivers flow is undeveloped, there being not a single important city on the banks, except Para at the mouth.

TOCQUEVILLE, tok'vil (Fr. tuk-vel), Alexis Charles Henri Clerel de, French states¬ man and writer: b. Verneuil, 29 July 1805; d. Cannes, 16 April 1859. He was originally destined for the military profession, but ex¬ changed it for that of law. In 1827 be was ap¬ pointed an assistant magistrate at Versailles. In 1831 he was commissioned by the French government to proceed along with his friend, M. Gustave de Beaumont, to America, and to

investigate and report upon the penitentiary system of the United States. The results of the inquiry were published in 1833 under the title (Du Systeme Penitentiaire aux Etats-Unis et de son Application en France. } This, how¬ ever, was only the precursor of the greater and more celebrated work (La Democratic en Amerique> (1835), to which the Montyon prize of the French Academy was awarded in 1836, and which, by 1850, had run through 13 edi¬ tions. It was the first systematic analysis of democracy as exemplified in the institutions and political relations of the United States, and was translated into the principal European lan¬ guages. Tocqueville was in 1839 elected to a seat in the Chamber of Deputies, and ranged himself with the opposition. After the Revolu¬ tion of 1848 he was nominated deputy from the department of La Manche to the National As¬ sembly,

where he voted always against the propositions of the ultra-democratic party. In the Cabinet of 2 June 1849, he accepted the portfolio of Foreign Affairs, but resigned it the same year, after holding it for five months. After the coup d'etat of 2 Dec. 1851, he lived retired from public affairs, and devoted his leisure to the production of <L'Ancien Regime et la Revolutionˆ published in 1856. His com¬ plete works appeared in 1860-65. Consult Jaques, (Alexis de Tocqueville) (1876) ; Sou¬ venirs d' Alexis de Tocqueville) (1893) ; and D'Eichtal, < Alexis de Tocqueville et la Demo¬ cratic Liberale) (1897).

TOCSIN, a bell sounded with quick strokes for the purpose of alarm. The word is de¬ rived from the French, and the use of the toc¬ sin as a signal to arouse the people was so com¬ mon during the French Revolution that the word has come to be proverbially used for any loud sound or call marking the commencement of an important event.

TODAS, or TUDA, a singular race of people inhabiting the upper part of the Neil- gherry Hills in southern India. They are pas¬ toral in their habits and possess a queer un¬ written language. Their religion is the wor¬ ship of the sun and of departed spirits. They follow the practice of polyandry in both its forms — the brothers of one family having one common wife, yet receiving the right, at certain seasons, of temporary husbands to the women of the subject villages. They are a tall, well- proportioned and a fine muscular race of men, are dominant over the neighboring tribes and receive from them a "goodoo® or tribute of one- sixth of their crops, the Todars holding aloof from tillage of the soil. They have slowly in¬ creased in number since 1858 when a count of them showed only 337, a recent estimate plac¬ ing their number at 750.

TODD, Alpheus, Canadian author and li¬ brarian: b. England, 1831; d.. Ottawa, Canada, 22 Jan. 1884. He removed with his parents to Canada in 1833; was for some time assistant librarian of the legislative assembly of Upper Canada, and in 1858 he became chief librarian. Upon the Confederation he was appointed to that office with the Dominion Parliament. He was also a writer of high authority on consti¬ tutional law and Parliamentary government. Author of (The Practice and Privileges of the Two Houses at Toronto> 0839) ; Parliamen¬

tary Government in England* (2 vols., 1867- 69), etc.

TODD, Charles Burr, American author: b. Redding, Conn., 9 Jan. 1849. He received his education in the public schools. For many years

he was special writer on the New York Evening Post. In 1895 he was secretary to the commission appointed by Mayor Strong of New York to publish the early records of New York City. His published works are (History of the Burr Family in America) (1879) ; his¬ tory of Redding, Conn. *(1880; 2d ed., 1906); (Life and Letters of Joel Barlow> (1886) ; (Story of the City of New York) (1895) ; (Story of Washington, the National Capital* (1897) ; (Lance, Cross and Canoe in the Valley of the Mississippi, *(Brief History of New York) (1899) ; (The True Aaron Burr* (1902) ; (The Real Benedict Arnold* (1903); <In Olde Connecticut (1905) ; (In Olde Massachusetts) (1907); (1907); <The Washington Crossing Sketch Book) (1914) ; (Sketches of the Delaware Valley) (1916).

TODD, David, American astronomer : b. Lake Ridge, N. Y., 19 March 1855. He was graduated from Amherst in 1875 where he be¬ came professor of astronomy in 1881. From 1882 to 1887 he held a similar post at Smith College. In order to make astronomical obser¬ vations he has conducted expeditions to Texas in 1878, transit, of Venus, Lick Observatory 1882, to Japan in 1887 and again in 1896, to West Africa in 1889-90, to Tripoli, Barbary, in 1900 and 1905, to the Dutch East Indies in 1901, to the Andes of Chile and Peru in 1908 and to Russia in 1914. He is the author of several textbooks on astronomy, also (Stars and Telescopes) (1899) ; <Lessons in Astron¬ omy * (1902), also articles in magazines and reviews.

TODD, Henry Alfred, American philolo¬ gist and educator: b. Woodstock, Ill., 13 March 1854.. He_ was graduated at Princeton Univer¬ sity in 1876 and later studied at the universities of Paris, Berlin and Madrid, taking his Ph.D. at Johns Hopkins University in 1885. He was professor of Romance languages at Leland Stanford Junior University in 1891-93; and in 1893 he became professor of Romance philology at Columbia LTniversity. He was one of the founders of the Romantic Review in 1910; was a member of the advisory council of the Sim¬ plified Spelling Board; and in 1906 was presi¬ dent of the Modern Language Association of America. He has edited numerous works in the Romance languages.

TODD, Mabel (Loomis), American author: b. Cambridge, Mass., 10 Nov. 1858. She edited the JPoems *(1890-96) and (1899). Her original writings include 'Total Eclipses of the Sun> (1894) and (Corona and Coronet* (1898) • <A Cycle of Sunsets* (1909). The results of study of the Ainu aborigines in Kitami province, Japan, appeared in various magazine articles.'

, DODD'S TAVERN, Engagements at.

I he Virginia campaign of 1864 began on 4 May by the advance of the Army of the Poto¬ mac across the Rapidan, the cavalry divisions of Generals Gregg and J. H. Wilson leading.

Wilson crossed the Rapidan at Germania Ford, and maiched rapidly by Wilderness Tavern to Parker s Store, from which he sent a recon- noissance toward Mine Run, the rest of his division going into bivouac. During the night he was ordered by General Meade to advance in the direction of Craig's Church, leaving one regiment to hold Parker's Store. Just beyond Craig's Church Wilson encountered Rosser's Confederate cavalry, which was driven back two miles, and at noon, as he had heard noth¬ ing of the approach of Meade's infantry, and his own position was threatened, he began to withdraw to Parker's Store, when he heard that the regiment left there had been attacked by Confederate infantry, and that he was cut off from communication with General Meade's in¬ fantry. He determined to withdraw on the Catharpin road, by way of Shady Grove Church, to Todd's Tavern, on the Brock road. Before he was fairly on the road he was attacked in heavy force and followed by cavalry, but he reached Todd's Tavern by crossing the Po River at Corbin's bridge. A part of his com¬ mand was cut off, but came in later in the day. As he approached Todd's Tavern he was re- lieved. by Gregg's division, which, by Meade's direction, Sheridan had sent to assist him, and Stuart's cavalry, which was closely following Wilson, was driven back by Gregg to Shady Grove Church, about four miles. Sheridan was holding the left flank of the army, and covering its trains, while it was grappling with Lee in the Wilderness, and on the 6th had two di¬ visions at Todd's Tavern, covering the roads centring at this point, where he was attacked early in the day by Stuart, who was anxious to get at Grant's flank and his wagon train, but his successive attacks were repulsed. Meade, anxious about his left, directed Sheridan to draw back from Todd's Tavern, closer to the trains, which Sheridan did in the afternoon, and the Confederate cavalry occupied Todd's Tavern. Preliminary to Grant's movement from the Wilderness to Spottsylvania Court House was the necessity to hold Todd's Tavern, which was midway between the two places and on the direct road connecting them; and on the 7th two brigades of Gregg's division and two of Merritt's, dismounted and fighting on foot, attacked Stuart and, after a sharp and closely contested action, drove him from Todd's Tavern, with severe losses on both sides, Fitz- hugh Lee's division retreating in the direction of Spottsylvania Court House and Wade

Hampton's southward, to Corbin's bridge of Po River. Sheridan withdrew and encamped, Gregg's and Merritt's divisions in the open fields to the east of Todd's Tavern. Very early on the morning of the 8th Gregg was put in position to guard the roads from the south and Merritt's division renewed the engagement with Fitzhugh Lee on the Spottsylvania Court House road to open the way for the advance of Warren's Fifth corps from Todd's Tavern to the Court House. Merritt became severely engaged, but slowly gained ground until about 6 a.m., when he was relieved and Robinson's division of Warren's corps took the advance. Hancock's Second corps, following Warren's, reached Todd's Tavern at 9.30 a.m., and took position covering the Brock road, Catharpin and Spottsylvania roads, and began to intrench, holding the extreme right of the army. At

11.30 a.m. Gen. N. A. Miles' brigade, with Gregg's cavalry brigade and a battery, moved out on the Catharpin road toward Corbin's bridge, and when half a mile from it and one and one-half miles from Todd's Tavern, the head of column was opened upon with artillery from the heights on the south side of Po River. Miles formed line, his artillery replied to that of the enemy, there was a skirmish with Wade Hampton's cavalry, which was kept at bay, and at 5.30 p.m., when Miles began to withdraw, he was attacked by Mahone's division of in¬ fantry and fell back fighting to Todd's Tavern. Consult (Official Records* (Vol. XXXVI).

E. A. Carman.

TODDY, or PALM-WINE, a drink made in tropical countries from the sap of various palms, especially when in a fermented state. The word is of Hindustani origin and is gen¬ erally applied in India to the substance used as yeast to leaven bread. In the Malayan Archi¬ pelago, toddy is the sweet juice of the flower sheaths of Arenga saccharifera. In Brazil the majestic buriti, or murichi palm (q.v.), is felled, and cavities are dug in the stem in which to collect the sap, from which a fermented liquor is made. This has led to the use of the name of wine-palm for this tree. The spadix of the. useful Nip a frutescens yields toddy which is changed into vinegar by one process, into arrack by another and may also be con¬ verted into a delicious syrup, thick, frothy and clear, with a slightly saline flavor. Sugar is made from this syrup by evaporation. The toddy or jaggery-palm (Caryota urens), a palm crowned by drooping bipmnate leaves, with wedge-shaped leaflets, furnishes a similar sap when the flowering stems are cut. This, like that of the nipa, can be boiled down into syrup and will yield a coarse brown sugar known as jaggery or goor. The sap is fermented for the toddy and further distilled for arrack. The

cocoanut (Cocos micifera), the palmyra palm (Bora-ssus flab ell if or mis) , the date (Phoenix dactylifera) , and the wild date (Phoenix sylvestris), all yield toddy in India, the latter being grown extensively in Bengal, for the sake of this drink and the sugar extracted from it; it is said that the sap can be induced to flow from the upper portion of the stem for many years. The West Africans make their toddy from Raphia vinifera.

The word toddy was applied by the Scots to a drink made of whisky and hot water, sweetened. Burns uses the term in (The Holy Fair.* Whisky and cold water, properly called grog, is also known by this name. Toddy-Cat is the name given in southern India to the palm-civet on account of its alleged fondness for palm-juice.

TODDY-BIRD, a swallow-shrike (Arta- mus fnscus) of India and Ceylon. It is about seven inches long, of dusky plumage and is most abundant in wooded districts, especially where palm trees abound, more particularly the Palmyra or toddy palm, from which it takes several of its popular names.

TODDY-CAT, one of the civets (Paradoxu- rus typus), common throughout the greater part of India, Ceylon, Burma and the Malayan region, which dwells mainly in the Palmyra or toddy palm-groves. See Toddy.

. TODHUNTER, Isaac, English mathema¬ tician: b. Rye, 1820; d. Cambridge, 1 March 1884. He was graduated from London Univer¬ sity in 1842 and from Saint John's College, Cambridge, in 1848. He was elected a Fellow of his college in 1849 and became a lecturer and tutor. He was elected a fellow of the Royal Society in 1862. Todhunter was a man of high attainments in various branches of learning, but is best known as the author of numerous mathematical textbooks. His most important works are 'Treatise on the Differential Cal- culus) (1852); 'Analytical Statics *(1853); 'Plane Co-ordinate Geometry) (1855); (Ex¬ amples of Analytical Geometry of Three Di- mensions) (1858); (Algebra) (1858); 'Trigo¬ nometry* (1859) ; (The Theory of Equations) (1861); 'History of the Progress of the Cal¬ culus of Variations during the 19th Century) (1861) ; 'History of the Mathematical Theory of Probability from Pascal .to Laplace) (1865) ; 'History of the Mathematical Theories of At¬ traction from Newton to Laplace *(1873); 'The Conflict of Studies* (1873) ; 'Laplace's Functions

(1875) ; 'History of the Theory of Elasticity (ed. Karl Pearson 1886).

TODHUNTER, John, Irish poet and dramatist: b. Dublin, 30 Dec. 1839. He was educated at Trinity College, Dublin, and after studying at Vienna and Paris, practised medicine for some years in his native city. He was professor of English literature at Alexandria College, Dublin, 1870-74, and later removed to London. He has published among other works 'Laurella and Other Poems *(1876) ; 'Alcestis* (1879); 'A Study of Shelley *(1880); 'The Banshee and Other Poems* (1888) ; and several plays, such as 'Helena in Troas *(performed 1886) ; 'The Prison Flower* (per¬ formed 1891) ; 'A Comedy of Sighs* (per¬ formed 1894).

TODLEBEN, tot'la-ben, or TOTLEBEN, Franz Eduard Ivanovitch, Count, Russian general: b. Mitau, Courland, 20 May 1818; d. Soden, Germany, 1 July 1884. He studied at the College of Engineers at Saint Petersburg, and entered the Russian army during its oper¬ ations against the Circassians in 1848. Having been recognized as a most able engineer in this campaign, he was sent to the Crimea in 1854, where he distinguished himself while under constant fire from the guns of the enemy in the rapid conversion of the city of Sevastopol into a formidable fortress. For this and other valuable service during the Sevastopol cam¬ paign he was promoted to' the rank of general. At the close of the Crimean War he retired to private life, where he devoted himself to sci¬ entific investigation and to the writing of a history of the war. During the Russo-Turkish War of 1877 he was sent to Plevna, where he compelled the commander, Osman Pasha, to surrender his entire army to the Russians. He was afterward made commander-in-chief of the army at Constantinople. At the end of the Russo-Turkish War he entered political life, and was in his later years governor, first of Odessa, and afterward of the province of Vilna. He published an account of the defense of Sevas¬ topol (French trans., 'Defense de Sevasto¬ pol, *(1804). Consult Kinglake, 'The Invasion of the Crimea* (1863-87) ; Brialmont, 'Le gen¬

eral comte Todleben *(1884) ; Krahmer, 'Gen¬ eral-adjutant Graf Todleben* (1888).

TODMORDEN, tod-mor'den, England, a town in Lancashire and Yorkshire, on the Cal- der, 21 miles northeast of Manchester. The churches of various denominations, town-hall, free library, technical school, etc., are the chief buildings. The industries consist of foundries, machine works and manufactories for cotton . goods. Pop. about 26,000.

TODY, a term applied to a family (Todiidce) of birds closely related

to the motmots and kingfishers. They are distinguished by the long flat bill, short and rounded wings and short and square tail. Only four species are known, all of small size, and inhabitants of tropical America. The green tody (Todus viri- dis) of Jamaica is about four inches in length, and green on the upper parts, the flanks rose-colored, the throat scarlet and the belly pale yellow. The bill is red. It frequents the trees along watercourses, and has the habits of a fly-catcher, taking short flights in pursuit of insects and returning to the perch. They nest in the manner of kingfishers, in holes excavated in banks, and lay three or four white nearly spherical eggs. Consult Evans, 'Birds* (New York 1900).

TOFT, an old English word denoting a thicket of trees, a homestead or a piece of ground on which a messuage or home formerly stood. Taken in the second sense toft was frequently used in legal papers in conjunction with the work croft, "toft and croft® meaning a house and homestead, with the stables and outbuildings, the whole surrounded by a thicket or enclosure. Probably from the fact that the house was usually surrounded by trees came the later meaning of soft, which is preserved in the modern word tuft, a grove of trees.

TOGA. See Costume.

TOGO, Heihaichiro, Count, Japanese ad¬ miral: b. Kagoshima, Japan, 1847. He very early became known as one of Japan's most daring naval officers, and a few years before the annexation of the Hawaiian Islands by the United States, he was sent to Hawaii in com¬ mand of the battleship Naniwa to protect the Japanese who were then complaining of perse¬ cution by the government. There he nearly became involved in warfare with United States ship Boston whose captain supported the de¬ mand of the Hawaiian government for the sur¬ render of an escaped Japanese prisoner, and threatened to fire upon the Naniwa. When Togo immediately cleared his ship for action, however, the captain of the Boston apologized and withdrew his threat. In 1894 Togo prac¬ tically began the war with China by firing upon Chinese transports carrying troops with an evi¬ dently hostile purpose. On the breaking out of the Russo-Japanese War in 1904 he was ap¬ pointed commander-in-chief of the Japanese navy and conducted the operations against Port Arthur, and the bombardment of that port, defeated the Russian fleet there, driving it back, after severe fighting, to the shelter of the inner harbor, and damaging several Russian ships. On 27-28 May 1905 he met and annihi¬ lated the _ Russian Baltic squadron, only four small cruisers and some torpedo boats escap-

ing. See Japan-Russo-Japanese War; Man¬ churia.

TOGOLAND, Africa, a territory on the Gulf of Guinea, between French Dahomey and the British Gold Coast, held as a German col¬ ony from 1884 to 7 Aug. 1914, when it was oc¬ cupied by British and French allied troops. The revenue to Germany in 1913 was over $1,000,000. It has a coast line of 32 miles, but extends 325 miles inland, where it becomes broader. Area, 33,630 square miles. Lome is the chief port and capital. The coast is low and bordered by lagoons, but the interior is crossed by the escarpment of the Sudan Pla¬ teau. The country is well watered, the interior by branches of the Volta, which forms the west boundary. The chief products are palm oil, copra, rubber, indigo and dye-woods. Cattle raising is carried on by many of the natives. They also do weaving, make pottery and mine and work a little iron. The inhabitants, who number about 2,000,000, are Sudan negroes, the European population being less than 400. Commerce is rapidly increasing, and there is regular steamship connection with Europe.

TOGUE, a local name in Maine for the lake-trout (q.v.).

TOILERS OF THE SEA (<Les Travail- leurs de la Meri), a novel by Victor Hugo, published in 1866. The scene is laid in the Channel Islands and the book is dedicated to the <(Isle of Guernsey, severe yet gentle, my present asylum, my probable tomb.®

TOISE, toiz, in the French system of meas¬ ures used previous to the decimal system, was the unit of linear dimension. It consisted of six pieds or feet, each of which was composed of 12 pouces or inches, each pouce being divided into 12 lignes or lines. The toise was thus the equivalent of 1.94904+ metres or of 6.3946 + English feet.

TOKAT, to-kat', Asia Minor, a town in the vilayet of Sivas, 70 miles from the Black Sea. It extends between steep rocky walls in a labyrinth of narrow streets bordered by miser¬ able houses. It contains a large mosque, ba¬ zaars, foundries and manufactories of carpets, silk, wool and cotton goods, etc. Copper is mined in the vicinity. The town was formerly prosperous, but ill treatment of the Armenian population has largely reduced its inhabitants, believed to number about 22,000 in 1919.

TOKAY, tcrika' (Hungarian, to'koi), Hun¬ gary, in Semplin County, at the junction of the Theiss and Bodrog, 130 miles northeast of Pesth. Its buildings include a theological semi¬ nary, gymnasium, high school, etc. In the neighborhood are rich mineral deposits, as salt, sapphires, etc. The chief occupations are agri¬ culture, fishing, viticulture and timber-trade. The Tokay wine is famous and the best is pro¬ duced on the hill of Mezes-Mali. Great care is exercised in the culture, gathering and selec¬ tion of the grapes. The wine is of various qualities, dependent finally upon the amount or lack of artificial pressure. The best kinds are the Essence and the Ansbruch, of amber color when new, turning green with age. There are 34 wines, grouped as sweet and dry; 2,000,000 gallons are produced, but the celebrity of the wine is such that many imitations are made by

French and German dealers, which are even sold in Hungary. Pop. 5,500.

TOKEN MONEY, a name in numismatics applied to pieces of money current only by sufferance and not coined by the authority of the state or government. In England in the 16th century the national coinage was so un¬ satisfactory and inconvenient that large num¬ bers of private traders and merchants were im¬ pelled to have halfpence and farthings manu¬ factured for themselves. These ((tokens,® as they were called, were made of lead, pewter, latten, tin and even leather, and could only be made use of as currency at the shops or ware¬ houses of their respective issuers. Notwith¬ standing the endeavors made during several reigns to put a stop to the circulation of this unauthorized coinage, traders' tokens continued to multiply to an astonishing extent, until, in 1672, a proclamation was issued, prohibiting their making or use under severe penalties. From that date until 1787 the issue of private tokens entirely ceased; but in the latter year, owing to the great scarcity of government cop¬ per coins, the Anglesey Copper Mines Company struck and put into circulation some 300 tons of copper pence and halfpence. The bold ex¬ ample thus set was speedly followed by other trading firms all over the kingdom, and again the government found it necessary to take action in the matter, which it did by issuing a new na¬ tional copper coinage. For some years the issue of private tokens was thus effectually checked; but in 1811 the authorized coinage again getting scarce, the copper companies and others recom¬ menced the issue of batches of tokens. This went on until 27 July 1817, when the manu¬ facture was prohibited by act of Parliament, and all tokens in currency ordered to be with¬ drawn from circulation by 1 Jan. 1818.

In the United States small coins became so scarce in 1862 that tokens

made their appear¬ ance in large quantities. They were of two classes, war or patriotic tokens, and trade or advertisement tokens. Both kinds were issued with a mercantile view, since they passed for a cent and could be manufactured (in sufficient quantities) for much less. Cards and tokens appeared during 1862, 1863 and 1864. Of the patriotic or war tokens there were something like 400 varieties coined, including mulings and different metals, the latter largely restrikes. Of original pairs of obverse and reverse there must have been less than 200. The common varieties bore the inscriptions <(Army and Navy,® and <(Not One Cent.® The first coinage of trade tokens, or store cards, as they were sometimes called, took place in Cincinnati where nearly 900 varieties were issued, fully three times as many varieties as any other city issued except New York. A number of other Western cities soon followed the example of Cincinnati, but it was not until the early part of 1863 that New York began to issue the famous Lindenmuller cents, of which there were more than a million coined; these were followed by the Knicker¬ bocker tokens, consisting of many varieties. Altogether there were between 600 and 700 varieties issued from New York. Ohio issued about 1,300 varieties from 100 different cities and towns, more than any other State issued; New York State comes next after Ohio, with over 900 varieties. New Jersey had but few,

and Pennsylvania not many; chiefly from Phila¬ delphia and Pittsburgh. Detroit furnished as many advertisers as New York, and the rest of Michigan nearly as many as Cincinnati. Indiana had about 100; Illinois, including Chicago, not as many as Indiana; and Wisconsin nearly twice as many. When the government stopped the coinage of tokens in 1864 there were upward of 20,000,000 in circulation.

TOKIO, to'ke-6, or TOKYO, the capital of Japan, situated at the head of the land-locked Bay of Tokio, on the east coast of central Hondo, and at the mouth of the Sumida Gawa. Besides the latter river, which divides the city into two unequal parts, Tokio is intersected by a large number of canals, which are generally crossed by wooden bridges. Some of the canals form concentric courses, enclosing a number of islands, one within the other; and on the inner¬ most of these stands the imperial palace. This large cluster of buildings is surrounded by mag¬ nificent gardens, and enclosed by high walls and fosses. On the outer islands are most of the government departments and foreign lega¬ tions. Surrounding these central islands, the city spreads out on

all sides, with a rather irregular and complex street plan. There are numerous parks in and around the city, some of them being large and beautiful. Practically all the houses are built of wood. Besides the palace the only notable buildings are some of the numerous temples, especially that of Kwannon, and the temple of the Shoguns. There are six European churches, the finest being the Russian cathedral. Tokio contains about 70 hospitals of good standing, including the Komagome Hospital for epidemics and the Tokio Charity Hospital. The former is sup¬ ported by the city and the latter by the Im¬ perial Court. There also exists an asylum for. orphans of the poor, established by the city. Ac¬ cording to the latest returns on educational af¬ fairs there are about 500 public and private primary schools and kindergartens. The num¬ ber of children of school age is about 225,000 of whom about 80 per cent are in attendance. There are 35 middle schools, public and pri¬ vate, of which six are for girls. The schools higher than middle grade and placed under the direct control of the Department of Education number 13, including the Imperial University, the First High School, the Higher Commercial School, School of Foreign Languages, the Tokio Higher Technical School, Higher Male Normal School and ■ Higher Female Normal School. Besides there are two public normal schools, supported by the Tokio Prefecture. The keiogijiku, Waseda and Women's Univer¬

sity are most prominent among the private high class institutions, among which are included 10 other colleges of law, economics, philosophy and religion. In addition to those above men¬ tioned, there are over 280 public and private schools, mostly of the middle school grade, teaching special subjects. The city has a num¬ ber of libraries opened to the public, including the Imperial Library at Uyeno Park. The sanitary condition of the city is in a fair con¬ dition, though street drainage is not so well advanced as in Western countries. Each ku (ward) has sanitary organization supported by rate levies from the inhabitants themselves, ihe metropolis is well supplied with parks and

open spaces. The largest parks are the Shiba, Uyeno and Hibiya parks. In the first two are beautiful temples connected with the old To-kugawa family, and here the remains of the Shoguns are buried. At Uyeno also is the Imperial Museum. Automobiles have been in¬ troduced as a means of transportation and an ˆautobus® line is in operation, in addition to the electric tramways. Streets are being laid out regularly of late years and modern dwell¬ ings are being erected. Great harbor works have been undertaken by the municipal assem¬ bly at a cost of 37,000,000 yen. There are also a modern water-supply system, excellent street railways, gas and electric light, macadamized roads, public works, etc., all carried on accord¬ ing to methods of

civilized cities all over the world. The municipal council is elected by the municipal assembly, and the latter is chosen by popular vote. Although the principal railroad centre of the empire, Tokio is not an import¬ ant manufacturing or commercial city. Its port is Yokohama, near the entrance to the bay. The city was founded in 1456 and in 1590 it became the capital of the Shoguns, the em¬ perors residing at Kioto. With the downfall of the Shoguns in 1868, Tokio (till then known as Yedo) became the residence of the emperors and the sole capital. It has several times suf¬ fered from earthquakes and conflagrations. Pop. (1920) 2,173,162.

TOKOLY, te'kel-yi, or TOKELY, Em- erich, Count, Hungarian patriot. See Tekeli.

iunuuawa, Prince, Japanese noble¬ man and political leader, known as <(the last of the Tycoons.® See Hitotsubashi.

TOKUSHIMA, to~koo-she'ma, Japan, the capital of the prefecture of the same name, and the largest city on the island of Shikoku, situ¬ ated on the northeast coast, on the Ku Channel. It is an important steamship station, with a picturesque location on the coast and a moun¬ tainous background. Pop. 70,000. The pre¬ fecture population is 775,000.

t T,°LAND, John, English writer: b. near Londonderry, 30 Nov. 1670; d. Putney, 11 March 1722. He was brought up as a Roman Latholic, but at 16 went over to Protestant¬ ism. He was educated at the University of Glasgow, and studied divinity in the University i 1696 he published a work enti¬

tled c Christianity not Mysterious, > which may be regarded as opening the prolonged English controversy between deism and orthodoxy. The House of Commons ordered it to be burnt by the common hangman, and Toland met with determined opposition from many quarters, though Locke gave him a certain amount of support. He subsequently supported himself by literary hack-work and various forms of political party service. Besides the work above mentioned he wrote a (Life of Milton> (1698) U? an edition of his prose works; (Memoirs of Denz.l, Lord Holies' (1699); ‘Anglia Libera> defense of the Act of Succession,

a!ld ,,I,h£ State Anatomy of Great Britain* etc. (1717).

t > vvct, uiy, county-seat

of Tama County, on the Chicago Northwestern Railroad, about 50

miles northeast of Cedar Rapids and three miles from Tama (q.v.) a railroad junction on the Iowa River. It was

ettled in 1844 It is in a fertile agricultural egion in which there is considerable attention g V?n it0 stock-raising. The industries are con¬ nected chiefly with the farm products. The principal public buildings are the county court¬ house, . jail, the churches and schools The educational institutions are Leander Clark Col- lege (U.B.), opened in 1856; a Government Indian Industrial School, public schools, and a library. There are two banks and two news- papers besides a collegiate weekly. The govern- ment is administered by a mayor and a council composed of six members. Pop. 1,721.

TOLEDO, Ohio, city, county-seat of Lucas County, on the Maumee River, near its mouth; lat. 41 30 N.*, long. 83° 32' W. The city is 587 feet above sea-level. It is 96 miles west of Cleveland, 124 miles north of Columbus and 234 miles east of Chicago. The northern corpora¬ tion line is within two miles of the Michigan boundary. The city lies on both sides of the Maumee River, the principal business section being on the left bank j it extends from the river mouth, where the stream opens into Maumee Bay, to a point nine miles up stream. The area of the city is 31.59 square miles.

Commerce and Transportation.— The lo¬ cation of Toledo, at the western end of Lake Erie, gives it great commercial advantages, for it is at the head of the direct lake route east¬ ward. The distance by lake to Chicago is 691 miles, while it is but 234 miles by rail. Hence there is an enormous traffic between the Eastern cities and the region lying southwestward, of which Toledo is the distributing point. This natural advantage is supplemented by the rail¬ way system, the city being the centre of 16 trunk lines, making direct communication to the At¬ lantic on the east and the Pacific on the west, with direct lines north and south. These trunk lines, including their branches, give a grand total of 23, making Toledo second only to Chicago in the number of railroads; 393 trains and 572 interurbans arrive and depart every 24 hours. Many of the trunk roads reaching the city have dock facilities, with regular steamer connections to all important lake ports. The location of Toledo makes it the most con¬ venient shipping point for a large portion of the (<winter-wheat belt,® and it is one of the most important primary grain markets of the United States, after Chicago. It has 12 grain elevators, with a storage capacity of 8,500,000 bushels.

Toledo is the leading clover-seed mar¬ ket of the world and its quotations govern the prices of clover-seed for the United States. In 1918 Toledo received over 20,000,000 bushels of wheat, corn, rye, oats and barley. Toledo is one of the largest shipping ports for soft coal in the world. This comes by rail from the mines of West Virginia, southern and eastern Ohio and Pennsylvania, and is transported by water to all ports on the upper lakes. The Ohio Central, Hocking Valley, Pennsylvania and Bal¬ timore and Ohio railroads have immense docks on the river front, with steam apparatus by which a carload of coal at a time is conveyed into the hold of a vessel. Similar appliances are used for the rapid unloading of iron ore coming from the Lake Superior mines, which is shipped by the same roads to the iron furnaces in south¬ ern Ohio, to mix with the native ores, thus producing a superior quality of iron and steel.

There is also a very large trade done in lumber, salt, etc., loledo being the largest distributing P˚mt on the lakes for coal, ore and lumber. More than 50 per cent of all the coal transported on the Great Lakes in 1918 was loaded in loledo.

The harbor of Toledo lies entirely within the Maumee River, giving full protection to shipping. The Maumee is really a wide and deep estuary of Lake Erie, to the foot of the historic ((Rapids of the Maumee,® just above Perrysburg, the site of Fort Meigs, famed for Hari isons defense in 1813. Above this the river passes for some 15 miles over outcrops of limestone. At the northern city line the river opens into Maumee Bay, which is three miles north and south by six miles east and west. 1 h rough the bay the United States government has dredged a straight channel, 400 feet wide by 21 feet deep and eight miles long from the mouth of the river. The harbor proper em¬ braces the wide channel of the river, which is 700 to 1,400 feet wide between the harbor lines established by the government. The channel of the stream has been improved by the govern¬ ment to the same depth and width as the stiaight channel. The cost of this channel through the bay, and the corresponding river improvements, has been over $2,000,000. The wharfage space covers both banks of the river the entire length of the city, 18 miles in all, besides several miles on Swan Creek, a deep tributary which enters the river in the middle of the business section. Besides these there is unlimited wharf capacity along the shores of the bay, now being utilized.

Manufactures.— The advantages of Toledo as a distributing point by lake and rail, its prox¬ imity to raw material and fuel, have caused its industrial interests to dominate all others. As an example of this is the fact that the renowned Lake Superior iron ores and the coal and coke

from the Ohio and West Virginia fields meet at its wharves on a common basis of economy. This resulted in the building in 1903 and 1904 of a blast furnace and steel plant on the river front by the Toledo Furnace Company with a capacity of 400 tons per day. This company is now capitalized at $4,000,000 and its capacity has been doubled. Other great industrial estab¬ lishments nationally known and with large capi¬ tal invested in Toledo are the Willys-Overland Company, $75,000,000, producing passenger au¬ tomobiles. This is the second largest automo¬ bile plant in the world; the Paragon Refining Company, $25,000,000, which refines petroleum ; the Owens Bottle Machine Company, $15,500,- 000, producers of the bottle-making machine, which has revolutionized that industry; Na¬ tional Supply Company, $14,000,000, producing oil well supplies and machinery; the Electric Auto-Lite Company, $13,000,000, producing au¬ tomobile starting and lighting systems; the National Malleable Castings Company, $8,000,- 000, with the largest malleable casting plant in the world; the Sun Company, $5,000,000, refin¬ ers of petroleum products ; the Toledo Machine and Tool Company, $3,000,000, builders of presses and machine tools; the Towar Textile Mills Corporation, $2,500,000, producing heavy ducking and belting; the Champion Spark Plug Company, $2,000,000, which produces more than 50 per cent of all the spark plugs in the world;

the Ed. Ford Plate Glass Company, $2,000,000, manufacturers of polished plate glass ; the To¬ ledo Shipbuilding Company, $2,000,000, which has built some of the largest ships on the Great Lakes; the Libbey Glass Company, $1,000,000, manufacturers of fine cut glassware and elec¬ tric light bulbs ; the Hettrick Manufacturing Company, $1,000,000, manufacturers of tents, awnings and canvas goods; the Toledo Sugar Company, $1,000,000, which refines sugar from beets extensively cultivated in the territory sur¬ rounding 1 oledo ; the Toledo Scale Company, $900,000, manufacturers of the famous Toledo scale; Milburn Wagon Company, $700,000, builders of farm wagons and electric vehicles. There are more than 600 other busy manufac¬ turing plants in Toledo; in the Manufacturing Directory, issued by the Toledo Commerce Club, there are 921 different classifications of articles made in Toledo. Toledo is the centre of the metal wheel industry in the United States. There are four plants in Toledo capitalized at $1 ,250,000, producing bicycles and children's vehicles and giving employment to more than 1,000 men. More than 60,000 people are em¬ ployed in the industries of Toledo.

Most of the power used in the factories is supplied by the Toledo Railways and Light Company. The Acme Power Company, a subsidiary company of the Railways and Light Company, has com¬ pleted the first unit of an $8,000,000 plant, which will be utilized to further electrify To¬ ledo's industries. The Standard Oil Company of Ohio has erected a $5,000,000 refinery. This company has a pipe line direct to the mid-con¬ tinent field, through which the crude oil is pumped. The $20,000,000 nitrate plant started by the government in 1918 in Toledo is to be converted into a permanent arsenal. Toledo is one of the busiest wholesaling and jobbing centres in the Middle West. The many rail¬ roads and electric lines make shipping easy to any territory surrounding the city. Post office records show that 42,000,000 people can be reached with over-night mail service. Large manufacturers in the East and West maintain branch houses and distributing stations in Toledo.

Banks.— T here are four national banks and 18 State savings and private banks in Toledo. The capital of the national banks is $3,500,000, and the surplus and undivided profits of these banks amount to $4,499,382. The capital of the other 18 banking institutions totals $4,140,300 with surplus and undivided profits of $2,366,619.' In addition to these banks there are eight build¬ ing and loan companies with a combined capital stock of $26,700,000. At the beginning of 1918 the bank deposits in Toledo passed the $100,-000,000 mark; clearings during 1918 totaled $539,114,586. Toledo also is the home of nine bond houses, which do a business upwards of $85,000,000 annually. In 1918 Toledo lead all cities of its class in postal savings deposits. Records show there were 2,950 individual de¬ positors and $1,318,173 on deposit. The post¬ il 391 oooceipts in Toledo in 1918 totaled Municipal Conditions. — The slope from ˆ W. r.lver on both sides is gradual, but amply sufficient to. ensure good drainage. It is well laid out, with wide streets. These aggregate 423 miles in length, of which 400 miles are

sidewalked, 256 miles electrically lighted and 244 miles are paved, chiefly with wood block, brick and asphalt. The residence streets are beauti¬ fully shaded, and the absence of all fencing gives this section a park-like appearance. The sewerage system is excellent, there being a total of 292 miles, all emptying into the Maumee River. The waterworks originally cost about $1,400,000 and has a capacity of 70,000,000 gal¬ lons daily, with 353 miles of street mains. The city is supplied with natural gas brought from three fields, northwestern Ohio, central Ohio and West Virginia; and there are 25,000 con¬ sumers, the gas being used only for household purposes. The electric car system is very com¬ plete, covering 120 miles of streets and

accom¬ modating all sections of the city. There are 10 distinct interurban electric roads in addition, with freight and passenger stations in the busi¬ ness centre. They have a total of 1,546 miles of track, connecting Toledo with a large num¬ ber of surrounding cities and villages, including Cleveland and Detroit. The discovery of gas and petroleum in northwestern Ohio in 1887 was one of the contributing causes for the growth of Toledo, as this city is the natural metropolis in the oil area and this business still remains a potent factor. The rapid growth in population caused the expansion of the resi¬ dence section in Toledo. In the west end of the city, which is the newer area, there are thousands of beautiful homes set among the original forest trees. In more recent years beautiful residential sections have been de¬ veloped by real estate operators. Ottawa Hills is one of the most beautiful high-class residen- tidl developments in the country. Many large homes have been built in the up-river section Toledo has a greater per cent of home-owners than any city of its size in the country. The working man owns his modest home and takes a pride in his lawns and garden patch. All of the residential streets are well paved and lighted with 3,160 arc lamps.

Buddings. Among the notable buildings are the courthouse, in front of which is a fine bionze statue of President McKinley, erected in 1903; Museum of Art; the Young Men's Christian Association building; the Masonic temple ; the Young Woman's Christian Asso¬ ciation building; Newsboys' building; the City Market , the Teiminal Auditorium, which will seat 5,000 persons; handsome Toledo Club building; Woman's building; a Soldiers' Memo¬ rial building; armory of the Ohio National Guard; the Public Library (which has 50,000 volumes and five sub-stations) ; the Valentine theatre, one of the finest and most artistic fil¬ er tors in the United States, and many modern office and business blocks.

Churches and Schools. — There are 91 church edifices in the city, nearly all having Sunday-schools. Some of the rooms devoted to the latter are up to the best modern stand¬ ards m plan and equipment. Nearly all have large libraries for the use of the scholars, there are two public high schools, built at a cost of $750,000 each, a manual training school and a vocational high school. There are 51 public school buildings, besides 22 parochial schools belonging to and controlled by the Ro¬ man Catholic Church. The latter Church also supports an academy under the Ursuline Nuns,

a similar school by the Notre Dame Sisters, and Saint John s College, an institution for boys and young men, under the direction of the Order of Jesuits. 1 oledo University with an enrolment oi 1,200 students is maintained by the city, lheie are 10 private schools; two large busi¬ ness colleges, one of which has 500 students. The Museum of Art is an organization for the advancement of art, numbering in its member¬ ship the most progressive citizens. It occupies a building built at a cost of $1,000,000 and a val¬ uable gajlery of paintings and objects of art.

Charities. — Among the benevolent and phil¬ anthropic institutions are the Toledo State Hos¬ pital for the Insane, supported by the State. This is an institution on the cottage plan, with accommodations for 1,700 inmates; the Toledo Hospital, a large institution supported by the voluntary contributions of citizens; Saint Vin¬ cent's Hospital and Saint Anthony's Orphans' Home, conducted by the Gray Nuns; Lutheran Orphans' Home; Old Ladies' Home; a Roman Catholic hospital for the aged, conducted by the Little Sisters of the Poor; Mercy Hospital; Robinwood Hospital; Flower Hospital; Mater¬ nity Hospital ; the Country Children's Home ; the Young Men's Christian Association and Young Woman's Christian Association; the day nursery, a home for foundlings, training school for nurses and a number of private hospitals.

Parks. — The park system of Toledo em braces a total of 1,532 acres; beginning at the city limits up the river on the west side is Walbridge Park, 64 acres, on a bluff 75 feet high, with an unrivaled river view; Ottawa Park, on the western side of the city, 280 acres; Willys Park, 100 acres; Bay View Park, 202 acres, at the point where the river empties into the bay. Further up the river on thus side is Riverside Park, 63 acres, fronting the stream. On the east side are Collins Park, 90 acres, and Navarre Park, 62 acres. Besides these, there are 44 smaller parks and triangular spaces, ranging from one-eighth of an acre to seven acres area. The large parks are con¬ nected by a boulevard, which is 10 miles long on the west side, 150 to 200 feet wide, now under construction, extending in a semi-circle from Walbridge to Bay View parks, the most of the necessary land being donated by property- owners. On the east side a similar semi-circle is projected and partially completed. Recrea¬ tion centres and parks are being increased in number as rapidly as the city budget permits.

Recreation. — Toledo offers all the advan¬ tages of a summer resort, because of its prox¬ imity to Lake Erie and its fine beaches. Just 45 minutes from the heart of the city is located Toledo Beach. Here will be found many com¬ fortable summer homes along the edge of Lake

Erie, extending for a distance of several miles. Hundreds of Toledo people spend the summer months at the beach, going to and from work each day. The street car company maintains a half-hour service to this resort. Point Place and Edgewater, located on the bay just outside the city limits, are meccas for fishermen. On the south shore of Maumee Bay will be found Harbor View Beach, with many cozy summer homes nestled among the groves which border the bay shore. In the city Walbridge, Riverside and Bay View parks are located on the banks of the Maumee River. These are easy of access

and daily, during the summer lime, attract thou¬ sands of people. Yachting and canoeing are favorite sports in Toledo. The river and bay are dotted with small crafts of all kinds. More than $5,000,000 has been invested by the people of Toledo in sailboats, motorboats, canoes and cruising yachts. There are three yacht clubs and a power boat club. Toledo Yacht Club maintains one of the finest buildings of its kind in the country at the mouth of the Maumee River. This club adjoins Bay View Park. The Toledo Power Boat Club is situated on the bay near Bay View Park. The Maumee River Yacht Club is located at the southerly end of Walbridge Park. The Ottawa River Yacht Club has headquarters on Ottawa River near the bay. The city maintains a municipal club house at Riverside Park. There are many other smaller club houses supported by canoe clubs, etc. In the winter time ice boating and skating are the leading outdoor sports. Practi¬ cally all of Toledo's parks have public swim¬ ming pools and the most modern playgrounds equipped for the children. In Ottawa Park there is one of the finest municipal golf courses in the United States. Public tennis courts also are maintained by the city. Fine golf courses are maintained by the Inverness Club, Country Club, South Shore Country Club and the Syl- vania Golf Club. There is a keen interest in Toledo in baseball. Toledo supports a team in the American Association, and Swayne Field, the home of the Toledo team, is one of the finest ball parks in the league. There are many semi-professional teams which have large fol¬ lowings. The city maintains ball diamonds in several of its parks. Toledo is a Mecca for excursions during the summer months; people come for hundreds of miles to take trips on the water. Three passenger steamship lines main¬ tain regular service to Sugar Island, Detroit, Mackinac, Put-in-Bay, Cedar Point, Cleveland, Buffalo and other points on the Great Lakes.

Government.— Toledo has a simplified form of the Federal form of government. The people elect the mayor, vice-mayor and one ward councilman. All other city officers are ap¬ pointed by the mayor, with

the exception of the city clerk, who is elected by council. All city offices are for a term of two years. There are 16 wards. The vice-mayor presides over council, but has no vote except in case of a tie. The mayor's cabinet, appointed by him, consists of the heads of various city depart¬ ments; these are a director of law, director of public service, director of public safety, director of public welfare, director of finance.

History. — The Maumee River was one of the most important routes for travel by the Indians and the white traders. Going by canoe to a point near Fort Wayne, Ind., a portage of a few miles enabled them to reach the head¬ waters of the Wabash, which they followed to the Ohio and thence to the Mississippi. An¬ other important route was up the Maumee and the Auglaize, a southern tributary, thence by portage to the headwaters of the Great Miami, which reaches the Ohio just below Cincinnati. An important Indian trail also crossed the river at the rapids above the city, by which hunting parties went to Kentucky. A few French Can¬ adian hunters and trappers settled, in the 18th century, at points within the present site of Toledo; but there is no reliable account of the

earliest sporadic settlement of Americans on the city plat. In 1805 a treaty was made be¬ tween the United States and the Indians, at a stockade, named Fort Necessity, which stood on a high clay bluff at the junction of Swan Creek and the Maumee. By this the red men yielded title to the (<Fire Lands,® granted to the citizens of Groton and New London, Conn., in recompense for the burning of these towns by the British in the Revolution. In 1817 a com¬ pany of speculators laid out a town at the mouth of Swan Creek, called Port Lawrence. Very few settlers came, however, and the ham¬ let languished. In 1832 another settlement, named Vistula, was begun by Major Stickney, for many years Indian agent, a mile further down the river, at the foot of what is now Lagrange street. This spurred the owners of the land at Port Lawrence to new efforts, and a brisk rivalry sprang up between the two villages. The two were wisely consolidated in 1833. A public meeting of the citizens of both was held to determine the name of the united town ; and, at the suggestion of Willard J. Daniels, the name of Toledo was adopted. He had been reading a history of Spain, and urged the name of the old Moorish capital for the reasons that there was no town of that name in America, that it has a pleasant sound and is easily pro¬ nounced. Toledo was incorporated as a city

in

1.

The town had slow growth until the opening of the Wabash and Erie Canal, from Toledo to the fertile Wabash Valley in Indiana, in 1843, and of the branch from Defiance south to Cin¬ cinnati, called the Miami and Erie Canal, which was opened to traffic in 1845. In 1846 these two canals brought to Toledo products valued at $3,000,000, while those going from Toledo to points on both aggregated nearly $5,000,000. The first railroad to reach Toledo was called the Erie and Kalamazoo, which was opened from Toledo to Adrian, Mich., in 1836, the cars being. drawn by horses. The next year a loco¬ motive was put on the line, and a contract for carrying the mails was obtained from the gov¬ ernment. The road was sold by the sheriff in 1842, and its line is now, part of the great New York Central system.

Population. — The population (1840) was

1,222; (1860) 13,768; (1880) 50,137; (1900) 131,822; (1910) 168,497; (1920) 243,109.

Raymond T. Skinner, Toledo Commerce Club.

TOLEDO (Sp. td-la't'ho), Philippines, pueblo, province of Cebu, on the west coast, 35 miles west of the pueblo of Cebu. Petroleum and natural gas are reported in the vicinity. Pop. about 13,500.

TOLEDO, Spain, in New Castile, capital of a province of the same name, on the Tagus, 45 miles southwest of Madrid. It is the archie-piscopal see of the primate of Spain. The city is walled and occupies an acclivity, around which rise lofty mountains. The city is built compactly, houses crowded, streets steep, wind¬ ing and narrow. The chief points of interest are the Alcazar (1551), once including fortress and palace, which occupies a central and high point of the town ; the great Gothic cathedral (1227-1493), a most imposing edifice of great architectural merit, which has seen many vicis¬ situdes but retains some fine stained glass and a

choir of marvelous beauty. The large square of Zocodoven is the fashionable promenade, and thoroughly Moorish in character. Here the heretics were burned and the bull-fights take place. There are besides a theological seminary, monastery, several palaces and hospitals. The manufactures comprise the famous Toledo sword-blades, small-arms, church ornaments and vestments, silk, wool and cotton textiles and confections. Toledo was the ancient capital of all

Spain and important in the country's his¬ tory. It was taken by the Romans 193 b.c. ; and subsequently was occupied in turn by Goths, Moors and Castilian monarchs. It was also the seat of the Inquisition (q.v.). The town is now sadly decadent. The Alcazar, so often damaged by fire, has been restored with considerable expense. Pop. about 22,000. The province has an area of 5,919 square miles and a population about 438,071. Consult Calvert, A. F., (Toledo: an Historical and 'Descriptive Account* (New York 1910).

TOLEDO NEWSBOYS' ASSOCIA¬ TION, The, was organized 1892, with its founder, John E. Gunckel (q.v.), as president. Air. Gunckel remained president of the asso¬ ciation until his death in 1915. Through his untiring efforts* the association had a marvelous growth and was the means of reclaiming the heretofore neglected boy and girl and remold¬ ing their lives, making them useful and sub¬ stantial citizens, capable of carrying on and furthering the plans of the great metropolis, which, like all cities, must be trusted to a rising generation. To-day former newsboys of this association are filling and in many instances managing the great business enterprises of the city. Following his death, Mr. J. D. Robinson, one of Toledo's greatest philanthropists, became its president, and again the association was placed on a solid foundation. Never in the history of the association has it enjoyed greater prosperity. The association as in the past is loyally supported by the philanthropic people of the city, and every advantage is offered the boy of the street to become a- useful and honored citizen. The boys are constantlv warned of the evils and dangers that beset them and urged to refrain from gambling, stealing, lying, swear- mg, smoking cigarettes, drinking intoxicating liquors, going into saloons or associating in bad company. A fine brick building built in 1908, costing $110,000, dedicated to the newsboys of Toledo, furnishes them one of the finest audi¬ toriums in the city together with a spacious and well-equipped gymnasium and cadet room, swimming pool of large capacity, fine library' playrooms, furnished kitchen and dining-room, lobbies and special rooms for band and orchestra practice, where the association maintains a 36-piece band and 14-piece orchestra. The asso¬ ciation now has a membership of 11,500. Sun¬ day afternoon entertainments, a special feature of the association, from 1 October to 31 March, given by the schools, churches and different or¬ ganizations of the city, are highly appreciated cn j e boys- Each. Sunday the auditorium is hiled to its capacity. The association also maintains a court of investigation, where erring boys are required to account for misconduct. An employment bureau within the association proves . a valuable asset and many boys are placed in responsible positions, later to become

1 General Post Office 2 Scott High School

Court House

pai tners or managers. The boys are en- comaged to return all found articles to the building. Articles of more than $50,000 have been returned to their rightful owners, for which the finder receives an “honor® badge. Each year the entire association is tendered an outing, or better known “Field day,® which never fails to add a bright page to the history oi the newsboy.

TOLEDO WAR, The, a name popularly given to the contest over the division line be¬ tween Michigan on the north and Indiana and Ohio on the south. It arose out of an error in the location of the southern point of Lake Michigan. _ In 1805 the Territory of Michigan was organized in conformity with the Ordinance of 1787, which provided that the line between Ohio, Indiana and Illinois on the south, and the territory on the north, should be <(an east and west line running through the southern point of Lake Michigan.® This was set down on the maps of the times 42° 32' N., but when Michi¬ gan was organized it was found that the true line through the southern point of Lake Michi¬ gan was 65 miles to the south, or 41° 37' 19" N., and this more southerly line was adopted. But when Indiana and Illinois were organized as States, the northern line was adopted, and there was thus left a belt 65 miles broad claimed by both factions. Congress ordered a survey, which was completed in 1817, establishing the “Harris® line, near the northern one. But the people of Michigan protested vehemently, as the city of Toledo was in the disputed belt. In 1836 Ohio by act of legislature organized town¬ ships in this territory, which had long been under the control of Michigan. Then both Michigan and Ohio appealed to President Jack- son, but got no relief. The governor of Ohio called out the militia, the governor of Michigan did likewise and occupied Toledo. When it seemed as if a conflict could no longer be pre¬ vented the matter was settled by the admission of Michigan to the Union as a State upon con¬ dition of her acceptance of the ((Harris® line, and giving her in recompense the northern part of the peninsula of Wisconsin. Great deposits of copper

and iron being found in this penin¬ sula, Michigan accepted the conditions and entered the Union as a State 26 Jan. 1837. See United States, the Wars of the.

■TOLERATION, a word meaning in its general sense forebearance without approval, as when a state has an established church, but other churches are tolerated — that is, their members are permitted to worship in their own way without interference on the part of the state. In this meaning toleration is different from the system of voluntary support of all churches without a state religion. It was much used in America, however, in a narrower, or perhaps a broader, sense, during the struggle to put an end to the compulsory support of Con¬ gregational churches by the taxpayers in cer¬ tain New England States, especiallv Connecti¬ cut. Toleration is now universal in civilized countries, so far as permission to worship is concerned, but some restriction still exists as to bell-ringing by Roman Catholics in Sweden, and there is a certain degree of intolerance toward Protestants in some South American republics. Nowhere, however, in any country pretending

t,° civilization is persecution on account of re¬ ligious belief permitted by law.

In all ages enlightened minds have favored toleration. It was the rule among the ancient Greeks, and also among the Romans, until re¬ ligion became so identified with state affairs that refusal to accept the state religion was treason to the government. Toleration was un¬ known in practice during the Middle Ages, al¬ though it had earnest advocates among Chris¬ tians, Mohammedans and pagans. In modern times toleration has been a growth of the past three centuries. As late as the early part of the last century men were imprisoned in New England for refusing to pay taxes for mainte¬ nance of the local church. England removed Roman Catholic disabilities in 1829, but did not admit Jews to Parliament until 1858. In a legal sense toleration is now coextensive with civili¬ zation and semi-civilization, but education only can make it effective by causing a fraternal and tolerant spirit to take the place of intoler¬ ance and fanaticism, wherever the latter pre¬ vail.

TOLERATION ACT, a statute of Wil¬ liam and Mary, under which freedom of wor¬ ship was granted to Protestant dissenters from the Church of England, provided they made a declaration against transsubstantiation and took the oaths of allegiance and supremacy. See Toleration.

TOLIMA, to-le'ma, Colombia, a volcano rising from the central cordillera of the Co¬ lombian Andes to a height of 18,320 feet.

TOLL, Eduard, Baron von, Russian ex¬ plorer: b. 1850; d. 1902. In 1885 he began to explore the Post-Tertiary fauna of the Jana region, and in 1893 found the body of a mam¬ moth in the ice near the delta of the Jana. Later he commanded the Sarja expedition which wintered on the west coast of Kotelnoi Island (1901-02) and discovered large deposits of Post-Tertiary fauna, including mammoths, reindeer, etc., in the great ice-cliffs there. With F. G. Seeberg he started south in November 1902, and perished on Bennett Island, where their records were found by Kolchek a year later. Consult Toll, Emma, (Die Russiche Polarfahrt der Sarja) (Berlin 1909).

TOLL, a tax paid or a duty imposed for a privilege granted, such as the payment claimed by owners of a port of entry for the privilege of landing or shipping goods; the fee exacted by those who erect or maintain a bridge for the privilege of passing over the same; a portion of grain retained by the miller as his compensa¬ tion for milling; a charge made by the owners of a fair or exhibition for the privilege of ex¬ hibiting or selling goods; a compensation for services, especially for transportation, as canal or railway toll. In the United States tolls, as applied to bridges and highways, are a subject for State legislation, while those applying to rivers and harbors are usually in the province of Congressional action. Tolls were at one time of international importance, since they were exacted on certain straits and tidal rivers by virtue of the sovereignty of a particular state, such as the Scheldt tolls and sound dues levied by Denmark. The tendency in the United States is to abolish tolls, and most bridges and

highways are now free to the public. See Taxation.

TOLMAN, Herbert Cushing, American Greek scholar: b. South Scituate, Mass., 4 Nov. 1865. He was graduated at Yale and studied at the universities of Berlin and Munich. He received his Ph.D., from Yale and was honored with the degree of D.D., from Peabody College and S.T.D., Hobart College, and LL.D., University of Nashville. From 1894 he was head of the Greek department of Vanderbilt University and is the author of several works on classical and philological subjects. His ‘Ancient Persian Lexicon and Texts) and An¬ cient Persian Language and Cuneiform Supple¬ ment were adopted

immediately after publi¬ cation by the universities of Germany and were recognized by foreign philological reviews as superseding what had yet been done in that line of research, while the American Journal of Philology and the New York Nation spoke of the author as the leading American author¬ ity in the field of ancient Persian language. He was the first to identify positively the hitherto unknown season of the Persian month, Gar- mapada, with June-July, an identification of great value to historians in fixing accurately several important dates. Dr. Tolman was elected president of Hobart College in 1913, but declined. In 1915 he was appointed dean of the College of Arts and Science of Vander¬ bilt University.

TOLMAN, William Howe, American safety engineer: b. Pawtucket, R. I., 2 June 1861. In 1882 he was graduated at Brown Uni¬ versity and from 1894 to 1898 was general agent of the New York Association for Im¬ proving the Condition of the Poor. He also served as secretary of the New York commis¬ sion on public baths and of the improved housing council of the same city. He is founder and from 1908 to 1916 was director of the American Museum of Safety. He has taken part in several international housing congresses and is member of several societies for social betterment, both American and foreign. Dr. Tolman is the author of (History of Higher Education in Rhode Island' (1891); Munic¬ ipal Reform Movements in the United States) (1894) ; 'Handbook of Sociological Reference for New York City' (1894) ; 'Report on Pub¬ lic Baths and Comfort Stations) (1897); 'The Better New York' (1906); 'Social Engineer- ing) (1909) ; (Hygiene for the Worker ' (1912) • 'Safety' (1913); also 'Industrial Betterment,' a monograph prepared for the United States Section of Social Economy, Paris Exposition of 1900, and various review articles.

TOLOWA, tol'o-wa, originally the name of a village, but extended to designate a tribe of the Athapascan stock of North American Indians occupying the coast of California from a point a few miles north of the mouth of Klamath River northward to a short distance beyond the boundary of Oregon and the valley of Smith River. They were noted basketmakers and subsisted largely on salmon and other fish. In 1862 they were placed on a reservation, which was abandoned six years later, since which time they dwindled and largely disappeared.

TOLSTOY, Count Lyof Nikolaievitch,

Russian novelist and social reformer: b.

Yasnaya Polyana, government of Tula, 9 Sept. 1828; d. Astapova, 20 Nov. 1910. He studied languages and law at the University of Kazan.

In 1851 he went to the Caucasus district as an ensign of artillery and he served in the defense of Sevastopol during the Crimean War. To this period of his career belong his earliest literary works, among them the autobiographi¬ cal ‘Childhood, Boyhood and Youth,) the brilliant descriptions of the Crimean campaign entitled ‘Sevastopol in December 1854,) Se¬ vastopol in May 1855 ’ and (Sevastopol in Au¬ gust 1855 J and (The Invasion.’ He left the army on the conclusion of the war and went to Saint Petersburg, where he made the acquaint¬ ance of Turgenev (q.v.) and other distin¬ guished Russians and soon after he published ‘The SnowstornP and Two Hussars. ’ His

first foreign journey was made in 1857 and marks an epoch in his spiritual history and on his return he -retired to his estate to live a simpler life. He was greatly interested in the condition of the peasantry and founded a free village school on his property, for which he prepared reading and other textbooks himself. At the end of two years, however, the school was closed, both on account of opposition of the government inspectors and also the lack of interest among the masters and pupils. Later when he asked permission to reopen his school the government flatly refused. His ‘ Family Happiness’ was issued in 1859 and was soon fol¬ lowed by (Three Deaths) (1859), ‘Polikuschka’ (1860) and others. In 1862 he married the daughter of a Moscow physician. The next period of his life saw the production of the two works upon which his literary reputation chiefly rests, (War and Peace : ’ (1865-68), dealing with Napoleon’s invasion of Russia, and ‘Anna Karenina’ (1877), a powerfully realistic study of human passion and its effects. Soon after the completion of the latter novel Tolstoy be¬ gan to develop his characteristic views of re¬ ligion and its application to individual and social life. He believes that the Sermon on the Mount literally interpreted is the supreme law of the Christian life and he lays special stress on the precept, ((Resist not evil.” His system has much in common with the anarchist-com¬ munism of his fellow-countryman, Kropotkin, but its peculiar religious basis gives it a unique character. In 1901 he was formally excommuni¬ cated by the Holy Synod of the Russian Or¬ thodox Church and in a reply to the edict of excommunication he clearly enunciated his religious and theological views. These include the denial of the Trinity, of the deity of Jesus and his vicarious atonement, of orthodox conceptions of the future world, of every kind of sacramentalism and similar dogmas and are substantially identical with those of modern spiritual Unitarianism. Among the works of his. latest period, in which his religious and social views are more or less expounded, are the following: (What the People Live By’ (Eng¬ land 1889) ; ‘What to Do> (England 1889) ; (My Confession’; <My

Religion’; <The Death of Joan Ilyitch’ (1886) ; (Where Love is there God is Also’ ; ‘The Kingdom of God is Within you ; (The Kreutzer Sonata’ (1890);

whlle ye have the Light’ (England 1890), a tale of the early Christians; ‘The Power of Darkness,’ a drama; ‘The Fruit®

of Enlightenment > (1891), a satirical comedy; (Master and Servant *; (Politics and Religion* ; (Patriotism and Christianity *(1894), on the Franco-Russian' alliance, and (What is Art?* (1898). (Resurrection *(1900) is a powerful novel of the same type as (Anna Karenina.* There are American translations by Dole, Hapgood and others (22 vols., New York 1902), and by Leo Wiener (24 vols., Boston 1904-05). Tolstoy gave up all privileges of rank in order to live a life of labor and asceticism and dur¬ ing the great Russian famine he found abundant opportunity for carrying out his gospel of social service. (See Anna Karenina; War and Peace). Consult De Vogue, (Le Roman Russe *(1888) ; Dupuy, C. E., (Great Masters of Rus¬ sian Literature* (New York 1886) ; Garnett, Constance, (Tolstoy: His Life and Writings *(London 1914) ; Howells, W. D., (My Literary Passions* (New York 1895) ; Lloyd,' J. A. T., (Two Russian Reformers: Ivan Turgenev and Leo Tolstoy *(ib. 1911) ; Lowenfeld, (Leo Tolstoi* (1892); Maude, A., (The Life of Tolstoy *(2 vols., New York 1910; 4th ed., 1911) ; Merezhkovsky, D. S., (Tolstoy as Man and Artist* (ib. 1902) ; Rolland, R., (Tolstoy *(ib. 1911) ; Tolstoy, I. L., (Reminiscences of Tolstoy* (ib. 1914) ; Turner, (Count Tolstoy as Novelist and Thinker* (1888).

TOLTECS, tol'teks or tol-taks', an Indian tribe said to have occupied portions of the Mexican plateau previous to the advent of the Aztecs. Little is known of the race and that little only through Aztec traditions and picture writing. They are supposed to have come from the north and to have been supreme in their territory from the 7th to the 11th century. Their principal city was Tolan, where they set¬ tled about 661 a.d. from which they got the name Toltec. Lists of their kings or chiefs are extant — but these are considered untrust¬ worthy by antiquaries. The hero-god Quetzal- cohuatl is supposed to have lived in their cities before their overthrow, which came in 1013, when they were driven south by savage tribes. Aztec records tell no more -of the Toltecs, but from the fact that the Quiches and other tribes from the north are known to have settled in Guatemala about this time, the inference is strong that they were banished Toltecs.

TOLUCA, to-look'ka, Mexico, capital of the state of Mexico, 36 miles southwest of Mexico City, on a division of the National Railway, 8,761 feet aboˆe sea-level. Three steam railways — the Mexican National, the Toluca and San Juan and the Toluca and Tenango, all narrow gauge, supply transporta¬ tion facilities and there is a well-equipped street railway. The city is situated in the beautiful valley of Toluca, just over the mountain range which forms the western background of the national capital. This valley, which lies at the foot of the Toluca Mountain, is one of the most notably productive and beautiful spots of the republic. The city was founded by the Matlatzinca Indians and was advanced to the title and rank of city in 1677. The industries include a brewery, large flour-mill, glass-bottle factory, two packing-houses and several mod¬ ern creameries. There is a local bank — the Bank of the State of Mexico — a branch of the National Bank and an agency of the Bank of London and Mexico. The city is well paved

and provided with beautiful plazas, one of which contains a monument in honor of the patriot priest, Hidalgo, dedicated in 1900. In another plaza is. a life-size figure in bronze, of Morelos, while in still another is an imposing monument to Columbus. A museum supported by the state occupies a spacious building and the State Library, containing 'some 11,000 vol¬ umes, is located in the immediate vicinity. The principal buildings are the palace of the state government, the municipal palace, the Scientific and Literary Institute, civil hospital, School of Trades and Arts. Pop. 33,000.

TOLUENE, methyl benzene, CeHsCHs, is an aromatic hydrocarbon present in American petroleum, in wood-tar and in coal-tar. Upon distillation coal-tar yields a fraction known as light oil, boiling at 100°-120° C. The toluene of commerce has been obtained from this frac¬ tion. Toluene has also been prepared (1) by the dry distillation of tolu balsam; (2) by heating brombenzene with methyl iodide and metallic sodium (Fittig Synthesis) ; (3) by

treating benzene with methyl halide and dry aluminum chloride (Friedel-Craft Synthesis) ; (4) by heating toluic acid with lime.

The enormous demand for toluene created by the European War, made it the subject of a number of patents. . According to Fr. P. 479, 295, the compound is made by passing hydro¬ chloric acid into boiling methyl alcohol in the presence of dehydrated zinc chloride and con¬ ducting the methyl chloride produced into a mixture of benzene and dry aluminum chloride. Other patentees claim to have obtained toluene from gas-tar naphtha by distilling under press¬ ure at 13Q °-240° C. (U/ S. 1,225,237) ; or, from gas-drip naphtha, by passing it

with steam and water-gas through checkerwork heated to about 800° C. (U. S. 1,230,087). To these may be added the widely-advertised bracking** process, according, to which toluene and benzene have been, obtained by heating oils, containing ali¬ phatic or aromatic hydrocarbons, at prescribed temperatures and pressures. The process has been tried , on a large scale, but its success as a commercial enterprise has been seriously ques¬ tioned. Of much greater importance are the improvements inaugurated for the extraction of the maximum amount of toluene from coke- oven or city gas supplies. It has been known for some time that only a small fraction of the toluene obtained from the by-products coke- ovens is recovered for commercial purposes, the greater proportion finding its way into city gas during the process of distillation. Toluene recovery plants have, therefore, been installed in all parts of the United States with the object of stripping illuminating gas of this material. As a result of this measure the toluene output for 1918 has probably exceeded 20,000,000 gal¬ lons. The maximum output for 1912-13 was not over 500,000 gallons.

• Toluene is a colorless liquid with a boiling point of 110° .C. and a specific gravity of 0.872 at 15° C. It is an excellent solvent for many organic compounds. With a side-chain that readily responds to a number of reagents and with a nucleus that can be nitrated, sulphonated. halogenated or reduced, toluene is capable of forming a large number of derivatives which are either useful commercial products or in¬ termediates for the manufacture of explosives,

synthetic dyes, perfumes, drugs, substitutes for sugar and poisons used in chemical warfare. Trinitrotoluene, saccharin, indigo-blue, brom-benzyl cyanide, benzyl chloride, benzotrichloride, benzoic acid, nitrobenzaldehyde, toluidine, are some of the more important derivatives of this hydrocarbon.

V. S. Babasinian,

_ Lehigh University.

TOLUIDINE, exists like all

disubstitution products of benzene in the ortho, nieta and para modifications. When toluene is treated with nitric acid, a mixture of ortho- and para-nitrotoluenes is obtained. The reduc¬ tion of this

mixture yields the corresponding ortho- and para-toluidines. These are sepa¬ rated by strongly cooling, the product, when the ortho compound remains as an oil, while the para compound solidifies and may be re¬ moved by filtration. Or, the mixed toluidines are treated with a quantity of sulphuric acid insufficient to effect complete neutralization; the ortho compound is now removed by dis¬ tillation, while the para compound remains be¬ hind as a sulphate. It has also been noted that the oxalate of para-toluidine and its phosphate are much less soluble than the corresponding derivatives of the ortho compound. Upon these properties are based a number of methods for the separation of the two modifications. On account of the high cost of manufacture, meta- toluidine is used to a limited extent only. It has been obtained by the reduction of meta- nitrobenzal chloride. Meta-toluidine may be readily obtained from meta-nitrotoluene, but the latter can only be prepared on a commercial scale by indirect methods.

Ortho-toluidine is an oily liquid. It boils at 197°-199° C. and has a specific gravity of 1.102 at 4° C. Meta-toluidine is also an oily liquid with a boiling point of 203° C. and a specific gravity of 1.0041 at 4° C. Para-toluidine is a solid which crystallizes in leaflets. It melts at 43°-45° C. and boils at 190° C.

Ortho- and para-toluidines are important in¬ termediates in the dye industry. After diazoti- zation they may be coupled with G Acid to form Ponceau G, with R Acid to produce Pon¬ ceau RT, with beta-naphthol sulphonic acid S' to form Orange GT, and with dioxy-naphtha- lene sulphonic acid S to yield Azofuchsine B. Magenta, is an oxidation product of a mixture of toluidines and aniline; Primuline is a fusion and sulphonation product of pera-toluidine and sulphur; Mauveine, Safranine, Chloramine Yel¬ low, Cochenille Scarlet 2R, Spirit Yellow R, etc., are obtained from toluidines. Simple deriv¬ atives of toluidines have also been used for the manufacture of certain pigments; thus diazotized nitro-toluidines have been coupled with beta-naphthol producing Orange R, Fast Red HL, Lithol and Fast Scarlet R.

V. S. Babasinian, .

Lehigh University.

TOM. known as BLIND TOM. See Blind Tom.

TOM, Asia, a river in southern Siberia, in the government of Tomsk, rising in the Abakanic Mountains and after a course of 450 miles

flowing northward into the Obi. It be¬ gins to be navigable at Kusnezk.

TOM BROWN'S SCHOOL DAYS, a

story depicting English public-school life, writ¬ ten by Thomas Hughes and published in 1857, when the author was a young barrister of three- and-thirty. It leaped at once into a deserved popularity it has never lost. Tom is a typical middle-class lad, with the distinctive British virtues of pluck, honesty and the love of fair play.

TOM JONES. (The History of Tom Jones, a Foundling^ a novel by Henry Fielding, was published 28 Feb. 1749 — a red-letter day in the calendar of English fiction, for this work in the opinion of many stands at the head of all novels ever written in our lan¬ guage. It succeeded several most interesting experiments in the novel of contemporary man¬ ners such as Richardson's (Pamela) and (Clarissa HarloweP Smollett's 'Roderick Random, > and his own 'Joseph Andrews.) When Fielding wrote 'Tom Jones, > his intel¬ lect, wonderfully observant and penetrative, was in full maturity; his pen had been long prac¬ tised in the drama and the essay and in fiction ; his mind was highly cultivated in the ancient and modern literatures; he had associated with all classes of people, the high and the low, and he had thereby gained a knowledge of the men and women of his t.ime unsurpassed by any one then living. His aim was to present the very form and pressure of the age, and on the effort he expended "some thousands of hours.® Having in mind the ancient epics, he divided his novel into 16 books, each with an initial chapter on the art and morality of that "new province of writing® which he claimed to be introducing to the British public. In its orig¬ inal form, 'Tom Jones) filled six volumes, containing, all told, about 350,000 words.

For his comprehensive view, Fielding began his delineation of character in the country with two. Somerset gentlemen — Mr. Allworthy and Squire Western, the one a Hanoverian and the other a Jacobite. Into the household of All¬ worthy he placed a sister, Bridget, her maid, Deborah, a pair of nephews, Tom Jones and Master Blifil and their tutors, Square the Deist and Thwackum, the orthodox divine. Into the household of Western he placed a sister, Diana, a daughter, Sophia and her maid and former nurse, Mrs. Honour. Then, after describing life in the country while Tom and Sophia were growing up, he brought most of his characters up to London for contrast and interaction with more highly-seasoned men and women of the town. The manner in which Fielding con¬ ducted his story, concealing until the end the mystery of Tom's birth, has received the high¬ est praise

ever since the novel first appeared down to the eulogy by the late W. E. Henley. Scott, for example, likened the narrative to the easy flow of a river through lands affording wide prospects ; Coleridge thought the nice structure of the plot was equaled only by that in the very greatest dramas, such as the ‘CEdipus) of Sophocles. And in general, little exception has ever been taken to Fielding’s craftsmanship beyond his introduction of the tale of the ‘Man of the Hill,* the matter of which a modern novelist would manage differ¬ ently. It is not to be inferred that Fielding laid out a plot by compass and rule. At the outset, he probably had in mind his conclusion,

but nothing more. He wrote at leisure re¬ membering what he had seen and heard,’ let¬ ting his story develop as he proceeded, casting his mind backward and forward and gathering up at the end all the threads of his narrative into a consistent and impressive whole. This is the way that literary genius, in distinction from mere literary talent, works, and achieves its ends.

Apparently Fielding drew his characters in the mam from real life. Where he followed his model too. closely or where he deviated too far from it, his success was onlv partial. Squire Allworthy, who had an original in Ralph Allen, the philanthropist of Bath, is altogether too good for this world ; he lacks those elements which really make a man, lovable and humorous as he is. Likewise Blifil, for whom no orig¬ inal was ever claimed, is hardly more than a stage, villian, whose hypocrisy is so transparent that it should have been detected long before it had a chance to work its mischief. Thwackum and Square, though rather artificial creations, are always entertaining, for they have enough of reality to support their humorous preten¬ sions. Partridge, the schoolmaster and barber, superstitious and afraid of his dreams, inter¬ ested Voltaire greatly. Minor characters, like Diana Western, Mrs. Honour and Bridget All¬ worthy, are almost always admirable. For a superb creation we turn to Squire Western — the fox-hunting squire who goes to bed drunk and gets up in the morning before daybreak ■ to follow the hounds, who loves his daughter better than all other creatures except his kennel, who quarrels with his sister, swearing great oaths referential. Under the excitement of Sophia’s refusal to marry Blifil, he develops into a veritable whirlwind of contending pas¬ sions.. The height of the storm is reached in certain scenes with his sister, which, brutal as they are, have never been surpassed for humor in this language of ours. His daughter,

Sophia, for whom Fielding's own wife, Charlotte Cra- dock sat, is a portrait of unusual charm. She is a real woman depicted in all her beauty, fine breeding, self-poise, modesty, vivacity and independence when the inevitable struggle comes between paternal tyranny and the promptings of her own heart. She wins the first great battle in our fiction for the enfranchisement of her sex.

The crux of the novel has always been the hero, who resembles Fielding himself in tem¬ perament but not in the incidents of his career. He is kind, generous, chivalrous and perfectly honest, but he is lacking in practical sense, and so falls into all sorts of mistakes in conduct. He loves Sophia desperately and would win her at all hazards. This passion, however, does not protect him against the allurement of other women, and herein lies the trouble. Generous critics overlook the boy's affairs with Molly Seagrim and Mrs. Waters, but they halt at the intrigue with Lady Bellaston. Had Fielding thrown in a word of explanation over that in¬ trigue, Coleridge would have excused all. Here arises a question that may be interminably de¬ bated. Fielding himself thought no explanation necessary. He depicted the young man of his time as he was without comment. In thus keep¬ ing his art true to nature he acted rightly.

The influence of (Tom Jones) cannot be

well considered apart from the influence of Fielding's other works. The novel was im¬ mediately translated into French, Dutch and German, and subsequently into Spanish, Italian, Polish and Russian. The French imitated it, dramatized parts of it and turned it into a comic opera. The Germans appropriated its disquisitions on the art of fiction and to some extent wrote novels in its style. (Tom Tones* has probably been reprinted in English a hun¬ dred and fifty times. To pass by a host of imi¬ tations, it suggested the general outline of plot to. Scott for (Waverley,) his first novel; its spirit permeates the best work of Thackeray, and (Pendennis) was written in direct imita¬ tion.. In short, to (Tom Jones) nearly all suc¬ ceeding novelists are indebted who have aimed to depict life, not. as it ought to be, but as it really is. Since Fielding's day fiction has ex¬ tended its scope to include things never dreamed of by him; but for method, manner and pro¬ cedure his art is the source. Scott called him (<the Father of the English Novel.®

Wilbur L. Cross.

TOM MOUNTAIN, in Hampshire County, Mass., between Holyoke and Northampton, and overlooking the Connecticut Valley. Though only

1,214 feet in height, thousands of tour¬ ists ascend Mount Tom each year on account of the grand view from its summit.

TOM THUMB. See Stratton, Charles Sherwood.

TOM-TOM, or TAM-TAM, a native East Indian drum used by musicians, jugglers, public criers, etc. It is generally cylindrical in form, the depth of body being about three times the diameter of the heads, of which there are two. It is made of resonant wood or of hard-baked earthenware, and the heads are covered with skins, drawn tight by side-lacings, as in the modern drum. It is beaten with the fingers or the open hand and produces a hollow monot¬ onous sound. Similar instruments used by the natives of western Africa receive the name of tom-tom, as do also certain types of Chinese gongs.

TOMAH, Wis., city in Monroe County, on the Chicago, Milwaukee and Saint Paul Rail¬ road, 42 miles northeast of La Crosse. It is the site of a government industrial Indian school and contains, the railroad bridge works and a large saw-mill, Pop. about 4,000.

TOMAHAWK, Wis., city in Lincoln County, on the Chicago, Milwaukee and Saint Paul and the Marinette, Tomahawk and West¬ ern railroads. It is 23 miles north of Merrill on the Wisconsin River. The principal indus¬ tries are saw-mills, woodworking plants, pulp and paper factories and a tannery. Pop. about

3,000.

TOMAHAWK, a weapon of warfare of North American Indians, a light war axe. Be¬ fore the advent of the white traders the head of the axe was usually a piece of stone sharp¬ ened at both ends and put through a piece of wood for a handle; sometimes the stone was two-edged and more like a modern double-axe ; sometimes hard horn was sharpened and used in the place of the stone. But the white traders brought the natives, iron hatchet heads and the stone ones were gradually discarded. These hatchets had but one cutting edge, the

other shorter end being formed into a ham¬ mer-head, or oftener into the bowl of a pipe, which communicated with a tubular hollow made in the handle, thus made to serve as a pipe stem. From the custom of the Indians of burying their tomahawks when they made peace with a foe comes the custom of saying that two opponents who have made

peace have ˆburied the hatchet.®

TOMALES, to-ma'les, a bay on the coast of California, reaching the ocean, about 40 miles north of San Francisco. It is a narrow inlet of the Pacific, the railroad is near and parallel to its eastern shore, and Tomales Point is on the west, separating the bay from the ocean. The village of Tomales is a short distance inland.

TOMAN, or TOMAUN, a current gold coin of Persia, varying in value from $1.75 to $2.25 or even higher. In Persia it is reckoned as the equivalent of 100 schakis or shakis.

TOMATO, a perennial herb (Lycopersicon lycopersicon) of the family Solanacece. It is a native .of western South America, whence it was introduced into cultivation in Europe dur¬ ing. the 16th century. At first the wrinkled fruits were regarded with suspicion or dis¬ favor, and were more popular as garden orna¬ ments than for other purposes. During the 18th century both yellow and red-fruited sorts were known, but not until the middle of the 19th century was there a decided improvement in the form of the fruit. At the beginning of that century the fruits were used to a small extent for pickles and preserves, but less for other purposes. The development of the to¬ mato both in its form and its popularity as a vegetable is mainly due to the care of plant- breeders, who have eliminated the wrinkles from the fruit, and to the development of per¬ fect methods of canning. The annual con¬ sumption of tomatoes, both as a salad and cooked or preserved in various ways, aggre¬ gates thousands of tons in the United States, where the crop is more widely grown than in any other country of the world. The season opens in mid-winter in Florida and the Mississippi delta, and advances northward until Septem¬ ber, when it ends in Canada. Considerable quantities of tomatoes are forced in green¬ houses at various seasons, but especially during the spring months.

Though perennial in its native country and in other frostless climates, the tomato is best known in the temperate regions as an annual herb. It is a straggling, clammy, ill-smelling, grayish-green plant with variously formed pin¬ nate leaves and small racemes of small yellow¬ ish flowers, followed by fleshy many-seeded berries which in some improved horticultural varieties weigh more than a pound. Several botanical varieties have been recognized, among which the following are best known : Cherry tomato (L. lycopersicon, var. cerasiforme) , grown in gardens for its little yellow or red globular fruits which are used for home-made preserves and pickles; pear and plum tomato (var. pyriforme) , similar to preceding except in form of fruit; large-

leaf tomato (var. grandi- folium), a group of varieties originated during the closing quarter of the 19th century, and in¬

cluding some of the most important com¬ mercial varieties; the common tomato (var. vulgare), the most widely cultivated form in America. One other species is cultivated, more for ornament than for its fruit, which, although edible, is too small for general house¬ hold use; it is the current tomato (L. pimpinellifolium), also known as the German raisin tomato. The nlant is very spreading and branchy, with small egg-shaped leaves and long racemes often bearing more than 30 cur¬ rant-like red fruits. It has produced hybrids with the preceding species, and is useful for covering unsightly objects during the summer. The former species has been grafted upon its close relative, the potato, but the two plants have never been known to cross-fertilize. These grafts are interesting as curiosities but not otherwise.

Several other plants have been called to¬ mato ; the best known are probably the husk tomato (Physalis pubcscens), also known as the strawberry tomato, ground cherry and dwarf cape gooseberry. It is popular in gardens for its fruits which are made into preserves or kept in their husks in cool dry rooms until needed for use in mid-winter. The name strawberry tomato is also given to Physalis alkekengi, bet¬ ter known by its specific name and as the win¬ ter cherry or bladder cherry. The red fruits are edible, but are not generally relished. The plant is chiefly ornamental on account of its very showy blood-red calyces. The tree to¬ mato (Cyphomandra betacea) is cultivated to a small extent for its light brown, egg-shaped fruits, which resemble the tomato in flavor but are rather more musky and acid.

In cool climates the seeds are generally sown under glass in early spring and pricked out in flats, boxes or pots when the first pair of true leaves appear, allowing them to stand in the former not closer than three by three inches, or two by six inches. Abundant ventilation should be given at all times and the tempera¬ ture kept rather low to make the plants grow stocky and able to adapt themselves readily and without check to the conditions of the field. At this time they should be about five inches tall. The sturdier the plant, the less is it likely to suffer under ordinary conditions and care when set in the field, the earlier will it commence to bear, and the more profitable will be the fruit.

Whenever possible the tomato should be planted on rather rich loamy soil of medium texture and well exposed to the sun. Good drainage is essential. It is generally considered best to apply stable manure to previous crops, because the applications made during the cur¬ rent

year are thought to impair the flavor of the fruits as well as to induce a rampant growth of vine at the expense of productivity. In the field the plants are usually set four to five feet apart each way, and when grown ex¬ tensively each sixth or eighth plant in the row is . omitted and each 15th or 20th row is skipped, so as to facilitate harvesting with least injury to the vines, wagons being^ driven across the field to distribute the empty crates and collect the full ones. Until the vines spread and thus prevent tillage, cultivation is given weekly to keep the surface lose and free from weeds, Often a top dressing of some

readily soluble fertilizer is given after the plants ha\ e been in the field about a month.

ror home use and for fancy markets to- matoes aie of.ten trained in many ways, es¬ pecially to stakes, upon slat frames and trel¬ lises. . bor such the plants are subjected to more or less pruning and tying, which usually vary with individual growers. But the' single stem is usually conceded to be the best method of growing such plants. The advantages se¬ cured by training are early ripening and better colored, larger sized and superior flavored fruits.

Since the vines are tender to frost the to¬ mato is usually cut short before mid-autumn, lhere are, however, at that time many fruits approximately mature, besides large quantities less advanced. The former may be gathered and ripened in warm rooms or sunny windows, and by storing in cool places from which they can be removed to warmth as needed the sea¬ son may be extended several weeks after the vines have been destroyed. The greener fruits are widely used for making sweet pickles, chowder and <(India relish.^

In greenhouses the tomato is one of the most popular vegetable crops. Though it is often grown in special houses or as 1(he leading crop it is probably more frequently employed as a successor to carnations and some other green¬ house plants, which either commence to fail in the early spring months or have a smaller sale when brought into competition with spring flowers. The fruits are sought about Easter time and from then until the out-door plants commence to bear the greenhouses may often be very profitably employed. Hand, pollination is generally considered essential to the setting of the fruit and the labor this involves is often a drawback on account of its expense. The plants are raised usually from seeds, sometimes from cuttings, or the

rooted tips of plants which previously occupied the benches. They are planted in soil similar to that in favorable fields, either in solid beds, on shallow benches, or in boxes or pots, the second being pre¬ ferred. The plants are usually trained to a single stem supported either by a stout cord suspended from the sashbars, or upon a trellis, the former preferred. Two feet apart is the favorite distance; five feet the preferred height ; a minimum temperature of 60° is the lowest night temperature; 65° being pre¬ ferred by most growers. Abundant light and air must be given at all times, but water must be carefully controlled, especially in cloudy weather, because the plants are apt to grow too rapidly to foliage if water is in excessive sup¬ ply. During the winter months an average crop of three pounds of fruit to each plant trained to a single stem is considered fairly good. In the spring months four pounds is perhaps be¬ low the average. Unless 30 cents a pound can be realized during the winter the crop is rarely paying, and many growers set the profitable figure at 40 cents a pound. In the spring a somewhat lower price with a rather higher average production makes the crop profitable.

The more progressive tomato growers are alive to the fact that the so-called plant dis¬ eases which have been reported injurious to the tomato are more readily prevented by intel¬ ligent management of the plants than by the use

of so-called remedies. Every effort is, there¬ fore, made to keep the conditions in the seed bed as well as in the field as favorable as pos¬ sible. Adequate ventilation, rather low tem¬ perature and limited water supply are found conducive to the health of the seedlings. And sturdiness at the time of setting in the field is a safeguard against subsequent troubles. Grow¬ ers, whose methods produce inferior plants, or who are negligent in various other respects, often suffer serious losses; and perhaps the majority still have recourse to fungicides, none of which have been found fully satisfactory and in some instances have failed completely from the first trial.

Many insects feed upon the tomato, but very few are usually numerous enough to do serious damage. The best known are probably the boll-worm (Heliothis armigera) , the to¬ bacco-worm (Phlegethontius carolinus) and various species of cutworms. Flea-beetles, potato-beetles and thrips are also well-known enemies. As a rule, however, they are not responsible for serious damage. The larger species are generally picked off by hand and the smaller are driven away to other plants by the use of repellants such as tobacco dust, Bordeaux mixture, etc. See Fungicides; In¬ secticide.

Consult Bailey, (Standard Cyclopedia of Horticulture* (New York 1916) ; and numer¬ ous bulletins of the agricultural experiment sta¬ tions and of the United States Department of Agriculture.

M. G. Kains,

H orticultiiral Consultant

i

TOMB, a vault, cavity, niche, excavation or chamber to receive the dead body of a human being; also the monument erected to his memory, or the combined structure that answers both of these purposes. Among Eastern peo¬ ples it early became the practice to place the remains of the dead in excavated chambers or m case the dead bodies were first burnt, to place urns containing the ashes in such chambers. These structures even in times of great antiquity were decorated within or with¬ out with appropriate inscriptions. Early tombs often bore character writing, telling of the parentage and the place of residence, perhaps the station of life, of the deceased, and, in the case _ of heroes, the history of achievement was in all likelihood carved on the walls of the structure. Rude peoples whose only means of written expression was by picture-writing have employed that language to tell of the exploits of dead. Tombs are often designed to contain the remains of more than one person, and of such were the Roman columbarium and the Egyptian pyramids. With some races tombs were made elaborate objedts of art; with others, such as the Greeks, they were highly artistic but simple and tasteful. The stele or flat stone set up to mark a grave was often highly carved, and the stele of Dexileos in Athens is famous. Large edifices built as monuments to the dead are not found in Greece, but were common in the semi-Greek lands of Asia, the most noted being that of King Mauso- lus of Caria, whence comes the term mauso¬ leum (q.v.). Roman monuments were of great splendor, as is attested by the few examples remaining to the present time. They were

often of large proportions, the so-called ((Castle of Saint Angelo® being nothing else than the tomb of the Emperor Hadrian and his succes¬ sors, Stripped of its sculptures, its marble colonnade, its probable conical superstructure,® and crowded with defensive works that make of it a veritable citadel. Other tombs of great splendor are

found outside of the walls of Rome and although despoiled and in some, in¬ stances subverted to the purposes of other, adjacent architectures, they testify to the wealth and the artistic attention which the Romans bestowed on them. Pompeii, too, had its long street of magnificent tombs, which has been partially uncovered outside the limits of the city proper. In portions of Italy and in some of the older Spanish-American towns burials in the cemeteries were made in niches which rose row above row, terrace-like. In the niches rested coffins bearing the bodies. Burial in churches was prohibited during the earlier cen¬ turies of Christianity, but from the custom of erecting churches or chapels over graves of martyrs the custom arose to bury monarchs under the cover of the church, and the most important tombs of the Middle Ages are gen¬ erally so situated. The earlier examples con¬ sist of a simple stone coffin or sarcophagus, often with a low, gabled lid and a sculptured cross. Following these come the altar-tombs, in the form of a table, and subsequently, in the 13th century, a species of tomb consisting of a sarcophagus bearing a recumbent figure of the deceased, the whole surmounted by a canopy, often of- exquisite beauty of design. Still more stable are the churchyard tombs of which fine examples are seen in the tombs of La Scala in the churchyard of Santa Maria Antica in Verona. The tombs of the Renaissance period became more and more complex. The sar¬ cophagus was disguised and subordinated to the decorations of sculptured upholstery and groups of symbolical or mythological figures. Immedi¬ ately following the Middle Ages the beauty and value of the statuary employed partly compen¬ sated for the loss of architectural design, as is the case in Michelangelo's tombs ; but in suc¬ ceeding years this redeeming feature was lost and tomb architecture rapidly declined. The tomb placed in a niche in a church naturally suggested the memorial tablets of more recent years. The tomb of the Virgin Mary is vene¬ rated near Jerusalem, in the Cedron Valley. The sepulcher is completely below the present ground level, and is reached by a stone stair¬ way descending 48 steps. Consult the pamphlet by Jean Baptiste Christyn, (Les tombeaux des hommes illustres,) etc. (1674) ; and the paper by L. S. Mercier, (Le tombe di Verona) in (Teatro italiano moderno) (Vol. II, 1792).

TOMBAC, an alloy consisting of from about 75 to 85 parts copper, mixed with 15 to 25 parts zinc, and used as an imitation of gold for cheap jewelry. When arsenic is added it forms white tombac.

TOMBIGBEE, tom-big'bi, a river rising in Tishomingo County, in the northeast corner of Mississippi, and flowing south to Lowndes County where it enters Pickens County in Ala¬ bama. It continues an irregular southern course and unites with the Alabama River, 45 miles north of

Mobile Bay. From the point of junction the waters enter Mobile Bay by

Mobile (q.v.) and Tensas (q.v.) rivers. The total length is over 500 miles. It is navigable for 412 miles from Mobile Bay, to Aberdeen, Miss.

TOMBS, The, a noted city prison in New York. It occupies the entire block bounded by Center, Elm, Leonard and Franklin streets, and is connected with the criminal courts building on the other side of Franklin street by an upper story closed passage, locally known as the "bridge of sighs.® The Old Tombs building built in 1838 was replaced in 1898 by a new structure on the Center street side. Part of the old building still standing indicates some¬ thing of the fine Egyptian architecture in which the original structure was built. Its propor¬ tions are grand in their beauty, but they are dwarfed into insignificance by its situation and by the high commercial buildings surrounding it. The prison covers the site of the pre-Revo- lutionary gibbet and, therefore, stands on ground long dedicated to penal punishment. Its internal arrangement is into corridors of cells which rise in tiers one above the other. It is used almost wholly for prisoners awaiting trial.

TOMCOD, or FROST-FISH, a species of small cod (Microgadus tomcod) of the North Atlantic, usually abundant in the mouths of the rivers after the first frosts of autumn. It is from 4 to 12 inches long, olive green above, and silvery below. It is a valued food-fish, and has several useful relatives on the Pacific Coast.

TOME, Jacob, American philanthropist : b. York County, Pa., 13 Aug. 1810; d. Port Deposit, Md., 16 March 1898. In 1833 he settled in Port Deposit, and there acquired a fortune in business. In 1864 he .entered political life as State senator, being chairman of the Senate Finance Committee, and was instrumental in reducing the indebtedness of the State greatly to the public welfare. His public benefactions include a large gift to Dickinson College, and the establishment of a technical school, the Jacob Tome Institute, at Port Deposit, which he erected at a cost of $1,600,000, and by his will permanently endowed with an equal sum.

TOME, tc/ma. See Concepcion, Chile.

TOME, a post-village in Valencia County. New Mexico, on the Rio Grande River. Early in the 16th century it was settled by the Spaniards and for years was the seat of gov¬ ernment. In 1708 it was destroyed by the Comanche Indians, since which time it never has regained its

importance in the locality. Pop. about 500.

TOME INSTITUTE. See Jacob Tome Institute.

TOMLINSON, Everett Titsworth, Amer¬ ican author: b. Shiloh, N. J., 23 May 1859. He studied at Williams College, and afterward taught in various preparatory schools in the Eastern and Middle States, but in 1894 began to devote himself to literature, particularly to the writing of historical books for children. His publications include: (The Boy Soldiers of 1812) (1895) ; (Three Young Continentals)

(1896) ; (Tecumseh’s Young Braves* (1897); Washington’s Young Aide) (1898); (A Jersey Boy in the Revolution (1899) ; (Under Co¬ lonial Colors) (1902) ; (Young Folks’ History

INTERIOR OF TOMB OF PRINCE MERAB. (Part 1)

Os

1? 71

1

■Pi

ii

. ■ r

'•fl

•P

4* %

4Sr^2s*'

, / ‘

'ti,

■***-'€?

— O

rf

f 1

I8 1

A

lfv\

Tmmf

?!

*1

^ T

i Mi t ®¥

111

c.

oj*~

Hn

|

s

H

f *

7®-

«SS^-

AaJ

| fl

1 *

INTERIOR OF TOMB OF PRINCE MERAB. (Part 2)

-
-
- «

of the Revolution) (1902) ; (Young Americans in the British Isles) ; (A Lieutenant Under Washington > (1903); (1905); (Soldiers of the Wilderness) (1905) ; (Winning His Degree> (1905) ; (Four Boys in the Yellow¬ stone) (1906) ; (Marching Against the Iroquois) Camp Fire of Mad Anthony) (1907); (The Fruit of the Desert) (1907); (Four Boys in the Land of Cotton > (1907) ; (Mad Anthony's Young Scout) (1908); (Four Boys on the Mississippi) (1908) ; (Light Horse Harry s Legion ' (1910) ; (The Champion of the Regiment) (1911); (The Young Minute-Man of 1812' (1912); (The Young Sharpshooter) (1913) ; (Scouting With Daniel Boone) (1914) ; (Places Young Americans Want to Know)

(1915).

TOMMASEO, to-m'ma-za'o, Niccolo, Ital¬ ian philologist and philosopher : b. Sebinico, Dalmatia, about 1802 ; d. Florence, Italy, 1874. He studied law in Padua but turned to litera¬

ture and became known as a poet and critic. He was forced to leave Florence where he was colloborating with Viessieux in publishing his (Antologia) which was suppressed by the gov¬ ernment. He then went to Paris where he de¬ voted his time to making the French and Ital¬ ians better acquainted. In 1838 he went to Corsica where he made a collection of popular songs which were published in 1841. He re¬ turned to Venice where he was arrested in 1848 for his liberal opinions, but was freed by the Manin insurrection. Finally settling down in Turin he began (1854) to publish his great dictionary of the Italian language. He was distinguished for his vast and accurate knowl¬ edge as a philologist and for his constant efforts to educate the people. He was the author of a number of works in Italian.

TOMMY ATKINS, a generic nickname ap¬ plied to the British soldier. It originated many years ago from certain printed forms — enlist¬ ment applications and military accounts, where¬ in, as a model, the name <(Thomas Atkins" was inserted, like the mythical ((John Doe" of Amer¬ ican documents.

TOMOCHICHI, to'mo-che'che, a chief of the Yamacraw branch of the

Creek confederacy : b. in the town of Apalachicola, Ga., about 1642; d. at Savannah, Ga., 1739. He withdrew from the confederacy and with his followers went to live at Yamacraw Bluff on the Savannah River where he was instrumental in making a treaty of peace with Governor Oglethorpe and in securing the ceding of important territory by the Creeks. In 1734 he accompanied the gov¬ ernor on a visit to England.

TOMPKINS, Charles H., American sol¬ dier: b. Fort Monroe, Va., 12 Sept. 1830; d. Washington, D. C., 1895. He studied at West Point, but resigned without completing his course. In 1856, however, he enlisted in the dragoons, and was promoted first lieutenant in the Second United States Cavalry in 1861. At the outbreak of the Civil War he was assigned to service in the defense of the national capital and was engaged in one of the first reconnoiter- ing expeditions. He was particularly dis¬ tinguished for bravery in the Shenandoah cam¬ paign, and was brevetted brigadier-general in 1865. After the war he served as chief quarter¬

master in various divisions of the army, and in September 1894 was retired with the rank of colonel.

TOMPKINS, Daniel D., American states¬ man : b. Westchester County, N. Y., 21 June 1774; d. Staten Island, 11 June 1825. He was graduated at Columbia College in 1795, and afterward admitted to the bar, but soon entered political life. He was a member of the New York legislature and of the State Constitu¬ tional Convention in 1801 and in 1804 was elected to Congress, but was appointed to the State Supreme bench, and accepted that posi¬ tion instead of going to Washington. He was governor of New York in 1807-17 and in 1817—25 was Vice-President of the United States. He took an active part in the War of 1812, and was one of the strongest and most able oppo¬ nents of slavery. It was largely through his in¬ fluence that the bill abolishing slavery in New York was kept before the. legislature, but he did not live to see its enactment.

TOMPSON, Benjamin, American poet: b. Braintree, Mass., 14 July 1642; d. Roxbury, Mass., 13 April 1714. He was graduated from Harvard and was long a teacher at Cambridge. He wrote (New England's Crisis,) a long poem of King Philip's War.

TOM'S RIVER, N. J., village, county-seat of Ocean County, on the Pennsylvania and the Central of New Jersey railroads, about 50 miles east of Philadelphia, 36 miles southeast of Trenton and four miles from Barnegat Bay. It is one of the colonial villages of New Jersey,

and in the Revolutionary days was a haven for privateers. The salt found here made it a place of importance in the settlement days. On 24 March 1782 the village was burned by the British. It is now a favorite summer resort. The chief industries are connected with the care of summer guests ; but there are consider¬ able shipments of cranberries, farm products, fish and oysters. It contains five churches, four schools and one bank. Permanent population about 2,000.

TOMSK, Asia, in western Siberia, (1) capital of the government of its own name, on the Tom (q.v.). It is the seat of a governor and of a bishop and of the educational district of West Siberia. It has 20 Russian churches, monastery, convent, synagogue, mosque, uni¬ versity with three faculties and 900 students, technological institute, theological seminary and various other schools for both sexes ; also vari¬ ous scientific societies, Russian musical society, theatre, library, halting station for deported Russians, banks, harbor, etc. The industrial works comprise tanneries, distilleries, wagon factories, etc. There is a brisk transit trade with Siberia. It lies on a branch of the Siberian Railroad. Tomsk dates from 1604. Pop. about 117,000. (2) The government has an area of about 330,000 square miles and is in the south and southeast mountainous, and embraces the Altai system. The Obi and its tributaries are the chief streams. There are vast swamps in the flat districts. The climate is very cold and unhealthful. Storms and earthquakes occur often. Pop. about 4, 000, OCX).

TON, a measure of weight and capacity, equivalent to 20 hundred-weight. As the his¬ torical (<hundred-weight" of Great Britain and

the United States contains 112 pounds, the ton is reckoned as 2,240 pounds. This is known as a dong® ton. In some of the States legislation has made the ton consist of 2,000 pounds, being 20 hundred-weight of 100 pounds each. This is known as a "short® ton. United States laws make the ton equal to 2,240 pounds when not otherwise specified. A metric ton is 1,000 kilo¬ grams, or 2,204.6 pounds avoirdupois. A ton of earth is the equivalent of 21 cubic feet. As a measure of capacity, of a vessel or a car, a ton is 40 cubic feet; this is an "actual® ton. I he "register® ton contains 100 cubic feet. See Tonnage.

Applied to liquid measure the word, in the form tun, was in common use with the old Eng¬ lish wine dealers. A tun of beer contained 216

gallons, of 282 cubic inches each, while a ton of wine contained 2a2 gallons of 231 cubic inches each.

TONALITY, in music, the character and quality of tone. Good tonality demands: cor¬ rectness of pitch, the production of sounds slightly out of tune being termed of doubtful tonality ; correctness of intonation ; and correct¬ ness of key relation, a passage wanting in defi¬ niteness of key or scale being termed of un¬ certain tonality. The word has been adopted by art critics and is applied to painting in con¬ sidering the system of tones, or the color- scheme, of a picture.

TONAWANDA, tdn-a-won'da, N. Y., city in Erie County, on the Niagara River, Tona- wanda Creek and Erie Canal, and on the New York, Central and Hudson River Railroad, op¬ posite North Tonawanda and 10 miles north of Buffalo. Several railroads pass through and electric lines connect with Buffalo and Niagara Falls. It is in a fertile agricultural region, and on account of the good water power extensive manufacturing interests have been developed. The chief manufactures are steel, lumber and lumber products and paper boards. There are about 75 manufacturing establishments making products of the annual value of $2,500,000. The educational institutions are a high school, public and parish schools and a public library. The two banks have a combined capital of over $300,000. Pop. (1920) 10,068.

TONBRIDGE, English market town in Kent, 29 miles southeast of London, on the Medway River. It contains the remains of a mediaeval castle which stands near the en¬ trance to the town, a parish church and a gram¬ mar school founded about 1550. It is noted for the manufacture of a peculiar kind of wooden ware known as “Tonbridge ware.® Pop. about

17,500.

TONDO, t6n-do', Philippines, a district of the city of Manila, the most northern district on the bay shore, ffhe streets are mostly narrow, the houses built of cane and nipa; it contains a large church and convent, the station of the Manila and Dagupan Railroad, and the city slaughter-house. The inhabitants are mostly fishermen and laborers engaged in the tobacco and cigar industries.

tt T9NE, Theobald Wolfe, leader of the United Irishmen: b. Dublin, 20 June 1763; d. there, 19 Nov. 1798. He was graduated at irimty College, Dublin, in 1786, practised law for a time without much success and gradually

politics became his absorbing interest. He held republican opinions, and believed that Ireland ought to assert her rights as an independent nation; but the objects of the clubs of United Irishmen started at Belfast and Dublin in 1791 were limited to legislative reform. In 1792 he was appointed secretary of the general Catholic committee. The government came to know through a spy that he had given information in 1794 on the question of invasion to an emis¬ sary of the French government, but they per¬ mitted him to leave the country and go to America. He sailed from New York to France in 1795, and urged the French government to undertake an invasion of Ireland. He was ad¬ jutant-general in Hoche's abortive expedition against Ireland in 1/96, and he afterward served under Hoche on land. He accompanied one of the small French expeditions sent to assist the Irish rebels in 1798, but was taken prisoner after a brief naval engagement near Lough Swilly. He was tried by court-martial at Dublin, convicted of treason, and ordered to be executed within 48 hours. He, however, cut his throat in prison. Consult the edition of his journals and political works, with a by his son (1826), of which a new edition, entitled (The Autobiography of Wolfe Tone,* was issued by Barry O'Brien (1893).

TONE, sound considered with reference to its pitch, timbre, duration and volume. Nearly all tones in music are composite, consisting of several simple constituents having different rates of vibration and known as partial tones. They vibrate according to fixed laws, the pitch de¬ pending on the nature of the sonorous body and the mode of producing its vibration. The partial tone having the lowest pitch (and usu¬ ally the loudest sound) is called the prime or fundamental tone, while the other partial tones are called accessories, harmonics or overtones. Tones differ in quality or timbre according to the number and relative force of their partial tones. A pure tone is a simple harmonic vibra¬ tion. The seventh tone of a scale is called the characteristic tone ; two tones coalescing are termed combinational. The interval of a majoi second is called a tone or whole tone half of such interval being a semitone. When a Uano key is sounded it produces a note and the character of that note is a tone; the charac¬ ter ot all the notes of an instrument gives the tone of the instrument. See Note; Pitch

TONER, Joseph Meredith, American phy- siaan: b. Pittsburgh, Pa., 30 April 1825; d. Washington, D. C., 1 Aug. 1896. He was gradu¬ ated at the Jefferson Medical College in 1853 and established himself as a medical prac¬ titioner in Washington in 1855. He was the originator of the plan for the American Medi¬ cal Association Library established in Washing¬ ton in 1868 and made a part of the Smithsonian

Institution founded the Providence Hospital and Saint Ann s Infant Asylum in Washington and in 1871 the Toner lectures under the aus¬ pices of the Smithsonian Institution. He de¬ vised the system of symbols for the indication ,° ff^gj'aphical localities which was adopted by the Post Office Department and made valu¬ able researches into early American medical iterature. His collection of 26 000 medical books and 18,000 pamphlets he presented to Congress in 18 82, His publications include

‘Maternal Instinct, or Love> (1864); ‘Medical Register of the United States > (1874) ; ‘Annals of Medical Progress and Medical Education in the United States> (1874); ‘Medical Men of the Revolution (1876), etc.

T t6n¥'g4, or FRIENDLY IS-

LANDS, Polynesia, a group of islands under British protection, situated in the south Pacific Ocean, mainly between lat. 18° 30' and 22° 30' S., and between long. 173° and 176° W., south¬ east of the Fiji Islands and southwest of Samoa. They are sometimes classified as three groups, the Tonga-tabu, Haabai and Vavan. The group consists of about 200 islets with a total area of 390 square miles. The largest, Tonga- tabu, is 20 miles long. The islands are partly volcanic and mountainous, partly of low coral formation. They have been subject to consider¬ able changes in modern times by volcanic ac¬ tion. The soil is fertile and the vegetation luxuriant. The chief exports are copra, fruits, mats and sponges. The annual imports and exports total each about $350,000, trade being mainly with Australia and New Zealand. The larger islands are visited every fortnight by vessels of the New Zealand Union Steamship Company. The inhabitants belong to the finest of the Polynesian types. They are peaceful, civilized and Christian, being mostly Wesleyan Methodists. Excellent schools and a college have been established by missionaries. The immediate ruler is King George II and native council, whose capital is Nukualofa on Tonga- tabu. The islands were discovered by Tasman in 1643. In 1845 they were united under one king. In May 1900 they were declared under British protection. Pop. about 24,000, including 380 Europeans.

TONGAS, tong'gaz, a tribe of the Kalu- schan stock of North American Indians, resid¬ ing around Cape Fox and at the mouth of Port¬ land Canal, southeastern Alaska. They number about 250.

TONGRES, tongr, Belgium, a town in the province of Limburg, on the Geer, 12 miles north of Liege. The church of Notre Dame (1240) is the first dedicated to the Virgin in the north. The cloister belongs to the 10th century. The industrial works include tan¬ neries, distilleries and hat manufactories. The population before the war was about 10,000.

TONGUE, the principal organ of the sense of taste and an essential part of the ap¬ paratus of speech in human beings. The name tongue is also given to various structures in invertebrates, as the proboscis of a lepidopter or the odontophore of a shellfish. In man the tongue is attached by its base or root to the hyoid bone and to the epiglottis. Its tip, sides, upper surface and part of its under surface are free. Its under surface is fixed to the lower jaw by the genio-hyoglossi muscles and from its sides the mucous membrane is reflected on the inner surface of the gums. In front of the under surface a fold of the mucous mem¬ brane is specially developed and is named the frenum linguae. The upper surface- is convex and bears a deep middle line, the raphe, which ends behind in a deep follicle or sac — the foramen coecum. Two-thirds of the forward portion of the organ are rough and bear the characteristic structures known as papillae, in

which the sense of taste resides. The posterior third is smooth and exhibits the openings of numerous mucous glands. The substance of the tongue consists of numerous intrinsic muscles, which are named superior and inferior longitudinal and transverse muscles. The mucous membrane consists of an upper layer or cutis supporting papillae and covered with epithelium. This cutis supports the blood-ves¬ sels and nerves and into it the muscles of the tongue are inserted. The papillae, which cause the characteristic roughness of the tongue, are of three kinds. The circumvallate papillae num¬ ber from eight to 10. They are of large size and are placed on the hinder part of the upper surface and extend from the raphe in two diverging lines. Each of these papillae consists of a rounded central and flattened disc, situ¬ ated in a cup-shaped depression or fossa. The exposed part of the papilla is itself covered with numerous smaller papillae. The fungiform papillae are more numerous than the circum¬ vallate and are scattered irregularly over the upper surface of the tongue, but are most plen¬ tiful on its apex and sides. They are of large size, of rounded, projecting form and of a deep red color. The filiform or front papillae are of very small size and are arranged in rows corresponding with the rows of the circum¬ vallate papillae. In structure the papillae are like those of the skin (q.v.) and contain loops of capillary vessels as well as nervous fila¬ ments. The mode of termination of the nerves -in the papillae is hardly determined. Numerous follicles and mucous or lingual glands exist on the tongue, the functions of these latter being

the secretion of mucus (q.v.). The epithelium (q.v.) of the tongue is of the flat or scaly kind, resembling that of the epidermis or outer skin, but the deeper cells of the epithelial layer do not contain any pigmentary or coloring mat¬ ter. The muscular halves or substance of the tongue are divided in the median line by a fibrous septum. The arteries are derived chiefly from the lingual and facial trunks and the nervous supply is distributed in the form of three main nerves to each half of the organ. The gustatory branch of the fifth nerve sup¬ plies the papillae in front and those of the sides. The lingual branch of the glossopharyngeal nerve supplies the mucous membrane at the sides and base and also the circumvallate papillae, while the hypoglossal nerve is dis¬ tributed to the muscular substance of the organ.

The gustatory nerves and glossopharyngeal branches are the nerves which provide the tongue with common sensation and also with the sense of taste, the hypoglossal nerve being that which invests the muscles of the tongue with the necessary stimulus. The conditions which appear to be essential for the exercise of this sense are: (1) the solution of the matters to be tasted — that is, their presence in a form in which their particles may readily come in contact with the nerves of taste, there being thus a strong analogy between the sense of taste and that of touch, since the latter sense must be in a manner exercised before the taste' of any substance can be perceived; (2) the presence of a specialized gustatory nerve, a necessary condition for the exercise of this sense. Occasionally it happens, however, that other stimuli than those produced by the actual

contact of sapid substances with the nerves of taste may excite that sense. If a current of cool air be directed on the tongue a saline taste is perceived; and a smart tap on the tongue will produce a taste analogous to that excited by electricity. A minute current of electricity can be detected by the tongue which is not ob¬ servable by the contact of the hand. It appears necessary that the surface of the. tongue itself should be moist, in order that the gustatory sense may be exercised, and hence the inability to taste substances when the palate and fauces are dry and parched. The tongue itself does not appear to be the exclusive seat of this sense. The soft palate, uvula, tonsils and upper part of the pharynx in all probability exercise this sense, although in a minor degree when compared with the tongue. The middle of the tongue appears to be most feebly endowed with the sense of taste, the most sensitive region of the organ being the tip and edges. The tongue may occasionally lose its sense of taste and re¬ tain its sensibility to touch, or vice-versa Sur¬ prising variations in taste

occur. While some substances taste alike when touched by every part of the tongue, other substances taste dif¬ ferently when applied to different parts of the tongue. Sensations of taste, or at any rate of the impressions of taste, may remain for long periods after the substances tasted have dis¬ appeared, while the frequent repetition of the same taste . dulls the sense. This sense may also be excited by internal stimuli as well as bv those of external kind.

In the ai ticulation of words, the modulation of sounds, the tongue plays an‘ important part among the organs of speech; and in mastica¬ tion, swallowing and nearly all the actions per¬ formed by the mouth the tongue is more or less concerned.

Various mechanical devices and structures thought to resemble the human tongue in some respect are so named, as the pole of a wagon the fastening pin of a buckle, a vibrating slip in a musical reed, the tang of a tool, a strip of leather for closing the front gap in a laced shoe, etc.

TONGUE-FISH, an English name, cor¬ rupted from the French tangne, applied to young soles and other small edible' flatfish found along the shores of the English Channel.

I he term has been applied by Jordan to the American genus Syniphurus of sole-like fishes occurring on both United States coasts.

TC)NGUE-TIE, an abnormal attachment or adhesion of some part of the tongue to some portion of the surrounding structures of the mouth. The ordinary form of tongue-tie con¬ sists in an abnormal development of the frenum I he tongue, in consequence, cannot be ex¬ tended beyond the lips, and suction and masti¬ cation, as well as speech, are impeded.

. TONGUES, Confusion of, the punishment

inflicted on the builders of Babel, according to the Biblical narrative, when God so confounded their language that they could not understand each other, though up to that time there had been among them only one language The re- suh was that the building of the tower was abandoned, and those who had been engaged in its erection were dispersed over various lands (Gen. xi, 1-9).

TONGUES, Gift of, a gift bestowed in connection with the Pentecostal descent of the Holy Spirit. According to the Acts of the Apostles, when the members of the Church had assembled with one accord on the Jewish day of Pentecost, suddenly a mighty, rushing wind pervaded

the building in which they had assembled, cloven tongues as of fire de¬ scended on each and those on whom they were bestowed began to speak with ((other tongues as the Spirit gave them utterance® — the Par¬ thian s, Medes, Elamites and others, who re- pamed to the place when news of the miracle reached them, bearing testimony to its reality (Acts 11, 1-21).

c - ir JCC OUL-JA, 1 OiNlCJ

Sol-fa, or Movable doh System.

TONICS, remedies which are alleged to promote nutrition and thus increase the strength or tone of the body when it is reduced. Thev are assumed to restore the functional activity of various tissues, and not merely increase the vˆor of muscular fibres, as was formerly be¬ lieved. Tonics are of two kinds, medicinal and non-medicinal The medicinal tonics are vari- ously classified, according to the part of the *hey Principally act upon, or to the effects they produce. Those that increase the secre¬ tions of the alimentary canal, the saliva, gas¬ tric or intestinal juice, etc., and so aid diges¬ tion, are spoken of as gastric or stomachic intestina1 and digestive tonics. Examples of

an?hrˆCS-ar?- the vegetable bitters, cinchona and its derivatives, quassia, columbo, gentian

taraxacum, nux vomica and the salts of strych¬ nine; dilute mineral acids, small doses of alco- holics and extracts of malt. Valuable adjuncts to the above are vegetable and animal pepsin. Blood or haematic tonics are those designed to improve the quality of the blood, and include iron and its salts, arsenic, manganese, mercuric chloride and quinine. Vascular tonics, often administered to increase the tone of the blood¬ vessels, include belladonna, digitalis, ergot and strychnine. General tonics act chieflv ??

rhetrwdghtˆTgtheShUI dCd t0 gradually ˆcrease me weight of the body or exert a stimulating

or modifying action upon the tissues. Cod-live?

oil and other fats, salts of phosphorus and

arsenic act as general tonics. Nerve-tonics or

nervines, wh.ch are given to increase the tone

of the nervous system, include arsenic strych!

nine, salts of iron, zinc, copper and silver, phos-

p orus, ammonia chloride and quinine; cardiac

ˆ1f\LlguallS'.Str0p!lanthus' strychnine stim-

tlL re h<i?n s. actl?n' The non-medicinal tonics (usually classed as general tonics) are

sunlight, friction, electricity and massage; also

f orrn<;Se ˆ ˆ rPˆ ˆ and C°ld in its Various forms and applications, as air, the shower and

sponge bath and sea-bathing. Within recent years there is more and more doubt of the benefit of so-called medicinal tonics and an increased resort to nature's sunlight air and exercise, the stimulation of the cold bath etc

Hillf fCS.uart employed in conditions of de¬ bility of the body generally, or of its different parts, but unless properly used they do harm For example, bitter tonics should not be us™d when there . s severe pain and tenderness of

! lC,P'gaMrri,U,m' ,a heavllV coated tongue and vomiting of blood or much mucus. While iron

is ail efficient remedy in most forms of anaemia, it is not always easily assimilated and it is gen¬ erally futile in chronic wasting diseases and in organic affections.

TONIKA, ton'e-ka (also TONICA and TUNICA), a tribe of North American Indians, forming a distinct linguistic stock, and for¬ merly residing on the Lower Yazoo in Missis¬ sippi. They were first described by De Soto as the Tanico. They were allies of the French colonists in their contests with neighboring tribes, and in 1699 were reported to occupy 260 cabins extending over four leagues. 'In 1706 they were driven away by the Chickasaws and Alabamas, and in 1730 were defeated by the Natchez, who burned their village and killed a number of them. The remainder retired to the lower Mississippi, where, in 1760, they occupied three villages, and in 1802 numbered about 400 souls. The Tonikas were an agricultural tribe; they flattened

their heads and wore very little clothing; the women made pottery and a fabric from the mulberry. Polygamy was not com¬ mon. There are now a very few survivors of the tribe, near Marksville, La., who speak their native language as well as Creole and English.

TONK, India, a small native state of the Rajputana, east of Ajmer-Merwara. Area, 2,553 square miles; pop. about 303,000. It yields Britain an annual revenue of about $650,000. The capital, Tonk, about 60 miles south of Jaipur has a population of 55,000.

TONKA, tdn'ka, Lower Siam. See Puket.

TONKA, TONCA, TONGA, or TON- QUIN BEAN, is the fragrant seed of the leguminous tree Dipteryx odorata, native to the northern countries of South America. The tree grows to 80 feet in height and bears fruits which are pod-like, oblong and fibrous and contain a , single seed. This is of the shape of an almond, but larger, in a shining black coat. Tonka beans have the fragrance of new-mown hay, due to the same odorous principle, prismatic couma- rin, as the sweet vernal grass and melilot. They are used for their aroma, either whole or pow¬ dered, for scenting clothes, snuff and in perfum¬ ery and even as a substitute for vanilla.

TONKAWA, tong'ka-wa, a nomadic tribe ‘of North American Indians, comprising a dis¬ tinct linguistic stock. They formerly roamed over the plains of Texas, were noted for their cannibalistic practices and were regarded as out¬ laws by the surrounding tribes. Early in the 19th century they were reported to number be¬ tween 2,000 and 3,000, but in 1857, when they were settled on a reservation on the upper Brazos River, in Texas, their number was offi¬ cially estimated at fewer than 1,000. During the Civil War (5 Jan. 1862), owing to their refusal to join the Comanches, Delawares and others in an insurrection against the whites, the latter In¬ dians attacked a party of some 200 Tonkawas, comprising more than half the tribe, killing all of them. The remainder returned to Texas where they stayed until 1884, when they were placed on a reservation in Oklahoma. Here the few survivors now live with the Poncas.

TONKIN, ton-ken', TONKING, or TONGKING, French Indo-China, a territory under French protection, bounded on the north by China, on the east by the Gulf of Tonkin, on the south by Anam and on the west by Laos.

Area, 46,400 square miles. It is divided into 14 provinces and includes about 8,000 villages. It consists of two mountainous regions

surround¬ ing on three sides the large alluvial plain and delta region of the Song-koi (Red River), also an intermediate region of plateaux. The Song- koi flows through the centre of the territory from northwest to southeast and opens a navi¬ gable waterway extending in the rainy season as far as Lao-kay. The Song-bo (Black River) rises in Yunnan and joins the Song-koi, the largest river in the Mekong, forming a large portion of the western boundary. The principal mineral resources are deposits of coal, iron, copper and gold. The climate is hot and humid and the alluvial plain of Tonkin produces some of the best rice in the world. Sugar, cotton, tea, Indian corn and opium are also cultivated to a great extent, and on the higher ground there are coffee plantations. The manufacturers include silk, paper, cotton textiles, indigo and oils. Commerce has rapidly increased, the ex¬ ports, chiefly rice, maize, sugar cane, silk, cot¬ ton, coffee, tobacco and animal products amounting to about $10,000,000 annually. The imports in 1915 totaled $8,000,000, being largely tools, machinery and beverages. The principal port is Hai-fong, which has steamship connec¬ tion with Hongkong, Yokohama and Cochin- China. Railroads run from Hanoi to Hai-fong and Nam-dinh to Lungchow and to Yunnanfu and to the Chinese frontier. There are ocean cables connecting with Hongkong and Hue. Hanoi is the capital, and, since 1902, also the capital of the whole of French and Indo-China. Tonkin was an independent state until 1802, when it became a province of Anam. The lat¬ ter is still its nominal position, although the Anamite vice-royalty was superseded in 1897 by a French residency, and the French protec¬ torate is more direct here than in Anam proper. The provinces are governed by a resident and vice-resident, and each is subdivided into four military territories under commandants. Pop. estimated in 1911 as 6,119,720, with 33,000 Chi¬ nese and 6,132 Europeans.

TONKIN, Gulf of, Indo-China, an arm of the China Sea extending northward between French Indo-China and the Chinese island of Hainan. It is about 400 miles long and 200 miles wide. It forms the coast of the protec¬ torate of Tonkin and receives the commerce brought down by the important river Song- koi from a rich agricultural region.

TONKS, Oliver Samuel, American teacher of art : b. Malden, Mass., 24 Dec. 1874. He was graduated at Harvard University, where he took his Ph.D. degree in 1903, and was a Fellow of the American Classical School at Athens (1901-02). He served as assistant curator of the department of classical art in the Boston Museum of Fine Arts (1903), was in¬ structor in Greek at the University of Vermont (1904), lecturer at Columbia (1905) and pre¬ ceptor in art and archaeology at

Princeton (1905-11). He then became professor of art in Vassar College. He collaborated in writing (The Art Museum and the Public SchooP

(1912).

TONNAGE, the carrying capacity of a ship. As this capacity is variously measured the word has several special meanings. As it comes

from the shipyard the ship's capacity is rated as “dead weight tonnage.® As it is measured by maritime surveyors and registered as of so many tons, its capacity is spoken of as ((gross registered tonnage® and “net registered ton¬ nage,® both figures being given, as in different ports dues are collected variously, sometimes on the gross and sometimes on the net ton¬ nage. War vessels, which have no ((carrying capacity® in the mercantile sense, are rated by their “displacement tonnage.® Still another form is recognized among shippers as “cargo tonnage® or “measurement tonnage.®

Deadweight Tonnage is the amount of deadweight tons of 2,000 pounds which can be loaded upon a vessel at load-line (q.v.) draught when she has on board her full complement of stores and fuel.

Displacement Tonnage is the weight of sea water actually displaced by the vessel. It is computed usually by calculating from the drawings of the ship by the naval architect the cubic content of the immersed hull in feet and adding to that figure the number of cubic feet in the propeller, the shafting exterior of the hull and the submerged portion of the rudder. This total is divided by 35, as 35 cubic feet of sea water weigh almost exactly one ton.

In ascertaining the carrying capacity of a ship under the old style of measurement (ab¬ breviated O. M.) the depth of the vessel was assumed to be the same as its breadth and the tonnage was obtained by multiplying the length by the breadth by the depth and dividing the product by 94, the quotient being the tons bur¬ den. But this rule was found to be impracti¬ cable, since shipbuilders sought to evade ton¬ nage and harbor dues by building their ships very narrow and deep. In 1835 the British Parliament remedied these defects by new measurement laws, which were amended by the Merchant Shipping Acts of 1854 and 1894. Under this system, known as the Moorsom,

actual measurements of the depth of the ves¬ sel are made at certain intervals, the number of which depends on the length of the tonnage deck, and at these points transverse areas are computed.

Gross and Net Registered Tonnage. — For

purposes of measuring tonnage the United States practice divides vessels into six classes based upon their length (the British into five). These lengths and the number of longitudinal sections into which they are respectively di¬ vided are as follows: I, vessels under 50 feet long, into six parts; II, between 50 feet and 100 feet, into eight parts; III, between 100 and 150 feet, into 10 parts; IV, between 150 and 200 feet, into 12 parts ; V, between 200 and 250 feet, into 14 parts; VI, over 250 feet, into 16 parts. These divisions are set out on the "tonnage deck,® which in a vessel with less than three decks is the upper deck; in a vessel with three or more decks is the second deck, counting from below. The length of this deck is measured on its centre line from the inside of its inner¬ most plate or plank at the bow to the inner¬ most side of the plate at the stern, but making allowance for rake. The stations being marked off at equal distances upon this line, measure¬ ment of the transverse areas are made at each station, the depth being first taken. This is the distance from one-third up the round of the

beam at the bottom to the top of the deck lim¬ bers, allowing two and one-half inches for ceil¬ ing. If this depth at midship is more than 16 feet the figure representing the depth is divided into six equal parts and a transverse meas¬ urement is made at each division, and at the top and the bottom. Counting from above, the second, fourth and sixth measurements are multiplied by four, and the third and fifth are multiplied by two. These products are added together, and to the sum thus obtained are added the top measurement and the bottom measurement. This total is then multiplied by one-third of the equal vertical distance into which the depth was divided, and the total is accepted as the transverse area at that station. Ihese transverse areas are numbered consecu¬ tively from the bow to the stern. Omitting the first and the last, the second, fourth and each succeeding area with an even number is multi¬ plied by four; and the third, fifth and each succeeding area with the odd number is multi¬ plied by two. These several products are then added together and the first and last also added, and the sum is then multiplied by one-third the equal longitudinal distance between the sta¬ tions. The total is the cubic content of the ship in cubic feet. This figure is arbitrarily divided by 100 and the quotient is the underdeck tonnage. To this is added the number of cubic feet in all deckhouses and permanently cov¬ ered-in

spaces which are above the tonnage deck, and which are or may be used to pack with cargo or use as transport for passengers. These additions are also divided by 100 and added to the underdeck tonnage to make the gross registered tonnage. The net registered tonnage is computed by deducting from the gross the cubic content of the engine-room (including the shaft tunnel), the crew space, cable lock©*6, coal bunkers, chartrooms and • j\11 space needed in the navigation of the ship, and such part of the space in the double bottom as is not available for fuel, stores or cargo. In calculating the ship's registry tonnage it is a common practice to compare the engine space with the gross tonnage, and if it is above 13 per cent, and under 20 per cent, to make an arbitrary deduction of 32 per cent for a screw vessel and 37 per cent for a sidewheeler in making the figure for the net tonnage. These deductions from the gross tonnage differ at dif-feient potts, and for this reason the ship always carries its gross tonnage figures as well as the net figures for the calculation of port and canal dues by the local authorities.

Cargo or Measurement Tonnage is the true cubic content of the ship in cubic feet divided by 40 — on the principle that a ton (2,000 pounds) of average cargo will occupy 40 cubic feet in the ship s hold. It is on this as¬ sumption that the freight charges for transpor¬ tation are fixed. Where the cargo will weigh more than 2,000 pounds to the 40 cubic feet of space, as with stone, metals, cement, etc., the actual weight of the material is used as the basis of figuring the freight.

lhe British system of measurement was adopted by the United States in 1864, and sub¬ sequently, with slight variations, by all mari¬ time nations. At Suez, Panama and other canals where tolls are based on tonnage, the management have established rules of their

own for measurement, as they have to deal with vessels of all nations. Under modern rules account is taken of the space in double bottoms now commonly utilized for feed, water, oil, fuel, etc., and no allowance of more than 5 per cent of the gross tonnage for crew space is countenanced. Deckhouses, however, which are used only as lounging rooms by passengers accommodated elsewhere in the vessel are also deducted in arriving at net tonnage.

TONOMETER, in music , an instrument for measuring the pitch of tones, such as a tuning fork or a set of graduated tuning forks. The

best-known tonometer was invented by Scheibler in 1834, and was subsequently im¬ proved by Konig. It consisted of an excep¬ tionally perfect set of tuning forks with an ap¬ paratus for determining the exact number of vibrations per second produced by a given tone. An _ instrument for measuring tension in a liquid, or of the eyeball, is also termed a tonom¬ eter.

TONQUIN. See Tonkin.

TONSILS and TONSILITIS. See Nose and Throat, Disease of.

TONSON, Jacob, English publisher: b. London, 1656; d. there, 2 April 1736. In 1678 he opened his shop at the Judge's Head, Chan¬ cery lane, near Fleet street. He soon became the publisher of Dryden's works, and continued as such for many years. In 1690 he completed the purchase of the publishing rights of Para¬ dise LostC and afterward claimed that he made more on that poem than on any other. About 1700 he removed his shop to a . place in Gray's Inn Gate. When the Kit-Cat Club (q.v.) was founded he was made its secretary. He pur¬ chased a house at Barn Elms and provided a room there for the meetings of the club. In 1710 he moved to the Shakespeare's Head. Here he continued until his retirement from business in 1720. His name is associated with nearly all the literary men of his time: with Pope, whose pastorals appeared in Tonson's <Miscellany) (1709); with Addison, for whom he published <Cato) (1713) and for a time issued The Spectator ; with Congreve, Steele, Waller, etc. Wycherley spoke of him as hav¬ ing long acted as gentleman-usher to the Muses. He published Rowe's edition of Shakespeare

(1709).

TONSURE, the shaving of a space on the top of the heads of Roman Catholic and Greek priests, performed as a solemn rite since the 6th century. The custom of cutting away the hair in token of the dedication of a person to the service of God is very ancient, being men¬ tioned as early as the 4th century. The tonsure furnishes a means to distinguish the higher clergy from the lower, as the extent of the tonsure increases with the rank. The shape of the bare space also varied at different peroids. Many religious orders (for example, the Fran¬ ciscans) allow only a narrow strip of hair around the head to grow ; all above and below is shaved. Shaving the hair precedes conse¬ cration; it is performed by the bishop. It was never ordered by the Holy See or any ((provincial or national council,® says W. H. W. Fanning, and by tacit consent the custom has been discontinued in English-speaking countries.

TONTINE, ton-ten', a form of annuity or financial assurance in which gain accrues from survivorship. The word is derived from the name of Lorenzo Tonti, a Neapolitan who set¬ tled in Paris in the time of Cardinal Mazarin and who invented this style of life annuity, lonti proposed the system to the French gov¬ ernment as a method of raising money and while the plan was not adopted, still it served as a model on which all future tontines were operated. The members of Tonti's association were to subscribe the sum of money needed by the government and were to receive life shares in the society. There were to be 10 classes of subscribers, according to their age, and for each class a fixed sum was to be divided yearly among the members of the class. When a member died his share was divided with the rest among the members of the class so that the death of each member benefited all those remaining, and the profit to the last few sur¬ vivors in each class was enormous, while the sole survivor received the entire sum of inter¬ est accruing to his class. Upon his death the interest ceased and the borrower obtained the capital. In 1689-92 the system was used by Louis XIV, who was sorely in need of funds. He organized a tontine with a capital of $70,000,000, which lasted for a period of 40 years. The sole survivor drew an annual in¬ come of $367,500 from his original investment of $1,500. During the following century the tontine was frequently used in France and in Great Britain, and in at least one instance in the United States, in order to raise large sums of money. A disastrous private tontine in France, known as the ((Caisse Lafarge,® was established in 1791. When 60,000,000 francs had been subscribed into the company it was found that either through gross error or fraud the interest promised was an impossible one and the subscribers owing to the financial panic then prevailing lost not only their interest but their capital as well. The 'last public tontine in England was opened in 1789 and the in¬ terest, amounting to $210,150, was paid as late as 70 years after that date. The Irish tontines, established 1773-77, drew as man}^ as 3,500 mem¬ bers. Tontines in the United States were at one time popular as a means for raising money for the erection of large buildings. The New York Tontine Society, founded in 1790, was wound up 1870-78, while tontine buildings were erected in New York, New Haven, Albany and other American cities.

Although tontines in their old form were long ago abandoned by financiers, the tontine system as applied to life assurance has given rise to an important modification of the usual insurance policies. What is known as the ton¬ tine dividend policy has the following distinc¬ tive features': The holders of such policies constitute a class by

themselves ; they do not participate in profits until after the lapse of the tontine period, usually 10, 15 or 20 years; the representatives of the insured in case of his death before the commencement of the dividend period receive only the sum mentioned as the face value of the policy; no surrender value is allowed to anyone who relinquishes his policy before the dividend period and all profits from whatever source are reserved until that period, when the accumulated dividends are to be

equitably divided among the holders of such policies, as are then in force. This form of policy is now in very little favor. Modifica¬ tions from these general principles have been practised by various societies. For further in¬ formation consult F. De Peyster's < History of the Tontine Building) (1855). See Insurance.

.TONTO (Spanish, <(foolish®), an inappro¬ priate name applied by the Spanish colonists of Arizona in the 19th century to a number of In¬ dian tribes, namely: (1) 'To the Tulkepaia, a tribe of the Yuman stock settled in 1875 on San Carlos reservation, Arizona. (2) To the Eoyo- tero Apaches, an Athapascan tribe. (3) To the Pinal Apaches of the same stock. (4) To a mixture of Yavakai (Yuman) men and Pinal women who have intermarried. The name has been especially applied to the last-mentioned body, who formerly occupied Tonto Basin and the Pinal Mountains of central Arizona, whence some 500 of them were removed to the Rio Verde reservation and later to the San Carlos reservation. They number about 700, and speak a mixed Yuman-Athapascan language.

TONTY, ton'te, or TONTI, Henri de,

Italian explorer: b. about 1650; d. Fort Louis (Mobile), September 1704. He was a son of Lorenzo Tonti. He entered the French army, served also in the navy, and in 1678 came with La Salle (q.v.) to Canada, went with him into the Illinois country in 1680, undertaking the first civilized occupation of that region, and was placed in charge of Fort Crevecoeur, a little below Peoria, where La Salle left him. In 1681 he joined La Salle at Michillemack- mac, and with him descended the Mississippi to its mouth. Subsequently he was in com¬ mand at the stronghold on ((Starved Rock,® called by La Salle Fort Saint Louis, and in 1688, after La Salle's death, unsuccessfully at¬ tempted the rescue of the French colonists left in Texas. ((There are

very few names in French-American history,® says Parkman, <(mentioned with such unanimity of praise as that of Henri de Tonty.® He wore a metal hand with which he so effectively disciplined the Indians on occasions that they thought him a great medicine man. Consult French, his¬ torical Collections of Louisiana) (Vol. I, 1846) ; Parkman, (The Discovery of the Great West> (1869; new ed., 1898).

((TOO PROUD TO FIGHT,® an expres¬ sion used by President Wilson in the course of an address delivered to 4,000 newly-naturalized American citizens in Convention Hall, Phila¬ delphia, on 10 May 1915. Torn from its con¬ text, this now historic phrase accumulated a large amount of more or less intentional mis¬ interpretation. The sentence immediately fol¬ lowing it contains the real gist of the Presi¬ dent's meaning: «There is such a thing as a man being too proud to fight. There is such a thing as a nation being so right that it does not need to convince others by force that it is right.®

TOOELE, Utah, county-seat of Tooele County, on the San Pedro, Los Angeles and Salt Lake and the Tooele Valley railroads, 35 miles southwest of Salt Lake City. The in¬ dustries include a large smelter, a flouring mill, saw mills and a creamery. It has a Carnegie library. Pop. (1920) 3,602,

TOOKE, John Horne, English politician and philologist: b. Westminster, 25 June 1736; d. Wimbledon, 18 March 1812. He was edu¬ cated at Westminster and at Eton, whence he was removed to Saint John's College, Cam¬ bridge. In 1756 he entered himself at the Inner Temple; but in 1760 he took orders. He was a warm opponent of the American war, and was prosecuted for sedition for the word¬ ing of a resolution by which the Constitutional Society voted £100 to the widows and children of the Americans ((murdered by the king's troops,® in the battle of Lexington. For this obnoxious paragraph he was tried at Guildhall in 1777, and^ sentenced to a year's imprison¬ ment and a fine of £200. In 1780 he published a keen review of Lord North's administration, in a pamphlet entitled (Facts, > and in 1782 a (Letter on Parliamentary Reform. } It was in 1782 that he took the name of ((Tooke,® being previously known as John Horne. This came about through his being named as heir to Wil- liam ^Tooke, a wealthy gentleman of Surrey. In 1786 he published in an octavo volume his work entitled (Epea Pteroenta) (Greek for (Winged Words *), or the diversions of PurleyP In 1801 he accepted the seat for Old Sarum. His political life closed with the dis¬ solution of Parliament in 1802. Tooke possessed considerable learning. His (Epea Pteroenta* is original and ingenious, and has exercised considerable influence on the subse¬

quent development of philological investigation.

TOOLE, John Lawrence, English come- dmn;b London, 12 March 1832; d. Brighton, 30 July 1906. He was educated at the City of London School. After serving for some time as a wine-merchant's clerk he took to the stage and made his first apperance at the Hay- market in 1852. He then played with great suc¬ cess in Dublin, Belfast, Edinburgh and Glas¬ gow, and ultimately became a popular favorite everywhere. In 1880 he began the management of the Folly Theatre, London, which he after¬ ward reconstructed and named after himself In 1874. he vˆited America, in 1888 he pub¬ lished his (Reminiscences* and in 1890 made a successful tour in Australia and New Zealand. He was one of the most popular actors on the stage, inimitable in his personation of semi- pathetic, semi-ludicrous characters. Among his most successful parts were Paul Pry Caleb Plummer in the (Cricket on the Hearth, > and Uncle Dick in One of his latest parts was that of Walker in Barrie's Walker, London.)

TOOLE, Joseph Kemp, American lawyer A/r iorte executlve: b. Savannah, Mo., 12 MayL,- i , He removed to Montana, became established as a lawyer in 1870, and served two terms as district-attorney. He was a member of the Territorial legislature in 1879 and of Congress, 1884-88. He was elected to the Constitutional Convention in 1889 was govJernor of th,e new State of Montana,

i in was re-elected governor in 1900 and 1904 but resigned 1 April 1908; and re¬ tired into private life.

r TOOLS. The almost innumerable variety pt mechanical appliances and devices which are included under the general term «tools» may be primarily classified into three important groups

according to the nature of the material worked upon: (1) Wood-working tools; (2) Metal¬ working tools; and (3) Masonry-work tools; each oi which include special forms of hand tools and machine tools which may be still fur¬ ther subdivided according to the class of work accomplished with their aid, or according to the character of the machines in connection with which they are employed.

Wood- working Tools.

The small tools used in wood-working are those mainly employed in

carpentry work and consist of the various forms of ‘guiding *tools ‘holdings* tools, ‘rasping *tools «edg!» tools or ‘cutting* tools, ‘boring *tools, ‘striking* tools and ‘chopping* tools.

The machine tools include the various forms of lathes, borers, shapers and slotters, equipped with suitable accessory devices such as cutters, drills, etc., according to the purposes for which they are used in turning, boring, drilling and other kinds of work in wood. The machine tools are always operated by power and in re¬ cent years a good many hand tools, as drills, are power-driven.

The guiding tools comprise the following named devices:

Chalk-line. — This consists of several yards of light cord wound upon a wooden reel. The cord is well rubbed in with chalk or with char¬ coal and is used for the purpose of making marks where cuts have to be made.

Rule. — This is a thin, flat, narrow strip of hard wood, ivory or metal, frequently two feet in length, and graduated or divided on both sides by a series of lines at right angles to the edge of the strip into inches and tractions of an inch, such as halves, quarters, eighths, twelfths, sixteenths and thirty-seconds.

Straight-edge. — This consists of a long, flat strip of hard wood, or of bright hard steel. Straight-edges range from four to six feet in length and from two to four inches in width. When they are made of wood, well-seasoned material free from winding is essential, and a metal edge is commonly attached, and when made of steel they are often nickel-plated in order to prevent them from rusting. They are used for ruling and marking straight lines.

The Squares or Try-squares. — A square usually consists of a wooden stock or back into which a steel blade is fitted at right angles and secured by screws or rivets. It is used for marking-out work at right angles. Squares vary in size from 3 to 30 inches. Sometimes they are made entirely of plain or of nickel- plated steel and have scales engraved on their edges.

Spirit-level consists of a glass tube partially filled with a quantity of spirit so as to allow of the existence of an air-bubble about half an inch in length within the tube. This tube is enclosed in a framework of hard wood the edges of which are perfectly level and true and parallel to the axis of the tube. It is protected on the most important sides, the edges, by metallic facings and is provided with a sight- hole either on

the top or at the side through which the movements of the bubble may be ob¬ served. Spirit-levels range in length from 8 to 48 inches and are used for the purpose of ascer¬ taining whether the surface of a piece of work

or the portion of a structure is truly horizontal or truly perpendicular.

Plumb-level. — This is a cord attached to the exact centre of the upper end of a vertical straight-edge. A weight suspended from the lower end of the cord swings freely in a pear- shaped hole near the lower end of the straight- edge. A straight line is marked on the straight¬ edge from the centre of the pear-shaped hole to the point of attachment of the cord. In testing the perpendicularity of a surface, one edge of the straight-edge is placed against the surface under test and the coincidence of the cord with the line marked on the straight-edge is carefully noted.

Gauges. — Three common kinds of gauges are used in carpentry work — the ‘marking *gauge, the ‘cutting* gauge and the ‘mortise *gauge. The marking gauge consists of a head or block which slides along a shank about nine inches long. A spike is inserted near the end of the shank and the movable head is provided with a screw or a wedee by which it may be fixed at any required distance from the spike. It is used for the purpose of making a mark on a piece of wood parallel to an edge which has been previously straightened and along which the head of the gauge is guided while the spike inflicts the mark. It is very useful in dressing several pieces of wood to exactly the same breadth. The cutting gauge is similar to the marking gauge in all respects with the excep¬ tion of the spike which is replaced by a thin steel plate. This plate passes through the shank and is held in place by a set-screw and is sharpened on one edge so that it is capable of cutting either with or across the grain. It is used for gauging dovetailed work and for cut¬ ting veneers to equal breadths. The mortise gauge is also similar to the other two gauges but it is provided with two spikes, one fixed and the other movable and capable of being adjusted at different distances from the fixed spike by means of a set-screw. It is used for the pur¬ pose of gauging mortise and tenon work. Compound gauges consisting of combinations of cutting and marking* gauges or of marking and mortise gauges are also commonly used for the purposes designated.

Bevels. — These are made somewhat like the squares, but with the exception that the blades are attached to the stock by a pin which permits of their being set at. any angle other than a right angle, and held in such position by a thumbscrew ; they are used for the purpose of marking lines at such angles to the first side of the piece of work. In

some forms the blade is slotted through a part of its length and is called a ‘sliding *bevel. Others such as the ‘boat-builder’s* bevels have two brass blades, one at each end of the stock, while in the ‘pro¬ tractor* bevels the sliding arm works through a semi-circle graduated into degrees.

Mitre-box. — This is a device for guiding a saw so that it will cut at some regular angle, as 45 degrees. In its simplest form it is a rectan¬ gular box composed of two vertical sides fastened to the bottom. A saw-cut made at an angle of 45 degrees through the sides guides the saw when it is employed to cut a piece of wood such as a picture molding placed in the mitre-box. Other cuts than those at an angle of 45 degrees may be made in the same box by cutting the guiding cuts at the

required angles through the sides of the box. The most convenient form of mitre-box for cutting a wide series of angles is one provided with movable guides which may be readily set at the required angles. As a rule, the mitre- edges of the moldings are left rough from the saw so as to make the glue adhere more firmly, but where sawed mitre-work requires to be planed smooth it is planed up with a “shooting-board® which consists of two pieces of wood screwed together so as to form a step, on the upper one of which two strips of wood are screwed at right angles to each other. These strips act as guide-bars against which the piece of molding to be mitred is held and then planed off on the edge of the step.

Compasses and Calipers. — These devices are made of metal and are employed for the purpose of taking dimensions such as the in¬ side and outside diameters of pipes and other cylindrical work that cannot be taken accu¬ rately with a rule. A compass consists of two legs which are movable about a sector joint. In the form called a “wing-compass,® it is pro¬ vided with a metal arc and a set-screw attach¬ ment which permits of its being set to corre¬ spond with a definite measurement and remain so set without variation until that particular measurement is no longer required. Compasses are also used for striking-out circular figures.

Calipers are termed “inside® and ((outside® calipers according to the character of the dimen¬ sions taken by their aid. Inside calipers are made with straight legs which are bent around only at the point and

are used for measuring internal diameters. Outside calipers are made with bowed legs and are used for taking meas¬ urements of external diameters. “Combination® calipers are an improved form in which the legs are pivoted near the middle point, thus making four movable ends, two of which are bowed and are used for taking outside measurements, and the other two straight and applicable to the taking of inside measurements.

Trammels. — These are appliances in the form of beam-compasses in which the heads slide along a straight bar to which they may be tightened by set-screws. The heads are made either of brass or of hard wood, the former being preferable, and steel points are inserted into the bodies. They are employed for the purpose of taking measurements and for strik¬ ing arcs which exceed the capacity of the ordinary compasses.

Caliper-rules and Caliper-squares. — The

caliper-rule consists of a short steel rule, a portion of which is attached to a closely-fitting slide which may be drawn out until the object to be measured is embraced between the oppos¬ ing portions of the rule. As both the rule and the slide are graduated into minute fractions of an inch, the thicknesses of the objects meas¬ ured can be read off directly from the dimen¬ sions on the slide. The caliper-square is a square, one elbow of which is fitted with a caliper-rule.

Bell Centre-punch. — This is a useful little device, by the aid of which a square, round, oval or triangular article may be instantaneously and accurately centred for the purposes of drilling and turning. It consists of a punch which is enclosed within a tube the lower end of which is expanded or tapered into the shape

of a bell. This tapering mouth adapts itself to bars of different diameters, and when dropped over the end of a bar of any cross-section what¬ ever ensures the marking of the exact centre of the bar by the point of the punch.

The holding tools are represented by the various forms of pincers, vises and clamps.

Pincers. — These consist of various forms of implements shaped somewhat like tongs and are used for the purpose of drawing nails from timber. They are made of iron and faced with steel in the jaws. The faces are made large and nearly flat so as to afford great power of leverage.

Vises. — These are made in a great variety of forms and sizes, the most useful of which are those with parallel movement in the jaws. The ordinary vise consists of a pair of steel¬ faced jaws one of which is capable of being moved by a screw or by a lever, while the other is fixed rigidly. The improved forms are pro¬ vided with swivel-bases and swivel-jaw attach¬ ments, which enable them to grip the work in any position that may be required for con¬ venienceinworking. These appliances are usu¬ ally attached to a work-bench and are used for holding or gripping pieces of work which re¬ quire to be held firmly, but which have not suffi¬ cient weight in themselves to remain stationary or immovable under the operation of the tools. The vise-jaws are usually steel-faced. In fit¬ ting them to a vise they are first screwed to the wrought-iron backing and serrated while untempered; they are then removed and hard¬ ened and subsequently screwed back into place on the backing. In the smaller forms the steel- jaws are usually welded to the. backing. In the form commonly known as the "taper® vise, a loose jaw-piece rounded on the back and capa¬ ble of movement in a corresponding hollow seat¬ ing is attached to the fixed jaw. It affords a slewing movement by which the vise may be adapted to different angles for holding various forms of tapered work. The vise-claws or vise- clamps are simply angle strips of lead, brass or copper, which are placed against the jaws in order to prevent the bruising of delicate pieces of work by the serrations on the hard-steel faces.

Clamps. — These comprise several forms of appliances for holding together pieces of work in position for nailing and screwing or for tightening up the joints in glued work in order to allow sufficient time for the glue to harden. An ordinary form consists of a long iron bar and two brackets which slide thereon. One of the backets is capable of being moved freely to any point on the bar while the other is actu¬ ated and its amount of travel limited by a screw which is attached to the end of the bar and operated by a lever handle. The bar is pro¬ vided with a series of holes along its length for receiving the iron bolts by which the freely- sliding bracket may be held stationary at any desired point. Some of the other useful forms are the adjustable "screw-clamp® and the "cor¬ ner-clamp,® the latter being a very useful device for securely gripping two sides of a picture- frame while they are being nailed or glued together.

The rasping tools comprise the various forms of saws, files and rasps.

The Saws are an important class of tools

TOOLS

employed for cutting and dividing substances, lri general, the saw may be defined as a tool having a serrated blade and furnished with a handle or frame by means of which it is op¬ erated either by hand as in the case of the hand¬ saws or by belting as in the case of the power- driven saws. The saw-blade or saw-plate is usually made of the best tempered steel and the form, length and pitch of the teeth are designed and made to suit the class or character of the work performed and the nature of the ma¬ terial worked. The various terms used for de¬ scribing the principal parts of a saw may be briefly defined as follows : “space,® the dis¬ tance between the points of two adjoining teeth. “Pitch® or “rake,® the inclination or angle of the face of a tooth. This varies from 65 de¬ grees to 70 degrees for cutting soft woods and from 80 degrees to 85 degrees for cutting hard woods. The corresponding “relief-angle® or the angles formed by the base and top of the tooth varies from 45 degrees to 50 degrees for soft woods and from 65 degrees to 70 degrees for hard woods. “Gullet® or “throat,® the depth of the tooth from the point to the root. “Gauge,® the thickness of the saw-blade, usually deter¬ mined by the wire-gauge. “Set,® the amount of lateral inclination given to the teeth to one side or the other of the plane of the blade for effect¬ ing a clearance of the sawdust. “Points,® the number of teeth points to an inch, taken as a unit in estimating the coarseness or fineness of a saw. The teeth of cross-cut saws are usually formed to cut both ways. Saw teeth are desig¬ nated by various names such as “peg® teeth, “M® teeth, “half-moon® teeth, “gullet® teeth, etc., according to their peculiar form. The various kinds of saws commonly used by wood¬ workers are the “hand-saws,® the “back-saws,® the “frame-saws® and the “pad-saws.® The “pit,® “deal,® “frame,® “band® and “circular® saws are mostly used in connection with the production of lumber and sawmill-work. See Saws and Sawing in this Encyclopedia.

Files and Rasps. — These comprise a class of tools having surfaces covered with sharp- edged furrows or teeth, which are employed for removing particles of wood, metal or other ma¬ terial by the process of abrasion or the cutting action of a multitude of fine points. They are made in a vast number of shapes and sizes and of various degrees of fineness or coarseness to adapt them to various kinds of work and materials. A file differs from a rasp in that its furrows or teeth are made by straight cuts in¬ flicted on its surface by a reciprocating chisel before the metal is hardened, either in a series of single cuts or crossed cuts, while the teeth of a rasp are a number of isolated projections raised on its surface by the pyramidal end of a triangular punch. See Files and File Mak¬ ing in this Encyclopedia.

Edge Tools comprise the various forms of chisels and gouges, the planes and a miscel¬ laneous assortment of spokeshaves or smooth¬ ing tools and various appliances such as grind¬ stones, emery wheels and oilstones, used for maintaining a sharp cutting-edge on the various tools.

Chisels and Gouges. — The essential princi¬ ple of these types of cutting tools is that of the wedge. The chisel in its simplest form practically constitutes the slice of an axe, but as

its action or movement is the result of the force applied to it by the blows of a mallet or hammer, the eye of the axe is replaced by a suitable device for receiving the blows. When the element of thrust enters into the operation of a chisel, as in the cases where it is used by the simple pressure of the hand, its action passes into that of the plane iron. Chisels are specifically defined as “chipping,® “cross-cut,® “firmer,® “pairing® and “mortise® chisels. The firmer chisels are the ordinary short chisels used by wood-workers and are so designated in order to distinguish them from the paring chisels which are usually about twice the length of the firmer tools and are almost exclusively used by patternmakers. Paring chisels are sel¬ dom driven with the mallet, but are actuated by hand pressure alone. They are made in width ranging from one-fourth inch to two inches. The mortise chisel is a stout wood¬ workers’ chisel which is driven with a mallet and used for cutting mortises where percussion and leverage are rendered necessary. The gouges are forms of paring and firmer chisels which have curved cross-sections. The cutting- edge of the paring gouge is formed by grinding its inner face and that of the firmer gouge by grinding its outer face. Gouges vary in width from one-eighth inch to two inches. The par¬ ing gouge differs from the ordinary firmer gouge in its increased length. It is never driven with the mallet, but is applied with a thrusting motion of the hand and is used chiefly by pat¬ ternmakers for cutting the various curved out¬ lines of their work. It will be observed, that as a rule, the chisel cannot be satisfactorily used over a surface wider than itself, and, therefore, the gouge was devised in order to obtain a tool of greater utility for that pur¬ pose. In practice this advantage is partially realized, but there still remains quite a tendency on the part of the gouge to follow the grain of the wood instead of cutting through the fibres at a very slight inclination. All gouges are held and used in the same way as a paring chisel, but if any occasion demands the driving of a gouge with a mallet, it should always be held in a perpendicular position.

Spokeshaves or Drawing Knives are es¬ sentially two-handed blades which can only be used by being pulled toward the operator. The

general form consists of a long, narrow, chisel- edged blade the ends of which are attached to two handles which stand at right angles to the blade. These handles are of wood ancl the “tangs® into which the ends of the blade are prolonged are bent around at right angles to the blade and pass right through the handles and are riveted over brass plates at their ends, in order to prevent the blade from being drawn out of the handles when it is drawn toward the workman against the resistance of the wood. These tools are used for cutting thick and heavy chips off the rough edges of boards so as to decrease the amount of the work required in the planing operations and they are also used by patternmakers for the cutting of sweeping curves or “sweeps® in work where great ac¬ curacy is not essential. Router types are pro¬ vided with cutters of varying forms and are effectively used for chamfering, rabbeting and other similar purposes.

Planes. — In its simplest form the plane con-

sists of a chisel-shaped plane-iron, so-called, though made of steel, placed at an angle in a “stock” or box of wood or metal in such a way that the cutting edge projects slightly through the bottom of the box. It derives its value from the guidance imparted to the cut¬ ting edge by the sole or bottom of the box. The plane is operated by being pushed forward, over the surface of the material being worked,’ so that the cutting edge bites into the fibre and removes a thin shaving which slides up¬ ward along the upper side of the plane-iron and is thus discharged from the hollow of the box. The depth of the cut or the thickness of the shaving removed may be regulated by rais¬ ing or lowering the plane-iron, which is usually held in place by means of a wedge or by a screw, and is, therefore, capable of being ad¬ justed. The plane-irons are made both single and double. In the latter case, the back-iron is introduced for the purpose of breaking the shaving so as to reduce the amount of cumu¬ lative indrawing force due to the continuity of the fibre of a long shaving. Planes in which double plane-irons are used are called “built- up» planes. There are at least a hundred differ¬ ent kinds of planes in use at the present time, but all of them may be grouped into three gen¬ eral classes — the “jack-planes,” the “trying- planes” and the “smoothing-planes.” The jack-plane is the first plane used for roughing down the timber received from the hands of the sawyer or from the saw-mill. The cutting-edge of its plane-iron is more curved than those of the other planes and consequently takes coarser and narrower shavings. The trying-plane is

used after the jack-plane for producing the great¬ est accuracy attainable in the surfacing of wood by hand. It is usually about 22 inches in length and carries a plane-iron about two and one- half inches in width. The cutting-edge is sharp¬ ened perfectly straight transversely, and this, combined with the length of the plane, enables the workman to produce very true surfaces by its use. The smoothing-plane is a small plane used for imparting a smooth finish to surfaces in work where extreme accuracy is not es¬ sential. It is made about eight inches in length and is designed to carry plane-irons ranging from one and three-fourths to two and one- fourth inches in width. Some of the more useful and important special forms of planes are the “rabbet” or “rabbeting” plane, em¬ ployed for making window frames and other similar work in which a rabbet or recess is required to be cut for the reception of the edges of a glass plate or other material; the “plow,” employed for cutting a deep groove along the edge of a board for the reception of a corresponding tongue formed along the edge of an adjoining board, and the “stop-chamfer” plane, employed for cutting any chamfer or bevel-edge ranging from one-eighth inch to one and one-half inches in size, with a constant angle.

Grindstones, Emery Wheels and Oil-

stones.— The sharpening of the cutting-edges of chisels and plane-irons is performed first "on a grindstone or on an emery wheel and then finished to a fine edge on an oilstone. Grind¬ stones are natural stones which are turned into circular form and are made of varying diam¬ eters. They are usually arranged to revolve in

troughs containing water, but they ought not to run actually in the water as that would tend to soften them and cause them to wear un¬ equally. The water should be fed onto them from a drip-can. They are revolved by a crank- handle attached to the axle and make about 100 revolutions per minute when used for grinding ordinary tools. Various forms of rests or sup¬ ports have been devised for holding the tool during the process of grinding, but in the case of wood-working tools they are seldom used, the workmen usually preferring to hold the tools by hand against the edge of the rotating stone. Grindstones are “trued” or “turned-up” by hand by means of a pointed bar of steel which is constantly rotated during the opera¬ tion so as to always present a new cutting-edge to the stone and they are “trued” mechanically by means of a threaded roller of steel which is clamped in a frame and allowed to rotate against the surface of the stone. Such appli¬ ances are called “grindstone truers.” Emery wheels are similar in appearance to grindstones, but made of powdered emery cemented to¬ gether or of emery cemented to a wooden centrepiece. The

cementing material usually em¬ ployed is a silicate insoluble in water and the wheels are usually made in about 10 degrees of coarseness. They are usually of smaller diameter than grindstones and operated at a higher rate of speed. Emery itself is a species of corundum composed of oxide of iron, alumina, silica and a small proportion of lime! The oilstones, sometimes called “hones,” are es¬ sentially fine-grained natural stones which are used for producing the final edge on cutting tools by the process of abrasion, with oil in¬ stead of water to assist the process. They are usually set in wooden stocks and provided with covers to protect them from dust and grit The principal varieties are the Turkev the Charnley Forest, the Arkansas, the Grecian and the Washita stones. As a general rule oilstones will wear away the most in the mid¬ dle and become hollow both in the direction of their length and breadth. Sometimes, as in the case of the sharpening of jack-plane irons, this hollowing out. is somewhat of an advantage as it imparts a desirable curvature to the cutting edge, but when it extends to an inconvenient degree the surface of -the stone is leveled by leing rubbed on a flat sandstone or on an emery slab Gouges and bead-planes are usually set or sharpened by means of oil-slips or * thin slips of oilstone about six inches long and two inches broad and ranging from one-eighth inch to one-half inch in thickness, the edges of which

Ye ir0iVndr ln a transverse direction to fit the hollow faces of the tools.

Boring tools for wood comprise the various anTthe driHs5’ g ’ aUgerS’ bitS and braceS

Awls or bradawls are the simplest forms of boring tools and are used for preparing holes tor the admission of nails and screws. In its ordinary form the awl consists of a small steel rod one end of which is fastened to a wooden handle and the other end double-bevelled to a sharp V-shaped edge by which the fibres of the wood may be compressed and parted so as to torm a hole without producing chips and dust.

ie greatest drawback in the ordinary forms is the tendency of the steel rod to pull out of

the handle when the tool is withdrawn from the hole it has made in the wood. This is especially the case when working in hard woods. In

the superior forms' this fault is remedied by the use of a hollow handle which contains a number of awls of different sizes, each of which may be fastened to the handle by means of a screw- nut.

Gimlets are of awl-form plus a screw. It consists of a small steel rod, one end of which is attached to a wooden handle which forms a T with the rod, and the other end is shaped into the form of a screw. This end consists of. a point in the form of a taper screw and a spiral groove which extends partway of the stem or body as in the case of the (<twist-gim- lets,® or the body may be hollowed out into a nearly semi-cylindrical shell as in the case of the ˆshell-gimlets.® The commonest forms are called <(spikes,® while other forms are desig¬ nated as ((triple-twist® gimlets, «auger® gimlets, (<patent-twist® gimlets and ((brewers-twist® gim¬ lets, according to the shape of the spiral body. A complete assortment of these tools are usu¬ ally required by a wood-worker.

Augers are merely large gimlets. They are made in both the twisted and the shell forms and are operated by both hands by means of a wooden bar thrust through the eye at the handle end of the stem. Their sizes increase one- eighth-inch at a time from three-eighths-inch to two inches in diameter.

Bits and Braces. — 'The bits comprise the various, forms of boring tools such as ((centres,® ((shells,® ((gouges,® ((countersinks,® etc. They are actuated by the ((brace® or ((stock.® These tools were developed in order to overcome the faults inherent in all forms of awls, gimlets and augers, due to the interruption of the con¬ tinuous rotation of those tools necessitated by the changing of the position of the hands and by the limited amount of pressure applied to the tool. The stock or brace consists of a crank, one end of which is provided with a round head for receiving the pressure of the breast of the operator and the other end re¬ cessed for the reception of the bit. In the earlier forms the bit was secured in the receiv¬ ing end of the brace by means of a thumb¬ screw which engaged a notch near the end of the stem and constituted the weak point of the compound tool. This defect has been remedied in the later forms by the use of various kinds of expanding devices or expand¬ ing-chucks which adapt themselves to all shapes and sizes of stems and hold the bits securely and truly in place. The centre-bit comprises the centre-point, nicker and cutter attached to a shank. The nicker and the cutter are actuated by the brace and rotate about the centre-point. It is used for boring large and deep holes. The countersinks are made in a great variety of forms and are designated as ((snail-horn,® <(rose-head® and ((flat-head® according to the shape of the cutting point. In wood work they

are employed for enlarging the entrances of holes when it is desired to let the heads of screws or bolts lie completely below the sur¬ face of the wood. Some of the other useful forms of bits actuated by the brace are the ((screw-driver® bit, the shank end of which is square-tapered to fit the socket of the brace and which being turned with the brace is

quicker in its action than that of a hand-worked screw-driver; the «taper» bit for boring fun¬ nel-shaped holes ; the <(shell® bit, the cross section of which is composed of a convex and concave curve roughly semi-circular in form; the ((nose® bit, a shell bit provided with a nose or lip at the cutting-point for the withdrawal of the core from the wood; the <(spoon® bit, the cutting-edge of which is formed in the shape of a parabola and, therefore, does not draw out the core as effectually as the nose bit ; and the ((gouge® bit, the cross-section of which is similar to that of the gouge and is simply rounded at the cutting-point without the provision of a nose or lip. In the ordinary forms of the compound tool the brace is ro¬ tated through complete revolutions, thus pre¬ venting the boring of holes or the driving of screws in one side of a corner at a distance any closer to the adjacent side than that which is equal to the radius of revolution, but this shortcoming of the tool is remedied in the hatchet brace in which the brace acts as a lever which moves the bit around and at the same time feeds it forward by means of a ratchet and click actuating a square-threaded feed-screw, as the brace is moved back and forth through partial revolutions.

The striking tools comprise the various forms of hammers and mallets.

Hammers. — Ordinarily, a hammer consists of two parts — the iron or steel hammer-head, and the shaft or handle of wood which is driven into a hole in the (<centre of mass® of the hammer-head. The angles at which the handles are attached to the heads vary greatly on account of the variations in the position of the centre of gravity of the head relatively to the line of the penetration of the handle, and also on account of the various convexities of the faces of the hammer-head. The form of the ((pane® or the narrower or smaller end of the hammer-head also varies greatly in the hammers used for different purposes. When of hemispherical form as in the engineers' ham¬ mers, it is called a (<ball® pane; when it is made in the form of a narrow, round-edged ridge placed at right angles to the axis of the handle it is called a ((cross® pane; and when the ridge runs longitudinally it is called a Straight® pane. In the claw-hammer the pane is curved upwards toward the handle and is divided by a V-shaped, groove, and the head is usually attached to the handle by means of side flanges. It is very use¬ ful for drawing nails. The hand

hammers used by wood-workers range in weight from one-half ounce to 10 pounds. The weight of the head and the balance of the head in the handle are the most important considerations controlling the suitability of a particular hammer, for if the handle is too light for the head it will break off.

Mallets. — These are forms of hammers in which the metal heads are replaced by wooden blocks. They are practically heavy wooden hammers which are used for delivering blows on the handles of chisels and gouges in order to avoid the risk of smashing and splitting them down as is usually the result when iron hammers are used for that purpose. Round- faced wooden mallets are used by molders for rapping patterns in order to detach the sand which adheres to them when they are drawn

from the molds. Woodworkers' mallets are either square or round in form. The square mallets are about six inches in length and two by wood-workers range in weight from one-half inches in width. The round mallets are about five inches in length and three inches in diameter. The mallet-heads are usually made of hickory wood, and sometimes of lignum vitae.

The chopping tools are the axes, the hatch¬ ets and the adzes. In each case they represent the combination of a striking tool and a cutting tool. In these tools the shape of the handle or helve and the manner in which it is attached to the blade is of the utmost importance in gov¬ erning their effectiveness.

Axes and Hatchets are edged tools with handles used in chopping for rough cutting or splitting. They vary mainly as to the weight of the blade, to the shape or curvature of the handle and to the form of the cutting-edge. Axe blades range in weight from two to seven pounds. These blades are usually made by welding the hard tempered steel portion which forms the cutting-edge to the iron portion which contains the <(eye)} provided for the re¬ ception of the handle. The curved form of the handle is designed to counteract the influence of the force of gravity which tends to twist the blade downwards when the axe is used for chopping at various obliquities. The form of the cutting-edge, curved horizontally, and wedge-shaped transversely to the sides of the blade, is designed for the purpose of separating the groups of wood fibres successively, and for equalizing the pressure of the blow on each side of the blade. A hatchet is a light form of axe, with usually a nail-pulling groove back of the blade.

In the adze, the cutting edge stands trans¬ versely or at right angles to the handle, which is quite short. The entire* outer face of the blade is made slightly curved, and its cutting- edge is formed by beveling from the inner face. It is usually employed for the forming of lengths of wood into curved shapes.

Metal-working Tools.

The almost innumerable variety of metal¬ working tools and the great variety of pur¬ poses for which they are employed make their classification into a series of general groups practically impossible within a limited space. In a general work they may be conveniently

di¬ vided into various classes according to the char¬ acter of the work to which they are applied. Such a method of classification would group the main body of metal-working tools under foundry work, forge shop work and machine shop work, the last named including all the turning, .gear-cutting and toolmaking tools and appliances. The greater number of these are treated under their special headings in the several volumes of this Encyclopedia, and as in the case of the wood-working appliances, the various kinds of machines employed in the metal-working industries will be found speci¬ fically treated under the title Metal-working Machinery. The larger metal-working tools are known as machine-tools, including all those machines that operate cutting tools for shaping metal, as lathes, power-drills, boring-drills, shapers, milling machines and the like.

The elementary descriptions of the various forms of small tools such as the guiding tools, the holding tools, the rasping tools, the cutting tools, the drilling tools and the striking tools already given in connection with the wood¬ working tools will be found applicable to similar tools employed in metal working, subject, how¬ ever, to the modifications demanded by the greater hardness of the material worked, and the greater accuracy of execution required in the finished products of some classes of metal work. In the main these modifications consist in the employment of finer and harder ma¬ terials in the making of the tools, in the par¬ ticular forms given to the cutting edges and in the methods by which the tools are applied in the execution of the work.

The guiding tools employed in metal work are quite similar to those already described, and comprise the various forms of rules, squares, straight-edges and calipers, all made of metal, and also the various forms of micrometer cali¬ pers with vernier attachments which are capable of measuring dimensions as small as 1-10, 000th of an inch. These calipers are divided into two general classes — the ((yoke)) calipers and the ˆbeam” calipers. In the former, the outer end of the shank of the yoke contains a split-nut which is employed for making adjustments for wear. For this purpose, the nut is closed onto the screw by being advanced on the stem toward the yoke. The shell or thimble on which the graduations are marked is attached to the end of the screw and rotates with it, and moves along over the shank. A speeding arrange¬ ment for rapidly advancing the screw is pro¬ vided in the form of a knurled-nut in the yoke, which is also capable of contracting a bushing over the measuring stem so as to lock it in any desired position. The measuring point and the opposing anvil are carefully ground so as to make their faces perfectly parallel with each other. These micrometers are usually provided with a screw having 40

threads to the inch, with the barrel graduated to lOths and 40ths of an inch. By this arrangement one revolution of the screw advances the thimble one division on the barrel, equal to one-fortieth of an inch, and as the circumference of the thimble is di¬ vided into 25 equal parts, one-twenty-fifth of one revolution of the screw advances the meas¬ uring point one-twenty-fifth of one-fortieth, equal to one one-thousandth of an inch. By the aid of the vernier attachment applied to the barrel measurements as small as one ten-thou¬ sandth of an inch are readily obtained.

Gauges and Indicators.— These tools are employed for indicating the sizes of wire, machine-screws, drills and plate thicknesses! Various systems of gauges are employed, in all of which the dimensions are purely arbitrary. The American or Brown and Sharp gauge was adopted to produce a gauge to overcome the irregularities in spacing of the Birmingham gauge. In this gauge the dimensions increase by regular geometrical progression, the largest dimension No. 0000 being equal to 0.46-inch and the next smaller dimension, No. 000, being

*00ˆ-00ˆ ky multiplying 0.46 by the constant .8Ab22, each smaller number being the prod¬ uct of the preceding number and the constant. Gauges for indicating the gauge of wire or plates are of two forms — the angular and the

!l°tC!? g?Uˆes* 0ther. forms of gauges are the centre gauge which is used for gauging lathe and machine centres in turning and grind¬ ing work ; the '“screw-thread” gauge used for grinding threading tools ; the “screw-pitch” gauge used for determining the pitch of screw t ireads; the “depth-gauge” used for measuring the depth oi holes and recesses ; the “scratch” gauge used for ruling lines parallel with the edge of a piece of work and several forms of surface” gauges which are principally used in determining the parallelism of the surface of a piece of work with the machine table, hous¬ ing or other plane of reference. They are also used in testing, erecting and in the setting¬ up work on machine tools.

Test indicators are a class of tools or in¬ struments used for determining small irregu¬ larities in the accuracy of cylindrical surfaces and small variations from the true rotation of such surfaces. They are also used in determin¬ ing the inaccuracies of a plane surface and in measuring small amounts of end or lateral motion such

as the end-motion of a spindle. They are of two types — those which merely indicate the existence of the irregularities and those which give a reading or measurement showing the exact amount of the errors.

Some of the other small tools indispensable to the metal worker may be briefly summarized as follows :

The various forms of “hack-saws” used for severing purposes. They are made of hard¬ ened steel to cut metal and mounted in a light frame and may be operated either by hand or by some form of power. Their blades are usually made with 14 teeth to the inch for gen¬ eral work and with 25 teeth to the inch for cutting tubing and thin metal.

The “monkey-wrench” and other forms of wrenches used for screwing and unscrewing the nuts of screw-bolts, etc.

The various forms of “drills” and especially the modern ((twist-drill” which is universally used at the present time and which has com¬ pletely supplanted the old flat forged drill which for many years held the first position as a tool for producing circular holes in metal.

The “reamers” and ((broaches,” which com¬ prise a class of fluted tools used for finishing and truing cored or drilled holes. They are solid when used in a socket or with a wrench and shell or hollow when bored out to fit a mandrel.

The “screvwthreads,” “taps” and “dies,” which, according to their use, may be divided into two classes — those used for fastenings and those used for communicating motion.

There are three forms of screw threads used for fastenings — the “V” thread in which the sides make an angle of 60 degrees with each other and in which the top and the root are sharp; the “United States standard® thread which is similar to the “V” thread with the exception that the top is cut off and the bot¬ tom filled in ; and the (<Whitworth” or “Eng- lish standard” thread in which the top is rounded off and the root filleted in and in which the sides form an angle of 55 degrees with each other. There are also three forms of screw-threads employed for communicating motion — the ((square” thread, the “trape- zoidal” thread and “Powell's” thread.

The top is used for producing internal threads and the die is employed for cutting ex¬ ternal threads. They are of two kinds — those operated by hand and those operated by power- driven machines. Hand taps are made in sets each of which comprise three taps — the “taper- tap,” the

“plug-tap” and the “bottoming tap.” The taper-tap is parallel on the point for a dis¬ tance equal to one-fourth the diameter of- the tap and this point is made the diameter of the roots of the teeth and corresponds to the cor¬ rect size of the hole to be tapped so as to pro¬ duce a full thread. In the plug-tap the first three teeth are tapered off and in the bottoming- tap the teeth extend full to the point. The ta¬ per-tap is used for starting a thread, the plug- tap for extending it nearly to the bottom and the bottoming-tap for finishing the full thread to the very bottom of the hole.

The dies may be divided into two general classes — those which have to be passed over the work several times in order to produce a finished thread and those by which a finished thread is produced at a single cutting. In the former, the cutting-dies are held in a stock and are capable of being separated so as to permit of their being passed over the work and then closed, by means of a set screw, an amount sufficient to enable them to cut a full thread. In the latter, when they are not of the screw- plate type, the “chasers” or “cutters” are held radially in a cast-iron “collet” surrounded by a wrought-iron ring. These dies are capable of being adjusted to compensate for wear. The bevelled outer ends of the chasers fit into cor¬ responding bevelled grooves in the wrought- iron ring so that when the ring is forced down the chasers are moved toward the centre. A great variety of self-opening and adjustable dies are also used for machine threading.

Masonry Work Tools.

The masonry work tools may be conven¬ iently divided into two general classes — stone¬ masons’ tools and bricklayers’ tools. Those employed by either of the two classes of work¬ men are neither numerous nor intricate in de¬ sign. The principal tools of the stonemason are the saw, the mallet, the scrabbling hammer and the various forms of chisels designated as the “inch-tool,” the “boaster” and the “broad- tool,” which are distinguished by their size, the first being one inch, the second two inches and the third three and one-half inches in width. In the work of stone cutting, the preliminary operations are performed by a small chisel called the “point” and the finishing work exe¬ cuted by the use of the others in turn accord¬ ing to their size. The principal tools of the bricklayer are the various forms of trowels, the plumb levels and the bricklayers’ hammers. For further information relative to the various forms of stone-cutting saws, see Saws and Sawing; Stone-Cutting and Dressing; and also the articles under the titles Files and File Making; Metal-working Machinery; and Wood-working Machinery in this Ency¬ clopedia.

TOOMBS, Robert, American lawyer and statesman: b. Wilkes County, Ga., 2 July 1810; d. Washington, Ga., 15 Dec. 1885. He was the son of a Georgia planter, attended for one vear Franklin College (now the University of

Georgia) and was graduated at Union Col¬ lege, Schenectady, N. Y., in 1828. In 1829 he studied law at the University of Virginia and in 1830, being under age, was admitted to the bar by special act of the legislature. Within 10 years he became one of the foremost lawyers of Georgia. In 1836, when the Creek War broke out in Alabama, he raised a company of volun¬ teers and served as captain under Gen. Winfield Scott. In 1837-40 and 1842-43 Toombs was a member of the legislature and during this time became a leader of the State Rights Whigs of Georgia. From 1844 to 1852 he served as rep¬ resentative in Congress and was one of its best oiators and debaters. In 1850 he was a prom- nient supporter of the compromise measures in the House. In 1852 with other Southern Whigs he refused to support Scott for President. After 1852, like Stephens, he acted with the Democrats. From 1853 to 1861 he was in the United States Senate. In 1854 he favored the Kansas-Nebraska Bill as carrying out the prin¬ ciples of the compromise of 1850. Immediatelv before the elections of 1860 Toombs lectured in the North on slavery. After the election of Lincoln he advised secession of the Southern States and made secession speeches in Georgia in December 1860 and in the United States Senate in January 1861, maintaining that in secession lay the only hope of security for the South. Georgia seceded 19 Jan. 1861 and Toombs withdrew from the Senate four days later. In March he was formally expelled. He was chosen to the Confederate Provisional Congress that met in Montgomery 4 Feb. 1861 and by a considerable minority was considered as a candidate for President. On 21 February he was made Secretary of State by President Davis. He opposed the firing on Sumter that began the contest of arms. Resigning Sep¬ tember 1861 to become a brigadier-general in the Confederate army, he fought with distinc¬ tion in the second battle of Manassas (Bull Run) and at Sharpsburg (Antietam). He re¬ signed his commission in 1863 and in 1864 was made commander of the Georgia militia. He disapproved the policy of the Richmond ad¬ ministration and personally disliked Davis. With Vice-Pi esident Stephens and Governor Brown he headed the Peace Movement in Georgia in 1864, thereby doing much to weaken the cause of the Confederacy. In 1865, to escape arrest, Toombs went abroad, visiting Cuba, France and England. Returning in

1867, on the restoration of the privilege of habeas cor¬ pus, he soon amassed a fortune of $500,000* in the practice of law. In 1872 he was a member of the Georgia Democratic Convention and sup¬ ported Horace Greeley for the Presidency. In the Georgia legislature passed a law pro¬ viding that railroads should be taxed like other property. The railroads resisted, and Toombs, taking the case of the State, won the suit in the courts and collected all back taxes. For 10 years he continued the struggle to force the railroads to pay taxes and give proper service to the public and in 1877 secured the passage of a law providing for a board of railroad com¬ missioners. Other Southern States have since passed laws modeled after the Georgia law.

By his enemies Toombs was considered ex- treme and intolerant — a ˆfire-eater ® His friends thought him a statesman of the first

order and were disappointed that he made no higher mark. . His hasty temper hindered his career in politics. In the army he was an able general, but not a disciplined subordinate. He belonged to the school of Jefferson in politics, believing in strict construction, State sover¬ eignty and strong local government, with much liberty ˆ for the individual. His political theories vveie meant for times of peace, but could not stand the strain of war; consequently he was at vanance with the Confederate administration trom the beginning. As long as he lived loombs never ceased to denounce the Recon¬ struction measures of Congress. His experi¬ ences from 1865 to the end of Reconstruction caused him so to dislike the United States gov¬ ernment that he refused to ask for a pardon or to take the oath of allegiance and he never again had the privileges of citizenship. Con¬ sult Stovall (Robert Toombs, Statesman,

Speaker, Soldier, Sage> (1892); Trent, <South- ein Statesmen of the Old Regime* (1897).

W. L. Fleming,

West Virginia University.

TOON, or TOONA, a tree (Cedrela toona) ot the family Meliacece. It is a native of India .and Australia, being found at altitudes of 4,000 ieet on the Himalaya Mountains as well' as near tide-level. In the former country it is one of the largest trees; in the latter, it often exceeds 150 feet in height and 18 feet in cir- cumference. Hooker mentions a specimen in India 10 feet in diameter at five feet from the ground. The tree is cultivated for its timber bark and flowers. The wood is soft, open- gi amed, easily seasoned and worked, little lia¬ ble

to warp and easily polished. The heart- wood is reddish and resembles mahogany and veneers taken from the roots or where branches join the trunk are said to be remarkably hand¬ some. The chief uses of the wood are in house-bui ldmg, furniture-making, carving, etc. Unde! the names bastard cedar, bastard white cedar and Moulmein cedar the wood is an im¬ portant export to English markets. The bark is very astringent and is used for making leather which usually is purplish from a dye also Present, ihe flowers yield a reddish or yellowish dye which is in common use in India A dose relative, of this tree, C. sinensis, is grown in the United States in streets and upon lavvns. It resembles the ailanthus in hardiness and its graceful feathery foliage, but is superior in regularity denseness of growth and in the absence of disagreeable odor during the blos¬ soming period. Several other species are cul¬ tivated in California and the Gulf States, but

Ice 'mahogany! C0Mer PaMS °f the countˆ

TOOTH-BILLED PIGEON, a large nut-pigeon (Dnpunculus strigirostris) of Samoa, formerly called «dodlet» under the erroneous impression that it was a surviving rclafve of the dodo It is about 14 inches long body rounded beak orange, with the lower mandible deeply cleft into three distinct teeth

.IdosVhe *lP - Fnf d’, neck’ breast and abdomen glossy greenish black, rest of back, wings, tail

and under coverts deep chestnut. It is now i are.

TOOTH-ORNAMENT, a decoration pecu- cuhar to mediaeval architecture, consisted of lour-leafed flowers, the centres of which pro-

ject in a point. These are used in series, either in a continuous row or at slight intervals, and are generally inserted in a hollow molding. Iney are used in great profusion in the Early English architecture, forming one of its char¬ acteristic features, and in some of the richer suits of molding the flowers are very thick and the series is repeated several times.

TOOTH-SHELL. See Dentalium.

. TOOTHACHE, a pain in a tooth or ad¬ jacent jaw, arising from various causes. The most common cause is decay of some portion of

the tooth, admitting air to the nerve, which causes sharp pangs. If there is a considerable opening it is colloquially called “jumping toothache. The pain may be stopped by ap¬ plication of oil of cloves on cotton and closing the passage that admits air ; if oil of cloves is not to be had diluted chloroform on cotton is a good substitute; creosote is also used, es¬ pecially in a gum styled toothache gum. But the pain and decay will usually continue unless the services of a dentist are sought. Decay m the root of a tooth often generates gas, which induces a pressure on the nerve, and consequent toothache. The remedy is to bore a small hole into the tooth and release the gas. If this is not done the gas forces itself through the gums, often with severe pain, resulting in a gum-boil. This is not a true boil, but a hole worked through the flesh by the pressure of the gas. When this finds a vent there is some re¬ lief, but a permanent cure involves treating the tooth by a dentist. Neuralgic toothache is a purely nervous variety, and may occur either in sound or carious teeth. It comes and goes suddenly in paroxysms, and is accompanied by little or no swelling. As a preventive against toothache the teeth should be kept scrupulously clean, and when they show symptoms of decay the services of a skilful dentist should be secured. The decay of a tooth is arrested by stopping or filling up the cavity.

TOOTHACHE TREE. See Aralia. TOOTHED HERRING. See Mooneye.

TOOTHPICK, a small pick for removing substances lodged in the teeth. The ordinary toothpick is of wood about the size of a fric¬ tion match, but longer and slenderer and pointed at one end or both. The use of wooden toothpicks has become very common in the United States and many millions of the tiny wooden slivers are manufactured there every year. The seat of this industry is in Maine, near the forests of white birch, which wood is chiefly employed in their making. The felling of “toothpick trees® is not a separate business but one incidental to the Maine lumbermen. After a tree has been felled the branches are lopped off and only the trunk is sent to the mills. There the bark is skinned and the naked trunk is cut by machinery into thin sheets of wood of the thickness of toothpicks and as wide as a toothpick’s length. These sheets, known as “veneers,® are run through another machine which in one operation cuts them into toothpicks ready for shipment. Of the better grade of toothpicks large importations are made every year from Japan and from Portugal. The Portuguese toothpicks are made of orange- wood and are smaller but tougher, better shaped and more finely pointed than the domestic picks.

The Japanese make their toothpicks from fine reeds, which they shave

down to the thinness of paper, retaining the reed's strength and pliability. Metal toothpicks, as of gold, which were formerly common, are now little in de¬ mand since their use endangers the enamel of the teetR Quill toothpicks, cut from the shaft of a hen's feather, are still considerably used. TOOTHWORT. See Dentaria.

TOOWOOMBA, too-woom'ba, Australia, a town of Queensland, in the southeastern part of the state, 100 miles by rail west of Bris¬ bane, on an elevation known as the Great Dividing Range. It has a number of churches, two colleges and other educational institutions, and a fine new municipal building. There are flour-mills, saw-mills and a brewery, and in the neighborhood are vineyards. Pop. about 11,000.

. TOP-MINNOWS, a group of small, robust minnows, represented by Gambusia patruelis of the brackish waters along the Atlantic Coast, which are distinguished by their habit of swim¬ ming and feeding near the surface. See Minnow.

TOP-SHELLS, the Turbinidce, a family of gasteropod mollusks, mostly tropical and oriental, in which the shell is usually turbinate or top-shaped, but may be pyramidal. It is generally nacreous internally. The operculum is horny, and may exhibit a spiral form. In the genus Turbo the shell is top-shaped with a rounded base. The whorls are convex, and the aperture is large, the operculum being calcare¬ ous. The genus Trochus also belongs to the top-shells. In the latter genus the shell is pyramidal and the base flattened, the operculum being horny. The common top is the T. zizyphnus. Others are the T. versicolor, the T. imperialis and the T. niloticns. After hav¬ ing been ground and polished to exhibit the nacreous inner layers, they are extensively sold as ornaments.

TOPAZ, a mineral having the composition of an aluminum fluo-silicate. It is not the topaz of Pliny and other early writers which was chrysolite (q.v.), the names having been interchanged. It generally crystallizes in or¬ thorhombic prisms, colorless, white, yellow, or occasionally pale green or blue. Trans¬ parent topaz, in any of its tints, is a beautiful gem. The colorless variety much resembles dia¬ mond, and is sometimes sold for it, though its lower hardness (8) affords an easy test. What has been called the largest diamond in the world, among the Crown jewels of Portugal, is probably a colorless or "white® topaz. The yel¬ low variety is most familiar, and is called "Bra¬ zilian topaz,® in distinction from "Oriental to¬ paz® (yellow sapphire) and "false,® "Scotch® or "Spanish topaz® (yellow quartz). The "Ori¬ ental topaz® is much rarer, harder (9) and denser (about 4) ; while the "Spanish topaz® is cheaper, less hard (7) and lighter

(2.65), the density of topaz being 3.4 to 3.6. It is also distinguished by its eminent basal cleavage. The favorite shade is wine-yellow or sherry- color. Both yellow and blue topaz fade and be¬ come white by weathering or exposure to light, and some yellow varieties can be changed to a pale pink by heating, yielding the so-called “burnt topaz® or “Brazilian ruby,® resembling the pale, or Balas, variety of ruby spinel (q.v.).

Topaz occurs usually in metamorphic rocks, like gneiss, but also somewhat in igneous rocks; it is frequently, though not always, as¬ sociated with tin-ore. The principal localities are in Ceylon, Siberia, Japan, Brazil and Mexico. In the United States it occurs in large masses at Stoneham, Me., and Trumbull, Conn. ; in crystals in Colorado and Utah. Fine topaz crystals, colorless and pale blue, have re¬ cently been found in San Diego County, Cal.

TOPAZOLITE, a variety of andradite garnet having a light yellow or pale grayish green color. The most beautiful specimens are found in the Ala Valley, Piedmont, Italy. They also occur in California.

TOPE, a Buddhist monument intended for the preservation of relics. The oldest monu¬ ments of this kind are spherical or elliptical cupolas, resting on a circular or rectilinear base, with an umbrella-shaped roof, and sometimes with a series of roofs of this form which de¬ velop into a spire, p}ˆramid or other architec¬ tural ornament. In the interior is a cell or chamber for containing the box with relics; but in some cases no relics have been found, and it is supposed they have been buried under¬ ground. The Sanskrit name is stupa, mound, from which is derived thupa and tope, mean¬ ing top. The older topes are masonry mounds, the cupola top and ornamental roofs and spire , forms being later developments for ornamenta¬ tion. Some of them are of great architectural beauty, rising tier above tier, with a series of graceful ((parasol® roofs, the limit of height being about 300 feet. But the typical con¬ struction is that of The Great Tope at Sanchi, in central India. This is a hat-shaped mound or dome 42 feet high and 106 feet at the widest point. The flat space on top was for the chhatra or umbrella-like apex, this being the royal em¬ blem. This was like a substantial parasol, as if to guard the relics from the weather. The Great Tope is surrounded with a magnificently carved stone railing, leaving an elaborate orna¬ mental entrance or gateway, over 30 feet high. The chamber or cell in which the relics were kept was generally

built with an outer con¬ struction of masonry; often enclosing a bronze box, which again enclosed a silver cylinder or case and within this perhaps a casket of gold containing the relics which it was desired to preserve. The number of stones in the topes often indicate Buddhistic symbolism — three, seven and 13 being the numbers rich in meaning. Topes are common in the Orient and there are groups of conspicuous ones at Amravati, Sarnatti and Telelabad in Bengal, at Satdhara and Sonari in central In¬ dia, at Abayagiri, Ruanwalli and Tuparamaya in Ceylon, etc. Relics of kings and great men were thus cared for, much as we build statues and monuments to-day. See Dagoba; Pagoda.

TOPEKA, Kan., city and county-seat of Shawnee County, capital of the State and the third largest city in the State, on both banks of the Kansas River, on the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Union Pacific and the Missouri Pacific, 67 miles west of Kansas City. The city is well laid out with broad streets crossing at right angles and beautifully shaded. Topeka was settled by people from the <(Free State®

in 1854; an anti-slave constitution was adopted here in 1856 known as the (<Topeka Constitu¬ tion® and the Topeka government was estab¬ lished by national authority. It was incorpo¬ rated as a city in 1857 and selected as the State capital in 1861. The principal industries are the railroad shops of the Atchison, Topeka and Santa Fe Railway, printing plants, six flouring mills haying a capacity of 5,000 barrels per day, creameries, packing-houses, foundries, machine shops, boiler works, preserving works, silo factories, engine works and planing mills. According to the United States census of man¬ ufactures of 1914 Topeka had 159 manufac¬ turing establishments with a combined capital of $14,186,000, employing 5,721 persons, paying $3,691,000 in wages and manufacturing a prod¬ uct valued at $20,000,000. Topeka has 10 banks, three, of which are national banks and three building and loan associations with assets of $9,000,000. Topeka is an important jobbing centre, there being four wholesale groceries, six wholesale commission houses, wholesale hardware, paper, drugs, etc. It is one of the chief railroad centres between the Missouri River and the Pacific Coast. The State Capi¬ tol, a handsome stone edifice, is the most im¬ portant building of the city. The State Memo¬ rial building, erected to the memory of the veterans of the Civil War at a cost of $550,000, is the most handsome structure in the city The government building and the court house are also creditable buildings. Topeka has a municipally owned city building with audi¬ torium annex with seating capacity for 5 000 people. Just west of the city, two miles, is ’the State Hospital for the Insane; the State Re¬

form School is located just north of the city about three miles. The Colored Industrial In¬ stitute is a coeducational institution for col¬ ored boys and girls located just east of the city. Orphans Home — two Crittenden Homes one each for the unfortunate white and colored girls, the Provident Association Building lngleside Home for Old Ladies, a Methodist Home for the Aged are among the most notable of its charitable institutions. The Santa Fe Railroad maintains its own private hospital and. the public hospitals are Saint Francis, Christs Hospital and Stormont Hospital The city has a free public library, a well-organized public school system, including a high school established in 1874; an excellent manual train¬ ing school is also maintained. It is the seat of Washburn College, a coeducational institu¬ tion for men and women, and the College of the Sisters of Bethany and three business col¬ leges. Topeka has the commission form of government, having a mayor and four com¬ missioners; a well-equipped fire department and an excellent police department. The city owns its own electric light and water plant. The cost of city government as reported by the United States government reports for the year 1915 shows $20.71 per capita as spent in Topeka for the maintenance of city government. The physical valuation of Topeka is about $56 000 - 000. The area of the city is 16 square miles, lopeka has over two miles of ornamental lighting system, has 240 acres of city-owned parks and play grounds. Pop. 52,250.

TOPELIUS, to*-pa'le-oos, Zachris, Finnish

author: b. Kuddnas, near Nykarleby, 14 Jan.

1818; d. Helsingfors, 13 March 1898. He was graduated at the University of Helsingfors in 1840, in 1841-60 edited the Helsingfors Fid- ningar, in which many of his earlier writings first were printed, and held at the university the chairs successively of Finnish history (1854-63), of the history of Finland and the northern regions (1863-76), and of general his¬ tory (1876-78). After Runeberg (q.v.), he is the chief poet of Finland. His religious and patriotic lyrics are particularly valued. Among the collections of his verse are (Flowers of the Heath > (1845-54); (1870). He wrote also several dramas, such as (After Fifty Years'* (1851), and works of fiction, including (A Surgeon’s Stories’ (1853-67), a cycle based on Finnish and Swedish history from the time of Gustavus II Adolphus, to that of Gustavus III. There are German translations of several of his writings and an

English version of the (Surgeon's Stories) has appeared in the United States (1883-88).

TOPFFER, Rudolph, Swiss novelist : b. Geneva, 1799; d. there, 1846. In 1832 he became teacher of aesthetics at the Academy of Geneva and in 1839 his novel (Le presbytere> attracted general attention to him and ensured his posi¬ tion in the world of letters. He was a volumi¬ nous writer and won renown for his (Voyages en zigzag) (1848) which were continued with illustrations by himself in 1853. Among his best productions are his seven little novels in pictures which were published together in Geneva, 1846-47. Consult Wolterstoff, Her¬ mann, (Essai sur la vie et lis oevres de Rodolphe TopffeU (Magdeburg 1894).

TOPHET, or TOPHETH, a locality de¬ scribed in Scripture as in the valley of Hin- nom, near Jerusalem, where high places were erected, and which was the chief seat of the worship of Moloch, with its fiery human sac¬ rifices and abominations. The good King Josiah suppressed that form of idolatry, and made Tophet a receptacle for the refuse of Jerusalem. Afterward it became a burying- ground. It was shunned with horror by the Jews, and the word has come to be used by Christians as the synonym of a place of punish¬ ment after death. The origin of the word is doubtful. It is derived by some from Hebrew toph, a drum, in allusion to drums beaten to drown the cries of children burnt in the fire to Moloch, and this seems a probable interpreta¬ tion. Another derivation is from an Aramaean word signifying to spit or vomit, in allusion to the disgust excited by the place. Consult 2 Kings xxiii, 10; Jer. vii, 31-32; Isa. xxx, 33.

TOPIC, the subject of a discourse, whether written or spoken ; the matter treated of in con¬ versation, argument, oration, literary compo¬ sition, etc. In rhetoric and logic topic was re¬ stricted to the narrower sense of a common ground of argument, a general maxim or dic¬ tum from which other arguments may be started: one of the various general forms of argument employed in probable reasoning, as distinct from demonstrative reasoning. In medicine the word is used to denote any rem¬ edy locally applied; it is, however, more fre¬ quently used in the plural, topics, denoting the class of such remedies, than applied to any one specific.

TOPLADY, Augustus Montague, Eng¬ lish theologian and hymn writer : b. Farnham, Surrey, 4 Nov. 1740; d. London, 11 Aug. 1778. He was educated at Westminster and Trinity College, Dublin, and in 1768 was presented to the vicarage of Broadhembury, Devonshire. Though a voluminous writer — and a strenuous defender of Calvinism against

John Wesley — Toplady is now hardly known except as the author of the hymn (Rock of Ages,' one of the finest expressions of evangelical faith and fervor to be found in all hymnology.

TOPOGRAPHICAL SURVEYING. See

Surveying.

TOPOLOBAMPO BAY, Mexico, a small bay of the Gulf of California on the west coast of the state of Sinaloa. It is noted on account of the attempt made in 1886 by a number of Socialists of the United States to form a co¬ operative community on its shores. A com¬ pany was chartered, in which all the colonists were stockholders, and which was to own all the land, and conduct all the business of the community. Everything was to be done as far as possible on the socialistic plan as described in Bellamy's (Looking Backward. ' Several hundred colonists joined in the experiment, and a city was surveyed and laid out on an elabo¬ rate plan. The experiment, however, was a failure, largely owing to aridity of the land and the absence of available streams for irriga¬ tion. The place was abandoned in 1891.

TOPOPHONE, an instrument for deter¬ mining the direction from which any sound pro¬ ceeds. It is valuable for use at sea, during fog, or in the night, to determine the direction of a sounding bell, fog-horn, whistle, etc. The top- ophone was invented by A. M. Mayer, and con¬ sists of a centrally pivoted horizontal bar hav¬ ing at each end resonators, with their openings facing the same way, each with a connecting sound tube for the ears of the observer. In use the bar is turned until a position is found in which the sound is loudest and equally distinct in each ear. The location of the sound is at a right angle to the bar in the direction to which the resonators face.

TORAH, or THORAH. See Pentateuch.

TORBANITE, a lustreless variety of can- nel coal, especially rich in volatile matter formerly used in the manufacture of illuminat¬ ing gas, paraffin and lubricating oils. It oc¬ curs at Torbane Hill, near Bathgate, Scotland, but the supply is exhausted. See Boghead Coal.

TORBERNITE, an ore of uranium con¬ sisting of a hydrous phosphate of uranium and copper, CUO.2UO3.P2O58H2O, obtained 'in Utah and Black Hills of South Dakota.

TORBERT, tor'bert, Alfred Thomas Archimedes, American soldier: b. Georgetown, Del., 1 July 1833; d. at sea off the coast of Florida, 29 Sept. 1880. He was graduated at West Point in 1855, was engaged on

frontier duty in Texas, Florida, New Mexico and Utah in 1855-60, and at the outbreak of the Civil War was assigned to the duty of mustering in volunteers. He was commissioned colonel in 1861, and led his regiment in the Peninsula cam¬ paign of 1862 ; was assigned to the command of a brigade in that year; and participated in the second battle of Bull Run and in the battles of

South Mountain and Antietam. He was pro¬ moted brigadier-general of volunteers in 1862; commanded a brigade at Gettysburg in 1863; for gallantry there was brevetted major in the reg¬ ular army; in April 1864 was transferred to the cavalry service and placed in command of the 1st division of the Army of the Potomac. He commanded the cavalry in many subsequent en¬ gagements, including those at Hanovertown, Milford, Winchester and Waynesboro. In 1864 he was brevetted major-general of volunteers, attaining the same rank in 1865 in the regular army. In 1866 he was mustered out of the volunteer service and resigned his regular army commission. He was United States Minister to the Central American States 1869-71, was trans¬ ferred as consul-general to Havana, Cuba, and in 1873—78 was consul-general in Paris. He was lost in the foundering of the Vera Crus off the coast of Florida.

TORCELLO, tor-chel'ld, Italy, an island in the lagoon of Venice, six miles above the city. It is the see of a bishop and possesses an ancient Byzantine cathedral of Santa Maria of the 7th century, with mosaics of the 12th cen¬ tury, curious altar-benches, an antique crypt, octagonal baptistery from 1008 and a belfry; Santa Fosca is another handsome church with a fine interior (12th century). Pop. 130.

TORDENSK JOLD, Peter, Norwegian naval officer: b. Trondhjem, 1691; d. 1720. He endeared himself to the people by his exploits in the navy to which he was appointed a lieu¬ tenant in 1711, and in 1716 was given noble rank for his victories. When but 25 years of age he destroyed the Swedish fleet of 44 ships and compelled the raising of the siege of Fredriks- hald by Charles XII. He was made vice-admiral (1719) for the destruction of the prin¬ cipal Swedish squadron.

TORGAU, tor'gow, Germany, a town in the province of Saxony, Prussia, on the Elbe, 32 miles northeast of Leipzig. Prior to 1889 it was a fortified town, and has considerable historical significance in

connection with (1) the Alliance of Torgau, a confederacy formed in 1526 by Saxony, Hesse and other German states in which Protestantism united for the purpose of defense against aggression on the part of their antagonists ; (2) the Articles of Torgau, a dec¬ laration by Luther and his supporters in 1530, which was the foundation of the Augsburg Con¬ fession; (3) the battle of Torgau, fought in the suburb of Luptitz, 3 Nov. 1760, when the Prus¬ sians under Frederick the Great defeated the Austrians under General von Daun ; (4) the siege of Torgau by Tauentzien in 1814, the city holding out for three months and surren¬ dering 10 Jan. 1814. The Renaissance Harten- fels Castle of the 15th century was a former electoral residence. In the town-hall is a museum of Saxon antiquities. There is here a modern fort for the protection of the railway system. The royal stud farm was long located m the vicinity. Pop. about 13,000.

TORMENTIL, an old provincial name for various species of Potentilla (q.v.), a plant supposed to yield relief from the torment of toothache.

TORNADO, from the Spanish tornada, (<a turning about,)} the local name given in various tropical and subtropical regions, notably Sene¬

gal, to violent whirlwinds or cyclones, with the usual accompaniment of electrical disturbances and downpouring rain. See Cyclone; Meteor¬ ology; Wind.

TORNADO ALARM, an apparatus which automatically gives an alarm when there is a sudden change of atmospheric pressure, such as precedes a tornado. It is a form of barometer in which the main mercury tube has a cylin¬ drical bulb at the top and is bent in the form of a siphon. Near the lower portion of its shorter member is a secondary tube, the con¬ nection being made by means of a short tube connecting with the main tube by a very small opening. The fluid in both the larger tubes will remain normally of equal or nearly equal height in ordinary changes of the weather, but in case of sudden atmospheric changes the small opening in the connection between the tubes restricts the movement in the secondary tube as compared with that in the main tube. Such variation in the movement of the mercury in the two tubes when sufficient to indicate an ap¬ proaching storm, is made to give an alarm by means of floats in the tubes connected with wires in an electric circuit, there being on one wire a fork and on the other a tongue, by which contacts are made, to ring an alarm when the points meet. This alarm should sound some two minutes before the first blasts of the tor¬ nado. Ordinary storms have no effect at all on the apparatus.

TORNEA ELF, tor'ne-a elf (sometimes written Tome), Sweden, a river at the north, which rises in Lake Tornea. Part of its course forms the boundary between Sweden and Fin¬ land, and then empties into the Gulf of Bothnia, after a course of 275 miles. The town of Tornea stands at its mouth and on the opposite side of the river the Swedish town of Hapa- randa.

TORONTO, Canada, a city and lakeport, the capital of the province of Ontario, situated on the circular Toronto Bay between the mouths of the Don and Humber rivers, on the north¬ west coast of Lake Ontario, 313 miles west- southwest of Montreal and 60 miles in a direct line northwest of Buffalo, United States. It is the seat of the provincial government, of the higher law courts, of an important university and of the Department of Education of the province ; it is also the cathedral city of a Roman Catholic and of an Anglican diocese. In commercial importance it is the second city in the Dominion, and, after Montreal, the chief lailway centre. The Grand Trunk, the Cana¬ dian Pacific, and many branch lines connect it with the principal cities of Canada and of the northern United States, and it is the head¬ quarters of the Canadian Northern and the Temiskaming and Northern Ontario railways. The fine harbor, five miles long and one and a half wide, is formed by a long, low, sandy island, protected by imposing breakwaters ; this island is, in summer, a favorite bathing and heating resort. A great scheme of development, which includes the deepening and extension of the harbor, land reclamation, boulevard con- sti uction and the creation of industrial sites is in progress. The city rises gradually from the \vater s edge to a height of 220 feet; it extends from east to west for about 10 miles along the lake shore and from north to south from three

TORONTO, CANADA

View of the Centre of the City

TORONTO, CANADA

1 Ontario Parliament Buildings

2 The University of Toronto

to seven miles, and covers an area of about 32 square miles, with streets crossing each othei at right angles. An electric street railway

sys¬ tem has about 144 miles of tracks. The archi¬ tecture, especially of the numerous public build- mgs, is tasteful and imposing, and there are many fine shops and residences. Brick of a pleasing light color, or red, is the chief building material. Of the public buildings, the most striking group is that connected with the Uni¬ versity of Toronto. The main building or University College, a fine Norman structure in gray stone, with a massive tower and richly sculptured doorway, was rebuilt after partial destruction by fire in 1890; the Library, the new Medical Building, the Biological Department, the School of Practical Science, with its hand¬ some new engineering building in the Renais¬ sance style, and a number of other large struc¬ tures, unite with this to make up an imposing group, not wholly harmonious, but in a spacious setting of park land. Adjacent are the ((Neo- Greekˆ Parliament buildings, containing the government offices, and a handsome and well¬ decorated legislative hall. The magnificent city hall and courthouse is, next to the univer¬ sity, the most striking of Toronto's buildings. Others worthy of mention are Osgoode Hall, the seat of the provincial law courts; the Nor¬ mal School buildings, offices of the Department of Education; Central Technical School; Trin¬ ity College, in connection with the Church of England, an ornate building, in the late Gothic style ; the custom house, the post office, the exhi¬ bition buildings, where an important annual exhibition is held, and the lunatic asylum, in about 40 acres of ground. A new Union rail¬ way station to cost $5,000,000 is in course of construction. The churches most worthy of notice are the Roman Catholic and Anglican cathedrals, both in the pointed style; the latter is an excellent specimen of Early English. There are numerous theatres and many public halls, the chief being the Massey Music Hall, which will hold 4,000 or 5,000 people. Toronto has 1,329 acres of park, the chief being Queen's Park, adjoining the university, and the extensive High Park, at the west of the city. It is a great educational centre. The university (see following article) is one of the best equipped in America. Educational institutions connected with it are Trinity College (already men¬ tioned) ; Victoria College (Methodist, arts and divinity) ; Knox College (Presbyterian, theo¬ logical) ; Wycliffe College (Anglican theolog¬ ical) ; Saint Michael's College (Roman Catho¬ lic), and colleges for instruction in music, den¬ tistry, pharmacy and veterinary science. Its agricultural college is situated not at Toronto but at Guelph, Ontario. McMaster University is an independent Baptist institution, teaching arts and divinity. Upper Canada College, in spa¬ cious grounds, is a residential school for boys, as is also Saint Andrew's College, the site of which was acquired in 1917 for a military hos¬ pital. Havergal College is a similar type of school for girls, and besides it are Bishop Strachan's School, Saint Margaret's

College, etc. The Toronto Conservatory of Music has a very large number of pupils. The Observa¬ tory, at which the weather reports for the Do¬ minion are made up, is in the university grounds. Toronto has suffered from destruc¬

tive conflagrations, notably in 1849, in 1890 and m April 1904, when more than 100 buildings in the wholesale business section were burned down, some 5,000 persons were thrown out of work, and about $11,000,000 worth of property was destroyed. The industries of Toronto in¬ clude a great agricultural implement factory, iron foundries, shipbuilding, rolling stock, dis¬ tilling and brewing, pork-packing, the manu¬ facture of soap, tanning, , aeroplanes, etc. The city possesses a well-equipped system of public libraries, with a fine reference library centrally located, in which the John Ross Robertson his¬ torical and ornithological collections are housed. Shipping on the lakes is laid up in winter, but during the navigable season several lines of steamers connect with the principal ports on the Great Lakes and the Saint Lawrence. The lake commerce in lumber, grain, coal, cattle and fruit is large. Toronto's bank clearings in 1917 were $3,004,785,565 ; customs revenue, $35,732,- 400. The city has over 1,700 manufacturing es¬ tablishments, employing 80,000 hands.

The name Toronto is derived from the Huron word, signifying «place of meeting. » In 1749, when the French were establishing a chain of forts or posts through all the West and down the Mississippi Valley, Fort Rouille was founded, on a site even then often called Fort loronto. In 1756 this fort, on the west side of the present city, was destroyed to prevent its falling into the hands of the English. In 1793 Governor Simcoe finding Niagara or Newark, which lay almost under the guns of an Amer¬ ican fort, too close to the frontier for the seat of government, removed the capital to the other side of Lake Ontario and established his head¬ quarters in a tent, on a site in the eastern part of the present city. In 1813 Toronto, called York by Governor Simcoe, was captured and partially burned and looted, twice in the same year, by the American army and navy. In the first capture the American General Pike, the discoverer of Pike's Peak, together with many soldiers, was killed by an explosion. In 1834 Toronto was incorporated as a city with its present name. In 1837 it was the chief scene of a brief and ineffectual rebellion under Wil¬ liam Lyon Mackenzie (q.v.). At that time and often since Toronto has shown itself to be fer¬ vently British in sentiment. Its later history has been purely civic, without other interest than that attaching to prosperous growth. A pleasant society and an attractive situation make it a favorite place of residence. Population has increased rapidly. In 1793, when Governor Simcoe landed, there were only a few families. In

1834 the population was less than 10,000. In 1861 it had increased to 44,821, in 1871 to 56- 092 and in 1881 to 86,415. In 1891, including some annexed suburbs it amounted to 181,220 and in 1911 to 376,240. Police census (1917)'

535,271.

Consult Scadding, (Toronto of 01d> ; Scad- ding and Dent, 'Toronto, Past and Present ; Adam, 'Toronto, Old and New* ; and 'The Toronto Annual.)

George M. Wrong,

Professor of History , University of Toronto.

TORONTO, Ohio, village in Jefferson County, on the Ohio River, and on the Penn¬ sylvania Railroad, 10 miles above Steubenville, the county-seat. It is in a region in which

there are extensive beds of clay and large stone quarries. It is near the natural-gas fields of West Virginia. The chief manufacturing es¬ tablishments are potteries, brick and tile works, The shipments are chiefly pottery, sewer pipe, terra-cotta and fire-brick. Pop. 4,271.

TORONTO, University of, situated at Toronto, Canada, the head of the educational system of the province of Ontario. The first step toward the establishment of the univer¬ sity was taken in 1797 when the council and assembly of Upper Canada petitioned the king for an appropriation of Crown lands for the purposes of education, and the establishing of a university. The appropriation was made, but nothing further was done toward the found¬ ing of the university until 1827, when it was chartered under the name of the University of King's College; the organization of the university was further delayed, largely owing to objections to the sectarian character of its charter, which was amended in 1837 ; and it was not till 1843 that it was opened to stu¬ dents. In 1849 the name was changed to the University of Toronto; in 1853 the university was further transformed by the organization of two corporations, known as the University of Toronto and the University College; to the latter was assigned the teaching in arts and the entire control of its students. In 1887 a further organization of the whole university took place. Under what is known as the ˆFederation Act® the university became a teach¬ ing body once

more, with faculties of arts, medicine, applied science and engineering, to which have been added since, faculties of educa¬ tion, forestry, household science and music. In the faculty of arts the subjects were divided as between the University of Toronto and Uni¬ versity College, which may be termed the State Arts College, the complement of the faculty of arts of the university. In this reorganization of the faculty of arts there are now Victoria College, representing the Methodist Church of Canada; Trinity College, representing the Church of England; Saint Michael's College, representing the Roman Catholic Church — so that there are four arts colleges giving instruc¬ tion in the same arts subjects, but sending their students to the university for instruction in other subjects, among which are mathematics, sciences,, philosophy, political science, history.

The institutions which have close relations with the university are either federated or affil¬ iated. Among the federated institutions, out¬ side the arts colleges, are Knox College and Wycliffe College, while among the affiliated colleges are the Ontario Agricultural College, the Royal College of Dental Surgeons, the On¬ tario College of Pharmacy and the Ontario Veterinary College. These federated and affil¬ iated colleges are represented on the senate of the university, which has charge of the edu¬ cational policy. Each faculty has its own council and has charge of the discipline and con¬ trol of its students, while the caput is made up of the chief executive officers of the uni¬ versity, together with the heads of the feder¬ ated colleges.

The university receives a very substantial grant annually from the government of the province of Ontario and is affiliated with the leading universities of Great Britain and Ire¬

land, as well as with the General Medical Coun¬ cil of Great Britain.

The degrees offered by the university include arts, medicine, applied science and engineering, pedagogy, forestry and music, under the regular faculties, while through the affiliated institu¬ tions degrees are given in law, dentistry, agri¬ culture, pharmacy, with diplomas in public health and physical training. Extension and summer session work are carried on in the faculty of arts. The university is coeducational and had during the session 1918-19 an attend¬ ance of approximately 3,000, which is likely to develop to a greater attendance than in pre¬ war days, when the enrolment exceeded 4,000.

The important building* are the main build¬ ing, convocation hall,

the library, household science, the various laboratories and within Toronto the buildings of Victoria College, Trinity College and Saint Michael's College.

Provision is made for the undergraduate activities of the men in Hart House, the gift of the Massey Estate. There are residences for men students of the university and for both men and women in University College, Victoria, Trinity and Saint Michael's colleges.

TORPEDO, a genus of rays of the family T orpcdinidce, most remarkable for their elec¬ tric organs, which lie on each side of the head. (See Electric Fishes). The electric shock is powerful enough to kill small animals, and specimens two or three feet long can by a single discharge disable) a full-grown man. 4 he family, which includes about seven genera and 15 species, is widely distributed over the Atlantic and Indian oceans ; T . ynarynoratci and two others are common in the Mediter¬ ranean, and T. hebetans reaches the south coasts of Britain. The American form most often seen is T. occidentals, which may reach a weight of 200 pounds; it is uncommon, but occasionally seen along the coast from Cape Cod to Cuba.

TORPEDO, Automobile. See Automo¬ bile Torpedo.

TORPEDO-BOAT DESTROYERS. See

Anti-Torpedo Boats.

TORPEDO BOATS. The torpedo boat first made its appearance as an adjunct to the fleet in 1886. At that time its displacement was less than 100 tons, and its speed about 20 knots an hour. From that time on it gradually increased in size and speed until in 1896 its displacement was about 125 tons and its speed about 23 knots an hour. The next evolution was the destroyer. This new type of vessel became necessary, for the dangerous character of the torpedo boat was fully recognized, armed as it was with an inaccurate weapon'. During the revolution in Chile in the earlv nineties a battleship was destroyed by a torpedo fired at night from a large torpedo boat, and during the Japanese-Chinese War in the middle nineties torpedo boats were freely used by the Japanese.

As the years went by the range and ac¬ curacy of the torpedo rapidly improved and the torpedo boat increased its size to make it more habitable and seaworthy. Its tonnage soon rose to 400 tons and then merged into the destroyer. As the size of the torpedo boat still increased, destroyer tonnage was compelled to keep pace, the final or

present destroyer dis-

placement of about 1,100 tons (with a speed of about 32 knots per hour) having been reached and determined by most nations from a consideration of the strategical and tactical duty of the fleet with which it serves. The offensive weapon of the destroyer was originally the gun, but after the torpedo boat disappeared the torpedo became the important weapon and the guns were retained for defense only. The pivotal characteristics of the destrover were high speed, seaworthiness, moderate radius of action and plurality of torpedo tubes and torpedoes. 1 o enhance these characteristics in¬ creased size was necessary and this lessened the chance of being able to surprise an enemy on the alert, and surprise was a corollary in its usefulness. These considerations tended to limit the size and when sufficient tonnage for necessary offensive work was gained, no further increase was thought justified. The present tendency is to increase the destroyer's gun- power for offensive purposes against the sub¬ marine and this brings the destroyer back to the original conception of the use of that type. Further development will undoubtedly be toward high speed, moderate size, long-range torpedoes, a plurality of small guns and large radius of action. The destroyer, supported by large cruisers, makes an excellent offensive force, especially when armed with long-range torpedoes. Making contact in the daytime with an enemy's fleet, destroyers can, at night, readily slip through the screen and attack the enemy while in its night formation.

A well co-ordinated destroyer force be¬ comes a most important asset to a fleet when about to go into battle. A well-timed feint upon the battle line of the enemy may give to its own battle line a verv important advantage of position. By the intelligent use oi a smoke screen, made by emitting large volumes of oil smoke from destroyers' smoke stacks, a battle line in confusion can be rescued from destruc¬ tion and permitted to reform or to escape. In the battle of Jutland the German fleet was concealed in a smoke screen formed by Ger¬ man destroyers at the time when the main British fleet was about to bring a superior force against it. When the smoke cleared it was observed that the German fleet had ex¬ tricated itself from danger.

While the first duty of the destroyers was to run down attacking torpedo boats and sink them with the fire of their small rapid- fire guns, it was also armed with torpedo tubes in order that it might be

used as an at¬ tacking torpedo vessel and to defend the battle¬ ships at night. The smaller type of torpedo vessel — the torpedo boat — was classed as a weapon of defense, employed to guard the home coast from raids by the enemy's war¬ ships, while the larger was regarded as an offensive weapon, used to destroy the smaller type and allow capital ships to perform, with¬ out danger, their duties of blockade and various war measures. See Submarines.

Edward S. Farrow,

Consulting Military and Civil Engineer.

TORPEDO DRAG, a device for clearing harbors, river-channels, etc., from floating torpedoes and submarine mines. It consists of a long cable, bearing grappling hooks set at frequent intervals. The ends of the cables are

made fast in boats, one on either side of the channel, and as the vessels -proceed up and down the channel, abreast, the hooks on the rope be¬ tween them catch the torpedoes. Sometimes a drag is thrown ahead of a vessel by a small mortar and is drawn in by a windlass; this is to clear the channel through which the vessel must pass.

TORPEDOES. Torpedoes or explosives moving through the water to the object at¬ tacked, as distinguished from the mine or stationary explosive, first took the form of what was in reality a towed mine. The Harvey, Menzing and the various French towing torpedoes were weapons of this kind. The torpedo was towed astern of a launch with a rig that permitted a rudder on the torpedo be¬ ing controlled from the towing boat. The torpedo could be guided to a position on the quarter, while a second torpedo was towed astern. By means of a dipping or detaching apparatus, when the whiskers of the torpedo touched the target, the torpedo would become completely submerged before the explosion took place. Torpedo warfare received great impetus during the Civil War, various types being de¬ veloped by both the Confederates and the Federals. Dragging for torpedoes and the use of torpedo nets dropped over the sides of ves¬ sels were then first practised, but there appears to have been no use of submarine boats until more recently. During this war the spar or outrigger torpedo came into active use and on more than one occasion during that period and later proved its worth. This weapon consisted of a torpedo carried at the end of a spar or pole which projected from a launch. It was so arranged that just before the target was struck, the

torpedo could be plunged below the sur¬ face to obtain the holding or plugging effect of the water for the explosion. The explosive usually consisted of about 33 pounds of guncot¬ ton which could be fired upon contact, or at will, by employing a firing battery. To carry and drive home the spar torpedo a fast sea¬ worthy launch or small torpedo-boat was em¬ ployed.

In its early stages of development, battle ranges seemed logically to keep the torpedo in the background, except at night, when the speedy torpedo-boat counted upon getting near enough to launch its weapons with a more reasonable promise of making a hit. The naval constructor, accepting the torpedo at its poten¬ tial value as seen by the majority of the fight¬ ing officers simply limited his efforts to fabricating the under-body of his fighting craft so that the damaging effects of a chance blow from a torpedo should be confined to a re¬ stricted area. Hence the inner and the outer bottoms, and the water-tight, cellular division- ing of the intervening space. As a matter of fact, the naval constructor's work stood up under torpedo attack and performed its func¬ tion remarkably well. It is a matter of record, that the general run of torpedoes fired during the Russo-Japanese War did far less damage than was expected of them, and a goodly num¬ ber of vessels so struck were not sunk as was counted upon, but were able to get into port and be repaired. There were ships lost to both belligerents by subaqueous attack, but the most conspicuous of these disasters were due

to the violent blows of passive mines. Where the active torpedo had failed in its mission the anchored floating mine filled the offensive gap. These mines carried larger explosive charges than the torpedoes then in service, and proved two things : First, that the naval constructor had planned well ; and, second, that the auto¬ mobile torpedo must needs be made a more powerful weapon if it were to fill the office in¬ tended for it. In the Russian fleet at Port Arthur were several vessels that had been built by the French for the Russian government. In addition to the usual compartmenting of the inter-bottom space, the French designers had reinforced the region most likely to be attacked by torpedoes by means of a caisson built of plating nearly two inches thick. The object of this caisson — assuming that the explosion of the torpedo should be sufficient to rend or rupture the plating o f the inner and outer bot¬ toms was to provide more space in which the guncotton gases could expand and dissipate

the most dangerous percentage of their remaining force. The ingenious theory of this style of construction was proved to be all that its originators claimed for it. The Russian ships so built were several times hit by Japanese mines, and while grievously wounded over wide areas of their under-bodies, yet the caissons remained substantially intact and the vessels were able to return to harbor.

. The automobile torpedo first came into use in the early seventies. It was the outcome of a series of experiments commenced in 1864 by Robert Whitehead, then superintendent of iron works at Fiume, Austria. This torpedo, known as the Whitehead or fish torpedo, claimed the following capabilities: (1) It could be adjusted to run at any depth from 5 to 15 feet when fired from either a submerged or surface tube, or from a surface detaching apparatus; (2) upon firing, it would make a straight run, pro¬ vided a proper allowance was made for the deflection due to transverse currents; (3) it could be adjusted to stop at any distance up to its extreme range and after stopping to sink or float; (4) it could make a run of 1,000 yards at a speed of 15 or 16 knots, while 300 yards could be covered at a speed of 19 to 20 knots; (5) it could carry a warhead holding a charge of 33 pounds of guncotton, to explode upon contact. This torpedo was propelled by a three-cylinder Brotherhood engine weighing 35 pounds, driving two propellers and developing 40 horse power. Eventually the Whitehead torpedo came to be used in the United States service, and later the Bliss-Leavitt torpedo was adopted. As heavier armor was added against a**ack a large gap developed which the Whitehead torpedo and its various kindred rivals could not fill, and here it was that the genius of an American naval officer, Com¬ mander Cleland Davis, placed the torpedo upon a new and more formidable footing. He aban¬ doned the guncotton warhead, which was the accepted instrument of destruction since the inception of the Whitehead, and substituted a gun in its stead. If one will study carefully the photographs of either bursting submerged mines or exploding automobile torpedoes, the most impressive visual sign of the violence ex¬ erted will be found in the great volumes of water blown upward. The water has yielded more than the steel structure attacked, and

the major part of the energy designed to wreck has spent itself uselessly in blowing hundreds of tons of water into the air. Commander Davis sought so to concentrate the powers of assault in his torpedo that but little of its force should be dissipated in disturbing the surrounding water while the bulk of the energy of his weapon should remain unimpaired and centred in piercing the enemy's defenses and penetrat¬ ing to the very vitals of the object of attack. He did not discount in the slightest the truly remarkable developments

which had taken place in the other departments of the automobile tor¬ pedo. Increased range, higher speed and more precise functioning all helped him toward his objective; but it is his invention which made this underwater projectile a graver menace to the largest of fighting craft. This torpedo car¬ ries an eight-inch gun capable of expelling an eight-inch projectile with a muzzle velocity of 1,000 feet per second, which is quite enough to carry the projectile through a single plate of Ivrupp armor, something like four or five inches thick, where virtually in contact with the muz¬ zle of the gun — as would be the case with this torpedo. Ships are not protected under water with plating of these dimensions, and it would be a much easier task for the projectile to pass successively through a number of thinner plates even if their combined thickness were more than the limit set. The projectile fired from this torpedo carries a bursting charge of high explosive of between 35 and 40 pounds. This charge is detonated by a delayed action fuse, which is designed to meet the maximum re¬ quirements imposed by the best protected dread- naughts built. When this weapon is launched upon its sinister errand the little propeller at the upper side of the torpedo's nose revolves, and releases the tripping rod, so that the tor¬ pedo can be discharged upon contact with its target. When the rod hits the obstruction it is driven backward and engages the trigger which first compresses a spring attached to the firing pin and then releases it so that the pin can strike the gun primer, thus setting off the pro¬ pelling charge of powder which drives the shell out of the gun. As soon as the projectile hits the outside plating of a ship's bottom the fuse in the base of the shell begins to function, being set to explode the charge in the shell so maiiw hundredths of a second after impact.

. he model n submarine torpedo varies in size according to the service for which it is intended and ranges from 14 inches in diameter and 15 feet m length to 21 inches in diameter fee* in length, weighing from 1,000 to 2,6(X) pounds, the smaller type being used to sink unprotected freight and passenger ships

ra"p- lt 1S 'capable of a speed of more than 30 miles per hour and when travel¬ ing at normal speed possesses the great mo¬ mentum of about 65,000 foot second pounds. Generally speaking, the torpedo consists of the following parts: (1) The warhead, which con¬ tains the high explosive charge, fired by an exploder upon striking the target, the charge ranging from 200 to 500 pounds, depending upon the type of torpedo; (2) The air flask a special y constructed shell of steel, very strongly built to withstand a test pressure of 5 000 pounds to the square inch. This flask carries air at an initial pressure of 2,250 pounds per square inch, the air being used to operate all

the mechanism of the torpedo in addition to the motive power; (3) The depth control mechanism, which permits the torpedo to be ™n at any desired depth under water, and which consists principally of a pendulum and a /^?rSatlC pistpn ?ctuating horizontal rudders ; (4) The gyroscopic steering gear. The gyro- static compass through the vertical rudders maintains the torpedo on a course parallel to that in which the torpedo began its run; (5)

o oifn en£>ines- The air at the high pressure of 4350 pounds per square inch first passes through a reducing valve which decreases its pressure to that required for use by the engine. This air is then heated by an alcohol flame, which also acts to produce steam of the water in the combustion flask, the air and steam mixing and passing to the engine. The engines are gen¬ erally reciprocating, but in the Bliss-Leavitt and some other torpedoes are turbines driving two propellers.

Torpedoes are projected by means of special fonns of tubes or guns. The tube is usually built into the hull of the submarine, in which case it is aimed by manoeuvring the boat. In the case of destroyers and battleships, the tor¬ pedo may be projected from submerged tubes or from deck tubes. In general, torpedoes are projected from submerged tubes by compressed air and from deck tubes by a small charge of gunpowder. Submerged tubes on battleships, however, may be designed to use either powder or compressed air. When the torpedo is fired from a submerged tube the compressed air or the gas from the powder follows the torpedo out of the tube with a rush and causes an eruption on the surface of the sea, which is visible for a considerable distance. As a re¬ sult of the warning given by this eruption, vessels have sometimes been able to escape the torpedoes by a quick manoeuvre. The modern torpedo is self-propelled, being driven through the water by its own compressed air motor, the air being supplied from a strongly-built reservoir within the body of the torpedo itself. Torpedoes directly operated by internal com¬ bustion engines as motive power are not trust¬ worthy. The range of a torpedo is approxi¬ mately a mile, those designed for use on battle¬ ships and destroyers being longer ranged than those for use on submarines. The great diffi¬ culty in getting proper direction and sufficient motive power to give the required speed for a long duration of time renders the long range torpedo impracticable. The latest German tor¬ pedo had a range of about 2,000 yards, as the compressed air storage reservoir was reduced in size in order to increase the charge of high explosive in the warhead. The charge was from 300 to 400 pounds. The depth at which a torpedo travels may be regulated to hit the most

vital part of the vessel, and that is usually about 10 feet below the surface. In case of torpedo attack against an armored ship the torpedo, to be dangerous, should strike be¬ neath the armor belt, which usually extends about 10 feet below the water line. Torpedoes are usually provided with means to cut, more or less effectively, through nets placed in their paths. The detonation of the torpedo is ac¬ complished through a mechanism placed within its warhead; and if the torpedo is checked in its forward motion the firing mechanism in¬ stantly ignites the heavy charge of explosive

contained within the warhead. It is not neces¬ sary to strike a firing pin on the end of a tor¬ pedo to detonate the charge. Many sugges¬ tions have been submitted for a torpedo to be electrically propelled from a ship by means of a flexible cable connecting it with the ship. This was the first type of torpedo built, but was discarded for the present dirigible type, as the weight of cable, difficulties in insulation, etc., render it of little practical value. The effectiveness of the Hammond radio-controlled torpedo is promising. The Board of Ordnance and Fortifications recommended favorably to the Secretary of War as to the merits of this invention, and the Secretary recommended to Congress that this new type of weapon be in¬ stalled in a few of the more important coast defenses.

When firing a torpedo at a moving target there are several important factors which the torpedoist must consider. These are the speed of the target, the course of the target and the speed of the torpedo itself, all of which factors must be known within limits in order to make effective hits. The various nations have their preference for torpedoes. The British use the Whitehead ; the Germans, Schwartzkopf ; the French, Whitehead and Schneider; the Japan¬ ese and Italians, the Whitehead. In the United States the Whitehead and Bliss-Leavitt tor¬ pedoes are in general use. See Naval Mines; Submarine Mines; Submarines.

Bibliography.— Fitzgerald, C. C. P., Sub¬ marine Warfare *(London 1919) ; Talbot, F. A. A., Submarines, their Mechanism and Oper¬ ation (London 1915) ; Donville-Fife, Charles W., Submarine Mines) (London 1914) ; Naval Annual, <British and Foreign Torpedo Boat Flotillas) (London 1912) ; Fulton, Robert, tor¬ pedo, War and Submarine Explosions* (re¬ print, New York 1914) ; Currey, E. H., (The Menace of the Torpedo *(New York 1914) ; Bradford, R. B., (History of Torpedo Warfare* (Newport, R. I., 1882).

Edward S. Farrow,

Consulting Military and Civil Engineer.

TORQUAY, tor-ke', England, a fashionable watering place in Devonshire, situated on the south coast, 26 miles northeast of Plymouth, named from the Tor Abbey nearby, which was founded in 1196. It is built on a series of terraces rising from the beach, and is a much frequented bathing and winter resort. It con¬ sists largely of villas and gardens, and has a fine promenade, public parks, libraries, a mu¬ seum, electric light and an excellent water sup¬ ply and drainage system. There are manu¬ factures of terra-cotta ware, and trade in coal and marble. The name also applies to the borough and the Parliamentary division in which it lies. Pop. of the borough about

39,000.

TORQUE, an ornament of twisted gold or other metal, worn as a collar or a necklace by the ancient peoples of Asia and northern Europe. It consisted of a circle of stiff gold, twisted except at the ends, which remained straight or which in some cases were looped back, so as to overlap. Such collars were con¬ sidered a characteristic ornament of the ancient Gauls and are said to have been so abundant that about 223 b.c., Flaminius Nepos erected to Jupiter a golden trophy made from torques of

conquered Gauls. The Torquati, a family of Manlian gens, attribute their name to their an¬ cestor T. Manlius, who having slain a giant Gaul in single combat lifted from the neck of the dead body an enormous gold torque, which he ever afterward wore upon his own.

TORQUEMADA, Juan de, hoo-an' da tor-ka-ma'tha (Latinized form Turrecremata), Spanish theologian and cardinal : b. Valladolid, 1388; d. Rome, 26 Sept. 1468. He entered the Dominican order in 1403, and was graduated at the University of Paris in 1424. After serv¬ ing as prior at Valladolid and Toledo, he was appointed by Eugenius IV master of the sacred palace in 1431. In 1439 he became a cardinal-priest, later exchanged his title for the cardinal- bishopric of Albano, and still later (1464) for that of Sabina. He gave liberally of labor and money to charities and church-building, and won tame as a theological writer and con¬ troversialist. He was an influential member of the councils of Constance, Basel and Flor¬ ence, at the last-

named of which drew up the proposals for union between the Greek and Latin churches. Among his works may be mentioned (Meditationes> (1467) ; (1477) ; and <Commentarii in De- cretum GratianP (1519). Consult Lederer, <Der spanische Cardinal Johannes von Torquemada)

(1879).

TORQUEMADA, Tomas de, Spanish monk, first Grand Inquisitor of Spain : b. Valla¬ dolid, 1420; d. Avila, 16 Sept. 1498. He en¬ tered the Dominican order, was for 22 years prior of the monastery at Segovia, and in October 1483 was made by Sixtus IV inquisi¬ tor-general for Castile and Leon. The Inquisi¬ tion (q.v.) had been established in 1480 at Se¬ ville, but Torquemada was the first to give it its organization. He founded four tribunals at Seville, Cordova, Jaen and Villa Real. Dur¬ ing his 18 years of office he burned 10,220 per¬ sons and condemned 6,860 to be burned in effigy. By these methods the Inquisition acquired vast sums of money. Torquemada was justly hated, and never went about without a body guard. His later activities were directed against the Jews and about 1,000,000 of them fled the country to escape his persecution. He was one of the most bloodthirsty fanatics of his¬ tory. Consult standard works on the history of Spain and of the Inquisition; also Molenes,

< Document Ineditis. Torquemada et requisi¬ tion > (1897).

TORRE DEL GRECO, tor're del graTco, Italy, on the Bay of Naples, seven miles south¬ east of Naples at the foot of Vesuvius. The town has been demolished by earthquake at various epochs, and in 1857 and 1906 a simi¬ lar disaster greatly changed and damaged the locality. It is much frequented by foreigners as well as Italians on account of its sea¬ bathing. There are important coral and other fisheries, besides shipyards, manufactories of rope, coral goods and lava ware. Pop. of commune about 36,000.

TORRENCE, Frederic Ridgely, American poet: b. Xenia, Ohio, 27 Nov. 1875. He was educated at Miami, Ohio and Princeton uni¬ versities, was librarian in the Astor Library 1897-1901, and since 1901 at the Lenox Library,

New York. He has published (The House of a Hundred Lights* (1900); (E1 Dorado: a

Tragedy* (1903); (Abelard and Heloise) (po¬ etic drama, 1907).

TORRENS, William Erskine, American promoter: b. New York, 15 July

1870; d. 20 June 1914. After making a study in the mills of New England and Philadelphia of manufactur¬ ing methods and finance, he became in 1896 foreign commissioner for the National Associa¬ tion of Manufacturers of the United States, and was thus engaged until 1899. During this time he secured concessions from Brazil, Vene¬ zuela, Argentina, Cape Colony, China and Japan for establishing sample warehouses for the exhibition of American manufactured goods. He has written Commercial Traveling in South America) (1897) ; Commercial Travel¬ ing in South Africa) (1898) ; Commercial Traveling in the East* (1899).

TORRENS, Lake, South Australia, a large shallow salt lake, the central one of a group in the central southern section, 125 miles long and 25 miles wide, about 50 miles north of Spencer's Gulf. In the dry season it is re¬ duced to a salt marsh.

TORRENS SYSTEM, a system of title- registration devised by Sir Robert Torrens, and first successfully used in Australia. Its object is to make the transfer of landed prop¬ erty as simple and as safe as that of any other property and to do away with the necessity of repeated title examinations. The system is operated through a bureau of registration, in charge of a registrar, and becomes effective on the first transfer of any property after the es¬ tablishment of the system, all land transactions being registered in this ofifrce. A title may be registered as absolute or as possessory. Be¬ fore registry the title is fully investigated by the registrar, who receives from the owner all the documentary evidences of title, descriptions of boundaries, etc. When the registrar is sat¬ isfied that the title is perfect, he files away all these old papers and issues to the holder a cer¬ tificate of ownership, a duplicate of which is filed in the registrar's office. Such certificates bear on their faces notice of all encumbrances on the property. If the estate is vested in fee simple the title is known as "absolute® and the certificate is stated to be an absolute certifi¬ cate. Should it appear that an absolute title to any land can be held only for a limited period or subject to reversions, then the regis- tiai will except from the effect of registra¬ tion any estate, right or interest arising before t it* specified date or under the conditions named, all of which will be entered in the register and noted on the certificate, which is stated to be a "qualified® certificate. In the case of a "possessory® title the applicant is registered as becoming owner on giving such evidence of title as may be prescribed, and the registration of any person as first owner with a possessory title only will not interfere with the enforcement of any estate, right or interest adveise to the title that may then exist or which may arise a later date. And this fact i» noted on the "possessory® certificate issued to the owner. This examination

and registra¬ tion of title does not have to be repeated after. a certificate has once been issued, the transfer

of the certificate with accompanying entry of that fact in the registrar's office completes the transaction. By this method the transfer of a land title certificate becomes as simple and as inexpensive as the transfer of a certificate of stock or of a bank share, and the holder of the title is absolutely free from the usual danger of land title transfers, such as flaws in the title, the neglect of obscure future con¬ ditions, etc. Should any person suffer loss through misdescription, omission or any other error in the certificate issued by the registrar, he is indemnified from an insurance fund cre¬ ated for that purpose. This fund is provided by the imposition of a tax of one-fourth of 1 per cent on the value of the land at the time of the first certificate of title being granted, _ in addition to the registration fees. The registrar is the judge in all cases as to the liability of the fund to such compensation. The fees for registration under the Torrens sys¬ tem are very small, usually being $24 in case of the first registration, and three dollars upon the issue of every subsequent certificate. The system has been vigorously opposed by title guaranty companies and by members of the legal profession who see in it an end to a fruitful source of fees since under it there is furnished State title insurance instead of pri¬ vate title insurance, with nominal cost for con¬ veyances.

The Torrens system is in use in South Aus¬ tralia (1858), British Honduras (1858), Van¬ couver (1860), consolidated with British Co¬ lumbia (1866), Queensland (1861), Tasmania (1862), New South Wales (1862), Victoria (1862), England (1862, 1875, 1897), Ireland C 1865, 1891), New Zealand (1870), British Co¬ lumbia (1871), Western Australia (1874), Wales (1875, 1897), Fiji (1876), British Guiana (1880), Ontario (1885), Manitoba (1885), Canadian Northwest Territories (1886), Lee¬ ward Islands (1886), Jamaica (1888), British New Guinea (1889), Cyprus (1890), Illinois (1895), Ohio (1896), California (1897), Massa¬ chusetts (1898), Minnesota (1901), Oregon (1901), Philippine Islands (1902), Colorado (1903), Hawaii (1903), Nova Scotia (1904), Alberta (1906), Saskatchewan (1906), Wash¬ ington (1907), New York (1908), North Caro¬ lina (1913), Mississippi (1914). The Massa¬ chusetts law is the best and the most success¬ ful in the United States; the New York law has been in great part a failure, due to de¬ fects in the act, of which the opponents of the

system have taken advantage. Since the origi¬ nal Torrens Act gave a judicial and discre¬ tionary power to the registrar not in conform¬ ity with the spirit of American institutions, this portion of the law has been slightly changed in order to adapt it to the require¬ ments of this country. Consult Niblack, William, (Analysis of the Torrens System *(Chicago 1912) ; Cameron, A. G., (The Torrens System* (Boston 1915) ; id., (The Torrens System, Its Cost and Complexity; a legal and Practical Treatise) (Chicago 1903) ; Torrens, Sir Robert, (Essay on the Transfer of Land by Registration (London) ; Beers, W. F.„ (The Torrens System of Realty Titles) (New York 1907) ; Kennedy, J. P., (List of Ref¬ erences on the Torrens System) (Virgina State Library, Richmond, Va., 1906).

TORRENTS OF SPRING (Weshniya Vodui*), by Ivan Sergeyevitch Turgenief, is the tragi-comedy of a man of weak will who succumbs to a passionate impulse, yields to the seductions of the typical ((vampire® woman and throws away the happiness of his whole life. (<Weak men,® says the author, <(never bring things to an end ; they always wait for the end to come.® The title is symbolical and not quite adequate, the comparison being introduced in the wrong place.

Sanin, a young nobleman, is in his 22d year, very good-looking, with handsome graceful figure, kindly bluish eyes, golden hair, a clear skin, a smile like a child's and giving the im¬ pression of (<freshness, health and softness, softness, softness,® a man ((recognizable at a glance as the son of a sedate aristocratic family, the type of the fine young pomyeshchik, born and reared in our wide steppe-like regions.® On his way home from Europe to Russia he is de¬ tained for a few hours at Frankfurt-am-Main, and by chance drops into a confectioner's shop conducted by the widow of an Italian Revolu¬ tionist. It happened that just at that moment Emilio the only son had fainted and his sister, Gemma, a young girl of exquisite beauty ap¬ peals to Sanin to bring him back to life. This the young man does; the family are profuse in their expressions of gratitude and persuade him to remain for a few days in Frankfurt. During a Sunday excursion with the two young people and Gruber, a bumptious and conceited German clerk to whom Gemma is betrothed, an intoxicated officer, Baron von Donhof, insults the young girl, and when her lover shows no spirit to resent it, Sanin impul¬ sively takes it upon himself to provoke the in¬ evitable duel. This duel is described at con¬ siderable length with a wealth of comic detail. Neither party is injured and the Russian and the Baron part almost friends.

It results, however, in Gemma's breaking her engagement with the ridiculous and pusil¬ lanimous Gruber, but Signora Roselli begs Sanin

to use his influence with her daughter to persuade her not to ruin her prospects and reputation by such an act, an engagement being regarded in Germany as no less sacred than marriage itself. Sanin reluctantly undertakes to fulfil this delicate mission but finds it im¬ possible, since he has himself fallen in love with the beautiful girl and she is no less fas¬ cinated with him. He decides to sell his estate in Russia and invest money in the widow's con¬ fectionary business. By another turn of fate he meets at this moment his former school¬ mate, Polozof, another type of the lazy, easy¬ going Russian, who is married to an enor¬ mously rich young woman. Polozof tells Sanin that his wife will perhaps buy his estate and offers him a place in his carriage to Wiesbaden where Marya Nikolayevna is taking a cure. She is beautiful but unscrupulous and plays all her arts to fascinate Sanin, who weakly yields and never returns to Gemma. Thirty years later Sanin, always unhappy in his remorse for his dastardly behavior finds a little garnet cross which Gemma had given him. It brings up all the details of his soul's tragedy. He goes to Frankfurt and through Baron von Donhof learns that Gemma had married a rich Ameri¬ can. He writes to her and when she replies,

enclosing a photograph of her own daughter, he sees in the picture the very image of his lost love and sends her the garnet cross to¬ gether with a magnificent string of pearls. Gemma is the very ideal of sweet girlish purity and charm and is presented in striking con¬ trast with the fascinating and not unsym¬ pathetic Russian siren who ruins men for her selfish amusement. It is an amusing and yet rather repulsive story. Originally published in the European Messenger (Vyestnik Yevropui) in 1872, it has been translated as 'The Torrents of Spring) by Constance Garnett (1897); 'Spring Freshets) by Isabel F. Hapgood (New York 1904) ; 'Spring Floods } by S. M. Butts (1874-75), and by E. Richter (London 1896).

Nathan Haskell Dole.

TORRES NAHARRO, B. de., Spanish dramatic poet: b. near Badajoz, about 1500. He is called the creator of Spanish comedy and was the first writer of his time to develop fully his plots. He wrote fluently in both poetry and prose and his collected works were dedicated to Ferdinand d'Avalos, the husband of Vittoria Colonna. It was not until

1520, however, that his plays became known in Spain where they were very popular.

TORRES (tor'res) STRAIT, the narrow channel which separates Australia and Papua. From Cape York on the northern coast of Australia to New Guinea it measures about 80 miles. . Navigation is unsafe owing to the shoals, islands and reefs within its waters. It was discovered in 1606 by a Spanish navigator from Peru.

TORRES VEDRAS, tor'res va/dras, Por¬ tugal, a town in the district of Lisbon, situated on the railroad, 25 miles north of Lisbon. It is noted for its extensive lines of fortifications, 28 miles long, reaching to the Tagus River, and protecting 500 square miles of territory. They were begun in 1809, and behind them Welling¬ ton in 1810 checked the French advance toward Lisbon. It has hot sulphur baths and an old Moorish citadel. Pop. about 8,000.

TORREY, tor'!, Bradford, American nat¬ uralist and author: b. Weymouth, Mass., 9 Oct. 1843; d. 1912. He was educated in the public schools, taught two years, entered business in Boston, and for many, years after 1886 was a member of the editorial staff of the Youth's Companion. He has been well ranked as a field ornithologist, and writes entertainingly of his observations. His essays have been collected into the following volumes: 'Birds in the Bush) (1885); 'The Foot-Path Way > (1892); 'A Florida Sketch-Book) (1894); 'Spring Notes from Tennessee) ; 'A world of Green Hills) (1898); 'Every-Day Birds) (1900); 'Nature's Invitation) (1904); 'Friends on the Shelf) (1906) ; 'Field Days in California*

(1913).

TORREY, Charles Cutler, American Se¬ mitic scholar: b. East Hardwick, Vt., 20 Dec. 1863. He was educated at Bowdoin College where he taught Latin (1885-86). He studied at Andover Theological Seminary (1886-89) and at the University of Strassburg (1889-92) where he took his Ph.D. degree. Since that time he has been instructor in Semitic languages at Andover (1892-1900), director of the Ameri¬ can School of Oriental Research in Palestine

(1900-01), editor Journal of the American Oriental Society (1900-07; 1911-16) and presi¬ dent of the society (1917-18). His publications include 'The Commercial-Theological Terms in the Koran) (1892) ; 'Composition and His¬ torical Value of Ezra-Nehemiah) (1896) ; 'The Mohammedan Conquest of Egypt and North Africa) (trans. from the Arabic, 1901) ; 'Selec¬ tions from Bokhari) (1906); 'Notes on the

Aramaic past of Daniel) (1909); 'Ezra Studies> (1910); 'Composition and Date of the Arts) (1916). Since 1900 he has been attached to Yale College.

TORREY, Charles Turner, American

anti-slavery reformer: b. Scituate, Mass., 21 Nov. 1813; d. Baltimore, Md., 9 May 1846. He was graduated at Yale in 1830, entered the Con¬ gregational ministry, and held pastorates at Princeton, N. J., and Salem, Mass. Having re¬ moved to Maryland to promote the cause of anti-slavery, he became an active agent of the Underground Railroad (q.v.), and was arrested and imprisoned in 1843 for his report of a slaveholders' convention held in Baltimore. The following year he was again arrested, and being convicted of aiding in the escape of run¬ away slaves, he was sentenced to a long term in the penitentiary. The harsh treatment he received while undergoing his sentence brought on consumption from which he died, and his remains were taken to Boston where he was honored by a public funeral. He was regarded as a martyr in the cause of abolition, and "Tor- rey's blood crieth out," became an anti-slavery watchword. He wrote 'A Memoir of William R. Saxton) (1838), and while in prison pro¬ duced a volume of sketches of Massachusetts life, 'Stone, or the Pilgrim's Faith Revived) (1846). Consult Lovejoy, 'Memoir of the Martyr Torrey) (1847).

TORREY, John, American botanist: b. New York, 15 Aug. 1796; d. there, 10 March 1873. He received his first instruction in botany, mineralogy and chemistry from Amos Eaton, and was graduated at the New York College of Physicians and Surgeons in 1818. His leisure from medical practice he devoted to scientific pursuits, particularly to botany, and in 1824 he abandoned medicine and became professor of chemistry, mineralogy and geology at West Point. From 1827 to 1855 he was professor of chemistry and botany at the College of Physi¬ cians and Surgeons, serving simultaneously at Princeton. From 1853 until his death he was chief assayer in the United States Assay Office, New York He participated in the councils of Columbia College as trustee, and in 1860 pre¬ sented to that institution his extensive her¬ barium and botanical library. In his special field of scientific research his publications were numerous. One of his earliest was a 'Cata¬ logue of Plants Growing Spontaneously Within Thirty Miles of the City of New York) (1819), which he prepared for the New York Lyceum of Natural History (now the New York Acad¬ emy of Science), of which he was a founder and for many years president. In 1843, as botanist of the Geological Survey of New York, he published an elaborate work on the flora of that State. Meantime he had issued in connec¬ ts™ w*th ˆsa Gray (q.v.), parts of a work on The Flora of North America* ; but this

was also discontinued after the completion of the

order Composite ?. From 1845 onward he pub¬ lished memoirs and reports on the botanical specimens brought back by expeditions to vari¬ ous parts of the West and South by Capt. John C. Fremont and others, among them being re- ports. on the botany of the expeditions for as¬ certaining the most practicable route for a Pacific railroad and making the Mexican boundary survey. He was president of the American Association for the Advancement of Science in 1855, and was named by Congress in 1863 one of the original members of the Na¬ tional Academy of Sciences.

TORREY, Joseph, American clergyman : b. Rowley, Mass., 2 Feb. 1797; d. Burlington, Vt., 26 Nov. 1867. He was graduated at Dart¬ mouth in 1816 and at Andover Theological Seminary in 1819. He was for a time pastor of a Congregational church at Royalton, Vt., but in 1827 became professor of Greek and Latin at the University of Vermont. In 1842 he took the chair of philosophy there, and in 1862-66 was president of the institution. He translated Neander's (General History of the Christian Religion and Church *(1854), and edited (Remains of President James Marsh* (1843) and (Select Sermons of President Worthington Smith) (1861). A volume of his lectures, (A Theory of Fine Art,* appeared posthumously (1874).

TORREY, Reuben Archer, American evangelist: b. Hoboken, N. J., 28 Jan. 1856. He was educated at Yale College and at Leipzig and Erlangen in Germany He was ordained as a Congregational minister in 1878, was super¬ intendent Minneapolis City Mission Society and became associated with Dwight L. Moody in 1889 and served as superintendent of the Moody Bible Institute until 1908. In 1902-03 he mˆde an evangelistic tour of the world. His life has been devoted to evangelistic work in many lands and he has written much on Bible subjects which have been translated in a score of languages.

TORREY BOTANICAL CLUB, a bo¬ tanical society in New York which is the most important organization of its kind in America, and one of the six scientific societies affiliated in the Scientific Alliance. The club was an out¬ growth of a former club, chartered in 1871. This band met in the herbarium of Columbia College, (<drawn there by the genial welcome and wide botanical knowedge of its presiding spirit, Dr. [John] Torrey,** and was the nucleus of the present club, finally

organized under its present name, complimentary to Dr. Torrey, in 1873. Dr. Torrey was the first president, but, unfortunately, died almost immediately.

The Torrey Club is the centre of botanical interest in New York, and the neighborhood, and is especially valuable for its weekly ex¬ cursions that may be joined by any botanist, and which take parties out to good botanizing localities under intelligent guidance. Many local floras have been compiled by members of the club, one of the most important of which, is that of Dr. Britton and others, (The Pre¬ liminary Catalogue of Anthophyta and Pterido- phyta growing within 100 miles of New York.* The valuable herbarium of the club includes the material for this list, and specimens of the flora, within the same area. It is now depos¬ ited at the New York Botanical Garden, which

was originated and developed by members of this society. The club issues three regular pub¬ lications, namely : Bulletin, a very scientific and widely known journal; Torrey a, of more popu¬ lar scope; and Memoirs , which include many valuable monographs.

TORRICELLI, tor-re-chel'le, Evangelista,

Italian mathematician and scientist : b. Faenza, Italy, 1608; d. Florence, October 1647. He early devoted himself to mathematical studies, and having read Galileo's dialogues,* composed a treatise concerning motion according to his principles. Galileo having seen this, conceived a high opinion of the author, and engaged him as his amanuensis. He accordingly went to Florence in October 1641, but Galileo dying three months after, Torricelli was about to re¬ turn to Rome, when the grand duke of Tuscany, Ferdinand II, engaged him to continue at Flor¬ ence, giving him the title of ducal mathemati¬ cian and the promise of a professorship in the university on the first vacancy. Torricelli's name is important in the history of science as the discoverer of the natural law according to which fluids rise in an exhausted tube from an open vessel exposed to the pressure of the at¬ mosphere, namely, that the weight of the fluid which rises in the tube is equal to the weight of an equal surface of atmospheric air of the height of the atmosphere. He also improved the telescope and microscope. See Barometer.

TORRICELLIAN EXPERIMENT, The,

so called because made by the Italian physicist, Evangelista Torricelli (q.v.), who discovered the principle upon which barometers are made. Torricelli was led to investigate Galileo's theo¬ ries of the law that

((nature abhors a vacuum.** He filled a glass tube, closed at one end, with mercury, and placing his finger over the open end inverted the tube. He now placed the tube vertically in a small trough containing mercury and removed his thumb from the open end, after it was under the surface of the mercury. The mercury in the tube dropped until it stood at a height of about 30 inches. Here it rested, with a vacuum in the top of the tube, under the closed end. Torricelli concluded that the col¬ umn of mercury in the tube was sustained by the pressure of the atmosphere on the larger surface of the mercury in the trough and that the height of the column was in inverse ratio to its specific gravity. Other experiments con¬ firmed this theory and led to the invention of the barometer (q.v.).

TORRIGIANO, Pietro, pe-a'tro tor-re- ja'no, Italian sculptor: b. about 1470; d. Spain, 1522. He went to England in 1509 to erect the tomb of Henry VII and his queen, still in West¬ minster Abbey. The works which he executed for English churches were destroyed by the Puritans. He was given a commission to make a statue of the Virgin Mary, and receiving what he considered an inadequate price destroyed it. For this he was imprisoned by the Inquisition, and there starved to death.

TORRINGTON, Frederick Herbert, Ca¬ nadian musician : b. Dudley, England, 20 Oct. 1837, and was educated there. When but 16 years of age he was made organist (1853) at Saint Anne's Church at Bewdley, England, and in 1857-69 he held a similar position at Great Saint James Street Methodist Church, Mon¬ treal, Canada. He then went to Boston where

he was organist in Kings Chapel (1869-73) and professor in the New England Conservatory of Music. Returning to Canada he became or¬ ganist of the Metropolitan Church at Toronto and conducted the Philharmonic Society there and founded (1886) the first Toronto musical festival. Two years later (1888) he founded the first college of music. He was elected presi¬ dent of the Canadian Society of Music in 1892. In 1895 and 1896 he conducted musical festivals at Toronto and in 1903 was assistant conductor of the cycle of musical festivals in that city.

TORRINGTON, tor'ing-ton, Conn., bor¬ ough in Litchfield County, on the Naugatuck River, and on the New York, New Haven and Hartford

railroads, about 23 miles west of Hartford and 18 miles north of Waterbury. Settlements were made in the vicinity in the early part of the 18th century, and in 1740 Torrington was incorporated. In 1887 it was chartered as a borough. It is the birthplace of John Brown (q.v.). The borough has a num¬ ber of manufacturing establishments; chief among which are bicycle and machine shops, plating-works, brass-works, woolen mills and novelty works. It also manufactures needles, hardware and tobacco products. In 1914 there were 54 manufacturing establishments, with a capital of over $16,000,000, and annual products of over $14,000,000, with payrolls of about $2,a00,000. The principal public buildings are the churches, schools and the Young Men's Christian Association building. The educa¬ tional institutions are a high school, public and parish schools, several private schools and a public library. There are two banks. The bor¬ ough is the commercial and industrial centre of the town of Torrington, which contains 20,623 inhabitants.

TORSION BALANCE, an instrument in which small forces are measured by noting the torsion that they can produce in a fine wire or a delicate fibre of some other material. The invention of the instrument is usually ascribed to Coulomb (1736-1806), who employed it in his extensive researches on electricity. Caven¬ dish also made use of it for the purpose of determining the mass of the earth; his experi¬ ment consisting in determining the attractive power of a pair of leaden spheres, and compar¬ ing this with the attractive power of the earth itself. In its conventional form, the torsion balance consists of a light horizontal arm, sus¬ pended at the centre by the fibre whose torsion is to measure the force that is applied to the arm. Quartz is now extensively used for the suspending fibre, its employment having been suggested by C. V. Boys, who showed how to prepare fibres of this material, which are very strong and elastic. Boys dipped an arrow into melted quartz and then shot the arrow from a bow ; the quartz being thereby drawn out into a fibre of exceeding fineness. The upper end of the torsion fibre is attached to a graduated head, by whose rotation the fibre can be twisted through a known angle. In applying the torsion balance to the measurement of electrical repul¬ sions, the horizontal arm, /, is provided at one end with a light ball, g, which can be charged to a definite electrical potential, and the torsion head is turned so that this ball is brought to a known distance from a similar fixed ball, g',

which can also be charged. The reading of the graduated head being observed when the fibre is fre from torsion and the balls, g g\ are at a known distance from each other, the balls are charged. They at once separate, owing to the repulsive action exerted between two electrical

charges of the same sign.. The graduated head is then turned so as to produce a torsion on the suspending fibre, tending to restore the balls to their original position. The twisting of the head is continued until the relation of ihe balls is the same as at first; and when this state is established, it is evident that tha torsion of the fibre is exactly balanced by the repulsion of the charges. In order to deduce the electrical re¬ pulsion in definite measure, it is only necessary to determine, by a separate experiment, what force is required to twist the suspending fibre

Torsion Balance.

through one entire turn; and a simple propor¬ tion then gives the repulsive force desired. The application of the torsion balance to experi¬ mental work of other kinds will be readily un¬ derstood from the foregoing description of its application to the measurement of electrical re¬ pulsions; for the principles involved are the same in all cases, the force that is to be meas¬ ured being determined by noting the torsion required to neutralize it, in a fibre whose tor¬ sional constant has been determined by direct comparison with a known force. The fact that the torsional moment of a homogeneous twisted fibre is proportional to the angle through which the fibre is twisted was established experimen¬ tally by Coulomb. In actual service the torsion balance is surmounted by a case of metal or glass, the air in which is kept dry by a dish con¬ taining calcium chloride, or phosphorus pent- oxide or pumice stone wetted with concentrated sulphuric acid or some other powerful and non-volatile drying agent.

The name <(torsion balance" has also been applied to a form of commercial balance in which the pans that contain the weights and the objects to be weighed are supported, not upon knife edges, but upon the middle points of nar¬ row, thin, horizontal ribbons of stretched steel, in such a manner that when the balance de-

scends at either ˆ end, the steel ribbons are exposed to a torsional moment which tends to restore the balance to the normal position of equilibrium.

Allan D. Risteen.

TORSIONAL RIGrIDITY, that species of rigidity .by which a cylindrical bar of any ma- terial resists the action of a force (or ®couple®) which tends to twist the bar in such a manner as to convert its originally

straight, longitudinal elements (or fibres) into a helical form. The torsional rigidities of a pair of cylindrical bars oi identical dimensions but composed of differ- e*F substances may be compared by comparing the twisting moments that are necessary in order to twist both of them through the same small angle. If one end of such a cylindrical bar is held fixed, while the other end is twisted by a lever applied to it after the manner of a wrench, the angle x, through which the bar will

. . , . . CLPR

be twisted, is given the formula x — - ;

D4

L being the length of the bar that is twisted, D being its diameter, and C being a constant peculiar to the material of which the bar is composed; while P and R are respectively the twisting force, and the length of the lever to the end of which this force is applied. The minimum diameter that a shaft should have, in order to transmit a given horse power safely, may be calculated by the following formula :

D = F V H/R, where D is the diameter of the shaft in inches, H is the number of horse power to be transmitted, R is the number of revolu¬ tions of the shaft per minute, and F is a numeri¬ cal factor peculiar to each kind of material. For wrought iron, F may be taken as about 4, and for steel it may be taken as 3.8. Consult Kent, c Mechanical Engineer's Pocket Book) ; Ran- kine, (Applied Mechanics.)

TORSK, a Scandinavian species of cod. See Cusk.

TORSO, an art term applied to the trunk of a statue of which the head and limbs are wanting, or to the trunk of a statue considered independently of the head and extremities ; also to the trunk or thorax of a model. Many ex¬ amples of ancient sculpture recovered in the last five centuries have .been incomplete in this manner. The most famous is the Torso Belve¬ dere, a torso of a statue of Hercules, seated. It derives its name from the Belvedere, at Rome, in the Vatican Palace where it is pre¬ served, and is attributed to the school of Lysippus, being believed by some authorities to be the work of that master, although a Greek inscription ascribes it to the artist Apollonius. It is considered by connoisseurs one of the finest works of art remaining from antiquity.

TORSTENSSON, tor'sten-son, Lennart, Swedish general: b. Torstena,

17 Aug. 1603; d. Stockholm, 7 April 1651. At 14 he became a page at the court of Gustavus Adolphus and in 1630 accompanied him to Germany as cap¬ tain of the bodyguard. He was commander of artillery at the battle of Lech, 5 April 1632, was taken prisoner before Nuremberg in August and confined for six months in a subterranean dungeon in Ingolstadt. In 1641 he was ap¬ pointed commander-in-chief of the Swedish army in Germany. He defeated the Archduke

Leopold and Piccolomini at Breitenfeld, 2 Nov.

1642, threatened Prague and relieved Olmiitz in

1643, and after the declaration of war by Den¬ mark in December he advanced into that coun¬ try and in six weeks had conquered the whole peninsula with the exception of the fortresses Rendsburg and Gliickstadt. He defeated the Austrian general, Gallas, at Juterbok, 4 Nov.

1644, and Katzfeld at Jankau, 6 March 1645, pushed through Moravia to the Danube and de¬ stroyed the fortifications on Wolfsbriicke be¬ fore Vienna. His siege of Briinn was unsuc¬ cessful owing to the stubborn defense and a pestilence among his troops, and after with¬ drawing into Bohemia, in 1646, he was com¬ pelled by illness to resign his command. He was made Count of Ortaba and governor-gen¬ eral of West Gothland by Queen Christina in

1.

TORT is a legal term indicating an injury or wrong; tort may be committed with force, as trespass which may be an injury to the per¬ son, such as assault or false imprisonment or to property in possession, or a tort may be com¬ mitted without force, such as an injury to one's character or affecting one's personal liberty. One may be liable in damages for a tort, but same is distinguished from a similar right growing out of a contractural relation. An ac¬ tion in tort is a civil action which undertakes to discover if a wrong or crime is involved. A misappropriation of funds by a trustee, for ex¬ ample, must be inquired into before it can be certainly known: (1) that the fund is short; (2) that the defendant is responsible for the shortage; (3) whether there is a question as to the amount of the misappropriation ; (4) whether the defendant simply owes such short¬ age, or (5) whether he stole it, and should be arrested. Actions in tort are common in cases of breach of contract, libel, trespass, conversion, assault, negligence resulting in accident, etc. Consult Burdick, F. M., (The Law of Torts) (1905); Bohlen, F. H., (Cases in the Law of Torts>

(1912).

TORTICOLLIS, twisted neck, an affection in which, while the head is bent usually toward one of the shoulders, the twisting of the neck turns the chin to the opposite side. In this con¬ dition, known in various forms as stiff-neck or wryneck, lateral movement of the head often causes great pain, especially when the affection is due to rheumatism (q.v.). This attacks the muscles lying on the side of the neck, especially the sternomastoid. In the great majority of cases only one side of the neck is affected, the head being drawn more or less obliquely toward that side; but occasionally, in a form more strictly to be regarded as stiff-neck, both sides are equally attacked, in which case the head is kept stiffly erect and looking straight forward. As long as the head is allowed to remain at rest there is merely a feeling of discomfort; but every movement is apt to be extremely painful. This affection is usually caused either by ex¬ posure of the part affected to a current of cold air, or by wearing wet or damp clothes round the neck, but may also arise from spasm or strain of the muscles of the neck, causing a crick. It is usually temporary, but in some cases muscular contraction renders it perma¬ nent.

TORTOISE. See Box-turtle; Land- tortoise; Terrapin; Turtles.

TORTOISE PLANT, a loft climber (Testudinaria elephantipes) of southern Africa, resembling a yam, and belonging to the same family. It has slender twining stems, alternate, netted-veined leaves,, small dioecious bell-shaped yellowish flowers in axillary racemes, and triple-winged capsules. It is, however, char¬ acterized by its globular rootstock, sometimes four feet in diameter, and growing above the ground. This enormous tuberous structure is woody or succulent, and is covered with a soft corky bark, which, cracking by exposure, be¬ comes tessellated with angular protuberant plates suggestive of those of the tortoise. When young it has also suggested the name of elephant's-foot, and its utilization as a food by the natives has given rise to the title Hotten- tot's-bread.

TORTOISE-SHELL, the material of the large epidermal scales of the hawksbill sea- turtle (Chelone imbricatd). Thirteen of these plates cover the carapace, and instead of being joined together by their edges so as to make apparently one piece, are thinned off at their posterior margins, and overlap each other like the tiles of a roof. They vary in size according to the part of the shield they occupy. The larger are sometimes from a foot to 18 inches long by six inches broad; the thickness rarely exceeds the eighth of an inch. The beautiful mottled color and semi-transparent characters of this material are well known. A remarkable quality is possessed by tortoise-shell which very greatly increases its usefulness for the orna¬ mental purposes to which it is generally ap¬ plied, that is, the property of being easily softened by a heat equal to boiling water, and of retaining any form when cold which has been given to it when heated. Pieces can also be welded together by the pressure of hot irons properly applied. The chief use of tortoise-shell is in making combs for the hair; but it is also used for inlaying ornamental furniture and various other fancy objects. By the French cabinet-maker Boule (see Buhlwork) it was used most effectively in combination with brass as a veneer for rich furniture, and all boule or "buhl® work consists of such a veneering com¬ bination. In India, China and Japan many articles are made of it, showing great skill and taste.

TORTOISE-SHELL BUTTERFLY, a

butterfly of the genus Vanessa as the Camber¬ well beauty (q.v.), in reference to the reddish- brown, black and white coloration.

TORTOLA, tor-tola, one of the Virgin Islands, West Indies, lying northeast of the island of Saint John, from which it is separated by a narrow channel; area, 24 square miles. It is hilly and rugged, the

highest elevation being 1,600 feet. Only a small part of the land is cultivated, cotton and sugar are raised, and sugar, molasses and rum exported. The island is one of the most important of the Virgin group and contains the chief town, Roadtown.

TORTOSA, tor-to'sa, Spain, a city in Cata¬ lonia, 45 miles southwest of Tarragona and 100 miles southwest of Barcelona, on the Ebro River. Its ports are El Fangar and Los Alfaques at the mouth of the river. It occupies

an acclivity rising from the left bank, and is fortified, part of the walls being of great an¬ tiquity. There are several small squares, and the streets are narrow and crooked, some of them very steep. The houses are built of solid masonry, there is a cathedral and other churches and a monastery. There are manufactures of soap, paper, hats, leather, porcelain, faience, and important fisheries. In the vicinity are frag¬ ments of Roman ruins, also marble and ala¬ baster quarries. Pop. about 26,000.

TORTRICID.ZE, a family of moths. See Leaf-roller; Moth.

TORTUGAS, tor-too'gaz. See Dry Tor- tugas.

TORTURE, as a*means of judicial punish¬ ment, descended to the countries of modern Europe from the Greeks and Romans since it appears not to have been practised by the Hindus, the Hebrews or the Egyptians. Tor¬ ture was judicialy inflicted either to extort con¬ fession, purge sin, or aggravate punishment. As practised by the Greeks, it was not applicable to a freedman, except in certain cases, but was commonly applied to slaves. Indeed the word of a slave could not be admitted as testimony, except under torture, and either party to a con¬ troversy could demand the torture of his op¬ ponent's slaves. The principal modes of tor¬ ture with the Greeks were the wheel, the rack, the sharp comb, the burning tiles, the vault (into which the victim was bent double), and the injection of vinegar into the nostrils. From the Greeks the Romans got their system of tor¬ ture and from the Roman laws it was engrafted in the judicial systems of all the modern coun¬ tries of Europe. The Romans, like the Greeks, exempted freedmen from the horrors of tor¬ ture, except in cases of treason. But under the emperors the torture of a freedman was not an infrequent occurrence. The Romans chiefly employed the rack, the scourge, hooks for tear¬ ing the flesh, and fire in its various uses. Roman contact with barbarian races gave the practice to the latter, but with one exception it made slow headway in replacing the older and more superstitious custom of the ordeal. That ex¬ ception is in the case of

the Visigoths who es¬ tablished a system of torture that remained uninterrupted from the time of their settlement in Spain to modern times, and which furnished a model upon which most of the other Euro¬ pean systems were based. Legalized torture be¬ came common in France during the first part of the 13th century and in Germany a century later. English lawyers assert that it was never legalized in Great Britain, but certain it is that it was commonly practised, and, if not directly enjoined, was at least sanctioned by the laws of that realm. All Europe came under the system during the 15th century, in conse¬ quence of the systematization of the Inquisition (q.v.), and the growth of that institution in power and importance, and with the exceptions of Great Britain and Sweden, torture formed a recognized department of the jurisdiction of European nations until the end of the 18th century. During the time of the Inquisition torture was applied by the civil, not by the ec¬ clesiastical, court, and the ecclesiastics present at the question were there simply as witnesses of the confession and not as agents, as popular fancy has pictured them. A confession ex-

torted by torture was of no avail to the prosecu¬ tion before an ecclesiastical tribunal, unless it was voluntarily confirmed three days afterward. . r°m the 13th century on, the use of torture increased, until its extreme cruelty and the horror of its practice led to a revulsion of feeling and to its general abandonment in the latter half of the 18th century. In *some coun¬ tries, however, it continued to be officially recognized and sporadically employed until the early part of the 19th century. It was abolished in Saxony in 1783, in Russia in 1801, in Wiirtem- berg and Bavaria 1806-07, in France in 1789 (although it was employed in 1814), in Han¬ over in 1819, and in Baden in 1831. It is be¬ lieved, however, that it was practised in Russia even early in the 20th century. It never was sanctioned in the United States, though . witches® were burnt near Salem, and the burn¬ ing of negroes for rape by lynch law still persists. Consult Lea, H. C., (Superstition and Force } (1870J ; Pearsall, R. L., etc. (1838); Sassen, M. J., <Dis- putatio de abusu et usu torturae) (1697) ; Par¬ sons, < Studies in Church History* (Vol. II, Art. inquisition,® 1895). See Inquisition; Rack.

TORU DUTT, to'roo doot. See Dutt, Toru.

TORY, Henry Marshall, Canadian min¬ ister and educator: b. Guysboro, Nova Scotia, 1867. He was educated at the local academy

and at McGill University where he was gradu¬ ated in 1890 with high honors in mathematics and physics. He studied theology at Wesleyan University and entered the Methodist Church in 1889 but retired in 1892 to become lecturer in mathematics in McGill University and was pro¬ fessor there until 1908 when he was chosen president of the Provincial University of Alberta at Strathcona. He published (A Manual of Laboratory Physics) (1902).

TORY, the name of a political party, used in Great Britain and other Anglo-Saxon coun¬ tries, is said to have originally been applied to the Roman Catholic outlaws who lived in the bogs of Ireland during the reign of Charles II. The name became identified with the opponents of the bill excluding the Duke of York from the English succession (1679), and was thus in¬ tended to imply Roman Catholic sympathies on the part of the duke's adherents. It was trans¬ ferred to the court party in English politics, their opponents being classed as Whigs. Since the clergy of the Church of England taught the doctrines of passive obedience and the divine right of kings, they also were known under the name of Tories. In modern English politics the successors of the Tory party are known as Con¬ servatives, but the old term is not infrequently heard in Parliamentary debate. Political parties in British colonies at times followed closely the divisions and names in England, so that in Australia and New Zealand the conservative elements in the representative assemblies were known as Tories. In the American colonies the name w#s given to the adherents to the policy of the mother country, a!nd during the Revolu¬ tionary War was applied to all persons sus¬ pected of British sympathies. Consult Bentinck, Lord Henry, (Tory Democracy) (London

1918).

TOSCANELLI DAL POZO, Paolo, tos'- ka-neHe dal pot'so, Italian geographer: b.

Florence, Italy,. 1397 ; d. there, 1482. He be¬ lieved that India could be reached by sailing to the westward and so advised Columbus in 1474. He also gave the king of Portugal similar views. It is thought that he strengthened the views of the great navigator to undertake the western voyage, although not alone in doing this. Consult Vignaud, Henry, (Toscanelli and Columbus) (New York 1902).

TOSTI, Sir Francesco Paolo, fran-ches- ko padld tos-te, Italian composer: b. Ortona di Mare, 7 April 1847 ; d. 1916. He was a pupil and later teacher at the Conservatorio Reale, Naples, and in 1869 appeared as a concert singer at Rome. Shortly afterward he became

vocal instructor at the court; removed to Lon¬ don in 1875 and in 1880 was appointed in¬ structor to the royal family. He produced (The Grand Duke® (opera, 1888) ; (La prima donna) (opera, 1889) and many English and Italian songs. His (Good-bye) ; (For Ever and For Ever* ; (That Day/ etc., are widely popu¬ lar. He was knighted in 1908.

TOSTIG (TOSTI, TOSTINUS), West- Saxon warrior: d. 1066. In 1055 he was made earl of Northumbria, Northamptonshire, and Huntingdonshire, by Edward the Confessor. A stern ruler, he repressed feud and disorder by the exercise of a merciless justice (patriam pur - gando talium cruciatu vel nece), with no dis¬ tinction of rank. In 1063 he joined his brother Harold in the invasion of Wales, but in 1064, for treacherous murder, was outlawed, while Morcar was chosen to the earldom (1065). He retired into exile in Flanders, in 1066 committed various depredations on the Isle of Wight, Lindesey and the east coast and subsequently joined Harold Hardrada, king of Norway, in an invasion of England. They landed in York¬ shire, but were entirely overthrown by Harold and his household troops at Stamford Bridge. Tostig figures in Tennyson's drama of <Harold) (1877). Consult Green, (The Conquest of Eng¬ land *(1884) ; Freeman, (History of the Nor¬ man Conquest* (Oxford' 1887).

TOTARA, or TOTARRA, a tree (Podo - carpus totara) of New Zealand, of the yew family, excelled only by the kauri for general utility, and most abundant in the central part of North Island. It is from 60 to 80 feet in height and has a fibrous brown bark which is deeply furrowed and was used by the natives for roofing their huts. Its leaves are linear and of a greenish-brown color. The wood is red¬ dish-brown, clear and straight in the grain and does, not warp or twist. It is largely used for furniture, cabinet-work and house-building, but is particularly valuable for bridges, wharves and marine piling, as it is durable under the ground or water and resists the attacks of teredos for a long time. The aborigines made canoes from the trunks of these trees. See Podocarpus.

TOTEM, a word which appears to have been applied originally to the animal or other thing held sacred by certain American Indians as the sign or symbol of the tribe or of an in¬ dividual Indian. The superstition is not con¬ fined to American Indians and has its counter¬ part in the symbols of civilized nations. The American eagle, the lion of Great Britain, the thistle of Scotland, the rose of England, etc., and the arms of noble families are illustrations.

The practice can be traced, indeed, throughout all history, among the greatest empires and the most savage tribes.

The totem superstition varies in its features in different countries. The members of the Emu clan of an Australian tribe believe them¬ selves to be descended from the emu and are regarded as' forming a kind of blood-group in virtue of their common descent. No member is permitted to marry within the clan, and all the members are bound to support one another in times of necessity. No Emu clansman will knowingly kill or eat an emu. Among some savage peoples the dead totem is elaborately mourned and carefully buried. Besides clan totems there are sex totems and individual totems. The totem having an important bear¬ ing on a person's relations to his fellows, it is shown conspicuously, being often tattooed on the skin or otherwise. The importance of .totemism in relation to the social and religious institutions of savage peoples was first pointed out by J. F. M'Lennan in 1868 and much fresh light has been shed on the subject by subsequent investigators but no satisfactory explanation of this curious system has yet been advanced. The American Indians were given to totemism and not only set up various animal figures as em¬ blematic of their tribes but individuals were fre¬ quently named after animals. The exact mean¬ ing and character of their totem practices is little understood. There were rules as to all marriages of those in kindred totems; some took their totems from their fathers, some from their mothers and some from their tribe. Totem¬ ism exists also among many African peoples, and numerous instances of it are to be met with in Asia and Polynesia. (See Africa; Austra¬ lia; Indians, American). Consult Lang, A., (The Secret of the Totem> (1905); Frazer, (Totemism) (1887) ; Durkheim, E., Elemen¬ tary Forms of the Religious Life) (Eng. trans . London 1915).

TOTEM POLE, a pole used among North American Indians to exhibit the totem figures. The totem pole is composed principally of three half human, half animal figures, seated above one another and holding erect a pole on the summit of which, for instance, is the totem. See Totem.

TOTONICAPAM, to-t6*-ne-ka-pam\ Gua¬ temala, the capital of the department of the same name, situated 60 miles northwest of the city of Guatemala. It manufactures cloth, pot¬ tery and wooden implements. It was half de¬ stroyed by an earthquake in 1902. The popu¬ lation, consisting almost entirely of Quiche In¬ dians, is about 28,000.

TOTTEL, Richard, English printer and publisher: b. about 1525; d. 1594. He was granted a patent in 1553 to print law books, which was extended for life in 1559. He also published the writings of the men of his day. He was a charter member of the Stationers' Company which he left in 1589 because of poor health. His most notable work was done in compiling and publishing the first poetic an¬ thology in England. <Tottel's Miscellany *(1557). which contained 271 hitherto unpublished poems. . Aitiong his other publications were the translation of* <*De Officiis* by Grimaldi (1556) and the translation of the second and fourth books of the <Eneid) by Surrey (1557).

TOTTEL'S MISCELLANY. The work which commonly goes by this name was pub¬ lished under the title (Songes and Sonettes, written by the ryght honorable Lorde Henry Haward [i.e., Howard] late Earle of Surrey, and other,) by the stationer Richard Tottel, on 5 June 1557. Its popularity was such that a second edition was issued in the following month and six others followed within the cen¬ tury. Tottel's method, too, was imitated by other editors and publishers and doubtless stim¬ ulated the vogue of what are now usually called the Elizabethan anthologies. In the address of (<the Printer to the Reader,® he alludes to the verse of well-known Latin and Italian poets, adding: (<That our tong is able in that

kynde to do as praiseworthy as the rest, the honorable stile of . the noble earle of Surrey, and the weightinesse of the depe-witted sir Thomas Wyat the elders verse, with severall graces in sondry good Eng- lishe writers, doe show abundantly.® This pas¬ sage indicates the real significance of the vol¬ ume namely, the effort which it represents to beautify English poetry and to show that the art of the Italians could be rivaled by the new courtly or cultivated school of British poets. Compare, to the same effect, a passage in a work called (The Arte of English Poesie) (1589), attributed to one George Puttenham : (<In the latter end of the same kings raigne [i.e., Henry VIII] sprong up a new company of courtly makers, of whom Sir Thomas Wyat the elder and Henry Earle of Surrey were the two chieftains, who having travailed into Italie, and there tasted the sweete and stately measures and stile of the Italian Poesie, as novices newly crept out of the schooles of Dante, Arioste and Petrarch, they greatly pollished our rude and homely maner of vulgar Poesie, from that it had bene before, and for that cause may justly be sayd the first reformers of our English meetre and stile.®

Wyatt had died in 1542 and Surrey in 1547 but it was reserved for the publisher Tottel to secure manuscript copies of many of their poems and bring them out for the first time in print. These occupy the place

of honor in the being followed by poems attributed to Nicholas Grimald (who has been suspected of acting as Tottel's editor) and by those referred to "Uncertain Authors.® A number of the poems in this last group can be identified, one of them, indeed, being a now familiar lyric of Chaucers; but the majority remain anonymous, nor is any of these comparable to the best work of Wyatt and Surrey. The elements of famili¬ arity and .of novelty in the collection are per- haps best illustrated by the metrical form of the P°ems- One finds, for example, the old "rhyme royal® stanza of Chaucer, and the loose, sometimes doggerel "septenary,® or seven- foffj Ime, which had been popular from the Middle English period; but side by side with these occur specimens of Italian forms not pre¬ viously naturalized in English. Of these last the most noteworthy are certain poems in the great Italian form, the terza rima , and a considerable number of sonnets — the first in English poetry Wyatt s sonnets, largely versions of Italian and h rench poems, follow the recognized continen¬ tal types; while the younger poet, Surrey seems to have undertaken to modify the form in the direction of English taste, with the re-

suiting type of sonnet, in three quatrains and a couplet, which was to be the favorite in the Elizabethan age and the form chosen by Shake¬ speare. Outside the work of these two poets, the contents of the miscellany are of slight in¬ trinsic value ; but its historical importance is so marked that because of its publication in 1557 it is customary to date from that year the beginnings of modern English poetry.

A convenient modern edition of Tottel's Mis¬ cellany is that in Arber's (English Reprints. *For accounts of the poetry of Wyatt and Sur¬ rey consult Courthope's <History of English Poetry' and Padelford's (Early 16th Century Lyrics* (Belles Lettres Series).

Raymond M. Alden.

TOTTEN, tot'en, Charles Adiel Lewis,

American inventor and military instructor: b. New London, Conn., 3 Feb. 1851; d. Milford, Conn., 12 April 1908. He was graduated at West Point in 1873 and was instructor in mili¬ tary science and tactics at the Amherst Agri¬ cultural College, at the Cathedral School, Saint Paul, N. Y. and at Yale University. He patented improvements in high explosives, in collimating sights and in signal-shells; besides a system

of weights and measures and improve¬ ments in linear and other scales. He patented a war game which he described in a publication entitled (Strategos, the American War Game *(1880) and also published (Important Ques¬ tions in Metrology* (1883). More recently he issued Cost Israel Found in the Anglo-Saxons *(1890) and (Toshua's Long Day and the Dial of Ahaz* (1891).

TOTTEN, Joseph Gilbert, American mili¬ tary engineer: b. New Haven, Conn., 23 Aug. 1788; d. Washington, D. C., 22 April 1864. He was graduated from West Point in 1805, was engaged in a survey of Ohio and the western territories, and in 1806 resigned from the army. He re-entered the army in 1808, was reappointed second lieutenant of engineers and was in charge of the construction of Castle William and Fort Clinton in New York Harbor until 1812. He was chief engineer in the army on the Niagara frontier during the War of 1812, was brevetted lieutenant-colonel in 1814, and after the war was engaged in the construction of coast defenses until 1838 when he was pro¬ moted lieutenant-colonel and chief engineer in the army, and shortly afterward became su¬ pervisor and inspector of the United States Military Academy. At the outbreak of the Mexican War he was placed in charge of the engineering operations and in recognition of his services in planning the siege of Vera Cruz was brevetted brigadier-general in 1847. He then resumed his duties at Washington, but was ap¬ pointed one of the commissioners for arranging the terms of capitulation. He became brigadier- general in 1863 and in 1864 was brevetted major-general. He published (Essays on Hy¬ draulics and Other Cements* (1842).

TOTTENHAM, tot'en-am, England, a town of Middlesex, forming a residential suburb of London and situated some six miles north of the Tower of London, just outside of the city limits. It was a favorite resort of Isaak Wal¬ ton. Among its most interesting buildings are an old church and Bruce Castle, an Elizabethan mansion formerly owned by Robert Bruce. Pop. 150,000.

TOTTENVILLE, formerly an incorpo¬ rated village in Richmond County, N. Y. ; since 1898 in New York City. See Staten Island.

TOTUAVA. See Bluefish.

TOUCAN, too-kan' or too'kan, a family (Rhamphastidce) of coccygomorphous birds somewhat resembling the hornbills, and distin¬ guished by the great development of the bill, which is curved

superiorly and bears a promi¬ nent keel, with cutting edges frequently toothed. The outer walls of the bill are extremely thin, its interior is hollowed out into air-cells, and it is thus rendered comparatively light. The tongue is slender and barbed along the sides. The toes are paired, two forward, two back¬ ward and the tarsi scuttelated, the wings rather short and the tail long, with 10 quills. The toucans are confined to tropical America, where about five genera and 60 species occur. They are birds of brilliant and striking plumage, and the bill and naked skin about the eyes partake of this brightness of hue. Most of the species are gregarious, spending most of their time in hopping actively about among the treetops and seldom flying far. The times of their greatest activity are the morning and evening, when the woods are filled with their loud harsh cries. While fruits are their chief food, insects and the eggs and young of birds are also eaten. They have a characteristic manner of throwing back the head and bolting their food. When sleeping the head and tail are turned toward each other and rest on the back. All of the species, so far as known, nest in holes in trees, the birds sometimes excavating a suitable place in a decayed stub. Only two white eggs are deposited.

The following are some examples of the species, many of which are familiar in the col¬ lections of zoological gardens. The toco toucan (Rhamphastos toco) is black with a black and orange bill, blue circumocular areas and white throat and rump. It is nearly two feet long and inhabits Argentina. A well-known relative is the ariel (R . ariel). The aragari (Pteroglos - sus aracari) is green with the head and throat black and the bill black and white. A related species (P . beauharnaisi) is dark green with the lower back crimson, the belly yellow and red and the bill black, orange and white. Both of these are found chiefly in the forests of the Amazon Valley. A well-known species is Selen- idera spectabilis, in which the sexes are unlike. The hill toucan (Andigena bailloni) of the low¬ lands of Brazil, has the head, neck and lower parts orange yellow. Consult Sclater, Cata¬ logue Birds *British Museum,* XIX (London 1891) ; Bates, (Naturalist on the River Amazon* (London 1863). See Hornbill.

TOUCEY, tow's!, Isaac, American jurist: b. Newtown, Conn., 5 Nov. 1796; d. Hartford, Conn., 30 July 1869. He received a private clas¬ sical education, was admitted to the bar in 1818, and established a law practice at Hartford. He was State’s attorney for Hartford County in 1822-25, served in Congress in 1835-39 and was again State’s attorney in 1842-44. He was governor of Connecticut in 1846-47, and in 1848-49 was United States Attorney-General. In 1850 he was elected to the State senate and served in the United States Senate in 1852-57. He was appointed Secretary of the Navy by President

Buchanan in 1857 and served until

1. His conduct of naval affairs was severely criticized. He was accused of favoring the secession cause by scattering the best ships of the navy in distant seas. The charge was de¬ nied, though Toucey continued to be regarded as a sympathizer with the South.

TOUCH, the sense of feeling. See Senses.

TOUCHSTONE, LYDIAN STONE, or BASANITE, a velvet-black jasper, used on account of its hardness and the uniformity of its texture and color as a streak tablet for de¬ termining the relative amounts of baser metal and pure gold in alloys. The sample is rubbed on the stone and the color is then compared with a series of standards of kown composition. The expert is able quite accurately to determine the fineness of the sample, the streak becoming redder as the proportion of copper increases, or yellower as the percentage of gold increases. This method of testing has been in vogue from the earliest times, the name Lydian Stone ap¬ pearing as long ago as 450 b.c. Modern methods of assaying have now largely superseded the use of this stone.

TOULON, too-lon, France, a fortified sea¬ port town and naval arsenal, in the department of the Var, on the Meriterranean, 42 miles southeast of Marseilles. The port is separated from the roadstead by bomb-proof moles and comprises two parts: one, including the mer¬ chant shipping; the other, the dockyard, slip, arsenal, foundry, etc. The fortifications are very complete. The cathedral was founded in 1096. This, the hotel-de-ville and a capacious theatre are the chief of the old buildings; more recent are the Musee Bibliotheque, Marine School, library and observatory, the lyceum and botanical gardens. The Place de la Liberte con¬ tains a splendid monument to the heroes of the Revolution ; Le Place d'Armes, the Boulevard Strasbourg and Jardin de la Ville are prom¬ inent promenades. It has modern fortifications of the first class and is headquarters for one of the five maritime arrondissements carrying stores for the Mediterranean fleet, with impor¬ tant shipbuilding interests. The bay or harbor is defended by torpedoes and commanded by six forts. On the hills north of the city very strong forts are located. .Toulon was known to the ancients as Telo Martius or Telonion. The Saracens sacked the city in 889 and

Charles V captured it twice in the 16th century. Louis XIV gave Toulon its importance as a naval station, making the dockyards and arsenal the finest of France. Toulon first became famous as a stronghold in the 16th centuiy. Here the English were defeated by the fleets of France and Spain (1744) ; and in 1793 Napoleon forced the English and Spaniards to evacuate the posi¬ tion— his first memorable victory, while com¬ manding the French Republicans. In time of peace about 600,000 tonnage is entered and cleared annually. The principal trade is in wines, fruits and oils. There are metal manu¬ factories and lace works. Pop. about 107,000.

TOULMIN, Henry, American lawyer : b. Taunton, England, 1767 ; d. in Washington County, Ala., 11 Nov. 1823. He came to Nor¬ folk, Va., in 1793 and in 1794—96 was president of Transylvania University. In 1796-1804 he was secretary of state of Kentucky and in the latter year was appointed judge of the United

States District Court of Mississippi. He as¬ sisted in framing the constitution of the State of Alabama, in whose legislature he served. He was author of (A Description of Kentucky) (1792) ; (A Collection of. the Acts of Ken¬ tucky } (1802) ; (Review of the Criminal Law of Kentucky > (1804) ; (Digest of the Laws of Ala¬ bama > (1823).

TOULOUSE, Edward, French alienist; b. Marseilles, France, 1865. He studied in Paris and became head physician of the asylum at Villejuif where he established a laboratory for experimental psychology. He founded the Bibliotheque de Psychologie Experimental and other journals and was a writer of repute on his specialty. His chief publications were 'Organisation scientifique d'un service d'alienes) (1900) ; (Technique de psychologie experimen¬ tal (2 vols., 1905; 2d ed., 1911); (Comment conserver sa sante (1914) ; etc.

TOULOUSE, too-looz, France, capital of the department of Haute-Garonne, 140 miles southeast of Bordeaux, on the Garonne. It is the centre of railway traffic and river and canal freight in southern France. A fine bridge connects the town with the village of Saint Cy-prien. It is a quaint old town, but very enter¬ prising. The most remarkable buildings are the cathedral, church of Saint Sernin, Hotel-de-Ville, museum and Palais-de-Justice. The Musee contains an almost unparalleled collec¬ tion of objects d'arts from the Gallo-Roman to the Renaissance period. There are several fine academies of art, science and literature (one claiming its origin to have been in games of the troubadours of 1323, namely, Societe des Jeux Floraux) ; professional and technical schools, a large public library of 225,000 vol¬ umes, an observatory and botanical garden. Toulouse is one of the larger cities

of France, designated as the seat of a State university, which includes faculties of law, medicine, sci¬ ence, letters, etc. It has a library of over 150.000 volumes and nearly 5,000 students. There is also a large Catholic institution with theo¬ logical, literary and scientific instruction. The old name of the city was Tolosa, dating back before the Christian era. It was sacked by Q. S. Cepio 106 b.c., and rebuilt and regarded as an important city in the 4th century. The Visigoths, under King Wallia, made it their capital in 419. It was taken by Clovis in 507, and was Charibert's capital in 630. For many hundred years it was the foremost city of southern Gaul., The Saracens took it in 718. Ihe name developed into Toulouse about 780, where Charlemagne made his young son Louis, king of Aquitaine, with his capital there. About bbU, the first Count of Toulouse established himself, and these nobles governed the city and southern France for over 500 years. The tri¬ bunal of the Inquisition was established at Toulouse. It was the scene of Hugenot mas- sacies in 1562 and again in 1572. The manu¬ factures include textiles, leather, cannon, steam-engines, tobacco, brandy, etc. In modern history, the most important event was its de¬ feat by the English, while in ignorance of Napoleons abdication. Pop. (1911) of com-

,149'576' the town proper being about 23,000 less.

TOULOUSE University of, celebrated brench school of higher learning, founded by

Pope Gregory IX in 1230 as a protest against the Albigensian heresy. It was originally a theological school but became noted as a school of law and sided with royalty against the Church. At one time not less than 10 well- endowed foundations were included in it, but under the national system it now includes only the faculties of law, medicine and pharmacy, and science and philosophy. There also is the faculty of Protestant theology of Montauban and two free faculties of theology and philosophy. Its library is noted and contains considerably over 150,000 volumes.

TOULOUSE GOOSE. See Geese.

TOUMEY, James William, American pro¬ fessor of forestry: b. Lawrence, Mich., 17 April 1865. He was educated at the Michigan Agricultural College in 1889, and was special student at Harvard in

1893. He was assistant in the department of botany in the Michigan Agricultural College (1890-91), professor of biology in the University of Arizona (1891-98), and finally entered the United States Forestry Service and became director of the Yale Forestry School in 1910. He is the author of several books on forestry and kindred subjects.

TOUR, Maurice Quenti de la, mo-res koii-tan de la toor, French painter: b. Saint Quentin, 5 Sept. 1704; d. there, 18 Feb. 1788. He began his art studies in his native town and subsequently devoted himself to the execution of pastel portraits in Paris, in which city he gained such reputation that the most famous of his contemporaries gave sittings to him. In 1746 he was elected to the Academie He re¬ turned to his native town in 1784 and the Saint Quentin Museum now contains 80 portrait pastels of his. His <Pompadour) is in the Louvre ; and there are two other of his pic¬ tures in the Dresden Gallery. Consult Patoux, (L'Guivre de M. Quentin da la Tour au Musee de Saint Quentin* (1886).

TOURACO, a large and beautiful African bird of the genus Corythaix ; with a short, rather small, high bill ; both mandibles notched and finely serrated; short, rounded wings, with the three first quills graduated; a long rounded tail, short, strong feet and an erectile crest. Their prevailing color is green, with purple on the wings and the tail, the peculiar red of which is furnished by a special pigment called turacin. They feed on fruits, perch on the highest branches of trees. It is a member of the family of plantain-eaters (q.v.). Consult Newton, dictionary of Birds) (New York 1896).

TOURAINE, too-ran, a former province and duchy of France, bounded by Maine, Orleannais, Berry, Poitou and Anjou. Its capital was Tours. It now forms the depart¬ ment of Indre-et-Loire. It was anciently in¬ habited by the Gallic tribe of Turones.

TOURCOING, toor-kwan, France, a town in the department of the Nord, nine miles northeast of Lille. Before the war it was a well-built and prosperous manufacturing town with modern churches and schools, also a handsome hotel-de-ville in Renaissance style. It had improved rapidly in a commercial sense, and the staple manufactures are textiles of all kinds, especially woolen goods, velvet carpets and rugs; besides dye-works, soap-works and sugar refineries. The chief imports were wool,

flax, yarn and hemp, and the exports combed wool, yarn, tissues, rags and flax. It was cap¬ tured by the Germans in 1914, and sadly wrecked during the Great War. The popula¬ tion in 1911 was 82,644.

TOURGEE, toor-zha', Albion Winegar,

American jurist and author: b. Williamsfield, Ashtabula County, Ohio, 2 May 1838; d. Bor¬ deaux, France, 21 May 1905. He was gradu¬ ated at the University of Rochester (N. Y.), enlisted May 1861 as a private in the 27th New York volunteers, was wounded at the first bat¬ tle of Bull Run, and having been discharged, studied law and was admitted to the bar at Painesville, Ohio. In 1862 he re-entered the military service as first lieutenant in the 105th Ohio, in 1864 resigned, and in 1865 began pro¬ fessional practice at Greensboro, N. C. He was a delegate to the Southern Loyalist convention at Philadelphia in 1866, and in 1867 to the con¬ stitutional convention of North Carolina, where he drafted the article on the judiciary. From 1868 to 1874 he was judge of the Superior Court of the State. During his term of office the Ku Klux Klan was exposed and largely broken up, and his services to this end were very efficient. The sworn statements of several hundred mem¬ bers received by him were later utilized in a series of fictional works dealing with Recon¬ struction times in the South, of which (A Fool's Errand) (1879) was the best known. Contem¬ porary interest in these books was great, and their sales were very large for those days. Tourgee was made consul at Bordeaux in 1897, consul-general at Halifax in 1903, and from then until his death was again consul at Bor¬ deaux. He was editor of The Continent (1882- 84; 5 vols.), an illustrated weekly published in New York (Vol. Ill in Philadelphia), and also wrote a few law books. Among his other works were (Bricks without Straw> (1880) ; (John Eax) (1882) ; (An Appeal to Caesar* (1884) ; (Button's Inn> (1887) ; (With Gauge and Swallow) (1889) ; (Murvale Eastman) (1890) ; (Out of the Sunset Sea) (1892), and <The Mortgage on the Hiproof House) (1896).

TOURJEE, Eben, American musical con¬ ductor: b. Warwick, R. I., 1 June 1834; d. Boston, Mass., 12 April 1891. He studied at the academy at East Greenwich, R. I., and later opened a small music store in Fall River, Mass. Later he turned to music-teaching, both privately and in the public schools. After a period of study in Europe he opened a conservatory at Providence in 1864. This institution was re¬ moved to Boston in 1867 and became the New England Conservatory of Music which has grown to be the most important music institu¬ tion of the kind in America. In 1872, when the College of Music of Boston University was founded, he became its dean. He was the or¬ ganizer of several large choruses, notably that assembled for the Peace Jubilee in 1869, and another of nearly 20,000 singers for the World's Peace Jubilee in 1874.

TOURMALINE, a common and wisely dis¬ tributed mineral, so called

from an East Indian name, and known to earlier writers as schorl. It is a very complex aluminum boro-silicate, with several marked varieties depending on the presence and proportions of other metallic oxides. The precise constitution of tourmaline has been recently studied elaborately by eminent

mineralogical chemists both in Europe and America, without exact agreement, save in its general features, as derived from a complicated boro-silicic acid. According to the oxides pres¬ ent, three types are clearly determined, — iron tourmalines, mostly black; magnesia tourma¬ lines, usually brown ; and alkali tourmalines, in which some lithia is present, of red, green and other rich colors. These last, when transparent, yield beautiful gems, of a hardness of seven to seven and five-tenths and specific gravity three to three and one-tenth. The black variety is quite common in schists, gneisses and granites; the brown is usually in crystalline limestones ; the brightly colored varieties occur in dikes of albitic granite, often associated with lepidolite. The gem tourmalines have received a number of special names; the pink or red is called rubellite or Siberian ruby; the green, Brazilian emerald; the deep blue, indicolite, or Brazilian sapphire; the colorless, achroite. The crystals are rhombohedral, hemimorphic and of pris¬ matic habit, either short and stout or long and slender, with three, six, nine or 12 sides, and with rhombohedral, or more rarely, simple basal terminations. The prisms are often so deeply striated vertically, as to completely obliterate the faces. The physical properties of tourmaline are very interesting; it is rendered highly elec¬ tric, both by heating and by friction and it has remarkable polarizing action on light; so that plates . cut from transparent crystals, parallel to their length, are much used in experiments in optics, mounted in the so-called tourmaline pincers or tongs. With this is connected a very high dichroism, such that the color is frequently quite different according as light traverses a crystal lengthwise or across. Entirely distinct from this is another peculiar feature, namely, the intermixture of two or more colors in the same crystals, either transversely (concentrically} or lengthwise, sometimes gradually and some¬ times sharply ; so much so that elegant gems have lately been cut from some of the crystals from Southern California which are half red and half green, with perfectly sharp demarca¬ tion between the two brilliant tints. The most noted localities for bright-colored tourmalines are in the Ural Mountains; the island of Elba; Brazil; Paris, Me.; Haddam Neck, Conn., and above all, several mines recently opened in San Diego and

Riverside counties, Cal. (See Gems). Superb black tourmalines occur at Pierrepont, N. Y. ; fine brown crystals at Gou- verneur, N. Y., and Hamburg, N. J.

TOURNACHON, Felix, French author and aeronaut ; b. Paris, 1820 ; d. there, 1910. He was educated in Lyons, studied medicine but re¬ turned to Paris and founded the Revue Comique in 1849 and in 1854 published the Pantheon- Nadar, both which brought him renown. His experiments in aerial navigation led him to con¬ struct a huge baloon, Le geant, with which he made seyeral ascensions. At the siege of Paris he was invaluable as a carrier of information and commanded the company of aeronauts. He was the author of a number of publications in¬ cluding (1871) and <Le Monde ou Ton patange* (1883).

TOURNAI, toor-na, Belgium, a town in the province of Hainault, on the Scheldt, 50 miles southwest of Brussels near the French border,

15 miles east of Lille. It is the seat of a

bishop, has pleasant suburbs, fine quays and streets. Its ancient Romanesque cathedral has five towers and contains pictures by Rubens. Other churches are Saint Quentin, Saint Brice and Saint Jacob, besides the belfry with its wonderful chimes. Other prominent features are a picture-gallery, a library of 60,000 vol¬ umes, an episcopal seminary, five hospitals, an asylum, museum of natural history, city hall, theatre and a bronze statue of Princess d'Epinoy, marble bust of Dumortier and many mediaeval buildings. The industries embrace the manu¬ facture of woolen goods, hosiery, valuable car¬ pets, linen, ribbon, faience, soap and candles, much of which is handwork. Tournai was in the 5th century the seat of the Merovingian kings, then belonged to France, but later was incorporated in the Spanish Netherlands. It lies near the scene of many battles in 1581, 1667, 1709, 1745, during which years it belonged to France, and in 1914, when it was devastated by the German invasion. Pop. 37,349.

TOURNAMENT, a friendly contest at arms among warriors of noble birth during the Middle Ages. The use of the term was not fixed and it denotes the gathering of the nobles and knights, the contests and the fetes or carousals which followed. A tournament often lasted several days, a week or two, and during this time the lords and knights would gather at the town in which it was to be held, with their servant and esquires, and each would establish quarters which would be made gay with flags and pennants and would erect his arms or in¬ signia. Meantime there would be prepared the lists, the place where the

contests were to be held; this consisted of a rectangular space of large dimensions, fenced in by ropes or a rail¬ ing and surrounded by galleries erected for the ladies and spectators of honor. Certain quali¬ fications of birth were necessary for admission to the contests and each lord or knight had sponsor some lady whose champion he claimed to be and whose colors he wore. The knights were attended by their squires who fur¬ nished them with arms, raised them if dis¬ mounted, etc. The weapons used in the con¬ tests were lances with the points covered swords with point and edge dulled and maces or clubs of wood. The knights wore armor which was heavy or light according to the cus¬ toms of the section in which the contests took place, the latter were held under very exact rules and under the constant supervision of judges and governors. In some of the tour¬ neys it was not allowed the contestant to dis- ; he was to run so many courses with the lance or strike so many blows with the sword or mace, and the successful knights re¬ ceived prizes delivered by some lady who had been selected the queen of beauty. On the second day there was often a tourney for the esquires and perhaps on the third day there would be a general melee of knights or squires or even a small mock battle in the lists.

Such were the tournaments of the latter part of the Middle Ages. Their origin is ob¬ scure and they seem to have passed through a period in which they were contests in deadly combat and never a friendly contest for skill It is thought they arose out of the old trials by ordeal (q.v.) and that at first they partook ot a judicial nature. Certain it is that at first

they were far more deadly than in later years a • u t iat were not uncommonly fought

with the weapons of war. Jousts differed from tournaments in two respects : they were single combats between two men and they were of- tenest fought with the weapons of war. Jousts were of two kinds — the joiite a ouirance or mortal combat, usually fought between two representatives of different nations, and the joute a plaisance, the joust of peace which sometimes took place at the end of a tourna¬ ment, but which seems oftener to have been a prearranged contest in the nature of a duel. Later, while jousts still retained the aspect of a single combat to decide some question of importance, they lost their vicious nature and blood was rarely spilled. The passage of arms was a

favorite practice of roving knights, a party of whom would assemble at some place and suspend, each, several shields of different colors, offering combat to any knight who presented himself. The acceptor of the chal¬ lenge. struck the shield of the knight whom he wished to engage and the color and variety of the shield which he struck determined the nature of the combat and the arms to be em¬ ployed.

The tournament languished with the decline of chivalry, after the 15th century. The death of Henry II, who was accidentally killed in a tilting contest, had much to do with hastening its abolition, but it is probable that the change in the modes of warfare and the critical temper engendered by the revival of learning were more nearly the causes of their abandonment. The word tournament survives in modern con¬ tests in chess and checker play, tennis and other games. The contestants are entered, often classi¬ fied as to their ability and paired off for indi¬ vidual play until every player has met every other player in the tournament. The one with the highest percentage of wins is then declared the victor and receives the first prize. Consult Leon Gauthier's (La Chevalerie) ; Hallam's (Middle Ages) and Viollet-le-Duc's (Diction- naire du MobilierP

TOURNIQUET, a contrivance for com¬ pressing a blood-vessel to stop the flow of blood in amputations and in dangerous hemorrhage from wounds and to control the circulation through an aneurism. It is believed to have been first used in France by Morel (1674). As used by this surgeon in amputations of limbs, it consisted of a stick passed beneath a bandage and twisted so that the tight knot would exert especial pressure on the principal bleeding ves¬ sel, the rest of the bandage compressing the other vessels of the limb sufficiently. At the present time such a tourniquet is known as an emergency tourniquet, which may also consist of anything tied around the part above the wound in case of arterial hemorrhage (below, in case of venous hemorrhage) and twisted by means of a stick or anything convenient. Com¬ pression is increased by placing a pad over the main artery. Compression of a bleeding vessel with the thumb or finger is of service where a tourniquet cannot be obtained. Tourni¬ quets are of various kinds and are named prin¬ cipally from their inventors. Du Puytren's tourniquet consists of a semi-circular piece of metal with a head at one end and is used to compress the abdominal aorta ; Esmarch's con-

sists of a piece of flat rubber tubing to be wound about the upper part of a limb, after the blood has been driven out of the limb by an elastic bandage or to be used by itself in com¬ pression of the iliac arteries, the abdominal aorta, etc. The field tourniquet, resembling Petit's

spiral tourniquet, is a paddefd strap to be buckled on and pressed down l5y a screw upon an artery. With the horseshoe tourniquet, named from its shape, pressure is exerted at two points. The provisional tourniquet is one applied loosely, to be tightened in case of necessity.

TOURO, too'ro, Judah, American phi¬ lanthropist: b. Newport, R. I., 16 June 1775; d. New Orleans, La., 18 Jan. 1854. He was the son of Rev. Isaac Touro, who in 1762 was chosen rabbi of the Jewish congregation of Newport, R. I. The son removed to Boston, Mass., where he engaged in business with his uncle, Moses Hays, in whose employ he sailed to the Mediterranean in 1798 as supercargo. In 1802 he settled in New Orleans, where he became a wealthy merchant. He displayed his patriotism in the War of 1812 by enlisting as a volunteer in General Jackson's army and was severely wounded at the battle of New Orleans. The range of his benevolence was very broad; families and individuals, churches and syna¬ gogues alike were enriched by him. Toward the erection of the Bunker Hill Monument he gave $10,000.

TOURS, toor, Berthold, Dutch composer : b. Rotterdam, Holland, 17 Dec. 1838; d. Lon¬ don, 11 March 1897. He studied at Leipzig and Brussels and going to London in 1861 became musical editor to Novello, Ewer and Company, 1878. His productions were principally religious in character and his (Service in F, > (Blessing, Glory, Wisdom and Thanks) and (0 Saving Victim, > were especially favorites. As a church composer he represented, with Stainer and Barnby, a new phase of English Church music which comprehends the introduction of new dramatic and melodic elements for which the entire school is probably indebted to M. Gou¬ nod.

TOURS, France, capital of the department of Indre-et-Loire, on the left bank of the Loire, at the confluence of the Cher, 130 miles south¬ west of Paris. The principal entrance to the city is by a magnificent bridge across the Loire, 1,423 feet long. The banks of the river are enclosed by a quay, lined with handsome houses and finely-planted promenades. Great part of the town is new and many of the streets are spacious and elegant; but the older quarters are inferior. The principal edifice is the cathe¬ dral. Its west front consists of three lofty-flamboyant portals surmounted by a window of astonishing dimensions and flanked by two domed towers, 205 feet high. The interior, of the purest Gothic, and lighted by beautifully stained glass, is 256 feet in length and 85 feet in height. Two towers form conspicuous ob¬ jects from every part of the town; one called the tower of Saint Martin or Horloge, from containing the principal clock;

the other the tower of Charlemagne, because his queen, Luit- garde, was buried below it, and both remark¬ able as the only relics which the Revolution of 1793 have left of the vast cathedral of Saint Martin of Tours, after it had flourished for

12 centuries. The archiepiscopal palace is re¬ garded as one of the most handsome in the kingdom. It is the seat of a college, has other excellent educational institutions and a library of 175,000 volumes. The manufactures consist of silk stuffs, ribbons, cloth, serge, rugs, chemi¬ cals and father, besides steel and ironworks and pottery, and the trade is in corn, wine, brandy, dried fruits, wax, hemp, wool, etc. Tours early acquired considerable importance and under the Romans was known by the name of Caesarodunum. It was from the gates of Tours that Charles Martel (q.v.) drove back the Moslem invasion of Europe in 732. In modern times it became famous for its silk manufactures and had so extended as to have a population of 80,000, when the revocation of the Edict of Nantes deprived it of nearly half its inhabitants and almost all its industry and inflicted a blow on its prosperity from which it has scarcely recovered. During the Franco-German War Tours was made the seat of the government delegation during the siege of Paris, 12 Sept. 1870. The delegation removed to Bor¬ deaux on 10 December. Tours surrendered to the Germans 21 Dec. 1870. Pop. 73,398.

TOURVILLE, toor-vel, Anne Hilarion de Cotentin, Count de, French naval officer: b. Tourville, department of La Manche, 24 Nov. 1642; d. Paris, 28 May 1701. He entered the navy in 1660, became a captain in 1667, par¬ ticipated in the battle of Agosta in 1676, and in command of the vanguard at the battle of Palermo in 1677 he destroyed 12 of the enemy's ships. He was appointed lieutenant-general of marine in 1680, commanded several expeditions against the North African pirates in 1682-88, became vice-admiral in 1689 and in 1690 was in command of the fleet which supported James II of England. He defeated a Dutch-English fleet off the Isle of Wight in that year, but in 1692 was ordered to attack a superior fleet off Cape La Hogue, in order to facilitate the land¬ ing of the Jacobites, and was defeated. He was created marshal of France in 1693 and in that year he captured and destroyed a Dutch-Eng¬ lish fleet off Cape Saint Vincent. At the out¬ break of the War of the Spanish Succession he was appointed commander-in-chief of the combined naval forces of France and Spain, but died shortly after.

TOUSSAINT, Anne Louisa Geertruida,

Dutch novelist: b. Alkmaar, 1812; d. 1886. She lived at The Hague after her marriage to the architectural painter, Jan Bosboom, in 1851 and became noted for her novels, especially her historical works. He (Het huis Lauernesse> (1841; 10th ed., 1885) was translated into sev¬ eral languages and her Leicester trilogy became famous. Her works were collected in 25 vol¬ umes. Consult Ten Brink, Jan, (Life of Anne Louisa Geertruida ToussainC (Amsterdam

1886).

TOUSSAINT, too-san, Francois Domin¬ ique, called L'Ouverture, loo-ver-tiir, Haitian soldier and liberator: b. 1743; d. Fort de Joux, near Besangon, France, 27 April 1803. He was a full-blooded negro and was born a slave. When the insurrection of the blacks broke out in 1791 Toussaint took service in their army, but not till he had assisted his master to escape. He rose quickly in the army, being made in 1795 a general of brigade. In this

position he displayed much military as well as political ability and rendered valuable serv¬ ices to the French republic against the British troops which had been landed on the island. In 1797 the French government made him gen¬ eral of division and subsequently general-in¬ chief of the troops in Santo Domingo, and as such he signed the convention with General Maitland for the evacuation of the island by the British. He now assumed sovereign au¬ thority, but it was only after a severe struggle against insurrectionary movements that he was able firmly to establish his position. In 1801, on the submission of the Spanish forts, he was completely master of the island. He now framed a constitution by which he was ap¬ pointed president for life of the republic of Haiti, with the right to name his successor. He was simple and abstemious in his own habits, but affected great magnificence in his surroundings and exacted a rigorous court etiquette. His character has been highly lauded by Wordsworth in a poem and by Wendell Phillips, who made him the subject of one of his lectures. He ruled with wisdom and jus¬ tice. Recognizing the failings of most of his own race he chose as his council white men with one exception. By his vigorous govern¬ ment the commerce as well as the agriculture of the island began to revive. After the Peace of Amiens Napoleon sent a powerful expedi¬ tion under his brother-in-law, Leclerc, to sub¬ due Toussaint, who after a struggle was forced to surrender and on his oath of fidelity was permitted to retire to his estate. He was after¬ ward detected conspiring against the French and being seized by a somewhat unworthy stratagem, was sent to France, where he died in

prison. At the time a suspicion of poisoning was general, but there is no evidence to sup¬ port it. Consult his (Memoires) (1853) ; the lives by Saint-Remy (1850), Gragnon-Lacoste (1877) and Schcelcher (1889); Mossell, <Tous- saint L'Ouverture, the Hero of Santo Do- mingo) (Lockport 1896).

TOWAKONI, a sub-tribe of the Wichitas, of the Caddoan linguistic stock of North Amer¬ ican Indians, who in 1719 were found on the Cimarron, near its junction with the Arkansas, in the present Creek Nation, Indian Territory. Later they were on the Brazos and Trinity rivers of Texas and in 1822 were reported to number 1,200. They made their first treaty with the LInited States in 1837. In 1840 they were said to have numbered 500 and to have resided on the Pecan branch of the Colorado River of Texas, but by 1850 their population was re¬ ported at 140 and their home on the Upper Brazos. They are now with the Wichitas on a reservation in Oklahoma, where they number about 130.

TOWANDA, t5-wan'da, Pa., borough, county-seat of Bradford County, on the Sus¬ quehanna River and on the Lehigh Valley Railroad, about 50 miles north by west of Scranton. It is in an agricultural and stock-raising region and is the commercial and in¬ dustrial centre for a large portion of the country. The chief industrial establishments are planing- mills, furniture factories, wagon and carriage works,. a large toy. factory, a piano factory, foundries and machine shops. The water sup¬ ply comes from springs 16 miles from the

borough. The educational institutions are Sus¬ quehanna Collegiate Institute (Presbyterian), founded in 1850, a high school, public and parish

lnm° '* ia hlgk SCJ10°1 library containing about b.UUO volumes and a college library. The two

mow. Pop5 s,oc».a combined capital of over

American diplo- matist: b Philadelphia, 17 April 1848. He was graduated at Harvard in 1872 and spent four years in study and travel in Europe and the East, part of which time he was attache to the American legation at Madrid under Daniel E. Sickles, Minister to Spain. After his return he was admitted to the bar in 1878 and in 1882 removed to Duluth, Minn., where he was con- nected with large

railroad and mining interests, in 1887 he settled in Philadelphia and in 1891 relinquished active business affairs and gave his attention to historical studies. He became president of the department of archaeology and palaeontology at the University of Pennsyl- yania. In 1897 he was appointed United States Minister to Austria-Hungary; during 1899-1902 he was Ambassador to Russia, and in the latter year became Ambassador to Germany, retiring in 1908. He published a Catalogue of a Col¬ lection of American Colonial Laws* (1890); (1895) ; < Essays Political and His- toricaP (1914).

TOWER, Zealous Bates, American soldier: b. Cohasset, Mass., 12 Jan. 1819; d. there, 21 March 1900. He was graduated from West Point in 1841 and was appointed second lieu¬ tenant of engineers the same year. He was employed in the construction of the defenses of Hampton Roads in 1843-46 and served with distinction in the Mexican War. Promoted major in August 1861, he fought in the first battle of Bull Run and for bravery in the sec¬ ond battle of Bull Run was brevetted major- general. He became lieutenant-colonel in 1865 and colonel in 1874, and was retired in 1883.

TOWER, in architecture, a structure more or less lofty, of varied form or plan, whether standing alone or forming a part of a church, castle or other building, but essentially high as regards its surroundings. In ancient times towers were erected as memorials to the dead, for purposes of defense and as religious monu¬ ments. Mediaeval castles usually had one or more towers, serving for observation and also adding to the sightliness of the structure. The walls of ancient fortifications usually bore towers at intervals for commanding the vicin¬ ity, from which defenders might more easily shoot arrows at besiegers. When a tower is very long and slender it is termed a spire, as on many churches. Numerous little towers on a structure are named turrets. In old stone structures, as the Tower of London, the towers were apt to be circular. As Gothic architecture developed, square and rectangular towers were more common. In Oriental architecture there is a tendency to finish a tower with a dome. In modern structures towers are mainly for ornament and are located at one or all the four corners of a building, or centrally. Among towers are included the mosques of the Moham¬ medans, the lofty bell towers common in Rus¬ sia, ancient lighthouses along the seacoasts and

the round towers (q.v.) of India, Ireland and other countries. The tower bastion of mediae¬ val castles contained rooms and cells. (See Bastion). Water towers are similar to stand pipes (q.v.). See Gable for a description of gabled towers; also Campanile; Eiffel Tower; Pisa; Monuments; Pagoda; Tope.

TOWER, Round, a building peculiar to early Christian architecture, of slender form and usually bearing a conical roof. Windows are few in number and generally small. The type is common to Ireland, and in addition to the Irish bee-hive huts forms its only distinc¬ tive contribution to architecture (see Ireland, Architecture). More than 100 exist in Ire¬ land. A > few examples are to be found in Great Britain and on the Continent, point¬ ing to the time of the invasion of the Irish missionaries. The smallness of the windows seems to make it improbable that the towers were used for bells and rather points to their employment for defensive purposes. The name is given to remains of structures of American Indians of the Pueblo type. They are found standing in isolation or in connection with walls of rectangular form. They are built of roughly-dressed stone and some are interesting structurally for their two or three concentric walls, with the two outer ones connected by transverse walls on radial lines. See Irish Archeological Remains ; Irish Art.

TOWER BRIDGE, London. See Bridge;

paragraph Movable Bridges ; also London.

TOWER CLOCKS. See Clocks. TOWER OF LONDON. See London. TOWER MUSIC. See Chimes.

TOWER OF SILENCE. This name is applied to structures built by the Parsees for the disposal of their dead. They are towers — called dakhmas — about 40 feet high and with large diameter. Somewhat below the top of the wall is built a floor of iron grating and upon this the bodies of the dead are placed until by exposure to the elements and to birds of prey the flesh is entirely removed from the bones and they have fallen into a pit below. There are evidences that they were carefully chained. One of these ((towers of silence® stands in the neighborhood of Bombay, India. It is believed that their primary purpose was sani¬ tary, to prevent contamination of local soil and water.

TOWER OF THE WINDS. See Athens.

TOWHEE BUNTING, a large, black, white and chestnut bunting of the American genus Pipilo, several species of which occur in the United States. Several are confined to the southwest, but one species, the chewink,- or ground-robin (P. crythropthalmus) is numerous in summer throughout the whole of the eastern half of the country, and its sharp, metallic call is familiar to every countryman. In spring the male has a delightful song, but one not fre¬ quently heard The nest of

the towhee is made upon the ground in the woods, where the birds spend most of their time, scratching vigorously among the leaves for their food, and its five red-spotted eggs are cleverly concealed by a domed canopy of twigs and leaves. Consult Wilson, Audubon and other writers on Ameri¬ can birds.

TOWN, Ithiel, American architect: b. Thompson, Conn., 1784; d. New Haven, Conn., 13 June 1844. With Alexander J. Davis he designed the old Capitol (since razed) at New Haven, the city hall at Hartford and the State capitols at Indiana and North Carolina. Town also designed churches at Hartford and New Haven and a bridge at Richmond, Va., over the James River. He is the author of a number of books on architectural and other subjects. His large library went in part to Yale College. He was one of the original members of the Academy of Design.

TOWN GOVERNMENT. See Municipal Government; Town and Town Meetings.

. TOWN AND TOWN MEETINGS. In

its broadest meaning the word town denotes simply a collection of houses without regard to the size of the collection and without regard to the form of its political organization. In this sense a hamlet without any governmental powers at all of its own may be referred to as a town and likewise a great municipality like New York or London may be thus desig¬ nated. In some of the Southern and Western States «town» is the legal designation of a municipal corporation whose powers are greater than those of a village and smaller than those of a city. In the New England States, while the word town is often used in a loose or broad sense, more frequently a town denotes a minor civil division (elsewhere called township) which is sometimes wholly rural, sometimes wholly urban and sometimes partly rural and partly urban. An advertised meeting of the voters of a New England town summoned for the con¬ sideration of local business is called a town meeting.

The Pilgrim Fathers who settled at Ply¬ mouth (1620) and the Puritans who settled (1628-30) at Salem and Boston began at once to develop a system of local government They settled in compact communities and gave the name town to the thickly inhabited portion

of a grant or purchase. The organization of the town was accomplished through the agency of a town meeting. The early settlers of New Eng¬ land were equals in social rank; their average of intelligence was high; they were nearly equal in worldly possessions. Respecting mat¬ ters of government, they were intensely dem¬ ocratic and at the same time intensely theo¬ cratic. They believed that the state should be a ((city of God);> and that authority in spiritual and temporal matters should flow from a com¬ mon source. Accordingly fheir town meetings were religious assemblages acting as pure democracies, except in Rhode Island, where the civil authority did not interfere in matters of conscience. The meetings in colonies where the theocratic principle prevailed were usually held in a church, and all the male church members of the town who were of legal age could at¬ tend and take part in the discussions and vote upon any question that, might arise. The town was incorporated and its boundaries were de¬ fined by the colonial legislature. It was then left to govern itself pretty much in its own way, providing, of course, it did nothing con¬ trary to the laws of the colony. At first, while local government was getting under way, town meetings were called every month or two. In Boston in 1635 10 general town meetings were

held. The people soon found, however, that they could not give so much time to public affairs and it was not long before it became the custom to summon the town meeting but once in the year, provision being made for calling special meetings when there was need. The town meetings elected such officers as were re¬ quired for the management of local business and made such by-laws (town laws) as com¬ mended themselves to the judgment of the com¬ munity. For the management of the affairs of the town during the interval between town meetings a board of townsmen, usually called selectmen, was elected. The number of select¬ men in the earlier towns ranged from 3 to 13. These officers administered the finances of the town, appointed sundry subordinate officials, let out contracts for public work and exercised such

cw wcic xicLCbˆary to secure ana main¬ tain the peace, safety, comfort and religious conformity of the people. As stewards of the people they gave to the town meeting an ac¬ count of their stewardship in the form of an annual report. A town clerk, who acted as secretary of the meeting and who served as the recording officer of the town, and a con¬ stable, whose duties, broadly speaking, were those of a peace officer, were always chosen. The selectmen, the clerk and the constable were the constitutive officers ; no town was without them. Among other officers elected in the early town meetings may be mentioned the tithing- man, a kind of Sunday constable, who saw that

the people came to church and with fox-tail wand kept them awake during the sermon ; the fence-viewer, who supervised the erection of boundary fences between adjoining owners; the hog-reeve, who saw that rings were kept in the noses of swine running at large; the field-driver, who impounded stray cattle. Repre¬ sentatives to the colonial legislature were also elected in town meeting. Besides electing town officers, the town meeting acted as a legislature tor all matters of local concern. It levied the town taxes ; it passed by-laws relating to the use of common fields and pastures; it made assignments of lands to individuals; it pro¬ vided for the management and support of the p! 10j's' New England colonies but

Rhode Island it regulated and controlled all affairs connected with the church, subject to the superior authority of the colonial legisla¬ ture. No detail of the civil or religious life of the community was too small for the attention of the town meeting. It prescribed the man¬ ner ™ Y.hlch the sch°olmaster should use the rod; it directed the arrangement of seats in the c“MrJh; it specified the hour of the day at which the woodman should begin to wield his

axe.

Such was the early New England town meeting. Its origin is traced by some students o political science to the Anglo-Saxon tunscipe

a i °xt e stl 1 earlier Teutonic mark. The early New England town certainly bore a strong resemblance to the ancient type of Teu¬ tonic local government. The name town itself reminds us of the Saxon tun (Old German Zim, a hedge) ; the selectman reminds us of the baxon gcrefa, headman (he was actually called headman in Rhode Island) ; the town meeting was, in many particulars, a counterpart of the Saxon Tunmoot. There is no evidence, how-

ever, that the New England settlers consciously imitated any existing or pre-existing type of local government when they developed their town .system. They brought to their task Eng¬ lish political instincts and English traditions and availed themselves of English experience, but the town as an institution, both in its or¬ ganization and in its functions, was an out¬ growth of the peculiar social, economic and political conditions which prevailed in New England during the first years of the colonial period.

The town meeting system described above had its beginnings in the settlements of Ply¬ mouth, Salem and Boston and was adopted by the offshoots of these parent towns. When¬ ever the population of a grant or purchase be¬ came sufficiently large to support a church and conduct local government it was incorporated by the central legislative body and a town meeting was called. Thus the town system grew as New England grew, and was soon deeply rooted in the affections of the people. It re¬ sulted in a society that was as purely demo¬ cratic as any the world had ever seen. During the colonial period the town was the distinguish¬ ing feature of New England life, and when the Revolution came the little democracies proved to be powerful aids in the cause of liberty. In the town meeting it could easily be learned who were loyal and who were not. Through the agency of the town organization military stores were secured and the famous minutemen (q.v.) were organized. The resolutions of numerous town meetings voiced in the plainest manner possible the sentiment for independence and were the precursors of the Declaration itself. And their influence in great public affairs con¬ tinued after the Revolution. (<How power¬ fully,® said Thomas Jefferson, <(did we feel the energy of this organization [the town] in the case of the Embargo (q.v.). I felt the founda¬ tions of government shaken under my feet by the New England townships. There was not an individual in their States whose body was now thrown with all its momentum into action, and although the whole of the other States was known to be in favor of the measure, yet the organization of this selfish community en¬ abled it to overrule the Union.® In another place the great Democrat says: ((They [New England towns] have proved themselves the wisest invention ever devised by the wit of man for the perfect exercise of self-govern¬ ment and for its preservation.®

In its essential characteristics town govern¬ ment in New England has not changed greatly since the days of the early settlers, except in its religious feature; that feature entirely dis¬ appeared in the early part of the 19th century, when the separation of Church and ˆ State was achieved. Details in the organization and in the powers of the town differ in the different New England States, yet the outlines of town government in all these States are practically identical and are as follows : The State legis¬ lature defines the boundaries of the town, in¬ corporates it, and confers powers upon it. As a corporation, the town can sue and be sued, and can acquire and hold real property. A town may be divided by the legislature into two or more towns or can be united with and made a part of another town. The public affairs of the town are transacted in a town meeting

which meets annually, and also assembles in special meetings which

may be called from time to time. The meeting is held in the town hall or in some other hall sufficiently large to ac¬ commodate the mass of voters. When the people have assembled, the town clerk calls them to order and states the purposes for which the meeting is called. A moderator (presiding officer) is then chosen and business proceeds according to parliamentary rules. All questions are decided by a majority vote of the legally qualified voters in attendance. Usually citizens who are qualified to vote for a governor and for members of the State legislature are also qualified to vote in town meeting. Here is democracy in its purest form. Young and old, rich and poor, the obscure and the prominent, are present, and every citizen may not only vote, but, if he chooses to do so, may also bring the full force of his character and influence to bear upon the deliberations of the meetings. Routine business is quickly disposed of, but those matters which happen to be the subject of contention are generally discussed fully and freely. The right to vote on local taxation and appropriations is in some States reserved to taxpayers. The finances of the town are watched keenly, and if there has been misman¬ agement or extravagance during the past year there is sure to be a merciless exposure in the town meeting. If improvements are needed or if the town is lagging behind its neighbors in progressiveness, the discussion in the folkmoot is likely to be directed toward a remedy. At annual town meetings the following things are done: (1) The rate of taxation for the com¬ ing year is fixed. Money is appropriated for the schools, for the care of the roads, for the support of the poor, for the salaries of officers and for other necessary expenses. Sometimes the schools are managed by school districts. When this is the case each district elects its own officers and sometimes also makes its own levy, but the town meeting or town council elects the school superintendent. (2) By-laws are passed. These may relate to such matters as infectious diseases, locations of sidewalks and curbstones, the erection of buildings, the regulation of the speed of vehicles. Many things which in other places are done by a body of chosen representatives are done in town meeting by the people themselves acting as legislators. (3) Town officers are elected. At the head of these stand the selectmen, or councilmen, three or five or seven in number. These are the executive officers of the town. They supervise the construction of roads, grant licenses, care for the poor, abate nuisances, check the spread of contagious diseases, listen to the complaints of those who have grievances of a public nature, select jurymen, canvass the voting list, look after the paupers and represent the town in court when it is sued. When a specified number of voters sign a call for a special town meeting it is the duty of the select¬ men to place on the town post a warrant which calls the meeting and states the purposes for which it is

called. After the selectmen, the town clerk is next in importance and usefulness. This officer calls the town meetings to order and keeps a record of its proceedings. In ad¬ dition, he usually keeps a record of the births, marriages and deaths andl grants certificates of marriages and the real estate records of the

*own. Town assessors make out a list of the taxpayers of the town and place an estimate iipon the value of their property. Sometimes the selectmen themselves act as assssors. In addition to the officers mentioned the town jneeting. usually elects tax collectors, a town treasurer, town solicitor, overseers of the poor, a school committee, trustees of the town library, constables (peace officers), surveyors of high¬ ways, fence-viewers, milk inspectors and field- drivers, or it refers the election of these offi¬ cials to the town council. All town officers have a tenure of one year. The list of officers which has been given is not complete, yet it is long enough to show that in every New Eng¬ land community a great many people must take a part in public affairs. Undoubtedly it is this general participation in the business of govern¬ ment that makes the people of this part of our Union such a wide-awake and progressive body of citizens.

In all the New England States (Massachu¬ setts excepted) the town is the unit for rep¬ resentation in at least the lower branches of the State legislature. Government in New England . is, therefore, by towns rather than by counties, as in other States. The town has so many functions and absorbs so much local business that little is left for the county to do. Indeed the county in New England exists prin¬ cipally for judicial purposes; in Rhode Island it exists solely for judicial purposes. As it is to-day so it has always been: throughout the whole period of her history the focus of New England life has been the town. “Towns,® says Joel Parke, (<have been the arterial system of New England through. which has circulated the life-blood which has invigorated, sustained and strengthened her, making her expand in her religious,, social, educational, benevolent and political institutions.® The people cling tena¬ ciously to their town system. Boston did not change from town to city government until 1820 when, with a voting population of 7,000, she found that the town meeting could no longer act as a deliberative body. Yet the conditions of population in recent years sometimes make it extremely difficult to administer local gov¬ ernment on the town plan. People are mov¬ ing from the country to the city, depleting some towns and making others

too large to meet in mass. Towns in New England vary in population from less than 100 souls to 20,000. As a matter of experience local government in New England is changing with the new con¬ ditions. So long as the population of a place remains , below 10,000 (the population of Aristotle's ideal city) town government is usually economical, efficient and pure, but when the population greatly exceeds that number the interest of the citizens , in local matters begins to flag, the town meeting becomes unmanage¬ able and the town government is in danger of falling into unworthy hands. The remedy is municipal incorporation. The thickly inhabited part of the town secures a charter and becomes a borough or village or city and the people sur¬ render a part of the public business to chosen agents. . This change, however, usually does not extinguish town government within the boundaries of the new municipality, although it does take from it many of its former powers.

. While town government in its pure form is found only in New England, modifications of

it appear in those Western States whose popu¬ lation contains a strong admixture of New England emigrants, notably in Michigan, Il¬ linois, Wisconsin, Minnesota and Nebraska. Each of these States has provided by law for a system of local government which resembles more or less closely the New England system. In Michigan, for example, the voters of a township, after they have elected their local officers, meet in the afternoon in mass for the transaction of certain local business. At this meeting they may regulate the keeping and sale of gunpowder, the licensing of dogs, the vac¬ cination of the inhabitants; they may order the purchase of books for the town library; they may under certain restrictions, and within cer¬ tain limits, order the raising of money by taxa¬ tion. In Illinois, in those towns which have adopted the township system, there is a similar meeting of the voters after the township offi¬ cials have been elected. Here we have the form at least of the town meeting, but it does not appear that the spirit of the New England town vivifies these western meetings. Township government in the West has always been and continues to be essentiallv representative. A New England town meeting may last for a day, sometimes for two days, and personal at¬ tendance for so long a time means inconven¬ ience and money loss. Representative govern¬ ment, on the other hand, requires no such sacrifice. Because town government requires so much of the citizen's time and burdens him with such great responsibility, it has been ex¬ tremely difficult to transplant it. The example of the town meeting has undoubtedly had great influence upon the course of local government in all parts of the Union, but it cannot be said that town government,

either in spirit or in form, is vigorous in any State outside of New England.

Bibliography.— Howard, (Local Constitu¬ tional History of the United States) ; Adams, Germanic Origin of New England Towns *; Johnson, (The Genesis of a New England State) ; Parker, 'Origin, Organization and In¬ fluence of the Town of New England) ; Bemis, 'Local Government in Michigan and the Northwest* ; Shaw, 'Local Government in Illinois *; Fiske, 'American Political Ideas*; Bryce, 'American Commonwealth *(Vol. I) • Hosmer, 'Life of Samuel Adams* (ch. xxiii)'.

S. E. Forman,

Author ' First Lessons in Civics. *

TOWNE, Henry Robinson, American

manufacturer: b. Philadelphia, Pa., 28 Aug 1844. He attended the University of Pennsvl- vama but left school to become a draftsman in the Port Richmond Iron Works. In 1863 he was placed in charge of government work in 5.. shops and later, in 1864, was in charge of building the engines for monitors and similar important work until the close of the war. In the course of time he took a special course in physics at the Sorbonne, Paris, and in 1866 he became associated with Linus Yale in making his famous locks, and after the latter's death was president of the corporation until 1915. Later he became chairman of the Federal Re- serve Bank of New York and was connected wr, other business interests. He is the author , Towne on Cranes* (1883) and numerous technical papers.

TOWNE SCIENTIFIC SCHOOL, a de¬ partment of the University of Pennsylvania. See Pennsylvania, University of.

TOWNELEY, Charles, English art collec¬ tor: b. Burnley, Lancashire, 1737; d. Lon¬ don, 1805. He was educated at Douai College and began collecting art objects abroad in 1768. He made frequent trips abroad for the pur¬ pose and in 1791 was made a trustee of the British Museum. His collection of marbles, known as ((The Towneley Marbles,® together with his statuary, medals and other gems of ancient art, was bought by the museum after his death. Consult Ellis, (The Towneley Gal- lery) (London 1846).

TOWNELEY MARBLES, a notable col¬ lection of Greek and Roman sculpture, forming a portion of the gallery of antiquities in the British Museum ; so named after Charles Towneley, by whom the collection was made.

TOWNSEND, Charles Elroy, American politician : b. Concord, Mich., 15 Aug. 1856. He was educated at the Jackson High School and at the University of Michigan, and was ad¬ mitted to the bar in 1895. He was a delegate to the Republican National Convention in 1888 and served on the State Central Committee (1898— 1902). In 1903-11 he was elected a member of Congress from the second Michigan district, and on 18 Jan. 1911 was chosen United States Senator.

TOWNSEND, Charles Haskins, American zoologist : b. Parnassus, Pa., 29 Sept. 1859. He was educated at public and private schools and became assistant United States Fish Commis¬ sioner in charge of salmon propagation in Cali¬ fornia in 1883. He remained in the govern¬ ment service in various positions until 1902, when he was made director of the New York Aquarium, a position which he still holds. He is author of numerous monographs relating to fisheries, fish culture, etc.

TOWNSEND, Edward David, American soldier: b. Boston, Mass., 22 Aug. 1817; d. Washington, D. C., 11 May 1903. He was graduated from West Point in 1837, served in Florida 1837-38 and on the Canadian frontier in 1838-41 ; was promoted captain in 1848 and colonel in 1861. In the year last named he was made chief of staff to Lieut. -Gen. Winfield Scott. In March 1865 he was brevetted major-general United States army, and was placed on the retired list in 1880. He published Cate¬ chism of the Bible — The Pentateuch > (1859); Catechism of the Bible — Judges and Kings* (1862); (Anecdotes of the Civil War in the United States) (1884).

TOWNSEND, Edward Waterman, Amer¬ ican author: b. Cleveland, Ohio, 10 Feb. 1855. He was for some years on the staff of the New York Sun and in 1895 became widely known by his Chimmie Fadden and Major Max, *in which a typical New York boy of the rougher class is depicted. Later works include Chim¬ mie Fadden Explains, Major Max Expounds> (1895) ; (A Daughter of the Tenements) (1896); (Lees and Leaven) (1903); (Reuben Larkmead* (1905); Cur Constitution (1906); <Beaver Creek Farm) (1907); (The Climbing Courvatells) (1909).

TOWNSEND, George Alfred, American journalist: b. Georgetown, Del., 30 Jan. 1841;

d. 15 April 1914. He was graduated at the Philadelphia High School in 1860 and entered journalism. He was special war correspondent of the New York Herald and World in 1861— 65, afterward engaged as a lecturer, and in 1866- 67 he was in Europe as special correspondent in the Austro-Prussian War and later at the Paris Exposition. For many years after 1868 he was an editorial writer and correspondent on the staff of the Chicago Tribune , and his contributions to the press, under the penname ((Gath,® have been widely read. His publica¬ tions include Campaigns of a Non-Combatant *(1865) ; Che Real Life of Abraham Lincoln* (1867); (Washington Outside and Inside*

(1871) ; (Tales of the Chesapeake *(1880) ; Che Entailed Hat* (1884) ; President Crom- welP (1885) ; (Mrs. Reynolds and Hamilton-' (1890); Columbus in Love *(1892); (Poems of Men and Events* (1899) ; (Poems of the Delaware Peninsula,) etc.

TOWNSEND, Lawrence, American diplo¬ mat: b. Philadelphia, 13 Aug. 1860. He was educated at the University of Pennsylvania and spent some six years in Europe in the study of international law and the history of diplomacy. He was first secretary of the American legation at Vienna 1893-97, Minister to Portugal 1897— 99 and Minister to Belgium, 1899-1905.

TOWNSEND, Luther Tracy, American Methodist clergyman: b. Orono, Me., 27 Sept. 1838. He was graduated from Dartmouth in 1859 and from Andover Theological Seminary in 1862, served in the Federal army during a portion of the Civil War, and in 1864 entered the Methodist ministry. He was professor of Hebrew in Boston University 1868-70 and of practical theology there 1872-93. He has since been professor emeritus. He has published among many other works Credo * (1869);

(Bible Theology and Modern Thought *(1883) ; Cvolution of Creation) (1899) ; Cod's Good¬ ness and Se'verity) (1903) ; (God and the Na¬ tion* (1905) ; (Doctrine of the Trinity) (1910) ; (Bible Studies *(1913) ; Cod and War* (1915) ; (Hell Is No Myth* (1917).

TOWNSEND, Thomas Seaman, American compiler: b. New York City, 27 Aug. 1829; d. there, 1908. He was given a classical educa¬ tion but devoted himself to commercial life. His renown rests chiefly on a compilation of newspaper clippings relating to the Civil War which fills 125 large volumes and forms a mine of information for the historian of the times from 1860 to 1901. The collection is in Colum¬ bia University Library and is entitled the (Townsend Library of National, State and In¬ dividual Civil War Records.* He also lec¬

tured and gave addresses on the War of the Rebellion.

TOWNSHEND, town'zend, Charles, 2d

Viscount, English statesman: b. Rainham, Nor¬ folk, 10 March 1674; d. there, 21 June 1738. On the death of his father, the first viscount, in 1687, he succeeded to the peerage and took his seat as a Whig in the House of Lords, 1695. He was one of the commissioners for arranging the Scotch Union (1706), was joint plenipotentiary with Marlborough in the confer¬ ence at Gertruydenburg (1709), and as Ambas¬ sador to the States-Genergl signed the Barrier Treaty at The Plague, 29 Oct. 1709. He was

censured by the House of Commons for this action and declared an enemy of the queen and kingdom. He accordingly entered into corre¬ spondence with the elector of Hanover, who, on his accession as George I, appointed Town- shend Secretary of State, 1714. In 1717 he was made lord-lieutenant of Ireland; was again Secretary of State from 1721 to 1730, when he retired by reason of disputes with his broth-in-law and colleague, Sir Robert Walpole.

TOWNSHEND, Charles, English states¬ man: b. 29 Aug. 1725; d. London, 4 Sept. 1767. He was grandson of the 2d viscount Town¬ send, was educated at Leyden (probably also at Oxford) and entered Parliament in 1747. The next year he received a minor office and in 1754 became Lord of the Admiralty. From this post he rapidly advanced and became a member of the Privy Council in 1757, Secretary at War in 1761, and in 1766 Chancellor of the Exchequer. Pitt's entrance into the House of Lords and eventual incapacity through ill health left Townshend virtually at the head of the govern¬ ment, and he defied his nominal chief in declar¬ ing the right of the East India Company to territorial revenue and made use of his official position to secure for himself a large share in a public loan. In 1767 he was defeated on his proposition for a land tax. On 13 May he in¬ troduced measures dealing with the American colonies, virtually reviving the principles of the Stamp Act, which had lately been repealed. The American Revolution was caused by the imposition of' taxes which he proposed. His reputation as an orator was scarcely second to that of Pitt himself. Of his qualities Lecky has written : (<Exuberant animal spirits, a bril¬ liant and ever ready wit, boundless facility of repartee, a clear, rapid and spontaneous elo¬

quence, a gift of mimicry which is said to have been not inferior to that of Garrick and Foote, great charm of manner, and an unrivaled skill in adapting himself to the moods and tempers of those who were about him, had made him the delight of every circle in which he moved, the spoilt child of the House of Commons.® Consult Cobbett, 'Parliamentary History of England to 1803 3 (1806-20); Fitzgerald,

'Charles Townshend, Wit and Statesman

(1866).

TOWNSHEND, Sir Charles James, Ca¬ nadian jurist: b. Amherst, Nova Scotia, 22 March 1844. He was educated at King's College and became a noted barrister. He was at one time a member of the law faculty at King's College and practised successfully at Amherst, was a puisne judge (1887), and since 2 Nov. 1897 has been chief justice of Nova Scotia. He was knighted by King George in 1911. He was conserva¬ tive member of the House of Commons (1884- 87) and held other positions of honor. Among other papers he is the author of (A History of the Courts of Judicature in the Province of Nova Scotia.3

TOWNSHEND, Charles Vere Ferrers,

British soldier: b. 1861. He joined the army from the Royal Marines in 1886 and was a major-general in 1911. His life was one of constant activity and in the Great War he com¬ manded the Mesopotamia campaign until com¬ pelled to surrender at Kut-el-Amara for lack of

food after a five months' siege by the Turks. Previously he had served in the Sudan and Nile expeditions (1884-85), participated in the South African War (1899-1900) and was with the British army in India (1907-09).

TOWNSHIP, a local minor civil or political division of territory within a county in the United States, outside of New England where they are termed towns. See Town and Town Meetings.

TOWNSLEY, Clarence Page, American

army officer : b. De Kalb, N. Y., 24 Sept. 1855. He was educated at the Potsdam Normal School, Union College (1876) and the United States Military Academy (1881). He also at¬ tended the Government Artillery and Torpedo schools and was active in various positions, reaching the superintendency of the United States Military Academy at West Point (1912— 16) and being appointed commander of the 30th division, National Guard, in 1917.

TOWNSVILLE, Australia, the most im¬ portant town of northern Queensland, Aus¬ tralia, situated on Cleveland Bay on the east coast. It has a number of fine buildings, in¬ cluding a new cathedral, a new custom-house, the Supreme Court building and a large prison. The chief industrial establishments are an iron foundry, an ice plant, a soap factory and meat packing houses. The town has a good harbor, well fortified; it is the terminus of a railroad to Hughenden and the chief outlet for the products of northern Queensland. The great Commonwealth Bank has a branch here. The exports amount to nearly $15,000,000 annually. Pop. 13,835.

TOWSE, John Ranken, American dramatic critic: b. Streatham, England, 2 April 1845. He was educated at Cambridge University and came to N ew \ ork in 1869. He took up newspaper work and since 1874 has been dramatic critic of the Evening Post. He published 'Sixty \ ears in the Iheatre: an Old Critic's Me¬ mories3 (1913-16).

TOXICOLOGY, the study of poisons. The word poison is difficult to define, since many substances which in minute amounts exercise no harmful action on the body may in large quantities produce disastrous effects. Then again, some substances which are harmless when taken into the stomach, as water, for in¬ stance, if injected into a blood-vessel prove very dangerous, causing death at times from the destructive action of the water on the blood-cells. Moreover, the many studies of recent years on bacteria and other low forms of life have resulted in a new series of concep¬ tions regarding the poisonous actions of the compounds formed by these bodies; and still further, certain forms of perverted metabolism of the human body result in the production of certain products which, retained by the body, work harmful effects. (See Auto-intoxica- tion; Metabolism). If all the different factors are taken into consideration, a strictly scientific definition of the word poison cannot be given. In general it is said that a poison is any sub¬ stance which brings about a change in the molecular composition of an organ or organs, causing its functions to depart very distinctly from the normal. But what grade of molecular disturbance is necessary to make a substance a

poison, or how far from the normal must be the functional alteration, it is impossible to say. Many substances, strychnine for example, while being .distinctly poisonous in appreciable doses, are very useful and helpful to the body when given in small amounts. Infinitesimal doses

of copper salts act as pronounced poisons on cer¬ tain forms of lowly organized plants, while a higher plant, the potato, does not suffer from large doses used as a spray to kill insect or fungus-parasites.

The modern conception of poisonous action is essentially a physico-chemical one, the dis¬ tinction between a molecular physical action and a molecular chemical action being difficult to make. But it is believed that for practically all forms of poisons a distinct alteration in the character of the cells of the body takes place, as well as a change in the chemical composition of the poisonous substance. It is impossible at the present time to summarize these changes. It is rarely that the reaction between the body¬ cell and the poison is purely of a physical nature, yet this very frequently happens in many poisons that act on the blood. By some of the poisons — the anilines, for example — the blood undergoes changes, not so much due to new chemical compounds formed, as to physical changes in the tension of the blood-serum and the blood-corpuscles, whereby the blood-coloring matters stream out into the plasma, and the oxygen-carrying function of the blood is lost. Similar types of poisoning result from some of the metals, and the poison of the cholera organism is thought to act in a like manner. In other poisons there is a direct union of the ions of the poison with some constituents in the cells of the body, mak¬ ing new chemical compounds, and thus inter¬ fering with the molecular activities of the cells.

Von Jaksch has divided the poisons into two classes : the exogenous poisons, or those that come from without the body, and enter by way of the skin, the lungs, the stomach or the intestines ; and the endogenous intoxications that result from changes within the human body through disordered metabolism. Oc¬ casionally the former class may cause such changes in the body that death results from an intoxication of the second variety. Thus a severe irritant to the kidneys, such as canthar- ides, may cause such an acute inflammation of that organ that it cannot secrete urine, and the patient may die of uraemic poisoning. In much the same manner certain bacteria find en¬ trance into the body and develop poisons both within the tissues and also in the intestinal canal, and furthermore provoke putrefactive processes in the food in the intestinal canal. This brings about a triple form of poisoning, as it were.

The different typ'es of poisoning are many. They cannot all be given in the space here available, but the symptoms and general treat¬ ment of a few of the more common types of poisoning will be mentioned. Poisoning by the mineral acids, nitric, sulphuric, hydrochloric, is not uncommon. In these there is a marked caustic action, with intense

burning pain when taken by the mouth. The lips are stained yel¬ low, black or white respectively, according to the acid taken. There is nausea, vomiting and diarrhoea, with all the symptoms of an intense gastro-enteritis, with collapse, pale face, cold

sweating extremities, small, feeble pulse, rapid respiration; and the patient dies in intense agony. Treatment is by prompt washing out of the stomach with an alkaline solution, soap, washing soda or other mild alkali being useful. Then comes the use of heat, of mucilaginous drinks, such as white of egg, gum arabic, slip¬ pery elm, olive oil, milk, etc. The technical details require prompt medical attendance as soon as the washing out with the alkaline solu¬ tion is commenced.

Oxalic acid is frequently swallowed by mis¬ take. Here the staining is usually absent; the gastro-enteritis is marked as in poisoning with the mineral acids ; there is great muscular weak¬ ness and twitching of the muscles, particularly about the face; sometimes there are convulsions and further symptoms of collapse are present. In treatment wash out stomach by tube, or by drinking large quantities of water with lime — teaspoonful of lime to quart of water — and stimulants. Following oxalic poisoning large quantities of water should be taken for a week or so to flush the surplus oxalates from the kidneys.

Poisoning by alkalis is infrequent. Occa¬ sionally sodium hydrate, or potassium hydrate, is swallowed. Lime is also taken by accident; so (rarely) is ammonia. The symptoms are much like those of poisoning by the mineral acids. There are no * marked discolorations, as noted, but otherwise the symptoms are sim¬ ilar. Treatment is by rapid washing of stom¬ ach with weak acids, vinegar being' the most convenient, and by demulcents, as in acid¬ poisoning.

The halogen compounds are very markedly poisonous as gases, notably chlorine, bromine, fluorine; and the iodides and bromides cause forms of chronic poisoning known as iodism and bromism (q.v.).

The heavy metals as such are not poisonous, but their soluble compounds are all poisonous. They vary widely, however, in strength. In order, from the strongest to the weakest, they are caustic or astringent; severe caustic metal¬ lic salts being, in order, mecury, tin, silver, antimony, copper, zinc, iron and aluminium. But in poisoning the acid part of the salt is of importance. From strongest to weakest these acids run : hydrocnloric, nitric, sulphuric, phos¬ phoric, acetic, citric, tartaric. If a caustic metal is combined with a caustic acid the re¬ sulting salt, if soluble, is a very powerful poison, mercuric

chloride, or corrosive sub¬ limate, being an illustration. If a weak metal like iron is combined with a strong acid the result is an intermediate poison like chloride of iron ; when a weak metal, as lead, is combined with a weak acid, as acetic, lead acetate, sugar of lead, a weak poison, is formed. Thus' the strength of a metallic salt may be calculated from the comparative positions of the metallic and acid ions. In all these metallic poisons albumen compounds are formed. The coagu- lum varies in all and according to its solubility or insolubility the burning of the poison is more or less deep. In all the symptoms are analogous; there is severe gastro-enteritis, with symptoms of collapse. The treatment is similar in all : washing of the stomach, white of eggs, milk, demulcents, artificial heat, respi¬ ration and afterward careful feeding.

Arsenic and phosphorus are poisons that

give very similar symptoms : acute gastroen¬ teritis, with nausea, vomiting, purging; then some grade of apparent recovery, to be fol¬ lowed after a few days with a recrudescence of the gastro-enteritis and the development of secondary blood-vessel changes, which may cause minute hemorrhages in any part of the body. Then follow fatty degeneration and death. The commonest form of salt causing arsenic-poisoning is Paris green; while rat- poison and matches are responsible for most cases of phosphorus poisoning. Treatment of arsenic poisoning calls for prompt washing of the stomach, small doses of magnesia and water every 15 minutes for several hours and stimulant supportives. Phosphorus can usu¬ ally be detected by the odor. There should be prompt washing, and avoidance of oils, although castor-oil may help in getting phosphorus out of the intestinal canal. Authorities, however, prefer the saline cathartics. A prompt oxidiz¬ ing agent, permanganate of potash or hydrogen peroxide, should be us*ed, or small doses (1 to 2 grains), diluted, of copper sulphate.

For the effects of poisoning by the alcohols, see Alcoholism. Practically all of the anes¬ thetics (ether, chlorolorm, ethyl chloride, etc.) and hypnotics (chloral, paraldehyde, trional, sulphonal, veronal, etc.) belong to the alcohol group (see Alcohol), and the symptoms are closely allied.

Phenols form a distinct group in which car¬ bolic acid, creosote, creolin, lysol, resorcin, pyrogalhc acid, thymol, guaiacol, naphthaline,

salol, etc., belong. They cause symptoms closely resembling one another. Carbolic acid may be taken as the type. This causes gastro-en-tentis, with severe pain, white scar of lips and throat, buzzing, dizziness, smoky to blackish urine pale, bluish face, weak heart, quick breathing, coma and sometimes convulsions. Treatment is by quick washing of the stomach. A mixture of lime and sugar of syrupy con¬ sistency, Epsom salt, milk, white of eggs, car¬ diac stimulants and artificial respiration are all valuable.

. Another large group of poisons, the anilines, includes many of the modern drugs, such as acetanilid. Closely allied are different aniline dyes. Also phenacetin, antipyrin. In these the characteristic signs of poisoning are somewhat similar to those seen in the phenol group, but in the more pronounced ones of this series the main changes occur in the blood. There is blueness of the skin and lips, difficulty in breathing, sometimes pinkish to purplish urine rapid and feeble heart action. The chief changes are due to a partial destruction of the red blood-cells. In phenacetin the blood rarely disintegrates as in antifebrin or acetanilid; whereas in antipyrin there is no real blood action. The treatment of these forms is by prompt evacuation, cardiac stimulation, oxygen and, most important of all, artificial respiration.

Alkaloidal poisons (see Alkaloids) are nu¬ merous The commonest forms of poisoning from these, the most powerful poisons, are morphme (opium, laudanum, paregoric), strychnine (nux vomica), atropine (bella¬ donna), cocaine (coca), aconitine (aconite) and nicotine (tobacco). In acute opium poison¬ ing the classical symptoms are drowsiness, coma, small pin-point pupils, loss of pain, slow

breathing (six to eight to a minute), moist skin, dry mouth, rousing with more or less active consciousness and quick relapse. Treat¬ ment is by washing the stomach with hot strong tea or coffee, by mouth or by rectum, and by artificial respiration. Too much walking of the patient about is not desirable.

Strychnine poisoning causes twitching of muscles, cramps, irregular muscular move¬ ments, convulsions at slightest jar or touch fixation of muscles of breathing, with cyanosis! Ireatment is by great quiet, alcohol, chloro¬ form and stimulants.

Belladonna poisoning shows wide-awake, restless consciousness, sometimes active, busy delirium; dry mouth, skin hot and flushed, pupils widely dilated and paralyzed to light and accommodation, rapid feeble heart and rapid respiration. Treatment is by prompt evacuation of stomach, sodium bromide, opium, caffeine or coffee.

Another group of glycoside poisons is char¬ acterized by a great similarity in action. Many of these are used in medicine and some were used as arrow-poisons by wild natives. This group contains digitalin (digitalis), strophanthin (strophanthus), convallarin (lily-of-the-valley) bryonin (bryonia), apocynin (dogbane), olean- drm (oleander), scillain (squills), etc. These are all heart poisons. They first quicken the heart, then slow and regulate it, hence their use¬ fulness in many heart diseases; but in overdoses they paralyze the heart by overstimulation. As these drugs rarely cause poisoning, the treat¬ ment is omitted.

Tox albumins form a group of special char¬ acter, and all are very violent. Some are of vegetable and others of animal origin. The most important are abrin (in jequirity-seeds) ricin (from the seed-coats of the castor-oil bean— frequently causing death in children who eat the whole bean), phallin (in poisonous mushrooms), rattlesnake poison, cobra poison heloderma and the poison of lizards, etc.

1 he most important of the bacterial toxins some of which might be classed here, are dis¬ cussed under their respective heads. For the endogenous intoxications see the articles on

tnL lnˆ10us leases, cholera, diphtheria, tuberculosis, pneumonia, tetanus, typhoid etc •

bItPQthR dlˆeas?s ?.f metabolism, uraemia, dia- betes, Basedow s disease, Addison’s disease — thyroidism, myxoedema, cretinism, etc. See loxiNs and Antitoxins.

Bibliography.— Autenreith, W., ‘Laboratory Manual tor the Detection of Poisons and Powerful Drugs' (Philadelphia 1915) ; Brand¬ ts6’ A. H., ‘Manual of Toxicology' (8th ed New York 1915) ; Becker and Witthaus, ‘Medi¬ cal Jurisprudence, Forensic Medicine and Toxicology' (New York 1894); Von Jaksch Die Vergiftungen' (1897); Robert, '< Lehr- buch der Intoxikationen) (1902)- Kunkel Handbuch der Toxikologie' (1900); Kionka’ Grundnss der Toxikologie' ; Peterson and Haines, ‘Text-book of Legal Medicine and

<te0<Fr (Vol. II, 1903); Reese, J. J„ MeAcal Jurisprudence and Toxicology' (gfa ed Philadelphia 1911); Smith, W. R.,’<Medi- cal Junsprudence) (London 1913).

r (Smith Ely Jelliffe, M.D.,

1 Diseases > J°Urna Newous and Mental

TOXINS AND ANTITOXINS. Mitchell and Reichart (at the University of Pennsyl¬ vania) first demonstrated that the poisonous constituents of snake venom are proteins, or closely related bodies. This statement did not meet with favor in Europe, especially in Ger¬ many, at the time, but further studies have confirmed it and it is now a well-established fact that some of the most powerful poisons known are proteins, or at least so closely asso¬ ciated with proteins that all attempts to obtain them free from proteins up to the present time have failed. Such bodies have been found in animal, vegetable and bacterial life, but are limited to certain genera and species. In 1887 Sewall (at the University of Michigan) re¬ ported a research which should be recorded as the first step in the discovery of methods of securing immunity to the action of these pro¬ tein poisons, now known as toxins. Sewall studied the effects of the venom of the rattle¬ snake on pigeons. Having ascertained the minimum fatal dose of this poison he at first administered less than this quantity, and, by gradually increasing the dose, established an immunity which enabled the pigeons to bear without apparent harm many times the mini¬ mum fatal quantity. That this investigator at the time appreciated the possible bearing and significance on protection against disease of his results is shown by the following quotation from his report : ((This work was undertaken with the hope that it might form a worthy con¬ tribution to the theory of prophylaxis. I have assumed an analogy between the venom of the poisonous serpent and the ptomaine produced under the influence of bacterial organisms.® In 1891 Ehrlich, in a similar manner, succeeded in establishing in animals a high degree of im¬ munity against two of the most potent protein vegetable poisons known — ricin, from the castor bean, and abrin, from the jequirity bean. One gram of ricin is sufficient to kill one and one-half million guinea pigs, and the potency of abrin is about one-half that of ricin. To these poisons immunity, as Ehrlich demonstrated, is easily established by feeding the animals by the mouth upon small and gradually augmented doses. While these vegetable products differ from snake venom in being absorbable from the alimentary canal, the resemblance in potency and in the production of immunity is striking. Moreover, like snake venoms these are pro¬ tein poisons. Ehrlich made two important ad¬ vances over preceding workers. He found that the immunity produced with these substances is specific. An animal immunized to ricin has no immunity to abrin, and vice versa. It was later found that this specificity holds good with all poisons of this class. In the second place, Ehrlich found that the blood serum of

the im¬ munized animal contains the immunizing agent, and that transference of this serum to a fresh non-treated animal confers a passive immunity upon the recipient. Moreover, this transferred immunity is quantitative. If the first or actively treated animal has been given an immunity of 10 times the fatal dose, and no more, then one- tenth of its blood will be required to give the fresh animal immunity to one minimum lethal dose, while if the actively treated animal has been immunized to 100 fatal doses, one-hun¬ dredth of its blood serum will immunize a

fresh animal to one fatal dose, and one-tenth of its serum to 10 fatal doses. Furthermore, he found that the immunity of an actively treated mother may be transferred to the nurs¬ ing young through the milk. Roux and Yersin of the Pasteur Institute found that cultures of the diphtheria bacillus, especially cultures four or five weeks old, when freed from the living organism by filtration through porcelain, con¬ tain a poison similar in many respects to snake venom and the vegetable products ricin and abrin. The bacteria — free cultures — when injected into guinea pigs even in minute doses, killed the animals in the same time and with the same symptoms and lesions that result from inoculation with the living organism. Von Behring later immunized larger animals, first goats, then horses, to filtered diphtheria cul¬ tures, and demonstrated that the blood of ani¬ mals thus immunized has both protective and curative value in the treatment of diphtheria.

The toxin of diphtheria is prepared by grow¬ ing a virulent culture of the diphtheria bacillus at 38° C. for two weeks or more and then re¬ moving the bacteria by filtration. In other words, diphtheria toxin is an old filtered cul¬ ture of the diphtheria bacillus. The potency of the toxin solution depends upon many con¬ ditions, all of which must be considered when one attempts to secure a highly active product. The medium generally employed for the growth of the diphtheria bacillus consists of beef tea containing 1 per cent of sodium chloride, from 1 to 3 per cent of peptone, and made feebly alkaline with a solution of sodium carbonate. This medium is placed in glass flasks, each of which should not be more than one-third full in order that there may be a large surface exposed to air which favors the growth of the bacillus and the production of toxin. The flasks are inoculated by floating small masses of diphtheria bacillus growths, taken from agar tubes, on the surface of the beef tea in the flasks. After having been thus inoculated, the flasks are kept at 37°C. for about 14 days, when they are filtered and the filtrate constitutes the diphtheria toxin. The toxin solution quickly loses its potency when freely exposed to air and light, but when properly protected it remains without material

deterioration for months, and under most favorable conditions, for years. Protection is secured by covering the toxin solution kept in dark bottles with a layer of toluol. In this way both air and light are excluded. Pro¬ tection is made more complete by keeping the bottles in a dark room, the temperature of which does not rise above 15°C. When por¬ tions of the solution are to be used, with¬ drawal is made by sterilized pipettes intro¬ duced through the layer of toluol. Under these precautions, the toxin solution may be kept without marked loss in toxicity for two years or even longer. Before the toxin pre¬ pared as stated above is used in the prepara¬ tion of antitoxin, its strength must be deter¬ mined. This is done by ascertaining the mini¬ mum amount of it necessary to kill a guinea pig of from 200 to 300 gram-weight within from three to five days. This amount is known as the minimum lethal dose. In most laboratories engaged in the preparation of diphtheria anti¬ toxin, the toxin is not regarded as sufficiently

potent unless the minimum lethal dose does not exceed 0.02 cubic centimeter. However, it is not always easy to secure a preparation of such high potency, and weaker solutions may be used. Occasion¬ ally a much stronger product is obtained, and when this happens the preparation is greatly prized and carefully kept under the conditions mentioned above. Horses free from disease are carefully selected by skilled veterinarians. Lsually they are submitted to a malein test to be sure that they are free from glanders. Dur¬ ing the procedure the animals should be care¬ fully guarded against wounds however slight, since these may serve as ports of entry for tetanus infection. Into these horses the toxin solution is injected, at first in small amounts. The first dose is usually followed by a tran¬ sient disturbance in health. This may be slight, and indeed may not be in evidence at all. However, often after the first dose the ani¬ mal s coat roughens, the appetite is impaired, and it may show some elevation of temperature. When there is complete return to health, usually after three or four days, a second in¬ jection of the toxin is made. It is safer to make the second injection no larger than the first. Indeed, the practice is to make the second injection slightly less than the first. In this case there is usually no recognizable dis¬ turbance in the well-being of the animal. After the third or fourth treatment the quantity of toxin used can be rapidly increased and it soon develops that the an-imal bears without apparent effect many times the amount which if used without previous treatment would have caused death. After this condition of im¬ munity has been secured, a portion of blood is drawn from a

vessel in the neck of the horse, allowed to coagulate, and the separated serum tested for its antitoxic strength. This process is known as the standardization of the antitoxin. The procedure consists in ascer¬ taining how much of the blood serum of the treated horse is necessary to neutralize 100 minimum lethal doses of the toxin. The serum of the horse and the toxin are mixed in vary- ing proportions in vitro, and the mixture in¬ jected into guinea pigs of from 200 to 300 grams weight. The amount of toxin taken in these mixtures represents 100 minimum lethal doses, and the minimum amount of serum which must be added to this so that the mix¬ ture will have no effect on the guinea pig is known as an immunity unit. It will be seen from what has been said that the filtered culture of the diphtheria bacillus constitutes the toxin, while the blood serum ot the immunized horse constitutes the antitoxin. Both of these are standardized, and one neu¬ tralizes. the other quite as effectively as acid neutralizes alkali. Diphtheria antitoxin, which is the blood serum of an immunized horse, is put on the market in tubes fitted with hypo¬ dermic needles and ready for use without transfer. This avoids the possibility of con¬ tamination after the preparation leaves the laboratory of the manufacturer. Such con¬ tainers are labeled showing the number of im¬ munity units contained, and this is wholly with¬ out reference to the amount of fluid in the ?! When such a preparation is labeled 5,000 Immunity Units® it is to be understood

that all the fluid in that tube, whether it be 5 cubic centimeters or more, contains enough antitoxin to neutralize 5,000 times 100 minimum lethal doses of the toxin as tested on a guinea pig. The practice of medical men most skilful in treating diphtheria is to use an antitoxin of the highest obtainable potency, and doses of from 20,000 to 40,000 immunity units are now commonly employed.

When a child is suffering from diphtheria, its throat constitutes the flask in which the bacillus is growing and elaborating its toxin. The toxin filters through the walls of the pharynx into the blood. The physician in¬ jects under the skin of the child the serum of the immunized horse which he calls anti¬ toxin, and this passes into the blood of the child and neutralizes the toxin absorbed in the throat. Thus, the acid and alkali are brought together and a harmless product results. The toxin being neutralized as fast as it is absorbed from the throat, does not attack or injure the body cells of the child. It must be evident that the earlier in the infection the neutralizing agent can be used, the more satisfactory is the result. Here, hours count. It has been shown that when the antitoxin is injected into the child on the first sign of the disease the per¬ centage of recoveries is 100. Out of 2,428 cases studied by Hilbert the percentage of deaths varied with the day

on which the anti¬ toxin was administered as follows:

First day .

Second day .

Third day . .

Fourth day .

Fifth day .

Sixth day . .

After the sixth day

2.2

7.6

17.1

23.8

33.9

34.1

38.2

According to Wernicke the saving of lives during the first year of the use of diphtheria antitoxin in Germany amounted to 20,000, and if the agent were promptly and properly used the saving of lives would amount in that coun¬ try to 45,000 annually. The value of diphtheria antitoxin is even greater than is indicated by the lowering in the death rate from this disease. For every sick child treated with antitoxinˆ on an average five are saved from being sick. \ hile the curative value of antitoxin is great, its preventative value is still greater. The physician called to a family in which one child has diphtheria gives a curative dose of anti¬ toxin to the sick child and immunizing doses to the others. Even when the sick child has been neglected so long that the curative value of the antitoxin is lost, its preventive value in the others is still potent. Diphtheria antitoxin has lowered not only the mortality rate but still more the morbidity rate. In 1880, before the discovery and employment of this agent, deaths from diphtheria in the registered area of the United States amounted to 112.6 per 100,000; “I 1913, after the general employment of diphtheria antitoxin, it was 18.8. Certainly it !?• un£ exaggeration that the discovery of diphtheria antitoxin is one of the most benef¬ icent of all agents, and it could not have been made without animal experimentation. The pre¬ paration of this agent necessitates the annual sacrifice of the lives of hundreds of guinea pigs and it leads to the saving of the lives of thousands and tens of thouands of children.

State and municipal laboratories are em¬ ployed in the detection and recognition of diphtheria, and antitoxin is furnished free to those who cannot afford to pay for it. When a physician sees a case which he suspects to be diphtheria he makes a swab from the throat of the child and transfers this in a sterilized test tube to the municipal laboratory. Here a culture is made and after 12 hours a positive statement can be furnished as to the nature of the disease. Even this delay is

unnecessary if the physician is sufficiently confident that he has a case of diphtheria to deal with. Under proper precautions there is no danger in the administration of this agent. In the more en¬ lightened communities school medical inspec¬ tors are constantly on the watch for the first evidence of this disease and the child of the poorest citizen is transferred and treated in a municipal hospital with as much skill and care as the richest can secure. Since diphtheria toxin has not been obtained in a pure state, its nature, so far as its chemistry is concerned, remains unknown. There is still doubt as to in just what group it should be classified. Usu¬ ally it gives at least some of the general protein color tests, but preparations have been secured which do not respond, altogether at least, to these tests. The molecular weight of the toxin is much less than that of the antitoxin be¬ cause the former filters readily through porcelain and diffuses quickly through gelatin, while the antitoxin is largely removed from solution by filtration through porcelain and does not diffuse through gelatin. From these facts it is inferred that the molecule of the anti¬ toxin is much larger than that of the toxin. The toxin is highly susceptible to heat, a tem¬ perature of 60°C. being sufficient to markedly reduce, although it does not wholly destroy its toxicity. A like effect is induced by the pres¬ ence of both mineral and vegetable acids. Even lactic and tartaric acids speedily render it inert and its toxicity is reduced, although not completely destroyed, by borax and boric acid. It is highly susceptible to the action of oxidizing agents such as potassium perman¬ ganate, chlorine, iodine, etc. It diffuses through parchment but does not pass through animal membranes or collodion sacs. It is in¬ soluble in alcohol, and prolonged contact with this agent destroys its toxicity. It is also robbed of its virulence by the digestive fer¬ ments present in the alimentary canal, and therefore is harmless when taken into the mouth, provided there is no break in the con¬ tinuity of the mucous membrane. From solu¬ tion it is carried down mechanically on the addition of calcium chloride, which precipitates calcium phosphate. In this respect diphtheria toxin closely resembles the enzymes. There are other respects in which this resemblance is evident. Some of these are as follows : (1) It is destroyed by heat; (2) in its purest preparation it does not respond to all the tests characteristic of proteins; (3) it is active in high dilutions; (4) it is a product of cell activity; (5) when introduced into the body there is a period of incubation before the de¬ velopment of its effects; (6) when introduced into animals in progressively augmented doses it leads to the production of an antibody.

The chief objection to accepting the theory

that toxins are enzymes or ferments lies in the fact that in their action

on animals and in their reactions with their antibodies their effects may be measured mathematically and follow the law of multiple proportion. In other words, the toxins do enter into the reactions and are ex¬ hausted or neutralized in doing so. On the other hand, the weight of evidence is that enzymes or ferments do not enter into the reactions caused by their presence and that they are not consumed in such reactions. For in¬ stance, the hydrolytic enzymes, such as diastase and pepsin, cause starch and protein to take up water and pass over into sugar and peptone while the enzyme itself does not enter into the reaction and is not consumed in the process. It might be stated differently as follows : An enzyme changes the tempo of a reaction which would more slowly occur without its presence, while a toxin combines with its antibody much as an acid combines with an alkali.

When a fatal dose of diphtheria toxin is injected into a susceptible animal, such as a guinea pig, there is a period of incubation dur¬ ing which the animal shows no marked de¬ parture from the normal. This incubation period varies somewhat with the size of the dose, but is never less than' about eight hours, even when many times the fatal dose has been used. However it should not be inferred that nothing happens during this period of incuba¬ tion. The disturbance simply does not rise to the plane of gross clinical observation. The toxin begins to act soon after its introduction into the body. Within an hour or two the clinical thermometer, which is not a highly delicate indicator of changes in temperature, shows an elevation which proceeds slowly un¬ til a short time before death, when there is a progressive and rather rapid fall in tempera¬ ture which may reach some degrees below nor¬ mal before death. The skin about the point of injection becomes edematous and later necrotic. The interval between injection of the toxin and death is the same as after inoculation with the living organism. When sublethal doses are given there is often paralysis, beginning in the posterior extremities and gradually extending over the body. The internal organs are hy-peremic, with minute hemorrhages in the adrenals, stomach and intestines. Occasionally a gastric ulcer is produced. Diphtheria toxin apparently has a special avidity for nervous tissue. Whether this action is primarily cen¬ tral or peripheral has not been satisfactorily determined, though it is most probably the lat¬ ter. When the toxin is injected into a sus¬ ceptible animal it soon disappears from the blood current and manifests its activity on certain organs and tissues. It has not been found in the urine except when massive doses have been given. In unsusceptible animals it remains for a long time in the blood stream and is of course without action on the tissues, and it is for this

reason that the animal is re¬ fractory. Animals differ widely in their suc- ceptibility to diphtheria toxin. This is true of individuals, and still more markedly true of species. The most susceptible animal is the guinea pig. Horses, sheep and goats are suc- ceptible, while rabbits are less so, and white mice practically refractory.

The toxin is a secretion of the living bacillus

and different strains of the organism vary widely in the amount of toxin " which they elaborate. There is apparently no constant and fixed relation between the virulence of a given strain of the bacillus and its toxin pro¬ duction. A strain isolated by Park of New York, and generally known as Park No. 8, has proved in both American and European laboratories to be a most efficient toxin pro¬ ducer. It was obtained from a relatively mild case of diphtheria and it has shown no great virulence as tested by the experimental inocu¬ lation of guinea pigs. With this strain filtered products have been obtained with as low a minimum lethal dose as 0.0015 cubic centimeter. However this strain sometimes fails to produce a satisfactory toxin. Through another strain Madsen once reported a toxin whose minimum lethal dose was as low as 0.0005 cubic centi¬ meter. This is the most powerful diphtheria toxm yet reported. The cellular substance of the diphtheria bacillus contains a protein poison, as was first shown in the waiter's laboratory! Against this poison diphtheria antitoxin has no neutralizing effect and it must be regarded as a poison, but not a true toxin. It will be seen that the word toxin has come to have a distinct and specific meaning. All toxins are poisons, but all poisons are not toxins. Those poisons which when injected into animals in gradually augmented doses produce antibodies are known as toxins. The serum of horses immunized to diphtheria toxin, and known as diphtheria anti¬ toxin, is usually preserved by the addition of 0.5 per cent phenol or 0.3 per cent tricresol. Filtration of the serum through porcelain re¬ moves the antitoxin on account of the large size of its molecules. Heating antitoxin to from 60° to 70° C. destroys its value, but the dried antitoxin will bear a temperature of 110° C. for half an hour without injury. Diph¬ theria antoxin is quite certainly a protein. It is true that it bears some resemblance to fer¬ ments. It is in and of itself perfectly harm¬ less to the animal body. All disturbances which may result from the administration of diphtheria antitoxin are due to other constitu¬ ents of the serum and may be induced by the use of the serum of a normal horse. The anti¬ toxin may be precipitated from

the serum by metallic salts as other protein constituents are, but it is not carried down mechanically as hap¬ pens to the toxins and the ferments. It is more than probable that the antitoxin is a globulin. It is precipitated with this protein fraction, and the concentrated antitoxin has been prepared by this method. Unfortunately the immunity induced by diphtheria antitoxin is only temporary, lasting from three to four weeks, while one attack of diphtheria does not give immunity to another. For this reason it frequently happens that a child who has once had an immunizing dose may, a few months or possibly a few years later, need a curative dose. The fear of anaphylactic shock has led many physicians to hesitate about a «reinjec- tion» of horse serum after an interval of 10 days or longer, but with proper care one may do this with safety. In all cases of ˆreinjection® after an interval of 10 days or longer one drop ot the antitoxin should be administered and if no untoward symptoms follow within an hour, any amount of the serum may be injected with safety. This procedure should be adopted not

only in all cases of <(reinjection® but when the patient has shown at any time asthmatic symp¬ toms. With these precautions no physician need fear to use diphtheria antitoxin in the treat¬ ment of this disease. When antitoxin is used early in the disease the extension of the mem¬ brane in the throat usually stops in a few hours. For this reason laryngeal diphtheria is now rarely seen except in neglected cases. Not only does the extension of the membrane stop on the administration of the antitoxin, but as a rule that already formed begins to recede, becomes detached and fades away.

In all civilized countries the manufacture of diphtheria antitoxin is under government control. In the United States this is one of the functions of the United States Public Health Service. No one can manufacture diph¬ theria antitoxin without a permit from this service and such permits are not granted until personal inspection has convinced the service ot the reliability and scientific intelligence of the manufacturer. Besides this, every batch of diphtheria antitoxin prepared is tested not only by the manufacturer but in the Hygienic Laboratory at Washington. It is highly essen¬ tial that the preparation and standardization of so valuable an agent as this should be under government control.

Tetanus, or lockjaw, is one of the most strikingly distressing and fatal diseases known. Therefore it is not strange that it is men¬ tioned in some of the earliest medical writ- . ˆ . . was known to the writers of clas¬ sical times that tetanus was in some way con¬ nected with wounds and that it was much more common in military than in civil

life. Furthermore, it has long been known that the frequency of the development of tetanus does not run parallel with the extent or gravity of the wound. Indeed it is more likely to result from a trivial penetrating wound than from a large open one. The infectious nature of this disease was first demonstrated by French phy¬ sicians, especially Verneuil. However the ex¬ perimental transfer of tetanus was first made ??oiW° itahai? Physicians, Carle and Rattone, in 1884. I hey inoculated 12 rabbits with matter taken from a pustule on a man who had tetanus. Within a few days 11 of these animals developed the disease, and from these it was transferred to other rabbits. Soon thereafter Nicolaier induced tetanus in rabbiffi, guinea pigs and mice, by inserting bits of earth under the skm t his investigator also discovered the specific bacillus, but failed to separate it from associated bacteria. This was done by a Japanese bacteriologist, Kitasato. The tetanus bacillus develops spores which are highly re¬ sistant to heat, and other adverse agents and may retain their vitality quite indefinitely. In

i°Ca h-!ej 10(? per cent of ˆbbits inoculated with the soil develop this disease. As a rule the spores are most abundant in filthy soil, espe¬ cially that richly impregnated with horse ma¬ nure. Before the days of aseptic surgery tetanus was especially prone to follow operative procedures, as was noted by Larrey, Napoleon's great surgeon, and many other operators both in the field and in hospitals. Among certain primitive dirty people tetanus of the newly born is frequent on account of the methods of cutting and dressing the cord. On certain islands, as Reunion and Cayenne, the infantile

death rate from this cause has in some years been as high as 50 per cent. In other localities tetanus works havoc among women in the puerperal state. Some savage tribes smear their arrowheads with mud rich in tetanus spores. The marked mortality from Fourth of July celebrations in this country a few years ago was due to tetanus infection. Fortunately the barbaric rites with which we were ac¬ customed to celebrate the birthday of our na¬ tion have been beneficially modified, largely through the knowledge spread by the Journal of the American Medical Association. The parts of our country most abundantly infected with this virus seem to be the Atlantic States, especially Long Island and the Valley of the Hudson. Commercial gelatin and catgut used by surgeons have been the bearers of this in¬ fection, and most thorough sterilization is neces¬

sary in order to destroy the spores. Formerly we spoke of idiopathic and traumatic tetanus. Now, we are quite sure that the former does not exist. The wound may be so trivial that it is healed before symptoms of the disease develop. In other cases the wound may not be on the skin, but on a mucous membrane, as in the mouth, nose or throat. The writer saw a case in which the virus had entered through the gum from which a tooth had been extracted. It has been claimed that tetanus is more preva¬ lent in black and mixed races than among whites, and some have endeavored to show the existence of racial susceptibility. The truth is that filthiness is the predisposing agent rather than a racial difference. The simple custom of drying the wash by spreading the clothes on the ground has been found to play a part in the prevalence of this disease. The distribution of the tetanus virus seems to be world-wide. It has been found in every land, in the temperate and torrid zones at least, and in many waters such as those of Lake Geneva and the Dead Sea. It may be present in bilge water and men on ships have been infected from this source. Many years ago on an English ship after a naval battle 16 of the wounded died of tetanus. It may be carried into wounds with bits of infected clothing ‘or with the dirt on the skin, and it has been found on nearly every article worn by the soldier, . from his shoes to his collar. Virgin forest soil has gen¬ erally been found free from this virus, but the sweepings from the streets, stables, houses, boats and cars frequently produce tetanus when introduced under the skin of animals. Of our domestic animals, the horse is the most sus¬ ceptible and is a frequent victim. The ox-comes next, followed closely by sheep and goats. Dogs and cats are not easily infected, but do succumb to inoculation. When swallowed, the tetanus bacillus has no effect unless there be some break in the mucous membrane and it is eliminated with the faeces unchanged. In this way the faecal matter of men and animals pollutes the soil.

Tetanus toxin, one of the most potent poisons known, is prepared by growing the tetanus bacillus in bouillon or blood serum un¬ der anaerobic conditions. The bacillus is re¬ moved by filtration and the filtrate constitutes the toxin. It is of delicate nature and is easily destroyed by both physical and chemical agents. Light and air rapidly render it inert. Even in filtration of the culture both light and

air should be excluded. According to Kitasato, exposure to sunlight completely destroys the toxin within from 15 to 18 hours. Other investigators have reported the time as only half of this. Oxidizing agents such as dilute solutions of potassium permanganate, mineral and vegetable acids, destroy it promptly. From its solution in the filtered cultures tetanus toxin is thrown down on the addition of ammonium sulphate, and by dialysis and evaporation in vacuo it can

be obtained in dry form, not pure but mixed with the proteins carried down with it by the reagent. The purest preparations yet made still give the protein reactions and there are those who claim that the toxin is an albumose, but this does not necessarily follow. According to Brieger and Cohn, the fatal dose for a mouse is about 0.0000005 gram and for a man, about 0.00023 gram. It requires 2,000 times as much of the poison per kilo of body-weight to kill a rabbit as it does to kill a horse, and the chicken is 100 times less susceptible than the rab¬ bit. It is highly poisonous when introduced sub¬ cutaneously or intravenously, but is most potent when administered subdurally or in-tracerebrally. This is due to the fact that it has a predilection for nervous tissues. It has been shown quite conclusively that when in¬ jected subcutaneously the toxin is conveyed to the nerve centres through the axis cylinders of the motor nerves, and that symptoms of tetanus first develop when the anterior horns of the spinal cord are reached. This explains why there is always a period of incubation, both after subcutaneous injection of the toxin and as a result of wound infection with the bacillus. It also makes plain the observation so frequently recorded that the period of incubation is shorter the nearer the site of in¬ oculation is to the central nervous system. That tetanus toxin does combine with certain constituents of the central nervous system was demonstrated some years ago by Wassermann who found that when the toxin is rubbed up in a mortar with brain or spinal cord tissue it is completely fixed and neutralized. In other words, it forms a compound with some con¬ stituent of this tissue. This is probably what happens when the poison is generated by the bacillus in the animal body and as a result of the injury thus caused to the nervous tissue tetanic spasms occur. A tetanus antitoxin is prepared in a manner similar to that employed in the preparation of diphtheria antitoxin. Un¬ fortunately, however, the brillant practical re¬ sults obtained in the treatment of diphtheria have not been secured in the treatment of tetanus. The value of tetanus antitoxin as a protective agent has been recognized for many years and has been fully confirmed in . the treatment of the wounds of the World's War. Before the United States entered the war, American laboratories were busy supplying the armies of the Allies with this material. Sol¬ diers received a protective dose before they went into battle and all wounded were treated with this agent as soon as possible. In this way a high death rate from tetanus has been avoided, notwithstanding the fact that a large proportion of the wounds are infected with the bacillus. If one waits until symptoms of tetanus have developed the administration of the serum fails in a large proportion of the cases to effect a cure. However, even under

this condition the treatment is not wholly with¬ out value. The cessation of trench warfare was followed by a notable decrease in the num¬ ber of wounds infected with the organism of this disease.

In certain parts of Germany, especially in Wiirttemburg and neighboring parts of Baden and Bavaria, where sausage, a favorite article of diet, has been imperfectly cured and eaten raw, poisoning from this article of food has long been known. Rarely, similar cases have occurred among those in the United States who persisted in the Old World method of preparing and eating sausage. As a rule, food which produces this form of intoxication has been prepared for a long time before it is eaten. Phe disease thus produced is known as (<botul- isnU and it should be clearly understood that this does not include the ordinary form of food poisoning which leads to vomiting and purging and generally ends in recovery. In 1885, some 30 cases of botulism developed in a small Belgian village and were studied by Van Ermengem of Ghent. In this instance, the food was a ham which had been kept in dilute brine. It was from a sound animal, other por¬ tions of which had been eaten while fresh with¬ out harm. In fact the companion ham, from the same brine, had been eaten without dis¬ turbing those who had partaken of it. The sound ham lay near the surface and was not wholly covered by the brine while the faulty piece lay on the bottom of the vat and was completely excluded from the air. It was not noticeably decomposed, but was marked by soft colored spots and gave off the odor of butyric acid. In this meat the bacillus botulinus was found. An aqueous extract of the ham was injected into animals and proved to be intensely poisonous. In cats it caused dilatation of the pupils and abundant mucous secretion in the mouth and pharynx, prolapse of the tongue, roughness of the voice followed by complete aphonia, difficulty in swallowing and paralytic symptoms resulting in death within from four to eight days. Mice and guinea pigs, rabbits and apes were affected in much the same way. The apes were found to be equally susceptible when fed by mouth, while cats, rats, dogs and chickens were not susceptible when fed. Other outbreaks due to the same cause have been re¬ ported from time to time in this and other countries.

The bacillus botulinus is strictly anaerobic, except when grown with other organisms which consume the air. It grows only feebly at animal temperature, but at lower tempera¬ tures and when the air is excluded it develops its toxin. It will be seen that it does not cause an

infection but an intoxication. Indeed, the bacillus does not multiply in the animal body, or does so only to a slight extent. It is a toxicogcnic, rather than a pathogenic, organism.

A striking characteristic of this toxin is that it affects some animals, including man, when taken by the mouth. It also has a predilection for nervous tissue. According to Marinesco and others it induces marked changes in the cells of the anterior horns, leading to chroma¬ tolysis, and disintegration of Nissl's granules. Like tetanus toxin, it combines in vitro with nervous tissue, forming an inert compound. An effective antitoxin has been prepared and has proved efficient in animal experimentation. The

writer is not aware that this antitoxin has been used in the treatment of botulism in man. This toxin may occur in canned vegetables as well as in meats. There was quite a scare in the United States in 1917 concerning the possibility of botulism being widely prevalent on account of the new methods of preserving food pro¬ posed at that time by the Agricultural Depart¬ ment. This fright has not been justified by subsequent events. Apparently the bacillus botulinus is not widely distributed. So far, it has been found only once except in food and that was in the faeces of hogs. As has been stated, it grows only in the absence of air or in association with other organisms which con¬ sume the air, and it has been found in canned foods. In such, it produces gas which bulges the ends of the can and food from such con¬ tainers should not be eaten. In brine of more than 10 per cent strength it will not grow. It is of special interest because it is essentially a saprophytic organism producing in food in the absence of air a most potent poison which affects man when taken into the stomach.

Reference has already been made to the fact that the toxins were first found in the venom of snakes. Antitoxins to these venoms have been prepared, their value demonstrated ex¬ perimentally on animals, and some slight use of these preparations have been made in the treatment of men bitten by poisonous snakes in India. However, these antitoxins like all others are strictly specific and an antitoxin must be prepared for the venom of each species of poisonous snake, dhe rarity of death from this cause in most parts of the world and the diffi¬ culty of preparing and keeping on hand an antitoxin for the treatment of the bite of each species limits the use of this preparation. Within recent years an antitoxin has been pre¬ pared and used successfully in the treatment of cerebrospinal meningitis. In this instance a definite amount of fluid is withdrawn by punc¬ ture under aseptic precautions from the spinal canal and is replaced by the injection of the antitoxin.

Furthermore, it has been demon¬ strated in our own camps during the war that the intravenous injection of this antitoxin is beneficial.

Scientific investigations and experimental studies on animals have given to man almost absolute control of diphtheria and of such enteric diseases as typhoid fever and its allies Tuberculosis, formerly known as the <(Captain of the Hosts of Death, » has been greatly curbed but to-day pneumonia,— or as we should say, the pneumonias, — is the mostly deadly disease that we have to deal with in both military and civil life. The medical profession has recently come to a realization of the fact that etiologic- ally there are many forms of pneumonia. In the first place, there are several types of the pneumococcus. In the second place, other or¬ ganisms belonging to the streptococcus and staphylococcus groups may cause pneumonia. In the Rockefeller Institute there has been pre¬ pared a serum for the treatment of that form of pneumonia due to pneumococcus Type I. Animals have been immunized to this organism and the sera of such animals have been used in the cure of this disease. However, it is not certain at present that such sera have true antitoxic values. Some claim that the sera of animals immunized with this type of pneumo-

coccus have a bactericidal action, while others think that they only render phagocytic action more effective. In order to be of service in the treatment of pneumonia due to pneumococcus iype I, a relatively large amount of the serum must be used. In other words, a certain de¬ gree of concentration must be reached. The law of multiple proportion which holds good between diphtheria toxin and its antitoxin fails here. Our experience in the World War has demonstrated the great destructiveness of the pneumonias and the lesson that we have learned should lead to the greatest effort toward the discovery of both preventive and curative measures in these diseases. On the battlefields of France the gas bacillus, known also as the Welch bacillus, proved a most distressing and destructive agent. Shortly before the war closed Bull and Pritchett at the Rockefeller In¬ stitute discovered an antitoxin for the poisons of this organism and fully demonstrated its value in experimental animals. The cessation of trench warfare led to a rapid reduction in the number of wounds infected by this organ¬ ism and the time has not yet come for a cor¬ rect estimate of the practical value of the anti¬ toxin. See Immunity; Medical Science and The World War; Serum Therapy.

Victor C. Vaughan,

Dean, Department of Medicine and Surgery,

University of Michigan.

TOXODON, a genus of large Pleistocene mammals whose complete remains are found in the Pampas formations of Argentina. They were about the size of a hippopotamus ; the teeth consist of large incisors, very small lower canines and strongly-curved molars, all with persistent roots. According to Cope, the tarsal bones more nearly resemble those of the Pro - boscidea than any other known ungulates. With a smaller genus, Nesodom, it constitutes the sub-order Toxodontia.

TOY, Crawford Howell, American Oriental scholar: b. Norfolk, Va., 23 March 1836; d. Cambridge, Mass., 12 May 1919. He was grad¬ uated at the University of Virginia in 1856, studied in Berlin (1866-68), and became pro¬ fessor of Hebrew in the Southern Baptist Theo¬ logical Seminary in 1869 and professor of He¬ brew and other Oriental languages and lecturer on biblical literature at Harvard in 1880. From 1909 until his death he was professor emeritus. His published works include {The Religion of IsraeP (1882) ; Quotations from the Old Tes¬ tament in the new Testament J (1884) ; (Judaism and Christianity, a Sketch of the Progress of Thought from Old Tes¬ tament to New Testament5 (1890); He¬ brew Text and English Translation of Ezekiel5 (1899) ; Commentary on Proverbs) (1899) ;

< Introduction to the History of Religion5 (1913), and others.

TOYAMA, to-ya-ma', Japan, the capital of the prefecture of Toyama, situated near the head of Toyama Bay, west coast of Nippon, 170 miles northwest of Tokio. It has consider¬ able trade in drugs and leather. Pop. of the city about 64,822; of the prefecture, 829,596.

TOYNBEE, toin'be, Arnold, English social economist and philosopher: b. London, 23 Aug. 1852; d. Wimbledon, 9 March 1883. He was interested in various movements of popular re- vol. 26 — 47

form and the betterment of the laboring classes. Though called a socialist, he was certainly a conservative one and vigorously opposed in two lectures the doctrines of the (Progress and Poverty 5 (1880) of Henry George (q.v.).

Toynbee Hall in Whitechapel, London, was established in his memory in January 1885 and Was the first Universal settlement.® His writ¬

ings were posthumously collected as (The In¬ dustrial Revolution5 (1884; 4th enlarged ed., 1894). Consult Montague, (Life5 (Johns Hopkins historical series, 1889) ; Milner, Ar¬ nold Toynbee: a Reminiscence5 (1895).

TOYNBEE, Paget, English critic and author: b. Wimbledon, 20 Jan. 1855. He was educated at Balliol College, Oxford, and from 1878 to 1892 was a private tutor. An Italian scholar, he has been a contributor to Romania and the Giornale Storico della Letteratura Italiana, and published Hndex of Proper Names in the Works of Dante5 (1894-97) ; diction¬ ary of Proper Names and Notable Matters in the Works of Dante5 (1898) ; (Ricerche e Note Dantesche5 (1899); (A Critical Text of the Divine Comedy5 (1899) ; besides editions of the three parts of Cary's (Vision of Dante,5 with introductions and notes (1899-1901-02) ; a (Life of Dante5 (1900; 2d ed., 1901), and (Dante Studies and Researches5 (1902).

TOYNBEE HALL, a social settlement, the first in the world, founded by Canon S. A. Bar¬ nett in memory of Arnold Toynbee, who while a student at Oxford became interested in the White Chapel district poor. The settlement was opened in 1884 and was a success from the start, gradually becoming a centre of educa¬ tional and social endeavor and rallying to its work many of the leading young men of the time. Consult Gell, Philip L., (Account of the Work of Toyribee Hall in East London5 (Bal¬ timore 1889). See Social and University Settlements.

TOYS, American, Manufacture of. To

tell the story of the art of toy-making from its earliest days it would be necessary to follow the industry back through many centuries, for the archaeologists, in delving among the tombs of ancient Greece and Egypt, have made the sur¬ prising discovery that children played with dolls — and jointed dolls at that — more than 5,000 years ago. Moreover, by the side of these dolls the scientists have unearthed other playthings that children still crave : dolls' furniture, the utensils for cooking and for keeping shop, and, what is perhaps more interesting from the point of view of the antiquarian, the articles used by the priests in making the sacrifices, cleverly duplicated in miniature, showing that the chil¬ dren of those times also played at having re¬ ligious exercises for the benefit of their dolls.

Scientists now claim that the custom of playing with dolls is one that is practically as old as the world itself, and they base their as¬ sumption upon the theory that playthings are and always have been just as necessary a con¬ stituent of human health and development as

either food or medicine. The most eminent modern psychologists support this theory. They claim that the reason why children crave toys is that their nature requires them, and that to deprive them of such playthings would be to retard their mental growth and development.

In spite of the early origin of toys the prog¬ ress in the manufacture of playthings was so slow that even as late as 100 years ago they were few in number, simple of construction and extremely costly, especially in the United States. At that time no such articles were systematically manufactured in this country, and as the cost of importation added materially to the price, there were comparatively few persons who were financially able to purchase such puppets for their little ones. Instead, the chil¬ dren of those days accepted more primitive playthings — dolls that were often not dolls at all, but pieces of cloth, either folded and pinned in such manner as to suggest the ((shape» that was not there, or with head and bust stuffed hard with sawdust, the features being indicated by pen and ink drawing. In addition to these dolls there were a few other toys that could be purchased for children, but hoops, jumping- ropes, ten-pins, marbles, pop-guns, the jack-in- the-box the battledoor and shuttlecock, a few simple games, some' roughly illustrated books, alphabet blocks, etc., represented the limit of the toy-sellers' stock.

So far as America is concerned the toy¬ making industry is of so recent an origin that it can scarcely be said to have a history. Be¬ fore 1875 more than 90 per cent of the toys sold in this country were of foreign manufac¬ ture, and we have made no attempt to export such few articles as we did make into other countries. To-day, on the other hand, scarcely 5 per cent of the toys we sell are made abroad, while our exports are increasing rapidly.

To obtain anything like an accurate idea of the great progress that this nation has made in the art of toy-making it is necessary to remem¬ ber that up to about 1875 there was not a doll factory in the United States, and that such other toys as were- manufactured in American turning 'mills were cheap in quality and unprepossessing in appearance. When the American manu¬ facturers began to make toys, about a quarter of a century ago, they found that it would be extremely difficult for them to compete suc¬ cessfully with the foreign toy-makers in the field which they had occupied for so long. In the

first place material was cheaper in Europe, and there could be no comparison between the comparatively good wages paid to workmen in this country and the miserable pittance allowed in those German and Swiss villages where the entire population was held under contract to produce such goods at prices that barely enabled them to keep body and soul together. To over¬ come this difficulty American inventive genius was called into play, with the result that the local manufacturers not only established many new lines of toy specialties but that they evolved countless ingenious contrivances that the for¬ eign producer has never dreamed of making. Thus while we still import some dainty toys from France and Switzerland, nearly all the newest and most unique productions are now made in America.

Simple toys are made mostly of wood and metal, using the same principles employed by mechanical engineers in the making of duplicate machinery. A design having been decided on, and reduced to its most simple elements, gigs are fashioned so that each piece is a duplicate of every other piece, and the construction is pushed

through on the American factory system. Many toys are really model machines, as steam-en¬ gines, locomotives, cars, carriages, fire-engines, automobiles, tanks, etc. ; others are mere figures or puppets, as the Noah's ark men, wooden sol¬ diers and the like ; others are miniatures of com¬ mon household articles, as chairs, tables, plates, cups, spoons, etc., assured to be proper for the furnishing of a doll's house. Others are very elaborate and costly as goat's carriage, push-mobiles, working locomotives, contractors' ma¬ chinery, imitation large figures of elephants, dogs and Teddy bears, hobby horses, etc. Some single toys in playthings sell at retail between $100 and $200, which is not considered extrava¬ gant by the rich.

The United States census compiles together the manufacturers of toys and games. It is not possible wholly to separate the two, but it appears that there were in 1914 about 200 estab¬ lishments wholly devoted to toy-making, and as many more partly devoted to the industry, which gives employment to about 5,000 persons, with annual products valued at $8,000,000.

TRACERY, in architecture, permanent openwork in a window, the top of a doorway, etc., characterized by geometric and ornamental management of the prominent lines of the de¬ sign. It is common in the cathedral structures of Europe, especially in the older French and Italian structures. The term is extended to similar decorative work of a conventional char¬ acter, as on a dado or ceiling decoration.

TRACHEA, tra-ke'a or tra'ke-a, or WIND¬ PIPE, the principal air-passage of the body; a tube extending from the larynx to a point opposite the third dorsal vertebra, where the tube divides into two chief divisions or bronchi, one of which supplies each lung with the air necessary for respiration or breathing. The trachea is of cylindrical form and is both mem¬ branous and cartilaginous in its structure. Its length is about four and one-half inches and its diameter from three-fourths inch to one inch ; that of the male being larger than that of the female. The front or anterior surface of the organ is convex and is covered in the neck and chest by various structures, including the isthmus of the thyroid gland, the inferior thyroid veins, the sternohyoid and sternothyroid muscles, the first part of the sternum, the arch oi the aorta, etc. The trachea rests on the gullet or oesophagus, while in the chest it is situated between the pleurae or membranes lining the thorax and has the pneumogastric nerve on each side. The trachea is composed of rings or zones of a gristly or cartilaginous nature, known as the cartilages of the trachea. It rests on the gullet or oesophagus, while each cartilage forms an imperfect ring, being unclosed behind and having the gristly edges merely joined by fibrous membrane. The cartilages are sepa¬ rated from each other and also connected to¬ gether by narrow bands of fibrous tissue. The first cartilage of the trachea is broader than the others and may be divided at one extremity, while the last cartilage is thick in the middle and curved backward at the point where the trachea divides into the two bronchi. Some¬ times two of the cartilages may unite. The muscular fibres of the trachea exist in longi¬ tudinal and transverse layers and are composed ot unstriped or non-striated fibres. (See Muscu-

i>ar System). The trachea itself is lined by delicate mucous membrane, which is covered by epithelial cells provided with delicate vibratile processes or cilia. The trachea derives its blood from the inferior thyroid arteries. Its nerves arise from the pneumogastric trunks and recur¬ rent branches, as well as from the sympathetic system. Foreign bodies falling into the trachea most frequently enter the right bronchus, be¬ cause of the larger size of the latter and be¬ cause of the more oblique position of the left bronchus.

Diseases and Injuries of the Trachea. —

The trachea is liable to inflammation and its products and frequently suffers from extension of disease from the larynx. Acute inflamma¬

tion may occur as an idiopathic affection or a symptom of other disease, as smallpox, measles, typhus, tuberculosis, croup, etc. The symptoms are pain in the windpipe from the top of the sternum, expectoration of mucus, sometimes in regular rings and a peculiar brazen-like cough. Chronic inflammation usually accom¬ panies follicular pharyngo-laryngitis, tubercu¬ losis and syphilis, and may extend to the sub¬ mucous tissues and the cartilaginous structures, resulting in ulceration, cicitrization and stricture. The treatment consists in rest, the application of warm poultices, the inhalation of steam im¬ pregnated with balsamic or anodyne substances and the administration of antiphlogistic rem¬ edies. Constriction of the trachea may be pro¬ duced by aneurismal or other tumors pressing externally on the trachea ; or the symptoms may be produced by pressure on the nervous trunk or the inferior laryngeal fibres. Foreign bodies occasionally "pass through the larynx into the trachea and the accident is a formid¬ able one, which not unfrequently proves fatal. The accident occurs most frequently among children and is caused by a sudden inhalation while holding something in the mouth. Occa¬ sionally, however, a foreign body may, during the act of swallowing and without an inhala¬ tion, pass under the epiglottis and into the upper part of the larynx. Foreign bodies in the wind¬ pipe may be arrested above the rima glottidis, between the vocal cords, in the cavity of the larynx or in the trachea. In such cases the patient is suddenly seized with convulsive cough and dyspnoea. The speech is more or less af¬ fected and the breathing is whistling or stridulous ; but the diagnosis rests mainly on the sudden accession of the symptoms. When the presence of a foreign body is made out, it ought to be removed at once. When the body is loose in the trachea, a free opening lower down should be at once made and the open¬ ing may be either longitudinal or transversely valvular. It is advisable in nearly all cases to open the trachea, as, by securing a free aper¬ ture for respiration, spasm of the glottis is obviated and the foreign body may be removed through the artificial opening, or it may fall through the glottis into the mouth. Fracture of the trachea occurs from direct violence and in such cases the wounded part should be laid freely open, so as to secure the passage of air to the lungs. Union of the wound by suture is to be avoided, that by suppurative inflamma¬ tion being preferable, the head and neck being retained in a suitable position. Foreign bodies in the trachea and all kinds of injury from

external violence are serious affections, as dis¬ ease of the lungs is apt to be induced.

The term trachea as applied in respect to invertebrates connotes a more or less compli¬ cated arrangement of air-tubes and spiracles

(q.v.), most fully developed in insects and con¬ stituting the respiratory system. See Insects. For the general subject, see Anatomy; Lungs; Nose and Throat; Respiration.

TRACHEOTOMY. See Nose and Throat.

TRACHOMA. See Ophthalmia.

TRACHYTE, tra'kit, an igneous or pyro¬ genic rock of the effusive type and consisting of a ground mass of slender hair-like crystals of orthoelastic feldspar and ferro-magnesian silicates (hornblende or augite) and generally phenocrysts of sanidine feldspar. It differs from rhyolite chiefly in the absence of quartz. Trachyte occurs in the Black Hills, in Custer County, Colo., in Montana, along the river Rhine, where the Drachenfels furnishes the most typical variety, in the Auvergne, in Italy, and in the Azores. The compact pre-Tertiary varieties are classed as felsites (q.v.) or as porphyries.

TRACING PAPER, transparent paper which enables a drawing or print to be clearly seen through it when laid on the drawing, so that a pen or pencil may be used in tracing the outlines of the original. It is prepared from smooth, unsized, white paper rendered trans¬ parent by an oily application, as of oil of tur¬ pentine with an equal part of Canada balsam, nut-oil, etc.

TRACT NUMBER 90. See Tracts for the Times.

TRACT SOCIETIES. The circulation of religious appeals in writing preceded the inven¬ tion of printing and was used by Wyclif and other reformers at times and places when and where open preaching might have been too perilous. The printing-press made it possible to multiply such appeals and it was largely used for this purpose in the religious controversies of the 16th and 1 7th centuries. The 17th cen¬ tury and the beginning of the 18th witnessed the organization of several societies within the Church of England for promoting Christian knowledge and ((the dispersion both at home and abroad of Bibles and tracts of religion.® It was not, however, until 1750 that members of different Protestant denominations united in London to form the (<Society for Promoting Religious Knowledge Among the Poor.® This and other societies with a similar object circu¬ lated many religious books and tracts.

In the United States the Methodist Book Concern, established in Philadelphia, issued its first publication in 1789, and removed to New York in 1804. In 1822 a bindery was estab¬ lished and in 1824 a

printing office was added. The division of the Methodist Church on the slavery issue led to the establishment of a separate book concern at Nashville, Tenn., by the Methodist Episcopal Church South. The publications of the Book Concern are of three classes — first, the bound volumes, denomina¬ tional papers and some pamphlets ; second, those of the Methodist Episcopal Sunday School Union, and third, those of the Methodist Epis¬ copal Tract Society. The Concern has developed far beyond the (<tract society,® being now a

large religious publishing house. The salaries of bishops and other expenses of the Methodist Episcopal Church are paid out of the profits of the Book Concern.

The American Tract Society was founded in the spring of 1825. In this society Christians of various Protestant denominations united to publish and circulate “whatever would best diffuse a knowledge of our Lord Jesus Christ as the redeemer of sinners and promote the interests of vital godliness and sound morality,® the material circulated to be such as would re¬ ceive the approbation of all evangelical Chris¬ tians. The society established a system of colportage, gave wide circulation to tracts and sought to place Christian literature in every family. Periodicals were established for young and old and the needs of the large foreign population were met by religious publications in their own languages. The society has contrib¬ uted from its earnings nearly $1,000,000 to assist missionaries abroad in printing books approved by the society. In donations and legacies the society has received over $7,000,000 and has expended that amount in its gratuitous work, besides printing and circulating over 800,- 000,000 tracts, pamphlets, books and periodicals, many of which were sold. Among the nationali¬ ties reached in their own languages by publica¬ tions of the American Tract Society are the Swedish, Danish, French, Spanish, Dutch, Ital¬ ian, Portuguese, Polish, Bohemian, Hebrew, German-Hebrew, Hungarian, Lithuanian, Fin¬ nish, Welsh and Armenian. It has furnished religious, reading matter to the American soldiers in large quantities.. Besides the Ameri¬ can Tract Society, every important denomina¬ tion has an organization for the circulation of its denominational literature.

TRACTARIANISM, the name usually given to a system of religious opinion and prac¬ tice promulgated within the Church of England in a series of papers published under the title of (Tracts for the Times,-*

between September 1833 and March 1841. The immediate object of the writers seems to have been to rouse a large number of nominal adherents of the Church of England from their apathy, by awakening their interest in what the writers conceived to be the distinctive principles of that Church. For this end they sought to mark out a middle way be¬ tween “Romanism® and what they called ultra-Protestantism. The leaders in this movement were J. H. Newman, John Keble and E. B. Pusey, and they were assisted by not a few devoted adherents, such as R. H. Froude (brother of the historian), Hook, Palmer, Per- seval, Isaac Williams and others. In the first stage of the movement little else was attempted than the inculcation of the peculiar and ex¬ clusive powers of ministers episcopally ordained by the laying on of hands in a direct and un¬ broken line , from the apostles, and it was not till the publication in 1838 of the of R. FI. Froude, under the joint-editorship of -N ewrnan and Keble, that any suspicion was cieated in the public mind of the ultimate tend¬ encies of the movement. The volumes pub¬ lished under that title were pervaded by an unmistakably anti-Protestant spirit, and the fact of their being edited and defended (as they afterward were) by two who were known to be leaders in the Tractarian movement caused that

movement to be denounced by many who had hitherto treated it with indifference or for¬ bearance, or had even bestowed upon it a cer¬ tain measure of approval. From that date the bishops began a series of charges all bear¬ ing more or less strongly against the authors of the tracts, and treating them not as heretics but as disturbers of the Church. Still the move¬ ment went on more actively than ever. A mul¬ titude of controversial writings appeared on both sides, and the tracts gradually showed more and more of a leaning to the Roman Catholic Church. At last, in Tract No. 90, written by Mr. Newman, and published in March 1841, an attempt was made to prove that there is no insurmountable barrier between the Roman Catholic and the Anglican communions ; that the Thirty-nine Articles, although prepared by Protestants, are susceptible of a Catholic interpretation not inconsistent with the doc¬ trines of the Council of Trent. On the 15th of the same month the hebdomadal board of the University of Oxford condemned the tract as teaching a mode of interpreting the Thirty- nine Articles inconsistent with the statutes of

c and the bish°P of the diocese

of Oxford recommended that the series of tracts should terminate with that number, which it did. A few years later (1845) Newman went over to the Church of Rome, as several of the other partakers in the movement had done be-

•nC t m' Tbe effects of the movement can still be traced within the English Church in the extreme development of ritualism in a sec- tmn °f the High Church. See Great Britain 1 he Church of England; Newman, Fran¬ cis William ; Pusey, Edward Bouverie • Pusey- ism ; Ritual.

, , ˆ -1 -electric, inc insLury oi me

development of electric traction follows closely that of other great technical developments — starting with experiments on a small scale, hav¬ ing no practical outcome, followed by experi- ments on a larger scale, showing the physical possibility of the system, and finally using the experience so obtained in a successful, commer¬ cial application of the system to practical oper- ating conditions. It was not until the invention and development of dynamo-electric machines made it possible to obtain electrical energy a.t a reasonable cost that the commercial application of electric traction became possible, and even after that electric . machinery had to be im¬ proved before electricity could compete with the existing means of traction. Among the first to study the problem seriously were Siemens, in Germany, and Edison, Field, Daft and Vande- poele in this country. Before 1884 a few roads had been built for exhibition purposes and from that time until 1888, although some small roads were equipped with a few cars, yet it had not been proved that electricity could be profitably substituted on tramways for cable or animal traction. In February of 1888 the Sprague Jectric and Manufacturing Company finished the equipment of the tramways in Richmond, Va with the Sprague Electric Railway system, and operated the road so successfully that rail¬ road managers from other parts of the coun¬ try were convinced that they had something to substitute . for animal traction that would in¬ crease their facilities for transportation and de¬ crease the cost of operation. From this time

the development of electric roads in the United Mates has been rapid. At first horse tramways were electrically equipped, then cables were dis¬ placed- by electric trolley roads, then the tram¬ ways were extended further to the suburbs and surrounding towns, and towns were connected by interurban roads equipped electrically, run¬ ning at high speeds and offering a service im¬ possible with steam locomotives. For city train service on elevated roads, the substitution of electricity has taken a longer time, as the steam locomotives were

efficient and as the changes involved an expenditure which would not have been advisable unless decided advantages with respect to service and cost of operation were shown.

Direct-current Railway Motors.— On all

the electric roads in this country, and on a large proportion of those abroad, direct-current mo¬ tors are used for traction. These motors are of the series type, and are usually connected to the axle through a single spur gearing. The charac¬ teristics of the direct-current series motor are admirably adapted to traction work. The speed is dependent upon the tractional effort, and the motor slows down when the tractional effort increases, having something of the effect of a variable speed gear; this is very important in practical railway work, for if the motors ran at a constant speed, the energy demanded on grades would be greatly exaggerated and much larger motors would be required. It is also true that this type of motor gives a greater flexibility to the system, as far as speed is con¬ cerned, and this flexibility is important in prac¬ tical operation. To show the difference between a series motor and a shunt motor, suppose the track resistance is 10 pounds per ton weight of the car; then if the speed were constant (as would be the case with a shunt motor), the power required on a 5 per cent grade would be 11 times as much as on a level — air re¬ sistance being omitted — while with a series motor it would be only three or four times as much.

It might be well to briefly trace the develop¬ ment of electric railroad motors in the United States. The motors used by Sprague in the equipment of the Richmond road had too small a capacity for the work required and very often burned out. They were two-pole machines, of a rated capacity of 7.5 horse power, and at first drove the axle through a single reduction gear¬ ing; the work, however, was so heavy that it was found necessary to change to a double re¬ duction gearing, the teeth of the pinion stripping on the heaviest grades. These motors were un¬ protected from moisture and from the dust and dirt of the streets. The methods of suspend¬ ing the motor and some of the details of the regulation are still retained. The field magnets of the motor were sleeved on the axle, thus centring the armature on the axle and al¬ lowing a satisfactory relation between the two. The first motors had a double commutator, which was soon abandoned, as it greatly in¬ creased commutator troubles, which were at that time serious. The brushes first used on these motors were of copper and a number of forms were experimented on, it being necessary to re¬ verse the motor without injuring the commu¬ tator. None of the experiments with copper brushes were successful, and it

was not until the introduction of the carbon brush by the

Thomson-Houston Company that the commu¬ tator difficulties were largely obviated.

. Soon after the Sprague Company entered the railway field, the Thomson-Houston and West- inghouse companies took up electric railway work, and greatly aided its development by adding their immense resources to the resources of the Sprague Company. From this time the eevelopment of street railway apparatus was rapid. The first motors of all the companies used double reduction gearing, and one of the first improvements, after the introduction of the carbon brush, was the design of a comparatively slow-speed motor which allowed a single reduc¬ tion gearing to be used. The first motor of this kind was made by the Wenstrom Company, and within a short time other manufacturers were making slow-speed motors — some going so far as to attempt gearless motors; the latter, how¬ ever, were not successful owing to their great weight and lack of efficiency at reasonable speed. Most of the slow-speed motors that were made at this time were not thoroughly en¬ closed, their efficiency being such that a better ventilation than could be obtained by a totally enclosed machine was necessary. The machines were, as a rule, of the four-pole type, with parallel armature windings, requiring four brushes and causing, under certain conditions, unbalancing in the circuits that greatly increased the armature losses and decreased the efficiency. The next step in motor development was made by the Westinghouse Company in what they called their No. 3 motors, a machine much like those at present in use. It had four poles, each of them provided with a field coil, while the ar¬ mature was provided with what is called a series winding, necessitating only two brushes and doing away with the unbalanced armature circuits of the earlier machines. This type, with the modifications suggested by experience, is the one used in this country at the present time, and almost universally used abroad.

Controllers. — The first method used for regulating railway motors was by inserting re¬ sistance in the circuit of the machine; this was modified and developed until, in the Richmond motors of the Sprague Company, the series- parallel system was used, combined with a vari¬ able resistance obtained by making different combinations of the coils into which the field windings of the machine were divided. On starting and for slow speeds the two motors were used in series, while for the higher speeds they were placed in parallel. This system was abandoned, and for some years a parallel sys¬ tem for operating two motors on a street car was used. One difficulty found in the early series-parallel control was the liability of the motors to slip when in

series position. The slipping on one pair of wheels would allow the motor connected to these wheels to revolve at such a high speed that its counter-electromotive force would cut off the power from the other, and the car would not start. This difficulty, which always exists, but which is not of im¬ portance on ordinary roads, was further com¬ plicated by the electrical difficulties in the con¬ troller — the method of control not being as efficient as that used at present. In the Sprague system, there was no resistance outside of the motors, but the motor fields were divided into a number of coils, and the relations of these coils were varied, giving first a high resistance

and a very strong field for a given current, and afterward a comparatively low resistance and a comparatively weak field. The difficulty of this system lay in the fact that all the heating inci¬ dental to the low efficiency of the motors on starting was liberated in the field ; and, further, the inductance of the fields was greatest at the breaking of the circuit, when all the coils were in series. The Thomson-Houston Company modified this by placing a variable resistance di¬ rectly in the motor circuit, the resistance being regulated by a movable contact arm, con¬ trolled by the motorman. This gave better re¬ sults than the Sprague system, but it also lacked efficiency. In 1891 the General Electric Com¬ pany brought out a series-parallel controller, similar in some respects to the early Sprague control, but differing from it in the fact that the regulating resistances were not obtained by vari¬ ations of the different motor field windings, but by resistances outside of the motor. This sys¬ tem, with variations due to different conditions of operation, is still used and gives excellent re¬ sults. _ Perhaps the most important develop¬ ment in controller work was due to the intro¬ duction of the magnetic blow-out devised by Prof. Elihu Thomson. This apparatus is so placed as to control the breaking of the cir¬ cuits, and almost entirely eliminates the destruc¬ tive effects of sparking, due to the breaking. The method of operation is as follows : At first the two motors are placed in series, the re¬ sistance being also in series with them; then the resistance is gradually cut out, until finally the motors are in series across the line with no outside resistance in their circuits. Then the resistance is again cut in and one of the motors is short-circuited; the next operation cuts out the short-circuited motor, the next places it in parallel with the other motor, a large part of the resistance still being in series with them ; the rest of the operations consist in cutting out the resistances until finally the mo¬ tors are in parallel across the line.

The shifting of the circuits, due to the various operations necessary for regulation and cross circuiting, is carefully guarded against by enclosing the dif¬ ferent sections in compartments.

Multiple-unit System of Control. — In ur¬ ban train service, where a number of cars are operated in one train, with frequent stops, the question of acceleration is of the utmost import¬ ance. In order to accelerate quickly, it is nec¬ essary to have a large margin of tractive effort on the train — that is, it is necessary to have a large proportion of the total weight of the train on the driving wheels. When the question of displacing steam locomotives for elevated rail¬ way service first came up, and was attacked on the basis of using electric locomotives, the ad¬ vantages of the latter were not apparent. There was, of course, some advantage in the matter of expense, but not enough to justify the expendi¬ ture necessary to change from steam to electric service. Mr. Sprague devised a system by which a number of cars on a train could be equipped with electric motors and controlled from any one of the cars; this system he called the ((mul- tiple-uniU system. At first it was opposed by most of the manufacturing companies and by many electrical engineers.. With his customary energy, however, Mr. Sprague worked his sys¬ tem out to a practical demonstration, and to-day all trains operated by electricity employ his

fundamental methods. The advantages of this system are these : It gives a large proportion of the total weight of the train on the driving wheels, and at the same time distributes this weight over the whole length of the train. In the first place, this allows rapid acceleration without slipping of the wheels, and in the sec¬ ond place, it does not impose an undue strain on any elevated structure. It is also possible, of course, to change the number of units on a train without changing the relative weights of the driving mechanism of the car. It further¬ more utilizes all the train space for the trans¬ portation of the passengers. Its disadvan¬ tages, compared with a single locomotive, lie in the fact that it necessitates a greater num¬ ber of motors, thus adding to the cost of in¬ stallation and repairs, and it greatly compli¬ cates the system of control.

In the Sprague system each car is equipped with a controlling device operated by a pilot motor, the motor being operated through a cir¬ cuit controlled by the motorman. The system is to a considerable extent automatic, as the rate at which the different positions of the con¬ troller on each car are changed depends upon the flow of current into the motors, and is not determined by the motorman. This is an im¬ portant feature of the apparatus and makes the acceleration uniform, and at a rate to give the greatest efficiency. The General

Electric method of control is somewhat different from this, each car having a master-controller, very much like the ordinary tramway controller — the speed at which the current is cut into the motors being determined by the rate at which the motorman turns the handle of the con¬ troller. In the Westinghouse controller, the ap¬ paratus which supplies current to the motor is operated pneumatically, the valves of the pneumatic system being worked by magnets in a local circuit, which has as a source of energy a few storage batteries on each car and is op¬ erated by a master-controller on each car of the train. This makes all the operations inde¬ pendent of the line current and gives very posi¬ tive and efficient action.

Overhead Trolley System.— For collecting the current to run electric cars, a number of devices were used, until finally Sprague's suc¬ cess at Richmond fixed a type of collecting de¬ vice that is still considered standard in this country and is largely used abroad. Until actu¬ ally determined by experiments, it seemed im¬ possible that a moving contact device could col¬ lect the current necessary to supply the energy to the cars without such destructive sparking ajnd heating that it would be inoperative In the first experiments on electric railroading the current was collected from the rails; afterward it was collected through small carriages running on the overhead wire; and finally it developed into a rotating wheel having a contact on the underside of the trolley wire and pressing against it by some spring arrangement. What is called a «bow» trolley was first used — that is, a wire bent into the shape of a bow, press¬ es against the underside of the wire, but hav¬ ing no rolling contact. This is still used to a considerable extent abroad and presents some advantages over the trolley wheel used in this country. A number of modifications of both of these systems have been devised and employed. The overhead trolley wires, from which the

current is collected, are usually of copper; they are either suspended from insulators fastened to a span wire between poles on the two sides of the track, or from brackets fastened to a pole and projecting over the track. In this country they are almost universally placed over the centre of the track, but abroad they are sometimes placed on the side of the road, the trolley being so constructed as to make a side¬ bearing contact.

Underground Trolleys. — From the earliest application of electricity to

railways, attempts were made to do away with the overhead wires used in the ordinary trolley systems. Conduits having a slot through which a current-collecting device could pass were placed beside the tracks or between the rails ; conductors were placed in these conduits and the collecting devices on the cars were made to bear against the conductors. At first the conduits were not large enough, not enough space was given for insulation, and the results were unsatisfactory. The first success¬ ful system to be installed was a tramway at Budapest, designed by the Siemens Company. Here the conduit was on the side of the track, the tram rail forming part of the slot. The con¬ ductor was supported from below by insulators and the system was constructed on a larger scale than had been previously employed — the details were carefully worked out and the road has operated successfully from the time of its installation. In the meantime, in this country, the necessity of some such system in the cities of New York and Washington, where overhead wires were not permitted, had forced the differ¬ ent electrical companies to take up seriously the question of conduit construction, with the result that successful systems were worked out for both Washington and New York, the sys¬ tems being practically the same. The slot in these systems is in the middle of track. The conduit is constructed as follows : Cast-iron yokes supporting the tramrail and slot rail are placed at intervals of five feet, the rails are attached to the yokes and the whole structure is blocked up in its proper position; then sheet steel is placed between the yokes, forming a tunnel of the proper dimensions, and concrete is packed around the yokes and the forms, sup¬ porting the structure in its proper position and forming a tunnel for the conductor rails. The steel forms are then taken out. The conductors are made of T-iron, held from above by porce¬ lain insulators placed in cast-iron boxes along the track. The details of the different systems that have been installed vary, but the above is practically the standard type of construction. The current for the car is collected by means of what is known as the plow, which passes through the slot and has two cast-iron, contact shoes held against the conductor rail by springs; the rail is supported on cross-rods on the car and has a wide limit of lateral motion. It is usual to place ducts beside the track, these ducts containing the feed wires that are connected at various intervals with the conducting rail.

The Generation and Distribution of Cur¬ rent. — • In the earlier roads, and, in fact, in many of the roads now operated in this coun¬ try, the current for the motors is obtained from direct-current machines, having a voltage of between 500 and 600 volts. These machines are, as a rule, compounded so that their voltage in¬

creases with an increase of load. There were two reasons for this : One

is that the increased voltage compensates to a certain extent for the loss of voltage in the distributing system; the other, and most important reason, is that the strengthening of the field prevents the sparking that might otherwise be caused by the armature reactions. It is the custom to ground the nega¬ tive side of the machines and connect the trol¬ ley wires through what is called ((feed wires® to the positive brushes. These feed wires are carried along the line, connected at intervals to the trolley wires, it being usually the custom to divide the road into sections and feed the different sections from different feed wires. At the voltage which has been adopted as the standard — that is, from 500 to 600 volts — the economical distribution when the service is heavy is limited, and if a direct-current system is to be employed for a large area, a number of stations must be installed. For this reason, when the distances are great, it is sometimes necessary to employ a high potential alternating system, reducing it to a 500-volt continuous-cur¬ rent system at centres of distribution called sub¬ stations. On interurban lines, for instance, where the distances are great compared with the number of units in operation, this method becomes imperative, as otherwise the variations of load on the central station would be exces¬ sive, and the cost of power would be practically prohibitive. This method of operation may be described as follows : The central station, lo¬ cated at some point where the greatest economy of operation can be obtained, generates alternat¬ ing currents at a high potential ; these alter¬ nating currents are taken to the sub-stations, situated at reasonable distances from one an¬ other along the line, and are there changed to alternating currents of lower potential by means of transformers and then converted into direct currents of the proper potential by means of rotary converters. In this way a large area can be supplied from one central station and a comparatively large number of units can be operated at one time from this station, thus giving conditions of maximum economy. On the sub-stations themselves, there is, of course, a fluctuating load and it is the custom to install storage batteries in connection with the rotary converters to equalize the load ; the battery stor¬ ing energy when the load is light and giving it out when the load is heavy.

The Return Circuit and Electrolysis. — In most of the overhead traction systems, the cur¬ rent passing through the motors goes through the wheels of the car to the rails, and then returns to the station, ((bus bars® finally*appear- ing at the negative brushes of the dynamos. When a system is operated in this way, the rails are bonded — that is, two adjacent rails- are connected by conductors securely attached to the rails and giving a low resistance to the electric current.

If the bonding is good, a considerable part of the current passes along the rails while a small portion strays through the earth to other conductors, such as water pipes and gas mains, using these as a return conductor. If the bonding is bad, however, a considerable portion of the return current is carried by the underground pipes, causing them at times serious injury. For this reason, and also because of the fact that low conductivity in a rail return causes loss of energy, it is of

importance that the bonding of the rails should be as thoroughly perfected as possible; it should also be carefully inspected at intervals, as the bonds are liable to break and produce a high resistance between the adjoining rails, thus diverting a considerable amount of current to the underground pipes. The matter of the elec¬ trolysis of underground metallic structures re¬ ceived little attention during the first two or three years of electric railroad development; the effect, however, naturally increased with time and the development of the systems until the serious damage that occurred became evi¬ dent, and means for preventing it was sought. These means, as a rule, consisted in connecting different points of the rail circuit to the negative bus-bars of the station, by return feeders, and in making metallic contacts between the rail and pipes at points where the current was leav¬ ing the pipes ; also in metallically connecting the pipes near the station with the negative bus-bars. No electrolytic damages is done when the cur¬ rent leaves the pipe through a metallic conductor ; it is only when the current passes from the pipe through an electrolyte, such as is furnished by moist soil, that corrosion takes place. In some places, the joints of the pipes have been insu¬ lated to prevent the current from passing through them and this is perhaps the most efficient means of avoiding electrolytic troubles.

Alternating-current Motors.— The most important drawbacks of the induction motor are these: In the first place the motor has practically the same characteristics as a direct- current shunt motor and, therefore, does not afford the variation of speed with load that is one of the most important and valuable features of a series motor. In the second place three circuits are necessary to operate the machine and while the track can be used for one of these circuits, the necessity of two wires over each track, the wires having a con¬ siderable difference of potential, makes the prac¬ tical operation of such a traction system diffi¬ cult. Numerous systems have been devised for regulating these motors, but they are either com¬ plicated or

inefficient and it is the opinion of the writer that induction motors will not be used for railroad work except under special conditions. The only advantage such a system °ffers is the high potential that can be used and this advantage is neutralized by the fact that the three conductors necessary make high potentials practically unavailable. Electrifica¬ tion offers a wonderful opportunity for saving in capital expenditure, where expanding de¬ mands new facilities which by other means would be inordinately expensive to provide. The higher sustained speeds of electrically- hauled trains on heavy grades offers an ir¬ resistible opportunity to expedite traffic and the flexibility of make-up and movement of multiple-unit suburban trains is a most valu¬ able consideration. The fact that electricity as a source of railroad motive power offers the only possible connecting link between the water¬ fall and the locomotive gives it an unique po¬ sition, analogous to that of alternating current ln the,.ffneraI power distribution field. It is more difficult to pvove out the economy of elec¬ tric opeiation on this basis, but it is certainly sound over-all conservation to use to the limit a form of motive power that cuts down mate¬

rially the rate at which the supplies of coal and fuel oil are being depleted.

During the last few years the new cars have been made considerably larger and hence the propulsion equipment has become proportion¬ ately more powerful than that formerly pro¬ vided. The latest motors are specified to per¬ form any service, on cars weighing 75 tons loaded, that is now being performed by the motors on the original 58-ton cars and it is required also that they shall, operate satisfac¬ torily on trains made up indiscriminately of the old and new. types of cars. These motors are provided with tapped field commutating poles and self-ventilation. They operate nor¬ mally at 600 volts direct current but are capable of successful operation at voltage up to 750. Space restrictions have had a marked influence on the design, owing to the use of clasp brakes and the desire to utilize standard electrical con¬ struction and to this end the gear face has been reduced to . four and one-half inches in place of the five-inch face that would ordinarily have been used. Acceleration is accomplished' either automatically or by hand, the former being under control of the current-limit relay on each car and there are 10 notches for forward run¬ ning, and six for reverse, these including the running positions made available by the field control as well as the customary intermediate running points.

In some of the single-phase locomotives of recent construction spur gears and coupling rods have been adopted for transmitting the power

from the motor to the driving axles. Each truck is provided with two motors geared to a common intermediate shaft which is connected to the driving wheels by means of the coupling rods The latter are arranged one on each side ° *the locomotive with an angular displacement ot 90 degrees The pinions on the motor shaft ˆre wl*h .sPrin&s to give circumferential flexibility. This arrangement is adopted to equalize the tooth pressures on the two pinions and to compensate for the sudden alterations of tongue chiefly due to the coupling rod drive with its changing reciprocating forces. Two strongly constructed centre pins supported from the trucks take the weight of the locomotive body and the electrical equipment. The control switches with their operating apparatus are mounted together with the transformer so that the whole forms a complete unit which can be installed or removed bodily through an opening in the roof. The two motors of each pair are connected in series, while the two pairs are in parallel with one another.

locomotivcs are now generally con¬ sidered in two groups, regardless of system of supply namely, the powerful machines which are used in heavy electrifications on the main lines of important steam roads and the fighter locomotives which find their field of application in less conspicuous duty in the elec¬ trified zones of steam roads and in handling freight cars on interurban lines. The former locomotives are of special designs, each rail¬ road system haying its own requirements. The design of the lighter machines tends more to standardization. Standard interurban freight locomotives are usually of the steeple type which is preferable to the box type in ap¬ pearance and is free from compressor noise.

ˆe|1&n features introduced to ensure reliability and low maintenance cost include particularly (1) Form-wound armature coils, with special insulation in the ends of the slots ; (2) Strap- wound field coils securely fastened and held against vibration; (3) Substantial brush-holder design and construction; (4) Mica insulated, undercut commutations; (5) Bearings of ample size with oil-gauging pockets, lubricated ‘by oil drawn up and filtered through waste; (6) Two-point gear case suspension. The unit switch control has proved itself capable of handling the heavy currents encountered and also to withstand the bumps to which the loco¬ motives are subjected, particularly in switching work, low-speed, drag-freight service or main¬ line service. In this control the various main circuit connections are made by unit

switches, actuated by compressed air taken from the air¬ brake system ; the admission of air to the switch cylinders being controlled by magnet valves, which valves, are operated by current from a control circuit through a train line from the master controller. Current from this control circuit is tapped from points on the control resister which is connected between trolley and ground, or may be supplied by a storage battery.

In late years the solution of the electric railway problems has become more difficult. The automobile has become a most serious com¬ petitor ; at this time more than 6,000,000 pleasure cars are licensed. The automobile has not only decreased riding upon the trolley cars during business hours, but it has deprived the railway of practically all of its pleasure riding. The entire economic basis of the industry has been undermined and if the business is to survive it must be a radically different business in the future than it is at the present time It must, in the first place, secure prompt and adequate relief by a sufficient increase in revenues to enable it to function as a public utility; for a rejuvenation of credit is essential to carrying through the radical readjustment in operating methods which will be necessary. In many of

the smaller cities, the companies must turn to one-man cars, permitting more frequent service with reduced operating cost. In the larger cities the companies and the public must face the necessity of abandoning the theory of a flat five-cent fare covering the entire city area and of charging the passenger according to the dis¬ tance which he rides. See American Street Railways; Railways, Street.

Edward S. Farrow, Consulting Military and Civil Engineer .

TRACTION ENGINE, an engine designed for drawing loads on ordinary roads or across country, and thus distinguished from the locomo¬ tive which hauls loads over steel or iron rails. The traction engine is designed to withstand severe jolts and to climb gradients of at least 1 in 10 and on a surface which sinks some¬ what beneath the weight of the engine, thus presenting a continual slope upwards in front of the wheels. The speed seldom exceeds eight miles an hour and consequently it is usual to reduce the speed of the driving-wheels from that of the engine shaft by intermediate gearing. Usually attached to the main axle is a winding drum, by which heavy loads may be drawn up bad hills on a wire rope, the engine having previously ascended, light, to the top. A heavy fly-wheel and a high-speed gov¬ ernor are provided. The driving-wheels of a traction engine have tires or treads of great breadth to distribute the weight of the boiler and engine over

a large area of yielding road¬ way. The tires are also usually corrugated or roughened to give adhesion. A very efficient means of steering is always provided in the trac¬ tion engine to enable it to make the sharp turns required in ordinary roads, and it is further¬ more usually so designed that by throwing out the intermediate gearing from connection with the traction-wheels, the steam-engine proper can be used as an agricultural engine for threshing, milling, pumping and other similar purposes. Light traction engines were once

Common Form of Traction Egnine.

favorites in drawing plows but ‘have been dis¬ placed by the tractor of the internal-combus¬ tion engine type, although these are really trac¬ tion engines. It is, however, usual to limit this term to the older type of land engine pro¬ pelled by steam. This type appears to hold its place in America for hauling threshing ma¬ chines from place to place and for driving them. In roadless countries, such as parts of Australia, Africa, etc., a heavy type of trac¬ tion engine is employed to haul trains of wag¬ ons, as well as to act as portable engines for providing power for threshing machines etc. Engines designed for threshing outfits are sup¬ plied with fire-boxes capable of burning wood, straw and refuse fuel. Since the opening years of the present century the steam traction engine has 'been displaced to a very great ex¬ tent by tractors and engines of the internal combustion type. (See Tractor). Consult Maggard, James H., <The Traction Engine: Itsˆ Use and Abuse5 (3d ed., Philadelphia

TRACTOR, a machine that draws a load, especially a power-engine mounted on wheels for traveling on roads or rough ground and hauling wagons, trailers, plows, cultivators or the like; a traction-engine. The locomotive (q.v.) was the first common form of tractor, but does not bear the name, and by common consent the term has been confined mainly to road.-engines that do not operate on a track or ride on rails. The word tractor began to be used when steam plowing became general. For this purpose a road-engine was developed with massive wheels, having broad metal tires that would not sink readily in soft soil, and to give them greater grip on the ground, or tractor capacity, cross-pieces were fixed on the rims, so as to resist slipping when there was hard pulling. This engine was provided with a long, horizontal boiler, an upright smoke¬ stack and many of the conveniences of a locomotive. At the rear was usually a

draw¬ bar, to which could be hitched a gang of plows, or cultivators, or mowing or reaping machines. It has made possible the extensive wheat farm¬ ing of the Great Northwest, and has been largely introduced in the principal agricultural countries of the world. International plowing matches have been held with these farm trac¬ tors, notably at the Canadian government ex¬ perimental farm in Ontario. These have been instituted by the Ontario Department of Agri¬ culture in co-operation with Plowmen's Asso¬ ciations. But these farm tractors have been so large and costly that their use was prohibited on small farms, and they have been satis¬ factory only on approximately level areas of ground.

It has remained for Henry Ford and Son to produce a small and inexpensive tractor adapted to the use of the small farm. This machine is known as the Fordson tractor, and as introduced in 1918 carried a 22 horse¬ power kerosene engine, of the four-cylinder type. The frame is like a small auto-truck, and the fore-wheels are of steel construction, with ball bearings, dust protector, and flanges to pre¬ vent side slipping. The rear wheels — 42 inches in diameter and 12 inches wide — are the drivers, and carry most of the weight; the gripping flanges of these are of angle-steel, set

at an angle of 45 degrees. The driver's seat is between the driving wheels, and the method of control is very similar to that of a light auto¬ truck. A bevel-pinion and sector are con¬ nected with the steering wheel, and entirely enclosed and lubricated by oil splash. Directly under this is the throttle lever, the spark lever being mounted on the dash. The distance be¬ tween the wheels, constituting the tread, is but 38 inches, and the machine can turn a com¬ plete circle within 21 feet.

The ordinary plowing speed is two and three-quarters miles an hour, with a low speed of two and one-half miles an hour, the draw¬ bar pull being 1,800 pounds and 2,500 pounds, respectively. When traveling or doing light work, a speed of six and three-quarters miles an hour is available. Fairly good ground can be plowed at the rate of about three-quarters of an acre an hour, varying, of course, with conditions. A little less than three gallons of kerosene per acre is a fair average consump¬ tion. . With fuel and water tanks full the machine weighs 2,700 pounds.

Automobile Tractors.— As soon as the modern auto-truck was perfected and began to have, a considerable sale, it became apparent that it was a convenience to separate the truck into two or more parts, one being a tractor and the others trailers. Many of the manu¬

facturers of auto-trucks build tractors on the same general lines as their trucks, but instead of providing them with a rear body for carrying a load, there is simply space for attach¬ ing a ˆfifth-wheel® device, or else a draw-bar, to which a trailing car can be easily attached. A typical form of these is shown in the illustra¬ tion, the tractor having four low heavy wheels, with radiator, motor and cab in front, and the rear of the chassis clear for supporting a fifth- wheel or turntable device, on which the forward end of a trailing car may be supported and swiveled. About 40 per cent of the weight of the trailer is designed to be carried on the tractor, and as the trailer has but two principal wheels, located at the rear, it is provided near the front with a pair of light supporting wheels, that are swung out of the way when it is attached to the tractor, but which can be used to keep it upright when not connected with the tractor. This type of trailer is often called a semi-trailer to distinguish it from a four-wheeled trailer, that bears all its own weight, and is pulled by some form of draw¬ bar.

. The combination of auto-tractor and trailer is very convenient, for it not only enables the tractor to deposit its load without any delay but it can be used to haul all sorts of trailing cars, and often a number of them in a train. The method of connecting the tractor and trailer by a fifth-wheel device is shown in the illustration. Tracks T are mounted on the rear frame F of the tractor, and a swivel S is set between the rails. The fifth-wheel device con- sists of an axle centrally mounted on this swivel, and two light wheels W W that run around on the tracks, and can be swung about in a half circle. The forward end of the trail-mg car C is mounted and fixed on this fifth- wheel device. The fifth-wheel device of course takes its name from the fifth wheel on the front axle of an ordinary wagon, though it

TRACTORS

Copyright, Underwood & Underwood, N. Y.

1 Self-Reversible Tractor carrying its own Plows

2 Tractors hauling 12-disc Plows and Spike-toothed Harrow Trailing

TRACTORS

- -cC-. >•*'•'■

'.. . *rt*V

■ ■ *«

Hr

‘ ' X- o^'

p&iSf

*- > w

Ppk'^' • '

.%::r3feSi

«swt»5» .; u fa

•tN’iSV ♦ «4

v\%

1 Tractor hauling Hay Wagon and Loader

2 Tractors hauling Reapers and Binders

TRACTORS

1 Caterpillar Tractor hauling a Three-gang Plow

2 Caterpillar Tractor, especially effective on soft ground

TRACTORS

1 Caterpillar Tractor for farm work

2 Caterpillar Tractor for army work

TRACTOR

TRADE

747

has been developed into a mechanism that is much more than a wheel. Some manufactureis use a swiveling pair of bolsters instead of this fifth-wheel device. When a trailer is loaded ready to start, the tractor is backed up to it, and hitched on by simply guiding the two small wheels of the fifth-wheel device up the tracks ; or, if an automatic coupler is used, the method of connecting may be very similar to that used in coupling railway cars. It is necessary to provide trailers with brakes, else they might create trouble in going down hill,

and these have to be connected with the tractor, so as to be operable in unison with the brakes when set by the driver. The connection between tractor and trailer must also be such as to permit a rocking motion, so that when passing over uneven roads all the wheels shall travel on the road without straining the framework.

Military Tractors — The military «tank® which attained fame in the World War was based on a peculiar form of tractor designed to work in a rough country, as in logging opera¬ tions, canal building, etc. The very heavy end¬ less chains, bearing feet on each link, fitted these machines for the most arduous pulling work under the most trying conditions, and some military man among the British recog¬ nized their possibilities when armored, and the military C(tank)) was the result, introducing this type of machine to untold thousands who other¬ wise would never have heard of it. Though too slow of operation to compete with the ordi¬ nary tractor of auto-truck type, yet the tank- tractor has such superiority in marshy, stony and very rough ground, that it has obtained considerable use.

The Synmotor. — Another peculiar form of tractor that has been invented by a New Jersey genius is called the synmotor. It is an adapta¬ tion of the motor-cycle to agricultural traction. Instead of pneumatic tire wheels, this machine is provided with steel rims and angle grips, like the wheels of big farm tractors, and is designed to draw cultivators, seeders and small mechanism used in truck farming. Its peculiar¬ ity lies mainly in its being attached by a wire to a central post, around which it circles in re¬ ducing spirals. When started on a circle of ground it does its work automatically until the entire circle of 100 or more feet in diameter is plowed or cultivated, excepting a small por¬ tion in the centre. It operates in a four- to seven-foot swath, and uses gasoline fuel.

The drawing or pulling device of a rope¬ way or wireway is also termed a tractor. See Motor Truck; Tank.

TRACTOR, Caterpillar. A tractor em¬ ploying, instead of the usual drive wheel, a flexible steel belt, or track, which supports the weight of the machine, even in very soft ground and gives it greatly increased tractive efficiency under all conditions. Invented by Benjamin Holt, of Stockton, Cal., about 1900, it was first used in the peaty soil of the San Joaquin delta, or (<tule,® country. It is particularly adapted to cultivation of orchards or other plowed ground since there is no soil packing; to reclamation work in swampy land; to hauling where roads have not been established, as in desert, forest or in military operations ; to climbing grades, since the track principle affords unusual pulling

effort in proportion to weight, and to other ex¬

treme conditions. It is also used, of course, wherever ordinary tractors can be used and is often preferred because of absence of injury to pavements. ˆCaterpillar® is a trade-marked word properly applied only to the Holt tractor. Other tractors following the same general principle are referred to as ˆCrawlers,® ((Creep- ers,® <(Alligators,® ˆCentipedes,® <(Tracklayers,® etc. See Tank.

TRACTOR ENGINE. See Internal

Combustion Engine.

TRACTS FOR THE TIMES, a series of short essays or theological pamphlets published in Oxford between 1833 and 1841 by the leaders of the Oxford movement — Newman, Keble and Pusey. See Tractarianism ; Oxford Movement.

TRACY, tra'si, Benjamin Franklin, Ameri¬ can lawyer and politician : b. Oswego, N. Y., 26 April 1830; d. 1915. He was admitted to the bar in 1851, was district attorney of Tioga County in 1853-59, helped to organize the Re¬ publican party in New York State and served in the legislature during 1861-62. At the open¬ ing of the Civil War he recruited two volunteer regiments in New York, the 109th and the 137th, and became colonel of the former. Later he was colonel of the 127th regiment of United States negro troops, and at the close of the war was brevetted brigadier-general of volun¬ teers. As United States district attorney for the eastern district of New York, 1866-73, he drafted an internal revenue bill which more than trebled the United States revenue at a time when the huge war debt was being liqui¬ dated. In 1881-82 he served as judge of the Court of Appeals, and in 1889 became Secretary of the Navy in President Harrison's Cabinet His term was marked by a large increase in the navy and the formation of a reserve naval militia. At the close of this service he resumed his law practice in New York. He was presi¬ dent of the commission that drafted the charter for Greater New York in 1895-96, under which he was the Republican candidate for mayor in 1897, but failed of election. In 1899 he was counsel for Venezuela in the boundary arbitra¬ tion between that country and England.

TRACY, Joseph, American Congregational clergyman: b. Hartford, Vt., 3 Nov. 1794; d. Beverly, Mass., 24 March 1874. He was gradu¬ ated at Dartmouth in 1814, ordained to the ministry, and was pastor of churches at West Thetford and West Fairlee in 1821-29. He edited the Chronicle, Windsor, Vt., ' for five years, the Boston Recorder for one

year and then became president of the Massachusetts Colonization Society and of the American Colonization Society for Massachusetts, which positions he held until his death. He was asso¬ ciate editor of the American Theological Re¬ view for many years and published (Three Last Things } (1839) ; (The Great Awakening, a His¬ tory of the Revival of Religion in the Time of Edwards and Whitefield) (1842) ; and CA Me¬ morial of the Semi-centennial Anniversary of the American Colonization .Society* (1867).

TRADE. See Commerce; Imports and Ex¬ ports.

TRADE, Acts of. See Acts of Trade; Great Britain — Navigation Act.

TRADE, Board of. (1) In the United States a body of men selected from among the business men of a city, and appointed to rep¬ resent and act for the whole business com¬ munity in advancing and protecting their inter¬ ests. (2) A similar body acting for a trade or industry, usually for the regulation of trade abuses. (3) In England, a permanent commit¬ tee of the Privy Council, presided over by a member of the Cabinet, and divided into seven departments, each having its separate staff. It controls the issuing of patents, registering of joint-stock companies, handles trade insurance, settles disputes, etc. The British Board of Trade conducted highly useful work during the great World War, exchanging commercial in¬ telligence, and assisting manufacturers and mer¬ chants in the unusual problems confronting them.

TRADE ASSOCIATIONS, business or¬ ganizations composed of the individuals, firms and corporations engaged in a trade or industry, formed and operated to deal with those things in which the membership have a community of interest, as wage scales, uniform rules and measures, guarding of legislative interests, maintaining prices, exchanging of information as to credits of customers, etc. These associa¬ tions in the United States developed mainly after 1870, largely as a result of the growth and activity of the trade unions. (See Unionism). The demands by workmen for better pay and conditions were generally re¬ sisted, and employers met and began to organ¬ ize against their employees. Before such meet¬ ings the proprietors in a particular trade rarely had any personal acquaintance, knowing each other only by name, and usually having a poor opinion of each other, because of sharp com¬ petition and business rivalry. Brought into

contact over labor difficulties, their views as to each other changed; they learned to respect their competitors, and warm friendships some¬ times developed between them. They began to talk with each other about trade problems, and soon saw the wisdom of combined action in securing trade reforms. Their anti-union associations took on a broader scope; they en¬ gaged secretaries and business managers, and began to do business in those things which were for the common interest and benefit of the trade. So came into being the American News¬ paper Publishers' Association, the National As¬ sociation of Stove Manufacturers, the Asso¬ ciation of Wool Manufacturers, the Typothetae (q.v.), The National Erectors' Association, the Coal Operators' Association, the Photo-En¬ gravers' Association, National Metal Trades Association, National Founders' Association and hundreds of others. As time went on, each of these associations tended to enlarge its scope and sometimes several organizations were formed in one trade, to care for different branches of the work. For instance, in New York City, the Typothetae, the oldest organiza¬ tion among employing printers, concerns itself largely with exchanging information as to costs, bookkeeping, preserving fair competition, watch¬ ing credits, etc. The Printers' League handles all labor difficulties, makes agreements with the unions, settles disputes as to shop rules and the like. The Master Printers' Associa¬ tion concerns itself with the well-being of the smaller printing offices, the job printers, insists

on uniform treatment by paper jobbers, the charging of a fair profit on engraving, bind¬ ing, etc., reports on customers who are slow pay, etc. In most cities, however, one local organization serves a trade wholly, and no need is felt for two or three to look after various branches of work. It is practically true that in every large city there is a trade organiza¬ tion in every trade represented by a consider¬ able number of houses. These conditions have naturally led to combinations to keep up prices, and the public has been jealous at times of certain organizations, which they classed as a trust in certain trades and industries. At times the suspicion of taking unfair advantage of the public was well founded, and at other times the members of a trade association have only sought fair protection from competition that was ruinous and not advantageous to the com¬ munity. Where the trade organizations have gone too far, and used their power of co-opera¬ tion to push prices above a fair level, there has usually been a reaction; either district attor¬ neys have brought criminal suits charging Com¬ bination in restraint of trade, and caused the dissolving of trade associations, or else the in¬ creased prices have brought new firms into the field, that did not belong to the

association, and these have undersold, and brought down the level of prices to a basis of keen competi¬ tion. Of late years there is a tendency in the United States for the large trade organiza¬ tions to work together for business reforms. They call upon each other for assistance in securing needed legislation, and they have formed a National Association of Manufac¬ turers, whose influence is very powerful. See Trade, Board of; Chambers of Commerce.

TRADE DOLLAR, a former coin of the United States, containing 378 troy grains of sil¬ ver and 42 troy grains of alloy. Trade dollars, issued under Act of Congress 12 Feb. 1873, were legal tender to the amount of $5. Those issued under the Act 22 July 1876 possessed no. legal tender power. They were intended for trade with countries doing business on a silver basis. As silver depreciated in value the trade dollar de¬ preciated, and speculators bought them abroad at 80 or 90 cents and circulated them in the United States at face value. This was easy because specie payment had just been resumed by the government in 1875, and the public liked the silver. When the lower value was generally understood, and they continued to fall in price they were objected to and gradually disap¬ peared from circulation.

TRADE-MARKS. Certain marks or in¬ scriptions set on manufactured goods for the purpose of establishing the identity of their manufacture or selection. An examination of the evolution and development of the trade- mark in the United States of America is sub¬ stantially an examination of the evolution and development of the vast commerce of our coun¬ try.

• • .. . , m a rk is a mark or

sign indicating the source or origin of the article to which it is affixed. Unlike a patent (q.v.) it is not a monopoly. In its very exist¬ ence it evidences competition, and lays claim

a degree of superiority in such competition.

A trade-mark may consist of a word or words, or of a symbol, design, device or picture; or

it may be constituted by an original and dis¬ tinctive shape or form of package in which the goods are packed or contained; or it may con¬ sist of a combination of some or all of these elements; but in whatever

form the trade-mark appears on the market, its office is either to in¬ dicate the origin or source of manufacture of the article, or when used, as it may be, by the dealer who sells to the ultimate purchaser or consumer, but who does not manufacture or produce the article, it may then indicate selec¬ tion or endorsement of the manufacture of the article bearing such dealer's mark.

Office of the Trade-mark. — Not only does the trade-mark indicate the source or origin of the goods to which it is attached, but it also performs the office of guaranteeing or assuring to the purchaser, whether he be an intermediate or an ultimate one, that the hon¬ est skill of the owner of the trade-mark, the good quality of the goods, the carefulness of selection, the purity of ingredients or cor¬ rectness of weight or measure are to be found in the articles to which such mark is affixed. Further than this the protected and defended trade-mark builds up for the manufacturer to whom it belongs that following in the market which becomes immensely valuable in apprais¬ ing the goodwill of such a business.

The Origin of the Trade-mark. — The introduction of the trade-mark into commercial use was natural, and when once effected rapidly became a trade necessity.

A chemist in the olden days prepared a mixture or lotion and recommended it to the customers of his shop, who found it effica¬ cious. A shoemaker made shoes for his patrons which by reason of good quality and superior workmanship won favor for him among his patrons ; so that these trades-people, pursuing their various lines of industry, not only retained their custom, but were recommended by their patrons to others, such customers becoming ac¬ customed to resort to the shop of the one or the other of the tradesmen who supplied such wants, a habit which is known in law as the goodwill of a business.

So long as the customer of the chemist transacted his business face to face with him in the same old shop, or so long as the shoe¬ maker measured his patrons and delivered his goods to them in person, so long was it un¬ necessary for such manufacturers to mark their wares.

Their customers and patrons obtained a per¬ sonal delivery and needed no other assurance or guaranty as to the genuineness of the articles purchased by them ; but after a while, some of these purchasers and users of these various articles removed to other localities, and would desire to continue to use the same lotion or wear the same shoes ; and they would order the same directly, if they could,

or through some agent middleman if they could not; and then in the latter case, to quiet any apprehension which such customers residing at a distance might feel regarding the genuineness of the articles de¬ livered to them, the chemist would affix a label to the bottle or jar containing the lotion, which would bear his name and address; and the shoe¬ maker would mark on some part of the shoe his name and address; after a while the pro¬ ducers of these various articles found that the

mere use of their name and address, while con¬ stituting a good and sufficient indication of the origin of their products, was nevertheless sub¬ ject to several matters of inconvenience; the first was that perchance many of the customers could not read ; and the next was, that the use of the name of the manufacturer alone was at- tended^ by a legal difficulty, to wit, that while a man's name would constitute a most perfect trade-mark, yet any other man bearing the same name had an equal right to use it, provided he did so honestly and fairly, and if engaged in the same line of business, a trade confusion would naturally and often did arise, as wit¬ ness the Brown Iron Bitters case.

Adoption of Symbols and Arbitrary Words. — To reach and remedy these difficulties, manufacturers then began to adopt and use symbols consisting of pictures or devices, at first simple in their nature, such as shields, stars, geometrical figures or representations of animals and the like ; they also coined arbitrary and. fanciful names, not descriptive of kind or origin, which were generally used in connection with the name and address of the manufac¬ turer; and so it came to pass that symbols, devices and arbitrary designations or titles were slowly, gradually, but generally substituted in the place of the mere name and address of the manufacturer; the goods in due course of time became known by such marking; the marks, in turn, served to indicate origin, as well as to guarantee the peculiar excellence which the pur¬ chasers or consumers expected and had a right to find in their purchases with respect to qual¬ ity, purity, measure or value.

So public usage has also often given an accidental meaning to a trade-mark, not at all contemplated originally; as witness the case in h ranee, where a man named Jean Bardon manu¬ factured cigarette paper, marking it with his initials, ((J. B.,® which he separated by a lozenge, so that the mark appeared to be the word "JOB/8 The public became accustomed to call for «JOB® paper, and that name was duly pro¬ tected as a trade-mark, although it had never been intended to invent or use the word ((JOB® in connection with Jean Bardon cigarette paper.

Requirements of a Valid Trade-mark.— Inasmuch as the markets of commerce are <(markets overt® or ((open markets,® it soon became evident that, in order to secure a trade¬ mark which would be unique, and the exclusive property of the person or firm originating and adopting it, such mark would of necessity have to be one which others did not have an equal right in law to use for the same class of mer¬ chandise; so that it became an established rule of construction of the law of trade-marks that no mark would be protected as the exclusive property of any one person which others had an equal right to use ; as, for instance, a mark indicating quality, or a geographical mark, in¬ dicating that the goods bearing the mark were made or produced in a certain locality; or a mark which merely consisted of the statement of ingredients, or the generic or class title of the article; to be perfectly plain, every person living in New York, making hats or shoes, or other articles of commerce, would have the right to label and mark such articles as <(New York Hats® or <(New York Shoes® or the like; so every person would have the right to make

the “Best Quality Hats® or the “Best Quality Shoes® or “Superior Hats® or “Superior Shoes® or the like.

Kinds of Trade-marks. — There are two distinct kinds of trade-marks, to wit, a mark consisting of a word or words, or a mark consisting of a symbol or picture.

The former kind may be designated as an ear-mark,® and being mainly distinguished, when used, by its sound, it has been held by high authority that the use by another of a similar word, alone or in any form or com¬ bination, or in connection with any style of label or form of package, is unlawful, and would constitute an infringement upon the original mark.

The other kind of a mark, consisting of a symbol or picture, may be designated as an .eye-mark,® because it appeals to the sense of sight. To constitute an infringement upon such a mark, the defendant's mark must be of so close a resemblance as to be likely to mislead a purchaser using ordinary attention. There may oe also an infringement upon important parts of. a trade-mark, without the whole of the mark being copied. This will be restrained, because the law does not look for complete identity in the imitation . trade-marks, but similarity will be held sufficient to warrant the interposition of a court of equity.

“Secondary Meaning® Phrases Protected.

—In dismissing this branch <pf the subject, it may be stated that no mark which merely indicates an essential element or quality of the article to which it is applied can be exclusively appro¬ priated as a trade-mark, subject, however, to one important qualification which has attended the evolution of the law of protecting industrial property in this country, and which was ren¬ dered necessary by the natural and proper de¬ sire on the part of our courts and judges to do equity and to protect the purchasing public.

The exception to which we refer is when a term, phrase, title or designation which is used in connection with a trade-mark acquires what is known as a “secondary meaning® in the market.

By this we mean that when a phrase, title or designation, which of itself could not be protected- as a technical trade-mark, because primarily conceived and designed to merely in¬ vite trade or catch and engage public atten¬ tion, becomes in time so identified and associ¬ ated with the articles of merchandise to which it is affixed, that the public, on seeing it, at once recognizes that it stands for the goods to which the trade-mark proper is usually at¬ tached, even though that mark should be absent.

An illustration of this may be found in the case of a trade-mark for a certain medicine; the words “Candy Cathartic® are certainly de¬ scriptive, as fully descriptive as any words well can be ; but they had been used to so large an extent and were so thoroughly advertised in connection with the medicine in question that it was shown that many purchasers in-' stead of calling for the trade-marked name of the article would ask for “Candy Cathar¬ tic® ; and, vice-versa, druggists handling the ai tide so associated and identified the sec¬ ondary phrase or title, “Candy Cathartic,® with the trade-mark proper that when “Candy Ca¬

thartic® was called for a box of the tablets would be promptly handed out. The court ac¬ cordingly protected such descriptive phrase against use by a competing firm.

“Camel’s Hair,® a purely descriptive term for belting, was protected after it had acquired a secondary meaning on the market, as apply¬ ing to a particular make of belting. Likewise, btone® was upheld as a designation for ale the name Stone being the name of the village in which the brewery was located, and which through such use had come to designate a par¬ ticular product.

Likewise, a geographical name may ac¬ quire a secondary meaning, especially against in t ringers who do not reside in the same geo¬ graphical territory or. locality; as witness the tact that Saint Louis® was protected as a mark for lager beer against brewers using the same title, but not doing business in the city of Saint Louis. The history of the “Dur- ham tobacco case may also be profitably con- sidei-ed, where Blackwell, the proprietor of Durham® smoking tobacco, failed in his at- tempt to restrain another tobacco manufacturer ° . f ur“am from using such title in connection with tobacco, whereat certain Virginia tobacco

maKUm ?utjlde °f Durham, becoming

emboldened by the defeat of the Blackwell con¬ cern, began to use the title “Durham® in con¬ nection with their tobacco, but were promptly enjoined from so doing by the courts.

It by no means follows, however, that the ae ense of such trade-marks by the courts estab¬ lishes the wisdom of their selection as such marks On the contrary, they are to be avoided as leading to litigation more or less annoying and expensive. In the selection of a trade¬ mark every precaution should be taken against personal, geographic and descriptive names and. equally against such marks as in appearance or in sound as spoken shall simulate trade¬ marks already owned by others. An error in these respects, even though it escapes legal prosecution, may result in the partial or total ˆVˆStCj °* money spent in advertising, which indeed, may redound as well to the advantage of a competitor as to one’s self. Another point

!° ,be rer?eTberTd 1J} devising or selecting a trade-mark is that it should be simple and easily recognized. Few customers give keen and close observation to goods purchased, and the ultimate value of the goodwill of a manu- acturmg business may be largely dependent

favoriteTrands* "d UnqUa‘ified recognido" of The Doctrine of “ Clean Hands.”— Another and most important matter to be considered by the owner of trade-marks is in their cor¬ rect use of their trade-mark.

The usual protection and relief sought against infringement and the invasion of trade¬ mark property is by means of a suit in equity brought t9 restrain the infringer from continu¬ ing to imitate or use the infringing mark, and tor an accounting for damages; but as such a proceeding in equity is governed by well- settled principles of equity, one defense which nas been very often successfully urged and raised to defeat any action on the part of the owner of a trade-mark is what

is known as the defense of “unclean hands.®

It is a well-settled principle of equity that

“he who enters a court of equity, seeking equity, must do equity, and come with clean hands.®

In other words, a party will not be heard to complain of the wrongful acts of another as against himself, if that same party has been guilty of similar wrongful acts of fraud, misrepresentation or deceit against the pur¬ chasing public.

The United States Supreme Court in the celebrated and leading case of Manhattan Medicine Company against Wood, many years ago, laid down the doctrine that a party would find no relief in a court of equity as against an alleged wrongdoer if he himself were guilty of wrongdoing in using the mark to deceive the purchasing public.

Having this important fact in mind, it be¬ hooves trade-mark owners and users to be very careful in the use of their marks, labels and packages, and the following simple rules may well be observed for their protection and benefit.

No misstatements concerning the origin, quality or quantity of the articles to which the mark is attached should be used in connection with the labels, packages or accessories of the goods. So, also, if a trade-mark was not orig¬ inally adopted by a party but was acquired by transfer or assignment, such fact must be dis¬ tinctly announced on the labels or packages. The courts, however, will not countenance the trans¬ fer or assignment of a trade-mark except as a part of the transfer of the business which it has represented. The business cannot be trans¬ ferred to one party and the trade-mark to an¬ other.

While the doctrine of <(Unclean Hands® has been carried to a very great extent by the courts, it has been held in many cases that too strict an application of such a rule would lead to the destruction of valuable industrial prop¬ erty, and, at the same time, relegate the purchas¬ ing public to the tender mercies of false, fraud¬ ulent and infringing marks.

The courts have in many cases recognized the fact that where there is no vicious or wrongful intent on the part of a trade-mark owner, who

is shown to conduct a legitimate and honest business, that slight lapses or im¬ material misstatements, not persisted in or con¬ tinued, and statements which are substantially true, although not entirely so, will be over¬ looked and not visited with the punishment of denying equitable relief to the trade-mark owner who is guilty of such infractions.

The understanding which the public has of certain trade customs or usages are also al¬ lowed to prevail ; as witness the <(Hennessy Brandy® cases, decided by the New York courts of appeals, where the defense was interposed that the plaintiff's bottles were not full or actual pints or quarts in size, and that, therefore, the owners of said trade-mark were guilty of in¬ equity and misconduct; but the court held that inasmuch as such pints or quarts were known as ((commercial® pints or quarts, and understood so to be by the purchasing public, that no fraud was either contemplated or had been committed, even though the bottles to which the mark was attached were not of full measure.

•How Trade-mark Property is Acquired. — Property in a trade-mark is acquired by priority of adoption and continued use on the market. A mere announcement of an intention to adopt

a certain title or symbol which is not followed or accompanied by use on the market does not confer any trade-mark rights. Moreover, the law requires that the trade-mark shall be in actual use in trade before application is made for its registry. The title to a mark may be lost by deliberate abandonment or the transfer to others of the title or goodwill of a business in which the mark has been used.

The person who adopts and first uses a certain distinguishing mark for his goods, be¬ comes possessed with what is known as the common-law right of ownership thereof, and such right is an enforceable one, and will be protected by the courts of this country.

Patent Office Registration. — Trade-marks may be registered under the existing registra¬ tion statutes only when the same are used in commerce with foreign nations, or among the several States or with Indian tribes. The provision for marks used among the several States is new and in force since 1 April 1905. Under this law marks exclusively used for 10 years preceding the passage of the law can be registered, irrespective of the prohibitions in the law, which would otherwise apply. Regis¬ tration confers no greater property rights than are acquired under the common-law right of ownership, except that triple damages may be recovered in certain cases. Registration, how¬ ever,

does not create a right to a trade-mark ; this is gained only by priority of adoption. The trade-mark thus signifies a public claim to such adoption and use; if it is not in accordance with the facts the registration may be canceled. Before registry a trade-mark is published 30 days in the Official Gazette of the Patent Office, during which period any person having good grounds for believing that its registration threatens his rights may oppose its registration. Besides the national law in the matter most of the States have trade-mark laws which pro¬ tect the intrastate use of a trade-mark, a use which is not covered by the Federal law.

Assignment of Trade-marks. — Trade¬ marks may be assigned with the goodwill of the business in which they are used, or a trans¬ fer of the business itself ; or they may descend by inheritance ; but such an assignment must be recorded in the United States Patent Office within three months of its date or the good¬ will thereof does not vest in the assignee any enforceable right or title. A trade-mark has no value or standing apart from the goodwill of the business of which it has been a part.

Partnership Marks. — Upon the dissolution of a partnership, either partner may there¬ after continue to use the trade-marks of the partnership, unless the same are otherwise dis¬ posed of upon the dissolution, or where other contractual relations exist governing the future disposition of the same upon a dissolution.

Defenses. — In cases of infringement, actual deception by the infringer need not be proven. The likelihood of deception is sufficient to war¬ rant the interposition of a court of equity. So it is no defense that the infringing article is superior in quality to the genuine, nor is the absence of intent to deceive a defense. Laches or delay in asserting rights are generally held to deprive the owner of the right to claim dam¬ ages or obtain a preliminary injunction. Aban¬ donment is also a good defense, but strict proof

of an intention to abandon ownership is essen¬ tial to the establishment of this latter defense.

Patented Articles. — Where a new trade¬ mark consisting of a word-symbol is affixed to a patented article, the right to use such name or title for such article will become public property upon the expiration of the letters patent, as was held in the <(Castoria” and ((Singer Sewing Machine” cases. Otherwise the mon¬ opoly enjoyed by the owner of a trade-mark is perpetual.

State Laws. — In many of the States, acts have been passed making it a criminal offense to refill or use again without the owner’s con¬ sent bottles or other packages which have been registered under what are known as <(Bottling ArCtSu or Trade-mark Registry Acts ; so in many of the States the imitating or counterfeiting of trade-marks is made a criminal offense.

Labor Union Marks. — In many of the States labor unions or associations of work¬ ing men are permitted to register their labels or trade-marks, indicating that the goods to which such labels or marks are affixed were manufactured by union labor, and such acts have been sustained as constitutional in most of the States.

Copyrighting of Labels — New labels, not

previously used, and containing some artistic or novel character of design, may be copy¬ righted in the United States Patent Office and will be protected for 30 years. But labels which merely describe an article, or only indicate size, number or weight, or are only the result of the application of the typesetter's art, are refused copyright entry.

Unfair Trade Competition. — An article on the subject of trade-marks and their protec¬ ts011. in this country would at the present time be incomplete without some mention of the cognate subject of ((Unfair Trade Competition."

The evolution of the law of trade-marks in course of time satisfied the courts of this country that the mere enforcement of strictly technical trade-mark rights fell far short of the practical requirements and necessities of our commerce, inasmuch as the purchasing pub¬ lic was being constantly cheated and defrauded in having goods not of .a genuine source of origin foisted upon them, while the owners of such genuine goods, as well as the purchasing public, were frequently left without redress or legal protection. To remedy this defect of the administration of justice, the restraining of unfair trade competition was applied to cases where technical trade-mark rights could not be enforced.

1 he essential difference between a case brought to restrain the infringement of a technical trade-mark, and to restrain a case of unfair trade competition, may be sum¬ marized as follows :

Both suits are brought to restrain a fraudu¬ lent act of the defendant; both proceed on the theory that a court of equity will protect the property rights of the owner of the trade-mark, and at the same time, guard the purchasing public against being deceived; but while in a case brought to restrain the infringement of a trade-mark, no proof of actual deception is now required, nor is any proof of damage to the owner of the imitated trade-mark required to enable him to recover, in a case of unfair

trade competition the essence of maintaining the suit is in the

establishing of the fraud prac¬ tised by the defendant and the actual deception caused thereby upon the purchasing public. Probable deception is ranked with actual de¬ ception in constituting infringement. It is con¬ strued as an attempt to steal the goodwill of an established business.

It thus follows that in the extension of the principles of doing equity and according the fullest protection to the purchasing public, a man may even be restrained from using his own name in the transaction of his business, where such use is of a fraudulent character, cal¬ culated to breed trade confusion and designed to mislead and deceive the purchasing public, already accustomed to that name as connected with another line of merchandise.

History.— Trade-marks are of extreme antiquity, being found on bricks unearthed by explorers among Egyptian and Assyrian ruins, and upon Egyptian pottery dating back to 6000 b.c. Such marks have also been found on gold and silver ornaments and even upon carved jewels, and the containers used by the Roman pharmacists for their salves, creams and lotions. In more recent times historic mention of laws protecting workers in metals, smiths and armorers in such trade-marks as early as 1374. In the Middle Ages guilds of artisans in Germany, France and Italy compelled the use of trade-marks by their members as a protection to the purchaser as well as to the trade in general. Trade-mark protection in England did not begin until 1783, and it was not until 1838 that laws were passed which afforded really adequate protection. In the United States agi¬ tation for a trade-mark law began in 1791, but the Federal trade-mark law was not placed among the statutes until 1870. The present law bears date of 1905.

Trade-mark law in the United States has substantially been made during the past few decades; for the first reported American trade¬ mark case found in the books is that of Bell against Locke, decided by Chancellor Walworth in the Court of Chancery in the State of New York in January 1840. The following reported American trade-mark cases are desultory and sporadic until about the year 1870, when they became more numerous. Since that time trade¬ mark litigation has vastly increased. ’

The Philosophy of the Law of Trade¬ marks. The whole legal and underlying prin¬ ciple of the law embraced in this subject and its entire philosophy are founded upon the the¬ ory of securing honest trade and fair trade m the commerce of our national markets, and the doing of strict justice between man and man, while protecting the extremely valuable property rights which are at the present time

found to exist in the transaction of modern businessˆ both in the ability to enjoy unmolested and secure from invasion the marks of com¬ merce, as well as to retain the goodwill of the business in which they are used. In brief, no one has or can have the right to sell his goods as ostensibly the product of another who has bmh up a goodwill by pronounced excellence of his products.

Equity has _ been poetically termed the flower of justice” ; and equity, with its long arm, and with the acute conscience of the

court, is able to prevent and remedy acts of injustice, where the law itself would other¬ wise prove powerless and futile. See Patents.

Bibliography.— Elfreth, W. H., (Patents, Copyrights and Trademarks > (New York 1913) ; Geyer, A., (Registry of Water Marks and Trade Marks) (New York 1900) ; Hopkins, J. L., (The Law of Trademarks, Trade Names and Unfair Competition (Cincinnati 1917) ; Laborde, A., (Traite Theorique et Pratique des Marques de Fabriquex et de Commerce) (Paris 1914) ; Nims, H. D., (The Law of Un¬ fair Competition and Trade Marks* (New York 1917) ; Rogers, E. S., (Good Will, Trade- Marks and Unfair Trading) (Chicago 1914) ; Sebastian, L. B., (The Law of Trade Marks) (London 1911).

Morris S. Wise,

Editor of the (Trade-Mark Record ,y New York.

TRADE AND TECHNICAL PRESS, American. The principal function of the trade and technical publication is the advancement of the commercial, industrial, professional, scien¬ tific or other interest, which they represent, by keeping the reader informed as to the prevail¬ ing conditions of his trade throughout the country, and even the entire world. Thus a well-edited, broad-minded, accurate and pro¬ gressive trade journal will exert a great influ¬ ence toward welding together the separate units of each great profession, trade or in¬ dustry into one vast community of interest. The general newspaper and the trade journal differ in the fact that the former appeals to the whole public, whereas the latter caters to a smaller class of professional, commercial, tech¬ nical or scientific readers, giving within its compass only such knowledge as pertains to its special field.

These organs, of which every great trade in the country has its own,

bring to the atten¬ tion of those interested any invention or dis¬ covery which is, or in time may become, of great importance, but which to the general public would be of little or no interest; they present the conditions of the home and foreign markets by .giving tables of quotations other¬ wise inaccessible to the trade; and gather all possible information which may be a guide to, or throw any light upon, future conditions. Improved processes or methods of manufac¬ ture and changes or improvements in other industries which would possibly have a bear¬ ing upon a certain trade; the many items of general interest to the lines with which they are concerned, and the public questions which vitally affect those interests ; the almost innu¬ merable changes taking place in the industrial world; all these, and more, are chronicled in every issue of the trade journal and discussed with a knowledge of detail, a grasp of the sub¬ ject and fullness of treatment to be found no¬ where else. ,

Such papers are of much importance to the trades they represent. Some are merely ad¬ vertising sheets ; some contain literary matter along with the special news ; others are deeply scientific; yet each is conducted to subserve the interest of the respective trade. Of these papers some are published weekly; some semi¬ monthly and others monthly; and a number of the financial papers, which may be considered as

belonging to this class, are published daily. Some instances among trade journals have en¬ joyed remarkable and continued success, and have financially prospered far more than had been hoped, but the history of journalism is strewn with the wrecks of others whose exist¬ ence was of such short duration that they did not pay for the original investment.

That the trade and technical journal may have the highest standard of editorial service and supervision, it is necessary that experts should be employed in the writing of articles, and none but the ablest men in each separate line should contribute, for the reader is gen¬ erally an expert in the topic of which they treat, and any inaccuracy of statement or error of judgment is not only noticed, but is remem¬ bered. This tendency to inaccuracy or error is in a large measure lessened by the employ¬ ment of a large corps of trained and skilful reporters who ascertain the tendencies of the market before they have become apparent, and also by having, in a great many instances, con¬ fidential relations with the leading minds of the trade. Thus a reputation is established, the paper becomes a power in its branch of

in¬ dustry and is quoted by all as an authority when discussing subjects of which it treats, and of which, in the nature of things, their knowledge is limited.

The trade journal also occupies an important position in the field of advertising, for the judicious advertiser selects the publication which is read by the class to which his merchandise will appeal, and this method is more economical and profitable to him than employing the ordi¬ nary newspapers which reach the general public and are not carefully consulted for technical matter. The vast number of advertisements which they publish in every issue, and the prices which they receive per line for such advertise¬ ments are astounding when the competition that exists for all these is considered. That it is profitable, however, to the advertiser, is plainly apparent from the enormous amount of adver¬ tising which each journal carries.

The American Railivay Journal, of New York, first published in 1830, was the first paper which met the desires of one particular class of merchants. This was the pioneer of the specialty commercial journals, and it was for some time the only one of its kind, for though a few others had attempted to enter the field, their stay had been of short dura¬ tion, and it was not until 1846 that one which still exists, was founded. This was the Dry Goods Economist, but though it began in the largest trade, it experienced much difficulty in attracting attention among either the buyers or sellers, and as conditions at that time were unfavorable to a journal of this character, it was not for a long time and only after a bitter struggle that it rested on firm ground.

These journals were soon afterward fol¬ lowed by those in the hardware and leather trades, known as the Shoe and Leather Re¬ porter and The Iron Age, both of which ex¬ perienced the same difficulties in gaining a foot¬ hold in the commercial world.

Meanwhile, the scientific field had been more successful as to the number of papers and periodicals published. The American Journal of Science was founded in New Haven, Conn.,

in 1818, by Professor Silliman, and the Jour¬ nal of the Franklin Institute , in Philadelphia, in 1825. About 1820 a law periodical was founded in New York, but legal journals did not become common until nearly 50 years later. Medical journals soon sprang up in New York,

Boston and Philadelphia, and are now to be found everywhere; a little later a journal was established treating of the drug trade. The Scientific American was founded in 1845 and since then many scientific or semi-scientific journals and various professional journals, not touching upon scientific subjects, have been started. By I860 there were about 20 trade papers and 50 other technical papers ; by 1872 this number had increased to 124 trade and 132 other technical papers, representing 41 different lines, in which religious, agricultural, educational and sporting journals were not included. See Advertising; American Pub¬ lishing; American Newspapers; American Printing Trade; Newspapers; Periodicals; Journalism; Printing; Printing Presses ; Books ; etc.

TRADE SCHOOLS. The differences in meaning between such words as vocational, in¬ dustrial, manual training, technical, trade, part- time, co-operative, continuation, apprenticeship and corporation are not always understood and the terms are frequently used as if they were interchangeable, consequently brief definitions are necessary before the subject of <(trade schools** can be satisfactorily treated.

V ocational education is an inclusive term for all forms of occupational training such as L iUStna ' a§Ticultural, commercial and house¬ hold arts. A vocational school has for its controlling purpose the fitting of students for use! ul occupations. The pupil must have leached the age when work papers can be secured and the courses are below college giade. T. he aim of such a school is to supple¬ ment general education and not to take the place of it.

Industrial education is used in a broad as well as in a restricted sense. The term covers all education connected with the industries such as the industrial and household arts of the elementary and secondary schools, technical and trade instruction for industrial workers 3IK J training in engineering schools. The term Industrial school is used at times in America to indicate instruction of a primary order which gives pupils one or more branches of industry in order that habits of work and thrift shall be inculcated. This form of school is often used for reclaiming young offenders from evil habits, or for dependent and neg¬ lected children.

A manual training school offers activities of a more or less trade-like character with the idea of developing or educating the individual, that hand and mind may be trained together and each help the other. The aim is not to give a wage-earning vocation. The general education m these schools has usually little relation to the trades and is carried further t lan is necessary or possible for the ordinary apprentice. In

some of the schools vocational elements are being introduced.

A technical school may be elementary in character or it may train engineers. The aim m both cases is to give theoretical and scientific

knowledge connected with a chosen occupation. It prepares the overseer or superintendent rather than the apprentice or worker. In its simplest form such use of tools or apparatus is taught as will show the connection of theory with practice. Handwork is given to explain the science rather than to fit a student directly for a trade. The highest development of this type of school is found in the great technical institutions where both the application of art to industry and the most thorough scientific training are provided. The Massachusetts In¬ stitute of Technology and the great German and American textile schools are examples. The night technical classes so numerous in Europe and America are adding trade features in order to be especially useful to workers who are be¬ yond 16 years of age, the aim being to pro¬ vide instruction directly related to the employ¬ ments. Many of the courses offered in the Young Men's Christian Associations are ex¬ amples. In England the polytechnic schools offer .ti*aining of this kind and public instruc¬ tion in America is rapidly meeting this same need. Industrial and household arts, science, drawing and forms of industrial arithmetic and English are offered to enable ambitious older workers to get ahead in their trades.

A trade school may be advanced or prepara¬ tory in character. The first offers several years of training for full apprenticeship or for journeyman. The Williamson Free School of Mechanical Trades in Philadelphia is such a school. A preparatory trade school offers short courses of from three months to a year to workers (from 14 to 16 years of age) who are entering trade. The Manhattan Trade School for Girls in New York City is a school of this order. Trade schools are founded to teach a sjEglc trade such as watchmaker or tailoring or they may offer a number of occupations. The simplest form is a workshop where the manipu¬ lation of some trade is taught which requires the expert use of tools. This kind does little for the development of the worker. An all— day trade school, such as The Manhattan Trade School for Girls, aims to give a preparation which shall abolish the drudgery and waste of reJ=ˆdar workroom and supply an economic and vital instruction. Actual shop methods are followed in all of the trades, practice occupies most of the eight-hour day, and industrial art as related to each trade, hygiene and social, civic and industrial teaching start the student well equipped for wage-earning. Part-time, co- ope> ative and continuation schools are used for trade instruction. The aim is to co-operate di- rectly with the

industry and train workers while they are wage-earning. The training may be given during the working day in the factory itself, the workers being paid and also given an education. Or the classes may be in a near-by school building, the students being allowed to leave their work for several hours per week. Salesmanship classes illustrate this form of training. Public instruction may be responsible for the teaching in both cases. Courses are given on subjects which are difficult to learn in the rush of the workroom. The exPˆriˆnce which the worker is gaining in the trade itself is thus supplemented by instruc- during the day for the younger workers and at night for the older ones. Technical

courses, general education, science, drawing and design, business arithmetic and English are frequently given. These schools are being organized in many States as laws are enacted making it compulsory for employers to allow workers between 14 and 16 years of age to at¬ tend such schools during the day, for five or more hours per week, without loss of wage. Germany has done much to develop the con¬ tinuation school during the day and at night. Apprenticeship and corporation schools have been organized by some of the railroads and great business enterprises for training their own employees. The work is of the part-time character and the workers are paid their full salaries. The aim is to increase the ability of the worker for his own sake as well as for the corporation.

This article deals with the trade school as it trains apprentices or journeymen, by day, or supplements their work in the regular trade by part-time classes by day or night. It deals with the wage-earner rather than with the overseer, superintendent and director. The textile and engineering schools and institutes of technology belong to the technical rather than the trade-school field and the instruction is usually of college grade. Some of them have special sections for apprentices, however. Many of the agricultural and mechanical col¬ leges in the United States have trade depart¬ ments but this work does not always lead to a degree. Drexel and Pratt institutes deal with trade courses in addition to their regular technical and normal aims. Regular all-day trade schools and part-time classes are not yet numerous all over the United States, therefore, other institutions are undertaking trade work to meet the demand of communities to help the workers.

Education for trade has for centuries re¬ ceived attention on the continent of Europe. Complete systems of industrial education have been developed in many countries, from the manual training of elementary and secondary education, through the trade and technical schools to higher engineering and scientific institutions. These schools are generally under government support and control. Within the last 50 years they have become increasingly important and are graduating competent work¬ ers for both men's and women's employments. The thoroughness of the courses in these con¬ tinental schools has rightly given them a high reputation. The length of the trade co'urses abroad is from three to five years, a fact due to some extent to the demand of the trade unions for a long period of apprenticeship. The United States has some trade schools offering a like preparation. Conditions of artisan life with us are so different that the foreign type of trade school does not altogether meet our needs. The aim here has been rather to give the trade work in as short a time as possible, often in only a few months. This course is frequently accomplished by considerable drill in the theory as well as in the practice of the trade. The New York Trade School offers in its day classes three to four months' prepara¬ tion in various building trades, a certificate of proficiency being issued on the completion of the work. European schools do not usually give such short courses as these. The Wilmerding School of Industrial Arts, for Building and

Architectural Drafting, the Lick School of Me¬ chanic Arts and the Lux School for Girls, all in San Francisco, and the Williamson School of Mechanical Trades in Philadelphia, correspond more nearly to the European model of thor¬ ough training for three or four years. In these schools the aim is to teach the trades with the science underlying them, together with thorough academic courses corresponding to our manual training high schools. The Manual Training High School of the United States surpasses anything of the kind abroad and is a distinctly American type. It does not aim, however, to give trade instruction, and hence the William¬ son and the three California schools are not strictly manual training schools.

The value of trade schools has been recog¬ nized by foreign governments and they not only control, but also support or subsidize them. The war has temporarily interfered with this instruction in the warring countries, but as peace is established the work will continue. The trade schools already organized witfi- us often began under private management but passed into public control, as with The Man¬ hattan Trade School for Girls in New York and the Boston Trade School.

Germany has been foremost in developing trade instruction to supplement shop experience. The poverty of the workers there, as well as here, forces them early into the shops to earn a living. In order to help these workers to obtain better positions and better salaries, spe¬ cial day, evening or Sunday instruction has been arranged in the Continuation Schools (Fort- bildungschulen). Each German state has made a study of the best way to help its different trade workers. These schools have been so satisfactory that they have not only developed all over the empire, but also in other countries. In Germany they are preferred to the all-day trade school. Belgium and France are re¬ nowned for their day trade schools; Austria and Hungary have unusually complete systems of trade instruction, and Switzerland and Italy also provide carefully for this class of educa¬ tion. For 35 years Russia has had trade schools to train the workmen in various fields. Eng¬ land's well-organized technical instruction in¬ cludes trade work also.

Germany.

The awakening of Germany to the import¬ ance of training her wage-earners took place about the time of the Centenntial Exhibition in Philadelphia in 1876, which showed Germany's products to be distinctly inferior to those of other continental countries. The French Ex¬ position of 1878 still further manifested the lack of art in Germany's manufactured goods, and a commission was appointed to investigate reasons and to suggest action. The result of the work of this commission is now seen in the systems of trade and technical schools which have been organized, and in the reputa¬ tion which Germany now has for the applica¬ tion of science to industry. These schools have been great factors in this change. The German section in the Saint Louis Exposition of 1904 gave evidence that not only in the con¬ nection of science with, but also in the applica¬ tion of art to industry, that country has pushed to the front and now takes rank with or even

excels those nations which have in the past con¬ trolled the industrial field. Germany has be¬ come thoroughly imbued with the idea that money devoted to trade instruction is wisely spent. The earnest study which she has given to the subject has shown her the problem in its complexity and difficulty. The solution has been varied to suit the needs of different locali¬ ties and also of all classes of workers from

the wage-earners of small skill to the directors of great industries. A satisfactory interrelation between workers, employers and schools has been the aim as well as social efficiency.

These schools have been founded and are supported in various ways : by the state, by the municipality, by the commune, by the trade guilds, by associations of workers and by private individuals. There is a marked tend¬ ency, however, for the governments of the German states to assume the entire control and administration. Small tuition fees are fre¬ quently charged. In some of the great technical or technological institutes gratuitous instruction is offered to apprentices, but a fee is required of those who wish to study for more advanced positions. The tuition fees, however, cover but a small part of the expenses.

Germany is giving attention to the training of apprentices for trade in many classes of institutions. Different sections of the republic vary in their way of meeting the problems. The following kinds of institutions are repre¬ sentative: Trade Continuation (Fortbildung- schulen) and Industrial Continuation Schools (Gewerbliche Fortbildungschulen) ; Trade Schools (Fachschulen) ; Industrial Drawing Courses ; large technical schools, with sections for apprentices; apprentice workshops (Lehr- werkstatten).

Of these the Continuation Schools , generally conducted by trade guilds, are by far the most popular for training the ordinary wage-earner. General education is compulsory in Germany up to the 14th year. After this time a majority of the children of the laboring class must begin to work to contribute to the support of their families. The continuation schools are formed to aid those of both sexes who are forced to work, their object being to supplement the trade in which the worker is daily employed. In industrial centres the curriculum is con¬ nected with the trades of the locality. In other sections, the character of the instruction may be general, commercial or even agricultural, as the need is felt. The courses deal more with the theoretical part of the work than with the ac¬ tual manipulation of tools. The aim is to give such instruction as the worker cannot well get in the shops. It correlates with the daily shop work and thus aids the workers with the great¬ est economy, as the students are productively employed and expensive laboratories and shops are not necessary.

The beneficial effect of these continuation schools on the development of industry and on the condition of the working class has been felt so keenly that the imperial government has pro¬ vided by law that employers must always per¬ mit their employees under 18 years of

age to attend such schools. The state has made this education compulsory, it being felt that all em¬ ployees should have an education which will enable them to better understand the nature of their trade. It often happens that these busy

day workers are too tired when night comes to benefit by such instruction, and week day and Sunday classes have, therefore, been opened.

The continuation schools found in Prussia give instruction of a general character, but they emphasize drawing, bookkeeping and such branches as are likely to be of value to those engaged in shop or factory work. For girls they add embroidery, dressmaking, sewing, iron¬ ing, millinery, mending and cooking. In Ba¬ varia the work of the industrial continuation schools is so specialized for individual trades or groups of trades that they are really trade con¬ tinuation schools. Dr. Kerschensteiner, the schulrat of Munich, has been a force in de¬ veloping continuation and trade schools in Munich and throughout Bavaria. His aim is always to make the students understand the materials on which they are working and to develop in them thought and wise action. It is said that 56 trades are taught in the schools there.

The trade continuation and trade schools proper usually differ from the industrial contin¬ uation school in giving more specialized trade instruction. An illustration of continuation work for boys is the Artisan School, No. 1, in Berlin. The aim is to “give to apprentices and workmen, especially during their leisure hours, a knowledge of drawing and the applied sciences and arts which concern their respec¬ tive trades and which serve as the necessary complement to their shop practice.® All of the drawing, mathematics and sciences are special¬ ized in separate courses directly adapted to some trade. The hours of instruction are in the afternoon and evening of week days and on Sunday morning. All-day courses in trades are also given at this school.

Trade Schools with all-day work in a single trade are numerous, but are not always largely attended. Schools of watchmaking, basketmak¬ ing, cabinetmaking, horseshoeing, toymaking and other trades have been opened in response to local needs. The following is a partial list of the occupations provided for in the trade schools : Artistic darners, artificial flower-

makers, bakers, barbers, basketmakers, black¬ smiths, braziers, bookbinders, cabinetmakers, chimney sweeps, cooks, carpenters,

confection¬ ers, dressmakers, dyers, embroiderers (hand and machine), engravers, gardeners, garment makers, glaziers, goldsmiths, horseshoers, hair¬ dressers, handsewers, ironworkers, joiners, knit¬ ters, lacemakers, leatherworkers, locksmiths, laundresses, masons, modelers, machinesewers, menders, milliners, paperhangers, painters, pho¬ tographers, potters, printers, rugmakers, sad¬ dlers, spinners, stonecutters, stuccoworkers, strawplaiters, shoemakers, tinsmiths, tailors, trunkmakers, woodworkers and carvers, weav¬ ers, wickerworkers, watch- and clockmakers, wagonmakers, wheelwrights.

Trade work for girls in Germany is not as extensively developed as that for boys. The sentiment of the German people, that woman's place is in the home, has caused these institu¬ tions to combine strong housekeeping features with the trades. These housekeeping-trade schools are doing excellent work, but the trade continuation schools organized for women are of more general importance in training for defi¬ nite trades. Most of these schools offer three distinct fields to women: (1) The commercial

subjects, which prepare for clerkships or secre¬ tarial work, training stenographers, typewriters, etc. ; (2) the domestic industries such as house¬ keeping, cookery, needlework, repairing and ironing, and (3) special trades for women, such as dressmaking, millinery, white work, art needlework, designing, bookbinding, composing and photography. In Berlin the nine municipal continuation schools for girls maintained by the city, and the Victoria Continuation School maintained by private funds, are typical schools of this character. They offer day as well as night work. The Women's Work Schools (Frauenarbeitsschulen) found in many cities, notably in Nuremberg, Bavaria and Reutlingen, Wurtemberg, are day trade schools as is also the Potsdam Trade School for Girls.

The Lette Society of Berlin has done much to foster trade instruction for girls. The aim of the society is the improving of the working class by (1) the removal of obstacles and preju¬ dices in the way of female employment; (2) the fostering of commercial and industrial edu¬ cation; (3) the furnishing information for op¬ portunities for learning trades and securing situations and help where existing institutions are inadequate ; (4) the establishment of ex¬ changes for the exhibition and sale of women's handwork; (5) the protection of women against harm, morally or otherwise, especially regarding lodging houses. This

society has opened a number of different kinds of schools. The trade courses range from four to six months of all-day work.

The Schools and Courses of Industrial Drawing and Art have made their curricula so practical that they adapt themselves directly to the various trades. There are also, in many instances, workshops in connection with these art schools, in order that the student may have practical experience of the value of his designs and plans. The building and textile trades and such art industries as the making of jewelry, metal and wood working, engraving, gold and silversmithing, painting on glass and china, orna¬ mental designing and decorative painting, are especially considered in these schools.

Elaborately developed systems of special Technical Schools provide for all grades of positions in the building and textile .trades. They touch to a small degree the problem of training an apprentice. These great day schools have been very successful. Over 50 of them are to be found for the building trades, and Prussia alone has eight for the textile trades. There are three grades of labor in the building trades: (1) architects; (2) those who execute the architect's plans, and (3) the workmen. The evening continuation school sometimes pro¬ vides for the lowest grade, and at other times the building trades school offers a special sec¬ tion. The textile trades have also three grades, and weaving workshops are provided for the apprentices, either in all-day work, or in even¬ ing and Sunday classes. In some of the textile schools women are admitted, the one at Aix-la- Chapelle offering an elaborate course of textile darning, the girls being paid wages according to the value of their work. The School of Tex¬ tile Art in Plauen, Saxony, has also a depart¬ ment for women. Instruction in embroidery and the making of lingerie is given, the aim being to train superintendents of workrooms.

Apprentice Workshops are organized both in connection with public trade schools and as pri¬ vate institutions. They aim at a more compre¬ hensive and systematic training than can be ob¬ tained in the ordinary shop. The Krupp Steel Works at Essen offer a complete course of apprenticeship.

Itinerant Trade Courses are also provided in such industries as weaving, garment cutting, embroidery, machine work, straw plaiting and bookkeeping. These courses have been benefi¬ cial in small towns where there are cottage in¬ dustries.

The effort of organized labor to preserve handwork and the small trades has been of vast service in Germany in the development of

trade schools. The various trade guilds have dealt carefully with the subject of apprenticeship and have been untiring in their efforts to have fa¬ vorable conditions attend such instruction.

Belgium.

Education is not compulsory in Belgium, but the schools are well attended. The primary school is followed by an excellent system of trade education for both sexes. In many par¬ ticulars the schools are similar to those in the neighboring countries, but they also present characteristic features. For boys the element¬ ary trade schools are followed by superior trade and technical schools, and those again by the great technological institutions.

Trade-instruction is carried on in the indus¬ trial schools (ecoles industrielles) and in the trade schools (ecoles professionelles). The first gives theoretical instruction in industrial operations with practical courses in design. The second gives trade work combined with theoretical instruction, has all-day sessions, and is the trade school proper, although many of the ecoles industrielles have trade sections.

Trade training of an elementary grade is given in the following institutions: — For boys: Industrial schools, trade schools, Saint Luke trade schools, apprentice shops, trade courses. For girls: Trade schools (including trade schools proper, trade and housekeeping schools, housekeeping and trade schools), trade courses, apprentice shops.

The length of the courses in the trade school proper is from three to five years. The trade schools for girls were organized before those for boys. They offer the most advanced form of trade education for girls. The industrial school is the largest and most important class of institution in Belgium for the training of young men. As these latter schools are supple¬ mentary to the trade and do not give regular trade instruction, and as their courses are given at hours when workmen can attend, they resem¬ ble the continuation schools of Germany. The number of these schools is rapidly increasing.

Trade instruction in Belgium is justly re¬ nowned for certain features: (1) The excellent system of economical administration and wise supervision; (2) the thoroughness of its instruc¬ tion in general education applied to the various trades and also in the teaching of the trades; (3) the importance of art in all of the schools and the practical use made of it in designing in each of the trades; (4) the adaptation of all of the trade work to local needs.

The trade schools are with few exceptions

under government control, although no general law governs their* formation. Schools have been established by communes (ecoles commu- nales), by private individuals (ecoles fibres), and by provinces (ecoles provinciales). Com¬ plete liberty of organization is allowed to local authorities or to private individuals, in order that the schools may be adapted to local needs. This freedom has made these schools really local institutions, conforming to no uniform model. A system of subsidizing them has been devised. A certain sum of money is voted an¬ nually for this purpose, and placed at the dis¬ posal of the minister of industry and labor. When the schools desire a portion of this ap¬ propriation they must submit a formal applica¬ tion, accompanied by details of their work which will enable the ministry to judge if the school should receive assistance.

The government exercises regular supervi¬ sion over schools receiving the subsidy. Each year they must send to the ministry for ap¬ proval of their accounts, their budgets for the ensuing year, and any changes in their organiza¬ tion or in their programs. The supervision of these schools is most efficient. An inspector- general of industrial and trade education is at the head, and under him is an expert corps of inspectors. Inspections are also made by such provincial or communal authorities as aid in the support. Religious bodies, industrial organiza¬ tion and private individuals also help these schools. Some of the schools give free instruc¬ tion, some require an entrance fee, and others charge for tuition.. Students who are too poor to pay for instruction or to attend even when it is free are aided in various ways.

The difference between a manual training and a trade course is very marked in Belgium. The trade schools may differ in characteristics, but they all keep strictly in view the fact that they are preparing students to earn a living in some particular branch of industry. Drawing and industrial design are at the base of all in¬ struction for girls as well as for boys, and are taught with reference to their use in particular trades. A practical general education is also considered a necessary part of the instruction in the trade, and usually occupies the first half of the day. Libraries, museums, collections of scientific apparatus for demonstration, public exhibitions, and provision for traveling schol¬ arships are means used to develop the highest efforts of students.

The provision made for teaching girls is very thorough.. The Trade Schools proper (ecoles professionnelles) have programs in theoretical as well as in practical work. There are at least 50 of them in the kingdom. The aim is to teach such trades as are open to girls, and at the same time to carry forward the reg¬ ular school education. The trades taught are dressmaking and cutting, waistcoat- and corset¬ making, fine lingerie, millinery, artificial flower¬ making, industrial drawing and ornamentation, embroidery, designing for lace and embroidery, and painting on glass, china or silk. Commer¬ cial courses are also given. The general course, which is compulsory, includes the French and Flemish languages, arithmetic, history, geog¬ raphy, hygiene and domestic economy, writing, drawing, singing and gymnastics. The instruc¬ tion is excellent and has been especially adapted

to the trades and to the needs of women in their households. A high place is given to domestic economy in Belgium. Its full development is in the housekeeping schools (ecoles menageres), but some of it is required in the trade schools also. The trade courses for girls vary in dif¬ ferent schools according to the needs. The length of the course is usually three or four years, but five years are sometimes required.

. The pioneer trade school for girls in Bel¬ gium is the Bishoffsheim, 94 Rue de Marais, Brussels, established in 1865. The age of en¬ trance is 12 years, and the length of the course is four years. The trade courses are numerous and well taught. The courses in drawing, in¬ cluding designing for lace embroidery and gar¬ ment decoration, painting on glass, porcelain, china, fans and textiles, and the dressmaking and the artificial flowermaking are especially notable. The reception room at this school is decorated with fine examples of porcelain tiles and china painting, and the windows are of stained glass, this work all having been done by graduate students. The Communal Trade School for Girls on the Rue du President, Brussels, is noted for the fact that each of the trade instructors is also the teacher of the course in design in connection with the trade. The course in embroidery and applied design is especially fine. Another Brussels communal school on the Rue du Poinqon, 26, noted for its dressmaking and commercial courses, and the Antwerp School, Rue des Architects, with its five-year courses in some of the trades, are also examples of the excellent professional training for girls in Belgium.

An advanced trade course of one year for dress designers, dressmakers and intending teachers in trade schools is given in Brussels, a study of the evolution of dress in all countries being a notable part of the work.

The ' Trade-Housekeeping Schools (ecoles professionnelles-menageres) and the housekeep- mg-trade schools (ecoles menageres-profession- nelles) are also giving more or less time to trade work.

. Apprentice Shops for teaching trade work to gnds are not numerous, but are doing good work. They were opened in response to local needs rather than as a part of regular trade instruction. One of their distinguishing fea¬ tures is that the students after a time receive financial remuneration for their work There are several of these schools, as the one at Bas- senge for straw plaiting and straw-hatmaking:

Jeme“e *or lingerie and dressmaking; at Maldeghem for hand and machine embroidery and crochet work on tulle, and at Saint Trond tor lacemaking.

The Industrial Schools (ecoles industrielles) for boys are similar to the continuation schools of Germany. They are very numerous in all parts of the country and have been organized with reference to local needs. They teach a large number of technical subjects connected with the trades which the boys follow during ˆ u i Some of these are also day trade schools and have advanced as well as elemen- ˆry work. The school at Verviers is an exam¬ ple, the aim being to give a training to the workmen who are employed in the numerous industries in that city, including the departments of mechanics and construction, dyeing and

weaving. The Industrial School* at Tournay, which is one of the oldest and most important in Belgium, also partakes of the nature of a trade school. It has no shops of its own, but it has entered into contract with local manufac¬ turers to direct the pupils’ practical education. This is an excellent method of combining theo¬ retical with practical instruction. The school gives its theoretical instruction in the early morn¬ ing or in the late afternoon. The Industrial School of Morlanwelz has departments of min¬ ing, building construction, engineering, electric¬ ity, shop technology and mechanical drafting. The organization of the school population, the equipment, the excellence of the instruction and the ability of the teaching force make this school a power in the kingdom. The age of the students entering is from below 14 to over 20. The schools of Ghent, Seraing, Chatelet, Char¬ leroi, La Louviere and many other cities are adapting

themselves to local industrial condi¬ tions and are doing good work. Certain work in the industrial schools is also open to girls, but, with the exception of the commercial courses, they are not well attended.

The Trade School proper for boys is also well developed. Under this head are the day trade schools (for teaching actual trades), the trade continuation schools (for supplementing the day shop work), and the trade schools of fishing. Some of the day trade schools teach but one specific trade, while a number of trades are taught at other schools. An illustration of the first class is the Brussels Trade School of Tail¬ oring. A four years' course is offered. The leading tailoring houses of the city show their interest in this school by contributing to its sup¬ port, supplying it with order work and helping to place the graduates. The students pay a small entrance and tuition fee. They are paid a small sum for their work, and this money is placed in the state savings bank and given to the student when he completes his apprentice¬ ship, but if he leaves the school before that time he loses the right to the money. The Gun Makers School at Liege for making arms was originally begun by the manufacturers but is now conducted by a committee composed of labor men, city officials and manufacturers. The school is open day and night.

The H. Nicaise Trade School of Metal- and Woodworking at Ghent is an illustration of the class of school offering instruction in several trades.

Jewelry work, chasing, upholstery, furnish¬ ing, printing and many other trades are taught in evening or in Sunday morning continuation classes. The trade schools for fishing are placed at the seaports.

The Saint Luke Trade Schools are similar both to the day trade school and to the trade continuation school. They aim particularly to train for artistic branches of the handicraft trades. They were established by the Roman Catholics. The school at Schaerbeek, Brussels, is an illustration of this class of trade school.

Apprenticeship Shops have been organized for weaving and stone cutting and are doing successful work.

France.

France began to plan and legislate, for the training of her handworkers centuries ago.

The forerunner of the trade school began in 1799, but the. great development of the subject has been during the last quarter of a

century, following the French Exposition of 1878. The number of such schools receiving help from the government increased from 48 in 1880 to 292 in 1904. France appreciates that her industrial success depends on the education of her work¬ men, hence the government takes a direct part in developing the system of trade instruction. Schools are provided to teach all grades of workers from the semi-skilled artisan in the ordinary trades to the engineer for the more ad¬ vanced scientific and technical work. Trade training is always founded directly on primary education, design is considered fundamental and a large amount of shop work of a practical nature is given.

Manual apprenticeship schools have been organized to give boys instruction in their chosen industry or to fit them for the secondary technical schools. There are four national trade schools (ecoles nationales profession- nelles), situated at Armentieres, Nantes, Vier-zon and Voiron, and 32 practical commercial and industrial schools (ecoles pratiques de commerce et d'industrie), 26 for boys which are situated in various parts of France, and six for girls at Boulogne-sur-Mer, Havre, Marseilles, Nantes, Rouen and Saint Etienne. In addition to these, the municipalities of important cities have established schools for the elementary teaching of trades, industries and arts. Reli¬ gious bodies, societies, business enterprises and private individuals, encouraged by the success of the national and municipal schools, have like¬ wise organized instruction for the improvement of the artisan.

Government control requires that the schools receiving subsidies should all conform to certain requirements. The Practical School of Indus¬ try at Saint Etienne (ecole pratique d'indus¬ trie) may be taken as a type of these institu¬ tions. The trades of weaving, modeling in wood, machine fitting, cabinetmaking, electricity and gunmaking are taught here. The work is on an elaborate scale, the course being four years in length. The first year is preparatory and completes the student's primary education while also giving him shop practice of various kinds to discover his aptitude for any trade. During the next three years he studies his trade practically and theoretically, and continues his general education which is closely adapted to his trade needs. Here, as in other schools, much emphasis is laid upon the study of art.

The greatest and most progressive system of municipal trade schools is in Paris. The Diderot School was the first one organized, hav¬ ing been established in 1872 for wood and metal work. The courses are three years in length, entrance being by examination. Practical work occupies the greater part of the day, but consid¬ erable time is given

to drawing and theoretical instruction. By an ingenious arrangement a first-year student is put between a second and third year student that he may profit by their experience. Apprenticeship is made less of a tax on the city from the fact that the products of the classes are sold. The Boulle School trains skilled artisans and mechanics in wood and metal. The furniture construction is justly noted. The products are artistic as design is

especially emphasized. The course is five years in length, primary academic instruction, trade work, technical art and a scientific course being included in its curriculum. Schools of printing and publishing, applied physics and chemistry, industrial art and industrial drawing are also supported by the municipality of Paris.

. There are six municipal trade schools for girls in Paris. The instruction includes art, academic work and the chosen trade, and the courses are either three or four years in length. The trades taught are similar to those in Bel¬ gian trade schools for girls. The aim is to educate for a trade, to develop the intelligence of the workers, and to teach them to be self- reliant and resourceful. The French schools execute practical order work in their depart¬ ments, and every trade school in Paris has its clientele. The model for these municipal schools is the private school begun in 1864 by Elisa Lemonnier. There are two of the Lemon- nier schools in Paris at the present time. They offer courses of four or five years in length.

The training for girls in the practical schools of commerce and industry (mentioned above) is similar to that offered in the Paris municipal schools. Schools are also organized which offer both home-making and trade. These are well patronized as many women de¬ sire both subjects.

United States.

The United States had not many ex¬ amples of the all-day trade school until re¬ cent years, for her problems of national development had taken her full time. The beginnings were usually under private control — illustrations being the New York Trade School for Boys and the Manhattan Trade School for Girls. The subjects of instruction at the for¬ mer are the various building trades such as carpentry, bricklaying, sheet metal and cornice work, electrical work, house and

fresco paint- mg, plumbing, steam and hot water fitting, sign painting, plastering, blacksmithing and printing It was founded in 1881 by the late Col. Richard T. Auchmuty, who originated the system of instruction. It includes the theoretical as well as the practical branches of the trade. The courses are made as short as possible — usually about four months for the day classes, which provide trades for younger men. The night courses aim to give additional skill to those already in the trade. The students come from all over the United States, and several thousand have received the certificate and twice as many more have been enrolled. It is claimed that this school has greatly helped the building trades and also has raised the standard of in¬ telligence and efficiency in the working class The Baron de Hirsch Trade School, also in New York city, offers similar trade training.

The Williamson Free School of Mechanical .trades, near Philadelphia, is a different type of trade school. The course is three years in length and the school term extends throughout the year. The pupils are regularly indentured as apprentices and live at the school. Scholas- ˆ1C eˆamin.ations are required for admission, and theie is no charge for board, clothing or instruction. The trades taught are carpenter¬ ing bricklaying, including range, furnace and boiler setting, and the machine trade in all of

its usual details, patternmaking, steam and electrical engineering and steam fitting. Each student takes but one of the trades named, and his instruction in mechanical and freehand drawing is in the direction of his particular trade. The academic work continues through¬ out the three years, and special attention is given to ethical training that the pupils may be good citizens as well as good mechanics. It can accommodate but one-fifth of those desiring ad¬ mission. There are three notable trade schools in San Francisco. The Wilmerding School of Industrial Arts trains for the building trades, the Lux School offers girls home-making and wage-earning courses and the Lick School of Mechanic Arts gives the metal trades. All three schools are under the same principal though financially independent. There is no charge for tuition, use of tools, instruments or materials. The courses cover four years and the aim is to send intelligent citizens as well as well-instructed workmen into the trade. Grad¬ uate courses are also given. The schools are built on adjacent lots and the students can use the shops of either institution. They are free> and the latter school is open to both sexes. A competitive examination is held for entrance at the School of Mechanical Arts. A preliminary course of more than two years in general education and manual training is followed by the selection of some trade and apprenticeship in it. The school aims to solve a general problem of teaching various trades as an integral part

of education, rather than to meet some special need of the community.

The Wentworth Institute in Boston trains for various skilled mechanical trades in both day and night classes. Like other schools of its type it was of great service in training men for war occupations during 1917 and 1918.

The Carnegie Technical Schools of Pitts¬ burgh offer trade work on a large scale to both sexes as a part of a huge plan of technical in¬ struction. The School for Apprentices and Journeymen gives classes for those already at work. The instruction is both theoretical and practical, with the object of turning out skilled mechanics The Margaret Morrison School for Women offers training in home-making and also in wage-earning pursuits.

The Manhattan Trade School for Girls in New York city is a short-time all-day prepar¬ atory trade school. It trains for skilled trade work. It is a pioneer school in this class of education and was begun in 1902 under private

ˆ°ntimA paˆs,ing !nto the Public school system in 1910. 1 he aim is to shorten the period

of apprenticeship of those girls who leave the public schools to go to work, and to create in them an appreciation of the meaning and value of their trade and its relation to the work of the world. The school is open throughout the year, students may enter at any tune, are on probation for a time, and each is advanced according to her ability, hence there is no definite length of course ; experience has s lown that it may be anywhere between six months and two years. The trades offered are : (1)1 hose which centre about the needle such as dressmaking and millinery; (2) those that use foot-power and electric-power machines, including such machines as those for embroid¬ ery, hemstitching and buttonholes; (3) those

that depend on the expert use of paste or glue, such as labeling, sample mounting, pocket-book and card-casemaking, library outfits, blank book covers, and novelty boxmaking. Practical aca¬ demic work, as well as drawing and color, are also taught, but always with an eye single to their bearing on the needs of each trade. A cer¬ tificate is given only after a girl has been tested in a position and has shown her proficiency and also a good spirit in the workroom. The

tui¬ tion is free, and in especially deserving cases some financial aid may be given to pupils. The school has the cordial support of some of the foremost philanthropists, trade unionists, social workers and employers of labor of New York city. The Boston Trade School follows closely the plan of the Manhattan Trade School for Girls. It was begun in 1904 and taken over by the city in 1908. Similar trade schools for girls adapted to their communities are found in other cities, Worcester, Massachusetts and Milwau¬ kee, Wisconsin, being especially notable.

Schools for specific trades are to be found all over the United States. The Brewers' Schools of New York, Chicago and Milwaukee; the Schools of Watchmaking and Repairing in Waltham, Mass., and at the Bradley Polytchnic in Peoria, Ill., and the Barbers' Schools in Nebraska and other States are instances. Ship¬ building, photography, linotype and many other trades are taught in this class of school.

Business enterprises have also opened trade schools. Many of the institutes for dress¬ making, so numerous in the large cities, were organized by some firm to teach a special sys¬ tem of drafting patterns.

The Apprenticeship or Corporation School is also found, being represented by such instruc¬ tion as is given their workmen by the school of Messrs. R. Hoe and Company, manufacturers of printing presses, and the Carriage Builders' National Association (both in New York city), the Ladies' Home Journal, Philadelphia, the General Electric Company, at West Lynn, Mass., and great railroads, such as the New York Central and the Atchison, Topeka and Santa Fe.

Night classes for teaching trades are to be found in connection with the work of social and religious bodies. The Saint George's Trade School of New York city belongs to this class. The Catholic Protectory, near New York city, is teaching numerous trades for both sexes as a part of its scheme of reformation, and simi¬ lar work is done in other institutions of this character.

Trade or technical teaching, in institu¬ tions with other educational aims is found fre¬ quently. The pressure to introduce this work has been so great that trade classes have been offered in a variety of places, some of them receiving State or Federal aid. Much of the instruction is of a supplementary character, to take the place of apprenticeship. The technical features are usually more prominent than the special shop practice. Pratt Institute, Brooklyn, offers classes which resemble those of the trade continuation schools. The

fundamental aim of the institute is for ˆindustrial and technical in¬ struction, }) but it has responded to the call for trade training and has opened night classes to fit boys for carpentering, machine work, plumb¬ ing and fresco painting. Trade classes for girls

are also given. The technical classes are justly noted, but they do not aim to prepare ap¬ prentices for the trade. The Drexel and Spring Garden institutes in Philadelphia, the Me¬ chanics Institute in Rochester, the Hebrew Technical institutes for both sexes and the Clara de Hirsch Home in Ne\y York city and the Christian associations are instances of in¬ stitutions with other aims giving attention to trade instruction.

The great schools for the colored people and Indians have been foremost in inaugurating trade education as an adjunct to their academic or normal aims. The Hampton Normal and Agricultural Institute in Virginia, the Tuskegee Normal and Industrial Institute and the Agri¬ cultural and Mechanics College in Greensboro, N. C., are examples of these schools. They have developed for both sexes almost all of the leading trades. The work is given in the most practical manner, as the shops are for produc¬ tive industries and not alone for theoretical instruction. Trade teaching in these schools has been placed on a high ground and the re¬ sults have justified the wisdom of the methods chosen.

Continuation, co-operative and part-time classes are increasing in number, Massachusetts, New York, Wisconsin and Indiana have been foremost in enacting laws to further vocational education and have organized various forms of trade classes to help their working people. Other States are following rapidly. Depart¬ ment stores are using the continuation schools for training their sales-people and are also organizing part-time classes in their own build¬ ings. In Massachusetts the trade schools in Beverly and Fitchburg have begun an inter¬ relation with the industries in their towns and the school in part-time instruction. Prevo- cational work in the later grades of the school is rapidly increasing and serves to guide young workers into occupations suited to their ability, thus preparing them for entering trade or tak¬ ing further training at a school.

The passing of the Federal bill for voca¬ tional education gave a great impetus to train¬ ing boys and girls below college grade for trades and industries. The aim of the meas¬ ure, stated tersely, is to promote training in agriculture, trades, industries and home eco¬ nomics, and also to train teachers for voca¬ tional positions. The Federal board is also au¬ thorized to make investigations and to send out reports. It

supervises and controls the work it assists, and works in connection with the State boards — the Federal and State boards acting as an agent. During the European War (by spe¬ cial legislation) it prepared men for various branches of war work and is still giving train¬ ing to disabled soldiers, sailors and marines.

Austria.

The Austrian government has developed an exceptionally logical system of trade instruction for both sexes. The legislation in regard to fostering handicrafts has been similar to that taking place in Germany and has had a great effect on the development of trade training. The schools of all grades are carefully classi¬ fied and grouped. The elementary education for trade is given in schools for particular trades and in the industrial continuation schools.

Another group, known as the Central Indus¬ trial Educational Institutions, which are most of them in Vienna, have for their function the promotion of industrial education and to serve as models for other schools of the empire. Some of these schools offer both a lower and a higher trade education in connection with their other important lines of investigation.

The Schools for Particular Trades are very numerous. There were about 100 state schools and more than half that number of pri¬ vate or state subscribed schools in the report of 1899. Important examples of this class are the schools for. lace work and hand and machine embroidery. in Dornbirn and Laybach ; for weav¬ ing *n i Rˆhenberg, Vienna, Schonberg and \ arnsdorf ; for wood, iron and stone work in Bergreichenstein, Bozen, Chrudim, Bruck aus der Mur and Laas; for earthenware and glass- work at Teplitz and Oberlentensdorf ; for metal work in IClagenfurth, Swiatniki and Nixdorf and for other trades in Gablonz, Turnau and Karlstein.

The Industrial and - Trade Continuation Schools are also extensively developed and are similar to the German ones of the same name. They have reached their highest development in Vienna. A great central school enrolls about 8,000 pupils. The school is open for 10 months, six days a week. The work is com¬ pulsory for four years for both sexes. A watch and clock making all-day school is in the same building.

Switzerland.

The Swiss are an industrious and practical people and their schools show the national characteristics. This country has the distinc¬ tion of having provided the model for the first French trade school. As early as 1599 Saint Francis de Sales conducted a school which maintained an industrial section. The Duke de la Rochefoucauld, while traveling in Switzer¬ land, heard of the school, and, at his own ex¬ pense, founded a similar one in France, which later became a National School of Arts and Trades.

The Federal government has developed an excellent system of subsidizing and supervising trade schools. The continuation school is the favorite, and they are similar in character to those of Germany, though the special trade fea- tuies are not so well developed. They are found in all of the cantons and are for both sexes.

The Industrial Art Schools are giving train¬ ing to apprentices in the trade, as well as ad¬ vanced instruction. The cantonal School of In¬ dustrial Arts at Geneva, devoted purely to the art industries, and the Trade and Industrial Art School in Bern, combining other industries with its art work, are examples. Certain classes in both .of these schools are open to women.

The Trade Schools proper cover a wide field of occupations. Of those teaching a simple trade, the watchmaking schools are the most numerous. Woodworking, embroidery and weaving schools are also characteristic of Switzerland. Many of the schools teach sev¬ eral trades. The course is usually three years in length, and includes such art and academic work as is felt to be necessary for the under-

»

standing, of the trade. These schools have had for their models the German, Belgian and French institutions of a similar character. The art work is generally less notable, however. The cantons of Appenzell, Bern, Geneva, Neuchatel, Saint Gall, Soleure and Zurich have successful trade schools as well as apprentice shops.

Trade instruction for women is also well developed. Many of the trade schools include the housekeeping element as is the case in Germany, Belgium and France. The Trade and Housekeeping School (ecole profession- nelle-menagere) in Geneva offers a three-year course. . The work produced resembles the brench in precision of technique and beauty of execution, but has, perhaps, less artistic value. Of the trade

schools proper a good example is the school for ladies' tailoring and lingerie making at Zurich. Pupils must be over 14 years of age and present certificates showing a good general education. Courses of three or four years are offered, which include practical work at the chosen trade, theoretical instruction concerning it, auxiliary academic subjects, drawing and drafting and at least six months service in a salesroom connected with the school. The Bern Women's Hand¬ work School (Frauenarbeitsschule) also gives trade training, but does not at present include art or academic work in its curriculum. i Schools for housekeepers and servants have been developed in Switzerland and give excel- lent cours9s of several months' duration. All. of the ordinary work of housekeeping, cooking baking, preserving, serving, cleaning, sewing repairing, washing, ironing, gardening, sweep¬ ing and putting rooms in order is included in the course. An effort to lengthen the time of training is being made. Lenzburg, Bern and Bomswil have good schools of this class

. TPe- ,Swiss trade sch˚o1 is felt to have a beneficial effect on the working man and woman

as well as on. the industries, and is favored by the labor unions. Although the schools have not cieated new industries, they have been the means of developing many. The schools of wciod-carving have done much to improve this trade, and machine embroidery has been through the schools, brought prominently for¬ ward The products of this industry are largely exported to the United States

The trade school proper was not de¬ veloped to as great an extent in England as on the Continent. Although technical educa¬ tion has received attention, there have been until recently but few instances where the day schools . aimed to take the place of actual apprenticeship. This was due largely to the Education Act of 1889, which forbade the practme of any trade, industry or employment in the schools. The education acts later took a more favorable attitude toward trade in¬ struction, and government aid can now be given for fostering such schools. They are rapidly increasing.

Supplementary trade work is largely offered in the night continuation classes, which resemble those of Germany, and attract large numbers of s udents. There are 4,000 of these classes in London alone^ Mr. Robert Blair, of the Mosely Educational Commission, says in his report on

TRADE UNIONS

technical education in the United States : ((We are in the main trying to do in one institution — the evening school — * what Germans and Americans are in the main endeavoring to do in two.® The night classes are open to both sexes. Girls do not take much advantage of them, however, for the reason that nine or 10 hours of work during the day leave but little energy for resuming workshop practice.

Although the polytechnics have done much for the industries, it is only of late years that they have fostered real trade instruction in the day classes. Such instruction, however, has recently been increasing. A late report gives the number of day trade students in or near London as 5,800. These are provided for in 35 well-equipped workrooms (principally in the polytechnics) in which 200 courses are given bearing on 53 different trades. The evening classes are doing a fine work in training older workers for better positions. Day preparatory trade schools are being organized. Engineers of high rank are urging educational facilities for apprentices, workmen and experts equal to those offered on the Continent of Europe.

Trade training for girls has not been greatly encouraged by the working class. The germ of it has been in the excellent domestic economy schools. The Women's Industrial Council of London is doing much to foster trade schools for girls as a part of education. The London County Council has opened an All-Day Trade School of the preapprenticeship type. It began under private control but was taken over by the city in 1907. A girl can enter at 14 and remain two years. A day continuation school has also been opened for girls at work. The Borough Polytechnic in London opened in 1904 Day Trade Waistcoat-Making School for Girls, and other polytechnics have followed the example. General education, art and domestic science are included in the one-year course. The council is urging that similar day courses be offered at each technical institute in London, in order to train workers for all good trades employing women.

Italy.

Education for industrial pursuits began seriously in Italy after the national union. In 1898 vigorous reforms took place in the schools which raised the standard of teaching and reorganized the courses of study. The schools were founded chiefly by individuals. They differ widely in type, in object and in pro¬ gram. Many of the schools receive subsidies from the state as well as from the provincial or communal authorities, or from chambers of commerce, or from the

savings banks. The government exercises a certain class of super¬ vision over those schools receiving subsidies. Although there is no co-ordination between the schools there is a' response to local needs. As in other countries, there are several grades of schools. The schools of arts and trades (scuole d'arti e mestieri) train the workmen. These institutions are very numerous in the cities and small towns, and are unevenly dis¬ tributed through Italy. Piedmont, Lombardy, Campagna and Tuscany have the greater num¬ ber. The instruction in many of them deals more with the technical features than with the academic and theoretical. As in other conti¬

nental countries there are two classes of schools for apprentices : The day school to train work¬ men for trade, and the night or Sunday courses to improve workmen engaged in the industries. Everywhere there is the emphasis on the artistic side of industry. The Casanova Institute of Arts and Trades in Naples and the Municipal School of Arts and Trades in Genoa are illus¬ trations of the day trade schools for boys.

Trade education for girls (scuole pro- fesionale) has received serious attention. The schools are largely attended. The parent insti¬ tution is in Rome. It still remains a model for other schools. The girls enter at 12 years of age, on completing their elementary edu¬ cation and continue to attend the classes for three, four or even six years. The compulsory subjects are drawing and cooking. Optional subjects are languages, needlework in all branches, laundry work, lace and artificial flowermaking, hair-dressing, bookkeeping and arithmetic. There is also a nurses' training school. Similar schools are to be found in Florence, Milan, Venice, Turin, Parma, Bologna, Palermo and in some of the smaller towns.

Bibliography.— (Reports *of the Commis¬ sioner of Labor _ (Washington, annually) ; (Reports* of the United States Commissioner of Eduction (ib., annually) ; <Reports) and (Bul¬ letins *of the National Society for Voca¬ tional Education (New York) ; Reports5 and (Monthly Summaries* of the Federal Board for Vocational Education; <Reports) of the Royal Commission on Technical Education for Great Britain (London, annually) ; Pro¬ ceedings of the International Congresses for ' Technical, Commercial and Industrial Edu¬ cation; Annuaire de la jeunesse (Paris^J (Some Trade Schools in Europe, * United States Bureau of Education, Bulletin No. 23 (Washington 1914) ; (Reports *of the Massachusetts Commission on Industrial and Technical Eduction (Boston 1906, 1908) ; (A Glance at Some European and American Voca¬ tional Schools,* issued by the Consumers' League of Connecticut (Hartford 1911) ; Chamberlain, A. H., (The Condition and Tendencies

of Technical Education in Germany) (Syracuse 1908) ; Cooley, E. G., Vocational Education in Europe *(Chicago 1912) ; Damm, P., <Die technischen Hochschulen Preussens* (Berlin 1909) ; Dean, (The Worker and the State* ; Kerschensteiner, G., Education for Citizenship * ; id., Organisation und Lehrplane der obligatorischen Fach-und Fort-bildungs- schulen fur Knaben in MiincheiP (Munich

1910) ; Roman, F. W., (The Industrial and Commercial Schools of the United States and Germany) (New York 1915) ; Seath, J., (Edu¬ cation for Industrial Purposes) (Toronto

1911) ; Woolman, M. S., (The Making of a Trade SchooP (Boston 1910).

Mary Schenck Woolman, Specialist in Vocational Education; Formerly Professor of Domestic Art, Teachers Col¬ lege, Columbia University, and Director of the Manhattan Trade School for Girls.

TRADE UNIONS, as defined by the Fed¬ eral statutes, are associations of working people for the several purposes of aiding members toward greater efficiency, promoting their gen¬ eral intelligence, raising of funds for the benefit

of sick, disabled or unemployed members or the families of deceased members, and for the regulation of their wages and hours and con¬ ditions of labor, and the protection of their individual rights in the prosecution of their trades. The primary object was to assist mem¬ bers in contests with employers, and it was not for some time later that the unions introduced funeral benefits, homes for incapacited workers, schools for instruction, etc. See American- Federation of Labor; Guilds; Unionism.

TRADE UNIONS, General Federation of,

a labor organization of Great Britain, aiming to unite all the British trade unions for mutual assistance and the advancement of the interests of labor. It admits any trade union to mem¬ bership, but no branches or individuals. It was organized in 1899 at a special session of the British Trades Union Congress. The govern¬ ment is vested in a general council of repre¬ sentative delegates meeting annually, and in an executive ((management committee® of 15, no two to be of the same trade. District com¬ mittees may also be organized. Any union

dis¬ satisfied with ruling of the management com¬ mittee may appeal to the council, and from the council to the vote of the general membership. The federation deals solely with industrial ques¬ tions, particularly with the conduct of strikes, and aims to preserve industrial peace. All unions joining the federation pay an entrance fee of one penny (two cents) per member and regular dues are paid on two different scales, the higher scale, sixpence (12 cents) per quarter per member, the lower scale, threepence (6 cents) per quarter per member; all pay¬ ments are calculated on 90 per cent of the membership. In case of a strike approved by the general council or the management com¬ mittee, unions that have belonged to the federa¬ tion 12 months are entitled to a strike benefit of five shillings ($1.25) per week per member on the higher scale, and half that amount on the lower scale. . Several large and representa¬ tive unions have joined the federation; among them are the Amalgamated Society of Engineers, the Boot and Shoe Operatives, the Cotton Spin¬ ners, the Shipwrights, the Tailors and the Gas- workers and General Laborers; the membership approximates 1,000,000. See Unionism.

TRADE WINDS, one of those perpetual or constant winds which occur in all open seas on both sides of the equator, and to the distance of about 30° north and south of it. On the north of the equator their direction is from the north¬ east (varying at times a point or two of the compass either way) ; on the south of the equator they proceed from the southeast. In some places the trade winds become periodical, blowing one-half of the year in one direction and the other half in the opposite direction. They receive their name because their known regularity is an assistance to trading vessels which often lay their courses so as to receive as much assistance as possible from favor¬ able breezes. See also Currents, Ocean; Meteorology.

TRADING STAMPS, printed slips given by some merchants as an inducement to the trading public. They are usually gummed so that they may be pasted in a book which is furnished and which when filled has a value in

premiums offered. These stamps are used ex¬ tensively and are said to be of considerable value in working up trade. They have been the cause of lawsuits brought against the issuing firms under the laws forbidding lotteries.

TRADITION, the body of oral informa¬ tion, opinion, inexact records, statements and evidence of things long past communicated from older generations to the present. That evidence of ancient things which is not com¬ mitted to writing and vouched for by com¬ petent

authority. As applied to profane history Jt signifies knowledge of the past handed down by word of mouth from generation to genera¬ tion. In this sense the line between tradition and myth is often hard to distinguish, one merging into the other. Historical tradition, however, has usually, if not invariablv. a sub¬ stantial foundation and both tradition and myth are of the highest value in tracing human experience and progress both in the historic and prehistoric periods for it should be unneces¬ sary to state that the so-called historic period is not a uniform era, but varies with different races of mankind, according to the age at which they come within the range of historic observation.

Tradition in the religious sense holds a Place not less important than in its profane meaning. It is a chief ground of doctrinal di¬ vision in Christianity ana also in Mohammedan- ism between Roman Catholics and Protestants cm •• e . riPer faith and between Sunnites and Shiites in the latter. A similar division existed among the Jews of the later Scriptural period. In the Roman Catholic view the term tradition is applied to the doctrines believed to have been communicated by Christ to his Apostles and handed down by them orally to their succes¬ sors. ˆ the writings of the Fathers are regarded as witnessing these traditions. The Council of I rent teaches, that the truth of Christ is con¬ tained partly in the sacred writings and partly m unwritten tradition received by the Apostles from Christ, or from the Holy Ghost, and en¬ trusted by them to the Church, and that Scrip¬ ture and apostolic tradition are alike to be reverenced See Catholic Church; Jewish sects; Mohammedanism; Protestantism- Shiites; Sunnites.

TRADUCIANS (from traduco , transmit), a name which the Pelagians anciently gave to the Catholics because of their teaching that original sin was transmitted from father to children. More commonly the term is applied to the theory that souls are transmitted to children by the parents, instead of being created

r m AuSusti.ne appears to have in¬

clined to this belief, without committing him¬ self to it.

TRAFALGAR, traf-al-gar', or tra-fal'gar, a cape on the southwest coast of Spain at the northwest entrance of the Strait of Gibraltar.

It is low and sandy and terminates in two headlands, on the east of which is a martello tower. The famous naval battle in which Nel¬ son lost his life, after defeating the combined

rwMi an<ˆ Spanish fleets under the command of Villeneuve and Gravina, was fought off this

Tapc r24n 1805‘ Consult Corbett, Sir

imo< ihe CamPaiSn of Trafalgar (London

TRAGACANTH, GUM TRAGACANTH, GUM TRAGIC, a gummy exudation from the stem of various species of Astragalus, natives of t- he mountainous regions of western Asia. It comes on the market as irregular leaves or ribbon-like pieces, of a white or brownish-white color and somewhat translucent. It swells up in water; does not readily dissolve but forms a gelatinous mass which is sometimes utilized as a mucilage. Used in pharmacy to give con¬ sistency to lozenge or pill mass. It is also used to stiffen calicoes and other fabrics.

TRAGEDY, a serious drama or poem, representing an important event or a series of events in the life of some person or persons, in which the diction is elevated and the catastrophe melancholy. Tragedy originated among the Greeks in the worship of the god Dionysus or Bacchus. See Drama.

TRAGOPAN, a pheasant of the genus Ceriornis, closely allied to the common fowl. C. satyra, a common species, is a native of the Himalayas where it inhabits the forests at 8,000 to 11,000 feet elevation. The plumage is spotted, exceedingly brilliant and variegated in colors and two fleshv protuberances hang from behind the eyes. When the bird is excited it can erect these protuberances till they look like a pair of horns. A large wattle hangs at either side of the lower mandible. Unlike most pheasants they build their nests in trees.

TRAILL, tral, Catherine Parr Strickland, Canadian writer, sister of Agnes ‘Strickland (q.v.) : b. London, 9 Jan. 1802 ; d. Lakefield, On¬ tario, 29 Aug. 1899. She was married in 1832 to Capt. Thomas Traill with whom she removed to Canada in 1833 and made her home for the rest of her life at Lakefield, Ontario. Among her works are (The Backwoods of Canada > (1835) ; (Canadian Crusoes) (1852) ; Ramblings in the Canadian Forests) (1854) ; (Afar in the Forest) (1869); (Studies of Plant Life) (1884); (Pearls and Pebbles> (1895).

TRAILL, Henry Duff, English journalist and man of letters : b.

Blackheath, Kent, 14 Aug. 1842; d. London, 21 Feb. 1900. He was graduated at Saint John's, Oxford, 1864, called to the bar in 1868, but soon took to literature. He wras connected with the Pall Mall Gazette (1873-80), the Saint James' Gazette (1880-82), Telegraph (1882-96) and the Saturday Review (1883-94). From 1889 to 1891 he was editor of the Observer, from 1898 to 1900 of Literature. Among his publications are (Lives) of Straf¬ ford (a very original work with a new view) (1889); William III (1888); Sterne (1882); Coleridge (1884) and others; also Central Government (1881) ; Recaptured Rhymes *(1882) ; (The New Lucian* (1884; revised and enlarged 1900), his best work; (Saturday Songs) (1890), satirical verse; Rrom Cairo to the Soudan Frontier* (1896) and (The New Fiction and Other Essays on Literary Subjects)

(1897).

TRAIN, Elizabeth Phipps, American novelist and translator: b. Dorchester, Mass.,

1 Sept. 1856. She was educated at Wells Col¬ lege, Aurora, N. Y., and her first literary wurk consisted entirely of translations from the French. They include (The Apostate) (1889) ; Recollections of the Court of the Tuileries> (1891), etc. Her first original publication was

(Dr. Lamar *(1891) and she has since written (Autobiography of a Professional Beauty) (1895); (A Social Highwayman* (1895); (Queen of Hearts) (1897) and other works.

TRAIN, George Francis, American finan¬ cier and eccentric author: b. Boston, 24 March 1829; d. New York, 18 Jan. 1904. In 1850 he was put in charge of the Liverpool branch of an American business house and three years later was admitted to partnership. Another branch was established in Melbourne, Australia, in 1853, under his supervision, and during the three years of his stay there he introduced a sailing-ship service between Boston and Aus¬ tralia. In 1858 he interested English capital in the building of the Atlantic and Great Western Railway and afterward undertook street-rail¬ way enterprises in England and other European countries, but his plans, through opposition and otherwise, were frustrated. His next railroad enterprise was the building of the Union Pacific Railway, ground for which was broken at Omaha 2 Dec. 1863 and the connection that linked the eastern and western extremities com¬ pleted 10 May 1869. He made a tour of the world in 80 days, arriving in Marseilles, France, 20 Oct. 1870, where he organized the Com¬ mune, was arrested and imprisoned for 13 days at Lyons. In 1872 he became an independent

candidate for President of the United States. He was a man of eccentric habits and extrav¬ agant speech and in November 1872 was ar¬ rested on the charge of having published ob¬ scene literature. The passages objected to were wholly quotations from the Bible. Mr. Train was discharged from custody after having been adjudged insane by legal decision. His later years were spent in New York, where he adopted the habit of speaking only to children. He called himself <(Citizen of the World,® and while his title to property valued at $30,000,000 at Omaha, Neb., remained in litigation he af¬ fected a simple style of living and spent his last years at a cheap hotel, where he died. Among his publications are (An American Merchant in Europe, Asia and Australia) (1851) ; (Young America Abroad) (1857) ; (Young America in Wall Street) (1858) ; (Young America on

Slavery *(1860) ; (Championship of Women) (1868) and (My Life in Many States and in Foreign Lands.*

TRAIN BANDS, a body of citizens par¬ taking of the nature of both militia and volun¬ teers, instituted by James I and dissolved by Charles II. The term was afterward applied to the London militia, from which the third regiment of the line originated and in which the renowned John Gilpin was a captain.

TRAINED NURSE. See Nurse, Trained.

TRAINED TEACHERS. See Education,

Elementary.

TRAINING, Athletic. See Physical Training.

TRAINING SCHOOL FOR TEACH¬ ERS. See Teachers, Professional Training of.

TRAINING SCHOOLS, Nautical. See

Nautical Training Schools.

TRAJAN, tra'jan (Marcus Ulpius Traja- nus), Roman emperor: b. Italica (near Se¬ ville), in the Spanish province of Bsetica, 53

a.d. ; d. Selinus, Cilicia, 117. He was the son of i raj anus, a Roman

commander under Ves¬ pasian. He accompanied his father in a cam-

Piaigr > u-ga“lst tbe Parthians and also served on the Rhine with such ability that when Nerva came to the throne he adopted the young soldier and raised him to the rank of Caesar (97). Nerva dying a few months after, he succeeded to the throne (98). He was at that time in . Germany, where he remained for more than a year, to settle a peace with the German tribes, and in 99 set out with a numerous escort to* Rome. After largess to the soldiers and people he took successful measures for supplying the capital with corn. He punished and banished informers, reduced the taxes and filled the most important posts with men of talent and integ¬ rity. He moreover founded libraries, and under ms patronage the studies were revived which had suffered from the persecution of Domitian Ry the unanimous voice of the Senate he was awarded the title ((Optimus.» In 101 he set out on an expedition against Decebalus, king of the Dacians, who had forced Domitian to purchase peace by an annual payment of money, and after two years defeated the Dacians and re¬ turned to Rome to enjoy the honors of a triumph with the name of Dacicus (103). In this year Pliny was made governor of Pontus and Bithyma, which circumstance gave rise to a series of letters between him and Trajan still

e?ta2t .Aˆonˆ these are the epistles respecting the Christians, whom he directs Pliny not to search for, but only to punish if brought before n ˆ Decebalus renewed the war with the Romans in pursuing which Trajan con-

StniCted £ bridˆe °.ver the Danube, below the modern Orsova, which was one of the greatest works of antiquity (105). He then marched into Dacia reduced the capital of Decebalus and turned Dacia into a Roman province. It

was in commemoration of his wars in Dacia that he erected the sculptured column which still bears his name. In 114 he dedicated the horum that he had built in Rome and set out on a new warlike expedition against Chosroes, the Parthian, ffhe result of this war was the reduction of Armenia to a Roman province. His war with the Parthians was completed in two campaigns, after which he sailed down the ligns and entered the Persian Gulf. During his absence the Parthians revolted. After giv¬ ing a king to the Parthians he laid siege to

tra, the capital of an Arabian tribe, but was obliged to withdraw to Syria. In the following year (117) he proposed returning into Mesopo¬ tamia, but was attacked by a disorder, which induced him to repair to

Italy, leaving the army under the command of Hadrian. He had pro¬ ceeded no farther than Selinus, in Cilicia, when he died, after having adopted Hadrian for his successor. His good qualities as a ruler were such that, at the distance of 250 years from his death, the senators', in their acclamations on the accession of a new emperor, were accustomed to wish that he might be more fortunate than Augustus and better than Trajan.

tanTRAJANS COLUMN- See Rome; Tra-

TRAJAN'S WALL, Rumania, a fortified line in the Dobrudja extending east from the Danube to Kustendji on the Black Sea, a dis-

of 37 miles- !t is a double, in some places, a triple, earthwork on the south side of a natural fosse consisting of a narrow marshv valley. Another wall of the same name, built

apRofˆan leˆ10nL 1(>5-155 a.d., extends from the Pruth east to the Black Sea.

TRAMP. See Mendicancy. Wi™RoteWAYS' Aeria1' See Conveyer;

.

'

.

'

'

/

\

•

\

i

■ <

i

Vol. 27, TRANCE TO VENIAL

Americana

/

‘+ +m&*

■

■/?m

.■c

Y

sjf

•fly

‘^WU:

i

,

.

■

■

K

d

1

i

|

I

i

I

I

1 1

THE

ENCYCLOPEDIA

II

AMERICANA

jr

IwrpW

UjiIVEF(SAL

JtffOWLEDCEj

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

\

$

i

%

Copyright, 1920

EY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY ALBANY NEW YORK

JAN |R 1922

©CIA654 317

-vw? /

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXVII

AMES, HERMAN V., A.B., A.M., Ph.D.

Professor of American Constitutional History, University of Pennsylvania

UNITED STATES — THE FORMATION OF STATE CONSTITUTIONS
UNITED STATES — THE PEOPLING OF THE UNITED STATES UNITED STATES — THE FEDERAL CONVENTION OF .1787

AUSTIN, O. P., M.A.

Statistician, National City Bank, New York

UNITED STATES — TERRITORIAL EX¬ PANSION

UNITED STATES — INDUSTRIAL AND COMMERCIAL DEVELOPMENT

BABASINIAN, V. S., Ph.D.

Professor of Chemistry, Lehigh University

TRINITROTOLUENE

UREA

URIC ACID

BOLLING, GEORGE MELVILLE, Ph.D.

Professor of Greek Language and Literature, Ohio State University, Columbus, Ohio

VEDIC LITERATURE

BOWEN, EDWIN WINFIELD, A.B., A.M., Ph.D.

Professor of Latin, Randolph-Macon College

UNITED STATES — THE ALIEN AND SEDITION LAWS

UNITED STATES — THE LOUISIANA PURCHASE

UNITED STATES — MILITARY EVENTS OF THE CIVIL WAR UNITED STATES — IMMIGRATION

(1789-1916)

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

TRISTRAM SHANDY

BROOKE, TUCKER, M.A., Litt.B.

Professor of English, Yale University

TROILUS AND CRESSIDA

TWO GENTLEMEN OF VERONA, THE

BROWN, MARSHALL S., Ph.B., A.M.

Professor of History and Political Science, New York University

UNITED STATES — STATE CONSTITU¬ TIONS (1789-1919)

BURCH, ARTHUR J.

Secretary of Troy Chamber of Commerce

TROY, NEW YORK

BURR, WILLIAM H., C.E.

Professor of Civil Engineering, Columbia University

TUNNELS AND TUNNELING

CAIRNS, WILLIAM B., Ph.D.

Assistant Professor of American Literature, Uni¬ versity of Wisconsin

TWICE TOLD TALES, THE TWO YEARS BEFORE THE MAST

CALDWELL, JAMES H., B.S.

President of The Ludlow Valve Manufacturing Company, Troy, N. Y.

VALVES .

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

TURKEY, OR THE OTTOMAN EMPIRE, DIPLOMATIC RELATIONS OF THE UNITED STATES WITH UNITED STATES — HISTORY OF ARBI¬ TRATIONS

UNITED STATES — IMPEACHMENT

CARMAN, E. A.*

General, United States Army

TREVILIAN RAID AND BATTLE OF TREVILIAN STATION TULLAHOMA CAMPAIGN TUPELO, BATTLE OF VALVERDE, OR FORT CRAIG, BATTLE OF

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Economics, Harvard University

VALUE

CHADWICK, F. E.

Formerly Rear-Admiral, United States Navy

UNITED STATES — THE WAR WITH SPAIN

COCHRANE, CHARLES H.

Formerly Secretary, Typothetas of New York

TYPE AND TYPE-FOUNDING

CORNYN, JOHN HUBERT, B.A., LL.B.

Birmingham Southern College

VELAZQUEZ, DIEGO RODRIQUEZ DE SILVA

COUMBE, CLEMENT W.

Editorial Staff of The Americana

UNEMPLOYMENT

UNITED STATES FLYING CORPS

VASES

VAULT

VELLUM

COX, ISAAC JOSLIN, A.B., Ph.D.

Northwestern University, Evanston, Ill.

UNITED STATES — THE PRESIDENT'S OFFICE

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell University

- *■ A ,

UTILITARIANISM

- Deceased

Contributors to Volume XXVII — Continued

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

TROLLOPE, ANTHONY VATHEK

CURRIER, ANDREW F., M.D.

Mt. Vernon, N. Y.

VACCINE

CUSHMAN, ROBERT EUGENE, A.B.

Associate Professor of Political Science, University of Minnesota

UNITED STATES — THE JUDICIARY

DARTON, NELSON H.

Geologist, United States Geological Survey

UNDERGROUND TEMPERATURES

DAYTON, EDWIN W.

Major, Infantry, R. L.

UNITED STATES — ARMY OF THE UNITED STATES

DEWEY, DAVIS RICH, A.B., LL.D.

Professor of Economics and Statistics, Massachu¬ setts Institute of Technology

UNITED STATES — FINANCES (1775-

1919)

DODD, WILLIAM E., Ph.D.

Professor of American History, University of Chicago

UNITED STATES — THE CAUSES OF THE WAR OF 1812

UNITED STATES — THE WAR OF 1812 UNITED STATES — ANNEXATION OF TEXAS TO THE UNITED STATES UNITED STATES — SECESSION

DOLE, NATHAN HASKELL, A.B.

Editor of Tolstoi's " Collected Works "

TURGENIEF, IVAN SERG&YEVITCH

DRISCOLL, JAMES F., D.D.

Rector of Saint Gabriel's Church, New Rochelle, N. Y.

TRANSUBSTANTIATION

DRUM, WALTER, S.J., A.B.

Professor of Scripture, Woodstock College, Wood- stock, Md.

TRENT, COUNCIL OF

FAIRLIE, JOHN A., Ph.D.

Professor of Political Science, University of Illinois

UNITED STATES — POLITICAL PAR¬ TIES

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

TRENCHES

FICKLEN, JOHN R.

Late Professor of History, Tulane University

UNITED STATES — THE CONFEDER¬ ACY

FISH, CARL RUSSELL, Ph.D.

Professor of American History, University of Wisconsin .

UNITED STATES — THE NEW DEMOC¬ RACY AND THE SPOILS SYSTEM

FLEMING, WALTER L., Ph.D.

Professor of History, Vanderbilt University

UNITED STATES — SUFFRAGE

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

TREASON

TREATIES, INDIAN

TRIPLE ALLIANCE

TRIPLE ENTENTE, THE

UNITED STATES — RECONSTRUCTION

GEDDES, JAMES, Jr., Ph.D.

Professor of Romance Languages, Boston University

UN CURIOSO ACCIDENTE

GRAVES, CHARLES, REV.

Minister of the First Unitarian Congregational Society, Hartford, Conn.

UNITARIANISM

GUITERMAN, ARTHUR, B.A.

Author and Critic

TREASURE ISLAND

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

TRAVELER, THE

HART, ALBERT BUSHNELL, Ph.D., LL.D., Litt.D.

Professor of Government, Harvard University

UNITED STATES — SLAVERY UNITED STATES — FOREIGN POLICY

HARTMAN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Literature, College of the City of New York.

TROTZKY, LEON

HORNER, HARLAN H., A.M., Pd.D.

Dean, State College for Teachers, Albany, N. Y.

UNIVERSITY

HUEBNER, GROVER G., Ph.D.

Assistant Professor of Transportation and Com¬ merce, University of Pennsylvania

UNITED STATES — RAILROAD TRANS¬ PORTATION

INGERSOLL, HELEN

Naturalist

VALLISNERIA

ISAACS, EDITH J. R.

Critic and Essayist

VAN ZORN

JELLIFFE, SMITH ELY, M.D., Ph.D.

Editor, “Journal of Nervous and Mental Disease.”

UNCONSCIOUSNESS

JERNEGAN, MARCUS W., Ph.D.

Associate Professor of History, University of Chicago

TREATIES

VAN BUREN, MARTIN

JONES, JENKIN LLOYD, D.D.

Minister of All Souls Unitarian Church, Chicago’

UNITED STATES — CIVIL AND RE¬ LIGIOUS LIBERTY

Contributors to Volume XXVII — Continued

KAINS, M. G., B.S.A., M.S.A.

Lecturer on Horticulture, Columbia University

TRANSPLANTING

KEYSER, CASSIUS J., Ph.D.

Professor of Mathematics, Columbia University

TRIGONOMETRY

KINYOUN, JOSEPH J., M.D., Ph.D.

Washington, D. C.

VACCINATION

KLEIN, HENRI F.

Editorial Staff of The Americana

UKRAINE

KLEIN, HENRI F.

McDonnell, john b., b.a.,

Editorial Staff of The Americana

TURKEY, OR THE OTTOMAN EMPIRE

McCOLLESTER, LEE S., B.D., D.D.

Dean, Crane Theological School, Tufts College, Massachusetts

UNIVERSAL1SM

McDonnell, john b., b.a.

Editorial Staff of The Americana

UNITED STATES — NAVY OF THE UNITED STATES

MACE, WILLIAM H., B.L., M.L., Ph.D.

Professor of History and Political Science, Syracuse University

UNITED STATES — THE ABOLITION AND FREE SOIL MOVEMENTS
UNITED STATES — EFFORTS TO SET¬ TLE THE SLAVERY QUESTION
UNITED STATES — CAUSES OF THE CIVIL WAR

McGRANE, R. C., Ph.D.

Assistant Professor of History, University of Cincinnati

TYLER, JOHN

UNITED STATES — THE VICE-PRESI¬ DENCY

UNITED STATES — SPEAKER OF THE HOUSE OF REPRESENTATIVES

McLaughlin, Andrew c., a.b., ll.b.,

A.M., LL.D.

Professor of History, University of Chicago

UNITED STATES — GENERAL OUT¬ LINE HISTORY (1776-1920)

UNITED STATES — THE EUROPEAN WAR

MACLAY, EDGAR STANTON

Author of “ The History of the United States Navy ”

UNITED STATES — CHRONOLOGICAL HISTORY OF NAVY

McMAHON, JAMES, A.M., D.Sc.

Professor of Mathematics, Cornell University

VECTOR ANALYSIS

MACY, JESSE, A.B., LL.D.

Professor Emeritus of Political Science, Grinnell College

UNITED STATES — BEGINNINGS OF PARTY ORGANIZATION AND GROWTH OF THE PARTY SYSTEM AND PARTY MACHINERY

MOORE, J. PERCY, Ph.D.

Professor of Zoology, University of Pennsylvania

UNGULATA

MOSES, MONTROSE J., B.S.

Dramatic Critic

TRUTH, THE

NEWCOMB, SIMON, Ph.D., LL.D., D.Sc.* DOOLITTLE, ERIC, C.E.

Professor of Astronomy and Director of Flower Astronomical Observatory, University of Penn¬ sylvania

UNIVERSE

NEWELL, FREDERICK H.

Professor of Civil Engineering, University of Illinois; Formerly with the United States Recla¬ mation Service

UNITED STATES RECLAMATION SERVICE

NEWLAND, DAVID H.

Assistant State Geologist, New York

McDonnell, john b., b.a.

Editorial Staff of The Americana

UNITED STATES — BOUNDARIES ETC.

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

TREASURY, THE LITTLE TURANDOT

PILCHER, LEWIS F., Ph.B., LL.B.

State Architect, New York State

UNITED STATES ARCHITECTURE

REEVES, JESSE S., B.S., Ph.D.

Professor of Political Science, University of Michigan

UNITED STATES — GROWTH AND DEVELOPMENT OF LAW

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

ULTRAMICROSCOPE UNDULATORY THEORY OF LIGHT UNITS OF MEASUREMENT URINARY ANALYSIS VACUUM

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Formerly Secretary to American Minister to Teheran, Persia

TURKEY, OR THE OTTOMAN EMPIRE, AND THE WORLD WAR TURKISH LANGUAGE TURKISH LITERATURE

- Deceased

Contributors to Volume XXVII — Concluded

SCOTT, S. DUNN

Staff of the Vancouver “ Daily Province”

VANCOUVER, CANADA

SHUMWAY, D. B., B.S., Ph.D.

Professor of German Philology, University of Pennsylvania

TRISTAN

SMITH, DAVID EUGENE, Ph.D., LL.D.

Professor of Mathematics, Teachers College, Columbia University, New York

TRIGONOMETRY, HISTORY OF THE ELEMENTS OF

SMITH, W. ROY, B.A., M.A., Ph.D.

Professor of History, Bryn Mawr College

UNITED STATES — THE WAR WITH FRANCE

UNITED STATES — THE MEXICAN WAR

SPARKS, EDWIN ERLE, Ph.D., LL.D.

President of Pennsylvania State College

UNITED STATES — WESTWARD MOVE¬ MENT

SPENCER, CHARLES WORTHEN

Professor of Political Science, University of Nevada

UNITED STATES — CAUSES OF THE REVOLUTION

UNITED STATES — THE AMERICAN REVOLUTION

UNITED STATES — THE AMERICAN REVOLUTION (DIPLOMATIC CONDI¬ TIONS DURING THE WAR AND THE PEACE NEGOTIATIONS)

STONE, ALFRED HOLT, LL.B.

Member American Historical Association

UNITED STATES — THE THIRTEENTH, FOURTEENTH AND FIFTEENTH AMENDMENTS TO THE CONSTITU¬ TION

SULLIVAN, JAMES, Ph.D.

Director of the Division of Archives and History of the University of the State of New York

UNITED STATES — THE DECLARA¬ TION OF INDEPENDENCE
UNITED STATES — ARTICLES OF CON¬ FEDERATION

UNITED STATES — THE COLONIAL AND TERRITORIAL SYSTEMS

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

TROILUS AND CRISEYDE

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia University

TYPEE

WALSH, JAMES J., Ph.D., M.D., LL.D., Litt.D., Sc.D.

Author of “ The Thirteenth Greatest of Centuries ”

. TWELFTH CENTURY TWENTIETH CENTURY

WALSH, JOSEPH, A.M., M.D.

Medical Director, White Haven Sanitorium for Tuberculosis; Formerly Commanding Officer, United States Army general Hospital No. 17

TUBERCULOSIS

WALTER, FRANK K., B.A., M.A.

Vice-Director, New York State Library School

TRAVELING LIBRARIES

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

TREMATODA

TRICHINA

TRYPANOSOMA

WEEKS, RAYMOND, Ph.D.

Professor of Romance Languages and Literatures, Columbia University

TWENTY THOUSAND LEAGUES UNDER THE SEA

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature;” ” Modem French Literature ”

TRUMPETER OF SAKKINGEN TURKISH SPY, THE UNDINE

WHEELOCK, CHARLES F.

Assistant Commissioner for Secondary Education, University of the State of New York

UNIVERSITY OF THE STATE OF NEW YORK

WHITFORD, H. N.

Yale School of Forestry, New Haven, Conn.

TROPICAL FOREST PRODUCTS

WHITNEY, ORSON F.

Author of “ Whitney’s History of Utah ”

UTAH

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

UNIVERSALS

WILCOX, MARRION, A.M., LL.B.

Co-editor “ Encyclopedia of Latin America”

VENEZUELA

WOODBURN, JAMES ALBERT, Ph.D., LL.D.

Professor of American History, Indiana University

UNITED STATES — THE POLITICAL EVENTS OF THE CIVIL WAR

WOOLSEY, THEODORE S., LL.D.

Professor of International Law, Yale University

UNITED STATES — DIPLOMACY

WRIGHT, HERBERT F., Ph.D.

Sometime Librarian of the Latin Library, The Catholic University of America

VATICAN, THE

KEY TO PRONUNCIATION

a

far, father

n

Span, h, as in canon (can’ycm), pihon (pen’ySn)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or 6

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e, as in de ; eu, as in neuf; and oeu, as in

oi

oil, soil ; also Ger. eu, as in beutel

boenf, coeur; Ger. b (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

ih

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht , wacht

u or u

but, us

hw

what

u

pull, put

!

file, ice

ii

between u and e, as in Fr. sur,

Ger. Muller

• kS

i or 1

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

A

1

y

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point , Jean, temps

syllabic stress

‘.Vi (t j T /. I ‘) Vi 1 Vi O 51 <1 OT Y5I S

.

if sti ilfir.d ,on

‘

‘

10J1 JH’.*:

ift .• I

l uM‘. ‘ :jt U : ... ‘

Ji q //o

>1U>: i

si)

JO d ,*i: rf

.

.

t ,a$y (U’.in,

s

,,nn,U :«■>*

,

■ : t (.1 ■ * ‘ J ,(‘iq) ’

»u*»V L1

Trance, a state in which the voluntary functions of the body are suspended and in which a dream life is carried on of more coherency than in ordinary sleep. In some cases the only external sign of trance is the length of time during which the voluntary functions are suspended. The patient is then said to be in a trance-sleep. When the trance is deeper the action of the heart and lungs is very feeble al¬ though perceptible ; the state of the patient is distinguished as that of trance-coma. When the trance is so deep that the action of the heart and lungs becomes altogether imper¬ ceptible, the body falls in temperature and no sustenance is taken, the patient is said to be in a death-trance. There are four definite sorts of trance, each differentiated from ordinary sleep: (1) The subject of a hypnotist or mesmerist, who is controlled to the point of losing con¬ sciousness of his surroundings. (See Hypno¬ tism). (2) The medium who, according to spiritualistic theories, accepts the control of a discarnate

intelligence and goes into a state of greater or less coma, during which he answers questions or has experiences on the astral or psychic plane, of which he is unconscious and cannot remember when he returns to a normal condition. (See Spiritualism). (3) The state of an individual who, according to various Eastern philosophies, is able at times to. leave his physical body and to travel in his spiritual body on the higher planes of life; or at least who becomes unconscious of activities on the earth plane, resting in a state of coma which his soul or ego has experienced in the world of spirits, spiritual world, heaven-world or whatever one chooses to designate it. Such were the experiences of Swedenborg (q.v.). (4) The condition of the patient who loses physical consciousness but lives and breathes, sometimes for weeks and months. (See Coma). This state is closely allied to somnambulism (q.v.). Consult Podmore, F., (Modern Spirit¬ ualismˆ (London 1902) ; Owen, R. D., de¬ batable Land) (1872) ; Besant, A., (A Study in Consciousness* (1900); Prince, M., dissocia¬ tion of a Personality) (1908) ; Hyslop, J. H., (Psychical Research and SurvivaP (1913) ; Lodge, Oliver, (Raymond) (1916).

TRANI, tra'ne, Italy, in the province of Bari, on the Adriatic, 26 miles northwest of Bari, a seaport on the southern coast, formerly of considerable importance. The cathedral

(12th century) with handsome bronze doors and interesting crypt and castle are the chief buildings. Promenades occupy the site of the ancient fortifications. Trade depends upon oil, grain, almonds, wine and figs. During the Crusades Trani flourished, and it has been the see of an archbishop since the 11th century. Pop. 35,000.

TRANQUEBAR, tran-kwe-bar', India, in Madras, district of Tanjore, 56 miles south of Pondicherry, an important seaport, with citadel and fortifications. There are two Protestant churches, a Portuguese chapel and schools for Danish, English and Portuguese, a reading- room and literary institute. A Protestant mis¬ sion was established here as early as 1706, which was the first in India. There are some manu¬ factures of coarse cloth. The Danish settle¬ ments, established in 1616, were purchased by Great Britain in 1845. Pop. of town 5,000, with native suburb of Poraivar 14,500.

TRANS-ATLANTIC FLIGHT. Up to

May 1919 the aerial passage of the Atlantic Ocean was a surmise with a hope of early suc¬ cess, because its possibilities had been worked out, in theory, as beyond a peradventure. The American navy had several. sea-planes trained for the endeavor; Capt. Harry Hawker had

landed his British Sopwith biplane parts at Mount Pearl, four miles west of Saint Johns, Newfoundland, already on 4 March. On 5 April Captain Raynham and Major Morgan had left Liverpool, England, with their Martin- syde aeroplane and arrived at Saint Johns, Newfoundland. The British authorities had tested their ˆdirigibles® and R-34 was expected to sail very shortly.

On 16 May three United States navy sea¬ planes (NC-1 , NC-3 and NC-4) started from Trepassy Bay, Newfoundland, Europeward with the Azores in view as first landing stage. NC-4 arrived at Horta, Azores Islands, on 17 May under Commander A. C. Read. He had started from Trepassy at 6:07 p.m. 16 May and arrived at Horta 17 May at 9:25 a.m., having accomplished the distance of 1,200 nautical miles in 15 hours and 18 minutes, at a speed of 81.7 knots per hour. NC-1, under Lieut. – Commander P. N. L. Bellinger, got caught in a fog just short of the mark and had to be towed to Horta, where the plane sank. NC-3, under Commander J. H. Towers, was at first supposed to have been lost, no word arriving as

to his whereabouts or existence. But he also had suffered from the fog and, after 48 hours, managed to get to Ponta Delgada under his own power. NC-4, on 20 May, continued its flight to Ponta Delgada, leaving at 8:40 a.m. and ar¬ riving at 10:24 p.m., accomplishing a flight of 150 nautical miles in 1 hour 44 minutes, a speed of 88 knots per hour; on 27 May the trip from Ponta Delgada to Lisbon was made in 9 hours 43 minutes at a speed of 81.3 knots per hour for the 800 miles ; on 30 May Lisbon to Mondego River was negotiated, a distance of 100 nautical air miles, in 1 hour 20 minutes; Mondego River to Ferrol, 220 miles, was the next stage accomplished the same day in 3 hours 7 minutes. On 31 May the final stage, from Ferrol to Plymouth, was accomplished in 6 hours 59 minutes, a distance of 476 miles. Thus the first passage over the Atlantic from the start at Rockaway to Plymouth, a distance of 3,936 nautical miles, was completed in 59 hours 56 minutes flying time. United States destroyers were distributed along the ocean course to give assistance if necessary.

NC-4 Construction. — The extraordinary size of the NC flying boats and their general make-up was due to Rear-Adm. D. W. Tay¬ lor, chief constructor of the navy. The title NC stands for Naval Curtiss and they were constructed for war purposes. The NC-4 has beneath the flying apparatus a strong sea¬ worthy boat adapted for rough water. The

hull is 45 feet long with 10 feet beam. Bottom is a double plank Vee. It is divided by bulkheads into six water-tight compartments, the front one having a cockpit for lookout and navigator. Wings are 12 feet long, weighing but 26 ounces each. There are four Liberty engines of 400 brake horse power per engine and minimum power 1,600 horse power. One of the engines is mounted with a tractor propeller each side of centre line; one engine is mounted on centre line and two others are mounted tandem. The front engine actuates a tractor propeller, the rear engine drives a pusher propeller. It was a new system. Control apparatus was the same as on small aeroplanes. The metal fittings were of special alloy steel, having 150,000 pounds tensile strength per square inch. This permitted much weight reduction. The gasoline tanks (nine of 200 gallons each) were of sheet aluminum, the seams welded; each tank weighed 70 pounds. With its load the machine weighed 28,000 pounds and empty but entire 15,000 pounds. Dimension in length is 60 feet 5}4 inches ; height 24 feet Sl/s inches. Personnel of NC-4 was : Commanding officer, Lieut-Com- mander A. C. Read; pilots, Lieuts. E. F. Stone and Walter Hinton; radio operator, Ensign H. C. Rodd; engineer, Chief Machinist's Mate E. S. Rhodes.

On 18 May Capt. Harry Hawker with Mc¬ Kenzie Grieve. R.N., as pilot, left Saint Johns with their Sopwith and were forced to alight, through engine trouble, in the ocean 1,000 miles east of their starting point and 900 miles from Ireland, their attempted landing point. They were given up as lost for days, but a Dutch tramp steamer picked them up in a sinking con¬ dition and landed them. Their plane followed the well-known design of the Sopwith war planes. It had 4 feet width, 31 feet length,

tested flight duration 24 hours at 100 miles per hour. Engine was Rolls-Royce developing 375 horse power at 1,800 revolutions. Propeller was four-bladed and geared to 1,200 revolu¬ tions. Machine weighed 6,000 pounds fully equipped for the long flight.

On 14 June at 12:13 p.m., New York time, Capt. John Alcock and Lieut. Arthur Brown, pilot, started in their Vickers <(Vitny® bomber plane from Saint Johns, Newfoundland, and landed at Clifden, Galway, Ireland at 4:40 a.m. next day, New York time. Mistaking from their height a bog for a green grass land sur¬ face, they nearly wrecked their machine on landing, and it buried itself up to the axles and then toppled over on its side. The brave pas¬ sengers were rescued by landsmen. They had navigated the Atlantic for the first time in a non-stop passage. The wonderful flight was 1,960 miles, and it was completed in 16 hours 12 minutes at the average speed of 120

miles per hour. They had reckoned on the advantage of a full moon, but dense fog and mist ob¬ scured both moon and stars for 14 hours, mak¬ ing the voyage doubly perilous. The air was so cold it caked the instruments with ice. Soon after the start the wireless radio apparatus got loose and blew away and their receiver was unable to receive messages either because of ˆstatic® conditions. Hence these two brave bird-men and the world were dead to each other 16 hours, adding much to the anxiety of all. But the $50,000 prize offered by the London Daily Mail for the first non-stop passage was earned as well as the national greeting. The Vickers ®Vimy® plane was motored by two Rolls-Royce engines and was built for bombing. Its wing was 67 feet 2 inches. Length over all was 42 feet 8 inches; gap, 10 feet; chora, 10 feet 6 inches. Gasoline capacity was 870 gal¬ lons, weighing 6,000 pounds. The two Rolls- Royce Eagle 375 horse-power engines were carried between the upper and lower planes either side of the fusilage. The strength of the <(Vimy® is brought about by hollow seamless tubing in its construction. It had a double under carriage equipped with two-wheel chassis beneath each engine. Entirely equipped full weight was 13,000 pounds.

R-34 Flight.— July 5 Com.-Maj. G. H. Scott, R.A.F., completed his non-stop flight, on the dirigible balloon airship R-34, across the Atlantic Ocean by landing at Roosevelt Field, Mineola, Long Island, N. Y. It took 108 hours 12 minutes in its passage from East Fortune air station, near Edinburgh, Scotland. Air dis¬ tance traveled (as per log) was East Fortune to Trinity Bay, Newfoundland, 2,050 nautical miles (2,357 statute miles) ; Trinity Bay, New¬ foundland, to Roosevelt Field, 1,080 nautical miles (1,242 statute miles), a total of 3,130 nautical miles (3,559 statute miles), regardless of drift from powerful winds. Headwinds and thunderstorms rocked her and lifted her 800 feet one time. Wind was sometimes 50 miles per hour. Shortly before ending her voyage the wind obstructions had so nearly exhausted her fuel as to cause her to send radio calls for additional gasoline, but the wind veered and it became unnecessary. Personnel: Maj. G. H. Scott in command; Capt. G. S. Greenland, first officer; 2d Lieut. H. F. Luck, second officer; Brig.-Gen. E. M. Maitland, executive officer;

TRANS-ATLANTIC FLIGHTS

I

TRANS-MISSISSIPPI EXPOSITION — TRANSCAUCASIA

3

Lieut. -Comdr. Z. Lansdowne, United States navy; Maj. G. G. H. Cooke, navigating officer; Lieut. Guy Harris, meteorological officer; 2d Lieut. R. D. Durrant, wireless officer; W. O. W. R. Mayes, coxswain, besides 11 warrant offi¬ cers and men, six riggers, two wireless oper¬ ators and a stowaway (Ballantyne), who had been formerly a rigger with the crew and re¬ fused to be left behind After several days' stay at Mineola R-34 returned across the ocean to England (her second passage) without re¬ markable incident.

R-34 Construction. — The dirigible was of rigid Zeppelin type, built from designs of Wil¬ liam Boardmore and Company, Ltd., Glasgow. The machinery was built and installed by Sun¬ beam Motor Car Company, Ltd., Wolverhamp¬ ton. She was launched 14 March 1919. Capac¬ ity was 2,000,000 cubic feet in 19 gas bags. Length over all, 920 feet. Gross lift, with 95 per cent hydrogen at 15° C. and 760 millimeters barometic pressure, 68 tons. Total horse power 1,375. Speed average, 75 miles per hour. Framework was constructed on longitudinal and transverse lattice girders of duralumin built from three-corner rails and X-shaped pieces. An A-shaped keel at bottom of the hull fur¬ nished passage between the cars. The keel contained 81 gasoline tanks of 71 gallons each and storage room for supplies. Sleeping was in hammocks suspended from main ridge of keel. Weight, by tons, carried was: Gasoline (4,900 gallons), 15.8; oil, 0.9; water ballast, 3; crew and baggage, 4; spares, 0.2; drinking water, 0.42. Total, 24.32 tons. Radial wire trusses braced the hull athwartship at the trans¬ verse frames, forming the partitions for the 19 gas-bags. Tail planes were horizontal and ver¬ tical fins and hinged flaps for steering and elevating. There were four suspended cars : the forward gondola was largest and divided into a navigating room, radio cabin, forward engine-room. The latter contained a Sunbeam Maori-4 engine. The elevating and steering wheels were located in the navigating-room, together with all the navigation instruments (gas-pressure gauges, gas thermometers, level indicators, etc.). There were two small ((wing- cars® attached amidships to act as engine-rooms, the after gondola acting in the same capacity. The wing-cars each was equipped with a Sun¬ beam Maori-4 engine and drove 16-foot pro¬ pellers (as did the forward engine). The after gondola, of much larger size, had two Sun¬ beam Maori-4 engines and mounted tandem drove a 19*d foot propeller with either one or both engines. The Sunbeam Maori-4 engines were of special design with 12 cylinders in double row of six each in V-form at an angle of 60 degrees. Cylinders were 110 millimeter bore, 135 metre stroke. The wireless appara¬ tus was 12,000 miles transmission range.

TRANS-MISSISSIPPI EXPOSITION, a popular exhibition of commercial

and agricul¬ tural products held in Omaha, Neb., from 1 June to 1 Nov. 1898. The exposition covered about 200 acres. There were over 20 buildings artistically grouped and connected by vine- shaded arcades; the main buildings alone hav¬ ing an aggregate floor space of 500,000 square feet, exclusive of 200,000 square feet of gallery space. The exposition was a great success, in¬

dustrially and financially, the total number of visitors being 2,613,374, and the total cash re¬ ceipts $1,761,364.18, giving a surplus of

$400,000.

TRANS-SIBERIAN (trˆns si-be'ri-an) RAILWAY, an extensive railroad system of Russia, between Petrograd, Port Arthur (q.v.) and Vladivostok (q.v.), a distance of 5,500 miles across both European and Asiatic Russia. The government of the tsar as far back as 1870 be¬ gan to plan this great railway enterprise, realiz¬ ing the possibilities of developing her vast ter¬ ritory to the eastward. Beginning at Moscow the work of building the railroad was rapidly extended and Orenburg was reached in 1877. In 1880 the bridge over the Volga was built and the section connecting the Volga and Obi River basins was begun. In May 1891 the first work on the real Trans-Siberian Railway was begun. From that date the railway was steadily pushed forward. In perfecting this vast enterprise Rus¬ sia sent commissioners to the United States to study the American railway systems. She im¬ ported Italian workmen who had helped to build the Simplon and Saint Gotthard tunnels for the construction work. She built towns in the desert and transported whole families by the thousand to them for the work. Finally the line of track extended from her ancient cap¬ ital of Moscow in the West to her newest stronghold, Port Arthur, in the East, a direct line of communication — save only for one piece, the Lake of Baikal. This lake is large and frozen nearly half the year. At first it was traversed by boats, but in 1905 a line of rail was laid around its southern end. The line as a single-track railway was completed in 1902. It is 5,500 miles long and cost $175,000,000. The entire system from Moscow to Port Arthur was built cheaply, with light rails and wooden bridges, and it was impossible to maintain any¬ thing like a desirable speed. The schedule time for passenger trains was long (\3l/2 miles an hour) for the through express trains. During the Russo-Japanese War it became so apparent that the road was wholly inadequate to the needs of the country that constant improve¬ ments of roadway and rolling stock were in¬ augurated.

TRANSCASPIAN RAILWAY, an im¬ portant line of railway, beginning

at Uzna Ada on the Caspian Sea and extending as far as Merv in 1886, Samarkand in 1888, and to Tash- kend and Andijan in 1900. The Amu-Darya (Oxus) is crossed by a wooden bridge 6,804 feet in length.

TRANSCAUCASIA, trans ka-ka'si-a, Rus¬ sia in Asia, the region extending between the Caucasus Mountains on the north and Armenia and Persia on the south. The provinces on both sides of the Caucasus, with the added Armenian districts, constitute Caucasus' or Caucasia in the widest sense, and before the empire was broken up were under one central authority, with 1 1 minor provinces ; but the ter¬ ritory is sometimes divided into North Cau¬ casus, Transcaucasia and Armenia. It includes the famous Baku oil region. The chief town is Tiflis. Transcaucasia comprises eight prov¬ inces ; total area, 95,500 square miles ; -pop. about

7,500,000.

TRANSCENDENTAL PHILOSOPHY,

that type of philosophy which holds understand¬ ing to be the creative activity in the real world. To understand the use of the term transcen¬ dental during the past century, we must refer back to Kant and his distinction between transcendental and transcendent. Kant ap¬ plied the term transcendent to such ideas as he believed were beyond the range of any possible experience. On the other hand, he designated as transcendental those ele¬ ments which were necessary constituents of experience, but which could not come from sense-perception. These transcendental elements are the organizing principles or con¬ cepts which are the inherent property of the mind as an active understanding. Such organ¬ izing principles could never be furnished by sen¬ sation ; for it is only by their agency that the material of sensation is built up into a compre¬ hensible experience. Thus Kant maintained that the world of actual experience as far as its form is concerned is the result of the logically neces¬ sary structure of our minds, and consequently that this world is formed according to the laws of thought. Just because it is such a thought- construction Kant did not believe that the world of our experience had true reality. This true reality, he affirmed, exists beyond the world of experience and we can know nothing of it ex¬ cept its existence. Thus for Kant the tran¬ scendental represented that activity of under¬ standing which is instrumental in the construc¬ tion of human experience, but

not in produc¬ tion of reality. Kant's successors of the Ideal¬ istic School (Fichte, Schelling and Hegel) rejected his theory of an ultimate reality beyond experience, and held that the true and only reality was given within the unity of experience. Since the world of experience is formed accord¬ ing to the active principles of understanding, these transcendental principles become, in this case, active not only in the construction of experience, but also in the construction of reality. Thus in the first half of the last cen¬ tury, transcendental acquired a broad and im¬ portant meaning, signifying in general, a spir¬ itual interpretation of the universe, and more strictly, that philosophy which affirms the ac¬ tivity of reason or understanding in the nature and development of reality. Chiefly through the writings of Coleridge and Carlyle, the ideas of Kant and his successors were made known in England. Through the same medium the transcendental philosophy became known to America and inspired a definite movement in New England. This movement, called New England Transcendentalism, was a reaction from the prosaic orthodoxy and utilitarianism of the time toward a deeper and more ideal inter¬ pretation of reality. W. E. Channing and Ralph Waldo Emerson (qq.v.) were prominent in the inauguration of this movement; and there became associated in it a remarkable coterie of congenial spirits. The Transcendental Club, founded in 1836, and Brook Farm (q.v.), a social community organized in 1841, were imme¬ diate results of the movement. The first literary organ of the school was the Dial, founded in 1840. The Journal of Speculative Philosophy, founded in 1871, and the Concord School of Philosophy (1879) were later expressions of the same. The philosophy of this school was

not systematically set forth, nor was it derived wholly from German sources. It was an ideal¬ ism, rather vague, and often incoherent, which owed almost as much to the philosophy of Plato and the Neo-Platonic mysteries as to modern thought. Abolitionism and philanthropy owe much to the New England Transcendentalists. See Alcott, A. B. ; Hedge, F. H. ; Ossoli, Sarah Margaret Fuller, Marchioness; Rip¬ ley, George and Thoreau, H. D.

Bibliography. — Caird, '(Hegel> (Philadel¬ phia 1883); Carlyle, (Sartor Resartus) ; Coler¬ idge, (Biographia Literaria) ; Emerson,

TRANSEPT, in architecture, the trans¬ verse portion of a church of which the ground- plan is in the form of a cross; that part be¬ tween the nave and the choir which projects externally on each side and forms the short arms of the cross in the general plan.

TRANSFER PAPER. See Paper.

TRANSFIGURATION, Feast of the, a

festival on 6 August, instituted in honor of the Transfiguration of Christ. It is said to have been instituted in the West by Pope Calixtus III (1455-58), but is mentioned in the 9th century.

TRANSFIGURATION, Sisters of the.

See Orders, Religious.

TRANSFORMATION. See Mythology.

TRANSFORMER. See Electrical Terms.

TRANSFORMER, Step-down. See Elec¬ trical Terms.

TRANSFORMER, Step-up. See Elec¬

trical Terms.

TRANSFUSION, in medicine, the opera** tion of transferring blood (defribrinated) from a receptacle to the vein of a patient — indirect or mediate transfusion; the transmission of blood from the vein of the giver to that of the patient — direct or immediate transfusion; also the intravenous or subcutaneous introduction into the body of any substance, as saline solu¬ tion, etc. The transfusion of blood from the veins of one living animal to those of another, or from those of a man or one of the lower animals into a man, is a very old operation, hav¬ ing been first performed in 1492. Although it has been used many times with success in re¬ storing the vigor of exhausted subjects, it has frequently failed, owing to the injection of air, the too rapid distention of the heart, phlebitis, thrombosis and embolism. Blood-transfusion has been mainly used in cases of exhaustion from hemorrhages. In recent years the tend¬ ency among medical practitioners has been to substitute the injection of normal salt-solution for that of blood. It seems to be proved that <(for efficiency, freedom from danger and ease of administration the subcutaneous injection of normal salt-solution, six drams of sterilized salt to one gallon sterilized water, at a temperature of from 110° to 120° F., excels any and all things that have ever been used to relieve those suffering from shock and from the effects of hemorrhage, and as an eliminant in septic and toxic conditions.® The possible dangers at- *

tending the intravenous injection of normal salt-solution are those of blood-transfusion ; but ((when life is almost extinct and the patient's vitality so loW that the probability of absorp¬ tion from the subcutaneous spaces is slight, or where the tissues are cedematous, then the solu¬ tion should be injected into a vein.®

TRANSFUSION, Blood. See Blood Transfusion.

TRANSIT CIRCLE. See Meridian Circle.

TRANSIT INSTRUMENTS. See As¬

tronomy.

TRANSIT OF VENUS. See Venus.

TRANSITION ROCKS. See Paleo¬ zoic.

TRANSITS. The passage of a heavenly body between the observer and another more distant body of larger apparent surface is called a transit. The most frequent phenomena of this kind occur in the case of the satellites of Jupiter. The latter is many times larger than any of its satellites and it happens very fre¬ quently that an observer with a good telescope can see the passage of a satellite of Jupiter passing over the disc of the planet. The' times of these transits are predicted in the astronom¬ ical ephemeris. The transits of the inner satel¬ lites occur at nearly equal intervals of one day 18*4 hours, and it takes about 2 hours and 27 minutes for the satellite to cross. The tran¬ sit can be observed only when Jupiter is above the horizon and the sun below it, so that only about one transit in five is visible at any one place. Since the satellite is an opaque body, it casts a shadow which may be thrown upon the planet. To an observer on the latter, if the shadow passed over his position, there would be a total eclipse of the sun. The shadow appears to us as a small dark spot passing over the planet near the position of the satellite.

The satellites of all the other planets are either too small or too distant to admit of their transits being observed. For the most part they are entirely obliterated to our sight by the brilliant light of the planet itself when they ap¬ proach the latter.

The planets Mercury and Venus, having or¬ bits inside that of the earth, will be seen in transit across the sun whenever they pass in a direct line between the earth and sun. If the planes of their orbits coincided with the eclip¬ tic, this would happen at every inferior con¬ junction of the planet. But, as a matter of fact, there is a certain

inclination of each of the orbits to the ecliptic. Imagining the latter plane to surround the sun, extending out to the earth, the orbits of the inferior planets each intersect this plane at a small angle at two op¬ posite points. The line adjoining these points passes through the sun and is called the line of the nodes. If, when the planet is in inferior conjunction, the earth happens to be on or near this liner a transit of the planet will be seen across the sun's disc. In the case of Mercury the earth passes the line of nodes about 8 May and 10 November of each year. It is only within a few days of these times that transits of Mercury can be seen. When such a transit does occur, we must generally wait several

years before there is another. The interval be¬ tween those which occur in November is gen¬ erally 7 to 13 years. The interval between the transits which occur in May is generally 13 or 20 years. The following is a list of the transits of Mercury for the 20th century with the Greenwich mean time of the middle of the transit :

Year

Date

Greenwich

mean

time

1907

Nov. 14

0 h.

1914

Nov. 7

0

1924

May 7

14

1927

Nov. 9

18

1940

Nov. 11

11

1953

Nov. 14

5

1957

May 5

13

1960

Nov. 7

5

1970

May 8

20

1973

Nov. 9

23

1986

Nov. 12

16

1993

Nov. 5

16

1999

Nov. 15

9

The earth passes the line of nodes of Venus on 6 June and 6 December of each year. But it very rarely happens that Venus is so near the node on these dates that a transit will be seen. Accordingly the transits of this planet occur at much longer intervals than those of Mercury. For many centuries past and to come there are four transits in every 243 years. The condition which governs their recurrence is that 13 revo¬ lutions of Venus require almost exactly eight years. The result is, when Venus and the earth happen to pass a node at nearly the same time, they will both pass nearly the same point eight years afterward. But at the end of the second interval of eight years the conjunction will occur so far from the node that no transit will be visible. The result of this is that the transits occur in pairs, eight years apart. The interval between the last transit of one pair and the first of a pair following is either 105*4 years or \2\y2 years. The dates of these transits for several centuries past and to come are as follows :

1631 December 7 1639 December 4 1761 June 5 1769 June 3 1874 December 9

1882 December 6 2004 June 8 2012 June 6 2117 December 11 2125 December 8

It will be seen that the whole 20th century will pass away without the inhabitants of the earth having an opportunity to observe this phenomenon. But the approach of the transits of 2004 and 2012 can be watched in thought through successive cycles of eight years. An inferior conjunction of Venus occurred on 8 July 1900. At that time the earth, having passed the node on 5 June, was 34 degrees distant from it. In consequence, there was no transit, but Venus, could it be visible so near the sun, would have been seen passing, below the sun. Eight years later the same thing repeated it¬ self, only the conjunction took place be¬ tween two and three days earlier, namely, on 5 July 1908, the earth being between two and three degrees nearer to the node than it was on 8 July 1900. The conjunction continues re¬ peating itself every eight years, two or three days earlier at each repetition and a little nearer to the node, until 2004, when there will be a transit. At the conjunction of 1908, the earth was on the opposite side of the node, but

near enough to it for another transit. Then there will be no more transits for more than a century.

Transits of Venus derive their astronomical celebrity from the belief entertained in former times that they afforded the best method of measuring the distance of the sun from the earth. The measures were made by the prin¬ ciple of parallaxes. An observer, as far north as he could station himself to observe the tran¬ sit, would see Venus pass over the sun's disc on a line apparently further toward the south than an observer who was in the Southern hemi¬ sphere. The comparison of the observations made by observing the times which, at each station, it took Venus to complete its transit, afforded the means of calculating the parallax and the distance of the sun. The feasibility of doing this was pointed out by Halley about the middle of the 17th century, and, on his proposal, expeditions were sent by various na¬ tions to points in the Northern and Southern hemispheres to observe the transits of 1761 and 1769. This was a period of great unrest, and several of the expeditions became celebrated through the adventures to which they gave rise. In 1769 Mason and Dixon, the English astronomers, started on a ship of war for their station in the Southern hemisphere, but were at¬ tacked by a French frigate and were

compelled to return to nort after a severe battle. The king of Denmark sent Father Hell, a Jesuit astronomer of Vienna, to a point near the North Cape, where very successful observations were made. But doubts were thrown on the genuine¬ ness of his record, which were not settled for more than a century. The transit of 1769 was visible in the Atlantic States and observations upon it were made under the auspices of the American Philosophical Society, held at Phila¬ delphia. The most celebrated of the Phila¬ delphia observers was David Rittenhouse.

When the observations of these transits were worked up, it was found that they would not give so certain a result as was anticipated. No two observers seemed to agree as to the exact moment at which Venus had entered wholly upon the disc of the sun. The entrance was not seen in the sharp and precise way it should be seen, but seemed to be uncertain, through a dark haze forming on the two limbs at the mojnent when Venus was entering. The out¬ come of the affair was that it was more than 60 years after the last transit before a result had been worked up from it which was sup¬ posed to be quite satisfactory. This was done by Encke in 1822. The distance of the sun which he derived was, in round numbers, 95, 000,000 miles. This distance appeared in all astronomical textbooks and was almost uni¬ formly accepted for 30 years.

Then it was found by Hansen and others that there was something wrong in this deter¬ mination and it was claimed that the distance was more than 3,000,000 miles less than Encke had found it. The methods of making this determination are stated in Astronomy, Theo¬ retical. It has since been shown very clearly that a great error did really exist in Encke's determination, though it was not so great as had at first been supposed.

Notwithstanding this failure of the method,

it was supposed that with the greatly refined telescopes and better means of observation of recent times, the transits of 1874 and 1882 could be utilized advantageously in the same way. Accordingly, on each of these occasions, ex¬ peditions, fitted out with the best instruments that science could provide, were sent by various nations to the best stations for observation in various parts of the world. But when the observations were worked up, the results were again found to be unsatisfactory and the obser¬ vations turned out to be more useful for de¬ termining the position of Venus, and the slight change from century to century of its node, than for determining the distance of the sun.

Simon Newcomb.

TRANSMIGRATION OF THE SOUL, or METEMPSYCHOSIS, the belief of many races and tribes at all times, to the effect that the soul after the death of the body passes into the bodies of the lower animals or other human bodies, or, it may be, of plants or in¬ animate objects. Among various tribes of Africa and America the belief is found entirely unconnected, so far as can now be discovered, with any ethical notions. In the teaching of the Brahmanic Hindus, among whom the doc¬ trine can be traced further back than in any other race, it has its foundation in the belief of the connection of all living beings and of the gradual purification of the spiritual part of man and its return to the common source and origin of all things — God. By some the migra¬ tion of a human soul through various bodies is regarded partly as a penance and partly as a means of purification. E. B. Tylor says in (Primitive Culture,* that <(the theory of the Transmigration of Souls, which has indeed risen from its lower stages to establish itself among huge religious communities of Asia, great in history, enormous even in present mass, yet arrested and as it seems henceforth un¬ progressive in movement ; but the more highly educated world has rejected the ancient belief and it now only survives in Europe in dwindling remnants.® Probably the greatest in¬ telligence who believed in metempsychosis was Plato. The doctrine was and is common in Asia and was accepted by some of the early Christians, and there are suggestions of it in the Kabbala.

Pythagoras is the first. Greek philosopher in whose system the doctrine occupied an im¬ portant place, but Thales and Pherecydes are both said to have preceded him in teaching it. Plato in his (Phaedo) advances some probable arguments in favor of the doctrine, propound¬ ing the speculation that souls return into the Godhead after a cycle of 10,000 years, during which they have to abide in the bodies of ani¬ mals and men. Plotinus treats of two kinds of transmigrations, a passage of souls from in¬ visible ethereal bodies into earthly ones and from earthly into other earthly bodies. Among the Romans, Cicero alludes to this doctrine, and Virgil, and more especially Ovid, in many passages give it a poetical treatment. Caesar informs us that it was believed in by the Gauls, who, he says, in this faith were able to despise death. The doctrine is. also found in the Tal¬ mud. but only a minority of the Jewish rabbis appear to have adopted it. They treat the sub-

jcct of transmigration in their peculiar way, maintaining that God created but a certain number of Jewish souls, which, therefore, con¬ stantly return on earth as long as Jews are to be found here and are sometimes made to dwell in the bodies of animals for the sake of penance, but at the day of the resurrection will all be purified, and in the bodies of the just revive on the soil of the promised land. The doctrine of the transmigration of souls has also been held by various Christian sects, for example, by the Carpocratians, Valentinians and Manichaeans. It was also professed by the Arabs before Mohammed, but was not admitted by him into the Koran. Even some modern European writers have inclined to this doc¬ trine. Among these may be mentioned Lessing in Germany and Pierre Lerou and Jean Rey-naud in France. The reasoning of Lessing in support of the doctrine amounts to this, that the human soul can acquire the infinite con¬ ceptions of which it is capable only in an in¬ finite series of successive existences, that the soul in one condition may supply the deficiencies of another, and thus gradually fit itself for a perfect life.

He thus appears more of a reincarnationist, and this emphasizes a distinction that many lose sight of. Reincarnation and transmigra¬ tion are not at all identical. Obviously all human intelligences have a conscious ego which the majority conceive to be an immortal soul. Whatever we call it, we have something that raises us above the animal body which we in¬ habit. This soul or ego comes from somewhere or is created when each of us is born. Inasmuch as some souls very early show vast abilities and others are very dull and stupid, the as¬ sumption that the wise souls have lived before is not irrational. This being granted, we have our choice of two momentous but quite differ¬ ent theories. Transmigration supposes that the soul at death goes into another body, perhaps the body of a beast if punishment is deserved, perhaps is born into a wealthy and brainy family if reward is deserved. Reincarnation, as gen¬ erally taught and accepted by Theosophists, is but one day in a larger life; it propounds that as individual souls die here they pass a time on the higher planes, and are then reborn to acquire further experiences, advancing or evoluting from the lower to the higher. This is an extension of the idea of evolution and far more reasonable than the transmigration doctrine. Many, therefore, regard transmigra¬ tion as a mere corruption of the rational theory of reincarnation. Consult Besant, A., (The Self and Its Sheaths) (1895) ; Sinnett, A. P., (Esoteric Buddhism> (1883) ; Berthalet, A., transmigration of Souls) (1909) ; Moore, G. F.,

TRANSMISSION OF POWER, Long Distance. See Electric Transmission of En¬ ergy; Power Transmission.

TRANSPADANE (trans-pa'dan) RE¬ PUBLIC. See Cisalpine Republic.

TRANSPIRATION, in physics and chem¬ istry, a name first applied by Graham (in 1846) to the phenomena that are observed when a gas discharges into a vacuum, through a capil¬

lary tube, and since extended so as to include the passage of any kind of a fluid, whether gaseous or liquid, through a capillary tube, from a region where the pressure is high, to one where it is low. The laws governing the transpiration of fluids are imperfectly known. They are quite different from those that govern diffusion phenomena, and also different from those that hold in the case of the effusion of gases through a minute hole in a thin partition. In transpiration, the viscosity of the fluid ap¬ peared to be the chief factor in determining the quantity of fluid traversing the tube in a given time. The temperature of the fluid is also of much importance. Water, for example, will transpire through a given tube two and a half times as rapidly at 113° F., as. at 41° F., the conditions of the experiment being supposed to be identical in all respects save as to tem¬ perature.

TRANSPLANTING, the process of estab¬ lishing plants in new quarters, is one of the most important operations of horticulture, agri¬ culture and forestry since it permits large num¬ bers of plants to be grown during their early stages in very restricted areas, thus economiz¬ ing space and the labor entailed in their cultiva¬ tion until they are able to care for themselves. The operation is, therefore, in constant use in greenhouses, nurseries, etc., where it occupies a very large part of the time of the workers. And for forestry work hundreds of thousands of seedling trees are transplanted annually.

The operation may be performed at any sea¬ son provided proper care is exercised in manipulation. But there is with each species of plant a season at which success is more certain than at others. With evergreens this season is in the spring just before growth starts; with deciduous subjects the autumn, af¬ ter the leaves have fallen, is often as good as the spring, but a great many deciduous plants may be transplanted during the growing season. Usually, and upon large scale operations, how¬ ever, only small herbaceous plants are trans¬ planted while in active growth and then only when prepared for such operation by being grown in gardens or beds with this end in view. Such preparation is necessary since the opera¬ tion, so far as the plant is concerned, is always violent because, even when most carefully per¬ formed, large quantities of the roots are de¬ stroyed and these losses are the greater as the plants are larger and more firmly established. Hence, the smaller the plant when removed, the more

likely is it to become re-established. Trees, shrubs and herbaceous perennials which have not become active in the spring or have ceased activity in the fall are less likely to suffer because their active roots have either not formed, as in the former case, or have ceased to act in the latter. The plants should always be removed with as much of the root-system as possible, be exposed to the air and sun as short a time as possible and replanted in soil at least as moist as that from which they have been taken ; if more moist, so much the better. By soaking the soil deeply around each plant it is possible to transplant strawberries and other plants successfully even while the ground is powdery dry in midsummer. Since the loss of feeding roots will curtail the supply of water

absorbed, the leaf surface must be reduced con¬ siderably. In many instances one-half is con¬ sidered satisfactory, but with fruit trees, vines and ornamental shrubs, two-thirds or even more is frequently cut away from the tops. This top pruning is preferably done after the plants have been set, because any injured twigs may then be removed and there is then less danger of injuring the buds which are counted upon to form the new tops. Always the soil should be pressed firmly about the roots, the larger sub¬ jects being made firm by tramping the soil down hard with the feet.

Many factors exert an influence upon trans¬ planting. In arid regions, and in places where the winds are dry or prolonged, the operation is less successful than where reverse conditions prevail. Plants which have tap-roots cannot usually be transplanted successfully after they have once become established; hence, the neces¬ sity of transplanting them when very small and the advisability in many cases of cutting off the tap-roots by means of root pruning tools which go beneath the plants while still growing in the nursery rows. Instead of this method plants and others that are slow to pro¬ duce roots are often transplanted several times in the nurseries to develop more ex¬ tensive root-systems near the surface. Stocky plants almost invariably give better results than attenuated or weak ones, and plants which have been inured to the temperature of the outside air succeed where plants not so ˆhardened-off® from greenhouse or hotbed conditions will almost invariably fail or suffer serious check. The weather at the time of the operation is also an important factor. If cool, cloudy or showery weather succeeds the transplanting, the chances of success not only in the operation but in the crop (if the plant is an economic)

are greatly enhanced, and if the soil be freshly prepared so much the better. Except in dry weather it is inexpedient to water newly set plants ; but when this is done water should be given in abundance at the base of the stem, and after it has soaked down the surface should be pulverized to hold the moisture in the soil. The watering is best done in the evening and the pulverizing in the morning.

For the transplanting of cabbage, tomatoes, sweet potatoes, strawberries and other field- crops special machines have been devised. They usually consist of a furrow-maker, a distance- indicator, a plant-setting device, a tank for watering the individual plants as set, and two seats for the boys who place the plants alter¬ nately as needed. The whole is mounted on wheels and drawn by a pair of horses. The position of the next row to be planted is indi¬ cated by a marker. These machines are widely used and have been found to do excellent work with great rapidity and economy. The ˆmisses® and failures are surprisingly small in number. They are economically filled by hand.

The transplanting of large trees is frequently practised for producing quick effects in parks and private estates. The subjects chosen are al¬ ways such as have grown remote from other trees, first because the labor of cutting roots is less, and second because the tree is more shapely. Trees which have grown in groves and forests are rarely selected because their trunks are frequently too long, and have to be easily

handled to be sightly when transplanted as isolated specimens. The lower and the more bushy the top the better, because the mechanical appliances required are less powerful and costly and because the necessary pruning of the top after setting can be done with least injury to the form of the tree. If such trees may be obtained from shallow soil, so much the better, because the roots will then be near the surface. Trenches are dug as far away from the trunk as seems advisable, with large specimens 15 feet or more radius is common. When the work is done during the growing season the roots ex¬ posed are wrapped with wet moss, straw or similar material and burlap. They are wrapped and tied to the trunks for ease of handling in transit. The tree is lifted upon trucks after the excavation beneath it is complete and the ball of earth with the roots is transported to new quarters. In winter work with large trees the trenches are dug if possible in the fall and the tree with its ball of earth lifted when frozen. The practicable limit of weight for such specimens seems to be about 30,000 pounds. Such specimens of maple, elm and other hard¬ wood trees have a diameter of about two and one-half feet. When

being set in its new posi¬ tion the earth should be shoveled in gradually after the roots are in place and abundant water be applied to ensure the complete filling of every cranny. Tamping the soil around the roots with small rods is also widely practised. It is doubtful if such operations are in the long run entirely satisfactory when considered in the light of the expense, but as in the case of ordi¬ nary transplanting necessity demands them. Consult Bailey, (Standard Cyclopedia of Horti- culture) (New York 1914-17).

M. G. Kains, Horticultural Consultant.

TRANSPORT, a ship or vessel employed by a government for carrying soldiers, war stores or provisions from one place to another. At the beginning of the Spanish-American War the United States had no ships of this class. A number of coastwise craft were pur¬ chased and hastily transformed into transports on which troops were shipped to Manila and other points. When the war closed the United States government fitted up a number of these vessels as model transports. In the war be¬ tween Russia and Japan in 1904, the Japanese transported almost their entire army to Korea; some of her expeditions requiring as many as 100 transport ships for this purpose. When the United States declared war against Ger¬ many in 1917, it was almost wholly without efficient transports, for all available vessels had been put into service transporting freight, there being a reduced supply of ocean-going vessels. The first step of the United States government, therefore, was to overhaul the German ships that had been interned in Hoboken, and fit them for transport service. The government then bought all available merchant craft, which were few, and started its immense shipbuilding pro¬ gram, which was one of the wonders of the war. (See Shipbuilding). The United States transports sailed regularly from various ports, always unannounced, and so effectively guarded that there were very few losses in landing millions of troops in France.

TRANSPORTATION, (1) a punishment formerly awarded in Great Britain for crimes of a serious description, but not entailing the penalty of death. It varied in duration from seven years to the term of the criminal’s life, according to the offense. The convicts were sent to Australia, Tasmania and Norfolk Island. In 1857 transportation was superseded by penal servitude, but it was only in 1868 that trans¬ portation to western Australia actually ceased. (2) A general name for

the movement of pas¬ sengers or freight from one point to another, by rail, road or water. Transportation will be found fully treated in various articles under Railways: American Merchant Marine; Common Carrier; Steam Vessels.

TRANSPORTATION OF SCHOOL CHILDREN. See Education, Rural.

TRANSUBSTANTIATION. The real

substantial presence of the body and blood of Christ in the Eucharist is one of the funda¬ mental doctrines of the Roman Catholic Church, and the mode or nature of this mysterious pres¬ ence, which is also a matter of doctrinal belief, is expressed by the technical theological term “Transubstantiation.® The word seems to have been first used by Hilbert, bishop of Tours (1057-1134) ; it afterward became current in the Scholastic period and was solemnly adopted and approved by the Council of Trent (Sess. 13, Can. 2). In controversy exception has been sometimes taken to the term as being unscrip- tural and relatively new, but the real issue is concerning the doctrine that it serves to ex¬ press, for if the traditional Catholic belief in the Real Presence be true — belief which was never seriously called in question before the Sacramentarian controversy of the 16th cen¬ tury — it must be granted that considering the system of philosophy according to which the entire scheme of scholastic theology was built up, no more appropriate word could be found to convey the idea than “Transubstantiation.® as is shown by the use of the cognate words transformation, transfiguration, etc. Like the words dfiodvciog and deordxog which in ear¬ lier controversies became famous as epitomiz¬ ing the specific points of doctrine in dispute, the term “Transubstantiation® embodies the dis¬ tinctive teaching of the Roman Catholic Church concerning the mystery of the Eucharist. In defining the traditional position on this point against the various new views advocated by the Reformers, the Council of Trent (Sess. 13, ch. 3, 4 and Can. 2)* describes transubstan¬ tiation as ((the changing of the whole substance of the bread into the body, and of the whole substance of the wine into the blood of Jesus Christ, the appearances of bread and wine alone remaining.® This doctrine, as explained by theologians, involves the Aristotelian and scho¬ lastic theory concerning the physical nature of bodies. These are supposed to contain two dis¬ tinct and even, absolutely speaking, separable elements, namely, the underlying substance, and the accidents by which the substance is vari¬

- The doctrine of Transubstantiation had already more than once been the object of authoritative declaration on the part of the

Church, namely, in a council held in Rome under Gregory VII, 1079 a.d.; in the Fourth Lateran Council (1215); in the profession of faith sent by the Council of Lyons to Michael Palaeologus (1274); in the Decree for the Armenians which emanated from the Council of Florence (1445), etc.

ously modified (for example, size, shape, weight, color, taste, etc.). Substance, according to the same theory, consists of two essential elements or principles, one passive and indifferent, called the matter (materia prima), the other active and determining, called the substantial form. The matter is supposed to be the same in all bodies, and the specific nature and characteris¬ tics of each one are determined by its form. Thus, every species of body inanimate or liv¬ ing, including man, has its own substantial form whereby it is specifically constituted, and differentiated from all other species, and when one substance or body is changed into another (for example, wine into vinegar), the process is understood by the Scholastics as the passing away of one form (that of wine) and the succession of a new one (that of vinegar), while the material element which is the subject or basis of the change remains the same. This substantial change is, therefore, technically called transformation. No process of natural change from one thing to another was supposed to involve both elements of substance (matter and form), but such being the miraculous change recognized by tradition and the theological schools in the mystery of the Eucharist, it was aptly termed transubstantiation. According to this doctrine, in virtue of the divine power at¬ tached to the words of consecration, the entire substance (both matter and form) of the bread and wine ceases to exist, and its place succeeds that of the body and blood of Christ. The accidents or appearances remain as they were before, but they do not adhere to or modify the body of Christ as they did the sub¬ stance of the bread; they are sustained miracu¬ lously without any connatural subject of in¬ hesion, and in all respects they follow the same physical and chemical laws as if no change whatever had taken place. The body and blood of Christ remain present in these conditions as long as the consecrated species retain the out¬ ward appearance and characteristics of bread and wine, but when through deglutition or otherwise these qualities disappear, the Real Presence ceases, and the matter of that sub¬ stance, which if the process were merely natu¬ ral would, in the given conditions, have suc¬ ceeded the bread and wine, is created to meet the exigencies of the new accidents which supervene. Hence the doctrine postulates a real annihilation of matter and a subsequent creation of the same. Besides this the Real Presence thus explained, involves various other miracles, for instance, the multilocation of

Christ's body in the Sacrament and its presence in the consecrated particle without the ordinary relations to -space — a presence analogous to that of the soul in the body which it animates, but which is not really measured by any cor¬ poreal dimensions. In explanation of this the theologians say that Christ's hody in the Sacra¬ ment retains its internal, intrinsic dimensions, that is, the mutual relation of the different parts to one another, but is deprived of its extrinsic quantity, that is, its relation to other physical objects and surrounding space. The Council of Trent defined transubstantiation as the tra¬ ditional teaching of the Church chiefly in op¬ position to the view put forward by Luther, who, while he retained on Scriptural grounds the doctrine of the Real Presence and defended

it against the so-called <(Sacramentarians,® main¬ tained, however, that the substance of the bread and wine remain after the consecration as be¬ fore. This theory is called that of <(Consub- stantiation,® a word implying the coexistence in the Sacrament of both the bread and the body of Christ. Another view advanced by some of the early Reformers who rejected the Catholic doctrine, is that of <(Impanation,® ac¬ cording to which in virtue of the consecration a hypostatical union would be effected between the person of Christ and the bread and wine.

But the specific controversy between the Roman Catholic theologians and the various Protestant sects concerning the manner of Christ's presence in the Sacrament has been practically lost sight of, because, modern Prot¬ estants have for the most part given up the doctine of the Real Presence altogether, and interpret the words of institution (Matt, xxvi, 26-28, and parallel passages in the Synoptics) and other passages referring to the subject in a figurative sense. Many Catholic theologians maintain that even apart from the authoritative interpretation of the Church, the doctrine of Transubstantiation can be proved from the Scripture texts mentioned. In other words, that the idea conveyed by the word Transub¬ stantiation is as clearly contained in the New Testament as the notion expressed by the words 6[io6vglo{ and fleoroˆof, which were the keynotes of the Arian and Nestorian con¬ troversies. Others admit that a proof of the doctine, at least as it is philosophically ex¬ plained, can be educed from the words of insti¬ tution only by reading into them subtile con¬ siderations foreign to the minds of the Apos¬ tles and the New Testament writers. Be that as it may, we find that the early Fathers

under¬ stand these texts as really implying the doc¬ trine of transubstantiation. They do not, of course, use the word or attempt any philosoph¬ ical explanation of the mystery, but they affirm that contrary to the testimony of our senses, what seems to be bread is no longer such after the words of consecration, but the body of Christ. Thus Saint Cyril of Jerusalem writes : <(What seems bread is not bread,

though it seems so to the taste, but Christ's body; what seems wine is not wine, though the taste will have it so, but Christ's blood® (Cathech. iv, 9). Similar passages abound in the patristic writings, and that they express equivalently transubstantiation few will deny.

In connection with this doctrine the Coun¬ cil of Trent has defined that in the Eucharist <(the whole Christ (body, blood, soul and divin¬ ity) is contained under each species (that is, under the appearances of either the bread or the wine), and also under every part or portion of each species, at least after the parts have been separated® (Sess. 13, Can. 3). These two points offer no special difficulty if once the doc¬ trine of Transubstantiation be admitted; it need only be remarked that they exhibit the in¬ trinsic reason why the Catholic Church consid¬ ers communion under one kind to be sufficient. If priests celebrating mass are obliged to re¬ ceive under both kinds, it is only because their communion is held to be an integral part of the Eucharist sacrifice for which both species are absolutely required. For other more subtle questions connected with the theory of Tran¬

substantiation as elaborated by the Roman Catholic theologians, together with the explana¬ tions whereby it was made to fit in with the philosophical systems of Descartes and Leib¬ nitz, as well as with more recent theories, con¬ sult any of the standard manuals of Cath¬ olic theology, for example, that of Wilhelm and Scanned (in English), Vol. II, p. 415 et seq. For a criticism of the doctrine from the Prot¬ estant point of view, consult Hodge, Syste¬ matic Theology, , Vol. Ill, p. 678 et seq.

James F. Driscoll, D.D., Rector of Saint Gabriel's Church , New Roch¬ elle, N. Y.

TRANSVAAL, trans-val (now included in the Union of South Africa), a British colony in South Africa, bounded on the north by Mata-beleland, on the east by Portuguese East Africa and Swaziland, on the south by Natal and the Orange River Colony and on the west by Griqualand West, British Bechuanaland and the Bechuanaland

protectorate. The area, pre¬ vious to 1903, was 119,139 square miles but was in that year reduced to 110,426 square miles by the transfer of some of the southeastern districts to Natal. The land consists in the main of a plateau lying between 3,500 and 5,000 feet above the sea. On the east this plateau is bounded by a northern extension of the Draken- berg, rising to an altitude of 8,725 feet. East of this the land falls rapidly toward the coastal regions of the Portuguese territory. Two main mountain ranges traverse the interior of the plateau ; the Witwatersrand forms the divide between the Vaal River, flowing on the south¬ ern, and the Limpopo River on the northern boundary. The geological structure consists of granite and slate covered by the Cape forma¬ tion of standstone, slates and conglomerates, and in some parts by coal-bearing strata.

The climate is dry, nearly all of the scant rainfall being in the summer months, October to March. The mean maximum temperature is 73° and mean minimum 48°, mean annual 67° F. The western territory has a rainfall of 12 inches, which increases eastward, being 40 inches on the eastern border. Over 2,000,- 000 acres of land are under cultivation, and 30,000,000 acres are devoted to grazing. There are over 5,000,000 sheep and over 2,000,000 goats. The plateau and mountains are ex¬ ceedingly rich in minerals, including gold, dia¬ monds, coal, lead, silver, sulphur, cobalt, salt¬ petre, copper and iron. The gold deposits are foremost in the world. (See Transvaal, Gold Mining in the). In 1916 the produc¬ tion of diamonds, found chiefly near Pretoria, amounted to $28,000,000, and the coal to $6,000,- 000, copper $3,000,000 and tin $1,650,000. The diamond output in 1913 was valued at $57,000,- 000, but most of the mines shut down when the war of 1914 began. The climate in the eastern and northern lowlands is tropical; on the plateau it is cooler and very agreeable, but the rainfall is deficient. Forests, chiefly of acacias, are but of small extent. With irriga¬ tion the soil would be suitable for all European and sub-tropical agicultural products, but up to the present time there has been very little agriculture, the Boers being chiefly occupied in cattle raising. Railways have been built from Johannesburg to Delagoa Bay, Durban and the Cape ports. The mileage, about 2,500, is being

extended. The principal exports are gold, dia¬ monds, copper, wool, cattle, hides, ostrich feathers, ivory and minerals. The chief imports are provisions* machinery, carriages, automo¬ biles, shoes and clothing. The government is vested in an administrator, an executive

com¬ mittee of four and a provincial council of 36 members. Good schools are maintained; there were 892 in 1916, with an average attendance of 73,000. There are also three normal col¬ leges and 298 native schools, with 20,000 pupils. The capital is Pretoria, and the largest city is Johannesburg (q.v.), with a population of about 120,000. The total population was given as about 1,688,212. Of these 1,219,845 were natives, Kaffirs, Basutos and Bechuanas. Only one-third of the white population were Boers (q.v.), the rest being, previous to the war, termed ((Uitlanders.)) Transvaal was settled by Boers from Cape Colony in 1833-37. In 1856 they adopted a republican constitution, but in¬ ternal disagreements, unwise administration and troubles with the natives forced the republic in 1877 to consent to annexation by Great Britain. In 1880, however, the Boers rose in arms, with the result that their independence was re-established, subject to British control over external affairs. The discovery of gold brought in large numbers of foreigners, chiefly English, who demanded a voice in the govern¬ ment. After fruitless appeals to Pretoria, and a disastrous attempt at insurrection in 1896 (known as the <(Jameson Raid®), the Uitlanders appealed to the British government. After three years of negotiations England, in October 1899, rejected an ultimatum addressed to it by the Transvaal government, which thereupon invaded British territory. The war, in which the Orange Free State threw in its lot with the South African republic, lasted nearly three years. After a series of remarkable initial successes had been gained by the Boers, the two republics were finally occupied by British troops, and their annexation to the British dominions was proclaimed 1 Sept. 1900, al¬ though hostilities continued until June 1902. The War of 1914 stimulated manufacturing in the Transvaal, and they now tan their own leather, produce their own cement, beer and matches, besides manufacturing explosives, rope, brooms, brick and earthenware. See South African War; Transvaal, Gold Mining in the; Union of South Africa.

TRANSVAAL, Gold Mining in the. The

Transvaal, prior to 1903, comprised an area of nearly 120,000 square miles, but in that year, by the transfer of some of the southeastern dis¬ tricts to Natal, this area was reduced to about 112,000 square miles, which nearly equals the size of the territory of Arizona.

Besides the famous Witwatersrand there are two quartz-mining districts of some importance, namely, Lydenburg and De Kaap.

The Lydenburg district first attracted atten¬ tion in 1876, when the alluvial deposits of that section began to be exploited. At a latter

period vein-mining was started, and at the present time several companies are operating in that district. The product in 1898 of five com¬ panies, running 137 stamps, was 154,560 tons of ore, yielding 108,884 crude ounces of gold

(an average of 14.09 dwt. gold per ton) valued at £314,953.

The De Kaap gold-fields were discovered in 1884. In 1898 seven companies, running 200 stamps, produced 89,760 crude ounces of gold, valued at £296,330.

General Features of the Witwatersrand. —

This mining district derives its name from the Witzvatersrand, or (

The gold-field lies on the high plateau of the southern Transvaal. In its physical aspect the country bears a striking resemblance to certain parts of Wyoming and Nevada. While perhaps somewhat less regular in its undula¬ tions, it is equally destitute of trees other than a sparse growth of shrubs, and in appearance suggests herding and agriculture rather than mining. It is from 4,200 to 6,000 feet above sea-level, to which fact it owes its temperate and mild, indeed salubrious climate, in spite of its semi-tropical latitude. The coastal lands contiguous to the Transvaal are malarial and unhealthful.

The soil of the country is in most localities fertile; but irrigation is generally necessary; and this, owing to the lack of facilities for storing water, is not feasible at the present time.

The Transvaal has a rainy season of four or five months, the heavy rains beginning usually with November or December and con¬ tinuing until March or April. This is what is known as the summer or warm season. The thermometer rarely reaches 95° in the shade, and the heat is ((dry.® During the remain¬ ing <(winter® months (April to September) rain is very exceptional, and there is no ex¬ treme cold. Snow is a rare occurrence in the Witwatersrand district. While the climate is remarkably salubrious and invigorating, the dis¬ trict has had in the past a high rate of mor¬ tality, by reason of the lack of proper sanita¬ tion. Undoubtedly this will be greatly mini¬ mized under better government.

The town of Johannesburg (q.v.) lies upon the southern slope, about midway between the east and west extremities of the <(banket®-basin, immediately to the north of what is known as the central section of the Rand. This is by far the most important mining section of the gold¬ field. The Witwatersrand district, in a com¬ prehensive

sense, embraces also the outlying districts of Heidelberg and Klerksdorp. Johan¬ nesburg is reached by three railway lines from the ports of Cape Town, Delagoa Bay and Durban, the distance by rail being 1,013, 396 and 487 miles respectively.

Historical.— Mining in the Transvaal was prohibited until 1868, at which time the Boer government, being in dire financial straits, threw open the gold-fields to exploration and exploitation by all comers, and even went so

far as to offer a bonus for the discovery of profitable mines in the country. As a result, prospecting in the early 70s led to the discovery of quartz-veins and the inauguration of mining in several parts of the northern Transvaal. In 1885 the conglomerate- or “banket®-beds of the Witwatersrand were discovered. In that year a small stamp-battery was erected to crush the material of a quartz-vein a few miles west of Johannesburg and a crushing of conglomerate was subsequently made in this battery. But it was not until April 1887 that a battery of three stamps was erected to treat the ore of the Witwatersrand “banket.® This was followed by the erection of other batteries and the output of gold for that year was 23,000 ounces. The product increased by leaps and bounds, as is shown by the table of production given later.

Mining Titles. — The mining laws of the Transvaal are excellent in character and while the claims cover every square foot of land for an area of nearly 40 miles long by from two to three miles wide there have been practically no conflicts over extra-lateral rights.

Notwithstanding the change in the political status of the Transvaal following the Boer War the main features of the mining law of the South African Republic are retained. The principles of the English common law and the immemorial precedents of English practice up¬ hold present rights according to the statutes in force at the time of their inception. The mine- operators of the Transvaal whose titles were acquired from the Republic are, therefore, se¬ cure in the position thus defined; and hence it is not inappropriate in this place to state the Transvaal mining law as it existed prior to the war.

According to that law (1903) the right of mining for and disposing of all precious metals and precious stones belongs to the state ; but the state president, with the advice and consent of the executive council,

may, by proclamation, throw open government ground as a public dig¬ gings, upon which mining claims can be “pegged off® (that is, located) as specified by law.

An owner of a farm may, upon application to the government, have the farm likewise pro¬ claimed. Before the proclamation of a private farm, the owner has the right of allotting to any person or persons he may specify a cer¬ tain number of claims, called V ‘ er gunning claims, the number depending upon the size of the farm but not exceeding 60 as a maximum.

The owner has the further right to reserve for himself one-tenth of the ground, which is called a Mynpacht. This portion is held by the owner as a lessee, under what is called a Myn¬ pacht Brief, for a term of not less than five years nor more than 20 years, with the privilege of renewal. The rental on Mynpacht was 10.?. per Morgen (2.11 acres) in 1903.

He may also retain a certain area for resi¬ dential and farming purposes, called a ((JVery) or homestead. Finally, the owner of a pro¬ claimed farm is entitled to one-half of all licenses paid to the government.

A reef-claim (lode-claim) is 150 Cape feet (155 English feet) on t-he strike of the reef by 400 Cape feet (413.2 English feet) in the direc¬ tion of the dip — about 1.47 acres.

Table I — South African Land-Measures.

1 Cape ft . = = 1.033 English ft.

1 Cape sq. ft. . . . = 1.067 English sq. ft.

1 Claim . = 150 by 400 Cape ft. = 60,000 Cape

sq. ft. or 64,025 English sq. ft. f= 1.47 English acres.

1 Morgen . = 92,196 English sq. ft. = 2.1165

English acres of 43,560 sq. ft.

Prospecting is not allowed on private ground without permission of the owner, but public ground is open to prospectors, though claims may not be pegged out until after proclamation of the ground in question as above described.

For a prospecting license on proclaimed private ground there is a charge (1903) of 5y. per month per claim, half of which goes to the owner and the rest to the government. On government ground the similar charge is 2s. 6 d. per month, which goes to the government.

When, in the judgment of the mining com¬ missioner, the results of the exploration justify the step, he may convert the prospecting licenses into a digger's license, after which a charge of 20.?. per claim per month is made, provided ore from the property is being crushed. If, how¬ ever, no ore is being extracted and crushed from the claim, the charge for the digger's license is 15.?. per month.

In 1896 the receipts from prospecting licenses amounted to £620,000; from diggers' licenses, £61,000, and from machine-stand licenses, £59,000.

Financial Conditions. — At the outbreak of the South African War the total capitalization of the gold mines of the Witwatersrand was over £70,000,000 at par, and at market prices about £147,000,000. A large part of these amounts represents worthless properties which have been "floated® during "boom® times ; yet, notwithstanding this excessive capitalization, the mines yielded about 7 per cent on the total capitalization at par, and about 3.5 per cent on market prices. Eliminating properties notori¬ ously without value, and also the capitalization of certain "deep-level® properties which have not, as yet, reached a producing stage, we may pronounce the returns from bona-fide invest¬ ment and competent management to have been exceedingly satisfactory.

In 1898 77 companies operating stamp-bat¬ teries produced 4,295,609 crude ounces of gold bullion of the value of £15,141,376, and of these companies 41 distributed in dividends for that year £4,847,505, or about 15.6 per cent on their nominal capital of £31,018,000. The market cap¬ italization of the same companies, however, was £82,555,000; and the dividends returned on this capitalization were about 5.9 per cent.

The majority of the "outcrop companies® — indeed, nearly all of those situated in the cen¬ tral section (extending from the Langlaagte Estate to Knights, on the Witwatersrand) — are free of indebtedness and will not require fur¬ ther capital, unless for future increase of plant, especially for enlarging their milling capacity. Any additional capital required for such pur¬ poses could be provided either from the profits already earned, or by the issue of debentures, to be ultimately likewise redeemed from profits.

For the “deep-level® properties, on the other hand, and especially for those covering the deeper levels, that is, those situated on the second and third lines of claims parallel to the outcrop, a large amount of money must be ex-

pended before the mines can become productive. Instead of increasing the capital stock for this purpose it is generally the practice of the Rand companies to i;aise the money by the issue of debentures. There has been no difficulty in ob¬ taining working capital by this means, often to the extent of £400,000 or £500,000. About £5,000,000 of such debentures were issued up to

1903.

Houses of high standing have been able to raise such loans of working capital upon deben¬ tures bearing interest at 5 to 6 per cent per annum, giving as an inducement to the pur¬ chaser the right to exchange the debentures for fully paid-up shares, at a certain price, within a given period from the date of issue, during which period the shares are likely to command a good premium.

Nearly all the Rand companies in 1903 were controlled by large financial concerns, such as Wernher, Beit and Company, who control the Rand Mines group and some other properties ; the Consolidated Gold Fields Company, which controls the Simmer and Jack (one of the largest mines on the Rand), the Robinson Deep, the Nigel Deep and some of the first, as well as many of the second, row of ˆdeep-levels® ; the Messrs. Farrar, who control the East Rand Proprietary and its subsidiaries, the An¬ gelo, Dreifontein, New Comet, etc.; Barnato Brothers, who control the Primrose, Glencairn, Ginsberg, Roodepoort, etc., and A. Goerz and Company, who control the Geldenhuis Estate, the May Consolidated, the Lancaster and the Geduld Princess Estate, etc.; Mr. Neumann and associates, controlling the Consolidated Main Reef, Treasury and Wolhuter; Messrs. Alba, controlling the Aurora West, Meyer and Charl¬ ton, George Goch, Van Ryn, etc., and J. B. Robinson, who controls the Robinson group, comprising the Langlaagte and Randfontein Estates and their several subsidiaries. These parties had the entire financial and technical direction of the companies in which they possess a major voting interest. All the important companies are listed on the stock exchanges of Johannesburg and London.

Gold Production of the Transvaal.

1884-89

1890. . . .

1891. . .

1892. . .

1893.. ..

1894.. .. 1895. . .

1896. . . .

1897.. ..

1898.. ..

1899.. ..

1900.. .

1901.. . . 1902. . .

1903.. .

1904. . .

1905. . .

1906. . .

1907. . .

1908. . .

1909. . .

1910. . .

1911 .. .

1912.. . 1913. . .

1914. . .

1915. . . 1916. . .

£2,678,231

1,869,645

2,924,305

4,541,071

5,480,498

7,667,152

8,569,555

8,603,821

11,653,725

16,240,630

15,728,693

1,510,131

1,096,051

7,253,665

12,589,137

16,055,000

20,802,000

24,580,000

27,404,000

29,958,000

30,926,000

32,002,000

34,992,000

38,758,000

37,658,000

35,588,000

37,264,000

38,110,000

The financial administration of the Wit- watersrand mines is, as a rule, able and honest. The Transvaal law requires a monthly state¬

ment of the amount of ore crushed, gold pro¬ duced, etc. Such reports are published monthly by the companies in great detail.

As a rule, the Johannesburg local directors and mine managers are exceptionally trust¬ worthy and full reliance can be had on the accuracy of their reports. Sometimes, how¬ ever, attempts are made, for market purposes, to underestimate the working costs, by charging to capital expenditure money which should strictly be reckoned as working expenses. In this way fictitious profits may be shown ; but the practice is not usual, and latterly has been seldom adopted.

In the formation of a new company the owner or owners of the mining claims (and often the financial promoting syndicates) usu¬ ally receive a certain number of vendors' shares of the company to be formed by an amalgama¬ tion of claims. Moreover, a certain number of shares are sold (usually at par) for working capital ; and a certain number of shares are re¬ tained as a treasury reserve, which frequently are sold, some time afterward, at a consider¬ able advance. The majority of the companies have greatly increased their capital since their formation ; but, notwithstanding this fact, their new shares are in many cases several hundred per cent above par.

Economic Conditions. — The methods of mining in the Witwatersrand district present no features specially different from those followed in the exploitation of similar deposits elsewhere. (See Gold Mining; Gold Standard and Gold Production). In 1898 there were employed upon the Rand 9,476 whites and 88,627 Kaffirs. The attempt to introduce Chinese labor early in the century was but partially successful. In December 1915 there were 23,069 whites and 223,764 native negro workers in the mines. The white laborers are predominantly British, though the leading consulting and superintend¬ ing engineers and many of the important mem¬ bers of the technical staffs are Americans. The mine- and mill-foremen are usually either Americans

or British subjects who have had mining experience in America. These men are generally thoroughly competent ; but the aver¬ age of white labor as a . whole, especially among carpenters and machinists, is far below the American standard. Considerable improve¬ ment, however, is taking place in this regard. A large part of the manual laborers on the surface and all the miners except those running machine-drills are blacks — Basuto, Zulu, Shan- gani and Zambesi <(boys.® The quality of this black (native) labor is very poor. Most of the (

and the holes are fired by him, firing by the ˆboys® being usually forbidden. Some of them, however, acquire sufficient knowledge to fire a hole and also to run a machine-drill. The latter work is generally done by contract, and the con¬ tracts are given to whites.

By reason of the rapidly increasing demand for labor and the obstacles interposed by the Boer government, there was a great deficiency of native labor. As a result large numbers of air-drills have been necessarily employed in stoping, to the great disadvantage of the mines, since much of the ground is of ‘such a character as to make stoping by machine-drills econom¬ ically unadvisable. Where the reefs are flat or small, the employment of drills necessitates the breaking down of much larger blocks of ground than would be necessary with > hand-drills. Moreover, work under such conditions involves the excessive use of dynamite — an important item where dynamite is as expensive as it has been upon the Rand — and creates at the same time an undue amount of fine waste, which not only lowers the yield of the ore in the battery, but increases the production of slimes.

The percentage of working costs of mining is given in the subjoined table, from which may be seen that the white and the native labor represent about 30 per cent each.

Table Showing Percentage of Working-costs.

	Per cent
White labor . ._ .	31.22
Native labor (including food) .	29.83
Explosives (dynamite, fuse, caps) .	9.70

Coal . 9.07

Chemicals (cyanides, etc.) . 3.22

Tools, steel, shoes, dies, etc . 3.29

Mining timbers, lumber . 4.05

Candles, lighting . 1.38

Sundries . 8.24

Total . 100.00

Before the Boer War the difficulty of secur¬ ing adequate labor was so pronounced that Cecil Rhodes, some 10 years ago, appealed to the Transvaal government for permission to im¬ port coolies for work in the Rand mines, but was met with a curt refusal on the part of President Kruger. Since the incorporation of the two Boer republics into the British empire matters have become still worse in this respect. For, whereas in 1897 about 100,000 Kaffirs were working in the mines, it was found impossible in 1903 to secure more than 60,000, and no fewer than 200,000 were needed. All attempts to obtain native labor from other parts of British Africa failed, owing to the inherent indolence of the black man and to his particular aversion to underground work. The conse¬ quence was that the owners were unable to work their mines to anything approaching their full limit. This was all the more serious when it is borne in mind that throughout the war, and for some time afterward, the Transvaal mines, comprising the most important gold- producing area of the world, were practically at a standstill, causing a scarcity of gold.

Conditions in 1917. — So far, we have been discussing conditions in the Transvaal in 1903, when the production was £12,589,000, or $60,- 000,000. Within two and a half years there¬ after the Transvaal passed Australia in gold production and caught up with the United States. In 1906 the territory became, what it has ever since remained, the world's greatest

producer of gold, with an output that year of $123,000,000. It could and should have been even greater, for the gold was there, and the stamp-mills, but the laborers were few. White men do not many of them care to go to South Africa, and the natives are not inclined to hard work. Chinese were imported, but they did not like it, and after getting in a few thousand the experiment was abandoned. Then came the tube mill, as an improvement on the time- honored steam-pump,

and this helped the pro¬ duction. In 1903 the 7,915 stamps were half of them idle most of the time. In 1916 there were 9,250 stamps and 310 tube mills, and the product over three times as great, the average monthly reduction being 2,370 tons of ore, averaging 6.26 hundredweight gold per ton, or £3,170,000. The cost of production is still phe¬ nomenally low, although 54 per cent of it is labor. In 1916 the average ton of ore cost $4.34 to mine and turn into gold, and yielded a profit of $1.96. Those who think a gold mine must be all profit may well reflect on this, that if the cost in these greatest of mines had been 45 per cent greater, there would have been no profit in getting out the gold. The largest producing Rand mines in 1916 were the following:

Monthly output of ore

Crown mines . 203,000 tons

Randfontein Central . 185,712 tons

East Rand Proprietary . 155,500 tons

Knights Deep . 102,400 tons

It is, therefore, apparent that the largest producer of these mines is yielding (at $4 a ton) over $8,000,000 a year of gold. Wonder¬ ful as this is, yet these four great mines are scarcely as valuable as some of the new mines coming into wealth in the Far East Rand ter¬ ritory. This new section has been developed by following the trend of the ore beds as they go deeper, and sinking shafts anywhere from 4,000 to 7,500 feet deep. These new mines are com¬ ing into their best, while those quoted are at their zenith or declining. T. A. Rickard con¬ siders the New Modderfontein the greatest mine in the world. In 1916 it was yielding 53,500 tons a month of very rich ore, averaging a value of $7.65 a ton, or 70 per cent more than the aver¬ age for the whole Rand. But the wonderful part is that borings have tested out a continu¬ ance of this rich ore to the total of nearly 20,- 000,000 tons, so that this mine may reasonably look forward to a production of $125,000,000 worth of gold in the next 20 years. When will this phenomenal supply of gold give out, as all gold mines and gold fields do eventually? In 1903 the accepted estimate of remaining gold to be mined was $3,500,000,000. . Since then $2,000,- 000,000 has been taken out, and yet some en¬ thusiasts think there is $3,000,000,000 left.

South Africa as a whole gives no promise of becoming a leading factor

in the economic life of the world. Mr. Bryce's forecast of the gold regions outside of the Rand throws light on the whole situation. He says :

<(Assuming that a fair proportion of the quartz-reef gold fields turn out well, it may be predicted that population will increase in and around them during the next 10 years, and that for some 20 years more this population will maintain itself, though of course not necessarily in the same spots, because as the reefs first de¬ veloped become exhausted, the miners will shift

to new places. After these 30 or possibly 40 years, that is to say, before the middle of the 20th century, the country, having parted with its gold, will have to. fall back on its pasture and its arable land ; but, having become settled and developed, it may count on retaining a re? son- able measure of prosperity.®

(The above was written by John Hays Ham¬ mond in 1903 and has since been revised by bringing the figures, etc., up to date. — Ed.).

TRANSVAAL WAR. See South Afri¬ can War.

TRANSYLVANIA, tran-sil-va'm-a, Ru¬ mania. Until annexed by Rumania in De¬ cember 1918, Transylvania, since 1868, had been a part of Hungary. It has an area of 21,500 square miles. The surface is moun-i tainous, being covered with the Carpathian chain and its ramifications. The whole be¬ longs to the basin of the Danube, which receives a great part of its waters circuitously by the Maros and the Szamos, both tributaries of the Theiss. The climate is healthful; the summer heat of the lower grounds is at times extreme. There are magnificent and valuable forests; fruits abound everywhere, and the culture of the vine is general. The crops in¬ clude, besides the ordinary cereals, potatoes, etc., also maize, hemp, flax and tobacco. Fine breeds of horses, cattle and sheep are reared. Many horses are exported. Large numbers of swine are fattened. The wild animals include bears, wolves and wild boars. The minerals are important and include gold, silver, copper, lead, iron, quicksilver, antimony, coal and salt. The last occupies immense tracts. Manufac¬ tures have made little progress and are chiefly in the hands of Germans. The trade is chiefly confined to the natural produce of the country, and imported manufacturers. The chief towns are Kolozsvar (61,000), Brasso

(41,000), Nagyszeben (34,000). Education is in a back¬ ward state. The population, about 2,500,000, is very mixed. Transylvania not being now a political division of Hungary, the reader is re¬ ferred to Hungary for further statistics. The principal nationalities are Rumanians, Magyars and Germans, besides Gypsies, Jews, Bulgarians and others. The chief religious bodies are Roman Catholics, Greek Catholics and Prot¬ estants. The name Transylvania, signifying (

TRANSYLVANIA COLLEGE, a non¬ sectarian institution of higher education at Lexington, Ky., founded in 1798. Its faculty numbers 29; the average annual attendance of students is 280 ; the tuition fees are $65 ; the

living expenses, board, etc., $170. The produc¬ tive funds amount to $414,936 ; the total income, including tuition or incidental expenses, to $43,- 253. The college colors are crimson. The library contains over 23,000 volumes. The number of graduates since organization is 3,555.

TRAP, any dark-colored volcanic rock of columnar structure, named with reference to their common stairlike arrangement. Most trap rocks are either finegrained basalts, diabases, diorites or gabbros. The term is a convenient one when the exact nature of the rock has not yet been determined and is largely used in field work. The Palisades of the Hudson, North Mountain in Nova Scotia, the Giants' Causeway and Fingal's Cave are familiar examples. The name is derived from the Swedish ((trapp,® applied to these rocks from their occurrence in step-like sheets.

TRAP-DOOR SPIDERS, large hairy theraphosid spiders of the family Ctenizidce and its allies, which inhabit dry warm countries and form well-like pits or burrows in the ground, closed by a hinged lid. These burrows are placed in high, well-drained situations and are dug by the owners, who cut down and carry away the earth in their jaws, depositing it at some distance. The holes vary in size with the species and age of the occupant, and the largest may be more than a foot deep. The burrow of a species (Cteniza calif ornica) common in southern California is of that depth, and an inch in calibre, when the owner is fully grown. In some species the wells have a branch bur¬ row slanting from one side, and others make two entrances, so that a plan of the burrow would resemble a Y. These burrows are lined with a coating of silk, and in every case the entrance (or entrances) is closed by a tight- fitting circular door composed of clay, bound and lined with silk, and hinged at one side to the lining of the burrow; the top of the door is left rough and earthy, so that when it is closed nothing betrays the presence of such a contrivance. In this snug castle

the spider dwells in safety and comfort, rearing its young under the protection of the door, which it can hold so firmly shut that nothing short of tearing the structure apart will suffice to open it. In the species of the south of Europe the lining and door are much thinner than those made by the American trap-door spiders; and if these doors are torn off a new one will be made overnight, for several nights in succession or until the insect's strength is so exhausted that it can no longer produce the requisite silk. For further facts consult general works, especially Mogg- ridge, (Harvesting Ants and Trap-door Spiders > (London 1873). See Spiders.

TRAP-NETS. See Pound-net Fishing. TRAP-ROCK. See Rocks; Trap.

TRAP-SHOOTING, an outdoor sport in¬ creasingly and deservedly popular in the United States and Canada, in which by means of a mechanism now called the ((trap® a disc of coarse pottery, ((the clay pigeon,® is thrown upward at an angle unknown to the sports¬ man, who thereupon sights his piece and fires while the disc is still in the air. The name trap¬ shooting is derived from the former practice of placing a series of traps in the ground, in each of which was imprisoned a live pigeon, and at a given signal of the marksman the operator

of the trap liberated one of the birds. The first mention of trap-shooting as a sport is found in an old English publication called the Shooting Magazine, issued in 1793, and it is there referred to as being a ((well established recreation® of the period. Trap-shooting, both at live birds and inanimate targets, has become one of the most popular of British sports, but is not indulged in to nearly the same extent as in the United States. In the records of the Sportsmen's Club of Cincinnati, Ohio, for the year 1831 is found the earliest mention of trap¬ shooting in the United States. Cincinnati, therefore, appears to be the birthplace and early home of the sport in the United States. Passenger pigeons, and sometimes quail, were used in the sport. The Long Island Club was formed about 1840, and soon after the New York Sportsmen's Club was organized in that city. What may be termed the (

tower instead of from the ground. The levers are worked from below and hurl the targets at any desired angle.

The first and the only international trap¬ shooting contest was held at

the Middlesex Club grounds near London, 11-13 June 1901. The conditions of the matches called for any 10 men from the United States against any 10 men from England, Ireland and Scotland, each man to shoot at 100 targets; the Americans to use but one barrel and one and one-fourth ounces of shot, while the British team were allowed the use of both barrels and one and one-eighth ounces of shot, the targets to be shot at 18 yards rise. A purse of $5,000 was to go to the winner of three out of five contests. The Americans won three consecutive matches, end¬ ing the contest on the third day, the total score standing :

First Match Second Match Third Match

Americans

866

877

843

British

801

794

749

W. R. Crosby of the American team scored 93, 95 and 90 in the three matches as against 87, 87 and 83 by Izzard, Joynt and Pike, respec¬ tively, of the British team. On 19 June of the same year the American team defeated a picked Scottish team, the total score being American 9o9 ; Scottish 882. For a full and complete his¬ tory of this sport, with illustrations of very many tiaps and discussions of their individual merits, together with rules for matches, scor- lˆS, etc., consult Eaton, D. H.,

TRAPA. See Singh ara Nut.

TRAPANI, tra’pa-ne, Italy, a seaport and episcopal see in Sicily, 47 miles west of Palermo, capital of a province of the same name in the extreme west end of the island. It is a walled town, and its port the safest on the western coast. The chief edifices are the cathedral, provincial palace and lyceum. A statue of Victor Emmanuel stands in the piazza bearing his name. The manufactures consist of coral,

alabaster and shell objects, ice and olive- oil. There is an active trade in wine, salt and flour. The fisheries are important, especially sponges and tunny-fish. At a short distance northeast of the town is Mount San Giuliano, the ancient Eryx (q.v.). Pop. of the town about 15,000; of the commune 60,799; of the province, 367,507.

TRAPEZIUM, and TRAPEZOID, two

geometrical terms. As commonly accepted in the United States the word trapezium is used to denote a quadrilateral of which no two sides are parallel, while trapezoid is the name applied to a quadrilateral two of whose sides are parallel. Ancient Greek writers did not always make a clear distinction in their usage of the two terms, and in England the .definitions are the reverse of those here given.*

TRAPHAGEN, Frank Weiss, American chemist and metellurgist : b. Eaton, Ohio, 20 July 1861. He was graduated from the School of Mines of Columbia University in 1882, and afterward pursued special studies in analytical and applied chemistry receiving the degree of doctor of philosophy. In 1884 he became an instructor in chemistry and physics at the military academy at Staunton, Va. He was pro¬ fessor of chemistry at the College of Montana,

1887-93, and in the latter year accepted the chair of chemistry at Montana State College, which position together with that of chemist of the Montana Experiment Station he occupied until 1903, when he was elected to the position of professor of metallurgy at the Colorado School of Mines, Golden, Col. In 1917 he became pro¬ fessor of metallurgy at the South Dakota School of Mines. He has published in addition to numerous State, bulletins (A New Departure in Cyanide Treatment) ; (Salicylic Acid in

Fruits) ; (Notes on Alkali Soil in Montanaˆ ; (Sugar Beets) ; (Food Adulteration } ; Colo¬ rado School of Mines Notes, } on assaying and many articles on metallurgical subjects. Pro¬ fessor Traphagen is Fellow of the London Chemical Society, the Society of Chemical In¬ dustry, the German Chemical Society, the American Association for the Advancement of Science, the American Chemical Society, mem¬ ber of American Institute of Mining Engineers, and many other

scientific bodies.

TRAPPISTS. See Cistercians; Orders, Religious; Rance, Dominique Armand Jean

LE BoUTHILLIER DE.

TRASIMENO, Lago, la'go tra-se-ma'no. See Perugia.

TRASK, Spencer, American banker: b. Brooklyn, 1844; d. 31 Dec. 1909. * He was edu¬ cated in Princeton University from which he was graduated in 1866 to enter a Wall street banking house and in 1881 established one under his own name with branches in the larger cities. He was a supporter of many inventions including those of Edison ; was identified with many corporations and was widely known as a man of philanthropic tendencies. He built Saint Christina's Home for Children at Sara¬ toga and did much to restore the popularity of the springs there. He was killed in a railroad accident.

TRASKITES, the early designation of the Sabbatarian Puritans, an English sect. The title was derived from John Trask, of Somerset¬ shire, who about 1617 became a preacher in London. Trask enjoined upon his followers a fast of three successive days, saying that with the third day's fast they would attain the state of justified saints; enforced the performance of all things according to the law of Scripture; required that Sunday be observed with a strict¬ ness equal to that with which the Jews ob¬ served the Sabbath ; eventually made Saturday the day to be observed thus, this feature be¬ coming distinctive of the sect; and establishec' several ceremonial customs. In 1634 the com¬ mission for ecclesiastical causes included «Traskists» among the ˆseparatists, novelists and sectaries® to be proceeded against by the authorities. Trask was haled before the Star chamber, and put in the pillory. Later, he is said to have recanted, though it is also re¬ corded that before his death he became an Antinomian. The Traskites perhaps also as¬ sumed the title Separatists (q.v.). The modern Seventh-Day Baptists represent the Sab¬ batarian views of the Traskites.

TRASS, a trachytic tuff from the Eifel dis¬ trict, which is used on the Rhine for hydraulic cement.

TRAUTWINE, trowt'win, John Cresson,

American civil engineer: b. Philadelphia, 20 vol. 27— 2

March 1810; d. there, 14 Sept. 1883. He entered the office of William

Strickland, a leading engineer and architect of Philadelphia, in 1828, and made rapid progress in the profession. He designed and had charge of the construction of the Penn Township Bank, assisted in the con¬ struction of the United States Mint and other public buildings, and in 1831 became civil en¬ gineer on the Columbia Railroad. He was en¬ gaged in railroad engineering until 1842, and in 1 8-4 1—19 wTas associate engineer with G. M. Totten in the construction of the Canal del Dique, connecting Magdalena River with the Bay of Cartagena. In 1850 he was again engaged with Totten in making the surveys for the Panama Railroad. He was later occupied in a survey of the harbor of Arecibo, Porto Rico, and in railroad surveying in Pennsylvania. He went to Honduras in 1857 to survey the route for an interoceanic railroad, and in 1858 he ex¬ amined the harbor of Montreal and planned for that city a system of docks. He retired from active business after 1864, though he continued to act as consulting engineer and expert. He published (Method of Calculating the Cubic Contents of Excavations and Embankments> (1851) ; (Field Practice of Laying Out Circu¬ lar Curves for Railroads1* (1851), and (Civil Engineer's Pocket-Book. > This latter has be¬ come standard, is reissued at short intervals, and is popularly called ˆrautwineP

TRAVANCORE, trav-an-kor', India, a na¬ tive state in the province of Madras, occupy¬ ing the extreme southwestern part of the In¬ dian peninsula; area, 7,594 square miles. The soil is well watered, fertile and well cultivated. Coco and areca-nuts, pepper, tea and coffee are exported. The state is well administered, and both elementary and higher education pro¬ vided for. It yields an annual revenue of about £761,000. The inhabitants are mostly Hindu, and ruled by a raja. Pop. about 3,428,975, being 452 to the square mile, which is ex¬ cessively dense, even for India.

TRAVELER'S TREE, an arborescent plant (Ravenala madagascariensis) belonging to the family Musacecu. It has a succulent or woody stem, and broad, shining, banana-like leaves, among the largest in the world. They are in two opposed rows and in one plane, and form a semi-circle above the base like an open fan, with ribs many feet long. The Ravenala is a very conspicuous object in Madagascar, its original habitat, and usually grows in clumps. Water from the surface of the leaves is con¬ veyed down the channeled petiole to reservoirs in the excavated basal sheaths, whence the thirsty traveler can obtain a refreshing liquid even in- the driest seasons. It is otherwise a very useful plant since the leaves are service¬ able in house-building, as thatch, partition, and even in making walls. The hard, external cotex is stripped off, beaten flat and used for flooring. The green leaves do duty also as wrapping-paper, rain-sheds, table-cloths and dishes, and

when folded properly, as spoons or drinking vessels. The large flowers are in a spathe, and are racemose, maturing into woody capsules, enclosing seeds that are edible and have a pulpy and lacerate blue aril yielding an essential oil.

TRAVELER, The. Oliver Goldsmith's (Thc Traveler, or a Prospect of Society,* a

didactic poem in couplets, was published in 1764, with a dedication to the poet's brother, the Rev. Henry Goldsmith. The first of Gold¬ smith's works to attract wide attention, it went through many editions and was pronounced by Johnson the best English poem since the death of Pope. The theme is somewhat akin to that of Johnson's ˆasselas.* From a point of vantage in the Alps the poet takes survey of the nations of Europe, asking which has the greatest share of happiness. He concludes that each government and way of life has its draw¬ backs as well as its advantages, and that the ((bliss which centres in the mind® may be at¬ tained as well under one system as another.

"Still to ourselves in every place consign'd

Our own felicity we make or find."

The successive pictures of Italy, Switzerland and England are interesting and nicely differ¬ entiated. The versification is smooth and grace¬ ful and the expression felicitous. Especially pleasing is the intimate account of France, ((gay sprightly land of mirth and social ease,® where the poet himself in earlier days had piped to the (

James H. Hanford.

TRAVELING LIBRARIES. A traveling library has been defined as ((A collection of books lent for stated periods by a central li¬ brary to a branch library, club, or other organ¬ ization or, in some instances, to an individual.® The chief characteristics from which it derives its name are its temporary location in the place to which it is sent and the implication that any traveling library will or may be changed for others.

The date of the first traveling library is un¬ certain. Passing by the itinerant chapman and ballad-seller, the religious colporteur and the

camp library of Napoleon I listed in Bour- rienne's 'Memoires,* the ˆCirculating schools® of Wales, promoted in 1730 by Griffith Jones, and the later similar schools of the General Assembly of the Kirk of Scotland in the High¬ lands and the Scottish islands may be noted as forerunners of educational extension and its logical corollary, traveling libraries. The first really practicable traveling library plan seems to have been started by Samuel Brown in East Lothian, Scotland, in 1817, though it is stated that the principle had been used with some Scottish parish libraries as early as 1810. Brown procured 200 selected volumes <(about two- thirds of which were of a moral and religious tendency, while the remainder comprised books of travel, agriculture, the mechanical arts and popular sciences.® Four libraries of 50 vol¬ umes each were stationed in Aberlady, Salton, Tyninghame and Gawald. In 20 years these li¬ braries had increased to 3,850 volumes, dis¬ tributed through 47 villages. Jean Frederic Oberlin is said to have founded itinerant libra¬ ries in his parish of Waldbach in the Vosges Mountains at about the same time that the East Lothian libraries were established. Both of these early plans barely survived their founders.

A successful system of traveling libraries was begun by the public library of Melbourne in 1860. Oxford University in 1878 and Cam¬ bridge University soon after began to send out traveling libraries as an aid to their university extension courses.

Traveling Libraries in America. — The

American lyceum movement demonstrated the need of libraries to conserve the results of its work. ((Itinerating libraries® and a county sys¬ tem of traveling libraries were proposed as early as 1831. In 1848, the American Seaman's Friend Society began to furnish libraries to American ships, afterward extending its work to naval hospitals and life-saving stations. The United States government has supplied similar libraries to lighthouses. These were exchanged frequently. The first general American travel¬ ing libraries supported by public funds were authorized by the New York State legislature in 1892. The first library was sent out by the New York State Library in February 1893. Beginning with 10 libraries of 100 volumes each the circulation for the first fiscal year was 2,400 volumes. This increased in 1918-19 to a total circulation of 43,958 vol¬ umes sent out in 1,099 different collections, with a total stock of 100,641 volumes. Michigan and Montana enacted traveling-library legislation in 1895 and Wisconsin and Iowa in 1896.

Virtually every State library commission now maintains a traveling

library system for the li¬ braries of its own State. The work of the traveling libraries section of the Educational Extension Division of the University of the State of New York may be taken as typical of the more highly organized form of this work in the State commissions. This division will send traveling libraries (

When the books in these libraries are avail¬ able to all members of a community no fee is charged for the first 25 volumes. In the case of restricted use (as in classes 6 and 7) a small fee is charged. Small fees are also charged for volumes in excess of 25. The period of loan is from three months (in the case of house libraries) to one year (in case of schools and study clubs). The collections are of two types : fixed and open shelf. The former are lent as a unit and the borrower is allowed no substitutions for titles on the list. The latter are selected from the general collection of the extension department to meet, as far as possi¬ ble, the specific desires of the organization or person borrowing the library. The fixed col¬ lection is more economical as it ensures the use

of the whole collection ; the open shelf collec¬ tion is more flexible and, therefore, more satis- factor}' to most people. The tendency is to¬ ward the open shelf collection.

The large city libraries maintain similar systems. Their <(deposit stationsˆ are essen¬ tially traveling library collections. In addition, smaller collections of books are sent to clubs, schools, organized societies, police and fire sta¬ tions and many other types of organizations. The New York Free Circulating Library, which had for several years supplied traveling libra¬ ries to schools, in 1897 established a traveling library department. This, which is now the Ex¬ tension Division of the New York Public Li¬ brary, in 1918 sent out 46,402 volumes to 417 agencies. The Free Library of Philadelphia be¬ gan its traveling library work in 1896. A typi¬ cal example of the use of traveling library books is seen in the Saint Louis Public Library which reports a circulation of 240,883 volumes in the fiscal year 1918-19.

An interesting variant of the traveling li¬ brary is the book-wagon or automobile which delivers books along definite routes radiating from some library centre. The pioneer book- wagon in the United States was started in April 1905 by Miss Mary L. Titcomb of the Wash¬

ington County Free Library of Hagerstown, Md. The Connecticut Public Library Commit¬ tee and the Delaware State Library Commis¬ sion have also maintained book-wagons. Book- wagons have also been used in parts of Wis¬ consin. A local book delivery automobile has recently been put into service by the Endicott (N. Y.) Free Library. To some extent rural mail delivery wagons have been used for traveling library purposes but the possibilities in this direction are capable of much greater development.

Several unsuccessful attempts have been made to establish traveling libraries on a com¬ mercial basis. The best known of these, the Booklover's Library and the Tabard Inn Library, founded in Philadelphia in 1900 and 1902 re¬ spectively, were measurably successful for some time.

Educational .Significance of the Traveling Library. — The traveling library idea has spread throughout the civilized world and the small collection of books changed frequently is known in many places in which the more elaborate pub¬ lic library is as yet unknown. The late war was instrumental in giving the idea greater promi¬ nence than ever before. The case of books sup¬ plied by the Red Cross, the American Library Association or other relief organizations fol¬ lowed the troops into the trenches as well as into the camp and hospital and prison camps. It was a familiar sight on every war vessel or transport. The Germans as well as the Allies were quick to see the value of the traveling li¬ brary in maintaining morale.

The great advantages of the traveling library are economy, mobility and adaptability. The collection is limited to books definitely chosen for some purpose. The obsolete and useless are eliminated. The frequent change of collections gives each group or community receiving the libraries access to the volumes in all the groups. Books on timely topics or those needed to meet changes in community taste can in this way be provided at a minimum cost. The traveling li¬ brary can be put into the home, the store, the

grange or wherever people congregate. It is not limited to any one place. No permanent building or special assistant is needed to make it give fairly satisfactory service if intelligence in selection is shown by the library which issues it. The only records needed are the simplest types of lending records.

The traveling library is of special signifi¬ cance in four different directions : in providing the rural population and special organizations with library facilities, in aiding the rural schools to keep their

instruction abreast of the times, in promoting educational extension move¬ ments of all kinds and in promoting the estab¬ lishment and development of permanent libra¬ ries. The town and village libraries, aided by the county library systems, are beginning to pro¬ vide much more adequate library service for the rural population than formerly. (See Rural Libraries). Nevertheless, there will always be a considerable portion of the population for which the traveling library will furnish the only really convenient access to good books. Even the proposed extension of the parcel post service for library books at reduced rates will supplement, not supersede, the larger collection of the traveling library. The factory and the machine shop, the social club and the fraternal organization also find it much to their advan¬ tage to have immediately at hand a small, well- chosen collection of books changed often enough to prevent their becoming stale.

The rapid and extensive changes in school curricula and the modern methods of teaching, most of which imply considerable use of mate¬ rial outside the textbook, are making the school library more than ever an essential part of the well-equipped school. The rural and small town schools, no less than the schools in the large cities, need fresh books in their libraries. In most cases the funds available for this purpose are inadequate. The traveling library sent by the State Library Commission, the State De¬ partment of Education or other central agency, can fill this need better and at less expense than the local school board. It can supply the books needed to supplement the standard books, the reference books and the supplementary readers and textbooks which the school must have as a permanent part of its equipment. In many cases, the traveling library will show whether or not the desired book is really needed per¬ manently. The value of the traveling library is so well recognized by teachers that practically no central distributing agency can supply the demand made by the schools for this service. In many cities (e.g., Rochester, N. Y., Buffalo, N. Y., Cleveland, Ohio, Portland, Ore., etc.), the pub¬ lic library has a regularly organized system of classroom libraries, changed at regular inter¬ vals and intended to supplement the school work. See also School Libraries.

Practically every well-devised scheme of edu¬ cational extension, whether lyceum movement, university extension centre, study club, corre¬ spondence course, Chautauqua movement or Sunday school, has recognized the need of a small library to conserve and amplify the re¬ sults of the instruction. The courses on a com¬ mercial basis have rather generally tried to sell personal collections to their patrons. Those without commercial intent have usually seen the need of larger, more flexible collections, avail¬ able to all taking the extension work

and sub-

ject to changes frequent enough to maintain variety. The traveling library has demonstrated its value in these cases. It has made it possible for the educational work to be varied in subject. It has enabled the ambitious student to go far beyond the limits of the lecture or the pre¬ scribed textbook. It has made true Carlyle's oft-quoted statement, <(The true university of these days is a collection of books.®

The development of traveling library sys¬ tems has in most cases been followed by the es¬ tablishment of permanent public libraries or the further development of those already estab¬ lished. The advantages of the traveling library are so manifest under such a variety of condi¬ tions that State legislatures have rather gen¬ erally been willing to make some appropriations for their establishment and support. The trav¬ eling library implies a central administrative agency. This has required the formation of a State Library Commission or a similar body charged with the supervision of traveling li¬ brary work. The traveling library, when intelli¬ gently used, has generally shown the need of larger, more stable collections of books than the library commission could supply. The logical result has been an agitation, by the study club, the school or the other organization using the traveling library, for a permanent public library. Many of the smaller libraries in all parts of the country have originated in this way. The (

Complete statistics of traveling libraries are rather difficult to obtain. As previously inti¬ mated, virtually every State Library Commission, every large public library, many extension departments of universities and an increas¬ ing number of commercial corporations main¬ tain them. Different methods of calculating cir¬ culation and different interpretations of the term ˆtraveling libraries® further complicate the matter. The more important original sources are indicated in the appended bibliography.

Bibliography. — Many references are in¬ cluded in Cannons, H. G. T., (Bibliography of Library Economy) (London 1910), and in li¬ brary Work, Cumulated 5 (Minneapolis 1912). Current statistics of State systems are included in the (League of Library Commissions Hand¬ book J and in the bulletins of the various com¬ missions. Statistics of city systems are to be found in the reports of the individual libraries.

For the early history of the movement consult Brown, Samuel, (Some Account of Itinerating Libraries and their Founder5 (Edinburgh 1856) ; Brown, Wm., Memoir Relative to Itinerating Libraries5 (Edinburgh 1836; reprinted New York 1836) ; University of the State of New York, (Study clubs: annual report 1897 } (Al¬ bany 1898; Extension Bulletin 23) ; libraries

and University Extension5 (Albany 1892; Ex¬ tension Bulletin 4) ; Dewey, Melvil, and Avery, Myrtilla, (Traveling Libraries) (Albany 1901 ; Home Education Bulletin 40) ; and Adams, H. B., (Public Libraries and Popular Educa¬ tion (Albany 1900; Home Education Bulletin 31). On organization and management consult Hutchins, F. A., traveling Libraries5 (Boston 1902; American Library Association, Library Tract 3) ; Bullock, Edna D., Management of Traveling Libraries) (Boston 1907; American Library Association Library Handbook 3); Eastman, Linda A., (Branch Libraries and

other Distributing Agencies 5 (Chicago 1911; American Library Association Manual, chap, xv). Koch, T. W., (Books in the War5 (Boston 1919) describes the traveling library service of the different countries in the World War.

Frank K. Walter,

Vice-Director, New York State Library School.

TRAVELING SIDEWALK, a transpor¬ tation system consisting of movable, parallel, continuous platforms to carry passengers from one point to another. They were first practi¬ cally tested at the World's Columbian Exposi¬ tion in Chicago in 1893 and since then success¬ fully installed in Berlin. The sidewalk built for the Paris Exposition in 1900 was over three miles long and consisted of three parallel platforms, the outer one being stationary, the next having a speed of four kilometers and the inner one a speed of eight kilometers per hour. With these speeds it was found to be very easy to step from one to the other at any point. The system is excellent and practicable, and it is generally believed that only the opposition of existing traction interests prevents its adoption in a number of large cities. It has been pro¬ posed to build them for 3, 6, 9 and 12-mile speeds and to place seats on the speediest plat¬ form and run it under cover. It is estimated that they will carry more people at less cost in a congested territory than any other system.

TRAVELING STAIRWAY. See Esca¬ lator.

golf champion: b. Montclair, N. J., 1887. He held the championship of New York for five years and of New Jersey for three years and won the national amateur title for six years in succession (1907-13), finally losing it to Ouimet in 1914. In 1915 he won the national open title. Author of (Travers' Golf Book) (1913) and (The Winning Shot5 (1915).

TRAVERS, Morris William, English sci¬ entist : b. London, 1872. He was educated at University College, London, and in France. Returning to his home school he taught there until 1903 ; was professor in chemistry at Bris¬ tol and finally became director of the Indian Institute of Science at Bangalore (1906-14). He specialized in the study of gases at a low temperature and was the author of several books on the subject, notably (The Attainment of Very Low Temperatures5 (1904).

TRAVERSE CITY, Mich., city, county- seat of Grand Traverse County, on Grand Traverse Bay, an arm of Lake Michigan, on the Pere Marquette, the Grand Rapids and In-

diana, and the Manistee and Northeastern rail¬ roads, about 145 miles north of Grand Rapids and about 60 miles northeast of Manistee. Tra¬ verse City is in'an agricultural and fruit-grow¬ ing region. The excellent harbor gives the city shipping advantages to all the lake ports. The city is extensively engaged in manufacturing and is especially known for its production of oval wood dishes and corn starch. Other manu¬ factures are flooring, fruit baskets, sash and doors, interior finishings, wagons and sleighs, farm implements, flour, leather, lumber and foundry and machine-shop products. The city has three banks with a combined capital of $310,000. The Northern Michigan Insane Asy¬ lum is located here. The city has a high school and five ward schools, municipal buildings, a public library and churches of all denomina¬ tions. Traverse City was settled in 1852 and became a city in 1896. It is governed by a mayor and a council of 10 elected every two years. Pop. (1920) 10,925.

TRAVERTINE, calcareous sinter or chemically precipitated calcic carbonate, gen¬ erally from streams or lakes, the waters of which contain an excessive amount of lime in solution. It either encrusts

vegetable or in¬ organic matter, or forms a loose more or less porous or spongy mass on the surface of ledges. It is much used in Italy for building stone, Saint Peter's at Rome being constructed of it; the outer walls of the Colosseum also exhibit travertine. See Sinter.

TRAVIS, William Barrett, American sol¬ dier: b. Conecuh County, Ala., 1811; d. near San Antonio, Tex., 6 March, 1836. He was admitted to the bar in 1830, practised law at Claiborne, Ala., and in 1832 removed to Texas, where he soon after took up arms in the strug¬ gle for Texan independence. The old mission station of San Antonio de Valerio had been converted into a fort named the Alamo (q.v.) and Travis was in command of it with a garri¬ son of 140 men, when, on 23 Feb. 1836, Santa Anna attacked him with a force of 4,000 Mexi¬ cans. The garrison defended the fort without the loss of a man for 10 days, though the only reinforcement which reached them was one of 32 men. A breach was finally made in the wall and in the desperate hand-to-hand struggle which ensued the entire force of Texans, with the exception of Travis, and four of his men, were killed. The survivors were taken pris¬ oners and were put to death by order of Santa Anna. The incident forms one of the most thrilling stories in American history, and the object of Travis, to engage the Mexicans for a sufficient period to enable General Houston to organize his army, was accomplished when six weeks later the Texans met and over¬ whelmed Santa Anna at San Jacinto, rallying with the war-cry ((Remember the Alamo !® Con¬ sult Amelia Barr, (Remember the Alamo.)

TRAWLING, a European mode of fish¬ ing, very common in some European waters, in which a net in the form of a large bag 70 to 100 feet long, narrowing to the closed end, is dragged along the bottom of the sea. The mouth or wide end of the net (in the ((beam trawl®) is kept open by a beam, at the ends of which are attached the ends of the rope by which the net is dragged along. In the ((otter

trawl,® which has largely superseded the beam trawl, there is no beam and the mouth is kept open chiefly by two boards that rest edgewise on the bottom and are spread out diagonally by wire ropes attached to them and connected with the trawling vessel. In the narrow, closed end of the net the fish are collected and lest they should escape there is usually an inside net opening backward. This mode of fishing is practised to a very great extent in the seas round the British Islands, especially in the North Sea, for nearly all kinds of fish except herring and mackerel. Cod, whiting and other white-fish are taken in this way in large num¬ bers and some kinds of flat-fish, as soles, can scarcely be taken in any other manner. There are many

small steam-vessels engaged in this industry, which largely developed in recent years, but was largely crippled by the Great War. The method is often objected to as de¬ stroying fish spawn and ultimately tending to injure the productiveness of the fishing-grounds, but except, perhaps, as regards certain localities, this does not seem to be conclusively proved. However, it has been prohibited within three miles of the British shores and is not practised in the American fisheries.

TREACLE. See Sugar Growing and Sugar Making.

TREADMILL, originally a mill operated by man power, later adopted as a means of punishment, consisting of a large wheel, about 20 or 25 feet wide, with steps on its external surface, upon which the workers or criminals stand in the position of walking up-stairs. Their weight sets the wheel in motion and they maintain themselves in an upright posture by means of a horizontal bar fixed above them, on which they rest their hands, but they have to keep on climbing, climbing, until the weary task is ended. The power thus obtained may be applied to operate any convenient machinery. The treadmill is the invention of Sir William Cubit and was introduced into the prisons of Great Britain about 1820. It has been gen¬ erally abolished.

TREADWELL, Aaron Lewis, American

zoologist : b. Reading, Conn., 1866. He was educated at Wesleyan University and at the University of Chicago, at the last of which he took the Ph.D. degree in 1898. He became pro¬ fessor of zoology at the Miami University (1891-1900) ; was professor of biology at Vas-sar College (1900-14) and afterward was pro¬ fessor of zoology at the latter institution. He was instructor in marine biology at the gov¬ ernment laboratory at Woods Hole, Mass. (1898-1906). He has written a number of articles on embryology and kindred topics.

TREADWELL, tred'wel, Daniel, Ameri¬ can inventor: b. Ipswich, Mass., 1791; d. Cam¬ bridge, Mass., 27 Feb. 1872. His inventions include a machine for making wood screws, a power printing-press, a system of turnouts for single-track railroads and a machine for spin¬ ning hemp for cordage. As a consequence of this invention large works were erected in Boston in 1831 and several years later he fur¬ nished his machines to the Charlestown Navy Yard. He filled a contract with the govern¬ ment for 12 six-pounder cannon made of wrought iron and steel by an improved method

of his devising. This invention was secured by patent in the United States and England, and anticipated by at least 18 years the Arm¬ strong gun formed upon the same plan with additional features. In 1822 he established and conducted, in connection with John Ware, the Boston Journal of Philosophy and the Arts, and during 1834-45 he was Rumford professor at Harvard. He published (The Relations of Science to the Useful Arts* (1855) ; (On the Construction of Hasped Cannon> (1864).

TREADWELL, Frederick Pearson, Swiss chemist: b. New Hampshire, 1857, but went abroad while still young and took the degree of Ph.D. at Heidelberg in 1878. In 1883 he went to Switzerland to become assistant in the tech¬ nical school at Zurich where he became a pro¬ fessor in 1894. He is best known as the author of (Handbook of Analytical Chemistry* (2 vols.), which has been translated into several languages and is used as a textbook in the United States.

TREASON. Treason is the highest crime known to society, and traitors by the law of every country are liable to the severest punish¬ ment. It is a crime directed against the very existence of the state itself and is, therefore, regarded as peculiarly odious. The ancient common law of England made a distinction be¬ tween petit treason and high treason; thus it was petit treason for a wife to kill her hus¬ band or a servant his master; it was high treason for a subject to kill or attempt to kill the king or queen or to levy war against the king or adhere to his enemies. But this dis¬ tinction was never introduced into American law. Here, what was known as petit treason was regarded as nothing more than murder. In England in early times judges sometimes declared offenses to be treasonable which were r.ot so in fact. This was known as construc¬ tive treason. To remove this abuse Parlia¬ ment enacted during the reign of Edward III the famous Statute of Treasons, which defined the offense of treason under seven fields, the third of which was levying war against the king and the fourth of which was adhering to his enemies and giving them aid and comfort. The framers of the Constitution of the United States preferring not to leave to Congress or the courts the power to define the offense incorpo¬ rated in the text of the Constitution itself (Art. Ill, sec. 3) the definition of treason. This section declares that ((Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.® It will be seen that this definition embodies parts three and four of the Statute of

Edward III but does not embrace the other parts of the statute. The word <(only® in the definition, said Chief Jus¬ tice Chase, was intended to exclude from the criminal jurisprudence of the new republic the odious doctrine of constructive treason. Under this definition only two classes of acts are trea¬ sonable : levying war against the United States and adhering to its enemies, giving them aid and comfort. The Supreme Court has interpreted the first part of the definition to mean that in order to constitute treason there must be an

actual levying of war, that is, there must be a body of men actually assembled for the purpose of effecting by force a treasonable purpose. When this condition exists all those who per¬ form any part, however minute or however remote from the scene of action, and who are actually leagued in the general conspiracy are to be considered as traitors. But if there is an actual assemblage for this purpose it is not necessary that actual violence should take place in order to make the assemblage treasonable. The Federal courts have even held that an insurrection of armed men, the object of which was to suppress the excise offices and to pre¬ vent by force and intimidation the execution of an act of Congress was levying war and as such was treason. It is more difficult to state the elements of the crime of ((adhering to their enemies, giving them aid and comfort.® Mr. Justice Field of the United States Supreme Court during the American Civil War charged a grand jury that (< Whenever overt acts have been committed which, in their natural conse¬ quences, if successful, would encourage and advance the interests of the rebellion, in judg¬ ment of law aid and comfort are given.®

In the recent case of Sir Roger Casement in England it was said in the indictment that ((if a British subject commits an act which weakens or tends to weaken the power of the king and of the country to resist or to attack the enemies of the king and the country, that is in law the giving of aid to and comfort to the king's enemies.®

Among the specific acts which have been held to come within the purview of the phrase quoted above are the selling of goods to and buying goods from the enemy government or its agents or forces ; the communication of information to him with the purpose of aiding him; joining or offering to join his forces; delivering up of prisoners to him; trading with the enemy under certain circumstances ; acts which tend and are designed to defeat, ob¬ struct or weaken our own arms ; advising, in¬ citing and persuading others to give aid and comfort to the enemy, etc. Under the Constitu¬ tion the testimony of at least two witnesses to the overt act is necessary to convict. An ((overt® act is one which is of a character susceptible of clear proof and not one

which rests on mere inference or conjecture. But an overt act may consist of words as well as deeds and while the testimony of two witnesses to the act is neces¬ sary to convict, it is not necessary to prove the intention. Nor is it necessary that the treasonable act should have been successfully performed. Thus the purchasing of a vessel, guns and ammunition for the purpose of using them in aid of a rebellion against the United States has been held to be a treasonable act.

Although treason is popularly regarded as a breach of allegiance it is now well settled that an alien as well as a citizen may commit trea¬ son, since if domiciled in the country he owes it a local and temporary allegiance in return for the protection which he receives. Although the Constitution defines treason it does not prescribe the punishment but confers that power on Congress, subject to the condition that no attainder of treason shall work corruption of blood or forfeiture except during the life of the person attainted. This limitation as to pun-

ishment was intended to prohibit the unjust early practice in England of cutting off the right heirs to inherit the property of a traitor. Under the provision of the Constitution the property-of the traitor may be confiscated only during his lifetime; upon his death his prop¬ erty reverts to his lawful heirs. In 1790 Con¬ gress provided that any person convicted of treason should suffer death but the statutes as revised in 1909 provide that the court in its discretion may substitute imprisonment at hard labor for not less than five years and a fine of not less than $10,000.

James W. Garner,

Professor of Political Science, University of Illinois.

TREASURE ISLAND, Robert Louis Stevenson's earliest novel, is a vivid tale of pirates, adventure and buried treasure that brought the author his first taste of popular applause. Frankly designed for boys, its ap¬ peal to younger readers was as immediate as it has proved enduring; yet distinguished men sat up late to finish it; Andrew Lang spent over it (

Arthur Guiterman.

TREASURE TROVE, in English law, a name given any coin, gold or

silver plate, or bullion found hidden in the earth or other private place. In Great Britain such treasure belongs to the Crown and any person finding it is bound to give information of the fact to the officers of the Crown. Failing to do so he is liable to fine or imprisonment. The Crown, on having treasure trove delivered up to it, is in the habit of paying to the finder its full value, in order that persons may not be induced to conceal such discoveries with a view to the profit, whereby many interesting remains of antiquity might be lost. The term is not often used in the United States and has not any technical legal meaning.

TREASURY, The Little ((I1 Tesoretto*), an allegory in rhymed heptasyllabic couplets, was written probably in 1262 and not later than 1266 by the Italian scholar Brunetto Latini during his stay in France. This early mediaeval poem, one of the oldest specimens of Italian

didactic verse, antedates slightly the author's French encyclopedia (Li Livres dou Tresor,* and can be considered an abridged Italian pre¬ liminary draft intended for a less cultured public. The immediate inspiration of the VII, 1883).

Alfred G. Panaroni.

TREASURY DEPARTMENT. The

Treasury Department is that branch of the government service which has control of the national finances. It is under the direction of the Secretary of the Treasury, who is ap¬ pointed by the President, with the consent of the Senate, and among cabinet officers, ranks second in the line of succession to the Presi¬ dency. His salary is $12,000 a year. He pre¬ pares plans for the improvement of the rev¬ enue and superintends its collection ; directs the forms of keeping and rendering the public accounts and of making returns ; grants war¬ rants for all disbursements authorized by ap¬ propriations and submits to Congress, annually, estimates of the probable receipts and expendi¬ tures of the government for the ensuing year. The construction and care of public buildings and the administration of the coast guard and public health service are under his direction. He is chairman, ex-officio, of the Federal Re¬ serve Board. Each of three assistant secre¬ taries performs such a part of the duties of the secretary as he may prescribe.

The comptroller of the currency exercises

general supervision over the organization and regulation of national banks throughout the United States, including Alaska and Hawaii.

The treasurer receives and disburses all public moneys that may be deposited in the treasury at Washington, in the sub-treasuries and in the national bank depositories and makes authorized advances to disbursing officers.

The register signs all bonds of the United States and keeps records of the outstanding principal and interest of the bonded indebted¬ ness of the government.

The designing, printing and finishing of all paper money, bonds and postage, customs and revenue stamps are done in the Bureau of Engraving and Printing, where also are pre¬ pared the pension certificates, commissions, dis¬ bursing officers' checks and portraits author¬ ized by law, of deceased members of Congress.

The director of the mint has charge of all matters relating to the coinage. Tests of the weight and fineness of the pieces struck at the mints are made in his assay laboratory. The mints are located in Philadelphia, San Fran¬ cisco, New Orleans, Carson and Denver.

The secret service is charged specifically by statute with the detection and arrest of counter¬ feiters and the guarding of the President of the United States.

The division of the Treasury Department which supervises the work of collecting the customs duties and of guarding against smug¬ gling is a highly specialized organization. The country and its territorial possessions are di¬ vided into customs districts, in each of which places are designated where goods may be entered or delivered, according to law. Col¬ lectors of customs are required to execute and carry into effect all instructions of the Secre¬ tary of the Treasury in regard to the customs- revenue laws. In addition to the regular em¬ ployees of this service, special agents are em- polyed in foreign countries as well as in the United States, whose duties are along the lines of the detection and prevention of frauds against the revenues of the United States aris¬ ing from customs.

The commissioner of internal revenue super¬ vises the collection of internal revenue taxes and the enforcement of the laws related to

them.

Until the office was abolished by an act of Congress which took effect 1 July 1921, the Comptroller of the Treasury was the chief of the auditing system of the Treasury Depart¬ ment. The duties originally performed by him are now performed by the General Accounting Office at the head of which is the Comptroller- General of the United States. The law states that the balances certified by the Comptroller-General shall be fina-l and conclusive upon the executive branch of the government and that all claims or demands of the government or against it and all accounts in which it is con¬ cerned shall be settled in the General Account-j ing Office. Under this law. the six auditors of the Treasury Department were abolished- The Comptroller-General investigates all matters re¬ lating to the receipt and disbursement of public funds and must report to .Congress every ex¬ penditure or contract made by any department. The General Accounting Office is not connected with any ether -department.

The public health service conducts scientific investigations of contagious and infectious dis¬

eases and matters relating to the public health. The surgeon-general is required by law to call a conference of State and Territorial boards of health or quarantine authorities each year and additional conferences when, in his opinion, the interests of the public health demand such action. He has the care of sick and disabled seamen at 23 marine hospitals and 123 other relief stations. He enforces and regulates the national quarantine laws and has supervision over the medical officers detailed in the consular offices at foreign ports and those engaged in the mental and physical examination of ar¬ riving aliens.

The principal duties of the coast guard are rendering assistance to vessels in distress and saving life and property; destruction and re¬ moval of wrecks and other dangers to naviga¬ tion ; extending medical aid to sailors engaged in deep-sea fisheries ; protection of the customs- revenue ; operating as a part of the navy in time of war, when the President shall direct; en¬ forcement of the laws relating to quarantine and neutrality; suppression of mutinies on mer¬ chant vessels ; protection of game and the seal fisheries of Alaska and the enforcement of the sponge-fishing laws.

The supervising architect has charge of the erection of public buildings, selecting the sites, securing the necessary cession of jurisdiction from the States affected, preparing the draw¬ ings, estimates and specifications and superin¬ tending the construction

thereof. He is charged, with the care and maintenance of all Federal buildings outside of Washington.

While the Federal reserve board is actually an independent body, its work is closely allied to that of the Treasury Department and its headquarters are in the Treasury building in Washington. Its functions are to exercise supervision over the affairs of the Federal reserve banks, issue Federal reserve notes to member banks and in general to perform the various banking functions described in the Fed¬ eral Reserve Act. The support of the board is derived from the several reserve banks, through assessments levied semi-annually, pro rata. It has full power to appoint its own employees and to regulate the conditions of their em¬ ployment. Both the Secretary of the Treas¬ ury and the comptroller of the currency are members of the Federal Reserve Board.

TREAT, tret, Mary Lea Adelia Davis Allen, American naturalist : b. Tompkins County, N. Y., September 1835. She was mar¬ ried to Joseph Treat in 1863, and has published (Chapters on Ants} (1879) ; ‘Home Studies in Nature* (1885); (My Garden Pets> (1887); etc. She is also joint author of (Through a Microscope.*

TREAT, Robert, American soldier and statesman : b. Pitminster, near Taunton, Somer¬ set, England, 1622; d. Milford, Conn., 12 July 1710. He came to Massachusetts in 1635, re¬ moved to Wethersfield Conn., in 1637, settled at Milford in 1649, was assistant to the gov¬ ernor in 1657-65, represented Milford in the general assembly of New Haven colony in 1653-59, and from 1659 to 1664 was, with a year’s exception, a member of the governor’s council. Repeatedly elected magistrate of Mil¬ ford, he was ordered at the Restoration to ap¬ prehend Whalley and Goffe, the regicides, who

were secreted there; but he appears to have postponed issuing a writ of search until they were beyond his jurisdiction. He was again made a deputy in 1663, but in 1666 went with a company of planters to found Newark, N. J. (q.v.), where he remained until about 1671, when he returned to Connecticut, becoming in 1673 a member of its council of war. In 1675, with the rank of major, he commanded the Con¬ necticut force which defeated the Indian be¬ siegers of Springfield and Hadley, Mass.; and in November of that year was appointed second in command to Governor Winslow in the New England forces in the

field. (See Colonial Wars in America, King Philip's War). For his services he was made deputy-governor of Connecticut in 1676. In 1683, upon the death of Governor Leete (q.v.) he became governor. In December 1686 Andros (q.v.) landed at Boston, with commission as royal governor of all New England, and he quickly set about at¬ tempting to abrogate the Connecticut charter. The general assembly met in October 1687, and Andros appeared with about 60 regular troops to enforce his demand. He did not get the charter; why, the records prudently omitted to explain.' Tradition has an account (see Charter Oak), for the impeachment of which Johnston fails to discover good grounds. Treat yielded to superior force, and Andros' com¬ mission having been read, was made a member of the council for New England. After the deposition of Andros in 1689, Treat resumed his duties, and continued in office until 1698, when he refused re-election. For 10 years more, however, he was deputy-governor. Con¬ sult Johnston,

TREATIES. A treaty is an agreement or compact between two or more independent sovereign states for the settlement of their current interests or controversies, or for the purpose of increasing, modifying or determin¬ ing their respective rights, duties and obliga¬ tions, between themselves, or between each, and the subjects of the other. A treaty is some¬ what similar to a contract in private law, an important difference being that its enforcement depends largely on the good faith of the con¬ tracting parties, and the fact that in case of a dispute the parties can settle it in only two ways ; by agreement, or by an appeal to force. The term treaty includes various transactions between states, such as treaties of peace, con¬ ventions and agreements of a political or com¬ mercial character. The term is, however, usu¬ ally restricted to the more important interna¬ tional agreements of a general character — to those covering several subjects such as a treaty of alliance, peace or commerce.

Treaties as a Source of International Law. — Treaties are an important source of inter¬ national law, for a special agreement between two nations may work so well that other na¬ tions will enter into such an agreement, and the principle or practices involved may finally be accepted by all nations as a part of the common law of nations. Or a considerable number of important nations may declare for a new set of rules binding on themselves, which later may be adopted by others, as for ex¬ ample, the Declaration of Paris made in 1856, providing for new maritime rules referring to

privateering, blockades, contraband, etc. Trea¬ ties entered into by a large number of powers, which redistribute territory, make or unmake

dynasties and states, and set up a new balance of power, are also important sources of in¬ ternational law. Examples are the Treaty of Westphalia, 1648; Peace of Paris, 1763; Con¬ gress of Vienna, 1815, and the Peace of Ver¬ sailles, 1919.

The Right to Make Treaties. — The right to make a treaty is one of the essential and determining attributes of sovereignty. Semi¬ sovereign or dependent states are easily recog¬ nized because of the fact that this right has been abridged or destroyed. Even sovereign and independent states may voluntarily restrain or modify this faculty by treaties of alliance or confederation with other states. Dependent states, restricted with respect to their right to make important international agreements, often retain power to make, unrestricted, certain treaties of a commercial character, or an extra¬ dition or naturalization treaty. Members of federal states are usually forbidden to make independent treaties, except those of a minor character. The States of the United States are forbidden by the Constitution to enter into treaty relations with foreign states or make agreements with each other except by the con¬ sent of Congress.

The treaty-making power, or the agent to whom the power is given to negotiate a treaty varies in individual countries. Ordinarily, in monarchical countries, it is vested in the Crown, but the approval of the legislative body may be necessary for ratification. In other words, power to negotiate and power to ratify are two separate steps. In states having a republican form of government the power to negotiate is usually exercised by the executive council. In the United States the treaty-making power is vested by the Constitution in the President, with the advice and consent of the Senate, two- thirds of the members present concurring. The preliminary negotiations leading up to the treaty and the drafting of the instrument, have in practice been in the hands of the President, usually acting through the Secretary of State, or through special envoys. The framers of the Constitution probably intended that the Senate should share in these preliminary nego¬ tiations, by giving advice as well as consent. The House of Representatives also may have a share in the treaty-making power, if legisla¬ tion is necessary to carry it into effect, in which case its consent must be obtained.

The ambiguity with respect to the exact powers of the Senate in giving advice has never been settled. Washington personally appeared before the Senate on one occasion (1789) and asked its ˆadvice® and consent respecting a proposed treaty with the Southern Indians. The Senate voted on seven specific questions respecting the proposed negotiations, favoring only a part of those proposed. Washington later,

on several occasions, sought the advice of the Senate through special messages regard¬ ing proposed treaties, before negotiations were opened. President Jackson in a message of 6 May 1830 sought the advice of the Senate respecting the conclusion of a treaty with the Choctaw Indians in accordance with certain propositions therewith submitted. Presidents

Polk, Buchanan, Lincoln, Johnson and Grant sought the advice of the Senate respecting various treaties, conventions, etc. Neverthe¬ less, the cases mentioned are exceptional. The Senate has on various occasions since 1883 advised the President by resolution concerning the negotiations of treaties by the executive, but such resolutions are not mandatory, and the right to adopt them is not dependent upon the treaty-making power. The President more commonly consults with individual members of the Senate, especially those on the Committee on Foreign Relations, to which all treaties are referred in the Senate.

The practice prior to 1815 was to submit to the Senate, for confirmation, the names of commissions designated to negotiate treaties, but since this date this course has been ex¬ ceptional. Treaties have, with few exceptions, been negotiated through the Secretary of State, the regular diplomatic representatives and con¬ sular officers, or special agents, commissioned by the President, without special confirmation for this purpose by the Senate. A resolution was introduced into the Senate against this practice as early as 1833 — that of appointing diplomatic agents to foreign countries by the President alone, without the advice and consent of the Senate. But on motion of Mr. Webster it was tabled. Again in a resolution of 9 Jan. 1883, consenting to a treaty with Korea, the Senate declared that it did not by that act admit or acquiesce in any right or constitu¬ tional power of the President to authorize any person to negotiate treaties with a foreign power, unless appointed and commissioned *by and with the advice and consent of the Senate, except in the case of a Secretary of State or diplomatic officer appointed by the President to fill a vacancy during the recess of the Senate. The executive has, however, recognized no limi¬ tation in this respect, and special agents are employed including the famous case of Presi¬ dent Wilson himself acting as one of the nego¬ tiators to the Peace of Versailles of 1919.

Respecting the question of giving consent, there has been no doubt and the Senate has rejected numerous treaties presented to it for

ratification. Since the Senate has not usually been consulted with respect to the subject-matter of a treaty, it has exercised its co-ordinate power in treaty-making by means of amend¬ ments. The Senate by thus withholding action, may compel the President to enter into new negotiations again, in order to incorporate into the treaty its wishes. It may give its consent with an amendment. The President must then try and induce the other party to the treaty to accept the amendment. If such amendment proves unacceptable, then no treaty results. The President alone has the power to negotiate treaties, and he is the sole organ of the nation in its external relations, and its sole representa¬ tive with foreign nations, except so far as he may delegate that power to some agent. Ratifica¬ tions are exchanged only by virtue of special powers conferred on duly authorized agents, by the President, after the advice and consent of the Senate has been secured, two-thirds of the senators present concurring. The President may withhold from the Senate a treaty already negotiated. He may submit it to the Senate with a recommendation for an amendment, or

a request that no amendment be made. The President may refuse to ratify a treaty even though the Senate has advised ratification. He may even withdraw a treaty from consideration by the Senate, in order to effect changes, or to terminate proceedings thereon. Certain agree¬ ments may be made by the President without the advice and consent of the Senate. While not technically treaties, such agree¬ ments are often their equivalent. It has been well stated that all treaties are agree¬ ments, but all international agreements, and understandings are not “treaties.® For ex¬ ample, President Monroe, through the acting Secretary of State, Mr. Rush, entered into an agreement 28-29 April 1817, with Great Britain, through the British minister, for the limitation of the naval forces to be maintained by the two governments on the Great Lakes. Nearly a year later the Senate declared, in answer to the request from President Monroe, that this was an arrangement the President was competent to enter into by powers vested in him by the Constitution, without the advice and con¬ sent of the Senate. Similar agreements have been made by our Presidents with sovereign nations, at various times, without the advice and consent of the Senate, respecting prelimi¬ nary articles for peace treaties, reciprocal cross¬ ing of international boundary lines by troops of the respective countries in pursuit of bands of Indians, and for putting into execution treaty stipulations, etc.

The House of Representatives is not men¬ tioned in the Constitution as one of the parties that must be consulted in making a treaty. But a treaty involving the payment of money, for example, can only be carried into effect by an act of Congress. Therefore, in such a case the

consent of the House to a treaty must be secured before final ratification, if its execution is to be made certain.

How Treaties are Made. — The actual

preparation of important treaties involving sev¬ eral states is usually the work of ministers, or representatives, selected for the special purpose, with definite powers to act on behalf of the government they represent. Rules of procedure are drawn up, the various representatives of the states interested are given an opportunity to submit projects or arguments affecting their interests, and the proceedings are put in writing and submitted to the various representatives for approval. The treaty is usually drawn up in the form of articles, stating who are the con¬ tracting parties, the purpose or object of the treaty, and the stipulations agreed on, such as boundaries, indemnities, terms of ratification.

Ratification. — Treaties must be ratified by the sovereign authority of the states which are parties to their operation in order to be bind¬ ing. This act is completed through the ex¬ change of written instruments identical in form and signed by persons given such powers by the supreme treaty-making power. Treaties may fail of ratification notwithstanding the fact that the minister or commissioners may have followed their instructions exactly. New con¬ ditions and the great magnitude of the interests of a nation make it necessary that the final consent shall rest in the nation itself after a review of the work of its agents.

Powers. — The nature and the extent of the treaty-making power includes the power to make peace, acquire and dispose of territory, recognize the independence of new states, change boundaries, guarantee territorial integ¬ rity of other states, provide for neutrality of countries, grant special privileges with respect to trade and commerce, and in fact consummate any other acts not inconsistent with sovereignty.

Validity • — The validity of a treaty depends upon several matters. Freedom of consent is indispensable to the validity of every agreement. But this does not mean that an engagement entered into by a nation under such duress as is implied by the defeat of its military forces, or the occupation of its territories, gives the conquered

country the right to say that its con¬ sent was obtained by force. Nor does inequal¬ ity in the conditions of a treaty form a suffi¬ cient reason for refusing to execute it. Treaties which violate fundamental principles of mod¬ ern international policy are voidable; for ex¬ ample, acquiring of proprietary rights over the open sea, or a compact to re-establish the slave trade. The contracting parties must of course possess the full power to enter into treaty engagements, and the agents must not exceed the powers laid down in their instruc¬ tions. The formal consent of the parties must be given. The subject matter of the treaty must be such that it is physically or morally possible of execution. For example, a clause involving a violation of the sovereign rights or power of a third state is invalid. Treaties properly entered into are binding, and are not affected by changes of government, and obliga¬ tions involved may either release the other party or even be a just cause for war.

Kinds of Treaties. — Treaties are of various kinds and have been classified in different ways. There are special and general treaties. When a compact is put into effect and the object has been attained so that there is nothing further to be settled by future action, it is called an ˆexecuted® convention. Such compacts are bind¬ ing on states regardless of changes of govern¬ ment. An example would be the settlement of a boundary question by treaty. All treaties which stipulate the performance of successive acts, execute jy treaties, to be continued through a period of time, limited or unlimited, fall into the second class.

Treaties of alliance, guarantee, commerce, arbitration, peace and the like, involving the performance of successive acts, are the chief means of regulating the intercourse of modern states. A treaty of alliance is an agreement of two or more states, for the purpose of secur¬ ing their mutual desires. It may be offensive or defensive, or both ; temporary or permanent, equal or unequal. Two states may guarantee the continuation of a certain state of affairs in a third state. Treaties of guarantee are entered into to secure the observance and execu¬ tion of other treaties or the maintenance of certain existing conditions, such as the perma¬ nent neutrality of a state, for example, — Switz¬ erland or Belgium, or the free navigation of a river or the neutrality of a ship canal. Treaties of commerce regulate the conditions of trade, and define the rights and duties of commercial intercourse, such as the exchange of raw materials and manufactured articles.

Reciprocity treaties are compacts requiring mu¬ tual observance of certain duties or obligations. These involve such subjects as extradition, naturalization or copyright; for these are recip¬ rocal on

the subject named. Reciprocity trea¬ ties are, however, ordinarily thought of as com¬ mercial in character. They provide for the ad¬ mission of certain products of each state into the ports of the other, at special rates, or duties, less perhaps than other countries pay, or without payment of any duty. Most treaties of arbitration are agreements between sovereign states to submit their disputes to tribunals or to a board of arbitrators, whose final awards they bind themselves to abide by. General ar¬ bitration treaties commenced to be entered into quite frequently from the middle of the 19th century, and have in recent years become very popular. The most important influence toward international arbitration of disputes was the calling of The Hague Peace Conferences of 1899 and 1907. The first provided for a number of conventions and declarations, one especially — the <(Convention for the pacific settlement of international disputes® which was agreed to by the delegates of the 26 states represented, of which the United States was one. At the second conference 44 states were represented, and 13 conventions were agreed upon, the first of which dealt with the pacific settlement of international disputes, being a revision of that of 1899 with numerous additions.

Treaties of peace are similar in form to other treaties but the contracting parties do not enter into them on equal terms. They are nevertheless binding even though one of the parties has no real freedom of consent, and in fact may be compelled to sign a treaty under duress. Nearly every treatjf of peace confers advantages on one side and imposes disadvan¬ tages on the other. In one sense the peace nego¬ tiation is a kind of extension, in another plane of conflict, of the military operations, in which the victor can threaten to resume hostilities, if his terms are not accepted. This kind of press¬ ure is not exactly the same as duress. The defeated party may not consider that the use of such pressure gives him any right to violate his agreement; for he chooses to sue for' peace and accept some hardships, in order to avoid the much greater evil of subjugation or anni¬ hilation. The victor might refuse to suspend hostilities until this event was consummated, with the result that there could be no treaty of peace. We may consider that the right of the victor to force the defeated party to accept his terms of peace is in the nature of a com¬ pensation for not pressing the victory to the extreme limit possible. Thus a treaty of peace is a compromise of necessity, unlike most other treaties which are equal transactions.

Objects Sought. — The constituent elements of treaties of peace vary considerably from other treaties because of the purposes and the condition of the belligerents. The fundamental object of a treaty of peace is first, to put an end to the war; secondly, to settle differences

that produced it; thirdly, to settle whatever new differences may have arisen in the course of the hostilities. Two classes of articles may be distinguished, general and special. In the first class are those that relate directly to the cessation of the war and resumption of peace;

for example, provisions for the evacuation of territory, restoration of property captured, lib¬ eration of prisoners, the revival or abrogation of treaties concluded before the war. The special articles are those that relate to the essential points at issue — the terms on which peace is to be re-established, for example, the principal demands imposed by the victor on the vanquished, such as the cession of territory or the payment of indemnities, and the articles specifying the conditions and methods of carry¬ ing the main articles into effect. Miscellaneous articles deal with subjects peculiar to each indi¬ vidual treaty, such as provisions for demobili¬ zation, destruction of fortresses, rights of navi¬ gation or trade, establishment of new states, etc. Secret articles are sometimes agreed upon which do not appear in the treaty made public. Such articles may modify or suspend certain clauses of the open treaty, or even make new provisions, which are kept secret in order per¬ haps to avoid offending their states, or even to prevent opposition to the treaty by subjects of the parties who are signatories to the treaty. The date when the treaty is in full effect, espe¬ cially treaties of peace, is not always easy to determine. The date when a treaty is signed does not necessarily show when the terms begin to operate. But the signing of the treaty marks the latest date for ceasing hostilities, unless otherwise provided for. The date when the treaty as a whole begins to operate, when peace is definitely and finally established, when the new status or position of the states begin, de¬ pends upon the date when ratifications have been completed and exchanged by all the parties signatory to the treaty, unless some other date is named in the treaty. The exact date of the operation of certain clauses may be indefinite or indeterminate, because of the operation of other clauses. For example, military occupa¬ tion of the enemy's territory might continue for years, until the payment of an indemnity was completed.

Special Agreements. — There are a great variety of international agreements and acts in¬ volving matters of less importance than treaties that have been given special names. Those ap¬ plied to the more special or limited subjects are protocols, notes, memoranda, declarations, conventions, congresses, cartels, etc. The word

ˆprotocol® is used in different ways, but com¬ monly it means the preliminary document re¬ cording the fundamental principles or the par¬ ticular points on which an agreement has been reached, thus serving as the basis for the final instrument. Notes are resumes of diplomatic conversations. Memoranda define in detail cer¬ tain points on which misunderstanding might arise. Declarations are signed statements of principles which states intend to observe in their relations to one another. Conventions and congresses are bodies convened to discuss important questions of interest to several states, or for the purpose of settling questions of controversy. The conclusions may result in a treaty, or may be expressed in a state¬ ment of international policy, like the declara¬ tion of Paris, 1856. Examples of congresses on this continent are those of Panama, 1826, and those called by the United States known as Pan-American Congresses, which have con¬ vened at various times since 1889. Cartels are

agreements entered into in time of war for the exchange of prisoners. They are the official acts of generals or admirals with the express or presumed consent of their governments. Capitulations are agreements entered into in time of war by commanders of armies or navies for the surrender of forts, armies, etc. Such action is subject to the approval of the govern¬ ment of the commander.

Interpretation of Treaties. — Treaties are subject to varying interpretations, because all possible cases that might arise cannot be fore¬ seen. General terms applied to particular ques¬ tions are the occasion for disputes concerning the meaning of the language used. European treaties are generally written in French. If England and the United States are parties they are drawn up in both languages, in parallel columns. The rules of interpretation include the following which are commonly recognized as valid. Interpretation must be mutual; only one true meaning can be given to a clause of a treaty; words are presumed to have been used in their usual sense ; in case a treaty is in two languages, each document is regarded as origi¬ nal, and the sense of the treaty is to be drawn from them collectively; matters expressed in detail have precedence over those expressed in general terms ; the treaty is to ‘be regarded as a whole, its context and spirit, and each part with reference to others. The spirit of the treaty rather than the letter should govern in cases where literal interpretation fails to yield rea¬ sonable sense. Clauses favoring justice and humanity are to be construed more broadly than those involving cruelty or hard conditions. In general, the interpretation may be drawn from the connection and relation of the different parts; and with the purpose of keeping the treaty in operation, rather than of making it inoperative through disagreement as to de¬ tails.

Treaties cease to be operative, or are ter¬ minated, under the following conditions : by mutual consent of the contracting parties ; when terms upon which the treaty was conditioned cease to exist; when either party violates stipu¬ lations ; when one party withdraws having the option to do so; when the performance of. the treaty becomes impossible, as in the case of a triple alliance, with war breaking between two of the members, and the third state finds itself unable to fulfil its obligations ; when a new state of affairs arises, overturning an existing state, the latter being the basis of the treaty; when the stipulations of the treaty limit the period of its operation. War may suspend the operation of a treaty, but not in all cases; for example, one entered into to amend the rules of inter¬ national law, or one guaranteeing the neutrality of a state.

Renewal. — It is the usual, but not uniform practice, for the parties to agree in the treaty of peace to renew treaties existing between them at the outbreak of the war. Even without express stipulation as to renewal, it is generally agreed that certain treaty obligations are not annulled by war, but only suspended by it. For example acts previously done or rights already transferred under the sanction of a treaty are not nullified by a mere state of war; for example, a treaty in which territory has been ceded and boundaries established. Such

rights are, however, subject to the law of conquest.

Enforcement. — The enforcement of trea¬ ties is a subject of great importance, but also of great uncertainty. Unlike private contracts, where either party may compel the submission for a disputed interpretation to an independent tribunal for adjudication, treaties depend upon the good faith and honor of the contracting parties for their enforcement, and their willing¬ ness to agree. In case of disagreement either party determines for itself the nature of its obligations, and the only alternative is recourse to force, or denunciation of the treaty by the aggrieved party. Since the contracting parties are sovereign states no tribunal can exercise authority over them without their mutual con¬ sent. Various methods to insure the execution of treaties have been used, such as giving hos¬ tages, pledges, a guarantee by a third state, and military occupation of a territory belonging to the party who is required to fulfil certain de¬ mands within a stipulated time. The agencies for enforcement are the legislature, executive, army and navy and the courts. The first four are

more important in the case of treaties of peace, commerce, etc., and the last in cases of naturalization and extradition.

Bibliography. — Butler, C. H., (The Treaty¬ making Power of the United States) (2 vols., New York 1902) ; Crandall, Samuel B., trea¬ ties; Their Making and Enforcement (2d ed., Washington 1916) ; Devlin, R. T., treaty Power Under the Constitution of the United States) (1908) ; Malloy, W. M., treaties, Con¬ ventions, International Acts, Protocols, and Agreements between the United States and Other Powers) (2 vols., Washington 1910) ; Moore, J. B., (Digest of the International Law of the United States) (8 vols., 1906), and his¬ tory and Digest of the International Arbitra¬ tions to which the United States has been a Party* (6 vols., Washington 1898) ; Phillimore, W. G. F., (Three Centuries of Treaties of Peace and Their Teaching) (1918) ; Phillipson, Coleman, termination of War and Treaties of Peace) (New York 1916). Most of the im¬ portant treaties on International Law have a de¬ tailed discussion of treaties, such for example as Wheaton's (Elements of International Law) (5th English ed., London 1916; revised by Cole¬ man Phillipson) ; and Davis, George B., the Elements of International Law) (New York

1909).

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

TREATIES, Indian. In a limited sense the Indian tribes of North America have al¬ ways been treated by the government to which they were subject as foreign nations. Before the Revolution the king maintained diplomatic intercourse with those tribes residing within the limits of the territory claimed by Great Britain, and after the colonies became independent the relations between them and the Indians contin¬ ued to be regulated through formal treaties, ne¬ gotiated with their chiefs and approved by the tribe. The Articles of Confederation made pro¬ vision for maintaining diplomatic intercourse with the Indian tribes by vesting in Congress the power to negotiate treaties with them. By the Federal Constitution the treaty-making

power was vested in the President, and from the foundation of the government until a recent day the relations between the United States and the several Indian tribes occupying the ter¬ ritory embraced within the limits of the Union were regulated exclusively through regular dip¬ lomatic channels. These treaties were negotiated by

commissioners or agents with the chiefs on terms of theoretical equality, and were ratified by the Senate according to the usual methods. Considering the actual dependent status of the Indians there was an element of absurdity in the practice of regulating the relations between them and the government to which they were subject, through diplomatic channels. Be¬ sides, this method proved inconvenient and at times embarrassing to the government. Finally by an act of Congress passed in 1871 it was de¬ clared that thereafter Indian affairs should be regulated directly by Congress and not by treaty. Since 1871, therefore, no treaties have been con¬ cluded with Indian tribes, but those existing at the time of the act were continued in force. The majority of the treaties between the United States and the various Indian tribes have been treaties of friendship or of cession, those of the latter class providing for the extinction of the <(possessory right® of the Indians to the lands which they occupied and in some cases for the removal of the Indians to the territory espe¬ cially set apart for their use west of the Missis¬ sippi River. Among the more important and best-known Indian treaties were those of Fort Stanwix of 1784 with the Iroquois, providing for the cession to the United States of western lands claimed by them; the Treaty of Greenville of 1795 with tne Wyandots, Delawares, Shaw- nees, Ottawas, Chippewas, Pottawattomies, Miamis, Eel Rivers, Weas, Kickapoos, Pianke- shaws and Kaskaskias by which a large part of the territory embraced in the present State of Ohio was ceded to the United States; the treaty of 1826 with the Creeks for the cession of lands in Alabama and Georgia ; various treaties be¬ tween 1791 and 1835 with the Cherokees for the cession of lands occupied by them in Georgia ; the Treaty of Dancing Rabbit Creek of 1830 with the Choctaws for the cession of lands in Mississippi, and the Treaty of Pontotoc Creek of 1832 with the Chickasaws for the relinquish¬ ment of their claims to lands in the same State. Between 1828 and 1832 treaties were made with the so-called five civilized tribes, the Creeks, Cherokees, Choctaws, Seminoles and Chicka¬ saws, as well as several other tribes of lesser importance, providing for their removal to the Indian territory west of the Mississippi. These treaties usually contained provisions for the payment of a lump sum to each tribe in consid¬ eration of the relinquishment of its lands, for the payment of annuities to the chiefs and the promise of various articles such as rifles, hoes, kettles, blankets and tobacco to each Indian who emigrated. Provision was also generally made for means of transportation to the Indian Territory and for supplying them with wagon- makers, wheelwrights, blacksmiths, millwrights, etc. Heads of families desiring to remain and become citizens were usually allowed to do so and were given 160 acres of land.

Down to 1837, at which time most of the In¬ dians formerly residing east of the Mississippi River had emigrated to the Indian Territory,

the government had concluded 349 treaties with 54 Indian tribes distributed as follows:

With the Appalachicolas .

With the Caddoes .

With the Omahas .

With the Cherokees .

With the Chickasaws .

With the Chippewas .

With the Choctaws. .

With the Comanches .

With the Creeks . .

With the Crows .

With the Delawares .

With the Eel Rivers . , .

With the Floridas .

With the Foxes .

With the Hunkpapas .

With the Illinois .

With the Ioways .

With the Kanzas .

With the Kaskaskias .

With the Kickapoos .

With the Mahas . .

With the Mandans . .....

With the Menomonees or Menominies. .

With the Miamis .

With the Minnetarees, or Belantse-Etas

With the Missouris .

With the Mohawks .

With the Muscogees . . .

With the Oneidas .

Witn the Osages, Great and Little .

With the Ottawas .

With the Ottoes . .

With the Pawnees .

With the Peorias .

With the Piankeshaws .

With the Poncarars .

With the Poncars .

With the Pottawattomis .

With the Quapaws .

With the Ricaras .

With the Sacs .

With the Seminoles .

With the Senecas .

With the Seven Nations of Canada .

With the Shawnees .

With the Siounes .

With the Sioux .

With the Six Nations of New York .

With the Tetons .

With the Weas .

With the Winnebagoes .

With the Wyandots .

With the.Yanctons .

2

1

2

18

8

21

11

1

12

1

16

7

1

10

1

1

5

3

6 11

2

1

6

10

1

4 1 2 1

7 19

5

6 2-

8 1 1

38

4

1

12

2

12

1

14

1

10

4

2

8

6

14

3

For the full text of these treaties with the date of the conclusion and ratification of each, together with the names of the commissioners and signatories consult (Treaties Between the United States and the Several Indian Tribes from 1778 to 1837 } (Washington 1837) ; consult also Weil, (Legal Status of the Indian.*

James W. Garner,

Professor of Political Science, University of Illinois.

TREATIES OF THE UNITED STATES WITH FOREIGN NATIONS.

The United States has always been a treaty¬ making country, as well as a treaty-keeping country. From the earliest days of its history as a nation, when as a new republic, flushed with victory and hopeful for the future, it appealed to the great foreign powers for rec¬ ognition, the policy of almost every Congress has been to enter into such agreements, and there has been scarcely a Secretary of State who has not realized the necessity of devoting his energies to engendering such sentiments of mutual confidence and friendliness between the United States and other governments. Among the agreements thus established are the reciproc¬ ity treaties which have been a bone of con¬ tention among American statesmen for more than a century. Thomas Jefferson, while Sec¬

retary of State during Washington's first ad¬ ministration, urged upon Congress the adoption of such a reciprocity policy in regulating the customs and commerce of the United States with other nations :

"As to the commerce," he said, "two methods occur: First, by friendly arrangements with the several nations with whom these restrictions exist, or, second, by the separate act of our own legislature for

countervailing their effect. There can be no doubt that, of the two, the friendly arrange¬ ment is the most eligible."

From Jefferson to McKinley, a period which represents practically the entire history of the United States, there have been few occasions when this sentiment has not been supported by some of the greatest men in the American political world, and the success of the reci¬ procity movement, so far as this country at least is concerned, undoubtedly inspired the last remarks of President McKinley. A few minutes before he was murdered he declared :

Reciprocity treaties are in harmony with the spirit of the time. If some of our tariffs are no longer needed for revenue, or to encourage and protect our industries at home, why should they not be employed to extend and promote our markets abroad.

In 1909 the only countries with which the United States had no treaty were Abyssinia, Monaco and Montenegro ; and those with which no treaties of peace, amity and com¬ merce were established were Egypt, Rumania and Salvador. Among the most important trea¬ ties to which the United States has been a party are the various international agreements which have been executed at Geneva, at Brus¬ sels, and, since the establishment of the per¬ manent International Court of Arbitration, at The Hague, and the fact that this country is fully in sympathy with the purpose of the court is shown by its anxiety to avoid armed conflict, and the readiness with which it has resorted to the more peaceful methods of arbi¬ tration offered by this international tribunal.

The table on following page is a list of the important international acts and conventions in which the United States has been an active participant.

Extradition Treaties. — In 1909 the United

States possessed treaties of extradition with over 50 nations, the countries with whom no treaty existed being Bulgaria, China, Costa Rica, Egypt, Greece, Honduras, Korea, Mo¬ rocco, Paraguay, Persia, Rumania and Siam. Such a treaty had existed earlier with Spain, but was expressly abrogated and annulled by Article XXIX of the Treaty of Friendship and General Relations of 3 July 1902. The crimes and offenses which are extraditable under the treaties in force in 1909 were generally inter¬ preted as follows: Murder, homicide (com¬ prehending assassination, parricide, poisoning, infanticide, manslaughter, when voluntary), or the attempts to commit any of

these crimes ; abduction, kidnapping or childstealing; bigamy, crimes against railroads, wrongful or wilful destruction or obstruction of railroads which endanger human life; arson; crimes committed at sea; piracy by the law of nations; revolt, or conspiracy to revolt, by two or more persons on board a ship on the high seas against the authorities of the ship ; wrongfully sinking or destroying a ship at sea, or attempt¬ ing to do so; assaults on board a ship at sea with intent to do serious bodily harm ; rape,

SUBJECT

Concluded

Proclaimed by United States

/

Amelioration of the condition of the wounded in time of war .

22 Aug.

20 May

20 March

1854

26 July

1882

Establishment of an International Bureau of Weights and Measures.

1875

27 Sept.

1 1 June

1878

For international protection of industrial property .

1883

1887

For international protection of industrial property (supplementary convention) .

15 April

14 March

1891

22 June

22 May

15 Jan.

2 April

17 Dec.

1892

For the protection of submarine cables .

1884

1885

For international exchange of official documents, scientific and literary productions . . General act for the repression of African slave trade .

15 March 2 July

5 July

8 June

1886

1890

1889

1892

Formation of an international union for the publication of customs

tariffs .

1890

1890

Regulating the importation of spirituous liquors into certain regions of Africa .

1899

6 Feb.

1901

Relative to the pacific settlement of international disputes . .

29 July

29 July

29 July

1899

1 Nov.

1901

Relative to the laws and customs of war on land. . .

1899

1 1 April

1 Nov.

1902

Relative to the launching of projectiles and explosives from balloons, etc .

1899

1901

For the adaptation to maritime warfare of the principles of the Geneva convention. . . Additional act for the protection of industrial property .

29 July

14 Dec.

1899

1900

1 Nov.

25 Aug.

1901

1902

Final protocol entered into at the conclusion of the Boxer troubles in China in 1900. .

7 Sept.

27 Jan.

30 Jan.

3 Dec.

1901

Conventions between the United States and other powers on literary and artistic copyrights .

1902

9 April

24 March

1908

Arbitration of pecuniary claims .

1902

1905

International sanitary convention (Paris) .

1903

18 May

1 March

1907

International sanitary convention (Central and South America) .

14 Oct.

1905

1909

Repression of trade in white women .

18 May

21 Dec.

1904

15 June

21 May

29 Jan.

1908

Exemption of hospital ships from payment of dues .

1904

1907

International Institute of Agriculture .

7 June

1905

1908

New agreement between China and certain powers for the Whangfu conservancy .... General act of the international conference at Algeciras .

27 Sept.

7 April

6 July

3 Nov.

1905

1906

22 Jan. »

3 Aug.

2 Dec.

1907

International Red Cross convention for the amelioration of the condition of wounded of the armies in the field .

1906

1907

Importation of spirituous liquors into Africa .

1906

1907

Unification of the pharmacopceial formulas for potent drugs .

29 Nov.

1906

International Office of Public Health .

9 Dec.

1907

17 Nov.

1908

Second Hague Peace Conference conventions .

18 Oct.

1907

28 Feb.

1910

Conventions concluded at the Central American Peace Conference .

20 Dec.

1907

offenses against chastity committed with violence ; abortion, or procuring abortion ; ob¬ taining money or valuable goods under false pretenses (usually an amount in excess of $200) ; forgery, the utterance of forged papers ; forgery or falsification of official acts of gov¬ ernment, of public authorities or of courts of justice, of public or private instruments ; the use or utterance of the thing forged or falsified ; counterfeiting of government acts, seals, stamps, dies and marks of state, or public ad¬ ministration, or the fraudulent use of any of the above-mentioned objects; counterfeiting or altering money, whether coin or paper, the counterfeiting of titles or coupons of public debt, bank-notes or other instruments of public credit, and the utterance, circulation or fraud¬ ulent use of same; the introduction of instru¬ ments for the fabrication of counterfeit coin or bank-notes or other paper current as money; embezzlement of public moneys committed within the jurisdiction of either party by public officers or depositaries ; embezzlement by any person or persons hired or salaried to the det¬ riment of their employers; larceny (usually an amount not less than $200) ; burglary, defined to be the act of breaking and entering the house of another in the night time, with intent to com¬ mit a felony therein ; robbery, defined to be the felonious and forcible taking from the person of another of goods or money by violence or by putting the person in fear; theft of horses, cattle or livestock (of the value at least $25) ; fraud or breach of trust by a bailee, banker, agent, factor, trustee or other person acting in a fiduciary capacity, or director or member or officer of any company, when such act is made criminal by the laws of both countries (usually not less than $200) ; obtaining by threat of injury or by false devices, money, val¬ uables or other personal property (usually not less than $200) ; receiving moneys, valuables

or other personal property with the knowledge that they have been stolen (usually not less than $200) ; perjury or subornation of perjury;

crimes and offenses against the laws of both countries for the suppression of slavery and slave-trading; mayhem and any other wilful mutilation causing disability or death; bribery.

The United States has treaties, conventions and agreements on the following subjects with the countries mentioned : Peace, amity, com¬ merce and navigation. — Algiers (peace and amity), Argentine Republic, Austria-Hungary (commercial), Belgium (commercial), Bolivia, Borneo, Brazil, Central America, Chile, China, Colombia, Congo (commercial), Corea, Costa Rica, Cuba, Denmark, Dominican Republic, Ecuador, Egypt (commercial), Ethiopia (com¬ mercial), France, German Empire (commer¬ cial), Great Britain, Greece (commercial), Guatemala, Hanover, Hanseatic Republics, Hawaiian Islands, Hayti, Honduras, Italy (commercial), Japan, Lew Chew, Liberia (com¬ mercial), Madagascar, Mecklenburg-Schwerin (commercial), Mexico, Morocco (peace, friend¬ ship and protection), Muscat, Netherlands, Nicaragua, Oldenburg (commercial), Orange Free State, Ottoman Empire (commercial), Paraguay, Persia, Peru-Bolivia, Peru, Portugal (commercial), Prussia, Russia (commercial), Salvador, Samoan Islands (commercial), Sar¬ dinia (commercial), Serbia (commercial), Siam, Spain, Sweden, Sweden and Norway, Switzerland, Tonga, Tripoli (peace and friend¬ ship), Tunis, Two Sicilies, Venezuela.

T rade-marks. — Austria-Hungary, Belgium, Brazil, Denmark (also industrial designs and models), France, German Empire (also pat¬ ents), Great Britain, Guatemala (also patents), Italy, Japan (also patents and designs), Lux¬ emburg, Netherlands, Rumania, Russia, Spain. Switzerland.

Copyright. — Austria-Hungary, Belgium,

Chile, Costa Rica, Denmark, France, German Empire, Great Britain, Italy, Japan, Mexico, Netherlands, Norway, Portugal, Spain, Swit¬ zerland.

Arbitration. — Austria-Hungary, China, Costa Rica, Denmark, Ecuador, France, Great Britain, Haiti, Italy, Japan, Mexico, Netherlands, Nor¬ way, Paraguay, Peru, Portugal, Salvador, Spain, Sweden, Switzerland.

Reciprocity. — Bulgaria, Cuba (commercial), Great Britain, Hawaiian

Islands, Mexico.

Naturalization, immigration or emigration. — Baden, Bavaria, Belgium, Brazil, China, Denmark, Ecuador, Great Britain, Haiti, Hesse, Honduras, Mexico, North German Union, Peru, Portugal, Sweden and Norway, Uruguay, Wurttemberg.

The United States has other subjects on which treaties, conventions and agreement are based, besides the foregoing, among which may be mentioned the open door policy and ex¬ change of notes and the final protocol at the conclusion of the Boxer troubles, with China ; recognition of the flag, with Congo ; inter- oceanic canal, with Costa Rica ; agreement for lease of land for coaling station, with Cuba ; readmeasurement of vessels, with Denmark ; collection and application of the customs rev¬ enues with the Dominican Republic; alliance, act separate and secret, contract for payment of loans, cession of Louisiana and relations in Tunis, with France; general act concerning Samoa, with German Empire; tenure and dis¬ position of property, with Guatemala; abolish¬ ing droit d'aubaine, with Hesse, Nassau, Saxony and Wurttemberg; reimbursing ship¬ wreck expenses and exchange of notes declar¬ ing policy in the Far East, with- Japan; pur¬ suit of Indians (eight agreements) and claims (((The Pious Fund®) with Mexico; inter- oceanic canal, with Nicaragua; right to hold real estate, with Ottoman Empire; neutrals at sea and whaling ships, with Peru; Pacific Ocean and northwest coast of America, neu¬ tral rights at sea, cession of Alaska, admeas¬ urement of vessels, fur-seal fisheries and cor¬ porations, with Russia ; regulation of the liquor traffic, with Sardinia; judicial procedure, dis¬ criminating duties, tonnage duties, commerce, with Cuba and Porto Rico, cession of outlying islands and letters rogatory, with Spain ; prop¬ erty with Switzerland; neutrals at sea, with the Two Sicilies; and duties on liquors and consular powers, with Zanzibar.

The United States has made more treaties and other forms of agreement with Great Bri¬ tain than with any other country. These in¬ clude the following subjects: Naval forces on the Great Lakes; fisheries, boundary, and res¬ titution of slaves; indemnity under the award of the emperor of Russia (1822); indemnity for slaves (1826); arbitration northeastern boundary; boundaries, suppression of slave trade, and extradition (Webster-Ashburton ■ — 1842); boundary west of Rocky Mountains; ship canal connecting Atlantic and Pacific oceans (1850); cession of Horseshoe Reef; reciprocity, fisheries, and navigation ; suppres¬ sion of slave trade (1862, 1863, 1870) ; claims, fisheries, navigation, and boundary (Treaty of Washington, 1871) ; original modus vivendi concerning fisheries, 1891, 1906, 1907, 1908,

1909; general act concerning Samoan Islands;

fur-seal fisheries; Bering Sea arbitration agreement; deserters from merchant vessels; Alaskan boundary, 1903-05-06; tenure and dis¬ position of property; ship canal (Hay-Paunce- fote Treaty, 1901) ; boundary line between United States and Canada, 1910, and boundary line in Passamaquoddy Bay, 1910.

The Second Hague Peace Conference Con¬ ventions (1907) contained the following pro¬ visions: Pacific settlement of international dis¬ putes; the limitation of the employment of force for the recovery of contract debts; opening of hostilities; the laws and customs of war on land; rights and duties of neu¬ trals in land war; the laying of automatic submarine contact mines; bombardment by naval forces in time of war; the adaptation of the principles of the Geneva Convention to naval war; rights and duties of neutral pow¬ ers in naval war; and a declaration prohibiting the throwing of projectiles and explosives from balloons. The International Prize Court, which meets at The Hague, when called together to settle some international dispute is composed of 15 judges, eight of whom are chosen by the larger marine countries, Germany, Austria- Hungary, France, Great Britain, Italy, Japan and the United States, the other judges being chosen from the remaining nations. In prize cases an appeal may be taken from national courts to the international court, according to the Convention of 21 Sept. 1910.

The conventions concluded at the Central American Peace Conference in 1907 contained provisions respecting peace and amity; the establishment of a Central American Court of Justice; extradition; the establishment of an international Central American bureau and a pedagogical institute; and regarding commu¬ nications.

The following are the treaty negotiations of 1911 : 24 February, new treaty with Japan was ratified by the United States; and on 4 April ratifications were exchanged at Tokio. The significant feature of this treaty is its omission of any explicit stipulation concerning the regu¬ lation of the emigration of the people of one country to the other. As part of this treaty, which is one of commerce and navigation, the representatives of the two countries agreed upon the proctocol of a provisional tariff ar¬ rangement and a declaration on the subject of immigration made by the Japanese govern¬ ment. Japan further agreed to continue to grant to the United States the ((most favored nation® treatment in tariff matters, pending the negotiation of a special agreement.

On 17 May 1911 the draft of a general treaty of arbitration was submitted by Secre¬ tary Knox to the British and French Ambas¬ sadors; and on 28 June it was announced at Washington that this treaty had been agreed upon in every important provision. It is the first comprehensive agreement for arbitrating practically all disputes that can arise between two sovereign nations, including even questions of vital interest and national honor. It pro¬ vides for arbitration by The Hague court of all questions, without reservation, that are re¬ garded by the contracting parties as proper for arbitration. All other disputes are to be submitted to a commission of inquiry, to be composed of the permanent court of The

Hague. This commission will investigate and report whether or not the matters in contro¬ versy should be arbitrated. This treaty was signed 3 Aug. 1911 between the United States, Great Britain and France and' was finally ratified 7 March 1912.

On 28 June a treaty abolishing pelagic seal¬ ing was signed at Washington by representa¬ tives of the United States, Great Britain, Rus¬ sia and Japan.

On 26 January the reciprocity agreement between the United States and Canada was submitted to the legislative bodies of both countries. It was upheld in Congress, but in the Canadian elections on 22 September the party supporting the proposed trade reciprocity was defeated.

The most important event in which the treaty-making power of the United States was involved at the end of 1911 was President Taft s abrogation of the Russian Treaty of 1832 with this country. This was done 17 December by his directing the American Am¬ bassador at Saint Petersburg to denounce the treaty in friendly terms. The notification that he had so acted was delivered to the Foreign Office 18 December. The action was taken by the President on the primary ground that Rus¬ sia had violated the terms of the treaty by refusing to vise passports for American citizens of Jewish birth or Catholic faith. The House had voted 300 to 1 demanding abrogation. The operation of the treaty — which was one of commerce and navigation — ceased by this ac¬ tion on 1 Jan. 1913.

Under an agreement entered into between the United States and Great

Britain 20 July 1912 all outstanding claims between the two countries shall be submitted to arbitration. The arbitration treaty with France which expired in 1913 was renewed in February of the same year. In 1914 the so-called Bryan-Wilson treaties were presented by the United States to various foreign countries. The object of these treaties was to provide a means of pre¬ venting international trouble from developing into war. In general these treaties stipulate that the contracting parties to the treaty^ shall, in each case, submit to a commission all in¬ ternational disputes that cannot be settled by diplomacy. The contracting parties to each treaty bind themselves not to declare war or begin hostilities until such time as the com¬ mission shall have submitted its findings. Each nation is free to disregard the report of the commission if it should see fit to do so. The following countries entered into the Bryan- Wilson treaty agreement with the United States : Salvador, Guatemala, Panama, Hon¬ duras, Nicaragua and The Netherlands in 1913; Bolivia, Persia, Portugal, Costa Rica, Switzer¬ land, Dominican Republic, Venezuela, Den¬ mark, Italy, Norway, Peru, Uruguay, Argen¬ tina, Brazil. Chile, Paraguay, China, France, Great Britain, Spain, Russia, Ecuador, Greece, Sweden, in 1914; and Norway in 1915. The United States: Senate declined to ratify the Treaty of Versailles, signed 28 June 1919, but on 25 August 1921 at Berlin the United States en¬ tered into a separate treaty with Germany in which it reserved to itself all of the rights stipulated for its benefit in the Treaty of Ver¬ sailles but expressly stating it would no* be bound -by any of the provisions: relating to the vol. 27 — 3

League of Nations. See War, European- — Peace Treaties. See also International Claims and Disputes; Hague Court, The; International Law.

Bibliography. — Balch, (International Courts of Arbitration (Philadelphia 1896) ; Devlin, R. T., (The Treaty Power under fhe Constitution ' (San Francisco 1908) ; Foster, Arbitrations and The Hague Court) (Boston 1904) ; Hertslet, Sir Edward, (Treaties, Con¬ ventions, Etc., Between the United States and Other Powers' (Washington 1910) ; Moore, J. B., (History and Digest of the International Arbitration to Which the LTnited States Has Been a Party' (Washington 1898) ; Morris, (International Arbitration and Procedure' (New Haven 1911); Snow, F., (Treaties and Topics in American Diplomacy' (Boston 1894).

TREATING. See Corrupt Practices Acts.

TREATY, an agreement, league or con¬ tract between two or more nations formally signed by commissioners properly authorized, and

ratified by the supreme power of each state. Treaties are not admissible by sub¬ ordinate States, for instance, New York State cannot make any binding treaty with Canada, as that is the province of the Federal govern¬ ment at Washington. The conditions that govern or should govern treaties are defined in International Law (q.v.). The treaty¬ making power of the United States is vested in the President, though the work of treaty-mak¬ ing falls to the office of the Secretary of State. It is usual for the President to seek the ad¬ vice of the Senate in making a treaty, in order that it may receive their prompt ratification. The Senate has the right to return a treaty for amendment or reject it. When the Senate ratifies, the President, through the Secretary of State, may sign and conclude the treaty. A treaty so made overrides all State laws, even their constitutions, but it cannot deprive individuals of their constitutional rights. Where a treaty involves a payment of money the House of Representatives, where all appropri¬ ation bills must originate, has claimed a right to participate; but this claim remains disputed. In France the President makes treaties. In countries where there is a sovereign it is usu¬ ally his privilege, though he may be held in check by legislative power. Treaties of alliance are common, as the well-known alliance be¬ tween Great Britain and Japan made in 1902 and extended in 1905, which resulted in bring¬ ing Japan into the World War. Treaties re¬ garding boundaries and distribution of terri¬ tory are also common ; submission of differ¬ ences to arbitration ; trade agreements ; navi¬ gation and fishing regulations ; exchange of moneys, mail, etc. ; protection of copyrights ; return of criminals ; adoption of rules of inter¬ national law; adoption of recommendations of The Hague Peace Tribunal.

Some famous treaties are Westphalia Treaty, closing the Thirty Years' War, in 1648, in which most of the nations of Continental Europe participated; Peace of Utrecht, a ser¬ ies of treaties between 1713 and 1715, be¬ tween France, as opposed to England, Hol¬ land, Prussia, Savoy and Portugal ; treaty of independence of the United States, accepted by Great Britain at Paris in 1783; the parti-

tion of Poland in 1772 and again in 1793; the separation of Belgium and The Netherlands, made at London 1831 and modified 1839; ces¬ sion of part of Lombardy to Sardinia in 1859; dissolving the German Confederation and es¬ tablishing of the North German Confedera¬ tion with full recognition by Austria, the trans¬ fer of Schleswig-

Holstein to the new confed¬ eration and ceding the balance of Lombardy to Italy in 1866; Treaty of Frankfort, being new treaty of France and the German Empire af¬ ter the War of 1871 ; settlement of territory growing out of Spanish-American War, be¬ tween United States and Spain, 1899; Russo- Japanese treaty of peace at Portsmouth, United States of America, 1905 ; the German Peace treaty signed at Versailles, 1919. Various agreements tending to mitigate the horrors of war have been incorporated in treaties on numerous occasions. Guarantees for the per¬ formance of conditions in treaties are usually demanded and formerly it was customary to give hostages. International law has been framed as the recorded customs governing civilized nations in carrying out their treaties. Refusal to abide by a treaty is a cause of war, since treaties bind both parties until mutually abrogated. It is generally conceded that a war wipes out all previ¬ ous treaties between the parties and that they have to be made again to come into force. If a state change its government, as in. going from a monarchy to a republic, all treaties are void and have to be remade with the new gov¬ ernment to be effective. Consult (Treaties, Conventions, Etc., Between the United States of America and Other Powers, 1776— 1909 J (Washington 1910) ; Herslet's (British and Foreign State Papers) (London) ; Albin, P., (Les Grandes Traites Politiques' (Paris 1911) ; Crandall, S. B., (Treaties: Their Making and Enforcement (Washington 1915). See Hague Court, The; Triple Alliance; Treaties; Treaties of the United States with Foreign Nations; War, European — Peace Treaties; Peace Conference.

TREATY, Anglo-Japanese. See Anglo-

Japanese Treaties.

TREATY ELM, a celebrated tree, formerly in the environs of Philadelphia, Pa., under which William Penn '(q.v.) negotiated a treaty with the Indians. A monument marks its place.

TREATY PORT, a port open to commerce with certain nations in accordance with the terms of a treaty, in a country not generally open to foreign commerce. China is the one nation where treaty ports were for many years of importance ; the first ports were opened to trade by the Nankin treaty with Great Britain in 1842; these ports were Canton, Amoy, Fu- Chau, Ningpo and Shanghai. Since then other treaty ports have been established, by the treaty with Japan in 1895 and by the treaty with the powers in 1902. About 1900 they numbered over 30, and include Samshui, Wuchow, Whuhu, Shasi, Chung-King, Yochow Hang¬ chow, Su-Chau, Lungchow, Niu-Chwang (the most northern), Chang-Sha, Ngan-King, Wan- Hsien, Wai-Chau and Kong-Mun. Since

1912 the Republic of China has made all her ports free. Japan was also first opened to foreign commerce by means of treaty ports ; the first

treaty in March 1854 with the United States opened two ports, Simoda and Hakodadi, to American commerce; in the same year the Brit¬ ish gained access to two ports, and later the Dutch and the Russians ; by subsequent treaties both the United States and Great Britain gained more ports and further privileges. In 1899 Japan was recognized as on an equality with the other powers, and the whole country thrown open to foreign trade.

TREATY OF PORTSMOUTH. See

Portsmouth, Treaty of.

TREATY OF SAN STEFANO. See San

Stephano, Treaty of.

TREBBIA, treb'be-a, Italy, a tributary of the Po which rises in the mountains of Liguria. It was on the banks of the Trebbia that the Romans under Sempronius were defeated, 218 B.C., by the Carthaginians under Hannibal.

TREBIZOND, treb'Lzond, Asia Minor, (1) A seaport, military station and capital of a vilayet of the same name, in the northwestern extremity, on the Muchka where it enters the Black Sea, 120 miles northwest of Erzeruiru It has a citadel, mosques and churches; its streets are irregular and narrow. It is the see of an Armenian archbishop, a United Armenian bishop and a Greek metropolitan. Its trade is important. The exports consist of tobacco, car¬ pets, silks, fabrics, cattle, raisins, walnuts and hazelnuts. The imports are cotton and woolen manufactures, sugar and silks. It was founded by the Greeks about 700 b.c. On the establish¬ ment of the empire of Trebizond by Prince Alexius, in 1204, this city was made the capital. The Turks overran the region and took the city in 1641. It was captured by Russia in 1916, but owing to the disruption of the Russian forces it was not long held. Among the Greek major and minor claims at the Peace Conference in Paris- 1919 was the proposal to form the Pon- tian Republic of the region around Trebizond, with the ancient city as the capital. Trebizond is the residence of foreign consuls. Pop. 55,000. (2) The vilayet or province has an area of 16,671 square miles. It has great mineral riches and extensive forests, and a mixed population. Pop. 1,265,000.

TREBLE, Lillian Massey, Canadian phi¬ lanthropist: b. at New Castle, Ontario, 2 March 1854; d. California, 1909. She became interested in mission work and organized classes in do¬ mestic science which led to her founding The Lillian Massey School of Household Science and Art. Similar results were secured at Toronto and other universities and she gave the Toronto University a handsome building which was opened in 1913.

TREBUCHET. See Ordnance.

TREE, Sir Herbert Beerbohm, English actor: b. London, 17 Dec. 1853; d. 2 July 1917. He was a son of Julius Beerbohm, and was educated in England and Germany. After en¬ tering upon a business career he became inter¬ ested in private theatricals, and adopted the pro¬ fession of the stage in 1878. Succeeding in this, he assumed the management of the Haymarket Theatre in 1887, and became one of the most conspicuous of the actor-managers of recent times. After 1897 he played in his own theatre, Her Majesty's, one of the best constructed of

London playhouses. He possessed great versa¬ tility, and played parts ranging from Hamlet to Falstaff. Tree achieved an early success in 'The Private Secretary > (1884). This was fol¬ lowed by Macari in (Called Back,* and by the pan jo f the Russian Spy in (The Red Lamp> (1887). In eccentric character parts he essayed the leading roles in (The Ballad-Monger) and in ' Trilby. > In modern social drama he ap¬ peared in (A Bunch of Violets,* (Captain Swift,* (A Woman of No Importance,* (John- a-Dreams,* (The Dancing GirP and (The Tempter) ; while of Shakespearean plays he produced (Merry Wives of Windsor,* (Ham- let,) (Henry IV* and (The Taming of the Shrew. * Stephen Phillips' (Herod* was writ¬ ten for him. His publications include (The Imaginative Faculty,* delivered as a lecture be¬ fore the Royal Institution (1893) ; and other lectures on (Hamlet from an Actor's Prompt Book* ; (Henry VIII and His Court) ; ˆThoughts and Afterthoughts* (1913) ; Noth¬ ing Matters) (1916), etc. He received the honor of knighthood in 1909.

TREE-CAT, a palm-civet. See Palm Cat.

TREE-CREEPER, a bird (Certhea) . See Creeper.

TREE-CRICKET, one of the small, al¬ most colorless crickets of the genus CEcanthus, specifically the snowy cricket (OE. niveus), whose

two-syllabled rhythmic night-song is one of the most familiar summer noises of eastern America. This song varies greatly in pitch and rapidity according to the temperature and other conditions. In the day-time the insect trills in a different voice. Consult Howard, (The In¬ sect Book* (New York 1901), wherein will be found extensive references to other works.

TREE FERNS. See Ferns and Fern Allies.

TREE-FROG, or TREE-TOAD, a frog of the family Hylidcz, distinguished from com¬ mon frogs (Ranidce) by having the ends of the fingers and toes dilated into flattened discs or suckers, which enable them to lead their peculiar arboreal life. They are of more elegant form, smaller size, brighter colors and more active habits than the Ranidce, and are lively during the day; they feed on insects, which they pursue on bushes and trees, stealing toward them or suddenly springing and swinging upon them ; they climb like geckos, and by the same mechan¬ ism ; the lower surface of the discs is endued with a viscid secretion, by means of which they can walk with the body suspended from the under parts of leaves and other smooth bodies; the skin is mostly smooth upon the back, but on the abdomen and inside of legs thickly studded with small warts or tubercles. They possess to a remarkable degree the faculty of changing color, by the modifications of the contents of the pigment cells under the skin (see Chromat- ophores), no doubt a provision to enable them to elude their numerous enemies. They are very clamorous, and particularly noisy at the approach of rain. In winter they bury them¬ selves in the earth or in the decayed wood and dust of old stumps. They breed in the spring, depositing their eggs in the water. The species are numerous, especially in tropical America.

The common tree-frog of North America (Hyla versicolor) resembles a toad in form,

but is more flattened ; body short and warty above, the color varying from pale ash to dark brown, with several large irregular blotches of greenish brown, white and granulated below, and abdomen yellowish near the thighs ; the colors vary at the will of the animal. The head is short and rounded, the mouth large, with teeth on upper jaw and vomer; eyes large and brilliant, the iris bright golden ; there are four fingers and five toes, both ending in viscous pel¬ lets, the former distinct, but the latter webbed. It is about two inches long, and is found abun¬ dantly as far west as the Mississippi, on decay¬ ing trees

and about old fences of wood or stone, the color of which it nearly resembles. It is very noisy in spring and summer toward even¬ ing, especially in cloudy weather, and its cheer¬ ful and abruptly terminating note must be fa¬ miliar to all residents in the country. This species in the Southern States is replaced by the green tree-frog, which is bright green above, yellowish white below, with a straw-colored lateral line extending from the upper jaw over the shoulder and along the side; it is shorter and more slender than the northern species, and is most commonly seen about broad-leaved plants, especially Indian corn, the color of the leaves of which it greatly resembles, concealed during the heat of the day, but coming out morning and evening and becoming very active and noisy; the single note is clear and bell-like. The tree-frog of Europe (H . arborea) much resembles this. Several other species occur in the Southern and Southwestern States. In the genus Acris the locomotive discs are less de¬ veloped and the limbs more slender than in Hyla , and there are teeth on the palate instead of the vomer. The A. gryllus, or cricket, is about one and one-half inches long, with an elongated pointed head, a triangular dusky spot between the orbits ; body ashy above, with a green and sometimes reddish dorsal line, and three oblong black spots margined with white on the sides. It is a lively species, constantly chirping like a cricket, even in captivity. In the genus Hylodes the palate is toothed, and the slender fingers and toes are free, with small discs. Pickering's tree-frog (H . pickeringii) is nearly an inch long, with short head and yellow¬ ish brown body, with dusky rhombodial spots and lines, sometimes like the letter X on the back; pale flesh-colored below, tinged with yellowish on the throat. This is the true peep¬ ing frog, the noise being made by both sexes; in summer they cease to be vocal, retiring from the pools where the eggs were laid to the woods, where they live on trees, hopping about on the branches in search of insects and occa¬ sionally uttering a shrill whistle.

Many strange variations in breeding-habits and rearing of young characterize the tree-frogs of tropical America, which exist in a great number of genera and species. A famous South American species is the ferreiro (H . faber), which makes small pens or nurseries under water in which its eggs are left to hatch, and where the tadpoles are confined, protected from many dangers. Another species (H . goeldii) carries its few large eggs on its back until they hatch, and the young remain some time after¬ ward. The genus Nototrema develops pouches in the skin of the back of the female in which the eggs and young are safely transported. Ex-

tensive information and guidance to further facts may be found in the (Cambridge Natural History- > (Vol. VIII, London 1901).

TREE-KANGAROO. See Dendrolagus; Kangaroo.

TREE-PORCUPINE, or COUIY, a

South American arboreal porcupine (q.v.) of the genus Cercolabes (or Sphingums) , char¬ acterized prominently by the long, naked pre¬ hensile tail. There are several species, all small and short-spined.

TREE-RAT, a small East Indian rat (Mus arboreas), common in Bengal. It builds a nest in cocoanut trees and bamboos, and lives partly on grain and partly on young cocoanut.

TREE-SHREW, or BANXRING, a small squirrel-like insectivore of India and the Malay Archipelago, the several species of which con¬ stitute the family Tupaiidce. The fur is soft and glistening, and a long, bushy tail is gener¬ ally present. They are restlessly active during the day, searching for insects and fruits, both on the ground and in trees. Two of the largest species are the tana (T . tana), with a feathery tail, in one variety of a bright, golden color; and the ferruginous banxring (T. ferrnginea) , widely distributed in the Malayan region. The soles of the feet in the latter are plaited like those of geckos and give the animals a sure grip of a branch. Consult Blanford, (Mammals of India* (London 1888).

TREE-SPARROW. See Sparrow.

TREE-TOAD. See Tree-frog.

TREE OF TULE. Among the big trees of the world, the best known are the Sequoias, or Giant Redwoods of California, which reach a diameter of 36 feet and a height of 279 feet. Not so widely known, but equally tall, are the Eucalyptus trees of southeastern Australia. The Banyan trees of India cover more space, but these are more like a grove than a single tree. The Big Tree of Tule may fairly claim to be the largest tree in the world. Tule is about 360 miles south of the City of Mexico and just a few miles south of Oaxaca, on the stage road between Oaxaca and the Ruins of Mitla. The tree is about 50 feet in diameter — Campbell's guide book gives the circumference as 154 feet and two inches at six feet from the ground — and the height is a little more than three times the diameter of the trunk, so that in general appearance it resembles a gi¬ gantic willow. A common name

for the tree is The Montezuma Cypress. The scientific name is Tax odium mucronatum; consequently, it is closely related to the Swamp Cypress, or Bald Cypress (Taxodium distichum) of the southern United States. The Montezuma Cy¬ press was once abundant in Mexico and many of the trees were very large, but, even in the time of Cortez, the Big Tree of Tule was famous as the largest of all living things. Humboldt carved on the trunk an inscription which is now so overgrown that only the be¬ ginning and end of the lines can be read. The government — at least until 1912 — recognized the tree as a wonder and kept guards to pre¬ serve it against the ravages of tourists. Esti¬ mating the age by the annual growth rings and assuming that the growth rings of the big tree are of about the same width as in other large

trees of the same species, the Big Tree of Tule must be at least 5,000 years old. The famous Tree of the Sorrowful Night — Arbol del Noche Triste — in the City of Mexico, the tree under which Cortez rested after his worst de¬ feat at the hands of the Aztecs, belongs to the same species.

TREE WORSHIP. The worship of a tree as in itself divine does not appear to have prevailed in any age of the world. In the my¬ thology of ancient Greece and Rome, trees were regarded as the abodes of sylvan deities, super¬ natural beings, inferior to the gods of Olympus. Even where this view was not taken, and the tree was not venerated as the dwelling-place of divinity, trees were associated with the worship of the gods, and a certain degree of sanctity attached to them. This association was so strong and to the popular view so indissoluble, that to destroy a grove in which a god was wor¬ shipped was to put an end to the worship at that particular spot. Bible statements (1 Kings xv, 13, 14 and other places) show that the removal of an idol, while the grove remained, was not sufficient to put a stop to idolatry. The sacred groves were also an essential feature of Druidical worship. It should be remembered that, while the philosophers and other learned men of ancient Greece and Rome looked upon the current mythology with incredulity, if not contempt, the great mass of the people, and in particular the peasantry, were deeply devoted to it, and to them the sacred groves, the dryads, fauns and satyrs were very real.

Tree worship, or anything resembling it, has no place in any branch of Christianity, and among Christians the attachment to trees, or any particular tree, is entirely a matter of nat¬ ural sentiment. There is nothing of the kind in Mohammedanism, and the sacred literature of Buddhism attaches no sanctity to trees. Never¬ theless, before the destruction, in October 1887, of the Bo tree, grown from a branch of

the tree sent by Asoka, king of Maghada, and famous as a devotee of Buddhism, to Ceylon, in the 3d century b.c., thousands of pilgrims visited the tree annually and offered up prayers before it. This cannot be called tree-worship in the ancient meaning of the term. It is true, nevertheless, that the early Buddhists regarded certain trees as sacred, and much time elapsed before members of that faith got rid of their old superstitions in this respect. Those super¬ stitions still prevail among the more barbarous races, and some of the Greek Christians in re¬ mote districts are said to mingle pagan worship of tree-gods with their nominally Christian practices.

TREFOIL, any of several plants having trifoliate leaves, as clover, etc., especially bird's- foot (q.v.), a legume of the genus Lotus (q.v.). In architecture , a three-lobed ornament, form¬ ing a conventionalized figure of three leaves, used in tracery, panels, windows, etc. Also in heraldry, a bearing or charge representing a conventional triple clover-leaf, always accom¬ panied with its slip or stalk. It signifies fidelity.

TREGEAR, Edward, Australian author : b. London, 1 May 1846. He went to New Zealand in 1863, where he served in the Maori War and other military work. Later he became gold fields surveyor at Coromandel and

TREES

1 The oldest tree in the world. A giant Club-moss (Lepidodendron) flourished in 2 Specimens of Club-moss (Lycopodium q. v.l the present living representative of

Devonian times (q. v.). Restored, natural size, from only known fossil, found in New York the Devonian giant State, and now in New York State Museum , ...

Thomas, and surveyor of native lands. He organized the Labor Department of the New Zealand government in 1891 ; and he was deco¬ rated by the French government in 1896. Among his published works are (The Maori Polynesian Comparative Dictionary) ; (Fairy

Tales of New Zealand and the South Seas) ; (The Maori Race* ; (A Dictionary of the Mangareva* ; (A Dictionary of Niue.*

TREGELLES, tre-gel'es, Samuel Prideaux,

English Biblical scholar: b. Falmouth, 30 Jan. 1813; d. Plymouth, 24 April 1875. Early in life he worked in the iron foundries at Glamorgan, and by himself studied the classical and Oriental languages. In 1837 he settled in London, where he superintended the publication of the Eng¬ lishman's Greek Concordance to the New Tes¬ tament (1839) and the (Hebrew and Chaldee Concordance to the Old Testament (1843). In 1838 he began the critical study of the New Testament, and formed the design of a new Greek text derived from a comparative study of ancient manuscript. With this end in view he made several visits to the Continent, spend¬ ing five months in Rome, where he discovered some important readings in his examination of Codex B in the Vatican, which manuscript, how¬ ever, he was not allowed to copy. He published his (Account of the Printed Text of the Greek New Testament in 1854, and in 1857 began the publication of the first part of the Greek Testa¬ ment, comprising Matthew and Mark. The re¬ mainder of the gospels and the epistles were published from time to time until 1870. The (Revelation } was edited from his notes by S. J. Bloxidge and B. W. Newton in 1872, and in 1879 Dr. Hart published his materials for the prolegomena in an appendix to the Greek Testa¬ ment. Others of his works are 'Defense of the Authenticity of the Book of DanieP (1852) ; (Collation of the Texts of Griesbach, Scholz, Lachmann and Tischendorf, with that in com¬ mon Use* (1854) ; and the (Codex Lacynthius, Fragments of Saint Luke) (1861).

TREITSCHKE, Heinrich von, German historian: b. Dresden, 15 Sept. 1834; d. Berlin, 28 April 1896. He was educated at the univer¬ sities of Bonn and Leipzig and early advocated a German union in his writings. In 1858 he was appointed lecturer in history at the Uni¬ versity of Leipzig and became the most popular teacher at that institution. He also became known to the general public through a series of lectures on the constitutional history of Ger¬ many. He was a close student of the political trend in Germany and in 1864 he advocated a German union under Prussian leadership. About 1865 he was appointed to a lectureship at Freiburg, but he resigned the following year to become editor of the Preussische Jahrbuclier. His strong and sometimes violent opposition to modern liberal tendencies in government led to frequent bickerings with Brentano, Schmoller and other economists and led to his resignation. He was next at the University of Kiel, at Heidelberg in 1867-73, and after 1873 held a chair at the University of Berlin. After the formation of the empire in 1871 Treitschke was elected to the Reichstag. At first a National Liberal he became ever more and more con¬ servative. His

uncompromising Germanism caused him to make violent attacks on all opin¬ ions and all party groups in which he saw some¬

thing injurious to the rise of the German Empire. He was now one of those who sang the praises of the Hohenzollerns and in the days of the Kulturkampf he ably supported the government. Treitschke attacked the Ultra- montanes, the Socialists and the Jews. In Great Britain he saw the chief obstacle to Ger¬ man imperialism and colonial expansion. He was responsible for most of the anti-British feeling in Germany in the last decade of his life. In England he remained comparatively unknown, until the outbreak of the war in 1914 caused renewed discussion of Germany's polit¬ ical thought in the closing quarter of the 19th century. His writings were now translated and extensively circulated. Treitschke was attacked as one of the instigators of the war; his anti- English utterances were quoted in proof of the allegation that he foresaw an unavoidable con¬ flict between the two countries.

As a historian Treitschke is highly regarded. His especial claim to fame is his 'Deutsche Geschichte im neunzehnten Jahrhundert* (5 vols., 1874-94; English translation, 7 vols., New York 1915 et seq.). This work was incomplete at the author's death, ending with a discussion of the events preceding the Revolution of 1848. This history is one of the classics of Germany because of its power of style, skilful character delineation and vigorous narration. Its faults are discursiveness, bad arrangement and ex¬ treme partisanship. Other works are 'Zehn Jahre deutscher Kampfe, Schriften zur Tages- politik) (1874; 3d ed., 1897) ; (Der Sozialismus und seine Gonner* (1875) ; (Der Sozialismus und der Meuchelmord> (1878) ; (Ein Wort fiber unser Judentum) (1880) ; (Historische und politische Aufsatze* (1865; 1870; 1897); 'Zwei Kaiser) (1888) ; 'Politik,* collected lectures on political subjects (2 vols., 1907) ; 'Ausge- wahlte Schriften) (2 vols., 1907). Selections from the 'Politik* have appeared in English (London 1914). There is in English a collec¬ tion of Treitschke's essays between 1871 and 1895, entitled (Germany, France, Russia and Islam) (London 1915). Consult Davis, H. W. C., (The Political Thought of Heinrich von Treitschke) (1915) ; Schiemann, T., (Heinrich von Treitschkes Lehr, und Wanderjahre) (2d ed., Munich 1898) ; Hausrath, A., (Zur Erin- nerung an Heinrich von Treitschke* (Leipzig 1901) ; id., 'Treitschke, His Doctrine and His Life* (New York 1914) ; McCabe, Joseph, 'Treitschke and the Great War* (New York 1914) ; McClure, E., 'Germany's War Inspirers) (New York 1915) ; Miigge, M. A., 'Heinrich von Treitschke* (New York 1915).

TRELEASE, William, American botanist: b. Mount Vernon, N. Y., 22

Feb. 1857. He was graduated at Cornell University in 1880 and took his degree as Sc.D. at Harvard in 1884. He was in charge of the Summer School of Botany in the later institution (1883-84) ; was lecturer oni botany in Johns Hopkins (1884) ; director of the Missouri Botanical Garden (1889-1912), and since 1913 has been professor of botany in the University of Illinois. He is a member of various learned societies, the editor of several botanical works and author of numerous reports on botanical and entomological subjects.

TRELLIS, a frame composed of crossed bars or latticed and used for many purposes.

The French espalier is a kind of trellis made of larch wood about shoulder-high on which shrubs, flowers, vines, roses, etc., are trained and supported.

TRELLISED DRAINAGE, also known as Latticed Drainage, is a drainage net¬ work in which there is a notable tendency for the larger streams to occupy parallel courses, with the tributaries notably at right angles or nearly so. This may be caused by parallel series of faults or joints which con¬ trol the courses of the streams. More often, however, it occurs in regions like the Appa¬ lachians, where the rocks consist of alternating hard and soft beds tilted up on edge. The streams may at first occupy any position, but those on the softer rocks develop more rapidly than the others and finally capture their less favored neighbors until all the larger rivers occupy parallel courses on the soft beds. At a few points the large streams break across the hard rock ridges and at these points the valleys become notably narrower, forming nar¬ rows or water gaps. When as a result of piracy such water gaps loose their streams they are called wind gaps. Contrasted with trellised drainage is the branching, tree-like pattern de¬ veloped on flat-lying beds or on homogeneous rocks and known as dendritic drainage. See Stream Piracy; and the section on Work of Running Water in the article on Geology.

TREMAIN, Henry Edwin, American sol¬ dier: b. New York, 14 Nov. 1841. He was graduated from the College of the City of New York in 1860, served in the Union army 1861-66, rising from the grade of private to brigadier-general of volunteers, and for con¬ duct at the battle of Resaca, Ga., 15 May 1864, he was awarded a Congressional medal of honor. After the war he pursued the study of law and was

graduated from the Columbia Law School in 1867. He was United States attorney of New York in 1873-77, and has since en¬ gaged in law practice. He is active in political matters, prominent in various military organiza¬ tions of the veterans of the Civil War and has published (Sailor's Creek to Appomattox Court House, or the Last Hours of Sheridan's Cavalry } (1885).

TREMATODA, or FLUKES, a promi¬ nent class of the branch or phylum Plathel- minthes of consistently parasitic habit. The simple body, the presence of an alimentary canal and even of some special sense organs together with the occurrence in most cases of free living stages in development shows that the trematodes stand much nearer free living forms like the Turbellaria than do the cestodes. Furthermore, while the majority of flukes are endoparasitic there are also ectoparasitic species which display considerable freedom and not only pass from host to host but have an ex¬ tended period of free existence before they as¬ sume the parasitic life.

Trematoda are generally flattened and elongate though some are conical,, cylindrical or irregular in form. The mouth is mostly at or near the anterior tip of the body and the excretory pore near the posterior end. Highly developed muscular suckers are found at the anterior end on the ventral surface or at the posterior end. The ectoparasitic species have

commonly chitinous hooks or anchors in con¬ nection with the suckers to serve as additional organs of attachment. Many species are more or less covered with minute scales or spines. Trematodes vary in size from 0.2 mm. to 25 or rarely 75 mm. in length. The body is solid as parenchymatous tissue fills all the space be¬ tween the organs. The alimentary system is either rodlike (rhabdocoel) or shaped like a tuning fork (triclad). In some of the larger forms it possesses lateral branches which may assume a complex aspect. There is no skeletal system but muscular layers of circular, longi¬ tudinal and diagonal fibres lying near the surface of the body form the main part of the dermomuscular sac. By virtue of this excessive muscular de¬ velopment the flukes are ex¬ tremely mobile and variable in form. Stellate flame cells ter¬ minating in minute tubules con¬ stitute the elements of the ex¬ cretory system which varies in complexity with the size of the organism.

The reproductive system comprises with rare exceptions the organs of both sexes. The male organs are rather simple, whereas the female system is very complex. The parts and their relations are very similar to those found in cestodes. The development of trematodes is direct

and simple among the ectoparasitic forms but com¬ plex among endoparasites where it is complicated by al¬ ternation of generations and one or more changes of host. In the common sheep liver fluke which presents a life cycle of moderate complexity, a minute ciliated embryo es¬ capes from the egg shell whenever this is carried by chance into a water body. The lit¬ tle free swimming larva (miracidium) seeks out a snail and in its liver tissue metamorphoses into a sac (sporocyst) in which is developed a new generation (redia). Within these indi¬ viduals are produced similar forms or when conditions are favorable a modified type

(cercaria) which deserts the snail and encysts on grass or in the water. This form is really the young distome and it attains the stomach of the sheep with food or drink. There set free by digestion, it wanders into the liver and by growth becomes adult. Even more complex conditions are found in other species; the most if not all endoparasitic trematodes agree in

selecting a mollusk as an intermediate host and in manifesting alternation of generations.

Several species are of great economic im¬ portance; thus the sheep liver fluke (Fasciola hepatica) produces epidemics of liver rot of great magnitude, entailing large annual losses to sheep raisers in England, Australia and on the Continent; the loss in extreme instances has reached $20,000,000 in a single year.

About a dozen species of fluke are known as human parasites. The Asiatic lung fluke (Paragonimus westermani) is very abundant in

Opisthorchis feli- neus, from liver of man. Europe. (Original drawing from type speci¬ men.)

the East (Japan, China, Formosa and the Philippines) and produces a disease resembling tuberculosis. A related species has been re¬ ported from a few localities in the United States. The Chinese intestinal fluke (Fasciolopsis buski) though formerly believed to be rare, is now known to be exceedingly abundant in some parts of China, Siam, etc. It gives rise to serious intestinal troubles.

The human liver fluke (Clonorchis sinensis) is very abundant in some parts of China and Japan and has frequently been introduced into this

country. The human blood fluke has three species; Schistosoma hcematobium which has been identified in Egyptian mummies of the 20th dynasty (1250 b.c.) and is exceedingly common in that and adjacent regions to-day. Sch. japonicum, endemic in parts of Japan, China and the Philippines; Sch. mansoni, re¬ ported first from the West Indies, and known to occur in Central and South America and in the Kongo Basin, Africa. It was very likely in¬ troduced into this continent by the slave trade. All species are the cause of serious circulatory, renal and intestinal disturbances. The eggs are evacuated either with urine or feces and are distinguished in that the Egyptian form possesses a terminal spine, the Japanese form is spineless and the form from the West Indies has a lateral spine on the egg. The disease produced by the first species has long been known as Egyptian hsematuria. For further data consult Fautham, Stephens and Theobald, (Animal Parasites of Man* (London 1916) ; Ward, H. B., (Trematoda in Reference Hand¬ book of Medical Sciences) (New York 1917).

Henry B. Ward,

Professor of Zoology, University of Illinois.

TREMOLITE, a white or gray variety of amphibole. It occurs abundantly either in dis¬ tinct crystals or in columnar or fibrous masses. It is essentially a calcium and magnesium meta¬ silicate, being distinguished from the other vari¬ eties of the mineral by its pale color due to the absence of iron.

TREMULANT, a draw-stop in a pipe or reed organ which regulates a mechanical device consisting of a thin metallic plate so arranged as to modify the admission of wind into the pipes, and by its vibrations produce a sweetly tremulous or waving effect, presumably imita¬ tive of the vox humana, or human voice. Young organists usually have to be warned against the overuse of this device.

TRENCH, Herbert, British writer of poems and plays : b. Avoncore, County Cork, Ireland, November 1865. He was educated at Oxford and was a Fellow of All Soul's Col¬ lege; became examiner at the Board of Educa¬ tion (1891) ; then traveled extensively abroad and was director of the Haymarket Theatre where he produced Shakespeare's (King Lear' and Maeterlinck's (The Blue Bird.* He was founder of the British Institute in Florence, where he drew up the scheme for producing a better understanding between Great Britain and Italy (1918). He published (Deirdre Wedded and Other Poems) (1901); (Lyrics and Nar¬ rative Poems) (1911); (Napoleon,* a play (1918), etc.

TRENCH, Richard Chenevix, Irish prel¬ ate, archbishop of Dublin : b. Dublin, 9 Sept.

1807; d. London, 28 March 1886. He was edu¬ cated at Harrow and Trinity College, Cam¬ bridge, where he was graduated in 1829. His college friends included Tennyson, Hallam, Maurice, Sterling and Kemble. Ordained in 1832, he became curate at Hadleigh, in Suffolk, in the following year. He took priest's orders in 1835, and held the curacy of Curdridge, Hampshire, during 1835-41. After a few years as curate at Alverstoke, in Hants, he obtained the rectory of Itchenstoke, in 1844. He became examining chaplain to Bishop Wilberforce of Oxford in 1845, and professor of divinity in King's College, London, the next year. The latter post was held by him till 1858, and during 1856-63 he was dean of Westminster. He was consecrated archbishop of Dublin on the first day of 1864. He resisted the disestablishment proposals of Gladstone, but accepted the new conditions loyally. He resigned the see in 1884. He was buried in Westminster Abbey. Trench was known as a poet by many sonnets, lyrics and other verses published in the follow¬ ing, among other volumes : (The Story of Justin Martyr, and other Poems) (1835) ; 'Poems from Eastern Sources) (1842). His contribu¬ tions to philological subjects include (The Study of Words* (1851) ; English, Past and Pres¬ ent (1855) ; and (A Select Glossary of Eng¬ lish Words* (1859). His Biblical and theolog¬ ical works comprise 'Notes on the Parables of our Lord) (1841); Exposition of the Sermon on the Mount) (1844) ; 'Christ the Desire of all Nations1* (1846) ; 'Studies in the Gospels* (1867), and many volumes of sermons. He was a member of the committee for revising the New Testament. Among his other publica¬ tions are 'Sacred Latin Poetry* (1849) ; 'A Household Book of English Poetry* (1868) ; 'Plutarch : his Life, his Lives, and his Morals* (1873) ; and 'Lectures on Mediaeval Church History* (1877), Consult (Letters and Memo¬ rials of Richard Chenevix Trench* (1888).

TRENCH, Military. See Fortification ; Trenches.

TRENCH MORTAR. See Gunnery.

TRENCHARD, tren'chard, Stephen Deca¬ tur, American naval officer: b. Brooklyn, N. Y., 10 July 1818; d. New York, 15 Nov. 1883. He was appointed midshipman in the navy in 1834, served in the Seminole War, was on the coast survey in 1845-46 and in 1847 was promoted lieutenant. He was engaged on board the Saratoga in the war with Mexico, was attached to the coast survey in 1853-57 and in 1857-60 served on the Powhatan on her diplomatic cruise to China and Japan. He was promoted commander in 1862, participated in both attacks on

Fort Fisher and in 1866 received rank, as captain. In 1871 he was promoted commodore, served on the examining board in 1871-72 and as lighthouse inspector on headquarters duty in 1873-75. He was advanced to the rank of rear- admiral in 1875 and in 1876-78 was in command of the North Atlantic squadron. He was re¬ tired in 1880.

TRENCHES. An entrenched zone con¬ sists of an entire system of trenches and their auxiliaries, composed of wire entanglements and other obstacles, listening posts, lookouts, machine-gun emplacements, fire trenches, com¬ municating trenches, trenches for reserves and

supports, command posts, cave shelters, latrines and the like, occupied or susceptible of being occupied by a firing line and by its supports and local reserves.

Firing trenches are those designated prima¬ rily for delivering rifle fire against an infantry attack and are usually constructed in short lengths for a squad, section or platoon, arranged so that they are mutually supporting and thor¬ oughly cover the ground by both frontal and flanking fire. If longer than required for a squad they should be of an irregular or in¬ dented trace and be traversed at intervals of from five to eight yards so as to give protec¬ tion from enfilade fire and localize the effect of shell bursts.

If the firing trenches are located under fire when an attack has been halted the location is determined by the line at which the troops are forced to halt, and dig themselves in. This line may in some cases be a hostile trench captured in the course of the attack. Ordinarily each man will construct individual cover in the form of a lying trench, which he will gradually im¬ prove to a sitting, kneeling or standing trench. Small adjustments of position may be made by the officers with a view to getting the best pos¬ sible line under the circumstances. The individ¬ ual pits are connected up into squad or longer length when night falls, and the trace and loca¬ tion can then be rectified.

If the enemy has been found in a strong defensive position and an attack has not been made, or has resulted in a withdrawal, a line of firing trenches may be located under cover of night from 500 to 600 yards, or even more from the enemy, the exact distance depending upon the ground, the facilities for natural cover and the tactical

condition. This line may be made fairly strong and complete before any further advance is attempted. Then under cover of darkness or fog, or a heavy bombard¬ ment, a new firing trench may be constructed at a distance of 200 to 300 yards from the enemy.

When not in the presence of the enemy a careful reconnaissance should first be made and the firing trenches can then be located with due regard to the terrain, the tactical requirements and economy of men.

The following general rules should govern the location of the firing trenches: (1) The field of fire should be such as to expose an attacking enemy to fire for at least the last 200 to 300 yards of his advance. To ensure this it may be necessary to clear the foreground. With well-trained troops a shorter field of fire may be sufficient, provided it is covered by frontal and flanking fire and is strengthened by a good obstacle, which should be well screened from the distant view of the enemy. (2) Concealment of the trenches is of the greatest importance. (3) The defenders should be screened from the enemy's view and shel¬ tered from his fire by natural or artificial cover so arranged as to afford the maximum develop¬ ment of rifle fire. (4) The foreground should contain natural obstacles to break up the for¬ mations of attacking troops, but not afford them cover. (5) There should be good communica¬ tions within the position and over ground that may be used for counter-attacks. (6) The trenches should not be placed too near unalter¬ able features that reveal their location or fur¬

nish good range marks for the enemy. (7) The location of firing trenches on the crest or forward slope, though exposing them to view and bombardment, gives a feeling of superiority to the troops and increases their morale ; en¬ ables the support, reserve, communicating and approach trenches to be well concealed; offers greater facilities for observation and for the assembly of troops for the assault close to the firing trenches and unobserved. (8) The loca¬ tion of firing trenches behind the crest of a slight ridge screens them from view and fire of the enemy's artillery, unless he has in his possession high ground living a view of the reverse slope. Special conditions, such as the enemy's local superiority in artillery, may jus¬ tify the deliberate choice of such a position, but it must not be too far down the reverse slope, arrangements must be made to deny the enemy access to the crest of the ridge and there must be a number of saps forward to the crest to allow a continuous observation of the front slope. (9) In woods the trenches should be located 10 to 20 yards from the front edge; the natural appearance of the woods should not be changed, but a clear field of fire obtained by cutting some of the brush, small trees

and low branches.

Frequently trenches designed primarilv for other purposes (such as cover trenches, com¬ municating trenches, approach trenches) are in places prepared for occupancy by a firing line, with appropriate banquette, etc. Sometimes approach trenches may be prepared for firing in both directions. These are not firing trenches, as their use for firing is secondary.

Cover trenches are from 10 to 100 yards in rear of the firing trenches, to protect men of the firing line (except firing trench guards) during all but the infantry attack. It is *not advisable to occupy firing trenches in force ex¬ cept when they are attacked by infantry. The bulk of the firing line should, therefore, be close at hand under cover, and to a certain extent the trenches which afford this cover facilitate lat¬ eral communication. They are often not con¬ tinuous, and there obtains with them also the tactical requirement of dispersal. Cover trenches are amply provided with cave shelters, bombproofs and the like, and in places with firing banquettes, overhead cover and loopholes, or head cover. From the cover trenches, ap¬ proach trenches proceed forward at frequent intervals to the communicating trenches or fir¬ ing trenches. Usually at less frequent intervals are approach trenches entering the cover trenches from the rear.

Communicating trenches are deep trenches used to afford proper lateral communication. They are frequently of short lengths, in front or in rear of the general line of the cover trenches, and generally opposite intervals be¬ tween such trenches. Portions of the commu¬ nicating trenches are prepared for fire and local supports may be sheltered in portions of them. Communicating trenches and cover trenches are connected by approach trenches ; and where communicating trenches are in advance of cover trenches they are connected with the fire trenches by approach trenches relatively close together.

Approach trenches are those enabling one to pass within the intrenched zone from front to rear or vice-versa between firing trenches, cover

trenches, communicating trenches and other parts of the trench system farther in rear. Por¬ tions of approach trenches are prepared

for fir¬ ing, sometimes in both directions. They are deep, comparatively wide and winding, tra¬ versed or zigzagged.

Local trenches extend to observation sta¬ tions, command posts, latrines, machine-gun emplacements and the like from firing, com¬ municating, cover or other trenches.

oyer the parapet with proper effect so he can hit the bottom of his own wire entanglement. Traverses must be adequate. A parados must be provided to give protection against the back blast of high explosive shell ; the trace of the trench should be irregular, to provide flanking fire; and if the trench is to be held for any length of time, the sides must be revetted and the bottom of the trench must be floored and drained. The drawings show the trench pre-

Long Range Searching or Barrage Fire and Profile of Trenches.

Support trenches are designed to shelter all of the troops who form the local supports of the firing line during hostile artillery fire, and a portion of them during the period of the in¬ fantry attack, if all are not then required far¬ ther forward. They are ordinarily similar in type of construction to cover trenches, but are located farther to the rear. Toward the front they merge into the cover trenches. Toward the rear they may be as remote from the firing trenches as 200 or 275 yards. Approach trenches provide communication from them to front and rear. Support trenches are some¬ times provided with firing banquettes and the like, and machine-gun emplacements may be located among them. Often the ground is such as to permit the supports to occupy naturally sheltered positions, where support trenches may be much modified or omitted in places alto¬ gether.

Reserve trenches are trenches designed to shelter the local reserves. They are in rear of the support trenches, but often merge into them toward the front. While the firing trenches hold, reserve trenches are not ordinarily sub¬ jected to prolonged and severe artillery fire.

Every firing trench should fulfil the follow¬ ing essential conditions : The parapet must be bullet proof; every man must be able to fire

pared for firing through and over the parapet and typical sections for long range searching or barrage fire. The narrower the trench, the bet¬ ter the cover ; but if too narrow it may hamper

Trench for Fire through and over the Parapet.

the movement of troops too much. Therefore, a firing trench is usually

made broad enough to allow of movement behind the line of men manning the parapet. Every man must be able to use his rifle over the parapet, and the men

moving behind must not have to stoop down in order to get their heads under cover.

The resulting section is, therefore, with a banquette or firing step 18 inches wide and four feet six inches (or five feet, if we allow for a small notch or hollow to hold the rifle) below the crest of the parapet, and behind this a deeper portion from 18 to 30 inches wide at the bottom and from six to seven feet below the crest line of the parapet. The firing step must have a level surface to give a firm foothold. It may consist of an earth step revetted with planks held in place by stakes.

The best type appears to be a trench with a firing banquette for five or six rifles in each bay, between two traverses, each six feet thick, and with the back part of the excavation formed into a communicating trench for observation and manning of parapets. This trench is some¬ what deeper and three feet wide.

Types of communicating and approach trenches are now becoming fixed. In France the following seem to have been the normal : Communicating and approach trenches well to the rear six feet wide, those farther forward three feet wide and both types six feet eight inches deep. A communicating trench less than three feet wide at the bottom is sure to become jammed. This is the minimum to be allowed, and the work should be commenced with a width of not less than three feet eight inches at the top, so as to get three feet at the bot¬ tom, according to the stiffness of the soil.

Berms of one foot on each side of a sap or trench where earth is piled up are considered in¬ dispensable. They prevent sliding of earth and furnish a little shelf on which to place tools, bags, guns and other articles, in case troops want to pass the occupants ; the double berm also makes it possible for infantry to get out of a trench when the emergency requires.

Edward S. Farrow,

C onsulting Military and Civil Engineer.

TRENCK, trenk, Baron Friedrich von der, German adventurer: b. Konigsberg, 16 Feb. 1726; d. Paris, 25 July 1794. His life was a succession of adventures scarcely less marvel¬ ous than the romantic and highly colored ac¬ count he gives of them. He entered the Prus¬ sian service in 1740 and stood high in Frederick the Great's favor, until, supposedly through his love affair with the king's sister, he incurred the royal displeasure, which caused his first imprisonment, the beginning of no end of mis¬ fortunes; loss of property, numerous imprison¬ ments and attempts at escape, dangerous wounds and perils of all kinds. The stories of how he broke out of several famous prisons are all most graphically described in his (Selbstbiographie) (1787), and in one or more very popular English translations which have delighted the youth of four generations. All his wonderful adventures are told in a manner that reminds one of Munchausen's marvelous tales. The anecdotes interspersed give a vivid picture of the turbulent condition of court life at the time of Frederick the Great and Maria Theresa. His restless, adventurous temperament led him to Paris, when the Revo¬ lution was in full swing; he was there accused of being a secret emissary of foreign powers, and was beheaded by Robespierre's order. Con¬

sult Wahrmann, 'Friedrich Freiherr von der Trencks Leben, Kerker und Tod) (1837). His cousin, Baron Franz von Trenck, an equal hero and swashbuckler, has also written an autobiography (1748), which, however, has not attained the celebrity of the other's wonderful mixture of fact and imagination.

TRENDELENBURG, tren'de-len-boorg, Friedrich Adolf, German philosopher: b. Eutin, Germany, 30 Nov. 1802; d. Berlin, 24 Jan. 1872. He studied in Kiel, where he came under the influence of John Erich von Berger, and ac¬ quired his early philosophical training at Ber¬ lin, and was appointed professor in the univer¬ sity of that city. His writings embrace the whole field of philosophy, ontological, ethical and aesthetical. He set forth the ethical aspect of his philosophy in the treatise 'The Ethical Idea of Right and Law,} and the aesthetic as¬ pect in 'Niche5 (1846) ; and (The Cathedral of Cologne) (1853). He wrote also 'Natural Jus¬ tice on the Ground of Ethics> (2d ed., I860).. His principal claim to distinction as a thinker rests on his acute criticism of the systems of Kant and Hegel.

TRENHOLM, George A., American mer¬ chant: b. South Carolina, 1806; d. Charleston, S. C., 10 Dec. 1876. He was one of the largest dealers in cotton in the South before the Civil War and during the war was engaged in block¬ ade-running, endeavoring to obtain supplies for the Confederates from Nassau. He was ap¬ pointed Secretary of

the Confederate Treasury in 1864, but was taken prisoner later in that year and held until 1865, when he was pardoned by President Johnson.

TRENT, William Peterfield, American man of letters: b. Richmond, Va., 10 Nov. 1862. After study at the University of Vir¬ ginia and at Johns Hopkins University, he was professor of English in the University of the South (1888-1900) and dean of its academic department (1894-1900). From 1892 to 1900 he was editor of the Sewanee Review, and since 1 July 1900 has been professor of English literature at Columbia University. He has published (Life of William Gilmore Simms) (1892) ; ‘English Culture in Virginia 5 (1889) ; ‘Southern Statesmen of the Old Regime) (1897) ; (Robert E. Lee) (1899) ; (John Mil- ton) (1899) ; ‘The Authority of Criticism5 (1899) ; ‘War and Civilization (1901) ; ‘The Progress of the United States in the Century5 (1901) ; ‘A History of American Literature 1607-1865) (1903) ; ‘Greatness in Literature and Other Literary Addresses) (1905) ; Long¬ fellow and other Papers> (1910); (Defoe — How to Know Him) (1916), etc. He has also edited ‘Select Poems of Milton (1895) ; ‘Es- says of Macaulay) (1897) ; ‘Poems and Tales of Edgar Allan Poe) (1898) ; ‘Balzac’s Comedie Humaine5 (1900); Southern Writers, Selections in Prose and Verse) (1905), and has collaborated in numerous literary under¬ takings, e.g., ‘Colonial Prose and Poetry,5 editions of Shakespeare and Thackeray and the ‘Cambridge History of American Litera¬ ture.) Since 1905 his chief work has lain in English history and literature 1680-1730, with special attention to Defoe, of whom he has written a biography and bibliography in 10 volumes still in manuscript.

TRENT (German, Trient, tre-ent’), Italy, a town in the southwestern part of Trentino, of which it is the’ capital, situated on the river Adige or Etsch, 19 miles northeast of the Lago di Garda. It is a historical city, being the capital of the Trindentini, about the 4th cen¬ tury. It has belonged to Italy, to Venice, Austria, Bavaria, France, Austria and again to Italy. Among its numerous churches the most noteworthy are the cathedral, built in the 13th and 14th centuries in the Byzantine style, and entirely of marble ; and the church of Santa Maria Maggiore, in which the meetings of the celebrated Council were held. A statue of Dante was erected here in 1906. The principal manufactures are silk, wine, brandies and sausages. Pop. about 30,000. See Trent, Council of.

TRENT, Canada, a river discharging into Lake Ontario through the Bay of Quinte. The greater part of its course of 175 miles consists of a senes of large, irregular and elongated lakes, which have been canalized for a distance of 160 miles. The stream itself furnishes water power, and large quantities of lumber are floated down on it. It passes the towns of Peterborough and Trenton.

TRENT, England, a river rising in Stafford¬ shire, and flowing in a general northeast direc¬ tion through Derby, Nottingham and Lincoln counties, emptying into the Humber estuary near its head. It is 170 miles long, and nav¬ igable 95 miles for small vessels and barges. It is connected by numerous canals with Midland manufacturing cities.

TRENT, Council of. The 19th oecumenical council of the Catholic Church was that of Trent (1545-63). It ranks with Nicaea, Ephe¬ sus and Chalcedon as one of the greatest of the general councils. Hitherto the Church had been sundered by schism and riven by heresy in the East. Now the West was in revolt. The deposit of faith had been effectively defended against the onslaughts of Arius, Nestorius, Eutyches and Photius. Now Luther and the Protestant reformers had to be met. So the Council of Trent had a twofold purpose: First, clearly to define the teaching of the Church on the issues that Protestantism had raised; sec¬ ondly, effectively to legislate against the abuses that had crept in among the clergy and laity. During the pontificate of Clement VII (1 523— 34), the Emperor Charles V had frequently urged the advisability of a general council as an effective means of stemming the tide of Prot¬ estantism. This means was purposed by Paul III (1534-49) from the very outset of his reign. The Pope's efforts were again and again frustrated by the bickerings and rivalry that marked the relations between Charles V and Francis I. So the Council of Trent was not opened until 13 Dec. 1545.

1. First Period (1545-47). — The first for¬ mal session of the Council of Trent was at¬ tended by the three papal legates — Cardinals Giovanni del Monte, Marcello Cervini and Reginald Pole — 4 archbishops, 22 bishops and 5 generals of religious orders. The right to vote was enjoyed by all of these fathers, though not by the 42 theologians and 9 canonists, who came to the council only as consultors.. Paul III was fully aware that political chicanery would prevent many bishops from going to

Trent. Yet the prospect of their absence was no hindrance to his determined will to convoke the council. The doctrinal and disciplinary au¬ thority of a general council does not depend on the number of the bishops that attend ; but, in the last analysis, is consequent upon the

infalli¬ bility and supreme jurisdiction of the Pope.

A very simple method of procedure was adopted by the council. The cardinal legates proposed the subjects to be discussed: a con¬ gregation of theologians drew up an elenchus of doctrines to be defined under each subject; com¬ mittees and particular congregations debated each doctrine at great length ; a general congre¬ gation went over the same ground in detail and fixed upon the content and wording of the de¬ cree; finally the council in formal session defini¬ tively voted on the decree. The thoroughness of this mode of procedure accounts for the long time that intervened between the formal ses¬ sions.

The first dogmatic decision of the Council of Trent was given 8 April 1546, in session IV, on Scripture and tradition. It ((receives and venerates with equal love and reverence® both Holy Writ and divine tradition; determines the canon of the Bible; selects the Vulgate as the authoritative Latin version, to the exclusion of all other Latin editions of the Bible then cur¬ rent; and defines the right of the Church to in¬ terpret the inspired Word of God. In session V, 17 June 1546, Trent decreed the universality of the fall of the human race in Adam, and other doctrines concerning original sin. Then came the important matter of justification. Sixty-one general congregations, besides many committee meetings and special congregations, were devoted to this doctrinal issue and to the reform measures that were appended thereto. On 13 Jan. 1547, in session VI, the masterful decree was passed. It contains a preface, 16 chapters and 33 canons or condemnations Ses¬ sion VII, 3 March 1547, treated of the sacra¬ ments in general and of baptism and confirma¬ tion. The Smalkald War and an epidemic caused a majority vote of the council, in ses¬ sion VIII, 11 March 1547, to transfer its meet¬ ings from Trent to Bologna. Fourteen bishops remained at Trent; they were there detained by Charles V. Indeed, the emperor so interfered with the council that it came to no dogmatic de¬ cisions at Bologna, and 13 Sept. 1547 was sus¬ pended by Paul III.

2. Second Period (1551-52). — Julius III (1550-55), who as Cardinal del Monte had been first papal legate to the council, reconvened the synod at Trent, on 1 May 1551. His legates were Cardinal Marcellus Crescenzi, Arch¬ biship Pighinus of Siponto and Bishop Lipo- manni of Verona. Henry II of France pre¬ vented the French bishops from attending. De¬ crees on the sacraments of eucharist, penance and extreme unction were issued in sessions XIII-XIV. There were now in attendance, 3 legates, a cardinal, 10 archbishops and 54 bish¬ ops. Delegates from several Protestant princes were present at these two

sessions. They de¬ manded that the council define the supremacy of an oecumenical council over the Pope and postpone definitions on all points of controversy between Catholics and Protestants. The coun¬ cil refused to accede to their demands. Many particular and general congregations were then held in regard to the sacrifice of the mass. No

decree was decided upon. The council ad¬ journed 23 April 1552 because of the nearness of Trent to the war zone of Charles V and Maurice of Saxony.

3. Third Period (1562-63). — On the death of Julius III, a former president of the council, Marcello Cervini, was elected Pope (1555) ; he took the name Marcellus II and reigned only 22 days. Paul IV (1555-59) vigorously carried out the reforms instituted by Trent; but did not reconvene the council. Pius IV (1559-65) was minded to do so. He was deterred by the petti¬ fogging interferences of secular rulers. The Emperor Ferdinand wished a new council and not a continuation of the old; he insisted on the choice of some German city other than Trent as the place of meeting. It took some time to bring him and the rest of the Catholic monarchs to terms. The third period of the council began at Trent 18 Jan. 1562. The presi¬ dent was Cardinal Ercole Gonzaga; his assist¬ ant cardinal legates were Stanislas Hos, James du Puy, Jerome Seripando, Louis Simonetta and Marcus Siticus. Besides these legates, there were present a cardinal, 3 patriarchs, 11 archbishops, 40 bishops, 4 abbots and 4 generals of religious orders. The theologians numbered

34.

Bickerings with Emperor Ferdinand and lesser princes delayed the preparation of the de¬ cree on holy communion. This decree was most important in its dogmatic and disciplinary bearing. At the formal session XXI, 16 July 1562, the council decided that communion under the form of bread was sufficient for the laity. <(For He that said, (Except ye eat the flesh of the Son of Man and drink His blood, ye shall not have life in you) (John vi, 54), also said, (If one eat of this bread, one shall live for¬ ever J (John vi, 52). And he that said, (He that eateth my flesh and drinketh my blood, hath everlasting life) (John vi, 55), also said, (The bread, which I shall give, is my flesh for the life of the world) (John vi, 52). And finally He that said, {He that eateth my flesh and drinketh my blood, abideth in me and I in him) (John vi,

57), nevertheless added, (He that eat¬ eth this bread shall live forever) (John vi, 59). ˆ Moreover, the council vindicated to the Church the right to determine how the sacraments should be administered; whether, for instance, communion should be under one form or two. Session XXII, 17 Sept. J562, clearly defined the teaching of the Church in regard to the sacri¬ fice of the mass. Cardinals Gonzaga and Seri¬ pando died; they were replaced by the cardinal legates Morone and Navagero. Eighty-four theologians, among them the learned Jesuits Salmeron and Lainez, took part in the prelimi¬ nary discussions on the sacrament of orders. Session XXIII, 15 July 1563, issued the defini¬ tions of Trent on orders and the hierarchy. By this the council had 235 voting members. Ses¬ sion XXIV, 11 Nov. 1563, had to do with the sacrament of marriage. In session XXV, the last, 3-4 Dec. 1563, besides the usual decrees of reform, were promulgated the doctrines of in¬ dulgences, and of the veneration of the saints, relics and images. Finally all those decrees were read and approved, which had been passed during the reigns of Paul III and Julius III. These Tridentine definitions were signed by 4 cardinal legates, 2 cardinals, 3 patriarchs. 25 archbishops, 167 bishops, 7 abbots, 7 gen¬

erals of religious orders and 19 proxies for 33 absentees. Pius IV confirmed the decrees of the Council of Trent, on 26 Jan. 1564, by the bull <(Benedictus Deus.®

Bibliography. — The dogmatic decrees of Trent are given in scientific and accurate form by Denzinger-Bannwart, (Enchiridion Symbolorun P (11th ed., 1911). The classic on the council is being published by a German Catho¬ lic publication society, the Gorresgesellschaft ; the title of this monumental work is (Concilium Tridentinum: diariorum, actorum, epistula- rum, tractatuum nova collection Five vol¬ umes Lave thus far appeared : I, Diariorum p. 1, the commentary of Hercules Severolus (1901) ; II, Diariorum p. 2, the diaries (1ˆ4) of Angelo Massarelli (1911) ; IV, Actorum p. 1, the acts of sessions 1—1 1 1 (1904) ; V, Actorum p. 2, the acts of sessions IV-VIII (1911) ; X, Epistularum p. 1, letters written from 5 March 1545 to 11 March 1547 (1916). The history of the council was written up a parti pris by Saroi, Hstoria del concilio tridentinoˆ (1619). Against him wrote Pallavicino, Hstoria del con¬ cilio di Trento) (2 vols., 1646-57). Other works of moment are Dupuy, Hnstructions et lettres concernant le concile de Trent* (1654) ; Labbe-Cossart, (i-iv, 1884-97) ; Lainez, (Disputationes triden- tinae* (ed. Grisar, 1886).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College, Maryland.

TRENT AFFAIR, The, in American his¬ tory, during the Civil War, in October 1861, Capt. Charles Wilkes, United States navy, intercepted at sea the British mail steamer Trent, bound from Havana to Saint Thomas, and took off two Confederate commissioners, accredited to France, Messrs. Mason and Slidell, who were among her passengers. They were taken to Boston, and imprisoned in Fort Warren, but were released on 1 Jan. 1862, on the demand of the British government, and per¬ mitted to proceed to Europe. Secretary Seward accepted England's demand as an adoption of the American doctrine which denied the right of search.

TRENT NAVIGATION SYSTEM. See

Canadian Canals.

TRENTE ET QUARANTE. See Rouge ET NoiR.

TRENTON, Canada, a town and port of entry in Hastings County, situated on both sides of the Trent River at its mouth in the Bay of Quinte, 90 miles northeast of Toronto, and at the junction of the Grand Trunk and Central Ontario railways. It has large manufac¬ turing industries, and an extensive export trade in timber. Pop. 3,988.

TRENTON, Mo., city and county-seat of Grundy County, on one of the forks of Grand

River, and on the Chicago, Rock Island and Pacific and the Quincy, Omaha and Kansas City railroads, about 100 miles northeast of Kansas City, and 80 miles northeast of Saint Joseph. It was established in 1841, in 1857 was incorporated as a town, and in 1893 was char¬ tered as a city. It is in an agricultural and stock-raising region, and nearby is a large coal field. The chief manufacturing establishments are flour mills, butter and cheese factories, cigar factory and machine shops. The shipments are chiefly farm and dairy products, livestock and coal. The educational institutions are public schools, the Jewett Norris Library, which was endowed of $15,000, and school of music and dramatic art. It has municipally owned water¬ works, four banks, one national and three State banks with a combined capital of $230,000. Pop.

(1920) 6,951.

TRENTON, N. J., city, capital of the State, county-seat of Mercer County, on the Dela¬ ware River, and on the Delaware and Raritan Canal, on the Philadelphia and Reading and the Pennsylvania railroads, about 59 miles south¬ west of New York City and 29 miles northeast of Philadelphia. It is in lat. 40° 14′ N., long. 74° 46′ 30″ W. It is at the head of navigation in the Delaware River, and a falls here yields water power. The ground area is nine square miles, and there are about 230 miles of streets. Two bridges cross the Delaware and connect with Pennsylvania.

Manufacturing. — Among the large indus¬ trial establishments there are 34 engaged in the manufacture of pottery products, including vitrified china, Belleek china, semi-porcelain, common china, and white granite; also sanitary earthenware, electrical specialties, porcelain bath tubs, vitrified and decorative tiles, terra cotta, drain-pipe and brick. These have made Trenton pottery famous all over the world. Nearly all the clay and all of the coal used in the pottery industry is brought to Trenton. The value of the products amounts to about $7,000,000 per annum, though they have run as high as $12,000,000. Trenton's iron industries (the great works of the John A. Roebling's Sons Company, manufacturing metal wire rope, fire-proof wire, lath, cables, etc., are here) ana machine shops produce $5,000,000 per annum. There are 16 rubber works, making a great variety of products, and having sales approxi¬ mating $30,000,000 each year. Other important manufactures are crackers, school and church furniture works, watches, oil cloth, tobacco goods, carriages and wagons. There are also anvil works, flint and spar mills, lumber yards and fertilizer works. There are about 70 dif¬ ferent industries, comprising 540 concerns, representing approximately $50,000,000 capital. There are a total of 3,500 business places in the city.

Public Buildings. — The principal public buildings are the State capitol, the United States government building, municipal and county buildings, opera house, State prison, insane hospital, State home for girls, city library with 40,000 volumes, three hospitals, State arsenal and the Y. M. C. A. building. The Battle Monument, commemorating the battle of Trenton, is conspicuously located, and bears a bronze figure of Washington. The city has a large number of fine church and school build¬ ings and business houses.

Churches and Charities. — The churches and missions in the city number about 75. There are about 15,000 Roman Catholics, 5,000 Methodists, 3,500 Presbyterians, 4,000 Bap¬ tists and 2,000 Episcopalians. The members of the Society of Friends, Orthodox and Hicksite, once a power in the community, have dwindled to less than

100. There is a State asylum for the insane, three large hospitals, a Children's Home, the Widows and Single Women's Home, and a number of smaller benevolent and chari¬ table institutions.

Education. — Trenton has a number of noted educational institutions, among which are the State normal and model schools, the State school for deaf-mutes, an industrial school for girls, a large high school, 34 public elementary and primary schools, a school of industrial arts, one Roman Catholic college, eight parish schools, one academy, business colleges and sev¬ eral private schools. Educational classes are conducted under the auspices of the Young Men's Christian Association. There is a free public library, a beautiful white marble build¬ ing, containing about 75,000 volumes; the State library and several school libraries.

Banks and Finances. — There are eight banks ; the combined capital of the three national banks is $1,250,000; the deposits of all except two private banks are $16,622,740. The real estate of Trenton is assessed at over $70,- 000,000. The cost of city maintenance each year is about $1,650,000. The chief items of expenditure are, for schools, $500,000; for police department, $180,000; for fire depart¬ ment, $170,000; for lighting, $75,000.

Government. — Commission government has been established with five commissioners, hav¬ ing charge respectively of public affairs, revenue and finance, public safety, streets and improve¬ ments, parks and public property. The mayor has charge of public affairs and is advisory to the other commissioners. The city em¬ ployees are under civil service control. The fire department has been completely motor¬ ized. The police and fire departments are removed, by law, from political control, and are effectively administered. The water sup¬ ply of the city was municipalized in 1859, and is conducted with satisfaction to the inhabitants of Trenton. The consumption of water averages about 80 gallons per capita, and the reservoir capacity is 120,000,000 gallons. The board of health has taken an advanced position upon all questions of public sanitation, while the parks of the city, the main breathing ground being named Cadwalader, occupy about 150 acres. An effective system of sewer-drains and paved streets is being extended to all parts of the city, while macadamized roads lead to all nearby rural communities. A bronze statue of Washington, on a granite shaft, marks the place where Washington placed the cannon at the battle of Trenton. A monument to Gen. George B. McClellan is in Riverview Cemetery.

History. — The site of the southeastern por¬ tion of Trenton was

occupied, as claimed by an influential body of scientists, as the home of man in the Ice Age. (See New Jersey). Near the banks of the Delaware River, during the period of recorded history, was a village of the Unami sub-tribe of the Lenni Lenape (Delaware) Indians. The name of the princi-

pal creek, Assanpink, running through the city, is a corrupted form of an Indian name meaning <(place of stone implements.® Many such ob¬ jects are found in and near the city. The loca¬ tion was known to the Dutch and Swedish pel¬ try traders, who before 1664 came to Trenton to exchange commodities with the Indians. The advent of the members of the Society of Friends at Burlington (1677) led to the development of the nearby territory. These settlers had abandoned the idea of earlier adventurers that precious metals were to be found along the Delaware, that the river was a northwest passage to China, and indus¬ triously began the work of colonization, based upon cultivation of land, and the stimu¬ lation of river commerce. As early as 1679, certain Englishmen petitioned for lands at (

The outbreak of the Revolution found senti¬ ment in Trenton divided. Broadly, the Presby¬ terians were favorable to war, the Society of Friends were non-combatant, while the mem¬ bers of the Church of England leaned toward support of royal government. A <(committee,® in the village of about 600 inhabitants, was active in establishing communication between the Whigs of New York and Philadelohia, and as early as 23 May 1775 a Provincial Congress of New Jersey met in Trenton, a principal motive for assembling being the providing for militia regulation in the colony. It was near

Trenton that General Washington, en route to take command of the army, upon 23 June 1775, first heard the news of the battle of Bunker Hill. Thence, until Trenton became famous as the spot where was fought one of the great, if not the greatest battle of the Revolution, the village life was without particular incident.

It was upon 8 Dec. 1776, after his memorable <(retreat through the Jerseys,® that General Washington succeeded in conveying his little army across the Delaware at Trenton, and oc¬ cupied a ferry-town, later known as Morrisville, named in honor of Robert Morris, the financier of the American Revolution. During the flight of Washington from Fort Lee to Morrisville, it was that Thomas Paine wrote the

memorable words, <(These are the times that try men's souls,® words that later brought the then un¬ expected response from Lord Germain, colo¬ nial secretary of state, ((A11 our hopes were blasted by that unhappy affair at Trenton.® The fate of a nation hung in the balance. The Anglo-Hessian troops were in control of Ne\y York and quartered at Amboy and New Bruns¬ wick, and were raiding for supplies throughout East Jersey. Rail, the Hessian commander, oc¬ cupied Trenton, with outposts stretched for 20 miles north and south of the city. Philadel¬ phia was threatened, and the Whigs in that city were almost panic-stricken. Washington wrote, ((No man, I believe, ever had a greater choice of difficulties and less means to extricate him¬ self from them.® Congress, charging Washing¬ ton with dictatorial powers, fled from Phila¬ delphia to Baltimore, while Eastern Pennsyl¬ vania and much of New Jersey were overrun with Tory sympathizers and a riff-raff ready to follow the flag that was in the ascendency. Dis¬ appointed in not meeting General Lee, and chagrined at his capture, Washington disposed his force of 10,000 men along the west bank of the Delaware. Four brigades, under Generals Stirling, Mercer, Stephen and DeFennoy held the river fords from New Hope to Yardley; General Ewing occupied Morrisville, opposite Trenton, and Colonel Cadwalader held Bristol, 10 miles below. Taking advantage of the fact that the Hessians would celebrate Christmas with feasting and drinking, Washington pre¬ pared to rid West Jersey and Philadelphia of all danger from Anglo-Hessian occupancy. Cadwalader was to cross at Bristol and drive the king's troops from Burlington County, Ewing was to take position south of Trenton, holding Rail's men in check, while Washington was to cross the river nine miles above Tren¬ ton, and by a sudden descent capture or destroy the Hessian garrison in the village. Only one part of the plan was made effective. With 2,400 men and 18 pieces of artillery, Washing¬ ton crossed the river, in a northeast storm, upon the early morning of December 26. Ad¬ vancing quietly along the road from a point now known as Washington's Crossing, then called McConkey's Ferry, General Washington led his men through sleet and snow and over frozen ground to a point where the highway forked. The army separated about four miles from the village, one division being com¬ manded by Washington, the other by General Sullivan. Both divisions reached Trenton shortly after sunrise. Immediately confusion seized the Rail, Von Lossburg and Von Knyp-

hausen regiments there quartered. Their pickets were driven back, and

the battery of Capt. Alexander Hamilton, stationed near the pres¬ ent Battle Monument, swept one of the three principal streets of the town. Rail was wounded unto death, and finding themselves caught in a cul-de-sac, the regimental com¬ manders surrendered at various points in the village. No American officer or enlisted man was killed, and only four were wounded. The Anglo-Hessian loss was about 20 killed and 75 wounded. Nine hundred and eighteen men were captured by Washington, who, dur¬ ing the same day, recrossed the river, with 1,000 of his own men reported unfit for duty. While the battle of Trenton was being fought, neither Ewing at Morrisville nor Cadwalader at Bristol was able to co-operate with Washing¬ ton, owing to the river being filled with ice floes.

Two causes may be said to have operated to secure the defeat of Colonel Rail. One was the ill-feeling undoubtedly existing between the Hessians and the English, and the conse¬ quent lack of discipline. Rail, who had early been warned of Washington's preparations, was drunk upon the nigtit previous to the bat¬ tle and neglected all customary preparations to meet a foe for whom he had contempt. Wash¬ ington immediately took advantage of the electri¬ cal effect that the battle produced. He re¬ crossed the river from Pennsylvania and upon 2 Jan. 1777 occupied Trenton, with strong out¬ posts established nearby at the villages of Bor- dentown and Crosswicks. The British generals, Cornwallis and Grant, with 8,000 Anglo-Hes¬ sian troops, advanced toward Trenton from New Brunswick, 30 miles distant, fighting their way inch by inch. Through the centre of Tren¬ ton passes the Assanpink Creek, then well wooded and surrounded by marshy soil. Wash¬ ington crossed to the south side of the stream, occupied rising ground, leaving the main part of Trenton to the king's troops. Determining to capture the British stores at New Brunswick, strike a blow at Colonel Charles Mawhood's regiments at Princeton, and in a month regain partial control of <(the Jerseys,® over which he had been pursued, Washington escaped from Trenton at midnight 3 January. Leaving his camp fires brightly burning, he marched to the eastward of Trenton and early in the morning fell upon Mawhood at Princeton, defeated him, and made away for winter quarters at Morris¬ town. At the battle of Princeton, Gen. Hugh Mercer, for whom Mercer County is named, was brutally stabbed and soon died. During # the remainder of the Revolution Trenton was an important centre. To the village were brought spoils captured by the Whigs, and dur¬ ing the British retreat from Philadelphia to Monmouth an attempt was made to divert a body of Anglo-Hessian troops for the purpose of raiding the town. Here met the Com¬ mittee of Congress that attempted to dispose of the question of the Pennsylvania-Connecticut

land grants, which at the close of the Revolu¬ tion so seriously affected the rights of the set¬ tlers in the Wyoming Valley. In 1782, 153 inhabitants of Trenton formed an association to prevent the importation of British goods, and bring all sellers and purchasers to< a realization of the dominant Whig spirit. This action was taken to meet a trade-policy begun by British

merchants, when it was found that for the pur¬ pose of conquering the United States the war was a failure. In June 1783 the Congress of the Confederation, torn by internal dissensions and State prejudices, a wandering body, abused, threatened and insulted, undertook the estab¬ lishment of a Federal capital, requesting vari¬ ous States to yield to the United States juris¬ diction over any district to the extent of 20 miles square and to grant £30,000 in specie for purchase of lands and erection of Federal build¬ ings. Trenton being suggested as a suitable location, a contest between the South and New England was precipitated. A compromise was effected to the end that Congress should meet alternately in Trenton and Annapolis, a plan described by Francis Hopkinsom as a new mechanism in government, of a pendulum-like character. Congress met in Annapolis, and a patriotic Trentonian who died in December 1783, made a bequest of £100 to Congress if that body would settle itself at Lamberton, now the southern part of the city. On 1 Nov.

1784 Congress met in Trenton, and an ordinance was passed to lay out a Federal city upon either bank of the river and to provide suitable buildings at a cost of not over $100,000. Congress adjourned to New York, where it met 11 Jan. 1785. Ultimately in the autumn of

1785 the South defeated the appropriation measure, and thus died the plan to make Tren¬ ton the capital of the United States.

Before the close of the 18th century, Tren¬ ton accorded a reception to President Wash¬ ington upon 21 April 1789, while he was on his way to New York to attend his, the first, inauguration. A triumphal arch was erected over the Assanpink bridge, while maids and matrons strewed his way with flowers. The Federal government was conducted at Tren¬ ton during a smallpox epidemic in Philadel¬ phia immediately before the removal of the public offices to Washington. Upon 25 Nov. 1790, Trenton, after a long contest between East and West Jersey, was chosen, as a com¬ promise, to be the capital of the State, and two years later received a charter as a city, with only minor officers authorized to be selected by a limited electorate. This class legislation, characteristic of the conservative spirit of early State legislation, lasted until the adoption of a State constitution in 1844.

The year 1804 was notable in the history of Trenton for the opening of a bridge across the Delaware River, making an all land stage route from Jersey City to Philadelphia, and the chartering of the Trenton Banking Com¬ pany, which, with a bank at Newark, organ¬ ized the same year, were the first in the State. By 1830 Trenton contained about 5,000 in¬ habitants. With agitation concerning the de¬ velopment of water power, the improvement of highways, the construction of the Delaware and Raritan Canal, and the building of lines of rail¬ way to unite New York and Philadelphia, the city entered upon an industrial life. Within 10 years, Trenton had direct communication by land and water with all of the growing cities of the Atlantic seaboard, and her manufactures com¬ manded national attention. Before 1860, her potteries and her metal industries had become well established, although both traced their origin, by sporadic development, to Revolu¬ tionary times. Later came the third of Tren-

ton's great industries, that of the rubber goods manufacture. The later history of Trenton is largely the record of commercial develop¬ ment and of steady growth.

Prospective Growth. — Owing to advan¬ tageous location upon the lines of great rail¬ way systems, its position at the head of tidal navigation, and the slight resistance offered by .geological conditions, Trenton is destined to advance rapidly as an industrial centre. The growth of the city is purely normal, the city itself meeting all reasonable* demands made by the congesting tendencies of population. An extensive system of trolley lines, one of which unites Philadelphia and New York, has given Trenton a distinctive impulse. Pop. (1900)

73.307; (1910) 96,815; (1920) 119,289.

Bibliography. — Lathrop, J. M., (Atlas of the City of Trenton and Borough of Princeton) (Philadelphia 1905) ; Lee, (Historv of Trenton) (Trenton 1895) ; Raum, J. O., (History of the City of Trenton) (ib. 1871) ; Volk, Ernest,

(Archaeology of the Delaware Valley > (Cam¬ bridge, Mass., 1911).

TRENTON, Tenn., city, county-seat of Gibson County, on the Mobile and Ohio Rail¬ road, about 82 miles northeast of Memphis. It is in a

fertile agricultural region in which an excellent quality of cotton is grown. The chief manufacturing establishments are cottonseed-oil mills, cotton compress, a large cotton mill, box factory, flour mills and foundries. The educa¬ tional institutions are the Peabody High School, Laneview Academy, graded elementary schools and a library. Pop. (1920) 2,751.

TRENTON FALLS, a series of six beauti¬ ful cascades in West Canada Creek, Oneida County, New York, 15 miles north of Utica. The cascades appear at intervals as the creek passes through a ravine two miles long. The total descent, in the two miles, is 312 feet.

TRENTON STAGE, that interval of geo¬ logic time during which the Trenton strata of New York and Canada and the equivalent beds of other regions were laid down. Trenton strata are typically developed in the Mohawk Valley in New York State, the type locality being Trenton Falls on the South Canada Creek near Utica. The beds are typically limestones of a dark color and often argillaceous. They are very fossiliferous, among the common spe¬ cies being Rafinesquiva alternata, Plectamba- sites sericea, Dalmanella testudinaria, Prasopora tycopordon, Calymmemrenaria, Trinuclcus con- centricus, Araphus gigas, and many others. The formation is well developed in the valley of Lake Champlain and in the Upper Saint Lawrence Valley. In southern and central New York the formation is buried by several thou¬ sand feet of later strata. Where thus buried it is sometimes a reservoir of gas and oil. In the Upper Mississippi region it is represented by the Galena limestone. On the Cincinnati anti¬ cline it underlies the typical Cincinnati beds. In the Hudson Valley it is in part represented by shales carrying a graptolite fauna with Dicello- graptus, Cocnograptus and other types. In age the formation is Middle Ordovician. See Palaeozoic; Ordovician; Cincinnati Anti¬ cline, etc.

TREPANG, in zoology, a popular name for several edible tropical holothurians (q.v.), espe¬

cially H. cdulis of the Oriental seas. It reaches two feet in length and when dried forms an important article of food in China, called by the French bee he de nier. About 35 varieties are enumerated by traders, but only five or six have any real commercial value. To prepare them for the market the viscera are removed, and the animals boiled for about 20 minutes, then soaked in fresh water, and afterward smoked and dried. The curing process occu¬ pies about four days, during which the trepang must be kept very dry, for it readily absorbs moisture from the atmosphere. The final prod¬ uct is an uninviting rubber-like substance, which is used to prepare a thick soup, much

liked in China and the Philippine Islands. Trepang is largely prepared by the Chinese in Hawaii and California from local holothurians, both for local consumption and for export to China. Consult Simmonds, Commercial Products of the Sea,* and similar books.

TREPHINE, tre-fen' or tre-fin, a surgical instrument consisting of a cylindrical or crown saw about one-quarter to one inch in diameter, with a cross handle like that of a gimlet, and a centre-pin which, when the instrument is used, is thrust forward a little beyond the level of the teeth of the saw so as to secure accurate im¬ plantation and prevent sliding. It resembles in some respects the trepan, and both are used to remove a circular disc or button of bone from the skull. This operation is known as trephin¬ ing or trepanning, and is resorted to for the purpose of relieving the brain from pressure or irritation. It has been employed in simple frac¬ tures with signs of compression ; in compound fractures with depression and apparently no compression; in punctured and gunshot frac¬ tures, even without symptoms; in coma, from meningeal abscess, hemorrhage and tumors ; and in epilepsy and insanity, where lesions could be definitely localized.

TREPORT, Le, a French town situated at the mouth of the Bresle River, 45 miles north¬ east of Rouen. It is notable for its 16th cen¬ tury tower, the Church of Saint Jacques and an ancient Renaissance house. Its proximity to Paris makes it a popular bathing resort. It has a good harbor and a canal extending to Eu. Pop. about 4,000.

TREPOV, Dmitry Feodorovitch, Russian soldier : b. Saint Petersburg, 1855 ; d. there, 1906. He entered the army in 1874 and after taking part in the Russo-Turkish War retired in 1896 with the rank of colonel. He was made chief of police of Moscow but was re¬ moved in 1905 because of conflicts between the police and students, only to become Governor- General of Saint Petersburg and later Assistant Minister of the Interior with command of the entire police force of the empire. In the latter part of 1905 he became commandant of the Imperial palace where he died.

TRE'R CEIRI, trar cha'rl, the ruins of an ancient British fortified town situated in the northwestern part of Wales, six miles south of Carnarvon. The surrounding fortifications and substantial stone walls of the Cytian-houses or huts are still standing. An investigation in 1903 disclosed a number of Celtic bronze and iron implements and ornaments, specimens of Celtic pottery, and porcelain beads of Egyptian

manufacture, which place the date of the fort at about the 2d century a.d.

TRESCOT, tres'kot, William Henry,

American diplomat : b. Charleston, S. C., 10 Nov. 1822; d. Pendleton, S. C., 4 May 1898. He was graduated from the College of Charleston in 1840,ˆ studied at Harvard, and was admitted to the bar in 1843. He was secretary to the United States legation at London in 1852-53, assistant secretary of state for South Carolina in 1857-60, resigning upon the secession of that State. In 1862-66 he served in the State legis¬ lature and after the close of the war was sent to Washington as the representative of his State during the Reconstruction period. He removed to Washington in 1875 and engaged in law practice there. He was appointed counsel for the United States before the fishery com¬ mission at Halifax, Nova Scotia, in 1877, was one of the commissioners to revise the treaty with China in 1880, represented the United States in reference to her rights on the Isthmus of Pan¬ ama in 1881, and in 1882 was commissioner with General Grant to conclude a commercial treaty with Mexico. He was subsequently engaged in the practice of law at Washington. He pub¬ lished (A Few Thoughts on the Foreign Policy of the LTnited States5 (1849) ; (An American View of the Eastern Question5 (1854) ;

TRESGUERRAS, Francisco Eduardo,

Mexican painter, sculptor and architect : b. at Celaya, 1745; d. 1833. He was educated at San Carlos Academy in Mexico City and was noted as a painter and sculptor in his youth. He de¬ signed the Church of Our Lady of Carmen at Celaya, conventual churches at San Miguel de Allenda, a bridge at La Laja and other struc¬ tures. He was widely known also as a poet and a musician.

TRESHAM, Francis, English courtier : b. about 1567 ; d. 1605. He was imprisoned for taking part in the Essex rebellion (1601) and was implicated in other plots including Winter's mission to the king of Spain. He died in prison as the result of his intriguing.

TRESPASS is a legal term applied generally to any wrongful entry upon the property of an¬ other, and also to mild assaults upon the per¬ son, but more especially applied to peaceable, but unlawful entry upon another's property for which there is a remedy by action, for dam¬ ages. Any person entering the house or grounds of another may

be expelled by force, if such is necessary, but trespass is justifiable where the intrusion is for a lawful purpose — as to pay or demand money lawfully due, or to serve any legal process, and forcible entry may be made to execute a criminal process. One who aids and abets the perpetration of a tres¬ pass is liable with the one committing same. The straying of one's cattle on another's prop¬ erty has been declared trespass in some juris¬ dictions. A trespass is deemed wilful when the trespasser has received notice not to intrude, and it is malicious, where the intrusion is de¬ signed for the -purpose of injury, or annoyance. One in possession of real estate can generally maintain an action against one trespassing against his rights, and such possession can be either in person or by tenant. Trespass may vol. 27 — 4

be committed on a highway or road by one who has the use of same against the owner of prop¬ erty adjoining it, and against one who may un¬ lawfully obstruct such highway or road. Any unlawful interference with another's goods or property is trespass, it not being necessary to take actual possession of the same; the taking of one's goods or property by accident, or error, constitutes trespass, unless in the event of some justifiable cause. In many of the jurisdictions there exists by statute, criminal actions for trespass, where the same is wanton or malicious. A trespasser is responsible for the natural con¬ sequences of his wrongful or negligent act, but where no special injury is shown, only nominal damages, as a rule, can be recovered. Poaching is a non-legal term applied to trespassing on the property of another for the purposes of killing and stealing game or fish.

TREU, George D. C., German archaeologist: b. Saint Petersburg, 1843. Educated at the uni¬ versities of Dorpat and Berlin, he taught in the latter university (1882) and took part in the excavations at Olympia (1877-81). He pub¬ lished (Hermes and Praxitiles5 (1878) ; Exca¬ vations at Olympia5 (1879-81) ; and a number of other works relating to archaeological dis¬ coveries.

TREVELYAN, tre-velyan, Sir Charles Edward, English statesman : b. Taunton, Somerset, 2 April 1807 ; d. London, 19 June, 1886. He was educated at the Charterhouse and Haileybury College, and entered the East India Company's Bengal civil service in 1826. He returned to England in 1838 and in 1840 was appointed assistant secretary of the treasury. He was knighted in 1848 for his services during the Irish famine, and later, with Sir Stafford Northcote and others, was instrumental in throwing open the civil service to competition. In 1859 he was appointed governor of Madras, but was recalled in 1860 for having protested against a new system of taxation imposed in

India. He became Finance Minister in India in 1862, and during his administration introduced various fiscal reforms and also promoted the ex¬ tension of public works. He resigned because of failing health in 1865, and after his return to England engaged in numerous charitable en¬ terprises. He was created a baronet in 1874. He wrote Education of the People of Ireland5 (1838) ; (The Purchase System in the British Army5 (1867) ; (Christianity and Hinduism

Contrasted5 (1882).

TREVELYAN, George Macaulay, English historian: b. 16 Feb. 1876. He was educated at Harrow and at Trinity College, Cambridge; entered the war service (1915-18) and was awarded a medal for valor in Italy. His publi¬ cations include England in the Age of Wy- cliffe5 (1899) ; England under the Stuarts5 (1904) ; (Garibaldi's Defense of the Roman Re¬ public5 (1907) ; (Garibaldi and the Making of Italy5 (1911) ; (The Life of John Bright5 (1913), etc.

TREVELYAN, Sir George Otto, English biographer, historian and politician : b. Rothley Temple, Leicestershire, 20 July 1838. He was educated at Harrow and Trinity College, Cam¬ bridge, was for several years in the Indian Civil Service, sat in the House of Commons in 1865 — 68 as the representative of Tynemouth in the

Liberal interest, and in 1868 was returned by the Hawick or Border Burghs. He was ap¬ pointed a civil lord of the admiralty in Glad¬ stone's administration of 1868, but resigned in 1870 because he disagreed with his colleagues on the Elementary Education Bill. He was prominently identified with the movement for the abolition of the purchase of army comijiis- sions, and he was a leading advocate of the electoral reforms effected in 1884-85. In 1880 he accepted the post of parliamentary secretary to the admiralty, and in 1882, after the murder of Lord Frederick Cavendish and Mr. Burke, he went to Ireland as chief secretary to the lord-lieutenant. In 1884 he entered the cabinet as chancellor of the Duchy of Lancaster, and on the formation of Gladstone's short-lived ministry in 1886 he accepted office as secretary of state for Scotland. He resigned less than two months later because he could not support the Home Rule policy of the ministry, and in June of the same year succeeded to the baro¬ netcy. He failed to secure re-election as a Unionist after the dissolution of 1886, but in 1887 he was returned as a Gladstonian Liberal for the Bridgeton

division of Glasgow, a con¬ stituency which he represented continuously from that date till his retirement from political life early in 1897. In the Liberal government of 1892-95 he was secretary for Scotland. He is favorably known as an author by the follow¬ ing works: (The Competition Wallah) (1864), a series of letters on Indian matters reprinted from Macmillan's Magazine; (1865); (The Ladies in Parliament, Horace at the University of Athens, and other Pieces) (1868) ; (Speeches on Army Reform5 (1870) ; (The Life and Letters of Lord Macaulay) (1876), an admirable biography of his uncle; (The Early History of Charles James Fox) (1880) ; (The American Revolution (4 vols., 1909), a strongly panegyrical work, containing many interesting side-lights on the statesmen and soldiers of the period; (Interludes in Prose and Verse5 (1905) ; (George III and Charles Fox> (Vol. I, 1912; Vol. II, 1914). See Mac¬ aulay, Trevelyan's Life of.

TREVENA, John (Ernest George Hen- ham), English writer: b. about 1873. He led a wandering life for 20 years on account of ill health but was a prolific writer. Under his own name (Henham) he published (Menotah: A Tale of the Canadian Northwest5 (1897) ; (Bo¬ nanza: A Story of the Outside) (1901) ; (The Plowshare and the Sword) (1903) and others. Under his pseudonym appeared (Furze the Cruel5 (1907) ; (The Dartmoor House that Jack Built) (1909); (Adventures, among Wild Flowers5 (1914), etc. Consult Cooper, F, T., (Some English Story Tellers5 (New York

1912).

TREVES, trevz, Sir Frederick, English

surgeon: b. Dorchester, 15 Feb. 1853. He was educated locally, but developed a talent for surgery, and in 1881-86 was professor of anat¬ omy and pathology in the Royal College of Sur¬ geons. He was examiner in surgery at Cam¬ bridge University, and during the Boer War accompanied General Forbes to South Africa as consulting surgeon, and was with the relief column at Ladysmith. He held the post of sur¬ geon extraordinary to Queen Victoria, 1900-01, and performed the operation for appendicitis on

King Edward VII, 24 June 1902. He was created a baron during the coronation season. He is the author of works on physical educa¬ tion, surgery and anatomy, and has also pub¬ lished a (Tale of a Field Hospital5 (1900).

TREVES, trevz (Fr. trav; Ger. Trier, trer), Prussia, a town' of the Rhine

province, situated on the Moselle, six miles from- the boundary of Luxemburg and 25 miles northeast of the city of Luxemburg. Outside of southern France no city of Europe north of the Alps con¬ tains so many and so well preserved remains from the Roman period as Treves. There are a large amphitheatre built by Trajan, an old Ro¬ man gate, the (

TREVET, Nicholas. See Trivet, Nicholas.

TREVILIAN RAID and BATTLE OF TREVILIAN STATION. On 5 June 1864 General Grant ordered General Sheridan to take two divisions of cavalry and move into Charlottesville, destroy the railroad bridge over the Rivanna near that town, the Central Rail¬ road from that point to Hanover Junction, if practicable, and then rejoin the army. To General Hunter, whom it was expected he would meet at Charlottesville, Sheridan carried instructions to unite with him and join the Army of the Potomac. Sheridan started on the morning of the 7th with Torbert's and Gregg's divisions and four batteries of artillery, in all about 8,000 men. He crossed the Pamunkey at New Castle Ferry, moved up the north bank of the North Anna, marching by way of Aylett's and Chilesburg, crossed both branches of the North Anna on the 10th and at night encamped a little over three miles northeast of Trevilian Station on the Central Railroad. He had heard the day before that General Breckinridge, with an infantry division, was moving up the rail¬ road to Gordonsville and that the Confederate cavalry, was marching in the same direction on the south side of the North Anna to intercept his own column, and during the night it was ascertained that it was in his front. General Lee had heard on the morning of the 8th that

Sheridan was on the march, and ordered Gen. Wade Hampton, with his own division of cav¬ alry, to follow in the direction of Gordonsville, directing Gen. Fitzhugh Lee, with another di¬ vision to follow Hampton as speedily as pos¬ sible. Hampton had in the two divisions about 5,000 men and three batteries of artillery. On the morning of the 9th Hampton marched from Atlee's Station of the Virginia Central Rail¬ road toward Beaver Dam Station, passed Louisa Court House on the 10th and encamped that night in Green Spring Valley, three miles north¬ west of Trevilian Station; Fitzhugh Lee near Louisa Court House, about six miles east of the station. During the night Hampton learned where Sheridan had encamped and

determined to attack him at Clayton's store, about midway between Trevilian Station and Carpenter's Ford of the North Anna. His own division was to advance by way of the station ; Fitzhugh Lee by the direct road from Louisa Court House to the store. Hampton started early, and by day¬ light had reached the station and was moving on the road to Clayton's store, with Butler's and Young's brigades, Rosser's brigade advancing by a road on his left, when Sheridan was en¬ countered, having scarcely left his camp, Tor- bert's division in advance and about three miles from the station. There was a sharp skirmish between the advance parties, and Hampton dis¬ mounted his men and formed them in dense timber across the road. General Custer, with his brigade, was sent by a wood road on the left to strike the Louisa Court House road and move up in Hampton's rear, passed unnoticed and unopposed to his assigned position, cap¬ tured many of the Confederate led horses and created much confusion. Sheridan says that as soon as he heard of this the two remaining brigades of Torbert's division were dismounted, assaulted Hampton's position, and carried it, though with severe loss, capturing many pris¬ oners and driving Hampton's men at a run back on Custer at Trevilian Station, some of them through Custer's line, and that Custer began fighting in all directions, capturing many of the enemy. Hampton, however, says he was not driven from position, but that, finding Cus¬ ter in his rear, he withdrew to a new position, and that Rosser punished Custer severely, driv¬ ing him back against Fitzhugh Lee, who was coming up, recapturing some ambulances, wagons and three caissons, and taking in addi¬ tion four caissons and Custer's headquarters wagon. General Gregg attacked Fitzhugh Lee on the Louisa Court House road, drove him and pursued until night. Hampton's division fell back in the direction of Gordonsville and, during the night, was joined by Fitzhugh Lee, who made a detour for that purpose. Sheridan encamped at Trevilian Station. At night Sheridan learned from some of his 500 prisoners that Hunter was moving on Lynchburg and that Breckinridge was at Gordonsville. He, there¬ fore, determined to return, as his ammunition had been much reduced. On the morning of the 12th Gregg's division began the destruction of the railroad toward Louisa Court House and at 3 p.m. Torbert's division, reinforced by a brigade of Gregg's, went up the Gordonsville road to secure a by-road leading over Mallory's Ford of the North Anna, as Sheridan intended to return by way of Spottsylvania Court House

Torbert became heavily engaged with Plamp- ton, the battle continuing until 10 p.m., the advantage remaining with Hampton. During the night Sheridan moved back by the route he had come, recrossing the North Anna at Car¬ penter's Ford, abandoning some of

his very severely wounded, but carrying 377 with him in conveyances of every description, and some 370 prisoners. He reached the White House on the Pamunkey on the 21st, followed by Hamp¬ ton, who moved on the south side of the North Anna. Sheridan's loss at Trevilian Station on the 11th and 12th was 102 killed, 470 wounded and 435 captured or missing. Hampton says he captured 570 prisoners in the battle and in pursuit, and that the loss in his own division was 59 killed, 258 wounded and 295 missing, a total of 612. The loss in Lee's division is not given. Sheridan marched from White House on the 22d, had a severe engagement with Hampton at Saint Mary's Church (q.v.) on the 24th, and on the 25th and 26th crossed the James River near Bermuda Hundred and re¬ joined General Grant. His entire loss, June 7-24, was 150 killed, 738 wounded and 624 cap¬ tured or missing. Consult (Official Records)

(Vol. XXXVI); Humphreys, (The Virginia Campaign of 1864-65) ; Sheridan's (Personal Memoirs) (Vol. II) ; The Century Company's (Battles and Leaders of the Civil War> (Vol. IV).

E. A. Carman.

TREVISA, tre-ve'sa, John, English writer and translator: b. Cornwall about the middle of the 14th century; d. 1412. He was educated at Queen's College, Oxford, where he was an associate of Wyclif's, and on taking holy orders was appointed vicar of Berkeley, in Gloucester¬ shire, and canon of the collegiate church of Westbury. His chief works are a translation of Higden's (Polychronicon) (1837), one of the earliest specimens of English prose; of Occam's (Dialogue between a Soldier and a Clerk, } and of (Bartholom3eus de Proprietatibus RerumP which last, a very mine of rare English words, stands in the list of proposed reprints of the Early English Text Society. Caxton said that Trevisa had also translated the Bible; but his version, if it ever existed, is not known to be extant.

TREVISO, Duke of. See Mortier, Ed¬ ouard Adolphe Casimir Joseph.

TREVISO, tra-ve'so1, Italy, the capital of the province of Treviso in Venetia, situated 16 miles north of Venice. Among its interesting buildings are the cathedral of San Pietro, be¬ gun in the 12th century and but recently finished, the large Gothic church of San Nicolo (1310— 52), the recently restored provincial palace, a new and fine courthouse and the theatre. There is an academy of sciences, a seminary and tech¬ nical school and at the Borgo Cavour a notable gallery of paintings and extensive library. The manufactures include hardware, machinery, pa¬ per, silk, woolens, chemicals and pottery;

and there is a lively trade in grain and cattle. The province is 956 square miles in area and has 550 inhabitants to the mile. Pop. of the town, 43,597; of the province, 524,013.

TREVITHICK, trev'i-thik, Richard, Eng¬ lish engineer and inventor: b. Illogan, Corn¬ wall, 13 April 1771 ; d. Dartford, Kent, 22 April

&2

1833. In 1797 he succeeded his father as a leading engineer in Cornish mining. Among his first inventions was an improved pump, which soon came into universal use in deep mining. He next perfected a high-pressure steam-en¬ gine and began to experiment in the construc¬ tion of locomotive engines. Passengers were first conveyed by steam by means of his road locomotive in 1801, and he soon after success¬ fully worked a tramroad locomotive. His ideas were later taken up and developed by Stephen¬ son. He was the first to recognize the value of iron in shipbuilding and the appli¬ cation of steam to agriculture. In 1816 he went to Peru, where several engines of his devising were in use in the mines, but the outbreak of the War of Independence 10 years later caused him to lose all his prop¬ erty there. After some adventures in Central America, where he met Robert Stephenson, he returned to England in 1827. His request for recognition and reward for his numerous inventions was disregarded by government, and during his latter years he was in great poverty. Consult the biography by his son Francis (1872).

TREVOR, trevor, Sir John, English statesman: b. 1626; d. London, 28 May 1672. He entered Parliament in 1646, but attained to no important position until 1659, when he be¬ came a member of Monk's council of state. Early in the reign of Charles II, however, he obtained some public employment in France, and in 1668 was again sent there, this time as a special envoy to negotiate a treaty. On his return to England he was knighted and shortly afterward was appointed secretary of state. He was reputed to hold non-conformist opin¬ ions, yet his position in the government re¬ quired him to inquire into and to suppress, where necessary, sectarian meetings in parts of the kingdom. In 1671 he was named on the committee to investigate the petition of Irish landholders dispossessed by Cromwell.

TRIAD. See Harmony.

TRIAD, Hindu. See Trimurti.

TRIAL, Legal (from Old French trier, to try, to choose), the examination and deter¬ mination of the issues between two parties by a judge with a jury, a judge without a jury or by a referee appointed by a court for the purpose, in either civil or criminal proceedings. The trial is that part of a legal action which consists of the court's investigation of the issues in dispute after the arraignment and hearing of the pleas. In a criminal case should the defendant plead guilty there is no trial, sen¬ tence being pronounced in the same manner as if the trial had been held and concluded. The trial embraces the opening of the case by the plaintiff's attorney with a concise statement of the cause of action, the examination of wit¬ nesses and evidence and the cross-examination of the witnesses by the counsel for the defense, if desired. The defendant's counsel in turn produces his witnesses, who may be cross-ex¬ amined by the plaintiff's attorney. The de¬ fendant's attorney then argues his case and the plaintiff's argument closes the case, and, in civil cases, the trial. In criminal cases the trial includes the judge's charge to the jury and the rendering of the verdict, but does not include the sentence imposed by the judge, nor a hear¬

ing on appeal. See Issue; Judgment; Jury; Summary; Verdict.

TRIAL BALANCE. See Bookkeeping.

TRIAL BY BATTLE. See Battle, Trial by ; Combat ; Ordeal.

TRIANGLE, a figure with three straight sides; a plane figure bounded by three right lines. A spherical triangle is a portion of a spherical surface cut out by three planes which meet at the centre of the sphere and whose sides are each less than a semi-circle of the sphere. It may be equilateral, isosceles, etc. When a plane figure is formed by three arcs of circles intersecting two by two in three angles, it is a circular triangle. An equilateral triangle, having equal sides, is also always equiangular. An isosceles triangle, having two equal sides, has also two equal angles. An oblique triangle is one whose angles are all less than 90 degrees. See Trigonometry.

TRIANGLE, a musical instrument. See

Orchestra, The, and Orchestral Instru¬ ments.

TRIANGLE. An instrument of hard rubber or similar material used for drawing lines at angles to a ((T}) square. The two forms commonly in use have right angles and an acute angle of 45°, or of 30°, or 60°.

TRIANGLE OF FORCES. See Mechan¬ ics.

TRIANGLE SPIDER. An insect common in the eastern United States, belonging to the Uloboridce and called the Hyptiotes cavatus. It makes a web consisting of four radiating lines with a series of double cross lines and from the apex of the triangle a strong line extends to the supporting twig so that by jarring this it loosens the whole net, thus entangling insects in the cross threads.

TRI ANGULATION. See Surveying;

Geodesy.

TRIANON, Le Grand, le gran tre-a non,

Versailles, France, a one-storied palace of con¬ siderable extent, formerly a private residence of the French sovereigns, and originally built for Madame de Maintenon by Louis XIV. The palace is visited for its historic interest; its numerous apartments retain much of the orig¬ inal furniture and contain several fine modern works of art. It is called the Grand or Great Trianon to distinguish it from the Petit Trianon.

TRIARTHRUS (triple jointed). An Ord- dovician trilobite having a depressed carapace of elongated oval outline, the middle third of which is occupied by the broad axis. The best known species is the Triarthrus becki of the Utica shales.

TRIASSIC, the oldest period of the Meso¬ zoic era and the system of rocks then formed, so named from its threefold division in Ger¬ many, as follows: Transition or Rhaetic, Upper Trias or Keuper, Middle Trias or Muschelkalk, Lower Trias or Bunter Sandstein. Of these divisions, the middle one alone is marine, and characterized by marine fossils. The Keuper consists of non-marine sandstones, marls and clays, often with coal seams. The Bunter con¬ sists of mottled red and green sandstones, marls and conglomerates with occasional beds

of dolomite, rock salt and gypsum. The typical marine Triassic series of beds is found in the Alps, Himalayas and Siberia. The Triassic is preceded by Carboniferous and followed by Jurassic. In various portions of California and other western States sections are obtained which cover each a greater or smaller interval of the entire Triassic column. Altogether the entire interval is pretty well covered by -the various local sections, so that western North America furnishes a nearly complete series of marine Triassic strata. In other regions of

North America the Triassic strata are chiefly non¬ marine. Such is the condition in the interior and such is the character of the Newark sys¬ tem of eastern North America (Nova Scotia, Connecticut Valley, New York, New Jersey and Pennsylvania to Virginia region and the isolated patches in Virginia and the Carolinas). In Europe the Triassic is often called the (

In portions of the United States the rocks of this period are hardly separable from those of the Jurassic, so that they are frequently known to American paleontologists as (

The life of the period is not greatly different from that of the Carboniferous, especially in the vegetation, as cycads, tree-ferns, etc., re¬ mained prominent. (See Paleobotany). Fishes abounded. Reptiles multiplied on land, particularly the bipedal carnivorous Dinosaurs (terrible reptiles), which reached 40 feet in length, and were the animals that made the so- called ((bird-tracks® of the Connecticut Valley. Marine forms also began to develop, such as mosasaurs, plesiosaurs and their relatives in all parts of the world. The most important and characteristic creatures of the time, however, were amphibians, especially of the Stegocephal- ian type. Compare Jurassic. See Geology, and the authorities there cited. Also Newark Series; New Red Sandstone.

TRIBE, an aggregation of families of similar descent, united under a common leader¬ ship, and forming part of a nation, as in the case of the Roman tribes, or a small nation in itself, as the Sioux or the Cherokee nation of Indians. The tribe was undoubtedly the first step in social organization from the independent family — the human male and female living with their offspring apart from others of their kind, in cave or woods. The tribe was retained in political organizations even of an advanced stage, such as Athens and Rome. It was and

is to this day the only form of organization among uncivilized races and it is retained by some of the civilized, such as the Highlanders of Scotland. The tribal system, while in itself a signal advance from the independent family, has generally been found an obstacle to social and political progress when brought into con¬ tact and rivalry with higher political develop¬ ment. The progress of Scotland was undoubt¬ edly retarded by the tribal or clan system among the Highlanders and has been wonder¬ fully rapid since the clans were virtually sup¬ pressed as political entities by the British gov¬ ernment in the 18th century. The internal his¬ tory of Russia has been largely a struggle of imperial and centralizing against tribal in¬ fluences. The Indian tribes of America are slowly but surely becoming merged' in

the gen¬ eral population.

TRIBES, The Lost Ten. See Lost Ten Tribes, The.

TRIBUNE, the designation of certain Roman officials, civil and military, with varying rank and power. The ..title is plainly derived from the tribes which the tribunes represented and the early tribunes were no doubt com¬ manders of the horse and foot furnished to the Roman army by the original tribes. The num¬ ber of these military tribunes was increased with the number of the tribes ; the kings, it is assumed, appointing them while the monarchy lasted, and the consuls succeeding to that power. As the division between patricians and plebeians grew wider the popular assembly became jealous of the consuls and demanded and ob¬ tained a voice in the appointment of military tribunes, the tribunes nominated by the popular body ranking as magistrates of the Roman people, as well as military officers. One of the tribunes, known as the tribunus cerarius, was the paymaster of the troops.

Far superior to the military tribunes and armed with a power of veto which made them superior even to the consuls, when it came to an issue of authority, were the <(tribunes of the commons,® created as the result of a long Struggle between patricians and plebeians. In 494 b.c. the commons seceded, and took refuge on the Sacred Mount and bound themselves to stand by each other until the patricians should consent to the appointment of two officers to protect the plebeians in their rights. The patricians agreed to the demand and the tri¬ bunes of the people, who figured so prominently in the subsequent history of Rome, were created. Their powers increased enormously in the later years of the republic and were ultimately ab¬ sorbed by the emperors. Consult Botsford, G. W., (The Roman Assemblies) (New York 1909) ; Abbott, F. F., (History and Description of Roman Political Institutions) (Boston 1911). See Rome.

TRIBUNE. An architectural term used to describe that portion of a structure from which an audience is addressed. The term is applied especially to the desk from which a legislator may address the French Chamber of Deputies or the Senate. It is also used to designate the apse of a church or a balcony or gallery for musicians.

TRIBUTE, a sum of money or other property paid by one person or state, at definite

intervals, to another person or state, as acknowl¬ edgment of submission or to secure protection or guarantee peace. The custom of giving tribute arose in very early days and was com¬ mon among the Greeks and Romans. Later it appeared in England and elsewhere under the feudal system, at which time the term was not clearly differentiated from taxes and rent. Sometimes the right to levy tribute is given by treaty between two states. It may be in the form of a contribution raised by a sovereign to defray the expenses of the nation.

TRICERATOPS, a gigantic armored dino¬ saur found fossil in the Upper Cretaceous rocks of Wyoming. It was larger than a modern rhinoceros and had three great horns, two over the eyes, the other on the proboscis. The skull was phenomenal, a specimen measuring six feet by five, roughly triangular and broad at the rear. The heavy legs ended in three-toed feet. Though frightful of aspect, this great creature, normally 25 feet in length, was a vegetarian, with a most minute brain. See Dinosauria.

TRICHECHIDiE. See Pinnipedia.

TRICHIASIS, an inversion of hairs about an orifice of the body, especially of the eye¬ lashes. The inverted lashes irritate the ball of the eye and may cause ulceration and opacity of the cornea. Treatment consists in removal of the offending eyelashes and, when necessary, operative measures to correct the faulty position of the lids. The term trichiasis is also applied to hair-like filaments in the urine, the result of disease of the kidneys or bladder; to a matting and interlacing of hair (Trichiasis coacta) and to knotty swellings in the female breasts (Tri¬ chiasis lactea) from an accumulation and arrest of milk in the milk-ducts.

TRICHINA, a small nematode parasitic in the rat, pig, and man which is the cause of a much dreaded disease termed trichinosis or trichiniasis. The scientific name of the parasite is properly Trichinella spiralis and it is believed to have been originally a rat parasite from which host it went over into the hog and from that to man. Two stages are distinguished: (a) Muscle trichina, the immature form, en¬ cysted and inactive, and (b) intestinal trichina, the adult form, free and ultimately sexually mature. The species is highly specialized for the parasitic existence and the entire life his¬ tory is passed within some host. The encysted trichina in muscle tissue if brought living into the stomach of some flesh-eater is set free by the digestion of the cyst. It

passes into the intestine and within two and one-half days reaches sexual maturity. After pairing the male dies and the female grows greatly in size. The species is ovo-viviparous, and the first young are produced in about one week from the date of infection. Before giving birth to any, however, the female bores her way into an intestinal villus and lying with the genital pore in a lacteal vessel, pours out all the young into the lymph fluid. They are carried into the musculature and permeate muscle fibres which undergo granular degeneration, while a cyst is formed about each by an in¬ filtration of round cells. Eighteen days are demanded to complete the process, and the young trichina coiled within the cyst is ready

for transfer to another host ; but it may wait even years before this transfer is effected. Meanwhile there is laid down in and around the cyst calcareous material which gradually encroaches upon and ultimately involves the entire capsule, transforming it to a granule of lime in the muscle. The original discovery of the trichina was made in a dissecting room in London by Dr. Paget who noticed that minute granules in the muscle dulled the edge of the scalpel, and on investigation found the para¬ site. The cyst may undergo fatty degeneration rather than calcareous. While very resistant against smoking, pickling and even decom¬ position of the meat, the trichina is readily killed by cooking, so that no danger attaches to the consumption of well-done pork. Pro¬ longed cooking is necessary to bring the centre of large pieces of meat to the proper tem¬ perature. Epidemics of trichinosis were very frequent in the last century, especially in Ger¬ many where the consumption of smoked but uncooked ham is general. By a system of rigid meat inspection, carried out at large ex¬ pense, the cases of the disease have been very greatly reduced in Germany. Epidemics have been rare in other countries, though, as will appear later, errors in diagnosis are easy if the disease is not suspected.

Symptoms. — The disease manifests three stages: (a) Intestinal irritation during the growth of the adult trichinae; (b) myositis with rheumatic pains and fever due to the invasion of the muscles by the larvae, and (c) period of subsidence corresponding to the encystment of the worms. The severity of the symptoms de¬ pends evidently on the individual but primarily on the number of encysted trichinae that were ingested. Violent symptoms in the first stage have been mistaken for dysentery or cholera, and in the second for rheumatism, while con¬ fusion with typhoid is very common. The ex¬ amination of a fragment of excised muscle will afford positive evidence of trichinae if present.

Henry B. Ward,

Professor of Zoology, University of Illinois.

TRICHINIASIS. See Trichina.

TRICHINOPOLI, trich-m-op'o'-li, or TRICHINOPOLY, India, a town in the prov¬ ince of Madras, situated at a railroad junction, on the South Indian Railroad, 190 miles south by west of Madras, on the right bank of the Kaveri River. It is defended by a fortress built on a steep rock, 275 feet high. The rock is crowned by a large pagoda, and an¬ other temple carved out of one side of it. It was under native government previous to 1801, when the British acquired control. The town manufactures cutlery, saddlery and jewelry. Pop. 123,512.

TRICHINOSIS. See Trichina.

TRICHOME (from a Greek word mean¬ ing ((growth of hair®), the hair-like outgrowth from the surface of some plants. These may be either uni- or multi-cellular, and if they have flattened expansions at the top are called scales. Glandular hairs secrete various sub¬ stances which may be either liquid or solid. Root hairs greatly increase the surface for the intake of water and play an important part in this respect. The trichome are used extensively by systematists in describing plants.

TRICHOPTERA. See Caddis-fly.

TRICLINIC SYSTEM. See Crystal¬ lography.

TRICLINIUM, among the Romans the dining-room where guests were received, fur¬ nished with three couches, which occupied three sides of the dinner table, the fourth side being left open for the free ingress and egress of servants. On these couches, which also re¬ ceived the name of triclinium, the guests re¬ clined at dinner or supper. Each couch usually accommodated three persons.

TRICOLOR (French tricolor), term ap¬ plied to a flag having three colors, usually re¬ stricted to flags which have the colors in equal masses. See Flags of Foreign Nations.

TRICOPHYTON. See Barber's Itch; Ringworm.

TRICYCLE. See Bicycle.

TRIDENTINE CREED, the profession of the Tridentine faith, published by Pope Pius IV, in 1564. It originally consisted of the Nicene creed, with a summary of the Tridentine defini¬ tions, to which is now added a profession of belief in the decrees of the Vatican Council. See Trent, Council of.

TRIDYMITE, a mineral occurring in small, hexagonal tabular crystals in trachyte and other volcanic rocks. Chemically it is pure silica and therefore identical with quartz, from which it differs in its form and lower specific gravity, 2.3. It was first found in Mexico in 1868, but has since been recognized in many localities in Europe, New Zealand, Iceland and the United * States. Probably the finest specimens come from Euganean Hills, northern Italy. Its name refers to its frequent occurrence in ˆthree-fold® twin crystals, or trillings.

TRIENNIAL ACT, the name commonly given to the Act of Parliament 16 Charles II, <(for the assembling and holding of Parlia¬ ments once in three years at least.® This act was confirmed after the Revolution of 1688, by 6 William and Mary, cap. ii. The Septennial Act I George I, cap. xxxviii, passed 7 May 1716, empowered Parliaments to sit for seven years. This Act, again, was replaced by the Parliament Act of 1911, which reduced the life of a Parliament to five years.

TRIER. See Treves.

TRIEST, tre-est' (Italian Trieste, the an¬ cient Tergesteum), Italy, one of the principal seaports of the kingdom, situated between Gorz and Istria in the Coastland, and at the head of the Gulf of Triest, the extreme upper portion of the Adriatic Sea. The city rises from the water in an amphithea¬ tre formed by the sloping escarpment of the Karst plateau. The old town has nar¬ row and crooked streets, but in the newer portions, surrounding it on nearly all sides, the streets are broad and regular, with numerous open squares, ornamented with fountains and monuments. The cathedral of San Giusto stands on an eminence on the site of an old Roman temple. Other notable buildings are the magnificent city hall, the old exchange, the fine building of the Austrian Lloyd, the elegant palace of Revoltellla, now a municipal museum, and the large Teatro Politeama. There are also remains of a Roman theatre and aqueduct.

The principal educational institutions are the commercial and nautical academy, with an ob¬ servatory, two German and two Italian high schools, a military academy, 'a public library and archaeological

museum. The manufactures include soap, candles, confectionery, playing cards and saddlery, and there are breweries, iron foundries, large petroleum refineries, ma¬ chine shops, oil and lineoleum f actories and ship¬ yards. Of the 17 Austrian diets, that of Triest is the sixth in membership. The city is chiefly important for its commerce. During the last decade of the century, however, the progress was not so rapid, owing to keen competition, and to the fact that Triest ceased to be a free port in 1891, after having been so for nearly two centuries. A great extension of the harbor was undertaken about 1905, and com¬ pleted shortly before the war. There was also much activity in railroad building. Triest has. great shipyards and was the headquarters of the great Austrian Lloyd Steamship Company. In 1914 10,686 vessels of 3,87 1,346 tons were * entered and 14,186 vessels of 5,475,445 tons cleared from this port. The principal articles of export are sugar, wool and woolen goods, paper, timber and coal, clothing, metal ware, instruments and watches and glassware. The chief imports are cotton, coffee, fruits and vegetables, hides and animal products, oil, flax and tobacco. Pop. of the city 170,000; of the province about 246,500. About 75 per cent of the people are Italians. It was under Austrian control from 1388 until the end of the World War in 1918, when it passed to Italy.

TRIFOLIUM. See Clover.

TRIFORIUM, in Gothic architecture, a gallery or arcade with a triple-arched front, above the arches of the nave and below the clearstory. While the triforium was named from its three arches, similar galleries were built and carried the name improperly, having two or four arches.

TRIGGER-FISH, one of the fishes of the plectognath family, Balistidce, in which when the dorsal fin is erected the first ray, which is very thick and strong, holds its elevated position so firmly that it cannot be pressed down ; but if the second ray be depressed the first im¬ mediately falls down like the hammer of a gun when the trigger is pulled. The 8 or 10 genera and about 100 species are all inhabitants of warm seas. A single species (B . carolinensis) of the typical genus Balistes occasionally wanders northward on the Atlantic Coast as far as Cape Cod. It is a rather handsome fish, with the body enclosed in a heavy armor of scales and has three stout dorsal spines. The fool-fishes or file-fishes (q.v.), so called on ac¬ count of their large, expressionless, staring eyes and rough prickly skins, are closely re¬ lated. In West Indian waters are many rep¬ resentatives of these and other genera and especially of Balistes.

TRIGGS, Oscar Lovell, American educa¬ tor: b. Greenwood, Ill., 2 Oct. 1865. He was graduated from the University of Minnesota in 1889, studied at the universities of Oxford and Berlin in 1890 and was teacher of English in* the University of Chicago 1892-1903. He was editor of Lydgate's (Assembly of Gods> (1895) ; coeditor of (Complete Works of Walt

Whitman* (10 vols., 1902), etc., and has written (Browning and Whitman; a Study in De- mocracy) (1893); (Chapters in the History of the Arts and C'fafts Movement (1903), etc.

TRIGLID-ffi, a family of acanthopterygian fishes, deriving its name from Trigla, its typical genus, and related to the Cottidce. This family is noted for having cheeks covered with bony plates and the head armed with spines and for membranous appendages ; the eyes are set high in the head; one of the suborbitals is very large; the jaw is protracted; there are two dorsal fins, the rays of the first spinous ; the first rays of the other fins, except the caudal, are often of the same structure, while all the fins are greatly developed. The family may be divided into six sub-families: (1) Genus Dactyloptera, in the species of which genus the pectoral fins are of sufficient length to enable the fish to support itself in the air for a short time. There are two species, D. volitans and D. orientalis; (2) Genus Trigla, typified by T. cuculus, T. hirundo, T. lyra, T. gurnadus, the American species, Prinotus Carolinus, P.' tribulus, P. punctatus, etc.; (3) Genus Cottuso including C. gobio, C. scorpius, C. bubalis, C. quadricornis, C. Virginianus, C. conus, C. Mitchillii, etc.; (4) Genus Aspidophorus, to which belongs the armed bull-head, A. Euro- pceus, noted for being completely covered with horny scales; (5) Genus Sebastes, the spines of its main specie, .S'. Norvegicus, being used in Greenland for needles; (6) Genus Gasterosteus, which includes the Sticklebacks, the most prom¬ inent of which are G. trachurus, G. spinachia, G. biaculeatus, G. neoboracencis, G. quadracus and G. occidentalis.

TRIGLYPH, in architecture, ornaments re¬ peated at equal intervals in the Doric frieze. Each triglyph consists of two entire gutters or channels cut to a right angle, called glyphs, and separated by their interstices, called femora, from each other, as well as from two other half-channels that are formed at the sides.

TRIGONIA (from a Greek word meaning triangular®), is one of the

most important types of the lamellibranchs in the Mesozoic seas. The trizoma became most abundant in the middle and upper Jura and the middle Cretaceous but has declined until it now is rep- presented by but five species living in Australian waters. Consult Lycett, John, (A Monograph of the British Fossil Trigonias) (London

1872-79).

TRIGONOMETRY, invented to meet the needs of astronomy, was for centuries (see Trigonometry, History of the Elements of) but a useful art. At length it was advanced, chiefly by the Swiss mathematician, Leonard Euler, to the dignity of a science. At present, as both an art and a science, it has most inti¬ mate connections with nearly every branch of mathematics pure and applied. The aim of this article is to give briefly an intelligible account of the subject with some regard to both its practical and its theoretic aspects.

Plane Trigonometry.

Conventions and Definitions. — Any two

perpendicular lines, as X'OX and YOY' , divide the unbounded plane into four congruent por¬ tions, called quadrants, which hang together

about the origin O and of which XOY YOX' , X'OY' and Y'OX, taken in order, are known respectively as the 1st, 2d, 3d and 4th.

The amount of turning (about O and in the plane) of a half-line, as OX, which will bring it to coincide with another half-line, as OP, is called the angle between them. The angle is regarded positive or negative according as the turning is counter-clockwise or clockwise. If a half-line turn quite round, so as to coincide with its initial position, it is said to '■urn through or to generate a whole, or round, angle, or peri- gon. The unit- angle used in practical com¬ putation is the 360th part of the whole angle, and is named degree. The unit- angle employed in theoretic investigation is the angle generated by the turning of a half-line, as OP, till one of. its points, as P, describes a circle arc equal in length to the segment OP. This unit-angle is named radian, being subtended by an arc equal to its radius. Either unit is readily expressible in terms of the other. Thus the whole angle, or 360°, being equal to 2n radians, where ˆ is the ratio of the circumference to the diameter of a circle (see Geometry, Ele¬ mentary; Geometry, Pure Projective), it is seen that 1 radian = 57.3° (approximately),

tt radians = 180°, — = 90°, — = 45°, etc. From

the definition of angle, it is clear that an angle may exceed 2n. Suppose, for example, that OX generates an angle a (Fig. 1) and then turns through 2tt; it will thus have generated the angle « + 2?r. The half-lines bounding an angle are called its beginning and end. Except when otherwise stated or unmistakably implied, all angles will be thought as beginning at OX, origin of angles.

X'OX and YOY' are' named co-ordinate axes (see Geometry, Cartesian) ; the former, the axis of abscissce, or X-axis; the latter, the axis of ordinates, or F-axis. Distances on or parallel to the X-axis are considered positive if measured rightward, negative if leftward; dis¬ tances on or parallel to the F-axis are positive if measured upward, negative if downward. Accordingly, to each point in the plane (Fig. 1) corresponds a unique pair of numbers, its abscissa and ordinate, its x and y, and con¬ versely.

Definitions of the Trigonometric Func¬ tions. — On OP, making any angle a with OX, take any point P. Complete the figure as indi-

cated, denoting the lengths, of OF, FP and OP by x, y and r respectively. Plainly the values of x, y and r vary with the position of P on OP, but, and this is important, by the laws of similar triangles, their ratios do not. These ratios do vary, however, and this, too, is im¬ portant to note, with the value or size of the angle a. Because of this reciprocal dependence of the ratios on a and of a on the ratios, the latter are called functions of «, and conversely. Because of their importance, the ratios, or trigonometric functions of the angle have re¬ ceived names and symbols, as follows :

y

— =sine of a =sin a,

r

— = cosecant of a — cosec a,

y

X ,

— = cosine of a =cos a,

r

— = secant of a =sec a,

x

y

— =tangent of a =tan a,

x

X

— = cotangent of a =cot a.

y

These equations serve to define sin a and cos a for all finite values of a. For any one of the other functions the denominator of the defining ratio becomes zero for certain values of a. Division by zero, being meaningless, is inadmissible. For such values of «, therefore, these functions are not defined. Thus, e.g., the tan is not defined for a =90°. It is indeed cus¬ tomary to write tan 90u = °°, but this is merely short for saying that, as a approaches 90°, tan a increases beyond every assignable (finite) value.

Range of Variation and Periodicity. — It is

readily seen that, if a (Fig. 1) increase or de¬ crease by 2 7r, then x, y and r regain their initial values. Hence sin (a -f 2 nP) = sin a , n being any positive or negative integer. Similarly for the other functions. Hence the functions are periodic, having the period 2?r. It is to be noted, however, that an increase or decrease of a by tt alone merely reverses x and y in sign, their ratios remaining the same. Accordingly the period of tan and cot is tt. The periodicity of the trigonometric functions, it is, that gives them their great value in Analysis. Each func¬ tion assumes all the values of its range as « varies through the period of the function. As a varies continuously from 0 to 2 tt, sin a changes continuously, increasing from 0 for

a — 0 to 1 for a = -,»then decreasing to 0 for

a = 7r, then changing sign and decreasing (alge-

3tt ,

braically) to — 1 for a = — then increasing to

0 for a = 2tt. Meanwhile cos « runs, continu¬ ously through the same circuit of values, though in different order, beginning and ending with 1,

and changing sign at a = — and . Hence sin

and cos are restricted to the values 1, — 1 and intermediate values. Not so the other func¬ tions, however. Both tan and cot assume all finite real values, and also vary continuously with a, except for those angle values for which, as noted, the definitions fail. For any such

value, the function is said to be discontinuous. For example, as a increases through 90°, tan a leaps from being great at will and positive to being great at will and negative. The sec and the cosec each assumes every finite real value except those between 1 and — 1.

Geometric Depiction. — The above indicated courses of variation of the trigonometric func¬ tions may be readily represented graphically, namely, by the so-called curves of sine, cosine, tangent, etc. These are found by the familiar method of analytical geometry (see Geometry, Cartesian) for plotting the graph of a func¬ tion of a real variable. A convenient unit of length is chosen to represent the radian, or unit¬ angle. Angle values are then laid off on the

X-axis and corresponding function values parallel to the axis of Y. A sufficient number of points being thus determined, a smooth curve, called the graph of the function, is drawn through them. The curve in Fig. 2 is part of the sine curve, or sinusoid. The undulations extend rightward and leftward (for negative angles) indefinitely. The curve of cosines is identical in form with the sinusoid and may be obtained in position from the latter by trans-

7T

lating it as a rigid figure leftward through -y

units of length. For graphs of the remaining functions, the reader is referred to recent text¬ books of trigonometry and analytical geometry. All the graphs in question are transcendental curves (see Curves, Higher Plane; Calcu¬ lus), being intersected by any straight line of the plane in an infinite set of points, real or imaginary.

Functions of Negative Angles. — By refer¬ ence to Fig. 1 and their definitions, it is im¬ mediately seen that the functions of a and the

corresponding functions of — a are equal in value but excepting cos and sec, reversed in sign. Thus, symbolically, sin a — — sin (— «), cos a — cos (— -a). Accordingly, cos and sec are called even, while the others are called odd, functions of the angle, in obvious analogy with the behavior of signs in case of powers of positive and negative quantities.

Complements, Supplements, Explements. — Two angles are called explements, supplements or complements, of each other, according as

their sum is 2tt, tt or Any pair of explements

are

representable by the symbols tt f a and

7T

7 r — a ; any two supplements by — + a and

7T 7T

— — a ; any two complements by — + a and

- a. The query is natural : how are the

4

values of a function of two explements, or two

supplements, or two complements, related? By reference to Fig. 3, it is plain that sin (tt «) — — sin (7r — a) and that cos (tt + a) = cos (it — a) , since y = — y', x — x and r = r; hence : sines of explenients are equal in value and opposite in sign; cosines of explenients are equal. In like manner may be detected all the relationships in question, tabulated below :

A Table of Critical Values. — Certain critical values of the angle occur so frei quently alike in theory and in practice that it seems desirable to tabulate the cor¬ responding function values. The latter may be readily found from the function definitions by help of Fig. 1 and the three accompanying tables. Other angle values of

Explements, Fig. 3. sin (n + a) = — sin (n — a) ,

eos(7r + a)= cos(7r — a),

tan (71 + a) = — tan (ˆ — a),

cot(7r-fa)= — cot (n — a), sec(7T-ba)= sec(;r — a),

cosec (tz + a) = — oosec (7 r — a) ;

cos

Supplements, Fig. 4. sin(i + a)= sm(f-ay

(r+tt) —cos(f—a)-

tan = — tan ˆ — aj ,

(r+a) — cot(j-a)-

(f + a) = sec(*-«), + aj = cosec — otj ;

cot

sec

cosec

cosec

Complements, Fig. 5. sin + aj — cos

(l+“) = sin&

&+“)- cot&

&+“)= tan&

/ 7T \ lit

I — h a I = cosec I —

(t+”)” secd

cos

tan

cot

sec

«).

“)■

“)•

«).

“)•

Note that in Fig. 4, r~r\y — y, x — — x ; that in Fig. 5, OP — OP’~ r — r, and that, from the laws of equality among triangles, x = y\ x’— y. Note, too, that in any of the tables, the sine and cosine relations determine the others, as should be so, since tan and cot are the ratios, while cosec and sec are respec¬ tively the reciprocals, of sin and cos. The mentioned determination is but a special mani¬ festation of the

Interdependence of the Functions. — There is in trigonometry only a single fundamental or characteristic notion, as, say, that of sine — a fact that accounts for the proverbial high de¬ gree of plasticity or malleability of the subject matter. Any one of the six functions is de¬ rivable from, and expressible in terms of, each of the others. Of such interdependence the definitions themselves of the functions afford illustration. At the same time they furnish the clue to its explicit determination. Thus, squaring and adding corresponding members of the defining equations of sin and cos, and noting that x2Jr y2= r2, one finds the fundamental rela¬ tion : sin2 a + cos2a = 1, whence sin a —

± V 1 — cos2 a, and cos a — ± V 1 sin2 a; from which, if either sin a or cos a be known, the other may be found. In any of the better recent textbooks of trigonometry may be found a readily constructible table expressing each func¬ tion in terms of each of the remaining ones. The theory of the six trigonometric functions is ultimately the doctrine of a single one of them.

7T

notably frequent occurrence are 30°, or and

7T

60°, c* r j. To find the value of sin 30°, observe, Fig. 1, that, if a = 30°, y is the half-chord of 60°, i.e., y — — ; whence sin 30° = From this, by

means of the relation, cos_« = V 1— sin2«, it is seen that cos 30° = £ V 3 ; from this last , since

cos ^ – + a ^ sin = ^ — aj , sin 60° = £ V 3 ; and,

similarly, sin 30° =%. Thence, by definitions

and foregoing formulae, tan 30° = cot 60° = ^^,

tan 60° = cot 30° V 3 ; sec 30° = coseco 60° =

2

sec 60° = coseco 30° = 2. Analogously and by means of relationships to be subsequently given,

a =

0

1.

71

r ^

if

7U.

Z7t ‘

IF

•I

0

OK

1

o/i

0

OK

-7

-1/5

0

cos =

1

OK

0

-Wz

- 1

-n

0

]

C

sec =

1

PH

00

-n

-1

m

00

1

coset

00

m

/

PH

00

-Vz

-1

-Tz

00

—

tan =

0

1

00

-1

0

1

00

0

V

cot-

00

1

0

-]

00

1

0

-/

00

$

function values corresponding to many other angles, as well as solutions of the inverse prob¬ lem, admit of explicit determination. Such methods are, however, in general, inconvenient, and, in problems of computation, the deter¬ minations in question are, as a rule, effected by means of logarithmic tables. See Alegbra, and below.

The Laws of Sine, Cosine and Tangent. —

Such may be named the three famous formulae, now to be presented, that serve for the solution of any triangle, i.e., for the explicit determina¬ tion of the remaining parts of a triangle of which any three independent parts are known.

By reference to Fig. 6, it is seen that sin a –

2 r

• • o c

similarly, sin ˆ — yr and sin y = — ; whence, for

any triangle of sides a , b, c, and angles a, (3, yt

there holds the relation: — -ˆ— = 2r,

sin a sin p sin y

r being the radius of the circumscribed circle. This relation is the Law

of Sines. It is plain, Fig. 7, that a — b cos y + c cos (3, whence c cos (3 = a — b cos y ; squaring, c 2 cos2 /3 = o3+ cos8 y — 2ab cos y; by law of sines, c sin (3= b sin y; squaring this, adding to the preceding equations, and noting that sin2-}- cos2 = 1, there results ca=a2 + 62 — 2ab cos y. This and the analogous equations, b2— c2Jr a — 2ca cos (3, a2 — b2 + c2 — 2 be cos a, similarly obtain¬ able, together constitute the Law of Cosines. The Law of Tangents, deduced at a later stage of this article, is, a + 6 : a — b = tan £(

Addition Theorems. — These serve to ex¬ press functions of an angle in terms of the like or unlike functions of its parts. Let OP — OPj=- r = r' in Fig. 8; a' and a any two angles.

Fig. 8.

It is evident that x = r cos a, x — r cos a', y — r sin a, y'—r sin a'. Also, by the ˆPythagorean theorem and the law of cosines, d2 ~ (x x)2 . + (y — y'y= 2P—2P cos (a' — a), whence, on

substituting r cos a, etc., and reducing, it is

sound that cos (a' — o) = = cos o' cos a + sin a' sin a. The four formulae

(1) cos (a — > (3) — cos a cos (3 + sin a sin /S'.

(2) cos (a -f (3) — cos a cos (3 — • sin a sin (3.

(3) sin (a -f (3) — sin a cos (3 + cos a, sin [1.

(4) sin (a — (3) — sin a cos (3 — cos a sin (3,

are together named the Addition Theorem for Sine and Cosine. Formula (1) is equivalent to the preceding one; (2) results from (1) on re¬ placing — (3 for /3; (3) from (1) on writing n

2 – a for a; and (4) from (3), as (2) from

(1). Dividing (4) by (1), and both terms of the resulting right-hand quotient by cos a cos f3, there results: tan (a — (3) =: (tan a — tan (3): (1 + tan a tan (3), which with the relation, tan (a j (3) = (tan a -f tan f3) : (1 — tan a tan /3), constitutes the Addition Theorem for the Tangent. The analogous relations for the re¬ maining functions are omitted as being but little used.

Prosthapheretic Formulae. — From the ad¬ dition theorems, which

concern functions of angle sums and differences, may be easily de¬ duced equally important formulae concerning function sums and differences. Replacing o /3 by u and a — (3 by v in (1), (2), (3), (4), adding (3) and (4), then (1) and (2), and then adding or subtracting one obtains the four formulae :

(5) sin u + sin v — 2 sin \{u + v) cos %(u — y),

(6) cos u j cos v — 2 cos \{u j v) cos \(u — v).

(7) sin u — • sin v — 2 cos \{u j v) sin — v),

(8) cos u — cos v =: — 2 sin \{u +*;) sin \{u — 1 >).

These relations, which have been named firos- thapheretic* express sums and differences in terms of products, and so render them suitable for logarithmic computation.

Some Important Deductions from Fore¬ going Formulae.— Setting a — (3 in (2) and (3), there result

(9) cos 2a = cos2 a — sin2a,

(10) sin 2« = 2 sin a cos a.

The former combined with the relation 1 ~ sin* a + cos2 a yields

(11) 1 + cos 2a —2 cos2 a,

(12) 1 — cos 2a — 2 sin2 a.

Again, putting a = (3 in addition theorem of tangent, the result is tan 2a— 2 tan a: (1 — tan2a). Division of (12) by (11) yields (1 — cos 2a): (l+cos 2a) = tan“a, whence follow

(13)

(14)

cos 2a = sin 2a —

1 — tan2a

1 + tan2a’ 2 tan a 1 f tan2 a ’

Once more by definition tan a = sin a ;cos a. Squaring each member and adding 1 to each square, one finds the most used of secant for¬ mulae, sec2a= 1 4- tan2 a. The corresponding co¬ secant relation is cosec2 a = 1 + cot2a. Hosts of other more or less useful and interesting kindred formulae, readily deducible, may be found in the current textbooks and in pocket manuals for engineers. This paragraph will be closed with a deduction of the above presented Law of Tangents. By the Law of Sines, a :b =.sin a: sin /3; whence, by “composition and division,): >

- So called by Prof. W. B. Smith. Prosthaphceresis was a method of computation invented by Wittig, a pupil of Tycho Brahe. The method has been superseded by logarithms.

(a + b) :(a — ■ b) = (sin a sin (3): (sin a — sin (3) ; expanding the right-hand number by (4) and (3) , and applying the definition of tangent, the relation sought is found to be (a + b) : (a — b) = tan | (a + /3);(tan £(« — 0).

Solution of Triangles. — Etymologically trigonometry is triangle measurement, and, though the science wonderfully exceeds the verbal significance of its name, yet measure¬ ment of triangles is a very important, and, at the same time, the most generally familiar, one of its manifold applications. A triangle is determined by three independent data, of which the simplest are: two sides and an angle; two angles and a side; three sides. The three angles are not independent, any pair of them determine the third angle. Let a, b, c denote the lengths of the sides, and a, (3, y the corresponding (opposite) angles, of any triangle. The data being those mentioned, three cases arise: (i) given a pair of opposite parts, and one other, as a, a and b, or a, a and (3, to find the remaining parts; (ii) given three adjacent parts, as a, y, and c, or a, c and (3, to find the rest; (iii) given three alternate parts, a, b and c, to find the angles. In case (i), it is sufficient to employ the Law of Sines; in (ii), the Law of Tangents; in (iii), the Law of Cosines. In (i), if the (

(15) tan ia=7jroSjiS~a){Syb)(S-C)'

where 5 is £(a + b + c). Similar relations hold for (3 and y. The significance of (15) and its elements is further exhibited by Fig.

9, any triangle arid its inscribed circle. The radius K is precisely equal to the radical of (15), whence, if T denote the area of the triangle, T = sK = V s(s — a)(s — b)(s — c), a formula attributed to Hero of Alexandria (about 125 b.c.).

Triangle Solution Exemplified. — Given a = 32.456, b — 41.724, c = 53.987 ; required the angles. Applying logarithms to (15),

log tan y2a = \o gK — log (s — a). j = 64.084, (s — a) =31.628,

(s — b) =22.36, (s — c) = 10.097, loe (s — a) = 1.50007, log (s — b) = 1.34947, log (s — c) = 1.00419, colog s = 8.19325 — 10.

Summing and taking half,

log K = 1.02349; log (s — a) = 1.50007; whence

log tan =9.52342 — 10,

whence

i a = 18° 27′ 23”, = 36° 54′ 46”.

In like manner one may find (3— 50° 32′ 32”. and y = 92° 32′ 44”. As a check one finds a } (3 f y= 180° O’ 2”, an excess regarded in practice as very slight and in most work negli¬ gible. To secure more accurate results, which is seldom necessary, it suffices to employ loga¬ rithms of more than five decimal places.

Inverse Trigonometric Functions. — The symbols arcsin n or sin—1 n , arccos n or cos—1 n, arctan n or tan—1 n , etc., denote respectively an angle whose sine is n, whose cosine is n, etc. They are variously read inverse sine, cosine, etc., of n, or anti-sine,, etc., of n, or, again the arc or angle whose sine, cosine, etc., is n. They are called inverse trigonometric or circular functions, being related to the direct (so-called) trigonometric or circular functions much as are the integral and the derivative of the Calculus (which see), or the logarithm and the exponential of Algebra (which see). Like analogies abound. It should be noted that sin—1, cos—1, etc., do not signify reciprocal of sin, cos, etc. Moreover, unless the contrary is expressed, it is generally understood that sin—1 n, etc., shall signify the smallest positive one of the infinitely many angles whose sine, etc., as n. Thus sin— ˆ will ordinarily mean 30°, though, taken in full generality, it would signify 30° Hh 2wr, or 150° + 2 wr, n being any integer. The direct functions are one-valued functions of the angle, but the angle is an in¬ finitely many-valued function of a direct- function value.

Trigonometric Equations.— These are such as involve one or more direct or inverse trigonometric functions, regarded as the un¬ knowns or variables like the x, y, etc., of ordinary algebra. Such an equation, for ex¬ ample, is sin a -F sin 5 a — sin 3 a. To solve it, apply formula (5) ; then 2 sin 3 a cos 2a — sin 3 a ; whence either sin 3 a = 0, or 2 cos 2 a — 1; hence either a — n~:3or a — «77 ± 7r:6. For another example let sin-1 § — cos—1 {§ = sin—1 x, to find x. Denote sin—1!, cos— f, and sin— lx by a, (3, and y respectively. Then sin a — f, cos a = £, cos /3 — -JI, sin/3 — T5, siny = x. Alsoa — (3 — y, and sin(a ■ — (3) = sin a cos (3 — cos a sin (3 = sin y = x; substituting the values of sin a, etc., it is found that xˆ= For applications to the solution of the general cubic equation in one un¬ known, the reader is referred to the articles on Algebra or that on Equations, General Theory of.

Some Trigonometric Series — Consider the infinite series

(s)

sin a

g3 a5

L2-3 + 1-2-3-4-5

/ \ * a2 t a*

Mcos« = l _ + I_

a®

12

•8

+ ....

It may be proved algebraically, and is proved by means of Maclaurin's Expansion (see Calcu¬ lus), that the series (ˆ) and (c) respectively represent or define sin a and cos a for every finite value of the angle a reckoned in terms of

the radian. The precise meaning is that, if Sn denote the sum of the first n terms of (j), then the limit of Sn as n increases endlessly is sin a. Similarly for (c). The algebraic proof is too long for insertion here, and that by the Calculus rests on presuppositions not appropriate in this article. As a compromise it is edifying and interesting to assume the validity of equations (s) and (c) and then after the manner of natural science to test them, regarded as hypotheses, by their implications, or conse¬ quences. Rigorous proof is not thus obtainable, but certainty can be thus more and more nearly approximated. Any consequence of (s) or (c) or both that is known to be untrue would alone suffice to invalidate one or both assumptions absolutely, while any number of consequences known to be true merely tend to support but do not suffice to prove the hypotheses. Some such supporting consequences may be noted. If a = 0, series (j) and (c) become respectively 0 and 1, as should be the case, since sin 0 = 0 and cos 0 = 1. If a be replaced by — a, each term of (s) is reversed in sign, while (c) is unchanged;

and this, too, should be so, for, as before seen, the sin is an odd, and the cos an even, function of the angle. Again, it is proved in algebra (see Algebra, also Series) that, e being the Napierian base.

e“ = 1 + a + F2 + r2:3 + – ‘ adinf

for every finite value of a real or imaginary. Writing i a for o, where (after Euler) i = V — 1, one obtains

/ a2 a4 \

**“ = l1 ——2 + T2tt~- ■)

. / a3 a5 \

+ * a “ m + 1 -2-3 -4-5 • ■ 7*

or eia = cos a Ar i sin a.

Replacing i by — i,

e~i<* z= cos o. — i sin a.

The product of the last two equations yields 1 = cos2a j sin2a, another result known to be true. Once more,

= cos (a + (3) + i sin(a + (3) ;

also,

ei a-ei/3 z= (cos a + i sin a) (cos (3 A~ i sin B)

— cos cl cos (3 — i sin a sin

+ f(sin a cos (3 + cos a sin (3) ;

whence

cos (a + (3) = cos a cos (3 — sin a sm (3,

and . _

sin (a + j (3)= sin a cos (3 f cos a sm (3,

two equations of the known addition theorem for sine and cosine. It is indeed a fact that the whole body of trigonometric relations de¬ duced or deducible from the original- defini¬ tions, Fig. 1, of the functions, are obtainable analytically from (s) and (c) regarded as

definitions, and, like the latter, would then be free from geometric reference. Each of the other functions, direct or inverse, is repre¬ sentable in the form of a series analogous to (s) and (c). Such series may be found in books of trigonometry and of the calculus.

DeMoivre's Theorem. — From e*a = cos a-A-i sin cl it follows that

e*na _ (cos ct+i sin a)n;

but e*na =cos na A-i sin na,

hence (cos aA-i sin a)n =cos na A-i sin na,

a famous theorem due to De Moivre and known as De Moivre's Theorem. Suppose n — 3, then cos 3a + i sin 3a = (cos a A~ i sin a)3 = cos3 a

— – 3 cos a sin2 a + f (3 cos2 a sin a — sin3 a) ; whence cos 3a = cos3 a — 3 cos a sin2 a , sin 3a = 3 cos2 a sin a — sin3 a.

Similarly sines and cosines of any multiple of a may be expressed in terms of the like func¬ tions of the single angle.

Euler's Formulae. — From the relations eia = cos a A- i sin a, e~ ia =: cos a — i sin a, may be found, by addition and subtraction, the Eule- rian equations

1 l . . i

cos a = — – (eia A~ e~xa) , sin a = : (e*a — e~ ia),

Z Ll

which are equivalent to (c) and (s) and serve to define sin and cos in terms of imaginary powers of the Napierian base.

7 r

Some Curious Relations. — Letting a =—

eia — cos a j i sin af we get ehni = i : squaring, we obtain eiir = — 1; also elˆi = — iy and e27r* — 1=0. The last is especially noteworthy as in¬ volving the most notable set of five numbers in mathematics : 0, 1, i, e, Further develop¬ ments would lead into the doctrine of Circle Partition (Kreistlieilung) , which belongs to the Theory of Functions of the Complex Variable, to which the reader is referred. See Complex Variable, Theory of Functions of a.

Spherical Trigonometry.

A spherical triangle is the figure bounded by three aros (of great circles) on the surface of a sphere. Spherical trigonometry has for its principal problem that of determining the numerical values of the three remaining parts of a spherical triangle when three parts are given. This note is confined to triangles whose sides are each less than a semi-circumference and whose angles are each less than tt, or 180°. Any spherical angle is measured by the corre¬ sponding diedral angle, and the latter by the plane angle of intersecting lines (in the faces of the diedral angle) drawn perpendicular to its edge. For convenience the triangle will be supposed to be on a sphere of unit radius ; the sides will then be measured by their correspond¬ ing central angles. In all mathematics, every problem of angular measurement is ultimately that of measuring the angle between intersect¬ ing lines, as all distance problems are reducible to that of determining the distance between two points.

The Right Spherical Triangle.— Let O be

the centre of the unit-sphere containing the tri¬ angle CAB right-angled at A. BP being drawn

perpendicular to OA, and similarly PQ to OC, BQ is perpendicular to OC. By aid of the figure

one may readily find in order the relationships :

(1) cos a = cos b cos c, (2) sin c — sin a sin C, (3) cos C— cot a tan b (4) sin b = tan c cot C, (5) sin b = sin a sin B, (6) cos B — cot a tan c, (7) sin c — tan b cot B, (8) cos a = cot B cot C, (9) cos B — cos b sin C, (10) cos C = cos c sin B.

Sufficient for the solution of any right tri¬ angle, these are less convenient than the equiva¬ lent derived set presented under the title

Napier's Circular Parts and Rules. — These parts are : 90° — a, 90° — B, 90° — C, b and c. By substitution in the preceding formulae, these parts are seen to be related as follows :

(T) sin (90° — a) = cos b cos c,

(2') sin c = cos (90° — a) cos (90° — C),

(5') sin b — cos (90° — a) cos (90° — B), (9') sin (90° — B) — cos b cos (90° — C),

(10') sin (90° — C) = cos c cos (90° — B) ;

(8') sin 90° — a) = tan (90° — B) tan (90° — C), (7') sin c = tan b tan (90° — B),

(4') sin b = tan c tan (90° — C) ,

(6') sin (90° — B) = tan (90° — a) tan c,

(3') sin (90° — C) = tan (90° — a) tan b.

Arranging the parts in some such cyclical scheme as in Fig. 11, it will be seen that any part being taken as middle part, there are two adjacent parts, and two others that may be and are called opposite. By inspecting the first half of the preceding table it appears that the sine of any middle part is equal to the product of the cosines of its opposite parts, and, from the second half, that the sine of a middle part is the product of the tangents of its adjacent parts. Such are Napier's rules for circular parts, the more readily remembered by vir¬ tue of the assonances appearing in their statement.

In the solution of right spherical triangles it should be observed: (1) that a is less or greater than 90° according as 90° is not or is intermediate to b and c, these being supposed not equal to 90°; (2) b or c and the opposite angle are both less or both greater than 90° ; (3) that corresponding to the data, b or c and the opposite angle, there are two solutions.

Quadrantal Triangles. — Those are so named that have a side equal to 90°. The supple¬ mental polar triangle of a quadrantal is right- angled. -Hence to solve a quadrantal, solve its polar and subtract its parts each from 180°.

Oblique Spherical Triangles. — The theory

of the oblique spherical triangle is contained in the following numbered equations deducible by

help of the figures. From Fig. 12 and analogy it is obvious that

(11) sin a : sin b = sin A : sin B,

(12) sin b : sin c = sin B : sin C,

(13) sin c\ sin a = sin C: sin A,

three propositions constituting the Law of Sines for Spherical Trigonometry. The Law of Cosines, readily found from Fig. 13 (in which CP is perpendicular to the plane AOB, PD, and PE are perpendicular to OA and OB, and PG and DF are parallel to OF and PE), is the triplet :

(14) cos a = cos b cos c + sin b sin c cos A,

(15) cos b — cos c cos a + sin c sin a cos B,

(16) cos c = cos a cos b + sin a sin b cos C.

From these, by passing to the polar triangle (of equal generality with that of Fig. 13), one finds three relations of type

(17) cos A — sin B sin C cos a — cos B cos C.

From the law of cosines flow the two triplets of formulae adapted to logarithmic computation and being respectively of the types

(18) tan L4 = V sin(j — fr)sin(.y — a) : _

V sin s(s — a),

and

(19) tan Jo = V — cos (S — A) cos S :

Vcos (S — B)cos(S — C),

s and N being the half sums of the sides and of the angles.

Napier's Analogies. — From (17) by help of the Sine Law are found the so-called first set of Napier's analogies, namely

(20) cos b(a + b) : cos b(a — b).

= cot bC : tan b(A + 5),

(21) sin b(a ~h b) : sin i(a — b)

= cot bC : tan b(A — B) ;

and from these, by use of the polar triangle,

this second set:

(22) cos b(A + B) : cos b(A — B)

= tan b c : tan b(a + b).

(23) sin b(A + B) : sin b(A — B)

tan b c : tan b(a + b) .

For ways of resolving the ambiguity incident to the use of the Sine Law, the reader is re¬ ferred to any standard work on Spherical Trigonometry. (See Bibliography) .

Plane Trigonometry a Special Case of Spherical. — The ground of the notable resem¬ blances between corresponding plane and spherical formulae may be made evident by the following considerations : Suppose a plane p tangent to a sphere of radius r at a point P If r increase without limit, the one-based zone having P for mid-point will flatten, swelling out toward p so as to include any given finite point Q near at will but not on p however far 0 be from P. Plane p is said to be the limit of the sphere surface as r increases limitlessly — a relationship commonly expressed briefly by saying that a plane is a sphere of infinite radius. Accordingly the geometry and the trig¬ onometry on a sphere of radius r ought to de¬ grade respectively into plane geometry and plane trigonometry, on taking r infinitely great. To show that and how, in case of trigonometry, such degeneration actually occurs, consider the spherical Sine Law

(5) sin a _ sin b sin c

sin a sin sin 7*’

where a, b, c are the sides (i.e., the central angles they subtend), and «, /3, y the correspond¬ ing angles, of a triangle on a sphere of radius r. Denoting the lengths of a, b, c by l, m, n re-

/ fft ft

spectively, a, b, c =— > — > — (radian measure).

r r r

Denoting the lengths of a, b, c by l, m, n re-

. I . m . n

sin- , sin- sin—

r l r m _ r n

l sin a m sin n sin y‘

r r r

Now it may be proved that the limit of the ratio of the sine to the angle as the angle ap¬ proaches zero is 1. Hence as r increases limit-

l fft ft

lessly and consequently the angles — > — > —

r r r

(numerators being kept constant, or finite at any rate) approach zero, the foregoing Sine

/ fft fl

Law degrades into — — = – — 7> = — — the Sine

sin a sin o sin p

Law for plane triangles. Similarly, by use of the Sine and Cosine Series, it may be shown that the Cosine Law for the sphere degenerates for r—ˆ> into the Cosine Law for the plane, and that the Tangent Law for the plane is but a special case of the fourth Napierian analogy, the Law of Tangents for the sphere.

Hyperbolic Functions. — These are asso¬ ciated with the rectangular hyperbola (see Geometry, Cartesian and Calculus) in a man¬ ner similar to the connection of the trigonomet¬ ric or circular functions with the circle. The hyperbolic functions invented by Lam¬ bert (1768), may be defined as follows (compare with the Eulerian formulae) : nam¬ ing them hyperbolic sine, etc., and denoting them by sink, etc., their definitions are, sinh a = = e~a), cosh a — £(ea + e— “), tanh a

= sinh a;cosha, etc. Each of the six is ex¬ pressible in terms of each of the others. Thus cosh2a — sinh2a = 1 . tanh2a (sech2

Pseudo-spherical Trigonometry. — A given sphere has constant positive curvature (see Cal¬ culus). If the radius be infinite, the curvature is zero. The plane is a sphere of constant zero curvature. Suppose the curvature to be con¬ stant and negative. The surface is then called pseudo-sphere. This, too, has its trigonometry. Its formulae are obtainable from those of spher¬ ical trigonometry by replacing the circular func¬ tions by the corresponding hyperbolic functions. See Trigonometry, History of the Elements

of.

Bibliography. — Chauvenet, (Treatise on Plane and Spherical Trigonometrv) (19th ed., Philadelphia 1881); Loney, (Plane Trigonom-etry) (Cambridge 1895) ; Todhunter, (Plane Trigonometry* (London 1891) ; (Spherical Trigonometry> (London 1901).

Cassius J. Keyser,

Professor of Mathematics, Columbia University.

TRIGONOMETRY, History of the Ele¬ ments of. Among the ancients trigonometry was simply an adjunct to astronomy, and it so remained until comparatively recent times. A slight trace of its application to mensuration is

found in the famous papyrus of Ahmes (see Algebra, History of the Elements of), where a quotient called seqt is mentioned. In the case of the pyramids the seqt seems to have been the cosine of the angle of slope of the edge, or in some cases the tangent of the angle of slope of the face. Among the Greeks frequent reference to trigonometry is found among the writings of the astronomers. Hypsicles (c. 190 b.c.) used the Babylonian division of the circumfer¬ ence into 360 degrees and from this time the sexagesimal fraction became common in as¬ tronomy. Hipparchus (c. 150 b.c.) was the first to compute a table of chords, the ancients gen¬ erally using the chord instead of the half-chord or sine. Hero of Alexandria (see Hero of Alexandria) gave rules which are the equiv¬ alent of certain modern formulas, and in par-

2tt

ticular computed the values of cot – for all

• n

values of n from 3 to 12 inclusive. Menelaus of Alexandria (c. 100 a.d.) carried the study of Spherics to a considerable prominence, his

celebrated Regula sex quantitatum relating to the transversal of the sides of a spherical tri¬ angle, and he wrote six books on the calcula¬ tion of chords. It is, however, to Claude Ptol¬ emy (q.v.), c. 125 a.d., that is due the introduc¬ tion of a formal spherical trigonometry into astronomy. The Almagest made the sexa¬ gesimal fraction more widely known and Ptol¬ emy calculated the chords of arcs to a half degree.

The Hindu astronomers used the half chord instead of the chord which the Greeks usually (but not always) employed. They thus used the sine, and they added the versed sine and the cosine, computing tables for these ratios. They also knew the relation, sin2 x + cos2 x~ 1.

The Arabs made the greatest advance in trigonometry of any peoples before the Renais¬ sance. A1 Battani, or Albategnius as the Latin writers called him, c. 900 a.d., brought into greater prominence the use of the sine, and computed a table of values of sin jr/cos x and its reciprocal, thus practically using the tangent and cotangent. The present names for the vari¬ ous functions are mostly modern. The name sinus seems first to have been used by Gherardo of Cremona, c. 1150, although often attributed to Plato of Tivoli (also c. 1150) in his trans¬ lation of A1 Battani. Among the western Arabs, Jabir ibn Allah, often known as Geber, was prominent, his trigonometry covering both the plane and the spherical parts.

In Christian Europe the science is first seri¬ ously considered in the work of Regiomontanus (q.v.), the tamous pupil of Peuerbach (q.v). The latter had done some excellent work in trigonometry, but he died before he could write his projected treatise, and Regiomontanus car¬ ried out his plans. The result was a work which influenced subsequent textbooks much as Euclid's (Elements* influenced plane geometry. The principal formulas of plane and spher¬ ical trigonometry are set forth and the element¬ ary science became crystallized. Subsequent advances have been chiefly in the nomenclature, the symbolism and the computation of tables, particularly of logarithmic tables. Among the most prominent computers of the values of the functions and of logarithms should be men¬ tioned Rhieticus (1514-76), Pitiscus (1561-

1613), Burgi (1552-1632), Napier (1550-1617), Briggs (1560-1630) and Vlacq, whose tables ap¬ peared in 1628.

Bibliography. — Braunmiihl, A von, (Ge- schichte der Trigonometric* (Leipzig 1900, 1904) ; Cantor, M., (Geschichte der Mat-he- matik) (Leipzig, 2d ed. 1894) ; Gow, J., his¬ tory of Greek Mathematics* (Cambridge 1884) ; Cajori, F., (History of Mathematics) (New York 1900).

David Eugene Smith,

Professor of Mathematics, Teachers College, Columbia University, New York.

TRIIODOMETHANE. See Iodoform.

TRIKALA, tre'ka-la, or TRIKKALA,

Greece, city in northwestern Thessaly, 38 miles west of Larissa, with which it has railroad connection by way of the Gulf of Volos. The chief industries are tanning, dyeing and the manufacture of cotton and woolen goods. The ancient town, Trikka, had* a famous temple of .TEsculapius. Pop. 18,000.

TRIKOUPIS, tre-koo'pis, Charilaos, Greek statesman, son of Spiridon Trikoupis (q.v.) : b. Nauplia, 23 July 1832; d. Cannes, France, 11 April 1896 He inherited his father's lit¬ erary bent of mind and iater began the study of jurisprudence in Athens, afterward studying and completing his course at Paris. His mind, then turned toward diplomacy and in 1852 he entered the service of his countrv as attache to the legation in London and in 1863 was pro¬ moted charge-d'affaires. In 1865 he was in charge of the negotiations with England which brought about the cession of the Ionian Islands. He was elected to the Boule the latter part of the same year and joining the Radical party be¬ came successively Minister of Foreign Affairs in 1866, Premier in 1875 an again in 1877 Minister of Foreign Affairs in the coalition ministry under Canaris. He then again became Premier in 1878-80 and served also the terms 1882-85, 1886-90, 1891-93 and 1893-95, but at the next election he was defeated and even lost his seat in the Boule. This was probably due to the low state of the finances of the government, which he had in vain attempted to raise to a degree of stability through the imposition of tariffs and the enactment of agrarian laws as well as by the building of railways. Public confidence in his administrative ability was, however, once more shown by his re-election from the district of Valtos, but he was at the time sick and died before taking his seat. His speeches were published in one volume at Athens in 1888.

TRIKOUPIS, Spiridon, Greek statesman and man of letters: b. Missolonghi, 20 April 1788; d. Athens, 24 Feb. 1873. After complet¬ ing his education at Paris and London he be¬ came private secretary to Lord Guilford at Corfu. In 1821, upon the outbreak of the Greek insurrection, he returned to Missolonghi and joined the patriots. Throughout much of his life he was engaged either in administrative or diplomatic affairs. From 1833-41 he was Min¬ ister to England and after 1843 he held in suc¬ cession the portfolios of the Ministry of For¬ eign Affairs and of Public Instruction, the Vice-Presidency of the Senate, and the post of Envoy Extraordinary to France. As a man of letters he was among the greatest names of modern Greece. Most celebrated of his works

was the oration pronounced on Lord Byron, his friend and associate, at the cathedral of Missolonghi. His (Poeme des Kliphtes* (1820) is well known, as is also his (Histoire de la Revolution Grecque* (1853-57).

TRILBY, a novel by George Du Maurier, so named for its principal figure and published in 1894. It is a story of artist life in the Latin Quarter of Paris. It achieved a great and sud¬ den popularity and was very soon dramatized. Trilby, the heroine, is a laundress and artist's model and her relations with three artists, Taffy, the Laird and Little Billee, form the theme.

TRILITHON, or TRILITH, a monu¬ ment, probably sepulchral, either standing alone or forming part of a larger work, and con¬ sisting of three stones, two uprights, connected by a continuous impost or architrave. Among the best-known examples of trilithons are those at Stonehenge, on Salisbury Plain, England.

In the trilithons still standing, each of the up¬ rights has a tenon on its surface and the under sides of the architrave or horizontal piece have each two mortises into which the tenons fit. Similar monuments are found in Scandinavia over the graves of the distin¬ guished dead.

TRILL, in music, the repetition of a note alternately with another, either a half tone or a tone above it. The sign of a trill in music is the syllable tr placed over or under the prin¬ cipal note. The trill was known and used at the end of the 16th century.

TRILLIUM, a genus of the family Lilia- ccce, monocoty-ledonous plants, having all the parts in threes, to which circumstance the generic name refers. They are handsome plants known also as wakerobin, native to North America and Asia. The leaves are triple, in

a single whorl, the flower-peduncles arising from the centre. The three petals of the flowers alternate with the same number of sepals. The fruits are large berries, dark red or purple, and sometimes angled. The plants are early blooming smooth perennials, with perpendicu¬ lar rhizomes ending abruptly and abounding in starch. Trillium grandiflorum, which extends from Quebec to Florida and westward, in cool, damp woods, has rhombic, ovate, pointed leaves. The petals are somewhat spreading, pure white or touched with pink, when aged turning to old-rose tints. The painted trillium (T. undulatum) is very small, with w lyte petals, narrow and wavy-margined and veined with purple. T. cernuum has a white-petal flower nodding on a recurved stalk quite under the leaves, which are broadly rhombic. Other species have green flowers, as T. viride and T. recurvatum , the latter distinguishable by its reflexed sepals. Two at least are purple-flowered, the blossom of one being sessile (T.ˆ* sessile), and the other (T. erectum) having de¬ clined flower-stems and reddish purple petals, somewhat acute, and a little longer than the lanceolate sepals. The flowers have a most disagreeable odor, probably attractive to car¬ rion flies, however, and are among the first plants to bloom in the shady, cool woods of eastern America. They are called beth-root or birth-wort, and have a rhizome of sweetish, astringent, acid taste and emetic properties.

TRILOBITE, an early and priniitive form of Crustacerce fossil, remains of which are very common in the Paleozoic era. They are doubt¬ less the ancestors of modern Arachnida, that is spiders, scorpions and mites. In palaeon¬ tology, any individual of the order Trilobita, so called from the division of the external skeleton into three regions: (1) a cephalic shield ; (2) a variable number of body rings and (3) a caudal shield, tail or pygidium. The cephalic shield is usually more or less semi¬ circular, with an elevated portion, the glabella, bounded by the fixed cheeks, to which the free cheeks which bear the eye are attached by the facial suture. The posterior (genal) angles of the free cheek are commonly prolonged into longer or shorter spines. The eyes are sessile, compound and consist of an aggregation of facets, covered by a thin cornea. The number varies greatly, Barrande having found as few as 14 and as many as 15,000 facets in each eye in different types. Behind the cephalic shield comes the thorax, composed of a number of segments (2 to 26), capable of more or less movement on each other; in several genera this freedom of movement was so great that species could roll themselves up into a ball, like a hedgehog. The tail is also

composed of a number of segments (from two in Sao hirsuta to 28 in the genus Amphion), ankylosed or amal¬ gamated. The extremity is sometimes rounded, but may be prolonged into a spine and the ends of the pleurae of the tail-segments may also be produced into spine-like processes. With re¬ gard to the under-surface and appendages of the trilobites much remains to be discovered. The head bears a hypostome or plate in front of the mouth and four pairs of jointed ap¬ pendages, the basal parts of which were modi¬ fied to serve as jaws.

From Walcott's examination of sections of rolled-up specimens, it appears that the thoracic appendages were slender, five-jointed legs, in which the terminal segment formed a pointed claw, and the basal segment carried a jointed appendage, homologous with the epipodite of many recent crustaceans. On each side of the thoracic cavity was attached a row of bifid, spiral branchial appendages, and appendages serving also as gills were probably attached to the bases of the thoracic limbs.

Trilobites vary greatly in size, some being scarcely larger than a pin's head, while species of Asaphus have been discovered two feet in length. They appear to have lived on muddy bottoms in shallow water, feeding on small marine animals, and probably swam on their backs, as do the recent Apus and the larval forms of Limulus. The general opinion of zoologists at the present time is that they are related, through the Xiphosura and Limulus, to the Arachnida, and are not crustaceans as for¬ merly believed. Trilobites are characteristic of the Palaeozoic system or rocks, and reached their maximum development in the Ordovician. The genera are numerous. (See Arachnida). Consult Zittel and Eastman, (Text-book of Palaeontology) ; Walcott, (Bulletin Museum Comparative Zoology* (Cambridge 1881).

TRILOGY, among the ancient Greeks, a union of three tragedies, connected in subject, which, together with a satirical piece, were per¬ formed in immediate succession. There is only vol. 27 — 5

one trilogy of antiquity which we can be cer¬ tain of possessing complete, namely, the (Orestias) of ZEschylus, which contains the (Agamemnon, } Who phori,* and WumenidesP In modern usage any group of three dramas or operas is so named.

TRIMBLE, trim'bl, Isaac Ridgeway,

American soldier: b. Culpeper County, Va., 15 May 1802; d. Baltimore, Md., 2 Jan. 1888. He was graduated from West Point in 1822, en¬ gaged in surveying military roads under the government in

1822-32, and then resigned to pursue the profession of civil engineering. He was afterward engaged as chief engineer on different railroads and at the outbreak of the Civil War joined the Confederate army. He was appointed colonel of engineers in 1861, had charge of the construction of defenses of Nor¬ folk, Va., and later built the batteries at Evans- port on the Potomac. He chose the position for the Confederate forces at Cross Keys, 8 June 1862, was engaged at Gaines' Mills, Slaughter Mountain, and at Manassas, and in 1863 was promoted major-general. He took part in the charge of Pickett's division at Gettysburg, where he lost a leg and was taken prisoner. He was exchanged in April 1865 and reached Lynchburg on his way to rejoin Lee, the day after the surrender at Appomattox.

TRIMBLE, Robert, American jurist: b. Berkeley County, Va., 1777; d. 25 Aug. 1828. He removed with his parents to Kentucky in 1831, and there gained with little instruction sufficient education to enable him to teach. He later studied law, was admitted to the bar in 1803 and in that year settled at Paris, Ky., where he engaged in law practice. He was soon afterward chosen to the legislature, was appointed second judge of the Court of Ap¬ peals in 1808, and chief justice of Kentucky in 1810. He was United States district attorney in 1813, served as district judge in Kentucky in 1816-26, and from 1826 until his death was a justice of the United States Supreme Court.

TRIMETHYLAMINE (CffLN), an or¬ ganic chemical compound found in very small quantity in various plants, hawthorn, wild cherry, pear, etc., but contained in considerable amount in herring brine, where it is the result of the decomposition of organic substances con¬ taining nitrogen. Obtained usually by the action of heat upon the Winasses** or residues from the refinery of beet sugar. It can be made in the laboratory by action of methyl iodide upon ammonia. A liquid boiling at 9° to 10° C., soluble in water and possessing a very strong ammoniacal and fishy odor. Its chemical be¬ havior is like ammonia in that its water solu¬ tion is a strong base which unites with acids to form salts. It may be considered as am¬ monia NH3 in which the three hydrogen atoms have been replaced by three methyl (CH3) groups. The methylamine hydrochloride is used extensively in place of ammonium chloride in the Solvay process for manufacture of potas¬ sium carbonate. See Chemistry, Progress of — Soda.

TRIMMER, Mrs. Sarah, English writer: b. Ipswich, 1741; d. 1810. She was the author of popular juvenile works, many of which are of an educational character, and her success in founding Sunday schools led to her being summoned to Windsor castle to aid the queen

in similar work. In 1787 she established an industrial school for girls at Brentford, which was highly successful. Of her many writings (Abridgements of the Old and New Testa¬ ments } (1793) was given a large circulation by the Society for Promoting Christian Knowledge.

TRIMORPHISM. See Isomorphism.

TRIMURTI, tri-moor'ti, in the religious system of latter Brahmanism, the Hindu trinity, Brahma, Vishnu and Siva, considered as an in¬ separable unity. The sectaries of Brahma, Vishnu and Siva respectively make their god the original unity from which the trinity emanates; but considered separately, Brahma is the creating, Vishnu the preserving and Siva the destroying principle of the deity, while Trimurti is the theological or philosophical unity, which combines these separate forms in one self-existent being. (See Brahma; Siva; Vishnu). The Trimurti is represented symbolically as one body with three heads, Vishnu at the right, Siva at the left and Brahma in the centre, holding the receptacle for alms and wearing the crown of roses.

TRINCOMALI, tring"kd-ma-le', or TRIKONAMALAI, Ceylon, a town situated on Trincomali Bay on the northern part of the east coast. The bay forms a safe harbor of refuge, and is defended by strong fortifica¬ tions. It has sustained several sieges, and has been held by the Portuguese, by the Dutch twice and by the French three times. It was captured by the British in 1795, and was formally ceded to Great Britain in 1802. Pop. about 11,000.

TRINE, Ralph Waldo, American writer on character building: b. Mount Morris, Ill., 9 Sept. 1866. He was graduated from Knox College, Galesburg, Ill., in 1891, and has pub¬ lished several popular booklets mainly con¬ nected with (New Thought, } including (What All the World's a-Seeking) ; (In Tune With the Infinite) ; (The Greatest Thing Ever Known) (1898) ; (Every Living Creature-* (1899) ; (The Land of Living Men* (1910) ; (The New Alinement of Life) (1913), etc.

TRINE IMMERSION, the name given to the practice in the primitive Church of dipping a person who was being baptized three times beneath the surface of the water, at the naming of the Three Persons of the Holy Trinity. See Baptism ; Baptists.

TRINIDAD, Colo., city and county-seat of Las Animas County; situated in the extreme southern part of the State, 50 miles- east of the

Continental Divide, on the Atchison, Topeka and Santa Fe and the Denver and Rio Grande railroads. It was first settled in 1853 by Mexi¬ can ranchers; became a town under territorial law in 1872, and a city in 1877. Trinidad is situated in a coal-mining and agricultural region, and derives its business chiefly from mining and trade in agricultural products ; there are also railroad shops and a wool-scour¬ ing mill, and three banks with a combined capital of $275,000. It contains a Carnegie public library, four public schools, includ¬ ing a high school, a business college, Saint Joseph's Academy and the San Rafael Hos¬ pital. The government is vested in a mayor and a board of aldermen of 10 members, elected

bi-annually; the waterworks are under munic¬ ipal ownership. Pop. (1920) 10,906.

TRINIDAD, Sp. tre-ne-t'hatV, Cuba, city, province of Santa Clara, four miles .from the southern coast, 40 miles southeast of Cienfuegos. It was founded by Diego Velasquez in 1513. It is connected by railroad with its port, Casilda, and carries on a considerable trade ; coffee was formerly its most important export, but the export of sugar is now increasing.. It is well situated on high ground, and is one of the most healthful cities on the island. Pop. about 12,000.

TRINIDAD, or ASCENAO, a small unin¬ habited rocky island in the Atlantic, in lat. 20° 31′ S., long. 29° 20′ W., about 700 miles east of Brazil. It was first discovered by the Portu¬ guese, but was never claimed or made use of till 1700, when the English astronomer, Halley, in the course of a scientific cruise, raised the British flag on it. Thereafter the island was regarded as a derelict, as no power exercised active possession. There is hardly any fresh water and the island reeks of rotten fish and guano. Access by boat is most difficult, and the water is alive with sharks. The whole area is about five square miles. In 1894 the island had gained a monentary celebrity through the an¬ nouncement by Baron Harden Hickey (q.v.), that he had created himself ttPrince of Trini- dad.}) In January 1895, Great Britain annexed the island for a cable-station site. The British annexation roused considerable opposition in Brazil. By mutual consent the dispute was submitted for arbitration to the king of Portu¬ gal, who decided in favor of Brazil. Consult Knight, E. F., (Cruise of the Alert) (London 1890) ; New York Tribune, 11 Feb. 1898.

TRINIDAD, an island off the coast af Venezuela north of the mouth of the Orinoco river and belonging to Great Britain; area, 1,860 square miles; population (1919 estimated) 386,- 907. Trinidad and the adjacent island of To¬ bago (area, 114 square miles) are administered

as one colony, having a governor, an executive council of six members and a legislative coun¬ cil of 21 members. Port of Spain, population 69,796, is the capital. The island was discovered in July 1498 by Christopher Columbus who gave it the name it still bears. From its discovery until 1797, when it capitulated to a British force, it was a Spanish possession. In 1595 San Jose de Oruna, the old capital, was burned by Sir Walter Raleigh. In 1640 and 1677 the island was raided by the Dutch and in 1690 by the French. It was finally ceded to Great Britain in 1802 by the Treaty of Amiens. In respect to flora, fauna and geological formation it is closely -related to the mainland of which, at one time, it probably was a part. It is traversed from east to west by three ranges of hills — one in the north, one in the south and one near the middle. In the northwest Mount Tucuche attains a height of 3,100 feet. Numerous small streams flow either east or west. Near the Gulf of Paria in jthe ward of La Brea is the famous Pitch Lake, yielding annually large quantities of asphalt which is exported as a paving material. The lake covers an area of 104 acres. Near the centre the pitch bubbles up in a liquid state. The remainder of the surface will show the

impression of the lightest footsteps when the sun is hot. Underground forces cause the pitch to rise to the surface and when any portion is removed nature so quickly replaces the damage that within 24 hours the hole will be refilled. Another object of interest is Maracas Falls, northeast of Port of Spain, where the water pours over a solid wall of rock 312 feet high, lhe white population of Trinidad is made up mostly of English, French, Spanish and Portu¬ guese. By far the greater part of the inhabi¬ tant are native West Indians of African descent, but there are a number of East Indians and some Chinese on the island. English is spoken generally. In 1919 elementary schools num¬ bered 293. Secondary education is afforded for boys : by Queen's Royal College, Saint Mary's College and Naparima College; for girls: by Saint Joseph's Convent. Educational expendi¬ tures in 1919 totaled approximately $371,300. The principal articles of export are petroleum, of which there seems to be a large supply; cocoa, sugar, rum, molasses, asphalt, cocoanuts, copra and bitters. In 1919 the value of imports exceeded $30,000,000 ; exports, $36,000,000 ; rev¬ enues exceeded $6,700,000; customs, $2,000,000, government expenditures, $6,500,000. The pub¬ lic debt in 1919 was approximately $11,000,000.

TRINIL MAN. See Man, Prehistoric Races of.

TRINITARIANS. See Redemptionists ; Trinity Doctrine.

TRINITROPHENOL. See Picric Acid.

TRINITROTOLUENE, or TNT,

CeHzCCHs) (N02)3, a high explosive, the final nitration product of toluene, is obtained by the energetic treatment of this hydrocarbon with strong nitric acid in the presence of concen¬ trated sulphuric acid. The reaction takes place in three stages, with the formation of mono- nitrotoluene and dinitrotoluene as intermediate products. The compound has also been pre¬ pared on a large scale by dissolving orthonitro- toluene in 100 per cent sulphuric acid at 60- 70° C. ; a mixture ()f nitric and sulphuric acids is allowed to run into the solution in a fine stream with constant stirring and cooling. Under these conditions the formation of dini¬ trotoluene is indicated by a drop in temperature. In order to complete the reaction, the mixture is maintained at a temperature of 120-130° C. for one hour. An increase in yield is claimed by the addition of water to the reaction mix¬ ture at 100° C. During the process of manu¬ facture a number of inorganic salts are pro¬ duced by the action of acids on nitrating cham¬ bers; these impurities act as catalysers and pro¬ mote the formation of nitrated cresols and other by-products, which may form unstable salts with metals, causing premature explosions. It is, therefore, necessary to prepare a compound of high purity. For this purpose the crude product is removed from the nitrators as soon as the desired reaction comes to an end, and purified by first washing with boiling water; volatile impurities are removed by keeping the compound at 95-100° C. for several hours ; it is then crystallized from a mixture of 90 per cent alcohol and benzene. Patents have also been issued dealing with purification by dis¬ solving in hot concentrated sulphuric acid and extracting the product by dilution and cooling.

The compound has further been purified by recrystallization from orthonitrotoluene.

Pure trinitrotoluene crystallizes in almost white needles which melt at 80.6° C., and pos¬ sess a density of 1.6. Its density may be in¬ creased to 1.7 by melting and pouring into shells, or by ‘allowing the molten mass to cool under pressure. It dissolves readily in alcohol, acetone, benzene, toluene, nitrotoluene, and fairly readily in hot concentrated sulphuric acid.

Although trinitrotoluene does not quite pos¬ sess the detonating power of picric acid, in many respects it is decidedly superior to this competitor. At ordinary temperatures it is a perfectly stable explosive; it may be compressed into shells, mines, torpedoes and into slabs or cylinders with perfect safety, and the pressed charges withstand impact of high power bul¬ lets without exploding. The compound is non- hygroscopic, and its dust or vapor are not irritating. Having no acid properties it is inert in the presence of metals or their oxides. When ignited it burns with a smoky flame, and when detonated with mercury fulminate it leaves no poisonous vapors or gases, and having a much lower melting point than picric acid, it may be poured into shells at lower temperatures. On account of these properties trinitrotoluene has been extensively employed, sometimes in pref¬ erence to picric acid, as an explosive for shells, mines, hand grenades and torpedoes. It has also been used in safety detonators. Being somewhat deficient in oxygen, it is often mixed with potassium chlorate, lead nitrate and other compounds that can supply the necessary oxygen.

Trinitrotoluene exists in six isomeric modi¬ fications. These are of practically the same value as explosives. The commercial product usually contains the symmetrical compound (1- methyl 2, 4, 6- trinitrobenzene), although the other isomers may also be present.

V. S. Babasinian, Lehigh University.

TRINITY, (1) a river which has its rise in the Shasta Mountains and flows through Trinity County, in the northeastern part of California. It has two forks and empties into the Klamath River in Humboldt County. Its length is about 250 miles. (2) A river in Texas which has its rise in a group of streams north of Dallas and Fort Worth in the northern part of the State. It flows east and southeast and enters Galveston Bay, an arm of the Gulf of Mexico. The total length is 560 miles. At high water it is navigable for small boats a distance of 500 miles. It flows through a rich agricultural country.

TRINITY BAY, Newfoundland, a large ir¬ regular bay on the southeast coast, cutting off, together with Placentia Bay, the peninsula of Avalon from the main part of the island. Its chief port is Heart’s Content.

TRINITY COLLEGE, Cambridge, Eng¬ land, founded by Henry VIII in 1546 on the site and out of the revenues of Michael-house (1324), King’s Hall (1337), and other ancient societies, is the largest college of the university. To the 60 fellowships and scholarships of the foundation Queen Mary added 20 scholarships. The scholarships,

which are tenable up to the M.A. degree, have a yearly value of from $150 to $500, the sizarships of about $350, and there

are further three annual minor scholarships of $350 and three of $250, tenable for three years, besides 16 exhibitions for scholars from West¬ minster, Saint Paul's, Lynn, Shrewsbury, etc., and numerous prizes. The fellows, with cer¬ tain exceptions, must take holy orders within seven years after their M.A., and the college may elect professors or other distinguished lit¬ erary or scientific men to regular or honorary fellowships. Trinity is more conspicuous for the extent than the special architectural beauty of its buildings. Noteworthy, however, are Nevill's Fountain, the three great gateways by which the three chief courts are entered, the Gothic Hall with its high-peaked roof, the chapel (re-decorated 1875), the library designed by Wren and containing 100,000 volumes, the Master's Lodge, with its state-rooms, where royalty and the judges are received, and the rich collection of busts and statues of former members — of Newton by Roubiliac, Porson by Chantrey, Byron by Thorwaldsen, Barrow, Macaulay, Whewell, Sedgwick, Tennyson, etc. The gross income in 1917 was £81,472 and the undergraduates numbered 595, with 3,255 mem¬ bers on the boards.

TRINITY COLLEGE, located at Durham,

N. C. It was founded as a school of secondary grade in 1838 and was then located in Ran¬ dolph County; in 1851 it became a normal col¬ lege and the next year established a full col¬ lege course and was granted power to confer degrees. In 1857 it was placed under the con¬ trol of the North Carolina Conference of the Methodist Episcopal Church, South, and in 1859 the name was changed to Trinity College. Dur¬ ing the Civil War the college was compelled to close, and was reopened in 1866. In 1891 it was moved to its present site in Durham. Women were admitted to all privileges of the college in 1896. The college offers three groups of studies, all leading to the degree of A. B., the first group requires Latin and Greek in the first two years, the second group sub¬ stitutes French or German for Greek, and the third group is for students intending to do ad¬ vanced work in mechanical, electrical or civil engineering; the work of the last three years is partially elective. Provision is also made for graduate work for which the degree of A.M., is conferred. There are 50 scholarships and two loan funds for the aid of poor students; tuition is free for those

studying for the min¬ istry. A new charter extending the scope of its activities was granted in 1903. The grounds, consisting of 73ˆ acres, are known as Trinity College Park, and are under the municipal government of Durham; the buildings include the Washington Duke building, the Crowell Science building, the Epworth building, the Mary Duke building, the Craven Memorial hall, the Angier Duke gymnasium, a dormitory (erected 1902) and the library of 52,000 vol¬ umes (completed 1903). The productive funds in 1917 amounted to $1,641,000, the increase being largely due to donations from James B. and N. Duke; the students numbered 705 and the faculty 52.

TRINITY COLLEGE, Hartford, Conn., was founded by Bishop Brownell of the Prot¬ estant Episcopal Church in 1823 and was then chartered as Washington College. In 1845 the name was changed to Trinity College; in

1872 the original campus was sold to the city of Hartford as the site for the State Capitol and the college moved to its present site in the suburbs. The college offers (1) a course in arts leading to the degree of A.B.; (2) a course in science, leading to the degree of B.S. ; (3) a course in civil engineering, added to the curriculum in 1903-04; those taking this course may receive either the degree of A.B., or B.S., according to their electives; (4) grad¬ uate courses leading to the degrees of M.A., and M.S. The college has a large number of scholarships, two fellowships and several grad¬ uate scholarships. The principal buildings are of brown stone, secular Gothic in architecture. The library in 1918 contained 85,000 volumes. The productive funds amounted to $1,618,000. The average attendance is about 250 and the faculty numbers 25.

TRINITY COLLEGE, Ireland, is said to have been founded by Queen Elizabeth in 1591. Some authorities, however, assert that she merely endowed and Protestantized the school and that its establishment was due to Alexander Bigner or Bignor, an ecclesiastic of the 13th century. It is the largest and most important educational institution in Ireland and has exten¬ sive buildings which enclose several quadran¬ gles. Corinthian columns ornament the princi¬ pal front, the chapel has a Corinthian portico and the decorations of the fine library are also Corinthian. See Dublin, University of.

TRINITY COLLEGE, Oxford, England, was founded by Richard de Hoton, prior of Durham, in 1290, for the education of the stu¬ dent monks of Durham. It was rebuilt and im¬ proved by Sir Thomas Pope in 1554, and after Balliol was the first college re-endowed by a layman, and further remarkable in view of the Reformation, as being,

like Saint John's, in¬ debted for this to a Roman Catholic. The fac¬ ulty consists of a president, 12 fellows, several honorary fellows and lecturers. There are 21 scholarships, nine exhibitions, and the average annual attendance of undergraduates is about 200. The college has in its gifts 10 church liv¬ ings. The buildings surround a fine quadrangle and include a Renaissance chapel, built in 1694, in which is a fine altar-piece and a beautiful carved screen. Among the distinguished alumni .are Sheldon, Ludlow, Ireton, Newman, Pitt, North, Stubbs, Rawlinson and Bryce. The gross income in 1917 was £10,024 and the under¬ graduates numbered 158.

TRINITY COLLEGE, a Roman Catholic institution for the higher education of women, located at Washington, D. C. It was founded by the Sisters of Notre Dame (Namur), and was first opened to students in 1900. It offers two college courses leading to the degrees of A.B., and B.L., respectively; and has no prepara¬ tory department. The library in 1917 contained over 15,000 volumes; the income amounted to $25,000; there were 10 instructors and the stu¬ dents numbered 281

TRINITY COLLEGE, University of,

situated at Toronto, Canada, and federated, since 1903, with the University of Toronto. The University of Trinity College was founded by royal charter in 1852, and up to 1903 con¬ ferred degrees in arts, divinity, medicine, law, music, dentistry and pharmacy. At present, under the terms of the federation with the Uni-

vcrsity of Toronto, Trinity University confers degrees, under its own charter, only in the fac¬ ulty of divinity and co-operates with the Uni¬ versity of Toronto in giving instruction in the faculty of arts, the degrees in this faculty and in all other faculties, except divinity, being con¬ ferred by the University of Toronto. Trinity Medical College, which prior to the federation was the teaching body in the faculty of medi¬ cine, was amalgamated in 1903 with the Toronto Medical College to form the faculty of medicine in the University of Toronto. The arts courses are open to both men and women. The divinity courses are maintained in close connection with the Church of England in Canada and stu¬ dents are prepared for the ministry of that Church. Trinity College has always made residential collegiate life one of its prominent features, the men students residing in Trinity

College and the women students residing in Saint Hilda's College, which is open only to women students of the University of Toronto enrolled in Trinity College. See also Toronto, University of.

TRINITY DOCTRINE, the Christian doctrine of the triune nature of God. The doc¬ trine of the Trinity is nowhere expressly taught in the Old Testament. The doctrine in regard to the divine nature which is most strongly insisted on throughout the Old Testa¬ ment is the unity of God as opposed to polythe¬ ism, and by the names by which God revealed himself to Moses (Ex. iii, 14, 15, and other passages) it is implied that the divine nature is inscrutable to human intelligence. The plural form used to designate the Deity in the account of the creation, and many other incidental cir¬ cumstances or expressions, are, however, held as implying, if not teaching, this doctrine.

In the New Testament it is evident that the doctrine of a Trinity in the divine nature is clearly and copiously taught. In the Gospels Christ himself asserts a mysterious union be¬ tween himself and the Father, appropriates to himself by an evident allusion the mysterious name of God revealed to Moses, and repeatedly refers to the Holy Spirit along with the Father as partaking of the same divine nature and union. The same doctrine is implied in the teaching of John, the forerunner. In the baptism of Christ by him the Holy Spirit is represented as de¬ scending visibly upon him while he is recog¬ nized by an audible voice from the Father, and in the rite of baptism instituted by Christ the names of Father, Son and Holy Ghost are used as the joint designation of the divine being. The apostles and other writers of the New Testa¬ ment Epistles constantly employ this form both in the introductory assertion of their authority and in their closing benedictions.

Among the definitions which resulted from the conflict of opinion in the early Church with regard to the doctrine of the Trinity, that which was adopted by the Catholic Church, and is generally accepted by orthodox Christians, fairly claims the merit of the fullest harmony and most comprehensive consistency with the various statements of Scripture. It is that there are in the Godhead three persons, one in sub¬ stance, coeternal, equal in power, the Father, Son and Holy Ghost. It was only, however, after a severe and protracted conflict that this definition came to be generally accepted, and as soon- as the definition proceeds one step further

a wide schism again separates the Church. The Eastern Church holds that the Holy Ghost pro¬ ceeds from the Father; the Western, through¬ out all its divisions, adopting the amended form of the

Nicene Creed, holds that he proceeds from the Father and the Son. The three creeds commonly called the Apostles', the Athanasjan and the Nicene, all contain the points of agree¬ ment between the two divisions of the Church, while on the point of difference the Athanasian and the commonly known form of the Nicene express the faith of the Western Church. The word ˆTrinity® is not in Scripture. The term persons is not applied in Scripture to the Trin¬ ity, but something analogous to the conception of personality seems to be implied in the apos¬ tolical arguments of the epistles. See Arian- ism; Nicˆe, The Councils of; Nicene. Creed; Unitari anism.

TRINITY HALL, an English college at Cambridge, founded in 1350 by William Bate¬ man, bishop of Norwich. It continues to be the legal college of the university under the new statutes in force since 1882 and presents seven livings. Consult Malden, H. E., {Trinity HalP (London 1902).

TRINITY HOUSE, Corporation of the.

An old English religious corporation dating back to the reign of Henry VIII and managed by a board called the Elder Brethren, selected from the naval and the merchant service. It now controls the more important lighthouses, light-ships and fog signals on the English Coast. Its headquarters are in London and its specific duties are lighting and buoying the Thames and adjacent coast.

TRINITY RIVER, a Texan stream flow¬ ing southeast and emptying into Galveston Bay about 40 miles north of the city of Galveston. It is formed from a network of small streams in Montague, Jack, Denton, Parker and Wise counties and frequently runs dry above Dallas. It is over 500 miles long.

TRINITY SUNDAY, so called from being set aside in special honor of the Trinity. It comes directly after Whitsunday and was estab¬ lished as a common festival by decree of John XXII who died 1334.

TRINODA NECESSITAS, a triple tax imposed for public purposes from which no lands, whether used for secular or religious purposes, were exempt in Anglo-Saxon times. These taxes were for the maintenance of bridges and highways, for the erection and keep¬ ing in repair of fortresses and for the support of the king's naval and military forces.

TRINUCLEUS (from the Latin tres, three, and nucleus, little nut). A trilobitic genus of the middle and upper Ordovician rocks. The body seldom exceeds an inch in length and has a broad horseshoe-shaped

head shield. The head is bordered by a wide pitted margin ; the glabella is convex and consists of a prominent median and two less elevated lateral lobes. In some forms the young were provided with simple eyes. The thorax had six segments with narrow axis.

TRIO, in music, a composition for three voices or for three instruments. In a specific sense the term ˆtrio" is used to indicate a mid¬ dle section in a composition and derived its

name from the three-part writing in this mid¬ dle section employed by the old composers.

TRIONAL, a harmless hypnotic, best ad¬ ministered in hot milk. It is a white crystalline powder prepared by the action of methyl-ethyl ketone upon mercaptan and the oxidation of the resulting product by permanganate of potas¬ sium. It melts at 169° F., and is readily soluble in alcohol, but sparingly so in water.

TRIPALMITIN. See Palmitin.

TRIPHENYLMETHANE DYE¬ STUFFS. See Coal-tar Colors.

TRIPHENYLMETHYL, obviously a de¬ rivative of the radicle methyl which cannot exist independently. This remarkable substance was discovered by Gomberg in 1901 and may be prepared by the action of metals on chloro- triphenylmethane. It forms a colorless crystal¬ line solid, melting at 293° F. and acts as a highly-unsaturated compound which when dis¬ solved in liquid sulphur dioxide conducts the electric current.

TRIPHYLITE. See Lithiophilite.

TRIPITAKA. See Pitaka.

TRIPLE ALLIANCE, a name applied to

various international agreements, the earliest being that concluded in 1668 between England, Holland and Sweden, with the object of op¬ posing the advance of France. Within two years, however, Charles II of England signed a treaty with the French king, binding him¬ self not to interfere with the French designs on the Netherlands.

(2) An alliance formed in 1717 between England, France and Holland, guaranteeing the clauses of the Treaty of Utrecht referring to the English Protestant succession, the French succession and the renunciation by Spain of her claims to the throne of France. It was intended as a counterpoise to the alliance of Russia, Sweden and Spain, and by the adhesion of Austria became the Quadruple Alliance in

1718.

(3) The Triple Alliance (India) was formed between the English, the Peshwa and the Nizam in 1790 with the object of invading the do¬ minions of Tippoo Sahib and equally sharing them between the contracting parties.

(4) The alliance of Brazil, Argentina and Uruguay in the war waged against Paraguay from 1865 to 1869.

(5) The most important Triple Alliance, and the one usually intended by the term, is that concluded between Austria-Hungary and the German Empire in 1879, to which Italy became a party in May 1882. The text of the treaty of alliance between Austria-Hungary and Ger¬ many — which is not subject to periodical re¬ newal — was first made public on 3 Feb. 1888. That between Italy and Austria-Hungary was never made public until 1915, after Italy's de¬ nunciation of it on 4 May and declaration of war against her former ally, Austria, on the 23d. The preamble of the treaty between Ger¬ many and Austria-Hungary of 1879 declared that a <(solid alliance® between the two empires ((can threaten no one, but is rather calculated to consolidate European peace as created by the stipulations of the Treaty of Berlin® (of 1878). The two emperors, therefore, solemnly promised each other Lnever to give an aggres¬

sive tendency whatever to their purely defensive agreement.®

Article I of the treaty reads as follows:

((If, contrarily to what may be hoped- and contrarily to the sincere wishes of the two high contracting parties, one of the two Empires were to be attacked by Russia, the two high contracting parties are bound to lend each other reciprocal aid with the whole of their im¬ perial military power, and, subsequently, to conclude no peace except conjointly and in agreement.®

Article II declares that:

<(If one of the two high contracting parties were to be attacked by another Power, the other high contracting party binds itself, by the present act, not only not to uphold the ag¬ gressor against its high ally, but at the least, to observe a benevolent neutrality with regard to the contracting party aforesaid.®

<(If, however, in the case previously men¬ tioned, the Power attacking were to be upheld by Russia, whether by way of active cooperation or by military measures that should threaten the Power attacked, then the obligation of reciprocal assistance with entire military forces — obligation stipulated in Article I of this Treaty — would immediately become executory, and the military operations of the two high contracting parties would also, in such circum¬ stances, be conducted jointly until the conclusion of peace.®

Ex-Chancellor Prince von Billow in his book on (Imperial Germany) thus describes the pur¬ pose and results of the alliance : ((It was neither the desire of conquest nor unsatisfied ambition that brought the states of the Triple Alliance together and keeps them united. The three mid-European states are bound to each other by the firm resolve to maintain the existing balance of power in Europe, and should a forcible change be attempted, to prevent it if need be by force. The united strength of mid¬ dle Europe stands in the path of any revolu¬ tion — any European policy which might elect to follow the courses pursued by Louis XIV or Napoleon I. This alliance is like a mighty fortification dividing the continent in two.

<(The founders of the Triple Alliance inten¬ tionally created a guarantee of peace. They have not been disappointed in their hopes, for the steadfastness of the Triple Alliance has more than once in the course of the last thirty years warded off the • rising danger of war.® He concludes with the observation that ((The Triple Alliance as a guarantee of peace has proved its worth for thirty years and this justi¬ fies our hopes.®

This defense of the Alliance was written shortly before the outbreak of the Great Euro¬ pean War since which time Italy has ceased to be a member of it. Italy's position as a member of the Alliance was from the first peculiar, if not unnatural, and it is well known that she joined it with more or less misgiving if not reluctance, largely in consequence, it is said, of pique at the acquisition of Tunis by France. That she should have entered into an alliance with Austria which execised dominion over nearly a million Italians occupying considerable territories to which Italy had never ceased to lay claim and which she still hoped eventually to recover can only be explained

by the Ital-

ian suspicion of the designs of Great Britain and b ranee in the Mediterranean region. The alliance by its very nature, therefore, con¬ tained the seeds of its own dissolution. The national aspiration for ((Italia Irredenta® con¬ tinued to be a source of irritation between Austria and her neighboring ally, and as time passed the ties which bound them began to snap. The first shock came in 1908 on ac¬ count of the annexation by Austria of Bosnia and Herzegovina, an act which greatly irritated the Italians who regarded with regret if not .fear the extension of Austrian power and influence in the Balkans. The weakness of the bond had already been revealed to the world in 1906 at the Algeciras Conference, when Italy broke away from her allies and acted with Great Britain and France against Germany and Austria-Hungary. Furthermore, Italy's war against Turkey in 1911 and 1912 and her subsequent annexation of Tripoli and Cyrenaica was regarded by Germany, Turkey's protector, with regret, for Turkey in effect was now to all intents and purposes a member of the alliance. Germany had been compelled to stand by and see her Ottoman protege stripped of her possessions by an ally which refused to consult Germany or consider her sug¬ gestions. This action of Italy still further re¬ vealed how loosely she was bound to her allies and particularly her independence of Germany in the conduct of her foreign policy. The al¬ liance was again weakened by the outcome of the Balkan wars. Although Austria and Italy had acted together in thwarting Serbia's aspira¬ tions for an outlet on the Adriatic, in creating Albania an independent state under international supervision, the seeds of future discord between Austria and Italy were sown, since it marked the beginning of a diplomatic struggle between the two powers for control of the newly-es¬ tablished state.

On 8 Dec. 1912 it was announced from Vienna that the Triple Alliance had been re¬ newed ((without any change.® The announce¬ ment created a mild surprise in other countries; in Austria itself it caused a panic on the Bourse and a run on the savings banks in Galicia. The last time the treaty had been renewed was in 1902 for 12 years, and would consequently not have expired till May or June 1914. Conflicting reports stated that the renewal was for 12 years or two terms of six years ; also seven years. The Austrian press dwelt on the pacific character of the alliance and declared the re¬ newal as <(a clear hint to all whom it may con¬ cern.® It was recalled that

Bismarck had pub¬ lished the terms of the treaty in 1888 at a moment when Austro-Russian relations were strained. Italy, it was known, had two treaties, one with each of the other two contracting par¬ ties. In 1912, also, an attitude of growing op¬ position was manifesting itself in Italy against Austro-Hungarian action with regard to Serbia. In German naval circles efforts were made to give the alliance a definite significance for naval as well as for military defense, in the sense of binding Germany's partners to pro¬ vide naval ˆcompensations® for the increased military expenditure of Germany in order that the naval power of the Triple Entente (q.v.) might have to be strengthened in the Mediter¬ ranean and so, perhaps, be weakened in the North Sea. A more drastic attitude was adopted

by a general officer writing in the Zeit, a Ger¬ man diplomatic organ (8 Dec. 1912). He argued that Russian boldness had its root in the <(in- famous alliance® with France, and the situa¬ tion could only be saved if the Powers of the Triple Alliance adopted the formula that Russia must not be allowed to mobilize, and that the Alliance must fall immediately upon France and crush her before Russia could intervene. One victory on French soil, he stated, would cure Russia of her fondness .for the French alliance. The paper editorially declared that these ideas prevailed in a great part of the Austro-Hungarian corps of officers. In any case, it was evident that the renewal of the alliance (

Under the terms of the treaty of 1882 be¬ tween Italy and Austria-Hungary, by which treaty Italy became a member of the Triple Alliance, Italy bound herself in certain cir¬ cumstances to come to the aid of her allies in case they should find themselves in war with another power or powers. Article III of this treaty reads as follows: ((If one or two of the High Contracting Parties should be at¬ tacked without direct provocation on their part, and be engaged in war with two or several great powers not signatory to this treaty, the Casus foederis shall apply simultaneously to all the High Contracting Parties.® Article IV de¬ clares that :

<(In the event that a Great Power not signa¬ tory to this Treaty should menace the safety of the States of one of the High Contracting Parties, and that the menaced Party should be forced to make war on the Power, the two others bind themselves to observe toward their ally a benevolent neutrality. Each one of them in that case reserves to herself the right to participate in the war, if she should consider it appropriate to make common cause with her ally.®

During the negotiations preceding Italy's entrance into the war in 1915 the Italian govern¬ ment contended that these stipulations

bound Italy to come to the aid of her allies only in the case of a defensive war. Regarding her allies as the aggressors in the war of 1914 she did not consider, therefore, that a casus foederis existed. Moreover the Italian government com¬ plained that the Austro-Hungarian government had violated article VII of the treaty of 1882 by failing to communicate to the Italian govern¬ ment the terms of the Austro-Hungarian de¬ mands of 23 July 1914, upon Serbia, which preceded the declaration of war by Austria against Serbia. The answer of the Austro-

Hungarian government that the note to Serbia had not been communicated to the German gov¬ ernment, that Germany had not been consulted regarding Austria's relations with Serbia and that the Italian government had been assured that Austria-Hungary had no designs of con¬ quest in Serbia, was not regarded as satisfac¬ tory. After protracted negotiations between Italy and Austria-Hungary, in which the Italian government demanded the cession of certain Austrian territories to Italy which Austria at first refused, but afterward partially agreed to but not to take effect till after the war, the Italian Parliament in May 1915 declared that the Triple Alliance had been dissolved by the failure of the Austro-Hungarian government to acquaint the Italian government with the terms of the ultimatum to Serbia. In a note handed by the Italian Ambassador at Vienna to the Austro-Hungarian Minister of Foreign Affairs, the former referred to the Triple Alli¬ ance as having been entered into as a guarantee of peace and defense, the observance of which would have sufficed to furnish a solid basis for common and effective action. (< Austria-Hun¬ gary, }) the note went on to declare, ((in ignoring the obligations existing under the treaty, pro¬ foundly disturbed the status quo in the Balkans and created a situation from which she alone was destined to profit to the disadvantage of interests of the greatest importance, which her ally had many times affirmed and proclaimed. So flagrant a violation of the letter and the spirit of the treaty, — not only justified the re¬ fusal of Italy to place herself on the side of her allies in a war provoked without her knowl¬ edge, but at the same time deprived the alli¬ ance of its essential meaning and of its reason for existing.® See Italy and the War; Aus¬ tria-Hungary and the War; War, European : Historical Introduction; Diplomatic History.

Bibliography. — Bullard, (The Diplomacy of the Great War* (New York 1906) ; Billow,

(Imperial Germany* (New York 1914) ; Cool- idge, A. C., (The Origins of the Triple Alli¬ ance } (New York 1917) ; Fullerton, W. M.,

(Problems of Power) (London 1914) ; Stowell, (The Diplomacy of the Great War* (New York 1915) ; Italian Green Book and Austrian Red Book (1915) containing the diplomatic corre¬ spondence relating to the disruption of the Triple Alliance ; (Current History* (New York, June 1915).

James W. Garner,

Professor of Political Science , University of Illinois.

TRIPLE ENTENTE, The. In the litera¬ ture of international law and diplomacy the term (

the stipulations of which each pledged itself to come to the assistance of the other in case of war, but upon a series of treaties and un¬ derstandings between France and Russia, be¬ tween Great Britain and France and between Great Britain and Russia, by which their vari¬ ous differences were settled and by which they agreed to act together in the future in the main¬ tenance of their common interests and that in certain eventualities they would come to each other's assistance with their naval forces in defense of those interests.

Like the Triple Alliance, however, the Triple Entente evolved out of a dual agreement, namely, the diplomatic understanding between France and Russia concluded in 1891. The text of the document embodying the terms of this agreement had never been made public, but its purpose as announced was the maintenance of the peace and the balance of power in Europe. In the following year the Russo-French under¬ standing was strengthened by the conclusion between the governments of the two countries of a ((military convention,® providing for the joint co-operation of their armed forces against a common enemy, and in 1894 this was suc¬ ceeded by the conclusion of an alliance (the <(Duplice® or ((Dual Alliance®) between the two governments. The texts of both these two last-mentioned agreements and even their exact dates have likewise been kept secret, but in August 1897, during an exchange of toasts be¬ tween the Tsar of Russia and the President of the French Republic the existence of the alli¬ ance, though not its terms, was publicly an¬ nounced and proclaimed. This understanding with Russia was no doubt entered into at the instance of France as an offset to the Triple Alliance between Germany, Austria-Hungary and Italy. The idea of revanche against Ger¬ many for the loss of Alsace-Lorraine had by no means been

abandoned by the French, and now that France had been encircled by a group of powers including her old enemy, Germany, bound by a treaty of alliance, she turned her eyes toward Russia, who had her own griev¬ ances against Germany, and between whom and France strong economic bonds were being cre¬ ated through huge investments of French capital in the Muscovite Empire and through enor¬ mous loans to the Russian government by French capitalists. These advances were cor¬ dially received by Russia and thus the alliance was easily concluded.

The alliance between France and Russia was now followed by a rapprochement between Great Britain and France, for a century tradi¬ tional enemies of each other in Europe, Africa and America. For a long time Great Britain, secure in the protection of her fleet, and geo¬ graphically separated from the continent by the English Channel, had pursued a policy of ®splen- did isolation,® eschewing international alliances and avoiding intervention in the disputes of continental Europe. With her undisputed mas¬ tery of the sea she did not need the support of allies to protect her interests at home or in her colonial dominions. But, in consequence of the policy of conscription by which the Ger¬ man army was eventually made the most power¬ ful military organization in the world and in consequence of the rapid building by Germany of a powerful navy which, rightly or wrongly,

Englishmen believed was intended to destroy their supremacy on the seas, the British policy of ((splendid isolation® was abandoned and Great Britain like France began to look about for continental allies against the real or fancied designs of Germany. The Fashoda incident of 1898 which brought France and Great Britain to the verge of war with each other was quickly forgotten and the two governments, in the pres¬ ence of a power which they regarded as a com¬ mon enemy and which had strengthened its position by alliances, now drew together. In 1903 following an exchange of visits by the heads of the two states and representatives of both Parliaments, the two governments entered into a general treaty of arbitration by which they agreed to settle by judicial methods all dis¬ putes arising in the future between them, with certain exceptions. This agreement opened the way for the conclusion in the following year of a closer rapprochement and the definite settle¬ ment of all outstanding disputes between the two nations, some of which were irritating and of long duration. This rapprochement owed its success largely to the

savoir faire of King Edward VII, whose admiration for French manners and French culture caused his ad¬ vances to be favorably received by the govern¬ ment of the republic. The skilful diplomacy of Lord Lansdowne, Sir Edward Grey, M. Del- casse and M. Paul Cambon likewise facilitated the bringing about of what came to be known as the Entente Cordiale. By a ˆDeclaration® dated 8 April 1904, and cast in the form of a treaty, the old source of irritation between the two countries due to the British occupation of Egypt since 1882 was removed. The govern¬ ment of France agreed that it would no longer oppose the British occupation of Egypt by in¬ sisting upon a time limit for the termination of the occupation, in return for which the Brit¬ ish government promised to recognize the special interests of France in Morocco, particu¬ larly her right to preserve order in that country and to provide assistance, economic, financial and military, to the Moroccan government to enable it to establish the necessary reforms, subject to certain treaty rights of Great Britain therein and subject also to certain interests which Spain by virtue of her geographical posi¬ tion and her territorial possessions on the Moorish coast had in the country. This mutual engagement was to be binding for a period of 30 years, and was to be extended at five-year intervals thereafter unless expressly denounced by one of the parties upon one year's notice.

In the same year the century-old conflict between France and England regarding French treaty rights in the fisheries on the coasts of New Foundland were amicably settled by com¬ promise.

Germany regarded the agreement of 1904 by which France was given a free hand in the commercial, if not the political, exploitation of Morocco — an agreement as to which Germany had not been consulted — as one which ignored her own rights therein and threatened her safety. Following the sudden and somewhat dramatic landing of the German Emperor at Tangier on 31 March 1905 — an incident which was intended to serve notice on Great Britain and France that they would not be permitted to partition the territories of North Africa be¬

tween them without consulting Germany — a demand was made by Germany that the whole question should be submitted to a conference of the powers interested. The conference met at Algeciras in 1906, but on account of the defection of Italy from her allies (see Triple Alliance) and the lending of her support to England and France, the resulting agreement was a disappointment if not a humiliation to Germany, for it practically confirmed the rights claimed by France. Germany for the moment accepted the agreement formulated by the Al¬ geciras Conference, but subsequently claiming that France wTas

ignoring the principle of the ((open door® in Morocco and was interfering with the rights of German subjects therein, the German government sent a warship (the Pan¬ ther) to Agadir in July 1911, ostensibly to protect German interests but in reality, as it was believed in England and France, for pur¬ poses of aggression. War between Germany and France for some weeks hung in the balance, but it was averted by two treaties (November 1911) by which France agreed to cede a por¬ tion of the French Kongo to Germany, in re¬ turn for which Germany promised to recognize Morocco as a French protectorate and to with¬ draw from further opposition to French con¬ trol therein. During this crisis, England let it be known that she would support France against German aggression upon her rights in Africa. In the following year the Entente Cordiale ripened into what was in effect an alliance for certain purposes between Great Britain and France. This understanding was embodied in an exchange of notes between Sir Edward Grey, then British Minister of Foreign Affairs, and M. Paul Cambon, the French Am¬ bassador at London, in which it was agreed that if either government ((had grave reason to expect an unprovoked attack by a third power, or something that threatened the general peace, it should immediately discuss with the other whether both governments should act to¬ gether to prevent aggression and to preserve peace, and if so, what measures they would be prepared to take in common.® It was in pursuance of this understanding, of which M. Cambon on 30 July 1914, when the German attack on Franck was imminent, reminded Sir Edward Grey, that the latter on the 2d of August 1914, informed the French Ambassador that he was authorized by the Cabinet to give assurance that in case the German fleet should come into the channel or through the North Sea to undertake hostile operations against the coasts of France, the British fleet would give all the protection within its pow.er.

Finally, in 1907, Great Britain and Russia, between whom good relations were temporarily strained during the Russo-Japanese War on account of the Dogger bank incident and both of whom had become rivals in Persia, settled their disputes and laid the foundations of an Entente Cordiale which ripened into an alliance in 1914. The Anglo-Russian convention of that year, like that between Great Britain and France, eliminated certain long-standing dis¬ putes regarding their spheres of influence in the Orient. By the terms of the Convention the northern portion of Persia was declared to be within the Russian sphere of influence, while the southern part was similarly assigned

to Great Britain. In the same year a naval convention similar to that

between France and Russia was concluded between the two nowers providing for the joint co-operation of their navies in certain contingencies.

Thus as a result of these several conventions and understandings between France and Russia; between England and France; and between England and Russia, the Triple Alliance found itself at the outbreak of the present war con¬ fronted by the Triple Entente. Already by 1904 an Entente Cordiale between Italy and France had been brought about and when Italy repudiated the Triple Alliance in May 1915 and joined Great Britain, France and Russia in the war against Austria-Hungary, the Triple Entente became a quadruple entente, if not an alliance in the strict sense of the word. See also Morocco; Triple Alliance.

Bibliography. — See the authorities cited in the article on the Triple Alliance.

James W. Garner,

Professor of Political Science, University of Illinois.

TRIPLER, Charles Eastman, American inventor: b. New York, 10 Aug. 1849; d. Liberty, N. Y., 20 June 1906. Early in life he became an expert mechanician, and in 1871 constructed several models of canal boats propelled by their own motive power. In 1872 he was engaged on a naphtha engine to be used in launches, its principle being the recondensation of naphtha so that it could be used over and over. Experi¬ ments in the field where he afterward became distinguished were also begun at this time. In the early part of 1890 he made his first regen¬ erative coil, and he shortly discovered principles hitherto unutilized in the process of liquefying air. About 1895 he was widely advertised as the discoverer of liquid air. See Liquefied and Compressed Gases.

TRIPLET, in music, a combination of three notes to be played in the time of two. They are joined by a slur and distinguished by having the figure 3 above them.

TRIPOD. This name, signifying generally any three-legged utensil, came to be applied to a bronze altar consisting of a caldron raised on a three-legged stand of bronze. Such was the altar of Apollo at Delphi. It had a round flat plate on the top, on which the priestess sat when giving responses. Tripods of fine work¬ manship and of precious metal were placed in later times as votive gifts in the temples, es¬

pecially those of Apollo (q.v.).

TRIPOLI, North Africa, capital of the Italian district of Tripolitania, situated on the Mediterranean Coast, 100 miles from the bound¬ ary of Tunis. It is the CEa of the Phoenicians, and lies in a fertile region, is surrounded with a wall, with its domes and slender minarets, has a pleasing aspect. It is a clean and compara¬ tively well-built city, with a handsome palace of the bey, good caravansaries, public baths, numerous mosques and two Christian churches. It was formerly the centre of a large slave trade but now there are manufactures of carpets and cloths and a considerable caravan trade over Sahara. The exports are esparto, barley, ivory, skins, ostrich feathers, etc. The imports are mainly from Great Britain, being foodstuffs, metals, machinery and hardware. It was in

Tripoli Harbor that Lieut. Stephen Decatur in 1804 recaptured and fired the United States frigate Philadelphia. Pop. of the town about 30,000; of the district (Tripolitania) 73,000.

TRIPOLI, North Africa, formerly a Turk¬ ish province, but since 1912 annexed to Italy, situated along the Mediterranean Coast from Egypt to Tunis, and extending inland from 60 to 600 miles to the Libyan Desert and French Sahara. It consists of Tripoli proper, the semi¬ detached district of Barca or Benghazi in the northeast and the oasis district of Fezzan in the south, and is bounded on the north by the Mediterranean Sea, on the south by the Sahara, on the east and southeast by the Libyan Desert and on the west by Tunis. The total area of Tripoli and its dependencies is about 406,000 square miles. It is now known as Libia Italiana.

Topography. — ‘There are practically no harbors of any importance with the exception of Tripoli, the capital city, as the coast line stretches for over 700 miles in an irregular line and is almost unbroken by protecting headlands or indented with bays. The eastern half forms the Systis Major or Gulf of Sidra and is broken by numerous rocky points, which are, however, of insufficient size to form harbors ; the western half, extending from the Gulf of Cabes, or Les¬ ser Syrtis, east to Mesurata Point, is low and sandy. The greater portion of the interior, even up to the Mediterranean shores, is a desert country consisting of sandy plains or naked mountains and plateaus. Two mountain ranges stretch from west to east, running nearly par¬ allel to the coast, to the south the Suara Moun¬ tains and to the north the Gharian Mountains, the latter about 20 miles from the coast, having a

width of from 12 to 15 miles and consisting for the most part of volcanic rocks and isolated peaks. In the southwestern and southern parts of Tripoli proper is the Hammada-el-Homra, an interminable stony tableland covering about 40,000 square miles and about 1,500 feet above sea-level, south of which is the Fezzan depres¬ sion, in the oasis of which dwell tribes nomi¬ nally subject to Tripoli, but practically inde¬ pendent. The eastern part of the country (Barca) is practically a continuation of the desert in the south, the mountains to the north being a continuation of the two ranges in Tripoli proper.

Fezzan. — This section of the country cov¬ ers an area of about 150,200 square miles. In the northern part are low mountains or hills and sandy plains and a few fertile valleys are in the southern part. To the south, especially in the district surrounding the capital, Muzruk, are numerous oases, which together with the Valley of Wady Lajal, form the most fertile section of Fezzan, corn and dates being culti¬ vated in large quantities. The most common animals found in the hills are foxes, jackals, gazelles, the ostrich, vulture and falcon. There are no streams of water and but a few natural springs and small lakes, the rainfall being very slight and with long periods intervening.

Barca. — To the western and northern parts of this district, which is about 500 miles long by 400 miles wide, is the elevated plateau of Cyrenaica, which encloses the Gulf of Sidra and which is separated on the south from the Libyan Desert by the Aujila depression, a remarkable chain of low-lying oases. South of this depres-

sion the land gradually rises to a height of 1,200 leet and then again depresses to the level of the desert. The sides and summits of the hills in the east and north are well cultivated and af¬ ford excellent pasture.

Climate. — The climate is dry and warm, but healthful, droughts prevailing from May to September and rains from November to March.

Industries. — In the hilly districts a large portion of the land is left for grazing purposes and cattle-breeding has become an important branch of trade, but olives, figs, almonds and other fruits are cultivated to a considerable ex¬ tent. The coast region in the extreme west, particularly the district of Mesheea, is a fertile fruit and cotton-raising

district, the chief prod¬ ucts of which are wheat, barley (the chief food of the people), millet, Indian corn, pomegran¬ ates, lemons, figs, jujubes, apricots, plums, watermelons, cotton, silk, tobacco, saffron, mad¬ der and castor-oil ; while from the interior comes senna, dates and galls. Esparto-grass, barley and other grains, straw mats, earthen jars and other manufactures, beside the sur¬ plus products of the date and olive plantations, are exported by sea. The principal articles manufactured are carpets, cloaks, etc., sack¬ ing, prepared skins, morocco leather, earthen¬ wares, etc. There is considerable trade by caravan with the Sudan, carrying European goods south, and ivory, ostrich feathers, rubber and gold north. The total value of the com¬ merce is about $7,000,000 annually.

Government and Population. — Tripoli, which was until 1912 under the despotic rule of the sultan of Turkey, was then annexed by Italy and divided into two independent districts, Tripolitania and Cyrenaica, with their respective capitals at Tripoli and Benghazi. Each district has its governor appointed by the king upon the recommendation of the Minister of Colo¬ nies. There are courts of first and sec¬ ond instance and appeal. The revenues of the country are raised by direct tribute from the Arabs and district governors, a land tax, a tax on Jews and merchants and on export and import duties. The religion is Mohammedan¬ ism and while Arabic is generally spoken, Italian is the official language. The inhabitants are mostly Berber, but Jews are numerous, especi¬ ally on the coast, Moors in the towns and nomadic Bedouins in the country. The popu¬ lation of Tripoli, including the dependencies, has been variously estimated at from 800,000 to 1,300,000. The town of Tripoli has a pop¬ ulation of about 30,000; Benghazi of 35,000. Railways are under construction, over 300 kilo¬ meters having been laid.

History. — In ancient times Tripoli belonged successively to Carthage, Numidia and Rome. Later it passed into the hands of the Vandals and Greeks. It was captured in 644 by the Arabs, who turned the state religion from Chris¬ tianity to Mohammedanism. The city of Tripoli was captured in 1510 by Ferdinand the Catholic and from 1530 to 1551 was under the control of the Knights of Saint John. In 1551 Tripoli be¬ came a Turkish province, then fell into a state of anarchy and remained a nest of pirates until in 1835 Turkey reasserted its authority and re¬ duced what had been known as one of the (

As a piratical stronghold Tripoli became in¬ volved with various European nations and

finally with the United States. Both England and France sent

expeditions against it in the latter part of the 18th century, and after numer¬ ous tributes and ransoms to insure peace had been paid by the United States to the ((Barbary States® as a whole, a treaty with Tripoli was concluded in 1796 for peace without ransom. The pasha, however, inside of four years broke the treaty, demanding $225,000 and $25,000 an¬ nually, and on refusal of payment declared war 14 May 1801. An American squadron under Commodore Dale blockaded the harbor of Trip¬ oli and under Commodore Preble (1803-04) bombarded the port five times. The city of Derme, in Barca, was also captured by General Eaton. Fearing further bombardment from the squadron and disaster by land, as well as dis¬ affection and insurrection among his own troops, the pasha signed a treaty of peace on 3 June 1805. In 1815 Decatur forced the pasha to re¬ lease all ships and prisoners of whatever nation which he had seized and also to pay all indem¬ nities on pain of having the city destroyed. Since that time several rebellions have occurred, the most notable taking place in 1842 and 1844, but all have been successfully suppressed by the Turkish government. In September 1911 war broke out between Italy and Turkey and an Italian army of invasion occupied the coun¬ try. On 5 November Italy decreed its annex¬ ation ; but the struggle continued until 18 Oct. 1912, when by the Treaty of Ouchy, Turkey con¬ sented to abrogate her sovereignty and the an¬ nexation has been recognized by the great powers. See Barbary ; Barbary Powers, United States Treaties and Wars with the; Barca; Fezzan; Turko-Italian War.

TRIPOLI, TRIPOLIS, or TARABU- LUS, Syria, an important town in the vilayet of Beirut, about 40 miles north-northeast of the city of Beirut and two and a half miles from El-Mina, its port of entry. It is situ¬ ated at the foot of a spur of Mount Lebanon and at the mouth of the Kadisha. The ancient town was situated on a triangular promontory jutting out into the Mediterranean Sea, and for several centuries continued to occupy that posi¬ tion. Earthquakes destroyed a greater portion of the town in 450 and again in 550; in 638 it was captured by the Saracens ; it became an important stronghold at the time of the Cru¬ sades, and in 1108 was captured by the Cru¬ saders, after having successfully withstood a siege lasting several years. At that time a large and valuable library was burned. It was de¬ stroyed by the Egyptian sultan, Kalaun, in 1289, but soon afterward the town was rebuilt on its present site and now enjoys considerable prosperity. In May 1864 the government pow¬ der magazine exploded, destroying a large por¬ tion of the town and 300 or 400 lives. Among the buildings are a custom-house, foreign con¬ sulates, churches, a synagogue, several mosques, an American mission station and girls' school, an

orphanage and girls' home of the French Sisters of Charity, a monastery, and an old castle standing on an adjacent height. The main source of income is derived from the export of raw silk, sponges, ivory, sugarcane, olive-oil, cotton, wool, ostrich feathers, tobacco, galls, cochineal, soap, etc. Pop. about 30,000, mostly Mussulmans.

TRIPOLI, a porous, silicious rock, prob¬ ably formed by the weathering and leaching of chert beds. It occurs abundantly in Mis¬ souri, southern Illinois and western Tennessee. The tripoli usually consists of over 98 per cent of silica (Si02). Large blocks are used for filter stones. The finer material is ground into tripoli flour, used largely in scouring and pol¬ ishing preparations. The term tripoli is in¬ correctly used for tripolite (q.v.) or diato- maceous earth.

TRIPOLI AND INFUSORIAL EARTH.

See Mineral Production of the United States.

TRIPOLITAN WAR, in American his¬ tory, the name applied to a war between the United States and Tripoli in 1801-05. It was caused by the refusal of the United States to increase its payment for immunity from tho depredations of the Tripolitan corsairs. After several engagements peace wras concluded 4 June 1805.

TRIPOLITE, a name applied to a silicious ooze composed chiefly of silicious shells of diatoms and hence often called diatomaceous earth or wrongly infusorial earth. It resembles clay or chalk, but is a little harsh between the fingers and scratches glass. It often forms thick deposits below peat swamps. In the Miocene beds of the Atlantic Coast is a more or less im¬ pure diatomaceous deposit over 200 feet in thickness. Not to be confused with tripoli. See Tertiary; Diatoms.

TRIPOS, a term applied in Cambridge Uni¬ versity, England, to the list of successful candi¬ dates for honors in the final examinations of the different departments of the university; also the honor examination. The word is supposed to be derived from the fact that the candidate for honors formerly sat on a three-legged stool (tripod or tripos) during his disputation with the professor.

TRIPP, Bartlett, American diplomatist: b. Harmony, Me., 15 July 1842. He was grad¬ uated at Waterville College (now Colby Uni¬ versity) in 1861 and completed a law course at Albany in 1866. He

practised first at Augusta, Me., but in the spring of 1869 removed to Yankton, Dak. In 1877 he served on the com¬ mission appointed to revise and codify the laws of Dakota and was president of the first con¬ vention that drafted a constitution for the new State of South Dakota. During 1885-89 he was chief justice of the Territory and in 1893 was appointed United States Minister to Austria. Returning from his diplomatic post ir 1897, he was, two years later, appointed chairman of the commission having in charge the settlement of complications arising between England, Ger¬ many and America over the affairs of Samoa.

TRIPTOLEMUS, trip-tol'e-mus, in the Greek myth, the son of Celeus, king of Attica, and of Metaneira. The goddess Ceres loved him and wished to make him immortal, but was prevented through the meddling curiosity of his mother. She, however, taught him plowing and agriculture and instructed him how to sow corn and make bread. She also gave him her chariot, drawn by two dragons, in which he traveled over the earth and distributed corn to all the inhabitants of the world. He is the hero of the Eleusinian mysteries and founder

of the Thesmophorian celebration. In the At¬ tic Eleusinian fable he is represented as the judge of the dead.

TRIPTYCH, trip'tik, in art, a picture, carv¬ ing or other representation in three compart¬ ments side by side ; most frequently such as is used for an altar-piece. The central picture is usually complete in itself and the designs on either side smaller.

TRIREME, in classical antiquity, a large galley or war-vessel with three benches or banks of oars on a side, a common class of warship among the Greeks, Romans, Carthaginians, etc. The trireme was usually provided with a large square sail, which could be raised during a fair wind to relieve the rowers, but was not em¬ ployed in action.

TRISACRAMENTARIAN, a name given to those Lutherans and other Protestants who maintained that the sacraments of Baptism, the Lord's Supper and Penance were necessary to salvation. This opinion was held by some Lu¬ therans at Leipzig and was advocated in Eng¬ land in the ˆInstitution of a Christian Man,® published in 1536.

TRISAGION. See Doxology.

TRISECTION OF AN ANGLE (from

Lat. tresectus, cut in three parts), a famous problem in mathematics. It

was first investi¬ gated by the Sophists and Hippias of this school invented the quadratrix by whidi any angle

may be trisected. In the figure let BD be the quadrant of a circle, BG be the arc of the quadratrix and the construction involve the DB B \

relation = j^-. Then by dividing B A into

segments having any given ratio, the quadrant or any arc BD can be divided into arcs having the same ratio.

TRI.SMEGISTUS. See Hermes Tris-

MEGISTUS.

TRISMUS NA.SCENTIUM (Lat., lock¬ jaw of the newborn), a form of lockjaw, usu¬ ally fatal, occurring in children a few days after birth. See Tetanus.

TRISSINO, Giovanni Giorgio, jo-van'ne jor'jo tres-se'no, Italian author: b. Vicenza, 18 June 1478; d. Rome, 8 Dec. 1550. He studied the Greek language under Chalcondvlas and be¬ came also a graceful Latin and Italian writer. At a mature age he was employed by Popes Leo X and Clement VII upon several diplo¬ matic missions. He wrote ^ofonisbaC the first Italian regular tragedy; (LTtalia Liberata dai GotiC an epic in blank verse; and (La Poetica,* a treatise on poetical art. To his suggestion is attributed the present method of

writing the v and j of the Roman alphabet different from the u and i with which they were before confounded. He also endeavored to introduce distinct signs for the different sounds of o and e.

TRIST, Nicholas Philip, American lawyer and diplomatist: b. Charlottesville, Va., 1800; d. 1874. He studied at West Point but left the Military Academy without graduating; studied law with Thomas Jefferson; in 1824 took a clerkship in the United States Treasury Depart¬ ment and in 1829 became private secretary to President Jackson. He was consul at Havana in 1834-36 and in 1845 was made chief clerk in the Department of State. On 15 April 1847 President Polk appointed him special agent to negotiate a peace with Mexico, American suc¬ cesses having practically determined the result of the war with that country. (See Mexican War, The). A quarrel with

General Scott hindered the performance of his mission and his efforts were unavailing until the new government suc¬ ceeded that of Santa Ana. Meanwhile Trist's commission had been canceled ; but having be¬ come reconciled with Scott, he followed his counsel and continued the negotiations, which resulted in the Treaty of Guadalupe-Hidalgo (q.v.).

TRISTAN, TRISTRAM or TRISTREM,

the central figure of a circle of Celtic myths, which with modifications subsequently appeared in all European literatures. See Arthurian Romances ; Morte d' Arthur ; Tristan.

TRISTAN, a courtly epic written by the Middle High German poet Gottfried von Stras- burg about 1210. Like most courtly German epics it is a free rendering of a French source, in this case that of the trouvere Thomas of Brittany, the master of the aventiure, as Gott¬ fried calls him. It tells the story of a pair of unfortunate lovers, Tristan and Isolt, who are constrained by a love potion to love one an¬ other against their will. Tristan* belongs to the Bretonic cycle of sagas and reflects the struggles between the Bretons of Cornwall and the Viking kingdom of Ireland. The earliest version is that of the Norman minstrel Berol, which was translated into German by Eilhart von Oberge about 1170. Gottfried knew this version but considered that of Thomas to be more accurate. This version of Thomas ap¬ pears also in the form of a Norwegian prose saga about 1226 and of an English poem, (Sir Tristrem,* about 1300.

As Gottfried tells the story, Tristan was the child of Riwalin of Parmenie and Blanche- fluer, sister of King Mark of Cornwall. His parents died early, his mother in giving him birth, and he was brought up by a faithful vassal named Rual, who taught him many languages and trained him in all knightly arts. When the lad was 15 he was abducted by Nor¬ wegian traders and landed on the coast of Cornwall, where he was taken to his uncle's court, although neither was aware of the re¬ lationship. Here he soon became a favorite and was made a knight. Later he fatally wounded the giant Morolt, who had been sent by the king of Ireland to collect tribute long overdue. A splinter of Tristan's sword re¬ mained in Morolt's skull. Tristan himself was wounded, and, as his wound would not yield

to treatment, he set out disguised as a minstrel to the court of Queen Isolt of Ireland, who was famous for her healing arts, but whose brother Morolt he had slain. Here he was healed by the queen and spent sometime in¬ structing her daughter Isolt in the art of music. On

his return he praised the beauty of the fair princess so highly that King Mark was persuaded to make her his bride. Tristan is sent as the messenger, succeeds in ridding the land of a fell dragon, and receives as his reward the hand of the king's daughter, which, however, he claims for his uncle and not for himself. Meanwhile he is recognized as the slayer of Morolt by the missing splinter in his sword, but paints the advantages of a union with King Mark in such glowing colors that he succeeds in reconciling the relatives of the dead giant. On the voyage to Cornwall, Isolt and Tristan, through a mistake of the maid Brangaene, drink of a love potion prepared by Queen Isolt for her daughter and King Mark. For a time the two young people strug¬ gle bravely against the overpowering passion which steals over them, but finally abandon themselves to the enjoyment of their love. In¬ stead of confessing their secret to King Mark, they conceal it, and after Isolt becomes the king's bride, continue their clandestine meet¬ ings. Again and again they are suspected and are finally caught, but Isolt succeeds in clear¬ ing herself by a trick at the trial which is held to decide the question of her guilt. Again detected in a meeting, Tristan is banished and goes to Arundel, where he marries a second Isolt, Isolt «of the white hands® ; but because of his love for the first Isolt he lives with the latter in chastity. Here Gottfried's poem breaks off. It was continued and finished by two other poets, Ulrich von Tiirheim, a Swabian, and Heinrich von Freiberg, a Saxon, who relate how Tristan, once again wounded, sends for his love Isolt. She hastens to his side, but his wife Isolt, prompted by jealousy, declares that the vessel carries a black sail instead of the white one agreed on if Isolt were coming. Tristan succumbs to the shock and Isolt on land¬ ing throws herself on the body of her dead lover and dies of a broken heart.

The poem is justly famous among mediaeval epics for its wonderful psychological analysis, its masterly portrayal of the struggles of . the two lovers against their ill-fated love and the beauty and limpidity of the verse. It is very long, nearly 20,000 lines, but it does not weary us, as do many courtly epics, with lengthy de¬ scriptions of armor and dress. The best edi¬ tions are those of Bechstein (two vols., 3d ed., 1890), W. Golther (Stuttgart 1889) and K. Marold (Leipzig 1906). It has been trans¬ lated into modern German by H. Kurz (1844), by Karl Simrock (1855) ; but finest of all i« a free rendering by W. Hertz (5th ed., 1911). An English prose translation has been made by Jessie L. Weston (1899). Matthew Arnold modernized it under the title of Tris¬ tram and Iseult* and Swinburne unblished in 1882 his Tristram of Lyonesse,* the best mod¬ ern epic version of the old saga. Many Ger¬ man modernizations exist, among the most important of which are the epic by Karl Im- mermann (1840) and Richard Wagner's beau¬ tiful

music drama Tristan and Isolde) (1850). Consult Golther, W., Tristran und Isolde if

Dichtungen des Mittelalters und der Neuen Zeit5 (Leipzig 1907).

D. B. Shumway.

TRISTAN DA CUNHA, tris-tan' da koon' ya, or D'ACUNHA, a group of three small islands in the south Atlantic Ocean, belonging to Great Britain, and situated in lat. 37° 6′ S., and long. 12° 2′ W., about 2,000 miles west of Cape Town and 3,000 miles east of Bahia Blanca, on the South American Coast, probably the most isolated inhabited spots on the globe. The islands are named Tristan, Nightingale and Inaccessible. They are peaks of sunken mountains, for nearby soundings go below 6,000 feet and not far away to 12,000 or more. The principal and only inhabited member of the group, Tristan, is 16 square miles in area. It is an extinct volcano rising almost abruptly to a height of 8,200 feet. There is a fine stream and a fresh-water lake. The first per¬ manent settlement was in 1810 and the pop¬ ulation is now about 100. The people are moral and hospitable. The climate is mild, but wet. Cattle, sheep and vegetables are raised. The island was discovered by the Portuguese navi¬ gator Tristan da Cunha in 1506 and in 1817 was taken possession of by Great Britain. Pop. about 100.

TRISTEARIN. See Stearic Acid.

TRISTRAM, Henry Baker, British clergy¬ man and writer: b. Eglingham, 1822; d. 1906. Educated at Lincoln College, Oxford, he be¬ came rural dean of Durham (1880) and trav¬ eled extensively thereafter. Among his more noted writings are (The Land of IsraeP (1865; 2d ed., 1882) ; (Natural History of the Bible5 (1867; 5th ed., 1880); (The Land of Moab5 (1873; 2d ed., 1874); (Eastern Customs in Bible Lands5 (1894), etc.

TRISTRAM SHANDY.

In spite of, perhaps because of, its popu¬ larity, (Tristram Shandy5 received, as it has since continued to receive, much adverse crit¬ icism. This was based on the minor grounds of formlessness and lack of definiteness and realistic sense and for the more important rea¬ sons of alleged indecency. Dr. Johnson con¬ demned it for the latter fault and it was also made the subject of burlesque and irony. Sterne,

however, continued writing in his own vein and was rewarded with immediate and permanent reputation as an original humorist of high rank. With Richardson, Fielding and Smollett he is usually regarded as one of the four great novelists of the 18th century.

(Tristram5 remains one of the most diffi¬

cult of books to describe. Generally speaking, it belongs to the discursive, digressive, rambling, intime kind of novel best represented by Rabe¬ lais and Cervantes, to whom Sterne constantly makes acknowledgment, and it is doubtless the prototype of such modern and more decorous novels of the whimsical kind as (The Autocrat at the Breakfast Table.5 It is, however, unlike its originals, in that it apparently lacks the general and satirical purpose that modern critics have discerned in Rabelais and Cervantes, and because its picaresque type of adventure is al¬ most always mental rather than physical. It is an account of the humors of odd people of vivid personality and ways of mind and it is replete with the wit and humor of special situations, persons and habits. It is the vehicle for Sterne's wit, sentiment, whims, humor, learning and notions about various particular things. So far as the author expressed his pur¬ pose, such passages as the following tell what he is trying to do : <('Tis to rebuke a vicious taste, which has crept into thousands besides herself — of reading straight forwards, more in quest of the adventures than of the deep erudi¬ tion and knowledge which a book of this cast, if read over as it should be, would infallibly impart with them. The mind should be ac¬ customed to make wise reflections and draw curious conclusions as it goes along.55 (Ch. 20). <(My work is digressive and it is progress¬ ive too — and at the same time.55 (Ch. 22). <(Writing, ' when properly managed (as you may be sure I think mine is), is but a different name for conversation. As no one who knows what he is about in good company, would ven¬ ture to talk all — so no author who understands the just boundaries of decorum and good breed¬ ing would presume to think all : the truest re¬ spect which you can pay to the reader's under¬ standing is to half the matter amicably and leave him something to imagine, in his turn, as well as yourself.55 (Ch. 36).

More concretely, the characters are the im¬ portant thing. Only 10 figure directly in this long novel. Walter Shandy, merchant; his wife; his brother, the immortal Uncle Toby; the latter's servant, Corporal Trim; Dr. Slop; Yorick, the parson ; Obadiah, the manservant ; Susannah, the maid servant; the Widow Wad- man, Toby's inamorata; and Bridget, her maid; besides Tristram, the showmaster. Numerous lay figures, Didius, Kysarcius, Phutatorius and others, are named from time to time to set off these principal characters, but they never actu¬

ally appear ; and there are many illustrative and digressive stories, as that of the nose and the excellent episode of Le Fever. Nearly half the book is taken up with the prenatal sur¬ roundings of Tristram, — of the Shandy family the articles of marriage settlement, the local accoucheurs , and other such matters, and of these, the discourses of Mr. Shandy, Uncle Toby, and Dr. Slop, while awaiting the birth of the hero, form a large part. Uncle Toby, the most famous character in the book and one of the most enjoyable creations in litera¬ ture, is characteristically described by his hobby¬ horse, playing at fortification and the art of be¬ sieging towns. He responds chiefly to such ideas; and yet such is Sterne's art that Toby remains immortal for his simple and generous nature. (Tristram5 is practically without story

or plot, the only connected episode being that about the middle of the novel the hero is born with a broken nose and is misnamed Tristram, to the great grief of his father. Otherwise it is all quiddity, degression, eccentricity and interlude. Of the three hundred odd chapters, some have only a line or two, and no one chapter may be said directly to follow its predecessor. Con¬ sult the (Life of Laurence Sterne) by Percy Fitzgerald, the biographical criticism by Paul Stapfer and H. D. Traill in the (English Men of Letters) series, as well as the usual his¬ tories of English literature and the 18th century.

William T. Brewster.

TRITHEISM, the doctrine that there are three Gods, instead of three Persons in the Godhead. It has been taught both in the early Christian period, and in recent times, although so far as known to the public it has no pres¬ ent advocates. The Gnostics, according to Cy¬ ril of Jerusalem, were the first to teach it. A similar doctrine was formulated in the 6th century by Ascugnages of Constantinople, after whom one of his pupils, Philoponus, founded a tritheistic sect, which was followed by another sect called Cononites. Tritheism seems to have been dead or dormant for several centuries, until Rosellinus, in the 11th century, brought it forward in a novel form. He taught that the name of God was the abstract idea of a genus containing the three Persons, the Father, the Son and the Holy Ghost. Having been condemned by the Council of Soissons in 1092 he recanted. Tri theism was not heard of again until 1691, when Dr. Sherlock, Dean ot Saint Paul's, London, maintained that (

TRITHEMIUS, Johannes, German Catho¬ lic theologian and historian: b. at Trittenheim near Treves, 1462; d. at Wurzburg, 1516. He was christened Heidenberg but was called after his birthplace. He entered the Benedictine monastery at Sponheim and became its abbot (1483) but his strict rule made him unpopular and he exchanged for the monastery of Saint James at Wurzburg. Of his numerous writings his letters were published in 1536 and his ser¬ mons in 1576. He was a pioneer author in German church history. Consult Janssen, Johannes, ˆHistory of the German People at the Close of the Middle Ages) (Eng. trans. by A.M. Christie, London, 1896).

TRITICUM, a genus of grasses (q.v.), one species of which (T. vulgare) is wheat (q.v.). See Grasses in the United States.

TRITOMA, a florist's name for a genus (Kniphofia) of African plants of the family Liliacece, one of which (K . aloides) is also widely known as flame-flower, red-hot-poker- plant, torch-lily, etc., and is planted among shrubbery that needs an enlivening color be¬ tween midsummer and the coming of frost. The (

taken up and stored during the winter, and in places where the ground is likely to freeze and thaw alternately they should be mulched. They succeed well in any well-drained, warm, loamy soil well protected from wind. Ordinary care in cultivation and fertilizing is sufficient. This species has a score or more of named varieties.

TRITON, tri'ton, in Greek mythology, son of Poseidon and Amphitrite, with whom he lived in a golden palace at the bottom of the sea. The Triton Sea, a fabled ocean in Africa, appears to be his haunt in the Argonaut cycle. He is variously described, but his body is gen¬ erally a compound of the human figure above with that of a dolphin below. He is also horned and prick-eared as if an ocean satyr. He carries a large shell, which serves him as a horn on which he blows loudly to rouse the waves, or softly to assuage their fury. Numer¬ ous tritons sometimes appear, creatures who in addition to the torso of a man and the tail of a dolphin prance through the billows with the forefeet of a horse. A most beautiful example of this conception is the (Triton and Nereid) of the Vatican, in which Triton amid a group of sportive Cupids is carrying off a Nereid. Con¬ sult Escher, (Triton, und seine Bekampfung durch Herakles> (1890) ; Brunn, (Griechische Gotterideale) (1893).

TRITON. See Trumpet-shell.

TRITYLODON (from the Greek, meaning <(three knotted teeth®). A

mammal from the lower Jurassic of South Africa; primitive and multituberculate, seemingly resembling the cynodont reptiles with which it has been classed.

TRIUMPH, a solemn procession granted to a victorious general of ancient Rome. It was bestowed only on one who had held the office of dictator, consul, or praetor, and after a decisive victory over foreign foes, or on the complete subjugation of a province. On the day of the triumph all the temples were thrown open; every shrine was decorated with garlands, and every altar smoked with incense. The general assembled his soldiers without the city, delivered to them a commendatory oration, and distributed rewards and money as their share of the spoil of the enemies. He then mounted his car and advanced to the triumphal gate (porta trium- phalis), where he was met by the senate, and the procession was formed and marched along the Via Sacra to the Capitol. It was led by the senate, headed by the magistrates, and included a train of carriages laden with spoils — models of captured forts and cities, pictures of the country conquered, trumpeters and flute-players, white bulls or oxen destined for sacrifice, at¬ tended by priests with their insignia and imple¬ ments ; the most distinguished captives, etc. The triumphant general rode in a circular char¬ iot drawn by four horses ; in his right hand he bore a laurel bough, and in his left a sceptre; he was attired in gold-embroidered robe and a flowered tunic, and his brows were encircled with laurel. In the car he was accompanied by his children of tender age, and sometimes by very intimate friends. A public slave held over his head a gold Etruscan crown ornamented with jewels. The legates, tribunes and eques¬ trians, with the grown-up sons of the conqueror, followed on horseback. The infantry followed

in marching order, their spears adorned with laurel, shouting, Io triumphe! singing hymns to the gods, and praising or ridiculing their gen¬ eral, according to the license of the day, as their humor might dictate. As the procession as¬ cended the Capitoline Hill some of the captives were withdrawn from it and conducted to prison to be put to death. As soon as their execution was intimated the victims were sacrificed, offer¬ ings presented to Jupiter, and the general and his friends parted in the temple, returning home in the evening accompanied by flutes and torches and a crowd of citizens. Sometimes when the spoil was great the procession extended over more than one day. The ovation was a lesser triumph, so called because the sacrifice

on the occasion was a sheep. The general entered the city on foot, and was not attended by the senate. He was preceded by flutes, but not by trumpet¬ ers, and was not necessarily accompanied by his army. Consult Mommsen, (Romisches Staats- recht) (1887).

TRIUMPHAL ARCH. See Arch, Memo¬ rial and Triumphal.

TRIUMVIR, in ancient Rome, one of the three men united in office. The triumvirs were either ordinary magistrates (as the triumviri capitales, who were police commissioners, hav¬ ing charge of the jails, and acting as magis¬ trates, the triumviri monetales, who were com¬ missioners of the mint, and had the charge of coining money), or they were extraordinary commissioners appointed to jointly execute any office. The term is specifically applied to the members of the two triumvirates. See Triumvirate,

TRIUMVIRATE, an office administered by three men (triumviri) . When Caesar was mur¬ dered, Antony, Octavius and Lepidus received power to restore order in the state : they were called triumviri reipubliccu constituencies, and their office the triumvirate. The coalition be¬ tween Caesar, Pompey and Crassus is also called a triumvirate, but it was merely a union or con¬ spiracy of three private citizens without the pub¬ lic sanction. See Rome.

TRIVANDRUM, tre-van'droom, TRIVAN- DRAM, or TRIUVANANTAPURAM, India, the capital of the native state of Travancore, situated on the west coast near the southern extremity of India. It has two colleges, good schools and hospitals, also a fine modern palace of the raja, and on the outskirts are a fort, a military cantonment and an observatory. It is connected by a canal with the port of Quillon. Pop. 63,561.

TRIVET (or TREVET), Nicholas. Early English historical writer: b. about 1258; d. about 1328. He wrote extensively, but is chiefly known for his

TRIVIUM, the name given in the Middle Ages to the first three of the seven liberal arts — grammar, rhetoric and logic. The other four, consisting of arithmetic, music, geometry and astronomy, were called the quadrivium.

TROBRIAND, Philippe Regis, Baron de, French soldier and writer: b. Tours, France, 4 June 1816; d. 1897. He was educated in Paris

and elsewhere abroad and came to America in 1841. He was editor (1854-61) of the Courier des Etats-Unis. In 1861 he entered the

Federal army, playing an important part in the battles of Fredericksburg and Gettysburg and becom¬ ing a brigadier-general (1864). He was bre- vetted a major-general (1865) and later was com¬ missioned a colonel in the regular army. He afterward commanded the districts of Dakota, Montana and Green River. In 1879 he retired. He published a novel and an historical work on the campaigns of the army of the Potomac. Consult Post, M. C. (his daughter), (The Life and Memoirs of Compte Regis de Trobriand* (New York 1910).

TROCADERO. An elevated place opposite the Pont d'lena, on the right bank of the Seine. It was named after a Spanish fort near Cadiz captured by the French in 1823. It was used for the exhibitions of 1867 and 1878, for the latter year being laid out as the Palais du Tro- cadero. The buildings contain a great concert hall with two towers and in the wings a fine museum.

TROCAR, a surgical instrument consisting of a sharp-pointed rod sliding in a canula or tube, and used in the operation of tapping, or the puncturing of a cavity to drain off .fluid. The rod projects a little beyond the canula, and is withdrawn after the combined instrument has been thrust in. Duchenne's trocar is an in¬ strument for removing small portions of tissue from deep parts for the purpose of microscopic study. Durham's or the piloting trocar is a guide for the introduction of a jointed tracheot¬ omy-tube. Aspirating trocars are usually sup¬ plied with a stop-cock.

TROCHEE (Lat. trocheeus, Greek rpoˆcuof), in Greek and Latin verse, the name given to a measure, or foot, which consists of a long and a short syllable. See Versification.

TROCHELMINTHES, a division of

worms, containing a comparatively small num¬ ber of minute aquatic organisms, characterized by having that larval form denominated a trochophore (see Larva). It is principally composed of a single class, the Rotifera (q.v.), plus two other groups of microscopic and little known marine "worms," the Dinophilea and the Gastrotricha. Consult Parker and Haswell,

TROCHES. A lozenge-shaped pastile con¬ taining usually a medicinal substance put up with sugar and mucilage and flavored. They are dissolved in the mouth and are used to act on the throat. The United States Pharma¬ copoeia recognize nine official troches. Am¬ monium chloride, cubeb, gambir, krameria, liquorice and opium, potassium

chlorate, san¬ tonin, sodium bicarbonate and tannic acid.

TROCHILIDZE, the family of the hum¬ mingbirds (q.v.).

TROCHOID, in mathematics is the path that any point of a circle moving along a plane, and around its centre, traces in the air; so that a nail in the rim of a cartwheel moves in a trochoid, as the cart goes along, and the wheel itself both turns around its axle and is carried along the ground. The word trochoid is de¬ rived from the Greek rpoxog, from rpexe> run, and eidog shape. In mathematical parlance,

the word trochoid conveys the same idea as the word cycloid.

Few curves have afforded finer scope for exercise of modern geometry than the trochoid or cycloid (q.v.). Its properties successively engaged the attention of Roberval, Fernat, Descartes, Pascal, Slusius, Wren, Wallace and Huygens. Huygens rectified this curve as early as 1657 ; and having afterward discovered the isochronism, or its remarkable property that all bodies along it will descend from any point in the same time and likewise that it produces a similar trochoid by its development, he ap¬ plied the discoveries to the improvement of the pendulum, and showed how perfectly synchron¬ ous vibrations could be procured, theoretically at least, by causing a flexible rod to vibrate be¬ tween the trochoidal cheeks. Upon this geo¬ metrical curve, then, depends the better part of the whole doctrine of pendulums. Huygens demonstrated that from whatever point or height a heavy body oscillating on a fixed centre begins to descend, while it continues to move in a trochoid (or cycloid) the times of its falls or oscillations will be equal to each other. It is likewise the curve of quickest de¬ scent — that is, a body falling in it from any given point above to another not exactly beneath it will come to this point in less time than in any other curve passing through those two points. This very singular property of the trochoid with respect to motion was first discovered by one of the Bernouillis in 1697. From this it is easily seen that if any body whatever move in a trochoid by its own weight or swing together with some other force act¬ ing upon it all the while, it will go through all the distances of the same curve in exactly the same time, and accordingly pendulums have sometimes been contrived to swing in such a manner that they shall describe trochoids, or near trochoids, and thus move in equal times whether they go through a longer or shorter path of the same curve.

As the curve of quickest descent, the trochoid is understood to assume its inverted position. It is to be noticed that although the trochoid is longer than many curves and the straight line that may connect two points not in the same verticle line, yet it is, of all lines which can be drawn, the one through which a body will fall in the shortest time. John Bernouilli made the enquiry after the curve which possesses the property: ((That a body setting out from any point of it, as A, and impelled solely by the force of gravity, will reach another point of it, as B, in a shorter space of time than it could reach the same point by following any other path.® To this curve he gave the name brachystochrone, from ppaxioroq shortest, and xpovoq time. It is plain from what has been said about the curve of quickest descent alone, that the brachystochrone and the trochoid (or cycloid) are one and the same curve.

This curve possesses an additional histori¬ cal interest entirely independent of the par¬ ticular nature of the curve, for the determina¬ tion of the nature of this line suggested to Lagrange the idea of an entirely new branch of mathematics, the calculus of variations.

The trochoid (or cycloid, under which name the brachystochrone is best known) may be made to assume an endless variety of forms by vol. 27 — 6

placing the tracing point not in the circum¬ ference of the generating circle but without or within it. The meaning in this article of a curve is the totality of points, whose co-ordinates are functions of a parameter which may be dif¬ ferentiated as often as may be required. Con¬ sult Klein, H., (Elementar Mathematik vom boheren Standpunkte aus) (Leipzig 1909, Vol.

II, p. 354).

If the generating point lies upon the cir¬ cumference of the generating circle, the curve is known as a common trochoid or a cycloid.

When the point is without the circumference of the generating circle, the resulting curve is called curtate or contracted. If the point of generation lies within the circumference of the generating circle, the curve is called a prolate or inflected trochoid or cycloid. In all three in¬ stances the wheel or generating circle is thought of as rolling along a straight line in a single plane. For trochoids otherwise conditioned by the surface over which the wheel can roll see Roulette; Hypocycloid; Cycloid.

One more fact in connection with this in¬ teresting curve may be noted : It is believed by some that birds, such as the eagle, which build in the rocks, drop or fly down from height to height in this curve. It is impossible to make very accurate observations of their flight and path, but there is a general resemblance be¬ tween it and the trochoid or cycloid, which has led several ingenious men to adopt this opinion.

With the further development of photographic observation, this hypothesis may be confirmed or abandoned.

TROCHOSPHERE, a form of larva (q.v.), especially characterizing the Trochel- minthes (q.v.), but also seen in other of the lower invertebrates. It is a microscopic oval body, with a mouth, short alimentary canal, and anal opening at the lesser end. There is slight evidence of sense organs. Consult Parker and Haswell, (Text Book of Zoology)

(1910).

TROCHU, tro-shii, Louis Jules, French soldier: b. Belle Isle, department of Morbihan,

12 May, 1815; d. Tours, 7 Oct. 1896. He was educated at the school of Saint Cyr, entered the army at an early age, and in 1840 was at¬ tached to the general staff with the rank of lieu¬ tenant. Sent to Algeria in 1846, he was made adjutant to Marshal Bugeaud and after some years of service in the ministry of war, acted in the same capacity with Marshals Canrobert and Saint Arnaud in the Crimea, gaining special distinction in the storming of the Malakoff bastian at Sevastopol. He fought against Aus¬ tria in 1859 doing excellent service at Solferino, •

where he held the rank of general of division.

Once more in the Ministry of War and in favor with the government, he made himself persona non grata by the publication of his (L'Armee frangaise en 1867, > in which the deplorable con¬ ditions prevailing in the army were ruthlessly pointed out and a reorganization of the national forces on the German model was urged. After the outbreak of war with Germany he was made governor of Paris, but placed himself in oppo¬ sition to the empire, and after the proclamation of the republic, 4 September, became president of the government of national defense, retain¬ ing at the same time his office of governor of the capital. In his defense of the city against

the besieging German army he displayed a half-heartedness which his enemies ascribed to timidity, but which was due to his conviction of the hopelessness of resistance. He resigned the governorship a few days before the capitu¬ lation of the city, but remained at the head of the provisional government till the meeting of the National Assembly. In his defense he pub¬ lished, (L'empire et la defense de Paris devant le jury de la Seine) (1872) ; (Pour la verite et pour la justice) (1873) ; (La politique et le siege de Paris) (1874).

TROCHUS. See Top-shells.

TROGLODYTES, the prehistoric cave¬ dwelling men of Western Europe, Asia, Ethio¬ pia, Egypt, etc. The name is sometimes ex¬ tended to any savages living in caves. See Cave-dwellers.

TROGON, a bird of the family Trogonida, of the order Coraciiformes or Coccygomorphcu, and unique in the structure of the feet, in which the first and second toes are directed backward and the third and fourth forward, whereas in all other yoke-toed birds the first and fourth toes are directed backward. The bill is short, strong and of wide gape; the tail generally long and in some species very long; the feet small and often feathered almost to the toes. They form a well-marked family of insectivor¬ ous and frugivorous forest-haunting birds of small size, whose dense, puffy plumage exhibits the most exquisite tints of pink, crimson, orange, brown or metallic green, often relieved by delicate bands of pure white. In one Guatemalan species (Pharomacrus mocinno), the long-tailed trogon or quetzal, the tail-cov¬ erts of the male are enormously lengthened into waving plumes of rich metalic blue-green, , as graceful and marvelous as those of the birds of paradise. This is the "national bird0 of Guatemala, a distinction which it owes to its ancient association with the great Mexican deity Quetzalcoatl (q.v.).

Trogons are unable to use their feet for climbing, and usually take their station on the branches of a tree, dashing on insects as they fly past, or on some fruit at a little distance from them, and returning to their seat to eat what they have secured. The family includes about 10 genera and 50 species, which abound in tropical America with a few representatives in Africa and the Oriental region. A single species, the coppery-tailed trogon (Trogon am- biguus), just enters the United States from Mexico. It is a magnificent metallic golden- green bird less

than a foot in length which nests in holes in trees and feeds upon fruits, insects, small lizards, etc. Consult Gould, (Monograph of the Trogonidse) (London 1875) ; Godman and Salvin, (Biologia Americana-CentralP (London 1896).

TROILUS (tro'Tl-us) AND CRESSIDA,

(1) A poem by Geoffrey Chaucer, written about 1369 and adapted from Boccaccio's (Filos- tratoP (See Troilus and Criseyde). (2) A play composed by Thomas Dekker and Henry Chettle, and first acted in 1599. (3) A tragedy

by Shakespeare. (4) A play by Dryden printed in 1678.

TROILUS AND CRESSIDA.

puzzling play. There is a still unsolved mys¬ tery about its-appearance in the Folio of 1623 : it is not mentioned in the prefatory Catalogue-* of plays contained in this volume, but appears with pages irregularly numbered at the end of the section devoted to histories and before the first tragedy, a decided chill. What most shocks the reader of the present play is the apparent irreverence to Chaucer and to Homer, but neither of these can have been to Shakespeare a particularly holy name. From Chaucer he derived the love story of (Troilus and Cressida,* a story unknown to the ancients ; but Shakespeare was not, as Spen¬ ser was, sufficiently antiquarian in his tastes to attain any real appreciation of Chaucer. Homer was probably first made known to the dramatist in Chapman's translation of seven books of the Iliad, published a year or two before this play was produced. The first looking into Chapman's Homer aroused in Shakespeare inspiration far different from that of Keats. He saw in the then fragmentary work not the true grandeur of the tale of Troy divine, the barbaric splendor of Achilles, and the pathos of Hector, but merely Thersites, whose effective grotesqueness can be traced di¬ rectly to Chapman's lines. Otherwise Shakes¬ peare saw in the Troy story what the various mediaeval compilers from Dares Phrygius to Caxton had made of it — a tissue of false ro¬ mance in which the Greeks were held up to in¬ famy as a race of schemers, rioters and brag¬ garts, and in which the conquest of Troy was the sordid business that Virgil first suggested. The account of Hector's death, revolting to modern readers of Homer, was sound doctrine to most Englishmen of Shakespeare's day. Thus interpreted, the material lent itself not unnaturally to the indubitably powerful drama on the vanity of human wishes which the poet constructed from it. The publisher's preface of 1609 indicates that even when first produced (Troilus and

Cressida) cannot have been suc¬ cessful. Revivals have been most infrequent;

yet a production by the Yale Dramatic Associa¬ tion in 1916, thought to be the only one ever given in America, was eminently effective.

Tucker Brooke.

TROILUS AND CRISEYDE. This nar¬ rative poem of over 8,000 lines, written about 1380, is the longest and most elaborate work of Geoffrey Chaucer, and is by many considered his masterpiece, though it is by no means so widely known as those immortal Canterbury Tales > which have made his name the common property of all English-speaking peoples. As is usual with Chaucer, the main outline of the story is not original ; it is, indeed, the gradual growth of perhaps 2,000 years, from Homer to Boccaccio. But Chaucer has made it his own as he made the stories of his Tales and as Shakespeare made the plots of his plays, and <(by the alchemy of his genius has transmuted the baser metal into gold.® Troilus, son of Priam, king of Troy, faithfully loves the beau¬ tiful Criseyde, daughter of the Trojan priest Calchas, who has deserted to the Greeks. Through the intercession of Pandar, uncle of Criseyde and friend of Troilus, the lovers are united, and for three years are supremely happy. At length, Criseyde is transferred to the Greek camp in exchange for a Trojan prisoner, and joins her father. At parting, the lovers vow eternal constancy, Criseyde, especially, assuring Troilus of her unalterable affection. Once in the Greek camp, however, she soon yields to circumstances and transfers her love to Dio¬ mede, the Greek. When Troilus becomes con¬ vinced of her faithlessness, he seeks revenge upon his successful rival, but fails, and, after performing prodigies of valor, is slain by the enemy. Criseyde and Diomede survive. The story itself is slight, and the action moves slowly; only about 1,600 lines are pure narra¬ tive ; almqst 6,000 lines are dialogue or solilo¬ quy; several hundred lines are descriptive, or purely lyrical, or in the form of the poet's per¬ sonal comments upon the action and the charac¬ ters. The emphasis is so much more upon character than action, that the poem might almost be called a psychological novel in verse, — a surprising production for its period, and one that curiously anticipates a favorite literary method of the 19th century. This story of love, faithlessness and despair, Chaucer treats sympathetically, yet with a sanity, a sense of values, a profound humor and a worldly wisdom that turn the tragedy

into com¬ edy, rather ironic yet neither cynical nor bitter. He has gone far beyond his immediate prede¬ cessor in the treatment of the story, Boccaccio (whose poem

that grows into overmastering passion ; devoted and self-sacrificing friendship; the lure of lovely womanhood. Its supreme excellence is its marvelous characterization. Troilus and, especially, Criseyde and Pandar, are unmatched outside of Shakespeare as examples of the in¬ teraction of character and circumstances. They show Chaucer's profound knowledge of human traits and motives ; each is completely rounded, utterly consistent and convincing. Each reacts upon the others ; together they mold the ac¬ tion, which, as in all true drama, moves logic¬ ally onward to its inevitable conclusion. This is less the material of ordinary narrative poetry than of psychological drama, easy to make over into a play, as might have been done by Chaucer in Shakespeare's time, and as was actu¬ ally done by Shakespeare in his (Troilus and CressidaP though with a curiously cynical degradation of the material. As a masterpiece of sheer poetic craftsmanship, (Troilus and Criseyde) far surpasses anything that English poetry has to offer before the time of Spenser. Chaucer handles his seven-line stanza (rime roycile, rhyming ababbcc) with an ease and variety of effect, as well as with a variety and richness of music, possible only to a great mas¬ ter. The monotony which might have attended the use of one form through over 1,000 stanzas is obviated by skilful and constant shifting of the caesura or verse-pause, by a copious vocabu¬ lary, and an inexhaustible variety of rhyme. In form, then, as in matter, the poem is essentially great. It must be admitted that as mere narra¬ tive it is always prolix ; that it is written in a language now archaic ; that, since its time, standards of taste and literary methods have often changed; and that some effort must be made to overcome these initial barriers to a full appreciation. When these have been passed, however, it will be found that (Troilus and Criseyde) remains, after the lapse of over five centuries, a very great work, rich in the essen¬ tial elements of poetry.

The evolution of the Troilus and Criseyde story, though important and interesting, can here be only briefly indicated. Homer, in the 24th book of the (Iliad) makes his solitary mention of Troilus as a son of Priam who died before the beginning of the poem. The cyclic poets acted upon this suggestion and developed Troilus into a hero. In the time of Constantine the Great, Dictys Cretensis' book, (De Bello TrojanoP in which Troilus figures largely, was translated from the original Greek into Latin: and, about 635 a.d., another (De Bello TrojanoP in which Troilus is a prominent hero, appeared in Latin as a supposed translation from the Greek of a certain Dares Phrygius. It

was from Dares that Benoit de Saint Maure, troub¬ adour to Henry II, king of England, obtained much of the material for his poem of 30,000 verses, which turns the story into a mediaeval romance, and first introduces the love element by giving Troilus a mistress named Briseida, who figures in the Uliad) as the love of Achil¬ les. Guido de Colonna, a judge at Messina, in 1287 translated Benoit's poem into bad Latin. From both Benoit and Guido, Boccaccio de¬ rived the material for his poem (Filostrato> (((one stricken by love®), in which he changes the name of the heroine to Criseida (the golden one), and adds Pandar to the dramatis per-

sonce , Chaucer uses only about one-half of Boccaccio's poem, condensing, amplifying, para¬ phrasing, ignoring, according to his needs and purpose. He draws also upon both Guido and Benoit, and even Boccaccio's prose romance which is upon an entirely different subject, for certain details.

The standard text of the poem is that edited by W. W. Skeat (in (Comolete Works of Geoffrey Chaucer,* 6 vols., Oxford 1894). Crit¬ ical works are numerous. Among these consult (Chaucer's Troylus and Cryseyde compared with Boccaccio's Filostrato translated by Wil¬ liam Michael Rossetti* (London 1873; Chaucer Society Publications, 1st series, 44, 65) ; Price, Thomas Randolph, (Troilus and Criseyde) (Modern Language Association of America, Publications, Vol. II, pp. 307-322, 1896) ; Ham¬ ilton, George L., (The Indebtedness of Chau¬ cer's Troilus and Criseyde to Guido delle Colonne's Historia Trojano> (New York 1903) ; Young, Karl, (The Origin and Develop¬ ment of the Story of Troilus and Criseyde } (London 1908; Chaucer Society Publications, 2d series, 40). Chapter VI of Robert K. Root's (The Poetry of Chaucer* (Boston 1906) gives a fair and interesting criticism of the poem.

Marion Tucker.

TROJAN WAR, The. According to Greek legend a 10 years' war carried on by the con¬ federated Greeks led by Agamemnon (q.v.), the king of Mycenae and Argolis, against the men of Troy with their allies. The purpose of this war was the recovery of Helen, wife of King Menelaus of Sparta, who had been car¬ ried off by Paris, one of the sons of Priam, king of the Trojans. The earliest and latest dates that have been assigned for this struggle are almost two centuries apart,

the former being 1335 b.c., the latter 1149 b.c. The commonly accepted date is that of Eratosthenes, 1183. The story is that there was a gathering of the gods and goddesses, and that Eros flung a golden apple among them, addressed to ((The Fairest.** Paris was given the task of deciding who was fairest, and of course got into trouble, for he named Aphrodite (q.v.) in order to gain her assistance in securing Helen. He won her, but obtained the everlasting animosity of Juno and Minerva, who aided the expedition of Agamem¬ non by every means in their power. Achilles, Odysseus, Ajax, Diomedes (qq.v.) and other famous adventurers, with more than 1,000 ships and 100,000 troops, sailed for Troy and laid siege to the city. The story is told at great length in Homer's

TROLLEY. See Railways, Street.

TROLLING, trol'ling, a method of angling that consists essentially in dragging a bait or bright object through the water, so that fishes are led to mistake it for a moving bait-fish. Trolling is ordinarily practised with a trolling-

spoon, so-called because it was originally fashioned from the bowl of an ordinary tea¬ spoon to which a hook was soldered. The modern spoon-bait is a flat piece of metal nickeled or silvered and brightly polished and variously shaped to suit the tastes of the angler so that it will spin or skip along the surface when drawn rapidly through the water. A stout hook projects from one end and the other is attached by a swivel to the line which should be protected for a foot or so by a wire or other snood to prevent it from being cut by the fish's teeth. The spoon or bait is trailed at a con¬ siderable distance behind the rowboat, sailboat or launch by which it is drawn. Trolling is effective in fishing tor predaceous, surface-feed¬ ing fishes, such as pike and pickerel, blue-fish, tarpon, tuna, bonito, various species of mackerel, etc., and also (by employing a copper wire as a substitute for the line) in the capture of maskinonge and lake trout when they retire to deep waters.

TROLLOPE, Anthony, English novelist: b. London, 24 April 1815: d. Harting in Sussex, 6 Dec. 1882. He was a son of Thomas Anthony Trollope, a barrister at the law, by Frances, daughter to William Milton, an English clergy¬ man. His mother afterward became well known in letters. Soon after the birth of this child, the Trollopes settled on a farm — the Orley Farm of one of the novels — at Harrow, where the boy was later out to school. As a poor day- boarder, he was persecuted by the masters and scholars of this famous school, and learned nothing there except a little Latin and Greek. In 1834, he

obtained a clerkship in the general post office at London. After seven years' serv¬ ice, carelesslv performed, he was appointed clerk to one of the post office surveyors in Ireland. This position, which kept him in the open air, proved most congenial. In order to increase his income, after his marriage in June 1844, to Miss Rose Heseltine of Rotherham, Yorkshire, Trollope turned his Irish ex¬ periences into fiction. (The Macdermots of Ballycloran* (1847), and

there. Before setting out on the latter trip he signed a contract for a book of travel, and when he returned it was complete. (The West Indies and the Spanish Main) (1859), the author regarded ((as the best book that has come from my pen.® A sojourn of nine months in the United States resulted in (North America) (1862). After retiring from the post office in 1866, Trollope visited Australia and South Africa, and published accounts of his travels. In the meantime novel after novel came from his pen. Cathedral life exhausted, he turned to the country gentleman, producing (He Knew He Was Right* (1869), a study of jealousy; (The Vicar of Bullhampton* (1870), which caused a sensation; (The Way We Live Now) (1875), dealing with schemes for getting rich quickly, and other novels of the same general type. The next year he opened a new vein with (The Prime Minister,* the first of his political novels. In 1879 he published a biog¬ raphy of Thackeray, with whom he had been associated on the Cornhill Magazine. After becoming almost the most prolific of English novelists he died, with the manuscript of novels in his desk, on 6 Dec. 1882 at Harting in Sus¬ sex, which had been his home for two years. After suffering brief eclipse, Trollope has now come to be regarded as ranking perhaps next to Dickens as a great chronicler of English life and manners among the middle classes. Some¬ what deficient in the artistic sense, he possessed wit, humor, pathos and a keen intelligence. See Barchester Towers.

Bibliography. — The delightful (Autobiog¬ raphy published bv his son in 1883, may be supplemented by F. E. Trollope's (Frances Trollope* (2 vols., London 1895) ; T. A. Trol¬ lope's (What I Remember) (3 vols., London and New York 1888-90), and (The Recollec¬ tions of Edmund Yates* (2 vols., London 1884). Mr. Henry James included a fine ap¬ preciation of Trollope in (Partial Portraits) (New York 1883).

Wilbur L. Cross,

Professor of English, Yale University.

TROLLOPE, Frances Milton, English novelist: b. Stapleton, near Bristol, 1780; d. Florence, Italy, 6 Oct. 1863. In 1809 she was married to T. A. Trollope, a barrister, but in 1829 she was left a widow with six children. After the death of her husband she came to this country, where she tried to establish a millinery business in Cincinnati, but not succeeding re¬ turned three years later to England, where she turned her experiences in America to account by publishing a book on the (Domestic Man¬ ners of the Americans* (1832). The work procured her the reputation in her country of a pungent, if somewhat prejudiced, satirist, “but in the United States of an unsuccessful and dis¬ gruntled alien; it gave great offense although the justice of some of her strictures is now recognized. Mrs. Trollope followed up this first success with a long series of works, chiefly novels, becoming one of the most voluminous novelists of her day. After 1844 she passed the greater part of the remainder of her life in Italy. The most successful of her novels was (The Widow Barnaby) (1839), with its sequels: (The Widow Married) (1840), and (The Barnabys in America, or Adventures of the Widow Married® (1843). Among her other

novels may be mentioned (Tremordyn Cliff) (1839) ; (Petticoat Government (1859) ; fash¬ ionable Life, or Paris and London,* her last work (1856). Consult

TROLLOPE, Thomas Adolphus, English author, eldest son of F. M. Trollope (q.v.) : b. 29 April 1810; d. Clifton, Gloucestershire, 11 Nov. 1892. He was educated at Winchester and Oxford. After 1841 he lived in Italy until 1888, when he made his home in Devonshire. During his Italian residence he was a corre¬ spondent of the London Standard for a time, and Italian correspondent of the New York Tribune. His many published works include travels, novels and Italian histories. Among them are (A Summer in Brittany) (1840); (A Summer in Western France) (1841) ; (La Beata* (1861) ;

(1864) ; (History ot the Commonwealth of Florence* (4 vols., 1865) ; (Dream Numbers> (1868); (A Siren* (1870); (1877) ; (Sketches from French History* (1878) ; (What I Remember > (1887-89), the last a sprightly, entertaining autobiography.

TROLLS, trolz, gnome-like creatures of Norse mythology; giants in Icelandic litera¬ ture ; dwarfs in modern Scandinavian folklore. These latter dwell underground in a hill or mound, in this respect resembling the brownies of Scotland. Trolls are depicted as well dis¬ posed to the human race — but given to steal¬ ing provisions or even children and

women. They are claimed to make themselves invisible, can foresee the future and endow human be¬ ings with extraordinary physical strength or wealth.

TROMBONE, a musical instrument of the trumpet class, an improvement on the earlier sackbut. It is a large deep-toned instrument with sliding tubes and is capable within its compass of producing every sound of the chro¬ matic scale in perfect tune. In the orchestra three trombones are used, which harmonize with each other. The range of the alto trom¬ bone is from C above the second line of the bass to G above the treble staff; that of the treble trombone is from B, the second line below the bass staff, to G, the second line of the treble; that of the bass from C, the second line below the bass staff, to G, the second line of the treble.

TROMP, tromp, Cornelis, Dutch admiral: b. Rotterdam, 9 Sept. 1629; d. 29 May 1691. He was a son of Marten Harpertzoon Tromp (q.v.). Entering the service at an early age, he was barely 19 when entrusted with the com¬ mand of a vessel dispatched against the Alge¬ rine pirates, and two years later was made rear-admiral. After distinguished service in the Mediterranean, he fought under the su¬ preme command of De Ruyter against the Eng¬ lish under the Duke of York, and after the de¬ feat of the Dutch at Lovestoft (13 June 1665), displayed great skill in effecting the retirement of the vanquished fleet. In the following year he was again under De Ruyter and fought with distinction, but owing to his impetuosity in attacking an English fleet without orders, was retired from active service. Restored to his command ,in 1673, he displayed consummate

bravery in a series of engagements fought in June and August of that year. After the con¬ clusion of peace with England he was placed in command of a fleet sent to the aid of the Danes against the Swedes, and won several notable victories. On the death of De Ruyter he was made comander-in-chief of the naval forces of the United Provinces.

TROMP, Marten Harpertzoon, Dutch ad¬ miral : b. Briel, 1597; d. 10 Aug. 1653. He went to sea at 10, and after a period of service in the merchant marine was taken prisoner by the English and kept in confinement for several years. In 1624 he entered the navy as captain of a frigate, and in 1637 became lieutenant- admiral. On 18 Feb. 1639 he gained an over¬ whelming victory over a Spanish fleet in the North

Sea, off Gravelines, and in October of the same year repeated his exploit by shatter¬ ing a great Spanish armament in the Downs. War between England and the Dutch broke out in 1652, and he fought an indecisive battle with Blake off Dover, 29 May 1652, but lost a great part of his fleet during a severe storm in the Channel. Supplanted by De Ruyter in the command of the fleet, he was speedily re¬ stored, and on 10 December defeated Blake near Dungeness, wresting from the English the mastery of the Channel. A rather apocry¬ phal story represents Tromp as triumphantly parading the Channel with a broom at his masthead. From 28 Feb. to 2 March 1653 he held his own in a running fight with a greatly superior English fleet, and though he sustained some loss, succeeded in bringing into safety a large convoy of merchant ships. On 13 June he was defeated by Dean and Blake in the Eng¬ lish Channel, but took the sea again in July, and on 10 August joined battle with Monk in the Channel. The fight was turning in the favor of the Dutch when the Dutch admiral fell, shot throught the heart.

TROMSO, trom'se, Norway, capital of the province of Tromso (area 10,121 square miles), at the northwest, stands on a small island of the same name, which consists of low fertile land and is five miles long. It is an old his¬ torical town, has a bishop's see, and a Roman Catholic church, town-hall, arctic museum, etc. Its fisheries are important, and there is con¬ siderable trade in oil, sealskin, herrings, dried and smoked fish. There is boatbuilding and rope-making. Notwithstanding its location near the 70° of north latitude, the climate is mild, as the Gulf Stream permeates the surrounding waters. Pop. of town about 7,447 ; of the island about 81,920; of the (

226,145.

TRONA, native hydrous sodium carbonate, or soda (HsNasGjOs). It has a hardness of 2.5 to 3, specific gravity, 2.11 to 2.14; vitreous, glistening lustre; gray or yellowish-white color; alkaline taste; and is not altered by exposure to a dry atmosphere. It occurs as thin crusts in Fezzan, Africa, in an extensive bed in Churchill County, Nev., and in fine mono¬ clinic crystals at Borax Lake and elsewhere in California.

TRONDHJEM, trond'yem (German, Dront- heim), Norway, a seaport town on the west coast, the ancient capital of the country, beauti¬ fully situated on a bay at the mouth of the

Nid, on the south side of the Trondhjem- fiord. It has spacious, regular and remark¬ ably clean streets, the houses being chiefly of wood. The most remarkable edifice is the cathedral, which mainly dates from the

latter part of the 12th to the end of the 13th century, and is entitled to rank, as a whole, as the most remarkable ecclesiastical structure in the kingdom ; it has long been undergoing exten¬ sive restorations. Among other buildings are a residence of the royal family, an academy of science, containing a valuable library and anti¬ quarian collections, an arsenal, etc. The manu¬ factures are not of much importance, but there are breweries, distilleries, paper-mills, and shipyards. Two railways now terminate here. The harbor was much improved, the beginning of the century, and about 600 vessels of 350,000 total tonnage enter and also clear annually. The commerce in normal years is about $20,000,000. The trade consists chiefly in exports of timber, dried and salted fish, tar and copper. Pop. 45,335. It is in the amt of Sondre Trondhjem, having about an area of 7,185 miles and popula¬ tion about 148,306.

TROOST, Gerard, American geologist: b. Bois-le-Duc, Holland, 15 March 1776; d. Nash¬ ville, Tenn., 14 Aug. 1850. He was educated at the University of Leyden, and was, in 1809, sent by Louis Bonaparte, king of Holland, on a tour of scientific observation to Java. The capture, by a privateer, of the vessel in which he sailed having interrupted this undertaking, he came in 1810 to the United States and set¬ tled in Philadelphia where he became a mem¬ ber of the Academy of Natural History, of which he was elected the first president, holding office until 1817. In 1814 he established the first alum works in the United States ; and in 1825 joined Robert Owen's community of New Harmony, from which he retired at the end of two years. Removing to Nashville in 1828, he was appointed professor of chemistry, min¬ eralogy and geology in the university there, and in 1831 geologist to the State of Tennes¬ see, both of which positions he held until his death. He published reports on the geology of Tennessee, etc. His mineral collections were the largest in the United States.

TROOSTITE, a variety of the mineral willemite (q.v.), occurring at Ogdensburg, N. J., in large rough crystals usaully of reddish- brown, flesh, red or gray color.

TROPiEOLUM, a genus of annual and perennial herbs of the family Tropaeolacece. The species, of which there are about 45, are natives of South America, particularly Chile and Peru, whence many have been taken to all the warmer parts of the world to be grown in gardens for their odd, conspicuous flowers. They are mostly climbing vines, with alternate, usually simple, peltate leaves, from the axils of which the generally long-peduncled, irregu¬ lar, usually yellow, orange or red, sometimes blue or purple, flowers are produced singly.

Several species, especially T. tuberosum, pro¬ duce edible tubers which are used for food in the tropics. The leaves and flowers of a few species are used as salads, for which their peculiar peppery flavor especially fits them. Their young, tender pods are often pickled and in this form are frequently employed a-s a sub-

stitute for capers. The species most used in this way are T. majus and T. minus, known as nasturtium, Indian cress and yellow larkspur, names which better fit plants of other families. Another species in popular use is T. peito- phorum, which, like T. majus, is commonly employed as a climber upon porches, balconies and banks. The canary-bird flower (T . pere- grinum) is probably more often grown in¬ doors than out, in the north, T minus is a dwarf, non-climbing species which blossoms earlier and more profusely than others; it is frequently used in beds and borders. Few plants are more frequently satisfactory and popular than the nasturtiums. They will thrive in any garden soil if well exposed to the sun, and not allowed to become very dry. Since they are tender to frost they are either sown rather late or are started under glass and transplanted when the weather becomes settled. Especially fine specimens may be propagated by cuttings, and tuberous species should be dug and stored during the winter. The peren¬ nials. seem to require richer soil than the annuals.

TROPHONIUS, tro-fo-‘m-us, builder of the temple of Apollo at Delphi. After his death he was reverenced as a hero, and had an oracle in a cavern near Lebadeia in Boetia. Pausanias describes how, after purifying himself, he was drawn through the mouth of this cave by an unseen power, and details all that he witnessed there. Don Quixote’s famous visit to the oracle preserves its memory in modern literature.

TROPHY, in antiquity, a monument or me¬ morial in commemoration of some victory. It consisted of some of the arms and other spoils of the vanquished enemy, hung upon the trunk of a tree or a stone pillar by the victorious army. The custom of erecting trophies was most general among the Greeks, but it passed at length to the Romans. It was the practice also to have representations of trophies carved in stone, in bronze or similar lasting substance. In modern times trophies have been erected in churches and other public buildings to com¬ memorate victories or heroic action in war. The term has been extended to describe any group of objects hung on a wall to commemorate an event, industry or activity.

TROPIC-BIRD, a sea-bird of the family Phcutontidce, related to the pelican. The bill in these birds is sharp, curved superiorly, and is as long as the head. The two middle feathers of the tail are very long and narrow, giving the birds the names boatswain-bird or marlin- spike among sailors. They inhabit the tropical seas and can fly for days together without visit¬ ing land, resting and sleeping on the water. A large and well-known species is Phateon cetliereus, which averages about two and one- half feet in length, the tail-feathers being about 15 inches. It is most often seen in the Indian Ocean, where it breeds on the Mascarene Is¬ lands. The yellow-billed tropic-bird (P . flavi-rostris) is smaller and more often seen in the western Atlantic, since it annually visits Ber¬ muda and the Antilles to breed, laying but a single, heavily blotched egg in a hollow of the beach, or sometimes in a rude nest in a tree. Consult Newton, dictionary of Birds* (New York 1896).

TROPICAL FOREST PRODUCTS. The

products of forests are usually divided into two great groups, as follows: (1) Major forest products, such as wood used for construction purposes and for special uses, as furniture, cabinet work, wood used for small articles of all kinds, etc. ; (2) Minor forest products in¬ clude firewood, tannin extracts, dyes, rubber, gutta percha, rattan, bamboo, wood oils, resins and various forest plants that produce medicinal products, like quinine, cocaine, sarsaparilla, epicac, camphor, etc. As a matter of fact, the value of these minor products of tropical for¬ ests consumed in the world's markets greatly exceed the value of the major products. In¬ deed, so great is the demand for some of the minor forest products that many of them have almost entirely become cultivated ones. Ten or 15 years ago while most of the rubber of commerce came from a wild forest tree (Hevea braziliensis) of the Amazon valley, approxi¬ mately 80 per cent of the rubber used to-day is from cultivated plantations of this tree in the Eastern tropics.

Kapoc is the commercial name for the cot¬ ton from the so-called cotton tree (Ceiba pen- tandra) and is a native of tropical America, but the chief source of this valuable product, used principally in stuffing mattresses, is from plantations in Java. Formerly the chief source of the Peruvian bark, quinine (Cinchona spe¬ cies) was from the wild forests of Ecuador, Colombia and Peru. To-day most of the qui¬ nine comes from cultivated plantations in India and Java. The lack of cheap labor in the Ameri¬ can tropics is the chief reason why these valuable products are cultivated in the Eastern tropics.

Because the climatic conditions of temperate regions are not favorable

for the production of many tropical minor forest products, the tem¬ perate markets must always depend on the tropics for most of them unless synthetic prod¬ ucts can be substituted. While efforts made to produce synthetic rubber have not proved suc¬ cessful, yet the manufacture of synthetic dyes has greatly reduced the demands for the dye woods of the tropics, hence until the war greatly, but temporarily, stimulated the use of tropical dye woods, the amount of these woods used in the markets is not likely to be greatly increased.

On the other hand tropical woods for con¬ struction purposes have not been in demand in the great lumber markets of the world, the United States and Europe, principally because the forest of these regions have light timbers in large quantities that are better suited for general construction timbers than the so-called hardwoods of the tropics. The coniferous woods, or softwoods, of the temperate regions of North America, Europe and Asia stand in sharp contrast with that of the hardwood for¬ ests of the tropics. On the one hand coniferous forests occur in pure, or nearly pure, stands that make their lumbering on a large scale more profitable, hence the lumber industry has been highly developed ; on the other hand the hard¬ wood tropical forests are more complex in character and usually far away from well-developed industrial regions, hence capital has not been attracted to their exploitation on a large scale. Moreover, because of the great development of the lumber industry, es-

pecially in the United States, there has been an over-production; the surplus finds its way to all parts of the world and large amounts have been absorbed by tropical countries. The con¬ tribution that tropical forests have made to the lumber markets has been woods for special uses rather than those for general construction purposes. Many woods of tropical countries are used locally for general construction pur¬ poses, that never find their way into outside markets. The study of tropical forests show that while they are more complex in composi¬ tion than coniferous forests of temperate re¬ gions, yet this complexity is not so great as formerly supposed. The complexity is increased by the undergrowth trees that do not reach commercial size. The trees that reach huge size and overtop the undergrowth species are composed of comparatively few species whose woods are little known. Also, a large percen¬ tage of these trees produce rather soft hard¬ woods that are easily worked. Thus, the esti¬ mated stand of timber in the Philippines is 200,000,000,000 board feet, more than

100,000,- 000,000 of which are light hardwoods that can be and are being substituted locally for many purposes to which imported coniferous woods were put. These forests also occur in sufficiently heavy stands to warrant the establishment of fairly large lumbering operations that will re¬ duce the cost of their utilization. A recent estimate of the area and stand of timber in some of the large tropical forest regions is as follows :

FOREST REGION

Forested area in million acres

Stand of timber in billion board feet

Southern Brazil .

260

650

Amazon Basin .

1,024

3,400

Northern South America .

200

500

Indo- Malay Region .

320

1,600

T otal .

1,804

6,150

The forested area of the United States is estimated at 550,000,000 acres, carrying a stand of timber of 2,800,000,000,000 board feet. Thus the Amazon region alone is estimated to have some

600,000,000,000 feet more than is found in the United States.

At the present time it is not possible to con¬ nect the market or local name of many of the tropical woods with the specific scientific name of the trees producing them, for much sys¬ tematic work in botany is necessary before this can be done. Indeed, as in ‘some temperate woods, a group of species stands for the wood. Thus the term oak stands for several species of the genus Quercus and the trade term pine refers to a large number of species of Pinns and even to many other coniferous woods not of this genus. Also where adjectives are pre¬ fixed to the market names, the name may in¬ clude more than one species ; several species of oak produce <(white oak,® and (

ican and European markets, and a few that play an important role in the countries in which they occur.

1. The Mahogany Family (Meliacece) . — 1. The ((true® mahogany originally came from Swietenia mahagoni Jacq. and seems to be en¬ tirely restricted to the West Indies and South¬ ern Florida. Late investigations show that the Swietenias of southern Mexico, Central Amer¬ ica and, perhaps, Colombia, are two different species and at least some of that from Vene¬ zuela is a fourth species.

The wood of the four species is accepted as true mahogany, and when placed on the market usually bears the name of the place or region from which it comes. Thus we have Cuban, Santo Domingo, Honduras, Nicaragua, Mexican, etc., mahogany. Santo Domingo mahogany is considered the most desirable grade. Through¬ out this range the wood is locally known under the Spanish name of caoba. The different grades of mahogany vary in weight from 35 to 52 pounds per cubic foot, and cannot be con¬ sidered as very heavy. Mahogany is red in color, beautifully grained, easily worked and is durable. It takes a natural polish, is adap, to stains and takes glue well. The combination of these qualities makes it the furniture wood par excellence of the world. Most of the sub¬ stitutes of true mahogany fail in one or more of these qualities and hence are inferior.

2. African Mahogany. — The growing scarcity of easily-accessible true mahogany has led to the introduction of many woods as substitutes. The best of these belong to the same family (Meliacece) . Under the general name of Afri¬ can mahogany the tropical regions of West Africa have supplied large quantities of ma¬ hogany. Perhaps the best known of these is the Gambia or Senegal mahogany (Khaya senegalensis, A. Juss.), although other species of this genus and species of the genera Tri- chilia, Carapa, Entandrophragma and a

number of species of other families furnish African mahogany.

3. Spanish cedar, Cigar box wood, Cedro. — The above are the commercial names of a num¬ ber of species of the genus Cedrela which occur throughout the American tropics from the West Indies and Mexico to Paraguay and northern Argentina. The original Spanish cedar (Ce¬ drela odorata L.) appears to be confined to the West Indies and has a strong cedar odor, hence the name. It is used mostly for cigar boxes. Most of the Cedrelas of the American conti¬ nent, known everywhere under the Spanish name of cedro, seem not to hold this strong odor when exposed to the air for some time. The wood of cedro closely resembles that of true mahog¬ any in many respects, except that it is usually much softer and lighter in weight. The heavier grades are about the same weight as the light¬ est mahoganies. There is little doubt that some of the so-called mahogany found in the markets is really cedro. Cedro is a common and much- prized wood in the markets throughout all Latin American countries, especially in Argentina. It is used for furniture and light construction work, principally interior finish of houses. The genus Toona (formerly called Cedrela) found in parts of the eastern tropics produces woods almost identical with that of cedro. In the Philippines a species of this genus (Toona

calantas, Merr. & Rolfe) has the common name of calantas, and in India another species has the common name of toon.

4. Carapa or Demarara Mahogany (Guiana), Andiroba or Brazilian mahogany (Amazon re¬ gion). — In the lowlands from the mouth of the Orinoco River (Venezuela), in the Guianas and to and including the Amazon Valley, is found a wood bearing the above names which is the product of Carapa guianensis Aubl. This wood resembles mahogany in some respects but is much coarser grained. It makes a good, cheap substitute for this wood, but is locally used for much the same purposes as cedro.

Besides the above woods all belonging to the mahogany family, together with others of less importance, there are a large number of species belonging to different families that ap¬ pear in the markets under the name of mahog¬ any. In all about 60 such species have

been listed. The most important of these are dis¬ cussed below in connection with the family to which they belong.

II. The Locust Family (Leguminosce) . — The locust family, represented in our temper¬ ate flora by such trees as the black locust, honey locust and others, has a large number of species of soft, hard and very hard woods that are used locally in the tropics for all sorts of purposes, and some of them find their way into temperate markets.

1. Rosewoods, Jacarandd or Caviiina (Bra¬ zil) ; Blackwood (India). — The name ˆrose® was applied to this wood because of a fragrant odor resembling that of the rose. Similar woods without the odor also bear this name. The woods are dense, heavy, durable and are dark brown or black in color, sometimes streaked with purple, rose and other colors. Their chief use is in furniture, pianos, inlaying and small turnery objects. The main source of the rose¬ woods is Brazil. Here the true rosewood of the Rio de Janeiro region is referred to Dal- bergia nigra Allem, and that of the Amazon region to Dalbergia spruceana Hub., but it is known that a number of species of Machcerium produce rosewood. The rosewoods of Central America are supposed to come from species of Dalbergia. A similar wood of Colombia under the name of negrillo or granadillo is a species of Machcerium, though the name grana¬ dillo is applied to a number of other woods. The Indian rosewood is- Dalbergia latifolia Roxb. A similar wood (Dalbergia melan- oxylon Guill. & Perr.), under the name of Senegal ebony, comes from Africa. In a broad sense the cocobola wood of Panama (Dalbergia retusa Hemsl.) can be classified as a rosewood. Other woods of less importance in different genera of this family and species of other fami¬ lies are often classed as rosewoods. Some of these have the blackish color and others are classified as rosewood because of their rose

color. . .

2. Padauk (India) ; Narra (Philippines) ; African Padauk (Africa) .— The genus Ptero- carpus produces a number of woods usually of a beautiful red color, but sometimes yellowish red and even nearly black. These woods have a similar use to those of the rosewoods and are sometimes given the name of mahogany. The chief source of the best padauk (P ter o carpus dalbergioides Roxb.) is the Adaman Islands (India), though P. indicus Willd. and other

species of Burma and India and the Philippines produce similar woods. In the Philippines the local name is narra. It has been exported to the United States under the name of Philippine mahogany.

3. Brazilwood ; Logwood, or Campeche. Brazilwood is a reddish yellow wood mainly produced by certain species of the genus Ccesalpinia, and perhaps by Hcematoxylon brazilleto Karst. It is exported chiefly as a dyewood. Brazilwood from the eastern tropics was known in Europe before America was dis¬ covered. When Brazil was discovered, because of the abundance of this wood along the coast in the region of Rio de Janeiro, the country was named after the wood. C. sappan L., and perhaps related species, is the source of brazil¬ wood from the Eastern tropics. It is known in India under the name of sappan-wood and in the Philippines as sibucao. While scattered throughout the American tropics, the chief commercial source is Brazil and the Caribbean Sea region. The source of the wood from Brazil seems to be C. echinata Lamck., though there is some doubt about it. It is known locally as ibirapitanga or pdo Brazil, and also has the export name of Pernambuco wood. The brazilwood of the Caribbean region seems to be mostly Hcematoxylon brazilleto. Log¬ wood or campeche (Hcematoxylon campechia- num L.) is blood red in color and yields a dye (stain) known as hsematoxylon. It comes chiefly from Southern Mexico and Central America. It is semi-cultivated in India and parts of the West Indies.

4. Dividivi (Ccesalpinia coriaria Willd.). — The pods of this tree are rich in tannin and they are exported in considerable quantities prin¬ cipally from Colombia and Venezuela where the tree grows in dry districts where it is wild or semi-cultivated.

5. Tonka bean (Guianas and Venezuela) ; Cumaru (Amazon). — The beans of this tree (Dipteryx odorata Willd., and one or more closely related species) after being treated in casks of rum, are exported in considerable quantities principally from the region south of the Orinoco River in Venezuela. They are used in making perfumes and flavoring extracts. The wood of cumaru is very hard, difficult to work, yellow in color, streaked with red, and is used to some extent in the Amazon region.

6. West Indian Locust; Courbaril; Algarroba (Venezuela and Colombia), Jatahy (Brazil). — The West Indian locust is the English name for a wood produced by Hymencea courbaril L., although in Brazil, under the name of jatahy, besides the above, there are several species of Hymencea that give similar woods. The wood is red with dark streaks. It is used locally but little exported. The different species yield a resin known as South American copal, or courbaril, which is exported in considerable quantities especially from northeastern Brazil. Bodies of the resin are deposited in the ground on the death of the tree and are thus mined.

7. Copahyba. — This is the Brazilian name of a wood similar to the West Indian locust and with the same uses. It is produced by several species of the genus CoPaifera. The tree pro¬ duces an oil known as aciete or copaiba oil that is exported to some extent. It is found also in northern South America and neighboring regions,

8. Araribia (Brazil) ; Cartan (Venezuela) ; Guayacan jobo (Colombia) ; Amarillo de Guayaquil (Panama). — This group of woods comes from several species of the genus Cen¬ tro lobium. The woods vary from a bright red¬ dish yellow to yellow streaked with darker color. They are used quite extensively locally, especially in Brazil and deserve to be exported as fine furniture woods.

9. Acapu. — The acapu (Vouacapoua ameri- cana Aubl.) is a reddish brown wood, with dark, almost black, streaks, and very hard and heavy, that comes from the Amazon valley and is exported in some quantities.

10. Purpleheart, Violet wood; Guarabu or Pdo Roxo (Brazil) ; Nazareno (Panama) ; Tananeo (Colombia). — These woods are gen¬ erally referred to the genus Peltogyne and found from Panama to Brazil, though species of closely related genera may produce some of them. The woods are dark purple, sometimes with violet shades. They are quite extensively used in Brazil and British Guiana for many purposes. Some of them yield an odorous resin used medicinally and a red dye used for textile fabrics. Purpleheart has been exported from British Guiana and neighboring islands.

11. Balsamo ; Balsamo de Tolu (Colombia) ; Oleo or Cabreuva (Brazil) ; lncienso (Argen¬ tina). — The general name of balsamo is here applied to a group of woods that come from the genera Myroxylon and Myrocarpus. The woods are dark or yellowish red in color and the bark or wood or both yield oily substances. The bark of the balsamo of Colombia (Myroxy¬ lon balsamum [L] Harms.) yields a resinous oil, balsamo de tolu, that is exported to some extent. The woods are used locally and de¬ serve to find wider markets. The cabreitva or Sao Paulo, Brazil, is probably the most used. The incienso of Argentina, a scented wood, is highly valued in Argentina.

12. Ipil (Philippines) ; Mirabeau (Borneo and Malay Peninsula). — The genus Instia es¬ pecially Instia bejugo [Colebr .] O. Ktze. is the

main source of the wood. It is yellow when fresh cut but turns reddish brown to chocolate color when exposed. It is highly valued for construction work in contact with the ground. In the Philippines it is one of the principal woods used for railroad ties.

13. Tindalo (Philippines). — This wood is the product of Pahudia rhomboidia (Blanco) Prain. The wood is yellowish red, becoming very dark with age. It is greatly prized for flooring, fine interior finish and furniture.

14. Acle (Philippines) ; Pyingado (Burma). — Both these woods resemble each other closely in structure. In color they are dark brown and resemble in this respect the black walnut. The acle (Albizzia acle [Blanco] Merr.) is highly prized in the Philippines as a fine furni¬ ture wood. The pyingado (Xylia dolabriformis Benth.) grows in the teak forests and is used extensively for railroad ties.

The above are only a few of the many woods produced by the Leguminosce.

III. Lauan or Dipterocarp Family (Dip- terocarpacece) . — From the standpoint of pro¬ ducing lumber for general construction pur¬ poses this is the most important tropical family, because the species compose a large percentage of the lumber in the forests in which they occur, and the woods are easily cut and worked. The

family is confined to the eastern tropics, es¬ pecially to Borneo, the Philippines, Sumatra, Malay Peninsula and parts of Burma and India. With respect to their hardness and durability the woods can be divided into a number of groups.

1. Lauan , Tanguile (Philippines) ; Seriah or Meranti (Borneo, Malay Peninsula). — This group of woods is found throughout nearly the whole range of the family. Besides the above there are very many local names for the dif¬ ferent species which belong to genera Pentacme, Parashorea, and certain species of Shorea. They are the most abundant of the dipterocarps. The woods of the lauans (to use the local Philippine name for the whole group) are all light hardwoods, not durable, as easily worked as pine; locally they are used for all light construction purposes. In regard to color they are classified as white and red lauans. The latter include tanguile. The better grades of the red lauans show resemblance to mahog¬ any and large quantities have been shipped to the United States for mahogany. Of these tan¬ guile (Shorea polysperma [Blanco] Merr.) is the best. In the United States it is usually sold under the name of Bataan

mahogany. The product of other species, mostly Shorea negrosensis Fox., sells in the United States as Philippine mahogany. Certain red lauans from Borneo are sometimes sold in England as Borneo redwood.

2. Apitong (Philippines) ; Kruen (Borneo and Malay) ; Eng. (Burma), and other names for these and other regions. — This group ot woods belongs to the genus Dipterocarpus. In contrast with lauan, apitong is a moderately, not very durable, hard wood, of a reddish brown color. It finds its greatest use for heavier construction purposes not in contact with the ground.

3. Yacal (Philippines) ; Selangan batu (British North Borneo and Dutch East Indies) ; Ressak (Dutch East Indies) ; Thingan (India), and other local names for these and other regions. — This group of woods is the product of certain species of the genera Hopea and Shorea. The yacals are dark brown in color and are the hard, durable woods of this family. They are comparatively easily worked and are most valuable for construction work in contact with the soil and any construction where dura¬ bility and great strength are required. They are a. good substitute for teak in many classes of shipbuilding.

4. Guijo (Philippines);ˆ/ (India). — These woods are like the apitongs but finer grained and more durable. The Sal (Shorea robusta Gaertn. f.) is one of the most important tim¬ bers of India. The guijo (Shorea guiso [Blanco] Blume) is one of the most useful timbers of the Philippines.

5. Borneo camphor; Kapor (Malay name). — This wood, the product of Dryobalanops aromatica Gartn. yields a substance that closely resembles camphor for which it is sometimes used. It is known only from Borneo, Sumatra, and the southern, end of the Malay Peninsula.

IV. The Brazil-nut or Monkey Pot Family (Lecythidacece) . — This family is confined mostly to South America. The woods of the family, while at present little used, promise to play an important role in the future lumber in¬ dustry of South America, because in many

vy *

im. ■(ifaHH

Ip I

•

fllMtfl

Bpljfc

:> ft

■ 1 r

fht

y

mi

||

1 Parana Pine (Araucaria braziliana), forest of Southern Brazil. The undergrowth tree is Embura (Nectandra sp.), the timber de luxe of the region. 2 Cedro or Spanish Cedar (Cedrela sp.), in the forests of Southern Brazil. Cedro is one of the most common woods used throughout tropical America. 3 Lepacho (Tecoma sp.), in the Alto Parana region of Argentina. Equivalents of this wood, belonging to closely related species of the genus Tecoma, occur in the forests from Mexico to Northern Argentina. 4 A Lauan or Dipterocarp forest of the Philippine Islands. Among the species in this forest is Red Lauan (Shorea negrosensis), whose wood is sometimes sold as Philippine mahogany in the United States

TROPICAL FOREST PRODUCTS

1 Tanguile (Shorea polysperma), Philippine Islands. Bataan mahogany

2 African mahogany logs in. West Africa

Wood of this tree is sold in the United States under the name of

TREES, TROPICAL

1 Oil Palm (Elaeis guineensis)

3 a. Livistona subglobosa. b. Euterpe oleracaea. c. Mauritia flexuosa

2 a. Date Palm (Phoenix dactylifera). b. Cabbage Palm (Oreodoxa oleracea)

4 Indian Fan Palm (Corypha elata)

places the members of the family are very abundant. The important members of the family have large cup-shaped fruits, called by the English monkey pots. The trees of the family are the giants of the forests, and in parts of the Magdalena Valley, the Amazon Valley, British Guiana and the coastal forests of Brazil they form the most important element in the composition of the forest.

1. Brasil nut; castanheiro (Brazil). — The Brasil nut (Bertholletia excelsa H.B.K.) is one of the largest trees of the Amazon and is the source of the Brazil nuts of commerce. Be¬ cause of the value of the nuts the wood is little used.

2. Colombian mahogany, Albarco (Colom¬ bia). — The wood of this tree is the product of Cariniana pyriformis Miers. It is abundant in foothills bordering the large rivers. Because of the resemblance to mahogany it has been shipped to the United States under the name of Colombian mahogany.

3. Jequitibd (Brazil). — This is the product of several species of Cariniana (by some authors, Couratari) and is abundant in the coastal forests from Bahia to Sao Paulo, and the interior of the state of Sao Paulo. The wood is reddish, comparatively soft and would make a better substitute for mahogany than albarco, because it is more easily worked. In Brazil it is used for construction purposes.

4. Monkey pots, Coco de Mono (Colombia) ; Kakeralli (British Guiana) ; Sapucaya (Brazil). — This group of woods is the product of several species of the genus Lecythis and occurs from Sao Paulo, Brazil, to Panama. The wood, red¬ dish brown in color, is used locally for con¬ struction purposes in contact with the ground, and in Brazil is especially valuable for railroad ties. Several species from Brazil with the name of sapucaya furnish the so-called paradise-nut of commerce.

5. Other woods in the Amazon Valley worthy of mention are the following : Matamata (Eschweilera matamata and other species) is a wood highly valued for salt-water construc¬ tion because it resists well the action of the shipworm (teredo). The tauarys are products of several species of the genus Couratari and are used locally for shipbuilding.

V. The Laurel Family (Lauracece). — Be¬ sides producing the cinnamon (Cinnamonum seylanicum Breyn.), found in South and West India, and Ceylon where it is extensively culti¬ vated; the camphor (Cinnamonum camphora [L.] Nees & Eberm.) principally from Formosa; and the alligator pear , or aguacate, or avocado (Persea americana Mill.), originating in parts of the American tropics and widely cultivated, this family produces a great variety * of timbers found scattered throughout the tropics. In the American tropics many of these timbers occur under the general names of canella (Spanish and Portuguese), laurel (Spanish) and louro (Portuguese). The best- known woods are the following: (1) Green-heart (Nectandra rodioei Schomb.) found prin¬ cipally in British Guiana from which country it is exported as a first-class wood for salt-water construction purposes. Large quantities of it were used in the building of the Panama Canal. When fresh cut the wood is grayish brown in color but on exposure turns to a dark green or

chestnut color. (2) Billian or Borneo Iron- wood (Eusideroxylon swageri T. and B.) is the eastern counterpart of the greenheart so far as use is concerned. It is exported mostly from British North Borneo. The wood is yellow when fresh cut, but on exposure turns to a glossy brown. (3) Embuia (species of Nectandra) is the timber de luxe of parts of Southern Brazil and because of its great durability is extensively used as a railroad tie. It occurs in the Parana pine forests of the states of Parana and Santa Catharina, Brazil.

VI. The Quebracho or Sumac Family (Ana – cardacece). — This is the family to which the sumac and poison ivy of our flora belong. The best known member of this family is the tree that produces the mango fruit (Mangifera in- dica L.), a native of the eastern tropics but introduced throughout the western tropics.

1. Quebracho (Argentina and Paraguay).

— The wood of this tree (Schinopsis balansce Engl.) yields a valuable extract much used for tanning purposes and locally it also furnishes a very durable railroad tie. It is logged mostly in northern Argentina and the value of the ex¬ ports of wood and tannin extract reach a higher figure perhaps than the value of all the other exported forest products of South America ex¬ cept rubber. The wood of another species (.S’. lorentsii [Griseb.] Engl.), also called quebracho, and found in northern Argentina principally, contains tannin, but at the present time it is little used for this purpose. The woods of a number of other South American species of this and other families are called

quebracho. These should not be confused with the real quebracho, although some of them do contain tannin.

2. Gongalo Alves (Brazil) ; Diomate (Co¬ lombia) ; Gateado (Venezuela) ; Urunday (Ar¬ gentina), and other local names for these and other parts of the American tropics. This group of woods “comes from several species of the genus Astronium which presumably extends from Central America to northern Argentina. It has been introduced in the United States under the name of king wood. In color the wood is brownish red with black, or nearly black, streaks. It is used for construction pur¬ poses (in Brazil for railroad ties) and as a cabinet and furniture wood.

3. Espava (Panama) ; CaracoU (Colombia and Venezuela) ; Mija or Mijagua (Venezuela).

— This is reddish, moderately soft wood, found in northern South America and adjoining re¬ gions, and is used locally to some extent as a light construction material. From Panama it has been exported to the United States under the name of espave mahogany. It is the product of Anacardium rhinocarpus D. C.

VII. The Teak Family (Verbenacece). — Teak (Tectona grandis Linn.) has long been known as the best shipbuilding timber in the world. The wood is moderately hard, very durable, strongly scented, dark golden yellow in color, turning brown to almost black with age. It is mainly the product of Burma and India, though there are extensive plantations in Java and smaller ones in other parts of the eastern tropics. In the Philippines, Molave (Vitex paviflora Juss.) is another member of this family that is locally very much used, espe¬ cially for shipbuilding and construction work in contact with the ground.

VIII. Miscellaneous Woods. — 1. A group

of woods known as Lepacho (Argentina), Ipe or Pdo d’arco (Brazil), Surinam Greenlieart (Guiana), Araguanay (Venezuela), Guayacan (Colombia, Ecuador and Panama) and many other local names, are of a greenish or brown¬ ish yellow color, hard, durable and much used for heavy construction work in contact with the ground. They belong to various species of the genus Tecoma (Catalpa or Bignoneacece family). Some guayacan has been shipped to the United States under

the name of Lignum Vitae. (See below).

2. Peroba. — This is the generic common name for a group of rose colored or brownish yellow woods that occupy the most common place in the hardwood markets of Rio de Janeiro and Sao Paulo (Brazil). They are moderately hard, easily worked, and are used for heavy and light construction work, interior finish and for making furniture. The peroba rosa (known as carreto in Colombia and Venezuela), and in part the peroba amarello (Brazil), are the prod¬ uct of certain species of Aspidosperma (Apo – cynacece). Much of the peroba amarello seems to come from certain species of Tecoma of the Bignoniacece.

3. West India or Venezuela Boxwood. — The growing scarcity of the true boxwood (Buxus sempervirens L.), valuable for rulers and wood¬ engraving, has led to the introduction of some tropical woods as substitutes. The chief candi¬ dates for these substitutes seem to be the fol¬ lowing: (a) Roble bianco, a Tecoma species (Bignoniacece) from Venezuela and West In¬ dies; (b) species of Casearia (Flacourtiacece) , principally from the Maracaibo region of Vene¬ zuela, and certain species of Aspidosperma (Apocynacece) from Venezuela. The last two usually are known under the name of zapatero. Certain species of Aspidosperma under the name of piquid marfim or marfim (marble) are found in southern Brazil, although these seem not to have been exported as boxwood. The woods mentioned above are light yellow in color, fine grained, and hard and compact.

4. Laurel (Spanish), Louro (Brazil). — Scat¬ tered throughout the moist regions of the Amer¬ ican tropics, under the above names, are a group of woods belonging to the genus Cordia (Borraginacece) . They are brownish in color, strong and easily worked, hence are much used for certain classes of construction work. The woods under these names should not be con¬ fused with the members of the Lauracece family mentioned above.

5. Balsa wood or cork-wood. — Scattered throughout the damp American tropics, usually under the name of balsa, are a group of very light woods (about eight pounds to the cubic foot) that have recently been much used in the making of buoys for life boats and are now being used for lining refrigerators. They are usually referred to Ochroma lagopus Sw. (Bombacacece) , but it appears now that several species of this genus produce this wood.

6. Kapoc; Cotton tree ; Ceiba (Spanish) ; Samauma (Brazil). — The kapoc of commerce is the cotton from the fruits of a tree (Ceiba

pentandra Gaertn., family Bombacacece) , and is exported mainly from planted trees in Java, and is used extensively in stuffing mattresses. The tree, however, is a native of the moist

American tropics and is one of the largest in the forests. The wood is very soft and at present is very little used.

7. Ebony. — The true ebonies of commerce come usually from certain species of the genus Diospyros, the persimmon family (Ebenacecu) . The trees that produce this wood are found very scattered throughout the tropical forests of both hemispheres. The woods are very hard and dense and generally black or brown streaked with black. The. growing scarcity of true ebony has led to the introduction of many substitutes belonging to species of other families.

8. Fustic, Mora (Latin America).— Fustic is the market name of perhaps the most important dyewood of commerce. It is mainly exported from the Caribbean Sea region of the American tropics. It is the product of Chlorophora tinc- toria L. Gaud, of the family Moracece. It is used in dyeing shades of yellow, brown, olive and green.

9. Lignum Vitce; Guayacan (Spanish). — This is usually the product of various species of Guiacum officinale L. and Guiacum sanctum L., although other species of Guiacum, Bulnesia arborea Engl, (locally known from Venezuela as vera), and Bulnesia sarmienti Lorentz (known from Argentina as palo santo), fur¬ nish some of the wood. They all belong to the family Zygophyllacece. The wood reaches the markets of the world principally from the West Indies, Northern South America and Central America. The wood is much used in certain parts of shipbuilding esoecially in stern bush¬ ings and for bowling balls, bed castors, pulleys, etc. It is extremely hard and heavy and oily.

IX. The Mangrove Family (Rhizopho – racece). — The mangrove forests of the tidal swamps of tropical regions, composed mostly of species of the above family, are literally for¬ ests of the sea. Although found best developed in the estuaries of large rivers in the eastern tropics, they are also present in the western hemisphere. Here one species (Rhizophora mangle L.) is found, while in the Eastern trop¬ ics a number of species of this genus, and of the genera Bruguiera and Ceriops, form the main composition of the forests. While there are many local names for the different species in the eastern hemisphere, the gen¬ eral local name in the Philippines and Spanish America is mangle, and in Brazil, mangue. In proportion to the area they cover they are locally the most valuable of all the forests for they are the

main source of fire¬ wood and tannin extracts. The latter, espe¬ cially from Borneo, is exported in considerable quantities.

X. The Pine Family (Pinacece). — While the woods of the pine family are marketed * mainly from temperate zones, mostly the North Temperate, yet the highlands of the tropics and subtropics contain a number of Opines® that are used locally and are coming to be exported to some extent. Many of the true pines (Pinus) and other genera of the western part of the United States extend into Mexico and in some parts form extensive forests. Pine in mer¬ chantable quantities is also found in parts of the West Indies, and in Guatemala and Hon¬ duras of Central America. Preparations are already being made to exploit these forests.

India, Burma and the Philippines contain true pines that are used locally. The lower slopes of the Himalayas in India also contain other genera of the family that are quite extensively utilized. In the semi-tropical regions of the Brazilian states of Parana, Santa Catharina and Rio Grande del Sul, and in the state of Mis- siones (Argentina), occur very large areas of ihe Parana pine (Araucaria braziliana A. Rich.). There forests contain about 200 bil¬ lion board feet of standing timber and are playing an important role in furnishing soft¬ wood lumber to the adjoining industrial regions of southern Brazil, Argentina and Uruguay.

XI. Bamboos (Gramincea) . — The bamboos and their allies are the grass trees of the trop¬ ics. They furnish cheap wood for the poorer classes for construction purposes and for al¬ most every use to which wood can be put. Bamboos are more abundant in the eastern than in the western tropics where, besides occurring as constituent parts of some wild forests, they are extensively planted, also to some extent throughout the western tropics. The construc¬ tion bamboos belong principally to certain spe¬ cies of the genera Bambusa, Arundinaria and Dendro calamus. While wild bamboos occur in the western tropics and are cultivated to some extent, they do not play so important a part in the life of the people. In certain parts allies of the bamboos or canes take their place. These are the cana brava (Gynerium sagitta-tum [Aubl.] Beauv.), and species of Guada known locally in the Amazon as taboca and in Ecuador under the market name of Guayaquil cane. This is rather extensively exported as a construction wood to the dry treeless coastal regions of Peru and Northern Chile.

XII. Palms (Palmce). — In regions where bamboos are not abundant palms largely take their place as construction timbers. Besides they furnish a large number of minor forest products. Certain palms produce food, in others the nuts produce valuable oils, and some yield wax, and from others vegetable ivory is ob¬ tained. Besides the cocoanut and the date palms which are really not forest products, the following are mentioned betause they produce products that are extensively exported :

1. The ivory nut palm or vegetable ivory. — The ivory nut is the product of a number of Species of the genus Phytelephas. It is found in portions of Ecuador, Colombia and the Ama¬ zon. At present it is one of the principal ex¬ ports of Ecuador and this country is the chief source of the nuts. Ivory nuts are principally used for buttons, but many small objects like checkers, chess, etc., are made from it.

2. Rattans. — The rattans of commerce are the product of several species of the genus Cala¬ mus and related genera. They are climbing palms, in some cases they reach the great length of 400 or more feet, and clamber from tree to tree in the forests. They are confined to the eastern tropics. They furnish the main cordage of the countries in which they grow. When exported and in the round they are used for canes, umbrella handles and for making chairs; and ˆsplit® rattans find their greatest use for seats and backs of chairs.

3. The Oil Palm. — The nut of this palm is extensively exported from West Africa for the valuable oil it contains. It is also found in Brazil where it was introduced from Africa.

Here it is used locally only. It is the product of Elceris guieensis Jacq.

4. Wax Palm. — This palm yields a wax that comes from scales on the underside of the leaf. The palm is Copernicia cerifera L. and is ex¬ ported mainly from northeastern Brazil.

5. The Panama Hat Palm. — This belongs to the Cyclanthacece , a family closely related to the palms. The species that furnishes the ˆstraw® for Panama hats is Corludovica pal- mata R. and P. The making of Panama hats is a very important industry in Ecuador, and neighboring parts of Peru and Colombia.

XIII. Rubber, Guttapercha, Chicle. — The trees and other plants that produce the rubber of commerce are found in many parts of the tropical world. The principal one of these is Hevea braziliensis Muell. Arg. (Euphorbiacece) , a tall tree, native of the vast Amazon region.

Formerly most of the rubber of commerce was collected from this region. While the supply from the Amazon valley has not decreased, the increasing demand for rubber has been met by the extensive rubber plantation of the Malay Peninsula and neighboring regions, principally Ceylon, Sumatra, Burma and Borneo. The eastern tropics now produces fully 80 per cent of the world's supply of crude rubber. The commercial name of rubber from Hevea brazili¬ ensis and certain other species is Para rubber. It has the local name of seringa. Ccara rubber (Manihot glaziovii Mull. Arg. and other spe¬ cies) locally known as Manigoba, belongs to the same family as the Para rubber. It comes from the dry regions of northeastern Brazil and is cultivated to some extent in other parts of the tropics. Next to Para rubber in importance is the so-called Castilloa rubber, the product of Castilla elastica Cerv. and other species of this genus and belongs to the family Moracece. It is a native of tropical America from southern Mexico to the Amazon region. In Brazil it is known as caucho in distinction from the seringa (Para rubber). This rubber tree has been cul¬ tivated extensively.

The Mangabeira rubber, mainly the product of Hancornia speciosa Gom. belongs to the family Apocynacece. It is found throughout the region from the territory of Acre, Brazil, to southern Parana, Brazil, and in adjoining regions of other countries. It is cultivated to some extent but as yet the cultivated rubber is not commercially important. To this family also belong the African wild rubbers, princi¬ pally species of the genera Landolphia and Kickxia.

Gutta percha is not a rubber, for it is plas¬ tic rather than elastic. It comes from trees that belong to the family Sapotacece, mostly certain species of the genera Payena and Palaquium that are found only in the Indo-Malay region. In the western tropics balata, mostly the prod¬ uct of Mimusops balata Gsertner., is the near¬ est to gutta percha. It comes mainly from the Guianas and Venezuela.

Chicle is the source of the chewing gum of commerce. It is the gum of a tree known under common names of sapodilla or nispero and other local names. This is Achras zapota L. The chicle of commerce comes mostly from southern Mexico where the tree is native. It is planted, however, in other tropical countries.

Bibliography.— Boulger, G. S.,

Applications of the Timbers of Commerce) (2d ed., London 1908) ; Gamble, J. S., (A Manual of Indian Timbers) (London 1902) ; Foxwor¬ thy, F. W., (Indo-Malayan Woods > (The Phil¬ ippine Journal of Science , C. Botany, pages 409-592, Vol. IV, Manila 1909) ; Whitford, H. N., (The Forests of the Philippines) (Bull. No. 10, Bureau of Forestry, Manila, P. I., 1911) ; Navarro de Andrade, Edmundo and Vecchi, Octavio, (Les Bois Indigenes de Sao Paulo> (Sao Paulo, Brazil 1916) ; Pereira, H., (The Timber Trees of the State of Sao Paulo BraziP (Sao Paulo, Brazil) ; Huber, H., (Mattas e Madeiras Amazonicas) (pages 91- 216, Vol. VI, Boletim do Museu Goeldi 1910, Para, Brazil).

H. N. Whitford,

Yale School of Forestry.

TROPICAL FORESTS. The beauty of a tropical forest is greatly overestimated by dwellers in temperate climes. The testimony of nearly all travelers to the tropics is to the effect that nowhere did they see such an expanse of flowers and charming forests as those they had left, and they all complain of the monotonous greenness of the trees, which have never to pre¬ pare for winter. Where the trees are most immense and crowded, as in the Amazon dis¬ trict, and in the East Indies, the forest is lonely and silent, shadowy and sombre in the subdued light. The trunks rise without branches for many feet, tied together with creepers and lianes, in an indescribable confu¬ sion of festoons and ropes and cables, reaching from tree to tree, and to the ground; some flat, some twisted either around each other or smothering a tree ; some limp and swaying, others drawn taut like the stays of a ship's mast. Mqnv of them are climbing palms (Cala¬ mus) and many are armed with cruel fishhook¬ like thorns. The lianes, and the trees them¬ selves, support myriads of small epiphytic or parasitic plants, ferns, fungi and countless other species. Overhead the forest is roofed by the tops of the trees and of the creepers ; the foliage is sharply defined against the sky, even the finely-cut delicate leaves of the great legumin¬ ous trees characteristic of these forests. Nearly all the flowers of the deep forests are confined to this upper stratum, where the sun's rays can reach them, and they are not always easily seen, being often green or white, and incon¬ spicuous amid the verdure. The flowers of the most tropical trees, moreover, are, even when brilliant, very fugacious; one reads of people walking through the maple leaves petals of a day, as through the maple leaves in autumn. The forest trees, however, are very prolific, and many of them bear bud, blossom, and unripe and mature fruit at the same time. The forest giants in some instances have pro¬ tected themselves against the dangers of the great height and top-heaviness. Tapangs

and figs have great buttresses like undulating wooden walls, others, as the screw-pines and the mangroves, perch on aerial roots, sent down from trunk and branches. The last are found along sea-shores, stepping far out into the water, backed by the screw-pines and nipa-palms and presenting an almost impenetrable front, woven into a thicket by interweaving creepers, interminably long and even thorny. It is at such edges of the forest, in clearings and along

roadsides, that one sees the imagined beauty of the tropics. There the under-shrubs have a chance to grow and bloom, interspersed with graceful tree ferns and waving palms, The creepers and tree-branches descend and hang waving and blossomladen over the masses of ferns and ground plants ; and there the brilliant blossom of orchid and parasite and epiphyte are visible.

African forests are often like those of tem¬ perate zones, with open glades and clumps of trees. One can hardly call the oases of palms in the deserts, forests. In Abyssinia the country has been likened to the Scotch Highlands.

It is Australia, however, which has the most peculiar tropical forest, for in spite of the fact that her gum trees are the tallest trees in the world, it is a shadeless land. So burning are the sun's rays, that the leaves of the predomi¬ nating eucalyptus are so disposed as to present always their edge to the sky; the acacias have delicate compound leaves, the ti-shrub has re¬ duced its foliage to mere needles, and the weird she-oak has dispensed with leaves altogether, string-like branchlets taking their place. The first impression of an inland Australian forest is one of monotony in color and appearance, and of burning heat and desolation heightened by the flapping strips of the bark of the gum-trees, which is cast away as northern trees shed their leaves.

TROPICS. (1) In astronomy, two circles on the celestial sphere, whose distances from the equator are each equal to the obliquity of the ecliptic, or 23ˆ2° nearly. The northern one touches the ecliptic at the sign Cancer, and is thence called the Tropic of Cancer, the southern one being for a similar reason called the Tropic of Capricon. The sun's annual path in the heavens **is bounded by these two circles, and they are called tropics, because when the sun, in his journey northward or southward, reaches either of them, it reverses its polar movement, and turns back, or travels in an opposite direction in regard to north and south. (2) In geography, the tropics are two parallels of latitude, each at the same distance from the terrestrial equator, i.e., 23° 27'. The one north of the**

equator is called the Tropic of Cancer, and that south of the equator the Tropic of Capricorn. Over these circles the sun is vertical when farthest north or farthest south, that is, at the solstices, and they include between them that portion of the globe called the torrid zone, or the “tropics,® or tropical regions, a zone al¬ most 47 degrees wide, having the equator for its central line. The Tropic of Cancer passes through the centre of Mexico, just misses the northern point of Cuba, next invades the Sahara desert, crossing the Nile at Dendur, north of the Nubian desert, cuts Arabia centrally, then passes through northern India, China at Canton and across the island of Formosa to the Pacific Ocean, passing a little north of Hawaii. The Tropic of Capricon crosses Chile, Argentina, Paraguay and southern Brazil, strikes Africa just south of Walfish Bay, in what used to be German territory, cuts through the northern Transvaal and Portuguese East Africa to In- hambane Bay; it then passes through southern Madagascar and divides Australia.

TROPINE, CsHisNO, an organic basic sub¬ stance obtained by action of heat and baryta on

the alkaloid atropine. Colorless crystals soluble in water and alcohol.

TROPISMS, influences exerted by their en¬ vironment upon plants or animals leading to involuntary actions, or to mechanical alterations of posture, growth, etc. Such influences are exercised by chemical agents, by the earth, water, sunlight, heat, electricity, etc. See Chemotropism ; Geotropism ; Heliotropism ; Thermotropism, etc.

TROPPAU, trop’pow, Gzecho-Slovakia, an important city on the Oppa, 78 miles northeast of Briinn. It is well built and consists of an inner town, with pleasure-grounds on the site of the former fortifications and of three suburbs. Handsome public buildings include several fine churches, an upper gymnasium, a museum, a library of 35,000 volumes, an upper real-school and other educational institutions. The chief manufactures are woolen and linen cloth, beet¬ root sugar, beer, liquors, paper. A congress of sovereigns was held here in 1820, occasioned by the revolutions of Spain, Portugal and Naples. Pop. about 32,300.

TROSSACHS, tros’aks, (bristles), Scot¬ land, a romantic defile forming

an approach to the Western Highlands, in Perthshire, about eight miles west of Callander. It extends for about a mile between Lochs Ackray and Kat¬ rine, winding between Ben A'an on the north and Ben Venue on the south, and confined by lofty rugged precipices covered to their summits with birch, pine and other trees. It is a favorite region for tourists and is in the locality where lived Scott's (Lady of the LakeP

TROTTER, Newbold Hough, American artist: b. Philadelphia, Pa., 4 Jan. 1827; d. At¬ lantic City, N. J., 21 Feb. 1898. He was graduated at Haverford College in 1845 ; en¬ gaged in business till 1858, when he turned his attention to the fine arts. When the Civil War broke out he joined the Germantown Home Guards and took part in the battle of Antietam. After the war he was appointed by the United States government to paint all the mammalia of North America in a series of volumes to be issued by the government. His best known pictures include ˆGrizzly Bears) ; (Wounded Buffaloes* ; (The Last Stand* and (Indian En¬ campment and three paintings representing the progress of the means of travel in Penn¬ sylvania during 50 years.

TROTTING. See Horse, Trotting; Sports; Their Development, Speeds and Records.

TROTZKY, Leon (pseudonym for Leon Bronstein), Russian Socialist: b. Odessa, 1879. In 1900 he was imprisoned at Odessa for participating in a revolutionary labor movement. Since early youth Trotzky has been an ardent advocate of the cause of the Social-Democratic Party, and one of the ablest agitators and orators who have written and spoken in its de¬ fense. He had traveled all over Europe before the outbreak of the War in 1914 (for instance, the social complications resulting from the Balkan Wars led him to tour the Balkans in 1912, for the purpose of social study). The outbreak of the war found him in Vienna, which he left on the same day for Switzerland, where he spent a number of months, engaged in Socialistic agitation. He wrote here an

interesting pamphlet, in Russian, erf which Ger¬ man and English translations appeared later (one under the title (The Bolsheviki and World Peace* ; New York 1918), attacking the European Socialistic parties for supporting their governments in the war ; in Germany he was punished by a sentence to six months' imprison¬ ment, pronounced in his absence. In Paris, where he next settled (1915), he edited, for the Russian colony, a Socialist weekly, Nashe Slovo, but his merciless and uncompromising propa¬ ganda soon led to his exile from France to Spain (this period is interestingly covered in his (

Chapters from My Diary,* written in Russian for Novy Mir; English trans. in The Revolutionary Age, Boston 1918). From Spain he sailed, by way of Cuba, to New York, where he arrived 14 Jan. 1917. During his short stay in America he worked for several weeks as an editor on the Russian Socialist daily Novy Mir, devoting his evenings to lectures in Russian and German (he knows very little English and is not so good a linguist as Lenine) to New York branches of the Socialist party. Immedi¬ ately after receiving news of the outbreak of the Russian Revolution, he sailed from New York for Europe on the Norwegian steamer C h ris tianiafj ord 28 March, but was removed 3 April from the ship at Halifax by British au¬ thorities and interned in a concentration camp at Amherst, from which he and his family were only released a month later, when they were permitted to continue their journey on the Danish steamer Hellig Olav. Trotzky's own description of these experiences will be found in an article (In British Captivity,* published in The Class Struggle (New York 1918). After his arrival in Petrograd, Trotzky at once be¬ came one of the intellectual leaders of the Bol¬ shevik section of the Social-Democratic party, although he had not, like Lenine, been identified with this movement from its inception in 1903. In June 1917 he established a weekly propa¬ ganda paper at Petrograd, called V period (For¬ ward), in which a number of articles and speeches in his brilliant and inspiring manner appeared. After the Bolshevik coup d ' etat of 6 Nov. 1917, Trotzky became Minister (Peo¬ ple's Commissaire) for Foreign Affairs, while Lenine (q.v.) became Premier; later the For¬ eign Affairs portfolio went to Chicherin, while Trotzky headed the Department of the Army and Navy. He was one of the Russian delegates to the Brest-Litovsk conference and signed the Treaty of Brest-Litovsk with the delegates of the Central Powers on 9 Feb. 1918. A full ac¬ count of his participation in the Bolshevist coup, as well as in the peace negotiations, will be found in his book (From October 1917 to Brest-Litovsk (New York 1919). In September 1918 reports of alleged connection between Trotzky and the German government were cir¬ culated in the American press (on these, see Lenine, Nikolai). Rumors of large armies raised and organized by Trotzky, possessing im¬ mense military resources, and intended to in¬ vade Germany in the support of the revolution in that country (which opened, largely as a result of Russian propaganda, in November 1918), persisted for many months in 1918-19. Consult Williams, A. R., (The Bolsheviks and the Soviets* (New York 1918).

Jacob Wittmer Hartmann.

D0

TROUBADOURS, troo'ba-doorz, The. See Provencal Literature.

TROUBETZKOY, troo-bets'koi, Amelie Rives, Princess, American novelist : b. Rich¬ mond, Va., 23 Aug. 1863. She was married to John Armstrong Chanler in 1888, but secured a divorce from him on account of incompatibility, and in 1896 was married to a Russian artist, Prince Pierre Troubetzkoy. Among her works are (The Quick or the Dead?* (1888) ; (Vir¬ ginia of Virginia) (1888) ; (The Witness of the Sun* (1889); (Barbara Dering) (1892); (Tanis, the Sang-Digger) (1893) ; (The Mock¬ ing of the Gods* (1902) ; (Selene* (1905) ; (Augustine the Man* (1906).

TROUBETZKOY, Prince Paul, Russian sculptor : b. Intra, Italy, 1866. The son of a Russian nobleman, he worked by himself, after study under Bazzaro, and won recognition with his (Indian Scout* in 1894. Three years later he removed to Moscow, wrhere he was appointed professor of sculpture at the academy and from this date he did much vigorous work. Since 1905 he has lived in Paris and specimens of his art are found in many European galleries. Among his later works are the equestrian monu¬ ment to Alexander III (1909, Petrograd) and (The Daughter of Prince Scipione Borghese on Horseback) (1908). He has received numerous gold medals for his work.

TROUESSART, Edouard Louis, French zoologist : b. at Angers, 1842. He took the de¬ gree of M.D. at Paris in 1870 and served as surgeon in the French army, becoming, finally, professor of zoology in the Museum of Natural History in Paris. His publications are numer¬ ous and in 1895 he was laureate of the Societe entomologique.

TROUP, troop, George McIntosh, Amer¬ ican statesman: b. on the Tombigbee River, then in the Territory of Georgia, 1780; d. Laurens County, Ga., 3 May 1856. He was graduated at Princeton in 1797, was admitted soon after to the bar, and at 21 was elected a member of the State legislature. He was a representative in Congress from Georgia 1807— 15, and in 1816 was elected a United States senator. From 1823 to 1827 he was governor of Georgia, and in 1829 was a second time elected to the National Senate. He was a man of great integrity, an impassioned speaker, and one of the most earnest and able of the ad¬ vocates of State rights and State sovereignty.

TROUT, any of the various smaller species of fresh-water fishes of the family Sahnonidcz (q.v.) ; especially a <(charr® of the genus Sal-velinus, and specifically the speckled or brook trout of eastern North

America (S. fontinalis) . The name comes originally from the European brown trout (S. far is) . The distinction be¬ tween the closely related salmon-trouts (q.v.) and the true trouts, or charrs, is most surely found in the character of the dentition. Harris has explained the difference as follows :

«Put your finger in the mouth of your cap¬ ture, and if you find the vomer, a bone situated on the front part of the roof of the mouth, flat, with teeth on its body, and behind these an irregular single or double series of teeth, you hold in your hand a salmon-trout. If you find the vomer much depressed, convex and shaped like a boat, with teeth on the head of the bone,

and none on its shaft, you have a charr under inspection.®

All of the American charrs, except the Dolly Varden and three of the Arctic species, are natives of the waters east of the Mississippi, the common brook or speckled trout being the most widely distributed. The last species may be known at sight by the worm-like markings on the back, red spots on the sides, the large mouths, blunt snouts and dark mottlings on their dorsal and tail fins. It is the most beauti¬ ful of all the charrs by reason, as Harris writes, of the mantle of rose and violet which it wears, the mellow diffusion of which suggests and justifies the descriptive phrase so often applied to it by anglers — ((the bloom of the trout.® It is to be found in the streams flowing north into the Arctic Ocean, as far west as Victoria Land; ranging north and westward to the tributaries of the Great Lakes, and as far south as the southern spur of the Georgia Alleghanies. It also occurs near the sources of some of the rivers flowing into the Mississippi River and the Gulf of Mexico. The habits of trout are as various as the streams in which they dwell and the moods of the weather, and anglers find constant novelty in studying them in an effort to overcome their devious and cunning ways. Their breeding is after the general method of their race, but they never go down into salt water. They mate late in summer, and the male keeps off intruders. The female uses her tail in making the nest, whipping the gravel until a hole is made about two inches deep, and then cleans the bottom for a foot or more around the hole. When she is ready to spawn the male knows it and approaches her. The ova are then dropped and the milt is deposited upon the eggs, the male being within a few inches of his con¬ sort. This occurs in northern New England in November or early December; farther north at early dates. But many of the eggs fail to be¬ come fertilized, dropping down stream on the current; they are devoured by minnows or other fish who are lurking in the vicinity. Probably not 5 per cent of the ova dropped on natural spawning beds

ever mature, while of those raised by the improved methods of the fish cul- turist fully 80 to 90 per cent come to maturity in the hatching ponds. Unfortunately those raised by the artificial process are generally placed, when fingerlings, in streams abounding with their natural enemies, and but a small per¬ centage of these innocents become yearlings, at which age they are able to take care of them¬ selves.

The charrs are also represented in Maine and New Hampshire by the Sunapee trout (Salvelinus atpinus aureolus), which is classi¬ fied by ichthyologists as a local variety of the European charr or saibling (S. alpinus), pecu¬ liar in its local coloration and other character¬ istics. It is <(brownish, sides silver-gray, with small orange spots on sides above and below lateral line ; caudal grayish ; belly orange ; anal orange, edged before with white; ventrals orange with a white band on outer rays; no mottlings anywhere.® This beautiful charr is as good to eat as it is good to catch. It reaches a weight of 10 pounds and rises freely to the fly in May and early June, after which, as the water grows warmer, it settles into deeper water, and in July and August takes a live

minnow and fights finely at a depth of 50 to 60 feet. It is connected with its European type by the arctic trout, a variety (arcturus) of the Arctic Coast north of Hudson Bay and variety stagnalis of the rivers of Greenland and Boothia.

The quasky, or blueback trout (5*. oquassa) , is the smallest and one of the handsomest of the charr trouts. It never exceeds 12 inches in length and is dark blue, the red spots small and round and usually confined to the sides of the body. Its habitat is confined to Moose- lucmaguntic Lake, of the Rangeley system, in Maine, although Professor Merriam states that identical fish have been caught in the lower Saint Lawrence River weighing six or seven pounds. The blueback lies concealed in the deep water during the greater part of the year, but about 10 October comes near the shore and ascends in shoals the Kennebago River for the purpose of spawning. Half a mile above its mouth the Kennebago receives the outlet of Lake Oquassa ; the trout then leaves the Ken¬ nebago to the left and runs toward Oquassa Lake, when its voyage comes to an end. About the middle of November it goes back to Moose- lucmaguntic Lake and is seen no more until October of the next year. The blueback re¬ sembles the

Sunapee trout more than any other of the. charr species, yet differs from it in size, spawning habits and markings of the young. Varieties of it are known in certain lakes in northern Quebec and in the rivers of the Arctic Coast. The only trout native to the waters west of the Rocky Mountains is the red-spotted, bull or Dolly Varden (S. mcilma) . It is found in the streams east and west of the Cascade Range from the upper Sacramento to Montana. It is a gaudy and large species, and good, but is not the equal of its Eastern congeners in game qualities.

Trout are justly regarded as the most inter¬ esting of all the smaller fishes that attract the angler. They are taken with the garden worm, the grub, the live minnow and the artificial fly by the method explained in the article Angling (q.v.). For artificial cultivation, see Fish-

culture.

Bibliography. — Goode, (American Fishes } (New York 1888) ; Jordan, D. S.,

(New York 1908) ; Jordan and Evermann,

(American Food and Game Fishes* (new ed., New York 1914) ; McCarthy, (Familiar Fish> (New York 1900) ; Phillips, E., (Trout in

Lakes and Reservoirs: A Practical Guide to Managing, Stocking and Fishing) (New York 1914) ; Rhead, L., (American Trout Stream In-sects) (New York 1916) ; Sage and Cheney, (Salmon Trout) (New York 1902) ; Stone, < Domesticated Trout* (Charleston, N. H.,

1877).

TROUVˆRE, troo-var', a member of the class of ancient poets of northern France, cor¬ responding to the troubadour of Provence. Their productions partake of a narrative or epic character and thus contrast broadly with the lyrical, amatory and more polished effusions of their# southern rivals. _

TROUVILLE, troo-vel, France, a fashion¬ able watering-place on the English Channel, in the department of Calvados, situatedˆ at the foot of a hill on the right bank of the Touques at its mouth, near the mouth of the Seine, 10 vol 27 — 7.

miles south of Havre. It has a harbor, com¬ prising an inner and an outer basin, and a splendid beach. The Casino or Salon offers all the attractions usually found in such institu¬ tions. The season is at its

height in August. Boat-building and fishing are the only real in¬ dustries. Pop. about 6,901.

TROVATORE, II. Verdi's opera of

TROVER, in law, an action to recover the value of goods unlawfully converted by another. Originally this was an action on the case for damages against one who had found goods be¬ longing to another and refused to give them up on demand of their owner.

TROWARD, Thomas, English New Thought apostle: b. Belgaum, India, 1844; d. 1916. During his youth and young manhood in India he imbibed the principles of Eastern philosophies and about 1904 he retired from the position of division judge which he held and came to Great Britain, lecturing and writ¬ ing on the application of the underlying spiritual principles found in all religions to the active life of to-day. Though he is classed as a mental scientist and New Thought advocate he was really a sincere, educated Englishman who devoted his later days to trying to inform the Western peoples what they had to learn from Eastern philosophies. He published (Lectures on Mental Science) (Edinburgh 1906) ; (Bible Mystery and Bible Meaning) (1907) ; (Dove Lectures) (1909) ; (The Crea¬ tive Process* (1911), etc.

TROWBRIDGE* tro'brij, Edmund, Amer¬ ican jurist: b. Newton, Mass., 1709; d. Cam¬ bridge, Mass., 2 April 1792. He was graduated at Harvard in 1728 and for some time bore the name of Goff, which was that of an uncle. He became attorney-general for Massachusetts (1749) and was elevated to the Supreme Court (1767) where he presided over the trial of Capt. Thomas Preston and his men for firing on the people in Boston (5 March 1770). In 1772 he resigned. As executor of John Alfred, a wealthy Boston merchant, he founded at Har¬ vard the Alfred professorships of natural re¬ ligion, moral philosophy and civil polity.

TROWBRIDGE, John, American scien¬ tist : b. Boston, Mass., 5 Aug. 1843. He was graduated from the Lawrence Scientific School, Harvard University, in 1866 and served as instructor there, 1866-69. He was assistant professor of physics at the Massachusetts Insti¬ tute of Technology in 1869-70 and filled the same position in Harvard, 1871-81. He was pro¬ fessor of experimental physics at Harvard, 1880-88 and in the year last named became Rumford professor of applied science there and in 1884 was made director of the Jefferson Phys¬ ical Laboratory at the same institution. In 1878 he was elected a member of the National Acad¬ emy of Sciences and later was vice-president of the American Academy of Arts and Sciences. He has

published (The New Physics* (1884) ; (What is Electricity?* (1896) ; (The Resolute Mr. Pansy) (1897) ; (Three Boys on an Electric Boat) (1894); (The Electrical Boy) (1891); (Philip's Experiments, or Physical Science at

Home5 (1898) and many papers on physics and more especially on electricity.

TROWBRIDGE, John Townsend, Ameri¬ can author : b. Ogden, Monroe County, N. Y., 18 Sept. 1827 ; d. 12 Feb. 1916. He attended a district school and by doing farm chores man¬ aged to obtain sufficient funds to attend a classical school at Lockport, N. Y., for one term. Then he went to Illinois for a year, teaching school in the winter and working as a farmhand in summer. Returning to Lockport he taught school for a few months and then decided to devote himself to literature, for which he early had evinced a fondness. At 19 he went to New York City. His literary aspirations found no encouragement, and after a year of futile effort he removed to Boston. There he soon became widely known as a writer of stories and sketches under the pen name of Paul C'reyton. In his first book,

(Father Brighthopes5 (1853), Mr. Trowbridge caught the fancy of the boys of that day, and with a long series of volumes he held juvenile interest unabated through succeeding genera¬ tions. These included (The Drummer Boy5 (1863) ; (Cudjo's Cave; (1863) ; (The Three Scouts5 (1864); Neighbors' Wives5 (1867); (Coupon Bonds and Other Stories) (1872) ; (The Silver MedaP (1908) ; (A Pair of Mad- caps) (1909); (The Jack Hazard Series) ; (Toby Trafford Series) ; (Start in Life Series5 and (The Tide Mill Series.5 For many years he edited Our Young Folks, which numbered among its contributors Dickens, Whittier, Mayne Reid, Harriet Beecher Stowe and Louisa M. Alcott. Although his verse does not show the enduring excellence that marked his boys' books, (Darius Green and His Flying Machine5 (1870) proved him to hav£ been unconsciously a prophet with honor. Consult his autobiog¬ raphy, (My Own Story5 (1903).

TROWBRIDGE, Samuel Breck Parkman,

American architect: b. New York, 20 May 1862. He was graduated at Trinity College, Hartford (1883), at Columbia School of Architecture (1886) and then studied abroad. After gradu¬ ation from the School of

Architecture he was sent by the Archaeological Institute to superin¬ tend the erection of the American School of Classical Studies at Athens, Greece. Later he became a member of distinguished New York firms of architects and established a high stand¬ ard in his profession. He was appointed by President Roosevelt as chairman of the Na¬ tional Council of Fine Arts. He is a member of many foreign societies and was appointed a Chevalier of the Legion of Honor (1910) and elected to the National Institute of Arts and Letters (1915).

TROWBRIDGE, William Petit, American engineer : b. in Oakland County, Mich., 25 May 1828; d. New Haven, Conn., 12 Aug. 1892. He was graduated at West Point in 1848, served there during the last year of his cadetship as assistant professor in chemistry, later as assist¬ ant in the astronomical observatory, and in 1851 was assigned to the coast survey. His work on the Pacific Coast in 1853 embraced a series of magnetic and tidal observations covering a distance of over 1,300 miles, from San Diego to Puget Sound. In 1860, at Key West, Fla., he superintended the erection of the first perma¬ nent self-registering magnetic observatory in

the United States. After the outbreak of the Civil War he furnished minute descriptions of the rivers, harbors and inlets of the Southern coast to the War Department, and later was stationed at New York, where he superintended the accumulation and transmission of field-supplies. Besides these duties he superintended the construction of fortifications at Willett's Point and at Governor's Island, and the repairs of Fort Schuyler. In 1870 he became professor of mechanical engineering in the Sheffield Scien¬ tific School at Yale, and later held a professor¬ ship in the Columbia School of Mines, and at both institutions rendered an efficient service in the establishment and development of new courses of instruction. To him belongs the credit for the design of the first cantilever bridge, details of which are given in his work, Proposed Plan for Building a Bridge across the East River to Blackwell's Island5 (1869). A company was formed to carry out the scheme, but the financial crisis of 1873 put an end to the plan. He was the inventor of a coil-boiler, utilizing forced circulation of water, a principle that later came into use. His publications in¬ clude Neat as a Source of Power5 (1874) and (Turbine Wheels5 (1879).

TROY, troi, or ILIUM, a famous ancient city in the northwestern part of Asia Minor, the capital of the Troad, a region lying on the coast of the Higean Sea, at the entrance to the Helles¬ pont (Dardanelles). The fame of Troy rests upon the two Homeric epics, the Iliad and the Odyssey (see Homer), which, incidentally to their main themes, give an account of the long war in which the city was finally destroyed.

The date of the latter event is generally placed at 1184 b.c. The cause of the war was the ab¬ duction of Helen, the wife of King Menelaus of Sparta, by Paris, son of the Trojan king, Priam. Almost all the states of Greece proper united to avenge the insult, and, under the leadership of Agamemnon, king of Mycenae, landed on the Trojan coast with a large army. After besieging the city in vain for 10 years, they finally took it by a stratagem. They placed outside the walls a large wooden horse in whose interior a number of Greek heroes were con¬ cealed, and the rest of the army then retired to the ships as if they had given up the siege. The Trojans in exultation dragged the horse within the walls, and during the night the Greeks came forth and were joined by the main army which had returned from the ships. The city was now given over to fire, plunder and massacre. Among those who escaped was iEneas, who reached Italy, and, according to the legend, was the ancestor of the first Roman kings. The Homeric legend of Troy is believed by modern scholars to be woven around a nucleus of fact. About the 6th century b.c. a new Troy, Ilium Novum, was founded on what has ever since been believed to be the site of the Homeric city. The place is now called Hissarlik, and lies a few miles from the southwestern entrance to the Dardanelles. Here Dr. Schliemann began excavations in 1871 and again in 1890, and his researches prove that the site has been occupied successively by seven cities. The second of these from the bottom bears marks of having been destroyed by a conflagration. Within its walls were found the ruins of a palace, and a number of gold and silver ornaments. Dr. Schliemann

considered this second city to be the city of Priam and the Homeric legend, but later exca¬ vations have shown that only the sixth (the fourth from the top, later discoveries having increased the total number to nine) city can be referred to the period described in Homer. Of this city nothing remains except portions of the colossal and well-built outer walls. Consult Schliemann, (Trojanische AltertiimerP

TROY, Ala., city, county-seat of Pike County, on the Central of Georgia and the Alabama Midland railroads, about 50 miles south by east of Montgomery. It is in an agricultural region in which cotton is one of the principal products. It has been incorporated since 1843. Its industries are connected chiefly with the cultivation and marketing of cotton. The educational institutions are Troy Industrial Academy for colored pupils and public schools. There are two private banks. Pop. 6,000.

TROY, Mo., city, county-seat of Lincoln County, on the Saint Louis and Hannibal Rail¬ road, about 50 miles northwest of Saint Louis. It is in a region rich in deposits of glass sand, iron ore and coal, and surrounded by fertile agricultural lands. The chief manufacturing establishments are flour mills, butter and cheese factories and tobacco factories. The shipments are chiefly farm and dairy products, tobacco products and livestock. There is one high school, public elementary schools and a library. There are two State banks. Pop. about 1,120.

TROY, N. Y., city, county-seat of Rens¬ selaer County, on the east bank of the Hud¬ son, 150 miles north of New York, 191 miles west of Boston, 235 miles south of Montreal, Canada, and 296 miles east of Buffalo. It is at the head of tidewater navigation on the Hudson River, and the New York State Barge Canal system has its main outlet opposite the city. Through the State Barge Canal, Troy has connection with the Great Lakes and the North¬ west, while the Champlain branch of the canal gives an opening to Canadian territory. Steam¬ ers and barges ply regularly between Troy and New York and the intervening cities. The United States has spent large sums of money in improving the channel in the river so the larger vessels for the new canal system have no difficulty in reaching the canal. The steam railroads operating in Troy are the New York Central, the Delaware and Hudson, the Boston and Maine and the Rutland. There are also long-distance trolley roads, some of them main¬ taining freight service, that extend through the Hudson Valley to Lake George on the north; through the Mohawk Valley on the west ; south through the Hudson Valley and eastward to the manufacturing villages along the Wynantskill Creek, a distance of 12 miles. These transpor¬ tation facilities give Troy great advantages as a manufacturing and distributing point, so there are built up opposite the city, not half a mile from its borders, but not included in its population, the cities of Watervliet and Cohoes and the villages of Waterford and Green Is¬ land. With those places Troy is connected by bridges over the Hudson River, there being four. There is a modern steel bridge across the Hudson at Congress street, which carries

foot passengers, vehicles and street cars. Built as a toll bridge, the State of New York ac¬ quired it under condemnation proceedings.

Trade and Manufactures. — Troy ranks ninth in population among the cities of the State, but fifth in industries. The chief manufactures are collars and cuffs — about 90 per cent of all the collars and cuffs made in the United States are made in Troy. So great has this industry become in this city that special ma¬ chinery has been invented for it and is manu¬ factured here. It has an extensive system of laundries,

and for this industry special ma¬ chinery has also been invented and is manu¬ factured in this city. It is noted for its high grade of merchant iron; its valves and hydrants (valves of 96 inches inside diameter are now made here). Other manu¬ factures are stoves, knit goods, paper, cars, electrical machinery, mechanical and engineering instruments, bells, paints, clay products, floor cloths, brushes, tobacco, ci¬ gars, carriages, scales, currency ink, horseshoes, ranges, hydrover tractors, blowers and fans, fishline, twine, shirtwaists, cotton waste, knit goods, shirts, thermometers, stamped tinware, metal stove-front bars, marine engines, beaded bags, anchor chains, etc. The famous machine- made horseshoe invented by Henry Burden is manufactured here. He also made the largest over-shot water-wheel yet made in America. It is 60 feet in diameter. The guns for coast de¬ fense of the United States are made at the government arsenal at Watervliet, opposite Troy. Troy and its environs are now under¬ going a great industrial expansion, the first definite movement of this sort in the recent his¬ tory of the city. During the war, the Watervliet arsenal was enlarged until it became the largest government arsenal in the world for the produc¬ tion of heavy ordnance. The arsenal has been enlarged to provide in peace times the nucleus for adapting ordinary industries to the produc¬ tion of ordnance in- war periods in addition to its own production. This is an advanced step in government policy. Open hearth steel and pro¬ ducer gas plants are being erected and the city and district seem destined to obtain their former high standing as an iron and steel centre. The most significant development is the purchase of the northern end of Green Island by Henry Ford and Son of Detroit, as a site for a steel factory and farm tractor plant to be operated largely by power from the government dam across the Hudson at Troy. In addition to its great collar and shirt factories, Troy has be¬ come important for the manufacture of women's shirtwaists. There is a State dam across the Hudson at Troy and factories are operated by the power here obtained. There is considerable water power on the Wynantskill and Poestenkill creeks ; each stream has a fall of about 200 feet in the hills east of the city.

The city contains more than 258 concerns engaged in manufacturing and employing about 26,636 wage-earners and producing annually over $60,000,000 worth of goods.

The city is situated on a narrow alluvial plain, extending north and south along the river front for six and one-half miles. From the plain, and paralleling the river, a range of hills arises, in some places to a height of 500 feet. While most of the city is confined to the level ground, the finest residential part is on

the hills, of which the most prominent is Mount Ida. On a spur of this hill, jutting out boldly into the centre of the city, stands Prospect Park. The waterworks reservoirs are located on the hills east and northeast of the city. A new gravity system has been installed with a daily capacity of 18,000,000 gallons and the old gravity systems supplement this with 9,000,000 gallons.

There are a number of cemeteries in Troy, but Oakwood, containing 400 acres, crowns one of the hills east of the city, overlooking the valley of the Hudson opposite the delta of the Mohawk. The cemetery plateau is 300 feet above the plain, to which it inclines with precipitous sides. The Hudson is in sight for miles, while the Mohawk breaks through the hills to the west, tumbles over a rocky preci¬ pice 60 feet in height, then passes peacefully through its four mouths into the Hudson. Oak- wood cemetery is a resting place for three dis¬ tinguished national heroes. — Gen. John E. Wool, the commander-in-chief of the American forces in the Mexican War, Gen. George H. Thomas, <(the rock of Chickamauga,® and Gen. J. B. Carr of Civil War fame. General Wool's monument is a monolith 60 feet high, and weighing more than 100 tons. The Earl Crematory, a promi¬ nent object in Oakwood, is a memorial building erected at great cost, and contains, aside from a perfect incinerating apparatus, some fine mosaics, rare marbles and rich stained glass. The streets of Troy are regularly laid out until the river front is reached, when the streets are intersected by River street, which follows the curvatures of the Hudson River. These irregu¬ lar intersections form triangles misnamed squares. In one of these stands the Soldiers' and Sailors' monument, 93 feet high, costing over $50,000. On the lower sides of the stone work are bronze bas-reliefs representing battle scenes; one of them being a representation of the engagement between the Monitor and the Merrimac. This is a particularly appropriate scene because most of the armor plate of the Monitor was rolled in Troy. There are 100 miles of streets in Troy, of which 65.22 miles are paved.

Buildings. — Troy has many; public buildings of note and many of its citizens have built beautiful and substantial memorials for chari¬ table and educational work. Troy has de¬ veloped as an educational centre during recent years through the endowments of Mrs. Russell Sage, the widow of the noted financier, Russell Sage, who was a former resident of Troy. The gifts of Mrs. Sage have given an impetus to old institutions and enabled them to add ex¬ tensions. The Emma

Willard School has been removed from the central section of Troy and located in a new group of fine buildings, in the eastern section of Troy on the hills, over¬ looking the Hudson Valley and the Berkshires. The former home of the Emma Willard School has been converted into a women's college of applied arts and has an enrolment exceeding 300. Another educational enterprise which has done much to make Troy famous is the Rensselaer Polytechnic Institute (q.v.), an excellent school of civil engineering. Its graduates have designed some of the greatest engineering works of modern times. Extensive additions have been made to the Rensse¬

laer Polytechnic Institute through the aid of Mrs. Sage. It enrolls about 1,000 students. The post office, a fine granite structure; the savings bank building, which cost about $600,000, and which contains a fine Music Hall with seating capacity of 1,300; the public library, white marble in the Italian Renaissance style, cost about $300,000; the courthouse, city hall, Rowe Memorial, Young Men's Christian Association, Young Women's Christian Associa¬ tion ; R. P. I Alumni, Ilium and other commer¬ cial buildings, the Union station, a high school and the Rensselaer Hotel are among the city's notable structures. The leading charitable and religious institutions are the Troy Orphan Asylum, a group of buildings of the Eliza¬ bethan style of architecture; three Roman Catholic orphanages, a reformatory, a home for the aged, three hospitals, several very fine churches, and the Salvation Army Temple. The public and parish school buildings recently erected are all models of completeness and beautiful architecture.

Finances. — The assessed valuation of tax¬ able property is $61,194,631, of which $55,700,1 14 is for real estate, and the net bonded debt $4,379,620. The maintenance and operation of the city in 1919 was $1,256,360. There are several national banks, one State bank and two trust companies. There is one savings bank and three building and loan associations.

Government. — Troy is governed as a second class city of the State of New York and in addition to general State laws retains features of its old charter. The city is well governed, the principal problem being the comparatively great length, narrow width and steep grade of some streets leading to the residential districts on the heights to the East. The State of New York and city of Troy are co-operating in the election of an extensive system of docks to serve as terminals for traffic created by the New York State Barge Canal system.

History. — The site of Troy was the seat of several farms, in 1786,

when Albany had been called a city for a hundred years. The Mohegan Indians formerly had a fortified village on the site of Troy at a point just north of the Poestenkill Creek. The Mohawk tribe of Indians had a palisaded village on the west side of the Hudson River on an island formed by the third and fourth branches of the Mohawk River at its mouth. Hostilities broke out be¬ tween tribes, in which the Mohawks were suc¬ cessful, and the Mohegans were finally driven to the Connecticut River. The Dutch families, who afterward took possession of this ground on the east side of the river, found a natural meadow land, and they called it <(Pafraets Dael,® <(The paradise of a lazy man.®

The islands forming the delta of the Mo¬ hawk River, opposite Troy, were the scene of much activity during the Revolutionary War. The American army encamped here to obstruct the march of Burgoyne. The island which was formerly the site of the Mohawk Indian vil¬ lage, above referred to, was fortified on its north side by earthworks, under the superin¬ tendence of Thaddeus Kosciuszco. Gen. Philip Schuyler commanded the American troops, with his headquarters at Van Schaick's house, which is still standing. The fortifications may yet be plainly seen. From these islands the American

army marched north undei* General Gates, who succeeded Schuyler, and soon afterward fought the British at Schuylerville in what is known as the battle of Saratoga.

Three miles above the site of Troy stood a village called New City, afterward Lansing- burg. In 1787 New City had nearly 500 in¬ habitants, Albany had about 3,000, and Troy consisted of a few farmhouses. The deeper channel in the river at Troy made navigation so much easier than at New City that the enter¬ prising settlers who began to arrive from New England, seeing its advantages, located here. The settlement grew rapidly, being known at this time as <(Van der Heyden's.® In 1789 the settlers changed the name to Troy. The falls on the Poestenkill Creek were taken advantage of, and three mills were here erected, a saw mill, a grist mill and a paper mill; the last, the first of its kind in northern New York, was built in 1792. In 1808 a rolling mill was estab¬ lished on the Wynantskill Creek. Troy soon outstripped Lansingburg, and in 1793 the State legislature decided on Troy as the county-seat of Rensselaer County.

During the War of 1812 the merchants of Troy supplied large quantities of provisions to the American army. Samuel Willson, who slaughtered cattle and packed beef in Troy, supplied his beef to the army (

The charter incorporating Troy as a city was passed by the legislature in 1816.

The State dam was constructed across the Hudson River at Troy in 1823. This marks the tidal point of the Hudson River. At this time commerce with New York was mainly by sloops, of which 39 were recorded as owned by Troy merchants. In addition to its rapidly growing commerce, Troy now began to acquire fame as an educational city; the Emma Willard Seminary, established in 1814 and removed to Troy two years later, was developing a national fame ; and in 1825 the Rensselaer Polytechnic Institute was opened. The population of Troy was now 7,859. The population and industries increased rapidly, and it became an important manufacturing centre. Its collar and cuff and iron industries gave its growth a great impetus. Its remoteness from the mines has caused it to lose its supremacy in the iron industries, but the collar and cuff industry has steadily in¬ creased. Industrially, the city is noted for hav¬ ing a group of precision industries, that is, works where machining is done to a standard of one one-thousandths of an inch instead of the usual machine shop standard of one one- hundredths-inch. This was the determining factor in the government enlarging the Water- vliet arsenal during the war and after the war. Precision trained mechanics of this sort are found in few other centres in America. Troy has had several destructive fires. The most notable was the one of 10 May 1862, when the total value of property destroyed was $2,677,892 ; about 800 buildings were burned.

The village of Lansingburg and the city of Troy gradually grew toward each other until the dividing line was not apparent to the eye, yet each maintained its separate government.

In 1900 an act was passed by the legislature an¬ nexing Lansingburg and other outlying territory to the city of Troy. This act did not take effect until 1 Jan. 1901, too late to receive notice in the LTnited States census of 1900. However, an enumeration was taken by the census officials, as shown in the census reports, giving the popu¬ lation of Greater Troy as 75,057. The popula¬ tion in 1920 (U. S. Census) was 72,013. Consult Weise, (Troy's One Hundred Years*/*

Arthur J. Burch,

Secretary of Troy Chamber of Commerce.

TROY, Ohio, village, county-seat of Miami County, on the Miami River, the Miami and Erie Canal, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Cincinnati, Hamilton and Dayton railroads, about 20 miles north of Dayton. It was located in 1807 in an agricultural and stock-raising region, and has considerable manufacturing interests, being in¬ corporated in 1890. The principal manufac¬ tories are planing mills, foundries, bent wood and wagon factories, and a flour and grist mill. There is considerable trade in farm and dairy products, and in the local manufactures. The educational institutions are a high school, Saint Patrick's Academy, public and parish schools and a public library. The two banks have a combined capital of $300,000. Pop.

(1920) 7,260.

TROY WEIGHT. See Weights and

Measures.

TROYES, tnva, France, capital of the de¬ partment of Aube, and formerly of the province of Champagne, 103 miles east-southeast of Paris by rail, on the left bank of the Seine. Many of the streets are narrow and irregular, and lined with mediaeval timber hous£S. The principal edifices are the cathedral, a splendid specimen of florid Gothic; the churches of Saint Urbain, of Saint John and of Saint Madeleine, in the flamboyant style ; the hotcl-de-ville, the prefecture, the hospital, museum, palais de jus¬ tice and public library, containing 140,000 printed volumes and nearly 15,000 manuscripts. The manufactures consist of cottons, woolens, hosiery, soap, artificial flowers, paper, gloves, etc. There are numerous worsted and cotton mills. The division of the Seine here into sev¬ eral arms facilitates local water transportation. It carries on an important trade in grain, wine, brandy, colonial produce, famous sausages, hemp, wax, wool, wood, iron, lead, zinc, etc. The town was in existence previous to the con¬ quest of Gaul by the Romans, by whom it was called Augustobona. The Treaty of Troyes be¬ tween Charles VI and Henry V of England was concluded in 1420. Nine years later the English were expelled by Joan of Arc. The revocation of the Edict of Nantes in 1685 interfered with trade, so- the population was reduced from about 40,000 to 24,000. It has since recovered, and in 1911 was 55,486.

TROYLUS AND CRYSEYDE. One of

Geoffrey Chaucer's poems, written about 1380 and supposed to be a translation from Boccaccio. The episode first appears in a 12th century romance. See Troilus and Criseyde.

TROYON, trwa-yon, Constant, French painter: b. Sevres, 25 Aug. 1810; d. Paris, 21 Feb. 1865. He was one of the first and great¬ est of the French <(Naturalists,® and was

trained as a painter on porcelain. His pictures rank high among those of his contemporaries, and his cattle and landscapes rival the best productions of the Dutch school. He excelled in natural presentation of the familiar views of cattle in the fields and on the farms and was very prolific. The large French galleries all have numerous samples from his brush. There are several good examples of his work in the Ne\f York Metropolitan Museum, and among them Tow,' (0n the Road) and land¬ scape and Cattle. > Consult Dumesnil, (Constant Troyoffi (1888), and Hustin, (Les Naturalistes Frangais} (1893). The Brooklyn Institute, the Art Institute in Chicago, the Corcoran Gallery in Washington and others in Philadelphia and San Francisco have many of his canvasses. Consult Hustin, A., (Constant Troyon) (Paris 1893) ; Gansel, W., (Cosot und Troyon) (1906).

TROZO, tro'tho, or SAN JOSl£, san ho-sa', Philippines, a suburb oi the city of Manila, occupying the centre of the northeast quarter of the city, southeast of Tondo. The people are largely engaged in the mechanical industries ; there are also a few Chinese and native resi¬ dents of the upper class.

TRUANT SCHOOL, the popular name for

a school or reformatory for truant or vaga¬ bond children; organized under State auspices and managed by the State educational officials. In 1850 Massachusetts passed a law permitting the punishment of truancy by confinement. New Hampshire, New York, Rhode Island and Con¬ necticut made similar legislation before 1865, and New York and other cities made like pro¬ visions; but where the law was not a dead letter, habitual truants were classed as <(juvenile disorderly persons® and were sent to almshouses or reformatories. In 1880 Massachusetts began to establish county schools for truants, and sev¬ eral were established in large cities elsewhere. Many States and cities provide for the arrest of truants and their being replaced in the

pub¬ lic schools, a method followed in Continental Europe, where there are no institutions exactly parallel to the American truant school. In Great Britain there are two provisions for school of¬ fenders, the day industrial and the truant schools, based on the Industrial Schools Act of 1866, for (

TRUBNER, Nicholas, London publisher: b. Heidelberg, Germany, 1817 ; d. London, Eng¬ land, 1884. He learned his trade abroad and on coming to London was employed by Long¬ mans for a time. but in 1851 entered in busi¬ ness for himself and speedily became the head of Triibner and Company. He published a bibliographical Guide to American Literature) (1855), which was enlarged four years later; also (Trubner's Oriental Series* and the (Brit- ish and Foreign Philosophical Library.)

TRUCE, a temporary suspension of hostili¬ ties between two armies or states for negotia¬ tion or other purposes. It has almost the mean¬ ing of armistice, but suggests a more local understanding. A truce may, however, apply either to all the operations of a war or to

those at one place only, as a truce after a bat¬ tle for carrying off the wounded. A truce to become generally binding requires the sanc¬ tion of the commander-in-chief, it may be ended before the period previously agreed upon if due notice be given to the opposite party.

TRUCE OF GOD, the title given in the Middle Ages to a limitation of the right of private warfare introduced by the Church In order to mitigate an evil which it was unable to eradicate. This truce of God provided that private feuds should cease, at least on the holy days, from Thursday evening to Sunday even¬ ing in each week; also during the whole season of Advent and Lent and on the octaves of the great festivals. The salutary regulation was first introduced in 1033 in Aquitaine, then in France and Burgundy. Under William the Con¬ queror it was introduced into England, and in 1071 into the Netherlands. At many councils it was a chief subject of discussion and was enjoined by special decrees. Whoever engaged in private warfare on the prohibited days was excommunicated. The truce of God was also extended to certain places, as churches, con¬ vents, hospitals, churchyards, etc., and certain persons, as clergymen, peasants, merchants, pil¬ grims and, in general, all defenseless persons. At the Council of Clermont (1095) it was made to include all Crusaders. This institution died out when the rulers of the various coun¬ tries became strong enough to curb effectually their turbulent and powerful subjects.

TRUCK, Motor. See Motor Truck.

TRUCK ENGINE. See Internal Com¬ bustion Engine.

TRUCK FARMING. See Horticulture.

TRUCK SYSTEM, the practice of paying the wages of workmen in goods instead of money. This practice has prevailed in various places and trades, particularly in the mining and manufacturing districts of Great Britain, and the workmen have often had to pay ex¬ orbitant prices for their goods. Several acts of Parliament have been passed with the ob¬ ject of abolishing the system. In the United States the system was common in the Pennsyl¬ vania coal fields where miners are paid in store checks; at the end of the week or month their wages have been consumed by rent, sup¬ plies, groceries and other necessaries of life. In most of the States it is now prohibited by law.

TRUCKEE, truk-e', a river, the outlet of Lake Tahoe in California. It flows north, then enters Nevada and flows east, then north, enter¬ ing Pyramid Lake, which has no apparent out¬ let. The river is about 100 miles long. Reno, Nev., is the most important town on the river.

TRUDEAU, Edward Livingston, Ameri¬ can physician: b. New York, 5 Oct. 1848; d. 15 Nov. 1915. In 1871 he was graduated at the College of Physicians and Surgeons, New York, and established his practice in that city. Attacked by tuberculosis he removed to the region of Saranac Lake in 1873, and there re¬ mained until his death. In 1884 he founded a sanitarium for the treatment and cure of incip¬ ient tuberculosis among the poorer classes. For many years Dr. Trudeau followed the open-air method of treatment, and in 1894

founed the Saranac Laboratory for the study of tuberculosis, the first of its kind in America. Robert Louis Stevenson was among his most noted patients. He was recognized in America and abroad as the foremost authority on tuber¬ culosis and on methods for combating it. In 1905 he was president of the Association of American Physicians, and five years later of the Congress of American Physicians and Surgeons. He became first president of the National Association for the Study and Pre¬ vention of Tuberculosis. Consult his (An Autobiography5 (Garden City, N. Y., 1916) and Chalmers, Stephen, (The Beloved Physician5 (Boston 1916).

TRUE, Alfred Charles, American educa¬ tor and agriculturist: b. Middletown, Conn., 5 June 1853. He was graduated at Wesleyan Uni¬ versity, Connecticut, from which he also received a degrees of D.Sc., and after a graduate course at Harvard, 1882-84, was an instructor at Wesleyan, 1884—88. He then entered the United States Department of Agriculture; was suc¬ cessively editor, vice-director and director (1888-1915) of the office of experiment sta¬ tions, and became director of the State Rela¬ tion Service in 1915. For many years he was editor-in-chief of the Experiment Station Record and the Experiment Station Work, and had charge of investigations in irrigation, drainage and human nutrition. He still has supervision of the Federal work and expendi¬ tures for agricultural experiment stations in all the States and in Alaska, Porto Rico, Hawaii and Guam, and for co-operative ex¬ tension work in agriculture and home economics throughout the United States under the Smith- Lever Act of 8 May 1914, together with in¬ vestigations in home economics and agricultural education. In 1914 he was president of the Association of American Agricultural Colleges and Experiment Stations, and since 1902 has been dean of the Graduate School of Agri¬ culture maintained by the association. He is the author of monographs on agricultural ex¬ periment stations in the United States and on agricultural education.

TRUE, Charles Kittredge, American edu¬ cator : b. Portland, Me., 14 Aug. 1809; d. Brooklyn, N. Y., 20 June 1878. He was gradu¬ ated at Harvard in 1832, was subsequently pastor of several Methodist churches and prin¬ cipal of the Amenia Seminary. In 1849 he re¬ ceived the degree of D.D., from Harvard, and was professor of moral philosophy at Wesleyan University (1849-60). He was a ready writer and produced many books, notably (Life and Times of John Knox5 (1874); (The Thirty Years' War5 (1879), and the (Life of Captain John Smith5 (1882).

TRUE, Frederick William, American biol¬ ogist : b. Middletown, Conn., 8 July 1858*; d. 25 June 1914. Graduated, University of the City of New York, 1878; entered the government service in 1878 ; and was expert special agent on fisheries for the 10th census, 1879. He was curator of the department of mammalia at the United States Museum, 1881-92, an executive curator, 1892-97. In the year last named he was appointed head curator of the department of biology at the United States National Museum. He published (Review of the Family of

Delphinidse5 ; (Whalebone Whales of the West¬ ern North Atlantic5 (1904) ; Observations on Living White Whales5 (1911), etc.

TRUE, Rodney Howard, American bot¬ anist and physiologist : b. Greenfield, Wis., 14 Oct. 1866. His education was secured at the University of Wisconsin and at Leipzig, where he took his Ph.D. degree (1895). He taught in the schools of Wisconsin, was made a lec¬ turer in botany in Harvard in 1900-01, since which time he has been in charge of physiological investigations for the United States Depart¬ ment of Agriculture. His writings though voluminous are chiefly contributions to scien¬ tific journals.

TRUEBA Y COSIO, Telesforo De, Span¬ ish author: b. Santander, Spain, 1798; d. Paris, 1835. He was educated in a Catholic college in England, and served as an attache to the Spanish legation there until 1822. Returing to Spain he founded an academy of the younger generation of poets and wrote two comedies which rank with the best productions of the time. Subsequently he fled for political rea¬ sons to London, where he gained repute as a fluent English writer. His greatest success was won by his description of manners, (Paris and London5 (1831). He returned to Spain in 1834, and was elected to the Cortes.

TRUEBLOOD, Benjamin Franklin,

American publicist: b. Salem, Ind., 25 Nov. 1847; d. Newton Highlands, Mass., 26 Oct. 1916. He was graduated from Earlham Col¬ lege, Richmond, Ind., in 1869; entered the ministry of the Society of Friends the same year, and was president of Wilmington (Ohio) College, 1874-79. He was president of Penn College, Oskaloosa, Iowa, 1879-90, and received the following honorary degrees : LL.D., Iowa Wesleyan University, 1887; LL.D., State Uni¬ versity of Iowa, 1890; LL.D., Baylor Univer- city, Waco, Tex., 1907. Dr. Trueblood was secretary of the American Peace Society in Boston, 19 years, in Washington, four years; was editor of the Advocate of Peace, 1892-1915, and published (The Federation of the World5 (1899). He made translation of Kant's (Zum ewigen Frieden5 (1897) ; also published many pamphlets, numerous articles in magazines, gave many lectures on inter¬ national subjects, participated in International Peace Congresses and many other conferences. On account of broken health he resigned the secretaryship of American Peace Society, May 1915, and was elected honorary secretary of the American Peace Society.

TRUFFLES, subterranean saprophytic fungi (q.v.), chiefly European Tuberacece, the mycelia of which grow in leaf-mold. Their fructifications are edible, solid tuber-like bodies, ranging from the size of a filbert to that of a potato, and ultimately set free by the decay of the mycelium. There are several species of truffles, which are not only

nutritious but very much esteemed for their aromatic flavor and piquant taste, and are used in fine cooking, pates, etc. Although white truffles are some¬ what in demand, it is the black or queen truffles (Tuber cibarium, T. cestivum, or T. melanosper- mum) of England and France, which are in most demand, those of Perigord being con¬ sidered as the finest. These are of varying

size, and have a gray or seal-brown or nearly black skin, which is pebbled, or warty, with small angular protuberances. The firm in¬ terior, with such a texture as has an immature puff-ball, is dark-brown, somewhat mottled by reason of its chambered structure, and retic¬ ulated with the white films of hyphae. Truffles are practically never cultivated, in spite of various attempts, but are occasionally cared for in situ. They thrive best in limestone soils, and in such light, moist, but well-drained wood¬ lands, as are frequented by the various species of trees near which the truffles prefer to exist — possibly on their decaying roots. The tubers are entirely subterranean, occurring either deep in the ground or close to the surface, ripen in winter and are dug out, either laboriously by unaided man with a sharp spud, or by the aid of dogs and pigs. The latter are com¬ monly used in Perigord, their rooting instincts and fine nose for scent being turned to account. A trained sow will sniff the peculiar pervasive odor exhaled by a ripe tuber, and will make directly for it, either laying it bare or uprooting the solitary tuber, to be rewarded with an acorn or chestnut. Good intelligent sows in a prolific forest will unearth 10 or 12 pounds of truffles in a day, which will bring in a good price. Dogs are also used in the same manner, especially by poachers. The red truffle (Melanogaster varie- gatus) is, like the false truffle (Scleroderma vulgare), allied to the puff-balls; and Terfezia leonis . is the white, potato-like truffle of Italy. The African species of Terfezia and Tirmannia, somewhat inferior in quality, in some parts of Algeria and Tunis form an important food- supply for the people.

TRUJILLO, troo-hel’yo, or TRUXILLO,

Peru, the capital of the department of Libertad, situated close to the Pacific Coast, 320 miles northwest of Lima. It is partially surrounded by ancient adobe walls, believed to be 250 years old. It has a cathedral, a national college and a university. There are interesting ruins of a former great city four miles to the north. The port is Salavery, connected with the city by a short railroad. Many bananas

are shipped north. Pop. about 8,000.

TRUMBITCH, Ante, Foreign Minister of the Serb-C'roat-Slovene kingdom (1918), was born Spalato, Dalmatia, and was for many years mayor of that city. A prominent lawyer, he became president of the Dalmatian Pro¬ vincial Diet and a Dalmatian deputy to the Austrian Reichsrat. He escaped from Austria on the outbreak of the war and assisted to form the Southern-Slav Committee, of which he was elected president. In July 1917 he concluded the Declaration of Corfu with Serbia — the pre¬ liminary charter of Southern-Slav unity under the Karageorgevitch dynasty. In March 1918 he also concluded the Italo-Southern-Slav agreement with Italy and was appointed Foreign Minister of the new kingdom on 22 Dec. 1918.

TRUMBULL, trum'bitl, Annie Eliot,

American novelist, daughter of J. H. Trumbull (q.v.) : b. Hartford, Conn., 2 March 1857. She was graduated Horn the Harvard High School in 1876 and has published (A Cape Cod Week) (1898) ; hod's Salvation> (1898) ; 'Mistress Content Cradock) (1899) ; 'Life's Common Way) (1903) and other works.

TRUMBULL, Gurdon, brother of H. C. Trumbull (q.v.), American artist: b. Stoning- ton, Conn., 5 May 1841 ; d. Hartford, Conn., 28 Dec. 1903. He learned his art in Hartford and New York. It was in studies of fish that he achieved his reputation and his most noted works were (Over the FalP ; (A Plunge for Life) and 'A Critical Moment.5 He was the illustrator of the work of his sister, Mrs. Annie T. Slosson, (The China Hunters' Club,5 and was author of the work entitled (Names and Portraits of Birds. 5

TRUMBULL, Henry Clay, American au¬ thor and editor: b. Stonington, Conn., 8 June 1830; d. Philadelphia, Pa., 8 Dec. 1903. He was educated at Williston Seminary, East Hampton, Mass., and at first engaged in railroad business at Hartford, but in 1858 became State mission¬ ary of the American Sunday School Union for Connecticut. He was ordained to the Congre- gationalist ministry in 1862, entered the Union army as chaplain, and served through the war with the exception of a portion of 1863, when he was held a prisoner by the Confederates. He was appointed missionary secretary for New England of the American Sunday School Union in 1865, normal secretary in 1871 and in 1875 he removed to Philadelphia. He purchased the chief interest in the Philadelphia Sunday- School Times in that year and was its editor until his death. He discovered the site of Kadesh-barnea on the southern border of Pales¬ tine while on a tour of the East in 1881.

His works include (The Sabbath School Concert5 (1861); ‘The Knightly Soldier> (1865); (Kadesh-barnea } (1884) ; (Studies in Oriental Social Life5 (1894) ; ‘War Memories of an Army Chaplain5 (1898) ; (01d Time Student Volunteers5 (1902), etc.

TRUMBULL, James Hammond, Ameri¬ can philologist, brother of H. C. Trumbull (q.v.): b. Stonington, Conn., 20 Dec. 1821; d. Hartford, Conn., 5 Aug. 1897. He was educated at Yale, assisted Rev. James H. Linsley in com¬ piling catalogues of the mammalia, reptiles, fishes and shells of Connecticut in 1842-43, was assistant secretary of the State of Connec¬ ticut in 1847-52 and again in 1858-61, and sec¬ retary during the Civil War, 1861-65. He was corresponding secretary of the Connecticut His¬ torical Society in 1849-63, and its president in 1863-89. In 1863-91 he was librarian of the Watkinson Library of Reference at Hartford, was an original member of the American Philo¬ logical Society from its organization in 1869 and was its president in 1874-75. He was elected to the National Academy of Sciences in 1872 and was appointed lecturer on the Indian languages of North America at Yale in 1873. He prepared the catalogue of Ameri¬ cana belonging to George Brinley which added much to his reputation as a bibliographer, and devoted the closing years of his life to the com¬ pilation of a dictionary and vocabulary from John Eliot’s Indian Bible, which he was re¬ puted to be the only living American able to read. His manuscript was published under the title (Natick Dictionary5 (1903). His other works include (Colonial Records of Connec¬ ticut5 (3 vols., 1850-59); (The Best Method of Studying the Indian Languages5 (1871) ; historical Notes on the Constitution of Con¬ necticut5 (1872) ; ‘Indian Names of Places in

and on the Borders of Connecticut with Inter- pretations) (1881) ; (Memorial History of Hart¬ ford County > (2 vols., 1886), etc.

TRUMBULL, John, American jurist and poet : b. Westbury (now Waterbury), Conn., 24 April 1750; d. Detroit, Mich., 10 May 1831. Graduated at Yale in 1767, he began in 1770 to contribute to the Connecticut Journal and New Haven Post-Boy a series of essays called (The Correspondent, > patterned after (The Specta¬ torˆ in which he satirized the controversial writers of the time and the American slave-traffic’; and published in that year (An Essay on the Use and Advantages of the Fine Arts.* In 1771 he became a tutor in Yale and began the study of law, which he continued in John Adams’ Boston

office in 1773, in which year he was admitted to the bar. He practised at New Haven in 1774-76, at Westbury in 1776-81 and from that time at Hartford. In 1789-95 he was State's attorney for Hartford County, in 1792 and 1800 was elected to the legislature, in 1801-07 was judge of the Connecticut Superior Court, and in 1808-19 of the Court of Errors. From 1825 he resided at Detroit. His (Progress of Dulness* (Part I, 1772; Part II, 1773) was his first elaborate work in verse. It was a clever satire on the defective culture of contemporary American society, and its epigrammatic ridicule made a great stir. But he is known for (Mc- FingaP (1782), a burlesque epic, in the metre and much in the style of ˆudibras,* which it follows, however, without sacrifice of origi¬ nality. It admirably developed the humorous characteristics of that disturbed time, and from the first had an unprecedented popularity. Its hero is Squire McFingal, a Scottish-American Tory politician of Massachusetts, with a gift for tedious and inflated speechifying; his Whig opponent, Honorius, seems to be, according to Tyler, a portrait of John Adams. It was the most representative of the distinctly literary productions of the Revolution, to whose move¬ ment it greatly contributed. No contempo¬ raneous record presents so well the thought of the period. In pointedness, in ingenuity of rhyme, in the skilful arrangement of its ludi¬ crous narrative, it is admirable. Many extracts such as :

"No man e'er felt the halter draw.

With good opinion of the law,'1

passed into the general anthology of quotations. It was reprinted by Lossing, with introduction and notes, in 1857, and another edition of it appeared in 1881. In all, about 40 editions have been circulated in the United States and Eng¬ land. For its full understanding the work now requires some study of the Revolutionary epoch. Trumbull's (Poetical Works> were collected in 1820. Consult the excellent account in Tyler, ˆLiterary History of the American Revolution

(1897).

TRUMBULL, John, American artist; b. Lebanon, Conn., 6 June 1756; d. New York, 10 Nov. 1843. He was graduated at Harvard in 1773; studied painting in Boston; served in the Revolutionary War; and in 1780 went to England to study under West, but was im¬ prisoned on a charge of treason and forced to leave the country. Subsequently he returned to England and became the pupil of West. In 1786 he produced his first historical picture, the

(Battle of Bunker Hill*; which was soon fol¬ lowed by the (Death of Montgomery Before Quebec* and (Sortie of the Garrison from Gibraltar.* In 1817 he was employed by Con¬ gress to paint four pictures for the rotunda of the Capitol at Washington, namely (The Dec¬ laration of Independence, * the Surrender of Burgoyne,* the Surrender of Cornwallis,) and the designation of Washington at Annapolis. > He was for many years engaged in finishing his sketches, many of which, together with por¬ traits and copies of old masters, 54 pictures in all, he surrendered to Yale College in considera¬ tion of an annuity of $1,000. Consult his Auto¬ biography) (1841).

TRUMBULL, Jonathan, American patriot : b. Lebanon, Conn., 12 Oct. 1710; d. there, 17 Aug. 1785. Graduated from Harvard in 1727, he studied theology and was licensed, but in 1731 left the ministry for the law, was a member of the assembly in 1733, its speaker in 1739, and deputy-governor in 1767-68. From 1769 until his resignation in 1783 he was governor. Dur¬ ing the Revolution he worked with vigor for independence. He is said to have been the original <(Brother Jonathan** (q.v.), that being Washington's familiar name for him. He was the only colonial governor to take the popular side in the struggle; and when notified by Washington (August 1776) of the inadequacy of the army, called for nine more regiments of 350 each, in addition to the five Connecticut regiments already supplied. These troops ar¬ rived at New York just in time to meet the British advance. In 1766-69 Trumbull was also chief justice of the Superior Court of Connec¬ ticut, and as such he has been highly praised by Bancroft. Consult the (Life* by Stuart

(1857).

TRUMBULL, Jonathan, American politi¬ cian, son of the preceding: b. Lebanon, Conn., 26 March 1740; d. there, 7 Aug. 1809. He was graduated from Harvard in 1759, and prior to the Revolution was a member of the Connecti¬ cut legislature and speaker of the house. He was paymaster-general in the Connecticut army, 1775-80, and military secretary to Washington, 1780-83. He sat in Congress, 1789-95, being speaker of the House of Representatives, 1791— 95, was United States senator, 1795-96, lieu¬ tenant-governor of Connecticut, 1796-98, and governor from 1798 till his death.

TRUMBULL, Joseph, American states¬ man: b. Lebanon, Conn., 7 Dec. 1782; d. Hart¬ ford, Conn., 4 Aug. 1861. He was graduated at Yale in 1801, was admitted to the bar at Windham in 1803 and settled in Hartford where he practised until 1828. He represented Hart¬ ford in

the legislature in 1832-48 and in 1851, was representative in Congress in 1839-43 and in 1849-50 was governor of Connecticut.

TRUMBULL, Lyman, American politician: b. Colchester, Conn., 12 Oct. 1813 ; d. Chicago, Ill., 25 June 1896. He studied law in Georgia, was admitted to the bar and settled in Belle¬ ville, Ill., in 1837. He was secretary of state of Illinois in 1841-42; and justice of the Supreme Court of the State in 1848-53. He was United States senator, 1855-73, and although formerly a Democrat, became prominent as a Republican. He secured the passage of the 14th Amendment ; and was one of the Republicans who voted

against the impeachment of Andrew Johnson. After 1872 he supported the Democratic party.

TRUMPET, a musical wind-instrument with a flaring mouth, generally made of brass, and sometimes of silver. Primitive trumpets were straight tubes. The curves were intro¬ duced to shorten the length. Slides, valves and keys are now added. (See Horn). The orchestral or slide trumpet consists of a tube about five and one-half feet long, twice curved, and ending in an open cone. The slide is on the second curve. The scale of the slide trum¬ pet begins with A sharp in the first space of the brass stave, and extends to C above the treble stave, but C below the bass stave can be produced. The natural notes are C (below bass), C (octave), G, middle C, E, G, B flat, C, D, E, F, G, A, B flat, B, C. A univalve trumpet was introduced by Bassett in 1876. The addition of the valve greatly improves the slide trumpet in accuracy and completeness without injuring its characteristic tone. The trumpet, with its thrilling notes and bugle calls, is well fitted for military music.

TRUMPET-FISH, or TRUMPETER, one of the most important food-fishes (Latris hecateia) of the southern hemisphere. It ranges from 30 to 60 pounds in weight and is considered the best flavored of any of the fishes of New Zealand, Tasmania and South Aus¬ tralia. Large numbers are smoked and sent into the interior.

The name is also applied to several species of fishes belonging to the small families Aulosto- midce, Fistulariidoe and M aero rhcimp hosidee, all belonging to the order Hemibranchii, and all having the facial bones much elongated to form a tube bearing the small nearly or quite toothless mouth at the end. They are fishes of peculiar aspect,

the body as well as the head being elongated and sometirhes protected by bony plates, and in the Fistulariidce the caudal fin bears a pair of long, slender filaments. These fishes are variously known also as to¬ bacco-pipe fishes, cornet-fishes, snipe-fishes and bellows-fishes, all these names having reference to the tubular snout. They are tropical, and species of each family occur in the Gulf of Mexico and the southern waters of the United States.

TRUMPET-FLOWERS, plants belonging to Tecoma and Bignonia and allied genera of the family Bignoniacece, having trusses of gaily-colored flowers with funnel-form corollas. Campsis grandidora is the showy trumpet- flower or trumpet-creeper from China, with drooping, salmon-yellow and scarlet flowers three inches broad, but is not so hardy as the American C. radicans, which is a very common shrub of the South, and is called Virginia trum¬ pet-flower by foreigners. It climbs high by rootlets, sending out long, pendulous sprays with opposite pinnate leaves which end in a corymb of tubular flowers, orange colored as to the tubes, and expanding into a five-lobed scarlet limb. Both of these species are planted extensively, as ornamental vines, to cover walls, verandas, etc. The yellow elder, or upright trumpet-flower (Tecoma stans), is an evergreen shrub of erect growth introduced from Central America, and growing readily in southern Florida. The leaves are pinnate, and immense panicles of golden-yellow flowers bend down

the branches with the weight of their bloom. The Cape honey-suckle (Tecomaria capensis) is an evergreen climber which can be trained into shrub form, and is useful for Florida; it can also be grown as a climber, or as a pot-plant, in northern greenhouses. Bignonia venusta of Brazil is another greenhouse climber in the North, but can be grown out of doors in warm climates. Its hanging, ˆtring-like shoots are clothed with axillary and terminal clusters of large tubular orange-yellow flowers, for four or five feet of their length. The cross-vine, or quarter-vine (B. crucigera) of the southern United States, so called because a transverse section of the stem shows a cruciform marking, is also known as the tendriled trumpet-flower. The leaves are pinnate with only two leaflets, and terminate in a branched tendril ; the flowers are large and campanulate with undulate or slightlyjobed limb borne in few-flowered cymes. Gelsemium sempervirens, formerly classified among bignonias, is not only called yellow jas¬ mine, but also the evergreen trumpet-flower. Various species of Solandra, Brunfelsia,Catalpa, and Datura , are known as trumpet-flowers ; es¬ pecially tropical tree-species of Datura, such as in Java form boundary hedges about the coffee plantations, and are a marked feature in the landscape. Tlievetia neriifolia, of tropical America, is an oleander-like,

poisonous plant, with yellow, fragrant flowers, and curious fruit, and is known as yellow-oleander, or trumpet- flower; it grows luxuriantly in Florida.

TRUMPET SHELL, a large marine gas-

teropod (Triton variegatus) of the South Seas. The shell, which is a foot or more in length, is white mottled in irregular spiral rows with ruddy brown and yellow, deepening into chest¬ nut at the point; interior white; lip with smooth white ridge on a black ground. It is employed by the Australian natives and the South Sea Islanders as a trumpet. To fit the shell for this purpose a round hole is bored at the side, about one-fourth the length from the tip, and a loud hoarse sound is produced by blowing across the hole, as a performer plays a flute. While blowing, the right hand is placed in the cavity of the shell. The large conch shells of the West Indies are frequently pierced and used for the same purpose.

TRUMPETER, a genus (Psophia) of wading-birds, related to the cranes, found in South America, and so named from their hollow cry, which results from the peculiar conforma¬ tion of the windpipe or trachea. The bill is short and stout, and except for their long legs and necks these birds resemble fowls. The most familiar species is the golden-breasted trumpeter (P. crepitans), which is readily tamed and becomes a favorite inmate of the house. The head and neck are velvety-black; the breast is _ glossy-green ; the back gray; and the wings, tail and under parts black. This species, like the others, lives in the forests in flocks; and feeds upon fruit, seeds and insects. They run swiftly but seldom fly. The eggs, numbering 10 or 12, are light-green in color, and are de¬ posited in a mere hole scratched in the ground. Only about five other species are known, all belonging to the single genus and constituting the family Psophidoe. A large North American swan (Olor buccinator) has also borne the name. See Trumpet-fish.

TRUNK FISH

\

TRUMPETER OF SAKKINGEN, The.

The Trumpeter of Sakkingen (Der Trompeter von Sakkingen, 1853) by Joseph Viktor von Scheffel, the most widely read of modern Ger¬ man

stories in verse, blends the 17th century tradition of the checkered but finally happy love of a musician of Sakkingen and a baron's daugh¬ ter with experiences of Scheffel's varied life. The nairative, humorous, thoughtful and quizzi¬ cally satirical, interspersed with songs, grave and gay, tells first how Werner, student musi¬ cian, under the protection of the Pastor (Schef¬ fers friend Riesterer of Rickenbach) becomes music teacher to the squire's daughter Marga- reta. Their loves are rudely sundered by the paternal aristocrat. Werner, going to Rome, becomes band-master to Pope Innocent XI. At a pontifical function 1 July 1679, Margareta recognizes Werner and swoons. The Pope, learning their story, ennobles Werner, unites the lovers and procures the squire's blessing. Sardonic comments and lyrics by the Pastor's cat, Hiddegeigei, on the course of true love are possibly a bitter-sweet echo of Scheffel's own disappointment in his love affair with his cousin Emma Heim. The Silent Man reflects the au¬ thor's political disillusions of 1848. There are over 300 German editions of the 'Trumpeter.* It has been best rendered in English by T. Martin (1893).

Benjamin W. Wells.

TRUMPETS, Feast of, a Jewish feast on the first and second days of the seventh month (Tisri), which was to be kept as ((a sabbath, a memorial of blowing of trumpets, an holy convocation.® No servile work was to be done on it; but an offering of fire was to be presented to Jehovah (Lev. xxiii, 23-25). It preceded by 10 days the Great Day of Atonement (27). In Numbers (xxix, 1-6), details are added as to the "offering of fire,® which was to include the burnt offering, a meat offering, and a sin offering. The first of Tisri was New Year's Day of the civil year. It is still observed as a Jewish festival.

TRUNK, a light strong oblong box, now usually made of wood, cloth, leather or fibie, with metal corners, fastenings, locks, etc., used by travelers as a receptacle for clothing and other personal belongings. In the 18th century few trunks were needed as there was little traveling. The business of manufacture was then generally conducted by those who were saddlery and harness makers. It has long been a staple business, and of recent years shows a tendency to specialize. The most popular mod¬ ern trunk is the wardrobe trunk, made to stand on one end, with supports for hanging gowns, coats, tiousers, etc., and also a set of drawers with dressing case conveniences. Another specialty is the auto-trunk made in a variety of shapes to fit odd spaces in automobiles. In New York in 1840 there were 11 makers, and in 1901 there were five large factories whose sales amounted to $2,000,000. In the United States in 1905 there were 373 establishments engaged in

the manufacture of trunks and valises, paying out $4,139,034 in wages. In 1914 there were 561 manufacturers in the country, employing over 10,000 people, using a capital of $18,571,000 and producing goods to the total value of $26,477,000, of which $12,847,000 rep¬

resented actual production, the balance being cost of materials. Trunks and valises to a value of about $1,000,000 were manufactured in addition by other industries. This showing, however,- represented a falling off of about 10 per cent as compared with 1909. New York State manufactures over one-fourth of all the trunks made in the United States and Pennsyl¬ vania, Illinois and Virginia come next.

TRUNK-BACK. See Leather-turtle.

TRUNK-FISH. A variety of fish of the order Plectognathi and the sub-order Ostraco- dermi. See Coffer^fish.

TRUNK-HOSE, a kind of short wide breeches gathered in above the knees, or im¬ mediately under them, and distinguished accord¬ ing to their peculiar cut as French, Gallic or Venetian. This garment prevailed during the time of Henry VIII, Elizabeth and James I.

TRURO, troo'ro, Thomas Wilde, Baron, English statesman: b. London, 7 July 1782; d. there, 11 Nov. 1855. He was educated at Saint Paul's School, studied law, and in 1817 was called to the bar. He was retained for the defense of Queen Caroline in 1820 and made himself famous by his conduct of the case. He entered Parliament in 1831, sitting for Newark- on-Trent, and continued to hold that seat until 1841, with the exception of the years 1832-35. He subsequently represented Worcester until 1850 when he took his place in the House of Lords. He was appointed Solicitor-General in 1839, and Attorney-General in 1841, though he occupied the latter office but a few months. He introduced Rowland Hill's postal reform plan to the House in 1843, and in 1846 was re¬ appointed Attorney-General by Lord Russell, an office which he vacated a few days later to become chief justice of the Court of Common Pleas. He was sworn as lord-chancellor in 1850 and at the same time was created Baron Truro. His career as chancellor was eminently successful, a fitting conclusion to his long and honorable career.

TRUSDELL, Charles Gregory, American philanthropist: b. Montgomery, N. Y., 1 May 1826; d. Chicago, Ill., 16 Feb. 1903. He received an academic education, studied theology, and in 1857 was ordained in the Methodist ministry. He held various charges in Iowa

until 1865, in which year he became presiding elder of the Iowa City district. He subsequently accepted the pastorate of a church in Chicago and preached there until the fire of 1871 when he was appointed to superintend the distribution of the relief fund. In this capacity he expended nearly $5,000,000 for the relief of the fire suf¬ ferers. The Relief and Aid Society was con¬ tinued afterward for the benefit of the Chicago poor and Trusdell remained superintendent until his death. He was appointed presiding elder of Chicago in 1885.

TRUSS, in surgery, an appliance for the support of a rupture or hernia (q.v.), or for keeping the injured parts in place when reduced. It consists of a pad of wood, hard rubber or other hard material, or of soft rubber filled with water — a water-pad — for compressing the aperture through which the hernia protrudes. In an inguinal hernia this pad is held in place

by a steel-spring band, or some metallic band molded to fit the inequalities of the body, passing wholly or partly about the hips, and assisted by a leather strap. Usually one of two pads are attached to the band posteriorly where pressure is exerted on one or both sides of the spine. A fair temporary truss may be made of a com¬ press of cloth, cotton, oakum, etc., held in place by adhesive plaster and a spica bandage. An umbilical hernia may be kept in place by a pad, strips of adhesive plaster, and a cloth bandage. An ill-fitting, uncomfortable truss does harm.

TRUSS, in architecture, a combination of braced timbers, or of steel-work, or of both together, so arranged as to constitute a frame, that resists strains in two or more directions. A trussed beam is one braced against deflec¬ tion. (For illustrations of trusses, see Bridge). The simplest example of a truss is the principal or main couple of a roof, in which the tie- beam is suspended in the middle by the king¬ post to the apex of the angle formed by the meeting of the rafte’rs.

TRUSS BRIDGES. See Bridge Construc¬ tion, Modern Methods of.

TRUST COMPANIES. See Banks and Banking — ‘Trust Company.

TRUSTEE, in law, a person to whom property is legally committed in trust, to be ap¬ plied either for the benefit of specified individ¬ uals or for public uses. The person for whom or in whose favor the trustee holds the estate, or any interest therein, is called the cestui que trust.

Trusts are generally raised by marriage settlements or by wills. The ordinary trusts in the former case, as to real estate, are, in the first place, for securing to the wife payment of her pin-money during marriage, and of her jointure on her becoming a widow; then for raising the stipulated provisions for younger children, and also for providing for their main¬ tenance while minors. Trusts are commonly raised in wills for the maintenance or advance¬ ment and portioning of children. Trustees may be declared verbally as regards personal estate, but as to land, writing is necessary. No one is compelled to undertake a trust, but if he once accept he cannot renounce it unless the trust- deed contains a provision enabling him to do so, or by the consent of all those beneficially inter¬ ested in the estate. Trustees are bound to act in strict accordance with the terms of the trust, and are liable for the consequences of any breach of trust. However, courts may relieve a trustee from personal liability, either wholly or partly, if he has acted honestly and reasonably. They are accountable for the interest which they do or might make from the employment of the money in their possession, as also for the whole profits they may derive from trading with the trust fund. As their office is considered purely hon¬ orary, they are not entitled to any allowance for their trouble in connection with the trust. Trustees are liable for any misapplication of the trust fund arising either from ignorance of facts which they might by common diligence have known, or from ignorance of the law in any case, even though they may have acted in good faith and in reliance on the opinion of eminent legal advisers ; but they may apply for advice by petition to a judge or by summons

to a judge, and so be absolved from responsi¬ bility. The estates of trustees deceased are liable in the case of fraudulent administration. The appropriation of the trust fund by the trustee to his own use makes him liable to prosecution and punishment by imprisonment. There is a growing tendency to leave such trus¬ teeships to trust companies.

TRUSTS. I. An economic unit is an ag¬ gregate of land, labor and capital united to¬ gether by more or less permanent bonds and operating under the guidance of some direct¬ ing mind or minds. Economic units differ in size, in the character of the work done and in the relative amount of the co-operating ele¬ ments employed, but all are alike in one respect, viz., all are destroying natural resources and using up human energy in order to produce commodities and services necessary for human existence or human pleasure. Under the capi¬ talistic system, each economic unit is controlled and directed by certain persons called proprie¬ tors, who, generally speaking, own the land, hire the labor and reap the benefits that arise from producing

the commodities or services at: less than the costs incurred. Under such cir¬ cumstances, the proprietors naturally try to form economic units of such size and such character as to secure a minimum of costs for a given benefit or a maximum of benefits for a given cost or costs. In this connection, three facts should be borne in mind; first, it is al¬ ways much easier to form and to operate small economic units than large ones ; second, in cer¬ tain kinds of work, larger units are necessary, in many kinds, the larger units are more pro¬ ductive and therefore more profitable for their proprietors ; third, economic units may be united into compound economic units, or systems, of such size and character that all or nearly all the advantages which might have been obtained by the creation of large size units at the outset are gained by the process of uniting or amalgamat- ingˆ existing economic units at any time after their formation. In view of the above condi¬ tions it is not only natural but in most cases extremely desirable that proprietors should start out in a modest way, compare costs and re¬ sults in the small and large units operating in the same particular field and attempt to ad¬ just the size of the operating units according as the small or large are found to be more pro¬ ductive.

An increase in the size of the units and in the scale of the operations may be secured either by adding more land, labor and capital to existing units or by uniting existing units into systems as above stated. The former proc¬ ess secures the requisite size by growth, the latter by union. Generally speaking, wherever conditions have changed in such a way that the larger units possess advantages over the smaller ones, both processes are going on side by side, some proprietors employing one, others the other, the choice being determined partly by the mental and moral characteristics of the proprietors, partly by the peculiar conditions of the industry in which the transition from small scale to larger scale production is economically demanded. Whatever the conditions in the in¬ dustry and whatever the character of the pro¬ prietor, the process of securing the readjust¬ ment of size by growth is accompanied by con-

sequences of which the proprietors as a class are cognizant. To convert all of the small economic units into large units is of course impossible except in a very rapidly growing field. Some of the economic units must there¬ fore remain small, and smallness under such circumstances means economic death. To avoid such disastrous consequences the proprietors may prefer to join together into unions,

thus securing certain of the advantages of size with¬ out at the same time facing a competitive strug¬ gle that must inevitably result in the complete annihilation of those units that for any reason are left behind. The unions thus formed may be composed of any number of economic units from two to the total number in existence. Unions composed of a relatively small number of economic units are co-operative agencies for performing in common certain functions that otherwise would have been performed by each member separately. They, therefore, are institu¬ tions possessing distinct economic advantages to society by reason of their efficiency and also by reason of the competition which they foster and preserve. Unions composed of a large number of economic units, while possessing the advantages that grow out of co-operative ac¬ tion, may gain by virtue of the union a very different kind of power, viz., the power of monopolistic control over the goods and serv¬ ices which they respectively produce. In the latter case the organizations thus created are enabled not only to retain for the proprietors all the benefits arising from the co-operative action which follows, but further to gain an additional advantage in the enhanced price which they are in a position to obtain for their goods and services.

II. The simplest form of union is one in which the proprietors secure concerted action along some one or more lines by a simple agree¬ ment, providing for uniform action upon cer¬ tain stipulated points or for the sharing of privileges or benefits that flow either directly or indirectly from the union.1 Agreements pro¬ viding for uniform action upon one or more specified points are called simple combinations ; those providing for a sharing of benefits are called pooling combinations, or in the vernacu¬ lar of the trade, pools. Combinations may be compared to a league of nations in that each member retains its independence in full except as it temporarily surrenders a portion of its sovereignty in the interests of the common good for a limited period of time and even then sub¬ ject to withdrawal on notice or without notice at the risk of suffering certain specified or con¬ tingent penalties. Simple combinations embrace the following types of agreements: first, those limiting the territory within which the several parties may do business ; second, those limiting the amount of business which may be done; third, those fixing the price at which each may sell its goods or services. Pooling combina¬ tions include : first, agreements providing for a distribution of the business in certain agreed upon proportions, and second, those providing for a sharing of the profits arising from the

1 These agreements may provide means and measures for their own enforcement, may inflict penalties for infraction of their terms, or may

leave the observance of their various stipulations to the good faith of the several members. In

business over which the pool has jurisdiction. Combinations and pools may also be classified into various categories on the basis of the num¬ ber of specific agreements included within the union, as for example, simplex, duplex, triplex, quadruplex, etc.* A simplex combination is based upon an agreement as to one point only, as price, or output. A duplex combination is based upon an agreement that covers two im¬ portant features, as price and output, or price and percentage of business. As the number of points which the agreement covers increases, the field within which the members are free to act upon their own motion correspondingly diminishes and if in any case all possible points are included, the combination during the period of the agreement would be to all intents and purposes a single economic unit occupying the field formerly covered by its constituent mem¬ bers.

III. The higher types of union differ from the simpler types in two respects: first, all of the proprietors' interests in the several eco¬ nomic units are amalgamated or merged into one completely or nearly completely unified or¬ ganization; and, second, they generally are per¬ manent institutions. Such institutions may be separated into two main classes, first, federated unions and second, centralized unions. The federated unions embrace two classes, trusts and holding combinations. The centralized unions include one class only, viz., the single corporation owning directly the various plants and properties which formerly were separate economic entities. The trust, the holding cor¬ poration and the single corporation composed of an aggregate of formerly independent eco¬ nomic units are financial unions in contradis¬ tinction with the combinations which are merely incomplete operating unions.

IV. A combination is formed by agreement of the parties and like any contract may be either verbal or written. A financial union on the other hand involves a purchase and a sale either of securities or physical assets and con¬ sequently the formation of such an organization includes first, an agreement as to the terms of the exchange and second, provision for the transference of the several proprietors' inter¬ ests to a newly created body legally authorized to purchase and hold the same. Let it be sup¬ posed that A , B and C are proprietors of busi¬ ness enterprises manufacturing and selling safety razors. After selling their different products in competition for some years, A con¬ ceives the idea that an agreement as to prices at which each may sell his goods would, by preventing price competition, enable each of the razor makers to increase his own earnings. A

therefore suggests a meeting and after a dis¬ cussion, supplemented in many cases by an in¬ vestigation of costs and the actual prices ob¬ tained for their respective goods, an agreement is reached and a memorandum covering the points agreed upon is drawn up and signed or a verbal contract is entered into according as the combination is a written or verbal one. After the combination is formed, the parties

the latter case the combinations thus formed and operated are termed gentlemen's agreements.

2 Stevens, 'A Classification of Pools and Combinations based upon American Experience ' (American Economic Re¬ view, Vol. Ill, No. 3, pp. 545-575).

separate and proceed to manage their separate business enterprises as before except that each of the proprietors causes a new price list to be prepared and issues instruction to his sales managers to sell goods only at the prices thus established. Whenever any one of the parties to the combination desires to change the price list, a meeting of the principals or their agents becomes necessary at which the whole question of price is taken up and a decision reached either to abide by the old price list, to estab¬ lish a new one or failing an agreement on one of the above points to terminate the agreement and resume the former power of price making by individual action. The combination is then by virtue of its structure both incomplete in its scope of action and unstable in point of time. It, therefore, may be used only when the above features are relatively unimportant. To secure either permanency or completeness or both some form of financial union, that is either a trust, a holding corporation or a single corporation must be selected and adopted.

To create a trust any number of business units as for example, a, b, c, d, etc., transform their individual business establishments into corporations,1 formed upon similar plans. They then organize each of the new corporations and thereafter call a meeting of the representatives of the several business units that desire to enter the trust for the purpose of formulating a plan of union. To do this a trust deed2 is drawn up, a document similar to a corporate charter in its essential features, but peculiar in that it provides (1) that the common stock of the several corporations included in the plan be exchanged for trust certificates and (2) that the trustees (a) manage the several

corporations <(in the manner they deem most conducive to the best interests of the holders of said trust certificates”3 and (b) receive all interest and dividends declared upon and paid upon the bonds and stocks which they hold in trust and distribute such receipts including also any receipts from the sale of the trust property by declaring and paying dividends upon the outstanding trust certificates. . A trust, then, is a group of corporations tied together into a permanent financial union in accordance with the terms of a trust deed and operating under the control of a board of trustees created and acting under the authority of the said instru¬ ment. To make the above definition conform to the conditions which were present in all of the trusts established during the decade 1879- 88, two others must be added, viz. (1) that the corporations thus joined together must be com¬ peting with each other at the time of the union and (2) that practically all of the producing units in the same market must be included in the organization.

The first of the industrial trusts was formed in 1879 by the Standard Oil interests under the guiding genius of Mr. S. C. T. Dodd, later

1 Unless the existing business units are already corpora¬ tions, in which case the existing organizations are used.

2 For a copy of the Standard Oil Trust deed of 2 Jan. 1882, consult Report of the Commissioner of Corporations on the Petroleum Industry, Part I, pp. 361-369.

3 From the Standard Oil Trust Deed, paragraph 15.

4 The Cotton Oil Trust, the Sugar Trust, the Whiskey Trust and some others of lesser importance.

5 The People vs. North River Sugar Refining Company,

121 N. Y. 582.

vice-president and general counsel of that un¬ usual aggregation of properties and brains. The trust, a unique form of federated union, was invented in order to secure centralized admin¬ istration without at the same time obliterating the corporate identity of the several units of which the organization was composed- The suc¬ cess of the Standard Oil Trust was so pro¬ nounced that it was very soon copied and within the decade immediately following, a half dozen other trusts were formed4 and began operation. The career of the trust as an individual organi¬ zation was, however, short-lived, two of the lead¬ ing examples, the Sugar Trust in New York5 * and the Standard Oil

Trust in Ohio,0 being declared illegal organizations on two grounds, first, because it was beyond the power of cor¬ porations, either directly or indirectly, to enter into partnerships with other corporations and second, because it was illegal to form monop¬ olies. As a result of the two decisions above referred to it became evident that either the federated form of financial union must be abandoned or some substitute invented or dis¬ covered. Fortunately for the trust institutions, the path was open. As early as 1833, 7 the Balti¬ more and Ohio Railroad Company was author¬ ized by the State of Maryland to purchase the unsold portion of the stock of the Washington Branch Road, provided a majority of the stock¬ holders should vote in favor of the said pur¬ chase. In due time their consent was obtained and for over 66 years the stock in the Wash¬ ington Branch Road was carried as an asset in the balance sheet of the parent company. Begin¬ ning about 1850 the practice became common among the railways‘4 and later was adopted by the Western Union Telegraph Company and va¬ rious other industrial corporations. The stock¬ holding method of uniting corporations was thus well known among financiers when the trust was declared illegal and would have been immediately adopted by the various trusts except for the fact that at that time express authority must generally be obtained from some legis¬ lature3 and naturally legislatures were not in¬ clined to grant the requisite authority where monopolies might thus be created or maintained. At this juncture the State of New Jersey amended her general corporate law by adding a clause providing that corporations incorpo¬ rated under her laws might, with certain ex¬ ceptions, hold stock in other corporations when¬ ever such power was deemed desirable by the board of directors and the right to do so was ex¬ pressly stated in the articles of a corporation.10 Soon thereafter the American Sugar Company, which after the dissolution of the trust had purchased the assets of the various subsidiary corporations, purchased the stock of several Philadelphia refineries and in a leading case the purchase was held to be legal under the Sherman Anti-Trust Act.11 The holding cor¬ poration thus having been authorized by one

6 Standard Oil Trust Case, Ohio, p. 450.

7 Report of the Baltimore and Ohio Railroad Company, 1833, pp. 7-10.

8 Robinson, 4 The Holding Corporation * (.Yale Review, February and May 1910).

9 Noyes, ‘ Intercorporate Relations,’ p. 264.

10 Laws of New Jersey, 1889, p. 414.

11 United States vs. E. C. Knight Company, 156 U. S., p. 1 et seq.

of the States and one such organization ap¬ proved by the highest court, this form of fed¬ erated union was generally adopted by all the greater aggregations of capital from 1894 on for the next decade. During the period 1894- 1904, the new form of federated union was so extensively used by the railways and the in¬ dustrial corporations that the holding corpora¬ tion threatened to serve as the tool of well-nigh universal monopoly and on this account the economic literature of the period was largely devoted to a discussion of the growth, develop¬ ment and dangers of the new type of trust.

Curiously enough the turning point came in connection with the creation of a holding cor¬ poration uniting two of the greater railway sys¬ tems. In 1900, Mr. James J. Hill, desiring to consolidate into a more permanent union the vast railway interests of which he was the head, projected a holding company to unite the various railways known as the Great Northern system, and in connection with this scheme the proposal was made to include the North Pacific in the new organization. After a memorable contest in which the Harriman interests played a spectacular part, the project was perfected, the Northern Securities Company was incor¬ porated 12 Nov. 1901 and shortly thereafter the new corporation acquired by exchange of its stock a large majority of the stock of both the Northern Pacific and the Great Northern Railway companies. This union aroused marked antagonism in the Northwestern States and as a result, early in 1902, suits were brought by both the State of Minnesota and the United States for the purpose of securing the dissolu¬ tion of the Northern Securities Company as an illegal trust under the Federal Anti-Trust Law, and after a notable legal contest, the Supreme Court held the new company an illegal com¬ bination and consequently enjoined it from vot¬ ing the stock in the two companies and from ex¬ ercising any control over the companies whose stock it held.1 As a result of this decision, the Northern Securities Company as a holding cor¬ poration was dissolved and this type of union was thereafter considered to be of doubtful legality except in those cases when no monopoly was obtained by its means. The decision in the Northern Securities case was later sustained and extended to cover consolidations composed of manufacturing companies by those

rendered in the Standard Oil2 and Tobacco3 cases in

1911.

Although the single corporation has been used at intervals throughout its history4 as an agency for uniting independent business establishments into more or less completely consolidated fi¬

1 193 U. S., p. 360.

2 221 U. S., p. 1.

3 221 U. S., p. 106.

4 Consult Scott's Joint Stock Companies to 1720, for

early instances.

6 "In the case of the newer combinations in the United

States it has been found that practically all the important ones are put into the form of a single large corporation. In

many cases the new corporation buys the individual plants which it seems desirable to combine and thus becomes a single owner of all the establishments.

In other cases, and this is perhaps especially true with reference to the largest combinations, the stock of the con¬ stituent members is all bought by the single unifying company, the constituent companies then retain their organization intact, being controlled simply by this central corporation, as a stockholder, which can elect directors and officers at will and thus guide the management absolutely." Report of Ind. Com., p. vii.

nancial unions, such use was of small importance before 1890 and even since then the federated union has been more widely patronized.5 While the space available for this article is too limited to go into details, it may nevertheless be pointed out that in the beginning of its history the Standard Oil Company made extensive use of this device and it was only when this corpora¬ tion began extending its scope so as to in¬ clude pipe-lines and other allied interests whose identity it was desired to preserve that the trust and the holding corporation form became the favored instrument of consolidation. In the later history of the trust movement two cases may be mentioned. When in 1891 the Sugar Trust was dissolved as a

result of the court decisions, a new corporation, the American Sugar Refining Company, was organized and it proceeded to purchase the properties which the trust had formerly controlled.6 During the later period of consolidation the International Harvester Company has been the most import¬ ant aggregation to make use of the single cor¬ poration as a means of uniting a group of allied business enterprises. This union was formed in 19027 and in 1912 the United States filed a petition8 in the District Court, district of Minnesota, alleging that the single corpo¬ ration thus formed was a monopoly and asking that the combination be decreed to be in re¬ straint of trade and a monopoly under the Anti- Trust Act of 1890. Here then we have a case presented for adjudication9 in which the union is neither in the form of a combination, a trust, a holding corporation, but in the form of a consolidation consummated by the purchase by a single corporation of the tangible properties of competing economic units.

The language of the Sherman Anti-Trust Act is seemingly as comprehensive as possible. ((Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States or with foreign nations® is declared to be il¬ legal. But the language of a statute must be interpreted by the courts before its meaning is certain and the Sherman act is not an ex¬ ception. For the first two decades of its his¬ tory it was strongly asserted by counsel for various combinations that the combining of competitive units by purchase19 was not prohib¬ ited no matter what the effect upon competition, since otherwise Congress would have intended to place a limit upon the acquisition of property. It was early intimated by the Supreme Court that this contention would not be sustained wherever the effect of sustaining it would mean the nullification of the act. Thus as early as 1905

6 This same method was used by the United States Rubber Company, the National Cordage Company and its successor, the Standard Rope and Twine Company, the National Wall Paper Company, and indeed by a considerable number of the great consolidations formed immediately after the trust was declared illegal.

7 The International, Harvester Company, Bureau of Cor¬ porations, 1913.

8 The United States of America, petitioner, vs. Inter¬ national Harvester Company et al., Petition in Equity. In the District Court of the United States for the District of Minnesota.

9 In the Supreme Court of the United States, International Harvester

Company, appellant, vs. The United States of America. Brief for the United States, pp. 10-19.

10 In the Supreme Court of the United States, 1914. Inter¬ national Harvester Company vs. United States of America. Brief for the United States, p. 48.

it was stated that the (

Bibliography. — bibliography on Trusts and Combines,5 issued by the Library of Congress (Washington, D. C.) ; Trusts, House of Representatives, 50th Congress, 2d Session, Report No. 4165; Investigation of Trusts, New York, 1897; Report of the Industrial Commission, Washington, D. C, 1900, especially Vols. I, II, XIII, XVIII and XIV; Federal

1 Harriman vs. Northern Securities Company, 197 U. S.. p. 291.

2 221 U. S., pp. 1, 78, 79.

3 221 U. S„ pp. 106, 176, 177.

- 226 U. S„ p. 61.

5 United States vs. American Tobacco Company, 221 U. S., p. 176.

6 United States vs. Union ‘Pacific Company, 226 U. S., pp. 61, 97.

Anti-Trust Decisions, 1890-1912, Vols. I-IV ; Reports of the Commissioner of Corporations on the Petroleum Industry, the Steel Industry, the Beef Industry, The Tobacco Industry, etc. ; Annual Reports of the Attorney-General ; the Report of the Stanley Committee on the United States Steel Corporation, House of Representa¬ tives, 1912 ; Court records in the various suits brought by the United States government under the Federal Anti-Trust Act of 1890. Consult also Brandeis, Louis D., business a Profession (Cambridge, Mass., 1914) ; Brown, W. J., brevention and Control of Monopolies) (New York 1915) ; Clark, J. B., and J. M., (The Control of Trusts5 (New York 1912) ; Collier, W. M., (The Trusts) (ib. 1900) ; Crowell, J. F., (Trusts and Com¬ petition (Chicago 1915) ; Davies, Joseph E., (Trust Laws and Unfair Competition (Wash¬ ington 1916) ; Dewing, A. S., Corporate Pro¬ motion and Reorganization5 (Cambridge 1914) ;

Durand, E. D., (The Trust Problem) (Cambridge, Mass., 1915) ; Eddy, A. J., (New Competition (4th ed., Chicago 1915) ; Ely, R. T., Monopolies and Trusts) (new ed., New York 1912) ; Haney, L. H., business Organ¬ ization and Combination (ib. 1914) ; Hirst F. W., Monopolies, Trusts and Kartells> (ib. 1906) ; Jenks, Jeremiah W., (Trusts and Industrial Combinations5 (inr United States Department of Labor Bulletin 29, Washing¬ ton, 1900) ; id., (The Trust Problem5 (new ed. by W. E. Clark, New York 1912); Kales, (Contracts and Combinations in Restraint of Trade5 (Chicago 1918) ; id., bases on Con¬ tracts and Combinations in Restraint of Trade5 (ib. 1916) ; Levy, Monopoly and Competition5 (London 1911) ; Liefmann, Robert, (Kartelle und Trusts und die Weiterbildung der Volkswirtschaftlichen Organisation5 (2d ed., Stuttgart 1910) ; id., (Die Unternehmenver-bande5 (Leipzig 1898) ; Le Rossignol, J. E., Monopolies, Past and Present5 (New York 1901); Meade, E. S., (Trust Finance: A Study of the Genesis, Organization, and Manage¬ ment of Industrial Combinations5 (new ed., ib. 1909) ; Moody, John, (The Truth about Trusts5 (ib. 1904) ; Pohle, Ludwig, (Die Kartelle der gewerblichen Unternehmer5 (Leipzig 1898) ; Raffalovich, Arthur, bes trusts, cartels, et syndicats5 (2 ed. rev., Paris 1903) ; Ripley, W. Z., (ed.), (Trusts, Pools and Corporations5 (new ed., Boston 1916) ; Rousiers, Paul de, bes industries monopolises5 (Paris 1898) ; Seager, Henry R., XXVI, New York 1911) ; Stein- mann-Bucher, Arnold, (Wesen und Bedeutung der gewerblichen Kartelle5 (Leipzig 1891) ; Stevens, W. H. (ed.), industrial Combina¬ tions5 (New York 1913) ; id., (Unfair Com¬ petition5 (Chicago 1917) ; Tarbell, Ida M., (History of the Standard Oil Company5 (new ed., 2 vols., New York 1911) ; Taft, W. H., (The Anti-Trust Act and the Supreme Court5 (ib. 1914) ; Van Hise, Charles R., (Concentra¬ tion and Control5 (ib. 1912) ; von Halle, Ernst, (Trusts or Industrial Combinations or Coali¬ tions in the United States5 (New York 1895) ; Walker, Francis, bombinations in the Ger¬ man Coal Industry5 (New York 1904).

Maurice H. Robinson,

Professor of Economics, University of Illinois.

TRUSTS, THE GROWTH AND CONTROL OF

TRUSTS, THE GROWTH AND CON¬ TROL OF. Magnitude of the Trusts. — In

1904, c Moody's Manual of Corporation Statis¬ ticsˆ (The Truth about Trusts,* and other cog¬ nate works, stated that there were seven greater industrial trusts in the United States having an aggregate capitalization in stocks and bonds of a par value of $2,662,752,100, and controlling over 1,500 subsidiary plants, and 298 lesser in¬ dustrial combinations with a total capitalization of $4,055,039,433, and controlling over 3,400 sub¬ sidiaries. Adding various reorganized trusts, the aggregate capitalization outstanding in the hands of the public of 318 important and active industrial trusts at that time was no less than $7,246,342,533, representing in all consolidations of nearly 5,300 distinct plants, covering practi¬ cally every line of productive industry in the United States. Mr. Moody also gave details of over 1,500 distinct corporations, of which 251 had a capitalization of $6,905,700,000, and 410 had a total floating capital of $20,379,162,511. The United States Steel Corporation, the larg¬ est of all, with its numerous subsidiaries, rep¬ resented $1 ,703,168, 1 18 of this aggregate capital¬ ization. Under date of 11 Sept. 1912, Albert H. Walker, author of (History of the Sherman Law,* in President Taft and the Sherman Law,* noted that from the beginning of the Taft administration to that date, among 62 prosecutions begun under the Sherman law, the only cases that developed any hope of a general public benefit were those of the follow¬ ing companies : Standard Oil, American To¬ bacco, Du Pont Powder, Electric Lamp, Stand¬ ard Sanitary, Wire Pool, Sugar Refining, Shoe Machinery, United States Steel, Cash Register and International Harvester. He also gave a list of 50 holding companies that had not been disturbed <(in their regular business of violating the Sherman law throughout the administration of President Taft.® These holding companies had a capitalization of over $2,300,000,000, and controlled more than 700 subsidiary corpora¬ tions. Further, he declared: <(I can furnish a list of more than 950 other industrial holding companies which have an aggregate capitaliza¬ tion of more than five thousand million dol¬ lars, with more than 6,000 subsidiary corpora¬ tions.®

Sherman Anti-Trust Law. — This act of Congress, originally proposed and outlined by John Sherman, when United States senator from Ohio, was perfected by the Judiciary Committee of the United States Senate, enacted by Congress, and approved by the President on 2 July 1900. .That committee comprised Sena¬ tors George F. Edmunds, chairman

(Vermont), John J. Ingalls (Kansas), George F. Hoar (Massachusetts), James F. Wilson (Iowa), William M. Evarts (New York), James L. Pugh (Alabama), Richard Coke (Texas), George G. Vest (Missouri), and James Z. George (Mississippi). There has since been an animated controversy on the question of the authorship of the law, which has continued to bear Senator Sherman's name. The most prominent discussions were by Senator George F. Hoar, in his (Autobiography, } Senator John B. Foraker, Albert H. Walker, Francis E. Leupp, in a contribution to The Outlook, and Senator Edmunds, in an analytical contribution, and George Harvey, in an historical (Fore- vol. 27 — 8

word,* both in The North American Review (December 1911). Senator Hoar, a year be¬ fore his death, claimed the authorship of the law. Judge Edmunds declared that while the law bears the name of Senator Sherman that gentleman merely introduced a bill of which only the enacting clause, as first drawn, was retained by Congress, and that the law as it now stands was drafted by himself as chairman of the Committee. Further, he stated : ((It would be correct to say that nearly every mem¬ ber of the Committee was the author of that bill, for my work in drawing it up was merely putting into logical shape what every member of the Committee had participated in.® It may here be stated that the precise work of each member of the Committee has now been clearly established by the official records. Also that since the law has practically broken down in its operation, nobody is very particular as to who fathered it.

In framing the law the Judiciary Committee believed that the well-known principles guid¬ ing the courts in the application and construc¬ tion of statutes would lead them to give the words of the act a beneficial and remedial rather than an injurious and technical interpre¬ tation, one hurtful to any honest trade, as well as out of harmony with the beneficent spirit and policy of the whole act. Nearly 11 years after the passage of the act (1911), Judge Ed¬ munds wrote : ((That belief has now, on the whole, been realized. It is believed that no case founded on the act has been finally de¬ cided by the courts adversely to the contracts or conduct of parties accused in which such contracts or conduct did not offend against both the letter and the spirit of the act, as well as against the sound public policy under¬ lying both the provisions of the Constitu¬ tion and the act of Congress touching the subject.®

Chief Provisions of the Sherman Law. —

The act is divided into eight sections, of which the first and seventh practically embody the spirit of the entire act.

Section 1 recites : ((Every contract, com¬ bination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several States or with foreign nations is hereby declared to be illegal. Every person who shall make any such contract or engage in any such combination or conspiracy shall be deemed guilty of a misdemeanor, and, on con¬ viction thereof, shall be punished by a fine not exceeding $5,000, or by imprisonment not ex¬ ceeding one year, or by both said punishments, in the discretion of the court.®

Section 7 recites : Any person who shall be injured in his business or property by any other person or corporation by reason of any¬ thing forbidden or declared to be unlawful by this act may sue therefor in any Circuit Court of the United States in the district in which the defendant resides or is found, without respect to the amount in controversy, and shall recover threefold the damages by him sustained, and the costs of suit, including a reasonable attor¬ ney's fee.®

In view of notable actions instituted by the Federal government it should be noted in con¬ nection with the foregoing that section 2 makes it a misdemeanor, punishable as in section 1,

for any person to monopolize or combine or conspire to monopolize any part of the trade or commerce among the several States or with foreign nations; and that section 8 classes cor¬ porations and associations with persons wherever the words ˆperson® or ˆpersons® occur in the act.

Notable Prosecutions Under the Sherman Law. — At the close of 1912 the United States government had instituted suits against about 125 corporations for violations of the Sherman law. In a special message to Congress on the trust question, 5 Dec. 1911, President Taft pre¬ sented a list of 99 suits that had been brought up to 1 Nov. 1911. By administrations these were divided as follows: President Harrison (1889-93) seven; President Cleveland (1893- 97) eight; President McKinley (1897-1901) three; President Roosevelt (1901-09) 44; Presi¬ dent Taft (1909-11) 37; President Wilson (1913-16) 18. The most notable of these cases in which decisions were rendered favorable to the government were, briefly stated, as fol¬ lows :

Northern Securities Company: suit brought to restrain the defendant

from acquiring in any manner the control of the Great Northern and the Northern Pacific Railway companies, 10 March 1902; petition of the government upheld in Circuit Court, 9 April 1903 ; decision af¬ firmed by United States Supreme Court, 14 March 1904.

Swift and Company, Chicago : suit brought to restrain alleged beef trust from suppressing competition and maintaining a monopoly in the purchase of livestock and the sale of dressed meats ; Circuit Court granted a perpetual in¬ junction, 26 May 1903; United States Supreme Court affirmed it, 30 Jan. 1905.

Armour and Company and others, Chicago : indictments found against various meat-packing companies and individuals, 1 July 1905; all ob¬ jections decided in favor of the government except certain pleas of immunity based on in¬ formation given the government; court sus¬ tained pleas so far as individual defendants were concerned, but overruled them with re¬ spect to the corporations.

Standard Oil Company of New Jersey: suit to dissolve illegal combination instituted 16 Nov. 1906; decree favoring the government filed 20 Nov. 1909; United States Supreme Court affirmed judgment, 15 May 1911.

American Tobacco Company: petition to dissolve illegal combination filed 10 July 1907; decision favoring the government except as to certain foreign corporations rendered 7 Nov. 1908; both sides appealed; United States Su¬ preme Court sustained the government on all points and ordered dissolution, 29 May 1911.

Du Pont de Nemours Company (Powder Trust) : petition for dissolution of combination filed 30 July 1907; court ordered dissolution, 21 June 1911.

American Sugar Refining Company: indict¬ ment found, 1 July 1909; United States Su¬ preme Court decided defendant's plea of the statute of limitations in favor of the govern¬ ment.

Missouri Pacific and 24 other railway com¬ panies : petition to enjoin proposed advance in freight rates in Western Trunk line ter¬ ritory sustained by Interstate Commerce Com¬ mission.

Standard Sanitary Manufacturing Company: petition to enjoin the combination from re¬ straining competition and enhancing prices of enamel ware, under cover of a patent licensing arrangement; government sustained, 13 Oct.

1911.

General Electric Company: bill in equity, charging combination in incandescent electric lamps and asking decree for dissolution, filed 3 March 1911; form of dissolution accepted by Circuit Court, 12 Oct. 1911.

United States Steel Corporation : petition for an injunction and dissolution filed 27 Oct. 1911. In June preceding, Herbert Smith Knox, United States Commissioner of Corporations, reported that when the steel corporation was organized in 1901 its tangible assets were worth $682,000,000; that by 31 Dec. 1910. these assets had increased to $1,187,000,000; and that by the latter date the corporation had an aggregate of $1,468,000,000 in outstanding securities. The corporation claimed that its iron ore properties were worth $700,000,000, but the Commissioner believed that $100,000,000 would be a liberal estimate. During the summer of 1911 the affairs of the corporation were put under in¬ vestigation by a committee of the National House of Representatives, and in May 1912, the taking of testimony in the government's suit for an injunction and dissolution was begun in New York. But the steel trust, after an im¬ mense amount of testimony had been taken, secured a decision adverse to the government, from which the government appealed.

Application of the Rule of Reason. — The United States Supreme Court decided in favor of the government in the case of the Standard Oil Company of New Jersey and its subsidiaries on 15 May 1911, and in that of the American Tobacco Company on 29 May following. In each instance the decision was an elaborated review of the case, prepared bv Chief Justice Edward D. White. It was held that the cor¬ poration was a monopoly in restraint of trade; that it must be dissolved within six months; that corporations whose contracts are not un¬ reasonably restrictive of competition are not affected by the Sherman law. In the American Tobacco decision it was held that the company was a combination in restraint of trade and a monopoly in violation of law; that it had been guilty of intimidation and had shown a clear purpose to stifle competition ; that the company must disintegrate and recreate a condition of transacting business not repugnant to the law, under the scrutiny of the Circuit Court; and that, if at the end of six to eight months the component corporations failed to' bring them¬ selves into harmony with the law, a receivership and dissolution would follow. This decision affected 65 American corporations, two English corporations, and 29 individual defendants; but none of them appear to have suffered seriously.

After a dozen or more years of litiga¬ tion it became apparent that the govern¬ ment was not gaining anything for the people by its suits against the trusts. Up to 1918 more than a hundred civil suits and more than a hundred criminal suits had been brought against trusts and trust mag¬ nates, and four of these had been aimed at labor unions, doubtless with the quiet backing of some magnates who wanted to find if unions were not

also trusts. The government appeared to win a number of these suits. The great Standard Oil Company was ordered to dissolve, and di¬ vided itself into 60 odd companies, and went on as before. The National Cash Register Company was told to change its ways, and some of its officers received jail sentences, but the writer can find no record that any of them were served or that the Standard Oil ever paid that $29,000,000 fine which a certain judge once levied on them. A criminal suit was brought against William Rockefeller, Alexander Coch¬ rane, George F. Baker, Theodore N. Vail and nine other directors of the New York, New Haven and Hartford Railroad Company, to find out whether the looting of some $200,000,000 could be charged to any individuals ; ‘but the jury acquitted six and disagreed as to the others. The Corn Products Company was told to give a $50,000 bond for good behavior and so was the National Starch Company. The criminal suit against the Cudahy Packing Company was not pressed ; the heads of the concerns con¬ stituting the Wire Rope Association and the Rubber Covered Wire Association were fined from $5,000 down to $100 each; the great DuPont concern paid the costs and reorganized ; the sugar trust asked that its case be held open until decisions were reached in the Harvester and Steel trust cases ; in very many other cases small fines were imposed or the government lost, or the cases were appealed and held up under technicalities.

To strengthen the Sherman law, the Clayton Trust Bill was passed and approved 12 Feb. 1913. This prohibited certain monopolizing con¬ tracts, popularly called Hying® contracts, by the use of which the United Shoe Machinery Com¬ pany especially had built up and held an im¬ mense monopoly. (Such contracts absolutely choked off competition.) This law permits any person to sue in any District Court where a trust has an agent, and to recover three times the damage sustained by any violation of the Sherman law, also his attorney’s fees. It also aimed to stop interlocking directorates and to check many objectionable practices by corpora¬ tion officers. Labor unions were

expressly ex¬ empted from its provisions. Much was ex¬ pected of this Clayton law, but the United Shoe Machinery Company won its case on the appeal to the United States Supreme Court and writes what contracts it pleases, and the other trusts go merrily on much as they used to. Most of the States passed anti-trust laws of one sort or another, as notably New Jersey, under the Wilson administration ; but these laws have been even less effective than the Federal laws, because the State seldom has much jurisdic¬ tion over a trust that does business all over the world. The Federal Trade Commission was then created on much the same lines as the Interstate Commerce Commission, and of this body much is hoped. It has headquarters in Washington, and the five commissioners, ap¬ pointed by the President, receive' each $10,000 salaries, no more than three to be of one party. So they seem to be well removed from in¬ fluence. They began their work late in 1914 and conducted the newsprint, the book paper and the bituminous coal investigations. The In¬ ternational Paper Company was accused of creating a corner in paper early in the war,

and the newspapers said they cleared up about $25,000,000 in a few months. For this six of the officials paid fines of $2,500 each. Just as it began to look as if the Federal Trade Com¬ mission really might do something to alleviate the evils of trusts, the United States entered the World War, the government took over the railways and various other large manufac¬ turing plants and industries, and investigations ceased. After the war in 1919 the meat-packing interests were being investigated.

The trusts are not the menace to democracy that they have been pictured ; they have im¬ proved methods and reduced costs in many ways ; they have shown that competition is not the life of trade, that it entails much waste; in many lines of endeavor they have built up great businesses legitimately and won success because they deserved it ; in other lines, though they monopolized, they now so control everything that it cannot be taken away from .them, as there are no other concerns that know how to handle the business. Germany has demon-* strated to us that concentration of interests tends to reduce costs and increase efficiency. Their form of monopoly was called the kartell, and in some of them, as the potash and sugar kartells, the government participated. Ameri¬ can industry must maintain and improve its efficiency, and big business must continue wherever it handles things better than can groups of small concerns. It appears that we cannot crush the trusts if we would, for the trusts represent both the capital and the brains of American industry. Therefore the trusts must be reformed where they need reforming.

Bibliography.— Consult Bigelow, Consti¬ tutional Difficulties of Trust Regulation (1905) ; Brewster, (What to do with the Trusts) (1907) ; Bridge, (Inside History of the Car¬ negie Steel Company*. (1903) ; Chicago Con¬ ference on Trusts, Complete Report* (1900) ; Clark, Control of Trusts) (1901) ; Collier, (The Trusts) (1900) ; Dodd, Combinations, their Uses and Abuses* (1894) ; Dos Passos, Commercial Trusts* (1901) ; Edmunds, (The Anti-Trust Law> (North American Review 1911) ; Eliot, (Future of Trade Unionism and Capitalism in a Democracy* (1910) ; Ely,

(Monopolies and Trusts* (1900) ; Fay, (Big Business and Government * (1912) ; Hadley,

(Railroad Transportation (1885) ; Hicks, Competitive and Monopoly Price) (1912) ; Hirst, Monopolies, Trusts and Kartells) (1906); Hobson, (Evolution of Modern Capi¬ talism * (1894) ; Unside View of Trusts*

(1900); Holder, (Trusts, Business, and Us) (1912) ; Ingalls, Claves to the Trusts) (1908) ; Interstate Commerce Commission, (Annual Re-ports) (1887-1917) ; Jenlcs, (The Trust Prob¬ lem * (1900) ; Jennings,' (People and Their

Property * (1908) ; Lloyd, (Wealth Against

Commonwealtn (1894); Macgregor, Undus- trial Combination (1906) ; Meade, (Trust Finance> (1903.) ; Meyer, (Railway Legisla¬ tion in the United States) (1902) ; Montague, (Rise and Progress of the Standard Oil Com¬ pany * (1903) ; (Trusts of To-day* (1904) ; Moody, (The Truth About the Trusts* (1904) ; Pierce, (The Tariff and the Trusts) (1907) ; Ripley, (Trusts, Pools and Corporations) (1905); Snyder, Unterstate Commerce Act and

Federal Anti-Trust Laws) (1907) ; Taft, (Labor and Capital5 (1908) ; (Prosecutions Under the Sherman Anti-Trust Law5 (1911) ; Tarbell, (History of the Standard Oil Company-* {Mc¬ Clure's Magazine, 1904) ; (The Trust, its Books) (1902) ; United States Industrial Com¬ mission, (Report) (190CM32); (Federal Anti¬ trust Decisions5 (1907) ; Von Halle, (Trusts or industrial Combinations and Coalitions in the United States) (1895) ; Walker, (History of the Sherman Law) (1910) ; Taft, W. H., (The Anti-Trust Act and the Supreme Court5 (1914) ;

Crowell, J. F., (Trusts and Competi¬ tion (1915) ; (President Taft and the Sherman Law5 (1912) ; (President Taft and the Rail- roads) (1912); Brown, W. J., Prevention and Control of Monopolies > (1915) ; Shale, de¬ crees and Judgments in Federal Anti-Trust Cases — 1890 — 1918> (Washington 1918); Fed¬ eral Trade Commission (Reports. }

TRUTH, Sojourner, American negro lec¬ turer: b. Ulster County, N. Y., gbout 1790; d. 'Battle Creek, Mich., 26 Nov. 1883. She was held in slavery even after its abolition in the State. In 1827 she escaped, discarded the slave name Isabella, and chose the above fanciful appellation — Truth — as the substance of her Message and Sojourner because it was divinely revealed. Though quite illiterate, she spoke with much natural talent on emancipation and other reforms. Consult (The Narrative of So¬ journer Truth5 (1884).

TRUTH, The. At the time of his death in 1909, Clyde Fitch was enjoying a British and Continental reputation equal almost to his popularity at home. His psychological study, (The Truth,5 had been widely received; his melodrama, (The Woman in the Case,5 had just been hailed in London. There is no doubt that any estimate of Fitch as a dramatist — his prolific pen turned* out over 30 original plays, not counting dramatizations and adapta¬ tions from the French and German — must rank as high, in technical vividness and psy¬ chological achievement, (The Girl With the Green Eyes5 and (The Truth,5 usually grouped together as his most acute feminine studies. Both were written for the actress, Mrs. Clara Bloodgood ; and both were pondered over long before pen was put to paper. As answer to the critics who continually believed Fitch to be a hasty spinner of slight feminine studies, one notes in the dramatist's correspondence that as early as 1894 he was speaking to friends of the (

(The Truth5 was equally as carefully thought out, and is as incisive in its study of the snares and tragedies of lying, as the former is of jealousy. It was presented in New York, 7 Jan. 1907, and was not a financial success, though it was praised for its distinction of style. From the time, however, it was given in London, at the Comedy Theatre, 6 April 1907, with Miss Marie Tempest as Becky Warder, it was universally praised as a tech¬ nical triumph of revelatory psychology, — showing logically, relentlessly, yet deftly, how a woman's habit of lying over slight things, that might be explained away, leads to un¬ happiness and dire tragic ends.

(The Truth5 has had a worthy stage history in Germany, Italy, Russia, Hungary and the Scandinavian countries. It was revived by Mr.

Winthrop Ames, at the New York Little Theatre, on 11 April 1914.

Montrose J. Moses.

TRUXILLO, troo-hel'yo. See Trujillo.

TRUXTUN, truks'ton, Thomas, American naval officer: b. Long Island, N. Y., 17 Feb. 1755; d. Philadelphia, Pa., 5 May 1822. He was impressed into the British navy in 1767, and in 1776 was offered a commission which he refused in order, to enlist in the cause of the colonies. He was appointed lieutenant in the American navy in 1776, and assigned to the Congress, equipped and commanded the Inde¬ pendence in 1777 and was later in command of the Mars with 20 guns. He cruised about the English Channel, greatly damaging the British merchant marine, and in 1781 was appointed to command the Commerce with 30 guns. His engagements throughout the war were uni¬ formly successful. After the conclusion of peace he was employed for several years in the West India trade, but in 1798 upon the organi¬ zation of the United States navy he was ap¬ pointed one of its six captains and assigned to the frigate Constellation, with which, in 1799, he captured, after a severe battle, the powerful French ship L'Insurgente, and in 1800 La Vengeance. He was made conv mander of the West India squadron in 1801 with the rank of commodore, and in 1802 was appointed to command the expedition against Tripoli, but he retired from the service in that year. He wrote (Remarks, Instructions, and Examples relating to Latitude and Longitude, also the Variation of the Compass5 (1794).

TRYON, tri'on, Dwight William, Ameri¬ can painter: b. Hartford, Conn., 13 Aug. 1849. He studied art at Paris under De la Chevreuse, Daubigny and Guillemet and at the Ecole des Beaux-Arts. In 1886 he was appointed director of the Hartford School of Art; subsequently held the chair of art at Smith College, North¬ ampton, Mass., and finally settled in New York. He is well represented in all public collections in America, especially in the National Gallery, Washington, and in the Metropolitan Museum of Art, New York. He has been awarded numerous medals and other testimonials to his skill and success as one of the foremost land¬ scape painters of this country.

TRYON, Sir George, English naval offi¬ cer: b. 4 Jan. 1832; d. off Tripoli, 22 June 1893. He entered the navy in 1848, served in the Crimean War, in 1861 became commander of the Warrior, the first British sea-going iron¬ clad, and in 1874-77 commanded the Raleigh. He was secretary of the admiralty in 1882-84, became vice-admiral in 1889, in 1891 was ap¬ pointed to command the Mediterranean

station, and in 1893 perished in the flagship Victoria in collision with the Camperdown, due to his error during naval maneuvers off Tripoli.

TRYON, George Washington, American

conchologist : b. Philadelphia, Pa., 20 May 1838; d. there, 5 Feb. 1888. He was educated at the Friends' School of Philadelphia, and in 1865 originated the movement for the construction of the present edifice of the Philadelphia Academy of Natural Sciences. In 1865-71 he was the

editor of the American Journal of Conchology. His publications include (Synopsis of the recent Species of GastrochaenidaP (1861) ;

(Monograph of the Order of Pholadacae) (1862) ; (Monograph of Terrestrial Mollusks of the United States) (1865) ; (Land and Fresh-Water Shells of North America) (1873) ; (American Marine Conchology > (1873) ; (Structural and Systematic Conchology } (3 vols., 1882) ; (Manual of Conchology) (12 vols., 1879-85), etc.

TRYON, Thomas, English dietist : b. near Cirencester, England, in 1634; cl. 1703. He worked at carding wool as a boy and tended sheep until 18, when he drifted to London. At the age of 48 he wrote a series of pamphlets recommending water, bread and fruit as food and drink. His book called (Health's Grand Preservative) (1682) was republished (1691) as (The Way to Health > and attracted the at¬ tention of Benjamin Franklin.

TRYON, William, British colonial gov¬ ernor in America: b. in Surrey, England, 1729; d. London, 27 Jan. 1788. He served with ability in the British army, arrived in North Carolina as its lieutenant-governor in 1764, succeeded Governor Dobbs on the latter's death in 1765, and in 1771 was made governor of New York. In both colonies he was noteworthy chiefly for the cruelties of his administration. In North Carolina he suppressed the Regulators (q.v.) and displayed much inhumanity toward his prisoners. During the Revolution he led in per¬ son expeditions which destroyed the Connecti¬ cut towns of Danbury, Fairfield and Norwalk. In 1778 he resigned and went to England, where he became lieutenant-general in 1782.

TRYPANOSOMA, a genus of flagellate Protozoa included in the order Binucleata which are characteristic parasites of vertebrates and

insects. Related genera live in the gut of in¬ sects but Trypanosoma is parasitic in the blood of vertebrates (except Tr. equiperdum) . The species are transmitted by blood-sucking in¬ sects, especially the biting flies (Glossina), and it is probable that a sexual generation is developed in the insect in alternation with the asexual generation in the vertebrate host.

The species are difficult to characterize and thus far are distinguished only by culture ex¬ periments. The number of known forms and of diseases produced by them is rapidly in¬ creasing. Among the most important are the following: Trypanosoma lewisi from the rat, transmitted by fleas and lice, cosmopolitan, probably not pathogenic. Tr. brucei in cattle, horses, mules and wild herbivores, transmitted by Glossina, produces nagana or tse-tse fly disease. It occurs in Africa south of the Sahara. Tr. equiperdum, in horse and ass, transmitted by contact (and by biting flies?) produces dourine. It is endemic in the circum- Mediterranean area and has been introduced into nearly all regions, including North Amer¬ ica. Tr. evansi, in domestic and wild mammals, transmitted by Stomoxys and Tabanus, pro¬ duces surra in India, China and the Philip¬ pines. Tr. equinum, in horses, causes mal de caderas in South America. Tr. gambiense, in man, transmitted by Glossina, produces sleep¬ ing sickness. It occurs in equatorial Africa (elsewhere by importation).

The most of the diseases named are very

severe and recovery is rare so that these para¬ sites rightly rank as the most dangerous known.

Henry B. Ward.

TRYPETIDZE, the family of fruit-flies (q.v.).

TRYSA, an old city in southern Lycia. It is interesting as the site of an ancient funeral monument with sculptures derived from Greek models representing famous battle scenes. The sculptures were taken to Vienna in 1883.

TSAR, tsar. See Czar.

TSARITSYN, tsar-it’zin, or TZARIT- ZIN, zar-it’zm, Russia, in the government of Saratov, on the Volga, 230 miles northwest of Astrakhan. It contains the remnants of old fortifications, a castle, seven churches, a mosque, theatre, schools, banks, etc. It is a rail¬ way centre and has numerous factories, machine works, tanneries, brickyards and canneries. It carries on a brisk transit trade in Baku

petro¬ leum, corn, timber, fish, salt, wool and meals, in the country included between the Don and Volga rivers. Pop. 100,817.

TSARSKOYE-SELO, tsar-sko'i sal 6-, or ZARSKOJE-SELO («Tsar's Town»), Russia, a town in the government of Petrograd, 14 miles south of the capital, with which it is con¬ nected by rail. It was the favorite summer residence of the Imperial family, and was founded by Peter the Great. In 1744 the Em¬ press Elizabeth erected the magnificent palace, which Catherine II decorated at great expense. The principal front is about 1,000 feet long. The interior is gorgeously ornamented, the walls of some of the rooms being covered with amber, mother-of-pearl, jaspers, agates and other precious stones. This palace was not oc¬ cupied by the Imperial family for many years before the Revolution of 1917. The palace grounds, which are 18 miles in circumstance, are finely laid out, and offer every variety of landscape.

TSCHAIKOWSKY, chl-kof'skl. See

Tchaikovsky.

TSCHERMIGITE, cher 'mi-git, native am¬ monia alum. It occurs at Tschermig, Bohemia, in white, fibrous masses, vitreous in lustre, transparent or translucent, with a hardness of one to two, and a specific gravity of 1.50. It is a hydrous sulphate of aluminum and amo- nium. It is extensively manufactured from the residues of gas works and is used as a substi¬ tute for potash alum.

TSCHUDI, choo'de, ˆGIDIUS or GILES,

Swiss historian: b. Glarus, 5 Feb. 1505; d. there, 28 Feb. 1572. After receiving an education at Basel, Vienna, and Paris, he traveled for a time and served in the French army, 1536-44. He was the chief magistrate of Glarus in 1558, but on account of his opposition to the Ref¬ ormation, the spread of which he attempted to suppress by force of arms, was banished in 1562. He was recalled in 1564 and spent his remaining years in arranging historical matter which he had collected. His (Die uralt wahr- haftig alpisch Rhetia) was published as early as 1538, but his chief works, the (Schweizer- chronik) or (Chronicon HelvetiorumP cover¬ ing the time from 1100 to 1470 and the (Besch- reibung Galliae Comatae,* were not printed till

1734-36. Modern research has shown that his historical statements are unreliable.

TSENG KI-TSEH, or MARQUIS TSENG. Chinese statesman: b. Hunan, 1837; d. 1890. He was appointed Minister to Great Britain and France in 1878, and in 1880 was given an embassy at Saint Petersburg where he negotiated the treaty restoring Kulja to China. In 1885 he negotiated a convention with Great Britain in regard to the opium traffic. In 1886 he returned to Peking and in 1887 was made vice-president of the board of revenue.

TSETSE-FLY, an African gadfly (Glos- sina morsitans) , noted for the deadly effect of its bite in many cases on warm-blooded animals, but which is regarded as usually harmless to man. It is about the size of a house-fly, brown, with a few yellow stripes across the abdomen. The symptoms of a bitten animal are at first those of a severe cold; the eyes, nose and mouth begin to run, the body then swells, while ema¬ ciation sets in. The harm done does not result from a poison in the mouth of the fly, as formerly supposed, but from the communication to the blood of the victim of a microscopic blood- parasite similar to that of Texas fever, which it has received from a diseased animal and carried to another. Tsetse-flies not them¬ selves infected with parasites are thus harm¬ less. Cattle and other animals which recover from the disease are usually immune, and at¬ tain a similar immunity after residing for a time in South Africa. The great dread of this fly formerly entertained has, therefore, proved to be unjustified.

TSIMSHIAN, tsim-she-an' («people»), a group of North American Indian tribes, form¬ ing the Chimmesyan linguistic stock, residing between the Nass and Skeena rivers, British Columbia, together with the adjacent territory and the islands off the coast. They subsist chiefly on the products of the rivers and the sea, especially salmon and oolachen, the latter furnishing large quantities of oil. They also hunt bear, mountain goats and other large game, the horns of the goats being carved into spoons and ladles which are used in their communal feasts. They also make dug-out canoes, but most of their boats are purchased from the Haidas. Their houses are constructed of im¬ mense cedar beams and planks and often are large enough to accommodate a hundred per¬ sons, who are presided over by a house chief. Each family and town also has its special chief. The population of the tribes forming the stock is about 3,200, including about 750 forming Dun¬ can's colony at New Metlakahtla on Annette Island, Alaska.

TSINAN-FU, tse'nan'foo', China, the capi¬ tal of the province of Shan-

tung, situated near the south bank of the Hoang-ho River, 220 miles south of Peking. It covers an area of about 10 square miles, within the earthen wall that surrounds it. There are excellent public buildings, an enormous assembly room, fine temples, an old tower and a Romish cathedral. There is a railway, begun by the Germans and taken over by Japanese capital. Pop. about

250,000.

TSING-TAU, or TSINGTAO, China. See

Kiao-Chau; Shantung.

TSITSIHAR, or CICIKAR, tset-se-kar', Manchuria, capital of the province of Hilung- Chiang, situated on the Nanni, a branch of the Sungari River, near the Mongolian frontier, 500 miles northwest of Vladivostok. It is an im¬ portant station on the Eastern Manchurian Rail¬ road, has large fairs and a considerable traffic in furs and grain. Pop. about 30,000.

TSU, an old castle town of Japan, capital of Miye prefecture, on the bay of Ise and con¬ nected by railway with Nagoya, 46 miles dis¬ tant. It has modern buildings and newspapers. Intersected by two rivers, its seaport is at the Iwate river's mouth.- It is noted for its manu¬ factures of porcelain, fans and parasols. Near¬ by is Shirako, famous during nearly a thousand years, for its artistic designs and patterns for textiles, which have been copied all over Japan. Pop. of the prefecture 1,101,573, of the city

47,295.

TSU-SHIMA, tsoo-she'ma, Japan, an island in the Korea Strait, about midway between Korea and the Japanese island of Iki Shima. It is 50 miles long by 10 miles wide, and di¬ vided near the centre by a small sound. It was off this coast that Admiral Togo won the principal naval victory in the war with Russia in 1905. Pop. 38,636.

TSUBA, tsu-bah, the Japanese sword guard, unlike the early Chinese and European sword guards which were wrought into the blade, was a distinctly separate piece of metal, through which the blade passed. Originally, in prehis¬ toric times, the tsumiba, or (was heavy, of gilt copper and ovate shape. In its development, securing strength with light¬ ness, it came to be, from the 16th century on¬ ward, a work of art also. The tsuba reached the highest expressions of pure design and rep¬ resentation of faith and motive, as well as of imagination, while serving in practical useful¬ ness. It became the focus of Japanese art

in metal; thickly colored alloys, silver and gold were made use of to express permanently, on iron, unique artistic conceptions, standard and orthodox symbols, and the complete repertoire of Japan's religious, mythological, poetic and literary lore, as well as personal tastes and preferences. Various schools of designers and workers were developed, whose products the experts easily recognize. Perhaps nothing else of Japanese conception or expression in art ex¬ cels the 'tsuba as a revelation of the native mind and characteristic features of Japan's civ¬ ilization. On the abolition of sword wearing by civilians, in 1871 — optional at first and later compulsory — probably a million blades were thrown on the market to be made into domestic tools or laid away in museums. Their wooden scabbards — most probably an evolution from the Malay original, with its loose case of wood — were often lacquered in characteristic and costly style, but their metal ornaments, especi¬ ally the guards, were in the main preserved. At once art connoisseurs of Europe and Amer¬ ica, perceiving this rich find in the artistic field, became eager collectors, so that the private cabinets and public museums compete eagerly for notable or unique specimens. Consult Okabe-Kakuya, Japanese Sword Guards > (Boston 1908).

TSUNG-LI-YAMEN, tsoong' le' ya/mun, the. department of foreign affairs in the Im¬ perial Chinese government. It is now super¬ seded. See China.

TU FU, Chinese poet: b. Siangyanfu, about 712; d. 770. He gained the favor of the reign¬ ing emperor but had a stormy life until 761 when he was given a post in the Board of Works which he held for six years. His book containing 1,405 compositions was issued in 1059. Consult Giles, H. A., (History of

Chinese Literature) (New York 1901).

TUAM, tu'am, Ireland, an ancient town in the county of Galway, Connaught, 126 miles west by north from Dublin. It is the seat of the Roman Catholic archbishop, and of the Anglican bishop of Tuam. Its principal edifices are the Protestant and Roman Catholic cathe¬ drals, the hishop's palaces, the college of Saint Jerlath, tor the education of Roman Catholic clergy; the courthouse, national and other schools. The manufactures are confined to can¬ vas and a few coarse linens; there is some trade in grain. Pop. about 3,000.

TUAMOTU, . twa-md'too, or PAUMOTU (pow-mo'too) ISLANDS, or LOW ARCHI¬ PELAGO, Polynesia, a group of islands in the Pacific Ocean, belonging to France, and situated between lat. 14° and 25° S., and between long. 124° and 148° W., south of the Marquesas Islands, and east of the Society Islands. The group consists of about 80 atolls with a com¬ bined area of 366 square miles. They are, with a few exceptions, of low coral formation, and the surrounding waters are beset with reefs. Cocoanuts, yams and bread-fruit, and pearl, are about the only products. Pitcairn and Ducie Islands belong to Great Britain; the rest are French, and administered from Tahiti. The group was discovered by Quiros in 1606, and came into the possession of France in 1881. In 1903 a severe storm and flood visited the islands and many of the inhabitants perished. Pop. about 5,000. See French Establishments in Oceania.

TUAREGS, too-a'regz, TUARICKS, or TAWAREK, a fierce and powerful race of Berber origin, professing to be Mohammedans, but different in their practices, religious and social, from most of the believers in that faith. They are virtually independent, although roam¬ ing within the boundaries of several jurisdic¬ tions, French, Turkish and Moroccan. The tribe is often predatory, and members of it have been guilty of grave outrages on travelers in the desert. Both men and women are of fine physique, and the women go unveiled, and take part with the men in the public affairs of the tribe. Tuareg is the Arabic name for the tribe. They call themselves Imoshagh. See Berbers.

TUATARA, too-a-ta'ra, the native name of Sphenodon pnnctatiim, a large lizard-like reptile formerly abundarft on the mainland of New Zealand, but now restricted to some of the small islands off the coast and probably doomed to total extinction. It is the sole living repre¬ sentative of the order Rhynchocephalia and be¬ cause of its great zoological interest as a relic of that ancient group should be preserved, and, indeed, it is protected by the Colonial govern¬

ment. It is about two to two and one-half feet long, with four strong, five-toed limbs, a loose- fitting scaly skin and a fringed crest extending from the head to the tip of the tail. In color it has olive sides and limbs with minute white specks, beneath yellowish ; the spines of the nuchal and dorsal crests yellow, of the caudal brown. The teeth are completely coalesced with the jaws and palate to form two tubercu- late ridges on each side posteriorly in the upper jaw, and a very hard polished beak in the front of the mouth. Most interesting skeletal features are the presence of two well-developed post or¬ bital arches in the skull, the firmly-fixed quad¬ rate bone, the long series of abdominal ribs and the presence of separate intercentra between the

vertebral bodies. On the roof of the skull in the parietal bones is a conspicuous opening, the seat of the pineal eye, which in this animal reaches a high degree of development, but is shielded from the access of light rays by a heavy curtain of pigment which covers it.

These animals live in burrows which ter¬ minate in large chambers lined with grass. Cer¬ tain species of petrels occupy the 'tuataras* bur¬ rows as nesting sites, and the*two are reputed to live peacefully together. During the day the tuatara sleeps in its nest but issues at night to seek its exclusively animal food, which consists of insects, lizards, frogs, small birds, earth¬ worms, etc., or along the seashore of crabs, marine worms and small fishes. They are pug¬ nacious but sluggish creatures, and are very fond of lying in water. Sometime during the summer, from November to January, about a dozen eggs are deposited in a hole in the ground, and there they remain for about 13 months when, during the following summer, they hatch. Consult Howes, trans¬ actions Zoological Society of London) (Vol. XV).

TUBA, in music, a brass wind instrument of the saxhorn family, the lowest as to pitch in the orchestra; it has five cylinders, and its com¬ pass is four octaves. It is utilized, since its introduction by Wagner, as the bass of the trombone choir. Also, a high pressure reed stop of eight-foot pitch on an organ.

TUBAL-CAIN. The son of Lamech and Zillah, and according to Gen. iv, 22, the in¬ ventor of the art of working in metals.

TUBBS, Frank Dean, American educator: b. Mexico, N. Y., 9 April 1864. He was graduated from the Ohio Wesleyan University in 1888 and received the degree of A.M. in 1893. From 1889 to 1894 he was professor of natural history at the Mexican Methodist College, Puebla, Mexico, from 1894 to 1897 was presi¬ dent of the South American School of Theol¬ ogy, Mercedes, Argentina, and from 1899 to 1901 was professor of biology and geology at Kansas Wesleyan University. In 1902-07 he was professor of science and in 1903-07 prin¬ cipal of Marion (Ohio) High School. In 1907 he became professor of geology and astronomy at Bates College, Lewiston, Me. In 1910-12 he lectured ortˆsdence at the Bangor Theological Seminary. Professor Tubbs is author and translator of several works in the Spanish language and is well known as a lecturer on science and travels.

TUBE-WEAVER, a group of spiders (q.v.).

TUBE WELL, or DRIVEN WELL, a

device for obtaining water from the soil, con¬ sisting of an iron pipe of small diameter, pointed at the lower end, and driven vertically down into the earth usually by means similar to those used in driving oil wells, until it pierces a water-bearing stratum. The tube is provided with a number of lateral perforations near its lower end, through which the water can enter it. In some cases the water exists in the soil under a pressure sufficient to cause it to flow up through the tube and out at the top; but more commonly a pump must be applied at the upper end, to draw the water up to the sur¬ face. When the well is to be driven to a depth greater than one length of pipe, the tubing is usually constructed in sections, which are united by means of screw connections ; new sections being added at the upper end as the sinking of the well proceeds.

TUBER, a shortened, thickened, fleshy, sub¬ terranean stem in which the leaves appear as scales with axillary dormant buds, collectively called ˆeyes® in the potato, and Terusalem arti¬ choke, which are good examples. Internally they contain starch as a principal component. Tneir office is to act as reservoirs of food and to propagate the species when favorable condi¬ tions present. Plants which bear tubers are all perennials.

TUBERACEiE. See Fungi.

TUBERCULIN, a culture used to test for the presence of the disease tuberculosis in cat¬ tle. Prepared as follows: The attenuated cul¬ tures of tubercle bacilli or germs are allowed to grow in broth containing glycerine. After growing for several weeks, the bacilli produce certain toxic or poisonous substances wThich are soluble in and hence dissolved in the broth. The toxic solution is filtered from the bacilli and becomes the solution tuberculin. The process of manufacture has been subject to much variation. When injected in small quan¬ tity into a healthy animal it produces no effect, but if the animal has the disease tuberculosis it causes a decided rise in bodily temperature and hence can be used as a test for that dis¬ ease. It was originally introduced by Profes¬ sor Koch of Berlin, and hailed as a cure for consumption, on the principle of vaccination for hydrophobia. It proved ineffective, but is by some deemed useful as a test. Consult Cochrane and Sprawson, (Guide to the Use of Tuberculin (1915).

TUBERCULOSIS, an infectious, com¬ municable disease caused by the

bacillus of tuberculosis. The bacillus induces the formation of little nodules called tubercles. These tubercles may grow in size through the continued action of the organisms; they may soften, break down and be expelled, leaving behind an ulcer or a cavity; they may become hard by a process of sclerosis ; or they may calcify. In addition to the local mani¬ festations the disease produces general symp¬ toms like elevation of the body temperature, increased pulse-rate and loss of weight. It is popularly known under a variety of other names as consumption, phthisis, decline, debility, hectic fever and when localized in a special part or tissue, as Pott's disease or hunchback, scrofula, hip-joint disease, white swelling (tuberculosis

of elbow) and lupus (tuberculosis of skin). Contrary to prevalent lay opinion, when prop¬ erly treated, it is a very curable affection.

Distribution of the Disease, Geographical. — Tuberculosis is the most universal of all dis¬ eases. It is found in every part of the world, and has been known from the beginning of his¬ tory. It was accurately described by Hippoc¬ rates (460 b.c.), and by Galen (200 a.d.). It is most prevalent, however, in large cities and especially in overcrowded districts.

Distribution According to Race. — No race is exempt, but some races appear less resistant than others. Indians, when brought into civili¬ zation, prove especially susceptible. Among the other races in this county the negroes seem to be the most susceptible with next in order the Irish, while Jews stand at the end of the list. In the general mortality about one-tenth and in the mortality between the ages of 15 and 60 about one-fourth of all deaths are due to it. The number of clinical cases in a community is about 10 times the number of deaths in a year (Rosenau). Eighty per cent of these manifest it in the lungs.

Distribution Among Animals. — Most ani¬ mals are more or less susceptible. Among domestic animals it is found most frequently in cattle and swine, though sheep and horses are not exempt. Dogs and cats manifest it rarely. It is also found in birds (fowl) and fish. Wild animals in their native haunts seem less susceptible, yet in domestication it is the most common cause of death. Rabbits, guinea-pigs, rats and mice may acquire it. Guinea-pigs are especially susceptible to experimental inocula¬ tion and are, therefore, commonly used for this purpose. Though frequent in adult cattle, it is infrequent in calves (Nocard), showing that direct heredity plays no part.

Etiology (Causation). — The actual cause of the disease is the

tubercle-bacillus described by Robert Koch in 1882. This is a minute vegetable non-motile organism in the shape of a rod or lead-pencil, measuring about three microns of an inch) in length, and about

four to six times longer than broad. It is visible only under the higher powers of the microscope, a 3*2 oil-immersion lens being usually used to study it. Its principal characteristic is its be¬ havior toward aniline dyes. It requires the strongest dyes to stain it, but when stained it holds the dye so tenaciously that exposure even to strong mineral acids for a reasonable time fails to decolorize it. This characteristic fur¬ nishes the most ready means for its recognition. It is quite parasitic in nature, growing on but few artificial media, namely, blood-serum, glycerine-agar, bouillon or potato, best on the first. It grows only at the body temperature (37° C.). It is slow in growth, and becomes apparent only from 5 to 14 days after inocula¬ tion of the medium. Exposure moist to a tem¬ perature of 60° C. for 15 minutes, or boiling, kills it, though freezing has no effect on it. It is killed by direct sunlight within a variable period of time (from 15 minutes on), depend¬ ing on the season and the character of the medium containing the organism; by diffuse sunlight near a window in a week or two. In growing (either parasitically or without the body) the organism elaborates a chemical product highly poisonous to most animals. It

is this poison circulating in the blood which produces the general symptoms of the disease, such as fever, increased heartbeat, emaciation, etc. Tubercle-bacilli found in different animals differ in their characteristics. The human, bovine, avian and fish varieties have been dif¬ ferentiated. One of the principal points to be noted is the slow propagation of the organisms with the consequent slow development of the disease. The actual infection usually precedes the manifestation of the disease by scarcely ever less than two and frequently as many as 20 years.

Predisposing Causes. — Though the bacillus of tuberculosis is the actual cause of the disease whenever it occurs, other factors require con¬ sideration. As wheat will not grow on every soil, so the tubercle-bacillus will not grow in every individual. In fact it would appear that the majority of human beings are quite insus¬ ceptible, and that as a rule an overwhelming dose of the organisms repeated frequently for some time is necessary to overcome the resist¬ ance. All the

conditions necessary to produce susceptibility are unknown, yet it is empirically true (and could be with reason supposed) that any circumstance which tends to lower the gen¬ eral vital resistance decreases the resistance to tuberculosis. Therefore, defective and insuffi¬ cient food, over-work, worry, chronic alcohol¬ ism, surroundings like a damp, dark, over¬ crowded dwelling, persistent irritation of a somewhat naturally susceptible part of the body, as irritation of the lungs by the constant in¬ halation of dust (mine-workers, stone-cutters, etc.), previous severe disease like typhoid fever, etc., all tend to increase the susceptibility.

It was thought in the past that the most common cause active in the production of sus¬ ceptibility was heredity, because the disease manifests itself more commonly in the children of the tuberculous than of the non-tuberculous. Recognizing the communicability of the disease, however, the closeness of the contact after birth easily accounts for this, without it proving them more susceptible. In fact, a strong argument can be deduced to the contrary, namely, that the children of tuberculous parents are less sus¬ ceptible. Granting the communicability, it is not a surprise that children who are kissed and fondled for years by tuberculous mothers con¬ tract it, but it is a surprise if any escape ; and if they were more susceptible we would expect them to contract it in such a virulent form that no child of a tuberculous mother would ever reach adult age. The fact is, however, that the majority of children of tuberculous parents never manifest the disease and the ones who do usually manifest it in a very chronic fashion and only after the age of 15. In other words, though these children live in an atmosphere impregnated with the germs, the majority fail to contract it and the remainder resist it for years.

Flick's paper on tuberculosis as a house- disease goes to prove its communicability. He investigated all the houses of the largest, oldest and most thickly populated ward in Philadel¬ phia, and found that the deaths from tuber¬ culosis in that ward were disproportionately large in certain houses. In short, he demon¬ strated case after case of apparently healthy families moving into a house previously oc¬

cupied by a tuberculous person with the result that one or more members died of the disease.

Modes of Infection. — There are four pos¬ sible modes of infection, namely, inoculation, heredity, inhalation and ingestion.

Inoculation. — Villemin's work, supple¬ mented by that of Cohnheim and Salamonson, absolutely established the fact that the disease was

inoculable. Inoculation is, however, quite rare as a method of general infection in human beings, and its occurrence is practically limited to special occupations. Inoculation with the production of a strictly limited local lesion is reasonably common on the hands of physicians who do anatomical or post-mortem work (the post-mortem wart, the leichen-tubevoXo. of the Germans), of butchers, tanners, etc. Local tubercles have also been produced bv piercing the ears for earrings, by tattooing and by washing the clothes of a tuberculous patient. Both local and generalized tuberculosis have been reported as a result of the rite of cir¬ cumcision, the last step in which is the sucking of the wound.

Heredity. — Up to the time of Villemin this

was the generally accepted mode of acquiring the disease, though here and there down the centuries from the time of Galen some one has stood out against it in favor of contagion. Hereditary transmission has been experi¬ mentally proven on the lower animals (Gart¬ ner), and occasionally demonstrated in human beings by the finding of tuberculous lesions in the foetus. These proofs occur so rarely, however, that the ordinary view of practically all cases being examples of contagion, is fully warranted.

Inhalation. — The common belief at the pres¬ ent day is that the majority of cases of tubercu¬ losis are the result of inhalation of the germs. The contagiousness of the disease being proven, and the infectious bacilli being found in the matter given off from a tuberculous ulcer (therefore, in the sputum in tuberculosis of the lungs), it is readily understood how people liv¬ ing with a consumptive may be more or less constantly inhaling the contagion. Nuttall's estimate of the number of bacilli thrown off in the expectoration daily could only make one wonder how anybody escapes the disease, were it not that they are so easily and quickly devital¬ ized. In a case where the patient expectorated about four ounces daily, Nuttall estimated the number of bacilli to be from one and a half to four billions in the 24 hours. Experiments on animals with the dust of rooms occupied bv tuberculous patients have usually proven posi¬ tive (Cornet). The arguments for inhalation as the most common mode of infection are: (1) the very great frequency of tuberculosis of the lungs; (2) the frequency with which all per¬ sons are exposed to this form of contagion.

Ingestion. — For years it was thought that tuberculosis of the lungs was the result of in¬ halation of the germs, and abdominal tuber¬ culosis the result of ingestion with food or otherwise. The argument

favoring this view appeared plain; namely, that primary mesenteric gland tuberculosis is almost limited to children, especially the bottle-fed. Living as they do en¬ tirely on cows' milk, and considering the sus¬ ceptibility of horned cattle to tuberculosis, the inference seemed so justified that scarcely any

exception was taken to it. In addition, adults who live as a rule on cooked food scarcely ever show mesenteric gland tuberculosis as a primary infection, but practically always tuberculosis of the lungs, which would readily seem to be the result of contact with the disease in their occu¬ pation, sleeping-rooms, etc. This plain view of the matter has, however, undergone a change. The majority of clinicians and pathologists of our day believe that children manifest the mesenteric form more frequently simply be¬ cause these glands are more susceptible at that age, and adults the pulmonary form for an analogous reason. For several years at the end of the 19th century considerable was writ¬ ten to prove that practically all cases of tuber¬ culosis were the result of ingestion of the germs. It was contended that even in tuber¬ culosis of the lungs the germs entered through the digestive tract, passed into the chyle-vessels with the fat, were carried through the thoracic duct to the heart and took up lodging in the lung on account of its non-resistive power. The experiments about this time demonstrating the infectivity of cows' milk became so numer¬ ous (Gerlach, Bang, Bollinger, Ernst) that the question of the digestive tract as a probably common route (if not actually the most com¬ mon) seemed practically settled. At the British congress on tuberculosis in 1901, however, Koch threw a shell which scattered scientific physicians and left them in two hostile camps. Coming from any one else the opinion (for it was scarcely more than an opinion, being based on a small number of experiments) would have been scoffed at, but coming with Koch's au¬ thority it could not fail to arouse interest and even advocates. Koch affirmed that the differ¬ ence between the bovine tubercle-bacillus (that is, the bacillus causing disease in cattle) and the human tubercle-bacillus was such that one was not contagious to the other species, or was so slightly contagious that the number of case's of tuberculosis thus produced might be left out of consideration without impairing statis¬ tics. During the past 18 years the efforts to disprove Koch's statement have been numerous, but the question is not yet absolutely settled. Our investigations are conclusive enough, how¬ ever, to lead us to believe that about 5 per cent of the cases in human beings are due to the bovine bacillus. Practically all of these

are in the lymphatic glands of children, or in other extra pulmonary locations ; the number in the lungs of adults is negligible.

Primary and Secondary Infection. — The belief is gradually gaining ground that the ordinary manifest tuberculosis of the lungs is a result not of primary but of secondary in¬ fection. Inoculation experiments on animals have always shown primary inoculation to pro¬ duce tuberculosis of the nearest lymphatic glands with no lesion at the site of inoculation, and secondary inoculation to produce no lesion of the lymphatic glands with definite tubercu¬ losis at the site of inoculation. It would ap¬ pear, therefore, that pulmonary tuberculosis is the result of secondary rather than primary in¬ fection and occurs in one of the following ways : The individual ingests tubercle bacilli, which pass through the intestinal wall without producing a lesion, but cause tuberculosis of the mesenteric, and later the bronchial glands.

The disease of the bronchial glands produces stasis of the lymphatic circulation in the lung, with a consequent retrograde flow of lymph, which carries the tubercle bacilli from the glands to the lung tissue. Or after the lymphatic glands have become involved an en¬ tirely new infection by inhalation or ingestion produces the pulmonary manifestation. A num¬ ber of investigators (prominent among them Bushnell) believe that the primary infection practically always occurs in childhood and that adult infection is extremely rare.

Pathology. — When the tubercle bacilli are deposited in a tissue they proceed to multiply. Like other plants in growth, they take from their surroundings the chemical elements neces¬ sary. The living cells from which this material is taken die. In addition, the growing bacilli throw off waste products containing a poison (toxin) which kills other cells. We soon, therefore, have the tubercle bacilli in a mass of dead debris.* A reaction now occurs on the part of the healthy tissue to prevent extension — the cells of the part multiply, and white blood cells wander in from the blood for the pur¬ pose of consuming the organisms. It is this mass of bacilli, debris and new cells which constitutes the tubercle described first by Baillie in 1794, and which is the specific lesion of the disease no matter in what organ it occurs. The debris looks like a soft cheese, and is called caseous material or caseation. The new cells are called epithelioid. Usually a tubercle also shows what we call a giant cell, a cell three to eight times larger than the epithelioid.

The question of the cure of the tubercle seems to depend on whether the epithelioid cells or the tubercle-bacilli obtain the upper hand. If the epithelioid cells are manufactured more rapidly than the tubercle-

bacilli destroy them they form a dense wall about the tubercle- bacilli, elongate, become fully formed fibrous connective-tissue cells, thus shutting the bacilli up in a capsule, and the bacilli die, while the caseous material calcifies or is absorbed and re¬ placed by scar-tissue or fibrous tissue. When the amount of fibrous tissue in the lung is large we speak of fibrosis of the lung. If, however, the bacilli are victorious the tubercle may grow larger and, coming in contact with other tuber¬ cles, form what is known as a conglomerate tubercle, and so continue until even a whole organ is involved. Again, the caseation may advance so rapidly, especially in the lung, that there is never any sharp demarcation between healthy and diseased tissue. This is generally called diffuse tuberculosis, and in the lungs is known as caseous or tuberculous pneumonia.

Finally, as the tubercle advances, other micro-organisms (particularly streptococci or staphylococci) may gain entrance to the caseous material and break it up. If now the tubercle, in growing, reaches a surface its liquid con¬ tents may be expelled, leaving behind an ulcer or a cavity. This happens most frequently in the lungs, and the resultant cavity may be of any size from a pea to that of a whole lobe of the lung.

The cavity is usually within the lung, or if at the margin, is limited by the pleura, which thickens about it. Sometimes, however, it breaks through the pleura, allowing pus into the

pleural cavity, which is called pyothorax or empyema ; occasionally both pus and air are ad¬ mitted producing pyopneumothorax.

When newly formed, tubercles appear to the naked eye as grayish-white or yellowish-white specks about the size of a millet seed, hence the name miliary tubercle. When two or more of these fuse, it is called a conglomerate tubercle. Usually the disease, especially in the lungs, pro¬ gresses by a small number of tubercles localized in one area running together to form con¬ glomerate tubercles and these again to form a larger mass which we call tuberculous infiltra¬ tion. Sometimes in non-resisting cases miliary tubercles develop rapidly all through the lung and rarely in many other organs and the indi¬ vidual dies before they become conglomerate. This condition is described as miliary tuber¬ culosis. In growth tubercles destroy the tissue which they replace and even when cure results, they only change to masses

of scar tissue ; the original tissue never returns.

Lymph-Gland Tuberculosis. — Children are most frequently the victims, and the bronchial, cervical and mesenteric are the glands of predi¬ lection. Tuberculosis of the cervical lymph- glands is popularly called scrofula. It is treated in a similar way to chronic tuberculosis of the lungs by rest, fresh air and nourishment, or by the X-ray, which appears to be frequently successful. When the glands break down, surgical interference is usually necessary.

Bone Tuberculosis. — This is likewise most common in children. It may be limited to the medulla or periosteum, and spread from either to the cortical portion, producing necrosis (tuberculous caries). It is most frequent at the joints, especially the hip and the intervertebral. Tuberculosis of the vertebral column is popu¬ larly called Pott's disease, or hunchback. It is usually associated with lumbar or psoas abscess. When localized to the vertebras, cures are frequent. The treatment of Pott's disease and other joint tuberculous disease, like hip- joint disease, is similar to that of chronic tuber¬ culosis of the lungs.

Intestinal Tuberculosis. — The intestines show either a miliary variety (the tubercle lying either beneath the mucous membrane or the peritoneum) or a chronic ulceration. Both forms are usually secondary to tuberculosis elsewhere. Miliary tuberculosis and tubercu¬ lous ulcers of the appendix are not uncommon, particularly in advanced tuberculosis of the lungs.

Laryngeal Tuberculosis. — 'This is mani¬ fested commonly by adults as a complication of advanced tuberculosis of the lungs. Its bad reputation, as far as cure is concerned, comes from the fact that it usually occurs only when the tuberculosis of the lungs is so advanced that the individual is incurable on account of the lung condition. When it occurs early in the case or as a primary affection, it is just as curable as tuberculosis elsewhere. The amount of hoarseness or pain does not indicate the seriousness of the condition. A small insignificant closed tubercle between the vocal cords may produce marked hoarseness; a small ulcer on the epiglottis may produce great pain; a large, much more serious ulcer when situated elsewhere may produce neither hoarseness nor pain.

The organs most commonly affected in adults are the lungs; in children, the lymph- glands, bones and joints. The other organs are affected much less frequently, and in about the following order: Intestines, peritoneum, kid¬ neys, meninges, brain, spleen, liver,

generative organs, pericardium, heart. Tuberculosis of the skin comes under the head of lupus (q.v.).

Symptoms and Prognosis of Tuberculosis of the Lungs. — It is necessary to differentiate three varieties, acute miliary tuberculosis, acute tuberculous pneumonia and chronic tubercu¬ losis.

Acute Miliary Tuberculosis of the Lungs.

— This may begin as a primary or be secondary to an acute or chronic affection elsewhere. It is most common as a termination of a chronic affection of the lungs. It comes on rather rapidly, like the ordinary acute infectious dis¬ eases, and is sometimes distinguished from them (especially typhoid fever) with difficulty. There is a loss of appetite, loss of flesh and strength, fever (102° to 104° F.), accelerated pulse, hurried respirations, a brown fissured tongue, delirium, then stupor and death. The duration is from two to four weeks. The prog¬ nosis is always grave, though no case of tuber¬ culosis is ever so grave that treatment is surely in vain.

Acute Tuberculous Pneumonia.— This is

practically always secondary to a chronic tuber¬ culosis of the lungs. It begins, like lobar (ordinary) pneumonia, with a chill, high fever, rapid pulse, shortness of breath, hemorrhagic sputum, flushed face, and the physical signs of consolidation of parts of the lung. Instead of ending by crisis about the ninth day, like lobar pneumonia, it continues to a fatal termination ; or the acute symptoms gradually subside, the diseased area becomes fibrous, and the patient gradually gets well, or approximately so, with a loss of lung-tissue equal to the involvement, which is sometimes an entire lung. The diagnosis is made by the ordinary signs of pneumonia and the tubercle-bacilli in the sputum. The prognosis is verv unfavorable; rarely, however, a case recovers sufficiently to lead a useful life for a number of years. The treatment is that of chronic tuberculosis.

Chronic. Tuberculosis of the Lungs. — This is what is ordinarily understood by consumption, or tuberculosis of the lungs without qualifi¬ cation. Its symptoms vary with the progress of the disease, and the susceptibility of the in¬ dividual to the poison (toxin) excreted by the bacillus. The onset is usually insidious, and the disease frequently progresses for 5 to 20 years before the patient recognizes it. The symptoms are often brought out by a ˆcold® from which the patient seemingly does not re¬ cover. Many, therefore, attribute their disease to such a <(cold.):> The first noticeable symptom is

sometimes a hemorrhage or a pleurisy; again, a progressive loss in weight or a slight dry cough, becoming gradually worse. The most important very early symptoms are usually slight fever, especially toward evening (which may or may not be accompanied by a chill), hectic flush, acceleration of the pulse-rate, cough, expectoration, loss in weight, progressive pallor of the skin, night-sweats, indigestion or loss of appetite, vague general pains, and sore¬ ness localized in the chest. The one positive

sign of tuberculosis at this stage is the finding of tubercle-bacilli in the sputum. If every lesion were open, that is, in communication with a bronchus, there would be tubercle-bacilli in the sputum from the earliest stages, and the diagnosis would be easy; but many lesions are closed, that is, completely encapsulated, and, therefore, show no bacilli in the sputum. Hence the physician must rely on other signs brought out by careful inspection, palpation, percussion and auscultation of the chest and X-ray ex¬ amination.

As the disease advances, all the foregoing symptoms are intensified. The pulse-rate be¬ comes more rapid, so that it is evident to the patient in palpitation or shortness of breath,- the temperature rises to 102 or more, the loss of weight becomes excessive, frequently reaching one-fourth, sometimes one-third and rarely one- half of the usual weight, the pallor becomes marked, the appetite is completely lost, cough may become almost continuous day and night and of a most racking character, expectoration increases, the feet usually swell and the picture presented is known to everybody. The patient is extremely emaciated, the chest is quite flat, the depressions above and below the clavicles are marked and the scapulae stand out prominently on the back. Hemorrhage may or may not occur. As a rule there is little or no pain. The lungs themselves possess no sensitive nerves, and it is only the associated pleurisy which occurs at intervals that produces this symptom. Examination by the physician now reveals the signs of extensive solidification. This may extend over one whole lung or. over the greater part of both. It may or may not be associated with cavities.

Chronic tuberculosis of the lungs, when diag¬ nosed sufficiently early, and when the personal resistance is good, is a very curable affection. This is proven by the number of cured lesions found at autopsy. It is very conservative to say that 50 per cent of all bodies coming to the

autopsy table past the age of 35 (death having been the result of some other disease than tuberculosis of the lungs), show a healed lesion of tuberculosis of the lungs. The present post¬ mortem and clinical records demonstrate that 75 per cent of cases recover. Moreover, these post-mortem records are absolute ; there is no practical question of diagnostic error. In addi¬ tion, many cases with a lessened resistance can be so improved under judicious treatment that their lives are prolonged in comfort for 10, 20, even 30 years. For the encouragement of those afflicted, it might be stated that according to Jacobson the following appear to have suffered from tuberculosis: Cicero, Milton, Samuel But¬ ler, Pope, Shelley, Hood, Keats, Elizabeth Bar¬ rett Browning, Francis Thompson, Goethe, Schiller, Moliere, Richelieu, Merimee, Thoreau, Calvin, Descartes, Locke, Kant, Spinoza, Mozart, Chopin, Paganini, Beaumont, Samuel Johnson, Sterne, DeQuincey, Scott, Jane Austen, Charlotte and Emily Bronte, Stevenson, Bal¬ zac, Voltaire, Rousseau, Washington Irving, Hawthorne, Gibbon, Kingsley, Ruskin, Emer¬ son, Cardinal Manning, Raphael, Watteau, Bastien LePage, Marie Bashkirtseff, Cecil Rhodes and Laennec, as well as a large num¬ ber of present-day physicians, who after de¬ veloping the disease became tuberculosis experts,

like Edward L. Trudeau, Lawrence F. Flick, H. R. M. Landis, Lawrason Brown, A. M. Forster, James Price, Estes Nichols and E. S. Bullock.

Diagnosis. — Only rarely is the diagnosis difficult. The comparison of the autopsy find¬ ings with the clinical diagnosis at the Henry Phipps Institute showed the physical signs of Laennec to be practically perfect. In addition, we have as aids the examination of the sputum, the X-ray and the tuberculin test. Of these the physical signs elicited by an expert' are the most positive. The sputum may fail to show tubercle bacilli on account of the lesion being closed. The tuberculin test is practically absolute, though it does not tell us in what part of the body the tuberculosis is. It is very useful in the diagnosis of tuberculosis in cattle because we only wish to learn the fact of its existence and are not concerned about its location ; but not so useful in human beings in whom we usually wish to learn the nature of a lesion in a particu¬ lar place. The X-ray in advanced tuberculosis is about as accurate as physical signs, but in early lesions it frequently fails. It is likely that time will make the X-ray more accurate.

Treatment of Chronic Tuberculosis of the Lungs. — There is no known specific for the disease. Koch's tuberculin is used by the minority of physicians and by them only in selected cases. There are at present more than 25 different tuberculins (emulsions and sera) on the market, and almost every discoverer claims his is the only one

beneficial. The most that can be said with certainty in regard to the treatment with any of them is that in ex¬ pert hands in small doses they do no harm. In the hands of inexperience their employment is fraught with danger. Whether tuberculin is used or not, the most careful hygienic regime must be instituted. The disease progresses on account of a lack of resistance in the patient ; the object, therefore, is to increase the resisting power. This is accomplished by rest, fresh air and good nourishment. If the disease is active, that is associated with fever, rapid pulse or rapid emaciation, or other serious symptoms,

. rest in bed is necessary. The patient should remain in bed until the temperature is below 99.6, the pulse below 100, serious symptoms in abeyance and gain in weight is evident. An early favorable case usually requires from two to six weeks rest in bed ; advanced cases cor¬ respondingly longer. Even when ready to be up all day he should lead a regular life, retiring at a proper hour (before 10 p.m. if an adult), in order to get sufficient rest. He should have nine hours' sleep, must sleep alone and, when possible, in a room alone. The best situation for the room is on the southwest corner of the house. The windows of the sleeping-room should be kept wide open, no matter what the weather. In summer all the windows in the room, and in winter, when the air diffuses much more readily, one window at least, should be wide open. The idea is to make every inhala¬ tion one of fresh air. During the day the patient must spend as much time as possible out of doors, yet in summer he must not be in the sun. When the weather is cold he should be comfortably wrapped. It is better to multiply the coverings which are readily removed than underclothes. Patients suspecting lung trouble

frequently come to the physician wearing a chest protector, two or even three undershirts and other clothes. This is not only unnecessary, but probably harmful. The regulation clothes of the kind most comfortable to the patient meet all requirements.

Diet. — Nourishment is most important. If a patient is run down, and he usually is, it is absolutely necessary to build him up. This can be accomplished only by a proper amount of food. Some physicians of repute in tuberculosis advise a general mixed diet with the addition of two to four pints of milk daily. Some push the nourishment; others, like Bushnell, insist that it should not be forced. In regard to nutritive value foodstuffs stand in the following order : Milk, eggs, meat,

vegetables, cereals. Contrary to popular opinion potatoes never made anyone fat. An ordinary good diet would be: Breakfast, 7:30 a.m., fruit, two boiled eggs, bread and butter and two glasses of milk; lunch, 9:45 a.m., one glass of milk; dinner, 12:30 p.m., soup, meat (preferably rare roast beef or beefsteak), three kinds of vegetables and a simple dessert, like ice cream or rice pud¬ ding; lunch, 3:30 p.m., one glass of milk; sup¬ per, 6 p.m., meat or eggs, potatoes or other vegetable, bread and butter and two glasses of milk. The diet found most generally suitable to the great majority of patients at the Sana¬ torium for Consumptives at White Haven, Pa., is as follows: Breakfast, 7:30 a.m., one and one-half pints of milk, with two raw eggs (the eggs may be broken up in the milk or taken whole) and fruit; lunch, 10 a.m., one pint of milk and one raw egg; dinner, 12:30 p.m., soup, meat, three or four kinds of vegetables and pudding or ice cream ; lunch, 3 :30 P.M., one pint of milk and one raw egg; supper, 6 P.M., one and one-half pints of milk, two raw eggs and fruit; lunch, 8 p.m. (just before retiring), one-half to one pint of milk. Alcohol (whisky, brandy, wine, etc.), which was at one time much lauded, especially by the laity, is now avoided by experts.

Climate. — Up to recently considerable de¬ pendence was placed on climate. Patients who could afford it were advised to betake them¬ selves to the Southwest, and not infrequently those who could not afford it were told to ((beat their way.)} It is still generally believed that a dry climate is more suitable for the cure of the majority of patients; yet no matter what the climate, the patient must carry out the fore¬ going or a similar line of treatment. It is to be remembered that tuberculosis is a disease of all climes and altitudes; that cases develop in Colorado and New Mexico as well as in Can¬ ada, and that cases have been and are being cured in all parts of the world. Some writers, among them many eminent in the specialty of tuberculosis, absolutely deny any influence to climate. This, however, may be affirmed with certainty: that if the removal to another cli¬ mate entails, or is likely to entail, the least hard¬ ship or privation, it is better for the patient to remain at home. Moreover, if the patient is sent away he must be referred to another physician, or to a sanatorium, where he will have a physician's care. To send him away to meet his difficulties and emergencies by him¬ self is an acknowledgment on the part of the physician that he does not know how to treat

tuberculosis. Tuberculosis is, at least, as seri¬ ous a disease as typhoid fever and requires analogous attention to detail. To send a tuber¬ culous patient to a farmhouse or hotel in the country away from medical supervision is simi¬ lar to instructing the family of a typhoid

patient in the regime to be followed without returning to learn if the directions are carried out properly, or if new complications have taken place. In addition, in the hotel or board¬ ing-house the patient is afraid to follow the regime too strictly, fearing that others will recognize his complaint, and he will be asked to leave. Moreover, to send a patient to a farm¬ house where his disease is known has no fur¬ ther advantage. In this case the people have usually had tuberculous patients previously and have some ideas relative to the disease. These ideas are frequently wrong, yet wishing the patient well, they endeavor to instruct him. Any sick individual is more or less at the mercy of the well people about him ; if they insist on certain things he has not the will-power to resist. He is, therefore, being treated by lay people not a physician.

Sanatoriums. — New sanatoriums for the treatment of tuberculosis are springing up al¬ most every month. They are opening their doors as a result of private enterprise or bene¬ faction or of a municipal crusade against the disease. -They serve a three-fold purpose: (1) they gather in consumptives from large centres of population, and so prevent them from acting as a focus of contagion; (2) they instruct the patient how to take care of himself so that he is not a menace to others even when he returns home; (3) they demand a discipline which, if followed out, will in a favorable case cure. As a rule patients do better in sanatoriums than at home. There are a number of satisfactory sanatoriums throughout the United States, es¬ pecially in the Northeast and Southwest quadrants.

Prevention in Cases of Chronic Tuber¬ culosis of the Lungs. — The contagion is con¬ tained in the matter given off from a tuber¬ culous sore. Therefore, in a case of tubercu¬ losis of the lungs it is only necessary to destroy the sputum to prevent contagion to others. The patient should expectorate only into receptacles where the sputum can be properly handled with¬ out coming in contact with other things. He should never expectorate into rags or hand¬ kerchiefs, but should limit himself to spit-cup and paper napkins. The spit-cup should – be made of paper so that it may be burned, or if of china should contain an antiseptic or ger¬ micide. Ordinary lye will suffice. • The cup should be boiled daily. When coughing, the patient should hold a paper napkin before his mouth. There should be no question of any¬ one sleeping with the patient. Children are especially susceptible; hence, when the parents are tuberculous, extra care must be exercised. The sick room should be uncarpeted, have no curtains or hangings and contain only the bed, a table, washstand and the necessary two or three chairs. Window shades are permissible. The room should be as open to the sunlight as possible in order to keep up constant disin¬

fection. The patient, however, should not be in the sun. The eating utensils (knives, forks, spoons, cups, saucers, plates and glasses) should

be separate and should be boiled after use. Food of any kind left over should be burned; it must not be given to others, or even to the domestic animals, the cow, dog, pig or cat. The patient's soiled clothes should be handled as little as possible. When a change of clothes, sheets, pillow-cases, wearing apparel takes place, the soiled pieces should be rolled up in a clean sheet and boiled without unrolling. They may then be washed in the usual manner. If the patient is walking about the house, every room that he occupies should be as open as possible. He should not be allowed to make the dining¬ room or the kitchen his living-room. Nobody should leave the patient's room without washing the hands immediately. Children should not be allowed in the sick-room. If the patient dies, the bed and furniture should be taken outside and washed. Bureau drawers should be scrubbed. The mattress should be sent to a steam-cleaning establishment, or at least the stains on it washed with soap and water. Fol¬ lowing this the mattress and furniture should be exposed to the sunlight for at least three or four days. The floor and woodwork of the room should be scrubbed and the room opened as much as possible to the air and sunlight for a week. A good working rule for all infectious diseases is that everything which has come in contact with the patient should be burned or boiled; if neither is feasible, it should be thor¬ oughly scrubbed and exposed to the sunlight.

Campaign against Tuberculosis. — This is one of the most important public health issues of the day, and through it we expect the eradi¬ cation of the disease. During the last 40 years the death rate of tuberculosis has fallen 50 per cent, due, at least, partly to the public health efforts against it. The prospect is sufficiently bright that every State, municipality and indi¬ vidual should be interested. Every municipality should have hospitals for early and advanced cases, dispensaries for the treatment of the poor, an anti-tuberculosis society for the edu¬ cation of the public and open-air schools for tuberculous children. Anti-spitting laws should be made and enforced. Tuberculosis should be on the list of notifiable diseases. Tuberculosis in cattle should be under administrative control. The individual .can aid by voluntary work in connection with a hospital or dispensary, by membership in the anti-tuberculosis society or by donation of funds

for the work.

Bibliography. — For scientific treatment of the' subject, the following writings may be con¬ sulted: Laennec, (Diseases of the Chest) (1823); Walshe, (Diseases of the Lungs> (I860) ; Koch, (Die Aitiologie der Tuberkulose) (in (Berliner Klinische Wochenschrift,5 No. 15, 1882) ; and (Weitere Mittheilungen fiber der Tuberkulose> (in (Deutsche Medizinische Wo- chenschrift,) 1891) ; and (Ueber bakteriologische Forschung> ((Verhandlungen des X. Interna- tionalen Medizinischen Congress,5 Berlin, 4 Aug. 1890) ; and (Relation of Human and Bo¬ vine Tuberculosis) (in (Sixth International Congress on Tuberculosis, 5 Vol. IV, p. 645, 1908) ; Smith, (A Comparative Study of Bovine Tubercle Bacilli and of Human Bacilli from Sputum) (in Journal of Experimental Medi¬ cine, 1898, III, p. 451); Comet, (Verbreitung der Tuberkelbacillen ausserhalb des Korpers) (in (Zeitschrift ffir Hygiene,5 1888, Vol. V) ;

Flick, (A Review of the Cases of Tuberculosis which Terminated in Death in the Fifth Ward of Philadelphia, during the Year 1888) (in Proceedings of the County Medical Association, May 1889) ; Trudeau, (The Therapeutic Use of Tuberculin Combined with Sanatorium Treat¬ ment of Tuberculosis1* (in Transactions of the Second Annual Meeting of the National Asso¬ ciation for the Study and Prevention of Tuber¬ culosis, 1906) ; Hamman and Wolman, tuber¬ culin in Diagnosis and Treatment (1912) ; Norris and Landis, (Diseases of the Chest5 (1917) ; Fishberg, (Pulmonary Tuberculosis5 (1916) ; Lord, (Diseases of the Bronchi, Lungs and Pleura5 (1915) ; Pottenger, (Clinical Tu¬ berculosis5 (1917) ; Brown, (Symptoms, Diag¬ nosis, Prophylaxis and Treatment of Tuber¬ culosis5 (in Osier's Modern Medicine,5 1913) ; Bushnell, (Manifest Pulmonary Tuberculosis (in Military Surgeon , April 1918) ; Barjon, (Radio-Diagnosis of Pleuro-Pulmonary Affec¬ tions5 (tr. by Honeii, 1918) ; Dunham, (Manual of the Roentgenological Examination of the Chest5 (in American Review of Tuberculosis, November 1918) ; Walsh, tuberculosis Work in Europe5 (in Bulletin Johns Hopkins Hos¬ pital, 1906), and (Folly of Sending Tuberculous Patients away from Medical Supervision5 (in Journal of the American Medical Association, 3 June 1911), and (Pregnancy in Cases of Tu¬ berculosis of the Lungs5 (in American Journal of Obstetrics, LXXVII, 1918) ; Walsh, Wood and Thompson, (X-ray Study of Advanced Tuberculosis of the Lungs with Autopsies — The Degrees of Density of General Hospital No. 175 (in Transactions National Tuberculosis Association, 1919) ; Crowell, tuberculosis Dis¬ pensary Method and Procedure5 (1916) ; tu¬ berculosis Directory of Institutions and Asso¬ ciations in the United States5 (published by the National Tuberculosis Association).

In general it may be stated that the more the patient learns about tuberculosis the more he will understand the reasons for the direc¬ tions of the physician and the more likely he is to carry them out. Every patient who can afford it, therefore, should join the National Tuberculosis Association (381 Fourth avenue, New York City), in order to receive the litera¬ ture accompanying membership. In addition the following popular works are recommended : Flick, Crusade against Tuberculosis. Consump¬ tion a Curable and Preventable Disease. What a Layman should Know about it5 (1903) ; Knopf, (Pulmonary Tuberculosis: Its Modern Prophylaxis and the Treatment in Special In¬ stitutions and at Home5 (1899) ; Brown, (Rules for Recovery from Pulmonary Tuberculosis5 (1916) ; Krause, ‘Essays on Tuberculosis5 (in Journal of the Outdoor Life, 1918-19) ; Carring¬ ton, ‘ Fresh Air and Flow to Use It5 (1912), and (Living and Sleeping in the Open Air5 (1912) ; Minor, ‘Hints and Helps for Tu¬ berculous Patients5 ; Walsh, Onset of Tubercu¬ losis5 (in Journal of the Outdoor Life, August 1908), and Occupations for the Arrested Tu¬ berculous5 (in Spunk, August 1919) ; National Tuberculosis Association Standard Pamphlet, (What you should know about Consumption5 (1916) ; Otis, ‘Tuberculosis, Its Cause, Cure and Prevention5 (1918); King, (The Battle with Tuberculosis and Flow to Win it5 (1917) ; French, (Home Care of Consumptives5 (1916);

Galbreath, (T. B. Playing the Lone Game of Consumption (1915) ; Hawes, Consumption, What it is and what to do about it} (1916) ;

(Nostrums and Quackery) (published by the American Medical Association Press, 1912).

Joseph Walsh, A.M., M.D., Medical Director, White Haven Sanatorium for Tuberculosis ; formerly Commanding Officer, United States Army General Hospital No. 17 (for Tuberculosis) .

TUBERCULOSIS, in cattle. See Rinder¬ pest.

TUBEROSE, tu’be-ros or tub’roz, an am- aryllidaceous garden-flower (Polianthes tube- rosa). The funnel-shaped perianth, an incurved tube, with somewhat rose-like lobes, often doubled in cultivation, has caused a misunder¬ standing as to the name, which properly refers to tuberous roots, but is generally pronounced as if it were ((tube-rose.” The flowers are creamy-white, waxen and brittle in texture, do not

fade quickly, and are extremely fragrant, especially toward night. They are borne in a raceme at the top of a slender stem, from two to three feet tall. This stalk springs from a tuft of linear leaves, and is sheathed with the bases of others. The tube-rose is raised from bulbs, which are not hardy in the northern, but are grown for the trade very successfully in the southern, United States.

TUBES, Metal. See Pipe, Manufacture of.

TUBES, Pneumatic. See Pneumatic Tubes.

TUBES OF FORCE, imaginary tubular spaces in a field of force, and especially in a field of electric or magnetic force, whose bounding surfaces may be regarded as made up of lines of force. At any point in the surface of such a tube, the resultant force has a direc¬ tion that is tangent to the tube. The concep¬ tion is due to Faraday, and is very useful in forming a mental image of the phvsical state of a field of force. A tube of force cannot have a free end in any finite region of space. The tube must either return into itself, or pass off to an infinite distance, or terminate upon a mass of matter. The total number of lines of force included within a given tube of force is constant throughout the entire length of the tube; and hence it follows that the total force at all sections of the tube is the same; the in¬ tensity of a force varying inversely as the cross-section of the tube. In the case of an isolated electrified sphere, the tubes of electric force are radial cones, which converge, in ex¬ ternal space, toward the centre of the sphere, but which terminate upon its surface. Also called ((Tubes of Induction." See Electricity; Magnetism ; Induction.

TUBIGON, too-be'gon, Philippines, pueblo, province of Bohol; on the west coast; 24 miles northeast of Tagbilaran. It is on the coast highway. Pop. 15,860.

TUBINGEN, tii'bing-en, Germany, a town in Wiirtemberg, on the Neckar, 16 miles south of Stuttgart. The town stands in the midst of diversified scenery and is the seat of a national university. New buildings have been erected in connection with this flourishing institution, comprising various medical and physiological institutes. The university was founded in 1477.

The library contains 250,000 volumes. There are a botanical garden and fine scientific museums and collections, and an observatory. Names of celebrities connected with the univer¬ sity are Melanchthon, Reuchlin and Baur. There is trade in agricultural produce, wine and fruits. Its chief history is connected with the 30 Years' War and the

Reformation. Pop.

19,076.

TUBINGEN SCHOOL, a name given to two separate and very different schools of philosophy, because their founders were con¬ nected with the famous University of Tubingen. The old school of Tubingen was orthodox. Gottlob Christian Storr, its founder (1746- 1805), professor of philosophy at Tubingen in 1775, and professor of theology two years later, accepted without reserve the divine authority of the Scriptures, and defended miracles. Storr severely criticized Kant's book: (Religion Within the Limits of Pure Reason,) and he set forth his own system in a work called (Theory of Christian Doctrine Drawn from the Scriptures.) The later or modern school is that of Ferdinand Christian Baur (1792-1860), also professor of theology at Tubingen. Be¬ sides attacking the authenticity of certain of the Pauline epistles, he attempted to show that the fourth Gospel was not genuine. He admitted the morality of Christianity, but denied the miracles attributed to Christ and his apostles. Although Baur moderated his tone in later years his teachings promoted the spread of unbelief, and the (Life of Jesus) by Strauss (1832), which attempted to show the Gospel to be a philosophic myth, was the outcome in a large degree of the critical studies of Baur. In 1915 there were 2,056 students and 128 in¬ structors, but before the war the student body was much larger. Consult Pfleiderer, Otto, development of Theology in Germany since Kant) (London 1890) ; Nash, H. S., (The His¬ tory of the Higher Criticism of the New Testa¬ ment (New York 1906) ; Moore, E. C., Out¬ line of the History of Christian Thought since Kant (1912).

TUBMAN, Harriet, negro abolitionist and philanthropist: b. in slavery about 1815; d. Au¬ burn, N. Y., 10 March 1913. She escaped from her master's plantation in Maryland when about 25 years of age, visited Garrison Brown and other Abolitionists and became an active promoter of the ˆunderground railway." She first rescued her parents and during the two decades before the Civil War made repeated journeys to the South and brought a total of 400 or more of her race to the North and into Canada. During the war she served with the Massachusetts troops as a scout and guided Colonel Montgomery in his memorable expedi¬ tion into South Carolina: By the friendly help of Secretary Seward she was able to make her home in Auburn, N. Y., after the war, and there soon became engaged in philanthropic service in behalf of the poor and aged of her people. Her efforts led to the Foundation of the Harriet Tubman Home for Indigent Aged Negroes, to which she gave personal oversight until 1908. She married in the South in early life a man named Tubman, who died, and later married

Nelson Davis.

TUBUAI, too-boo-T, or AUSTRAL IS¬ LANDS, Polynesia, a group of islands belong-

ing to France, and situated in the Pacific Ocean south of the Society Islands. Combined area, 111 square miles. They are fertile and produce tobacco, bananas and arrow-root. The population is estimated at 2,000, mostly native Polynesians.

TUBULAR BRIDGE. See Bridge.

TUBURAN, too-boo'ran, Philippines, pueb¬ lo, province of Cebu ; on the west coast, on Tahon Strait, 30 miles northwest of Cebu. It is on the west coast highway, and is a place of considerable importance. Pop. 12,570.

TUCKAHOE, an Indian generic name, ap¬ plied by the eastern Algonquins to all round¬ ish roots. Specifically, it was the name of several Indian foods, as of the golden-club (Orontium aquaticum), and the arrow-arum (Peltandra undulata), both having deep and fleshy rootstocks, acrid when fresh, but ren¬ dered edible by cooking, and abounding in starch. Another tuckahoe was a subterranean fungus (Dachyma cocos), found very gen¬ erally throughout the Southern States in light, loamy soils and growing on old roots, either as a saprophyte or a parasite. In form, size and cortex, it is not unlike a cocoanut, and is white and apparently structureless within, moist and yielding when first dug up, but becomes dry and cracked internally soon afterward. It is also called Indian-bread, Indian-head or In¬ dian loaf, but is without starch, composed largely c f pectose, is tasteless and insoluble in water.

TUCKAUBATCHEE, Battle of, in the

War of 1812. On 18 Jan. 1814, after the battle of Autossee (q.v.), General Floyd left Fort Mitchell on the Chattahoochee and marched toward Tuckaubatchee, 40 miles south of Emuckfaw. His army consisted of 1,700 men, including 400 friendly Indians, while opposed to him were not more than 2,000 poorly armed warriors. By 27 January he had erected a fortified camp on Calibee Creek seven or eight miles south of Tuckaubatchee and there was unexpectedly attacked by the Indians, who drove in the sentinels and engaged in a

fierce conflict within the lines. But the attack was finally repulsed with a loss to the Indians of 37 dead and many wounded while Floyd's loss was 22 killed and 147 wounded. The militia, having had enough Indian fighting, insisted on returning home, wherefore Floyd abandoned all his fortified posts and on 1 February reached the Chattahoochee. Consult Adams, (pp. 193-194).

TUCKER, tuk'er, Abraham, English phi¬ losopher: b. London, 2 Sept. 1705; d. Beck- worth, Surrey, 20 Nov. 1774. He studied at Oxford, and later at the Inner Temple in preparation for the bar; but upon the death of his father he retired to his estate near Dorking. In 1754 he began to write his philo¬ sophical works, and nine years later published his first treatise, (Free WHIP The first four of the seven volumes of his most celebrated work, (The Light of Nature Pursued,5 was published in 1768, and the last three posthu¬ mously.

TUCKER, Benjamin Ricketson, American anarchist: b. near New Bedford, Mass., 1854. He was educated at the Massachusetts Insti¬ tute of Technology and in 1877 founded the Radical Review which was short lived. He then founded the journal called Liberty which in 1881 became one of the leading anarchist papers. Besides translations from leading an¬ archist writers he published (State Socialism and Anarchism5 (1899).

TUCKER, Charlotte Maria («A. L. O. E.,» that is, A Lady of England), English ju¬ venile writer: b. Barnet, Hertfordshire, 8 May 1821 ; d. Amritsar, India, 2 Dec. 1893. She be¬ gan her literary career in 1852 with the pub¬ lication of (Claremont Tales) and subsequently published more than 50 books besides numer¬ ous short stories. In 1875 she went to India where she engaged in missionary work until her death. Her books are chiefly of an alle¬ gorical character and are strongly religious in tone. The proceeds from their sale she de¬ voted principally to her missionary work. Among them are (Wings and Stings) (1853) ; (01d Friends with New Faces) (1858); (The Lost JeweP (1868) ; (Fairy Frisket5 (1874) ; (Pride and His Prisoners5 (1882) ; driven Into Exile) (1887) ; (Harold's Bride5 (1888), etc.

TUCKER, George, American author : b. Bermuda, 1775; d. Sherwood, Ala., 10 April 1861. After graduation at William and Mary College in 1797 he began the practice of law at Lynchburg, Va., and was a member of the State legislature for several years. He became representative in Congress (1819-25), and from that time on was professor of philosophy and political economy in the University of Virginia. He wrote much, including (A History of the United States.)

TUCKER, Henry Saint George, American jurist: b. Williamsburg, Va., 29 Dec. 1780; d. Winchester, Va., 20 Aug. 1848. After his education at William and Mary College he studied law at Winchester (1802) and served as a private in the War of 1812. He was rep¬ resentative in Congress (1815-19), chancellor of the fourth judicial district (1824-31), judge of the Court of Appeals (1831—41) and professor of law at the University of Virginia (1844-45). He declined the appointment as United States Attorney-General by President Jackson. He published (Lectures on Natural Law and Gov¬ ernment (1844).

TUCKER, Henry Saint George, American

lawyer and scholar: b. Winchester, Va., 1853. He received his education at Washington and Lee University, and practised law at Staunton. He sat in the House of Representatives for eight years, and in 1897 succeeded his father, J. R. Tucker, as professor of constitutional and international law at Washington and Lee. Later he was a dean at what is now George Washington University. He served a year as president of the American Bar Association (1904-05), a post held by his father in 1892-93. He wrote (Tucker on the Constitution5 (1899) ; limitations on the Treaty-Making Power5 (1915); (Woman Suffrage by Constitutional Amendment5 (1916).

TUCKER, John Randolph, American naval officer: b. Alexandria, Va., 31 Jan. 1812; d.

Petersburg, Va., 12 June 1883. He joined the navy in 1826, and during the Mexican War took part in several operations. He resigned in April 1861 and became a commander in the Confederate navy, taking part in the engage¬ ments in Hampton Roads, including the conflict between the Monitor and the Mcrrimac. He was prominent in the engagement at Drewry's Bluff, and was soon after promoted captain and sent to Charleston, S. C., to command the naval forces. After the fall of that city he went to Virginia and organized the naval brigade, which he commanded until the retreat of the Con¬ federate army from Richmond. He received a commission as rear-admiral in the Peruvian navy in 1866 and directed the combined squad¬ rons of Peru and Chile in their war with Spain. Being made president of the Peruvian hydro- graphic commission, he instituted explorations and surveys of the head waters of the Amazon.

TUCKER, Josiah, English clergyman: b. Laugharne, Wales, 1711; d. Gloucester, Eng¬ land, 4 Nov. 1799. He was graduated at Ox¬ ford, was ordained and appointed curate at Saint Stephens, Bristol (1737) and made rector in 1749. He became dean of Gloucester in 1758. He was noted for his views bn the rela¬ tions of the American colonies to the mother country, holding that separation would be no loss to the latter. His pamphlets on political economy anticipated some of the views of Adam Smith (q.v.). Among his notable utter¬ ances were (The Elements of Commerce and Theory of Taxes) (Bristol 1753) and Reflec¬ tions on Present Matters of Dispute between Great Britain and Ireland) (1775). Consult Clark, W. E., (Josiah Tucker) (New York

1903).

TUCKER, Nathaniel Beverley, (I),

usually known as Beverley Tucker, lawyer and son of Saint George Tucker: b. Williamsburg, Va., 6 Sept. 1784; d. Winchester, Va., 26 Aug. 1851. He was graduated from William and Mary College, Virginia, in 1801, studied law and practised in Virginia until his removal to Missouri in 1815. Here he was circuit judge until his return to Virginia in 1830. In 1834 he became professor of law at William and Mary College and served until his death, 17 years later. He was a prolific writer and has been pronounced the ablest man with his pen of that day in Virginia. Besides many political and miscellaneous essays published in magazines and periodicals, he wrote (The Partisan Leader: a Tale of the Future) (1836) ; (George Balcombe,5 a novel (1836) ; discourse on the Importance of Study of Political Science as a Branch of Academic Education in the United States) (1840) ; discourse on the Dangers that Threaten the Free Institutions of the United States5 (1841); (Lectures intended to Prepare the Student for the Study of the Constitution of the United States5 (1845); ˆPrinciples of Pleading5 (1846); and an unfinished life of John Randolph, his half-brother. (The Par¬ tisan Leader,5 a prophecy of Civil War between North and South, was reprinted in 1861 by the Republicans under the title (A Key to the Dis¬ union Conspiracy,5 the object being to prove that the Southern leaders had long been plan¬ ning secession and war.

TUCKER, St. George, American lawyer: b. Port Royal, Bermuda, 10 July 1752; d.

Edgewood, Va., 10 Nov. 1827. He came to Virginia in 1771 as a student at William and Mary College, studied law, was admitted to the

bar in 1774, and to practice in the general court the following year. He became interested at once in the revolting colonies and in 1781 was commissioned major in the Virginia forces. He was wounded at the battle of Guilford Court¬ house and was promoted lieutenant-colonel. He became a delegate to the Annapolis Con¬ vention (1786) and professor of law in William and Mary College (1790-1804), after which he sat on the bench as judge for 37 years. He was the author of several poems and dissertations on topics of the day and an annotated edition of Blackstone.

TUCKER, Samuel, American naval officer: b. Marblehead, Mass., 1 Nov. 1747 ; d. Bremen, Me., 10 March 1833. He ran away to sea in boyhood, in 1768 commanded a merchant vessel plying between Boston and London, and on 17 May 1776 became a captain in the American navy. He settled at Bristol, Me., in 1792, and in 1812 captured a British vessel off the Maine Coast. He was a member of the Massachusetts legislature (1814-18), was one of the framers of the constitution of the new State of Maine (1819) and sat in the Maine legislature 1820-21. Consult Sheppard, Rife of Commodore Tucker5 (1868).

TUCKER, Thomas George, Australian critic and historian : b. Burnham, England, 29 March 1859. On graduation from Cambridge University he became professor of classical and comparative philology at Melbourne University in 1885. He is the author of many critical edi¬ tions of Greek works. Among his other publi¬ cations are (Things Worth Thinking About5 (1890) ; Rife in Ancient Athens5 ; Rife in the Roman World of Nero and Saint Paul5 ; (Intro- duction to the Natural History of Language.5

TUCKER, William Jewett, American col¬ lege president: b. Griswold, Conn., 13 July 1839. He was graduated at Dartmouth College in 1861, and after completing the course at An¬ dover Theological Seminary, was ordained to the Congregational ministry in 1867, and in¬ stalled as pastor of the Franklin Street Church, Manchester, N. H. In 1875 he became pastor of the Madison Square Presbyterian Church, New York. From 1880-93 he was Bartlett pro¬ fessor of homiletics at Andover, and from 1893 till his resignation in 1909 he was president of Dartmouth College. He is now president emer¬ itus. His administration was marked by the enlargement and diversification of the curricu¬ lum, by the consolidation of the Chandler Sci¬ entific School with the College, and by the es¬ tablishment of the Amos Tuck School of Ad¬ ministration and Finance. The growth of the college in numbers and resources during his administration changed its relative place among New England colleges. He has been Phi Beta Kappa

orator at Harvard, Lyman Beecher lec¬ turer at Yale, Morse lecturer at Union Semi¬ nary, New .York, and lecturer at the Lowell Institute, Boston. He assisted in founding and editing the Andover Review, and established the Andover House in Boston, a social settle¬ ment, now known as the South End House. His published works include (From Liberty to Unity5 (1892); (The Making and the Unmak¬ ing of the Preacher5 (1899) ; (Public-Minded-

ness) (1910) ; (Personal Power) (1910) ; 'The Function of the Church in Modern Society> (1911). Since his retirement, on account of impaired health, in 1909, he has taken part in the discussion of public questions, chiefly through articles in the Atlantic Monthly. Among these are (The New Reservation of Time) (Academic Pensions), (The Progress of the Social Conscience, } (The Goal of Equality, 1 (The Ethical Challenge of the Warp (The Crux of the Peace Problem. >

TUCKERMAN, tuk'er-man, Bayard, Amer¬ ican author: b. New York, 2 July 1855. He was graduated at Harvard in 1878, studied in Europe, and devoted himself to writing upon literary and historical subjects. He has also been lecturer on English literature at Princeton. His works include (History of English Prose Fiction) (1882) ; (Life of General Lafayette) (1889) ; (Diary of Philip Hone) (1889) ; 'Peter StuyvesanC (1893) ; c William Jay and the Abolition of Slavery } (1893) ; and 'Philip

Schuyler, Major-General in the American Revolution. }

TUCKERMAN, Edward, American bot¬ anist: b. Boston, 7 Dec. 1817; d. Amherst, Mass., 15 March 1886. He was graduated at Union College in 1837, and at the Harvard Law School in 1839. After a period of study in Europe he pursued another course at Harvard and later graduated from the Divinity School there. In 1854 he formed a connection with the faculty at Amherst College which lasted till the end of his life. In his earlier years his subject was history, but in 1858 he was trans¬ ferred to the chair of botany, though he con¬ tinued as a lecturer on history until 1873. He was the foremost authority in the United States on the subject of lichens. Tuckerman's Glen in the White Mountains was named in his honor. His scientific publications include (Genera Lichenum : An Arrangement of the North American Lichens) (1872) ; 'A Cata¬ logue of Plants growing without Cultivation within Thirty Miles of Amherst College* (1875) ; and (A Synopsis of North

American Lichens, Part P (1882).

TUCKERMAN, Henry Theodore, Ameri¬ can author and critic: b. Boston, 20 April 1813; d. New York, 17 Dec. 1871. He contributed very largely to periodicals, and his writings were at intervals collected. He was best in¬ formed on topics of art, and his (Book of the Artists) is yet valuable for reference. His works include (The Italian Sketch Book) (1835); Usabel; or, Sicily ˆ (1839); 'Rambles and Reveries* (1841) ; (Thoughts on the

Poets) (1846) ; (Artist Life* (1847) ; Charac¬ teristics of Literature> (1849-51); cThe Opti¬ mise (1850) ; 'Poems* (1851) ; 'Memorial of Horatio Greenough* (1853); 'Bibliographical Essays) (1857) ; 'Art in America* (1858) ; 'The Book of the Artists) (1867) ; 'The Col¬ lector: Essays) (1868). He edited with Wil¬ liam Smith 'A Smaller History of English and American Literature) (1870). Consult the ad¬ dresses by Duvckwick (1872) and Bellows

(1872)'.

TUCKERMAN, Joseph, American clergy¬ man and philanthropist : b. Boston, Mass., 18 Jan. 1778; d. Havana. Cuba, 20 April 1840. He was graduated at Harvard in 1798 and was ordained a Unitarian minister in 1801, with a

charge at Chelsea, Mass. He there organized the first Seaman's Friend Society. In 1826 he removed to Boston where he successfully took charge of a large organization for co-operative charity. Going abroad, he assisted in the for¬ mation of similar work and his plans became a model in France. He was the author of several philanthropic publications. A memoir of his life was written by Channing in 1841.

TUCSON (from the pima styuk-son, "black or dark base,® in allusion to a stratum in a mountain to the westward), Ariz., city, county-seat of Pima County, on the Santa Cruz River and the Southern Pacific, the El Paso and Southwestern, and other railroads, about 120 miles southeast of Phoenix and 150 miles from the Gulf of California, lat. 32° 14'; long. 110° 54'. Tucson is the second city in size in the State of Arizona, and is a mining, agri¬ cultural and stock-raising region, and also gains great importance as a resort for those afflicted with pulmonary ailments. Its altitude is 2,390 feet, and owing to the dryness of the climate (the precipitation averaging less than 11 inches per annum) the summer heat is not oppressive, although the temperature frequently rises above 100°, while'the climate in winter is delightful. The modern part of the city is well-built and paved and has

numerous attractive residences, church edifices, public buildings, hotels and business houses; but the older part of the city bears the appearance of a typical adobe Mexican town of the 17th century The chief industrial establishments are the shops of the Southern Pacific Railroad, but there are also flour mills, a fibre factory, ice factory, foundry, brick and tile plant, and lumber and stock yards. The Chamber of Commerce enumerates 35 establish¬ ments, employing 1,200 wage-earners and 125 salaried employees, and having invested a capi¬ tal of $2,500,000. Wage-earners receive $1, 279- GOO, and office employees $187,500. It has six excellent banks and two good daily newspapers. It is the seat of a Roman Catholic arch¬ bishopric, with a cathedral, and also of the University of Arizona (q.v.) ; it has a good public school system, several sectarian schools, a Presbyterian boarding school for Indians, and a library housed in a building erected by Andrew Carnegie at a cost of $25,000. Tucson contains a number of churches of various de¬ nominations, a Roman Catholic hospital and numerous tuberculosis sanatoria. A Desert Botanical Laboratory has recently been estab¬ lished in the vicinity under the auspices of the Carnegie Institution of Washington.

When first known to history Tucson was a rancheria of mixed Papago, Pima and Sobai- puri Indians, the missionary at San Xavier del Bac, nine miles down the Rio Santa Cruz, be¬ ginning to visit it for the purpose of converting ˆ the natives in 1763. In 1776 the Spanish pre¬ sidio at Tubac was removed to Tucson, when it became known as the Presidio de San Augus¬ tin del Tuguison. In the early days the sur¬ rounding country was overrun and its inhabit¬ ants harassed by the Apaches. In September 1848 its population was 760; before the close of the year it was considerably augmented by refugees from Tubac and Tucumcari, who had been driven out by the Apaches, but by 1852 the number of inhabitants had dwindled to 300 or 400. Being within the limits of Gadsden

Purchase (q.v.), Tucson was garrisoned in 1856 by the First dragoons, and on August 29 of that year a convention was held to take measures for a territorial organization of Arizona. From February to May 1862, the city was occupied by Confederate troops, in 1867 the capital was changed from Prescott to Tuc¬ son, where it remained until 1877, when it was transferred back to Prescott. (See Arizona). The city was incorporated in 1877 and rein¬ corporated in 1883, and adopted a new form of government with a manager in 1915. Pop.

(1920) 20,292.

TUCUMAN, too-koo-man', Argentina, the capital of the province of Tucuman, in the northern part of the country, situated near the eastern base of the Andes, on the river Tala, 300 miles northwest of Cordoba. It has a delightful climate, is surrounded by orange groves and sugar plantati©ns, and has a uni¬ versity, a fine cathedral, a large hospital, li¬ braries and a theatre, excellent banking facilities and good newspapers. The chief industrial es¬ tablishments are sugar factories, distilleries and tanneries. It is an old city, founded by the Spanish in 1565. During recent years it has grown very rapidly, becoming a centre for sev¬ eral railroad lines to Santa Fe, Rosario, Buenos Aires, Cordoba and Salta, and is the principal trade centre of northern Argentina. The area of the province is 10,422 square miles, the popu¬ lation about 333,000; of the city 100,080.

TUCUMCARI, N. Mex., city and county- seat of Quay County, on the Chicago, Rock Island and Pacific and the El Paso and South Western railroads, about 350 miles southwest of Denver. It has a government experiment farm and a city library and is a distributing point for coal. It is interested in cattle raising, wheat and corn growing and the manufacture of sisal. Pop. (1920) 3,117.

TUDOR, tu'dor, one of the royal families of England, having a representative on the throne from 1485 to 1603. The line began with Henry Tudor, Earl of Richmond, the grandson of Sir Owen Tudor, a Welsh knight of distinction, who, after the battle of Bosworth Field, was proclaimed king with the title of Henry VII (q.v.), from him the crown de¬ scended to his son, Henry VIII, whose son, Edward VI (q.v.), succeeded, and after him his two sisters, Mary (q.v.) and Elizabeth (q.v.). See also Great Britain — The Refor¬ mation in England.

TUDOR, William, American author: b. Boston, 28 Jan. 1779; d. Rio Janeiro, Brazil, 9 March 1830. He was graduated from Har¬ vard in 1796 and entered the counting-room of John Codman, in whose employ he visited Paris. He afterward made a tour to Italy and the Continent, and on his return engaged in found¬ ing the (< Anthology Club" In 1815 the first number of the North American Review ap¬ peared under his editorship, and three-fourths of the first four volumes were written by him. In 1819 he published (Letters on the Eastern States, } in 1821 (Miscellanies) and in 1823 (Life of James OtisP In 1823 he was appointed Amer¬ ican consul at Lima, and in 1828 made charge- d'affaires at Rio Janeiro, where he wrote a work published anonymously under the title (Gebel Teir> (1829). He was

one of the found¬

ers of the Boston Athenaeum, and to him the country is indebted for the first suggestion of Bunker Hill monument.

TUDOR ARCHITECTURE, late Perpen¬ dicular work in England. There are three phases of this style of architecture: (1) The Early Tudor, from the reign of Edward IV to Henry VII, inclusive. Of this style there are no per¬ fect buildings and only few traces remaining. The Palace of Shene, built by Henry VII, has totally disappeared; but, according to the Sur¬ vey of 1649, it abounded with bay windows of capricious design, with rectangular and semi¬ circular projections, and was adorned with many octagonal towers, surmounted with bulbous cupolas of the same plan, having their angles enriched with crockets. (2) Tudor, in vogue during the reign of Henry VIII. The plan of the larger mansions of this period was quad¬ rangular, comprising an inner and base court, between which stood the gate house. On the side of the inner court facing the entrance were the great chamber, or room of assembly, the hall, the chapel, the gallery for amusements, on an upper story, running the whole length of the principal side of the quadrangle, and the sum¬ mer and winter parlors. The materials were either brick or stone, sometimes both combined. Molded brickwork and terra-cotta were also employed for decorative purposes. Among the more striking peculiarities were the gate houses, the numerous turrets and ornamental chimneys, the large and beautiful bay and oriel windows, hammer beam roofs and paneled wainscoting round the apartments. (3) Late Tudor, or Elizabethan, as seen in many country houses.

TUESDAY, the third day of the week, so called from the Anglo-Saxon god of war, Tiu, or Tiw. See Tyr.

TUFA, a name applied to the cellular de¬ posits from mineral springs. These are either silicious or calcareous. The former are classi¬ fied under silicious sinter, the latter are called calc tufa or calc sinter. Calc tufa is a cellular variety of calcite in which the mineral matter has been deposited from the waters of springs around nuclei of leaves, twigs, mosses, etc. Many older writers extended the term to in¬ clude Huff," a usage not sanctioned at present.

TUFF, a name properly applied only to finely divided particles ejected from volcanoes by explosive eruptions, and only so called after partial or complete compacting. The most no¬ table illustration is the volcanic ash which buried Pompeii. The term is not to be con¬ fused with <(tufa" (q.v.).

TUFTS, James Hayden, American edu¬ cator: b. Monson, Mass., 9 July 1862. He was graduated at Amherst in 1884 and at Yale jn 1889 and took his Ph.D. at Freiburg in 1892. He was instructor in mathematics in Amherst (1885-87), in philosophy at the University of Michigan (1889-91) and in 1900 became head of the department. He also served as dean of the Sanior College (1904 and 1907-08), Uni¬ versity of Chicago. He is the author of various monographs on philosophical subjects and be¬ came editor of the International Journal of Ethics (1914).

TUFTS COLLEGE, located at Tufts Col¬ lege Station near Medford, Mass. It was chartered in 1852 and first opened to students

in 1854; though established 'by members of the Universalist Church, it is non-sectarian in its policy and control. A notable feature of the first curriculum of the college was the special attention given to history; the policy has always been most liberal, and the courses have been constantly increased in number and broadened in scope in response to the tendencies of the modern educational development. Civil en¬ gineering courses were begun as early as 1869; and courses in other engineering departments added later; the first professional school was the Divinity School established in 1882; the Medical School was added in 1893, and the Dental College in 1899. All departments were open to women in 1892. In 1910 Jackson Col¬ lege for Women was opened as a department of Tufts' College. The college organization now includes the following departments: (1) the School of Liberal Arts ; (2) the Engineering School; (3) Jackson College for Women; (4) the Graduate School; (5) the Crane Theologi¬ cal School; (6) the two-year Pre-Medical School; (7) the Medical School; (8) the Den¬ tal School. The degrees conferred are A.B. and B.S. in the School of Liberal Arts, Engineering and Mechanics, and A.M. for graduate work. The courses leading to the degree of A.B. are largely elective, requirements being by groups, instead of by special subjects, and each group except English and physical training including electives ; the science and engineering courses are more specialized in character, and include only a few electives. Shop work is included in the engineering course. The Bromfield-Pearson School is designed to furnish instruction for those who are deficient in some of the studies required for entrance to the engineering courses, but fitted to pursue the college courses in cer¬ tain subjects. The Crane Theological School offers a four years' course leading to the de¬ gree of S.T.B. ; in 1902 an arrangement was

made by which the A.B. course could be com¬ bined with the theological course in such a way that both degrees could be obtained in five years. The Medical School offers a four years' course leading to the degree of M.D. ; the Dental School confers the degree of doctor of dental medicine at the satisfactory completion of a four years' course. These two schools are located at Boston, occupying a large well-equipped building completed in 1902. An ad¬ ditional building for the Medical School was completed in 1917.

There are 82 scholarships and four special scholarships provided in the collegiate depart¬ ment and 12 in the Crane Theological School. The government of the college is vested in a board of 30 trustees, 20 of whom are self- perpetuating; to give the alumni as a body a representation in the college administration, 10 of the trustees are elected by the alumni, two each year for terms of five years. Alumni members of the board of trustees have the same power as the self-perpetuating members of the board. On the college campus there are (1918) 21 buildings ; these are Ballou Hall, the Bar- nurtl Museum (built and endowed by P. T. Barnum), the Goddard Chapel, the Goddard Gymnasium, the Eaton Library, Packard Hall (occupied by the Crane Theological School), the chemical building, the Bromfield-Pearson School (containing the engineering shops),

Robinson Hall, Miner Hall (occupied by Jack- son College for Women) and Paige Hall, four dormitories for men. East Hall, West Hall, Dean Hall and Curtis Hall, five for women, Aletcalf Hall, Start House, Richardson House, Gamma House and Knight House, and the power house. The general library in 1918 con¬ tained 74,000 volumes ; in addition there are several special libraries, including the Univer¬ salist Historical Society collection (in Packard Hall), 6,000 volumes; the library of natural history (in the Barnum Museum), 2,500 vol¬ umes; the Metcalf musical library (in the God¬ dard Gymnasium), 1,600 volumes. The Medi¬ cal and Dental schools also have libraries in their building in Boston, and students in these schools have access to the Boston Public Li¬ brary. The productive funds in 1918 amounted to $2,256,000; the students numbered 1,645; the faculty numbered 2ˆ5.

TUG-OF-WAR, a sport in which a number of persons divide into two parties; a line is marked out on the ground, and the two parties, laying hold of either end of a stout rope, try to drag each other across the line.

TUGBOAT, a small steam-vessel, having very large engines of great horse power and very little storage capacity, used for towing large

vessels in and out of harbors, and in rivers and canals. More than 1,000 of these are employed in New York Harbor alone and are classed by boatmen under various names. Tugs are also of great service in forcing a channel through the ice ; in rescue work if there is a wreck or a ship on fire; in transport¬ ing car floats for the railroad companies and in towing great rafts of logs.

TUGENDBUND, too'gent-boont (German for <(league of virtue®), a union ostensibly for the promotion of educational and social re¬ forms, which was organized in Prussia in 1808, the real purpose being to free North Germany from the intolerable yoke of Napoleon. The Prussian government was apprehensive that the Tugendbund might involve it in further diffi¬ culty with the French emperor, then virtually master of Germany, and suppressed the move¬ ment in 1809.

TUGUEGARAO, too-ga-ga-ra'o*, Philip¬ pines, pueblo, capital of the province of Caga¬ yan, Luzon, within a few miles of the Grande de Cagayan River, 215 miles north of Manila. It is on the main highway to Manila and is the centre of a fertile agricultural region. It is well built, many of the houses being of stone; it has a large public square, a church, court¬ house and town-hall. Pop. 16,820.

TUILERIES, twe'le-riz (Fr. twel-re, named from the <(tile-works,® which originally occupied the site), previous to 1871 the royal and imperial palace at Paris, situated almost in the centre of the city on the north bank of the Seineˆ It was founded in 1564 by Cathe¬ rine de Medici, wife of Henry II. Later monarchs extended it and altered the plans, until it became a large, complex structure, but with little architectural interest. It was stormed and sacked by the Paris mob in each of the revolutions, but was restored, and served as the residence of all the monarchs of the 19th century, including the two emperors. In 1871 it was set on fire by the Communists, and al-

most totally destroyed. Only the two eastern wings connected with the Louvre remain. The rest of the site has been converted into a public garden. See Paris.

TUKE, tuk, Daniel Hack, English physi¬ cian: b. York, 19 April 1827; d. London, 5 March 1895. He studied at Saint Bartholo¬ mew's Hospital College, London, and was graduated from the University of Heidelberg in 1853. He afterward made extensive tours on the

Continent, visiting the principal asylums for the insane and recording his observations, a practice he continued throughout his life. Upon his return from his first tour abroad he became visiting physician to the York Retreat for the Insane, but was compelled to retire in 1859 because of failing health. In 1875 he re¬ moved to London and until his death was en¬ gaged as consulting physician in mental diseases. He was associate editor of The Journal of Men¬ tal Science in 1878-92, collaborated with J. C. Bucknill in writing (A Manual of Pyschological Medicine) (1857), and also wrote illustrations of the Influence of the Mind on the Body* (1872) ; insanity in Ancient and Modern Life5 (1878) ; (History of the Insane in the British Isles1* (1882) ; dictionary of Psycho¬ logical Medicine1* (1892), etc.

TUKE, Henry Scott, English writer and religionist: b. York, 1756; d. there, 1814. He was a distinguished minister of the Society of Friends and wrote several works which are considered standard authorities in that denomi¬ nation. Among them are (The Faith of the People called Quakers in our Lord and Saviour Jesus Christ, set forth in Various Extracts from their Writings5 (1801) ; (The Principles of Religion as Professed by the Society of Christians usually called Quakers, Written for the Instruction of their Youth and for the In¬ formation of Strangers5 (1805), and bio¬ graphical Notices of Members of the Society of Friends5 (1813).

TUKE, William, English philanthropist: b. York, 24 March 1732; d. there, 6 Dec. 1822. He was devoted to mercantile pursuits, princi¬ pally in the tea and coffee trade. Belonging to the Society of Friends, his attention was called, through the death of a fellow-believer confined in the York County Asylum, to the necessity of ameliorating the condition of the insane. With his son Henry, Lindley Murray and other Friends he secured funds for the opening of the York Retreat in 1796. In this institution began in England the modern humane methods of treatment, a reform that, unknown to Tuke, Pinel was carrying out contemporaneously in Paris. Inmates were no longer kept in chains ; restraint and irksome discipline were removed; quiet surroundings with some industrial occu¬ pation were provided. After his death import¬ ant legislation on the treatment of the insane was the direct result of his reforms.

TUKUARIKA, too’kwa-re’ka. See Sho- shonean Indians.

TULA, too’la, Mexico, a town in the state of Hidalgo, situated on the railroad, 40 miles west of Pechuca, at an elevation of 6,750 feet. It has a church and convent built by the early Spanish settlers, and in the neighborhood are extensive ruins supposed to be remains of the

old Toltec capital. Cotton is manufactured. Pop. 5,000.

TULA, Russia, (1) capital of Tula, on the Upa, 120 miles by rail south of Moscow. It is an important manufacturing place, has churches, museum, arsenal and government offices, and an ancient Kreml. Its industrial works include a large gun factory, sugar refinery, dye-works, factories for bicycles, small arms, samovars, harmoniums, bells and mathematical instru¬ ments, besides manufactures of soap, candles, sealing wax, etc. Pop. 140,620.

(2) Tula, is a government of central Russia, whose area comprises 11,954 square miles. Its surface is mostly flat, and almost everywhere capable of cultivation. There are extensive forests, and the principal streams are the Oka, Upa and Don. Canals connect the region with the Baltic, Black and Caspian seas. Agricul¬ ture and stock raising are important. Iron is extensively manufactured. Pop. 2,016,000.

TULALIP. See Salishan Indians.

TULANE, tu'lan', Paul, American philan¬ thropist: b. Princeton, N. J., 6 May 1801; d. there, 27 May 1887. He came of a distinguished family of French jurists, the probate judgeship of Tours having been in the Tulane family for 150 years. His father, Louis Tulane, came to America about 1795 and settled on a farm near Princeton, N. J., where his family lived for many years. Paul's early education was limited to a common school training, and he worked on the farm and, later, assisted in keeping a small grocery. About 1819 he went to New Orleans, settled there, and with the aid of a French cousin, then in America, opened a general mer¬ chandize store in 1822. By 1828 he had amassed a fortune of $170,000, a large amount at that time. He continued in a prosperous mercantile career until 1858, when he retired from active business, purchased a residence in Princeton and divided his time between it and New Or¬ leans for many years, continually increasing his property both in the Crescent City and at the North until his death. His interest in edu¬ cation appears to have been first awakened dur¬ ing the trip with his cousin in 1819 on observing several young Creoles from New Orleans on their way to Transylvania University, in Ken¬ tucky. He seems then to have been struck with the fact of the lack of educational advantages for these young people at their home. This interest bore fruit in the fact that, entirely without solicitation, he formed in 1882 a group of friends into a body which incorporated itself as <(The Board of Administrators of the Tu¬ lane Education Fund.55 To them he gave in trust a considerable property, without specific instructions except that the fund donated was <(for the promotion and encouragement of in¬

tellectual, moral and industrial education among the white young people in the city of New Orleans, State of Louisiana.55 By contract with the State, securing thereby exemption from taxation on its property, the board thus formed took over the University of Louisiana, founded in 1832, the name of which was then changed to Tulane University of Louisiana (q.v.). His first gift for educational purposes in New Orleans consisted of his New Orleans real estate, valued at about $363,000. By subsequent gifts his en¬ dowment was raised to a total of $1,100,000.

TULANE UNIVERSITY OF LOTIS- IANA, located in New Orleans. This institu¬ tion, under its present name, was created by Act No. 43 of the legislature of 1884. Its oldest department is the Medical College, which was organized as a private enterprise in 1834, and which was the first medical college in the Southwest. In 1845 the first Democratic Con¬ stitutional Convention that assembled in the State provided for the establishment of an institution to be known as the University of Louisiana, which should embrace as one of its departments the medical college already in ex¬ istence, together with a department of law, a department of natural sciences and of letters. The State refused to bind itself to support the new university, but in the years following the legislature appropriated about $100,000 for the equipment of the medical department and for a building to house it. The plans of the con¬ vention for the other departments were not realized until 1847. The first meeting of the board of administrators took place 27 April 1847. On 4 May of the same year the board decided that law lectures should begin the following November. On 1 June 1847 a committee was appointed to report on the organization of a department of letters and natural sciences. The first president of the university, elected 21 July 1847, was Dr. Francis Lister Hawks of North Carolina. The academic department existed only as a high school until 1851, when the college proper was opened with 12 freshmen and two sophomores. The medical college was the most successful department down to 1861, when the Civil War closed the university. At the close of the conflict the law and medical colleges were reopened, but the reopening of the academic department was de¬ layed. In November 1878 the academic depart¬ ment was revived under Dean Richard H. Jesse. Beginning in 1879, the State made an appropria¬ tion of $10,000 a year for its support, the first regular appropriation it had ever received. Private munificence, however, was now to take the place of State appropriations. In 1882 Paul Tulane, a former merchant

of New Orleans, made a large donation for the higher education of <(the white young persons® in the city of New Orleans. This donation was augmented until it amounted to more than a million dollars. The acceptance of this gift was followed by the absorption of the old University of Louisiana, which was effected by Act 43 of the general assembly of 1884, and which has been ratified by the present constitution (1898). As a quasi- State institution the university is exempted from all taxation on its property, and in recog¬ nition thereof it remits all claim to the appro¬ priation of $10,000 and gives a free scholarship to every legislative and senatorial district in the State. To the presidency of Tulane Uni¬ versity of Louisiana the board called a dis¬ tinguished soldier and scholar, Col. Wm. Preston Johnston, who labored until his death in 1899 to enlarge the usefulness of the insti¬ tution. He was succeeded in 1900 by Dr. Edwin A. Alderman, who, in turn, was succeeded in 1905 by Dr. E. B. Craighead, in 1912 by Dr. Robert Sharp and in 1918 by Dr. Albert B. Dinwiddie. In 1886 Mrs. Josephine Louise Newcomb donated $100,000 to the Tulane University of Louisiana, for the higher educa¬ tion of white girls and young women. This

endowment, to which Mrs. Newcomb added more than $2,000,000 during her life and in her will, has enabled the administrators of the uni¬ versity to offer to women the advantages formerly given only to men. In 1891 Mrs. Ida G. Richardson presented the medical depart¬ ment with a splendid modern building, equipped with every needed appliance for instruction in medicine. In the year 1894 the undergraduate departments were moved from the old con¬ tracted quarters (on Dryades street, near Canal), to a splendid site on Saint Charles avenue, opposite to Audubon Park in the best residential section of the city, and in 1918 Newcomb College was removed to its new site, adjoining the Tulane campus. In 1900 Mrs. Caroline S. Tilton gave to the university the present beautiful library building and in 1906 made an additional donation for the erection of the annex to the library. In 1902 Mr. Alex. C. Hutchinson -bequeathed the sum of $800,000 to the university for the benefit of the medical department. The Richardson Memorial, on Canal street, was transferred to the Hutchin¬ son Fund, and the proceeds of this transfer used for the erection on the campus of the Richardson Memorial Building, the enlarge¬ ment of the Chemistry Building, which was renamed the Richardson Memorial Chemistry Building, and the Richardson Memorial Dormi¬ tory for medical students. In 1906 the New Or¬ leans Polyclinic was acquired by the university, and is now the Graduate School of Medicine and in 1909 the New Orleans College of Dentistry became the School of Dentistry. In 1910 Mr. F. W. Callender

bequeathed the sum of $65,000 to the university, which sum was set apart as a foundation for the establishment of the F. W. Callender Laboratory of Psychology and Education. In 1910 Mr. Stanley O. Thomas bequeathed the sum of $60,000 for the erection of a building to be known as Stanley Thomas Hall. As presently constituted the university comprehends the following colleges and schools : College of Arts and Sciences, College of Technology, H. Sophie Newcomb Memorial College for Women, Faculty of Graduate Studies, College of Law, College of Medicine (including School of Medicine, Graduate School of Medicine, School of Dentistry and School of Pharmacy) and the College of Commerce and Business Administration.

TULARE, Cal., city in Tulare County, on the Southern Pacific and the Atchison, Topeka and Santa Fe railroads, about 45 miles south¬ east of Fresno. It has an important trade in fruits and cereals and dairy products. There is a public library. Pop. (1920) 3,539.

TUL|£, too'le, the Spanish-American name of a variety of the bulrushes, Scirpus lacus- tris and S. tatora, so common in the overflowed lands of the southwestern United States that those districts are called tule lands. S. lacus- tris is a tall, large, smooth-stemmed rush with an umbel of flower spikelets, and with the leaves reduced to mere sheaths. It has a thick, fleshy, perennial rootstock, eaten by the abo¬ rigines, and which when sun-dried and pow¬ dered is said to keep well, and to be of good taste. Tule seeds, also, are eaten ; and the stems are woven into mats and baskets, and. like reeds, are used in great bunches to form the curious craft called balsas.

TULIP, a genus of bulbous herbs of the family Liliacecu. The species, of which about 100 have been described and 40 introduced into cultivation, are natives of temperate Asia, and some have become naturalized in the Mediter¬ ranean region of Europe. They are character¬ ized by tunicated bulbs, linear or broad radical leaves from the base of which rises the scape three inches to two feet or more tall and bearing at its summit usually a solitary bell¬ shaped flower, sometimes two, three or even four. These flowers are large, brilliant and showy, single or double, generally erect but sometimes nodding. Their colors are red, yel¬ low, white and variegated in a great variety of tints and markings.

For more than three centuries the tulip has been popular in European

gardens and prior to this period it was cultivated by the Turks for many centuries. In 1753 Linnaeus grouped the garden tulips under the botanical name Tulipa gesneriana , which has since been errone¬ ously cited as that of the original species. Another form (T. siuaveolens) was named in 1797. It was well known in southern Europe prior to this date, but seems to have been an escape and was formerly distinguished from other tulips then cultivated by its earlier bloom, larger size, pubescent scape and fragrant flow¬ ers. Hence the conclusion that the earlier gar¬ den varieties are probably derived from the latter species and the later ones probably from the former.

Interest in the tulip began in Vienna in 1554, when Busbequis, an Ambassador to Turkey, procured seeds from a garden near Constantinople. From that time forward the popularity of the plant increased rapidly. In 1591 specimens of Clusius' varieties stimu¬ lated interest in the plant in Holland, where the production of new varieties increased rapidly until it became a craze in 1634.. From that date until 1637 the wildest speculation pre¬ vailed. Not only were enormous prices paid for individual bulbs, 13,000 florins (about $5,200) for a bulb of the variety Semper Au¬ gustus, but ownership was divided into shares, and many of the schemes known to the stock and bond market were in vogue, often without the existence of any bulbs at all. The govern¬ ment had at last to interfere but this was not until many families had been impoverished or even ruined financially. Since that time the popularity of the plant declined, but later reached the normal basis upon which it now rests, with its headquarters in Holland and Belgium. During the closing decade of the 19th century experimenters in the State of Washington have produced superior tulip and other bulbs, and will probably supply the Ameri¬ can market.

The garden tulips are divided into four principal groups : seifs, in which the flowers are of only one color; roses, in which the petals show varying shades of red, scarlet and pink ; bizarres, in which the petals have yellow bases or centres and are bordered more or less widely with orange, red, etc. ; and by- bloemens, dark-colored flowers — purple, ma¬ roon, brown, black, etc. In these various classes about 2,000 varieties are listed by the European bulb growers, and they are further divided into singles and doubles, and except

the seifs are segregated into feathered and flamed, according as the colors are inter¬ mingled in narrow or broad stripes.

One of the most remarkable phenomena about tulips grown from seed is that after the plants began to produce blossoms for one or several

years they ((break® ; that is, the colors and markings of the flowers change radically. A single-flowered self may become a double-flowered bizarre or rose, perhaps even showing no traces of the original tint. Owing to the length of time required to produce flowering bulbs from seed — three to seven years — this method of propagation is rarely practised ex¬ cept by originators of new varieties and by growers who supply small bulbs to fanciers and others. Named varieties are all propagated asexually, generally by offset bulbs which are usually produced freely. These do not ˆbreak® unless the progeny is obtained prior to the ˆbreaking® of the parent bulb.

Tulip will grow in almost any garden soil, but will thrive best in well-drained friable loam of moderate texture and richness. The bulbs should be planted in mid-autumn four inches below the surface. During the winter, in the North they may be mulched with litter, ever¬ green boughs, etc., to keep the frost in the soil and prevent alternate freezing and thawing. In spring when the weather has become some¬ what settled the mulch should be removed and the surface smoothed with a rake. After blos¬ soming the leaves should be allowed to turn yellow before the plants are dug, if they are to be dug, in order to allow them to elaborate food for the next season's bloom. If desired they may be left in the ground for two or three years. When taken up they should be cleaned, the offsets removed, dried in the shade and stored in a cool dry place until planting time. For house and greenhouse use, the bulbs may be planted in flats or pots as soon as received from the seedmen, kept in a dark place until the roots are well produced and the tops be¬ gin to show ; then they may be taken to a temperate room and gradually inured to both light and heat. After they have produced their blossoms they are usually thrown away because a fresh supply can be obtained so cheaply that the care usually required to <(bring them around® again is considered wasted. However, they are sometimes planted in odd corners of gardens where some specimens will usually recover from the effects of the forcing. Consult Bailey, (Standard Cyclopedia of Horti- culture) (New York 1916) ; Solms-Laubach, (Weizen und Tulpe und deren Geschichte) (Leipzig 1899).

TULIP-TREE, one of the handsomest and largest deciduous trees (Liriodendron tulipi- fera) in America, attaining its greatest dimen¬ sions in the Middle States, in deep, moist, loamy soils. It is remarkable for its absolutely straight, massive trunk, sometimes tapering from a base, 20 to 25 feet in girth, to a height of 150 feet. The bark is regularly ridged, but is of fine texture and ashen-hued. That of saplings is very smooth, grayish-green and mottled with gray. A tree grown in the open is of a symmetrical, pyramidal or spindle-like

outline, with many diverging and upward sweeping branches. The foliage is very glossy and bright green, the leaves peculiar in form,

being nearly square, and three-lobed, the lateral lobes rounded at the base, the central one hav¬ ing a broadly-triangular notch taken out of its apex. They turn to a clear yellow in autumn, and the leaves, trembling on long petioles, have caused this tree to be confounded with the pop¬ lars, in popular nomenclature. When very young, the blade is bent down against its stem and is covered by two membranous boat¬ shaped stipules, which unite about the bud and do not separate and fall away until the tender leaf is able to endure the weather.

The tulip-tree is one of the magnolia fam¬ ily, and in June is covered with handsome flowers, which have suggested the generic name, meaning Hily-tree® ; but the vernacular term seems more apt, since the six petals have the flaring, cup shape of the tulip. They are solitary, terminating the branchlets, and are yellowish-green outside, lined with orange, with a suggestion of a green star at the base. A ring of stamens stands inside, surrounding the column of carpels. The fruits persisting long after the leaves have fallen, are like long sa¬ maras, hung by slender stalks, on the cone- shaped receptacle, and overlap it like inverted shingles. During the winter they are torn away and drift hither and thither.

The heartwood is classed among light woods, is easily worked, has a compact fine grain, and takes a high polish ; when perfectly seasoned, it is durable and resists insects' at¬ tacks, but is likely to warp and shrink if not well dried. The color may be either white or yellow, and the wood is known as white or yel¬ low poplar, the latter variety being the better. At one time used greatly for house-building, furniture, wooden utensils and many other purposes, on account of its lightness and strength, it is also valuable for carriage panels. Indians were said to have wrought it into long canoes, so regular and light were the trunks. An infusion of the bark when added to an equal quality of dogwood is reckoned as a remedy for intermittent fevers, when alone as a substitute for cinchona and as a gentle cathartic. Many fossil species have been found, repre¬ sentatives of the Liriodendron type, of which it alone survives.

TULL, Jethro, English agriculturist : b. Basildon, Berkshire, 1674; d. near Hungerford, Berkshire, 21 Feb. 1741. He was educated at Oxford, and was called to the bar in 1699. He appears to have had political ambitions, but ill health compelled their abandonment and after an extended tour of Europe he settled on his estate and devoted himself to agriculture. In 1809 he removed to his farm near Hungerford which he christened "Prosperous Farm® and continued his experiments. He

introduced the system of planting in rows and pulverizing the soil between them, but made the serious mis¬ take of considering the finely pulverized earth and moisture sufficient for the growth of the plants and dispensed with fertilizing the soil, a system which involved him in serious losses. He invented the drill-plow and published (New Horse-Hoeing Husbandry) (1733), a work which was long an authority in England.

TULLAHOMA, Tenn., city in Coffee County, on the Nashville, Chattanooga and Saint Louis Railroad, about 69 miles south¬ east of Nashville. It contains the Chautauqua

grounds, the Pythian Home, the Fitzgerald and Clarke Preparatory School, the State Voca¬ tional School for Girls, the Cumberland, Pylant and Hurricane Springs. Its manufactures in¬ clude buggies, golf sticks, overalls and tobacco products. Pop. (1920) 3,977.

TULLAHOMA, thl-a-homa, or MIDDLE TENNESSEE, CAMPAIGN. When General Bragg after the battle of Stone River or Mur¬ freesboro (q.v.) fell back from Murfreesboro he designed to hold the line of Elk River, but was directed to hold that of Duck River, north of which he disposed his forces; his infantry front extending from Wartrace on the right to Shelbyville on the left, with cavalry on the right at McMinnville and on the left at Colum¬ bia and Spring Hill. Polk's corps, on the left, held Shelbyville, which was well fortified, and a strong detachment was thrown forward about 10 miles to Guy's Gap. The greater part of Hardee's corps held Hoovel's, Liberty and Bell Buckle gaps, and part of it was at Tullahoma, 36 miles south of Murfreesboro, which was fortified and held as a depot of supplies. Bragg's position was covered by a range of high, rough, rocky hills, the principal routes passing southward from Murfreesboro toward Tullahoma and the line of his communications with Chattanooga, being the Manchester road through Hoover's Gap, the Wartrace road through Liberty and Bell Buckle gaps and the Shelbyville road through Guy's Gap, all of which were strongly held. His cavalry, under Generals Wheeler and Forrest, was very ac¬ tive, attacking posts and detachments in Rose- crans' rear and on his flanks, breaking railroads and capturing wagon trains and in every man¬ ner harassing him, and to prevent which Rose- crans was but feebly prepared, having a much inferior cavalry force in point of numbers.

Early in January 1863, the troops of the Army of the Cumberland, under General Rose- crans, were organized into three army corps, designated the 14th, 20th and 21st, com¬ manded respectively by Gens. Geo. H. Thomas, A. McD. McCook and T. L. Crittenden. There

was a reserve corps, under Gen. Gordon Granger, and a cavalry corps, commanded by Gen. D. S. Stanley. There were in the early months of 1863 many reconnaissan¬ ces, which brought on several severe engage¬ ments. and the cavalry was kept busy by Wheeler and Forrest. Rosecrans was pushing his preparations for an active campaign and keeping up a fruitless appeal to the authorities at Washington for an increase of his cavalry force. By the middle of June he had decided upon a campaign to drive Bragg from middle Tennessee and fully informed that he was strongly intrenched at Shelbyville and Tulla¬ homa determined to render these intrenchments useless by turning Bragg's right and moving on the bridge across Elk River in his rear, thus compelling his retreat or to give battle on open ground. He says: (

to move General Granger's command to Triune, and thus create the impression of our intention to advance on them by the Shelbyville and

Triune pikes, while cavalry movements and an infantry advance toward Woodbury would seem to be feints designed by us to deceive Bragg and conceal our supposed real designs on their left, where the topography and the roads pre¬ sented comparatively slight obstacles and af¬ forded great facilities for moving in force.® Rosecrans had about 50,000 infantry, 6,800 cav¬ alry and 3,000 artillery; Bragg 30,000 infantry, 14,000 cavalry and 2,250 artillery. The cam¬ paign was opened by Rosecrans on 23 June, when Mitchell's cavalry division moved from Triune, and drove Wheeler's cavalry back upon the infantry with sharp skirmishing at Eagle- ville, Rover and Unionville. At the same time General Granger, with part of his own corps and Brannan's division of Thomas', moved from Triune to Salem, and the rest of the army was ordered to be in readiness to march next morn¬ ing with a good supply of rations. On the next morning McCook started from Murfreesboro, on the Shelbyville road, and then moved to the left for Liberty Gap, which was seized before night by R. W. Johnson's division, after a sharp skirmish with a part of Cleburne's division. Thomas advanced on the Manchester pike; Wilder's brigade of mounted infantry in ad¬ vance drove some Confederate cavalry through Hoover's Gap to its southern extremity when it was fiercely attacked by infantry and held on until Thomas came up with infantry, when the Confederates withdrew, leaving Thomas in full possession of the gap. Two divisions of Crit¬ tenden's corps moved to Bradyville, near Wood¬ bury. On the other flank Granger and Brannan advanced

from Salem to Christiana, and Stan¬ ley, with a division of cavalry, moved through Salem and joined Mitchell at the intersection of the Salem and Christiana roads. During the day Mitchell had had a sharp encounter with Wheeler's cavalry at Middleton. Stanley, hav¬ ing driven Wheeler's cavalry back to Guy's Gap, on the 25th, joined Granger at Christiana.. On the left Crittenden advanced to Holly Springs ; Brannan joined Thomas at Hoover's Gap, and Rousseau's division closed up on Reynolds', which was skirmishing in advance of the gap. During the afternoon three brigades of Stew¬ art's Confederate division attacked two brig¬ ades of Johnson's and one of Davis' at Liberty Gap, to ' regain it, under the impression that Rosecrans was intending to march his main body through it. The attack was repulsed with a Union loss of 231 killed and wounded; and a Confederate loss of over 400. On the 26th Thomas pushed the Confederates back to within five miles of Manchester.; Crittenden followed Thomas ; McCook remained at Liberty Gap and Granger at Christiana. Thomas had gained so much ground toward Manchester that it was now practicable to concentrate the whole army there and force Bragg to abandon his nosition or give battle outside his works, and the con¬ centration began on the 27th. Early in the morning Thomas seized Manchester, capturing a few prisoners, and at midnight had concen¬ trated his entire corps at that place, 12 miles from Tullahoma. McCook withdrew from Liberty Gap, and marching through Hoover's Gap followed Thomas. The steady advance of Rosecrans' columns on Bragg's right convinced the latter that it was impossible to hold the long line to Shelbyville, so, early on the morn¬ ing of the 27th, Polk was withdrawn from that

place to Tullahoma, Wheeler, with the cavalry, being left to cover his rear. Stanley's cavalry and Granger's corps advanced from Christiana, drove Wheeler from Guy's Gap and pursued him inside the intrenchments four miles north of Shelbyville, where Wheeler made a stand with Martin's division to cover Polk's wagon train then on the road from Shelbyville to Tul¬ lahoma. Wheeler was driven from the in¬ trenchments by Minty's cavalry brigade and pursued into Shelbyville. He crossed Duck River and was about to burn the bridge when he was informed that Forrest, who had been ordered from Franklin to Tullahoma, was ap¬ proaching with two brigades to join him, upon which he hurriedly recrossed to the north side of the river, with Martin, 500 men and two guns, and had scarcely crossed when the Union cavalry came charging right down the main street and toward the guns. These had been loaded with canister and were discharged when the Union cavalry were only a few paces from their muzzles. But the charging cavalry rode over Wheeler and his 500 men,

took the guns and covered the entrance to the bridge. Wheeler ordered a charge, cut through a part of the thin Union line, dashed down ‘the steep river bank and swam the stream. Wheeler, Martin and some of the men escaped, about 50 were killed or drowned, many were made prisoners. Forrest had turned back when near Shelbyville and making a detour of eight miles crossed the river and marched to Tullahoma. It was dark when the action closed and the Union troops bivouacked at Shelbyville. As Bragg had now been forced from his first line on the right and from Shelbyville on the left, Rosecrans directed his attention to force him from Tullahoma back beyond the Tennessee. Thomas began the movement. Early on the morning of the 28th Colonel Wilder, with his brigade of mounted infantry, started from Manchester to burn Elk River bridge and break the railroad south of Decherd, in the rear of Tullahoma, and to sup¬ port the movement Col. J. Beatty’s brigade marched to Hillsboro. The Elk River bridge was found too strongly guarded to warrant an attack and Wilder marched for Decherd, which was reached at 8 p.m. Wilder burned the depot and water-tank and had destroyed about 300 yards of the railroad, when he withdrew upon the approach of Confederate infantry. Next day he broke up the Tracy City Railroad, and then dividing his force advanced toward Anderson and Tantallon, on the railroad to Chattanooga. Both places were held in such force that he made no attack and uniting his command at University he returned to Man¬ chester on the 30th. When Wilder moved out on the 28th Thomas threw two divisions in the direction of Tullahoma and next day there was a general movement on the place and on the night of the 30th the advance was within two miles of it; the three corps of Thomas, McCook and Crittenden closed up, and Stanley’s cavalry had come over from Shelbyville and bivouacked at Manchester. The concentration was ef¬ fected with great difficulty. When the campaign opened the weather was fair and the roads good, but on the second day a heavy rain set in which continued during the entire movement and the roads became almost impassable for artillery and the trains, making the operations exceedingly slow. On the 29th

Bragg was reinforced by General Buckner, with 4,000 men, from Knoxville, and he proposed to give Rosecrans battle at Tullahoma, but when his communications with Chattanooga were so seriously threatened, he concluded to withdraw, and on the night of 30 June abandoned Tulla¬ homa and fell back beyond Elk River. Thomas advanced on the morning of 1 July and occu¬ pied Tullahoma, and

Rosecrans ordered an immediate pursuit, but Bragg held the crossings of Elk River, the pursuit was abandoned and Bragg continued his retreat over the Cumber¬ land Mountains and across the Tennessee River to Chattanooga, leaving middle Tennessee again in Union possession. The nine days' campaign was one of the most brilliant of the war. Rose¬ crans' loss was 84 killed, 473 wounded and 13 missing. Brafgg's loss in killed and wounded is not known. Rosecrans reports that he left in his hands 1,634 prisoners and 11 guns. Con¬ sult (Official Records5 (Vol. XXIII) ; Van Horne, (History of the Army of the Cumber- land) (Vol. I) ; The Century Company's bat¬ tles and Leaders of the Civil War5 (Vol. III).

E. A. Carman.

TULLOCH, tul'ok, John, Scottish educator and ecclesiastical writer: b. near Tibbermuir, Perthshire, 1 June 1823; d. Torquay. England, 13 Feb. 1886. After study at Saint Andrews he became assistant minister at Dundee (1844), and principal and professor of theology at Saint Mary's College, Saint Andrews, in 1854. He edited Fraser in 1879, and was dean of the Chapel Royal, London, in 1882. A broad theo¬ logian, and the founder of the Scottish Liberal Church party, he nevertheless championed orthodoxy, and opposed disestablishment. In 1872 he lectured in the United States. He pub¬ lished (Leaders of the Reformation> (1859) ; (English Puritanism and its Leaders> (1861) ; beginning Life) (1862); (The Christ of the Gospels and the Christ of Modern Criticism5 ; (Lectures on Renan's Life of Jesus) (1864) ; (Theology and Greek Philosophy in England in the 17th Century> (1872); (PascaP (1878); (Movements in Religious Thought in Britain during the 19th Century5 (1885) ; and several volumes of sermons. He gained the second Burnett prize of £600 for an essay (On the Being and Attributes of God,5 which was pub¬ lished under the title (Theism: The Witness of Reason and Nature to an All-Wise and Be¬ neficent Creator5 (1855).

TULLUS HOSTILIUS, tul'us hos-til'i-us,

king of Rome in succession to Numa Pompilius (672 b.c). He was a warlike monarch, in whose reign took place the combat of the Horatif and Curiatii. (See Horatii). He subdued and utterly destroyed Alba by treachery. He likewise conquered the Fidenates and Sabines. His death, after a reign of 33 years, is ascribed by some to lightning, by others to assassination by Ancus Martius, his successor.

TULSA, Okla., the county-seat of Tulsa County, situated on the Arkansas River in the heart of the Mid-Continent Field, of which it is

the financial, commercial and transportation centre. Tulsa is known as <(The Wonder City55 and the oil capital of the world, there being more than 500 operating oil and refining com¬ panies located in the city. A survey of Tulsa

shows that it has a greatly diversified indus¬ trial activity, giving employment to 14,640 men, with an annual pay-roll in excess of $20,000,000. Tulsa has eight large refineries, a number of iron works, boiler works, stove works, tool works, machine shops, glass factory, smelter and approximately 150 small and large indus¬ trial plants, and a number of wholesale and jobbing houses, several coal companies, 13 public service corporations. The city is served by the Atchison, Topeka and Santa Fe, the Midland Valley, the Missouri, Kansas and Texas and the Frisco railroads, with three local systems of street railways. Tulsa has a practically unlimited supply of natural gas, of cheap fuel oil and coal, which is being mined within a few miles of the city limits. The bank clearings in Tulsa for 1918 were $489,983,156, the clearings being the lar¬ gest of any city in the State. Tulsa fad, under the call of the comptroller of the currency on 4 March 1919, on deposit in the 10 local banks $51,427,337 and the bank clearings for the city average $1,500,000 per day. The building per¬ mits for Tulsa since 1 Jan. 1917 are $14,997,178, the permits for April 1919 being in excess of $650,000 and representing permits issued for 148 homes. Tulsa is a city of splendid homes costing from $3,000 to $150,000; of good sub¬ stantial business houses and has a number of eight-story, 10-story, one 11-story and one 17- story office building. The elevation of Tulsa is 750 feet and the average rainfall 36 inches with a mean temperature of 60°. The city has a fine convention hall, seating 4,000 people ; a new Y. M. C. A. building, costing a quarter of a million dollars ; a Y. W. C. A. building, costing approximately the same amount ; a splendid public library; a modern county court¬ house; a fine municipal building; an imposing government post-office building, with numerous club buildings. There are 30 churches ; 475 schoolrooms built largely on the unit system, with a high school costing $550,000 and $1,000,- 000 was recently voted for the extension of the educational facilities. The county is now spending $2,000,000 for permanent hard sur¬ faced roadways under a recent bond issue. Stock-raising, dairying and diversified farming are successfully conducted in Tulsa County and the truck grower has wonderful opportunities presented along the valley lands of the Arkansas River. Tulsa is known as the millionaire city, the local Chamber of Commerce having one committee of 50 men with every member of it worth more than $1,000,000 and some of them worth more than $10,000,000, these fortunes having been made from the oil

industry in the Mid-Continent Field. The city is the head¬ quarters for oil field supplies for Kansas, Texas and Oklahoma and is the financial clearing point for the great oil transactions of the Mid-Con¬ tinent Field. All of the fraternal organizations which are popular in the Southwest are repre¬ sented; there are six noon day lunch clubs of civic societies ; beautiful parks, paved boule¬ vards and paved streets, stately homes and modern business establishments. In the late war the city gave more than 10,000 men to the war and war work through three volunteer military units and through the draft and re¬ cruiting offices. Tulsa subscribed for the Liberty Loans as follows: First, $5,685,000;

V

t r ■ BBS

ipi, C5B PSBS HJB H*®® I*,1®® * jffirv *

w~«»- ***** «■•»*■

SECTION IN THE BUSINESS DISTRICT OF TULSA, OKLA.

TUMACACORI MISSION NATIONAL MONUMENT _ TUMOR

innd^n$6,4l?‘u00Vrthird’ $4,623,400 ; fourth, $c,w40,o60, fifth, $5,300,000. There are 10

newspaper and periodicals published in Tulsa. The Tulsa World is the morning paper ; the Tulsa Tribune is the afternoon paper. Other publications include the Oil and Gas Journal , the Oil Record , the Employer, the Inter-State Farmer and the Unionist Journal. The city is under the commission form of government, having a mayor and four commissioners. The police and fire departments are efficient and well organized, being provided with every mod¬ ern equipment for the protection of life and property. From a population of 1,390 in 1900 the city had grown to 72,075 in 1920.

TUMACACORI MISSION NATIONAL MONUMENT. In southern Arizona, 45 miles south of Tucson on the Nogales branch of the Southern Pacific Railroad. The full name is Saint Joseph of Tumacacori. It was founded within a year or two of 1687 by Fathers Francisco Kino and J. M. Salvatieraz, Jesuit missionaries to the Indians. The building which is in the form of a Greek cross with basilica was built of adobe bricks, plastered with cement and coped

with burnt brick. The roof was flat and covered with tiles. The basilica remains. It was near the old presidio of Tubac in a rich valley and was at rne time an important. centre. This mission and 10 acres surrounding it were donated to the government in 1918 and made into a national monument.

TUMAL, the name given by the Avars to the Kasikumuks (q.v.).

TUMBREL. See Ducking-stool.

TUMERIC PAPER. See Test-papers.

TUMOR (Lat. tumor, from tumeo, to swell). Terms frequently used in the same sense are new growth, neoplasm, malignant disease. A neoplasm or tumor in the narrower sense is a new formation of tissue, apparently arising and developing independently, atypical in structure, inserted uselessly into the body, possessing no function of service to the organ¬ ism and showing no typical termination to its growth. (Ziegler).

The frequency with which tumors occur, the resistlessness with which many of them carry their victims on to a painful death and our ignorance in regard to their true nature com¬ bine to render their study one of the most in¬ teresting and important departments of pa¬ thology. In spite of the enormous amount of research which has been devoted to this field we must admit that though the histogenesis or structure of tumors is now fairly well under¬ stood, their pathogenesis or underlying prin¬ ciple of causation is still shrouded in mystery. We have learned that the ultimate cells and tissues which make up the substance of these new growths are the same in type as those nor¬ mally occurring in the body, and that each structural element of the tumor is derived from a pre-existing element of similar nature, but what was the force or stimulus which enabled these cells to break the laws of inter-relation¬ ship which ensure the normal development and function of each part of the body is still un¬ known. See Cell; Development Hypothe¬ sis ; Heredity ; Histology.

It is this tendency to assume an independ¬ ence of existence and to flourish in opposition

to the physiological restraints to which normal cells are subject in their growth and function that characterizes tumors and forms the chief point of difference between them and certain inflammatory and other tissue proliferations. In short, a tumor is an overgrowth of tissues beginning locally, but frequently, by various methods of

extension, invading near or remote regions, which is never of use to the body and frequently is directly hostile to it. The lower animals, particularly mammals, are subject to the same aberrancies of cell growth, and tumors comparable to those occurring in man are ob¬ served in all the vertebrates. Plants also ex¬ hibit analogous formations. See Veterinary Medicine.

General Characters of Tumors.— As has

been indicated, the integral structural units of tumors may always be traced back to normal types, and each class of new growths takes origin from corresponding normal tissues. Thus epithelial tumors spring from epithelial tissues, connective tumors from connective tissues, etc. Viewed as a whole a tumor is a true parasite, since it leads an independent existence, deriv¬ ing nourishment from its host without in any way contributing to the latter's welfare. The processes of growth, nutrition and cellular re¬ production go on in tumors much as in normal tissues and they are provided with a connective tissue framework, blood and lymphatic vessels and nerves to provide for their vital needs. In¬ terference with nutrition or other causes lead to degenerative changes and necrosis, and in¬ flammation, cicatrization, ulceration, etc., take place in their customary manner. A tumor may continue to increase indefinitely in size, or it may in some instances become quiescent in growth and remain without change for longer or shorter periods, of time. The growth of the tumor goes on independently of the rest of the body and often is at its expense; thus a lipoma or fatty tumor may continue to extend in size even after the body's reserve of fat has become exhausted. Growth is effected by three different means: (1) By central or expansile growth due to increase of elements within the tumor, so that the surrounding tissues are pushed aside. This has been likened to the increase in size produced by inflating a rubber balloon. (2) By infiltration, that is, the outly¬ ing portions of the tumor push their way into the surrounding tissues as do the roots of a growing plant. (3) By metastasis. The im¬ portance of this method of growth lies in the fact that it represents the means of dissemina¬ tion by which remote parts of the body may be invaded. The blood or lymph vessels are broken into and bits of tumor tissue travel to a greater or less distance till they lodge in some tissue or organ and form initial foci of second¬ ary or daughter tumors. In carcinoma the ad¬ joining lymphatic glands through their close connection with the lymph current are usually the first structures to be secondarily invaded. From a clinical standpoint it is usual to divide tumors into two great classes: (1) Malignant; (2) non-malignant. There is also a small group of neoplasms which stand between these two and are sometimes malignant and sometimes behave like benign growths.

The malignant tumors (or what in popular parlance are called ˆcancers®) embrace the carcinomata and sar¬ comata and possess certain invariable character-

istics: (1) Their growth is by infiltration and destruction of the surrounding tissues; (2) they form secondary growths by metastasis; (3) they are difficult to extirpate surgically and tend to recur locally; (4) they induce a gen¬ eral disturbance of health known as cachexia. By this is meant a condition of defective nutri¬ tion due wholly or in part to the demands on the body made by the growth of the tumor, to its interference with digestion or food ab¬ sorption if situated in certain parts, as the oesophagus or stomach, to the loss of albumi¬ nous material through the constant discharge from ulcerating areas, to the absorption of deleterious substances arising from putrefactive changes in the tumor, to hemorrhage, to the pain and resulting loss of sleep, anxiety, etc. It is possible that the tumor itself produces a poison which contributes in producing cachexia, but portions of human carcinomata introduced into the tissues of experiment animals if free from bacterial contamination do not appear to exert any toxic effects.

The benign tumors, on the other hand, are distinguished by usually being encapsulated so that they can be easily extirpated through the absence of any tendency to form metastases. They are dangerous to life only through com¬ pression of important organs, but it must be remembered that their position may in this way give rise to most serious conditions. Many varieties are also extremely liable to become the seat of malignant degeneration.

Theories of Causation and the Occurrence of Tumors. — Comparatively little is yet known in regard to the actual causes of tumor forma¬ tion. Many highly ingenious theories have been elaborated, but plausible as they may seem they are mere speculations and none of them can be said to be satisfactory from every point of view. Cohnheim in 1882 promulgated a doctrine which has many adherents and affords a rational ex¬ planation at least for congenital tumors and for many benign new growths. Briefly stated, his view is that during the development of the embryo (see Embryology) small clusters of cells become displaced from their normal sur¬ roundings and form little islets of tissue dif¬ ferent in nature from their environment. These cells remain alive, but lie dormant until some

stimulus stirs them into activity and they then form the nucleus for tumor formation. Having once started to proliferate they exhibit the in¬ tense vital energy of embryonal tissue and de¬ velop untrammeled by the restraints imposed upon normal cell growth. This theory has much in its favor, such as the tendency of many tumors to develop in regions which correspond to embryonal foldings, and to assume embryonal types of structure, but it is impossible to demon¬ strate any such displaced aggregations of cells, and clinical observations in manv cases are strongly against it. A somewhat broader and more general view is taken by Ribbert, who be¬ lieves that through some means, perhaps as the result of injuries or inflammation, numbers of healthy cells become cut off by bands of con¬ nective tissue and are thus isolated from the physiological restraints which ordinarily keep the cellular capacities within normal bounds. As a result of this liberty, excessive growth and perverted activity, in other words, tumor forma¬ tion, occur. Hansemann denies that mere segre¬ gation of cell groups can have this result and

accounts for the great intensification of vitality necessary bv assuming a change in the individual cells, termed anaplasia, consisting in a loss of differentiation and increased capacity for inde¬ pendent existence. According to this writer two factors, anaplasia and a proliferative stimulus, are necessary for tumor formation. It will be seen that these theories leave much to be de¬ sired, but it is probable that the truth lies in this direction of cytological research and that as we gain a deeper insight into the physiology of the normal cell our understanding of these com¬ plex perversions of growth will be correspond¬ ingly increased.

Much has been written of late on the para¬ sitic origin of tumors, particularly of carcinoma, and bacteria, yeasts and protozoa have all been described and figured in great detail as causa¬ tive agents. None of these so-called cancer parasites has, however, been able to withstand the crucial tests of cultivation and of repro¬ ducing the tumors on inoculation into animals, and it has also been impossible so far to infect animals of one species with tumor tissue de¬ rived from another. Belief in the infectious nature of carcinoma is shared by very few ob¬ servers at present, and it is probable that the instances in which carcinoma has occurred in people intimately associated, as husband and wife, are either due to coincidence or to direct transplantation of cancer cells. So-called ((can- cer houses® and cancer districts are described, but such observations are too fragmentary and unreliable to be taken as the basis for general¬ izations.

Climatic, racial and geographical features have been drawn into the discussion by some authors, as well as matters of diet; for example, habitual over-indulgence in meat. In connec¬ tion with this latter point it is an interesting fact that carcinomata are said to be much less frequent in herbivorous than in carnivorous animals. On the other hand carcinoma is not uncommon among religious sects in the East that are strict vegetarians.

Injuries, both acute, such as blows and falls, and in the form of long-standing irritation, un¬ doubtedly have some connection with tumor formation. Acute trauma is most often asso¬ ciated with tumors of the connective tissue group, and chronic trauma with carcinomata. Typical examples are found in the cases in which sarcoma follows bone injuries, and car¬ cinoma of the lower lip is apparently produced by the constant irritation of pipe smoking or of a roughened tooth. Certain occupations which involve chronic irritation of the skin through chemicals, such as tar or paraffin products, also seem to predispose toward tumor formation. Too much importance must not be attached to this . factor, however, for it has never been possible to produce tumors in animals experi¬ mentally in this way, and in the cases in which new growths have followed trauma there was probably some already existing predis¬ position.

Age. — The liability to different sorts of tu¬ mors varies very considerably with different periods of life. In childhood and in early adult life carcinomata are rarely seen and of the malignant tumors sarcoma predominates, while the reverse is the case after the age of 30. To this rule there are many exceptions, however. When young people do acquire carcinoma the

disease is always of extremely virulent type, whereas in the very aged its development is slower and in particular the formation of me-tasases is much less extensive.

Sex. — ‘Carcinoma isˆmuch more frequent in women than in men and the organs of predilec¬ tion also differ in the sexes. In men the tongue, lips and stomach are oftenest attacked, while in women the disease is most commonly seen in the breast or uterus.

Heredity. — The tendency of modern pathol¬ ogists is to ascribe less and less importance to heredity as a cause of tumor formation.

Statistics are particularly misleading in this re¬ gard and while it is undoubtedly true that in a considerable proportion of cancer cases more or less remote members of the same family have been similarly affected, a like inquiry into the antecedents of healthy persons would show ap¬ proximately similar results. A celebrated case is that of Napoleon I — who, as well as his father and two sisters, died of carcinoma of the stomach. Carcinoma is a common disease and, therefore, appears frequently in the same fam¬ ily; sarcoma is rare and so has less appearance of hereditary transmission.

Increase of Malignant Disease. — The sta¬ tistics of recent years show that throughout the world, but particularly in England, there seems to be a marked increase in the occurrence of carcinoma. Roswell Park says that if the ratio of increase in the number of cancer deaths in New York State continues unchanged for the next 10 years the mortality from this cause will be greater than that of pulmonary tuberculosis, smallpox and typhoid fever combined. These figures cannot be accepted without some reser¬ vation, however, for undoubtedly the diagnosis is now made in cases that were formerly un¬ classified, autopsies are more frequent and the causes of death are more definitely indicated in death certificates. Also through municipal sanitation, improved methods of medical treat¬ ment, more widespread dissemination of the laws of hygiene, etc., a greater number of peo¬ ple now live to reach the age when carcinoma is frequent. The increase seems to affect prin¬ cipally those of the upper ranks, in contradis¬ tinction to tuberculosis which spreads most ac¬ tively among the proletariat.

In conclusion, it may be said that probably no one cause underlies the formation of all types of tumors, but that possibly widely differ¬ ing factors may be concerned in the production of the different varieties.

Classification of Tumors. — Until our knowl¬ edge of the causes of tumors becomes more exact, a satisfactory classification is impossible. The so-called histogenetic classification based on embryological data is open to many objec¬ tions, as well as various other systems pro¬ posed. The following table is taken from Delafield and Prudden's

C o nncctive- T issue T yp e.

Normal Tissue.

T umors.

Fibrillar connective tissue. Mucous tissue.

Embryonal connective tissue. Endothelial cells.

Fat tissue.

Cartilage.

Bone.

Neuralgia.

Fibroma.

Myxoma.

Sarcoma.

Endothelioma.

Lipoma.

Chondroma.

Osteoma.

Glioma.

Muscle-Tissue Type — Myomata.

Normal Tissue. Tumors.

Smooth muscle tissue. Leiomyoma.

Striated muscle tissue. Rhabdomyoma.

Nerve- Tissue Type — N euromata.

Vascular-Tissue Type — Angiomata.

Normal Tissue. Tumors.

Blood-vessels. Angioma.

Lymph-vessels. Lymphangioma.

Epithelial-Tissue Type.

Normal Tissue. Tumors.

Glands. Adenoma.

Various forms of epithelial Carcinoma,

cells, and associated tissues.

To these may be added the following two groups :

T eratomata and Cystomata.

It will be observed that the designation for each form is derived by adding the suffix -oma to the technical name of the corresponding tis¬ sue type, and for mixed tumors compound names are formed, as adeno-carcinoma, myxo¬ sarcoma, etc.

Different Varieties of Tumors. — Malignant Tumors — Sarcoma. — Sarcomata are tumors of the connective tissue group, composed of cells, embryonal in type, which are disproportionally numerous in comparison to the basement sub¬ stance, so that the tumor as a whole is usually soft and pulpy in contradistinction to the stony hardness of carcinomata. They are character¬ ized by extreme vascularity, the new formed vessels often being mere channels between the tumor cells, and the tendency to form metas- tases by means of the blood current rather than the tymphatics. Their cells may be of many varieties and the following chief types are recognized: (1) Large and small spindle

celled; (2) large and small round celled; (3) giant celled ; (4) melano sarcomata, which con¬ tain pigment, frequently arise from pigmented moles and are extremely malignant. Mixed tumors, such as osteo-sarcomata, angio-sarco- mata, etc., frequently occur. Sarcomata may arise from bone, the brain and spinal cord, the breast, the kidney, uterus and lymph glands. They grow rapidly, owing to their vascular structure, are prone to necrotic changes and if situated on the surface of the body break down and ulcerate. Sarcoma is not common, is a disease of early life, rarely appearing after the age of 40, and frequently is a sequel of injury or inflammation. In many respects sarcoma behaves like a growth due to some parasitic infection.

Carcinoma. — Carcinomata, or cancer in the true sense, are tumors composed of a more or less dense connective tissue framework, hold¬ ing in its meshes epithelial cells. These exhibit much diversity of type and arrangement, so that several classes are recognized. (1) Epitheli¬ oma. This is the form which commonly occurs on the skin, at the muco-cutaneous junctions, such as the lips, about the nose and eye, and on the mucous membranes covered with squamous epithelium, as

the mouth, oesophagus and cer¬ vix of the uterus. On the face a slowly grow¬ ing form known as Jacob's or rodent ulcers is sometimes seen which may last for years and is rarely fatal. On the skin or lip epithelioma be¬ gins as a warty protuberance which soon ulcer-

ates and gradually extends in size until a sore with hard irregular base and edges, and foul bloody discharge, is formed. (2) Cylindrical celled carcinomata. These occur in the stomach, intestines and uterus. (3) Carcinoma simplex. This displays great irregularity in the shape of its cells and is the commonest form attack¬ ing the internal organs. If the connective tis¬ sue is in excess, the dense, hard scirrhus car¬ cinoma results ; whereas if the cellular elements preponderate, the tumor is termed a medullary cancer or carcinoma molle.

About 80 per cent of the tumors of the female breast are carcinomata. The disease is rare before the age of 35, is most common be¬ tween 45 and 55 and in women who have borne children. The negro race is much less suscep¬ tible. It begins as a hard nodular mass not painful to pressure, which soon becomes firmly fixed to the tissues and causes retraction of the nipple. The axillary lymph-glands are invaded early and can usually be felt as small hard nodules. In neglected cases the skin over the tumor ulcerates and there is a foul discharge. The arm becomes swollen and useless, and pain of neuralgic nature is usually present. The bones, liver, pleura and brain are often at¬ tacked secondarily.

Carcinoma is usually disseminated by the lymph stream and promptly invades the lym¬ phatic glands. According to Birch-Hirschfeld the following are in order of frequency the organs most often primarily attacked : Uterus, external skin, female breast, stomach, rectum, oesophagus, ovary, testicle, external genitals, prostate and bladder, pancreas, kidney, intes¬ tine, bile ducts, liver, bronchi. It is a disease of mature life and is not often seen before the age of 30.

Intermediate Tumors. — Adenoma. — Ade¬ nomata correspond in general structure to nor¬ mal glands, but either do not secrete or are unable to discharge the secretion through the gland ducts. They grow slowly, but may reach a large size, particularly if distended by accu¬ mulated secretion. In this case they are termed cyst-adenomata, and the oftentimes huge ovar¬ ian cysts belong to this class. Many goitres (q.v.) are adenomatous tumors. Adenomata are in themselves benign,

but are prone to take on carcinomatous tendencies and then become very malignant. They occur in the breast, the ovary, the thyroid gland, the kidney, salivary glands, stomach, intestines and uterus.

Endothelioma. — This tumor springs from the cells lining the blood vessels and lymph spaces and has much in common with both the carcinomata and sarcomata. Endotheliomata differ greatly in their virulence, but at times behave much as do sarcomata. They occur in the membranes of the brain, the pleura and peritoneum, the salivary and lymph glands. Growths of the parotid gland are frequently of this type.

Benign Tumors. — Fibroma. — This is a growth composed of bundles of fibrillar con¬ nective tissue. Two main types, the hard and the soft, occur. Fibromata frequently appear in young adults and may arise in any part of the body containing connective tissue. They are often seen in the skin, mucous membranes, the breast, in fibrous membranes, nerves and the gums, and are often associated with other forms of tissues in complex tumors. They are

usually well encapsulated and may be single or multiple. Ordinary warts and moles and some nasal polypi are fibromata. One form not infrequent in women arises in the sub¬ cutaneous tissue, gives rise to severe attacks of pain and is called painful subcutaneous tu¬ bercle. Keloid is a form occurring in scars, which is most common in negroes and is very hard to eradicate.

Myxoma. — This tumor is made up of tissue embryonic in type and called mucous tissue. Myxomata are soft and elastic, grow slowly and are usually considered benign, though they have a tendency to recur and sometimes undergo sarcomatous change. ‘ They frequently occur as polypi (see Polypus) in the nose, where they give rise to chronic catarrh, and are also found in glands such as the parotid and breast, the subcutaneous and submucous tissues and the sheath of nerves. Myxomatous tissue is often found in mixed tumors.

Lipoma. — Fatty tumors are among the com¬ moner growths and are composed of lobules of fat held in a stroma of connective tissue. They are most often seen in middle life, and the skin of the back or shoulders is a favorite site. They may be multiple and sometimes occur as diffuse fatty enlargements about the neck. The yellowish patches often seen about the eyelids in old persons are a form of lipoma called Xanthoma.

Osteoma. — Osteomata are composed of bone and usually originate in

bone, periosteum or cartilage, though they may spring from other types of connective tissue. They grow slowly, are benign and are often multiple. A special form known as odontoma or dentigerous cyst develops from the germ of the permanent teeth.

Chondroma. — This is most often met with in the young and is composed of hyaline and fibro- cartilage. Chondromata may form from the long bones, the pelvis, cartilage or in glands like the parotid and testicle. In the latter situations they are especially apt to become sarcomatous. Chondroma is frequently preceded by rickets in infancy. The so-called <(joint-mice® or floating cartilages in joints are often pedunculated or broken off chondromata.

Glioma. — Gliomata are tumors developing from the neuralgia or supporting tissue of the central nervous system. They are found in the brain, spinal cord and cranial nerves. Some forms, particularly those occurring in the retina during childhood, are closely allied to the sar¬ comata, and owing to its situation glioma is always a source of danger.

Myoma. — Two varieties of myomata are recognized: (1) Leiomyoma, composed of un¬ striped muscle cells and more or less fibrous tissue; (2) rhabdomyoma, which is rare, and contains striped muscle cells and spindle cells. Growths of the first class are found in the oesophagus, stomach and intestine, the skin, bladder and ovary. They are commonest, how¬ ever, in the uterus and its male analogue, the prostate gland. In the former situation they form the so-called uterine fibroids which often attain large size and may menace health through hemorrhage or pressure on adjoining struc¬ tures. The prostatic enlargement of old age is due to leiomyoma of the gland. Myomata are tumors of later life.

Neuroma. — Tumors composed of nerve tis¬ sue or true neuromata are rare, arise in middle

life and are apt to be accompanied by severe pain or paralysis. False neuromata are tumors developing in the connective tissue sheaths of the nerves and may be fibromata, myxomata, etc. Traumatic neuromata are frequently the cause of the painful stump following amputations.

Angioma. — Angiomata are of two sorts: (1) Haemangioma, consisting

of dilated blood-ves¬ sels, and (2) lymphangioma, composed of di¬ lated lymph-vessels. The first type is subdivided into (a) capillary haemangiomata and (b) cav¬ ernous angiomata. Capillary angiomata or nevi form the so-called mother's marks, port wine stains or strawberry marks with which infants sometimes come into the world. These are patches of distended cutaneous capillaries or venules, and if small can be obliterated by electrolysis. Larger ones are treated by ex¬ cision. Cavernous angiomata are made up of large vessels and if on the surface of the body may form swellings of considerable size. Lymphangiomata are usually congenital, but may be acquired and vary in size as do the haemangiomata. With both classes of angioma there is danger of rupture and serious hemor¬ rhage or escape of lymph.

Cystomata. — These are benign tumors filled with fluid the result of the activity of the cells lining the cyst wall, which is the real new growth. Many forms of cystomata belong to the adenomata ; others occurring about the neck are the result of faulty closure of embryonic openings and are called branchio-genetic cysts. Cysts due merely to accumulation of secretion through stoppage of the duct of a gland, as the sebaceous cysts of the skin ("wens®), or resulting from parasitic infection as the hydatid echinococcus cysts (see Hydatid), are not grouped with true tumors.

Teratomata. — These are tissue formations of embryonic origin which frequently exhibit great complexity of composition and contain such di¬ verse structures as bone, teeth, skin, hair, car¬ tilage, muscle, glands, etc. Cysts of this sort are called dermoids and are especially common in the ovary and regions where folds of the developing embryo come in contact, as at the orbital angles, the neck and the base of the spine. Theoretically, teratomata are to be classed with the malformations rather than with the tumors. See Teratology.

The Diagnosis of Tumors. — In dealing with conditions likely to lead to results of such grav¬ ity as are involved in tumor formation, prompt recognition of the nature of the case is of the utmost importance. If taken at a sufficiently early stage both carcinoma and sarcoma can be cured by operation and impending danger from benign growths be recognized and averted. Swellings and ulcerations about the face and especially the lips and tongue which do not promptly disappear are, in older people, most suspicious. The formation of hard masses in the female breast should also be called to the attention of the physician as soon as noticed, and excessive menstrual flow or hemorrhage be¬ tween the periods in younger women suggest the possible existence of uterine fibro-myomata. A

bloody or malodorous discharge subsequent to the menopause is very likely to be due to carcinoma of the uterus. Dyspepsia in older people together with loss of weight point to¬ ward malignant disease of the stomach, and in¬ definite abdominal pain, emaciation, obstinate

constipation or alternating diarrhoea and con¬ stipation, especially if there be blood in the stools, are strongly suggestive of a new growth of the intestine. It cannot be too strongly emphasized that delay is fraught with the great¬ est danger and may make cure impossible or add immeasurably to the difficulties of the operation. In doubtful cases where tumors are accessible it is the custom of surgeons to excise small bits of tissue and submit them to micro¬ scopic examination to determine their nature. In obscure abdominal disorders an exploratory laparotomy may be the only means of estab¬ lishing the diagnosis. The procedure itself is as free from danger as any surgical manipula¬ tion requiring a general anaesthetic can be, and if malignant disease is present it may be pos¬ sible to eradicate it and save the patient from the miserable death which is otherwise in¬ evitable.

The Treatment of Tumors. — In general it may be said that for most tumors the proper treatment lies in their removal when feasible at the earliest possible moment. Modern surgery has made possible operations which formerly were unheard of and the chances of the patient afflicted with malignant disease are constantly improving. The older surgeons operated to prolong life or to make existence more bearable till death came as a relief : the surgeon of to¬ day operates to cure. Large portions of the stomach are frequently excised for carcinoma, and many cures are reported. Intestinal resec¬ tion makes the extirpation of new growths in this region possible, while the technique of uterine operations has been developed to such a degree that fibromyomata can be removed with comparatively little risk, and even carci¬ noma in this situation has lost some of its terrors. Malignant tumors of the breast are permanently cured in from 40 to 50 per cent of the cases, the success being due to the thorough¬ ness with which modern operators remove the tissues under the breast and the enlarged glands in the axilla, and statistics are showing constant improvement in the operative results in all forms of malignant disease. See Surgery.

Various other plans of treatment are em¬ ployed to some extent. Inoperable sarcomata have been greatly benefited by injections of bac¬ terial toxins, and in the use of various forms of light-rays from the violet end of the spec¬ trum, the X-rays and in the emanations from radio-active substances we have promising adjuncts to surgery.

See Phototherapy; Ra¬ dium Therapy.

Caustics are rarely successful in the treatment of malignant tumors and their application is al¬ ways painful and leaves disfiguring scars. Char¬ latans of various types diagnose all sorts of conditions as cancers and proceed to cure them with great eclat ; when actual malignant growths are encountered by them the time lost in this way before the necessity for proper advice is realized usually costs the patient's life.

Bibliography. — Bainbridge, W. S., 'The Cancer Problem* (New York 1914) ; Brewer, G. E., 'Textbook of Surgery) (3d ed., Phila¬ delphia 1915); Delafield and Prudden, 'A Hand¬ book of the Pathological Anatomy and His- tology) (10th ed., New York 1914), which con¬ tains a full bibliography; Bland-Sutton, John, 'Tumors, Innocent and Malignant* (4th ed., Chicago 1906) ; Hertzler, A. E., 'Treatise on

Tumors) (Philadelphia 1912) ; Scudder, C. L., (Tumors of the Jaws) (ib. 1912) ; Virchow, Rudolf, (Die krankhaften Geschwiilste) (Ber¬ lin 1900) ; Von Bergmann and Bull, (A System of Practical Surgery) (New York 1904) ; Till- mann's (A Text-book of Surgery) (New York 1901"); White, C. P., (Pathology of Growth: Tumors) (New York 1914).

TUMULUS, an ancient artificial mound, often of large size, raised usually over the tomb of some prominent person. The custom appears to have been universal in the early his¬ toric period. As it required the use only of earth, and of rude stones for a sepulchral chamber, it was the only feasible method by which races in a low state of development could commemorate their dead, the tumulus was con¬ tinued after architecture had made some prog¬ ress. In ancient as in modern times, where large numbers of dead were heaped together, and it was desired to honor them all, the tumu¬ lus was the only monument that could be con¬ veniently provided. The vast grave at Salis¬ bury, N. C., in which thousands of Union dead are interred, is a tumulus as much as any of the great burial mounds of the ancients. Similar constructions are even now being heaped on modern battlefields.

The Bible and Homer give examples of tumuli. They are found in North America, Mexico, Central and South America, in Great Britain and Scandinavia, in Asia and Africa. They are not in all instances burial mounds. The Bible, in Genesis, xxxi 44—55, relates the erection

of a “heap,® or tumulus, as evidence of an agreement as to boundary between Laban and Jacob. It is probable that some of the mounds were ancient forts. That at Silbury Hill, Wiltshire, England, 170 feet high, may not have been a sepulchre, and some of the Amer¬ ican mounds were sacrificial, and others may have been places of defense. Indeed all three uses — sepulchral, sacrificial and defensive — may have been included in a mound. It is also certain that some tumuli are simply residential ruins, the crumbled remains of adobe dwellings, or, in the desert regions of Asia and Africa, sand heaps rising as the sole memorials of van¬ ished and once populous cities. See Mega- lithic Monuments ; Mound-builders.

TUMUT, tu’mut, Australia, a town in New South Wales, southwest of Sydney. It is in a mountain valley 1,050 feet above sea-level, on the slope of a hillside on the south bank of the river Tumut, from which the town takes its name. The Tumut does not dry up like most Australian rivers, during the hot weather, but remains at continual high water mark owing to the melting snows of the neighboring moun¬ tains, the loftiest of which is Mount Kosciusko, the culminating point of the entire continent. The town has four banks, four churches, schools and a lecture hall. Pop. about 1,200.

TUN. The old form of spelling for ton. It is still used to some extent for a cask or vat of liquor. See Ton.

TUNA. See Tunny.

TUNA, a cactus. See Prickly Pear.

TUNBRIDGE (tun’bnj) WELLS, Eng¬ land, in Kent, a watering-place and market- town, 35 miles southeast of London. It occu¬ pies detached hills with fine views and pictur¬

esque surroundings. At the end of the fine parade, the ˆPantiles,® are medicinal springs, which have been honored by royal and distin¬ guished patronage since the 17th century. The common contains 170 acres. The principal buildings are a church, public and society halls, convalescent home for children, mechanics’ in¬ stitute, Nevill’s club and pumproom. Tun¬ bridge ware, consisting of fancy inlaid work or mosaics, is sold extensively. The original town of Tunbridge (pop. about 13,000), a wool- trade centre, is four miles to the north. Pop. of Tunbridge Wells about 35,000.

TUNDRA, toon’dra, the Russian name for the extensive low-lying, swampy peat-mosses which compose a considerable part of the great

Siberian plain and that of North Russia. From June till the middle of August the tundras are thawed to a small depth, and are seen covered with mosses and lichens, among which there are sprinkled a few flowering plants. Many furred animals, along with various migratory birds, resort to the tundras for the short sum¬ mer-season.

TUNGSTEN (Wolfram), a metallic ele¬ ment found in the minerals scheelite (CaWCh), wolframite [(FeMn) WCb], hubnerite (MnWCh) and ferberite (FeWCb). It occurs in veins and in placer (q.v.) deposits. The most im¬ portant occurrence is the placer tungsten of Burma. Portugal is also an important pro¬ ducer. In the United States, the important oc¬ currences are in Bowlder County, Colo., San Bernardino County, Cal., and in the Black Hills of South Dakota. The pure metal is obtained by the Goldschmitt process (see Thermit), that is, by the reduction of tungstic acid by aluminum filings ; also by reduction of the oxide by heating with charcoal in an elec- trice or regenerative gas furnace. It is malle¬ able and hard enough to scratch glass. Not acted upon easily by mineral acids. Atomic weight, 183.6; symbol, W; specific gravity, 16.6. It forms a number of compounds, among which are the chlorides WCk, WCh, WCU, WClo, the oxide WO3, and the acid WO(OH)4. Tung¬ sten is used extensively alloyed with other met¬ als, as iron and aluminum, to which it imparts very desirable properties. Tungsten steel is very hard and tough, highly magnetic, not easily rusted and has the valuable properties of self¬ hardening. The alloy of tungsten and alumi¬ num known as partinium is very light and tough and is used largely in automobile construction. It is also used in incandescent lamp filaments. See Mineral Production of the United States.

TUNGUSES, toon-goo’sez, a leading branch of the Mongol division of the Mongol- Tatar family, small in numbers but extending over a vast area from the Pacific in the west to the Yenisei River in the east. The race is found along most of the seaboard from Korea and Kamchatka, where a war was being carried on in 1904 between Russia and Japan. The Manchus, who conquered China, and are the rulers of that empire, are of Tungus stock, and from the same source came, in the remoter past, a large part of the savage and half-savage hordes that swept over lower Asia and western Europe. The Tunguses are now a dwindling race. Their morals are good, and their religion is chiefly the aboriginal Shamanism, although

some have been converted to Christianity and Buddhism. Their name is said to be derived from a Chinese word signifying ˆpeople.® The Funguses on the higher Pacific Coast are called the Lamuts, or ((sea-people,w and those in the vicinity of the Amur and Korea are called by the Russians the Tazi. The Tunguses, exclu¬ sive of the Manchus, are estimated at about 80,000 in number, of whom about 15,000 are in the Amur Basin, and the others in Siberia. See Mongolian Race; Siberia; Tungusic.

TUNGUSIC, a language spoken over hun¬ dreds of thousands of square miles of Asia, by the people known as Tunguses. Manchu is a dialect of this language. It is a Mongol tongue, of a low grade of development, having no verbs, and possessing no distinction of number and person in the predicative words. See Tunguses.

TUNGUSKA, rivers of Siberia. The three large rivers of Irkutsk,' which unite to form the Yenisei are known as the Upper, Middle (or stony) and Lower Tunguska. They drain an area of about 800,000 square miles. The Upper and the Lower Tunguska are each rivers about 1,800 miles long, and they unite at Turukhansk, just south of the Arctic circle. The upper branch drains Lake Baikal. See Siberia.

TUNIC, an ancient form of garment in con¬ stant use among the Greeks ; a sort of short- sleeved shirt. Among the Romans the tunic was an under garment worn by both sexes (under the toga and the palla), and was fas¬ tened by a girdle or belt about the waist. The woman's tunic was often long like the modern chemise. Soldiers often wore the tunic without the toga, as some workmen to-day wear a blouse. When ornamental, it sometimes became an article of ceremonial dress, as the purple- bordered laticlavus of senators. The Anglo- Saxons of the Middle Ages also wore a tunic, much like a skirt, and often tied at the waist. The term is also used ecclesiastically to denote a dress worn by the subdeacon, made originally of linen, reaching to the feet, and then of an inferior silk, and narrower than the dalmatic of the deacon, with shorter and tighter sleeves.

TUNICATA, or UROCHORDA, a class of animals of the phylum Chordata (q.v.), commonly represented by the Ascidians (q.v.) formerly much misunderstood. Since Kowa- lewsky's description in 1866 of the development of an ascidian, it has been clear that these animals, together with all the other tunicates, must be associated in the zoological system with Amphioxus and the true vertebrates. Most tunicates pass through a free-swimming, tadpole-like, larval stage (and a few remain permanently in this condition) which has in the tail or swimming organ a notochord and a tubular central nervous system,

both of which develop in essentially the same manner as in other vertebrates. The fore part of the alimentary canal is perforated by pores or stigmatse opening to the exterior and serves as a respiratory organ. After a short free-swim¬ ming period, the larva attaches itself in typical cases and the tail is gradually absorbed with its contained organs, so that both notochord and tubular nerve cord disappear, a remnant of the latter in the body becoming the gang¬ lion of the adult. The Tunicata comprise three

orders : The Larvacea, including forms of small size and simple structure, which retain the lar¬ val tail throughout life. Appendicularia is an example found abundantly among the surface fauna of our coasts. The Thaliacea, including almost exclusively free swimming pelagic forms which have no tail in the adult and seldom a tailed larvae. They form compound colonies and exhibit an alternation of generations. Salpa (q.v.) is an example. The Ascidiacea , includ¬ ing usually fixed, simple or compound forms, with usually well-marked larvae, but no tail in the adult state. Molgula cynthia, Boltenia and Amarcecium are common genera on our coasts. See Ascidian. Consult Herdman, (Challenger Reports,) Vols. VI and XIV, Lon¬ don (1882 and 1886) ; Verrill, invertebrates of Vineyard Sound* (Washington 1874).

TUNING. See Reed, Flue and Stringed Instruments, Temperament, Tuning and Voicing of.

TUNING-FORK, in music, a piece of steel having two parallel forks or prongs of equal dimensions, constructed and tempered so as to give a definite note when caused to vibrate. Tuning-forks are small and easily carried in the pocket. They may be sounded by striking against any convenient solid object. Large tuning-forks are used for lectures on acoustics, fixed on sounding-boxes, and caused to vibrate with a resined hair-strung bow.

TUNIS, tu’nis (Afrikiya), North Africa one of the old Barbary States on the Mediter¬ ranean coast, formerly tributary to Turkey, and now a French protectorate, bounded on the north and east by the Mediterranean Sea, on the south by Tripoli and on the west by Al¬ geria. It extends about 400 miles from north to south, 150 miles from east to west and has an area of 38,450 square miles. The coast is indented by the three large gulfs of Tunis, Hammamet and Gabes. It is bordered by a low, sandy and desert region in the east and by precipitous mountains in the north. The northern part of the country

is a plateau, be¬ coming very mountainous in the extreme north. The southern part is a flat steppe region, lying partly below sea-level, and containing large tracts of salt marsh. The principal river is the Mejirda, in the north. The northern moun¬ tains are covered with large oak forests, and contain very fertile valleys. The principal minerals exploited are salt, nitre and phos¬ phates, iron, lead and mercury. Large num¬ bers of cattle, sheep, camels and fine horses are raised. Agriculture is less developed, though climate and soil in the north are favor¬ able. There is some vine and oil culture, and considerable fisheries along the coast, but the industries are not important. The principal commercial ports are Tunis-Goletta, Susa and Sfax. The chief exports are vegetables, oil, phosphates and mineral ores, esparto-grass, livestock and cattle products, sponges, dyes and fruits. The total value of exports in 1916 was $23,750,000, and of imports $26,850,000. The head of the immediate government is the native bey, who rules under French protection. The capital is Tunis. The population is of a very mixed character, containing, besides the Moors, traces of the ancient Numidian, PhcEnician and Roman elements. The total population is about

1,906,000. In 1918 there were 48,000 French and 130,000 other foreigners, including 112,000 Italians. Tunis was a part of the ancient Carthaginian dominion, and afterward of the Roman province of Africa. In the latter part of the 7th century it was taken by the Arabs, and in 1575 it came under Turkish suzerainty. In 1881 France invaded Tunis under pretext of punishing the Krumir marauders. As a result of the invasion the bey was forced to sign the treaty making the state a French protectorate.

Education. — There are about 287 public schools, eight lycees and colleges and 23 private schools. There are 30,767 pupils of whom 18,731 are boys. Of all pupils, 7,025 are French, 9,639 Mussulman; 4,870 Jews, 9,639 Italian; 1,570 Maltese and 280 others. In the Great Mosque at Tunis there is a Mohammedan university. In the city are 86 and in the interior 1,214 Mussulman primary schools, some of which receive state-aid.

Government. — The government is carried on under the direction of the French Foreign Office, which has a special department for Tu¬ nisian affairs, under the control of a French Minister Resident-General, who is also Tuni¬ sian Minister of Foreign Affairs, and a min¬ istry of

10 heads of departments, eight of whom are French. French tribunals take cognizance of cases between Europeans and between Europeans and Tunisians, and there are native courts for cases between natives.

Finance. — The 1916 revenues aggregated $12,843,245, made up from direct taxation $2,278,845, indirect taxation $3,878,180, mo¬ nopolies (tobacco, etc.) $4,384,385, post office, telegraphs, etc., $607,095 and royalties, etc., $1,694,740. In the same year the disbursements amounted to $12,283,945, for the civil list the residency and district services, public debt charges, the various government departments and the army. The public debt is about $450,-

000,000.

Communications. — About 2,000,000 tons of shipping enter and clear annually at Tunisian ports. About 37,962 miles of good roads have been constructed within the last 30 years. There are in operation 1,535 miles of railway, 3,721 miles of telegraphs, 254 telegraph offices, which handle annually about 1,700,000 messages. There are 724 miles of urban telephone lines and interurban systems with 2,717 miles of wire. There are 456 post offices, which in 1916 handled 41,077,660 letters in the internal service, and 71,111,196 in the external service.

Defense. — There is an army of occupation maintained by France, and having an average strength of 17,000 to 18,000, with 600 officers. There are a few native regiments (spahis , etc.) included in this force. In the Great War 1914-18 about 35,000 Tunisian troops served under the tricolor in France.

Bibliography. — Journal officiel Tunisian; Foreign Office Reports (London annually) ; Annuaire Statistique de Tunisic (Paris) ; Besnier et alii, (La Tunisie an debut du XXe siecle) (Paris 1904) ; Bloesch, H., (Paris 1917) ; Thomas, P., (Essai d'une descrip¬ tion geologique de la Tunisie) (Paris 1908) ;

Vivian, H., (Tunisia and the Modern Barbary Pirates) (London 1899).

TUNIS, North Africa, the capital of the French protectorate of Tunis, situated in the northeastern corner of the country, at the west¬ ern extremity of a shallow salt lagoon con¬ nected with the Bay of Tunis by a narrow chan¬ nel at the port of Goletta. A canal, six and one-half miles long and 22 feet deep, has been dredged through this lagoon to Tunis. There is a good water supply provided by rebuilding

an ancient aqueduct. The interior of Tunis presents generally a labyrinth of narrow dirty streets; but great changes have taken place since the French occupation, a European quarter with fine buildings, including the French resi¬ dency, the public offices, Roman Catholic cathe¬ dral, etc., having arisen. Besides the colleges, there are good hospitals and a large asylum for the aged, maintained by the Little Sisters of the Poor. Among the most interesting native buildings are the bey's palace and the mosques. The city has considerable manufactures of silk and woolen goods, shawls, mantles and jewelry. There is now regular steam communication with Europe and the ports of Algeria, and a rail¬ way runs to Algiers. The ruins of ancient Carthage lie about 10 miles to the northeast of Tunis, and may be reached by railway. Pop. about 164,606 Moslems, 43,000 Jews, 70,000 Italians, French, etc; total, 277,606.

TUNKERS. See Dunkards; German Baptist Brethren.

TUNKHANNOCK, Pa., county-seat of Wyoming County, on the Susquehanna River and the Tunkhannock Creek, and the Lehigh Railroad. It is 30 miles northwest of Wilkes- Barre. Lumbering is carried on extensively, and the chief industries are tanning, spool and tub factories, stave and planning mills and furnaces and machine shops. There also are witchhazel distilleries. Pop. (1920) 1,736.

TUNNELS, Great Modern. The comple¬ tion of the boring of the Simplon tunnel on 24 Feb. 1905, thus assuring of its being opened to travel during the latter part of that year, marked the culmination of one of the greatest events in civil engineering during the last dec¬ ade, and the successful termination of the greatest tunnel boring enterprise of any age, ancient or modern.

At the present time, four great tunnels pierce the great Alpine barrier between north¬ ern and southern Europe. The Mont Cenis and the Saint Gotthard connect France and Italy; the Arlberg places Austria in communi¬ cation with Italy, while the Simplon forms a direct connection between Italy and Switzer¬ land, bringing Geneva and French Switzerland into closer communication with Milan and the Adriatic railways. It also shortens the dis¬ tance from Calais to Milan by 95 miles, as com¬ pared with the Mont Cenis route, and by 80 miles over the route passing through the Saint Gotthard.

The feasibility of a transalpine tunnel was contemplated about the middle of the 19th cen¬ tury, and work was begun on the Mont Cenis tunnel in 1857, at a point near Modane in France, from which it passes under the eleva¬ tion, Col de Frejus, about 18 miles west of

Mont Cenis, and emerges into Italian territory

at a point near Bardonecchia, 24 miles from Susa. The exact length of the tunnel between portals is 7.6016 miles, but as the railway, in¬ stead of entering the tunnel at the portals, joins it through special curved sections at each end, the total length of the borings amounts to about eight miles. It was bored simultaneously from both ends on a rising gradient, with its summit at the middle point. The grade from Modane is about 1 in 2,000. The rock forma¬ tion traversed as the boring advanced south¬ ward from Modane was characterized by car¬ bonaceous schist 1.3027, quartz 0.2414, limestone 0.2210, and calcareous schist 2.0357 miles; while the entire distance traversed from the Bardo¬ necchia end to the summit amounting to 3.800 miles, was through calcareous schist. The alti¬ tude of the tunnel is about 4,248 feet above sea- level, and 5,428 feet below the crest of the mountain. At the Modane end the tunnel is 25 feet 3ˆ2 inches wide. at the bottom, 26 feet 2Y\ inches at the point of maximum breadth ; semi-circular in form, and 24 feet 7ˆ2 inches in height. At the Bardonecchia portal, an elliptical arch is introduced to resist the greater strain caused by the different inclination of the strata, and the height is 11 inches greater than that of the Modane section. The side walls are eight feet six inches in thickness throughout the en¬ tire length of the tunnel, and with the excep¬ tion of 300 yards on the north side, are lined with brick and stone, while the side paths are paved with flagstones 20 inches in width. Dur¬ ing the first three years, the operations con¬ sisted of hand labor exclusively, but in 1861 and 1862 power drills were installed at the Bardonecchia and Modane ends, respectively. The drills employed were designed by Som- meiller, the chief engineer. They were of the percussion type, the operative power being com¬ pressed air. Gas factories and machine shops were installed at each end. During the boring process, many springs were tapped, the water from which found an outlet through the tunnel. This water was finally utilized to furnish the power for the air compressors operating the drills — the Italian engineer profiting by the suggestion of the invention by Bartlett in 1855, of a rock drill operated by air compressed by a steam engine. The air compressing apparatus was installed at the Italian end, the compres¬ sion approximating six atmospheres, derived from the hydraulic pressure from mountain streams and the water from the tapped springs. The same apparatus supplied fresh air at the rate of 2,000 cubic feet per minute, while the ventilation was accomplished partly by the

atmospheric drills, and partly by special venti¬ lating pipes eight inches in diameter, the blow¬ ers and exhausting bells being operated by powerful turbines. Gunpowder was exclusively used in the blasting operations, the charges be¬ ing fired by a magneto-electric apparatus in front of a movable bulkhead, which was ad¬ vanced as the work progressed, the detritus being subsequently removed by hand, by gangs of men 900 feet apart, working on scaffolds at various heights. The hauling was accom¬ plished by horses and small trucks. The credit of the work belongs to the three Italian en¬ gineers, Sommeiller, Grandis and Grattoni, whose genius surmounted the many obstacles which daily confronted its advance. The boring

of the tunnel was finished in 1870, and it was opened to traffic in 1872, equipped with a double-track railway and cost $1,100 per linear yard, a total expenditure of $15,000,000, and required 13ˆ4 years for the accomplishment of an engineering task, which was the greatest in its time. The entire undertaking was financed by the Sardinian government. It is an example of tunnel construction by the drift method.

Immediately following the opening of the ((Mont Cenisˆ for travel in 1872, a work of much greater magnitude was undertaken not only to make another connection beween France and Italy, but to connect the North Sea ports with those of the Mediterranean ; those of Bel¬ gium, Holland and Germany, with Genoa; and the Valley of the Rhine with that of the Po. The enterprise was too great for private indus¬ try or capital, therefore, in 1871 Italy, Germany and Switzerland voted large subsidies for the construction of a railroad to run from Lucerne, Switzerland, to Lake Maggiore, Italy, a dis¬ tance of 108 miles, 21 per cent or about 120,000 feet of which was to be tunnelled through mountains of granite. It was estimated that the work could be accomplished at a cost of 187,000,000 francs. An international treaty was signed; a stock company was organized with 34,000,000 francs of stock in 20 shares, and 68,000,000 francs of mortgage bonds. Italy gave 45,000,000 francs, and Germany and Switzerland each 20,000,000 francs. This esti¬ mate, however, was found to be too low by 102,000,000 francs, and caused a great many un¬ necessary delays in the work, which was finally completed at a cost of 289,000,000 francs ($57,- 800,000), of which $11,500,000 was expended on the Saint Gotthard tunnel alone, the location for which in spite of many undesirable topographical conditions was selected at the most central point of the Alpine range, on ac¬ count of the directness of the route thus ob¬ tained. The northern portal is situated near the little village of Goeschenen in the canton of Uri, Switzerland, from which the axis of the tunnel passes through the range under the lofty peak known as

Col de Saint Gotthard, and emerges from its southern portal near Airolo in the canton of Tessin, Italy, after traversing a direct distance of nine and one- quarter miles, and forms a part of the railway from Lucerne to Chiasso.

Unlike the case of its predecessor, the Mont Cenis, the tracing of its axis was beset by a great many difficulties, due to adverse topo¬ graphical conditions. The axis of the Mont Cenis was traced under the mountains by means of three astronomical observatories, one being established at a high elevation and equipped with a telescope that revolved in the vertical plane passing through the axis of the tunnel. From this station the position of the other two observatories were determined toward the en¬ trances, their telescopes placed in the same verti¬ cal plane, and the direction of the axis supplied to them whenever necessary. The direction of the Saint Gotthard was determined by care¬ ful triangulation ; the fine topographic maps of Switzerland forming an important and valu¬ able adjunct to the operations. Owing to the great elevation at which the tunnel was driven, that of the north and south portals being re¬ spectively 3,639 feet, and 3,757 feet above sea-

level, seven sets of helical or spiral tunnels, four on the Italian, between Giornico and Fiesso and three on the Swiss side, were constructed to bring the railway up to the great elevations of the portals. This system, designed by Hellwag, the engineer-in-chief, comprised a series of 100 tunnels in all, some of which are 6,000 feet or more in length, making the total dis¬ tance tunneled slightly less than 23 miles. Un¬ der these conditions, the trains enter the foot of the mountains and by winding about through the spirals within its bowels, emerge along its sides a couple of hundred feet higher up at each lift until the entrance to the main tunnel is reached. The travelers are thus afforded suc¬ cessive views of the magnificent Alpine scenery from various altitudes, passing within a few hundred yards of Rutli, Biirglen, Altdorf and other spots made famous by William Tell, and

ally. The force of laborers numbered 3,500 all Italians, while the officers were Swiss and Germans. The men were paid from three to six francs per day of eight hours' work, and had to board themselves. Under these cir¬ cumstances the poor food with which they sup¬ plied themselves contributed greatly toward the enormous death rate. Favre (Swiss) was the head of the firm of contractors. The cross sec¬

tion dimensions of the boring is similar to that of the Mont Cenis, and is lined throughout with masonry 18 to 20 inches in thickness. It is equipped with a double-track railway, and re¬ quired nine and one-half years of labor for its construction, which was commenced in 1872 and completed in 1882.

The third great Alpine tunnel, the “Arlberg,® forms a part of the Austrian railway between Innsbruck and Bludenz in Tyrol, which con-

LACO/m&A

SUMMIT 2310 FT.-

(LEVEL)

GRADE- “2 PER t00°

BOUNDARY

3

SWISS PORTAL £

(NORTH END) CO

2250 FT.

SEA LEVEL MILES 0

MONTE LEONE 11671 FT. ABOVE SEA LEVEL.

SWITZERLAND j I T A LY/\ “(about / nil eit Y of tunnel)

HIGHEST POINT OVER TUNNEL-

5.94

ITALIAN PORTAL

(SOUTH END) 2078 FT.

SEA LEVEL 12.40 MILES

PROFILE SECTION: SIMPLON TUNNEL.

through the intricacies of the rugged Axen- strasse. Salient facts relative to the construc¬ tion of this tremendous piece of engineering may be briefly stated as follows: The work was prosecuted under the

Belgian system, main heading; rock drills being operated and ven¬ tilation accomplished by water power exclu¬ sively. At the Swiss end, 1,220 horse power was derived from the Reuss River by means of four horizontal impulse turbines, and at the Italian end, 1,220 horse power, from the com¬ bined heads of the Tessin and Tremola rivers, by means of six turbines of the same type. These turbines working in pairs, drove groups of Colladon air compressors, which supplied 1,000 cubic yards of air per hour at a com¬ pression of seven to eight atmospheres, equal to 100 horse power, delivered at the drills, which, when exhausted, equaled 8,000 cubic yards of fresh air per hour. Dynamite was exclusively used in the blasting operations, being considered cheaper and safer than nitro¬ glycerine. At first the arrangements for venti¬ lation were very inadequate, and combined with a lack of proper sanitary and hygienic regulations, resulted in a great loss of life. The application of the injector system of venti¬ lation, invented by Signor Saccardo, engineer of Bologna, rectified these conditions materi-

nects westward with the Swiss railroads, and southward with those of Italy. It penetrates the Alpine watershed between the Rhine and the Danube, from Saint Anton to Langen, a distance of 10.25 kilometers, about six and one-third miles, its axis passing 1,594 feet under Arlberg Pass. The eastern and western portals are respec¬ tively 4,277 feet and 3,985 feet above sea-level, with the summit at an elevation of 4,301 feet. Its construction was begun in 1880 and com¬ pleted in 1883, at a cost of $7,500,000. Passen¬ ger trains pass through the tunnel in about 25 minutes.

Many schemes to connect Switzerland and Italy by a railway near the Simplon Pass had been in contemplation for several years. In 1881 the Jura-Simplon Railway advanced the scheme of piercing the Alpine barrier by a tun¬ nel, which entering the base of Monte Leone at a short distance above Brigue, situated on the Switzerland side, on the left bank of the Rhone, and passing under the lofty mountain range, would emerge at Iselle on the Italian side, the distance to be traversed being somewhat over 12 miles. . Since the days of the Roman Empire, the Simplon Pass has been the trade route be¬ tween Milan and the flourishing cities of the Valley of the Rhone. For more than 2,300 years it was the great highway of trade and travel

between southern and northwestern Europe. Over it, Hannibal led the

conquering armies of Carthage, and, later, Caesar his legions, when he laid the foundations of the Roman Empire. In modern times the Jura-Simplon Railway has run its trains along the same route, although laboring under the almost prohibitory difficulties of excessive grades and the long distance com¬ pelled by the ruggedness of the rock formation on the Swiss side of the frontier. The Swiss and Italian governments considered the scheme proposed by the Jura-Simplon Railway Com¬ pany favorably and undertook its financing jointly. The Swiss government entrusted the work of construction to the Baugesellschaft fuer Simplon-tunnel, Brandt Brandau and Com¬ pany extending to it a credit of $13,000,000, stipulating that the entire work should be com¬ pleted in five and one-half years, the limiting date being stated as 21 May 1904. For each day that the work was finished prior to that date the company was to receive a premium of $1,000, and for each day of delay subsequent to that date it was to be fined a similar amount. The price named, however, was greatly ex¬ ceeded, the actual cost finally amounting to $15,- 700,000 ; the additional payment and the exten¬ sion of time for completion being agreed to by the governments interested, on national grounds as well as in due recognition of the many un¬ expected difficulties that confronted the con¬ tractors and caused unavoidable delays. For example, although the advancement of the tun¬ nel averaged between 500 and 700 feet per month, an advance of only 50 feet was made during the first three months of 1902, the work being retarded by the tapping of many springs and by the occurrence of numerous rock-slips.

The first blast in the work of boring was fired 21 Nov. 1898, the operations being carried on simultaneously at both the Swiss and Ital¬ ian ends. In order to avoid the excessive freight rates compelled by the expensive opera¬ tion of the traffic over the inclines of the Saint Gotthard, as well as for the purpose of making it an express route operating fast-train service, the altitude of the tunnel was kept as low as possible, although it might have been driven at a much higher level with an enormous saving in the cost. The Swiss end has an altitude of 2,250 feet and the Italian end 2,076 feet above sea-level, while the summit of the tunnel, where the ascending gradients from each end meet, has an altitude of 2,310 feet.

This tunnel, unlike the other transalpine bor¬ ings, which are single passages equipped with double tracks, consists of two parallel tubes or twin passages, each 16ˆ2 feet wide, separated by a distance of 55.7 feet between their axes, each passage being equipped with a single track, thus permitting of travel in both directions at the same time. It is straight throughout its entire length with the exception of a short

curve at each extremity, so that the new railway running from Brigue and gently ascending the valley of the Rhone for a distance of one and one-fourth miles, enters the tunnel on a right curve of 1,050 feet radius. The straight portion of the tunnel begins at a distance of about 460 feet from the entrance, extends a distance of 12jˆ miles, at an obtuse angle with the Rhone Valley in Switzerland and the Val Vedro in Italy, and emerges on a left curve of 1,311 feet radius, above the banks of the Diveria River, on the

Italian side. It has rising gradients of two per 1,000 from the Swiss side and seven per 1,000 from the Italian entrance, the summit of the tunnel or the meeting point of the gradients being at a distance of 5.944 miles from Brigue, at an altitude of about 2,310 feet above the level of the sea, and about 7,000 feet below the crest of the mountain between the Furggen- baumhorn and the Wasenhorn. The two pas¬ sages are connected by transverse galleries or cross-headings at intervals of 660 feet, thus facilitating ventilation and problems of trans¬ portation. At the summit the transverse gal¬ lery is excavated to double width and affords room for the central station located at that point.

The working force numbered 1,000 men, di¬ vided into three shifts on the eight-hour basis, so that the work was carried on continuously day and night during the entire period of over six years. These laborers were all Italians, the Swiss having no adaptability to the work of blasting rocks and removing debris, thousands of feet below the snow-capped mountain ranges or the verdant hills upon which they tended their herds and crops. This small army of workmen was comfortably located in well- arranged quarters which were erected across the river near the Swiss portal, and every neces¬ sary precaution was taken to protect their health and keep them in a fitting condition to prose¬ cute their labors. The many fatalities conse¬ quent to a lack of these precautions in the con¬ struction of the Saint Gotthard afforded an example by which the Simplon management profited greatly. At the Swiss end they estab¬ lished a fine hospital with facilities for treating emergency and contagious cases. Sanitary and hygienic regulations were strictly enforced. When a shift of laborers was relieved and came out of the hot workings in the tunnel, each man was required to take a bath at once, before being exposed to the keen Alpine atmo¬ sphere, and he was required to hang his damp working clothes in a drying room, and put on another suit while he was off work. As the Simplon boring was executed at a depth rang¬ ing from 5,000 to 7,000 feet below the surface of the mountains, about 50 per cent deeper than had ever been required previously, the en¬ gineers were compelled to devise means to ameliorate the resulting conditions of torridity, in

which the temperature frequently rose to 110° F. These conditions were modified by pumping cold water from the outside into the boring through pipes pierced with small holes, so that the water fell upon the laborers like a fine rain or drizzle, and through this liquid veil the fresh air was forced and cooled to a bearable tem¬ perature. The general refrigeration was ef¬ fected by means of 34,118 feet of 9.96 inch piping from each end, connected to four re¬ frigerating appliances of 71 heads and 11 jet sprays placed at intervals along the boring, so that the spray would bathe all the sides of the headings in the ' neighborhood of rock heated to a temperature by infiltration from hot springs, the waters of which were of a parboil¬ ing temperature and often exceeded 112° F. The plan of carrying away the hot water to some point where its effect would not cause the same local inconvenience was uniformly pursued, but only partially prevented the heat¬ ing of the air, although the greatest care was

taken to insulate the pipes both from hot and cold radiations. Ventilation was accomplished with the aid of the auxiliary tunnel, No. 1. It is to be understood that of the twin passages, the one designated as No. 2 was completed first, that is, enlarged from the heading to its ulti¬ mate dimensions, passage No. 1, at first being carried on with much smaller dimensions, and forming an important adjunct in the system of ventilation. The compressed air for this pur¬ pose and for operating the compressed air loco¬ motives was carried through tunnel No. 1, to the headings through pipes varying from 1.18 to 1.97 inches in diameter; air valves on the main at various points enabling the recharging of the locomotives. When the heading face was some distance in advance of one of the transverse gal¬ leries cool air was supplied to a nearby point through a light sheet-iron pipe carried imme¬ diately below the roof of the heading. At inter¬ vals a connection was formed between the hy¬ draulic pressure main running along the floor of the heading, so that a jet of air was forced into the overhead pipe under a pressure of about 78 atmospheres, inducing a strong current in the pipe which was conducted right up to the face. The water was collected in and drained off a number of siphons placed at intervals along the air main. During the last two years of the work compressed air locomotives were exclusively used at the Swiss end as the use of horses for switching the spoil trucks at the headings was made impossible by the heat of the tunnel. An important feature of the entire work was the fact that no possible advantage that could be derived from transported hy¬ draulic force was neglected.

The water dis¬ charged from the tunnel from tapped hot springs and infiltrations amounting to 50 or 60 gallons per second was utilized to operate the ventilator turbines, as also the return water pumped into the tunnel for power to drive the rotary drills and for purposes of refrigeration.

The rock-boring work was accomplished with an hydraulic perforator, a machine consisting of a hollow steel stem, two and three-fourths-inches diameter, carrying on its end the three tempered cutting points. It was operated by a hydraulic engine with a pump pressure ranging from 80 to 120 atmospheres, representing an available force of 22,000 to 26,000 pounds. Dur¬ ing operation water was constantly forced through the hollow stem, and while washing away the debris tended to keep the teeth cool. The teeth biting into the rock wore it away at the rate of about one-third an inch per revo¬ lution, the number of revolutions varying from four to eight per minute according to the hard- hess of the rock. From 10 to 12 machines were in operation at each end of the tunnel from the start. When the drills had penetrated to the depth of about five feet they were withdrawn, the dynamite was inserted and fired and the spoil cleared away.

Perhaps the greatest of all of the difficulties encountered in the prosecution of this work was the influxes of hot water, first on the Swiss and later on the Italian side. Professor Schardt, the official geologist, estimated that the tunnel discharged one billion cubic feet of water dur¬ ing its construction. At times the boiling springs tapped converted the boring into a veri¬ table canal, forcing a suspension of operations

for months at a time, until the water was got¬ ten under control, pumped out and the walls of the tunnel sufficiently cooled by sprays of ice- water to allow the men tb resume work. Even then they had to be sprinkled constantly with ice water to enable them to withstand the deadly temperatures. These conditions forced the abandonment of the operations on the Swiss side at a point about six miles distant from the entrance, the necessity for the suspension of operations being materially augmented by a landslide which occurred at Moerel, a point on the Rhone, a short distance above the intake of head-water which supplied the hydraulic force for the power station at Brigue. The work was then carried on from the Italian end and ad¬ vanced regularly at the rate of about 16ˆ4 feet per day, until 6 Sept. 1904, when a gigantic boiling spring was tapped which discharged into the tunnel a stream of water with a tempera¬ ture of 113° F. at the rate of 1,600 gallons per minute. The rock temperature was forced up to 108° F., and the work had to be stopped until a transverse gallery could be

constructed to join the two southern passages so as to allow the hot water to flow out of the main passage through a lateral canal along its walls. The temperature was cooled by jets of ice cold water, and after a delay of three months, dur¬ ing which the work of enlargement was accom¬ plished, the heading was pushed forward re¬ sulting in a junction of the northern and south¬ ern tunnels 24 Feb. 1905, allowing the immense volume of water which had accumulated in the headings of the abandoned north tunnels to flow down through the main south tunnel into the Diveria River.

The machinery installed at both ends of the tunnel was mainly of European manufacture. It consisted of four-stage high-lift centrifugal pumps and hydraulic turbines at the power stations, centrifugal pumps driven by Pelton wheels in the swamped portions of the tunnels; duplicate 12ˆ-foot ventilating fans, which will continue to serve all the requirements of the tunnel under operative conditions, driven by two 200 horse-power hydraulic turbines. High- pressure plunger pumps in connection with the hydraulic accumulators, each pair of pumps be¬ ing driven by a Pelton wheel, supplied cold water to 16 Brandt hydraulic borers working at both ends of the tunnel, four at each heading face. The high-lift refrigerating centrifugal pumps were run in series at 950 revolutions per minute, under a pressure of 370 pounds per square inch and supplied water to the re¬ frigerating plant at the rate of 18.21 gallons per second. The refrigerating conduit also fur¬ nished power for fo.ur ejector pumps and six portable fountain heads located in the traversing galleries. In the beginning steam locomotives were employed for hauling, and steam engines were kept in reserve to be used in case of the failure of the water power; but as the work ad¬ vanced compressed air locomotives were used exclusively at both ends of the borings. The air compressors had a capacity of two and three cubic meters of free air per minute and com¬ pressed air into a reservoir of the tubular bat¬ tery type. The machinery installations at both ends of the tunnel were identical.

A very clear idea of the difference in the amount of time and labor consumed in the bor-

ing of ancient and modern tunnels may be ob¬ tained by comparing the Roman tunnel bored for the purpose of draining Lake Fucino with the Simplon. The former, begun in the reign of Julius Caesar, was completed during that of Claudius 52 a.d. It was three and one-half

miles long and passed under the Palatine at a maximum depth of 400 feet. Its construction involved the sinking of 40 vertical shafts and many inclined galleries, requiring the labor of 30,000 men during a period of 11 years. It was the most celebrated work of its kind at that time and still remains in an almost perfect state of preservation.

On the other hand, the Simplon tunnel with its twin passages 12*4 miles in length, repre- sening 2414 miles of boring, at a depth often exceeding one and one-quarter miles below the surface, required the labor of 1,000 men during a period of about six and one-half years. The Fucino tunnel has a normal cross section 10 feet high by 6 feet wide ; with the appliances used in the work of the ((Simplon® it could have been easily bored in six months.

Another important European tunnel was completed in 1916 despite the war. It is known as the Rove tunnel and runs from l'Estaque, France, to make way for a canal from Mar¬ seilles to the Rhone River. It is four and one- half miles long, 72 feet wide and 47 feet high, and it is wonderful that the French were able to complete it at such a time.

In 1906 work was begun on a tunnel under the Loetschen Pass from Bern to Brig, Switzer¬ land. It is nine miles long and was opened in the summer of 1913. Other long Swiss tunnels are those at Cote d'Or, begun in 1915, and the Jura tunnel between Munster and Grenchen, the latter five and five-eigths miles.

The only American tunnel previous to 1900 comparable to the transalpine borings already described is the Hoosac tunnel on the line of the Fitchburg Railroad, between Troy, N. Y., and Greenfield, Mass. It is driven through a southern spur of the Green Mountain range, known as Hoosac Mountain, and is 25,037 feet (four and three-fourths) miles in length. Its construction was begun in 1855 and com¬ pleted in 1873, the masonry work requiring several additional years. During this period the work was suspended many times on account of a lack of funds and the natural obstacles en¬ countered. Where the rock is solid, it is 20 feet high and 24 feet wide, but wherever arch¬ ing was necessary these dimensions are some¬ what greater. The work was carried on by four headings, one from each end and two from an intermediate shaft 1,028 feet in depth; modern tunnel boring methods, involving the use of electricity, nitro-glycerine, air compres¬ sors and power rock drills and marking their first introduction in America. It has an ascend¬ ing gradient of 26 4/10 to the mile, is equipped with a double railway track and cost a little less than $11,000,000. Slightly longer is the Rogers Pass tunnel (26,400 feet) on the Canadian Pacific Railway in the Selkirk Mountains of British Columbia. It is 24 by 29

feet, concrete lined. What will be the longest American tun¬ nel is the Continental Divide, being cut under the Rockies for the Denver and Salt Lake Rail¬ road, six and one-half miles in length. The longest up to the date of opening (1909) was

the Gunnison in southwestern Colorado, six miles in length.

The lengths of some of the other important mountain tunnels in various parts of the world are as follows : the <(Giovi® on the Genoa-Ronco Railway, 8,260 meters (about five and one- sixth miles) ; the <(Marianopoli,® on the railway from Catania to Palermo, in Sicily, 6,840 meters (about four and one-quarter miles) ; the <(Sutro® in Nevada, 6,000 meters (about three and three-fourths miles) ; the ((Standridge,® be¬ tween London and Birmingham, 4,970 meters (a little more than three miles) ; the <(Nerthe,® between Marseilles and Avignon, 4,620 meters (a little more than two and three-fourths miles) ; the <(Pracchia Tunnel,® on the main railway line between Florence and Bologna, through the Apennines, comprising 52 tunnels with heavy gradients — 25 per 1,000 through¬ out, the several tunnels varying in length from 3,000, 6,000 to 9,000 feet, characterized by very poor ventilation, which was finally improved by adopting the Saccardo system, which was here applied practically for the first time. The <(Bilbo® in Italy, 4,240 meters (a little over two and one-half miles) ; the (

The most notable of the many other exam¬ ples of mountain tunnels are : the (

sulphur mines at Schemnitz, Hungary. It was begun in 1782, the time required for con¬ struction being estimated at 30 years and the cost at 1,215,000 florins. The progress of the work, however, suffered a great many delays and it was not completed until 1878, the total expenditure amounting to 4,599,000 florins. It is 9 feet 10 inches high, five feet two inches wide and is the longest mining tunnel in the world, having a length of 10 V\ miles. The <(Kojak,55 forming a part of the Northwestern State. Railway of India, about two and one-half miles long, and completed in 1891. The <(Tequixquiac,55 a boring 14 feet in diameter, driven through sandstone for the purpose of draining the Valley of Mexico. It is six miles long and cost $6,760,000. The drainage works designed to improve the sanitary condition of the City of Mexico and prevent the inundation of its streets, for long

periods at a time, by the overflow from Lake Texcoco and the con¬ sequent loss of thousands of lives, were begun during the latter part of the 16th century. Up to 1789 the work was of an intermittent char¬ acter, cost many thousands of lives and many millions of dollars. From 1789 to 1830 the effort was more sustained and systematic but, although $8,000,000 had been expended, and the city protected from the inundations, its position in the bottom of a basin without natural drain¬ age, with the artificial drainage canal inade¬ quate in depth owing to its being controlled by the level of the lake which was but slightly lower than that of the city, continued to keep it subject to virulent epidemics of malaria. The new works, gigantic in character and ranking with the greatest of modern engineering accom¬ plishments, were begun in 1885 and completed in 1900, with a total expenditure of $20,000,000. These works consist of a complete sewerage system within the city; a system of sewers to control the overflow of the entire valley; a canal 43 miles long, connected with the sewer¬ age system, at the Saint Lazaro gates, by which the sewage of the city, its waste waters and the waters of the valley are conducted to the tun¬ nel, thence to a river emptying into the Gulf of Mexico.

The <(Graveholz,)5 on the Bergen Railway in Norway, about three and one-third miles in length, and the Yanagase Zama forming a part of the Tsuruga-Nagahama Railway in Japan.

Two London river tunnels deserve mention. The Blackwell tunnel under the Thames is a mile and a quarter in length, but only 3,088 feet are under the river, 1,370 feet are roofed over and the remainder of the length is com¬ posed of the open-cut entrances. It was driven with a 28-foot shield and built of great cast- iron rings steadied with cement. The Rother- hithe under the Thames is about the same size.

New York River Tunnels. — This article would not be complete without reference to the great under-water tunnels constructed around Manhattan Island during the opening years of the century. The greater part of New York city lies on Manhattan Island and to afford easier railway communication from all sides a series of very difficult under-river tubes was planned and built. The four largest were built by the Pennsylvania Railroad Company, to bring its traffic into New York from Jersey City and to carry it over the East River to Long Island. The Hudson and Manhattan Railroad system

built four under the Hudson for passenger communication between New Jersey and New York, affording an outlet for the passengers of the Lackawanna and Erie railways and also for Pennsylvania passengers from Newark and local points. The pair of Belmont tunnels

was constructed to connect Long Island City with New York and open up Queens County to de¬ velopment. The Rapid Transit tunnels run from the Battery in Manhattan to Joralemon street, Brooklyn. Two other pairs of tunnels are under construction to join Manhattan and Brooklyn. No other great city was ever so thoroughly honeycombed by tunnels. See New York City; Tunnels, River and Lake.

Bibliography. — For further detailed in¬ formation consult Drinker, (Paris 1889) ; Danino, (Gallerie della traversata dell' Appenino, nella linea Fog- lio> (Rome and Naples 1875) ; Prelini, (Tun- neling) (New York 1901) ; Simms, (Practical Tunneling) (New York 1896) ; also the fol¬ lowing works describing tunnels: Von Rosen- burg, (The Vorburg Tunnel5 (New York

1887) ; Walker, (The Severn TunneP (London

1888) ; Burr, (Tunneling Under the Hudson River5 (New York 1885) ; Sutro, (The Sutro TunneP (New York 1887) ; Cochrane, (Modern Industrial Progress) (Philadelphia 1905) ; Stauffer, D. M., (Modern Tunnel Practice5 (New York 1911) ; Brunton and Davis, (Modern Tunneling5 (1914). See Subways; Tunnels and Tunneling.

TUNNELS, River and Lake. Hudson- Manhattan Tunnels. — These are frequently termed the McAdoo tunnels. They consist of two separate sections of sub-aqueous tubes : (1) The twin tubes which run from the Hoboken, N. J., terminus of the Delaware, Lackawanna and Western Railroad crossing the Hudson River to below Christopher street, New York City, and running to 6th avenue, thence uptown to 32d street. (2) A pair of tunnels driven from the terminal of the Pennsylvania Railroad in Jersey City across the Hudson, entering New York City at Cortland street.

Haskins Tunnel. — The early history of the up-town twin-tunnels under the Hudson River is a tragic one. D. C. Haskins, a west¬ erner of wealth, conceived the idea that the Hudson River could be crossed by a tunnel formed by boring in the bed of silt deep below the surface, maintaining an air pressure in the heading equal to the hydrostatic head outside and retaining the excavated space by insertion of a series of iron rings as fast as the boring progressed. Work was commenced in 1874 from the New Jersey side; it was the first attempt to tunnel the Hudson River. A shaft was sunk to 54 feet below mean high water, an air lock was built and the regular tunneling began with an air pressure of about 18 pounds at the shaft, increasing to 36 pounds at 1,600 feet distance. After carrying this north heading a quarter of a mile, the south tunnel was started. Then the New York end was commenced

with sinking a timber caisson to a depth of 56 feet below high water. Blow-outs occurred with flooding and letting in of silt, which ended in a serious blow-out in 1880, cutting off the escape of the

excavating crew and drowning 20, thereby end¬ ing operations. In 1888 S. Pearson and Son of England took up the contract, and the shield method of driving was used, but financial troubles closed out operations till 1902, when the plant and franchise were acquired by the New York and New Jersey Railroad Company, who renewed the effort. In 1905 the Hudson Company obtained the tunnel interests and the operation became part of what is known as the McAdoo System.

McAdoo Tunnels. — With the amalgamation of the New Jersey Railroad Company and the Hudson-Manhattan Railroad Company in 1903, the McAdoo System started in operation. Leaving out consideration of the great ter¬ minal and other works, the great tunneling feat alone is featured here. The overcoming of the many very difficult engineering problems was placed under the management of Charles M. Jacobs and J. Vipond Davies, and they deter¬ mined on the employment of compressed air as a medium for operating drills, shields and all mechanism used in construction. On the Jersey City side the former shield service was used with certain necessary changes, such as heavy hood or apron to protect the workers. Pressure of 33 pounds was carried, as the upper stratum of the tunnel was of silt. Blow¬ outs were closed with clay blankets supplied from scows waiting in readiness. The shield was driven by hydraulic jacks with 2,500 tons aggregate thrust to make passage through the silt, thus making excavation unnecessary. A rock reef at one time was struck that reached 16 feet above the bottom of the space to be tunneled, the upper part being of clay so fluid as to slip into the pockets of the shield. Gi¬ gantic blow-pipes supplied with fuel from tanks of kerosene were used to bake the clay to suffi¬ cient hardness as to permit the excavators to work on the rock beneath. The tunnel diameter of 15 feet 3 inches was lined with cast-iron plates bolted together in circular section. The greatest engineering feat in this great under¬ taking was the construction of the tunnels at the junction of the Christopher street, 9th street and 6th avenue, New York City. At this point two tunnels run east under 9th street and two north under 6th avenue. Overhead here were the surface car lines of the Metro¬ politan Street Railway, and above this the Elevated railroad, both in operation. An arch, to accommodate two tubes approaching from the

south and four tubes diverging east and north had to be constructed with 68 feet maxi¬ mum width, and the soil was a (

menced in 1905 and opened for traffic oper¬ ation in 1909. These consist of two tubes 5,950 feet long and 15 feet 3 inches inside diameter. As to the land sections of the Hudson-Man¬ hattan tunnels, one connects, by two single- track tubes, the Hoboken terminal with the Jersey City Pennsylvania Railroad station, run¬ ning parallel with the Hudson River. This was completed in 1911. Another land subway con¬ nection runs from Morton and Christopher streets to connect with 33d street, running along 6th avenue. This was opened to the public in 1910 and was constructed with shield to 12th street, then cut-and-cover to 33d street.

Cleveland Water Works Tunnels. — This tunnel is under Lake Erie and is a three-mile sub-aqueous tunnel driven by hydrualic shield and lined with concrete blocks. The character of the soft ground permitted a speed of 886 feet in one heading. The soil met with was stiff clay, free from runs. But accumulations of marsh-gas made hazards of explosions equal to those in coal-mining, and necessitated coal¬ mine methods of precaution. The land head¬ ing carried the longest continuous compressed- air section recorded — 14,000 feet finally. Ir¬ regularities in advancing the shield (due to inadequate survey force) took the workers 180 feet out of alignment and out of grade line 6 feet above and below. When the two headings were approaching to about 1,500 feet of each other an expert survey was made and a (

Astoria Gas Tunnel. — This New York tun¬ nel is 4,262 feet long. It extends from the Astoria plant of the Astoria Heat, Light and Power Company, opposite Hell Gate to the 132d street distributing station in the Bronx. It is run at a depth of 225 feet. The Astoria shaft is 34 feet 6 inches in diameter, 279 feet 9 inches deep, while the Bronx shaft has 26 feet diameter and is 233 feet deep. The total length of tunnel with shafts is 5,171.79 feet. It has a D-shaped cross section with bottom slightly

concaved; the excavated section was 19 feet 9 inches wide and 21 feet high. Shafts and tun¬ neling are lined with concrete from 18 inches to 36 inches thick. The lining in the tunnel is reinforced with steel rods where bad ground is met. Inside cross section of completed tun¬ nel is 16 feet 9 inches wide and 18 feet high. The stratification met with was

Fordham gneiss at terminals and Inwood dolomite between. Ground was broken 12 Sept. 1910, and tunnel was finished in 1914. It carries two 72-inch gas mains and is provided for two more. In re¬ moving the remaining 122-foot bench to finish the excavating, in July 1913, a great rush of water was struck. The serious difficulty was overcome by covering the entire west side of the exposed bench by a series of concrete bulk¬ heads and buttresses. But a rush of water near an emergency bulkhead that had been erected flooded the tunnel. Grouting till 8,850 bags of cement had been injected at a pressure of 400 per square inch sealed the leak, when the tunnel was pumped out after a delay of 102 days.

Detroit River Tunnel. — This tunnel was

projected to carry the main line of the Michi¬ gan Central Railroad under the Detroit River across to Winsor, Can. Its sub-aqueous sec¬ tion is a twin tube 2,625 feet in length extend¬ ing from a shaft back of the dock line on the Canadian side to one similarly situated on the Detroit shore. The Detroit side approach is a double track parallel to the main lines for 1,540 feet to the portal of a twin-arch approach tunnel 2,135 feet in length. This latter has a 2 per cent grade under yards and tracks. The Canadian approach contains 2,900 feet of open cut and 3,600 feet of twin-arch tunnel all on 1.5 per cent grade. The two sub-aqueous tubes are circular with a diameter of 20 feet. They have a continuous %-inch steel plate shell 23 feet 4 inches in diameter enclosing a lining of 1 :2 :4 concrete, 20 inches thick. This concrete is reinforced by 1-inch longitudinal rods 18 inches apart on centres in a concentric circle. A concrete mass 1 : 3 : 6, 55 feet 8 inches wide at top and 30 feet 10 inches deep surrounds the tubes. This produces a continuous monolithic tunnel of two tubes having a diameter of 20 feet. The method of construction consisted of dredging a trench in the river's clay bed. The twin steel shells, which were constructed on the shore in 11 bulkheaded sections were floated to position and sunk separately, then connected by special joints. The concrete coating was de¬ posited through tremies from a scow filling a form surrounding the shell sections. The water was next pumped out from each section and the 20-inch concrete lining was placed while other sections were being sunk. This process eliminated working in compressed air and has given much satisfaction. The sections of tubes are reinforced every 12 feet by vertical trans¬ verse diaphragms of %-inch plates, stiffened at the diagonals and outer edges with 3 1/2 by 3ˆ2- inch flange angles. Each section of the tubes received a 5-foot deep temporary bulkhead at each end before floating, affording a 10-foot space between the sunken sections and a man¬ hole admitted a diver from the outside. The twin-tube sections were constructed on ways at the Great Lakes

Engineering Company's ship- 3'ard 40 miles from their destination. They weighed about 550 tons and had a length of

262.5 feet. One section for closing was 64.5 feet long and weighed about 130 tons. The sections were towed by tugs from shipyard to tunnel site, requiring about 12 hours each. The trench in the river had a 48-foot bottom and a depth of from 22 to 40 feet. The first tube section was sunk 3 Oct. 1907, and the last dur¬ ing the fall of 1909.

Catskill Aqueduct. — This is a tunnel con¬ struction for supplying New York City with water conveyed from the Catskill Mountains. It is claimed by many experts as the most stupendous engineering project ever completed, even including the Panama Canal. It carries the water from the mountains to Staten Island a distance of 120 miles, and adds a capacity of 375,000,000 gallons per day to the New York City supply, and reserves a supply sufficient for a series of years of drought. The tunnel taps the great artificial Ashokan Lake which is fed by the Esopus Creek. It extends 92 miles from the reservoir to the northern boundary of New York City and continues 35 miles within the city limits, including the branch to the borough of Queens, Kensico storage reservoir, Staten Island, etc. The water supply is on a gravity system, free from pumping. The conduit of which the aqueduct consists is made up of several types, plain Portland cement concrete constructed in trenches then covered with earth ; grade tunneling, pressure tunnels and steel-pipe syphons. Of the first is 55 miles construction having horseshoe section 17 feet high by 17 feet wide inside, composed of concrete without steel reinforcement and covered with earth em¬ bankment. Being the least expensive type this was used as much as the conditions permitted. Of grade tunnels there are 24 (14 miles in all) horseshoe shape, 17 feet high, 13 feet 4 inches wide. To cross broad, deep valleys circular tunnels were driven in the rock (where suitable) and lined with concrete. There are seven pres¬ sure tunnels of a total of 17 miles and a diame¬ ter of 14 feet. The connection of the pressure tunnels with the adjacent aqueduct portions is made (with one exception) by shafts. This ex¬ ception is the Bryn Mawr steel-pipe siphon and Yonkers pressure tunnel. The tunnel through the city is also a pressure tunnel 18 miles long. For cleaning, repairs, etc., drainage shafts are furnished each pressure tunnel to unwater the same. The Hudson River is crossed in a tunnel excavated through granite 1,114 feet below sea- level connecting with a shaft at Storm King Mountain on the west bank and another shaft at Breakneck Mountain on the eastern bank of the river. Where the rock is insufficiently sound in valleys steel-pipe syphons were used instead of pressure tunnels. The pipes were constructed of 7 1-16-inch to %-incn steel plates rivetted together. The inside is lined with two inches

of cement-mortar, and the tunnel is enveloped with concrete and covered with an earth em¬ bankment. There are 14 of the siphons with an aggregation of six miles. The cost of the Cats¬ kill water supply system, when completed, in¬ cluding surveys, real-estate, construction, en¬ gineering, general supervision and all items ex¬ cept interest on bonds will be $177,000,000, which will include the Schoharie addition.

New York Rapid Transit Tunnels. — The East River tunnels consist of four twin-tube tunnels, as follows:

1. Old Slip Tunnel. — From Manhattan to

Clark street, Brooklyn. This creates the Brooklyn connection for the <(Seventh Avenue- Broadway® or west side line of the Interbor- cugh Rapid Transit Company's system. The bore between shafts is 3,799 feet long, with the land tunnel on the Manhattan side 355 feet long and that on the Brooklyn side 1,750 feet long. These tubes afford a single track totaling 11,- 800 linear feet. On the Manhattan side the tunnels passed through a section 975 feet long consisting of mica-schist in bottom and sand in the top of the tunnel. Under the centre of the river they passed through gneiss for a length of 470 feet. The rest of the tunneling was through . soft material, mostly sand and fine gravel, with bowlders on the Brooklyn side. At the lowest point the tops of tubes are 71 feet below mean high water. But in places the natural cover over the tubes is nil. Here the former experiences with clay blanketing proved invaluable. Clay was dumped from the river surface to provide the necessary cover. Clay blanket process was used elsewhere to prevent <(blow-outs.® The lining consisted of standard bolted cast-iron rings 26 inches wide. Outside diameter of tunnel is 17 feet 6 inches. In rock inside diameter of iron is 16 feet 4 inches and a net clear diameter after concrete lining of 15 feet 4 inches. In soft ground heavier iron is used, giving 16 feet inside diameter of iron, and the net clear diameter of tunnel is 15 feet. In rock, the clear space outside the iron lining was packed with stone and grouted with Port¬ land cement. In soft ground, fine gravel and grout were forced out by compressed air to fill the void left by the passage of the shield. The shield was worked in compressed air under a maximum pressure .of 37ˆ2 pounds. Work com¬ menced January 1915, and tunnels were opened to traffic April 1919. Cost was $6,300,000, including the station in Clark street, Brooklyn. The chief difficulty encountered was

in tunnel¬ ing almost directly under the foundations of buildings in Clark street, Brooklyn, in loose sand and gravel. This was successfully over¬ come by careful breasting of the face, and by blowing gravel and cement grout under high pressure to fill the voids behind the tail of the shield. This stopped all ˆsettling,® hence¬ forth, of contiguous buildings.

2. Whitehall Street, Manhattan, to . Mon¬ tague Street, Brooklyn. — This tunnel will con¬ nect the Brooklyn Rapid Transit system on 4th avenue, Brooklyn, with the lower Broadway (Manhattan) line of the same company, now ip operation. The length of this tunnel be¬ tween shafts is 4,290 feet, the land tunnel, Brooklyn side, being 1,700 feet long. There are two (

were used as lining. Outside diameter of iron was 17 feet 2 inches and 18 feet. The latter was always used when a shield was employed. Inside diameter of iron was 18 inches less in earth and 14 inches less in rock. Clear diame¬ ter after placing concrete lining is in all cases one foot less than inside diameter of iron lin¬ ing. Outside the iron lining the same system of packing voids was used as in the Old Slip tunnel (see above). The excavation was car¬ ried forward by the medium of shield and com¬ pressed air; maximum pressure was 34ˆ2 pounds. Work commenced October 1914, and is nearly complete. Estimated cost is $5,750,- 000. In the course of the work the same diffi¬ culties were encountered as in the case of the Old Slip tunnel.

3. Sixtieth Street, Manhattan, Tunnel to Borough of Queens. — This tunnel will connect the Interborough Rapid Transit Company's elevated system in Queens, over which the Brooklyn Rapid Transit Company has operat¬ ing rights, with the Brooklyn Rapid Transit subway under lower Broadway (Manhattan), now in operation. Length of tunnel from 2d avenue, Manhattan shaft is 1,364 feet. From Manhattan shaft to Blackwell's Island shaft is 1,610 feet, and from Blackwell's Island shaft to Long Island City portal is 1,740 feet. The Long Island City approach is in cut-and-cover and elevated construction and 2,607 feet in length. This twin tunnel affords 14,642 linear feet of single track. The tubes run through 1,800 feet of mica-schist from 2d avenue, to the edge of the river on the Manhattan side, then through 700 feet of sand under the west channel of the East River, then through 1,200 feet of gneiss under Blackwell's Island, then through 600 feet of soft ground under the east channel of the East River, then through 400 feet of gneiss to the portal in Long Island City. At the lowest point (which occurs in the west channel) the tops of tubes are 98 feet below mean high water. At this point the tubes emerge from the natural river bottom, and tun¬ neling had to be

carried out through an arti¬ ficial clay blanket . 45 feet thick. Standard heavy cast-iron lining was used only where shield was used, i.e., in soft ground or unsound rock. The iron rings are of the same type as in the above-described Whitehall street tunnel. In sound rock a circular . concrete lining 13 inches thick was used, leaving a net maximum clear diameter of . 15 feet. Where light iron lining was used (in unsound rock), the clear space outside was packed with stone and grouted with Portland cement (as in former cases). In soft ground only enough grout was used to fill the space left at the sides of the tunnel to prevent flattening; no structural weight being overhead in soft ground portions, filling or grouting was unnecessary. The maxi¬ mum pressure used in shield work was 48 pounds. Work commenced August 1916 and was completed June 1919, but is not yet open to traffic; the cost was $4,230,000. The chief difficulty was the very high air pressure. This involved, at one time, 16 shifts daily. The men worked two 45-minute periods in the high pressure with a 5-hour interval.

4. East Fourteenth Street, Manhattan, to North Seventh Street, Williamsburg. — This tunnel connects the Brooklyn Rapid Transit Company's lines in Williamsburg (Brooklyn)

and East New York with a subway extending west under 14th street to 6th avenue, Man¬ hattan, with provisions for transfer of passen¬ gers to the Brooklyn Rapid Transit subway on lower Broadway, now in operation. Its length between shafts is 3,437 feet. The Manhattan land tunnel is 1,627 feet, and that on the Brooklyn side is 2,025 feet. These twin tubes afford a single track 14,178 linear feet long. The land headings are. entirely in soft ground, and the shield method with compressed air was used. The river tunnel proper (between shafts) will be in rock for about 2,300 feet and in sand and gravel for the rest of the distance — about 1,140 feet. At the lowest point the tops of the tubes are 97 feet below mean high water. The cover is ample except under the main ship channel near the Brooklyn side, where the tops of the tunnels emerge from the natural river bed, and there a clay blanket is used. The type of lining is same as described for Whitehall street tunnel (see above). About 1,100 feet of tube in sound rock will have no iron lining, but will be lined with a circular concrete lining 13 inches thick. Minimum clear inside diameter will be 15 feet. Filling of voids will be done on the same process as de¬ scribed in the case of Old Slip tunnel. Exca¬ vation is by shield in compressed air in soft ground; in rock without compressed air. Maximum pressure employed

was 39 pounds. Work commenced August 1916 and is not com¬ pleted. Land headings and soft ground shield excavation are complete from both shafts, and the headings in rock near the middle of the river were joined August 1919. Cost will be about $6,000,000. No unusual difficulties have been encountered.*

Harlem River Tunnels. — These connect the Lexington avenue subway with its exten¬ sion northward into the Bronx. Its construc¬ tion was carried out in substantially the same system as the Detroit River, Michigan Central tunnel described above. It consists of con¬ structing steel tube sections; floating them to site ; sinking into excavated river-bed trench ; adding concrete outer covering through tremies. The metal sections are next un¬ watered and inner concrete lining added. This system eliminates working in compressed air, except in the few cases where divers' work is needed. This tunnel consists of four tubes rigidly fastened together by diaphragms.. It was sunk in five sections, four of these sections being 220 feet long each and one 200 feet, or a total length of 1,080 feet. The diaphragms were spaced 15 feet and 7 inches apart and formed convenient pockets for placing the sur¬ rounding concrete. In the matter of joints a butt joint was used instead of the overlapping joints used in the Detroit work. Stiffening angles, which were used in the Detroit tunnels, were here placed outside. This saved much timber. This was a much easier engineering work than the Detroit tunnels, the distance being but 600 feet between the river bulkheads, and the top of the tunnel is only 7 feet lower than the original river bed. The Harlem River tunnels are 16 feet 6 inches in diameter inside

- Above stated costs are for finished structure without track and equipment except ducts on either side, embedded in concrete benches both sides of tubes, to carry electric cables,

the concrete lining, the interior walls having flat sides. The width of the finished structure is 76 feet and the height 24 feet 6 inches, in¬ cluding the surrounding concrete. The last section of tubing was sunk in September 1914.

The engineering of the New York subway tunnels was carried out under the direction of the Public Service Commission for the First District, State of New York. Mr. Alfred Craven was Chief Engineer during the incep¬ tion of these projects and is still active as con¬ sulting engineer. Mr. D. L. Turner became Chief Engineer April 1917. Mr. Clifford M. Holland was in direct charge of the work as engineer of the tunnel division. For bibliog¬ raphy see under Tunnels, Great Modern.

tunnel may be considered an underground or sub-surface passage of any form of cross-sec¬ tion most suitable for the purpose of construc¬ tion or for the purposes to be served after con¬ struction. It is ordinarily supposed to be con¬ structed without disturbing the natural material over it or around it, although in some modern engineering works true tunnels are constructed by first removing the overlying material by open excavation if on land, or by dredging if under water, then constructing the tunnels by suitable means and refilling over the completed structure. Tunnels are of all sizes as well as shapes, of cross-section and may be horizontal or inclined; indeed, a shaft may be considered a vertical tunnel. When tunnels are small and built ahead of the main structure or for subor¬ dinate purposes, as in mining, they are called headings or adits. Obviously, tunnels may be constructed for a great variety of purposes. They are commonly employed for railroad pur¬ poses, for the passage of foot and vehicular traffic under rivers as in the city of Chicago, for sub-surface transit purposes in large cities as in the city of London, to form aqueducts in great water supply systems, as for the city of New York with the 31-mile Croton aqueduct tunnel, for sewer purposes, and for serving other public conveniences in modern communities.

Ancient History. — The art of tunnel build¬ ing is one of the oldest of engineering pro¬ cedures. The ancient Egyptians built ex¬ tensive tunnels for tombs and temples, and nearly or quite the same thing was done in ancient India. The ancient Assyrians con¬ structed a tunnel under the Euphrates River, after having diverted its waters to another channel, the cross-section of which was 12 feet wide by 15 feet high. They also built other tunnels. The ancient tunnels were probably invariably built in rock or other hard material in which there was not suffi¬ cient water to give material trouble; there is no. record of a true sub-aqueous tunnel being built in ancient times. Methods adapted to tunnel excavations through soft material sat¬ urated with water have been developed only in comparatively recent times. The old Ro¬ mans were by far the greatest engineers of ancient times and they excelled all earlier peoples in their tunnel constructions as they did in all other constructions. The <(fire-set- tingˆ method of tunneling was due to them as was also the method of sinking vertical shafts at different points on a tunnel line to afford a greater number of points of attack

on the work. They built fires in their tunnels against the rock to be excavated, and, after heating it to the highest practicable temper¬ ature, suddenly chilled it by pouring water on it and taking advantage of the resulting soft¬ ening, cracking and disintegration. They were also aware of the advantage of using vinegar instead of water in this method of tunneling through calcareous rocks, thus taking advantage of chemical action as well as disintegration by alternate heating and chilling. Probably the longest of the old Roman tunnels was that built to drain Lake Fucino ; it was designed to have a section 6 feet by 10 feet. Forty shafts as well as inclined galleries were sunk for the construction of this tunnel 3ˆ miles long. The deepest shaft was about 400 feet. Most of the Roman tunnels were small, but they occasionally built large ones, like that for the highway in the Posilipo Hills between Naples and Pozzuoli, 3,000 feet long and 25 feet wide at the centre. The entrances are 75 feet wide and at the centre the height is 22 feet. Its general form, therefore, approximates the frustra of two cones with their small bases joined. This was for the purpose of concentrating the light in the central or less illumined portion.

In the Middle Ages. — Obviously the con¬ struction of ancient tunnels was excessively slow as well as laborious, although drills, chisels and even saws, fitted with hard cutting stones like corundum for teeth, were used even by the early Egyptians. Hammers and wedges were also employed. The first appli¬ cation of gunpowder of importance was prob¬ ably at Malpas, France, in 1679-81, in the con¬ struction of the tunnel on the line of the Languedoc Canal, 510 feet long, 22 feet wide and 29 feet high. The first stimulating de¬ mand for modern tunnel construction of any great amount began with the construction of canals in France and England during the last half of the 1 7th century, and all of those tunnels were either in rock or dry hard ground. It was not until after 1800 that tunneling through sand and wet ground was undertaken in sufficient magnitude to be regarded as a branch of engi¬ neering construction. A tunnel for the Saint Quentin Canal in France was built through soft soil in 1803. The width of this tunnel was 24 feet, and timbering including struts and plank¬ ing was used to support the walls, and sides prior to constructing the masonry lining. From the earliest times the necessity of lining tunnels with masonry was recognized and it was done wherever the material was of such a weak and uncertain character as to make its self- sustaining qualities doubtful.

Modern Tunnels. — The greatest stimulus of all to the construction of tunnels was given when the construction of railroads began. From that time until the present, tunnel works of great magnitude, including those through sub-aqueous material, have been con¬ stantly

constructed. Among the earliest of these were two tunnels built on the. line of the Liverpool and Manchester Railway in England. The first tunnel of any kind built in the United States was that known as the Auburn Tunnel near Auburn, Pa., built in 1818-21 by the Schuylkill Navigation Company for the water transportation of coal. This tunnel was several hundred feet long and was about 22 feet high by about 15 feet wide. The first railroad tun¬

nel in the United States was also in Pennsyl¬ vania on the Allegheny Portage Railroad and was built 1831-33. It was 901 feet long, 25 feet wide and 21 feet high. What may be properly termed epoch-making tunnel structures in the United States and in Europe are the Hoosac Tunnel in Massachusetts and the Mont Cenis Tunnel which pierces the Alps between Pied¬ mont and Savoy. These are termed epoch- making structures because the exigencies of their construction first brought into use power- drills and high explosives, the two great modern agents in rapid and economical rock tunnel construction. The Hoosac Tunnel was built be¬ tween 1854 and 1876, the progress of the work having been interrupted over long periods. Its total length is about 4ˆ4 miles and it is a double-track tunnel. The Mont Cenis Tunnel was built between 1857 and 1872 and has a length of 7.6 miles. This is a single-track tunnel. The beginning of the work on the Hoosac Tunnel was quickly followed by the commencement of the double-track Erie Tun¬ nel through Bergen Hill, near Hoboken, N. J. This tunnel was built 1855-61 and has a length of nearly 4,400 feet. Its greatest height is 21 feet and its width 28 feet. Among the more prominent tunnels of this country driven through rock, there may be mentioned the Croton Aqueduct Tunnel, 31 miles long with a horseshoe cross-section in general 13.53 feet high and 13.6 feet wide. The Niagara Falls Power Tunnel, 6,700 feet long, has a horseshoe section 19 feet by 21 feet. The single-track Cascade Tunnel on the North¬ ern Pacific Railway, built in 1886-88, is 9,850 feet long. It is 16.5 feet wide and 22 feet high and is lined with masonry.

General Methods of Operation. — The more simple methods of excavating tunnels may evi¬ dently be employed for rock and firm earth or other materials relatively dry. In such cases it is customary to divide the cross-section of the tunnel into a number of parts and excavate them in such order as will be most conducive to economy and speed of completion. This di¬ vision of the section into those parts successively excavated is illustrated by Figs. 1, 2 and 3. In each of those figures the numbers show the order of excavating the different portions, the part 1 being the first removed in each case. Fig. 1 shows the sequence of removal followed

in the Saint Gotthard Tunnel, while Fig. 2 ex¬ hibits that followed in the Mont Cenis Tunnel; Fig. 3 illustrates the order of excavation in the ((German method® of tunneling. If the first part, numbered 1 in the figures, is in the top

of the tunnel it is called a heading, but if it is at the bottom of the section it is called a drift. The heading or drift being first driven, the full tunnel section is reached by enlarge¬ ment in the order or sequence shown. The usual width of heading is about 8 feet, al¬ though it may be but 6 feet. The height is about 7 feet. These dimensions give room for two men to work. Driving the heading is the most difficult and expensive operation of the tunnel excavation. These headings are some¬ times driven 1,000 to 2,000 feet ahead of the full section, although that is not common. The alignment of the heading, which is also the alignment of the completed tunnel section, is transferred with great accuracy from the sur¬ face, either at the ends of the tunnel or down through shafts by various and well-known methods of engineering surveying. Shafts are the vertical passages sunk from the surface along the centre line of the tunnel or at a

short distance on one side of that centre line for the purpose of attacking the excavation at as great a number of points as possible. They enable the work to be extended both ways from the point where the shaft is sunk and also form points at which the excavated materials are raised from the tunnel ; they also permit ma¬ terial for lining or other purposes to be lowered into the excavation and put in place. Central shafts are usually employed, although French

engineers frequently adopt side shafts having their axes 30 to 40 feet on one side of the centre line of the tunnel. At the present time power elevators are used in shafts for raising and lowering men and material. When the shafts are left open and lined where neces¬ sary, they become permanent features of the completed structures, affording ventilation. Where shafts are filled after the work is com¬ pleted they are called temporary shafts, and they may be circular in section as is usually the case where they are lined, or they may be rectangular, their sides being braced with tim¬ ber to prevent material falling in. Central shafts are more convenient than side shafts. If water flows into the tunnel excavation or is found in shaft sinking, it must usually be pumped to the surface. Tunnels are usually classified in relation to the material in which they are driven, such as tunnels in hard rock, in

loose soil, in quicksand, cut-and-cover tun¬ nels, sub-aqueous tunnels. On the whole, hard rock is probably the safest material in which to drive a tunnel and it gives the least difficulty. This is true chiefly in view of the effective ex¬ plosives and covenient power-drills and other machinery now available for the purposes of excavation. Rock tunnels may be driven by using either a heading or a drift, depending upon the local circumstances in choosing the method. Tunnels in soil may involve serious difficulties if the soil is saturated with water. The excavation may be first made near the top, that is, near the soffit (the Belgian method) ; or along the perimeter (German method) ; or in two halves entirely independent of each other (the Italian method) ; or, finally, the whole sec¬ tion together (the English and Austrian methods). The Belgian method is more fre¬ quently employed in Europe. After excavating the material under the soffit the arched roof of the tunnel is constructed and supported on either side of the excavation until the lower part of the material is removed, when the neces¬ sary side and bottom lining is completed. In the German method two drifts are driven, one on either side of the lower portion of the sec¬ tion, as shown in Fig. 3, then others are

In hard rock

In loose soil

METHODS OF EXCAVATING TUNNELS

In quicksand Open-cut tunnels

Sub-aqueous tunnels

By drifts.1 By a heading.

By upper half;

The arch is built before the side [Belgian method, walls. j

By the perimeter;

Excavated and lined before the cen- [German method, tral nucleus is battered down.

By whole section;] English method.

The lining begins after the whole [Austrian method, section is excavated. j

By halves;

The lower half is excavated, lined]

and filled in again, followed by > Italian method, the work of the upper half. J

In resistant soils.

In loose soils. Built up.

By two lateral narrow trenches.

By one very large trench. By slices.

At great depths under the river bed.

At small depths under the river bed. On the river bed.

By any method.

By shield.

By compressed air.

By shield and compressed air.

By coffer dams.

By pneumatic caissons.

TUNNELS AND TUNNELING

2 Harlem Rhrer TKilˆˆgto/Avenˆ Lˆ L SSecfon%?S for sinking

the four temporary buoyancy cylinders

showing

TUNNELS AND TUNNELING

1 Concrete lining 60th Street Tunnel, Route No 61

2 Details of iron lining and rear of shield, 60th Street Tunnel, Route No. 61

TUNNELS AND TUNNELING

opened above them until the completed peri¬ meter except the lower central portion, which is then termed the ˆbench® (see Fig. 7), has been exposed. The masonry lining is then com¬ pleted above the bottom. After removing the central portion of the material the invert or bottom of the masonry lining is put in place. The Italian method is more expensive than the others and is not often followed, but the Eng¬ lish method is employed by excavating lengths from 10 to 25 feet, the masonry invert lining being completed first, then the side walls, and the top arch last. Tunnels in quicksand must be driven by methods applicable to soft soil saturated with water. Cut-and-cover tunnels have been more used for subways in cities than for other purposes. The most notable cases of these latter tunnels are the recently completed subways in the city of New York and the Boston subway, although a consider¬ able portion of the latter was built without removing the material over the top of the finished arch. Sub-aqueous tunnels are the most difficult of all to build and require the employment of special methods and appli¬ ances which will be described later on.

Excavation. — The statement on the preced¬ ing page shows the general character of excava¬ tion for thetion for the different kinds of tun¬ nels to which allusion has been made. It is taken from (Tunneling) by Charles Prelini, C. E.

The Timbering of Tunnels. — As excava¬ tions are made for tunnels not only in rock, but also frequently in soft material, it is neces¬ sary to support the sides and top of the ex¬ cavation to prevent material falling in, and this support is usually given by timber struts and planking, called either lagging or poling boards, suitably disposed concurrently with the excavation. As round sticks are more economical than sawed timber they are usually employed for this purpose. Methods of putting this timber in place vary largely with the methods of excavation employed and the sequence in which various portions of the tun¬ nel are excavated. If the material is reason¬ ably self-sustaining, as clay and much firm earth as well as most rock, the entire excavation may be completed closely in front of the tim¬ bering already in place if it is not desired to follow the excavation immediately with the masonry lining. In rock tunneling the masonry lining may usually be completed, where needed, immediately following the excavation without much or any timbering. In soft material, how¬ ever, it is usually necessary to use timber sup¬ ports, even for the first excavation, in the head¬ ing or drift. In fact, it is commo.nly necessary to insert poling boards, as they are called, ahead

of the actual excavation, as shown in Figs. 4 and 5. The poling boards are inserted over the crown bar or top horizontal round stick of the bracing and under the block on which one end of the previous poling board rests, thus enabling the soft material to be ex¬ cavated at the front part of the heading without the newly exposed material falling down. After the heading or drift is thus excavated and timbered, other portions of the cross-sec¬ tion are excavated concurrently with placing the supporting timbers, so that when the entire section is excavated there will be a complete sys¬ tem of supporting struts and cross timbers with the poling boards or lagging resting directly

against the soft material of the sides and roof. These supporting timbers are so placed as to permit small dump' or tram cars to be used for carrying out the excavated material. Obviously, the precise method of using poling boards will depend upon the manner or sequence in which the different portions of the excavation are completed and the kind of material found. It is equally evident that the poling boards and lagging may be used lengthwise of the tunnel or transversely, as shown in Figs. 4 and 5, the former necessitating the excavation of the least amount of material and being preferable in most cases. After thus completing the excava¬ tion and timbering, the masonry lining may be put in place, the timbering being removed as fast as the masonry progresses. The lagging and poling boards usually remain undisturbed back of the masonry lining. The timber which has been removed when the masonry is laid may be repeatedly used, not more than about 20 per cent of it usually being destroyed in any one use.

The Lining of Tunnels. — Reference has already been made to the masonry lining of tunnels. This lining may be constituted of almost any grade of suitable masonry, in ac¬ cordance with its durability, strength and facility of being put in place. The kind of lining masonry is determined largely by the convenience and economy of the local supply. If the tunnel is in saturated water-bearing material the static head or pressure on the lining may be very great, and the thickness of masonry must be sufficient to carry that water pressure. Occasionally also there may be some little motion of the rock through which the tunnel is driven. In such cases the masonry lining must be of sufficient thickness to resist that movement. While no general rule can be given, the thickness of masonry lining may be from 1 to 4 or 5 feet, the least thickness being suitable for rock not very liable to fall and the greater thickness for such soft material as wet clay and sand and in cases where the static pressure of the saturat¬ ing water may be very great. In some special locations for temporary purposes timber lin¬ ing has been used, but it is not ordinarily em¬ ployed for permanent work. Iron lining has also been employed under certain special con¬ ditions,

but it is not often used for other than those methods of driving tunnels through soft material with the aid of the pneumatic process and the shield, the circular cast-iron lining being put in place immediately behind the shield. This cast-iron lining is made in sec¬ tions with flanges for joints and for stiffening purposes which when put in place form a com¬ plete circle. These sections are sometimes not more than 2 feet by 4 feet, while in other cases they may be as much as 5 feet or 6 feet square. In all cases they are cast so as to form complete circular cylinders when put in place and bolted together.

The Pilot Method of Tunneling. — This

method has not been extensively employed. It was introduced in 1880 by Anderson of Ander¬ son and Barr, who used the method in the con¬ struction of the main relief sewer tunnel in Brooklyn, N. Y., in 1891. About 700 linear feet of this sewer has a diameter of 15 feet, 4,700 linear feet has a diameter of 14 feet, and 3,940 linear feet has a diameter of 12 feet, making

9,340 linear feet in all. The material penetrated was mostly sand and gravel, some of it being wet. The principal feature of the method is a wrought-iron cylinder of one-fourth inch plate and 6 feet in diameter, the axis of which corresponds with the axis of the tunnel. This

Fig. 4. j

small 6-foot heading or pilot is the first portion of the tunnel excavated. The front end of the pilot was carried about 30 feet ahead of the completed tunnel section, allowing a 10-.foot length of four-ring brick masonry lining to be put in place, while 15 to 20 feet of the pilot rested in unexcavated material. As fast as excavation was made at the front end of the pilot, plates were taken off the rear end which projected into the finished work and put in place at the front end. In this manner the pilot was carried ahead as fast as excavation could be made. In this case the pilot was built of one-fourth inch iron plates carrying 3-inch by 3-inch angles on their edges. The exca¬ vation then made around the outside of the pilot was closely followed by radial struts with one end supported against the pilot and the other end carrying iron plates and lagging to protect the exposed face of the excavation. Iron plates were used over the crown of the finished excavation, but were not carried down on the sides, although they

could be so extended if desired. In this manner the complete tunnel was successfully excavated and the material held back until the brick lining used in this case was in place. All work was done at ordinary atmospheric pres¬ sure. No other large work has been com¬ pleted by this method, although it possesses advantages for many localities.

Baltimore Belt Line Tunnel. — This double¬ track tunnel is a part of the double-track line of railway in the city of Baltimore, Md., built for the Baltimore and Ohio and Western Maryland railroads. It was driven through a great variety of materials, some of which were soft and saturated with water and gave much trouble. Rock was penetrated in some places and in others clay so hard and tough as to require blasting for its removal. For the greater part of its length, however, this tunnel was driven through soft material, some of which carried so much water that it was with difficulty that the work could be pros¬ ecuted without danger of serious settlements at the surface above it. In one case the set¬ tlement caused the destruction of a large building. The general plan of operations was that of the German method. Drifts along

the sides of the tunnel were first driven, thus providing for the drainage of the upper part of the material to be removed. Por¬ tions of the side walls were built in these drifts and subsequently extended upward to the elevation of the springing line of the arch. The top heading was then driven and the adjacent side portions were immediately thereafter removed, thus completing the ex¬ cavation to the full width of the upper half of the section. All these drifts and other excavated portions were heavily timbered and strutted so as to protect the exposed surface to the greatest possible- extent. The illustrations show the method of strutting or bracing and the use of the poling boards employed. (Figs. 6 and 7). In laying up the arch of the tunnel both iron and timber centres were employed. As is shown in the illustrations the masonry of the arch and side walls was laid up inside of the exterior line of round struts and the poling boards outside of them. The voids outside of the tunnel masonry were filled with rubble masonry so that no vacant spaces were left unfilled. The lining of the arch in general consisted of five rings of brick work, but where the soil was unusually soft eight rings were employed. The large amount of water in the material under the tunnel caused considerable difficulty in build¬ ing the invert. Enclosures, however, of short sheet piling transversely across the tunnel were formed, within which the material was excavated and the foundation course of con¬ crete 8 inches thick was laid. On this con¬ crete foundation the brick invert was placed. One of the unique features of this work was the 6-inch perforated pipes which were inserted radially about 10 feet

into the soft wet material surrounding the upper part of the tunnel where it was deemed feasible to resort to this pro¬ cedure. Through these perforated pipes thin Portland cement, mortar or grout was forced into the surrounding soft material, so that when the Portland cement set a solid stiff mass of material was produced instead of the saturated and easily flowing natural material. The bot¬ tom side drifts and the masonry walls built in them were ordinarily carried about 20 feet ahead of the arch, although at times this work was as much as 90 feet in advance. The arch was usually built in complete transverse sections about 18 feet in length.

General Features of Method Used in Quicksand. — The construction of the Baltimore Belt Line Tunnel illustrates some of the general features of method suitable for use in quick¬ sands and other soft materials. Quicksands are simply fine sand mixed to some extent with fine clayey matter and saturated usually with running water. All wet material is soft, and in tunneling through such material the first effort is to drain that part of the ex¬ cavation as effectively as possible. This is accomplished by driving either a centre bot¬ tom drift or, as in the Baltimore Belt Line Tunnel, two bottom side drifts, all of which are well calculated to drain the material above them. If the water does not flow away from these drifts by gravity it may be led into sumps and removed from them by pumping. After this draining is accomplished the remaining material is taken out by some method such as those already described, timber bracing or

strutting being introduced concurrently with the excavation. Poling boards are constantly used to keep the material from falling into the excavation and the joints between them are frequently packed with hay or material of similar character so as to permit water to enter without bringing with it the soft material. The masonry lining is then put in place as al¬ ready described in connection with the Balti¬ more Belt Line Tunnel, frequently leaving the exterior line of strutting and the poling boards in place. The hardening of soft material may also be produced in other ways than by inject¬ ing Portland cement grout, as by freezing or by stock ramming.

Sub-aqueous Tunnels. — All the preceding methods of tunneling described pertain to tun¬ nels not driven below open water, although the material which they penetrate may be fully saturated with water. The most difficult tun¬ neling is that which must be carried on at

con¬ siderable depths below the surface of free water above the work. In such cases the water finds its way through either porous material or through crevices or fissures in the overlying rock so that both the completed tunnel and the work in progress are subjected to a water pres¬ sure represented by the static head of the water above them. Occasionally in rock tunneling under such conditions or in stiff clay, water may flow in upon the work in quantities not too great to make its removal by pumping feasible. Whenever, however, water enters too freely for such procedures, compressed air must be used to keep the water out, the pressure of air being determined by the depth of the work below the water surface. When tunneling is prosecuted under these conditions a ˆshield® is ordinarily used, as will be described further on. An in¬ stance illustrating the method to be followed in sub-aqueous rock tunneling will first be given.

The Severn Tunnel. — This tunnel, a double- track tunnel, a little less than 4ˆ4 miles long, was built under the river Severn in the south¬ western portion of England between 1873 and

1886. Although this tunnel was built largely through rock, for a short distance the material penetrated was gravel. The bed of the river at the tunnel site is composed of strata of con¬ glomerate limestone, carboniferous beds, marl, gravel and sand. The least thickness of the natural cover over the tunnel is 30 feet of marl on the English side of the river. At the deepest part of the river channel the thickness of the sandstone over the tunnel is about 45 feet. The vol. 27 — 11

entire tunnel is lined with vitrified brick work 2*4 to 3 feet thick, laid in Portland cement, the invert having a thickness of 1}4 to 3 feet. Much water was encountered in the prosecution of this work which produced grave difficulties. Indeed, at one time the entire work was flooded for a period of 13 months. The water gave much trouble at other times, breaking through in large volumes, but in no other instance was the work suspended on account of the water for a period of more than a few weeks. Pumps were employed to raise the water through a side heading connecting with a shaft 29 feet in diameter. The greatest amount of water raised concurrently by all the pumping sta¬ tions was about 27,000,000 gallons in 24 hours, although the total pumping capacity provided was equivalent to about 66,000,000 gallons in 24 hours. The ventilation of this tunnel, which is a matter of great importance on account of its length, is accomplished by a fan 40 feet in diameter in one of the shafts, making 43 revolu¬ tions per minute and drawing out 447,000 cubic feet of air per minute to an 18-foot shaft near to the work.

Tunneling by the Use of a Shield. — The

method which has been employed more than any other for sub-aqueous tunneling in soft

Fig. 6.

materials is that which it is believed was first devised and applied by the great French- English engineer, Sir M. I. Brunei. Brunei was born in France in 1769, spent six years in the United States, then went to England and became one of the greatest civil engineers of Great Britain, where he died in 1849. He secured his first patent covering the use of a shield for sub-aqueous tunneling in 1818. He first employed a shield in the effort to build a tunnel under the Thames River at London in 1823. His first shield was found to be too weak in actual service and had to be replaced by another and somewhat larger one designed by and built under the direction of Brunei him¬ self. This shield was rectangular in transverse section, 37 feet 6 inches wide by 22 feet 3 inches high, and by the use of it two parallel tunnels of horseshoe shape were built, each being 13 feet 9 inches wide and 16. feet 4 inches high, the two being separated from each other by a wall 4 feet thick. This dividing wall was not continuous, but was pierced by arch openings, each about 4-feet span about every 20 feet. The total structure built of brick work was 38 feet wide over all and 22 feet high. The tunnel

was finished in 1843, making the total time of construction, including all stoppages and delays, 20 years. Another English engineer, Peter W. Barlow, patented in England in 1865 a method of sub-aqueous tunneling by the use of a circular shield with a cylinder cast-iron lining for the completed tunnel. After 1869 he was associated with the English engineer, James Henry Great- head (1844-96), in the construction of the tun¬ nel under the Tower of London, 1,350 feet long

laborers stand in order to make the desired excavation through the openings themselves. If the material being penetrated is very soft and porous an inrush of water may take place even when compressed air is used, and the diaphragm must be strong enough to resist the resulting pressure. It may be, and usu¬ ally is, heavily braced with plates and angles, both vertical and horizontal- The illustra¬ tions show how

complicated its construc-

Fig.

7.

and 7 feet in diameter, which penetrated com¬ pact clay and was completed within a period of 11 months. This was a remarkable record in tunnel building, and from that time until the present numbers of tunnels in soft material under water have been constructed on what is commonly known as the Greathead system, which simply means the use of a cylindrical or circular shield, developed from Brunei's original plan and subsequently perfected by Greathead. The use of the shield has made it possible to construct tunnels under rivers at depths be¬ low the surface of the water as great as the effect of compressed air on laborers will per¬ mit, it being a matter of comparative indif¬ ference how soft the material may be, ex¬ cept that the softer or more easily flowing the material the more carefully must the work be executed. The shield is composed of a cylindrical shell usually constructed at the present time of steel plates and angles or other shapes with a heavy braced diaphragm placed at right angles to the axis of the shell. This diaphragm is of heavy steel plate and shape construction. It may have a num¬ ber of openings in it closed by doors or other suitable devices. These openings in the dia¬ phragm permit laborers to excavate the mate¬ rial immediately in front of the shield. If the tunnel is a large one the openings may have platforms in front of them, on which

tion may be. The cylindrical shell in which the diaphragm is located may extend from one to 10 or 12 feet in front of the diaphragm and from 6 or 8 to 26 or 27 feet behind it. The tunnel lining, usually of cast iron from one inch to two inches in thickness and possi¬ bly lined with masonry, is constructed within the rear or tail of the cylindrical shell, so that the latter always overlaps by two or three to four or five feet the finished lining of the tunnel, thus preventing any material or water falling into the completed work. Obviously as the workmen excavate the material in front of the shield, pass it through the dia¬ phragm and take it out in the rear, the shield must be moved forward so as to bring its front end again up to the face of the exca¬ vation. As these shields are very heavy masses of steel, weighing sometimes 40 to 80 tons or more, and as the friction of the sur¬ rounding material on the sides of the shell must be overcome, a heavy force is needed to make the movement. This force is usually supplied by hydraulic jacks so devised and placed around the circumference- of the dia¬ phragm as to push against the completed iron lining of the tunnel. These jacks

have cylin¬ ders six inches or more in diameter and are actuated with water or other liquid at a pres¬ sure of 1,000 to 3,000 or 4,000 pounds per square inch. A shield about 21.5 feet in diame-

ter was used in the construction of the Sarnia tunnel under the Saint Clair River above De¬ troit, Mich. This shield was moved by 24 hy¬ draulic jacks, as shown in the illustration, each having a capacity of 125 tons and so placed as to press directly upon the cast-iron tunnel lin¬ ing behind it. By such means the shield may be pushed ahead as fast as the excavation is made and the tunnel lining completed behind it.

The Saint Clair River tunnel is a single- track railroad tunnel built in 1890-91 by the Grand Trunk Railroad. The total length of the tunnel is 6,000 feet, made up of 1,162 feet on the United States side of the river, 844

shield, usually the upper part. The shield for the use of the East Boston tunnel recently constructed was segmental and was used for the roof of the tunnel only, as is also shown in the illustrations. The front portion of the cylindrical shell, consisting of the front portion of the shield as a whole, may be vizor-shaped if material is not too soft. In such a case the upper part of the fresh excavation is protected by the vizor exten¬ sion of the shield. Where the material is stiff enough to hold itself up for a short time the front extension of the shell is not needed.

Longitudinal Section.

Cross Section.

Fig. 8.

feet on the Canada side of the river, and 2,310 feet under the Saint Clair River. It is built through the clay underlying the river and has a clear inside diameter of 19 feet 10 inches, the cast-iron shell being two inches thick and having an outside diameter of 21 feet. The cast-iron shell is lined with six inches of brick and cement. The shield was 15 feet 3 inches long and required’ from 450 to 2,000 tons to move it during construction. The maximum daily progress through the clay was 15.3 feet. The average monthly progress was 230.4 feet from the American side and 219 feet from the Canadian side.

The transverse section of a shield may be circular, elliptical, or any other shape; it may even be rectangular, as in the case of Brunei's Thames tunnel. The shield for the Clichy sewer tunnel in Paris was elliptical in outline. Again, if the material is not too soft, the shield may be segmental only, that is, com¬ prising but a part of the outline of the full

It is thus seen that the purpose of the shield is to prevent the inrush of water and soft material while excavation is being made, the diaphragm of the shield acting as a bulk¬ head and the openings in it being so devised as to be quickly closed if necessary. The extension of the shield in front of the dia¬ phragm is designed to prevent the falling or flowing in of the exposed face of the new excavation. The extension of the shell back from the diaphragm is designed to afford opportunity for putting in place the finished tunnel lining, whether of cast iron or of steel plates lined with masonry. Where the mate¬ rial is saturated with water it is usually neces¬ sary to use compressed air in connection with the shield. The intensity of this air pressure is determined by the depth of the tunnel be¬ low the surface of the water above it. A greater intensity of pressure is needed for the material at the bottom of the tunnel than at the top, but as the pressure required for the

bottom must in general be used, there will be danger of "blow-outs® at the top, requiring great caution in soft material. With a diameter of shield of 22 feet the pressure at the bottom of the excavation may exceed the water pres-

Double-track Tunnels.

NAME OF TUNNEL

Quality of soil

Cost per lin. ft.

Method of tunneling

Mont Cenis

Granitic

$273.73

Drift

Saint Gothard

193.63

Heading

Stammerich

Granitic

157.90

English

Stall e

Broken schist

290.58

Austrian

Rothenfels

Dolomite

115.64

English

Dorremberg

Calcareous

86.08

Belgian

Stafflach

Calcareous

91.69

English

Open

Calcareous

93.19

Austrian

Wartha

Grewack

87.95

Austrian

Mertin

Grewack

87.55

German

Schloss Matrei

Clay schist

94.25

English

Trietbitte

Clay and sand

229.00

German

Canaan

Clay-slate

69.50

Wide heading

Church-Hill

Clay with shells

178.00

Bergen No. 1

Trap rock

182.31

Single-track Tunnels.

NAME OF TUNNEL

Quality of soil

Cost per lin. ft.

Method of tunneling

Mont Cenis

Gneiss

$82.27

Heading

Stalletti

Granite and quartz

62.75

Austrian

Marein

Clay schist

64.36

English

Welsberg

Gravel

165.07

Austrian

Sancina

Clay of first variety

129.40

Belgian

Starre

Clay of second variety

191.61

Belgian

Cristina

Clay of third variety

307.42

Italian

Burk

83 . 90

Wide heading

Bra fiord Ridge

85.33

Wide heading

Dunbeithe

Limestone

70.47

Wide heading

Fergusson

Sandstone

*37.46

Wide heading

Port Henry

Limestone

fSO.OO

Wide heading

Points

Granite

*72.00

Wide heading

- Are unlined. f Lined with timber.

sure at the top by between 9 and 10 pounds per square inch. Such inequalities tend to produce either a “blow-out® at the top of the heading or an inrush of water and soft material at the bottom. The following table was compiled

by Mons. R. Le Gouez and shows the dimen¬ sions of the cylindrical shells of some of the principal shields used in tunneling through soft material up to the present time.

The friction on the outside of the shell of the shield against the surrounding material may be over 1,000 pounds per square foot or much less than that. The amount of nomi¬ nal hydraulic jack power required may be roughly taken at 4,000 to 6,000 pounds to every square foot of frictional surface on the outside of the shell of the shield.

Some of the principal later tunnels con¬ structed by the aid .of

shields, in addition to the early tunnels of Brunei and others, are the Sar¬ nia tunnel under the Saint Clair River, near De¬ troit, Mich, (already described) ; the East Bos¬ ton tunnel, a part of the rapid transit system of the city of Boston ; the two parallel Hudson-Manhattan (McAdoo) single track electric railway tunnels opened to the public in 1908, under the North River between Hoboken and New York, and the tunnels under the North and East rivers that were constructed by the Pennsylvania Railroad Company. The accom¬ panying tables of double-track and single-track tunnels relate to some of the principal tunnel structures of the world and give the quality of material penetrated, with the cost per linear foot, as brought together by Charles Prelini, C.E., in his ˆunnelingP

Pennsylvania Railroad Extension Tunnels. — In the recent extension of the Pennsyl¬ vania Railroad into New York City and Long Island, involving engineering enterprises, the cost has been estimated at $100,000,000. The carrying out of the gigantic project necessitated the construction of numerous tunnels, both land and sub-aqueous. These consist of: (1) The Bergen Hill, N. J., tunnels. (2) The North River tunnels starting from Weehawken, N. J., running beneath the Hudson River to New York City and connecting with the Penn¬ sylvania Railroad station at 33d street, near 11th avenue. (3) Tunnels under 33d and 32d streets from the railroad station to First avenue. (4) East River tunnels from Manhattan shaft of New York City side of the river, running under East River to Long Island shaft and Long Island City.

NAME OF SHIELD

Length in feet

Diameter

Tail

Body

Front

Total

Concorde Siohon .

6.75

2.51

2.55

1.16

6.67

Clichy Siphon .

8.39

2.51

2.55

1.16

6. 16

Mersey .

9.97

5.61

2.98

2.98

11.58

East River .

10.99

3.51

0.32

3.67

7.51

City and South London .

10.99

2.65

2.82

1.01

6.49

Glasgow District .

12.07

2.65

2.82

1.01

6.49

Waterloo and City .

12.99

2.75

2.98

1 . 24

6.98

Glasgow Harbor .

17.25

2.75

2.98

1.08

8.49

Hudson River .

19.91

4.82

2.98

5.67

10.49

Saint Clair River .

21.52

4.00

2.98

11.25

15.25

Clichy Tunnel .

23.7-19.8

4.00

2.98

6.88

17.22

Clichy Tunnel .

23.8-19.4

7.44

11.90

4.46

23.65

Blackwall .

27.00

6.98

5.90

6.59

19.48

Waterloo Station .

24.86

3.34

5.51

1.14

10.00

TUNNY

165

Bergen Hill Tunnels. — These consist of two parallel single-track, concrete-lined tunnels 5,920 feet long between portals. The boring through Bergen Hill was largely in trap rock (diabase), partly in sandstone. Some of the former was so extraordinarily hard as to re¬ quire 10 hours to drill a 10-foot hole in the heading with a number 34 slugger drill at 90 pounds air pressure. Work started May 1905 and completed May 1908. Height of the tunnel inside is 16 feet 2 inches from the top of track rail to crown. The tunnel is lined with con¬ crete variably, according to the soils to be sup¬ ported. The water proofing is of six-ply felt and seven layers of pitch. Bench walls at either side of tunnel carry conduits for tele¬ phone, telegraph, etc.

North River Tunnels. — These extend from 10th avenue, New York City, to the large shaft at Weehawken, N. J., crossing under the Hudson River. They consist of two single- track tubes lined with cast-iron rings, and have an outside diameter of 23 feet, and 21 feet 2 inches inside diameter. The subaqueous portion is 6,128 feet long. Work was started April 1904 and completed 1910. The Weehawken shaft was a large piece of work being over the tunnels and including both. Difficulties occurred from the treacherous nature of the rock, which hindered work till it was lined its entire length with concrete. The tunnels under the river were driven with shields. The floors of two plat¬ forms were so constructed that they could be extended 2 feet 9 inches in front of the cut¬ ting edge or 8 inches in front of the

hood. The motion to the sliding platforms was given by hydraulic jacks. The land tunnels consist of 977 feet of double tunnel on the New York City side and 230 feet on the New Jersey side. The Manhattan end (from 11th avenue to 32d street) is very complicated, having in its 977 feet nine different styles of cross section caused by a curve; for the curve is effected in straight lengths not curves. Parts of the land tunnels were shield driven but other parts were open- cut work and ordinary land tunneling, as great variation was found in the nature of the ma¬ terial met with ; some soft ground caused some cut-and-cover work. The cast-iron rings of the tube are bolted together through holes in flanges. After lining with concrete the inside diameter of the tube is 19 feet, but after laying the flat bed there is left 16 feet 7 inches from top of rails to soffit of arch. The concrete lining is reinforced with steel rods. Excavating was done under an average air pressure of 25 pounds when air pressure was needed.

Cross T own T unnels. — These extend east¬ erly from the Terminal Station to permanent shafts east of First avenue under 32d and 33d streets. For an average of 350 feet west from the First avenue shafts there are four tunnels in sound, fairly dry rock which was drilled and blasted, but this Hudson schist varied consid¬ erably physically and an ancient water-course was struck causing difficulties. Sand also caused much trouble in spots. Some open-cut work on 32d and 33d streets caused much underpinning of houses. On Sixth ave¬ nue the Elevated Railroad was under¬ pinned to rock. Concrete lining is used on these twin tunnels. These two-track tunnels have their crown about 60 feet below

street surface. In the three-track tunnel heavy brick arching was used for tunnel lining and concrete for roof of open-cut work. These tunnels were completed March 1909, but road¬ way restoration required further time.

East River Tunnels. — These connect the cross-town tunnels, by tunnels beneath the East River, with Long Island City. They consist of four single-track, cast-iron and concrete lined tubes with an outside diameter of 23 feet, starting from two permanent shafts on the east side of the river. Each tunnel is about 6,000 feet long, 3,900 feet of which is between the shafts each side of the river and 2,000 feet in Long Island City. The work was finished in exactly five years. The East avenue heading needed at start 15 pounds air pres¬ sure for soft ground and considerable water ; then rock permitted discontinuance. A shield was soon brought into use but found imprac¬ ticable except for a short distance under the Long Island passenger station. Solid rock ex¬ cavating was done with hottom-heading-and break-up or

with top-heading-and-bench meth¬ ods ; soft ground in top of rock tunnel was ex¬ cavated in normal air by mining-and-timbering method. In some parts of this work water was struck and tunneling was done in compressed air zvithout a shield by building the iron lining up to face of the full-sized excavation, then top-heading a hole for about 10 feet in ad¬ vance about 3 feet wide by 4 or 5 feet high, then timbering. A permanent shaft was con¬ structed on the Manhattan side over each pair of tunnels. The four river tunnels between the Manhattan-Long Island City shafts were con¬ structed with shields working both ends at once. One difficulty overcome was that caused by the small depth of roof at the deepest part of the river (at the Manhattan pier-head line) and consisting of fine sand. Safer cover to protect against blow-outs was given by adding blankets of clay /on the river bed seven to ten feet thick. Air pressure carried in soft ground work were from 30 to 34 pounds ranging up to 37 pounds in tunnels B and D at Manhattan and up to 42 pounds for short periods to remove broken plates. The chief difficulty was in soft sand allowing the shield to settle, thereby breaking plates in the bottom of the rings. Blow-outs of such severity oc¬ curred as to stir up the bed of the river suf¬ ficiently to necessitate shutting down work for three weeks to allow the river bed to consoli¬ date and permit further work. Standard cast- iron tunnel lining was used, giving 23 feet out¬ side diameter with rings 30 inches wide, 11 segments and a key to each ring. Inside di¬ ameter of tubes is 21 feet 2 inches. There are lk2-inch thick webs in the central portion; flanges are 11 inches deep. In passing from rock to soft ground cast-steel rings were added as reinforcement for a short stretch. The iron tube is line with concrete. For Bibliog¬ raphy see under Tunnels, Great Modern.

William H. Burr,

Professor of Civil Engineering, Columbia Uni¬ versity.

TUNNY, or HORSE MACKEREL, a

large, brilliant and valuable fish of the mackerel family (Thunnus thynnus), which occurs in shoals in almost all (he seas of the warmer and temperate parts of Europe, Asia, Africa and

America, but is not equally common in every season or in all parts of the seas which it fre¬ quents. Immense numbers enter the Mediter¬

ranean by the Straits of Gibraltar in May and June and immediately divide, one part follow¬ ing the shores of Europe and the other those of Africa, in search of a place to deposit their spawn. The fishery is one of the most im¬ portant in the Mediterranean, especially about Sardinia. At the approach of winter the fish re¬ tires to deep water. It often, besides, wanders widely and has acquired many local names, as albacore, horse-mackerel, etc. It is not un¬ common in the Pacific off Santa Catalina, where it is known as the tuna, and is angled for from small launches that run out to sea. Large ex¬ amples, and they sometimes attain a weight of 1,500 pounds, fight so determinedly for freedom that many hours are often consumed in master¬ ing them. Tuna are caught off the Atlantic Coast, especially about Block Island during the months of August and September. At times they readily take artificial bait, being fished for by trawling. The large Wilson spoon or squids are used; the larger fish are harpooned. Al¬ though readily sold when captured and much relished there is no regular fishery for the tunny in the United States. See Mackerel.

TUPAC AMARU II, the name assumed by a Spanish-Peruvian adventurer: b. Tinta, 1740; d. 10 Sept. 1780. His name was Jose Gabriel C'ondorcanqui and his mother was the daughter of the last of the Incas. He was killed on the failure of an uprising which he had planned.

TUPAIA, or BANXRING. See Tree-

shrew.

TUPELO, Miss., town, county-seat of Lee County, on the Old Town Creek and on the Mobile and Ohio and the Kansas City, Mem¬ phis and Birmingham railroads, 100 miles south¬ east of Memphis, Tenn. It is in an agricultural and stock-raising region. The water supply is obtained from about 40 artesian wells. The chief industrial establishments are cotton presses, cotton-gins, flour mills, spoke fac¬ tories, furniture factories, brickyards and ma¬ chine shops. The two banks have a combined capital of $100,000. It has a high school and graded schools. Pop. (1920) 5,055.

TUPELO, one of the several American trees of the genus Nyssa, family Cornacece. Nyssa is found also in Eastern Asia. There are swamp-loving trees, with alternate, entire, or nearly entire leaves, and regular, small, greenish flowers in capitate clusters, the fertile blossoms sometimes solitary, on slender axillary stalks, and appearing with the foliage. The drupe is more or less oval, with a compressed stone. Nyssa sylvatica is the sour gum, or pepperidge, growing farther north than the other species, and more apt to be found away from water, and made conspicuous in autumn by the scarlet of its foliage and by the dark-blue fruits, which are a valuable food for migrating robins. When leafless it is still noticeable, for the pic¬ turesque growth of its limbs, sometimes in round heads, often horizontal, as if the many knotty branches lay in strata. The bark is rough and gray. The wood is of a light color, but with a twisted grain, which makes it diffi¬ cult to work. This unwillingness to split, how¬ ever, makes it desirable for beetle-heads, ox-

yokes, hubs of wheels, bowls, etc. Tupelo is durable when completely immersed in water, especially if salt, and is, therefore, of value for ships' keels; but it will not stand alternation of moisture and dryness. The southern moun¬ taineers value it for "chaw-sticks,® — small pieces of the stem, chewed into brushes with which they may dip up snuff. In consequence of its erratic growth and fibre, sour-gum trees were debarred as evidence in boundary disputes, in cases where some time had elapsed after blazing trees, as shown by the condition of the scar. Nyssa ogeclie, called the Ogeechee lime, from the stream of that name, which is said to be about its northern limit, is an inhabitant of southern river-swamps liable to inundations. Its young branches have a silvery gray back, and the short petioled oval leaves are whitish pubescent beneath, when young, and are about six inches long. It

becomes a large tree of handsome but somewhat peculiar habit. The fruit is of the size and shape of an olive (which caused the French in Mississippi to call this tupelo “the olive®), but is scarlet, and of an agreeable acid flavor. It is preserved in sugar. The wood is of little account, being soft, and the roots of one variety are so light that buoys for fishermen’s nets were made out of them. Nyssa aquatica is the large tupelo, or “cotton® gum, so called because tomentose in all its more youthful parts.

TUPELO, Battle of. In March 1864, Gen.

N. B. Forrest, at the head of a large force of Confederate mounted infantry, advanced from Mississippi and made a raid through West Ten¬ nessee to Paducah, Ky. Upon his return he assaulted and captured Fort Pillow (q.v.) on 12 April. General Sturgis set out from Memphis to pursue him, and was badly defeated by For¬ rest, at Guntown (q.v.), 10 June, and pursued back to Memphis. On 5 July Gen. A. J. Smith, with Colonel Grierson’s cavalry division, two infantry divisions of Gen. J. A. Mower and Col. D. Moore, of the 16th corps, and a brigade of colored troops, under Col. E. Bou¬ ton, in all about 14,000 men — 11,000 infantry and 3,000 cavalry — and 24 guns, left La Grange, Tenn., to march southward against Forrest, then reported in the vicinity of Tupelo, Miss. On the evening of the 7th one of Grierson’s cav¬ alry brigades, when near Ripley, attacked a Confederate cavalry force of 500 men, under Lieutenant-Colonel Hyams, driving it back and inflicting a loss of 35 killed and wounded, with a loss to itself of four wounded. Smith moved on through Ripley, crossed the Tallahatchie River at New Albany on the 9th and on the 10th encamped about five miles north of Pon¬ totoc. Next morning the march was resumed and ˆ Pontotoc was found occupied by McCul¬ loch’s cavalry brigade, supported by a brigade on a hill immediately south. The Seventh Kansas cavalry were deployed as skirmishers and, sup¬ ported by a brigade of infantry, advanced and drove in the Confederate skirmishers and at the same time Grierson’s cavalry, gaining the east side of the town, attacked the Confederates in flank and drove them from the place and the hill beyond, leaving several dead and wounded. Gen. S. D. Lee joined Forrest and assumed com¬ mand of all the Confederate forces. Smith remained at Pontotoc on the 12th and a recon- noissance developed the fact that the main

Confederate force was about nine miles south on the Okolona road, on

the opposite side of a low, swampy bottom, through which ran two creeks, a position which he did not deem pru¬ dent to attack, and upon which he demonstrated only. Early in the morning of the 13th he marched out of the town eastward for Tupelo, 18 miles distant, on the Mobile and Ohio Rail¬ road. General Lee, informed of Smith's move¬ ment, ordered it checked before the railroad was reached. Forrest, with a brigade and a regiment, made successive attacks upon the rear, which was covered by Bouton's colored brigade and the Seventh Kansas cavalry, but was repulsed and kept back, and Buford's and Chalmers' divisions attacked the train in flank, causing the destruction of a few wagons, but were driven back by Mower's division, which captured some prisoners and a battle-flag. At dark Smith camped at Harrisburg, a mile from Tupelo, in good position on a knoll almost clear of trees, beyond which was a growth of timber. Mower's division was drawn up on the right of the Pontotoc road, on which the army had marched, and Moore's division on the left of the road, with Bouton's colored brigade on the extreme left. Meanwhile Grier¬ son's cavalry division had occupied Tupelo, proceeded to destroy the railroad and was then disposed on both flanks of the infantry. Early in the morning of the 14th Lee ordered For¬ rest to attack Smith's left, and at 7.30 a.m. Forrest, having dismounted his entire command, made an impetuous charge, with four brigades in line, supported by Chalmers' division and Lyons' brigade. The assault fell upon Moore's division and the left of Mower's, but failed to shake either, although four successive attempts were made. Between the assaults Forrest's artillery was very active, but was effectively replied to by two Union batteries, whose fire was so annoying that a brigade charged them but was repulsed. After a hard struggle of one and one-half hours Forrest withdrew from Moore's front, leaving many dead and wounded. He now marched to the left, crossed the Pon¬ totoc road and advanced in three lines against Mower, whose men reserved their fire, until the charging lines, closed in mass, were quite near ; then they opened upon them with musketry and canister, driving them back in disorder; but they rallied and renewed the attack. For over two hours the battle raged on Mower's front; then he ordered his division to advance, which it did, capturing many pris¬ oners and driving Forrest from the field about noon. The afternoon was spent caring for the wounded of both armies and burying the dead. About 9 o'clock in the evening Forrest made an attack upon the extreme left of the Union line, including Bouton's colored brigade. The attack was easily repulsed. At an early hour of the 15th Forrest's men advanced from the cover of the woods in front of Mower's division; Mower charged them and they fled to their horses and rode away. Meanwhile another advance was made on the extreme left, held by Bouton's

brigade. For two hours there was sharp artillery firing, when Forrest, under cover of his guns, came forward, but was met' by a counter-charge, led by Smith, which broke Forrest's line and sent it in retreat. It was now past noon. Smith's ammunition had run low and he had a scant supply of rations. Grier¬

son had destroyed some miles of railroad and after the last repulse of Forrest Smith moved slowly northward about five miles and went into camp for the night at Old Town Creek. The men were settling themselves for a rest when shells from the rear fell and burst among them. Bell's brigade, with a battery, had closely followed the column and attacked; Mower turned upon them'; Crossland's brigade came up and joined Bell; but both were repulsed by Mower with severe loss and fell back upon Mc¬ Culloch's brigade, which held ground. McCul¬ loch was desperately wounded, Forrest was wounded and some prominent officers were killed. Smith resumed his march next morning, followed for two days by two brigades of For¬ rest's cavalry and reached Memphis on the 23d. Smith had about 14,000 men engaged and his losses, from the 11th to the 15th, were 77 killed, 559 wounded and 38 missing. The Confederate troops engaged numbered about 6,600; their losses, as reported by Forrest, were 210 killed and 1,116 wounded. Consult (Official Records) (Vol. XXXIX) ; Wyeth,

E. A. Carman.

TUPfAN STOCK. The chief linguistic stock of South America and in its corrupted form the trade medium throughout the Ama¬ zon region. The Tupian tribes held the greater portion of the territory when the Portuguese took possession of Brazil and as a rule were superior to the other aborigines. They prac¬ tised agriculture and were experts in many arts. Their houses were for the most part communal. The Tupian languages have been extensively cultivated. Consult Adam, Lucien, (Materiaux pour servir a l'etablissement d'une grammaire comparee des dialectes de la famille Tupi* (Paris 1896).

TUPPER, tup'er, Sir Charles, Canadian statesman: b. Amherst, Nova Scotia, 2 July 1821 ; d. in England, 1915. He was graduated from Edinburgh University in 1843 with the degree of M.D. ; began the practice of medicine in his native town and in 1867-70 was presi¬ dent of the Canadian Medical Association. He entered political life in 1855 when elected as a Conservative to the Nova Scotia assembly and there became a leader of his party in the adoption of a more progressive policy, became provincial secretary in 1857 and in 1864 Premier of Nova Scotia. He took a leading part in bringing about the union of the Canadian provinces and in the organization of the Do¬

minion government, attending the Charlotte¬ town and Quebec conferences and the final conference at London. In 1867 he was elected to the Canadian House of Commons, represent¬ ing his constituency there from 1867 to 1884, from 1887 to 1888 and from 1896 to 1900. He was president of the Privy Council in 1870-72, Minister of Inland Revenue in 18*72 and Min¬ ister of Customs in 1873. The Conservative government being defeated in the last-named year, he became one of the principal organizers and leaders of the opposition and brought be¬ fore Parliament the plan of moderate protec¬ tion for home industries, subsequently adopted by a Conservative administration. On the re¬ turn of his party to power in 1878 he entered the government as Minister of Public Works

and in 1879 organized and became first Minister of the Department of Railways and Canals; in this office he greatly assisted the construction of the Canadian Pacific Railway. In 1884 he went to London as High Commissioner of Canada, returning for a time in 1887-88 to become Minister of Finance, but resigned that office in 1888 and resumed his position in Lon¬ don. In 1896 he again returned to Canada to enter the ministry and was Secretary of State until April, when he became Premier; but his party was defeated in June of that year and he was chosen leader of the opposition in the House. He lost his seat at the election of 1900 and retired from public life. In 1887 he was one of the plenipotentiaries to the fisheries con¬ ference at Washington, which resulted in the treaty settling the fisheries dispute. In 1879 he was knighted and in 1888 made a baronet. Consult his (Recollections of Sixty Years) (To¬ ronto 1914) ; Sanders, E. M., (The Life and Letters of the Right Honorable Sir Charles Tupper) (1916).

TUPPER, Sir Charles Hibbert, Canadian statesman, son of Sir Charles Tupper (q.v.) : b. Amherst, Nova Scotia, 3 Aug. 1855. He was educated at McGill and Harvard universities, taking the degree of LL.B. at the latter in 1876. In 1878 he was admitted to the bar and began the practice of law at Halifax, later prac¬ tising in British Columbia. He was elected to the Canadian House in 1882 and re-elected in 1883, 1887, 1891 and 1896. He entered the Con¬ servative government as Minister ‘of Marine and Finance in 1888, holding that office till 1894. In 1895 he was Minister of Justice and Attor¬ ney-General and for a short time in 1896 solici¬ tor-general. As Minister of Marine, he ob¬ tained the passage of several acts providing for the safety of ships and seamen ; as Min¬ ister of Justice he dealt ably with

the Manitoba school question. In 1893 he represented Great Britain in the Bering Sea arbitration tribunal at Paris; in the same year he was knighted. He retired in 1904.

TUPPER, Martin Farquhar, English poet: b. London, 17 July 1810; d. Albury, 29 Nov. 1889. He was graduated at Christ Church, Ox¬ ford, in 1832; studied at Lincoln's Inn; was called to the bar in 1835, but never practised, and in 1838 published the original edition of his (Proverbial Philosophy.* This he expanded into four series (1839-76). The earlier of these went through about 60 editions. By 1881 the work had reached the sale of 1,000,000 copies in America. The readers of it were either those whose ridicule made Tupper synonymous with the egregiously commonplace or those who calmly absorbed the strange effusion with convictions that the author <(had eclipsed Solo¬ mon.® It was summarily treated by reviewers, parodied widely and cleverly and for the years of its popular success remained a favorite butt of the critics. Remarks regarding him may be found in (Passages from the English Note- Books) of Hawthorne (1870). His other writ¬ ings, such as (War Ballads) (1854) and (Rides and Reveries of Mr. 2Esop Smiths (1857), were less conspicuous. In 1851 and 1876 he visited the United States. Consult the autobiographi¬ cal (My Life as an Author* (1886).

TUPPER LAKE, N. Y., an Adirondack village in Franklin County, on the northern

branch of the New York Central Railroad, about 108 miles northeast of Utica. Its chief industry is lumbering. Pop. (1929) 2,508.

TURA, too'ra, or TOORA, Siberia, a tribu¬ tary of the Tobol, 78 miles west of Tobolsk. Its length is 300 miles.

TURANDOT, an oriental fantasy in verse by the Venetian dramatist, Carlo Gozzi (q.v.), was th fourth of his Fiabe (those odd nursery- tale plays) and was produced in Venice, 22 Jan. 1762. To confute the criticisms of his adversaries, that the Fiabe owed their success to utilization of magic metamorphoses and scenic mechanism, Gozzi replied with a work from which the supernatural element and com¬ plicated stage devices were eliminated. The theme is the familiar Persian tale of the cruel princess averse to matrimony who compels her royal suitors to solve three riddles or to suffer death. This bald subject, already known to European literature from the (Gesta Ro- manorum,* becomes amplified in Gozzi's hands into a five act tragi- comedy by the addition of a secondary plot, the love of the enslaved Prin¬ cess Adelma for the princely hero, Calaf. Gozzi, with his

customary anachronisms, places the scene in Pekin and transfers there under the guise of court officials the stock Italian masks, Pantalone, Brighella, Truffaldino and Tartaglia, whose Venetian humor gives the comic con¬ trast to the serious plot. Turandot, the daughter of the gentle Emperor Altoum, has successfully eluded all suitors till Calaf solves the three enigmas. Excepting the third and fourth acts which are cluttered with seraglio bickerings and the insertion of the secondary action, beauti¬ ful in the handling of the confession of Adel- ma's love, the drama maintains its interest re¬ markably well. Calaf is strikingly poetic in his unswervable love and his detached romantic in¬ tensity. His faithful follower, Barach, is a well-drawn type of loyal devotion and self- sacrifice.

Lacking the essentially local appeal of the other Fiabe,

dot, Princess of China) (an adaptation in three acts from the German, London 1913).

Alfred G. Panaroni.

TURANIAN, a designation applied to the so-called agglutinative family of languages — ■ that is, languages in which no proper inflection exists, but in which pronouns are made to ad¬ here to the root of the verb to form the con¬ jugation and prepositions to substantives to form the declension. There must be no proper incorporation between the root and the ad¬ hering word ; the two must simply lie side by side, agglutinated or <(glued® together, but one must not modify the form of the other. The Turanian languages are agglutinative, while the Aryan and Semitic languages are inflec¬ tional, and the term Turanian is made to include every language of America, Asia and Europe that is not Aryan or Semitic, with the exception of Chinese and its related dialects. (See Chinese Language and Literature). Max Muller divides the Turanian languages into two great divisions, the Northern and the South¬ ern. In the Northern he includes five classes, the Tungusic, Mongolic, Turkic, Finnic and Samoyedic. He divides the Southern into four, the Tamulic or Dravidian languages of the Dekkan, the dialects of Bhotan and Tibet, the Taic of Siam and the Malayic of the Malay and Polynesian islands. He groups under these nine classes 116 dialects, to which others add Acadian, the Basque and North American tongues. There is serious doubt among phi¬ lologists as to whether the agglutinative lan¬ guages should be classed as a group, under a family

designation and Peile, in his work on (Philologyˆ published in 1877, expresses the view that ((these languages are much too dif¬ ferent to give any ground at all for believing that they all belong to the same family.® See Etymology; Language; Philology; Science of Language; Speech.

TURATI, Filippo, Italian Socialist: b. at Como, 1857. On graduating in the law at Bo¬ logna in 1877 he was appointed counsellor ‘from the province of Milan and later was elected a member of the Chamber of Deputies. He served as editor of La critica sociale (1891-1903), the Socialist organ, and became leader of the Ital¬ ian Socialists until temporarily deposed in 1904 by Enrico Ferri. He was, however, returned to power in 1910 on his reformist policy by the Milan congress.

TURBAN, a distinctive covering for the head, consisting of a long cloth wound around, sometimes enclosing a cap or tarboosh worn by most nations in the Orient’ and of very various forms in different nations and different classes in the same nation. In Moslem countries the style of the turban frequently indicates the posi¬ tion or rank of the wearer. The Turkish sul¬ tan’s turban contains three heron’s feathers, with many diamonds and other precious stones. The grand vizier has two heron’s feathers; other officers but one.

TURBAN-SHELL, a top-shell (q.y.), of the genus Turbo, so-called from its fancied re¬ semblance to a Moorish turban ; it is one of the commonest shells in the stock of every dealer in trinkets, polished to show its nacreous underlayers or fashioned into some ornament.

TURBELLARIA, the whirl-worms; a class of free-swimming platyhelminthcs, character¬ ized by the ciliated epidermis containing rhab- dites, a delicate body and usually also a muscu¬ lar protrusible pharynx. They were named by Ehrenberg in 1831 on account of the micro¬ scopic whirlpools produced in the surrounding water by the constant vibration of their epider¬ mal cilia. Some of these forms are minute and resemble infusoria; such are the Rhabdocoelida (q.v.). With the exception of certain rare parasitic forms all Turbellaria are carnivorous; they overpower the prey, perhaps by the pe¬ culiar cutaneous structures (rhabdites) already noted and then suck out the substance of the victim by means of the pharynx. The Turbel¬ laria include three orders, based primarily upon the character of the alimentary canal, namely, (1) Polycladida, in which the intestinal branches are numerous, radiating from a common cavity above the pharynx; all are marine. (2) Tri- cladida, in which the intestine has three main branches, extending one anteriad and two posteriad from

the pharynx. (3) Rhabdocoelida, in which the alimentary canal is straight and simple or at most slightly lobed. Almost all species are hermaphroditic, although in many male and female organs are in activity at suc¬ cessive periods rather than synchronously. The reproductive system is always complex. In many instances sperm masses are introduced into the body of a second individual by sub¬ cutaneous injection, being implanted in the skin at any point and compelled thus to make their way through the tissues to the proper location.

TURBERVILLE, or TUBERVILLE, George, British poet: b. Dorsetshire, about 1530; d. about 1610. He was educated at New College, Oxford, and became a Fellow in 1561 but left without a degree and studied law in London. He went to Russia in 1568 with Thomas Randolph, English Ambassador, and of his latter days nothing is known. He wrote pleasing verses and translated from the Latin and the Italian. Selections from his poems may be found in (Early English Poetry> (edited by Fitzgibbon, London 1887).

TURBINE, literally that which spins or whirls around ; in mechanics, a wheel which rotates by the aid of flowing water, air or steam and thus furnishes motive power for machinery. Although the steam-turbine is as old as the Christian civilization it is only within the last half century that it has been fully de¬ veloped. The ordinary turbine with which we are most familiar is the horizontal water wheel made to rotate by the escape of water through orifices, under the influence of pressure derived from a fall.

Water-Turbine. — There are three recog¬ nized types of the water-turbine, (1) the ra¬ dial; (2) axial; (3) combined or mixed-flow. Turbine wheels are made in various sizes from five to seven feet in diameter, with still larger sizes for extraordinary purposes. Perhaps the most powerful water-turbines in the world are those installed in 1894-95 for utilizing the power of Niagara Falls (q.v.). The supply of water to the turbine is regulated by a gate or gates, which can partially or entirely close the orifice where the water enters or leaves. The speed of a turbine is regulated by opening and closing the gate which admits the water. Where the

power used fluctuates, the speed will fluctuate unless some method is adopted to adapt the power developed to the power utilized. This is

usually done by means of a governor, which is so devised that when little power is being used the resulting increase in speed will actuate it to close partly the gate, and when much power is being used, the decrease in speed will actuate it to open the gate wider.

High and Low Pressure. — Turbines are di¬ vided into high and low pressure, the former being relatively small, revolving at a high speed, driven by elevated heads of water. The low- pressure turbines are relatively larger, contain a larger volume and run at a lower rate. In the Black Forest, Germany, turbines are running with heads of 72 and 354 feet, and having diameters of 20 and 13 inches, respectively. Low-pressure turbines perform excellent duty with large volumes of water having only nine inches head.

The Radial Turbine. — In radial turbines the water in passing through the wheel flows in a direction at right angles to the axis of rotation or approximately radially. The water may flow inward from the circumference to the centre or outward from the centre toward the circumfer¬ ence. The best-known type of the inward flow is the Francis turbine, and of the outward flow the Fourneyron turbine.

The Axial Turbine, or parallel flow as it is sometimes called, is one in which the water flows through in a direction generally parallel with the axis of rotation. The water may flow from the top downward or from the bottom upward. The best known type of the down¬ ward flow is the Jonval turbine.

The Combined Turbine, or mixed flow, is any combination of the radial or axial ; that is, the water may flow inward and up or down or outward and up or down. Still another classifica¬ tion is made to distinguish reaction turbines from impulse turbines. In the reaction tur¬ bine all parts are filled with moving water, while in the impulse turbine the buckets or other parts are only partly' occupied by the water passing over them, the atmosphere having access to the remaining space. A reaction turbine is driven by the dynamic pressure of the water, which may be under a certain static pressure, due to the fact that the inflow takes place under pressure, since the wheel is always filled with water. In the impulse turbine the inflow takes place freely against air pressure only. Most turbines are built on the reaction principle. For a more detailed description of water tur¬ bine see Hydraulics ; Water-wheel.

The Steam-Turbine. — The earliest known steam-turbine was that invented by Hero which is described in an Alexandrian manuscript of about 120 b.c. This was not a practical inven¬ tion, however, being

merely a toy. Little prog¬ ress was made in the turbine up to the 17th century. Branca made an impulse steam-tur¬ bine in 1624, and Edward Somerset followed with a device in 1650. The French engineer Tournaire is entitled to particular mention as having in 1853 indicated the capabilities of the steam-turbine. But the general introduction of the steam-turbine since 1890 is due to the Swed¬ ish engineer De Laval and to C. A. Parsons. Thus it is acknowledged that the progress of the steam-turbine is wholly modern and mainly

recent. Only after evolution of the modern mathematical sciences could its action be un¬ derstood and the machine be properly designed; only after modern tools and methods of me¬ chanical construction had become refined could it be built in safe and economical forms. The influence of the Hero toy or Alexandrian in¬ vention upon modern engineering is shown to have been of great value. The Hero idea lay dormant during nearly 2,000 years, which elapsed between the days of Greek philosophy and modern, practically applied, science..

Modern Development. — Steam-turbines are heat engines, converting the calorific energy of the steam into directly-available mechanical en¬ ergy. From another point of view they are

rig. 2

Turbine Jets.

analogous to hydraulic turbines, and in design, construction and operation are controlled by the same ultimate principles. To-day the tur¬ bine is more nearly a <(perfect steam-engine® than any other known type, so far as its design and construction are concerned. As in the case of hydraulic turbines the steam-turbine is di¬ vided into classes ; the two principal ones being action and reaction turbines ; and each of these classes is subdivided accordingly as the turbine is composed of a single wheel or of several wheels, traversed successively by the steam in course of expansion. Among reaction turbines (compared in hydraulics to the Jonval turbine) of which, as multiple machines, the prototype is the Parsons turbine, the steam is only partially expanded in the distribution and acquires its full expansion in the movable wheel. The steam, therefore, acts on the blades at once by its pressure and its velocity. In the action tur¬ bine, the steam only acts on the movable wheels by its velocity. Each wheel revolves in a casing in which the pressure is uniform. Action tur¬ bines revolve at a less velocity than reaction turbines. There are now recognized three ways of utilizing steam for the transformation of heat

into useful work: (1) By directing a jet of steam on all movable objects, such as the blades of fans, or, in reaction wheels, by allowing the steam passage itself to revolve ; (2) by con¬ densing steam in a cylinder and allowing the external atmospheric pressure to force a piston inward; (3) by cutting off slices of high-pres¬ sure steam and expanding in the cylinders of the modern reciprocating engine. The present- day steam-turbine designer, however, is merely concerned with the first and oldest method.

The Impulse Steam-Turbine. — The sim¬ plest possible steam impulse turbine must con-, sist essentially of a fixed nozzle guiding a jet of steam upon vanes arranged at a periphery of a rotating wheel in a very similar way to the buckets of the water-wheel ; but to turn this

wheel efficiently it is necessary not only to make the nozzle of suitable dimensions and shape for the work to be done, but to form the vanes or buckets of the wheel so that they make the best possible use of the steam as delivered from the nozzle. The function of the nozzle is to convert the whole available energy of the steam into mass velocity in the required direction. It should, therefore, be designed so as to expand the steam to the same pressure as that of the wheel chamber before the delivery on the vanes. If the nozzle is improperly formed, either the expansion will not be complete and the jet will burst into a cloud at the orifice, or eddy currents

there will be retardation of flow due to the skin friction, and if C is too short the steam will not have time to expand completely. The area at A, then, depends on the quantity of steam to be passed; the area, B, on final pressure required, and the length, C, on the velocity of flow due to the difference between initial and final pres¬ sures. The best shape for wheel vane faces is undoubtedly as nearly a semi-circle as is per¬ mitted by the angle of the nozzle in Fig. 3. This angle is usually about 20 degrees, which is nearly the maximum possible. While being of sufficient area to reverse the direction of current without shock or eddy, these vanes

Comparative sizes of Turbine and Reciprocating Engines. (This outline shows a familiar type of vertical reciprocating engine, enclosing a Parsons turbine-generator unit of the same capacity).

will be set up within the nozzle itself and re¬ tardation of flow will be

the result. To arrive at the best shape of steam nozzle, the ratio of expansion required should be first decided and the area of entrance — A in Fig. 1 — should bear a relation to the orifice, B, in direct propor¬ tion to the increased volume of steam when ex¬ panded. The curve of nozzle walls is calculated to allow gradual expansion, until maximum ve¬ locity, due to initial pressure energy, is attained. Fig. 1 shows an example of what is found to take place in an incorrectly shaped nozzle. The steam particles rebound from the. walls as shown by the dotted lines, and meeting at a a a a form points of greatest pressure. Turning again to Fig. 2, if the length, C, is too great,

should be short, so as to minimize skin friction, and the edges should be sharp to avoid blanket¬ ing the nozzle. The most efficient mean speed of vanes is just under half the velocity of the steam current, thus leaving the exhausted mole¬ cules relatively motionless. For this reason single disc turbines must revolve at enormous speed and be geared down for driving ordinary machinery. For example, a 10-inch De Laval turbine working at 70 pounds' pressure revolves 14,000 times per minute.

The Multiple-Step Plan. — Geared motors are avoided by most engineers, and so the mul¬ tiple-step steam-turbine was devised as a means for reducing the speed of rotation and driving machinery direct. This idea was first developed

by C. A. Parsons during 1884-87. The earliest Parsons parallel flow turbine was a collection of zigzag nozzles whose walls were formed by pro¬ jecting rings of blades intermeshing and so ar¬ ranged that the ˆzigs® were fixed to the inner circumference of a stationary hollow cylinder and the ((zags}) to the outer circumference of a rotable cylinder. The modern Parsons turbines from which such notahly economical steaming results have been obtained differ from the ear¬ liest — apart from improvements in mechanical and constructional detail — only in the alteration of the contour of the steam passages or nozzles from a zigzag to a sinuous shape. Instead of turning sharp corners the steam now traverses flowing curves and the cross-sectional area of steam channels increases in nearly exact propor¬ tion to the growing volume of steam as it

to a certain extent permitting correct mainte¬ nance of expansion ratios for varying steam pressures and loads. Professor Curtis argues

that his arrangement of a few large nozzles and wheels in series lessens the percentage of waste through spilling of steam. In order to reduce the revolutions per minute as far as possible, Mr. Parsons appears to advocate a large num¬ ber of turbines in series of small diameter, while Professor Curtis believes in few wheels of large diameter. Prof. A. Rateau of Paris has worked out a multiple step impulse steam- turbine, consisting of a number of Pelton or Laval wheels arranged in series on a shaft, each wheel revolving in a separate chamber. Dis¬ tributing nozzles convey the steam to the wheel vanes, and the whole of the expansion is ac¬ complished within the fixed nozzles. The steam

A comparative elevation of a 5 , 000 kilowatt steam-engine direct-connected to a generator, and a 5 , 000 kilowatt Curtis steam-turbine connected to a generator, showing economy of space.

expands to the exhaust pressure, the collective areas at each stage fulfilling more closely the conditions for a perfect nozzle, as previously mentioned. But as expansion takes place both within fixed and moving blades, as the whole passage is one continuous nozzle, the clearances and workmanship must be of the finest to min¬ imize leakage, which in the earlier machines caused serious trouble.

Professor Curtis of New York has designed large steam-turbines which follow Parsons' very closely in theory, but are differently worked out mechanically. Few revolving discs of com¬ paratively large diameter are arranged, and the fixed steam nozzles only play upon part of their periphery, in some cases only two nozzles being employed on the first disc. Provision is made for altering the nozzle areas according to load by opening or closing their tapered walls, thus

leaves the chambers at almost the same pressure at which it enters, the wheel vanes merely re¬ ceiving the impulse due to the velocity of the particles; there is, therefore, in this case no tendency to leakage and no necessity for clear¬ ance.

The Dow Turbine. — The turbine invented by Dow is an inward-flow wheel with concentric sets of guides and vanes in series, and is said to have attained 35,000 revolutions per minute, working regularly at 25,000, consuming 45 pounds of steam per horse power per hour. The Dow turbine, as built for work in connec¬ tion with the Howell torpedo, gives an average of about 11 horse power in coming up to speed in regular working, at 60 pounds steam-pres¬ sure, and weighs from 100 to 150 pounds, or not far from 13 pounds per horse power. Its fly¬ wheel rim attains a speed of nearly seven miles

a minute at 10,000 revolutions per minute. The designer estimates its power at 150 pounds steam-pressure and the same speed at 40 horse power, or one horse power to three and seventy- five hundredths pounds weight, and states that this may be still further reduced to the extraor¬ dinary minimum of two and one-half pounds weight per horse power, a figure within the estimated allowable maximum for use in aero¬ nautic work. These engines have been suc¬ cessfully employed in driving electric machin¬ ery and in ˆspinning® the <(fly® of the Howell torpedo. For alternating currents, this system possesses the peculiar advantage of permitting a <(dynamo® to be employed having but two poles. In the United States the substitution of the Dow turbine for the system previously in use for spinning torpedoes has brought down the weight and volume of machinery from the earlier minimum of 360 pounds and three cubic feet per machine to 55 pounds and one cubic foot.

The Tesla Turbine. — About 1910 Nicola Tesla exhibited a remarkable 100 horse-power engine, so light that an ordinary man could hold it at arm's length. It was a steam turbine utilizing a new principle. He made a wheel of parallel circular plates about three-sixteenths inches apart and boxed it in, with apartments at the centre and the periphery. Admitting steam at the periphery in a tangential position, the steam rotated the plates by side friction, and continuing around in reducing spirals continued to give out its propelling face as its speed re¬ duced. Thus it was doing the work of a mul¬ tiple expansion engine with uniquely simple apparatus. The spent steam escaped at the cen¬ tre. Though most wonderful in theory, this machine has not become commercially useful. See Steam ; Steam-engine.

TURBINE NAVIGATION. The applica¬ tion of steam-turbines (see Turbine) to tor¬ pedo boats, destroyers and cruisers is to be an¬ ticipated from their unique capacity for develop¬ ing great power and high speed with light and compact machinery. The conditions in a fast passenger steamer are favorable to the economi¬ cal application of steam-turbines, and in such steamers the smoothness of their running will be a strong recommendation. C. A. Parsons, who has made remarkable developments in the steam-turbine, claims many advantages for the marine turbine engine. Among these many ad¬ vantages he gives the following: (1) increased speed; (2) increased economy .of steam; (3) increased carrying power of vessel; (4) in¬ creased facilities for navigating shallow waters; (5) increased stability

of vessel; (6) increased safety of machinery for war purposes; (7) re¬ duced weight of machinery; (8) reduced space occupied by machinery; (9) reduced initial cost;

(10) reduced cost of attendance on machinery;

(11) diminished cost of upkeep of .machinery ;

(12) largely reduced vibration; (13) reduced size and weight of screw propellers and shaft¬ ing. It may be said, generally speaking, that the larger scale on which the engines are made, the simpler is the construction, the higher the steam efficiency and the lower the speed of rotation.

The Turbinia Experiments. — In 1894 the steam-turbine had developed to such an extent that a syndicate was formed to apply the turbine

to marine work, and a vessel, appropriately named the Turbinia, was built to develop high speed and to secure determinative measures of the value of steam-turbines in driving the screw-propeller. The first outcome of the ex¬ periment on the Turbinia was the discovery of a previously unsuspected cause of inefficiency at high speeds of rotation of the screw such as were adopted in this construction — ((cavitation® by centrifugal action about the screw, which worked in a self-created cave in the midst of the water, throwing out the water faster than it could flow into the space by the action of gravity, even reinforced by the often still more active tendency to fill the vacuum thus caused. It was only when the speed of rotations of the screws had been reduced to 2,000 revolu¬ tions per minute, and after they were set in series of three on the same shaft, that the little boat made her famous run and attained a speed of 32ˆ4 knots an hour, and later of 34ˆ2. The trials of the Turbinia were reported as follows:

<(The mechanical friction of the turbines is particularly small, and the work spent on fric¬ tion is not materially increased by increasing the range of expansion. This allows the steam to be profitably expanded much farther than would be useful or even practical in an engine of an ordinary kind. Apart from questions of friction the addition of weight and bulk to al¬ low for this extended expansion would be enor¬ mous in the ordinary engine; in the turbine it is very moderate. Steam is expanded nearly 200- fold in the Turbinia and this is accomplished with engines which are much lighter than re¬ ciprocating engines of the same power, although in these the expansion would be much less complete. Rough weather was met with

in some of the trials, but the Turbinia proved to be a good sea boat. The machinery worked with perfect smoothness, the screws did not race and the bearings remained perfectly cool throughout. From first to last during the whole of the trials, there was no hitch whatever or difficulty of any kind in the action of the tur¬ bine. Some 20 were made under various condi¬ tions as to speed, the range of speeds tested extending from 6ˆ4 knots to 32ˆ4 knots. Two successive runs on the measured mile in oppo¬ site directions in smooth water and at the slack of the tide gave the following data:

Trial of Turbinia.

Time on the mile, first trial, 109f sec.; second trial, 110 sec.

Corresponding speed in knots, first trial, 32.79; second trial, 32.73.

Mean speed in knots, 32.76.

Revolutions per minute, of high pressure and intermediate shaft, 2,230.

Revolutions per minute of low-pressure shaft, 2,000.

Steam pressure in boiler by gauge, 210 pounds per square inch.

Steam pressure on admission to high-pressure turbine, 157 pounds per square inch.

Greatest pressure in stokehold by water gauge, 7} inch.

The speed reached during this trial, 32.76 knots, in the mean was the highest recorded for any vessel. It is greatly in excess of the speed hitherto reached for a boat so small as the Turbinia, It is clear that the exceptional speed developed in the Turbinia has been achieved without sacrifice to economy, and that the substitution of turbines driving high-speed screws in place of reciprocating engines driving

screws of much more moderate speed is not attended with increased consumption of steam so far as fast running is concerned.®

The Viper Destroyer. — The success of the Turbinia led to the construction in 1899 of a naval <(torpedo-boat destroyer,® Viper, and this craft, only 210 feet in length, of 375 tons dis¬ placement,

developing 11,000 horse power, on 15,000 square feet of heating and 376 feet of grate surface, in water-tube boilers, with steam at 175 pounds by gauge; at 1,050 revolutions of the turbines, made over 37 knots, above 43 miles an hour. The contract speed was 35 knots. The turbines were two .high and two low pressure, each driving a separate shaft car¬ rying two propellers. The turbines were 35 and 50 inches in diameter. No vibration was produced by the engines, and the engine-room was so quiet that it was hardly possible to realize the presence of engines developing over 10,000 horse power. Here, as in all craft of the sort, the extraordinary performance in power production, once all is understood, is that of the boilers; that of a horse power for each one and one-half square feet of heating surface, and from each square foot of grate about 30 net horse power. This is probably the most extraor¬ dinary phenomenon in this or any other ex¬ ample of marine engineering. For warships of the destroyer class the absolute maximum of possible speed is the first thing to be desired, and the expenditure necessary to secure the extra speed is a matter of comparatively small importance.

The Turbine Passenger-Steamship. — In

1901 the turbine for passenger steamships was first adopted on the King Edward VII, a pas¬ senger steamer of a type in common use on the Clyde, built by William Denny Brothers of Dumbarton, Scotland. The builders, the Par¬ sons Turbine Company and a captain of long experience in the Clyde passenger trade and the steamers by which it is carried, were all equally interested in the venture. To insure that accu¬ rate data on which the performance of the tur¬ bine might be obtained, the King Edward was modeled as nearly as possible of the same size and same general design as the paddle steamer Duchess of Hamilton, one of the crack steamers running on the route for which the King Edward was designed. The latter is, however, of slighter greater draft and more displacement. The weight of the motors, con¬ densers, steam pipes, auxiliaries connected with the propelling machinery, shafting, propellers, etc., is 66 tons ; which works out at about half the weight per indicated horse power of the engines required for paddle steamers of the same type. Another advantage secured to the boat by the adoption of the turbine engines is increased deck space for passengers.

Steam is raised in a double-ended Scotch boiler of the ordinary type, 20 feet long by 16 feet 6 inches in diameter. There are four fur¬ naces at each end, made to work under forced draft with closed stokehold. For purposes of comparison, the capacity of the boiler under these conditions might be set down roughly at about 3,000 indicated horse

power. It is, how¬ ever, in the steam-turbine — the first engine to realize the dream of a perfect steam-driven ro¬ tary engine — that the chief interest in the craft is centred. The principle of the turbine

is fortunately simple enough to make it easy of explanation. Inside the cylinder to which the steam from the boiler is led is a drum or hollow shaft studded with row upon row of blades or vanes, all set at an angle to the flow of the steam as the sails of a windmill are set to the breeze. It is apparent that the rush of steam deflected from its course by the first row of blades would not reach the next in such a directtion as would allow it to do its work effectively. To meet this difficulty there are, between each row of the working blades, a row of guide-blades fixed to the inside of the cylinder casing and set at the reverse angle. These blades are stationary and their sole pur¬ pose is to again alter the direction of the flow of the steam and bring it back to the straight course from end to end of the cylinder before it meets the next succeeding row of working blades. The tops of the revolving blades reach nearly to the outer casing of the cylinder and the stationary blades project inward until they almost scrape the revolving shaft or drum. A series of turbine wheels on one shaft are thus constituted, each one complete in itself, like a parallel-flow water-turbine; but, unlike a water-turbine, the steam, after performing its work in each turbine, passes on to the next, preserving its longitudinal velocity without shock, gradually falling in pressure on passing through each row of blades, and gradually ex¬ panding. There is no rubbing friction and no wearing parts except the bearings on which the main shaft or drum revolves.

Following are the net results of the compara¬ tive trials :

Coal,

Mileage,

Miles per ton. Number of days run,

Daily average consumption Average speed,

Duchess of Hamilton

1,758 tons, 13 cwt.

15,604 8.87

15 tons, 17 cwt. 16£ knots.

King Edward

1,429 tons, 16 cwt.

12,116 8.47

79

18 tons, 2 cwt. 18§ knots.

The success of the King Edward was so pronounced that arrangements were at once made to construct other vessels of the same type, to be engined also with the steam-turbine. Larger and yet larger ocean-going vessels are ‘being built and equipped with turbine engines, which have demonstrated their many advan¬ tages. See also Steam Vessels; Steam-En¬ gines

Gardiner D. Hiscox, M.E.

TURBIT, a breed of domestic pigeons, having a small flattened head and very short beak, a crest and a ruffled breast. The colors are various, but usually the body is white and the wings are colored.

TURBOT, a European flounder (Rhombus maximus), brown and speckled in color and usually weighing about 10 pounds, and excep¬ tionally as much as 40 pounds, which is famous as a delicacy. It inhabits rather shallow waters in the Mediterranean and in the Atlantic, but is rare northward of Scotland. Like the other flatfishes it lies on the bottom concealed by sand with which it covers itself partly and seizes such small fish as approach, displaying much activity in their pursuit. It spawns dur¬ ing the spring and early summer and full-grown females deposit between 5,000,000 and

10,000,000 eggs. In the early stages of develop¬ ment the eggs are buoyant, but later sink to the bottom. The turbot is an important food-fish and much esteemed in England and on the Con¬ tinent. Some are taken on hand-lines, but the bulk of the supply comes from the trawl-fishery in the English Channel. The nearest representative of the turbot on our Atlantic Coast is the window-pane flounder (R . macula-tus), so called on account of its rhomboidal shape and a slight

translucency, but this has very little value as a food-fish.

TURCHIN, ter'chin, John Basil (Ivan Vasilevitch Turchininoff), Russian-Ameri- can soldier: b. province of Don, Russia, 30 Jan. 1822; d. Anna, Ill., 19 June 1901. After his graduation at the Artillery School, Saint Peters¬ burg, in 1841, he entered the service as ensign, participated in the Hungarian campaign and afterward was graduated in 1852 at the military academy for officers of the general staff. After the Crimean War, in which he attained the rank of colonel of the Imperial Guards, he re¬ moved to the United States and adopted the profession of civil engineering. When the Civil War broke out he was commissioned col¬ onel of the 19th Illinois volunteers and came to command a brigade under General Buell in Tennessee. He proposed a plan that proved successful in the capture of Huntsville and in recognition of this service he was made briga¬ dier-general. After the war he returned to his profession as civil engineer. In 1873 he founded in Washington County, Ill., the Polish society of Radom. He contributed to scientific and military periodicals and wrote (Military Ram¬ bles > and (The Campaign and Battle of ChickamaugaP

TURCO-ITALIAN WAR 1911-12. Ever since the occupation by France of Algeria and Tunis in 1882, Italian statesmen had been more or less preoccupied with the question of Tripoli and Cyrenaica, the last remnants of Turkish dominion in Africa. On the northern coast of the Black Continent, that strip which belongs to Egypt was to all intents and purposes already British, though nominally still under Turkish suzerainty; French Algeria and Tunis stretched westward almost to Gibraltar, to the borders of Morocco. Only Tripoli and Cyrenaica were Turkish, wedged in between British and French boundaries. All that Italy possessed outside the homeland was a matter of 185,000 square miles on the east coast of Africa — Eritrea and Italian Somaliland, and the tiny concession at Tientsin, China. Her efforts to found an over-seas empire had not met with success; continually instigated by Bismarck to launch out in colonial enterprises wherever she might risk a collision with France or Great Britain, Italy had come to grief at Adowa in 1896. But she had coveted Tripoli long before the Abys¬ sinian disaster. In 1890 Premier Crispi wrote privately to Lord Salisbury: ((If we had Tripoli, Bizerta would no longer be a menace for Italy nor for Great Britain. * It was sus¬ picion of France, fostered by Bismarck, that had led Italy into what became known as the Triple Alliance; but that suspicion had died out in time and given place to a rapprochement between the two Latin nations. Bismarck had persistently refused to extend the Alliance to the Mediterranean, where Italy's chief interests

lay. At the time Crispi wrote about Tripoli to Lord Salisbury, France and England were avowed enemies, hence Italy's aspirations had to follow the British statesman's advice, namely, to wait. Crispi fell in 1891, and the occupation of Tripoli waited for 20 years. The accession of M. Delcasse to the French Foreign Office in 1898 changed the history of Europe. He settled the Fashoda crisis with England, arranged a treaty of commerce with Italy and inaugurated that Mediterranean policy which led to the Anglo-French Entente, secured British estab¬ lishment in Egypt, the French protectorate over Morocco and secret acquiescence (in 1901) to the Italian seizure of Tripoli. About 1902 Italy began to adopt a policy of <(peaceful penetra¬ tion® in Tripoli and Cyrenaica by founding a number of undertakings, commercial and indus¬ trial, throughout the territories. The Bank of Ronre provided the capital to build grain ele¬ vators, electrical works, factories, etc., gradu¬ ally securing a kind of mortgage on the prov¬ ince that might, if necessary, provide an op¬ portunity for armed intervention. It was only a question of time that such opportunity should arise, for the Turkish authorities placed every possible obstacle in the path of economic de¬ velopment and made the most strenuous efforts to thwart the Italian ventures. All the under¬ takings languished, the invested capital re¬ mained unproductive and bankruptcy loomed on the horizon. Early in 1911 the manager of the Bank of Rome informed his government that he was preparing to enter into negotiations with an English and a German group of financiers, driven thereto in the interests of the shareholders (Revue des deux Mondes, 1 June

1912).

According to M. Rene Pinon, this undesir¬ able prospect greatly contributed to the de¬ termination of the Italian government to inter¬ vene by force of arms if other measures should fail. There was another consideration that made it incumbent for Italy to hasten matters to a crisis. Germany, one of her partners in the Triple Alliance, was preparing to forestall her in the move on Tripoli, with the intention of acquiring a coaling station on the North African Coast. Public opinion in Italy was ripe for a military adventure; for some decades a kind of ˆnationalist® movement, headed by enthusiastic young officers and literary men, had gained many adherents to the tenets of imperialism and colonial expansion. On the other hand, there were many of the older type of Garibaldians who regarded the raid on Tripoli as an act of brigandage. From the beginning of September 1911 the position in Tripoli was hotly debated in the press, the Turks being accused of injustice to Italians and of intriguing with Germany. The Turkish trans¬ port Derna arrived at Tripoli on 26 September laden with guns

and munitions. Italy delivered an ultimatum on the 27th giving Turkey 48 hours in which to accept the occupation of Tripoli by Italian troops and an Italian admin¬ istration, with the proviso that the Sultan's sovereignty should be secured and an annual tribute paid by the new protectorate to the Porte. An Italian fleet was already stationed off Tripoli; an expedition under General Caneva set sail from Italian ports. On 29 Sept. 1911 Italy declared war, secure in the moral

support of the French and British govern¬ ments. Tripoli was blockaded on the 30th; two days' bombardment easily smashed the Turkish defenses, and the city was occupied on 5 October. Though the attacking vessels were only three or four miles from the land, not one of the few Turkish shells that were fired struck anything. The Turks themselves sank the Derna and another small steamer. In¬ cluding reserves, the Turks had about 8,000 men in Tripoli. The defenses of the town were old-fashioned, of concrete, equipped with ob¬ solete guns. The enormous disparity between the feeble Turkish navy (of four battleships and two cruisers) and the powerful, modern Italian fleet rendered it most unlikely that Turkish reinforcements should be sent to Tripoli by water, and no other way existed. On 29 September Italian warships sank some Turkish torpedo-destroyers off Prevesa in the Adriatic, which led Austria to forbid any fur¬ ther operations in those waters, thus obliging Italy to restrict her naval campaign to the Tripolitan Coast and the Red Sea, the ˆEgean Sea being also barred. By the time the Italians landed in Tripoli the Turks had withdrawn 10 miles inland. Italian transports poured fresh troops on different parts of the coast, including 10,000 at Benghazi, which was captured on 20 October, and Derna on the 18th. The Italians expected that the Turkish troops would sur¬ render and that the native Arabs would yield to the invasion, but both Arabs and Turks joined forces and fought valiantly. Around the town of Tripoli, which stands on a little peninsula, the Italians erected an entrenchment of about 10 miles facing the desert. Nesciat Bey, the Turkish commander, attacked through the oasis on 23 October; the Arabs behind the Italians in the suburbs suddenly attacked in the rear. The Italians were only able to save themselves after a long and desperate fight. On 26 October another attack took place, but was repelled with considerable Italian losses. On 5 Nov. 1911 the Italian Official Gazette published a decree de¬ claring the annexation of Tripoli, which Gen¬ eral Caneva read in the presence of the troops and the natives. The annexation was by no means complete, however, for the obstinate re¬ sistance of the Turks

and the Arabs hindered the Italians from advancing very far from the coast. The Arab rising had been accompanied by hideous cruelties toward captured Italian soldiers ; its suppression was marked by equally savage reprisals and a wholesale slaughter on the Italian side. Deplorable details were pub¬ lished by foreign newspaper correspondents to¬ gether with photographs taken on the spot. Turkish officers by some means got into the country, reorganized the troops and soon took the offensive by continually harassing the Italian lines. One of the officers was Enver Bey, who afterward stated in a news¬ paper article, <(I found 900 desert warriors when I came here, and now I have under me 16,000 trained soldiers.® He said that on one occasion his little army had captured two ma¬ chine guns, 250 rifles, two cannons, 30,000 cartridges and 10 mules from the enemy. In November 1911 the Italians made preparations to attack the Dardanelles, but the plan was vetoed by Russia. Early in November the Italians recaptured two positions which they

had evacuated in October; and on 4 December forced the Turks to abandon their base at Ain Zara, which they fortified. On 19 December an Italian column narrowly escaped annihila¬ tion. By the end of the year the Italian press grew restive and inclined to blame Germany, Austria and France for the obstacles to Italian success. France and England were accused of upholding traffic in contraband of war, and energetic steps were demanded from the navy. In January 1912 the Italians had 100,000 men at the front; Enver Bey commanded about 15,000 Turks around Benghazi, and some 10,000 or 12,000 were located at Tripoli. Up to April the Italians remained on the defensive, repel¬ ling violent Turkish attacks. In January two French vessels were seized on suspicion of carrying contraband. France protested, and the vessels were released. During February and March the Italians captured several strong positions; near Benghazi the Turks were com¬ pletely defeated and two small Turkish war¬ ships were sunk in the harbor of Beirut. Since January 1911 Turkey had been endeavoring to quell a rising in Yemen, and had for that pur¬ pose moved troops from Tripoli — before the Italian ultimatum — and sent them to Arabia. In January 1912 Italian warships entered the Red Sea, sank several Turkish gunboats and bombarded Jebel Tahr, Hodeidah and Loheia, besides dropping shells on various Turkish camps and hampering the Yemen operations by declaring a blockade of the coast. On 25 March 1912 the German emperor intervened in person by meeting the king of Italy at Venice. But his mediation proved fruitless, owing to Ger¬ many's double role as Turkey's protector and Italy's ally. In April an Italian force landed near the Tunisian frontier at Zuara and cut the main artery of the contraband smuggling busi¬

ness. An Italian squadron now approached the Dardanelles and bombarded the outer forts (18 April 1912). The Turks promptly closed the straits to all shipping, with remarkable conse¬ quences. The loss to Russian grain export quickly amounted to many millions. England, Bulgaria, Greece and Rumania lost some $100.- 000 per day each ; British steamers, headed for the Black Sea, had to be diverted through the Suez Canal toward Indian markets; on 2 May 1912 there were 185 idle vessels anchored east and west of Constantinople. Yielding under powerful representations from European gov¬ ernments, the Turks reopened the Dardanelles on the 10th of May. , On 5 May a strong Italian force landed at Rhodes, on the island of that name, occupied the capital and 10 days later compelled the Turkish garrison to surrender. They also occupied the islands of Neros, Karki, Stampalia, Piscopos, Scarpanto, Patmos, Casos, Kalminos, Karpathos, Kos, Lipsos and Simi. On 8 June the troops in Tripoli defeated a Turco-Arab force at the oasis of Zanzur and on the 15th General Camerana attacked near the oasis of MUrata, which was taken in July. Heavy fighting took place on the western frontier during June, July and August. By slow degrees the Turks and Arabs were driven back until the whole western coast-line was in Italian hands. On 5 Sept. 1912 General Caneva was re¬ called and two separate commands were formed for Tripoli and Cyrenaica. During the night of the 12th July five Italian torpedo-boats en-

tered the Dardanelles to attack the Turkish fleet lying above the. Narrows. But the entrance to the Narrows was barred by thick steel cables at Ivilid Bahr and they had to retire under heavy fire from the shore batteries. This was the last naval operation of the war. In Sep¬ tember it leaked out that peace negotiations between Italy and Turkey were in progress under a veil of mystery in Switzerland. Each side was anxious to end the war : Turkey, to prepare for another war that hung over her head, and Italy, to recover her freedom of action in Europe. Meanwhile, fighting con¬ tinued in Tripoli. On 22 September a strong Turco-Arab position south of Zanzur was attacked and captured. During the middle of the. month Enver Bey attacked the Italian positions at Casa Aronne and Kasr-el-Lebn in Cyrenaica. In a fierce battle the Turks were repulsed with heavy loss. A few miles east¬ ward the Italians stormed Sidi Abdullah and occupied Bombah on 7 Oct. 1912. On the

next day Montenegro declared war bn Turkey — the overture to the

Balkan Wars (q.v.). On the 12th a hitch occurred in the peace negotiations. Italy was preparing for further naval operations, and for the moment it seemed that she would become an ally of

the Balkan League (q.v.). Turkey needed peace with Italy at all costs to prevent this; besides, Italian command of the ZEgean hindered Turkey from sending troops to

Macedonia. The Italian terms were accepted in full and the Peace of Lausanne was at last signed at Ouchy on 15 Oct. 1912. Turkey

bound herself to withdraw her troops from Tripoli, but did not recognize the sovereignty of Italy; she was to have a representative to watch over the interests of Mohammedans in Tripoli. On her side, Italy was to restore all the captured ˆEgean Islands, on condition that a full amnesty should be granted to their in¬ habitants, and their autonomy respected: she was to pay that part of the Ottoman Public Debt which is guaranteed by revenue from Tripoli and Cyrenaica. Consult Irace, Chevalier Tullio, (With the Italians in Tripoli: The Authentic History of the Turco-Italian War) (London 1912) ; Fullerton, W. M., (Problems of Power) (London 1913) ; McCullagh, F., Htaly's War for a Desert) (Chicago 1913)

TURDID7E, Turdus, the family and genus of the typical thrushes.

TURENNE, Henri de laˆTour d'Auvergne, on-re de la toor dd-varn-y tˆi-ren, Vicomte de, French commander: b. Sedan, 11 Sept. 1611; d. Sasbach, 27 July 1675. He learned the art of war under his uncles Maurice and Henry of Nassau, and in 1630 entered the service of France. In this service he distinguished him¬ self in Lorraine and northern Italy, and in December 1643 he received from Mazarin the command of the army of the Rhine. In August 1646 he succeeded, by a series of skilful ma¬ neuvers, in forming a union with the Swedes under Wrangel, and along with him defeated the Bavarians at Zusmarshausen, and com¬ pelled the elector to agree to a truce (March 1647). During the disturbances of the Fronde, which began in 1648, he at first sided with the malcontents; but after the death of his elder brother he changed sides, and defended the court against the Prince of Conde, who had vol. 27 — 12

previously been the main support of the court party. The victories of Turenne at Bleneau on the Loire (April 1652), and in the suburb of Saint Antoine at Paris (July 1652), led to the termination of the civil war and the com¬ plete triumph of the court party ; but during these disturbances the Spaniards had taken up arms, and now under Xonde,

who was so ex¬ asperated with the court that he joined the enemies of France, invaded Artois. Turenne was sent to repel the invasion, and gained a victory at Arras in 1654. But the war was prolonged for several years. At last his vic¬ tory on the downs near Dunkirk in 1658, and the capture of Dunkirk itself in the same year, prepared the way for the Peace of the Pyrenees, which was concluded in the following year. In 1660 he was named marshal-general of the camps and armies of France. When the war was renewed with Spain in 1667 Turenne con¬ quered Flanders in three months, and in the following year subjugated Franche-Comte in as many weeks. In the Dutch War of 1672 he had the chief command and earned greater re¬ nown by his exploits during this war than in any other. Turenne first marched against the elector, Frederick William of Brandenburg, and having driven him back as far as the Elbe forced him to sign the Treaty of Vossem in 1673. In the winter campaign of 1674-75, which was signalized by the victories of Sintzheim, Mulhouse (1674), and Turkheim (1675), he delivered Alsace, which had been given up for lost by the minister of Louis XIV, from the imperial troops. This is the most brilliant cam¬ paign of his whole career. He was killed at Sasbach while making his preparations to en¬ gage Montecuculi.

TURFAN, toor-fan', Eastern Turkestan, an important city on the south slope of the Tyan-Shan Mountains and on a tributary of the Tarim River. Its once important trade declined seriously in 1860-70 owing to the troubles in Kashgar. Pop. 30,000.

TURGAI, toor-gi'. Russian Central Asia, a' sparsely populated district lying south of the government of Orenburg, and north of the Aral Sea. Area, 169,832 square miles. Pop. 706,200. It is traversed in the west 'by the southern extremity of the Ural Mountains. The rest of the country is steppes inhabited by Kirghiz and their herds.

TURGlSNIEF, Ivan Sergyeyevitch, Rus¬ sian novelist: b. Orel on the Oka. 9 Nov. 1818 (N. S.) ; d. Bougival, 3 Sept. 1883. He be¬ longed to an old aristocratic family. One of his ancestors, Pyotr Turgenief, was executed on the Lobnoye Myesto in Moscow for at¬ tempting to unmask the False Dmitri. An¬ other, Yakof Turgenief, was the famous jester of Peter the Great, who suggested cutting off the patriarchal beards of the Boyars. Ivan's father, Sergyei Nikolayevitch, was a member of the Yelisavyetgrad regiment of cuirassiers serving at Orel, where he married Varvara Petrovna Lutvinova, and retired with the rank of colonel. In 1820 he took his wife and three sons to western Europe. At Bern, when about four years old, Ivan narrowly escaped the fate of the children that mocked Elijah: he was looking at the bears and if his father had not seized him by the leg in time he would

have tumbled into the pit. On returning to Russia he was given the usual education of wealthy landowners. He always regretted that his native language was not included in the curriculum. What he learned of Russian poetry and legend came to him by the mouth of one of his mother's serfs who introduced him to the Rossiad, ' the first Russian book he ever read. In 1828 the Turgeniefs removed to Moscow and Ivan entered the university when he was 16, but in 1835 he was trans¬ ferred to the University of Saint Petersburg, where he finished his studies as Kandidat in the department of philology. He had already felt the impulse to write, and he tells in his (Recollections ' how in 1837, under the eye of Professor Pletnyef, he composed (

Nobleman's Nest' (1858) ;

Nathan Haskell Dole.

TURGITE, ter'jit, a common iron ore much resembling limonite, with which it is usually associated. It is distinguished from that by its red streak, higher specific gravity, 4.14 to 4.68, and by its violent decrepitation when heated. It usually occurs in compact-fibrous, often botryoidal or stalactitic coatings on the surface of limonite. It then possesses a bril¬ liant submetallic lustre on the outer surface and a much duller, satiny lustre on the broken fibrous surfaces. Its color is black or dark brownish-red ; hardness 5 to 6. Its most typical American locality is in Salisbury, Conn. It also occurs in an earthy form like red ochre.

TURGOT, tur-go, Anne Robert Jacques,

French statesman: b. Paris, 10 May 1727; d. there, 20 March 178}. In 1751 he renounced his intention of entering the Church, and in the end of the following year he was admitted a councillor of the Parliament. While fulfilling the duties of this position he also occupied him¬ self with economical studies, and made himself well acquainted with the physiocratic system of Quesnay. In 1761 he was appointed intendant of Limoges, which post he occupied for 12 years, and was long remembered with gratitude for his wise, salutary and benevolent reforms and regu¬ lations. On the accession of Louis XVI in 1774 Turgot was first put at the head of the marine; but a few months later he became comptroller- general of France. He moderated the duties on articles of the first necessity without loss to the revenue; freed

commerce from many fetters, and encouraged industry by enlarging the rights of individuals, and abolishing the exclusive privileges of companies and corporations. He

also formed a project for commuting the feudal rights, for rendering salt an article of free mer¬ chandise, and for reforming the royal household. His reward for these useful and benevolent views was opposition and ridicule. He was, however, able to carry into effect some very im¬ portant improvements ; but as he endeavored to control the nobility, restrict the clergy, and re¬ strain the license assumed by the officers of the Crown, they all united against him. The result was his dismissal from office in 1776, from which period he lived a retired and studious life until his death.

TURIN, tu'rin, or TORINO, to-re'no, Italy, capital of the province of the same name, on the Po, 75 miles southwest of Milan. Its po¬ sition at the junction of several Alpine mountain routes lends it much military importance. It is a large military station, directed toward the defense of the western highways over the Alps. It contains numerous fine squares of Piazzas, chief of which is the Piazza Vittorio Emanuele, unsurpassed on the Continent; Piazza Carlo Emanuele II or Carlina; and others, usually embellished by equestrian statues or busts of distinguished men. The Nuovo Giardino Pub- blico, along the river, botanical garden, Giardino della Citadella, Giardino Reale and zoological garden are interesting parks. The Renaissance cathedral (1492-98) has a marble fagade and con¬ tains the tombs of the Dukes of Savoy. Other churches are the Consolata, San Spirito, San Massimo, Gran Madre di Dio, a Moorish syna¬ gogue, and a Waldensian church. La Superga is a fine Basilica on an eminence overlooking the town. It is the burial chapel of the House of Savoy. The chief palaces are Palazza Madama, Carignano, — with natural history col¬ lections — Palazzo di Citta, or town hall — con¬ taining a library and monuments — Palazzo Reale, or royal palace, with a royal armory, Palazzo dei Torri, Palazzo del Accademia delle Scienze, with a fine collection of antiques and a picture gallery, etc. The museums and Ac¬ cademia Albertina delle Belle Arti, the exchange, arsenal, university (1404), theatres, hospitals and numerous schools are the other important edifices. One of the best libraries of Europe is housed in the Biblioteca Nazionale. The Royal Albertine Library of 60,000 volumes and 3,000 manuscripts is also located here, and there is a municipal library of 104,000 volumes. Manu¬ factures are important

and consist of silks, jewelry, furniture, pianos, gloves, leather, paper, iron and steel goods, soap, tobacco, machinery, and velvet hats; silk and wine are exported. Turin was the capital of the modern kingdom of Italy until 1865; it was the ancient capital of the Taurini, a native tribe of Celto-Liguarians, and was the seat of government under Charle¬ magne until 1032. The French captured the town in 1640 and in 1800 annexed it. In 1815 it was restored to the House of Savoy. Pop. 451,994. Consult Borbonese, (Torino illustrata e descritta) (Turin 1884), and Promis, (Storia dell antica Torino) (ib. 1871).

TURIN, University of, Italian school founded by Louis of Savoy (1405). Toward the latter part of the 15th century it shared the prosperity of the period. It was reorgan¬ ized in 1632 and the present building was erected in 1713. The university has faculties of law, medicine and surgery, philosophy and let¬

ters, and physical and mathematical sciences. There is an average annual attendance of over 2,000 students.

TURK ISLANDS, British West Indies, a group of small islands lying at the southeastern extremity of the Bahamas, north of Haiti, but forming, with the neighboring Caicos Islands, a dependency of Jamaica. The area is 165ˆ2 miles. Grand Turk, the principal member, is seven miles long, but the Caicos Islands are larger. The chief product is salt. Pop. 5,615, of whom 286 are white. Education is free in the government schools, of which there are nine of primary grade, with an enrolment of 1,030, and an average attendance of 794 pupils. The total imports annually amount to about $150,000 and exports somewhat less. There is a cable station at Grand Turk. See Caicos Islands.

TURKESTAN, toor-kes-tan’, Central Asia, the general name given to the region lying be¬ tween Mongolia, China and Tibet on the east and the Caspian Sea on the west. It is divided by the Mustagh range and a southwestern out¬ runner of the Tyan-Shan Mountains into East or Chinese Turkestan and West or Russian Turkestan.

East Turkestan is bounded on the north by Sugaria, on the east by Mongolia and China, on the south by Tibet and India, and on the west by Western or Russian Turkestan. Area, 550,340 square miles. It consists of a desert plateau basin skirted by the Tarim River, and encircled on all sides by mountains — on the north by the Tyan-Shan, on the south by the Kuen-Lun, and on the west by the Pamir high¬ lands. Agriculture is carried on only in the oases and in irrigated districts along the river, where cotton, tobacco and hemp are grown.

The chief exports are silver, silks, felts, carpets and cotton. East Turkestan belongs adminis¬ tratively to the Chinese province of Sin Kiang. Pop. 1,200,000.

West Turkestan in* its widest sense in¬ cludes the entire southwestern portion of Asiatic Russia. It consists of the states of Khiva and Bokhara in the south, the general govern¬ ment of the Steppes in the north, and the gen¬ eral government of Turkestan, or Russian Turkestan proper. The latter reaches from the Chinese Empire to the Caspian Sea, and con¬ sists of the districts or provinces of Samarkand, Fergana (with Russian Pamir), Semiryechensk, Syr-Darya, and the Trans-Caspian region. Area, 649,644 square miles; exclusive of Trans-Caspia, 409,414 square miles. The extreme eastern and southeastern parts are mountainous, but the greater portion consists of vast arid steppes traversed, by the rivers Amu and Syr Darya which flow into the Aral Sea. Only the irri¬ gated portions along the rivers can be culti¬ vated; they produce wheat and rice in great quantities, besides melons, grapes, fruits and cotton. The nomadic inhabitants of the steppes are engaged in cattle raising. Wheat, raw cot¬ ton and cattle products are the principal ex¬ ports, and trade has been greatly facilitated by the completion of the Trans-Caspian Railroad. The capital of the general government is Tash¬ kent and the pop. about 5,300,000; exclusive of Trans-Caspia, 5,000,000.

TURKEY, a river in northeastern Iowa. It flows southeast and enters the Mississippi in

the southeastern part of Clayton County. The Galena limestone is found in the Turkey River Valley. The river is about 100 miles long.

TURKEY, an American game-bird of the pheasant family and genus Meleagris, widely known both wild and domesticated. The com¬ mon northern wild turkey (M . gallap-avo) formerly inhabited almost all parts of the United States and southern Canada and south¬ ward through the greater part of Mexico ; it is now numerous, however, only in thickly wooded mountainous and inaccessible regions. It is a very beautiful bird of trim form and stately mien and the cock is colored with golden bronze hues, marked and varied by the blue and black lustre of the plumage. A peculiar tuft of hair¬ like feathers is suspended from the breast, and the head and neck are furnished with wattles and erectile structures, which under excitement exhibit

varying tints and hues. The wild tur¬ key is a bird of the forests, where it lives in small flocks which enter clearings only to feed. They are eminently terrestrial, being swift of foot, and they scratch on the ground for the nuts, seeds, insects, etc., upon which they feed or pick berries and small fruits from the bushes. When pursued they prefer to run and seek concealment in the underbrush but if forced to fly are strong of wing. At night they roost in the tops of trees and are always keen- sensed and alert. Like most of the pheasants turkeys are more or less polygamous and in the spring the cocks fight viciously for the posses¬ sion of mates, before whom they show off in the pompous and ludicrous manner so well known in the domesticated bird. A simple nest on the ground, often by the side of a log, is made and lined with dry leaves ; in it from one to three females deposit from 10 to 25 eggs, which are dirty white with reddish spots. Only one brood is raised in a season unless accident overtakes the first.

Although formerly so abundant and so tame that the early settlers* found the neighboring forests almost as convenient as poultry yards, few persons have now the opportunity of shoot¬ ing a wild turkey, but any such are events in the life of a sportsman, for success requires both skill and knowledge. The method most in vogue is for the concealed hunter to attract the birds to him by imitating their call upon a tur¬ key whistle and to shoot the wary birds as they appear. This method is most effective when the hen's call is employed to attract the cocks. They are also hunted with dogs or even stalked.

The domesticated turkey is derived from the Mexican variety, examples of which were carried to Europe in the early part of the 16th century; but it is possible that the strain may have been mixed in England with northern birds. The latter were partially domesticated by the Indians and New England settlers. The domesticated turkey has lost the grace, agility and brilliancy of color of its progenitor, but in other respects has been but little modified. In habits it is indeed still a half wild creature. In the four centuries of its domestication it has remained remarkably stable and except in color no distinct varieties have been produced. Of its habits, appearance and merits nothing need be said. The young of the domesticated tur¬ key require especial care for the first five or six weeks of their existence.

The beautiful Central American ocellated turkey (M . ocellata) is of rather less size than the common turkey, but more brilliantly colored. This species lacks the tuft of hairy feathers seen on the breast of the other and derives its specific name from the presence of brilliant eye¬ like spots on the tail-coverts.

Consult Baird, Brewer and Ridgway, (North American Land Birds,) Vol. Ill (Cambridge 1872) ; Darwin, (Animals and Plants under Domestication, } Vol. I (New York 1868) ; Mc- Grew, T. F., (Turkeys : Standard Varieties and Management (United States Department of Agriculture, Washington, D. C., 1915) ; Mc- Ilhenny, E. A., (The Wild Turkey and its Hunt- ing) (Garden City 1914) ; id., (Turkeys, Water-fowl and Guineas) (Mountain Grove, Mo., 1914) ; Sandys, (Upland Game Birds* (New York 1902).

TURKEY, or THE OTTOMAN EM¬ PIRE (Memalik I Osmanie), an empire con¬ sisting of territory in the peninsula of Asia Minor, and also a small portion of southeastern Europe east of Chatalja. Until 1920 it included Adrianople vilayet in Europe, and in Asia, Arabia, Syria, Palestine, Mesopotamia and Kur¬ distan (qq.v.). The end of the First Balkan War in November 1913 saw Turkey's European territory considerably curtailed, its former hold¬ ings being in part divided between Bulgaria, Greece, Montenegro and Serbia. This loss of territory was inconsiderable compared with that which was ordered by the Paris Peace Confer¬ ence after Turkish arms had gone down to defeat in October 1918. In the following table the area and population of Old Turkey are shown :

VILAYETS

Area

square

miles

Population

Europe:

Constantinople .

Chatalja (“ Independent ” San-

1,505

1,203,000

jak) .

733

78,000

Adrianople .

8,644

610,000

Asia Minor:

Ismid (“ Independent ” Sanjak)

3,130

222,700

Brussa .

25 , 400

1,626,800

Bigha (“ Independent ” Sanjak)

2,550

129,500

Smyrna, or Aidin .

25,801

2,500,000

Kastamuni .

19,570

961,200

Angora .

27,370

932,800

Konia .

39,410

1,069,000

Adana .

15,400

422,400

Sivas . i .

23,970

1 ,057,500

Trebizond .

16,671

1,265,000

Armenia and Kurdistan:

Erzerum .

19,180

645 , 700

Mamuret-ul-Aziz .

12,700

575,200

Diarbekr .

14,480

47 1 , 500

Bitlis .

10,460

398,700

Van .

15,170

379,800

Mesopotamia:

Mosul .

35,130

500,000

Bagdad . .

54,540

900,000

Basra .

53,580

600,000

Syria:

Aleppo .

Zor (“ Independent ” Sanjak) . .

33,430

30,110

1,500,000

100,000

Syria .

37,020

1 ,000,000

Beirut .

6,180

533,500

Jerusalem (“ Independent ”

Sanjak) .

6,600

341 ,600

Lebanon .

1,190

200,000

Arabia:

Yemen .

73,800

750,000

Grand total .

613,724

20,973,900

TURKEY

181

Under the Treaty of 11 May 1920 Turkey ceded Thrace, west of Chatalja, excepting the Derkos watershed, Tenedos, Imbros and the - TEgean islands occupied by Greece, to Greece. Smyrna is to be administered by Greece for five years, after which a plebiscite is to be held to determine its final status. Mesopotamia. Palestine, Syria, Armenia, the Hedjaz and Kur¬ distan become independent, the first three under mandatories. Castellorizo and the Dodecanese are given to Italy. Constantinople remains with Turkey but the Straits area is under control of the League of Nations. New Turkey, there¬ fore, has an area of 174,900 square miles and a population of 8,000,000.

Topography. — Former European Turkey formed a peninsula bordered by the Black and Marmora seas, the Bosporus and Dardanelles on the

east and south, on the southwest it was bounded by the 2Egean Sea, of which the only important indentation in this region is the Gulf of Saros. Its northwestern boundary is the Maritza River and its northern the frontier of Bulgaria. There are no great elevations in this region. Near the Bosporus Devonian forma¬ tions are in evidence but away from the coastal hills stretches a plain of comparatively recent formation, the principal part of which is the valley of the Maritza in which there are few points over 600 feet above sea-level.

Asiatic Turkey is bounded on the north by the Black Sea, on the east by Armenia and Kur¬ distan, south by Mesopotamia, Arabia, Syria and the Mediterranean and west by the 2Egean Sea. The coast line is regular except in the vilayets of Bigha and' Brussa, which have nu-< merous indentations and are fringed with thou¬ sands of islands. The Taurus and Anti-Taurus ranges extend through Turkey from Persia to the iEgean Sea, and in many places send out short spurs which on the south slope to the plains, but end abruptly on the north.

Hydrography. — The chief river of former Turkey in Europe is the Maritza (the ancient Hebrus), which enters the 2Egean Sea near Enos now in Grecian territory. It was on the bank of this river, near Adrianople, that in 1364 occurred the battle between the Christians and the Turks, which resulted most disastrously for the Christians. The Kizal-Irmak (Red River), the largest stream in Asia Minor, is about 600 miles long. It flows in a north by east direction into the Black Sea. The Men- dere (the ancient Mseander) flows into the zEgean.

Geology and Mineralogy.— The south¬ eastern part of European Turkey belongs geo¬ logically to Asia. Devonian rocks are found on both sides of the Bosporus, and the similarities are multiplied by the fossils, the rock layer, the appearance of the river beds, and the nature of the soil and stone. Lava of considerable depth covers a large portion of the plains of Asia Minor. The marks of violent upheaval and of volcanic action abound. The mountains of Tur¬ key are rich in minerals, but mining is yet in a crude condition. Meerschaum is found at Es- kisheh, in Asia Minor, and copper, lead, coal, antimony, rock salt,. emery, alum, nitre, iron ore and chalk abound in many places. A valuable lithographic stone is quarried near Brussa. A

royalty of from 5 to IS per cent is paid on all minerals which are exported from Turkey.

Climate. — The climate of Turkey in'- Eu¬ rope is about the same as that of the countries in Europe which border on the Mediterranean ; but radical changes occur frequently. The cold northeast winds which

sweep down from the frigid regions of Russia modify greatly the cli¬ mate of the north and south valleys. In the northern portions of Asiatic Turkey the winters are cold and humid; in the sheltered valleys the climate is comparatively uniform and warm. The rainless season is from April to Septem¬ ber but the heavy dews furnish a large amount of moisture The highest peaks of the Tau¬ rus Mountains are covered with snow all the year.

Flora and Forests. — On the lowlands of old Turkey in Europe, and on the lower slopes of the mountains, are found a variety of ever¬ green trees, box, myrtle, palms, sycamore and also walnut, almond and carob trees. The grape-vine and the citron flourish on the east¬ ern and southern slopes and in the valleys. The roses from which the celebrated <(attar of roses® is distilled grow in abundance on the plain of Adrianople. Many of the flowering plants of Asiatic Turkey belong to the same families as those in European Turkey, but they differ in genera. On the lower slopes of nearly all the ranges are found cedar, cypress and oak trees. On the plains are large groves of mulberry and sycamore, and in the valleys are grape-vines, groves of orange, olive, fig, pomegranate and many nut-bearing trees. Some of the interior plains are almost treeless and a large acreage is used for pasturage. Grasses, sage, wormwood and broom grow on those plains. South of Armenia the grape¬ vine, lilac and jasmine are features. A species of maize grows wild on many of the warm lowland regions.

The forest laws (recent) are modeled after those of France; but no restrictive laws are enforced, and Turkey is being rapidly deprived of timber.

Fauna. — The principal wild animals of Eu¬ ropean Turkey are the dog, cat, boar, badger, bear, civet, squirrel, chamois, roe, deer, beaver, mole, hedgehog, wolf, marten, fox, hare and bat. Fish are found in large quantities and in nearly all the waters. Coral and sponge fisheries are extensive. Leeches exist in the marshes. There are over 240 species of birds of which about 100 are songsters. In Asiatic Turkey the striped hyena, lion, bear, jackal, wolf and wild boar are fairly numerous, and the hare, hedgehog, jerboa, leopard, mole and wolf, abound in certain regions. The domestic animals are the horse (the camel is more common), ox, ass, goat and sheep. A famous species of goat is found in Angora (q.v.). The buffalo sup¬ plants the ox in many parts of Asiatic Turkey. The bee and the silkworm are raised in many sections, but especially in the southwestern part of Asiatic Turkey.

Soil and Agriculture. — The greater part of the lowland region of

Turkey in Asia has a most productive soil, but lack of moisture makes some portions almost a desert. Irriga¬ tion has reclaimed certain localities. The chief occupations in all of the Ottoman Empire are agriculture and cattle raising, yet agricultural

methods are most primitive, and only a small portion of the arable land is under cultivation. Agricultural development is retarded by the system of levying tithes on all the produce, and by the internal custom dues which oblige the farmer to pay a fee on all produce exported from one province to another.

The land is held under four different forms of tenure: (1) “Miri,® or Crown lands; (2) Wacouf,® or pious foundations; (3) <(Muli-kaneh,® or Crown grants; (4) <(Miilk,® or free¬ hold property. The Crown lands form the largest portion and are held directly from the Crown. The government grants permission to cultivate an unoccupied tract and in return exacts a certain fee; but continues to exercise the right of seignory over the rented land. If the lessee neglects to cultivate the land for three years in succession, it reverts to the Crown, and again becomes (

Agriculture is carried on in a most primi¬ tive fashion. The soil is in general very fer¬ tile; the principal crops are tobacco, a world- famous product, cereals of all kinds, cotton, figs, nuts, almonds, grapes, olives, all varieties of fruits, coffee, madder, opium and various gums. There are 16,567,775 acres under culti¬ vation as follows : 13,689,474 under cereals ; 473,085 acres under fruits and vegetables; 779,- 982 acres under cotton, flax and other indus¬ trial crops ; and 1,213,530 acres under vines. Coffee is grown in the Hodeida region; Konia is the principal centre of opium pro¬ duction ; while tobacco is fairly widely dis¬ tributed. There are about 18,000ˆ000 acres under forest. The forest laws are patterned after those of France, but their enforcement is very lax and the country is being denuded

rapidly of its timber. Pine, larch, oak, fir and the cedars are the more important timber trees. Mulberry plantations are on the increase and the silk-worm industry is being revived. The product is largely marketed in France. A recent livestock census showed 2,397,348 horned cattle, 163,691 buffaloes and 30,942 pigs in Turkey.

Manufacturing and Other Industries. —

The manufactured products are mostly hand made. Although there is an abundance of raw material, manufacturing has declined since about 1850. The carpets for which Turkey was once famous, the woolen goods of Mace¬ donia (now itself lost to the empire) and other products, have in almost all parts of the empire been undersold by the machine products of other countries. A few glass factories and several paper mills have been established. Turned-brass and beaten-copper utensils for household purposes are made by hand. There are a few steam manufactories in Constanti¬ nople. The government operates cloth mills at Kara-Mursal and Ismid in which modern machinery has been installed. The chief out¬ put has been khaki woolen cloth for the use of the army. There is a woolen yarn-spinning works at Panderma, which employs 140 wage- earners and turns out 2,750,000 pounds of yarn annually. Fishing is an important in¬ dustry; the fisheries of the Bosporus alone have an annual value of over $1,250,000. The methods of fishing are most primitive. The sponges obtained along the Mediterranean rank with the best in the world. Pearl is obtained from the Persian Gulf and mother-of-pearl from the Red Sea.

Transportation. — The length of railroad line in Asiatic and European Turkey on 1 Nov. 1914 was as follows: In Europe (miles open only): Salonica-Monastir, 136 miles; Con- stantinople-Salonica, 317 miles; Oriental rail¬ roads, 593 miles, or a total of 1,046 miles in European Turkey. In Asia: Haidar-Pasha- Angora, 358 miles; Eski-Shehir-Konia, 283 miles; Mudania-Brussa, 25 miles; Smyrna-Cas- sabra, 165 miles; Alasheir-Afion-Karahissar, 156 miles; Smyrna-Aidin, 320 miles; Konia-Eregli-Persian Gulf, 125 miles; Messina- Adana, 42 miles; Beirut-Damascus-Mzerib, 153 miles; Rayak-Aleppo, 204 miles; Tripoli-Homs, 63 miles; Damascus-Medina, 812 miles; Jaffa- Jerusalem, 54 miles; Haifa-Deraa, 105 miles; making a total of miles open for Asia of 2,865. Territorial changes after the Great War have caused the loss of much of this mileage to Turkey. The Bagdad Railway concession to Germany had for object the extension of the Anatolian line from Konia to Adana, Mosul, Bagdad and Basra, with numerous branches, it has been constructed continuously as far as Kara Bunar in Cilicia. The following sections have also been completed: Dorak to Bagtche on the Adana side of the Taurus Mountains; Radjun via Muslimie to Jerablus on the Eu¬ phrates, with branch from Muslimie to Aleppo ; Jerablus to El-Abiad in the direction of Nisi- bin (with a wooden bridge over the Euphrates) ; Bagdad to Samara; Alexandretta to Toprak Kale on the Dorak-Bagtche line. The line from Konia to Bagdad will have a total length of 1,509 miles, of which 1,117 miles (not contin¬ uous) are now in operation. In 1916 Turkey,

Longitude East from Greenwich

Kutais

iinope

Bat uni

Hukba

‘SKUTARI \ CTBiio

ˆYitse’

Atl.ffikcl

- .-.Kandj

►Is mid

＞zir Koprii’i

(\ da bat •aluinja.

Elehu

oMersivanT)*ˆ J _

, A ““I J i

Vo rr ,V4V’ˆ-Jui’chalGui?l » FTajl-jikoi V＞

y’ o TokatA

SurnuMie,

isabethpol

’Alexandftmpl ‘vjnk

(Gumry)

Lkmni i.

mamba

Tschorum

Sungurlu

% prft

roscl ‘ifc&BgtfpM ly

‘ #1%

I’liiiiii sˆIˆKh aneˆ-jˆj

Ky * (

tˆErz erji in.T6’pya’l?feal&.’

• r-ˆ f ii. x!S*«? K’M ° Kara

‘u*oar*AT»

liaba-»,ujl

GulJ

Aladja T Jangtfn

Kelkit’

i|llirj2imara’ fes Di’-riffi

Karakefchela

lEskisJieTF

liknan

Boghadich

a’jjp’ \Soma ini •Phcrgama*’

“AT Akhfg§a

fgl-fodga

‘ivri-hissar . , . Pesst

Kadikoi

‘alnafe-ˆpˆ

Konus

Asisiel

Kirshehr

Elfin A, ~~ '.Khozat.'W Mas.

u r • j

/ Pertek —

Boghazluybm

emran

J -Mamljulik

/ Chewelikˆˆˆˆ X

° Mush

v \ "wTi, //Ah. Tnl\

v l ° Hini~T ° Nersq&jki '/ L-rgnana \ /

I) HazroT \ ˆjE&k

Bftlowodun % ˆ Lake K

'ˆy\ˆJA*s > t1kr

/ ' V4kshehr ˆ

Eberdfˆ Qoi

nssiq\ˆ J — « Sarymsiklj

lJ ˆ I lije A °.—*Sej;e|gjˆ

r\ ˆ ERdlAS oAojW \

Akserai 0 "'}Melegob* *'

iun Kara Hissor

Snndykly

ischivril

[Keban-Madei

“i uiT

Derenc

Malatia?1’^ /

i anaˆS’

.Tabriz

<7< > ii rai-k. / 7 —

ˆozddogan rBura,ty doTBuidur

ˆ °Yefftnn>nmn » I ‘T

Ortakbi

,Goksun

Kouieh

i Ismll

[Jr unit’

\ .4

[zbarta \

D I A o Diarl)

teishehr 067′

fi rumla

Kara Piimi;

lulame’r.k

sk>!zv

\Soghlah

Spoils

Midyado

Jezire-Ibn-Omar1

Eregli ,.

_ , c

C Wk Karatashˆ

g“i

C. Anamur

<4 , C. St. Andreas

yVin .nschehir’ˆ \ MardinK

Narseid

ˆhirvan

e) AlQtab

Nisibin

Birejik

“■■’* ‘me,”” ˆ

I HoaVdiifeˆ- Erbil (Artilb

oireL3

&>‘if of EJ

jDˆRIiode* / (Kastm> 7[Rhodes X °Tjindos

Prasonisi

Barran

Telkef1

TfAlexandrctta

7,

/.tfety a

ˆyˆKctdez -ˆAntioch »|jcllib0 •* r|V aKibay

oMa’arrat ■l-o.Kalaaˆ el-Medi!

y ˆKalat el Nejim /

L E PfP o /

Aleppo

Mcskcne

Nineveh,

Si’ndjarˆ

Rakka

Ras el-Basit

Sura

Altyn-Kopru •kuk° Sulei

Kasiiut I.

£/ Hadr

.Haleb l Ruins

Rizokar

Kormakitl

Latakii

Kaluat Sherhats‘\ / (Canne Ruins) (Yˆ

Daduk-Tauk

EsSaan,

VLoflroniko V ASaiamis Ruins

ˆ>Xvamagusta C. Greco Larnaca

Hamah

Ban! as

Kerkesla Ruins

[arnadan

.Lefka

CYPR

(-BRIT.)

Tuz Cburmati Kefri °

Meyadln

Selemije*

Tartus

Abu Rejjasch

:ouklid* <ˆ

Eplskopl

.Kldjim il Clicil

Homs

f Limasol C. Gata

Tekrit’iJ

wTarabulus Kalat el Hqˆn

Ana

°Tadmor (Palmyra Ruins)

.Khairnl%b’

Albukemal

Djuanije

jamara

Ghasˆ, O Djunehˆˆ

St. George Bag,

Beirut]

Dler el Kamaf Saldojbf- SurafendiG

zEs Sur/Ty

Mendeli

Baghdadlje

CyEz’ Zebedan i

ˆ Damascus

Laseheja

Hit \T\ Ramadi

iagdad

Seleucia Ruins

Musejjib’

Acre/ ° 7 Hal fa toy AtHt

Tail t u ra L

Caesarea Ruins r ˆ

(Kalsarieh) ˆ

Nabulus0 ˆ

Jaffa

Ramlebl Eriha.,ˆ

Esdud/ JˆmisaJem* Ian Ruins / Bethlelicˆ/ Tr l huZzeJlA, , „ nl Jl V

I fed j2

iretii \ ˆTibnel

r Babylon e\Hille,

Nemara *

Kerbela

‘plzCul

＞Ali-Gharbi

° Bozra eskj-Sliiim

‘NeiefX

Axnara

Abu , lubarni

Lamlun

lZaleh Lake

Boi-t Said

Hebron0 ＞ . Ain Jldfej

Alexandr

Mariut Lai

ˆEUˆbidf

Arkaˆˆ.

uk-esb-Sbeiyuk

turkey

ASIA

Korna

AfˆOhibam s ‘o KeraJc KatraneJ/-

Y Wans,＞rafkA

ianhur

Medina

SCALE

Stalutellliles, lOˆjˆl.imTh,

0570 50 30 40 60 00 70 80 90 100* 120 140 16(

lsmailla

Hand, McNally S Co’o No. 11.x 14 Map of Turkey Copyright by Rood McNally & Co.

GizeTT

Suez]

GULF i OF SUEZ

Gulf of Akaba/

TURKEY

183

as it then was, had 3,720 miles. Before the Great War the Turkish government controlled 1,116 miles. The British military authorities took over the administration of the Bagdad Railway in January 1919. There are 1,814 post offices in the empire, which handle an average of about 22,000,000 letters, 2,000,000 post cards and 14,000,000 samples and printed matter an¬ nually. A parcel post system has been intro¬ duced. Foreign post offices were abolished in Turkey on 1 Oct. 1914. There are 28,890 miles of telegraph lines with about 50,000 miles of wire and about 11,000 telegraph offices. The volume of business approximates 6,000,000 mes¬ sages annually.

Commerce. — Commerce as well as agricul¬ ture seems to be greatly retarded and its de¬ velopment prevented by the duties on imports and exports and the taxes imposed on the trade between different divisions of the empire. All articles imported into Turkey are taxed 8 per cent ad valorem, except tobacco and salt, which are monopolies. There is an export duty on all produce sent abroad, except cereals, and all produce sent from one division of the country to another pays the 8 per cent. The total trade of Turkey in 1913-14 was $183,048,400 for im¬ ports and $97,180,600 for exports. In 1916-17 the imports

declined to $98,526,520 and the ex¬ ports to $58,292,905. The imports in 1913-14 came from the United Kingdom, 20 per cent; Austria-Hungary, 15 per cent; France, 7.7 per cent ; Germany, 12 per cent ; Russia, 7.5 per cent; Rumania, 10 per cent; Italy, 11 per cent; Egypt, 4 per cent and the United States 2.6 per cent. Greece, Bulgaria and The Nether¬ lands supplied the remainder. The exports were taken by Great Britain, 20 per cent; France, 18 per cent; Austria-Hungary, 11 per cent; and Egypt, the United States and Germany about 4.5 per cent each. In 1916-17 almost 80 per cent of both import and export trade was with Ger¬ many and Austria-Hungaria.

Shipping and Navigation. — The shipping and navigation facilities of the Turkish Empire consisted in 1911 of 120 steamers with a total carrying capacity of 66,878 tons ; sailing vessels, 963, with a tonnage of 205,641.

Army. — At the beginning of 1914 the new military service law was put into effect by the War Minister, Enver Pasha. Under the terms of this law it was ordained for the first time that every male Ottoman subject was liable to military service and that even where an exon¬ eration tax would be accepted, this did not exempt the individual from military training, but only from a portion of the full term. When the army was mobilized later in the year, the provisions of the law were rigorously enforced, in so far that all males of military age, whether Moslem or Christian, were called into the service. Inasmuch as there were nu¬ merous exemptions under previous laws, under which Christians were almost wholly exonerated from service, a very great number of untrained men were called to the colors. These were di¬ vided into three classes: (1) Moslem, who were at once placed in training; (2) Christian, few of whom were placed in combatant service, but who were largely employed in transport and auxiliary service, and (3) certain persons, both Moslem and Christian, who were allowed to pay a high exemption tax. This tax was used to defray expenses of mobilization, etc. In

February l9l7 a law was passed providing for universal military service between the ages of 20 and 45. The term of actual service was placed at two years in the infantry and three in other branches, the remaining / years up to 40 being spent in the Ihtiat, or reserve. From 40 to 45 the service is continued in the Mustah- fiz, or territorial army. The tribal, or irregu¬ lar Kurdish, cavalry was employed in military operations during the Great War. Turkish di¬ visions had normally three line regiments and six to nine field or mountain batteries, each line regiment consisting of three battalions; thus the division comprised nine battalions. The ar¬ tillery, where armed with

quick-firing guns, was organized in four-gun batteries and where armed with older guns, in six-gun batteries. An army corps consisted of two or three divi¬ sions, a cavalry brigade, three howitzer batteries, engineer battalion, transport battalion and sig¬ nal company. The peace strength of the army was estimated at about 200,000 men; the war strength was approximately 1,000,000.

In addition to the regular military forces mentioned above there were large forces of gendarmerie, necessitated by the many subject races and turbulent elements within the empire. This force amounted to about 60,000 men, of whom about 16,000 were mounted. The Treaty of Peace of 11 May 1920 caused Turkey to lose possession of all her fortresses, both in Europe and in Asia. The fortresses and defense works of the Dardanelles and the Bosporus, under the terms of the treaty, are to be demolished, and Great Britain, France and Italy reserve the right to maintain military, air and naval forces in the Straits. Turkey's armed forces, also by the Treaty, are limited to a maximum of 50,000 men under guarantees similar to those enforced on Germany and the other enemy nations. (See War European-Peace Treaties). Compulsory service is abolished. Turkish soldiers must serve for a period of 12 years ; the number of officers is limited to 2,500 and they are obliged to serve for 25 years. All plans and measures for mobilization are prohibited and no reserve forces are permitted. The Turkish air force is abolished altogether. For the history of the Turkish campaigns see War, European.

Navy. — The only ships of real value as naval vessels were the Torgut Reis of 9,876 tons and armed with six 11-inch guns, fitted with en¬ gines developing 10,000 horse power and capable of steaming 16 knots; the Sultan Selim, battle cruiser, formerly the German Goeben (see Goeben and Breslau) of 22,640 tons, armed with 10 11-inch guns and 12 six-inch guns, and four torpedo tubes, engines of 70,000 horse power and having a speed of 27 knots ; the cruiser Hamidieh of 3,800 tons, armed with two six-inch and eight 4.7-inch guns, engines of 12,500 horse power and with a speed of 22 knots. In addition there were about 20 gun¬ boats and vessels, one-half of them being mod¬ ern, nine destroyers and six torpedo boats, with some transports and a considerable number of auxiliary vessels and motor boats. A sub¬ marine flotilla was brought into being during the Great War. Under the terms of the armis¬ tice concluded 30 Oct. 1918 all Turkish ships and vessels of war were surrendered on 5 No¬ vember to the Entente powers. The Treaty of Peace of 1920 abolished the Turkish navy, ex¬ cept for a few small vessels for police duties.

Religion. — Mohammedanism is the officially established and recognized religion, but other forms of worship are tolerated. Among these non-Mohammedan native communities or <(Millets® which are recognized by the Turkish government are Latins or Catholics, Orthodox Greeks, Armenians, Armenian Catholics, Chal¬ dean Catholics, Protestants, Nestorians, Syrian Catholics, Syrian Jacobites, Melchites, Jews, Bulgarian Catholics and Maronites. All these may possess their own ecclesiastical rule and their spiritual heads have a high place in the civil community. The sultan as caliph is supreme head of the Moslems. The chief ecclesiastical dignitary is the Sheikh-ul-Islam, but his functions are judicial and legal rather than spiritual. He is a member of the Cabinet.

There is no priesthood in Mohammedan Turkey in the strict sense of the term. The Ulema, however, or persons connected in one way or another with the official ministrations of Islam, form a separate class. The principal charges in connection with mosques, theological schools., etc., are to a large extent hereditary. The number of mosques in the empire as it was in 1914 is computed at 2,120, of which 379 were in Constantinople and many others in territory now torn from the empire. The num¬ ber of the clergy was 11,600. Connected with the mosques are 1,780 elementary schools, where education is supplied gratis. The temporalities of the Church are controlled by the Ministry of Pious Foundations (Evkaf), which has a separate budget of its own. The revenue of the Evkaf is derived chiefly from charges on and reversionary interests in real property which has at one time or another been made the sub¬ ject of consecration to religious purposes, and which is known as Vakuf. The department of the Sheikh-ul-Islam is not provided for in the budget, but in that of the state. Moslems form 92 per cent of the whole population ; Christians about 7 per cent and Jews the remainder.

Education. — Elementary education is nomi¬ nally obligatory for all children of both sexes. A law of 6 Oct. 1913 provided that children from 7 to 16 should receive primary instruction either in state schools, schools maintained by religious communities, private schools or, sub¬ ject to certain tests, at home. State schools are under the direct control of the Minister of Public Instruction. Community schools also are inspected by the Ministry. There are several religious foundations which maintain theological seminaries. There are also inter¬ mediate or secondary schools for boys from 11 to 16 years of age, and similar institutions for girls were inaugurated in 1918-19. Five such schools for girls in Constantinople have 2,000 pupils. Aleppo has 710 Moslem,

250 Christian, and 30 Jewish, with 19,000, 8,000 and 2,000 pupils respectively. In all 36,230 schools were enumerated in 1918 with 1,331,200 pupils. There are training schools for teachers but the standard is low. French, English, German and American missionaries maintain sectarian schools. A university was founded at Con¬ stantinople in 1900. It was reorganized in 1918. There are five faculties, arts, theology, law, medicine and science. The faculty of medicine and the Military Medical School occupy a modern building at Scutari. Other schools of higher learning are the Imperial Art School, the Greek Great National School, with 400

students, and the Greek Theological Seminary with an average of 80 students.

Archaeology. — The modern explorers, ex¬ cavators and decipherers, or translators, have given us a new world, a large portion of which is below the surface of the territory formerly occupied by the Ottoman Empire, chiefly in Babylon, Asia Minor, Palestine, Egypt, Assyria and Arabia. The land of Babylon and Nineveh, of Assvria and Khorsabad would naturally be fruitful in records of the past. The number of cuneiform documents found in Macedonia alone are of great value. One of the causes which have contributed to the recent activity in search¬ ing for archaeological remains is the desire to se¬ cure corroborative testimony in favor of the Bible. Such reasons greatly influenced some of the American missionary societies to begin in¬ vestigations. The University of Pennsylvania sent out an expedition which discovered, in the vicinity of Nuffar, 2,000 cuneiform tablets, many of which were in existence 2,800 years before the birth of Christ. Dr. Hilprecht was appointed to supervise the editing and classifying of the results of the expedition. The collection contains many inscribed bricks, clay stamps for bricks, marble vases, sacrificial vessels, door sockets, enameled and plain vases, seals and seal cylinders, gold and silver orna¬ ments, clay sarcophagi, stone, iron and bronze articles, bas-reliefs, intaglios, human skulls and numerous other articles. The American Arch¬ aeological Institute explored the territory near Asso (present Behram) in the years 1881-82. The excavations brought to light buried forti¬ fications of successive periods, baths, theatres, temples which were of the archaic Doric order and down to and within the Christian era, porti¬ cos, private dwellings, a gymnasium, a Greek bridge and a highly ornamented group of tombs. Other exploring expeditions have been sent to Turkey by the French, English and Germans, and the Turkish government has given the matter considerable attention. In an article on the Turkish excavations by Ameri¬ cans, written by James B. Fox, he says: <(The dreary solitudes that long brooded over those buried civilizations have

begun to disappear before the labors of dauntless and indefatigable explorers, and a literature, almost overwhelm¬ ing in extent, graven in clay and stone, trans¬ ports us back to the very cradle of the race. They reveal a perfection of art, a marvelous¬ ness of correspondence, a development of civilization in those primeval days that excite the wonder and admiration of our more en¬ lightened age. Schools and libraries must have existed everywhere; clay books were stored in the cities ; letters of every description were exchanged on every subject; and, judging from the tablets of Zel-el-Amarna, Canaan was a centre of correspondence, even before the age of the Exodus. The objection of the (higher critics } that Moses could not have written the Pentateuch, because the art of writing was un¬ known in his day, falls hopelessly to the ground.®

The whole country, especially Syria, Pales¬ tine and Babylon, contains vast archaeological treasures. Specimens of Byzantine architecture still exist in a good state of preservation. The statues found among the ruins of ancient Nineveh, and preserved in the British Museum, are remarkable monuments. The half-tamed

Turk had wandered for centuries over the plains near the Tigris without ever dreaming that he was crossing the place of sepulchre of a once gorgeous city, until Sir Henry Layard (q.v.) and other English explorers began the excavations which restored Nineveh to the world.

The Turkish government has, since 1884, opposed the removal of objects of antiquity from the country, and no excavations may be made without a firman. The government has a valuable collection of archaeological specimens at the museum of Tchinli Kiosk. The splendid archaic frieze of the Doric temple in Assos is not in one place, but portions are in America, Paris and Constantinople. Facsimiles of some of the famous statuary found in Nineveh (originals in England) are in museums in New York and other places. See Assyria; Assyriology ; Babylon ; Canaan ; Biblical Archaeology; Nineveh; Palestine; Tel-el- Amarna, etc.

Finance. — The public revenue of Turkey comes from the following sources: direct taxa¬ tion, tithes, verghis (land and property tax), temettu (income tax), for exemptions from military service, aghnams (tax on sheep, cattle, etc.), and other sources; indirect taxation, various customs (salt, tobacco, spirits, stamps, fisheries, silk and other

sources), administra¬ tive and military departments, share in tobacco Regie profits, tribute revenues and other sources. The largest portions of the expendi¬ ture are for debt charges and for military purposes. No regular budget existed before the restoration of the Constitution in 1908. Since that year there have been voted or enacted by the executive a budget and finances for every year. The revenue in 1918-19 was £T33,965,698 ($152,845,641) and the expenditure £T5 1,762, 761 ($232,932,424) . The chief items of expenditure were: finances, $46,778,040; post office, $5,350,- 414; police, $11,541,406; justice, $4,806,634; education, $4,826,416; commerce, $7,123,059; army, $27,198,454; navv, $7,668,256. For the civil and religious administrations 21 per cent of the general expenditures is allotted, while ordinarily 28 per cent is reserved for the military establishment. Unable to meet its liabilities the Ottoman government made an arrangement with its creditors, confirmed by the Irade, of 8/20 Dec. 1881, supplemented and modified by the Irade of 1 Sept. 1903. A council of administration was appointed, to which were handed over for distribution among the bondholders the funds derived from the excise duties and other funds. On 31 Aug. 1918 the total debt was placed at £T454,649,590 ($2,045,923,155) of which £T149, 475,754 ($677,- 640,893) is external debt.

Money. — A charter for a new national bank, to be known as the Ottoman National Credit Bank (Osmanli Itibar milli Bancassi) was issued by the government in January 1917. Its capital is $18,000,000 (£T4,000,000) . With the expiration of the privileges of the Imperial Ottoman Bank in 1925, the new bank becomes the state bank with the right to note issue. The Imperial Ottoman Bank in 1910 had a capital of $45,000,000, a note circulation of £T941,250 ($4,235,625) and cash on hand to the amount of £T3,568,834 ($16,140,753). The note issue of this bank consisted up to 1914 of notes

of £T5 and upward ($22.50), secured by a gold reserve of not less than 33 per cent of the face of the issue. During the War 1914- 18 there were five emissions of paper currency secured by German treasury bills. The total of these was about $383,000,000. Currency re¬ form was inaugurated on 17 April 1916. A gold standard with the piastre as the unit is to be general all over Turkey. The piastre equals 40 para. Piastre, half-piastre, quarter- piastre and eight-piastre pieces are of nickel. Two, 5, 10 and 20-piastre pieces are of silver, 25, 50, 100, 250 and 500 piastre pieces are of gold. The gold 100-piastre piece weighs 7.216 grammes, .916 fine, or has 6.6147 grammes of pure gold. It is equal to £T1 or $4.50 in currency of the United States.

Weights and Measures. — The Oke of 400 drams is equivalent to

2.8326 pounds avoirdu¬ pois ; the kileh =* 0.9120 imperial bushel ; 44 Okes — 1 Kintal or 125 pounds; 39.44 Okes = 112 lbs.; 180 Okes — 1 chcke or 511.380 pounds; Endaze (cloth measure) =27 inches; one arshin (land measure) =30 inches; one donum (land measure) = 1,098.765 square yards. Since 1889 the metric system is obligatory for cereals ; metric weights were decreed obligatory in 1892, but the decree does not appear to have been enforced. On 1 March 1917 Turkey in¬ troduced the Gregorian calendar and it is now used side by side with the Mohammedan or Hegira calendar.

Government. — 'The government of Turkey is an absolute monarchy and the sultan is the ruler. The succession to the throne is hereditary. It is now and since 1617 has been vested in the family of Othman (or Osman), in the person of its oldest living male member. The sultan is, therefore, succeeded by his oldest son, provided there are no living uncles nor cousins who are older in the Othman family. The oldest son takes the throne without regard to his mother, provided he sprang from the harem. The harem is a permanent institution of the empire, and all children born in the harem, no matter who their mothers are, whether free women or slaves, are legitimate and of equal lineage. It has been the rule and custom of the sultans of Turkey for many centuries not to contract regular marriages, but to maintain the harem. The inmates of the harem are women who are brought to it by purchase or who come to it by their free will. The greater part of them have heretofore come from places out¬ side of the empire, the majority having come from Circassia. The sultan selects a certain number, generally seven, to be <(Ladies of the Palace, who are called ((Kadyn.):> The rest are called <(Odalik,):> as they remain under the ˆKadyn® as servants. There is a superintendent of the harem, an aged woman of the palace, who bears the title of ˆHaznadar-Kadyn.®

Constitutions after the model of West Euro¬ pean states were drawn up at various periods by successive Ottoman governments, the first by Sultan Abdul Medjid was proclaimed 3 Nov. 1839, and the most recent in a decree of Abdul- Hamid II in November 1876. The latter pro¬ vided for the security of personal liberty and property; for an irremovable judiciary; torture was abolished; the freedom of the press con¬ ceded, and equality before the law of all Otto-

man subjects was proclaimed. Islam was de¬ clared to be the state religion, but freedom of worship was secured to all creeds, and all

persons, irrespective of their creed, were de¬ clared eligible to public office. Under this con¬ stitution the legislature should consist of two houses, a Chamber of Deputies and a Senate. Senators were to be appointed by the sultan, from among those who had deserved well of the state and should be at least 40 years of age. Every 600 electors were to select one electoral delegate and the latter were to choose one deputy for every 6,000 electors. Electors must be Ottoman citizens of at least 25 years of age and electoral delegates must be at least 30 years of age. In 1878 this constitution be¬ came a dead letter and the reign of Abdul- Hamid II was a more complete autocracy than perhaps any of his predecessors. In 1908 the prevailing discontent, which also developed in the army, caused by decades of corruption and misgovernment, compelled the sultan to issue a decree for the convocation of a new Parlia¬ ment, and on 23 July 1908 constitutional gov¬ ernment was restored in Turkey. The constitu¬ tion in force is theoretically that of 1876, but it has been modified in some respects since 1908. For administrative purposes the empire is divided into vilayets, or governments, these subdivided into sanjaks, or minor provinces, these into smaller divisions known as kazas. At the head of each vilayet is a governor-gen¬ eral, or vali, representing the sultan, and as¬ sisted by a provincial council. Over the minor divisions are local authorities (mutesarrifs, kaimmakams, mudirs, etc.), subject to the gov¬ ernor-general. Political reasons since 1908 have led to frequent modification of the vilayet sys¬ tem. Thus several of the sanjaks are governed directly by mutesarrifs reporting direct to the Minister of the Interior. These are known as independent sanjaks and are in every case detached from the vilayet to which they hitherto belonged.

In 1913 a new law on vilayets was promul¬ gated. Its ostensible purpose is to decentralize authority and a bill of 1918 provided for the creation of three new sanjaks in Mesopotamia, to be set up in March 1919. In 1919 Mesopo¬ tamia was being administered by the British.

History. — • The origin of the Turks, like that of the Arabs and almost all the Eastern nations, is enveloped in darkness. It has been sought in the Tatars of the Caucasus and among the ancient Parthians (the conquerors of Persia) ; some ethnographers claim the Turks as descend¬ ants of the Scythians, or roving Tatars, who possessed the country between Sarmatia and the Tanais, and who, after overrunning all Asia, conquered Turkestan, from which they received the appellation of Turks. The Ottoman people at the present day call themselves Osmanlis, from a Turkish chieftain named Osman (or Othman), who established himself at Brussa in the 14th century. In the Turkish language the word “Turk® means a rustic or clown, and

the Turks consequently never apply that word to themselves, but reserve it for the Turcomans and other tribes of central Asia.

The language of the Turks shows they are near of kin to those who spoke the Ural-Altaic or Turanian languages, which were in use from the western frontier of China to the Caspian

Sea. There are different dialects, the harsh one of the east and the soft and more melodious one of the west, but many of the words, phrases and grammatical forms are similar. A portion at least of the present Turkish race are descend¬ ants of a people who once inhabited the terri¬ tory west of Lake Baikal. The claim is made that while living near the shores of that lake Christian missionaries visited them, and in sup¬ port of this claim is the fact that their ancient alphabet had 14 letters based on the Syriac al¬ phabet. The name "Turks® given to the mighty hordes who dwelt on the steppes of northern Asia, at the foot of the Altai Mountains, and beyond Persia, is first mentioned in our history about the middle of the 6th century. They were an aggressive people, seeking existence in lands where others had found sustenance. At the present day the name of Turk or Tatar generally denotes a Moslem speaking a Turkish language, and Mongol a Buddhist speaking a Mongol language. But in earlier centuries it is not so easy to draw that distinction. Timur (Tamerlane) has been described both as a Turk and a Mongol ; he came of a Turkish¬ speaking stock, and his descendants founded the "Mogul® Empire in India, a name which ap¬ pears to be a variant of "Mongol.® The only certain distinction between the Turks and their kindred tribes is linguistic, but in nearly all cases the Turkish-speaking stocks have shown themselves warlike and mobile to a remarkable degree, and where these qualities are found among non-Turkish-speaking tribes — as among the forbears of the Magyars — an admixture of Turkish blood may be suspected. It has always been a puzzle to historians how a race of people which had never before been politi¬ cally conspicuous in the world should suddenly have exhibited such a marvelous power of con¬ quest. Nor could one have expected the rise of a race of world conquerors from the multi¬ tude of barbarians who were ever roving to and fro in the vast sandy desert of Arabia, where they preyed upon one another, marking history with but few traces of their existence. But the Turks, starting as an obscure tribe from the confines of China, have touched Vienna, Algiers, Arabia, Egypt and India; while the Arabs under Mohammed and his suc¬ cessors not only produced and spread a new religion, but extended in less than a century throughout Arabia, Syria and Egypt, along the coast of Mauretania far into the interior of Africa, and included within their embrace Spain and part of Gaul. Eastward, Persia and Scinde had been subdued and Transoxiana

invaded by the Arabs. 1 ranslations made in recent years from Chinese histories reveal the existence, over 1,000 years b.c., of warlike nomads called Hiung-nu (Huns), a generic title applied to various barbarous tribes whose original haunts were the plains of central Asia, from the Oxus to the Arctic Circle and from the borders of China to the Caspian Sea. They lived on horse¬ back and were trained to handle bows and arrows from childhood. From these records we can trace the Turks as a branch of the Hiung-nu as far back as the middle of the 5th century of our era. One of the clans — the Asena — settled near the modern town of Shan-tan, in the prov¬ ince of Kan-su. In their vicinity was a hill called from its shape Diirko, or Tu-chiich, the

TURKEY

Constantinople and the Bosporus

TURKEY

1 The Palace of a Turkish Go\ ernor-General

2 Boating on one of the Rivers of Turkey

TURKEY

1 Mosque of St. Sophia at Constantinople

2 Interior of St. Sophia

TURKEY

“helmet.” This is said to have been the origin of the name which has since been so widely applied and become so famous in history. About the middle of the 6th century we find the Chinese calling these people the “Tu-kiue” and attributing to them an astonishing degree of progress. \ ithin a few years they became a world power which had relations with China and Byzantium. In about the year 800 they secured possession of a part of the territory now called Armenia, and they named the place Turkomania. They were that branch of the Turk family which learned the Mohammedan religion from the Saracens and, later, founded the Ottoman dominion in Europe. Turks and Saracens first came together early in the 8th century, when the caliph, or successor of the Prophet, ruled as temporal and spiritual chief over the Mohammedan world. As soon as the Saracens began to conquer and convert the Turks, the latter began to play an important part in

history. Under the caliphs the}' ap¬ pear as slaves, as subjects, as mercenaries, as practical masters, as avowed sovereigns and, finally, claiming for themselves the powers of the caliphate. In process of time the chiefs of this barbarous soldiery arrogated to them¬ selves the most important offices in the state, leaving to their sovereign only a nominal au¬ thority. Harassed by civil disorder and sec¬ tarian violence, the caliphs were unable to check the usurpations of those who, in their names, ruled the provinces of the empire, and whose ambition it was to become the founders of separate and independent dynasties. Thus one province after another was lost, and in the end Baghdad fell into the hands of the Mogul Hologu. From the 11th to the 13th centuries the Turkish dynasty of the Seljuks (q.v.) ruled over a large part of Asia. Later this empire was divided on account of internal dissensions, and during the 13th century the Mongols be¬ came virtually the owners. It was in the course of the struggles between Seljuks and Mongols that the name Ottoman Turks first appeared. Othman was the son of Ortogrul and grand¬ son of a Turkish emir who, early in the 13th century, and on the approach of the Mogul Ghengiz Khan, left his home in Khorassan in search of some safer settlement in Asia Minor. On the march he perished in the Euphrates, but Ortogrul obtained from the Seljuk sultan of Iconium settlements for his followers in the ancient province of Phrygia. His son, Oth¬ man, extended his possessions chiefly at the expense of the Greek emperor, and in 1299, on the death of his patron, the ruler of Iconium, assumed the title of sultan. Thus began the Ottoman Empire; a succession of 10 great princes of the dynasty widely extended their territories and raised their military power to the first rank in Europe.

In 1328 the seat of the monarchy was fixed at Brussa, under the shadow of Mount Olym¬ pus, and Asia Minor was conquered to the Hellespont. The history of Turkey proper be¬ gins with the reign of Othman; he was bold and brave, loyal to friends, cruel to foes and possessed the vices of the conqueror and the virtues of the leader. His immediate successor was his son Orkhan, who assumed command of the armies at the death of his father in 1326. He organized the Janissaries, a body of paid

infantry, highly trained and fearless of foe or danger. By marriage he formed an alliance with the Greek emperor and also secured the diplomatic friendship of the Genoese, who were then among the commercial rivals of the Medi¬ terranean. Solyman I invaded Europe in 1355 and Amurath 1 took Adrianople in 1360 and made it his capital. For many years the waves of Moslem invasion rolled over European bat¬ tlefields. At times the Moslem armies seemed destined to conqueror the world; Macedonia, Albania and Serbia fell before

them. Christian forces flocked together to stem the flood, from Hungary, Italy and the upper Danube ; but the Turks defeated the combined armies at Kossovo, 15 June 1389. Sultan Murad was killed the same day; his successor, Bajazet I (q.v.), who was sumamed Yilderim (thunderbolt), had a sanguinary and unsuccessful reign. He began by attacking and taking the dominion of his father-in-law, the Prince of Phrygia. He next sufiered a defeat in Europe at the hands of Stephen, sovereign of Moldavia, after which he was suddenly called to suppress Caraman Oghly, a petty Asiatic ruler, whom he speedily crushed, besides taking several provinces in Armenia. Returning to Europe, Bajazet cap¬ tured some towns on the Danube and nearly the whole of Wallachia. King Sigismund of Hungary called upon the princ- es of Christen¬ dom to repel the Turk. He received a con¬ federate army of some 100,000 Christians under his command; they were defeated by Bajazet with 60,000 men. The Empire of the East, almost reduced to the city- of Constantinople, lay invitingly open to Turkish attack. John, son of Andronicus, sought the aid of the sultan against his uncle, Manuel, promising to cede the city on condition that he be allowed to retain the sovereignty over what the Greeks still possessed in the Morea. Bajazet sent him 10,000 Turks, who ravaged the country round the city and compelled Manuel to hand the empty title of emperor to John. Bajazet's schemes of conquest were suddenly arrested by a call to defend his own territory against the redoubtable Tamerlane, who with his Tatar hordes conquered with remarkable rapidity Persia, Mesopotamia, Asiatic Sarmatia and Syria, and forced the gates of Baghdad. The sultan hastily collected d large army and en¬ countered Tamerlane on the plains of Angora (Ancyra) on 28 July 1402. In a fierce battle the Turks, outnumbered, were defeated and Bajazet was taken prisoner. He died the fol¬ lowing year of grief and humiliation, in the train of his conqueror. Tamerlane reinstated all the Mohammedan princes who had been dethroned by Bajazet and returned to Samar- cand without retaining any of his conquests. An interregnum followed from 1403 to 1413 under Solyman and Musa, two worthless sons of Bajazet. Neither is included in the Turkish roll of sultans. Both were killed in civil strife and the throne fell to their youngest brother, Mohammed I, who reunited the empire, reigned with moderation and justice for eight years and restored much of the national glory lost by his father. During his reign the Grand Vizier Ibrahim organized a Turkish navy, which was destroyed by the Venetians. Murad II (reigned 1421-51) captured Thessalonica (1429), besieged Belgrade in 1435 (on which

occasion artillery was first used against the Turks), defeated a confederation of European princes under King Ladislas of Hungary at Varna, 10 Nov. 1444, and finally defeated the Hungarians under Huniades in 1448. His reign was troubled with conspiracies and pretenders, besides suffering discomfitures at the hands of Scanderberg (q.v.). In 1451 Mohammed II (q.v.) became sultan, one of the most perfidi¬ ous and sanguinary rulers that history exposes to the execration of posterity. The outstanding event of his long reign (30 years) is the capture of Constantinople (1453), though his whole life may be described as one long campaign, in the course of which he conquered two empires, 12 kingdoms and nearly 300 towns. What he ac¬ complished as a conqueror for the advancement of the Ottoman Empire caused the Turks to regard him as the greatest of their sultans, and in their eyes the glory of his conquests atones for his many vices. He made Constantinople the capital of the empire. He attacked and conquered successively the Morea, Serbia, Bos¬ nia and Albania; from the Venetians he took Lemnos and Negropont; from the Genoese, Caffa; he made the Crimea a dependency of Turkey in 1475, while Otranto in southern Italy belonged to Turkey when Mohammed died, though it was soon reconquered. Greece fell under the Turkish yoke; the empire of Trebi- zond was conquered in 1461. The island of Rhodes, defended by the Knights of Rhodes, held out against the Turk; the mountain district of Montenegro, in a ceaseless warfare of over 400 years, withstood the Turkish might. The Ottomans were now brought into the neighbor¬ hood of Poland, Lithuania and Russia. Greeks, Slavs and Albanians came under Turkish dominion, overcome by the arms of their own children, for the Janissaries, which formed the main strength of the Ottoman armies, were re¬ cruited from kidnapped children of the con¬ quered nations. The conquests of Mohammed gave the Ottoman Empire in Europe nearly the same extent it had up to 1878, when the Berlin Congress began the dismemberment of the empire.

The next sultan, Bajazet II, who reigned from 1481 to 1512, was neither a man of war nor a genius like his father. His wars were confined to winning a few points from the Venetians and making raids into Hungary and other Christian lands to the north, committing unspeakable atrocities which provoked retali¬ ation on the part of the Christians. Under Selim I wars of conquest were waged against Mohammedan enemies. He drove the Persians to the valley of the Euphrates and the Tigris. In 1517 he added Palestine, Syria and Egypt to his empire and took over the spiritual au¬ thority of the caliphate from a fugitive line of caliphs settled in Egypt. From that time the sultans have combined in their persons the dual role of emperor and

spiritual head of the Moslem world. Selim outdid his predecessors in systematic bloodthirstiness. When he pro¬ posed to massacre all the Christians in his realm and to abolish the practice of the Christian re¬ ligion, he was sternly opposed and turned from his project by the Mufti Djemali, an honest dxpounder of his own law and a righteous man. Remembering the humiliating defeat of his grandfather by the Knights of Rhodes, Selim

made vast preparations to renew the campaign, when death cut him down, 22 Sept. 1520. His son, Suleiman (or Solyman) the Magnificent, succeeded and reigned 46 years, the most glori¬ ous period, according to historians, of the Ot¬ toman dynasty. Allowing for some of those occasional crimes which seem inseparable from every Eastern despotism, Suleiman may be re¬ garded as a good ruler according to his light. He took Rhodes (1522) from the Knights, who withdrew to Malta and became the Knights of Malta. He took Belgrade in 1521 and on the field of Mohacs (1526) subdued half of Hun¬ gary. The Turkish- armies were the terror of the world and the <(Conquering Turk® was a mighty power by land and sea. The north and south coasts of the Mediterranean had been conquered or laid waste; many of the countries of Europe had been conquered in whole or in part and all the rulers trembled. Germany was threatened, but the walls of Vienna (1529) checked the advance of Suleiman's army. The Christian nations suspended for a time their dissensions to marshal their forces against the Turks. The Ottoman Empire seemed strong, almost invincible, but its weakness lay in in¬ ternal dissensions, for the conquered nations, although subdued, were perennially rebellious. Having settled affairs in Hungary and Wal- lachia by treaties, Suleiman turned his atten¬ tion to Persia, where, after some initial de¬ feats, he found himself landed in a war that extended over a period of 20 years. During that time the sultan took large tracts of Armenia and Mesopotamia, together with the strong¬ holds of Van, Mosul and Baghdad. The Turk¬ ish navy swept the Mediterranean, the Red Sea and the remote waters of the Indian Ocean. A one-time corsair, Barbarossa, was appointed Capitan-Pasha of the fleet. This celebrated warrior captured Algiers and installed his brother as sovereign; he next defeated the gal¬ leys of the Genoese and devastated their coast. Turning to the Italian coast, he took several towns in Calabria, terrorized Naples and even Rome, and then sailed for Africa and made himself master of Tunis. Charles V formed an alliance with several Christian princes and set out for the African coast at the head of a powerful fleet to try conclusions with Bar¬ barossa, who was severely defeated. Tunis was devastated as mercilessly as the Turks them¬ selves could have done it. The Emperor Charles then laid

siege to Algiers, lost great numbers of his troops by disease and 140 vessels in a tremendous storm off the Barbary coast. Sulei¬ man now turned his whole naval force under Barbarossa against the Venetian Republic. Af¬ ter ravaging the Archipelago and capturing many of the islands, Barbarossa encountered the combined fleets of Spain, Italy and Venice off Previsa. In the battle that ensued the Turk¬ ish admiral gained a decisive victory and Venice sued for peace. From the death of Suleiman I in 1566 the power of Turkey began to decline; the race of rulers degenerated as a whole, not even retaining the military courage and daring of their predecessors. From 1300 to 1566 Turkey was the first military power in Europe. Under Selim II, son of Suleiman, the Turks were first brought into armed conflict with the Russians, thus inaugurating an implacable an¬ tagonism that extended down to the 20th cen-

tury. In August 1571 the Turks captured Cy¬ prus from the Venetians, but two months later a maritime league of Austrians, Spaniards, Ve¬ netians and the Knights of Malta crushed the Turkish fleet in the battle of Lepanto (q.v.) and temporarily extinguished the fear of an exten¬ sion of Mohammedan rule in the West.

From Murad III (reigned 1574-95) there follows for 300 years a train of 22 sultans of whom none can be described as noteworthy — until the accession, in 1876, of Abdul Hamid II. Murad III began with having his five young brothers murdered. He raised a cook to the position of Grand Vizier, fought a moderately successful war with Persia and hastened his death by intemperance and debauchery. Mo¬ hammed III (1595-1603) went even further than his father in causing his own 19 brothers to be strangled in his presence. He gained some military successes in the Balkans over the Archduke Maximilian and was himself carried off by the great plague in Constantinople a few months after he had put to death his eldest son, Mahmoud, a public favorite. Achmet I (1603-17) encountered revolutions and plague and was defeated by the Persians. Mustapha I (1617) emerged from long captivity to ascend the throne, proved his utter incapacity and was incarcerated in a tower four months later. Othman II succeeded at the age of 14. He in¬ troduced the death penalty for drinking wine and made an attempt to conquer Poland, which failed. A revolt of the Janissaries released Mustapha from the tower and replaced him on the throne, while Othman became a pris¬ oner and was strangled in his cell after a brief reign of four years (1622). Within little over a year

Mustapha was sent back to his prison as a lunatic. During that short reign the country fell into anarchy and desolation ; revo¬ lutions in Asia Minor and defeats by the Persians made a new ruler imperative. Murad IV (1623-40) was 13 years old when he stepped into his heritage and quickly gave evidence of a resolute and tyrannical disposition. Insur¬ rections and disasters marked his reign; the Lebanon tribes revolted; the Tatars of the Crimea rose in arms, cut up a Turkish force and ravaged the Black Sea and Bosporus shores; the Persians overran Turkish territory; the treasury at home was empty and the people starving; the soldiers mutinied in the capital and murdered the Grand Vizier; death reaped a bloody harvest throughout the country for months before order was restored. Murad led an army against Persia, reconquered Bagh¬ dad and butchered some 25,000 persons of both sexes and all ages (1638). The sultan drank himself to death and was succeeded by his brother Ibrahim (1640-48), the sole surviving male representative of the house of Othman. The new sultan at once plunged into ferocious debauchery. He ordered wholesale executions and was finally strangled after a disgraceful reign of nine years. Mohammed IV (1648-87) was seven years old on his accession. The early part of his reign was marked by all the dis¬ orders of a state without a head. Six viziers were deposed or strangled in a few years; the Janissaries and other troops murdered each other wholesale; the Turkish fleet was de¬ feated several ‘times by the Venetians, who took Lemnos and Tenedos, but soon lost those islands again. The pasha of Aleppo broke out in re¬

bellion and was crushed; disturbances in Wal- lachia led to a great European campaign- in which the Turks were opposed by Germans, Austrians, Poles and Hungarians. In July 1664 it seemed that the road to Vienna lay open to the Osmanlis, when the allies inflicted a severe defeat on the river Raab. The city of Candia, in Crete, was again vigorously at¬ tacked by the Turks, who had besieged or blockaded the place for nearly 20 years. It now occupied another two years’ conflict to compel the Venetians to surrender, 6 Sept. 1669, and the island was added to Turkey. The war against Poland, conducted by the sultan in person, was at first a success for the Turks, who received Podolia and the Ukraine in ad¬ dition to an annual tribute. In the second stage the tables were turned by the gallant Sobieski. For about 30 years the master minds directing the political and military destinies of Turkey were the Grand Viziers Mehemet and Achmet Kidprili, re¬ spectively, father and son. On the death of the latter in 1678, his brother-in-law, Kara Mustapha, became Grand Vizier — a totally dif¬ ferent character from his two brilliant prede¬ cessors. His one ambition was the conquest of Vienna, which plan he proceeded to put

into execution with an army of about 300,000 men composed of Hungarians (then in revolt against the emperor of Germany), Turks, Tatars, Mol¬ davians and Wallachians. Kara Mustapha reached Vienna with but little opposition and laid siege to the city in the middle of July 1683. The Duke of Lorraine threw 10,000 men into the city just before the arrival of the Turks. The defense made a gallant stand under Count Rudiger von Stahremberg until the arrival of Sobieski (who was now king of Poland), with Polish, Saxon and Bavarian contingents num¬ bering altogether some 70,000. With this army he attacked the Turks, and, aided by the Duke of Lorraine, fought a sanguinary engagement (12 Sept. 1683) lasting throughout the day. The Turkish host was routed with enormous loss and its camp given over to pillage. For his failure Kara Mustapha was officially doomed at Belgrade to strangulation ; his severed head was carried to Constantinople and exhibited in public. The signal defeat of the Turks before Vienna was joyfully hailed throughout Chris¬ tendom as presaging the downfall of the Mo¬ hammedan power in Europe. The empire was attacked on all side. The Venetian Republic declared war and captured several Greek cities from the Turks; Sobieski scattered the Turkish forces and reduced Slavonia and Transylvania. The sultan's troops, overwhelmed with defeat and disaster, revolted against the government. Mohammed lost his throne and was shut up in the same prison from which his brother Suleiman was now released (1687) and girt with the sword of Othman. Suleiman II was 46 years old and had passed the greater part of his life in confinement. A fresh outbreak of the turbulent Janissaries carried riot and mur¬ der through Constantinople. They attacked the Grand Vizier's̆ palace, killed that dignitary and murdered the inmates of his harem, whose mutilated bodies were dragged through the streets. The Austrians and their allies harassed the Turks in Hungary, Bosnia and Serbia, re¬ taking Erlau, Gradiska and Belgrade, while the Venetians conquered sections of Dalmatia.

Before the end of Suleiman's second year the Turks had lost all their conquests north of the Danube excepting Temesvar and Gross War- dein. Kioprili-Lade Mustapha, a son of Me- hemet Kioprili, was appointed Grand Vizier. He restored order and confidence, abolished abuses, administered even-handed justice and enforced religious toleration. He led a success¬ ful campaign against Belgrade and defeated the Germans near Essek in 1689-90. Suleiman died in 1691, having reigned barely four years. His brother, Achmet II (1691-95),

was an incapable weakling. Kioprili fell in battle with the Aus¬ trians and his army was routed. Famine and pestilence fell upon Turkey; the imbecile ruler died and was followed by a worthier monarch, Mustapha II (1695-1703), who announced that he would himself begin the Holy War against the <(unclean Christians.® At the outset his Danube campaign proved successful but he came to grief at the battle of Zenta, in Hungary, on 11 Sept. 1697, when the Austrians under Prince Eugene attacked the Turkish army as it was crossing a temporary bridge over the Theiss (Tisza) and, the cavalry being already across, cut it in two and completely routed the infantry, driving them into the river. The prince lost only 500 against the Turkish losses of 30,000. About this time the young Tsar Peter (the Great) of Muscovy sought to open a permanent (ice-free) water communication with the West, with civilized countries, through the Baltic or the Black Sea. But the first be¬ longed to Sweden and the second to the Turks, while the Caspian was in the hands of the Persians. Existing treaties with Poland and Austria, as well as policy and religion, urged the tsar against the Turks, and Constantinople has always been the point of attraction for orthodox Russia. Peter decided to attack by the Don and besiege Azov, the key to the sea of that name and whence the Turks made their plundering expeditions. An army of 100,000 men, many of them French (according to Voltaire), and other foreigners, formed the heart of the expedition. The attempt failed owing to the lack of a fleet to invest Azov from the sea and the siege was raised in 1695. Within less than a year Peter had constructed a fleet of 22 galleys, 100 rafts and 1,700 boats by 26,000 workmen assembled at the small ports of the Don. By July 1696 part of the out¬ works of Azov were captured and before the great assault was begun the place surrendered. This important event secured the Black Sea traffic to Russians and set a limit to Turkish power in that quarter. Ottoman power was practically broken by the Peace of Karlowitz on 26 Jan. 1699 between Austria, Poland, Rus¬ sia, Venice and Turkey. Under that treaty Turkey ceded to Austria Transylvania, all Hun¬ gary north of the Marosch and west of the Theiss and all Slavonia except a small part between the Save and the Danube. A 25-years' peace was also stipulated. With Poland and the Venetian Republic terms of peace were agreed to without limitation of time. Venice retained her conquests in Dalmatia and the Morea; Poland recovered Podolia and Kami- nietz. The truce with Russia gave her Azov and was at first for only two years, but was afterward extended into a peace for 30 years. Mustapha was deposed in a revolution in 1703 and died a year later.

Achmet III came to the throne in 1703 after having spent his 30 years of life in his prison home. But he had spent part of his time in the

profitable study of politics and gov¬ ernment, so that, unlike most sultans, he was not altogether unfitted for his task. As soon as he felt himself securely installed he dis¬ missed the Grand Vizier and Mufti and ordered all the ringleaders of the late revolution to be put to death. He next appointed another mem¬ ber of the eminent Kioprili family to be Grand Vizier, but the efforts of the latter failed before the internal confusion and discord. The pub¬ lic and officials turned against him and he was dismissed 14 months later and replaced by Bal- tadji Mehemet Pasha, a man risen from the people. Externally the country was at peace. After the defeat of Charles XII at Pultova by Peter the Great on 8 July 1709, the Swedish king made his escape from the field by swim¬ ming the Borysthenes. He fled to Bender, in Bessarabia, then Turkish territory, where he collected the remnants of his army — some 18,- 000 men — and endeavored for two years to entice the sultan into war with Russia. Achmet III was anxious to recover Azov and, therefore, ordered his Grand Vizier to put army and fleet on a war basis by raising a force of 200,000 men (August 1710). War broke out in 1711. Peter the Great set out for Poland in March, accompanied by his wife, Catherine. In the ensuing struggle the Russian army got into difficulties on the Pruth from lack of provision and the defection of Moldavia and Wallachia. The Turks and Tatars, though suffering heavy losses in a two days' battle, forced the Rus¬ sians almost to the point of surrender when the Empress Catherine, who attended a despondent council of war in camp, suggested bribing the Grand Vizier, a notoriously avaricious man. Catherine gave her jewels and 200,000 rubles were collected and sent to the Turkish camp. Peter at the time lay sick in his tent, reluctantly consenting to make peace proposals. The Grand Vizier Baltadji agreed to make peace on remarkably mild terms, though the Russian envoys had been instructed to accede to any terms and sacrifices. By the Treaty of the Pruth (21 July 1711) Azov was restored to Turkey and the Russian fortresses built on Turkish territory at Taganrog. Saton, Kamen- nov and elsewhere were to be demolished, while the Azov Sea fleet was to be burnt. Further, Charles XII (who had not accompanied the Turkish army) was to be allowed to return to Sweden and left in peace by Russia. Peter the Great never recovered from this humiliation and it might be said that from this time Russia and Turkey were nearly always at war. In 1714 Turkey was again at war with the Venetian Republic. Austria intervened and declared war on Turkey and later dictated the Treaty of Passarowitz (21 June 1718), by which Austria obtained Belgrade and other cities, extending her influence over large portions of Wallachia and Serbia. The Turks lost Hungary. The interests of Venice suffered; the Morea was again confirmed to Turkey. In 1723 Peter the Great joined Turkey in an attempt to dismem¬ ber

Persia, a co-operation that was short-lived Mustapha III, who reigned from 1757 to 1774, became alarmed at the growing strength of Russia and demanded that Catherine II should remove her army from Poland. But during

her reign the Russians ravaged the Crimea and put an end to Turkish rule in the peninsula, while the Wallachian army conquered Bes¬ sarabia, including Bender, and penetrated into Bulgaria. While Turkey was preoccupied with the revolt in Egypt, which broke out in 1768, Catherine prepared further disaster for the Ottoman Empire. A Russian fleet defeated the Turkish navy at Chios and annihilated it in the port of Chesme with British aid. The Russian commander, Alexis Orloff, delayed his projected attack on Constantinople and found the Dardanelles had been too strongly fortified in the meantime. But the Russians had recov¬ ered Azov, the Crimea, the shore of the Black Sea between the Dnieper and Dniester and made important gains in the Balkans. By the Peace of Kutchuk-Kainardji in 1774 Turkey was compelled to yield the Russian conquests, acknowledge Russian protection over the Chris¬ tian subjects of the sultan and to open the Bosporus and Dardanelles to Russian merchant ships. In 1787 Turkey again declared war against Russia, but suffered defeat except at the battle of Belgrade, where the force under Selim III was victorious. The Peace of Sistova (1791) ended the wars between Austria and Turkey. Russia began another war against Turkey in 1807 and succeeded in nearly every encounter. The insurrection in Greece at the time when the Turkish army was engaged else¬ where was a severe blow to Mustapha IV. The Peace of Bucharest in 1812 closed a six years' struggle in favor of Russia. The Ser¬ bians rose against the Turks in 1815; Greece revolted in 1821 and declared her independence of Turkey in 1822. At the naval battle of Navarino (20 Oct. 1827) the allied fleets of France, Great Britain and Russia annihilated the Turkish and Egyptian fleets, thereby assur¬ ing Greek independence. A short war raged between Russia and Turkey in 1828-29, the latter being the loser. The Turkish war with Ibrahim Pasha is related under Egypt (q.v.).

Crimean War Period. — Up to the middle of the 19th century the Ottoman Empire had exerted a tremendous influence upon the his¬ tory of Europe for over 400 years. The Turks had proved themselves not only redoubtable warriors, but a distinct peril to Western civiliza¬ tion and Christianity. The Turk conquered for the sake of conquest ;

he devastated and massacred, but made no effort to colonize or introduce tolerable government. In all the territories that fell under his sway the Turk was ever in the minority; he was not assimilated with the natives nor they with him; he was ever a stranger to the soil and his (

Europe, as has been shown, there were frequent coalitions among European states to resist the invader. It was reserved for the 19th century to witness the anomalous spectacle of Christian nations rushing to the defense of the Turk and the preservation of his dominions — at least in Europe. This political phenomenon is known as the ((Eastern Question,® which is treated under that head. The first important manifestation of this policy was the war in the Crimea (q.v.). Already in 1853 the Tsar Nicholas I described Turkey as the <(Sick Man of Europe® to the British Ambassador and proposed a division of his property when the patient should die. The old Russian ambition for Constantinople has been mentioned. The other Turkish possessions in Europe at that time contained populations of more or less well-marked races which could be set up as independent states — as they eventually were. The Crimean War, in which France and Great Britain fought on the side of Turkey against Russia, resulted practically in a draw, though Russia was obliged to make important con¬ cessions to her rival by the Treaty of Paris.

In 1875 Bosnia and Herzegovina broke into open revolt, stung to desperation by intolerable abuses, and in February the six European powers launched the Andrassy Note, the first of a long succession of similar documents, most of which have been delivered in the same fashion, only to meet the same fate. The note demanded administrative reforms on a liberal scale, but nothing came of it. Though nominally acting in concord, the Powers at this epoch were far from being in harmony. The note having failed in its object, Prince Gortschakov, Prince Bismarck and Count Andrassy met in Berlin and framed the ((Berlin Memorandum® (q.v.), in which the signatories declared it futile to accept the sultan's bare word and promise for reforms, and demanded material guarantees. The effect of the memorandum was nullified by Lord Derby's objection to the principle of interfering with the integrity of the empire, but it was published and noted by the Turks, though never formally handed to them. The Bulgarians broke out in insurrec¬ tion in April, but were easily crushed with relentless ferocity. The internal condition of Turkey went from bad to worse and the financial situation became desperate; the interest on the public debt amounted to nearly $70,- 000,000, out of a total revenue of $100,000,000. Payment was stopped, Turkish stocks fell 50 per cent and the populace grew more and more furious against

their rulers. Frequent demonstrations were made by the turbulent Softas (students), and at length the Grand Vizier and the Sheikh-ul-Islam were ejected from office, while Midhat Pasha, the leader already of a Turkish reform party, was given a place in the ministry. Within two weeks of this change the palace was silently surrounded with troops, the Sultan Abdul Aziz was made prisoner and dethroned by his ministers on a fetvah from the Sheikh-ul-Islam. Murad V was placed on the throne, and Abdul Aziz was found dead in the Cheraghan Palace 4 June 1876. According to the verdict of a number of European doctors he had committed suicide by cutting the veins in his arms with a pair of sharp-pointed scissors. The advent of Murad

was hailed with popular enthusiasm, as he was supposed to be liberal-minded and inclined toward political liberty. A short time, how¬ ever, revealed that he was a weak-willed creature, quite unable to check the high¬ handed proceedings of his Cabinet, and on 31 Aug. 1876 he was unceremoniously deposed, not secretly, as his uncle had been, but deliberately and openly, and Abdul Hamid II, his younger brother, became sultan. For 28 years Murad lived a state prisoner; his death was announced 31 Aug. 1904.

Abdul Hamid at first gave no sign of his latent strength and energy. Not loiig before his accession Serbia had suddenly declared war on Turkey and proclaimed Milan Obrenovich (

not allowed to stand, the Bˆrlfii Congress cut¬ ting down the Turkish sacrifices of territory. However, Rumania, Serbia and Montenegro were released from Turkish suzerainty and Bul¬ garia was left in only nominal dependence. Bosnia and Herzegovina were placed under the administration of Austria and a small part of Armenia was ceded to Russia. The treaty further obligated the sultan to introduce re¬ forms into the remaining Christian provinces — an obligation that still lacked fulfilment at the close of the European War 40 years later. The result of the war was by no means very dis¬ astrous to Turkey; the loss of the Balkan principalities had long been inevitable, but she was still permitted to retain suzerainty over eastern Rumelia, which in 1885 broke away and united with Bulgaria. Turkey also lost Kars and Batum to Russia. The most serious blow was the war indemnity, but Russia proved indulgent and consented to easy instalments, thus providing herself with a Damocles' sword over Turkey. Just before the signature of the treaty, Great Britain concluded the Cyprus Con¬

vention, taking over the administration of that island and in return undertaking to defend Turkey in case of Russian aggression in Asia Minor. In 1881 Midhat Pasha was tried for alleged complicity in the murder of Abdul Aziz. He was Mound guilty,® exiled to Arabia and finally strangled.

In 1882 the Arabi Pasha revolt broke out in Egypt, and the sultan at the outset en¬ couraged it, as being directed against the grow¬ ing dictation of Europe personified principally by the Dual Control. The viceroy Ismail had been deposed and held a prisoner in Constan¬ tinople, and his son Tewfik was running with hare and hounds, being also in partial sym¬ pathy at first with Arabi and his army, whom he knew to be working with the tacit approval of his suzerain. Later on, when the British expedition arrived, Tewfik threw over the rebels, though it was he who gave the order to return the fire of the British fleet. The sultan was invited to send his own troops to Egypt, but for some reason never made clear he de¬ clined the British invitation. The result has been the definite loss of Egypt, although the suzerainty had already become purely nominal under Ismail. By 1885 the Ottoman Empire had been shorn of Serbia, Rumania, Bulgaria, Montenegro, eastern Rumelia, Egypt, Cyprus, I unis and I hessaly. A comparative calm reigned after the settlement of the Bulgarian question and Abdul Hamid devoted himself principally to improving his army and extin¬ guishing all internal opposition to his arbitrary rule. It was not until the Armenian question loomed upon the horizon that European diplo¬ macy again roused itself to activity on the shores of the Bosporus, though there was now a different grouping of influences. Since the war, Russia had been viewed with justified mis¬ trust, and the sultan had leaned upon the Triple Alliance, headed by the German em¬ peror, who had almost openly posed as his friend and protector in Europe, as Great Britain had bound herself to be in Asia. When Abdul Hamid saw signs of disruption between mem¬ bers of the 1 riplice, and England drifting into trouble both with Russia and France, who were joining hands, he decided to reverse his policy

and turn to Russia as a friend. No exact date can be fixed for this change, but it may roughly be said to have been inaugurated about 1889-90. It was at this time that the beginnings of dis¬ orders in Armenia were reported. Early in 1890 the churches of Erzerum were broken into and profaned, while a score of Armenians were killed and wounded. The Armenians then de¬ cided that their only hope of

salvation was, at any cost, to bring about European interven¬ tion. The Trochak, a Russian branch, instituted a system of anarchism, bombs and dynamite, by which they counted on provoking the sultan to such massacres as should force the intervention of Europe. So far as the massacres went, their calculation was correct ; but Russia, who was distinctly opposed to any establishment of an autonomous or independent Armenia, invari¬ ably hampered any proposal for active coercion of the sultan. That monarch, being confident of the non-participation of Russia, if not of her positive help in case of any act of force by other European powers, and also being steadily encouraged bv Germany, took little heed of the threats and warnings issued by a Concert no three of whose members had the same views and almost all of whom were cer¬ tain to protect him from aggression on the part of any one power that might attempt such a thing. The Sassun massacres of January 1895 brought more protests from European govern¬ ments, to which the sultan replied that he was then engaged upon a project of reforms which he hoped to communicate within a month. Nothing happened up to September, however, when the Armenians organized a demonstration at the Porte, which was followed at once by a wholesale butchery all over Stambul, Galata and Pera. This was only a beginning, and for the next few months there was scarcely a dis¬ trict in Asia Minor which did not run red with the blood of Armenians. In spite of the most energetic paper remonstrances of the Powers singly, collectively and in groups, not a single individual was punished. At first, after the Convention of Cyprus, the task of guarding the rights of the Christian population was supposed to devolve chiefly upon Great Britain, who ap¬ pointed military consuls and up to a certain point succeeded in remedying a few abuses. But toward 1890 — as soon as Russia had come to some terms with Turkey— Great Britain lost all influence. She appealed to all the sig¬ natories to the Berlin Treaty when the Sassun massacres took place, but only France and Russia responded, and they, apparently, only to prevent England from acting alone. The re¬ form scheme eventually submitted by the six am¬ bassadors, quite apart from its inherent defects, was foredoomed to failure from the certain knowledge of the sultan that Russia did not really recognize the existence of any Armenia; also that Germany had no particular interest in Asia Minor, as she carelessly stated, and that England did not consider the scheme as sufficiently guaranteed, but wanted something more which the other Powers would not back her in asking or obtaining. In fact, directly England wished to insist upon an immediate and categorical answer from the sultan, Prince Lobanoff wired from Saint Petersburg to the Russian Ambassador that <(in no case would Russia co-operate in coercive measures, nor, VOL. 27 —

indeed, would she consent to the establishment of a privileged Armenian province or provinces® (which England was pressing for) ((to serve as a nucleus for a possible future Armenian king¬ dom.® After months of fruitless discussion the sultan again emerged triumphantly from the contest by substituting another scheme of his own — which never materialized.

Having thus entirely defeated the fictitiously united Powers, the sultan turned his attention to the Young Turkey party, a group or relic of the Midhat faction which aimed at the re¬ generation of the empire by utilizing the best Moslem elements without interference or con¬ trol from Europe. Its first article was minis¬ terial responsibility, as opposed to palace au¬ tocracy, with ultimate ideas of representative chambers for legislation which should put an end to the worst abuses and raise the country from the slough of corruption into which it had fallen. In short, the Young Turks' object was to curb the arbitrary exercise of power by the sultan and give to every Turk and Christian some sort of legal status, though it was scarcely likely, having got rid of Midhat Pasha and all his associates by means of trumped-up charges and judicial murders, that Abdul Hamid would permit the seed sown by them to ripen and bear fruit. The chief sources of danger were the Softas and the students in the naval and military academies. Accordingly, these were mercilessly pursued with torture, drowning, beating and exile. As he had cowed the Armenians, so the sultan resolved to break the spirits of the Young Turks. Unlike the Armenians, they had not the passive sympathy of foreigners behind them, and they lacked the necessary finances. Not that cash was wanting among the people, but any man who ventured to subscribe was sure to be denounced and spirited away.

At the beginning of 1897 the sultan was probably stronger than ever before, despite the furious assaults made upon him by ostensibly united Europe. The Cretans once more broke out into revolt. Not only did the Powers refuse to let the sultan send more troops to the islands, but demanded that a large portion of those already there should be withdrawn. The Greeks then landed an expeditionary force under Colonel Vassos and proclaimed the island annexed to Greece, but the Powers protested and blockaded Vassos with a mixed fleet. The sultan speedily mobilized a large army on the Thessalian, Bulgarian and Serbian frontiers. Despite all warnings from the Powers, the Greeks raided Turkish territory and the sultan declared war upon Greece, with the consent, be it noted, of the Powers them¬ selves. In a few weeks Greece was beaten to her knees, and now the Concert headed by Russia intervened, deprived the Turks of the spoils of victory,

ordered them to evacuate conquered Greek territory and created the island an autonomous state under the high commissionership of Prince George of Greece, an arrangement which lasted till 1906. By the Balkan wars of 1912-13 Crete was finally annexed to Greece.

The outstanding events of Turkish history during the first 15 years of the 20th century were the perennial Macedonian feuds, an irregular civil war between Serbians and

Albanians on one hand and Greeks and Bnlgars on the other, both being freely assisted by guerrilla bands from beyond the frontier. Bulgarian villages were attacked and their inhabitants assaulted or murdered by Greeks, while sanguinary conflicts occurred between Turkish troops and Bulgarian bands. The international gendarmerie established by the Powers was unable to cope with the insurgents, and its operations were impeded by the in¬ efficiency and corruption of the judiciary. A revolt in Yemen and the lack of funds pre¬ vented the sultan from dealing with the difficulties besetting him on all sides. In 1907 the Porte, still suzerain over Bulgaria, made remonstrance to the latter as to the persecution of the Greeks. All the Balkan states seemed on the verge of war; European intervention was powerless; massacre and outrage continued. The Turkish revolution, engineered by the Young Turks, broke out in 1908. Almost bloodless in execution, it led to the revival of the dormant Constitution and the prorogued Parliament of 1878. Abdul Hamid accepted the inevitable and transformed himself into an ardent reformer and a pattern sovereign ac¬ cording to the best Western models. He sud¬ denly became almost the most popular person in the empire. On 5 Oct. 1908 Prince Ferdinand proclaimed himself tsar of Bulgaria and de¬ clared his absolute independence of Turkey; Austria annexed Bosnia and Herzegovina. Abdul Hamid was dethroned in 1909 and ban¬ ished to Salonica; he died on 10 Feb. 1918. His brother, Mohammed V, succeeded to the throne and soon became a helpless puppet in the hands of the Young Turk leaders, Enver Bey and Talaat Pasha. Italy declared war on Turkey in 1911 and took Tripoli. Before that war was ended the Balkan League declared war on Turkey in 1912, which was followed by an¬ other war among the members of the league in 1913, the results of which were destined to have important consequences in the great European War which broke out in the following year. All the events here touched upon will be found fully described under the different headings given in the list of cross-references below. Separate

articles are also devoted to all the prominent characters concerned. See Abdul Hamid II; Armenia; Balkan League; Bal¬ kan Wars; Constantinople; Crimean War; Eastern Question; European War; Hejaz ; Mesopotamia; Palestine; Russo-Turkish War; Syria; Turco-Italian War; Turkey and the World War.

Bibliography. — Abbott, G. F., (Turkey, Greece and the Great Powers) (London 1917) ; Azoury, N., (Le Reveil de la nation arabe dans l'Asie turque5 (Paris 1905) ; Baker, G., (The Passing of the Turkish Empire in Europe) (London 1912) ; Bamberg, F., (Geschichte der orientalischen Angelegenheit . . . 1878)

(Berlin 1892) ; Banse, E., (Die TiirkeP (Bruns¬ wick 1915) ; Barclay, Sir J., (The Turco-Italian War* (London 1912) ; Barker, T. E., (The Great Problems of British Statesmanship (New York 1917) ; Beehler, W. H., (History of the Italian-Turkish War> (Annapolis 1913) ; Bucknill, J. A. S., and Utidgian, H. A., (The Imperial Ottoman Imperial Code) (Lon¬ don 1914) ; Buxton, C'. R., (Turkey in Revolu¬ tion (ib. 1909) ; Cahun, L., (Introduction a

Thistoire de l'Asie : Turcs et Mongols a 1405 ˆ (Paris 1896) ; Chirol, Sir V., (The Derelict Turkish Empire) (Asia, New York, March 1919) ; Courtney, Lord, Nationalism and War in the Near East) (by a diplomat; Oxford 1915) ; Cox, S. S. (United States Ambassador), (Diversions of a Diplomat in Turkey } (New York 1887) ; Creasy, Sir E. S., (History of the Ottoman Turks* (London 1882) ; Cuinet, V., (La Turquie d'Asie* (Paris 1891—98) ; Czap- licka, M. A., (The Turks of Central Asia in History and at the Present Day : An Ethnologi¬ cal Inquiry into the Pan-Turanian Problem* (Oxford 1919) ; Davey, R., (The Sultan and his Subjects) (2d ed., London 1907) ; Delaygne, L., (Essai sur les finances ottomanes) (Paris 1911) ; Douglas, Rev. J. A., (The Redemption of Saint Sophia) (London 1919) ; Duggan, S. P. H., (The Eastern Question: A Study in Diplomacy * (New York) ; Eliot, Sir C., (Tur- key in Europe) (London 1900) ; Ellison, G., (An Englishwoman in a Turkish Harem* (Lon¬ don 1915) ; Endres, F. C., (Die TiirkeP (Munich 1917) ; Eversley, Lord, (The Turkish Empire: Its growth and decay) (London 1917) ; Ferriman, Z. D., (Turkey and the Turks) (ib. 1911) ; Freeman, E. A., (The Ottoman Power in Europe: Its Nature, Growth and Decline* and (History and Conquests of the Saracens) (London 1877) ; Fullerton, W. M., 'Problems of Power* (London 1914) ; Garnett, Lucy M., 'Turkey of the Ottomans) (ib. 1912) ; Gaulis, G., 'La ruine d'un empire> (Paris 1913) ; Gibbons, H. A., 'The Foundation of the Otto¬ man Empire 1300-1403* (Oxford 1916) ; Ham- mer-Purgstall, J. von 'Geschichte des osmanischen Reichs, etcP (10 vols., Budapest 1836); Hecquard, C., 'La Turquie sous Abdul

Hamid IP (Paris 1901) ; Heidborn, A., ‘Manuel de droit publique et administratif de l’Empire ottoman> (2 vols., Vienna 1912) ; Hichens, R., ‘The Near EasP (London 1913) ; Holland, T. E., (The European Concert in the Eastern Question: a collection of treaties, etcP (Oxford 1897) ; Jaschke, G., ‘Die Welt des Islams) and ‘Die Entwicklung des osmanischen Verfassung-staates von den Aufangen bis zur GegenwarP (Berlin 1917) ; Jenkins, H. D., be¬ hind Turkish Lattices : The Story of a Turkish Woman’s Life* (London 1911) ; Krause, P., ‘Die Turkei* (Leipzig 1916) ; Landemont, Comte de, ‘L’Europe et la politique orientale 1878-1912> (Paris 1913) ; Lane-Poole, S., ‘Tur- key) (Story of the Nations series, New York 1896) ; Mandelstam, A., ‘Le sort de l’empire ottoman) (Zurich 1917) ; Marriott, J. A. R., ‘The Eastern Question* (Oxford 1919) ; Maurice, Gen. Sir F., (The Russo-Turkish War* (London) ; Miller, W., (Travels and Politics in the Near EasP (London 1898) and ‘The Ottoman Empire 1801— 1913) (ib. 1913) ; Moore, J., (Outlying Europe and the Nearer OrienP (General Grant’s tour, Philadelphia 1880) ; Morawitz, C, (Les finances de la Tur¬ quie* (Paris 1902) ; Morgenthau, H., Ambas¬ sador Morgenthau’s Story* (New York 1918) ; Muir, Sir W., and Weir, T. H., (The Caliphate: Its Rise, Decline and FalP (Edinburgh 1915) ; Newman, Cardinal, (The Turks in their relation to Europe1* (Historical Sketches, Vol. II, London 1872) ; Nossig, A., (Die neue Tiirkei und ihre Fiihrer* (Halle 1916) ; Ollier, E., ‘History of the

Russo-Turkish War> (2 vols., London 1880) ; Ostrorog, Count Leon, (The Turkish Problem* (ib. 1919) ; Parker, E. H., (A Thousand Years of the Tartars* (London 1895) ; Pears, Sir E., (Turkey and its People) (ib. 1911) and (ib. 1916) ; Percy, Earl, (The Highlands of Asiatic Turkey) (ib. 1901) ; Philippsohn, A., (Das Tiirkische Reich) (Weimar 1916) ; Pickthall, M., (With the Turks in War Time) (London 1914) ; Pinon, R., (L’Europe et la jeune Turquie) and (L’Europe et l’empire ottoman* (Paris); Polybius (pseud.), (The Settlement of Turkey) {Asiatic Review, London, February 1919) ; Ram¬ say, Sir W. M., (Impressions of Turkey during 12 years’ Wanderings) (London 1897) and (The Revolution in Constantinople and Turkey* (ib. 1909) ; Ranke, L. von, (Die OsmaneiP (1877) and (Serbien und die Tiirkei* (1879) ; Saint- Yves, G., (Les chemins de fer franqais dans la Turquie d’Asie) (Paris 1914) ; Salmone, H. A., (The Fall and Resurrection of Turkey) (Lon¬ don 18%) ; Schmidt, (Das Eisen’bahnwesen in der Asiatischen Tiirkei* (Berlin 1914) ; Schopoff, A., (Les reformes et la protection des Chretiens en Turquie, 1673-1904* (Paris 1904); Spry,

W. J., (Life on the Bosphorus: Turkey Past and Present* (London 1895) ; Sykes, Sir M., (The Caliph's Lost Heritage: A short history of the Turkish Empire) (London 1915) ; Whitman, S., 'Turkish Memories* (ib. 1914) ; Woods, H. C, 'The Danger Zone of Europe) (ib. 1911) ; Wright, H. C. S., Two Years under the Crescent* (ib. 1913) ; Young, '■Corps de Droit Ottoman) (collection of Turk¬ ish laws) ; Zinkeisen, J. W., 'Geschichte des Osmanischen Reichs in Europa > (7 vols., Ham¬ burg and Gotha 1840-63). Guide Books by Baedeker, Cook, Macmillan and Murray.

Henri F. Klein, John B. McDonnell, Editorial Staff of The Americana.

TURKEY, or THE OTTOMAN EM¬ PIRE, Diplomatic Relations of the United States with. The opening of American diplo¬ matic relations with Turkey, although delayed for nearly a half century after the achieve¬ ment of American independence, was con¬ templated soon after the conclusion of the early treaties with the Barbary states. In 1798, following the formation of a European coalition (of Russia, i \ustria, England, Turkey and Naples) against France, the Russian Min¬ ister at London suggested to Rufus King (the American Minister at London) that the Rus¬ sian government would be inclined not only to form a commercial treaty but also to use its influence in aiding the negotiation of such a treaty with Turkey. Mr. King while recog¬ nizing the advantage of such a treaty with Russia also discreetly admitted that extension and establishment of the American trade in the Levant would undoubtedly be an object of importance. On 11 Feb. 1799, William Smith, Minister Plenipotentiary to Portugal, was com¬ missioned Envoy Extraordinary and Minister Plenipotentiary to Turkey, but did not go.

The first American vessel which raised the American flag in the Bosphorus was the Ameri¬ can frigate George Washington, which was .seized in 1800 by the Dey of Algiers and forced to carry an Algerian ambassador to Constantinople. For 30 years thereafter,

American commerce in the eastern Mediter¬ ranean was conducted under the protection of the English Levant Company.

In January 1815, the Russian government in a note to Levett Harris, charge at Saint Peters¬ burg, offered to obtain through its Minister at Constantinople the good offices of the sultan in securing for the American government fa¬ vorable arrangements with Algiers.

The first attempt to arrange commercial re¬ lations with Turkey on a treaty basis was made in 1817, and thereafter followed by various

other unsuccessful attempts.

Finally in September 1829 President Jack- son appointed for that purpose a commission composed of Commodore Biddle, David Offley (the American consul at Smyrna) and Charles Rhind of Pennsylvania. Rhind, who preceded the others to Constantinople, negoti¬ ated a treaty conceding trading privileges of the most favored nations and containing a sepa¬ rate secret article which allowed Turkey to purchase timber and to build ships in the United States. This Treaty of 1830, signed by the three commissioners, was ratified by the Senate only after rejection of the separate article. It was proclaimed 4 Feb. 1832. In exchange of ratification, which occurred at Constantinople, the American government was represented by David Porter of Maryland, who was commissioned charge d'affaires on 15 April 1831 and later as Minister Resident on 3 March 1839. The first Turkish diplomatic representa¬ tive in the United States was Blacque Bey who presented his credentials as Envoy Extraordi¬ nary and Minister Plenipotentiary on 23 Aug.

1867.

In 1868 a question arose in regard to the contents or stipulations of the original draft of the Treaty of 1830 which was found to differ from the translation ratified by the American Senate. The American government complained that the arrest and imprisonment of two Ameri¬ cans was contrary to Article 4 of the Senate version which provided for trial by the Ameri¬ can Minister or consul in such cases ; but the Turkish Foreign Minister replied that the treaty clause quoted was not in the original Turkish document and, therefore, was not correct.

Meantime, in February 1862, the two gov¬ ernments negotiated a new commercial treaty which changed minor provisions of the Treaty of 1830 but contained no provision in regard to extraterritorial jurisdiction. This treaty al¬ though valid for 28 years was terminable by a notice of one year before the expiration of either 14 or 21 years. In 1874 and again in March 1883 the government of Turkey gave advance notice, unaccepted by the United States, but neglected to submit the re¬ quired notice at the proper time. It insisted that the notice of March 1883 was given prop¬ erly and, therefore, that the treaty was abro¬ gated after 5 June 1884. Soon thereafter, how¬ ever, it invited the negotiation of a new treaty.

A third treaty with Turkey, an extradition treaty, was negotiated in 1874 and proclaimed 26 May 1875.

By the Treaty of 1830 the United States obtained recognition of the rights of its citi¬ zens to pass the Bosphorus and the Dardanelles and to enter the Black Sea which the Sultan until near the close of the 18th century had

guarded from foreign vessels as jealously as he protected his own harem from outsiders. This right for merchant vessels had been granted to Russia in 1774, to Austria in 1784, to Great Britain in 1799, to France in 1802 and to Prussia in 1806 and was finally granted to all nations by the Treaty of Paris in 1856 as modi¬ fied by the Treaty of London in 1871. The American government, having never adhered to the treaties of Paris and London, claimed the right to send into the Black Sea ships of war which were prohibited to other foreign powers by the treaties, but while reserving all ques¬ tion of right it entered the Dardanelles in such case only after asking permission of the Porte.

Under the Treaty of 1830, which was the basis of all American rights in Turkey, the American government continued to claim the privileges of extraterritoriality. This conten¬ tion, based upon an admitted mistranslation of the treaty, was opposed by the sultan's govern¬ ment; but American consuls have continued to exercise extraterritorial privileges in Tur¬ key and in Turkish dependencies and in 1900, after the privilege for which America contended had been granted to other nations, the Ameri¬ can insistence of right was placed on the most favored nation clause. In 1914 Turkey abro¬ gated the privilege in the case of all nations. This . action was promptly protested by the principal nations and the final outcome awaits the results of the peace negotiations termi¬ nating the war.

The question of naturalization long re¬ mained a prominent source of friction. The Turkish government refused to permit the re¬ turn of its subjects who were naturalized in the United States after 1869, and frequently ex¬ pelled them when discovered on Turkish terri¬ tory. A naturalization treaty negotiated in 1874 to settle the controversy was approved by the Senate after amendment, but, because of various declarations attending the exchange of ratifications, was never proclaimed or put into effect. Later efforts to induce the government of Turkey to accept the treaty in the spirit con¬ templated by the Senate amendment were un¬ successful. Finally, in 1889, the Turkish gov¬ ernment seemed willing to accept it, but fol¬ lowing the

reapproval of the Senate with a proviso against retroactive effects, it resorted to tergiversations and thereby prevented ratifica¬ tion.

The importance of an understanding to re¬ lieve disagreeable situations resulting from Turkish policy was emphasized in recent years by the increased immigration of Armenians and Syrians to the United States and was re¬ flected in the recognition of larger importance of American diplomatic representation at Con¬ stantinople illustrated in the service of Oscar Straus whose triple embassy covered the years 1887-89, 1898-1901 and 1909-10.

Although Americans always openly sym¬ pathized with Christian nationalities subject to Turkey, the American government until re¬ cently hesitated to participate with the European concert of powers which so often intervened or remonstrated against conditions within the Turkish Empire. In 1894, following American Senate resolutions against reported ˆatrocities® by Turkish officials, President Cleveland, who had declined the invitation of

Turkey to investigate conditions, decided that American action would prove inconvenient be¬ cause of the European concert under the Treaty of Berlin. Later, the possibility of American intervention was indicated in the in¬ creased American indignation resulting from the Armenian massacres, and probably was pre¬ vented only by the influence of ancient tradi¬ tions in causing the American government to avoid any action by which it might become in¬ volved in the mazes of the Eastern Question. More recently, American diplomacy became more active at Constantinople. This activity encouraged the proposal, at the close of the World War, that the American government assume a new responsibility by accepting the mandatory of Armenia, or in the execution of an international guarantee of the free passage of the Dardanelles.

The larger number of American diplomatic disputes with Turkey originated in questions concerning the educational and charitable in¬ stitutions established in the Turkish Empire by American missionaries who insisted upon privileges under provisions of a series of old capitulations df sultans granting substantial self-government to foreign communities in Tur¬ key. Although these capitulation rights were conceded by the government at Constantinople, their enforcement resulted in difficulties. In 1903 the government of Turkey recognized the justice of American demand for official legal¬ ization of American educational institutions in Turkey, based upon a similar privilege granted to France in 1901, but it failed to issue the necessary decrees until 1907, when the privileges were finally granted in return for

certain com¬ mercial concessions. It failed, however, to acknowledge by treaty the American claims to indemnity for injury to missions or other American property in periods of internal dis¬ order.

In 1906, after considerable opposition, the Sublime Porte finally conceded the demand of the American government to be permitted to raise the rank of its diplomatic representative from minister to ambassador, who thereby obtained the right of personal interview with the sultan to discuss official matters. This arrangement, first unsuccessfully proposed to Turkey by President McKinley, was especially necessary to remedy unsatisfactory relations as conducted through the irresponsible Turkish Secretary of Foreign Affairs.

Another subject of discussion resulted from increase of American commercial interests. In 1907 the American government successfully de¬ manded an equal right with European powers to approve or disapprove proposed increases in Turkish tariffs. Recently American capital has been attracted by new opportunities for de¬ velopment in Turkish territory.

In conflicts between Turkey and the Balkan states and in the conflict between Turkey and Italy in Tripoli culminating in 1913 in the al¬ most complete destruction of the Turkish Em¬ pire in Europe, the United States had «only a remote and detached interest,® but in the later world conflict in which Turkey was an ally of Germany and Austria the American govern¬ ment recognized a duty which compelled it to participate actively in war against the Cen¬ tral Powers and in the subsequent peace nego-

tiations which determined questions relating to Turkey and her dependencies.

Bibliography.— Malloy, W. M., treaties and Conventions of the United States1 (1910) ; Moore, J. B., < International Law Digest1

(1906); Schuyler, Eugene, /American Diplo¬ macy 1 (1886) ; North American Review (May 1906, pp. 689-700) ; (United States Foreign Re¬ lations1 (1861-).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

TURKEY, or THE OTTOMAN EM¬ PIRE, AND THE WORLD WAR. The

Turkish Empire was from the very start an anomaly. When at the zenith of its power and expansion it embraced, like the Roman Empire of old, large tracts of land in the three continents, Asia, Europe and Africa. But at no time was it consolidated. Always it was a mere congeries of territories differing greatly one from the other in civilization, race, speech and religious faith. It was built on rude con¬ quest, and was solely maintained by terror and arms. The dominant race in it, the Ottoman Turks, was always the minority and always, too, intellectually below par in comparison with the subjected majority. After 1540 the process of slow decay and disintegration set in. Under a few able rulers Turkey rallied somewhat, and in 1683, when Mustafa Pasha went with an army of half a million to lay siege to Vienna, the abnormal Asiatic power for the last time in history — like an expiring candle, flickering or flashing' — practically closed its meteoric career. Since then it has, more or less justly, earned her nickname of the (XIV of France through¬ out his long and troubled reign was in alliance with Turkey against the Hapsburgs. During the Napoleonic era England was Turkey's silent or outright supporter. In fact, England's political and economic interests were seldom running counter to those of Turkey. Her aim was all the while to maintain a feeble Turkey, but an intact one, especially since British India loomed up as important and as easy access to those rich possessions had to be kept open. France, it is true, had special interests in Syria, but these needed not necessarily to conflict with Turkish or French policies. During the Crimean War both France and England stood on the side of Turkey against Russia. Quite late, only since the period of Peter the Great, Russia collided with Turkey, but since then a score of wars were fought in which Turks and Russians faced each other with hostile intent. And for the space of 50 years one of the favorite Russian ambitions has been the destruction of Turkey and the acquisition of Constantinople. As for the Central Powers, Austria-Hungary and Germany, the former waged more frequently war with Turkey, ever since the fall of Christian Constantinople in

1453, than any other country. Twice Vienna was besieged by the Moslem Turks and their hosts, in 1529 and 1683. For 150 years nearly the whole of Hungary was under Turkish dominion. Transylvania was Turkish for even a longer space of time. During the 16th, 17th and 18th centuries Austria was almost inces¬ santly at feud with Turkey. For a long time Austria constituted itself the champion of the Christian populations on the Turkish Balkan, until deprived of that role by Russia. With Germany political relations of more than tem¬ porary importance were of much more recent date. With Prussia, as the more

bellicose por¬ tion of Germany, Turkey entered only into re¬ lations since the reign of Frederick the Great, the second half of the 18th century, and these relations were consistently amicable ones. But Turkey held rather aloof from Prussia and from the latter's creation, the new German Empire, even as late as the accession of its last ruler, William II, in 1888. Since then, however, there was a decided change. The Kaiser took infinite pains to strengthen the political and economic ties with Turkey. The Turkish army was reorganized by Prussian offi¬ cers and put on a Prussian footing, the most effective work in turning the hitherto but loosely coherent and badly disciplined Turkish hosts into a formidable fighting machine being per¬ formed, at the behest of William II, by Gen. Baron von der Goltz, although from Moltke on a number of other efficient Prussian drill masters had devoted many years to the pre¬ liminary task. Other material bonds, as well as intellectual ones, followed in rapid succes¬ sion. William II let no opportunity escape to assure Turkey of potential German support. During his trip to Palestine he grandiosely pro¬ claimed himself the admirer and, in a manner, the powerful protector of not alone Turkey, but of the entire Moslem world. The national policy of Germany, as managed from Berlin, embraced a quasi-protectorate over decadent Turkey, with its threatening tentacles turned more especially toward Britain and British India. As relations with Germany became more and more intimate during the long reign of Abdul Hamid, financial and economic schemes began to multiply, all directed from the Foreign Office in the German capital. These latter culminated in the planning and partial construction of the Berlin-Bagdad Railroad, a line which was chiefly meant to serve Turkish strategical schemes in a future war wherein Russia, England and France should be in¬ volved, but which also was to connect by the briefest route Berlin with the Turkish part of the Orient, and to bring more especially Mesopotamia within the sphere of German in¬ fluence and thus not only checkmate the British but to threaten permanently the approaches to British India. Anatolia to the northward, that is, the heart and source of purely Turkish power, was to be brought near the south on the Euphrates line. The complete economic con¬ quest of Turkey, at the instance and with the earnest collaboration of the imperial staff at Berlin, was elaborately planned and had already in good part been accomplished when the World Wanbroke out in 1914. The overwhelm¬ ing bulk of the Turkish masses did not fall in with these projects, not even while during 1915

and 1918 the fate of Turkey trembled in the balance. But Enver Bey, the all-powerful War Minister, and Talaat Bey, the equally omnipo- otent Secretary of the Interior in Turkey, who completely terrorized the feeble and sickly sul¬ tan, Mohammed Rashid, were apt pupils of German statecraft, and until the complete col¬ lapse of Turkey came these two and their fol¬ lowing had it all their own way.

The causes that induced Turkey late in 1914 to enter the World War on the side ot Germany now lie clear before the eyes of the world. They are intimately connected with and lie enwrapped in the coming of the so-called Young Turk party to power. When in 1908 the absolutism of Abdul Hamid came to an end and the wholly unexpected and bloodless revolu¬ tion that deposed him and in a sense modernized Turkey and its government so successfully brought the Young Turks with their Parisian ideas of liberty and progress on the stage, the entire West almost expected nothing less than a complete rejuvenation and liberalization ot Turkey, and for a short time there were ap¬ parent signs of that. During this short transi¬ tion period German national statecraft, which had strongly supported the personal regime of the autocratic Abdul Hamid, was under an eclipse. But the Young Turks very soon upset their own initial program, and from setting out as spokesmen of Western liberalism they turned into more ruthless advocates of force in the service of their ideals than had been Abdul Hamid himself. Instead of rostering a rational program of internal reform they became Nationalists, Panislamists, finally Panturanians. That is to say, their aims became the following: enforcement of a policy recognizing only the Ottomans as instruments and worthy servants of the state, and the rooting out by every means, of alien, that is, non-Turkish and non- Moslem elements within the Turkish Empire, such as Armenians, Syrians, Nestorians, Arabs; the spreading by persuasion or force of the doctrine that Turkey is the cradle and instru¬ ment of Islamic rule, within and abroad; the gathering into one fold,, into one great state of the future, of the whole Turanian race. As early as October 1911, the Young Turk Con¬ gress adopted resolutions in favor of Panislam- ism throughout Turkey and of suppression of every other type of religious practice and faith. (

ianism. Ahmed Shereef Bey wrote: <(If all the Turks in the world were welded into one large community a strong nation would be formed worthy to take an important place among the other nations of the earth.® It was this under¬ lying dogma which inspired the Turkish armies in Asia during the brief period of the World War when they were triumphant in the Cau- causus and in West Persia to invade the latter and attempt to annex those districts where peo¬ ple of Turanian stock were predominant. The great Russian victory of

Sarikamysh, 1917, squelched these dreams in blood. Tekin Afp, another equally influential Young Turkish leader, had this to say: <(If the Russian despotism is, as we hope, to be destroyed by the brave German, Austrian and Turk¬ ish armies, 30,000,000 to 40,000,000 Turks will receive their independence.. With the 10,000,000 Ottoman Turks this will form a nation of 50,000,000, advancing toward a great civilization which may perhaps be com¬ pared to that of Germany in that it will have the strength and energy to rise ever higher. In some ways it will be even superior to the degenerate French and English civilizations.® To doctrines such as the above, namely, teach- ins" salvation for the decrepit Ottoman people through the help of Panislamism and Panturan- ianism, had been changed the Liberalism, the (

When, therefore, at the beginning of the World War, in the fall of 1914, Turkey was urged by both sets of belligerents to join them, the soil was well prepared for her entry into the war on the side of Germany. For the dominant currents of opinion ran strictly coun¬ ter both to British, Russian and French inter¬ ests and aims. Britain was threatened in her Indian rule by the dogma of Panislamism — it might mean the revolt or weaning away of her 60,000,000 Mohammedan subjects if the Central Powers and Turkey should prove vic¬ torious; she had, besides, always advocated the equal rights of the non-Turkish populations in the Ottoman Empire. This applied with still greater force to Russia, and French aspirations in Syria would also be frustrated if Panislam¬ ism should prevail. On the other hand, no such considerations were apparent in the case of Germany and Austria. Again, the Turkish army was German-trained and partially so offi¬ cered. This was one of the deciding factors that led to Turkey's siding with Germany in the tremendous struggle, that and the belief that militarily Germany was invincible. There were minor reasons as well tending in the same di¬ rections. For economic reasons England, France and Russia , had never consented to Turkey's raising her rates of import or export duties. Yet these were, from the Turkish point of view, wholly inadequate and contributed very largely to Turkey's poor finances. The Turks also strongly desired the complete abolition of consular jurisdiction, within Turkish territory, abuses of which they seriously complained of. Much Turkish pride had been roused on the latter point. Turkey likewise found much fault with the state of economic, financial and politi¬ cal tutelage in which, as she averred, the three powers spoken of kept her. They wished,

therefore, to utilize the World War for casting off this <(yoke,® as it seemed to them. These considerations, all of them strong and like¬ wise all of them coinciding so entirely with the things striven for by the ruling clique, coterie, or whatever one may term it — for just a hand¬ ful of men, Enver, Talaat, Niazi and Shevket, held Turkey's destiny in the hollow of their palms during the years that Turkey fought Russia and the Western Powers, — vanquished any misgivings which Turkey, especially the more conservative portions of her population, may have had. These considerations, too, stifled the voice and benumbed the conscience of the Turkish government and official circles in regard to the Armenian and Syrian atroci¬ ties later on. Classic witnesses for this are two credible and highly respectable Germans who saw all and spoke out. One of them was Dr. Martin Niepage, of the German Technical School at Aleppo, who resigned his charge because the war crippled the school and who addressed a strong letter of protest to the Reichstag in respect of these cruel outrages against Ottoman Christians. Incidentally he passes judgment on the <(civilizatory mission® of the Turks, saying: (

Bibliography. — Abbott, G. F., (Turkey in Europe and Asia) (Oxford pamphlets, Ox¬ ford and London 1915) ; id., (Turkey, Greece and the Great Powers* (London 1916) Anon., (The Near East* (30 March 1917, London) ; Asiat. Jahrbuch (1914) ; Anon., (Turkey, a Past and a Future) (London 1917) ; Field, A., (Turco-British Entente* (London 1913) ; Gibert, F., (Question d'Ori- ent* (Versailles 1913) ; Glueck, L.,

Wolf von Schierbrand, Formerly Secretary to American Minister to Teheran, Persia.

TURKEY-BUZZARD, the best known and most widely distributed of the American vul¬ tures (Cathartidce) , its range including the greater part of the United States and the entire South American continent. It is about two and one-half feet long, its wings may extend six feet and it weighs about six pounds. The plumage is blackish brown, the naked head is red and the bill white ; the scientific name is Cat hart es aura. From about the latitude of Philadelphia northward the turkey-buzzard is migratory and visits New England only rarely, but throughout the remainder of its range it is chiefly resident. Like other vultures its princi¬ pal food is carrion, but insects and small living mammals, reptiles and the young and eggs of birds are also eaten. Especially in the South,

where it consorts with the black vulture, this species performs a most valuable service as a scavenger. To a considerable extent grega¬ rious the common attraction is generally the presence of some carcass.

Notwithstanding the generally repulsive habits of the turkey-buzzard its powers of flight must claim admiration ; seemingly for hours at a time it soars in widen¬ ing circles, often at a great height, and scans the earth in quest of a meal. The actions of any one bird when food is discovered attract others, and these again others, until many have gathered to the feast, often from great dis¬ tances. In this manner all of the buzzards over a large area keep in touch with one another and any decomposing carcass is certain to be discov¬ ered and removed. Turkey-buzzards nest in pairs or in small communities, building their rude nests on the ground often by the side of a fallen log, or an old rotting tree stub or in a cave among rocks and always in out-of-the-way places in thick woods. The eggs are one or two in number, nearly three inches long and dirty white spotted with various browns and lavender. The nestling birds are thickly cov¬ ered with white down. The rookeries are often very foul. See Vulture.

TURKEY-CORN. See Squirrel-corn.

TURKEY ORDERS AND DECORA¬ TIONS. See Orders, Royal.

TURKEY-RED, a color, originally pro¬ duced on cotton cloth, rivaling the rich red ob¬ tained in dyeing wool and more permanent than any other red dye. It is obtained by the use of madder, in conjunction with an intricate and tedious method of dyeing, the three most essen¬ tial processes of which are the impregnation of the cloth with an oleaginous soap, the mordant¬ ing with alumina and the dyeing with madder. The theory of these several processes is little understood and for that reason the long and repetitious method has ‘never been successfully shortened. The art is supposed to have origi¬ nated in India and from there was introduced into Turkey, where Adrianople was long the seat of the industry. From this fact comes the name Adrianople-red, by which the color is sometimes known. In the middle of the 18th century Great Britain and western Europe be¬ gan the manufacture of turkey-red fabrics and in portions of France, in Glasgow and in Lan¬ cashire the industry has assumed importance. Besides being used in the solid color, turkey-red cloths are used in the manufacture of cloth (

TURKEY-STONE, or TURKEY OIL¬ STONE, a very fine-grained silicious rock, highly prized as a honestone. It comes from Asia Minor.

TURKISH BATH, a popular form of hot steam or hot air bath in which the bather after being subjected for some little time to a con¬ siderable temperature is vigorously rubbed down, and is then conducted through a series of cooling chambers till he has regained

his normal temperature. The secretions and accre¬ tions are completely removed from the skin, which is left free to perform its functions.

TURKISH LANGUAGE. It belongs to the linguistic group known as the Ural-Altaic

or Finno-Ugrian. Of the idioms forming part of this group the Turkish holds premier place because of the great size of territory in which it dominates and because of its conformity of type. In structural points it excels within its own domain. Properly speaking, all those dia¬ lects spoken as far east and north as the Lena River in Siberia, and all of which are nearly related, may be classed as Turkish. But general usage confines the term to the language of the Ottomans, or Turks proper, with its centre in Anatolia, Asia Minor. The two characteristic peculiarities of the Ural-Altaic family, viz., agglutination and vowel harmony, are found in great strength in the Turkish. The first of these, agglutination, makes possible the auto¬ matic formation of conjugations, the root of the verb in all these cases remaining unaltered at the head of the word. Thus, for instance, sev-mek, to love, becomes sev-ish-mek, to love each other; sev-ish-dir-mek, causing to love each other; sev-ish-dir-il-mek, causing to have loved each other; sev-ish-dir-il-me-mek , not causing to have loved each other, etc. As to the purity of vowel harmony, invariably no soft vowel may be employed in a word the stem of which does not contain it; thus, pederiniz, your father, but dostunouz, your friend. Suffixes are usually inserted, as yazdim, I wrote, yazmadim, I did not write. The grammatical forms are abundant, logical and efficient. To give an idea of the ampli¬ tude and flexibility of these grammatical forms, it may be mentioned that the mutations of which each Turkish verb is capable have been com¬ puted to run up to a score of thousands. Yet withal the rules are so simple and clear that the memorizing of 44 syllables or particles en¬ ables the student to construct himself and understand the whole series. Another unique feature is that the Turkish grammar has but one conjugation and no irregular verbs save the few auxiliaries. There is no gender for noun, pronoun or adjective, and the latter is not subject to any change except for compari¬ son. The Turkish syntax is also peculiar, the unit of expression being the paragraph, and there being no punctuation. As a rule the sub¬ ject of the dominating verb is put at the be¬ ginning, or near the beginning, of the paragraph, and all subordinate clauses have their verb in the

participial form, and the meaning of the whole phrase being not apparent during the building-up process until the chief verb, some¬ where near the end, makes the sense clear.

But while thus the grammatical structure of Turkish is purely and consistently Ural- Altaic, the stock of words in it, notably that used for literary purposes, has been greatly added to from Persian and Arabic, as well as European tongues, while the original number of Turkish words has correspondingly shrunk. Its alphabet Turkish has borrowed from the Arabic, with five new consonants added to the original 28 Arabic. The adoption of the Arabic alphabet, which was done for purely religious reasons, was a grave mistake from the linguistic point of view, as phonetically the Turkish and the Arabian differ very materially from each other, and some of the Turkish sounds cannot be properly reproduced in Arabic at all. One of the five additions is, besides, purely Persian, and another purely Turkish. Like the Arabs

and Persians the Turks read from .right to left. There is, however, a variety of script signs in use, such as those only employed for fermans (or official decrees), for poetry, for letter writing, etc. The most interesting forms of Turkish writing are those used on the in¬ scriptions found in Siberia, near the Yenisei River; these contain historical records, a few of them dating back to the 4th and 5th centuries a.d. Those inscriptions met with north of Lake Baikal, in Mongolia, are also of great archaeo¬ logical importance, recounting as they do the deeds of Bilga Kagan, and those of Kara Bal- gassun, dating from about 800 a.d., are also worthy of note. In all these ancient records the alphabets used are of Aramaic derivation, some simple and rune-like in shape, others, of more recent date, more complicated.

Bibliography. — Courteille, Pavet de, (Jaga” taische Sprachstudien> (Leipzig 1867) ; Denner, O., (Sur l’origine de l’alphabet turc) (Helsing¬ fors 1897) ; Marquardt, T. F., (Chronologie der altturk Inschriften> (Leipzig 1898) ; Muller, August, (Tiirk Grammatik) (Berlin 1889) ; Redhouse, M. M., ‘Lexicon of the Ottoman Turkish Language) (Constantinople 1884) ; Remusat, Abel, ‘Recherches sur les langues tatares) (Paris 1820) ; Radlov, W., (Saint Petersburg 1900) ; ‘Proben der Volks- lit. d. tiirk. Stamme Sudsibiriens) (ib. 1872) ; ‘Yakutische Sprache) (Leipzig 1908) ; ‘Alt- tiirk. Inschriften der Mongolen) (Saint Peters¬ burg 1897) ; Thomsen, V., (Inscriptions de l’Orkhon dechiffrees) (Helsingfors 1896) ; Vam- bery, Ed., ‘Uigurische Sprachmonˆ (Inns¬ bruck 1870) ; Wahrmund, A., (Grammatik d. tiirk. Sprache1* (Giessen 1884) ; Wells, Chas., (Grammar and Dictionary of Turkish* (Lon¬ don 1880) ; Youssouf, ‘Grammaire complete de la

langue ottomane) (Constantinople 1892).

Wolf von Schierbrand, Formerly Secretary to American Minister to

Teheran, Persia.

TURKISH LITERATURE. As Islam was

the gift of Arabia and Persia to the Turks, so also has their literature been powerfully in¬ fluenced by these two countries. Nay, the sober truth is that nearly all their higher education dates from there, at least up to the period of the Crimean War, but a few generations ago. As a consequence, there is relatively little of originality in Turkish literature. However, it is customary to subdivide it into three periods : The earliest, when Turkish writers first arose in central Asia and India, and when they em¬ ployed for the most part Persian as their medium of expression, about 900-1500 a.d. ; the middle period, about 1500-1850 a.d., when Arabic was both their model and inspiration in literature, save only in poetry; and the modern period, since the middle of the 19th century, when they turned to the Western na¬ tions, preferably the French, for instruction and guidance. It goes without saying that, in a general way, during the two older periods Turkish literature closely resembles that of the chief Oriental writers of those times, both in aims and style and in subject matter, and that being largely imitative it is to a great extent devoid of those strong traits that are found in other, in purely national, literatures. In fact, much of the best literature written by Turks during those 900 years is necessarily swallowed

up by, and forming an integral part of, Persian and Arabic literature, as also it is mostly couched in those two tongues and colored by their idiosyncrasies. The last and shortest period, that of 1850 to the present day, is again too strongly tinctured with the Gallic spirit to be taken as a fair representation of the Turkish mind, although ˆrealism® has been its chief motto, — the realism of Zola usually.

In point of time the earliest literary records of Turkish writing are the well-known inscrip¬ tions in central and northeastern Asia, but these have almost solely an archaeological, and not a literary, value. Of considerable merit is a genealogical history of the Tatars by Abul Ghazee, from as early as the 12th century, not¬ able mainly for its pristine Turkish. The author of (Baz Nameh > a lengthy poem de¬

scriptive of the delights of falconry, is by one of the best of the 2,200 Turkish poets (among whom there are but seven women) and rhymes¬ ters enumerated in a history of Turkish litera¬ ture by Baron Hammer-Purgstall. Unfortu¬ nately the poem is anonymous. Suleiman (d. 1403), author of ˆewlid-i-NebiP a famous lay celebrating the birth of the Prophet and read in mosques these last 500 years with powerful effect, first wrote in a Turkish approximating that of to-day. Shekhi (about 1440), author of the (Khar Nameh) (Book of Donkeys), intro¬ duced the Persian romantic epic with the Turks. Burhan-ed-Deen, a descendant of Genghis Khan, who lost his life in 1398, an adventurer and great warrior, left some poems in Turkish, although closely modeled after the Persian style. Amud-ed-Deen, writing under the pseu¬ donym of Nesimi and a man strongly influenced by Sufeeism, wrote early in the 15th century. But being a freethinker and heretic, he was (in 1417) flayed alive in Aleppo. All his writings breathe, however, a joyous spirit. Ali Sheer, writing under the name of Nevayi (d. 1500), was doubtless a poet of considerable pre¬ tensions, who in order to have the necessary leisure for writing resigned early from the lucrative office of Grand Vizier to Sultan Hus¬ sein. His writings show much humor and power of expression. Babr, a scion of Tamer¬ lane, and conqueror of a part of India (in 1525) was also quite a writer, but confined himself to prose. His campaigns he has him¬ self described in rather rude but highly expres¬ sive Turkish. Lami is probably the most pro¬ ductive of all Osmanian poets. His fame rests chiefly on his four great epics. He died in 1531. Baki, of obscure origin, is held to be the greatest lyric genius the Turkish race has produced. But while fluent and often flamboyant, his thoughts are nearly altogether borrowed from the Persians, especially from Hafiz. Baki's output was voluminous, but much of it has not survived. A little more mental independence may be ascribed to Fazli, likewise a lyrical poet, who lived and flourished during the reign of Soliman the Great and died in 1563. His fine allegorical poem, (Giil u BiilbiiP (Rose and Nightingale), has been translated into several languages, and is in part quite modern in its train of thought. Even greater originality is shown by Mesehi (d. 1512), whose love sonnets addressed to the boy beauties of his town, both in metre and in diction, are elegant productions. Rewami (d. 1523) cultivated as his specialty

dithyrambic poems celebrating the festivals, banquets and great processions of his day. Sa'ad-ed-Deen, perhaps the best-known poet of his day, died in 1599, when Arabic influences began to permeate Turkish literature. His life was a very active one, his career beginning as a great chieftain and ending as Sheikh iil Islam, in the reign of Mohammed III. His great work was named ˆaj-et-Tevarikhp a

laudatory his¬ tory of the Turkish Empire and its conquests, but its chief blemish is its superabundance of foreign vocables. The greatest poets of the 17th century were Nefi (d. 1635) and Nabi (d. 1712). The latter's ghazels are among the finest of this distinctly Oriental form of poetry. Nabi's real name was Yousouf, and he resided in Urfa, the recipient of a modest pension from the sultan. One of his longer poems, the HvairiyehP has been done into French. Kiatni, whose real name was Abu Bekr, and who died in 1791, was a successful imitator of the earlier Turkish poets. In historical works Turkish literature is very rich. But the common defect of all Oriental historical writings, exaggeration and strong partisanship, clings to them, of course. Among them all may be mentioned Katib Tshelebi (Hadja Khalfah), who died in 1658, leaving behind him a great mass of valu¬ able manuscript writings, mainly historical and geographical. Rashid (1660-1721), Naima Efendi (1591-1659), Sami, Shakir and Subhi (all three about 1730), Izzi, Wassif (1750-70), Enveri, Dshefdet (1774-1825), Assim (1787— 1808), Lutfi (from 1830 on), are some names of note. The works of these writers are very voluminous, but nearly all, except in details, utterly unreliable. Some monographs, however, are important, such as that by Kemal Pasha Sa'adi, who as a contemporary and actor de¬ scribed the events preceding and the campaign ending in the memorable battle of Mohacz (1526). Of geographical works, mainly fanci¬ fully descriptive, some have been translated by Hammer-Purgstall into English (London 1834). Another chapter of Turkish literature, as yet very inadequately gone into and promising rich treasure, is that comprising anonymous collec¬ tions of popular tales, buffooneries, etc., such as the (History of the Forty Viziers, > a cycle of stories rich in racy humor and wit, although rather frequently obscene; the (Life of Nasr- ed-Deen Hodja,) a collection of similar scope, said to have emanated from some unknown Turk of Anatolia; (Siret-i-Sej j id BattaV a sort of Don Quixote; the (Shah MiranP a col¬ lection of Turkish fairy tales, etc. Since the Crimean War a movement set in, partly politi¬ cal, partly literary in its nature and best known as the Young Turkish. There had been before that an enormous number of Turkish works translated from European languages, mostty French. After 1850 this tendency increased greatly. But hand in hand with it went a re¬ birth, or a new adaptation of Turkish to modern thought. Ibrahim Shinassi was its first leader, and Mohammed Emin its most eloquent interpreter, his poems being striking, ringing true and full of power and elemental passion. Among the band of ˆrealists® and <(purists® initiated by the latter deserve mention : Amed Vefik Pasha, author of a dictionary (d. 1893) ; Ahmed Midhat Efendi, novels, essays (d. 1905) ; Kemal Pasha (d. 1878) ; Jevdet Pasha, the his-

torian, Zia Pasha, the poet and essayist, Ebuz- zia Tewfik, the critic and writer.

Bibliography. — d'Istria, Doria, (La poesie des Ottomans) (2d ed., Paris 1877) ; (La poesie des nations turques) (in Revue Britann- ique 1878, No. 12) ; Gibb, E. J. W., (History of Ottoman Poetry* (Vol. I and II, London 1900- 02) ; Hammer-Purgstall, Baron J. von, (Geschichte der tiirk. Litteratur) (3 vols., Gottingen 1810-12)j Jacob, G., (Tiirkische Lit- teraturgesch. in Einzeldarst.* (Berlin 1900) ; (Tiirkische Volkslitteratur) (ib. 1901) ; (Tiirk- isches Lesebuch) (Erlangen 1903) ; Poole, R. L., (The Story of Turkey* (New York 1888) ; Pradloff, J., (Versuch eines Worterbuchs der tiirk, Dialekte* (Leipzig 1904-06) ; Thalasso, J., (Revne Encycl. Larousse,* No. 327 (Paris 1899) ; (Turkish Literature) (in (Worlds' Great Classics, * London 1901) ; Wells, Chas., (Literature of the Turks) (London 1891).

Wolf von Schierbrand, Formerly Secretary to American Minister at

Teheran, Persia.

TURKISH SPY, The. Giovanni Paolo Marana (1642-93) was a Genoese political refu¬ gee gifted with a keen mind, cosmopolitan politi¬ cal interests and a facile pen. Finding himself in financial straits, he began in Paris in 1684 the publication of (L'espion du Grand Seigneur dans les cours des princes chretiens,* a series of little volumes of letters addressed by <(Mahmut the Arabian® to officials and friends in Turkey. This scheme, then novel, gave opportunity for relatively free comment on Continental politics in the days of Cardinal Mazarin and the young Louis XIV and of French society and manners in the hey-day of Versailles. The idea was keenly relished. Three other volumes had followed by 1688, afterward increased by other hands to nine in the edition of 1756. The substance of these four volumes forms the first volume (1687) of an English version afterward extended to eight with this descriptive title page : ((The eight volumes of Letters writ by a Turkish Spy who lived 45 years undiscovered at Paris giv¬ ing an impartial account to the divan at Con¬ stantinople of the most remarkable transactions of Europe and discovering several intrigues and secrets of the Christian courts, especially that of France, from the year 1637 to the year 1682, written originally in Arabic, translated into Italian and from thence into English and now published with a large historical preface and index to illustrate the whole.® The

translation was apparently by William Bradshaw, revised by Robert Midgley. It passed through at least 25 editions. The volumes from the second on¬ ward appeared first in English. Whether they were translated from a French manuscript, pos¬ sibly Marana's, is uncertain. The opportunity for political satire contained in Marana's idea delighted Swift, who commends it in the (Journal to Stella.* It was often imitated in England and notably in France in the (Persian Letters) of Montesquieu. Consult dictionary of National Biography) (Vol. XXXVII, 366, 367), Art. (< Midgley.®

B. W. Wells.

TURKOMANS, ter'ko-manz, a group of nomadic Tatar tribes occupying the regions to the east and south of the Caspian Sea. Other

related tribes, known as the western Turko¬ mans, are settled further to the west and south, in Syria and Asia Minor. See Turkestan.

TURMERIC, the tuberous rhizomes of a plant (Curcuma longa) of the ginger family. It is a perennial, native to southern Asia, and cultivated largely both there and in the Malayan Islands. The ovate, central tubers are known as <(bulbs,® or <(round turmeric® ; the more cy¬ lindrical, lateral ones, as ((fingers® or Hong tur¬ meric.® They are all hard and tough, brown¬ ish or yellowish-green outside and orange-hued, resinous and aromatic internally. The aro¬ matic taste and odor are due to an oil called turmerol or turmeric-oil. Turmeric, ground into a powder, has been valued for centuries in Asia, and especially in India, as a carmina¬ tive and aromatic-stimulant drug, an infusion of it in milk being a common remedy for colds ; it is also applied externally as a cooling lotion for diseases of the skin and eyes. Its chief utility in India, however, is as a condiment and dye, it being the important yellow ingre¬ dient of curries and curry-powder, and yielding a beautiful, but fugacious yellow dye. White paper soaked with a tincture of turmeric changes to a reddish-brown color, drying out to violet when an alkali is added to it, so that a test-paper for alkalies is prepared from it called turmeric or curcuma paper. The plant itself has long, narrow sheathing leaves on the flower-stalk, which end in a leafy spike of yel¬ low flowers. A species of Canna, cultivated in Sierra Leone, is the African turmeric, used by the natives there as a dye-plant. Blood- root (S anguinaria canadensis) and the yellow- root (Hydrastis canadensis) are also called turmeric and turmeric-root. The turmeric-tree is Acr onychia baueri, of southeastern Austra¬ lia, the bright-yellow inner bark of which yields a dye.

TURNBULL, Robert James, American

publicist: b. New Smyrna, Fla., Jan. 1775; d. Charleston, S. C., 16 June 1833. He was edu¬ cated in England, was admitted to the bar in 1794 and began practice in Charleston. In 1810 he retired to his estate and became active in the Nullification movement. He was a mem¬ ber of the free trade convention (1831-32), was a delegate to the South Carolina con¬ vention that passed the Nullification ordinance (1832) and joined the volunteers to oppose the constitutional government. His pamphlets written under the pseudonym of <(Brutus® were collected and published in 1830.

TURNBULL, William, American engineer: b; Philadelphia, Pa., 9 Oct. 1800; d. Wilmington, N. C., 9 Dec. 1857. He was graduated at the West Point Military Academy in 1819 and entered the army as lieutenant of artillery. He was made assistant topographical engineer with the brevet of captain in 1832, and in 1843 was superintending topographical engineer on the Potomac aqueduct. He was made major in 1838, had charge of repairs to' the Potomac long bridge (1841-43) and later was in charge of harbor improvement on the Great Lakes. He was brevetted colonel for services during the war with Mexico, and was after¬ ward engaged in a variety of difficult engineer¬ ing projects.

TURNER, ter'ner, Charles Tennyson,

English poet: brother of Alfred Tennyson. See Tennyson-Turner, Charles.

TURNER, Charles Yardley, American artist: b. Baltimore, Md., 25 Nov. 1850; d. New York, 31 Dec. 1918. He studied in Paris with Laurens, Munkacsy and Bonnat. Was elected to the National Academy of Design; was mem¬ ber of the American Water Color Society, the American Etchers and the National Society of Mural Painters. Mr. Turner excelled as a mural painter. Two of his pictures, (The Burn¬ ing of the Peggy Stuart' and (The Barter With the Indians,' are in the courthouse at Baltimore. Two of his lunettes are in the Hudson County courthouse, Jersey City, N. J. Other paintings are in New York galleries and elsewhere. In the Metropolitan Museum is his (Bridal Procession' and in the Union League Club, Chicago, is (John Alden's Letter.' (A Dordrecht Milkmaid,' in the Water Color Society exhibit in 1892, at¬ tracted much favorable attention and then came perhaps the most noted of his canvases, (Days That Are No More,' picturing a

widow and a child on the stile of a churchyard. At the Buffalo Pan-American Exposition (1901) Mr. Turner was director of color ; he was assistant direc¬ tor of decoration at the World's Columbian Exposition, Chicago, in 1893. In 1912 he be¬ came director of the Maryland Institute Schools of Art and Design at Baltimore.

TURNER, Ethel, pen name of Mrs. H. R. Curlewis (q.v.).

TURNER, Fred, Australian botanist: b. Pontefract, England, 1856 He went to Aus¬ tralia in 1874, where he joined the staff of the Government Gardens at Brisbane and re¬ mained for five years, when he became botan¬ ist to the Department of Agriculture of New South Wales, and consulting botanist to the West Australian government. He traveled over 60,000 miles throughout Australia botan¬ izing; made the study of botany popular in Australia and wrote interestingly on the sub¬ ject for the press. He is the author of numer¬ ous works, many of which have been published by the government ; translated into numerous foreign languages and republished at the ex¬ pense of foreign governments. He is the holder of many medals and diplomas for economic botany. For several years he was engaged in the botanical survey of New South Wales. Among his published works are (Grasses of New South Wales' (1890) ; Undigenous For¬ age Plants of Australia' (1891); (Australian Grasses' (1895) ; (West Australian Grasses' (1896) ; (West Australian Salt Bushes' (1897) ; (Suspected Poison Plants of New South Wales' (1890-1914); (Noxious Exotic Weeds' (1890- 1913) ; (New Commercial Crops for New South Wales' (1890-1914).

TURNER, Frederick Jackson, Ameri¬ can historian: b. Portage, Wis., 14 Nov. 1861. He was educated at the University of Wisconsin and took his Ph.D. degree at Johns Hopkins (1890), becoming professor of. American his¬ tory in the University of Wisconsin (1892- 1910) and professor of history in Harvard the latter year. He was president of the American Historical Association (1910-11) and associate

in the department of historical research of the Carnegie Institute (1916-17). He is author of (Rise of the New West' (1906) ; (Reuben Gold Thwaites' (1914), etc.

TURNER, Henry McNeal, American bishop of the African Methodist Episcopal Church: b. Newberry Court House, S. C., 1 Feb. 1834; d. 8 May 1915. He educated him¬ self by dint of earnest perseverance and was licensed to preach by the Methodist Church South in 1853. In 1858 he transferred his membership to the African Methodist Church and studied for the classics, Hebrew and di¬ vinity at Trinity College.

He was the first colored chaplain ever commissioned, and after being mustered out in 1868 was then commis¬ sioned chaplain of the regular army. He sat in the Georgia legislature in 1868 and 1870, and in 1880 became a bishop in his Church. He organized four annual conferences in Africa, was a prominent advocate of the return of his race to Africa and published (Methodist Polity,' etc.

TURNER, Joseph Mallord William, Eng¬ lish painter: b. London, 23 April 1775; d. Chel¬ sea, 19 Dec. 1851. He entered the Royal Acad¬ emy as a student, and after remaining there in that capacity for five years and working actively at his profession for another five, during which periods he sent to the exhibition no less than 59 pictures, he was elected in 1799 an associate of the Royal Academy. In the two following years he exhibited 14 pictures, and in 1802 was elected an academician. Until this date he had chiefly been known as a landscape painter in water-colors, but thenceforth he turned his at¬ tention to oil-painting, and in the ensuing half century produced at the Academy exhibitions upward of 200 pictures. In 1807 he was elected professor of perspective in the Royal Academy, and the following year appeared his (Liber Studiorum' or (Book of Studies,' which Char¬ les Turner, Lupton and others engraved. Other works by him which were engraved are his illustrations of Lord Byron's and Sir Walter Scott's poems; Rogers' (Italy' and (Poems' ; (The Rivers of England' ; (The Rivers of France' and (Scenery of the Southern Coast.' To enumerate the different paintings of Turner would be impossible. They have established him as the greatest of English landscape paint¬ ers and earned for him the appellation of the (

tion, on condition of a suitable building being erected within 10 years for their reception. They have been placed in the Turner Gallery, occupying two rooms in the National Gallery. He also intended a large part of his fortune to be devoted to the formation of a benevolent fund for artists, but this intention, though clearly enough expressed, was set aside by the lawyers because of the somewhat confused nature of his will. Turner owes his immense reputation largely to the brilliant advocacy of John Ruskin (q.v.) in his (Modern Painters.* Mr. Ruskin divides his career, from an artistic point of view, into five periods : a period of development, three periods of greatness and one of decline. His development period ended with 1800. It includes these, among other works : (A View of the Archbishop's Palace at Lam- beth) (1790) ; (The Pantheon the Morning after the Fire) (1792). His first style lasted from about the 'beginning of the century to about 1820, and in it he <(labored as a student imitating various old masters.® The

principal pictures of this period are (The Fifth Plague of Egypt) (1800) ; (The Tenth Plague of Egypt* (1802) ; (Kilchurn Castle) (1802) ; (Calais Pier) (1803) ; (The Shipwreck) (1805) ; and (Dido building Carthage) (1815). The (Liber Studiorum* also belongs to the period of his first style. His second style prevailed, ac¬ cording to Ruskin, from about 1820 to about 1835, and was characterized by freedom from mere imitation and by striving for beautiful, ideal effects. Among the works which illustrate it are the following: (The Bay of Baise,* with (Apollo and the Sibyl) (1823) ; (Cologne*

(1826) ; (Dido directing the Equipment of the Fleet* (1828); and (Ulysses . deriding Poly- phemus) (1829). During his third period, 1835- 45, he produced many splendid works of marked individuality, but shallow critics began to ridi¬ cule him and his work, and full appreciation of his genius did not come until Ruskin entered the lists in 1843. The following represents his third style: (Mercury and Argus) (1836) ; (Snowstorm, Avalanche, and Inundation) (1837) ; (Modern Italy1* (1838) ; (Ancient Italy* (1838) ; (The Fighting Temeraire Tugged to her Last Berth1* (1839), his best known picture; (The Campo Santo) (1842) ; (The SnowstornP (1842); (Peace — Burial at Sea* (1842); (The Approach to Venice> (1843) ; and (Rain, Steam and Speed) (1844). The remaining years of his life were years of decline, but his genius still asserted itself fitfully. The Metro¬ politan Museum and the New York Public Library have several good examples of the work of this artist. Consult Ruskin, (Modern Painters, * biographies by Thornbury (New York 1862) ; Hamerton (Boston 1879) ; Monk- house (New York 1882) ; Armstrong, Sir W., (J. W. Turner> (New York 1901) ; Wornum, (Turner Gallery) (1859) ; Wedmore, (Turner and Ruskin1* (2 vols., London 1900) ; Cook's Handbook to the National Gallery; Rawlinson, W. G., (Turner's Liber Studiorum : Descrip¬ tion and Catalogue1* (2d ed., New York 1907) ; Finbery, A. J., (Turner's Sketches and Draw¬ ings* (ib. 1910) ; Phythian, J. E., (ib. 1905). See also the article Painting for an indication of his position in the history of painting.

TURNER, Nat, negro slave, preacher and leader of the ˆSouthampton Insurrection® ; b. Southampton County, Va., 1800 ; executed at Jerusalem, Va., 11 Nov. 1831. A man of ele¬ mentary education, but a preacher of natural ability and influence among the negroes, his mystical claims of hearing voices and seeing visions from childhood culminated in 1828 when he announced that a voice from heaven had declared that <(the last shall be first® ; that the negroes should rise and slay their enemies and gain freedom and control, when a sign should appear. The solar eclipse of February 1831 and subsequent unusual atmospheric con¬ ditions were accepted as the signal, and on

Sunday night, 21 Aug. 1831, Turner and seven companions murdered his master and five mem¬ bers of the family in their beds. With their band increased to 53 members, the negroes massacred 24 children, 18 women and 13 men of white blood before noon of the following day, when they were dispersed by a party of white men who had hastily gathered for de¬ fense. The criminals were subsequently hunted down and Turner escaped capture until 30 October. Tried and condemned, 17 of the band, including Turner, were hanged. The remainder received other sentences, as evidence showed that they acted under life or death compulsion. In other instances, at the risk of their lives, faithful slaves successfully defended their masters and families from slaughter. Pro¬ slavery advocates irrationally attributed the in¬ surrection to the work of the abolitionists. Stricter slave codes were enacted, and the liber¬ ation movement received a serious setback. Consult Drewry, W. L., (The Southampton In¬ surrection* (Washington 1900).

TURNER, Ross Sterling, American artist:

b. Westport, Essex County^ N. Y., 29 June 1847; d. 12 Feb. 1915. He adopted the profes¬ sion of an artist in 1873 and studied in Ger¬ many and Italy. Among his notable pictures are (A Small Court, Mexico* ; (E1 Jardin Mo¬ desto* ; and (A Bermuda Wedding.* He is the writer of (Water Colors*; (Art for the Eye — School Room Decorations*, etc.

TURNER, Sharon, English historian : b. London, 24 Sept. 1768; d. there, 13 Feb. 1847. After a successful career as a London attorney he retired from practice in 1829 and devoted himself to literary pursuits. He is best known by his (History of the Anglo-Saxons* (1799— 1805; 7th ed., 1852), long a standard authority. His. other works include (History of England during the Middle Ages* (1814-23; 7th ed., 1853) ; Modern History of England,* com¬ prising (The Reign of Henry VIII* (1826) ; and (The Reigns of Edward VI, Mary and Elizabeth* (1829) ; (Sacred History of the World as Displayed in Creation and Subse¬ quent Events to the Deluge* (1832; 8th ed., 1848), etc.

TURNER, Thomas, American naval officer: b. Washington, D. C., 23 Dec. 1808; d. Glen Mills, Pa., 24 March 1883. He entered the navy in 1825, served on the Columbia, flagship of the East India squadron, in 1838-41, and partici¬ pated in the destruction of the Malay pirate towns, Mucke and Quallat Rattoo, Sumatra, in 1839. He was commander of the Fredonia in the Gulf squadron in 1847, commanded the

Reefer in the assault upon Tuspan in April 1847, and in 1855 was promoted commander. In 1858-60 he was in command of the Saratoga in the Home squadron, and in the latter year captured the ships Miramon and Marquis de Habana, which were being used by the Mexican revolutionary party to blockade the port of Vera Cruz. At the outbreak of the Civil War he was assigned to command New Ironsides in the South Atlantic squadron, was promoted commodore in 1862 and took an important part in the assaults on the forts of Charleston, S. C., in 1863. He became rear-admiral in 1868, com¬ manded the Pacific squadron in 1868-70, and in the year last named was retired, after 45 years of active service.

TURNER, Sir William, English anatomist: b. Lancaster, 1832; d. 1916. He received his general education in private schools and began the study of medicine in Saint Bartholomew's Hospital, graduating with distinction in the University of London in 1857. He became a member of the Royal College of Surgeons in 1853 and in the following year was appointed demonstrator in anatomy in the University of Edinburgh. In 1867 he succeeded John Goodsir as professor of anatomy. This post he resigned in 1903, when he was elected principal of the university. After 1873 he represented his uni¬ versity on the General Medical Council, of which he became president in 1898. In 1886 he was knighted. He presided over the meeting of the British Association at Bradford in 1900 and delivered an address on the progress of the cell-theory in biology. He examined in an¬ atomy on behalf of the universities of Oxford, London and Durham, and lectured before the Royal College of Surgeons. He was one of the founders, and from 1866 to 1894 was joint editor of the Journal of Anatomy and Physi¬ ology, and contributed many papers to the transactions of learned societies. He published (An Introduction to Human Anatomy) (1875) ; 'Lectures on the Comparative Anatomy of the Placenta) (1876) ; and an (Atlas of Human Anatomy and Physiology.*

TURNER, William Wadden, American philologist: b. London, England, 23 Oct. 1810; d. Washington, D. C., 29 Nov. 1859. In 1818 he came to New York, was given a public school education and became a printer. At 26 he was a master of modern languages and Hebrew, and later secured a knowledge of Arabic, Sanskrit and other Asiatic tongues. He printed a num¬ ber of works. In 1842 he was elected professor of Oriental literature in Union Theological Seminary and held the

position until 1852, when called to the library of the patent office in Washington.

TURNER PRINTS. See Engravings.

TURNER FALLS, Mass., village in Frank¬ lin County, on the Connecticut River, and on the New York, New Haven and Hartford and the Boston and Maine (Fitchburg) railroads, about 35 miles north of Springfield and three miles northeast of Greenfield, the county-seat. The village is in an agricultural section and has considerable manufacturing interests. The long bend here in the river is cut off by a canal three miles long, which, with three falls, furnish extensive water power. The chief manufac¬ tures are cutlery, paper, leather, foundry and

machine-shop products and cotton goods. The village has a high school, public and parish schools and a public library. Turner Falls is the largest village in the town of Montague (q.v.). Pop. (included in that of the town) about 6,866.

TURNER'S GAP, Battle of. See South Mountain, Battles of.

TURNER'S REBELLION.' See United States, Wars of the; Nat Turner's Rebel¬ lion.

TURNEY, ter'ni, Peter, American jurist, son of Hopkins Lacey Turney: b. Jasper, Tenn., 22 Sept. 1827 ; d. Winchester, Ky., 19 Oct. 1903. He was admitted to the bar in 1848, practised law at Winchester until the secession of the Southern States, which he actively pro¬ moted, and then entered the Confederate army, in which he served throughout the war. He resumed his practice at Winchester after the war, was a justice of the Supreme Court of the State in 1870-86, chief justice in 1886-93, and in 1893-97 served as governor.

TURNIP, a popular name for two closely related biennial herbs of the family Brassi – cacece. The common turnip (Brassica rapa) has a flattened white-fleshed, tuberous root crowned by a compact tuft of thin green hairy leaves from the centre of which, during the second season, a flower-stem rises about 18 inches and bears numerous yellow flowers. The Swedish turnip, rutabaga or baga (B . campes-tris), has a more globular yellow-fleshed root with a more or less distinct leafy neck and glaucous bluish hairless cabbage-like leaves. The flowers are also yellow. The former has also a tap-root with few fibres; the latter has a large number of fibrous roots not only from the main tap-root but from the base of the tuberous part. Neither of these

species is definitely known in the wild state, but they are supposed to be natives of eastern Europe or adjacent parts of Asia. They have been culti¬ vated for centuries as food for man and beast, the common turnip for early use in spring and autumn and the rutabaga more as a winter vegetable or stock food. In many places they have run wild and are occasionally known as charlock. When wild they soon lose the tuber¬ ous root.

Except in season of sowing, the cultivation of both species is similar. The common turnip is a quick-growing plant which is usually sown as soon as the soil can be worked in the spring or during midsummer. The first sowing pro¬ duces roots for late spring and early summer use ; the last, for autumn consumption. The rutabaga is generally grown as a full season crop, the seed ‘being sown in late spring. It is much richer in flavor than the common turnip. Like other root crops both these plants suc¬ ceed best upon deep, rich, well-drained light loamy soils free from stones and other obstruc¬ tions. The seed is sown in drills about 18 inches apart and the plants thinned to stand about eight inches asunder. The late crop is often sown broadcast, particularly where beef cattle are kept, since the animals may be turned upon the field to browse after the larger roots have been gathered for storing or sale. For success in such practice, however, the supply of moisture in the ground must be abundant,

and the soil must be in the highest possible state of tilth before the sowing of the seed be¬ cause no cultivation can be given during the growing season. When sown in drills clean cultivation must be given until the leaves meet between the rows and completely shade the ground. Under favorable conditions and good cultivation the yield has exceeded 1,000 bushels to the acre, but under ordinary management half this amount is nearer the average. The early crop is often sold in bunches; the late, by measure. The only insects that are occa¬ sionally troublesome are the maggot and the flea-beetle. The former may be avoided by judicious rotation, turnips never being planted oftener than once in three years upon land which has been occupied by a cruciferous crop. The flea-beetles may be repelled by tobacco dust, Bordeaux mixture, etc.

TURNPIKE, a gate that is set across a road and is watched by a person appointed for the purpose in order to stop carriages, carts, wagons, etc., and sometimes travelers, till toll is paid, for the cost and upkeep

of the road. Such roads are called turnpike-roads, or simply turn¬ pikes, and formerly were very numerous in Great Britain, but latterly tolls on foads have been almost entirely abolished. See Roads and Highways.

TURNPIKE GERANIUM. See Goose-

foot.

TURNSPIT, a small dog, somewhat like a dachshund, used in old times, in the kitchens of great houses, to turn the spits or jacks upon which meat was roasted before an open fire, the dog traveling in a small treadmill geared to the spit. The breed is now practically extinct.

TURNSTONE. See Brant-bird.

TURPENTINE, a resinous juice, oleo- resin, extracted from several trees belonging to the genus Pinus. The common American tur¬ pentine of commerce comes from the Pinus palustris, which grows abundantly in the South¬ ern States. When first extracted it is crude or common turpentine, varying from 75 to 90 per cent of resin and 25 to 10 per cent of oil. Crude “turpentines are named from the trees or the territory from which they are taken, as Aleppo turpentine, from the Aleppo pine; American turpentine, from Pinus palustris; Bordeau turpentine, from the seaside pine (P. pinater) ; Canadian turpentine, from the bal¬ sam-fir; Carpathia turpentine, from the Swiss pine; Hungarian turpentine, from the Mugho pine; also white turpentine, from the long- leaved Carolina pine. The Pistacia tree also yields an excellent turpentine and is sometimes called the turpentine tree, or terebinth. This is believed to have been the original source, the trees being plentiful in the island of Chios. To obtain the oil of turpentine the juice is dis¬ tilled, usually with water. (See Turpentine Oil). Oil or spirit of turpentine, often called simply turpentine, and also “turps,® is color¬ less and is employed extensively in medicine, both internally and externally, and it is also widely used in the preparation of paints and varnishes.

The Box Method. — Prior to 1901, turpen¬ tine gathering, as conducted in the United States, was needlessly destructive of the forests and needlessly wasteful of the product. The

method, under the box system universally em¬ ployed, was to chop into the base of the tree itself a cup-like cavity, the sole purpose of which was to receive the resin which flowed from a scarified face of

the trunk above it. The box itself does not add to the flow of turpentine; on the contrary, experiment has proved that it diminishes the flow. It is an unnecessary wound driven into the body of the tree at its most vital spot, both weakening its vigor and lessening its power to support the strain of the wind. At the same time it opens the trunk to disease and provides a storehouse of combustibles against the coming of the for¬ est's great enemy — fire. A forest which has been heavily turpentined by this method has before it only decay and death. Until recently the destructive methods in use have been re¬ garded with entire indifference in the regions affected. This has been due to the low valua¬ tion of timber throughout the turpentine belt and to the popular belief that the pine forests of the Southern States were inexhaustible.

The Cup System. — In 1901 Dr. Charles H. Herty, of the Bureau of Forestry, after numer¬ ous experiments, discovered a new way of ex¬ tracting turpentine by using earthen pails or cups, not unlike the method of obtaining maple sap. The discovery has resulted in a complete change of methods by turpentine operators all over the South. In a bulletin published in 1902 by the Bureau of Forestry, the claim was made that the experiments with the new cup and gutter system of turpentining had resulted in an increase over the old boxing system of 23 per cent in the amount of the product extracted. This figure was raised in 1903 to more than 36 per cent. The economic saving of this new discovery is enormous. It not only causes a great increase in the amount of turpentine pro¬ duced, but it is a most important factor in sav¬ ing the pine forests of the South. Trees from which turpentine has been extracted by the old method soon die from the wounds inflicted on them. The cup and gutter system, on the other hand, is not fatal to the life of the tree and does very little damage to the timber.

The experiments during 1903 have abund¬ antly justified the claim made that the box is an "unnecessary wound,® for the cup system has proved efficient in the hands of the regular tur¬ pentine labor, while the increased profits under this improved system are sufficient to warrant its adoption by any turpentine operator, regard¬ less of all questions connected with the future of the naval-stores industry. Recent experi¬ ments in the distillation of wood have demon¬ strated that a vast amount of turpentine may yet be obtained from the fallen pines of the South, which are preserved by their content of resin and turpentine. This product is some¬ times called artificial turpentine. For statistics and other information concerning the turpen¬ tine industry see the article Naval Stores. See also Rosin.

TURPENTINE OIL, the volatile oil or spirit obtained by distilling crude turpentine, the latter being obtained from coniferous trees by incision through the bark or wood. When crude turpentine is distilled there results resin, a solid, and the oil of turpentine, a liquid, which when pure is clear and colorless. It consists chiefly of an essential hydrocarbon oil (CioHie),

Photograph by J. Horace McFarlaud Co.

CHELONE (TURTLE-HEAD)

and the resin, colophony. It is possessed of a penetrating, peculiar odor and a pungent, bit¬ ter taste. The various oils display marked diversities in physical properties according to their sources. They are insoluble in water, slightly soluble in aqueous alcohol and miscible in all proportions with absolute alcohol, ether and carbon disulphide. They are solvents for iodine, sulphur, phosphorus, resins and fixed oils. The two principal varieties are derived from the sap of the Pinns maritima, or the French maritime pine, and from the long-leafed pine of the Southern States of the United States. The former has a specific gravity of 0.864, boils at 161° and turns the plane of polar¬ ization to the left ; the latter has the same spe¬ cific gravity and boiling point, hut turns the plane of polarization to the right. Both oils absorb oxygen from the air and acquire power¬ ful oxidizing properties for the probable for¬ mation of an organic peroxide (CioHuCh). Turpentine absorbs chlorine with such energy as sometimes to set it on fire. Turpentine oil is of great importance in the arts, and is es¬ pecially employed for giving consistency to oil paints and varnishes, conferring on them drying properties. In pharmacy, in small doses it is absorbed and acts as a stimulant, antispasmodic and astringent. It produces diuresis, and com¬ municates to the urine passed a smell like that of violets. It can arrest hemorrhage in the capillary vessels. It is generally administered as an enema to destroy taenis, ascarides, etc., in the intestines. Applied externally, it is a powerful rubefacient. Chian turpentine, the product of the terebinth tree, has latterly been successfully employed in cancer.

TURPENTINE VINE. See Pistachia.

TURPIN, ter'pln (Fr. tiir-pan), or TYLPI- NUS, French prelate: d. 2 Sept. 800. He was archbishop of Rheims and reputed author of a Latin

narrative of Charlemagne's wars against the Saracens. There are indications that the work was written in the 12th century, perhaps by Pope Calixtus II. There are editions by Ciampi (1822) and Reiffenberg (1836). Con¬ sult Paris, (De Pseudo-Turpino> (1865) ; id., (Histoire poetique de Charlemagne) (ed. by Paul Meyer, Paris 1905) ; Potthast, August, (Bibliotheca Historica Medii iEvP (Vol. II, Berlin 1896).

TURPIN, Richard (known as ((Dick Tur¬ pin®), English highwayman: b. Hempstead, Essex. He began life as a butcher's apprentice, was detected in cattle-stealing, fled and joined a band of thieves, with whom he engaged in various acts of depredation and brutal crime. He was captured at York and hanged for mur¬ der. His lawless daring made his name a byword, but he has also 'been decked in the colors of heroism through the ascription to him of generous qualities which there is no evi¬ dence to show that he possessed. He is the hero of Harrison Ainsworth's (Rockwood)

(1834).

TURQUOIS, ter-koiz', a mineral whose name (often spelled Turquoise®) alludes to its coming into the European market through Turkey. It is a hydrous phosphate of alum¬ inum, containing a small amount of copper, to which its color is due. It has been a favorite gem in the Orient, from the earliest times, ap¬

pearing in Egyptian jewelry of extreme an¬ tiquity. Turquois does not crystallize, but forms little veins and nodules in a trachytic igneous rock. Its hardness is 6, its specific gravity from 2.6 to 2.8, lustre somewhat waxy and its color varies from dull green to beautiful pale blue. In modern jewelry, only the fine ((robin's- egg® blue stones are prized ; these occasionally turn green because of the gradual drying out of the wrater which they contain ; heating or exposure to the weather always produces this change. The chief turquois mines, near Nisha- pur, in Persia, have been worked for many centuries ; it has also come from the Sinaitic peninsula, which was probably the ancient Egyptian source. The Persian yield has 'been failing recently, under crude and primitive methods of working; but a number of Ameri¬ can localities have been discovered which are now furnishing a large part of the world's sup¬ ply. All these mines were formerly worked by Indian or Aztec peoples, some of them very extensively, though only with fire and stone tools, which latter are always present. In some cases, traditions still linger among the Indians, and the stone is held sacred to Montezuma and his people. It figures largely in the Spanish records of the conquest of Mexico, and was in part the highly prized <(chalchihuitl® of the Mexicans ; though in central and southern

Mexico this stone was not turquois but green jade. The chief locality is near Los Cerillos, New Mexico; it is also mined at several other points in New Mexico, Arizona, Nevada and California. A substance often used in place of true turquois is the so-called bone-turquois or ondontolite, which is fossil bone colored blue by phosphate of iron. It is easily distinguished un¬ der the microscope by its structure, and by its not yielding a 'blue color with hydrochloric acid and ammonia. Turquois in the natural rock has recently been very extensively cut into gem stone and sold under the name of Turquois matrix.® Consult Pogue, J. E., (The Turquoise; Its History, Mineralogy, Geology, etc.* (206 pages plates Memoirs National Academy of Science, Vol. XII, pt. 2).

TURRET, in architecture, a kind of small tower. Turrets are chiefly of two kinds, such as rise immediately from the ground, as stair¬ case turrets, and such as are formed on the upper part of a building by being carried up higher than the rest. In modern naval archi¬ tecture, the term is given to a revolving tower usually of armor plate in or on top of which the ship's guns are mounted.

TURTLE CREEK, Pa., borough in Alle¬ gheny County, on the Pennsylvania and the Union railroads, 12 miles southeast of Pitts¬ burgh. It has a Carnegie library and a large technical school, and the Westinghouse Elec¬ tric and Manufacturing Company has a big plant there. Pop. (1920) 8,138.

TURTLE-DOVE. See Dove.

TURTLE-HEAD. The popular name given

to Chelone barhata and Chelone carnpanulata plants of the natural order Scrophulariacece now classed with the Pentstemons (q.v.). They are distinguished by leaves of a leather-turtle appearance whence the designation.

TURTLE TRIBE. See Unami.

TURTLES, TORTOISES and TERRA¬ PINS, members of the reptilian order Testudi- nata or Chelonia (q.v.). To all of the marine and some of the fresh-water species, espe¬ cially those of large size, the name "turtle® is applied; most of the smaller pond and marsh dwellers are "water-tortoises,® a few being designated as "terrapins,® while the

terrestrial ones, whatever their size, are properly “land- tortoises.® About 300 living species, most of them inhabitants of fresh waters, have been described, but the group has steadily declined since Eocene times, and many ancient families are entirely unrepresented in the modern fauna. Tortoises are especially numerous in warm climates, and none extend into the Arctic regions. The marine forms are pelagic and wide-ranging. The various members of this group exhibit considerable diversity in habits and structure, and have been arranged (see Chelonia) in four sub-orders and numerous families, of which three sub-orders and seven families are represented in the North American fauna.

Of the sub-order Athecce and family Der- matochelydidce the huge leather- turtle (q.v.), the largest of all modern turtles, occasionally appears on our coast. The Trionycholidea with the single family Triony chidce, or soft-shelled turtles, are found in the fresh waters of Africa, Asia and North America. They have the plastron and carapace incomplete and covered by a leathery skin ; the neck is very long and flexible, and though folding vertically cannot be retracted entirely within the shell ; the head is small and elongated with a slender snout, at the tip of which are the nostrils; the feet are broadly webbed, with long straight claws on some of the toes. Amy da mutica has the upper jaw serrate and the carapace without tubercles. It is found in the region of the Great Lakes and the Ohio River. Aspidonectes spinifer has the cutting edge of the upper jaw smooth and the margin of the carapace with tubercles. It is abundant throughout the upper Mississippi Valley and particularly in the slug¬ gish streams emptying into the Great Lakes. Closely related species are found southward. The soft-shell turtles are strictly aquatic, leav¬ ing the water habitually only in the spring, when about 50 spherical hard-shelled white eggs are deposited in an excavation above the level of the water. They spend much time buried in the mud at the bottom, either entirely concealed or with the head protruding from a hole. They breathe by raising the nostrils to the surface, or, if in water too deep, by means of a thick growth of vascular papillae in the pharynx over which a current of fresh water from the nostrils continually passes. Strictly carnivorous, they feed upon all kinds of fish, frogs, mussels, snails and insects which come within reach of their ravenous jaws and which they seize with remarkable suddenness. They are powerful swimmers.

The order Pleurodira includes three families of recent and several of extinct turtles, the for¬ mer being confined to the fresh waters of South America, Africa and Australia. The tartaruga of the Amazon is of great commercial importance. Unlike most turtles of this group they are said to be largely vegetarian, which probably accounts for the

great value placed

upon their flesh and fats. During the months of September and October vast numbers leave the water at about midnight to deposit their eggs in holes on the higher ground. Two re¬ lated genera are found in Africa. The family Chelydidcs is confined to South America and Australia. The matamata (Clielys matamata) is common in Cayenne. Its length when fully grown is about three feet. It is remarkable in many ways ; its snout is prolonged as in Aspido¬ nectes and the head and neck are covered with tufts of cutaneous outgrowths which probably assist in the concealment of the animal in. the thick aquatic vegetation among which it lives. It is carnivorous.

To the Cryptodira belong the great ma¬ jority of living turtles and tortoises. This sub¬ order includes 10 or 12 families, seven of which have recent representatives. The Cheloniidce includes the sea-turtles, in which the limbs are flat, scaly, inflexible paddles and the heads quite incapable of retraction within the shell. Only four genera and about seven species are known, all widely distributed. The three Atlantic species all occur on our shores more or less frequently. The best-known one is the green turtle, whose flesh is so highly esteemed in soups, etc. This species (Chelone midas) is the largest of sea-turtles, and reaches in some cases a weight exceeding 1.000 pounds. It occurs in all parts of the world when the water is not very cold, but most numerously about tropical archipelagoes. As with the other large sea-turtles, the most numerous catch is made when the females come on shore at egg-laying time, on moonlight nights in summer. Their retreat is cut off and the turtle turned on its back. When once in this position these turtles are unable to right themselves. They can en¬ dure many weeks without food and water, and hence can be transported great distances on seas in the hold of ships. Before the days of refrigerated meat they served as a welcome diet for sailors; and on some of the Pacific islands these and other large turtles were wholly exterminated by reckless slaughter. The green turtles feed on the roots of the eel-grass, and, betrayed by the floating tops of the grass, are sometimes taken in nets while feeding. The principal catch for the American market is now made in the neighborhood of the Florida reefs, where it forms a regular business with many boatmen. Their catch is largely made by spearing.

Another large and valuable turtle is the hawksbill (q.v.), which furnishes tortoise-shell (q.v.). A third species is the loggerhead (Thai – assochelys caretta), which is much more fre¬ quently taken on the coast of the Middle and New England States than either of the others. It may be distinguished from the green turtle by the thin non-

imbricated plates of the carapace, by having the central scale on the top of the head surrounded by a circle of more than 12 small scales, while the green turtle has seven; and by having two, instead of one, claws on the feet. This species reaches a large size, up to 500 pounds, and is carnivorous. It has no com¬ mercial value, but is sometimes sold as the green turtle.

A strictly American family (Chelydridcs) is that of the snapping-turtles (q.v.), including two well-known species of some commercial importance.

TURTLES

1. Leather-back Turtle. 2. Hawksbill, or Tortoise-shell Turtle. 3. Long-necked Turtle. 4. Matamata. 5. Elephant Land-tortoise. 6. Wood-tortoise. 7. Snapping-turtle.

•

V

‘

•

•

•

.

TUSAYAN

TUSCANY

209

Numerous species of small or medium-sized pond, swamp and land tortoises belong to the families Kinosternidee and Emyidee. Of the first the well-known musk-turtle or stink-pot of boys (Aromachelys odoratus), found in every pond in the Eastern States, is an example. The diamond-back (q.v.) (Malaclemmys centrata) of the Atlantic salt-marshes, the red-bellied ter¬ rapin (Pseudcmys rubriventris) , the painted turtle (Chrysemys picta) and the speckled tor¬ toise {Clemmys guttatus) , three common pond- turtles of the East, the last two being familiar to every fisherman, Clemmys muhlenbergi, a less common species distinguished by its dull brown shell and a yellow

blotch on each side of the neck, and found along meadow streams, and the map-turtle (Graptemys geographicus) , chiefly of the Mississippi Valley, and distinguished by the yellow streaks and irregular lines which everywhere mark the shell and skin, all belong to the Emyidee , which also includes the familiar land tortoise (q.v.), or box tortoise (Terrapene Carolina') and numerous other species.

Of the true land tortoises (q.v.) (Testudini – dee), the gopher turtle (G op herns Polyphemus) of the Southern States, the European land tor¬ toise (Testudo grceca) and the gigantic Gallapa- gos tortoises (Testudo) may be mentioned. See Land Tortoise.

Besides the articles in this work on par¬ ticular kinds of turtles consult Holbrook, (North American Herpetology (Philadelphia 1842) ; Agassiz, L., Contributions to the Natu¬ ral History of the United States,* Vols. I and II (Boston 1857) ; Boulenger, E. G., Catalogue Chelonians British Museum* (London 1889) ; id., (Reptiles and Batrachians* (New York 1914) ; Hoffman, in Brown's (Thierreichs* (Leipzig 1890) ; Taylor, Cox Tortoises of North America) (Proceedings United States National Museum, Washington 1895) ; Gadow, Cambridge Natural History, * Vol. VIII (Lon¬ don 1901) ; True, (The Useful Aquatic Reptiles and Batrachians of the United States) (Wash¬ ington 1884) ; Williston, S. W., (Water Reptiles of the Past and Present (Chicago 1914). On fossil species consult Hay, O. P., (Fossil Tur¬ tles of North America> (Washington 1908).

TUSAYAN, too-sa-yan', an ancient <(prov- ince,** comprising the tribal range of the Hopi or Moqui Indians of northeastern Arizona, which was first visited by Pedro Tovar and Juan de Padilla, of the expedition of Coronado, in the summer of 1540. It comprised seven vil¬ lages or pueblos, probably all of which have since been abandoned and new ones built on near-by sites. Between the year named and 1583 two of the villages became depopulated, for in the latter year Antonio de Espejo visited the province of (

their snake dance, in which live rattlesnakes and other serpents are used. Their villages are all situated on lofty mesas, and their houses are generally similar to those of the other Pueblo Indians (q.v.). The Spaniards established mis¬ sions among them as early as 1629, but they never took kindly to Christianization, and in 1680 murdered their Spanish priests. Hence¬ forward little effort was made to convert them, but in recent years schools have been established in their midst by the United States govern¬ ment and an effort made to teach them

the white man's ways, sometimes force being used to overcome their conservatism. The Hopi are kind, hospitable and industrious and have been regarded by ethnologists as the most primitive Indians within the United States. They num¬ ber 1,841. Oraibi in the Moqui Reserve, Ariz., is their largest pueblo.

TUSCALOOSA, tus-ka-loo'sa, Ala., city, county-seat of Tuscaloosa County, on the Black Warrior River and on the Alabama Great Southern Railroad, about 52 miles south¬ west of Birmingham and 90 northwest of Mont¬ gomery. It was formerly the capital of the State (1826-46). It is in an agricultural region in which are grown large quantities of cotton. Extensive coal fields are in the vicinity. The chief manufacturing establishments are cotton gins, cotton compresses, flour mills, machine shops, iron smelters, coke ovens, lumber mills and creameries ; coal mining and stock-raising contribute to the prosperity of the city. The principal public buildings are the courthouse, the Alabama Insane Hospital, the churches and schools. The educational institutions are Oak City Academy (Baptist), and Stillman Insti¬ tute (Presbyterian), both for colored students, University of Alabama founded in 1831, Uni¬ versity High School, a public high school, the Tuscaloosa Female College (Methodist Episco¬ pal), Central Female College, Institute for Training Colored Ministers (Presbyterian), public elementary schools and libraries. Pop.

(1920) 11,996.

TUSCANY, tus'ka-m (Italian, Toscana, tos-ka'na), Italy, a compartimento, or terri¬ torial division, bounded by the divisions of Liguria, Emilia, Marches, Umbria and Rome, and on the west by the Ligurian and Tyrrhenian seas. It consists of the provinces of Arezzo, Florence, Grosseto Livorno (Leghorn), Lucca, Massa e Carrara, Pisa and Siena, with a com¬ bined area of 9,304 square miles. A number of islands off the coast form the Tuscan Archi¬ pelago. The greater part of the surface is mountainous with some enclosed river plains in the interior at Florence and Arezzo. Along the coast are the low, marshy and unhealthful regions of the Maremme. The principal rivers are the Arno, Cecina, Serchio and the Om- brone. The mineral wealth is very extensive, the chief products being iron, copper, mercury, lignite, fine Carrara marble, salt, boracic acid and sienna earths. The soil in the valleys is fertile, producing wheat, corn, grapes, olives, tobacco, chestnuts and flowers. The industries are very active and extremely varied. The capital is Florence, and the chief port is Leg¬ horn. For ancient history and archaeology see Etruria. After the fall of the Western Em¬ pire, Tuscany passed through various hands and

was finally made a duchy under the Lom¬ bards. In the 12th and 13th centuries it was broken up into a number of small republics, among which Florence held the leading place, and later it was reunited under the dukes of Florence, the Medici. After the extinctions of the Medici family it passed to the house of Lorraine, under which it remained, with an in¬ terruption at the time of Napoleon (see Etruria, Kingdom of), until it was annexed by Sardinia in 1860. It then became, with Sardinia, a part of the kingdom of Italy. See Florence; Arezzo; Pisa and appended bibli¬ ographies. Consult Cruickshank, A. M.,

(Smaller Tuscan Towns) (New York 1912) ; Hewlett, M. H., (Earthwork out of Tuscany) (ib. 1911) ; Hutton, Edward, (Siena and South¬ ern Tuscany* (ib. 1910) ; Seignobos, Charles, Political History of Europe since 1814* (Eng¬ lish trans., New York 1900) ; von Reu- mont, Alfred, (Geschichte Toscanas seit dem Ende ‘des florentinischen Treistaates* (3 vols., Gotha 1876-77).

TUSCARAWAS, tus-ka-ra’was, a river of northeastern Ohio ; it unites with the Mohican and forms the Muskingum (q.v.). It is about 126 miles long. Massillon is the chief town on the river.

TUSCARORA, tus-ka-ro’ra (sig. probably <(Indian-hemp gatherers®), a tribe of the Iro- quoian stock of North American Indians, which, when first known to the whites, lived on the lower Neuse River and its tributaries, the Trent and the Contentnea, the Tar and Pamlico riv¬ ers, comprising the territory south of the present Raleigh, N. C. In 1711 they num¬ bered about 4,000, in 15 towns. As the white settlers of North Carolina took from the Indians such lands as they needed, and as they also kidnapped young Indians for purposes of slavery in the West Indies and in the New England colonies, a large portion of the Tus- caroras, in 1711, incensed to bitter hatred toward the whites, formed with neighboring tribes a conspiracy to destroy all the settlers. The war which ensued lasted two years. On 26 March 1713 the hostile Tuscaroras were driven into a fort on Neuse River, where, after a severe conflict, they were defeated with a loss of 800 prisoners. Thus broken in power, the remnant of the hostiles migrated northward and in 1722 were adopted into the League of the Iroquois or Five Nations, in New York, forming the Sixth Nation. In the American Revolution the Tuscaroras espoused the cause of the colonists. They now number about 350 in Lewiston, New York, and 350 on the Six Nations reserve, Grand River, Canada. Neither portion retains distinctive pagan rites,

and on the whole they are more progressive than their Indian neighbors.

TUSCULUM, tus'ku-lum, Italy, an ancient city of Latium, 15 miles south of Rome in the Alban Hills. Tradition has it that Tusculum was founded by Telegonus, son of Odysseus and Circe. Subsequently its relations with Rome were cordial, and bestowed upon it the right of citizenship. In the Middle Ages it became the seat of a powerful family of counts. In the 12th century it was destroyed by the Romans, whereupon the inhabitants built a new town in the vicinity — Frascati. Its beautiful location

attracted many wealthy Romans, who estab¬ lished villas in the district. Distinguished among its residents were Lucius Crassus, the orator ; Pompey, Hortensius, Lucullus, Scarus, Brutus, Caesar and Cicero. This city existed until 1191 when the Romans destroyed it. The Tusculana Disputationes were written here. An ancient amphitheatre, theatre and fragments of the city walls belonging to the ancient city have been excavated. See Frascati.

TUSCUMBIA, tus-kum'bi-a, Ala., city, county-seat of Colbert County, on the Tennes¬ see River, and on the Southern, the Northern Alabama and the Louisville and Northern railroads, about 174 miles northwest of Mont¬ gomery, and four miles below Florence, which is on the opposite side of the river. It was settled in 1812 and was incorporated in 1818. Tuscumbia is in a beautiful valley surrounded by hilly, almost mountainous land ; the soil is fertile, the rainfall medium and distributed throughout the year, and the temperature favorable to agriculture and fruit-raising. The chief manufactories are railroad shops, agri¬ cultural-implement works, cotton gins and flour Pop. (1920) 3,855.

TUSK-SHELL. See Dentalium.

TUSKEGEE, tus-ke'ge, Ala., city, county- seat of Macon County, on the Tuskegee Rail¬ road, a branch of the Western Railway of Alabama, 45 miles northeast of Montgomery. It was first settled in 1780 by Indian traders, was incorporated as a borough in 1800, and as a city in 1820. It is the centre of a fertile cot¬ ton-raising region; contains cottonseed-oil mills, cotton ginneries, brick kilns and saw-mills. It is also a pleasant winter resort. It is widely known as the seat of the Tuskegee Normal and Industrial Institute (q.v.), established in 1881, and is also the seat of the Alabama Conference Female College, Methodist, established in 1855. The city government is vested in a mayor and a council of six members. Pop. (1920) 2,475.

TUSKEGEE NORMAL AND INDUS¬ TRIAL INSTITUTE, a negro educational institution established by negroes in Tuskegee, Ala., for the education of students of their own race. The school was called into being by an act of Congress, and was opened in 1881 under the official name of Tuskegee State Normal School, and two years later this designation was changed to the present name. The growth of the institution was rapid and the attendance had reached near 2,000 in 1917. In this school have been trained many of the noted negro leaders of the country. Andrew Carnegie gave the college $600,000; and other gifts have raised the endowment fund to over $2,000,000 with the prospect of considerable ad¬ ditional funds in the near future. Tuskegee Institute possesses over 100 buildings, close upon .20,000 acres of public lands and a library of over 20,000 volumes, together with extensive modern school equipments. The faculty and office staff number close upon 200 employed in the home work of the college and in ex¬ tension teaching; and the work which they are called upon to do is extensive, varied and far-reaching, embracing as it does the studies of the common school, the industrial school and the Bible-training institute and theological

seminary. Industrial training is one of the great features of the school; but it is not suffi¬ cient unto itself, since industrial instruction always goes hand in hand with the other edu¬ cational work of the institute. The school curriculum includes day and night sessions, the latter being intended for students too poor to pay their way through college. Considerable stress is placed upon the teaching of the me¬ chanical industries, and this department of the college covers everything from electrical en¬ gineering to shoemaking and the commoner trades of life. Attention is also paid to the industrial education of women in line with their lives. The extension work of the col¬ lege, which is carried on through the Tuskegee Negro Conference, is largely directed to prac¬ tical and industrial ends, in which agriculture receives special consideration. The name of Booker T. Washington (q.v.), its president until 1915, was as well known as the institute. Consult Washington, B. T.,

TUSSAUD, tii-so', Marie Gresholtz (((Ma- dame Tussaud®), founder of the well-known exhibition of wax-work in London : b. Bern, Switzerland, 1760; d. London, 16 April 1850. She learned the art of

modeling in wax in Paris, where she assisted her uncle Curtius in his (Cabinet de Cire) in the Palais Royal. For a time she gave lessons in modeling to Elizabeth, sister of Louis XiVI, and in this way became acquainted with the leading personages at court. During the Revolution she was imprisoned for three months. In 1802 she established herself in London. The collection of over 300 portrait figures (that of Voltaire and others yet on view modeled by Madame Tussaud herself from life) with a remarkable collection of relics, is still one of the interesting features of London, where it is now managed by a company. Con¬ sult Herve, F., (Memoirs of Madame Tussaud5 (London 1878).

TUSSER, tus'er, Thomas, English agricul¬ tural writer and poet : b. Rivenhall, near Wit- ham, Essex, about 1524; d. London, 3 May 1580. He was a chorister at Saint Paul's and elsewhere, studied at Cambridge, was fo£ 10 years retainer and musician to Lord Paget at court, and farmed unsuccessfully in Suffolk and Norfolk. Later he was a singer in Norwich Cathedral, a tax-farmer in Essex, and a servant of Trinity Hall, Cambridge. Tusser of whom Fuller, in enumerating his vocations, says he was (

TUSSER, TUSSORE, or TUSSEH, the

silk spun by the tusser silkworm. See Silk¬ worm.

TUSSILAGO, genus of plants of the gen¬ eral order Composites. The only species is the colts foot (Tussilago farfara), which is char¬ acterized by solitary flower heads appearing be¬ fore the leaves. These are much sought after by bees and are, therefore, of economic value as honey producers apart from the general feeding value of the grass.

TUSSOCK-MOTH, one of the small gray¬ ish or brownish moths of the genus Halesidota, or some allied genus, whose cocoons are com¬ posed of silk and caterpillar hairs mingled, and are fastened in the interstices of the bark of trees. These moths defoliate trees, and feed upon a wide variety of hard woods. They are, consequently, a constant pest of parks and shade-trees, and measures must be taken to de¬ stroy the cocoons in winter, by scraping them off the trees or applying strong insecticides. A European species is a special pest of hop- vines. There are 20 species in the United States. The most destructive are the gypsy moth and the browntail moth which have wrought havoc in New England within the last 50 years. Consult Holland, W. J., (The Moth Book* (new ed., New York 1905).

TUTELO, too-ta'lo. Strictly the name of a tribe of the former Monacan confederacy of the Siouan stock of North American Indians, who, when first known to the whites, in 1671, lived on the headwaters of the Dan in south¬ western Virginia. The name, however, being a contraction of the Iroquoian designation (Todi- rich-roone) of all the Siouan tribes of the South Atlantic Coast was employed by the Iroquois in a more comprehensive sense. By 1675 the Tutelo tribe had drifted to the Roanoke River in southern Virginia, and by 1701 had occupied several parts of upper North Carolina, owing to pressure of the Iroquois from the north. Soon after 1711, with the remnants of the various tribes of Virginia and the adjacent parts of North Carolina, they were gathered at Fort Christanna, in the present Brunswick County, Va., where they became generally known as Christanna or Saponi Indians, although the latter name was strictly applicable to a single though cognate tribe. At Fort Christanna the tribes were thrown in contact with unprincipled whites, whose influence had the usual effect of rapidly degrading the Indians, although Gover¬ nor Spotswood made an attempt to educate their children. The Iroquois raids continued, not¬ withstanding the proximity of the garrison, but these practically came to an end with the Albany treaty of 1722. Dissatisfied with their white neighbors, and particularly with the hanging of one of their chiefs, the Tutelo, Saponi and other confederated tribes resolved to follow the ex¬ ample of the Tuscaroras (q.v.) by placing them¬ selves under the protection of the Iroquois. Consequently, about 1740, they began a gradual migration northward, settling first at Shamokin village, Pennsylvania, where Sunbury now stands. By 1748 they had settled at Skogari, in the present Columbia County, Pa., where they were described by Zeisberger as <(a degenerate remnant of thieves and drunkards.® In 1753 the Tutelo and their allies were adopted by the Cayugas, becoming a part of the Six

Nations. As the Iroquois espoused the cause of the British in the American Revolution, half of them, including most of the Cayugas, were driven into Canada, where they were settled on the Grand River reserve. The Tutelo went with them, erecting their village on (XXI, Philadelphia 1883- 84) ; Hodge, (Handbook of the American In¬ dians* (Washington 1910) ; Mooney, (Siouan Tribes of the East) (Washington 1894).

TUTICORIN, too-te-kor'in, India, a sea¬ port in the province of

Madras, situated on the northwest shore of the Gulf of Manar, 70 ’miles northeast of Cape Comorin. It is the terminus of the South Indian Railroad, has pearl fisheries and considerable trade. There are several cot¬ ton manufacturing establishments. Pop. 34,758.

TUTOR, in Scotch law , the guardian of a boy or girl while a minor. A father is tutor to his children by common law. Failing him, there may be three kinds of tutors — tutors nominate, tutor-at-law or tutor-dative, the division being borrowed from the Roman law. A tutor-nom- inate can only be appointed by the father, either under his will or by some writing clearly indic¬ ative of his wish. He is not generally bound to find security for his intromission with the estate of his pupil, but the Court of Session may ordain him to do so. A tutor-at-law is appointed by the court when there is no tutor-nominate, or when he dies, or does not accept. The nearest relation by the father is usually appointed if 25 years old and able to give security. But the tutor-at-law has only the custody of the pupil’s estate, his person being entrusted to his mother, or, failing her, to his nearest relative on her side. A tutor-dative is named by the Crown when there is no tutor-nominate, nor at-law. The office is in all cases an unpaid one, and the tutor is bound to make inventories and to keep accounts. For certain important acts — selling land, for example — he requires the sanction of the Court of Session. Tutor is also applied to a Fellow of a college or university who discharges particular functions, the latter differing in various universities.

TUTTIETT, tut’I-et, Mary G. ˆMax¬ well Gray®), English novelist: b. Newport, Isle of Wight. Her first work was (The Broken Tryst* (1879) ; but (The Silence of Dean Mait- land) (1886) at once brought her before the English and American public as one of the most notable of the later novelists, and is the book by which she will be longest remembered. Later works include (The Reproach of Annesley > (1889) ; (In the Heart of the Storm) (1891) ; Sweethearts and Friends) (1897) ; (The House of Hidden Treasure) (1898) ; (Ribstone Pip- pins) (1898); (The Forest ChapeP (1899); (The World’s Mercy) (1900) ; (Four Leaved Clover* (1901);

TUTTLE, tut’l, Daniel Sylvester, Amer¬ ican Protestant Episcopal bishop : b. Windham, Greene County, N. Y., 26 Jan. 1837. He was

graduated from Columbia in 1857 and from the General Theological Seminary in 1862 ; was admitted to deacon’s orders in 1862 and to the priesthood the next year. He was rector of Zion Church, Morris, N. Y., 1863-67, and in the year last named was consecrated missionary bishop of Montana, Utah and Idaho. He was translated to the diocese

of Missouri in 1886, and in September 1903 succeeded Rt. Rev. Thomas March Clark as presiding bishop of the Protestant Episcopal Church. He is the author of (Reminiscences of a Missionary Bishop >

(1906).

TUTTLE, Herbert, American historian ; b. Bennington, Vt., 29 Nov. 1846; d. Ithaca, N. Y., 21 June 1894. He was graduated at the University of Vermont in 1869, and soon after entered the field of journalism. His first news¬ paper work was in connection with the Boston Daily Advertiser. In 1872 he went abroad and for some years resided in Germany, where he became a correspondent of the London Daily News, the Glasgow Herald, and the New York Tribune. Here he devoted much time also to the study of German political history and in¬ ternational law, and upon his return to Amer¬ ica was appointed resident lecturer in the de¬ partment of political science at the University of Michigan, and in 1882 became professor of international law and the theory of politics at Cornell University. In 1890 he was appointed to the chair of modern European history at Cornell. He published (German Political Leaders) (1876) ; (History of Prussia to the Accession of Frederick the Great) (1884) ; and (History of Prussia under Frederick the Great)

(1888).

TUTUILA (too-twe'la) ISLANDS, a

group of the Samoan Islands (q.v.).

TUTUTUNNE (((people close to the water®). The name (1) of a gens or village on the north bank of Rogue River, above its mouth, in Oregon, and extended to include (2) a num¬ ber of gentes or villages of the Athapascan stock of North American Indians in the same general locality. Little is known of the primi¬ tive customs of the tribe, but they formerly practised polygamy, and widows were buried alive in the graves of their deceased husbands. After hostility toward the government they were removed in 1856 to the Siletz reservation, where they have since resided. At the date mentioned they were officially reported to number 1,311, but they are now reduced to a few score.

TUY, twe, Philippines, pueblo, province of Batangas, Luzon, on Mantenlupa River, 24 miles northwest of the pueblo of Batangas. It is surrounded by a cattle raising and agricul¬ tural region; and is connected with Balayan and the coast highway by road, and with the

prov¬ ince of Cavite by a trail leading over the Sierra de Tagaytay. Pop. 2,430.

TVASHTRI, twash'tri, or TVASHTAR,

in the Rigveda of the Hindus, the mythological creator, shaper or divine artisan, later classed among the Adityas or gods of heavenly light. He is the divinity who creates the gods, human¬ kind, and animals, and rules their destinies. His daughter Saranyu, whom he married to Vivasant, was the mother of Yama and Yami, the primaeval pair. The sun as the primary source of life and all blessings is supposed to

be the mythological origin ol Tvashtri. Con¬ sult Barnett, L. D., (Antiquities of India } (Lon¬ don 1913) ; and Macdonnell, A. A., (Vedic Mythology > (Strassburg 1897).

TVER, tvar, Russia, (1) capital of the gov¬ ernment of that name, on the Volga, 96 miles northwest of Moscow. It contains a Kremlin or fortress, surrounded by a wall, outside of the main town, has fine promenades, spacious open squares, handsome buildings, palace, churches, two monasteries, convent, Protestant and Catholic churches, etc. The cathedral of the Transfiguration is a remarkable structure with five cupolas, and fine mural paintings by Platon (18th century). Further a monument to Catharine II, theatre, various schools, semina¬ ries and military academy. There are numer¬ ous manufactories, including cotton mills, iron- foundries, wagon works, saw mills, starch fac¬ tories, etc. A brisk trade is carried on with Moscow and Petrograd. There are spacious docks and machine-shops. Pop. about 62,600. (2) The government contains an area of 25,225 square miles. The surface is mountainous, de¬ clining into a plain at the north. Forests are extensive and the fields yield rye, barley, hemp and flax. The Volga and the Dvina are the principal rivers. Cottage industries are exten¬ sive and produce linen, felts, shoes, axes, nails, crude implements, etc. There are also manu¬ factories of cotton goods, leather, flour, etc. Pop. 2,250,200.

TWACHTMAN, twat'man, John Henry,

American painter : b. Cincinnati, 4 Aug. 1853 ; d. Greenwich, Conn., 8 Aug. 1902. He came under the influence of Frank Duveneck in 1875, just as the latter was fresh from the studio of Pilotry at Munich, and

was making a great impression in New York by his brilliant and rapid execution. Twachtman, at his sugges¬ tion, studied from 1875 to 1878 at Munich under Loefftz and subsequently at Paris. He eventu¬ ally settled at Greenwich, Conn., developing an original line of artistic production, in which he tempered the crudeness of impressionism by a certain refined and tender sensibility, and mani¬ fested a fine sense of color in its most delicate shades and subtile combinations. He has been called a <(minor poet of the brush.® Without being a rich colorist, or a bold innovator he produced pictures fresh, original and finding their way to the heart by their pathetic simplic¬ ity, the truthfulness of their detail and the ab¬ sence of all flourish and self-consciousness in the apparent ease and directness of their tech¬ nique. His typical theme was a winter land¬ scape, a stream of water rushing down a ravine, befween thin edges of ice, and bare bushes on each side ; a white house with dull colored roof, under a turbid gray sky; or the coolness, mois¬ ture and silence of a snow scene, whose atmos¬ phere he suggested with truly marvelous felic¬ ity. If he was not fully appreciated in his life¬ time his paintings will doubtless grow in pop¬ ular estimation, and win recognition as vital in¬ cidents in the history of American art, gaining emphasis also from their personal interest as reflecting the artist's fine nature, his love of beauty in landscape, and his keen observation of the more fleeting and elusive phases of at¬ mospheric change, the more sombre charms of rugged or barren scenery and clouded sky, in the seaboard of the Eastern States. An exhibi¬

tion of his paintings was held in New York in 1913 and there was a Twachtman room at the Panama-Pacific Exposition, San Francisco, in 1915. His works are scattered throughout America, but he is well represented in all im¬ portant galleries.

TWAT, twat, or TUAT, Sahara, a large group of oases situated to the south of western Algeria in lat. 27° to 29° N., and separated from the Atlas Mountains by the desert of El Erg. It contains several salt lakes, wadies and some artificial irrigation canals, and produces dates, wheat, senna, cotton, etc. The principal cara¬ van routes from Timbuktu to Algeria and east¬ ern Morocco converge at this point, and the trade is very important. The principal single oases are Guarara in the north and Twat proper in the south, the latter having several mosques and a population of about 49,000. The Algerian railway system reached Twat in 1912. It is in the French sphere of influence.

TWEED, twed, William Marcy, American politician: b. New York, 3 April 1823; d. there, 12 April 1878. He was by trade a chairmaker and first gained political foothold through his popularity as foreman of the

((Americus® Fire- Engine Company No. 6, known as <(Big Six.® He was an alderman in New York in 1852-53, United States congressman in 1853-55, chairman of the New York board of supervisors in 1856, school commissioner in 1856-57, deputy street commissioner in 1861-70 and State senator in 1867-71. From his appointment as deputy street commissioner the power of the famous Tam¬ many Ring really dates. He was practically at the head of the department and with his sup¬ port of unscrupulous political friends his power increased until when elected commissioner of public works in 1870 the <(Tweed Ring® con¬ trolled practically every department of munici¬ pal expenditure.ˆ He increased enormously the city pay-roll, giving to political allies high- salaried sinecure positions. His largest scheme for robbing the city treasury was that of the county courthouse, begun in 1868 and planned to cost $250,000, but upon which $8,000,000 was re¬ ported as expended in 1871, leaving the build¬ ing uncompleted. The charter of 1870 which placed the power of auditing accounts with cer¬ tain city offices occupied by Tweed and his friends removed all restraints from the system of plundering devised by the unscrupulous poli¬ tician and the amounts appropriated extended into the millions. A secret account of these depredations was kept in the auditor's office and in the winter of 1870-71 the items were copied by a clerk in the office and were printed in the New York Times in July 1871, resulting in the downfall of the <(ring® in the election of the following November. Tweed was brought to trial in 1873 on a charge of grand larceny and forgery and sentenced to 12 years' im¬ prisonment and a heavy fine. His sentence was reversed in 1875, but he was unable to furnish bail pending certain civil suits brought against him and was committed to jail. He escaped to Spain in 1875 but was brought back to New York on a warship and again committed to the Ludlow Street jail, where he died. Consult Bryce, (The American Commonwealth) (new ed., 2 vols., New York 1910) ; McGuire, J. K., (The Democratic Party of the State of New

York) (ib. 1905) ; Myers, G., (History of Tam¬ many HalP (ib. 1901).

TWEED, Scotland, a river rising in Peeble- shire at Tweed's Well and the largest stream of the country. At Coldstream it forms the boundary between England and Scotland and enters the North Sea at Berwick, after a course of 97 miles. Its chief tributaries are Gala and Ettrick Waters, the Leader, Teviot, Till and Whitadder. The chief towns on its

route are Peebles, Melrose, Kelso, Abbotsford, Cold¬ stream, Dryburgh, Norham Castle, etc., many of them rich in historical and literary associa¬ tions. The river is celebrated for its trout and salmon fisheries. It is navigable for barges for a short distance above Berwick. Consult Crockett, W. S., (1892); Lauder, T. D., (Scottish Rivers > (1874) ; Veitch, J., (The River Tweed) (1884).

TWEEDLEDUM and TWEEDLEDEE,

a phrase used only in making reference to a distinction between the two.. The suggestion is, of course, that the only distinction between the two is in sound, in other words a distinc¬ tion without a difference. The expression arose in the 18th century in the course of a dispute between the admirers of Bononcini and those of Handel, as to the respective merits, of those musicians. The matter was thus satirized by John Byrom (1692-1763) :

“Some say, compared to Bononcini,

That Mynheer Handel’s but a ninny;

Others aver that he to Handel Is scarcely fit to hold a candle.

Strange all this difference should be ’Twixt tweedledum and tweedledee.”

TWEEDS, a certain kind of cloth, so called from the fact that its manufacture orig¬ inated and was long exclusively carried on in towns on the Tweed and its tributaries. It is distinguished by the softness and flexibility of its texture, qualities which result from the man¬ ner in which it is made, the yarns not being so finely spun nor the cloth so closely woven or so thoroughly felted as is the case with the fine English cloths. Tweeds are also well known by their peculiar and endlessly varied patterns and mixture of colors, produced by weaving with dyed yarns. The manufacture is of comparatively recent origin; but the great demand for the material has led not only to the rapid growth of the manufacture in its original locality, but also to its extension to various other parts of Scotland, and also into England, as well as to the imitation of the ma¬ terial in France and other continental countries.

TWELFTH CENTURY. This is the century of the crusades. The first crusade was preached in 1095 and the Latin kingdom of Jerusalem came into existence (1099) just be¬ fore it opened. Men continued to go from Eu¬ rope in large numbers during the first quarter of the century to strengthen the little Christian kingdom. The second crusade

(1147) gave a new impetus and the third crusade (1190) at¬ tracted large numbers of men from Germany, France and England. It might be thought that with Europe pouring out hundreds of thou¬ sands of her men, the youth and chivalry of the time, so many of whom were killed or crip¬ pled, though the whole population was less than that of most of the countries now, the period

would be distinctly one of sluggish transition and that great accomplishment could not be ex¬ pected. In spite of all this the century wit¬ nessed the great beginnings of that magnificent intellectual and artistic movement at the end of the Middle Ages which culminated in the 13th century, a period that itself sent out the next three crusades. The intensity of feeling aroused by the heartfelt efforts of Europe to rescue the Holy Land from the Moslem more than made up for the physical losses and this deep stirring of the human mind and will led to some of the greatest achievements that hu¬ manity has ever made. The effect of this stimulus was noted all during the later Middle Ages and the movement affected all classes and made itself manifest in the smaller as well as the larger towns. The architectural impulse was felt particularly in northern France and was so widely diffused that <(each village and hamlet of Northern France possessed a church that was commonly of real value. No matter how insignificant it usually contained some ob¬ ject of art of striking beauty, an altar piece or a painting or a statue or stained glass or a tombstone or wood carving or a bell or wrought iron work that still bear the stamp of the genius time.® All this has been emphasized for us by the destruction caused by the Great World War and the effort to catalogue the losses. Other countries were but little behind France in following the impetus. Spain has a series of great cathedrals, the foundations of which are traced to this time, though the country was in the midst of a determined effort to free it¬ self from the incubus of the Moors. Many of England's great cathedrals were begun be¬ fore the 12th century closed, while in Italy the earlier Renaissance, as it is sometimes called, affected architecture,' art and literature. Gothic or pointed construction — so-called in depreca¬ tion in the later Renaissance because not origi¬ nating in classic antiquity it seemed only worthy of the Goths, their barbarous ancestors, came into existence. It has for its basic prin¬ ciple that ornament should not be for its own sake but spring from construction work, and the first hints of it have been traced to Sicily. The pointed style fascinated the crusaders on their return and the fashion for it soon became diffused all over Europe.

The political history is that of the crusades. The second crusade was preached by Saint Ber¬ nard, after the fall of Odessa, a frontier

strong¬ hold of the little kingdom of Jerusalem, awak¬ ened the fear that the Holy Places might again fall into the hands of the infidels Bernard was bitterly disappointed in what seemed its failure, but it saved Jerusalem for the Christians for a generation. The Holy City was taken by Sala- din, the well-known sultan of Egypt (1187), and this brought on the third crusade in which the three greatest sovereigns of Europe, Frederick Barbarossa, the emperor of Germany, Richard I of England, the Lion Heart, the title won by his heroism in this crusade, and Philip Augus¬ tus of France took the cross (1190). The em¬ peror led his troops by land, but the German crusaders suffered as did their predecessors on crusade from friction with the peoples of east¬ ern Europe and from disease in Asia Minor. In spite of obstacles they achieved success, but Frederick was drowned, his troops became dis-

heartened, the Turks inflicted severe losses and only 5,000 out of 100,000 ever returned to their homes. Richard and Philip Augustus convoyed their troops ship and joined their forces at the siege of Acre. The siege was long and costly, but in spite of all Saladin's efforts to relieve the garrison the city had to capitulate. A rupture between Richard and the French king led to the return home of Philip Augustus and his troops. The English king remained to complete the task of winning back Jerusalem, but in vain. The tales of the personal combats between Richard and Saladin and their imme¬ diate followers belong to romance rather than history, but have some foundation. Saladin proved an opponent worthy of the chivalry of Europe. Richard concluded a favorable peace with the provisions that the Christians should have free access to the Holy Places and hold all the coast from Acre to Ascalon. Richard's return was hastened by rumors that his brother John was plotting against his kingdom. On his journey from the Holy Land homeward the English monarch fell into the hands of his po¬ litical enemy the German Emperor Henry IV, the successor of Frederick, and was imprisoned incommunicado. Blondin, the favorite minstrel of the king, wandering in quest of him, sang to his harp beneath the walls of Richard's Ger¬ man prison and his voice was answered by the king. The imprisonment of the champion of Christendom against the Turks evoked bitter protests, but Henry absolutely refused release except on payment of an immense ransom. The story has often been cited as typical of the po¬ litical bad faith of the time, but analogous events are not rare in history, even in our time. Richard was so beloved of his people that even the enormous imposition demanded did not seem too much, and with the consent of

the clergy they stripped the very churches to make up the sum. The Lion Heart returned to Eng¬ land to be enthusiastically welcomed by his peo¬ ple, though his death within a few years put John (Lackland), a younger brother, one of the most despicable of English monarchs, on the throne (1199).

Bishop Stubb's estimate of the crusades in his lectures on ((Mediseval and Modern His¬ tory,® delivered as professor at Oxford, has now come to be the accepted view. ((They were the first great effort of mediaeval life to go be¬ yond the pursuit of selfish and isolated ambi¬ tions; . . . they failed in their direct ob¬

ject, but that is only what may be alleged against almost every great design which the Great Disposer of events has molded to help the world's progress ; for the world has grown wise from the experience of failure rather than by the winning of high aims. . . . They

brought out the love for all that is heroic in human nature, the love of freedom, the honor of prowess, sympathy with sorrow, perseverance to the last.® Besides they touched men's hearts and minds so deeply that they stimulated them to their highest activity and as a result the cru¬ sading generations and those which immediately followed them succeeded in accomplishing more great things that the world will never willingly let die than any other. They were a great mani¬ festation of the power of the spirit of man, and while they brought immense material losses to Europe and entailed almost innumer¬ able evils, they brought immense good.

The political hero of the time is Arnold of Brescia, born about 1100 and executed 1155, who came into enduring fame about the mid¬ dle of the century. The Italian cities were at this time just developing independent republi¬ can existence under consuls with a senate and an assembly of free citizens. Arnold, a disciple of Abelard, campaigned for and obtained the re-establishment of the Roman republic. The Pope was deposed, a senate of 56 members was formed, the ancient letters S.P.Q.R. reappeared in the public documents, and the republic be¬ came a fact. Every city of any importance throughout Italy, except in the kingdom of Naples, followed the example and took on a republican form of government. The emperor Frederick I, known as Barbarossa, looked jealously at this spread of the spirit of democ¬ racy and crossed the Alps to assert his rights in the peninsula. Italy welcomed him with naive confidence that he would confirm the established order. The emperor proceeded to use all his power against the young municipal republics. He restored the Pope and Arnold of Brescia was executed. When Frederick returned to Italy in 1158,

reaction against him throughout Italy was general and when he attempted to place imperial officials over the Italian towns, many of them revolted. Frederick laid siege to Milan, which held out for two years and then yielded only to famine. The Milanese were compelled to destroy their carroccio which car¬ ried their standard of independence and the town itself was totally destroyed, many of the neighboring cities which bore old grudges being permitted to wreak their vengeance upon it. Frightfulness, instead of crushing the" spirit of the Italian cities, aroused their patriotism. The league of the Lombard cities was formed and Frederick had to lead his forces into Italy six times. On his fifth expedition he was defeated by the Lombards at Legnano (1176) and was compelled at the peace of Constance to re¬ nounce all his claims over the Italian cities. Between the Italian cities and his own turbu¬ lent nobles, Frederick was almost constantly at war during a long life which was to end in- gloriously in the Third Crusade.

The league of the Italian cities to preserve their liberties was one of the first confederacies organized in the modem spirit. Formed as the result of the conflict with the German emperor, they were unfortunately the scene of bitter con¬ flicts between two parties among the Italians themselves, the Guelphs and the Ghibbcllines, these being the Italian forms of the German names, Welf and Waiblingen. The Welfs or Guelphs were the Papal and popular party op¬ posed to the Ghibbellines, the imperial and aris¬ tocratic party. The Welfs were so called from Welf I of a powerful family in the time of Charlemagne. Waiblingen was the name of an estate not far from Wurtemburg belonging to the House of Hohenzollern, hence its use as a rallying cry of the emperor's party at the bat¬ tle. The names Guelph and Ghibbelline are said to have been first used as war cries at the battle of Weinsburg in 1140 in which the Hohenstauffen emperor, Conrad III, conquered Welf VI. The names lost their significance in Germany to a great extent to become extremely important in Italy and there continued to des¬ ignate bitterly antagonistic parties till the end of the 15th century. The first Lombard League

included all the cities from Venice to Piedmont. Henry the Lion, chief of the Welfs, had re¬ fused to follow the emperor, hence the adop¬ tion of the name of the opponents of the em¬ peror in Italy. The success of the effort of the league against Frederick led to its formation in the following century once more and brought the Italians

their first appreciation of what a united Italy might mean.

Bishop Stubbs declared that the greatest man of the century in his influence on his own and subsequent times was Bernard of Clari- vaux (1090-1153). At the age of 23, after an education which had awakened in him a taste for literature and tapped a vein of poetry, Ber¬ nard, wearied of the trifles of life, with 30 young noblemen of Burgundy who shared his feelings, asked for admission to the monastery of Citeaux, where the rule of Saint Benedict was being re-established in all its old-time rigor. Bernard responded so well to the monastic dis¬ cipline that only three years later, Stephen, the abbot of Citeaux, sent him at the head ot a group of religious to found a new monastery in the Vale of Bitterness (Absinthe) in the diocese of Langres. Bernard renamed the place Claire Vallee, or Clairvaux, Bright Val¬ ley, and his own name has had this for epithet ever since. Bernard though so deeply intent on mortification that his health was threatened by it, and the regime at Clairvaux was so austere that it would seem forbidding, had a marvelous attraction for men and numbers flocked to him. Even his father and six brothers came to share the peace and happiness of his religious life at Clairvaux. The monastery became so crowded that over and over again bands of monks had to be sent out for new foundations.

Here Bernard wrote his great books which are still often consulted and have been re¬ printed in most of the modern languages in our generation. Here he delivered his homilies and from here the letters were written which influenced his times so deeply and reveal the man to us. The poetic tendency of his earlier years was now turned to sacred poetry and Bernard wrote some of the most beautiful of hymns. He became known as Doctor Melliflu¬ ous. He was famous in philosophy and theol¬ ogy as well, and it was he who answered Abe¬ lard so effectively and yet with so little of acerbity that that distinguished university man felt that nothing more could be said. Bernard and Abelard became reconciled and Abelard be¬ came a monk at Cluny and a teacher in the school of the monastery. When the crusade of the middle of the century was to be preached, Bernard was felt to be the man of all others to lead it, and his voice stirred multitudes to take up the cross, and wonders attested by all who heard him enhanced his influence. The failure of the crusade to accomplish all that he hoped embittered the close of Bernard's life. The selfish pettinesses of men face to face with a great good work made him realize how little he could really touch them.

Bernard's opponent in theological contro¬ versy, Abelard, is the other famous intellectual genius of the century. He is remembered for his

scholarship and his educational influence, but mainly for the romance in his life. Like so many errant geniuses of France, Abelard was born (circa, 1079) in Brittany, just com¬ ing of age for his life work in our century. He

was destined to a military career, but preferred to become a wandering scholar, hearing the lec¬ tures of many of the renowned teachers of the day. Shortly after the beginning of the cen¬ tury he was at Paris for some time" and occu¬ pied a chair in the cathedral school, the fore¬ runner of the university, where he taught dia¬ lectics with great success. He became the idol of Paris and, as he says himself, had the world at his feet. In the midst of this adulation came the romance which ruined his career. The popular professor was engaged by Canon Ful- bert to give lessons to his niece, Heloise. She was deeply intellectual and became a devoted admirer of her brilliant teacher. She was hand¬ some and before long the teacher was forgotten in the lover. There was a secret wedding after the birth of their son, and Heloise retired to the nunnery of Argenteuil and Abelard gave up his professional career. He was but in minor or¬ ders at the time and now he became a Benedic¬ tine monk in the abbey of Saint Denis. He had a rather stormy career after this, one phase of which is touched upon in the paragraphs with regard to Saint Bernard, but the end of his life was spent in peace at Cluny. He was buried at the Paraclete, the nunnery of which Heloise was the abbess. Their remains are now said to be in the cemetery of Pere la Chaise (Paris), where' their tomb is a place of senti¬ mental pilgrimage. The surprise is to find a romance with all the modern elements working itself out over seven centuries ago.

Heloise was not yet 20 when she met Abe¬ lard, a man of nearly 40, at the summit of his career, and was won by his prestige and his in¬ tellectuality. Later in life she attracted the at¬ tention of Peter the Venerable of Cluny and of Saint Bernard for her intellectual qualities, and the rules which she gave to her nunnery, the Paraclete, became the basis of the constitutions of many monasteries for women. She had great administrative power and her letters are a revelation of a wonderful mother heart, com¬ bined with an intellect of high order and a lit¬ erary quality usually supposed to have developed only much later in history than the 12th cen¬ tury. The fault of her youth was amply ex¬ piated and she came to be looked up to as a great good woman whose advice on important questions was worth having and who was turned to by many of her contemporaries because of their thorough appreciation of her excellent judgment and her unselfish character.

The century had its intellectual life, many of the products of which have survived, mainly in the monasteries. Citeaux, Clairvaux, Cluny, have already been mentioned and the abbey of Saint Victor founded by William of Champeaux, archdeacon of Notre Dame, deserves a place be¬ side these. William after lecturing to crowds of students in Paris, relinquished his chair and retired to a small hermitage dedicated to Saint Victor near the city, where he was followed by a great many of his pupils, Abelard among them, and was persuaded to take up his lectures again. This was the origin of the famous abbey and school of Saint Victor. With the schools of Saint Genevieve and Notre Dame, it afterward formed the basis of the University of Paris. Among its most distinguished scholars were many known only by their Christian names and distinguished by the appellative ((of Saint Vic- tor.» There was Hugh of Saint Victor, termed

the Saint Augustine of his time because of his work in philosophy and theology and the breadth of his scholarship, and Richard of Saint Victor, a Scotchman, called the ((mystic doctor® because of the lofty spirituality of his writings; then Adam of Saint Victor, whether a Breton or a Briton is not known, who wrote hymns which are among the greatest of the time, and this is the supreme period of hymn writing in history. Archbishop Trench de¬ clared Adam of Saint Victor ((the foremost among the sacred Latin poets of the Middle Ages.® Other Saint Victorians were Peter Comestor (d. 1178), the historian, Peter Lom¬ bard (1 100—1 164) , the famous Magister Sen- tentiarum, whose book was the basis of scholas¬ ticism and the subject of so many commen¬ taries; Thomas the abbot of Saint Andrews, to whom Saint Francis sent young Saint Antony of Padua for his theological studies, and many others. Few schools in history have had so many pupils of enduring distinction in a cor¬ responding space of time. The abbey was the centre of the intellectual life of Europe at this time and the Mecca for many distinguished visitors, not a few of whom came to remain for scrtne time. The English were particularly interested in it, and the second abbot, Achard of Saint Victor, was either an Englishman or was related very intimately to the Normans in England at that time.

The hero of the century in the eyes of all his contemporaries and for centuries later was Thomas a Becket, the martyr archbishop of Canterbury (1118-70). A legend makes his mother a princess from the East who met his father on the crusades. Kept in duress by her father

until a Becket's return to England, she escaped surveillance and followed with only his name to guide her. She found her lover to become a Christian wife and the mother of Thomas a Becket, later the archbishop. He was a brilliant student at Merton College, Oxford, and at Paris, and at 22 entered the service of Theobald, archbishop of Canterbury. He became a favorite of Theobald who sent him to study civil and canon law at Bologne and Auxerre. When Henry II succeeded Stephen as king of England, he made Thomas a Becket his chan¬ cellor at the age of 36. The king and his chan¬ cellor were said to have <(but one heart and one mind.® When Archbishop Theobald died in 1161, Henry selected Thomas as his successor. Thomas would have refused the offer saying ((I know your plans for the Church. You will assert claims which I, as archbishop, must needs oppose.® Henry insisted. The inevitable divi¬ sion of opinion foreseen by Thomas occurred, owing to the king's ambition, and the arch¬ bishop refusing to yield had, like many an¬ other archbishop, to go into exile. Reconcilia¬ tion took place and Thomas returned to Eng¬ land but the disagreement as to Church and state rights recurred and the king said impa¬ tiently, before his nobles in Normandy, <(Who will rid me of this troublesome Churchman?® Four knights immediately left the royal pres¬ ence, crossed the channel to Canterbury, and finding the archbishop in his cathedral at ves¬ pers, slew him before the altar. The popular outcry over this bloody deed was intense. The king shocked at the unlooked for effect of his hot words did public penance, and for the rest

of the Middle Ages and until King Henry VIII brought about the separation from Rome, the shrine of Saint Thomas at Canterbury was one of the most famous and one of the most visited in Europe. Many thousands of pilgrims found their way there every year. Chaucer has made the Canterbury pilgrimages live for all the after time though the destruction of the shrine put an end to them four centuries ago.

The 12th century witnessed a climax of the development of the right of sanctuary or the right of asylum as it is also called, which meant so much for the beginning of the reign of law instead of violence. It consisted in the privilege enjoyed by all those who were persecuted and were in danger of violence, whether the perse¬ cution was just or unjust, of flying to a church where they were guaranteed immunity against capture or violence of any sort on the part of their pursuers. This privilege endured so long as they remained on sacred ground. In the meantime the ecclesiastical authorities under whose protection the fugitive had come used their influence to secure justice or at least to calm the passion of the pursuer. What was needed above all was time and this was secured by this means. This right had been exercised

during preceding centuries to very good effect, but a number of incidents during the 12th cen¬ tury shows that it was coming to be recognized by all, even by rulers, and that as a consequence many acts of injustice, some of them irrepara¬ ble, which would have occurred if the fugitive were without refuge, were prevented. This right of sanctuary was without discrimination as to the social condition of the refugees and this fact had much to do with making social barriers less decisive than they had been.

James J. Walsh,

Author of cThe Thirteenth Greatest of Cen¬ turies, ?

Principal Events of the Twelfth Century.

1105. Henry I becomes King of England. Abelard opens a school of rhetoric at Paris. Hiloise becomes his pupil.

1106. Henry V is crowned Roman emperor of Germany.

1114. The marriage of Matilda, daughter of Henry I of England, to Henry V, Roman emperor.

1115. Saint Bernard founds Clairvaux Abbey.

1118. Rise of the Knights Templars. By submission to the king the commons of France gain protection from the nobles. Villanage abolished.

1122. Abelard founds the monastery of the Paraclete of which his wife, H61oise, becomes superior.

1127. The Southern Sung dynasty established in China and exists under nine emperors until 1280.

1130. Creation of the kingdom of Naples and Sicily.

1133. Count Roger of Normandy invades Sicily.

1135. Stephen becomes king of England.

1138. Civil war in England.

1139. Portugal becomes a kingdom.

1141. Papal interdict laid on France.

1142. Death of Abelard.

1146. Saint Bernard preaches the Second Crusade. Roger of Normandy and Sicily invades Greece.

1152. The divorce of Louis VII of France from Eleanor, gives Guienne, Poitou, etc., to Henry II of England, who marries her, and wars ensue. The Troubadours flourish. The Albigensian persecutions begin.

1153. Dealjh of Saint Bernard of Clairvaux.

1154. The Plantagenets assume power in England.

1155. Execution at Rome of Arnold of Brescia.

1156. Roman law and the Catholic religion definitely estab¬ lished in Germany.

1161. Thomas k Becket becomes archbishop of Canterbury.

1162. Milan is destroyed by Barbarossa.

1164. Death of H61oise.

1169. Invasion of Ireland by Henry II of England.

1170. Archbishop a Becket of Canterbury assassinated.

1176. Barbarossa of Germany leads his fifth expedition into

Italy and is defeated by the Lombards at Legnano. The Peace of Constance is concluded. The first Lom¬ bard League is inaugurated.

1180. Philip II reigns over France. Summons John of England as a vassal.

1187. Saladin captures Jerusalem. The Third Crusade is preached.

1189. Circuit of justice introduced in England. Death of Henry II. Richard I of England, Barbarossa, emperor of Germany, and Philip Augustus of France join the Third Crusade.

1190. Defeat and death by drowning of Barbarossa. Siege and capture of Acre by French and English Crusaders. Quarrel between Richard and Philip, and withdrawal of the French from the Crusade.

1191. Saladin repulses all attacks on Jerusalem. Concludes a peace with Richard, giving Christians free access to all the holy places of Jerusalem.

1192. Capture and imprisonment of Richard I — Co6ur de Lion — by Henry IV of Germany.

1194. Release of Richard by ransom.

1195. Several thousands of Europeans sacrificed in the Crusades. Return of the survivors.

1199. Richard I of England dies.

TWELFTH-DAY, Epiphany (the 6th of January), which is the 12th day from Christmas. This was formerly (as it still is) a day of great festivity and the evening of the day was the occasion of observing many curious cus¬ toms. One of the most widespread of these was the

baking of a cake (in England called twelfth-cake) with a bean in it, and dividing the cake among the partakers of the feast. Whoever got the piece with the bean in it was regarded as king for the remainder of the day, in France for the whole of the year. This cus¬ tom is supposed to have been derived from that which prevailed among the Roman children at the end of the Saturnalia, of drawing lots with beans to see who should be king. In Italy it is customary to give presents to children on this day.

TWELFTH NIGHT. Just before Shakes¬ peare began his series of great tragedies he wrote (Twelfth Night* (1600-01) — the last of his great comedies. The play is notable for its blending of romantic beauty and charm in the story of the Duke, Olivia, Viola and Sebastian with a comic underplot in which are involved Maria, Sir Toby, Belch, Sir Andrew Aguecheek, Fabian and Malvolio. For the romantic story the author was indebted to several Italian stories which had been translated into French by Belleforest, and later into English by Barnaby Riche in his (Apolonius and Silla.* The comic scenes and characters are the invention of Shakespeare, although they repeat many of the devices and effects of previous comedies. In fact the comic part of the play is a recapitula¬ tion of characters and incidents that had been successful in other comedies. Sir Toby and Sir Andrew belong to the family of Falstaff and Slender, while the clown is another Touchstone with a certain added maturity. The scenes in which the over-serious and self-centred Mal¬ volio is made ridiculous by the clever devices of Maria are among the triumphs of Shake¬ speare's comic genius. Whether the interpreta¬ tion of Malvolio's Puritanism as given in this play may be considered as Shakespeare's judg¬ ment is still a matter of debate. The conclu¬ sion of the comedy, in which the conflicting forces of love caused by the mistaken identity of Viola and Sebastian are resolved and the complete discomfiture of Malvolio is realized perfectly represents the subtitle of the play — (What You WHIP The play was thus a sort of farewell to a type of dramatic writing in which Shakespeare had already achieved great tri¬ umphs. No comedy is more delightful or more fascinating. Edwin Mims.

TWELVE PATRIARCHS, Testaments of the, a work not recognized as in any sense Scriptural or authoritative, but of interest from the standpoint of ecclesiastical history. It was written in the 2d century after Christ, and pur¬ ported to relate utterances of the fathers of Israel, foretelling the coming of the Saviour and discoursing on the results that would flow from that event. The predictions are modeled on those of Jacob, Gen. xlix, when the patriach blessed his sons and prophesied the future of them and their descendants before giving up

the ghost. See Apocalyptic Literature.

TWELVE TABLES, Law of the, the first

written code of Roman laws, enacted in statu¬ tory form, having been drafted by a commis¬ sion of 10 elected for the purpose and approved by the popular assembly (451 and 450 b.c.). It appears to have been a compilation of the older laws, founded on custom and precedent, but it formulated personal and property rights in such clear language that the patrician magistrates were no longer able to misinterpret and mis¬ apply them with impunity, as in former times, [t was regarded by the people much as Ameri¬ cans regard the national Constitution, and Roman schoolboys learned the Twelve Tables by heart, even as late as the age of Cicero. A great body of rules grew up around the Twelve Tables, and as these called for expert legal interpretation, the study and practice of law gradually developed into a distinct profession. There remain to-day only fragments of this celebrated code. Many attempts at reconstruct¬ ing it have been made, the latest by Voigt in 1883. Modern critics, never happy unless they can upset a tradition or two, contend that the Twelve Tables are a private compilation prob¬ ably of the 3d century b.c. Consult Lambert, Edouard, (Le problem de l'origine des Douze Tables) (Lyons 1902), and Appleton, C., (Le testament romain : la methode du droit compare l'authenticite des Douze Tables) (Paris 1903). See Rome; Decemvirs.

TWENTIETH CENTURY. The opening

year of the latest century was marked somewhat dramatically by the close of the long reign over the British Empire of Victoria of England, queen and empress, who died 22 Jan. 1901 ; by the assassination and death 14 Sept. 1901 of William McKinley, President of the United States, and by the accession of Theodore Roose¬ velt, Vice-President, to the chief executive office. Throughout the civilized world there was prom¬ ise of peace and a growth of the spirit of hu¬ manity and internationalism. War between civil¬ ized nations seemed almost a thing of the past. Many World's Fairs, Universal Expositions, held in the preceding half century had brought the nations together as never before. Trade between nations as a medium for cementing friendship seemed to portend an ever-better understanding among rival peoples. The edu¬ cated classes were drifting into a sense of se¬ curity as regards war. A peace conference was held in Switzerland in the nineties and though it had broken up in disagreement the fact of its assembling seemed a great step forward. At the end of the century (1898) young Tsar Nich¬ olas of Russia invited the nations to send dele¬ gates to a peace conference at The Hague. Most of them

accepted. The conference was held (1899) and established a permanent court

of arbitration. Early in our century over 125 arbitration treaties between nations were ar¬ ranged and statesmen considered the negotiation of such treaties as their highest activity. The second Hague Conference (1907) held at the invitation of the United States occupied itself with the drawing up of rules for humane war¬ fare, — many of which were violated in the Great War. It strengthened the faith in peace and there were confident prophecies of a time soon to come when reason would rule interna¬ tional relations as it did personal relations since the disappearance of the duel.

In spite of the growing feeling that war was soon to be a thing of the past, when the cen¬ tury opened England was at war with the Boers and the United States was at war in the Philip¬ pines. In 1904 the bloodiest war that men had engaged in up to that time occurred between Russia and Japan. Just 50 years before Japan had been invited into the circle of civilization. When the Portsmouth (N. H.) treaty of peace (1905), signed largely through the influence of President Roosevelt, left Japan the victor, the yellow race had become a factor in world poli¬ tics. Despite threatening incidents for seven years there was peace, but then the wars came thick and fast. Italy warred with Turkey over Tripoli (1912), the Powers refusing to permit the bombardment of Constantinople and limit¬ ing the war zone to Africa. The same year the first Balkan War broke out and the civilized world rejoiced when it seemed as though the defeated Turks were at last to be driven back to Constantinople. The dilatory diplomacy of the great nations in its fear of disturbing the balance of power, permitting Turkish atrocities to continue, made the world ready to welcome the removal of the sultan from Europe. The little Balkan nations, Greece, Serbia, Bulgaria, Montenegro, seemed about to accomplish what the <(Great Powers® had balked over. Having disposed of the Turks with unexpected readi¬ ness the Balkan nations quarreled among themselves over the spoils and the second Balkan War, Greece and Serbia and later Rumania ranged against Bulgaria, proved one of the bitterest in the history of humanity. The same year the Mexican troubles, not yet concluded, began, and in the summer of 1914 the Great War broke out. The peace treaty was signed 28 June 1919 at Versailles, but fight¬ ing continued in many parts of Europe, so that no century of human history had so many wars in so short a

time with so many killed and wounded and the end of it is not yet in sight.

The underlying motive of these wars was invariably commercial expansion. The Boer War resulted from English efforts for trade advantages in South Africa. The Russian- Japanese followed Russia's extension of her sphere of influence into Manchuria to obtain an ice-free port on the Pacific, her position in Europe denying her such an outlet for her commerce. In 1860 Vladivostok became a Rus¬ sian port, but as it is closed during the winter Russia turned south toward Korea and the Manchurian coast. The Siberian Railroad was to be carried across Manchuria and its exten¬ sion was made possible by the Japanese-China War (1895). The international convention after the Boxer Rebellion promised to shut out further encroachment on China, but Russia

continued to advance and Japan declared war. Italy's war with Turkey was for Tripoli, the only portion of northern Africa left for the exploitation of European countries. The first Balkan War was almost a holy war in its pur¬ pose to expel the Turk, but the underlying mo¬ tives were territorial expansion and commercial opportunities. The second Balkan War re¬ vealed this very clearly and was waged with supreme selfish disregard for human rights by grasping governments. The Mexican troubles were largely fomented by trade interests and grasping politicians. The Great War was rooted entirely in commercial rivalries and the fear that the growing power of other nations might prevent commerce and manufactures from having a free outlet into distant coun¬ tries. Colonial expansion, the root of so many international difficulties, was almost entirely a matter of securing an outlet for the products of industry and the surplus population of Euro¬ pean countries. The industrial era of the 19th century reached a climax of influence in which it was felt that the disposal of the industrial products of its people was the most important thing for government to secure. Many of the industries for which political striving was so earnest were employing men for such wages and under such conditions of health as made decent living almost impossible for a great many of those employed. The Great War produced internal conditions in all countries in which labor was in a position to claim rights that for a time seriously disturbed all national condi¬ tions. The war began for industrial expansion and commercial advantage redounded almost entirely to the benefit of labor in all the coun¬ tries. What labor as the paramount influence in the lives of nations may do for mankind must depend on the ability of its leaders. With 7,000,000 able-bodied men killed in the war and another 7,000,000 so seriously crippled that they cannot do manual labor, at least

12,000,000 laborers were lacking from the world's labor supply. They were mainly the best labor elements, the able-bodied of military age. Their absence will surely affect the labor situation for some years to come. Everywhere then, as the second decade closes, there is un¬ rest among the laboring classes and a striving for better wages. The outlook for better con¬ ditions for labor is promising unless political disturbances and a lack of community spirit are permitted to interfere.

Besides these wars a series of incidents all commercial in origin, carrying threats of war with them, occurred. In 1905 Germany's jeal¬ ousy of the commercial rights which France had acquired in Morocco and which pointed to French absorption of that country seriously disturbed the world: The conference of Al- geciras (1906) proved a diplomatic defeat for Germany, practically all the nations, including the United States, taking part against her. Ger¬ many's hopes were revealed. The German ac¬ quisition and fortification of Kiau-chau com¬ plicated the Far Eastern question ; the proposed Berlin to Bagdad Railway with its strategic possibilities put another factor into the al¬ ready complex Near East situation, while the rapidly increasing German navy threatened the development of superiority by sea as well as by land. This led to a lining up of the other

countries of Europe for self-defense. Germany's entrance into the Far East brought about (1902) an alliance between Japan and Great Britain, the first between a Western and an Eastern power. Mainly through the influence of King Edward VII (reigned 1901-10) England and France, hereditary enemies, composed long¬ standing difficulties (1904) and the hostility between England and Russia, due to their rivalry in Asia was replaced by an Anglo- Russian Entente. Persia, which had been a bone of contention between them, was divided into spheres of influence and a neutral section. Afghanistan, which had been a critical issue, was placed entirely under British influence and Tibet was to be respected. Great Britain, France and Russia thus made the Triple Entente as opposed to the Triple Alli¬ ance of Germany, Austria and Italy. This rec¬ onciliation of ancient enmities which brought about co-operation between these countries was due more to the influence of King Edward VII of England than any other single factor. After a rather stormy youth and a middle age given over to trivialities it seemed as though the long life of his mother, Queen Victoria, was fortunate in delaying his ascent of the throne and yet the 10 years of King Edward's reign accomplished much to align the world

favorably for the great struggle that was to take place a few years after his death. He proved a diplomatic ruler of high order whose international influence was all for the best. The rapprochement between France and Eng¬ land probably saved Europe from war at the time of the Agadir incident when Germany sent a naval vessel to enforce her demands as to some compensation in Africa for the rights which France was securing in Morocco. The crisis was only delayed a few years.

The spirit of the time seething in so many wars had a beneficial effect in the political arena which will make the century forever famous in the history of democracy. Popular government and responsibility to the elected representatives of the people advanced as never before. The Liberals of England suc¬ ceeded in modifying parliamentary law so that the veto power of the House of Lords on legis¬ lation was eliminated and as a consequence important measures of reform in taxation and franchise were passed. In Portugal King Car¬ los and the Crown Prince were assassinated 1 Feb. 1908 and Manuel II, younger son suc¬ ceeded to the throne but in October 1910, fled before a revolution which set up a republic. The republic maintained itself though the monarchists have not ceased reactionary efforts. To the surprise of all, the Sultan of Turkey in July 1908 after a revolt in the army which threatened to prove serious proclaimed a constitution and elections were held and a new Parliament was opened in December. The Young Turks, representative of the better edu¬ cated Ottomans' came to be the dominant party and liberalization was promised but the results were far from satisfying; cruelties continued and Turkey's entrance into the war against the Allies marked the doom of Turkish power in Europe. Austria took advantage of the disturbance in Turkey to annex Bosnia and Herzegovina placed under Austrian control by the Great Powers after the Russian-Turkish

War. In October 1908 Prince Ferdinand of Bulgaria declared his country independent of Turkey and assumed the title of Tsar.

The most astonishing democratic develop¬ ment was the establishment of a republic in China where late in December 1911 a pro¬ visional republican government with Dr. Sun Yat Sen as President was proclaimed. This was all the more surprising because scarcely 10 years before the Boxer Rebellion (1900) had seemed to stamp China as hopelessly re¬ actionary. The (

In Russia the liberalizing tendencies of the young Tsar, so promising at the beginning of the century, gradually changed and utter au¬ tocracy prevailed. The Russian- Japanese War provided an opportunity for the

liberal ele¬ ments to press political reforms. With the army in the Far East the government had to yield but not until after the awful massacre of Bloody Sunday, January 1905, and harsh at¬ tempts at suppression which were rudely inter¬ rupted by the loss of the battle of Mukden (23 March 1905) and the annihilation of the Russian fleet in the East (27 May 1905). In August 1905 the imperial decree establishing a representative body, the Duma, though with very limited powers was issued. Unrest con¬ tinued and a universal strike led to the grant¬ ing of legislative powers. This body was arbi¬ trarily dissolved the following year and another more complacent elected. This filled out its term as did the third Duma though without accomplishing much; but the fourth Duma was at hand in 1916 to demand the abdication of the Tsar when Russian affairs reached a crisis. The proclamation of a republic in 1917 seemed too good to be true and there are so many warring elements that the Russian people have still their political salvation to work out.

The greatest event of the century, the great¬ est of its kind in the history of humanity is the World War which lasted over four years and three months. On 28 June 1914, Archduke Francis Ferdinand, heir to the Austrian throne, with his wife, was shot to death in Serajevo, the capital of Bosnia. A bomb hurled by a printer aged 20 missed them, injuring others, but shots fired by a student, Princip, aged 19, proved fatal. Official investigation showed that the two assassins belonged to a Ser¬ bian secret society for revolutionary propa¬ ganda in Bosnia. Many Serbian high offi¬ cials, hoping to unite the Serbs everywhere for action, were members of this. The annexa¬ tion of Bosnia by Austria had aroused deep enmity in Serbia. Austria felt that this fo¬ menting of revolution could no longer be per-

mitted. For the next three weeks Austrian diplomacy kept its own counsel, except so far as it was shared by Germany, but the authori¬ ties planned war against Serbia. In 1913 they had proposed aggregation against Serbia but Germany and Italy, as members of the Triple Alliance, refused to join it. The Austrian mili¬ tary purpose was so thoroughly hidden that many important diplomats and government officials of Great Britain, Russia and France, unsuspecting, went on their vacations in late July. July 23d, Austria's ultimatum to Serbia was delivered. War evidently was intended. No independent state could maintain its self- respect and accept the provisions. Behind Ser¬ bia stood Russia, unwilling to permit further Austrian encroachments

in the Balkans. Ger¬ many was the ally of Austria and France of Russia and Great Britain had an understanding with both so that war would involve most of Europe. Serbia, taking counsel with foreign embassies, gave a most diplomatic reply, but could not submit completely. The Austrian Minister to Serbia withdrew at the end of the two days allowed for the reply and Austria declared war on Serbia 28 July. With Aus¬ trian mobilization, Russia mobilized and on this score Germany's Ambassador was instructed to withdraw from Saint Petersburg after hav¬ ing handed over a declaration of war 1 August. August 3d the German Ambassador to France declared a state of war because of aggressions at the frontiers. Germany seemed assured that England would not enter the war. The British Empire had but a few hundred thousand sol¬ diers, the Boer War had been unpopular and had revealed British weakness and the threatened in¬ surrection in Ulster, for which German muni¬ tion plants supplied the arms, seemed to give assurance that England would refuse to enter a Continental war. Her great fleet made her mistress of the seas but it was felt that before this could count materially the war on the Con¬ tinent would be over. When on 4 August it became known that German troops had invaded Belgian territory, Great Britain declared war. The German Chancellor in the Reichstag con¬ fessed that the invasion of Luxemburg and Belgium was <(against the rules of international law® but the necessity of the situation de¬ manded it. He promised ((to atone as soon as our military end is attained.® When the Eng¬ lish Ambassador declared that the invasion of Belgium would mean war the German Chan¬ cellor suggested that ((a scrap of paper® ought not to count for so much. Germany must be held responsible for the war at the bar of history, for though Austria precipitated it a word from Germany would have prevented it and not only was that word withheld but the publication of Austrian diplomatic documents (1919) shows that from early in July Ger¬ many urged such measures against Serbia as could only mean war. The most important witness against Germany is her own Ambassa¬ dor in London during the crisis, Prince Lich- nowsky, who published (1918) his account of the negotiations to prevent the war in which he found the English eager and anxious to avoid a conflict which they foresaw so clearly would prove ruinous for all concerned.

The first great phase of the war was the invasion of France by Germany with the idea

that taken unawares the French would be put out of the war before slowly mobilizing Russia could be dangerous, and then the German armies might be turned to the Eastern front against the Russians. The advance of German troops through Belgium proved not only a

political mistake, costing the sympathy of the world, but also a strategic error. The Ger¬ man armies were delayed in Belgium, affording time for French mobilization, though Belgium fortresses, supposed impregnable, rapidly crum¬ bled before modern long-range high-explosive projectiles. The Germans approached Paris until the Eiffel Tower was in sight, when Von Kluck, commanding the German right wing, wheeled to the left (east) to cut off the French from their communications and precipitate a second Sedan on a far greater scale. On his exposed right wing a fresh army from Paris threw itself impetuously and the French centre under Foch holding, despite fierce attacks of Prussians and Saxons who were forced back, Von Kluck had to retire with immense losses and serious impairment of German morale. The plan of a short decisive war was at an end. The Germans entrenched and the long-drawn- out trench warfare of the next four years began. As Ivan Bloch had declared 15 years before, the spade proved more important than the rifle. This first battle of the Marne, fought along the historic river where for centuries Teutons and Franks had met, is one of the decisive conflicts of history. The ultimate con¬ flict of the war was to be a second battle of the Marne, which also went against the Ger¬ mans. After the first Marne battle the German objective became the Channel ports instead of Paris, and the bitter conflict of the fall and winter was in the mud of Flanders along the Yser around Ypres. The English and Belgians, supported by the French under Foch, heroically held against the massed attacks of the Ger¬ mans though at awful cost in men. The ((con- temptible little® English army multiplied itself by valor. The Belgians, sturdily brave in mis¬ fortune, opened the sluices as their countrymen had so often done before against enemies, and the Germans were kept from the Channel ports.

On the Eastern front corresponding ultimate failure of objective met the Central Powers. The Germans defeated the Russians signally at Tannenberg, taking many prisoners. In August 1914 the Austrians planned an offensive, invaded Russia, but were driven back into their own territory, tried to reorganize there and lost another great battle, which gave the Rus¬ sians possession of Lemberg, capital of Aus¬ trian Galicia. The Russians next invested the strongly fortified city of Przemysl, while the rest of their troops pushed on to the outskirts of Cracow, capital of Austrian Poland. Przemysl fell (March 1915) and the Russians from the heights of the Carpathians looked down on Hungary, which seemed at their mercy. The Germans had to rush men from their Western front to save the situation, and this afforded time for British army organiza¬ tion. Serbia was overrun and suffered in¬ tensely for the rest of the war. The Russians made a masterly retreat,

came back under Brusiloff late in 1916, while the Germans were attempting Verdun and the Austrians were en¬ gaged with the Italians in the Trentino and

seemed in sight of victory. Austria had to hurry picked troops from the Italian front and the Germans had to summon forces even from Verdun to meet the overwhelming attack which carried the Russians to the very gates of Lem¬ berg once more and gave them nearly 500,000 prisoners. Encouraged by Russian success Ru¬ mania entered the war on the side of the Allies 27 Aug. 1916. For a while her armies made progress against the Austrians, and there was hope of Russian co-operation, but the progress of disintegration had already begun in Russia and the supplies of food and oil to be obtained in Rumania tempted the Central Powers to a great drive which completely overwhelmed the Rumanians. The armies of the Central Powers entered Bucharest under Falkenhayn and Mack- enson 6 Dec. 1916, and for the remainder of the war Rumania had to suffer as an occupied country.

In the spring of 1915 an attempt was made to take Constantinople. English troops, strengthened by forces from Australia and New Zealand, who had come by way of the Red Sea, landed at Gallipoli. The expedition was badly managed and in spite of the most heroic bravery made no progress. An attempt to aid the land troops by the British navy was answered by such well-directed fire that im¬ portant naval vessels were sunk. A later British invasion of Mesopotamia seemed at first destined to like failure. Kut-el-Amara was captured by the British, but they were sur¬ rounded and had to surrender after intense suffering. Better organization led to the re¬ capture of Kut, and Bagdad fell (March 1917) and Jerusalem was taken by the English troops (December 1917). One of the significant de¬ velopments in connection with these expedi¬ tions was the self-sacrificing loyalty of the Dominion troops to Great Britain. The Aus¬ tralian-New Zealand auxiliaries (Anzacs) gave an example of bravery at Gallipoli that has never been surpassed. The Canadian troops stamped their names immortally on Flanders fields and proved second to none in the daunt¬ less courage with which they attained objectives set them.

Having refused to take her part in the Triple Alliance with the Central Powers at the beginning of the war, Italy, unable to obtain the cession of Italia Irredenta, unredeemed Italy, that is territory occupied mainly

by people of the Italian race still under Austrian rule, was forced by popular opinion to enter the war on the side of the Allies 23 May 1915. Gradually the Italian armies pushed their way into Austrian territory, greatly lessening Aus¬ tria's power of resistance to Russian invasion, but making slow progress because of Alpine heights as the fighting terrain. The advance continued with some intermission all during 1916 and the greater part of 1917, when a sur¬ prise attack of German-Austrian troops brought the defeat of Caporetto (24 October), due partly to a new mode of attack, but mainly to a defeatist propaganda among the Italian troops. All northern Italy was laid open to the invader and over 250,000 prisoners were taken. The coming of British and French troops steadied the Italians and there was an immense patriotic reaction which strengthened the morale of the Italian troops. After this Italy proved a valu¬ able factor in the war, claiming the attention

of Austrian troops and proving a resource for Greece and the Balkan nations.

The year 1917 was the high tide of war effort and success for the Central Powers, and they felt on the strength of their position at the end of it that the war was surely won. Germany held most of Belgium and northern France, and the most determined and costly at¬ tacks had failed to dislodge her. Serbia over¬ run was held by the Central Powers and most of Rumania was in their possession. From Berlin to Bagdad German influence was su¬ preme. The collapse of Russia enabled them to put their agents in control of large portions of it as the Brest-Litovsk Treaty revealed. The defeat of Italy back to the Piave in the autumn nearly put that country out of the war. There was doubt for a time as to whether Italy could come back effectually, but she did. The hopes of the Allies were at their lowest ebb just as America entered the war and the U-boat sink¬ ing of nearly 1,000,000 tons of shipping a month, unknown then, but now revealed, seemed to portend an enforced unfavorable peace. The situation grew worse in prospect rather than better during the spring of 1918, for German drives made disturbing progress. The appoint¬ ment of General Foch as commander-in-chief of the Allied armies and the increase of Amer¬ icans on the line in France gave renewed hope to the Allies. After Foch's counter-attack, be¬ ginning 18 July, the Central Powers crumbled, no other word can describe the unexpectedness of their collapse, and the armistice was signed 11 November.

The importance of naval power was demon¬ strated completely. The English fleet main¬ tained its supremacy and protected England's commerce, so indispensable for the country. A single month's

interruption of commercial in¬ tercourse would have put England in severe straits ; two months would, it is said, have compelled capitulation. Germany's commerce was completely interrupted, though when sub¬ marine freighters came to the United States our genuine neutrality was shown by readiness to furnish supplies. This form of commercial re¬ lations proved too difficult and Germany's seg¬ regation from the world by sea more than any other single factor brought about German col¬ lapse and the end of the war. A great naval engagement was looked for between the rival fleets, but did not come. A portion of the German fleet met a strong detachment of the British (31 May 1916) but the engagement was hampered by mists and interrupted by darkness. The English lost about twice as many vessels and men as the Germans but their claim that the Germans escaped complete defeat only by retreat in the darkness was confirmed by the absence of any further attempt on the part of the German fleet to risk an engagement. After the armistice was signed the immense German fleet steamed across the North Sea and sur¬ rendered at Scapa Flow, where a few months later it was sunk by its officers in violation of their parole.

In spite of England's command of the sur¬ face of the seas the submarine warfare came very near proving the vital turning point of the war. Only the revelations made by Admiral Sims make it clear how serious were England's affairs from this danger when America entered the war. If the German U-boat campaign had

continued for even a few months to be as dis¬ astrous as it had been, British authorities felt that the end of the war could not be far off. American naval aid proved as important a factor for ultimate victory as military assist¬ ance pn the Continent in the following year. American enterprise and ingenuity solved the problems of U-boat resistance and robbed this German naval arm, the real cause for the forcing of America into the conflict, of its power. Some 2,000,000 American troops were convoyed to Europe with a loss of scarcely a hundred, and communications which ensured the victualing and supply of our armies in Europe and of the English people were main¬ tained in such a way as to prevent any serious interference with work or war.

Early in 1917 the Germans had finished enough submarines to make them confident of being able to put an end to English commerce. They

declared a barred zone around the British Isles (1 Feb. 1917), offering a permit for one United States ship a week to reach Britain. Submarine warfare had already strained the relations with the United States ; the sinking of the Lusitania (7 May 1915); with 1,200 men, women and children, over 100 American citizens, had created bitter feelings; other sinkings of American vessels were explained diplomati¬ cally, but the bitter feelings grew. When un¬ restricted submarine warfare was declared dip¬ lomatic relations were broken off and Count Von Bernstorff, whose connection with disturb¬ ing machinations in this country made him unpopular, was sent home. Sinkings continued, hostile relations with Mexico against the United States were attempted by Germany, and on 6 April Congress approved the President's declaration that the United States had been forced into the war. The United States was totally unprepared, but the first troops, regu¬ lars, reached France in July. It was not, how¬ ever, until the beginning of 1918 that American troops in large numbers were sent to France. In the meantime peace negotiations had been suggested by Germany, and 8 Jan. 1918 Presi¬ dent Wilson issued a program of world peace with 14 points, to be prominent on peace nego¬ tiations. The Quadruple Alliance : Germany, Austria-Hungary, Bulgaria and Turkey nego¬ tiated a peace with the Bolsheviki in control of the Russian government. This Brest-Litovsk peace, so called from the town in Poland where representatives met, showed that the Germans were intent on dismembering Russia for the benefit of the Central Powers. March 21, 1918 the Germans began a great <(peace drive® on the Western front to force the Allies to sue for peace. The British were driven back almost to Amiens, but with the French held firmly. April 9 the Germans attempted to break through the British between Arras and Ypres to reach Calais and the English Channel. The British command to die at their posts, "backs to the wall,® checked this. The third great Ger¬ man thrust came on 27 May and was answered by a counter-attack by the Americans, who took Cantigny. A week later the second and third American divisions stopped the Germans at Chateau Thierry. The German armies pre¬ pared for the fourth great drive, 15 July, and for three days seemed to be breaking through, but were held, and on 18 July Foch began the counter offensive. This was a complete sur¬

prise and proved the beginning of the end. Colonel Sargent in (The Strategy of the West¬ ern Front) tells the reason: "But it was per¬ haps not so much the surprise due to the con¬ cealment of his forces prior to attack that deserves mention, as it was the surprise caused by the rapidity of the blows which he struck and the unexpected places where they fell. Hardly had the Germans been driven from the

Chateau Thierry salient when Rawlinson at¬ tacked from the British front toward Chaulnes and Debeney from the Montdidier front to¬ ward Lassigny and Roye. These attacks were soon followed by Mangin's attack toward Noyon and Byng's toward Bapaume. Then came Horne's great attack from Arras toward Cambria and Douai, followed shortly afterward by Pershing's double attack against the Saint Mihiel salient.® The American capture of the Argonne Forest was one of the great events of history. Many an army in preceding gener¬ ations had tried to take the Argonne Forest bv direct attack when the ground was not so thoroughly fortified as at this time, but no army ever succeeded in taking it until the Americans overran it at the end of September. This broke the spirit of the German armies, for it was recognized that there were millions more Americans to come over and that resistance was hopeless. As a matter of fact, all the preparations had been made to have 5,000,000 of Americans in France during the following year. The British forces in France are in striking numerical contrast. Mrs. Humphrey Ward published (1919) the official chart of the British general staff. The actual fighting strength January 1916 was 470,000. The maxi¬ mum was reached (April 1917) 760,000. The number continued to descend and in May 1918 was 540,000 with but 465,000 on armistice day. At that time America's total forces in France were nearly 2,000,000 and 1,390,000 (General March's figures) were on the firing line. The French figures were not available but the opinion of military authorities is that they had less than 1,000,000 of men in actual com¬ bat on armistice day. The Americans had more than three times as many as the British and perhaps one and one-half times as many as the French. Nothing shows so clearly the factor that America was in ending the war as these figures.

The Peace Treaty saw the application of the principle of self-determination of the na¬ tions which made very important changes in the map of Europe. Finland became independent. Poland, which had disappeared as a country a century before, divided by Prussia, Austria and Russia, was now restored to its former status, Dantzig on the Baltic was made a free city. A new state, Czecho-Slovakia, consisting of the former provinces of the Austrian Empire, Bo¬ hemia and Moravia, was established. Hungary became independent of Austria ; it was thus lim¬ ited to a very small territory around Vienna. The Eastern Slavs formed Jugo-Slavia, con¬ sisting of Serbia, Croatia and Slavonia with Bosnia and Dalmatia. Race characters were made the foundation of boundaries in the Bal¬ kans. Greece acquired territory in Macedonia. Rumania had its territorial boundaries rear* ranged to include people of similar race. Bulgaria was restricted in its frontiers,

and the Ottoman Empire in Europe almost disappeared.

TWENTIETH CENTURY

At the beginning of this century the Irish problem, so thorny for several generations, seemed to approach solution. Land bills passed by Parliament had given the tenantry rights and the Congested District Boards solved hous¬ ing problems. One of the first important appli¬ cations of the elimination of the veto power of the House of Lords was made for a Home Rule bill, which passing the Commons three times and rejected by the Lords was signed by the king, thus becoming a law (September 1914). Because of the war it was suspended. For some time Ulster, the northern part of Ire¬ land, though represented in Parliament by a majority of Home Rule members, had been threatening at least in and around the city of Belfast, to revolt if Home Rule were granted. They bought arms from Germany and openly drilled recruits. When the order was given to mobilize against them a number of the most important officers in the army refused to serve. In spite of this situation Redmond, leader of the Home Rulers, announced that the National¬ ists would support the war. The continued suspension of the Home Rule Law caused grave discontent and in April 1916 an insurrection broke out in Dublin led by the Sinn Fein (Gaelic for <(We ourselves,® pronounced shin fane), and proclaimed an Irish Republic with its own flag. The rebellion was suppressed, the leaders captured and ruthlessly put to death, though clemency to the Boers under similar circumstances had proved the value of a con¬ ciliation policy. The Irish people were ren¬ dered thoroughly disaffected and peace in Ire¬ land has since been maintained by coercion. Though self-determination has come for prac¬ tically all the other peoples of Europe, as the result of the war, it has not come for the Irish in spite of their age-long struggle for it.

A very prominent feature of the history of the century centres around votes for women. Certain of our Western States and New Zealand and Australia granted the suffrage to women in the later 19th century and with the establishment of The Commonwealth of Aus¬ tralia full Parliamentary suffrage was granted to women (1901). Finland (1906), Norway (1907), Sweden (1912), Denmark (1915) en¬ acted woman suffrage. In England the suf¬ frage leaders, tired of Parliamentary methods for securing the vote for women, resorted to violence. From 1905 to 1910 this policy was continued and, as has been the case with regard to manhood suffrage in the first half of the 19th century, proved more effective so that in 1910 a woman suffrage bill passed a

second reading of the House of Commons but was then shelved. Violence continued but without legislative result though the question was being forced upon many minds. With the outbreak of the war the militant suffragists announced suspension of agitation so that the women might devote themselves to the country's needs. They rendered such service to the country in many ways that opposition to woman suffrage largely diminished. The Reform Bill of 1918 granted the ballot to women over 30 years of age with certain real estate conditions. This gives the franchise to some 6,000,000 of women. In the United States the Western States, which granted votes to women, had been well satisfied with the legislation and the suffrage movement

was spreading even before the war. With the magnificent devotion to national purposes ex¬ hibited by the women of the country during the war other States granted the vote and op¬ position to woman suffrage in America notably lessened. Congress passed a bill authorizing an amendment to the Constitution granting the vote to women. This was duly approved by the legislatures of three-fourths of the States, and became part of the Constitution in

1920.

Education suffered severely from the war. Attendance at European universities in the countries at war fell to a small percentage of what it had been before for all healthy young men were at the front. For a time it seemed as though university professors would have little to do but the war called many of them to do special work connected with their department for war purposes. The application of science so as to make war more destructive than ever sadly diminished the prestige of intellectual attainments. Soon another derogatory element exerted its influence. Most of the professors in German universities signed a document di¬ rected to the educated classes of the world, proclaiming that the war was not of Germany's making but was made by her enemies for her humiliation in jealousy of her magnificent progress during the past generation. Germany was waging defensive war for the Fatherland. A manifesto signed by 3,500 German teachers, professors and lecturers proclaimed the belief that the salvation of the culture of Europe de¬ pended upon the victory which Germany was about to achieve. The word culture became equivocal. German education was thrust from the pedestal which it had occupied in the academic world and lost the prestige which it had acquired, particularly here in America, during1 the preceding generation.

This revelation of the inner meaning of what was thought highest in modern education was due to the fact that German universities and

schools were state institutions and faculties felt compelled to support government. The value of academic freedom was realized as never before, though it was pathetic to see that great mental attainments proved insufficient to give that independence of judgment which might be expected of men looked up to as leaders of the intellectual life of Europe. The tendency to set success in life as the principal goal of education was unveiled. The incidents led to a review of the reasons for German prominence in education and its definite elimi¬ nation. At the end of the war Germany had lost not only her position in world affairs but above all her primacy in the academic world.

An even severer blow to the prestige of university teaching was the discovery that aca¬ demic chairs had been made pulpits for the spread of the doctrines which animated the Central Powers during the war and which proved a shock to the rest of the world. The struggle for life had been taken in a very lit¬ eral non-Darwinian sense as the order of thfc universe in securing the survival of the fittest. This was particularly applied to international affairs and charity and justice were supposed to be things apart from national aggrandisement. The three great apostles of these teachings, which had not been taken quite seriously out-

side of Germany but deeply influenced German academic minds, were Nietzsche, Treitschke and Bernhardi. Nietzsche, with some mental dis¬ turbance from early adult life, spent many years before his death in an insane asylum. In a series of books he supplied pan-Germanism with a basic philosophy. A typical expression was, ((Ye say it is the good cause which hal- loweth even war, I say unto you (it is the good war which halloweth every caused War and courage have done more great things than charity.® Instead of the Christian law of char¬ ity Nietzsche proclaimed <(this new command¬ ment which I give you, Oh my brethren, Be ye hard.® Treitschke was a professor of history at the University of Berlin attracting large audiences by the spell of his eloquence. The basic principle of his philosophy of history was that a state is not subject to the moral law. Its only policy is expediency and even its treat¬ ies bind only so long as it is advantageous to keep them. ((A state cannot bind its will for the future as against another state. A state has no superior judge over itself and it will con¬ clude all its treaties with this tacit reservation.® Bernhardi, much read in Germany, was scarcely known in other countries, for his teaching seemed too contradictory of accepted principles to be taken seriously.

It was the culmination of the philosophy of Nietzsche and the philos¬ ophy of history of Treitschke as applied to the 20th century situation. Bernhardi hailed war as the greatest good. Nature wanted the sur¬ vival of the fittest and war brought that about. ((Might is at once the supreme right and the dispute as to what is right is decided by the arbitrament of war. War gives a biologically just decision since its decisions rest on the very nature of things.® The materialistic philosophy of the later 19th century had run itself out to its legitimate conclusions and a great educated people proceeded to apply those conclusions and the world then had to take them seriously.

The literary output of the century was mainly notable for its lack of serious signifi¬ cance. There was never so much reading in the history of humanity and books sold as never before and never so much attendance at plays and never so much money made by novelists and dramatists, but there is more than a serious doubt as to the enduring literary value of any¬ thing written in the century. The war stimu¬ lated some young poets ((whose souls were touched by flame in the trenches® to flights of song higher than for a generation, but even with the stimulus of war nothing has been writ¬ ten that is taken seriously as great poetry and great literature. Reading has become very largely a recreation, attendance at the theatre to a great extent a dissipation of mind and seri¬ ous thoughts are not welcomed. Large collec¬ tions of books are available for all those who wish to make use of them but three out of four of the volumes taken from the libraries are of fiction, just as about the same proportion of the theatres are filled with audiences intent on light musical comedy. Great museums are visited by discouragingly few people, one in 10 or less of the population goes once a year, and popular education seems to have resulted largely in the cult of the trivial.

The 20th century was a period of enterpris¬ ing invention and adventurous discovery. After years of effort the North Pole was reached by Peary 6 April 1909, and only two years later the South Pole was reached by Amundsen 16 Dec. 1911. He preceded Scott with a British expedition by but a few weeks. Wireless teleg¬ raphy became a means of communication even to the antipodes, invaluable for ships at sea, saving many lives; wireless telephony became an actuality. The triumph in invention was the solution of the problem of flying by the Wright Brothers in America. The Great War brought intensive development of aviation so that just after the war (1919) transoceanic flight was not a surprise. Facility of communication pro¬ gressed, annihilating distance. Men developed ever so much greater power to

use physical re¬ sources. There was some question whether the mental side of humanity was not pushed into the background by this. Rodin, the French sculptor, said that the telephone represented man's ear, stretched out to hear a thousand miles; the fast express train was a lengthening of his legs to get over ground as if with <(seven league boots® ; as man's mind remained the same, exaggeration of the body without corre¬ sponding mental development made a monster of him. During the Great War the applications of science added immensely to destruction and to the toll of human lives and suffering de¬ manded by the struggle. Man's material prog¬ ress proved as potent for ill as for good.

The world figure of the first two decades of this century is Theodore Roosevelt, born of an old Dutch family with a Celtic strain of which he was proud. He won back seriously threatened health by years of ranching in the West to be robust and vigorous, and developed into a man of broad views who in every posi¬ tion looked to the general good rather than that of any faction despite what might be the result for his own career. The Spanish-American War brought him into national prominence; elected governor of New York and then Vice-President for McKinley's second term, the as¬ sassin's bullet made him President at a moment when the ((big interests® were in control of our politics. He set himself to oppose them for the benefit of the people, and while the advo¬ cates of special privilege roused opposition to him he became the most popular individual in the United States. Under his leadership the Progressives became a great factor in politics. His activity in bringing about the peace con¬ ference between Russia and Japan and the value of his influence in securing the acceptance of peace conditions made him a world figure. He put aside a third successive term as Presi¬ dent though he might have argued that his first incomplete term did not bring him under the traditional restriction and there seems no doubt that he could have been President again. When the reactionary movement gained the upper hand he brought the defeat of President Taft and came to be looked upon as the most strik¬ ing personality in the country whose opinions were considered as always thoroughly repre¬ sentative of the best interests of the whole people. At the beginning of the war he of¬ fered to organize and lead a division on the Western front. His four sons were prominent in the war. He died suddenly 6 Jan. 1919, re-

gretted by all his fellow-countrymen even by those who had not followed his leadership.

James J. Walsh,

Author of (The Thirteenth Greatest of Cen¬ turies, . >

Principal Events of the Twentieth Century.

1901. 22 January Queen Victoria of the British Empire dies. Edward VII proclaimed king and emperor. President McKinley shot 6 September, died 14 September. Theodore Roosevelt, Vice-President, becomes chief executive of the United States. Pan-American Exposition at Buffalo. Pan-American Congress in the city of Mexico. Hague court of international arbitration instituted. Australia extends the suffrage to women.

1902. Anglo-Japanese alliance to preserve the integrity of China and Korea. The first congress of the republic of Cuba assembles in Havana. Peace treaty signed be¬ tween the Boers and the British. The California Pious fund controversy with Mexico arbitrated by The Hague tribunal. The Samoan dispute decided in favor of Germany by King Oscar of Sweden. Reciprocity treaty established between Newfoundland and the United States.

1903. Panama Canal Treaty rejected by Colombia. State of Panama secedes, proclaims a republic and concludes Isthmian Canal Treaty with the United States. Assassi¬ nation of the king and queen of Serbia. Death of Pope Leo XIII; election of Pope Pius X. Alaskan boundary dispute decided in favor of the United States. Russia disregards Japan's representations over encroachments in Manchuria.

1904. Russo-Japanese War. Anglo-French treaty settles Newfoundland, African and other disputes. British expedition into Tibet, reaches Lhasa. Louisiana Pur¬ chase Exposition at Saint Louis.

1905. Defeat of the Russian army and navy. Treaty of Portsmouth, N. H., ends Russo-Japanese War. Anglo- Japanese treaty of alliance renewed. Parcels post treaty effected between the United States and Great Britain. Norway separates from Sweden. Wright brothers in¬ vent the aeroplane.

1906. Pan-American conference at Rio Janeiro. Earth¬ quake and fire destroys two-thirds of San Francisco. Franco-German embroglio over Morocco settled by the Algeciras conference. First Douma or Parliament opened in Russia in May, dissolved in July. Parliament opened in Persia. End of Dreyfus case in France. Separation of church and state in France. Norway independent elects Haakon VII king. China restricts the opium traffic. War between Central American

republics.

1907. Second Russian Douma or Parliament lasts from March to June. In Finland, under full woman suffrage laws, 19 women are elected to the Diet. New Parliament opens in the Transvaal. Hostile demonstrations against British rule in India. In China, reform movement over¬ throws old educational and military systems. Universal suffrage in Austria strengthens the Socialist party. Women suffragists in England make violent demon¬ strations. The second Hague conference meets. Japa¬ nese laborers excluded by law from the United States except by passport. Interstate Commerce Commission in the United States prosecutes corporations for viola¬ tion of the anti-trust laws. Tercentennial celebration of the settlement of Jamestown, Va.

1908. United States Congress remits $13,000,000 of Chinese Boxer indemnity. United States and Japan agree on Pacific Ocean affairs. United States severs diplomatic relations with Venezuela. King and crown prince of Portugal assassinated. Belgium annexes Kongo. Bul¬ garia declares independence. Sultan of Turkey restores the Constitution. The powers unite to prevent war.

1909. Austria annexes Bosnia and Herzegovina. Peary reaches the North Pole. Hudson-Fulton celebration at New York.

1910. King Edward VII of England dies; George V succeeds. South Africa union is proclaimed. Arizona and New Mexico admitted to statehood. Pan-American con¬ ference meets at Buenos Aires. Aerial navigation makes great progress.

1911. Revolution in Mexico. President Diaz resigns and sails for Europe. Francisco I. Madero elected President. Chinese National Assembly is dissolved. The republic of Portugal is recognized by the leading powers. War between Italy and Turkey in Tripoli. George V, king of England, crowned emperor of India at Delhi. Amundsen reaches the South Pole 16 December.

1912. China, the oldest of monarchies, becomes a republic 12 February. Italy annexes Tripoli 23 February but war continues with Turkey until 18 October and the signing of the Treaty of Ouchy. The Balkan League de¬ clares war on Turkey, 30 September and the first Balkan War begins.

1913. Parcel post system established in the United States. War of the Balkan allies against Turkey ended by the Treaty of London 30 May.

The second Balkan War,

between the Balkan Allies, begins 29 June, and is ended 10 August by the Treaty of Bucharest. President of Salvador assassinated. Ex-President Madero of Mexico assassinated. Woman suffrage introduced in Hungary. The first Parliament of China assembles. The Gettys¬ burg semi-centennial celebration. Dedication of the palace of peace at The Hague.

1914. Direct wireless communication established between Germany and the United States. Treaties of arbitration ratified by the United States Senate with Great Britain, Norway, Sweden, Switzerland, Portugal, Spain, Italy and Japan. Formal opening of the Kiel Canal. Assassi¬ nation of Archduke Francis Ferdinand of Austria and his wife. Declaration of war by Austria against Serbia. The World War begins.

1915-1916. The World War.

1917. 2 April. The United States declares war against the illegal acts of the .German government and joins the Entente Allies to end the conflict.

1918. Germany sues for peace and hostilities cease 11 No¬ vember. See War, European, and related operations.

1919. Theodore Roosevelt dies suddenly 6 January. Franco- American-Anglo treaty of alliance defends France from unprovoked attack by Germany. Peace treaty, signed at Versailles 28 June 1919, reconstructs Europe and provides for a league of nations against war. Trans-Atlantic flights made by aeroplanes and dirigible balloons.

TWENTY THOUSAND LEAGUES UNDER THE SEA. This popular romance by Jules Verne tells an exciting story that makes a powerful appeal to the imagination of most young people and to not a few of their elders. The author launches immediately into his story, gives himself over to it, has confi¬ dence in it and trusts to events rather than to style to attain his purpose. As a result, no critic has ever spoken well of his style, yet all concede his ability to tell a rarely good story. ‘Twenty Thousand Leagues under the Sea,* though written in 1869-70, before the invention of the submarine, remains to-day the most fascinating story of its kind, surpassed only by the truth, which has again shown itself stranger than fiction. Many details of Verne’s sea- monster fit startlingly the modern submarine, and the present-day reader finds in the romance, if much to entertain, little to astonish him. The story is carried on by a well-balanced group of characters,

not the least of whom is Conseil, the faithful servant, who captivates the boy reader as does Friday in (Robinson Crusoe.* Apart from its series of thrilling adventures which render this romance of the sea so good a story, the book is most remarkable as an anticipation of events which actually surpass it in all the elements of romance. In this respect it is, and will remain, an example of the sheer prophetic power of the creative imagination.

Raymond Weeks.

TWICE TOLD TALES, The, was the

earliest published work of Nathaniel Hawthorne with the exception of a juvenile romance, (Fan- shawe.* After his graduation from Bowdoin College in 1825 Hawthorne lived a secluded life at his mother's modest home in Salem, and wrote and rewrote many tales. No publisher would accept a collection of these, but S. C. Goodrich brought out a number of them in his annual, The Token, and a few of them ap¬ peared in other places. It was not until 1837, when a college friend secretly gave the pub¬ lisher a guarantee against loss, that these were collected and issued in book form. The title chosen calls attention to the fact that they had been printed before. An enlarged edition of the 'Twice Told Tales) appeared in 1842. The volume of 1837 was the first work of Hawthorne to bear his name, and it did some-

thing toward introducing him to the public; but it was not until the success of his romances directed attention to these earlier works that their value was fully perceived ; and the author could still refer to himself as (are his fondness for old New England settings, as in the four (Tales of the Province Housed (The Gray Champion) and many more ; his interest in psychological studies, and especially in those which involve the effect of some sin or ambition on the soul, as in ˆWakefield,* (The Minister's Black Veil,* (Lady Eleanor's Mantle,* etc.; his habit of cen¬ tring his tales about a material object, as in the (May-Pole of Merry Mount, > (Endicott and the Red Cross) and others already named; and his use of an elusive but powerful suggestiveness, which varies from a passing hint like the falling of the withered rose-leaves in (The May-Pole of Merry Mount) to the carefully elaborated ending of (The White Old Maid.* The volume also contains a few pieces like (Sights from a Steeple) and (Sunday at Home,* which are

in no sense tales, but which illustrate the author's power of interesting the reader in a quiet ac¬ count of slight and seemingly unimportant details. Even in the tales proper, the plots, judged according to standards developed by later writers, are not especially elaborate or ingenious. The portrayal of character is not always vivid, though the reader is rarely con¬ scious of any notable deficiency in this respect. The author excels in the representation of ordi¬ nary human beings in situations that produce mental or moral stress, in the creation of an effective atmosphere or tone and in so weaving his incidents and foreshadowing their outcome as to produce a perfect impression of unity. Those who wish to make a careful study of one of the tales for the sake of Hawthorne's tech¬ nique can do no better than to choose

William B. Cairns.

TWICHELL, Joseph Hopkins, American Congregational clergyman and author : b. South¬ ington, Conn., 27 May 1838; d. 20 Dec. 1918. He was graduated at Yale in 1859, and served as chaplain during most of the Civil War. In 1865 he accepted a call to the Asylum Hill Con¬ gregational Church, Hartford, Conn. His writ¬ ings include (John Winthrop> (1891) and (Some Old Puritan Love Letters* (1893).

TWICKENHAM, twik'n-am, England, a town or urban district of Middlesex, on the Thames four miles southwest of London. In the 18th century it was a fashionable resort. It is now a residential suburb. Here are Walpole's villa and Orleans House, once the residence of Louis Philippe. Pop. 29,367. Consult Cob-

bett's Memorials of Twickenham* (London

1872).

TWIG-GIRDLER; TWIG-PRUNER. See

Girdler.

TWIGGS, twigz, David Emanuel, Ameri¬ can soldier: b. Richmond County, Ga., 1790; d. Augusta, Ga., 15 Sept. 1862. He was appointed a captain in the Eighth Infantry in March 1812, served in the War of 1812 and in 1814 was promoted major. He also fought in the Semi¬ nole and Black Hawk wars, and in 1836 reached the rank of colonel. During the Mexican War he rendered important services, and was bre-vetted brigadier-general for his conduct at Palo Alto and Resaca de la Palma, where he com¬ manded Taylor's right wing. He commanded a division at Monterey, received the brevet of major-general, was for a little while governor of Monterey and then joined Scott at Vera Cruz.

He commanded the Second division in the advance on the City of Mexico ; at Cerro Gordo he led the attack, and at Contreras and Churubusco and at the city gates he performed efficient service. In 1861, while in command of the Department of Texas, he unresistingly sur¬ rendered to the Confederates the United States property entrusted to his care, and was in con¬ sequence dismissed from the army. Entering the service of the Confederacy, he held a brief command in Louisiana, but toward the end of 1861, on account of infirmities of age, he re¬ signed.

TWIGGS, Levi, American marine officer, brother of David Emmanuel Twiggs : b. Rich¬ mond City, Ga., 1793; d. Chapultepec, Mexico, 13 Sept. 18471 He entered the marine corps as second lieutenant in 1813, and was senior officer of marines on the frigate President during her last cruise under Decatur. At the outbreak of the Mexican War he joined the expedition under General Scott and was killed in the as¬ sault upon Chapultepec.

TWILIGHT, daylight which continues after sunset, called crepuscular light. Twilight is occasioned by the reflection of sunlight from the higher parts of the atmosphere which are still illuminated after the sun has become in¬ visible from ordinary heights. Light is reflected from the upper air till the sun is about 18 de¬ grees below the horizon, but the duration of twilight is manifestly much influenced by the state of the atmosphere as to clouds, etc. In low latitudes, both on account of the quickness with which the sun traverses the 18 degrees below the horizon and because of the transparency of the atmosphere, there is little twilight. On the other hand, in latitudes higher than 43 degrees twi¬ light at certain times of the year lasts from sunset to sunrise.

TWILIGHT SLEEP. This term is used as the equivalent of the German term Dammer schlaf, a fanciful term applied by Kronig and Gauss for the method used by them in the de¬ livery of parturient women at their private hospital for women in Freiburg, Germany. It was claimed by them in 1914 that they had been using it for 15 years with great success and they certainly have been fortunate in spreading abroad the knowledge of it and draw¬ ing patrons from many parts of the world. It consists in the hypodermatic use of a combina¬ tion of scopolamine and morphine in solution

from the beginning of labor pains and ˆcon¬ tinued at sufficient intervals to keep the patient semi-narcotized and in a state of amnesia so that she is oblivious of the fact that she is in labor or that she has labor pains, or even that she has a baby when it is born. The dosage is graded according to the tolerance of the patient and repeated as often as she appears to be com¬ ing out from its influence. Kronig and Gauss assert that it is uniformly or nearly uniformly satisfactory in depriving labor of its suffering, that it has few fatalities, that occasionally, rarely, an infant is apparently narcotized, but that suitable effort will always, or nearly al¬ ways, relieve this. They insist that it is a great boon for women to proceed to labor with the assurance that the much dreaded pain of that ordeal will be eliminated, that the mental effect will prove very stimulating and offer to the woman a much more desirable prognosis than she could have by other methods of treatment at present in vogue.

An account of the method of treatment at the Freiburg institution was published by two laymen (women), who had been there and familiarized themselves with the method, in McClure's Magazine for June 1914. The treat¬ ment requires the constant attendance and watchful care of the physician from the mo¬ ment the first hypodermic of the mixture js given. It is quite possible that it may result in morphine poisoning if given unadvisedly and there is a very real danger that the infant may be still-born. It seems a little strange if the method has all the merits which are claimed for it that it should have been used so long in Germany and not have found favor at the great maternities at Berlin, Munich, Vienna, Prague and elsewhere, but none of these great institu¬ tions seems to have been sufficiently impressed with its importance to take it up and use it as a matter of routine in its obstetric service.

After the appearance of the article above mentioned the method was tried in several hos¬ pitals in New York and Brooklyn and under skilful obstetric management. In the years which have passed since then it has been used in some hundreds of cases with very good suc¬ cess, as reported in various contributions by those who have tried it and advocate it. But it has failed to meet general approval with obstet¬ ricians just as it seems to have failed to excite enthusiasm in Europe.

The combination of these drugs has been used in this country a number of years as a preliminary to general anaesthesia before the performance of a major surgical operation. Its effect in the experience of the writer in such use has been good; it calms the patient's fear, slows the pulse and keeps it slow during the operation, and relieves

the patient of the post- operating tendency to vomiting. Also the patient may sleep uninterruptedly for many hours after the operation, which frequently is a great advantage.

It is not receiving the attention or discussion which it had a year ago, and it seems likely that the slight wave of popularity with which it was ushered in has passed along, like anaesthesia by injection of certain fluids into the spinal canal which a few years ago was used by numerous obstetricians but now has been practically aban¬ doned because of its danger. For many years

obstetricians have made use of ether and chlo¬ roform during labor and it would be hard to imagine anything more effective than one or the other of these in relieving the severe pain of parturition when it is properly given. Its effect passes off more quickly than the scopolamine morphine combination and when chloroform is used it is rarely followed by vomiting or other unpleasantness. There is a mortality to ether and chloroform, and also a certain morbidity, but the percentage is so small it would be unwise to discard such beneficent helps. If it were possible for the use of scopolamine and mor¬ phine to be applied to 100,000 unselected cases and compared with an equal number of cases in which chloroform was used it is probable there would not be a very great difference in the mor¬ tality and morbidity of the two methods. It is quite improbable that there will be any revolu¬ tion in obstetrics from the twilight sleep in¬ fluence and from present appearances it will very soon be one of the curiosities in obstetric practice.

TWILL, a textile fabric, in which the weft threads do not pass over and under the warp- threads in regular succession, as in common plain weaving, but pass over one and under two, over one and under three, or over one and under 8 or 10, according to the kind of twill.

TWIN FALLS, Idaho, city and county-seat of Twin Falls County, on the Oregon Short Line Railway, 35 miles south of Shoshone. Abundant water power is provided by the Shoshone Falls. It has a general manufac¬ turing business and makes candy, harness and vinegar. Pop. (1920) 8,324.

TWIN-LEAF, an herb (Jeffersonia di- phylla) of the barberry family, found in the northeastern United States. It has solitary four- parted white flowers, an inch across, borne on slender scapes, and succeeded by capsular fruits. The radical, long-petioled leaves are peculiar, the cordate blade being divided to the very base, forming two obliquely ovate lobes, entire, or again somewhat lobed, glaucous beneath and

ap¬ pearing to be twin leaflets. The leaves arise in tufts from a thick, horizontal rootstock, which is somewhat fleshy, and is said to be stimulative and antispasmodic. It has been employed as a remedy for chronic rheumatism.

TWISS, Sir Travers, English jurist: b. London, 19 March 1809; d. there, 15 Jan. 1897. He was graduated at Oxford, and afterward from 1842 to 1847 was professor of political economy there. In 1852-55 he occupied the chair of international law at King's College, London, and in 1855-70 was regius professor of civil law at Oxford. In 1862 he was made ad¬ vocate-general of the British Admiralty, and in 1867 was knighted and appointed advocate-gen¬ eral to the queen. In 1872 he retired from public office, but was occupied with various slate affairs, notably with the drafting of a constitution for the Kongo Free State, for the Belgian government, and in 1884-85 was counsel extraordinary to the British embassy at the Congress of Berlin. His published works in¬ clude (1846); (View of the Progress of Political Economy in Europe Since the Six¬ teenth Century> (1847) ; (The Law of Nations) (1861-63); (Monumenta Juridica: The Black

Book of the Admiralty > (1871-76) and bellig¬ erent Rights on the High Seas5 (1884).

TWO GENTLEMEN OF VERONA, The. (The Two Gentlemen of Verona> would seem to be Shakespeare's earliest attempt at romantic comedy of the popular Italian sort. The play is mentioned in Meres's list in 1598, but was not printed before the folio of 1623, and appears to have been little acted either in Shakespeare's time or since. No evidence for a very early date exists except the logical im¬ probability that this comedy could have been written by Shakespeare as late as (A Midsum¬ mer Night's Dreamt (The Merchant of Venice5 and other works which show much higher mastery in the same line. As (Love's Labor's Lost5 is particularly a study in language and (The Comedy of Errors5 in plot construc¬ tion, (The Two Gentlemen of Verona5 is pri¬ marily a study in characterization — crude as yet but interesting in its foreshadowing of what Shakespeare was later to do. We are reminded of (A Midsummer Night's Dream5 in the interlocking fates of the contrasted pairs of lovers; of (The Merchant of Venice5 in Julia's talk to Lucetta of her suitors and in the servant-clowns; of (Twelfth Night5 in Julia's disguise; of (Romeo and Juliet,5 finally, in Valentine's device of the rope-ladder, in the rendezvous of Silvia and Eglamour at Friar

Patrick's cell, and in the passing mention of Friar Laurence (IV, ii, 37). (The Two Gentle¬ men of Verona5 is notably deficient in ability to portray real feeling. The plot proceeds by the help of conventional tricks and artificial dia¬ logue. The representation of the awakening of love in Julia (I, ii) and in Silvia (II, i) is quite insincere, while the indifference with which Proteus's perfidy is treated and the essential weakness of Valentine chill the reader. There are, however, three elements of promise : the breath of deeper sympathy in the play's best scene (IV, ii), where Julia and the Host look on while Proteus woos Silvia ; the fine song, one of Shakespeare's best, in this same scene <(Who is Silvia, What is She?55 and the melan¬ choly Launce with his dog Crab. The story of Valentine was perhaps invented by the drama¬ tist, but the part of the plot which concerns the fickle Proteus and the true-hearted Julia is apparently an adaptation of the tale of Felismena, one of the episodes in Montemayor's long pastoral novel, (Diana Enamorada.5 An English translation of this Spanish work was not printed till 1598, but several versions seem to have been current earlier in manuscript, and the outline of the tale was otherwise available.

Tucker Brooke.

TWO HARBORS, Minn., city, county- seat of Lake County, on the Duluth and Iron Range and the Lake Superior railroads, 28 miles northeast of Duluth. It is a large ore shipping point and also ships lumber and pulp wood. Pop. (1920) 4,546.

TWO KETTLE INDIANS (mistransla¬ tion of Oohenongpa, lit. (

been occupied by the Crow Indians, long before white men came. They were noted for their prowess in war, and have had, with other Siouan tribes, numerous conflicts with the whites. The Tetons are on reservations, as follows: 4,907 Brule, Lower Brule, ((Northern,55 Loafer, under Rosebud agency, South Dakota; 467 Lower Brule under Lower Brule agency, South Dakota; 2,471 Blackfoot Sioux, Minni¬ conjou, Sans Arcs, and Two Kettles under Cheyenne River agency, South Dakota ; 6,608 Oglala under Pine Ridge agency, South Dakota ; about 500 Blackfoot Sioux and 500 Hunkpapa under Standing Rock agency, North Dakota. Total Tetons (est.), 18,098, not including Sitting Bull's refugees in Canada, about 100 in number.

TWO NOBLE KINSMEN, The, a pa¬ thetic drama founded on Chaucer's' (Knighte's Tale,5 and first printed in 1634, with the names of Shakespeare and Fletcher on the titlepage as authors. That Shakespeare wrote any part of it is not now believed, but Massinger

and Row- ley are sometimes suggested as collaborators with Fletcher.

TWO-PHASE SYSTEM. See Electrical Terms.

TWO RIVERS, Wis., city in Manitowoc County, on the Chicago and Northwestern Rail¬ road and on Lake Michigan, seven miles north¬ east of Manitowoc. Its manufactures are office furniture, dentists' and printers' cabinets, gaso¬ line engines, aluminum novelties, woodenware and knit goods. Pop. (1920) 7,305.

TWO SICILIES, Kingdom of the. See

Sicilies, The Two.

TWO-THIRDS RULE, a provision of constitutional and parliamentary law intended to restrain and prevent unjust and inconsiderate action on the part of majorities. It was un¬ known in the legislative assemblies of ancient Greece and Rome, and has no precedent in the Parliamentary history of Great Britain. It may be regarded as American in its origin, and grew out of the jealous vigilance with which the smaller communities included in the Union of States sought to safeguard their political rights. The Constitution of the United States, in con¬ ferring on the Senate the power to try impeach¬ ments, provided that no conviction should be had by less than a two-thirds vote, thus secur¬ ing to a minority of the States as represented in the Senate, the power to decide the result. The effect of the two-thirds provision, in the case of President Andrew Johnson, when tried on articles of impeachment, was to prevent his conviction, the vote being 35 senators for con¬ viction and 19 for acquittal. A change of one vote would have carried conviction, and al¬ though public feeling ran high at the time, some senators who voted against the President ex¬ pressed themselves in subsequent years as gratified with the result. In this case the two- thirds rule had exactly the effect intended by the framers of the Constitution. A similar rule regarding trials of impeachment has been adopted in State constitutions. The Constitu¬ tion of the United States also provides that in the event of a veto by the President of any measure which has passed Congress, an affirma¬ tive vote of two-thirds shall be necessary to enact the measure into law, and such vote must be taken by yeas and nays, and the names of

the persons voting entered on the journal of each house respectively. This rule has also been adopted in the States in which governors

possess the power of veto.

The two-thirds rule is best known through its adoption and political effect in national con¬ ventions of the Democratic party held for the nomination of candidates for President and Vice-President of the United States. It was adopted in the first Democratic National Con¬ vention, held in the city of Baltimore, 21 May 1832, when the Committee on Rules reported the following resolution :

(

The rule applied only to the nomination for Vice-President for the reason that there was no difference of view as to the nomination for President, Andrew Jackson being the unani¬ mous choice for the latter office, while there were several candidates for the Vice-Presi¬ dency. Martin Van Buren was nominated for Vice-President under the two-thirds rule, and was elected to preside over the very body which, by the casting-vote of John C. Calhoun, the former Vice-President, had rejected his nomination as Minister to England.

In the Democratic National Convention of 1836 no reference was made to the two-thirds rule. Martin Van Buren was nominated for President without opposition and Richard M. Johnson received more than a two-thirds vote on the first ballot for Vice-President. In 1840 Van Buren and Johnson were again made the candidates of their party, without any necessity for invoking the two-thirds rule. They were defeated in the election by Harrison and Tyler.

In the Democratic National Convention of 1844 the two-thirds rule was reaffirmed, and made to apply to both President and Vice-President. Van Buren had a majority of votes for the Presidential nomination, but less than two-thirds, and he maintained this majority on the first eight ballots. Opposition to him was strong, however, and on the ninth ballot James K. Polk, of Tennessee, who had not received a vote until the eighth ballot, received the entire vote of the convention. He had not even been a candidate for the nomination, and his name had not been put formally before the convention, when its members agreed, in view of the opposition to Van Buren, to make him their nominee. The supporters of Van Buren had apprehended from the first that the adop¬ tion of the two-thirds rule would involve his defeat, and they opposed it strenuously, the de¬ bate on the question lasting a day and a half. Since its adoption in 1844 it has never been disputed in Democratic National Conventions. The convention of 1848, which spent three days in organizing, followed the rule, and it was again reaffirmed in 1852 when Lewis Cass, the leading candidate,

was defeated, and Franklin Pierce nominated on the 49th ballot. Cass had a majority on many ballots, but did not com¬ mand the necessary two-thirds, while Pierce did not receive a vote until the 40th ballot. In the

convention of 1856 James Buchanan had a majority for President early in the balloting, but did not receive the necessary two-thirds until 17 ballots had been taken.

The Democratic National Convention which met in Charleston, S. C., 23 April 1860, was the most exciting ever held in the history of the party, and the enforcement of the two- thirds rule in that body may be said to have indirectly brought about the Civil War. The convention was in session for 10 days, and took 57 ballots without making a nomination. Stephen A. Douglas had a majority over all on all ballots, but could not obtain the neces¬ sary two-thirds. There were 303 votes in the convention, and 202 were necessary to a choice. The convention adjourned to Baltimore, and there the party divided on the issues which brought about the conflict between North and South in the following year. It is generally agreed that Douglas, if nominated at Charles¬ ton, and supported by the whole strength of his party, would have been elected, and civil war avoided. That this would probably have been the result is indicated by the fact that Abraham Lincoln, the Republican candidate, re¬ ceived a popular vote of 1,866,152, against a popular Democratic vote of 1,375,157 for Doug¬ las and 847,953 for Breckenridge, indicating a large popular majority, and electoral majority also, for the Democratic candidates, had the party been united. In subsequent Democratic conventions the two-thirds rule has been ad¬ hered to, but at various times its repeal has been earnestly urged by many Democratic party leaders and newspapers.

TWO-WIRE SYSTEM. See Electrical

Terms.

TWO YEARS BEFORE THE MAST,

by Richard Henry Dana, Jr., is a truthful narrative that has all the fascination of fiction. When the author was advised to try a sea voyage for his health, which had become im¬ paired during his student days at Harvard, he rejected the conventional pleasure trip to Europe, and shipped as a common sailor on a vessel bound from Boston around Cape Horn to what is now California and Oregon. Gold was not yet discovered, and the cargo chiefly sought was hides. On his return he published, in 1840, the account of his experiences which has

become an American classic. It gives an admirably vivid account of life on a sailing vessel in the days when the old American merchant marine was at its best, and it shows glimpses of the Pacific Coast that are interest¬ ing in view of later historical developments. Young Dana was not only a close observer but a ((good mixer.® His descriptions of ocean storms, of the wild scenery around the Cape, of the coast country, of the details of naviga¬ tion and the stowing of cargo are supplemented by sympathetic and very real portrayals of his shipmates during the long cruise. Though he did not write for the sake of effecting reforms, his recital of unnecessary hardships and abuses to which the crew were subjected attracted public attention, and had a salutary effect. His style is not ambitious, but is apt, direct and admirably suited to his material. It may have been this lack of apparent effort that made publishers slow to accept the work. The manu¬ script is said to have brought the author but a

nominal sum, ‘but the merits of the book were promptly recognized as soon as it was pub¬ lished, both in England and in America. While by no means a “juvenile® it is a narrative of unfailing interest for ‘boys. A later edition, published in 1869, contains an added chapter which gives an account of a later trip to Cali¬ fornia; this is of both comparative and bio¬ graphical interest. Handsomely illustrated editions of the work have been published in recent years.

William B. Cairns.

TWOMBLY, Alexander Stevenson, Amer¬ ican Congregational clergyman and author : b. Boston, 14 March 1832; d. Newton, Mass., 19 Nov. 1907. He was graduated at Yale in 1854 and at the Andover Theological Seminary in 1858. From 1859 to 1872 he held pastorates in Cherry Valley, N. Y., Albany, N. Y., and Stam¬ ford, Conn. He also served as chaplain in the Army of the Potomac. In 1896 he retired from the ministry and devoted himself to literary work. He wrote (The Choir Boy of York Cathedral) (1890) ; (Masterpieces of Michel¬ angelo and Milton > (1896), and (Hawaii and Its People) (1900). He also edited the silver series of (English Classics. *

TYAN-SHAN, te-an’shan, THIAN- SHAN, or CELESTIAL MOUNTAINS, central Asia, a range of mountains running in an easterly direction from the Pamir plateau along the northern boundary of the Tarim Basin (East Turkestan) into southern Mon¬ golia. In the east it forms a

more or less con¬ nected ridge, but toward its western extremity it spreads out, fan-like, into a number of di¬ verging ranges. The highest point, situated near the western end, is Tengri Khan, with an alti¬ tude of little over 24,000 feet. See Himalaya.

TYBEE, ti-be', an island in Chatham County, Ga., at the mouth of the Savannah River. It is about six miles long and three miles wide. The waters surrounding it are on the north Tybee Roads, on the east the At¬ lantic, on the south Tybee Creek and on the west Lazaretto Creek. The Tybee lighthouse is on the northeastern end; it is 144 feet high; the white dioptric light is 150 feet above the water and is visible 18 nautical miles. The lighthouse is in lat. 32° 1′ 20″ N., long. 80° 50′ 31″ W. In the Civil War it was occupied by the United States forces, under command of Brigadier-General Sherman, 28 Nov. 1861 and batteries were subsequently erected on it and the adjacent islands, for the reduction of Fort Pulaski at the mouth of the Savannah River, commanded by Colonel Olmstead of the Con¬ federate army. The bombardment began on the morning of 10 April 1862 from 11 bat¬ teries, between 1,500 and 3,000 yards from the fort, mounting 20 guns and 16 mortars, and the fort capitulated at 2 o'clock the next after¬ noon.

TYCHO BRAHE, ti'ko* bra'e. See Brahe, Tycho.

TYCOON, or TAIKUN, ti-koon', a Chin¬ ese word meaning <(great prince.® The title was formerly conferred by foreigners on the sho¬ gun or commander-in-chief of the Japanese army.

TYLER, Bennet, American clergyman : b. Middlebury, Conn., 10 July 1783; d. South

Windsor, Conn,, 14 May 1858. He was gradu¬ ated at Yale (1804), was pastor of the Con¬ gregational church in South Britain, Conn. (1808-22), president of Dartmouth College (1822-28) and pastor of the Second Congre¬ gational Church, Portland, Me. (1828-33). He became professor of Christian theology in the seminary at East Windham (1833) and re¬ mained there until the day of his death. His (Lectures on Theology > was published after his death by Rev. Dr. Gale, his son-in-law (Boston 1859). Consult Walker, W., (New England Leaders* (New York 1901).

TYLER, Charles Mellen, American edu¬ cator: b. Limington, Me., 8 Jan. 1832; d. 16 May 1918. Graduated, Yale, 1855, later at¬ tended the divinity school there, ordained in the Congregational Church in 1857, served as captain of volunteers during the Civil War. At its close

he became pastor of the South Con¬ gregational Church, Chicago, and in 1873 he was called to the First Congregational Church of Ithaca, N. Y., where he remained till 1892, when he resigned to accept the appointment of Sage professor of history and philosophy of religion and Christian ethics at Cornell Uni¬ versity, becoming professor emeritus in 1903. After 1907 he served as trustee of Cornell Uni¬ versity. He published (Bases of Christian Be- lief) ; (Life of George Wolcott, U. S. V.,* and last chapter of Pfleiderer's (Geschichte der Re¬ ligious Philosophy and various articles in papers and magazines.

TYLER, Daniel, American soldier: b. Brooklyn, Conn., 7 Jan. 1799; d. New York, 30 Nov. 1882. He was graduated from West Point in 1819, served on garrison duty in New England in 1819-24 and was on duty in France in 1828-29 preparing a comprehensive work on (Manoeuvres of Artillery) and securing draw¬ ings and designs afterward used in modeling the United States artillery equipment. In 1834 he resigned from the army and was occupied as a railway constructing engineer and railroad president until the outbreak of the Civil War. He was appointed colonel and later brigadier- general of volunteers in 1861 and was in com¬ mand of a division at Blackburn's Ford and at the first battle of Bull Run. He was mustered out of service 11 Aug. 1861, but was reap¬ pointed brigadier-general of volunteers 13 March 1862 and assigned to the Army of the Mississippi. He participated in the siege of Corinth, April-June 1862, and in June 1863 was in command at Harper's Ferry and Maryland Heights. In April 1864 he resigned his commis¬ sion and subsequently established large cotton and iron industries in Alabama, was president of the Mobile and Montgomery Railroad in 1873-79 and also founded the town of Anniston, Ala.

TYLER, James Gale, American marine

artist: b. Oswego, N. Y., 15 Feb. 1855. He was educated in the public schools of Oswego, N. Y., until 1870; studied for marine artist with A. Cary Smith, naval architect. He is represented in the collections of T. B. Clark, James Gor¬ don Bennett, Catalin Lambert, A. K. Bolan, W. M. K. Alcott and many others. Among his most important pictures are (The Half Moon) ; (The New World) ; fNorman's Woe) ; low¬ ing In the Prize> ; (Under Steerage* ; (Fortunes

of War* ;

TYLER, John, 10th President of the United States : b. Greenway, Charles City County, Va., 29 March 1790; d. Richmond, Va., 18 Jan. 1862. He was the second son of John Tyler, governor of Virginia (1808-11) and United States district judge (1812-13), and Mary Armistead, the only daughter and heiress of Robert Armistead. In early youth Tyler at¬ tended the school kept by Mr. McMurdo, a tyrannical Scotchman. Young Tyler at the age of 11 showed his independence and courage by crushing the autocratic schoolmaster's au¬ thority. In 1802 Tyler entered the grammar school of the College of William and Mary at Williamsburg, where he displayed an especial fondness for ancient history, Shakespeare's poetry and music. In 1807 he was graduated, and two years later was admitted to the bar. He was elected in 1811 to the State legisla¬ ture, where he became a firm supporter of President Madison's war policy. One of his earliest public acts in this session occurred in connection with the United States Bank. The recharter of the bank was then before Con¬ gress and the Virginia assembly, in which State the bank was unpopular, instructed their senators, Richard Brent and William B. Giles, to vote against the recharter. Brent, however, voted in favor of the recharter and Giles voted in the negative, though contrary to his opinion and under protest. Accordingly, on 14 Jan. 1812, Tyler introduced resolutions of censure upon the course of the senators, asserting the Virginia doctrines as to the bank and the right of instruction. On 20 March 1813, Tyler married Letitia, daughter of Robert Christian. Her health was delicate. She died shortly after he became President. In 1844 Tyler married Miss Julia Gardiner. During the War of 1812 Tyler was called into the field at the head of a company of militia in defense of Richmond, then threatened by the British. From 1811 to November 1816 he served in the State legislature, when he was chosen to fill a vacancy in the House of Representatives. Here he became conspicuous as a strict con¬ structionist Republican and States-Right ad¬ vocate. He consistently opposed Calhoun's bill in favor of internal improvements, Clay's proposal for the recognition of the inde¬ pendence of the revolting Spanish-American colonies, a national bankrupt law, increased tariff duties and a bill for changing the per diem allowance of members of Congress to an annual salary of $1,500. He condemned, as arbitrary and insubordinate, the conduct of General Jackson in Florida, and delivered an elaborate speech against the national bank. In the 16th Congress, Tyler opposed the passage of the Missouri Compromise on the ground that Congress had no power to legislate for or against slavery in any Territory. In 1821 he declined re-election and retired to private life; but in 1823 he was again elected to the Vir¬ ginia legislature. From 1825 to 1827 he served as governor of the State, when in the latter year he was elected United States

senator to succeed John Randolph. In the Senate Tyler

maintained an independent attitude although adhering to his strict constructionist principles. He voted against the (

out his administration Tyler was a President without a party and in constant strife with Congress. At the close of his term Texas was annexed, and this seemed to commend him for re-election ; but in August 1844, after having been nominated at an irregular Democratic convention at Baltimore in May, Tyler with¬ drew from the race. From then until the Civil War Tyler held no public office, but when South Carolina adopted its ordinance of seces¬ sion Tyler came forth as an advocate of peace- and was chosen president of the Peace Con¬ vention which met in Washington, 4 Feb. 1861. Seeing the futility in getting Congress to ac¬ cept the Peace Conventions resolutions, Tyler advocated the immediate secession of Virginia. In May 1861 he was elected a member of the provisional Congress of the Confederate States, and the following autumn was elected to the permanent Congress, but died before taking his seat. Consult Tyler, L. G., (The Letters and Times of the Tylers) (3 vols., Richmond 1884), and Wise, H. A., (Seven Decades of the Union5 (Philadelphia 1872) ; Wilson, J. G., Presidents of the United States5 (Vol. II, New York 1914).

R. C. McGrane,

Assistant Professor of History, University of

Cincinnati.

TYLER, John Mason, American biologist: b. Amherst, Mass., 18 May 1851. He was edu¬ cated at Amherst (1873), received his A.M. degree there (1876), was at Union Theological Seminary (1874-76) and at Gottingen and Leipzig (1876-79). He was instructor in biology in Amherst (1879-81), and Stone pro¬ fessor in biology in that college since 1882. Among his publications are (Man in the Light of Evolution) (1908)> and Place of the

Church in Evolution) (1914).

TYLER, Lyon Gardiner, American edu¬ cator: b. Sherwood Forest, Va., August 1853. He is the son of President Tyler, and was graduated at the University of Virginia in 1875. In 1877 he became professor of

belles- lettres at the College of William and Mary. In 1882-S8 he practised law in Richmond, Va., and in 1888 was called to the presidency of the College of William and Mary. He has pub¬ lished (The Letters and Times of the Tylers5 (1884-85) ; Parties and Patronage in the United States5 (1890) ; (The Cradle of the Republic (1900; 2d ed., 1906); (England in America5 (1904) ; (Williamsburg, the Old

Colonial Capital5 (1907) ; (The Cavalier in America5 (1913). He edited (Narrative of Early Virginia, 1606-1625 5 (1907) ; (Men of Mark in Virginia5 (5 vols.) ; (Biographical

Dictionary of Virginia5 (5 vols., 1915).

TYLER, Moses Coit, American historian and scholar : b. Griswold, Conn., 2 Aug. 1835 ; d. Ithaca, N. Y., 28 Dec. 1900. He was gradu¬ ated from Yale in 1857; later studied theology there and at Andover, and was pastor of the First Congregational Church, Poughkeepsie, N. Y., 1860-62. He was professor of English literature in the University of Michigan, 1867-81; literary editor of the Christian Union in 1872-74, and in 1881 was appointed professor of American history in Cornell University, which position he occupied at the time of his death. He was ordained deacon in the Prot¬

estant Episcopal Church in 1881 and priest in 1883. He published (The Brawnville Papers5 (1869) ; (A History of American Literature During the Colonial Period5 (1878) ; (Manual of English Literature5 (1879) ; (Life of Patrick Henryk (1887) ; (Three Men of Letters5

(1894) ; (The Literary History of the American Revolution5 (1896). His (History of American Literature5 is a work of great literary charm and the most thorough scholarship. Consult Burr, G. L. (in (Report5 of the American His¬ torical Association, Vol. I, New York 1901) ; Austen, J. T. (ed.), (Moses Coit Tyler: Selec¬ tions from his Letters and Diaries5 (Garden City, N. Y., 1911); Trent, W. P. (in The Forum, New York, August 1901).

TYLER, Robert Ogden, American soldier: b. Greene County, N. Y., 22 Dec. 1831 ; d. Bos¬ ton, 1 Dec. 1874. He was graduated at West Point in 1853, and until the outbreak of the Civil War served on frontier duty in the West. In April 1861 he accompanied an expedition for the relief of Fort Sumter. In May he was made assistant quartermaster with the rank of captain, and in September was appointed colonel of the Fourth Connecticut Volunteers (after¬ ward First Connecticut Heavy Artillery), with which he served until the spring of 1862 in the

defenses of Washington. He was conspicuously active in the Peninsula campaign of 1862, partic¬ ipating in its principal battles, and in No¬ vember was promoted brigadier-general of vol¬ unteers. At Fredericksburg he commanded the artillery of the centre ground division. In recognition of his bravery in that action he was brevetted major in the regular army. He distinguished himself in the battles of Chancel- lorsville, Gettysburg and Spottsylvania ; and was placed in command of the artillery reserve in the Army of the Potomac in November 1863. During the Spottsylvania action he repulsed an attack of Ewell's corps, and for this (

TYLER, Royall, American jurist and author: b. Boston, Mass., 18 July 1757; d. Brattleboro, Vt., 16 Aug. 1826. In 1776 he was graduated at Harvard. He studied law under John Adams, was aide to General Lincoln for a short time in the Revolutionary War and afterward in Shays' Rebellion of 1786. He en¬ gaged in law practice at Guilford, Vt., in 1790, became judge of the Vermont Supreme Court in 1794 and in 1800-06 **was chief justice. (Reports of Cases in the Supreme Court of Vermont** (2 vols., 1809) constitute his only legal publication, but as a dramatist and a humorous writer he attained a considerable reputation. He was one of the first successful American playwrights, his plays including (The Contrast5 (1786) ; (May-Day5 (1787) ; (The Georgia Spec5 (1797), etc. He was a con¬ tributor of humorous prose and verse to the leading periodicals of his day, and also pub¬ lished

was republished in 1887 by the Dunlap So¬ ciety. Some of Tyler's work appeared in The Farmers Museum and The Portfolio of Joseph Dennie.

TYLER, Wat, English social reformer : b. Colchester, Essex; d. London, 1381. Nothing is known of his antecedents. There was serious cause for the rebellion which he headed, but like men of other ages he had ideas beyond his time, which he had imbibed from the teaching of a priest, John Ball (q.v.). The Insurgents demanded the abolition of serfdom and the poll-tax, a maximum rent of four pence per acre for all lands freed from monas¬ tic or monarchial control, the right to buy and sell free from toll all over England, the aboli¬ tion of the statutes of labor which favored land¬ lords and master-craftsmen at the expense of the workingmen. There seems to have been a general spirit of discontent against all vested interests pervading the lower classes at

the accession of Richard II — city corporations, monastic landholders, chartered corporations of all sorts. The young king paltered with Tyler and made promises which he afterward broke and the rebel leader was stabbed to death by Walworthe, mayor of London. This insurrec¬ tion is an interesting incident in the history of the English people and cannot be treated as cavalierly as it used to be until about the middle of the 19th century when English historians be¬ gan to apply themselves seriously to a study of their country's history as illustrated by original documents. Froissart and Walsingham deal un¬ kindly and unfairly with Tyler, as might be ex¬ pected since he opposed the clerics. Consult Trevelyan, (England in the Age of Wycliffe' (1899) ; Powell, (The Rising in East Anglia in 1381' (1896) ; Reville, (Soulevement des

travailleurs d'Angleterre en 1381' (Paris 1898) ; Hunt, W., and Poole, R. L., (The Political History of England) (Vol. IV, London 1906) ; Oman, C., (The Great Revolt of 1381 J (Ox¬ ford 1906) ; Kriehm, George (in American His¬ torical Review, Vol. VII, New York 1902).

TYLER, Tex., city, county-seat of Smith County, on the International and Great North¬ ern, the Saint Louis Southwestern railroads, also a branch to Lufkin in Angelina County; about 95 miles east by south of Dallas. The city is on the highest point of land between the Gulf of Mexico and the Red River and is in a fertile agricultural region. The chief manu¬ facturing establishments are a box factory, brick works, pottery, canning factory, ice factory, oil mills, mattress and overall factory, ((Cotton Belt® railroad shops, general offices, waterworks, electric-light plant, telephone works. The last census reported 20 industrial establishments, employing 592 persons, with a capital of $686,000 invested, paying $391,000 in services, $449,000 for raw materials and turn¬ ing out products valued at $897,000. The ship¬ ments are chiefly cotton, corn, fruits, vegetables, hay and livestock. There are several churches. The educational institutions are Tyler College, Tyler High School, Hubbard, Marsh and Doug¬ las public schools, two public schools for col¬ ored pupils and East Texas College for colored pupils. The four banks have a combined capital of $600,000, and the average annual amount of business is $50,000,000. The government is of the commission form since 1914. Tyler was

settled in 1846, incorporated the same year and chartered as a city in 1875. Pop. (1920) 12,085.

TYLOPODA, a group of ungulate mam¬ mals, containing the camels and llamas, an ancient group characterized especially by the structure of the feet, in which no traces of the second and fifth toes remain, and

the fused metacarpals and metatarsals diverge somewhat at the distal ends. The tread is formed by sole- pads. Singular peculiarities are the elliptical shape of the blood corpuscles and the charac¬ ter of the rumen-chamber of the stomach. See Camelim:.

TYLOR, ti'lor, Sir Edward Burnett, Eng¬ lish anthropologist : b. Camberwell, London, 2 Oct. 1832; d. 2 Jan. 1917. He was educated at the Friends' School, Tottenham, and in 1856 accompanied the ethnologist Henry Christy on a scientific journey through Mexico, one result of which was his (1861). He was appointed keeper of the Oxford University Museum in 1883 and became professor of anthropology there in 1895. He was knighted in 1912. In 1888 he was Gifford lecturer at Aberdeen and became presi¬ dent of the Anthropological Society in 1891. He has published in addition to the work al¬ ready named Researches Into the Early His¬ tory of Mankind' (1865); Primitive Culture' (1871; 3d ed., 1891); (Anthropology' (1881); (The Natural History Religion' (1900). His works gave a great impetus to anthropological science. Tylor is perhaps best remembered for his statement and development of the proposi¬ tion that animism is an unusual factor in primi¬ tive religion.

TYMPANUM. See Ear.

TYNAN, Katherine. See Hinkson, Kath¬ erine Tynan.

TYNDALE, tin'dal, Hector, American sol¬ dier : b. Philadelphia, 24 March 1821 ; d. there, 19 March 1880. He was engaged in business in his native city during the events just preced¬ ing the Civil War. With John Brown and his raid in Virginia he had no connection ; but on the last visit of Mrs. Brown to her husband Tyndale consented, at the risk of his life, to act as her escort, a duty which, in the face of insult and violence, he unflinchingly performed. At the outbreak of the war he was in Europe, but at once returned and entered the army as major of the 28th Pennsylvania regiment. In April 1862 he was promoted lieutenant-colonel. At Antietam he commanded a brigade, with which he three times repulsed Confederate as¬ saults. Early in the day he was badly wounded, but remained on the field for hours, being finally carried, with a second wound, to the rear. In November 1862 he was made brigadier-general of volunteers for gallantry in that battle. At Wauhatchie by a bayonet charge he captured a hill which was later named Tyndale's Hill. He also took part in a number of battles around Chattanooga. In 1865 he was brevetted major- general. He was a Republican nominee for mayor of Philadelphia in 1868, and was defeated by only 68 votes out of more than 120,000.

TYNDALE, William. See Tindall, Wil¬ liam.

TYNDALL, tin'dal, John, British physi¬ cist: b. Leighlin Bridge, County Carlow, Ireland,

21 Aug. 1820; d. Haslemere, Surrey, 4 Dec. 1893. After secondary schooling he joined the Ord¬ nance Survey, with which he was connected for five years. He was then engaged in railway work, and in 1847 became a teacher of physics at Queenwood College, Hants. After studying in Berlin and becoming acquainted with Fara¬ day, Huxley and other eminent men, he was ap¬ pointed professor of physics in the Royal Insti¬ tution, London, with which he continued to be connected till his retirement in 1887. Tyndall did a vast amount of valuable work by original investigation in various branches of science, especially magnetism, electricity, heat, light and sound, on which he published many papers and several well-known volumes. Among these are (Notes of a Course' of Nine Lectures on Light) (1870) ; (Notes of a Course of Seven Lectures on Electrical Phenomena) (1870) ; Contribu¬ tions to Molecular Physics in the Domain of Radiant Heat) (1872) ; (On the Transmission of Sound by the Atmosphere) (1874) ; (Free Molecules and Radiant Heat* (Philosophical Transactions, > 1882). He made, also, studies of glacial phenomena. In 1872-73 he lectured in the United States, and in 1873 published (Six Lectures on Light, Delivered in America.) He was president of the British Association meet¬ ing .at Belfast in 1874 and delivered an elo¬ quent address, which, by its materialistic tend¬ ency, aroused much controversy. Ke was the recipient of numerous honors from learned bodies at home and abroad, and many of his books were translated. His ability as a speaker fitted him to be a popular expounder of compli¬ cated problems in modern physical science.

TYNE, tin, England, a northern river formed by the junction of the North and South Tyne, rising in Northumberland and Cumber¬ land counties. As a united river it flows by Newcastle and empties into the North Sea at Tynemouth, after a course of 120 miles. It is partly tidal and belongs to the richest coal re¬ gion of England. Its principal tributaries are the Derwent and Team. The chief towns are Corbridge, Ovingham, Newburn, Newcastle, Gateshead, Jarrow, Tynemouth, North and South Shields (qq.v.). It is navigable above Newcastle. Ship-building is important, and the Tyne is celebrated for its boat races. Many manufactures are carried on along its banks. Many

improvements have been made by the building of long piers and the deepening of the channel, giving an impetus to trade. Consult Guthrie, (The River Tyne* (Newcastle 1880), and Palmer, (The Tyne and its Tributaries) (London 1881).

TYNEMOUTH, tln'muth or tin'muth, England, a municipal and Parliamentary bor¬ ough in Northumberland, at the mouth of the Tyne on its north bank about eight miles east of Newcastle. It is a favorite watering-place and a fine promenade, park and winter garden have been laid out along the beach. There are many handsome buildings in the town, including Tynemouth Palace and a picturesque old priory, the Master Mariners' Asylum, aquarium, as¬ sembly-rooms, etc. The borough includes the towns of North Shields, Chirton, Cullercoats and Preston. The clearings at the port amount to 1,500,000 tons annually and there is a large export trade in coal and coke. Pop. 58,800.

Consult Adamson, (Tynemouth Priory and Castle) (in Archaeologia TElina, Vol. XXIII, London 1901).

TYNER, ti'ner, James Noble, American lawyer: b. Brookville, Ind., 17 Jan. 1826; d. Washington, D. C., 5 Dec. 1904. He was ad¬ mitted to the bar of Indiana, but later gave up his practice to enter political life. In 1869 he was elected to Congress from Indiana, and served until 1875, when he was appointed Post¬ master-General. He remained in the Cabinet until 1882. In 1889 he was made assistant At¬ torney-General for the Post Office Department, in which capacity he served until 1893. Four years later he was reappointed to this office, but resigned in 1903.

TYNG, Stephen Higginson, American Protestant Episcopal clergyman: b. Newbury- port, Mass., 1 March 1800; d. Irvington, N. Y., 4 Sept. 1885. He was graduated from Harvard in 1817, was in mercantile pursuits in 1817-19 and in 1819 began the study of theology with Bishop A. V. Griswold (q.v.). He was or¬ dained in 1821, and was minister of Saint George's, Georgetown, D. C., in 1821-23 and of Queen Anne's parish, Prince George County, Md., in 1823-29. From 1829 to 1833 he was rec¬ tor of Saint Paul's, Philadelphia, from 1833 to 1845 of the church of the Epiphany there. He held the rectorship of Saint George's, New York, from 1845 until his retirement as pastor emeritus in 1878. He was well known for his eloquence in the pulpit and on the platform. His theology was strongly evangelical, and he was a prominent opponent of ritualism in his Church. He also advocated total abstinence, and was otherwise identified with reform interests. Besides editing successively The Episcopal Re¬ corder, The

Theological Repository and The Protestant Churchman, he published several vol¬ umes, including collections of sermons and ad¬ dresses and (Recollections of England* (1847) ; (Forty Years' Experience in Sunday Schools) (1860) ; (1874). Consult the (Life* by his son, C. R. Tyng (New York

1890).

TYPE. See Printing.

TYPE-CASTING MACHINES. Every book, news and job-printing office in former years has been absolutely dependent on the type¬ founder, with his elaborate plant and his estab¬ lished fonts of type in standard and individual copyrighted faces. The waste and wear was large and costly. Office economics compelled the use of fonts even after the faces of many of the types had become too battered for clean printing. To replace the broken and battered type it was necessary to send to the foundry for <(sorts** (as the individual types are called) to fill out the fonts, and this was not only ex¬ pensive but unsatisfactory, because it resulted in mixing new type with the old. The inven¬ tion of the Mergenthaler Linotype machine enabled the printing offices to present absolutely clear-faced, freshly-cast body type for news¬ papers, books, pamphlets and the like. To a degree, also, headline type for newspapers could be economically set up and a considerable propor¬ tion of the advertising display. But there still remained a demand for movable type for hand

use. To effect the economy demanded, a small, compact machine, a sorts caster, to cast in¬ dividual type of any face and size at the pleas¬ ure and convenience of each office, was de¬ vised and several different makes are now in successful operation in many newspaper, book and job-printing offices, one being the inven¬ tion of J. S. Thompson, another of Hanrahan, Brown and Boydon.

The sorts caster occupies but little space — • four and one-half feet high by three and one- half feet long by three feet wide. It is op¬ erated by belt and pulley and requires one- fourth horse power. Carrying to the full the newly-adopted standardization of type, one size of the machine will cast with accuracy type from 6-point up to and including 36-point, and a larger size type from 36-point to 72-

point.

A very solid cast-iron frame supports the strongly made component parts — an adjustable steel mold to which is fastened the brass matrix of the desired letter; a gas-heated pot of molten type metal ; a plunger rod to force accurately the exact amount of molten metal into the mold as the latter is automatically thrust forward into place, and a planer to trim the base of the type and eject it, perfect and complete, along on the delivery rod when mold and melting pot separate.

The base of the mold is stationary and per¬

manently secured to the machine and forms with the ejector rod two sides of the mold. These are so arranged as to receive interchange¬ able insert mold parts to complete the exact

parallelogram required by the particular face and size of the type to be cast. This insert mold part carries the brass matrix in which is cut the face of the type. Each matrix speci¬ fies the exact adjustment of blanks which the operator must make to procure the correct width or set-wise size of the character to be cast. There is an insert mold part for each body- wise size.

A 50-pound font of 12-point type can be cast in nine hours and a font of 18-point in seven. Fonts of matrices are sold outright; dis¬ tinctive designs may be cut for individual printers, or fonts may be hired as books are from a circulating library.

TYPE-COMPOSING MACHINES. See

Composing Machines.

TYPE METAL. See Type and Type- Founding.

TYPE-SETTING MACHINES. See Com¬ posing Machines.

TYPE AND TYPE-FOUNDING. A type

for printing is a letter or character in reverse, which is inked and impressed on paper to print. Type are ordinarily made of a composition of lead, tin and antimony, lead predominating. A common formula is : lead 10, antimony 4 and tin 2. The addition of antimony serves to harden the type and tin toughens it, while the proportion of the three is designed to obviate shrinkage in casting. Very large type are cut out of hard wood, with a pantagraph machine. Type are now made to a uniform height, which is a little under an

inch, and are cast so ex¬ actly that thousands of them are combined in lines, pages and forms and wedged together solidly in a chase or frame and placed on the bed of a press for printing. Early printers had to cast their own type by throwing the hot molten metal into hand moulds. Hand casting was abandoned about 1845 and the Bruce type¬ casting machines were generally adopted in American type-foundries. These cast the type with a jet or sprue that had to be broken off, after which the type was smoothed by rubbing on a stone to remove the bur or rough edges. About 1890 automatic Barth type-casting ma¬ chines came into use, delivering a completed type, and these have displaced the hand-ma¬ chines. The standard machines are used to cast body type, as from 5- to 12-point. (See Printing for description of type sizes). There are also machines that cast job or display type and one of these also sets the type. See Com¬ posing Machines.

Type-founding begins with designing the let¬ ters, which are drawn to a very large scale. Permanent dies are made from these draw¬ ings and these dies are used to guide the cut¬ ters of a punch-cutting machine, which form characters or letters in steel that is afterward hardened. These punches look like type but have usually a long shank. They are used to drive into softer metal to form a matrix, which matrix is later to form one erd of a mold in which the type is cast. A mold of a given size may be used to cast any type of that size, if the appropriate matrix of the desired letter is introduced. The form of a matrix is that of a letter or printed character, but the type itself is a reverse form. The type proper is made rectangular and is nicked on the front

or lower side to assist the compositor in placing it in correct position. The position of the nick or number of nicks also serves to distinguish the type of different fonts of the same size. There is usually a groove across the foot to take out any irregularity in breaking off from the sprue ; also a pin-mark on one side. The top or printing surface of the type is called the “face® and the beveled side of this face is the “beard,® the beveling permitting easy with¬ drawal from the matrix. When a type-face is in high relief it is said to have a deep “counter.® The horizontal hair-lines, which are conspicuous on the H, F, M, etc., are termed “serifs.® A part that hangs over the body, as in some f’s and j’s, is a “kern.® Blank types, below type high, are called “quadrats® or “quads,® but when less than an n in width are termed “spaces.® The “body® of a type is the size of the shank and the

standard sizes are measured by “points.® (See Printing). A point is one- seventy-second of an inch, and 12-point and “pica® are now identical. The point and the pica are the units of measurement, together with the m. This m is spelled “em® and is assumed to be square in body, as wide as it is high. One thousand ems is the unit by which type composition is paid. The price of type com¬ position has varied all the way between 25 cents and $1 per thousand ems.

Type are made in an infinity of styles or faces, the most common of which are shown below :

This line is set in Roman.

This line is set in Roman italic.

This line is set in Old Style.

This line is set in Gothic.

This line Is set In Gothic condensed.

This line is set in Antique.

TLiis line is set in Antique expanded.

This line is set in Bold Face .

©Iftfl liur ia art fit Gfcxt

This line is set in De Vinne.

Type that is broad for its height is termed “fat® and when narrow for its height is “lean.® A font or “fount® of type is a complete assort¬ ment of one kind. As more e’s are used than any other letter, these are the most numerous in a font, being followed by t, a, o, i, n, etc. An ordinary font contains capitals, lower case, figures, points, spaces and quads and some signs or reference marks, as $, &, *. It may also con¬ tain italic, small caps, fraction-marks, ac¬ cented letters, logotypes, etc. The printer’s case is usually made as a pair, the lower case let¬ ters, figures, points and spaces being in the lower case of the pair and the capitals and small capitals and signs, etc., in the upper case. Hence capitals are sometimes called “upper

CclS6 ˆ

The first English type-founder of ability was John Day (1522-84), who made type only for his own printing office. Benjamin Sympson (1597),

of London, was the first English founder to make type for the printing trade. He was followed by John Grismand. Thomas Wright, Arthur Nichols and Alexander Fifield. Joseph Moxon was the most distinguished of the early English founders, and flourished from 1G59 to 1683. He published the first book which describes type-founding, (Mechanick

Exercises) (1683), a reprint of which may be found in many large libraries. William Caslon (1692-1766), of London, was the most con¬ spicuous founder of the 18th century and laid the designs of some of the best modern faces. After him came John Baskerville, Alex¬ ander Wilson, Thomas Cottrell, Joseph Fry, Joseph Jackson, Robert and William Martin, Vincent Figgins, William Miller, Anthony Bessemer, all of Great Britain. In the United States, Abel Buell, of Connecticut, is men¬ tioned by De Vinne as being probably the first founder, in 1769. The early founders were also stereotypers. It was in 1772 that Christopher Sauer (or Sower) established a type-foundry at Germantown. Benjamin Franklin established his Philadelphia printing office with type bought of P. S. Fournier, the French founder who is credited with originating the point system. Later Franklin cast his own type in a small way. John Baine, of Glasgow, came to Phila¬ delphia, in 1875, and started a foundry. Adam G. Moppa established the first foundry in New York about 1791, but later went to work for Binny and Ronaldson, who began type¬ founding in Philadelphia in 1796. In 1833 this was taken over by Johnson and Smith and finally became the well-known house of MatKellar, Smith and Jordan. White and Wing started in Hartford in 1804, but discon¬ tinued. White going to New York in 1810. In 1854 White and Company sold out to Farmer, Little and Company. Robert Lothian made type in a small way in New York early in the 19th century. James Conner established himself originally as a stereotyper in New York in 1827 and later took up type-founding. William Hagar's foundry was started in New York in 1840. David Bruce (1770-1857), followed by George Bruce and David Bruce, Jr., conducted a type-foundry in New York from 1806 until 1890. David Bruce, Sr., invented the "patent block® for stereotypes and David Bruce, Jr., the first real type-casting machine. James Lind¬ say and Peter C. Cortelyou were associated with the Bruces. Samuel N. Dickinson and Michael Dalton were the most conspicuous Boston founders in the last century. The Cin¬ cinnati type-foundry was established in 1817, the Saint Louis foundry in 1840. Faulkner and Son established a foundry in San Francisco in 1866 and Painter and Son in 1868. Collins and McLeester began in Philadelphia in 1853, Barn¬ hart Brothers and Spindler were established in Chicago in 1878 and later in Saint Louis, Omaha, Kansas City and Saint Paul. Marder,

Luse and Company started in Chicago in 1855 and later they had a foundry in San Francisco. Shraubstadter and Saint John started the Cen¬ tral Type Foundry in Saint Louis in 1875; the Cleveland foundry was established in 1879. The multiplication of type-foundries in the United States entailed great duplication of costs in producing new type faces. These and other conditions induced the formation in 1S92 of the American Type Founders Company, which took over 23 of the leading firms and corpora¬ tions in type-founding in America. This has been commonly referred to as the Type Trust, but it never monopolized the business and inde¬ pendent foundries have 'been maintained in most large cities. Early in the 20th century the widespread use of the linotype machine took away from the type-foundries a large part

of the trade that would otherwise have existed in individual type. Then the monotype and sev¬ eral type-casting machines came into use in large printeries, which now cast a great deal of their own type. The business of the type- foundries, thus reduced, has changed and they now handle a great variety of printers' sup¬ plies and small mechanism. Consult Pasko, dictionary of American Printing) (1892) ; De Vin'ne, (Plain Printing Types5 (1900).

Charles H. Cochrane, Former Secretary, Typothetce of New York.

TYPEE. (Typee: a Peep at Polynesian Life,5 which Herman Melville published in 1846, was the earliest notable romance dealing with the South Seas, a region abundantly exploited by romancers since. Melville had visited the Marquesas in the summer of 1842 as a sailor before the mast on the whaling-ship Acushnet, had escaped with a companion to the island of Nukuheva [Nukahiva], and had strayed into the cannibal valley of Typee [Taipi], where the savages held him for four months in an "in- dulgent captivity.55 Although he kept no jour¬ nal and wrote nothing down for three years, he followed his memories closely; but of few writers is it more difficult to say than of Mel¬ ville at what point fact shades into fiction. Merely as history (Typee5 has real value, with its sympathetic yet sharp-eyed observation of Marquesan customs and its rich descriptions. It is, however, as fiction that the book has been primarily influential and generally read, as a romance of the life led by a sophisticated man among perilous, lovely, barbaric surround¬ ings. The valley of Taipi becomes, in Mel¬ ville's handling, a region of dreams and languor

which stir the senses with the fragrance and color of the landscape and the gay beauty of the brown cannibal girls, especially of Faya¬ way, the dainty, memorable heroine. Yet Melville, though thoroughly sensitive to the felicities of the exotic life, never loses himself in it entirely, as did later men like Lafcadio Hearn and Pierre Loti, but remains always the shrewd and smiling Yankee. (He later con¬ tinued the narrative in a sequel, (Omoo,5 q.v.).

Carl Van Doren.

TYPEWRITER, a machine operated by means of a manual keyboard, which produces characters resembling those of ordinary letter press, as a substitute for handwriting, by the impress of type.

History. — The first successful typewriter was an American invention, and was so far perfected in the late seventies of the 19th cen¬ tury that many thousands were then being made to supply the demand. The archives of the British Patent Office show that in 1714 a patent for a writing machine — the first type¬ writer known — was applied for by Henry Mill, a London engineer. No drawing of his machine is extant, and its construction is not known. In 1784 a French invention appeared, designed to make embossed or raised char¬ acters for the blind. In 1829, W. A. Burt patented the first American machine. A French machine of 1833 was provided with the first manual keyboard. In 1843, Charles Thur- ber, then of Worcester, Mass., secured a patent for a typewriter, and two years later a second patent, but his machines were never perfected Jfor practical use. About this period Sir

Charles Wheatstone invented several writing machines, the models of which repose in the South Kensington Museum. The year 1855 saw the production of Foucault's writing machine for the blind. Indeed most of the efforts of early inventors were directed to producing machines for the use of the blind, and embossed characters were general.

In 1856, Alfred E. Beach, of New York, one of the proprietors of the Scientific American, secured a patent for a typewriter which em¬ bodied the characteristic basket-like disposition of type-bars and type used on the standard machines of to-day. The Beach machine was for printing embossed letters for the blind. Contemporaneous with this inventor. Dr. S. W. Francis, of New York, was working on the same line. He arranged his keys in a circle around the instrument, used an inking ribbon, a traveling paper-frame and an alarm-bell, rung as the end of the line was approached, thus embodying many features of present-day instruments. Thomas Hall, of New York (inventor of the

Florence sewing- machine), also was experimenting on a type¬ writer about this time. In 1859 he learned of the prior patents and tried to purchase them. In June 1867 he obtained a patent of his own; and one of his machines, printing large and small letters, was shown at the Paris Exposi¬ tion of 1867. The paper was placed on a table, which slid under the bottom of the machine. The spacing for letters varied with their thickness, thus producing work more resembling that of type than does the iden¬ tically spaced typewriting of recent machines. Hall struggled against much discouragement, and never succeeded in bringing his machine into use. In 1881 he secured a patent on another type of machine, with a perforated dial-plate and rubber cylinder. It achieved a partial success, but of late years it has been turned out in cheap form as a toy. John Pratt, of Center, Ala., secured a United States patent in 1868 for what he called his Pterotype — a complicated machine which did not come into public use. This brings us to the recent history of the typewriter in which it was brought to the high degree of efficiency we witness to-day. Charles Latham Sholes, of Milwaukee, Wis., with Samuel W. Soule and Carlos Glidden, became associated: the first two were trying to construct a numbering machine and Glidden suggested developing the idea into a typewriter. After months of work Sholes left the others, and with James Dens- more, of Meadville, Pa., as financial backer, pushed the invention to completion, and secured a patent in June 1868. In 1873 it was put on the market as the Sholes and Glidden typewriter. E. Remington and Sons, of Ilion, N. Y., became the manufacturers of the ma¬ chine and, in 1874, 400 were sold. These early machines printed only one kind of letter so that the writing was in capitals only. The in¬ troduction of small letters occurred in 1877 and many minor improvements were added from time to time. As this machine, the first which proved a commercial success, embodies most of the fundamental elements of present- day machines, an enumeration of these will not be amiss. The Remington, as it is now known, is characterized by the “shift,55 by which the

same keys print large or small letters as de¬ sired. The radial type-bars, forming when at rest a sort of basket, form another common feature. On the top of the frame is a roller covered with India-rubber; and by its side and parallel, a smaller roller. Between these the top edge of a sheet of paper is inserted, and brought into proper position to receive the first line of “writing.® Immediatelv in front of the rubber cylinder (in the “visible writers®), beneath (in the “invisible

writers0), and in line with its axis, is the ink-ribbon ; and in front of the ribbon at a point in the centre every letter is made to appear in suc¬ cession to do the writing. The ink-ribbon is automatically raised in tront of the type-bar when a key is depressed, and falls back to its original position as the bar recedes, this per¬ mitting the typist to see the impression on the paper. During operation the ribbon is gradu¬ ally unwound from a spool or holder at one side of the machine on to another at the op¬ posite side; the movement of the ribbon may be reversed at will. The carriage with the platen moves along one space to the left as each key is released. This movement and stoppage is regulated by a coiled spring and strap, and a ratchet escapement. For tabulation special column stops are set at the desired dis¬ tance and upon depressing the tabular key the carriage advances to the left until the next column stop is reached. The types are usually of steel or some hard alloy and are fixed in the ends of a series of levers, each lever hav¬ ing its fulcrum at a point in the circumference of the central opening. The key for forming the spaces between the words extends nearly the whole length of the keyboard, so that it can be readily worked, no matter in what position the hands may be at the close of every word. The depression of each key causes the letter with which it is connected to strike the ink-ribbon, thereby transferring the form of the letter to the paper. On removal of the pressure, the type descends by its own gravity.

The Caligraph, invented and developed by George W. N. Yost, uses no shift, but has a separate key for each character. In February 1880 a patent for a typewriter was granted James B. Hammond, of New York. The type¬ faces were carried on the periphery of sec¬ tors of circles. These were slipped on a verti¬ cal pin and rotated around -it. Three such sectors gave three sets of types, thrown into action by two “shifts.® Instead of striking the type against the ribbon and paper, a hammer gave the paper a blow from the back against the ribbon and type-face. The force of the blow came from a spring, so that an even force was always secured. Other classes of machines have no ribbon, but use an inking pad. Of these the Yost was the most success¬ ful. In 1889 arrived the Smith-Premier ma¬ chine — a double keyboard type-bar machine. It made use of a tri-colored ink-ribbon. The Blickensderfer machine of the type-wheel class entered the field in 1892 and attained great popularity. After a period its backers put out an electric machine which rendered opera¬ tion very easy. From 1890 to 1905 over 100 new machines were brought out, but few had any distinguishing merit and after a brief

career the market was left to the older and standard machines. An exception to this was the Underwood machine of the type-bar class, a

“visible® writer from the start. This ma¬ chine is a great favorite with typists because of the ease of manipulation and the high quality of the work. The L. C. Smith machine also proved of enduring quality. Ball-bearings were used to secure smoothness and ease in running. Other more or less successful ma¬ chines are the Oliver, Royal and Monarch. The Oliver can scarcely be called a “visible writer® since only one-third of the line of writing can be seen. This machine has a “double shift® system for which the advantage is claimed that a smaller and simpler key¬ board is rendered possible thereby.

Within recent years writing-machines have been developed for writing on flat cardboards, on a book such as a ledger, to make out bills, tabulate, discount and add several columns of figures. The Elliott-Fisher, the earliest and one of the best of these machines, has a flat platen, about which the machine proper may be moved up or down, right or left, etc. Bookkeeping and adding typewriters have also been put on the market by the makers of standard writing- machines such as the Remington and Under¬ wood companies. They have done much to remove the drudgery from bookkeeping and accounting.

The typewriter became a favorite soon after its introduction in the seventies. It is now regarded as an essential part of all office equipment and even in the home it is coming into general use. Portable machines of ex¬ cellent quality have made it available for travelers, army officers in the field, etc. Maga¬ zines and other periodicals are practically a unit in demanding typewritten “copy® from their correspondents and contributors, be¬ cause of its greater legibility. As regards speed, a rate of 60 words a minute is good ordinary work and is about three times faster than a good penman, a rate of 80-90 words is fast average, while 100 words or over per minute is considered very fast. The record in competition is 143 words per minute. A recent invention is a typewriter with telegraphic at¬ tachment, which makes it possible for an operator to type a message, for instance, in Montreal, and a receiving machine in New ¥ork prints the message on a paper after the manner of the ordinary machine. The Patent Office reported on 9 Oct. 1919 that it had issued approximately 7,006 patents covering typewrit¬ ing machines.

Statistics. — -Too frequently official statistics include the incidentals under “Typewriters and Supplies.® Below are the latest available figures :

Year

Establishments

Typewriters and supplies value

1914 .

107

$30,988,000

26,309,000

16,642,000

8,400,000

1,422,000

1909 .

89

1904 .

66

1899 .

47

1889 .

30

These establishments or factories were located in the States as follows: Connecticut,

7; New Jersey, 8; New York, 61; other States, 31. In the year 1914 typewriter machines were being produced in 50 establishments with an invested capital of $27,635,000, with an output valued at $19,851,000 and giving em¬ ployment to 12,654 wage-earners. The fol¬ lowing are the export values of typewriters in recent years: 1908, $6,495,756; 1909, $6,899,-

069; 1910, $8,239,510; 1911, $9,778,498; 1912,

$11,423,691; 1913, $11,532,364; 1914, $10,575,- 573; 1915, $5,315,134; 1916, $9,104,189; 1917,

$11,162,423; 1918 $7,480,714. The sudden fall in exports after 1914 is, of course, a reflection of the war cutting off Europe from the Ameri¬ can product as well as shortage of ships and contracted credits in neutral countries.

TYPHA, the cat-tails or bulrushes, a genus of perennials growing in swamps, the somewhat sword-shaped bases of the leaves often sub¬ merged. The leaves of T. latifolia are radical, long and linear ; the flowers are monoecious in a cylindrical spike, terminating a tall stem and subtended by fugacious bracts. The perianth consists of 'bristles, with stamens or ovary ac¬ cording to sex ; the staminate flowers are at the apex of the stem and after pollinating gradually disappear, leaving the lower fertile ones to mature their fruits. When ripe, these fruits form decorative cylindrical masses, of a handsome seal-brown color, at the level of, or a little higher than, the tops of the leaves. Dur¬ ing the winter these spikes disintegrate and the nul-like fruits float away, supported by the white hairs expanding at their bases. The smaller species (T . angustifolia) has spikes in which the staminate and pistillate portions are slightly separated. Both are widely distributed. As is the case also with the western American species, the abundant mealy pollen of T. ele- phantina, or elephant-grass, serves for bread in India and New Zealand and also as a substitute for matches and tinder, since it is very inflam¬ mable. The plant is a favorite food of elephants. Typ-ha rhizomes abound in starch and when rid of their acridity become a food of various peo¬ ples ; they have also been employed as an astrin¬ gent and diuretic drug, and the down of the fruits serves as a dressing for wounds and for upholstering purposes. See Bulrush ; Tule.

TYPHOID BACILLUS. This bacillus,

the cause of typhoid fever, was first discovered by Eberth in 1880. He found it in the glands of the mesentery and in the spleen. It was not until 1884, however, that Gaffky obtained the organism in pure culture. He first used a potato culture-medium and was fortunate in obtaining the organism, for since its discovery it is be¬ coming more and more evident that the typhoid bacillus is very closely allied to a great variety of other forms and it is now necessary to use a very complicated technique in order to separate this form from a number of allies. One form, the Bacillus coli commune, or colon bacillus, a constant inhabitant of the intestinal canal, re¬ sembles the typhoid bacillus so closely that as late as 1890 no less an authority than Koch de¬ clared that a sure means of differentiation be¬ tween the typhoid and colon bacillus had not been discovered. Since then, however, work by a number of bacteriologists, Pfeffer, Wasser- mann, Loffler, Abel, Hiss and others, has given a series of distinguishing signs, so that at the present time it is possible to make a definite

separation of the typhoid organism from all others. The typhoid

bacillus is a short compara¬ tively plump rod varying in length from ts hnn to so'oo of an inch and in width from soˆin* to 3o ooo of an inch. It has a number of flagella (10 to 12) which enable it to move. The marked motility of the typhoid bacillus is of much importance in the study of this form since the so-called blood-test or Widal's test for typhoid depends on a change in this character¬ istic. For the details of its cultural characters standard works on bacteriology should be consulted but it is of importance from the stand¬ point of sanitary science and preventive medi¬ cine (q.v.) to realize that the typhoid bacillus is capable of growing for a time at least in many different foods and drinks, particularly in milk and in water. Every patient with typhoid fever is constantly giving off millions of these small bacteria in stools and in urine. From these two main sources the great danger in typhoid contagion comes, for soiled fingers of chambermaids, flies, household implements may all prove intermediaries in conveying the bacilli to food and thence into the digestive canal of a well person. Or the faeces and urine may soak into a well or other source of drinking-water supply, and thus be the means of causing extensive epidemics. Contagion by uncleanli¬ ness and lack of care in disinfecting the stools and urine is responsible for most cases of typhoid fever. Destroy the bacillus by heat or by proper chemical means and typhoid fever wall disappear. (See Bacteria ; Typhoid Fever). Consult Muir and Ritchie, (Manual of Bac¬ teriology > ; Kolle and Wassermann, (Hand- buch der pathogene Mikroorganismen) (1902- 04) ; Osier, W., (Problems of Typhoid Fever in the United States) (Baltimore 1899) ; id., (Studies in Typhoid Fevers) (ib. 1895) ; (Washington 1911) ; (Reference Handbook of the Medical Sciences> (1915); Whipple, J. G., (Typhoid Fever: Its Causation, Transmission and Pre¬ vention (New York 1908).

TYPHOID FEVER, or ENTERIC FEVER, a specific continued fever of long du¬ ration and communicable, due to the Bacillus typhosus or Eberth's bacillus. It is usually attended with diarrhoea, sometimes with an eruption and is characterized by inflammation and ulceration of Peyer's patches (q.v.) in the small intestine, by enlargement of the spleen and mesenteric glands and catarrhal inflamma¬ tion of the intestinal mucous membrane. It is one of the exanthemata (q.v.). This fever was called typhoid and at one time abdominal typhus, from its supposed resemblance to typhus fever (q.v.). It has also been known as low and as slow fever and as autumnal or fall fever. It is considered to be a preventable disease, yet it prevails frequently as an endemic and epidemic, especially in large cities, destroying many lives. It occurs most often in the fall and early winter and mostly between the ages of 18 and 45, when men especially are less prudent and run more

to excesses than at other periods of life. Improper dwellings and bad sanitary environments, excess in eating and drinking, want of sleep and too much mental work — by these the vitality is un¬ dermined, predisposes persons even in the prime of life to the onset of typhoid, especially if it be prevailing in their community. It is believed

that the blood of such persons has undergone some chemical change which has diminished its bactericidal quality and so lowered its inherent power of resistance to disease. It is not very uncommon to find cases of ((walking typhoid," i.e., persons not sick but having a temperature of 102° to 104°, especially toward evening.

Typhoid fever is frequently, if not always, a septicaemic disease and its range of infectivity is greater than is usually supposed. The bacillus has been found in the blood, urine, faeces and sputum. Milk, vegetables, flies, oysters, etc., are bearers of the germs, while the bacilli may be conveyed 'by air to the respiratory mucous membrane and their initial colonization take place there rather than in the gastro-intestinal tract. Typhoid fever like cholera is consid¬ ered as "ingestion infection" and both are disseminated from the excreta, vomit and per¬ haps sputum. But drinking water polluted by the bacilli through infected sewage, etc., is the most frequent cause of typhoid infection. Germs from a single case of typhoid may find their way into springs and other sources of water supply and cause widespread dissemina¬ tion of the disease. The epidemics in Lausanne, Switzerland (1872), Chicago and Philadelphia (1890-1900) and Ithaca, N. Y. (1903), are ex¬ amples of typhoid outbreaks caused by polluted water. "In Vienna, when for a period the water supply from guarded springs was turned into the city, typhoid which had persisted in epidemic form for years almost entirely disappeared and when as the drier season advanced this purer supply was insufficient and the water of the Danube was again turned on the scourge broke out with renewed violence but in those parts of the city supplied by river-water. This experience was repeated in Paris and it is practically true of every city supplied with drinking water from exposed streams and lakes." Freezing does not sterilize water so that contaminated ice used in drinking fluids or coming in direct contact with food is a source of infection. The boiling of water is a safeguard while filtration is not trustworthy in the elimination of infective, or¬ ganisms. Next to infected drinking water in¬ fected milk is the most common cause of typhoid through the polluted hands of milkers or from the washing of

receptacles for milk in cold water polluted by typhoid discharges. Such vessels should be thoroughly scalded. The ingestion of uncooked articles of food and especially of salad vegetables — lettuce, celery, etc. — raised in ground fertilized by infected sewage, is a source of infection, as is the in¬ gestion of oysters and clams grown in water similarly contaminated. Dust carrying typhoid germs, if inhaled, may convey the disease into the system. That flies which have found access to the excrement of typhoid fever patients may carry the infecting organism to food and so produce typhoid was proved in the Spanish-American and the Boer wars. The danger of typhoid in armies is always imminent; soldiers will drink polluted water, not caring to wait till it is boiled; the ground becomes saturated with discharges; flies and dust abound, and many of the men will not keep clean. “Typhoid fever in our camps,” says Sternberg, “has been to a large extent due to the neglect of well-known sanitary measures.” This has been the experi¬ ence in nearly all wars.

Experiments have shown that infected cloth¬ ing, surface soil, faeces and urine retain active bacilli for many days and there is reason to believe that typhoid is sometimes spread through infected hands, clinical thermometers, water- closets, clothing, etc. The New York depart¬ ment of health, which insists upon the im¬ portance of disinfecting the urine as well as the faeces of typhoid patients, states that “it is prob¬ able that in 50 per cent of the cases the typhoid bacilli are present in the urine at some stage of the disease,” and recommends keeping the urinal or bed-pan partly filled with a 1 to 20 solution of carbolic acid.

Two important means in the diagnosis of typhoid have come into use within the last few years ; namely, Erlich’s test or the diazo-reac- tion and the Widal test. The first, which has the advantage of being more readily applied, is as follows: “Equal parts of the suspected urine and a solution (saturated solution of sulphanilic acid in 5 per cent hydrochloric acid 40 parts ; 0.5 per cent solution of sodium nitrite 1 part) are mixed and well shaken. On the addition of a few drops of ammonia a brilliant rose-pink color should appear, if the case be one of typhoid fever. The 12-hour sediment is also characteristic, consisting of a dirty gray lower layer and a narrower dark olive-green upper layer.” The reports of army surgeons in the great European War (1914-18) show that the affection known as “para-typhoid” is more com¬ mon than typhoid. It has most of the symptoms of typhoid but less pronounced and has been responsible for deaths, which have been im¬ puted to other causes. It is believed that the bacilli responsible

are a union of the Eberth and Colon bacilli as shown by the Widal re¬ action. A mixed serum has been used hypo¬ dermically with success against both.

Prophylaxis. — “An epidemic is like a con¬ flagration, — it is more easily suppressed at the beginning.” “An ounce of prevention is worth a pound of cure.” These are two sayings quite applicable to typhoid fever. The Ithaca epi¬ demic might have been prevented by keeping the water supply pure ; but once started, “all the science of the 20th century could not save all the lives.” Purity of water and cleanliness of foods, proper cooking, the thorough removal and destruction of refuse, the use of septic tanks for sewage, the getting rid of flies and other hygienic measures are the means for pre¬ venting the origin and spread of typhoid; but these measures must be persistent, not spas¬ modic. The term summer typhoid is frequently applied to typhoid fever appearing in cities in the fall, but originating in country summer re¬ sorts — classed, it may be, as healthful.

It is now well ‘known that from 2 to 10 per cent ‘of all cases of typhoid become “carriers” of the disease, some “temporary” for about three months, others “chronic” for an indefi¬ nite period, continuously or intermittently for years it may be.

Such carriers as well as walking cases of typhoid are frequent sources of infection. The bacilli collect in the gall bladder, multiply and discharge into the intestines and find their way into the urine. The germs in the*undisinfected excreta of these people are carried by flies or soiled hands to food. Even persons who have never had typhoid may become carriers. ‘“Ty-

phoid Mary® was such a carrier, acting as cook in various families and in a hospital she was responsible for 57 cases of typhoid and three deaths. Boards of health now issue directions to Carriers.®

The various efforts that have been made by the use of internal medicines such as sal- varsan and unotropin, to rid the body of a carrier of the lurking germs have only been partially successful.

Anti-typhoid serums and bacterins are used hypodermically with excellent results as immu¬ nizing agents — and as a cure. The prevention of typhoid by such means in armies is a triumph.

In 1901 Parkes and Rideal reported that after detailed experiments made to determine what substances could be added to drinking- water containing typhoid or other infecting micro-organisms to make it innocuous, they had decided upon acid sodium phosphate or sodium bisulphate, in compressed tablets of five grains each, to be used three to a pint of water 15 minutes before drinking, and when not in use to be kept in a closed receptacle, as a metallic box. They believe that the substance will be efficacious unless the water is very badly pol¬ luted. The statement has been made repeatedly in newspapers that lemon-juice destroys the typhoid bacillus, and therefore should be added to suspected drinking-water. W. H. Park, the bacteriologist, shows on the contrary that while the acid kills the micro-organisms it requires too much acid and too much time for the chem¬ ical action to take place to render lemon-juice a practical agent for their destruction.

Symptoms and Course of the Disease. — The duration is usually from three to four weeks in adults in cases of recovery, though the patient may be sick many days beyond the 28th, owing to diarrhoea, loss of muscular tone, flabby heart, etc. Death may occur in the first and even the fourth week, or later, but usually takes place in the second or third week. It may result from a peritonitis set up by perfora¬ tion of an ulcerated spot, from intestinal hem¬ orrhage, even after all the leading symptoms are gone, from diarrhoea, pneumonia, nephritis, embolism, thrombosis, etc. The period of in¬ cubation, which is not definitely known, is vari¬ ously stated to be from 7 to 21 days. It is diffi¬ cult to determine the exact time of exposure to the poison, and the onset of the attack is usually insidious.

First Week. — The disease begins with more or less fever, lassitude and aching ((in the bones,® and sometimes a chill, more often a chilly feeling, especially when the hands are put into cold water or the person is exposed to cold air. Headache, pains in the back and limbs, alternations of chilliness and heat, and some¬ times vomiting, nosebleed, diarrhoea and ten¬ derness of the abdomen supervene. The pulse rarely exceeds 85 or 90; the tongue is moist, but covered with a thin coating; the fever gradually increases, remission occurring in the morning. Toward the end of the first week the tongue becomes dry, delirium is likely to occur, weak¬ ness is marked, consciousness is numbed and diarrhoea may increase. Toward the end of this week a rash sometimes appears, consisting of small pink spots, most abundant on the abdo¬ men and chest, then on the back and rarely on

the face and extremities. The spots continue to come out as long as the fever continues, do not coalesce, disappear under pressure, and do not become hemorrhagic.

Second Week. — The tongue is very dry; if there has been diarrhoea it increases, or may appear for the first time, and is attended by gurgling, the discharges having a peculiar ((pea- soup® appearance. There is more or less ten¬ derness over the ileo-caecal region, due to the inflammation of Peyer's patches, and some tumidity of the abdomen. Delirium increases; temperature rises at night to 102°, 104°, 105° F., or more with sharp declines in the morning (steeple-like rises, as shown on temperature chart) ; the pulse is frequent — 100 to 120.

Third Week. — Gradually the patient passes into the third week, and symptoms slowly abate; or he grows worse; then the tongue cracks and bleeds ; sordes appear on the lips, teeth and tongue ; he has low muttering delirium ; tym¬ panitis is considerable ; fever continues. He may recover even now, but there is the possible danger of hemorrhage, perforation or a serious depression of the vital forces, at any stage of the disease, but chiefly in the second and third weeks. As recovery sets in the greatest care is necessary that the patient may not overeat nor exert himself unduly, lest a relapse should occur or a serious complication be induced.

Treatment. — The treatment consists of rest in bed from the outset, diet, hydrotherapy and medicines. The food through most of the sick¬ ness should be largely liquid — milk, peptonoids, etc., and predigested material, but always adapted to the patient's powers of digestion. If curds or undigested food be seen in the stools, all food should be suspended for a considerable time, or given of another kind and in small quantity every three or four hours. Later, bread and milk, milk pudding, with rice or tap¬ ioca, eggs lightly boiled, poached or shirred and cocoa may be given. The patient may drink freely of water at any time, and may have fruit-juices. When the temperature has been normal for several days he may have fish, chicken, broths, soups and may carefully and gradually resume ordinary food. Sponging with tepid or cold water, vinegar and water, or alcohol and water, and the use of wet packs — as frequently as they can be used with appar¬ ently good results are often more serviceable than drugs. Yet medicinal measures are often necessary. Coaltar derivatives should never be used except to lower the temperature, and then very carefully. Eliminatives, as calomel and intestinal antiseptics, as salol, are useful. Ace- tozone, or benzolyl-acetyl-peroxide, is now used internally as a germicide with benefit in many cases. Stimulants should only be used when there are signs of heart-failure and then in moderate quantity — brandy, whisky, cham¬ pagne, ether and camphor. Opium, carefully used in excessive diarrhoea or in peritonitis ; ice internally, and applied to the abdomen in intes¬ tinal hemorrhage; ergotine hypodermically; bromide of sodium, etc.,

producing necessary quiet or sleep, are all of value; but the disease cannot be shortened in its course to any extent, though its severity may be modified. Skilful nursing, therefore, is necessary. The preven¬ tion of bed-sores and the keeping the mouth

clean add much to the patient's comfort and help him to recover.

Typhoid fever in children is more common than was at one time believed. It is the (fever, etc., and seldom occurs under one year of age. It does not conform closely to the type of typhoid in adults and differs as to distinct stages and well-defined temperature changes. It runs its course in from 10 to 20 days, and is characterized by gastro-intestinal catarrh, fever, prostration, wasting, nervous symptoms and scanty isolated eruption. See Pathology.

TYPHON, ti'fon, in Greek mythology, a giant, the son of Tartarus and Gaea. He had 100 heads shaped like those of a serpent and with devouring flames darting from the many mouths and eyes. Typhon, as soon as born, made war on heaven to avenge the death of his brother giants, compelling the gods to fly for safety; Jupiter, however, regaining courage, threw off the resemblance of a ram which he had assumed, and, hurling his thunderbolts at the audacious invader, flung him to earth wounded and writhing, when, to prevent his recovery, he cast Mount Etna at his head and buried the rest of his body beneath the earth. Through this vast mountain, however, the im¬ prisoned giant still belches forth his fire and smoke and howls his discordant thunder. Con¬ sult Longfellow's poem (Enceladus,5 and Meyer, M., (Die Giganten und Titanen) (1887).

TYPHOON, name given by navigators to those tremendous rotatory storms of wind or hurricanes that visit the coast of Tonquin and China as far north as Ningpo and the south¬ eastern coast of Japan. Typhoons are the cy¬ clones of the Eastern Asiatic Coast. They occur from May to November but are most fre¬ quent during July, August and September. They resemble the great hurricanes of the West Indies in their general characteristics, but with the main features more strongly marked. There is a depression of the barometer, over a space more or less circular, accompanying the ty¬ phoon, but it is generally more contracted in area, and deeper and more abrupt than in European or American storms. It is not un¬ common for the barometer, at the centre of the depression, to read 28.3 inches, and on

rarer occasions to fall even as low as 27 inches, and the changes of pressure are very rapid, fre¬ quently two or three inches in an hour. It is this enormous difference of atmospheric pres¬ sure between neighboring places, and the con¬ sequent rapidity of the fluctuation, which gives the typhoon its terribly destructive energy — the law regulating the strength of the wind being, that it is proportioned to the difference of pres¬ sure between the place from which it comes and the place toward which it blows. The low pressure in the centre is confined to a very limited space, and since all round this space the pressure is greater, it follows that the level of the sea there will be higher. Hence a high wave frequently accompanies a typhoon, ad¬ vancing inland, carrying with it ruin and dis¬ may, and sometimes bearing ships far over the level fields, where they are left stranded. Ty¬ phoons have their origin in the ocean east of China, especially about Formosa, Luzon and the islands immediately south. They thence

proceed, in four cases out of five, from east northeast toward west southwest, rarely from east southeast to west northwest, in other words, their course is generally along the coast of China. The whole body of the typhoon ad¬ vances at the rate of 12 miles or more an hour; within the body thus traveling the winds often blow 80 to 100 miles an hour, whirling round the centre of atmospheric depression in a direction contrary to the motion of the hands of a watch, as do all the storms in the northern hemisphere. They thus rotate in the directions south, east, north, west, and travel along the coast, so that the coast feels the north side of the typhoon, while at a distance from the coast the south side alone is experienced. The rotation, however, is in circles not returning on themselves, nor opening outward by their centrifugal motion, but tending to blow some¬ what inward upon the centre of lowest pressure. The intensity of the typhoon is aggravated by the large quantity of heat disengaged in the condensation of the vapor of the atmosphere into the deluges of rain which fall during the storm — 10 to 12 inches of rain frequently fall¬ ing in one day. The meteorological offices at Manila, Hongkong and Tokio publish special studies and charts of typhoons from time to time, while the general paths with special ex¬ planations are published in the monthly pilot charts of the Pacific issued by the United States Hydrographic Office. Consult Algue, Jose, (The Cyclones of the Far East5 (2d ed., Manila 1904) ; and Doberck, W., (Law of Storms in the Eastern Seas5 (4th ed., Hongkong 1898).

TYPHUS FEVER, a highly contagious eruptive fever, one of the exanthemata (q.v.), formerly known as putrid, ship, jail or camp fever, and by other names. The disease is very rare in the United States, and when it appears it is usually in the line of immigrant travel. But owing

to the very strict quarantine regula¬ tions of the American and Canadian govern¬ ments it is seldom imported, or if introduced is stamped out by thorough isolation and dis¬ infection. A constant vigilance is exerted to prevent the importation of old rags, which are seldom free from infection. The disease is also rare in the great centres of population in Europe and elsewhere, but it is epidemic in certain towns of the Old World and in some parts of Latin America where sanitation is of a most primitive kind. It is a filth-disease, therefore a disgraceful disease, and its oc¬ currence is favored by overcrowding, bad ventilation, poor food, etc., and is especially more likely in winter. The body louse is the carrier of the disease. Though resembling typhoid fever in some respects, it is easily recognized, quarantined, disinfected and con¬ trolled. It is caused by the bacillus typhi exanthematici, discovered by Dr. Harry Plotz in 1915. There are no characteristic lesions, ex¬ cept that the blood contains but little fibrin and is darker than normal, and the spleen and liver are engorged and softened. Sometimes the stomach and lungs are also softened. The real cause of death is not usually acertained. The mortality of typhus fever is not much more than that of typhoid fever when there is good ventilation and strict attention to other hygienic measures, but in overcrowded and badly ventilated prisons, etc., it is very great.

The average duration of typhus (14 to 21 days) is less than that of typhoid fever. The incubation period varies from one to two weeks. The fever begins much in the same way as typhoid, with lassitude, aching in the limbs, headache, chills or chilliness, rapidly rising temperature and dark flushing of the skin. The eyes are moderately congested; there is little disposition to diarrhoea ; the abdomen is not swollen or tender; and the patient is not likely to vomit, or to have nosebleed. The tongue soon becomes dry and dark, and sordes form ; the pulse is frequent ; as the fever reaches its height the breath and perspiration have a pecu¬ liar musty odor, and the patient passes from a state of delirium into a nearly comatose con¬ dition. Toward the end of the first week (usually the fourth or fifth day) an eruption appears on the sides of the abdomen, in the axillae and about the wrists. For the next two days it continues to appear over the rest of the skin, except that of the face, and is most abundant on the trunk. After the third day it ceases to come out. At first the spots dis¬ appear under pressure, but after a day or two they fade out like black-and-blue spots, and in another day or two a small petechial hemor¬ rhage

appears in many of them. At its height the rash has a dull red color which Sir William Jenner compared to the juice of a ripe mul¬ berry. When the spots coalesce and spread over a large space much danger is indicated. Treatment consists in combating the evils which give rise to the disease. The patient should be kept in a well-ventilated room with windows open even in winter ; but he must also have plenty of bed-clothes, and there must be a fire in the room. Keep the room and patient thoroughly clean, and see that he has an abundance of good and easily digested food. Stimulants and other medicines will be seldom needed, yet a physician must not be dispensed with, since complications such as erysipelas and abscesses may occur. Plotz used a vaccine with considerable success in Serbia during the great epidemic there in 1915. Consult Vaughan, C. C., (History and Epidemiology of Typhus Fever1* (Journal of the American Medical Association, Chicago, 29 May 1915).

TYPOGRAPHICAL UNION, Interna¬ tional, a society of typesetters, compositors and linotypers banded together for mutual pro¬ tection, for the regulation of wages, fixing the number of apprentices allowed to each estab¬ lishment, the length of time each apprentice must serve in order to become a master work¬ man, and for extending general aid to the members of such association. The international or supreme body is composed of delegates from subordinate unions in the United States and Canada. The management of the internal affairs of each union is left almost entirely to the subordinate divisions. Thus each local union may regulate the number of apprentices, the scale of wages for composition, time work, etc. Whenever a member of one local union comes within the jurisdiction of another local body, he at once is subject to the by-laws of the latter. Traveling cards are granted to mem¬ bers, but these cards must be deposited with the local union within the jurisdiction of which its holder proposes to remain for a given length of time, and dues must be paid into the

local union with which the card is deposited. It was founded in 1852 as the National Typo¬ graphical Union, taking the name International in 1869. In 1882 there were 95 local organiza¬ tions and a membership exceeding 10,000. In 1916 there were 754 local unions and 60,231 individual members. There are hundreds of local unions in the United States, that of New York being the largest, having a membership of several thousand — followed by Chicago, Philadelphia, Boston, Saint Louis and other large cities of the country. The International Union meets once every year, at different places in the United States and Canada. The per¬ manent headquarters are at Indianapolis, where a large school of instruction is maintained. A home for disabled printers and tuberculars is also maintained at

Colorado Springs.

TYPOGRAPHY. See Printing.

TYPOTHET2E, a name given to a trade guild consisting of persons connected with the printing trades, both workmen and employers. In the year 1465 the Emperor Frederick III of Germany ˆpermitted printers to wear gold and silver, and both the typographi and typothetae were honored by him with the privilege of bear¬ ing coat-of-arms, and wearing armor. The shield of the typothetae bore an eagle with ex¬ tended claws, and the open helmet was sur¬ mounted by a crown.® The first use of the name in the United States was in 1863, when P. C. Baker of New York proposed the name for a society of employing printers in that city. The name was adopted, but the society did not survive long. In 1883 the Typothetae of the City of New York was resuscitated. From that city similar organizations spread all over the coun¬ try, and in 1887 the United Typothetae of America was formed. Later the Printers Boards of Trade, mostly known as Franklin Clubs, were taken into the organization, and the title now is United Typothetae and Franklin Clubs of America. There are local Typothetae in most of the large cities of the United States and Canada. The organization has ceased fighting actually against unionism, and confines its activities largely to trade education and im¬ provement of conditions.

_ 0

TYR, tlr, in Norse mythology, the son of Odin, and the god of war and of renown. Ac¬ cording to the Edda, he had but one hand. When the Asa-gods persuaded the wolf Fenrir to allow himself to be bound with the Gleipnir, Tyr put his right hand in the wolf's mouth, as a pledge that he would be loosened ; and when the gods refused to release him, the wolf bit off Tyr's hand to the wrist, which was called in consequence, Ulflithr, or the Wolf's Joint. In the twilight battle of the gods, he meets his death at the same time with his enemy, the monster dog Garmr.

TYRANT, a word derived from the Greek turannos, which signified an absolute ruler. The vvord did not have originally the bad significa¬ tion which we now attach to it; but as it is a rule which admits of very few exceptions, that the possessor of uncontrolled power, whether individual, corporation, or multitude, will abuse it, tyrant came at length to signify an abuser of power, particularly of the chief power in the state. Consult Plasz,

Lipsius, (Griechische AlterthiimeU (4th ed., ib. 1897).

TYRCONNEL, ter-kon'el, Richard Tal¬ bot, Earl of, viceroy of Ireland: b. about 1630; d. Limerick, 14 Aug. 1691. He was the youngest son of Sir William Talbot, a prominent figure in politics under James I. At Drogheda he was with the forces that withstood Cromwell and one of the few that escaped the massacre there. On the accession of Janies II Talbot was at once made Earl of Tyrconnel and placed in command of the troops in Ireland, where he strove to secure the king's independence of Par¬ liament by favoring Roman Catholics in the army and in official preferments, at the expense of Protestants, many of whom he summarily dismissed. In 1687 he was made lord deputy of Ireland, an appointment that added dismay to the consternation which he had already spread among the English Protestants there, many of whom quitted the country, a great part of which was given over to lawlessness, com¬ mercial decay and general wretchedness. In 1689, when James reached Ireland after his flight from England, he created the earl Duke of Tyrconnel. After the battle of the Boyne (1690), in which he fought, the duke retired to France, but in 1691 returned to Ireland and further endeavored to serve the cause of James, which, however, was soon hopelessly lost.

TYRE (mod. Arab. Sur), the most famous city of ancient Phoenicia, in lat. 33° 12′ N., named probably from the double rock on which it was first founded. It was doubted among the ancients themselves whether Tyre or Sidon was the older, and tbe question is not settled ; though it seems certain that Tyre had long existed independently when Sidon, defeated by Ascalon, transferred herself almost bodily to Tyre. There were two towns of Tyre closely connected in historical times — one on the con¬ tinent, the other on the island opposite, to¬ gether comprising, according to Pliny, about 19 Roman miles. The more important of the two was the continental town, Palae Tyrus; while the island-town served more or less for store¬ houses, manufactories, arsenals and the like. The entire city was in a fertile region; and its magnificent combination of land and sea scenery formed the theme of many an ancient poet and seer. Nothing but myths have come down to us respecting Tyre in its earlier period. Its history dawns on us with Abibal, predecessor of the biblical Hiram, under whose rule (b.c. 980-947) Tyre attained its full glory and re¬ nown. An alliance with Solomon was entered into ; trading expeditions were undertaken jointly by the Israelites and the Phoenicians; and Solomon is supposed

even to have married Hiram's daughter. During Hiram's reign, Tyre was much enlarged and embellished; and its two roadstead and harbors, among the wonders of the ancient world, date probably from the same period. He was followed, according to ancient writers, by Balaeastartus ; after him reigned, for brief periods, his four sons, by the murder of the last of whom the throne became hereditary in the house of Ithobaal, the Ethbaal of Scripture, whose daughter was married to King Ahab. Tyre then appears to have gained the supremacy over Sidon and also spread her colonies far and wide. Shortly after the death of this king, Carthage was refounded by Elissa

(Dido), about 813 b.c., in consequence of a popular demonstration which deprived her of the throne in favor of Pygmalion. This <(new city® gradually diminished the importance of the old one; at least Tyre seems to have been weakened to such an extent by the emigration of its best elements that it disappears from history until the three great powers, Chaldsea, Assyria and Egypt by turns endeavored to make themselves masters of the Tyro-Phcenician Coast, with its east and west trade. Shal¬ maneser, king of Assyria, reduced Tyre after a long siege; and the whole of Phoenicia, the most important places of which had already thrown off their allegiance to Tyre, was ren¬ dered tributary to Assyria. During the Chaldaeo- Egyptian struggle, Tyre, again at. the head of the country, sided with Egypt and was con¬ quered by the Chaldseans. Once more the Phoenicians attempted to throw off the foreign yoke, and Nebuchadnezzar marched against them at the head of his armies. Having taken Jerusalem in b.c. 587, he reduced the whole sea-coast, except Tyre, which stood 12 years' siege by water and by land, ending not in sub¬ jection, but only in an apparent submission, leaving the native sovereigns on their thrones, and their wealth and power untouched. In b.c. 538 Cyrus became master of Phoenicia, which at that time again was under Babylonian supremacy, and the hegemony was bestowed on Sidon. For a long time Phoenicia prospered under wise Persian rulers ; but when Xerxes in his Greek wars, had completely destroyed the Phoenician fleet, and exhausted nearly all her resources, the exasperated inhabitants rose once more, but only to be utterly crushed. Sidon, at the head of the Revolution, was fired by its own inhabitants and again Tyre resumed the lead in 350 b.c. Having refused to pay alle¬ giance to Alexander the Great after the battle of Issus, it was besieged by him in b.c. 332 and fell after seven months' hard resistance. Alex¬ ander replaced the old inhabitants by new colonists, chiefly Carians ; and though the city had been almost destroyed, it rose again after a brief period to wealth and power, and in b.c. 315 was able to hold out 18 months against Antigonus. Under the Romans, Cleopatra re¬ ceived Tyre as a present

from Antony; but the last trace of its independent existence was taken from it by Augustus. A Christian com¬ munity had then been founded there. The trade and manufacture of Tyre, aided by its exceptionally favorable naval position, gave it, even under Roman dominion, a high place among its sister cities ; and once again, in a.d. 193, it even took active part in the contest between Septimius Severus and Pescennius Niger, which, resulting in the success of Severus, brought back to it some of its ancient distinction. In Saint Jerome's time it was again the most beautiful city of Phoenicia, and one of the most prosperous cities of the whole East. In the 7th century it came under the dominion of the Saracens and so remained until taken by the Crusaders and in 1192 became the northern boundary of Christian territory in Palestine. It continued to flourish — still chiefly through its renowned manufacture of purple — until 1516, when the conquest of Selim I, to¬ gether with the newly-discovered route to Asia by the Cape of Good Hope, put an end to its

wealth and commerce and almost to its exist¬ ence. Although there has been a slight im¬ provement in its prospects of late, the magnifi¬ cent city of old still presents a scene of desola¬ tion and wretchedness. About 6,500 inhabitants now dwell in Sur, among the ruins of its ancient glory, finding scanty livelihood in exports of tobacco, cotton, wool and wood. Consult Berard, Victor, (Les Pheniciens et l'odyssee> (Paris 1903).

TYRE, Bank of. The city of Tyre was ancient in the time of Alexander the Great. Directly or otherwise, its trade extended to all parts of the known world and embraced every commodity included in commerce. Its ships and caravans fetched tin from Britain, ivory and gold from Africa, spices and frankincense from India. For return cargoes they carried those woolens, colored by precious dyes, which con¬ stituted the basis of all its other commerce, the "bales of (purple) blue and broidered work and chests of rich apparel® mentioned in Ezekiel, xxii, et seq., a monopoly so odious to the Persians that the wife of Darius refused even to touch a piece of Tyrian woolens (Quintus Curtius, ii, 17). The enormous wealth thus created naturally led to the establishment of a bank, which after many vicissitudes was still found existing, when in a.d. 1124 Baldwin, brother of Godfrey de Bouillon, led his cru¬ saders from the capture of Tyre, to that of Roha or Edessa, near the fords of the Eu¬ phrates. It was here that were situated the famous woolen and fulling mills and dye-works of the

Tyrians. The advantages of the place were a fall of water for power, the adjacent alum deposits of Roha for mordants, the clays for fulling and the river for transport. The dye-stuffs being light were easily brought from the seacoast, where Godfrey secured the con¬ venient shipping port of Joppa, which he erected into a countship.

Edessa was no new manufacturing town. Under its ancient name of Oorfa or Urfa it had been one almost as long as Tyre had been a trading emporium. The two places had prob¬ ably been connected ever since they were founded by the Kheta, for its name of Oorfa was merely a replica of that Mongolian Oorga which down to the present day is celebrated for its woolen manufactures and beautiful but secretly applied dyes ; while as to the elusive Carchemish, where the Kheta were overthrown by Sargon, it was situated at or near the fords of the more recently named Edessa.

Following the example of his brother God¬ frey, Baldwin, for himself, now erected Edessa into a countship and stretched its territorial boundaries across the Euphrates, with the view to enlarge its scope of taxation, as well as its facilities for trade. He also rehabilitated the ancient Bank of Tyre and invited his crusading brethren, the Rhodians and Venetians, to make avail of its advantages as a place of security for the treasures which they were daily plundering from the surprised and defeated Greeks and Moslems. These became its prin¬ cipal depositors. Alluding to the crusading knights for description, Hallam says in his very first chapter : “Men resorted to Palestine, as in modern times they have done to the Colonies : in order to redeem their time, or repair their fortune. Thus Gui de Lusignan, after flying

from France for murder, was ultimately raised to the throne of Jerusalem. ... It was here in 1099, when their triumph was consummated, that it was stained with the most atrocious massacre ; not limited to the hour of resistance, but renewed deliberately, after that penitential procession to the Sepulchre, which might have calmed their ferocious dispositions.®

The avarice of the Knights of Rhodes was nowhere exhibited more glaringly than in their connection with the Bank of Tyre. This de¬ pository was first pounced upon by the Vene¬ tians, who after taking possession of its treas¬ ure and issuing in its stead parchment bank notes, signed by the doge Dominico Michieli, petitioned King Godfrey at Jerusalem to con¬ tinue them (the Venetians) in the bank’s “mer¬ cantile privileges.® Instead of making this concession Godfrey conferred the “privileges® upon his brother Baldwin. Among the coveted advantages of the bank was the monopoly of the wool trade

which now became the spoil of the French knight.

After Baldwin had set up his mills and dyeing works at Edessa, after he had employed the most cruel means to force from the natives the secrets of their trade, after Godfrey had arranged an organized resumption of the com¬ merce of Tyre, reviewed its ancient bank and secured and improved an additional sea-port at Joppa, their fellow-crusader, Rohemond, a son of Robert Guiscard, led several shiploads of lazzaroni from Naples, to ravage the East, steal from his allies the stolen secrets of Edessa, and carry them to Italy, there to con¬ tinue the once famous woolens trade of Tyre in the Bay of Taranto.

From that moment the Bank of Tyre de¬ clined; plunder still continued to come in and some measure of profits was gleaned from the melting of bullion, exchanges of coins, charges for the safekeeping of treasure, etc., but these items were not sufficient to support such a bank and cover the risk it ran from fire, rob¬ bery or successful fraud. The commercial community of Tyre was gone ; its shipping, its trade, its connections were gone; more than all, its great woolens trade was gone; and with little prospect of their revival. Yet a forlorn hope of improvement seems to have kept it alive, or nominally alive, until the year 1145, when Edessa was besieged by a native army commanded by the brave Zenghi, or Sangiar, one of the Atabek sultans, who, after a fierce struggle of 25 days, finally made a practicable breach in its formidable walls and entered the city sword in hand. His triumph, however, was marked by his death, for here, as Gibbon regrettingly relates, fell “the last hero of his race.® Although Tyre remained in the hands of the triumphant Latins, its woolens trade was lost ; its commercial importance annihilated ; and its bank expired and was forgotten. For the history of other ancient banks see Barce¬ lona, Bank of; Byzantium, Bank of; Fug- gers, Bank of the; Genoa, Bank of; Medici, Banks of the; Venice, Bank of.

TYRNAU, tTr’now, or TIRNAU, a town of Czecho-Slovakia, about 30 miles northeast of Presburg, on the Waaj Valley Railroad. Its in¬ terest was lost when the university was removed to Pesth (1635-1754). Cloth, linen, vinegar, sugar and wine are manufactured. It was for-

merly the residence of the Hungarian primates. Pop. 14,759.

TYROL, tlr’ol (Ger. te-rol’), or TIROL, Austria, a province situated in

the western part of the republic, 4,782 square miles in area, and bounded on the north by Bavaria, on the east by Salzburg and Carinthia, on the south by Italian Tyrol and on the west by Vorarlberg. Under the terms of the Treaty of St. Germain the province lost 5,518 square miles to Italy. Almost the whole area is included in the East¬ ern Alps, which are here almost as high and quite as complex, wild and romantic as the Swiss Alps, including large glaciers, gorges and mountain torrents. The highest point is the Ortler Spitze, on the western boundary; altitude 12,802 feet. The chief rivers are the Inn in the north, flowing into the Danube, and the Adige in the south, flowing to the Adriatic. But little of the soil is suitable for agriculture though con¬ siderable quantities of grapes and fruits are grown. Cattle, sheep and goats are raised in large numbers. Iron, zinc, copper and lignite are mined to some extent. The principal industries are cotton spinning and weaving. The chief ex¬ ports are cattle, cheese, lard, wine and fruit. Of the inhabitants 55 per cent are German and 44 per cent Italians ; nearly all are Roman Catholics. The capital is Innsbruck. Tyrol was anciently the eastern portion of Rhaetia. It came under the House of Hapsburg in 1359 through Margaret, the heiress of the last counts. In 1805 it was ceded to Bavaria, but restored to Austria in 1814. With Vorarlberg it formed a single administrative district of old Austria. Pop. 306,485.

TYRONE, ti-ron', Hugh O'Neill, 2d Earl of, Irish chieftain and soldier: b. about 1550; d. Rome, 1616. He was the grandson of the 1st earl and son of Baron of Dugannon. His early life was spent in England. After the murder of his brother in 1562 he returned to Ireland, succeeding to the barony. He was called <(The O'Neill, w and was the leader of the Irish insur¬ rection against Elizabeth and English occupa¬ tion. Both Connacht and Leinster soon joined the standard of the Ulstermen and were met by an English army under the Earl of Essex and engaged in a war for supremacy. For some years Tyrone baffled the English army, but was overcome by Lord Mountjoy in 1603, in spite of the aid of Spain, and compelled to surrender. He was pardoned later and rein¬ stated in his earldom. In 1607, being suspected of further intrigue, he fled to Brussels, and later to Rome, where he passed the remainder of his life living on a small stipend furnished jointly by the Pope and the king of Spain. Consult Meehan, (Fate and Fortunes of Ty¬ rone and TyrconneP ; Gainsforde, (True Ex¬ emplary and Remarkable History of Hugh, Earl of Tyrone) (1619); Bagwell, Ureland Under the Tudors) ; Mitchel, John, (The Life and Times of Aodh O'Neill } (New York 1868) ; McRory, S., (Beatha Aoidh Ui NeilP (Dublin

1906).

TYRONE, Pa., borough, Blair County, on a tributary of the Juniata River, and on branches of the Pennsylvania Railroad, about 15 miles north by west of Altoona and 90 miles west by north of Pittsburgh. It was settled in 1840 and incorporated as a borough in 1857. It is in an

agricultural region in which there are deposits of iron and nearby considerable timber. The chief manufacturing establishments are railroad shops, paper mill, iron works, lime kiln, lumber mills, shoe factory, chemical works and candy works. The educational institutions are a high school established in 1878, public and parish schools and a school library. There are sev¬ eral churches. The banks have a combined capital of over $400,000. The government is vested in a burgess and a council of 14 members who hold office for two years. Pop. 9,084.

TYROTOXICON, or CHEESE POI¬ SON, a ptomaine or poisonous principle pro¬ duced in cheese and in milk by putrefaction, and the usual cause of the poisonous symptoms sometimes following the eating of ice-cream and other milk or cream preparations. The name was first bestowed by Kuhn of Leipzig,, in 1824 on the poisonous principle in putrefied cheese, and by Vaughan of Michigan in 1885 on the alkaloid that he obtained by evaporating an acidulated aqueous and etherized extract of the poisoned cheese. Tyrotoxicon poisoning is accompanied by intense pain, nausea, diarrhoea, throat constriction and weakening of the heart's action. Prompt treatment should be rendered in the form of emetics, or saline purgatives, and tonics to stimulate the heart's action. See Ptomaines.

TYRRELL, George, British Catholic theo¬ logian : b. Dublin, 1861 ; d. London, 1909. He was educated at Trinity College, entered the Catholic Church (1880), became a Jesuit priest (1891) and was appointed instructor in philos¬ ophy at Saint Mary's College, England (1896). He was expelled from the Jesuit order (1906) for doctrinal reasons and was excommunicated a few years later for criticizing the Pope's encyclical on modernism. In 1908 he was at¬ tacked by Cardinal Mercier and replied in a volume called ediaevalismP Among his pub¬ lications was Christianity at the Cross Roads) (1909). Consult Egerton, H., (Father Tyrrell's Modernism (London 1909) ; Petre, M. D., (Autobiography and Life of George TyrrelP (2 vols., London 1912).

TYRRELL, James Williams, Canadian

civil engineer: b. Weston, Ontario, 10 May 1863. He took his degree as civil engineer at Toronto University in 1889 but before this date was topographer of the Geological Survey of Canada. In 1885 he

joined the Hudsons Bay expedition and was employed in that work on the steamer Alert until 1886. He practised his profession in Hamilton, Ontario (1889-93), ac¬ companied his brother as Eskimo interpreter on an expedition from Lake Athabasca through the Barren Lands to Chesterfield Inlet (1893), and was engaged by the government to survey the country between Great Slave Lake and Hud¬ sons Bay (1900). He was elected president of the Ontario Land Surveyors' Association in 1905, gazetted lieutenant of the Corps of Guides (1907) and promoted to be captain (1910). He has published books on his travels.

TYRRELL, Joseph Burr, Canadian geolo¬ gist : b. Weston, Ontario, 1 Nov. 1858. He was graduated at Toronto University in 1880 and at Victoria University (B.Sc.) in 1889. He was appointed to the Canadian Geological Sur¬ vey staff in 1881. He accompanied the Daw-

son Survey of the Rocky Mountains (1883) and began the exploration of the country north of Calgary between the Bow and Saskatchewan rivers (1884-87). He continued his explora¬ tions in the Hudsons Bay country for years and in 1895 he retired after being promoted to a captaincy in the Governor-General's Foot Guard. In 1908 he offered a prize for the best collection of minerals and was elected presi¬ dent of the Canadian Institute (1910, 1911). He is the author of numerous scientific papers.

TYRRELL, tir'el, Robert Yelverton,

Irish classical scholar: b. Ballingarry, Tipperary, 21 Jan. 1844; d. 1914. He was graduated at Trinity College, Dublin, where he became a Fellow in 1868, professor of Latin in 1871, and regius professor of Greek in 1880. In 1898 he became professor of ancient history and after 1904 served as registrar. He is the author of (Bacchae of Euripides-* (1891) ; Correspond¬ ence of Cicero5 (1879-1900); (Acharnians of Aristophanes in English Verse5 (1883) ; (Miles Gloriosus of Plautus5 (2d ed., 1886) ; (Sopho¬ cles5 (1897) ; an (Anthology of Latin Poetry5 (1893) ; (A Second Anthology5 (1901) ;

(Echoes of Kottabos5 (1906), with Sir E. Sulli¬ van; (Essays in Greek Literature5 (1909).

TYRRHENIAN (ti-rem-an) SEA, that

portion of the Mediterranean Sea which is en¬ closed between Sardinia, Sicily and the Italian peninsula.

TYRTiEUS, ter-te'us, Greek poet who flourished about 630 b.c. His birthplace is un¬ known. In the war between the Lacedaemon¬ ians and Messenians, the former applied to the Athenians for a general ; and the latter, it is said, in derision, sent them Tyrtaeus. The bard, however, so inspired the Spartans by his war¬ like songs, that they reduced the Messenians to subjection. He was accordingly treated with great respect, and received the rights of citizen¬ ship. Some fragments of his songs are extant. His poems are in Greek elegiac metre and in the time of the Hanoverian monarchy were translated into English and disseminated throughout the army for the purpose of foster¬ ing the warlike ardor of the soldiers. Consult Bergk, Coetse Lyrici Grseci5 (Vol. II, 5th ed., Leipzig 1914).

TYSON, George Edgar, American Arctic explorer: fi. New Jersey, 1829; d. 1906. He sailed with the Polaris American polar expedi¬ tion (1871) and when wrecked in Smith Sound he assumed command of the party until they were rescued by the sealer Tigress (1873). They had drifted with the ice pack fully 1,800 miles in the 196 days in which Tyson had kept the party together under the most trying cir¬ cumstances. Consult Blake's (Arctic Experi¬ ences5 (New York 1874).

TYSON, James, American pathologist: b. Philadelphia, 26 Oct. 1841 ; d. 26 Feb. 1919. Graduated at Harvard, 1860; took his M.D. at the University of Pennsylvania in 1863. He was professor of pathology and mor¬ bid anatomy (1876-89), professor of the prac¬ tice of medicine (1899-1910) and thereafter professor emeritus of the University of Penn¬ sylvania. He was president of the College of Physicians of Philadelphia (1907-10) and the author of numerous medical works of high

reputation, dealing chiefly with the cell theory and diabetes.

TYTLER, tit'ler, Patrick Fraser, Scottish historical writer: b. Edinburgh, 30 Aug. 1791; d. Malvern, England, 24 Dec. 1849. He was educated at the University of Edinburgh, and in 1813 was admitted to the bar of Scotland. In 1837 he removed to London, where he de¬ voted himself exclusively to historical writing and other literary pursuits. His (History of Scotland,5 begun in 1828, was completed in 1843, and was accepted as a standard work. He was also the author of (Life of James Crichton of Cluny, commonly called the Ad¬ mirable Crichton5 (1819) ; (Life and Writings of Sir Thomas Craig of Riccarton5 (1823) ; (Life of John WiclifF5 (1826) ; (Lives of Scot¬ tish Worthies5

(1831-32) ; historical View of the Progress of Discovery on the more North¬ ern Coasts of America5 (1832) ; (Life of Sir Walter Raleigh5 (1833); (Life of King Henry VIII5 (1837) ; (England under the Reigns of Edward VI and Mary5 (1839). He was granted a civil pension of £200 a year. Consult Burgon, J. W., (Life of Patrick Fraser Tytler5 (London

1859).

TYTLER, Sarah. See Keddie, Henrietta.

TYUYAMUNITE, tyu-ya:moon-ite, canary-yellow hydrous calcium-uranium vana¬ date, CaOˆUChWCLSCHaO ; occurs with car- notite, the most important of the radium miner¬ als as mined at various localities i.n Utah.

TZANA, tsa'na, Lake. See Dembea.

TZE-HSI, tze-she, empress dowager of China: b. Peking, 1835; d. 15 Nov. 1908. She was selected for the imperial harem when but 16 and by study and good fortune in her 26th year became the virtual ruler of China. She had an abundance of political wisdom which led to her selection of Li Hung Chang as her chief adviser. She was unable to prevent the Boxer Rebellion but its tragic results taught her a lesson and thereafter she encouraged the modernizing of China. It was largely through her influence that the country threw off the curse of opium. She was an ambitious woman but remarkably patriotic and her good deeds far surpassed the evil credited to her time. Consult Bland and Backhouse, (China under the Empress Dowager5 (Philadelphia 1910) ; Sergeant, P. W., (The Great Empress Dowa¬ ger5 (New York 1911), etc.

TZETZE, tset'se, a musical instrument of the guitar kind, formed of a long carved neck attached to a gourd. It has one string usually made of the tough fibre of a palm tree. The tzetze is of Abyssinian origin.

TZETZES, tset'sez, Johannes, a Byzantine author of the 12th century. His (Chiliades,5 a very dull collection of 30,000 Apolitical iambics,55 whose theme is stories drawn from Greek his¬ tory and mythology, has been edited by Kiess¬ ling (Leipzig 1826) ; his (Iliaca,5 a resume of Homer's (Iliad5 and kindred poems, by Bekker (1816). Commentaries on Homer, Hesiod, the (Plutus5 of Aristophanes and Lycophron's (Alexandra5 (ed. by Muller 1811), make up the remaining works of Tzetzes. Consult Krum- bracker, K., (Geschichte der byzantinischen Litteratur5 (2d ed., Munich 1897) and Spelt- hahn,

H., (Studien zu den Chiliades des Johannes Tzetzes5 (ib. 1904).

u

Uthe twenty-first letter and fifth vowel of the English alphabet. Its form in the Latin alphabet was V. In the Greek alphabet the character T repre¬ sented a vowel sound different from that represented by the Latin V (the vowel v or u) ; probably this Greek letter stood for a sound like that of u in French, which in German is represented by u; and the Greeks had no single character in their alphabet to represent the pure and simple vowel sound which u had in Latin and has in modern European lan¬ guages except English and French: this vowel sound the Greeks represented by the digraph ov as it is usually represented in English by the digraph oo; and in French by on. When a Greek word containing v was to be translated into Latin the v was represented by y, and the same is still done in English : Thoukydides (dovKvdidr/g) and tvxv become Thucydides and Tyche. In the Latin alphabet the vowel u (oo) and the consonant u (or w, or v) were both represented by V, and not till late in the 16th century was the form V restricted to the consonant element. The sound of u (oo, not as named in English, yu) is produced -by rounding the lips to the fullest extent consistent with a clear vowel sound and raising the back of the tongue higher than for any other rounded sound. This sound, short, is heard in full, and long in fool; and it is commonly represented in English by that digraph oo; in French it is represented by on, but in the rest of the Euro¬ pean alphabets by u. The fact that the primitive vowel sound u is expressed in English by oo is an indication that at one time the o-sound had a tendency to pass into the sound of u : thus good, foode, once were gode, fode. Be¬ sides the related sounds heard in too and full, u represents in English two other sounds, namely, the vowel sound heard in tub, but, and the diph¬ thongal sound heard in use, repute. The sound of u in but, tub is especially common in Eng¬ lish, and in unaccented syllables is represented also by other vowels, as a, e and o ; examples every, common, fashion, which might be writ¬ ten evury, commun, fashun. U is consonantal after g and in some other places. It is silent in such words as guard, build, etc. Gu in French and in English words derived from the French is often derived from a Germanic w. The letter u in Chaucer's time was pronounced like French u in words derived from the French ; and Sir John Cheke, writing 200 years after Chaucer, declares that in his day the u in duke, lute, rebuke was sounded <(like the Greek upsilon,® that is, like the French u. U stands for uranium in chemistry. See Alphabet.

UARAYCU, ooa-ri'koo, a tribe on the lower reaches of the Jura River in western Brazil.

They are known for their peculiar customs, notably those for testing the fortitude of their children and for betrothal in childhood. They burn their dead and bury the ashes in their huts.

UARDA, by George Ebers. Two genera¬ tions of German children, and a good many of their fellows in other lands, have had their first taste of Egyptian history and folklore through the medium of George Ebers' histori¬ cal romance, (Uarda) (1877) and its compan¬ ion-piece, (An Egyptian Princess. > Ebers, who was an Egyptologist of distinction, made a great point of the accuracy of his description of religious rites, science, warfare, dress, man¬ ners and customs ; and yet, except to the young, (Uarda) carries no illusion of ancient times because the characters themselves think and feel as moderns do. Uarda is a story of the time of Rameses II and the hero is Pen-

taur, the priest and epic poet.

•

UAUPES, wa-6-pas', Colombia, a river ris¬ ing in the eastern cordillera of the Colombian Andes, and flowing southeastward to the Rio Negro, which it joins in the northwestern cor¬ ner of Brazil. Length about 700 miles. The lower course of the stream is navigable.

UBANGI, oo-bang'ge, or MOBANGI, moˆ bang'ge, a river of Equatorial Africa, a tribu¬ tary on the right bank of the Kongo, which it enters in lat. 0° 30′ S. It is the lower course of the Welle or Makua, which has its sources to the north of Lake Albert Nyanza. It is navigable, but there are difficult rapids at Zongo in 40° 20′ N. Throughout a large part of its course down to its confluence with the Kongo it forms the boundary between the Belgian Kongo and French Equatorial Africa. By means of the Kongo and the Ubangi it is possi¬ ble to go from the coast of the Belgian Kongo almost to the Nile Valley. The basin of the river is very fertile and more thickly popu¬ lated than most other parts of central Africa. The part of the river known as the Welle was discovered by Schweinfurth in 1870; other por¬ tions were successively explored by Junker (1880), Hanssens (1884), Grenfell (1886) and others, and about 1890 the several parts were identified as belonging to the Ubangi. Consult Wauters, A. J., (Les bassins de l'Ubangi et de la Sanga5 (Brussels 1902).

UBERTI, oo-ber'tc, Bonifazio degli, Ital¬ ian poet: b. Pisa, about 1309; d. after 1368. He belonged to the noble family of Uberti, his grandfather having been a leader of the Flor¬ entine Ghibellines, and spent much of his time in exile. His ˆittamondo,* an unfinished di¬

dactic poem in the style of the (Divine Comedy) of Dante, placed him among the celebrated

writers of the Italian Renaissance. His lyrical poems received much later recognition. Con¬ sult (Dittamondo) (Milan 1826) ; Pellizzari, (I1 Dittamondo e la Divina Commedia) (Pisa 1905) ; Renier, R., (Le liriche edite e inedite di Fazio degli UbertP (Florence 1883) ; Whit¬ more, (Fazio degli Uberti as a Lyric Poet) (in Romantic Review , New York 1914).

UBIQUARIAN, u-bi-kwa ri-an, or UBI- QUITARIAN, a believer in the doctrine that the body of Christ, in virtue of the hypostatic union of his divine and human natures, is every¬ where — in Latin, ubique. The opinion was held by individual theologians in the 10th and suc¬ ceeding centuries, foremost among them the re¬ nowned English schoolman William of Ock¬ ham in the 14th : Christ's body after his resur¬ rection, he held, is ubiquitous. In the confer¬ ence at Marburg of Luther and Melanchthon with Zwingli and (Ecolampadius, Luther ex¬ plained in this way the true, real, corporeal presence of Christ in the Eucharist; and in the authoritative Formula of Concord (1577) the doctrine of the ubiquity of Christ's human¬ ity is expressly taught. But after Luther's death Melanchthon and other leaders repudi¬ ated Luther's doctrine of consubstantiation, while Brentius and Andrese defended it as an article of Lutheran orthodoxy. See Consub¬ stantiation ; Transubstantiation.

UCAYALE, oo-ki-a'la, or UCAYALI,

Peru, a river flowing northward through the eastern part of the country, and joining in long. 73° 20′ W. the Amazon, of which it has sometimes been regarded as the true upper course. Its main headstream, the Apurimac, rises in the mountains 115 miles northwest of Lake Titicaca, and another headstream, the Mataro, comes within 100 miles of the Pacific Coast opposite Lima and over 13,000 feet above sea-level. The headstreams water the most populous districts of Peru, but the main course lies in the wild, forest-covered lowlands. It has a length of about 1,500 miles, more than half of which is navigable for steamers. Its principal affluent is the Pachitea which is navi¬ gable to a point about 300 miles distant from Lima.

UCCELLO, oo-cheTlo (Paolo di Dono), Italian painter: b. Florence, 1397; d. there, 1479. He began as a goldsmith and worker in metal, assisting Lorenzo Ghiberti (q.v.) in the first pair of gates made by the latter for the bap¬ tistery at Florence. His name of Uccello UBird®) was given to him from the number of birds he kept as models for his pictures. Among the few works of his which have survived is a heroic-sized equestrian figure of Sir John Hawk- wood in the cathedral at Florence, painted in terra verde (q.v.). In the Louvre there is a picture of his which is principally interesting from the fact that it contains life-sized portraits of Giotto, Donatello, Brunelleschi, Manetti and Uccello himself. In S. Maria Novella is a num¬ ber of frescoes depicting scenes from Genesis and his (Battle of San Romano) is preserved in the Uffizi. The Metropolitan Museum, New York, contains his (Man and Woman of Porti- nari Family. > Consult Berenson, Bernhard, Florentine Painters of the Renaissance) (3d ed., New York 1909).

UCHEAN, u'che-an (adapted from Uchee or Y uchee), a linguistic stock of North Ameri¬ can Indians who, in the 16th century, lived on both sides of the Savannah River as far as its mouth in South Carolina and Georgia. They are supposed to be identical with the ((Cotifach-iqui® of De Soto's chroniclers, whose principal settlement was at the site of Silver Bluff on the Savannah, in Barnwell County, S. C. In 1729 a portion of the Yuchees, as the one sur¬ viving member is called, left their old seats and settled among the Lower Creeks on Chattahoochee River, where they established three villages in the neighborhood; and later a Yuchee settlement is mentioned as exist¬ ing on the Lower Tallapoosa, among the Upper Creeks. The tribe finally became practically a part of the Creek confederacy, and on the re¬ moval of the latter to the Indian Territory the Yuchees went with them. The surviving members of the tribe are usually classed as Creeks, but while the latter are doubtless inter¬ married with them, the Yuchees are jealous of their name and tenacious of their position as a tribe.

UCHIDA YASUYA, oo-chee-da ya-soo- ya, Japanese statesman: b. at Kumamoto, February 1865. Educated at the Imperial Uni¬ versity of Tokio and graduate of the College of Law in 1887, he entered the diplomatic serv¬ ice as the attache of the legation in Washing¬ ton, served as secretary in the foreign office in Tokio and of the legations in London and Peking. In 1895 he was made minister resi¬ dent in China. He served in other offices, at home and abroad, until, in 1899, he was made Wee-Minister of Foreign Affairs, and Minister to Peking in 1901-06, ambassador to Vienna 1907 and created baron. He was sent to Washington in 1909 and in 1912 called to be Minister of Foreign Affairs in the Saionji cabi¬ net. He was again dispatched to

Washington as ambassador, a public dinner in his honor being tendered to himself and wife by the Japan Society of New York. In 1916-17 he was ambassador at Petrograd and in 1918 was made Minister of Foreign Affairs in the Hara cabinet.

UCKEWALLISTS, uk-e-wol'ists, a reli¬ gious sect so denominated after the name of its founder, Uke Walles, native of Friesland, who in 1637 published his opinion regarding human salvation. He taught the doctrine of Univer- salism, and held that the period between the birth of Christ and the descent of the Holy Ghost was one of profound spiritual darkness and ignorance, during which the Jews were de¬ prived of divine illumination, and that, there¬ fore, their rejection of the Messiah and their complicity in the Crucifixion would not be visited with the uttermost penalties by Divine Justice. After the death of their founder, the Uckewallists became merged in the Mennonite sect.

UDAIPUR, oo-dl-poor', or ODEYPORE,

India, (1) A northwestern town, capital of a native state of the same name in Rajputana, 70 miles west of Gwalior. It is finely situated beside a lake 2,000 feet above sea-level, con¬ tains a notable royal palace, and exports cotton, indigo, etc. The old fortresses guarding the city are now in a dilapidated condition. Pop.

47,587. (2) The state (called also Mewar),

with an area of 12,756 square miles, came under the protection of Great Britain in 1817, and the raja ranks highest in dignity among the Rajput chiefs. Pop. 1,293,776.

UDAL, the name of a system of land ten¬ ure common in northern Europe before the feudal system. It is now preserved in Orkney and Shetland. The tenure was completed by undisturbed possession and provable by wit¬ nesses before a court. Though dependent on the Crown the incumbent pays only a slight tax known as skat. The tenure has been held by the English Court of Sessions to be equivalent to allodia; and the lands under it have been generally converted into fens. Consult Stubbs, William, Constitutional History of England) (Vol. I, 6th ed., Oxford 1897).

UDALL, u'dal, or UVEDALE, Nicholas,

English scholar and dramatist: b. Hampshire, 1504; d. London, 23 Dec. 1556. He was edu¬ cated at Winchester and Corpus Christi College, Oxford, from which he was graduated in 1524. He is said to have imbibed Lutheran opinions and to have been on this account prevented from getting his M.A. degree until 1534. He now be¬ came headmaster at Eton, a post which he held till 1541, when he was dismissed. He con¬ tinued, however, to hold till 1544 the vicarage of Braintree to which he had been appointed in 1537, and he gained the favor of Catharine Parr, queen of Henry VIII. Under her patron¬ age he translated part of Erasmus' Paraphrase of the New Testament.5 He was also in high favor at the court of Edward VI and held more than one benefice. On the accession of Mary he continued to maintain himself in favor and from 1554 till shortly before his death was head¬ master of Westminster. Udall is now only re¬ membered by his comedy (Ralph Roister Dois- ter,> a somewhat rude work in rhymed verses licensed in 1566 but probably written as early as 1540 and acted by the boys of Saint Mary's Col¬ lege, Eton. Several editions of this earliest of English comedies have since appeared, among them one in Arber's

UDINE, Giovanni da, jo-van'ne da oo- de'ne, Italian painter: b. Udine, Northeast Italy, 1487; d. 1564. He was originally a pupil of Giorgione at Venice and there did much decorative work. Afterward he was associ¬ ated with Raphael in frescoing the loggias of the Vatican and the Villa Farnesina. His work here completed, he returned to Udine in 1527 and painted many pictures for that city and neighboring places, executing the frescoes in Colloredo Castle. He also furnished the de¬ signs for the stained glass windows in the Bibli- oteca Laurenziana at Florence.

UDINE, North Italy, capital of the Udine province (ancient Utina), 83 miles northeast of Venice, forms a kind of double town — an outer and an inner — both surrounded by walls. It contains a castle (now barracks) on an emi¬ nence, a cathedral, archbishop's palace, museum, technical institute, etc. All these structures are of great interest both historically and architec¬ turally. The silk industry is important and there is a considerable trade, especially in flax

and hemp. Leather, metal ware, paper, velvets and silks are manufactured in Udine. The city was the military base of the Italians in the war with Austria 1915-18. Pop. 47,617. On 29 Oct. 1917 the city was occupied by the Austrian armies. See War, European.

UDO, a plant (Aralia cordata) of the ginseng family, native of Japan. The young shoots, after being blanched, are used in much the same

ways as asparagus, also in salads. Udo is grown extensively in Japan and has been introduced into the United States in recent years.

UEBERWEG, u'ber-veg, Friedrich, Ger¬ man philosophical writer : b. Leichlingen, Rhen¬ ish Prussia, 22 Jan. 1826; d. Konigsberg, Prus¬ sia, 9 June 1871. He was educated at Gottingen and at Berlin and in 1862 became extraordinary professor at Konigsberg. He was appointed to the chair of philosophy there in 1867 and re¬ mained in that position until his death. He published (System der Logik und Geschichte der logischen Lehren5 (1857) ; (Ueber die Echt- heit und Zeitfolge der Platonischen Schriften5 (1861) ; (Grundriss der Geschichte der Philoso¬ phic5 (1863), etc. Consult Lange, F. A., Fried¬ rich Ueberweg5 (1871) ; Brasch, Fie Welt und Lebensanschauung Friedrich Ueberweg's nebst einer biographisch-historischen Einleitung5 (Leipzig 1889).

UFA, oo'fa, Russia, (1) capital of the gov¬ ernment of the same name, on the Bielaya, at the confluence of the Ufa, 735 miles east by north of Moscow. It is defended by a citadel; is the see of a bishop and has a number of handsome and regular streets and considerable manufactures and trade. Pop. 103,485. (2)

The government was separated in 1865 from Orenburg; area, 47,130 square miles. On the east, where it is bordered by the southern Urals, the country is mountainous, wooded, provided with excellent pastures and rich in minerals. It is well watered by the Bielaya with its tributaries and has abundance of good arable land. To the west of the capital the country becomes flat and to the south steppes prevail. While very healthful the climate is severe. Copper, coal, iron, petroleum and sulphur are produced in small quantities, mining being yet largely undeveloped. Rye, oats and wheat are extensively grown and dairy farming is ad¬ vanced. Kymiss is an important product. Pop. 2,988,500, comprising about 1,400,000 Russians and the remainder Bashkirs, Meshtcheryaks and Tatars.

UGANDA PROTECTORATE, a British East Africa protectorate lying north of Lake Victoria Nyanza and bounded on the north by the 5th parallel of north latitude, dividing it from the Egyptian Sudan, on the east by Lake Rudolf and the British East Africa Protecto¬ rate, on the south by Victoria Nyanza and East Africa (late German colony) and on the west by the Belgian Kongo. Its total area is 109,119 square miles, including 16,377 square miles of water. For purposes of administration Uganda is divided into five provinces (a) the Eastern province, comprising the districts of Busoga, Bukedi, Teso, Lango, Karamojo and Lobor; (b) Rudolf province, comprising the districts of

Turkwel, Turkana and Dabossa; (3) North¬ ern province, comprising the districts of Bun- yoro, Gulu, Chua and West Nile; (d) the

Western province, comprising the districts of Toro, Ankole and Kigezi ; and (e) Buganda province, with islands in Lake Victoria, com¬ prising the districts of Mengo, Masaka, Mu- bendi and Entebbe. With the exception of the Rudolf province and the districts of Karamojo and Lobor, the whole protectorate is at present under direct administration; but the native kings and chiefs, whose rights are in some cases regulated by treaties, are encouraged to con¬ duct the government of their own subjects. The province of Buganda is recognized as a native kingdom under a kabaka, who is as¬ sisted in the government by three native min¬ isters and the Lukiko, or native assembly. In Buganda and in Bunyoro, Ankole and Toro purely native matters are dealt with by the Lu¬ kiko, but in certain cases there is an appeal to higher courts. For Europeans and non-natives justice is administered by English courts.

Topographically Uganda is greatly diversi¬ fied, having great plains, forests, swamps, des¬ erts and snow-capped heights. Rudolf prov¬ ince is very hot and although it has an elevation of over 2,000 feet it is very barren. The most fertile portion of the protectorate lies to the north of Victoria Nyanza, although the climate here is unhealthful and fraught with malaria. The part adjoining the Belgium Kongo on the west has well-forested hills and fertile plateaus and the climate is healthful. There is a pe¬ culiar native grass, much used by the natives as thatch, which often reaches a height of 12 feet or over. Lions and leopards, antelopes, wild cattle and crocodiles are numerous. Iron ore has been found in several districts and gold has been found in the north. Cotton is now grown in ever-increasing quantity. In March 1917 the total population of Uganda was 2,954,861, comprising 2,950,504 natives, 3,548 Asiatics and 809 Europeans. Among the natives approximately 600,000 belong to the intelligent, civilized Baganda, a race converted to Chris¬ tianity in the 19th century. Education is in the hands of missionary societies, French (Catholic) and English (Anglican), to which the government grants about $6,000 yearly for scholarships for students and teachers. The Bantu languages are spoken by about 1,700,000 natives, a few Kongo pygmies live near the Semliki River, the remainder of the natives are of the Masai, Nilotic or Sudanese stocks. In 1917 the total imports amounted in value to about $6,500,000 and the exports to $5,380,000. The

principal imports were textiles and yarns, $1,600,000; foodstuffs, $700,000; cotton, blankets, $150,000; sacks, $120,000; soap, $122,000; bi¬ cycles, $84,000; petroleum, etc., $75,000; agri¬ cultural implements, $75,000; clothing, $60,000. Exports consisted mainly of cotton, $1,800,000; coffee, $560,000; chillies, $135,000; ghee, $90,- 000; rubber, $29,000.

In 1917 the revenue of the protectorate was $1,577,290 and the expenditure $1,446,540. The headquarters of the British administration is at Entebbe ; the native capital of Uganda is at Mengo, Kampala. Nile steamers from Khar¬ tum ply to Rejaf, which is about eight days' march from Nimule, the northern boundary of the protectorate. A regular steamer service is maintained by the Uganda Railway Administra¬ tion between Kisumu, the railway terminus, and Entebbe, Port Bell and Jinja, all on Lake Vic¬ toria. The Busoga Railway Marine deals with

traffic on Lake Kioga. There is also a steamer and subsidiary craft plying on Lake Albert and the Nile between Butiaba and Nimule. The Busoga Railway, 62 miles long, joins Jinja, on Victoria, to Namasagali, a point on the Nile below the rapids. There are also a railway between Port Bell and Kamfala and a number of motor transports. The protectorate has 1,- 373 miles of telegraph line and there are tele¬ phone exchanges at Entebbe, Kampala and Jinja.

The currency is based on the Indian rupee and consists of silver rupees with a subsidiary coinage of 50- and 25-cent pieces and minor coins of nickel. British sovereigns also are in circulation.

The territories now included in the protec¬ torate came under British influence in 1890 and a portion of them was for a time adminis¬ tered by the British East African Company. In 1894 a British protectorate was declared over the kingdom of Uganda and some of the ad¬ joining territories and the area was gradually extended to the present limits. Speke first vis¬ ited the region in 1862 and in 1875 H. M. Stanley passed through it.

Bibliography. — (Handbook for East Af¬ rica, Uganda and Zanzibar* (Mombasa, an¬ nual) ; Ansorge, W. J., (Under the African Sun) (London 1899) ; Austin, H. H., (With Macdonald in Uganda) (London 1903) ; Cun¬ ningham, J. F., (Uganda and its Peoples* (Lon¬ don 1905) ; Grogan, E. S., and Sharp, A. H., (From the Cape to Cairo* (ib. 1900) ; Kmunke, R., (Quer durch Uganda* (Berlin 1913) ; Koll- mann, P., (The Victoria Nyanza: The Land, the Races and Their Customs* (London 1900) ; Lloyd, A. B., < Uganda to Khartoum * (ib.

1906) ; MacDonald, J. R. L., (Soldiering and Surveying in British East Africa* (ib. 1897) ; Mullins, J. W., (The Wonderful Story of Uganda) (ib. 1904) ; Portal, G., (Mission to Uganda* (ib. 1894) ; Purvis, J. B., (British East Africa and Uganda* (ib. 1909) ; Rolin, (Le droit de l'Uganda* (Brussels 1910) ; Roscoe, J., (The Northern Bantu* (Cambridge 1916) ; Stanley, H. M., (Through the Dark Continent (2 vols., London 1878) ; (Uganda Handbook (annual) ; Wallis, H. R.,

UGOLINO, oo-gd-le'no (DELLA GHE- RARDE.SCA), della ga-rar-des'ka, Count of Donoratico, Italian leader: b. Pisa, about 1220; d. there, March 1289. He was one of the lead¬ ing Ghibellines of Pisa, but, with the purpose of obtaining supreme power in the Pisan re¬ public, entered into a conspiracy with Giovanni Visconti, head of the Guelfs. Banished by his own party, he was later allowed to return. When subsequently Pisa was threatened by the Genoese under Oberto Doria, Ugolino was ap¬ pointed to command the defense. In the battle of Meloria, 6 Aug. 1284, he fled, thus deciding the contest overwhelmingly in favor of the Genoese. Treachery on this occasion has been generally imputed to him, but it has also been asserted that there is no adequate evidence for this view. However that may have been, the Pisans now granted Ugolino his opportunity and by naming him capitano and podesta, at first for one year and later for 10 years, made him practically dictator of the state. Lucca and

Florence joined Genoa for the spoliation of Pisa, but Ugolino, not without extensive ces¬ sions of territory, drew them from the alliance. More fully to obtain the confidence of the Guelfs, he made Nino Visconti associate-podesta. The latter, however, plotted with the Arch¬ bishop Ruggiero Ubaldini for Ugolino's over¬ throw. In July 1288 he was besieged in the Palazzo del Popolo and compelled to surrender. His death by starvation in prison was related by Dante, who, in a passage to which Ugolino owes most of his fame, places him above the Archbishop Ruggiero on the inward margin of the second division of the lowest (ninth) circle of the Inferno. The narrative was para¬ phrased by Chaucer ((Monk's Tale*) and trans¬ lated by Medwin with the assistance of Shelley (consult appendix to Dowden's edition of Shel¬ ley). Consult Del Noce, (Ugolino della Gherar- desca) (1890).

UGRIAN, a term used in ethnology and comparative philology with somewhat different denotations. In ethnology it usually denotes a

group of peoples of Mongolian stock extending from the rivers Ob and Ural in the east to the Baltic and the Danube in the west and south, and is thus an alternative name for Ugro- Finnish or Finno-Hungarian. In the science of language Ugrian, Ugro-Finnish or Finno-Hun¬ garian describes one of the great main branches of the Ural-Altaic (otherwise Turanian) group of languages. The Ugrian languages have no grammatical gender and cases of nouns denot¬ ing locality are richly developed. Possessive suffixes take the place of our possessive pro¬ nouns. The verb has in general but two tenses, one for completed and the other for uncom¬ pleted action. Some of the Ugrian languages, such as Hungarian, have an objective conjuga¬ tion of the verb, in which the personal object is expressed by a suffix. Most of these lan¬ guages have a special negative conjugation, in which the negation is conjugated while the verb remains unaltered. See Finns; Hungary.

UHDE, Fritz von, German historical and genre painter: b. Wolkenburg, Saxony, 22 May 1848; d. 1911. For a while a student in the Dresden Academy, he left the institution to enter the Saxon army, in which he fought dur¬ ing the Franco-Prussian War and became cap¬ tain of cavalry. He resumed art at Munich (1877), but soon went to Paris, where he was a pupil of Munkacsy. After a period of genre- work in the old Dutch style, he turned to sacred subjects, abandoning modern artistic traditions in that field and presenting his themes in a contemporary guise, somewhat after the fashion of the mediaeval painters. This, together with a certain dullness of composition, long pre¬ vented the recognition in many ways due him. His pictures, however, found their way into many German galleries; he obtained several distinctions, including a Munich professorship; and his ideas influenced considerably the trend of German art. Among his works are (Come Lord Jesus, Be Our Guest* (1885; National Gallery, Berlin); (The Last Supper* (1886); (1897) for the Stuttgart Museum; (Richard IIP ; (The Ascen¬ sion (1898); (Woman, Why Weepest Thou?* (1900), for the Vienna Museum; and (Going

Home' (1908). Consult the monograph by Von Ostini (1902) ; Rosentrogen in Klassiker der Kunst (Stuttgart 1908).

UHL, ool, Edwin Fuller, American diplo¬ mat : b. Rush, N. Y., 14 Aug. 1841 ; d. Grand Rapids, Mich., 17 May 1901. He removed with his parents to Michigan in 1844, was graduated from the University of Michigan in 1862 and was admitted to the bar in 1864. He was prose¬ cuting attorney for Washtenaw County in 187 1— 72 and in 1876 removed to Grand Rapids, where he engaged in law practice until his election as mayor of that city in 1890. He was re¬ elected in 1891 and in 1893 he was appointed Assistant Secretary of State. While de facto

Secretary of State during the'illness of Secretary Gresham he was entrusted with the arbitration of the boundary dispute between Brazil and the Argentine Republic. He was Ambassador to Germany in 1896-97 and then resumed his law practice.

UHLAND, oo'lant, Johann Ludwig, Ger¬ man lyric poet: b. Tubingen, 26 April 1787; d. there, 13 Nov. 1862. He studied jurisprudence at Tubingen and was for a time an advocate at Stuttgart, subsequently giving his attention to linguistic pursuits. His earliest poetry dates from 1800 and the first collection of his poems appeared in 1815. In this year also he began to attract attention as a patriotic song-writer in connection with the political changes of the day, particularly those affecting his native state of Wiirttemberg, (Vaterlandische Gedichte) ap¬ pearing in 1816. In 1818 his tragedy, (Ernst, Herzog von Schwaben,* appeared, and in 1819 another drama, (Ludwig der Baier.* His fame, however, rests on his songs and ballads, several of which are among the most renowned in Ger¬ man literature, and are well known in Eng¬ lish through translations by Longfellow. In 1819 he was elected by his native town of Tubin¬ gen, and later by Stuttgart, to the assembly of the states of Wiirttemberg, and in 1830 was ap¬ pointed extraordinary professor of German languages and literature at Tubingen, but re¬ signed this appointment in 1833 to take his place as a representative in the assembly. In 1848 the electoral circle of Tubingen elected him their representative in the German Na¬ tional Assembly. Among his antiquarian works are (Ueber das altfranzosische Epos* (1812) ; (Ueber Walther von der Vogelweide* (1822) ; (Ueber den Mythus der Nordischen Sagenlehre vom Thor) (1836) ; (Alte hoch-und nieder- deutsche Volkslieder* (1844-45; 3d ed., 1892). Consult the edition of his scientific works ed¬ ited by Holland, Keller and Pfeiffer as ˆcrip- ten zur Geschichte der Dichtung und Sage? (1865-72) and the several editions of his poeti¬ cal works entitled ˆGedichte und Dramen.* An edition of his poems, together with his life, was published at Stuttgart in 1863. Consult Bernherdt,

UHLANS, oo'lans or u'lans, a variety of light cavalry introduced into central Europe by

the Tatars. They were armed with sabre, lance and later with pistols. Just under the point of their lances hung gaily colored cloth, meant to frighten the enemy's horses; the lance itself was carried in the left

hand and attached by a strap under the left shoulder. The Uhlans were adopted from the Tatars by the Poles, Austrians, Russians and Prussians. The last- named nation used them with great effect in the Franco-Prussian War, in which they won bril¬ liant victories by their bravery and marvelous activity. In the War of 1914-18 the Uhlans of the Prussian service covered themselves with ignominy by their wanton acts of cruelty, plun¬ der and rapine in the march through Belgium and northern France.

UHRICH, ii-rek (Ger. oo'riH), Jean Jacques Alexis, French soldier: b. Pfalzburg, Lorraine, 15 Feb. 1802; d. Passy, France, 9 Oct. 1886. He was educated at the military academy of Saint Cyr, France, and in 1823 served in the campaign in Spain. He subsequently served in Africa, was appointed brigadier-general in 1862 and in the Crimean War became general of division. In 1862 he became grand officer of the Legion of Honor, and at the outbreak of the Franco-Prussian War was assigned to the command of Strassburg. Notwithstanding the importance of the post it was inadequately gar¬ risoned and fortified, but when the Germans demanded its surrender in August 1870 Uhrich refused. In the bombardment which followed the Germans hurled 200,000 balls and shells into the city, yet its commander stoutly resisted the siege until 27 Sept. 1870, when, convinced of the impossibility of holding the city, he surrendered. His defense won high praise from the German officers and in recognition of his services he was awarded the Grand Cross of the Legion of Honor. He wrote (Documents relatifs au siege de Strasbourg) (1872).

UHRICHSVILLE, u nks-vil, Ohio, village in Tuscarawas County, on the Stillwater Creek, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis a'nd the Baltimore and Ohio rail¬ roads, about 100 miles south of Cleveland and the same distance northeast of Columbus. It was founded in 1833 and was called at first Waterford; the name was changed to Uhrichs- ville in 1839. It is an agricultural and stock-raising region, and in the vicinity are deposits of clay. The chief industrial establishments are connected with clay products as brick, drain-tile and sewer-pipe. There are extensive shipments of clay products, wool and farm and dairy products. The city has several churches, a high school, public graded school and a school library. Coal-mining is extensively carried on. Pop. (1920) 6,428.

UINTAHITE, u-in'ta-hit, a very pure and highly lustrous variety of asphaltum from the Uintah Mountains, Utah. See Gilsonite.

UINTATHERIUM, u-in-ta-the'ri-um, one of the huge horned ungulates of the group Amblypoda , fossil in the Eocene strata of the Uintah

Mountains of northeastern Utah, whence the name ˆUinta-beast® is derived. They were massive, five-toed, rhinoceros-like animals, with heavy heads, an ample dentition, with very large canines, like short tusks, from the upper jaw, and four or more pairs of horns upon the skull,

supported by large cores. Closely allied were Tinoceras, Coryphodon, etc.

UIST, wist, North and South, Scot¬ land, two islands in the Hebrides, south of Harris, and separated from each other by the island of Benbecula. North Uist is about 18 miles long, with a breadth varying from 4 to 10 miles. South Uist is about 21 miles and has a width of about 8 miles. The soil is fertile. Cattle-raising, fishing and agriculture are the chief occupations. Pop. (North Uist) 3,753; (South Uist) 5,109.

UITLANDERS, oit'lan-derz, or OUT- LANDERS, the name given by the Boers, prior to the South African War of 1899-1902, to the foreign residents of the Transvaal, the majority of whom were British subjects attracted by the discovery of gold in 1886. The refusal of the Transvaal government to give them the fran¬ chise resulted in the extinction of the South African Republic. See South African War; Transvaal Colony.

UJI-YAMADA, oo-je-ya-ma-da, the sacred city of Japan, where are the great Shinto shrines, which for over a thousand years have been the centre of national and ancestral wor¬ ship. To this place of peerless sanctity, the emperor, after every important event, sends a message to make announcement to his ancestress, the Sun goddess. Uji and Yamada, formerly separate, form now one municipality, with rail¬ way, electric cars and lights and modern edi¬ fices. It produces lacquer-ware, chopsticks, flutes, paper pouches for tobacco, umbrellas, etc. The shrines, parks and places of interest attract many thousands of pilgrims annually. Pop. 40,357.

UJIJI, oo-je'je, or KAVELE, East Africa, a town in the Ujiji district, situated on the northern part of the east shore of Lake Tan¬ ganyika. It is the principal trading post on the lake, and a station for steamers. It is reached from Dar-es-Salaam on the coast, 743 miles away, by a railway. It was here that Stanley found Livingstone in 1871. Pop. 8,000.

UJJAIN, oo-jln', India, a town in Gwalior, on the Sipra, 350 miles northwest of Bombay. It is six miles in circumference, and was for¬ merly surrounded by a stone wall with round towers. It is the ancient

capital of Malwa and contains Scindia's palace, a poor edifice. It has a considerable trade in opium, cotton and grain. Pop. 39,890.

UJVIDEK, ooy've-dak, Jugo-Slavia. See Neusatz.

UKASE, u-kas', under the empire, a Rus¬ sian term applied to edicts whether legislative or imperial. The term was not extended to the orders of the ministers. Ukases had the force of laws until annulled by subsequent edicts and many such orders were issued in the course of one reign. In 1827 Emperor Nicholas had the great mass of accumulated ukases collected, col¬ lated and codified. This code, called the svod, published in 48 volumes, with the modifications of subsequent ukases codified annually, formed the body of the Russian law until the estab¬ lishment of the Soviet government in November 1917. Imperial orders for a day such as military orders during a campaign were called prikases.

UKIAH, u-ki'a, Cal., city, county-seat of Mendocino County, on the Russian River and on the San Francisco and North Pacific Rail¬ road, about 120 miles northwest of San Fran¬ cisco. It was founded in 1857. It is in an agricul¬ tural and stock-raising region. The industries are connected chiefly with the cultivation and shipment of farm products, hops and fruit. Considerable lumber and livestock are shipped to other markets. The educational institutions are a high school opened in 1893, public and parochial schools. Pop. (1920) 2,305.

UKRAINE, or UKRAINIA ("border land® or "march-land®), a great undetermined region in eastern Europe, embracing most of the southern part of Russia in Europe, East Galicia, Northwest Bukovina and East Czecho¬ slovakia. The territory may be regarded as a geographic unit standing on an equal basis with the regions known as Great Russia, North Russia, the Ural, White Russia and the Baltic provinces. During the early days of the Russian Revolution a Ukrainian Congress was opened at Kiev in April 1917, when the policy was adopted of national territorial autonomy within the future Russian Federal Republic. The boundaries of the new state were to be the Pripet on the north, the Black Sea and the Sea of Azov on the south, the Kuban River on the east and the provinces of Lublin and Grodno on the west. A Rada (central council) was formed, which issued a manifesto of autonomy in June 1917. The advent of Bolshevism altered the situation. On 20 Nov. 1917 the Rada

proclaimed the Ukranian People's Republic, transferred the land to the peasants, defined the limits of the new state and defied the Bolsheviki. The new republic allied itself with Rumania, Bessarabia, the Donetz Cossacks and the anti-Bolshevik General Kaledin. In December Trotzky sent an ultimatum threatening war unless the Rada ceased to bar the passage of the Bolshevik troops. There was considerable fighting be¬ tween the two forces, and on 8 Feb. 1918 the Bolsheviki claimed to be in military and politi¬ cal possession of Ukraine and that the Rada had ceased to exist. But that legislative body had sent a delegation to the Brest-Litovsk Peace Conference and had announced (11 Jan. 1918) that the Ukraine had resumed its international existence as an independent state. The dele¬ gation was ultimately recognized by Trotzky, but when it began negotiations for a separate peace with Germany and Austria, he protested and introduced some Soviet delegates from the Ukraine. The Austro-Germans, however, recognized the Rada delegates as representing an independent state, and at 2 a.m. on 9 Feb. 1918 the Central Powers signed peace with the Ukrainian republic.

Area and Population. — It is not possible as yet to define with any degree of exacti¬ tude the limits, area and population of the Ukraine. Authorities differ on the subject, and at the present time the republic is con¬ ducting a double war against the Poles and the Bolsheviki, the issue of which may re¬ sult in territorial changes. The state roughly corresponds with the three divisions of south¬ ern Russia known as the Southwestern Ter¬ ritory, Little Russia and New Russia, exclud¬ ing the territory of the Don Cossacks. Ac¬ cording to the treaties of Paris (June 1919),

which annulled the Brest-Litovsk and all other Russian treaties concluded by Germany since November 1917, the provisional boundaries of the Ukrainian republic were — on the north, the republic of White Russia; northeast, the Soviet or Bolshevik republic of Russia proper; east, the Don republic ; south, the Sea of Azov, the Tauride (Crimean) republic and the Black Sea; southwest, the reconstituted kingdom of Rumania ; west, the republics of Poland and Czecho-Slovakia. It is divided into the governments of Chernigov, Ekaterinoslav (or Yekaterinoslav), Kharkov, Kherson, Kiev (Kieff), Podolia, Poltova, Taurida and Vol- hynia. These nine governments, cut out of what was Russian territory, cover an area of nearly 200,000 square miles. With the added territory taken from Galicia, Bukovina and Hungary, the total area of Ukraine reaches to about 328,200 square miles, of which the population is estimated at 33,000,000. Too much faith, however, should not -be attached to these vital statistics, as "official® figures are either out of date or unreliable, being

generally compiled in favor of the ruling race, while the estimates of private authorities differ consider¬ ably. In the first complete Russian census (1897) the total number of Ukrainians in the then Russian Empire was given as 22,400,000; an estimate in 1910 showed 28,900,000. In the former Austro-Hungarian Empire about 4,- 000,000 Ukrainians (nominally Ruthenians) dwelt in Galicia, Hungary and the Bukovina in 1910. There are, in addition, some 500,000 Ukrainians in the United States; 300,000 in Canada and over 50,000 in South America. Numerically, this race ranks sixth among the peoples of Europe, the five above them being the Germans, Russians, French, English and Italians. See Ruthenes.

Topography, Etc. — Ukraine covers a varied surface configuration, but on a large scale, not as in western or central Europe confined in a small area, for one may travel hundreds of miles in any direction without encountering any change of scenery. There are landscapes of high and central chains of mountains, pictur¬ esque hill districts and richly cut plateaus, marshy plains and steppes strewn with barrows. The closed group of plateaus extending from the foot of the Carpathians and the Polish part of the Vistula region to the Sea of Azov form the morphological nucleus of the Ukraine. To this group the names of Pontian Plateau and Avratinian Ridge are commonly but erroneously applied. This Ukrainian Plateau group (a more apposite title) is divided into the follow¬ ing sections : The Rostokh, between the San and Bug rivers ; Volin or Volhynian, between the San and the Teterev; Podolia, between the Dniester and the Boh; the Pocutian, or Bessara¬ bian Plateau, between the Dniester and the Pruth; the Dnieper Plateau, between the Boh and the Dnieper. The plateau character con¬ tinues at the rapids section of the last-named river on the left bank where, at some distance, the last member of the plateau group lies — the Donetz Plateau. The plateau group is bordered on the north and south by two plain districts, the former consisting of adjoining lowlands — Pidlassye, Polissye and the Dnieper plain (with their extensions along the Donetz), and the latter of the long stretch of the Pontian

steppe-plain, which merges into the Caspian desert-steppe at the foot of the Caucasus. The Ukraine also takes in part of three European mountain systems — parts of the Carpathians, the little Yaila chain of Crimea and the western parts of the Caucasus. Altogether, more than nine-tenths of the whole territory is taken up by plains and plateaus ;

its western boundary extends beyond the defile of Poprad. The range of the Tatra is visible from the mountain country where the last Ukrainian villages lie. The territory reaches the Prislop Pass in the eastern part of the Carpathians, at that point where they are highest and most developed, though less than one-third of that mountain curve lies within Ukrainian national territory. It is only within the last 25 years that Ukrain¬ ian civilization spread to the Yaila Mountains of Crimea, three parallel ranges barely 100 miles long and separated by longitudinal val¬ leys, along the southeast shores of the penin¬ sula. The southern main range declines to¬ ward the sea in steep precipices, flat and rocky on top and intersected by deep gorges. The Caucasus forms the eastern boundary of the Ukraine and lies like a huge wall of rock be¬ tween Europe and Asia.

Of the plateaus, the Podolian is the highest and most massive, though not lacking in fine scenery. Its surface is covered with a thick crust of loess, of which the uppermost layer has been transformed into the famous black earth (Chornozem) noted for it9 fertility. Centuries of exploitation has diminished the forests with the result that many springs and brooks have dried up and rivers have been almost obliterated, causing serious droughts in the hot, dry summers. The Pocutian-Bes- sarabian Plateau reaches the valleys of the Bistritza and Vorona in the sub-Carpathian region and passes over into the Pontian steppe- plain in the southeast. The western part (Pokutye) has a flat, undulating surface and a number of funnel-shaped depressions called Vertep (caves), famous for their beautiful stalactites of white alabaster. The south¬ eastern or Bessarabian part is divided into nar¬ row marshes by the flat valleys of the Pruth and Reut rivers. The Rostokh Plateau, also known as the Lemberg-Lublin Ridge, is a pro¬ fusely cut, hilly, narrow plateau which merges on the south with the Podolian near Lemberg, where it becomes an erosive hill country. To¬ ward the east it resolves itself into parallel hill ridges which gradually become lower and em¬ brace marshy valleys. The soil is not very fertile owing to extensive sand and marl soil. The Volhynian Plateau is divided into several sections of different size by the swampy low¬ land of the Polissye. The surface soil is black soil only in the south, while many regions of loamy ground are rich in vegetable soil of considerable fertility. The hills have steep de¬ clines and flattened rocky peaks. The valleys of the rivers, broad, flat, with gentle slopes and marshy bottoms, differentiate the landscape from that of the Podolian, presenting a view of flat, wooded hills, slowly-flowing streams, marshes, marshy meadows and sandy ground. The Dnieper Plateau is parted into several sec¬ tions by broad river valleys and broad depres¬ sions which traverse it. Its configuration is varied,

rising south of Berdichiev to 1,000 feet,

sinking constantly lower to the east and south¬ east by irregular stages. To the furthest west is a level plateau, where the tributaries of the Teterev, Irpen and Ross flow slowly in flat valleys through whole rows of ponds, entering the plain between steep granite banks. The declivity of the right bank of the Dnieper is torn by gorges, presenting the appearance of a chain of mountains. The aspect of Kiev and the Shevchenko barrow is one of the most beau¬ tiful in the whole country. Dropping con¬ stantly lower toward the southeast, the land rises again in the region of the source of the Samara and along the Donetz. Here begins the Donetz Plateau, the easternmost member of the group, stretching in a long flat ridge from N.W.W. to S.E.E. and extending a flat side- ridge to either side. The surface is level, declining flatly toward all sides and sprinkled with countless tumuli. The coalfields of the Donetz are the richest in what was once the Russian Empire. Here also are quicksilver mines and great deposits of rock-salt, A number of factories have sprung up in recent years. Zinc, lead, copper and gold are ex¬ tracted.

The principal river system of the Ukraine concentrates in the Black Sea, which receives streams from north, northwest and east. The western boundaries of the country lie on the Baltic slope, while in recent times its coloniza¬ tion has reached parts of the Caspian slope on the Kuma and Terek rivers. The main river is the majestic Dnieper (1,300 miles), affection¬ ately termed (

The Ukrainian climate is of a continental character, assuming an entirely independent character. The central European climatic zone ends at the western borders of the Ukraine, while the more rigorous eastern European con¬ tinental climate, which obtains over all of White

Russia and Great Russia, covers only a small area in the northern Ukrainian territory. Win¬ ter is severe in the entire country, but far less variable than in central Europe or Russia. It is followed by a very short spring of about three weeks except in the northwest, where it is a little longer. The summer heat is consid¬ erable; May is as warm as July in England. Autumn is regularly very beautiful and com¬ paratively warm, though as early as October warm, sunny days are followed by night frosts. In the Crimea, the sub-Caucasian country,

southerly location and the proximity of the sea are apparent ; winters are short and compara¬ tively mild; the summer of five months with high temperature is followed by a long autumn. Mediterranean climatic conditions are found south of the Yaila and Caucasus Mountains. Here, on a narrow strip of land on the Black Sea the winter lasts less than a month ; after a long spring follows a six months' summer, passing imperceptibly into a mild autumn. The dreariest climate is that of the Beskids and the Gorgani in the Ukrainian Carpathians, where a five months' winter and long periods of rainy weather in the spring and autumn encroach upon a short summer. Prevailing west winds bring Atlantic air into northern Ukraine; east winds in the south bear the influences of the Asiatic steppe climate, and sometimes increase to terrific snowstorms, causing great destruction to human and cattle life. Yet in November and December moist, warm south winds fre¬ quently come up from the Pontus, but the freez¬ ing east winds referred to predominate and are responsible for the severe winters in that re¬ gion. East and south winds in the spring fre¬ quently bring heavy sandstorms which in¬ jure the crops. In the summer, however, west, southwest and northwest winds prevail, carrying moist Atlantic air and rain into the entire coun¬ try. Rainfall is less than in central or western Europe, being greatest in the mountain districts. The heaviest falls occur in June.

Consult the invaluable works of Prof. Stephen Rudnitsky, the eminent geographer of the University of Lemberg, Prof. M. Hrushev- sky, president of the Ukrainian Rada and the publications of the Ukrainian National Associa¬ tion and of the Ruthenian National Union, both of New York, for material not elsewhere ac¬ cessible.

Flora and Fauna. — The plant and animal geography of Ukrainia is more varied than that of Russia, for within its borders the three main divisions of European plant geography meet — the Mediterranean division, the steppe region and the forest region, and three mountain re¬ gions. Forests cover barely one-fifth of the country — only the northern and northwestern borderlands, where many swamp forests are to be found. In the forest region are also luxu¬ rious meadows with thick grass and tree clus¬ ters, stretching through wide, flat river valleys. In the swamps regular moors, made up of peat mosses, alternate with meadow moors in which swamp grass and herb vegetation predominate. Practically all the rest of the Ukraine is occu¬ pied by the steppe region, down to the foothills of the Yaila and the Caucasus. The fertile black earth region extends longitudinally through the country, over three-fourths of its area. On the Sea of Azov and in southern vol. 27 — 17

Crimea the brown dry steppe soil, with islands of saline soil and a peculiar vegetation, inclined to absorb salt, prevails. These also occur else¬ where along the rivers and the seashore. Grasses and herbs predominate on the meadow steppes, the former of the stippa species and the other of a lily-like growth. Grass is luxuriant and abundant in the northern part of the steppe region, while high weeds and thistles form dense thickets. In spring the steppe presents the appearance of a gorgeous flower carpet, but the colors soon fade into brown and yellow under heat and drought. This type of vegetation is thinner in the south. Terraces of trees are found along river valleys, and forests of oak, maple, poplar, white beech, wild apple and pear trees are studded over the steppes. The ancient Ukrainians of the Kiev state rooted out great areas of forest and reclaimed the land for civil¬ ization. Greater variety of vegetation is found in the Carpathians, though in regard to flora the country possesses but few endemic species. The fauna differs slightly from that of the rest of Europe. Many species which were danger¬ ous as beasts of prey or useful for food or skins have either been entirely exterminated by man or greatly limited in their multiplication. In the 16th century the Ukraine was so rich in bison, wild horses and deer that these were hunted merely for the sake of their skins, and only the choicest of the flesh retained. The wild horses that once roamed over the steppes in great herds are extinct ; the Sagai antelopes have retreated to the Caspian steppe; the once ubiquitous bear is now confined to the Carpa¬ thians, Caucasus and the Polissye country, in which regions the lynx and wildcat are also found. Throughout the country all sorts of smaller predatory animals have survived, such as wolves, foxes, badgers, martens, polecats. Of the large herbivora the bison has survived in the forest of Biloveza under government protection ; the stag only in the Carpathians and the Caucasus, and the moose-deer only in Pol¬ issye. In the woods are still many boars and roes. The beaver, formerly found on every river in the country, has now retreated to the most inaccessible swamps. Eagles and hawks exist only in the two great ranges; grouse and heath fowl hide in the dense thickets ; cranes and herons are rare ; water fowl, wild ducks, geese, coot and diving birds are still very nu¬ merous. Owing to the absence of scientific pisciculture the former wealth of fish has greatly diminished. Yet much fish is still taken — mainly pike, tench, carp, crucian, shad, etc. Sturgeon, sterlet and other sea fish which for¬ merly came in great swarms up the Dnieper, Dniester and Boh rivers are seldom found to-day.

The domestic animals are the same as in central Europe. Only in the extreme south camels and buffaloes are added. The horned cattle

belong chiefly to the so-called Ukrainian breed, distinguished by its gray color and its size, bony and strong-limbed. Hungarian cattle is widely distributed on the southwest borders. In recent years pure Dutch, Swiss and Tyrol breeds have been spread. The finest horses, the Ukrainian, have been raised by the Zaporog Cossacks and are noted for strength, speed and adaptability for all kinds of work. The Chornomoric variety is raised by the Kuban Cos-

sacks and is prized throughout eastern Europe for its high qualities. Another breed, the Hut- zulian mountain horse, possesses great strength though of small stature, and is unsurpassed for mountain roads. The peasant horses of Galicia, Podolia and Volhynia especially, despite their somewhat clumsy appearance, are particularly adapted for the rough roads of their land. Donkeys and mules are rare, and very few goats are kept. In sheep the Ukraine, thanks to vast pastures, is the richest country in Europe. Besides the native breeds, foreign merino sheep are raised, especially on the steppes. Hogs are raised in great numbers, the Polish, Russian and native varieties. In barn¬ yard fowl the Ukraine is the richest land in eastern Europe. Much honey is also produced, besides mulberry leaves, though the silkworm industry is unimportant.

Ethnography. — The Ukrainians are a Slav race which diverged from the common stock at a very early period and developed during the centuries into an entirely independent Slav na¬ tion, just as Poles, Czechs, Serbs and Bulgars have done. Of that great family the Ukrain¬ ians form the second largest branch. Their nearest relations are the Ruthenes (q.v.), who are true Ukrainians who had long been incor¬ porated in the Austrian Empire and lived under Hapsburg and Hungarian rule, but temporarily reunited with the mother-country as a result of the European War. The old Ukrainian Em¬ pire of Kiev was as old as the Holy Roman Empire of the German nation, but while the political evolution of the western European na¬ tions was proceeding, the Ukrainians were hin¬ dered by reason of their geographical situation at the western portals of Asia, where they were subject to Mongolian invasion. Though a mixed race, its formation took place in a dis¬ tant prehistoric past, while later admixtures were too insignificant to change the type ma¬ terially. From the Vislok to the Kuban and from the Pripet to the Black Sea, the Ukrainian people constitute a uniform anthropological type, which has preserved itself in its purest state in one wide zone embracing the Ukrainian

Carpathian lands, Pokutye, Podolia, the Dnieper Plateau and Plain, the Donetz Plateau and the Kuban sub-Caucasus country. Tall of stature, with long legs and broad shoulders, strongly tinted complexions, dark, thick, curly hair, rounded head and long face with a high and broad brow, dark eyes, straight nose, medium mouth and small ears, with strongly, developed lower face — these characteristics differentiate the Ukrainians from their neighbors, especially the White and Great Russians and the Poles. They are among the tallest peoples of Europe ; the finest physical types are those of the Kuban and sub-Caucasus, descended from the Zaporog Cossacks, who for centuries represented the flower of the people's strength. Under the old regime many of the Russian Ukrainians were enrolled in the guard regiments of the tsars. See Slavs.

Language and Literature. — There had long been an impression that the Ukrainian language was a rural dialect of Polish, while Russian bureaucracy consistently encouraged the view that it was merely a Little Russian dialect of the Great Russian language. In recent times, however, the more scientific philologists have

arrived at the conclusion that Ukrainian is not a dialect of Russian, but an independent lan¬ guage of equal rank with Russian, related thereto just as Bulgarian or Serbian, Polish or Bo¬ hemian. Two close analogies may be found in the Latin and Teutonic languages, e.g., Spanish and Rumanian are Latin languages, but are not Latin dialects; Flemish, Swedish and Dutch are Teutonic languages, but not German ˆdialects.® When the first Duma in 1905 removed the re¬ strictions on Little Russian publications which had been imposed in 1876, the Saint Petersburg Academy of Sciences emphatically declared that the two were independent languages of equal rank, as, for instance, English and French. To the Ukrainian, Russian is a foreign tongue and difficult to acquire. There are four dia¬ lects of Ukrainian — the North and South Ukrainian, the Galician or Red Russian and the Carpathian Mountain dialect. These are again subdivided into idioms, of which the North con¬ tains four, the South three, the Galician two and the Carpathian four, though all of them differ but little from each other. Despite many years of rigorous suppression, the Ukrainian language has been kept alive in all its richness, flexibility, euphony, comparative purity and wide range of expression.

Among Slavonic literatures only those of the Russians and Poles surpass tne Ukrain¬ ian, which possesses a large store of popular poetry, epic folklore and pre-Christian religious and secular songs. This literature has been built up during nearly a thousand years, dating from the flourishing days of the Kiev Empire and surviving

through five centuries of unre¬ mitting struggle against Tatar barbarism. Yet from those dark ages there remain legal, theo¬ logical, philosophical, polemic and even dra¬ matic monuments of literature composed in a jumbled macaronic language of mixed Church-Slavonic and Ukrainian. The impetus for a revival of Ukrainian literature was given by Kotlarevsky in 1798 through introducing the pure popular speech in his writings. A large number of poets and prose writers rose to more than local fame during the 19th century, chief among them being Kobylanska, Stefanyk, Vov- chok, Shevchenko, Kulish, Fedkovich,' Franko, Mirni, Kotsiubinsky and Vinnichenko. Science has also made considerable progress, as also have history, geography and philosophy, while two learned societies have been established at Lemberg and Kiev. The circulation of Ukrain¬ ian literature was forbidden by former Rus¬ sian governments in the territories under their rule.

Agriculture.— Nearly 90 per cent of the people are engaged in agriculture in the Ukraine, which is fitted by nature to be one of the most valuable food-producing regions in the world. Owing to lack of education in scientific methods, however, agriculture is still in a very backward condition. Better conditions prevail in the western borderlands, where regular n> tations of crops, artificial fertilizing and irm proved machinery have considerably raised the volume of produce with less. expenditure of hu- man energy. Agricultural co-operative associa¬ tions are spreading branches over the country and performing useful work to raise the level of husbandry by means of tuition, advice and assistance. Under foreign rule much of the

land has accumulated in the hands of alien land- owners, while the native peasant had perforce to be content with the less valuable ((leavings.)) While the great landlords grew wealthier the peasants grew poorer and were for many years compelled to seek homes elsewhere, in Siberia, Turkestan, Caucasia and further afield in the American continents. The Russian community system of land ownership existing in parts has not proved conducive to encouraging labor on land which the actual tiller cannot call his own. Despite all these obstacles the Ukraine remains the greatest grain-producing country of Europe, excepting Russia. Wheat, rye, barley, oats, buckwheat, millet, Indian corn, beans, lentils, fodder, hemp, flax, sunflowers, rapeseed, poppy, sugar-beet in enormous quantities, tobacco, all kinds of vegetables and fruits, grape-vine in parts, etc., are

raised in the Ukraine, besides which there is also a flourishing cattle-raising industry. See Flora and Fauna.

Minerals, Etc. — Some mention has been made of mineral deposits found in Ukraine. (See Topography) . The more important items are iron, mercury and manganese. The only im¬ portant coalfield is situated in the Donetz Pla¬ teau, and is one of the largest and richest in Europe. In petroleum and ozokerite the Ukraine is richer than any other European country. There are large peat deposits await¬ ing exploitation ; salt production has grown to great proportions from the immense deposits in salt springs and lakes and mines of pure rock-salt. Other natural treasures include phos¬ phorites, containing from 70 to 75 per cent phosphoric acid ; kaolin or porcelain clay and fireproof clays; slate, lithographic stone, mineral paints, sulphur, pumice-stone, mill-stones, whet¬ stones, chalk, gypsum, building stones, Devonian sandstone and granite gneisses, etc.

Manufactures. — Until recent years home in¬ dustries predominated in the Ukraine, weaving being the most important. The steady en¬ croachment of the factory system and introduc¬ tion of machinery are gradually displacing many of the domestic industries, though among the latter that of producing cloth, woolens, linen, carpets, tapestries, etc., is still carried on throughout the country, where weavers may be found in almost every village, especially in Galicia. Rope, cordage and nets are produced in large quantities, while the wood-working in¬ dustry comes second to the textile craft in mag¬ nitude. It includes carpentering, cabinet-making, cooperage, shipbuilding, wagon-building, turn¬ ing, carving, ornamental boxes and picture- frame making. Basket-weaving, shoemaking, pottery, brick-making, stone-cutting and metal working are trades located in districts where the soil provides the raw materials. Leather is abundant and prepared in flourishing tanneries ; horn combs, buttons and other small articles are made for export as well as home consumption. There are also numerous families devoted to painting sacred pictures. Among the many other branches of industries are those of pe¬ troleum refining, sugar manufacturing and re¬ fining alcohol distillation, beer brewing, milling, cotton and hemp production; lumber, iron and steel, cement, tiles, matches, cork and paper are worked or manufactured to a large extent by foreign capitalists.

The trade and commerce of the Ukraine are

still in a backward condition ; what there is rests almost exclusively in foreign hands, Rus¬ sians, Greeks, Armenians and Jews. Native competition against these more expert traders is as yet out of the

question owing to the ab¬ sence of educational opportunities. Another powerful drawback is the primitive condition of the means of communication in eastern Europe, which restricts or localizes most of the trade to small annual fairs, of which some 4,000 are held. The paucity of railroads and the bad state of the public highways render transport slow and difficult for horses and carts. Within recent years, however, some attempts at com¬ mercial organization have been made by the creation of exchanges and chambers of com¬ merce in the principal centres to promote the exportation of raw materials. Since home in¬ dustry covers the greatest part of domestic de¬ mand, the extent of foreign imports of manu¬ factured goods is very small compared with the great export of foodstuffs which crosses the Ukrainian borders. Under the Russian regime the national resources of the Ukraine were ex¬ ported in enormous quantities to other parts of the empire, while the Ukraine region was flooded with the inferior goods of central Rus¬ sian industry. At the same time an annual customs balance of about $100,000,000 went to the central government from the Ukraine to be used for the development of the central prov¬ inces. In addition to this serious drain the Ukraine raised about one-third of Russia's total cattle supply, five-sixths of the empire's total sugar-beet output, 60 per cent of the whole coal production and one-sixth of the world's manganese supply. Yet with all this boundless natural wealth which his country provided, the Ukrainian peasant was left in grinding poverty, illiteracy and lack of proper clothing; he sup¬ plied the necessary manual labor in return for a pittance inadequate to maintain a decent ex¬ istence. Centuries of oppression and political dependence resulted only in hindering the ma¬ terial and spiritual development of one of the naturally wealthiest countries in the world.

Cities, Towns and Settlements. — The largest city and most important seaport of the Ukraine is Odessa ,(q.v.) , situated on a deep, open roadstead 20 miles north of the Dniester outlet. Kiev (q.v.), with over 500,000 inhab¬ itants, comes next. It was the capital of the ancient Ukrainian kingdom and its spiritual cen¬ tre; it is still called the Jerusalem of the na¬ tion. Other populous settlements are Kharkov, Chernigov, Ekaterinoslav and Zhitomir. See Russia ; Galicia ; Poland.

History. — The historical life of the Ukrai¬ nian nation has differed entirely from that of the Russians or the Poles. Its roots lie in. the ancient kingdom of Kiev, called ((01d Russia® in the history books, and which formed a state erected by the southern group of the Eastern Slavic races, particularly by the Polan race around Kiev. A government existed early in the 9th century, and in 988 a.d. Greek Chris¬ tianity was accepted by Vladimir the Great, the (

spread northward and eastward. During the 13th century the Tatar invasion under Genghiz Khan brought disaster to Ukrainia : Kiev and other cities fell in flames, the plains were deso¬ lated and thousands of the people were carried into captivity. Of the remainder, those who were not killed either starved to death or sought refuge in Galicia. After the barbarian wave receded, the fugitives or their descend¬ ants returned to their motherland, but in the meantime ether Slav states had risen on the north. These latter coveted the fertile plains of the south and possessed the strength to bring them under their sway. The first of these states to exercise control over Ukrainia was Lithuania (q.v.), which ruled the land for 200 years, not without some justice and modera¬ tion. After 1569, however, Lithuania became united with Poland, and with the advent of the latter state to a predominant position in the union, the sorrows of the Ukraine increased under oppression and led to the inevitable re¬ volt. Though Poland ruled with an iron rod, she was too weak, even together with Lithu¬ ania, to defend the Ukrainians against the sporadic raids of the Tatars, who issued from the Crimea, carried devastation as far as Gali¬ cia and Volhynia, and depopulated the region by the seizure of slaves and slaughter. This perennial warfare on the border forced the Ukrainians to take independent defensive meas¬ ures. The farmers, hunters and fishermen on the marshy borders carried arms and led a pre¬ carious, half-industrial, half-military existence. They called themselves Kazaks (Cossacks), i.e., free warriors. These Ukrainian Cossacks created a military state organization in the 16th century around a strongly fortified position be¬ low the rapids of the Dnieper, the Zaporog Sich. Some notable features distinguished the Zapo¬ rog warrior state — absolute, democratic equal¬ ity, obligatory celibacy and duly elected officials. In wartime Unlimited power was vested in the highest official, the ataman or hetman, who then for the time being exerted the dictatorial sway of an autocrat. The Zaporog Cossacks were regarded by the entire Ukrainian people as their natural defenders alike against Tatar marauder and Polish political taskmaster. About the middle of the 17th century there was born the ((Ukrainian problem® which lasted un¬ til near the close of the great European War in 1918. Toward the end of the 16th century the prevailing discontent led to a number of Cos¬ sack insurrections, culminating in the great Ukrainian revolution in 1648. After 100 years' constant struggle for liberation the Ukrainians threw off the Polish yoke, led by their hetman, the doughty Bogdan Khmelnyzki. Feeling itself unable to stand alone, the Ukrai¬ nian National Council (the Rada) made a

treaty in 1654 with the Tsar Alexis of Muscovy, father of Peter the Great. That treaty brought the Ukrainians, figuratively speaking, out of the Polish frying-pan into the Russian fire, wherein they remained over 250 years. The treaty pro¬ vided that the Ukraine should retain complete autonomy as well as their Cossack organization,, the latter under their duly-elected hetman, with the right to conduct an independent foreign pol¬ icy, while the military should stand under Rus¬ sian suzerainty. But if the Ukrainian demo¬ cratic ideals and form of government had been formerly obnoxious to aristocratic Poland, they

were a still greater abomination to autocratic Russia. Three years after the signing of the treaty the liberator hetman died (1657) and Russia took the first steps toward crushing the national sentiments of the Ukrainian people and obliterating their democratic institutions. The incompetence of successive hetmans, jealousy and prejudice among Cossack officers, and the animosity of the poorer classes against the wealthy opened wide breaches into the na¬ tional solidarity, which Russian officialdom did not fail to profit by. The autonomy of the Ukraine was gradually whittled away until, by the Peace of Andrussovo in 1667 with Poland, the country was split into two portions, one, that nearest to Poland, was ceded to that coun¬ try, and the other, east of the Dnieper, was sup¬ pressed with unspeakable ferocity by Peter the Great after the failure of Mazeppa and the bat¬ tle of Poltava. Ukrainia, as a nation, ceased to exist; the Zaporog Sich managed to exist till 1775, when it was destroyed; the people became serfs under the process of Russification and re¬ pression — a fate which also befell Poland a few years later, when the whole of that country, with the exception of Eastern Galicia and the Buko- vina, which fell to Austria, was absorbed by Russia (1795). From this division of the coun¬ try rose a dual Ukrainian problem — that of the Ukrainians under Russia and of the remainder under Austria, in which latter they fell under the domination of the Polish element in Galicia. Here even the name “Ukrainians® was super¬ seded by that of “Ruthenes® (q.v.). In Rus¬ sian territory the Ukrainians were officially des¬ ignated as Russians and their language as a patois of Russian.

From this stage the history of the two sev¬ ered portions of the Ukraine form part of the history of Russia or of Austria. But about the middle of the 19th century the Austrian government adopted a new attitude toward Galicia, intended to check Polish preponderance and to reduce the pressure of Russia on the east. This policy consisted in encouraging the ideal of Ukrainian independence, with the ob¬ ject of creating a powerful or at least a large buffer state by reviving the

Ukrainian nation, in other words, uniting the Ruthenes with their brethren on Russian territory. Ruthenianism was fostered in Galicia by the foundation of professorships at Lemberg and the wholesale production of Ukrainian propaganda literature, which was circulated on the Russian side of the frontier. Toward the end of the 19th cen¬ tury the Ruthenians came to blows with their Polish overlords in Galicia, a conflict which the Austrian government could do little to sup¬ press. In 1902 a general strike of Ruthenians broke cut with the demand that Eastern Galicia be constituted a separate Ukrainian province. The Russian revolution of 1905 strengthened the movement against Polish suppression, and in 1908 the Polish governor of Galicia was shot dead by a Ukrainian student, who afterward es¬ caped to the United States. Early in the Euro¬ pean War the Russians overran Galicia and be¬ gan the Russification of the territory by making the Russian language obligatory and forbidding the Ukrainian. In the following year, how¬ ever, the Russians were expelled from Galicia by the Austro-German armies under Von Mack- ensen and the Central Powers made a bid for Polish support — Poland being also occupied by

them — with the promise of a reunited Poland under Austro-German patronage. This pros¬ pect alarmed the Ukrainians and led them to strive anew for independence. The Russian revolution of 1917, which swept away the Ro¬ manoff dynasty and finally developed into the greatest disorder under Bolshevism, gave them their opportunity. A national assembly, the Rada, was convened at Kiev, the old capital, in April 1917, and advocated a union with free Russia on a federal basis. Lvov and Kerensky, for the short time they were in power, opposed the plan. With the advent of Lenin and Trot- zky, however, the Ukraine broke loose alto¬ gether from Russia, though maintaining a sym¬ pathetic connection with the Russian people struggling to found a genuine democracy. The Central Powers, being desirous of breaking up Russia, aided the Ukrainian movement, with the result that the Ukrainian nation was recognized as an independent state, which finally concluded a separate peace with Germany and Austria. Poland was not represented at Brest-Litovsk ; her independence had been an article of faith of the Russian provisional government, while her self-determination was the policy of the Bolsheviki. The Ukrainians were divided on two distinct ideals. Their large peasant popu¬ lation was chiefly anxious to acquire the land from the great Polish proprietors, while in the towns there existed a strong intelligent national¬ ism. But

the Bolsheviki were opposed to both desires. As Socialists they objected to the in¬ dividualist peasant proprietors, and as central¬ ists or internationalists they had little sym¬ pathy with provincial chauvinism. On 20 Nov. 1917 the Rada issued a proclamation, trans¬ ferring the land to the peasants, establishing an eight-hour day, giving labor the control over in¬ dustry and defining the frontiers of the repub¬ lic. This bold attempt to forestall Bolshevism succeeded for the moment. The Ukrainians al¬ lied themselves with General Kaledin and the Cossacks of the Donetz basin, and with Ru¬ mania and Bessarabia. They occupied Odessa and fought steadily against the rising tide of Bolshevist troops. In December 1917 Trotzky sent them an ultimatum threatening war unless they ceased to bar the forces of Bolshevism, to which the Rada replied that they could not tol¬ erate the interference of Bolshevik elements in their national government.

The collapse of Austria liberated the Ruthe- nians, who hastened to unite with their kindred over the Russian border, a program that was distasteful to the Polish nobility. With the Ukrainian occupation of Eastern Galicia a war broke out between them. The Poles recaptured Lemberg, which city was again besieged by the Ukrainians in January 1919. During March the Ukrainians again occupied Lemberg after sev¬ eral days' hard fighting and a siege of three months; they had captured Przemysl on the 18th and brought up their heavy guns to reduce Lem¬ berg. The Ukrainians, headed by General Pet- lura, sought alliance with the Entente Powers to save them from Poles and Bolsheviki alike. The advance of the Bolshevist hosts upon Odessa during May was carried on with mur¬ der and rapine, turning the rich agricultural dis¬ tricts of the Ukraine into a wilderness. The rule of Bolshevism was introduced, with na¬ tionalization, confiscation and outrage. Instead of the Ukraine supplying the rest of Russia

with grain, as Lenin had intended, that country was itself brought to the verge of famine. The Poles demanded that the new Poland should in¬ clude Eastern Galicia on the ground that at least 35 per cent of the soil was owned by Poles. The natives objected that this ownership dated from feudal times and was manifestly unjust, seeing that the Ukrainian population was by far preponderant in the country. Early in June 1919, however, the Peace Conference authorized the military occupation of Eastern Galicia by Poland, <(after having fixed with the Allied and. Associated Powers an agreement whose clauses shall guarantee so far as possible the autonomy of this territory, and the political and religious liberty of its inhabitants. This agreement shall be based on the right of free disposition, which, in the last resort, the inhabitants of Eastern Galicia are to exercise regarding their political allegiance.® The motive prompting the Confer¬ ence appears to have

been that of uniting mil¬ lions of Ukrainians with Poland and Czecho¬ slovakia, with a view to later junction with Ru¬ mania, thereby creating a great barrier between. Germany and Russia in the future. The ancient title of hetman had been revived in May 1918 and conferred upon General Skoropadsky, a former general in the imperial Russian army. His attempt to hold the Ukraine for Russia with German aid failed. The National Union raised a volunteer army of 60,000 men and overthrew Skoropadsky. In August 1919 the Ukraine ceded Eastern Galicia to Poland and in Septem¬ ber the anti-Bolshevist General Denikine re¬ captured Kiev for the Ukraine. Two months later the city fell again into the hands of the Soviet forces. A Soviet government was estab¬ lished in 1920 and by the Treaty of Riga (19 March 1921) Ukrainian independence was recognized by Russia and Poland.

Bibliography. — Donzow, D., (Die ukrain- ische staatsidee und der Krieg gegen Russ- land) (Berlin 1915) ; Fedortchouk, Y., (Le reveil national des Ukrainiens) (Paris 1912) ; id., (Memorandum on the Ukrainian Question in its National Aspect* (London 1914) ; Hoetzsch, Prof. O., ˆussland* (Berlin 1913) ; Hrushevky, Prof. M., (The Historical Evolution of the Ukrainian Problem* (Letchworth, Eng. 1915) ; id., (Ein Ueberblick der Geschichte der Ukraine) (Vienna 1914) ; Levine, I. D., (The Resurrected Nations* (New York 1918) ; Lewicky, Dr. E., (Paris 1915) ; Ogg, F. A., (Paris) ; Steveni, W. B., (Things Seen in Russia> (New York 1913) ; (Ukraine* (Literary Digest, 12 Jan. 1918 and 10 May 1919) ; (The Ukraine and its Separate Peace) (Current History, Vol. XIV, pp. 426-434).

Henri F. Klein,

Editorial Staff of The Americana.

ULADISLAS, or VLADISLAS, kings of Poland. There were seven monarchs of this name.

ULCER is a suppurating sore produced by the destruction of some part of the living structure, leaving a hollow from which matter is discharged. Ulcers may be either internal cr external. They may be arranged either ac¬ cording to the constitutional or specific disease from which they are derived or according to the characters which they present. According to the first system ulcers are spoken of as healthy,

inflammatory, strumous, etc. ; while according to the second they are named irri¬ table, chronic, sloughing, etc. A common, simple or healthy ulcer is such as is left after the separation of an accidental slough in a healthy person, and is merely a healthy granu¬ lating surface tending to cicatrization. Its edges shelve gently down to the base, and are scarcely harder than the adjacent healthy skin. Their surface near the borders is of a purplish blue tint where the young epidermis modifies the color of the healing granulations and within this the granulations have a deeper hue than those at the centre, being most vas¬ cular where the cuticle is being chiefly devel¬ oped. The discharge from such an ulcer is healthy or laudable pus. The only treatment required is a little dry lint, if there is much discharge, or the water dressing, if the sore is comparatively dry. When the granulations are too luxuriant they must be touched with nitrate of silver and dressed with dry lint.

Inflammatory ulcers differ less than most kinds from healthy ulcers. They commonly arise from some trifling injury, such as a blow or slight abrasion of the skin, which to a healthy person would have done no harm. Their most common seat is on the lower half of the leg or shin. The surface is red and bleeds easily; the discharge is thin and watery; the edges irregu¬ lar or shreddy; and the surrounding skin shows a red tinge, and is the seat of a hot and aching sensation. This ulcer most commonly occurs in the infirm and old, the ill-fed and overworked. Hence constitutional treatment, good diet and complete rest (with elevation of the limb) are here demanded in addition to a water dressing or lead lotion applied warm. Senile ulcers usually present very little discharge, exhibit granulations of a rusty red tint and are sur¬ rounded by a dusky red area. Nourishing food, wine, bark and the mineral acids are here re¬ quired, and opium in small repeated doses is often serviceable. The local treatment must be of a stimulating nature, and in bad cases strapping the leg daily with a mixture of resin ointment and Peruvian balsam spread on strips of lint is recommended. Strumous or scrofu¬ lous ulcers usually occur as the consequence of scrofulous inflammation in the subcutaneous tissue or lymphatic glands. They most com¬ monly occur in the neck, groins, cheeks, scalp and the neighborhood of the larger joints. The discharge is thin and of a greenish-yellow tint. These ulcers are seldom very sensitive or pain¬ ful. The general treatment must be that rec¬ ommended for constitutional scrofula. Iodine in some form or other is the best local appli¬ cation. A poultice of bruised and warmed sea¬ weed is a very popular remedy; but there is probably nothing so efficacious as tincture of iodine diluted with water till it causes only a slight discomfort, and applied three or four times a day. Consult

Adams, E., treatment

of Chronic Leg Ulcers) (New York 1914) ; Da Costa, J. C., (Modern Surgery) (7th ed., Philadelphia 1914) ; Foote, E. M., (Textbook of Minor Surgery) (New York 1914).

ULEABORG, oo'lye-a-borg, Finland, town and capital of a government of the same name, at the mouth of the Ulea, on the northeast shore of the Gulf of Bothnia, 498 miles by rail north of Helsingfors. It has some manufac¬ tures and carries on a trade in timber, butter, grain, coal, iron, salt, raw hides, etc. Pop.

21,000.

ULEMA, the learned, knowing or wise: collective name of the body of theologians and legists in Mohammedan countries ; the word is Arabic and the plural form of alim, learned, wise. The Ulema constitute the legal and ju¬ dicial class and are interpreters of the Koran and of the laws derived therefrom; they are in Islam in a measure the counterpart of a hier¬ archy in a Christian monarchy, and are the principal check upon the irresponsible power of the sovereign. Every Mohammedan city has a body or Ulema, but the most renowned are the Ulema of Constantinople, of Mecca and of the Azhat University of Cairo. The Ulema of Turkey have the best organization, and enjoy many privileges and immunities. The classes of scholars and officials among the Ulema are the Imams, or readers of the public prayers in the mosques ; the Muftis, or doctors of the law, who act either as advocates or as assessors in the courts ; the Kadis or Mollas, who are the regular judges; they are subordinate to two Chief Kadis, one for the European, the other for the Asiatic provinces ; over them all pre¬ sides the Sheikh-ul-Islam, spiritual head, under the caliph, of orthodox Mohammedanism.

ULEX. See Furze.

ULEXITE, a mineral occurring in white, crudely spherical masses composed of fine fibres, having a silky lustre. It is very soft and light, its hardness being only 1, and spe¬ cific gravity 1.65. It is a hydrous sodium and calcium borate, NaCaB5Oo.8H:>0. It occurs in large quantities in Chile and Argentina, also abundantly in the salt marshes of Nevada and California. It is one of the commonest sources of borax.

ULFILAS, ULPHILAS, or WULFILAS,

bishop of the Goths : b. north of the Danube, about 311 ; d. Constantinople, 383. He was con¬ secrated bishop by Eusebius of

Nicomedia, probably at Antioch, in 341 ; and though his native language was Gothic, he learned to speak and write Greek and Latin. Like all the Goths he was an Arian, and was called to Constanti¬ nople by the Emperor Theodosius shortly be¬ fore his death to attend a conference or con¬ troversy on disputed matters of faith. His claim to renowir is based upon the fact that he translated into his own tongue the whole Bible, with the exception of the books of Kings, which he deemed too warlike for his in¬ flammable Goths. He seems to have invented the Gothic alphabet, which is evidently based on the Greek. He employed the Septuagint for the Old Testament, and a Greek text, different from the receiyed text, for the New. His translation is faithful, but not slavish. It was generally used by the Goths who migrated to Spain and Italy, but the Gothic language hav-

ing died out in southern Europe it was entirely lost and only some fragments have been pre¬ served. These consist of the greater part of the Gospels and epistles of Saint Paul, frag¬ ments of Ezra, Nehemiah, Genesis and of a psalm. The chief manuscript is preserved at the University of Upsala. There are editions of Gabelentz and Lobe (Leipzig 1843-46), Heyne (18%), Balg (1891), etc. This Gothic work is of the highest importance to the student of philology. (See Gothic; Goths). Consult Uppstrom, (Codex ArgenteusC a facsimile (Up¬ sala 1857) ; (Fragmenta Gothica Selecta) (ib. 1861); (Codices Gothic AmbrosianP (Stock¬ holm 1868). Consult also Bessell, W., (Ueber das Leben des Ulfilas und die Bekehrung der Goten zum ChristentutrP (Gottingen 1860) ; Cambridge Mediaeval History) (New York 1911) and Scott, C. A., (London 1885).

ULLOA, ool-yoa, Antonio de, Spanish scientist and naval officer : b. Seville, Spain, 12 Jan. 1716; d. near Cadiz, Spain, 5 July 1795. He entered the navy when very young and in 1735 was appointed with Jorge Juan a member of the French scientific expedition to Peru. They were engaged for nine years in making surveys of the country, and in studying the history and social conditions of the inhabitants, upon which they made a secret report to the Spanish government. This document is of great historical value as showing the abuses which later resulted in the Revolution and was later published in English under the title (Secret Information Concerning America y (1826). Ulloa was captured by the British on his return trip in 1744, but was shortly re¬ leased and returning to Spain became promi¬ nent among Spanish scientists. He founded the first metallurgical laboratory in

Spain and also established the observatory at Cadiz. He was appointed to various political offices of importance, and in 1766-68 was governor of Louisiana. He published (Relacion historica del viaje a la America meridionaP (1748) ; and (Noticias Americanas) (Madrid 1772).

ULLOA, Francisco de, Spanish soldier and explorer in the New World: d. about 1540. He accompanied Cortes (q.v.) in the conquest of Mexico, and was sent by that commander (July 1539) to explore the Gulf of California. With three ships, one of which he lost in bad weather, he sailed from Acapulco for the Gulf. He was the first to establish the fact that Lower California is a peninsula. He ascended to the upper waters of the Gulf, explored the western coast of the peninsula and reached, by some accounts, lat. 30° 30′ N., by others only 28°. Statements as to his death are con¬ flicting.

ULM, oolm, Wurttemberg, town situated 45 miles south-southeast of Stuttgart, on the left bank of the Danube and on both sides of the Blau, here crossed by five bridges. A bridge across the Danube connects with Neu- Ulm. It is a place of considerable strength, being provided with important defenses on both sides of the Danube. It is an old town, irregu¬ larly built, with narrow, winding streets. It has a cathedral in the old Gothic style, with spire 530 feet high, completed in 1890; manu¬ factures of machinery, woolen and linen cloth,

leather, ships, boats, pipes, pastry, paper, brass- ware, etc. ; and an important trade. Ulm was long an imperial free town. It forms an im¬ portant military position, and its possession has been keenly contested in every great European war, except that of 1914-18. The capitulation of Ulm, 17 Oct. 1805, was the turning-point of the campaign of Austerlitz. Pop. 56,100. Con¬ sult Loeffler, (Geschichte der Festung Ulm) (Ulm 1883) and Schultes, (Chronik von Ulm* (ib. 1886).

ULMANN, Albert, American author and stockbroker: b. New York, 2 July 1861. He was graduated from the College of the City of New York in 1881, and has been a member of the New York Stock Exchange from 1899. He has published Frederick Struther's Romance) (1889) ; (Chaperoned) (1894) ; (A Landmark History of New York) (1901) ; (New York's Historic Sites) (1902) ; (History of Maiden Lane> (1911); with Grace C. Strachan (1914), also editor of historical Guide to the City of New York'

(1909).

ULNA. See Arm ; Osteology.

ULPIANUS, ul-pi-a'nus, Domitius, Ro¬ man jurist: b. Tyre, Phoenicia, about 170 a.d. His public life at Rome began under Septimius Severus, first as assessor to the praetor (Papin- ian), and afterward as prcefectus prcetori under Alexander Severus (222). He was murdered before the eyes of the emperor, whose adviser and mouthpiece he had been, by the Praetorian guard which he commanded (228). He was a voluminous writer and extracts from his writ¬ ings form one-third of the

ULRICH, ul'rik, Charles Frederic, Amer¬ ican artist: b. New York, 18 Oct. 1858; d. New York, 15 May 1908. He began the study of his profession at Cooper Institute and the National Academy. In 1879 he was awarded a medal at Munich, where he had been a pupil under notable artists for some time. He sub¬ sequently settled in New York, but in 1884 removed to Italy. His best-known pictures include (In the Land of Promise J ; cThe Glass Blowers) ; (The Wood Engraver* ; (The Car¬ penter* ; (The Waifs* ; (A Dutch Typesetter ; (Washing of Feet in the Venice CathedraP and (Glass Blowers of Murano,* now in the Metro¬ politan Museum, New York City.

ULRICH, Edward Oscar, American geol¬ ogist: b. Cincinnati, Ohio, 1 Feb. 1851. He was educated for a physician but abandoned medicine to become curator of the Cincinnati Society of Natural History (1877-81) and later was pale¬ ontologist to the surveys of Illinois, Minne¬ sota and Ohio. After 1897 he was geologist of the United States Geological Survey. He also was associate editor of the American Ge¬ ologist and author of many learned essays.

ULRICH VON LICHTENSTEIN, early German poet: b. Styria, about 1199; d. 1276. His chief work is entitled (Frauendienst* and is valuable only as a history of the times. Con-

suit Becker's

1888).

ULRICI, ool-ret'se, Hermann, German philosopher and critic: b. Pforte, Saxony, 23 March 1806; d. Halle, Prussia, 11 Jan. 1884. He studied law, but from 1829 gave himself to philosophical study and became professor of philosophy at the University of Halle in 1834. He published Characteristics of Ancient His¬ toriography) (1883) ; (History of Poetic Art in Greece)_ (1835) ; < Treatise on Shakespeare's

Dramatic Art> (1839), a work much prized by Shakespearean students; (On the Principle and Method of Hegel's Philosophy > (1841);

(Ground Principles of Philosophy) (1845) ;

< System of Logic J (1852) ; (Glauben und Wis- sen) (1858); Cod and Nature) (1862); Cod and Man> (1866).

ULSTER, Ireland (Irish, Uladh, Laiinized, Ultonia), the most northerly of the four prov¬ inces, comprehending the counties of Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan and Tyrone. Area, 8,613 square miles. At a very early period Ulster was a provincial kingdom and its south¬ ern boundary was farther south than it is to-day. The O'Neills and O'Donnells were the princely families of Ulster and they main¬ tained themselves until the reign of Elizabeth. In the following reign the Irish title-deeds were declared void and Scottish Presbyterians were given the land, an injustice, the fruits of which have persisted to our day. According to the last census the principal religious pro¬ fessions in Ulster were Roman Catholics, 690,816; Protestant Episcopalians, 366,773; Presbyterian, 421,410; Methodists, 48,816; other professions, 53,881. Linen-weaving and shipbuilding, together with agriculture and stock-raising are the chief industries. See Ireland.

ULTIMA THULE, ul'ti-ma thule. See Thule.

ULTRA VIRES, ul'tra vi'rez, a law term originated in 1851 by Baron Bramwell in the case of <(East Anglian Railway Company vs. Eastern Counties Railway Companyˆ (11 Com¬ mon Bench, 775). It denotes the act or con¬ tract of a corporation beyond the powers con¬ ferred upon it in its charter. It is variously applied to its authorized acts performed in an unauthorized manner ; its authorized acts performed by agents of the corporation un¬ authorized so to act; positively illegal acts of the corporation; but most specifically to its contracts to perform acts for which it is un¬ empowered in its charter. The general rule is that ultra vires contracts cannot be enforced, and any stockholder or creditor can bring re¬ straining suits against the corporation.

ULTRAMARINE, a beautiful and perma¬ nent blue pigment originally obtained by pow¬ dering and washing the rare mineral lapis- lazuli. It is now made by heating to bright redness mixtures of aluminum silicate (china clay or kaolin), sodium carbonate, sulphur and charcoal, and washing, powdering and sifting the product. It is

supposed to be a compound of silicates and polysulphides. Largely used in dyeing, calico printing, in coloring soaps and as a paint pigment. The variety known

as cobalt ultramarine is prepared from a mix¬ ture of cobalt arsenate and a fresh precipitate of alumina by drying and heating slowly to a red color. Barium chromate enters into the composition of yellow ultramarine.

ULTRAMICROSCOPE. An optical ap¬ paratus designed for the collective study of particles that are too small to be individually seen by methods formerly in use. It is not, properly speaking, a new instrument, but is merely an ordinary microscope provided with certain accessory devices for illuminating the field in a special way. It is well known that the possibility of seeing small objects by means of optical magnification is limited by the fact that light has a finite (though short) wave¬ length. The theory of the telescope indicates that the resolving power of the instrument — that is, its ability to reveal small details — in¬ creases in direct proportion to the diameter of the object glass. Similarly in the case of the microscope, theory shows that there is a limit to the fineness of the detail that can be seen, and it is known that this limit is determined by the numerical aperture of the objective and the wave-length of the light that is used — the re¬ solving power being greater for high apertures and for short wave-lengths. In consequence of this theoretical limitation, it follows that no microscope, however perfect, can show an ob¬ ject in its true form and size, unless the di¬ ameter of the object is greater than about half the wave-length of the light by which it is viewed. In the case of an exceedingly small object diffraction phenomena become very marked; and when the diameter of the object is less than the limit indicated, these phenom¬ ena become so pronounced that the objective can no longer form a definite magnified image, corresponding in shape, size or details with such configurations as the real object may pos¬ sess. If the particle to be observed is station¬ ary, it may be photographed by means of ultra¬ violet light; and it is possible, by this means, to obtain somewhat more detail than can be per¬ ceived by the eye, which is sensitive only to light of a longer wave-length. No great gain can be made in this way, however, because there is a limit to the shortness of the wave-length of the ultraviolet light that can be used, and the most that we can reasonably hope for, in this direction, is to increase the visibility of de¬ tail sufficiently to enable us to learn something of structures having one-half or one-third the linear dimensions that can be directly perceived by the eye while using ordinary light. By means of the ultramicroscope, however, it is possible, under favorable conditions,

to per¬ ceive, by the eye, particles having linear dimen¬ sions as small, for example, as 1 per cent of the wave-length of the light that is used. The form of these small particles cannot be dis¬ cerned, on account of the limitation imposed by diffraction and noted above. They appear like circular discs, having an apparent diameter much greater than their real diameter. Yet notwithstanding the impossibility of ascertain¬ ing the real form of these particles, it is often useful to be able to demonstrate their existence and to count their number, ascertain their aver¬ age mass and study their translatory move¬ ments ; and these things can be done by the aid of the ultramicroscope. The principle upon which the ultramicroscope is based is exceed-

ingly simple. We see it exemplified in every¬ day life when a strong beam of sunlight trav¬ erses the air of a room that is otherwise dark or dim. As is well known, the beam, when ex¬ amined from the side, reveals the existence of countless motes or particles floating in the air. Everyone of these brilliantly illuminated parti¬ cles acts as a secondary source of radiation and hence can be perceived by the eye. Intent examination of a beam of sunlight under these conditions will show that some of the par¬ ticles present are large enough for their forms to be seen with a certain degree of defi¬ niteness by the eye. There are many others, however, that are altogether too small for this, and these smaller particles are perceived merely as luminous points, without visible form.

The principle of the sunbeam and the mote- laden air is applied in the ultramicroscope with¬ out essential modification. In the form in which the instrument is applied to the study of liquids and of such solid particles as they may hold in suspension, a narrow but powerful beam of light is sent through the liquid in a horizontal direction, while the liquid is examined from above by means of an ordinary microscope pro¬ vided with a water-immersion objective — the optic axis of the microscope being at right angles to the direction of the beam of light. By the aid of an arrangement of this sort, par¬ ticles that are altogether too small to be per¬ ceived under ordinary conditions may be made to stand out like tiny luminous discs against a background that is either dark or at all events far less brilliant. In liquids, the particles that are thus seen exhibit active Brownian move¬ ments (q.v.). The size of the particle that can be seen is determined by the brilliance of the il¬ lumination. If the liquid under examination

contains particles of every gradation of fine¬ ness, then with any given intensity of illumina¬ tion the particles that are too small to be seen in their true form, but which are nevertheless large enough to be separately revealed by means of this method of observation, appear as small luminous discs. Particles that are too small to be separately perceived in this way under the given conditions of illumination re¬ veal themselves, collectively, by communicating a hazy appearance to the beam of light.

Lord Rayleigh had shown, in 1899, that a particle that is too small to be separately seen by the microscope under ordinary conditions may, nevertheless, become visible if it is illu¬ minated powerfully enough, even though it may be beyond the power of the microscope to re¬ veal its true form. Dark-background illumina¬ tion, in which the object is seen by reflected, re¬ fracted, diffracted or polarized light, and not by ordinary light that is transmitted directly through it, has also been familiar to microscop- ists for many years, and the Wenham para¬ bolic substage condenser, in which the central rays are cut out by means of a central stop, while the oblique peripheral rays proceed up¬ ward at such a degree of angularity that they cannot directly enter the objective, has been a familiar accessory since 1872. In ultramicro¬ scopy the principles of darkground illumina¬ tion are merely developed scientifically and pushed to their ultimate limit; and the results that are obtained by observing exceedingly small particles under such conditions are studied with corresponding care. The method was

first applied to the study of colloidal solutions by Seidentopf and Zsigmondy in 1903. Con¬ sult Zsigmondy, (Chemistry of Colloids,* trans¬ lated by E. B. Spear (1917; and for special technical details consult Cotton and Mouton, (Les ultramicroscopes et les obj'ets ultramicro- scopiques) (1906) and Zsigmondy and Bach- mann, W., (Handhabung des Immersionsultra- mikroscops) (in the Kolloidzeitschrift, Vol. XIV, 1914).

Allan D. Risteen.

ULTRAMONTANISM, term which origi¬ nated in France to designate certain policies, teachings and tendencies favored by the Church ultra montes , across or beyond the Alps, and opposed to the interests of the Gallican Church : later, Ultramontanism was used to denote the whole theological system of the Church of Rome and the doctrine of papal infallibility. Previous to the Vatican Council of 1869-70 Ultramontanism was an issue within the Church. At present it is extremely difficult to define the essential character of Ultramontan¬

ism, as it has manifested itself since 1870. Many Catholics have noted that within recent years over 70 per cent of the appointees to epis¬ copal sees have been men who have made their theological studies in Rome and were in conse¬ quence imbued with ultramontane opinions, and would carry out the papalistic system, that is, the concentration of all power in the person of the Pope. Consult article (UltramontanisnP in (Realencyclopadie fur protestantische The- ologie und Kirche* (3d ed., 1908, Vol. XX, p. 213 et seq.).

ULUGH-BEG, oo'loogh-beg (or BEIGH),

Mongol astronomer: b. 1394; d. 1449. He was the grandson of Timur, or Tamerlane (q.v.) ; governed western Turkestan as regent for his father, Shah Rokh, while the latter was em¬ ployed in regulating the affairs of the southern half of the empire, and succeeded in 1447 to the imperial throne on his father's death. He built at Samarkand an observatory where he pre¬ pared tables of the sun, moon and planets, and compiled the first original star-catalogue since Ptolemy, redetermining the position of 992 fixed stars. He wrote in Arabic, from which Persian translations were later made. This catalogue was edited in England by Hyde ((Tabulse Longitudinis et Latitudinisp Ox¬ ford 1665, etc.), and by Baily in 1843 (Vol. XIII of the Royal Astronomical Society's Memoirs*, London 1843).

ULYSSES, u-lis'ez (Gr. dPiwatvc, Olysseus, ((the hater®; Lat. Ulixes), Greek hero. He was king of the island of Ithaca, son of Anticlea and Laertes. He sailed with 12 ships in the Greek expedition against Troy. During the Trojan War (q.v.) he was noted for his eloquence, sagacity and prudence. He was, therefore, often chosen for the services of a spy. After Achilles' death, he received that- chieftain's armor, the award driving Ajax mad. But he is best known through the series of adventures and misfortunes which the enmity of Poseidon compelled him to undergo during the 10 years of his return to <(far-seen rocky Ithaca.® This return is the subject of Homer's (Odyssey) (q.v.). Odysseus, according to Homer, was thrown upon the coasts of Africa, and visited the country of the Lotophagi, and of the Cy-

elopes, in Sicily. Polyphemus seized him, with his companions, six of whom he devoured (see Polyphemus) ; but the prince, having intoxi¬ cated him and put out his one eye, escaped from the cave. ZEolus, whose island he visited, gave him a bag of winds to carry him home.

Hi*s companions opened the bag, the winds escaped and they were driven back to the island of yEolus. Again sailing onward he reached a land inhabited by cannibal giants, the Lsestry- gones, from whom he escaped with only one ship. Then he was thrown upon the island .TEaea, where Circe changed his companions into swine. Subsequently he passed along the coast of the Sirens and escaped the monster Scylla (who seized some of his men, however) and the whirlpool Charybdis. In Sicily his com¬ panions killed the sacred oxen of the sun, for which Zeus destroyed his ship by lightning, and all were drowned except Ulysses, who swam to Ogygia, the island of the nymph Calypso, where for seven years he had to remain. The gods at last interfered, and Calypso suffered him to depart on a raft built by himself. Poseidon raised a storm and sunk his raft. Ulysses swam to the island of the Phaeacians where King Alcinous hospitably entertained him, and sent him home in a ship to Ithaca, after an absence of 20 years. He found his palace be¬ sieged by a set of insolent suitors for the hand of his wife, Penelope. With the aid of his son, Telemachus, he put the suitors to death. A por¬ tion of his adventures forms the theme of Stephen Phillips' striking blank verse play (Ulysses) (1902) ; and Tennyson's noble (Ulysses) is also concerned with the life of the Greek hero. Consult Liibker, Friedrich, (Real- lexikon des klassischen Altertums> (8th ed., Leipzig 1914).

UMA, oo'ma, in Hindu mythology, the con¬ sort of the god Siva. She is also usually des¬ ignated under the names of Kali, Durga, Devi (q.v.), Parvati, Bhavani, etc. This goddess is worshipped in various parts of India; but the textbook of her worshippers is the <(Devima- hatmya,® or ((the majesty of Devi® — a portion of the (

(1823-1900) develops the myth of Uma into one of those solar myths suggested to the primitive mind by the most familiar of astronomical phe¬ nomena. Consult Barnett, L. D., (Antiquities of India> (1913) ; Muir, John, ˆOriginal San¬ scrit Texts) (London 1873) ; Wilkins, W. J., (Hindu Mythology > (London 1900).

UMATILLA, a North American Indian tribe of Shahaptian stock, who dwelt formerly near the confluence of the Columbia and the river which bears their name. They did not practise agriculture but found a means of subsistence in game, fish, fruit, etc. In 1804 they were vis¬ ited by Lewis and Clark and in 1845 by Jesuit missionaries by whom they were converted to Christianity. Under a treaty of 1855 they were, with the Cayuse and Walla Walla, placed on a reservation near their old home. At present they number about 300.

UMATILLA RIVER, Ore., a southern affluent of the Columbia River,

rising in the Blue Mountains, and after a west and north¬ westerly course of about 150 miles through Umatilla County uniting with the Columbia at Umatilla village on the boundary between Ore¬ gon and Washington. Pendleton, the capital of Umatilla County, is the chief town along its course.

UMBAGOG, um-ba'gog, a lake, the greater part in New Hampshire, in Coos County, and part in Oxford County, Me. It is about nine miles long and from one to one and one-half miles wide. Its outlet is a short stream which enters Richardson Lake, in Maine. The scenery around Um'bagog is most beautiful, and its waters are well stocked with trout and other fish. It is a favorite resort for sportsmen.

UMBALLA, um-bal'a, or AMBALA, India.

See Ambala.

UMBELIFERS, or APIACE.®, a family

of herbs and a few shrubs popularly known as the parsley family. The species, of which about 1,500 have been described and grouped in ap¬ proximately 200 genera, are most abundant in the north temperate and Arctic zones. Many species are also characteristic of high altitudes in more equatorial latitudes. The most notable feature of the family is the arrangement of the flowers in umbels, which characterize nearly all the species. The umbels are often compounded, that is, they are composed of smaller umbels called umbellets. The leaves are sometimes simple but generally compound, and usually con¬ tain resinous substances (volatile oils) which are characteristic of the individual species and either give or assist in giving the plants their acrid or pleasant flavors. In some species these flavors are very disagreeable, as, for instance, in asafeetida; in others pleasantly odorous, as in fennel and anise. These last two species and several others, such as parsley, caraway, corian¬ der and celery (qq.v.) are popularly used for flavoring culinary preparations, such as salads, soups, sauces and dressings. The stems of celery have been greatly enlarged by cultivation, and are among the most esteemed salads, bofrh in America and Europe. Several umbellifers have become important root crops in temperate climates. Of these the parsnip and the carrot are the best known in America, but several others are cultivated in Europe, Asia and south¬ ern Africa. Some of these, such as skirret

(Sium sisarum) , and chervil (Chcerophyllum bulbosum) , are occasionally cultivated in Amer¬ ican gardens. Many of the species, including those now cultivated as esculents, were formerly considered to have medicinal properties, but ex¬ cept in a few cases, such as fennel and anise, they have been discarded and in these cases they are now used merely to disguise the unpleasant flavors of other drugs. Formerly, also, many were reputed harmful and even poisonous when eaten by man and animals. Among these was the parsnip. The ill repute has been completely dispelled in most cases, but still clings to celery and parsnip; the former being reputed poison¬ ous to certain individuals; the latter at certain seasons. Some of the uncultivated species are still under ban in some sections of the country but not in others. Besides the genera men¬ tioned, the following are among the most im¬ portant: Crithmum , Archangelica, Cono podium, Smyrnium, Levisticum, Eryngium and Prangos. Botanically the family has been found difficult to arrange satisfactorily. Coulter and Rose have described the American species ; De Candolle, Koch, Sprengel, Engler and other Europeans have also devoted much attention to this large group.

UMBER, an olive-brown earthy pigment that becomes redder when heated. This earth is found in several localities; the best variety has come for some time past from Cyprus and goes by the name of Turkish umber. It is found also in Georgia, Illinois, New York and Pennsylvania. Raw umber is of an olive-brown color, semi-opaque, perfectly durable in water or oil, and does not injure any other good pig¬ ment with which it may be mixed. It is essen¬ tially a mixture of oxides of iron and manganese with 13 to 14 per cent of silica, together with small amounts of lime, magnesia, alumina, water, etc. When highly heated all the water is drawn off, causing a change in the brown hy¬ drated ferric oxide to red ferric oxide, and also increasing the percentage of red-brown manga¬ nese oxide. The pigment is now called burnt umber. Raw umber is not subject to adulter¬ ation, but a ferruginous peat or brown coal from near Cologne is sometimes substituted for it. See Paint.

UMBILICAL CORD, the bond of com¬ munication between the foetus (which enters at the umbilicus, or navel) and the placenta, which is attached to the inner surface of the maternal womb. It consists of the umbilical vein, lying in the centre of the two umbilical arteries wind¬ ing from left to right round the vein. Contrary to the usual course, the veins convey arterial blood to the foetus, and the arteries return ve¬ nous blood to the placenta. As soon as a child is born, and its

respiration fairly established, the umbilical cord is tied, and divided near the navel, which spontaneously closes, the fragment of cord dying away. See Fcetus ; Obstetrics ; Placenta.

UMBRA, the Latin word meaning shadow, was for the ancient Romans a person who at¬ tended a feast uninvited by the host but as com¬ panion of one that was invited, whom he fol¬ lowed as his shadow; this parasite's duty was to laugh at the jokes of his patron. In astronomy, the black central portion of a sun-spot was first called umbra by Dawes; he limited the designa¬ tion nucleus to the patch of deeper blackness

sometimes noticed in the umbra, though the whole of the darker area is often called nucleus: The fringe of lighter shade surrounding a sun¬ spot is called penumbra. In ichthyology, the solitary genus Umbridce comprises two species: U. krameri, a small fish three or four inches long, found in stagnant pools in Austria and Hungary; and U. limi, rather smaller, locally distributed in the United States; its common name is dog-fish or mud-fish.

UMBRELLA, as its name implies, an in¬ strument for casting shade. They were intro¬ duced from Asiatic countries, where they are of great antiquity, and are used as protectors from the sun's rays, rather than from rain. They were brought to England from Italy in the early part of the 18th century, and later came into general use, being employed by ladies, but scorned by men as effeminate, until Jonas Han- way, an eccentric traveler, demonstrated its utility as a protection from rain. They soon came into universal use. The general construc¬ tion of umbrellas has changed little in the thousands of years it has been known, the an¬ cient Chinese patterns being adopted by the Europeans. Gloria or alpaca in the common grades and silk in the finer ones have been sub¬ stituted for the oiled paper once used for the covering, while grooved steel ribs have taken the place of the bamboo, rattan or oak ones. English manufactories control the largest out¬ put of the article and maintain a general excel¬ lence of quality. In Burma and Siam the um¬ brella is an emblem of rank. The Japanese have used umbrellas ever since their empire wa*s established. In Greece they were used by ladies of position, and the Greek poets have reference thereto. In Rome women and effeminate men used them as a protection from the sun's heat.

UMBRELLA-BIRD, an extraordinary South American forest-bird (Cephalopterns ornatus) of the family Cotingidce, which takes its name from its remarkable crest of feathers, the shafts of which, according to Wallace, radi¬ ate on all sides, reaching beyond the tip of

the bill and forming a dome or parasol about four inches in diameter. The resemblance of this ornament to a helmet-plume has led to the name ˆdragoon-bird.® Another curious feature is a cylindrical fleshy process, an inch and a half long, pendent from the front of the neck, and clothed with overlapping feathers. This bird is about the size of a crow and glossy black with a blue gloss on the crest. It in¬ habits the valley of the Amazon. In the Andine region occurs a second species (C . pendidiger) with a much longer dewlap ; and in Central America a third (C. glabricolis) in which the throat and dewlap are naked, except at the tip of the latter, and colored orange-red. These birds feed on berries and fruits, and have a loud, clear song. Consult Wallace, A. R., (Travels on the Amazon? (London 1853) ; Newton, ˆDictionary of Birds) (New York

1896).

UMBRELLA-TREE, in eastern America, the larger species of Magnolia, and especially M. tripetala, or elk-wood. The latter's great, thin, oval leaves are pubescent beneath, nearly two feet long, and half as wide, and radiate from the ends of the branches, in a manner suggestive of the protecting ribs of an um¬ brella. It is a tree from 30 to 40 feet tall, with

irregular branches, and grows naturally in shady woods and in deep soil. The flowers are large and cup-shaped, with creamy tinted, thick petals, and reflexed petaloid sepals, and have a disagreeable odor. The tree, nevertheless, is sometimes planted for ornament, being com¬ pletely hardy no farther north than Pennsyl¬ vania. The bark is slightly aromatic and tonic, but the wood is valueless. The ear-leafed un- brella-tree is M. fraseri, with auricled foliage and fragrant flowers. M. macro phylla is the great-leaved umbrella-tree. The pride-of-China-tree (Melia azedarach) has produced in the southwestern United States a variety, um- braculifera, which forms a regular, dome¬ shaped head like an open sun-shade, and is consequently to be added to the list of um¬ brella-trees. The Queensland umbrella-tree is the handsome araliaceous Brassaia actinophylla, a tree 40 feet high ; that of Guinea is Hibiscus guineensis. A screwpine, Ptandanus odora- tissimus, is also known by this name.

The umbrella-pine, or parasol-fir, is a tall evergreen tree (Sciadopitys verticillata) from Japan, with a pyramidal habit. Its true leaves are

reduced to minute scales, and its apparent glossy, dark foliage is composed of phyllodia, or stems assuming the functions of leaves, which are arranged in umbrella-like whorls on the branches.

UMBRIA, Italy, one of the ancient divisions of the peninsula, lying west of Etruria, and north of the country of the Sabines, and cor¬ responding approximately to the modern dis¬ trict of the same name, in the province of Perugia. It is usually described as extending from the Tiber east to the Adriatic; but when the Umbrians first came into history they were restricted to the ridge of the Apennines, the lowland region bordering on the Adriatic from the 2Esis (Esino) to the Rubicon being held by a race of Gallic invaders, known as the Se- nones. The Umbrians were subjugated along with the Etruscans, but joined the Samnites in their last gallant struggle against Rome, and were finally overthrown at Sentinum (295 B.C.). Later the Via Flaminia was constructed through Umbria and in the Augustan period Umbria was the sixth region of Italy. (See Italic Languages). The modern district formed part of the states of the Church until 1860. Its area is 3,748 square miles and a population of 686,500. The capital is Perugia, of which Leo XIII (then Mgr. Pecci) was archbishop for 32 years prior to 1878.

UMLAUT, oom'lowt, in philology, a modifi¬ cation of vowels ; the change of the vowel in one syllable through the influence of an a, an i or a u in the syllable immediately following. It is common in Teutonic languages — German, Scandinavian and Anglo-Saxon; traces of it remain in English, as in the plurals of man (men), "brother (brethren), mouse (mice), goose (geese), etc. In German the umlaut is seen in the frequent change of a, o and u to a, d, ii, as Mann, Manner-, Sohn, Sohne ; Kraut, Krduter. Consult Henry, Victor, (Short Com¬ parative Grammar of English and German> (London 1894), and Lichtenberger, H., (His- toire de la langue allemande) (Paris 1895).

UMNAK, oom'nak, an island of Alaska, one of the Fox Islands, a group of the Aleutian

Islands. It is about 66 miles long and 10 miles wide. On the east is Umnak Pass, five miles wide, which separates the island from Unalaska Island. The interior was explored, in 1757, by Nikiforoff, a Russian. The island is of volcanic origin; the highest point, Vsevidoff, is a vol¬ cano 8,000 feet high. Other peaks are also volcanoes. Just north, and connected with Umnak by a reef, is the volcanic island of Bogosloff which was thrown above water in 1796. On Umnak are many hot springs; in one part the springs are boiling. Near Deep Bay there are springs which vary in temperature. Fossil-wood, lignite, fire-clay and different forms of lava are found on this island. The largest village, Nikolski, has about 300 inhabit¬ ants. The chief industries are catching seal and fishing.

UMPQUA, ump'kwa, a small tribe of the Athapascan stock of North American Indians. They now number about 100 individuals and are on the Grande Ronde reservation in Oregon.

UMRITSIR, um-rit'ser. See Amritsir.

UN CURIOSO ACCIDENTE ((Part II, cap. 30) that the story of the plot is true, (III, cap. 37) Goldoni relates that the play was trans¬ lated into French by a Frenchman in 1784 with the title (The Dupe of Himself, * that it was played the following year and proved a com¬ plete failure. The merit of the play lies in its extreme simplicity, in the sprightliness of the dialogue, few of the speeches containing more than three or four words or a line or two, in the amusing situations in Goldoni's best vein and in the artistic perfection of the construc¬ tion of the comedy. Some of the scenes, for instance Act II, 8, are worthy of Moliere. For American students of Italian, the edition of the play edited with English notes by Professor Ford of Harvard University is

very useful and most readily available (Boston 1899). An English translation was published by the A. C. McClure Company in 1892 in the series (Masterpieces of Foreign Authors.* This ver¬ sion was produced by Mr. Donald Robertson in 1907-08. (Un curioso accidente) was performed in Italian under the auspices of the Modem

Language Department of the University of Toronto in 1917.

James Geddes, Jr.

UNA, u'na, in Spenser's (Faerie Queened the allegorical representative of Truth, which in this (

UNADILLA, u-na-dil'a, N. Y., village in Otsego County, on the Susquehanna River, and on the Delaware and Hudson Railroad, about 45 miles northeast of Binghamton and 93 miles southwest of Albany. It is in an agricultural region. The chief manufacturing establishments are a flour mill, creameries, machine shop, foundry and a wagon shop. The educational institutions are Union School and Academy, ranked as a high school, opened in 1893, and elementary and primary schools. There is one bank. Pop. (1920) 1,157.

UNAKA MOUNTAINS, a southwestern division of the Appalachian system, sometimes called in part the Great Smoky Mountains or simply the Smoky Mountains. They extend southward near the western boundary of North Carolina and Tennessee. The elevation of the range varies from 3,000 to 5,000 feet. They are well covered with pine trees and the slopes present a very picturesque aspect. Sandstone and shales with some metamorphic rocks make up the bulk of the range.

UNAKITE. A peculiar granite consisting essentially of yellow-green epidote, pink feld¬ spar and quartz ; occurs in Unaka Mountains, along North Carolina, Tennessee line and in Virginia. Used for ornamental work.

UNALASKA, oo-na-las'ka, an island of Alaska, one of the Aleutian Islands, and the middle one of the Fox Islands. Two Russians, Glottoff and Soloiroff, with a small party of ad¬ venturers, lived several months on the island the winter of 1765-66. The island is often vis¬ ited by whalers, sealers and explorers. It was an administrative centre,

and is still one of the important parts of Alaska. A naval rendezvous is at Captain's Bay, at the northeastern end of the island. The island is volcanic; the highest point, Makushin, 5,960 feet, smokes constantly and occasionally it sends out lava. The vicinity is often subject to earthquakes. At Iliuliuk the thermometer is rarely above 80 degrees in summer or below zero in winter. The climate is too cool for much vegetation. Copper and iron abound. But few small animals are found. The largest town, Unalaska, on Captain's Bay, is an outfitting station for ships passing to and fro from the Pacific to the Arctic oceans. The area of the island is about 800 square miles. Unalaska has a population of about 1,200, Aleuts, Russians and Americans.

UNAMI (((people down the river®), a divi¬ sion of the Delaware Indians of Pennsylvania, who occupied the Delaware River from the mouth of the Lehigh to the Delaware boundary line. They were sometimes referred to as the Turtle tribe, in allusion to one of their totems.

UNAU, the two-toed sloth. See Sloth.

UNCANOONUC MOUNTAINS. A small range of mountains in southeastern New Hamp¬ shire, rising rather prominently above the ad¬ joining rolling lands to an altitude of 1,348 feet. Somewhat well known as a summer resort. They are reached by trolley line from Shirley and Manchester. Used as a station in a base line of the United States Coast and Geodetic Survey. They consist of granite and gneiss.

UNCARIA, a genus of climbing plants with hooked spines, of the order Chinconiacce , and natives of the East Indies and tropical America. See Gambir.

UNCAS, ung'kas, Mohegan sachem : d. about 1683. He was originally a war chief of the Pequot sachem Sassacus, obtained the .sup¬ port of the English settlers and so acquired dominion over the Mohegan territory. In 1637 he joined the English in the war against the Pequots and received for his services another portion of the Pequot lands. He shielded many of the Pequots from the vengeance of the Eng¬ lish when the war was over, and for this was for a time in partial disgrace with the authori¬ ties ; but he was soon received again into so great favor with the whites that several at¬ tempts were made by different Indians to as¬ sassinate him. In 1643 he was victorious over the powerful Narragansett sachem Miantono- moh (q.v.) and in 1648 the Mohawks, Pocom- tocks and other tribes unsuccessfully made war against him. He was besieged in 1657 by the Narragansett chief Pessacus, and is said to have been relieved by Ensign Thomas Leffing-

well. In reward for this service it is said Uncas gave to Leffingwell all the land now in¬ cluded in the site of Norwich, Conn. In 1654 Uncas was reproved for ((rapacity and injustice® by a council of colonial commissioners. He was the ally of the English in all the wars against the Indians during his life, though in King Philip's War he was too old to be of much active service. In 1842 a monument was erected in his honor at Norwich. Consult Drake, S. G., (The Book of the Indians of North America) (1834) ; Stone, W. L., 'Uncas and Miantonomoh, a Historical Discourse) (1842). See Colonial Wars in America.

UNCIAL LETTERS. See Paleography.

UNCLE REMUS, a plantation negro, the assumed narrator of plantation and folklore stories collected by Joel Chandler Harris in such books as (Uncle Remus: His Songs and His Sayings* (1880); 'Nights with Uncle Remus) (1882); 'Uncle Remus and His Friends * (1892), etc.

UNCLE SAM. See National Nicknames.

UNCLE TOM'S CABIN, or LIFE AMONG THE LOWLY, a novel by Harriet Beecher Stowe (q.v.), the most important con¬ tribution of the emancipation movement to American literature, first appeared as a serial from 1 June 1851 to April 1852 in the National Era, an anti-slavery newspaper published at Washington, D. C. In serial form it attracted no particular attention, but after publication in book form, 20 March 1852, in a few weeks it achieved unusual success, finally attaining world-wide popularity, and being translated into over 22 different languages. For 18 years Mrs. Stowe lived in Cincinnati, where the problems of slavery were continually thrust upon her

attention, the river Ohio alone separating the city from Kentucky, where slaves bringing their tales of oppression and cruelty were con¬ tinuously escaping from their masters in at¬ tempts to gain freedom in Canada. In the great moral, economic and political movements of the times Mrs. Stowe and her husband took an active part. They had removed to Brunswick, Me., where Mr. Stowe had been appointed pro¬ fessor in Bowdoin College, when the storm occasioned by the Fugitive Slave Bill arose. Inspired by the force of the human message which she felt she must deliver, with full-stored memory and vivid imagination, she wrote with fervor-glowing heat the novel as

representative of certain phases of plantation life in the old South, which helped in no small measure the cause of emancipation. Few novels have ever aroused so much enthusiasm and indignation, so much criticism, favorable and unfavorable. (A Key to Uncle Tom's Cabin, > including in¬ teresting notes, documents and testimonials ap¬ peared in 1853 as a reply to inquiries, censure and criticism, and the same year she also pub¬ lished (A Peep into Uncle Tom's Cabin for Children.* Josiah Henson (q.v.) was the orig¬ inal of the character of Uncle Tom. Drama¬ tized soon after its publication in book form, (Uncle Tom's Ca,bin) still retains its stage popularity.

UNCLEANNESS, a ceremonial in various religious systems, symbolizing the lack of ritual purity of fitness. In the Brahmanic system food cooked by a Sudra or by an outcast is unclean to the Brahman ; he loses caste if he eats of it ; and he contracts ceremonial unclean¬ ness if he consorts with unclean persons, as the Pariah, the Mahar or other outcasts. The hieratic law of Judaism pronounced certain animals unclean and, therefore, not to be eaten. Of animals that <(chew the cud® all might be eaten, with exception of four; but of the four excepted — the camel, coney, hare and swine — the first only is of the class of the ruminants. Among birds declared to be unclean are the eagle, ossifrage, vulture, kite, etc., of which several cannot be positively identified ; but at all events the birds of prey are certainly in¬ cluded among the unclean birds, while most of the grain-feeding birds are allowed as articles of food. Among fishes or aquatic creatures, those are unclean which have neither fins nor scales. Except the leaping orthoptera — locust, grasshopper, etc. — most insects are unclean, as also all creeping things, from vertebrate reptiles to molluscous snails. And not merely were un¬ clean animals to be rejected as food, their car¬ casses were to be avoided, and whoever touched them became thereby unclean. The laws of ceremonial uncleanness were never of obligation in the religion of Jesus Christ, who taught that <(not that which entereth into the mouth de- fileth the man ; but that which proceedeth out of the mouth, this defileth the man® ; and with regard to persons, Saint Peter, after the vision of the sheet let down, would no longer call any man common or unclean. Consult Benzinger, I., (Hebraische Archaologie* (2d ed., Tubin¬ gen 1907), and Stade, B., (Geschichte des Volkes IsraeP (Vol. I, Berlin 1887).

UNCOMPAHGRE VALLEY PROJECT.

The Uncompahgre Valley Project is one of the largest construction enterprises undertaken by

the United States Reclamation Service under the Act of 17 June 1902. It effected the irri¬ gation of 150,000 acres of arid lands lying on both sides of the Uncompahgre River in south¬ western Colorado. It was accomplished by the diversion of the waters of the Gunnison River into the Uncompahgre Valley and the subsequent distribution of the water thus diverted, together with the waters of the Uncompahgre River, over the lands to be cultivated.

The engineering works connected with this project are as follows:

(1) The Gunnison Tunnel, which pierces the divide which separates the Gunnison River from the Uncompahgre River. This tunnel is 30,582 feet long and passes under the sum¬ mit of the divide at a depth of 2,220 feet. The eastern portal of the tunnel lies in the grand canyon of the Gunnison River. It is reached by a wagon road 10 miles in length, which is one of the picturesque drives of Colorado. The western portal is located in the Uncom¬ pahgre Valley near Cedar Creek Station on the Denver and Rio Grande Railway.

(2) The South Canal, which carries the water from the Gunnison Tunnel to the Un¬ compahgre River; 12 miles in length. This canal contains four short tunnels and many masonry drops.

(3) The West Canal, which distributes

the waters from the Gunnison Tunnel and the Uncompahgre River over the lands west of the Uncompahgre River; 30 miles in length.

(4) The East Canal, which distributes

the waters from the Gunnison Tunnel and the Uncompahgre River over the lands lying east of the Uncompahgre River; 35 miles in length.

(5) Numerous auxiliary canals and laterals.

(6) Impounding reservoirs on the head¬ waters of the Gunnison River for the storage of flood water to supplement the regular flow of the stream during the dry months. Streams of the arid region derive their summer flow in the main from melting snows in the high moun¬ tain ranges. When the warm sun of the spring months begins to be felt the great body of snow on mountains and foothills disappears quickly in floods of more or less magnitude, depending upon prevailing seasonal conditions. During the summer months the flow depends upon the slowly-melting snow fields which lie in deep gulches and behind lofty precipices, where they are sheltered from sun and wind. This late flow

is inadequate to the require¬ ments, and to supplement it convenient basins are dammed and filled with flood waters to be released gradually when needed later in the year. To provide for this contingency sufficient reservoir sites have been segregated on the headwaters of the Gunnison River. These sites will be held and developed as future needs dictate. In addition to supplementing the irri¬ gation waters these reservoirs will be useful as power producers.

The Uncompahgre Valley lies at about 5,000 feet above sea-level. It is sheltered by lofty mountain ranges and enjoys a mild and equable climate. The mountains surrounding the val¬ ley form a portion of the continental divide, and contain many of the richest gold, silver, copper and rare metal mines in the world. The soil of the valley is of unusual fertility. The principal products are apples, peaches, apricots*

prunes, cherries, wheat, oats, potatoes, sugar beets and livestock.

UNCONFORMITY, an erosional break in the continuity of deposition of sediments. When one stratum is deposited on the next in regular and unbroken order they are conform¬ able. But when the surface of one bed is eroded before the next is laid down the two are said to be unconformable. If the beds are ma¬ rine, that is, have been laid down in the ocean, an unconformity between them means that there was a period of emergence and erosion between the time of deposition of the first and second beds. It is by this means that we are enabled to work out much that is known about the distribution of land and water in past geologic time. Sometimes the older beds are folded as well as eroded, so that the younger lie hori¬ zontally above dipping beds below. This is called angular unconformity or discordance of bedding. If a region gradually sinks so that a series of beds are laid down above an old erosion surface in such wise that each suc¬ ceeding bed covers a larger area and laps over from the bed on which it naturally rests onto the old erosion surface, we have unconformity with overlap.

UNCONSCIOUS CEREBRATION, term formerly in general use in mental physiology, to denote the action by the mental faculties (or the cerebral organs), as of memory, reasoning, etc., performed without the mind being con¬ scious of what it does till the results of this unconscious action present themselves in the centres for consciousness in the new ideas or new combinations of ideas which were evolved in the unconscious process. The theory of un¬ conscious cerebration has

been current among German metaphysicians from the time of Leib¬ nitz and was systematically expounded by Sir William Hamilton. See Consciousness.

UNCONSCIOUSNESS, a condition of little or no consciousness. The definition of con¬ sciousness (q.v.) has been given in another vol¬ ume and it remains here to consider those de¬ grees and kinds of deviations from ordinary conscious states, particularly in the subnormal depressions. Under unconsciousness may be grouped two or three types. There may be total abeyance, such as is seen in epilepsy, in sleep, in brain concussion, in severe injuries, in infectious diseases, in drugs, as anaesthetics, hypnotics, alcohols, etc. There may be sub¬ normal conditions, semi-conscious, subconscious states which would properly be classed here, for in certain conditions, such as in some epileptics, some alcoholics or hysterics, consciousness at one time may be acute and yet all memory of the former state may be obliterated in another condition. Some of these conditions are grouped under the heading of double personali¬ ties. Some of these represent true phenomena, the vast majority are frauds. Thus from the minor forms of ˆabsent-mindedness® through sleep, up to the deepest grades of unconscious¬ ness produced by drugs, one can observe in life all the many steps of a large variety of uncon¬ scious phenomena. The site of consciousness has already been discussed and its coexistence with the entire nervous system maintained, but clinically it appears under many exciting causes.

The most important of these are:

Unconsciousness due to

1. Convulsions of unknown origin.

2. Epilepsy.

3. Hysteria.

4. Organic brain diseases.

5. Organic heart diseases.

6. Toxic causes — poisonings, endogenous

and exogenous.

7. Traumatism.

(1) In childhood convulsions with uncon¬ sciousness come on from a large number of unknown causes. Fear, anger, high temperature, teething, worms, are some of the actual irri¬ tants in many of these instances; but in many no cause, immediate or remote, is to be found. Many of these attacks resemble attacks of epilepsy. They are to be carefully watched to determine this point, otherwise much harm may come, particularly if they are mild epileptic attacks and the epileptic habit be engendered by carelessness in treatment. Sometimes these con¬ vulsions leave permanent brain injuries, but the majority recover without serious after effects. Convulsions in a child of unknown origin should mean to the mother that the nervous system is \ery readily upset and special precaution should be taken to avoid all forms of excitement in such children.

(2) Epilepsy. The most common form of unconsciousness in epilepsy has already been discussed (see Epilepsy), but there are in some epileptics minor alterations of conscious¬ ness that are of much importance. In some epileptics the patient, while not truly unconscious, yet may be so engrossed in a dominating idea that all outside elements of attention are ex¬ cluded. Thus some of this class may rob, murder, burn, roam off for days or even weeks, and yet on their return to their so-called normal conscious state, they may be absolutely oblivious to all that has happened. Such states are not uncommon in epileptics, but they are very rare outside of this condition and hysteria.

(3) Hysteria (q.v.). In this disease uncon¬ sciousness is rarely complete. Consciousness is altered. These changes are fully discussed. Also see Insanity; Paranoia.

(4) Organic Brain Disease. A number of brain diseases may cause unconsciousness. The most common are meningitis, hemorrhage, thrombosis, embolism, tumors, organic de¬ mentias. Under the general term apoplexy is included three separate disorders, all of which have similar symptoms. These are hemorrhage, embolism, thrombosis. In the one, a blood vessel in the brain breaks and there is destruc¬ tion of brain tissue, in the second, a clot, usually from a larger blood vessel, is swept into a smaller blood vessel of the brain, cutting off the blood supply of a part of the brain. In a third a disease of the wall of the blood vessel causes a local clot which fills up the vessel and in the same manner deprives a part of the brain of blood. In all of these conditions a <(stroke,® or apoplexy, with unconsciousness occurs. The individual symptoms may be consulted under apoplexy, hemorrhage of brain, embolism, etc. In general paralysis of the insane, attacks of unconsciousness are a regular part of

the de¬ velopment of the disease. See General Paresis.

(5) Some forms of heart disease are at¬ tended with fainting attacks. In these the

valves of the heart are found to act in a de¬ fective manner. See Heart, Disease of the.

(6) For a consideration of the toxic causes of unconsciousness see article on Toxicology.

(7) Traumatism, such as blows on the head, severe falls, sunstroke, all give rise to uncon¬ sciousness. The two former conditions have been discussed under concussion — the last under sunstroke. See Consciousness ; Con¬ sciousness, Disorders of; Consciousness, Bio¬ logical Aspects of, and consult bibliography under the first of these.

Smith Ely Jelliffe, M.D.

UNCTION, anointing with oil as a reli¬ gious or semi-religious rite, is traceable back to the rudest form of nature worship. The pillars of stone or of wood that were the symbols of phallic worship, as the sacred stone in every village of certain parts of India at present, had oil poured on the top of them. The cus¬ tom of pouring oil on sacred stones was not un¬ known to the Israelitish race (Gen. xxviii, 18; xxxi, 13). In the Mosaic ceremonial the use of unction is expressly prescribed for various oc¬ casions; among the Jews there was a holy anointing oil prepared with perfumes (Ex. xxx, 22-23) with which the priests and the tabernacle with all its furniture were anointed; the kings also were installed in their office by unction ; and the usage was retained in the Christian Church, being employed in the ad¬ ministration of the sacraments of baptism, con¬ firmation, order, in the consecration of altars, of sacred utensils, etc., and in the coronation of sovereigns. See Unction, Extreme.

UNCTION, Extreme (((the last anoint¬ ing®), one of the sacraments of the Roman Catholic Church as also of the Greek Orthodox Church ; it is a sacrament in which the sick that are in danger of death are anointed by a priest for the health of soul and body; its divine origin and sacramental character are in¬ ferred from the passage James v, 14, 15. The ˆmatter® of this sacrament is <(oil blessed by the bishop® ; but in the Greek Church the priests, commissioned by the

bishop, bless the oil. The ˆminister® of extreme unction is a priest, not any cleric in inferior orders. The ((subject® of the sacrament is a person that is dangerously sick. The ((form® consists in the prayers pro¬ nounced by the priest in administering the unc¬ tion; for example, at the unction of the eyes, the priest prays, (

UNDER-TENANT. See Rent, Law of.

UNDERGROUND MINING. See Min¬

ing.

UNDERGROUND RAILROAD, The, a

term made common in the United States prior to the Civil War, denoting a secret method of conducting negro slaves from the Southern States to Canada and free States in the North. Between the Ohio River and the Great Lakes were many abolitionists who gave shelter and assistance to escaping slaves, and their homes were known as stations of the underground rail¬ road. Among those who were patrons of the ˆunderground® system were Wm. Lloyd Garri¬ son, Wendell Phillips, Josiah Grinnell, Gerrit Smith, Theodore Parker, Thomas Garrett,

Charles Torrey, Samuel May, Levi Coffin, T. W. Higginson and F. B. Sanborn. (See Aboli¬ tionists). Consult Siebert, W. H., (The Un¬ derground Railroad from Slavery to Freedom* (New York 1899).

UNDERGROUND RAILWAYS. See

Subways; Tunnels and Tunneling.

UNDERGROUND RUSSIA, a noted work by Stepniak. The former editor of Zemlia i Volia (Land and Liberty), who for many years hid his identity under the pseu¬ donym of <(Stepniak® (freely translated ((Son of the Steppe®), wrote in Italian, in 1881, this series of sketches of the revolutionary and Nihilistic movement in which he had taken such an im¬ portant part. The introduction gives a succinct history of the individualistic propaganda which resulted in Russia in a certain measure of free¬ dom for women, and which, at the expense of much suffering and many young lives sacrificed, spread a leaven of liberalism through the vast empire of the tsars. Stepniak traces the suc¬ cessive changes that took place in the attack on autocracy between 1871 and 1881. The move¬ ment reached its final goal in 1917, when tsarism went down under a crushing defeat.

UNDERGROUND TEMPERATURES.

In the process of cooling the earth still re¬ tains a vast volume of heat. This heat is not appreciable at the surface where air tempera¬ tures prevail but it is manifest in deep mines and borings which show a general increase of temperature with depth. The rate of increase is by no means regular but varies from place to place and in some cases it changes with depth. In general it ranges from 40 to 80 feet to 1° F. and the average indicates that at a depth of 25 miles the temperature is about 2,200° F. or above the melting point of iron and rocks. It is difficult to conceive how great the maximum may be farther down. This heat is believed to be a residual of that which was present when the earth was in molten and gaseous conditions. Much has been lost by the cooling-off process that is still in operation. Volcanoes may be evidence of the general internal heat although it is more likely that they are manifestations of some local heat conditions probably developed at moderate depths.

A large number of observations have been made of underground temperatures in deep mines, wells, bore holes and tunnels in various parts of the world. Many of these have been taken with great accuracy and others are ap¬ proximations. Some representative ones are given at the end of this article.

Rates of increase of earth temperature are calculated from the difference between the mean annual air temperature and the observed tem¬ perature at the given depth, it being assumed that the temperature for the first 50 feet below the surface is that of the mean annual air tem¬ perature. It has been found, however, that the latter figure is somewhat too low, the discrepancy varying with latitude and various local condi¬ tions. The difference is about V/2° in a humid climate like that of England and 2l/2° to 3° in a dry climate such as that of northern Africa. In some cases the temperature at some shallow depth is directly determined and used for the comparison. In many instances temperatures are taken of various depths and the results plotted in a curve which is independent of the

surface temperature. Many temperatures have been obtained of flows from deep artesian wells and also of flows from pumped wells. In these it is necessary to know the depth of the source of the water and the flow must be large in volume and long continued. The

thermometers used are of several kinds but ordinarily self¬ registering maximum mercury thermometers or thermo-electric instruments are lowered in the borings or sunk in holes in deep mines. In deep holes, convection, gas expansion and heat from recent boring vitiate the result. The influx of deeper waters, proximity of recent volcanic rocks, lodes in which mineralization is in progress and planes or zones of movement have great influence, the last especially in fa¬ cilitating rise of deep seated underground water. In mines, especially coal mines, oxidation ma¬ terially increases the heat. In the upper part of the Anzin coal mines, in France, the tem¬ perature is 15° F. above the normal.

One of the most striking features of the rates of underground temperature increases as observed in borings and mines is their varia¬ tion from place to place. Undoubtedly some of these variations are due to imperfect ob¬ servations but most of them are related to local causes of which the nature is not known. At¬ tempts have been made to show that rates are lower in the mountains, higher in petroleum areas and coal fields and various other general conditions but in most cases these relations are not borne out when many observations are as¬ sembled. There are undoubtedly in the earth many factors which influence the rate of tem¬ perature increase such as variation in conduc¬ tivity of various rocks, underground tension, mineralization and movement of underground water. Local volcanic action of course is a most powerful agent but only present in certain areas where its influence generally is clearly apparent. Variation in radioactivity has been suggested as a factor, and the influence of bodies of cold water such as Lake Superior and former presence of glacial ice as causes of local diminution of earth temperature. Positive evidence is lacking along all these lines, however, and the results of extended special investigations must be awaited before the true explanation is attained.

Selected Observations in Europe, Etc.

Gradient Depth, feet to feet 1° F.

1,302 130

1,041 80

1,050 79

1,020 78*

2,790 77

1,317 77

2,700 72

2 , 000 69

855 76

1,769 68

620 62

1,100 55

2,445 54

1,584 70

1,929 57*

1,514 49

1,250 45

354 53

347 50

525 41

770 43

570 40

VOL. 27 — 18

East

Manchester

coalfield

GREAT BRITAIN

Bootle waterworks (Liverpool) Talargoch lead mine (Flint) ....

Nook Pit, colliery Bredbury “

Ashton Moss “

Denton “

Astley Pit, Dukinfield.

Scarle boring (Lincoln) .

Pontypridd colliery (S. Wales) .

Kingswood “ (Bristol) .

Radstock “ (Bath) .

London “ (Kentish Town) . .

Rosebridge “ (Wigan) .

Monkwearmouth colliery (Durham) . . South Hetton “ “ .. • • •

Boldon

Whitehaven “ (Cumberland)

Kirkland (Glasgow) .

Blythswood “ .

South Balgray “ . _ .

Carrickfergus, shaft of salt mine (Ire¬ land) . _ .

Carrickfergus, shaft of salt mine (Ire¬ land) .

Selected Observations in Europe, Etc. — Cont’d.

Gradient Depth, feet to

great Britain — Continued. feet 1° F.

Slittmine, Weardale(Northumberland) 660 34

Rosebridge . 3 , 680 53

BELGIUM

Seraing Collieries . 1,657 50

FRANCE

Pont a Mousson . 5,104 55

Martincourt . 3,937 56

Pas de Calais . 4,593 101

Charmoy (Creusot) . 3,831 48

Grenelle . 1,797 58*

Creusot (Monillarge) . 2,674 52

Passy (Paris) . 1,926 59

Bonchamp . 3,310 49

Saint Andre . 830 56

Troyes . 409 52*

Rochfort . 2,797 50

Anzin Collieries . 650 47

CENTRAL EUROPE

Paruschowitz (Upper Silesia) . 6,429 56

Sperenberg (near Berlin) . 4,160 59

Czuchow (Upper Silesia) . 7,346 54

Wittelsheim (Alsace) . 33*

Radersheim (Alsace) . 45

Ensisheim (Alsace) . 1 , 936 63

Schladebach (Meiseburg) . 4,055 65

Sudenburg (Magdeburg) . 1,857 58

Rehme (Westphalia) . 2,464 58

Gelsenkirchen coal . 2, 903-2 , 5 00 42-45

Minden . 2,408 36

Sennewitz (Halle) . 3,555 67

Lieth (Altona) . 4,130 65*

Arthern (Thurinzin) . 1 , 092 68

New Salzwerk (Minden) . 2,112 51

Sauerbrunnen (Bohemia) . 426 58

Vienna . 616 57

Schemnitz mines, Hungary . 1,368 74

Knurow (Bohemia) . 2 , 293 58

M on dorf (Luxemburg) . . . 2,330 57

Przibram mines (Bohemia) . 1,900 126

Saint Gottard tunnel . 5,578 82

Mont Cenis tunnel . 5,280 79

Italy

Naples . 1,459 180

RUSSIA A

Petrograd . 656 44

SIBERIA

Yakutsk (frozen ground) . 540 54

EAST BORNEO

Samarinda . 30-54

AUSTRALIA

Port Jackson . 2,733 80

JAPAN

Tokio . 1,184 72

MEXICO

Furbero oil field, Vera Cruz . 1 ,641 42

“ “ “ . 2,277 48

Selected Observations in United States.

Alabama. — Many observations of temperature of flows, from deep wells show a range from 50 to 100 feet to one degree, a large proportion falling below 75 feet to one degree; at Mobile the rate is 71 feet to one degree.

Arizona. — In the Phoenix region the shallower wells show rapid rates, 20 to 40 feet to one degree and deeper ones average 60 feet to one degree. In the plateau north the rates range from 22 to 50 feet to one degree. The rate indicated by the more vigorous flowing wells in San Simon valley varies from 30 to 60 feet to one degree.

California. — Flows from wells of moderate depth in the orange country of southern California vary somewhat in temperature, especially where there are local hot spring conditions; but the more closely accordant figures give rates near 50 feet to one degree. The many flowing wells in San Joaquin Valley show rates from 35 to 150 feet to one degree, but in the deep wells in the oil fields the range is from 27 to 91 feet to one degree. In Indio Basin most of the many flowing wells 400 to 700 feet deep show no increase in tem¬ perature. In Grass Valley gold mines the average rate is 114 feet to one degree.

Colorado. — Flows from artesian wells in Arkansas Valley show rates from 23 to 54 feet to one degree, mostly from 30 to 40 feet. In San Luis Valley the rate is 22 to 32 feet. At Trinidad 42 feet, at Denver 33 to 52 feet, and at Akron 45 feet to one degree.

Florida. — The great well at Saint Augustine showed a rate of 81 feet to one degree but other wells show rates varying from 43 to 100 feet and some are less.

Georgia. — Rates from 57 to 127 feet to one degree are indicated by wells but the data are not reliable.

Idaho. — High rates of increase are recorded in the State

but most of the observations are in areas over or near young volcanic outflows.

Illinois. — Many Illinois wells have mixed flows from various depths, but evidently the rate is low. Thermometers sunk at Saint John give a rate of 83 $ feet and at Streater 97 feet to one degree.

Indiana. — Data are not reliable but rates from 73 to 118 feet to one degree are indicated.

iowa. — The flowing wells of Iowa indicate various gradients but most of the data are unreliable owing to mixed flows. Thermometers sunk at Des Moines and Ames gave rates of 109 and 116 feet to one degree respectively. At Davenport 75 feet and at Council Bluffs 83 feet to one degree.

Kansas. — Most of the gradients obtained in Kansas varied from 50 to 75 feet to one degree, the deep shaft at Lyons Salt mine indicating 74 feet to one degree.

Kentucky. — The old deep well at Louisville has gradient of 81 feet to one degree according to one report and 106 feet to one degree according to another.

Louisiana. — In the 3,171-foot hole at Belle Island a thermometer sunk to a depth of 975 feet indicated a rate of 73 feet to one degree. In various flowing wells in the State rates are mostly 50 to 80 feet to one degree.

Maryland. — One observation at Crisfield on the Eastern Shore indicates a rate of 47 feet to one degree.

Michigan. — It is a fact of great interest that the rate of temperature increase is usually low in the deep mines of the northern peninsula of Michigan, the average being about 125 feet to one degree. Deep wells in the southern peninsula show rates ranging from 45 to 70 feet to one degree. The 3,455-foot hole at Bay City, temperature 97° in bottom, indicates a gradient of 68$ feet to one degree.

- Mississippi. — Flowing wells show varying rates from 43 feet at Biloxi to 211 feet to one degree at Vicksburg.

Missouri. — The data from Missouri while somewhat conflicting show low gradients. The 3,843-foot hole at Saint Louis Asylum indicates a

gradient of 78 feet to one degree.

Montana. — Observations in Anaconda Mine at Butte show an ayerage of about 50 feet to one degree while a flowing well at Miles City indicates a rate of 35 feet to one degree. Flowing wells in Little Bitterroot Valley show an average of 5$ feet to one degree, probably influenced by warm springs.

Nebraska. — The flowing wells in Missouri Valley in the northeastern corner of the State indicate rates of increase from 19 to 30 feet to one degree. The wells at Omaha have rate of 85 feet and at Lincoln of 57 feet to one degree.

Nevada. — The detailed studies of Comstock Lode, made long ago, showed that the rapid rates of increase probably are influenced by volcanic conditions. The temperature of 170 degrees at depth of 3,100 feet indicated a rate of 28 feet to one degree. At Tonopah the rate varies from place to place and with depth and the average is near 40 feet to one degree.

new jersey. — Flowing wells along the sea coast show an average rate of 50 feet to one degree with exception of Wild¬ wood well in which the rate is to 69 feet to one degree or more.

new Mexico. — A well at Sandia not far southwest of Albuquerque showed a rate of 35$ feet to one degree.

north Dakota. — Deep flowing wells in central and eastern North Dakota show rates ranging from 36$ to 56 feet to one degree with an average of 40 feet.

OHIO. — The 2,980-foot well at Findlay showed a rate of 95 feet to one degree with diminished rate as depth increased. The 2,775-foot hole at Columbus indicated 71 feet to one degree and 3,020-foot hole at Plymouth 69$ feet to one degree.

Oklahoma. — The rates in Oklahoma were found to range from 34 to 62 feet to one degree, the highest rate being in the central northeastern part of the State.

Pennsylvania. — Several very deep holes in the western part of the State have been carefully tested for temperatures. The 6,299-foot hole 15 miles southwest of Pittsburgh with temperatures of “ 156° near bottom ” (141.3° at 6,100 feet) indicated a rate of about 69 feet to one degree. The 429- foot hole at Homestead had a rate of 70 feet to one degree and the 5,380-foot hole at West Elizabeth 73 feet to one

degree. In the anthracite coal field rates vary, most of them from 72 to 140 feet to one degree, a 1,598-foot drill hole at Glen Lyon showing 130 feet to one degree.

south Carolina. — The deep wells at Charleston show a rate from 56 to 61 feet to one degree.

south Dakota. — Several hundred determinations of temperatures of water from deep flowing wells in the eastern part of the State show some remarkable anomalies of varia¬ tion from rates of 17$ feet to one degree, to 50 feet to one degree closely related to the configuration of the granite or quartzite floor of the artesian basin (consult Darton, N. H., 'Geothermal data in South Dakota,' American Journal Science, Vol. V, p. 161, and United States Geological Survey, 18th Annual Report, Pt. IV, pp. 606-611, 1897). The artesian wells near Belle Fourche show rates from 28 to 80 feet to one degree and the 2,965 foot flowing well at Edgemont with flow at temperature of 121 degrees indic¬ ated a rate of 39 feet to one degree, the same as two 700 foot holes at Buffalo Gap.

Texas. — There are many data from deep holes and wells in Texas. The 3,330-foot well at Manlin with flow tempera¬ ture of 147 degrees indicates a rate of 41$ to one degree, similar to the rate at Corsicana and some other places. The 3,250-foot well at Fort Worth probably indicates a rate

of 18$ feet, to one degree if all the flow is from 1,127 feet The Waco wells indicate average rate of 50 feet to one degree, Big Hill in Matagordo County 23$ feet to one degree; Batson 21$ feet to one degree; Sourlake 27$ feet to one degree, the four last in the oil regions where the rate appears to be high.

utah. — A few observations in Milford- Beaver region indicate high rates, 12 to 24 feet to one degree.

Virginia. — The investigations by Rogers in coal mines west of Richmond showed gradients of 72 to 84 feet to one degree. In the 2,130-foot hole at Fort Monroe a rate of 64 feet to one degree was found.

Washington. — Flowing wells in North Yakima Basin show rates of 25 to 36 feet to one degree. At Walla Walla a rate of 41$ feet to one degree was found.

west Virginia. — The deepest hole in the world is on the Goff farm eight miles northeast of Clarksburg in northern West Virginia. It was

7,363 feet deep in March 1918, and a test at 7,000 feet showed temperature of 152 degrees, indi¬ cating a rate of increase of about 51 feet to one degree. In the 4,771-foot hole four miles southeast of Wheeling the temperature at 4,462 feet was 1 10 degrees, indicating a rate 70 to 83 feet to one degree. In the 5,236-foot hole at Chelyan near Charleston the rate is 73 feet to one degree; 2,500-foot hole near Mannington 93 feet to one degree.

Wisconsin. — Temperatures of water from flowing wells in Wisconsin indicated rates varying from 54 to 100 feet to one degree.

Wyoming. — Three deep holes give widely different rates; Cambria 107 feet to one degree, Newcastle 21 feet to one degree and near Meteetsee 54 feet to one degree.

Consult reports of committees to investi¬ gate rate of increase of underground tempera¬ ture (in British Association for the Advance¬ ment of Science, reports of meetings of 1868 to 1881, et seq., notably the 52d, 1882, pp. 72-90) ; Dunker, E., (Ueber die Warme im Innern der Erde und ihre moglichst fehlerfreie Ermittlug) (in Zeit. fur prac. Geologie, November 1896) ; Jaczewski, (Uber das thermische Regime der Erdoberflache in Zusammenhang mit den Geo- logischen Prozessen) (in Verhand. der K. Russ. Mineral Gesellschaft, Vol. 42, No. 2, 1905) ; Koenigsberger and Miihlberg, (Ueber Messungen der Geothemischen Tiefenstufe deren Technik und Ver Wertung zur Geol- gischen Prognose und uber neue Messungen in Mexiko, Borneo und Mitteleuropa) (in Neuen Jahrbuch fiir Min. Geol. und Pal. B. B. 31, pp. 107-157) ; Abstract in Proceedings Institution of Mining Engineers; Lane, A. C., Geother¬ mal Gradient* (Michigan Geological Survey, Annual Report 1901, pp. 244—251) ; Darton, N. H., Gist of Underground Temperatures in United States> (United States Geological Sur¬ vey Bulletin No. 701, 1919).

Nelson H. Darton,

Geologist, United States Geological Survey.

UNDERGROUND WATERS. See

Waters, Underground.

UNDERHILL, John, American colonist: b. Warwickshire, England, 1597 ; d. Oyster Bay, L. I., 1672. He served in the Netherlands and in 1625 in the Cadiz expedition, in 1630 was summoned by Winthrop to New England to train the inhabitants in martial discipline and in 1634 was chosen from Boston to the Massachusetts assembly. In the Pequot

campaign of 1637 he distinguished himself as commander of the New England contingent. His account of the war, (Newes from America) (1638), was re¬ printed in the

where he was commissioned to wage war against the Dutch in New York. Upon the fall of the New Netherlands to the English in 1664 Underhill settled in Oyster Bay, L. I., on a tract of 150 acres ceded him by the Mantinenoc Indians.

UNDERWOOD, Benjamin Franklin,

American author and editor: b. New York, 6 July 1839; d. 10 Nov. 1914. At the outbreak of the Civil War he enlisted as a private in the Union army, was wounded and captured at the battle of Bull Run, and was not exchanged until 1862. He then became lieutenant and adjutant in the Rhode Island Heavy Artillery and served until the close of the war, acting in the mean¬ time as war-correspondent for the Newport, R. I., News. He was engaged in lecturing for 30 years after the war and in 1870-85 he was particularly prominent as an exponent of reli¬ gious (tfree thought.® He was business man¬ ager and coeditor of the Boston Index in 1880- 86 and in 1887 was engaged in a like capacity on the Chicago Open Court. He edited the Il¬ lustrated Graphic News in 1888, the Philosophic Journal in 1893-95, has written editorially for the Free Thought Magazine since 1893. He was secretary of the Psychical Science Congress at the Columbian Exposition in 1893 and has published Unfluence of Christianity on Civili¬ zation 5 (1871) ; (Spencer's Synthetic Philoso¬ phy5 (1891) ; (Utilitarian Ethics) (1903), etc.

UNDERWOOD, Francis Henry, Ameri¬ can author: b. Enfield, Mass., 12 Jan. 1825; d. Edinburgh, Scotland, 7 Aug. 1894. He was educated at Amherst College, studied law in Kentucky, and was admitted to the bar in 1847. He returned to Massachusetts in 1849, was ap¬ pointed clerk of the State senate in 1852, and in 1854 became literary adviser of the Boston publishing house of Phillips, Sampson and Com¬ pany. The establishment of The Atlantic Monthly , by that firm, was due to him and it was he who secured James Russell Lowell as editor-in-chief, Underwood being assistant edi¬ tor. Two years later his connection with the periodical came to an end, and from 1859 to 1870 he was clerk of the Supreme Criminal Court, Boston. He subsequently devoted himself to literary work till 1885, when he was

appointed to succeed Bret Harte as consul at Glasgow, and while in Scotland he lectured on American liter¬ ature. His term of office expired in 1889 and he returned to the United States for a time, but in 1893 was appointed consul at Edinburgh. He was the author of (Handbook of English Literature) (1871) ; (Handbook of American Literature5 (1872); (Cloud Pictures5 (1873) ; (Lord of Himself,5 a novel of Kentucky life (1874) ; (Man Proposes,5 a novel (1880) ; (The True Story of the Exodus,5 an abridgment of the work of Dr. Brugsch-Bey (1880) ; biogra¬ phies of (Longfellow5 (1882), (Lowell5 (1882), and (Whittier5 (1883): (Quabbin5 (1890); (Dr. Gray's Quest5 a novel (1896). His best work is seen in (Quabbin,5 a sympathetic study of life in a small New England town two gen¬ erations ago. He was endowed with a strong personality, had a wide acquaintance with books and men, possessed a fine critical sense and not a little literary power, but was to some extent lacking in constructive skill and char¬ acter delineation.

UNDERWOOD, Horace Grant, pioneer missionary in Korea: b. 19 July 1859; d. 12 Oct. 1916. Born in London, he came to America at the age of 12 and was educated in the New York University and New Brunswick Theological Seminary. Arriving in Korea, under the Pres¬ byterian Board, United States of America, in 1885, he began explorations and researches, showing an aptitude for mastering the lan¬ guage and an intensive energy in every sort of service to the people and rulers, from practical hygiene and education, to the counsel of roy¬ alty, while ever ardent and wise as a promoter of Christian unity, in continuous toil, from 1885 to 1915. Editor, preacher, teacher, he eschewed offers from the king of political honor and emolument. Was chairman of the board of Bible translators, from 1887 to 1911, and of the Korean Tract Society; professor of theology in the Korean Theological Seminary 1907-15; head of the Korean Educational Fed¬ erations; principal of the John D. Wells Train¬ ing School 1907-15, and founder of the Chris¬ tian College in Seoul. Lecturer in America on Foreign Missions. At his death there were 46 Protestant Christian churches within a radius of six miles from the centre of Seoul, the capi¬ tal. He was author of a Korean-English and English-Korean Dictionary (1889) ; Hntroduc- tion to the Korean Spoken Language5 (1890); – (The Call of Korea5 (1908) ; (Religions of Eastern Asia5 (1910). Consult the biography by his wife, Lilias Sterling Horton, herself physician and missionary, married in Korea in 1889, and author of (Fifteen Years Among the Topknots5 (1904) ; (Underwood of Korea5

(1918).

UNDERWOOD, John Cox, American sol¬ dier and civil engineer : b. Georgetown, D. C.,

12 Sept. 1840. He was graduated as a civil engineer at the Rensselaer Polytechnic Institute, Troy, N. Y., in 1862, and served with distinction in the Confederate army during the Civil War, reaching the rank of lieutenant-colonel. For nearly a year he was held as a prisoner at Fort Warren. In 1870-72 he was mayor of Bowling Green, Ky., and during 1866-75 served as city, county and consulting State engineer. From 1875 to 1879 he was lieutenant-governor of Kentucky. He was prominent in several secret fraternal organizations and Confederate patri¬ otic societies ; and in 1896 was chosen superin¬ tendent and secretary of the Confederate Memorial Association.

UNDERWOOD, Lucien Marcus, Ameri¬ can educator and botanist: b. New Woodstock,

N. Y., 26 Oct. 1853; d. Redding, Conn., 16 Nov. 1907. He graduated from Syracuse University in 1877 and was professor of botany there 1 883— 91. From 1896 he was professor of botany at Columbia. He published 1 Systematic Plant Record5 (1881) ; (Our Native Ferns and How to Study Them5 (1881-1901) ; (North American Hepaticae5 (1884) ; (Our Native Ferns and Their Allies> (1888) ; (Hepaticae Americanae5 (1887-93); (Moulds, Mildews and Mushrooms5 (1889). Consult Bonker, H. J. (ed.), Under¬ wood Families of America5 (1913).

UNDERWOOD, Oscar Wilder, American legislator : b. Louisville, Ky., 6 May 1862. Edu¬ cated at the University of Virginia he was ad¬ mitted to the bar in 1884 and practised in Bir¬ mingham. He was chairman of the Democratic

committee that adopted the present constitution of the State, was member of Congress (1895— 1915) and was elected United States senator (1915-21) ; re-elected 1921-27. He is a promi¬ nent leader of the Democratic party and its chief tariff expert. He was a popular candidate for the presidential nomination in 1912.

UNDERWRITER, one who insures, or makes a business of negotiating contracts of insurance. The term is particularly employed in connection with marine insurance. More re¬ cently it has come to be used in relation to certain modern financial conditions. Upon the

organization of a corporation to absorb several companies, it is customary to raise a sum of money to be employed either as a working capi¬ tal or for the purchase of such stock in the companies as original holders are unwilling to exchange tor ttie new securities of the corpora¬ tion. The one employed in raising this sum is styled the underwriter. See Insurance; In¬ surance, Life, in America; Insurance, Marine; Fire Insurance in America; Under¬ writing.

UNDERWRITING, in finance, a method of floating the bonds and securities of large cor¬ porations by means of fiscal agents or syndi¬ cates. The general rule governing the under¬ writing of new securities is that the syndicates shall receive a commission of 5 per cent on the value of the securities underwritten. As an il¬ lustration take a railroad issuing $50,000,000 of bonds. The railroad, it may be presumed, is of good standing, and the security excellent. The company prefers, instead of securing a high premium on the bonds, to save in the annual in¬ terest charges. So it issues a 3ˆ2 per cent bond, with the probability that it will sell at par, or perhaps higher. The underwriters agree to take the entire issue, say at 98, but it charges a com¬ mission of 5 per cent, or about $2,500,000, for labor, expense and risk attending the operation. The railroad is now secure. It is assured of the money it needs for which it has, indeed, paid a liberal discount, but no more liberal, pro¬ portionately, than would be required in procur¬ ing a modest loan in the ordinary market chan¬ nels. The syndicate must now sell the bonds. If there is an active investment demand, it may be able to accomplish this at once, at a considerable advance over the underwritten price of 98. Suppose it sells at 102, the syndi¬ cate would then reap a profit of 4 per cent, or $2,000,000 in addition to the commission of $2,500,000, less, however, the cost of advertising, wages, attorneys' fees and other incidentals. But if the demand were not as great as had been anticipated, the syndicate might find itself with millions of dollars of securities on its hands, for which it must pay, but for which there is no adequate market.

UNDINE (1811), the first notable writing of La Motte-Fouque, is a classic of romantic daintiness. <(The fragrance of poetry and the songs of the nightingales,® said Heine, (

born. Undine marries Huldbrand, gains a soul, but must lose life if she cannot hold him true to her love. Her nature is transformed to a tenderness that embraces even her companion and rival Bertalda, discovered to be the fisher- folk's daughter. Kuhleborn, warning, threaten¬ ing, is repelled. Undine loves too fondly, till af last Huldbrand's vagrant affections break the spell, and Undine melts from

his presence, but not from his life. For she has kept her soul and, when warnings cannot keep him from Ber¬ talda, returns on his wedding eve to draw away his life .in a kiss and, as a perennial spring, to clasp his grave in her embrace. The tale, as a legend of the Ritter von Staufenberg, dates from 1400. It was retold by Fischart and mystically interpreted by Paracelsus in his (Liber de Nymphis) (1590). As poetized by Fouque it won immediate popularity, was made subject of three operas, widely translated and illustrated by noted artists. Consult Pfeiffer, W., (Uber Fouque' s Undine> (1903).

Benjamin W. Wells.

UNDISCOVERED COUNTRY, The, a

story by W. D. Howells, published in 1880. The central figure, Dr. Boynton, an enthusiastic spiritualist, is an admirable study of an honest charlatan. He has become a monomaniac on the subject of spiritualistic manifestations and, branded as a cheat, with his daughter seeks ref¬ uge in a community of Shakers, whose quaint and kindly ways are portrayed with a loving pen.

UNDUE INFLUENCE, a legal term of

frequent use in testamentary suits, and some¬ times in cases of contested elections. Undue influence in the making of a will is exerted when the testator is so unnaturally influenced that he makes his will in favor of some one other than his natural heirs, — undue influence being oftenest charged when the testator's mind was infirm or weakened by illness and his will was made while he was under the supervi¬ sion of the outside beneficiary. Where undue influence is proved the court will set a will aside or allow compensation. See Will.

In voting, undue influence consists of force, violence, restraint, threat or intimidation prac¬ tised at the polls to influence votes to the way of thinking of the person making such demon¬ stration. When proved it vitiates the result to the polling and lays the perpetrator open to penal action, with severe punishment. The burden of proof rests on the party making a charge of undue influence. See Corrupt Prac¬ tices Acts.

UNDULATORY THEORY OF LIGHT, or WAVE THEORY OF LIGHT, the theory which accounts for the phenomena of light and radiant heat, by interpreting them as the re¬ sults of vibratory movements or undulations, in an all-pervading medium called the <(ether® (q.v.),. There are many optical phenomena which admit of a ready

mathematical explana¬ tion in this manner, without making any very definite assumptions concerning the nature of the ether, or the kinds of motion that occur in it. In order to explain the phenomena of polarization, however, it is necessary to assume that when a light-ray passes through the ether, the ether is disturbed in such a manner that its particles oscillate back and forth in paths

which are perpendicular to the direction in which the light-ray is traveling. In this respect the motion of the ether is very different from that which prevails in air when a wave of sound traverses that medium ; the motions of the air particles in the case of a sound-wave being to and fro along lines that are parallel to the direction in which the wave is progress¬ ing. The motion of the ether when a light- ray traverses it is supposed, in fact, to be very similar to the motion by which a vibra¬ tory disturbance is propagated from one part of an incompressible elastic solid to another part ; and for this reason the undulatory theory of light is often called the ˆelastic-solid® theory.

Christian Huyghens was the first to give the undulatory theory of light a definite form, and the origin of that theory may fairly be said to date from a paper written by him for the French Academy of Sciences, in 1678. Sir Isaac Newton was well aware of the possibility of accounting for many of the phenomena of light, by assuming that light consists of a kind of wave-motion in an all-pervading ether ; but he objected to the undulatory theory, because he could not understand how a body could cast a sharp shadow if that theory were correct. He was of the opinion that the waves would necessarily sweep around obstacles, and close in behind them in such a way as to render sharp shadows impossible. Newton, therefore, adopted the alternative ((corpuscular theory,® which teaches that light consists of storms of tiny material particles, or <(corpuscles,® which tend, by reason of their inertia, to travel in straight lines. He developed this theory with characteristic power and ingenuity, so that physicists were long divided between his teach¬ ings and those of Huyghens. In 1801, Dr. Thomas Young, an English physicist, solved the difficulty which led Newton to reject the undulatory theory; for he showed that when the dimensions of an opaque object are very great in comparison with the wave-length of light, the light-waves which fall upon the ob¬ ject are prevented from sweeping around and closing up behind it, by means of the phe¬ nomenon known as ˆinterference® ; those waves which tend to pass around behind such an obstruction becoming compounded together in

such a manner as to neutralize one another. Young's discovery stimulated investigation so that within the next 20 years great advances were made in the development of the undula¬ tory theory. Young and Fresnel, for exam¬ ple, exnlained the phenomena of polarization, and Fresnel developed his beautiful theory of the optical phenomena manifested by crystals. The objections raised by Newton had been en¬ tirely disposed of, and the undulatory theory had been placed u,pon an apparently firm foundation. Moreover, there are two things about the corpuscular theory which appeared to be absolutely fatal to it. The first is, that it does not lend itself readily to the explanation of interference. It is easy to understand that two waves in the ether may come together so as to neutralize each other; for an analogous phenomenon may be seen any day at the sea¬ shore, in ocean waves. It is not at all easy to understand, however, how two streams of light- producing corpuscles can produce darkness, when either stream alone will produce light.

Another even more fatal objection to the cor¬ puscular theory was, that this theory cannot explain refraction unless it is admitted that light travels faster in a dense medium than it does in a rarer one, while the undulatory theory requires that the light shall move faster in the rarer medium. Fizeau and Foucault proved by direct experiment that light travels faster in air than it does in water; and hence it Was considered that they had proved that the cor¬ puscular theory is not correct.

About the middle of the 19th century Michael Faraday published his experimental researches on electricity and magnetism ; and although these did not deal particularly with light, it happened that they had a most import¬ ant ultimate influence upon our views as to its nature. Maxwell, in studying Faraday's work and endeavoring to reduce his experi¬ mental results to a consistent mathematical theory, conceived the idea that light may be merely a periodic or vibratory electrical dis¬ turbance in the ether. Upon working out this idea in detail, Maxwell found that the new theory is free from many of the objections that had developed in connection with the older eiastic-solid theory; and the ((electro-magnetic theory® of Maxwell is now held by nearly all physicists, in preference to the older undula¬ tory theory. The difference between the two is somewhat as follows : Maxwell agrees that light is some sort of a periodical disturbance in some sort of an ether, and he also agrees that the displacements that occur as the wave pro¬ gresses are perpendicular to the direction in which the wave travels ; but he teaches that these displacements are not analogous to those that are produced in an elastic solid when that solid is deformed. He considers that they are of an electrical nature,

and that we must learn about them, not by observing the behavior of elastic bodies under stress, but by observing the phenomena exhibited by electrified bodies. In one sense, therefore, Maxwell's theory may still be regarded as a form of the undulatory theory; but the waves that are contemplated by it are electrical in nature, and are not strictly analogous to the waves in an incom¬ pressible elastic solid. See Ether; Light; Radiation ; Radioactivity ; X-Ray.

Allan D. Risteen.

UNEMPLOYMENT. In the sciences of economics and sociology the term unemploy¬ ment refers to an industrial condition in which large numbers of workers are without gainful occupation. No doubt in feudal times the work¬ ing classes found during trade depression, war periods and other cataclysms periods of inac¬ tivity leading to poverty and even hunger. But in those days it was not a cry issuing from hungering masses closely congregated as at present. In the early days of the artisan man¬ ufacturing units consisted of small individual ((shops® where work was performed by appren¬ tices and journeymen artisans mostly. And when the master craftsman had filled all orders and had no longer work for all, the journeyman went on his way to the next village or city seeking another job. The condition was gen¬ eral and provided for. The workman had his lodging-house in every town or village where, at small cost or free, he obtained board and lodging till he had canvassed the trade and ob-

taincd his job or left for the next settlement. His "papers® showed the signature of his former employer as proof of his good standing and he was aided in his quest for work by the state. With the growth of the cities, and consequently of the industries supplying them, manufacturing establishments grew into factories where the larger units could use more economy in methods besides producing in larger quantities at re¬ duced cost. It was the opening of that stage of civilization known as industrialism. And with these ever growing aggregates of manufac¬ turing industries forming themselves into trade centres with their great populations of "hands® or operatives was brought into being the hide¬ ous feature we know as "unemployment.® Its paradoxical phenomenon is conspicuous in the fact that with the growth and increasing pros¬ perity of the industries we find shoe factories closed in the midst of crowds of shoeless able workers whose presence forces on one's knowl¬ edge that the need or

demand for footgear is great ; the huge clothing factories shut down their operations while many thousands of will¬ ing workers stand outside shivering from lack of apparel with which to protect themselves against the elements.

Problem. — In a statement of the features of the subject of unemployment must not be omitted notice of the fact that large numbers of healthy and willing workers unable to find em¬ ployment carries with it the direct consequence of indignation and “unrest® among the populace generally of wage-earners, a disease of the body politic that at any time is a breeder of anarchists and revolution. Again another degrading influ¬ ence of unemployment is its demoralization of the suffering working classes who lapse easily into beggary and morally and physically deterio¬ rate so as to become unemployable, as inefficient and unreliable. Like most diseases unemploy¬ ment in an industry is infectious. The enforced idleness of these thousands affects other thou¬ sands in other trades as the penniless state of numerous members of a community forbids de¬ mand and consumption of goods produced by its other members, and the sales of other commodi¬ ties being reduced causes other factories to be closed down. And thus the entire chain of in¬ dustry from factory to retailer, consumer, capi¬ talist, banker, etc., is drawn, link by link, into the commercial vortex of panic.

Causes. — The direct and primary cause of the “shut-down® of factories which produce un¬ employment on a large scale is one of supply and demand, generally, depression of trade, overproduction (usually meaning enforced re¬ duction of consumption, an outcome of trade depression). Factors also leading to reduced demand are : changing fashions, overspeculation, hoarding of capital caused by commercial fears, etc. War and panic often bring about unem¬ ployment in its worst degree. In a less degree new inventions, changes in national policy (pro¬ hibition will close up breweries and distilleries, besides saloons, etc.), excessive immigration, bad labor laws, labor disputes. Other more or less potent factors are: lack of material, weather, etc. Causes within the industry itself are numerous such as : “seasonal® employment with its fluctuations in consumption, child labor, additions to the forces by female operation, casual employment as that of longshoremen and stevedores, coal passers, all dependent on the

arrival of ships in the port. The causes of un¬ employment are legion and many are insidi¬ ously invisible. Experts on the subject declare casual employment works with demoralizing ef¬ fect on the wage-earners, creating discontent and inefficiency from the periods of

idleness. On a smaller but more chronic scale we have numerous unemployed among the aged, debili¬ tated, defectives, vagrants, etc.

Statistics. — In the United States there is not even a system by which to get at the statistics of the unemployed as was painfully evidenced during the great distress of 1914, when so many philanthropically inclined desired facts as to the extent of the far spread misery and want. Un¬ employment has not been considered sufficiently important to build up an organization or gather¬ ing the data of distress from period to period. American statistics on unemployment are limited to several “investigations® set in operation at different times by missions, lodging houses, bread lines, relief organizations and other he¬ terogeneous agencies. The 1900 Federal census tells us 22.3 per cent of persons having gainful occupations were out of work some time during the year and more than 2,600,000 men and about 500,000 women were out of work seven months or more. The (Report of the Massa¬ chusetts Board to Investigate the Subject of Unemployment > (1895) contains some statistics. The Federal Bureau of Labor made an investi¬ gation in 1901 as to the cost of living among 25,440 families of the working classes and those with salaries of $1,200 or less, and discovered 49.81 per cent of the heads of families were idle part of the year. The Geological Survey in its report on mining conditions from 1890 to 1910 shows 22 to 43 per cent of the miners’ time was lost annually in the bitumenous region and the anthracite miners lost 23 to 50 per cent in other years than 1902 when the great strike was active. The Wainwright Commission in New York State in 1909 investigating employ¬ ers’ liabilities and allied matters found : “There were no statistics available from which to com¬ pute the actual number of those out of work,® but they estimated at least 3 per cent out of work in the State’s industries of those regularly employed and 8 to 10 per cent in winter. This rate increased to from 15 to 40 per cent in 1908 during the business depression. Of organized labor, where some systematic methods of ob¬ taining employment for its members prevail, the New York State Department of Labor col¬ lected monthly the reports of the unions from 1901 to 1911, which showed an average of 14,146 unemployed each month out of an average membership of 99,069, or 18.1 per cent. This is skilled labor. New York State Commissioner of Labor found out of 600,000 organized wage earners 101,000 idle (16.1 per cent of men) in 300 trades or branches between September 1912 and September 1913 (a bad year for labor), and growing to 38.8 per cent on 31 December 1913. Of this 92 per cent of idleness was due to lack of work and 2 per cent due to labor disputes. While the deplorable statistics given above apply to New York State, New York City had the

still higher figure, ending December 1913, of 45.5 per cent with over 90 per cent of the clothing trades of this city idle and. two- thirds of the union men members of the build¬ ing trade. The industries themselves have no records or particulars of unemployment. In this

same stray manner the temporarily organized appointees under the Federal Industrial Rela¬ tions Commission, in 1914, sent a sheet of eight questions to the chiefs of police of the cities of the United States to get at the underlying causes of industrial unrest, four of which ques¬ tions concerned the unemployed in each city. It was unaccompanied by any instructions as to a system of investigation, and from this and other causes the figures forthcoming are abso¬ lutely unreliable. Women were excluded from the inquiry and we have over 8,000,000 female wage-earners ; political influence on the replies suppressed or ((softened down® facts unques¬ tionable in some locations. With the utter lack of reliable statistics in this country wre are liable to look to Europe for such figures of unemployment; as this industrial disease has been more malignant in the old country greater research and more remedies are discoverable there. But as to whether we can utilize such foreign statistics as a measure on which to base our activity here or whether to adopt such remedies as may have proven efficacious in France, England or Germany, we are in doubt. Whether they would prove available in the United States labor field is dubious, surrounding conditions being so very different in many respects.

Relief and Remedy. — The past World War has proven that labor can be mobilized by our government, and such an experience might lead us to suppose that this last great disaster might be the means of opening our eyes to an effective method of treatment of this eco¬ nomic disease of unemployment by the Fed¬ eral- government. The Teutonic attempt at world invasion should be accepted as an eye-opener to us that our deficiencies in politics and economics are so dangerous as to render our very stability as a republic doubtful. Anarchism and other features we now call <(unrest® of the laboring classes are best (and probably only) to.be fought successfully with a perfectioning of our industrial system and one that will eliminate unemployment. The war has given us both the opportunity and vision of the necessity of industrial reform. The nation must come to a decision that the question of unemployment is one of the great national issues and should be treated by Federal and State

governments as one of the foremost problems and one of the permanent, not emer¬ gency, official duties due its people. The na¬ tional effort to find employment for the return¬ ing regiments of the American Expeditionary Forces has brought us the hitherto lacking ex¬ perience of handling that branch of the labor problem. Whether we shall gain from the ex¬ perience permanent advantage the future alone can tell. As to mitigating methods against the evil many of the advanced students of the problem assert that teaching the artisan to be expert in more than one line of manipulation, so as to take up vacancies elsewhere when the operations he performs have no demand, would reduce the ranks of the unemployed to a con¬ siderable extent. There are many agencies fighting to reduce the number of sufferers from unemployment of which space permits mention of but a few. Some of these give their services free, others charge a nominal fee to veil the appearance of charity. Like the professed (

their endeavor in locating vacancies in the industries. There are numerous public employ¬ ment bureaus. Forty-six States have had laws passed providing free employment bureaus. Municipal bureaus of independent origin and operation are established in many United States cities. The municipal lodging houses do their small quota of placing their distressed lodgers in service, and the New York social service bureaus attempt to organize the units into one whole of enlarged usefulness. In 1914 the Bureau of Immigration of the United States Department of Labor started 38 branch offices in different sections through which much use¬ fulness may result.

As to <(relief® agencies of philanthropic effort, the danger lies in the fact of their tend¬ ency to reduce the moral status of the as¬ sisted workers. This may occur by allowing the form of administration of assistance to be openly <(charity® work or by creating in the recipients habits of idleness, in both of which cases the agency is creating mendicants or de¬ pendents instead of maintaining the needful feeling of independence and the desire for active and gainful occupation. The general theory is, therefore, that philanthropic assist¬ ance shall be exerted only in behalf of those incapable of strenuous labor, such as the aged, debilitated, wounded, etc. A class of recent assistance to employment is represented in the Jewish Agricultural Aid Society and the Indus¬ trial Removal Office of New York City. But their function is mainly to place freshly-arrived Jewish immigrants in agricultural occupations and thereby avoid these from becoming addi¬ tional competitors in this already overcrowded city. The plan of activity practised by the agencies of the churches, missions or parish houses have been usually on a pseudo self- supporting basis of fees. Of

a similar character is the employment department of the Salvation Army and Volunteers of America, covering a large sphere of usefulness in both skilled and unskilled ranks of labor, where work accom¬ panies the assistance as a reciprocal. There is also the Inter-Church Committee on Unem¬ ployment of the New York City Federation of Churches with activities of the broader scope. The Y. M. C. A., the Y. W. C. A., etc., employ¬ ment bureaus carry out their part of the pro¬ gram for clerical and business employees un¬ employed. The National Employment Exchange places quite a number of workers of all kinds and charges fees. One expert at least is of opinion that the quantity of small employment agencies of the free order is too large and the effort should be diverted to large clearing houses of labor closely in co-operation with organized labor and organized business, all ((relief® or ((welfare® work being restricted to emergency and disability cases. Civic organi¬ zations recently have taken up this important problem of unemployment in other branches of activity than the locating of work for unem¬ ployed labor. Of such are The American Asso¬ ciation of Labor Legislation, the Committee for Immigrants in America, whose work is the stimulation of labor legislation, propagation of public interest in the unemployment problem, etc. The defect of all the above agencies is lack of combined organization, being strictly local or independent in action.

A general survey of the situation would

make it appear that logically there are two main points of attack in the unemployment prob¬ lem. (1) The temporary amelioration of a prevailing condition (relief on civil, State, Fed¬ eral or philanthropical lines) ; (2) the eradica¬ tion of the condition, preferably by Federal organization (it is a national disease). But the latter course calls for the co-operation of the industries themselves. A commencement of the United States intervention in this great national issue was the establishment of the De¬ partment of Labor with its secretary a member of the Cabinet in the United States government, created 1913. An early act was to establish 18 zones ((for the purpose of facilitating the dis¬ tributing of farm labor in the United States, with headquarters in the large cities. Several annual meetings of the International Conference on Unemployment have brought forth theories and useful discussion with interchange of views, and we must hope that there will arrive a deci¬ sion for some definite course to pursue for the extirpation of this international evil. From the National

Industrial Conference held at Wash¬ ington, D. C., 1919, good results must be hoped for, as it brings capital and labor into direct negotiation and both armies of production have now been trained to the knowledge that singly their efforts at profit-making and producing are nugatory.

Practically all the above enumerated agencies are factors for relief, for the allocation of un¬ employed labor, not for the eradicating of unem¬ ployment, for remedy, not cure, which, after all, is the main part of the problem for solution. These existing, mostly disconnected, sources of relief do not increase the volume of work nor regulate the industries from which work ema¬ nates. Experimental efforts are being brought to bear more or less in this direction. For creating work, charitable associations have es¬ tablished emergency industries, such as wood- yards ; sewing-rooms for women ; some cities have established road-building systems to afford extra work (including the quarrying and crush¬ ing of the stone for same) and other public works. This, however, is closely on a line with the snow-removal winter work of the cities. But plans for the reduction of the causes of unemployment in the industries, the equalizing of labor demand for the seasonal industries, for instance, has been of a strictly individual and sporadic nature. The nearest approach to this solution is, probably, the recent attempt of a large automobile concern to work its maximum output during the winter months and make its slack season during the summer, thus releasing its operatives for work on the har¬ vesting. Another method recently employed by several industries is to make a reduction of the hours of labor so as to spread the work over a larger number of employees and thus avoid the throwing out of work so many oper¬ atives. Some of the larger unions pay their members something during their unemployment out of their assessments, and the labor unions in general look after obtaining work for their members — this is the fruit of organization, that mainspring from which in the end, many experts tell us, must arise the eradication of unemployment. This matter of organization, from present aspects, is likely to take some form of ˆsocialization® of the interests of capi¬ tal and labor in the different industrial estab¬

lishments, a closer relation between employer and employee, as is being quite forcibly done in England since the World War. The Com¬ mission on Industrial Relations and other recent activities tend to show that, at least, this nation is awaking to the fact of the immensity of the problem from a national as well as social need.

Unemployment insurance has taken rapid strides, even becoming a state measure among several European nations, and has had much

discussion in this country. Its purpose is, how¬ ever, the lessening of distress of the unem¬ ployed and is no cure for the disease. The Ghent System holds a high place in this class of labor reform. The National Insurance Act (1911) in England followed the failure of the working of the Unemployed Workmen Act, and was a move in the direction of providing against too great distress of the unemployed, but its small weekly dole does nothing much toward reducing non-employment. Germany has shown the path to a systematic plan of avoiding the non-employment evil with its government free employment offices and bureaus for all classes of labor and its trade committees formed of employers and employees in equal numbers, be¬ sides its citizens' committees in charge of the bureaus. Its free shelters (Herberge) or hotels for journeyman artisans is an ancient institution. These systems are all, possibly, unadaptable to American conditions, without modification, but they lay down methods of con¬ trol that may be shaped into such form as to be practicable in the United States. The amount of public discussion of this enormously import¬ ant subject which has found its way into print may be conjectured by the fact that Selected Articles on Unemployment, > compiled by Julia E. Johnsen (New York 1915), has a bibliog¬ raphy of 22 pages.

Bibliography. — American Academy of Po¬ litical and Social Science, Employment and Unemployment (Philadelphia 1915) ; id., Steadying Employment (Philadelphia 1916) ; Beveridge, W. H., (Unemployment (London 1900) ; id., Unemployment,* list of reports (London 1912) ; Bureau of Labor, (Report of Unemployment in New York City) (in Bulletin No. 172, Washington, D. C., 1918) ; Diblee, G. B., (The Laws of Supply and Demand) (Bos¬ ton 1912) ; Gibbon, I. G., (Unemployment In- surance) (London 1911) ; Hobson, J. A., (The Problem of Unemployment (London 1908) ; Jackson, C., (Nonemployment and Trade

Unions* (London 1910) ; Kellor, F. A., (Boston 1916) ; Williams, W. S., fThe Problem of the Unemployed) (ib. 1917).

Clement W. Coumbe.

Editorial Staff of The Americana.

UNGAVA, ung-ga'va, Canada formerly, a northeastern territory formed in 1895, in the Labrador peninsula since 1912 the Territory of New Quebec. It is bounded on the north by Hudson Strait, west by Hudson Bay and James

Bay, south by Quebec, and east by the Atlan¬ tic. Area, 351,780 square miles. Ungava Bay, in the north of the district, opens into Hud¬ son Strait. Pop. 14,000 of whom 8,000 are whites, 2,000 Eskimo and the remainder Indians. Consult (Reports on Ungava, recently Added to the Province of Quebec, under the name of New Quebec) (Quebec 1915).

UNGER, ung'er, Frederic William, Amer¬ ican journalist: b. Philadelphia, 25 Jan. 1875. He was educated at the Eastburn Academy, Philadelphia, and after studying for the minis¬ try and for the bar, abandoned both for jour¬ nalism. He was attached to Lord Roberts' headquarters as staff correspondent for the London Tunes during the South African War. He published, (With Bobs and Kruger'

(1901).

UNGULATA, a great and heterogeneous group of hoofed mammals which first appeared in tht Eocene period as small marsh-dwelling forms scarcely distinguishable from the con¬ temporaneous ancestors of the Carnivora , but which early became differentiated into several quite distinct series that have continued to diverge until in the living fauna they terminate in quite isolated groups. Under these circum¬ stances it is not surprising that the opinions of zoologists differ greatly concerning the classifi¬ cation of these animals. Without considering the changes in classification that have followed increased knowledge of the living forms, it may be said that if the latter alone were con¬ sidered they would fall naturally into three distinct groups ; one typified by the horse, ox, pig, etc., another by the elephant, and the third by the coney (Hyrax). But with the great palaeontological discoveries of recent years, especially in the Eocene of Wyoming and other Western States, and in the later formations of Patagonia, not only have these groups been con¬ nected by annectent forms, but several totally new types have been found, and generalized un¬ gulates have been shown to intergrade with the Carnivora on the one

hand and with the Roden- tia Quadrumana on the other. By some zoolo¬ gists, as Cope, each of these principal groups, or radiating descent-series, has been given a dis¬ tinct ordinal name. Others have grouped all together as a single order, with numerous sub¬ divisions. As the latter arrangement is best adapted to the needs of the present article it is here followed.

In this broad sense the Ungulata have on each foot from one to five digits, terminated by broad, blunt nails or hoofs. With a very few exceptions among extinct primitive forms they are digitigrade and many of them walk on the very tips of the toes. The scaphoid and lunar bones of the wrist are always distinct. Well- marked milk and permanent dentitions are al¬ ways developed, and with a few exceptions these animals are strictly terrestrial and herbivorous. Evolution in this group has particularly affected the feet and teeth, with the other digestive or¬ gans. Correlated with the replacing of marshy forests by dry, grassy plains these animals in¬ creased in size and developed greater speed in running by a reduction in the number of digits from five to two or one, by the union of cer¬ tain bones of the foot and lower leg, and by a change in the position of the carpal and tarsal bones, so that they alternate and interlock. As

the soft succulent vegetation of the swamps gave way to the wiry grasses of the plains the teeth gradually changed from a tuberculate low- crowned form to one with crescentic and then complexly-folded enamel ridges, and a high persistently growing crown. Although similar changes have been traced in many families, they are shown in greatest perfection in the horses, where every step in the evolution from the four-toed, low-tooth-crowtted Orohippus of the Eocene, with well-developed ulna and fibula, to the one-toed, complexly high-crowned modern Equus with the greatly reduced ulna and fibula completely ankylosed with the radius and tibia respectively. See Horse, Evolution of.

A subdivision of all the Ungulata into Un- gulata V era, or true ungulates, and Subungu- lata is generally followed, though this, as in¬ deed every sharp subdivision of the ungulates, is obscured by known fossil species. The Sub- ungulata is a rather heterogeneous assemblage of the more primitive forms, in which the bones of the carpus and tarsus are not at all or only partially interlocking, the toes often five in number, and the feet sometimes sub¬ plantigrade. Some of the extinct forms have well-developed clavicles. In the living species the mammary glands are, at least in part, situated on the breast, and the placenta forms a zone or broad band. Besides the many re¬ markable extinct groups placed by Cope in the orders Taxeopoda (Condylarthra)

, T oxodontia and Amblypoda, the Hyracoidca and Pro- boscidea, represented in the modern fauna by Hyrax and the elephants, belong here.

The Hyracoidca and family Hyracidce com¬ prise only a few species of small rodent-like animals of the genera Hyrax or Procavia and Dendrohyrax, inhabiting Africa, Syria and Arabia. They present certain resemblances to the elephants on the one hand, and to the rhinoceroses on the other, but in most respects are quite isolated. The Hyrax syriacus is be¬ lieved to be the ˆconey" of Scripture. The front feet have four and the hind feet three toes, enclosed in hoof-like nails. No clavicles exist. The nose and ears are short, and the tail is rudimentary. No canine teeth exist, and the incisor teeth grow from permanent pulps like those of rodents. The placenta is zonary and deciduate, and there are six teats. The intestine is remarkable in having a large sac¬ culated and a pair of small conical caeca. These animals live in burrows in rocky moun¬ tainous districts, and are known as ((rock- rabbits" or ˆdassies," while the species of Dendrohyrax are arboreal and live in hollows of trees.

The elephants (q.v.), although usually placed in a distinct order of mammals — Proboscidea, are related to the other ungulates through the Hyracoidca and Amblypoda. Each foot pos¬ sesses five toes. There are no clavicles. The nose is prolonged to form a flexible proboscis, at the extremity at which the nostrils open. The testes are abdominal throughout life. The breasts are pectoral in position, and the placenta is non-deciduate and zonary. The canine teeth are wholly wanting, and the molars are few in number and are ridged or tuberculate on their crowns, very high and complex in structure in the specialized forms and appear in the jaws from behind, one at a time. The upper incisors

grow from persistent pulps and form tusks. No lower incisors are developed in the elephants but existed in Dinotherium and some species of Mastodon. The extinct Proboscidea are of exceptional interest. The various species of mammoth, mastodon, etc., which belong to the family Elephantidce , possessed enormous tusks curved nearly into a circle in the former, straight in the latter, and their remains are associated with those of early man. The Dinotheriidce , remains of which are found in the Pliocene formation, possessed simple tuber- culate molars and the lower incisors were greatly

enlarged to form downwardly-turned tusks, on which account these animals were formerly associated with the walruses.

The Unguhta Vera (or Diplarthra of Cope) include the great majority of living ungulates, most of which are highly specialized in respect to foot and tooth structure. They never have more than four fully-developed toes on each foot; these toes being provided with hoofs, and are never plantigrade. No clavicles or collar¬ bones are developed, though transitory ones sometimes occur during foetal life. The placenta, which is either diffuse or cotyledonary, is of the non-deciduate type. The molar teeth have broad crowns and vary in the different families. The mammae or milk-glands of the female are usually few in number and placed in the groin; or more numerous and abdominal. The intes¬ tine is very usually provided with a large caecum ; and the stomach may be complex. Re¬ garding the classification, a primary character is found in the number of the toes, with which many other characters are correlated.

The section Perissodactyla includes those forms in which the toes are usually present in an odd number (solid-hoofed). The third or middle toe tends to predominate, while in the Artiodactyla the number is even and the second and third predominate (split-hoofed). The dorso-lumbar vertebrae (that is, the vertebrae of the back and loins collectively) do not num¬ ber less than 22. The dentition varies, but the premolars and molars are always similarly formed. The third digit or toe of each foot is symmetrical by itself, that is, does not form a pair with its neighboring digit. The thigh or femur bears a third trochanter. The stomach is of simple character, and the caecum of very large size. The teats are inguinal in position and the placenta is diffuse. If horns are developed they belong merely to the epidermis, are not sup¬ ported by a bony core, and are never paired in living forms. Where two horns exist (as in some rhinoceroses) the second is situated be¬ hind the first. Belonging to the perissodactylate Ungulata, besides many extinct Teritary fam¬ ilies, are three living ones typified by the tapirs, rhinoceroses and horses (qq.v.). The group is declining.

The Artiodactyla , or “even-toed® ungulates, are distinguished by the presence of either two or four toes, the third toe of each foot forming a symmetrical pair with the fourth. The premolar teeth, whatever their character, are always simpler than the molars. When horns are developed they nearly always exist in pairs, and are supported on bony <

wants a third trochanter. Unlike the Perisso¬ dactyla the Artiodactyla are a dominant group and, while in the early Tertiary times they were

surpassed by the former in number and variety, they have steadily progressed as the latter have declined, and to-day are represented by about one-third of the known families, very numerous genera and species and often vast numbers of individuals. The living families are arranged under the sections Suina, or pig¬ like Artiodactyla , Tylopoda, or camel-like Artiodactyla, Tragidina, the chevrotains, and Pecora or ruminants.

Consult Flower and Lydekker, (Mammals) (London 1891) ; Lydekker, (Wild Oxen, Sheep and Goats) (London 1898) ; (Deer of All Lands } (London 1898) ; < Great and Small

Game of Europe, Asia and Africa) (Lon¬ don 1901) ; Bryden, (Great and Small Game of Africa) (London 1899) ; Sclater and Thomas, (Book of Antelopes y (London 1894-1900) ; Caton, (Antelope and Deer of America* (Boston 1881) ; Marsh,

J. Percy Moore, University of Pennsylvania.

UNICORN, a fabulous animal, described in ancient accounts as a native of India, with the body of a horse but of larger size, and with one horn of one and one-half to two cubits in length on its forehead, perfectly straight, with a white base, black middle and red tip. The unicorn was adopted as a supporter of the royal Scottish arms, from which it has been introduced as the left supporter of the British arms, and has in this form been imported into India. Consult Brown, Robert, (The Unicorn> (London 1881) and Gould, Charles, (Mythical Monsters * (ib. 1886).

UNICORN-FISH. See File-fishes.

UNICORN PLANT, one of the popular

names of plants of the genus Martynia, glan¬ dular, pubescent and fetid herbs, natives of America. They have irregular funnel form corollas, with oblique tubes, and limbs which are slightly two-lipped. The flowers gre vel¬ vety, yellowish-white and purple-mottled, and borne in racemes on a decumbent stem possibly two feet long in the devil's horns (M. lonis- iana), common in the southwestern United States, and occasionally escaped from gardens. The leaves vary from ovate to orbicular, some¬ times undulate at the edges, and the fruits are four-celled, four to five inches long, oblong, and prolonged into a curved point much longer than the body. At maturity the rather fleshy outer green layer of the fruit disappears, and leaves the woody part of the pods, which ulti¬ mately splits into two valves, that are very

tough and black, and sometimes as much as 13 inches long. These tapering horns are moistened and split by the Indian women of the Southwest, who weave them into their bas¬ kets, as the black element necessary in their color-scheme of decoration. The plant itself often serves as a motif for the design.

UNICORN-ROOT, a graceful smooth plant (Chamcelirium luteum) of the bunch-flower family. It has a tuft of radical spatulate foliage and narrow stem-leaves. The flowers are

small and white, with a perianth of six seg¬ ments, and are dioecious, in long racemes. 1 he staminate racemes, nodding at first, eventu¬ ally stand straight; fertile ones are always erect The fertile plants are sometimes three feet nigh. The tuberous rootstocks are bitter, and an infusion of them is a popular tonic and anthelmintic, and is said to be a large ingredient of certain patent medicines. One of the indus¬ tries of the mountaineers of the southern Alle- ghanies is that of digging these roots. This Chamcciiriiim is also known as devil's bit, or blazing star. The latter name being more gen¬ erally and correctly applied to the stargrass (Aletris farinosa), which is a similar plant, having a bitter tuberous rhizome.

UNIFORMITARIANISM, Huxley's name for the Lyellian doctrine of uniformity of geologic processes and results in all ages of the earth's history. In other words this doctrine teaches that the forces operative upon and within the earth to-day were active in former geologic times, and produced the same results, and to them alone are due the structural features of the earth and not to catastrophic revolutions. See Huttonian Theory.

UNIFORMITY, Act of, in English Church history, the acts 13 and 14 Charles II, designed to regulate the terms of membership in the Church of England and in the colleges of the universities of Oxford and Cambridge. Both the Anglican (or Episcopal) and the Presby¬ terian parties had desired that their respective belief should be that of the established church, and Charles Stuart, who, as a step toward ob¬ taining his father's throne, wished to stand well with both parties, promised, while still in exile at Breda, to use his influence to bring about a certain measure of comprehension. But the Parliament, which was overwhelmingly An¬ glican, was in no mood to favor such a scheme, and the Act of Uniformity which was passed required the

clergy to sign the Thirty-nine Ar¬ ticles and to use the Book of Common Prayer. The enforcement of these regulations wrought the exclusion or the secession from the estab¬ lished church of 2,000 ministers and laid the foundation of modern dissent. Among the pro¬ visions of the Act of Uniformity was one which made actual receiving ot the communion of the Anglican Church a condition precedent to the holding of public offices ; this condition was abolished by the act 9 George IV, ch. 17 ; and in 1829 the Test Act of 1672, a cupplement to the Uniformity Act, was repealed; that act ex¬ cluded Roman Catholics from public offices. In 1871 the University Tests Act abolished sub¬ scription to the articles, all declarations or oaths respecting religious belief, and all com¬ pulsory attendance at public worship in the universities.

UNIFORMS, Military and Naval, .special

costumes used in an army or a navy. While badges of identification have been known at all epochs, and while the followers of a lord often wore the livery of their master, the use of a uniform costume by large bodies of men was unknown until the modern era of large standing armies. The first advance beyond temporary badges was the use of a colored scarf to identify the various brigades of the Swedish army under Gustavus Adolphus. This device spread rapidly. The danger of the use

of such simple devices by an enemy soon led — first in France and soon after in England — to the adoption of a more or less definite uniform. The (

The military costume, like the civil, changed little in general outlines till the end of the 18th century. The original broad-brimmed felt hat was modified into the cocked hat, the breeches and coat lost their original fullness and the uniform became what is familiar to us in pic¬ tures of the American Revolution. Garments apparently less adapted than those of the middle of the 18th century to the active business of fighting can scarcely be imagined, yet after all they were in precise accord with the stiff, formal, drill-master-like. spirit of the close- order fighting of the day. The stock and collar came into use and much that previously played a useful part in the uniform — cuffs, lapels, etc. — was reduced to a dummy form which served for ornament alone. Various forms of head- gear worn by irregular troops from eastern Europe became stiffened and formalized into shapes which partly ousted the cocked hat, and are even yet in use. Among these were the busby, the fur grenadier cap and the mitre-cap of the Prussians, all descended from a conical cap edged with fur; the stiff leather shako —

which has given rise to most of the military headgear of the world to-day — and the square- topped czapka or lancer cap, which has shrunk from a crude leather cap to a complicated de¬ vice mimicking to a greater or less extent the German pickelhaube.

Toward the end of the 18th century the ample tailed coat began to shrink into the coatee, of a size scarcely greater than that of the tunic or blouse of the present day. This made necessary the introduction of a new article of military apparel — the overcoat. The breeches and white gaiters followed tardily in the suit of the civilian clothing of the time and were replaced by trousers in the first quar¬ ter of the 19th century. The helmet was also introduced at about this period, and is at pres¬ ent retained by the dragoons of most armies and by the German infantry.

The period after Waterloo was distinguished even above the 18th century for the extreme un¬ comfortableness of the uniforms and their total unfitness for any activity whatever. This was swept away in England by the reaction due to the Crimean War. At about the same time or a little earlier the coatee gave way to the looser tunic. The dress uniforms of to-day date back in essentials to this epoch. The dull service uniforms worn by all armies in the field at the present time are designed for comfort, useful¬ ness and inconspicuousness and date back to the border warfare in India during the latter half of the 19th century. Their general use is due to the experiences of the British in the Boer War. America soon followed the British khaki with its olive drab. Germany adopted a greenish gray, Italy a bluish gray and Russia a

grayish green. The Belgian khaki and the French horizon blue were only introduced after the unsuitability of the old brilliant uniforms had been manifested in the first months of the European War. The steel helmets in general use at present were introduced a little later.

The enlisted man in the United States army has a khaki or olive-drab service uniform, a blue dress uniform, a fatigue uniform of blue denim and in some cases a white uniform. The facings of the dress uniform and the hat-cord of the service hat are of the corps color, which are blue for the infantry, yellow for the cav¬ alry, red for the artillery, red and white for the engineers, orange and white for the signal corps, maroon and white for the medical corps, straw-color for the

quartermaster corps, red and black for the ordnance corps and green for the service school detachments. The officers' uniforms, besides service, dress and white uni¬ forms much like those of the enlisted men, are the full dress, the special evening dress and the mess jackets, worn on special occasions. The history of the uniforms of the United States army lends itself into a division into periods separated by the various wars in which the United States has taken a part. During the American Revolution the uniforms were governed by no particular principle, if the troops were so lucky as to be uniformed at all. After the end of the Revolution, the French uniforms were taken as a pattern and blue was made the color of the infantry and artillery uniforms, which were faced with white. Soon afterward, when cavalry regiments were raised, they were similarly uniformed, first in green with white facings and then in green with black facings. These uniforms survived in a more or less modified form until the War of 1812 when the sudden influx of large numbers of variously equipped militia made the re-establish¬ ment of a definite uniform desirable. The French model was again adopted, with dark- blue coatees and white or light-blue breeches or trousers. From the Mexican War to the begin¬ ning of the Civil War the uniform consisted of a long coat and trousers, with a shako or slouch hat. The corps colors were adopted at this period, in a form not widely divergent from that of the present day. The Civil War uni¬ versalized the service or undress uniform of blue, light in the coat and dark in the trousers. This again mimicked the uniform of the French, but after 1870 the success of the Germans caused the cut of the uniforms and the spiked helmets to be modeled after those of the Ger¬ mans. For service the slouch hat and leggings were worn. The uniform was found to be un¬ suited for active service in the Spanish War and was replaced by one of khaki. After the war this color was retained for the service uniform, which was patterned after that of the British. The dress uniform retains the original blue color.

The British dress uniforms are perhaps the most varied and gorgeous of those of any country in the world. Their general color is red, though certain rifle regiments, etc., form exceptions. They are faced with the color of the regiment. The khaki field-service uniforms much resemble those of the United States, ex¬ cept for the pleated pockets and the collar, which is box-cut for the officers and turns over in the uniforms of the enlisted men. Rolled

leggings known as puttees are used. While this uniform is practically the same throughout the army, the Highland Scotch regiments retain their tartan kilts, though they cover these with a khaki apron. The present field-service uni¬ form dates back to the Boer War of

1899-1902.

Blue coats and red trousers make up the dress uniform of most French soldiers and be¬ fore the European War were worn on active service. The long coat of the infantryman with its bottom corners buttoned back is char¬ acteristically French. The European War caused the French uniform — particularly that of the officers — to be assimilated to that of the British. The color, however, is light blue.

The Italian infantryman wears a dark blue tunic, gray trousers and a cloth shako. In the cavalry the trousers are replaced by breeches and the shako by a busby in lancer regiments and a helmet in dragoons. The Bersaglieri wear a broad-brimmed felt hat with a plume of cock's feathers. The service uniform is brown¬ ish gray.

Before the collapse of Russia in 1917 the uniform was in general green in color and in the infantry consisted of a large peaked cap, a loose blouse, trousers and high boots. The facings varied with the regiments. The cavalry wore blue or green coats with gray breeches. Cossack and Siberian regiments wore high sheep-skin caps. The field service uniform was of a khaki color.

The general color of the German dress in¬ fantry tunics is Prussian blue, except in Bavaria, where it is light blue. The trousers ar: black and the facings vary with the different regiments. The head-dress on some occasions is a brimmed or brimless cap, on others a spiked helmet. The tunics of rifle regiments are green and they wear shakos. Cuirassiers wear metal helmets and white tunics. The tunics of uhlans and dragoons are blue and their helmets are made of leather. The several regiments of hus¬ sars wear helmets of different colors and their head-dress is a busby of brown fur. Engineer and artillery uniforms are entirely blue. The field uniform is a brownish gray. The ordinary head-dress is retained but covered bv a gray cover. The Austrian tunic is generally dark blue, except that rifle regiments and engineers wear gray, while the artillery wears brown. The infantry wears light blue trousers, except in rifle regiments, where gray trousers are worn. Gray trousers are also worn by engineers. Mounted troops wear red breeches. The in¬ fantry head-dress is a shako. Hungarian uni¬ forms are patterned after the Austrian with the exception that elaborate braiding is used on the trousers. The field-service color of Austria- Hungary was bluish gray and a special gray cap was worn, except in cavalry regiments, which used their ordinary head-dress, protected by a gray cover.

Other countries incline as a rule either to the German or the French

model of uniform. The French influence preponderates in Switzer¬ land, Holland, Belgium, Spain, Portugal, Ru¬ mania, Greece, Brazil and Argentina. The uni¬ forms of the ‘Scandinavian countries, Turkey and Chile are German in cut, Serbia combines French and Austrian influence, while the uni¬ forms of Bulgaria are distinctly Russian. The British influence is preponderant in many field- service uniforms, such as those of China, Japan,

Greece and the United States. China and Mexico have borrowed to some extent from the United States, while the Cuban uniforms re¬ semble the American ones very closely.

Naval uniforms are much the same through¬ out the world. The British naval uniform, after which all others have been patterned, con¬ sists for the men of a jumper or overshirt of the familiar navy pattern, bell-shaped trousers and a pancake® cap, with a ribbon indicating the ship to which its bearer belongs. The blue undress or service uniform of the British offi¬ cer consists of a peaked cap, a double-breasted coat with brass buttons and blue serge trousers. There are various mess and dress uniforms. The American uniforms closely resemble the British, except that in the officers’ blue service dress a braid-trimmed blouse is worn instead of a coat. The Russian sailors wear a military tunic when on shore duty. In the German navy the cap-ribbons are very long and a jacket with many buttons is worn over the overshirt. (For the insignia of rank in the various armies and navies of the world, see Military Insig¬ nia of Rank). Consult the publications of the War and Navy Departments of the various governments and Detaille, (L’Armee frangaise> (Paris 1889) ; id., (Catalogue illustre de l’ex- position retrospective militaire du ministere de la guerre) (ib. 1890) ; Farmer, J. S., Regi¬ mental Records) (London) ; Knotel, R., (Hand- buch der Uniformenkunde> (Leipzig 1896) ; Lienhardt and Humbert, Res uniformes de 1’armee frangaise) ; Ogden, H. A., (Uniforms of the Army of the United States, 1779— 1888 (Washington 1908).

UNIGENITUS, u-m-jen’T-tus, the bull (1713) of Clement XI by which 101 theological propositions of a Jansenistic tenor contained in the writings of Pasquier Quesnel are con¬ demned as heretical, scandalous, impious, etc. (See Quesnel; Jansenism). The title of the bull is derived from its opening words Uni- genitus Dei Filins. Among the doctrines al¬ leged to be contained in Quesnel’s writings ((Moral Reflexions) on the Gospels and the whole New Testament) is this, that all love except the supernatural love of God is evil ; that without this supernatural love there can be no true hope, observance of the law or re¬ ligion ; that every prayer made by a sinner is itself sinful ; and that the Church is made up of the elect alone. While Louis XIV lived he compelled obedience to the bull ; but after his death, 1717, and the succession of his great- grandson, Louis XV, under a regency, those ecclesiastics who were opposed to the Roman decisions, among them

Noailles, archbishop of Paris, and four other bishops, made appeal to a future council of the Church against the Pope. Another appeal was made <(from the pope ill informed to the pope better informed® ; but the popes who succeeded Clement XI down to 1730, namely, Innocent XIII, Benedict XIII and Clement XII, would not entertain the ap¬ peal; the assembly of the French clergy in 1723 petitioned the king to uphold the Unigenitus with all the power of the state; in 1727 one of the appellants, Soanen, bishop of Seez, was con¬ demned by a provincial church council and was banished by the government; even Noailles in 1728 went over to the side of the Ultramon- tanes, and in 1730 the Sorbonne formally ac¬

cepted the bull; the same year the parliament of Paris was compelled to register it.

UNIMAK, oo-m-mak', an island of Alaska, the largest of the Aleutian Islands, about 75 miles long and 25 miles wide. A lagoon called Isanotski, of False Pass, separates the island from the mainland of the Peninsula of Alaska. Like the adjacent islands, it is volcanic. Shishal- din, an active volcano, is about 9,000 feet high. Sulphur abounds on the slopes and base, in crevices, of Shishaldin and near Progrumnoi volcano (5,523 feet high), in the western part of the island. The island is rocky and almost destitute of trees. The villages are few and small. The population is made up of Aleuts.

UNION, u'nyon, Me., town in Knox County, on the Georges Valley Railroad, a short line which extends from Warren to Union. The town contains the villages of Union, South Union, North Union and East Union. It was settled in 1744 and was first called Taylor Town. In 1786 it was organized as the Plantation of Sterlington, but the same year it was incorporated and took the name Union. In 1811 a part of the town was set off and called the town of Washington. The chief manufacturing establishments are mowing-ma¬ chine works, machine shops, carriage and fur¬ niture factories and organ works. Stoves are made here and considerable attention given to farm and dairy products. Pop. 1,233.

UNION, La, la oo-ne-on', Philippines, a province of the island of Luzon, in the south¬ western part of northern Luzon, bordering on the China Sea ; bounded on the north by Ilocos Sur, on the east by Lepanto and Benguet and on the south by Pangasinan ; length, north and south, 51 miles ; greatest width, 31 miles in the north, narrowing to 10 miles in the south; area, 867 square miles. The province is mountainous in the east, the western mountain sides sloping abruptly to the coast plains. There are numer¬ ous small rivers. The soil is well

cultivated; tobacco, rice, corn, cotton, sugar and chocolate are the principal products ; large quantities of sibucao, a valuable dye plant, grow on the mountains. Livestock raising is one of the principal industries of the province; carabaos and cattle, horses and hogs are raised. The west coast road of Luzon traverses this prov¬ ince ; this is paralleled by a telegraph line and also the Manila and Dagupan Railroad ; there are no roads, however, which extend any dis¬ tance into the interior. Civil government was established in August 1901 ; and at the close of that year the provincial governor reported the province in a peaceful and prosperous condition. Pop. 138,000, mostly Igorots and Uocanos.

UNION, La, Salvador, a seaport and capi¬ tal of the department of the same name, at the base of the Conchagua volcano, rising from the west shore of Union Bay, a landlocked inlet of the Gulf of Fonseca. An active domestic and coasting trade is carried on. Pop. 5,300.

UNION CHRISTIAN COLLEGE, lo¬ cated at Merom, Ind. It was chartered in 1859 under the auspices of the Christian Church and opened to students in 1860; the government of the college is vested in a board of 15 trustees elected by the stockholders from nominations made by the Church conferences of Illinois, Indiana and Ohio. The college has, in addition

to the regular collegiate departments of instruc¬ tion, a Biblical Department, a Normal Depart¬ ment, a Department of Music, a Preparatory Department and special courses in elocution and physical culture. There are two collegiate courses, the classical and scientific leading to the degrees of A.B. and B.S. respectively; a limited number of electives are offered in each course ; and a thesis is required for the obtain¬ ing of a degree. The degrees of A.M. and M.S. are conferred for graduate work. The Biblical Department and the Normal Depart¬ ment both offer three years' courses. The col¬ lege is open to men and women on equal terms. The students .maintain two literary societies. In 1901 an offer of $30,000 for the endowment was received from F. A. Palmer of New York, on condition that the college raise $20,000. The condition was met by 1902, and thus $50,000 added to the endowment fund. The students number about 200 and the faculty 11.

UNION CITY, Ind., city, Randolph County, on the Pittsburgh and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 80

miles northeast of Indianapolis, and 32 miles east of Muncie. It is near the Ohio boundary. Union City is in an agricultural and stock-raising region ; and the forests contain valuable hard woods, as ash, oak, hickory, walnut and chest¬ nut. The chief manufacturing establishments are flour mills, creameries, furniture factories, automobile factories, wheel and carriage works and machine shops. There are a high school, public and parish schools, hospital and a public library. Pop. (1920) 3,406.

UNION CITY, Mich., village in Branch County, on the Saint Joseph River, and on the Michigan Central Railroad, about 55 miles southwest of Lansing and 28 miles southeast of Kalamazoo. It is in a fertile agricultural region. The chief manufacturing establish¬ ments are a flour mill, creameries, a machine shop and lumber mills. It ships a considerable amount of farm and dairy products and fruit. Pop. (1920) 1,256.

UNION CITY, Pa., borough in Erie County, on the Pennsylvania and the Erie railroads, about 25 miles southeast of Erie. It is in an agricultural and oil region. The chief industrial establishments are flour mills, barrel factories, planing and grist mills, a powdered-milk plant, wagon and carriage works, furniture factories, oil-refinery, a tannery and a pump factory. Cabinet ware and dairy prod¬ ucts are among the shipments to outside markets. The educational institutions are a high school, public and parish elementary schools, a business college, and a public library. Pop. (1920) 3,850.

UNION CITY, Tenn., town, county-seat of Obion County, on the Nashville, Chattanooga and Saint Louis and the Mobile and Ohio rail¬ roads, about six miles from the Kentucky border and 110 miles northeast of. Memphis. It is an agricultural and stock-raising region and nearby are extensive timber lands. The chief manufacturing establishments are lumber mills, ice factories, canneries, furniture works, cotton mills, spoke factories and machine shops. The principal products shipped to other markets are farm and dairy products, fruit, cotton and

lumber products. The educational institutions are Union City High School and Training School, public elementary schools for white and for colored pupils and a school library. Nailling Hospital is located: in Union City. Pop. 4,412.

UNION COLLEGE, -located at College View, a suburb of Lincoln, Neb. It is a part of the school system of the Seventh-day Ad¬ ventists; the site was chosen in 1890, and the college opened to students in 1891.

It is avow¬ edly denominational and observes the Sabbath on the seventh day (Saturday). It is open to both men and women. It offers two regular college courses leading to degrees, the literary and scientific, and confers the degrees of A.B. and B.S. The Central Advance (a denomina¬ tional paper), a German and a Scandinavian paper are printed at the college shop. The campus consists of 22 acres on elevated ground; the chief buildings are the main building and the dormitories or <(homes.® The library con¬ tains over 6,000 volumes ; the students in all courses number about 550, with a faculty aver¬ aging 25 members.

UNION COLLEGE, non -sectarian institu¬ tion for the higher education of men, located at Schenectady, N. Y. It was founded in 1795 as Union College. In 1873 the Albany Medical College, Law School and Dudley Observatory were associated with Union College under the title of Union University. The Albany Col¬ lege of Pharmacy was affiliated in 1881. The fraternity system had its inception at Union in 1825. The university confers the degrees of B.A., Ph.B, B.S, B.E., M.A, M.S, M.C.E, M.E.E. and Ph.D. The productive funds aggre¬ gate $1,700,000 approximately and the income $225,000 annually. There are 50,000 volumes in the library.. Enrolment is in excess of 600 and about 325 in extension courses. The faculty averages 50 in number.

UNION FLAG, or UNION JACK, the

national flag of Great Britain and Ireland, is a composite of the prominent features of the flags of England, Scotland and Ireland. The first union flag was made upon the accession of James I, and from the fact that that sov¬ ereign. signed himself <(Jacques® the flag has been, improperly nicknamed the Union Jack (a ((jack); prpperly. being a flag flown upon the jack-staff of a ship). The first national flag in 1606 combined the English banner of Saint George (argent, a. cross gules) with the Scot¬ tish banner of Saint Andrew (azure, a saltire argent). In 1707 the flag was revised, becom¬ ing in heraldic terms azure, a saltire argent surmounted by a cross gules fimbriated of the second. When Ireland was united with the kingdom of Great Britain the flag was again altered, the red cross of Saint Patrick being in¬ troduced and forming the present Union Jack. In heraldic terms it is : azure, the crosses saltires of Saint Andrew and Saint Patrick quarterly per saltire counterchanged argent and gules, the latter fimbriated of the second, sur¬ mounted by. the cross of Saint George of the third fimbriated as a saltire. This was first hoisted on the Tower of London 1 Jan. 1801. The flag is the national flag for use on shore and for land forces ; it is used at sea only on a

ship bearing the English sovereign, when it is hoisted at the main mast, and at the main mast of the flag-ship of a fleet commanded by an admiral. With a harp on a blue shield dis¬ played in the centre it is the flag of the lord- lieutenant of Ireland. With the star and device of the order of the Star of India it is flown by the governor-general of India. When this flag design occupies the upper corner next to the staff of a red, white or blue field the flag so formed is called the red, white or blue ensign and is the flag for use on shipboard. Merchant¬ men carry the red ensign, and all British war vessels carry the white ensign divided into four quarters by the cross of Saint George. See Flags of Foreign Nations.

In the United States the term <(Union Jack® is applied to the blue flag with white five-pointed stars (one for each State in the Union), used in the navy. The flag is usually displayed when the vessel is in port.

UNION LABEL, a trade-mark adopted by a trades union to be placed on articles manu¬ factured wholly in union shops, under union rules by their sanction. The union label origi¬ nated in 1896 with the cigarmakers of San Francisco in their conflict with Chinese labor. Since then its application has spread till all trades-unionism looks to it as one of the most successful means of waging the struggle with combined capital. By agreement with individual manufacturers the labels, copyrighted by the unions, are attached to the various products of factory and mill, each box of cigars, for in¬ stance, each newspaper, each garment, and so on. While many unions have their copy¬ righted labels, a large number employ the com¬ mon label of the American Federation. Many States have passed laws imposing penalties upon counterfeiters of labels, and upon users of counterfeit labels. See American Labor; Labor; Unionism, etc.

UNION LEAGUE OF AMERICA, The,

began in 1862 in order to check the spread of disaffection to the United States government and to ((make loyalty effective.® The movement was spontaneous; the members of the United States Sanitary Commission began the organiza¬ tion in 1862, in Ohio, Philadelphia and New York. Leagues were formed all over the North before the end of 1863. The members were pledged to repudiate any political belief that conflicted with unconditional loyalty to the Union.

Several similar orders were absorbed by the Union League. The organization dis¬ tributed more than 5,000,000 political pamphlets; recruited negro regiments ; sent teachers to in- . struct the negroes and demanded negro suf¬ frage in 1865. The league was gradually ex¬ tended into the South among the “Unionists,® and during 1865-66 had a strong membership of whites in the mountain districts of that sec¬ tion. In 1867 negroes were admitted to the order in the South and at once nearly all of the whites deserted. From 1867 to 1876 the league and its offshoots formed the “machine® of the Radical party in the South. It controlled the negro vote absolutely and organized it well ; it made all nominations for office, and severely disciplined those who disobeyed orders. A con¬ stitution and ritual were adopted for use in the South. There was a weird initiation cere¬ mony to impress the negroes. The members

swore to vote for no one except members of their own order. An ex-Confederate could not join unless he would acknowledge that his course during the war had been treason, and under no circumstances was he eligible to office in the order or to become a candidate for po¬ litical office. The administration of the league was in the hands of the so-called carpet-baggers or political adventurers from the North. The local assemblies were called councils ; these together formed the Union League of America, with headquarters in each Southern State and general headquarters in New York. In the councils the negroes were drilled in the faith of the Republican party, a catechism being pre¬ pared for that purpose. There was complaint that the league was a cause of disorder and violence among the blacks on account of its in¬ cendiary teachings. At one time it was said that the membership reached 500,000 in the South. In the North after 1865 the order gradually died out, the surviving leagues be¬ coming social clubs, the chief of which is the Union League Club of New York City, in¬ corporated 16 Feb. 1865. It has had a great influence on Republican politics and of late years has opposed the progressive members of that party. By many it is considered one of the greatest strongholds of conservatism and reaction in America. As an institution of Re¬ construction the Union League was most im¬ portant. The rigid organization and the strict control imposed by it upon the blacks made it possible for them to vote as a race and vote the Republican ticket. Without the admirable discipline of the order, the few leaders of the Radical party in the South would have been unable to prevent the Conservative or Demo¬ cratic party from controlling the votes of the negroes, thus preventing the objects of the Reconstruction.

UNION LEAGUE CLUB, The, a social and political club organized, in 1863, in New York, by members of the local Republican party. It was

incorporated in 1865, its avowed object being ((to promote, encourage, and sus¬ tain by all proper means, absolute and unquali¬ fied loyalty to the government of the United States ; to discountenance and rebuke, by moral and social influences, all disloyalty to said gov¬ ernment and every attempt against integrity of the nation® ; and also to establish a library and art gallery for the collection of literature and works of art, and military trophies relating to the war. The club has a membership of about 1,800, and its headquarters are at its palatial clubhouse, 39th street and Fifth avenue, New York City.

UNION PACIFIC SYSTEM. The Union Pacific Railroad was organized 1 July 1897, un¬ der an act of the legislature of Utah approved 22 Jan. 1897, <(to carry out the reorganization of the Union Pacific Railway Company,® and now includes the Union Pacific Railroad, the Oregon Short Line and the Oregon Railroad and Navigation Company. The northerly or main line runs westward from Council Bluffs (Omaha) across the central part of the State of Nebraska, a co-ordinate line running almost parallel, about 150 miles to the south from Kan¬ sas City across the State of Kansas, and to Den¬ ver, Colo., whence it trends northward, joining the main line at Cheyenne, Wyo. Thence the

road continues westerly across the southern sec¬ tion of Wyoming and to Ogden, Utah. From this point the system makes use of its subsidi¬ ary, the Oregon Short Line, traversing southern and western Idaho, to Huntington, Ore. ; and thence by the subsidiary Oregon-Washington Railroad and Navigation Company's road to Portland, Ore., and Seattle, Wash.

The total mileage operated, as of 31 Dec. 1917, was 7,714.97 miles, of which 3,597.80 is of the Union Pacific Railroad, 2,148.65 of the Ore¬ gon Short Line, and 1,968.52 of the Oregon- Washington Railroad and Navigation Company. The system is prolific of branches, the main lines covering 3,534.64 miles, and the branches, 4,180.33 miles. Besides these roads there is operated 302.22 miles of leased lines, and the company enjoys trackage rights over 254.30 miles of other railroads.

The total operating revenue for the calendar year 1917 amounted to $130,101,864; earned by the transportation of 9,315,764 passengers and 23,874,511 tons of freight. The passenger travel averaged 115.08 miles per trip, at a cost of the traveler of 2.326 cents per mile —

aggregat¬ ing in the year 1,072, 053, 665 miles and $25,207,- 229. The freight haul average 448.3 miles per ton, at an average charge of 0.851 cent per mile — aggregating in the year 10,702,976,670 ton-miles and $93,347,832.

The operating expenses for the year were $77,295,158, making the net operating revenue $52,806,706. Taxes amounted to $8,451,691, leaving the net operating income at $44,355,015. Non-operating income amounted to $13,170,361 and deductions for rentals, interest, etc., totaled $15,998,875, leaving the net income at $41,536,500.

Dividends to preferred stock amounted to $3,981,740, and to common stock (16.89 per cent), $22,229,160. The sum of $15,313,973 was appropriated for the road and equipment.

The equipment of the road on 31 Dec. 1917 consisted of 1,538 locomotives, with an aggregate tractive capacity of 52,714,182 pounds. Passenger coaches, mail and baggage cars num¬ bered 1,150, of which 574 were of steel. Freight cars of all types numbered 41,247.

The entire investment in the road and its equipment on 31 Dec. 1917 stood at $632,- 813,457. Investments in other companies totaled

$268,733,986.

The total stock outstanding on the date cited amounted to $321,836,600 and the long term debt was $335,099,365. The credit balance of the profit-and-loss account was $124,354,104. The grand total of the system's resources was

$921,273,292.

In addition to operating the railroad, the company operates four steamer lines: (1) Portland to Astoria, Ore., 98 miles; (2) Astoria to Megler, Wash., 5 miles; (3) Riparia, Ore., to Lewiston, Idaho, 78 miles; and (4) Amwaco to Harrison, Idaho, 6 miles.

History of the Road. — The Union Pacific Railroad Company was formed ((for the purpose of acquiring, constructing, and owning railroads in the State of Utah, and elsewhere, with spe¬ cific authority to acquire the railroads, prop¬ erties, franchises and land grants formerly be¬ longing to the Union Pacific Railway Com¬ pany.® That corporation owned four divisions of railroad, with a total length of lines of 8,172 miles. In 1893, receivers were appointed for all lines except those owned jointly with other

companies. Afterward, separate receivers were appointed for some of the controlled roads.

When the Union Pacific Railway Company was first placed in the hands of receivers, the bonds outstanding aggregated $78,470,000. In addition to this amount, the government sub¬ sidy bonds amounted to $33,540,000. On this latter amount, the unpaid interest was $18,194,-000. At that time the share capital of the com¬ pany aggregated $60,869,000. A short time af¬ ter the receivers had taken possession of the property, legislation to guarantee a Federal government lien at 3 per cent was proposed in Congress. The security holders at the same time put forward a reorganization method. Both plans were defeated.

In 1897 the main line, from Council Bluffs to a point five miles west of Ogden, Utah, a distance of 1,048 miles, together with 70 per cent of the equipment, was sold under fore¬ closure and purchased by the reorganization committee, which, later, borrowed $44,000,000 from a syndicate. Following this event many extensions were made. In 1899 control was acquired of the Oregon Short Line Railroad. This purchase was followed by that of the Ore¬ gon Railroad and Navigation Company property. In 1901 by purchase of a controlling interest, possession was gained of the Southern Pacific Railroad Company and, three months later, con¬ trol of the Northern Pacific Railroad Company was acquired. These interests it was afterward compelled to relinquish as in contravention of the anti-trust law. The Union Pacific has im¬ portant connections with Southern California points by virtue of its affiliation with the Los Angeles and Salt Lake Railroad.

UNION OF SOUTH AFRICA, a legisla¬ tive union of the four self-governing colonies of South Africa, effected by the South Africa act, which was promulgated by royal proclama¬ tion of Great Britain 20 Sept. 1909, and became effective 31 May 1910. The original provinces of the union were Cape of Good Hope, Natal, Transvaal and Orange Free State. United they are bounded on the north by the former colony of German Southwest Africa, Bechuanaland Protectorate, Matabeleland and Portuguese East Africa, on the east by the Indian Ocean, on the south by the Atlantic Ocean and on the west by the Atlantic Ocean and the former colony of German Southwest Africa.

The area of the Union is 473,075 square miles, distributed as follows : Cape Colony, 276,- 966 square miles; Natal, 35,290 square miles; Transvaal, 110,430 square miles; and Orange Free State, 50,389 square miles. The total pop¬ ulation of the Union is 5,973,394 (1,276,242 Europeans), distributed as follows : Cape Colony, 2,564,965; Natal, 1,194,643; Transvaal, 1,686,212; Orange Free State,

528,714. The capitals of the four provinces composing the Union are Cape Town (Cape Colony), Pietermaritzburg (Natal), Pretoria (Transvaal), and Bloem¬ fontein (Orange Free State). The principal cities, with populations, are: Johannesburg (119,- 953), Durban (31,783), Cape Town (29,863), Pretoria (29,611), Pietermaritzburg (14,737), and Bloemfontein (14,730). The total imports for 1916 were valued at $188,622,000, and ex¬ ports $104,237,000, the United States being credited with 15.7 of the former and 14.8 of the latter. The public debt of the Union ex-

20°

22°

32°

B

24

26

Okatjeruo

a Kambom ft 1 etfontel^^ — „ – ‘ v Nukai

Korlkas® ^feoanltub

°Gobabla A

^ ° “Hurls

,Namkoab,^.^w Gunogoo (\j

Epukiro Rivrf.-^

t« tyeWy’ y

- y

^^y-Tlohaimnl frC

,4 Dakatjeu

f Anderson

MokatanL . Pepasobeom0

Inkauaqi ,ˆLehaiiani

.Top#!- 1

Mopanio

Pry Hei

imna wu« ˆ

ˆ .oHoornkrans ‘

c Nauchaa

jaeap f

“** ˆ Omi abQ

Bon“iiot.«f>

\ D

Wealeijr_yalcN’ _ _ –

t’NaoaanabU)! Achab° “NuIbi ˆ n Vo Ann °AminuV< t\

°Nuls)

V G«u»” ‘-f Out “Amin

» / Hugams

Roacbanaˆ ˆAwadaob

Patscbuua Noamasia _ ˆObea

Matsa 0 *

U A N A

Karkai®

OF_

H oMaB0bi 4

oOwanc

TROPIC

A 7~ *

Motlokotloko

lhututu

VˆSerotll Lobotanl 0

LAN

Riscberio

. Mohlssa

jbist

Vfatsqu-5 ««

Mopanl / ° PALAP

/ . Ratolo

Schoaohong &

Scbarane

l Mahontlo

o Tncotnan SImba

JE s !e

Lutblao

I

Belapathlun

Kherni

A

Isutsuao oPurebure

28

E

G

X ©Toms

’% • /v’ \

LL-t’v. NnoUpiind . ‘Ho v A . Xf» T

Ls tT

ˆVoKi

Kameelba\t

Dg E

Xˆˆ SSirtL pGoaniR

ˆPaula Holtf bT8ludje

t Litnpu v I iˆLinijm Lake

oT

£ Nunkabe £”

.tVs-E C T 0 K A T E

Kamotln# KhotoI1j

ioe

Kbatu

O , f

1 Mercury L* I Spencer Bay

ju Wt&JFh

GBotfonteuh t . \ ˆfGlbeˆa

WJO

vk._ ‘ , V Vi

^“‘5biB w?

fCukam.

- A

o*o Horoe0 f

^ °* i- GaulkobiˆV K PLATEAUv

A ? Haigaaibol

am ’ V,.oPe>

f KALK **»

•i/.DabcraB – =

% ° l

‘ Tees

\

Goals’

BAR

Goab

Mao pi o Kalnkani/ˆo HardekoJ

Okba0

Tegokwa®

Tachwam

Kbama

Sekuun

0 Meaeken oMotlbe

°k*‘k>os /CCm

-‘Jf

y /SckwanJ

—

_ .Great AniohaK Seal L\LV|deriu Bay Penguin L> •

Shark I..r , – -

Halifax lAukaraa

Long » L £/tia6«/t

v Karua®, “(iaˆoehas Beraeba

\ IK ® /-

BlumbrOnpft T Arugoanu

A

■ >Kectmapaboo]

‘-W Pootn. \ ’I’l.i.‘PˆS:

I AJTMMO % I # Gal!)ia“

X/

p„ o . Kuibia _v v \

I ylsk ptcMPUDDiNG l.,\ Prince of Wales Pomona 1-V ”aV

> Whale Bay\

RnU

JLriamBaB ˆ

. ht

Huob

Q ‘ ˆ Klipfonteln‘ “oGoreB-/ˆ

kaRAS o Gurus

Hurub

Tscbopao

O L O N G

TJokopon

Marallleuo

/ . K<:'

B A

_ Secbogo –

° ~ Ramoutsa

„ SecuRo KiiJ”

7T H O E N S/

lubello

ht®1.

lokalakala Molbbong

- o Kgetloa Skelclo

Morokweng’b,

/

/ oTokuji Moech wane

L A

Lotlokana#

«X V

Madebin

V’V

Lei

jHddcl;

% Garapbogne’®ˆ. N ’

££ˆ12.

ˆ Vryb.urg TigerHoof,

Namaiˆ

%L

ouurua » • / N — X. \ // / Wojmaran sstudt

fv — e?Y A»’/*V, L c H T > ˆ A /NTAˆsiˆ W

rˆ»ch… ‘A I” Up Lj Vy 11 u l? Kuiooi7N KgfUs Pv*

//aw Ukaina8 V i -/ y

O

Gaibcs ˆ(fabiB / Ariarno I oNoradjasy bJerusalem,’ˆ

Ubabia Lˆalb°

0 ˆCWartnbad

rAussenlyer

..‘-Al

lrialfonteln 6 Veloo#V

,‘ArruH.liii I ciˆ <

. \%rabla

113 . , -r

VfeJ T

Pott NoUotb r- o,1#|

\ N A M

Beenbreek

Lu.

Eenzaatnhci’i

GORDON i A

loewfontein

m))

v5 Uplngtonˆ

■«

Kakainas

L A

iek s’ Kal

Luc J Vlel ’ Keuken Prai

N/H kl

o

NyTittirpoiii’

TO- E Pol’-# ° A-imie#!

Ur I }

4la n dˆJ

ˆ Concordia J’ Aroegaa .

‘ s ˆ* > see: iOn-vˆask —

Katkop \JcV£rV‘0*P»rtKrfpˆ

C, O ˆPonaSt6«;Poi > nis ‘C

e*iii«mV?(«r y-

,,U > ’

ˆ:SSso-\LW0

1 . s.i.WS-Tn V’L

«»> N“» ri>1,lt \S#,n»lEa?«ˆp

- OT’Ta /■ *Vˆ”\ 7

f>eRiet;|v:;°rap, f

toweadorp 1-? o Q < > L

/

Commissioner st.

ˆJagt Koike floor

Drarˆb .eSdcVCU f$ TiilnY – BJ> ˆ|„i

L p

t_,‘ialI(-LP.«HoI“t0’1 _

PrleakaVd \ °0 range RiVer’TMt PaureBinl

biFS k a5ˆ£,H0PET0Wn\ Jane r h b %VˆStt?.lc#l.!.|?)rrVsˆOIltf

-S SaitP™M r/;/ Vˆ-WTk»V

Yv.ii.KtMi “ p .■# ‘J n ijfp A P

\si«WMfe k ffmai’A . . ˆ. l EiˆlPootl vL

I 4 ˆ * A’* V

>

t Genisdal

A’m-J ˆilAoKi, -’J

ffSiS’i

ˆ FAURESMi; Eauresmlth TS-

in

n/

V Zout Pckcl * ‘xA. I ‘aa uw pan/ (

‘ ~ ° Roˆd’e PoortNˆ \ M P«y-U8ville

, ZBoX-n.“k\/7HIL|PSTOWf!y

*“ v 0 7 6

ˆ.U)erle9foDteii

%

t’ t t>.’” ” 4akhRl8 ikU 1 1 <

C#tu..V;Sp#dSp*?Pootˆ ,{

St- Helmet j

KXein Paternoster Bat Cape Columbine \

Eianr/«| Bay i Cape Deaeadal 3. ;

I Moddfirfontt

UNION OF

SOUTH AFRICA

SCALES

lm

8latute Mile*, 103 = 1 InA.

25 50 75 100 13*

Kilometres, 100 = 1 Inch.

0 100 150 200

*to»er Fonteln PolbtA N Da88EN 1.5

Table J

CAPETOWNˆ

- – JA’ynui

Slang Kop I olnt c Sim< r**“‘‘

St. Lucia

// Bay A

x Cape St. Lucia Richard h Bay

24c

26(

D

28 c

Durban

C

Omkomanzi River Umzinto

0

Rand McNally's New 11 x 14 Map of Union of South Africa. Copyright by Rand McNally & Co,

rongituae Basil

C.p. of Good ˆdggS

28° 30? 32? – 34

SttriStf CONGO J CKinunda® \ a.ˆˆTT

wciftfa- j .!NGy. rJamo.on,3i-Tˆ— #ˆ7i

t TttnraJb? / KdfunV I / T\0ˆ / , FiST) CENTRAL

Taiton

t Eaat London barren dale tfoolridge

fewcaatle 'Burst ˆPort Alfred

IkowoIu1/ˆ*!/

ˆChllowelo l. Maguire

,, . _ •e.d7r,"

fch«Adot?fl”|“ r» a,lr“n’>

_ I Ahya. Bay _

““Recife

/ Aˆ

from Greenwich .

i’a

V Sˆqabl-North)ˆ

COUNTRY >

ANQ W AIT C

Serullj ˆ

E !

30£

16c

18

20

22

0

28

28°

30°

>32°

34

10

432

i

.

ceeds $756,000,000. There are 8,924 miles of railway and over 16,000 miles of telegraph line.

Provision was made by which other British colonies might join the Union. Before the day appointed for the establishment of the Union (31 May 1910), the elective members of the senate of the Union to represent the respective provinces were chosen by the two legislative houses of each colony sitting together, and within six months after the date of the estab¬ lishment the first parliament was summoned. Under the enactment of the British Parliament it was provided that the new commonwealth was to be governed by a governor-general ap¬ pointed by the king, an executive council appointed by the governor-general, and a Parliament of two houses, the membership of which w(as to be limited to persons of European descent.' Ministers of state, not more than 10, administer departments. All the powers, au¬ thorities and functions which at the establish¬ ment of the Union were in any of the colonies vested in the governor or in any authority of the colony, so far as they continue in existence and are capable of being exercised, are vested in the governor-general or the governor-general in council, or in the authority exercising similar powers under the Union, except such powers and functions as are or may be expressly vested in some other authority. The command of the naval and military forces is vested in the governor-general. The seat of government is Pretoria but the legislature sits at Cape Town. A principal feature of the membership in the senate and house of assembly is the tenure of office. The first senate was made up of eight senators nominated by the governor-general in council for 10 years, and for each of the orig¬ inal provinces eight senators are to be elected for 10 years by the two houses of the colonial legislature sitting together. The house of as¬ sembly consists of members chosen in electoral divisions in numbers as follows : The Cape of Good Hope, 51; Natal, 17; Transvaal, 45; Orange Free State, 17. With the increase in European population the representation will in¬ crease. The house of assembly was to continue five years from the date of its first meeting unless sooner dissolved. All money bills origi¬ nate in the house of assembly, but the assembly may not pass a bill for taxation or appropria¬ tion unless it has been recommended by message from the governor-general during the

session.

Each separate colony has at its head an administrator, appointed by the governor-gen¬ eral, an executive committee of four and a provisional council of 25 members or a num¬ ber equal to the number of members which the colony sends to the Parliament of the Union. The provincial committees and councils have authority to deal with local matters, such as finance, elementary education, agriculture, char¬ ity, municipal institutions, local works, roads and bridges, markets, fish and game, etc. The governor-general approves these local ordi¬ nances. > # .

The administration of justice is by the Su¬ preme Court of South Africa and other courts within the Union and in the provinces. The common law of the Union is the Roman-Dutch law. Prior to 1913—14 the expenses of the four provinces were entirely defrayed from grants by the Union government. Under the Financial VOL. 27 — 19

Relations Act of 1913 certain revenues were transferred or assigned to the provinces and the grants by the Union government were limited to 50 per cent of the total normal or recurrent expenditure of the provinces. The capital ex¬ penditures of the several provinces are financed by redeemable loans from the Union govern¬ ment. English and Dutch are the official lan¬ guages and are treated as on an equal footing. The administration of native affairs and those pertaining to Asiatics is vested in the governor- general in council.

The industrial development of South Africa will continue to be,, undoubtedly, along agricul¬ tural lines. The principal product is maize and the secondary products are bacon, beef, lard and hides. Conditions induced by the World War gave a great stimulus to wheat-growing and dairying. Sheep-farming is well established and capable of being greatly extended. An¬ other prosperous industry is ostrich farming. Cotton, mohair and sugar and tea have become important products. The cultivation of tobacco and fruit is highly productive and wine-growing is in a flourishing condition. The aim will con¬ tinue to be the upbuilding of an export trade and the extension of railway facilities from the agricultural regions. The wheat crop reached 5,500,000 bushels in the years of the war, while the maize crop of 1917 was 36,000,000 . bushels. Butter to the amount of 19,412,000 pounds and cheese to the amount of 4,266,000 pounds were produced in 1917. The latest live¬ stock census showed 5,796,949 cattle, 719,414 horses, 93,931 mules, 336,710 donkeys, 746,736 ostriches, 30,656,659 sheep, 11,762,979 goats, 1,081,600 pigs and 10,533,909 poultry. Wool ex¬ ports in 1917 amounted to 117,657,142 pounds

and of mohair to 3,690,828 pounds. In the same year hides and skins to the value of $13,000,000 were exported. Cotton-growing is on the in¬ crease as the plant is a good drought-resistant. The crop is now about 3,000,000 annually. To¬ bacco is produced to the extent of about 9,000,- 000 pounds annually. Cane-sugar to the extent of 115,000 tons was produced in 1917. The tea crop in the same year was 1,747,000 pounds. The main source of South African prosperity is, however, gold, coal and diamond mining. The output of diamonds in 1917 was valued at £7,713,810 and of 1916 £5,728,391, of which Cape Colony produced £4,057,928, the Trans¬ vaal, £933,643 and Orange Free State, £736,820. The gold production of the Union was valued at £38,923,921 and was almost entirely credited to the Transvaal. Coal production in 1916 totaled 2,739,665 short tons, the Transvaal and Natal leading. Cape Colony led in salt produc¬ tion, having more than half of the 106,303 tons mined. The latest statistics show that 340,000 persons (of all races) are engaged in mining, of which 47,000 are Europeans. Machinery, clothing, chemicals and dynamite are some of the principal imports. In 1917 3,889 vessels (overseas and coastwise) entered the ports of the Union; total tonnage 9,253,000 tons. The Colony is defended by a permanent force, coast garrison, citizen, naval volunteer and special reserves.

After the outbreak of the World War a re¬ bellion, of which the chief leader was Christian De Wet, broke out, but it was promptly sup¬ pressed by General Botha. In addition to send-

ing contingents for service with the British forces to France and Belgium and later in East Africa and Nyassaland, 65,000 troops were raised and sent against German South-West Africa, a campaign that was brought to a suc¬ cessful termination in July 1915. See War, European.

Bibliography. — (Official Year-Book of the Union of South Africa> (No. 1, 1917) ; Brand, R. H., (The Union of South Africa) (Oxford 1909) ; Brown, A. S., and Brown, G. G., (Guide to South and East Africa) (London 1918) ; Fairbridge, D.,

UNION SPRINGS, Ala., city, county-seat of Bullock County, on the Central of Georgia Railroad and the Birmingham and South Rail¬ road, about 40 miles southeast of Montgomery and 175 miles northeast of Mobile. It is in an agricultural and fruit region. The chief

manu¬ facturing establishments are cotton gins, cot¬ tonseed-oil mills, cotton-mills, spoke and handle factories, grist-mills and a machine shop. The educational institutions are a high school, founded in 1899, public graded schools and sev¬ eral private schools. Union Springs was in¬ corporated in 1844. Pop. (1920) 4,125.

UNION THEOLOGICAL SEMINARY IN THE CITY OF NEW YORK, The. It

was founded in 1836, under the auspices of the Presbyterian Church; the directors and pro¬ fessors of the seminary give their assent to the Westminster standards of this Church, but students of all denominations are freely ad¬ mitted. The seminary offers the following courses: (1) A three-years' course leading to a diploma requiring the study of Greek and Hebrew; (2) a three-years' course leading to the degree of B.D., requiring more hours' work and a higher standing than the diploma course, special work in some department chosen by the student and including a thesis; (3) a four- years' course requiring one year's graduate work and a thesis; (4) special and partial courses. For admission to the degree courses college graduation is required; for the diploma course college graduation or examination in Latin, Greek, philosophy, English and history. Part of the work in the regular courses is elective and some electives are provided for at Co¬ lumbia and New York universities. The cur¬ riculum of the seminary includes courses in Old and New Testament philology and exegesis, biblical, systematic and practical the¬ ology (including study of missions), apologetics, Christian ethics, church history and history of religion, voice culture and sacred music. Train¬ ing in actual Christian work is provided in churches and chapels, public institutions and settlement work; the Union Settlement is closely related, though not officially affiliated with the university. Seminary extension courses for lay workers were established in 1901. There are a number of undergraduate scholarships, graduate scholarships and two fellowships. Tbe seminary buildings contain a chapel, lecture-

rooms, library, museum, reading-room, gymna¬ sium, social-room, and dormitory-rooms. The library contains 135,000 volumes. The students average 225.

UNION UNIVERSITY. See Union Col¬ lege.

UNION UNIVERSITY, formerly Souths western Baptist University, is located at Jack- son, Tenn. The Baptists of Tennessee, realiz¬ ing the necessity of an institution under their control, set about in 1845 for

the establishment of such a school, especially for an educated ministry. It was located at Murfreesboro, un¬ der the name of Union University; during the Civil War the building was damaged, the equipment destroyed and endowment rendered worthless; these difficulties were partly over¬ come, and the University continued its work until 1873, when it was further crippled by an epidemic of cholera in Murfreesboro, and all exercises suspended. In 1875 a new charter was obtained and the name Southwestern Baptist University was adopted ; since that time its prosperity has been continuous and the endow¬ ment has largely increased. In September 1907 by action of tne board of trustees, the uni¬ versity resumed the original name, Union Uni¬ versity. The organization of the university con¬ sists of (1) the College Department; (2) the Department of Theology; (3) the Teachers' College; (4) the Business School; (5) the De¬ partment of Oratory and Physical Develop¬ ment; (6) the Department of Music, and (7) the University Academy. The College De¬ partment offers two courses, leading to the degrees of A.B., and B. S. ; certain studies are required in each course, while others are elect¬ ive. The degree of A.M., is conferred for post-graduate work. The courses of the The¬ ological Department do not lead to a theologi¬ cal degree, but are elective and receive some credit toward the degree of A.B., or B.S. The university is coeducational and the dormitory for young women was erected in 1897. In January 1912 the two main college buildings were destroyed by fire, but new buildings, in some respects very superior to the old ones, were erected. The library contains approxi¬ mately 10,000 volumes. The students number 300; the Teachers' College over 200 and the faculty, 20.

UNIONID.ZE, a family of bivalvˆd mol- lusks, the fresh-water mussels (q.v.).

UNIONISM, the principle of operating in¬ dustries by union labor; that industrial system through which corporations or other employers hire their men by collective bargaining with organized bodies of workmen. (See American Federation of Labor; Trade Unions; Strikes and Lockouts). Although less than 2 per cent of the active workers in America belong to trades unions, yet this organized fraction domi¬ nates the policies in all the large industries, and has been very active for a generation in raising wages, shortening hours and improving shop conditions. It is a notable fact thaf%the six leading countries in the Great World War are each imbued with unionism. In 1913, the year before the war broke out, the nifrnber of trade unionists in the leading nations was as follows : United Kingdom, 4,000,000; German Empire,

The House of Parliament, Pretoria

3,800,000; United States, 3,000,000; France, 1,0ˆ0,000; Italy, 975,000; Austria-Hungary, 750,- 000. No other country had as many as 225,000 union workers. The unions of Great Britain, Germany and the United States expended each close upon $20,000,000 in that year to maintain their organizations, provide benefits, etc.

In the United .States. — While the unions of Great Britain increased from 1,500,000 to about 2,800,000, those of the United States grew from 548,300 in 1900 to over 2,000,000 in 1910. The causes for this growth were, in the main, the great prosperity of all workers, the trust or combination idea, the many strikes and finally labor's natural growth. In 1895 the American Federation of Labor, the most powerful repre¬ sentative body in the United States — compos¬ ing the great majority of organized workers, had perhaps 200,000 members. In 1910 the Federation had upward of 1,800,000, and in 1918 their membership totals a full 2,500,000. There are about 500,000 unaffiliated union workers.

The growth of trade-unionism in America is due in large part to the trust and combination movements of capital, and the many strikes in every trade, many of which were so successful that the workingman got a revelation of the power of organization, and the membership of some of the trades — the building and mining in particular — increased with leaps and bounds.

The Necessity for Labor Unions, as Il¬ lustrated in the Building Trades. — Great con¬ struction companies, wholesale employers of labor in the building trade, have been at war since 1899 more or less incessantly with the trade-unions. Strikes, lockouts and boycotts have been common in all the larger cities. Since 1901 the building industry has involved in the United States an annual outlay of some¬ thing like $400,000,000 and employs more than 1,000,000 men. The experiences of the building trades in 1904 and the printing trades in 1906 demonstrated to the workmen the necessity for trades unions operating together, and this is now the fixed policy, accomplished through the American Federation of Labor.

Demands of Labor. — The demands of the American Federation of

Labor made in resolu¬ tions will show what is sought by the American trade-unionists. These were ;

1. Compulsory education.

2. The repeal of all conspiracy and penal laws affecting seamen and other workmen, incorporated in the Federal and State laws of the United States.

3. A legal work day of not more than eight hours.

4. Sanitary inspection of workshops, mines and homes.

5. Liability of employers for injury to health, body and

life.

6. The abolition of the contract system in all public works.

7. The abolition of the sweating system.

8. The municipal ownership of street cars, waterworks and gas and electric plants for the distribution of heat, light and power.

9. The nationalization of telegraphs, telephones, railways and mines.

10. The abolition of the monopoly system of land holding and the substitution therefor of the title of occupancy only. _

11. Direct legislation and the principle of referendum in all legislation.

12. The abolition of the monopoly privilege of issuing money and substituting therefor a system of direct issuance to and by the people.

The trade-unions of the United States are usually willing to resort to conciliation in the adjustment of differences as they arise, such conciliation to consist of committees represent¬ ing each side and with equal power. They are

usually in favor of arbitration when all means of conciliation have been exhausted, but they are opposed to compulsory arbitration, so called, and usually to compulsory investigation of the conditions attending a controversy. They do not object to although they have little faith in State boards of arbitration or other perfunctory legislative methods of adjusting difficulties. They are in favor of strict legis¬ lation relative to blacklisting. They claim that the blacklist is a rank injustice, and that wher¬ ever practised there is a degradation of

the man blacklisted, and an annoying and irritat¬ ing influence upon those who are not ; that it is a menace to the well-being of labor everywhere. On the other hand, they do not hesitate to use the boycott in enforcing their demands, on the ground that it is a legitimate war measure against men who are considered as strike-break- •ers and thus traitors to the cause of labor. They insist that during periods of labor strikes or other controversies no man or body of men should be enjoined to prevent the doing of something which, if done, would be punishable under the criminal code ; that they should not be debarred by injunction from picketing or patrolling, so-called, or from representing to non-union men that they had better not enter the service of the employer involved in a strike. They recognize their duty to avoid physical violence or intimidation, but claim that if some indulge in this, only those men engaged should be dealt with under the law. They insist that if they violate the law, and are .thus amenable to punishment under it, they should not be subject to fines and imprisonment for contempt of court under an injunction; and they claim that all petitions for injunction should first be heard, either by a jury or other¬ wise, before they are subject to the process of contempt. They are not in favor of socialistic revolution; but that under the present indus¬ trial system their affairs can be adjusted, their claims fairly adjusted and their condition made reasonably satisfactory. They are, as a rule, in favor of the extension of State control in cer¬ tain directions, but they are not social demo¬ crats as distinguished from State Socialists. They claim that the chief force which is ex¬ tending State-socialistic doctrines comes from employers, through trusts and combinations and the aggregation of capital. They are, therefore, generally in favor of some regula¬ tion of fortunes and incomes, and the heavy taxation of incomes on some progressive prin¬ ciple. For statistics of labor troubles see Strikes and Lockouts.

Bibliography. — For a general consideration of trades unionism and labor problems, consult Tolstoi, (The Slavery of Our Times* (1900) ; Ghent, William James, (Our Benevolent Feu- dalism) (1902) ; Brooks, John Graham, (The Social Unrest) ‘ (1903) ; Mitchell, (Organized Labor) (1903); Chapman,

Labor Movement (1917), and publications of the American Association for Labor Legisla¬ tion. Also (American Labor Year Book) (New York ann.), which contains many facts not often seen in the newspapers.

UNIONTOWN, Pa., borough, county-seat of Fayette County, on three branches of the Pennsylvania and one branch of the Baltimore and Ohio Railroad, about 70 miles south of Pittsburgh in the southwestern part of the State. It was settled in 1768 by Henry Beeson, and it was first called Beesontown. It was incorpo¬ rated in 1796. Uniontown is in an agricultural region, but the county is noted for its extensive annual output of coke. In the vicinity are coal fields, deposits of iron ore, glass, sand and natural gas. The chief manufacturing estab¬ lishments are glass plants, two foundries, brick yards, planing mills, flour mills and machine shops and coke plants. There are several churches. The principal public buildings are the Uniontown Hospital, county courthouse, jail, County Home for the Poor and the schools and churches. The educational institutions are a high school and public elementary schools. The banks have a combined capital of over $350,000, with deposits amounting to over $3,693,770. Two trust companies have a combined capital of about $300,000 and deposits of over $589,290. The government is on the commission plan. The net funded debt is $300,000 and the total realty valuation is placed at $8,000,000, which is one- third of the market value. The tax-rate per $100 of assessed valuation is $1.35. Pop. 15,692.

UNIONVILLE, Mo., town, county-seat of Putnam County, on the Chicago, Burlington and Kansas City Railroad, about 140 miles, in direct line, north by west of Jefferson City. It is. in an agricultural and stock-raising region and in the vicinity are large coal-mines. The industries are chiefly connected with farm products and mining. The educational institutions are the public graded schools, one private school and a school library. Pop. (1920) 1,765.

UNIT. See Units of Measurement.

UNIT SOCIAL ORGANIZATION, a so¬ ciological experiment which aims to bring all the people into a more active, intelligent and continuous participation in their own affairs, to vitalize municipal government and bring it closer to the lives of the people. The move¬ ment for this social plan was born in New York in 1916 and soon spread westward. The National Social Unit Organization advertised in 1916 for a community of 15,000 people some¬ where in the United States which would be willing to try out its plan. Sixteen cities re¬ sponded favorably, and Cincinnati, with well- federated social activities, a fine municipal university and with one of the best general hospitals in the United States, was chosen. The Mohawk-Brighton district of Cincinnati, a section populated largely by a native-born working class of Americans of skilled occupa¬ tions, was selected as the experimental labora¬ tory there. The original plan called for an

ex¬ periment of three years, at the end of which time the work done was to be evaluated and a decision reached as to its extension. As it worked out in the Mohawk-Brighton district, two fundamental ideas of organization are involved. First, for the purpose of procuring

the constant, active supervision of 100 per cent of the people over community affairs and also for the purpose of procuring representa¬ tion by persons who actually know the people they represent. A block organization was formed consisting of a block committee, or council of seven, elected by preferential ballot by all the men and women in the block more than 18 years old, who in turn selected the block worker or block executive who sits on a central citizens' committee and forms one- half of the neighborhood administration.

Groups were organized from the commu¬ nity, physicians to plan for public health, nurses to plan nursing, recreation workers to study and plan for the community's play needs, the trade unions to report the workingman's point of view in the solution of neighborhood prob¬ lems, business men to assist in the neighbor¬ hood business administration and teachers to plan a program of neighborhood education. Gifford Pinchot was chosen chairman of the National Citizens' Council of the Social Unit Organization. The social unit promoters have a distinct theory of unit organization, and their whole attitude toward its application is experi¬ mental. Hawing successfully applied the prin¬ ciples of organization for three years in one district, they are preparing to extend on a city¬ wide basis only those parts of the plan whose results have been demonstrated as beneficial.

UNITARIANISM. The Name.— So far

as is known the name Unitarian originated in Hungary. It was used there at first as the title of an association of religious believers of various sorts in the year 1568 or thereabouts. Peter Bod, the Transylvanian historian, who was too bitterly prejudiced against the doctrines constituting Unitarianism to make his state¬ ments concerning it always trustworthy, re¬ lates that in 1557 the Diet of Thorda in Tran¬ sylvania passed an edict (ratified in 1563) granting universal freedom of worship. At about the same time the various religious bodies within the country formed a league of toleration pledging themselves not to persecute one another. The members of this league were popularly called ((The United® or "Unitarians.® So at first the title carried no sort of theological significance whatever. Embracing as it did all kinds of Christian believers, it indicated simply a fraternal relationship. This league, or union of fraternity and tolerance, did not long endure. Dissensions arising from more or less

sharp differences of belief resulted in the withdrawal of those who held that belief in the dogma of the Trinity was fundamental to Christian faith and not to believe it an almost unpardonable sin. This withdrawal emphasized the Trini- tarianism of those who withdrew and the lack of it in those who remained loyal to the league. These latter were the non-trinitarians, perhaps anti-trinitarians, believing in God as One in¬ stead of “God in Three Persons.® They were called Unitarians, however, not because of this belief, but because they still remained members of the league of “The United® or “Unitarians.® It was natural and unavoidable that the title should come at last to mark the distinguishing faith of those persons who remained loyal to the league. While “no confirmation of this can be found from Unitarian sources® Bod’s explanation is probably not far wrong. Un-

less something of this sort had happened it is more than likely that the belief that «God is One® would have at that time been called by the distinctly theological term ((Arianism.® What is certain, hpwever, is that the name Unitarian appears in the decree of the Transyl¬ vania Diet at Leczfalva, 25 Oct. 1600. Thirty- eight years later the name was ratified by Transylvania Unitarians as the official desig¬ nation of their churches. It may well be as¬ sumed, in the absence of contrary testimony, that this name was chosen as the official desig¬ nation instead of the purely theological term Arian because of the meaning it had when used as the name of the league of fraternity and tolerance. Although since then it has come to have a distinctly theological significance, and is to-day generally used to distinguish those persons and churches within Christianity who stand for simple monotheism from those who hold the Trinitarian formula, yet this early non-theological meaning of the name does best ex¬ press the meaning which most Unitarians to-day give it.

History. — Unitarianism, that is the faith of those in Transylvania who in 1600 accepted the name as the official designation of their churches, and of those who since and in other countries have adopted the name or had it applied to them, may be said to be a belief that ((God is One.® The most conspicuous point of departure from Trinitarianism, the point usually emphasized, is the refusal to regard Jesus as ((very God of very God® and the assertion that he was distinctly and unqualifiedly a human being. This belief in some form and of vary¬ ing degree ((has accompanied Christianity from the beginning, at least as one of its forms.® Tertullian (circa 200), the

first to introduce the term Trinitas into Christianity, is authority for the statement that in his day ((the common people think of Christ as a man.® It is usually conceded that even though it might not be cor¬ rect to speak of Christianity during the first two or three centuries as being substantially Unitarian, it at least was not Trinitarian. It was this generally held belief that Christ was a man that Arius was trying to save in his conflict with Athanasius. It was this cham¬ pionship of Arius, of the human side of Jesus, that for centuries gave the name Arianism to any belief in the humanity of Jesus. But as the Arians expressed their belief in the great theological controversy that was had at Nicea (325), the difference between them and the Trinitarians was not very marked. The latter insisted that Jesus Christ was ((of one sub¬ stance® with the Father, the Arians refusing to go further than to concede that the Son was ((of like substance® with the Father. Although the decision at Nicea was against the Arian view, faith in the simple humanity of Jesus persisted all through the centuries, and those who held this view were usually subjected to bitter persecution. Differing interpretations of the Trinity were the cause of frequent disturb¬ ances within the Church from the time of Arius but it is not until the upheaval occasioned by the Reformation of the 16th century that really serious anti-trinitarian opinion and propa¬ ganda are met with. So rapidly did these opinions gather force and win considerable following that the (

ures against them. According to the temper and civilization of the times such measures were not marked by gentleness or humanity. Anti-Trinitarian opinions were, however, nour¬ ished rather than suppressed by persecution.

The burning of Servetus (1553) at the stake in Geneva, at the direct instigation of Calvin, for the sin of writing and publishing (1531) the book (Errors of the Trinity } (Calvin's copy is one of the two or three copies of this book surviving) may be said to mark the beginning of Unitarianism as a definite and continuous movement. But Michael Servetus was not the first to suffer martyrdom for disbelief in the Trinity. Bishop Mant in his (History of I re¬ land } records that in 1326 at Dublin one ((Adam Duff was burned alive for his denial of the Trinity*.® In 1551 George Van Parris was burned for a like offense. Before Servetus there were others who had written against the Trinity; among these may be mentioned Martin Cellarius (1499-1564), a close friend of Luther, and Ludwig Haetzer, whose views, however, were not disclosed until after his execution (1529) for anabaptism. But it was Servetus who first put the issue squarely before the world. <(Your trinity,® he writes, <(is a product of. subtlety and madness. The Gospel knows nothing of it. The old Fathers are strangers to these

vain distinctions. It is from the school of the Greek Sophists, that you, Athanasius, prince of tritheists, have borrowed it.®

In Poland and Hungary. — A group of men in Italy had incurred displeasure* because of their more or less outspoken opposition to be¬ lief in the Trinity, and they concluded it was the part of wisdom to move to other countries. Among these were Lelio- Socinus and his uncle, Faustus, and Giorgio Blandrata or Biandrata. The greatest degree of freedom of religious thought was to be found at this time in the countries of Poland and. Hungary. Consider¬ able anti-trinitarian preaching was going on there. In Poland the names of Gonesius and Gregory Pauli are the most noted, and in Transylvania Bishop Francis David. With the coming of Blandrata, a physician, to Poland in 1558, (

lishments were gradually closed and confiscated, and in 1658 all adherents of <(the Arian and Anabaptist sect were commanded to quit the kingdom within two years.® Thus ended organ¬ ized Unitarianism in Poland.

In the neighboring kingdom of Transylvania (Hungary) the Unitarian movement ran a somewhat similar course, except there it was not wholly destroyed by the Catholic reaction. There is some dispute as to the actual founder of Unitarianism in this country. Blandrata — • who later was instrumental in starting the per¬ secution. of Unitarians when for purely per¬ sonal reasons he sought to return to the Catho¬ lic Church — in 1563 came from Poland to Transylvania and <(was made physician-in¬ ordinary to the king, John Sigismund® ; and it is assumed that ((through his influence the king, the king's mother, and many nobles accepted the Unitarian faith.® Francis David, <(now regarded as the true apostle of Transylvania Unitarianism,® was elected (1564) bishop of the Calvinistic churches. His liberal and eloquent preaching attracted multitudes in Klausenberg, and caught the attention of Blandrata, who used his good offices to have him appointed chaplain to the king in 1566. Here he preached the doctrine that t(he who* divided Christ into two, man and not man but God, he is a de¬ ceiver.® In 1568 was issued a royal edict, con¬ firmed by the- Diet, giving to everyone complete freedom of conscience and of speech. During this year a great public debate was held with David and Peter Melius, a strict Calvinist, as the chief debaters. David triumphed and that May the whole people of the town of Kolozsvar became Unitarian,® which is probably an exag¬ geration but plainly

reveals the power of David's preaching. ((The example was followed by a large number of Transylvania towns.® At about this time there were in this country 425 congregations Unitarian by profession. <(In 13 higher schools and colleges besides that doc¬ trine was taught by able professors, several of whom were refugees from other lands.® By 1578 a serious controversy developed within the Unitarian churches. Blandrata, who was pre¬ paring to save himself in the powerful Catholic reaction which he saw coming, headed the party who were for maintaining that ((Christ should be invoked with divine honors, though without any inherent title to such homage,® and he called to his aid Faustus Socinus, who was a noted champion of this idea. The result was a <(public explosion on David's part against the cultus of Christ in any shape or form.® Whereupon, at the instigation of Blandrata, articles were drawn up (

England. — The organized beginnings of Unitarianism in England may be said to date from about 1773, when Theophilus Lindsey, on the failure of the petition for relieving clergy¬ men (Isaac Newton was an anony¬ mous writer on ■ the same doctrine and John Locke in his Reasonableness of Christianity > (1695) ranged himself on the same side. Dr. Samuel Clarke, Isaac Watts and Phillip Dodd¬ ridge aided materially in the spread of ((Socin- ian and Arian views among dissenters.® When Dr. Lindsey withdrew from the Established Church and set up a Unitarian meeting-house in London, a number of ministers of Presby¬ terian chapels soon followed his example. In the case of these latter it was not necessary for the ministers to withdraw from the min¬ istry of these institutions because the chapel trust deeds gave freedom of theological opinion, so there was nothing to prevent the chapels from accepting the Unitarian views. Thus it came to pass that a number of chapels with open trust deeds bodily went over to the Uni¬ tarian movement inaugurated by Dr. Lindsey.

In 1791 the Unitarian Book Society for the distribution of literature was organized, and from then on Unitarianism becomes a definitely organized force in the religious life of England. In 1844 all civil disabilities which Unitarians had suffered were removed.

At present there are in Great Britain 370 places of Unitarian worship. The number of members is not known and estimates are use¬ less. Manchester College, Oxford; The Unitarian Home Missionary College, Man¬ chester; and Presbyterian College, Carmarthen, Wales, are the training schools for British Uni¬ tarian ministers. The British and Foreign

Unitarian Association, with headquarters at Essex Hall, Essex street, London, is the organ¬ ization through which missionary and denomi¬ national enterprises are carried on. The Chris¬ tian Life and The Inquirer , London, are the leading denominational periodicals.

America.— It would not be correct to as¬ sume that Unitarianism in America, which ap¬ pears subsequent to its organized existence in Europe, originated independent of all foreign influence. The intercourse between the people of the Old World and the New made that impossible. Besides, the migration of people from the older countries to America in search sometimes of a greater freedom naturally in¬ cluded some of the Unitarian way of thinking and believing. The most notable and influenc¬ ing single incident was the coming of Dr. Joseph Priestly to the United States in 1794. Two Unitarian churches were founded by him, Northumberland, Pa. (1794), and Philadelphia (1796). The Unitarian church (1803) at Olden- barnveld, later Trenton, now Barneveld, N. Y., was founded by a group of Dutch refugees who had close relationship with the English Unitarians. These three churches have played a considerable part in the spread of Unitarian¬ ism in America, and the church at Barneveld furnished the inspiration to Mr. Huidekoper who later founded the theological school at Meadville, Pa.

But, broadly speaking, American Unitarian¬ ism is of American origin. It is in part the fruit of the spirit of religious freedom em¬ bodied in the Mayflower compact, and in part the result of the democratic form of govern¬ ment which ruled the New England parish churches. It is a suggestive and significant fact that the oldest Pilgrim church in America, that founded at Plymouth in 1620, in 1801 declared itself to be Unitarian by a large majority vote, and this without making any change whatever in its covenant. This church, now Unitarian in name and fellowship, uses the identical state¬ ment of faith drawn up by its Pilgrim found¬ ers. American Unitarianism is in large part the product of the habit of many notable New England divines of thinking and speaking their own thoughts and of their utter dislike of any¬ thing that savored of monarchy in religion as well as in politics. It was -also a product in part of their rebellion against what seemed to them to be the moral defects of the popular faith.

Before 1825, the date usually adopted as the beginning of organized Unitarianism in the United States, the ideas peculiar to Unitarian¬ ism were being preached by an ever-increasing number of the New England clergy and laity. It is not possible within the space of this

article to trace these beginnings. To Jonathan Mayhew, settled as minister of the West Church in 1747, belongs the honor of being the “first outspoken Unitarian in New England, not merely because he rejected the doctrine of the Trinity, but because he accepted all the cardinal principles developed by that movement since his day.® More important, in some re¬ spects, was the action of the corporate body of King’s Chapel, Boston — the first Episcopal church in New England — declaring for Uni¬ tarianism by inviting (1782) Rev. James Free¬ man to become its minister, and three years later voting to revise its Episcopal ritual by

eliminating all Trinitarianism therefrom. Dur¬ ing the last decade of the 18th century Uni¬ tarianism is reported to be ((on the increase in the Southern counties of Massachusetts® and that <(it is on the increase in Maine,® but with the exception of King’s Chapel and temporary societies in Portland and Saco, Me. (1792), the churches established at Northumberland (1794) and Philadelphia, Pa. (1796), there was nothing in the way of organized Unitarianism before the opening of the 19th century.

The next important incident after the action of King’s Chapel was the outcome of a con¬ troversy within the old church at Plymouth. In 1799 the church and parish, voting separately as was the custom, chose the Rev. James Ken¬ dall as minister. The minority, opposed to the liberal or Unitarian views of Dr. Kendall, with¬ drew from the old church and established the church known as the “Church of the Pilgrim¬ age,® leaving the church of Brewster and Robinson to become one of the pioneer churches in the Unitarian movement. Thus far the movement had gone along without creating anything more than local dissensions. But signs rapidly multiplied of the coming storm which was to rend New England Congrega¬ tionalism into Orthodox and Unitarian. With the opening of the 19th century the clergy of – the stricter sort were writing and speaking more critically and impatiently of the unorthodoxy that was being preached by a considerable num¬ ber of eminent clergy. In one instance it went further than critical words. The Rev. John Sherman (grandson of Roger Sherman), min¬ ister of the First Church, Mansfield, Conn., was expelled (1805) from the Windham County Ministerial Association for his anti-trinitarian- ism. In his defense he published the first anti-trinitarian pamphlet on this side of the At¬ lantic, the title of which was <(One God in One Person Only.® The election of the Rev. Henry Ware, known as a Unitarian, as Hollis pro¬ fessor of divinity at Harvard College, was the signal for controversy and open strife to begin. Immediately a war of pamphlets and sermons and periodicals was on and separation came to be ever more and more inevitable. The

stricter brethren widened the breach by establishing in 1808 a theological school at Andover to train clergy free from taint of the Unitarian heresy. The men charged with this heresy steadily denied that they were Uni¬ tarians or had any desire or purpose of being such, but in 1812 Dr. Belsham of England pub¬ lished his life of Theophilus Lindsey and in it he included a chapter on American Uni¬ tarianism which revealed a <(much closer alli¬ ance of several Boston liberals with the move¬ ment in England than they had been supposed willing to admit.® In 1815 Dr. Jedidiah Morse saw the volume and forthwith gave wide pub¬ licity to the facts. He went further and in his periodical, The Panoplist, virtually charged the exponents of Unitarian ideas in New Eng¬ land with being afraid to come out in the open and acknowledge the real character of their teachings. Whatever the merits of the accusa¬ tion — and the accusation is not without prej¬ udice — it forced the controversy to a crisis which eventually resulted in the severance of New England Congregationalism into “Ortho¬ dox® and “Unitarian® by the withdrawal in many cases from the old parish churches of

the orthodox party, leaving those of Unitarian ways of thinking in charge of the old church properties and organization. This seems to suggest, what is further borne out by an ex¬ amination of the early New England church covenants, that the Unitarian movement in New England and consequently in America was not a secession from Congregationalism but a de¬ velopment of the principles upQn which it was founded.

The men charged with heresy did not hesi¬ tate to show their colors. Such men as Wil¬ liam Ellery Channing settled over the Federal Street Church in Boston in 1813; Edward Everett, who became minister of the church in Brattle street in 1814; Francis Parkman settled at the New North Church 1812 and others met the charges and criticisms by a more definite and outspoken presentation of the things they held to be true. Their position is not correctly described as being mainly anti-trinitarian. They virtually called in question the whole doctrinal structure of orthodoxy. This was made clear by Dr. Channing in the sermon — now a his¬ toric landmark in Unitarianism — preached at the ordination of Jared Sparks in Baltimore, Md., in 1819. Dr. Channing used this occasion “to give a distinct statement of the opinions generally held by his liberal brethren, — their mode of interpreting the Scriptures, their views concerning God and Christ,

their idea of the nature of his mission and mediation.® This ser¬ mon marks the parting of the ways. The fol¬ lowing year, overcoming their repugnance to even appear to favor organizing another re¬ ligious body, the “liberal® ministers organized the Berry Street Conference for discussion among themselves. Five years later (1825) ((a club of some 25 liberal-minded and public- spirited citizens organized for social and phil¬ anthropic purposes,® which had existed in Bos¬ ton for some years, at a meeting held at the residence of Hon. Josiah Quincy, discussed “the advisability of forming an association to publish books and tracts setting forth the opinions and principles of the liberal party in the Congrega¬ tional churches.® The outcome was the form¬ ing, on 25 May 1825, of “a new society to be called the American Unitarian Association.® By a chance coincidence the British and Foreign Unitarian Association was organized on the same day. Henceforth Unitarianism is recog¬ nized as one of the religious bodies of America.

In America, as elsewhere, Unitarianism has experienced many conflicts within itself. The old order of things, the old thoughts were con¬ tinually being challenged. In the early years Unitarians retained much supernaturalism in their belief and forms of worship as is seen in the fact that Ralph Waldo Emerson felt under the necessity of resigning as minister of the Second Church in Boston because the church refused to “discontinue or radically change the order of communion service.® It became more and more clear that the genius of Unitarianism was fundamentally out of har¬ mony with traditional and popular Christianity. This, for the first time, was most conspicuously evident when, in July of 1838, Mr. Emerson addressed the graduating class of Harvard Divinity School. This address, on account of its unusually frank criticism of the traditional views of the “Divine Nature, Jesus, Christian¬

ity and of the offices of the church,® started a controversy within Unitarianism which was destined not to end until the “traditional® views were practically eliminated. Great impetus was added to this controversy and a division seemed to threaten, when Theodore Parker spoke on “the transient and permanent in Christianity® on 19 May 1841. This was further expounded in the following winter in a series of five lectures which he published under the title of a dis¬ course of Matters Pertaining to Religion 9 So acrimonious became the discussion that many of Parker’s fellow Unitarian ministers hesitated to call him a Christian. The central principle of Unitarianism which from the first had been the right of private interpretation and freedom of speech was strong enough, however, to pre¬ vent any serious rupture. A few years later the right of a man to think his own thoughts

and to speak them in religious matters became some¬ thing of an issue through the attitude of the American Unitarian Association toward Theo¬ dore Parker. His frank departure from tradi¬ tional beliefs and customs prompted the more conservative members of the denomination to scrutinize closely the beliefs of the young men coming into the ministry, and to create an atmosphere uncomfortable to too ad¬ vanced thinkers. The men of the Middle West, while not taking sides in the doc¬ trinal controversy which Emerson and Parker had precipitated, felt there was a distinct menace to freedom of thought and expres¬ sion in the attitude taken toward Dr. Parker, and so when these men of the Middle West organized in 1852 the Western Conference they were stoutly resolved to preserve the right of men to think and speak as they believed. In the following year, in giving advice to the mis¬ sionaries of the conference, it was stated that under no circumstances should they require "subscription to any human creed, or the wear¬ ing of any distinctive name.® With the denom¬ inational reawakening which came after the Civil War the question of the basis of fellow¬ ship became an issue. In 1865 the National, now the General Conference of Unitarian and Other Christian Churches, meeting biennially, was organized and the basis of fellowship al¬ though very broad was considered too narrow by some of the more radical, who thereupon organized the Free Religious Association. These conflicts came to an end by the action (1894) of the National Conference in adopting the present preamble to the constitution of that body. That is, Unitarians decided once and for all that within organized Unitarianism there should be absolute freedom of thought and expression. The constitution of the General Conference reads: "These churches accept the religion of Jesus holding, in accordance with his teaching, that practical religion is summed up in love to God and love to man ... we cordially invite to our working fellowship any who, while differing from us in belief, are in general sympathy with our spirit and practical aims.® With this jealous insistence upon free¬ dom of thought and speech for every individual, Unitarianism, or rather the Unitarian churches, have gone along associating themselves together in an increasingly effective organization. Lack¬ ing a central authority to compel obedience the Unitarian body lacks the driving power essential

to conspicuously successful propaganda. Uni¬ tarianism can only appeal to those who are thinking in its direction.

The character and aim of the organized activities of the denomination are evidenced by the various departments into which the Ameri¬ can Unitarian Association (Boston, Mass.), the executive branch of the denomination, is di¬ vided. The publication department, besides printing and publishing books of a more or less denominational character, aids in the work of Unitarian propaganda by printing and distribut¬ ing tracts to the number of about 400,000 copies annually, while the publicity department (

1884 Yukichi Fukuzawa started a movement in his country, Japan, looking ((to the introduction of a rational Christianity.® In response to an urgent request from Japanese the Rev. Arthur M. Knapp was sent to Japan in 1889 to investi¬ gate, and later in that year Mr. Knapp was prepared to begin work. In defining the pur¬ pose of his mission Mr. Knapp said, <(receive us not as theological propagandists, but as mes¬ sengers of the new gospel of human brother¬ hood in the religion of man.® The work of Mr. Knapp and his colleagues was wholly educa¬ tional. ((No churches were organized by the representative of the American Unitarian As¬ sociation. Those that have come into existence have been wholly at the initiative of the natives themselves.® In 1896 was organized the Jap¬ anese Unitarian Association, which, through the co-operation of influential and scholarly Jap¬ anese, is helping to liberalize religious thought throughout the country in both the Buddhist and Christian communions. In Italy the Uni¬ tarian work is carried on by the Association of Free Believers. A Unitarian association has been organized in Brazil by Brazilians, and movements Unitarian in everything but name are to be found in Switzerland, Holland, Nor¬ way and Denmark. There are Unitarian churches in the English-speaking countries, South Africa, Australia and New Zealand.

In the United States and Canada to-day there are about 475 churches and missions. Although the census of the membership of these churches is given in various publications, as a matter of fact there is no official census of Unitarian membership. This is due to the fact that usually Unitarian ministers have little in¬ terest in church membership. Unitarian min¬ isters are educated at the divinity school of Harvard University, which school (

What Unitarians Believe. — Popularly a Unitarian is one who does not believe in <(the divinity of Christ,® or more correctly in the deity of Christ. That is but another way of saying that Unitarians do not believe in the Tri- tarian formula expressed in the Athanasian and Nicean creeds and embodied in all Protestant orthodox creeds. Because of this lack of belief in the Trinity, Unitarians are classified in

the United States Religious Census as ((non-evangel- ical,® and are usually officially classified by the <(Evangelical® bodies as non-Christian. This latter classification was very definitely made at the organization of the Federation of the Chris¬ tian Churches of America in 1905. This officially representative body of <(Evangelical® churches decided that to qualify as a <(Chris- tian® church there must be a complete accept¬ ance of the Trinitarian formula. Unitarians de¬ cline to accept that decision and emphatically insist that it is not necessary to be a Trinitarian in order to be a Christian. To support this contention they point out that, so far as is known, Jesus himself did not teach the doctrine of the Trinity, neither did the Apostles. The only passage in New Testament literature which in any way reflects or embodies the Trinitarian

formula is that in 1 John v, 7, so plainly an in¬ terpolation that it is dropped from the Revised Version without any comment. Thev also point out that it was at least 150 years after the cruci¬ fixion of Jesus before the term Trinity began to be used by Christian teachers, and it was considerably later than this before the Trinita¬ rian formula was decided on as the Christian conception of deity. Unitarians hold that this doctrine, instead of coming from anything Jesus or the Apostles or their immediate successors taught, is altogether of heathen origin, though this is not necessarily anything against it. So they argue that in rejecting the Trinitarian formula and insisting on a pure monotheism they follow much more closely the teachings of Jesus than do the Trinitarians. For this reason they insist that they are entitled to be regarded as Christian. However, Unitarians care little for a name. The important thing is to be Chris¬ tian in spirit. They always speak of themselves as Christians. “But,® as Dr. Lowe expressed it when the wisdom of adopting the name as a part of the official title of the national organi¬ zation was being thoroughly debated, “I will oppose, as a test (of fellowship), any definition of Christianity.® That was designed to indicate that Unitarians regarded Christianity, not as a set of definitions of God and ‘Christ, but rather the Christ spirit which a man is under obliga¬ tion to put into his every day life.

Unitarians have no creed, no official theol¬ ogy. They have “statements® of faith, The most popular being: “The Fatherhood of God; the Brotherhood of man ; the Leadership of Jesus; salvation by character; the progress of mankind onward and upward forever.®

But this is in no sense final or authoritative, it is simply an attempt to set forth the things most commonly believed. There are forms for admission into Unitarian church-membership, but in no case is any sort of doctrinal test im¬ posed or implied. This arises not from any lack of religious belief or conviction among Unitarians, but, first, because they hold that be¬ lief in and frequent recital of a creed does not necessarily make a person Christian or even religious ; secondly, guided by experience, Uni¬ tarians feel very strongly that no church or council ought or has any right to require any person to commit himself for all time to sorpe particular form of worship, or sacraments or dogmas no matter how true they seem to be. They are not willing to accept as spiritual guides men who had so imperfect an under¬ standing of the world they lived in as did the makers of Christian creeds. Believing in the spiritual imperfection of all persons and insti¬ tutions, past as well as present, Unitarians feel that creeds and sacraments which change not make it impossible or unnecessarily difficult to press forward to a finer spiritual quality in life. Believing as they do that man is a progressively spiritual being in this world, they insist that the last word in religious truth has not been uttered and the goal of spiritual endeavor is still far ahead. For this reason Unitarians refuse to have anything to do with finalities and infalli¬ bilities in religion.

There is nevertheless a Unitarian faith which binds Unitarians together in a common pur¬ pose and a sort of common understanding of religious matters. It has been expressed thus :

“Just as an association of scientists is consti¬ tuted and sustained not by the adoption of a theory, however certain, but by a common pur¬ pose or aim, so a church is possible by virtue of the common purpose to seek contact with the divine life and to find mutual expression of the experience.® Although Unitarians are free to formulate each his own conclusion there runs through all the consequent diversity of opinion strands of a common faith and on all great religious issues there is among them a quite strong agreement. There is space for only a few brief hints on this point.

Unitarians are very modest when it comes to speaking of the Infinite Spirit “in whom we live and move and have our being.® To believe in, to have a lively consciousness of God, they do not consider it needful to assume a detailed familiarity. They shrink from frequent repi- tition of the name and also from using any word or phrase that suggests an anthropomor¬ phic conception. Unitarians most commonly speak of God as Father, not because that is an adequate or exact term, but because it sug¬ gests the finest, the most universal, the

most unselfish elements a man can conceive of or aspire to. Perhaps the term is generally used by them because it suggests that this over¬ shadowing, transfusing spirit is all the time prompting, tempting man to grow up into the divine likeness, just as the noblest of human fathers prompts his child to grow up in the likeness of the father's noblest self. Whether a distinct personality shall be ascribed to the idea of the Divine Fatherhood is a matter which each must decide for himself. They incline to the belief that a definite idea about God cannot be communicated from one to the other by a series of words or by a formula as is a law of science or a principle in mathematics, but that the idea must come from one's intuitive or ac¬ quired understanding. In thinking and speak¬ ing of God Unitarians are guided by the revela¬ tions of science no matter how recent, because they hold that if God is the living principle in things, that spirit which seems to be forever shaping the world of human life toward ever finer issues, then plainly a more accurate under¬ standing of the Divine Spirit will come with every new discovery, every step toward the ulti¬ mate truth of things. Unitarians prefer to speak of their thought of God rather than of . a belief in God , for the reason that the former phrase indicates that God is becoming more clearly re¬ vealed and that future generations will know more than is yet known concerning the Divine Spirit. While Unitarians do not believe it pos¬ sible to express their thought or consciousness of God in a phrase there are two Biblical ut¬ terances which they frequently quote as ex¬ pressing their idea. "Hear O Israel: the Lord our God is One Lord® (Deut. vi, 4) and "God is Spirit and they that worship Him must wor¬ ship Him in spirit and in truth® (John iv, 24).

The Unitarian idea of Jesus is that he is in all respects a human being. They hold that the idea that Jesus was "a man and something more® makes his "life of singular purity, eleva¬ tion, courage, sanity and devotion® worthless as an example to beings who are only men. Also a Christ "conceived of the Holy Ghost and born of the Virgin Mary® adds no dis¬ tinction or force to anything Jesus said or did

or was. That idea simply makes him one of many mythological beings which form the cen¬ tre of many religions. Unitarians contend that the Christ of miraculous birth is not the histori¬ cal figure of the Gospels, but an imaginary being created by theologians, in the days when there was no knowledge of science or history, for the purpose of meeting the necessities of a very elaborate scheme of saving man from

(

Unitarians believe in salvation as a purely human act, involving only human powers, the results iof which are effective in changing the character of a man's life here in this world. A salvation which aims to bring about a change in the sentence which a "supreme judge® has already pronounced against the soul of a man, a salvation which seeks to save one from terrible penalties inflicted for

eternity beyond the tomb, does not appeal to Unitarians as being helpful or in accord with the facts. They reject the idea that sin is purely or primarily an offense against God. Sin is moral and not theological in its nature. They cannot see how there is any sin in a man's disbelieving any or all the doctrines em¬ bodied in the church creeds. It may be in¬ defensible to refuse to belong to a church and to participate in the great sacraments, but they decline to regard this as a violation of the moral law. According to their idea sin is wrong more or less deliberately committed by one person against another. Any word or thought or sentiment or deed which in any way works against moral and spiritual well-being, that is sin. From this it follows that the first and only step which a person can take toward salvation is not merely to strive to right the wrong but to so change himself and his plan of life that he will henceforth do right and desire and plan only to do right. Consequently Unitarians cannot think of salvation as a means of escaping the consequences of sin. A man must accept the consequences of his words, of his thoughts, of his deeds. From this there is no possible escape and ought not to be. A man enters the path of salvation .only when he refuses to do or think or speak evil. And this every man, in a greater or less degree, is capable of doing. Unitarians reject the preva¬ lent belief that man is unable to save himself, and so must needs plead his helplessness be¬ fore a great supernatural saviour. They hold that by a continual struggle to master tempta¬ tions and provocations from within and with¬ out a man can, and in no other way can he, become a saved man. In their judgment salva¬ tion is seldom a completed act. Few if any are wholly saved. The degree of salvation which a person enjoys is the measure of his triumph over injustice, greed, hatred and the thousand and one evils which beset a man in the world. In so far as ritual acts or belief in supernatural influence spur a man to righteous endeavor such play a part in his salvation. There is, so Unitarians believe, the power of salvation with¬ in every person. Every effort which a person makes toward rightness of life is this saving power in operation. The purpose of salvation, as Unitarians conceive it, is not to secure a place in a heaven beyond, but to secure an ever increasing measure of heaven-likeness here.

What Unitarians believe concerning the future can easily be inferred from this. The idea of a ((heavenly city® above and a “bottom- less pit® below is dismissed by them as with¬ out warrant iof fact ; it has not even symbolic value. They have a <(great hope® of future ex¬ istence, but they stop short of expressing any definite knowledge concerning the what or the where of such existence. They hold as a hope, with some it is quite a positive belief, that the future can be nothing other than a continuance of this life. Unitarians generally feel quite sure that whatever happens after death, the soul that has lived its years .on earth in sin will not, as a reward for certain theological beliefs, enter into a state of perfect bliss and holiness, neither will such a soul because of lack of such beliefs enter into a pit or state of horror and despair from which there is no es¬ cape. There is no great gulf of difference

separating the future from the present. The soul passes on with all the character it has won on earth unchanged. The idea of a soul being sentenced eternally to happiness or misery is rejected by Unitarians as being utterly unjust. Death does not determine the soul’s character for all eternity. Death is not doom. If the soul lives on it is the belief .of Unitarians that its continued existence must be amid conditions which allow of unceasing progress toward perfection or constant deterioration, as each soul shall elect. In the life that is to be as well as in the life that now is the soul must reap what it sows. An eminent Unitarian scholar well expresses the general Unitarian attitude in these words: <(The doctrine of im¬ mortality is one in which Unitarians do not take a very acute interest. Their respect for human nature — their conviction as to the im¬ perativeness of the moral law, their profound faith in the goodness of the earthly life as a part of the goodness of all life rightly under¬ stood — all these combine to fix their attention rather on this life than on the life after death.

The manner of compiling the existing canon of the Bible coupled with the fact that the men engaged in the task did not know more than the scholars of to-day makes it impossible for Unitarians to accept the belief that this book is God’s inspired and infallible Word. The fact that there are in other religions scriptures believed to be inspired by deity and infallible takes from the idea that the Bible is a sacred book whatever distinction and au¬ thority such an idea is supposed to possess. Unitarians, however, hold the Bible in high esteem. They treasure it as one of the great, perhaps the greatest of the religious

books of the world. And though they concede that it speaks with authority on some matters it is only the authority of the man who sees clearly and speaks accurately. So an utterance which has authority in the Bible would have no less au¬ thority if found in any other book. Nor is a thing true or more true because it is in the Bible. Whether in the Bible or out of it a thing is true only to the degree that it squares with knowledge and experience. To Unitari¬ ans the Bible is an inspiration, never a finality. It is read from Unitarian pulpits partly fr.om custom, but most of all because it contains many passages of surpassing ethical beauty and inspiration, and usually only such passages are read. They use it in their Sunday schools be¬ cause it deals with the history of a great peo¬ ple, and largely because it discloses the sources and character of many religious, political, ritualistic and ethical ideas which have shaped and directed Christian civilization. But Uni¬ tarians never lose sight of the fact that the Bible is distinctly a Hebrew rather than a Christian production. But that fact does not detract from nor add to its ethical and spiritual excellencies. From these excellencies Uni¬ tarians will continue to draw ethical and spiritual encouragement and illumination.

The Church according to the Unitarian understanding of things is a purely human institution. With all due respect to its tradi¬ tions and appreciative of the good it has helped man to achieve, and wholly mindful of what in the way of spiritual comfort and strength it has been and is to many, Unitarians cannot

ignore what seem so plainly to them to be the facts that the Church within Christianity is comprised of a series of churches each main¬ taining a separate existence by the imposition of fairly definite rules of exclusion. The idea that some one Church is the one and only true church does not seem to be warranted. Nor does the idea that there is somewhere within, behind, above existing churches a sort of true, mystic church of the Spirit, which will some day be established, appeal to them as having any force .of truth. The Church is simply an organization of man's religious interests. The institution, no matter what its traditions and claims and forms, can have no authority above that which proceeds naturally from the intel¬ lectual and spiritual attainments of the persons composing it. Like every other institution it has a right to require that those seeking ad¬ mission shall go through certain forms and pass a satisfactory examination on matters of belief, but to .offer eternal rewards or pro¬ nounce eternal doom is wholly beyond its right and power. To belong to a church cannot secure any one a privileged! position after death. The Church is a saving and righteous force in a community when and only to the extent that its members are living examples of purest and noblest character.

The rites of Baptism and ihe Lord's Supper are observed in many Unitarian churches, but Unitarians do not retain the old belief in these matters. They attach no serious importance to them. The idea that immersion or sprinkling or signing with the cr.oss with water upon adults or babes can effect any spiritual regeneration or in any way change the relation between a human being and deity is rejected. Ritual or Sacrament can, in their judgment, possess no saving power. In Unitarian practice ((baptism® is generally spoken of as ˆconsecration.® The purpose of the service of consecration of children is to express the parents' desire that the children shall grow up into purity of life and nobility of service. The same idea is carried out in the consecration of those of <(riper years.® It is a consecration of life (

The one purpose of real religion, Uni¬ tarians believe, is not to prepare people for another life, but to inspire them to live this

as it ought to be lived. This explains why Unitarians have been most conspicuous in all enterprises which aim to improve the general well-being, morally, intellectually and even materially. Thus it happens that in an un¬ usually large number of instances Unitarians have been pioneers in philanthropic and edu¬ cational enterprises and have been pre-eminent in literature. A few instances may be quoted. The founder of the Perkins Institute for the Blind in Boston, a pioneer movement, was Dr. Samuel G. Howe, and to Dorothea Dix must be given credit for starting the movement which resulted in a more humane treatment of those in prisons, in almshouses and hospitals for the insane. A Unitarian layman, Henry Bergh, was the founder of the Society for the Pre¬ vention of Cruelty to Animals. The first woman advocate of the ((rights .of women® in the United States, Margaret Fuller, was a Unitarian, and conspicuous in this movement have been such women as Julia Ward Howe, Elizabeth Cady Stanton and Susan B. Anthony, all of them Unitarians. Horace Mann, pioneer in educational reform, was a Unitarian layman, and Henry Barnard writes that <(had it not been for Cyrus Peirce (Unitarian minister) I con¬ sider the cause of Normal schools would have failed or been postponed for an indefinite period.® Peter Cooper, founder of Cooper Union in New York City, was an earnest Uni¬ tarian. The first library in the United States that was free to all the inhabitants of a town or city was opened in Dublin, N. H., by the Unitarian minister of that place, the Rev. L. W. Leonard; and in the adjoining town of Peter¬ borough, under the leadership of

the Unitarian minister, the Rev. Abiel Abbott, the people voted to tax themselves to maintain a library — the first library in the country supported from the tax rate of a municipality. The United States Sanitary Commission, which did such splendid service in the Civil War, was originated by the Rev. Henry W. Bellows, minister of the Unitarian Church of All Souls in New York City. This devotion to humanitarian work is not accidental, it is Uni¬ tarian religion, and in their churches emphasis has been and is always put upon the religion of service, making the most and the best of this life.

This goes to explain how it Gomes to pass that Unitarians have been so conspicuous in literature, statesmanship, in the judiciary and elsewhere. The Unitarian representation in literature is out of all proportion to the size of the denomination. In American literature Uni¬ tarians are represented by Henry W. Long¬ fellow, Oliver Wendell Holmes, Ralph Waldo Emerson, James Russell Lowell, William Cul¬ len Bryant, Bayard Taylor, Nathaniel Haw¬ thorne, Thomas Wentworth Higginson, Wil¬ liam D. Howells, Bret Harte, Louise M. Al- cott. Among historians, Bancroft, Prescott, Motley and Parkman might be mentioned. Thomas Jefferson was an outspoken advocate of Unitarianism. John Adams and John Q. Adams, Millard Fillmore and William H. Taft are among the men of this faith who have oc¬ cupied the Presidency of the United States. John Marshall, Charles Sumner and Daniel Webster were also Unitarian laymen. The list is a long one and is referred to only to indi¬

cate the character of Unitarianism through the type of men and women who have been identi¬ fied with it.

Unitarian contributions to hymnology are out of all proportion to the size of the de¬ nomination, and the quality .of those contri¬ butions is second to none. The catholicity of their spirit and the excellence of their de¬ votional and spiritual character are evident from the wide approval which many Unitarian hymns have received. There is hardly a hymnbook of importance which does not contain a num¬ ber. See Hymnology.

Bibliography. — The material for this sub¬ ject is voluminous, particularly on the subject of Unitarian belief. There is no one formal statement which has more authority than an¬ other. An excellent presentation is contained in the article by Prof. F. G. Christie in Ameri¬ can Journal of Theology, 17 Oct. 1918; consult also Savage, Minot J., (Pillars of the Temple* ; Chadwick, John White, (01d and New Uni¬ tarian Belief * ; Emerton, Ephraim, (Unitarian Thought* ; Martineau, James, (The Seat of Authority in Religion) ; the sermons

and ad¬ dresses of W. E. Channing, Theodore Parker,

R. W. Emerson and M. J. Savage, and pamphlets issued by the American Unitarian Association.

On the History. — Allen, J. H., (Our Lib¬ eral Movement in Theology> and (The Uni- tarians> (in (American Church History* series); Cooke, G. W., (Unitarianism in America) and (Unitarianism, Its Origin and History* (Amer¬ ican Unitarian Association, 1890) ; Gordon, A., (Heads of English Unitarian History) ; Eliot,

S. A., (Heralds of the Liberal Faith) ; Maury, G. Bonet, (Early Sources of Unitarian Chris¬ tianity in England) ; and historical pamphlets issued by the American Unitarian Association, Boston, Mass.

Charles Graves,

Minister of the First Unitarian Congregational Society, Hartford, Conn.

UNITED AMERICAN MECHANICS, Junior Order of, a fraternal and beneficial organization founded in 1853. In 1910 it had a membership of 210,000, with 33 State councils and 2,400 subordinate councils. In the same year the order paid benefits to the amount of $760,000. Its membership has since slightly increased.

UNITED AMERICAN MECHANICS, Order of, a fraternal and beneficial organiza¬ tion founded in 1845. In 1910 it had a total membership of 46,217, with 18 State councils and 676 subordinate councils. In the same year the order paid benefits amounting to $112,775. It is the parent of the Junior Order.

UNITED ARMENIANS, a branch of the Catholic Church in communion with the See of Rome, but retaining the liturgy and ritual of the ancient Armenian Church ; they are estimated to number 150,000 souls. In 1830 Pius VIII nom¬ inated a primate for the United Armenians of European Turkey, and as accessions from the Schismatical Armenian Church grew numerous, six suffragan episcopal sees were created 1850. In resentment of the Pope's intervention in the election of their patriarch in 1870 a schism arose and the United Armenian Church lost upward of 4,000 members; the seceders were excom-

municated by the Pope, but they elected a pa¬ triarch of their own and came into possession of most of the church property. The schismati- cal patriarch in 1879 renewed his obedience to Rome, and his example was followed by many of the clergy and people. The United Arme¬ nians live in the Balkans and Turkey and in the Ukraine and south Austria.

UNITED BAPTISTS, a religious sect in the United States which had its rise in the mid¬ dle of the 18th century during the great revival of religion under the ministrations of George Whitefield. Owing to differences of opinion among Baptists as to the methods of the revival¬ ists some of them seceded from the churches and were called Separates, while those who remained were distinguished as Regulars ; the Separates approved the (

UNITED BRETHREN, called also MO¬ RAVIANS, a religious sect or society, the Unitas Fratrum, the membership of which was made up at first of Moravians or Bohemians, descendants of the first followers of John Huss (q.v.). A party of Moravians or Hussites, flee¬ ing from persecution in their native countries, were, 1722, permitted by the Count von Zinzen- dorf (q.v.) to settle on his estate, Berthelsdorf in Saxony. Berthelsdorf, new-named Herrn- hut, has ever since been the principal seat of the society ; hence the name Herrnhuters by which they are known in Germany. Their pa¬ tron devoted his whole estate to the propagation of Christianity through the ministrations of the Brethren and was the society's chief director and most zealous missioner and evangelist till his death. In Germany they are recognized by the several governments as Protestants attached to the Confession of Augsburg; but they claim for their bishops apostolic succession through the Waldensian Church; their bishops, how¬ ever, exercise no jurisdiction, their principal function being that of conferring ministerial order. Every congregation is governed by a board of trustees and a board of elders; the whole society or church is governed by synods composed of bishops and deputies of clergy and laity; in the intervals between synods the af¬ fairs of the Unitas Fratrum are managed by a conference of elders. There are communities and settlements of the United Brethren in various Christian countries, as Germany, Hol¬ land, Britain, North America and in heathen lands. The Brethren early entered the field of foreign missionary labor, and though numeri¬ cally the society is not to be compared with the other religious bodies which are represented in that work, it has perhaps the most complete missionary organization in the world. The island of Saint Thomas in the West Indies was the first field of their missionary zeal 1732; the following year they planted a mission in Green¬

land, the fruits of which have been most abun¬ dant; their missionary stations are found also in South Africa, Tibet, Labrador, Alaska and other heathen countries. In 1740 the first com¬ munities of the United Brethren were estab¬ lished in Pennsylvania, and in that colony they founded the three towns, Bethlehem, Nazareth and Lititz. From these centres went forth a large number of devoted Christian men and women who labored with great success among the colonists and the various Indian tribes. At present the American province of the Moravian Church or Unitas Fratrum is divided into two districts, the northern district with its seat at Bethlehem, Pa., the southern with its seat at Salem, N. C. Each of these districts has its own synod. In 1917 the Unitas Fratrum or Moravian Church had in the United States 144 ministers, 126 churches and 20,859 communi¬ cants. The Union Bohemians and Moravians had in addition for ministers, 21 churches and 1,000 communicants.

UNITED BRETHREN OF CHRIST, a

denomination of Evangelical Christians which, though not organized and named till 1800, had its origin in 1766 during a revival of religion among the immigrant German population of Pennsylvania and northern Maryland under the ministrations of Philip William Otterbein, a missionary of the German Reformed Church, and Martin Boehm, a minister of the Mennon- ite sect. By these leaders preachers were licensed and conferences assembled, but not until 1800 did the movement take the form of a church or assume a distinctive title; in that year at a cenference held in Frederick County, Md., the title of United Brethren in Christ was assumed and Otterbein and Boehm were chosen bishops. The sect is in no wise related either to the Unitas Fratrum, though that society is also officially styled United Brethren; nor to Methodism. Otterbein and Boehm were preach¬ ing the distinctive doctrines of the United Brethren in Christ before there were any Meth¬ odists in this country. The theology of the church is Armenian; its form of worship is simple, marked by congregational singing and participation of all members, male and female, in the devotional exercises. The ministers are appointed to their charges by the bishop and presiding elders at an annual conference ; the time limit of the pastoral relation is three years, but may be extended indefinitely by consent of the conference. Since 1889 women are admitted to the ministry on the same terms as men. Orig¬ inally the religious services were conducted in the German language : at present only in a small number of the churches is that language em¬ ployed. The church has a theological seminary and a publishing house at Dayton, Ohio, and in other places nine colleges and several academies. Its missionary society conducts home missions, also missions in

Germany and in South Africa. In 1917 the number of ministers of this church in the United States was 1,937, of churches 3,577, of communicants 345,705. Through a schism in 1889 the church lost a portion of its membership, and the seceders formed a separate organization called United Brethren (Old Con¬ stitution). This body had in 1917 310 ministers, 515 churches and 21,172 communicants, this be¬ ing a falling off of over 28,000 communicants in seven years. Presumably many of them re-

turned to the parent body, which gained over 60,000 in the same period.

UNITED CHRISTIANS OF SAINT THOMAS, those of the native Christians of Malabar and Travancor who are in communion with the Roman See. The Christian Church of Malabar, called the Church of the Christians of Saint Thomas, dates from an early period, perhaps the 6th century, and appears to have from the beginning been in communion with the patriarch of the Nestorians. At the close of the 16th century, under Portuguese domina¬ tion, this church was brought into communion with Rome. When the Dutch succeeded the Portuguese, the Christians of Saint Thomas renounced the union with Rome, and receiving a metropolitan from the Jacobite patriarch of Jerusalem, adopted the creed and liturgy of the Monophysites ; the direct opposite of their original Nestorianism. Throughout these changes a minority of the Christians of Saint Thomas adhered to Rome, and these, with later secessions from the schismatical Jacobite church, number about 100,000, subject to a vicar-apostolic appointed by the Pope. They use the Syriac liturgy of the Nestorians, not that of the Jacobites.

UNITED COPTS, the small body of se- ceders from the Monophysite Coptic Church who acknowledge the supremacy of the Pope and are in communion with the See of Rome. The church of the United Copts uses the rite of the Monophysite Coptic Church and retains many of the peculiarities of that church in mat¬ ters of discipline. The United Copts are pre¬ sided over by a vicar-apostolic appointed by the Sovereign Pontiff.

UNITED DAUGHTERS OF THE CON¬ FEDERACY, a social, literary, historical, monumental and benevolent association, com¬ posed of the widows, wives, mothers, sisters and lineal descendants of men who

rendered honorable servic in the army and navy of the Confederate States, or who served in the civil service of the Confederacy, or of any of the States embraced therein, or who gave personal service to the Confederate cause. It was organized at Nashville, Tenn., 10 Sept. 1894, Mrs. M. C. Goodlett, of that city, being the prime mover. In recognition of this service Mrs. Goodlett was subsequently made a per¬ manent official of the organization, with the title of honorary president and founder. The organization has 555 chapters, located in all parts of the United States, and has a total membership of 26,227.

UNITED EVANGELICAL CHURCH, a

religious body formed in 1894 by division from the Evangelical Association. The first general conference was held that year at' Naperville, Ill., at which the necessary legislation was en¬ acted, and a book of discipline drawn up and adopted. In 1918 the United Evangelical Church had about 1,000 organized congrega¬ tions, 2 bishops, 550 preachers, 90,000 enrolled members and about an equal number of pupils in Sunday schools. Its mission society main¬ tains missions in Hu-Nan, China; about $100,- 000 being the annual expenditure of the church for missions. Educational institutions under control of this denomination are Albright Col¬ lege, Meyerstown, Pa., Dallas College and La

Creole Academy, Dallas, Ore., and Western Union College at Le Mars, Iowa. It issues The Evangelical (weekly), The Missionary Tid¬ ings and Die evangelische Zeitschrift, all at Harrisburg, Pa. Consult Stapleton, Ammon,

(Annals of the Evangelical Association of North America and History of the United Evangelical Church) (Harrisburg 1900).

UNITED FREE CHURCH METHO¬ DISTS, a religious body in Great Britain formed by the amalgamation of two subdivisions of Wesleyanism, namely, The Wesleyan Associ¬ ation which had its rise in 1834 when, upon the removal of one or two influential ministers from the original connection, there resulted a secession; and the Wesleyan Reform Associa¬ tion, another body of seceders from the parent body, in 1849; this secession was caused by the expulsion of several ministers from the Wesleyan Church on charge of insubordina¬ tion. Soon these two seceding bodies entered into a union as United Free Church Methodists; 40 years after the union of the two bodies the United Methodist Free Church had over 85,000 members, 409 ministers and nearly 3,500 local preachers.

UNITED FREE CHURCH OF SCOT¬ LAND, the name assumed by the ecclesiastical body formed 31 Oct. 1900 by the union of the Free Church of Scotland (q.v.) with the United Presbyterian Church of the same coun¬ try. The Free Church contributed to the union 1,077 congregations, and the Presbyterians 599 congregations. Three divinity halls (or seminaries) exist, at Glasgow, Aberdeen and Edinburgh.

UNITED GREEKS. See Greek Reli¬ gion.

UNITED IRISHMEN, a society for polit¬ ical reform founded in Belfast 1794; its aim was to promote union among all the people of Ireland without distinction of creed, for the preservation of their liberties and the exten¬ sion of their commerce. At that time two- thirds of the people of Ireland, the Catholics, were by law excluded from all participation in the government of their country. The first society of United Irishmen consisted wholly of citizens of Belfast, respectable merchants and professional men, all of them Protestants or Presbyterians. The same year a branch so¬ ciety was formed in Dublin, and soon the Dublin society was recognized as the central directing body. In its membership were com¬ prised many young men representative of the best elements of society — scions of ancient houses Anglo-Irish or Celtic, some prosperous Dublin merchants, and many young profes¬ sional men who after the misfortunes of 1798 rose to eminent distinction in their own coun¬ try, in France, or in the United States, with¬ out recanting any of the principles of the United Irishmen. At first the society was con¬ stitutional and not secret : it was made a secret society in 1795, and steps were taken for the enrolment of men preparatory to a general in¬ surrection when the promised aid in men and material should arrive from France. At the close of 1796 there were reported as enrolled 500,000 men, sworn members of the society, of whom 100,000 were more or less provided with arms — muskets and pikes. In the mean-

time Theobald Wolfe Tone, Arthur O'Connor, Lord Edward Fitzgerald, and other agents of the society had been busy in France, and the Directory had given them assurance that aid would be forthcoming. On 16 Dec. 1796 a fleet of 17 sail of the line, 13 frigates and 13 smaller ships bearing 15,000 French troops sailed for Ireland from Brest, commanded by General Hoche, Grouchy second in command; this ex¬ pedition, defeated by continuous violent storms, had to return

home without effecting a landing in Ireland. In the spring of 1797 adverse winds prevailing for weeks prevented the sailing of a joint expedition of troops of the French and Batavian republics for Ireland. Bonaparte's armee d'Angleterre was made an ((army of Egypt® in the spring of 1798, and the long- planned insurrection in Ireland, started with¬ out any prospect of aid from France, met with inevitable defeat. After suppression of the in¬ surrection, which was confined to three of the 32 counties, by an armed force of 137,000 men, the chief leaders of the United Irishmen in Dublin and Belfast were first confined in a fortress for four years and then banished; very many of the exiles settled in the United States. Of the 20 leaders confined in Fort George the religious affiliations were: Episco¬ palians, 10; Presbyterians, 6; Catholics, 4. Though the society was secret the constitution and oath were published. Consult Plowden, cHistory of Ireland* (Philadelphia 1806).

UNITED KINGDOM. See Great Brit¬ ain.

UNITED MINE WORKERS OF AMERICA, The, the largest labor union in America, having for its object the union of all mine (

On 23 Sept. 1919 the United Mine Workers' Convention at Cleveland declared that this con¬ tract had expired because of the virtual ending of the war on 11 Nov. 1918. The convention on the same day adopted a resolution demanding an increase of 60 per cent in wages, a six-hour day and a five-day week and authorizing the

international officials to call a strike, effective 1 November, if a satisfactory agreement had not been negotiated by that date. On 17 Octo¬ ber Secretary Wilson of the Department of Labor conferred with President Lewis of the miners and T. T. Brewster, chairman of the operators' association, in Washington. This conference was futile, as was also a joint con¬ ference of miners and operators, called by Sec¬ retary Wilson, lasting from 21 to 24 October.

President Wilson issued a statement on 25 October, demanding the recall of the coal-mine strike order and declaring that a <(strike under those circumstances is not only unjustifiable, but unlawful.® On petition of the government United States Judge Anderson on 31 October issued a temporary restraining order to pre¬ vent miners' officials from doing anything in furtherance of the strike. On 8 November a temporary injunction was granted and a manda¬ tory order issued requiring the rescinding of the strike order. Meantime the bituminous miners walked out and production in all union mines ceased. Secretary of Labor Wilson again called the miners and

operators to Washington and on 21 November offered as a compromise that an increase of 31 per cent be granted the miners. A few days later, after this had been considered by the Cabinet, Fuel Administrator Garfield proposed an increase of 14 per cent, without any increase in the price of coal to the public. This was rejected by the mine workers.

President Lewis and Secretary-Treasurer Green conferred on 6 December with the Attorney-General of the United States and it was later announced that an agreement had been reached, based on the proposal of Presi¬ dent Wilson made on 5 December. Under this plan the miners were to return to work at once ; were to receive a 14 per cent increase in wages ; after resumption of work the President would appoint a commission of three — one operator, one miner and one representative of the pub¬ lic — to investigate and determine, if possible within 60 days, a basis for a new wage agree¬ ment. The miners' representatives after sev¬ eral days' discussion accepted the proposal on 9 Dec. 1919, and on the same day the strike was called off. v

UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA. See Presbyterian

Church in United States of America.

UNITED PROVINCES OF AGRA

(a'gra) AND OUDH, owd (formerly the Northwest Provinces and Oudh), British In¬ dia, a province in the north central part of India, bounded on the north by Tibet and Nepal, on the east by Bengal, on the south by the states of the Central India Agency and on the west by the Rajputana and the Punjab. It consists of' Agra (formerly the Northwest Provinces), 83,198 square miles; Oudh, 23,966 square miles; and the native states of Rampur, 899 square miles; and Garhwal, 4,180 square miles. Total area under British administration, 107,164 square miles; grand total, 112,243 square miles. Pop. (1911) : Agra, 34,624,040; Oudh, 12,558,004 ; Rampur, 531,217; Tehri, 300,-819; total, British province, 47,182,044; total, including native states, 48,014,080. The city of Agra has 185,449 population. See Ac.ra; Oudh.

UNITED SECESSION CHURCH. See

Presbyterianism.

UNITED STATES – BOUNDARIES, ETC. (1)

UNITED STATES, a federal republic composed of States, Territories, one district and colonies (see Boundaries, etc.). The official title is ((The United States of America.® Used in the singular (

1. Boundaries, etc.

2. General Outline History

(1776-1920).

3. Causes of the Revolution.

4. The American Revolu¬

tion (Military Events).

5. The Declaration of Inde¬

pendence.

6. The American Revolu¬

tion (Diplomatic Con¬ ditions during the War and the Peace N egotia-tions).

7. Articles of Confederation.

8. The Formation of State

Constitutions.

9. The Peopling of the

United States.

10. Finances (1775-1789).

11. The Federal Convention

of 1787.

12. Beginnings of Party Or¬

ganization and Growth of the Party System and Party Machinery.

13. The Colonial and Terri¬

torial Systems.

14. The Cabinet.

15. The Alien and Sedition

Laws.

16. The Judiciary.

17. Diplomacy.

18. The War with France.

19. The Louisiana Purchase.

20. Causes of the War of

1812.

21. The War of 1812.

22. Finances (1789-1816).

23. Westward Movement.

24. The New Democracy and

the Spoils System.

25. Annexation of Texas.

26. The Abolition and Free

Soil Movements.

27. The Mexican War.

28. Slavery.

29. Finances (1816-1861).

30. Efforts to Settle the

Slavery Question.

31. Causes of the Civil War.

32. Secession.

33. Military Events of the

Civil War.

34. The Confederacy.

35. The Political Events of

the Civil War.

36. Finances (1861-1919).

37. Reconstruction.

38. The Thirteenth, Four¬

teenth and Fifteenth Amendments to the Constitution.

39. The War with Spain.

40. Territorial Expansion.

41. State Constitutions.

42. Immigration (1789-

1916).

43. Suffrage.

44. Civil and Religious Lib¬

erty.

45. Disputed Elections.

46. Impeachment.

47. The President's Office.

48. The Vice-Presidency.

49. Speaker of the House of

Representatives.

50. History of Arbitration.

51. Growth and Develop¬

ment of Law.

52. Railroad Transportation.

53. Foreign Commerce.

54. Industrial and Commer¬

cial Development.

55. Army of the United

States.

56. Navy of the United

States.

57. Chronological History of

the United States Navy.

58. Political Parties.

59. Foreign Policy.

60. The United States and

the European War.

Appended to these articles will be found adequate cross references to much material which has been singled out for more extensive treatment under separate headings.

1. BOUNDARIES, ETC. The mam por¬ tion of the United States occupies the middle part of North America extending approximately from 24° 20′ to 49° north latitude, and from 66° 48′ to 124° 32′ west longitude. The northern boundary line beginning with the Pacific Ocean is as follows: The fixed line running about southeast in the Strait of Juan de Fuca, mid¬ way between the State of Washington and Vancouver Island, to Puget Sound, then north, and northeast, to the Strait of Georgia, then northwest to the 49th parallel; from thence east to the Lake of the Woods; thence along the southern coast of the Lake of the Woods, continuing along Rainy River, through the mid¬ dle of Rainy Lake, and several other lakes which are expansions of Rainy River, to Lake

Superior, north on the northwestern coast of Lake Superior to Port Arthur. From Port Arthur the line continues east through the Great Lakes (except Michigan) and the rivers or straits connecting them, to the Saint Law¬ rence River ; thence about midway to the 45th parallel ; thence along the 45th parallel east to Hall's Stream; thence north by east, along Hall's Stream nearly to the 46th parallel; then an irregular highland boundary to the Maine State line; thence along highland lines and the southwest branch of the Saint John River to 46° 45'; thence north 47° 20'; thence northwest to the extreme northerly boundary of Maine. From this point the boundary is along several small lakes and streams tributary to the Saint John; thence along the Saint John to the New Brunswick boundary and south in a straight line to the head of Saint Croix River; thence along the Saint Croix River, Grand Lakes and through Passamaquoddy Bay to the Atlantic Ocean. The southern boundary line between the United States and Mexico is as follows: Beginning at the point on the Pacific Coast at 32° it extends east to the Colorado River, south 20 miles along the Colorado, southeast to 31° 20′ north latitude and 111° west longitude, east along the line of 31° 20′ for 160 miles; thence north to latitude 31° 47'; thence east to the Rio Grande, and along the Rio Grande southeast, east and southwest to the Gulf of Mexico. The remaining portion of the southern boundary is defined by the northern and

eastern shore line of the Gulf of Mexico; the eastern boundary by the Atlantic Ocean and the west¬ ern boundary by the Pacific Ocean. The Canadian boundary line is 3,900 miles long; the Mexican boundary line is 1,975 miles long, and the total ocean, lake and river boundary is 10,758 miles. The greatest length, from the Atlantic to the Pacific, is 3,100 miles and north and south 1,780 miles. Alaska (q.v.), in the northern part of North America ; Hawaii (q.v.), in the Pacific Ocean; Porto Rico (q.v.) and the Virgin Islands in the Atlantic Ocean; the Philippines (q.v.), and several small islands in the Pacific (parts of the eastern hemisphere), are all included within the United States. The area of the main portion of the United States is 3,026,789 square miles. The area of Alaska is 590,884 square miles; of the Philippines 115,- 026; Porto Rico, 3,604; Hawaii, 6,449; Panama Canal Zone (leased), 436; Virgin Islands, 149; Tutuila and Samoa, 55; Guam, 210; making a total of 3,743,518 square miles.

Coast Lines. — The coast line is compara¬ tively regular ; there are no large indentations, but the largest and most numerous are on the Atlantic Coast. The principal arms of the sea on the Atlantic are Chesapeake, Delaware, New York, Massachusetts and Cape Cod bays, and Long Island, Albemarle and Pamlico sounds. On the coast of the Gulf of Mexico are Mobile, Galveston and Tampa bays; and on the Pacific Coast San Francisco Bay, Bay of Monterey, Puget Sound and Santa Barbara and San Pedro channels. (For coast lines of Alaska and the island possessions see articles on Alaska; Guam; Hawaii; Panama Canal; Samoa; Virgin Islands, etc.). There are no large islands off the coast of the main portion of the United States. Long Island (q.v.) is the largest; the next important are the islands off the northeast Atlantic Coast and

the Santa Barbara (q.v.) group off the south¬ west Pacific Coast. Florida in the southeast is the largest peninsula. There are more good harbors on the Atlantic Coast than on the Pacific or Gulf coasts. The Atlantic Coast differs widely in character in the north and south. In Maine, New Hampshire and north¬ ern Massachusetts it is very rocky, with rocky headlands jutting far into the sea and with numerous rocky islets. From Boston southward the coast is low and sandy, with numerous sandbars, back of which are swamps and lagoons. The latter is especially true of the North Carolina and Virginia coasts. The Dis¬ mal Swamp is the largest depression of this kind. The rivers of this coast have tidal estuaries. The Gulf Coast is also low and sandy and in

places extremely dangerous to navigation because of sandbars. The character of the Pacific Coast is very simple, there being an almost straight unbroken front to the sea throughout its length. With its indentations the Atlantic Coast line has an estimated total length of 12,350 miles; the Gulf Coast, 5,725 miles, and the Pacific Coast, 3,250 miles.

Topography. — The main part of the United States presents four physical divisions : two ele¬ vated and two lowland regions. The elevated are the Appalachian Mountains (q.v.) in the east and the Rocky Mountains (q.v.) or Cor- dilleran system in the west. The eastern low¬ land mass is along the Atlantic Coast, broad at the Gulf of Mexico and narrowing toward the north where the mountains are but a short dis¬ tance from the ocean. The southern part of the Atlantic lowlands joins the central lowland region south of the Appalachian Mountains and about 70 miles from the Gulf of Mexico. It is much less in extent than the central lowland division but it contains a large population, is the oldest portion settled by Europeans and was the chief battle ground in the war for Ameri¬ can independence. The northern and southern parts of this lowland section differ materially in formation and soil. The mountains in the northern part approach the ocean so that the foot-hills are almost at the sea line; the low¬ lands are in some places really series of low hills, masses of rocks, sandy soil, large areas covered deep with glacial deposits and with masses of rock formation which show the marks of mighty ice-forces. Beginning with and including the southern portions of New Jersey, and continuing to the Gulf and Florida Strait, is a plain of low, almost level, land, ex¬ tending in a gradual slope from the mountains to tide water. The soil and climate contribute to the extensive growth of fruits, tobacco, corn and cotton. The northern section of the At¬ lantic lowlan.d is a worn-down mountain region and the southern section at no ancient period was sea-bottom and even now the line of de¬ marcation between the coastal plain and the con¬ tinental shelf is very slight in many places. This section has received the name of <(Tide Water Country,® on account of its being a gift to the continent from the sea, and also be¬ cause many of its rivers are tidal streams for some distance from the ocean. The central low¬ land lies between and on the lower slopes of the two great uplifts. It is called the Mississippi Valley on account of the greater portion being in the basin of the Mississippi River. The higher slopes, merging into the foot-hill region

of the Appalachian on the east and the Pacific on the west, become the plateau lands. The so-called Piedmont Plateau lies west and northwest of the central part of the great Atlantic lowlands or plains.

The whole plateau seems not to have been brought down to the level of the sea, but to have inclined slightly to seaward and toward the valleys of the streams ; so that, in reference to its plain condition, the region is often called a pene¬ plain. When the land portions of the Atlantic lowland was raised above sea-level the same system of upheaval extended throughout the Piedmont region, and has continued with inter¬ mission to the present time, until the old plains have now reached an altitude which constitutes them a plateau as now understood. The plateau is bounded on the northwest by the Ap¬ palachian Mountains. It was not upheaved evenly and simultaneously in all its parts. Where first lifted, the gorges and valleys are convex; where last lifted they have concave profiles. The large grassy, almost treeless areas in this section are called prairies. This great lowland region of the United States is a part of the central lowland section of North America, which is called, in Canada, the Hudson Bay and Mackenzie regions. In the southern part of this section are vast areas of flood plains, and also land which at no very remote period was wholly under water. Beginning with the At¬ lantic plain or lowland at Florida, extending west and including the southern part of the central lowland section, there are broad areas only a few feet above sea-level, in many places less than 100 feet. The northern part of this central section is bounded by the Great Lakes. The divide between the streams that flow into the Great Lakes and those which flow into the Gulf of Mexico, by way of the Mississippi, is very slight. The three long slopes in this division are the one from the northern part to the Gulf ; the one from the Appalachian divide on the east to the Mississippi ; and the third from the Rocky Mountain divide on the west to the Mississippi. There are numerous sand¬ bars and swamp lands along the southern coast. The eastern slope is shorter and less steep as a whole than the western slope. There are high bluffs along many of the rivers of the western part, even in sections where there are large areas of rolling prairie lands. The huge boulders and mountain peaks of the north¬ west section seem like outposts on the begin¬ ning of the plateau region. In the southwest the lowlands extend around the southern part of many of the mountain chains, so that the greater part of the United States south of the low rocky hills which form the extremity of the Appalachian Mountains, and extending west to the Guadalupe Mountains, is one continuous lowland mass. The mountains in Missouri and Arkansas, south of the Missouri River and just west of the Mississippi, are the most im¬ portant highlands in this whole section. In Missouri these highlands are called Ozark Mountains or Ozark Plateau, in Arkansas Ouachita Mountains.

Along the Pacific Coast is a narrow strip of low land of not sufficient

extent to be classed among the great physical divisions, but of great value from an economic point of view. The southern part of this lowland border is consid¬ erably wider than that of the northern part.

ngitude WesiWj from. Greenwich

|) %Lake

C M

% Wi hiiipeg

Lake

’innipeaofiis

Sa*kaet

fPpet7?

Brandt

Estevan

Morris TURTLE I

Kenmai

\ illlavn

ˆisue Rot***®

’ •s £ P A’ ff

f ootehtac

Oe’vila I.®£

Cr’jokston

Sudbury*

Par»/»0|

Otta i

Carrington’

Tello’Si

(NV»tt«\ V

7

Ashcroft

LAKKV a’’ i

- l»uvr«a

Marinette

Orton i

1 ˆ0tne

Shoshone Q *

Bello Fourcbo

a. White wood

nloivsass!ˆ

| Shikopt

‘ Blahr, , *aJ Is

0 < *itc]i(

Huron

HtiXs

Xewcastle’

Ishkoshujga

FoodStf N. du Law? OˆPorta\

[anltcˆi

l’i l ■ >• ‘•

|CU«

inonas

Albert Lea

jU’t’aprings Chatnb«

Jernont

ˆAustin _ 1

sX*®”*’

AlitcbeUTI

-~ˆ04V

[ilwauhw

ˆ HoUailj

i*w|

Ainsworth

- E 1 1 s wort h

0 >

fewt””

Davenport;’

Coluint

Lincoln >

Newgyˆ 1

CoiaS®

a

r\»v t

-Seymour,

Wallace’

Hastings Vw Alina Superior Falibury ‘fy

— :

itiMran]

Norton

‘rreJlauto^_

U OVLawreno? »pne8 \A’ crnott

＞r\nccton～y(jˆ

Clifton’

Atchison

*a»sas c-i

[*\V« Ashlamj

fontros,

Choj,ono Weˆ ‘teoio — –

XSfdˆSs

aiutou

Sedalia1

Bisuiarc’

Trinidad

/Anthony

Santa Ba?Gara＞

[Monett,

°ivt＞iun/

4a\ˆwty

Espanola Q N }

SANTA FA

Poplar

Blult,

jllVILLE

Santa

‘San Bernard; AXilton

Fayetteville

‘Columbia

WjUu|>o0°^

.uutsvUlV/7^

Canadian

IJj/cksun,

Oklahoma

‘Amarillo

/ Chickasha Altus Pu

/Fort Smith’

>0

CoLtl^liJ

^|^ov/a \

t-l^rro jEstacadi

Littlk HociO

Duncan

RiU£r- 1

•^C/

Jfnˆhnm V

I LaCrangol

VA M A /

VOpTlika y

•vngnStuu

Tcnn’u*

VXWestj 0 Colum’

7 T

‘Durant

[Grenad

Lubbock

/MoGehee’

Tarnden

Staked Pla,

[enriettaV Y Bowie”

Texaikanˆ

oreenvUI

A|sbad l

ˆwiet water

■jjeridiai

Midland

Morgan,

Cross

l arris!

Btio’J’US’

Lufkin

,plarviUV)ˆJˆ

-‘jTT’Sb.

V

y* s < - hoi,l._ ˆ4 – %

(ˆOrleans

AtJSlˆ

‘;arCo/

lumont

jerrv llle

4 > «u Antonio

Cedar

Mouths of the

‘ˆMississippi Ki

Cblhuahi

Rlchtn*

HSulveston

Pi’edras Negras’

_ Petersburg

Tampa Pa

iirpuB Cbrlstl

Nuevo”

‘Laredo

rjˆOUSAND ” P’lorttl”

‘f˚b#njpˆ

UNITED STATES

Brownsvilleˆ

LHD*Oa

Mont rey”

ToaTUdˆs

SCALE

Statute Miles, 240 = J Incti,

(L. de la

Madrt

LDurant

Rand McNally’s New 11 x 14 Map of United States. Copyright by Rand McNally & Co,

.Victoria

P

Mr. u,

o

1

1

b

ˆ Saltillo /

W„

ˆ | /

0

ˆ 1 /

3

ˆEfhiWi jbls \il

•uttaliaˆj

\k)

Vfe

6

.

‘

The numerous parallel valleys, in some places valley arms, which are on the eastern border of the Pacific lowland strip, furnish a considerable area of productive farm lands.

The eastern uplift, the Appalachian Moun¬ tains, are the older and less extensive of the two great highland sections of the United States. (See Appalachian Mountains). They con¬ sist chiefly of mountain ranges which are nearly parallel with the Atlantic Coast and extend from near the Gulf of Mexico north into Can¬ ada. Nearly all of the western part of the United States, beginning about the 104th merid¬ ian, belongs to the Rocky Mountain region. (See Rocky Mountains). This portion of the United States has a greater altitude and extent than the mountain lands of the Atlantic region. The Rocky Mountains extend from Mexico to Canada. The ranges which constitute this group are by no means as regular in arrange¬ ment as are the Appalachian chains ; some ex¬ tend nearly parallel with the coast ; many lofty ranges are at almost right angles with the north and south ranges and others run northeast and southwest. Enclosed by ranges of these moun¬ tains are the Great Basin (q.v.) and the Yellow¬ stone Park (q.v.). The Great Basin region is a series of basins isolated to all appearances from each other so far as drainage lines, and differing in soil and geological formation. The chief basins are the Carson, Humboldt and Great Salt Lake. The mountain ranges within the Great Basin trend mostly north and south. The vast area of the volcanic

region of the Rocky Mountains contains many extinct vol¬ canoes. On both the eastern and western border are numerous high peaks connected by high plateaus. In the southern part or the por¬ tion drained by the Colorado River is a region of high plateaus crossed by streams which flow through deep canons, some of which are over 2,000 feet deep. The Grand Canyon (q.v.) of the Colorado is in places 6,000 feet deep.

Hydrography. — The United States may be divided into four great drainage slopes, — the Atlantic, Great Lake, Gulf and Pacific — al¬ though the second and third of these belong broadly speaking to the Atlantic. All the streams of the Atlantic slope drain into that ocean by river mouths within the territory of the United States. All the streams of the Great Lake slope ultimately discharge into the Saint Lawrence River, also within the territorial lim¬ its of the United States. The Gulf slope in¬ cludes all of that part of the United States which drains into the Gulf of Mexico. In pop¬ ular usage, most of this is called the valley of the Mississippi, while small areas are drained into the Gulf by streams not tributary to the great river. East of the Mississippi this slope is drained by the Apalachicola, Mobile and Pearl, and to the west by the Sabine, Brazos, Colorado, San Antonio, Nueces and Rio Grande. Along the western border of the Gulf slope the country is arid, having a rainfall of less than 20 inches annually. In this arid re¬ gion there are many small streams whose waters are not carried away by ocean-feeding rivers, as the small streams are lost in the san

a short distance through Mexican territory. In a large part of the Pacific slope there are many small streams that discharge their waters into sands, where they are evaporated and lost from the ocean-reaching drainage; but the val¬ leys in which they are evaporated incline to¬ ward streams draining into the Pacific Ocean. We thus have an Atlantic slope, a Great Lake slope, a Gulf slope and a Pacific slope. The lines of demarcation between these slopes are very irregular. Between the Atlantic and the Great Lake slopes the divides are sometimes in mountains and sometimes in hills; between the Atlantic and Gulf the divides are in part in mountains and in part along the low ridge of Florida; between the Gulf and Great Lake slopes the divide is an inconspicuous elevation, so low in many places that the waters may easily be diverted from one slope to another. The divide between the Mississippi region and the Pacific region is sometimes mountains, with peaks from 8,000 to 14,000 feet above sea- level. Of the large river systems the chief are the Mississippi, the Saint Lawrence, the Co¬ lumbia and the Colorado. The Mississippi (q.v.) is the largest, including within its basin nearly all the region in the central lowland sec¬ tion, and a large area of the Rocky and

Appa¬ lachian Mountains. The chief tributary is the Missouri (q.v.) which has a drainage area of about 530,000 square miles. Next in drainage area is the Ohio River (q.v.), the basin of which is over 200,000 square miles ; the Ar¬ kansas, 185,671 square miles ; the Red River, nearly 90,000 square miles. The total area drained by the Mississippi, its tributaries, and other streams which enter the Gulf, is 1,726,000 square miles. The Rio Grande, which also en¬ ters the Gulf of Mexico, has one large tribu¬ tary, the Pecos. Further streams which flow into the Gulf of Mexico are the small Colo¬ rado, the Brazos and others in Texas, and sev¬ eral rivers in Mis.sissipni, Alabama and Geor¬ gia. The Mississippi and its tributaries are navigable for thousands of miles. To the great central waterways is due the early development of the interior of the United States, first as a section with trading posts and forts at conven¬ ient places on the navigable streams, and later as a farming and manufacturing region. West of the divide in the Rocky Mountains the drain¬ age is to the Pacific Ocean. Nearly all the rivers, except those in the Great Basin, flow directly, or through a main stream to the open sea. The Colorado River enters the Pacific Ocean through the Gulf of California. The largest river of the Pacific Basin is the Colum¬ bia (q.v.). Some of the other important rivers are the Sacramento, San Joaquin, Klamath and a number of short streams. The rivers in Cali¬ fornia and some of the other valleys follow the course of the valleys, but the Columbia, Colo¬ rado and branches of the Columbia break through the mountains in several places and thus form high waterfalls and series of cas¬ cades. The Columbia has several large tribu¬ taries, chief of which is the Snake River. The rivers of the Atlantic Basin east of the Appalachians have mostly rapid currents, and have had great influence in the development of the manufacturing industries of the country. Many of the streams which flow into the At¬ lantic, or into wide bays which are arms of the ocean, are tidal streams for some distance

inland. (See Delaware; Hudson, etc.). The principal rivers of this basin are the Kennebec, Merrimac, Penobscot and Manchester in the northeast; the Connecticut, which flows into Long Island Sound; the Housatonic, the Hud¬ son, a magnificent stream, alike remarkable for its scenery and its navigable importance, which flows south for 300 miles and contributes to form the harbor of New York; the Delaware, which after a course of 300 miles enters the Delaware Bay and is navigable for large steam¬ ers to Philadelphia, a distance of 40 miles; the Potomac, which flows into Chesapeake Bay, and is navigable for

the largest vessels to Washing¬ ton, a distance, including the bay, of 200 miles; and the Savannah, which enters Savannah Bay and is navigable for large vessels for 17 miles, to the city of Savannah, where it forms an im¬ portant harbor. Besides the rivers, one of the most remarkable features of the United States, as also of Canada, is the chain of large fresh water lakes : Superior, Michigan, Huron, Erie and Ontario. The lakes drain an area of about 90,000 square miles, and send their waters into the Saint Lawrence, after precipitating the greater part of them in an accumulated mass over the renowned Falls of Niagara (q.v.), which are between Erie and Ontario. The rivers of the United States which flow into the Great Lakes (q.v.) are of no great length. The chief streams are the rivers of northern New York and Vermont, some of which enter the Saint Lawrence River through Lake Cham¬ plain; the Genesee River in the west central part of New York, and a number of small streams which enter Lakes Erie, Huron, Mich¬ igan and Superior. (See Saint Lawrence River). The Red River of the North enters the Atlantic Ocean through Lake Winnipeg and the Hudson Bay. In the interior of the United States are many groups of small lakes which have been mentioned in articles on the different States. The inland seas or salt-water lakes within the Great Basin are of special interest as being the remnants of large inland seas. The fresh-water lakes in the Appalachian sec¬ tion, and even the Great Lakes, were once much larger than at present. The chief ‘characteris¬ tics of the whole drainage system of the United States are that by far the greatest portion of the waters are carried south or in a southern direction, and reach the Atlantic Ocean through the Gulf of Mexico. The Great Lakes with their large outlet, the Saint Lawrence River, receive but a small portion of the drainage; their chief supply comes from the melting snows of the Rocky Mountains. The rivers which enter the Pacific are small streams, ex¬ cept the Columbia and Colorado. The Red River of the North is the largest stream which flows north.

Climate. — The main land-mass of the United States is in the temperate zone, and the climatic conditions of the whole country are about what is general in such zones modified chiefly by the great mountains and the winds. With every variation of surface it possesses every variety of climate, from that of the tropics to that of the Arctic regions. It is at the same time one of the hottest and one of the coldest countries; one of the wettest and one of the driest. The prevailing winds are from the west and are an important factor in the climatic conditions. The circulations of air from west to

east does not take place in steadily blow¬ ing winds, as is the case with the trades, but in cyclonic or whirling storms that have a gen¬

eral easterly movement alternating with anti- cyclonic movements of a similar character. In these storms winds blow from all directions, the general, course being nearly toward the centre of the storm. There is another class of storms which occur not infrequently, al¬ though they do not form part of the regular air circulation. This is what is commonly known as the West Indian hurricane, very vio¬ lent and of a much more intense type than the ordinary cyclone of temperate latitudes. Originating in the tropics, their course is gen¬ erally over the West Indies, entering the United States on the Gulf Coast and working off to sea in a northeasterly direction. Many of these have been extremely disastrous. The average annual temperature of the extreme southern part is 75° F. and of the extreme north 45°. The average temperature for Jan¬ uary in the extreme north (exclusive of Alaska) is about 20°; for July about 60°. The mercury falls as low as 40° below zero in the northern part of Minnesota, and is some¬ times as high as 120° in the hot, dry sections of Arizona and Texas. The west winds, which are prevalent in January, and which sweep over large interior areas lower the tem¬ perature, frequently to the minimum. The dif¬ ference in temperature of places in the same latitude on the Atlantic and Pacific Coast is quite marked. That of the Pacific is much warmer than that of the Atlantic. The rain¬ fall is generally the greatest in Washington, Oregon and Florida, but the humidity is great in the southern portion of Louisiana and other places along the Gulf Coast. The region around the Great Lakes has not an excessive humidity; but it is subject to extreme and rapid changes in temperature. This region is also subject to extreme changes in the winds. The Mississippi Valley receives its rainfall al¬ most entirely from the Gulf while the Atlantic States are supplied from the Atlantic Ocean. It is estimated that the Gulf supplies fully 55 per cent of the total rainfall in continental United States, the Pacific Ocean 30 per cent and the Atlantic 15 per cent. See America — Climatic Conditions ; Rainfall.

Flora. — The wide range of soil, topography and climate give the United States a rich ana varied flora. Tropic species are found in Florida, California, Texas, New Mexico and Arizona, along the southern frontier, while along the Canadian border boreal species abound. In the greater part of the country, as might easily be inferred from its geographi¬ cal situation, the species are those of the north temperate zone and to a large extent are peculiar to North America. (See America — Flora). The whole number of indigenous species, exclusive of the lower cryptograms, probably amounts to 5,000, and of these many have a very wide range. The number of woody species is about 850, and about half of these are of a size to be called trees. Of

the larger and more important, excluding all the smaller ones, and also the tropical species of the southern border States, there are about 150 species which are of economic importance. About 50 of these belong to the Coniferae. This coniferous growth extends in enormous

Modeled by the U. S. Survey

‘

.

’

•

volume down the cool, wet Pacific slope to central California; the giant redwoods and sugar-pines, etc., and the huge sequoia, the largest and oldest plants on the earth, being fa¬ mous everywhere. The conifers abound also through Michigan, Wisconsin and Minnesota to southern Missouri and northwestern Arkan¬ sas and to northeastern Texas and Oklahoma. The hickories, sequoias, magnolias, sassafras, etc., so abundant in America are only found in fossil form in the Old World. Many valuable varieties of grasses have originated from native species. Near the Atlantic Coast and along the southern borders European explorers found maize, squashes, tobacco and other use¬ ful plants iii cultivation among the aborigines. Central United States has prominent deciduous (hardwood) trees, such as the oak of many varieties, the beech, maple, elm, chestnut, black walnut, hickory, ironwood, pepperage, red mul¬ berry, etc. In the Southern States the yellow pine holds foremost place. The characteristic forms in the South are the magnolia, palmetto, tulip-tree, plant-tree, pecan, etc., with the cypress everywhere in the swampy regions. The plains are treeless, except a narrow belt along the water courses, and are covered with grasses, grading in the more arid regions into artemesias and cacti. The Cordilleran woods are chiefly conifers on the mountains; on the plains and in the valleys are the yuccas, cactus, etc., as stated above, and whose dense thorny growth is termed chaparral. In the Appala¬ chian Mountains and the upper Mississippi Valley, broad-leaved, deciduous trees, oaks, chestnuts, walnuts, poplars and cherry pre¬ dominate ; and in the Great Lake region pines, firs, spruces and larches are most abundant. The timber trees are considered elsewhere under their own heads, oak, ash, etc. (qq.v.), also under Lumber Industry of the United States ; Forestry. Other economic products of the native flora fall naturally into the classes of fruits, nuts and forage grasses. The native nuts include pecans, walnuts, chestnuts and pine nuts. The fruits include wild raspberries, blackberries, blueberries,

elderberries, cran¬ berries and serviceberry. The principal varieties of grasses are Kentucky blue grass, grama grass, bunch grass, buffalo grass, the clovers, lupine and white sage. To these must be added the hundreds of plants of all sorts from fungi to trees which have been introduced since the white settlement. Some are of economic value while others are among our most noxious and troublesome weeds. The white daisy is one of the latter as also the buttercup, dandelion, chickory and thistle. Chinese, Japanese and Mexican species have been introduced with success in California. The eucalyptus, several species of palms, English walnut, olive, prune, almond, etc., are now grown successfully.

John B. McDonnell, Editorial Staff of The Americana.

Geology. — There is great diversity in the geology of the country, a diversity that extends to the constituent rock formations, their distri¬ bution, structural arrangements and contained mineral deposits. Every important rock system is represented in its stratigraphy by one or more members. The basal formations belong to the early Pre-Cambrian and consist of ancient igne¬ ous rocks, like granite and various lavas, with

highly metamorphosed sediments in the form of crystalline limestones, schists and quartzites. Such occur along the axis of the Appalachians from New England into Alabama, and in the Black Hills, Ozarks and Rocky Mountains ; they are also developed bn a larger scale in the Adi- rondacks and in the Lake Superior district, where they constitute outlying areas of the so- called (

A long period of time elapsed in most places after the Pre-Cambrian until the first deposits of the Paleozoic group were formed, the hiatus being marked by a strong unconformity caused by erosion. The ensuing Cambrian strata rest upon the eroded and more or less upturned Pre- Cambrian rocks and are generally to be distin¬ guished by their less altered condition and wealth of fossils. The Cambrian, Ordovician and Silurian strata, the older members of the Paleozoic group, spread over extensive areas in the eastern United States, lying along the bor¬ ders of the crystallines in successive overlap¬ ping series. Altogether they have here a thick¬ ness probably of seven or eight miles, mainly sandstones, shales and limestones. In the west they occur in smaller belts and isolated patches. The valuable minerals are oil and gas in the Ordovician and Silurian, salt in the Silurian and iron ore represented by the beds of Clinton hematite which extend from central New York in interrupted outcrops all the way to northern Alabama.

The succeeding members of the Paleozoic in¬ cluded in the Devonian and Carboniferous sys¬ tems are largely sediments that accumulated in great thickness in the Appalachian belt and west as far as the Mississippi Valley, also to a lesser extent in the Rocky Mountain and Great Basin regions. Oil, gas and coal abound in these strata, the Carboniferous being a great coal¬ making period the world over. With the close of Carboniferous time a great change took place in the eastern part of the country, by which the sediments along the Appalachian region were uplifted from the sea and folded into moun¬ tains, which have ever since remained as a highland.

The Mesozoic strata are usually grouped into the Triassic, Jurassic and Cretaceous systems. A belt of Triassic rocks parallels the Atlantic Coast from North Carolina to New England. Sandstones, shales and trap are the chief rocks, the Palisades of the Hudson exemplifying one of the exposures of Triassic trap, a basic vol¬ canic rock. Extensive exposures of Triassic strata are met with in the western interior, where they seem to have been accumulated in shallow lakes and as wind deposits. Jurassic rocks are limited in development mostly to the Pacific Coast. The Cretaceous was a period of extensive sedimentation, and its rocks spread in a wide belt from the Gulf. of Mexico north¬ ward across the central United States and Can¬ ada to the Arctic Ocean. A thickness of four or five miles is attained by the sediments in the

Rocky Mountain region. Valuable coal meas- ures accompany the beds, second in importance only to those of the Carboniferous. Oil and gas also are found in the Cretaceous strata. Two mountain systems had their beginnings in Mesozoic time: the Sierra* Nevadas were re¬ raised in late Jurassic and the Rockies at the end of the Cretaceous period.

The Tertiary formations, which comprehend the greater part of the Cenozoic group, are spread in discontinuous patches over the west¬ ern United States and in a long belt that stretches along the southern Atlantic Coast and the Gulf region, reaching up the Mississippi Valley to the Ohio River. Some important coal beds of lignitic character were deposited in the interior during the early Tertiary. The strata otherwise include sandstones, shales, soft lime¬ stones and unconsolidated detrital materials. The later Quaternary deposits are largely rep¬ resented by glacial accumulations from the ice- sheets that extended from the highlands of Can¬ ada into the northern part

of the county; on melting the ice left behind a mantle of sands, gravels and clays, here and there heaped up into hillocks (kames, drumlins, eskers, etc.), that lie over all of the other formations. To the south of the limits of ice advance, which did not reach below the Ohio River, stream and es¬ tuary deposits were formed at this time and on the uplands the finely divided, probably wind¬ blown material called <(loess.)) At the outset of the ice invasion the land surface was consider¬ ably higher than at present and the northeastern coast line no doubt extended 100 miles or more further out into the Atlantic, to the limits of the continental shelf. This elevation and in¬ crease of land area thus indicated were influ¬ ential in producing the glacial climate, although not the only factors concerned with it. At the close of the Glacial epoch a subsidence took place, causing the sea to advance upon the land and producing fiords and drowned valleys along the coast, as now in evidence.

Mineral Wealth. — The United States is well provided with mineral resources, particularly of the more essential materials like coal, petro¬ leum, salt and the ores of iron, copper, lead and zinc. Clays of various kinds and building stones are widespread, while the precious metals and many of the rarer minerals occur in important quantities. Practically all of the mineral re¬ quirements for industrial needs and home con¬ sumption are supplied from domestic sources ; the principal exceptions that may be noted are tin, platinum, manganese ores, nitrates and pot¬ ash salts, of which the native production is usually supplemented by imports from other countries. The growth of mining has been one of the important elements in the remarkable in¬ dustrial development that has taken place in the last four or five decades and given the country its prominent position in the world's industry and trade.

Coal. — The coal fields of the continental United States underlie an estimated aˆea of 310,296 square miles, not including certain pos¬ sible fields about which little is now known or fields in which the coal is too deep to be avail¬ able. The coal content is put at 3,076,204 mil¬ lions of tons, and is now being consumed at the rate of 600 million tons a year. The principal fields are the Appalachian, which produces both bituminous and anthracite, the interior bitumi¬ nous field, the Rocky Mountain and Great

Plains fields of bituminous and lignite and the Pacific Coast fields, inclusive of Alaska, in which the coal is chiefly bituminous. Thirty States are represented in the mining industry, the chief producers being Pennsylvania, West Virginia, Ohio, Illinois, Kentucky, Indiana, Ala¬ bama, Colorado, Virginia, Iowa, Kansas and Wyoming.

Petroleum. — The exploitation of the oil re¬ sources began about 1860 in western Pennsyl¬ vania. In the following years the field was en¬ larged by drilling so as to cover parts of New York, Ohio and West Virginia, constituting with Kentucky and Tennessee the Appalachian field, which is still an active producer. The oil from this field contains a high percentage of the lighter distillates and has a paraffine base. Next in aggregate yield is California which has been a producer for over 40 years, mainly of heavy asphaltic oils. Its product conies mainly from the southern part of the State and has grown rapidly in the last 15 years. Even more recent and phenomenal has been the growth of oil pro¬ duction in Texas, Oklahoma and Kansas, or the Mid-Continent field, which now accounts for fully one-half of the entire yield of the country. Other important States in the industry are Louisiana, Illinois, Indiana and Wyoming. The total output in 1918 was 355,927,716 barrels, val¬ ued at $703,943,961.

Iron. — The production of iron ore is carried on in 21 States, while there are unworked de¬ posits in several others. The principal ore is hematite, w7hich is mined most extensively in the Lake Superior district of Minnesota, Wisconsin and Michigan, with Duluth as the chief shipping centre. Alabama has a large mining industry, based on deposits of hematite that occur in the vicinity of Birmingham. New York State con¬ tributes mainly magnetite ores that are found in the Adirondacks and the Highlands of the Hudson. The possession of important iron ore supplies and of coking coal gives a foundation for large iron and steel manufactures, in which the United States ranks pre-eminent. The out¬ put of pig-iron in 1918 w7as 38,230,440 long tons, valued at $1,180,759,565.

Gold and Silver. — The precious metals are produced mainly in the West. The opening of the California placer mines in 1849 marked the beginning of large-scale operations which soon gave the country leadership in the industry, only reliquished in late years. All of the Rocky Mountain States yield more or less gold and silver, but California, Colorado, Montana, Nevada, Idaho and Utah are the leading pro¬ ducers. South Dakota should be added to the list as having important gold resources. The gold placers wdiich at first supplied most of the metal, are of secondary importance at present; quartz veins and lodes have largely superseded them for mining purposes. The output of gold in 1918 was 3,313,313 fine ounces and of silver 67,879,206 fine ounces.

Copper. — Copper ores are found in Michi¬ gan and most of the western States with Ari¬ zona, Montana, Utah, Nevada and New Mexico as especially prominent producers. Michigan came into

prominence about 1840; its ores carry native copper and are found on Keweenaw Peninsula that projects into Lake Superior. The western deposits began to attract attention in the last quarter of the 19th century and have lately come under intensive development that has caused the production to double in a few years.

Latitude North

Vancouver I fa

Lake J Winnipeg I

Lake of r* the Woods

Rainy Lake

R iver

\ Di tilde

Lake • Jtaaca

ˆstotrg

‘fiufwnoi

‘yiOHAl p,

Pelainart

‘ ˆ os slue

Unc° mpuhare peak *

GR4N0

fRANCl8C0

LLANO ESTACˆtjr (STAKED PLAIN)

Oerro Blanco

•

Galveston_Bay_

Tampa

UNITED STATES

(Physical)

240 Statute Miles to one inch

Explanation-

above 8000 ft.

of Cancer

Longitude West from Greenwich

Copyright , by Rand, McNally & Company

\ b

0 f

—I _

cv l

The total output in 1918 was 1,908,533,595 pounds.

Lead and Zinc. — The principal lead deposits are in AJissouri, Idaho, Utah and Colorado. The output is now above 500,000 tons a year. Zinc ores are extensively mined in Missouri, New Jersey, Montana, Colorado and Idaho and the product of metallic zinc is about the same as that of lead.

Salt. — Rock salt is mined in New York, Michigan, Kansas and Louisiana, while natural brines are utilized for salt manufacture in many States. The total yield of salt in 1918 was 7,238,744 short tons, valued at $26,940,361. Much of the product is utilized for chemical purposes, particularly for making other sodium salts like the carbonate and bicarbonate, salt cake (sodium sulphate) and caustic soda.

Quarry Materials. — Stone for building and engineering works is extensively quarried in nearly all States. New England supplies the larger part of the granite for building and mon¬ umental purposes from quarries situated in Vermont, Maine, Massachusetts, New Hamp¬

shire and Connecticut. New York and Wiscon¬ sin have granites suitable for almost all uses. Marbles are quarried in many of the Appala¬ chian States, notably Vermont, Tennessee and Georgia, and sandstone and limestone over much of the country. Limestone serves a vari¬ ety of uses besides for constructional work, it being employed as flux in metallurgical opera¬ tions, as a chemical reagent and for Portland cement manufacture, an industry that has made rapid progress in the last two decades.

Clay Products. — The manufacture of clay wares and building materials constitutes one of the more important and widely represented branches of the mineral industry, the total value of the output in 1917 amounting to $248,023,364. Practically every kind of pottery is now made, although the demand for highLgrade porcelains and art wares is scarcely met by the domestic products and considerable quantities are im¬ ported. The ceramic industry is chiefly cen¬ tred in New Jersey and Ohio, but the white clays used in the best wares come from the South. Clay building materials are made in most of the States, with New Jersey, New York, Pennsylvania, Ohio and Illinois as the larger producers.

David H. Newland, Assistant State Geologist , New York.

2. GENERAL OUTLINE HISTORY

(1776—). At the close of the French war Eng¬ land had no settled policy of colonial admin¬ istration, nor could there be said to be a definite understanding as to the constitutional relationship of the colonies to the mother-coun¬ try. She entered upon plans which brought before long the loss of her dominions in Amer¬ ica. Her ministers, anxious for funds, deter¬ mined that America should make some contri¬ bution to the expense of colonial protection, and moreover that the navigation laws and acts of trade should be enforced. These acts had been systematically broken for decades, and stringent efforts to enforce them could mean nothing less than a violent interference with New England traffic. Moreover the colonies had without in¬ termission taxed themselves and passed laws in their own legislatures. When the Stamp Act (q.v.) of 1765 was passed, a storm of protest arose from the colonists, who declared that

taxation without representation is tyranny. The Parliamentary orators, on the other hand, asserted that Parliament had a right to tax the colonies, that taxation was only a part of the sovereign power and that all legislative author¬ ity resided in the English government. The re¬ peal of the Stamp Act was coupled with a declaration of the supreme

authority of Parlia¬ ment, and to the principle of this declaration the American leaders were never willing to accede. The imposition of import duties in 1767 met also with strenuous opposition in America, and when three years later all duties were aban¬ doned except the tax on tea, the concession was not gratefully received by the colonists. Mean¬ while troops had ‘been sent to Boston, and an encounter between a detachment of the soldiers and a few citizens ended in bloodshed (1770). The Boston Tea Party (q.v.) of the year 1773 was evidence that the device of a low duty would not tempt the New Englanders to give up their principles. The ministry now entered more seriously on efforts at coercion and passed a series of acts, the most grievous of which was the Boston Port Bill, which it was hoped would have the effect of bringing the colonists to a due respect for imperial power ; but, instead of improving, conditions grew worse. In Sep¬ tember 1774, the first Continental Congress met at Philadelphia and issued a declaration of rights and other papers. The advanced Ameri¬ can leaders, admitting that all were subjects of a common king, were now unwilling to acknowl¬ edge the authority of Parliament in any respect; although others, denying the right to tax, were still ready to argue that the British legislature could manage commerce and external affairs. The petition of the colonists was of no avail, and the Revolution passed from the stage of controversy to that of war.

The War of the Revolution falls into three periods. Between 19 April 1775, the date of Concord and Lexington, and 4 July 1776, the revolting colonists were gradually brought by events and arguments to the notion of independ¬ ence. The efforts of the British were as yet directed mainly to the repression of the uprising in Massachusetts. On 17 June 1775, Bunker Hill was fought. During the preceding month the second Continental Congress had convened at Philadelphia and bestowed the command of the American forces upon Washington. In March 1776, Howe evacuated Boston. On 7 June Rich¬ ard Henry Lee of Virginia moved a resolution in Congress declaring the independence of the colonies. The adoption of this resolution, 2 July, and the Declaration of 4 July, gave the Revolution a new character. It was now a war for independence and not for rights as colonists or Englishmen. Indeed the discussion had al¬ ready advanced to a stage in which the Ameri¬ cans, though ostensibly demanding rights known to the law, were in reality asserting fundamental principles and seeking to obtain their recognition in the law of the land ; they were working for the legal formulation of a democratic doctrine. Of this doctrine the Declaration is an embodi¬ ment, as were some of the State constitutions which the people were now constructing. The most important proposition was that people exist before government and

are possessed of natural rights which are inalienable, and which govern¬ ments, the work of their hands, cannot right¬ fully take away.

31 1

312

UNITED STATES — GENERAL OUTLINE HISTORY (1776-) (2)

The second period of the Revolution, begin¬ ning with the Declaration, ends with the en¬ trance of France into the war. During this period it was the endeavor of the British to separate Massachusetts and Virginia by gaining control of the Champlain-Hudson Valley. The battle of Long Island, August 1776, left New York in the hands of the British, and a year later Washington, defeated at Brandywine, was forced to vield Philadelphia to Howe. But in the meantime, Burgoyne, who had been sent from Canada to effect the main object of the British campaign, had been getting into diffi¬ culty, and on 17 Oct. 1777, he was forced to surrender to Gates at Saratoga. This victory probably determined the result of the war. France, who had hitherto contented herself with secretly aiding the Americans, in February 1778 entered into a treaty of alliance with them, hoping to secure thereby the enfeeblement of her ancient enemy, England.

The United States could hardly have achieved their independence without the French alliance. France was able to furnish the sea power, with¬ out which it is highly improbable that Yorktown could have been won. On the other hand, there is evidence that England entered into the contest with new zeal, now that she was confronted by her old enemy, France; and after the French alliance the Americans were more than once grievously near defeat.

The third period of the war ends with the signature of the treaty of peace at Paris, 3 Sept. 1783. Aside from Arnold's treason, interest in this period is confined to the South. Here the Loyalists were strong, and the British hoped to save at least Georgia and the Carolinas. In 1778 Savannah was captured and Georgia was overrun by the British. In 1780 Charleston fell and Gates was utterly defeated at Camden by Cornwallis. The tide began to turn with the opening of 1781, when Greene took command in the South. Winning no victories, he neverthe¬ less sold victory so dearly that by September Cornwallis was retiring northward, leaving the entire South, except Savannah and Charleston, in the hands of the patriots. . Cornwallis entered Yorktown, Va., and was there besieged by the French fleet under De

Grasse and the Ameri¬ can and French armies under Washington and Rochambeau. He surrendered 19 Oct. 1781.

In the peace negotiations at Paris, which filled the year 1782, the United States was represented by Franklin, who had been in France since 1777, Jay and John Adams. They succeeded in making a favorable treaty. The western boundary of the States was set at the Mississippi, and their southern at the 31st paral- el as far as the Appalachicola River, from which point it proceeded along the present north boundary of Florida to the Atlantic. The area of the territory lying within these boundaries was 827,844 square miles. Before the war was over the States had adopted Articles of Con¬ federation and Perpetual Union (1 March 1781). These articles apparently purported to have sovereignty in the individual States; and after the war was over, the States showed lack of ap¬ preciation of continental obligations and privi¬ leges. The Congress of the Confederation, in which body all the power granted by the Articles was centred, proved ineffective, for in cases of crucial need it could do little more than implore the States for funds or solicit obedience to the

orders which it had issued. There was no power in the central authority to collect taxes or regu¬ lar commerce. Things went from bad to worse — the States eyeing each other in jealous scrutiny; the debt of the Confederation growing larger, while the States, themselves distressed, refused to furnish the needed money; England refusing with some cause to surrender the west¬ ern ports within our territory; Spain refusing to acknowledge our right to navigate the lower Mississippi. Washington wrote, ((Something mtisJ: be done or the fabric will fall, for it certainly is tottering.® One great bond of union, one fact of national significance needs, however, to be mentioned. By 1786 the States that claimed land east of the Mississippi, north of the Ohio and west of Pennsylvania had sur¬ rendered their claims, Connecticut still retain¬ ing a small portion which was long known as the Western Reserve. For the organization of this domain, Congress passed the Ordinance of 1787, one of the great State papers of American history; it provided for temporary govern¬ ments, for the final admission of the Territories as States, and for the permanent exclusion of slavery.

In May 1787, a convention of delegates met at Philadelphia, charged with the duty of ren¬ dering Kthe Federal Constitution adequate to the exigencies of the Union.® The work lasted four months. Its product was the Constitution of the United States. As to whether the conven¬ tion should disregard instructions and proceed to draw up a new constitution instead of alter¬ ing the Confederation, there was

much discus¬ sion, tinged frequently with acrimony. The <(large-state party® insisted on a government with authority and on proportional representa¬ tion. The (

Washington was unanimously chosen the first

President of the United States and took the oath of office on 30 April 1789. Congress had already assembled and begun important tasks of legislation. There was a crying need for reve¬ nue, and a tariff bill was soon passed. The government was quickly put into working or¬ der ; necessary executive departments were established ; a Supreme Court and inferior tri¬ bunals were founded. Washington made Thomas Jefferson Secretary of State, Alexander Hamil¬ ton Secretary of the Treasury and Henry Knox Secretary of War. The first two repre¬ sented different tendencies in American life, and about them are crystallized the two lead¬ ing parties of the country; about Hamilton the Federalists, who were strong supporters of his policy, and about Jefferson the Republicans, who believed that Hamilton was intent upon establishing monarchical institutions. Not for some time, however, were these paities really organized, and the word organization seems hardly applicable to the political parties of 120 years ago when compared with those of the present time. Jefferson had faith in the peo¬ ple and was responsive to the impulse of demo¬ cratic America; Hamilton had rare talent for organization and administration, and repre¬ sented the conservative forces of the time. The Federalists advocated a broad and liberal in¬ terpretation of the Constitution ; the Republi¬ cans favored a strict interpretation, fearing that the Federalists would make use of their power to injure State rights or individual liberty. In the determination of the political affiliations, Hamilton's financial policy had much to do. He advocated the funding of the public debt and the assumption of the State debts with the un¬ derstanding that the creditors should be paid in full. He also proposed the establishment of a national bank and the levying of an excise tax, and raising adequate revenue by a tariff so arranged as to offer also support to American manufactures. All of these measures were adopted, and he thus brought to his support the holders of the public debt and, as a rule, the commercial and more substantial classes in the community.

The difficulties of Washington's first admin¬ istration centred chiefly in domestic affairs. Just before the beginning of his second admin¬

istration war broke out between England and France, and for the next 20 years American politics and interests were much affected by European conditions. The Federalists, on the whole, sympathized with England, whereas the Republicans, having different industrial inter¬ ests, were more inclined to sympathize with France. Difficulties of various kinds reached their climax in 1794, when the stability of the government was in danger. An insurrection against the whisky tax had broken out in western Pennsylvania; the Indians had for some years been waging war in the Northwest, and two armies sent to suppress them had been defeated ; the English, indignant at the way in which Genet, the French Minister to America, had been allowed to use our ports, were giving evidences of hostility and there was imminent danger of war. American commerce was ill- used by the British, who were not willing to see the Americans profiting by the contest be¬ tween England and France. These serious difficulties were finally disposed of by prompt and discreet action on the part of Washington's

government. An army sent to western Pennsyl¬ vania suppressed the insurrection ; General Wayne overwhelmed the Indians at the battle of Fallen Timbers; and John Jay, despatched as a special envoy to Great Britain, succeeded in making a treaty which, for a time, recon¬ ciled the two countries and did something to allay the ill-feeling that had been near bringing on open war. When Washington's second ad¬ ministration ended the government was well founded; there were strong evidences of na¬ tional patriotism and, despite the high degree of partisan bitterness, there was no reasonable ground for fear that the country would relapse into the state of confusion such as existed eight years before.

John Adams was the second President of the United States. He inherited, as his chief trouble, the French dissatisfaction with the Jay . treaty and with the way in which the United States had received France's claims to special consideration. The French, too, were not con¬ siderate in their treatment of American com¬ merce. Adams, hoping to arrange affairs ami¬ cably, sent a commission to Paris with authority to treat. This commission was treated with contumely by the Frenchmen and was given to understand by messengers sent from Talley¬ rand that America must furnish money and pffer bribes if she would have her interests – considered. When this story was told in the United States, the people were righteously in¬ dignant; an army was organized, Washington was put at the head of the troops, hostile en¬ gagements actually occurred between ships of the two countries at sea and it was fully ex¬ pected that war would ensue. Adams, however, listening to intimations that came in a round¬ about way from Talleyrand, appointed a new commission and succeeded in coming to

terms with France. In the meantime the Federalists, influenced by the prevailing excitement, had passed two measures of dangerous tendency — the Sedition Act and the Alien Act, against which the Republicans, under the lead of Madi¬ son and Jefferson, strongly protested. Vir¬ ginia drew up the famous Virginia resolutions of 1798 and 1800, which were the handiwork of Madison, while Kentucky presented similar res¬ olutions, portions of which were prepared by Jefferson. These documents declared against the constitutionality of the Alien and Sedition Laws ; the Virginia resolution declared that in case of a plain violation of the Constitution by the central government, the State was <(in duty bound to interposeˆ ; in the Kentucky res¬ olutions of 1799 it was announced that ((nulli-fication® (q.v.) was the rightful remedy. To explain what was meant by these resolutions would require much more space than the pres¬ ent article allows, and we must content our¬ selves with saying that there was evident peril in resolutions which purported to put forth the opinion of a State as over against that of the national government, and, moreover, that the resolutions of Virginia and Kentucky were used in later years to support a more extreme doctrine of State sovereignty, nullification and secession.

By the original plan for choosing a Presi¬ dent the electors did not indicate by their votes whether they were voting for President or Vice-President; they simply voted for two persons. In 1800 Jefferson and Burr, both candidates of

the same party, received an equal number of votes, and it was for some time uncertain which would be chosen President. The House of Rep¬ resentatives, despite the efforts of the Federal¬ ists, who voted for Burr, finally elected Jeffer¬ son, who became President on 4 March 1801. The passage of the Twelfth Amendment pre¬ vented the recurrence of this embarrassment. Jefferson's two administrations were replete with important events, full of perplexity and of difficulties. In 1803 Louisiana was purchased from France for $15,000,000, and thus Amer¬ ica became possessed of the great region stretch¬ ing from the Mississippi westward to the sum¬ mit of the Rocky Mountains; and Jefferson, the leader of the party which had objected to the broad and liberal interpretation of the Con¬ stitution, did more by the acquisition of this territory to assure nationality and the continu¬ ance of broad authority in the United States, than did any other President between the foun¬ dation of the government and

the election of Lincoln. The war, which was still waging in Europe and in which most of the nations of the civilized world were engaged, presented many perplexing problems to the American nation. Our merchantmen were seized on the ocean ; our sailors were impressed; our cargoes were confiscated, and in general America was treated as seemed to suit the needs and the whims of England and France. The New Englanders, on the whole, sided with England, or believed, if war must come, that a navy should be built up for American protection. The Southern and Western partisans of Jefferson were more in¬ clined to sympathize with France, while the President himself, averse to war, hoped that the European combatants could be brought to their senses by some system of persuasion or peace¬ ful coercion. The embargo measure of 1807 had the effect, however, of injuring American commerce and threatening American merchants with ruin, but not of bringing either England or France to a proper appreciation of the neu¬ tral rights of America.

When Jefferson retired from the Presidency in 1809, to be succeeded by Madison, our foreign relations were in a serious condition ; and, in spite of efforts to avoid war by the enforcement of non-intercourse measures and similar ex¬ pedients, hostilities finally broke out, war being declared against Great Britain in June 1812. The causes of this war need not be discussed here at length. It is sufficient to say, as we have already intimated, that both England and France had been ruthlessly disregarding the most palpable rights of the United States, and that the time seemed to have come when the new republic, though seeking peace and unpre¬ pared for war, needed to fight at least one of the European nations that had been doing us so much injury. The War of 1812 is not one which appeals to the enthusiasm, or unduly arouses the patriotism, of the American reader. The forces of the United States were not well handled, nor was there evidence of noteworthy generalship. The most famous battle was the victory of Jackson over the British at New Orleans, which in fact was fought after the treaty of peace had been signed, although of course the fact was not known on this side of the water. On the seas the American men-of- war brought credit and recognition to the nation and doubtless the prowess shown by American

captains and seamen did much to establish the United States in the eyes of the European world as a nation to be respected and to be treated with common courtesy. In fact one of our best-known historians declares that the bat¬ tle between the Constitution and the Guerriere, which ended in the total destruction of the British frigate, in the course of a short half- hour raised the American nation into the posi¬ tion of a first-class power. And thus, thoogh the war was not

crowded with honors for American arms, and though the Treaty of Ghent did not include a settlement of any of the chief difficulties which had brought the war about, the United States had done something to establish itself ; there was no longer danger that Ameri¬ can seamen would be impressed or that Ameri¬ can commerce would be treated with ruthless disrespect. After the war was over America entered on a long period of internal develop¬ ment, for the most part altogether unfret¬ ted by foreign complications. In 1817 James Monroe succeeded Madison in the Presidency.

Monroe's administration (1817-25) was in some ways uneventful, but it was not for that reason the less important in American history. These years are called the ((era of good feeling.® As a matter of fact, there was much bitter feel¬ ing, for there was intense rivalry and personal antagonism in State and national parties. But by 1820 there was practically only one party in existence, for the opposition of the Federalists to the war and the gradual broadening of the old Jeffersonian party, had had the effect of attracting all but a few irreconcilables into the old Jeffersonian party, which was, indeed, in most respects, Jeffersonian no longer. The young and vigorous West, naturally opposed to the narrow old-time Federalism, had strength¬ ened the Republican party and helped to give it broader and saner views of national power and duty. In 1816, forgetting their animosity to Hamilton's measures, the Republicans enacted a protective tariff law and granted a charter to the second Bank of the United States. There was in the country at large, moreover, a strong national spirit, a feeling of national strength and independence, itself in some measure the effect of the war, which for a time smothered sectional jealousy and helped to awaken patriot¬ ism. The period is also of interest to lawyers as well as to students of politics, as a time when a number of great decisions were rendered by the Supreme Court, giving, as it were, judi¬ cial confirmation to the spirit of nationalism that was otherwise manifest. John Marshall, the chief justice, with an able bench of asso¬ ciates, in the case of McCulloch v. Maryland, decided that a State could not tax a Federal agency, and that the Federal government could establish a corporation ; and the court gave ex¬ pression to the doctrine of implied powers which Hamilton had enunciated 27 years before. Near the same time decisions were rendered in Martin v. Hunter's Lessee, Cohens v. Vir¬ ginia and the Dartmouth College Case — all of great significance in constitutional history and law.

Of most importance in later days was Mon¬ roe's stand on the difficult diplomatic problem of his time, arising out of the independence of the South American states, and of the effort of European rulers, combined

in the Holy Alliance, to repress popular uprisings. We acknowledged

the independence of the South American states ; and as long as the European powers confined their policy to the eastern hemisphere, their principles were none of our affair. There came, however, evidences of an intention to overcome the new states on this side of the ocean, and Monroe issued his famous message of 1823, an¬ nouncing that we had no purpose to interfere with European affairs, but that on the other hand any attempt on the part of the European powers to extend their system to any portion of this hemisphere would be considered ((as dan¬ gerous to our peace and safety.®

In this <(era of good feeling,® characterized by nationalism as it was in the main, arose a great controversy between the free and slave States, a controversy which, as Jefferson said, <(rang out like a fire bell in the night®; it fore¬ told sectional animosity and strife. When the Constitution was adopted, slavery existed in nearly all the States, but was gradually disap¬ pearing in the North, and even in such a State as Virginia there was strong opposition on prin¬ ciple to the whole system. By 1820 slavery was practically extinct north of Maryland; but in the meantime, because of the invention of the cotton-gin and the development of textile ma¬ chinery, slave labor had become profitable at the South and the black population had much in¬ creased. Virginia statesmen no longer cried out against the system, which was now firmly fast¬ ened not only on the Southern States of the old 13, but also west of the Appalachians in the rich and fertile country from the Ohio to the Gulf. The climate and soil of the Southern States were favorable to the African and to the industries based on slave labor; and the big cot¬ ton plantation became the significant feature of Southern life. At the beginning of the govern¬ ment almost no cotton was grown in America or exported from its harbors; in 1824 142,400,000 pounds were sent abroad. And thus the South¬ ern States were grounded on a system of labor at variance with the labor system af the free North, which, in its turn, had been extending over the mountain range and on to the Missis¬ sippi, filling the western land with laborers who worked with their own hands for gain. Two different industrial systems faced each other across the waters of the Ohio.

The Territory of Missouri lay in the path¬ way of the expanding West. Slavery already existed there, but when the people asked admis¬ sion

to the Union, difficulties arose. The South wished to have Missouri admitted as a slave State; the North, not averse to its admission, desired to see it a free State. The South needed to have room for territorial expansion, since its agricultural system was ever demand¬ ing virgin soil and fresh acres. The North was unwilling to see a new slave State added to the Union and many — it is difficult to say how large the number — were opposed, on principle, to the extension of slavery. The sections were now equally represented in the Senate, though the North had outstripped the South in popula¬ tion. In the House of Representatives the mem¬ bers from the free States numbered 133, while from the South, in spite of the fact that three-fifths of the slaves were counted as a basis of representation, there were only 90 members. If the South was to maintain itself politically, it needed to retain or strengthen its hold on the Senate. The contest over the admission of Mis¬

souri was long and bitter. Before it was con¬ cluded, Maine, hitherto a part of Massachu¬ setts, sought admission, and the application at once complicated and lightened the problem. The effort to admit Missouri with a restriction providing for the gradual disappearance of slavery within its limits was not successful; and finally it was admitted as a slave State; the act providing for its admission stipulated that, ex¬ cepting within the limits of the new State, slavery should not exist north of the parallel of 36° 30', <(in all that territory ceded by France to the United States under the name of Louis¬ iana.® This was the famous Missouri Com¬ promise (q.v.). Maine was admitted, and the Senate was still evenly divided between the sections. Even more plainly than before, the Union was composed of two series of States, differing one from the other in industrial prac¬ tices, in social as well as economic habits that were likely to beget misunderstandings and to develop antagonisms. There was really a division of the national domain between the two systems.

The admission of Missouri as a State, only 18 years after the vast region between the Mis¬ sissippi and the mountains was purchased from Napoleon, is a proof of the remarkable growth of the United States. When the Constitution was adopted, only a few thousand people had found their way over the Appalachians; by 1810 there were over 1,000,000 inhabitants in the Mississippi Basin. Kentucky, Tennessee and Ohio had been admitted as States. At the out¬ break of the War of 1812, Louisiana came into the Union, and after the war was over, in the period of industrial reorganization that ensued, thousands flocked into the Western region, peopling the wilderness, clearing the forest for farms and plantations, building villages, estab¬ lishing civil government. In 1816 alone 42,000 settlers entered

Indiana. In six year's Ken¬ tucky more than doubled her population and Ohio was not far behind. Almost as if by magic prosperous towns appeared where but a short time before there had been nothing but forest or empty prairie land. Before the Mis¬ souri Compromise, Mississippi, Alabama, In¬ diana and Illinois had joined the Union as States. And yet this rapid peopling of the new country was but an example, extreme, perhaps, but typical nevertheless, of the movement that was characteristically American and resulted in the occupation of the great West, as far as the Pacific, in less than 100 years from the forma¬ tion of the Federal government.

With this Western movement came certain political acts and tendencies, not all attributable solely to Western influence, and yet intelligible only as we see the growth of the country and the development of national sentiment. Already steps had been taken for the building of a great national highway into the West. This at first the South had not opposed ; even in 1816 Cal¬ houn, moved by the national spirit of the time, in advocating the expenditure of money for in¬ ternal improvements, exclaimed in the House: ((Let it not ... be forgotten — nay, let it forever be kept in mind — that our vastness exposes us at the same time to the worst of calamities, dissension. We are great and rapidly, I was about to say fearfully, growing. . . .

Good roads and canals will do much to unite us.® Ere long the South opposed the building

of roads at national expense; but the West naturally favored making means of access to the East. Henry Clay was the strong advocate of internal improvements; and from him, too, a Western man with Western interests, came the demand for a protective tariff and the <(Ameri- can system.® New England at first objected to the tariff as a check to its commerce, while the South was not averse to the practice. But in 1824 the Northeastern States approved protec¬ tion and the South opposed. Each section, North, South and West, was coming to an ap¬ preciation of what seemed its economic in¬ terest. The Cotton States, given up to agricul¬ ture and to the raising of a great staple, much of which was exported, naturally objected to a tariff which seemed to be a burden on their in¬ dustry for the benefit of the manufacturing and commercial North. In 1828 the so-called "tariff of abominations® was passed, a measure which in many ways merited its name. This aroused strong Southern opposition and ushered in a

course of argument and protest against the action and assumption of the national govern¬ ment, which, with some variation, continued as occasion demanded till the outbreak of the Civil War.

South Carolina, as early as 1828, began to issue argument and objection to the exercise oi what it deemed unwarranted authority by the central government, and by 1832 the theories were formulated on which were to rest nullifi¬ cation and the attempted secession of later years. The principles set forth by South Caro¬ lina were brilliantly announced by Hayne in the ((great debate® with Webster in the Senate in 1830. Webster's eloquent sentences defend¬ ing the Constitution as the supreme law of the land made deep impression on the people of the North; the inspiring oration, read in many households, put into words for those unlearned in the law fundamental notions as to the char¬ acter of the Union and the government. Hayne's able speech made no small impression at the South ; and yet, when South Carolina, two years later, sought to put into practice the principle of State sovereignty, many of the Southern States declared her theories unsound and revolutionary. The full theory of State sovereignty and the doctrine of nullification was put forward by John C. Calhoun and ex¬ hibited in the State papers of South Carolina in declaring null and void within its limits the new tariff of 1832, which had been passed in place of the ((abominable® act of four years be¬ fore. Reduced to their lowest terms, Calhoun's theories, which were not improved in the 30 years that elapsed before they were tested on the battle-field, amount to this: The Union was a union of States, the Constitution not a law but an agreement between States; each State, being possessed of sovereign authority, must have the ultimate right to judge as to the validity of laws passed by the national govern¬ ment; an attempt to enforce a law declared null by a sovereign State would justify the State's retiring from the Union. These prin¬ ciples Calhoun declared constitutional and pre¬ servative, not destructive. The attempt of South Carolina to nullify the law of 1832 and prevent its enforcement was in part successful. Andrew Jackson, the President, a Western man without sectionalism, announced that the Union

must be preserved and was ready to subdue rebellion by force. But after delay and much discussion, Congress passed two bills, one a force bill, the other providing for the gradual diminution of the tariff rates in the course of the succeeding 10 years. South Carolina with¬ drew her nullification ordinance; if she had not won all, she had given an example of what bold assertion might accomplish.

Before speaking further of the events of Jackson's administration

(1829-37) into which the discussion of the tariff and of Southern ob¬ jection have led us, we should return to the movement which caused the election ,of Jackson and accounts for some of the problems of his time. In 1824 there were four Presidential can¬ didates, Crawford of Georgia, Clay of Ken¬ tucky, Jackson of Tennessee, and John Quincy Adams of Massachusetts. Crawford was the “regular® candidate, but no one received a ma¬ jority of the electoral vote, though Jackson had more votes than any other. The House, on which the choice devolved, elected Adams, partly be¬ cause of the influence of Clay; and there was at once an outcry, heightened wrhen Clay became Secretary of State, that a corrupt bargain had been made between Clay and Adams. It was said, too, that the will of the people had been violated by the failure to elect Jackson. The frontier general, therefore, “Old Hickory,® a downright man of primitive instincts and native keenness, was chosen in 1828 as a popular representative. The National Republicans, who were now led by Clay, in the course .of a few years were known as Whigs, a name adopted as a protest against the high-handed methods of Jackson. The Democratic-Republicans, shouting for Jackson and victory, were soon known as Democrats. The party continued for years to hold the confidence and win the suffrages of the people. Except at two elections, from 1828 un¬ til 1860, the Democrats were successful in elect¬ ing their Presidential candidate. With Jack- son, elected as he was, and borne in with acclaim as the man of the people, came a strong Western aggressive spirit ; and with him, too, the spoils systems, which was partly a fron¬ tier denial of the need of expert service, partly a sordid desire for place, partly a protest against an official class which some vaguely thought un¬ democratic. Jackson was naturally opposed to the national bank, and toward the end of the first term of service came (1832) a great con¬ troversy over the rechartering of that institu¬ tion, whose corporate existence was to end in 1836. A bill for rechartering was vetoed by the President. The followers of Clay denounced the veto, declared it usurpation and appealed to the people at the polls, only to be once more defeated. The next year Jackson decided that the government moneys should no longer be deposited in the national bank, and this, the famous <(removal of the deposits,® was the oc¬ casion of great excitement in Congressional circles and of much recrimination in political oratory. But Jackson’s cause, wise or unwise, was successful ; the bank was not rechartered, and the State banks continued for some years to hold — when they did not Lose — the national funds, which were, at a later time, transferred to the independent treasury. The State banks meanwhile, stimulated by a lust for Federal de¬ posits, grew surprisingly in number, though

their available capital and special holdings did not correspondingly increase. The crude treat¬ ment of the delicate matter of finance, a treat¬ ment not unnatural for a frontiersman, may have had Stome influence in bringing on the panic of 1837, which ensued as Van Buren, Jackson's successor, took the Presidential chair. Van Buren, as Jackson's heir, had to bear the odium of the hard times that followed ; but in fact the financial disasters were deep-rooted and were an inevitable consequence of the wild speculation that had been in viOgue for years, during which men, otherwise not devoid of sense, bought wild land with reckless con¬ fidence in immediate rise in value, and plotted towns on paper as if intention would by force of sheer desire transmute wishes into wealth. For three years and more the country suffered the pangs of commercial depression and, of course, in 1840 elected a Whig as President — William Henry Harrison, like Jackson a fron¬ tiersman, whose humble log-cabin was set up as a symbol of true, simple Americanism, as over against the luxury of Van Buren, who was charged with habits of obnoxious aristocracy. The Whigs had indeed taken a shaft from the Democratic quiver, and the thousands that gathered at the mass-meetings to shout for ((01d Tip,® as Harrison was called, were living proof that the day had gone by when the Whigs, even in conservative New England, could look askance at the Democrats as just a little below the proper social standard. For this the elec¬ tion of 1840, a time of shout and doggerel verse, of assertive and empty oratory, deserves notice in our political annals. It marks the final disappearance of any pretense on the part of either political party to stand above and aloof ; it marks assuredly the time when the spirit of confident Jacksonian democracy was, in politics at least, the settled spirit of the nation. The frontier, <(the most American part of America,® had completed its conquest of the whole.

The Jacksonian period deserves a word dis¬ sociated from political manoeuvre. It was a time of physical and economic growth. New in¬ ventions found application in industry and mul¬ tiplied the products of labor. New channels and new methods of transportation were put into use. When the Erie Canal was opened in 1825, the cost of transportation from Albany to Buffalo was greatly reduced. The steamboat, first used just before the War of 1812, had been of immense importance in building up the West, where the river system was especially adapted to the flat-bottomed steamers ; but before 1840 steamships were crossing the ocean, offering facilities for the

great tide of European im¬ migration. The first steam locojnotive built in the United States was built in 1825 ; in 1840 there were nearly 3,000 miles of railroad in operation. The emigration to the West went on at a rate more marvelous than before; population pushed on beyond the Mississippi, while such States as Illinois doubled and re¬ doubled their population, and the little cluster of houses near the head of Lake Michigan began its rapid growth into the big, teeming city of Chicago. In intellectual and moral lines the American people were awake. New works of literature were written; new movements for public improvement and reform were undertaken; and with these manifestations iof

the humanitarian sentiment was a tendency, too, toward ideals, toward ((soaring away,® as Carlyle wrote Emerson, “after ideas, beliefs, revelations and such like, into perilous alti¬ tudes.®

When such a spirit was abroad, when men were planning reforms and taking a new out¬ look on life, it was natural that some one should protest against slavery. Garrison founded the Liberator at Boston, and demanded the immediate abolition of slavery. The American Emancipation Society was soon formed. The extreme abolitionist, denounc¬ ing slave-holding as a crime, would consider no means to the end he desired, but insisted on the freedom of the blacks. Soon he was proclaiming the Constitution as <(a covenant with death and an agreement with hell,® and announcing that he would have no dealings or political communion with slave-iowners. The South wrought up to a strange pitch of ex¬ citement acted with indiscretion ; at least its voluble representatives were indiscreet enough ; for the abolitionists were but a handful, and nothing served so well to bring them into notice and ultimately to give the anti-slavery cause standing as the vehement denunciation by the Southern men in Congress. Worst of all for the South, as it soon proved, effort was made to strangle free speech in Congress and to check the right of petition, an effort which resulted naturally in a heated discussion when¬ ever the forbidden subject was mentioned, and increased by many thousands the number of anti-slavery petitions demanding abolition in the District of Columbia, or like measures. Finally the gag policy was abandoned, but it had accomplished an object the reverse from that intended. By 1840 an anti-slavery party, the Liberty party, was in the field, and the political movement which ended with the elec- tinon of 1860 was begun.

Soon after 1840 arose interesting questions from which trouble ultimately came. Some¬ times tariff and financial problems were under discussion, sometimes internal improvements and the dredging

of rivers and harbor's, some¬ times matters of diplomatic concern; but under¬ neath everything, though it did not always come to the surface, was slavery and the divergence of North and South. In 1836 Texas became in¬ dependent of Mexico and asked for admission into the Union. Her separate existence was recognized by sending a minister from Wash¬ ington; but there was for a time no serious movement for annexation. In 1840 Harrison and Tyler were chosen as President and Vice- President. Harrison died soon after the in¬ auguration (1841). Tyler, though elected on a Whig ticket, was by training and predilection really more in sympathy with the tendencies of the Democratic party than with those of the Whigs. He did not participate with the Whig leaders in their movement to carry out their plans in regard to a new tariff and a new bank ; and before the end of the term he had in¬ stalled Calhoun as his Secretary of State. An effort to bring Texas into the Union had now begun, but a treaty prepared to attain that end was rejected by the Senate. In 1844 the Whigs nominated Clay; the Democrats, Polk of Tennessee. Polk's adherents shouted for the tariff of 1842 and demanded the "reannexa-

tion of Texas,® referring by these well-chosen words to the fact that by the treaty of Spain in 1819 we had surrendered our claim to the land beyond the Sabine. The Liberty party, taking a strong stand against slavery, cast a much larger vote than four years before. Polk was elected; and under the influence of the election, the gloom of the Whigs and the en¬ thusiasm of their successful opponents, the an¬ nexation of Texas was consummated (1845). The new State was brought in, not by a treaty as in the case of the acquisition of Louisiana and Florida, but by virtue of a joint resolution authorizing the President to invite Texas to come into the Union as a State. Texas was a slave State; her admission into the Union had been vehemently .opposed by many Northern people because it increased slave territory and strengthened the hold of slavery on the land. Difficulties soon ensued, for Mexico was quite unwilling to surrender all the territory Texas claimed as hers and which we purported to have made our own. The new State claimed all the land from the old southwest boundary of the Union to the Rio Grande River. An effort to support the claim of Texas involved us in war with Mexico, a war which was not distasteful to Polk, who hoped it could soon be ended and that as a result he could obtain the Far West stretching away to the Pacific. The war (May 1846- February 1848) was a long triumph for Ameri¬ can arms, longer than Polk could have wished, but triumphant none the less. In

September 1847, General Scott entered the City of Mexico, and the next February was signed the Treaty of Guadalupe-Hidalgo, by which the United States secured the land westward to the ocean, and promised, besides assuming certain claims, to pay Mexico $15,000,000. There were thus added to the expanding republic, if we include Texas as the fruit of the war, about 875,000 square miles. In the meantime a treaty with Great Britain had been signed. The title of the United States to the Oregon country south of the 49th parallel was thus made secure. In 1853, by the Gadsden Purchase, something like 45,000 square miles — the southern portion of what became the territories of New Mexico and Arizona — were added to the national domain.

But the annexation of Texas and the new West immediately ushered in new difficulties. Even before the war was over there had come up in Congress the so-called Wilmot Proviso, the purpose of which was to exclude slavery from any land acquired from Mexico. In the election of 1848 Gen. Lewis Cass of Michigan, the Democratic candidate, was opposed by Gen¬ eral Taylor of Louisiana, one of the heroes of the war. The Free-soil party (q.v.), the successors of the Liberty party, presented Van Buren and Charles Francis Adams as their can¬ didates. They believed that Congress was legally bound to forbid slavery in the Terri¬ tories, having, as they said, <(no more right to make a slave than to make a king.® Of these parties, the first two did not proclaim definite opinions as to slavery. Cass had, however, already announced that, in his opinion, the people of ' the Territories should settle their domestic affairs for themselves, a doctrine which was later formulated as the doctrine of

(

There were by this time many plain mani¬ festations of the growing estrangement between the sections. There was indulgence in charges and countercharges. The South complained of the escape of slaves, the North of the Southern effort to extend slavery and of the existence of slavery in the District of Columbia. Re¬ ligious denominations began to divide along sectional lines, and there were still other evi¬ dences that in many respects the Union was legal, political and formal, that harmony was passing away. And yet, though perhaps the Southern people were in large measure united in defense of slavery, the great body of men at the North were not ready to act in unison in opposition to slavery or its extension. Not >et could the Free-soil party come near con¬ trolling either house of Congress. In the South the radical element had begun to talk of seces¬ sion. Soon after the election of 1848 several matters demanded immediate attention. Cali¬

fornia, where gold had been discovered, was being rapidly peopled; the inhabitants formed a constitution excluding slavery and asked admission to the Union. Some form of Ter¬ ritorial government was needed for portions of the West, and some answer must be made to the demand for abolition of slavery in the Dis¬ trict and to the complaints of the South. Henry Clay introduced into Congress a series of propo¬ sitions which furnished the foundation for the compromise of 1850. California came in as a free State; the slave-trade was abolished in the District of Columbia ; a rigorous fugitive-slave law was passed; New Mexico and Utah were organized as Territories without restriction as to slavery. In this compromise many hoped to see an end to sectional bitterness, but in vain. Before the compromise was passed, Taylor died and was succeeded by Fillmore.' For a time, indeed, there seemed to come a lull in the storm', and men breathed more freely. Both of the leading parties in the election of 1852 an¬ nounced their adherence — one may say devo¬ tion — to the compromise as a settlement of the slavery question. The Free-soilers did not yield their ground, but they cast fewer votes than four years before. Franklin Pierce, the Demo¬ cratic candidate, was chosen; General Scott, his opponent, received only 42 electoral votes out of the total 296.

But the cause of free soil was nearer con¬ summation than ever, for the direful subject of slavery could not be compromised away. Ef¬ forts to enforce the Fugitive-Slave Law met with resistance in some parts of the North, and the smuggling of the blacks by the Under¬ ground Railroad went on more briskly and

cheerily than ever. And then came the Kansas- Nebraska bill (q.v.), introduced by Senator Stephen A. Douglas (q.v.) of Illinois, and de¬ fended with all the vigor and vehemence of which he was master. It was passed in 1854, and the notion that compromise had cast a per¬ manent benign influence over the nation was shattered. The bill provided for the organiza¬ tion of two Territories in land covered by the provisions of the Missouri Act of a generation before, and both of them north of 36° 30'. The Missouri Compromise was repealed and — in accordance with the principles of popu¬ lar sovereignty — slavery was to exist in the Territories or be excluded as the people of the Territories might determine. For many North¬ ern people, willing to acquiesce in the com¬ promises, which they hoped had settled all dis¬ pute, the Kansas-Nebraska Act was a rude awakening. The Republican

party was formed, absorbing the Free-soilers, winning new adher¬ ents to the anti-slavery cause and protesting against the extension of slavery into the Terri¬ tories. In the autumn elections of 1854 this party made a showing of remarkable strength, but in 1856 the Democrats were once more suc¬ cessful, placing James Buchanan in the Presi¬ dential chair. Only one national party re¬ mained; the support of Fremont, the Republi¬ can candidate, was practically altogether from the Northern States.

From this time on there was little peace. In 1857 the Supreme Court, in the case of Dred Scot v. Sanford, declared that Congress had no right to exclude slavery from the public domain. In 1858 Abraham Lincoln, in a series of debates with Douglas, while both were candi¬ dates for election to the Senate, disclosed, with pitiless logic and with plain, unembellished phrase, the incongruity between popular sov¬ ereignty and slavery. If the Supreme Court was right, the slavery issue could no longer be avoided by adhering to the notion that the peo¬ ple of the Territories could exclude slavery if they chose ; they could not lawfully exclude an institution that had the lawful right to exist within their limits. Lincoln thus inserted the wfedge that split the Democratic party. In 1859 John Brown (q.v.), with some ill-defined hopes of doing service to the slaves, further embit¬ tered the South by invading Virginia. The Southern people, inspired by fear of a servile revolt, were aroused to great indignation, and the Northern abolitionists, with whom were classed all Republicans, were accused of plot¬ ting against Southern safety. The time was near at hand when only blows, not words, could settle the great question at issue between the sections, daily growing more hostile. In 1860 Abraham Lincoln was chosen President; the Republicans were successful, and South Caro¬ lina began preparations for setting herself up as a separate nation. State after State at the South adopted ordinances of secession. Through the winter of 1860-61 there was little opposition to the movement. Even many Northern men, strongly anti-slavery in sentiment, doubted the wisdom of spinning® one section to the other by bayonets. Attempts at compromise — the Peace Convention, the Crittenden resolutions — were failures. Lincoln, a man almost unknown to the great body of the nation, paid close at¬ tention to the events of the winter, and when he took the oath of office in March 1861, spoke

firmly. He asserted the illegality of secession, and declared that the Union was unbroken and the laws must be executed.

War began when the Confederate forces fired on Fort Sumter in Charleston Harbor. Lincoln called for 75,000 volunteers, and there

was immediate response at the North. Events now moved rapidly. Following the lead of South Carolina, 11 Southern States formed the Confederacy. Kentucky, Maryland, Delaware and Missouri, border States with slavery, did not join the Confederacy. On 19 April Lincoln declared the blockade of the Southern Coast. On 13 May England proclaimed her neutrality. Richmond, Va., had become the capital of the Confederacy, and at the North rose the cry, <(On to Richmond !* The complete defeat of the Union forces at Bull Run 21 July 1861 re¬ vealed to the North the magnitude of the task undertaken. The South had in some ways the advantage at the outset, for the North was the invader, and the South defending its own soil. The task of conquering a country as large as the Confederacy was enormous. Moreover, during the early years of the war, the Southern armies were more ably led and there was less confusion of counsels. Robert E. Lee was one of the most skilful generals of history, and not till the war was more than half finished did the North find Grant, Sherman, McPherson, Sheridan as the equals of Lee and his efficient lieutenants. But, in the long run, the North was destined to succeed because it was stronger, because in the contest for supremacy between free and slave labor the South had been hope¬ lessly beaten ; and thus the contest on the battle¬ field but made plain with arms what the eco¬ nomic forces had already accomplished. The North had more men, more wealth, more vigor to put into the conflict. The South, raising cotton, which was indispensable to the industrial interests of Europe, hoped and expected Euro¬ pean intervention, but did not secure it. The belligerent rights of the Confederacy were recognized, but its separate independent exist¬ ence was not. The coast of the Southern States was declared in a state of blockade, and the Federal government began the enormous task not only of fighting on the battlefield, but of surrounding and strangling the uprising against its authority. In the West the Northern armies, though not always successful, pushed the South¬ ern forces slowly before them. In July 1863, Vicksburg surrendered to Grant. Shortly after the Confederates inflicted decisive defeat on the Union forces under Rosecrans at Chickamauga. In the autumn the victory at Chattanooga, where Grant, ably supported by Hooker, Thomas and Sherman, overwhelmed the Con¬ federate forces, was a crushing blow for the Southern cause west of the Appalachians. The next year Sherman entered upon an aggressive campaign, taking Atlanta and then marching through Georgia to the sea. But in the East difficulties seemed to multiply in the early years. Robert E. Lee of Virginia, aided by staff commanders like Jackson and Longstreet, seemed for a time absolutely invincible. Suc¬ cessful in defeating McClellan in the Penin¬ sular campaign of 1S62, Lee soundly whipped Pope near Bull Run the same year. Driven back from Maryland by McClellan, who at¬

tacked him at Antietam, he defeated Burnside at Fredericksburg, and Hooker the next spring

3*:o

UNITED STATES — GENERAL OUTLINE HISTORY (1776-) (2)

(May 1S63) at Chancellorsville, and with a victorious army marched boldly into Pennsyl¬ vania, where he was repulsed by Meade at Gettysburg. The next year Grant, the victorious Western leader, taking command in person of the Eastern army, began his fearful “hammer¬ ing8 and led his men to ultimate victory. Lee surrendered at Appomattox 9 April, and the Confederacy collapsed in the spring of 1865. The energy of the free North seemed unabated; the South had been unable to supply Lee, its great commander, with men and supplies suffi¬ cient to meet the enormous weight of Northern arms, when wielded by a general of the first order.

At the close of the war the North had over 1,000,000 men in arms; the loss in battle and by disease had been great, — not far from 300,000 men. The Southern loss was presum¬ ably not much less. The expenditure of wealth had likewise been enormous ; in fact, the real loss is incalculable, for no one could even esti¬ mate what the South had given up. When the war ended, the national debt was $2,850,000,000; and in the four years nearly $800,000,000 had been raised by taxation. The expense of the war of defeating the Confederacy was increased by the hesitation of the government to resort to adequate taxation and by the issue of legal- tender paper, a measure possibly justified by political considerations. In July 1864, gold touched 285, and this meant an excessive price for other commodities, which were in the long run paid for in good money. On the other hand, the establishment of the national bank system by the acts of February 1863, and of June 1864, greatly facilitated the government’s control of the national resources.

At the beginning it was not thought at the North that the war was a war against slavery. In July 1861, Congress declared (

and to preserve the Union with all the dignity, equality and rights of the several States unim¬ paired.® But in the course of the struggle, slavery was doomed to fall. Foreign opinion and radical Republicanism alike demanded its destruction. Whatever might be said to the contrary, slavery had caused the war. On 22 Sept. 1862, Lincoln issued the Proclamation of Emancipation, declaring free all persons held as slaves within any State or parts of States in which the

people should be in rebellion the fol¬ lowing 1 January. But the Proclamation of Emancipation was a mere military order ; its efficiency upon the ensuance of peace was, there¬ fore, open to question. Moreover, it did not affect slavery in the loyal border States. In February 1865, the 13th Amendment was pro¬ posed to the various State legislatures, and tlie following December it became a part of the Constitution. The Civil War resulted in the freeing of 4,000,000 slaves, and in demonstrat¬ ing the American Union to be, in the words of Chief Justice Chase, (

Even before the war was over, the question had arisen as to how the Union could be re¬ constructed ; in case the South was beaten, what steps should be taken to establish the Southern

States once more in their constitutional rela¬ tions? The early Republican theory had been that the States could not secede, and hence it could now be logically argued that the States, having never gone out, were still in the Union. Lincoln's theory was not inconsistent with this idea; to him the task of Reconstruction was not to restore the States, but to see that the gov¬ ernments were in the hands of loyal men who would do their duty as citizens of the United States The assassination of Lincoln, 14 April 1865, brought sorrow, to millions of devoted people at the North. His successor, Andrew Johnson, was not well adapted to the difficult and delicate work that lay before him. On the one hand was a distracted South, overwhelmed with defeat ; on the other was a triumphant North made up of different factions (1) the radical Republicans, whose antagonistic spirit had been aroused by conflict; (2) the extreme advocates of negro rights like Charles Sumner, who acted in most respects with the radical partisans; (3) a number of men who had been acting with the Republicans but whose ante¬ cedents were those of the Democracy or whose inclinations held them with fragile threads to the Republican party; and (4) lastly the Demo¬ crats, who were strong in opposition. Johnson could not possibly hold together the elements on which he must rely. The fault was not al¬ together his ; the situation was replete with difficulties. And yet, if ever a nation needed wisdom and unselfish service rather than par¬ tisan bitterness and strife, it was during the trying years of Reconstruction that followed on the heels of Civil War. Lincoln had (July 1864) refused to sign the Wade-Davis bill, which proposed a plan for Congressional par¬ ticipation in the process of Reconstruction. Johnson, like his predecessor, believed that Reconstruction could be accomplished by execu¬ tive methods. In May he issued an Amnesty Proclamation. By December the governments of most of the Southern States had been estab¬ lished in accordance with the Presidential plans, which practically put the

States in the hands of those willing to take the oath of allegiance. Representatives came to Washington from nearly all the Southern States. But the process of Reconstruction was not to be so easy. Al¬ ready Sumner had given utterance to his State- suicide theory, the theory that a State by virtue of rebellion lapsed into the condition of a Territory. Thaddeus Stevens had announced the conquest theory, in accord with which the South was to be looked on as conquered ter¬ ritory and treated as such by Congress. Mem¬ bers of Congress were not ready to turn the problem over to the President, and little by little the breach between the two departments of the government widened. The Democrats supported Johnson's plans, the Republicans op¬ posed, and soon the President and the leaders in Congress were bitterly hostile. By degrees the enmity between Johnson and the Republi¬ cans became so bitter that he was impeached for venturing to disregard the Tenure of Office Act by removing Stanton, the Secretary of War. The Senate failed to convict him.

There was a number of acts passed by the Southern legislatures which appeared to North¬ ern people to be attempts to avoid the 13th Amendment and reduce the negroes practically to slavery once more. A joint committee on Recon-

struction now took charge of affairs, and the legislative branch of the government, passing important measures over the President's veto and denying the Southern States representation in Congress until certain demands were met, controlled the situation completely. The purpose of the Republican leaders was to give pre¬ dominance to the (

With the exception of Tennessee, the South¬ ern States refused to ratify the amendment, but their refusal was of no avail; the South was put under military government, and no State was admitted to representation until it had ac¬ cepted the amendment. In 1868 the measure was adopted ; it was of immense importance. Under the original Constitution, the liberty of the individual was in nearly every respect in the hands of the State; by the 14th Amend¬ ment it was declared that no State should ((deprive any person of life, liberty, or property, without due process of law, nor deny lo any person within its jurisdiction, the equal pro¬ tection of the laws.® It also provided that there should be a reduction of representation of any State that abridged the right of male citizens 21 years of age to vote. The chief purpose of the amendment in this particular was to cut down the

representation of those Southern States that did not give the ballot to the negro. Two years later the 15th Amendment was enacted, declaring that the right to vote should not be abridged ((on account of race, color, or previous condition of servitude.® . The last three amendments were the most evident constitutional products of the war. The last State to be admitted to the privileges of the Union was Georgia (July 1870). In the mean¬ time conditions had been bad in the South. (

In 1868 General Grant became President. During his time the difficulties in the South continued and long gave no sign of real better¬ ment. Only gradually was the trouble cleared away and a better feeling between the sections established. The most important fact of Grant's first administration was that Great Britain and the United States agreed, by the Treaty of Washington, to arbitrate the matters in dispute between them. During the war, the latter power had strongly objected to England's con¬ duct in allowing vessels that were to be used to prey on Northern commerce to be fitted out in her harbors. The most noted of these was the famous Alabama, which, after doing immense damage, was sunk by the Kearsarge in a fight off the coast of France. The Court of Arbitra¬ tion, which was provided for by the treaty, meeting at Geneva, awarded to the United VOL. 27 —2.'

States $15,500,000 as damages for the injuries inflicted. In the election of 1872 the Liberal Republicans appeared in opposition to the regu¬ lar Republicans. They demanded reform in the administration of government and that the gov¬ ernment cease its interference in the affairs of the Southern States. The movement marks the beginning of the gradual rearrangement of parties.

The Republican party had absorbed the Union element of the North and had attracted the support of even earnest war-Democrats ; but confronted with new problems, now that slavery was gone and the Union intact, the party naturally could not hold all the persons whom the pressure of war had brought within its lines. The Democrats supported the Liberal Republican candidate, Horace Greeley, but Grant was successful. His second administra¬ tion was marred by a number of serious official scandals — the Whisky Frauds, the Credit Mobilier, the Salary Grab — and there was a widespread feeling that all was not done to fer¬ ret out rascality. The panic of 1873 occurred; perhaps it was a natural result of the war; cer¬ tainly it was not to be wondered at in the light of extravagant speculation in a country still burdened with a load of paper money. And yet, in spite of all the country had endured, its pop¬ ulation and wealth had greatly

increased since the outbreak of the war, and, notwithstanding evidences of a loose and even dangerous spirit in public affairs, the people had, on the whole, withstood remarkably the deleterious influences of long civil strife.

In 1876 Samuel J. Tilden was nominated by the Democrats and Rutherford B. Hayes by the Republicans. The election was hotly contested and when the ballots were counted the result was still in doubt. Twenty electoral votes were in dispute — one from Oregon and the re¬ mainder from South Carolina, Florida and Louisiana. Tilden had received, undeniably, 184 votes and needed but one to have the requisite majority. The situation, fraught with manifest danger, was without precedent, and one for which there was no adequate constitutional pro¬ vision. By agreement between the Republican Senate and the Democratic House, an Electoral Commission was created, which determined the contest in favor of Hayes. The Democrats, with true patriotism, accepted the result with calmness. The new President, a man of sound judgment and fine character, by his frank and friendly conduct helped in the restoration of a better feeling at the South. The Federal troops, as we have already said, were withdrawn from the Southern States, and at the end of the ad¬ ministration much of the bitterness between the sections, which had lasted for a generation, had disappeared. The Republicans were again suc¬ cessful in 1880, electing James A. Garfield as President and Chester A. Arthur as Vice-Presi¬ dent. The administration had scarcely begun when Garfield was shot, and he died in Sep¬ tember 1881. Arthur succeeded to the Presi¬ dency and performed its duties with conserv¬ atism and good judgment. The administration was, on the whole, uneventful ; the country was prosperous ; the policy of resumption of specie payments had been adopted some time before and had been carried quietly into execution at the day set (1 Jan. 1879) ; the monetary basis of industry was good, even if not perfect; the im-

mense debt entailed by the war had been largely reduced ; the revenue of the government was so large that a surplus had been created which pre¬ sented its own difficulties. The foundation of better government was provided for by the es¬ tablishment (1883) of a Civil Service Commis¬ sion. In 1884 the Democrats nominated Grover Cleveland and the Republicans, James G. Blaine.. There was considerable defection in the ranks of the latter party, for, while many

persons gave the candidate enthusiastic support, others were unwilling to vote for him and announced their preference for Cleveland, who by his vig¬ orous administration as governor of New York had won confidence and respect. The disaffec¬ tion of the ˆMugwumps,® as the dissatisfied Republicans were called, proved to be a matter of some importance, for Blaine was defeated and the Democrats, for the first time since the election of Buchanan in 1856, placed their can¬ didate in the Presidential chair. During Cleve¬ land's term, and in a large measure because of the influence of the President himself, the tariff issue became paramount. The Republicans strenuously adhered to the doctrine of protec¬ tion and discountenanced all efforts to reduce the revenue by a lowering of duties, while their opponents, declaring all unnecessary taxation unjust taxation, attacked the high tariff as un¬ wise and harmful. This was the main question, therefore, in 1888, when Benjamin Harrison, the Republican candidate, was successful over Cleveland. Four years later, however, on a platform not very different from that of 1888, the Democrats, having nominated Cleveland for the third time, were successful. The years that followed were full of interest. A serious wordy altercation with Great Britain concerning the boundary of Venezuela was finally settled. In Harrison's administration a revolution had oc¬ curred in Hawaii and a treaty of annexation had been framed, but not ratified. Cleveland withdrew this treaty from the consideration of the Senate and announced that the American protectorate which had already been set up in the islands was at an end. The tariff question was the subject of much discussion and Con¬ gress passed, after much trouble, the Wilson bill, reducing the tariff in some degree, but sat¬ isfying neither party. In the spring of 1893 there were the beginnings of a disastrous finan¬ cial panic; the monetary condition of the coun¬ try was bad. In 1873 silver had been demone¬ tized, but a few years later (1878) the Bland- Allison Act had provided for the government's pui chasing and coining a limited amount of silver; in 1890 the Sherman Act was passed, by the terms of which silver bullion was to be bought periodically and paid for in treasury notes. The government thus was a heavy holder of silver, and there was doubt as to the ability of the government, under the circum¬ stances, to adhere to the gold standard. In 1893, under the pressure of the panic, the Sher¬ man Act was repealed, but trouble continued and not for some years was there a return of busi¬ ness prosperity. The hard times were doubt¬ less, like the difficulties of 1837 and 1873, not altogether due to the state of the money of the nation, but to many other causes as well. In 1896 the silver question was thoroughly debated. William J. Bryan of Nebraska was nominated by the Democrats on a platform demanding the free and unlimited

coinage of silver and gold at

the ratio of 16 to 1. _ William McKinley was selected as the Republican candidate on a plat¬ form declaring opposition to the free coinage of silver except by international agreement. The campaign awakened great interest among all classes of voters and resulted in the election of McKinley by a large popular and electoral majority. In the course of the administration a new tariff law was passed and also an import¬ ant act for the establishment of the monetary system. But of course, most important of all was the war with Spain, which ended in the in¬ dependence of Cuba and the annexation of Porto Rico and the Philippines. The Hawaiian Islands, also, were annexed while the war was in progress. (See United States — Spanish- American War). McKinley and Bryan were again in 1900 the candidates of their respective parties, and the former was again successful. McKinley was shot by an anarchist at Buffalo in September 1901, after his second inaugura¬ tion, the third of our Presidents to meet death from assassination.

Upon the death of McKinley (14 Sept. 1901), the Vice-President, Theodore Roosevelt, as¬ sumed the Presidency. He had held official po¬ sition of some prominence before this time, but he was still young, full of energy, enthusiasm and determination. All through the early years of the century he was a conspicuous and forceful influence in American life. His influ¬ ence was in some ways more strongly personal than official, blit, whatever the character or the source, it was marked. The years of his ad¬ ministration (1901-1909) coincided with a new comprehension of civil duty and of the tasks of government. Foreign complications were not particularly embarrassing, but, possibly because of their inherent importance, and possibly be¬ cause of the open public way in which they were treated by the President and his able Secretaries of State, John Hay (to 1905) and Elihu Root (1906-09), people at large took an unwonted interest. Matters of social and political reform also received new attention ; purely party con¬ troversy and animosity, at least among the peo¬ ple at large, appeared to drop into the back¬ ground, while the essential problems of civil improvement came forward with new force. We should be guilty of an exaggeration and see things in a false perspective if we should declare that in the first 10 years of the cen¬ tury men first came to see the responsibilities begotten by the tremendous industrial develop¬ ment of the years since the Civil War, and we should likewise be misleading if we should assert that only then did they see the social problems that resulted from the immensity of production, the concentration of industry and the great in¬ crease of wealth; but certainly during those years men in general first gave serious thought to problems of this nature. There was deep and widespread interest in social reform and in political improvement.

The new interest and new discontent re¬ sulted in legislation affecting political methods and industrial conditions. The direct primary, which was first adopted as legal for all nomi¬ nations by Wisconsin in 1903, was soon put into operation in many other States. Woman suf¬ frage was also widely taken up and adopted, and the agitation was actively carried on throughout the country. The movement for a national income tax, which had been advocated

for some decades, resulted in the adoption of the 16th Amendment in 1913, authorizing the government to levy a tax on incomes with¬ out apportionment among the States. The dis¬ cussion of the desirability

of relieving the State legislatures of the task of electing United States senators ended by the adoption of the 17th Amendment in 1913, giving the power to the people, one of the results of a widespread belief that the people should have more immediate participation in their own gov¬ ernment. The same general tendency was shown in the adoption of the initiative and ref¬ erendum ; some form of direct legislation was introduced into a number of the States, espe¬ cially those of the West, and it appeared for a time as if the system would become almost uni¬ versal. The recall of officials was also provided for in a few States, chiefly in the Far West. This method of controlling government by pop¬ ular action was not, however, quite so favor¬ ably viewed as were the initiative and referen¬ dum, and there was specially deep-rooted objec¬ tion to the recall of judges; in 1912 Mr. Roose¬ velt advocated the (

Proposals to improve conditions of work¬ ingmen were widely discussed, and something was done in the way of legislation : the old common-law rule as to the liability of employ¬ ers for injuries to workmen appeared to be un¬ just and wasteful as applied to conditions of modern industry; and compensation acts were established providing for payment in case of injury or death, even when the accident was due to fault or negligence of the workman. Plans for old age pensions for workers also received attention, but as yet little or nothing has been done by governmental action, though some of the larger corporations have volun¬ tarily established pension systems. Serious consideration was given not only to factory conditions but to hours of labor, and laws were passed in some States limiting hours, espe¬ cially those of women and children.

Of the early achievements of the Roosevelt administration first mention may be made of the Panama Canal. The experiences of the Spanish War, the new responsibility of the na¬ tion due to the annexation of Porto Rico and the independence of Cuba under our guardian¬ ship, made the building of the canal a matter of immediate concern. The United States soon after the war took up with England the abro¬ gation of the Clayton-Bulwer Treaty, and in 190 U02, by the second Hay-Pauncefote Treaty such abrogation was provided for, and definite basis was thus made for the construction of the canal as an American enterprise. There was difficulty in coming to terms with Colombia, within whose bounds lay the route for the canal ; but Panama opportunely revolted from Colombia and a treaty was made with the new state, whereby the United States became pos¬ sessed of the canal strip. Preliminary work was begun soon after occupation, but it was some time before excavation was begun in earnest. The work was carried to successful completion in 1914 under the direction

of army officers, who showed great engineering skill and administrative capacity. The expense was

about .$400,000,000. Some notion of the value and significance of the undertaking may be gathered from the fact that by the use of this waterway a voyage from New York to Japan was shortened some 4,000 miles, and from New York to San Francisco, 8,000 miles.

The annexation of Porto Rico, the Philip¬ pines and Hawaii brought new problems to the American government. Although the limits of the United States had been extended at various times in the past, the annexed territory — if we except Alaska — had been contiguous to the old, and had been largely unpeopled; as a con¬ sequence, such acquisitions did not bring up very serious or complex problems of adjustment. The slavery question, it is true, had in the earlier days complicated the task of establish¬ ing territorial government; but on the whole, from the time when the Ordinance of 1787 was adopted, there had been no difficult question as to the form of government to be set up on the new land, or of the relationship that should exist between inhabitants and the government at Washington; it was taken for granted that the territory, in accordance with the principles of the Ordinance of 1787, should be ultimately absorbed into the Union, and have all the rights and privileges of States. In the case of the new <(insular possessions,® no such expectation could well be entertained, and to add to the difficulties of the task, some little time elapsed before the Philippine Islands were brought safely under the sway of American authority. Because of the uncertainties of the Philippine situation, representative government was not accorded the people at first; but in 1907 an as¬ sembly met and from that time on acted with a commission, appointed by the President of the United States, as a legislature of the colony. In 1916 Congress passed an act declaring that the war with Spain was not a war of aggres¬ sion and that it had never been the intention of the United States permanently to retain the sovereignty of the Philippines ; a further step, therefore, was taken toward the establishment of full self-government in the islands by giv¬ ing the people a right to elect a second legisla¬ tive chamber and at the same time the Philip¬ pine commission was entirely given up. Soon after annexation (April 1900), civil govern¬ ment was set up in Porto Rico; the act of estab¬ lishment provides for a governor appointed by the President, an executive council of 11 mem¬ bers appointed in the same manner, six of them to be heads of administrative departments and not less than five natives of the island, and an elective assembly to act with the council as the

legislature. Hawaii's government has, from the beginning of American rule, been similar to that of the old well-known territorial type; the President appoints the governor, secretary and the judges of the Supreme and Circuit Courts; the legislature is composed of two houses, both chosen by the people. The condition of Cuba after the surrender of Spanish sovereignty de¬ manded attention ; for some three years the island remained in the charge of a military governor representing the United States, but in 1902 a constitution drafted by a convention went into effect, the authority of the United States was withdrawn and the new republic entered upon the interesting but difficult task of self-government. Once since the with¬ drawal, the United States has found itself com-

pelled to re-enter the island and restore order; but after doing so has restored authority to the Cubans.

The annexation of Porto Rico and of the islands in the Pacific, the development of trade, the growing complexity and intimacy of inter¬ national relationships, cast in some measure a new light on America's position in the world and her responsibilities; it was not uncommonly said that America had become a world power. Probably America had been in every sense a world power for a hundred years, but still it is true that the new ˆpossessions® and the new tasks called the people to a wider outlook on world politics and made it necessary to consider seriously what part should be played by the United States among the nations. It is prob¬ ably true also that with the beginning of the new century the average man was less provin¬ cial and more inclined than before to speculate on the complexity of the world's affairs and the perplexing problems begotten by backward countries, trade ambitions and general tenden¬ cies toward imperial expansion.

The history of political controversy and discussion during the early years of the century was on the surface at least not so very different from that of previous decades; but, as we have alreaely said, many subjects attracting wide public interest were not matters on which par¬ ties sharply differed ; both parties contained progressive elements, and with the possible ex¬ ception of the tariff, there appeared on the whole to be no very definite issue. As the cam¬ paign of 1904 approached it was apparent that, though Mr. Roosevelt had antagonized some of the old Republican leaders, his renomination was inevitable because of wide popular sup¬ port ; he was, therefore,

nominated without opposition, Charles W. Fairbanks of Indiana being the candidate for the Vice-Presidency. The Democrats nominated Judge Alton B. Parker of New York and Henry G. Davis of West Virginia. They gave up the struggle for free silver, for their candidate was strongly opposed to the principle ; they attacked ((pro- tectionism,® spoke out strongly against ((gigan- tic trusts® and advocated the independence of the Philippines in accord with the principles of anti-imperialism. In the course of the cam¬ paign the Democratic candidate made serious charges to the effect that large contributions had been made by wealthy corporations to the Republican treasury, and implied that the party and its nominees were put under obligations to the donors. These charges were denied ; but the whole controversy stimulated the move¬ ment for the enactment of corrupt practices acts, such as were afterward passed by the national government and some of the States. The Republicans were successful in the elec¬ tion, with an electoral vote of 336 as against 140 polled for the Democratic candidates, and with a popular plurality of over 2,500,000.

Before the coming of the next election con¬ ditions were considerably altered; opposition to trusts and to ((big business had increased ; there were demands in various quarters for laws for social betterment and relief ; and the increasing cost of living, which was credited in part to the tariff and the favoritism shown to certain industries, had awakened much com¬ plaint. Not much of this unrest found expres¬ sion in opposition to Mr. Roosevelt, who was

classed with the progressive clement of his party as against the ((stand patters® who disapproved change or recession, especially on the tariff. The Republican nominees in 1908 were William H. Taft and James S. Sherman. Mr. Bryan and John W. Kern were the Democratic candi¬ dates, the former still appearing to be the lead¬ ing and most influential person in his party. The Republicans, influenced by popular unrest, declared <(unequivocally for the revision of the tariff by a special session of Congress imme¬ diately following the inauguration of the next President,® and favored the development of a permanent currency system and the greater supervision of corporations engaged in inter¬ state commerce, while the Democrats explicitly demanded reduction of the tariff and emphati¬ cally advocated stringent control of trusts and railroads. Once more the Republicans were successful, though by a somewhat smaller elec¬ toral majority (321 to 162) than four years be¬ fore and by a greatly reduced popular majority, less than 500,000 votes. The next four years were full of restless disputation. As they had promised, the Republicans took up the tariff question and passed the Payne-Aldrich bill ; but the results were

decidedly unsatisfactory to those who had expected a ((revision down¬ wards,® and there was in some quarters a feel¬ ing that the public had been betrayed, that once more the tariff had been manipulated, not really lowered, or handled with reference to the needs of the consumer as well as the manu¬ facturer. This feeling was not confined to those who were traditionally associated with the Democrats or to those who had been con¬ sistently tariff reformers. For this reason, and probably because of more vague causes of dis¬ content, the party was defeated in the Congres¬ sional election of 1910 and lost control of the House.

For sopie years past the progressive or in¬ surgent element in the Republican party had been growing in strength; unwilling to leave the party, these persons nevertheless struggled against the control of those who had been dom¬ inant in its councils and had commonly marked out its policy. It might be said that during these years the progressive elements of the two parties for the Democratic party was also by no means at peace — appeared* to the on¬ looker to have more in common than did the varying elements in any one party. The ((in-surgents® in Congress took a determined stand against some pieces of Republican legislation and were successful (1910) in reducing the power of the speaker of the House, who had great influence on legislation and was thought to use his power to prevent free discussion or the free development of party programs and policies in legislation. There were various other evidences of dissatisfaction with the old regime in politics, many believing that President Taft, though thoroughly honest and right- minded, was under the influence of reactionary forces when he ought to be pushing the party forward. The truth seems to be that he was earnestly seeking to hold the elements of the party together, but he probably did not fully appreciate the depth and vigor of popular dis¬ satisfaction, and especially the objection enter¬ tained to the seeming sway of certain men whose names, rightly or wrongly, were as¬ sociated in the public mind with mechanical

politics and subservience to unpopular in¬ terest.

The result of this condition of affairs was shown at the opening of the campaign of 1912. Roosevelt, who had strongly favored the nom¬ ination of his successor four years before, now came out against him, became a candidate for the nomination and was enthusiastically sup¬

ported by a large portion of his party. Before the Chicago convention met, it was apparent that reconciliation between the warring ele¬ ments in the party was almost impossible. The meeting was, however, held securely in the hands of the old practised leaders, who were vigorously denounced for using what were called ˆsteam-roller® tactics to crush out oppo¬ sition and name their own candidate. When Taft and Sherman were nominated over the vehement protest of the Roosevelt followers, the insurgent elements, who were already call¬ ing themselves ˆProgressives,® met in conven¬ tion (Chicago, August) and nominated Roose¬ velt and Hiram W. Johnson. The Democratic party had its own difficulties, for there also contending factions struggled for control. The outcome, however, was not a breach in the party but acquiescence in the nomination of Woodrow Wilson and Thomas R. Marshall, who represented the more progressive wing. Under such circumstances there could be no real chance for either Taft or Roosevelt; but the campaign was carried on with great earn¬ estness and much public discussion had the usually beneficial effect of arousing public at¬ tention to vital matters. Wilson and Marshall were elected, receiving 435 electoral votes out of a total of 531, but only a minority of the popular vote (6,286,214 out of 15,031,169). The Progressives cast over 4,000,000 votes, over 500,000 more than the Republicans, who secured only eight electoral votes. In the Congressional elections the Democrats were also successful, gaining control of both houses; but the Pro¬ gressives made no such exhibition of strength as in the vote for President; the Congress of 1913-15 contained only nine Progressives and seven members commonly classed as Progres¬ sive Republicans.

Soon after the inauguration of Mr. Wilson Congress under his guidance took up a number of important matters. A new tariff bill was passed, extending the free list and lowering duties. To make up for the decrease in revenue an income tax was provided, including the principle of graduation. A currency bill, pro¬ viding for a Federal reserve bank system, was also enacted. Other important measures in accord with the Democratic program were put on the statute books.

The outbreak of the World War in the summer of 1914 brought many perplexing and difficult problems; the United States, seeking to maintain its rights and to fulfil its duty as a neutral state whose citizens were deeply stirred by the war and whose interests, com¬ mercial and personal, were strongly affected, found it no easy task to assert and uphold its rightful position. English commercial policy, which purposed to prevent all trade with the enemy, even trade passing through neutral countries, brought forth objection from the American government ; and on the other hand there was on more than

one occasion serious danger of war with Germany because of the

destruction by German submarines of British passenger ships carrying American citizens. The trouble with Germany and Austria was acute and fraught with danger of war from the time of the sinking of the Lusitania in the spring of 1915, and in February 1917 diplo¬ matic relations with Germany were broken be¬ cause of the declaration of that nation that vessels coming within a war zone which she marked off would be sunk without warning and without restraint. To add to the anxiety and perplexity of these trying years, our relations with Mexico were strained almost to the break¬ ing point. During the later years of Mr. Taft's administration Mexican conditions presented serious difficulties, but soon after Mr. Wilson's accession the situation became acute. Various factions strove for the control of the govern¬ ment, lawlessness prevailed, bandits sought their prey; American property was destroyed and American citizens murdered. In 1916 a band of outlaws crossed our border and killed several unoffending persons. At the beginning of his administration President Wilson an¬ nounced a policy of friendly regard for the countries of Latin America and disclaimed any desire or intention to acquire further territory; this policy he earnestly strove to fulfil ; but in the spring of 1916 a force was sent to Mexico to hunt out the archbandit Villa and to punish those who had invaded our territory. In the early summer the State militia was called out and some of these troops sent to the Mexican border. The Great War in Europe and the trouble with Mexico called the attention of the American people to miliary matters ; and the average citizen questioned whether the navy was strong enough to defend the coast in case of attack, or the army large enough to defeat invaders. There was strong demand for ((prep- aration,® and Congress passed measures provid¬ ing for a large increase in the army and for a greatly enlarged navy.

While making provision for the great expend¬ iture for military purposes, Congress declared that the United States ((looks with apprehension and disfavor upon a general increase of arma¬ ment throughout the world, but it realizes that no single nation can disarm, and that without a common agreement upon the subject every considerable power must maintain a relative standing in military strength.®

In 1916 the Democrats nominated Wilson and Marshall once more ; the Republicans named Charles E. Hughes and Charles W. Fairbanks. Mr. Roosevelt was nominated by the Progressives, but declined to be a candi¬ date and advocated the support of Mr. Hughes. The issue of the election did not appear at first to enlist the acute attention of the

people, but before the end there was widespread in¬ terest and enthusiasm. It is hard to say in a word what was the chief or controlling issue of the campaign : Republicans charged the Demo¬ crats with executive mismanagement, and in the later weeks of the campaign recurred to the tariff, declaring that the great business pros¬ perity of the country was produced by the war and would be succeeded by a hopeless depres¬ sion if sufficient protection were not provided. President Wilson himself was the centre of attack; and some speakers, notably Mr. Roose¬ velt, condemned his Mexican policy and his failure to take more decisive and aggressive

action in dealing with Europe, especially Ger¬ many. Mr. Wilson's supporters ably defended his administration as high-minded, progressive and constructive, and asserted that his atti¬ tude and action with regard to the trying prob¬ lems of diplomacy were wise and patriotic. In the midst of the campaign a sudden strike of railroad employees was prevented by the pas¬ sage of a Congressional act, on Mr. Wilson's recommendation, establishing an eight-hour day on interstate railroads for certain classes of employees. The President at the same time made additional recommendations which con¬ templated, among other things, making it un¬ lawful to bring on a strike or a lockout before public investigation of conditions ; but these recommendations were not at that time made into law. This labor problem and Mr. Wilson's action greatly complicated the discussions and the course of the campaign ; for some persons strongly condemned, while others as vigorously defended, the steps of the administration in this particular emergency, and it is impossible to determine whether the President's responsi¬ bility for the eight-hour measure (the Adam¬ son Act) aided him or reacted unfavorably. The result of the election showed, on the whole, something of a sectional variation, although even in the East, which was generally strongly Republican, New Hampshire, by a very small plurality, chose Wilson electors. Ohio broke the solid vote of the Old Northwest by casting its vote for the Democratic candidate, while many of the Western States, including Cali¬ fornia, added their votes to those of the South, and thus determined the election in Mr. Wil¬ son's favor. The Democratic candidate was supported by every State west of the Missis¬ sippi except Iowa, Minnesota, Oregon and South Dakota. In Minnesota the popular plu¬ rality was small, not far from 400. The electoral votes of the States carried by Mr. Hughes numbered 254; those carried by Mr. Wilson, 277 ; the Democratic plurality in the popular vote was over

450,000.

The history of the Great War in Europe and the forces that finally drove the United States to participate in that war have been told in other articles of this volume. That story need not be repeated here. We need only to remem¬ ber that in April 1917, after prolonged attempts to maintain American rights by diplomatic pro¬ tests and expostulations, President Wilson went before Congress and advised that Congress de¬ clare the recent course of the imperial German government to be in fact nothing less than war against the government of the United States. War was formally declared 6 April. Provision was soon made for the raising of an immense army, partly by calling the National Guard to the colors and also through the processes of a selective draft ; training camps for officers were hastily built, and by the middle of May were filled with some thousands of eager young men. Money was voted lavishly for airplanes and various other things that modern warfare de¬ manded. A few men were sent to Europe early in the summer of 1917, but it was the spring of 1918 before they were sent in large numbers. The American soldiers helped to stop the fierce drive of the Germans against Paris in the early summer of that year, and in the autumn they brilliantly executed plans for the seizure of the San Mihiel salient. In Sep¬

tember American forces began the Meuse- Ar- gonne offensive, the greatest connected series of engagements in which American soldiers have ever been engaged. Largely because of the courage of our troops and the terrific weight of the American armies which during these autumn months were hurled against the German line, the enemy were driven back until utter and overwhelming defeat stared them in the face. They applied for an armistice and on 11 No¬ vember the terms of the Allies having been accepted hostilities came to an end. Soon after this President Wilson himself crossed the At¬ lantic to Paris to represent, with four others, the United States at the Peace Conference. The Treaty of Peace with Germany was presented to the delegates of that country at Paris 7 May 1919 and after some delays and discussions was signed by the Germans. The treaty included, among other things, a provision for a league of nations in which America was to participate, and the terms of this treaty were subject to continuous discussion, not only in the Senate, when the ratification of the treaty was under discussion, but also in the country at large. The organization of the world to prevent war and to secure and develop peace had been proposed a number of times, especially from the beginning of 1916, and in various papers and speeches President Wilson had presented the desirability or necessity of such a consummation as the end, or perhaps the justification, of the whole

struggle. The difficulties in reaching a decision on the acceptance of the treaty and the League of Nations were enhanced by the elections of 1918. The Republicans obtained control of both houses of Congress, and there were conse¬ quent difficulties arising out of the party sys¬ tem in the way of hearty co-operation between the President and congressional leaders.

Among the most important internal political developments in recent years are the addition of four new amendments to the Constitution of the United States. The 16th amendment, already mentioned, gave Congress power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States : in other words, Congress, in levying an income tax, need no longer be bound by the clause in the constitution refer¬ ring to <(direct taxes.® In the same year the 17th amendment was adopted, providing for the popular election of senators. Then followed the adoption early in 1919 of the 18th or National Prohibition amendment, after which, in 1920, the 19th or Woman's Suffrage amendment was adopted. In accordance with the authority granted by the 16th amendment, an income tax law was passed by Congress, and during the course of the war a very large share of the gov¬ ernment revenue was obtained in this way. The Presidential campaign of 1920 was fought largely on the issue of the League of Nations. The victory of Mr. Harding, the Republican nominee, on a platform reaffirming America's old position of non-interference in European affairs, was overwhelming. President Harding, soon after his Inauguration, made treaties of peace with Germany, Austria and Hungary, in which American participation in the League of Nations was specifically repudiated. These treaties were signed in August 1921.

In July 1921 the President issued an invita-

tion to Great Britain, France, Italy, China and Japan to participate in a conference on armaments and on questions relating to the Pacific.

Bibliography. — Adams, H., (History of the United States of America' (9 vols., New York 1889-91); Fish, C. R., (Development of Ameri¬ can Nationality' (rev. ed., New York 1914); Hart, A. B. (editor), (The American Nation' (28 vols., New York 1904 et seq.) ; McMaster, J. B.„ (History of the People 01 the United States from the Revolution to the Civil War' (8 vols., New York 1883-1913) ; Schouler, J., (Eighty Years

of Union' (New York 1903) ; Wiley, E., and Rines, I. E.} (The United States : The History of its Beginnings, Progress and Modern Development' (11 vols., New York 1916) ; Winsor, J., (Narrative and Critical History of America' '(1884—89), and the bibliographies appended to the various articles of this series.

Andrew C. McLaughlin, Professor of History, University of Chicago.

3. CAUSES OF THE REVOLUTION.

The political and constitutional relations be¬ tween Great Britain and the English dominions in America in 1760 were ill-defined, and funda¬ mental understanding between the English com¬ munities on the two sides of the Atlantic as to the essential qualities of the connection was lacking. In England an act of Parliament had come to be regarded as the highest expression of power within the Constitution and the range of subjects over which Parliament's power extended was unlimited. In America the full consequences of the omnipotence of Parlia¬ ment were obscured by the fact that its power had been actually exercised over the colonies only for the purpose of establishing, protecting and maintaining a commercial system of im¬ perial extent and character, and in a manner which left the internal concerns of each colony largely under the direction of its local govern¬ ment. The superintendence of the colonial gov¬ ernments was in the hands of the Crown, under whose administration a considerable degree of local autonomy had been attained. The situa¬ tion was further obscured by the fact that within the very realm of commercial regulation, which constituted so large a part of the region of the exercise of Parliamentary power, the administration was notoriously inefficient. So that in the generation before George III, the system remained largely unexploited by Parlia¬ ment and its true character and possibilities un¬ appreciated by the Americans. Under these circumstances, it is evident that, if, after a long period of indeterminate relation, the issue as between Parliament and the colonies should be raised at all, much would depend upon the manner of its raising and on the circumstances prevailing on the two sides of the Atlantic at the time it was raised.

English political conditions at the beginning of the reign of George III were such as to afford peculiarly little promise that such a delicate relation would be handled with the req¬ uisite skill. The vicissitudes of the party sys¬ tem, the personal views and characteristics of the young king and the circumstances connected with his accession, all combined to make the question of the ultimate position of the sover¬ eign in the Constitution the absorbing issue of the time. The Whigs

sought a strong and per¬ manent system of government in ((the connec¬

tion of agreeing politicians commanding parlia¬ mentary influence” ; the Tories, <(in the creation of a powerful parliamentary, interest attached personally to the Sovereign, reinforced by dis¬ connected politicians and by small groups drawn from the most various quarters and directed by a statesman who was personally pleasing to the king.” Wide interpretation of the power of Parliament and Crown acting together was es¬ sential to both parties and issues requiring mod¬ eration and restraint together with firmness and steadiness in the use of this power by either party stood little chance of receiving attention on their merits. The demoralization of the Whigs and the intractable attitude of Pitt made it possible for the king and his <(friends” to restore for a time the personal will of the sovereign to a position of greater power in the Constitution. But the price of this success was the utter demoralization of parties and the party system of government, which was the direct cause of the vacillation, the violent alternation between severity and indulgence toward the colonies in ministerial policy, which was itself largely responsible for the unnecessary degree of turbulent defiance of existing authority, par¬ ticularly in Massachusetts.

Turning now to America, we find political conditions between 1688 and 1760, by influences outside of what was strictly the law of the situation, developing the several colonies into a group of actual commonwealths in which the forces of democratic society had far greater sway than in England and in the long run predominated over the aristocratic forces di¬ rected by the official classes. What the English government thought of as corporations emanat¬ ing from the Crown but subject to ultimate Par¬ liamentary regulation had grown into such an actual position that, whatever the technical law of the situation, it was inexpedient to treat them merely as corporations. The corporate provinces had governments almost entirely de¬ veloped from native sources and the limited control over them for imperial purposes at¬ tempted by the home government met with much obstruction. The same was true, though to a less degree, of the proprietary and royal prov¬ inces, for, though the official opportunity for enforcement of control was much greater, the weakness of the support given from home to the provincial governors in their contests with the legislatures left the latter the practically dominant power in the realm of provincial de¬ velopment. The modeling of each provincial government on the lines of the whole English Constitution, the wide range of interest taken into cognizance by each, extending to well-nigh everything but regulation of imperial com¬ merce, the

territorial scale on which provincial interests developed, the large degree of success which the representative legislature attained in controlling this development, often in defiance or evasion of directions from home, the isola¬ tion from the rest of the colonies within which each of these developments was conducted, all contributed to a view of itself by each province as a constituent part of a federative empire.

For such a theory of empire, however, the English community on the European side of the Atlantic was very far from ready. By the let¬ ter of the law of the situation as most authori¬ tatively interpreted at the time, colonial affairs were as much in the hands of Parliament as

any other interest of the British nation. When, then, the new circumstances of the empire created by the results of the Seven Years' War seemed to call for a policy which should (1) enforce the system of trade regulation more effectively, (2) provide for a standing military force for the control of the newly-ac¬ quired territory and (3) provide a revenue from America which should prevent the addition of the burden of expense thereby entailed to the already huge national debt, it is not surprising that, on the one hand, the ministry should take colonial obedience for granted, and on the other, that the colonists should take fright at the possibilities of oppression involved in the unlimited exercise of Parliamentary power. At all events, acts covering the above purposes were passed in 1764 and 1765. It is only fair to note that experience under the indeterminate relations previous to 1760 had been such as to lead the ministry not unnaturally to believe that unless these objects were secured by action of Parliament they would not be effectually secured at all. It is also to be observed that, whereas the power of Parliament to tax the colonies had actually been used only to regulate commerce and not to raise revenue, it is, in strict logic and in practical administration, impossible to admit the power to tax for one purpose without granting it for the other.

Of this three-fold program, distasteful in all its features to the Americans, the Stamp Act (q.v.) involved the greatest degree of novelty, invading, as it did, what imperial ad¬ ministration had hitherto left untouched — control of the legislature of each colony over the granting of supplies to the Crown. Upon this feature American resistance was concen¬ trated and before the time set for the act to go into effect it had been practically nullified by the use of a

variety of means, including mob violence as well as the resolutions of legisla¬ tures and of a Congress of delegates from a majority of the colonies. The basis of remon¬ strance was the contention that the granting of supplies from themselves for the use of the Crown by any body in which they were not personally represented was in violation of the fundamental principles of the Constitution. The English reply to this — that the colonies were virtually represented in Parliament as much as many sections and interests in England itself were — was probably quite in accord with the historic meaning of the word repre¬ sentation as it had progressively developed in England. But in America variations from this meaning had developed which made the theory of virtual representation in American eyes in¬ applicable to the case. To Americans the idea of representation adequate for taxing purposes included a franchise regulated by general rules and possessed by practically all free adult white males with a moderate amount of property, and an apportionment of representatives based on territorial and popular considerations rather than on those of ˆinterest.® In all of these points the contrast with English ideas of rep¬ resentation was fundamental and these varia¬ tions in understanding of this term help to ac¬ count for the blindness of each side to the justice of the contention of the other. This theory of representation involved in matters of taxation what has already been referred to in another connection, a theory of federative em¬

pire, while the English theory was that of con¬ solidated empire, directed by Crown and Par¬ liament, with the colonial governments as cor¬ porations, with somewhat extended powers, to be sure, in consequence of their peculiar cir¬ cumstances, but ultimately subject to complete regulation by Parliament. The attempt to en¬ force the revenue feature of the Grenville policy partially revealed the divergence between these two theories. The issue was raised on. the specific point of revenue ; on this point the colonies successfully resisted and in the repeal of the Stamp Act, in 1766, Parliament on the specific point retreated, at the same time assert¬ ing by the Declaratory Act its power over the colonies ((in all cases whatsoever.® Though the American resistance to the Stamp Act policy was undoubtedly a surprise to the ministry, once the incident was closed, even by such an inconclusive settlement, every effort of the government in matters of colonial policy should have been directed toward the achievement of an arrangement which should provide for de¬ velopment of imperial welfare without raising the issue as between Parliament and the col¬ onies in bare and abstract terms. Instead, the ministry, now dominated by the king's per¬ sonal influence, chose to raise the issue as plainly as possible by proposing a

revenue scheme which technically respected the colonial distinction between external and internal taxa¬ tion but in all other points carried out the es¬ sential aims of the Grenville policy. This was the real significance of the ((Townshend Acts,® passed in June and July 1767, and the thorough¬ going character of the American resistance to these acts was serious in a degree correspond¬ ing in ratio to the plainness with which the issue of Parliamentary legislation, in distinc¬ tion from Parliamentary taxation, was thus raised. Again owing to changes in the ministry and to complaints from commercial sources the Townshend legislation was repealed in 1769, except for taxation on the single item of tea, which was retained in set terms for the saving of Parliamentary right. By this time the colon sts had had experience of the consequences of the English theory of empire, under Parlia¬ ment as it then was, and they now formulated their position in the phrase, <(No legislation without representation.® The issue between Parliament and the colonies over the funda¬ mental question of the character of the empire • — federative or consolidated — had now been stripped of most of its disguises. Upon the issue, as thus stated, king and Parliament were in essential agreement, the differences between the various groups in Parliament, and between these groups and the king, being rather con¬ cerned with the question of the most effective use of this unrestrained power. But between 1770 and 1774 irritation was developing in an increasing and dangerous degree between the imperial officials and the colonial populations. Events like the so-called ((Massacre® at Boston in 1770, the destruction of the Gaspee in 1772 and the tea riot at Boston in 1773 led the min¬ istry to adopt coercion of the most unqualified kind. By the acts of 1774, aimed at the punish¬ ment of Massachusetts, by the closing of the port of Boston, altering the government of the province and making new and special provision for the quartering of imperial troops, the full possibilities of the theory of the Parliamentary

consolidated empire were revealed to the col¬ onies in general. But instead of the isolation of Massachusetts, which the ministry intended, a closer union of all the colonial governments was the result. Throughout the whole course of the agitation the impulse and the machinery of intercolonial discussion and action had been developing, and on the summons of Massachu¬ setts a Congress of delegates from 12 colonies met at Philadelphia in September 1774. This Congress gave expression to the colonial doc¬ trine, and provided for bringing pressure to bear on the commercial interests of Great Britain by

organizing a continental scheme for non-importation of British goods. The great result of the Congress was to enlarge the scene of opposition to the ministry from Massachu¬ setts to the colonies as a whole. In the newly- elected Parliament which met in November 1774, measures were taken still further to carry out the policy of coercion and, if possible, to divide the colonies, by providing for a general strengthening of the military force in America and forbidding the privileges of the fisheries and of trade with England to all but NewYork, Delaware and North Carolina. Schemes of conciliation were proposed but received only partisan consideration. Passion was now too highly involved on both sides to allow of suc¬ cess for any moderate or compromising plan. Any permanent scheme of governmental rela¬ tions requires mutual confidence to a certain degree and this confidence had been broken down by the circumstances of the agitation of the previous 10 years. Before the news of fur¬ ther action by Parliament in the direction of coercion had reached America, the extra-legal organization of Massachusetts, which the op¬ ponents of ministerial policy had set up there after the alteration in the provincial govern¬ ment, came into armed collision with the mili¬ tary forces of the Crown at Lexington and the military phase of the Revolution had begun.

Armed resistance to the ministerial policy, even in the organized manner and on the seri¬ ous scale with which it was carried on in 1775, probably did not appear to the majority of Americans at first to involve necessarily a sepa¬ ration from the empire. And yet the possibility of such an event as a last resort could not have been entirely absent from the minds of thinking men. It is in the sense of a determined and deliberate aim at such separation on the part of the average substantial citizen, that general dis¬ claimers of the idea of separation should be interpreted. Such a project was probably in the minds of some of the leading agitators from an early stage of the controversy. But it was not until the consequences of the determined stand of the king and ministry on the issue of coercion thoroughly carried out had been mani¬ fested and the elements of passion, prejudice and interest injected still more vigorously into the situation, that independence could be made to appear desirable or necessary. The king's rejection of the ((01ive-branch Petitionˆ and the proclamation naming the Americans as rebels, in August 1776, as well as the employ¬ ment of foreign mercenary troops, on the one hand, and, on the other, the appeal to local in¬ terest made by the experience of the newly-or¬ ganized State governments, as well as the in¬ ability of the moderate party in America to pro¬ pose any plan which promised success in achiev¬

ing what was now regarded as essential, all had a powerful effect and served tq obliterate the recollection and valuation of the possible ad¬ vantages of connection with Great Britain under more normal circumstances. All these considerations were popularized and brought vividly to the imaginations of great numbers by Paine's pamphlet, (Common Sensed By May 1776, the Congress, which had acted for a year as a revolutionary general government for the United Colonies, felt justified in entering upon consideration of the subject. Increasing con¬ sciousness of the need of foreign assistance, and clearer perception of the necessity of in¬ dependence as a condition of such assistance enforced the more strictly domestic reasons for the development of the sentiment of separation and on 4 July 1776 the formal Declaration was signed.

In summary, it may be said that, fundamen¬ tally, the causes of the American Revolution are to be found in the differences of characteristics progressively developed in the two English communities on the different sides of the At¬ lantic. These differences made the administra¬ tion of the system of government by which these communities were connected a matter of difficulty under any circumstances. When a change was made in the manner and purpose of the administration of this system, an issue was raised which the English community was partic¬ ularly ill-prepared to meet. The Americans practically demanded recognition of a new theory of the empire, precedents for which ex¬ isted, not in the law, but in the facts of adminis¬ tration of the existing theory. At the beginning of the controversy the apprehensions of the Americans were more concerned with the possi¬ bilities of the existing theory for despotism than with any serious tyranny actually exercised. But the conduct of this controversy over this issue was so unskilfully managed, as it turned out, that the feelings of discontent operative in the colonies for nearly a century were stimulated to the point of resistance. Opportunity was created for what was probably hardly more than a large and aggressively active minority to carry this resistance to the point of separation from the mother-country. That a more skilful management of the controversv would have prevented the ultimate separation cannot be affirmed with confidence. The scale and char¬ acter of the development of the colonial governments was making of them common¬ wealths not likely to be satisfied with a relation very far short of that which existed between Canada and England after 1837. And for such a relation England was hardly prepared much before that date. See Colony.

Bibliography. — Bigelow, J., in 'Cambridge Modern History y (Chap. 6, Vol. VII, New York 1903) ; Doyle, J. A., id. (Chap. 5, Vol. VII, New

York 1903) ; Fisher, L. G., ‘True History of the American Revolution) (Phila¬ delphia 1902) ; id., ‘Struggle for American In- dependence) (2 vols., Philadelphia 1908) ; Fiske, J., ‘The American Revolution (2 vols., Cam¬ bridge 1896-97) ; Frothingham, R., ‘The Rise of the Republic of the United States* (1871) ; Howard, G. E., ‘Preliminaries of the Revolu¬ tion, 1 763-75 * (New York 1905) ; Lecky, W. E. H., ‘History of England in the Eighteenth Century) (Vol. Ill, London 1878-90) ; Marks, N. A. N., ‘England and America, 1763 to 1783 J

(2 vols., Cleveland 1916) ; Osgood, H. L., (The American Revolution } (in Political Science Quarterly, March 1898) ; Perkins, J. B., (France in the American Revolution (Boston 1911) ; Trevelyan, Sir G. O., (The American Revolution) (6 vols., New York 1899-1914) ; Wharton, F., ed., (Revolutionary Diplomatic Correspondence of the United States’* (6 vols., Washington 1889) ; Winbolt, S. E., Ameri¬ can Independence and the French Revolution, 1760—1801 > (in Bell’s (English History Source Books, y Vol. XII, 2d ed., London 1915) ; Win- sor, J., (Narrative and Critical History of America) (Vol. VI, 1886-89).

Charles Worthen Spencer, Professor of Political Science, University of Nevada.

4. THE AMERICAN REVOLUTION (MILITARY EVENTS). The fundamental fact in the British strategy of* the American campaigns was their possession of control of sea-power, for the use of which in penetration of the seaboard strip by the openings of the Hudson River and Chesapeake Bay, the topog¬ raphy afforded pre-eminent opportunities. In defense the Americans had the advantage of moving rapidly on lines of interior communica¬ tion ; and the holding of a position somewhere between the coast and the mountains from which they could keep control of these interior lines and thus prevent the success of British detachments, quite as often by refusing as by giving battle, was an essential feature of Amer¬ ican strategy throughout the war. As a matter of fact, both sides were seriously handicapped in the course of working out their respective policies. On the American side, the prejudice against a standing army, the undue influence as¬ sumed by the States after the first flush of the enthusiasm of the Union had passed and the precarious character of the support given to military operations made the maintenance of a reliable military force a matter of supreme dif¬ ficulty for the genius of Washington himself. On the other hand, after 1778, the British were involved in war with France,

after 1779 with Spain, and after 1780 with Holland and in this quadruple contest found no allies.

The first three years of the war constitute, in a way, the most critical period from the strategic point of view, for it was in these years that the British held undisputed posses¬ sion of all the military advantage which con¬ trol of the sea could give, and it was in this period that their most serious attempt to break the confederacy in two by occupation of the Hudson-Champlain-Saint Lawrence waterway was made and frustrated. In 1775 the Amer¬ icans succeeded in keeping the British force confined in Boston while the attempt at the capture of Quebec by a double expedition north from Ticonderoga and northwest and west through the Maine forest under Montgomery and Arnold was made. This invasion collapsed and the evacuation of Boston by the British in March 1776 left each side in possession of its own territory.

The campaign of 1776 saw the British attempt at occupation of a Southern port, Charleston, repulsed and the advance south from Canada checked by Arnold's impromptu naval force on Lake Champlain till so late in the season that it got no further than Crown

Point. New York, however, was occupied by the British army, supported by the fleet, and Washington's army was forced across New Jersey, leaving the mouth of the Hudson and large parts of both East and West Jersey in the hands of the enemy — supposedly for the winter. But Washington's masterly surprise at Trenton and manoeuvre at Princeton in the last days of 1776 enabled him to hold northern New Jersey and keep the British confined to New York City and East Jersey only as far as Amboy and New Brunswick. The campaign of 1777 should have been devoted by the British to the single great object of occupying the whole length of the Hudson-Champlain-Saint Lawrence waterway, both ends of which lay in their possession. This fact made it the most available opening for their purpose and once the connection between the termini was made, the task of reducing the confederacy by sec¬ tions would become practicable. But Howe's move on Philadelphia by sea so reduced the strength and delayed the co-operation of the force at the mouth of the Hudson with the southward movement of Burgoyne that the lat¬ ter, hindered in his movements and unable to maintain himself at so slow a rate of advance, was surrounded and captured before the former had covered half the distance between New York and Albany. It is impossible to over¬ estimate the importance of this achievement of the Americans. It made possible the French Alliance, which not only increased the military resources of the American defense by the use of the French

sea-power, but involved the dis¬ persion of the total military resources of the British against several opponents instead of allowing them to concentrate on the task of subduing the Americans. The consequences became apparent in the campaign of 1778 which was opened by Clinton's withdrawal from Phil¬ adelphia across New Jersey toward New York, close-pressed at Monmouth by Washington, who now took up a position north and west of New York, from which he could watch and at¬ tack any movement of the enemy toward either New England or Philadelphia. This po¬ sition these armies practically maintained with¬ out decisive engagement till the end of the war. There was an attempt of the French fleet and American land force against Newport in 1778 which ended in failure. There were numerous marauding expeditions by the British, designed to draw Washington from his commanding po¬ sition. There was on the other hand the capture of the posts in the country west of the Alleghanies in 1778 and 1779 by Clarke, which had important consequences for the future de¬ velopment of the country. But from 1778 on, the most active endeavors of the British invad¬ ing force were directed against the Southern States.. The bold dash of Wayne on Stony Point in 1779 and the narrow escape from loss of the Highlands of the Hudson through Arnold's treason in 1780 were only episodes in a situation in the North which showed no decisive changes from 1778 to 1781.

The British attack on the South was- re¬ newed in 1778 by the capture of Savannah and the reduction of the greater part of Georgia. The British seem to have counted on the large number of slaves in the Southern States as an element of weakness in the defensive capacities of the region and to have planned to roll up

the South from Georgia to Virginia by combin¬ ing use of sea-power with the threat at the altars and fires of the interior by an overrun¬ ning force. An attempt in the summer of 1779 at a recapture of Savannah by the combina¬ tion of the French fleet and American and French land force under Lincoln was repulsed. The capture of Charleston in 1780 by the Brit¬ ish fleet and army made the soil of the Caro- linas for the two following campaigns the scene of an interesting conflict between two efficient armies, each under competent leadership, and, at first, on something like even terms, as far as aid from local partisans is concerned. The crushing defeat of Gates by Cornwallis in Aug- gust 1780, at Camden, S. C., seemed to promise Cornwallis the control of the whole State and a threatening position toward North Carolina, but the American victory at King's Mountain in October 1780 served to keep him close to ter¬ ritory

controlled from the sea. Greene now succeeded Gates in command of the American army and after King's Mountain and the battle of the Cowpens had largely deprived Cornwal¬ lis of his light troops, succeeded in drawing him away from the coast and northeastward across North Carolina almost to the Virginia line. Here, at Guilford Court House, in March 1781, in an action which was tactically a de¬ feat for the Americans, Cornwallis was so weak¬ ened that more thorough invasion of the Caro- linas became impossible. He retired first to Wilmington on the coast and then, as it be¬ came evident that Greene was returning south- westward again, crowding the British back to the coast at Charleston and Savannah, himself turned away and joined Arnold in Virginia in May.

The French Alliance now supplied, for the first time in an effectual manner, that indis¬ pensable element in the American defense, lack of which had prevented development of its more aggressive possibilities — viz., control of access by the sea. The threat upon New York by the French fleet and the forward movement by the American force drew off strength from Cornwallis in Virginia and kept Clinton close in New York till the strength of Washington's and Rochambeau's force was far on its way to Virginia. In the meantime, De Grasse's seizure of the entrance to Chesapeake Bay and the five days' action with the relieving British fleet off the entrance isolated Cornwallis, now in¬ trenched on the peninsula between the York and the James rivers, for a long enough period to allow of the complete investment of his posi- French fleet in his rear. Having exhausted the resources of such a position before the Eng¬ lish fleet could appear again, Cornwallis sur¬ rendered 19 Oct. 1781. It is worthy of note tion by superior numbers in front and the that this was the first failure of the British sea- power on the coast during the war and the thoroughness with which this first opportunity was exploited for purposes of aggressive de¬ fense indicates the grasp of the situation as a whole and the cautious daring which character¬ ized Washington's strategy. The British were now in possession only of the ports of New York, Charleston and Savannah, and by reason of the moral effect of the capture of Cornwallis the war was practically at an end.

The decisive battles may be selected as fol¬ lows: Bunker Hill, 17 June 1776, which in¬

spired the British commanders with a firm notion of the inexpediency of. a front attack on American forces behind breastworks ; Long Island, 27 Aug. 1776, which gave the British the control of the mouth of the Hudson; Saratoga, 17 Oct. 1777, which frustrated the attempt to break the confederacy in two and which brought the French

Alliance; King's Moun¬ tain, October 1780, and the Cowpens, 17 Jan. 1781, which deprived Cornwallis of his light troops in his overrunning of the Carolinas, and the naval action at the entrance of Chesa¬ peake Bay, in the early part of September 1781, which made the siege of Yorktown possible.

Bibliography. — Bancroft, G., (History of the United States* (Vols. IV and V, last ed., New York 1891) ; Doyle, J. A., (History of the United States) (London 1875) ; id., Cambridge Modern History) (Chap. 7, Vol. VI, New York 1903) ; Fiske, J., (The American Revolution (2 vols., Cambridge 1896-97) ; Lecky, W. E. H.,

(History of England in the Eighteenth Cen¬ tury5 (Vols. Ill and IV) ; Trevelyan, Sir G. O., (The American Revolution (6 vols., New York 1899-1914) ; Wiley, E., and Rines, I. E., (The United States) (New York 1916) ; Winsor, J., (Narrative and Critical History of America5 (Vol. VI, 1884-89).

Charles Worthen Spencer, Professor of Political Science, University of Nevada.

5. THE DECLARATION OF INDE¬ PENDENCE. On 10 June 1776 the Con¬ tinental Congress appointed a committee to draft a Declaration of Independence. (See Declaration of Independence). Jefferson, the most radical theorist on this committee, wrote out a rough draft of the Declaration. This was carefully revised by the committee and re¬ ported to Congress on 28 June. After further revision by that body it was adopted on 4 July and after being engrossed was 'signed on 2 Aug. 1776 by the members of Congress then present. The contents of the document fell under four heads: (1) the preamble, (2) theories of government, (3) an enumeration of a ((long train of abuses55 and (4) the resolution declaring independence. Of these the second and third portions are the most important. The philosophical doctrines underlying the Declara¬ tion as well as the phraseology in which they were given expression were not new. The docu¬ ment was simply the embodiment of ideas which had been prevalent for many centuries and which had crystallized into the systems of political philosophy of the 16th, 17th and 18th centuries. Jefferson had borrowed the ideas and even the language of Locke. The latter had found predecessors in Hobbes and Hooker. Hooker, a churchman, was simply giving ex¬ pression to ideas which had been prevalent among Church writers during the religious wars in France, the struggles concerning the powers of Church councils in the 1 5th century, the strife between Louis of Bavaria and the popes of the 14th century and the investiture controversy of the Hildebrandine epoch in the 11th century. For the

introduction of the ideas to churchmen probably no one was more responsible than Saint Augustine (354-430 a.d.).

The five fundamental theories of the Dec¬ laration are: (1) The doctrine of equality — (

inalienable rights; (3) that the origin of gov¬ ernment was in a conscious act or compact — ˆgovernments are instituted® ; (4) that powers of government rest on the consent of the gov¬ erned; (5) the right to throw off government, that is, the right of revolution or resistance. The compact theory of the origin of govern¬ ment is first found in the theories of Protagoras and the Sophists (481-411 b.c.). The Stoics at the time of Zeno (308 b.c.) brought forward the doctrine of the common brotherhood and equality of men. Cicero (106-43 b.c.) gave ex¬ pression to the theory that all men in a state of nature have certain equal rights. The Roman jurists of the empire declared that though the will of the prince had the force of law, it had such only because the prince's power was con¬ ferred on him by the oeople. This idea was ex¬ pressed more definitely by Saint Augustine when he said that government rested on a gen¬ eral pact of human society to obey kings — in other words, that government rested on the con¬ sent of the governed. The theory of resistance to the mandates of a ruler was given expres¬ sion to by Socrates (469-399 b.c.) and the Apostle Peter, but Saint Augustine was the first to give unqualified approval of it in a general statement. He said that it was not always bad not to obey a law, for when the ruler makes one which is contrary to God, hence to divine and natural law, then it is not to be obeyed. Augustine thus contributed the idea of resistance to a law contrary to natural rights, while the jurists had merely stated that laws should not be contrary to natural rights. They had not advocated resistance.

The five fundamental philosophical theories of the Declaration were, therefore, in existence by the time of Saint Augustine. They were used separately or together throughout the Middle Ages. The struggles between the tem¬ poral and spiritual powers of the time — the empire and the papacy — gave excellent op¬ portunities for their use. This is especially true of the fight which broke out between Henry IV of Germany and Pope Gregory VII (1073— 85). If the popes could get a general ac¬ ceptance of the above theories, the power and pretensions of the temporal rulers would be thoroughly undermined. It was natural, there¬ fore, that in the works of those Church writers who supported the popes frequent expression should be given to just such doctrines as those wdiich later found place in the Declaration of

Independence. The theories of Manegold von Lautenbach (1081), a participant in the above struggle on the side of the Pone, will serve as an example. He declared that the state was the mere work of man. Kingship does not exist by nature or by merit. Even the word king is a mere word of office. The power which he has was given him by the people. They did not exalt him above themselves so as to concede to him the free faculty of exercising tyranny, but they exalted him so that he should defend them from tyranny and interference by others. The people established government for mutual pro¬ tection. They made a compact with the king and chose him king that he might force evil men to obedience and defend the good from the bad. If he falls into tyranny himself, the people are freed from his dominion and from subjection to him. As you would dismiss a swineherd for not taking care of his herd, so

must you with better and more just reason re¬ move a king. Similar expressions of some or all of the doctrines are to be found in Gratian's codification of the canon law, in the writings of Peter Lombard, Alexander of Hales, Saint Bonaventura, Saint Thomas Aquinas, Englebert von Volkersdorf, Marsiglio of Padua, William of Occam, Wiclif and others. Nikolaus Cusa (1401-64) may be said to have been the first writer who combined the various theories, into a systematic whole. (

The third portion of the Declaration like the first is based on precedents. The enumeration of the Hong train of abuses® is similar to the Grand Remonstrance of Parliament in the reign of Charles I. The list of abuses really forms a history of the relations between the English king and the colonies during the second and third quarters of the 18th century. The actions of the king are held to be in violation of rights which Englishmen had embodied in such docu¬ ments as the Magna Charta, the Petition of Right, the Bill of Rights and the Act of Set¬ tlement. As Englishmen the colonists regarded themselves as entitled to the rights of English¬ men. They did not share the belief prevalent in England that the inhabitants of colonies were to be treated somewhat differently from English¬ men who stayed at home. Their ancestors had left England when English ideas of representa¬ tion in Parliament were undergoing a change during the control of Long Parliament and Cromwell. In the new land of America they developed theories and customs of representa¬ tion essentially different from those restored by Charles II. Englishmen at home might feel that they were represented by Parliament whether they voted for any one of its members or not, but in the colonies the idea had grown that a representative in a legislative body only represented the men who had a voice in his selection and who lived in the territorial

district from which he was chosen. So to the colonists ((the imposing of taxes without our consent®

meant one thing, while to Englishmen it meant another. The other grievances enumerated, such as the deprival of the benefits of trial by jury and the quartering of armed troops among the colonists, undoubtedly played an im¬ portant part in bringing about the War of the American Revolution, but probably no one thing contributed so much to the opening of that war as the feeling expressed in the phrase (

Bibliography. — Charming, Hart and Turner, ‘Guide to the Study of American History5 ; Friedenwald, declaration of Independence5 ; Dunning, (Political Theories5 ; Willoughby, ‘Political Theories,5 (Nature of the State5 ; Merriam, ‘American Political Theories5 ; Sul¬ livan, ‘Antecedents of the Declaration of In¬ dependence,5 in American Historical Associa¬ tion ‘Proceedings,5 1903.

James Sullivan, Ph.D., Director of the Division of Archives and His¬ tory of the University of the State of New

York.

6. THE AMERICAN REVOLUTION (DIPLOMATIC CONDITIONS DURING THE WAR AND THE PEACE NEGO¬ TIATIONS). Attempts to enter into rela¬ tions in some form with foreign powers are to be found in the very early stages of the exist¬ ence of the United States. In November 1775 Congress appointed a committee to corre¬ spond with friends in other parts of the world and this committee very soon came into com¬ munication with agents of the French govern¬ ment, sent to observe conditions in the colonies. Early in 1776 this committee appointed Silas Deane as their agent to go to France for the purpose of obtaining military supplies and by the last of July he had been admitted to an interview with Vergennes, the Minister for Foreign Affairs, and had been put into con¬ nection with Beaumarchais, through whom, with the connivance of the government, important supplies of war were furnished. Deane had been instructed to inform Vergennes that France had been selected as the first power to whom this application should be made “from an opinion that if we should . . . come to a total separation from Great Britain, France would be looked upon as the power whose friendship it would be fittest for us to cultivate.55 After the Declaration of

Independence, France and Spain, as powers most unfriendly to Eng¬ land, were still courted with the greatest dili¬ gence, but ministers or plenipotentiaries were also commissioned from time to time to the other courts on the Continent. From none but France and Holland, however, was recognition obtained, and from only these two was any official aid or countenance given before the conclusion of peace. Holland's recognition \ as extended just before the completion of the peace negotiations and Spain, though refusing to recognize the United States in the early days of the struggle, afforded a limited amount of financial assistance. In many regions of Europe among the people and at several of the courts, there was a disposition friendly to the Ameri¬ can cause, but in no case was this disposition serious enough for practical purposes to lead the governments away from the path of strict neutrality, except in the limited way afforded by the Armed Neutrality.

From the first, the French government had taken great interest in the colonial revolt and, before the arrival of Deane, had determined for the present to remain nominally at peace with England, but to assist the revolt surrepti¬ tiously with just enough energy to keep both sides actively and, if possible, exhaustingly, oc¬ cupied. In this policy the Spanish government joined and between the two governments 2,000,-000 livres were placed at the disposal of the insurgents in the summer of 1776. In Septem¬ ber 1776 Congress adopted a general plan for treaties to be proposed to foreign powers and joined Franklin and Arthur Lee with Deane as commissioners to lay such a treaty before the French government. The coming of Franklin increased the general popularity of the Ameri¬ can cause, but the government was not disposed to change its attitude for the relations of the proposed treaty, which was concerned largely with commercial relations and provided for no political alliance. Apparently Congress' appre¬ ciation of the need for foreign aid grew stronger after the British capture of the mouth of the Hudson and shortly after the meeting of the commissioners in Paris they were in¬ structed to abandon the commercial basis of the proposed treaty and to propose to France and Spain a political connection, offering as¬ sistance to France in conquest of the West In¬ dies, and to Spain in the subjugation of Portu¬ gal. Little substantial progress was made, how¬ ever, in this direction till December 1777, when news was received of the surrender of Bur- goyne's army at Saratoga. This signal achieve¬ ment of the Americans entirely changed the face of affairs by convincing France of the probability of ultimate American success, and within a few days of the receipt of the news the commissioners were informed, in reply to their peremptory inquiry as to the intentions of the

government, that the king was determined to acknowledge the independence of the United . States and to enter into treaty relations in sup¬ port of that independence. Accordingly, on 6 Feb. 1778, two treaties, one of commerce, on the most-favored-nation principle, and one of alliance, which provided for an intimate politi¬ cal association of the two countries, were signed. The treaty of alliance, which was very different from the original American proposals, stated the object of the alliance to be the main¬ tenance of the sovereignty and independence of the United States in government as well as in commerce, provided for mutual aid in case of war between France and Great Britain, agree¬ ing that territory reduced by the United States in the northern part of North America and in the Bermudas should belong to the United States, and that conquests in the West Indies should belong to the king of France, stipulated especially that neither party should conclude peace with Great Britain without the formal consent of the other first obtained, and pro¬ vided for the continuance of the war with Great Britain till formal or tacit recognition of the independence of the United States by the treat¬ ies ending the war. Articles XI and XII pro¬ vided for a mutual and perpetual guarantee of possessions in the western hemisphere, which was to give serious trouble in the subsequent relations between the two states. Whatever the sentiments of the French people, the French government entered into this relation, as was

nlainly stated in the announcement to the com¬ missioners of the king's determination to rec¬ ognize the new state, from no purely disinter¬ ested motives in favor of the Americans, but on the ground that it was manifestly to the interest of France that the power of England be diminished by the separation of the colonies. The popular sentiment for the American cause simply co-operated with Vergennes' aggressive designs on England in opposition to the more prudent suggestions within the government as to the ruinous effect of such an expensive en¬ terprise upon French finances.

Since the Family Compact between the Bour¬ bon kingdoms in 1761, the relations of France and Spain in all matters of external policy had been of the closest alliance, and the French- American treaty of 1778 contained a clause pro¬ viding for the accession of the king of Spain to its terms. Nevertheless Spain found the general spirit and the precise terms of this alliance not at all to her liking and announced to England that she held herself free from any such engagement, and proceeded to offer mediation on terms which would leave England in

possession of the Saint Lawrence Valley and the territory northwest of the Ohio, and herself in possession of everything west of the Alleghanies and south of the Ohio. On the refusal of the British government to accede to such mediation, Spain at length, on 12 April 1779, allowed herself to be urged into war with France against Great Britain, but expressly refrained therein from alliance with, or recog¬ nition of, American independence. In the mean¬ time, Luzerne, the French Minister to the United States, was trying to persuade Congress that Spain's price for an alliance with the United States, namely, the Floridas and exclu¬ sive navigation of the Mississippi, was not too high, and that the accession of Spain to the alliance would be likely to bring about peace • speedily. In September of the same year, Jay was sent as United States Minister to Spain with instructions to the purport that if Spain would accede to the treaties with France she should not be precluded from receiving the Floridas, and that if she should wrest them from Great Britain, the United States would guarantee them to her, provided that the United States should enjoy the free navigation of the Mississippi, and this proviso was laid down as an ultimatum. Jay was further instructed to secure a port on the Mississippi below the 31st parallel. Jay's mission was entirely unsuccess¬ ful, even after the change of his instructions, which abated the American claim to navigation of the Mississippi as an ultimatum.

In the meantime, in preparation for any opening that might develop, Congress had been preparing instructions for a commissioner to participate in negotiations for a general peace. In addition to recognition of independence, boundaries, substantially such as actually were finally adopted, the Newfoundland fisheries, free navigation of the Mississippi, with a port below the 31st parallel were laid down, at first, as ultimata, with John Adams, appointed as sole commissioner. But in 1781, under the influence of Luzerne, these instructions were revised, by referring to the claims therein indicated as ex¬ pressing the desires and expectations of Con¬ gress, but by leaving the commissioners at lib¬ erty to secure the interests of the United States

as circumstances might direct and enjoining them to undertake no negotiations for peace without the knowledge and concurrence of the French ministers and ultimately to be governed by their advice and opinion. Franklin, Jay, Laurens and Jefferson were joined with Adams as commissioners.

The news of Cornwallis' surrender had so strengthened the hands of the opposition in England that in March 1782 North resigned, and the recognition of American independence was made a condition of

acceptance of office by Rockingham. In proceeding to negotiations, considerable difficulty was experienced over the matter of the relation between the recognition of independence and negotiation of other topics. For reasons of his own, Vergennes encouraged the American commissioners in holding out for unconditional acknowledgment as a prior con¬ dition to negotiation. In the meantime Jay and Adams became convinced that Vergennes would, for the sake of Spain, as well as in conformity with his own plans for America, oppose the American claims in the matter of the western boundaries and of the fisheries. In conscious disregard of their instructions, they independ¬ ently suggested to Shelburne an arrangement which fully recognized independence before ne¬ gotiation and at the same time allowed him to see that a majority of commissioners present in Paris were willing to proceed in negotiations with Great Britain separately from their ally. Shelburne immediately took advantage of the division of the allies and with Franklin's reluc¬ tant consent, preliminary articles, exactly coinci¬ dent with the treaty signed in connection with the treaties of the other belligerents, were signed 30 Nov. 1782. The arrangement was then re¬ vealed to Vergennes, who, at first, indignant at the apparent bad faith, was pacified by Frank¬ lin's soothing explanations. As a matter of fact, both Frenchmen and Americans had scrupu¬ lously fulfilled the letter of their agreement in everything which had been exactly stipulated and in other matters, each nation equally had acted in accordance with its own views of interest.

The definitive treaty, signed in connection with the treaties between Great Britain and the other belligerents 3 Sept. 1783, recognized in its first article the independence of the several 13 States. The boundaries of the new na¬ tion were, on the west, the Mississippi River south to the 31st parallel; on the south, the 31st parallel from the Mississippi to the Chat¬ tahoochee, down that river to its junction with the Flint, thence in a straight line to the source of the Saint Mary's and thence to the sea ; on the north, practically the line of the Lakes and the Saint Lawrence, leaving stretches at the northeast and northwest corners so indefinitely described that much trouble was experienced at these points in later times. Both countries were to have free navigation of the Missis¬ sippi. The United States was to enjoy the right of fishing at all places where the inhabit¬ ants of both countries used at any time hereto¬ fore to fish, and the liberty of drying and curing fish on lands, except Newfoundland, which were unsettled. Creditors on either side were to receive no impediment to the recovery of the full value of debts heretofore con¬ tracted. Congress was earnestly to recommend to the States to pass acts in relief of the Loyal-

ists._ Provision was made for bringing hos¬ tilities to a close. By a separate and secret article it was provided that if Great Britain should win back the Floridas from Spain, the southern boundary of the United States between the Mississippi and the Chattahoochee should be the parallel of 32° and 30'. The con¬ clusion of this peace has been generally regarded as a remarkable achievement on the part of the American commissioners and its successful outcome is to be attributed not only to the daring statesmanship which disregarded the instructions of Congress, but also to the influence of Franklin in France, and the skill with which appeal was made to the enlightened generosity of the sentiments of the ministry in power in Great Britain.

Bibliography.— Fiske, J., (The Critical Period of American History 1783—89 J (1888) ; Fitzmaurice, E. G. F., (Life of Shelburne* (1875 —77) ; Lecky, W. E. H., (History of Eng¬ land in the 18th Century) (Vol. IV, London 1878-90) ; Wharton, F., ed., (The Revolution¬ ary Diplomatic Correspondence of the United States^ (6 vols., Washington 1889) ; Winsor, J., (Narrative and Critical History of America* (Vol. VII, 1884-89) ; biographies in Ameri¬ can Statesmen Series,* and works of John Adams, Benjamin Franklin, John Jay.

Charles Worthen Spencer, Professor of Political Science, University of Nevada.

7. ARTICLES OF CONFEDERATION.

On 10 June 1776 the Continental Congress ap¬ pointed a committee to frame an instrument of government. This was entitled the Articles of Confederation and Perpetual Union.® (See Confederation, Articles of). It was not until five years later (1 March 1781) that all of the States had finally signed it. The defects of this scheme of government were so numerous and serious that for a time it looked as if the Union would go to pieces. Under such circum¬ stances attempts were made at various times to change the Articles in such a manner as to give more power to the central government in those matters in which it was most seriously ham¬ pered : the finances, commerce and power to coerce the States. The first proposal to amend the Articles was made on 1 Feb. 1781, even be¬ fore they went into effect. This was known as the Five Per Cent Amendment. Its avowed purpose was to give to Congress the power to levy a 5 per cent ad valorem tax on most articles imported and on all prizes taken on the high seas during the

war. The proceeds of this tax were to go toward paying the principal and interest of the debt contracted during the war. Within a year 12 of the States had consented to the passage of this amendment, but Rhode Island refused. As the approval of all States was necessary for an amendment, this naturally failed. On 16 March 1781 Madison submitted a report of a committee which recommended giving to Congress the power to coerce the States to fulfil their Federal engagements. This power was to be embodied in an additional article to the Articles of Confederation. This report was referred to a grand committee on 2 May 1781 and reported back by it on 20 July of the same year. On its recommendation a new special committee of three was constituted to prepare an exposition of the Confederation, a

plan for <(its complete execution and supple¬ mental articles.® This committee reported on 22 August and thought it ought to be dis¬ charged from the exposition of the Confedera¬ tion because such a comment would be volu¬ minous if coextensive with the subject. The committee, nevertheless, made a report on the defects of the Articles of Confederation, and made strong recommendations that many sup¬ plemental powers be given to Congress. The committee further advocated that a committee be appointed to prepare representations to the several States of the necessity of these supple¬ mental powers and of pursuing, in the modifi¬ cation of the Articles, one uniform plan. These recommendations, however, came to naught. The matter of the defects of the Articles was taken up from the outside and on 26 Feb. 1783 Pelatiah Webster issued (A Dissertation on the Political Union and Constitution of the Thir¬ teen United States, * in which he advocated the adoption of very thoroughgoing changes in the Articles. He proposed to divide Congress into two bodies and to give it greater power over the States and over individuals. On 18 April 1783 a Revenue Amendment was introduced into Congress. The object of this was to obtain for Congress the power to levy specific duties on certain articles imported and a 5 per cent ad valorem duty on all other goods at the time and place ot importation. The collectors of the duties were to be appointed by the various States and after appointment were to be amen¬ able to and removable by Congress. The pro¬ ceeds from the duties were to be applied to the payment of the principal and interest of the debt. Under the same amendment the States were to make provision, during a term not longer than 25 years, for the collection and pay¬ ment of their proportion of the Federal ex¬ penses. In the same connection it was sug¬ gested that the basis for the calculation of such proportions be changed from the value of land in each State, as was prescribed in the eighth article of the Articles of Confederation, to the number of people in each State. Again 12 States

approved of this amendment, but this time New York, having just worked out an elaborate scheme of duties for herself against the other States, refused to ratify it. Alexander Hamilton of New York drew up an elaborate exposition of the defects of the Articles and on 3 June 1783 intended to present it to Con¬ gress along with a resolution calling for a general convention to revise the Articles, but he abandoned his project for wrant of support. On 30 April 1784 another amendment was rec¬ ommended by Congress. This time Congress asked to have given to it for a period of 15 years the power of forbidding trade with for¬ eign powers having no treaty of commerce with the United States and of prohibiting the citizens of any foreign state from importing into the United States any articles which were not the produce or manufacture of that State. This proposal, so essential in its essence for the gov¬ ernment of every country to have in that age of restricted trade, was ratified by only two States and, therefore, failed of adoption. In 1785 another man outside the halls of Congress, Noah Webster, put forth, in his work entitled * Sketches of American Policy,* suggestions for the improvement of the Articles. Like many

other men of the time he recommended a strong executive and giving to Congress the power to coerce the States. About the same time James Monroe introduced in Congress a proposition to change article nine of the Articles in such a way as to give Congress the power to place retaliatory duties on the products of foreign states that discriminated against the United States. The proceeds of such duties, however, were not to go to the Federal government, but were to go to the State in which they were col¬ lected. This proposition was referred on 28 March 1785 to a committee of which Monroe was chairman and on 13 and 14 July of the same year was discussed in Congress, but no action was taken. A similar proposition to that of Monroe's was embodied in the report on trade and revenue presented to Congress by a grand committee on 14 Aug. 1786. Additional proposals in the same report recommended that the States wThich delayed to pay their propor¬ tions of the funds required for the running ex¬ penses of the Federal government should have to pay fines in addition, that in States which made no provision for collecting the sums asked for Congress should have power to step in and order them collected by State officers and in case of necessity appoint officers or agents of its own to collect them, and that States offering resistance to Congress or its agents in making such collections should

be considered as violat¬ ing the Federal compact. Further provisions in this committee report gave Congress the power to introduce new systems of revenue and to make regulations for the finances, and if 11 of the States agreed to such systems or regulations, they were to become binding on all. In addition Congress was to be given the power to institute a court of seven members to try officials of the Federal government and to hear appeals from the State courts concerning the interpretation of treaties or regulations made by the Federal gov¬ ernment. On the report of this grand com¬ mittee Congress took no action. The longer the Confederation existed the more hopeless the chance for a strong central government became. From all sides came expressions of fear and alarm for the Union itself. As early as 1783 Washington, in a circular letter to the State governors, had expressed fear for the Union and declared that there must somewhere be lodged a supreme power to regulate and govern the general concern of the Confederated Re¬ public, or it would go to pieces. Jay, in a letter to Washington in 1786, said : ((I am un¬

easy and apprehensive, more so than during the war.® From our former friends in Europe came the disquieting news that they no longer had confidence in our credit. Adams in trying to negotiate a loan in Holland in 1784 was met with expressions of distrust in the stability of the Union — a distrust which the London gazettes did everything to encourage. As Con¬ gress had failed utterly in all attempts it had made to have the Articles amended, help had to come, if it came at all, from some other quar¬ ter. Congress had lost the respect of the coun¬ try through no fault of its own. The most capable men had deserted its halls for those of the State legislatures. Everything seemed to point to a speedy dissolution of the Union as it ex¬ isted under the Articles of Confederation, when qid came from an unexpected quarter and quite

by accident. This was the Alexandria Conven¬ tion, called to settle commercial disputes be¬ tween Virginia and Maryland. From this grew the Constitutional Convention. The new Constitution (q.v.) drafted by that body was ratified by nine States and 4 March 1789 set for its inauguration. On 2 March 1789 the Con¬ gress of the Confederation adjourned sine die, and thus brought the government under the Articles of Confederation to an end.

Bibliography. — Bancroft, Constitution1* ; Fiske, Critical Period) ; bibliography in Chan- ning, Hart and Turner, (Guide to the Study of American History } ; McLaughlin, Confedera¬ tion and Constitution. }

James Sullivan, Ph.D., Director of the Division of Archives and His¬

tory of the University of the State of New York.

8. THE FORMATION OF STATE CONSTITUTIONS. When the resistance to Great Britain first began, independence was not the aim and in consequence only pro¬ visional governments were established, tem¬ porarily to take the place of the English colonial governments which had one by one succumbed or been suppressed. Provisional Congresses or Conventions in the several colonies assumed po¬ litical control, entrusting the executive function to Committees of Correspondence and of Public Safety. Under these loose revolutionary organ¬ izations government was conducted for several months, but as it soon became evident that the contest was to be a prolonged one, there grad¬ ually arose a conviction that more regular and permanent forms of government should be or¬ dained. The several colonies turned to the Con¬ tinental Congress, representing all the colonies, for direction, and this body took the initiative in inaugurating the several State governments. Quite naturally, the first request came from the Provincial Congress of Massachusetts, as in that colony hostilities already had broken out. On 16 May 1775 that body asked its <(explicit advice respecting the taking up and exercising the powers of civil government.® The Congress replied 9 June, recommending that they should call upon the several towns entitled to repre¬ sentation in the assembly to elect members, and the assembly so chosen should elect a council, the two bodies should govern in approximate conformity to the spirit and substance of the colonial charter, until a governor of his majesty's appointment should consent to govern according to that instrument. This advice was promptly followed and the government so or¬ ganized remained in force until 1780, when the first constitution of that State was established. A few months later New Hampshire, South Carolina and Virginia successively sought' guid¬ ance with respect to the establishment of their civil governments, and by November Congress advised them respectively <(to call a full and free representation of the people® that they may adopt <(such a form of government as in their judgment would best promote the happiness of the people and most effectively secure peace and good order in the province during the continu¬ ance of the dispute with Great Britain.® Finally as the movement in favor of independence gained adherents, Congress 10 May, in anticipation of the Declaration of Independence, recommended that the colonies that had not already done so

should establish regularly ordained govern¬ ments. In consequence of this advice, the col¬ onies, each soon claiming to be of right a free,

sovereign and independent State, were shortly inaugurating their first State constitutions.

New Hampshire's constitution was completed 5 Jan. 1776, to be followed by South Carolina on 26 March. Both of these constitutions were incomplete and unsatisfactory, and proved but temporary, as they were replaced by new ones within a few years. Rhode Island and Connec¬ ticut retained their colonial charters. The for¬ mer simply discharged its people from their al¬ legiance to the king by act of the legislature of 4 May, the latter provisionally effected a similar change 14 June, which it made permanent by act of 10 October, at the same time enacting a short bill of rights. Virginia adopted its consti¬ tution 29 June, and New Jersey's was pro¬ claimed on 3 July. Thus before the Declara¬ tion of Independence seven States had assumed independent governments, and four had drawn up written constitutions. Four other States fol¬ lowed in the same year, Delaware, 21 Septem¬ ber; Pennsylvania, 28 September; Maryland, 11 November and North Carolina, 18 Decem¬ ber. In the year 1777 Georgia adopted a con¬ stitution on 5 February, and New York did likewise on 20 April. South Carolina's second constitution was promulgated 19 March 1778. Massachusetts continued under its provisional government until 16 June 1780, when its con¬ stitution went into force. New Hampshire finally secured a new frame of government, 2 June 1784. Vermont, although unrecognized by the other States, pursued her own independent course, framing two constitutions during this period, those of 1777 and 1786. The first was largely copied from that of Pennsylvania. No other State constitutions were adopted prior to the ratification of the Federal Constitution.

The compact theory, especially as put forth by John Locke in justification of the English Revolution of 1688, was generally accepted in America by the constitution makers of the Revo¬ lutionary period. Its principles as explicitly set forth not only in the Declaration of Independ¬ ence, but in all the State constitutions as well, were that the people have the natural right to abolish or alter their form of government when in their judgment it has become destructive of their rights. Seven of the constitutions ex¬ pressly declare that their former relations are dissolved because the king had violated the com¬ pact. This served as the basis for the legal de¬ fense of their action. Sovereignty, it was com¬ monly held, rested in the people, and from them alone emanated the power to inaugurate a new form of government. But in practice they de¬ parted somewhat from this theory. Although in most of the States the people were consulted through their choice of representatives to a pro¬ vincial convention, which should draft a frame of government, there were several

exceptions, as in the case of both the constitutions of South Carolina. Neither was the Virginia Provincial Convention, nor the New Jersey Congress spe¬ cifically empowered to frame a constitution, but each assumed that they were authorized to act in accordance with the advice of Congress. Again in the framing of the early Revolutionary constitutions that careful distinction that came later to be made between a legislative body and a constitutional convention was not observed. vol. 27 — 22

Owing to the exigency of the times, the Provin¬ cial Congress or Convention in each of the States that framed constitutions during the years 1776 and 1777, with one exception, acted not only in the capacity of a constitutional con¬ vention, but also assumed the powers of legisla¬ tion and administration. The one exception was in the State of Delaware, where a convention not only was chosen for the express purpose of framing a constitution, but dissolved upon the completion of that work. None of these con¬ stitutions was submitted to the voters for their approval, but went into operation at once upon their adoption by the convention. The first State to inaugurate the practice of seeking the sanction of the people upon the work of the framers was Massachusetts in 1778, but the pro¬ posed constitution was rejected by the voters. Two years later a constitution which had been drawn by a convention elected for the sole and express purpose of framing a fundamental law, was adopted by the people of Massachusetts. This practice was followed by New Hampshire in the inauguration of its second constitution in

1784.

The State constitutions reveal the continuity in the development of American political insti¬ tutions. They have been called by Bryce (

The main features of the constitution con¬ sisted of the Bill of Rights (q.v.), — in some in¬ troduced by a preamble, — and the constitution proper. Eight of the instruments of this period, if we include Vermont, were prefaced by bills or declarations of rights, and in the other con¬ stitutions there were important provisions of this character. The first of these was adopted by Virginia, and was drafted by George Mason. To a considerable extent it served as a model for the other States. In all the bills of rights there were some 100 different pro¬ visions. They were a statement of what Amer¬ icans regarded as the inherent rights of man. While doubtless suggested by the English Bill

of Rights, they were much more comprehensive and explicit than their English prototype, and deal much more with the rights of the individ¬ ual. Thus typical provisions are the declaration that ((all men are born free and equal,® and are to be protected in their personal and property rights. Freedom of religion, freedom of speech, the right to bear arms and of trial by jury are all carefully guarded. Similarly the freedom of the press, freedom of election, the right of as¬ sembly and of petition are guaranteed. Exces¬ sive bail and fines, cruel and unusual punish¬ ments, unwarranted search and seizures, the quartering of troops in times of peace are all prohibited. The granting of titles of nobility, hereditary honors or exclusive privileges are forbidden. All of these are principles that have been accepted as essential to the perpetuity of a democratic republic.

All the constitutions recognized the principle of the threefold separation of powers, and pro¬ vided for the establishment of distinct legisla¬ tive, executive and judicial departments. Not only had the experience of the Colonial period tended toward the differentiation of these three departments, but its importance had been em¬ phasized by Montesquieu. Some of these in¬ struments explicitly declared, as that of Massa¬ chusetts, that no one of the departments should ever exercise any of the powers of the other two, but in practice this principle was frequently not observed. In the organization of the legis¬ lative department all the States except two made provision for the bicameral system which had been developed during the colonial times. Penn¬ sylvania and Georgia were the exceptions. They retained their single house. The lower branch was the more popular and numerous, the senate, as the upper house was most fre¬ quently styled, being not more than one-third or one-fourth its size. Representatives were vari¬ ously apportioned, not in general according to the population, but the local divisions of the town in New England and of the county else¬ where served as the basis of representation. Old inequalities were continued and in some instances new ones were introduced. For the senate the same unit of representation served as for the house in four States, but special senatorial districts were created in others. The members of the lower house were elected annually except in South Carolina, where the term was two years. In the majority of the States the term for the upper branch was also one year, but in four it varied from three to five years. In all of the States save three the mem¬ bers of both houses were elected directly by the qualified voters, but by the first constitutions of New Hampshire and South Carolina the mem¬ bers of the upper house were chosen by the lower out of their number and in Maryland there was a senatorial electoral college. A freehold or

property qualification was required in all the States for membership in either branch, and also for the executive, except in Pennsylvania, where the payment of a poll tax was sufficient. In addition to a higher age and residence requirement for senators, a larger property qualification was usually called for, as tire senate was supposed to represent property. Thus in New Hampshire a senator must possess a freehold of £200, the governor £500; in South Carolina £2,000 and £10,000 for the respective offices. In addition religious qualifications were

required by all the States for governor and members of the legislature, except New York and Virginia. The usual one was that the mem¬ ber must be a Protestant, in tvvo a Christian, but in four a believer in the inspiration of the Scriptures, and in Delaware of the doctrine of the Trinity as well. In the organization of the executive department all the constitutions, ex¬ cept two, made provision for a single executive, who was usually called the governor. By the first constitution of New Hampshire there was no provision for a distinct executive. In Penn¬ sylvania an executive board was established. In only three States was the executive elected by the people, in the others he was chosen by the legislature. His term of office was usually one year, but in two Middle States it was three years and in South Carolina two. In nearly all the States an executive council, elected by the legislature, was associated with the governor. This body inherited the advisory and adminis¬ trative functions of the old colonial council. It was to act as a check upon the governor, sharing with him the exercise of those few powers that had not been already vested in the legislature.

A comparison of the powers conferred upon the legislative and the executive departments re¬ veals the fact that the constitution makers were very much influenced by their colonial experi¬ ence. They were mindful of the recent contests between the royal and proprietary governors and the legislatures. This led them to fear execu¬ tive usurpation, . while it gave them great confi¬ dence in the legislature, which had boldly cham¬ pioned the rights of the people. Accordingly almost unlimited powers were conferred upon the legislature, while the governor was deprived of nearly all the customary powers of the colo¬ nial executive. He was entrusted with a quali¬ fied veto in Massachusetts alone. The appoint¬ ing power was exercised by the legislature in five of the States, in several they chose the more important officers, while in a few the governor was allowed to share this power with the coun¬ cil. As commander of the military and naval forces of the State the governor presents a more imposing figure than as a civil officer. On the other hand, save for the provisions in the Bill of Rights, almost no limitations were placed upon the powers

of the legislature. In addition to strictly legislative power it exercised also important administrative functions, as pre¬ viously indicated. In several States the upper house possessed certain judicial powers which were brought oyer from the colonial council, and suggest similar functions of the House of Lords, as the trial of impeachments, and in a few cases it acted as a court of last resort.

The judicial system of the colonies was in general retained under the State governments. While differing in particulars there was a sim¬ ilarity in the organization of this department in all the States. Many of the details were left for statutory enactment. The chief provisions in the constitution related to the method of ap¬ pointment and removal and the tenure of office of the judges. In Georgia alone the judges, with the exception of the chief justice, were elected by the voters. Elsewhere they were appointed, in about half the States by the legis¬ lature, in the others by the governor and coun¬ cil. The usual tenure of the Supreme Court judges was for good behavior, but in most of

the States they were removable. In all the States their salary was fixed by the legislature. The judiciary lacked security and independence owing to its dependence upon the legislature, but fortunately in general that body refrained from interfering with the freedom of the courts.

Property qualifications were prescribed for the exercise of the suffrage in all the 13 States either in the constitution or by law. These varied from the requirement that the elector should be a taxpayer to that of the possession of freehold of the value of £100. In a few States a larger amount was required for the electors of senators than for represen¬ tatives. In South Carolina the suffrage was further restricted to those who believed in God and in a future state of rewards and punish¬ ments. As a result of these provisions the ma¬ jority of white men were unable to vote. Al¬ though freedom of religion was proclaimed in almost every constitution, in several there was a close connection between church and state. In addition to the religious qualifications for office holding already referred to, the legislature was empowered in two New England States to require the support of Protestant clergy at pub¬ lic expense, and in Maryland of the Christian religion. South Carolina declared the Christian Protestant religion to be the established re¬ ligion. Provision was made for amendment in eight of these constitutions. Five under vari¬ ous restrictions reserved this power to conven¬ tions. Three gave the amending power to the legislature, but under such restrictions as a vote by two successive

legislatures or requiring a larger majority than for ordinary legislation; in the remainder there was no provision for amend¬ ment, thus leaving the power in the complete control of the legislature.

Space does not permit the further analysis of these documents. It should, however, be noted that the later constitutions, as those of New York and Massachusetts, were more com¬ plete and more carefully drawn than the earlier ones, their framers profiting from the experi¬ ence of the other States. All of these constitu¬ tions, while republican, were not democratic in character, as judged by later standards. The religious and property qualification, so charac¬ teristic of 18th century ideas, gradually disap¬ peared with the advance of the new century, and the chief defects of these instruments, the excessive power placed in the hands of the legislature and the weakness of the executive, were in time corrected. So conservative, how¬ ever were some of the original States, and so well adapted were these constitutions to serve the purpose for which they were designed, that five of them, although amended, were not super¬ seded for more than a half-century, and one, that of Massachusetts, is still in force.

The period from 1776 to 1780, it has been truly said, is (

ican institution, the constitutional convention, — such as the ones held in Massachusetts and New Hampshire, — which in subsequent years was accepted as the all-important organ for framing the State constitutions. The method these two States employed in drafting their constitutions through a constitutional convention, and its subsequent submission to the voters for their approval, came to be the normal practice followed in the other States in ordaining their organic law. See Constitution; Government — Constitutional Government.

Bibliography. — Baldwin, S. E., (Modern

Political Institutions) (1908) ; Borgeaud, C., (Adoption and Amendment of Constitutions in Europe and America) (1895) ; Bryce, J., Amer¬ ican Commonwealthˆ (4th ed.. New York 1910) ; Dealey, J. Q., (Our State Constitutions) (1907) ; Dodd, W. F., Amendment and Revi¬ sion of State Constitutions* (1910) ; Hitchcock, H., American State Constitutions) (1887) ; Jameson, J. A., Constitutional Convention* (4th ed., 1887) ; Lobingier, C. S., (The People's Law) (1909) ; Michigan Constitutional Conven¬ tion, (Digest of Excerpts from State Constitu¬ tions J (1907) ; Morey, W. C., (First State Con¬ stitutions in American Academy of Political and Social Science Annals'* (September 1893) ; Schouler, J., Constitutional Studies, State and Federal* (1897) ; Newman, T. H., ed., (Digest of State

Constitutions* (1912) ; Stimson, F. J., Caw of the Federal and State Constitutions of the United States) (1908); Thorpe, F. N., (Federal and State Constitutions) (with bibliog¬ raphy, 1909) ; Phillips, J. B., (Reccnt State Con¬ stitution Making* (1904).

Herman V. Ames,

Professor of American C onstitutional History, University of Pennsylvania.

9. THE PEOPLING OF THE UNITED STATES. During the first 60 years of the 17th century a substantial beginning of the permanent colonization of the Atlantic sea¬ board had been made. In this work the Eng¬ lish, Dutch and Swedes each played a part, but the chief role had been taken by the Eng¬ lish. Their colonization efforts, at first chiefly prompted by commercial reasons, were feeble. The Virginia colony established in 1607, owing to ignorance, the blundering methods followed and the hardships encountered, increased very slowly. In spite of successive reinforcements and the introduction of the family system its population amounted to only about 3,000 after more than 20 years. The religious and political situation in England was more effective in stimulating colonization than commercial in¬ ducements had been. The pioneers of the religious refugees, the Pilgrims, who settled at Plymouth in 1620, after 10 years numbered only some 300. But the triumph of absolutism in church and state led to the great <(Puritan Exodus® to New England. During the 11 years that Charles I reigned without a Parlia¬ ment, 1629 to 1640, some 21,000 immigrants came out. With the outbreak of the Civil War in England, however, this emigration ceased. In the meantime there had been a small immi¬ gration to Maryland, which had been founded in 1634, consisting of some English Catholics, but more Protestants, and a constant flow of colonists to Virginia, a considerable proportion of which was of the poorer class. A report

of 1638 states that (

Meanwhile in the middle region lying be¬ tween the two groups of English colonies, the Dutch and the Swedes had planted settlements. The former had taken possession of the Hudson Valley and the western part of Long Island, the latter had a foothold on the banks of the Delaware. The Swedish colonists were never numerous and after 17 years of precarious ex¬ istence in 1655 their small settlements of 200 or 300 souls passed into the control of the Dutch. The Dutch,

more prosperous and pop¬ ulous than the Swedes were much less so than their English neighbors, owing to the narrow policy of the Dutch West India Company, but by 1664 New Netherland had reached a popu¬ lation of 7,000. This, however, was not ex¬ clusively Dutch, for even at that early date the future metropolis was a cosmopolitan city. Some 18 different languages were said to have been spoken in New Amsterdam in 1643, and the English had overrun a considerable part of Long Island. The English government, shortly after the Restoration, jealous of the Dutch, de¬ cided to wrest the middle region from them. This was accomplished in 1664, and while the Dutch population long remained an important element in New York the Anglicizing process at once began. During the period between the Restoration and the English Revolution of 1689 a few colonists came to New England, more to Virginia and Maryland and a beginning of the colonization of the Carolinas was made, but the greatest immigration was to the middle col¬ onies. East and West Jersey were settled — the former by English direct from England or from the Puritan colony of New Haven, the latter by the English Quakers, — and the <(Holy Ex¬ periment® in Pennsylvania had made a most prosperous beginning, with its English and Welsh Quakers and a few Germans, the fore¬ runners of the great 18th century migration. By the close of this period the middle colonies numbered about 40,000 inhabitants, or about half as many as New England, while the total population of all the English colonies is be¬ lieved to have been about 200,000, and by 1700 is estimated by De Bow as 262,000.

During the 17th century the colonies were largely English, but in the 18th century the immigrants were chiefly of other races, nearly all the countries of northwestern and central Europe being represented. Already an im¬ portant and valuable, although not large French element had been introduced into the popula¬ tion, through the coming of the Huguenots, who, especially in the years following the Re¬ vocation of the Edict of Nantes (1685), found their way into nearly all the colonies, but were especially numerous in South Carolina and New York. A number of their descendants became prominent during the Revolutionary period. A

few Germans seem to have come to America with the Swedish and Dutch settlements, but it was not until the founding of Pennsylvania that any considerable numbers arrived. Their migration has been divided into three well-de¬ fined periods. The first from 1683 to about 1709, during which there was a small immi¬ gration into Pennsylvania of perhaps a few score a year, of certain religious sects, chiefly Mennonites. The second period, 1709-27, opens with the coming of the Palatines, thousands of whom, in consequence of the

ravaging of the Palatinate by war and the prevailing religious and economic tyranny, had taken refuge in England in 1709 with the hope of being aided to America. Queen Anne's gov¬ ernment sent some of them to the Carolinas but more than 3,000 were transported to New York, where most of them in a few years settled in the Mohawk and Schoharie valleys, but a few hundred dissatisfied with their treat¬ ment eventually found their way into Penn¬ sylvania. About 1710 Swiss Mennonites and Palatines began to come directly to Penn¬ sylvania, followed by Dunkers and various other sects. By the close of the second period a conservative investigator places the number of Germans in this colony alone as between 15,000 and 20,000. During the third period, 1727 to 1775, the number of immigrants reached enormous proportions. While a few hundred Germans and Swiss found their way directly to some of the southern colonies, especially to the Carolinas and Georgia, by far the greater number came to Pennsylvania. A careful esti¬ mate by Kuhns of the number passing through the port of Philadelphia, based upon the lists of arrivals during this period, gives an aggre¬ gate of nearly 70,000. Almost one half of these fall within the six years 1749 to 1754. So numerous were the German immigrants that the English and colonial authorities were at times alarmed for the safety of the colony. As will be noted later many of the Germans found their way subsequently to other colonies, but the majority of the authorities agree that in 1775 they comprised about one-third of the total population of Pennsylvania, or about 100,000. Most of these later immigrants did not come for religious reasons, as was the case with the sectaries of the earlier periods, but they were chiefly of the peasant class, who were seeking relief from the burdens of feudalism. They were an honest, industrious, simple and deeply religious people. Content with their new-found prosperity they took little part in colonial politics. Settling together they largely comprised the population of certain counties. So conservative were they and tena¬ cious of their customs and language, that whole communities of their descendants to-day speak a dialect commonly known as Pennsylvania Dutch.

Another equally important non-English ele¬ ment introduced into the colonial population was that of the Scotch-Irish, or better, the Scotch Presbyterians from Ulster, Ireland. Here their ancestors had made their homes for two or three generations, but driven by the religious bigotry of the Established Church, the commercial jealousy of England and the oppression of the landlords, they now sought a refuge across the sea. The emigration began

about the opening of the 18th century, but as¬ sumed considerable proportion by 1718. It is estimated that between 1725 and 1768 the num¬ ber of emigrants rose from 3,000 to 6,000 annually. In consequence of the famine of 1740 it is said 12,000 left Ireland annually for several years for America. It is estimated that fully 50 per cent of these were pure Irish as well as Scotch-Irish. Between 1771 and 1773 some 30,- 000 departed. Froude says <(that ships could not be found for the crowds that wanted to go.ˆ As a result of this emigration about one-half of the Presbyterian population of Ulster came to America. Some of these went to New Eng¬ land, several thousand sailed directly to Virginia and the Carolinas, but by far the great majority landed first on the shores of the Delaware and took up their settlements on the frontiers of Pennsylvania and spread from there southward. This colony has been rightly called <(the seed plot of frontier emigration, w for beginning about 1732 a constant stream of emigrants, composed of Germans and Scotch- Irish folk, flowed to the South and Southwest along the great valleys into the western portions of Maryland, Virginia and North Carolina. Eventually the Scotch-Irish pene¬ trated even further into South Carolina and Georgia. This sturdy and God-fearing people formed the chief element in the population of the frontier counties from Pennsvlvania to Georgia, overflowing into what later became Kentucky and Tennessee. It is estimated that the ˆScotch-Irish comprised about one-sixth of the colonists at the Revolution. The other provinces of Ireland contributed a large quota of the immigrants to the colonies. During the Revolutionary War 38 per cent of the American armies under Washington consisted of these men or their descendants.

The British colonists were in general a sub¬ stantial and highly moral folk, but it appears to be true that among the indentured servants there was a considerable number of transported criminals. Some political offenders were sent to America, chiefly Scotch prisoners of war. A few hundred captured at the battles of Dunbar and Worcester in 1650 and 1651 were sent to New England. Again, following the suppres¬ sion of the uprisings in Scotland in 1678 and 1716 and after the battle of Culloden in 1746 companies of Scotch prisoners were sent re¬ spectively to Virginia, Maryland and South Carolina. But recent investigation seems to indicate that by far the larger number of con¬ victs sent to America were not political offend¬ ers. Some criminals were sent to the colonies in the earlier period, but the practice be¬ came more common after the English statute of 1670 and especially after the act of 1718, by both of which transportation to America was permitted in place of capital punishment for certain crimes. The records of Old Bailey alone indicate that between 1717

and 1775 not less than 10,000 were transported. Doubtless in many of these cases there were mitigating circumstances. Proof exists that all the middle and southern colonies served to some extent as penal settlements, but the most of the prisoners appear to have been shipped to Virginia and Maryland. Stith in his 'History of Virginia,* published in 1747, wrote ((Virginia has come to be reputed another Siberia, or a hell upon

earths Scharf estimates the number of ban¬ ished criminals in Maryland at 20,000, one-half entering after 1750. But the servant class was not recruited chiefly from the criminals. The majority of them were honest immigrants, who redeemed their passage to America by being bound out as indentured servants. This class was very considerable in both the southern and middle colonies. They were more numerous and important than slaves in the South during the 17th century, and formed a very con¬ siderable and important factor in the economic life of the middle colonies in the following cen¬ tury. Pennsylvania had an especially large number, mostly German and Irish. In addi¬ tion to the whites, representing almost all the various branches of the Teutonic and Celtic races, there was another large foreign element imported into the colonies, namely, the African negroes, who were held as slaves. Although first introduced into Virginia as early as 1619, they were not numerous during the first half of the century. In the last half, however, they rapidly increased in Virginia and Maryland, so that by the opening of the new century they probably equaled the number of indentured servants in these colonies, and the African slave trade became as important branch of foreign commerce. The growing demand for slave labor on the plantations in all the southern colonies led to a great increase in their number. Bancroft places the total slave population of the English colonies as 59,000 in 1714, 78,000 in 1727, 310,000 in 1760 and about 500,000 in 1775, or approximately one-fifth of the total population. Fully four-fifths of these were in the colonies south of Pennsylvania and com¬ prised about one-third of the inhabitants of that section. Here was a racial element destined in time to affect materially the development of the life and thought not only of the South, but also the political and social history of the whole country.

The steady growth of the colonies during the 18th century is indicated by the following figures. According to the report compiled by the Lords of Trade in 1721 the population had increased to a half million. Dexter, a very careful investigator, estimates that by 1743 it had reached 1,000,000, by 1767, 2,000,000, and was about 2,500,000 at the opening of the Revo¬ lutionary War. His figures are in substantial agreement with those of Bancroft. It is prob¬ able that about one-third

of the population in 1775 were immigrants. The stream of immigra¬ tion was interrupted by the war, but began again after the return of peace. There is, how¬ ever, almost no data and even estimates appear to be lacking for the period of the Confedera¬ tion. It has been estimated that the number of immigrants to the United States in the decade following the first census of 1790 was about 5,000 per annum. This may serve as a rough basis for calculating the number for the pre¬ ceding decade, although it is hardly probable that it was as large during the unsettled years of the ((Critical Period.** See also Popula¬ tion.

Bibliography.— Baird, H. M., (A History of the Huguenot Emigration to America) (2 vols., New York 1885) ; Bancroft, G., (History of the United States) (Vol. IV, last ed., New York 1891) ; Butler, (British Convicts Shipped to American Colonies*; Dexter, Estimates of

Population in the American Colonies) (1887) ; Dubois, 1 Suppression of the African Slave Trade to America) ; Hanna, (The Scotch- Irish in America > (1902); Kuhns, (The Ger¬ man and Swiss Settlements of Colonial Penn- sylvania > (1901) ; Lodge, H. C., (Short His¬ tory of the English Colonies in America) (1881) ; MacLean, (The Scotch Highlanders in America) (1900) ; McLaughlin, A. C., and Hart, A. B., (Cyclopedia of American Govern¬ ment (Vol. II, pages 739 to 757, New York 1914) ; Rossiter, W. S., (A Century of Popular Growth, 1790-1890) (1909) ; United States

Census Bureau, (Decennial Reports) (7t'h to 13th, 1850-1910) ; Wright, C. D., and Hunt, W. C., (History and Growth of the United States Census 179O-1890) (1900).

Herman V. Ames,

Professor of American Constitutional History, University of Pennsylvania.

10. FINANCES (1775-1789). The fiscal

systems of the American colonies were of a sim¬ ple character ; expenditures were small and taxes correspondingly light. Some of the local governments levied excise duties upon articles of luxury; nearly all placed tariff duties upon imports or exports; and the property tax was generally imposed. Illustrations of tariffs are found in tonnage duties, export duties on tobacco, import duties on slaves, and in a few colonies in more extensive tariff schedules on a considerable number of articles of merchandise. Public credit was almost unknown; there were no banks in the modern sense, and conse¬ quently no influential agencies for making loans. When emergencies arose, necessitating extraordinary expenditures, the colonies gen¬ erally resorted to emissions of bills of credit, or promissory treasury notes. In some instances these issues were so large that the notes depreciated in values, resulting in partial repudiation. When hostilities actually broke out in 1775, the Continental Congress found itself without recources and without power to collect reveune; funds, how¬ ever, were needed at once, and there seemed to be no other recourse than to issue bills of credit. The agitation for separation from the mother-country was in a large meas¬ ure inspired by the suspicion that England in¬ tended to impose a system of taxation with¬ out the consent of local bodies ;

and this suspicion of external taxation extended even to the collection of revenue by the colonies in common. Each commonwealth wished to maintain its revenue powers without abatement even if the object was the good of the whole. Between June 1775 and November 1779 there were 40 emissions of notes with a total issue of $241,000,000. In addition the States put out $209,000,000. These issues rested upon the faith of Congress which repeatedly called upon the several States to provide means for redemption, but these pledges were not -made good. The notes consequently depreciated in value, until in 1780 Congress recognized that its efforts were in vain, and made provision for the accept¬ ance of paper in place of silver at the rate of 40 to 1. Depreciation continued until the notes were regarded as worthless. The Fund¬ ing Act of 1790 provided for the retirement of notes, still in circulation, at a rate of 100 to 1 ; at this date is was estimated that about

$78,000,000 was still outstanding. See Money, Paper.

Congress also sought fiscal aid by making requisitions on the different States, by borrow¬ ing both at home and abroad and by attempts to secure national taxation. Requisitions were made both in specie and in specific supplies ; the yield of the former was less than $6,000,000, and the demand for specific supplies in the form of corn, beef, hay, etc., proved not only wasteful but ineffective. In order to borrow money, loan offices were established in the sev¬ eral States, at which indented certificates were sold, bearing interest varying from 4 to 6 per cent. In all $63,000,000 was thus borrowed, having a specie value of $7,600,000, according to the scale ot depreciation adopted by Con¬ gress in 1780. After 1782 Congress was unable to pay the interest and, therefore, issued to the holders of certificates indents which became current in the payment of State taxes and were receivable by Congress in the payment of requisitions made upon the States. Foreign loans, 1777-83, were obtained as follows: France $6,352,000, Spain $174,000, Holland $1,304,000. Small loans were obtained in France as early as 1777 and these proved of great service in the purchase of military supplies and in the payment of the interest of the domestic loans. Beginning with 1782 bankers' loans were placed in Holland, and fortunately these were continued after peace was restored until the new government was established in 1789. During the years 1784 —89, the Dutch loans amounted to $2,296,000. The efforts to secure a national tax were unsuccessful. The Articles of Confederation, which went into effect in 1781, practically granted no financial power to the new government. It was pro¬ vided that all expenses for the common de¬ fense or general welfare should be deferred out of a common treasury supplied by the several States in proportion to the value of

land and improvements; and the taxes were to be levied under the direction of the State au¬ thorities. In 1781 Congress recommended a duty of 5 per cent on imports, but unanimous consent could not be obtained from the States; in 1783 a more elaborate tariff was proposed, but again the approval of the States could not be secured.

The administrative management of the finances by. the Continental Congress well illus¬ trates the jealous attitude of a democracy de¬ sirous of maintaining, its liberties and fearing all forms of centralized authoritv. At first there were two treasurers, then a committee of 13 Congressional delegates, followed by a treasury board which handled all public moneys. Finally in 1781 the fiscal machinery was con¬ centrated, and Robert Morris was chosen super¬ intendent of finance. By the use of his per¬ sonal credit in borrowing funds, he introduced new vigor into the government, but his efforts to create a national system of revenue were fruitless. Through his advice the Bank of North America was established and during the years 1782—83 this proved of aid in making temporary loans to the government.

In 1784 the indebtedness of the national government, apart from the outstanding bills of credit, was $39,000,000, bearing an annual inter¬ est charge of $1,875,000. This burden together with the ordinary expenses of government

proved too much, and the national treasury rapidly drifted toward complete bankruptcy. In 1787 a national convention was held to frame a constitution which should endow the govern¬ ment with larger financial powers. The new Constitution gave to Congress the power to lay and collect taxes, and denied to the States the right to lay duties on imports or exports except what might be absolutely necessary for execut¬ ing its inspection laws. This gave to the gov¬ ernment the power it had so sadly needed, and proved to be a firm support when the new gov¬ ernment went into operation in 1789. See United States — Finances (1789-1816).

Bibliography. — Bolles, A. S., financial History of the United States from 1774 to 1885 } (4th ed., New York 1894-96) ; Bullock, C. J.,

(Finances of the United States from 1775 to 1789 > (Madison, Wis., 1895) ; Dewey, D. R., financial History of the United States) (5th ed., New York 1915).

Davis Rich Dewey,

Massachusetts Institute of Technology. 11. THE FEDERAL CONVENTION OF 1787. Early in the War of the Revolution the several colonies represented in that revolu¬ tionary body, the Continental Congress, recog¬ nized that some form of a regularly ordained central government was desirable. It was 17 Nov. 1777, however, before that body could agree upon the draft of a constitution; the Articles of Confederation, and the delay in ratification by the legislatures of the States prevented the new government being established until 1 March 1781. Even before the Articles were drafted the national enthusiasm of the years 1775-76 had cooled, most of the States had meanwhile drawn up their constitutions, and having had the selection of governmental powers there was little left to confer upon the general government, as they held tenaciously to all the powers they had appropriated. The States also became jealous of Congress and of each other. (

toward decentralization, — the general govern¬ ment being regarded as burdensome, — and the authority and character of Congress declined.

In practice the lack of power of Congress to lay taxes soon greatly embarrassed it. It depended wholly upon requisitions on the States for the means of paying the interest upon the debt, contracted to carry on the War of Inde¬ pendence and to meet the current expenses of the government. These were largely neglected or refused. Even before the Articles had gone into effect this defect was anticipated, and as a step toward greater efficiency the Continental Congress recommended, on 8 Feb. 1781, an amendment to the State legislatures, authorizing the general government to lay a duty of 5 per cent ad valorem on imports to pay the foreign debt. All the States consented except Rhode Island. She considered it <(the most precious jewel of her sovereignty that no State be called upon to open its purse, but by the authority of the State and by her own officers.® Her refusal was sufficient to defeat the project, although Virginia soon afterward withdrew her consent.

In the fall of 1781 Congress made requisi¬ tion for $8,000,000, but over a year later only $500,000 had been paid. Accordingly, that body again proposed another revenue amendment, 18 April 1783, this time seeking for a grant of power to lay moderate specific duties on certain enumerated articles and 5 per cent on all others for the period of 25 years. As a concession to the States the collection was to be made by officers appointed by them. This proposition met with even a less cordial response than the former one. As late as 1786 four States had

failed to give their assent, finally all but that of New York's was secured, but Governor Clin¬ ton twice declined to act upon the request of Congress to summon the legislature of that State in special session to reconsider its action, and so defeated the amendment and rendered the financial situation critical, as the compliance with requisitions had grown even more lax. Between 1782 and 1786 Congress had called for $6,000,000, but it received only $1,000,000. Some like Georgia, had paid nothing, nearly all were in arrears, while New Jersey expressly refused to pay its last quota as a protest against the illiberal policy of New York. The impotence of Congress could not be more clearly demon¬ strated. A committee of Congress in 1786 de¬ clared that any further dependence on requisi¬ tions would be <(dishonorable to the understand¬ ing of those who entertain such confidence,® and that (

The failure of the Articles to confer upon Congress power over commerce, either foreign or domestic, proved almost equally disastrous. England refused to grant us commercial rights, realizing that Congress had nothing to give in return and was powerless to retaliate. Con¬ gress, therefore, proposed a third amendment on 30 April 1784, asking the States to grant to it for 15 years the power to prohibit the en¬ trance into the ports of the country the vessels of foreign countries not having commercial treaties with the United States. This was es¬ pecially aimed at Great Britain, and it was hoped

that it would be instrumental in securing favor¬ able commercial concessions from her and other foreign nations, but more than two years later several of the States had failed to comply with the terms of the proposition. This attempt fail¬ ing, each State was left to regulate trade in its own way, and the way of each differed from that of every other. Not only did it prove impossible to secure a uniform policy toward foreign nations, but they were soon engaged in what Washington termed ((a war of imposts® with each other, as each State had a different set of tariff and tonnage laws, which engen¬ dered discord, rivalry and retaliatory regula¬ tions. Madison thus describes the situation : ((The States having ports for foreign commerce taxed and irritated the adjoining States trading through them.® New Jersey, lying between New York and Philadelphia, was compared to a cask tapped at both ends, while North Caro¬ lina, situated between Virginia and South Caro¬ lina, was likened to a patient bleeding at both arms.

The financial and industrial condition of the States was also very bad. In 1786 the situation was one of general depression, bankruptcy was impending. Seven of the States had sought relief in large issues of paper money. In west¬ ern Massachusetts the debtor class rose in an outbreak, known as Shay's Rebellion in November of that year, and before it was sup¬ pressed had greatly alarmed the friends of law and order and those who respected the rights of property. This outbreak is chiefly important owing to its influence in creating a sentiment favorable to a stronger national government. All signs seemed to point to an early dissolu¬ tion of the Union. ftOur situation,® wrote Madi¬ son, <(is becoming every day more and more critical. No money comes into the federal treasury, no respect is paid to the federal au¬ thority, and people of reflection unanimously agree that the existing confederacy is tottering to its foundation.®

The Articles of Confederation provided for but one way of amendment, but the requirement of securing the unanimous consent of all the States as well as of Congress rendered the amending provision nugatory. Some other means had to be found to reach the people than that prescribed by the Articles, if reforms needed were to be secured, but any other method would be extra constitutional and per¬ haps revolutionary. Such a means, however, had been already suggested. Passing by the early proposal for a convention by Thomas Paine in 1775, by Alexander Hamilton in 1780 and by Pelatiah Webster in 1781, it is worthy of note that the legislature of New York in July 1782, under the influence of Hamilton, was led unanimously to recommend the calling of a convention to revise the Articles of Con¬ federation. After the news of peace in April 1783, Congress took up this resolution only to defer action, but Washington, in June, ad¬ dressed communications to Congress and to the governors of the States urging the convoking of <(a constitutional convention® ((to form a new Constitution that will give consistency, stability and dignity to the Union.® This en¬ couraged Hamilton to present his resolutions to Congress, but without result. At the sugges¬ tion of Governor Bowdoin the legislature of

Massachusetts, 1 July 1785, adopted resolutions also calling upon Congress to recommend a con¬ vention to revise the form and powers of the government. But the States' delegates in Con¬ gress disobeyed their instructions and failed to present the resolutions, justifying their ac¬ tion on the ground that ((to seek reform through a convention is a violation of the rights of Congress and . . . must meet their disappro¬ bation.® From these failures it was clear that the plan of inducing Congress to initiate the called of a convention was vain. Some more indirect way of reaching the people must be resorted to. Fortunately it

was shortly found. Owing to the friction resulting from the con¬ flicting commercial regulations the legislatures of Virginia and Maryland had appointed com¬ missioners, who met in the spring of 1785 to prepare the terms of an agreement for the jurisdiction over the waters common to both States. The legislature of Maryland approved of their report but desired that Delaware and Pennsylvania be invited to join with them in a common system of commercial regulation. James Madison, a member of the Virginia legis¬ lature and an advocate of a stronger union, took advantage of this suggestion and was instru¬ mental in securing the adoption by the Virginia legislature, 21 Jan. 1786, of a resolution invit¬ ing all the States to send delegates to a con¬ vention to be held at Annapolis in September, to take into consideration the question of the commerce of the whole country. Only Vir¬ ginia and the four middle States were present at Annapolis. Realizing that they were too few for important action, at the suggestion of Ham¬ ilton, the convention issued an invitation to the States to attend a new general convention to meet at Philadelphia on the second Monday of the following May, to consider the whole situ¬ ation of the United States. Virginia at once elected delegates, and six other States did like¬ wise, before Congress took action. Finally, on 21 Feb. 1787, that body was led to give its sanction, although avoiding all reference to the other call, it fixed upon the same time and place for a convention as already proposed, ((for the sole and express purpose of revising the Arti¬ cles of Confederation and reporting to Congress and the several State legislatures.®

The convention was formally organized on 25 May 1787 with the election of Washington as president. For nearly four months it con¬ tinued in session in Independence Hall, sitting with closed doors, as nothing but its completed work was given to the public. Not till 1819 was its journal published, and Madison's notes, the best report of the debates preserved, were not printed till over half a century after the con¬ vention adjourned. All of the States but Rhode Island were represented, although New Hamp¬ shire was not present until 23 July. Seventy- three delegates are known to have been ap¬ pointed, but of these only 55 were in attendance. They comprised nearly all of the men of the greatest experience, authority and ability in the country. All but 12 had served in Congress and knew at first hand of its impotence. Among the delegates — classed by the parties into which they were shortly grouped — may be men¬ tioned as the leaders of the Nationalists, Madi¬ son, Hamilton, Wilson, Gouverneur Morris, Charles Pinckney and King; as the champions of the confederation, Paterson, Lansing, Yates,

and Luther Martin, while chief among the advo¬ cates of compromise were Franklin, Sherman, Ellsworth, Dickinson, Gerry and C. C. Pinckney. Many difficulties confronted the convention at the outset, owing to the conflicting instructions of the State legislatures and the divergent views of the members. They were at first divided into groups of the large and the small States, ihose who wished to draw up an entirely new scheme of government national in scope, and those who simply desired to amend the Articles. As the work of the convention progressed other com¬ binations were effected, in which the North was arrayed against the South, or the commercial against the agricultural States. The task before the delegates was to harmonize all these conflict¬ ing ideas and interests so that they might be brought to substantial agreement upon a plan which was calculated to command the approval of the people and infuse new life into the Union.

On 29 May, as soon as the convention had been fairly opened, Edmund Randolph presented the Virginia plan, which was probably largely drawn by Madison. It proposed a fundamental change in the government from a confederation to a federal union of States. It made provision for three distinct departments of government, a national legislature, executive and judiciary. The legislature was to consist of two branches, the first branch (representative) to be elected directly by the people of the respective States, the second (senate) by the first branch out of candidates nominated by the State legislatures. Representation in both branches was to be ap¬ portioned among the States according to the quotas of contribution or the free inhabitants. In addition to the powers under the confeder¬ acy, the Congress should legislate in all cases in which State legislation would interrupt the harmony of the United States, should have a negative on State laws contravening the articles of union or its laws and treaties and might coerce a delinquent State. The executive should be chosen by Congress for a limited term, and with a part of the judiciary should form a council of revision with a limited veto on legis¬ lation. An independent national judiciary was provided for. The remaining resolution related to the admission of new States, the guaianteeing to each State a republican form of government, the requirement of an oath to support the na¬ tional Constitution from State officers, provi¬ sion for amendment and the ratification of the new Constitution by conventions of the people. This plan was nationalistic in its tendency, al¬ though favoring the large States. It became the basis of the

Constitution. On the same day Charles Pinckney, of South Carolina, presented a plan of government. The so-called ((Pinck- ney Plan,® first published in 1819 in the jour¬ nal of Congress, J has long been known to be a document of little authority. Recently at¬ tempts have been made to reconstruct this plan, and within the last few months a contemporary manuscript has been found giving what is be¬ lieved to be the chief provisions of this plan. This would seem to indicate that the plan Pinckney actually presented suggested a con¬ siderable number of provisions that were incor¬ porated into the completed Constitution, and entitle him to greater credit than he hitherto has been accorded by scholars. It is impossible here to present the details of this draft, but

suffice it to say that it was national in character, made provision for the three departments of government, namely, a bicameral legislature — the Senate and House by name — a single ex¬ ecutive with the title of President and a Fed¬ eral judiciary, and suggested several additional features in regard to the powers of the execu¬ tive and legislative departments.

The debates in the convention naturally fall into three periods. During the first period, from 30 May to 19 June, the proceedings took place chiefly in the committee of the whole. The Virginia plan was under discussion for several days, when on 13 June this plan, some¬ what amended, but practically intact, was re¬ ported favorably to the convention in 19 reso¬ lutions. The chief changes made provided that a national government ought to be established, that the term of members of the lower house should be three years and of the upper seven years, and for the executive one term of seven years, and dropped the clauses for the coercing a State and for the council of revision, leaving to the executive a limited veto. During this discussion the antagonism between the large and small States had become evident, as the provision for proportional representation in both houses had been retained. This would give to the large States of Virginia, Massa¬ chusetts and Pennsylvania nearly a majority in both branches of the legislature. North Car¬ olina, South Carolina and Georgia also voted for this provision, probably in anticipation of future growth. This called forth a plan from the small States, which was presented on 15 June by Wiiliam Paterson of New Jersey, and is generally known as the New Jersey plan. This proposed no change in the basis of the government, which was still to be a confederacy. The existing Congress was to be preserved, but a plural executive chosen by Congress and a judiciary appointed by the ex¬ ecutive department with well-defined jurisdic¬ tion were provided for. Congress was to be given additional powers to enable it to levy customs duties and

internal taxes, and to regu¬ late commerce and for enforcing the payment of requisitions. The acts of Congress and trea¬ ties were to be (

delegates remarked, <(Hamilton was praised by many but supported by none.®

During the second period of its deliberations, which extended from 19 June to 26 July, the convention was occupied in the discussion of the 19 resolutions agreed to in committee. It was in this period that the great contest between the large and small States, or, better, between the national and confederate parties took place. The nature and character of the new organization was at stake, and was involved particularly in the determination of the question of represen¬ tation. The large States insisted upon propor¬ tional representation in both houses of Congress, the small States refused to enter the Union on any such terms. On 2 July a proposition for equal representation in the Senate was lost. The excitement was intense, the Convention seemed on the point of dissolving. Sherman declared, <(We are now at a full stop. Nobody, I suppose, means that we shall break up, with¬ out doing something® ; and he suggested a com¬ mittee as <(likely to hit on some expedient.® The matter thereupon was referred to a com¬ mittee of one from each State. They reported 5 July, favorably to equal representation in the Senate and proportional in the House, and as a concession to the large States that the House should originate money bills. To the resolu¬ tion as reported there was subsequently added the proviso that in the apportionment of repre¬ sentatives and direct taxes (

Pinckney and New Jersey plans were referred to this committee. Then the Convention adjourned until 6 August to await the com¬ mittee's report. On that date they reported the draft of a Constitution in which the main features of the completed Constitution already appear.

We now approach the third period of the work of the Convention, extending from 6 August to 17 September. During these six weeks the debate over the details of the draft progressed, and while great diversity of opinion was exhibited, it proceeded in the main without undue excitement, although the difference in the interests of the Northern and Southern States over commerce and slavery aroused for a time considerable excitement. Already during the preceding period

it had become evident, as Madison records, <(that the real difference of interest lay not between the large and small States, but between the northern and southern States. The institution of slavery and its con¬ sequences formed the line of discrimination.® But these yielded, as in the case of so many other issues, to compromise. In regard to com¬ merce it was agreed that Congress might regu¬ late foreign and interstate trade but should not have power to lay any export tax. This was a compromise between the commercial States of the North and the agricultural States of the South. Again the Northern States desired that Congress should have power to pass navigation acts, but the three extreme Southern States ob¬ jected, and refused at first to sanction the power except by a two-thirds vote of Congress for fear that the slave trade might be inter¬ dicted. The situation became critical, and again a committee of one from each State was re¬ sorted to. On 24 August they reported a com¬ promise which as amended provided that Con¬ gress should not prohibit the slave trade prior to 1808, but might impose a tax not to exceed $10 per head on such importations. This was carried by the votes of New England and those of the Carolinas and Georgia. By a simi¬ lar combination of votes the clause requiring a two-thirds vote to pass navigation acts was defeated. It is noteworthy that the Virginia delegates earnestly opposed this compromise. Subsequently the provision in regard to the rendition of fugitive slaves was agreed .to. This probably formed a part of the above-men¬ tioned compromise. These compromises were severely condemned by later generations who forgot that slavery at that day hardly was re¬ garded as a great moral issue. It is altogether probable, also, that these compromises generally have been over-emphasized and that others, per¬ haps of equal importance, have been overlooked. Certainly it is true, as has been well said, that ((the Constitution is a series of compromises.® No question gave the framers of the Constitu¬ tion so much trouble as the choice of the execu¬ tive. The Convention vacillated between several plans and showed a strange fluctuation of senti¬ ment. Several times it voted in favor of elec¬ tion by Congress ; once it agreed to a choice by electors chosen by the State legislatures — a plan subsequently twice rejected. After re¬ peated reconsideration the special committees in their report of 4 September recommended the electoral system very nearly as it was finally adopted on 6 September. This was regarded as a compromise between the large and the

small States, as by many it was expected that the ultimate election

would usually devolve upon the House voting by States. Thus it was said that the large States would nominate while the small States would elect. Over the organization of the executive, also, there was great differ¬ ence of opinion between those who desired a strong executive, vested in one man, and those who feared an approach to monarchy. These conflicting ideas were compromised by con¬ ferring upon the President great powers, but giving to the Senate or both branches of Con¬ gress certain checks and limitations upon the exercise of those powers.

It is impossible to enter further into the de¬ tails of the convention. Suffice it to add that on 8 September, when the members approached substantial agreement on the chief provision of the Constitution, a committee of five on ((style and arrangement® was appointed. This com¬ mittee made its report, largely drawn by Gouv- erneur Morris, on 12 September. It was ar¬ ranged in seven articles with the various sec¬ tions as in the present Constitution. Discus¬ sion upon this report continued until the 15th, when the Constitution as amended was agreed to. On Monday, 17 September, the draft of the Constitution was signed by 39 of the delegates and the convention adjourned sine die. Three delegates present, Gerry, Mason and Randolph, refused to sign, owing to the strong national features of the document, and to the rejection of the proposal to hold a second convention to consider amendments that might be recom¬ mended by the State conventions. There is evi¬ dence that only four of the 13 delegates who had been in attendance, but were absent at the time of adjournment, were opposed to the Constitu¬ tion; certainly the majority approved of it.

It has been truly said that <(if Americans possess political genius to any degree, it is for adapting old institutions to new needs.® The work of the framers of the Federal Constitu¬ tion strikingly illustrates the force of this state¬ ment, and the institutional development of our fundamental law. The framers drew largely upon their experience both during the colonial times and under the State governments, and the chief features of the Constitution are but a se¬ lection and adaptation of the provisions of the contemporary State constitutions. The Consti¬ tution made provision for the establishment of a government which was neither wholly national nor wholly federal, but partaking of the feat¬ ures of both. It provided for a mixed system. As Madison remarked, <(In some respects it is a government of a federal nature, in others, it is of a consolidated nature.® Thus in the legis¬ lature, consisting of two bodies, the Senate is based upon the federal, the House upon the national principle. In the new organization of the government the legislative department was improved, the executive and judiciary were sub¬ stantially created.

All were modeled in large measure after the similar departments in the State governments. The powers of the general government were greatly increased, while those of the State governments were correspondingly decreased. Certain express limitations were laid upon the latter and certain other powers were denied both to the State and to the Federal governments. The convention by a tie vote refused to add a bill of rights, as the opinion prevailed that such a guarantee of individual

rights was unnecessary as the Federal govern¬ ment was one of delegated powers only. By providing that the ratification of nine States should be sufficient to establish the new govern¬ ment the work of the convention was revolu¬ tionary.

In accordance with its resolves the Consti¬ tution was transmitted to Congress and after some attempts to amend, that -body finally agreed unanimously 28 September, in accord¬ ance with the desire of the convention, to trans¬ mit the Constitution to the legislatures of the several States to be submitted to State conven¬ tions. At once there sprang up a great pam¬ phlet and newspaper contest over the merits of the proposed frame of government. The most famous of these was a series of letters in ad¬ vocacy of the Constitution written by Hamil¬ ton with the aid of Madison and Jay, subse¬ quently collected under the title of (The Feder¬ alistˆ These exerted a profound influence throughout the country. (The Letters of the Federal Farmer> by Richard Henry Lee, one of the foremost opponents of ratification, had the widest circulation and were the most ef¬ fective of the pamphlets on the other side. The country was shortly divided into the Federalists and the Anti-Federalists. The former com¬ prised chiefly the professional and commercial classes, who favored the new government be¬ cause it would promote national credit and commercial intercourse. The Anti-Federalists were mainly the agricultural classes, who were the advocates of paper money, stay and tender laws and who opposed increased taxation. Geographically the strength of the Federalists was near the seacoast and in the few important valleys which were the highways of commerce inland, while that of the Anti-Federalists was in the interior and agricultural sections.

Hardly a provision of the Constitution es¬ caped criticism, but the absence of a bill of rights was the most common and weighty ob¬ jection raised. The fear that the strong gen¬ eral government provided for would encroach upon the sovereignty of the States and the lib¬ erty and rights of the individual was the chief obstacle to be overcome. The first State to ratify was Delaware (7 Dec. 1787),

followed in the course of a month by Pennsylvania, New Jersey, Georgia and Connecticut. In three of the States the vote was unanimous, and in Pennsylvania and Connecticut ratification was carried without difficulty, although in the for¬ mer State there was a vigorous but small oppo¬ sition. The first close struggle occurred in Massachusetts. The convention was very evenly divided and ratification was only secured (7 Feb. 1788) by a narrow margin, through the Federalists agreeing to the recommendation of a series of amendments. This plan was fol¬ lowed by all the subsequent conventions save Maryland, which ratified in April. All ex¬ cept five States had now taken favorable action, but it seemed very doubtful if any one of the five remaining States could be brought to accept the Constitution uncon¬ ditionally. The Virginia convention was the first of these to assemble, but the discus¬ sions were so prolonged that New Hamp¬ shire ratified before it, on 21 June, by a ma¬ jority of 11, making the ninth State, and thus ensuring the inauguration of the new system. Virginia followed on 25 June, by a majority of

10 votes in favor, out of 186, under the impres¬ sion that it was the ninth State to take action. The effect of these two ratifications upon the New York convention was fortunate. At first the opponents to unconditioned ratification had been in the majority. Finally a few of the opposition yielded sufficiently to permit of rat¬ ification by a majority of four, but this action was secured only by the Federalists consenting to a call for a second general constitutional con¬ vention to consider amendments. Happily this convention was never held. It has been impos¬ sible to refer to the important influence of cer¬ tain men in the State conventions, but at least passing note should be made of the astuteness of the Federal leaders in the Massachusetts con¬ vention, of the heroic services of Hamilton and Madison and the strenuous opposition of Pat¬ rick Henry and Lansing in their respective State conventions. Favorable action had finally been secured in the doubtful States, owing to the realization that the alternative of <(the Constitution or disunion® was before them to choose from. John Quincy Adams truly said, ((The Constitution was extorted by grinding necessity from a reluctant people.® Of the two remaining States, the North Carolina convention on 2 August refused to ratify without a bill of rights and the Rhode Island legislature repeatedly refused to call a convention. Finally, after the new government had been inaugurated, and Congress, in response to the general demand for a bill of rights, had submitted a series of amendments to the States, North Carolina ratified 21 Nov. 1789, but

Rhode Island's adherence was not secured until 27 May 1790, by a majority of two votes, and only then as a result of threatened hostile commercial legislation by Congress. Thus the 13 original States were finally reunited under the new Constitution. See Congress, Continental.

Bibliography. — (The Documentary History of the Constitution (issued by the Depart¬ ment of State, Washington, D. G, 1894-1905) ; Bancroft, G., (History of the Formation of the Constitution (1882) ; Curtis, G. T., his¬ tory of the Constitution > (1854) ; De Tocque-ville, Alexis, (On Democracy in America) (2 vols., New York 1894) ; Elliot, J.,

Herman V. Amf.s,

Professor of American Constitutional History , University of Pennsylvania.

12. BEGINNINGS OF PARTY OR¬ GANIZATION AND GROWTH OF THE PARTY SYSTEM AND PARTY MA¬ CHINERY. Political parties so-called have

existed in the United States from the beginning of its independent national life. Even earlier, while the colonies owed alle¬ giance to the governments of Europe, there were traces of political divisions and group¬ ings among the colonists according to their inclinations to sympathize with one or an¬ other of the political groups contending for power in the old home, or according to their differing views upon colonial and local affairs. But party organization there was none until near the end of the I8th century. Federalists and Anti-Federalists were the parties of the great discussion upon the adoption of the Con¬ stitution, but they were unorganized groups of the leaders of opinion and their supporters, divided by their opposing views upon the sole question in debate. After that contest had been ended by the triumph of the Federalists the party names persisted for a time, and the divi¬ sions were upon, questions of constitutional interpretation. No organs were developed for perpetuating these early parties or for enlarging their political functions. The beginnings of a form of organization which did permanently affect the development of the oldest of our true American parties appear during the first admin¬ istration of Washington in the Democratic clubs that sprang up and spread rapidly through the country. These were in some cases organ¬ ized in a manner remotely comparable to the organization of a. modern party and did effective service in strengthening the group which sup¬ ported the views of Jefferson. They were, how¬ ever, discredited by

the turn of events and their development was checked.

Party organization arose out of the search for methods of political action which would secure in a representative democracy the choice of men as servants of the people who would be truly acceptable to the people. To this end and in order that the electoral forces might not be scattered and lost, it was found necessary to make use of some form of nomination of candi¬ dates previous to an election. After the adop¬ tion of the Constitution the irregular and vary¬ ing local methods previously in use (the secret caucus, the open public meeting, the local unor¬ ganized convention, assisted by systems of cor¬ respondence and consultation) were rapidly ex¬ tended and made more effective, while more central agencies of nomination for State and national officials were developed. The difficul¬ ties and expense of travel led to the rise of the legislative caucus system for the nomination of State officers as early as the year 1790. The opposing parties were both represented in the State assemblies by prominent members and it seemed but a natural expansion of their regular duties that they should choose suitable candi¬ dates for the State offices. Their recommenda¬ tions were made known by proclamations signed by members of the caucus. Against constant and severe criticism the legislative caucus con¬ tinued in most of the States to exercise the power which had almo.st by accident fallen into its hands down to the year 1824, and even later in a few States ; then, under the pressure of popular demand, it gradually gave way to the growing convention system. In many instances during the period of its prevalence the legisla¬ tive caucus of the States assumed the privilege of nominating Presidential candidates.

The last years of the 18th century were

marked by the rise of a distinct party organ for the nomination of national elective officers. 1 his was the Congressional caucus which was of an origin similar to that of the legislative caucus of the States and grew out of the prac¬ tice of the Federalist members of Congress of meeting, with more or less formality and offi¬ cial sanction, for the discussion of party policy. It was easy to carry over into the field of nomi¬ nation the party power in their hands. Ham¬ ilton is credited with suggesting the first formal action of the Congressional caucus of the Fed¬ eralists in favor of a candidate for the Presi¬ dency in 1800, and so of originating the party organ. Evidences of such use of the Repub¬ lican party caucus are to be found, however, in the history of

the previous campaign. Both parties did so nominate candidates for the elec¬ tion of the year 1800. The efficiency, conven¬ ience and economy of the new agency, together with a natural human reluctance to surrender power once grasped, led to its continued use against constant and growing popular opposi¬ tion. It was seen to have become fully estab¬ lished as a party organ when, in 1808, the Re¬ publican caucus was called by the senator who had presided over that of 1804, <(in pursuance of the powers vested in him.® By the Jeffer¬ sonian Republican party it was made so able and efficient a party engine as to render the acceptance of its decisions a practical test of party loyalty, not only in the official circle but throughout the rank and file of party member¬ ship in the country. Party discipline was firmly enforced and the Republican represen¬ tatives in Congress saw that the behests of the caucus were respected in all the States. The nominating agencies in the States were manip¬ ulated in a manner to strengthen the national party organ, and the minority became almost helpless before it.

No method for choosing Presidential elect¬ ors was prescribed by the Constitution, that matter being left to each State to determine for itself. Three systems were employed in the early elections. In some of the States the legisla¬ tures chose the electors. In others candidates were nominated in large assemblies of promi¬ nent citizens, including members of the legisla¬ ture, which foreshadowed the State conven¬ tions of later days. Names so chosen were placed upon the general ticket of the party. Other States elected the electors by Congres¬ sional districts. The general ticket system gained ground over the others until by the year 1860 it was practically universal. The su¬ premacy of the Congressional caucus, supple¬ mented as it was by the power of the legisla¬ tive caucus in the States, transferred the po¬ litical authority of a free, democratic peo¬ ple to the hands of a few powerful leaders. The effects of the popular dissatisfaction with this form of party organization were apparent first in the yielding of the caucus in some of the States. The districts where the party was in a minority complained that they were un¬ represented in the legislative caucus, and in concession to their demands a modified form of the caucus began to be used (first in Rhode Island) about 1807. This was known as the «mixed caucus,® and was composed of the party members of the legislature together with dele¬ gates elected by the party in the districts in which the party sent no representatives to the

legislature. Some 10 years later still further concession was made to public sentiment (first in Pennsylvania), by substituting a <(mixed con¬ vention® for the mixed caucus. This also was made up of delegates popularly elected in the counties, along with members of the

legislature, but the members of the legislature were per¬ mitted to sit in the convention only when they represented counties from which no special dele¬ gates had been chosen.

From 1817 to the final overthrow of the legislative caucus, which for nearly all of the States was completed in 1832, the mixed con¬ vention was preparing the way for the ad¬ vent of a truly representative nominating ma¬ chinery, the State convention. Pennsylvania was again the first State to take the advance step. In like manner the Congressional caucus gave way slowly before the popular distrust, but its ultimate destruction became certain when, in 1816, it manifested a determination to force upon the Republican party an unaccept¬ able candidate for the Presidency. It was called again in 1820, but, in the face of the manifest temper of the people, decided to take no action. In 1824 it did once more and for the last time put forth candidates, but only a minority of the party members of Congress participated and it commanded no respect.

The Federalist party received a mortal blow in the election of 1800 and was slowly dying throughout the period of the dominance of the caucus. It held n.o more national caucuses, but in a variety of ways announced its candi¬ dates. In 1812 the Federalists held what has been called, though improperly, the first na¬ tional convention. It was composed of dele¬ gates from 11 States, who met as a peace party to oppose the war with England. They adopted the candidates already nominated by the Peace Republicans, who had ((bolted® the regular party ticket. During the unsettled period between the Congressional caucus and the national con¬ vention, State and local party agencies of di¬ verse forms acted as nominating bodies. The legislative caucus was still active in some States ; the assemblies themselves, as such, sometimes chose candidates ; mass conventions, county conventions, district conventions and popular mass meetings, all nominated Presiden¬ tial candidates, and some of those gatherings tooks pains to declare that they would not be bound by the proceedings of an Congressional caucus. All available means were made use of to render clear the final condemnation by the people of the objectionable party organ. Having been tried and found wanting, it was swept aside, to give place to any agency more in consonance with the national spirit. Though a Congressional party caucus is at the present day an acceptable part of the national party organization, it does not exercise the nominating function.

Nomination by conference or by preliminary meetings of party supporters which might be called conventions, had always been practised in the States and local areas and the use of a convention for

nominating the chief executive officers of the nation was the application of a principle already familiar to the people. The first of the long series of modern national nom¬ inating conventions was that of the ephemeral Anti-Masonic party, which met in Baltimore,

8 Sept. 1831, having representatives from 13 States. A long <(Address to the People of the United States® set forth the principles of the party somewhat after the manner of the platforms of later years and Presidential candi¬ dates were nominated. The political import¬ ance of this convention is not great, and it is significant only as standing first on the list. The two leading parties quickly adopted the convention method in national politics. In December 1831 the National Republicans — suc¬ cessors to the Federalists and predecessors of the Whigs — met in pursuance of a call by a legislative caucus in Marlyand. All opposed to the existing administration of Andrew Jackson were invited to send delegates. Eighteen States and the District of Columbia responded and the convention laid plans for rendering the new organ a permanent part of party machinery. The first Democratic national convention, which met in May 1832, was called by New Hamp¬ shire politicians and was composed of dele¬ gates from all the States except Missouri. The National Republicans were now giving place to the Whigs, and in the unsettled state of political affairs that party held no national con¬ vention in 1836, but legislatures and legisla¬ tive caucuses put forth candidates. A Demo¬ cratic convention was held, and that party has thenceforth convened with uninterrupted regularity in national convention to nominate party candidates for Federal elective office. By the year 1840 the Whigs also were equipped with adequate machinery and held their nomi¬ nating conventions with regularity thereafter.

The national convention cannot be said to have become a permanent part of the party or¬ ganization until it had provided for its own perpetuation. This was accomplished first by the Democrats when, in 1848, a national cen¬ tral committee, consisting ,of one member from each State, was appointed by the convention, one of its duties to be the calling of the next succeeding national convention. Similar ac¬ tion by the Whigs in 1852 completed the or¬ ganization of that party. Previous to that year Whig conventions had been called by a Con¬ gressional caucus or by a legislative caucus of some one of the States. Tributary to the na¬ tional convention, which is, in theory, the gathering up of the myriad expressions of political opinion throughout

the whole country, is a long series of State conventions, district conventions, county conventions, city conven¬ tions, until the unit of party organization is reached in the ward ior township primary, or caucus, made up of individual voters. All this complex machinery is kept in condition for effective action by means of committees ap¬ pointed in the various election areas. Details of the system vary widely in the several States, but each State has its State central committee with a general supervision of the subordinate party agencies of the State. The national com¬ mittee consists of one member from each State and Territory. It has general charge of the national interests of the party. Next in rank is the national Congressional committee, first appointed in 1866 by a Republican Congres¬ sional caucus. A few years later the Congres¬ sional caucus of the Democratic party took similar action. The Republican Congressional committee consists of one member of Con¬

gress from each State or Territory repre¬ sented by a party member. In the Democratic Congressional committee a State or Terri¬ tory having no party member of Congress is represented by an outside member ,of the party. It is the duty of the Congressional committee to supplement the action of the State and na¬ tional committees and more especially to take charge of the elections of members of the lower House which occur midway between two Presidential elections. In this matter the committee co-operates with local committees in the Congressional districts of the various States. The party committees hold a most im¬ portant and responsible position in the organ¬ ization. They are the permanent party officials who formulate the party rules, administer the enormous party funds and have general control over party business.

Since about the year 1880 the convention system has undergone considerable modification in the direction of legislative control of nomi¬ nations. Under the fully developed system direct nomination is confined to the local offi¬ cers in precinct, ward or township where the primaries are held. Here the individual mem¬ bers of the party by their direct votes nomi¬ nate the party candidates for local office. Can¬ didates for the larger areas of city, county, judicial district, Congressional district and State are nominated indirectly by delegates chosen at the primaries. Two methods of pro¬ cedure are in use at the primaries. The older is that of the mass meeting of party voters, most commonly called the caucus. It is or¬ ganized by electing a chairman and a secretary and the voting for local candidates or for dele¬ gates may be by ballot or by any method pre¬ scribed by party rules or by vote of the mem¬ bers present. The newer method is that of the primary election, which substitutes for the mass meeting a regular

election held under the control of party ior State officers, where qualified members of the party cast their votes one by one, for candidates for office or for delegates to nominating conventions.

The adoption of the primary election sys¬ tem does not necessarily do away with the nominating convention. Direct nomination may still

rect way candidates for judicial and State offices may be nominated and the convention within the State be wholly displaced.

The discontinuance of the convention in¬ volves radical changes in party organization. The permanent committees, the platforms, the rules for the control of party conduct, have all been the product of party conventions. When the convention disappears all party functions devolve upon the primaries and the officers chosen by them.

It has been proposed also to abolish the national nominating convention and transfer to the primaries the additional duties of nomi¬ nating candidates for the Presidency by direct vote, formulating quadrennially the national party platform and choosing the national com¬ mittee. But there is a natural distinction be¬ tween national and State politics. Issues arise within the States which have no direct rela¬ tion to national affairs, and which furnish a natural line of cleavage for the parties. For the formulation of party issues and the de¬ velopment of party policies the convention is found to be a more convenient agent than the primary. Some of the States in which direct nomination is extensively practised still retain the State convention for nominating State offi¬ cers and promulgating the State party plat¬ form. Where the State convention has yielded to the movement for direct nomination, party issues are formulated by party officeholders, by party candidates and party oommittees or by direct vote at the primary election, or by convention assembled for the purpose.

The primary election system was first intro¬ duced in those Southern States in which one political party has control and a nomination is equivalent to an election. Here the real contest is within the ranks of the dominant party at the primary. The party members there vote directly for the various candidates, the votes are canvassed and it is made a point of honor to abide by the decision so rendered. So important is the primary election that more votes are cast at it than at the legal election which follows. Some of the States — Missis¬ sippi,

for example — have passed laws for the regulation and control of the primary election. In other States, as Georgia, the dominant party holds a similar election under rules formulated by the party organization.

But the development of the primary elec¬ tion system is by no means confined to the South ; it extends to all sections of the country. Its object is to give to the unofficial members of the party greater power of control. The development of the system has coincided with the introduction of the Australian ballot legist lation. These new laws require the State to print and distribute the ballots. This had formerly been an important party duty. Be¬ fore the State officer can print the ballots he must have official information as to the names of candidates ; the laws, therefore, prescribe a formal process of nomination by petition ; but the real nominations are made by the political parties, and since the laws require some sort of official recognition of the nominating proc¬ ess, the State legislatures have been the more ready to yield to the already existing demand for legislation .on the subject of primary elec¬ tions. The result is that in many States the

ordinary party machinery is becoming subject to State regulation and control. In 1901 the State of Minnesota passed a law providing for the holding of a primary election for the nomi¬ nation .of candidates to be voted for at the gen¬ eral election. The Minnesota primary election under State supervision is for all parties, who must all vote at the same place and on the same day. This provision makes it easier to confine the vote of each party to its own members. Under this law the candidates for State offices are not subject to nomination at the primary. The object of this exception was to preserve the State convention and render it convenient for party leaders to meet in con¬ ference and make declarations of party prin¬ ciples. Numerous States have since adopted a compulsory primary system. Many of them re¬ quire State as well as local .officers to be thus nominated.

State control of party nomination leads to legal definition of party membership. Only members of the party have a right to vote at the primary. In Massachusetts, participation in a primary election of a given party disquali¬ fies a man for voting at the primary of any other party for the ensuing 12 months without a formal legal notice of a change of party choice. Direct nomination at a primary elec¬ tion creates a demand for preliminary nomi¬ nation of candidates, more or less formal, within the party itself. Party caucuses and conferences are utilized for this purpose. See Democratic Party; Republican Party; Whigs.

Bibliography. — Beard, C. A., (American Government and Politics)

(1910) ; Bryce, J., (The American Commonwealth) (4th ed., 1910) ; Ford, H. J., (Rise and Growth of American Politics) (1898) ; McLaughlin, A. C., (Significance of Political Parties > in Atlantic Monthly (pages 145-156, No. 150, North Caro¬ lina 1908) ; id., (The Courts, the Constitution and Parties) (1912) ; Macy, J., (Party Organization and Machinery) (Chap. 8, 1912) ; Ostrogor- ski, M., (Democracy and the Party System* (1910) ; W.oodburn, J. A., (Political Parties and Party Problems) (1903).

Jesse Macy.

Professor Emeritus of Political Science, Grin – nell College.

13. THE COLONIAL AND TERRI¬ TORIAL SYSTEMS. Under the generally well-known name of ˆterritorial govern¬ ment,® the United States has developed one of the best systems of colonial government that has ever existed. When, acting under the sug¬ gestions of Maryland, several of the colonies between 1780 and 1784 surrendered to the Fed¬ eral authority their claims to lands west of the Alleghenies, some provision had to be made for the government of them. This was done by the Ordinance of 1784, which provided for (1) the division into States; (2) the establishment of temporary government; (3) the establish¬ ment of permanent governments and the ad¬ mission of the prospective States into the Union as full States when a certain number of popu¬ lation had been reached ; (4) the maintenance of a republican form of government in the States; (5) and the subjection of each new State to the Articles of Confederation. Gray¬ son's Land Ordinance of 1785 made provision

for (1) the survey of the lands; (2) its division by north and south and east and west lines into townships six miles square; (3) and finally its sale in lots to purchasers. By 1787 all of the land north of the Ohio River, known as the Northwest Territory (q.v.), had come under the jurisdiction of Congress. Meantime an emi¬ gration company, called the Ohio Company (q.v.), had been formed in Massachusetts for the purpose of exploiting and settling these western lands. It had failed of success partly because settlers were unwilling to go to a land where so little guarantee was made for personal rights as in the Ordinance of 1784. The head men of the company, therefore, petitioned Con¬ gress for legislation which would give the guar¬ antees desired. The result of this petition was the passage of the Ordinance of 1787. This contained the personal rights asked for, such as trial by jury, habeas

corpus, etc., made ar¬ rangements for the treatment of the Territory as one, or later as two, districts, and made provisions for two successive forms of terri¬ torial government. At first a governor and three judges appointed by Congress were to act as a legislature, as well as fulfil their own special functions as executive and judiciary. When there were 5,000 free male inhabitants of full age in the district, they were to receive au¬ thority to elect a general assembly or lower house of a legislature but the upper house or legislative council of five members was to be appointed by Congress from a list of 10 names submitted by the lower house. The two houses meeting jointly were to choose a delegate to Congress who was to have a seat and the right of debating but not of voting. The governor, judges and administrative officers were still appointed by Congress. The keystone of this ordinance and that which placed the American colonial system above all other systems was the provision which allowed the division cf the Territory into three to five parts and when any one had 60,000 inhabitants it was to be admitted to the Union on an equality with the other States.

The Northwest Ordinance has formed the basis for all later territorial governments in the United States. As strong doubt was ex¬ pressed as to the right of Congress of the Confederation to pass such a law, the first Con¬ gress under the Constitution confirmed the or¬ dinance by the Confirmatory Act of 1789 and gave to the new President all the powers therein exercised by the old Congress. This it was enabled to do under the clause of the Constitu¬ tion which reads that Congress shall have power ((to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States.® In 1796 Congress passed, for the territory south of the Ohio River, an ordinance which was almost the same as the Northwest Ordinance.

With the great additions of territory (see Territorial Expansion) to the United States by the Louisiana and Florida purchases and sub¬ sequent wars and treaties came the necessity of providing territorial governments. All of these were very similar to that outlined in the Ordinance of 1787. As all of the land now com¬ prised within the United States, with the excep¬ tion of the original 13 States, Vermont, Ken¬ tucky, West Virginia, Texas and California,

was at one time or another under territorial government, it is easily realized how important a good colonial or territorial system of govern¬ ment has been to the United States. The territorial governments, on account of their com¬ mon basis, have been very similar, even though entirely dependent on the will of Congress. At

the head of each territorial government stood the governor. He, with any administrative offi¬ cers needed, was appointed by the President for a term of four years and was removable by him with the consent of the Senate. In earlier times the governor was usually sent out from the East, but later some man prominent within the Territory was chosen. The President also appointed judges for the Territories for terms of four years. The male inhabitants of the Ter¬ ritory, of full age, were allowed to elect a legis¬ lature of two houses, a council and a house of representatives. The legislature could pass laws on a large variety of subjects and arrange for local and municipal governments. The gov¬ ernor, however, had a veto on any laws, but they could be passed over his veto. Congress could at any time override statutes passed by a territorial legislature. This, however, was not often done. The Territory had the privilege of sending a delegate to Washington, to sit in the House of Representatives. He has the salary and all the rights and privileges of a regular member of that House, except the right to vote. Congress could, of course, with¬ draw a territorial government at any time, but this was seldom done. When the Territory reached a certain population (the number has varied much), Congress could admit it as a State by ratifying and accepting a constitution already drawn up by the people, or it could pass an Enabling Act. Under this the voters elect a convention to draft a constitution. If this was accepted the Territory forthwith became a State on an equality with other States of the Union. Congress at times imposed certain con¬ ditions in the Enabling Act. Whether these conditions were binding on the State if it after¬ ward disregarded them is a mooted point.

Besides the Territories organized as above, among which the Hawaiian Islands, acquired by annexation in 1898, may be included, there were at times certain lands under the jurisdiction of the United States, which may be called unor¬ ganized territories. These were Indian Terri¬ tory and Alaska. In both of these the popula¬ tion was largely Indian and that accounts for their different treatment. Indian Territory had a government with a legislature, but it sent no delegate to Congress like the other territories, had no organized government like theirs and in reality was only a form of local government which Congress permitted to exist for the time being and which it could abolish at pleasure without feeling that it was violating any of the rights or privileges which in the organized Territories were looked upon by the inhabitants as guaranteed to them by a compact with Con¬ gress. Alaska did not have for a time as com¬ plete a government as Indian Territory. By an act of 1884 Congress provided for a gov¬ ernor and a District Court. Owing to the in¬ flux of white people at the time of the dis¬ covery of gold in the Klondike, Congress

had to pass acts in 1899 and 1900 making more care¬ ful regulations for the government. In 1912

Alaska was organized as a Territory with a government similar to that given to the older Territories, but with more subjects referred to Congress for legislation.

The United States had to confront new prob¬ lems in the government of colonies or Terri¬ tories when Porto Rico and the Philippines were acquired in 1898. These islands could not be treated like the older Territories of the United States. There were those, however, who held that they were the same and that all laws passed for the United States were applicable to these outlying domains in the same way as they were to the Territories within the United States, Still others maintained that such was not the case and that laws passed for the United States did not apply to Porto Rico and the Philippines. The latter view was upheld by the Supreme Court in the Insular Cases decision in 1901. This made possible a new colonial system of government for the United States and brought about the abandonment of the principles of the Ordinance of 1787, so far as these island pos¬ sessions were concerned. A special kind of gov¬ ernment was accordingly worked out for Porto Rico and another one for the Philippines. Porto Rico had a governor and other administrative officials appointed by the President, a legisla¬ ture of two houses, the upper one largely ap¬ pointive and the lower one elective. The old court of the Spanish regime, including the mu¬ nicipal courts, were retained, but the island was organized as a new judicial district of the United States. The district judge, district at¬ torney and marshal were appointed by the Presi¬ dent. The qualified voters of the island every two years chose a resident commissioner to the United States who was recognized as such by the departments at Washington. By the Act of 1917 the people of Porto Rico were made citi¬ zens of the United States, the upper house was made entirely elective and other changes look¬ ing to a government almost comparable to that of the States were made. The governor is still appointed by the President and Congress may annul acts_of the legislature. For the Philip¬ pines a still more exceptional form of colonial government was established. The inhabitants were allowed to participate in the municipal government, but were not allowed to have a representative legislature. The executive power was in the hands of a commission of five mem¬ bers appointed by the President. By subsequent acts and especially by one

of 1916 more autono¬ mous government was given. Though the gov¬ ernor and some other officials are appointed by the President there is a legislature of two houses elected by the people and it elects two commis¬ sioners to go to Washington. No provision has been made for the eventual admission of either Porto Rico or the Philippines to statehood.

Guam, Tutuila (Samoa) and the Panama Canal Zone are under military governors ap¬ pointed by the President. The Danish West Indies recently acquired are under a temporary government by the boards with governors ap¬ pointed by the President.

With the addition of these outlying depend¬ encies to the jurisdiction of the United States the high ideal of colonial and territorial govern¬ ment set by the Ordinance of 1787 has eventu¬ ally been followed. The United States has found that it has had to handle for a time these out-

lying domains in much the same way as Eng¬ land, France and Germany handle their colo¬ nies and with little regard to those principles which were so vigorously upheld in the Declara¬ tion of Independence. Gradually, however, it puts into operation the principles for which it has always stood. In addition to the Territories, organized and unorganized, and to the depend¬ encies, the United States now provides for the government of the District of Columbia, na¬ tional forts and sites and Indian reservations. The regulations for these, however, scarcely form a part of the colonial or territorial sys¬ tem of government. The same is true of the virtual protectorates which the United States exercises over Cuba and Panama.

Bibliography. — Channing, Hart and Turner,

(Guide to the Study of American History } ; Griffin, (List of Books on Colonization ; Bryce,

(American Commonwealth* ; Hart, (Actual Government ; Reinsch, (Colonial Government-* ; Willoughby, territories and Dependencies. *

James Sullivan, Ph.D., Director of the Division of Archives and His¬ tory of the University of the State of Nciv York.

14. THE CABINET. The Cabinet, as the name is used in American affairs, is the Presi¬ dent's council. It is composed of the heads of – the 10 great executive departments. Four of these are older than the

government under the Constitution, for the Old Congress had found it necessary to establish a Department of Foreign Affairs, of the Treasury, and of War. The Post Office Department was established* by the Continental Congress before the Declaration of Independence. The framers of the Consti¬ tution assumed that such departments would continue to be necessary. They perceived also that the heads of these should be at the service of the chief executive. Hence the provision that he — <(the President — may require the opinion in writing of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices.® The first Congress under the Constitu¬ tion re-established the executive departments already existing. To the Foreign Office it added certain internal affairs, and changed the name to the Department of State. The office of Attorney-General was also established in 1789, being provided for by the great act that established the Federal courts. In 1870, 22 June, the Attorney-General was made the head of a Department of Justice. Five additional departments have been created as the expan¬ sion and progress of the country have de¬ manded. The Department of the Navy was established in 1798, 30 April; the Department of the Interior, in 1849, 3 March; the Department of Agriculture, in 1889, 9 February; the De¬ partment of Commerce (and Labor), in 1903, 14 February ; and the Department of Labor, in 1913, 4 March. Although the Constitution re¬ fers in two places to the heads of departments, it does not imply that they are to form a council to advise the President on questions outside of their respective departments. The distinction between the two functions is illus¬ trated by the following episode. During the in¬ terval, 21 February 28 May 1868, Secretary Stanton was on duty at the War Office, while Lorenzo Thomas, who had failed to get posses-

sion of the office, was attending the Cabinet sessions. Left without a council by the Con¬ stitution, Washington sought one for himself. At first he turned to the Senate. He had constitutional authority for advising with this body on the two subjects of appointments and treaties. But his visits to the Senate chamber were coldly received. At the same time he singled out certain men whom he consulted as individuals. On 27 Aug. 1790, he formally re¬ quested written opinions, on a question of gen¬ eral policy, of Hamilton, Jefferson, Knox, Randolph, Jay and Adams. These men were respectively the Secretary of the Treasury, Secretary of State, Secretary of War, Attorney- General, Chief Justice and Vice-President. On 4 April 1791,

the President addressed a let¬ ter to the three secretaries which brought about the first cabinet councils to which there is any reference. The occasion was his own absence from the seat of government. He herein ex¬ pressed the wish that if any important cases arose during his absence, the secretaries of the Departments of State, Treasury and War may hold consultations thereon to determine whether they are of such a nature as to demand his personal attendance at the seat of government. If the Vice-President is at the seat of govern¬ ment, the President wishes that he also be con¬ sulted. One or more consultations were held agreeably to this suggestion. Besides the offi¬ cers specified, the Attorney-General was present. During the year 1792, the three Secretaries and the Attorney-General occasionally met the Presi¬ dent at his house for consultation. But it was in 1793 that frequent consultations gave the council a definite place. The circumstance of this was the conduct of Minister Genet. In August of this year, Jefferson referred in his diary to the President's council as <(our cabi¬ net.® In the administration of John Adams the word was quite commonly used. It has never been introduced into the laws; but it can be found in the debates of Congress and in the President's messages. The rule that Washing¬ ton followed in the choice of his counsellors was to summon those officers who filled suf¬ ficiently high places In the government, and who held office at his pleasure. Under Jeffer¬ son the whole executive body was for the first time at harmony with itself. The Cabinet now had five members. For a period of seven ad¬ ministrations it maintained the status of an advisory body which expected to be called for consultation on all important questions, and at the same time had no power to enforce its views upon the chief executive. This was interrupted only by the disorders that resulted from weak¬ ness in the War and Navy Departments during the War of 1812. All the Presidents of this period succeeded to that office after being Sec¬ retary of State. Moreover, Madison, Monroe and John Quincy Adams retained in their Cabi¬ nets a number of their colleagues of the pre¬ ceding administration. This stability was favor¬ able to the Cabinet prestige. Jackson reduced the Cabinet to a more humble status. How¬ ever, the popular idea of the <(Kitchen Cabinet® is a mistake. During the period 1829-31 strained personal relations growing out of a scandal in the family of the Secretary of War made it almost impossible for the six heads of departments to meet together. The Postmaster-

General was now included with the others. But it does not appear that the President was at this period guided by the counsels of the editors who had helped to elect and had received posi¬ tions under the government. He was on most cordial relations with the Secretary of

State and the Secretary of War. After the recon¬ struction of the Cabinet, councils were held regularly or at least frequently. In the matter of the removal of the deposits from the Bank of the United States, he acted contrary to the Cabinet opinion, and found his chief adviser in Amos Kendall, who is the most remarkable figure in the commonly accepted ((Kitchen Cabinet.® It might be expected that a great war would give to the Cabinet an increased im¬ portance. This was not the case in the War of 1812 or the Spanish War of 1898. The Cabinets of Madison and McKinley did not meet the extraordinary demand upon them with notable strength. But those of Polk and Lincoln profited by their opportunity. The period from Jackson to Polk was one of Cabinet debase¬ ment. That from Fillmore to Lincoln was one of Cabinet ascendency. The executive council now had seven members. It had also begun to meet at regular times. Pierce has been the only President who made no change among the heads of departments during four years. This has been pointed to by Southern writers as proof of great power to control men. But Pierce was led by his council. The Cabinet as¬ cendency culminated under Buchanan. During the last months of his administration, the Presi¬ dent was under the dictation of Black and Stanton, the Secretaries of State and Warr The high position occupied by the Cabinet dur¬ ing the Civil War was not at the expense of the Presidential prerogatives. If Seward and Chase and .Stanton were exercising extraor¬ dinary powers, Lincoln was doing the same. Indeed he consulted his advisers in the matter of the Emancipation Proclamation only after the document was already composed. The most momentous episode in Cabinet history is John¬ son's attempt to remove Secretary Stanton from the War Department contrary to the Tenure of Office Act. This led to the impeachment of the President. Congress repealed the act early in the next administration, thereby acknowledging that it was an encroachment upon the Presi¬ dent's rights. Since the reconstruction of the government, the status of the Cabinet has been on the whole as it was before the administra¬ tion of Jackson. In Cleveland's first adminis¬ tration, the eighth member was added ; and under Roosevelt, the ninth. The President's council bears the name of the great executive organ of the British government. But its functions are much inferior. The ministers who compose the British Cabinet are members of Parliament. They digest the great bills that are to be introduced, and direct their course in the House of Commons and the House of Lords. Their functions thus combine those of the standing committees of Congress with the direction of executive affairs. Under the American system the executive officers are rigorously excluded from the floors of Con¬ gress. The chief avenue through which the heads of departments can influence legislation is the standing

committees. The question of admitting Cabinet members to the floors of

Congress for the purpose of giving information and of allowing them to participate in the de¬ bate of questions pertaining to their respective departments has been before Congress several times. See Cabinet; Kitchen Cabinet; Executive.

Bibliography. — Finley, J. H., and Sander¬ son, J. F., (The American Executive and Executive Methods' (Chap. 16, 1908) ; Har¬ rison, B., (This Country of Ours) (Chaps. 10- 11, 1897); Hinsdale, M. L., (History of the President's Cabinet' (1911) ; Learned, H. B., (The President's Cabinet' (1911) ; Mosher, R. B., (Executive Register of the United States' (1903) ; Stevens, (Sources of the Constitution of the United States' (1894) ; Journals of the Executive Proceedings of the Senate of the United States (35 vols., 1828-1918).

Mary L. Hinsdale, Ann Arbor, Mich. 15. THE ALIEN AND SEDITION LAWS. Alien and Sedition Laws, in the po¬ litical history of the United States, were four laws passed by the Federalist party in Congress, June and July 1798, during President Adams' administration. These laws gave rise to the first nullification proceedings in the South, namely, the Kentucky Resolutions (q.v.), passed in November 1798, and the Virginia Resolutions (q.v.), passed in December 1798, and resulted in the final defeat of the Federal¬ ist party. The Federalists, who had controlled the government from its very inception, re¬ sented all hostile criticism of their conduct of national affairs and spurned the charge made by the Republicans that the Federalists were • strongly inclined toward England and were try¬ ing to embroil the American nation in a war with France. Especially obnoxious to them were the embittered exiles who had been flock¬ ing to the shores of America from 1790. These exiles, who were French sympathizers, and, therefore, affiliated with the Republican party, attempted to create sentiment in favor of France, thus blocking the way of the Federal¬ ists, who desired to punish France for her out¬ rageous attacks on American oommerce and for her hostile attitude to the United States after the conclusion of the Jay Treaty. More¬ over, by obtaining control of journals here and there throughout the country, or by establishing sheets of their own, they would publish scur¬ rilous and offensive attacks upon the ruling party of Federalists, which the latter felt very keenly.

In 1797 the Federalists had a majority in the Senate, but the House was Republican. Therefore, the measures for defense against French aggression, which the Federalists at¬ tempted to pass, were all defeated by the Re¬ publican majority in the House. But the timely publication of the <(X. Y. Z.” correspondence (q.v.) showing the scandalous conduct of Tal¬ leyrand and the French Directory produced such an outburst of popular indignation against France throughout the entire country that the defenders of France were completely silenced, and even the moderates, who had sided with the Republicans, went immediately over to the support of the Federalists. The popular dem¬ onstration appeared to furnish a complete vindication of the course of the Federalists, who gained control of both houses and now

were supreme. No sooner had they secured entire control of the reins of government than they began to carry out their party program of suppressing all hostile criticism of the Fed¬ eral administration, even at the risk of stifling liberty and freedom of speech.

Accordingly, in 1798, the Federalists en¬ acted three laws concerning aliens: (1) The new Naturalization Act, passed 18 June; (2) the Alien Acts, passed 25 June; (3) the Sedi¬ tion Act, passed 6 July. The new Naturalization Act prolonged the requisite term of residence before naturalization from 5 to 14 years and the term after declaration of intentions from three to five years; denied alien enemies naturaliza¬ tion and required all white aliens to be regis¬ tered on arrival, under penalty, and such regis¬ try to be the only proof admitted on applica¬ tion for naturalization. The Alien Act author¬ ized the President, for the next two years, to order out of the country any aliens whom he thought dangerous or engaged in conspiracy. Any alien thus notified who should be found at large without the President’s license might be imprisoned for three years and could never thereafter be admitted to citizenship. The Se¬ dition Act empowered the President to arrest or deport all resident aliens when war was de¬ clared against the United States. As finally approved by the President, the first section .of the Sedition Act made it a high misdemeanor, punishable by a fine of $5,000 and five years’ imprisonment, for persons unlawfully to com¬ bine and conspire to oppose any measures of the government directed by proper authority or to interfere with the operation of any law of the United States or to intimidate any per¬ son from accepting or holding Federal office, or to commit, advise or attempt any insurrec¬ tion, riot or unlawful assembly. The second section prescribed that the writing, printing or publishing of any false, scandalous and ma¬ licious writing against the government of the United States, or either house of Congress, or the President, with the intent to defame or bring

any of them into contempt or disrepute, or to arouse against any of them the hatred of the good people of the United States or to stir up sedition within the United States, or to excite any unlawful combination for opposing or resisting any law or lawful executive act, should be punished, on conviction before the United States court having jurisdiction, by a fine not exceeding $2,000 and imprisonment not exceeding two years. The third section provided that the truth of the matter con¬ tained in the publication might be given in evidence as a good defense, the law and fact under the court's direction to be determined by the jury. A clause added by Bayard of Dela¬ ware limited the term of operation to 4 March 1801, so that it should expire with the Fed¬ eralists if they should lose in the succeeding Presidential election and the Republicans should not have the credit of repealing it.

These acts were denounced by the Repub¬ licans as being in opposition to the constitu¬ tional rights of the States to permit such immi¬ gration as they chose, up to the year 1808 (specifically applicable to slaves), as assuming national powers over persons under the juris¬ diction of their States and as violating the general right of trial by jury. On these points

the laws were attacked by the Kentucky and the Virginia resolutions, which Jefferson and Madison drew up, and which suggested nulli¬ fication as the proper remedy.

The alien and sedition laws were obnoxious to the Republicans, not so much on the ground that they were inimical to civil liberty, but rather because they were regarded by that party as an encroachment upon the principle of States' rights. It is this aspect of the laws that gives them their chief interest and importance. The Alien Law, it is to be observed, was not enforced, nor would it have produced much dis¬ turbance among the Republicans if it had been strictly enforced. But the Sedition Act, which cut very near the root of civil liberty and was contrary to the underlying principle of Amer¬ ican institutions, was enforced, since at least six prosecutions took place under it and Judge Chase invoked its authority for his scandalous partisan decisions. Upon the accession of the Republicans to power, these odious laws either expired by limitation or were repealed.

Bibliography. — Bassett, J. S., (The Fed¬ eralist System > (pages

254-264, 1906) ; Mac¬ Donald, W., (Select Documents> (pages 137—148, 1898) ; McMaster, J. B., (History of the People of the United States> (Vol. II, pages 393-400, 466-471, 1885) ; (United States Stat¬ utes at Large) (texts in Vol. I, pages 566-597).

Edwin Winfield Bowen, Department of Latin, Randolph-Macon College.

16. THE JUDICIARY. Origin and De¬ velopment. (a) State Courts. — While our American judicial system, like so many of our institutions, was modeled after that of England and was permeated by the principles and tradi¬ tions of the English law, it is also true that for practical purposes it dates not so much from the American Colonial Period as from the years of readjustment following the Revo¬ lution. The necessity under which most of the States were placed by the separation from Eng¬ land of adjusting their governmental institu¬ tions to meet the demands of an independent existence afforded an opportunity for working out changes in their judicial systems which could not under any circumstances have been long postponed. Colonial administration of justice had been marked by serious defects. The judicial function was shared by executive and even legislative officials. The courts were, in the main, manned by untrained magistrates who dispensed justice according to their no¬ tions of common sense and fair play rather than according to established and uniform rules of law. The State courts which came gradu¬ ally to replace this archaic and inadequate sys¬ tem followed in general the model of the then existing English judiciary. In the first place, there were the justices of the peace and local inferior courts for petty cases. There were, secondly, superior courts having original juris¬ diction in civil and criminal cases and organ¬ ized on a scheme either of districts or cir¬ cuits. In the third place, there were courts of last resort usually exercising nothing but appellate jurisdiction. Some States further complicated the machinery of justice by setting up intermediate appellate courts occupying a place between the second and third groups just referred to. This general arrangement of courts

still forms the backbone of our State judicial organization.

(b) Federal Courts. — Experience under the Articles of Confederation demonstrated the necessity of a separate system of Federal courts. The attempt to rely upon State tribu¬ nals, supplemented by the feeble efforts of a judicial committee of the Congress, failed mis¬ erably. The framers of the Constitution rec¬ ognized that there must be national courts to deal with at least three important groups of cases : first, disputes arising between the States of the Union; second, disputes

arising from the relations of the national government to foreign nations, such as matters covered by treaties ; and third, controversies over the mean¬ ing of the Constitution itself or the laws passed in pursuance of it. Since all these cases could if necessary be taken care of by one Federal tribunal, the framers of the Con¬ stitution contented themselves with providing for the organization of a Supreme Court of the United States and stipulating that such inferior courts should be created ((as Congress may from time to time ordain and establish.® Not merely the details but the broad outlines of the judicial organization of the United States are accordingly to be sought in the acts of Congress rather than in the clauses of the Federal Constitution. The first Congress of the United States enacted the famous Judiciary Act of 1789, organizing the Supreme Court, establishing a system of inferior courts and marking out the jurisdiction of each. With some amendments this act formed the basis of the entire system of Federal courts until it . was replaced by a revised Judiciary Act in *

1911.

Federal Judicial Organization.— At the pres¬ ent time the judicial system of the United States comprises three grades of courts for the trans¬ action of ordinary judicial business and two special courts: (1) The District Courts, 80 in number, form the lowest grade of Federal tri¬ bunals. They try civil and criminal cases and have original jurisdiction only. They are the only Federal courts in which a jury is used. Each district has a Federal district attorney and marshal to facilitate the work of the court and enforce its decrees. The jurisdiction of the District Court attaches in two types of cases. The first is the group of cases involv¬ ing the interpretation or application of the laws, treaties or Constitution of the United States, cases which are referred to as involving a ˆFederal® question. The second kind of case is that in which the legal rights of citizens of different States are involved. Here the basis of jurisdiction is ˆdiversity of citizenship.® The District Courts hear cases both in law and equity following the rules of procedure suitable to each. (2) The intermediate Federal courts are the nine Circuit Courts of Appeal created in 1891 to relieve the Supreme Court of some of its burden. These courts, sitting both in law and equity, hear appeals from the District Courts and in certain cases not involving the constitutionality of laws have final jurisdiction. In cases raising constitutional questions, appeal of course lies to the Supreme Court. Prior to 1911 a group of courts known as Circuit Courts stood between the District Courts and the Cir¬ cuit Courts of Appeal, but in that year they were

abolished and their work given to the District Courts. (3) The Supreme Court of the United States is the court of last resort on all ques¬ tions brought up on appeal from lower Federal courts and in all cases removed from the State courts for a determination of the meaning or application of the treaties, statutes or Consti¬ tution of the United States. It has original jurisdiction in all cases involving ambassadors and public ministers of a foreign government and those to which a State is a party. The court consists of a chief justice and eight asso¬ ciate justices and a majority of the court is necessary to decide a case. (4) In addition to the courts of general jurisdiction just described, there are two special Federal courts. One of these is the Court of Claims which has juris¬ diction in all cases involving claims of a con¬ tractual nature against the Federal government. The Court of Claims has no power, however, to give effect to its own judgments. Successful litigants before it are obliged to look to Con¬ gress for appropriations to satisfy the awards made. The other special Federal court is the Court of Customs Appeal which, as its name indicates, hears appeals upon all questions re¬ lating to the administration of the tariff laws. Its jurisdiction in these matters is final.

While in the main the State and Federal courts operate each group in its own sphere and deal with the questions arising under the consti¬ tution and laws of the government of which it is a part there is, as has been intimated, some overlapping of functions and jurisdiction. In the first place, any State court not even except¬ ing the justice of the peace is authorized and may be called upon to render a decision upon a question involving the construction of the Con¬ stitution, laws or treaties of the United States. The power of the State courts to deal with these Federal questions need not be regarded as final, however, and an appeal lies to the United States Supreme Court itself. In the second place, in cases in which its jurisdiction rests upon diversity of citizenship, a court of the United States will frequently be called upon to construe and apply the provisions of State statutes or constitutions. In all such cases the Federal courts are bound to follow the con¬ struction which may have been placed upon such statutes or constitutional provisions by the highest tribunal of the State.

Selection, Compensation and Tenure of Judges. — The judges of the United States courts of all grades are appointed by the Presi¬ dent with the advice and consent of the Senate. They hold office during life or good behavior and can be removed from office only by im¬ peachment. The chief justice of the Supreme Court receives a salary of $15,000 and the eight associates $14,500. Congress is forbidden by

the Constitution to diminish the salary of any United States judge during his term of office.

The method of choosing State judges varies as might be expected in different States. Three general methods prevail. The first is election by the people. A large majority of the States use this method although it did not become popular until the era of Jacksonian democracy. A second method is appointment by the gov¬ ernor usually with the consent of the State senate. This method of choice was once very common but has lost ground throughout the

States except in the East. The third way of choosing judges is by the legislature. This method was common in the early State con¬ stitutions, but is now found in but four States, all of the older group. The relative merits of the choice of judges by popular election and by appointment by the governor are hotly de¬ bated. In behalf of popular election it is ar¬ gued, first, that it is the only democratic method and is necessary to prevent judges from be¬ coming autocratic and irresponsible; second, the people know as much and usually more about the qualifications of judicial candidates than do the governors who must rely on the advice of party leaders; third, the courts in passing upon the constitutionality of laws ex¬ ercise a function which is not wholly free from political aspects and which should, there¬ fore, be performed under the scrutiny and ul¬ timate control of the people ; fourth, the alleged evils of popular election of judges may in the main be eliminated by making judicial elections strictly non-partisan in form and procedure ; finally, the choice of judges by the people has worked well in practice while many poor ap¬ pointments have been made by State governors. The popular election of judges is attacked on the following grounds: First, the people have neither the knowledge nor the interest neces¬ sary to pass upon the qualifications of judicial candidates. Second, since this is true there can be no real popular choice of judges and what is called popular election is really the popular ratification of appointments to judicial posi¬ tions made by irresponsible party leaders. Third, the qualities which make a good candidate in an election are not the qualities which make a good judge. This means that the best men fre¬ quently fail of election while the unfit may suc¬ ceed. Fourth, the sense of security and inde¬ pendence which a judge must enjoy if he is to administer justice fearlessly and impartially is too often destroyed by the realization that de¬ cisions which are unpopular even though sound may jeopardize his re-election. Finally, the ex¬ perience of the Federal courts as well as of the State courts which are chosen by the governor show that in practice the method of appoint¬ ment obviates the evils mentioned above and results in the choice of men of the highest ability and

integrity. It may be observed that the bar of the country is fairly unanimous in its opposition to the election of judges.

The term of office of State judges ranges from life or good behavior to a few years. Life tenure was originally the rule but _ has now become the exception since the principles and arguments justifying the popular election of judges also justify the practice of allowing the people an opportunity to retire them from office at the end of a fixed term of years. It is customary to choose the judges of the higher courts for longer terms than those of the lower courts.

There are three general methods by which State judges may be removed from office. The first and most common is the process of im¬ peachment by the legislature. This method is available in every State except Oregon. The second is by address of the two houses of the legislature to the governor asking for the re¬ moval. In such a case the judge in question is usually allowed some kind of hearing before

either a committee of the legislature or the governor. The governor is not bound to re¬ move a judge even though asked in this man¬ ner to do so. This is not a common method of removal. The third method of removal is by recall by the people. There are five States (1919) in which judges may be recalled. Some States which permit the recall of executive offi¬ cers have not extended it to the courts. Bitter controversy has arisen over the propriety of subjecting judges to the recall. It is urged in defense of the scheme that judges are, after all, merely servants of the people and that it is simply a natural and logical application of the principles of true popular government to make the judges feel their responsibility to the peo¬ ple by giving the people an effective means of enforcing that responsibility. More conserva¬ tive students of public affairs and especially the bar view the recall of judges with alarm. They argue that it will destroy the independ¬ ence of the bench by exposing judges to the condemnation of the public for any unpopular decision they may render, no matter how firmly justified that decision may be by law. Thus the courts would cease to serve as bulwarks for the protection of individual liberty against the onslaughts of the majority.

Brief mention may be made of a plan for the selection and retirement of judges which has been worked out by some distinguished mem¬ bers of the legal profession and is being pro¬ moted by the American

Judicature Society. This plan provides for the election by the peo¬ ple for a short term of a chief justice who is to perform not merely judicial duties but also administrative duties in directing the work of the entire judicial organization. This chief jus¬ tice is to appoint all the other judges for a term of three years. After a judge so appointed has served three years the question is presented to

the voters ((Shall Judge – be retired?®

This is a non-competitive recall election since no candidate opposes the sitting judge as vould be the case under the ordinary recall. If the people vote to recall the judge his successor is appointed by the chief justice. If he is not recalled he continues in office for six years when he is again subjected to a non-competi¬ tive recall election. If again retained in office he continues for nine years when the same process is repeated. If popular confidence is again expressed in him he then holds office for life. It is felt that this plan affords the proper degree of popular control over the judicial de¬ partment of the government without destroying the independence of the courts by making them the playthings of popular passion or partisan machinations.

Power to Declare Laws Unconstitutional.

— The power exercised by the American courts of holding unconstitutional and void acts of the legislature which are, in their judgment, in conflict with the constitution. State or Fed¬ eral, is a power as unique as it is important. In no other important country in the world do the courts perform this function. Furthermore, it is not a power which the national Constitu¬ tion or any of the early State constitutions ex¬ pressly conferred upon the courts. It was exercised in a few isolated State cases just after the Revolution, but it may be said to find its firm foundation as a principle of American

constitutional law in the classic opinion of Chief Justice Marshall in 1803 in the case of Marbury vs. Madison. It was there pointed out that our written constitution is a limitation upon legislative power. As such it becomes worth¬ less if the legislature is left free to violate it with impunity. Some authority must, therefore, exist to enforce the constitutional limitations. This authority is most appropriately confided to the courts. They are charged with the duty of determining what the law is in order that they may apply that law in the adjudication of the rights of parties in litigation. When the constitution and a legislative enactment are in conflict this duty of determining what the law is involves the duty of enforcing the con¬ stitution, which is the supreme law of the land, and of ignoring or

nullifying the law. In so doing the courts are merely recognizing the obligation of the oath of office by which they bind themselves to uphold the Constitution of the United States. While the foregoing rea¬ soning has not entirely escaped criticism it has seemed on the whole convincing and more than a century of acquiescence in the exercise of the power has relegated the question whether the courts were in the first instance justified in exercising it to the realm of academic and his¬ torical controversy. Not a few of the State constitutions now provide expressly for the judicial decision of questions of constitu¬ tionality and there is no State in which the courts do not exercise that power.

In exercising the power of deciding the constitutionality of statutes, the courts have im¬ posed upon themselves certain restrictions. The more important of these may be enumerated as follows : First, the court will exercise the power only in actual litigation between parties whose material interests are involved. This means that unless required by the constitution to do so, as is the case in some half dozen States, the courts will not render advance or advisory opinions. Second, laws will not be declared invalid merely because judges regard them as unreasonable, inexpedient, unjust, or contrary to the "spirit of the constitution.® Third, questions of constitutionality will not be decided unless their decision is necessary to a determination of the case before the court. Fourth, courts will not concern themselves with the legislative motives lying back of the enact¬ ment of a law in determining the validity of the law. Fifth, courts will not use the power of judicial review in regard to political ques¬ tions, questions which the courts regard as con¬ fided to the discretion of a co-ordinate branch of the government. Sixth, every statute is presumed to be constitutional and any reason¬ able doubt upon that question is to be resolved in favor of its validity. Adherence to these general principles has had a useful effect in preventing the abuse by the courts of their power to invalidate laws. It may be safely asserted that, in spite of some questionable de¬ cisions, the exercise of this power by the courts has been wholesome and beneficent and con¬ stitutes in the minds of many the most valu¬ able American contribution to political science.

Criticisms of Courts and Proposed Re¬ forms. — In recent years the State and Federal administration of justice has been the subject of bitter attack, not only from laymen, but also

from the bench and the bar on the ground of its inefficiency. The evils which are universally admitted to exist are as follows : First, the administration of justice is entirely too slow. It is not uncommon for the highest court of a State to be two or three years behind in its work. It is not unusual for a case to be in the courts five or six years before final decision can be had. There are extreme cases in which 20 years or more have elapsed between the time a case was first placed upon the judicial docket and the time of ending the litigation. Second, most of these delays are wholly un¬ necessary and do not serve in any way the ends of justice. This is due to our cumbersome and highly technical scheme of judicial procedure. It has sometimes occurred that fully half of the cases decided by a State Supreme Court are cases which raise, not questions of. sub¬ stantive law, but questions of legal technicality. Third, as a result of the two evils just men¬ tioned, justice, instead of being cheap and readily accessible to all, is too often placed be¬ yond the reach of the poor man. Among the more important proposals which have been made looking toward a more efficient ad¬ ministration of justice, may be mentioned the following: (1) In the first place, it is urged that rules of procedure must be radically sim¬ plified and that this should be done, not by legislators who are unfamiliar in the main with the real problem in hand, but by the courts themselves. Where courts have been allowed to recast these rules the results have been good. A notable case of this is the recasting of the rules of equity procedure by the Supreme Court of the United States. (2) A second remedy is to restrict the right of litigants to appeal to those cases in which the ground of appeal is actually related to law and justice. Reversals and re¬ trials on pure technicalities should be abolished. (.3) There is a movement in the direction of modifying the power of the common law jury especially in civil actions, making the procedure in jury trials less cumbersome, and even dispensing with the service of a jury in many cases. There is need for a radical change in the method of selecting jurors for criminal trials, a process which frequently consumes weeks or even months under our present sys¬ tem. (4) In the fourth place, it has been pro¬ posed that the principle of division of labor be applied to judicial work and separate courts be organized to deal with particular kinds of litigation. In this way judges would acquire an experience in dealing with certain types of cases which would greatly add to the efficiency and expedition with which these cases could be handled. Some steps have been taken in this direction in various places by the organization of probate courts, juvenile courts, women's courts, domestic relations courts, traffic courts and the like. (5) A most thorough-going and comprehensive program of reform is sanctioned by the American Judicature Society and many prominent members of the bar. It calls

for a radical change in judicial organization. It is proposed that the entire judiciary of a State constitute a single court. This court should be composed of three branches to deal with petty or local matters, with cases now coming up in the State courts of original jurisdiction, and with all appeals. Each of these divisions would

be under the administrative supervision of a chief justice who would have authority to assign the individual judges to special types of judicial work, to transfer judges from courts which were idle to those whose dockets were crowded and to transfer cases from the wrong court to the right one without necessitating be¬ ginning the case over again. In these and other ways the efficiency of the courts could be enormously increased and the processes of litigation simplified. Such courts would, of course, have the power to make their own rules of practice. The Municipal Court of Chicago is organized to a very large extent along these lines and has proved an interesting and sug¬ gestive model to those interested in the reform of our judicial system.

With the thoughtful attention which is be¬ ing given to these problems by men of the highest ability and with the ever-growing popular demand for some relief from evils of our present methods of administering justice, it is to be hoped and expected that progress in the direction of reform may be prompt and vigorous.

Bibliography. — American Judicature So¬ ciety, Journal and Bulletins; ((rev. ed., New York 1914) ; Beard, C. A., (The Supreme Court and the Constitution (1912) ; Carpenter, judicial Tenure in the United States) (1918) ; Corwin, Edward S., (The Doctrine of Judicial Review) (1914) ; Coxe, judicial Power and Unconstitutional Legislation (1893) ; Haines, Charles Grove, (The American Doctrine of Judicial Supremacy) (1914) ; McLaughlin, A. C., (The Courts, the Constitution and Parties> (1912) ; Munro, W. B., (The Government of the United States* (New York 1919) ; Storey, Moorfield, (The Reform of Legal Procedure) (1911) ; Willoughby, Westel W., (The Supreme Court of the United States* (1890).

Robert Eugene Cushman, Associate Professor of Political Science, Uni¬ versity of Minnesota.

17. DIPLOMACY. No complete history of the diplomacy of this country has ever been written. Much of its diplomatic effort has been spent upon private claims and national affairs, commercial rather than political. A history of these would be dull reading in¬ deed. Moreover, it must be confessed that, for long periods in our national life, our coun¬ try played but an inconspicuous part in the world's politics, and

upon such periods the his¬ torian must touch but lightly. To sketch the diplomacy .of a century and a third, observing a proper sense of proportion ; to trace the growth of policies, which have marched with the nation's growth ; to characterize treaties which are the crystallized results of diplomacy; yet withal to keep within the narrow limits of a review such as this; such is the aim of this article. The treatment .of the subject chosen is partly by periods and partly by topics, the latter where it is desirable to show the con¬ tinuous growth of a policy or the history of a negotiation running over many years.

UNITED STATES — DIPLOMACY (17)

The French Alliance, 1778. — How to get

military supplies and aid ; how to win a stand¬ ing among nations ; these were the problems which the men of the Revolution had to face. The difficulties were tremendous. No foreign state was in political sympathy with the colonies. Recognition of their independence meant war with Great Britain. The only string to play upon was hostility to Great Britain. The only states likely to feel such hostility were Spain — on account of Gibraltar — and France, driven out of Canada by the Eng¬ lish only 15 years before. Secret aid had been sent by France in 1776 and 1777 to keep the struggle alive, but open aid was dangerous, un¬ less the colonies showed ability to hold their own. Thus the diplomatic situation waited upon the military one. The success at Sara¬ toga was the turning point. Not 'in itself but in its consequences it was one of the great battles of the world. For after that the Comte de Vergennes threw off the mask, made trea¬ ties of commerce and alliance, thus recogniz¬ ing the infant state, sent money and aid openly, and accepted the consequence — war with Eng¬ land. In all this Franklin was the influential factor. His fellow-commissioners, Deane and Lee, were inferior men. Their instructions from Congress were impossible, to seek recognition, commercial privileges and aid, without reciprocal military engagements. By departing from these, they secured a liberal commercial treaty and a military alliance, binding until the independence of the colonies was secured, peace to be made jointly with the common enemy. These treaties did very much to accomplish American independence. Spain, though in nominal alliance with France, actually gave but trifling help.

The Treaty of Peace, 1782. — There had been overtures and negotiations looking toward peace in 1778 and 1779, but not on the

basis of a prior recognition of American independence which the colonies deemed essential. In 1781 various agents to foreign states were united as commissioners, with full power to treat with Great Britain. These were Franklin, Adams, H. Laurens and Jay. Of these Franklin alone had faith in the sincerity of the French govern¬ ment. A change in the British ministry in the spring of 1782, Lord North going out, made negotiation easier. The chief points at issue were: (1) The boundaries; (2) the Northern fisheries ; (3) the confiscated estates of Loyalists. Spain intrigued with France against the Mis¬ sissippi as lour western boundary, desiring to confine the new state to the region east of the Alleghanies. But by the westward migration into the Ohio which was already in motion, this was made impossible. In the northeast the Penobscot and Saint John rivers had been urged as boundaries, and a compromise, the Saint Croix, adopted. New England regarded the enjoyment of the fisheries of the Gulf and Banks as essential to her prosperity. Against the covert opposition of France and the indif¬ ference of the South, she stoutly held out for large fishing liberties and got them. Full resto¬ ration of confiscated estates by the new gov¬ ernment was a financial impossibility, was phys¬ ically difficult, was negatived by the fortune of war. The utmost that Great Britain could wring from the Americans was a treaty provi¬

sion that Congress should recommend to the States restitution and compensation to the pur¬ chaser for value. This was, and probably was intended to be, a nullity. But it was coupled with the welcome proviso that debts should be collectible and further confiscations stopped. This treaty was provisional, and made without Vergennes' knowledge (which was a violation of instructions), so great was the distrust of France by Adams and Jay. It was put into de¬ finitive shape the next year, 1783, with French consent and in compliance with Article VIII of the treaty alliance of 1778. This treaty of peace was a diplomatic triumph for the United States.

Attempts to Secure Recognition from Other Powers. — Although Spain was in alli¬ ance with France, the ally of the colonies, she added little weight to the coalition, was un¬ friendly and tricky, feared the result of Amer¬ ican independence upon her own possessions and made no treaty with the United States until 1795. Tuscany and Austria also refused a treaty on the plan voted by Congress and accepted by France, as did Prussia, whose timid king, without a navy, saw no chance of maintaining intercourse should it be established. Congress was ready to accede to the principles of the armed neutrality of 1780, but was not permittted by Russia, its originator. The Netherlands joined this neutral league in spite of British threats. This, with the exposure of an incip¬ ient negotiation with the colonies, led England

to declare war against her in 1780.

The Establishing of Commercial Rela¬ tions. — This was of the first importance to the new state. Its foreign trade was then relatively more important than now. The French treaty was the only commercial treaty existing until the very close of the Revolution. Decentraliza¬ tion, under the Articles of Confederation, was a serious handicap in negotiating, for it weak¬ ened the trade privileges to be offered. After sturdy persistence, John Adams had secured a treaty in 1782, from The Netherlands, much on the lines of the treaty with France. Both of these treaties, in the freedom of neutral trade, in the regulation of search, in the definition of contraband and the opposition to privateering, were liberal, and show the influence of Frank¬ lin. He also shared in the negotiation of two other treaties of amity and commerce, with Sweden in 1783 and Prussia in 1785, both con¬ taining much the same features as the earlier ones, and displaying the same enlightened char¬ acteristics. Spain came into line in 1795, her treaty restraining our southern boundary also, and in 1799 the expired treaty with Prussia was revived with some changes, due to war time. Jay's Treaty with Great Britain in 1794 was very much more than a treaty of commerce. How it dodged and how it settled many out¬ standing difficulties will be seen presently. But as a commercial agreement, its unlikeness to the others enumerated must be recognized. For in it, England, the foremost maritime state, did not grant that free ships made free goods, did not like Prussia allow pre-emption of all contra¬ band articles except provisions, but permitted trade, without discrimination, admitted consuls and inserted the earliest of our extradition agreements. Upon the basis of these commer¬ cial treaties this country's foreign trade was

built up, and much of its prosperity was founded. _ This is too apt to be overlooked.

Treaties with the Barbary Powers 1787— 1805. — This is a curious chapter in American diplomacy, but must necessarily be brief. Like every state trading along the Mediterranean, our own country was forced to pay tribute, to avoid the seizure of its ships and the enslave¬ ment of its citizens by the African corsairs. The alternative was to convoy our vessels, to put them under foreign protection or to estab¬ lish immunity by successful war. The treaties with France 1778 (Art. VIII), and with The Netherlands 1782 (Art. XXIII), promised us the

diplomatic aid of those countries against the Barbary powers, while both Portugal and Spain on occasion helped our crews. In 1784 Congress authorized direct negotiation, the commissioners being Adams, Franklin and Jef¬ ferson. Of these Jefferson preferred war, while Adams thought tribute the less expensive way. They tried to bring about concerted ac¬ tion with other states but failed. Then through an agent they dealt directly with Morocco in 1787. This treaty regulated commerce, forbade enslavement of prisoners and allowed partial consular jurisdiction. It promised no tribute but seems to have needed occasional liberal ˆpresents® to be operative. In the next decade treaties were made with ‘Algiers, 1795, carrying 12,000 sequins annually; Tripoli, 1796, with a lump sum of tribute agreed to (Art. X) ; Tunis, 1797, $107,000; the three costing us for their execution some $2,000,000. They contained some curious and some very modern provisions, but were alike in forbidding the enslavement of Americans. There were disputes, armed clashes, but nevertheless tribute, until Decatur wiped out the system and the shame in 1815.

Neutrality and Its Difficulties, 1793-1812. — Except for the Civil War, this was perhaps the most critical period in the history of the re¬ public. Gratitude to France, the surviving bit¬ terness toward England, many grievances left by the war and still unsettled, all these inclined the United States toward the French side in the Wars of the Directory. Such aid upon the sea might well be of vital importance. To secure it Genet was sent by France as minister. But he found Washington resolved upon neu¬ trality as the only safe course. Maritime war with England would have destroyed our com¬ merce and thrown our affairs into fatal confu¬ sion. Neutrality meant a breathing spell. Angered by this, Genet tried to compromise our performance of neutral duties in every way until withdrawn at the close of 1793. (See In¬ ternational Law). Opposition to Washing¬ ton’s course, shared by Jefferson and his fol¬ lowers, gradually built up political parties. Be¬ sides old grievances against Great Britain, there were newer ones, which the war with France led to, impressment of seamen from our ships, for instance (see Impressment), and the ruin of our trade with the Continent in breadstuffs, by an order making them contraband. A com¬ mercial treaty was also badly needed. In 1794 John Jay made the treaty which settled all these points, but only by leaving some of them out. It contained our first extradition agreement. It admitted us to the East and West Indian trade under conditions. It framed a list of contraband. But in it Great Britain did not renounce impressment. Jay’s treaty was ratified

in spite of a storm of abuse and opposition and helped American trade immensely in the years to come. Our relations with England and

France were like buckets in a well. As friend¬ ship with one grew, with the other it waned. So now France began to seize vessels and prop¬ erty, under any or no pretext. When Pinckney went to Paris to remonstrate in 1796, he was rebuffed. Humiliating negotiation went on nevertheless, in 1797, three commisioners being sent instead of one. A national loan and indi¬ vidual bribes were demanded by Talleyrand as a condition of negotiation. It was then that the curious episode of the X. Y. Z. Correspond¬ ence (q.v.) occurred. Thus this mission was as fruitless as the other had been. Yet a third one was sent, by Adams, to the dismay of the Federalists and was lucky enough to profit by the revolution of 18 Brumaire 1799, which made Napoleon first consul. For now France con¬ templated a commercial league against England, and was ready to negotiate. The treaty of 1800 was the result. This did not pay for French spoliations (that was arranged in 1803), but relieved the United States of the various em¬ barrassments of the 1778 treaties, while restat¬ ing many of their provisions. This treaty was another valuable step forward. But after an interval of calm, impressment became again active and various outrages were committed by British ships of war off our own coast. All this was dwarfed, however, by the extensive and illegal paper blockades (see International Law) with which the combatants fought to the injury of the neutral. Our reply was an em¬ bargo (see Embargo), and useless negotiations with both countries. England's obstinacy and Napoleon's duplicity, coupled with the ardor of our own South, forced us into the ill-judged War of 1812. In spite of all the hampering restrictions of this period, our foreign trade in¬ creased largely. Neutrality as established by Washington meant national salvation.

Boundaries and Territorial Growth. — The diplomatic processes which have built up our present limits, out of a country bounded west by the Mississippi and void of Florida, are lengthy and important. But the barest outline can be given here. They consist of (1) bound¬ ary adjustment; (2) territorial acquisition; the two often mingled. The first stretch of line, the Saint Croix River, was in dispute as early as 1783, but definitely identified in 1798. The next piece was to run north to certain ((highlands,)) which we placed near the Saint Lawrence, but Great Britain laid down across the heart of Maine. Much disturbance arose in this vast wild region, the scene in 1839 of what is known as the Aroostook War. In 1842 it was divided by the Ashburton Compromise, on the line of the Saint John River, the Saint Fran¬ cis and a range of hills. From the source of the Connecticut to the Lake of the Woods, the differences have not been serious. West of the Lake of the Woods, after the Louisiana Pur¬ chase, the line ran along the 49th

degree but halted at the Stony Mountains until 1846, when it was carried forward to the Gulf of Georgia, studded with islands. There are two ship channels through this archipelago, one of which (the Canal de Haro) after more long years of controversy was designated as the treaty channel, by the emperor of Germany, arbitrator, in 1873. This whole northern bound-

ary, from ocean to ocean, was relocated in 1908 by treaty. Meanwhile Alaska had been purchased from Russia in 1867, and here, too, were disputed boundaries. The Canadians de¬ sired a harbor on that coast, and interpreted the treaty so as to draw the line 10 leagues back from the coast, crossing some fjords, not going around their heads. But this was denied by the commission which decided the boundary in 1903. (See Alaskan Boundary Commission). The Mexican boundary is partly an artificial, partly a riverine one. The Rio Grande is a shifting stream and the Arizona boundary marks have a way of disappearing, so that to this day oc¬ casional diplomatic adjustments of the line are necessary. The chief acquisitions of territory prior to 1899 have been by the purchase of Louisiana, 1803; of Florida, 1819; of Alaska, 1867, and by the annexation of that vast region southwest of Louisiana which the Mexican War brought. Each of these events should be stud¬ ied under its own title. Of their diplomatic aspects but the slightest review can be given here. A long controversy with Spain over the free navigation of the Mississippi to the Gulf, with the right to transship, made it perfectly clear that our West would insist upon these privileges. French ownership of Louisiana, 1800, was far more dangerous than Spain's could be. The sale of Louisiana, 1803, though earnestly desired by the United States, was effected by Napoleon's naval and financial weak¬ ness and change of plans. (See Louisiana Purchase). Louisiana was a terribly ill-de¬ fined region and naturally capable of being stretched. In the far Northwest this process was aided by Gray's discovery of the Columbia, 1793; Lewis and Clark's exploration in 1804-05; Astor's trading-post at its mouth, 1810, and by the Spanish cession of rights on the Pacific (Art. Ill, treaty of 1819). But the rights so derived were vague at best ; the title to the Oregon country was left by treaty for many years in abeyance, and that splendid region finally won by the influx of settlers. Spain, in Florida, for years kept the inevitable at bay with the sole weapon of delay. Finally, in 1819, upon the assumption of our citizens' claims against Spain, up to $5,000,000, the cession of Florida was agreed to. (See Florida). The territory gained by the Mexican War was partly seized,

partly paid for. That war was necessitated by the annexation of Texas, to which Mexico still laid claim and with which she was still at war. (See Mexican War). The Gadsden Treaty of 1853, by purchase, en¬ larged this territory.

The Monroe Doctrine and Its Develop¬ ment. — This policy was based on the right of self-defense. It has never given the United States rights not otherwise existent. With much of truth it has joined much of indefinite¬ ness; to the genuine principle of self-defense it has joined this paradox, that the stronger the nation grew and the less it had to fear, so much the broader grew the doctrine in its application. Throughout the diplomacy of the past 80 years this doctrine runs like a thread. Toward Cuba and Hawaii, as well as toward South and central America, it was the determining factor in the national attitude. No native politician can live without accepting it ; our foreign neigh¬ bors, at one time or another, have for the most

part grudgingly submitted to it. Originally it announced three things : that no colonization on this continent by a foreign power would be suffered; that the United States would take no part in European politics ; that European inter¬ vention, to control the form of government of an American State against its will, would not be tolerated, because it was dangerous to our peace and safety. The first principle was aimed at Russia; the last at the Holy Alliance. This Monroe Doctrine was enforced on its original lines as late as 1865, against French interven¬ tion in Mexico. (See Mexico). In and out of Congress it was deemed applicable in a broader way, to limit French control of De Lessep's Panama Canal, in the period subse¬ quent to 1880. With a scope still further en¬ larged, it was used by President Cleveland in 1895, to curb Great Britain in her boundary dispute with Venezuela. And now it is within bounds to say that the old policy tends to be¬ come a new one, ((America for Americans,® the freedom of this continent from European sovereignty and control. As an evidence of this tendency may be cited Convention 2, signed at The Hague 1907, which forbids the use of force for the recovery of contract debts be¬ tween states until arbitration has been tried. To many of the American states even this seemed to fall short, they wishing force never to be legalized for the recovery of debts, public or private. See Monroe Doctrine.

Relations with Spanish-American States.

— Our diplomacy in this direction has been con¬ cerned mainly with such matters as (1) protec¬ tion from foreign aggression, as of Venezuela from her creditors, in 1903 ; (2) pressing pri¬ vate claims;

(3) exercising an indefinite kind of police power to keep order; (4) trying to bring about unity of feeling and action in vari¬ ous directions, as in the Pan-American and ear¬ lier congresses. This sense of a common inter¬ est and desire for unity of action have grown markedly in the past 10 years. The various fac¬ tors which complicate the situation are chronic revolutions, lack of security to the persons and property of foreigners resulting, defaulted na¬ tional debts, redress claimed by other powers, jealousy of the United States, lack of consider¬ ation and of understanding on the part of the Lhiited States, a theoretical but not very active republican tie of sympathy. The natural desire of foreign powers is to collect debts or secure redress by force, and if this is prevented by the United States, to make this country responsible. Our problem is to exercise the control which our position on the continent demands, with no assumption of responsibility for the acts of our neighbors. Somewhere between these positions there must be a line drawn ; to find it requires a nice diplomacy.

The Slave Trade and the Right of Search.

— For nearly 70 years the right of search was a burning question with. England in one form or another. The key to the difficulty was the pain¬ ful recollection of British impressment practice. That was an attempt to enforce a municipal law on a foreign ship on the high seas, that is, within another state's jurisdiction. It was not formally surrendered; it was disused. Early in the 19th century began the anti-slave trade agitation in England, perhaps a unique example of national altruism. To be made effective this

movement needed a universal right of search on suspicion of slave trading, to be exercised by the war ships of one or more states. By treaty with several powers, Great Britain gained this right, but in the case of the United States the memory of impressment made this later exer¬ cise of search too unpalatable. Hence, of course, slavers would try to screen themselves by a false use of our flag. To meet this Great Britain set up two new theories. One was, 1810, that since American statutes forbade our citizens to trade in slaves, English ships and courts might enforce this prohibition — an ab¬ surdity. The other, about 1840, claimed a right of visit (of a foreign ship at sea in time of peace) as distinct from a right of search, which was denied by Mr. Webster and surrendered by Lord Aberdeen in 1859, after years of

exas¬ perating controversy. (See International Law). In 1842, by treaty, the two powers agreed to maintain separate squadrons for slave trade prevention, acting in concert when feas¬ ible ; in 1862, the reciprocal rigfit of search was at last conceded to ships specially authorized. To stamp out the slave trade on land and on sea, as relates to Africa, many states, the United States amongst them, united in the act of 1892, but here too a reciprocal right of search existed only when otherwise granted by treaty.

Fisheries and Sealing. — Here we touch the question of a state's jurisdiction over the high seas and its coast sea. The treatment of the Northern fisheries was a problem in the peace of 1783; it is a problem to-day. In 1783 the high sea fishery was admitted to be open to the new state, while an extensive grant of coast fishing privileges off Newfoundland, Labrador, Nova Scotia and the Magdalen Islands was added. As a grant, this privilege was termi¬ nated by the War of 1812, according to British contention. By consenting in 1818 to the re¬ vival of but a portion of the coast fishery for¬ merly enjoyed, the United States accepted this theory. The grant of 1818 was in terms per¬ petual. Between this treaty and the next, in 1854, much had happened in fishery matters to disturb the peace of the two countries; adverse provincial legislation; the broadening of forbid¬ den waters by the headland theory; exclusion from the large bays under penalty of cap¬

ture; and on the other side, smuggling and ag¬ gression by our own smacks. In 1854 came in the principle of reciprocity, which really meant free fishing to us, free entry of fish to the Canadians, which they strongly desired. In 1871, this reciprocity, which had terminated,

was revived for a term of years, coupled with an arbitration plan for striking a

balance of values. Under this the Halifax Commission, 1877, decided $5,500,000 to be due Great Britain. Now we are back on the 1818 basis again, defined as to Newfoundland, by the arbitration of 1910, but we still need the Gulf fishing and the Canadians need our mar¬ ket. Since these are, the one of fluctuating, the other of great and certain value, it seems false reciprocity to try any longer to balance them. In the Pribilof seal herd, acquired by the Alaska purchase, the United States had a valuable as¬ set. These seals spend part of their year at sea, but returning to their isles to breed are exposed to pelagic attack. The United States has tried to prevent this wasteful method of gathering skins by claiming exclusive jurisdic-

tion over the eastern Bering Sea, and by claim¬ ing ownership in the seals while at sea. When these claims were tested by arbitration at Paris in 1893, they both broke down (see Bering Sea Controversy), but it had been agreed whatever their respective rights might prove to be, that sealing regulations should be enforced by the two powers for the preservation of the seal herd. Such were framed, but have proved inef¬ fective. The best way of treating the question from the first would have been by international union, to include Russia and Japan. Mr. Bay¬ ard tried this, but Canada's influence prevented and later Mr. Blaine tried the other, mistaken, tack. _ In 1897 our own country, Japan and Russia agreed to prohibit pelagic sealing, so long as experts deemed essential, and finally in 1911 Great Britain acceded, so that until 1926 all pelagic sealing in the north Pacific is prohibited, the catch on the Pribilofs being equitably shared.

As to Interoceanic Canals. — The diplomacy of the United States has been long and often concerned with the attempt to secure a favor¬ able canal concession across some portion of Central America, and to define such canal's status. It has been seriously handicapped, how¬ ever, by two things: (1) In constant uncer¬ tainty as to what route was physically best, it has had to negotiate, so to speak, in the dark, with several states, any one of which might be the sovereign of the route decided upon. (2) Our policy has alternated between the neutral¬ ization of a canal by the commercial powers, as in the case of Suez, 1888, and single-handed con¬ trol and protection by the United States, the latter predominating. The victory of the latter policy was made clear by the defeat of the first Hay-Pauncefote Treaty in the Senate. The con¬ vincing argument for it was the desire for an exclusive war right in the canal, for naval mobilization. This was rendered possible by the abrogation in 1901 of the Clayton-Bulwer Treaty (q.v.) of 1850 with Great Britain. The revolu¬ tion in Panama and its recognition as an inde¬ pendent state in 1903, followed by a canal treaty with the new state, by which the United States guarantees Panama's continued independent ex¬ istence, are the final steps in this long process of negotiation and definition. Under these two treaties with Great Britain in 1901 (the second Hay-Pauncefote) and the treaty of 1903 with Panama, the great canal has been dug, the proc¬ ess requiring 10 years from possession in 1904 to opening in 1914. Its status is that of terri¬ torial ownership, by perpetual grant from Pan¬ ama, the rights of the French Company being extinguished by the payment of $40,000,000 and with a douceur to Panama of $10,000,000 and $250,000 a year. The territory is a zone 10 miles wide, with water rights beyond this limit; Colonel Goethals was the engineering and ad¬ ministrative head ; Colonel Gorgas was in charge

of sanitation; it was theoretically neu¬ tralized but by the United States alone, which really means protected ; to make this protection effective the terminals have been fortified ; it is governed by an appointee of the President; it is opened on terms of equality to the ships of all nations. See Panama Canal.

The United States and the Declaration of Paris. — Why has ihe United States, always standing up for neutral rights, never joined in the neutral bill of rights of 1856, called the

Declaration of Paris (q.v.) ? It was the aboli¬ tion of privateering which was Mr. Marcy's stumbling block in 1856, because he deemed the retention of this right necessary to supplement our small navy. But, he said, if you will yield the right to capture enemy's innocent private property at sea as well, our accession will be gladly made. Spain and Mexico likewise re¬ fused. Yet when Spain and the United States were at war in 1898, neither side employed pri¬ vateers. It can be shown that the other rules of the Declaration are in the interest of the United States and accepted by it; also that pri¬ vateering is not of much practical value to-day, particularly to a naval power. The conclusion should be drawn that in this respect our diplo¬ macy has been a mistake, that, we should gain much and lose little by accepting the Declara¬ tion of Paris in its entirety.

The Diplomacy of the Civil War. — This was mainly concerned with three classes of questions: (1) those relating to the recognition of Southern belligerency; (2) those relating to the blockade; (3) those connected with the equipment and reception of Confederate ships of war in foreign, mostly British, waters. In the first particular Mr. Seward pursued a wrong-headed policy, claiming the rights of a belligerent to blockade and search, for example, which implied a legal war, but denying never¬ theless the existence of a war and of a body of neutral powers. This mistake complicated much of the early diplomacy of the war, and made the attitude of the North most difficult. When states find their relations closely affected by a civil war, their commerce hampered by the rules of blockade, contraband and search, a new flag seeking entrance to their ports, a new gov¬ ernment de facto applying belligerent rights on the sea, they are warranted by international law and by their own commercial interests, in rec¬ ognizing the new belligerent and declaring their own neutrality. In our Civil War, Spain, The Netherlands, Great Britain and

France did this, and Mr. Seward complained of it. The blockade of Southern ports was a gigantic task, slowly made effective, with some irregularities, but in the main conducted on legal lines. Great Britain, the power whose trade was most af¬ fected by it, respected it and was even consid¬ erate in declining to press remonstrance in view of lapses in the blockade of certain ports, and in cases where the declaration of blockade for a long period was not substantiated in fact. It was in the partiality with which England's neu¬ trality laws were administered at her colonial ports, and particularly in the violation of those laws in home waters, that she erred. Two Con¬ federate cruisers were built, equipped, armed and in some degree manned by British agen¬ cies. They helped to sweep Northern com¬ merce from the seas. Mr. Adams and the watchful consuls resident in England left no stone unturned to stop them. Never was there a more difficult position than that of C. F. Adams, nor one more gallantly filled. Sympathy for the South pervaded the ruling class. The gradual change of sentiment as the war pro¬ gressed, the consciousness of a dangerous prec¬ edent set, the diplomatic pressure applied after the war by a reunited United States, these led Great Britain on to the settlement of the so- called Alabama claims at Washington in 1871.

This was a diplomatic triumph, because it laid down a strict standard of neutral behavior, by which England consented tnat a court of arbi¬ tration should judge her conduct, though deny¬ ing that it had been theretofore applicable. See International Claims and Disputes.

Naturalization Questions. — The allegiance of individuals is transferred by emigration fol¬ lowed by naturalization. But if the laws of two countries prescribing the conditions of these processes are not identical, since the new allegiance involves protection, upon the return of the individual to his country of origin a legal conflict as to his allegiance may occur. So, too, if his emigration has been unpermitted, or has evaded military service. Owing to the copious immigration which has sought the United States, our diplomacy has been largely con¬ cerned with just such cases. Our diplomatic remedy was to seek as a favor for the individ¬ ual relief from the obligation or service still due which the naturalized German- American, for instance, visiting his mother-countrv, was held liable for. Some such had served in the Civil War, some had emigrated as mere boys. The law was clear, for a state may lay down its own conditions of emigration. Between 1865 and 1870 the situation became acute and a rem¬ edy was eagerly sought. Another class of diffi¬ culties arose where our laws naturalized emi¬ grants of states like England, which held the allegiance of their subjects to be indelible. Here both countries had claims to the service of the same person. By the

negotiation of treaties with the North German Union, 1868; Belgium, 1868; Hesse, Bavaria, Baden and Wiirttemberg, 1868-69; Mexico, 1868; Sweden and Norway, 1869; Austria and Great Britain, 1870; Den¬ mark, in 1872, these difficulties were cured. By these treaties, the right of expatriation was allowed and our five years' residence require¬ ment was recognized. (See Naturalization). The provisions of these treaties were reciprocal. Two withheld their privileges from youth who ran away when actually drawn for military service. The others made no such distinction. The subsequent working of these treaties has not been altogether without friction. It may be noted that the modern tendency is toward a uniform five years' residence rule for naturali¬ zation, as under the new Cuban Constitution. These naturalization treaties were a very consid¬ erable diplomatic achievement, due largely to our Minister resident at Berlin, George Ban¬ croft.

The Diplomacy of the United States in the Orient. — This has reflected commercial rather than political demands. Owing to the radical differences in law, in usage, in racial feeling, European intercourse with the East has insisted for its protection upon a fixed treaty tariff upon imports and upon that exemption from the local law and jurisdiction which we call exterritoriality. This was a limitation upon the sovereignty of Oriental states. On the other hand, only certain ports in China and Japan were opened to foreign trade. These various features appear in our treaties with China, 1844, 1858, and with Japan, 1854, 1857, 1858. Between 1860 and 1880 both countries began to absorb the new civilization, Japan eagerly and China, vaster and not so centralized, without enthusiasm. Here was the parting of

the ways. China thereafter allowed religious freedom, submitted to our drastic immigration restrictions, 1880 and 1894, but otherwise dealt with the United States on the old conservative basis. Japan meanwhile abolished feudalism in 1871 ; set up a representative Parliament, 1881, 1890; adopted a code of law framed on an European model and made rapid progress in the new ways. Her victory over China in 1895 gave her a position which compelled the powers to surrender their special privileges, as to duties and jurisdiction. In this our own coun¬ try had prior to the war taken the initiative. A considerable influx of Chinese work people, intense local prejudice against them in the West, some deadly riots in which they have suffered and on the other hand outrages to missionaries and the

Boxer attack on the legations in Peking have proved some mutual ill-will, while in the main the respective governments have been on friendly terms. More important still was the war with Russia, 1904, ended by the Peace of Portsmouth, both Japanese triumphs of arms and diplomacy.

As a result Korea become a Japanese pro¬ tectorate ; the control of Manchuria was shared with Russia and China; Japan's influence upon China increased; her position in the entire Pa¬ cific was enhanced; she became truly one of the great powers. As a result also a certain degree of friction has developed with the United States, owing to the hostile legislation of our Pacific States rather than to any Japanese act, it is true, but with a consciousness of conflict¬ ing interests. China during the last decade has tended toward modern ways. She has encour¬ aged railways and internal development; has driven out the Manchu dynasty; has assumed a republican form of government and a con¬ stitution; all without serious bloodshed. Under the policy of the Open Door and the Golden Rule, we have watched these changes hopefully yet realizing that the new republic has neither the political unity nor the military strength to make its future certain. See Japan; China; Siam.

Cuba and the Spanish War. — The rela¬ tions of the United States with Cuba have been impressed with a sense of the latter's geographi¬ cal importance, jealousy of its control by any other state than Spain and a desire for undis¬ turbed trade and settled government. To Cuba, Monroe's declaration of policy has applied with peculiar force. The slave interest before 1860 at one time dreaded a free Cuba, at another desired its annexation. Purchase was several times offered, as in 1847, and in 1854 under the foolish threat of the Ostend manifesto (see Ostend Manifesto), but Spain declined. Dur¬ ing the Civil War, Spain showed some sym¬ pathy for the South, although it was Southern influence that had coveted the island. The lib¬ eral revolution of 1868 in Spain was reflected in Cuba, but there cruelly put down. There ensued a disturbed decade when our neutrality was enforced in spite of aroused sympathy, some filibustering, and an offer of mediation, 1869. Cuban belligerency was not recognized, though Grant came within an ace of such ac- • tion. In 1878 the rebellion collapsed, in 1894 it broke out again. In the interval had come illusory reforms, better trade under reciprocity with the United States and steady misgovern-

ment. We were nearly affected by the new insurrection, in damage to trade and the bur¬ den of preventing filibustering. Yet what remedy was there? Recognition of Cuban inde¬ pendence was out of the

question, since inde¬ pendence as a fact did not exist. Recognition of Cuban belligerency was inconsistent with our usage and would have hurt our trade still more, while releasing Spain from all further responsibility for losses in Cuba. There re¬ mained inaction or intervention. The hand of the administration was forced early in 1898 by the destruction of the warship Maine in Havana Harbor, attributed by many to Spanish agencies, though a court of inquiry fixed no responsi¬ bility. War resulted. The chief points at issue before the peace commissioners at Paris were the assumption of the Cuban debt by Spain and the disposition of the Philippines. After a struggle and the payment of a sola¬ tium, Cuba was set free without being saddled with the cost of her ravaging, and the Philip¬ pines were ceded to the United States. So strong was the opposition to this last, as an act of domestic policy, that the Senate barely ratified the treaty. But as it has turned out our retention of the Philippines has been a test of character applied to this country which it has successfully mdt. For by reforming the land system of the islands, by giving them modern education, by developing communica¬ tions and enforcing order, by training in self-government, in short by sacrificing our own in¬ terests rather than squeezing for our own profit, we have lived up to the best ideals of colonial government.

The Great War and Our Neutrality. —

The European War, which began in August 1914, affected deeply the whole civilized world. But so large a part of that world was belligerent as to make the neutral fraction relatively powerless. The only wea¬ pons possessed by the United States were against Germany, the seizure of some $100,000,- 000 of merchant shipping lying up in our ports ; against England, an embargo of munitions and food stuffs. The first meant a break, perhaps a war, with Germany; the second meant a com¬ mercial panic. Our position, therefore, when it became apparent that both belligerents were bent upon infringing our rights as neutrals, was extremely difficult. We complained of German mine laying in the open sea, of her brutally illegal submarine methods, illustrated in the Lusitania, of her plots to prevent our trade in contraband which even attempted the destruction of our factories and ships ; we com¬ plained likewise of the British methods of block¬ ade, their definition of contraband, their ex¬ traction of noxious persons from neutral ships on the high seas, their seizure of mails and exasperating delay in remedial process.

Moreover, although probably three-quarters of our people warmly sympathized with the Entente allies, the German minority party tried in every way to hinder and to discredit the administration. Such

evidences of divided allegiance shocked the country so that in the Presidential campaign of 1916, all platforms denounced it.

During the war President Wilson offered mediation without avail, and various individuals agitated to bring about peace. They did not

realize that mighty, fundamental differences be¬ tween the combatants were being fought out, a terrible but necessary process before the world could return to peace. The United States per¬ formed its neutral duties faithfully for its trade in contraband, which was naturally objectionable to the Germans who got none of it, was abso¬ lutely legal and proper. Its long suffering in merely protesting against the invasion of its neutral rights, was due to the causes stated above. But as the war went on, the country became acutely conscious of its military weak¬ ness, and increases in both military and naval establishments were voted by Congress.

Relations with Mexico. — President Diaz ably built up commerce and transportation in Mexico and fulfilled its foreign obligations, but he failed to satisfy the demands of his people for education, a change of the land system, and administrative reform. His supplanter, Madero, was too feeble to solve either foreign or internal problems ; while Huerta had no chance, for President Wilson, displeased at the bloody be¬ ginning of his rule, refused to recognize him. Moreover, his rival, Carranza, was helped with arms and money to drive Huerta out and was recognized in turn. During all this upheaval the country fell into chaos, brigandage became rife, our own border had to be guarded, and on a somewhat trivial Jpoint of etiquette Vera Cruz was occupied, and later abandoned.

Carranza proved unequal to his task. He had no credit; he could not maintain order; his soldiery was insubordinate ; the national debt was defaulted and the country starved. Then came raids over the border, quite pur¬ poseless but most exasperating, led by Villa and others. To punish and prevent such raids, United States troops were sent southward hop¬ ing for a co-operation in bringing about order, which they failed to get. Instead they twice met with open resistance from the Carranzistas.

The United States and Arbitration. — This account of the diplomacy of the United States would :be incomplete without some reference to its attitude toward arbitration as a means of settling international differences. This has been a lifelong policy. It was used by the

provisions of Jay's treaty in 1794, to designate the Saint Croix boundary; in 1814 to apportion the islands in Passamaquody Bay; in 1814 also to settle the northeastern boundary. By this device the Alabama claims, the San Juan boundary, the Northeastern Fishery dispute, the sealing controversy, all these being differences with Great Britain, have been satisfactorily arranged. The Alaskan boundary was laid down by a joint commission which is not strictly an arbitral method but a substitute for it. All of this has been narrated. These were all in¬ stances of special arbitration, i.e., of -reference to a special court agreed upon ad hoc. Their fortunate outcome naturally led to a desire to broaden the usage, to make it general, perhaps obligatory, instead of particular. Both of The Hague conferences testify to the efforts of our delegates to this end. But besides this, our State Department has tried in at least three dif¬ ferent ways to generalize the arbitral principle by treaty.

(1) In 1908-11 Mr. Root made nearly 20 treaties which refer to The Hague Court ques¬ tions <(of a legal nature or relating to the in¬ terpretation of treaties" provided they do not

affect vital interests, independence, or honor. A vast number of similar agreements were made by other powers, their scope being equally limited.

(2) In 1911 Mr. Taft framed treaties, with both France and Great Britain, referring to arbitration all questions in dispute justiciable in their nature, to which was coupled a Commis¬ sion of Inquiry provision. These failed of rati¬ fication in any useful form.

(3) In 1913-14 Mr. Bryan carried through some 30 treaties based on a so-called Peace Plan which by the certain reference of all mat¬ ters in dispute to a commission of inquiry, war and increase of armament to await its report, gave opportunity for calm deliberation.

At The Hague and elsewhere, Germany stood in the way of all arbitral proposals which meant anything, preferring the arbitrament of force ; thus the two countries, Imperial Germany and the United States, in a sense might be regarded as the champions of the two systems of force and arbitration for the settlement of differences and their military power has cor¬ responded.

Modern Diplomacy and General Char¬ acteristics. — Other topics with which our diplomacy has had to do might be detailed. Extradition,

copyrights and trademarks, free navigation of rivers, Samoan affairs, tariff by treaty, and so on ; but these are more conven¬ iently discussed elsewhere. American diplomacy to-day still shrinks from an active part in Euro¬ pean politics. This was explicitly stated to The Hague Conference in 1899. With this in mind it is a question if the United States can properly be called a world power. But in point of fact, our interests and our diplomacy have been more impressed by those of Europe than we may think. Our share in international legislation relating to the care of the wounded, industrial property, the slave trade, submarine cables, ex¬ change of official documents, are examples, and particularly since the Spanish War has this been true. One detects in our recent diplomacy a more confident tone, a readier initiative, even the air of leadership, coupled with ingenuity of resource and that simplicity and directness of aim which have long been its characteristics. But yet its defects and handicaps must not be lost sight of, — lack of continuity from frequent change in administration and in party, lack of certainty because of the Senate's control of treaties made by the executive, lack of a trained diplomatic service. In reviewing the diplomacy of the United States as a whole, one is im¬ pressed by its blunt straightforwardness (some¬ times amounting to crudity or ill manners), by its usual freedom from intrigue, lastly by its rather surprising successes, owing surely to the soundness of its aims. <(Observe good faith and justice toward all nations," wrote Washington in his farewell address, (

Bibliography. — Bigelow, J., (Recollections of an Active Life* (1910) ; Coolidge, A. C., (The United States as a World Power* *(1908) ; Foster, J. W., (A Century of American Diplom¬ acy * (1900) ; id., (American Diplomacy in the Orient* (1903) ; id., (The Practice of Diplom¬ acy* (1906) ; Hart, A. B., foundations of

American Foreign Policy > (1901) ; Latane,

J. H., (America as a World Power* (1907) ; Richardson, J. D., (Messages and Papers of the Presidents* (1896-99) ; Schuyler, E., Ameri¬ can Diplomacy * (1901) ; Van Dyne, F., (Our Foreign Service* (1909) ; Wharton, F., ed., Revolutionary Diplomatic Correspondence of the United States* (6 vols., Washington 1889) ; White, A. D., Autobiography* (1910) ; Wilson, W., (History of the United States) (1904).

Theodore S. Woolsey,

Professor of International Law, Yale University.

18. THE WAR WITH FRANCE. The

outbreak of war in 1793 between Great Britain and the French Republic placed the United States in a most embarrassing position. Presi¬ dent Washington determined to adopt a policy of neutrality, but for two reasons he found it very difficult to do so. In the first place were the treaties concluded with France in 1778. The treaty of alliance guaranteed forever the integrity of the French possessions in America, and the treaty of commerce provided that French privateers and their prizes should have shelter in United States ports, a favor which was denied to the enemies of France. The question of the privateers gave most trouble. If the United States had adhered strictly to the obligations of the treaty they could not have preserved neutrality. Fortunately, at a critical time, the President's position was strengthened by the intemperate conduct of the French Min¬ ister, Citizen Genet (q.v.). The encroachments of the belligerents upon our trade rights con¬ stituted a second obstacle to the maintenance of a neutral policy. The British and French appeared to vie with each other in their zeal for seizing and confiscating American merchantmen and their cargoes. Many of these outrages could not be justified even under their own extrava¬ gant interpretation of the principles of interna¬ tional law. The partial compromise of the troubles with Great Britain in 1794 served to increase the hostility of France.

In March 1797, just after the inauguration of President Adams, news was received that the French Directory had refused to accept Charles Cotesworth Pinckney, who had been sent to supersede Monroe as Minister. Desiring to bring about a peaceful settlement if possible, Adams sent Elbridge Gerry and John Marshall to join Pinckney in a special mission. Shortly after their arrival in Paris they were approached by some agents of Talleyrand, who informed them that the Directors were much annoyed at certain remarks made by President Adams in a recent speech, but that a douceur of 1,200,000 lires would probably mollify their wrath. Ne¬ gotiations went on for several weeks, but as the commissioners refused to submit to black¬ mail, nothing was accomplished. On 5 March 1798 the President informed Congress that cer¬ tain dispatches had been received from France, which he would lay before them as soon as they could be deciphered and translated. A second message dated a fortnight later stated that the peace mission had been a failure and urged Congress to prepare for war. The Federalists were jubilant and the Republicans

very much disconcerted. The publication of the dispatches, however, aroused such strong popular feeling against France that the moder¬ ate Republicans gave up their opposition. These

documents became known as the X.Y.Z. Cor¬ respondence (q.v.), because the government used those letters in referring to Talleyrand's representatives. Both houses of Congress agreed by large majorities to support the President's, policy. An act was passed estab¬ lishing the Navy Department, and Benjamin Stoddert of Maryland was appointed as the first secretary. Previous to this time naval affairs had been in charge of the War Department. Money was appropriated to equip the navy, to strengthen the coast defenses and to buy arms and ammunition. An act of 14 July 1798 levied a tax on houses, land and slaves, the first national direct tax ever imposed in the United States. Of more doubtful wisdom were the Naturalization, Alien and Sedition acts, which were directed against French sympa¬ thizers.

The President's course was approved with as much enthusiasm by the public as it was by Congress. (

In spite of these successes the President

manifested very little zeal for the prosecution of. the war. This was doubtless due in part to jealousy of Hamilton, but it was mainly the result of his intense conservatism. John Adams was not the man to sympathize with the hair¬ brained schemes of Hamilton for the conquest of the Floridas. and he was certainly not the man to continue a war when there was no longer good cause for it, merely because public opinion seemed to favor it. Hearing that the French government would receive a minister from the United States and would treat him with courtesy and respect, he nominated Wil¬ liam Vans Murray to that position. The mem¬ bers of his own party were taken completely by surprise, and the leaders of the war faction made an attempt to defeat Murray's confirma¬ tion in the Senate. Adams checkmated their plans by withdrawing Murray's name and sub¬ stituting three commissioners, Murray, Chief Justice Ellsworth and Patrick Henry (25 Feb. 1799). Henry refused to accept, and William Davie of North Carolina was selected in his stead. Much to the chagrin of Hamilton, the Senate confirmed the nominations. The Ham¬ ilton partisans in the Cabinet now made a final attempt to delay the departure of the commis¬ sioners, but their success was of short

duration. The President asserted his authority, and the commissioners set sail in October 1799. The Federalists throughout the country were at first surprised, not to say disgusted, at the peace policy of the chief executive. Hamilton's in¬ trigues to checkmate his plans, moreover, re¬ sulted in a revulsion of feeling, and it may safely be said that the commissioners sailed with the approval of the vast majority of the American people.

The mission was successful. A treaty of peace was concluded with the first consul, 30 Sept. 1800. Provision was made for the resto¬ ration of captured ships and goods which had not yet been condemned. For protection in the future the rule was adopted that <(free ships make free goods,® except in the case of contra¬ band of war. The terms blockade and contra¬ band were defined, and certain regulations were made in regard to prizes and privateers. The most serious problem arose from the desire of the United States to be released from the obli¬ gations of the treaties of 1778 arid the desire of France to avoid paying indemnities for the American vessels and cargoes which had been confiscated. Article II of the new convention provided for the postponement of both ques¬ tions until a future settlement, with the under¬ standing that in the meantime the treaties of 1778 should not be in force. Strong opposition was made in the Senate to this article on the ground that it sacrificed the claims of American merchants. # It was finally struck out and a clause was inserted limiting the convention to eight years. In this amended form the treaty was returned to France. Napoleon ratified it with the proviso that each country made the concession which the other demanded. The Senate passed the final vote of ratification with this understanding. It was this bargain which gave rise to some of the French spoliation claims. The obligations of France were, of course, not to the United States government, but to American citizens who were engaged in foreign trade. Consequently when o,ur govern¬ ment released France from those obligations,

it tacitly assumed them itself. This treaty of 1800, like the Jay Treaty with England, was really only a temporary settlement. The troubles with both countries continued until the close of the great European conflict on the battlefield of Waterloo. See Treaties \ United States — Diplomacy.

Bibliography. — Adams, J., (Works 5 (10

vols., 1850-56) ; Allan, G. W., (Our Naval War With France> (1909) ; (American State Papers, Foreign Relations) ; (Annals of Congress, 5

Vols. VII-X; Lodge, H. C., (Life of Hamil¬ ton (1882); McMaster, J. B., (History of the United States) (1883-1907); Morse, J. H., (Life of John Adams) (1884) ; Richardson, J. D., (Messages and Papers of the Presidents5 (1896-99) ; Schouler, J., (History of the

United States5 (rev. ed., 1894-99) ; (Treaties and Conventions of the United States5 (1776—

1887),

W. Roy Smith,

Professor of History, Bryn Mawr College.

19. THE LOUISIANA PURCHASE.

The vast province of Louisiana was ceded by France to the United States 30 April 1803, the purchase price being $15,000,000. Originally belonging to France, Louisiana was ceded to Spain by the Treaty of Paris in 1763, and was retroceded to France for the purpose of colonization 1 Oct. 1800, with the understanding that if it was ever again ceded away it should revert to Spain. It was shortly after President Jefferson's installation that information con¬ cerning the retrocession of Louisiana to France reached America. Though the act was believed to be hostile to the interests of the United States, yet Jefferson hoped to maintain the friendly relations with the French government so recently restored by the so-called Treaty of Morfontaine. But when the Spanish intendant, Don Juan Ventura Morales, closed the port of New Orleans to American trade, Jefferson be¬ gan to see the purpose of the first consul in securing the retrocession of Louisiana and to experience a foretaste of Bonaparte's aggressive policy. Morales' act in closing the right of entrepot at New Orleans, as the right of de¬ posit was called, was regarded throughout the United States with feelings of strong disap¬ proval. Excitement ran high, especially in Ten¬ nessee and in Kentucky, in which States the people were eager for war. The Western set¬ tlers looked upon the summary closing of the port as the initial step in Bonaparte's aggressive policy, which contemplated not only the arrest of American trade development, but also of any farther expansion toward the Mississippi. The Western traders had chafed greatly under Spanish authority along the banks of the Mis¬ sissippi. Spain blocked the way to farther ex¬ pansion on the west and held control of all the waterways leading to the Gulf of Mexico, since the entire seaboard along that gulf was under Spanish dominion. Moreover, the whole val¬ ley of the Ohio as far as Pittsburgh was de¬ pendent upon the

permission of the king of Spain for an outlet to the Gulf for its rapidly increasing trade with the outside world. This permission the king granted, and by the treaty of 1795, which Godoy executed by way of off¬ setting Jay's Treaty, Spain gave the United States special privileges along the Mississippi, as the right of deposit at New Orleans with

only a nominal charge. Still the Western trad¬ ers were subjected to much annoyance under Spanish rule, and a growing desire manifested itself to expel Spain from that region and to annex her rich territory to the United States.

After Charles IV ceded Louisiana to France and Spain retired from the Mississippi, condi¬ tions were not improved, but rather aggravated, since the Western States feared Napoleon's grasping ambition quite as much as they had despised King Charles' authority. When, there¬ fore, the port of New Orleans was summarily closed, preparatory to the transfer of that region to France, there was such an outburst of popular feeling throughout the United States that President Jefferson was constrained, de¬ spite his strong desire for peace, to open nego¬ tiations immediately for the purchase of West Florida and New Orleans, as affording an out¬ let to the sea. Accordingly, he instructed his Ambassadors at Madrid and Paris, if possible, to obtain from their respective governments the cession of West Florida and New Orleans. Congress was fully alive to the demands of the people, and on 12 Jan. 1803 appropriated $2,000,000 with a view to purchasing the de¬ sired territory. Jefferson appointed James Monroe as Minister Extraordinary to France to aid Chancellor Livingston, United States Ambassador at Paris, to effect the purchase of New Orleans and West Florida. When Monroe set sail for France, on 8 March 1803, Jefferson was not at all confident that Monroe's mission would be successful. He admitted that he sent him largely to conciliate the people and to re¬ store political quiet throughout the country, then much worked up over the situation.

In treating for the purchase of West Florida and New Orleans Monroe's instructions in¬ cluded three contingencies : Monroe and Living¬ ston were to buy the desired territory if it could be bought for any sum not exceeding $10,000,000. They were to offer besides the purchase price, commercial privileges for 10 years in the ceded ports, the incorporation of the inhabitants on an equal footing with the

citizens of the United States, and, if demanded, even a guaranty of the west bank of the Mis¬ sissippi. As a second contingency, in case France refused to sell the territory in question, the ambassadors were instructed to sue for the right of deposit, together with such privileges as France would grant. In the event France acceded to neither of these propositions, then the ambassadors were to be given special in¬ struction by Congress adapted to the case. This last contingency might mean war, or it might mean further procrastination. In a communica¬ tion to the first consul, delivered through Pichon, Jefferson had already hinted at a prob¬ able alliance with England in case France de¬ clined to accept any terms whatsoever and positively refused relief to the United States from the severe conditions of trade along the Mississippi. When Livingston and Monroe first opened negotiations through Talleyrand for the purchase of New Orleans and West Florida, the French Minister of Foreign Affairs held out but little hope. The American ambassadors used every argument, but to no purpose, ap¬ parently. However, the aspect of affairs soon changed. The first consul was growing weary of the drain on his resources which Santo Domingo entailed. He reflected, too, that he vol. 27—24

would soon need all the men and money he could command for the execution of his plans in Europe. When, therefore, he received intel¬ ligence of the death of Leclerc in Santo Do¬ mingo and the annihilation of his army and the general uprising of the negroes of that province, he realized that the offer of the United States furnished him a suitable occasion for abandon¬ ing his costly schemes of French colonization in America, under cover of a new enterprise, and he gladly closed with the American am¬ bassadors to cede to the United States the whole of Louisiana for the largest sum he could ob¬ tain. He needed money to replenish his ex¬ chequer for his contemplated war with England and Germany, and he did not hesitate to break his word with Spain in ceding away Louisiana, which act, perhaps, he intended as a punish¬ ment for Spain for Godoy's treaty with the United States. The American ambassadors, astonished at the offer to sell the whole or no part of Louisiana, though not authorized to purchase the entire province, wisely closed with Talleyrand and Marbois and agreed to buy the whole of Louisiana. After some haggling over the price, Livingston and Monroe agreed to pay France $16,000,000. The documents were signed early in May and antedated to 30 April 1803, and thus the United States, beyond the expec¬ tation of all, acquired possession of the vast province of Louisiana.

The treaty for the cession of Louisiana is notable in that it contains no definition of the boundaries of the property transferred. When the American commissioners insisted that the boundaries of Louisiana be

defined, they were merely informed that the boundaries were the same as they were in the hands of France, ac¬ cording to Berthier's original treaty of retroces¬ sion. However, it was definitely understood on both sides that the Floridas were not included in the transfer, since that territory did not belong to France. Article III of the treaty provided that ((the inhabitants of the ceded territory shall be incorporated in the Union of the United States, and admitted as soon as pos¬ sible, according to the principles of the Fed¬ eral Constitution, to the enjoyment of' all the rights, advantages and immunities of citizens of the United States.® In addition to the sum of $11,250,000, which the United States prom¬ ised to pay France, the United States agreed to assume the spoliation claims of American citi¬ zens against the French government, amounting to $3,750,000, thus making the price in all $15,- 000,000. The ratification of the treaty by the Senate of the United States gave rise to a per¬ plexing constitutional question as to the right of Louisiana to be admitted into the Union and the process to be adopted. President Jefferson recommended, since there was no authority in the Constitution to buy foreign territory, that a constitutional amendment be adopted as the most convenient solution of the problem. How¬ ever, the treaty was at length ratified without recourse to a constitutional amendment, and the President acquiesced even at the risk of mak¬ ing blank paper by construction of the Constitu¬ tion. Spain protested vigorously against the cession of Louisiana to the United States, alleg¬ ing that the first consul had violated the treaty of retrocession and claiming that the province could be ceded to herself only. But when the Spanish government realized that both the

United States and France were resolved to make good the transfer, even by a resort to arms, if need be, Charles IV yielded and ac¬ cepted the cession as inevitable. Thus, for $15,000,000, the United States added to her ter¬ ritory a vast region extending from the Mis¬ sissippi to the Rocky Mountains and from Mex¬ ico to the Lake of the Woods. The annexation of Louisiana not only increased the territory of the United States by an immense area, but it also put a new complexion upon the politics of the nation and marked a new epoch in the national life. See Louisiana Purchase.

Bibliography. — Adams, H., (History of the United States > (Chaps. 2-5, Vol. II, 1889); Bond, F., Louisiana and the Louisiana Pur¬ chase* (Washington 1912) ; Fontaine, Louisi¬ ana Purchase) (Baton Rouge

1913) ; Hermann, B., Louisiana Purchase and Our Title West of the Rocky Mountains) (Washington 1898) ; Hitchcock, R., (The Louisiana Purchase and the Exploration, Early History and Building of the West) (Boston 1903) ; Hosmer, J. K., (His- tory of the Louisiana Purchase) (New York 1912) ; Marbois, (Histoire de la Louisiane et de la Cession* (1829; Laurence, trans., 1830) ; Marshall, T. M., (History of the Western Boundary of the Louisiana Purchase, 1819— 184U (Berkeley, Cal., 1914); Ogg, F. A.,

(Opening of the Mississippi: A Struggle for Supremacy in the American Interior> (New York 1904) ; Robertson, C. F., Louisiana Pur- chase) in American Historical Association Papers (I, 253-290, 1885) ; Robertson, J. A., Louisiana under the Rule of Spain, France and the United States 1 785— 1807 J (Vols. I— II, Cleveland 1911 –) ; Roosevelt, T., (The Win¬

ning of the West> (Vol. IV, 261-286, 1889) ; Thornton, W. M., (Who Bought Louisiana?* (Washington 1913) ; United States Department of State, (State Papers and Correspondence Bearing upon the Purchase of the Territory of Louisiana* (Washington 1903).

Edwin W. Bowen,

Department of Latin, Randolph-Macon College.

20. CAUSES OF THE WAR OF 1812.

The latter years of the 18th and the earlier years of the 19th centuries witnessed a phe¬ nomenal growth of American commerce due to incessant wars in Europe. Naturalization was easy in the United States ahd the wages of seamen were high. Great numbers of Eng¬ lish sailors availed themselves of these advan¬ tages. England became jealous of American trade. She had never granted to her subjects the right of expatriation, though she gladly re¬ cruited seamen wherever they could be found. In 1793 the right of searching neutral, especially American, vessels was claimed and put into practice. This so-called right meant that wher¬ ever an English warship met American mer¬ chantmen or war vessels they were required to stop, order their men on deck and permit as many sailors to be seized and forced into the English service as were unable to prove their nationality. It was maintained that only de¬ serters from the English navy were wanted ; but in the period of 1796 to 1802, 1,942 American seamen were pressed into the English naval service on the plea that they were deserters.

When the war between Great Britain and Napoleon broke out afresh in 1803, American trade received another impetus. French, Span¬

ish and even English traders raised the Ameri¬ can flag in order to get the advantages of neu¬ trals. An arrangement between England and the United States permitted American vessels to take in cargoes in her colonies provided these commodities were consigned to United States ports. The cargoes were afterward reshipped to Europe. This arrangement gave rise to great abuse. Ship-owners learned' to touch at Ameri¬ can ports, unload their cargoes, pay the required tax in the form of a bond, reload and, at the same time receiving their bonds back again, set sail for foreign markets. Thus it appeared that England's commerce would fall into the hands of her rivals. To break up this almost illicit trade and at the same time bring the impress¬ ment policy more strictly to bear upon the Americans, British war vessels were stationed just outside the more important ports of the United States. In the rigor of this surveillance American citizens were seized and American vessels confiscated in larger numbers than ever before. English cruisers virtually blockaded the Atlantic Coast from Maine to Georgia. On 27 June the British war vessel, Leopard, under orders from the British admiral at Halifax, signaled the Chesapeake to stop as she was leaving Norfolk Harbor. An officer was sent aboard the Chesapeake to search for deserters. Commodore Barron of the Chesapeake re¬ fused to muster his men. Thereupon the Leop¬ ard opened fire and, taking the Chesapeake by surprise, speedily disabled her ; three men were killed and 18 wounded. When the search was completed only one Englishman was found. Nevertheless, three American sailors were taken away, one being a negro. The <(Chesapeake affair® excited the people of the United States almost beyond precedent. Indignation meet¬ ings were held in most of the towns. Promi¬ nent men presided over these gatherings ; thou¬ sands of petitions calling loudly for reparation were sent to the President. War soon became the cry. President Jefferson did not believe in war, but he felt keenly the force of the insult and, after forbidding American harbors to Eng¬ lish war vessels, he sent an agent to England to demand disavowal of and reparation for the attack on the Chesapeake. England paid no at¬ tention to the President's representations.

While English-American relations were thus assuming a threatening attitude neutral trade was suffering still further restrictions in Eu¬ rope. In May 1806, provoked by Napoleon's closing the ports of Hamburg and Bremen, England declared, through her Orders in Coun¬ cil, the coasts of Belgium, Holland and Ger¬ many to the mouth of the Elbe in a state of blockade. On 21 Nov. 1806 the French

em¬ peror replied by the Berlin decree which de¬ clared a similar blockade of all the ports of England. Neither the orders nor the decrees could be enforced, but they made trade with England, France and Germany unlawful. Yet during the year 1807 still other Orders in Council were issued. These closed to neutral commerce all the ports of European states friendly to France and authorized the seizure of any neutral vessel en route to any closed port unless its captain first entered an English harbor, subjected its cargo to taxation and ob¬ tained a license to trade. Napoleon's reply was the Milan decree, which ordered the confiscation of every neutral vessel that permitted itself to

be searched or in any wise recognized the Brit¬ ish Orders in Council.

The British orders and the French decrees, the so-called right of search and finally the actual attacking of American war vessels seemed to leave the United States government no peaceful way out of her situation. Presi¬ dent Jefferson, however, suggested in 1807 that an embargo be laid on all American shipping. Congress had already prepared the way for such a policy at its previous session in the Non¬ importation Law which had not been put into force until a few weeks before. Congress as¬ sembled in November 1807 and immediately fell in with the President's idea of starving Europe into a recognition of the rights of neu¬ tral trade. The embargo went into effect in December 1807 and remained in force until 4 March 1809. This law solved none of the diffi¬ culties it was intended to solve. Opposition to the measure became so great that an Enforce¬ ment Act was passed. This gave the President despotic powers ; yet the commercial sections of the country resisted the law and smuggling became so general in New England that local officers of the United States declined to make any effort to stop it. The South suffered much hardship, too : tobacco and wheat, the principal commodities of export, shrank to one-half their former value. The Union itself seemed about to go to pieces just before the close of Jeffer¬ son's administration.

In place of the embargo a second Non-inter¬ course Act was substituted, which, though it practically prohibited trade with the great war¬ ring powers of Europe, gave some promise of improving the condition of commerce. With this change of policy Madison became President,

4 March 1809. England now sent a new Min¬ ister, David Erskine, who speedily negotiated a treaty which promised the withdrawal of the Orders in Council. Madison suspended the non-intercourse against Great Britain on 10 June 1809 by proclamation. The merchants and ship-owners who had respected the non-impor¬ tation hastened their goods and ships to sea. On 10 June 600 vessels sailed from American ports to take chances with their enemies in Europe. In July the news that Erskine's Treaty had been disavowed by the London Cabinet and that Erskine himself had been re¬ called came as a painful surprise to the Amer¬ ican people. Madison issued at once a second proclamation which recalled the first and re¬ placed the former restrictions on English trade. The British Qabinet now sent F. J. Jackson to the United States. Jackson completed the alien¬ ation of the American government. He in¬ sulted the President and ruined his own cause by insisting that Madison had duped Erskine into signing the recent treaty. The new Min¬ ister was summarily dismissed. Rose, another British representative, appeared next year in Washington, but his efforts availed nothing so long as his government forbade him to yield the great point in question — the repeal of the Orders in Council.

The year 1809 proved the non-intercourse ineffective, more injurious to Americans than to England and France, for now both powers had a chance to enrich themselves by enforcing the laws of the United States against her own com¬ merce. Napoleon proposed in his Rambouillet decree (March 1810) to seize every vessel within

his reach, that is, in the French harbors, on* the ground that such vessels had, perhaps, rec¬ ognized England's Orders in Council and were thus subject to his Milan decree; or if not, then they had violated the laws of their own country in offering to trade at all with either France or England. In a few months $10,000,000 worth of property was thus seized and finally confis¬ cated. Before Napoleon issued his Rambouil¬ let decree the American Congress had resolved to repeal the Non-importation Act. In place of it a new law was passed which held out a sort of bribe to England and France: in case either nation should cease to violate the commerce of the United States then non-importation should be revived against the other and maintained until neutral trade ceased to be violated. Na¬ poleon again turned an American law to his own advantage : he announced that his decrees would be suspended as against the United States after 1 Nov. 1810, if by that time Eng¬ land had suspended her orders or if the United States ˆcaused- her flag to be respected.® How¬ ever, he continued to sequester American car¬ goes. President Madison considered this a

suf¬ ficient concession. He gave England warning that non-intercourse would be enforced against her if the orders were not rescinded by 2 Feb. 1811. When the time expired, no action having been taken by England, Congress renewed the former law and prohibited all importation of English goods. This caused some alarm in England, but there was no abatement of im¬ pressments. A new Minister was sent to Washington. His instructions, however, still permitted no promises of any. change in Brit¬ ish policy.

While the ire of America was constantly ris¬ ing there came the news in May 1811, only three months before most of the Congressional elec¬ tions were to take place, that the United States frigate, President, had encountered the British sloop, Little Belt, after a hot chase of several hours, and practically annihilated her. Never was news more welcome to American ears. The (< Chesapeake affair® had been avenged. Min¬ ister Foster wrote his government that the Americans no longer pressed for reparation on that score. Public meetings were again held and the newspapers, especially in the South, were filled with exaggerated accounts of what had happened. Other events occurred during the summer and autumn of 1811 which tended to hasten the breach with England. The In¬ dians on the western frontier from Fort Dear¬ born to northern Georgia formed a confedera¬ tion against the United States. Tecumseh, the famous Shawnee chief, was the soul of the movement. It came to a battle at Tippecanoe, in western Indiana, on 7 Nov. 1811. The Ameri¬ cans, under Gen. William Henry Harrison, gained a complete victory. Tecumseh joined the English soon after and the general belief that England instigated the Indian attacks was confirmed. Harrison's victory was the second good omen of the year.

Notwithstanding all these causes for war it is quite probable that the government would not have declared hostilities the next year but for the revolution which took place in the Re¬ publican party — the controlling party since 1801. This party had come into power as an uncompromising opponent of English influence in the country. It had, however, for its leader

and founder a man who opposed war from principle — Jefferson. The old Republicans, coworkers with Jefferson, had become so op¬ posed to war that they permitted themselves to be isolated. The events of 1811 taught the people a bolder policy. The antipathy for Eng¬ land

which pervaded the ranks of the party had outgrown peaceful embargoes and non¬ importation laws ; men thought again of the Revolution. They elected new representatives to Congress. The new Congress had a mem¬ bership of 140; on its assembling more than 70 were found to be young and untried politicians. The most important of these new men were Henry Clay of Kentucky and John C. Calhoun of South Carolina. When Congress met the younger element evinced a war-like feeling quite unusual in that body. Clay was at once elected speaker of the House and with the aid of his friends he organized that branch of the legislature for the purpose of war. These young leaders were vigorous nationalists ; they thought of the Union as a great state; they looked to the future and had confidence in the Republic; they were imperialists who not only hoped to compel Europe to respect their flag but who aimed to conquer and annex Canada. They counted on using their strength to the utmost advantage against England because of the impending struggle with Napoleon. In this President Madison joined them. From Novem¬ ber 1811 to the end of the session the new party exercised all its ability and ingenuity in per¬ suading Congress and the country to prepare for hostilities. After long and weary debates and after many a compromise on army and naval matters, war was at last declared 18 June. The invasion of Canada had already be¬ gun. See Treaties; International Law; United States — Diplomacy.

Bibliography. — Adams, H., (History of the Administration of Jefferson and Madison) (rev. ed., 1909) ; Hunt, G., (Life of James Mad- ison) (1902) ; McMaster, J. B., (History of the United States* (1883-1907) ; Mahan, A. T., (Sea Power in its Relation to the War of 1812) (2 vols., Boston 1905) ; Roosevelt, T., (The Naval War of 1812* (3d ed., 1883) ; Schouler, J., (History of the United States } (rev. ed., 1894-99).

William E. Dodd,

Professor of American History, University of Chicago.

21. THE WAR OF 1812. The War of

1812 began officially on 18 June. The army of the United States numbered at that time 6,744 regulars. It was poorly equipped, poorly drilled and its morale was extremely low. But Congress had authorized its increase to 25,000 and provided, at least by law, for a second volunteer army of 50,000 men ; besides, the militia of the several States was called on to co-operate with the regulars and the volunteers. The result of these acts was very unsatisfactory. The

regular army never during the war reached 10,000, the volunteers appeared only in small numbers and the militia offered to serve only for short terms and then preferably in their own States. The governments of the New Eng¬ land States prohibited their militia from going beyond their State boundaries and various ob¬ stacles were put in the way of enlisting. The South was too remote from the theatre of ac¬ tion to feel the need of sending the militia to

the front. Tennessee, Kentucky and the old Northwest furnished the main body of soldiers, regular and irregular, who fought in this war. The American navy apparently promised still less at the beginning of the conflict. It con¬ sisted of seven frigates and nine smaller craft. And as to the sinews of war, the treasury was in a precarious condition as a result of the numerous trade regulation acts of Jefferson's and Madison's administrations. Congress ' was inveterately opposed to laying new taxes in any form. Loans had to be resorted to at the be¬ ginning. But the bulk of the capital in the country was in New England and New England was bitterly opposed to the war. Hardly half the money asked for was subscribed. On the other hand, England was contending in Europe with her great enemy, Napoleon. The British troops in Canada numbered barely 7,000; their line of defense was 1,000 miles long. The Eng¬ lish navy was, however, the undisputed mistress of all the seas ; the north Atlantic squadron counted three battle ships, 20 cruisers and 50 smaller ships.

The conquest of Canada was made the first object of attainment. An army of 1,850 men, under command of Gen. William Hull, crossed the Detroit River in the latter part of July 1812. Hull threatened the British stronghold, Malden, for a few days; but hearing that the English and their Indian allies had seized Mackinaw, a fort at the head of Lake Huron, he retreated across the American border to Detroit. From this point Hull hastened off two regiments to oppose the advance of the enemy from the west. At this juncture the British Major-General Brock crossed the river and de¬ manded the surrender of the Americans. Hull's supplies were already becoming scarce, his basis of operations was 200 miles south and his com¬ munications were most difficult to maintain. He surrendered the fort and all the troops under his command, without a fight, on 14 Aug. 1812. Some 2,500 men, 33 guns and the whole of Michigan were thus lost at the be¬ ginning of the contest. The principal cause of this was the failure of General Dearborn to march into Canada from the eastern end of Lake Erie, according to the plan of the campaign, and thus cut off all supplies from Brock and finally force him to surrender. But while Hull made his way through dense forests to Detroit, Dearborn was in Boston attending to the politi¬ cal side of the war. Not until October,

nearly two months after the disaster at Detroit, did Dearborn cross the Niagara; and then it was with only a small part of his army under the command of Van Rensselaer, a New York mili¬ tia commander. Van Rensselaer attacked Queenstown (13 Oct. 1812), and was repulsed by General Brock, who had hastened from the scenes of his recent triumph to check this sec¬ ond movement. He was successful, though he was killed in the engagement. The campaign closed with the enemy in possession of the Western forts and the Territory of Michigan to the Maumee River. In the East the border re¬ mained the same.

But while things had thus gone ill on land, the navy had in a measure restored American confidence. _ The frigate Constitution, Capt. Isaac Hull in charge, met the British Guerriere about 800 miles northeast of Boston on 19 Aug. 1812 and captured her after a fight of 30 min-

utes. Hull reduced his enemy's ship to a com¬ plete wreck, killed or wounded one-third of their crew and received the remainder as pris¬ oners of war. On 18 October, the American sloop, Wasp , met the British sloop, Frolic, and completely demolished her and on the 25th the United States, a frigate of 44 guns, fought the British frigate, Macedonia, 38 guns, and gained as signal a victory as that of Hull over the Guerriere. This telling work of the navy took the world by surprise. England forbade her sea-captains to fight American ships of supe¬ rior tonnage. American privateers swarmed the Atlantic. They did effective work. It be¬ came dangerous for an English merchantman to cross the English Channel. They captured 500 vessels during the fall and winter of 1812— 13. Marine insurance for the Irish Sea rose to 13 per cent.

The campaign of 1813 centred about Lake Erie. Gen. William Henry Harrison had led an army of militia, volunteers and regulars from Kentucky during the preceding summer with the object of reconquering Detroit. The winter and spring of 1812-13 were practically wasted ; but news reached him, while still in upper Ohio, 12 Sept. 1813, that Commodore Perry had annihilated the enemy's ships on Lake Erie, and he began to move forward more rapidly. Perry had devoted the spring and summer to the construction of a fleet which he thought would break the power of the Brit¬ ish on the lake. On 10 September Perry came up with the enemy's vessels under command of Captain Barclay. After a serious mishap to his flagship Perry took command of the Niag¬ ara, came within close range and

after two and a half hours of heroic fighting completely de¬ feated him. Thenceforth the lake remained in American hands. Harrison was now on the offensive. With the aid of R. M. Johnson's regiment of cavalry he forced Proctor, the English commander, across the Detroit. Proc¬ tor remained a few days at Malden, but, very much to the chagrin of his Indian allies, he continued his retreat northward. On 5 Oc¬ tober, on the north side of the river Thames, he gave battle to his pursuers. Proctor lost his entire army; the Americans lost 15 killed and 30 wounded. Upper Canada fell into American control. At the eastern end of the lake and looking to the gaining of Lake Huron, General Dearborn made several half-hearted moves. On 27 April 1813, the town of York (now Toronto) was attacked. A sharp battle ensued. The Americans were successful and in the disorder which followed the victory the government house was burned. A month later Commodore Chauncey compelled the Eng¬ lish to evacuate Fort George on the Niagara, while the English made an unsuccessful at¬ tempt on Sackett's Harbor. An expedition to Montreal under the command of General Wil¬ kinson proved a signal failure. The year closed with Lake Ontario still in English hands. At sea the Americans were unable to hold their own. On 1 June the frigate Chesapeake, com¬ manded by Captain Lawrence, was defeated and destroyed by the British frigate Shannon. The enemy now blockaded the whole Atlantic sea¬ board.

The year 1814 brought Napoleon's over¬ throw and consequently peace in Europe. Vet¬

eran troops were sent to Canada and to the South. But the Americans were becoming in¬ ured to war; there was a more general sup¬ port of the administration. After some feeble movements in the spring a third invasion of Canada was begun. The Americans numbered 4,700 ; the enemy was equally strong. At Chip¬ pewa an attempt was made to check the inva¬ sion but without success. On 25 July Lundy's Lane, the bloodiest battle of the war, was waged. The British were 3,000 strong; the Americans 2,600. The greatest valor was manifested on both sides ; the losses amounted to about one-third of the forces engaged. Both sides claimed the victory; but the invaders held their ground until autumn when they withdrew to the Niagara. In September an invasion of New York was attempted from the Canadian side. The line of Lake Cham¬ plain and the Hudson River was selected; but Commodore McDonough foiled the plan in the famous battle of Plattsburg on Lake Cham¬ plain on 11 Sept. 1814. The campaign closed with no serious advantage gained on either side. To divert attention from Canada the British Cabinet had sent an army of 3,500 men under General Ross to threaten Washington. Finding the

capital so poorly defended, Ross landed his force, marched directly on the city, and, though meeting with some feeble resistance at Bladensburg, drove the government into the woods and set fire to the public buildings — in retaliation for the destruction of the public building at York a year before. Ross now turned his at¬ tention to the city of Baltimore. Here he met with some resistance, the general himself being killed in the attack.

New Orleans was the next object. There was chance here of Indian support from north¬ western Georgia. An army of 6,000 British regulars sailed for the Mississippi under com¬ mand of General Pakenham. It appeared a few miles southwest of New Orleans (q.v.) on 23 Dec. 1814. The Americans were com¬ manded by Gen. Andrew Jackson. Before the decisive engagement occurred both armies had been augmented to about 8,000 men each. Jack- son fortified himself a few miles below the city and awaited the approach of Pakenham; on 8 January at early dawn the battle began. See¬ ing his men waver, Pakenham undertook to rally them. He was instantly killed; repeated efforts were made to carry the American works, but without avail. The English with¬ drew, having lost 2,036 men killed or wounded. Jackson's loss was 71.

On 24 Dec. 1814 the treaty of peace had been signed in Ghent. No mention was made in the treaty of impressment of sailors, of the right of search or of the status of neutral trade. The fall of Napoleon had made these questions obsolete. As to boundaries neither party gained anything. The cost of the war had been $100,000,000, 1,400 ships of all kinds, 21,000 sailors and about 30,000 soldiers killed or injured. Its benefits were the rise of a truly national spirit, the weakening the State su¬ premacy of former days and the consequent overthrow of the half-treasonable opposition of New England. For bibliography see Causes of the War of 1812.

William E. Dodd,

Professor of History, Randolph-Macon College.

22. FINANCES (1789-1816). Finances of the United States government in 1789 were in a most unfavorable condition. Not only had the Revolutionary War left a legacy of national indebtedness, amounting in 1784 to $39,000,000 exclusive of the continental bills of credit, but owing to the defective revenue system pre¬ scribed by the Articles of Confederation, no adequate provision could be made either to pay the principal or to meet the annual interest charges. When the new Federal government under the Constitution was established, the debt had swelled to $54,000,000; of this $11,700,000 was owed abroad. In addition to the above obligations, there was an unknown amount of State indebtedness, approximating $20,000,000. The total debt was a heavy burden for a popula¬ tion of less than 4,000,000 and for a country as yet undeveloped in its material resources.

In 1790 Congress enacted an elaborate fund¬ ing scheme providing for three loans, the first of $12,000,000 to take up the foreign indebted¬ ness ; a second, to the full amount of the domes¬ tic debt, accepting at face value all obligations previously authorized, excepting bills of credit which were rated at 100 to 1 ; and a third of $21,500,000 to cover such State indebtedness as has been incurred for war purposes. The act was a complicated measure with ingenious con¬ trivances, not only to make the loans accept¬ able to holders of old obligations, but also, by varying rates of interest and deferred interest on a portion of the debt, to afford the new gov¬ ernment time to recover from its financial mis¬ fortunes. On two points there was bitter op¬ position to the passage of the act: (1) From those who objected to the acceptance of old certificates of indebtedness at their face value, inasmuch as these had passed current at depre¬ ciated value, and had fallen into the hands of speculators; (2) from the Southern States which had paid off a larger share of their in¬ debtedness, and consequently were unwilling to be burdened with the debts of States which had been less self-sacrificing. The first objec¬ tion was met by the firm contention that na¬ tional credit could not tolerate discrimina¬ tion ; the second was removed by a shrewd bargain which established the new capital in Southern territory on the boundaries of Mary¬ land and Virginia. In 1795 after the funding operations were over, the total debt amounted to $80,700,000, bearing an annual interest charge of about $3,000,000.

The revenue system established in 1789 was of simple character. A tariff act with low rates was passed; specific duties were placed on about 30 articles; ad valorem rates of from iy2 to 15 per cent on a few specified commodities, and a 5 per cent ad valorem rate on unenumerated articles. Tonnage duties were included, and the principle of discrimination against goods imported in foreign vessels and foreign shipping was adopted. Although the rates imposed in this tariff were low, the debate on the measure as well as the preamble of the act shows that the principal of protection of home industry was recognized.

In the law establishing a treasury department, provision was made for a Secretary of the Treasury, a Cabinet position; for a comptroller to pass on the legality of bills presented against the government; for an auditor responsible for

the accuracy of the accounts ; for a register to preserve the accounts ; and for a treasurer to receive and pay out money on presentation of proper warrants. The framework of this sys¬ tem has continued until the present time and has proved highly effective in safeguarding the government against illegal expenditures. Alex¬ ander Hamilton (q.v.) was chosen Secretary of the Treasury, and by his constructive genius, exhibited in a remarkable series of reports on public credit, a mint, national bank and manu¬ factures, encouraged Congress to establish its credit on a broad and generous basis. Through his influence the Bank of the United States was established which granted temporary loans to the government, furnished a sound note circula¬ tion and took care of the government funds. In 1791 it was found that additional revenue was needed, and under the advice of Hamilton internal revenue duties were imposed upon the distillation of spirits. This provoked opposi¬ tion, especially in the agricultural section of the Middle and Southern States. Here it was claimed that the interior was sacrificed to the commercial interests of the Northern seaboard. In 1794 there was open defiance in Pennsyl¬ vania, and the Federal troops were called out to put down the so-called Whisky Insurrection (q.v.). It was contended that the collection of the taxes was inconsistent with the principle of individual liberty, that it injured morals by in¬ ducing false swearing, was burdensome, and interfered unduly with the business of distilling. Although the opposition failed in its efforts, the tax was not fruitful, amounting in 1793 to only $422,000 from which about one-quarter was de¬ ducted for cost of collection and returns for drawbacks. In 1794 excise duties were extended to carriages, sales of liquors, manufacture of snuff, refining of sugar and auction sales. The constitutionality of the carriage tax was as¬ sailed on the ground that it was a direct tax and should be

levied by apportionment accord¬ ing to population. The Supreme Court, how¬ ever, in the case of United States v. Hylton (1796) decided that under the Constitution there were practically but two direct taxes, the poll tax and the tax on land, that the carriage tax was an indirect tax and consequently constitu¬ tional. Expenditures continued to exceed the earlier estimates; the Indian War of 1790 was followed by the Whisky Insurrection, and in 1797 new military and naval expenditures were demanded on account of the strained relations with France. In 1798 a direct tax of $2,000,000 was laid upon dwelling-houses, lands and slaves. In 1800 the total receipts from all sources was about $10,848,000, of which $9,081,000 was de¬ rived from customs and $1,543,000 from internal revenue and the direct tax.

Hamilton resigned from office in 1794 and was succeeded by Oliver Wolcott who main¬ tained the Federalist policy of his predecessor. The administration of each was subjected to severe and bitter criticism by the Republican party under the leadership of Albert Gallatin. Charges were made that the accounts were juggled, that adequate information of the con¬ dition of the treasury was not given to Con¬ gress, and that appropriations were not made for specific objects but in lump sums, giving undue and arbitrary power to the Treasury De¬ partment. In 1801 the Republicans came into

power with Albert Gallatin as Secretary of the Treasury. Ecpnomy and abolition of what were regarded as inquisitorial taxes were immedi¬ ately entered upon. Appropriations for the army, navy and diplomatic service were reduced and the excise duties were repealed. The lat¬ ter step, however, was taken contrary to the opinion of Gallatin, who wished to husband the resources of the treasury in order to pay off the national debt as rapidly as possible. The commercial prosperity of the country at this period was at a high level ; our neutral com¬ merce took advantage of the European wars ; exports and imports were large, and customs revenues for seyeral years continued to increase by more than $1,000,000 annually. Notwith¬ standing the loss of the internal revenue duties and the issue of a new loan of $11,250,000 re¬ quired by the purchase of Louisiana, the posi¬ tion of the treasury steadily improved, so that the debt was reduced from $86,000,000 in 1804 to $45,000,000 in 1812. The success of this opera¬ tion was largely due to Gallatin's insistence that $8,000,000 should be annually appropriated to the extinction of the debt regardless of all other de¬

mands. Gallatin also introduced the practice of rendering annually to Congress a statement of the finances, and during his administration the policy of making appropriations specific was established.

In order to meet the expenditures of the war with Tripoli a special revenue was created in 1804 by the imposition of additional duties of 2/2 per cent on all imported articles paying ad valorem duties ; this was known as the Mediter¬ ranean Fund. In 1806 the import duty on salt was removed. In 1809 there was a temporary check to the good fortune of the treasury owing to the Embargo Act, but upon its repeal there was prompt recovery. Irritation between Eng¬ land and the United States was deep-seated, and in 1812 the treasury faced a situation for which it was ill-prepared. War with England made a heavy loss in customs revenue, for a large part of the commerce of the United States was with that country; there was no internal reve¬ nue system to fall back upon ; and the estrange¬ ment of the wealthy merchants of New Eng¬ land, who opposed the war, made it difficult to borrow money in that section. The failure to renew the charter of the United States Bank in 1811 also deprived the government of a sub¬ stantial agency either for making temporary loans or selling securities. Moreover, there were intrigues in the Republican party directed against Gallatin ; his influence was so far weakened that in May 1813 he retired from the treasury.

The extraordinary demands occasioned by war were at first met by loans in which short time treasury notes played an important part. Between 1812 and 1816, $84,400,000 of govern¬ ment stock was sold, of which $17,700,000 was redeemed during the period, making a net in¬ crease of $66,700,000 ; $36,600,000 treasury notes were issued of which about one-half were re¬ deemed, leaving $18,400,000 outstanding at the close of the war. Funds were borrowed under disadvantageous terms, a large part of the stock being sold at a discount; of $41,000,000 bor¬ rowed up to the end of 1812, New England contributed less than $3,000,000. The financial distress was also aggravated in 1814 by the sus¬ pension of specie payments by local banks in

all sections of the country except New Eng¬ land ; thus the receipts of the government, both for taxes and loans, were in depreciated cur¬ rency. It is estimated that for loans of over $80,000,000 the treasury received but $34,000,000, as measured in specie. Treasury notes were issued under five different acts ; the earlier ones were in denominations of less than $100 and were not designed for circulation ; before the close of the war, however, provision was made for the issue of notes as low as $3. With the exception of the last issue all

notes were re¬ deemable in one year ; and again with the excep¬ tion of the small notes, all bore interest; none of the notes was legal tender.

Congress too tardily endeavored to enlarge the sources of fiscal supply by increased taxes. The customs duties were doubled at the outset, but this gave little strength, since commerce wras almost at a standstill. In 1813 a direct tax of $3,000,000 was levied and internal revenue duties were revived. It takes time, however, to establish the machinery of a new tax sys¬ tem, and no receipts from either of the above sources appear on the books of the treasury ac¬ counts until 1814. As a consequence of this feeble financiering, deficit followed deficit, amounting in the years 1812-15 to $68,600,000. Gallatin was succeeded in the treasury by Wil¬ liam Jones and George W. Campbell, neither of whom was able to cope with the situation, and in October 1814, Alexander J. Dallas, a con¬ servative Republican and friend of Gallatin, was made secretary. The mischief, however, had already been accomplished, and Dallas was un¬ able while the war lasted to extricate the treas¬ ury from the embarrassments occasioned by in¬ adequate taxes and depreciated currency. See United States — ‘Finances (1816-61).

Bibliography. — Bolles, A. S., financial History of the United States from 1774 to 1885) (4th ed., New York 1894-96) ; Dewey, D. R., financial History of the United States) (5th ed., New York 1915).

Davis Rich Dewey, Massachusetts Institute of Technology.

23. WESTWARD MOVEMENT. The

curtain which veiled far Cathay and the mystic East was raised during the Crusades, but the trade of Europe was blocked by the intrusion of the Ottoman Turks. Adventurous captains, barred by the scimeter in the East, by the cold of the North and the heat of the South, sailed boldly into the West, and consequently brought civilization to the Americas on the eastern rather than the western coast. The American people took up the extension of this triumphal course, and, following the same direction, car¬ ried civilization directly across the continent of North America from the Atlantic to the Pacific. In less than three centuries, they traversed the 3,000 miles of continental interior, conquered nature, dispossessed the savages, evicted Euro¬ pean rivals, and set up a high form of civiliza¬ tion and government, where formerly were only wilderness and barbarians. This achievement is commonly known as (

Speculation is exhausted in conjecturing the probable result had

civilization been cast on the Pacific instead of the Atlantic Coast, and been compelled to make its way across the continent from west to east. Recalling the many chance

discoveries along the Atlantic because captains mistook indentations, one may imagine the nu¬ merous accidents which must have resulted along the almost solid Pacific Coast, and the hindrance to the spread of the people because all must come through a few ports. The nar¬ row Pacific Coast plain cannot be compared in size with the great Atlantic plain as a place for recruiting strength before commencing the over¬ land journey. Passing eastward, the inhospitable desert between the Sierra Nevada and Rocky Mountains would have met the emigrants in¬ stead of the fertile lands of Tennessee, Ken¬ tucky and Ohio. An eastern movement must have been delayed for generations by the im¬ penetrable Rockies and the arid region at their base, just as the western movement stands to¬ day blocked while developing a national irriga¬ tion scheme. If there be a national destiny shaping our end, it was surely in evidence when directing Columbus to the eastern instead of the western coast.

In 1619 the first successful attempt at col¬ onization within the confines of the British dominions of North America was made at Jamestown, Va. In 1775 the first representa¬ tive body of men gathered at Boonesborough from four incipient settlements in the present State of Kentucky. It had taken 165 years for the English speech to cover the Atlantic plain, cross the Alleghany Mountains and set up free government within the Mississippi Basin. In 1820 Missouri was admitted, the first State be- .yond the Mississippi River. Louisiana is not considered because her population was suffi¬ ciently complete for admission when she was purchased. It had thus required only 45 years to go from the Alleghanies to the trans-Missis¬ sippi region. In 1850, California, the first Pacific State, was admitted. Thirty years only had been required for the people to traverse the remaining half of the continent. The rapid in¬ crease in the rate of speed may be attributed to the growth of the protective efficiency of the central government, to the increasing number of people, and especially to improved means of transportation.

The Atlantic Coast Plain, upon which the present United States was born, is a long, nar¬ row strip of comparatively level land, trending from northeast to southwest, and lying, gen¬ erally speaking, between

the Appalachian Moun¬ tain system and the Atlantic Ocean. Its width varies from 50 to 200 miles, depending on the approach of the various flexions of the coast to the mountains. Within this long stretch, the battles of the Revolution were fought with a few small exceptions. It was essentially a coast war, the troops being frequently conveyed by transports from one point to another, and a French fleet co-operating with the army during the last general campaign. During the war, the Continental Congress sat at Philadelphia, Bal¬ timore, York, Princeton, Annapolis, Trenton and New York, never more than 150 miles from the coast. It is said that during one of the many dark hours of the contest, Washington expressed his determination, in case of ultimate defeat, to retire with his remaining comrades to the fastnesses beyond the Alleghanies and there continue the unequal contest. Evidence is not wanting to show that many of Washing¬ ton's fellow-officers and comrades contemplated future residences in the (

region beyond the mountains was called. They were (

Several attempts to penetrate the western country were made about the time of the out¬ break of hostilities between the colonies and those in authority. The country-dwellers in the uplands of Virginia and North Carolina were restless, fearless and self-reliant. They needed only a rifle, powder and ball for equipment. In this and similar respects, they were the antip¬ odes of their urban-dwelling brethren of the north Atlantic plain. A glance at a map will show that in western North Carolina, the water¬ shed has leaped over to the most easterly of the mountain ridges, leaving a large space of the (

These scattered Watauga settlements, largely in what is now Carter County, Tenn., not only set up the rudiments of government, but also furnished a supply for two great streams of emigrants to the West. One branch passed directly down the Tennessee River, founded Knoxville and planted innumerable villages and homes throughout eastern Tennessee. John Sevier attempted to collect them into his state of (

and Kentucky. Uncertainty of ownership left them almost entirely unprotected. As a de¬ fensive measure, George Rogers Clark headed a number of them, together with some Virginia recruits, and marched to destroy Kaskaskia and other former French posts now held by the British. Virginia in this way doubly confirmed her claim to the land north of tfie Ohio. It is worthy of note that it was a Virginia-Kentucky

enterprise and formed no part of the claims put forward in the treaty of peace for American ownership of the <(back lands.®

The Watauga route, although the first to be used in popular migration, was outranked in age by the Potomac-Monongahela portage path. It was the one which young Washington chose across the mountains when warning the French from the ((back lands®; along it Braddock led his ill-fated expedition, and over it Washington brought back the survivors of that disastrous excursion into the Western country. It required the shortest carrying over the Alleghany water¬ shed and evidently awaited only the pacification of the Indians north of the Ohio to become the great thoroughfare to the West. The conduct of the Revolutionary War had made the Lake Champlain route to Canada familiar. At Al¬ bany the Mohawk invited travelers to the west to follow its charming valley to Lake Oneida, and thence by the Oswego River to Lake On¬ tario. Washington, Lafayette, Madison and Hamilton made short trips in this direction after the war. But it was a long and perilous way to the Western lands, involving passing through the undependable Iroquois, a canoe trip on two great lakes and a long portage about Niagara Falls. This route, destined eventually to become the most popular, was very tardily developed. A fourth route would be opened in time about the southern end of the moun¬ tains, but not until the Creeks and the Chero- kees could be removed from the way or could be pacified.

These were the four great ways from the Atlantic to the interior. Pioneers on foot and in <(dug-outs® pushed their way across upland, through forests and along the streams. The northern portage is now used by the New York Central and West Shore railways and by the Erie Canal ; the Pittsburgh route by the Penn¬ sylvania and Baltimore and Ohio railways ; the ((Wilderness Route® by the Chesapeake and Ohio, the Norfolk and Western and the South¬ ern Railway lines, and the extreme southern route by the many east and west systems cen¬ tring in Birmingham, Ala. In the many changes from ((dug-out® to palace car, the peo¬ ple have never abandoned the line of least re¬ sistance for travel.

Among the many inducements held out in recruiting for the Revolutionary service was the promise of <(a good farm.® Led by visions of this bounty land, officers and men, at the close of the war, banded themselves together for the purpose of migrating to the ((back lands,® which had been won by their valor. This they would do not only for bettering their condition, but also for protecting the frontier against the In¬ dians, the Spanish in the Floridas and the British in Canada. Efforts to satisfy these am¬ bitions brought about the cession

of the west¬ ern lands by the States to the national govern¬ ment, the creation of the Northwest Territory

(q.v.), the sale of 1,000,000 acres to the Ohio Land Associators and the first settlement north of the Ohio made, at Marietta, 1788. However, occupation of the land north of the river pro¬ gressed but slowly until the victory of Wayne over the Indians and the resulting Treaty of Greenville in 1795.

The year 1790 marked an important stage in the history of the westward movement. The constitutional government under President Washington had been established the year be¬ fore. One of his duties was to make a number¬ ing of the people so that an equal representa¬ tion in Congress might be had. The first census taken in 1790 enabled us to know the number of people in each county and town and hence the distribution of population. It showed that little ˆislands® of people had run far ahead of the main body and established themselves, as already described, in Tennessee, Kentucky and Ohio. Not more than 5 per cent of the 3,929,- 214 total population lived west of the Alle¬ ghany watershed. The front wave of the people extended almost uniformly along the eastern slope of the mountains, throwing out long arms along the four routes to the West. The average distance of the people from the ocean was not more than 250 miles. The Americans were still coast dwellers. The West was as yet unknown. The most thickly settled portions lay in an ir¬ regular line from Portsmouth, N. H., to Balti¬ more, Md. Here dwelt more than 60 people to the square mile.

The westward advance, as suggested hereto¬ fore, was hindered constantly by the hostility of the savages. Perforce the national govern¬ ment was gradually given control of them by the States. It recognized them as foreigners so far as making treaties with them for the pos¬ session of their land was concerned. Scores of these treaties were made, establishing lines be¬ yond which the whites solemnly promised not to migrate and east of which the Indian agreed not to molest the white. But it was impossible for the government to restrain the land-hunger of the citizen when confronted by a savage. On the frontier, treaties were secondary to force. These broken and obsolete Indian treaty lines, from which the savages were driven back, bear a striking resemblance to the positions occupied at different decades by the foremost line of the pioneers. In order to provide for the unstay- able advance of population, increased constantly in numbers by immigration from Europe, the national government was convinced that some¬ thing like a general policy of treating with the Indians must be formulated. The whites some¬ times surrounded the Indian

lands, threatening to annihilate the savages, if they did not move on. Thus in 1820, the advance line of pioneers extended from Kentucky in a strong belt down through Tennessee and western Alabama to Louisiana; but between these people and their brethren in South Carolina and Georgia lay hundreds of miles occupied only by the savage Creeks and Cherokees. Toward the north, civ¬ ilization had spread up from the Ohio River about to the latitude of Vincennes and Saint Louis, but further advance was barred by the Pottawatomies. With difficulty the whites were kept from annihilating whole tribes. Peace and preservation for the Indian as well as for the white could be secured only by keeping the

former well in advance of civilization, assign¬ ing them to some remote portion of the country which they could hold en bloc. Here they could dwell perpetually. See Treaties, Indian.

Many Presidential messages, beginning with those of Jefferson, advocated such a disposition of the Indian. In 1839 a revision of the laws regulating trade with the Indians was made. One provision set aside all the land lying to the west of the Mississippi River except the States of Louisiana and Missouri and the Territory of Arkansas to be an (

It is evident that the front line of people will always be at right angles to the direction of movement, representing, as it does, the fore¬ most wave of advance. This is the <(frontier.® Technically it is the long, narrow, advanced strip which contains more than two people and less than six people to the square mile. The latest aspect of the frontier is associated with the Great Plains and cowboys; but the frontier in past times has occupied successive positions

from the Alleghanies westward at each suc¬ ceeding census. Its various positions remind one of the old sea beaches on a geological map. When young Andrew Jackson migrated to Tennessee and lodged in the (

Manifestly, if the start had been equal all along the line and the rate of progress equal, the frontier line would have been almost a straight line. But the topography of the land and the hostility of the Indians prevented such a regular advance. Long arms of people ran up the streams, islands of people were formed far in advance and deep

indentations frequently resulted from some hindrance. The frontier of 1830, for example, extended in a great convex westwardly curve from Detroit, Mich., to New Orleans. It threw out so many projections along the Wabash, the Illinois, the Mississippi, the Missouri, Arkansas and Red rivers that it was 5,300 miles long. Ten years later it had filled out these inequalities so much that al¬ though it extended from Green Bay, Wis., to Corpus Christi, Tex., it was only 3,300 miles in length.

No prediction could be safely made as to direction or rate of motion. A rush or (

The frontier in 1860 lay almost due north and south just west of Iowa and Missouri. It was the line-up for the final dash across the Great Plains, the best known and most pictur¬ esque of all the positions of the frontier. In 1890 it had assumed its highest achievement and was in its proudest position. Beginning at the Canadian border near longitude 100b it came down through the Dakotas and suddenly turned westwardly, encompassing the larger part of Colorado, and rounding down into Texas on the south. But 10 years later, popu¬ lation had so shrunken in the ((dry farming® districts of Nebraska, Kansas and Colorado, that the line had fallen back, almost coincident with the meridian of 101° west longitude from the Canadian boundary to the Rio Grande. For the first time in its history, the American frontier had retreated. Nature, driven back step by step through the conquering will and forces of men, seemed to have taken her stand in the arid regions and to defy further encroach-

ments upon her realm. National irrigation under the form of internal improvement is now the weapon with which she will again be overcome.

The movement of population, which con¬ quered the continent and unified the American people, was not only a westward movement but ‘ a due west movement. Men follow parallels of latitude because of similarity of climate, occu¬ pation, products, foods and dress. The con¬ stant tendency to migrate due west is shown in a study of Americans living in one State who were born in another. New York, to illustrate, has contributed more citizens to New Jersey than to any other State; then to Michigan, Pennsylvania and Illinois in decreasing order, but all to the westward. Georgia has sent more of her citizens to Alabama than to any other State; then to Texas, Florida, Tennessee,

Arkansas and Mississippi, in decreasing ratio. Arkansas and Iowa are about equally distant from the Atlantic, the place of setting out. But in the onward march, 26 New Yorkers found their way to Iowa for every one to Arkansas. On the other hand 57 South Carolinians have chosen to live in Arkansas for every one who chose to remove to Iowa. The State of Wash¬ ington has drawn most largely upon Illinois and Texas most heavily upon Tennessee. All this had a most important bearing on Northern and Southern sectionalism.

The due west movement has been accompa¬ nied thus far by a very slight return movement, except beyond the Rocky Mountains, where the entire migration is the reverse of that to the east of the continental divide. Thus Virginia has given to Missouri 35 citizens for one re¬ ceived in return. But with the exhaustion of the western public lands, the growth of cities and increased means of communication, the westward movement will gradually wane. As evidence of this, it may be noted that in 1880 Illinois had given to Iowa six persons for one received, but in 1900 the ratio had fallen to three to one. During the same period, the ratio of exchange between New York and Colo¬ rado had fallen from 75 to 1 to 22 to 1.

This return movement will be increased by the improved methods of applying steam and electricity to means of transportation. Mention has been made of the increased rate of motion owing to these and similar improvements. The waterways were the ready-made highways for the pioneers. Supplemented by carrying or portage paths from stream to stream or across watersheds, they formed a network of routes of travel, not only in a drainage basin, but from basin to basin. No small amount of the pro¬ verbial American ˆinitiative,® the capacity for doing things, must be attributed to the manner in which obstacles were overcome in this prim¬ itive travel and transportation.

The American frontier has passed forever. Fully equipped civilization stands at the edge of the arid region. It is met in the mining cities of the Rockies. The American pioneer lives only in the gratitude of the people. The influence which the frontier and frontiersman have wrought on American life have been sug¬ gested frequently in preceding pages of this article. A supplemental summary finds that the frontier has produced (1) a constant re¬ naissance of the principles of free government upon which the republic was founded. Western

State constitutions have been notedly more li¬ beral than those of the Eastern States. Eastern statesman have been rejuvenated by contact with the crude sons of the West. A jealousy of their republican institutions, amounting al¬ most to a madness, permeates the Western

peo¬ ple, sometimes making them liable to harbor political and economic vagaries. (2) The fron¬ tier has helped keep alive the principles of democracy in America, notwithstanding the enormous accumulations of riches which tend naturally toward begetting social distinctions. Among the frontiersmen personal strength and personal merit outweigh descent and social rank, (3) The needs of the people in the remote re¬ gions, met by Congress under the general name of (

<(The West® has always been a purely rel¬ ative term and so remains. To the New Eng¬ lander, it means New York or Ohio. To the people of those States it means the trans-Mis¬ sissippi region. In Utah, it means California. In 1832 Chicago was in the Far West. About that date, a man conceived the idea of killing hogs, packing them in barrels with salt, and shipping the pork by lake to Detroit and Buf¬ falo, instead of driving the animals on foot or shipping them by boat, as was the practice. By the end of the century, Chicago was (

the hungry Eastern States and Europe. As early as 1830 a long, thin projection of people ran up the Missouri River to the mouth of the Kansas, following the route of Lewis and Clark a few years before. It was prophetic of the future collecting and distributing point of Kan¬ sas City, 1.500 miles from the starting points along the Atlantic.

So long as wagon trains toiled over prairie trails, or pony expresses handled light pack¬ ages and the mails, or the overland coach car¬ ried a limited number of travelers, the resources and capacities of the great West remained un¬ tried. But, in 1862, two companies accepted the offer made by the national government of land and loans to construct a continuous rail¬ way from the Missouri to the Pacific. Prece¬ dent for this assistance of the government was found in the custom of granting certain portions of the domain for constructing means of access, thereby rendering the remaining land more val¬ uable. In 1869 the line was opened and it sounded the death knell of an isolated West. When the road was begun, there were only 14,916 miles of railway beyond the Mississippi. When it was completed, there were 22,863 miles in operation in that remote region.

The Great American Desert, as our fathers mistakenly called the Great Plains, is now fretted over with railway lines. In its midst lies Kansas, Nebraska and the Dakotas, among the largest corn and wheat producing States. West of the Mississippi lie Texas, Montana, Oregon and New Mexico, containing more sheep than the remaining States

combined. West of the Mississippi lie California, Idaho and Colorado, producing more precious metals than all the remaining States. Most of the manufacturing is still carried on east of the Mississippi. Likewise a majority of the people dwell on the eastern side. But the river, running north and south, is no longer a menace to the perpetuation of the republic as it once was. Migration and trade run east and west, and the great Father of Waters is spanned by more than a score of railway bridges, linking the people together along modern lines of transportation. These trunk lines bind together the East and West, the old and the new, sire and sons, manufactures and raw products, storehouses and grain fields. Home ties are no longer sundered by migration ; sectionalism is no longer begotten of distance ; and the people move freely to and fro over soil which their forebears wrested from nature in order that the experiment of a confederated republic might be tried on the largest scale yet at¬ tempted.

Bibliography. — Croly, H., (Promise of American Life) (1910) ; Griffis, W. E., Ro¬ mance of Discovery) (Boston 1897) ; Hinsdale,

B. A., (01d Northwest* (1888) ; Howe, F. A., (Wisconsin, an Experiment in Democracy) (1912) ; Lewis and Clark, (History of the Ex¬ pedition (3 vols., New York 1904) ; McCarthy,

C. , (The Wisconsin Idea) (1912) ; McLaughlin, A. C., and Hart, A. B., (The West as a Factor in American Politics) in (Cyclopedia of American Government (pages 668-675, Vol. Ill, 1914) ; Ross, E. A., (Changing America) ; Sanborn, J. B., Congressional Grants of Land in Aid of Railways) (1899) ; Shea, J.

D. G., (Early Voyages up and down the

Mississippi* (Albany 1902) ; Sparks, E. E.,

(The Expansion of the American, People* (Chicago 1901) ; Thwaites, R. G., (Early Western Travels, 1768-1846) (32 vols., Cleve¬ land 1904-07) ; Turner, F. J., (Rise of the New West (1906) ; id., Cist of References on the History of the West (1903) ; White, ‘W. A., LXXX, 1897) ; Winsor, J., (The Westward Movement (1897).

Edwin Erle Sfarks, President of Pennsylvania State College.

24. THE NEW DEMOCRACY AND THE SPOILS SYSTEM. The use of the

appointing power to secure, in addition to the execution of the functions attached to the various offices, other purposes such as the

en¬ richment of one's family, the building up of personal or party support, the carrying out of some general policy, is as old as government, is probably inherent in government. The term spoils system in United States history is more definite than this. It is generally used to refer to a particular method of employing this power which was introduced into national politics at the time of Jackson's Presidency, and which from that time until the eighty's was, after the Constitution, the most important feat¬ ure of American political machinery. Few important movements in our history have secured their first triumphs in the national government. The spoils system had long been tried out in various States before it became national. In Pennsylvania in 1799, in New York in 1801, Republican victories had been followed by the wholesale removal of Fed¬ eralists. The swiftly succeeding party changes brought retaliations, and both parties were soon committed to the practice. Popular approba¬ tion confirmed it, and popular apathy allowed appointments to be made more and more ex¬ clusively for political reasons. The New York constitution of 1820 embodied an attempt at reform. The spoils system was, however, too firmly intrenched to yield, and the Albany Re¬ gency, a combination of politicians skilful in making use of appointive offices for political purposes, and in controlling the minor elective offices by means .of caucuses, became the dominant power in the State. The advantages of the spoils system in building up and holding together a political organization did not escape the attention of politicians of other States. Proscriptions were carried out in Rhode Is¬ land in 1810, in Massachusetts in 1813, and, while they were unpopular and did not lead to a permanent introduction of the spoils system there, they indicate that in these States, and probably in others, there existed a class anxious to see the public offices turned over to the politicians. Debarred from using the State service for their purposes, such men naturally looked to the national salaries ; nor in this were they alone. The more fortunate politi¬ cians of New York and Pennsylvania had al¬ ready a little tinged with politics the national service in their States, but they would not rest satisfied until they could elect to the Presi¬ dency a man who approved their principles and would make the spoils system national. The existing state of affairs was displeasing not to the politicians only, but to the people, particularly those of the frontier States. The

wholesome distrust of life-tenure in execu¬ tive and legislative office, which had been so keen during the Revolutionary period, had ex¬ tended to administrative office ; the reasons for regulation had been

forgotten and limitation had oome to be considered as an end in itself. State constitutions and laws began to substitute a fixed term for tenure during ˆpleasure® or ((good behavior,® and in 1820 Congress limited to four years the tenure of the majority of United States officials. Such legislative action did not immediately lead, and was not intended to lead to, actual change ; it was to give the people the power to make such change, if neces¬ sary. In 1828 there was a popular feeling that the time had come. The long tenure, and in some cases too eminent respectability, the book learning, of the existing servants of the people, had made them for some time feared and dis¬ trusted. In this situation the charge of ((bar- gain and corruption® against Adams and Clay seemed proof positive : the case against the civil service was complete. Joined to this dis¬ trust of those in authority was a superb con¬ fidence in the honesty and capacity of the peo¬ ple. Jackson said in his first annual message: ((The duties of all public offices are, or at least admit of being made, so plain and simple that men of intelligence may readily qualify them¬ selves for their performance; and I cannot but believe that more is lost by the long continuance of men in office than is generally to be gained by their experience.® The frontier did not be¬ lieve in the expert; the typical American was a <(Jack of all trades.®

Jackson Introduces the Spoils System. — The election of Jackson was brought about by the combination of these two elements. Van Buren had brought the support of the organized Democracy of the North and East, of the politicians and the people that they represented. Jackson himself stood for the frontier democ¬ racy, with its confidence in itself and distrust of those it did not understand. The enormous crowd of office-seekers at Washington on 4 March 1829 left no doubt as to what course the government was expected to pursue. It is use¬ less to discuss the personal responsibility of Jackson and Van Buren for the subsequent course of the administration. They were but carrying out a policy in which they believed and which the people had elected them to put into effect.

Of 610 officers of the Presidential class, that is, those appointed by the President with the advice and consent of the Senate, 252 were re¬ moved during Jackson's administration. This number is not large, but there are facts which make this proscription the most noteworthy in our history. The majority of the removals were made in the spring and summer of 1829 and so attracted more attention than those of Jefferson, which were scattered through several years. Among those changed, moreover, were included nearly all the important officers, many of whom controlled large numbers of subor¬ dinates and carried on proscriptions of their own. In addition, the removals were to some

extent localized, for few were made in the old South. In the North and West, then, by far the greater proportions of the salaries and influence of the national service changed hands. The specially distinguishing feature of this pro¬

scription, however, was the nature of the quali¬ fications for office demanded. Up to this time, ability to perform the duties of the office, geographical fitness, good local standing and political opinions in sympathy with the appoint¬ ing power had been required with varying emphasis. Service to the party was sometimes rewarded, but incidentally, at no time being actually essential. Under Jackson, ability be¬ came incidental, and party service the main re¬ quirement, not only past service but future use¬ fulness as well. Newspapers were then not generally self-supporting and many editors received offices to enable them to pay their debts and improve their papers. Nor was loyalty to party alone sufficient. Unless one were a friend of Jackson or could obtain his ear, it was decidedly advantageous to belong to the Calhoun faction, and have his friend, Gen. Duff Green, editor of the United States Telegraph, press one's suit; or to advo¬ cate the succession of Van Buren and receive the aid of the powerful interests he represented. By 1831 the salaries of office-holders were oc¬ casionally assessed for party purposes, and, by the close of the administration, this practice was well recognized. The spoils system had been introduced into the national service : the question of its continuance remained.

The Whigs Establish the Spoils System. — The opponents of Jackson seized upon his administration of the civil service with avidity. They could not conceive that the people would endorse a practice that appeared so impolitic and wasteful. The Senate did not reject many of his nominations, but in 1831 several resolu¬ tions were introduced to show its disapproval and in 1835 an elaborate plan to regulate the control of the patronage was formulated. Web¬ ster, Clay, White and Calhoun delivered able speeches filled with high ideals of public serv¬ ice. When examined, however, the plan pro¬ posed is found to be purely an attempt to limit the power of the executive. The President was to present to the Senate the reasons for removals. Jackson refused to yield. His friends defeated the Senate's proposal, those whose nominations were rejected received compensa¬ tion in other ways, and on 10 Feb. 1835 he peremptorily refused to send to the Senate any information concerning the removal of Gideon Fitz, asserting that that body had no right whatsoever to investigate removals. While no tangible results were obtained by this senatorial opposition, the patronage was to play a prom¬ inent part in the campaign of 1840. The crisis of 1837 struck a staggering blow at the civil service. Public

servants who had speculated with government funds were caught without property to pay their loans: of 67 land officers, 64 were said to have been at one time in de¬ fault. This condition was partly due to down¬ right dishonesty, as in the case of a Samuel Swartwort, collector at New York; more, and especially in the West, to lack of business edu¬ cation. A treasury agent wrote of ((a certain looseness in the code of morality, which here does not move in so limited a circle as it does with us at home.® Some such experience was inevitable in so great a crisis. Its extent was due to the carelessness with which appoint¬ ments had been made, and the Van Buren ad¬ ministration suffered as if alone responsible

for the spoils system and the breakdown in the civil service. Reform became one of the most popular issues of the campaign, and the method of dealing with the situation proposed by the Whigs, the limiting ot the power of the execu¬ tive, was one that appealed strongly to their Southern States rights supporters. To nothing did the election of Harrison so strongly commit his party as to the abolition of the spoils sys¬ tem. Having come into power, they failed to enact their legislation planned in 1835, although in full control of Congress, and although the subject was brought up. To remove many of the incumbent officers was necessary to their reform, ‘but in filling the vacancies thus created they were pledged to return to the pre-Jack-sonian qualifications for office. Instead, while insisting upon ability somewhat more than Jackson had done, they continued to make party service the chief essential. The man appointed collector at New York was described to Peter B. Porter by Thurlow Weed as follows: “Although not personally popular, [he] is repre¬ sented as possessing an extraordinary share of tact or stratagem, and as being able, by his skill in planning and combining, and his un¬ tiring industry in executing, to produce the most astonishing political results. That, with the office of collector [which Weed considered as second only in importance to that of Post¬ master General] he could on all important occasions, command the vote of the City of New York, and, per consequence, of the State.® In 1841, then, the spoils system had been recognized by both parties and might be con¬ sidered established.

The Significance of the Spoils System. —

The continuous progress of the spoils system from a few States to the nation, from the nation into other States, from one party to the other, until it became a thoroughly national institution, indicates that it

possessed some prin¬ ciple of vitality. The reasons thus far offered are insufficient to explain its growth. No prac¬ tice could become so firmly fixed unless it served some fundamental lasting use. The spoils sys¬ tem was in fact a concomitant and probably a necessary one, of the democratic revolution which made Jackson President in 1829 and es¬ tablished the rule of the people in the United States. The people cannot govern unless organ¬ ized. They may overthrow old leaders in a revolution, they may elect new leaders by a plebiscite, they may even determine the policy of the government in moments of great national enthusiasm, but they cannot exert a steady con¬ trol of the details of adminstration unless their lagging interest is kept up and their views given a means of expression by organization. Organ¬ ization, however, requires leaders, not only lead¬ ers of ten thousands, who receive a reward of glory, but humble leaders of tens, ward-heelers, who enjoy little honor. Public interest attracts some to perform this function, but a sensitive democracy requires that these men shall be of the "people,® not men of wealth ; it would not have politics a business of class, as it largely is in England. Now, however public-spirited a poor man is, he has to earn a living. Such motives, moreover, would not attract a sufficient number. Material inducements are necessary and some substantial means of supporting party organization must be found. To supply this

is the function of the spoils system. The civil list becomes the pay-roll of the party and the recipients of public salaries are expected to serve the nation in the double capacity of work¬ ing officials and party organizers. The rise of the spoils system was, then, inextricably joined with the rise of party organization and of demo¬ cratic government and this connection has con¬ tinued to the present day, although \ has ceased, since the 80's, to be the controlling factor in national politics and in most localities.

The Struggle for the Patronage. — It fol¬ lows from this inter-relation of the spoils sys¬ tem and party organization that the control of the patronage would often mean control of the party. Hence the struggle to secure this control became very bitter, and raged not merely be¬ tween the two parties but also between the different branches of the government. The Constitution gives the House of Representatives no share whatsoever in the appointing power. In 1826, however, it was proposed that the dele¬ gations select the newspapers to be given the printing of the laws. In 1862 each member was allowed the appointment of two cadets at An¬ napolis and in 1899 General Grosvenor proposed that all government offices be divided equally among the Congressional districts and that the recommendations of the congressmen be requisite for appointment. The Senate, on the

other hand, possesses rights under the Con¬ stitution and has always fought to have them respected. In 1789 Congress decided that the Senate had no power over removals. This in¬ terpretation was continually attacked, but for a long time unsuccessfully. The House of Rep¬ resentatives did not sympathize and a two-thirds majority would be necessary to override the almost inevitable veto of the President. Under Johnson, however, circumstances were favor¬ able. The executive power had grown abnor¬ mal during the war; the patronage had become so extensive that it was feared even before the death of Lincoln; the actual President was hated, and his opponents had a two-thirds ma¬ jority. In 1867 the Tenure of Office Act was passed, providing that Presidential officers could be removed only with the advice and consent of the Senate. The friends of Presi¬ dent Grant procured the modification of this act in 1869, but, in spite of protests and with little to say in its defense, the Senate main¬ tained the law until 1887, when finally it was repealed and the interpretation of 1789 restored.

The Machinery of the Spoils System. — While legally the President has maintained his power except for this short period, in actual practice he has long been greatly restricted. It is of course impossible for him to be personally cognizant of the conditions and the qualifica¬ tions of candidates for all the positions scattered over the country. Assistance has always been necessary and it has been natural to consult the members of Congress best acquainted with the locality. This was done from the founda¬ tion of the government, but, with the develop¬ ment of the spoils system, the requests for ad¬ vice became more a matter of routine and the obligation to accept it became more binding; the discretion of the central government became a smaller factor. All representatives in sym¬ pathy with the party in power began to expect as a matter of course to control the appoint-

ment of minor officers, as rural postmasters, within their districts. Lincoln's correspondence shows that in 1849 he considered this a well- established rule, and as President he abided by it. Often courtesy extends this privilege to congressmen of an opposing party, notably to those from the South, and in cases where a fixed number of new offices is created for every Congressional district, as in the census appoint¬ ments for 1900. With regard to all local offices of the Presidential class, the senators from the State in question expect to be consulted. In the early history of the spoils system, the delegations composed of all members of Con¬ gress from the several States settled

such ques¬ tions ; under Pierce, they dictated nearly all important appointments. Lincoln wrote that the two Rhode Island senators, the two old repre¬ sentatives, and one of the new ones, combined in favor of one candidate, and added: ((While under peculiar circumstances a single member or two may be overruled, I believe as strong a combination as the present never has been.® After the passage of the Tenure of Office Act, the senators waxed in power at the expense of the representatives, their assumption reach¬ ing its height when Conkling and Platt in 1881 retired from the Senate because they were not allowed to control the New York appointments. The repeal of this law, however, has not re¬ stored the delegation to its former position; <(Senatorial courtesy® still gives a senator a practical veto on appointments from his State, as the other senators, disregarding party lines, will generally vote with him against a nominee whom he considers personally objectionable. General and foreign appointments are often times divided pro rata among the States and assigned in the same way as the local offices. This was understood in 1849, was a fixed rule under Pierce and has been the general practice ever since. The extension of the influence of members of Congress curtailed that of the sec¬ retaries of departments, and the limits of their respective powers have always been a source of difficulty. Under Pierce, it seems to have been the practice to allow the secretary at least a nominal veto on all nominations to offices within his department. Lincoln was in¬ clined at first to overlook this, and had much difficulty with Secretary Chase in regard to it. The personality of the secretary has much to do with his influence, but few of them exert very much at present, except as advisers of the President. The latter dispenses comparatively little patronage directly, but as the final arbiter in disputes between senators and representa¬ tives, holding in his hands the whole situation and adjusting the various interests, he has a power which makes even a weak man powerful and a strong man party dictator. The boss exerts his influence through some of these agen¬ cies : as the friend of the President, as a mem¬ ber of Congress or as the political mentor of congressmen. The whole is now highly system¬ atized; the Treasury Department can tell in a moment by its card catalogue how many men every congressman has recommended, how many have been appointed and what congress¬ man recommended every appointive officer.

The Spoils System and Administration. — The spoils system does not necessarily mean bad administration. Its uncertainties deter men

of conservative tendencies from entering gov¬ ernment employ; but the opportunities of sudden and distinguished advancement attract men of adventurous character, and undoubtedly so far in our history

this latter class has contained the greater part of the ability of the nation. It is not to be supposed, moreover, that the whole service has ever been changed at any single proscription. William Hunter entered the State Department in 1829 and served until 1886, pre¬ serving the continuity of tradition and becoming a power in the State by reason of his experience. He is a type of a large class of permanent offi¬ cials, who have on their shoulders the weight of routine business. Often it is easy to dis¬ tinguish between two distinct classes of officers, the one working at government duties and the other attending to politics. Of course this double system is expensive, because of the un¬ necessary number employed and the fact that the class of men attracted while able are not always honest ; but it need not be inefficient.

Rotation in Office. — While the rise of the spoils system is so closely connected with the rise of the new democracy, and its organization was soon completed, there are several significant episodes in its later history. The system had been justified before the public largely by the democratical phrase ((rotation in office.® For a long time, however, actual rotation was prac¬ tised only when the incoming President belonged to a different party from his predecessor. Bu¬ chanan was the first President to expel men of his own party. It was then held that the public offices were prizes, and that democracy demanded that they be shared round as often as possible, that no one should hold longer than four years. Consistency required that a Presi¬ dent who wao re-elected decapitate his own ap¬ pointees, and this policy was urged on Lincoln in 1865. He firmly set his face against the sug¬ gestion, and it has never been carried out. Bu¬ chanan's example, however, was followed until Roosevelt succeeded McKinley.

The Spoils System and the South. — The seaboard South was for a long time compara¬ tively free from the spoils system. Jefferson stated, not quite truly, that he had no requests for removals from that region. The dislike for the New York machine did much to pro¬ mote the formation of the Whig party there, and Calhoun was not more emphatic in his support of slavery than in his demand for re¬ form in politics. This immunity was largely due to the political conditions, the fact that politics was the business of the wealthy and that the public offices were not needed to sup¬ port party organization. The Civil War and Reconstruction brought a total change. The attempt to build up a stable Republican organi¬ zation composed of moneyless negroes and money-seeking white men from the North in¬ volved necessarily the use of public offices, both State and national, as spoils. After the over¬ throw of the negro domination, this organiza¬ tion was still maintained by the use of the national spoils, because of the votes it could cast in national nominating conventions. In the Democratic

party, the wealthier class gradually lost its control, and the rise of a real democ¬ racy has been again marked by the adoption of the spoils system, which may be said now to embrace the whole country.

The Spoils System and Civil Service Re¬ form.— At the very time that the spoils system was being extended into the South, it received a vigorous attack in the development of civil service reform. It was natural that such a movement should come when the Civil War had so greatly distended the civil service. The method of reform proposed was the substitu¬ tion of a mechanical for a personal method of appointment. It was claimed by the supporters of the status quo that no mechanical system could be devised which could properly take into account a man's ability to perform the func¬ tions of his office. The reformers claimed that such a system was possible, that offices must be withdrawn from politics and that this could be done only by eliminating the personal ele¬ ment. The conduct of private business was improving and the expert was beginning to play his part as the life of the nation became at the same time more complex and more orderly. In 1883, after an earnest crusade, Congress voted that the experiment be made. The law has received the support, more or less earnest, of every President since that time, and has been extended, officially or by practice, to in¬ clude the greater number of officers in the national civil service. In fact since the inclu¬ sion of the fourth class postmasters by Taft, and the virtual inclusion of the consular service by Wilson, comparatively few offices remain which could properly be placed under the me¬ chanical system of selection. Most State and city governments, moreover, have followed the national example. Not that the spoils system has vanished. The pressure on those portions of the service not covered by the law has increased, and the law is often circumvented. Nevertheless the bulk of our public servants are as secure in their positions as are those in private life, and their only political obligation is to refrain from political activity, not to exert themselves in it. The public service, moreover, is conducted with a reasonably high degree of efficiency.

It should not be overlooked, however, that the problem of which the spoils system was a crude and dangerous solution has not yet been satisfactorily solved. In fact just when the offices first began to be withdrawn from poli¬ tics the expenses of party organization greatly increased. The necessary funds were furnished in large measure by the campaign contributions of great corporations and powerful individuals

interested in securing or defeating legislation. This is one of the fundamental explanations of the course of politics in the ’80s, ’90s and the early 20th century. Meantime all other meth¬ ods have been evolved, as the statutory limi¬ tation of campaign expenses and the taking over of party primaries, with the consequent expense, by the government, while widespread popular contributions and publicity of expenses have decreased the importance of the individ¬ ual subscribers. At present all these methods are employed, and party control has become less concentrated. It is still uncertain what the final method by which democracy will main¬ tain control without too seriously interfering with the efficiency of administration will be.

Bibliography. — Beard, C. A., (American

Government and Politics > (1911) ; Borgeaud, C., (Rise of Modern Democracy) (1894) ; Cleve¬

land, F. A., (Growth of Democracy in the United States) (1898) ; Croly, H., (Promise;of American Life) (1909) ; Eaton, D. B., (Civil Service in Great Britain) (1880) ; Fish, C. R., (Civil Service and the Patronage) (1905) ; Hart, A. B., (Actual Government (1903) ; Jones, W. D., (Mirror of Modern Democracy> (1864) ; McBain, H. L., (De Witt Clinton and the Origin of the Spoils System in New York> (1907); Ostragorski, M., (Democracy and the Party System > (1910) ; Roosevelt, T., (Six

Years of Civil Service Refornt in (American Ideals and Other Essays) (1897) ; Tyler, L. G.,

(Parties and Patronage } (1891) ; Weyl, W. E., (The New Democracyˆ (1911).

Carl Russell Fish,

Professor of History, University of Wisconsin.

25. ANNEXATION OF TEXAS. The

Louisiana Purchase in 1803 gave the United States a shadowy claim to Texas. This claim was strengthened by each succeeding ad¬ ministration until 1819, when all rights beyond the river Sabine were given up as a considera¬ tion to Spain for the cession of the Floridas. Between 1820 and 1830 great numbers of Amer¬ icans settled in central Texas; most of these were from the Southern States, and they had carried their slaves with them. An arbitrary union in 1824 of this semi-Anglo- Saxon region to the Spanish state of Coahuila gave rise to

much dissatisfaction; the abolition of slavery throughout the newly-established Mexican re¬ public in 1829 increased the discontent of the thrifty Texan slaveholders; but when, in 1830, the Mexican government forbade citizens of the United States to settle within the discon¬ tented region and placed the country under mili¬ tary control, the Texans demanded (1833) com¬ plete separation from Coahuila and an inde¬ pendent existence in the Mexican confederation. This was refused and a still closer surveillance was established by Santa Anna in 1834. Two years later the Texans issued their declaration of independence and set up a government of their own. The fact that only two of the leaders of this movement were not American settlers is proof enough as to one cause of the conflict. Santa Anna attempted to put down the revolt; he failed disastrously. At San Ja¬ cinto, in northeastern Texas, April 1836, the insurgents defeated the Mexicans and either killed or captured their entire army. A consti¬ tution was now agreed upon and the republic of Texas firmly established. It is significant that the constitution provided expressly for the re-establishment of slavery, which had been maintained contrary to law since 1829. The boundaries of the new State were declared to be the Rio Grande on the southwest and the Sa¬ bine, Red and Arkansas rivers — the line of 1819 — on the north and northeast. These boundaries gave Texas a total area of 270,000 square miles — a territory equivalent to five of the larger States of the American Union. Gen. Sam Houston, the hero of San Jacinto, became the first President of the Texan Re¬ public. The government thus founded was in its essential features a copy of that of the United States. Texas was recognized at once by the United States as an independent nation, and the powers of Europe followed suit in a few years.

Texas made application for admission into the American Union in August 1837. President Van Buren opposed the proposition and eight States made formal protest against annexa¬ tion. But as early as May 1836, one month after the battle of San Jacinto, John C. Cal¬ houn had declared from his seat in the Senate that an independent power between the United States and Mexico was inadmissible ; be favored immediate annexation, and, as he openly de¬ clared, on the ground of the extension of slavery. Calhoun represented the South, and the South since 1830 had become more firmly anchored in slavery than ever. The States of Virginia, Maryland and the Carolinas exported not less than 50,000 slaves a year to the Far South and Southwest. An active propaganda favoring annexation immediately began; legis¬

latures of most of the slave-holding States passed resolutions calling for annexation. Even the great influence of ex-President Jackson was given to the cause. But the Whig party won the election of 1840, and the Whigs, more a Northern than a Southern party, opposed an¬ nexation. In order to ((carry® the important State of Virginia, which was already States- rights and pro-annexation in political complex¬ ion, John Tyler had been placed on the ticket with Harrison. Tyler, a Whig because of Jackson's high-handed methods rather than from principle, was a States-rights devotee, a slaveholder and a determined annexationist; he became President on the decease of Harri¬ son in April 1841. In 1842 the Texans again knocked at the door of the Union. It would have been opened to them but for the opposition of Webster, the Secretary of State. Next year Webster resigned and Abel P. Upshur of Vir¬ ginia was appointed to fill the vacancy. The new secretary belonged to the extreme States- rights school of politicians. The Cabinet, which had been reformed in 1842, was now in accord with the executive. Annexation became at once the main business of the administration. In October 1843 Upshur informed the Texan rep¬ resentative in Washington that a renewal of overtures for annexation would be welcome. Van Zandt asked for the requisite powers, but meanwhile the influence of the abolitionists had reached Texas and a sharp contest was waging there about the question of slavery. The pro¬ slavery party, both in Texas and the United States, suspected English intrigue. A speech of Lord Aberdeen's in Parliament gave some color to this suspicion. The administration in¬ quired of the English Cabinet the cause of the rumors circulating in Texas and the South and received a complete disavowal of any aim or intention on the part of the English government to interfere in any way with the affairs of the new republic. Still other influences had come into play: Texas had learned to stand alone; an armistice had been arranged with Mexico; a definite peace seemed more than probable. Houston and the other leaders of Texas had lost their former enthusiasm for annexation. The wooing was now to come from the other side. The slave States of the United States became uneasy; the vast and fertile area of Texas seemed about to be lost to their cause; failure to act promptly had been the fatal cause, and now fear of war with Mexico gave the final motive to Texas for remaining out

of the Union. The outlook was not quite so dismal as it seemed; the Texans inquired of Upshur, in January 1844, whether the United States would protect them against Mexico while the proposed negotiations were pending, for it was known to all that much difficulty and delay would be put in the way of annexation by the Whig party in the United States Senate. The Secretary of State did not

answer this question, but his agents in Texas let it be known that protection would be guaranteed. The way was again open and negotiations now began in earn¬ est. Upshur was killed, on 28 Feb. 1844, by the explosion of a gun on board the warship Prince¬ ton. Tyler called John C. Calhoun, the first great mover of the annexation scheme, to the office thus made vacant. Calhoun accepted the State portfolio with the single purpose of fin¬ ishing the work he had begun eight years be¬ fore. The treaty was speedily concluded and ratified by the representatives of both countries. On 22 April 1844 it was sent to the Senate. The issue was now clearly drawn and the coun¬ try immediately divided : Calhoun, sustained by the unanimous voice of the Southern States, asked for immediate annexation ; the Whigs, except its Southern wing, followed by the great majority of the North, denied the request.

Meanwhile, another issue had been prepar¬ ing. For many years the vast Oregon region had been held jointly by Great Britain and the United States. This territory extended from northern Texas to the 54th parallel of north latitude. Both England and the United States had claims on Oregon, and these claims had been mutually recognized, but the people of the West, always ready for growth and expansion and not given to quibbling over constitutional limitations, were rapidly coming to demand the whole of Oregon. Calhoun saw the importance of the Oregon question; he recommended that the Democratic party couple it with the Texas question, though he did not favor the extreme demands of the Westerners. The Southern Democrats seized the opportunity, and co-operat¬ ing with the expansionists of the West, they began a campaign for the control of the Demo¬ cratic national convention, which was to meet in Baltimore. The editor of the Richmond Enquirer was a typical leader of this move¬ ment. A letter of ex-President Jackson, written a year before, was now published in the En¬ quirer, bearing date of 1844. The Nestor of the party urged annexation. When the con¬ vention met it set aside at once Jackson's favorite, and the ablest Northern candidate, Van Buren, and nominated James K. Polk, an avowed <(Texas man.® The platform demanded the immediate (Te-annexation of Texas and the re-occupation of Oregon.® ((Fifty-four or fight® became the party cry of the West, while the leaders of the South boldly threatened secession in case Texas was not annexed. Meanwhile, the Senate rejected the Texas treaty by a majority of 35 to 16, and the leaders of the Whig party, aided by the dissatisfied followers of Van Buren, exerted their influence to the utmost to get the country to sustain the Senate majority. They failed by a narrow margin and Polk became the next President. Tyler and Calhoun, falling back on a popular Demo¬ cratic

doctrine, considered themselves and Congress <(instructed® by the country to

proceed with their work. Since the Senate held out stubbornly against them they resorted to the plan of accepting Texas by joint resolu¬ tion, a method hardly justified by the Con¬ stitution. This required a majority only of both Houses, while the passage of a treaty in regular form required two-thirds. The joint resolution passed, and on 3 March 1845 an¬ nexation was complete, so far as the United States was concerned. Texas approved the treaty without questioning its legality in June 1845, and in July of the same year the people of the Lone Star State, in convention assembled, ratified the work of their representatives by an almost unanimous consent.

Texas came into the Union with a quarrel on its hands: Both the Mexican and Texas governments claimed the country lying between the Nueces and the Rio Grande. This and all other subjects of dispute between these gov¬ ernments seemed about to be amicably arranged in the early months of 1845, on condition, how¬ ever, that Texas should not permit annexation to the United States. Mexico had repeatedly declared that annexation would be regarded as a declaration of war. When the joint resolu¬ tion passed Congress the Mexican Minister in Washington asked for his passports and the American representative in Mexico was un¬ ceremoniously dismissed. The United States had already sent troops into the disputed country ; a year later they advanced under General Taylor to the Rio Grande and trained their guns on the Mexican town of Matamoras. War followed. Texas had been obtained at the behest of a Southern party and for the purpose of a make-weight against the expansion of the free States toward the Northwest. The leaders of Texas had come into the Union to safeguard slavery against the free labor and abolitionist sentiment of the great outside world. This had not been done without the promise of the ftre-occupationw of Oregon, which gained the votes of the West and North. But the able, aggressive and uncompromising policy of Calhoun and his section had aroused the North; the abolitionists became politically im¬ portant, and the issue which followed ter¬ minated in civil war. See Texas; Mexican War.

Bibliography. — Bancroft, H. H., < Mexican States and Texas) (San Francisco 1885) ; Calhoun, Collected Works) (6 vols., 1853-55) ; id., (1900) ; Garrison, P., (Texas; A Contest of Civilizations,* in Ameri¬

can Commonwealth Series> (Boston 1903) ; McLaughlin, A. C., (Life of Cass) (1891) ; McMaster, J. B., (History of the United States) (1892) ; Raines, C. W., (Bibliography of Texas) (Austin 1898) ; Schouler, J., his¬ tory of the United States) (1913) ; Shields, J. T., (Border Wars of Texas) (Tioga 1912) ; Von Holst, H., (Life of Calhoun) (1882) ; Wooten, ed., Comprehensive History of Texas 1685— 1897> (Dallas 1898).

William E. Dodd,

Professor of American History, University of Chicago.

26. THE ABOLITION AND FREE SOIL MOVEMENTS. The first important and concerted movement in America for giving freedom to the slave began with Quakers. Their persistent opposition to human slavery arose

from the nature of their doctrines. Even before the American Revolution, individual Quakers like John Woolman of Philadelphia raised their voices in favor of emancipation. The emphasis placed upon the rights of man, in the Revolutionary struggle also strengthened the sentiment in favor of emancipation in all the colonies. As this period drew to a close, no stronger condemnation of slavery was uttered than by Thomas Jefferson, himself a slaveholder, in his famous book called (Notes on Virginia.* A similar arraignment of the institution was made by George Mason of Virginia, in the Constitutional Convention of 1787. About this time the Northern States were taking steps which ultimately freed them from slavery. New England and Pennsylvania led the way in this movement. The first anti¬ slavery society in America was formed in Philadelphia in 1780. Benjamin Franklin be¬ came one of its members. But this form of opposition was not confined to the Northern States, for both Maryland and Virginia organized anti-slavery societies. The movement in the South, however, did not reach the point of emancipation by State action. The institu¬ tion of slavery had become firmly riveted on the South, because of climatic and industrial conditions, and the problem of emancipation, therefore, was vastly more difficult than at the North.

In Washington's administration a new and powerful factor was introduced into the problem by the invention of the cotton gin. This machine so cheapened the preparation of cotton for the market that the raising of cotton be¬ came the dominant industry of the lower South. The North profited from this new era of cotton development by building cotton factories and in competing with England for the raw

cotton of the slaveholding States. Both an American and European demand were placed upon the South for the extension of cotton production. The price of slaves also rose, and the domestic slave trade so increased that the supply seemed to be abundant, al¬ though, when the African slave trade was abolished in 1808, many persons had hoped that the result would be the gradual decay of slavery. But they were mistaken. The new industrial and commercial foothold obtained by the institution gave it more favor than before in the eyes of both the North and South. Only the Quakers kept up any serious attack upon it during the first 25 years under the Constitu¬ tion.

Opposition to slavery had been based, thus far, on all sorts of grounds, and had been car¬ ried on in a very moderate and decorous fashion. The Quakers, although attacking the system on moral grounds, did so in a manner comporting with their reputation for moderation. The pro¬ longed and exciting struggle over the admission of Missouri (1819-21), however, turned atten¬ tion upon the slavery question in a more intense way than ever before. Benjamin Lundy a Quaker, who had already been working to en¬ courage slaveholders to emancipate their slaves, now founded the first important anti-slavery paper, the Genius of Universal Emancipation (1821). He published editions of his paper in Ohio, Tennessee and Maryland. In 1829 Lundy called to his aid young William Lloyd Garrison

who became the most fiery and radical of all the early abolitionists. His hard-hitting blows fell upon a New England slave dealer for carry¬ ing a cargo of slaves from Baltimore to New Orleans. Garrison was soon in jail, from which he was released by a stranger paying his fine. He now returned to New England and founded in Boston (1831) the most famous of all aboli¬ tion papers, The Liberatqr. With the aid of a few friends he founded the New England Anti-slavery Society in 1832 with the avowed object of endeavoring ((by all means sanctioned by law, humanity, and religion to effect the abolition of slavery in the United States.® Similar organizations sprang up in other North¬ ern States, and another anti-slavery paper, the Emancipator, was launched in New York City, under the patronage of Arthur Tappan, a philanthropist. These were small beginnings. Only a few men in any community were courageous enough to stem the tide of public disapproval. In 1833 a little group of men and women, gathered from 10 States, met in Phila¬ delphia to establish the American Anti-slavery Society. Among them were Garrison, Samuel J. May, John G. Whittier, William Goodell, Lewis Tappan and Lucretia Mott. In that city not a

man was found willing to serve as chair¬ man. For safety they met behind locked and guarded doors and labored at their task through¬ out the day without venturing to hold an even¬ ing session or to be seen on the streets in search of a mid-day lunch. A declaration of principles was issued which showed the unalterable deter¬ mination of the abolitionists to carry on the agitation against slavery until every slave in America was liberated. Public sentiment was to be aroused by public speakers traveling about the country, by sermons from the pulpit, by appeals from the press wherever possible and by a wider circulation of anti-slavery tracts and periodicals. Headquarters of the new so¬ ciety were set up in New York with Arthur Tappan as president, and with the Emancipator, Goodell editor, as their organ. Immediate emancipation was their cry and uncompromis¬ ing hostilities to slavery their creed. In a few years hundreds of anti-slavery societies had sprung up and more than 500,000 anti-slavery documents been distributed.

The rapid growth of the abolitionists intro¬ duced discord and faction. In a short time leaders arose who demanded that abolitionists participate in politics, as a means of forwarding the cause. Some of the old leaders, of whom Garrison was chief, strongly opposed political action, but declared in favor of woman's partici¬ pation in the work of the anti-slavery societies. The differences between the two parties were augmented by the strong opposition of some Northern clergymen to women taking part in public discussion. The dissensions grew till State and national organizations were disrupted, resulting in two sets of anti-slavery societies and two sets of anti-slavery publications. In 1840 a number of abolition leaders who believed the time for political action had come met at Albany and formed the Liberty party (q.v.). Among the founders of this national party were Myron Holley, Gerrit Smith and James G. Birney. The latter was nominated for the Presidency, and renominated in 1844. In the famous campaign of 1840 he polled about 7,000 votes and in 1844 62,000. Neither of these

votes represented the total strength of the abolitionists and certainly not the strength of the anti-slavery sentiment of the country. The rapid rise of the anti-slavery societies which followed the formation of a national organiza¬ tion greatly accelerated the work, begun by Garrison and the Liberator, of sending aboli¬ tion documents into the South. The result was a storm of indignant protests from the slave¬ holders who resented what they termed an in¬ terference with their own domestic institutions. They declared that the abolition literature sent among them was incendiary and intended to excite servile insurrection, the most dreaded, because the most horrible, of events.

Nat Turner's rebellion (q.v.) in Virginia (1831) was then still fresh in mind. In their excite¬ ment the slaveholders made certain demands upon the people of the North. They called for the suppression of the abolitionists and their work by public opinion and by State action. Rewards were even offered for the arrest and transportation to the South of Garrison and Arthur Tappan.

Public feeling in the North was already so bitter against the abolitionists that it hardly needed the added impulse of the South's de¬ mands. On 4 July 1834 the anti-slavery celebra¬ tion in New York City was broken up and the leaders compelled to flee for their lives. For nearly a week the excitement continued. All the important daily papers, except one, en¬ couraged the populace to suppress the aboli¬ tionists. Their business places and even their houses were attacked by the infuriated mob and the quarters occupied by the negroes were in¬ vaded and property destroyed. In nearly every Northern State the work of putting down the abolitionists went on. The rougher element was encouraged by resolutions passed by meet¬ ings of the respectable portion of the commu¬ nity. Fifteen hundred influential names signed a call for an anti-abolition meeting in Faneuil Hall. The great orators of Boston addressed an excited multitude. In a few days gallows were found standing in front of Garrison's home. A few weeks later at a woman's anti¬ slavery meeting a mob filled the streets, broke into the house to which Garrison had fled and dragged him out with a rope. He was rescued with great difficulty and was compelled to leave the city for safety. Danger threatened aboli¬ tionists in Brooklyn. Lydia Maria Child (q.v.) wrote : ((I have not ventured into the city, nor

does one of us dare to go to church to-day, so great is the excitement. Mr. Wright was yesterday barricading his doors and windows with strong bars and planks an inch thick.® A mob led by representative citizens of Cincin¬ nati destroyed the printing press of The Philan¬ thropist and attacked the houses occupied by negroes. In 1837 an Alton, Ill., mob shot down the Rev. Elijah P. Lovejoy (q.v.), the editor of an abolition paper, while he was endeavoring to protect his press. This event and other ex¬ treme measures against the abolitionists over¬ shot the mark, and public opinion became more sympathetic toward the hated and hunted dis¬ ciples of the abolition creed. The great major¬ ity of them — women as well as men — showed the true martyr spirit, in the era of their per¬ secution. But the rush of events was already drawing public attention away from the aboli¬ tionists and turning it toward other phases of the anti-slavery conflict.

The Quakers had begun in Washington's administration to petition Congress against the slave-trade. Later their petition struck at slav¬ ery in the District of Columbia. The abolition¬ ists joined in the work of petitioning against slavery in the District. As early as 1831 John Quincy Adams, then a congressman, presented 15 such petitions, but declared that he did not approve of their object. From year to year these petitions had been received and referred to the committee on the District of Columbia and nothing more came of them. But in 1835 Hammond of South Carolina moved that an antislavery petition be not received. To some, this motion seemed necessary to check the ris¬ ing tide of abolition petitions, but to others the remedy seemed worse than the disease, for it attacked the ancient right of petition. An ex¬ citing debate arose running throughout an en¬ tire day. Adams now came forward as the champion of the right of the petition and Slade of Vermont made a fiery speech declaring war upon the institution of slavery. This speech greatly angered the slaveholders and their sup¬ porters. In 1836 the debate over abolition pe¬ titions was renewed and continued for four months during which many thousands of per¬ sons put their names to petitions. The result was a resolution of the House to lay all papers relating to slavery on the table and to take no further action on them. This was the germ of the famous <(gag® rule. But this ac¬ tion only stirred anti-slavery people and by 1838 petitions to Congress against slavery had in¬ creased tenfold. Early in 1840 the House made answer to these by establishing the following standing rule : <(That no petition ... or other paper, praying the abolition of slavery in the District of Columbia, or any State or Terri¬ tory, or the slave-trade between the States or Territories of the United States in which it now exists, shall be received by this House or entertained in any way whatever.® Similar, though more temperate, debates were going on in the Senate and similar results followed.

The attempts to suppress the abolitionists' agitation both in and out of Congress by at¬ tacking ancient popular rights very naturally produced a reaction in their favor and against the cause of slavery. The battle for the right of petition was waged, therefore, with untiring energy by John Quincy Adams, Joshua R. Gid- dings and others. The threats made to expel them from Congress and the denunciation heaped upon them only aided them in the end by bringing to their aid an increasing number of congressmen and in 1844 victory crowned their efforts ; the gag rule was repealed.

Additional meaning was given to the ques¬ tions of freedom of the press and the right of petition by the demands of the slaveholders that

all anti-slavery documents be excluded from the United States mails. Some of the inhabitants of Charleston, S. C., broke into the post office (1835), seized a quantity of abolition literature and burned it in the presence of spectators. The Postmaster-General gave it as his opinion that although such documents could not lawfully be excluded from the mails, the postmasters owed a higher duty to their communities than to the laws. President Jackson, in a message to Congress, severely criticised the work of the abolitionists and recommended that Congress

prohibit, under severe penalties, the circulation of such documents through the mails. Congress not only did not accept the President's recom¬ mendation, but instead passed a law providing for fining and imprisoning postmasters for with¬ holding mail from the persons to whom it was addressed. On none of the points of contention had the opponents of the abolitionists been able to score a permanent victory. On the contrary the permanent results were against slavery. Among them may be enumerated the rapid in¬ crease of anti-slavery, if not abolition, senti¬ ment and the formation of a political party. Another result was the feeling of many North¬ ern men, who had little or no sympathy with the agitators, that the friends of slavery were de¬ manding too great a sacrifice of cherished prin¬ ciples for its protection. One of the most de¬ plorable results of 10 years of bitter agitation was the ill will engendered between the radical elements of the two sections. Neither could do right in the eyes of the other. The danger lay in the fact that other events might cause the spread of this sentiment to the steady minded classes of the two sections. Such events were already on the horizon.

The South came to feel that safety to slav¬ ery and to the social and industrial fabric based upon it lay in preserving the equilibrium be¬ tween the sections in the Senate. That equi¬ librium had been hopelessly lost in the House of Representatives and to preserve it in the Senate required the addition of new territory to the United States. To accomplish this end, the annexation of Texas quickly followed the Texan revolution and the cession of California and New Mexico came as a consequence of war with Mexico. But it was far more diffi¬ cult to determine slavery's relation to the new territory than it had been to win the territory by war. The South gave an indication of its coming attitude by defeating Van Buren for renomination in 1844, because he had opposed the immediate annexation of Texas. Northern anti-slavery men followed by defeating Henry Clay in New York by voting for a candidate of their own, because Clay, after opposing im¬ mediate annexation, had written a letter trying to explain the matter to the satisfaction of Southern Whigs. In 1846 President Polk asked

Congress to vote a sum of money to assist him in making peace with Mexico. David Wilmot, a Pennsylvania Democrat, offered an amend¬ ment to the appropriation bill, providing that in any territory obtained from Mexico slavery should never exist. This amendment is the famous Wilmot Proviso (q.v.). Twice it passed the House, but each time failed to get through the Senate. Southern leaders were stirred to combat more vigorously the idea that Con¬ gress could exclude slavery from the Territo¬ ries. Northern men affirmed more vehemently the right of Congress in this matter, because, to admit the South's contention would invalidate the anti-slavery features of the Ordinance of 1787 and the Compromise of 1820. The debates in Congress and the discussions by pulpit and press began to shake men's allegiance to the old parties. Therefore, the Whig party, the ma¬ jority of whose votes was generally in the North, nominated for President (1848) Gen. Zachary Taylor, a Louisiana slaveholder, but refused to commit itself on the slavery ques¬ tion. The Democratic party, whose main

strength lay in the South, nominated Lewis Cass of Michigan and likewise uttered no de¬ cisive word on the vital question. This non¬ committal attitude of the leaders of the old parties angered anti-slavery men of all parties who promptly coalesced and launched the Free Soil party at Buffalo, N. Y. (1848). The plat¬ form contained 19 resolutions mainly relating to slavery and declaring in favor of <(Free Soil, Free Speech, Free Labor and Free Men.® It also declared that Congress had, and ought to exercise, the power to exclude slavery from the Territories, but that it possessed no authority to interfere with slavery in the States where it already existed. Although this platform did not satisfy the extreme abolitionists, it offered a line of defense, on constitutional grounds, which appealed to moderate reformers who could not sympathize with the Anti-Union sen¬ timent of Garrison and his radical followers. The slaveholders were right in believing that the underlying cause and the logical conse¬ quences of the Free Soilers and the abolition¬ ists were not greatly different. The Free Soil¬ ers nominated Martin Van Buren for Presi¬ dent and Charles Francis Adams for Vice-Presi¬ dent. The Van Buren Democrats in New York, nicknamed the "Barnburners,® supported the new party. The result was a nominal Free Soil vote of over 290,000, the loss of New York by Cass and the triumph of General Taylor. The Van Buren supporters were avenged by the defeat of Cass, and most of them returned to this allegiance.

During the next four years the Free Soil idea gained at the North, but the party made but little progress. The Compromise of 1850, and the consequent effort to discourage all agitation as dangerous to the perpetuity of the Union, discouraged any great gain by the party. Both the old parties in their nominating conventions (1854) pledged themselves to stand by the Com¬ promise, and Hale, the Free Soil candidate only polled 156,000. The passage of the Kansas- Nebraska Bill (q.v.) (1854), suddenly precipi¬ tated the anti-slavery conflict in a more virulent form than ever before. The result was the break-up of the Whig party. Thousands of its Southern supporters joined the Democratic party (q.v.), while the majority of its Northern voters co-operated with other anti-slavery, ele¬ ments in forming a new party, the Republican. Although the organization of the Free Soil party was thus disbanded, its principle became the rallying cry of the Republican party (q.v.). See also Slavery.

Bibliography. — Garrison, W. P. and F. J., (William Lloyd Garrison) (1885-89) ; Hart, A. B., (Slavery and Abolition) (1906) ; Herbert, (Abolition Crusade and Its Consequences> (1912) ; Hume, (The Abolitionists' (1905) ; McKee, T. H., (National Conventions and Plat¬ forms of all Political Parties, 1 789—1905 } (6th ed., Baltimore 1906) ; Smith, T. C., (Liberty and Free Soil Parties in the Northwest

(1897).

William H. Mace,

Professor of History and Political Science, Syracuse University.

27. THE MEXICAN WAR. Owing to its close association with the slavery contro¬ versy the Mexican War has been the subject of almost endless dispute. Many people be¬

lieved at the time, and many others still believe, that it was forced on by a Democratic admin¬ istration in order to secure more territory in the Southwest for the extension of slavery. It would be difficult either to prove or to disprove this view conclusively. The immediate cause of the war was the annexation of Texas. The Democratic platform of 1844 favored annexa¬ tion, but at the same time it was equally explicit in asserting the American claim to Oregon, a territory which could not by any possibility be opened , to slavery. To the party leaders this connection of the two questions may have been only a shrewd bit of politics, but President Polk's determination to fight for 54° 40′ showed that it meant much more than that to him. The success of the ticket also indicated that it meant more to the American people.

The constant cry of a slaveholders' conspiracy would not blind them to the advantages of acquiring so much valuable territory. At the time of the annexation, Texas (q.v.) had been an independ¬ ent republic for nine years, recognized as such by the leading nations of the world. Although the Mexican government had made no serious attempt during that interval to reassert its rights, it now notified the United States that an¬ nexation would be regarded as a casus belli. The passage of the joint resolution of 1 March 1845 was, in consequence, followed bv the re¬ call of the Mexican Minister at Washington and the formal suspension of diplomatic rela¬ tions.

In addition to the Texas question there was a long-standing controversy in regard to the claims of American citizens against the Mexican government. During the numerous revolutions which had occurred since Mexico gained her independence Americans had often suffered im¬ prisonment and loss of property. A claims con¬ vention of 1839 provided for a board of corm= missioners to pass upon these cases. There was some delay, however, in making the payments, and a second convention was concluded in 1843, in which Mexico agreed to pay all claims within five years in quarterly instalments. A few payments were made, but in 1845 they had again fallen very much in arrears.

In October 1845 President Polk informed the Mexican Secretary of State that he wished to settle the questions in dispute amicably, and that he was ready to send an envoy with full power to act. The secretary made an evasive reply in regard to the subjects to be discussed, but expressed a willingness to receive our repre¬ sentative. The President at once commissioned John Slidell, of Louisiana, as envoy, and he set out for his new post in November. The war fever was so strong in Mexico when Slidell ar¬ rived that President Herrera was forced to refuse him an audience. A revolution, which occurred a few days later, resulted in bringing General Paredes, the head of the war party, into power. Being again refused recognition, Slidell returned to the United States in March

1846.

If annexation and the spoliation claims had been the only questions involved, the war might still have been averted. But a controversy arose in regard to the western boundary of Texas. The Congress of Texas in 1836 asserted that the boundaries of the republic extended to the Rio Grande. Historically the claim to the territory

between the Nueces and the Rio Grande was of doubtful legality, but owing to internal difficul¬ ties the Mexican government had taken no steps to assert its authority. Texas was admitted into the Union with ((the territory properly in¬ cluded within and rightfully belonging® to it, but subject to the adjustment by the United States government of all questions of boundary that might arise with other governments. If the Mexican authorities had received Slidell this question might properly have come up for dis¬ cussion. Their refusal left but one course open to the President, namely, to treat the Nueces-Rio Grande tract as American territory. The rev¬ enue laws were extended to it, and Corpus Christi, a town west of the Nueces, was made a port of entry. The Mexican authorities re¬ sented this intrusion, and a large force of men under General Ampudia were stationed on the south bank of the Rio Grande, preparatory to an invasion of the disputed territory. To op¬ pose him, Gen. Zachary Taylor with about 2,000 men was ordered to advance to the north bank of the river, opposite Matamoros. On 12 April Ampudia warned Taylor to withdraw beyond the Nueces within 24 hours or take the consequences. The warning being disregarded, General Arista, Ampudia's successor, sent no¬ tice on the 24th that hostilities were com¬ menced. On the same day a considerable force of Mexicans crossed the river a few miles above Matamoros and defeated a detachment of United States dragoons.

The news of this engagement reached Wash¬ ington early in May, and on the 11th President Polk sent a special war message to Congress. After speaking of the failure of the Slidell mis¬ sion and explaining the movements of General Taylor, he went on to say that war already existed, that it existed by the act of Mexico it¬ self and, consequently, that it was the duty of the American people to vindicate the honor, the rights and the interests of their country. (See Mexican War). The whole question hinged upon the ownership of the Nueces-Rio Grande strip. According to the President this district belonged to the United States, and the war was, therefore, defensive in its origin. On the other hand, if the Mexican claims to the strip were valid, Polk exceeded his constitutional powers in beginning an offensive war without the con¬ sent of Congress. However, the President's po¬ sition was safe enough because Congress had already recognized the country beyond the Nueces as American territory, by including it within the revenue system, and the Senate had ratified the appointment of a revenue officer. Two days after the message was received an act was passed providing for the vigorous pros¬ ecution of the war.

Whether or not the war was defensive in origin, it was certainly not

long conducted on that basis. After his successes at Palo Alto, 8 May, and at Resaca de la Palma, 9 May, Taylor crossed the Rio Grande and captured Matamoras on the 18th, before he could pos¬ sibly have heard of the Congressional act of the 13th. The President's military orders showed clearly his intention to seize Mexican territory. General Kearney was authorized to occupy New Mexico, Commodore Sloat to take possession of Upper California and Taylor to prosecute the war in Mexico. These orders were faithfully

executed. Kearney captured Santa Fe and brought all of New Mexico under subjection. Fremont and Commodore Stockton, who had succeeded Sloat, were equally successful in Cal¬ ifornia. Taylor made his way slowly into the interior. In September, after defeating an army under Ampudia, he captured Monterey.

The anti-slavery Whigs in Congress pointed to these facts as evidence that the war was not being waged to protect the honor of the United States, but purely in order to seize the territory of a weaker power. Among the discontented was Abraham Lincoln, who was elected to Con¬ gress in 1846. Jefferson Davis approved of the war and resigned his seat in Congress to lead a Mississippi regiment. In general the con¬ flict was popular in the South and unpopular in the North, the strongest opposition being in New England. Lowell's keen satires in the (Bigelow Papers> represent well the sentiment of that section of the country. See Lowell, James Russell.

In spite of adverse criticism, President Polk never once swerved from his original line of action. Early in 1847 a second army was sent out under Gen. Winfield Scott to land at Vera Cruz, and to attack the capital from the east. The series of Mexican disasters at the beginning of the war had resulted in another revolution which restored Santa Anna to power. His plan was to meet Taylor first, defeat him and then return to the city of Mexico in time to defend it against Scott. The battle of Buena Vista was fought 23 February 1847. Taylor's force of 5,000 men won a victory over an army four times as large. Immediately after the bat¬ tle Santa Anna hurried south to meet General Scott. The two armies first came into conflict at the mountain pass of Cerro Gordo, and the Americans were again successful. This was fol¬ lowed by the victories of Contreras, San An¬ tonio and Cherubusco. The way was now open to the City, of Mexico, but the arrival of a peace commissioner from the United States led to the conclusion of an armistice. See Mex¬ ican War.

The scene now shifts to Washington. Presi¬ dent Polk had been confident of success from the very beginning of the war. As early as 8

August 1846 he asked Congress for $2,000,000 to be used in negotiating a peace. This was far more than enough to meet the ordinary ex¬ penses of peace commissioners. The object of the President, however, was perfectly clear; in fact he made no attempt to conceal it. Mexico was to be called upon to cede New Mexico and California. A bill was introduced into the House of Representatives to appropriate the amount required. David Wilmot, a Pennsyl¬ vania Democrat, moved the insertion of a proviso to the effect that neither slavery nor in¬ voluntary servitude should exist in any terri¬ tory to be acquired by the war. (See Wilmot Proviso). It was passed by the House in 1846 and again in 1847, but was defeated by the Sen¬ ate on both occasions. The House finally yielded, and the appropriation, increased to $3,000,000, was made without the proviso.

Nicholas P. Trist, of Virginia, was at once sent to Mexico as a peace commissioner. He was authorized to demand the cession of New Mexico and Upper California and the recog¬ nition of the Rio Grande boundary. This was

the minimum to be accepted. In order to obtain these terms he was to begin with an additional demand for Lower California and for the right of way across the Isthmus of Tehuantepec. At the proper moment he might surrender these points and also offer a money consideration. The Mexican authorities refused the terms, negotiations were broken off and General Scott renewed his campaign. On 13 September he stormed the heights of Chapultepec, and on the following day entered the City of Mexico. The enemy were now compelled to accept whatever terms were offered to them. Negotiations were reopened with Trist, and the Treaty of Guada¬ lupe Hidalgo was signed 2 Feb. 1848. It was sent to the Senate 23 February, ratified by them with amendments 10 March, and the final ratifi¬ cations were exchanged 30 May. In return for 15,000,000 and the assumption by the United tates of the spoliation claims of their citizens, estimated at $3,250,000 more, Mexico ceded California and New Mexico, and recognized the Rio Grande frontier. Mexicans living in the ceded territory were to be free to continue to reside there or to remove to Mexico, without any prejudice to their property. Those who re¬ mained could either retain the title and rights of Mexican citizens or become citizens of the United States.

The immediate result of the war, then, was the acquisition of the vast

territory comprising the present States of California, Nevada, Utah, Arizona north of the Gila and parts of Wyoming, Colorado and New Mexico. More than half a million square miles of valu¬ able land were transferred from a non-progres¬ sive nation to a nation that was able to develop its resources. The enormous mineral deposits of that region were just beginning to be de¬ veloped. And even now, over half a century after the peace, the agricultural industry, owing to the tardy extension of irrigation facilities, is still far from its maximum development. Many of the best people in the country in 1848 were so blinded by the slavery issue that they could not realize the value of their conquest. Fortunately for our history, such men as Cass and Douglas had sufficient influence parti¬ ally to allay the prejudices of their section and thus to secure the ratification of the treaty.

But, although the anti-slavery sentiment was not strong enough to embarrass the govern¬ ment in the conduct of the war or to endanger the treaty of peace, still it could not entirely be kept in the background. That was shown, for example, in the struggle over the Wilmot Pro¬ viso. As soon as peace was concluded and it was no longer necessary to keep up the appear¬ ance of unanimity before the enemy, the con¬ troversy was renewed. Three questions came up for solution : Should California be admitted as a free State? Should the remainder of the territory acquired from Mexico be organized in accordance with the Wilmot Proviso? What should be the boundary between Texas and New Mexico? These questions and others con¬ nected with slavery were nominally settled by the compromise of 1850, but the controversy was soon renewed in a more violent form, and culminated in secession, civil war and emanci¬ pation. See Mexican War, The; Texas.

Bibliography.— Bancroft, H. H., ˆHistpry of Mexico) (Vol. V, San Francisco 1885) ; id., (History of California) (Vols. V-VI, 1886—

90) ; id., (History of Arizona and New Mex-. ico5 (Boston 1889) ; id., (Autobiography of Lieutenant-General ScotU (New York 1864) ; Grant, U. S., (Personal Memoirs> (2 vols., New York 1885-86; rev. ed., 1895); Haferkorn, H. E., (War with Mexico: a bibliography, 5 in Pro¬ fessional Memoirs5 (Washington 1914) ; How¬ ard, (General Taylor5 (New York 1892) ; Hughes, (Doniphan's Expedition: Containing an Account of the Conquest of New Mexico, etc.5 (Washington 1847; new ed. by. W. E. Con- nelley, Kansas City 1907) ; Ladd, H. O., (The War with Mexico5 (New York 1883); McElroy, R. M., (The Winning of the Far West5 (New York 1914) ; Mansfield, E. D., (The Mexican War5 (New York 1852) ; Ripley, R. S., (The War with Mexico5 (2 vols., New York 1849) ; Rives, G. L., (Mexican Diplomacy on the Eve of the War

with the United States,5 in Ameri¬ can Historical Review (Vol. XVIII, New York 1913) ; (The United States and Mexico, 1821-485 (2 vols., New York 1913) ; Royce, J., California5 (Boston 1886) ; Wilcox, C. M., ‘History of the Mexican War5 (Washington

1892).

W. Roy Smith,

Professor of History, Bryn Maivr College.

28. SLAVERY. When the English colo¬ nies were first established in America, chattel slavery of white people had nearly died out in Christian Europe, although serfdom to the owner of the estate to which one was attached still prevailed in Russia, Germany and many other parts of Europe. In England the only rec¬ ognized chattels were the rare negroes or Asi¬ atics owned as a matter of pride by a few wealthy men. In the New World, however, the English colonists adopted the Spanish habit of enslaving such of the native Indians as they could possess themselves of ; but the tribesmen were sullen, insubordinate and short lived. The slavery of that race was never of any economic importance, though as late as 1692 an Indian woman, Tituba, was one of the Salem witches.

Part of the white population in all the Eng¬ lish colonies was in a condition not far dif¬ ferent from serfdom, until s*ome time after the American Revolution. This was the dis¬ tinct class of so-called “indented55 or “inden- tured55 white servants, both men and women, who served their masters for a term of years, sometimes for life, and were almost com¬ pletely subject to his will. One element of this class was convicts. The early planters begged for “offenders condemned to die out of com¬ mon gaols.55 By 1650 grew up a regular prac¬ tice of “transporting55 some criminals instead of hanging them, and it is estimated that first and last 50,000 convicts came over. For in¬ stance, a Scotchman was sold as a slave for life to America for the heinous offense of burning the Bible; and in 1736 Mr. Henry Justice of the Middle Temple stole books and in consequence was transported to America, ((there to remain seven years, and to be put to death if he returned, etc.,55 and one Sarah Wilson, servant to a maid-of-honor to the queen, was landed in Maryland, put up for sale and pur¬ chased. Another fruitful source of indented servants was the political prisoners. After the battle of Worcester, in 1650, about 1,000 Scotch-

men were ordered sent to the colonies. In 1716 a lot of Jacobites were sent over.

By far the larger and more important class of white serfs was that of the <(redempti.oners,® who agreed with some shipmaster to carry them over and in America to sell their services for a term of years to any purchaser for a sum sufficient to pay their passage money. Thus, in 1774, John Harrower, whose diary has been preserved, ((was obliged to engage to go to Virginia for four years as a schoolmaster for bed, board, washing and five pounds during the whole time.® He was duly sold to a Vir¬ ginia gentleman, and lived a respectable and honest life. Many such servants on expiration of their time set up for themselves and founded families. White servants frequently ran away from their masters and were advertised, pur¬ sued, arrested, whipped and branded exactly like slaves.

By far the most important phase of Ameri¬ can servitude was the slavery of the African negroes ; it was directly related to the cen¬ turies of war between the Mohammedans and the Christians in Europe, which engendered a deep-seated belief that Christianity forbade the slavery of Christians, but allowed the enslave¬ ment of infidels. In 1517 Las Casas, a benevo¬ lent Spanish divine, suggested that negroes be imported into the West Indies from Africa, to save the remnants .of the unhappy Indians. The African slave trade at once sprang up in the Spanish and Portuguese possessions ; and by 1670 the English adventurers, especially Sir John Hawkins, began to engage in this profitable business. The first English conti¬ nental colony to buy negro slaves was Virginia, where, in 1619, a Dutch ship of war sold some in exchange f.or provisions ; but it was in the English West Indies, especially the sugar-grow¬ ing islands of Barbadoes, Tobago and Jamaica, that slavery first found a profitable field. To these islands were sent most of the white con¬ vict slaves, and the continent received for its supply of negro slaves only those already seasoned in the West Indies.

Though so early established, negro slavery was of very little importance on the continent during the 17th century. The total number of negroes in all the colonies in 1700 was prob¬ ably not more than a tenth of the whole popu¬ lation. The 18th century saw, however, a lively slave trade, and widely distributed slaves. England forced from Spain the privileges of the Assiento — that is, the monopoly of carry¬ ing slaves from Africa to the Spanish colonies. For supplying these laborers to the North American colonies, a direct

traffic grew up from Africa in colonial vessels, chiefly owned in New England and in New York. Newport and Bris¬ tol, R. I., were noted centres of the trade.

The result was that negroes were distributed more or less throughout all the colonies, al¬ though their condition, employment and treat¬ ment was very different from community to community. Excepting on Narragansett Bay and the Hudson River, where there were plan¬ tations with large numbers of slaves, the negro in the Northern colonies was chiefly a house servant, and the institution was here at the best; the old North Church in Boston still con¬ tains a gallery for such people. Negroes prob¬ ably were no worse treated than indentured

servants or apprentices of the time, and were often much valued and respected by their masters.

Proceeding southward, in Pennsylvania the number of negroes was large, and in Maryland, Virginia, the Carolinas and Georgia slavery was an established part of the social and eco¬ nomic system. The cruelties of the institution were most manifest in the scattered planta¬ tions of the Carolinas, in which the slaves con¬ siderably outnumbered the white people. There about 1780 Saint-John Crevecoeur found a ne¬ gro servant exposed in a cage, left there to be devoured alive by insects and by birds, which had already destroyed his eyes ; his unpardon¬ able offense was killing a white man.

The steady growth of slavery is remarkable because it was actually prohibited by two of the New England colonies. Massachusetts in the Body of Liberties in 1641, drawn up by Rev. John Cotton, declared that, <(There shall never be any bond slaverie, villianage or captivi- tie amongst us unles it be lawfull captives taken in just warres, and such strangers as willingly sell themselves or are sold to us.® And Rhode Island in 1652 ((ordered that no black man¬ kind, or white . . . serve any man or his

assigns longer than ten years.® These acts were a dead letter ; slaves were born, grew up, died and left the taint to their posterity in every Northern community, as well as in the South.

Indeed, there was in every community a body .of positive legislation relating to terms of transfer of slave property, and to special offenses of slaves, and of white people toward slaves, so that the institution of slave property was as firmly rooted and as widely disseminated as that of private prop¬ erty in land. This is the more striking, be¬ cause in

England the enslaving of blackamoors was thought inconsistent with human rights. In the celebrated case of James Somersett, in 1772, Lord Mansfield held that slavery was <(so odious that nothing could be suffered to support it but positive law® ; there being no such law in England, he therefore refused to compel James Somersett, whom his master had brought from Virginia to England, to remain in the custody of that master.

Long before slavery acquired such a firm and important status, it was attacked by phil¬ anthropic men. In 1624 John Usselinx ob¬ jected to slavery in the proposed Swedish colonies. Georgia was founded in 17.32, as an anti-slavery colony, but the restriction was given up in 1749. The first Englishman to protest against colonial slavery was Roger Wil¬ liams in 1637, and John Eliot in 1675 de¬ clared that <(to sell soules for mony seemeth to me a dangerous merchandize.® Richard Bax¬ ter, favorite English Puritan author of devo¬ tional books said in 1673, <(To go as Pirates and catch up poor Negros or people of another Land, that never forfeited Life or Liberty, and to make them slaves, and sell them, is one of the worst kinds of Thievery in the World.® Samuel Sewall, in his tract (The Selling of Joseph, > says: <(Originally and Naturally, there is no such thing as Slavery, because all Men, as they are the sons of Adam, are Coheirs; and have equal Right unto Liberty, and all other outward Comforts of Life.®

The most efficient agency against colonial slavery was the disapproval of the Quakers, hoth North and South. The German Quakers of Germantown in 1688 adopted a minute against the traffic in negro slaves, to the effect that though they were black, there was still no more liberty to have them as slaves than there was to have white ones. The organiza¬ tion of the Quakers in local meetings gave them an opportunity to develop an opposition to human slavery which was inherent in their at¬ tempt to embody the Golden Rule in their own lives ; hence there sprang up Quaker agitators, of whom Anthony Benezet and John Woolman were the most famous. John Woolman has left a delightful journal, edited by Whittier, full of the quaint records of his laborious journeys to testify against the evils of human slavery. Furthermore, many Quaker meetings passed minutes disapproving of slavery, and eventually disfellowshipping members who in¬ sisted on holding them. They did much to raise the standard of treatment of slaves and caused the liberation of large numbers.

For one of the many anomalies of the system of human bondage was the existence of a considerable class

By the time of the Revolution both slavery and anti-slavery were firmly established in the English colonies. The slave trade con¬ tinued steadily; and outside the Quakers and a few other reformers, there was little protest against it on moral grounds. Yet efforts were made to restrict it in some of the colonies; in the Northern, because they wished to raise a revenue from it ; in South Carolina because they feared slave insurrections. Whatever the reason, all such colonial acts were regularly vetoed by the governor, or disallowed by the home government, on the ground that a trade so profitable to British merchants must not be diminished.

The main objection to slavery before the American Revolution was that it was contrary to Christianity ; indeed for many years the planters objected to the efforts to evangelize their slaves, on the ground that a baptized slave might claim freedom as a Christian. Yet plant¬ ers had their slaves, kept them, worked them, if they felt like it killed them with overwork, and ignored the philanthropists. The larger number of the negroes continued to be pagans in a Christian land.

The Revolution added a second argument of immense weight, namely, the rights of man. It is perfectly true that the framers of the Declaration of Independence, when they said that (

sized this contradiction, for large numbers of negroes were enlisted in the Continental Army, especially in the Northern States, where they sometimes served in regiments indiscriminately with white men. Rhode Island was obliged to promise freedom to slaves who joined the army and to liberate their families; and a dangerous rift was thus made in the system of slavery.

This. rift was widened by the action of several States during and immediately after the Revolution. In 1775 an abolition society was formed in Pennsylvania under the presidency of Benjamin Franklin and similar societies fol¬ lowed in the New England States. These or¬ ganizations at once began to petition legisla¬ tures to secure better treatment for slaves, and even to prohibit slavery altogether. The move¬ ment rapidly gained headway in the Northern communities where slaves were few and vested property interests were small.

In 1777 the people of Vermont drew up a State constitution containing clauses <(that all men are born free and independent,®

and that hence slaves should be set free at the age of majority. The next community to act was Pennsylvania, where under strong pressure from the abolitionists, 1 March 1780, an act was passed declaring that all persons thenceforward born within the State should be set free at 28, thus putting slavery in process of extinction. Still more effective was the action of Massa¬ chusetts which, in 1780, adopted a new con¬ stitution, drafted by John Adams, the oppo¬ nent of slavery. The bill of rights included the declaration <(that all men are born free and equal, and have certain natural, essential, and in¬ alienable rights, among .which may be reckoned the right iof enjoying and defending their lives.® In 1783, in a test case, the Supreme Judicial Court held that under this clause there was no such thing as slavery in Massachusetts. The precedent thus set was followed by New Hamp¬ shire in 1783, in a constitution similar to that of Massachusetts ; and by gradual emancipa¬ tion acts in Rhode Island and Connecticut in 1784. For a time the tide was stayed; then in 1799 New York, and in 1804 New Jersey, passed gradual emancipation acts. Thus, of the 16 States admitted to the Union before 1800, eight became free.

Meantime the national government had also taken important and far-reaching steps in regard to slavery. The First Continental Congress, to damage English trade, drew up the Association of 1774, in which the colonists agreed not to import slaves ; and this prohibition was main¬ tained throughout the Revolution. Most of the States passed laws prohibiting the slave trade, so that when the Revolution was over there appear to have been no importations for a time.

The opposition of the Northern States to slavery was quickly reflected in Congress, where from 1775 to 1777 there were hot disputes on the question of assessing Federal taxes; the Northern States insisting that slaves ought to be counted either as a part of the population, or a part of the wealth of the South; the South insisting that slaves were not as productive as free men and that they ought not to reck¬ oned at their full number. Upon the more serious question of territorial slavery the Con¬ federation Congress took radical ground, for it

became necessary to provide a government for the immense areas added to the United States both north and south of the Ohio River. In 1784 Jefferson reported an ordinance which included a clause that in all the new Territories, <(after the year 1800 of the Christian sera there shall be neither slavery nor involuntary servitude.® For lack of

one vote in one State this clause was rejected; but in 1787, in the Northwest Ordi¬ nance, Congress applied to the Northwest Terri¬ tory the prohibition which had failed three years before. Hence, when the Constitutional Convention of 1787 adjourned, slavery was pro¬ hibited in the whole section of the country north of Maryland (except New York and New Jer¬ sey), by action of the States; and from the Pennsylvania line westward to the Mississippi, by Congress.

When the Federal Convention assembled at Philadelphia in May 1787 it speedily became evident that slavery, or rather the division of the Union into a free and a slaveholding sec¬ tion, was an obstacle to the work. Following the suggestion of Mr. Madison, that it was <(wrong to admit in the Constitution the idea of property in men,® the Convention scrupulously avoided using the words slave and slavery in the final document, but six clauses in the final draft distinctly refer to that institution.

1. The apportionment of direct taxes <(shall be determined by adding to the whole number of free persons . . . three-fifths of all other per¬ sons.® This clause was the result of a long and bitter controversy. As Gerry of Massachu¬ setts put it, <(why should blacks who are prop¬ erty in the South, be in the rule of representa¬ tion more than cattle and horses in the North ?® ; while Pinckney of South Carolina thought that in apportionment <(the blacks ought to stand on an equality with the whites.®

2. <(The migration or importation of such persons as any States now existing shall think proper to admit, shall not be prohibited by the Congress,® prior to 1808. This clause of course related to the slave trade, complete control over which was for a time withheld from Congress; and the concession to the Northern States was part of a bargain by which they retained the right to pass navigation acts.

3. A clause relating to fugitives provided for the return of any person <(held to service or labor in one State, under the laws thereof, es¬ caping into another.®

4. <(The citizens of each State shall be enti¬ tled to the privileges and immunities of the citi¬ zens in the several States,® — a clause afterward applied to, or claimed for, negroes.

5. <(Congress shall have power to dispose of and make all needful rules and regulations re¬ specting territory or other property belonging to the United States.® This was the power under which the Northwest Ordinance of 1787 had prohibited slavery.

6. Congress shall have power to exercise exclusive legislation in all cases whatsoever, over such district (not exceeding 10 miles square) as may, by cession of particular States and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in which the same shall be, for the erection of

forts, magazines, arsenals, dockyards and other needful buildings.

The experiment was now fairly under way of carrying on a Federal government with three different principles as regarded human slavery, — freedom in the Northern States; slavery in the Southern; and a discretionary power over territorial slavery in the Federal government. The difficulties of this situation were clearly shown when, in 1790, the abolition societies petitioned Congress to regulate the slave trade ; and the House of Representatives passed resolu¬ tions in which they expressly disavowed any power to regulate slavery within the States. Three years later Congress exercised its power over fugitive slaves by passing an act which provided that under the authority of the United States and on the certificate of any magistrate, a master or his agent might personally appre¬ hend a slave escaped into a free State.

In 1789 Congress exercised its power to deal with slavery in the Territories by re-enacting the ordinance of 1787; but in 1798, on the organi¬ zation of Mississippi Territory, the anti-slavery clause was omitted, and slavery was allowed to continue there. _ In 1801 the United States took over the District of Columbia and reaffirmed the pre-existing lawrs of Maryland, including harsh slave codes. The act for organization of the Territory of Illinois contained a clause which in 1820 was applied by the Missouri Compromise to the northern portion of the Louisiana . Purchase. Meanwhile a long con¬ tinued agitation in England against the slave trade resulted in an act against it in 1806. This example was helpful in the United States which, by Act of 7 March 1807, laid an absolute prohibition on the foreign slave trade which was enforced by additional acts of 1818 and 1820.

In 1821, on the final admission of Missouri, Congress insisted that a clause in the State Constitution prohibiting the incoming of free negroes should be withdrawn, because contrary to the citizenship clause.

In the 40 years from 1790 to 1830 the con¬ ditions of slavery radically changed. In 1790 the census showed 700,000 slaves ; in 1830 there were 2,000,000, in each case about one-third of the total population of the slave-holding com¬ munities. The persistence of

slavery was un¬ expected for in 1790 it was dying out from want of profitable employment. When Eli Whitney invented the cotton gin for separating the seed from the fibre (1794) a profitable crop was opened up to slave labor. The product of cotton in 1800 was 210,526 bales, in 1830 1,038,- 847 bales. It is a crop requiring cultivation during a considerable part of the year and adapted to rude labor in large gangs ; it thus made slave labor profitable in the Gulf States, and furnished a market for the surplus slave population of the border slave States; hence all sections of the South had an economic interest in its continuance.

Looking at slavery from the side of the slave, the conditions varied extremely; in gen¬ eral the work was lighter and the relations with the master more humane in the border slave States where farming was more diversified. The great cotton, rice and sugar plantations of the Far South made heavier demands upon the slave ; and the plantations were often managed

by hired overseers. The conditions varied also according to the character, intelligence and temper of the masters ; easy-going, kind-hearted, genuinely religious masters and mis¬ tresses often felt a strong personal responsi¬ bility for their slaves; but it was part of the system of slavery that passionate, coarse and overbearing men and women might own slaves and frequently treated them with harshness, severity or extreme cruelty.

The condition of the slave varied also ac¬ cording to his employment. Most of them were field hands, engaged in the rudest and most toilsome labor; but some were employed as roustabouts on the river steamers, as long¬ shoremen, and others as skilled carpenters, blacksmiths, masons, plasterers and the like. A much greater number were busy as house¬ hold servants, there being practically no other domestic service obtainable in the South. People, therefore, who needed such services and owned no slave hired one — almost always the handsomest, most intelligent and most promising slaves were used for household service, and it was a highly prized privilege, bringing better food, abundance of cast-off clothing and personal relations with the white people.

The field slaves worked long hours, com¬ monly from sunrise to sunset, and were kept up to their work by white overseers, and on

large plantations also by negro slave drivers armed with the whip. Men and women and half-grown boys and girls were engaged in this field labor. Their houses were cabins in the negro quarters, usually small, dark and dirty, but often as good as the ordinary house of the poor white. The clothing of the field hand was rough, coarse and scanty. Thrifty planters esti¬ mated that it cost about $15 a year, on an average, to feed and clothe a slave.

Most adult slaves were married, but family relations were so disturbed by sale and a feel¬ ing of irresponsibility that such relations were very changeable. The slaves usually had Sun¬ day free and a few days of jollification at Christmas ; in many churches negroes attended the same services and were received as mem¬ bers. Many communities had their own churches with a rude and boisterous worship, conducted by slave preachers.

One of the incidents or accompaniments of slavery much in the minds of people at that time was sale. Negroes who, in the colonial days, could be bought as low as $50, by 1830 were worth $500 ; and by 1860 prime cotton hands were quoted as high as $1,500. The South, in 1860, valued its slave property at about $2,000,000,000. Of course this high value de¬ pended upon the opportunity to market surplus slaves and to buy hands as needed; hence, a lively system of picking up slaves at private sale, gathering them into coffies or gangs and shipping them south by land or river, there to be sold out again. Though the slave trader was universally despised by the white people, the kindest master might get into debt and have to sell his slaves, or his death might cause his property to be divided. Auction sales were very frequent and abounded in pathetic incidents of the division of families and the sale of infants away from their mothers.

Another frequent incident was escape.

Slaves were always running away and taking refuge in swamps or forests; many of them returned, took their flogging and went to work again; many others became fugitives, and made their way to the Northern States; and thou¬ sands of them remained there or passed on farther north to Canada. These fugitives were commonly the most determined and ablest of their race and by stealing themselves they de¬ preciated slave property, especially in the bor¬ der States.

A third striking incident of slavery was manumission, — from early Colonial days slaves were set free by indulgent masters during their life or by their wills; and the free negroes in the South in 1860 were about one-sixteenth of the whole number. The process of setting slaves

free was commonly hedged about by two restrictions: (1) The master must give bonds that the freedman should not become a public charge; (2) in some States he was obliged to remove him from the Commonwealth in which he was set free.

A fourth incident was insurrection. Beside several risings in Colonial days, of which the New York Slave Plot of 1741 is the best known, there were three insurrections or attempted in¬ surrections in the 19th century : the Gabriel insurrection in Virginia (1800) ; the Denmark- Vesey in Charleston (1822) ; and the Nat Turner rising in Virginia in 1831, in which 70 white people were massacred. This was the last of such movements ; even during the Civil War there was no slave rising in the South, but the fear of it was a constant motive in the minds of the Southern people.

Looking at the institution of slavery from the point of view of the master, the Southern community was divided into three strata of white people: (1) The large slaveholders. In 1850 about 2,000 families owned as many as 100 slaves each ; the largest number under one management was about 2,500. These 2,000 families made up the social and political aris¬ tocracy of the South, furnished a great num¬ ber of the professional men and almost all the holders of high political offices, State or na¬ tional, in the South. (2) The small slavehold¬ ers, about 350,000 families : of these, in 1850, about 60,000 held only one slave. Such people commonly had a poor living, in rough houses with unsavory food and few opportunities for their children; with them were associated a considerable body of non-slaveholding farmers. (3) At the bottom of society was the great class of poor whites, including the moun¬ taineers ; they held no slaves, but owned their own land and lived upon it in a miserable fashion. They were a naturally intelligent people, but extremely ignorant and made up about three-fourths of the white population. They implicitly followed the political leader¬ ship of the great planters and were perfectly persuaded that the cause of slavery was their own, although they were looked down upon by well-to-do white men, and were sometimes despised by slaves.

The system of slavery was maintained by a rigorous code of special laws. Property and mortgage right in slaves were protected by law. The masters were assured the physical control of slaves by laws and customs which gave them authority to compel obedience and

force labor ; and to resist any real or supposed belligerency of the negro by force, which com¬ monly took the form of whipping. The laws held a master responsible for killing a negro, unless in defense of his life ; but. negro testi¬ mony could not be received against a white man, and the law of a State which absolved the master in case a slave was so inconsiderate as to die under a ((moderate)) chastisement suf¬ ficiently indicates that public sentiment de¬ manded giving discretion to the master in all doubtful cases.

Assemblages of slaves and any sort of riot¬ ous behavior were dealt with by special acts. In many States special tribunals of the slave¬ holders in the neighborhood took testimony in a summary fashion, and executed punishment, even to the taking of life. There were also special laws against the consorting of whites with negroes, or their purchase of property from slaves. Runaways were stopped by a sys¬ tem of patrols, a kind of voluntary mounted police, who scoured the roads and picked up suspected characters.

Such was the system of slavery, a system of brute force, buttressed by a powerfully welded public opinion, backed up by a body of positive law. On many plantations the life of a slave was easy enough, labor was light and he was looked on as a reasoning being; on other plantations he was treated worse than the beast of the field, because he could talk and was held to the responsibility of men. Slave labor was notoriously inefficient and wasteful ; and small planters made very little out of their slaves. The larger planters, by working out a kind of machine system, had better results ; but it was at the expense and the degradation of their white neighbors as well as of the slaves.

The Southern opposition to slavery, which had been widespread in 1787, grew less and less as the years went on, though till 1830 there was a national anti-slavery organization, which held a convention about once in two years, usually in a border State city. The system of slavery grew more and more deeply rooted, and when the Northern abolitionists began an active crusade against it in 1831, the Southern so¬ cieties disappeared and only a handful of Southern men and women could jbe found who would so much as make a public argument against the desirability of slavery.

From looking on slavery as an ˆevil® which must be destroyed, by 1820 the South as a com¬ munity were thinking of it as a difficulty which could not be removed without destroying the country. By 1830 they grew to advocate it as something which, whether evil or not, must neither be attacked nor discussed; thence it was an easy step to advocate it as desirable in itself, as Calhoun put it, <(a good, a

positive good.® In the last stage of the contest, just before the Civil War, Southern leaders like Jefferson Davis insisted that slavery must be extended in some degree to the Northern States.

The abolition movement is elsewhere dis¬ cussed, — our object at this point is to show how slavery, so strongly buttressed in the in¬ terests and the pride of the South, yet quickly came to an end. As has already been shown, when the two sections had clearly adopted op¬ posing systems of labor, many questions of choice between the two systems came before the

Federal government. It was in vain to urge that slavery was a State institution existing only under State laws, in the face of the fact that Congress, by its regulation of the slave trade in the District of Columbia, of inter¬ national relations, of fugitives and of the Ter¬ ritories, had a power to increase or to diminish the slave power. In fact, the national govern¬ ment furnished the arena in which the ques¬ tion was finally fought out.

The first great step came about 1835, when the abolitionists, in part encouraged by the English acts abolishing slavery in the West Indies (1830-35), began to send petitions to Congress asking for the prohibition of slavery in the District of Columbia. The South was able to influence enough Northern votes to secure a succession of gag resolutions, intended to prevent discussion in Congress ; but the question sprang up in many unexpected ways. The apparently innocent power of carrying mails by the Federal government brought to light objections to the delivery of abolition mail at the Southern post offices. The Southern leaders attempted to stop the rising tide of dis¬ cussion of slavery in Congress; but John Quincy Adams arose as the champion of free speech, and he was speedily aided by other men like Joshua R. Giddings of Ohio, who would not be silenced.

By 1842 it was plain that nobody could pre¬ vent the discussion of slavery throughout the North and in Washington; soon it had to be discussed, because of new questions of Terri¬ torial slavery. The principle of dividing the Union by a geographical line continued by the Missouri Compromise of 1820 was tested again when in 1845 Texas was brought into the Union with the express purpose of furnishing material for a body of slave-holding States; Congress deliberately prohibited slavery in the territory claimed by Texas, north of 36° 30’.

Then followed, in 1848, the annexation of New Mexico and California, with the plain ex¬ pectation that the 36° 30′ line would be pro¬ duced

to the Pacific. The North, however, was aroused and the people of California refused either to divide their Commonwealth or to ad¬ mit slavery within its borders. By the com¬ promise of 1850, California was acknowledged free, and New Mexico and Utah were prac¬ tically left as fighting ground for slave power; yet Congress, in 1848, passed a fourth significant act prohibiting Territorial slavery, this time in Oregon. In the same compromise of 1850, Congress passed a new Fugitive Slave Law and prohibited slavery in the District of Columbia.

The contest was raised again by the Kansas- Nebraska Act of 1854, framed by Douglas, which repealed the Missouri Compromise and, by implication, the three other acts prohibiting slavery in the Territories; and left Kansas to be controlled by the first set of people who might get on the ground. Contrary to expectation, the first set were from the North, and the de¬ termination of the Southern settlers in Missouri and of the South generally to take possession of Kansas in spite of the will of the majority of the settlers occasioned a civil war in Kansas, six years before the greater national Civil War.

By this time it became evident that slavery was a political question which divided the nation; and in 1856 the first large and wide¬ spread anti-slavery party was formed. The

Dred Scott Decision of 1857 was an attempt to suppress the controversy, and to take it out of politics, by denying the right of Congress to prohibit slavery in a Territory, though that right had four times been exercised, with little op¬ position. From this time the drift was steadily and irresistibly toward Civil War, — and the crisis was reached in 1860, when the Southern Democracy demanded, as a condition of remain¬ ing in the Union, their right to share in all ter¬ ritory thereafter annexed, and to have an end of abolition agitation in the North.

Although in a resolution of 22 July 1861 the House of Representatives declared that slavery was not the cause of the war nor the freeing of the slaves its purpose, from the beginning it was plain that slavery was the great question which divided the two sections, and that conse¬ quently its future was inextricably woven into that struggle. Hence, the war had hardly be¬ gun before there came a series of special enact¬ ments and executive proclamations. (1) On 26 April 1862 an act of Congress freed the slaves in the District of Columbia, with a

com¬ pensation of about $300 a head. (2) On 19 June 1862 an act, in flat defiance of the Dred Scott Decision, prohibited slavery in every Ter¬ ritory. (3) On 2 July 1862 an act was passed providing that slaves of persons engaged in re¬ bellion against the United States thereby gained their freedom. President Lincoln was all the while turning over in his mind a larger scheme, and on 22 Sept. 1862 he issued a preliminary proclamation, followed on 1 Jan. 1863 by a final proclamation, of emancipation, by which all slaves within the seceding States were declared free, excepting in the State of Tennessee, and certain districts of Virginia and Louisiana which were within the Federal lines.

To the national prohibitions of slavery in the Territories, the District of Columbia and the seceded slave States were added the actions of three slave-holding communities: West Vir¬ ginia, by its Constitution (21 March 1862), Missouri by a vote in convention (1 July 1863), and Maryland by a new constitution (13 Oct. 1864), declared for absolute or gradual eman¬ cipation. They thus joined the cohort of free¬ dom, so that at the end of the war the only re¬ gions within the boundaries of the United States in which slavery remained legal were Delaware, Kentucky and Tennessee, the last of which States declared for freedom by a new constitution in 1865.

Slavery was thus practically at an end. Nevertheless under the then accepted theory of the Constitution, both Congress and the States might legally re-establish it. To prevent that contingency and to wipe out the last vestige of the system, the 13th Amendment was intro¬ duced into Congress, received the necessary two- thirds vote (22 Feb. 1865) and 18 Dec. 1865 it was announced that the necessary three-fourths of the States had ratified it, and that to the text of the Constitution had been added the significant words, ((Neither slavery nor in¬ voluntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction?

As Lincoln said a few days before his death, «We have finished the job? Beginning in 1775 with a United States in which slavery was the normal condition of every community and

every square mile of vacant territory, the strug¬ gle of 90 years ended with a condition in which by the firmest of constitutional enactments the normal status was everywhere that of freedom. The amendment even reached out into the future, and covers all annexations made or that can ever be made ; so that chattel slavery of human beings, no matter what their color, is now absolutely unknown to the law of the

United States or of any State, Territory or de¬ pendency.

Bibliography. — Adams, A. D., ‘Neglected Period of Anti-Slavery) (1908) ; Brawley, (A Short History of the American Negro) (New York 1913) ; Channing, Hart and Turner, ‘Guide to American History) (1913) ; Collin, W. H., ‘Domestic Slave Trade> (1904) ; Cut¬ ler, J. E., ‘Lynch Law* (1905); Douglass, F., ‘Life and Times of Frederick Douglass) (Auto¬ biography 1881) ; Dubois, W. E. B., ‘Suppres¬ sion of the African Slave Trade) (1896) ; id., ‘Select Bibliography of the American Negro) (1901) ; George, J. Z., ‘Political History of Slavery in the United States) (New York 1915) ; Griffin, A. P. C., ‘Select List of Refer¬ ences on the Negro Question) (1903); Hart, A. B., ‘Slavery and Abolition) (1906) ; Locke, M. E., ‘Anti-Slavery in America) (1901) ; Mc- Dougall, M. G., ‘Fugitive Slaves* (1908) ; Smith, T. C., ‘Parties and Slavery) (1906) ; Woodson, ‘The Education of the Negro prior to 1861 } (New York 1915). Consult also the histories of von Holst, McMaster, Rhodes and Schouler; and biographies of pro-slavery and anti-slavery people.

Albert Bushnell Hart, Professor of Government, Harvard University. –

29. FINANCES (1816-1861). In 1816, at the close of war with England, the chief prob¬ lem of the government was the restoration of currency to a specie basis. Dallas, upon assum¬ ing the office of Secretary of the Treasury in 1814, vigorously endeavored to secure a charter for a second United States bank through which pressure might be exercised upon the local banks to resume specie payments. The Repub¬ lican party as a whole had long opposed a bank founded upon a Federal charter; and notwith¬ standing Dallas’ support promptly advanced constitutional objections. The discussion ran through two years in which several plans were proposed ; the principal points of difference were, first, whether the capital of the bank should be based upon treasury notes or upon government stock; second, whether the bank should be forced to loan money to the govern¬ ment ; and third, whether the bank should be given power to suspend specie payments. The bank was chartered in March 1816. Its capital was based in large part upon government stock ; the government in addition subscribed to the stock and had representation in its management. The bank was obliged to transfer the public funds free of charge, and was made the de¬ pository of government moneys. As a return for the exclusive privilege of a national char¬ ter, the bank paid to the government a bonus of $1,500,000. The establishment of this institu¬ tion was quickly followed by a Congressional resolve that after 20 Feb. 1817 all dues to the government should be paid only in specie, treas¬ ury notes, notes of the Bank of the United States or in notes of local banks

which were

payable on demand in the foregoing currency. This decisive action forced the State institutions to adopt sounder methods, and on the date named there was general resumption.

In 1816 the revenue system was reorganized, not for lack of revenue, but because the enor¬ mous volume of imports rushing into the coun¬ try upon the return of peace endangered do¬ mestic manufactures which had been abnormally stimulated during the war. The value of im¬ ports in 1816 was estimated at $116,000,000 as compared with $13,000,000 in 1814. Customs duties amounted to $36,000,000, far surpassing the previous estimate of Dallas of $13,000,000. Even President Madison affirmed the necessity of protection. A new tariff bill was conse¬ quently enacted 27 April 1816; in particular the cotton industry received protection. In De¬ cember 1817 the internal revenue duties were repealed; and in the following year supplemen¬ tary customs duties were placed upon iron com¬ modities, thus establishing the policy of pro¬ tection. In these measures the South cordially joined, and Calhoun, who afterward bitterly opposed the high tariff policy, at this time sup¬ ported higher duties.

During 1816 and 1817 the treasury was in a most favorable condition; revenue exceeded all expectation, yielding surpluses amounting in two years to nearly $30,000,000. Good fortune, however, did not continue; the new United States Bank was mismanaged and the currency was once more thrown into disorder. This, to¬ gether with an extraordinary commercial and manufacturing expansion, led to a crisis in 1819. The revenues were severely affected and cus¬ toms duties which yielded $26,000,000 in 1817 fell back to $13,000,000 in 1821. In 1820 and 1821 the treasury budget showed a deficit. Ex¬ penditures for the navy and pensions were re¬ duced; and a change in the management of the bank, with a contraction in its circulation and loans, led to a revival of business and improv¬ ing revenues. Beginning with 1822 the treasury annually enjoyed a surplus (except in 1824 when a large payment was made on account of Span¬ ish claims) which was applied to the reduction of the debt. In 1820 an attempt was made to increase tariff duties, partly to help the revenues at that time embarrassed, and partly in behalf of protection. The bill passed the House but failed in the Senate by one vote. Clay and John Quincy Adams championed protection and lib¬ eral expenditures for

internal improvements, cardinal points in the <(American System. M The effort was renewed in 1824 and protection was sought in particular for iron, wool, hemp, glass and lead, industries of the Middle West. The contest now assumed a sectional division, the Middle Western and Southwestern States being arrayed against New England and the South. New England's chief interest at this time was in commerce, and her leading representative, Webster, made an exhaustive argument in be¬ half of freedom of trade. The measure became law by a vote of 107 to 92; in the South there was but one vote in favor to 47 against. During the next 10 years the tariff question occupied a large place in Congressional debate and legis¬ lation. The tariff of 1824 fell short of- the demand of woolen manufacturers, and agitation for a revision with still higher rates resulted in the tariff of 1828. New England was turning more and more to protection, and Webster under

instructions made a speech declaring that through the encouragement of the Act of 1824 capital had been invested which needed further protection. The woolen tariff, or Tariff of Abominations, as the measure was frequently termed, aroused the fiercest controversy, which finally led to nullification and the compromise tariff of 1833. By this latter act a horizontal reduction of duties, spreading over a number of years, was made and for a while the tariff question yielded in importance to other political issues.

A persistent attack upon the United States Bank, resulting in its downfall as a Federal institution, began in 1829. President Jackson in his first annual message in 1829 raised the question of constitutionality, and doubted the value of the bank in establishing a sound cur¬ rency. In its place he suggested an institution more directly under the management of the Treasury Department with power to receive both public and private deposits, but with no right to make loans. Jackson undoubtedly voiced the conviction of Western democracy, that the affairs of the government should be divorced from private corporate undertakings. The suggestion had little immediate influence, for both branches of Congress made reports in favor of the bank. In 1831 Senator Benton took up the fight against the bank, resting his argument upon the evils of all kinds of bank notes, and in particular attacked the issue of branch drafts. In 1832 the bank petitioned for a new charter and was successful in carrying its bill through Con¬ gress. Jackson interposed a veto, laying stress upon the evil of a money monopoly. He did not stop here but next determined on the re¬ moval of the government funds from the cus¬ tody of the 'bank; in this he was encouraged by his re-election in 1832 which he interpreted as a popular endorsement of his opposition to

the bank. There were doubts, however, as to the legality of removal of the public moneys without the sanction of Congress. W. J. Duane, who was appointed Secretary of the Treasury in June 1833, refused to take the responsibility, and although Taney, the Attorney-General, sup¬ ported Jackson's contention, Duane remained obstinate. He was forced from office and was succeeded by Taney, who on 26 September is¬ sued an order directing the deposit of public moneys henceforth in certain local banks. These institutions, popularly known as Jackson's ˆpets,® were chosen with care, and by the Act of 23 June 1836, the regulation of public funds was strictly prescribed so as to safeguard the interests of the government in every possible way.

In 1835 the public debt was paid off ; cus¬ toms receipts had steadily increased ; and be¬ ginning with 1830 there was an enormous ex¬ pansion in revenue from sales of public land. In 1834 and 1835 the annual receipts from this source alone were nearly $15,000,000 and in 1836, $25,000,000. A new fiscal problem of dealing with a surplus was thus created; many schemes were projected, chief among which was Clay's proposition that revenue from lands be dis¬ tributed among the several States. Any plan to prevent a surplus by lowering customs was negatived on the ground that the tariff question has been, for the time being at least, settled bv the Act of 1833 and ought not to be reopened. On the other hand, there was objection to the

distribution of the proceeds of land sales on the ground that public lands had been ceded for paying off the Revolutionary debt; that this national income could not in fairness be given to States which had not originally shared in the gift, and that the Constitution required all revenues to be appropriated for specific objects. Others desired to make large expenditures for internal improvements, fortifications or educa¬ tion. It was impossible to pass a distribution bill, but the same end was reached by the Act of 23 June 1836, providing for the deposit of certain surplus funds in the treasury, amounting to $37,000,000, with the several States in propor¬ tion to their respective representation in Con¬ gress. In law this was a deposit which could be recalled, but it was practically regarded as a gift to the States. The deposits were to be made in four quarterly instalments during the year 1837. Before the deposit was completed the country was involved in a commercial panic which made it impossible for the government to pay the fourth instalment.

On 1 July 1836 the Treasury Department is¬ sued an order known as

the Specie Circular, requiring all land agents to accept only specie in payment for public lands ; as local bank notes had been previously received, and specie was scarce in the West where sales were made, speculative operations based upon land were sharply checked. Eastern banking institutions with Western connections were obliged to con¬ tract their loans, and this, coupled with a heavy transfer of funds, in accordance with the De¬ posit Act, proved a severer strain than many banks could stand. The evils were aggravated by commercial failures in Europe, decreasing crops and Southern speculation in cotton. In May 1837 the banks throughout the country suspended specie payments, and as the treasury had parted with its funds it shared in the distress and was also forced to suspend. Dur¬ ing the next few years treasury notes were issued amounting to $47,000,000, of which one- third were reissues ; and between 1841 and 1843 there were three long-term loans. With the exception of 1839, there was a series of annual deficits until 1844.

The failure of the banks to protect the funds of the government led President Van Buren to recommend the establishment of an independent treasury system by which the government might take care of its own funds. A prolonged dis¬ pute within the party over the details of this plan, as well as the opposition of Whigs who wished to establish another United States Bank, deferred the passage of the independent Treas¬ ury Act until 1840. In 1841 the Whigs gained the election and used their power by repealing the Treasury Law. Owing to the vacillating op¬ position of Tyler, who succeeded President Harrison, it proved impossible to pass construc¬ tive legislation, and for lack of other agencies the public funds were once more placed with local banks ; this practice continued until 1846. Whig success also led to a revision of the tariff in the Act of 1842 along protectionist lines. Additional reason for higher duties was found in the embarrassment of the treasury and the need of increased revenue. In 1846 the Demo¬ crats regained the Presidency and at once re¬ established the independent treasury system and enacted a new tariff. The Treasury Act of 1846

provided for the custody of public funds at mints, custom-houses and at subtreasuries in a few of the larger cities. It also provided that all public dues should be made either in specie or treasury notes, thus excluding bank notes. The system in its main features has remained unchanged to the present time, and it has been successful in safeguarding the funds of the government.

The tariff of 1846 was a free trade tariff ; specific duties were abolished ; and the duties were so rated as to yield the largest amount

of revenue. Commercial enterprise was again at a high level ; railroad construction and foreign immigration contributed to new industrial de¬ velopment ; and in spite of the temporary inter¬ ruption occasioned by the war with Mexico, the treasury entered upon another long period of prosperity. Customs receipts were large ; the sales from public lands again proved fruitful; and repeated surpluses made it possible to re¬ duce the debt, until in 1857 it stood at $28,- 800,000. In 1857 another reduction in tariff rates was made to which all sections of the country gave generous support. Railroad con¬ struction, however, had been carried too far and capital for the moment was unprofitably tied up in unproductive investment. Bank note circulation was unduly expanded, and a panic occurred in August 1857. The treasury with weakened resources fell into embarrassment and was obliged to issue treasury notes to meet its obligations. In the years 1858-60 the deficits amounted to $50,000,000.

During the period 1816-61, the United States became a commercial nation, necessitating new methods of customs administration. The reg¬ ulations affecting the appraisement of goods were made more strict. Credits to importers were abolished, and in its place a system of warehousing was established. Among the later Secretaries of the Treasury, Walker and Guthrie stand out pre-eminent, the first for his notable report in which he recommended the tariff of 1846 and the second for his development of administrative details. See also United States — Finances (1861-1919).

Bibliography. — Bolles, A. S., financial History of the United States from 1776 to 1885) (4th ed., New York 1894-96) ; Dewey, D. R., financial History of the United States) (5th ed., New York 1915).

Davis Rich Dewey, Massachusetts Institute of Technology.

30. EFFORTS TO SETTLE THE SLA¬ VERY QUESTION. In all co-operative ef¬ forts of the North and South to settle disputes over slavery the preservation of both slavery and the Union were, objects of primary consid¬ eration. The roots of such efforts are found in the compromises of the Constitutional Con¬ vention of 1787. The most important agree¬ ments then made provided that (1) three-fifths of the slaves should be counted in determining the number of congressmen a State should have and the amount of direct taxes it should pay and that (2) the African slave trade should continue for 20 years. These compromises are significant partly because the ((more perfect union® could probably not have been formed without them and partly because the ˆFathers® thus gave the stamp of approval to compromis-

mg disputes over slavery, for the sake of the Union. By the aid of the three-fifths advan¬ tage the South, in 1790, had but three less con¬ gressmen than the North. But each succeeding census showed a constantly growing majority in the North's favor so that by 1820 this majority amounted to 43. But the South had already begun to look for the protection of her interests in the preservation of an equilibrium in the United States Senate, where population is not so directly represented.

Of the original 13 States seven were North¬ ern and six Southern. During the administra¬ tions of Washington and Adams, Vermont, Kentucky and Tennessee were admitted and es¬ tablished an equilibrium between the two sec¬ tions in the Senate. The admission of Ohio (1802) and Louisiana (1812) preserved this situation. The addition of Indiana (1816), Mississippi (1817), Illinois (1818), and Ala¬ bama (1819) still kept up the balance. But the application of Missouri for permission to form a State constitution in 1819 threatened to break the plan of alternate admissions. Besides, slavery seemed to be making a flank movement into territory which might be looked upon as geographically belonging to the North, since nearly the entire eastern line of Missouri faced the free State of Illinois. The South's need of Missouri was indeed great, for but two more possible slave States remained to be carved out of Territories. Congressman Talmadge of New York introduced an amendment to the bill permitting Missouri to form a constitution, which precipitated the first great quarrel over slavery between the two sections, and which threatened the existence of the Union. This amendment, called the ((Missouri Limitation,® provided that no more slaves should be taken into Missouri and that slave children born within the State should be free at 25 years of age. The House of Represenatives passed the amended bill, after warm debates, but the Sen¬ ate struck out the amendment and then passed the bill. The House refused to accept the change and the measure was lost for the time being. In the next session the contest was renewed, but was given a new turn by the Sen¬ ate linking the bill for the admission of Maine, which the House had already passed, to the bill authorizing the people of Missouri to f-orm a State constitution. The Senate passed this bill with the proviso that slavery should be prohib¬ ited in the territory north of 36° 30', but twice the House rejected the bill in this form. A committee of both houses, however, agreed upon the following compromise: (1) The separation and passage of the Maine and Missouri bills; (2) the prohibition of slavery in the remainder of the territory of the

Louisiana Purchase north of 36° 30'. Both houses accepted the compromise and President Monroe signed the bill (1820).

But the quarrel which the people hoped had been settled was suddenly renewed in a more violent way than before. The constitution pre¬ sented by Missouri to Congress looked toward the exclusion of both mulattoes and free ne¬ groes from the State. The fiery debates, the resolutions from State legislatures on both sides of the question which had already been pre¬ sented to Congress, and the widespread discus¬ sion in the newspapers, led patriotic men to fear a dissolution of the Union. Therefore,

Henry Clay at once took the lead in trying to settle the new dispute. Although the House rejected the report of the committee of 13, Clay did not give up, but by his persuasive eloquence, and by personal appeals to members, he finally induced the House to pass a bill to admit Mis¬ souri as a State on the condition that her legis¬ lature give a pledge that the State would never pass a law excluding the citizens of any other State. Missouri gave the pledge and was ad¬ mitted (1821). Three important consequences followed from the Missouri contest: (1) The conviction that danger to the Union could force a compromise; (2) that Congress accepted the South's contention against placing unusual re¬ strictions upon a State as it enters the Union; (3) that Congress had the power to prohibit slavery in the Territories. The remote effect of thus devoting the northern part of the Louis¬ iana Purchase to free labor was far-reaching.

The second conflict over slavery which seri¬ ously menaced the Union had reference to ter¬ ritory obtained by the Mexican War (q.v.), Anti-slavery men sought to .exclude slavery from such territory by the Wilmot Proviso (q.v.), while pro-slavery men attempted to se¬ cure their interests by an extension of the Mis¬ souri Compromise line to the Pacific. Both of these efforts failed, .but the discussions in and out of Congress deepened sectional feeling. Excitement was further increased by events in California. The discovery of gold on the Sacra¬ mento (1848) drew a large, hardy, but reckless population from all quarters. The disorder which resulted made organized government an immediate necessity, but a bill to establish Ter¬ ritorial government for that region failed. Cal¬ ifornia did not wait long on Congress, but called a Constitutional Convention whose dele¬ gates voted unanimously for a constitution pro¬ hibiting slavery. The people of California rati¬ fied the constitution by an overwhelming ma¬ jority. Thus circumstances beyond the control of either party to the contest placed California beyond the reach of slavery. In the meantime the State of Texas seemed to be preparing to enforce her claims to a large

portion of what is now New Mexico. Anti-slavery men op¬ posed the demand of Texas because it was ex¬ pected that New Mexico would follow the ex¬ ample of California. President Taylor recom¬ mended Congress to admit California immedi¬ ately as a State and expressed the opinion that the people of New Mexico would soon follow the example of California (1849). The radical pro-slavery men were grievously disappointed over this attitude of President Taylor and strongly favored first putting California and New Mexico through the experience of Territo¬ rial government. Such a plan would have given slaveholders time to move into those Territories. Slavery had not yet learned that in the race for population it could not compete with freedom. The irritation of the two sections was now so great that men again feared for the safety of the Union. Although Henry Clay had retired from public life to spend his few declining years, the legislature of Kentucky without a dis¬ senting vote re-elected him to his old place in the Senate, hoping that the spell of his presence and the power of his eloquence might once more restore harmony between the sections. In Janu¬ ary 1850 Clay produced his most famous com-

promise bill. The following were its main fea¬ tures: (1) That California be admitted as a free State; (2) that the Territories of New Mexico and Utah be organized and that the question of slavery be left for their people to settle; (3) that Texas be paid $10,000,000 to satisfy her claims against New Mexico; (4) that the slave trade be abolished in the District of Columbia; (5) that a more efficient Fugitive Slave Law be passed. The debates over these measures continued into September and brought out the most splendid array of oratorical talent ever seen in the Senate. Stimulated by his last great effort for the Union, Clay seemed to gather new vigor, was unremitting in his labors and frequently spoke with his old-time power. When he rose to make his great speech a vast concourse which filled even the avenues to the Senate greeted him with tremendous enthusi¬ asm, and hung in breathless silence upon his words. When he had finished, women crowded to imprint on his wan cheek the kiss of admira¬ tion and approval. His effort kindled afresh the fire of patriotism.

The hand of death was also upon the mighty Calhoun. He was only able to sit in his place and listen to another read his last speech. The burden of his address may be summed up in three propositions: (1) The restoration of the equilibrium between the North and the South by an equal division of the territory and by an amendment to the Constitution in order to guarantee the equilibrium ; (2) a new law for

the return of fugitive slaves, and the cessation of anti-slavery agitation; (3) the peaceful secession of the slave States from the Union, if the above propositions are rejected. Calhoun was asking for an impossible Union and an impossible secession. The other member of the great trio, Daniel Webster, had been silent thus far, and no man, probably, knew what he would say, least of all his New England supporters. On 7 March Webster addressed the Senate in a speech <(For the Constitution and the Lffiion.® He made an appeal for conciliation and con¬ demned agitation whether by Northern or Southern men. But he seemed to lay the greater blame for the distracted state of public opinion upon anti-slavery men. For this unex¬ pected position they roundly denounced Web¬ ster and his popularity in the North began to wane. Clay and Webster were of the past and had spoken for the past. But the men of the future were in the Senate also : Seward, Chase, Douglas and Davis. There was less of com¬ promise in these men. Seward, in particular, aroused criticism by declaring in favor of a "higher law® than the Constitution, in dealing with the slavery question. Davis demanded the extension of the compromise line of 1820 to the Pacific. In spite of the efforts of Clay and his supporters, Congress refused to accept the bill as a whole. But after Taylor's death, Presi¬ dent Fillmore gave his influence in favor of the various parts of the bill, for, although no majority could be found for the measures as one bill, Congress gave majorities to the sepa¬ rate parts.

The people of the country seemed ready to accept the main features of the agreement and special efforts were made to impress upon the people the necessity and fairness of the result. Union meetings were held at which Whigs and Democrats vied with each other in praising the

compromise as a final and fair adjustment of the slavery question. Although these efforts seemed somewhat artificial, the result was a lull in agitation. The two old parties, in 1852, in national conventions pledged themselves to stand by the Compromise. Pierce was over¬ whelmingly elected President and was known to be a warm supporter of the Compromise. With these happy omens, politicians began to speak of a <(second era of good feeling.® One feature of the Compromise, however, threat¬ ened to disturb the promised peace. The pro¬ visions of the law for the rendition of the fugitive slaves were exasperatingly severe. The fugitive was denied the right to testify in his own behalf and was refused the use of the writ of habeas corpus. Any citizen could be summoned to aid in capturing and

returning the fugitive and could be fined and imprisoned for aiding him to escape. Slaveholders, who had lost many slaves through the operation of the Underground Railroad (q.v.), put the new law into vigorous operation. One result was a number of <(rescue mobs.® The most famous were the rescue of the slave Shadrach in Bos¬ ton by a crowd of his own color, and the rescue of the slave Jerry in Syracuse, by citizens led by Gerrit Smith and Samuel J. May. If the execution of the Fugitive Slave Law failed to renew the controversy with its old time bitter¬ ness the introduction of the Kansas-Nebraska Bill (q.v.) (1854) by Stephen A. Douglas,

senator from Illinois, more than accomplished this result. This measure was intended to settle the slavery question by turning it over to the people of the Territories of Kansas and Nebraska to determine for themselves whether they would have slavery or not. This bill in¬ volved the repeal of the Missouri Compromise and was amended so as to specify that fact. The reason given was that the Compromise of 1820 was not in harmony with that part of the Compromise of 1850 which left the question of slavery to the people of New Mexico and Utah. A flame of resentment spread over the North. Since the South had not demanded the measure, it appeared that Douglas was gratuitously pre¬ senting to slavery what had heretofore been re¬ garded as free soil, and that, too, by the repeal of a compromise venerated on account of its age. In spite of intense opposition in Congress and the fierce denunciations heaped upon the measure by pulpit and press, it became a law and compromise was at an end. Douglas lost in popularity at the North. He was burned in effigy in many places, and was even howled down in his own city of Chicago while trying to justify his conduct. The race for Kansas be¬ gan before the bill became a law, and soon free State settlers and slave State settlers were struggling for its control. (See Kansas). Two Territorial governments, two delegates to Congress, two constitutions and armed col¬ lisions followed in rapid succession. It was necessary to call in Federal troops to preserve order in Kansas. The doctrine of popular sovereignty had failed in application. The Whig party was dead and in its stead a power¬ ful anti-slavery party, the Republican, had arisen. Even the Democrats who remained loyal to the party were divided on the question whether a fair test of popular sovereignty had been made or not. Douglas and his followers in the North declared that the pro-slavery con-

stitution of Kansas had not been fairly ratified by the people of

Kansas. President Buchanan and his supporters asserted that the test was fair and that Kansas should be admitted as a slave State.

While the contest over Kansas was raging and threatening to involve the country in war, an entirely new method of solving the problem was tried. It was planned to take slavery com¬ pletely out of politics by means of a Supreme Court decision. The case of Dred Scott (q.v.) offered the opportunity. Dred Scott had sued for his freedom on the ground that having re¬ sided in a free State he could not be held in slavery on return to a slave State. The de¬ cision contained two points of historical im¬ portance. The first denied that the negro was entitled to the natural rights enumerated in the Declaration of Independence and the second as¬ serted that neither Congress nor the Territorial legislature could prohibit slavery in the Terri¬ tories. The South rejoiced over the decision, but public sentiment at the North refused to accept its conclusion because it not only refused to the negro his natural rights as a man, but in effeot asserted that Douglas' doctrine of Popu¬ lar Sovereignty and the Republican free soil principles were opposed to the Constitution. Instead of taking slavery out of politics, this decision drove the question in so deep that the country was hastened rapidly toward the crisis.

The Lincolm-Douglas joint debates (1858) so widened the breach between Northern and Southern Democrats that the national conven¬ tion of the party in Charleston in 1860 wit¬ nessed its complete disruption. The Southern delegates utterly repudiated Douglas and popu¬ lar sovereignty, the only man and the only principle on which the Northern wing of the party could conduct a campaign with anv show of success. Four parties were in the field and the Republicans with Lincoln won. During the fall and winter following, seven Southern States seceded from the Union. They had done what had been threatened for several years. The North had not believed the threats and was alarmed at the result. The Union of the Fathers was in danger of annihilation. <(What could be done to save it?® was a ques¬ tion asked by thousands of persons. Nothing decisive could be done. An old administration and a timid President were passing out. The new President and an untried administration had not yet assumed responsibility. In such a period how naturally men turned to compro¬ mises in order to ensure the return of the seceded States and to prevent others from with¬ drawing.

President Buchanan in his message to Con¬ gress declared that concessions to the South were the only means of saving the Union. Both houses entered on the work of conciliation by carefully appointing committees. The Senate's committee of 13 was made up of

six Republi¬ cans and six Democrats. A seventh member was the venerable John J. Crittenden of Ken¬ tucky, a non-partisan. The House committee of 33 was made up in the same careful way. The Senate committee soon fell into hopeless disagreement and accomplished nothing. The House committee worked under great disad¬ vantages. Two Southern members refused to serve, and after the events at Fort Sumter others left the committee. More than 40

propositions and plans were submitted. Some were wise and some were foolish. Some pro¬ posed that no changes be made in either the laws or in the Constitution respecting slavery. Others proposed changes which involved the reconstruction of the very foundations of the government. The report of the committee, however, recommended a number of far-reach¬ ing concessions: (1) The repeal of all Personal Liberty bills by which States had hindered the execution of the Fugitive Slave Law; (2) An amendment to the Constitution prohibiting future amendments, interfering with slavery, which were not proposed by slave States; (3) Immediate admission of New Mexico as a slave State; (4) The trial of fugitive slaves in the States from which they escaped. No less than seven minority reports from members of the committee were presented to the House. The report was finally adopted, after fruitless dis¬ cussion, but too late to check the tide of seces¬ sion. It probably convinced the border slave States that they were safe within the Union. The impression made by the Southern members on the border State men was not so favorable, particularly because they refused to accept the simple statement (

Convention,® as it was called, discussed propo¬ sitions for conciliation. It finally recommended to Congress the amendment of the Constitution very much after the plan of Senator Crittenden. But the Confederacy was already organized. Federal forts had been seized, and Lincoln's administration was about to enter upon its duties. The situation had moved beyond the point of compromise. Men were no longer willing to follow in the footsteps of the ˆFathers,® and Congress gave little or no heed to the work of the Peace Congress. See United States — Slavery.

Bibliography. — Dubois, W. E. B., (Select Bibliography of the American Negro) (1901) ; Griffin, A. P. C., (Select List of References on the Negro Question) (1903).

William H. Mace,

Professor of History and Political Science, Syracuse University.

31. CAUSES OF THE CIVIL WAR.

The Civil War was the culmination of the development of conflicting interests and feel¬ ings between the slave and the free States. Slavery in Colonial days, aided by favoring physical conditions, obtained a deeper hold in the South than it did in the North. The in¬ vention of the cotton gin increased that hold in many ways, and hastened the growth of in¬ dustrial and social differences between the two sets of States. The North, with its free labor, was able to respond to the industrial revolution which found its origin in certain great mechan¬ ical inventions, including the application of steam as a motive power, the manufacture of iron and the use of coal as fuel. Northern industry became rapidly diversified and North¬ ern population grew with great rapidity and built up great centres of production. The South, with its Slave labor, did not, or could not, take advantage of the new industrial forces, but pursued the older and quieter ways of planta¬ tion life. Her occupations did not increase greatly in number or change in character and her population remained, as formerly, largely agricultural. The meaning of two such con¬ trasting industrial and social conditions was not clearly seen at first. It took the tariff policy from 1816 to 1828 to show that these contrasting interests were becoming conflicting interests. The adoption of a distinctly protective policy caused commercial New England to enter upon an era of manufacturing, although her capital had been largely in the carrying trade. This same policy, after 8 or 10 years, convinced Southern leaders that their hopes of the South's profiting by the tariff were doomed to disap¬ pointment. Hence, in defense of their section and the interests built upon its system of slave labor, these leaders generally united in opposi¬ tion to the tariff. But how could the South successfully oppose protection while in a minor¬ ity in the House of Representatives and while not able to carry Kentucky, Louisiana and pos¬ sibly other slave States against the tariff?

Southern leaders soon began to pronounce the tariff unconstitutional, but as neither Con¬ gress nor the Supreme Court had so held, this sort of opposition was not very successful. But John C. Calhoun of South Carolina went fur¬ ther and declared that according to the Ken¬ tucky and Virginia Resolutions, the final appeal of the slave States should be to the right of

nullification by which, according to his view, any sovereign State

might refuse to obey any law of Congress which the State deemed un¬ constitutional. The principles of the Kentucky and the Virginia Resolutions (q.v.) had been again and again asserted by the New England States during the War of 1812. James Madison, the author of the Virginia Resolutions, denied Calhoun's interpretation of them, and the other slave States refused to follow South Carolina into nullification in 1833. They did, however, accept more and more the States Rights view of the Constitution, as a means of shielding their peculiar interests. Every additional con¬ flict between the two sections only intensified the South's view of this political doctrine, and in the end stood to the seceding States as the constitutional justification of secession. With little exception, during this same period, the North was moving just as certainly further and further from the views of the Hartford Con¬ vention and more and more toward the nation¬ alistic view of the Constitution. The doctrines asserted by Webster and Hayne in the great debate were typical of the position of the two sections. The two sections, therefore, were not only developing interests more or less antago¬ nistic, but were developing views of the Con¬ stitution best suited. to the defense of their respective interests.

During Andrew Jackson's administration the consciousness of hostile sectional interests was deepened by other events besides the tariff con¬ troversy. Again and again in the South Caro¬ lina Exposition, and in other papers intended to prepare the way for nullification, Calhoun set forth the idea of permanent industrial and social differences between the two sections. The attack by the abolitionists upon slavery as morally wrong, and the reply of the slaveholders in demanding the suppression of anti-slavery agitation, by denying the right of petition on the question of slavery, greatly strengthened the idea that the two sections possessed contrasting and conflicting interests. The natural conse¬ quence was the rise of antagonistic feeling be¬ tween the slave and free States. The growth of hostile feeling went rapidly forward during the contests over the annexation of Texas and over the Mexican War. Southern leaders declared that the acquisition of new territory for slavery was necessary to preserve the balance of power in the Senate and give fresh soil and a wider area for slavery. The anti-slavery men declared that, for these very reasons, no such territory should be acquired. Both parties began to threaten the Union. In 1844 the legislature of Massachusetts passed a resolution, introduced iby Charles Francis Adams, which referred to the Constitution as a <(compact® and asserted that annexation was an undelegated power to which Massachusetts would not submit. South¬ ern declarations of dissolving the Union, if slavery should be

excluded from the Territories, were even more emphatic.

The year 1844 witnessed another event which revealed the widening difference between the two sections. After an exciting contest over slavery the Methodist Episcopal Church split into a Northern and Southern branch. This di¬ vision made it easier for both parties to obtain both religious sanction and religious condemna¬ tion for their work. This situation added

greatly to the bitterness of the strife. The feel¬ ing between the pro-slavery and the anti-slavery elements became so pronounced in the next few years that both Whigs and Democrats in the Presidential campaign of 1848 refused to make any definite statement on the slavery question. The anti-slavery Whigs resented this non-committal position of their party and many of them joined in the formation of the Free Soil party, which pledged itself to oppose the extension of slavery to the Territories. At the same time the new party declared that Con¬ gress was powerless over slavery in the States where it existed. The election of 1848 revealed a further tendency toward sectionalization among the voters of the two old parties. Be¬ cause General Taylor, the Whig candidate, was a Southern slaveholder he received a much larger vote in the South, where the great strength of the Democrats usually lay; while Cass, the Northern Democrat, received some¬ what similar support in the North, though not so striking on account of the Van Buren de¬ fection. For the next two years the gulf of sectionalization greatly widened.

The specific cause of contention was the question of slavery or no slavery in the territory obtained by the war with Mexico. The South felt that slavery must go into the new lands, not only because that section needed the new region to add to her weight in the councils of the nation, but, also, because the region was acquired largely through her own efforts. The North was becoming more and more outspoken in opposition to the extension of slavery into the new region obtained from Mexico. Nearly every Northern legislature resolved in favor of the power and duty of Congress to prohibit slavery in the Territories. The legislature of Virginia resolved that if this principle be carried out the people of Virginia must either submit to (

When, therefore, Henry Clay, by the unani¬ mous vote of the legislature of Kentucky, was called from retirement and sent back to the Senate to restore harmony and to strengthen the weakening bonds of union his efforts met with sympathy and support on the part of the masses of the two sections. By the compro¬ mise of 1850, the admission of California as a free State and the abolition of the slave trade in the District of Columbia were bal¬ anced by the payment of $10,000,000 to Texas and by a new Fugitive Slave Law. HJnion® meetings were held in various places to bring public opinion into hearty accord with the com¬ promise. Nevertheless there were men in both sections who had little or no faith in the meas¬ ure as a means of allaying the hostile sec¬ tional feeling. The greatest argument of the South in support of the compromise was the greatest argument of the North against the compromise — the Fugitive Slave Law (q.v.).

The drastic provisions of this law and the new zeal for its enforcement caused a wider development of the ˆUnderground Railroad®

(q.v.). But to hinder further the return of the fugitive to his master, some of the Northern States began to pass Personal Liberty Laws. The Kansas-Nebraska Bill (q.v.) and the con¬ sequent contest for Kansas, led the majority of Northern States to nullify, as far as possible, the execution of the Fugitive Slave La\v by means of some such legislation as the Personal Liberty Laws. This legislation was cited by more than one seceding State, in 1860 and 1861, in justification of secession. Immediately, how¬ ever, the South became more and more irri¬ tated because, on account of the opposition of Northern men, so few fugitives were returned, while the North became more and more irri¬ tated because, by the aid of Northern men, so many fugitives were returned. It is instruc¬ tive to note that the people of the extreme Southern States, who lost few or no slaves, and the people of the extreme Northern States, who knew least about slavery, were the loudest in talk and most radical in action.

The growth of political association and inter¬ est which bound parties together had done much to strengthen the Union. But the excitement aroused by the passage of the Kansas-Ne¬ braska Bill and the bitter conflict for the pos¬ session of Kansas destroyed the Whig party, and dealt the Democratic party a severe blow. Southern Whigs went over to the Democrats, while Northern Whigs joined with anti-slavery Democrats and Free Soil men in forming a new anti-slavery party, the Republican, a purely sectional party. The break-up of the Whig party left an inheritance of suspicion and ill- will that boded nothing but evil.

The election of 1856 resulted in a victory for the Democrats, but the Republicans carried all the Northern States but four. The falling off in the Northern Democratic vote was as ominous as the disappearance of the Whig party. Would, therefore, the oldest party in our history also break in two along sectional lines, and former political friends be turned into enemies? Such an event, many believed, would indeed hasten the disintegration of the Union.

It was probably clear to the great leaders of the Democratic party that if the struggle in Kansas should go on much longer, nothing could prevent the Northern and Southern wings from taking opposite sides. Hence, the decision in the Dred Soott Case (q.v.) was hailed as the means of settling the dispute over Kansas by taking the question out of politics entirely. Chief Justice Taney, in rendering this decision, declared that, according to the Constitution, neither Congress nor the

legislature of a Ter¬ ritory could exclude slavery from the Terri¬ tory. The decision, in effect, placed the doc¬ trine of Popular Sovereignty and the Republi¬ can party under the ban of being opposed to the Constitution. The question was not taken out of politics, for while the South applauded, the North denounced, the decision. Even Northern Democrats wavered in its support; £or of what use was Popular Sovereignty, the doctrine of their favorite, Senator Douglas? The clearer this question became, the more un¬ certain became the question: Can the Demo¬ cratic party be held together in support of the slaveholders' view? The Lincoln-Douglas joint debates, in 1858, settled that question in the

negative. Lincoln forced Douglas to admit that he believed that a Territory could exclude slavery from its limits in spite of the Dred Scott decision. Douglas took this stand in order to keep faith with the Democrats of Illinois and of the North. But Southern lead¬ ers watched the debate with deep interest, and were mortally offended at this position of Douglas. They immediately began to take steps to ((read him out of the party.® But Douglas went into the National Democratic Convention at Charleston in 1860 with a ma¬ jority of delegates in his favor. They stood faithfully by him and voted down the plat¬ form of the Southern wing of the party. Southern delegations, one after another, with¬ drew from the convention, and the party of Jefferson and Jackson was broken in two. Later, in convention at Baltimore, no compro¬ mise could be reached and both factions nomi¬ nated Presidential candidates. With the Repub¬ lican party, there were thus three sectional parties in the field. How completely the people were imbued with sectional feelings may be seen from the fact that the one party — the Constitutional Union — which professed to be a national party and urged the putting away of sectional questions received only 80,000 votes in the North. Douglas obtained about 1,300,000 votes, but only 163,000 from the slave States. Lincoln received but 26,000 of his 1,800,000 votes from the South. The strong ties of po¬ litical association were breaking under the strain of sectional hostility, and it seemed that the only thing wanting was some overt and formal act to certify to the division in senti¬ ment which already existed. When, however, South Carolina took the leap, after Lincoln's election, and six other States followed her ex¬ ample, and when it became apparent that seces¬ sion meant a conflict of arms, then those deeper and more fundamental interests than party politics began to assert themselves. The con¬ servative

forces born of the history of the past and of the hopes of the future began to call out for concession and compromise. Dur¬ ing the winter of 1860-61 Congress, under pres¬ sure of the conservative interests and patriotic feelings, made vigorous efforts to allay the de¬ mon of sectionalism. The Peace Convention (q.v.) which met in Washington in February 1861, also endeavored to aid in restoring har¬ mony. But the movement of events was too rapid. Lincoln was in the Presidency but a few weeks before Sumter fell, and the two sec¬ tions were at war. It is of little consequence which of the parties struck the first blow, for there seemed nowhere any power or influence strong enough to long prevent sectional ani¬ mosity from bursting into flame.

The causes of the war or rather of seces¬ sion, as viewed by the South Carolina Secession Convention, are here briefly epitomized: (1) The American Revolution established the right of a State to govern itself and the right of a people to abolish a government, and that each colony became a free, sovereign and independ¬ ent State. (2) That the Constitution is a com¬ pact and was agreed to by soverign States. Since the obligation established by a compact is mutual, its violation by a single party to the contract releases the others. (3) We assert that 14 States have refused for years to fulfil

their constitutional obligations by hindering the return of fugitive slaves. (4) (

Finally it may be said that another cause which hastened the sectionalization of opinion and interests was the very great ignorance of the two sections of each other. The main line of migration, travel and commerce were east and west instead of north and south. This situation promoted ignorance and ignorance promoted suspicion and hate. The result was that people of the extreme North and of the extreme South had the most exaggerated notions of the characters, manners and views of the other. From these portions of each section came the bitterest partisans in the con¬ flict. There was little toleration in their views. But the people who neighbored across ((Mason and Dixon’s Line® were very different in their attitude. Their position was born of personal experience. They knew each other and knew that men on opposite banks of the Ohio River were really more alike than different. What¬ ever of moderation there was in the conflict was largely due to the people of the border States. Does not this justify the conclusion that if the two sections had really known each other the contest would have lost much of its bitterness and might have taken another form, and the controversy have ended short of war? Certainly the nation paid a dear price for its partisanship and

sectional bitterness.

Bibliography. — Chadwick, F. E., (Causes of the Civil War > (1906) ; Crawford, S. W., ‘Genesis of the Civil War > (New York 1887) ; Hosmer, T. K., (The Appeal to Arms > (New York 1907).

William H. Mace,

Professor of History and Political Science , Syracuse University.

32. SECESSION. The secession of 11 Southern States of the American Union during the winter and spring of 1860-61 is the most significant fact in American history after the adoption of the Federal Constitution. It was the one great attempt to make of the United States two republics instead of one, and the struggle which it precipitated decided that this could not be and that the Federation of 1787— 89 had become a nation.

Whether secession was a reserved right of the original members of the Union is the first inquiry that arises. From the reasoning of the founders of the national Constitution during the decades of fierce political controversy which followed the inauguration of the government one is compelled to believe that such right was considered as still residing with the States, though Madison gives strong grounds for the contrary opinion in the writings of his early as

well as his later life. As to whether this right was reserved it should be said that there is to¬ day a marked difference of opinion among his¬ torical scholars. That the States conferred whatever authority the Federal government had and that this central authority was strictly and specifically limited are propositions no longer seriously disputed.

The threat of Virginia and Kentucky in 1798 to prevent the enforcement of the Alien and Sedition Laws (q.v.) within their boundaries; the public declaration on the floor of Congress by leaders of New England public opinion in 1807 to 1811 that the commercial States would be justified in seceding from the Union; and the actual meeting of the Hartford Convention in 1814 to consider ways and means of resisting the national authority would all seem to estab¬ lish the point that the right of secession was claimed by each of the two great sections of the Union. These incidents are of further im¬ portance because they occurred within the life¬ time of many of the

framers of the Constitution and because many of these ˆframers® publicly espoused the views thus enunciated.

The Supreme Court of the United States, however, began about 1810 to expound the Con¬ stitution in a spirit of healthy nationalism. Chief Justice Marshall repeatedly affirmed the doctrine that the central government was that of a nation and that the rights of the States must be subordinated to the requirements of an enlightened national policy. This attitude of the court was vigorously and solemnly opposed by the Supreme Court of Virginia in 1815. In the celebrated lawsuit of Martin v. Hunter's Lessee appeal had been taken to the United States courts by means of a writ of error. Judge Marshall, with the unanimous agreement of his colleagues on the bench, reversed the de¬ cision of the Virginia court and issued a mandamus on the latter to execute the decree of the former. The judges of the Virginia court now entered into a painstaking ex¬ amination of the case and not only declined to honor the mandamus but declared in published opinions that the United States Supreme Court was usurping powers not granted and thereby encroaching on. the rights of the States. The policy of the Supreme Court was repudiated and the authority of the State courts even in cases involving the interpretation of treaties with foreign powers was asserted and incident¬ ally the sovereignty of the Slates was main¬ tained as staunchly as in 1798 — the right of a State to judge of infractions of the constitu¬ tions being emphatically reasserted. The right of secession was not advocated in terms, but any one could see that this was only a step fur¬ ther in the process.

During the years 1815 to 1822 the leading men of Virginia, including ex-President Jeffer¬ son, constantly excited public opinion against what they declared to be the dangerous teaching of the national courts. Virginia took the posi¬ tion she had occupied in 1798-99. Madison, however, protested against this later Virginia view, but rather on the grounds of expediency than otherwise. Other States followed the ex¬ ample of Virginia. Clearly then it was not a settled question in 1820 and the aggrieved party, whether North or South, claimed rights which,

in the last analysis, were equivalent to a with¬ drawal from the general compact.

What caused the matter to be more difficult of settlement was the fact that there was no final authority, no judge between the two par¬ ties. An infraction of the general Constitution, that is, a violation of the contract between the Union on the one side and the States on the other, was a matter that could not be satisfac¬ torily determined since

there was no outside tri¬ bunal whose judgment could be accepted as dis¬ interested. Jefferson thought on the whole that the States should be the final judges; Madison inclined with the exception of a few years of his life to the opposite view, while both Wash¬ ington and Hamilton had held that the national government was to be its own judge in such cases.

In 1832 South Carolina formally annulled the tariff laws of the Union and the State of Geor¬ gia had steadily refused to recognize the au¬ thority of the United States courts within her boundaries during a period of several years be¬ ginning with 1825. After the passage of the Fugitive Slave Law of 1850 and especially after the Dred Scott decision of 1857, many Northern States refused to obey the national authority and in various instances passed laws to prevent enforcement of the laws of the Union.

Further still actual secession was not un¬ familiar to Americans. The counties of west¬ ern North Carolina (new Tennessee), just prior to the formation of the national gov¬ ernment, had formally' declared their inde¬ pendence and then proceeded to establish a separate and independent government. This new sovereignty, called the State of Franklin, was successfully maintained for four years, 1784-88. Western Pennsylvania and north¬ western Virginia made a similar attempt to se¬ cede both from their mother States and from the Federal Union in 1794; in 1805 to 1807 there was danger that Kentucky, Tennessee and parts of the Louisiana cession would withdraw their allegiance from a government which was thought not to be sufficiently jealous of Western interests. The principle of local autonomy and local sufficiency was so universally accepted in the various sections of the United States that such threats and outbreaks were not surpris¬ ing; they were not thought to be positively un¬ lawful. Yet public opinion supported the Exec¬ utive in putting down the whisky <(insurrec- tion® as it was called and President Jefferson did not sacrifice his popularity by taking vigor¬ ous measures to prevent what appeared to be a dangerous movement led by Aaron Burr in 1806. In 1814 the strongest organs of public opinion in Virginia recommended the use of force against New England in case of secession and the terms of <(traitor® and ˆtreason® were frequently applied to leading opponents of the war with Great Britain. The vigorous and prompt proclamation against the proposed plan of South Carolina by President Jackson was a prominent cause of that leader's lasting popu¬ larity South as well as North. However, it was not quite decided then that a State could not withdraw from the Union, in which case, of course, no national law would have force within its jurisdiction. Calhoun, the author of nullifi¬ cation, did not at that

time advocate secession. He relied on the Jeffersonian teaching of 1798,

that the State was the proper judge of the va¬ lidity of a national law in so far as that State was concerned. The debate between Webster and Hayne brought to light the fact that a genuine national spirit had arisen in the North and that the conservative particularism of the earlier years had entrenched itself in the South¬ ern States. Meanwhile economic forces had begun to crystallize in such a way that disunion seemed to offer advantages to the South.

When the fierce struggle over Missouri was waging certain strong and far-seeing Southern leaders who regarded negro slavery as essential to the Southern economic and social structure declared that the James River and the Ken- tucky-Tennessee boundary was a natural line of cleavage between two civilizations which were growing up within the bounds of the United States. John Randolph and Nathaniel Macon held this view and there were a few others who agreed with them. The Missouri Compromise was considered by them a great blunder, notwithstanding its Southern origin. They declared it a violation of the national compact. From this time forward the develop¬ ment of the cotton plantation as the typical Southern institution of everyday life caused negro slavery in the lower South to appear to be an absolute necessity. Climate, soil and social habit combined to raise the institution from the position of a necessary evil to that of a benevo¬ lent system working alike for the upbuilding of the slave and his master. The price of cotton regulated the price of the negro; and the de¬ mands of the world's commerce grew faster than the supply of cotton. The economic life of this section was centred in this industry, and the profits were so great that with a small cap¬ ital the younger sons of the older families of the south Atlantic seaboard could become inde¬ pendent planters in a few years and in a decade or two they became masters of vast estates with hundreds of slaves. Three factors entered into the makeup of these fortunes : cheap lands, negro slaves and a demand for cotton. The supply of cheap lands seemed inexhaustible, the demand for cotton as already noted continued to increase, negroes alone were limited in sup¬ ply and they died very rapidly in the cotton belt. Maryland, Virginia and the Carolinas began early to send their surplus slaves south ; as the price mounted from $300 in 1820 to $1,000 in 1850 the stimulus to raising negroes increased and the immorality of the business appeared less evident.

This is the development which brought unity of economic interest to all the Southern States from Virginia, at least, to Louisiana.

It was but a natural step after 1833 to com¬ bine the inherent Anglo-Saxon idea of local au¬ tonomy with the economic interest of this group of States. And the almost universal resort to agricultural pursuits caused the operation of the national tariff to appear sectional, favoring the manufacturers of other sections at the expense of the cotton growers, who, having no competi¬ tors in the world's markets, could not ask for protection as did the industrialists of the North and East. The tariff became the object of the Southerner's most determined opposition. In Virginia college students formed anti-tariff clubs, taking vows not to wear tariff- favored clothing. And it required but little invention

to combine these ideas with those older ideas of State supremacy which had been so preva¬ lent immediately after the Revolution. Nulli¬ fication became secession and all the more rap¬ idly since the great nullifier, John C. Calhoun, soon gave up the former for the latter constitu¬ tional doctrine.

All these forces tended to build up a peculiar civilization, a peculiar social system south of the famous Mason and Dixon's line. Heads of families became patriarchs with numberless de¬ pendents looking up to them for their daily bread, and these chiefs naturally assumed the leading roles in State and local government. Government itself became a social affair and office-holding remained the badge of honor. These masters at home undertook quite as naturally the representation of their States in the national congresses and cabinet. And since three negroes out of every five were counted in the apportionment of representation in Con¬ gress, the owner of 500 slaves was equal in political power to 301 voters in the North. This had secured to the South a preponderance of influence in national legislation until about 1830, when the West and Northwest began to loom large on the horizon of the future.

Texas, embracing an area of 270,000 square miles, declared her independence in 1836. Mex¬ ico was unable to suppress the revolution. The . great majority of Texans were from the South¬ ern States; they were also slaveholders. A new State — Texas — entered the family of nations.

It applied, however, for admission into the United States in 1837. This meant an expan¬ sion of the territory of the South. It might serve as a check-mate to the West should it fail, as was clearly evident, to co-

operate with the South in party policy. But admission of the new State was opposed by the Northern representatives. After a struggle of several years the new State was finally admitted in 1845. This controversy embittered the sections of the country and threats of secession had been freely and boldly made in the South during the campaign of 1844 in case the new Territory should not be admitted.

Admission of Texas meant a declaration of war on the part of Mexico and war with that feeble and rather decrepit nation exposed a vast region of country stretching from Santa Fe to San Francisco to American conquest. In the war that ensued everything that could be de¬ sired was won. But not being content simply to despoil a weak neighbor the United States offered, by way of conscience salving, to pay for the territory so ruthlessly seized. When the bill authorizing the payment of a portion of the money came up in the House of Representatives David Wilmot of Pennsylvania offered his fa¬ mous proviso (see Wilmot Proviso), prohibit¬ ing the introduction of slavery into the country to be acquired. This aroused the ire of the Southern leaders, as was to have been expected. From 1847 to 1850, the date of the second series of compromises on slavery, the South was agi¬ tated as never before and in every State strong secession parties arose.

The South was ripening for a revolution. William L. Yancey (q.v.) of Alabama, had rec¬ ognized this; he had given up his seat in the na¬ tional House of Representatives in 1846 and from that time forth appealed to the people of

his State to yield nothing whatsoever to North¬ ern sentiment concerning slavery. He de¬ manded that all territory to be acquired from Mexico should be kept open to slave settlement, and a failure to protect slaveholders in their rights he declared to be a violation of the na¬ tional compact. Yancey was a fiery orator not inferior in the control of popular passion to Wendell Phillips; he was in fact the Southern counterpart of Phillips. In 1848 he prevailed on the Alabama State Democratic Convention to adopt his ideas which soon became known to the country as the (

In February 1849 the Virginia legislature declared almost unanimously that the Wilmot Proviso, if passed, would meet with <(resistance at all hazards and to the last extremity® in . that State. South Carolina followed with a recom¬ mendation for a convention of

the Southern States ; 3 Oct. 1849, Mississippi held a South¬ ern rights convention which embodied the prin¬ ciples of the Virginia resolutions tn an address to the people. As a result of this agitation Southern rights associations and committees of correspondence were organized in every section of the South. Throughout the North public opinion was crystallizing against the South on the subject of slavery; leading men were opposed to what was termed a <(further sur¬ render to Southern demands.®

When Congress met, all the subjects in dis¬ pute were summed up in the proposed <(com- promise of 1850® (q.v.). The South was thor¬ oughly aroused. The Mississippi delegates in Congress unanimously asked their State legis¬ lature for instructions how to vote on the compromise measures. The reply was a con¬ demnation of the proposed compromise and the election of delegates to the Nashville Con¬ vention to be held on the first Monday in July 1850. South Carolina followed suit. The other Southern States in irregular manner chose delegates to the Nashville Convention. But when the representatives came together they proved to be conservative. Formal protests against the principal items of the compromise bill still pending were voted ; but no threats were offered and the body adjourned to meet on the call of the president, who was a Whig and supposedly not unfavorable to Henry Clay's last great scheme. The convention never met again. This meeting had been intended on the part of South Carolina and, perhaps, Mis¬ sissippi, as the first great step toward concerted action on the question of secession. It failed. The secessionists were still in a minority in all the Southern States except South Carolina and possibly Mississippi and Texas. Congress after much angry debate passed the ((compromises.® The abolitionists of the North declared that the cause of humanity and good morals had been betrayed. Their speakers were applauded when

disunion was threatened or when it was as¬ serted that the Fugitive Slave Law, one of the items of the compromise, could not be enforced. Nearly all senators from the Southern States signed a formal protest against the compromise and had it published in the record.

Co-operation among Southern States having failed, separate State action was now recom¬ mended, and South Carolina led off with a State convention in 1851, but failing to get a two-thirds majority in that body the secession party' failed again. The agi¬ tation was continued. In Georgia, Alabama, and Mississippi, States Rights conventions were held and resolutions still looking to secession were adopted. In the elections which ensued in all the Cotton States the extremists were so badly beaten by a combination of Whigs and

conservative Democrats that the movement was given up and the compromises were acquiesced in. Even Robert Barnwell Rhett (q.v.), the arch-secessionist of South Carolina, gave up the fight, resigned his seat in the United States Senate and retired to his plantation.

Notwithstanding the opposition in the North to the Fugitive Slave Law, and the persistent discontent and agitation of such men as Yancey in the South against the so-called unequal op¬ portunity of slaveholders in the Territories, the sober element of the country accepted the com¬ promises of 1850. The election of 1852 con¬ firmed this view. The Democrats, who had come to be the conservative party of the na¬ tion and who emphasized the importance of quieting both the abolitionist and pro-slavery agitation, elected their candidates almost with¬ out opposition. The President, Franklin Pierce, chose, his Cabinet from both North and South; he without any doubt meant to <(let sleeping dogs lie.®

However, the country was at heart divided, and when the administration paid $10,000,000 to quiet the claims of Mexico to lands on our southwestern frontier it was taken by serious and conservative people as a sign that the South was really in the saddle and that the slave-expansionists meant to make use of their position; but later when the bill for the erection of the portion of the Louisiana Pur¬ chase territory now known as Kansas and Ne¬ braska into a Territory came up it was impos¬ sible to prevent the representatives of our two civilizations from renewing the struggle for su¬ premacy. Senator Douglas thought to solve the whole problem by enacting a law giving both sections of the country equal chances to win possession of new States, that is, the new¬ comers, whether pro- or anti-slavery in senti¬ ment and practice, were to be protected by national law until the population of the new Territory had grown large enough to be ad¬ mitted, as a State into the Union. In the formation of a State constitution the question of slavery was to be settled according to the interests and wishes of the majority. This was local or ((squatter sovereignty® (q.v.), as it was called. The advocates of this scheme thought it would please the North because that section would feel certain that her teeming population of free emigrants would secure to her the con¬ trol of the new States. The South would have all cause of complaint removed because she would at least have the opportunity to plant her

standards in* all the common territory without official interference and under the guarantee of national protection.

But this meant the repeal of the Missouri Compromise (q.v.), by this time a. sort of fetich in the eyes of the majority of people in the Northern States. It also meant the undoing of the now accepted legislation of 1850. But a strong party arose declaring that the Missouri Compromise was itself unconstitutional — the idea advanced by John Randolph and a few of his friends in 1820. The press of the South al¬ most without exception joined in the demand for the open and formal repeal of the compromise legislation and for the adoption of the popular sovereignty plan. The Cabinet approved the new and radical departure and during the spring of 1854 Congress debated and passed the Doug¬ las bill by large majorities and the President made it a law on 30 May 1854.

Immediately Kansas and Nebraska (q.v.) became the battle-ground of the two par¬ ties and in every State the war of words was waged hotter than ever. During the summer of 1854 <(anti-Nebraska men,® as they were called, met together in their vari¬ ous States and formed local organizations. They were able to secure the election of 103 members of the national House of Representa¬ tives and 15 senators. The new party, made up of remnants of all the older parties and embracing not a few abolitionists, took the name of Republican and declared unceasing warfare on the further spread of slavery. The next year it polled 114 electoral votes as against 174 for the Democratic candidate.

The Democratic party from 1852 to 1860 ac¬ cepted either positively or negatively the chief tenets of the Southern constitutional theory: (1) State rights, (2) low tariff, (3) non-inter¬ ference with the expansion of the slave power. The party was in the main dominated by South¬ ern men. During the Pierce administration, in addition to negotiating the Gadsden Purchase (q.v.), and repealing the Missouri Compromise, the leaders of the Democratic partv committed the country to the annexation of Cuba even bv force if necessary and the administration failed to punish Southern filibustering expeditions di¬ rected against Mexico and Central America. President Buchanan in 1857 publicly endorsed the aggressive Democratic policy. He called to his council board such pronounced pro-slavery men as Howell Cobb, Jacob Thompson and John B. Floyd, and he relied too much upon these men for advice in every crisis, which was but natural, since so few Northern States had cast their electoral votes for him.

In the South during these years the aggres¬ sive sectionalists

continued to urge the people on to secession as the only guarantee of their safety. Commercial conventions which dis¬ cussed politics met each year in one of the • larger Southern cities. These bodies recom¬ mended the boycotting of Northern manufac¬ tures, the encouragement of direct trade with Europe, the reopening, even, of the African slave trade. The Southern press took up the pro¬ gram and kept the agitation of sectional issues at the highest pitch of excitement. Parents were criticised for sending their sons to Prince¬ ton and Yale to be educated; State legislatures were urged to establish and generously support

military schools. Secession was often and in all sections of the South threatened in the event that the Republican party should succeed in electing a President.

In 1857 the Supreme Court added fuel to the fire by going out of the way to declare that Congress could not lawfully interfere with slav¬ ery in any Territory of the United States and that any slaveholder must be protected in his rights in all sections of the country. (See Dred Scott Decision). The result in the North was the immediate supremacy of the Republican party, whose one idea was that slavery should not be permitted to expand, but should be limited to the States in which it had prevailed for years. Lincoln expressed the view of the advanced thought of the North when he said this nation cannot long endure <(half slave and half free® ; it must become all one or all the other. His program was that steps should be taken to fix the bounds of the institution and to assure the nation that slavery was under process of final extinction. He was nominated as the Republican candidate for the Presidency in Chicago in May 1860, and elected the following November.

The Democratic party still insisting on its conservative, free trade, pro slavery program, met in Charleston, S. C., in April 1860. After some attempt on the part of some Eastern men to nominate Jefferson Davis on a Douglas platform and on the failure of Yancey to get his famous (

An exciting campaign was waged throughout the country. In the South Yancey was the principal orator. He had finally brought his section to accept the program which he had written for the Democrats of Alabama 12 years before; his powers of speech, the evident sincerity of motive which animated him and the universal interest in the campaign gave him vast audiences everywhere. Every Southern State but three voted as he asked and in the States which did not support him his party strength was very great. Douglas canvassed the North manfully, but he received the vote of but two States, New Jersey and

Missouri. Lin¬ coln received the majority of the electoral vote.

It was generally understood among Southern politicians that South Carolina would promptly secede in the event of a Republican victory. The Gulf States were expected to follow suit. The South Carolina plan was the same that Barnwell Rhett had urged in 1850-51 and Rhett, having been some years now the editor of the Charleston Mercury, had come forward again the leader of a State completely con¬ verted to his way of thinking. The Palmetto State seceded by unanimous vote of a conven-

tion of her ablest men on 20 Dec. 1860. By 6 Feb. 1861, the tier of Southern States from South Carolina to Texas withdrew their alle¬ giance from the Union and reassumed the sovereign powers which had been surrendered to the national government.

The agricultural life of the South had de¬ veloped slavery as a fundamental factor in her economic life; on this basis had been erected a feudalism of a high order, a social system unique in modern times. To protect this sys¬ tem from the hostile encroachments of an un¬ sympathetic outside world, the leaders of this section had since 1820 entrenched themselves behind the popular doctrine of States rights. Accepting this dogma without question the State of South Carolina made a single-handed fight in 1833 against the national tariff system as based on false interpretation of the national compact. The nation gradually adopted the Southern view and steadily lowered the tariff duties until in 1857 the country was placed practically on a free trade basis. Constantly threatened by representatives of Northern and Eastern States with the declaration that “slavery must go,® the champions of this new feudalism had accepted the issue with the ag¬ gressive North on the slavery question in the hope of winning again. Failing in this seces¬ sion was resorted to as the only alternative.

South Carolina sent commissioners to Wash¬ ington to negotiate with the President concern¬ ing the delivery of Fort Sumter and other property of the United States within the bounds of the seceded State. President Buchanan declined to receive them, but indi¬ cated a strong desire to avert hostilities. South Carolina demanded the surrender of the forts she claimed as her own. Meanwhile the State of Virginia had procured the assembly of a Peace Convention with the aim of bring¬ ing about a compromise. This failed to get consideration in Congress which had met in regular session. Then Senator Crittenden of Kentucky proposed his scheme of pacifi¬ cation; this failed to satisfy

either the ex¬ treme Republicans or the determined secession¬ ists, and events were left to shape themselves until the incoming President should be installed.

A convention of Southern delegates met at Montgomery on 4 Feb. 1861 to draw up a provisional constitution. This work was done in a few days and Jefferson Davis of Mis¬ sissippi, recently a distinguished senator in Con¬ gress, was elected President, with Alexander Stephens of Georgia, for Vice-President. The new Constitution was in most points quite like that of the old Union, the changes, with a few exceptions, being improvements on the old. This government went into operation at once, the United States forts and arsenals within the bounds of the confederation being promptly seized and strengthened for the benefit of the new Union of States. Secession was a fait accompli.

But from December 1860, to April 1861, the Northern people were anxiously debating the question whether there was a nation and whether this nation could coerce a seceded State or group of States. The firing on Fort Sumter on 12 April 1861 by the Confederate and South Carolina authorities decided these questions in the affirmative. President Lincoln called for

troops to suppress what he called a revolt. This call forced Virginia, North Carolina, Ten¬ nessee, Arkansas, Kentucky and Missouri to decide on which side they would cast their lots; the two last named States determined to remain neutral; Virginia, North Carolina, Tennessee and Arkansas all before the middle of June joined the Confederacy. The capital was re¬ moved to Richmond ; armies were rapidly en¬ listed; diplomatic agents were sent abroad; a regular government succeeded the provisional without serious friction. But the people of the Northern States had decided that a breaking up of the Union was unthinkable, criminal, trea¬ sonable and as such must be suppressed. The war began in earnest, and four years later all parties agreed to a peace which denied forever the right of secession, which yielded to the Union the constitutional right to lay such tar¬ iffs as were deemed necessary by Congress and which abolished African slavery forever and destroyed the social system which had been erected upon it. (See also Secession in the United States).

Bibliography. — Blaine, J. G., ‘Twenty Years in Congress) (Norwich 1884-93) ; Bur¬ gess, J. W., ‘The Civil War and the Constitu¬ tion (New York 1901) ; Davis, J., ‘Rise and Fall of the Confederate Government (New York 1881) ; Greeley, H., ‘The American Con¬ flict (Hartford 1864-66) ; Hosmer, J. K., ‘The Appeal to Arms’ (1861-63) ; (

Outcome of the Civil War' (1863-65, with bibliography; New York 1907) ; Logan, J. A., (The Great Con¬ spiracy ' (New York 1886) ; McPherson, E.,

(Political History of the Great Rebellion (Washington 1864) ; Moore, F., Rebellion Record' (11 vols., New York 1861-71) ; Pol¬ lard, E. A., 'The Lost Cause' (New York 1868) ; Rhodes, J. F., 'History of the United States from the Compromise of 1850′ (5 vols., New York 1893-1904); Schouler, J, 'History of the United States under the Constitution' (New York 1899) ; Wiley, E., and Rines, I., 'The United States: The History of Its Be¬ ginnings, Progress and Modern Development' (11 vols., New York 1916) ; Wilson, W., 'Di¬ vision and Reunion, 1829-89′ (1893; expanded, 26th ed., 1909) ; id., 'A History of the Ameri¬ can People' (1902; repr. 1910).

William E. Dodd,

Professor of History, University of Chicago.

33. MILITARY EVENTS OF THE CIVIL WAR. The flag of the United States was first fired upon during the Civil War by some batteries erected against Fort Sumter in Charleston Harbor. The occasion was the ap¬ pearance of the Star of the West on 9 Jan. 1861, off the harbor, bringing supplies of pro¬ visions from New York for Fort Sumter. This fort, under command of Major Anderson, was forced to surrender to General Beauregard 14 April 1861. Thereupon President Lincoln issued a proclamation calling for 75,000 volunteers. In the spring of 1861, after some skirmishes be¬ tween Union forces and Confederate troops dispatched to western Virginia to hold that section within the Confederate lines, West Virginia seceded from Virginia and passed per¬ manently into the Union lines. In July the army in front of Washington, under General McDowell, prepared to advance against the main Confederate army, under General Beauregard;

o

♦

'

and the encounter took place on the 21st at Manassas,ˆ where, on the arrival of the last brigade of Johnston's army, Beauregard's attack upon the Union flank turned McDowell's ad¬ vance into a disorderly retreat, the army fleeing back to Washington. This signal defeat of the

Union arms produced great mortification and consternation at the North. But the South was correspondingly elated and regarded this bril¬ liant victory as an augury of the ultimate suc¬ cess of the Confederate cause. Both sides now proceeded to make more vigorous preparations.

General McClellan was summoned from West Virginia and given command of the De¬ partment of the Potomac, and forthwith he set about organizing the troops rushing in from all parts of the North. On 20 August he took command of the Army of the Potomac, now first organized under that title, and 1 Novem¬ ber he was appointed commander-in-chief of the armies of the United States, superseding Gen. Winfield Scott, who was retired, at his own in¬ stance, because of failing health. After the battle of Bull Run but little hard fighting oc¬ curred during the remainder of 1861. Both sides contented themselves with establishing their respective lines. On 15 August President Davis ordered all Northern men to leave the South within the next 40 days. President Lin¬ coln thereupon proclaimed the seceded States in rebellion and prohibited all intercourse.

Early in 1862 the Confederate line through Kentucky was broken by separate attacks under General Thomas and General Garfield. On 6 February Admiral Foote's fleet, with the aid of General Grant's forces, captured Fort Henry on the Tennessee, and Grant then moved on Fort Donelson and forced it to surrender, 16 February, with 15,000 men. On 7 April General Pope captured Island No. 10. About the same time Gen. A. Sidney Johnston, with headquar¬ ters established at Corinth, attacked Grant awaiting Buell, at Shiloh Church, near Pittsburg Landing. Johnston was killed, and Beauregard in command of the Confederates was driven back by Grant and Buell, who had meanwhile joined him. Defeated, Beauregard returned to Corinth. The Federals now began an advance on Corinth. The Confederates ordered Price and Van Dorn from west of the Mississippi to defend the city; but on Halleck's drawing near Corinth, it was learned that the Confederates had already evacuated it. General Bragg, who had succeeded Beauregard, proceeded to Chatta¬ nooga by way of Mobile, forcing Buell mean¬ while to withdraw to the Ohio to protect his department. At the same time Gen. E. Kirby Smith invaded Kentucky, and defeating the Federals at Richmond on 30 August, he threat¬ ened Cincinnati. Thereupon Buell advanced from Louisville against Bragg, who, as a re¬ sult of the battle of Perryville on 8 October, was compelled to abandon Kentucky.

In September Price and Van Dorn advanced against Grant and Rosecrans, near Corinth, and were both defeated. After this campaign

Rose¬ crans was sent to relieve Buell in command of the Army of the Cumberland, 30 October. On assuming command Rosecrans concentrated his army at Nashville. On 26 December he moved toward Murfreesboro to attack Bragg, and there ensued a three days' battle ending 2 Jan. 1863. Rosecrans occupied Murfreesboro, and

Bragg retreated to Shelbyville, Tullahoma and Wartrace. Both armies then went into winter quarters. On 8 March 1862 the Union fleet in Hampton Roads was attacked by the Confeder¬ ate ironclad Merrimac , which inflicted heavy loss. However, on the following day the Mer¬ rimac was met by the Monitor and, after a severe engagement, retired to Norfolk, where she was blown up at the evacuation of that city by the Confederates, 9 May. The Western rivers, too, were the scene of some active naval engagements. Farragut's fleet did effective work on the Mississippi, taking New Orleans 1 May, and a little later Baton Rouge and Nat¬ chez. The Confederate flotilla under Commo¬ dore Montgomery was destroyed by Commo¬ dore Foote's fleet, in a desperate fight before Memphis, 6 June; and Memphis surrendered to the victorious fleet. At Galveston, however, the Confederates under Magruder, with the aid of an ordinary river fleet, won a brilliant victory; and the Alabama (which was sunk by the Kear- sarge off Cherbourg in 1864) captured the gun¬ boat Hatteras.

In March McClellan, who had been lying inactive so long, began his noted Peninsula campaign which terminated ' in utter failure. His advance was opposed by Gen. J. E. John¬ ston, who gradually fell back toward Richmond till he reached Seven Pines, or Fair Oaks. Here the armies met on 31 May. The timely arrival of Sumner's corps from the other side of the Chickahominy saved McClellan from serious disaster. Johnston being badly wounded, Gen. G. W. Smith succeeded to the command tem¬ porarily. On 2 June Gen. R. E. Lee was as¬ signed to the command of the Army of North¬ ern Virginia, which he retained till the close of the war. Gen. "Stonewall® Jackson (q.v.), by a brilliant campaign in the valley, in which he defeated Banks at Winchester, forcing him across the Potomac, Fremont at Cross Keys, and Shields at Fort Republic, held most of McDowell's corps around Fredericksburg, thus preventing them from joining McClellan, and himself suddenly appeared, 25 June, at Ashland, on the flank of McClellan's army in front of Richmond. Thereupon followed the Seven Days' battles, beginning with Mechanicsville 26 June, and including Gaines' Mill and Malvern Hill, after which McClellan withdrew to Har¬ rison's Landing on the James. The campaign proved a disastrous failure; and McClellan, having been relieved, 11 March, of the general command of the armies, now retained that of the Army of the Potomac and saw Halleck as¬ signed to the chief command, 23 July.

After the withdrawal of the Army of the Potomac to the James, McClellan, against his protest, was recalled from the Peninsula to the vicinity of Washington. General Pope was now ordered to organize the corps of McDowell, Banks and Fremont into the Army of Virginia, to cover this movement and to protect Wash¬ ington. With this army Pope advanced against the Confederate forces near Gordonsville, where, confronted by Lee and Longstreet, he retired behind the Rappahannock and was de¬ feated at the second battle of Bull Run, 30 August. He then withdrew to Centreville, where he was reinforced by the corps of Sum¬ ner and Franklin from McClellan's army. His flank was attacked by Jackson at Chantilly. On

2 September Pope was recalled with his army to Washington and was relieved of his com¬ mand, his forces being added to the Army of the Potomac under McClellan.

In September Lee set out for his invasion of the North, crossing the Potomac near Lees¬ burg and moving toward Frederick. He cap¬ tured Harper's Ferry and advanced to Hagers¬ town, thence retiring to Sharpsburg, where he was met by Hooker's corps of McClellan's army. A desperate fight ensued, 17 September in which the losses were greater for one day's fighting than in any other battle of the war. Lee then withdrew across the Potomac, Mc¬ Clellan's army following him into Virginia, and resumed his position beyond the Rappahan¬ nock. Near Warrenton McClellan was super¬ seded, 7 November, by Gen. Ambrose E. Burn¬ side. Burnside took his position opposite Lee's army near Fredericksburg, and on 13 Decem¬ ber attempted to cross the Rappahannock and assault Marye's Heights, only to be repulsed with terrific slaughter. The following month he undertook to cross the river above Freder¬ icksburg and turn Lee's left, but the attempt proved a dismal failure, being known as the great Mud March. Thereupon Burnside was relieved of his command and was succeeded by Hooker, 26 Jan. 1863.

The' winter of 1863 was spent in laborious, though fruitless efforts to capture Vicksburg, which, because of its strategic importance, the Confederates held strongly fortified. Grant and Sherman both failed. At length, in April, Grant began his second move upon the city from the south and east. Admiral Porter's fleet convoying the transports ran the batteries on the night of 16 April, and the advance of the army crossed the river, 30 April. On 1 May Port Gibson was captured and Grant had forced his way to the rear of Vicksburg. Preventing a junction of Pemberton's and Johnston's forces, Grant defeated the

former at Champion's Hill, and again at Big Black Ridge, 18 May, pursuing him into Vicksburg. After two unsuc¬ cessful assaults upon the fortifications, Grant undertook the siege of the city, which surren¬ dered, 4 July 1863. This event was a turning point in the war in the West, hardly less im¬ portant than Gettysburg in the East. Hooker opened the campaign of 1863 in the Army of the Potomac by crossing the Rappahannock at Fredericksburg and advancing to the Rapidan. At Chancellorsville the Union right was disas¬ trously routed by Jackson's corps, 2 May. In the night, while reconnoitering before his pick¬ ets, Jackson was mortally wounded by his own men, who mistook him for the enemy. On the following day Hooker was forced back, with heavy loss, and recrossed the river, 5 May. Hooker being utterly defeated, Lee set out from Fredericksburg, on 3 June, for a second invasion of the North. The advance under Ewell, after some minor engagements in the valley, crossed the Potomac at Williamsport, 15-16 June, and moved on to Chambersburg and the vicinity of Harrisburg and Columbia, cap¬ turing York on 28 June. Ewell was then or¬ dered to fall back to Gettysburg, where Lee was concentrating his army. The Army of the Potomac under Hooker had advanced mean¬ while to Frederick, where Hooker requested to be relieved; and Meade was assigned to the command. The two armies encountered each

other at Gettysburg and after a three days' bat¬ tle, 1-3 July, Lee retreated and recrosscd the Potomac, without a battle. After a month's rest in the Shenandoah, Lee resumed his former position below the Rappahannock, Meade following him thither.

The campaign of 1863 in the Army of the Cumberland had as its objective the recovery of middle Tennessee. Rosecrans forced Bragg from his lines along the Duck River; and Bragg retreating over the Cumberland crossed the Tennessee and arrived in the vicinity of Chattanooga. The Union line being advanced to the western base of the Cumberland, a cam¬ paign against Chattanooga was begun. Grant, now assuming general command of the military division of the Mississippi, arrived 23 October; and with the Army of the Cumberland under Thomas and with a force from Vicksburg under Sherman and one from the Army of the Po¬ tomac under Hooker, Grant fought and won the battles of Lookout Mountain and Mission¬ ary Ridge, 24-25 November, and forced a gen¬ eral retreat of the Confederates, thus securing Chattanooga to the Federals. Knoxville, held by Burnside, was besieged by Longstreet, who, when Sherman approached, retreated to Vir¬ ginia. In the meantime Charleston Harbor was the scene of a formidable attack and brillant de¬ fense, and on 16 November the city was bom¬ barded.

On 12 March 1864 Grant, now commissioned lieutenant-general, was placed in command of all the Union armies. He planned a combined movement of the armies: Gilmore from South Carolina to join Butler at Fort Monroe for a move up the James to capture City Point, threatening Petersburg and Richmond; Burn¬ side with an army from Annapolis to join Meade in command of the Army of the Poto¬ mac and advance against Lee's right to Rich¬ mond ; Sherman, with the Army of the Cum¬ berland under Thomas and the Army of the Tennessee under McPherson and the Army of the Ohio under Schofield, to move against Johnston's army at Dalton; and Banks, leaving the Red River country to Steele and the navy, with his army to move against Mobile. Grant operating with the Army of the Potomac under Meade, 119,000 strong, crossed the Rapidan, 4 May 1864 and met Lee with 62,000 men in the YVilderness, and a great battle followed, 5-6 May. At Spottsylvania Court House both armies entrenched and from 8-20 May there was terrific fighting. Grant then moved toward the North Anna. Meanwhile, Sheri¬ dan, commanding Grant's cavalry, made a raid around Lee's army and met and defeated J. E. B. Stuart at Yellow Tavern, where Stuart was killed, 1 1 May. Grant's advance was op¬ posed by Lee and desperate fighting occurred at North Anna and Bethesda Church. At Cold Harbor Grant attempted an assault along his entire line, only to be repulsed with a sicken¬ ing slaughter, 3 June, and so failed to interpose between Lee and Richmond. But Sheridan, who had been sent against Fitzhugh Lee's and Hampton's Cavalry, in the meantime de¬ feated both at Trevilian's Station. Grant now moved toward the James, crossing at City Point and Bermuda Hundred now occupied by Butler.

Grant established his lines before Peters-

AMERICAN GENERALS

1 U. S. Grant 2 Robert E. Lee 3 William T. Sherman

4 Thomas J. (Stonewall) Jackson 5 Philip H. Sheridan

burg and notwithstanding his heavy fighting till 1 November (the mine explosion and battle of the Crater occurred 30 July), Lee's lines re¬ mained unbroken. Sigel's campaign in the Shenandoah ended in defeat at New Market, 15 June, and he was superseded by Hunter, whose movement against Lynchburg was repelled by Early. Early then

invaded Maryland, threaten¬ ing Baltimore and Washington, 11 July, after which he was compelled to retire across the Po¬ tomac. Again he advanced into Pennsylvania and burned Chambersburg, whence Sheridan drove him back into Virginia beyond Staunton and devastated the valley. Sherman moved against Johnston at Dalton early in May, and Johnston, stubbornly resisting, fell back to At¬ lanta. Johnston was succeeded by Hood, who, after several unsuccessful battles, evacuated Atlanta and invaded Tennessee, only to be thoroughly defeated by Thomas at Nashville, 15-16 December. Sherman occupied Atlanta 2 September, and after Farragut's brilliant naval victory in Mobile Harbor made his famous march through Georgia to the sea, occupying Savannah 21 December.

Early in 1865 the closing campaigns of the war opened. Terry, co-operating with Admiral Porter, captured Fort Fisher, 15 January. On 1 February Sherman started north from Savan¬ nah, captured Columbia, after which event Charleston was evacuated, and on 19 March met Johnson whom he defeated after a sharp battle. In Alabama, Wilson, operating under Thomas, captured Selma with its immense war supplies, 2 April, and defeated Forrest's cavalry. The Army of the Potomac, the last to move in 1865, began a general movement to the left, 29 March ; and there followed the battles of Dinwiddie Court House and Five Forks, 31 March and 1 April. On 2 April the Confederate entrenchments were carried and Petersburg was evacuated; Lee, abandoning his lines held so long against such heavy odds, began a retreat to Amelia Court House. After the fall of Richmond on 3 April, Grant, with his entire army under Meade and Sheridan, pursued Lee and forced him to surrender at Appomattox, 9 April. The number paroled was 28,231, all told, the worn-out remnant of Lee's brave and noble Army of Northern Vir¬ ginia. In North Carolina Sherman and Scho¬ field moved against Johnston, who occupied Raleigh, and compelled him to surrender on 26 April 1865. This was the end of the war. See Civil War; also accounts of various bat¬ tles and engagements under their respective titles. For bibliography, see special article on Civil War in America, Vol. VII, pp. 6 to 20.

Edwin W. Bowen,

Department of Latin, Randolph-Macon College.

34. THE CONFEDERACY. When the election of Mr. Lincoln by the practically unanimous vote of the free States was an¬ nounced in the autumn of 1860, the slave States of the lower South made preparations to exer¬ cise what they regarded as their constitutional

right of seceding from the Union. The Re¬ publican party had triumphed on a platform which declared the Dred Scott decision of the Supreme Court to be a dangerous political heresy and which announced a determination to exclude slavery from the Territories. This platform was regarded by the South as the

culmination of a long line of grievances; its triumph seemed to justify secession. It is true that the Republicans were still in the mi¬ nority in both houses of Congress and on the Supreme bench ; but the election showed the increasing power of that party and pointed to its ultimate success. It is now evident that it was folly for the South to suppose that seces¬ sion would be successful, but if it was to be attempted, the South showed great political sa¬ gacity and foresight in not waiting longer. The anti-slavery sentiment had been growing apace in the North, and to the writer the autumn and winter of 1860-61 seems to have been pre¬ cisely the time to strike for a separation. The South, weak though it was, was stronger than it could have been at any subsequent period. This point should not be .obscured by the dis¬ astrous consequences of secession. However this may be, it now seems clear that the slavery question, in its various phases, was the princi¬ pal, if not the only, cause of secession, and, in its turn, secession was the cause of the war. This was the view taken by Vice-Presi¬ dent Alexander Stephens after the war had begun — a view not inconsistent with his decla¬ ration before the war (21 March 1861) that (

On 4 Feb. 1861, a Congress of delegates from all the States that had seceded met in Montgomery, Ala. At this date only six States had left the Union : South Carolina, 20 Dec. 1860; Mississippi, 9 Jan. 1861; Florida, 10 January; Alabama, 11 January; Georgia, 18 January; Louisiana, 26 January. In Texas the ordinance of secession was not passed until 5 February, and it had still to be submitted to the people. The Texan delegates, how¬ ever, arrived in Montgomery before this final ratification. All the delegates were elected by the same conventions that had passed the ordi¬ nances of secession.

The Montgomery Congress immediately pro¬ ceeded to form a provisional government. On 8 February it adopted a provisional constitu¬ tion, differing in some important particulars

from the Constitution of the United States. Under this Constitution,

which, being provi¬ sional was not submitted to the States, the delegates elected a President and a Vice-Presi¬ dent of the Confederate States of America, each State being allowed one vote. By the unanimous vote of the six States present, Jefferson Davis of Mississippi was elected President and Alexander H. Stephens of Geor¬ gia, Vice-President. On the 18th, siome three weeks before Mr. Lincoln was sworn in, these officers were duly inaugurated. The Consti¬ tution of this provisional government resembled so closely the permanent Constitution, to be described later, that its provisions need not be given. It was to continue in force for one year, unless altered by a two-thirds vote of Congress or superseded by a permanent govern¬ ment. A committee of two from each State represented in Congress having drawn up a permanent Constitution, this instrument of government was promptly adopted by the Con¬ gress 11 March, and being submitted to the seceded States was with almost equal prompt¬ ness adopted by them. This was accomplished by action of the same conventions that had passed the ordinances of secession. Where these conventions had adjourned, they were reassembled for the purpose. In no case does there seem to have been any demand for the calling of new conventions to ratify the Con¬ stitution. It was thought important to organize the government as soon as possible.

In the meantime Congress had passed acts to raise provisional forces for the Confederate States, to authorize the President to borrow $15,000,000 at 8 per cent interest for the sup¬ port of the government, to levy an export duty on each pound of cotton exported after 1 August and to organize the Post-Office De¬ partment. Courts were rapidly organized in the different States, but, as we shall see, the Confederate States never possessed a Supreme Court. The President was then authorized to receive from the various States such forts, arsenals and other public establishments with their contents as they had taken possession of within their respective limits. The request of the President to this effect met with prompt compliance .on the part of the States. With the hope of obtaining recognition from foreign governments, commissioners were sent to European countries, but they were unsuccess¬ ful in their missions. England, France and other countries in the summer of 1861 acknowl¬ edged the belligerency of the Confederate States, but beyond this action they refused to go. A recognition of the independence of the new Confederacy would have been regarded by the United States as an act of hostility. In November 1861 J. M. Mason and John Sli¬ dell were sent as special commissioners to Eng¬ land and France respectively. After leaving Havana the English vessel in which they had taken passage was overhauled by the San Jacinto of the American navy, and these com¬

missioners were forcibly removed. England demanded their restoration. The United States government at first hesitated, raising a hope in the Confederacy that war might ensue be¬ tween the two countries. Finally, however, Lincoln said : ((We fought England about this matter in 1812; we must give up these men.®

Accordingly the commissioners were placed on board an English vessel and allowed to con¬ tinue their voyage. On the 8th of August the Confederate Congress, to please foreign powers, had adopted all the provisions of the famous Declaration of Paris, except as to the use of privateers.

The provisional government of the Confed¬ eracy had hardly been in force two months be¬ fore it came into conflict with the United States government. The occasion of this conflict was the demand of the Confederate authorities that Fort Sumter in Charleston Harbor should be surrendered by the Union force that occupied it. Senator Douglas, though opposed to secession, had argued in the United States Senate that South Carolina was entitled to the possession of Fort Sumter; General Scott had advised its evacuation ; and Secretary Seward had prac¬ tically promised that it should be given up. The South, therefore, thought that a peaceable solu¬ tion was in sight. But President Lincoln, after a period of indecision, decided to provision the fort, and on 8 April 1861 so informed the governor of South Carolina. The South had not desired hostilities ; but the Confederate govern¬ ment thought it necessary to capture the fort and opened fire on it 12 April. This act pre¬ cipitated war. The . Confederate States, there¬ fore, have generally been made to bear the odium of beginning hostilities. The question is debatable ; for as Hallam says : ((The aggressor in a war is not the first who uses force, but the first who renders force necessary.® We are thus thrown back upon the question raised by Sen¬ ator Douglas, which cannot be discussed here. The bombardment of Sumter stirred the North as by an electric shock. When on 15 April Lincoln called for 75,000 volunteers ((to sup¬ press combinations obstructing the execution of laws in seven of the Southern States,® the free States rallied to his support. His determination, however, to coerce the Confederate States per¬ suaded four of the border States, which had hitherto held aloof, to join the Confederacy. Arkansas seceded 6 May; North Carolina 20 May; Virginia 23 May, and Tennessee 18 June. Kentucky, Missouri, Maryland and Delaware having refused to secede, no more accessions were to come to the South. West Virginia, moreover, with a population of 250,000, detached itself from Virginia and remained loyal to the Union. The population of the Confederacy was about 9,000,000, of whom three and a half millions were slaves; while that

of the Union States was approximately 22,000,000, an im¬ mense disparity of numbers. Wet,® said J. F. Rhodes, <(had the North known that the people of the cotton States were practically unanimous, it might have refused to undertake the seem¬ ingly unachievable task; for while hardly a man in the North assented to the constitutional right of secession, all acknowledged the right of revolution. . . . Many would have objected to combating that right.® The provisional Con¬ gress, being called together 29 April in Mont¬ gomery to consider the new condition of affairs, made provision for the prosecution of the war by adopting financial and military measures. On 6 May it passed an act, declaring that negotiations with the United States for a peaceable solution of difficulties had failed, and as Mr. Lincoln had called for 75,000 men to

capture forts within the jurisdiction of and belonging to the Confederate States of Amer¬ ica, and had issued another proclamation an¬ nouncing his intention to set on foot a blockade of the Confederate ports; and ((whereas by the acts and means aforesaid war exists between the Confederate States and the government of the United States, and the States and territories thereof, excepting the States of Maryland, North Carolina, Tennessee, Kentucky, Arkansas, Missouri, and Delaware, and the territories of Arizona, New Mexico, and the Indian Territory, south of Kansas ; therefore the president is au¬ thorized to use the whole land and naval force of the Confederate States to meet the war thus commenced and to issue letters of marque under the seal of the Confederate States against the vessels of the United States.® It was further provided in accordance with the Declaration of Paris (q.v.) that property of the enemy (except contraband of war) on board a neutral ves¬ sel should not be subject to seizure. In re¬ sponse to this declaration of existing war, a hundred applications for letters of marque were received from privateers, and troops crowded to the support of the new government with the same alacrity as in the North. On 21 May Congress adjourned to meet 20 July in Rich¬ mond, Va., now chosen as the permanent capital of the Confederate States. On 6 November an election was held under the permanent Consti¬ tution for President and Vice-President. As there was no opposition to Davis and Stephens, they Were unanimously elected President and Vice-President respectively by the electoral votes of the 11 Confederate States. They were to enter upon their office 22 Feb. 1862, and to hold office for six years. Under the provisional government the President had appointed as members of

his Cabinet Robert Toombs of Georgia, Secretary of State ; C. G. Memminger of South Carolina, Secretary of the Treasury; L. P. Walker of Alabama, Secretary of War; John H. Reagan of Texas, Postmaster-General, and J. P. Benjamin of Louisiana, Attorney- General. At the close of 1861 J. P. Benjamin had become Secretary of War; S. R. Mallory of Florida, secretary of the Navy; ex-Gov. Thomas Bragg of North Carolina Attorney- General, and R. M. T. Hunter of Vir¬ ginia had been appointed Secretary of State, vice Toombs, resigned. As the war went on, changes were made in the Cabinet as follows : On the resignation of Mr. Hunter, Mr. Ben¬ jamin in 1862 field for a time the portfolios of State and of War, until Geo. W. Randolph of Virginia was made Secretary of War. In the same year Mr. Randolph resigned and was suc¬ ceeded by James A. Seddon of Virginia. Mr. Seddon resigned in the early part of 1865 and was succeeded by Maj.Gen. John C. Breck enridge of Kentucky. In 1864 Mr. G. A. Trenholm succeeded Mr. Memminger as Secre¬ tary of the Treasury. Attorney-General Bragg was succeeded by Thos. H. Watts and subse¬ quently by George Davis of North Carolina.

The provisional Congress, which was uni¬ cameral, expired 15 Feb. 1862, and the Senate and House of Representatives, elected under the permanent Constitution, met in Richmond 18 Feb. 1862. The members of this Congress were chosen from the most distinguished men of the South. <(Of the 26 Senators, fourteen had been formerly members of the United States Con¬

gress, and in the lower house, out of 106, 33 had also represented the South at Wash¬ ington.® Subsequently, in the course of the war, the character of the Confederate Congress in general ability declined, many of the best men joining the army. One very necessary depart¬ ment of the new government it was found diffi¬ cult to organize. This was the post office. The position of Postmaster-General was offered by President Davis to Mr. Ellet of Mississippi and later to Mr. Wirt Adams of the same State; but both declined. Then J. H. Reagan of Texas, after twice refusing, was persuaded to accept the office. His reluctance was due to the fact that he knew the labor of organization would be heavy, and that if the mail facilities were in¬ ferior to those formerly furnished by the Fed¬ eral government, there would be great dissatis¬ faction. But Mr. Reagan was thoroughly competent. He sent letters to Washington be¬ fore the war began, and invited a number of clerks in the Post Office Department to take positions in the Confederate post office. All but two accepted. With their help organization proceeded rapidly, and. on 13 May Mr. Reagan announced that on the first of June the Fed¬ eral service would cease and the Confederate service would begin. All postmasters were re¬ quired by that date to render

their final ac¬ counts to the United States government, and were invited to continue their duties under the Confederate government. The Postmaster- General of the United States suspended the Federal service to take effect the same day. The permanent Constitution of the Confederate States required that the post office should be self-sustaining after 1 March 1863. In 1859-60 the United States had conducted the post office department in the States that were to form the Southern Confederacy at a loss of $1,941,425. Hence a radical change of management was necessary to meet the new requirement. Ac¬ cordingly Postmaster Reagan persuaded the rail¬ roads to carry the mails at one-half the former rate and to accept the bonds of the Confederacy in payment. He raised the rate on packages, newspapers and letters, the postage on the last being fixed at five cents per half ounce for a distance of less than 500 miles and 10 cents for a greater distance. The franking privilege was abolished and mail routes considered un¬ necessary were reduced in number or discon¬ tinued. As a result of these and other radical changes, the reports of the Postmaster-General show that by the latter part of 1862 a surplus was obtained, and from that time on there was a net annual increase of receipts over ex¬ penditures.

The various States of the Confederacy made no changes in the organization of their judici¬ ary system, but the provisional Constitution of the Confederacy provided that each State should be erected into a distinct judicial district, the judge having all the powers hitherto vested in the judges of the District and Circuit Courts; and that the several district judges together should compose the Supreme bench, a majority of them constituting a quorum. During the year 1861 these District Courts were organized, and they were continued under the permanent Constitution. Congress, however, passed an act 31 July 1861, providing that the Supreme Court should be organized only under the permanent Constitution. Accordingly, in the Congress that

met in 1862, the establishment of a Supreme Court was discussed, but nothing was done until the following year. In January 1863, Senator Hill in the Senate said: <(I think it high time the judicial department of the government be thoroughly organized; for it has been a limping concern long enough.® Finally, on 18 March 1863 the Senate passed a bill to organize the Supreme Court. This bill was intended to carry out the provisions for a Supreme Court as found in the permanent

Constitution ; provi¬ sions that were practically identical with those of the Constitution of the United States. The bill provided for a Supreme Court of the Con¬ federate States to consist of a chief justice and four associate justices, any three of whom should constitute a quorum. The court was to hold annually at the seat of government two sessions, and its appellate jurisdiction was lim¬ ited to appeals from the Confederate District Courts in the several States. Under a law passed by the provisional Congress (16 March 1861), it had been provided that the Supreme Court should also have jurisdiction in appeals from the State courts, <(where wras drawn in question the validity of a treaty or statute of, or an authority exercised under, the Confeder¬ ate States; or where was drawn in question the validity of a statute of, or an authority exercised under any State, on the ground of their being repugnant to the Constitution, treaties, or laws of the Confederate States; or where was drawn in question the construction of any clause of the Constitution, or of a treaty, or statute, or commission held under the Con¬ federate States.® This law of the provisional Congress was significantly repealed in the Sen¬ ate bill above mentioned. Whereupon the Rich¬ mond Examiner declared that a Supreme Court, without the circuit feature of the Su¬ preme Court of the United States, and acting simply as a court of appeals from the inferior tribunals of the Confederation, could do no mischief and might do much good. <(But had the original law been allowed to stand, pro¬ phetic inspiration was not necessary to foresee that the career of the Southern Confederacy would have been but a pursuit of the catas¬ trophe which overwhelmed the late Union.® The Supreme Court as thus constituted, how¬ ever, never saw the light of day after all. The Senate bill, after having been twice read in the lower house, was referred (20 March 1863) to the Committee on Judiciary, and no further mention of it is to be found. There has been much discussion as to the reason why the Confederacy failed to establish a Supreme Court. It seems clear that the reason was two¬ fold. The experience of the South with the Supreme Court of the United States had, in the opinion of many, been disastrous to State rights. Moreover, at this time the military exigencies were much greater than the judicial; hence it seemed wise to defer the establishment of such a tribunal to a more peaceable season. The absence of a Supreme Court, however, had its natural result. The Federal District Courts and even the State Supreme Courts interpreted the Confederate Constitution and in some instances declared the acts of Congress unconstitutional. When a Confederate court in South Carolina decided that Congress had no right to tax State bonds, the war tax on bonds was not collected in that State. The existence of a

court of final resort might have aroused antag¬ onism among the sovereign States ; but it seems to have been necessary.

The permanent Constitution of the Confed¬ erate States, while providing in almost the same words for the same division of powers, differed from that of the United States in some import¬ ant details. If a good case of infringement of copyright could be made out against the South, it is to be remembered that that section could claim a large share in the framing and wording of the original instrument. Nor did the South desire to draw up a new constitution. The in¬ tention was rather to make explicit certain States-rights principles that were held to be im¬ plicit in the old Constitution, and to make some additions which it was believed the experience of 70 years had shown to be necessary. Only the more important of the changes can be given here. In the preamble, instead of the ambiguous <(we the people of the United States,® is found (

transit and sojourn in any State of the Confed¬ eracy with their slaves or other property, and the right of property in said slaves shall not be thereby impaired. The Confederate States may acquire new territory (a clause much desired by Jefferson in the original Constitution), and in all such territory the institution of negro slav¬ ery, as it now exists in the Confederate States, shall be recognized and protected by Congress and by the Territorial o-overnment. Amend- mends to the Constitution are not be made through the initiation of Congress as in the old Constitution ; but upon the demand of any three States, legally assembled in their several conven¬ tions, the Congress shall summon a convention of all the States to consider such amendments as may be proposed by the States. If these amendments are agreed on by the convention and are ratified by two-thirds of the States act¬ ing through their legislatures or conventions, they shall form a part of the Constitution. Finally the ratification of five States shall be sufficient for the establishment of this Constitu¬ tion between the States so ratifying the same. Southern writers have very generally main¬ tained that every point which differentiated this Constitution from its predecessor was an im¬ provement on the latter. As to the correctness of this claim jurists will differ accordingly as they approve or disapprove of loose confed¬ eracies. Under this Constitution the Confeder¬ ate government levied taxes, negotiated loans, raised armies and for several years carried on a terrible conflict. The test of the worth of a constitution, however, is its working in times of peace as well as in times of war. If this Con¬ stitution had been tested in times of peace, it is likely that it would have shown the fatal tend¬

ency of all confederacies to disintegrate when no external pressure holds them together. Nor will it be maintained that in time of war the Constitution proved itself a very efficient instru¬ ment. The States, endowed with fresh ((sover- eignty," were jealous of their rights and some¬ times nullified the constitutional acts of the government. For such cases the Constitution spoke no word of coercion. On the other hand, while the government was clearly a confeder¬ acy, the exigencies of war compelled a concen¬ tration of power into the hands of the President and his Cabinet which grew into a military despotism. Congress protested, but grew feebler as the conflict became more desperate. There was friction between the legislature and the executive and between both and the States. Among the acts of the government that caused particular dissatisfaction may be mentioned the repeated suspension of the writ of habeas cor¬ pus down to 1 Aug. 1864; though Dr. Schwab has shown that this suspension was carried out with less stringency in the South than in the North. Other grievances were the severe con¬ scription acts, the impressment of supplies for the army at fixed prices, the constant interfer¬ ence with interstate commerce and the issue of vast quantities of irredeemable paper money. This currency was never formally made legal tender as was done in the North, but it was practically forced upon those who sold supplies to the government. All these measures which may easily be paralleled in history, and which seem to have been rendered necessary by the dire necessities of the war, caused distress and met with opposition in some of the States.

The blockade of the Southern ports by the navy of the United States was so strict that the wealth of the South, its cotton and other crops, could not be sent abroad, save at fatal risk, in exchange for the munitions of war. In the early stage of the conflict there had been no desire to export the cotton. The strange delu¬ sion that ((cotton is king" was so widespread that it was thought possible to compel England to recognize the Confederacy by withholding from her the great staple. When, however, the fallacy of this embargo was as clearly seen as once before in our history, both the Confederate government and some of the State governments utilized the blockade runners to send cotton abroad to exchange for the thousand and one things which the South, from lack of industrial development, was unable to supply for the sup¬ port of the army. But the help thus obtained was infinitesimal in comparison with the needs, and the government had to fall back upon the sacrifices of devoted men and women. (

Bibliography. — Callahan, J. M., diplo¬ matic History of the Southern Confederacy' (1901) ; Curry, J. L. M., (Civil History of the Government of the Confederate States' (Rich¬ mond 1901) ; Jefferson, D., (Rise and Fall of the Confederate Government' (2 vols., New York 1881) ; Schwab, J. C., (The Confederate States of America' (New York 1901) ; Pollard, A. E., (The Lost Cause' (New York 1867).

John R. Ficklen,

Late Professor of History , T ulane University.

35. THE POLITICAL EVENTS OF THE CIVIL WAR. The Civil War. in Amer¬ ica began by the Confederate attack on Fort Sumter, 12 April 1861. The secession move¬ ment had begun upon Lincoln's election ; war

had become inevitable at the time of his inaugu¬ ration. Two authorities — two sovereignties — were claiming independent jurisdiction over the same area, and, after that, it was only a ques¬ tion of time when these would meet in armed conflict. All effort at further compromise had failed. The time for saving the Union by con¬ ciliation and concession had passed. The United States government had now to decide either to recognize the Southern Confederacy as an independent power in its own limits, or to vindicate the national authority by force of arms. There was no longer any middle ground.

The issue upon which Lincoln had been elected was the restriction of slavery to the area of the slave States. The first purpose of the new President upon coming into power was to restrict the area not of slavery but of seces¬ sion. There were still thousands of Union men. especially in the border States and among Mr Lincoln's party opponents in the North, to whom ((coercion? was odious; who thought that military force as a means of holding the States together was not only useless but pernicious; who believed, or professed to be¬ lieve, that the national authority could never be successfully asserted by the bayonet and the sword against such a formidable revolution as that represented by the confederated slave States ; that compromise and conciliation were still the only hope of holding the border States; that the Union, now destroyed because of aboli¬ tion fanaticism and folly, could be restored only by dividing public opinion in the South, and by waiting until Southern men could be induced to accept Federal appointments and until the civil machinery of the Federal gov¬ ernment could again be put in motion in the Southern States. Lincoln

recognized this body of conservative Union opinion, and whatever of genuine loyalty to the national cause there was in it he wished not to antagonize. He would bring every possible man, every ounce of opinion, to oppose secession. He would, if possible, unite the North, divide the South and save the border States. For this reason Mr. Lincoln's inaugural address was quite concilia¬ tory in its attitude toward slavery and the South. The platform of his party committed him both to (

In this address Lincoln took no positive anti¬ slavery stand. He spoke in favor of the return of the fugitive slave, and he in no way urged the cause — the non-extension of slavery — for which he had been elected. In this Lincoln merely recognized, as any statesman should have done, that the paramount issue confront¬ ing the nation had changed since his election in November. Then it had been the extension of slavery; now it was the preservation of the Union, the unity and integrity of the nation itself. Therefore, on 4 March 1861, Lincoln stood ready, for the sake of avoiding war and

disunion, to subordinate, so far as it was mor¬ ally possible, his own and his party's anti-slav¬ ery purposes. He would not surrender the principle for which he had been called into power and his party into being. But he de¬ clared his willingness to accept an irrevocable amendment to the Constitution prohibiting the national government from ever interfering with slavery in the slave States; and he assured the people of the South that they would not be assailed, and that they could have no conflict unless they themselves became the aggressors. But the President declared that, despite the ordinances ot secession, he regarded the Union as unbroken, and that, as the Constitution and his oath of office bound him to do, he would faithfully <(execute the laws of the Union in all the States® ; and this he would continue to do unless, and until, his <(rightful masters, the American people, shall withhold the requisite means or in some authoritative manner direct the contrary.® ((The power confided to me,® he said, ((will be used to hold, occupy and possess the property and places belonging to the government, and to collect the duties and imposts ; but beyond what may be necessary for these objects, there will be no invasion, no using of force against or among the people any¬ where.®

Here was clearly drawn the political issue of the Civil War — national unity and the en¬ forcement of the national authority against dis¬ union and the right of secession. It was not possible for the national authority to recognize this issue — its own right to exist — as within the field of negotiation, and the attempt of the Confederate government to secure recognition by opening diplomatic relations at

Washington was repelled.

If the national government intended to maintain its authority and to ((execute the law in all the States,® there was nothing for the South to do but to yield or fight. The South's answer was the defiant attack on the national authority at Sumter. The call for 75,000 three-months' volunteers and the uprising of the national spirit followed. Party issues were forgotten, and the great body of the Democratic voters in the North, following their leader, Mr. Douglas, rallied patriotically to the support of the government, as did also many Brecken- ridge Democrats. (See Douglas; Brecken- ridge, J. C.). In the proclamation calling for volunteers Lincoln commanded the insurgents to disperse within 20 days, called Congress into extraordinary session for 4 July 1861, and announced that the object of the military force was to repossess the forts and places' seized from the Union. The time limit of three months for the troops was made necessary by the Act of 1795, as this law authorized the use of the militia <(until the expiration of three months after the commencement of the then next session of Congress.®

Virginia's secession followed immediately (17 April) upon Lincoln's call for troops, upon the plea of resisting ((coercion® and "invasion.® Tennessee and Arkansas soon afterward fol¬ lowed Virginia and joined the Confederacy, but the attempt to carry Missouri and Kentucky into the secession movement was foiled by the co-operation of the national government with (he Union forces in those States. After the bombardment of Sumter and before the meeting

of Congress (12 April-4 July 1861), President Lincoln assumed extraordinary war powers. (See United States — The President's Office). He proclaimed a blockade of Con¬ federate ports (19 and 27 April) ; he increased the forces of the regular army and navy (3 May) by his mere executive order, and he au¬ thorized his military subordinates in several places to suspend the writ of habeas corpus. (See Habeas Corpus). The orders of block¬ ade had been evoked by the purpose of the Con¬ federate government, indicated by Mr. Davis' letters of marque and reprisal (17 April), to use its ports for fitting out privateers to prey upon the commerce of the United States. The other measures of the President were held to be justified by the emergency. (See Privateer¬ ing; Blockade; Belligerent). Upon the as¬ sembling of Congress these executive acts were approved, and, as far as endorsement and Con¬ gressional resolution could do so, they were legalized ; and Congress proceeded to make military and financial

provision for a vigorous conduct of the war.

Slavery had been the primary cause of seces¬ sion and war. But slavery was not the issue on which the men of either side were called upon to fight. The cause for which the North rallied to arms was union and nationality; the cause of the South was independence and the rights of the States. Both disclaimed slavery as the cause of arms. But slavery, as it was the ever¬ lasting cause of strife before the war, was the chief cause of political difference during the war ; and the relation of the war to slavery is the most important point of view from which the political events of the war are to be studied. To what extent should the war be distinctly an anti-slavery war and be made an instrument of emancipation? To what extent should the war be conducted solely to preserve the Union, and to restore national authority without disturbing in any way the ((domestic institutions® of the States? On these questions Mr. Lincoln was constantly subject to pressure in opposite direc¬ tions. The conservatism in his nature and the conservative wing of his party required that he should not assume a more radical and aggres¬ sive anti-slavery attitude than the public senti¬ ment of the country would support; while his party opponents were vigilant and quick to de¬ nounce and oppose him for converting and de¬ grading the war from a noble effort for the Union into a mere abolition war for the <(nig- ger.® On the other hand the radical anti-slav¬ ery forces were constantly urging him to strike at the real strength of the rebellion by striking at its cause. This wing of the Union forces held with Sumner that the ((rebellion was but slavery in arms.®

Congress attempted to define the purpose of the war and its relation to slavery in the famous Crittenden Resolution of 22 July 1861, which was passed in both Houses by an almost unanimous vote. It was declared that the war was forced upon the country by the disunionists of the South ; that ((the War is not waged upon our part for any purpose of conquest or subju¬ gation, nor for the purpose of overthrowing or interfering with the rights or established insti¬ tutions of those States; but to defend and main¬ tain the supremacy of the Constitution and to preserve the Union with all the dignity, equal¬ ity, and rights of the several States unim¬

paired; that as soon as these objects are accom¬ plished the War ought to cease.® See Crit¬ tenden Compromise.

This is the platform upon which the con¬ servative Democracy of the North insisted that the war should be conducted, and for any de¬ parture from this policy they were ready to de¬ nounce the

administration and displace it from power. In saving the Union by war the ad¬ ministration must not be allowed to violate the Constitution in any way nor in any way inter¬ fere with the rights of the States or the legal status of the slaves. The political and party struggles of the Civil War focus themselves largely about this issue. On the one side were those of a conservative, purely Union-saving purpose, who were disposed to demand that the war be conducted strictly according to the forms and canons of the Constitution. Among these were probably many who cared more to save slavery and the rights of the States than to save the Union. On the other hand were the radical anti-slavery men who were de¬ termined that, while the war should be for the Union, it should not cease until emancipation should be secured. Among these were many who cared more to destroy slavery than to save the Union. Lincoln, as we shall see, occupied middle ground between these opposing ex¬ tremes.

In the gradual but constant progress of the administration toward an anti-slavery policy — in its movements from an attempt to save slavery and the Union together to the policy of emancipation and the reconstruction of a new Union wholly free, there are certain notable features and landmarks. Among these we may notice, first, the attitude of the administration toward military emancipation.

As early as 25 May 1861, Gen. Benjamin F. Butler, in command of the Union forces about Fortress Monroe, gave the first indication of a military method of emancipation. He refused to return to their masters slaves coming within his lines, on the ground that they had been used in aid of the rebellion, in the erection of bat¬ teries and other works ; that if slaves were prop¬ erty, as the South had always contended, they were, therefore, properly <(contraband of war® ; that this slave property, useful for military pur¬ poses, might as well be used in aid of the United States as against it; that masters in arms against the Constitution were barred from claiming the enforcement 'of their constitutional rights by their belligerent opponents, and that only slaves of loyal owners should be returned. Butler put this <(contraband property® to work for his own military purposes. Public senti¬ ment of the North applauded Butler's course although he was not promptly and heartily sus¬ tained by the administration.

The Confiscation Act (6 Aug. 1861), passed within a fortnight of the Crittenden Resolution, indicated the beginning of a change of policy toward slavery on the part of Congress. This is to be regarded as a military measure. It pro¬ nounced forfeiture of all slave property used in aid of insurrection and thus it substantially, under another form, endorsed Butler's contra¬ band order. Mr. Lincoln was not pleased

with the Confiscation Act, as he feared it would alienate the border States which he was dili¬ gently trying to conciliate. He wished Con¬ gress not to meddle with the slavery question,

1)ii t to leave that problem to the military au¬ thorities. On 8 Aug. 1861, two days after the passage of the Confiscation Act, Mr. Lincoln's Secretary of War, Mr. Cameron, wrote to Butler, who was pressing for further instruc¬ tions: <(It is the desire of the President that all existing rights in all the States be fully re¬ spected and maintained; in cases of fugitives from the loyal slave States the enforcement of the Fugitive Slave Law by the ordinary forms of judicial proceedings must be respected by the military authorities; in the disloyal States the Confiscation Act of Congress must be your guide.® The slave rights of loyal masters in _ disloyal States were to be safeguarded as far as possible. This policy indicates Lincoln's con¬ servatism at the beginning of the war, and his regard for vested rights whenever the slavery question appeared. In pursuance of this line of policy Lincoln tacitly endorsed Halleck's order returning fugitives and protecting slave property, while he did not hesitate to overrule and set aside General Fremont's order (30 Aug. 1861) in Missouri emancipating the slaves of all persons who had taken up arms against the United States. On 11 Sept. 1861 Lincoln overruled Fremont and on 19 May 1862 he revoked and repudiated a similar order of Gen¬ eral Hunter for the Department of the South. Lincoln declared that ((no commanding officer shall do such a thing upon my responsibility without consulting me.9 Chase and other anti¬ slavery supporters of the administration urged Lincoln to let Hunter's order stand, but the President was afraid it might alienate sup¬ port from his policy of compensated emancipa¬ tion which he was then urgently pressing upon the representatives from the border States. In his annual message of December 1861, Lincoln had expressed his purpose still (

By the spring of 1862 Lincoln's policy on slavery may be said to involve gradual emanci¬ pation by the consent and co-operation of slave¬ holding States ; national aid for t'he compensa¬ tion to owners, and the colonization of the negroes made free by this policy and by the operation of the Confiscation Act of Congress. Up to the time of the rejection by the border slave States of Lincoln's policy of compensated emancipation and its failure in consequence, anti-clavery sentiment and purpose may be said to have been more radical and outspoken in Con¬ gress and the country than in administration

councils. But after he dismissed his plan of compensated emancipation Lincoln determined upon emancipation in another way. This was emancipation as a war measure, by military power. He made known this purpose to his Cabinet as early as 22 July 1862. It was de¬ termined in the Cabinet council not to make public announcement of this policy until a more favorable military situation could be secured. Lincoln's pro-slavery orders, and his policy that seemed so much like timid conservatism, led the radical Republicans and anti-slavery men to continue their pressure and hostile criticism.

The effort to induce Lincoln to take a more decided stand against slavery brought out the celebrated Greeley-Lincoln correspondence. Greeley sent to Lincoln and published in his Tribune (20 Aug. 1862) his (

Lincoln's famous reply to Greeley contains in the most succinct form a statement of his war policy and his political attitude toward slavery. (

If there be those who would not save the Union unless they could at the same time save slavery, I do not agree with them, if there be those who would not save the Union unless they could at the same time destroy slavery, I do not agree with them. _ My paramount object in this struggle is to save the Union, and is not either to save or to destroy slavery. If I could save the Union without, freeing any slave, I would do it, and if I could save it by freeing all the slaves, I would do it; and if I could save it by freeing some and leaving others alone, I would also do that. What I do about slaves and the colored race, I do because I believe it helps to save the Union; and what I forbear, I forbear because I do not believe it would help to save the Union. I shall do less whenever I shall believe what I am doing hurts the cause, and I shall do more whenever I shall believe doing more will help the cause. I shall try to correct errors when shown to be errors, and I shall adopt new views so fast as they shall appear to be true views. Such is my purpose ac¬ cording to my view of official duty. I intend no modifica¬ tion of my oft-repeated personal wish that all men every¬ where might be free.

In September 1862 Lincoln publicly an¬ nounced his policy of emancipation. (See Emancipation). Notwithstanding this forward step, momentous in its ultimate, if not in its immediate, results, dissatisfaction with Lincoln among anti-slavery men continued and a con¬ certed movement arose within the Republican party to supersede Lincoln in the leadership. The dissatisfied Republicans sought to secure the nomination of Chase or some other more radical anti-slavery man for the Presidency. When this fell through, the more radical spirits secured an independent convention and the nomination of Fremont against Lincoln in 1864, and

this indicated a serious division within the Union-Republican party. On the other hand conservative men in the administration, like the Blairs, and others sincerely in favor of the war for the Union, opposed the Emancipation Proc¬ lamation on the ground that it would lose the fall elections, alienate support from the war and endanger its success ; while the Democratic opposition in the North were seizing upon all the anti-slavery measures of Congress and the President as material for a political campaign against the administration, on the ground that the war for the Union was being turned into a war for abolition.

The anti-slavery purposes of the war were making headway. The Democratic opposition to the war policy of Mr. Lincoln arraigned the administration on various indictments. The refusal of Congress to reaffirm the Crittenden Resolution; the abolition of slavery in the Dis¬ trict of Columbia (April 1862) ; the abolition of slavery in the Territories (June 1862) ; the second Confiscation Act of 17 July 1862, provid¬ ing for the emancipation of the slaves of rebels and their abettors, and for the employment of such freedmen in the suppression of the rebel¬ lion as the President might direct; the military annulment of the Fugitive Slave Act by the contraband policy and by the act (13 March 1862) forbidding military officers from arrest¬ ing and returning fugitive slaves ; the scheme for compensated emancipation, because of its enormous expense; the emancipation proclama¬ tion, as tending to incite slave insurrection ; the military organization of the blacks (July 1862), as tending to equalize the white soldiery with the negro ; the recognition of Liberia and Haiti ; the enlargement of legal privileges for the negroes where they were under national jurisdiction — all these measures were denounced by the op¬ ponents of the administration and were used to prove the abolition and unconstitutional character of the war.

On account of these anti-slavery measures all those were arrayed in the political opposition whose race prejudices against the negro were pronounced; who hated the New England aboli¬ tionists as much, or more, than they did the "fire-eating® secessionists ; who believed in slavery, or were indifferent to its evils; who thought that in the conduct of the war the wrongs of the negro should not be taken into account and that the interests of the white race alone should be considered.

Another noticeable factor in this opposition were the constitutional legalists, who were in¬ sistent upon holding the conduct of the war strictly to the forms of the law and the Consti¬ tution. These made the preservation of civil liberty and the rights of the individual their special cause and chief concern. They were more strenuous to preserve these individual rights than

they were to preserve the Union, and they contended that the Union could not be preserved, or need not be, if the Constitution and the law were violated and disregarded. That which claimed their obedience and loyalty, they asserted, was not a person invested with office, nor an idea of public necessity, nor an imaginary national life apart from the life of the Constitution. "What the Constitution or¬ dains or authorizes, that is the public necessity, that is the national life, that is the supreme civil obligation.® This was the position taken by able and conservative lawyers and leaders like George Ticknor Curtis and Horatio Sey¬ mour, who opposed the conduct of the war be¬ cause of what they considered the high-handed usurpations of power by the war authorities. They felt that loyalty required them to be loyal to the reserved rights of the States as the supreme law of the land as well as to the pow¬ ers vested in the general government; that loyalty bound them to safeguard the rights of persons and property guaranteed by the Con¬ stitution to every citizen, as well as to support a war to crush insurrection. With these feel¬ ings and principles they opposed the adminis¬

tration on account of the suspension of the writ of habeas corpus, on account of arbitrary arrests and the suspension of free assembly, free speech and free press. Certain newspapers had been suppressed (the New York News, the New York Journal of Commerce, Chicago Times Brooklyn Eagle and others) on the ground that they were encouraging the rebels to persevere in their resistance, by expressing sympathy with them, by urging the duty of acceding to their demands and by expressing dissatisfaction with the policy of employing force to overcome them. These papers were constantly denouncing as "an unholy war® the war "in defence of our country, its institutions and most sacred rights, and carried on solely for the restoration of the authority of the government.® This kind of party opposition to the war was what Lincoln called "the fire in the rear.® See Habeas Corpus; Milligan Decision.

Some of these opponents of the war were disloyal factionists who at heart were in sym¬ pathy with the South, and who preferred dis¬ union to the political and military success of the administration. These were the "Copperheads® of the North. Clement L. Vallandigham of Ohio was one of the most distinguished and extreme representatives of this group. He was arrested at Mount Vernon, Ohio, in May 1863, upon a charge of "publicly expressing sympathy for those in arms against the government of the United States and declaring disloyal sentiments and opinions with the object and purpose of weakening the powers of the government in its efforts to suppress an unlawful rebellion.® He was found guilty by a military tribunal and sen¬ tenced to close confinement — a sentence which President Lincoln commuted to banishment to the enemy's lines. The Democrats of Ohio of¬ ficially protested against these proceedings and

Lincoln informed them that Vallandigham had been arrested because "he was laboring with some effect to prevent the raising of troops, to encourage desertions from the army, and to leave the rebellion without any adequate mili¬ tary force to suppress it.® While in exile Val¬ landigham was nominated by the Democrats for the governorship of Ohio and was defeated by the unprecedented majority of 100,000 votes.

Elsewhere in the North Democratic leader¬ ship, while its purposes and principles were in most respects the same as those of Vallandig¬ ham, was more moderate and restrained, and, under the direction of men whose loyalty to the Union was undoubted, the Democratic successes in the elections of 1862 and 1863 were very pro¬ nounced. The military losses and disasters, the newness of the emancipation policy, the unex¬ pected extension of the war, the unfriendly atti¬ tude of foreign powers, the growing belief that the Union could not be restored by war, the vigor of the Democratic attack in the rear — all these were factors in causing the loss of the fall elections in 1862. This was interpreted as a vote of want of confidence in the administra¬ tion, and it is probable that if Lincoln had been a candidate for re-election in 1862 he would have been defeated.

Another cause of opposition is to be taken into account after the summer of 1863. This was the Conscription Act and the effect of the draft. Although what seems now like decisive military successes had come to the national arms in July of that year (Gettysburg, Vicks-

burg) a successful end of the war seemed dis¬ tant, and the people were becoming very weary of waste, bloodshed and battle. They were sighing for peace. But the burdens of the war were to be still further increased. On 3 March 1863 Congress passed a Conscription Act au¬ thorizing a draft of 300,000 men. Certain pro¬ visions of the act led to disagreements as to quotas between Federal and State authorities, and a clash seemed imminent. A $300 clause allowed a man who could pay that sum to be released, while one who could not must go into the ranks. With this discrimination in favor of the rich and against the poor, a great deal of popular prejudice and opposition were aroused by the party opponents of the admin¬ istration against the draft ; and the draft riots in New York, in July 1863, resulted in serious loss of life and property. Governor Seymour of New York requested President Lincoln to suspend the enforcement of the draft in that State, and it was intimated to Secretary Stan¬ ton that this act could be enforced only by the co-operation and consent of the State authori¬ ties. Stanton held that the issue of the Civil War was the enforcement of the national au¬ thority by its own power without dependence upon the consent of the State.

Added to the excitement and opposition aroused by the draft came the President's proc¬ lamation of 15 Sept. 1863, suspending the priv¬ ilege of the writ of habeas corpus throughout the United States in all cases where persons were held by the civil, military or naval au¬ thorities under the orders of the President, as <(aiders or abettors of the enemy.® This proc¬ lamation followed the grant of power conferred by the Act of 3 March 1863, by which Congress, as it had previously legalized previous suspen¬ sions of the writ, authorized the President to suspend this guarantee of personal liberty dur¬ ing a period of Civil War throughout the whole United States. Under this act military arrests without civil warrants and trials by military commissions continued in various parts of the North. The critics of the administration held that the purpose of this policy was to consider all political opponents of the administration as <(aiders and abettors of the enemy,® and they feared that all political discussion and criticism were to be suppressed by a military absolutism. (See Habeas Corpus; Milligan Decision). Freedom of the mails had also been denied to hostile matter, or such as might instigate others to co-operate with the enemy. (Consult Report of the Judiciary Committee of the House, 20 Jan. 1863).

Thus, with divisions within the ranks of the Union-Republican party, with the country long¬ ing for peace, with many factors and elements arousing and uniting the opposition, there was danger that the Union-Republican party would be defeated by the party calling itself the <(Con- servative-Union Party.® This party had nom¬ inated Gen. George B. McClellan, one of Lin¬ coln's deposed generals, on a peace platform, demanding peace after <(four years of failure to restore the Union by war.® Their policy was to restore the Union by stopping the war, by armistice, negotiation, convention, — by some diplomatic agreement to which both parties might agree, and that fighting should cease until an arrangement could be adjusted. They would substitute negotiation for subjugation. Pre-

sumably, in the mind of this party, if negotia¬ tion failed disunion was preferable to a con¬ tinuance of the war. Their great political error was in their failure to perceive that it was for¬ ever too late, on account of the state of public sentiment both North and South, to secure a restoration of the old Union under the old Constitution. While there was any hope left to them in the field the South would never consent to a restoration of the Union ; and when their military defeat, after Atlanta, Nashville and Sherman's march to the sea, became a foregone conclusion, then the terms of settlement and reunion were to be determined only by the national will. But it was in the face of the sit¬ uation before these military victories in the lat¬ ter part of '63 and the early part of '64, with the cry for peace

seemingly almost irresistible, that Andrew, Sumner and other radical anti¬ slavery men felt that the most important thing to do was to rescue Lincoln from the peace in¬ fluences that seemed to surround him ; from those who were tempting or pushing him to an unworthy or disgraceful offer of compromise with the leaders of the rebellion. These radical spirits wished to prevent Lincoln from offering the South peace merely on the basis of a re¬ stored Union without emancipation.

There were other political phases of the war on which the opposition joined issue with the administration. The conduct of foreign affairs was made the subject of severe animadversion. In the settlement of the Trent affair it was charged that Seward had been subservient to Great Britain and had sacrificed the national honor. In his tolerance of the French interven¬ tion in Mexico he had sacrificed the traditional policy of the Monroe Doctrine (q.v.). In do¬ mestic affairs the financial and revenue policy of the government were brought into adverse review ; while the creation and the admission of West Virginia were denounced as an unconsti¬ tutional act of spoliation and dismemberment of the <(01d Dominion.®

In the long session of 1861-62 Congress passed a number of measures which, even in this brief review, should not go unmentioned. It authorized the President to take possession of the railroad and the telegraph when the public safety required it; passed a Homestead Act; established a Department of Agriculture; passed the act to donate public lands to States and Territories for the purpose of founding agricultural colleges ; authorized the construc¬ tion of a railroad to the Pacific Ocean, aiding the road in land and government bonds ; and, finally, created the comprehensive scheme of internal taxation. The famous Revenue Act of 1 July 1862 developed the excise tax in a man¬ ner unheard of in this country before. Writers have frequently applied to this system of in¬ ternal revenue Sydney Smith's humorous ac¬ count of British taxation in 1820: ((Taxes upon every article which enters into the mouth, or covers the back, or is placed under the foot; taxes upon everything which it is pleasant to see, hear, feel, taste or smell; taxes upon warmth, light and locomotion ; taxes on every¬ thing on earth and the waters under the earth.® Every visible commodity or transaction was taxed. Licenses were required of all distillers and brewers, manufacturers, wholesale and retail dealers, of men in all kinds of business, — proprietors of theatres, of jugglers and circuses,

of lawyers, physicians, surgeons and dentists. The act imposed 20 cents per gallon on spirits, $1 per gallon on malt liquors, a heavy tax on tobacco and

cigars, carriages, yachts, billiard tables and plate ; on slaughtered hogs, cattle and sheep; on passports, legacies and receipts from railroads, steamboats and toll-bridges ; on divi¬ dends from banks and trust companies; and 3 per cent was assessed on incomes less than $10,000 and 5 per cent on incomes over $10,000, with an exemption of $600. Stamp duties on all kinds of paper were imposed. The income tax was regarded as a form of excise, not a direct tax. (See Income Tax). This Revenue Act and Legal Tender Acts under which $450,000,- 000 of legal tender notes, commonly called greenbacks, were issued, were the most impor¬ tant pieces of fiscal legislation during the war. See Legal Tender.

After the military successes of the Union arms in the fall of 1864 and after the re-election of Lincoln all hope of an independent Confed¬ eracy passed away. It was then only a question of endurance, of <(fighting to the last ditch.® The peace conferences had come to naught and the demands for an armistice were no longer a menace to the complete triumph of the national arms. (See Hampton Roads Conference). Al¬ ready, in 1864, the 13th Amendment and the various plans of reconstruction had begun to receive the attention of Congress, and it is to these subjects, after the fall of 1864, that the student of the political history of the war should give his attention.

Bibliography. — Blaine, J. G., 'Twenty Years in Congress) (Norwich 1884 —93) ; Bur¬ gess, J. W., (The Civil War and the Constitution (New York 1901) ; Davis, J., 'Rise and Fall of the Confederate Government (New York 1881) ; Greeley, H., (The American Con¬ flict (Hartford 1864-66) ; Hart, A. B., 'Source Book of American History) (New York 1899) ; id., 'American History Told by Contemporaries) (4 vols., New York 1898-1901) ; Hay, J., and Nicolay, (Life of Lincoln ; Johnston and Woodburn, (American Orations) (4 vols., 1895— 97) ; Lincoln's 'Complete Works, > and biog¬ raphies by Arnold, Barett, Hapgood, Herndon, Tarbell; McPherson, E., (Political History of the Great Rebellion (Washington 1864) ; Pol¬ lard, E. A., 'The Lost Cause (New York 1868) ; Rhodes, J. F., 'History of the United States from the Compromise of 1850) (5 vols., New York 1893-1904) ; Schouler, J., 'Flistory of the United States under the Constitution (New York 1899) ; Smith, T. C, Political History of Slavery> (New York 1906) ; Stanwood, E., 'History of the Presidency) (2 vols., 1898, 1912) ; Stephens, A. H., Constitutional View of the War between the States) (2 vols., Phila¬ delphia 1870) ; Thayer, J. B., Cases on Con¬ stitutional Law) (1895) ; Williams, G. W., (The Negro Race in America) (1883) ; Wilson, W., (History of the American People* (1902; repr. 1910) ; id., 'Division and Reunion, 1829-89) (1893; expanded, 26th ed., 1909).*

James Albert Woodburn, Professor of American History, Indiana Uni¬

versity.

36. FINANCES (1861-1919). In the win¬ ter of 1860-61 the finances of the Federal gov¬ ernment were most discouraging. Secession was under way; national credit depressed, and

executive efficiency was slowly disintegrating. There was little confidence that the Republican party, which had carried ihe election in Novem¬ ber 1860, would be able to weather the approach¬ ing storm. Some strength was shown at the close of the session by the passage of a new tariff law known as the Morrill Tariff, in which rates were slightly advanced. Lincoln took office 4 March 1861 and appointed Salmon P. Chase Secretary of the Treasury. On 15 April the troops were called out to put down the Rebellion and the country entered upon a four years' war which tried the financial system to the ut¬ most, necessitated radical methods of financier¬ ing, burdened the country with an enormous debt and raised taxes to a permanently high level. In brief, during the fiscal years 1862-65, expenditures were $3,348,000,000 ; taxes $667,- 000,000 and loans $2,622,000,000. Loans were nearly four times as large as taxes. In the spring of 1861 it was not supposed that the war would last long and consequently the legisla¬ tion of July and August was not designed to increase taxes in any considerable degree. A loan of $250,000,000 was authorized, some in¬ crease was made in the tariff schedules and an income tax was levied. Under the authority of the Loan Act the Treasury Department en¬ deavored with the assistance of local banks to borrow $150,000,000 by the issue of three-year treasury notes, bearing 7.3 per cent interest, since known as the seven-thirties. The banks re¬ sponded with energy, but owing to the restric¬ tions of the independent Treasury Law requir¬ ing all payments to the government to be made in specie, they could not carry the burden and in December suspended specie payments. The Treasury Department was forced to follow their example. By the Act of 25 Feb. 1862, a com¬ prehensive loan act was passed and authority given for the issue of $150,000,000 non-interest legal tender treasury notes. There was much opposition to making the notes legal tender, but the issue was justified in the debates on the ground of necessity — "necessity to meet the immediate obligations of the government; necessity to give currency to treasury notes ; necessity to provide money which would in turn purchase bonds.® Two further issues, each of $150,000,000, were made by the Acts of 11 July 1862 and 17 Jan. 1863. In addition to these non¬ interest notes, the legal tender quality was at¬ tached to some of the other short-term treasury notes. Other forms of treasury indebtedness were demand notes, certificates of indebtedness, temporary loans and fractional currency. Of the total amount borrowed $1,045 ,000,000 was in the form of long-term loans ; $890,000,000 in interest-bearing notes ; $458,000,000 in non¬ interest bearing notes and $208,000,000 in tem¬

porary loans.

In selling long-term bonds Chase kept four objects in view: (1) moderate interest; (2) general distribution; (3) future controllability, and (4) incidental utility. Chase objected to selling bonds at a discount, or to offering more than 6 per cent interest. After the suspension of specie payments the legal treasury tender notes, or greenbacks, depreciated greatly in value ; as they were, however, receivable in the pur¬ chase of bonds and as the bonds bore interest in gold, the return to the purchasers, as meas¬ ured in gold, was far greater than the nominal rate of interest would indicate. Under the con-

ditions, therefore, the market for bonds con¬ stantly broadened. To secure a wider distribu¬ tion in the investment of government securities, an agent, Jay Cooke (q.v.), was employed with an extensive system of sub-agents to place the bonds in every section of the country. Chase was also opposed to making long loans and consequently reserved the right to the govern¬ ment of redeeming bonds after 5 or 10 years. This gave rise to securities known as 5-20's and 10-40's, running for 20 or 40 years, but redeemable at the option of the government at the shorter period. In order to make a wider market for bonds, as well as to reform the. currency system on a national basis, the national banking system was organized in which circulation is based upon the deposit of bonds.

In July 1862 a more vigorous policy of taxation was adopted; internal revenue taxes were imposed upon fermented liquors and to¬ bacco ; upon occupations, auction sales, car¬ riages, yachts, billiard tables and plate ; upon slaughtered cattle, transportation agencies, bank¬ ing and insurance companies, advertising, in¬ comes, and legacies. At the same time tariff duties were increased to compensate domestic industry for the internal revenue duties. In¬ ternal revenue receipts did not meet expecta¬ tions and in 1864 a second expansion of the revenue policy was made. The internal revenue system was well-nigh universal in its application. <(Nothing was omitted from the raw product to the finished commodity; often an article re¬ ceived a half dozen additions ere it reached the consumer. And not only were all the con¬ stituent elements which entered into an article taxed, as the bolts, rivets, castings, trimmings and the like of an engine, but the engine when completed was subjected to an additional ad valorem duty upon its value.® Customs duties were again advanced because of the increased duties upon manufactures. The Act of 1864, however, went further in the direction of pro¬ tection and brought rates up to a level

which established a new standard of protectionism. The average rate on dutiable articles was in¬ creased to 47 per cent. The income tax of the war period was highly productive ; at its maxi¬ mum, incomes between $600 and $5,000 were taxed 5 per cent; and incomes above $5,000, 10 per cent. The total receipts from this source, 1863-73, amounted to $347,000,000.

When the legal tender notes were first issued they were convertible into bonds — securities which had a definite gold value, as interest was payable in gold. The quality of convertibility was taken away by the Act of 3 March 1863 and this, together with the increased issues and the waning hope that the government would be able within any short period of time to settle its obligations on a gold basis, led to a marked depreciation in the value of greenbacks. In July and August 1864, the average value of the gold dollar in currency was but 39 cents. As gold was daily needed by importers to pay customs duties and to settle balances abroad, a brisk and often speculative market in bullion resulted. Moreover, the repeated fluctuations in the value of gold measured in currency, oc¬ casioned by alternating hopes and fears as to the outcome of the war, affected all business. Prices were abnormally high and it was esti¬ mated that the cost of the war to the treasury

alone was increased by the inflated issues about

$600,000,000.

When peace was restored in 1865, there were three enormous tasks before the government : funding the debt into more convenient form, revision of the tariff system and the restora¬ tion of a standard of value by the resumption of specie payment. On 1 Sept. 1865, the public debt was $2,846,000,000; less than one-half of this was funded ; loans bore interest at five different rates ; they . matured at 19 different periods, and some were convertible or redeem¬ able at the option of the government. At first there was apparently general agreement that the volume of legal tender notes should be reduced, for on 18 Dec. 1865 the House of Representa¬ tives passed a resolution in favor of a contrac¬ tion of the currency with a view to as early a resumption of specie payments as the various interests of the country would permit. The Funding Act of 12 April 1866 authorized the conversion of temporary short-time interest- bearing securities into long-term bonds, but pro¬ vided only a slight contraction of legal-tender notes. It gave authority to retire $10,000,000 within six months and not more than $4,000,000 in any one month thereafter. Even this re¬ duction was not long continued. It was not easy for the country to readjust itself to peace conditions. Discontent was especially strong in agricultural sections where indebtedness had been incurred by farmers on long-term credits. The

return of hundreds of thousands of soldiers to industry led to many ill-advised ventures and failures. Prices naturally fell with the with¬ drawal of the excessive demands made by war, and for this fall producers were disposed to place the blame upon the contraction in cur¬ rency. On 4 Feb. 1868, after $44,000,000 in greenbacks had been retired, further contrac¬ tion was suspended. In 1869 the Supreme Court in the case of Hepburn v. Griswold decided, four to three, that the legal tender notes were unconstitutional. In 1871 the decision was re¬ versed on the ground that the government had the right to employ freely every means, not pro¬ hibited, which was necessary for its promotion. In 1884 the court decided in favor of the con¬ stitutionality of issues in times of peace.

National credit was also assailed by the proposition that Federal securities should be subject to local taxation and by the demand that bonds should be redeemed in currency in¬ stead of in coin. In some sections bitter at¬ tacks were made upon the rich, who were repre¬ sented as owners of idle wealth which they had gained through the possession of government securities at the expense not only of the laborer who had toiled under low wages and high prices, but also of the soldier who had taken his life in his hands and had received his pay in green¬ backs. In 1870 a Refunding Act was passed au¬ thorizing the issue of $500,000,000 bonds at 5 per cent, redeemable after 10 years ; $300,000,- 000 at 4 14 per cent, redeemable after 15 years and $100,000,000 at 4 per cent, redeemable after 30 years, all to be paid in coin and exempt from national, as well as local, taxation. This act with supplementary legislation fixed the char¬ acter of the debt for the next 25 years.

In 1873 a commercial panic occurred result¬ ing in prolonged industrial depression. The treasury endeavored to relieve the situation by

reissuing $26,000,000 of legal tender notes and Congress passed a bill for a permanent increase to $400,000,000. This inflation bill was vetoed by President Grant in a notable state paper, 22 April 1874. The Republican party, then spurred on by the repeated victories of the Democrats, by Grant's firm stand and the insistence of Secretary Bristow, finally determined to make resumption effective. In the Act of 14 Jan. 1875, it was provided that resumption of specie payments should be entered upon 1 Jan. 1879, and authority was given to the Secretary of the Treasury to sell bonds in order to acquire the necessary amount of gold. In 1877 John Sher¬ man (q.v.) was appointed Secretary of the Treasury and vigorously undertook a policy of gold accumulation ; $138,000,000 in gold was re¬

garded as sufficient to win confidence in the ability of the government to redeem all notes presented and for this Sherman sold $95,500,000 of bonds. Resumption was accomplished on the date set. _ _

In the meantime a new financial question had arisen. In 1873 silver was demonetized by Congress ; a variety of causes led to a fall in the bullion value of silver, among which were its demonetization by Germany in 1871 ; the limitation of coinage in the Latin Union in 1873, and the discovery of new supplies of silver in the United States. The depression following the panic of 1873 started a new clamor for an increased supply of currency and it was bitterly asserted that the United States had joined in a conspiracy to disown silver and limit the volume of legal tender money, in the interest of the creditor class. A struggle ensued to secure the free and unlimited coinage of sil¬ ver, and in 1878 the Bland- Allison Act was passed over the veto of President Hayes pro¬ viding for the monthly purchase of not less than $2,000,000 and not more than $4,000,000 of silver bullion at the market price. The Bland- Allison Act of 1878 continued in operation until 1890. Under its provisions 378,000,000 silver dollars were coined, at a purchase value of only $308,- 000,000, thus yielding a seigniorage of about $70,000,000. As the country had become ac¬ customed to paper money, it was difficult to put the new coins in circulation; authority was consequently given for the issue of silver cer¬ tificates in denominations as low as $1 for the deposit of coin. There was a more serious ob¬ jection to continuing coinage in the fear that it would be impossible to maintain a gold standard. Secretary McCulloch in 1884 and Secretary Manning in 1885 endeavored to arouse Congress to a repeal of the act. The demand, however, for an enlarged currency, represented both by the greenback movement of the period and by those who advocated still freer coinage of silver, made it impossible to secure this legislation.

After the Civil War sweeping changes were made in internal revenue taxes. In 1870 there were left only those on distilled spirits, fer¬ mented liquors, tobacco, banks and bankers, adhesive stamps and certain manufactured arti¬ cles and the income tax; the latter was repealed in 1872. There was less readiness to change tariff duties; protectionism had gained in strength through the growth of manufactures and the Republican party from its origin had been committed to the principle. Slight reduc¬ tions were made, but the system as a whole was

maintained with little change. The country recuperated from the crisis of 1873 and begin¬ ning with 1880 large surpluses were turned into the treasury. The Refunding Act of 1870 ham¬ pered the government in the redeeming of bonds, except at a premium, and in 1883 Con¬ gress was forced to overhaul the tax system. All internal revenue duties were repealed except those on spirits, fermented liquors and tobacco. Rates on tobacco

were reduced one-half. A tariff commission recommended a substantial reduction in customs, but Congress paid little heed and enacted a protective tariff in which a harmonious framework was sacrificed to the pressure of conflicting interests. The Demo¬ crats repeatedly endeavored, particularly during President Cleveland's administration, 1885-89, to enact tariff measures, but protectionist sym¬ pathies within the party defeated every at¬ tempt. In 1889 the Republicans regained con¬ trol and in 1890 enacted a measure, the McKin¬ ley Bill, in which protectionism was developed to a point hitherto unknown. Increased duties were laid upon a great number of articles and in some cases the rates practically prohibited importation. The act also introduced two new principles — a bounty on the domestic produc¬ tion of sugar and commercial reciprocity under executive proclamation.

In 1890 silver sentiment affecting both par¬ ties was so strong that further concessions had to be made in order to prevent unlimited coin¬ age. An act was passed known as the Sherman Silver Purchase Act, providing for the purchase of 4,000,000 (Ounces of silver buillion monthly, and the issue in payment thereof of treasury notes of full legal tender. This increased the monthly purchases of silver and authorized treasury notes of full legal tender in place of silver certificates which were of only partial legal tender quality. Treasury notes were re¬ deemable either in gold or silver coin at the discretion of the secretary.

Under the McKinley tariff customs duties declined, and this, coupled with commercial dis¬ turbances involving the United States, resulted in the exportation of gold. Large amounts of gold were obtained from the treasury by the presentation of legal tender notes and treasury notes of 1890. The gold reserve which since 1879 had been maintained at $100,000,000, or more, began to slip away until there was fear that the treasury would be forced on to a silver basis. On 30 June 1890 the reserve stood at $190,000,000; three years later it had fallen to $95,000,000. The significance of the underlying forces which were weakening government credit were not, however, clearly seen and appropria¬ tions continued to be made with a liberal hand. In 1890 there was a surplus of $105,000,000; in 1893 it was but $2,000,000, and in 1894 there was a deficit of $70,000,000.

The Democrats won in the election of 1892 and Cleveland again became President. In June 1893 the mints in India were closed to the coinage of silver; this led to a still further fall in the price of silver bullion and occasioned im¬ mediate apprehension that the treasury would soon be unable to redeem its obligations in gold. Within a few weeks the country was in a state of panic. President Cleveland called a special session of Congress and after most urgent pres¬ sure secured the repeal of the Silver

Act of 1890. The country did not easily re¬ cover from the panic; withdrawals of gold from the treasury continued and the administration was forced to make four issues of bonds in order to keep an adequate supply of gold on hand to meet the requirements of the ((endless chain.® The embarrassment of the treasury was also aggravated by an insufficient supply of revenue. The Democrats in 1894 enacted a new tariff measure which included an income tax; as introduced in the House under the leader¬ ship of Wilson, this bill was in the interest of free trade, but protective sentiment within the Democratic party radically modified the measure in the Senate, so that in its final form it made little change in existing policy. The income tax was promptly attacked on the ground of unconstitutionality. In a decision of 8 April 1895, the Supreme Court decided that a tax on income from land was a direct tax and, there¬ fore, unconstitutional unless apportioned; and in a decision 20 May, inoome derived from other sources was also brought within the same in¬ terpretation.

The Presidential campaign in 1896 was fought out on the basis of free silver. The Democrats in their platform declared in favor of the free and unlimited coinage of both gold and silver at the ratio of 16 to 1 without wait¬ ing for the aid or consent of any other nation; the Republicans, on the other hand, demanded international agreement. The Republicans won and made good the victory for the gold standard in the Currency Act iof 1900. This declared gold as the standard of value and au¬ thority was given the Secretary of the Treasury to maintain it by the temporary lock¬ ing up of treasury notes and the sale of bonds, whenever the reserve fell below $100,000,000. The act also provided for the refunding of the debt at a Lower rate of interest, and gave national banks opportunity to take out a larger amount of circulation.

Upon their return to power in 1897, the Re¬ publicans enacted the Dingley tariff; on some commodities the duties of 1890 were restored, on others compromises between the rates of 1890 and 1894 were accepted, and in a few in¬ stances the lower rates of the Wilson tariff were allowed to stand. The principle of re¬ ciprocity, dropped in the Wilson tariff, was again incorporated into the tariff system to be brought into operation, however, by treaties ex¬ ecuted by the Senate. In 1898 war with Spain necessitated the issue of $200,000,000 of bonds and the levying of new internal revenue duties. This proved amply sufficient to meet the in¬ creased

expenditures for the army and navy.

With the opening of the new century, in¬ dustrial and corporate enterprise developed on an unprecedented scale. The trust movement was in full swing and large amounts of cor¬ porate securities sought investment. Crops were large, and, beginning with 1902, the autumnal money stringency repeatedly became severe. Prosperity at the same time created a series of treasury surpluses. Congress, there¬ fore, in 1901 and 1902 repealed the internal revenue duties imposed in 1898; and Secretary Shaw endeavored through the agency of the Treasury Department to relieve the money market. He used not only the old expedients of depositing government funds in banks and of

purchasing bonds, but made new rulings whereby banks could more easily secure govern¬ ment deposits. State, municipal and even rail¬ road bonds were accepted from banks as col¬ lateral for deposits. The number of deposi¬ tary banks increased from 442 in 1900 to 713 in 1903, and government deposits from $93,- 000,000 to $413,000,000.

During this period the monetary circulation gradually increased. Bank circulation grew from $254,000,00 in 1900 to $739,000,000 in 1911. But the currency system remained as inelastic as ever, and the increased circulation brought with it the dangers of inflation. In October 1907, a severe panic occurred which brought the problem of currency reform into greater prominence. Many plans were pro¬ posed, as for establishing a central bank, legal¬ izing notes issued by clearing-house associations and for the issue of an emergency circulation. The result was the Vreeland-Aldrich Act of 1908, which provides for the issue of supple¬ mentary credit notes subject to a special tax. Provision was also made for the appointment of a monetary commission to devise a more permanent and satisfactory plan. This com¬ mission in 1912 reported in favor of the es¬ tablishment of a reserve association chartered by the Federal goverment to be the fiscal agent of the government and to hold its deposits. Its banking powers were limited to dealings with banking institutions, and ultimately the plan provided for giving to the reserve asso¬ ciation the sole power of note issue. Much fear, however, was expressed that this would centralize the banking power and thus es¬ tablish under another name a central bank, to which public (Opinion was generally opposed. Action was consequently delayed.

In 1910 Congress authorized the establish¬ ment of a postal savings bank system, whereby a certain percentage of the deposits are kept as a reserve fund in the treasury and a part invested in government securities.

In 1909 the Payne-Aldrich Tariff Act was enacted. Although there was general expecta¬ tion that duties would be lowered, but few important

changes were made. The most im¬ portant change was the placing of hides on the free list. Reciprocity as a general princi¬ ple was abandoned and a policy of retaliation endorsed through the adoption of a maximum and minimum principle. There was much dis¬ appointment over the outcome of this tariff struggle, for the cost of living was increasing and monopolistic influences appeared to be more and more oppressive. The Democrats secured a majority in the House of Representa¬ tives in 1910, and passed several tariff bills for the reduction of rates, particularly on cotton and woolens. These bills, however, were vetoed by President Taft. In January 1911, President Taft arranged a reciprocity treaty with Canada which provided for free trade in certain food products and reduced duties on manufactured goods. Only after a struggle was this agreement endorsed by Congress. Canada, however, decided against it.

Authority was also given for the appoint¬ ment of a tariff board which should collect data to assist the President in determining when a foreign country was entitled to the minimum scale of duties. Later this board was given

larger powers in the collection of information which it was hoped might be iof service in framing new tariff laws. The board employed experts and published exhaustive reports on the cost of production of woolen and cotton goods. The Democrats, however, were dis¬ inclined to accept the assistance of this new branch of administrative machinery on the ground that it encroached upon the legislative privilege and duty of originating and framing tariff bills. In 1912 consequently the board went out of existence owing to lack of an ap¬ propriation for its support.

The Payne-Aldrich Tariff Act provided for a tax of 1 per cent on incomes above $5,000 of all corporations organized for profit. Con¬ gress also proposed a constitutional amend¬ ment whereby a general income tax might be imposed, and this was accepted by two-thirds of the States.

The growth of treasury receipts and ex¬ penditures since the Civil War until 1910 is shown in the following table (in millions of dollars) :

Growth of Treasury Receipts and Expenses.

Internal Total Expen d- Customs revenue receipts itures

1870 . 195 185 396 294

1880 . 187 124 334 265

1890 . 230 143 403 298

1900 . 233 295 567 488

1910 . 334 290 676 651

Expenditures rapidly increased after the Spanish War. The colonial possessions im¬ posed new burdens of protection and develop¬ ment upon the government ; and there was a growing consciousness that this country must be in a position to take a larger place in world politics. The army, and more particularly the navy, made heavy draughts upon the treasury. The cost of the navy increased from $56,000,- 000 in 1900 to $123,000,000 in 1910. The gov¬ ernment extended its activity in many new directions at home. Of special importance were the expenditures for the Department of Agriculture. Between 1900 and 1912 the sum appropriated for agricultural purposes was $90,000,000, or double the sum expended in the previous 60 years. New services were under¬ taken, as food and meat inspection, the re¬ clamation of arid land and the extension of the forest service. Salaries increased with the growing cost of living; new public buildings were constructed, and the Census Bureau was made permanent. The cost of construction of the Panama Canal, amounting to nearly $300,- 000,000, was in part paid out of current taxa¬ tion and in part by loans.

The Democrats came into power in 1913. Their first step was to enact a new tariff law, known as the Underwood tariff. Ad valorem rates were substituted for specific and com¬ pound duties; the free list was extended, includ¬ ing coal, leather, wood-pulp, lumber, agricul¬ tural implements and machinery, wood, and ultimately sugar. Rates on many manufactured products were lowered and simplified. It is difficult to determine the effect of this new tariff either upon industry or fiscal receipts owing to the outbreak of the Great War in 1914 which disturbed so violently the normal commercial relationships of this country with Europe. Customs receipts fell from $319,000,-

000 in the fiscal year ending Tune 1913 to $210,- 000,000 in 1915 and $183,000ˆ00 in 1918. The latter figure is the lowest reached for 20 years. The average ad valorem rate of duty on the total volume of dutiable goods has fallen from 50 per cent in 1899 to about 25 per cent ; and on all goods, dutiable and free, from about 30 to less than 8 per cent.

The new Democratic Congress took advan¬ tage of the recent constitutional amendment au¬ thorizing the levying of an income tax, by in¬ cluding in the Tariff Law a tax upon net per¬ sonal income in excess of $3,000 or

$4,000 in case of a married couple. Surtaxes were also imposed which made the tax a progressive rate. In 1914 the yield was $28,000,000; in 1915, $41,000,000; and in 1916, $68,000,000. This was a disappointment to the supporters of the tax, but is accounted for partly because the law was not clear and the administration had not had experience in interpreting and enforcing its provisions. The yield of the corporation in¬ come tax was also not large, rising from $35,000,000 in 1913 to $57,000,000 in 1916.

The Democrats also determined to make a settlement of the banking difficulties which had hampered business for many years. In Decem¬ ber 1913, the Federal Reserve Act was passed. This in part followed the plan proposed by the National Monetary Commission, previously re¬ ferred to, but instead of creating one central bank provided for a central Federal Reserve Board with 12 regional banks. This new sys¬ tem was brought under tne control of the gov¬ ernment more strictly than was proposed in the original plan, by the requirement that the mem¬ bers of the Reserve Board be appointed by the President, and that the Secretary of the Treas¬ ury and the comptroller be ex-officio members of the board. The district banks hold the de¬ posits of the government.

The European War (August 1914) quickly disturbed these new financial plans and it was necessary' to add financial support to the treas¬ ury. Internal revenue duties were revised up¬ ward, 22 Oct. 1914, but the decline of cus¬ toms duties and the falling off of duties from liquors owing to the spread of prohibition, more than offset the advance in rates. In¬ creased expenditures were necessary in 1916 owing to troubles on the Mexican border and the need of providing for the new Shipping Board.

In his annual message, December 1915, President Wilson was finally aroused to the need of preparedness of this country and ad¬ vocated an increase in the army and navy with corresponding financial legislation to meet these expenditures. The army appropriation bill consequently enacted called for an increase of more than $150,000,000; naval appropriations also were largely increased. Altogether the appropriations noted amounted to over $1,600,- 000,000, or more than $500,000,000 larger than in the previous year. The nation was started on the road of big finance.

President Wilson advocated a pay-as-you-go policy of taxation in preference to borrowing by the sale of bonds. While Congress did not follow the more specific recommendations of the President as to the kinds of taxes to be levied it did accept his general principle and enacted, on 9 Sept. 1916, a revenue measure designed to raise some $200,000,000. This

measure increased income tax rates, imposed a Federal inheritance tax and introduced the special tax on the profits of munitions makers. The performance of Congress was not equal to the need of the treasury and Congress again had to take up the question of further income. It increased the inheritance tax and introduced, from foreign financing, a new tax on excess profits of corporations and partnerships. These new taxes were calculated to raise about $250,- 000,000. In addition authority was given to make new loans of over $600,000,000. Thus the situation stood when Congress adjourned in March 1917.

The next month saw the declaration of war, with the necessity of financial operations only paralleled by the tremendous undertakings of Europe. There was much discussion as to whether the enormous expenditures should be met by taxation or by borrowing. There were two opposing opinions. One argued that the material for the war must be furnished by the existing population and that consequently the real cost of the war must at once be sustained. The other held that it was impracticable to take all the existing income by taxation Xvith- out imperiling future production. A compro¬ mise was reached. Roughly a program. of one- third taxation and two-thirds borrowing was adopted.

Income taxes were increased in October 1917 and higher super-taxes were imposed, the limit of exemption was lowered and the excess profits tax was increased upon a graduated scale. The result was seen in 1918 when the ordinary receipts were four billions ($4,179,- 000,000), or approximately four times that of the pre-war period. Of this total, customs duties produced an insignificant amount, $183- 000,000 ; miscellaneous sources gave $300,000,000, and internal revenue taxes, $3,695,000,000. In this latter group, however, the new taxes on in¬ come and profits furnished more than three- fourths, or $2,839,000,000.

But the taxes of 1917, revolutionary as they were, were not sufficient for governmental needs. In the summer of 1918 Congress began the preparation of a bill to raise $8,000,000,000, but after the armistice in November the goal was set at $6,000,000,000. The chief increases were again in taxes on income, both of in¬ dividuals and corporations, and on excess profits. The adoption of the constitutional amendment in favor of prohibition reduced the amount expected from the tax on beverages. Taxes on transportation, including railways, telephones and telegraphs, previously intro¬ duced in 1917, were continued and luxury taxes were added. But chief reliance was placed on the income and excess profits taxes. The act of February 1919 planned to raise more than three-fourths of the $6,000,000,000 from this source. For residents the normal rate is 6 per

cent on the first $4,000 of net income above exemptions and 12 per cent on the remainder. In addition there are progressive surtaxes, reaching 65 per cent on incomes over a million dollars. The exemptions established in the act of October 1917, $1,000 for single persons and $2,000 for married persons and heads of fami¬ lies remained the same. The income tax as ap¬ plied to corporations was designed to yield over $3,000,000,000 or about one-third of this total income.

In addition to taxation the government made enormous loans. In 1917 and 1918 four Liberty loans were placed as follows :

First 3 is . $2,000,000,000

Second 4s . 3,807, 862 , 350

Third 4jS . 4,176,516,850

Fourth 4is . 6,989,047,000

$16,873,426,200

The rate of interest has gradually increased and for the Fifth Victory Loan (April 1919) the rate was advanced to 4)4 Per cent. The issues vary in tax-exempt privileges, the first being practically free from all taxes, while the others, though free from the normal income tax, are sometimes taxable for super-taxes and excess profits taxes. In placing these loans an extraordinary effort was made to give them wide distribution. Allotments were made to the different sections, States and towns, the bonds were issued in small denominations and popular appeals were made to incite sacrifice and patriotic support. In this huge undertak¬ ing the Federal Reserve banks played an im¬ portant part. Member banks have been able to rediscount loans secured by Liberty bonds.*

Considering the enormous task suddenly im¬ posed upon the government there is reason for satisfaction in the results accomplished. The government, however, has entered upon new fields of finance which will require new methods of financial operation. The budgets of 1920 and 1921 were $5,799,758,000 and $4,919,730,000 respectively. Receipts, year ended 30 Tune 1920, $22,547,420,420; disbursements, $23,441,383,565.

Since 1861 there have been 26 secretaries of the treasury; the most distinguished among these are as follows : Chase, notwithstanding his lack of experience with fiscal affairs, dis¬ played political shrewdness, devotion and in¬ tegrity at a time when ordinary methods of finance had to be laid aside; Fessenden, his successor, during the closing months of the war, inspired confidence ; McCulloch earnestly contended for an early

resumption of specie payments and the retirement of the greenbacks ; Boutwell in Grant's first administration carried through the refunding of the debt ; Bristow in Grant's second administration attacked corrup¬ tion in the internal revenue service and placed new insistence upon resumption; Sherman left a brilliant record in making resumption success¬ ful notwithstanding the opposing forces of in¬ flation; Manning in 'Cleveland's first term strongly urged a moderation of the tariff and the repeal of the Bland Act; Carlisle in Cleve¬ land's second administration upheld the credit of the government in the issue of bonds ; Gage executed the provisions of the Currency Act of 1900; Shaw reorganized the details of the cus¬ toms administration ; and McAdoo showed en¬ ergy and resourcefulness in managing the enormous loans of 1917 and 1918. As a whole, the treasury administration has been free from scandal. See also Banks and Banking; Money.

Bibliography — Bolles, A. S., < American Finance5 (New York 1904) ; Dewey, D. R., financial History of the United States> (5th ed., New York 1915) ; Noyes, A. D., (Forty Years of American Finance5 (New York 1909).

Davis Rich Dewey, Massachusetts Institute of Technology.

UNITED STATES — RECONSTRUCTION (37)

429

37. RECONSTRUCTION. With the sur¬ render of the Southern armies and the collapse of the Confederate government all organized resistance to the authority of the United States was at an end, but a problem second only to that of suppressing the insurrection now confronted the nation. This was the question of the restoration of the late insurrectionary States to their normal relations in the Union and the determination of the political status of both those who had borne arms against the United States and those who had been made free by the results of the war. It was a great political and social problem, involving, on the one hand, the political reorganization or ˆreconstruction® of the Southern State governments which had carried on the war against the Union and, on the other, (

Theories of Reconstruction. — It was ad¬ mitted on all hands that the collapse of the Confederacy left the Southern States in an anomalous condition so far as their political status was concerned, but opinions varied widely as to the exact nature of that status. The framers of the Federal Constitution ap¬ parently did not foresee the possibility of civil war and consequently inserted no provisions in the fundamental law relative to the status of a State which having once seceded should be re¬ conquered and

brought again under the author¬ ity of the United States. As soon as the even¬ tual defeat of the Confederate armies was fore¬ seen discussion of the status of the Southern States, preliminary to the work of political re¬ organization, became active both in and out of Congress and several well-defined theories were enunciated. One of these was the view held by President Lincoln and his supporters that the act of rebellion in each State was the act of combinations of disloyal persons who had un¬ lawfully subverted the State governments. The existence of the States themselves, he held, was not affected by the disloyal acts of their inhab¬ itants although he admitted that as a result of rebellion the States were out of their (

conquered provinces or governed indefinitely as Territorial dependencies under the plenary power of Congress. A third and somewhat intermedi¬ ate view was that finally adopted by Congress, namely, that the Southern States as a result of rebellion had (

Executive Reconstruction. — As early as 1862 large portions of Arkansas, Louisiana and Tennessee having been occupied by the military forces of the United States, President Lincoln proceeded to administer these districts through officers called (

the executive method by the passage of a joint resolution which prohibited the counting of the electoral vote of any State that had passed an ordinance of secession. A breach between the President and Congress now seemed inevitable but had Mr. Lincoln lived it is highly probable that owing to his tact and influence with Con¬ gress the difficulties would have been settled in a manner satisfactory to Congress and to the great advantage of the Southern States. After the assassination of Mr. Lincoln, the Vice-President, Andrew Johnson, a man of far more aggressive and obstinate disposition, took up his policy without material change and carried it through only to have it all rejected by Con¬ gress. On 29 May 1865, President Johnson is¬ sued a proclamation of amnesty designed for the benefit of all who had not taken advantage of Mr. Lincoln's offer of 1863. It resembled Mr. Lincoln's proclamation in all essential par¬ ticulars except that it excluded a large number of persons from the privileges of amnesty, among them all owners of $20,000 worth of property who had voluntarily enlisted in the Confederate service. Those who belonged to the excepted classes were allowed to make spe¬ cial application to the President, who agreed to extend such clemency as appeared to be con¬ sistent with the facts of the case and the peace and dignity of the United States. By subse¬ quent proclamations President Johnson ap¬ pointed "provisional

governors® for North Car¬ olina, Georgia, Mississippi, Alabama, South Carolina and Florida, the reconstruction of the other Southern States being regarded as al¬ ready complete. These officials were directed to call conventions in their respective States for the purpose of amending their old consti¬ tutions so as to adapt them to the new condi¬ tions created by the results of the war, after which they were to be restored to their normal relations with the Union. Before the end of the year conventions had been held in all these States except Texas and they had adopted con¬ stitutional amendments either "repealing® the ordinances of secession or pronouncing them null and void. Likewise they had all abolished slavery, most of them had repudiated all debts incurred in aid of the rebellion and all but Mississippi and Florida had ratified the 13th Amendment to the Federal Constitution. More¬ over they had held elections, chosen State offi¬ cers and representatives in Congress and the legislatures had elected United States senators. When, therefore, Congress met in December 1865 for the first time since the close of the war, the President took great satisfaction in inform¬ ing that body that all the late insurrectionary States except Texas, whose convention was not to meet until March of the following year, had been reconstructed and were ready to resume their constitutional places in the Union. Con¬ gress, however, ignored the whole scheme of reconstruction which Lincoln and Johnson had carried out, refused to admit the senators and representatives from the Southern States to seats in Congress and appointed a joint com¬ mittee of 15 members to inquire into the con¬ dition of these States and report whether any of them were entitled to representation in Con¬ gress. One of the chief reasons which led Congress to veto the executive policy was the drastic character of the police legislation which some of these States had enacted in the summer

and autumn of 1865 for the purpose, it was alleged, of keeping the negroes in a condition of involuntary servitude if not of actual slav¬ ery. The offense of vagrancy was so defined that few freedmen could escape punishment. Those who were unable to pay the fines imposed upon them were to be <(sold out,® their former masters being given the preference as lessees A harsh and unnecessary apprentice system for binding out colored minors was adopted.. In Mississippi negroes were prohibited from rent¬ ing or leasing land in incorporated towns and. in most of the Southern States they were denied the right to give testimony in the courts except in cases in which negroes were parties. The demoralization of the negro race in 1865 was undoubtedly such as required stringent police measures to prevent crime and pauperism ; but in singling out the black race for especial pun¬ ishment the Southern legislatures greatly of¬ fended the sentiment of the North. In April 1866, Texas having complied with the require¬ ments of the executive scheme of reconstruc¬ tion, the President issued a proclamation of¬ ficially declaring the rebellion at an end. In June the

Reconstruction Committee made its report declaring that the Southern State gov¬ ernments established under the executive aus¬ pices were illegal (although they had been re¬ garded as good enough to ratify the 13th Amendment), that Congress alone had author¬ ity to reconstruct these governments, and that guarantees of future security should be re¬ quired as a condition of restoration to the Union. The committee recommended the de¬ nial of representation to these States until suf¬ ficient guarantees for the protection of the civil rights of the negro were forthcoming and that a portion of those guilty of having taken part in the rebellion be disfranchised from voting and disqualified from holding office.

Congressional Reconstruction. — When Congress met in December 1866 an effort was made to impeach the President (see United States — Impeachments) and the Tenure of Office Act was passed to limit his power of re¬ moval. His power, also, as commander-in¬ chief of the army and his power of clemency were abridged and a law was passed requiring the new Congress to meet on 4 March follow¬ ing. In February Congress passed in spite of the President's veto the first of the Reconstruc¬ tion Acts for the more efficient government of the late insurrectionary States. This act grouped the said States into five military dis¬ tricts each of which was to be placed under the command of an army officer who was charged with the maintenance of order and the protec¬ tion of property. The State governments were left intact but were declared to be provisional only and subject to the paramount authority of the United States. By a supplementary act of 19 March, likewise passed over the President's veto, the military commanders were directed to cause to be made a registration of the qualified voters without regard to race or color and to call a convention, if the majority of the voters were in favor of one, for the purpose of adopt¬ ing a new constitution. When the constitution should be approved by Congress the State should be readmitted to representation in both houses of the National legislature. Military com¬ manders were promptly appointed for the dif¬ ferent districts and with adequate forces they

took possession and proceeded to govern the in¬ habitants according to the forms of military law. Arbitrary arrests were common, trial by jury was superseded by trial by military com¬ mission and various orders having the force of law were issued for the regulation of the con¬ duct of the citizens. The new colored voters were registered, many of the old white voters were excluded for participation in the rebellion, conventions were chosen in all the Southern States by the new electorates and by May 1868 these

conventions had all adopted constitutions establishing negro suffrage and disqualifying large numbers of white persons. In all the States except Mississippi, Texas and Virginia these constitutions were promptly ratified by the new electorates and in June they were re¬ admitted to representation in Congress. In Mississippi, where a constitution containing several provisions of a proscriptive character had been framed, the whites after a determined campaign succeeded in defeating it at the polls. In Texas and Virginia, where likewise ob¬ noxious provisions had been inserted in the constitutions, the reconstructionists were induced to delay indefinitely submission to the people. These three States, therefore, continued under military rule. In the meantime the legislature of Georgia having excluded the negro mem- bers-elect from their seats, the United States Senate refused to admit the senators from that State to seats in Congress. Consequently at the time of the accession of President Grant four of the Southern States were still unrestored to their constitutional positions in the Union. He was induced to recommend to Congress the re¬ submission of the constitutions of Mississippi and Virginia to the voters in such a way as to enable them to vote separately upon the ob¬ noxious provisions. Congress so directed; the constitutions were resubmitted, and were rati¬ fied without the objectionable provisions. By the same act Congress directed the submission of the Texas constitution to the people and it was duly ratified. These three States were punished for their tardiness by the imposition of an additional condition precedent to restora¬ tion, namely, the ratification of the 1 5th Amendment. Early in 1870, having complied with this additional requirement they were re¬ admitted to representation in Congress and re¬ stored to their full positions in the Union. Finally after having been twice reconstructed Georgia complied with the new conditions im¬ posed by Congress and in June was. likewise re¬ stored to her place under the Constitution. The military governments now gave way to the State governments, Federal interference was withdrawn and reconstruction technically at least was completed.

Civil and Political Rights for Freedmen.

— Slavery having been abolished by the 13th Amendment, adopted in 1865, the investment of the negro with civil rights followed as a neces¬ sary incident of his new status. Some of the Southern legislatures in 1865 passed laws deny¬ ing the freedmen the right to own real estate in some cases and to give testimony in the courts and having otherwise abridged their civil rights, Congress in April 1866 passed over the President's veto the noted Civil Rights Act which conferred upon all persons of color the status of citizenship and placed them upon an equality with white citizens in the making and

enforcing of contracts, in suing and giving testimony in the courts, in

acquiring, holding and conveying real as well as personal property and in the enjoyment of equal protection of the laws for the security of person and property. The United States courts were given jurisdic¬ tion of cases arising under the act and the President was empowered to use the army and navy to enforce it. Foreseeing the possible re¬ turn to power of those opposed to civil rights for the negro and the consequent repeal of the act, Congress immediately proposed the 14th Amendment, embodying the principles of the Civil Rights Act. To incorporate it in the Con¬ stitution would have the effect of placing the civil rights of the negro beyond the reach of any hostile Congress. Ratification of this amendment by the Southern States was made a condition precedent to their restoration to the Union. Finally, in July 1868, Congress de¬ clared that the amendment had been ratified by the requisite number of States and was, there¬ fore, proclaimed a part of the Constitution. The amendment declared that all persons born or naturalized in the United States and subject to the jurisdiction thereof are citizens of the United States and of the State in which they reside; provided for a reduction of the repre¬ sentation in Congress of any State that should deny the suffrage to any of its adult male citizens; disqualified many of the prominent ex- Confederates from holding Federal office; in¬ validated all debts and other obligations in¬ curred in aid of the rebellion and prohibited the States from abridging the privileges of citi¬ zens or denying to any person the equal protec¬ tion of the laws. By the threat of reducing their representation in Congress the nation offered an inducement to the Southern States to give the negro the right of suffrage, but it was soon discovered to be insufficient, and in February 1869 a new amendment (the 15th) was proposed which declared that the right to vote should not be denied or abridged by the United States or by any State on account of race, color or previous condition of servitude. Ratification of this amendment was imposed as a condition precedent to the readmission of the four States of Mississippi, Texas, Virginia and Georgia, which still remained under military government and without representation in Con¬ gress. By March 1870 the requisite number of States had ratified the amendment and it was proclaimed a part of the fundamental law. Al¬ though this important amendment did not directly confer the suffrage upon the negro it did confer upon him an exemption from dis¬ crimination upon the part of any State in fixing the qualifications for voting. Having secured full civil and political rights for colored citi¬ zens, the Republican leaders now undertook, by an act of March 1875, to secure social equality for all colored persons in hotels, public conveyances, theatres and other places of public amusement, but the Supreme Court held the act void as beyond the power of Congress.

The Freedmen's Bureau. — One of the agencies through which the process of recon¬ struction was worked out was the Freedmen's Bureau, first established in March 1865 and placed under the supervision of the War

De¬ partment. In general, its purpose was to aid and advise the large number of freedmen who were demoralized and made helpless as a result

of sudden liberation. During the last years of the war thousands of blacks left the planta¬ tions and gathered about the camps or followed in the wake of the Federal armies. To provide for their support was a difficult problem which every commander in the South had to meet. At first appeals were made to philanthropic persons of the North for funds with which to support this class, and generous responses fol¬ lowed, but as the end of the war approached the number of negro ˆcontrabands® increased until it was found impossible to rely wholly upon the support of charitable relief. Being released from the restraints of slavery, many freedmen made good use of their liberty to quit work and wander about the country only to find themselves, after a brief season, in a state of destitution. Others who continued to labor on the farms of their former masters were sometimes taken advantage of in regard to labor contracts and were denied the rights of free men which the results of the war had brought them. The bureau undertook to pro¬ vide hospitals and medical relief for the sick and infirm ; it distributed large quantities of food to the destitute ; it undertook to prevent the infringement of the civil rights of freed¬ men; it provided special courts for the trial of accused freedmen in all cases in which the State excluded the testimony of colored wit¬ nesses ; it examined and approved their labor contracts; it circulated the emancipation proc¬ lamation among the blacks of the remote dis¬ tricts ; it instructed them as to their new duties and responsibilities; it urged them to labor and impressed upon them the sacredness of the marriage contract; it established schools and supplied teachers to such communities as wished them and in various other ways undertook to aid the unfortunate blacks whom emancipation had left to shift for themselves. The officials of the bureau also used their influence with the credulous blacks to induce them to enter into labor contracts with planters and thus per¬ formed a service not without value to the white race.

The organization of the bureau was quite elaborate. Its head was a commissioner, this office being held by Gen. O. O. Howard (q.v.) ; there was an assistant commissioner for each State and a number of sub-commis¬ sioners, each in charge of a particular district of the State. In every locality was stationed an agent who acquainted the freedmen with the orders of the bureau, distributed the rations and performed various other duties. ˆ The law as passed in 1865 made no appropriation for the support of the bureau, but its income from the sale of certain confiscated

property and the rent of abandoned lands was sufficient to meet expenses. In July 1866 a new act was passed and the operations of the bureau largely ex¬ tended. It was not finally withdrawn from all the Southern States until 1872. Although the bureau accomplished some good it did not pro¬ mote the harmonious relations between the two races which it was expected to do. The agents of the bureau were mostly subordinate military officers and a considerable number of them turned out to be inefficient and unscrupulous. Too ofter able-bodied freedmen were encour¬ aged in their idle habits by the distribution of government rations, while in not a few cases they were led to believe that the lands were to

be distributed among them. Likewise it fre¬ quently happened that the zeal of the bureau officials for the enforcement of exaggerated rights led to violent conflicts between white citizens and the military forces which were at the disposal of the bureau.

The Carpet-Bag® Regime. — The recon¬ struction acts by enfranchising the negroes and disqualifying large numbers of the more in¬ fluential whites made it possible for the blacks to get possession of the governments in most of the Southern States and to rule them in a most ignorant and extravagant manner. They were made use of by unprincipled adventurers from the North who flocked to the South in considerable numbers after the close of the war, some to engage in the profitable industry of cotton planting, others to fill the offices from which the more prominent Southern whites were excluded. These Northern immigrants came to be called (that all their worldly effects were carried In a carpet-bag. By no means all of the Northern men who came to the South at this time were unscrupulous adventurers bent upon plunder, but they all allied themselves on the side of the negro in political matters, thus increasing the bitterness of race antagonism. A few na¬ tive Southerns — ((scalawags,® they were called — also allied themselves politically with the Northern men and negroes for the purpose of sharing in the offices. Both these classes of whites were bitterly hated by the native Southern element who saw themselves excluded from power by strangers and others who had little substantial interest in the State. The in¬ fluence of the carpet-bag class over the negroes was at first very great. They organized the freedmen into political clubs, instructed them in the art of voting and made use of them to further their own political ambitions. The carpet-baggers secured the nominations to the more important offices and were easily elected by large black majorities. But the colored vot¬ ers were not content to see all the offices held by their white allies, and their ambition was frequently too great to be ignored. Consequently many of the important offices came to be held by ignorant blacks who but a few years pre¬ vious were field-hands on the plantations. In several States negroes filled the offices of lieu¬ tenant-governor, secretary of state, superinten¬ dent of education and other important offices. In some instances they even sat upon the benches of the higher courts, while they filled many minor judicial positions. They occupied seats in the legislatures of all the Southern States, that of Mississippi in 1871 having as many as 55 colored members. A considerable portion of these were ignorant, some of whom were unable to read or write and all of whom were the pliant dupes of unscrupulous Northern men. With the State and local governments con¬ trolled by ignorant negroes and designing white men, an era of extravagance, misrule and corruption set in which in some instances amounted to outright robbery and plunder. Long and frequent sessions of the legislature were held for service in which the members voted themselves large per diem allowances. Old laws were ruthlessly repealed and replaced by bulky statutes, many of which bore the ear marks of animosity and oppression. Counties were

rechristened with names full of offense to Southern whites. Laws favoring

social equality were passed. Public school systems on an ex¬ travagant scale for the children of both races were established and taught by Northern teachers. Offices were greatly multiplied — many of them mere sinecures — for the benefit of good Republicans. Gigantic schemes of pub¬ lic improvement were undertaken, most of which were marked by frauds and extravagance. The rate of taxation was increased out of all proportion to the ability of the people to pay in their then impoverished condition resulting from four years of destructive war. In Mississippi this rate was increased from one mill on the dollar in 1868 to 14 mills in 1871, and the inability of the people to pay resulted in the confiscation of one-fifth of the land of the State. Large debts were incurred for pro¬ jected improvements, especially in Louisiana and South Carolina, where a wholesale system of plunder was carried out by the reconstruc¬ tion governments. In the latter State the pub¬ lic debt was increased from $5,000,000 in 1868 to nearly $20,000,000 in 1874. The tax levy was increased four-fold, although the value of tax¬ able property had declined 100 per cent. Large gratuities were voted State officials, the State capitol was furnished after the manner of a European palace and vast sums were squandered in reckless schemes for public improvement.

Under these conditions the taxpayers grew restless and disorders began to occur here and there. They naturally chafed under the rule of their former slaves who were controlled by strangers possessing no permanent interest in the South. Wherever the negroes were in the majority they carried the elections and con¬ trolled the government. The extravagance and corruption of their rule aroused the whites to adopt concerted measures for counteracting the political power of the negroes by terrifying them and keeping them away from the polls at election times. This was effectively accom¬ plished by the organization of secret bands, the best known of which was the so-called Ku- Klux Klan, said to have originated in Giles County, Tenn., in 1866. At first it was intended to serve as a disciplinary organization for scar¬ ing the superstitious blacks into good behavior, but with the ascendency of the negro to politi¬ cal power with its resulting imbecility and cor¬ ruption the purposes of the Ku-Klux Klan were changed to meet the new situation. Its juris¬ diction was styled the "Invisible Empire®; the chief functionary was the Grand Wizard; each State was a realm ruled over by a Grand Dragon. Then there were Dominions, Provinces and Dens presided over by Grand Titans, Grand Cyclopses, Ghouls, etc. The organization was elaborate and mysterious ; there was a constitu¬ tion and a solemn ritual and a gruesome mode of initiation. All of which appealed to the curious and at the same time excited the fear of the superstitious blacks. The members of the Klan when in service wore hideous dis¬ guises, the sight of which terrified the negroes and sent them running to their cabins. Prom¬ inent negro politicians, obnoxious carpet-

bag¬ gers and scalawags, Northern teachers of negro schools, were the most common victims of the Ku-Klux activities. Usually the Klan made known its orders by a warning couched in mysterious language, but always intelligible vol. 27—28

enough to convey its meaning. After the with¬ drawal from the South of the military govern¬ ments between 1868 and 1870 Ku-Klux outrages threatened the peace and security of the South. Republican legislatures passed anti-Ku-Klux acts and Republican governors offered large re¬ wards for persons guilty of going in disguise to commit crime, but public sentiment was too much in favor of Ku-Klux methods to make either effective. Besides, it was next to im¬ possible to convict anyone if caught and put on trial. Upon the recommendation of President Grant Congress appointed a joint committee to make a thorough investigation of conditions in the South and the voluminous testimony which it took showed conclusively that hun¬ dreds of murders had been committed in the Southern States by Ku-Klux bands, besides many outrages of a less flagrant character. To meet the situation Congress passed, in 1870, the so-called Enforcement Act giving the Fed¬ eral courts jurisdiction over certain offenses committed with the intent of depriving colored persons of their rights as citizens of the United States. In April of the following year Con¬ gress passed another Enforcement Act which further extended the jurisdiction of the United States courts and authorized the President to employ the army and navy and to suspend the writ of habeas corpus if necessary to put an end to Ku-Klux outrages. It also empowered Federal judges to exclude from juries persons believed to be in sympathy with the Klan. In pursuance of this act the Federal attorneys in the Southern States made special exertions to secure the indictment of those engaged in the Ku-Klux outrages and hundreds of indictments were found, but few convictions followed, owing to the sympathy of the juries for the accused. Acts were also passed for the super¬ vision of Federal elections in the hope of secur¬ ing to colored voters the unobstructed enjoy¬ ment of the right of suffrage which the 15th Amendment had conferred upon them. But all the efforts of Congress to secure the political rights of the freedmen failed because it in¬ volved negro domination and this had proved intolerable to the whites. See Ku-Klux Klan.

The Undoing of Reconstruction. — For a time the reconstructionists in the South were able, with the air of Federal troops, to maintain their power, but as the extravagance and corrup¬ tion of their rule increased the discontent of the native whites, who were the chief sufferers, became more general. Organized intimidation and ballot-box frauds were openly committed for the purpose of defeating the Republicans in the elections. Race collisions and. election riots were of frequent occurrence, and in all of them the blacks were the chief sufferers. In several States rival governments

were set up and civil war threatened. Negro militia companies were organized, but they were ineffective and served only to inflame the passions of the whites and increase their determination to overthrow the Republican government by violence. The gov¬ ernment at Washington showed less readiness to call out troops to interfere at the elections and a growing disposition to leave the Southern State governments to take care of themselves. Under these as early as 1870 the Democrats had regained control of North Carolina, Tennessee, Texas, Georgia and Virginia. Meantime the progress of the Southern movement was aided

by the wholesale removal by Congress of the political disabilities of the Southern whites and the division of the Southern Republicans into radical and conservative wings, the latter of which joined with the Democratic organizations. In 1874 Alabama and Arkansas were carried by the Democrats and the carpet-bag, governments in those States came to an end. In the following year, after a remarkable campaign, characterized by violence, riots and wholesale intimidation, Mississippi was carried by the Democrats, who speedily got rid of three of the State officers, including the ‘ governor, by means of impeach¬ ment. In the following year the ˆMississippi plan® was employed with success in the three remaining Southern States which were still <(un- reclaimed,® namely, Louisiana, Texas and Flor¬ ida. Solid Democratic delegations were now sent to Washington, most of the carpet-baggers returned to the North and the Southern whites were left in control. The subsequent disfran¬ chisement of the negro race in Mississippi, Louisiana, South Carolina, Alabama, North Caro¬ lina and Virginia and the judicial approval by the Supreme Court of these disfranchising con¬ stitutions ensured the permanent rule of the white race and thus marked the final and com¬ plete undoing of reconstruction so far as its political effects were concerned.

Bibliography.— -Andrews, E. B., (The United States during the Last Quarter of a Century (2 vols., New York 1896) ; Blaine, J. G., (Twenty Years of Congress) (2 vols., New York 1886) ; Burgess, J. W., Reconstruc¬ tion and the Constitution (New York 1902) ; Davis, W. W., (The Civil War and Reconstruc¬ tion in Florida* (New York 1913) ; Dunning, W. A., Reconstruction, Political and Economic (New York 1907) ; Ficklen, J. R.,*

(Civil War and Reconstruction in Alabama) (1905) ; Garner, J. W., Reconstruction in Mis¬ sissippi (New York 1902) ; Hamilton, J. G. D., Reconstruction in North Carolina) (1906) ; Kendrick, B. B., (Journal of

the Joint Commit¬ tee of Fifteen on Reconstruction (New York

1914) ; Lynch, J. R., Racts of Reconstruction (New York 1913) ; McCarthy, C. H., Rincoln's Plan of Reconstruction (New York 1901) ; McPherson, E., Rolitical History of the United States during the Great Rebellion* (Washington 1865); id., Rolitical History of the United States during Reconstruction (New York 1870) ; Ramsdell, C. W., Reconstruction in Texas> (New York 1910) ; Reynolds, J. S., Recon¬ struction in South Carolina* (1905) ; Schouler, J., (History of the Reconstruction Period> (New York 1913) ; Scott, E. G., Reconstruc¬ tion during the Civil War* (Boston 1895) ; Thompson, C. M., Reconstruction in Georgia, Economic, Social and PoliticaP (New York*

1915) .

James Wilford Garner, Professor of Political Science, University of Illinois.

38. THE THIRTEENTH, FOUR¬ TEENTH AND FIFTEENTH AMEND¬ MENTS TO THE CONSTITUTION. These three amendments to the Constitution are popularly known as the War Amendments. This designation is not without justification in

their origin. The difficulties involved in amend¬ ing the Constitution are so great that but for the conflict with which inˆ the popular mind these amendments are associated, it is doubtful if the principles which they embody could ever have been incorporated into it. These amend¬ ing articles primarily concerned the negro race and their adoption marked the transition of these people from slavery to citizenship. They meant that within a period of five years more had been accomplished than had been by half a century of polemical discussion. They embodied the re¬ sults of such a revolution of public sentiment as only war could have effected. The emancipa¬ tion of the American negro was never a more remote probability than at the outbreak of the Civil War. Almost the entire time of the last session of the 36th Congress, 3 Dec. 1860 to 2 March 1861, was devoted to the consideration of various measures calculated to compromise sectional differences. Every plan proposed had as its basis an effort more specifically to guar¬ antee against outside interference the institu¬ tion of slavery in the States wherein it then existed. On 11 Feb. 1861, without a dissenting vote the House agreed to a resolution of Mr. Sherman of Ohio which indicated the spirit of that body. It declared that neither. Congress nor the people of the non-slave-holding States had any right to interfere with the institution in any State in which it was established. A few days later the House went much further than this, and by a vote of 133 to 65 passed the Corwin Resolution, proposing an amendment to the Constitution. This provided that the Con¬ stitution should never be so

amended as to em¬ power Congress in any way to interfere with slavery in the States. It is significant of the sentiment which then pervaded the country that this resolution secured the support of such men as Charles Francis Adams, Schuyler Colfax, Henry Winter Davis, Justin S. Morrill and John Sherman. On the last day of the session, 2 March it received the constitutional majority in the Senate and was duly proposed to the country as the Thirteenth Amendment. Few more striking contrasts are presented in the history of the development of the Constitution than that between the amendment with which Congress would thus have commemorated the opening of the great conflict and the one which marked its close. This resolution was ratified by Ohio, Maryland and Illinois, but its fate possesses scant interest now, if indeed it did even at that time. Men soon realized that the hour of compromise had passed — that the great issues which had so long disturbed the repose of the country had been removed from the halls of Congress and submitted to the arbitrament of the sword.

Mr. Lincoln's attitude at this time was thor¬ oughly in accord with that of Congress. In his inaugural address he declared that he had no purpose, inclination or right to interfere with slavery in the States. To emphasize his posi¬ tion he quoted from the platform on which he had been elected and also declared that as in his opinion the proposed Corwin amendment was already <(implied constitutional law® he had <(no objection to its being made express and irrevocable.® There can be no question that in these declarations Mr. Lincoln gave expression to his most earnest convictions. The fact that

within two years after he uttered them he felt compelled, ((upon military necessity,® to issue the Emancipation Proclamation affords some idea of the significance and magnitude of the events which made for the first of the war amendments. When, on 1 Jan. 1863, Mr. Lin¬ coln followed his provisional proclamation of the preceding September by one unconditional in its terms, no one knew better than he that it was literally no more than it purported to be on its face — a war measure, pure and simple. The Emancipation Proclamation designated cer¬ tain States and parts of States within the field of military operations as (

The Thirteenth Amendment. — It is one of

the singular turns of the history of anti-slavery agitation that although New England had been so long identified with the abolition movement, it should fall to the lot of a man from a West¬ ern slave State to formulate and

introduce the amendment which was to write into the Con¬ stitution the fulfilment of the highest hopes of Garrison and Phillips. It was Mr. Hender¬ son of Missouri, who on 11 Jan. 1864 introduced in the Senate the joint resolution which be¬ came the 13th Amendment. This resolution, somewhat amended by the Judiciary Committee, passed the Senate on 8 April by a vote of 38 to 6. Abolition sentiment had not gained ground rapidly in Congress. That body had put itself on record many times as carrying on the war for the sole purpose of preserving the Union. As late as 22 and 25 July 1861, after the battle of Bull Run, the Crittenden resolutions de¬ clared that the war was not waged (

ment to give it effect upon the restoration of peace were just as truly issues of that election as was any other feature of the administration. From the first the President had been a cham¬ pion of the Henderson resolution and he was quick to take advantage of the result of the election in urging upon the House the necessity of its passage. This he did in his annual message of 6 Dec. 1864. He called the attention of the House to the result of the recent con¬ test, and told them that it meant the passage of the measure by the next Congress, if it failed in this. He declared the election to be <(the voice of the people now, for the first time heard upon the question® at issue. We need not consider which most influenced their action, Mr. Lin¬ coln's message or the determination to accept an accomplished fact. On 31 Jan. 1865, by a vote of 121 to 24, the House finally passed the resolution as it came from the Senate: Sec¬ tion 1. Neither slavery nor involuntary servi¬ tude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction. Section 2. Con¬ gress shall have power to enforce this article by appropriate legislation. On 18 Dec. 1865, the 13th Amendment was declared a part of the Constitution.

The Fourteenth Amendment. — On the first day of the memorable 39th Congress, 4 Dec. 1865, Mr. Stevens submitted a resolution pro¬ viding for a joint committee of 15 to inquire into the affairs of ((the so-called Confederate States.® The resolution created what became known as the Reconstruction Committee. To this committee was referred every bill, resolu¬ tion or petition bearing upon any phase of the relations between the Southern States and the general government, or involving consideration of the future status of the negro. The only re¬ sult of their labors in which we are interested was submitted to both Houses on 30 April 1866, as their plan for the reconstruction of the Southern States. This consisted of three features, embraced in a joint resolution, propos¬ ing a constitutional amendment and two bills. The three combined did not differ greatly from the 14th Amendment as finally adopted. The first section of the joint resolution did not con¬ tain a definition of national citizenship. In other respects it was the same as that adopted. Its second section, reducing

representation for suffrage abridgment, was adopted substantially as reported. Section 3 deprived of the right to vote for electors or representatives until 4 July 1870, all those in any way identified with the ((late insurrection.® One of the bills reported as part of this plan provided for rendering in¬ eligible to office certain proscribed classes of men in the Southern States. This bill formed the basis of the third section of the amend¬ ment as adopted, in lieu of the one reported by the committee. The fourth section was similar to the fourth section of the amendment, except that it did not contain the provision as to the validity of the public debt. The first of the bills reported provided that when the amendment proposed therein should have become part of the Constitution, and been ratified by ((any State lately in insurrection,® the senators and repre¬ sentatives from such State <(might® [<(may®j be admitted into Congress as such.® This bill did not pass either House, nor did Congress com-

mit itself in any way to the policy suggested by it, — that of admitting the Southern States upon their ratification of the proposed amendment. The House passed this joint resolution just as it came from the committee, the Senate making the amendments outlined above. These modifi¬ cations brought the resolution to the shape in which it now stands as the 14th Amendment. The Senate passed it 8 June 1866 by a vote of 33 to 11. On 13 June the House agreed to the Senate amendments by a vote of 138 to 36. A study in detail of the ratification of this amend¬ ment would take us further afield than we can go, for here the history of the amendments and that of Reconstruction so blend as to become difficult of separate treatment. Thus would be opened up the whole question of the rejection of the amendment by the Southern States, save Tennessee, and of the effect of such rejection upon the subsequent action of Congress toward those States in the matter of negro suffrage and the last amendment. In the process of Reconstruction ratification became, in specific terms, a condition precedent to the readmission of the Southern States, and was declared ac¬ complished in Seward's proclamations of 20 and 28 July 1868.

The Fourteenth Amendment.

Section 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

Section 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State, being 21 years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of repre¬ sentation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens 21 years of age in such State.

Section. 3. No person shall be a senator or represen¬ tative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken

an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a two-thirds vote of each House, remove such disability.

Section 4. The validity of the public debt of the United States, authorized by law, including debts incurred for pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

Section 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

The Fifteenth Amendment. — Propositions

having negro suffrage as an end were almost as numerous during this period as were similar efforts toward an emancipation measure prior to 1865. Indeed, one of the most frequently suggested means of enforcing the 13th Amend¬ ment was by conferring suffrage upon the freedmen. Limitations of space render it im¬ possible to trace here the evolution of the 15th Amendment through these numerous bills and

resolutions. It has been noticed above that the author of the 13th Amendment was a senator from a Western slave State, — Mr. Henderson of Missouri. It is even more singular that the same man should also have introduced the reso¬ lution which became the 15th. Early in the first session of the 40th Congress, 7 March 1867, Mr. Henderson introduced a resolution propos¬ ing an amendment to the Constitution which would prohibit a State from abridging the right <(to vote or hold office on account of race, color or previous condition.® The 40th Congress had three sessions, and the Henderson resolution slept in the Judiciary Committee until well along toward the close of the third. It was reported by Senator Stewart, on 15 Jan. 1869, amended to read as follows :

((The right of citizens of the United States to vote and hold office shall not be denied or abridged by the United States, or any State, on account of race, color, or previous condition of servitude.®

The Senate passed this resolution on 17 Feb¬ ruary. The House amended it by striking out the words <(by the United States,® which would have left

Congress with absolute control over negro suffrage. It also added to the grounds upon which suffrage abridgment was denied the States those of nativity, property and creed. The House had just refused to accept from the Senate such an amendment to a resolution of its own. Its action now, in tacking this on to the Senate measure, showed an utter absence of anything like agreement between the two bodies as to the precise form of the amendment. The situation finally yielded to considerations of party expediency, and the House acceded to the Senate's request for a conference. This resulted in a recommendation that the House recede from its amendments and agree to the Senate resolution. The latter, however, was to be amended by striking out the words ((and hold office.® Here was another important compro¬ mise to be engrafted on the Constitution, whereby was secured the 1 5th Amendment as we have it to-day.

The Fifteenth Amendment.

Section 1 . The right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous con¬ dition of servitude.

Section 2. The Congress shall have power to enforce this article by appropriate legislation.

Under the operation of the previous ques¬ tion the House was able to secure an agree¬ ment to this report as soon as submitted, 25 February. In the Senate, however, serious opposition developed among the friends of the measure. It was claimed that too great a sac¬ rifice to expediency had been made in striking out the words <(and hold office,® and thus reduc¬ ing the scope of the amendment to the matter of suffrage alone. On this account Mr. Ed¬ munds, one of the managers at the conference, had refused to sign the report, and now opposed the amended measure on the floor of the Senate. The session was drawing to a close, and perhaps there was something in the taunt of the minority that the dominant party dare not trust the fate of the measure to the suc¬ ceeding Congress. Though markedly earnest, the debate was not protracted. The Senate passed the resolution on 26 February. On 3

March Congress adjourned. In the unusual form of a special message from the President, com¬ municating its promulgation by the Secretary of Stale, the last of the War Amendments was declared adopted on 30 March 1870.

Validity and Enforcement. — The charge of "irregularity,® of a departure

from established constitutional methods, was made by the minor¬ ity against all the legislation enacted by Con¬ gress during the eventful years covering the period of Congressional Reconstruction. It was urged with greater force against the validity of the action by which the passage and adoption of these amendments were secured. Against the 13th was brought the charge that West Vir¬ ginia, whose ratification was declared necessary, had been created a State in disregard of the letter and spirit of the Constitution. The ques¬ tion of the right of a State to rescind a ratifica¬ tion once given was raised in the case of the 14th and 15th, as also the constitutionality of the entire plan of Congressional Reconstruction. It was not long, however, before the minority realized the necessity and wisdom of accepting the amendments as a matter of public policy. By February 1872 both parties in the House had gone on record as formally recognizing their validity, and the question ceased to possess more than a mere academic interest. The energy and earnestness of the Reconstruction statesmen were not exhausted with the adoption of the amendments. Immediately following the ratifi¬ cation of each one they set to work to enforce its provisions with the same determination which had characterized their efforts to secure its incorporation into the organic law. Various acts, some directed against peonage in New Mexico, others against the kidnapping of negro children, were passed to render impossible the placing or retaining of anyone in a state of in¬ voluntary servitude. The principal act for en¬ forcing the 13th Amendment clearly anticipated important provisions of the succeeding amend¬ ment. This was the Civil Rights Bill of 9 April 1866. The emancipating amendment left the late slaves in an anomalous position, and to meet the difficulties of their situation was the prime object of this elaborate measure. It de¬ clared all persons born in the United States, not subject to a foreign power, except Indians not taxed, citizens of the United States. Here we have a near approach to the definition of national citizenship contained in the first section of the 14th Amendment. It gave to every citi¬ zen so defined the same rights of property, and the same protection of person and property, en¬ joyed by the white citizen. It provided extraor¬ dinary means, judicial and executive, for its own enforcement, and for guaranteeing protec¬ tion to all persons in their "constitutional rights of equality before the law.® This act was passed over Johnson's veto more than two years before the adoption of the 14th Amendment, yet it served the purpose of an enforcing act for that amendment long after its ratification. Indeed, it answered that purpose, without even being amended, until after the ratification of the 15th Amendment. These enforcing acts themselves illustrate the process of develop¬ ment through which the negro passed in his transition from slavery to citizenship. They reflect the views of their framers as to the sig¬ nificance of each step taken in that movement.

Thus it appears that an act merely to enforce the emancipating amendment was considered broad enough to cover the first section of the 14th also. Extreme views were entertained as to the power of Congress in regard to the matters covered by the amendments. The last two were not proposed by Congress be¬ cause that body doubted its constitutional right to accomplish the same ends by legislation, but simply to remove those matters beyond the reach of a possible hostile majority. The next en¬ forcing act was that of 31 May 1870. This was "to enforce the right of citizens of the United States to vote,® but it also re-enacted, with some additional provisions, the Civil Rights Bill of 1866. Means were provided for preventing suffrage discriminations on account of color un¬ der almost any contingency that could rise. The act also provided for enforcing the third section of the 14th Amendment, prohibiting certain classes in the Southern States from holding office. This act was amended 28 Feb. 1871, by one which provided still more elaborate machin¬ ery for enforcing the right to vote. Among other features it required judges of United States Circuit Courts to appoint supervisors of Congressional elections, upon petition of two citizens. This, however, applied only to cities of at least 20,000 inhabitants. The Act of 20 April 1871 was the first specifically directed to the enforcement of the 14th Amendment. This was known as the Ku-Ivlux Act, and of all the enforcing laws it was the most drastic. The others conferred upon the Federal Courts juris¬ diction for acts in violation of their provisions, and for their enforcement placed at the call of even petty officials the military and naval branches of the government. This authorized the President in certain contingencies to suspend the privileges of the writ of habeas corpus. It was directed primarily against alleged conspiracies in the Southern States to render inoperative the first section of the 14th Amendment. The sec¬ ond and last act to enforce the first section was the Civil Rights Act of 1 March 1875. The first two sections of the act attempted to do for the newly-declared citizens, in the sphere of what may be called social privileges, what the Civil Rights Bill of 1866 had done in the field of property rights. They declared all persons within the jurisdiction of the United States "entitled to the full and equal enjoyment of the accommodations, advantages, facilities and privileges of inns, public conveyances on land or water, theatres, and other places of public amusement.® Infractions of this act gave rise to the Civil Rights Cases, which furnished the occasion for one of the most important inter¬ pretations of the 14th Amendment ever an¬ nounced by the Supreme Court. The one sec¬ tion of the 14th Amendment which has never been enforced is the second, — which provides for reducing the representation of States as a penalty for abridgments of the suffrage. Some of the men most prominent in Reconstruction legislation have announced the opinion that this section was rendered nugatory by the adoption of the 15th Amendment. This question, how¬ ever, has not been passed upon, in the

absence of enforcing legislation. Such legislation was attempted in the first apportionment act after the new amendment, that under the -census of 1870. It was at once discovered that the question was

one involving numerous practical difficulties, — difficulties probably unforeseen by the framers of ffie section, certainly entirely unprovided for by them. The advocates of changing the basis of representation in accordance with the new pro¬ vision had finally to content themselves with merely restating in the Apportionment Act the penalty provided in the amendment itself.

Interpretation. — The 14th Amendment has overshadowed the other two, alike in the num¬ ber and the importance of the cases involving its interpretation by the Supreme Court. A con¬ sideration of the three amendments shows this to have- been inevitably incident to the nature of the 14th. The 13th and 15th were simple and direct in terms, each covering a single question. Article IV of the Constitution de¬ clared the citizens of each State entitled to all the privileges and immunities of citizens in the several States. Article V of the amendments declared that no person should be deprived of life, liberty or property without due process of law. But Article V was operative upon the general government, not upon the States. The 14th Amendment for the first time defined national citizenship, and endowed it with the privileges and immunities hitherto the attributes of citizens of the States. It then went further, and prohibited the States from abridging these privileges and immunities in their new and broadened application. It borrowed and brought forward from the 5th Amendment the guaranty of due process of law, and decreed that henceforth the denial thereof should also be beyond the province of the State. In their new relation, the questions, what are the privileges and immunities of citizens? What is due process of law? and what the equal pro¬ tection of the laws? are capable of being raised under an almost infinite variety of circum¬ stances. They assume a new significance and issues of consequence and moment are in¬ volved in their determination.

The amendment of which this first section is the most important part was formulated by a Congress which convened almost before the din of war had died away. It was written of it, by the speaker of its house, that (

other.® But the Constitution was f(made to march® during the succeeding quarter-century. In 1898, in Holden v. Hardy, we find the court declaring that ((A majority of the cases which have since arisen have turned not

upon a denial to the colored race of rights therein secured to them, but upon alleged discriminations in mat¬ ters entirely outside of the political relations of the parties aggrieved.® Doubtless it would be a pleasing reflection that the later and larger interpretation of this amendment was the one contemplated by its framers. But this would not be warranted by the facts. The decisions nearest the amendment in point of time are nearest also to the intent of most of those who gave it life. The measure would scarcely have appealed to men from the Pacific Coast had they foreseen the construction to be placed upon their work in the cases of Yick Wo v. Hopkins and the United States v. Wong Kim Ark. In the case of Yick Wo, Chinese, as <(persons,® were held to be entitled to <(due process of law.® In Wong Kim Ark it was held that children born in the United States of Chinese parents having their domicile here are citizens of the United States. The effect of the former of these decisions was to give to the word (

The Civil Rights Cases furnish the most striking instance of the difference between the interpretation placed upon the 14th Amendment by those who framed it, and that of the court whose province it is to construe its meaning and determine its powers and limitations. These cases, which were decided in 1883, arose through certain alleged violations of the first and second sections of the Civil Rights Act of 1875. It will be recalled that this act declared all persons entitled to the equal accommodations of hotels, theatres and public conveyances. It also pro¬ vided certain penalties for the denial of these privileges (

UNITED STATES — THE WAR WITH SPAIN (39)

439

State control of its purely domestic affairs. The court placed upon the amendment the import¬ ant and far-reaching construction that it oper¬ ated as an inhibition upon the States alone, and not upon their citizens. In the words of Mr. Justice Bradley: (

Of the 15th Amendment it may be said as Mr. Justice Miller said of the 13th: ftIts two short sections seem hardly to admit of con¬ struction.® Of itself it confers suffrage upon no one. Save upon the grounds of race, color and previous condition of servitude, it does not diminish the right of the State to regulate the suffrage of its citizens. The power to impose any other qualification remains as it was before 1870. This has been held clearly enough in the few cases involving the right of suffrage abridgment thus far presented to the court. For one section of the country at least, harassed by problems peculiar to itself, it is well that this is so. For discussions of the 16th, 17th, 18th and 19th Amendments see articles on In¬ come Tan; Senate of the United States; Prohibition and Woman Suffrage. See Con¬

stitutional Amendments.

Bibliography. — Ames, H. V. A., (Proposed Amendments to the Constitution of the United States during the First Century of Its His tory) in American Historical Association's Annual Report II (1896).

Alfred Holt Stone, LL.B., Member American Historical Association.

39. THE WAR WITH SPAIN. The

Spanish-American War of 1898 was the out¬ come of conditions set up in Cuba by the political discontent in the island during nearly the whole of the 19th century, varied in the latter half by long-continued revolts. The

United States government, controlled as it was in the earlier half of the century by the slave interest of the South, had desired and made overtures at intervals to annex the island. But this wish disappeared with the changed condi¬ tions brought by the Civil War. There was no longer a reason through desire to extend slave territory, and the annexation of a large alien population, much of which was colored, was repellant. The Ten Years' War in Cuba, which began in 1868 through the refusal of Spain to accede to plainly necessary reforms, had been ended by promises from Spain which were not kept. Revolt thenceforward was pas¬ sive rather than active, but sure in time to break into activity, which it did in 1895. The com¬ mercial and social conditions begotten by chronic strife through so many years wrought not only upon the sympathies of the United States, but generated ill feeling which must always come when trade interests are deeply injured. Large property interests in the island itself were held by Americans, many of whom suffered most severely. By the end of 1897 the island had been brought to the verge of ruin. The insurgents, always strong in the east, had raided the west, burning canefields and destroying plantation buildings in the attempt to create a desolation which would make Cuba valueless to Spain. The Peninsular Government with more than 200,000 men in the island was making no head¬ way against the insurgents. It had become clear, as Consul-General Lee reported to his govern¬ ment, that Spain was powerless to suppress the revolt, and the insurgents equally powerless against the Spanish occupation. A large propor¬ tion of the rural population had been brought within the Spanish lines by a decree of Gov¬ ernor-General Weyler, issued early in 1897. But the Spanish authorities could feed neither them nor their o^/n troops. Destitution, starvation and death to an appalling degree was the re¬ sult ; cultivation outside the Spanish lines practically ceased; the commonest necessaries of life had to be imported. Spain looked upon the situation as due largely to American sympathies and aid. No doubt the dogged persistence of the insurgents was due in a considerable degree to hopes of American intervention, but the fact

is that the American government loyally did its duty in suppressing unlawful attempts to send aid from its ter¬ ritory. It could not suppress the general sentiment of the country for a much-suffering population. The American government thus felt called upon to insist upon' reforms which would restore something like the normal conditions of human society, and this pressure, united with the action of the Spanish liberals, caused to be enacted the law signed by the queen regent, November 1897, establishing a system of Cuban autonomy. General Blanco was sent in the be¬ ginning of 1898 as governor-general with the avowed object of pacification upon such lines. But the Spaniards and their friends in Cuba were opposed to the scheme as granting too much; the insurgents, as granting too little. Nor were the latter willing to continue the dom- inancy of Spain at any price. Nothing short of independence would be listened to. The attempt was thus doomed to failure. January 1898 was marked by serious military riots in Havana due to the opposition of the Spanish party to Blanco. In consequence of the supposed danger from

these disturbances to American citizens, the Maine , which had been for some time at Key West and vicinity, engaged in looking after fili¬ bustering attempts, was sent to Havana. Her arrival caused offense. She dominated the city from her anchorage, and her coming was thus looked upon as a threat. Her destruction, 15 February, naturally laid by the American public at the door of the Spaniards, brought a state of excitement which, combined with the previous feeling, made war dangerously near. The Court of Inquiry of which Admiral (then Captain) Sampson was president, after sitting more than a month, rendered a finding that her destruc¬ tion was due to an exterior mine. This finding was chiefly based upon the extraordinary man¬ ner in which the keel was forced up at the centre of the explosive effort, 34 feet above its normal position. As the ship settled but from four to six feet before touching bottom, it would seem impossible that any launching for¬ ward of the after body could have produced such an effect. Two other considerations add weight to the board's finding; the first, that the only ship of the American navy ever so destroyed had to wait to arrive in an unfriendly port before the catastrophe should be accom¬ plished ; the second, the wholly different effects of the explosion of the forward magazine of the Ojjuendo after the Santiago, action. The finding of the board in no way implicated the Spanish government, and the writer, as a mem¬ ber of the board, can state explicitly that no member of the board held such a view. It should be added that the very cursory and un¬ trustworthy examination by the Spanish divers is shown by their report that the keel appeared to be intact. The examination made in 1911 by the army

and navy board, after the un¬ covering of the wreck, substantiated the finding of the Court of Inquiry.

Events thenceforward marched rapidly. Congress and the people of the United States both became very hostile in sentiment to Spain. As early as January the government had taken steps to cover eventualities, as far as the navy was concerned, by ordering that the time ex¬ pired men should be retained, and after the Maine disaster ships were concentrated; the North Atlantic squadron at Key West, the Asi¬ atic squadron at Hongkong (ordered 25 Feb¬ ruary). Congress 9 March voted $50,000,000 for national defense; merchant vessels and yachts were purchased and armed; colliers and two hospital ships equipped; the four large ships of the American Line taken over for service and the two cruisers built at Elswick for Bra¬ zil, purchased and renamed the New Orleans and Albany ; the latter, however, was not far enough advanced to be used during the war. An American merchant ship which had been converted into a cruiser by Brazil was also bought, as also the Diogenes of 1,800 tons, built for Peru and never delivered, renamed Topeka' a small torpedo boat purchased in Germany and named the Somers , which did not reach the United States until after the war. The Treasury Department turned over to the navy 15 revenue cutters and four lighthouse tenders, all of which did good service. Coal in quantities was forwarded to Key West, which rapidly assumed the prominence of an import¬ ant naval base, the command of which was as¬ signed to Commodore Remey. A squadron was

formed at Hampton Roads of the Brooklyn (flag) and battleships Massachusetts and Texas, denominated the flying squadron with Commo¬ dore W. S. Schley in command.

The two navies stood as follows:

United

States

Spain

Nom¬

inal

Effec¬

tive

Nom¬

inal

Effec¬

tive

Battleships .

**5*

5

1

0

Armored cruisers .

2

2

6

4

Monitors .

6

6

t2

0

Protected cruisers .

13

8

5

4

Unprotected cruisers and gunboats .

21

20

9

5

Torpedo gun vessels .

1

1

11

10

Torpedo boat destroyers . .

0

0

6

6

Torpedo boats .

6

6

12

3

Small gunboats .

0

0

J84

?

- *One second-class.*

t Old iron-clads done over — non-effective. ; X All but 20 of these last under 200 tons.

The war was necessarily to be mainly naval. Whoever should control the sea would win. Spain could only hold Cuba by being able to send thither troops and supplies. As Mahan well says : (

considered. Neither ship had been docked for many months and when they left 1 April to go to the rendezvous east of Porto Rico to meet the expected torpedo flotilla and, failing the ˆ rendezvous, had to go to the Cape Verdes to join Cervera, they had crossed the Atlantic twice, had severely tried their engines and boil¬ ers, and had had no chance for a much needed overhauling of their machinery. They thus started on a third transatlantic journey, bot¬ toms foul, machinery in bad condition and ill equipped in almost every respect except in gal¬ lant spirit, to meet a foe who was in the high¬ est state of preparation. The advice and prophecies of Cervera were unheeded. When war had declared itself a large number of offi¬ cers high in the navy met at Madrid 24 April and decided that his squadron should at once proceed to San Juan, Porto Rico, its later move¬ ments being left to his discretion. The decision revealed an utter lack of preconceived plan and ignorance of the conditions of the problem. The ultimatum signed by President McKinley 20 April 1898, demanding the withdrawal of Spain from Cuba, was practically a declaration of war and the Spanish government sent the American Minister his passport the next day without awaiting the presentation by him of the fateful resolution.

In the early morning of 22 April, Captain Sampson, then rear-admiral by the authority vested in the President in time of war, sailed with such of the ships as could be made ready to leave, with orders to blockade the Cuban ports. The ships at or near Key West which could be drawn upon for this first move were (armored) New York, Indiana, Iowa ; (moni¬ tors) Puritan , Terror, Amphitrite; (cruisers) Cincinnati, Marblehead, Detroit; (cruiser-gun¬ boats) Wilmington, Machias, Castine, Nashville, Newport, Helena, Dolphin and auxiliary May¬ flower', (torpedo boats) Dupont, Porter, Foote, Winslow, Cushing and Ericsson-, (armed tugs) Nezinscot,Samoset, the armed lighthouse tender Mangrove and supply steamer Fern. By the afternoon of 23 May 20 of these were on the blockade, which was established from Cardenas, 85 miles east of Havana

to Bahia Honda, 55 miles west. It had been Sampson's wish to at¬ tack Havana at once and the order of battle was prepared, but the Navy Department refused consent, holding that the heavy ships should not be risked against batteries until the Span¬ ish squadron should be met. This was un¬ doubtedly correct in principle, but Sampson's knowledge of the conditions was more complete than that of the officials in Washington. Had Sampson had his way he would have taken Havana at once, without loss or serious injury to his fleet. It is an extraordinary fact that the disposition of the batteries was such that beginning at the southwest there was but one six-inch gun which could reply in that direc¬ tion. The batteries could have been enfiladed, one by one without any return fire whatever. Sampson's plan of attack, though more frontal, would in the writer's opinion have been perfectly successful. He could, after silencing the bat¬ teries, have anchored in the bight west of the Morro and awaited the coming of an army of occupation as did Dewey at Manila. It was his intention to go within 800 yards of the bat¬ teries, the water being extremely deep to the shore itself; it would have been impossible for

the men in the batteries, exposed as they were, to stand to their guns under the fire of the mul¬ titude of small guns carried by the small ships. Sampson yielded to the department's views with great reluctance. Commodore Dewey, who had relieved Rear-A.dmiral McNair in command of the Asiatic station, had concentrated, by order of the department of 25 February, all the ships of his squadron at Hongkong.

His squadron was composed of the following :

Tons

Speed

Main armament

Oympia .

5,870

21.6

4—8"; 10-5"

Baltimore .

4,413

20.

6-6″

Raleigh .

3,183

19.

1-6”; 10-5″

Boston .

3,000

15.5

2-8”; 6-6″

Concord .

1,710

17.3

6-6″

Petrel .

892

13.7

4-6″

The ships carried also 36 six- and three- pounders, 40 smaller guns and 19 torpedo tubes ; the crews numbered 1,743 men. The revenue cutter McCulloch, lately arrived, had been joined to the squadron, but was lightly armed, and could not be considered as adding to his fighting force. At Manila, under Rear-Admiral Montojo, these ships were available for action:

Tons

Speed

Main armament

Reina Cristina .

3,090

16.0

6-6.2″

Castilla .

3,342

0.

4-5.9″ 2-4.7″

Don Antonio de Ulloa.

1,152

14.

**2-4.7″*

Don Juan de Austria..

1,152

14.

4-4.7″

Isla de Cuba .

1,040

15.9

6-4.7″

Isla de Luzon .

1,040

15.9

6-4.7″

Marques del Duero. . .

500

10.

2-4.7″

- *This ship's machinery was under repair and the other two guns of her main battery were mounted, one at El Fraile, the other at Saugley Point.*

Two 2.9-inch, two 2.7-inch, 27 six- and three- pounders, 19 smaller guns and 17 torpedo tubes, with crews amounting to 1.695 men, were car¬ ried by the ships just mentioned. Besides there were the Velasco of 1,139 tons with two of her four guns at El Fraile and two gunboats, the Correo and General Lezo of 525 tons and three 4.7-inch guns each. All these were under repairs and took no part in the coming action, the crew of the Velasco manning the hastily built batter¬ ies at the entrance of the bay 25 miles from Manila. The Castilla, a wooden ship, built in 1881, had to be towed, as she could not use her engines. It must be admitted that the Spanish outlook was a sorry one and fully as hopeless as the report of Admiral Montojo indicates it to have been in his own mind.

The Baltimore had arrived at Hongkong 22 April and was allowed by the Hongkong au¬ thorities to be docked. On the 25th the British governor requested Dewey to leave and the squadron went to Mirs Bay, 30 miles distant on the China Coast, where it awaited the arrival of O. F. Williams, the American consul to Manila, whose local knowledge was regarded valuable. He came 27 April and that after¬ noon the squadron left in accordance with the Navy Department's telegram, sent 24 April, announcing that war had begun and directing Dewey to "commence operations at once,

442

UNITED STATES — THE WAR WITH SPAIN (39)

particularly against the Spanish fleet. You must capture vessels or destroy.® The telegram ended (

Dewey arrived off Subig the afternoon of 39 April, reconnoitered Subig with three of his ships and informed his captains assembled in consultation of his intention (the Spanish ships not being found in Subig) to stand on slowly and arrive at Manila at daybreak. He stood for the Boca Grande. The mouth of the bay, which is half way between Subig and Manila, is 10 nautical miles broad and divided by the island Corregidor two miles from the mainland on the north, which thus forms the Boca Chica (narrow

mouth). On the north side of this entrance were two batteries ; one (Punta Gorda) mounted 7-inch muzzle loading rifles, the lower, two 6.2- inch B. L. Hontoria rifles. On Corregidor itself were three 7-inch muzzle loaders looking north. Two miles southeast of Corregidor is Caballo island on which were three 5.87-inch B. L. Arm¬ strong rifles. Three and a half miles from Caballo is El Fraile, on which was a battery of three naval 4.7-inch guns taken, two from the General Lexo, one from the Don Antonio de JJlloa. All these batteries were built and manned by the navy. There were no torpedoes, the channel being too broad and deep for min¬ ing. The squadron naturally selected the broad passage between El Fraile and Caballo, which was reached at midnight. Signals from Cor¬ regidor showed that they were discovered and two shots were fired from El Fraile which were answered by three of the ships, and the squadron headed at slow speed for Manila, 25 miles distant. At 5.15 it was fired at from the Manila and Cavite batteries as it approached; the Spanish ships being sighted to the south¬ ward, the American squadron turned south and opened fire at 5.41. The ships moved in column three times west and two east, about parallel

to the Spanish line and at ranges varying from 5,000 to 2,000 yards. At 7 the Spanish flagship made a futile effort to leave the line and attack, and at 7.35, it being erroneously reported that but 15 rounds per gun remained for the 5-inch battery, the American squadron hauled off and the commanding officers called aboard the flag¬ ship for consultation. The crews were given breakfast. Nothing was known at the moment of the effect of the attack, but somewhat later this was evident when the two largest Spanish ships were seen to be afire. Being assured as to the ammunition supply, the attack was re¬ newed at 11.16 and continued until 12.40 when the American squadron returned and anchored off Manila. The Reina Cristina, Castilla and Don Antonio de JJlloa had sunk; all the others were burned by a party sent in from the Petrel after resistance had ceased and the ships been aban¬ doned. The Spanish loss was 167 killed and 214 wounded; there were of the Americans 7 slightly wounded. While the American squadron was more powerful, the difference in character of ships and numbers of types of guns cannot ac¬ count for this immunity from loss on the Amer¬ ican side. All the ships wTere vulnerable to all but the very lightest of the Spanish guns. The only reasonable supposition is that the Spanish by want of practice and through temperamental excitability could not shoot with any accuracy whatever. . There was courage in abundance, but no training.

Dewey made no effort to capture the city of Manila, as. he had no troops to hold it. No further firing took place. Cavite arsenal was taken possession of and a blockade of Manila established. He lifted and cut the telegraph cable, but the Hongkong office of the cable company refused to take his

messages as vitiat¬ ing its contract with the Spanish government. It was thus necessary to send a ship to Hong¬ kong to cable thence. The McCulloch coaled and left 5 May, and arrived at Hongkong the 7th with the official information of the victory. There was a period of quiet waiting for the. troops and ships, varied with rumors of the despatch of a fleet from Spain and by the ar¬ rival of Aguinaldo and the organization of a Filipino army which was later to give much trouble. The first American troops, 2,500 in num¬ ber, reached Luzon 30 June accompanied by the cruiser Charleston, which took over the sur¬ render of Guam en route ; the second expedition of 3,500 arrived 16 July. Dewey in the mean¬ time was rendered anxious by the departure from Cadiz 16 June of the Spanish squadron under Admiral Camara. This consisted of the second class battleship Pelayo, the armored cruiser Car¬ los V, three destroyers, three armed liners (two of which had been purchased from the Ham¬ burg. Line) and four transports. The expedition was in reality as ill advised as any other act of the Spanish Ministry of Marine. There were but two ships of any power and one of these slow ; the rest, excepting the destroyers, were power¬ less for offense or defense. The battle of San¬ tiago, which left Spain's coast open to the at¬ tack of the squadron which was formed to go through the Mediterranean, settled the question of their return, which was ordered from Spain 7 July. An expenditure of $320,000 for the ben¬ efit of the canal company was the main result of the expedition. In any case the arrival of the Monterey 4 August and the Monadnock 16

August, very effective ships in smooth water, removed any anxiety on the part of the Ameri¬ can commander. While much was to come in the Philippines, the battle of 1 May practically determined that they were lost to Spain unless she should succeed in destroying the American fleet in the Atlantic ; should she do this the ques¬ tion of final command in Asian waters could easily wait. The loss of the Philippines could have no determining effect (valuable as the re¬ sult was in prestige and in setting to rest any question of a European concert of intervention) so long as Spain could keep open her communi¬ cations with Cuba, relinquishment of Spanish authority in which had been announced in the Congressional resolution of 20 April as the ob¬ ject of American action. In the Atlantic was her only battle squadron ; so long as this was in being, so long would the war continue.

Cervera left the Cape Verdes with his four armored cruisers and three destroyers 29 April. This was known at the Navy Department the same day and the news at once transmitted to Sampson. The latter determined to go

eastward with the main part of the battle portion of his fleet. He obtained the consent of the depart¬ ment, coaled his ships and 4 May left with the New York, Iowa and Indiana, the monitors Amphitrite and Terror, the cruisers Montgom¬ ery and Detroit, torpedo boat Porter, tug W om- patuck and collier Niagara. He had calculated to reach San Juan by the 8th, judging that by this date the Spanish squadron would be in that longitude and premising with his usual excellent judgment that San Juan was their objective, as was the case. Should he not find them at San- Juan it was his intention to at once return to Havana, after making an effort to occupy San Juan and leaving the monitors there in occu¬ pancy, to hold it against the Spanish squadron should it appear later. Continuous breakdowns of the monitors, which had to be towed a great part of the way, and of the Indiana, so delayed the squadron that it was not off San Juan until the early morning of 12 May. No Spanish ships were there. The fortifications were, however, assailed by the squadron in an active bombard¬ ment of three hours, in which, on the American side, one man was killed and four wounded. On the Spanish side eight were killed and 20 wounded. There is little doubt, as is known from Spanish officers present, that the place would have been yielded had the attack been a little longer continued, not through actual dam¬ age but through pressure from a population frantic with fear. Sampson, however, yielded to the arguments regarding the necessity of holding the fighting ships intact to meet the Spanish fleet, and started westward.

The day previous to that of the action at San Juan occurred, as far as loss of life was con¬ cerned, two of the most serious fights of the war; one in connection with the cable cutting at Cienfuegos, the other at Cardenas ; both were most gallant deeds. The four launches (includ¬ ing two steamers) of the Marblehead and Nash¬ ville, under the immediate charge of Lieutenant Winslow, were employed in the former opera¬ tion, which was carried on in the early morning within a few yards of the beach under a cover¬ ing fire from the ships in a rough sea and under a severe rifle fire from shore. Three hours were spent in lifting the cables, two of which were cut; a third was lifted but as it was thought to

be a small cable connecting the destroyed cables with Cienfuegos and thus useless, it was lefi uncut, it being thought advisable not to delay for the purpose under the heavy and increasing fire. Lieutenant Cameron McR. Winslow and 12 men were wounded, two of the men mortally. At Cardenas, which was blockaded by the Machias, Wilmington, the revenue cutter Hud¬ son and the torpedo boat Winslow, it was de¬ termined to attack the three Spanish gunboats in the port, which is extremely shallow and difficult of access to larger vessels. The Wins¬ low, leading, had

approached the town within a mile when fire was opened by the Spanish battery and gunboats. Though supported by the other ships, the Winslow armed only with three one-pounder guns could not make much return. The Spanish fire was concentrated upon her, her steering gear and one engine injured and a shell exploded in one of her boilers. She became helpless and drifted shoreward. The Hudson , the lightest of the three other vessels, gallantly went to her aid and towed her into safety, but not before the Winslow's commander, Lieutenant Bernadou, had been wounded, and a little later. Ensign Bagley and two seamen killed and two others mortally wounded by a shell which ex¬ ploded on the deck. Her use for such a purpose was, of course, not justified, and the same might be said of much of the employment of these frail crafts during the war, the paucity of ves¬ sels and the necessities of the service making such misapplication unavoidable.

Sampson standing westward with his slow squadron received the first news of Cervera's ar¬ rival in the Caribbean at 3.30 a.m. 15 May while off Porto Plata, San Domingo. He then learned that Cervera was on the 14th off Curacao, and that the destroyer Terror was at Martinique. The telegram announcing this directed him to proceed with all possible dispatch to Key West, whither Commodore Schley's squadron was also ordered from Hampton Roads. Cervera's slow¬ ness of movement had been a surprise to all concerned on the American side at least. The two large liners Harvard and Saint Louis had been dispatched, on his departure from the Cape Verdes, to cruise on a line 73 miles north and south about 100 miles east of Martinique, until noon of 10 May. Had the orders read until 11 May, they would in all probability have sighted the Spanish squadron at sea. As it was the Harvard reached Saint Pierre, Martinique, at 9 a.m. of the 11th and the destroyer Furor, Fort de France, the capital of the island, at 5 p.m. The news reached the Navy Department early 12 May by telegram from Captain Cotton of the Harvard. The broken-down destroyer Ter¬ ror came into Fort de France next morning and remained there until 25 May when she went to San Juan, where she will be later heard from. The presence of Sampson at San Juan changed Cervera's course. Had the American squadron been slower by two or three days in reaching San Juan, Sampson's surmise would have proved correct. He would have found and destroyed the Spanish ships there, where they were ordered to go, instead of at Santiago. Cervera's infor¬ mation regarding Sampson's movements caused him to shape his course from Curasao, 290 miles away, in hope of obtaining much needed coal, and picking up the vagrant colliers Roath, Twicken¬ ham and Restormel, which had been chartered by Spain. These, however, failed him, but the

Curasao authorities allowed him 500 tons for the Teresa and Vizcaya, and he was enabled to obtain fresh provisions. At 5.15 p.m. 15 May he left for Santiago de Cuba. The Saint Louis which had joined Sampson the morning of 15 May was ordered with the armed tug Worn pa- tuck to Santiago to cut cables, and left the squad¬ ron for that port almost at the same hour as Cervera. Captain Goodrich, commanding the expedition, succeeded 18 May in cutting one cable in over 500 fathoms of water, engaging the batteries at the same time. Having suc¬ ceeded, as he supposed (mistakenly), in de¬ stroying the Santiago-Jamaica connection, he left for Guantanamo for the purpose of destroy¬ ing the French cable leading from there, but an engagement of 40 minutes with the Spanish gunboat Sandoval compelled him to desist, the very vulnerable character of his own ship, wholly unfitted for fighting, rendering this necessary. At this time, 8 a.m., 19 May, Cervera was entering Santiago Harbor only 40 miles away, having taken three and a half days to traverse the 600 miles from Curasao. Sampson reached Key West at 4 p.m. of the 18th and found Commodore Schley's squadron, which had arrived at midnight. All but the smallest vessel off Cienfuegos were ordered by the Navy Department to be withdrawn. The telegrams received showed that the Washing¬ ton authorities were convinced by information received that the Spanish squadron was sup¬ posed to carry munitions of war essential to the defense of Havana, and that it must reach this port or one connected by rail with it, not¬ ably Cienfuegos. The flying squadron was thus, with such additional armored and other vessels as Sampson should judge suitable, to proceed to Cienfuegos, Havana, being covered by the remainder of the fleet. Sampson was to have choice of command off Cienfuegos or Havana; Schley, however, to keep the flying squadron. He generously gave the opportunity to Schley, who having coaled, sailed on the forenoon of the 19th with the Brooklyn, Massachusetts, Texas and Scorpion with orders to establish a blockade at Cienfuegos with the least possible delay. Shortly after leaving Key West he passed the Marblehead and Eagle returning from Cienfuegos, Commander McCalla of the Marblehead having withdrawn the whole force on his own responsibility. McCalla communi¬ cated the situation there by sending the Eagle to speak the Scorpion. Much was made of his failure to mention an arrangement of signals he had made with the considerable Cuban force west of the harbor in case these latter wished to communicate, but as will be seen later this was of no consequence. The Iowa, the collier Merrimac, the Castine and the torpedo boat Dupont left on the forenoon of the 20th to join Commodore Schley, thus making a force much more than able to meet the Spanish squadron. A telegram was received from the Navy Department at 12.30 a. m. of this day saying, ((The report of the Spanish fleet at Santiago de Cuba might very well be

correct; so the department strongly advises that you send immediately by the Iowa to Schley to proceed off Santiago with his whole command, leaving one small vessel off Cienfuegos . . .}) The peculiar phraseology of the telegram, taken in connection with the Navy Department's in¬ sistence upon the necessity of Cervera's coming

within reach of Havana, caused doubt in Samp¬ son's mind, and he thus determined to hold the status quo until further information should be obtained. He thus wrote Commodore Schley to that effect, sending a personal letter and an official dispatch by the Iowa and a duplicate by the Dupont, which vessels also carried copies of a memorandum prepared by Commander McCalla regarding the Cuban forces west of Cienfuegos which showed that he had com¬ municated with them, and mentioning a con¬ venient landing place some 13 miles from the port. Corroboration of Cervera's arrival coming the evening of the 20th through the Key West cable office from an employee in Havana who had also sent the first, a dispatch was prepared to go by the Marblehead, supposed ready to leave for Cienfuegos, saying, (

. . .» As it appeared during the night that the Marblehead might be delayed, Sampson upon arrival off Havana in the afternoon (21 May) sent the Hawk as the fastest of the squadron with a copy of the dispatch, and an additional memorandum, the tenor of which urged the utmost dispatch as did also the verbal instructions which Lieutenant Hood of the Hawk was ordered to communicate. Sampson moved with the available force on the north side of Cuba to Nicolas Channel, in order to have an advanced position in case Cervera should move toward Havana from the east. Hood ar¬ rived off Cienfuegos at 7.30 a.m. 23 May, de¬ livered his dispatches and repeated the verbal instructions. He returned the same day, reach¬ ing Havana 25 May with dispatches from Schley which reached Sampson at 9.30 p.m. of the 26th by the Dolphin, whose failure to pick up the squadron earlier was a startling instance of the difficulty of finding even a large force at sea. Schley wrote that he was by no means satisfied that the Spanish squadron was not at Cienfue¬ gos, giving a number of reasons for his belief, one of which was his having heard guns the afternoon of 21 May (when about 40 miles from Cienfuegos), which he took to be a wel¬ come to the Spanish fleet. Lights, which turned out to be signals by the Cubans as arranged with Commander McCalla, had been seen to the westward of the harbor, but this arrange¬ ment, not having been communicated to Com¬ modore Schley, was not acted upon, though the fact of the presence of Cuban troops in that vicinity was known from the memorandum previously mentioned. The report of Captain Dayton of 20 July when blockading Cienfuegos would seem to show that it was not necessary to apply to the Cubans for knowledge regard¬ ing ships in the harbor. Dayton says (p. 219 Appendix to Report of Chief of Bureau of Navigation 1898) : ((During the

afternoon I made as close an inspection [of Cienfuegos Harbor] as practicable. From aloft could de¬ tect in the inner harbor four large steamers flying Spanish colors, one with four masts and one smoke stack, one with three masts and one smoke stack, and two with two masts and one smoke stack; also two fair-sized gun¬ boats, the larger being apparently of the Esmer¬ alda class. ... 1 he four-masted steamer was

U. S. S. Olympia. Admiral Dewey's flagship at Manila

1 U. S. S. Brooklyn. Admiral Schley's flagship at Santiago

2 U. S. S. Rochester, formerly New York. Admiral Sampson's flagship at Santiago

surrounded by lighters and appeared to be dis¬ charging cargo."

The arrival of Commander McCalla, how¬ ever (with the Marblehead, 24 May), who at once found the Cubans at the point which had been designated in his memorandum settled the fact that Cervera was not at Cienfuegos. Com¬ modore Schley thus left that evening with his squadron making, however, such slow progress that he was not off Santiago, 315 miles from Cienfuegos, until the afternoon of 26 May. The Yale, Saint Paul and Minneapolis were at the moment off Santiago by orders of the Navy Department to watch the port, and on the morn¬ ing of 25 May the Saint Paul had captured the British collier Restormel with 2,400 tons of coal which had already touched at Porto Rico and Curasao from which latter place she had been ordered to Santiago. The Harvard which had also been there had gone to Saint Nicolas Mole to send a dispatch received by the Scorpion 24 May from Commodore Schley. The three other ships, sighting the smoke of a number of ships to the south, had steamed in that direction, thus leaving the port without any observing ship, a fact which as will appear later might have had most serious consequences. It was found that Commodore Schley had determined to return to Key West and at 7.45 p.m., signal being made to that effect, the squadron headed westward with the collier Merrimac in tow of the Yale. The frequent breaking of the towline caused little progress to be made. The Harvard on the morning of 27 May reached the squadron and delivered a telegram received from the Navy Department at Saint Nicolas Mole the pre¬ ceding morning (26

May), the more important part of which was that directing him to pro¬ ceed at once and inform Schley and also the senior officer present off Santiago de Cuba as follows : <(A11 Department's information indi¬ cates the Spanish division is still at Santiago de Cuba. The Department looks to you to ascertain fact and that the enemy, if therein, does not leave without a decisive action. . . ."

This was answered (sending the Harvard to Kingston for this purpose and for coal) in a telegram, the main parts of which are as fol¬ lows: . . Merrimac s engine is disabled

and she is helpless; am obliged to have her towed to Key West. Have been absolutely un¬ able to coal the Texas, Marblehead, Vixen and Brooklyn from collier owing to very rough seas and boisterous weather since leaving Key West. Brooklyn is the only one in squadron having more than sufficient coal to reach Key West. Impossible to remain off Santiago in present state of coal account of squadron. . . . It is to be regretted that the Department's orders cannot be obeyed, earnestly as we have all striven to that end. I am forced to return to Key West via Yucatan passage for coal. Can ascertain nothing certain concerning enemy. ..." This was a very unhappy tele¬ gram in view of the facts that the Iowa, Massa¬ chusetts, Castine and Dupont had coaled from the collier at various times and that the Texas and Marblehead took coal the evening of the day the dispatch was sent; that while it was but 790 miles to Key West, the Massachusetts had sufficient coal to steam, at 10 knots, 2,371 miles; the Iowa, 2,028; the Texas, 1,459. The Brooklyn had enough to have blockaded 32 days; the Massachusetts, 24; the Iowa, 18; the

Texas, 14, and the Marblehead about 6 days and still have enough to go to Gonalves Bay in Hayti (Testimony Schley Court of Inquiry, p. 535). There was, moreover, the splendid and commodious harbor of Guantanamo but 40 miles east of Santiago, to be had, so to speak, for the asking. Had the squadron gone to Key West, it would still have had to coal at an anchorage in the open sea. Nor was any real endeavor made to get information as to the presence of the Spanish squadron. Most fortunately the next day, 28 May, Commodore Schley, now 38 miles west of Santiago, decided to return and go off the port. He arrived there the same evening and the question of the presence of the Spanish squadron was fixed by discovering the Colon moored near the harbor entrance; and another man-of-war and two destroyers near her. Cervera had been twice on the point of leaving Santiago for San Juan, Porto Rico, and steam was actually got up on the evening of 26 May, and every preparation made to leave, when his heart failed him at the report that the swell was sufficient to cause danger of the Colon's strik¬ ing a rock off Point Morillo on which there was but two and one-half feet of water more than the Colon drew. With the American

squadron so far (20 miles at 8 p.m.) to the south and with the intended departure so near nightfall, it is very probable the Spanish squadron would have got away unnoticed. There is no need to dwell upon the sensation such an escape would have made.

*Schley's telegram of 27 May produced con¬ sternation at Washington. Sampson on the north side of Cuba had occupied Nicolas Chan¬ nel 25 May. The force in the beginning was a very meagre one, the New York and Indiana being the only armored ships ; with these were the gunboats, Newport, Vicksburg, Mayflower, Machias, and the torpedo boats Rodgers and Foote. If the Spanish squadron should be met it was expected that the gunboats should be sacrificed in the general attack. In the afternoon of the same day, however, the fast and excellently armed cruiser New Orleans joined, and by the 25th were added the Montgomery (with the broad pennant of Commodore Watson), the Cin¬ cinnati, Detroit, Miantonomoh, Puritan, Terror, Amphitrite, Wilmington, Wasp and Vesuvius ; a powerful force if the Spanish squadron would only wait an attack, but amounting to little if it should use its speed to escape. This hetero¬ geneous collection of ships was fitly called by the men the <(Bargain Counter" squadron. The dispatches brought by the Dolphin in the night of 26 May, announcing that Commodore Schley had not moved from Cienfuegos, caused the Wasp to be dispatched to him with an order to proceed ((with all possible dispatch to Santiago to blockade that port. If on arrival there you receive positive information of the Spanish ships having left, you will follow them in pur¬ suit." This, of course, was not delivered, the Wasp having found that Commodore Schley had already gone. Sampson supposed this might be the case,*as appears in his telegram of 27 May to Washington, and his supposition was confirmed by a telegram sent by the torpedo boat Dupont 24 May by Commodore Schley to Key West for transmission to Washington, in which he mentioned that he would ((move east¬ ward tomorrow" (25th), though in fact he left*

that night. The mention of this delay, how¬ ever, decided Sampson to go himself to Santiago. The New Orleans was ordered there with the collier Stirling, and her commander, Captain Folger, was ordered to communicate with Schley ((and direct him to remain on the blockade of Santiago at all hazards, assuming that the Spanish vessels are in that port.® He also carried directions to use the Merrimac to block the harbor entrance, a suggestion for do¬ ing so also coming from the Navy Department. Though somewhat criticised, this was wise from the point of view at the time. The tele¬ gram of the Secretary of the Navy of 5 May directed Sampson not to

so risk his ships against fortifications ((as to prevent from soon after¬ ward successfully fighting the Spanish fleet composed of the Pelayo, Colon, Teresa and four torpedo boat destroyers i'f they should ap¬ pear on this side.® Spanish reinforcements were thus regarded possible ; there were two destroyers in Santiago and the danger to ships on blockade of being torpedoed would be con¬ stant; to hermetically seal a powerful squad¬ ron in the port, the entrance channel to which was less in breadth than the length of a ship of moderate size, thus leaving our own force free for other operations, was sound policy and so held by every one consulted.

Sampson arrived at Key West at 2 a.m. 28 May and found the Oregon, which had com¬ pleted her brilliant voyage of 16,000 miles, 26 May. She was reported ready for any service and left during the day for the squadron in Nicolas Channel. At eight Sampson received the telegram announcing the intention to send 10,000 troops to Santiago and that he was ex¬ pected to convoy the transports, going in per¬ son ; but about midnight the department's telegram arrived, reporting Schley's intention, expressed in his telegram of the 27th, to re¬ turn to Key West and asking Sampson how soon he could reach Santiago with the New York, Oregon, Indiana and some lighter ves¬ sels, and how long he could blockade there, sending his ships singly to a coaling point. Sampson answered this at 3 a.m. (29th), that he could reach Santiago in three days and could blockade indefinitely; that he thought he could occupy Guantanamo ; and that he (

capture of the collier Restormel by the Saint Paul. Sampson replied to this "Congratulate you on success. Maintain close blockade at all hazards, especially at night; very little to fear from torpedo boat destroyers. Coal in open sea whenever conditions permit. Send a ship

to Guantanamo with view to occupying it as base, coaling one heavy ship at a time. Ap¬ praise captured coal, use if desired and after¬ ward send ship in as prize.®

In the afternoon the desired permission to go to Santiago was received and at 11 p.m. the New York, having finished coaling, left for Nicolas Channel, reaching the squadron at 7 a.m. Commodore Watson was conferred with and at 9.07, signal being made to the Oregon, Mayflower and torpedo boat Porter to form column on the New York, Sampson stood east¬ ward at 13 knots. The squadron arrived off Santiago at 6 a.m. 1 June (in less than two days) having met in the Bahama Channel the Yale and Saint Paul. From Captain Sigsbee of the latter, the admiral received copies of several telegrams from Commodore Schley taken by the Saint Paul to Nicolas Mole, which showed that the enemy's ships had been seen in port, and that the situation would be held. As the squadron arrived, the Colon and one of the Vizcaya class were seen about seven- eighths of a mile within the

entrance, but they moved out of sight almost at once, which, in the case of the Colon, could be done without unmooring, by veering the hawsers attached to the shore and heaving in on her chain, the distance to go to take her out of view being very slight (her log mentions leaving her moor¬ ings at this point at 10.35 a.m.). The day pre¬ vious (21 May) Commodore Schley had gone aboard the Massachusetts and with the Iowa and New Orleans had fired upon the Colon and the batteries at the entrance. The ships passed the entrance twice at a speed of 10 knots and the ranges, as stated in the Iowa's log, at first 8,500 yards, increasing to 11,000. The total time of firing stated by the Massachusetts was 7 minutes 35 seconds. One shell, reported in the Colon's log as exploding near the stern, did some slight damage, but a battle between ships at the ranges reported in the log of the Iowa, 8,500 to 11,000 yards (from nearly five to over six miles), or even at 7,000 (four miles), the range first proposed, and lasting the time re¬ ported by the Massachusetts, could not be effective.

Sampson at once made preparations for sinking the Merrimac, Naval Constructor Hob¬ son being put in charge, as he had been previ¬ ously directed, as an expert, to study the ques¬ tion of the best steps to be taken to sink her quickly. Hobson was finally allowed to take the ship in. Many were as eager to go as he, the officers and men volunteering by the hundreds, but Sampson was moved to let it fall to Hobson from a sense of fairness, in that he had done the whole work of preparation. It was breaking day when the ship finally started and it became so light that she was recalled and sent in the night following; but her steering gear being shot away, she drifted, before sinking, too far up the channel to block it in any degree. Had her bow taken the east side of the channel at the point proposed, her stern would have swung with the tide (running flood) in such a way that the channel would have been closed almost as a caission closes a dry dock. It was fortu¬ nate, of course, in the light of events that it was otherwise. Hobson in his graphic and most excellent account says that he would more certainly have succeeded had he not been

recalled on his first start. The writer is now inclined to agree with him and rather the more as an amend for his share in causing his recall. But the fame of an heroic act is Hobson's all the same, and the failure made the third of July victory possible.

Sampson on arrival had found the Flying Squadron moving in column east and west in face of the port. He changed this, placing the ships with their heads toward the harbor en¬ trance on a six-mile radius, which made a

semi-circle of about nine miles. (This was later reduced to four during the day and three at night, with much less for certain ships). An order of battle was issued 2 June dividing the fleet into two squadrons, one (to the east) un¬ der the personal command of the commander- in-chief, the other (to the west) under Com¬ modore Schley. This order enjoined: ((If the enemy tries to escape, the ships must close and engage as soon as possible and endeavor to sink his vessels or force them to run ashore in the channel. It is not considered that the shore batteries are of sufficient power to do any ma¬ terial injury to battleships.® On 6 June the batteries were actively bombarded. The next day Guantanamo Bay was occupied by the Marblehead and Yankee and thenceforward was Sampson's base; the fort at the head of the deep water bay was destroyed 15 June by the Texas, Marblehead and Suwanee, the two former coming in contact each with a heavy gun cotton mine, but, in the pious language of Captain Philip, in his report, <(owing to Divine care neither of them exploded.® While every oombatant is ready to suppose Providence on his side, some credit ought to be given to the barnacles which had grown so actively that the mine machinery could not operate. On the 10th, the marine battalion arrived in the Pan¬ ther and at once went into camp, where from 11 May to the 14th it underwent a severe fire from the enemy, occupying a commanding posi¬ tion, in which some lives were lost. On the 14th, however, a force of two companies of marines and 50 Cubans, under Captain Elliott, attacked some 500 of the Spanish and destroyed their only water supply, from which time the bay and vicinity remained undisturbed though there was a force of over 7,000 Spanish at and near Guantanamo town, 12 miles from the bay head.

On 7 June a memorandum for night duty was issued ordering three picket launches to be placed one mile from the Morro, the Vixen, Suwanee and Dolphin on a two-mile radius from the Morro, the larger ships to come within a four-mile radius. The memorandum con¬ tinued : (

randum No. 14, issued the next day (8 June), had a most important bearing upon the final successful result. It directed the battleships to take turns of two hours each, beginning at

dark, in illuminating the harbor entrance with a search light. Later a second battleship was kept close to the illuminating ship so that the former could do any firing necessary without disturbing the illumination. The ship using the search light was kept not beyond two miles from the Morro and was ferquently nearer. The effect was a complete lighting up of the harbor entrance, making it impossible for the smallest craft to appear without being seen. It was the main element, as Admiral Cervera mentions, in preventing any attempt to leave at night. Memorandum 20 of 15 June directed that the distance of four miles from the en¬ trance during daytime

should under no cir¬ cumstances, even when coaling, be exceeded. The next day the batteries were again bom¬ barded. It was clear to the admiral's mind that in themselves they were not to be taken as a serious obstruction to the fleet. The Vesu¬ vius had arrived 13 June and from this time forward for many nights shook the vicinity with the explosion of her shells. While it cannot be said that they produced much actual damage, as there was so little to sustain dam¬ age, the batteries being but small objects for such practice, they certainly had a very marked moral effect upon those in the vicinity of their fall, the Pluton, by Spanish accounts, Being so violently lifted once that every one was thrown off his feet. The New Orleans and Texas had each by order of the admiral en¬ gaged singly the batteries and it was clear that they alone were not an obstruction to the fleet ; but the mines had to be reckoned with and Sampson urged the sending of the army, tele¬ graphing that with 10,000 men the city and squadron could be captured in 48 hours. His only view of the case, and the correct .one, was to land in the vicinity of the entrance, capture the batteries and occupy the adjacent positions, so that the fleet could at leisure lift or destroy the mines and enter the harbor.

When the war came the regular army of the United States had but 2,116 officers and 25,706 enlisted men. There were 25 regiments of in¬ fantry, 10 of cavalry and 5 of artillery. The bill approved 22 April declared all able-bodied male citizens from 18 to 45 liable to military duty; that the President might call upon each State and Territory for troops in proportion to its population ; that the regimental and company officers should be named by the governors of the States, the general and staff officers by the President. On 23 April a call was made for 25,000 men. On 26 April additional enlistments in the regular army were authorized tempo¬ rarily to a total of 62,597 men. In May the en¬ rolments amounted to 124,776 men. A second call 25 May for 75,000 caused the volunteer army to reach in August its highest number, 216,256. Immediate steps were taken by . the War Department toward concentration, chiefly at Chickamauga, Tenn., Camp Alger, Va., and at Tampa, Fla. ; the last being selected as the- point of departure of the invading force for Cuba, though many, including its general-in¬ chief advocated strongly making no move to invade the island until October on account of its supposed deadly summer climate. Historical precedents were brought to bear showing the fearful losses of expeditions of earlier cen¬ turies; with as much reason might one have

deprecated living in London because it once suf¬ fered from the plague. It was, as we came to know from the experience of the marines at

Guantanamo, a question of care ; but this care could not be given without experience on the part of officers and men, and the officers of the regular force were too few to count as against the rawness and ignorance of the vastly greater number of volunteer officers who had never known anything of the care of troops. The zeal and spirit of the army of volunteers, composed, as much of it was, of the best blood and intelli¬ gence of the country, were far from being an offset to their inexperience in the field. The army corps numbered eight, but the sixth was never organized. The fifth, under Major-Gen¬ eral Shafter, at Tampa, numbering about 15,000 men; and a part of the eighth, Major-General Merritt (some 11,000 out of a total of 16,000 at San Francisco) were those actively-employed before hostilities ceased. Shafter received orders 9 May (

Eagle for a short time. . . Resolute con¬

firms it.® The next day Sampson received a telegram from the Navy Department that the army expedition was stopped temporarily on account of the report Eagle and Resolute ; that the convoy was distributed to scour the straits

and re-enforce the blockade, and he was di¬ rected to send two of his fastest armored ships to search through Nicolas Channel, and then to re-enforce the convoy. The telegram asked ((Are you sure all four Spanish armored cruisers are at Santiago?® The only action taken by Sampson was to telegraph that he had no con¬ fidence in the report and that he considered it very unwise to suspend operations on this ac¬ count, ((but even if it is found correct there is sufficient force to furnish convoy. Armored vessel was probably Talbot which was sighted Thursday at 9 a.m. by the Scorpion standing east ; am confident no large ship escaped from here. . . .® His view was correct, the ar¬

mored ship as is now known was the English cruiser Talbot which left Havana that evening and was sighted by the Eagle at the same time with the Armeria and Supply under convoy of the Scorpion. Sampson sent for the log of the Scorpion, determined her position at the time and so telegraphed the Navy Department. To set the matter completely at rest Lieutenant Blue, who volunteered for the service, was landed 11 June at Aserradero, 15 miles west of Santiago, whence he went inland with guides furnished by General Rabi to a hill overlooking Santiago Bay. He reported aboard his ship, the Suzvanee, again the morning

of the Saint Louis. A feint was made by the fleet and 10 of the transports of disembarking at Cabanas Bay, two miles west of the harbor. General Rabi with 500 Cubans was also to make a demonstration near by. The New Or¬ leans, Detroit, Castine and Wasp were sta¬ tioned off Daiquiri, the Helena, Bancroft and Hornet at Siboney (seven miles nearer Santiago than Daiquiri), the Gloucester and Eagle at Aguadores (three miles east of the port) and the Texas, Vixen and Scorpion at Caba Has: the extent of coast line covered was 32 miles. Great difficulty was experienced through the wretched conduct of many of the transport captains who were under no proper control and wandered over the sea at will. Hours were spent in finding some of them and when found they would insist upon lying miles from a shore which they could have approached with safety within a ship's length. By sunset 6.000 men were ashore with the loss of two drowned by the capsizing of a boat. The immediate de¬ sertion by the Spaniards, under the fire of the fleet, of all the points about Daiquiri and Si¬ boney, but 10 miles from Santiago, caused the transfer to the latter points of landing opera¬ tions, and this was thenceforward the army base. Wheeler, the senior officer ashore (Shafter remaining aboard until the 29th), ordered Young to make a forward movement on the 23d, which brought about the skirmish of Las Guasimas, in which the 1st and 10th Cavalry and the Rough Riders, all of course unmounted, were engaged. The American loss out of the 964 in the fight was 16 killed and 52 wounded. The Spaniards retreated leaving 11 dead. On 24 June the last of the troops had been landed and two days later the field bat¬ teries were ashore. Shafter sent a telegram to the War Department gracefully acknowledging the services of the navy : <(Without them I could not have landed in 10 days and perhaps not at all, as I believe I should have lost many boats in the surf.® More difficult, however, was the question of getting supplies ashore as the fleet's boats with their crews had to return to their ships; and the army had a hand to mouth existence for days which must have been a serious element, through ill nourishment, in the development of the sickness later. On the 25th and 26th Garcia's force of 2,978 was trans¬ ported from Aserradero; on the 27th the 33d and part of the 34th Michigan arrived under Brigadier-General Duffield from Camp Alger and went into camp at Siboney. By 30 June the American force was in face of the Span¬ ish positions to the east and northeast of Santiago and in the afternoon a council was called in which plans were made for the battle of next day, 1 July; Lawton's division to assault El Caney at daybreak, and afterward take position on the right of Wheeler's and Kent's divisions and assist in the general attack on the lines to the east of and near Santiago. It is impossible in the space to deal with the details of these actions, which reflected the greatest credit upon both victor and vanquished. The American force was greatly superior in num¬ bers. the force under Generals Lawton, Chaffee, Ludlow and Colonel Miles (commanding a brigade) reinforced during the

day by Bates' command attacking El Caney, numbering 6,654, against about 500 Spanish who, occupying a

strong defensive position, maintained them¬ selves most heroically, losing 300 killed and wounded and 150 captured. Among the killed were General Vara de Rey and his two sons. The American Losses at this point were 88 killed and 355 wounded. The action was most ill-advised : Had Lawton merely contained the small force at El Caney and joined on the right at once, Santiago, in all probability, would have been carried at once. The attack upon the main Spanish lines east of and near the city, along the crest of San Juan Hill, was made by the dismounted cavalry division under General Wheeler and the first infantry divi¬ sion under General Kent, the whole force num¬ bering 8,336 men. Lieutenant Miley, of Shaf- ter's staff, gives the numbers of the Spanish as 750 in the most advanced position on San Juan Hill and 3,500 immediately in the rear. There were about 1,000 men ashore from the Spanish squadron under Cervera's chief of staff, Cap¬ tain Bustamente, who was mortally wounded. San Juan Hill was occupied by the Americans after a most courageous and bloody struggle with the loss of 144 killed and 951 wounded. The casualties of the day were thus over 10 per cent of the force engaged. It may con¬ fidently be said that few armies would have won success under the immense disadvan¬ tages to which Americans were subjected. Suddenly transported to a tropical climate, with clothing of a character in itself to madden a man into illness, with the scantiest of rations for days, subjected daily to torrential rains, fighting through the thickest of jungle, op¬ posed by an entrenched foe with smokeless powder, it required to win men such as com¬ posed this force, the finest in the writer's opin¬ ion, through its practical experience and train¬ ing, ever put into the field. Nor must the dis¬ abilities of the Spanish be overlooked. They were ill-fed, had long undergone the depressing effects of the tropics and were in no condition to meet a determined foe. They showed the obstinate courage always shown by their race when on the defensive, and sustained, to the full its honor.

Admiral Sampson, at the request of General Shafter, had supported, on the 1st, a demon¬ stration at Aguadores by a force commanded by General Duffield ; the few Spanish seen hav¬ ing disappeared, the New York and Oregon fired a number of eight-inch shells over the hills in the direction of Santiago and the ships in the bay. The evening of this day Colonel Escario with 3,500 men entered Santiago from Manza¬ nillo, a reinforcement which in the existing destitution but added to the difficulties of the Spanish. Sampson at Shafter's request bom¬ barded again the batteries at the entrance 2 July. Shortly after, Shafter sent a message urging Sampson to force an entrance, to which reply was made that this was impossible until

en¬ trance was cleared of mines ; a work of some time after the forts should be taken. Shafter stated it was impossible to say when he could take these and if as difficult as what he had been pitted against, it would require time and great loss of life. (

however, in time and with sufficient men, to cap¬ ture the forts along the bay.® Sampson at once replied that the forts could not prevent his en¬ trance but that it was a question of mines, to attempt to go over which would certainly result in the sinking of one or more ships, thus pre¬ venting further progress by the fleet. He said :

*avoid collision. One after the other the Teresa and Oquendo were seen to turn inshore afire and they were beached, the T eresa five and one- half, the Oquendo six miles west of the harbor entrance. The destroyers Pluton and Furor were fired upon by the Indiana and Iowa, but were destroyed in the small bight four miles west of Santiago largely by the fire of the Gloucester which engaged them with the utmost intrepidity. They were also fired at by the New York. The Vizcaya and Colon were still steaming west but the former hauled down her colors and turned in to the beach at Aserradero, 14J4 miles from the harbor, crossing the bows of the New York within a few hundred yards. The flagship signaled the Indiana to return off the port. The Iowa remained near the Vizcaya with the Ericsson and Hist to rescue the Viz¬ caya's crew. The Gloucester rendered the same service to the Teresa and Oquendo, assisted l&ter by the Indiana, Iowa and Hist, a duty which was rendered under great difficulties and danger. The chase of the Colon continued, the ships in pursuit the Brooklyn, Oregon, Vixen, Texas and New York (taken in order from sea¬ ward). The Oregon began firing her 13-inch guns at 10,000 yards range and the shot went over; her eight-inch guns were also tried but fell short as did the Brooklyn's. The Oregon reduced the range to 9,500, to 8,500, then 9,000, when at 1.20 the Colon hauled down her colors, turned inshore and ran her bows on the steep beach where empties the little river Turquino under the mountain of the same name, the high¬ est in Cuba (8,400 feet). The nearest ships had still over five miles to run to reach this point and on arriving near, Captain Cook of the Brooklyn boarded the Colon and received her surrender. He stopped on his return and re¬ ported aboard the New York which was the third ship to arrive, having passed the Texas and Vixen**

The Oregon was ordered to take charge of the Colon. The ship, however, was clearly sinking. All her sea valves had been opened and though every

effort was made to save her, and when the rising tide had floated her during the evening she was pushed hard ashore by the New York, she turned over on her side as she sunk and there remains. The Resolute, ordered by the commander-in-chief to report at Guan¬ tanamo the exit of the Spanish squadron, had met off Daiquiri an Austrian man-of-war whose flag was so similar to that of Spain that a warn¬ ing memorandum had been issued in expectancy of a visit from the Maria Theresa, which this ship turned out to be. The Resolute, taking the ship for Spanish, turned westward, warned the Harvard at Siboney, which also sighting the stranger stood west with the same news. The Resolute arrived at Rio Tarquino with the news, the Brooklyn was ordered to investigate the report and proceeding to the eastward met the Austrian vessel and after some delay ascer¬ tained her character. The distance from the Santiago entrance to the point where the Colon was beached is 52 nautical miles. Taking the

**The log of the Texas is inaccurate in stating that the New York and Vixen came up about 3.00; the writer has a photograph taken from the Texas showing the New Y ork passing the V ixen and from a direction which shows the New York must have passed the Texas. The time is marked by the signal flying from the New York which the Brooklyn's log gives as received at 1.50. The New York's log gives 2.00 as the time.*

*ships successively from the east to west posi¬ tions, the New York was 59*4 miles, the Oregon 53, the Texas 50ˆ4, the Brooklyn 49*4 miles from this point when the Spanish ships came out. Allowing five minutes to get headway and two miles for changes of direction of the Brooklyn, the speeds of the Oregon and Brook¬ lyn to 1.20 p.m., when the Colon surrendered and these ships as established by the Oregon's gun ranges were four and one-fourth miles east of the Colon's turning in point, were for the Oregon 13.37 knots and for the Brooklyn 12.06; for the New York to the time of stopping at 2 p.m. at the point of beaching (allowing five minutes to turn) 13.73; the Texas to the same point, and allowing one mile lost in backing and her time of arrival as 2.05, 11.72 knots.*

Admiral Cervera and a large number of his officers and men were received on board the Iowa, but all these as well as those on board the Resolute from the Colon were transferred to the Harvard and Saint Louis later; 1,615 men were taken to Portsmouth, N. H., and interned; the larger number of officers were cared for at Annapolis. The total Spanish loss was 353 killed or drowned and 151 wounded. The American loss was one man killed aboard the Brooklyn. There was the same disparity of damage as at

Manila, in no wise to be accounted for by disparity of force. The Spanish were greatly outmatched in heavy guns, having but 6 11-inch against the 14 12- and 13-inch and 38 8-inch of the Americans; but in rapid fire of lesser calibre, which should have done some damage against unarmored parts, they were practically equal, having 10 6-inch, 30 5-inch and 6 4.7-inch against the American 14 6-inch, 12 5-inch and 18 4-inch.

The next evening, 4 July, at midnight the searchlights showed a large ship in the entrance to Santiago Harbor. This, as known later, was the cruiser Reina Mercedes sent down to block the channel. She was sunk by the gunfire of the Texas and Massachusetts and later raised and sent to the United States. The destruction of this squadron was virtually the end of the war.

The firing on shore had been renewed the morning of the 3d, but at 8.30 a.m. General Shafter sent a letter to the Spanish comman¬ der saying that unless he should surrender he would be obliged to shell the city and allowing until 10 next morning for women and children to leave. At 6.30 p.m. a letter was received de¬ clining surrender, but Shafter on request of the various consuls delayed further action until the 5th. On 6 July Sampson's chief of staff visited General Shafter with reference to further ac¬ tion, and the result of the conference was that a letter was sent the Spanish commander drafted by Captain Chadwick and signed by General Shafter giving the facts of the destruc¬ tion of the Spanish ships and the ability of the squadron to shell his position with 8- and 13- inch shell; it urged surrender, suggesting a ref¬ erence of the situation to his government, in the meantime the cessation of hostilities to continue. On 8 July the Spanish general offered to leave Santiago with arms and baggage provided he should not be molested before reaching Holguin. This was referred to Washington and was de¬ clined. At 4 p.m. 10 July the, truce was ended, and firing began on both sides, the heavy shells of the navy during this and the next day fall¬ ing in the town and destroying 57 houses. At

2 p.m. the 11th the firing ceased and was not renewed. General Toral was informed of the heavy American reinforcements, and surrender was again demanded, the government of the United States offering to transport the entire Spanish command to Spain. A surrender was agreed upon 14 July, this to include not only the troops in Santiago but all those of the depart¬ ment, a total of about 24,000. The city was de¬ livered to the Americans 17 July. The result was fortunate for the American force in view of the sickness which had rapidly developed through the constant rains, bad shelter and in¬ sufficient food in the earlier days of the invest¬ ment. The situation became such that the gen¬ eral officers united in advising the removal of the army from Cuba. On the other hand the marines at

Guantanamo, under the excellent conditions of shelter and food and water supply which they had been able to keep, up, were re¬ markably healthy, the sick list not rising above that which was usual at home ports; the same can be said of the fleet, which kept its normal health. General Miles had arrived off Santiago 11 July in the Yale with 1,500 troops As soon as the surrender of Santiago was determined an expedition to Porto Rico under his command was organized, which sailed 21 July with 2,000 additional men. The battleship Massachusetts and 13 other naval vessels were detailed for service with the expedition.

There were in Porto Rico 8,223 regular Spanish troops and 9,107 volunteers. The de¬ stroyer Terror and small cruiser Isabel II were at San Juan, the former badly injured in an ac¬ tion with the Saint Paul 22 June. She had been struck by two five-inch shells, had three men killed and her machinery so damaged that she returned to port with difficulty. The Gloucester seized Port Guanica 25 July and Ponce surren¬ dered to the Dixie 28 July, in each case without appreciable resistance. Both places were occu¬ pied by. American troops. Reinforcements were rapidly arriving, there being available by the end of July a force of 9,461 officers and men (rising by the end of August to 16,973). Ad¬ vance was made from Guanica, Ponce and Arroyo. Several skirmishes ensued, in which three enlisted men were killed and four officers and 36 men wounded. The cessation of hostili¬ ties 12 August prevented the more serious work which would probably have been met in carry¬ ing the Spanish intrenched positions in the ad¬ vance to San Juan.

General Merritt in command of the expedi¬ tionary force to the Philippines had arrived 25 July. Accompanying him was a force of 4,847 officers and men, part of which did not arrive until 21 July. He had been preceded by the expedition under General Anderson with a force of 2,501, arriving at Cavite 30 June, and by that under Gen. F. V. Greene of 3,586 July 17.*

The situation at the time of General Mer¬ ritt's arrival was quiescent, but was seriously complicated by the presence of a Filipino army of probably 12,000 well-armed men under Agui- naldo, who had proclaimed an independent gov¬ ernment. The investment, however, proceeded without reference to this force and under the strain of considerable firing from the Spanish

**1,682 officers and men under Gen. E. S. Otis arrived 21 August; three other detachments left San Francisco succes¬ sively 19, 23 and 29 July, making a total of 641 officers and 15,058 enlisted men,*

lines at night. A joint demand on the part of the military and naval commanders-in-chief for surrender was made 7 August. The governor general declined but offered to refer to his gov¬ ernment. This was declined by the American commanders and the city was taken with but a show of resistance, 13 August. The total army casualties during the investment and as¬ sault were 17 enlisted men killed and 10 officers and 96 men wounded. Commodore Watson, relieved in the second command of the blockade on the north coast of Cuba by Commodore Howell, had been assigned 7 July to the com¬ mand of the squadron to join Admiral Dewey in the Philippines. This was to proceed, until their separation in the eastern part of the Medi¬ terranean, in company with the whole available armored force under Admiral Sampson. The protocol suspending hostilities, signed 12 August, of course ended the expedition and Sampson with the battleships and armored cruisers of his fleet arrived at New York 20 August, meeting an improvised reception which in spontaneity, magnitude and picturesqueness, combined as they were with the sentiment at¬ taching to a victorious fleet, has never been equaled in our country. The total losses had been in the army 279 killed, 1,465 wounded; in the navy 16 killed, 68 wounded.

The Spanish War, short and comparatively bloodless as it was, lifted the United States to a new plane. They became at once one of the dominant factors in world politics. Whatever the divergence of views, ethical or financial, in regard to the territorial acquisitions, there can be none as to the vastness of the change, con¬ sidered politically. The primary cause of the war, the freeing of Cuba, has become a second¬ ary event in face of the great changes wrought in our relation to the Caribbean and more par¬ ticularly to the momentous question of domi- nancy in the Pacific. The ownership of Hawaii and the Philippines (the former a direct out¬ come of the war also) are elements in this natu¬ ral destiny of the highest importance. From this point of view, and there is nothing facing the world of greater import than the future of eastern Asia, the war did much to put the United States in a position to meet the coming emergency. It also gave us a navy, an adequate army and the necessary bases for action, if action be forced upon us.

Bibliography. — Chadwick, F. E., delations of the United States with Spain) (1910) ; Flack, H. E., (Spanish American Diplomatic Relations Preceding the War of 1898) (1906) ; Hobson, R. P., (Sinking of the Merrimac) (New York 1899) ; Kennan, G., Campaigning in Cuba) (New York 1899) ; Lodge, H. C., (The War with Spain> (New York 1899) ; Mahan, A. T., (Lessons of the War with Spain} (Boston

1899) ; Roosevelt, T., (The Rough Riders (New York 1899; new ed., 1905); Sargent, H. H., Campaign in Santiago de Cuba) (3 vols., Chicago 1907) ; Sigsbee, C. D.,*

1900) ; Wheeler, J., (Santiago Campaign 1898) (Philadelphia 1899) ; United States Official Re¬ ports (Washington 1898).

F. E. Chadwick,

Formerly Rear-Admiral United States Navy,

40. TERRITORIAL EXPANSION. The

territorial expansion of the United States dates from the peace treaty of 1783, by which their independence was recognized and their boundaries named. There had been much un¬ certainty about the boundaries of the colonies for a considerable period prior to the War of the Revolution, and especially so in years im¬ mediately preceding the Declaration of Inde¬ pendence. The early grants to the colonies were made ((to the South Sea,® by which was meant the Pacific Ocean, though it was not then supposed that the continent was more than a few hundred miles wide. Gradually, however, the French moved up the Saint Lawrence and down the Mississippi Valley, establishing their claim to the great central area, and the Spanish gradually extended their claims northward at the extreme west, so that the claims of the colonies that their territory extended to the Pacific gradually dwindled, in view of the fact that the mother-country made no attempt to prevent these encroachments on the west. The increasing claims of the French in the Missis¬ sippi Valley and finally their claims to the Ohio Valley led to hostilities between the English and the French colonists and they were sup¬ ported by their respective governments. In 1753, the French having begun the establishment of a military post at the present site of Pitts¬ burgh, George Washington was sent by the governor of Virginia to warn them that the ter¬ ritory was claimed by the English colonies and must not be occupied by the French. Their reply was that they also claimed the territory by exploration and settlement and would hold it. This led to an attack by the English in the following year, in which they were repulsed by the French, and this precipitated the war be¬ tween the French and English, which resulted in the expulsion of the French from the con¬ tinent. The treaty between the French and English governments, by which the French withdrew from continental America, was made in 1763, and fixed the Mississippi River as the western boundary of British territory. It sub¬ sequently developed that France had a few months before secretly ceded her claims west of the Mississippi to Spain. The acceptance of the terms of this treaty of 1763 by the British government terminated the claims of the colonies that their boundaries extended to the Pacific. By this same treaty

of 1763, made be¬ tween England, France and Spain, Florida passed to the control of England, and as it was deemed advisable to divide it into two provinces or colonies, the British government concluded to add to the western section a nar¬ row strip from the southwestern part of the great colony of Georgia. Accordingly a strip west of the Appalachicola River, which had been formerly a part of Georgia, was attached to West Florida, against the protest of Georgia. The war between Great Britain and France regarding the territorial area in America had also resulted in the transfer of the French colony of Quebec to British control, and in 1774 the British government attached all of the territory north of the Ohio River and west to the Mississippi to the province of Quebec, making it, for purposes of government, a part of that province. This gave great dissatisfac¬ tion to the people of Massachusetts, Connecti¬ cut, New York and Virginia, since each of

these claimed that a part of the section north of the Ohio was within its original grant and should not be taken from them. And this was one of the many causes of dissatisfaction which finally culminated in the War of the Revolution.

Thus when the Revolutionary War closed there were several territorial questions to be settled, in making the peace treaty: first and most important, whether the country north of the Ohio was to remain a part of Quebec, or be recognized as still a part of the former colonies ; second, whether the section which had been taken from Georgia at the southwest and added to Florida should be restored as a part of the territory of the United States, in view of the fact that Great Britain had mean¬ time receded Florida to Spain; and, third, what should be the boundary at the extreme north¬ west. Virginia had held that her original char¬ ter gave her the territory north of the Ohio to the Mississippi River, including that lying west of the lakes, and besides that was the important fact that it had been occupied, in some degree at least, by the colonial forces during the War of the Revolution.

The result of these uncertainties as to bound¬ ary was that the commissioners sent to Paris to negotiate a treaty of peace with Great Bri¬ tain were instructed to claim all of the territo¬ ries in question, but to be guided by the French government in their work. These commis¬ sioners, Benjamin Franklin, John Adams, John Jay and Henry Laurens, soon after their meet¬ ing, found a disposition on the part of the French government to advise that the British retain the country north of the Ohio, and even

that the country south of the Ohio, between the Cumberland Mountains and the Mississippi, be declared neutral territory for the use of the Indians. As a result, the United States com¬ missioners broke off their relations with the French and negotiated the treaty according to their own views. By the boundary lines finally determined they obtained the recession to the United States of the small strip at the south¬ west corner of Georgia, now the southern part of Alabama and Mississippi, also the entire country north of the Ohio to the Great Lakes and that section west of the Great Lakes to the Mississippi and as far north as the present boundary line. These may be property said to be the first additions to the territory of the United States, since all of the area in question was more or less in dispute under the latest acts of the British government prior to the War of the Revolution and the organization of the 13 colonies as the ((United States of America."

The next addition to the territorial area of the United States, and that which is usually spoken of as the first addition to the territory of the United States, was the Louisiana Pur¬ chase. France had included the city of New Orleans and a small tract of country on the eastern bank of the Mississippi near its mouth in the territory ceded to Spain when she aban¬ doned the continent of North America in 1763. This gave the control of the mouth of the Mississippi to the nation controlling this ter¬ ritory. Following the close of the War of the Revolution, the area west of the Alleghenies had rapidly increased in population, and it was essential that this population should have an opportunity to reach the sea by the Mississippi River. An agreement was made with the

Spanish government in 1795 by which citizens of the United States should have the privilege of depositing their goods in New Orleans for transshipment abroad, without payment of duties, and that incoming goods should have similar privileges. In 1802, however, it became known that Spain had ceded the Louisiana coun¬ try to France, by a secret treaty made in 1800, and this fact caused great alarm among the people of the United States, lest their privilege of reaching the ocean through the Mississippi should be lost. A resolution was introduced in Congress authorizing the President to seize the city of New Orleans, but a substitute was adopted authorizing the President to send a commission to France and offer $2,000,000 for the city of New Orleans. James Monroe was sent as the special commissioner and authorized to co-operate with our Minister to France, Mr. Livingston. Napoleon, who was about entering upon war with the English, saw that his great possessions in America would be a source of weakness to him in such a war, and offered to sell the entire Louisiana territory to the com¬ missioners. While they were not. authorized to make such an agreement, they determined to assume the responsibility of doing so, and after some negotiation an agreement was made by which the entire territory was to be ceded to the United States for the sum of $15,000,000,

of which $11,250,000 was to be in bonds of the United States, the remainder to be paid to citi¬ zens of the United States having claims against France. The treaty reached the United States in July 1803, a special session of Congress was called in the following October and after two days of discussion the treaty was ratified, and in December the city of New Orleans and the vast territory thus acquired was turned over to the United States. The population at ttfat time was about 100,000, of which about one-half were whites, 10,000 mulattoes and 40,000 negroes. See United States — The Louisiana Purchase.

The next addition to the territory occurred in 1810-12, in the form of a small section of territory which had been a part of West Florida during the time that Great Britain controlled Florida. After the recession of Florida to Spain by Great Britain, the English citizens of the western part of West Florida became dis¬ satisfied, and especially so in view of the re¬ ports that Spain had sold West Florida to France. They held a convention in 1810, de¬ claring themselves a free and independent State. A communication was sent to the President of the United States, who instead of recognizing the new republic directed the governor of New Orleans territory to take possession of the territory, basing this action upon a claim that the territory had been sold to France and should have been included with the cession of Louisiana territory by France. The annexation does not seem to have been seriously objected to by the people of the area in question, but was met with protests on the part of both Spain and Great Britain. No further action was taken, however, and in 1812 the control of the United States was extended to another small section lying east of that occupied in 1810, this action being based upon claims similar to those upon which the occupation of 1810 was made These two additions gave to the United States the small section by which Alabama and

Mississippi now have a frontage upon the Gulf of Mexico.

The next addition to the territory of the United States, and that which is usually known as the second, was the purchase of Florida from Spain, in 1819. Florida had been continuously in control of Spain from the discovery to 1763, when Spain ceded it to Great Britain in ex¬ change for a part of Cuba, which Great Britain had seized during the war with France, because of the aid which Spain gave to France in that war. In 1783 England receded Florida to Spain, and in 1785 Spain sold West Florida to France, and it was upon this fact of the owner¬ ship of that territory by France that the United States claimed that it was included in the ces¬ sion of the

Louisiana territory in 1803, and upon this claim was based the occupancy in 1810 and 1812 above described. Florida was greatly desired as a part of the United States, both for the purpose of extension of the slave area and because of the fact that the presence of this foreign territory alongside of that in which slavery existed resulted in constant fric¬ tion between the people of the two sections. The escaping slaves from the adjacent territory of the United States found Florida a safe re¬ treat and there was also much bitterness over the fact that Florida had been made the head¬ quarters of a British force during the war of 1812-14. Repeated offers were made to the Spanish government for its purchase but with¬ out avail, but finally, in 1819, the Spanish Am¬ bassador at Washington signed a treaty by which Florida was to pass to the United States on payment of $5,000,000 in full extinction of the claims of certain American citizens against the Spanish government. The treaty was rati¬ fied in 1821 and the territory taken possession of by the United States, which in 1822 estab¬ lished the <(Territory of Florida.® See Florida.

The next addition to the territory of the Union was that of Texas. It was desired as a part of the Union, especially by those interested in the extension of slave area and slave States. It was formerly a part of the Spanish colony of Mexico. In 1810 the people of Mexico re¬ volted against Spanish rule, and in 1822 were successful, and in 1824 the republic of Mexico was established. The two provinces, formerly known as "Texas® and "Coahuila,® were made a single state of the new republic of Mexico, under the name of Texas. The desire of the people of the United States for this territory led to an offer of $1,000,000 to the Mexican government for its purchase in 1827 and another of $5,000,000 in 1829, but each was rejected. Meantime a large number of persons from the southern part of the United States settled in Texas, and in 1833 Texas attempted to obtain a peaceable separation from Mexico and inde¬ pendence, but without success. In 1836 Texas seceded from Mexico and established itself as a republic. In the election for President which followed, an almost unanimous vote was cast for annexation to the United States, but the application for admission, made by its Minister at Washington, was not favorably received by Congress. In 1844 another treaty of annexation was made but rejected by the Senate. The Presidential election in the United States which soon followed hinged largely on this question, and the sentiment was apparently in favor of annexation, and in January 1845

Congress passed a resolution giving "consent that the territory properly included within the Republic of Texas may be erected into a new State to be called the State of Texas.® This was accepted by the Congress of Texas and by popular vote in that republic, and in Decem¬ ber 1845, a joint resolution was passed in the Congress of the United States admitting Texas as a State. Thus, Texas passed from the posi¬ tion of an independent

republic to that of a State of the United States, without a treaty or without passing through the Territorial stage which usually preceded the formation of States of the Union. See United States — Annexa¬ tion of Texas.

The next great step in the development of the territory of the United States was the favorable settlement of the pending question be¬ tween the United States and Great Britain re¬ garding the control of the Oregon Territory. This territory had been claimed by Spain, Great Britain and the United States on grounds of exploration, and been jointly occupied by Great Britain and the United States after 1818, pend¬ ing a settlement of their respective claims. Meantime the treaty of the United States with Spain, made in the purchase of Florida, had resulted in the abandonment by Spain of her Oregon claim and the fixing of the boundary line between the Oregon country and Spanish territory, which then included all of what is now known as California, New Mexico and Utah. This strengthened the claim of the United States to the Oregon country, and by 1846 the demand of the people of the United States for a settlement of the boundary line became so great that there was serious talk of war with Great Britain to determine the question. Finally, in the year 1846, a proposi¬ tion was made by the British government fixing the boundary line on the 49th parallel and the Straits of Fuca. This was accepted and the Oregon country south of that line became an undisputed part of the territory of the United States. See Northwest Boundary.

The next addition to the national territory was what is known as the Mexican cession. A quarrel had arisen between Mexico and the United States, shortly after the annexation of Texas, regarding the boundary line between that area and Mexico, the Mexican government holding that the Nueces River was the southern boundary line of Texas, while the United States held that the Rio Grande was the boundary. The result was the war with Mexico, in which the United States was successful in every en¬ gagement, and it was followed by the cession by Mexico of the great area which includes the present States of California, Utah, part of Colo¬ rado, a small part of Wyoming and the Terri¬ tory of Arizona and a part of New Mexico. The eastern part of New Mexico was jointly claimed by Texas and by the United States as a part of the Mexican cession, and this claim and the control of about 125,000 square miles of Texas was settled by payment to Texas by the United States of $10,000,000. The area thus purchased from Texas now forms part of New Mexico, Oklahoma, Kansas, Colorado and Wyoming. The sum paid to Mexico for the magnificent area which was ceded to the United States at the close of the war was $15,000,000 in cash and a settlement of claims of citizens of the United States to the extent of $3,200,000

ALASKA ˆ

Ceded by Russia.

~V”ANCOUVl

PinoTtirer

Albany

LAKE

Yorkton

INKIPEG

JlAklTOUW

*T.leWT’**

irimorc

Bismarck \ \ <5'0|

RenfYc’” mttburtooˆ pˆ_ – “ˆOgacu

. ?«

ˆro/VfHr.;

*BaP*5*

“°‘tau S.

wffiwi

, oBellcPourche’

a W h i te woodˆ,

l Joro’

Pierre

luron ‘

ˆToCammon

Albert

Posebud

[cm opt

[NSINˆ ■

: i l a

[llllamsport

sSˆ’

/Tyron®

Jloi bfor)l

*-Aurora – 7Wˆ_*

v~jsic21ˆ

Ainsworth,ˆ- –

rannls

‘ˆOOKLVN

\TOU

,uiv

SHEYENNE

J— f-r – MOINE!

COUNCIL /ˆ£lourl(,,y BLUfPS pttumwSV /_

Jˆjaite

*Is****

fugtgp

*ITTSBURG**

ˆulesbin

(Vllcelinj

Wobrdaka City

Obcrlin

■ ParUcts

! ATCHli

MoLorl

Frcsn.

Mallei aTj jtjol o rn do

r*|,7avaje

＞hwonOw

iE.Fr E RSON. City ˆ

- Blrnnarok’

:it»UTg

‘o/aaj*

Junta

ˆhˆWetˆIiˆpahvU

I cli [tat

1 c w ooi1. .ˆ-MTinlft;

prince ten

WlUowb-

VSprii»’£*\

j, Eureka a Springs

TVVcatbci

‘ailiburn

Oceanside | National Clt*

iarilF. >

Lucrquc

ffijodewy -Y

\ v >!-PuaWiVjt

ITTLE ROCK’*) *—• « I lot/ \

’ortalca

Chlldre88Kj

Sejm

iurdou

Q(ambus0

[oswell

Camden

PORTO RICO

Ceded by Spain 7899

TL ANTIC I OCEAVq

/)„ ‘■(r,

- – —2i»ti-^v.c*,SAN JUAN 4*

OAILAS

Aui’c-i’-‘*3

i’ackson

\trvm*‘v

irwosi

‘fllorgnf

Ciudad

[ntt^eaburg

‘ licit ir.o

^ornam

San Angelo,

/

’Lufkin

s lni,‘i^L*

flcbeneyy.

•bnttai.

,/-o > oX Carolina;

\atka

\bas«

*, < ir": » Si • r C Yrj|iC0 3_fPu*y!t“'ll», ‘9^arrlJ*

Austin

Longfellow

SCALE; Stat. Miles,

San Mkrcos/ ANTONIOV./

olirmla

*J/ouths of (ha • JIi**i*tippi Hivor-*

Chibuah,,,

: tori a,

Sabinas’

punta

llauab

UAI

OAHU

N1II A U

GUAM “”

Ceded bySpa!n 7 899

WAKE ISLAND

Annexed 1899.

rtcklesville

LAXAT c~ Pal aw!

MAUI

PALAWAN O]*

*y JNegikjs I. *

ISLANDˆ

*(Arei*115,300 Sq. MiTe!*

S U LU

PARAGUj

WAKE

ISLAND

Channel

Pololu Mill

P Maliuki*

*Pu«*ˆLa*

■yrindp® ^\oVou^n’

XN*”” I cM * 1

Scale: _

Statute Miles, 252 = 1 Inch.

0 50 100 150 200 250

/ IIonomUcA

I^Lspahala Ml

DAK .

‘Baladac I.

Orote\

Xallua’-

lamboaogs

S JE A

Punalun

Ajayan

b° Scale: Statute Miles, 373

j lm .'c\T55i?s’r0K

110°

MIDWAY OT BROOKS II,

Annexed 1

iMipwat or Brooks 1b. io.

PHILIPPINE ISLANDS^ oBatak Is.

Ceded by Spain t

7899.

Xs »sˆ

Tig: at

> rˆ_THE WIDER PINK SHADING ?V ALONG THE

HAWAII

*K*7 > J «-v along the*

LS|C|-)/•>'**' \ ' ATLANTIC COAST*

Txmuˆ""n \> COVERS ALL THE

ˆ A SETTLED

'V \ TERRITORY IN THE J/icors»w'>" 7 \ UNITED STATES

Charleston \ AT THE CLOSE OF THE REVOLUTIONARY WAR.

- *Babuyan Is.*

[J z p>r

San E«mai»da

. y 7

Dsgups uj

1 P; L 1 N E*

l— % –

*A**

Waianae

ˆ HOKOt-0

(SANDWICH ISLANDS)

Annexed 1898. |

Scale : Statute Miles, 1 32 «»1 If cir.

169°

PAST OF SAMOA 1

V Acquired

14& TUTUILA I.

SLA NDS

790(Lpˆf'-

°:#0Tr

4*Va is.

' Scale: Statute Miles

, 82-1 Inch.

United States of Americaˆ_ 1900ˆ

Copyright, IBIS by Rand McNally A Co'_ — –

XiODgitude West from Greenwicli.

-

.

.

. ‘ .

.

UNITED STATES — TERRITORIAL EXPANSION (40)

455

I he last addition to the contiguous territory of the United States was what is known as the Gadsden Purchase (q.v.). It is a comparatively small and unimportant strip of territory lying between the Mexican cession and Mexico, south of what is now New Mexico and Arizona. It was claimed by both Mexico and the United States, and the dispute was settled by a pay¬ ment of $10,000,000 by the United States for the territory. The purchase was negotiated by the United States Minister to Texas at that time, James Gadsden, hence the title, (

The first addition of non-contiguous terri¬ tory occurred in 1867. by the purchase of Alaska (q.v.). The territory had been acquired by Russia, by discovery in 1741 and settlement in 1784, and a considerable industry in furs and shipbuilding developed. After the discovery of gold in California the Russians in Alaska traded with the people of California, especially prior to the development of transportation systems be¬ tween California and the eastern coast, and in this manner the people of San Francisco be¬ came aware of the value of the fur business, and probably of the existence of the precious metals. The California members of Congress urged its purchase ; bills to that effect were in¬ troduced in Congress, negotiations were opened with Russia through its Minister in Washington, and after considerable delay the agreement was made and the purchase consummated in 1867, the purchase price being $7,200,000. The Rus¬ sian government was moved to this sale of its territory in part by its disputes with Great Britain regarding boundary lines 'between Alaska and British North America, and chiefly by the great distance at which the territory lay from its possessions in Europe and Asia. Alaska has proved a very important contributor to the requirements of the United States, in furs, salmon and other fish, copper and gold.

The Territory of Hawaii (q.v.) was the first island territory annexed by the United States. Negotiations for the annexation of these islands began in 1854, when a treaty of annexation was framed under President Pierce's administration, but the sudden death of the king of the islands before its completion terminated the negotia¬ tion. In 1876 a reciprocity treaty was made with the islands by which the products of the islands were admitted free of duty into the United States and those of the United States admitted free into the islands, and this de¬ veloped commercial and other relations of the two communities very greatly. In 1893 a revo¬ lution occurred in the islands and application was made to the United States for annexation and a treaty framed and laid before Congress. It had not been acted on, however, at the close of the term of President Harrison and his suc¬ cessor, President Cleveland, withdrew it. On the inauguration of President McKinley the ap¬ plication for annexation was renewed, and after some delay Congress passed a joint resolution annexing the islands, and they were subse¬ quently given a Territorial form of government and made a customs district of the United States, so that all merchandise passes between them and the United States free of duty, just as it does 'between the various States of the Union. The trade between the Hawaiian Is¬ lands and continental United States aggregated

(1919) $136,591,198, the merchandise sent from the islands being chiefly sugar.

Porto Rico (q.v.), Guam (q.v.) and the Philippine Islands (q.v.J were

seized by the United States during the war with Spain, in¬ augurated in 1898 for the purpose of compelling that government to terminate her oppression of the people of Cuba. At the close of that war, in which the United States was successful, the islands were transferred to the United States by Spain, on the payment of $20,000,000 by the United States. While the treaty did not specify the precise purpose of the payment of the $20,- 000,000, it was understood that Porto Rico and Guam were retained by the United States under the rules of war, and that the payment of the sum named was with reference to the Philip¬ pines. Porto Rico has been made customs dis¬ trict of the United States and the commerce be¬ tween that island and the United States is not subject to any customs duties. It has grown from about $4,000,000 per annum, before the transfer, to about $22,000,000 in 1903 and $128,- 913,436 in 1919, the merchandise sent to con¬ tinental United States being chiefly sugar, to¬ bacco and fruits. Merchandise from the Philip¬ pines coming into the United States enters free of duty, and merchandise from the United States enters the Philippines duty free. The tariff of the Philippines differs from that of the United States; in the case of Porto Rico and the Hawaiian Islands the tariff of the United States applies to merchandise from for¬ eign countries, but all merchandise between the islands and continental United States passes duty free in both directions, as does also mer¬ chandise passing to and fro between Porto Rico and the Hawaiian Islands; while the Philippine Islands trade bears the same relation to that of Porto Rico, the Hawaiian Islands and Alaska as to continental United States. Porto Rico is governed by officers appointed by the President and a legislature elected by the people. The Philippines were governed by a commission appointed by the President of the United States, the commission being made up in part from citizens of the island and a part from citizens of the United States, but in 1916 the commission was abolished and a legislature created to consist of a Senate of 24 members and a House of Representatives of 90 members. The trade between the Philippines and the United States amounted in 1919 to $151,461,636, the chief exports of the Philippines to the United States being cocoanut oil, copra, manila hemp, sugar and tobacco.

The island of Tutuila, one of the Samoan group in the south Pacific, passed under the control of the United States in 1899. The group had been for many years under a joint protectorate of the United States, Great Britain and Germany, but in that year the joint pro¬ tectorate terminated, and the island of Tutuila, whose people had long ago expressed a desire for annexation to the United States, was annexed. The island is small, its chief import¬ ance being the possession of a fine harbor, the best in the south Pacific. See Samoan Islands.

Panama Canal Zone. — The United States by a treaty with the republic of Panama in 1904 obtained the privilege of constructing a ship canal across

the Isthmus of Panama and the control in perpetuity of a strip of land 10 miles

wide for its construction, maintenance and oper¬ ation. The sum paid for this privilege was $10,000,000, and in addition there was to he paid the further sum of $250,000 per annum as long as the occupancy shall continue. The United States did not acquire title to the ter¬ ritory but merely a perpetual right of occupa¬ tion, use and control. (See Panama Canal). The area, however, is classed as a part of the non-contiguous territory of the United States in the United States Statistical Abstract, issued by the Department of Commerce.

Virgin Islands. — The islands of Saint Croix, Saint Thomas and Saint John, formerly known as the Danish West Indies, purchased by the United States from Denmark in 1917, for the sum of $25, 000, OCX). They had been long a subject of negotiation between the Danish gov¬ ernment and that of the United States at prices ranging from $5,000,000 to $15,000,000, but the several propositions failed to receive the neces¬ sary legislative action for ratification. In 1916 war conditions rendered it advisable that the islands be promptly acquired in order that the United States government should be able to fortify and occupy as a naval base the harbor of Saint Thomas, known as the Gibraltar of the West Indies,® and considered of especial importance in the protection of the Panama Canal. President Wilson negotiated a treaty of purchase, naming a price of $25,000,000, and recommended that Congress ratify it, which it did, and the $25,000,000 was promptly paid and the title to the islands passed to the United States on 31 March 1917. Domestic products of the islands enter the United States free of duty and United States products enter the is¬ lands free of duty. A governor was appointed by the United States government to administer the laws in force in the islands pending legis¬ lation by Congress for their permanent gov¬ ernment. The trade between the United States and the islands amounted in 1919 to $3,192,132.

Expansion of the Territory of the United States from 1800 to 1921

Year

Area

Cost

Louisiana Purchase .

1803

875,025

$15,000,000

Florida .

1819

70,107

u6, 489, 768

T'pya.s .

1845

389,795

Orpgnn Tprritory .

1846

288,689

Mexican cession .

1848

523,802

618,250,000

Purchase from Texas. . .

1850

(c)

10,000,000

Gadsden Purchase .

1853

36,211

10,000,000

Alaska .

1867

599,446

7,200,000

Hawaiian Islands .

1897

6,740

Porto Rico .

1898

3 , 600

Guam .

1898

175

Philippine Islands .

1899

143,000

20,000,000

Samoan Islands .

1899

73

Additional Philippines. .

1901

68

100,000

Panama Canal Zone ….

1904

436

Virgin Islands .

1917

175

25,000,000

Total area added .

2,937,342

$122,039,768

(a) Includes interest payment.

(b) Of which $3,250,000 was in payment of claims of American citizens against Mexico.

(c) Area purchased from Texas, amounting to 123,784 square miles, is not included in the column of area added, because it became a part of the United States with the admission of Texas.

(d) The United States government by the payment of $10,000,000 and an annual payment of $250,000 acquired the right in perpetuity to construct and maintain the canal and to occupy a strip five miles in width on each side thereof.

See also United States — The Colonial and Territorial Systems.

Bibliography. — Coolidge, A. C., (The United States as a World Power5 (New York 1908) ; Hart, A. B., foundations of American Foreign Policy) (1901) ; Howe, A. H., Unsular Cases) (1901); Jordan, D. S., Umperial Democracy5 (1899) ; Lewis, G. C., Government of Depend- encies) (1901) ; Magoon, C. E., (Law of Civil Government in Territory Subject to Military Occupation5 (1902) ; id., (Report on the Legal Status of the Territory Annexed to the United States in the War with Spain5 (1900) ; Meyer- holz, C., federal Supervision over the Terri¬ tories of the United States5

(1908) ; Morse, A. P., (Civil and Political Status of Inhabitants of Ceded Territories,5 in Harvard Law Review, (Vol. XIV, p. 262) ; Randolph, C. F., (Law and Policy of Annexation5 (1901) ; Reinsch, P. S., (Colonial Government5 (1902) ; Rowe, L. S., (United States and Porto Rico5 (1904); Thomas, D. Y., (Military Government in Newly Acquired Territory5 (1904) ; Willoughby, W. F., territories and Dependencies of the United States5 (1905).

O. P. Austin,

Statistician, National City Bank, New York.

41. STATE CONSTITUTIONS (1789- 1919). The American Union is composed of 48 States or commonwealths, each of which has a body of fundamental' law known as a constitution. The sphere of government activ¬ ity which may be covered by the State has been negatively defined in the Constitution of the United States (Article X of the amendments) : (

Within the limits of the power thus defined, the State is supreme and in no way subordinate to the national government. The vast scope and sovereign character of this State activity seemed to substantiate the doctrine of State sovereignty. But the Civil War definitely and finally decided that the State is not sovereign, although it ex¬ ercises many of the powers usually regarded as sovereign. The accepted interpretation of the relation of State and Federal governments un¬ der the Constitution is that neither is sovereign. The people of the United States are alone sov¬ ereign. They have made both the Federal gov¬ ernment and the States their agents for certain specified purposes and for those purposes each is supreme and uncontrollable by the other. The organs of the State are concerned solely with those powers reserved to the States and do not possess and cannot have imposed upon them by the Federal government duties which are given by the Constitution of the United States to that government. The Constitution of the United States places upon the State a few, but very few, duties in connection with the conduct of the Federal government. The most important of these are those of electing the United States senators; of conducting the election of Presi-

dential electors and of members of the House of Representatives, and of providing a militia for Federal use in certain contingencies. Disre¬ garding, for the purpose in hand, these limita¬ tions and exceptions, we may treat the State constitutions as if they operated within the sev¬ eral States to the

exclusion of all other au¬ thority.

The closing years of the colonial period saw the 13 colonies in the possession of constitu¬ tions, either written or unwritten, which were in most respects essentially similar and which were, on the whole, well adapted to the needs of the inhabitants. The severance of the political ties which had bound the colonies to Great Britain made necessary the adoption of bodies of funda¬ mental law for the new States. With the ex¬ ception of Rhode Island and Connecticut, all of the original States had adopted new consti¬ tutions when the present Federal Constitution went into effect. In Massachusetts a conven¬ tion (1780) draughted a constitution and sub¬ mitted it to the people for ratification. New Hampshire adopted her first constitution (1776) without popular ratification, but submitted a second constitution, drawn up by a convention, to the people, by whom it was adopted in 1784. Rhode Island and Connecticut, whose colonial charters granted in 1662 and 1663, needed few changes to adapt them to the needs of State¬ hood, did little more than to substitute the name of the people for that of the king and continued these documents as their constitutional law until 1842 and F818 respectively. In the remaining nine States the constitutions were in every case adopted by conventions, without submission to popular vote, although in only one State, Dela¬ ware, had the convention received a formal mandate for so doing. In each of these States, except Delaware, the convention exercised the powers of a legislature as well as those of a constitutional convention. These Revolutionary constitutions were very short and most of them hastily constructed. They contained little be¬ sides a bill of rights and an outline of the frame of government. Their chief purpose was to define the fundamental principles of civil liberty and ((to distribute all, rather than to withhold any, of the powers of government.®

The history of the colonial period had taught the people that the legislature was the protector of their rights and liberties and that the other two departments were to be feared and guarded against as the representatives of the English Crown ; hence, in framing their new constitu¬ tions they gave predominant weight to the leg¬ islature and defended the rights of the people against executive and judicial encroachment by provisions in their declarations of rights and further by subordinating both, and especially the former, to the legislature. In eight of the orig¬ inal States, the governor was appointed by the legislature and in Massachusetts alone did he receive the veto power. The highest • judges were in no case elected by the people. In nine States they were chosen by the legislatures, in three by the executive and council and in one by the executive council alone. The possession of a freehold or the payment of a tax were qualifi¬ cations required of all voters, with a few minor exceptions, as in Rhode Island, where the eldest son of a voter who qualified by the posses¬ sion of property of the value of

$2,000 or of

$100 a year, could vote, or in Pennsylvania, where the sons of a taxpaying voter were likewise privileged to vote. South Carolina alone imposed a religious qualification : belief in God. In the five States where the governor was elected by the people, a higher property qualification was demanded for the electoral franchise in voting for governor than for mem¬ bers of the legislature. Nearly all of the States required additional qualifications for office hold¬ ing. In six States, property qualifications, rang¬ ing from a freehold to $50,000, were demanded of the governor and six prescribed a religious qualification for the same office. New Hamp¬ shire, Maryland and North Carolina permitted none but Protestants to occupy the governor's chair; Massachusetts none but Christians, while Delaware made belief in the Trinity, and Penn¬ sylvania and North Carolina belief in God and in the divine authority of the Bible, necessary qualifications.

Four fairly well-defined periods can be traced in the development of American State constitutions since the Revolution: (1) From the Revolution to the War of 1812; (2) from the War of 1812 to the Civil War; (3) from the Civil War to the last decade of the 19th century; (4) from about 1890 to the present time. These periods are somewhat overlapping but while not exactly defined will prove con¬ venient for a study of the growth of State ac¬ tivity. The first period may be characterized as that in which the legislature was supreme. The legislature, historically the guardian of popular rights against the British government, continued to be regarded as the best and safest repository of power. The strong colonial ex¬ ecutive was replaced by a governor having very slight administrative duties and even less discre¬ tionary power. He was elected by the legis¬ lature in most of the States, had the veto power only in Massachusetts and was unable to ad¬ journ, prorogue or dissolve the legislature. The constitutions were based upon a belief that the people had nothing to fear from the legislature, but that they should be safeguarded against the executive and judiciary.

The second period experienced most far- reaching political and social changes in the United States. Democracy was everywhere tri¬ umphant and American political institutions, in¬ cluding State constitutions, were very thor¬ oughly democratized. The earlier period placed marked limitations upon the privilege of voting, while the second nearly everywhere granted manhood suffrage to whites. State governors and judges were generally elected and the judicial term was shortened. The governor began to acquire the veto power. The confidence reposed in the legislature had been, in a sense, misplaced. In the early part of the second period there was much reckless management of the finances, money was squandered on the most chimerical schemes for internal improvements, charters were granted for banking institutions that had little or no capital, special legislation of the

worst sort was passed, monopolies were created, ap¬ pointments controlled, unmerited exemption from taxation was voted, and laws were even passed for the purpose of affecting cases pend¬ ing in the law courts. The day of reckoning came in 1837 and since that time there has been

a constant tendency to check and limit the pow¬ ers of the legislature. The revolutionary prac¬ tice of adopting constitutions in State constitu¬ tional conventions, without ratification by popu¬ lar vote, gave place to the direct reference of constitutions and their amendments to the people at the polls. The desire to narrow the field of legislative competence was further evidenced by the adoption of amendments limiting its author¬ ity over specified fields. Few important changes in the principles of State constitutional law took place before the Civil War. The chief improvements were of an administrative char¬ acter.

The Civil War, which marks the begin¬ ning of the third period, brought about a radi¬ cal readjustment of economic and industrial conditions throughout the United States, and, in addition, effected a complete change in polit¬ ical conditions in the Southern States. The predominant characteristic of this period has been a continued and increasing distrust of the State legislatures, which has resulted in very marked limitations of their powers. These have been effected chiefly in two ways. First, the field of legislative activities has been de¬ creased by prohibiting the passage of certain laws or classes of laws ; by direct legislation by means of constitutional amendments in matters formerly controlled by the legislature; and by requiring popular approval, at the polls, of cer¬ tain legislative measures, before they can be enacted as laws. Second, the powers of the governor and judges have largely increased. The governor's term which was, at first, annual in all but three States, has been greatly length¬ ened and is now annual in one only, while over half the States have a four-year term. His power has been further enhanced at the ex¬ pense of the legislature by an almost universal grant of the veto, only one State withholding this power and 34 granting, in addition, the power to veto items of an appropriation bill. The States of Washington, South Carolina and Virginia even allow the executive to veto items of any bill and the governor of Pennsylvania can approve such portion of an item of an ap¬ propriation bill as he sees fit. The executive appointing power has been materially aug¬ mented and the power to pardon and reprieve has been nearly everywhere granted. These changes are indicative of a growth in the con¬ fidence placed by the people in the governor, which is the most important source of his in¬ creased power. This confidence has been en¬

gendered by the fact that responsibility can be fixed upon the single executive, as it cannot be upon the legislature, which is, under our Amer¬ ican system, without responsible leadership. The judicial office, although based in a large majority of cases upon popular election, has had its term materially increased in this period.

The fourth period may be said to date from the last decade of the 19th century. It is marked by a conspicuous tendency to enlarge the functions of the State and to extend the ac¬ tivities of State governments over vast ranges of human activity which were formerly left en¬ tirely to the individual or to the individual re¬ strained only by the courts from encroachment upon the rights of other individuals and by a wide extension of the use of ultra-democratic

machinery of political control, such as initiative, referendum and, to a lesser decree, recall.

Socialization and democracy have gone hand in hand; the former adding new and en¬ larging old State activities and the latter pro¬ viding a more direct and intimate control of government by the people themselves. The magnitude of the vast business and social in¬ terests committed to State departments and to State administrative boards and commissions has made a trained personnel a necessity. Commendable progress has been made in the direction of a permanent civil service in many States, although the old idea that to the victor belongs all the spoils dies hard. A better ap¬ preciation of the value and necessity of the expert in administrative positions is manifest¬ ing itself, although the average American still greatly underestimates experience and training as assets in the art of government. Many stu¬ dents of politics believe that betterment in ad¬ ministration is accomplishing more for good government than are legislative and constitu¬ tional reforms.

Direct popular control of legislation may be divided into three classes : First, measures re¬ ferred by a representative body, either a con¬ stitutional convention or a legislature; second, measures passed by a representative body and then upon popular petition submitted to the people at the polls for final action ; and third, measures referred to the electorate for adop¬ tion after initiation by a certain proportion of the voters. The first class, commonly called compulsory referendum, deals largely with constitutional amendments. In a few cases, the submission of certain classes of statutory en¬ actments, such as State bond issues, is compul¬ sory. The first class has greatly exceeded the others, thus far, in number, but in the last decade the practice of popular initiative has rapidly increased. The popular vote in a com¬ pulsory referendum averages less than 50 per cent of the total vote cast at the same election, while measures submitted as the

result of popu¬ lar petition or initiative attract a considerably larger vote. Apprehension that initiative and referendum would result in increased radical¬ ism has not been justified. The people have, on the whole, voted intelligently and more con¬ servatively than their legislatures. Every State in the Union, except Delaware, has compulsory referendum of constitutional amendments. About a quarter permit initiation of amend¬ ments by petition and nearly one-half allow popular statutory initiative in some form. Massachusetts and Michigan grant to their leg¬ islatures the privilege of submitting statutory measures to popular referenda for final adop¬ tion. Initiative and referendum have been tried long enough to prove both their value and their limitations. Restricted to few and funda¬ mental enactments dealing with general princi¬ ples their use is decidedly effective in securing a real popular control of government. Indi¬ rectly they have tended to make legislative ac¬ tion more responsive to public opinion and more carefully considered. Applied to numer¬ ous and detailed measures, the system breaks down under its own weight. It can only sup¬ plement and not supplant the work of the State legislature.

The third of these measures of democratic control of State government, the recall of

elected officers, has been adopted in slightly less than one-fourth of the States and has been very rarely used for State officers and somewhat more frequently for local. The very general lengthening of the terms of elective officers made recall a logical feature of the program of real control of government by the electorate. Its adoption was in response to the demand of a democracy for the same effective control over men which the initiative and referendum gave over measures. Its value lies rather in its potential than in its actual use.

The recall of judicial decisions, demanded by the more radical advocates of popular con¬ trol, has not met with general favor.

The lack of confidence in the legislature which characterized the third period continued throughout the fourth, another evidence of which is the limitation of the time during which the legislature can sit. This has been ac¬ complished by decreasing the frequency and by limiting the duration of the sessions. Public opinion has traveled far from that of the Revo¬ lutionary period, which was expressed in the so-called axiom of political science : <(Where annual sessions end tyranny begins.® Six States only, and all of them of the original 13, retain annual sessions. Alabama, in her

recent constitution, has prescribed a quadrennial ses¬ sion. Nearly half of the States limit the duration of the session to from 40 to 90 days, and others accomplish the same end by cutting off the pay of the legislature at the end of a similar period. This attitude of the people is further shown by numerous constitutional pro¬ visions adopted for the purpose of preventing the railroading and fraudulent passage of bills, especially during the closing days of the ses¬ sion. For example, in New York, no bill may be passed or become a law unless it is printed and lies, in its final form, for at least three cal¬ endar legislative days upon the desks of the members, unless the governor certifies to the need of its immediate passage; and no amend¬ ment is allowed on the last reading of a bill. Other provisions attempt to prevent or punish bribery and make impossible the appointment of a legislator to any civil office during the term for which he is elected.

The rapid growth of State debts during the half century preceding 1870 was another cause of great dissatisfaction with the legislatures The total State indebtedness in 1825 was $12,- 790,728; in 1870 it had risen to the portentous sum of $352,866,898. Drastic measures were taken by a large number of States to prevent further squandering of the people's money by their representatives, with such success that the total of State indebtedness was reduced to about $172,000,000 in 1904, since which time there has been only a small total increase save in the States of New York and Massachusetts where bond issues for canals and for highways have enlarged their combined debt to an amount of approximately a quarter of a billion. Most States forbid the legislature to contract debt for more than a maximum amount fixed by the constitution. (For example, $50,000 in Oregon; $1,000,000 in Pennsylvania). New York State allows the legislature to issue deficiency bonds, not to exceed $1,000,000, and to contract debt for the purpose of repelling invasion or of sup¬ pressing insurrection, but for all other purposes the approval of the voters is necessary before

a loan can be contracted. Moreover, nearly every State requires that a sinking fund be es¬ tablished for every bonded loan issued.

This distrust of the legislature is traceable to several causes. State legislation has been frequently hasty and ill-advised. In New York from 1895 to 1904 the courts pronounced 41 laws, passed by the legislature, unconstitu¬ tional. Special legislation has engrossed the attention of the legislators and has often been so obviously opposed to the general welfare that public opinion has imputed the worst of motives to the members. The people are con¬ vinced that the party <(boss® controls the legis¬ lature, the members of which merely register his will ; and that he orders measures passed for partisan or corrupt purposes. The second of these reasons is unquestionably the most influ¬ ential. A vast majority of the laws passed in

the average legislature concern local or special interests. Eight typical States, in 1901, passed a total of 7,032 statutes, of which 5,876 were of local or special import. The objections to this class of legislation are two-fold. First : the time and interest of the members are so largely occupied with the work of obtaining legislative favors for political and personal friends that insufficient time and attention are given to bills of a general character whose ef¬ fect upon the private or political fortunes of the legislators may not be so intimate. Second: Special legislation, particularly for corporate in¬ terests, gives ample opportunity for bribery and corruption, which, although doubtless not so great as is often charged, is commonly believed by public opinion to be associated with the pas¬ sage of such measures. Perhaps an even greater evil is the constant changing and amend¬ ing of city charters and other local government laws in the interests of the (

The result of the presence, in the constitu¬ tion, of this great mass of matter, either di¬ rectly or indirectly restrictive of the powers of the legislature, has been to abolish the distinc¬ tion in character which formerly existed be¬ tween constitutional and statute law, and to in¬ corporate in the body of supposedly fundamen¬ tal law details that more properly belong in a statute or even in an administrative ordinance and thus enormously to increase the size of the constitution. It must be remembered that the Stale legislature is not, like Congress, a body exercising only delegated powers. Any power within the competence of the State it can legis-

late upon, unless forbidden by the constitution; hence any limitation of its power must be ex¬ pressly stated in the constitution. This is the reason why distrust of the legislature has caused such an increase in the size of our State constitutions.

The frequent and lengthy additions to our State constitutions are themselves a fruitful source of further amendment, for the more elaborated the fundamental law is in a grow¬ ing civilization the more frequent will the changes be. Dealing, as they do, often in mi¬ nute detail, with a large range of subjects, con¬ stant revision is necessary to remedy defects and to meet the needs imposed by changing conditions. The New Hampshire constitution of 1776, excluding the preamble, contained 600 words ; the constitution of Oklahoma contains nearly 50,000 words.

Constitution making has been most active in the West and South. Economic

and social changes have been the chief causes in the West, while in the South the Civil War and the suc¬ cessive attempts at a settlement of political problems have occasioned the frequent adoption of entirely new constitutions. Massachusetts has lived, since the Revolution, under the con¬ stitution of 1780; but several of the Southern States have adopted five and six entirely new constitutions in addition to numerous amend¬ ments. Nine new constitutions were adopted, and two were rejected, during the period from 1890 to 1903, and in the shorter period from 1895 to 1903 284 amendments were proposed and 168 adopted. An average of about 50 amendments per year has been maintained dur¬ ing recent years. Practically every State has made some change in its constitution within the last 10 years.

The method of amendment varies in the dif¬ ferent States. The practice of submitting funda¬ mental law to the voters for adoption had been almost universally in vogue, except in the Con¬ federate States, for about three-quarters of a century before 1890, but while the North and West still make this method obligatory, six Southern States, largely influenced by the negro problem, promulgated new constitutions by act of the constitutional convention without popular ratification. In all but 12 of the States constitutional provision is made for calling con¬ ventions for the purpose of general revision of the constitutions. The legislatures in most of these States, if their action is supported by the voters at the polls, can call conventions. Sev¬ eral make obligatory the submission to the people, at stated intervals (N. Y., Md., Okla., Ohio, 20, Mich., 16, Iowa, 10 and N. H., 7 years) of the question whether a convention is desired or not. Every State, save New Hampshire, makes provision for ordinary amendment by legislative initiative and in all of these, except Delaware, by submission to the voters for ratification. Twelve States allow the initiation of constitu¬ tional amendments by popular petition, signed by a fixed per cent of voters, which varies from 5 to 25 per cent but averages about 8. In Dela¬ ware only, is the legislature, acting by two- thirds majorities for two successive sessions, competent to adopt a constitutional amendment without popular vote. South Carolina and Mississippi have the unique method of requiring an amendment, which has been proposed by two- thirds of each house of the legislature and ap¬

proved at the polls, to be further ratified by a majority of each house at the next legislature. Thirty-two States allow one legislature, gen¬ erally by a two-thirds or a three-fifths vote of each house, to propose amendments. In 10, two successive legislatures must each adopt the proposed amendment before submission to the people. A majority of votes cast is sufficient for adoption in 33 States. Rhode Island re¬ quires a majority of three-fifths and New Hampshire two-thirds of the votes cast, while Missouri and Wyoming prescribe a majority of all the voters of the State. Ten other

States have slight modifications of the rule requiring a simple majority of the votes cast for the amendment. Delaware it will .be remembered does not refer amendments to the electorate.

After the grant of the franchise to the negro during reconstruction, the ideal of manhood suffrage was very nearly attained. Recent years, however, have shown a tendency to restrict the franchise save in the matter of woman suffrage. Seven of the Southern States have adopted re¬ strictions (six of them constitutional), which were primarily designed to deprive the negro of the right to vote and which have, in spirit at least, annulled the 1 5th Amendment. Even when the race problem is not involved, there is a tendency to place a higher value on the elec¬ tive franchise. An increasing number of States are restricting the privilege to citizens of the United States (only seven now permit aliens to vote), and a number of recent constitutions have imposed the qualification of ability to read and write English. In all, 16 States have an educational qualification, in several alternative with a property qualification.

One of the most remarkable of political phenomena of recent years has been the rapid spread of the woman suffrage movement. Wyoming, in 1890, was the first State to estab¬ lish full suffrage for women. Four other States followed her in the 19th century, but for over a decade no further addition was made to the list of suffrage States notwithstanding extraordinary efforts at propaganda. In 1911 California conferred the franchise on women and within three years five other States joined the column of equal vote States. At the present writing women have won the right to vote at all elections in 12 States and possess limited suffrage in many more. Moreover both of the great national parties have declared for woman suffrage and a Federal suffrage amendment has been passed by the necessary two-thirds vote of both houses of Congress and is now before the States for their adoption or rejection. See Woman Suffrage.

The typical State constitution contains: (1) A definition of boundaries, except in the older States; (2) A bill of rights; (3) A frame of government; (4) A great mass of miscellaneous provisions, arranged with slight regard for logical classification, ((relating to administration and law, including articles treating of educa¬ tion, of the militia, of taxation and revenue, of the public debts, of local government, of State prisons and hospitals, of agriculture, of labor, of impeachment and of the method of amend¬ ing the constitution, besides other matters still less political in their character® ; (6) The

schedule, which contains temporary provisions about putting the constitution into effect.

the most important part of the document, is found in every State constitution, except Michi¬ gan's, where there is no separate bill of rights. It contains those fundamental guarantees of personal liberty, the most prized heritage of our race, which are most familiar through incor¬ poration in the Federal Constitution, and in ad¬ dition many provisions, widely dissimilar in the several constitutions, defining supposedly inherent rights of the individual. The bill of rights of the Federal Constitution restricts the Federal government alone ; hence the necessity for the incorporation of a bill of rights in the State constitution. Mention will be made of one only of the rights thus secured to the citizen. Religious liberty, in its fullest sense, was not a possession of all people in the American States during the early years of national independence. Connecticut did not abolish her established church until 1818 and that of Massachusetts was not fully disestablished until 1833. At the present time all States have constitutional guar¬ antees of freedom of conscience, of expression of religious opinion, of worship or of non¬ worship and of equality of all religious de¬ nominations in the eyes of the law ; although the Christian religion is by the common law recognized as the prevailing religion of the country, as is witnessed by the laws of blas¬ phemy and of observance of the Christian Sabbath.

The frame of State government is strikingly similar throughout the Union. Each provides for an executive department consisting of a governor, a lieutenant-governor in most States, and heads of the important departments of ad¬ ministration (secretary of state, treasurer, comptroller, attorney-general, etc.), elected in nearly all of the States and constituting, with the governor, what is in reality an executive in commission. While in the Federal government the President is the executive, the State gover¬ nor is merely a part of the executive; a number of the most important heads of departments being nearly or quite independent of the gov¬ ernor, although in some States subject to re¬ moval from office for cause shown. They are practically colleagues, not subordinates, of the governor. Executive decentralization is the rule; a rule still further enforced by the crea¬ tion of large numbers of administrative boards and commissions, all of which are created by law and have their duties prescribed by the legislature and, whether appointed by the gov¬ ernor or not, are in practice very little under his control. A number of State governors have, in recent years, called attention to the defects of such excessive decentralization and have asked the legislatures to devise remedies for what they deem a growing evil. The

governor's power of appointment is in most States small and his actual control of administration is even less. His greatest legal power and responsibility are derived from the possession of the veto and the marked increase in recent years in the in¬ fluence of the gubernatorial office has been due to the fact that its incumbent is the elected representative of all the people and hence has their confidence and is the exponent of public opinion to a far greater degree than the legis¬ lature and to the governor's share in legislative power rather than to his executive and admin¬ istrative functions.

The legislature is everywhere bicameral.

Two houses exist because the American people believe that the bicameral system embodies a sound principle of political science and not be¬ cause special classes, or elements of the body politic, can thereby obtain a share in govern¬ ment. The essential difference, an artificial one, is that the senate, as the smaller body, represents a larger number of voters who possess the same voting qualifications as the electors for the lower house.

The democratic principle of representation in proportion to population may be regarded as the established American State policy, although there are numerous departures from the strict rule and in a few States gross violations of the principle allow the existence of a rotten bor¬ ough system comparable to that of England before the Reform Act of 1832. In many of these States the former historic unit of repre¬ sentation, the county or town, is retained partly for partisan purposes and partly to protect a minority, usually rural, against an industrial and urban majority. The constitutions of 18 States provide adequately for proportionate representation in both houses. In the remaining 30 States there are modifications of the rule for one or both houses, of which the most common is that each county (or town) shall have at least one representative. However, these ex¬ ceptions are grossly inequitable in some six or eight States only, nearly all of them among the original 13.

Although over one-half of the States give the initiation of money bills to the lower house, there is no sufficient reason for such discrimina¬ tion. The practice is a survival of colonial cus¬ tom or is a meaningless copy of Federal or English precedent. In other matters the powers of the two houses are in general identical, ex¬ cept in the process of impeachment and that in some States the senate has the power of con¬ firming executive appointments. The com¬ mittee system, modeled closely after that of Congress, is everywhere in use and rules and procedure are practically the same as the Con¬ gressional. The governor and heads of de¬ partments never occupy seats in the legislature and the English system of government through a premier, who is responsible to a Parliamentary majority, has

never found lodgment in the United States.

The organization of the judicial department varies somewhat in the several States, although the difference is rather in the degree of devel¬ opment than in the principle of organization. Most States have at the head of their system a single court of appellate jurisdiction called, gen¬ erally, the Supreme Court, sometimes the Court of Appeals; and a Superior or Circuit Court of highest original jurisdiction. Lower courts consist of county and local courts of inferior jurisdiction. In New York, whose judiciary may be taken as an example of more highly organized systems, which obtain in some of the larger States, the State courts consist of a Court of Appeals, four appellate divisions of the Su¬ preme Court, with justices assigned from the Supreme Court, and the Supreme, really a Dis¬ trict, Court of numerous judges, County Courts, except in New York County, and courts of the justice of the peace. The cities of the State have special Municipal Courts. In counties hav¬ ing a population of 40,000 or over there is a separate Surrogate's Court for probate jurisdic-

tion. Separate chancery courts, which were found in nearly all of the original States, were regarded as inconsistent with the democratic spirit of the age and now exist in a few only of the older commonwealths. Equity jurisdic¬ tion is, however, administered in all of the other States by the regular judges of the law.

Georgia was the only revolutionary State to vest the election of judges with the people. Six gave the choice to the legislature and in the remaining six the governor, with the consent of the council (in Delaware of the legislature), made the appointment. The strong democratic wave which swept over this country in the early part of the 19th centurv affected the judicial office by very generally transferring the election to the people and by adopting a short term in place of the life tenure of the early period. There are now 37 States which vest the election of the higher judges in the people, while minor judges are even more generally elected. The governor appoints in six States, subject to the approval of the council or senate. In Connecti¬ cut, the governor nominates and the legislature elects. In Rhode Island, Vermont, Virginia and South Carolina the legislature both nominates and elects the judges. Massachusetts, Rhode Island and New Hampshire (until 70 years of age) alone retain life tenure. The term in Pennsylvania is 21 years, in Maryland and Virginia 15, and in New York 14. Vermont has the shortest term, two years, while the average is from six to eight years. Judicial salaries have been considerably increased of late,

but in many States are still altogether too low to command the best or even thoroughly qualified men. They range from $2,500 in Ver¬ mont to $17,500 for Supreme Court judges in New York City, which is the highest judicial salary paid in America. The average for Supreme Court judges is about $5,000. In somes States judges are removable by impeach¬ ment, in others by an address of both houses of the legislature to the governor, a two-thirds vote generally being necessary and in a few by a two-thirds vote of the legislature.

The local government divisions of the State are the creation of the legislature, which, unless expressly restrained by the constitution, can make and change them as it pleases. Legally they are political divisions erected by the legis¬ lature for the purpose of assisting in the gov¬ ernment of the State. Historically the principle of local self-government lies deeply embedded in our political life and this fact has been recog¬ nized in numerous recent constitutional enact¬ ments, which limit the hitherto unrestricted control of local government by the legislature. A dozen States give cities and in some cases counties the right to frame their own charters.

Among the numerous miscellaneous pro¬ visions of the modern State constitution several deserve especial mention. Formerly edu¬ cation was a purely local concern, but the in¬ creasing recognition of the political importance of education in a democracy has led the State to grant extensive aid and to assume a large degree of control. Practically all of the States now have a State superintendent or commis¬ sioner, generally elected and nearly always a constitutional officer, and State boards of education. All but a few of the older States, in addition to financial assistance to primary

and secondary schools, maintain State uni¬ versities. So vital is the subject considered that the people embody the most important reg¬ ulations in the constitution. Even the revenues for the support of the universities are usually secured beyond the chance of hostile legislation by a constitutionally fixed rate of taxation.

The growth of great transportation and in¬ dustrial corporations in recent years has been the cause of a vast amount of restrictive and regulative legislation. Popular fear of the rail¬ road combination and of the industrial trust and distrust of the legislature as an efficient and incorruptible agent for dealing with capitalistic monopolies have led the voters in many States to incorporate provisions in their constitutions forbidding the combination of competing rail¬ road and telegraph lines, while a multitude of anti-combination laws have been passed by the remaining States. The lack of power to regu¬ late interstate commerce has made most of these efforts at control of transportation ineffective and a demand for more effective

Congressional legislation has consequently arisen. Anti-trust agitation has been so widespread that a large majority of States have now passed laws against trusts and of these about one-half have anti-trust clauses in their constitutions. Nearly all of the States have provisions against mono¬ polies, either in constitution or statute, and every State of the Union has found the regu¬ lation of corporations necessary. The subject of corporation control has aroused more interest than any other State question that has been before the American people since the era of reconstruction. Even in the recently adopted Southern constitutions, the control of corpora¬ tions was second only to the disenfranchise¬ ment of the negro as an object of popular desire.

. Administrative boards or commissions, with administrative, ordinance-making and even quasi-judicial powers for the effective regula¬ tion of public utilities and in some cases of vital industries are found in nearly every State. Public opinion tends to regard the extension and intensification of this means of control and regulation as the most promising method of safeguarding public interest against the evils resulting from powerful corporations.

Labor legislation has begun to find expres¬ sion in State constitutions, although the prob¬ lem is still very largely a matter of regulation by statutes. Provisions regulating hours, con¬ ditions _ of employment, especially of women and children; authorizing a minimum wage; establishing labor bureaus, boards, commission¬ ers and arbitration courts and modifying in the interest of the wage-earner some of the old common-law principles, such as the fellow-serv¬ ant rule, have made their appearance here and there in State constitutions.

Bibliography.— Baldwin, S. E.,

1916) ; Mathews, J. M., Principles of American State Administration (New York

1917) ; Munro, W. B., (editor), (The

Initiative Referendum and Recall ; Reinsch, P- # S., (American Legislatures and Legis¬*

lative Methods) (New York 1907) ; Stim- son, F. J.. Paw of the Federal and State Constitutions of the United States> (Boston 1908) ; Thorpe, F. N., (The Federal and State Constitutions (7 vols., Washington 1909) ;*

Wilcox, D. F., Government by all the People) (New York 1912) ; Willoughby, W. W., (The American Constitutional System (New York*

1904).

Marshall S. Brown,

Professor of History and, Political Science, New York University.

42. IMMIGRATION (1789—). The causes which operated before the Revolution to bring a small stream of European emigrants to the United States ‘ continued to operate after the establishment of the Federal government. Though no trustworthy records were kept in the early historv of the republic, it is estimated that from 1783 onward the number of immigrants to this country was about 4,000 a year till 1794, when, as a result of the French-English war, the number was increased to 10,000. After that date it dropped to about 6,000 a year till 1806, when, as a natural result ot the British and French Continental blockades and of the Ameri¬ can Embargo, it was reduced practically to nothing for the next 10 years. Then, beginning with 1816, the passenger arrivals, including re¬ turned Americans, reached about 8,000; and in the following year the number bounded up to 22,240. The large number of immigrants flocking to the country about this time pro¬ duced considerable hardship incident to over¬ crowding. At this juncture the first legislation concerning immigrants was enacted by Con¬ gress, which simply provided that a record should be kept of the number of passengers in each customs district, registering the sex, age, occupation and country of birth. Since the government encouraged immigration as increas¬ ing the wealth and developing the resources of the country, this act of March 1819 was not in the nature of a restriction, but was intended merely as a record of the arriving aliens. Ac¬ cordingly, from 1 Oct. 1819, an account has been kept at all the customs ports of the num¬ ber, sources and conditions of all immigrants to the United States. The record will be found in the accompanying table.

It is to be noted: first, that up to 1856 the record includes all ((alien passengers arrived,® and does not distinguish immigrants from pas¬ sengers, so that a reduction must be made from the total ; second, that the immigration over¬ land from Canada and Mexico is not included in these figures. For example, in the census of 1900 Canada is given as the birthplace of 1,183,- 255 persons, and Mexico as 103,445. An ex¬ amination of the table reveals the fact that the record shows several well-defined periods, with notable fluctuations. The first period extends from the beginning to 1826, inclusive, when the maximum seems to have been about 10,000 (reached in 1794, 1825 and 1826). The second period extends from 1827 to 1831, when the maximum is 27,382, the aver¬ age being

more than double that of the

Immigration to the United States by Years.

Year ending 30 Sept. Year ending 30 June

1820 .

8,385

1870 .

387,260

1821 .

9,127

1871 .

321,350

1822 .

6,911

1872 .

404 , 806

1823 .

6,354

1873 .

459 , 803

1824 .

7,912

1874 .

313,339

1825 .

10,199

1875 .

227,498

1826 .

10,837

1876 .

169,986

1827 .

18,875

1877 .

141,857

1828 .

27,382

1878 .

138,460

1829 .

22,520

1879 .

177,826

1830 .

23,322

1880 .

457,257

1831 .

22,633

1881 .

669,431

1832 (to 31 Dec.) .

60,482

1882 .

788,992

1833 (Jan. to Dec.)

58,640

1883 .

603,322

1834 .

65,365

1884 .

518,592

1835 .

45,374

1885 .

395,346

1836 .

76,242

1886 .

334,203

1837 .

79,340

1887 .

490,109

1838 .

38,914

1888 .

546 , 889

1839 .

68,069

1889 .

444,427

1840 .

84,066

1890 .

455,302

1841 .

80,289

1891 .

560,319

1842 .

104,565

1892 .

479,663

1843 .

52,496

1893 .

439,730

1844 .

78,615

1894 .

285,631

1845 .

114,371

1895 .

258,536

1846 .

154,416

1896 .

343,267

1847 .

234,968

1897 .

230,832

1848 .

226,527

1898 .

229,299

1849 .

297,024

1899 .

311,715

1850 .

310,004

1900 .

448,572

1850 (1 Oct. to 1

1901 .

487,918

Dec.) .

59,976

1902 .

648 , 743

1851 (Jan. to Dec.) 379,466

1903 .

857,046

1852 .

371,603

1904 .

812,870

1853 .

368,645

1905 .

. . 1,026,499

1854 .

427,833

1906 .

. . 1,100,735

1855 .

200,877

1907 .

. . 1,285,349

1856 .

195,857

1908 .

782,870

1857 (to 30 June) .

112,123

1909 .

1910 .

751,786 . . 1,041,570

Year ending 30 June

1911 .

878,587

1858 .

191,942

1912 .

838,172

1859 .

129,571

1913 .

. . 1,197,892

1860 .

133,143

1914 .

. . 1,218,480

1861 .

142,877

1915 .

326,700

1862 .

72,183

1916 .

298 826

1863 .

132,925

1917 .

295 403

1864 .

191,114

1918 .

110,618

1865 .

180,339

1919 .

141,132

1866 .

1867 .

332,577

303 , 104

1920 .

400,001

1868 .

1869 .

282,189

352,783

Total . . .

. . 33,630,104

first period. This increase is perhaps explained by the enormous influx of Europeans to this country as the natural result of the wretched in¬ dustrial conditions in Europe. The third period includes the decade from 1832 to 1842, when the tide of immigration is trebled or quadrupled, save a considerable ebb in 1838 due to the • panic of the preceding year. After this period, when steamboat navigation and railroads began to render the fertile plains of the West acces¬ sible, such abnormal conditions as the Irish famine and the California gold discoveries sent immigration up by leaps and bounds till 1854. The flood of immigration that swept over the country during these years, demoralizing poli¬ tics, trade and industries of all sorts, gave rise to the anti-foreign agitation ; and this combined with the business depression of 1857 and the Civil War, which followed soon after, to reduce the number of immigrants greatly. However, after the war when

the country entered upon a new era of industrial enterprise offering an almost boundless field for laborers, the tide of immigration again rose rapidly till 1873, when, under the influence of the panic and the hard times that followed, it once more receded. But, with the revival of business in 1880, foreigners again flocked to our shores in larger numbers than ever before, and immigration reached a

highwater mark (669,431) in 1881. Since that year there has been a steady stream pouring into the country, save during the period of busi-

been in the preponderance. The following table shows the racial groups of immigration by decades :

Immigration to the United States, Arranged by Nationalities and Decades.

COUNTRY

1831-40

1841-50

1851-60

1861-70

1871-80

1881-90

1891-1900

1901-10

1911-15

Austria-Hungary .

Belgium .

Denmark .

France .

Germany .

Greece .

22

1,063

45,575

152,454

5,074

539

77,362

434,626

4,738

3,749

76,358

951,667

*7,800 * 6, 734 17,094 35,984 787,468*

72,969 7,221 31,771 72 , 206 718,182

353,719

20,177

88,132

50,464

1,452,970

597,047 20,062 52,670 36,006 543,922 15,996 655 , 694 31,816 (95,264

(230,679 593,703 (6,723

\ 23,010

14,559 33,149 2,562

271,094 60,053 403 , 496 11,186 3,703,061 42 , 659

2,145,266 41,635 65,285 73,379 341,498 167,519 2,045,877 48,262 190,505 249,534 1,597,306 27,935 69, 149 53,008 34,922 118,202

‘388,017

120,469

339,065

17,464

8,136,016

361,808

889,427 25 , 447 29,798 40,432 137,711 118,916 938,984 31,344 47,527 72,055 894,003 27,921 48 , 580 11,187 17,020 73,741

193,623 62 , 944 121,740 10,250 3,795,797 528,098

Italy .

Netherlands .

Norway .

Sweden .

Russia (Russian Poland)

Spain .

Portugal .

Rumania .

2,253

1,412

} 1,201

646

| 2,954

1,870

8,251

13,903

656

2,759

9,231

10,789

20,931

1,621

10,353

11,728

9,102

109,298

4,536

8,493

55,759

16,541

211,245

52,254

9,893

307,309

53,701

568,362

265,088

6,535

Switzerland .

Turkey (in Europe) . . . United Kingdom:

England .

Scotland .

Ireland .

Wales .

4,821

4,644

25,011

23,286

28,293

81,988

73,143

2,667

207,381

263,332

3,712

780,719

385 , 643 38,331 914,119

568,128

38,768

435,778

460,479

87,564

436,871

657,488

149,869

655,482

Total Europe .

Total America .

China .

Tapan .

495,688

33,424

1,597,502 62 , 469

2,452,657

74,720

2,064,407

166,597

2,261,904

403,726

4,721,602

426,523

8

35

41,397

64,301

123,201

61,711

23,166

26,855

8,398

28,396

20,605

129,797

77,393

15,772

10,499

36,400

72,231

4,479

Turkey fin A si a)

Other Asia .

Total Asia .

Total Oceania .

Total Africa .

All other countries …. Grand total .

40

47

61

308

622

6,669

48

82

41,458

64,609

123,823

68,380

86,815

243,567

123,719

9

52

69,801

599,125

29

55

52,777

1,713,251

158

210

25,921

2,598,214

221

312

15,232

2,314,824

10,913

229

1,540

2,812,191

12,574

437

1,299

5.246,613

8,793

1,343

1,749

3,844,420

12,973

7,368

33,654

8,795,386

6,126

5,847

4,459,800

ness depression from 1894 to 1898 and during the World War 1914-18. In 1905, 1906, 1907 and again in 1910, 1913 and 1914 the number of immigrants exceeds the million mark.

Most of the early immigrants came from Great Britain, and a fair number from Germany. In 1850 Great Britain furnished about 60 per cent of the immigrants and Germany 584.000, or 36 per cent. Thus 96 per cent of the immi¬ grants in 1850 were of Teutonic blood, with the Anglo-Saxon element predominating. The proportion was very much the same in 1860. But in 1870, while the totals were much larger, the British percentage was falling and that of the other foreign elements was increasing. In 1880 the British contingent, including the Cana¬ dian, though larger in the grand total than be¬ fore, had dropped to 47.5 per cent, the German to 30, but a considerable new element had ar¬ rived of Bohemians, Poles, Scandinavians, Italians and Russians. In 1890 the British con¬ tingent had fallen to 29 per cent, or 2,700,000; the German increased to 33 per cent, or 3,000,- 000; while the number of Poles, Russians and Bohemians in the country amounted to 450,000, the Italians to 182,500 and the Scandinavians to 933,000. In 1900 the Slav element had reached 1,000,000, or nearly 10 per cent of the foreign-born population of the country, the Scandinavian over 1,000,000, the French includ¬ ing French-Canadian 500,000, the Italian nearly 500,000, the Mexican over 100,000, while the British had sunk to 19.4 and the German to 14 per cent. Since 1900 the Teutonic element has diminished considerably while immigrants from the countries of southern and eastern Europe have flocked in overwhelming numbers to our shores. Of these the Italians and Poles have

Several laws have been passed by Congress, designed to prevent certain evils of indiscrimi¬ nate immigration. Among those evils may be mentioned the immigration of criminals, pau¬ pers, contract laborers, diseased persons (whether in mind or body), and such other persons as are unable to support themselves. Such persons, according to the laws enacted from 1882 to 1893, are not permitted to enter the United States, and the steamship companies bringing in such immigrants as are rejected under these acts are required, at their own expense, to transport them back to the coun¬ tries whence they came. The following table shows the number of undesirable aliens de¬ barred and deported in some recent years.

Aliens Debarred and Deported in Representa¬ tive Recent Years

YEAR

Debarred

Deported

Total number of immigrants

1905 .

11,879

845

1 ,026,499

1906 .

12,432

676

1,100,735

1907 .

13,064

995

1,285,349

1908 .

10,902

2,069

782,870

1909 .

10,411

2,124

751,786

1910 .

24,270

2,695

1,041,570

1911 .

22,349

2,770

878,587

1913 .

19,938

3,461

1,197,892

1914 .

33,041

4,610

1,218,480

1916 .

18,867

2,906

298,826

1919 .

8,626

3,086

141,132

1920 .

11,795

2,262

400,001

In 1864 Congress passed the first immigra¬ tion act, which was designed to promote, not to restrict, immigration; but this act was re¬ pealed in 1868. In 1882, the year after immi¬ gration reached the unprecedented mark of 669,431, Congress enacted the first restrictive law debarring criminals, paupers, insane and

other, undesirable classes, as indicated above, and imposed a head tax of 50 cents on all aliens entering the United States. This head tax, by subsequent acts of Congress, was in¬ creased successively to one, two and four dollars. In 1885 a more drastic act was passed, which was intended to exclude contract labor¬ ers and strike-breakers and persons of the baser sort. But this act did not operate as success¬ fully as was expected; for it debarred the bet¬ ter classes of immigrants, such as artists, archi¬ tects, musicians and even clergymen, along with the undesirable classes which it was especially intended to exclude. It was, therefore, amended, in 1891, so as not to militate against such classes of immigrants as should be en¬ couraged.

In 1888 and 1892 Congress passed enactments debarring such immigrants of alien race as, for any reason, refuse to assimilate with our natives. This measure was directed specifically against Chinese immigrants and was intended to prohibit Chinese laborers from entering the United States. The law was the natural out¬ growth of the constant labor agitation and the earnest appeals from the Pacific Coast for re¬ lief from the vast hordes of ignorant and im¬ moral Chinese flocking to our shores.

In 1903 more drastic legislation was en¬ acted, which requires a preliminary . inspection of intending immigrants at the point of de¬ parture and gives the government the right to deport, within two years after arrival, any immigrant landed in violation of this special act.

In 1906 Congress legislated into being the present Bureau of Immigration whose duty it is to keep a complete record of all aliens enter¬ ing the United States.

In 1907 further restrictive legislation was enacted, which prohibits the bringing of women or girls into the United States for immoral purposes, such as prostitution. The immigra¬ tion enactments of 1907, also, provided for a commission of nine persons consisting of three senators, three representatives and three per¬ sons appointed by the President, to investigate the whole subject of immigration and to report to Congress with recommendations.

This commission expired by limitation 5 Dec. 1910, and submitted a final report, in which they reached the unanimous conclusion that the time had arrived for taking steps for the radical restriction of immigration. The pro¬ posals of the commission for such restriction, as presented in this report, are as follows: (a) a reading and writing test; (b) the exclusion of unmarried unskilled laborers; (c) limita¬ tion upon the number of immigrants arriving at any one port and from particular races;

(d) material increase of the amount of money in the possession of immigrants on arrival;

(e) material increase of the head tax (then $2). The commission, moreover, made the fol¬ lowing recommendations: 1. That for the protection of immigrants, government officials, both men and women, be placed on vessels carrying steerage passengers. 2. That the boards of special inquiry, which pass upon the appeals of would-be immigrants from adverse administrative decisions, should be composed of persons qualified to exercise judicial func¬ tions, that the hearings should be public and that an Assistant-Secretaryship of Commerce

and Labor should be created to review appeals from the boards. 3. That the state should strictly regulate immigrant banks and employ¬ ment agencies. 4. That the exclusion of Chinese laborers should be continued. 5. That no legis¬ lation regarding Japanese and Korean labor should be adopted so long as the present method of restriction is found effective. 6. That an understanding should be reached with the British government for the exclusion of East Indian laborers.

Of the foregoing propositions, the one pro¬ viding for a reading and writing test attracted the widest attention .both in and out of Con¬ gress. The American Federation of Labor urged the retention of the clause as the best method of excluding undesirable foreigners. On the other hand it was argued that its re¬ tention would exclude European agricultural workers who were every way desirable, but had lacked educational advantages.

A bill with a literacy test provision was vetoed by President Taft in February 1913. Two similar bills were passed in 1915 and 1916, but these likewise were vetoed.

A bill with the literacy test was enacted subsequently over President Wilson's veto. In May 1921 a law restricting foreign immigration into the United States to 3 per cent of the foreign-born persons in this country in 1910 was enacted to continue in force until 30 June 1922.

The European War greatly curtailed immi¬ gration to the United States as well as in¬ creased emigration to Europe. Thus the num¬ ber of immigrants from eastern and southern Europe (Poles and Italians) was reduced to below the number from the Teutonic races of Europe. Of the total 298,826 immigrants in the year 1916, the principal contributing races were as follows: English, 36,168; Scotch, 13,- 515; Irish, 20,636; Italians, 38,814; Greek, 26,792; Scandinavian, 19,172; French, 19,518; Mexican, 17,198; Hebrew, 15,108; Portuguese, 12,208; German, 11,555; Spanish, 9,259; Jap¬ anese, 8,711; Dutch and Flemish, 6,113; Fin¬ nish, 5,649; Russian, 4,858; African, 4,576; Polish, 4,502; Cuban, 3,442; Bulgarian, Serbian, Montenegrin, 3,146; Chinese, 2,239; no other race in excess of 2,000.

The chief occupations of immigrants arriv¬ ing in 1916 were as follows; professional (in¬ cluding teachers, engineers, artists, actors, clergy, etc.), 9,795; skilled labor of various sorts, 45,528; miscellaneous, 138,737, among which are included laborers (55,816), farm laborers (26,250), servants (29,258), merchants and dealers (7,017), farmers (6,840), agents (1,538), fishermen (741), manufacturers (315), hotel-keepers (243), etc. Those reporting no occupation, such as women and children, num¬ bered 104,766 of the total number of immi¬ grants (298,826).

Of the total alien immigrants admitted into the United States in the year 1916 (i.e., to 30 June, the end of the fiscal year), 141,390 entered through the port of New York; 12,428 through the port of Boston ; 7,955 through the port of San Francisco; 4,029 through the port of Providence, R. I.; 3,896 through the port of Seattle, Wash. ; 3,298 through the port of Honolulu, Hawaii ; and smaller numbers through other ports. But it is significant to note that a large number of the alien immi¬ grants in 1916 came into the United States

through the border stations, 100,366 entering through Canada and 16,520 through Mexico.

The United States Census Bureau gives the following general table of foreign-born resi¬ dents, arranged alphabetically by States.

Foreign-Born

White Population United States.

OF THE

STATE

1920

1910

Alabama .

. 17,662

18,956

Arizona .

78 . 099

46,824

Arkansas .

13,975

16,909

California .

. 681,654

517,250

Colorado .

. 116,954

126,851

Connecticut .

. 376,513

328,759

Delaware .

19,810

17,420

District of Columbia .

. 28,548

24,351

Florida .

. 43,008

33,842

Georgia .

. 16,186

15,072

Idaho .

38,963

40,427

Illinois .

. 1,204,403

1,202, 560

Indiana .

. 150,868

159,322

Iowa .

. 225,647

273.484

Kansas .

. 110,578

135,190

Kentucky .

. 30,780

40,053

Louisiana .

44,871

51,782

Maine .

. 107,300

110,133

Maryland .

. 102,148

104,174

Massachusetts .

. 1,077,072

1,051,050

Michigan .

. 726,214

595,524

Minnesota .

. 485,261

543,010

Mississippi .

8,019

9,389

Missouri .

. 185,893

228,896

Montana .

. 93,447

91,644

N ebraska .

. 149,652

175,865

Nevada .

. 14,802

17,999

New Hampshire. . . .

. 91,154

96,558

New Jersey .

. 738,761

658 , 188

New Mexico .

. 29,077

22,654

New York .

. 2,783.773

2,729,272

North Carolina ….

. 7,099

5,942

North Dakota .

. 131,486

156,158

Ohio .

. 678,647

597,245

Oklahoma .

. 39,951

40,084

Oregon .

. 102,149

103,001

Pennsylvania .

. 1,387,298

1,438,719

Rhode Island .

. 173,366

178,025

South Carolina ….

. 6,401

6,054

South Dakota .

. 82,372

100,628

Tennessee .

. 15,479

18,459

Texas .

. 360,071

239,984

Utah .

. 56,429

63,393

V ermont .

. 44,499

49,861

Virginia .

. 30,784

26,628

Washington .

. 249,818

241,197

West Virginia .

. 61,899

57,072

Wisconsin .

. 459,904

512,569

Wyoming .

. 25,243

27,118

Total .

. 13,703,987

13,345,545

Edwin W. Bowen,

Professor of Latin,

Randolph-Macon

College ,

V irginia.

43. SUFFRAGE. Suffrage means partici¬ pation in government by voting. There are two theories in regard to suffrage: (1) It is a privi¬ lege granted by the State to individuals ; (2) it is a natural, inherent right belonging to every man. The former is the usually accepted theory; the latter, the outcome of the revolu¬ tionary movements of the 18th century, is to¬ day generally discredited. Suffrage in the English colonies in America was restricted as in England. Virginia began in 1619 with manhood suffrage, but in 1655 and 1670 re¬ stricted the suffrage to ((f ree-holders and house¬ holders.® Similar restrictions existed in the other Southern colonies and in the middle col¬ onies. New England, notably Massachusetts and New Haven, had strict religious tests. Only ˆfreemen® could vote and only

members in good standing of some Congregational church could be (

male inhabitants were excluded, the entire list of (

Alternate educational or property qualifica¬ tions exist in Connecticut (1874), Massachu¬ setts (1856), Wyoming (1889), Maine (1891), and Delaware (1897). The payment of poll tax is now required in about half of the States, and in 20 States there is a direct or indirect educational test. The Federal government con¬ fers citizenship upon the alien by naturalization; the State confers the right to vote, subject only to the 14th and 15th amendments. In many States aliens have been allowed to vote after, they have declared their intention to become citizens. Indians must become natural¬ ized before voting unless permanently sepa¬ rated from the tribal organization, or living on their own property. As a result of recent war conditions absentee voting is provided for in several States, among which are Ohio, Okla¬ homa, Mississippi and Virginia. The tendency now seems to be toward requiring, as a qualifi¬ cation for voting, longer residence in the local¬ ity, registration to prevent frauds, American citizenship, and the payment of poll tax. The age at which a person otherwise qualified may

cast his first vote is, everywhere in the United States, placed at 21 years.

Negro Suffrage. — The extension of suffrage to negroes was a result of the Civil War. Prior to the Revolution, though there were no laws against it, it is not known that any negro ever voted in the New England or Middle colonies, but a few free negroes voted in Maryland, South Carolina and probably in North Carolina. Between the Revolution and the Civil War free negroes voted in several States. They were disfranchised in New Jersey, 1807; Maryland, 1810; Tennessee, 1834; North Carolina, 1835, and Pennsylvania, 1838. The elections of two Tennessee congressmen, John Bell and Cave Johnson, were decided by the ballots of free negroes. The agitation of abolition societies was the principal cause of the disfranchisement of free blacks. Vermont, Massachusetts, New Hampshire and New York alone before 1861 did not disfranchise them. The 13th Amendment (1865) to the United States Constitution merged the negroes into the political population for purposes of representation. A movement in the South (1867) to give the negro a limited suf¬ frage was stopped by the Reconstruction Acts (1867) which gave the ballot to the negroes in the South, though as late as 1868 most of the Northern States gave them no political privi¬ leges. The 14th Amendment (1868), while disfranchising

the prominent whites of the South, put a premium on the enfranchisement of the blacks by the State governments by offer¬ ing increased representation in Congress. The 15th Amendment (1870) provided against dis¬ crimination on account of race or color and practically resulted in universal manhood suf¬ frage. The amendments apply to the whole United States. Political corruption and mis- government followed the enfranchisement of the negro, and from 1868 to 1876 the Southern whites were engaged in overturning the govern¬ ments ruled by the negroes, thus beginning a thorough-going reaction against negro suffrage. From 1876 to 1890, the whites devoted them¬ selves to destroying in the South the Republican party organization which controlled the negro vote. During this period the negro vote was restricted by centralization of the administra¬ tion in Louisiana and North Carolina; by requiring the payment of taxes in Virginia, Arkansas, Georgia, Florida, Mississippi and Tennessee ; and by complexity of election laws — Australian ballot system, registration, etc. — in Alabama, Arkansas, Virginia, Tennessee and Mississippi, amounting practically to an educa¬ tional qualification. About 1890 began a move¬ ment to disfranchise negroes by changes in the State constitutions. Upon readmission to the Union (1868-70) a fundamental condition im¬ posed was that their constitutions should never be revised so as to deprive any one of the right of suffrage. This condition was ignored by the Southern States and the amendments were evaded. The suffrage clauses in these new Southern constitutions are alternative: (1) the ˆunderstanding® clause requires the voter to be able to read or understand when read to him any section of the Constitution; (2) the grand¬ father® or <(old soldier® clause excuses from other tests those who have served in any war and their descendants, or those who were voters before 1 Jan. 1867, and their descendants; (3) a clause requiring a tax paying and property

qualification from those disqualified under other clauses ; (4) the ((good character® clause re¬ quiring the voter to be of good moral character. Mississippi (1890) invented the ˆunderstanding clause,® giving it to South Carolina, Alabama and Virginia; Louisiana the <(grandfather® or wold soldier® clause (1898), giving it to North Carolina, Alabama and Virginia. Alabama (1901) discovered the ((good character® quali¬ fication, passing it on to Virginia. Practically all the Southern States have a property and tax-paying qualification for voters, which, with the educational test, has since 1905 become the sole qualifications, although in Louisiana by constitutional amendment adopted on 5 Nov. 1912, the (

Suffrage in the Territories. — In the Terri¬ tories suffrage is regulated by Congress, which may delegate its authority to the Territorial leg¬ islature. In the District of Columbia, white tax¬ payers voted from 1802 to 1855, when the suf¬ frage was extended to all white men, and in 1867 to white and black males excepting Con¬ federates and Confederate sympathizers.

Mis- government and corruption followed and in 1878 all voters in the District were disfranchised by Congress, local government now being carried on by a board of commissioners.

In Hawaii the right to vote is restricted to citizens of the United States who can speak, read and write English or Hawaiian. Thus most of the Chinese and Japanese, who are in the majority, are excluded for the present. In Porto 'Rico there is an educational qualification, and in the Philippines the voter must take an oath of allegiance to the United States and qualify either as a taxpayer or under an educa¬ tional test.

Woman Suffrage. — The right to vote is rather a recent acquisition by women in the United States. They are said to have had the suffrage in Massachusetts, 1691-1780, and in New Jersey, 1776-1807, but it is not clear that they exercised the privilege. During the first half of the 19th century the extension of male suffrage, the better education of women, their prominence in church and mission work, and the renewed agitation in regard to <(natural

rights,® especially in regard to slavery, re¬ sulted in demands that woman be given the ballot. The temperance movement and the need to protect property and family rights strengthened this demand. In 1848 the first woman's suffrage convention demanded the ballot, basing their claims on the Declaration of Independence. The extension of the franchise to the negroes led to renewed demands in be¬ half of women. In 1866 the first petition de¬ manding national suffrage for women was sent to Congress, and in 1868 the New England Woman's Suffrage Association was formed. Gradually the suffrage leaders of the entire United States were organized. The new States and Territories of the West were the first to make women the political equals of men, and that region was the stronghold of woman suf¬ frage, though the States east of the Appa¬ lachians were being strongly influenced. During the presidential campaign of 1916 both candi¬ dates declared for woman suffrage — Wilson, Democrat, for the ballot by State action ; Hughes, Republican, for suffrage through Fed¬ eral constitutional amendment. Wilson later supported the movement for Federal grant of suffrage, and in 1918 Congress sent out to the States an equal suffrage amendment which within a year was ratified by 14 States. The ratifications were: In 1919: Illinois, Wis¬ consin, Michigan, Ohio, Kansas, New York, Pennsylvania, Massachusetts, Texas, Iowa, Mis¬ souri, Arkansas, Montana, Nebraska, Minnesota, New Hampshire, Utah, California, Maine, North Dakota, South Dakota, ˆColorado. In 1920:

Rhode Island, Kentucky, Oregon, Indiana, Wyoming, Nevada, New Jersey, Idaho, Ari¬ zona, New Mexico, Oklahoma, West Virginia, Washington, Tennessee August (13-18), Con¬ necticut (21 September).

Georgia, Alabama, Mississippi, Maryland, Virginia, South Carolina, Louisiana and Dela¬ ware refused to ratify. On 26 Aug. 1920, Secre¬ tary of State Bainbridge Colby proclaimed the Suffrage Amendment a part of the Federal Constitution. Litigation .was begun at once to test the legality of the Tennessee ratification, and, as the national elections were near at hand, Gov. Marcus H. Holcomb, of Connecticut, who had persistently refused to call an extra session of the legislature, was persuaded to do so. Its ratification _ followed. 21 September, rendering futile the litigation instigated by its opponents. In all States suffrage organizations had been formed with national headquarters- in New York.

The effects of woman suffrage are not yet clearly evident. Both men and women vote in larger proportions than did men before the vote was given to women. Enfranchised women generally favor legislation for social reforms . — for prohibition, better schools, better condi¬ tions for women workers, restriction of com¬ mercialized vice, and regulation of child labor.

Bibliography. — Bishop, (History of Elec- tions) (1893) ; Bryce, (American Common- wealtlP (1910); Cleveland, (The Growth of Democracy y (1898); Hart, (Actual Government as Applied under American Conditions) (1908); Thorpe, Constitutional History of the Ameri¬ can People) (1898) ; Thorpe, Constitutional Historv of the United States) (1891) ; Stan¬ ton. (History of Woman Suffrage) (1887—1902) ; Hart and McLaughlin, Cyclopedia of American Government (1914) ; American*

Yearbook (1910) ; International Yearbook (1908). *See Woman Suffrage.*

Walter L. Fleming,

Professor of History, Vanderbilt University.

44. CIVIL AND RELIGIOUS LIB¬ ERTY. The euphony and familiarity of this title must be broken so as to read, "Religious and Civil Liberty in America,® if we study the subject in its logical chronological order, for civil liberty follows and is the product of religious liberty. A hierarchy implies an aris¬ tocracy; an aristocracy a monarchy. The stu¬ dent can do no better than to group his studies around the names of Roger Williams (q.v.) and Thomas Jefferson (q.v.). The birth of the one preceded that of the other by 136 years. The pivotal date of the first is the founding of the Providence Plantation by the exiled Roger Wil¬ liams, 1636; and the

pivotal date of the other is the signing of the Declaration of Independence in 1776. These two events are separated by a period of 140 years. The story of these two men is told elsewhere in these volumes, but the story of civil and religious liberty in America cannot be separated from their lives; still less can its purchase price be understood or appre¬ ciated apart from their story. Says John Fiske :

Within five years from the settlement of Massachusetts this young preacher — the learned, quick-witted, pugnacious Welshman, Roger Williams, had announced the true princi¬ ples of religious liberty with a clearness of insight quite remarkable in that age.

There is good history back of the pleasantry that the Puritans sought the western shore in order that they might enjoy the privilege of worshiping God according to the dictates of their own conscience and the further privilege of making all others worship in the same way. Governor Winthrop, one of the most liberal of the Boston colony, wrote :

We believe it to be important that the members of a Christian commonwealth should all hold the same opinions regarding essentials; and of course it is for us to determine what is essential. If people who have come here with us hold different views, they have made a great mistake and had better go back to England. But if, holding different views, they still wish to remain in America, let them leave us in peace and, going elsewhere, found communities accord¬ ing to their conscience of what is best. We do not wish to quarrel with them, but we will tell them plainly that they cannot stay here.

This is literally the program carried out in the case of Roger Williams. From the begin¬ ning he denied the power of civil magistrates to punish for violations of <(the first tablet of the law,® the table of piety, dealing with man's re¬ lations to his God. He declined the call to en¬ ter upon his chosen work with the settlement on Massachusetts Bay because they were not "separated,® as the Pilgrims were who settled at Plymouth; they were simply non-conforming members of the Episcopal Church, and as such they claimed the right to discipline for spiritual as well as civic misdemeanors. A few months later he accepted the opportunity to work with and for the Pilgrim Fathers of Plymouth. Here he worked for two years, supporting himself by manual toil during the week and teaching oil Sunday. But his ecclesiastical independence and his persistent teaching of the principles of soul-liberty filled Eldvr Brewster with anxiety, and when a call was given the young radical from the Salem Church, the good elder advised the Plymouth Church to demit him. In the latter controversy John Cotton, the belligerent ecclesiastic of Boston, remembered that "Elder

Brewster warned the whole church of the dan¬ ger of his spirit.®

When in 1633 the young minister ventured again within the jurisdiction of the Bay and took up the work of a religious teacher at Salem, the Boston ministers protested and ob¬ jected to his coming among them at the minis¬ ters' meetings held from house to house. Two years later he was summoned to Boston to answer charges before the General Court. He was accused of teaching that magistrates ought not to punish a breach of the ((first table® except when it was also a disturbance of the civil peace ; that the church had no right to impose an oath on an unbeliever, and that prayer at the sacrament or after meat must not be enforced by the magistrates. Williams' defense was that "none of his teachings led to a breach of holy or civil peace, of which I have desired to be unfeignedly tender.® Governor Winthrop, of whom Williams wrote years afterward <(Though he was carried with the stream for my punishment, he tenderly loved me to his last breath,® recorded in his diary :

Rev. Mr. Hooker, who was chosen to dispute with him could not reduce him from any of his errors, so the next morning the Court sentenced him to depart out of our jurisdiction within six weeks, all the ministers save one approving the sentence.

The sentence itself in part runs as follows :

It is therefore ordered that the said Mister Williams shall depart out of this jurisdiction within six weeks now next ensuing, which, if he neglects to perform, it shall be lawful for the Governor and two of the magistrates to send him to some place out of this jurisdiction, not to return any more without license from the Court.

But soon this six weeks' leniency caused the magistrates anxiety; they were afraid he would be able to carry out his expressed purpose of "establishing an independent community where all men may work as their conscience persuades them, everyone in the name of God.® A cap¬ tain of a sloop was, therefore, sent with orders to apprehend Williams and carry him on board his ship about to sail for England. The captain found the wife and children, but the minister had departed three days before. Thus in mid¬ winter, January 1636, this earliest apostle of re¬ ligious liberty in America, and, up to this date, one of the very few such apostles in the history of the world, secretly departed from Salem, leaving wife and children behind him. He sailed away, according to the advice of Gover¬ nor Winthrop who,

apparently ashamed of the precipitancy and narrowness of his clerical col¬ league, had advised Mr. Williams to retire promptly to the Indians on Narragansett Bay, where he would be beyond English claims and patents. His own account of this momentous exodus in America runs in part as follows :

I steered my course from Salem — though in winter snow, which I feel yet — unto these parts wherein I may say Peniel, that is, I have seen the face of God. I first pitched, and then began to build and plant at Seekonk, now Rehoboth; but when I received a letter from my ancient friend, Mr. Winslow, then governor of Plymouth, professing his own and others' love and respect to me, yet lovingly advising me, since I was fallen into the edge of their bounds, and they were loth to displease the Bay, to remove but to the other side of the water; and then he said I had the country free before me, and might be as free as themselves, and we should be loving neighbors together. These were the joint understandings of these two wise and eminently Christian governors, and others, in their day, together with their counsel and advice as to the freedom and vacancy of this place, which in this respect and many other provi¬ dences of the Most Holy and Wise One, I called Providence.

Following the voyage came the desperate exposures on land, — "fourteen weeks of bitter winter season without knowing what bread or bed did mean,® in his own phrase. His only succor was received at the hands of the Indians, whose language he had mastered during his Plymouth ministry for a purpose higher than he could then have dreamed of. When the final place of settlement was reached on Rhode Island, he said: "In gratitude to God's merci¬ ful providence to me in my distress, I gave to the place the name of Providence.®

Henceforth the story of Roger Williams is the story of the planting of what is probably the first commonwealth in history into whose fundamental constitution was incorporated an unequivocal guarantee of religious liberty. From Constantine to Williams, the Christian Church, always and everywhere in Christendom, dominated the State. Indeed, in all religions and in all ages, up to this time, priests have more or less directly claimed to be the arbiters of the civic and physical interests as well as of the spiritual destinies of men. The quality and quantity of the work accomplished by Roger Williams cannot be appreciated until the spirit of the Puritans, of whom he was one and with whom he contended, is more closely studied and understood. Popular traditions have lumped the various settlements of New England under one estimate, as one movement. The Puritans have been studied too much in bulk, as though they represented a coherent and consistent body, moving forward with one spirit and for one end: that spirit the spirit of freedom, and the one end religious and civil liberty. But the

banishment of Roger Williams is but one of a series, albeit the first of such acts. The noble Henry Vane arrived in Boston three months before Williams had to flee. Though a young man of only 24 years, he was of such brilliant powers that he was made governor of Massa¬ chusetts. But the spirit of the people was too intolerant, the air too dogmatic for him to stay, and in less than three years he went back to England to his larger career and to a tragic death for freedom's sake. In 1636 came Anne Hutchinson, the brilliant woman who preached transcendentalism before the Transcendental- ists : a woman who was gladly heard in the pulpit at that early date ; she gathered around her a growing following, — but she must not stay. With her band of followers she had to go. They turned their faces toward the land of greater freedom, the hospitable Rhode Island, where for a while she tarried on her way to death from an Indian's tomahawk in the neighborhood of what was to be New York.

The persecuted Quakers were naturally drawn to the boasted freedom of the New World, but when Anne Austin and Mary Fisher, representatives of this fellowship, landed at Boston from Barbados in 1656, they were promptly locked in jail lest they might proclaim their heresies to the curious crowd that gath¬ ered around them. A council pronounced their doctrines blasphemous; their books were burned and they themselves confined under hard cir¬ cumstances for five months, until the ship they had come in was ready to return them to Bar¬ bados. Later these Quaker missionaries found a more cordial welcome at the hands of the Mohammedans in Turkey than they did at the

hands of the Christian Puritans in Massachu¬ setts. However, the contention of John Fiske, that the Puritans had more at stake than the Mohammedans, deserves to be considered in this connection. Following these two women came eight Quakers from London, who were promptly arrested and special laws were passed that they might be disposed of. The penalties afixed in these anti-Quaker laws were cumula¬ tive, passing on up from flogging, through imprisonment at hard labor, cutting off one or both ears, boring the tongue with a hot iron, until finally capital punishment was reached in 1659, when two were hanged on Boston Com¬ mons. This was going farther than Quaker persecution had ever reached in old England ; and next year a Quaker woman was hanged at the same place. The last victim suffered in 1661 for the sole crime of holding to and practising the precepts of George Fox, as rep¬ resented by the fellowship of the Friends.

There is no finer test of a man's sincerity than that which demands that he take his own medicine. Roger Williams was called upon to apply his own doctrines in the case of the Quakers. From their teachings he dissented most heartily; he never came so near the intol¬ erant spirit as in the book entitled (George Fox Digg'd out of his Burrowes, and George Fox never came so near dealing in venom as in his reply, entitled (A New England Fire-Brand Quenched. y And still the communities of Rhode Island not only refused to join with the New England confederacy in a movement to keep out the Quakers, but welcomed them in spite of their views. When George Fox visited this country he did not dare go farther north than Newport, R. I., where he was sheltered in spite of his teaching. Hither Williams went, 30 miles in an open boat, he himself working the oars, not to suppress, but to hold high de¬ bate with the great disciple of soul-liberty, who had stood the test in England even as Roger Williams had in America, and who, in his doc¬ trine of the (*

As with the followers of Anne Hutchinson and George Fox, so with the Jews. Williams pleaded their cause with the powers of Eng¬ land, and the hunted children of Israel found shelter and welcome at Newport, where the lonely graves of the exiled community moved Longfellow two centuries later to sing the pathetic song of toleration entitled "The Jewish Cemetery at Newport.®

Twice, at least, Roger Williams returned to England in the interest of the new community, each time for the sake of strengthening the safeguards of religious liberty in his charter rights. The first time he was obliged to sail from Manhattan, for he was an exile from Boston. Once his stay was prolonged for three years, during which time he was deep in the politics of the Protectorate, an active helper of Cromwell, and an intimate associate of Cromwell's Foreign Secretary, ((Mister Milton,® to whom he taught Dutch. Scant justice has as yet been done to the benignant and ameliorating element introduced into the history of the United States, particularly of the New England

States, by Roger Williams. He came to reform the reformers, of whom Hawthorne facetiously said :

Let us thank God for having given us such ancestors and let each successive generation thank Him not less fervently for being one step further from them in the march of ages.*

Williams necessarily had much fighting to do. The titles of his books suggest contro¬ versy. 'The Bloudy Tenantt of Persecution for Cause of Conscience ; A Dialogue Between Truth and Peace, } is his most noted work. This a Puritan House of Commons caused to be burned in England. To this John

Cotton wrote the reply entitled 'Bloudy Tenantt Washed and Made White in the Bloud of the LambP In due time came the rejoinder from Williams, 'The Bloudy Tenantt Yet More Bloudy by Mr. Cotton's Attempt to Wash it White in Bloud of the LambP But notwithstanding this bellig¬ erency, Williams vindicated the liberty he es¬ poused and demonstrated in his own life that liberty and the love of liberty breed tenderness and not violence. "We have taxed your pa¬ tience often, but never exhausted it,® wrote Governor Winthrop. And his latest biographer, Oscar S. Straus, says : "In no act of his life is a spirit of selfishness disclosed® ; and again, "His patriotism was never dimmed by a shadow of suspicion of self-interest® ; and again, "He held his colony with a firm hand and a wise head.® He never preferred to be the power behind the throne rather than to be the power on the throne. When the Indians were at last nagged into the violence that led to the invasion of Rhode Island, Roger Williams, unarmed save with his staff, went out to meet them. He failed to turn them back, but they said, "We will not hurt you. Brother Williams.® This ac¬ complished linguist, the master of seven lan¬ guages, spent his 70 years and more in unceas¬ ing toil, much of the time earning his bread by manual labor. He alludes to a sacrifice of his own interests by refusing to kiss the Bible when taking an oath in England, but furnishes no particulars. Everywhere and always he kindled the spirit of liberty, and was never known to light the fires of persecution.

The first compact of the little band of exiles on the hill he named "Providence® carried the signatures of 13 men, five of whom made their mark. It was of such humble material that he laid the foundations of the first state ever un¬ equivocally committed to religious liberty. His first-born son is supposed to have been the first white child in Rhode Island. The last charter he obtained from Charles II was so wisely drawn, and liberty in it was so securely vouchsafed, that it served the commonwealth of Rhode Island for 180 years; it was not changed until 1843, and it would still serve as a model for a new State.

Thus the movement for religious liberty in America unfolded naturally into a passion for democracy, a demand for civil liberty, and our study lands us at the feet of Thomas Jefferson, who was the father of civil liberty in America, so far as movements whose beginnings are al¬ ways hid in the obscurity of still more primitive beginnings can be said to have a father.

" Author of the Declaration of Independence , of the statute of Virginia for religious freedom , and Father of the University of Virginia ,®

was the inscription which Thomas Jefferson left among his papers as one suitable for his own tomb. In another catalogue of things accom¬ plished, drawn up by his own hand, we find the following : ((Separated the church and state in Virginia; put an end to entails; prohibited the importation of slaves, and drafted the Declara¬ tion of Independence.®

Mr. Jefferson was the wisest read, the most accomplished of the Presidents, the intellectual giant of them all ; the first, if not the greatest, thorough-going Democrat in American politics. Jefferson, Jackson and Lincoln are the three Presidents who, in practice as well as in theory, by nature as well as by conviction, believed so profoundly in popular government and the sim¬ plicity and freedom involved therein that it be¬ came to them a religion, a source of unfailing enthusiasm. These three belonged to the peo¬ ple and found their highest inspiration in the purpose to serve them. The opinions of no other President ever received such prompt re¬ spect at home and abroad as those of Thomas Jefferson, and his official utterances occupy a place in literature as well as in the history of statesmanship unparalleled by the deliverances of any other President of the United States, save Lincoln.

Jefferson's devotion to civil liberty led to, or sprang from, his freedom in religious thought, in which he was notoriously unorthodox. He was deeply versed in the writings of French philosophers and the events that led up to the Revolution, and was sufficiently grounded in the philosophy of liberty to be able to give at short range the true estimate of that atmo¬ sphere-clearing storm which all clear thinkers at longer range are able to give it. He was a confidant and friend of Thomas Paine, and the principles laid down in 'The Rights of Man) and 'Common Sense) were not only familiar but congenial to him and probably had a direct influence upon his work. These documents, to¬ gether with' the life of the much-maligned and cruelly misunderstood author, should be closely studied in connection with the subject at hand.

At the first Congress, systematically con¬ vened at Philadelphia in 1774, Thomas Jefferson was chairman of the committee appointed to draft the Declaration of Independence, which in due time was offered in his own handwriting, essentially as it now stands; a clause censuring slave trade was suppressed. He regretted the first draft of the Constitution as adopted be¬ cause he feared the liberties of the citizens were not sufficiently safeguarded; it contained no precaution against monopolies and standing armies; the freedom of conscience and of re¬ ligion were not sufficiently guaranteed ; the rights of habeas corpus were not adequately secured, and no limitation was set to the time one person could occupy the Presidency, which, unguarded, as he feared, might grow into an absolutism more or less complete; in short, because it had no (

In his day, Mr. Jefferson combated a greater number of laws which were oppressive, customs which were stale, tendencies which were undemocratic, and fixed opinions which were popular than any other man in public life. He attacked systems and creeds where they were most sensitive. He aroused vested interests which were the most powerful, and which, when alarmed, were the most vindictive. Yet

never once in all his long life did he falter, surrender, or apostatize.

He took the unpopular side of slavery, and held to it. He defied the religious bigotry of his times, and continued to defy it. He challenged the organized power of land monopoly and class rule in his own State and overthrew it.

The first session of Congress after the adop¬ tion of the Constitution in 1789 adopted 12 amendments, most of them looking toward the relieving of the above anxieties expressed by Mr. Jefferson; the first amendment providing for the religious freedom of all the citizens and the unequivocal separation of Church and State. The constitution of nearly every State in the Union now has its ((Bill of Rights.® Most of these bills incorporate the exact phraseology of the Declaration of Independence concerning the "inalienable rights to life and liberty, and the pursuit of happiness.® This guarantee of re¬ ligious liberty is somewhat modified by the fol¬ lowing States :

Maryland declares a person incompetent as a witness or juror who does not believe

in the existence of God, and that under His dispensation sucn person will be held morally accountable for his acts, and be rewarded or punished therefor in this world or the world to come.

The law of Maryland provides that ((a belief in the existence of God® is a necessary quali¬ fication ((for any office of profit or trust in this State.® And also:

That every gift, sale or devise of land to any minister, public teacher, or preacher of the gospel, as such, or to any religious sect, order or denomination, or to or for the support, use, or benefit of, or in trust for, any minister, public teacher, or preacner of the gospel, as such, or any religious sect, order, or denomination; and every gift or sale of goods, or chattels, to go in succession, or to take place after the death of the seller or donor, to or for such support, use or benefit; and also every devise of goods or chattels to or for the support, use or benefit of any minister, public teacher or preacher of the gospel, as such, or any religious sect, order or

denomination, without the prior or subsequent sanction of the Legislature, shall be void; except always, any sale, gift, lease or devise of any quantity of land, not exceeding five acres, for a church, meeting house, or other house of worship, a parsonage, or burying ground, which shall be improved, enjoyed, or used only for such purpose; or such sale, gift, lease, or devise shall be void.

Mississippi provides that ((The Holy Bible shall not be excluded from use in any public school of this State® ; and makes a six months' residence a sufficient qualification for voting to a minister of the gospel, while two years' resi¬ dence is required for a layman.

New Hampshire provides that:

The people of this State have a right to empower, and do hereby fully empower the Legislature to authorize, from time to time, the religious societies within this State to make adequate provision at their own expense, for the support and maintenance of public Protestant preachers of piety, religion, and morality; provided, notwithstanding, that the several towns, parishes, bodies corporate, or several religious societies shall at all times have the exclusive right of electing their own public teachers, and of contracting with them for their support and maintenance.

Vermont, after providing freedom of con¬ science for all and the free exercise of religious worship in sweeping phrase, adds in Article III :

Nevertheless, every sect or denomination of Christians ought to observe the Sabbath or Lord's Day, to keep up some sort of religious worship which to them shall seem most agreeable to the revered will of God.

Virginia, though perhaps the first State after Rhode Island to provide for absolute separation of Church and State, introduces a curious

inconsistency, evidently quite unconsciously, in this wise :

It is the mutual duty of all to practice Christian for¬ bearance, love, and charity toward each other. t*

(

Ever since the signing of the Declaration of Independence there have been those in the United States who would dispose of its funda¬ mental

contention as a ((glittering generality,® or limit its application to their own sect or race; but, spite of sneers, past or present, eva¬ sions and contemptuous appeals to technical¬ ities, it still survives as the matchless document that not only liberated the United States from foreign thrall, but by its logic is destined to en¬ franchise the children of the world. Side by side, Jefferson's Declaration of Independence and Lincoln's Emancipation Proclamation stand in the world's library, unmatched and un¬ dimmed, to rebuke, to instruct and to inspire unborn generations. They were and still are prophetic documents. The Civil War which Jef¬ ferson foresaw came, and he who would study the story of civil and religious liberty in Amer¬ ica must take note of such events as the mar¬ tyrdom of Elijah Lovejoy (q.v.), and the de¬ struction of his abolitionist press at Alton, Ill. (1837) ; the appearance of Harriet Beecher Stowe's (Uncle Tom's Cabin > (1852) ; the exe¬ cution of John Brown (q.v.) at Harper's Ferry (1859); the firing upon the flag at Fort Sum¬ ter (1861) ; the Emancipation Proclamation of Abraham Lincoln (1863) ; the surrender of Robert E. Lee at Appomattox (1865).

In studying civil and religious liberty we find that, though they may be distinguishable in their sources, they are one in their culmination. Not more clearly did the passion for religious liberty make of Roger Williams an advocate of polit¬ ical liberty than did Thomas Jefferson's zeal for political liberty make of him an apostle of reli¬ gious liberty. The government has recently ordered published a little manuscript book of Thomas Jefferson's, entitled (The Life and Morals of Jesus of Nazareth, Extracted Textu- ally from the Gospels, together with a Com¬ parison of His Doctrines with Those of Others.) In this book the author compiled the ethical and spiritual portions of the Gospel, eliminating the miraculous and theological pas¬ sages. Of the compilation he himself wrote:

A more beautiful or precious morsel of ethics I have never seen. It is a document in proof that I am a REAL CHRISTIAN; that is to say, a disciple of the doctrines of Jesus, very different from the Platonists who call ME infidel and THEMSELVES Christians and preachers of the Gospell while they draw all their characteristic dogmas from what its author never said nor saw.

The conviction indicated in this book may be right or wrong. I refer to it because it illus¬ trates the liberty vouchafed by the fundamental laws of the United States, which not only guar¬

- *The above study of the State constitutions is based on the study of the text found in the Convention Manual for the Sixth New York State Constitutional Convention, published in 1894. Doubtless further amendments have been enacted since then, and our attention*

has been called by Judge E. O. Brown of the Circuit Court of Illinois, to certain omissions in the New Hampshire Constitution as published in this work, bearing on the question in hand.

antee freedom of utterance, but lead to a re¬ spect for sincere opinions, however they may differ from prevailing opinions.

Any sketch of the history of civil and re¬ ligious liberty in America would be incomplete without reference to the interesting contribu¬ tions of Lord Baltimore in Marvland, of Wil¬ liam Penn in Pennsylvania and the Utopian schemes of John Locke and Lord Shaftesbury in the Carolinas. It is one of the interesting paradoxes of history that the Catholic Calverts, who held the most sweeping charter ever brought to the New World, should establish a standard of hospitality in religion and liberality in politics exceeding that of any other colony.

Lord Baltimore came to establish a <(Palat- inate,® a palace county. He was made absolute lord of a vast territory with powers to declare war, collect taxes, create legislatures and ap¬ point judges. But knowing from experience the heavy hand of religious bigotry, his autocracy was a benign one. It offered hospitality to the persecuted in all lands and established many precedents precious to liberty.

The Quaker spirit represented by William Penn and his associates and successors was and is a pervasive influence, making for toleration, peace and co-operation. While the dreams which the free-thinking philosophers above mentioned tried to realize in South Carolina may be taken as forerunners of many sociolog¬ ical ventures on communistic or ideal lines that have followed, perhaps the most suggestive and creative of which was the work of Robert Owen at New Harmony, Ind. At any rate, from New Harmony to Altruria, the story is an attractive one to the social philosopher and a potent one in the interest of civil and religious liberty.

The law of the land demands toleration, but spiritual freedom goes further and demands appreciation and fellowship in the things about which men honestly differ. He who would study closely the development of feligious lib¬ erty in America must note the discussions and agitations that gathered about the following epoch-marking addresses : Channing's Balti¬ more address (1818) ; Emerson's Divinity School address, which, to use his own words, <(caused such a tempest in the Unitarian wash¬ bowl,® and in consequence of which Harvard for 30 years practically exiled its most illustri¬ ous alumnus from the platform of the freest university in America (1838) ; Theodore Par¬ ker's discourse on (The Transient and the Per¬ manent in Christianity) (1841) ; William C. Gannett's address on (The Faith of Ethics

(1887).

The growth of the spirit of religious liberty may be further traced by a close study of the most noted religious controversies in our his¬ tory, among which were the discussion concern¬ ing the teachings ot Horace Bushnell (1839-54) bv the Congregationalists of New England; the withdrawal of Henry Ward Beecher (1882) from the local Congregational Association to which he belonged ; the trial of David Swing (1874) by the Presbyterians of Chicago and of Hiram W. Thomas (1881) by the Methodists of Chicago. Significant also in the history of re¬ ligious liberty is the organization of the Free Religious Association in Boston (1867) and the holding of the Parliament of Religions in Chi-

cago (1893). This was the most significant re¬ ligious conclave ever held, perhaps the noblest corporate event in the history of religion. This was followed the next year (1894) by the or¬ ganization of the Congress of Religion in Chi¬ cago and the subsequent organization of the New York Conference of Religion, a similar organization within State limits. Significant in¬ dications of the growth of this spirit of co¬ operation, which springs out of the spirit of religious liberty, are found in the numerous interdenominational organizations for practical work, such as the Young Men's and Young Women's Christian Associations, the Christian Endeavor movement, the Woman's Christian Temperance Union, the Chautauqua movement and the various combinations for missionary work at home and abroad.

The development of civil and religious lib¬ erty is still incomplete; it still behooves (

Bibliography. — Bury, J. B., (History of Freedom of ThoughC (New York 1913) ; Cobb, S. H., (Rise of Religious Liberty in America) ; Mill, J. S., (On Liberty5 (New York 1909).

Jenkin Lloyd Jones, D.D.

45. DISPUTED ELECTIONS. On four occasions the electoral colleges have failed in the task of choosing a President and Vice-President. In 1801, after the counting of the electoral vote, the question was left to settle which of the two men, Jefferson or Burr, should be President, and which Vice-President. In 1825 it re¬ mained to choose a President from among the three candidates, Andrew Jackson, John Quincy Adams and William H. Crawford. In 1837 it was left to determine whether Richard M. Johnson or

Francis Granger should be Vice- President. In all these cases the difficulty was merely that the electors had so distributed their votes that the choice was incomplete. And the Constitution of the United States pointed out the procedure by which to complete it. The fourth case arose in 1877. The task was now thrust upon the government of deciding between rival electoral colleges in four States. This would determine whether Samuel J. Tilden and Thomas A. Hendricks, the candidates of the Democrat party, or Rutherford B. Hayes and William A. Wheeler, who were the Republican candidates, should become President and Vice- President respectively. There was no agency provided by the Constitution or laws to decide such a question.

The dispute of 1801 was a natural result of the rule laid down in the Constitution for the procedure of the electors. Each elector should vote for two persons. The person found to have the greatest number of votes should be the President, provided such number was a majority of the whole number of electors. The person having the next greatest number should be the Vice-President. But since a majority of the electors might be only one more than a quarter of the votes, and each elector cast two, it was possible for two persons to receive an

equal majority vote. The constitutional pro¬ vision for this contingency was that the House of Representatives should immediately choose by ballot one of the two persons for President. This vote must be taken by States, and the rep¬ resentation from each State should have one vote. A majority of the States was necessary to a choice. The official count of the electoral votes was made before the two Houses of Con¬ gress as prescribed by the Constitution. This was done on Wednesday 12 February, Jefferson himself presiding. There were 138 electors and 276 votes. The vote was distributed as follows : Thomas Jefferson, 73; Aaron Burr, 73; John Adams, 65; Charles Cotesworth Pinckney, 64; John Jay, 1. It had been anticipated that the electoral vote would not be decisive. Two days before the count the House of Representatives had adopted rules of order for the expected election. The representatives should be grouped by States, in order to determine for whom the vote of each State was to be cast. If the pre¬ liminary vote of any State resulted in a tie, that delegation could only cast a ballot marked (

By the official count of 9 Feb. 1825, the elec¬ toral vote for President was found to stand as follows: Andrew Jackson, 99; John Quincy Adams, 84; William H. Crawford, 41; and

Henry Clay, 37. The number of electoral votes necessary to a choice was 131. The ballot for Vice-President had been decisive; for John C. Calhoun had received 182 votes. The Con¬ stitution limited the House of Representatives in its choice of a President to the three highest candidates. The first ballot gave Adams the vote of 13 States; Jackson that of seven States; and Crawford that of four States. There was great popular indignation, for Jackson had received 15 more electoral votes than Adams. And besides this the Jackson electors had received a great majority of the popular vote. A rumor became current that there had been a ((corrupt bargain® among the Adams and the Clay men. This seemed to be confirmed as soon as President Adams took his seat by the nomination of Mr. Clay for Secre¬ tary of State. However, it was sufficiently shown later that this story rested upon no evi¬ dence.

It was discovered by the official count of 8 Feb. 1837, that the electoral vote for Vice-Presi¬ dent had been indecisive. The constitutional rule in such a case 'is that the Senate shall choose the Vice-President from the two highest num¬ bers on the list. These were Richard M. John¬ son and Francis Granger. Upon the motion of one of the members, the Senate proceeded to a viva voce vote. The result was 33 to 16 in favor of Mr. Johnson.

After the elections of 7 Nov. 1876, the first indications were that the Democratic party had chosen a majority of the electors. But the Re¬ publican party managers immediately began to claim three Southern States whose votes were likely to decide the issue. These were Florida, Louisiana and South Carolina. When the day arrived for the meeting of the electoral colleges, two sets of electors voted in each of these States and in Oregon as well. Thus four States trans¬ mitted double returns to the President of the Senate. Evidently a quarrel was before the country which might set up rival executives in the national government, or leave the nation without an executive. Whether it is agreeable to the Constitution for Congress to regulate by law the counting of the electoral vote, we will not here discuss. The only power relating to this subject, that is expressly granted, is to de¬ termine the time of choosing the electors and the time when the electors shall meet. Laws had been enacted concerning the accepting and rejecting of electoral votes prior to 1877. The most discreet men in the government felt that Congress should devise some expedient for dealing with an unprecedented situation. The Electoral Commission Law was enacted. This passed the Senate 25 January, the House of Representatives 23 January and was approved 29 January. Its title was <(An act to provide for and regulate the counting of votes for President and Vice-President, and the decision of questions arising thereon, for the term com¬ mencing 4 March 1877.® It provided in detail for the official count as prescribed by the Con¬ stitution. It ordered that this should begin on the first Thursday in

February, which was the first day of the month, and that the returns should be acted upon in the alphabetical order of the States. After the reading of each certificate, the president of the Senate should call for ob¬ jections. In cases which did not involve con¬ flicting returns, the two Houses should pass

upon the objections. They should separate for this purpose. No electoral vote should be re¬ jected except by the affirmative vote of both Houses. Section II, the most remarkable part of the law, provided for the Electoral Commis¬ sion, which was created to pass upon cases where there were double returns from a State. The Senate should choose five of its members by viva voce vote, on the Tuesday before the count began, to serve on the commission. The House of Representatives should likewise choose five members. Five associate justices of the Supreme Court were also to serve. The law designated four of these under the numbers of their respective circuits, the first, third, eighth and ninth. These were to select the fifth. When any case of double returns was reachtd in the official count, the certificates and papers relating thereto, together with all the objec¬ tions filed in the joint meeting of the two Houses, were to be referred to the commission. This body should decide by a majority vote the questions ; whether any and wrhat votes re¬ turned from a State are the votes provided for by the Constitution of the United States, and how many and what persons were duly ap¬ pointed electors in such State. The decisions were to be final unless they were set aside by the vote of both Houses of Congress. The mem¬ bers of the Commission were chosen on Tues¬ day, 30 January. The Senate wTas Republican at the time, while the House of Representatives was Democratic. Three of the senators se¬ lected were Republicans and two were Demo¬ crats. The former were George F. Edmunds, Vermont; Oliver P. Morton, Indiana; and Frederick T. Frelinghuysen, New Jersey. The latter were Thomas F. Bayard, Delaware, and Allen G. Thurman, Ohio. In the House this proportion was reversed. The three Democratic members were Henry B. Payne, Ohio ; Eppa Hun ton, Virginia, and Josiah Abbott, Massa¬ chusetts. The two Republicans were James A. Garfield, Ohio, and George F. Hoar, Massa¬ chusetts. Of the four justices designated by the law, Nathan Clifford and Stephen J. Field of the first and ninth circuits respectively were Democrats. William Strong and Samuel F. Miller, of the third and eighth circuits, were Republicans. Thus far the commission was equally divided. Moreover the arguments were likely to be so strong on both sides of the dif¬ ferent questions that the decisions would in¬ evitably follow party lines. While the law seemed to shift the burden of decision upon 15 men, it so operated that it was really imposed upon one man. It had been expected that the four associate justices would select Justice David Davis to be the 15th member of the com¬ mission. Mr. Davis was independent in poli¬ tics. But he had

accepted an election to the United States Senate, which was thought to make it unsuitable for him to serve. Justice Joseph P. Bradley of the fifth circuit was chosen. This made the commission consist of eight Republicans and seven Democrats. At the final sitting Senator Thurman was unable to serve on account of illness arrd Francis Kernan, New York, a Democrat, was substituted. The two most important United States laws per¬ taining to Presidential elections were enacted 1 March 1792 and 23 Jan. 1845, respectively. The act of 1792 provides that the executive au¬ thority of each State shall cause lists of the

names of the electors of such State to be certi¬ fied and delivered to the electors, and that the electors shall annex one of the said lists to each list of votes. The law of 1845 declares that each State may by law provide for the fill¬ ing of any vacancy or vacancies which may oc¬ cur in its college of electors, when such col¬ lege meets to give its electoral vote. Numer¬ ous cases came up in the count of 1877, to which these provisions were applicable. The Electoral Commission held four sittings. The first one began 2 February, when the returns from Florida were reached. It took a week to come to a decision in this case. The returns of the Hayes electors were certified by the gov¬ ernor in office on the day when the electors met. But it was believed that the State returning board, which had declared for a Republican vic¬ tory, had in canvassing the votes of the State rejected the returns from certain polling-places. On the other hand, the returns of the Tilden electors were certified by the attorney-general. And there was a duplicate of the same returns certified by a new Democratic governor. An additional cause of dispute in the case of Flor¬ ida grew out of the charge that one of the Hayes electors held an office under the United States government at the time when he was elected, and was, therefore, ineligible. This ob¬ jection was based upon the constitutional pro¬ vision that no person holding an office of trust or profit under the United States shall be ap¬ pointed an elector. The decision of the com¬ mission was based upon the ground that the re¬ turns of the Hayes electors were certified ac¬ cording to the law of the United States, and that the returning board had operated under the laws of Florida. To set these returns aside would be to go behind the action of the State officers. This the commission was in¬ competent to do. And it would be impossible to investigate the charges of fraud. As for the one elector who was objected to on the charge that he held an office under the United States, it was concluded after hearing evidence on both sides that he had properly resigned the office. The commission, therefore, held by a vote of eight to seven that the four Hayes electors were the lawful ones. This decision was reported 9 February. The

Electoral Com¬ mission was next in session 12-16 February, as the official count had now reached Louisiana. This State presented the spectacle of rival gov¬ ernments. The Republican officers claimed au¬ thority under the canvass of the State return¬ ing board. The Democratic ones claimed that under the popular vote as cast they had been elected. The returns of the Tilden and the Hayes electors were certified by rival execu¬ tives. The commission maintained that the Re¬ publican government held office by the opera¬ tion of the laws of the State. In this case, as in that of Florida, there were charges of fraud and ineligibility. But the commission could not go back of the certificate of the State authority. Accordingly the eight Hayes elec¬ tors were held to be the rightful ones. The commission was again in session 21-23 Febru¬ ary, to pass upon the returns from Oregon. The Republican party had carried the election but the governor, who was a Democrat, had certified to the election of only two of the Hayes electors. The third certificate was is¬ sued to the highest Tilden elector on the

ground that the third Hayes elector was a post¬ master. As the two Republican electors re¬ fused to meet with the Democratic one, both sides proceeded to fill the vacancies in the elec¬ toral college. The Republican electors ap¬ pointed the man from whom the governor had withheld the certificate. The one Tilden elec¬ tor appointed two other Democrats. The gov¬ ernor certified to the returns of the Tilden electors. Those of the other college were cer¬ tified to by the secretary of state. The reason¬ ing by which the disputes about Florida and Louisiana were decided operated in this case in favor of the Tilden electors. But the com¬ mission made a distinction. In those cases it had inquired whether the executive authority had carried out the laws of the State and had found that it had done so. Thus it was incom¬ petent for the commission to inquire further. But in the case of Oregon it found that the governor had not carried out the laws. Ac¬ cordingly the commission was competent to make him do so. Thus the three Hayes elec¬ tors were recognized. On 26 February the re¬ turns from South Carolina were submitted to the commission. The votes of the Hayes elec¬ tors were duly certified by the governor. But fraud on the part of the returning board and intimidation at the polls were charged. On the second day the commission decided that the returns of the seven Hayes electors should be accepted. The decision in favor of the Hayes electors was made in every case by a party vote of eight to seven. Moreover the Senate voted on each occasion to accept the decision and the House of Representatives to reject it. As the count proceeded, six cases of disputed votes came up which were not referred to the Electoral Commission, as they did not involve conflicting returns. In the electoral colleges of Michigan, Nevada, Pennsylvania, Rhode Island, Vermont and Wisconsin, respectively, vacancies had been caused by ineligibility, and the other electors had proceeded to fill the places. Some of the votes were objected to on this

account. The two Houses concurred in accepting some of these and differed with respect to others. There was no concurrent vote to reject. It was in the early morning of 2 March, only two days before the date set by the Constitution for the existing administration to come to an end, that the result of the official count was an¬ nounced. The vote as accepted stood Tilden and Hendricks 184, Hayes and Wheeler 185. Thus if the decision of the Electoral Commis¬ sion had been different in the case of a single elector, the contest would have been decided in favor of the other party.

After this contest was settled there were numerous movements in Congress to amend the Constitution so as to provide for disputed elec¬ tions. But none of them came to anything. Several laws on the subject were also intro¬ duced. It was 10 years afterward that a law disposing of such cases was enacted, the date being 3 Feb. 1887. This act is a lengthy one and provides in detail for the certification of electors and the counting of electoral votes. Its great provision is that the States shall pro¬ vide under their own laws by judicial or other methods of procedure to settle disputes as to the choice of electors. The decision arrived at within the State must be accepted. The only case that could arise for the national govern-

ment to settle would be that of rival tribunals within a State sustaining rival electors. The rule in such a case is that no vote can be re¬ jected except by the affirmative vote of both Houses of Congress acting separately. See Ballot; Elections.

Bibliography. — McCrary, (American Law of Elections) (4th ed., 1897) ; Mechem, F. R., (Law of Public Offices and Officers) (1890) ; Michael, W. H., (Elections: Contests in Cyclo¬ pedia of Law and Procedure) (Vol. XV, 393-

441, 1905).

Mary L. Hinsdale, Ann Arbor , Mich.

46. IMPEACHMENT. Impeachment in the national government is the formal act by which the House of Representatives makes ac¬ cusations, before the Senate, against the Presi¬ dent, the Vice-President or any ((civil officers" (executive and judicial officers, except those of the army and navy) of the United States gov¬ ernment. It is analogous to an indictment by a grand jury, though it is not confined to indict¬ able offenses. Impeachment developed in Eng¬ lish history before the establishment of the mod¬ ern cabinet system, as a power by which the representatives of the

people could control the agents of the irresponsible king, who, accord¬ ing to theory, could do no wrong. After the establishment of the Parliaments supremacy, and the present method of conducting the gov¬ ernment, the custom gradually fell into disuse. One of the most noted cases was that of War¬ ren Hastings whose trial for misgovernment in India lasted from February 1788 to April 1795, when he was acquitted. The latest case was that of Lord Melbourne in 1806.

The American colonial assemblies adopted the custom in a modified form as a means by which to check the executive and the judiciary. Though the right to remove officials was given to the general assembly by the Fundamental Orders ©f Connecticut in 1638, by the charter of Connecticut in 1662, and by the charter of Rhode Island in 1663, the word impeachment first appears in 1683 in the Pennsylvania frame of government, which provided that the general assembly should bring the impeachment, and that the council should try the case and pro¬ nounce judgment.

The new State constitutions after 1775 con¬ tain provisions on the subject: Virginia (1776) ; New Jersey (1776) ; Delaware (1776) ; Penn¬ sylvania (1776) ; North Carolina (1776) ; Georgia (1777); New York (1777); Vermont (1777) ; Massachusetts (1778) ; South Carolina (1778); Massachusetts (1780); New Hamp¬ shire (1784) and Vermont (1786). The New Jersey constitution of 1776 provided that the lower house should bring the impeachment and that the upper house should try it. The New York constitution of 1777 provided that the as¬ sembly should bring the impeachment and that it should be tried before a court consisting of the president, the senators, the chancellor and the judges of the Supreme Court. Judgment was to extend no farther than removal from office and disqualification from holding office under the State. The methods of trying the impeachment varied, but the tendency was to have judgment pronounced by the council or senate. The Constitutional Convention of 1787

incorporated the same principle into the Con¬ stitution for application in cases of treason, bribery ((or other high crimes and misdemean¬ ors," all of which can be punished in the ordi¬ nary courts. The House first passes a resolu¬ tion to impeach and then appoints a com¬ mittee to present the charges at the bar of the Senate which sits as a high court to try the case. The House also appoints a committee of managers to act for it in the trial before the Senate. At the close of the trial, after the evidence has been introduced and the arguments of the managers and of the de¬ fendant's counsel have been heard, each sena¬ tor is required to vote ((guilty" or (

In our national history this constitutional process has been invoked in nine

cases; six times against Federal judges, once against a senator, once against a Cabinet officer and once against a President. Only in three cases has it resulted in removal from office: Judge John Pickering in 1803 for drunkenness, profanity and violence on the bench, Judge W. H. Humphreys in 1862 for adhering 'to the Confed¬ eracy and Judge Robert W. Archbold in 1913 for corruption in office. Both Pickering and Humphreys were district judges of the United States: Pickering for the District of New Hampshire, and Humphreys for Tennessee. In the articles against Pickering it was charged that he made decisions contrary to law in a suit involving the seizure of a ship and that he ap¬ peared upon the bench (

Judge Humphreys at the beginning of the Civil War had engaged actively in the secession movement, but had not resigned his position as judge of the Federal District Court for Tennes¬ see. In May 1862, the House preferred against him seven articles of impeachment, based on a secession speech made by him at Nashville, 29 Dec. 1860, on his acceptance of office under the Confederacy, and on his action in the arrest and imprisonment of W. G. Brownlow, a citizen of the United States, in violation of his rights. Judge Humphreys made no defense and on 26

June 1862 he was convicted by unanimous vote of the Senate. The proceeding was merely a formal means of declaring his office vacant.

Justice Samuel Chase of the Supreme Court appointed by President Washington in 1796, an able but partisan judge who frequently indulged in political harangues in his jury charges, and who had incensed the Jeffersonian Republicans of the House by his conduct in certain trials under the Sedition Law, was impeached before the Senate in December 1804 on eight charges relating to arbitrary and unjust conduct, and to highly indecent and extra-judicial reflections upon the government of the United States be¬ fore the Maryland grand jury. He was found not guilty, probably because it was believed that <(his conduct had been rather a violation of the principles of politeness than of the principles of law ; rather the want of decorum than the com¬ mission of high crime and misdemeanor.®

Judge J. A. Peck of the Federal District Court for Missouri was impeached in 1830 on the charge of unduly punishing, for contempt of court, an attorney who had published a criticism of a decision of the judge in a land case (1827). He was acquitted by a vote of 24 against 21.

The case of William Blount, senator from Tennessee, seems to have settled that senators and representatives are not impeachable, on the ground that they are not civil officers. On 7 July 1797, the House, having evidence that Senator Blount was conspiring to transfer New Orleans and adjacent territory from Spain to Great Britain, by means of a hostile military expedition from the territory of the United States, decided to impeach him. Two days later, he was expelled from the Senate, and soon thereafter he was elected to the Tennessee senate. In December 1798, the House managers presented the case before the Senate of the United States for trial. Blount did not appear, but his counsel (Jared Ingersoll and A. J. Dallas) entered a plea that the Senate had no jurisdiction, since a senator is not a ((civil offi¬ cer® of the United States. The Senate sus¬ tained his plea and Blount was discharged for want of jurisdiction. The defense also made the plea that Blount, having been expelled, was no longer a senator, and could not be punished after he was out of office for acts done while he was in office.

It is still an open question whether an officer can escape impeachment and trial before the Senate by resignation or dismissal from office. This subject was discussed in the case of Wil¬ liam W. Belknap, who was impeached in 1876 for using his position as Secretary of War as a means of securing bribes from an Indian agent whom he had appointed at Fort Sill. A few hours before his impeachment he resigned his office and his resignation was accepted by the President. Belknap's counsel made the plea that the House had no power to impeach anyone who by resignation or otherwise had ceased to be <(a civil officer of the United States.® By a vote of 37 to 29 the Senate decided that Bel¬ knap was amenable to trial 'by impeachment. On most of the articles 36 senators voted ((guilty® and 25 voted ((not guilty,® and thus Belknap was acquitted. More than one-third of the Senate refused to vote for conviction, on the ground of lack of jurisdiction over an

officer who had resigned. This precedent' may not be regarded in future cases, however.

The most prominent case of impeachment in our history was that of President Andrew Johnson. It was the result of the violent con¬ troversies concerning policies of reconstruction, and was inspired largely by party motives. The President vetoed some of the most important measures of Congress and belligerently con¬ demned its policy of reconstruction. Congress passed all important measures over his veto, and sought to reduce his power and influence in other ways, especially by the Tenure of Office Act of March 1867. Johnson denounced Con¬ gress in very intemperate

language, and by de¬ manding the resignation of Edwin M. Stanton, Secretary of War, attempted to ignore the Tenure of Office Act which had stripped from him the power to remove executive officials. The House was thoroughly aroused, and on 3 March 1868 brought articles of impeachment against him, on 'll charges, principally of a political nature and based chiefly on his alleged violation of the Tenure of Office Act. The event was considered so momentous that the Senate in accord with the conviction of the chief justice who presided, drew up and adopted its own formal rules of procedure.

On 23 March, the court of impeachment con¬ vened and the reply of the President was read by his counsel. He denied any intention of violating the Constitution, or of attempting to bring Congress into disgrace or to ridicule it. Testimony was taken and then the arguments of the attorneys were filed. Party excitement and passion ran high, and on 16 and 26 May, after a long trial, the Senate by a vote of 35 to 19 decided that he was guilty of the princi¬ pal charges. This lacked one vote of the two- thirds majority necessary for conviction. (The court then adjourned sine die by a vote of 34 to 16). The necessary two-thirds was not ob¬ tained, largely because some of the leaders in the Senate feared that conviction might result in the permanent subordination of the executive to Congress. Seven Republican senators voted against conviction. The failure to convict was a public advantage, but the President did not win with dignity — for even while the trial was in progress he traveled about, making passion¬ ate speeches against Congress.

Charles Swayne, United States district judge for the northern district of Florida, was im¬ peached on 24 Jan. 1905, under 12 charges, but was acquitted on 27 Feb. 1905.

The last instance of a Federal impeachment was that of Judge Robert W. Archbold, of the Commerce Court, who, on 13 Jan. 1913, on five out of 13 charges of high crimes and mis¬ demeanors while in the discharge of his judi¬ cial duties, was found guilty by the United States Senate sitting as a high court of im¬ peachment, and was sentenced to removal from office and disqualified forever for any office of honor, trust or profit under the government.

The most prominent recent case of State (Commonwealth) impeachment was that of Gov. William Sulzer of New York, in 1913. In this case, for the first time, was raised the question whether a public officer is liable to im¬ peachment for acts committed by him before the beginning of his term of office. On 16 October the court of impeachment, including

members of the Senate and the judges of the Court of Appeals, found Governor Sulzer guilty of three of the eight charges (by a vote of 50 to 1), and voted to remove him from of¬ fice, but did not prevent him from holding future office.

Bibliography. — American Lazv Register (March 1867) ; (Annals of Congress) 8th

Congress, first session (pp. 315-368) ; Appleton,

(Annual Cyclopedia) (1868-76) ; Benton,

(Abridgment of Debates) (Vols 10 and 11) ; Congressional Globe, y 37th Congress, second session; Dewitt, impeachment and Trial of Andrew Johnson* ; Foster, Commentaries on the Constitution of the U. S.* ; Hildreth, his¬ tory of the United States) ; (House Reports of Committees 44, * 37th Congress, second session; Lalor, Cyclopedia of Political Science) (Vol. II) ; Moore, (History of Congress* ; Capers of American Historical Association (Vol. IV, pp. 145-177) ; Pomeroy, Constitutional Law> ; Wharton, (State Trials* ; North American Re¬ view (April 1905) ; American Year Book

(1913).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

47. THE PRESIDENT'S OFFICE. Ori¬ gin and Early Development. — In theory the king of England was the model for the Ameri¬ can chief executive. In fact, the framers of the Constitution were more influenced by such prototypes as the colonial governors and the official heads of the recently-formed States, but they did not make the chief officer of their <(more perfect Union® a mere figurehead. This was in keeping with the reactionary spirit that characterized the entire movement for a new constitution. Its leading delegates were deter¬ mined to have a single executive with adequate administrative powers. Having settled this point all the further details of the office required only careful adaptation and mutual compromise. The result formed such an important part of their labors that opponents styled the proposed frame of government ((a monarchical constitution® and largely centred their attack upon the ex¬ ecutive. But the ((Federalist Papers® of Ham¬ ilton and his associates, and popular confidence in Washington, unanimously designated as chief magistrate, largely overcame this opposition.

Washington strove to give the office a broad national basis, but even he could not render it non-partisan. Foreign complications and the controversies over finance caused him and Adams to adhere to the policy of the Federalists. Yet Washington never abandoned a certain judicial poise, even when his Cabinet became the centre of partisan strife, and Adams did not hesitate to incur party defeat in ridding his Cabinet of factional elements. Jefferson administered affairs as a frank and fairly suc¬ cessful party leader. Much of his success was due to his conversational and epistolary powers, to which Cabinet and Congressional majority alike yielded. Under his weaker successors the Congressional caucus nearly destroyed exec¬ utive independence. Our country was then struggling for full national recognition. Eng¬ lish traditions in regard to public service were still strong and the candidate for high office must show his peculiar fitness for it.ˆ Such factors, combined with the waxing spirit of

democracy, made mere tools of the weaker exec¬ utives or aroused factitious opposition against the stronger ones.

Jackson's great work was to restore the office to a co-ordinate position with Congress and the judiciary. Utterly lacking in definite train¬ ing, he was so thoroughly en rapport with dominant popular sentiment that he was able to force his will upon a hesitant Congress and to disregard Marshall's unacceptable decisions. He was aided in this result by the rise of the national convention, which destroyed the power of the Congressional caucus, and by the develop¬ ment of a party machine, based upon executive patronage and a subsidized press. The con¬ vention and party machine, however, made the future selection of second-rate party men al¬ most inevitable. The predominance of domestic problems after Jackson's administration gave Congress further opportunity to control na¬ tional policy. In some measure Polk showed how a successful war increased executive con¬ trol, but it was under Lincoln that the war powers of the President reached their highest development. His successor, Johnson, was un¬ able to maintain this high level and narrowly escaped conviction after impeachment by an encroaching Congress. The recurrence of do¬ mestic problems, largely of a materialistic type, gave Congress control in national affairs.

Recent Increase in Executive Power. — Cleveland ushered in a new group of strong executives, but he owed as much to the con¬ fusion of domestic politics as to his own native force. During his first administration Con¬ gress repealed the last of its restrictions upon the executive power of removal and estab¬ lished the succession to the Presidency upon its present basis. At the same time civil serv¬ ice reform and the tariff enabled Cleveland to assume a leadership that recalled the best efforts of Jefferson and Jackson. In his sec¬ ond administration he even challenged opposi¬

tion within his own party upon the issues of free silver and the tariff and startled the con¬ servative elements of the whole country by a new interpretation of the Monroe Doctrine.

Under McKinley our war with Spain served still further to emphasize executive leadership, especially in respect to new colonial posses¬ sions. The impetus thus given to executive power persisted in the problems connected with the Panama Canal and Latin America. Toward the latter our attitude has varied from a pro¬ tectorate in Santo Domingo to a recognition of equality in the A. B. C. powers. In every instance this action has followed executive initiative, occasionally in default of action by Congress or the Senate, but those bodies sub¬ sequently, albeit grudgingly, ratified the Presi¬ dent's action. Congress has even accepted without censure the existence of a state of war in Mexico and has tacitly followed the <(gen- tlemen's agreement® with Japan on the immi¬ gration question. Other measures of Wilson, Taft and Roosevelt, touching the Far East, involved a punitive expedition in China, the <(open door® in that country, intervention to end the Russo-Japanese War, the participa¬ tion in and withdrawal from Chinese loans and moral support to the Chinese republic. Much of the initiative in these affairs is due to the acquisition of the Philippines and to the neces-

sary increase in executive authority while work¬ ing out a colonial policy for those islands.

During the past 20 years the United States has gained greater influence in European af¬ fairs and a consequent increase in executive authority. American representatives were twice conspicuous at The Hague — on both occasions with hearty executive support. They even participated at the Algeciras Conference, al¬ though such action was contrary to traditional American policy. President Taft especially con¬ cerned himself to secure the adoption of arbi¬ tration treaties with the leading European na¬ tions, but was unable to overcome the opposi¬ tion of the Senate to any fancied abrogation of its privileges. His attitude in foreign affairs did much to assert an executive independence that he otherwise abandoned. Wilson, con¬ fronted with a world war that recalls the pre¬ vious contest against Napoleon, has handled the controverted issues thrust upon him with even greater freedom than his predecessors of a century ago and seems destined to open a new era in world diplomacy.

With a greater measure of executive con¬ trol in foreign relations has gone

an increasing leadership in domestic affairs. Both Roosevelt and Wilson have led their parties, although by divergent methods. Much of the popular de¬ mand for the reform legislation of recent years is due to executive guidance. The President has resorted more and more to direct popular appeal by voice and pen, and has thereby forced an unwilling Congress to carry out a party platform. He is thus becoming a real party leader, the one official chosen by the country at large, and chosen to carry out a definite party program, for which he assumes direct responsibility. President Wilson has shown this by reviving the custom of the two first Presidents in personally addressing both Houses of Congress; President Taft, by recom¬ mending a budget system for public expendi¬ tures. It is interesting to note that four of our recent Presidents, as well as Wilson, have in published works acknowledged this new mea¬ sure of executive responsibility, although when in office they assumed it in varying degrees of independence and by diverse methods. The office of the President, no longer a mere nega¬ tive influence in our government, has become a positive force for national guidance.

The Choice of President. — In the conven¬ tion of 1787 the question of selecting the na¬ tional executive presented numerous perplexities. The natural methods of choice — by the legis¬ lative assembly or by the people at large — were both rejected. The former was not in keeping with the rigid separation of powers that then seemed so necessary a doctrine, nor were the "Fathers® inclined to entrust the selection of so important an official to the general electorate. After passing over propositions to elect the Presidents by the suffrages of the State gov¬ ernors or by electors chosen by districts, the convention adopted an expedient suggested by the experience of Maryland. Each State should select Presidential electors equal in number to its senators and representatives. These electors, who supposedly would represent the intelli¬ gent people of the States, were to vote for two persons for President. A majority of all the electors would be necessary for a choice,

the one receiving the highest number of votes becoming President and the next on the list the Vice-President. By 1800 the chief defect in this plan was revealed in a tie vote for Jeffer¬ son and Burr. Presidential elections had al¬ ready become party affairs and this fact was registered in the speedy adoption of the 12th Amendment, under which the electors vote separately for President and Vice-President. By the original article of the Constitution the legis¬ latures of the various States were to determine the method of choosing the electors ; in the first election five legislatures did so without any reference to the people at large. By 1832 Delaware and South Carolina alone continued the practice and the latter held to it until 1860. In the election of 1876, the first in which it participated, Colorado also selected its electors through its legislature. Election by districts was

employed by Massachusetts in 1788 and by four States, in 1808. Maryland with the sporadic exception of Michigan, in 1892 was the last to abandon this system. After 1836 the practice of a popular choice of electors, upon a general State ticket, was in universal use outside of South Carolina. In 1845 Con¬ gress prescribed for the whole Union the pres¬ ent general election day. Since 1800 Presi¬ dential electors have been little more than re¬ cording agents in their respective States. To the States, however, the system gives a prom¬ inence and likewise a control in local suffrage that would be lost in an absolutely direct elec¬ tion. Occasionally the unpopularity of an in¬ dividual elector, or some technical objection to his qualifications, may cause a split in a State delegation. In a close election, such as that of 1916, this may cause uncertainty in regard to the general vote.

Following the change in the electoral col¬ lege came the Congressional caucus. This body, comprising the members of a given party in Congress, assumed the task of designating the candidates who should afterward receive the suffrages of the successful electors. At a period when party machines were new and unde¬ veloped and communication difficult this body exercised a potent influence, not merely in nam¬ ing the executive but in controlling his subse¬ quent policy. It thus violated the cardinal prin¬ ciple of separating the primary functions of government and was contrary to the growing spirit of democracy. In 1824 similar bodies in each State legislature broke the power of the national caucus but only offered a multitude of weak initiations in its place. During Jackson's ad¬ ministration the national convention composed of delegates selected by State district conventions became the acceptable method of naming Presi¬ dential candidates. It has so continued to our own day, although in the last two elections "Presidential primaries® under State laws have often been used to select party delegates. As yet neither of the leading parties has made a serious attempt to adopt a national primary law.

Technically the President is not chosen un¬ til the counting of the electoral votes in Febru¬ ary before the assembled Senate and House of Representatives. In 1800 an unsuccessful at¬ tempt was made to determine exactly what part each House should take in this ceremony, espe¬ cially in case of a contested vote. In 1865 a

question arose over the returns from the <(re- constructed® States of Tennessee and Louisiana. Congress hastily adopted the ((Twenty-Second Joint Rule,® which provided that each House should vote separately upon

disputed election returns. This joint rule was suspended in 1877 by the famous ((Electoral Commission,® con¬ sisting of five members from the Supreme Court and five from each House. This com¬ mission passed upon the returns of each State and by a party vote seated Mr. Hayes. In order that such a dispute might not recur, Congress in 1877 determined by law to accept election certificates issued by accredited State officers. Each State thus has the power to de¬ termine its own electoral vote.

The Presidential Succession. — The Vice- President, chosen in the same manner as the President, succeeds him in case of the latter's death, disability or removal. Five of the 28 Presidents have reached the higher office through their predecessor's death. The suc¬ cession was first regulated by the law of 1792, which provided that after the Vice-President the president of the Senate and in turn the speaker of the House might assume office for the sole purpose of ordering a new election. But during the intermission between two Con¬ gresses neither of these officials is in exist¬ ence. Accordingly this method was superseded by the Act of 1886, which provides that in case both the President and Vice-President die or are removed, the Secretary of State should succeed, and after him, in order of seniority, the other members of the Cabinet.

Powers, Obligations and Privileges of the President. — Since 1909 the annual com¬ pensation of the President has been $75,000, with special appropriations for the care of the Executive Mansion. In general the life of a President is characterized by a simple dignity, although Presidents Roosevelt and Taft recently confessed that their movements while in office were restricted by necessary precau¬ tions for their safety. The first two Presi¬ dents attempted a series of stately public cere¬ monials, which their successors wisely aban¬ doned. The President endeavors to keep in touch with public sentiment by frequent inter¬ views generally due to executive initiative, with those who are supposedly able to give him first¬ hand information. Of late the Presidents have made frequent lengthy tours over the country, both to learn general views and to guide such views, into particular channels. Moreover the President may be influenced in regard to popu¬ lar sentiment by the members of his Cabinet — his official advisers. But now the Cabinet offi¬ cial more frequently receives his views from the President than the reverse.

In the Constitutional Convention it was first proposed that the Cabinet should exercise a definite check upon the President but it was soon perceived that the power of the Senate over treaties and appointments was sufficient for this purpose. Washington consulted with his secretaries by letter, by personal interviews and in general meeting, but always reserved final decisions for himself. Jefferson at first affected a closer consultation with his Cabinet, with the idea of assuming only double weight in their joint

counsels, but found that he could not escape ultimate decision for himself. Jack¬

son frankly assumed a much more arrogant direction, and Lincoln, one as effectual, al¬ though pursued in a different manner. The present tendency is wholly in the direction of single executive responsibility in all affairs of great moment, although the President must entrust the multitudinous details of action to his subordinates.

The Act of 1789, creating the office of Secretary of State, gave the President the power to remove a subordinate without previously consulting the Senate. The only exception to the full exercise of this power occurred under the Tenure of Office Act, passed in 1867 to curb Johnson. Two years later the significant portion of this act was repealed and the re¬ mainder 3 March 1887. Although it served its purpose in affording a pretext to impeach Johnson, it never received judicial interpreta¬ tion. As head of the army and navy the Presi¬ dent exercises at all times an extensive ap¬ pointing power. The Constitution permits Con¬ gress to vest the appointments for some minor offices in the heads of departments or their immediate subordinates. About five-sixths of the 340,000 odd Federal offices are under civil service rules. About 10,000 of the more im¬ portant officials must be confirmed by the Sen¬ ate and it is over this patronage that the Presi¬ dent incurs trouble, if he does not give local influences due weight. Occasionally the Senate has requested additional information about the removal of an official before proceeding to con¬ firm his successor. Cleveland took the position that this was not in keeping with public interests and consistently maintained his point. Jackson used the power of removal in building up a per¬ sonal party machine, and his successors, in¬ cluding Lincoln himself, often had to follow his example. This abuse has been greatly cur¬ tailed since the passage of the Civil Service Act of 1883.

The President exercises a potent and in¬ creasing influence upon legislation. Legislative bills are frequently drafted by the departments directly interested in their passage. Certain attempts under Washington to have his Cabinet officers address the Houses directly were dis¬ couraged and not repeated. President Taft has expressed himself in favor of their appearance in Congress. The President exercises great in¬ fluence through his messages or addresses to Congress, his veto power, his enormous patronage and above all, through his more clearly recog¬ nized position as party leader. Here his in¬ fluence is both direct and positive. His veto power, a negative one, was copied almost ver¬ batim from the Massachusetts constitution of 1780. In theory it means that its exercise equals the votes of a sixth of the senators and repre¬ sentatives, but in reality it is far more potent. The first six Presidents made rare use of the veto. Jackson found it useful in reasserting the co-ordinate power of the

Presidency; Hayes used it to prevent <(riders® on appropriation bills ; Cleveland, more extensively than any other President, to defeat special pension legislation. The first two Presidents opened each Congress in person by a speech, and President Wilson has revived the practice with the published ap¬ proval of his immediate predecessor. These messages _ or addresses have often proved in¬ fluential in initiating legislation or in forcing

party issues. The growing power of admin¬ istrative interpretation also makes the executive influential in legislation, especially that of a fiscal character. The judiciary must depend upon the executive or his subordinates for the enforcement of its decisions and in cases when executive discretion is involved must often yield to his immediate control. This interde¬ pendence not merely maintains the chief magis¬ trate in a co-ordinate position, but frequently gives him temporary control of affairs. See Executive; Veto; Appointments to Office; Treaties; Cabinet and Cabinet Government; Federal Government; Constitutional Gov¬ ernment; Congress; United States — The New Democracy and the Spoils System.

Bibliography. — Beard, C. A., < American

Government and Politics> (rev. ed., New York 1914) ; Bondy, W., (The Separation of Powers' (in (Columbia University Studies,' Vol. V, No. 2, New York 1896) ; Bryce, James, American Commonwealth' (rev. ed., New York 1914) ; Fish, C. R., (The Civil Service and the Patron¬ age^ (Newr York 1905) ; Fairlie, J. A.,

Isaac Joslin Cox,

Northwestern University, Evanston, III.

48. THE VICE-PRESIDENCY. By pro¬ vision of the Federal Constitution, a Vice-Presi¬ dent of the United States i,s elected at the same time, for the same term and in like manner as the President by electors chosen in each of the States. A majority of the votes cast in the several electoral colleges is necessary to an election. The Vice-President is the president of the Senate, and in the event of an equal division in that body he gives the deciding vote. Under no other contingency has he a vote. The powers and duties of the office VOL. 27 — 31

1836; John Tyler, of Virginia, in 1840; George M. Dallas, of Pennsylvania, in 1844; Millard Fillmore, of New York, in 1848; William R. King, of

Alabama, in 1852; John C. Brecken- ridge, of Kentucky, in 1856; Hannibal Hamlin, of Maine, in 1860; Andrew Johnson, of Tennessee, in 1864; Schuyler Colfax, of In¬ diana, in 1868; Henry Wilson of Massachusetts, in 1872; William A. Wheeler, of New York, in 1876; Chester A. Arthur, of New York, in 1880; Thomas A. Hendricks, of Indiana, in 1884; Levi P. Morton, of New York, in 1888; Adlai E. Stevenson, of Illinois, in 1892; Garrett A. Hobart, of New Jersey, in 1896; Theodore Roosevelt, of New York, in 1900; Charles W. Fairbanks, of Indiana, in 1904; James S. Sherman in 190$; and Thomas R. Marshall in

1912.

Four Vice-Presidents were subsequently elected President, viz.: John Adams in 1796; Thomas Jefferson in 1800 and 1804; Martin Van Buren in 1836; and Theodore Roosevelt in 1904. The dates given have reference to the election by popular vote of the electors in the several States. Seven Vice-Presidents died in office, viz. : Clinton, Gerry, King, Wilson, Hendricks, Hobart and Sherman. In the Presidential contest of 1836 Martin Van Buren received a majority of the electoral votes for President, but no candidate received a majority for Vice-President. By constitu¬ tional requirement the duty of electing a Vice- President then devolved upon the Senate ; the candidates from whom such choice was to be made being restricted to the two who had re¬ ceived the highest number of electoral votes. One of these, Richard M. Johnson, of Ken¬ tucky, was duly elected by the Senate. The only Vice-President who resigned the office was John C. Calhoun. This occurred in 1832, and Mr. Calhoun soon thereafter took his seat in the Senate, to which body he had been elected by the legislature of South Carolina.

Five Vice-Presidents have, upon the death of the President, succeeded to the Presidency. The first President to die during his incum¬ bency of the great office was William Henry Harrison ; his death occurred 4 April 1841, just one month after his inauguration. The Vice- President, John Tyler, then at his country home in Virginia, was officially notified of the event, and upon reaching the seat of govern¬ ment at once took the oath of office as Presi¬ dent. There was much discussion for a time in and out of Congress as to his proper title whether ftVice-President of the United States acting as President" or <(P resident." The lan¬ guage of the Constitution, however, is clear, and it is no longer controverted that upon the death of the President the Vice-President be¬ comes in name as in fact — President. Upon the death of President Zachary Taylor, 9 July 1850, Vice-President Millard Fillmore succeeded to the Presidency, and was at a later date an unsuccessful candidate for election to that office. The third Vice-President who reached the Presidency by succession was Andrew John¬ son ; this occurred 15 April 1865, the day fol¬ lowing the assassination of President

Lincoln. President Garfield was shot 2 July 1881 and died in September of that year, when he was suc¬ ceeded by Vice-President Chester A. Arthur. Vice-President Roosevelt was the successor of

President McKinley, who died by the hand of an assassin in September 1901.

Two attempts have been made to secure the impeachment of the President ; — • the incumbent in each instance having been elected Vice- President, and succeeded to the higher office upon the death of the President. A resolution looking to the impeachment of President Tyler was introduced into the House of Representa¬ tives in January 1843, but being defeated no further steps were taken. Articles of impeach¬ ment for < (high crimes and misdemeanors® were presented by the House of Representa¬ tives against President Johnson in 1868. By constitutional provision the trial was by the Senate, the chief justice of the United States presiding. Less than two-thirds of the sena¬ tors voting for conviction, he was acquitted.

No constitutional provision existed until the adoption of the 12th Amendment for separate votes in the electoral colleges for President and Vice-President; the candidate receiving the highest number of votes (if a majority of all) became President, and the one receiving the second highest, Vice-President. In 1801 Jeffer¬ son and Burr each received 73 electoral votes, and by constitutional requirement the election at once devolved upon the House of Representa¬ tives, voting by States. Upon the 36th ballot, a majority of the States voting for Jefferson, he became President and Burr Vice-President. The constitutional amendment above indicated — by which separate ballots were required in the electoral colleges for the two offices — was the result of the intense excitement through¬ out the country engendered by this contest. The earnest opposition of Alexander Hamilton to Aaron Burr in the above-mentioned contest was the prime cause of the duel by which Hamilton lost his life at the hands of Burr, in 1804.

George Clinton, the fourth Vice-President, had as a member of the Continental Congress voted for the Declaration of Independence, and held the rank of brigadier-general during the War of the Revolution. The fifth Vice-Presi¬ dent, Elbridge Gerry, had been a prominent member of the Constitutional Convention of 1787. William R. King, elected in 1852, by reason of ill-health never entered upon the discharge of the duties of his office. By special act of Congress, the oath .of office was administered to him in Cuba and his death oc¬ curred soon thereafter. Of the 25 Vice-Presidents thus far elected, nine have been taken from the State of New

York. Adams and Jefferson, the first and second Vice-Presi¬ dents, rendered valuable service to the young republic at foreign courts, each by election was elevated to the Presidency, and their deaths oc¬ curred upon the same historic 4 July — just 50 years from the day they had signed the Decla¬ ration of Independence. A marble bust of each of the Vice-Presidents has been placed in the gallery of the Senate chamber. The office of Vice-President is one of great dignity. He is the presiding officer of the most august legis¬ lative assembly known to men. In the event .of an equal division in the Senate he gives the deciding vote. This vote, many times in our history, has been one of deep significance. It will readily be seen that the contingency may often occur when the Vice-President becomes

an important factor in matters of legislation. See als.o United States — Presidents and Vice-Presidents of.

R. C. McGrane, University of Cincinnati.

49. SPEAKER OF THE HOUSE OF REPRESENTATIVES. The Constitution of the United States provides that : ((The House of Representative's shall choose a speaker and other officers, and shall have the sole power of impeachment.® Even if the power to choose a speaker had not been expressly conferred by the Constitution, the House, as a legislative body, would have possessed the inherent au¬ thority to elect or appoint a presiding officer and such other officials as might be necessary to enable it to transact its business in an orderly and regular manner, and to make and preserve a record of its proceedings. As the Constitution does not prescribe the manner in which the speaker shall be chosen, the House itself must determine the mode of election, and, therefore, may order a vote to be taken in any way that will ascertain the choice of a majority, or the choice of a plurality, in case it shall have previously been determined that a plurality may elect. Although no rule has been adopted upon this subject, it is custom¬ ary to choose a speaker by calling the names of the members present who have filed regular credentials with the clerk, and by recording their votes in the journal. Pending the elec¬ tion, the clerk of the last preceding House of Representatives presides, and it is his duty to preserve order and decorum and to decide all questions of order, subject, however, to appeal by any member. The speaker is nominally elected to preside during the Con¬ gress then existing, but there is no constitu¬ tional or statutory provision, nor any rule of the House fixing the term of office, and, as he ' is merely an officer of the House, it would seem that he might be lawfully deposed at any time by the election of another to take his place. By statute, in England, it is pro¬ vided that, in case of a dissolution of Parlia¬ ment, the then speaker of the House of Com¬ mons shall continue in office until one shall be chosen by the new Parliament, and that, in case of his death, disability or absense from the realm during any dissolution or proro¬ gation, three of the commissioners of the House of Commons shall act for him in regard to the offices of the House. In this country, the office becomes vacant immediately upon the adjournment of Congress (see Congress of the United States), and there is no one au¬ thorized to act until a new speaker is elected by the next House, but as already stated, the clerk presides over the new House until a speaker is chosen. During the sitting of Congress the speaker may designate a member to discharge the duties of the office in his stead, but this substitution cannot extend beyond an adjourn¬ ment. In case of his illness, however, he may, with the approval of the House, make such appointment for a period not exceeding 10 days ; but, if he is absent and has omitted to make an appointment, the House eledts a speaker pro tempore.

The speaker is nominated and elected by the members of the party with

which he is affili-

ated, and the office is one of great political importance. His powers and duties differ in many respects from those appertaining to the office of speaker of the House of Commons, and he exercises much greater influence in directing the course of legislation and in politi¬ cal matters generally than the presiding officer of any other legislative body in the world. He not only presides over the deliberations of the House and preserves order and decorum, but until 1911 he appointed all standing commit¬ tees and all select and conference committees ordered by the House, and, inasmuch as the member first named on the committee becomes its chairman, the speaker determined who should occupy all those important positions. In con¬ stituting the important standing committees, chairmanships are always given to members of the speaker's political party, and this is also gen¬ erally the case in the appointment of select and conference committees. This power to appoint the standing and select committees is generally exercised by the presiding officers of legislative bodies in the United States, but it is not vested in the speaker (of the English House of Com¬ mons or in the speaker of the House of Com¬ mons of the Dominion of Canada. Originally the House of Representatives appointed all the important committees by ballot, and the speaker appointed only such as consisted of not more than three members, an arrangement which con¬ fined his power to control legislation, otherwise than by the exercise of his personal and official influence, within very narrow limits as com¬ pared with the present system.

Until 1911 the speaker was chairman of the Committee on Rules, which consisted of himself and four other members, who were appointed by him. All proposed action relating to the rules, joint rules and order of business had to be referred to this committee for consideration and report, and it, therefore, practically de¬ cided what legislative measures should be taken up for consideration in the House, when they should be considered, what time should be al¬ lowed for debate and what amendments, if any, should be offered and voted on. However, in 1909 an attack on the arbitrary power of the speaker was instigated when the Democratic leader, Champ Clark, moved that the speaker should appoint committees only as instructed by the House, and that the Committee on Rules be enlarged to 15 members, elected by the House and be instructed to report at the following ses¬ sion upon the entire subject of rules revision. The proposal seemed too drastic and the final result was a motion proposed by John J. Fitz¬ gerald of New York freeing members Some¬ what of the necessity of (seeing the speaker > before offering motions.® However, on 19 March 1910 the attack was

renewed by George W. Norris of Nebraska, who introduced a reso¬ lution to increase the Committee on Rules from 5 to 10, to provide for their election by the House and to exclude the speaker from mem¬ bership. This brought on a heated conflict, the Democratic and insurgent Republicans joining forces; but owing to a tactical mistake, Joseph G. Cannon, against whose arbitrary actions the resolution was mainly directed, weathered the storm. But in 1911 when the Democrats gained control of the House they signalized their vic¬ tory by stripping from the speaker the power

of appointment of all remaining standing com¬ mittees and vesting this function in the Ways and Means Committee subject to the ratification of the House. By so doing the House secured greater control of its affairs <(than it had exer¬ cised at any time since the Civil War.® The Committee on Rules has since been raised from 10 to 11 members.

The speaker must rise from the chair to put a question to the House, but he may state it sitting. There are four different methods of taking the sense of the House on a pending proposition: First, by the voices, the members who vote, in the affirmative saying ((Aye,® and those voting in the negative saying <(No.® If the speaker doubts, or if a division is called for, he directs those in the affirmative to rise from their seats and be counted, and after he has made the count and announced the number, those voting in the negative rise and are counted. If he still doubts, or if tellers are demanded by one-fifth of a quorum, the speaker designates two members, one from the affirma¬ tive side and one from the negative side, to count the votes for and against the measure and report the result to him. Even after all these methods are resorted to, if the yeas and nays are demanded by one-fifth of the members pres¬ ent, the speaker directs the clerk to call the roll, and the names of those voting are entered on the journal. It is frequently the case that the votes are taken in all these different ways upon the same question before the result is finally ascertained and announced.

When the House resolves itself into a com¬ mittee of the whole, the speaker leaves his place and designates a member to preside as chairman. In case of disorder in the committee, the regular practice is for the committee to rise by vote and report the fact to the House, but there have been occasions when the speaker, having knowledge of the disorder, has sum¬ marily resumed the chair and restored order without the formality of a vote by the com¬ mittee to rise and report.

It is the duty of the speaker to sign all acts, addresses, joint resolutions, writs, war¬ rants and subpoenas ordered by the House, and to decide all questions of order as they arise, subject to appeal by any member. Being a representative himself, he has the right to vote on all questions in the House and in com¬ mittees of the whole, but, under the rules, he is not required

to vote in ordinary legislative proceedings, except in case when his vote would be decisive or when the House is voting by bal¬ lot. When there is an even, or tie, vote, the question is lost, and the speaker, therefore, does not vote unless he is in favor of the measure. According to the general parliamentary law, the speaker has no right to speak except on questions of order, but, in the House of Rep¬ resentatives, he has several times participated in the debates without asking the consent of the House; and it is not unusual for him to speak and vote in committees of the whole.

He is required to take the chair on every legislative day at the time to which the House shall have adjourned at its last sitting, and, on the appearance of a quorum, it is his duty to cause the journal of the last day's proceed¬ ings to be read, having first examined and ap¬ proved it. Generally, however, the reading of

the journal is dispensed with by unanimous consent of the House. If no quorum attends at the hour of meeting, or if it appears at any time during the sitting that no quorum is present, he has no power to adjourn the House on his motion, as is the case in the English House of Commons. Under the Constitution, a majority of the House constitutes a quorum to do business, but it is provided that a smaller number may adjourn from day to day and may be authorized to compel the attendance of ab¬ sent members, in such manner and under such penalties as it may prescribe. Accordingly, it is provided by rule that 15 members, including the speaker, shall be authorized to compel the attendance of absent members, and, conse¬ quently, the House is not disabled and forced to adjourn because there is no quorum present.

The speaker has the power to appoint and remove for cause the official reporters of de¬ bates for the House, and he prescribes regula¬ tions for the admission of the representatives of the press to the reporters' gallery. He has also control over the hall of records and the unappropriated rooms in that part of the Capi¬ tol assigned to the use of the House. Under the statutes of the United States he appoints from the membership of the House three visit¬ ors to the Military Academy, three to the Naval Academy, a consulting trustee of the Reform School of the District of Columbia, two direct¬ ors of the Columbia Hospital for Women, three regents of the Smithsonian Institution and two members of the Memorial Association of the District of Columbia.

Since the organization of the government under the Constitution, on 30

April 1789, there have been 65 Congresses, but owing to the fact that in many cases the same person was several times re-elected to the office, there have been only 35 permanent speakers of the House. Of the 35, four were representatives from Massa¬ chusetts, four from Virginia, four from Ken¬ tucky, three from Pennsylvania, three from In¬ diana, two from New Jersey, two from South Carolina, two from Georgia, two from Maine, two from Tennessee, and one from each of the States of Connecticut, North Carolina, New York, Ohio, Iowa, Illinois and' Missouri. The speaker who held the position longer than any other was Henry Clay of Kentucky, who was elected six times ; but he did not serve six full terms, having resigned from the office twice before the expiration of the Congresses for which he had been chosen.

Under the Constitution, Congress may pro¬ vide by law for the case of removal, death, resignation or inability, both of the President and Vice-President, designating what officer shall then act as President, and, by a statute passed 1 March 1792, it was enacted that in such a case the president of the Senate, or, if there should be none, the speaker of the House, for the time being should act as President un¬ til the disability should be removed or a Presi¬ dent should be elected. This statute remained in force until 19 Jan. 1886, when Congress passed another act providing that in case of the removal, death, resignation or inability of both the Presi¬ dent and Vice-President, the Secretary of State, or, if there should be none, or in case of his re¬ moval, death, resignation or disability, the Secre- tarv of the Treasury shall act as President, and

that the right of succession shall pass next to the Secretary of War, then to the Attorney- General, Postmaster-General, Secretary of the Navy and Secretary of the Interior. The De¬ partment of Agriculture and the Department of Commerce and Labor had not then been created, and, consequently, the secretaries of these de¬ partments are not included in the act and they are not in the line of succession. Although the Act of 1792 remained in force for nearly 95 years, the contingency provided for never oc¬ curred. This was fortunate, for the country, because there were grave doubts as to its con¬ stitutionality, and, if the offices of both Presi¬ dent and Vice-President had at any time become vacant, the succession of the president of the Senate or the speaker of the House might have been seriously contested. The questions which would have arisen are: (1) Whether the word ˆofficer® used in the Constitution did- not mean an officer of the United States; and, if so (2) whether the president of the Senate and the speaker of the House are such officers or are only representatives of the States or the peo¬ ple, chosen by the two branches of Congress to preside over their deliberations.

Bibliography. — Follett, M. P., (Speaker of the House of Representatives)

(1896) ; Fuller, H. B., Speakers of the House) (1909) ; Hart, A. B., (Speaker as PremieU in Practical Es¬ says on American Government } (1894) ; Hinds, A. C., Precedents of the House of Representa- tives) (1907) ; McCall, S. W., (The Business of Congress) (1911); Reed, T. B., in North American Re¬ view (CLXIV, pp. 612, 641, 1897) ; < Manual of the House of Representatives) (1909).

R. C. McGrane, University of Cincinnati. 50. HISTORY OF ARBITRATIONS. International arbitration is a voluntary sub¬ mission of certain definite points in an inter¬ national dispute to the decision of a third party. (The decision of the arbitrator or court of arbi¬ tration is binding except wffien the award is outside of the points submitted, equivocal, im¬ possible, influenced by fraud or corruption, or a denial of justice). It is largely the outgrowth of the complex international relations of the 19th century which have resulted in a growth in the recognition of international duties and lia¬ bilities. From 1800 to 1900 there were 136 im¬ portant international arbitrations and many minor commissions.

The United States, pre-eminent in the ad¬ vocacy of arbitration between states, took the lead in several very important international ad¬ justments. She began her national existence with many unsettled questions, and as she set¬ tled them there arose many new problems de¬ manding solution. With a desire to substitute reason for force in settling disputes, she ac¬ cepted international arbitration as a prominent feature of her policy. Her arbitrations em¬ braced many kinds of international controversy, and many important questions of law, both public and private, some of which might have resulted in expensive wars.

I. The chief arbitrations of the 19th century to which the United States was a party can be only briefly summarized here.

With Great Britain. — Arbitrations with Great Britain were the most important. The first

cases arose under the Jay Treaty of 1894, articles 5, 6 and 7 of which provided for three mixed commissions: (1) To settle the identity of the Saint Croix River, which was specified in the treaty of 1783. The commission in 1798 decided upon the Schoodiac. (2) To decide what compensation, if any, was due British sub¬ jects who had been unable to collect debts in some of the States where the terms of the treaty of 1783 had been disregarded. The board of five arbitrators met at Philadelphia in

1797, quarreled and adjourned in 1798. The matter was finally settled by the treaty of 1802 which awarded Great Britain £600,000. (3) To settle

questions regarding contraband, rights of neutrals and prize court decisions. This com¬ mission met at London. There were several interruptions (and the disagreement of the Philadelphia commission caused a suspension from July 1799 to February 1802), but it com¬ pleted its work in 1804. Its work was very important in determining subsequent interna¬ tional law (q.v.).

After the cases wisely provided under the Jay Treaty, there followed a period in which the effects of European wars rendered arbitra¬ tion practically impossible, and produced an extraordinary train of circumstances which finally precipitated the Anglo-American War of 1812. Since that war every vexatious ques¬ tion which has arisen with Great Britain has been settled by arbitration in case direct nego¬ tiation failed. Articles 4, 5, 6 and 7 of the Treaty of Ghent of 1814 provided for three commissions or boards of arbitration: (1) To determine the title to certain islands in Passa- maquoddy Bay. At New York, in 1817, the board made its award, substantiating in the main the British claims. (2) To determine the northeast boundary of the United States, from the source of Saint Croix to the Saint Law¬ rence. The board met at Saint Andrews in 1816, and held its last meeting at New York in 1822, but reached no agreement. By a con¬ vention of 1827 the points of difference were referred to the king of the Netherlands, who, in 1831, proposed a compromise line which neither party was willing to accept. The mat¬ ter was finally settled by the Webster-Ash- burton Treaty of 1842. (3) To determine the

boundary through the middle of the lakes to the upper end of Lake Huron and then to the Lake of the Woods. The commission agreed upon the first part in 1822 and finally adjourned in 1827, leaving the boundary westward from Lake Huron through Lake Superior to the Lake of the Woods unsettled till the Webster-Ash- burton Treaty of 1842.

By the treaty of 1818 the question in dis¬ pute as to the obligation of Great Britain to return the slaves which she had in her posses¬ sion at the time of the signature of the Treaty of Ghent was referred to the emperor of Russia who in 1822 decided that Great Britain had not complied with the Treaty of Ghent, and that she should pay to the United States an indemnity. The mixed commission which was selected to fix the amount of compensation finally agreed on most points, but adjourned in 1827, its functions having been ended by the ratification of a convention concluded at Lon¬ don in 1826 by which the United States received

$1,204,906.

A convention at London in 1853 provided for a claims commission which ended its sessions in 1855, after giving important decisions regard¬ ing fishery rights and rendering awards in the famous McLeod and Creole cases. The reciproc¬ ity treaty of 1854 provided a commission to adjust disputes regarding fishermen which might arise under the treaty, but no resort was made to the stipulation. In 1855 a commission was organized to determine the reciprocal re¬ served fisheries rights, under the reciprocity treaty, wdiich had renewed the privileges re¬ nounced by the United States in the convention of 1818 as to in-shore places. The work was concluded in 1866.

In 1857 commissioners were appointed to de¬ termine the boundary under the treaty of 1846, there having been a disagreement in regard to the San Juan water boundary — as to the middle of the channel separating Vancouver's Island from the continent. They held six in¬ formal meetings in 1857 and finally disagreed. Discussion of the boundary continued until the Civil War, and was resumed in 1866. The Senate failed to vote upon the convention of 1869 for the submission of the question to the arbitration of the President of the Swiss Con¬ federation. Under the treaty of 1863 commis¬ sioners were appointed to settle the claims of the LIudson's Bay Company (q.v.) and the Puget Sound Agricultural Company arising under the Oregon treaty of 1846. In 1869 they awarded $450,000 and $200,000, respectively, to the companies, which in turn executed deeds relinquishing all claims.

The greatest arbitration treaty was that of Washington (1871) which provided for four distinct arbitrations: (1) The question of the San Juan water boundary was referred to the emperor of Germany who in 1872 rendered an award in favor of the American claim to the Haro Channel. (The boundary was fixed by protocol in 1873). (2) The American claims

for losses from Confederate cruisers of British origin (Alabama claims, q.v.) were referred to the Geneva tribunal, which in 1872 awarded $15,500,000 to the United States. (3) The claims and counterclaims growing out of the Civil War (outside of the cruiser claims) was referred to a mixed commission which in 1873 awarded Great Britain $1,929,819. (4) The

claims for American use of the northeastern fisheries (of Nova Scotia) were referred to a commission of three persons which met at Hali¬ fax in 1877 and awarded $5,500,000 to Great Britain.

Under a treaty of 1892, a commission was created to settle the Bering Sea controversy (q.v.) as to sealing. It met at Paris in 1893 and decided that the United States can claim no ex¬ clusive rights in sealing in Bering Sea

except within three miles of the coast of her territory, though it favored the American plea for the necessity of regulating pelagic sealing. Under the decision of this commission, there was created a new commission (1896) which awarded $471,151 to the Canadian sealers whose vessels had been seized. In 1897 the question of the boundary between Alaska and the British possessions was submitted to a board of arbi¬ tration. After considerable delay, the arbi¬ trators met at London (1903) and decided the

main points in favor of the American con¬ tentions.

There were two important Anglo-American cases in which a third party was involved: (1) Under a convention of 1889 between the United States, Great Britain and Germany, to settle conflicting interests in the Samoan Islands (q.v.), the nomination of the chief justice of the islands was to be referred to the king of Sweden in case the three powers could not- agree. In 1899 a joint high commission, which was sent to investigate the complications which had arisen, decided that a partition of the is¬ lands between the United States and Germany was the best solution of the problem. An agree¬ ment for partition was signed at Washington in December of the following year. (2) In 1890 the United States, Great Britain and Portugal agreed to submit to three eminent jurists, to be selected by the President of Switzerland, the settlement of a dispute caused by the seizure and the annulment of the charter (by Portugal) of the Delagoa Bay Railway, which had been constructed under a concession to an American.

Among the more important American arbi¬ trations with other nations in the century before 1900 are the following:

With Spain. — A commission, under article 21 of the treaty of 1795 with Spain provided for a commission which met at Philadelphia in 1 797— 99 and awarded $325,440 to the United States for depredations on American commerce before 1794. To settle spoliation claims arising after 1795 a commission was appointed in 1802, but the provisions governing it were rejected by the United States. Diplomatic relations which were suspended in 1805 were resumed at the close of the Napoleonic wars and resulted in the Treaty of Florida, in 1819, by which all claims were adjusted. In 1870, on the suggestion of Secre¬ tary Fish, the case of the Colonel Lloyd Aspin-wall, an American vessel seized near Cuba by the Spanish authorities, was submitted to a board of arbitration which met at New York in the same

year and awarded $19,702 to the United States. By an agreement of 1871 a mixed com¬ mission was created to adjust claims resulting from the Cuban insurrection. It met at Wash¬ ington and concluded its labors by February 1883. In 1885 the question of damages for wrongful seizure and detention of the American bark Masonic was referred to Baron Blanc, the Italian Minister at Madrid.

With France. — The United States and France did not succeed so well in settling their disputes by arbitration. In 1800 they agreed upon a convention for settling disputed claims for depredations after 1788. France did not carry out faithfully her part of the agreement, but in 1803 she concluded another convention providing a commission and the payment of claims. Subsequent depredations produced new claims which France delayed to pay. In 1831 these claims and French counterclaims were adjusted by a commission which awarded the United States an indemnity of $5,558,108. The delay of France- in paying led to a rupture of diplomatic relations, but through the media¬ tion of Great Britain in 1836 the claims were paid. In 1880 a board was created to adjust the claims growing out of the Mexican troubles of 1862—67, the American Civil War and the Franco-German War (q.v.). It completed its work in 1884 and awarded $612,000 to France.

With Mexico. — By the treaty of 1339 with Mexico, the adjustment of miscellaneous claims was submitted to a mixed commission, composed of two Mexican commissioners and an umpire (a citizen of Prussia). In the treaty of 1848 the United States and Mexico agreed to submit all disputes to arbitration, and in 1868 they provided for the settlement of all claims after 1848 by a joint commission which held its first meeting in 1869 and finally completed its work in 1876. The award was in favor of the United States ($4,125,622 in favor of citizens of the United States and $150,498 in favor of citizens of Mexico), but Mexico delayed final settle¬ ment, claiming that the award was unjust. Un¬ der the convention of 1889 (and in harmony with the arbitral boundary stipulations of the treaties of 1828, 1853 and 1882) a permanent board, called the International Boundary Com¬ mission, was established to determine questions arising from changes in the course of Rio Grande and the Colorado rivers along the boundary between the United States and Mexico.

With Venezuela. — In 1866 a mixed com¬ mission was created to settle American claims against Venezuela. In 1868 it awarded $1,253,- 310 to the United States. Fraud being charged, the claims were finally (1885) submitted to a second commission which in 1890 awarded $980,572 to the United States. Another claims case with Venezuela was that of the Venezuela Steam Navigation Company in 1892.

Among other cases arbitrated were the fol¬ lowing: Claims for the brig General Arm¬ strong in 1851 (with Portugal) ; Panama riot claims, in 1857-62 (with New Granada) ; claims for the brig Macedonia, 1858-63 (with Chile) ; claims for the United States and Paraguay Navigation Company, 1859 (with Paraguay) ; claims against Costa Rica, in 1860; claims against Ecuador, in 1862; Colombian claims of 1861 and of 1864; Peruvian claims, 1863 and 1868-69; claims for the steamer Montijo, 1874 (with Colombia) ; Pelletier and Lazare claims, 1884 (with Hayti) ; Bokkelen claims, 1888 (with Hayti) ; the Carlos Butterfield claims, 1888 (with Denmark); Chilean claims, 1892-94; the Santos claims, 1893-96 (with Ecuador).

The Russian seal cases, resulting from the seizure of four American vessels in Bering Sea, in 1891, by a Russian cruiser, was (by protocol of 8 Sept. 1900) submitted to the decision of an arbiter who in 1902 gave a decision award¬ ing $114,670 in favor of the United States.

In addition to submitting its own cases to arbitration, the United States through its offi¬ cials (the President and diplomatic representa¬ tives) in the latter part of the 19th century acted as arbitrator in several cases. She has acted as mediator in numerous cases, the most important being to secure an armistice between Spain and the several trans-Andean South American countries in 1871, and in adjusting a long-standing boundary dispute between Chile and the Argentine Republic in 1881. Her gov¬ ernment has often created tribunals, under her own statutes, to execute conventional obliga¬ tions and to settle questions of international relations.

In the same period there were many me¬ morials and petitions presented to Congress on the subject of international arbitration. In 1874 a resolution in favor of general arbitra-

tion was passed by the House. In 1888 the President and Congress received a communi¬ cation signed by 233 members of the British Parliament urging the negotiation of an arbi¬ tration treaty. In 1883 Switzerland proposed to the United States the inauguration of inter¬ national treaties providing for arbitration. The President of the United States assented to the proposal. In 1890 the Senate (the House con¬ curring) adopted a resolution in favor of arbi¬ tration. Negotiation between the United States and Great Britain for a general and permanent treaty of arbitration soon followed, and in 1897 a treaty was concluded and sent to the Senate by President Cleveland. President McKinley also urged its ratification, but it

failed to get the necessary two-thirds vote. Meantime a general treaty of arbitration for American re¬ publics, drafted at the first Pan-American Conference of 1889-90, lapsed and never was ratified. The United States, however, became a party to The Hague Convention, adopted at The Hague Peace Conference 29 July 1899, which resulted in the establishment of The Hague permanent court — the crowning event of the 19th century in arbitration.

II. The creation of The Hague Court marked the beginning of a new period of in¬ creased interest in arbitration. To this tri¬ bunal reference (voluntary or compulsory) of all questions of claims for arbitration was favored by the second Pan-American Con¬ ference (at Mexico, 1901-02). Its first case, the controversy between the United States and Mexico over the famous Pious fund of the Californias, was satisfactorily settled in 1902 and gave dignity to the court, attracting the confidence of other states and resulting in the early submission of other international disputes for its decision. Its next important case was the Venezuela trouble of 1903, in which four nations were involved, and which was sub¬ mitted to arbitration through the influence of President Roosevelt, who had prevented Ger¬ many's plans of using force against Venezuela. In 1910 it settled by arbitration the claims of the Oronoco company resulting from conces¬ sions annulled by President Castro of Vene¬ zuela — claims which had been arbitrated in 1903 but were resubmitted on the ground that the umpire had disregarded the terms of the protocol submitting the case for his decision and award. In the same year it made a satis¬ factory award in the Anglo-American North Atlantic Coast Fisheries controversy, involving an interpretation of the treaty of 1818, sub¬ mitted to it by special Anglo-American agree¬ ment of 1909.

The second Hague Conference (1907), called at the initiation of President Roosevelt, enlarged and strengthened the convention of 1899 for the settlement of international dis¬ putes. It provided that, in case either govern¬ ment party to a dispute should decline to arbi¬ trate when requested to do so, the other party might go directly to the bureau of The Hague Court and publicly request arbitration of the controversy. Through the influence of the American delegates it also drafted a convention which prohibited the use of force for collection of contractual debts from debtor nations be¬ fore an attempt at arbitration. It also strength¬ ened the provisions for the creation of commis¬ sions of inquiry and approved the principle of

obligatory arbitration. The American proposi¬ tion for a form of treaty for obligatory arbi¬ tration, stipulating that certain classes of con¬ troversies should go spontaneously (automati¬ cally) to The Hague Court, received the vote of 35 of the 44 delegations, but was opposed by Germany and four

other powers (Austria, Greece, Rumania and Turkey). The confer¬ ence also took another advanced step in voting unanimously for a regular international court of justice with judges in permanent service and holding regular sessions, but it failed to find a method of appointment of judges satis¬ factory to all the powers, great and small.

A Central American Conference which con¬ vened at Washington in 1907, largely through the influence and initiative of President Roose¬ velt, resulted in the foundation of a Central American court for the arbitration of questions of an international character affecting the rela¬ tions of the five republics.

New efforts for treaties of obligatory arbi¬ tration with stipulations for reference of con¬ troversies to the new Hague tribunal were remarkably successful — although Secretary Hay's general treaties of 1904-05, providing for arbitration of judicial disputes and questions of treaty interpretation by The Hague by special agreements by the executive without reference to the Senate, failed because of Senate amend¬ ment. No less than 51 such treaties were signed before June 1907, and the number after 1907 was increased by 1910 to about 80, of which 24 were negotiated by Secretary Root before January 1908, each providing for approval of special agreements by the Senate, and in Feb¬ ruary 1909 were all ratified by the Senate. These treaties, terminating after five years, provided for reference of questions of a judi¬ cial nature and those regarding the interpre¬ tation of treaties, but excluding questions affecting vital interests and honor.

The application of the principle of arbitra¬ tion in international relations was made in the establishment of two tribunals to decide con¬ troversies arising between the United States and Canada : one, a permanent international fisheries commission (by treaty of 1908) to set¬ tle fishing difficulties ; and tffe other an inter¬ national joint waterways commission (by treaty of 1909) for exercise of jurisdiction in cases involving the use, obstruction or diversion of boundary waters, and with authority to inquire and report concerning other matters of differ¬ ence or dispute along the frontier or to decide such questions as might be referred to it.

More comprehensive arbitration treaties with England and with France., providing for sub¬ mission to The Hague of all justifiable ques¬ tions arising from claims of rights under treaty or otherwise, and also the creation of joint high commissions of inquiry to which any contro¬ versy might be submitted for investigation and report before submission to arbitration, were signed in August 1911, but emasculated by the Senate in March 1912 and finally abandoned.

Secretary Bryan proposed that the principle of international commissions should be extended to all questions, with a provision that no war should be commenced during investigation. His plan was to supplement the arbitration treaties with a new set of agreements providing for commissions of inquiry (five members) to which all questions (after a diplomatic failure)

would be submitted for investigation and re¬ port, delaying for one year any preparation for hostilities or declaration of war. The plan was promptly approved by 31 nations but was inter¬ rupted by the World War in 1914 after a score of such treaties had been signed.

During the war the decline of national in¬ terest in arbitration treaties was coincident with an increasing interest in a League of Nations which became the dominating idea in the peace negotiations at Versailles in 1919, and which emphasized the necessity of an international court to execute international judgments and to maintain peace.

Bibliography. — Balch, T. W., international Arbitrations) (1896) ; id., (The Alabama Arbi¬ tration (1900) ; id., (A World Court in the Light of the United States Supreme Court) (1919) ; Darby, W. E., international Tribu¬ nal (1904) ; Johnson, W. F., (America's For¬ eign Relations } (1916) ; Malloy, W. M., trea¬ ties . . . between the United States and Other Powers, 1776— 1909> ; Moore, J. B., (History and Digest of International Arbitrations to which the United States has been a Party (1898) ; id., Principles of American Diplomacy * (1918) ; Wilson, G. C., the Hague Arbitra¬ tion Cases* (1915) ; Report of the American Historical Association (1891) ; Foreign Rela¬ tions, United States; American Year Book; In¬ ternational Year Book.*

James Morton Callahan, Professor of History and Political Sciences, West Virginia University.

51. GROWTH AND DEVELOPMENT OF LAW. The history of law, or the rela¬ tions pf members of society to one another and of all to the State, is a history of organic growth. Upon it various phases of political, social and economic activities of a people have left indelible traces. The history of American law is from the beginning somewhat complex, but it represents the development of legal prin¬ ciples in the feeble and scattered colonies of the 17th century into the diversified yet systematic body of law in force to-day in a nation whose inhabitants differ in their various needs as widely as they are distributed geographically. The heterogeneous character of administration in the various colonies, the organic change from British

colonies to independent states, the welding of the separate States into a na¬ tional union, the taking-over of certain legal powers and duties by the Federal government under the Constitution and the consequent growth of a Federal jurispru¬ dence, partly opposed and partly complemen- tal to that of the States, the addition of new Territories by conquest and purchase, each in turn becoming States under the Constitution, — all these have been factors in producing the differentiated body known as American juris¬ prudence. In order to understand the develop¬ ment of American law, its history may be divided roughly into four periods: (1) The period of settlement, extending through the 17th century; (2) The period of organization, covering the 18th century to the Revolution ; (3) The period of extension, from the Revolu¬ tion to about 1850, and (4) The period of mod¬ ern law and procedure from about 1850 to the present time.

The Period of Settlement (1607-1700). —

The year of the settlement at Jamestown, Va., was also the year of Calvin's Case (7 Coke's Reports, 17), which upon a state of facts quite disconnected from colonial matters laid down the theory of the English courts as to the posi¬ tion of dependencies. This was that English statutes did not bind dependencies, as parcels of the realm in tenure, unless they were specially named. At a later time in the cases of Blankard v. Galdy (2 Salk. 411) and Campbell v. Hall (1 Cowper, 204) this principle was more elaborately developed, and Blackstone lent to it the weight of his authority. That English subjects going to a new and uninhabited country carried with them, as their birthright, the laws of England existing at the time of colonization, was a sup¬ plemental corollary of the former principle. While such was the theory accepted by English courts, it does not follow that during the colo¬ nial period it was adopted in its entirety by the colonists themselves.

The English settlements in America varied so much in their origin and spirit that at first no general legal principles were con¬ sciously adopted. The early London Company which exploited Virginia had few purposes in common with the Puritans who aimed at a theocratic form of government in Massa¬ chusetts. Their different aims were apparent in the laws adopted for the regulation of the colonies. Nowhere were trained lawyers to be found among the early settlers, and the pro¬ fession of law was not only held in no esteem, but the lawyer was for a long time denied the privilege of practising for hire. This distrust of the legal profession was under the cir¬ cumstances not unnatural. Lawyers were a recognized caste in England. The common law of England in the early 17th century had become harsh in its methods, rigorous in its procedure, and technical in its practice. It was founded upon precedents which grew out of old social and religious conditions with which the emigrants not only had little sympathy but from which they had also sought to escape. The settlement of hitherto

unoccupied ter¬ ritories made necessary a new order of things in which were erected new institutions fitted to a scattered population, a rude society, and a simple economic system. All of the colonists had, however, as a part of their English birth¬ right _ and inheritance, certain deeply-rooted traditions which included a knowledge of and reverence for the great principles of the Eng¬ lish common law, which assured the fun¬ damental rights of person and property, which are the landmarks of English constitutional liberty. Familiar with representative gov¬ ernment, they brought with them belief in the adequacy of statutes as a means of bringing law into conformity with the needs of society. Moreover, some notion of the orderly arrange¬ ment of statutes into codes was not wanting to the settlers. At the beginning, therefore, de¬ pendence was placed upon statute law to the exclusion of judge-made law. Such dependence is to be explained by the new conditions in which the colonists were placed, their distance from the mother-country, and the absence of trained lawyers.

The radical differences in the character of the colonists were reflected in their statutory

enactments. The. theocracy of Massachusetts found expression in the Body of Liberties (1636) in which the Mosaic Code was adopted. 1 he Connecticut Code (1643) was similar. The early code of Virginia (1612) was exceedingly severe and it was modified soon after the col¬ ony had its own legislative assembly. The commercial spirit of the colony's promoters as¬ serted itself in the laws which aimed at the economic regulation of the colony. While the criminal codes, judged by the standards of the present, seem harsh, yet in comparison with the criminal law of England, they were mild, for while the laws of Connecticut specified 12 crimes for which the death penalty was pro¬ vided, there were more than 200 offenses pun¬ ishable by death under the English law. No other colony introduced a system of codes so all-embracing and modern in spirit as did Penn¬ sylvania, which by its frame of government and fundamental laws embodied the opinions of the most enlightened statesmen of the time with the modifications which experience had found necessary. In Maryland, owing to the continued disagreement between the proprietors and the people, no formal code of laws was in force. The colonists accordingly claimed that they were governed by the common law of England in so far as it was applicable to the local conditions existing. The proprietor op¬ posed this claim as in derogation of his rights and the controversy was not settled until well into the 18th century.

The almost universal adoption of codes which restated legal principles remained to be put in force by the colonial courts. The con¬ stitution of

these courts was as various as was that of the colonies. Everywhere the trial courts were presided over by men untrained in the law ; the procedure was of the most in¬ formal kind. Whether, as in Virginia, the County Court consisted of 8 or 10 gentlemen holding commissions from the governor, or as in Rhode Island, where the judges were elected annually by the people, there was little chance for a systematic declaration of the law based upon precedent. It is the universally accepted theory of American jurisprudence that the col¬ onists brought with them such parts of the un¬ written common law of England as was suited mutatis mutandis to the conditions of colonial life. No exact dates, however, can be set for a general reception of the common law. Where the colonial codes were silent the early colonial judges did not consciously draw upon English precedents for their decisions. Knowing little and caring less for the technicalities of the law and having no law books, they decided cases not covered by the codes according to the rules of substantial justice as between man and man, taking as in Massachusetts (1646) <(the words of eternal righteousness and truth as the rule by which all kingdoms and jurisdictions must render account," or, as in Virginia (1631) (< do¬ ing equal right to poor and to rich after their cunning, wit and power and after the laws and customs of the colony and as near as may be after the laws of England." While the systems of grand and petit juries were everywhere to be found, their powers differed from their Eng¬ lish originals; the respective provinces of the court and petit jury were not clearly defined. Contrary to the English practice, evidence was frequently submitted in writing; pleading was

according to no rule, and while the terminology of the common law was used, the precise mean¬ ings of legal phrases were overlooked. Pecu¬ liarly English provisions were modified or abro¬ gated. The theory of feudal tenures was abolished save in those colonies, as in Mary¬ land, where the proprietary system prevailed. Primogeniture had no existence in Massachu¬ setts, Connecticut or Delaware and the eldest son was given a double portion in lieu thereof. Appellate procedure was as informal as was that of the trial courts. Usually the method was by appeal to the governor and council, not upon reserved questions of law, but by a re¬ view of the whole case upon its merits. Ap¬ peals beyond the highest authority in the col¬ ony to the king in council were generally and successfully denied by the colonial governments.

In the founding of separate colonies, disT tinct in character one from another, by re¬ sourceful and self-reliant Englishmen were the beginnings of American jurisprudence. The ((wise and salutary neglect" of the mother-country did much to make early American law peculiar to itself.

Period of Organization (1700-1776). —

During the 18th century and prior to the Revo¬ lution, law and procedure tended toward a common type in all the colonies. The causes of such a change from the variant beginnings of the century previous were not only political, but social and economic. Increase of popula¬ tion by immigration, mostly from England and by natural increase, added wealth, growth of towns and better facilities of inter-communica¬ tion rendered the crude administration of the earlier period insufficient for colonial needs. The revocation of colonial charters and the or¬ ganization of Crown colonies led the way to greater uniformity of administration. Com¬ mon grievances started a national feeling. All of these forces aided in creating a common public sentiment which found its expression in law either directly through legislation or indi¬ rectly from the bench. During this period were laid the foundations of a later constitutional law. Every inhabitant of a charter colony was interested in the legal proceedings in England concerning the charters, in which were in¬ volved definite and fundamental principles of public law. Furthermore, sentiment in these colonies agreed that if a colonial legislature enacted laws not in accordance with the powers granted by charter, the act was void. Familiar¬ ity with colonial charters bred a belief in the wisdom of written constitutions; and the prac¬ tice of declaring void all legislative enactments in conflict with charter powers assisted in build¬ ing up the later theory of constitutional limita¬ tions, State and Federal.

As a part of the political education of the period was the growing conviction, long held by Maryland, that the common law of England, modified in certain matters by Parliamentary enactments, was the supreme law ; that it was one and the same for each colony and that by means of it everyone was guaranteed in his rights as an Englishman. Appeals to England, which at an earlier time had been discouraged, were now claimed as a matter of right, so that if a colonial court failed to declare the law in accordance with the common law, an English court of appeal I^ad jurisdiction to remedy the error. As the judges in the Crown colonies

were appointed during good behavior and tended, therefore, to hold to prerogative, their decisions in matters of public right were apt to be unpopular.

The appearance of trained lawyers and the removal of the ban placed upon the legal pro¬ fession had much to do with the change in pro¬ cedure. Local prejudices and slip-shod methods of practice gave way before a regulated system based upon the common law. Not until the second half of the 18th century, however, was the American lawyer a person of great public influence. The generation which stood for polit¬ ical independence

and furnished men of affairs was one of lawyers. English lawbooks and re¬ ports were imported. Procedure was copied from that obtaining in the English courts. Pleading according to the rules of the common law was introduced with all the old techni¬ calities.

Holding by commission from the Crown, the colonial governor assumed to a greater or less extent the functions of a chancellor and gave relief in equity. As the governor derived his chancery powers from the king, recourse to him was never popular. While in England equity had become an independent system under the chancellorship of Lord Hardwicke (1736-56), in the American colonies the chancery courts re¬ mained in a rudimentary state. In every colony, however, there was a court having a semblance of chancery powers. Pennsylvania adopted in her early codes a system unique in the history of jurisprudence, in that in the courts of the colony, having both law and equity powers, equitable rights were administered under com¬ mon-law forms.

The period may be characterized as one in which courts were organized as far as possible like those of England, rendering decisions ac¬ cording to the common law, introduced by lawyers and welcomed by the people as a part of their liberties. The uniform character of the common law superseded local custom as far as practicable, v/hile the earlier colonial codes cov¬ ering many matters of criminal law and neces¬ sarily local economic regulations remained in force.

The Period of Extension (1776-1850). —

The legal changes entailed by the War of Inde¬ pendence were largely of a constitutional char¬ acter, a discussion of which is beyond the scope of the present article. The ideas of which the Revolution was the outgrowth contributed vastly to the development of an American juris¬ prudence sufficiently distinct from that of Eng¬ land and of the later colonial period as to be a separate system. Speculative writers like Montesquieu, Burlamaqui and Vattel exerted an influence which was apparent not only in matters of constitutional organization but also in the habits of thought of the American bar. Of the 56 signers of the Declaration of Inde¬ pendence 35 were lawyers. The American na¬ tion began not so much with the promulgation of a revolutionary manifesto as by a declaration of principles of natural law, the fruit of Amer¬ ican legal minds. It is of no little significance that more copies of Blackstone's Commen¬ taries^ the first systematic exposition of Eng¬ lish law, were sold during the 18th century in America than in England.

Independence brought about a change in the fundamental organization of every State.

Each adopted a written constitution or (as in Rhode Island and Connecticut) continued in force its colonial charter as a sufficient declara¬ tion of constitutional matters, and in each it was necessary to construe them. Experience and theory left such construction to the courts and the supreme rule which guided was that of the common law. In every State varying writ¬ ten constitutions construed according to the principles of the common law tended to the formation of fairly uniform ideas of constitu¬ tional law. The Federal Constitution provided what the Articles of Confederation had almost completely lacked. The courts authorized by the Constitution acquired jurisdiction not only of constitutional questions, disputes between States and admiralty matters, but also, within certain limitations, of cases wherein citizens of different States were parties. Both the Articles of Confederation and the Constitution provided that full faith and credit should be given to the proceedings of a State court by the courts of every other State and an essentially national character was impressed upon American juris¬ prudence. Thus, while the Federal courts had exclusive jurisdiction in certain cases (a power which the decisions of Chief Justice Marshall greatly increased), the division was not as be¬ tween matters of purely public and those of private law. All the courts, State and national, became necessary and component parts of one symmetrical system, in which there was one ap¬ proximately uniform mode of procedure, that of the common law of England, consciously adapted to American needs. Judges appointed by popu¬ larly elected governors or elected directly by the people, decided questions of law and equity pre¬ sented by lawyers who had little of the class traditions of the English barrister. The Amer¬ ican lawyer was from the first amenable to democratic influences. The requisites for ad¬ mission to the bar were determined by State laws and not by slavish adherence to the tradi¬ tions of the Inns of Court. The lawyer know¬ ing no distinction between barrister and attor¬ ney, as obtained in England, gave advice to clients and tried their cases himself ; he was not a member of a caste but of a more or less demo¬ cratic society. The position which he assumed was one in which activity in politics was ex¬ pected as well as accessibility to clients in mat¬ ters more particularly concerning his profession. The influence of the American bench and bar has generally been to assist in making law to conform to social needs, or, in other words, in the democratization of law.

When the American colonies became inde¬ pendent, each was governed by (l).the common law of England, in so far as each had tacitly or expressly adopted it as suited to local needs; (2) those English statutes which were amend¬ atory of the first; (3) the colonial statutes and (4) such customs as were peculiar to Amer¬ ican conditions and incorporated in judicial de¬ cisions. In order to give authority to these earlier laws, nearly all of the original 13 States formally adopted them either by a constitutional

provision, ˆas in Delaware (1776) and New York (1777), or by legislative enactment as in Pennsylvania (1777). The method of adopting English statutes was by no means uniform. Vermont recognized the statute laws of Eng¬ land as existing prior to 1760, in so far as they were not repugnant to the constitution and laws

of the State. The beginning of the American Revolution (19 April 1775) was the date set in New York, and English statutes locally ap¬ plicable and enacted prior to that time were declared in force. In Pennsylvania only those English statutes which were admittedly valid during the colonial period were continued. The Virginia convention of 1776 adopted the common law and English statutes of a gen¬ eral nature which had been enacted prior to 1607. This action was taken as a prece¬ dent in the first extension of law over ter¬ ritory belonging to the Federal government. The United States adopted the language of Virginia and extended the common law under the same limitations to the Northwest Terri¬ tory. The Ordinance of 1787 was the 'founda¬ tion of the jurisprudence of the states carved out of Federal territory. In Michigan, while the English statutes were afterward expressly repealed, the substance of them was re-enacted and to prevent any confusion as to what system of law existed, the old Coutume de Paris, once in force when Michigan was a French posses¬ sion, was declared abrogated. In Louisiana a different policy was followed. The Territory of Orleans, afterward the State of Louisiana, formed the most populous portion of the Lou¬ isiana Purchase. French in spirit and tradition, its institutions had been developed according to French ideas modified somewhat by Spanish in¬ fluence. The civil law of France and Spain was continued in force. Thanks largely to the influence of the code prepared by Edward Liv¬ ingston, who had in turn been influenced by Bentham', Louisiana is the only State of the Union whose jurisprudence is not based upon the common law. In the other States of the old Louisiana Purchase, the common law was adopted, as was proper according to the theory of the extension of law over territories hitherto uninhabited. In all the Western States, formed out of territory originally Mexican, the practice was the same and in all of them the common law is presumed to exist. While common-law powers were given to the courts in their en¬ tirety, in no State was there created an equity court having the full and complete jurisdiction which such a court had in England. Chancery courts, when created by legislative enactment, have had their powers conditioned and circum¬ scribed by the law creating them.

The Period of Modern Law and Procedure (1850 to the Present). — The

theory of Ameri¬ can government is that the state and the people are one. In nothing has this theory produced more definite results than in law. This is true not only in positive legislative enactments made by the people's representative 'but in the indirect legislation of the bench, formulated by judges, the servants of the people. While it is the theoretical function of a judge to declare and not to make law, he may be a potent factor in bending old law to new needs. The irresistible tendency toward universal suffrage and the enormous increase in population which char¬ acterized the middle of the 19th century, at once left marks upon law and procedure. The States of the Middle West, which drew a large share of their inhabitants from Europe, entered upon an era of constitution-making. In these new expressions of fundamental rights, the Middle States put aside traditions, according to which their first constitutions had been framed, and

built upon a democratic basis. The statutes, which up to that time were of comparatively small bulk, were revised and put into codes. Some States (for example, Ohio, Indiana and Iowa) abolished all common-law offenses and rebuilt their systems of criminal law upon a statutory basis. Impatience was felt at the technical methods which the courts had used and the adoption of the Reformed Procedure was the expression of this dislike.

In 1848 David Dudley Field, an eminent lawyer of New York, succeeded in having the legislature of that State adopt a code of civil procedure which effectually broke away from all tradition and aimed at the simplifying of civil pleading and practice by the abolition of all distinctions between actions at law and in equity. According to the reformed theory, there is but one form of action, based upon a complaint containing a simple statement of the facts constituting the grievance for which re¬ dress is asked in a judgment settling the rights, whether legal or equitable, of all the parties to the action. This theory was well calculated to appeal to the imagination of democratic commonwealths; one after another State adopted the New York plan as a whole or in part, and the Reformed Procedure is now in force in all but a few of the States. This sys¬ tem was, so far as pleading was concerned, an entirely new idea; it was neither a modification of the common-law method nor an adaptation of the various forms of equity pleadings. The Code furnished its own rules for the construc¬ tion of pleadings upon its own peculiar prin¬ ciples. Whether or not the Reformed Procedure as in force in many States has resulted in sim¬ plicity is a question for legitimate difference of opinion. In some jurisdictions the constant tinkering with the laws of practice and proced¬ ure by the legislature has rendered that branch of the law so uncertain that probably more than one-half of the questions of law presented to courts of appeal are upon questions of trial or appellate procedure.

The second half of the 19th century was marked by . stupendous

development in in¬ dustrial enterprise. Steam and electricity revo¬ lutionized the forces of production and dis¬ tribution, and necessitated the employment of vast combinations of capital. Substantive law, as expressed in statute and decision, has fol¬ lowed sometimes closely, sometimes lagging behind, this industrial and commercial evolution. Contracts, once a small part of the body of law, now occupy a position once undreamt of. In¬ sistence upon the form of a contract has given way to reasonable interpretation of its matter, viewed according to the changing conditions of commerce and trade. Corporations, once cre¬ ated only by the express favor of a sovereign, were given a new character such as modern society and its industrial enterprises demanded. But 200 private corporations were organized in the United States prior to 1800, and of these a dozen only were designed to engage in manu¬ facturing. Limitations upon the States, declared by the decision in the Dartmouth College Case (1819), were to a large extent overcome by subsequent State constitutional . amendments. Capitalistic production with its consequences created anew the purpose and idea of a private corporation. Individuals, none of whom had at command sufficient capital to float a large enter-

prise, joined their funds and in their associated capacity received as a matter of right a charter from the State. The charter, the powers of which were limited by the law of its authoriza¬ tion, at first special and afterward general, gave the corporation a personality having cer¬ tain rights. As a consideration for these rights, the corporation assumed certain statutory bur¬ dens and regulations. Unless by the express or implied authority of its charter, a corpora¬ tion cannot engage in business outside of the jurisdiction creating it. In other States it is a foreign corporation. As such, the other States may stipulate the conditions under which it may enter to do business. Here the Federal Constitution steps in. Under it Congress has the power to prescribe rules for the regulation of interstate commerce. The organization of rail¬ way systems extending through several States and the increase in production of large manu¬ facturing corporations, selling their output in many States, have given opportunities for na¬ tional legislation. The diverse citizenship of corporations and the large interests represented by them, as well as the limitations placed upon the States by the 14th Amendment, have brought a constantly increasing number of cases into the Federal courts. Thus the American law of corporations, a compound of national and State legislation and of Federal and local de¬ cisions, is of increasing bulk and variety, and no subject of the law has grown into greater importance.

The doctrine of judicial review, first au¬ thoritatively set forth by Chief Justice Marshall in Marbury v. Madison (1803), was expounded and

amplified by Thomas M. Cooley in his Constitutional Limitation (1868). This work had an almost unrivaled influence upon bench and bar. The courts, at least until the close of the 19th century, were generally under the domination of the doctrines of natural rights and laissez-faire. With the increasing sphere of legislative activity in Congress and in the State legislatures, based upon newer concep¬ tions of social justice, there frequently ap¬ peared .decisions by the courts, Federal and State, which many regarded as reactionary, and even as usurpations of power. Justice Holmes in several dissenting opinions of the United States Supreme Court has strikingly emphasized the true function of the judiciary. It would seem that in recent years courts have been more conservative than formerly in de¬ claring statutes unconstitutional.

Increasing attention has been paid during the present century to improvement in the form of the statute law. Many States, realiz¬ ing that legislative activity is still on the in¬ crease, have sought to remedy the traditional crudities of expression and to improve the technical quality of the statutory law by the establishment of legislative reference and law¬ drafting bureaus. It is too early, however, properly to appraise the influence of these agencies.

Earlier diversities of law among the various States produced great confusion, particularly in the field of commercial law. As a result of the efforts of the Commission on Uniformity of Legislation, an instrumentality working with and encouraged by the American Bar Associa¬ tion (established in 1878), a uniform Negotiable Instruments Act has been adopted by all the

States and Territories except Georgia and Texas. Uniform warehouse receipts, stock- transfer, bills of lading, sales and partnership acts, prepared and advocated by this commis¬ sion, have been adopted by many States. This body of uniform State laws is increasing yearly and its influence may well be to develop a new common law, wherein identical statutes will give rise to uniform interpretation.

The noteworthy tendencies in American law at the present time are, (1) the constantly widening sphere of government, State and Federal, away from laissez-faire and toward collectivism and State interference, motivated by a new sense of social justice and not by in¬ dividualistic natural rights, and effected by the statutory enlargement of the police power by the States, and by what is in effect a Federal police power exercised under the guise of power over interstate commerce; (2) the in¬ creasing adoption of uniform legislation in mat¬ ters affecting business; (3) the progressively increasing area of statutory law, Federal and State, by legislative assemblies and by popular initiative and referendum ; (4) the confusion between purely

constitutional and properly statutory matters; (5) the modified concep¬ tion of the judicial function, and (6) simplifi¬ cation and settlement of judicial procedure.

For nearly two centuries and a half after the English colonies were planted in America, American jurisprudence changed gradually, keeping in harmony with the political and social conditions of the colonies and States, Then with a great wave of immigration and far- reaching industrial changes and the occupation of a continent from ocean to ocean, American jurisprudence set itself to meet the needs of a modern and complex society. The result has been an enormous product of legislation and a much bulkier output of decisions from the Fed¬ eral and State courts. A system of law, to be sound, must have an orderly development; it must be progressive and not revolutionary. Many of the changes which have taken place in America have likewise been adopted in England and for the same reason as in this country. Since 1875 the English procedure has been sim¬ ilar to the American. Both the English and American systems of jurisprudence are, there¬ fore, parts of one great system, based upon the common law of England and built to satisfy the requirements of a modern commercial and in¬ dustrial society, wherein personal freedom has the greatesj possible play. Its idea of personal right is its heritage from the common law. See also various articles under Law.

Bibliography.— (Two Centuries' Growth of American Law} ; Kent, ; Pomeroy, (Equity Jurispudence and 'Remedies*; Fisher, (Evolution of the Consti¬ tution of the United States) and Administra¬ tion of Equity through Common Law Forms) ; Reinsch, 'English Common Law in the Early American Colonies* ; Hilkey, (Legal Develop¬ ment in Colonial Massachusetts) ; Sioussat, 'English Statutes in Maryland*; Field, 'Law Reform in the United States) ; Wilson, Courts of Chancery in America) ; American Bar*

Association, (Annual Reports > ; Conference of Commissioners on Uniform State Laws, (Annual Proceedings) ; Roscoe Pound, various articles in the Harvard Law Review and else¬ where; Freund, (Standards of American Legislation^; Baldwin, (American Judiciary; Warren, (History of the American Bar.**

Jesse S. Reeves,

Professor Political Science, University of Michigan.

52. RAILROAD TRANSPORTATION. The American Railway System. — The con¬ struction of railroads in the United States be¬ gan on a small scale in 1828 when the Baltimore and Ohio built its first mileage. The Charles¬ ton and Hamburg began constructing some mileage in South Carolina in the following- year, and in 1830 the Mohawk and Hudson, the parent company of the New York Central sys¬ tem, began construction. The work under¬ taken by these pioneer railroads proceeded so slowly at first that in 1830 but 23 miles of line were in actual use. During the following de¬ cade other lines, radiating from the various North Atlantic seaports, were begun, so that by 1840, 2,818 miles of line had been completed. Railroad promoters still had difficulty in ob¬ taining the necessary construction funds. They had to depend largely upon local communities and business men who desired improved trans¬ portation rather than upon investors and finan¬ ciers. The practical feasibility of railroad transportation had not been demonstrated to the satisfaction of the investing public. During the decade 1840 to 1850 the construction of railway mileage progressed slowly to 9,021 miles, and was confined largely to the Atlantic seaboard section. It was not until the last two years of the decade that railroad construction began to progress rapidly. The gold discoveries in Cali¬ fornia caused an unusual demand for overland routes to the West; they directed the attention of the seaboard population to the resources of the interior; and they were instrumental in solv¬ ing the money stringency which had hampered construction. The construction engineers' field of action was shifted mainly to the Central West. Private speculation was rampant; many States, cities, counties and townships offered aid to railroad companies more freely than in early years; even Federal aid, offered indirectly through the States, became a substantial factor in railroad building. Business prosperity pre¬ vailed throughout the country, carrying with it a demand for improved transportation facilities. By 1860 a combined system of 30,626 miles had been completed.

The Civil War interrupted line construction in the country as a whole, but gave a special stimulus to the building of a transcontinental line to the Pacific Coast. The beginning of the Union-Central-Pacific line during the war was due in large part to the urgent desire on the part of many public men to bind the far west¬ ern territory to the Central West and East. They were actuated by rumors to the effect that the Pacific Coast section was threatened with annexation to Canada. Before this line was completed other transcontinental lines were un¬ der way. During the years 1867 to 1873 railroad construction forces were unusually active throughout the Trans-Mississippi Valley and the far West. The railroad mileage of the United States as a whole was increased by

33,000 miles. An interruption then accompanied the financial and industrial crisis of 1873, the crisis having in fact been brought on largely

by excessive railroad capitalization and too rapid construction of new mileage. In 1880 railroad construction again began to progress rapidly. The railroad system advanced from 93,267 miles in 1880 to 163,597 in 1890, over 70,000 miles be¬ ing completed in a single decade. During the following decade 29,749 miles were added. The long extended business and financial depression beginning in 1893 and the over-construction of the preceding decade brought the work of many construction gangs and promoters to a halt. More progress was made during the decade end¬ ing in 1910 when 46,947 miles were completed, but since then railroad construction funds have been directed more largely to the improvement and building of terminals, sidings, additional tracks and operating facilities than to the build¬ ing of more mileage. Single-track mileage ad¬ vanced from 240,293 miles in 1910 to 252,231 in 1914; the coming of war conditions then be¬ came a factor. On 31 Dec. 1917, the last date for which complete mileage figures are pub¬ lished, the country's single-track mileage ag¬ gregated 253,626 miles, exclusive of switching and terminal companies. On 31 Dec. 1916 rail¬ road trackage in the United States, included sec¬ ond, third and other tracks as well as single- track mileage totaled 397,014 miles. In 1913 the whole of Europe had approximately 215,000 sin¬ gle-track miles of line, and the entire world, ex¬ clusive of the United States, had about 430,000.

Equipment and Personnel. — At the closing of the calendar year 1917 it was officially re¬ ported that the railroad companies operating this mileage were equipped with 2,568,374 cars, of which 2,409,548 were in the freight service, 55,939 in the passenger service and 103,916 in company service. In addition the Pullman Com¬ pany owns over 5,000 sleeping, tourist, parlor and other specialized passenger service cars, and on 1 Jan. 1913 137,179 privately owned freight cars were in use throughout the United States. The number of locomotives in service on 31 Dec. 1917 totaled 66,070. There has been a steady tendency to increase the capacity of freight cars and locomotives in the United States. The average capacity of freight cars in the United States now exceeds 41.3 tons as com¬ pared with 14.5 tons in Germany where the av¬ erage capacity is the largest in Europe. Many American cars in the coal and ore trade have a capacity ranging from 50 to 65 tons and some exceed this figure. The average weight of Ger¬ man locomotives before the war was 52 tons, excluding tender, while the average weight of locomotives, including tender, in the United States is close to 90 tons. During the 10 years ending in 1916 the average number of tons per train in the United States has advanced from 344 to 535 ; the average number of tons per loaded car from 18.9 to 22.4; the average number of freight cars per train from 26ˆ4 to 34.9 and of loaded freight cars per train from 18.2 to 23.4. The railroad companies in operating the railroad system during the calendar year 1916 employed an

average of 1,700,814 employees and paid $1,506,961,000 in wages and salaries. In 1917 Class I lines, i.e., those having a yearly op¬ erating revenue exceeding $1,000,000, employed an average of 1,732,876 employees who received a total compensation of $1,739,482,000.

Railroad Capitalization. — The magnitude of the American railroad system is further por¬ trayed by its huge capitalization. The total par value of railroad capital outstanding in 1917 was $20,247,659,000. The proportion of this representing watered securities cannot be ac¬ curately stated, as current statistics of market value are not published and the work of valua¬ tion undertaken by the Interstate Commerce Commission is far from completion. On 1917 investment in road and equipment, representing the book values reported by the Class I and II railroads, amounted to $18,423,235,000. An ac¬ curate comparison cannot, however, be made be¬ cause of inaccuracies occurring in book values before the commission prescribed a uniform ac¬ counting schedule for investment in road and equipment. The dividends declared by the rail¬ road companies, excluding switching and termi¬ nal companies, in 1917 totaled $381,852,000 or 6.81 per cent on the dividend-yielding stock. Over 36 per cent of the capital stock of Ameri¬ can railroads, however, was not paying any dividends whatever. Railroad dividends reached their maximum in 1911 with $460,195,000 and an average rate on dividend-paying stock of 8.03 per cent.

Revenues and Expenses. — The operating revenues of the railways operated under gov¬ ernment control in the calendar year 1918 reached the astounding total of $4,913,320,000. Of this, $3,450,094,000 consisted of freight reve¬ nues, $827,219,000 of passenger revenues and the remainder of mail, express, miscellaneous trans¬ portation, incidental and point facility revenues. Although these operating revenues were greater than during previous years, expenses under¬ went a more rapid increase and caused a heavy reduction in net operating income. Operating expenses of the lines under government con¬ trol rose from $2,858,212,000 in 1917 to $4,006,- 895,000 in 1918. After these expenses, and also tax accruals (other than war taxes), uncollect¬ ible revenues, equipment rents and joint-facility rents were deducted there was a balance or net operating income of but $690,419,000 in 1918 as compared with $974,779,000 in 1917. There was a deficit of about $210,000,000 below the stand¬ ard return guaranteed by the government under the Federal Control Act. It is this reduction of net income that so greatly complicates the re¬ turn of the railroads by the government to the railroad companies and the adoption of

a satis¬ factory governmental policy. The average rates of operating expenses to operating reve¬ nues or ((operating ratio,® advanced from 70.5 per cent in 1917 to 81.5 per cent in 1918.

Railroad Traffic. — The freight traffic of the railroads operated under government control measured in ton-miles, advanced slightly from 427,342,924,000 in 1917 to 434,997,928,000 in 1918. A total of 1,264,016,000 tons of freight were carried in 1917, 57.96 per cent of which con¬ sisted of coal, ore, coke, sand, stone and other mine products, 15.27 per cent of manufactured products, 8.28 per cent of agricultural products, 7.98 per cent of forest products, 2.52 per cent livestock and animal products, and 7.99 per cent of miscellaneous commodities and general mer¬ chandise. The large proportion of heavy, bulky commodity traffic is one of the striking differ¬ ences between the freight traffic of American and European railroads. So also is the long average haul per ton of freight which was 312.07

miles for Class I railroads in 1917 as compared with about 62 in Germany and 78 in France shortly before the European War began. The passenger traffic of American railroads has, with the exception of a few unusual lines, al¬ ways been of secondary importance as a source of operating revenue. It has, however, grown largely in volume during the past 15 years. Many railroads improved their passenger serv¬ ices and actively competed for passenger traf¬ fic. Measured in passenger miles it advanced from 29,082,837,000 in the fiscal year 1908 to 42,605,902,000 in the calendar year 1918, exclud¬ ing short lines having less than $100,000 in yearly revenues and switching and terminal companies.

Railroad Freight Rates. — In making freight rates in the United States the railroads have not been guided by rigid rules or theories. The most general practice has been to make rates at <(what the traffic will bear,® i.e., at a point be¬ lieved by them to yield the largest revenues in the long run rather than at the present moment and to encourage the development of traffic in the future. This practice has, however, been subject to a minimum determined in the case of the general level of their rates as a whole by the aggregate cost of service, and in the case of an individual rate, by the special or out-of-pock¬ et costs incurred in connection with a particu¬ lar item of traffic. It is also subject to a maxi¬ mum determined by the value of the service per¬ formed. As the extent of public regulation of rates increased, many rates made originally by the railroads were changed by the Interstate Commerce Commission or by State commis¬ sions, the judgment of whom regarding the rea¬ sonableness of rates sometimes differed from that of the carriers. During Federal control rate changes were initiated by the Director-Gen¬ eral of Railroads, the Control Act of March 1918 requiring the Interstate Commerce Com¬ mission when reviewing

them to give due con¬ sideration to revenue needs and expenses as certified by the President.

Freight rates may be variously grouped according to their form or application. They may be either class or commodity rates. In the former case thousands of items of freight traffic have been grouped into a limited num¬ ber of classes, all those in the same class re¬ ceiving the same rates. Three major freight classifications : — the official or eastern, the southern and the western — govern most classi¬ fied freight in the United States. In addition there is a Canadian and a Mexican classifica¬ tion, applicable to some American shipments ; a number of State classifications established by State laws or commissions, and certain excep¬ tions to the major classifications due to the re¬ fusal of some lines to accept them in full. Va¬ rious efforts have been made by the railroads to unify freight classification throughout the United States, but only a limited degree of suc¬ cess was attained. In 1918 when the lines were under government control a tentative consoli¬ dated classification was prepared under the di¬ rection of the Director-General, its adoption de¬ pending upon the completion of an investiga¬ tion undertaken by the Interstate Commerce Commission. In September 1919 the commis¬ sion recommended the adoption with modifica¬ tions of certain parts of the proposed consoli¬ dated classification. Much freight is not shipped

under class rates, but under commodity rates which are quoted for specified articles without reference to classification. Commodity rates usually are lower than class rates; they are granted to most freight moving in large volume and particularly to heavy, bulky commodities re¬ quiring low rates in order that the traffic will readily move. A distinction is also drawn be¬ tween local and through or joint rates; the for¬ mer applying between points located on the same line and the latter between points located on different lines. Joint rates involve agreement among the different carriers transporting a through shipment and make necessary the ar¬ rangement of rate divisions among them. By no means all through traffic is covered by joint rates. Much traffic moves between points lo¬ cated on different lines on a combination of local rates, and so-called proportional rates have also been established at various points. Under this latter plan instead of applying a joint rate or a combination of locals, a proportional rate to some defined gateway or rate point is added to the rates lawfully in effect beyond, the pro¬ portional rate being lower than the local rates to the gateway, but applicable only in case of through shipments.

Many complicated rate structures have de¬ veloped in the different traffic sections of the United States. Differences in the amount of water, rail and industrial or commercial com¬ petition is largely responsible for the existence of sharply defined freight rate structures. Local rates covering short distances are frequently based upon mileage, but as the length of the haul increases distance tends to play a less im¬ portant role in rate making. There are also many so-colled mileage scales applicable to long distance traffic, but they do not grade rates strictly on a mileage basis. The aggregate charges on a shipment moving under a mileage scale gradually advance as distance increases, but not in the same proportion ; the rate per ton per miie declines as the length of the haul in¬ creases, and beyond certain distances the scales usually provide flat rates for all distances. Dis¬ tance also is an important factor in the percent¬ age rate system applicable between points in the Central West and the Atlantic Seaboard. The rates between Chicago and New York are basic in this rate structure; those between New York and other Central Western points are determined largely although not entirely according to their relative distance from New York as compared with the distance from Chicago to New York; and those between Central Western points and North Atlantic ports, other than New York, are determined from the New York rates by apply¬ ing fixed ((port differentials.® Throughout Southern territory distance considerations are less important. Because of water and commer¬ cial competition there are belts of blanket or uniform rates along the South Atlantic Sea¬ board, in Virginia, and along the Ohio River; and there are many basing points throughout the South where the long and short haul princi¬ ple is not applied. Distance is also disregarded in a large measure in the interstate rate struc¬ tures of Texas and the Southwest, of the Cen¬ tral Trans-Mississippi Valley and the North¬ west, and of the transcontinental railroads which carry freight to and from the Pacific Coast terminals.

Although there has been a tendency to es¬

tablish graded distance rate scales a large num¬ ber of group rates applying uniformly through¬ out defined areas remain in effect in many parts of the United States. Even in the North At¬ lantic States where distance largely controls the rates from the Central West to the large sea¬ ports, group rates apply to large areas inland from Boston, New York, Philadelphia and Bal¬ timore.

Freight and Passenger Services. — Freight trains are of two general kinds — tonnage trains which move forward when the desired number of cars are loaded or when the officials in charge of operation consider it expedient, and scheduled freight trains which are dispatched at regular times. The latter usually carry perish¬ able products, high-class freight and commodi¬ ties in the delivery of which speed is important. On some lines

extensive arrangements have been made for expediting "time,® "fast® or "preference® freight by means of special bill¬ ing, car placards, telegraphic reports and spe¬ cial operating regulations. In certain indus¬ tries, particularly in the fresh fruit and vege¬ table, meat products, oil, coal and livestock in¬ dustries, much freight moves in privately owned freight cars. Some of these cars are owned di¬ rectly by shippers, and others by private car line companies, most of which, except in the case of palace livestock cars, are subsidiaries of shippers. The freight rates paid by shippers using their own cars are the same as those paid by other shippers, but the private car owners re¬ ceive a mileage allowance from the railroads as a rental for the use of their cars. In case of private refrigerator cars the icing charge col¬ lected from the shipping public by the railroads, moreover, reverts to the private car line if it performs the icing service. Many special freight services are performed and privileges granted by the railroads. They are in some in¬ stances covered by the regular line haul freight rate, while in others the shipper or consignee is required to pay special charges. Important ex¬ amples are the reconsignment privilege, stop¬ ping in transit, switching and spotting cars, the peddler car service, the milling in transit privi¬ lege in the flour and lumber industries, the fab¬ rication in transit privilege in the iron and steel industry, the recompressing privilege in the cot¬ ton industry and the in-transit privilege which has been extended to various western wool cen¬ tres. Somewhat different are the demurrage and storage charges of the railroads, for they are primarily penalties designed to release equipment and station or warehouse space. Carload ship¬ pers and companies are required to load and unload freight cars within a specified free time or pay a demurrage charge per car per day after its expiration. Consignees of less than carload shipments are similarly required to re¬ move their freight from the freight station or other delivery point within a specified free time or on their failure to do so to pay railroad stor¬ age charges ; and, in case the freight is sent to a public warehouse by the carrier, also whatever cartage and public warehouse charges are in¬ curred.

Passenger services in the United States are not classified as systematically as in Europe, but a number of rather well-defined classes have developed. The Pullman and parlor-car service corresponds roughly to the first-class service of European railways, and the regular

first class, day-coach service corresponds roughly to the second-class service provided in Europe. American railroads do not regularly provide services similar to the third-class serv¬ ice generally found in Europe and

the fourth- class service provided in some countries. In some parts of the United States, however, the railroads perform a second-class service which varies widely in definition and quality. In some instances it bars the passenger from the Pullman and parlor-cars, but permits him to occupy the regular day coaches ; in some it en¬ ables him to occupy a tourist sleeper ; in others it limits him to a smoking-car, a special second- class day coach, or to the regular day coaches of designated trains. Bona fide immigrants arriv¬ ing at certain ports have for some years been provided with a special immigrant service at very low fares and mention should also be made of the colonist, harvester and special excursion services which werp offered from time to time in the past, but were largely restricted during the war.

Business Organization of American Rail¬ roads. — The business organization of American railroads varies according to the volume of their traffic, the importance of particular kinds of traffic, the extent of their mileage and the area within which they operate and the views of higher officials with respect to efficient organ¬ izations. The president reporting to the board of directors is the chief executive official in most instances, but on some lines the chairman of the board virtually performs the functions of an executive. Linder the president there usually is a varying number of vice-presidents, who act as the chief executive officials of par¬ ticular departments or in the capacity of gen¬ eral vice-presidents. There is also a Secretary's Department under a secretary, who reports di¬ rectly to the president and board of directors. The president, vice-presidents and secretary and some of the other department heads frequently including the general counsel, treasurer and comptroller, comprise the Executive Depart¬ ment. The exact make-up of this department, however, varies in different railroad companies. The specific business departments of most large American railroads include the following: (1) Secretary's Department; (2) Law Department; (3) Treasurer's or Financial Department; (4) Comptroller's or Accounting Department, which is subdivided into the comptroller's office and four or five auditing departments; (5) Transportation Department, which is subdivided into three subdepartments — operating, main¬ tenance and mechanical or motive power; (6) Traffic Department, which is divided into a freight and a passenger traffic department; (7) Insurance Department; (8) Purchasing De¬ partment, which in some railroad organizations is combined with a Supply Department; (9) Real Estate Department; (10) Relief and Pen¬ sion Departments, which may be separate or combined, and (11) Freight Claim. Department. A number of lines also have so-called Indus¬ trial Departments, separate from the Traffic Department, to promote the location of indus¬ trial plants on their lines. There are many as¬ sociations and joint organizations which consti¬ tute important parts of the business organiza¬ tions of the railroads. Among them are their freight and

passenger traffic associations, in which competitive rates and fares are discussed

before changes are initiated. The three main freight classifications are issued by the Official, Southern and Western classification committees jointly maintained by the railroads for this pur¬ pose.

The Federal Railway Administration. — In

a proclamation issued 26 Dec. 1917 the Presi¬ dent of the United States took over for Fed¬ eral control all the large railroads, and many of the smaller lines, and appointed a Director General to administer them. The President acted under powers granted to him by Con¬ gress on 29 Aug. 1916. Later in March 1918 Congress enacted the Federal Control Act to authorize a Federal guarantee of carriers' rev¬ enues equal to their average annual operating income for the three years ending 30 June 1917; to arrange for contracts with the various lines; to limit dividends; provide a revolving fund of $500,000,000; regulate railroad securi¬ ties, and define the rate powers of the Presi¬ dent and the Interstate Commerce Commis¬ sion.

On 28 Feb. 1920 the Transportation Act went into effect and on 1 March 1920 the Fed¬ eral government returned the railroads to the private corporations that owned them. The Transportation Act provided for the termination of Federal control, for the arbitration of dis¬ putes between common carriers and their em¬ ployees and also amended the Act to Regulate Commerce of 1887. The new act provided for the relinquishment of the rental paid by the government to the railroads but guaranteed to such corporations as agreed to accept it a net revenue equal to the government rental for a period of six months — or to 1 Sept. 1920 — on condition that net earnings in excess of the rental should be turned over to the government. Nearly all the roads accepted the guarantee. During the period of Federal control the gov¬ ernment incurred considerable expenditure for additions and betterments to the property of the roads and advanced sums for the refunding of corporation securities maturing during the period of control. The Transportation Act of 1920 provided for the funding of this indebtedness of the roads to the government for a period of 10 years at 6 per cent interest. Operating ex¬ penses had increased so under Federal operation that in nearly all cases the government had to make up deficits for the six months' period 1 March-1 Sept. 1920.

For the arbitration of disputes between the management of the roads and their employees the act created a Railroad Board of Labor Ad¬ justment composed of nine members — three representing the management, three the em¬ ployees and three representing the general public. This board rules on

wages and working con¬ ditions. Its findings are published but are not enforceable by law.

The Interstate Commerce Act is amended so as to permit the Interstate Commerce Commis¬ sion to fix such rates for freight and passenger carriers as will provide the roads with a net operating income equal to Sl/2 to 6 per cent on the value of the property devoted to transporta¬ tion. Earnings in excess of 6 per cent are to be divided — half to be retained by the road as a reserve fund and half to be paid to the govern¬ ment for the establishment of a contingent fund. The Commission is empowered to fix minimum

as well as maximum rates, and likewise its ap¬ proval must be obtained for the issuance of new securities, for the construction of extensions and new facilities. Combinations of railroads may be formed with the approval of the Com¬ mission provided such combinations do not re¬ move existing competition.

Government Regulation of Railroads. — Regulations of railroads in interstate com¬ merce began with the enactment of the Inter¬ state Commerce Act in 1887. Its application was widely different from what its framers anticipated, in part because of the defects of the statute itself and partly because of the way some of its provisions were interpreted by the courts. Congress, in later years, enacted a series of important amendments. To over¬ come the refusal of railroad officials to testify before the commission on the ground that they might incriminate themselves, Congress in 1893 enacted the ((immunity bath® amendment, which requires them to testify, but protects them against prosecution on account of testi¬ mony or evidence submitted by them, and this amendment was upheld by the Supreme Court in 1896. To strengthen the anti-rebating clause of the law, Congress in 1903 enacted the Elkins Act. Corporations as well as their agents were made liable ; departure from pub¬ lished rates was made the test of rebating, and the receivers of rebates were declared to be as much guilty as the railroads paying them. This law abolished the penalty of imprison¬ ment, leaving a fine as the punishment for guilt; but imprisonment as well as fines were re-enacted when the Interstate Commerce Act was again amended in 1906. In 1903 Con¬ gress also passed the (

A. ˆcommodities clause® prohibited railroads from transporting in interstate commerce any products produced by themselves, except timber

and lumber products and commodities in¬ tended for use by the railroads in their busi¬ ness as common carriers. The so-called Car¬ mack Amendment required carriers receiving traffic for interstate shipment to issue bills of lading and held such railroads liable for loss or damage to property caused by any carrier over whose lines the traffic passes in moving to its destination. The Commission was given the power to fix a reasonable maximum rate for one found, after full hearing upon com- vol. 27 — 32-

plaint, to be unreasonable or unjustly dis¬ criminatory, and this rate-making power in¬ cludes interstate freight charges of any kind, passenger fares, rate divisions and through or joint rates. The orders of the Commission were declared to be binding unless specifically set aside or superseded by a Federal court of competent jurisdiction. To give effect to the Commission's power to prescribe a uniform system of accounts it was now provided that carriers may keep no other set of books than those prescribed by the Commission, and that it may employ special agents and examiners to inspect all their accounts and records. To fur¬ ther expedite the work of the Commission it was given additional power to call upon the carriers, not only for the usual annual statis¬ tical reports, but for monthly reports of earn¬ ings and expenses and special reports on any matter within its jurisdiction.

The Interstate Commerce Act was again amended in 1910 when the Mann-Elkins amend¬ ment was passed. The Commission was au¬ thorized to suspend proposed rate advances before they go into effect. The original sus¬ pension holds, during the time authorized by law for hearings and investigation of the pro¬ posed rates, after which the Commission may permit them to become effective or suspend them permanently. A special Commerce Court was created to handle review cases appealed from the Commission, and various other classes of railroad cases. This court, however, was abolished in 1913. The long-and-short haul clause, which had been rendered ineffec¬ tive by court interpretation of the words ((under substantially similar circumstances and conditions,® was amended by striking this limiting phrase out of the clause. There may be no violation of the long-and-short-haul principle unless the Commission, in particular instances, expressly waives its application. The Commission was also authorized to fix maxi¬ mum rates on its own initiative, and to regu¬ late freight classifications. Shippers were au¬ thorized to select the through routes over which their shipments are to move; and the railroads were required to quote rates upon

written request to their agents. They were

directed to bring suit against the United

States, and the Department of Justice

was placed in charge of all litigation in¬ volving appeals from the Commission's orders. Each carrier, moreover, was re¬ quired to designate an agent at Washington, D. C, upon whom orders and notices may be served. A Securities Commission was created to report on and make recommendations to Congress concerning railroad stocks and bonds. Telegraph and telephone companies engaged in interstate commerce were brought within scope of the Act.

A further amendment to the Interstate Commerce Act is contained in the Panama Canal Act of 1912. The Commission was given power to establish physical connec¬ tions between rail and water carriers ; to fix maximum proportional rail rates to and from ports; to establish through routes and maximum joint rates over rail and water lines ; and, if it finds a railroad entering into ar¬ rangements with an ocean carrier at any port, to require it to enter into similar arrange-

ments with all other ocean carriers operating from such port to the same foreign country.

The Panama Canal .Act also prohibits rail¬ road-controlled steamship lines which are or may be in competition with the proprietory railroad from navigating the Panama Canal. Railroad ownership or control of steamship lines, operating elsewhere than through the Canal, which are or may be in competition with the controlling railroads, is prohibited unless the Interstate Commerce Commission permits such railroad control to continue. The Com¬ mission may grant such permission only if it is of the opinion that the controlled steamship line is operated in the interest of the public, and that the continued ownership will not prevent or reduce competition.

In 1913 the Interstate Commerce Act was enhanced by the passage on 1 March of the Railroad Valuation Act. In 1915 the Cummins' amendment providing for full settlement of loss and damage claims was enacted, only to be radically reamended the following year. In 1917 a <(car service amendment® increased the Commission's powers over car distribution and car service rules; a Apriority amendment® au¬ thorized the President, during the war, to grant priority to designated traffic, a power which he exercised through a Priority Director; a <(commission organization amendment® in¬ creased the membership of the Interstate Com¬ merce Commission to nine, authorized the es¬ tablishment of responsible

divisions, and pro¬ vided that <(no increased rate or charge or classification shall be filed except after ap¬ proval thereof has been secured from the Commission.® The Federal Control Act of 21 March 1918 amended the Interstate Com¬ merce Act by authorizing the President to initiate charges by filing them with the Com¬ mission ; by preventing the Commission from suspending such charges pending final deter¬ mination, and by requiring the Commission when investigating such rates upon complaint to give due consideration to the absence of competition under Federal control and to certi¬ fication from the President to the effect that it is necessary to increase operating revenues to defray the expenses of Federal control, to pay railroad taxes, and to pay the compensa¬ tion guaranteed to the railroad by the gov¬ ernment.

Federal legislation, other than the Inter¬ state Commerce Act, affecting the railroad industry includes the Sherman Anti-Trust Act of 1890, and the amended Clayton Anti-Trust Law of 1914; the Erdman Con¬ ciliation and Arbitration Act of 1898 as amended by the Newland's Act of 1913; the safety appliance laws of 1893; the locomotive ash-pan act of 1908; the sixteen-hour continu¬ ous labor act of 1907 ; the eight-hour wage basis law of 1916, and the bill of lading act of 1916. See also Federal Administration, p. 496 infra.

State Regulation of Railroads. — Regulation of the railroads by the States antedates Fed¬ eral regulation by many decades. All of the States, except Delaware and Utah, now have commissions with rate-making powers. There are three general types of State commissions : (1) Public utility commissions with jurisdic¬ tion, not only over railroads and other rail transportation facilities and agencies, but also

*over other public utilities, such as street rail¬ ways, gas, electric, water, warehouse, telegraph and telephone companies; (2) railroad com¬ missions with jurisdiction over railroads and a more limited number of other transportation and public utility concerns; and (3) corpora¬ tion commissions with authority over public utility companies and also other corporations.**

The powers of these commissions vary. Many of them have powers similar to those of the Interstate Commerce Commission, while some of them are vested with greater powers as well as wider jurisdiction. Many possess powers with respect to railroad capitalization, some are authorized to prescribe complete schedules of maximum rates, and some have widely differing powers over railroad services and operation. Besides the commissions upon whom the States have conferred mandatory powers the legislatures of many States also regulate railroad charges and practices directly by statute. There are two-cent fare and maxi¬ mum freight rate

laws, and statutes regulating car service and demurrage, private sidings, grade crossings, terminal facilities, train service, safety appliances, head lights, the size of train crews, capitalization and other phases of rail¬ road operation too numerous to describe in limited space.

As the extent . of State regulation in¬ creased a conflict developed between the States and the Interstate Commerce Commis¬ sion. The United States Supreme Court in 1886 had drawn a line between Federal and State regulation when it decided that the Fed¬ eral railroad laws applied only to interstate traffic. In later years it became apparent, how¬ ever, that although the States were not regulat¬ ing interstate traffic directly they were doing so indirectly. The making of an interstate rate may, because of business competition, vir¬ tually compel a railroad to readjust some of its interstate rates or otherwise permit an un¬ just discrimination against interstate shippers to stand. When, therefore, the Interstate Com¬ merce Commission in its Shreveport Rate case fixed reasonable maximum rates from Shreve¬ port, La., to points in Texas and ordered the railroads whose interstate rates in Texas were fixed at a lower level by the State of Texas to discontinue discriminating against interstate traffic, the railroads complied by raising their rates on intrastate traffic moving between various points in Texas. In the test litigation that followed the Supreme Court in 1914 held that the Interstate Commerce Com¬ mission had the power to overrule a State Com¬ mission which fixes intrastate rates resulting in unjust discrimination against interstate traffic carried at rates which the Federal commission pronounces to be reasonable. In a series of later decisions involving similar conflicts in Ne¬ braska, South Dakota, Illinois and Arkansas

- *The following States have public utility commissions: Alabama, California, Colorado, Connecticut, District of Columbia, Georgia, Hawaii, Idaho, Illinois, Indiana, Kansas, Maine, Maryland, Massachusetts, Missouri, Montana, Nevada, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, West Virginia, Wisconsin, Wyoming. The following have railroad commissions: Arkansas, Florida, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Nebraska! North Dakota, South Carolina, South Dakota, Tennessee, Texas. The following have corporation commissions: Ari¬ zona, New Mexico, North Carolina, Oklahoma, Virginia.*

*the courts reiterated the superior *power of the Interstate Commerce*

Commission in case of conflict between intra- and interstate rates, but insisted that the Commission's orders must be specific in defining the rate points or areas within which State-made rates are overruled.

Future of Control or Regulation. — Neither the Interstate Commerce Commission nor the States regulated "the railroads with their usual energy while the lines were under control of the Federal Railway Administration. So long as the war continued no effort was made to thwart the wishes of the Director-General of Railroads. With the signing of the armistice, however, arose the desire for a permanent transportation policy. Many plans were pro¬ posed ranging from government ownership to a return of the railroads to their owners, sub¬ ject to direct or indirect guarantees of income and Federal regulation differing in many re¬ spects from that which prevailed in the past.

Grover G. Huebner, University of Pennsylvania.

53. FOREIGN COMMERCE. The for¬ eign commerce of the United States has ex¬ panded with even greater rapidity than that of the other parts of the world. World com¬ merce increased from $1,000,000,000 in 1789, the year of our birth as a nation, to $40,000,- 000,000 in 1913, the year preceding the great war which disarranged all commercial move¬ ments, while the foreign commerce of the United States grew from $43,000,000 to $4,300,- 000,000 in that same period. World commerce in 1913 was 40 times as great as in 1789, while United States commerce in 1913 was 100 times as great as in 1789.*

Exact and continuous records of our for¬ eign trade did not come into existence until the adoption of the Constitution. Indeed, one of the most important reasons for the formation of that c

the Constitution for the Articles of Confedera¬ tion.

The first record of the commerce .of the United States under the Constitution is that of the year 1790. Prior to that time there were occasional compilations of the records of the various States, but no continuous record of the imports or exports of the colonies or States. MacPherson's (Annals of Commerce) puts the imports of the colonies in 1769 at $12,760,000 and the exports $13,870,000. Of the imports $7,867,000 were from Great Britain, $3,840,000 from the West Indies, $734,000 from Africa and $373,000 from southern Europe. Of the exports $7,445,000 went to Great Britain, $3,635,000 to the West Indies, $2,686,000 to southern Europe and $98,000 to Africa. Dur¬ ing the Revolutionary War the commerce fell to a very small total, and during the period of the Confederation had slowly advanced to ap¬ proximately

$40,000,000, about evenly divided between imports and exports. In 1790, the first year under the Constitution for which a full record was made, the imports were $23,000,000, and the exports $20,000,000.

From the adoption of the Constitution for¬ ward the commerce steadily advanced. By 1800 the imports were $91,000,000, and the ex¬ ports $71,000,000, though about one-half of the exports were foreign merchandise drawn chiefly from the West Indies and re-exported to Europe.

During the first half of the century, 1800- 1900, the growth of the foreign commerce of the United States was comparatively slow. The people were busy developing the interior of the country and thinking out and applying to prac¬ tical use the necessary methods for transporting the products or possible products of the interior to the water's edge, whence they could be trans¬ ported to foreign countries. In 1819 occurred an incident which had a profound effect upon the commerce, not only of the United States, but also upon that of the whole world. In that year a little steamer, which had been built in New York at the suggestion of Daniel Dod, an engine builder of Virginia, sailed out of the port of Savannah, and pushed boldly out upon the ocean, heading for the ports of Europe, which had never, up to that time, been reached by a steam vessel from the western shores of the Atlantic. The voyage was successful, and the lessons taught by it resulted in the establish¬ ment in 1838 of regular steam navigation be¬ tween the United States and Europe. Mean¬ time the railway systems of the United States and of the world were slowly developing and by 1850 a railway line connecting the Atlantic with the Mississippi Valley was opened, the Boston and Albany road, and this vas quickly followed by the New York and Erie, the New York Central, the Pennsylvania and the Balti¬ more and Ohio. . During that same time the people of the United States were transferring a part of their population to the Mississippi Valley, and as a result of these occurrences, the development of transportation facilities and thus the cheapening of cost of transportation, the commerce of the country in the year 1850 was over $300,000,000, the imports being $174,- 000,000 and the exports $144,000,000.

In the second half of the century the for¬ eign commerce grew by leaps and bounds. The

ocean steamer greatly developed its carrying power, tonnage multiplied and the cost of transportation on the ocean was greatly re¬ duced, while the

tremendous increase of the railway system of the country had a similar effect upon the cost of moving the products of the interior to the water's edge, and in this movement the Great Lakes also rendered marked assistance with the development of large and powerful freight carrying steamers which handled the merchandise which the rail¬ ways were able to deliver to them at the western end of the chain and transfer from the eastern end to the tidewater. The development of the great manufacturing system of the country, the greatest in the world, added large quantities of manufactures to the available ma¬ terial for exportation and at the same time created a great demand for manufacturing ma¬ terial to be imported from other parts of the world. As a result the foreign commerce of the country which totaled but little more than $300,000,000 in 1850 was $686,000,000 in 1860, $827,000,000 in 1870, $1,504,000,000 in 1880, $1,647,000,000 in 1890, $2,244,000,000 in 1900, $3,302,000,000 in 1910 and $4,279,000,000 in 1913, all of the above figures being for fiscal years.

During all of this period of rapid growth the exports greatly exceeded imports, though prior to that development imports were usually as much as the exports, and frequently exceeded them. In the period from 1900 to 1913 exports were often as much as $500,000,000 in excess of the imports, and in fact the -annual average of excess of exports during that period was about $500,000,000. This was due in the earlier part of that period to the fact that the United States had large quantities of meat and grain to spare for foreign countries, and in the later years to the rapid growth of the exportation of manufactures, which grew from $485,000,000 in 1900 to $1,185,000,000 in 1913.

With the opening of the great European War in 1914 there came a great change in the commerce of the United States, and while it was to some extent temporary it is significant as an illustration of the power of the great manu¬ facturing industry of the country to respond to extraordinary demands from abroad, and suggestive as to the possibilities and prob¬ abilities of the future of our tra'de. The European countries at war required vast quan¬ tities of war materials, powder, shot and shell, firearms and materials for their construction, metal working machinery, barbed wire, high ex¬ plosives of various kinds and miscellaneous manufactures for war uses, to say nothing of the demand for horses and mules for the war and materials for feeding and clothing their soldiers and the maintenance of their system of transportation. To all of these demands the producers of the United States, whether manu¬ facturers or agriculturists and mine operators, responded with remarkable promptness and in volume of supplies, and the exports grew from $2,365,000,000 in 1914 to $2,769,000,000 in 1915, $4,333,000,000 in 1916 and $6,290,000,000 in 1917. With the entrance of the United States into the war there came*

great demands upon the manufacturers and producers for material for our own armies, and the government also found it necessary to restrict exports to pre¬ vent their passing to the Central Powers of

Europe with which we were at war, and as a result the exports were temporarily reduced, de¬ spite the fact that those passing out of the country went at prices far above those pre¬ vailing prior to the war. The total dropped to $5,920,000,000 in 1918 but with the great food re¬ quirements of Europe and the demand for man¬ ufactures in the other grand divisions the fiscal year 1919 made the phenomenal record of $7,225,000,000 exports and $3,096,000,000 im¬ ports, making the grand total of imports and exports $10,321,000,000 against the former high record of $8,949,000,000 in 1917.

The developments of the last half century have resulted in a widening field for our com¬ merce, both as to imports and exports. With the development of the manufacturing industry there came new demands upon the tropics for manufacturing material and a less demand upon Europe for manufactures, and the in¬ creasing population and the prosperity of the masses increased the demand for the products of other countries, such as sugar, tea, coffee, cacao, tropical fruits, silk for manufacturing, rubber, fibres, tin and other manufacturing ma¬ terials. The wool production of the country was insufficient to meet home requirements and this was also true of hides and skins and other staple requirements of manufacture. As a re¬ sult the value of manufacturing material im¬ ported in a raw state increased from $276,000,- 000 in 1900 to $1,110,000,000 in 1917 and $1,251,- 000,000 in 1919, and of manufactures for use in manufacturing from $92,000,000 in 1900 to $475,000,000 in 1917 and $606,000,000 in 1919. These two classes of manufacturing material which formed 46 per cent of the imports in 1900 were 60 per cent of the greatly increased total in 1919. Meantime manufactures showed an equal growth in the share of the rapidly in¬ creasing export trade, aggregating $485,000,000 in 1900, $1,185,000,000 in 1913, $4,136,000,000 in 1917 and* $3,337,000,000 in 1919, under the stimu¬ lus of the demands of the war and the increased demand from neutral countries which found their supplies of manufactures from Europe greatly decreased. The manufactures exported in 1900 formed 35 per cent of the total exports of domestic merchandise, in 1913 42 per cent and in 1917 66 per cent.*

The changed conditions of our trade and trade requirements above noted resulted in a readjustment of the share of the trade with the various sections of the world. In 1890 57 per cent of the imports were drawn from Europe, and 80 per cent of the exports went to that continent. In 1913 only 49 per cent of the greatly increased imports were drawn from Europe and 60 per cent of the exports sent thereto, though of course the great demands

of the war have resulted in a temporary in¬ crease which merchandise for Europe forms of the exports. On the other hand Europe had little to sell and our imports from that continent fell off nearly 60 per cent during the wai period.

The tables which follows show the growth of our commerce from 1789 down to 1920, pre¬ senting figures at decennial periods showing the total of imports and exports, and the share thereof with each grand division, also the share which foodstuffs, manufacturing ma¬ terial and manufactures respectively form of the imports and exports.

Imports and Exports of Merchandise into and from the United States, 1790 to 1920.

FISCAL YEARS

1790

1800

1810

1820

1830

1840

1850

1860

1870

1880

1890

1900

1905

1910

1913

1914

1915

1916

1917

1918

1919

1920

Imports

$23,000,000 91,253,000 85 , 400 , 000 74,450,000 62,721,000 98,259,000 173,510,000 353,616,000 435,958,000 667,955,000 789,310,000 849,941,000 1,117,513,000 1,556,947,000 1,813,008,000 1,893,926,000 1,674,170,000 2,197,884,000 2,659,355,000 2,945,655,000 3,095,877,000 5,238,621,665

Exports (a)

$20,205,000 70,972,000 66,758,000 69,692,000 71,671 ,000 123,669,000 144,376,000 333,576,000 392,771,000 835,638,000 857,829,000 1,394,484,000 1,518,562,000 1,744,985,000 2,465,884,000 2,364,579,000 2,768,589,000 4,333,483,000 6,290,769,000 5,919,711,000 7,225,084,000 8,111,039,730

Excess of imports

$2,795,000

20,281,000

18,642,000

4,758,000

29,134,000

20,040,000

43,187,000

Excess of exports

$8,950,000

25,410,000

167,683,000 68,519,000 544,543,000 401 ,049,000 188,037,000 652,876,000 470,653,000 1,094,419,000 2,135,599,000 3,631,451,000 2,974,056,000 4,129,208,000 2,872,418,065

(a) Includes foreign merchandise re-exported.

Commerce of the United States with the Grand Divisions, 1830 to 1920 (000 Omitted).

FISCAL

Europe

North America

South America

Asia (a)

)

Oceania (b)

Africa

YEARS

Im-

Ex-

Im-

Ex-

Im-

Ex-

Im-

Ex-

Im-

Ex-

Im-

Ex-

ports

ports

ports

ports

ports

ports

ports

ports

ports

ports

ports

ports

from

to

from

to

from

to

from

to

from

to

from

to

1830. .

$40,841

$48,175

$17,549

$18,886

$6,239

$4,587

$5,532

$1,845

$385

$94

$309

$234

1840. .

64,147

98,931

22,628

23,737

9,421

5,970

9,626

2,286

602

455

646

708

1850. .

124,954

113,862

24,137

24,723

16,648

9,077

10,315

3,052

1,401

208

682

977

1860. .

216,831

310,272

75,083

53,326

35,993

16,742

26,202

11,068

3,495

5,373

3,799

3,228

1870. .

249,540

420,184

126,544

68,962

43 , 596

21,651

31,413

10,972

1,423

7,335

9,860

3,415

1880. .

370,822

719,434

130,077

69,438

82,127

23,190

67,009

11,646

14,130

6,847

3,789

5,084

1890. .

449,987

683 , 736

148,369

94,100

90,006

38,753

67,507

19,697

28,357

16,460

5,085

5,082

1900. .

440,567

1,040,168

130,035

187,595

93,667

38,946

139,842

64,914

34,611

43,391

11,218

19,470

1905. .

540,773

1,020,973

227,229

260,570

150,796

56,894

161,983

128,505

25,388

33,079

11,344

18,541

1910. .

806,270

1,135,915

306,767

385,520

196,165

93,247

193,155

60,862

37,100

50,890

17,490

18,551

1913. .

892,866

1,079,075

361,944

617,413

217,735

146,148

276,495

115,057

37,543

79,103

26,425

29,089

1914. .

89^,603

1,486,499

427,399

528,645

222,777

124,540

286,952

113,026

42,144

83,568

19,149

27,902

1915. .

614,355

1,971,435

473,080

477,075

261,490

99,324

247,770

114,470

53,523

77,765

24,953

28,520

1916. .

616,252

2,999,305

591,896

733,025

391,562

180,175

437,181

278,611

96,226

98,775

64,766

43,591

1917.

610,471

4,325,444

766,113

1,164,451

542,213

259,559

615,217

380,320

65,328

111,284

60,013

52,747

1918. .

411,579

3,732,174

918,347

1,236,359

567,418

314,560

826,194

447,129

146,206

134,891

75,911

54,299

1919. .

372,954

4,634,817

1,052,570

1,291,932

568,735

400 , 902

830,904

603,925

190,008

208,351

81,066

85,157

1920. .

1,179,460

4,864,155

1,486,459

1,635,813

860,944

490,944

1,368,669

798,136

157,892

193,235

.

185,196

128,755

(a) Exports to Asia in 1916 and 1917 include merchandise for Russia via Vladivostok.

(b) Figures subsequent to 1900 do not include trade with Hawaiian

Islands.

United States Imports and Domestic Exports by Great Groups, 1830 to 1920 (000 Omitted).

FISCAL

years

Crude materials for use in manufacturing

Foodstuffs in crude condition and food animals

FoodstufiFs partly or wholly manufactured

Manufactures for further use in manufacturing

Manufactures ready for consumption

Imports

Exports

Imports

Exports

Imports

Exports

Imports

Exports

Imports

Exports

1830 .

$4,215

$36,482

$7,382

$2,272

$9,655

$9,557

$5,152

$4,117

$35,735

$5 , 462

1840 .

11,510

75,488

15,273

4,565

15,189

15,936

11,359

4,841

44,300

10,584

1850 .

ii ; 711

83,985

18,012

7,536

21,466

20,017

26,163

6,061

95,312

17,162

1860 .

39,692

216,010

45 , 744

12,166

59,838

38,625

34,899

12,642

172,130

35,811

1870 .

55,615

213,440

54,081

41,853

96,082

50,920

55,569

13,712

173,615

56,329

1880 .

131,862

238,788

100,297

266,109

118,125

193,353

110,780

29,044

196,587

92,774

1890 .

170,637

304,567

128,480

132,073

133,333

224,757

116,924

46,455

230,686

132,527

1900 .

276,241

325,294

97,916

225,906

133,027

319,696

134,222

153,276

203,126

331,746

1905 .

389,161

472,114

146,131

118,185

145,356

283,065

177,828

209,926

252,373

402,050

1910 .

566,271

565,935

144,777

109,028

181,567

259 , 260

285,138

267 , 766

367,723

499,215

1913 .

635,210

73 1 , 759

211,747

181,907

194,243

321,204

349,402

408,807

408,179

776,297

1914 .

632,866

792,716

247,948

137,495

227,644

293,218

319,275

374,221

449,318

724,908

1915 .

1916 .

575,357

948,826

510,456

535,952

223,930

251,887

506,993

380,638

285,725

310,938

454,575

599,059

327,177

356,857

355 , 862 657,923

335,877

311,871

807,466

1,998,298

1917 .

1,109,665

732,389

335,573

532,018

343,474

739,038

477,725

1,191,788

377,662

2,943,923

1918 .

1,230,252

897,324

372,682

374,978

380,227

1,153,702

540,742

1,201,439

402 , 670

2,185,420

1919 .

1,280,715

1,215 962

376,228

719,720

456,241

1,785,180

605,820

952,776

393,195

2,384,801

1920 .

1,752,876

1,870 827

577,628

917,974

1,238,152

1,116,960

802,024

958,910

877,123

3,204,382

502

UNITED STATES— FOREIGN COMMERCE (53)

Prior to the development of the great pro¬ ducing power of the Mississippi Valley imports generally exceeded exports, but when that great area began to pour out its vast production of wheat and corn and meats and livestock and cotton and iron and copper and timber, the ex¬ ports began to exceed imports, and on several occasions the excess of exports over imports was more than $600,000,000 per annum, and in the 17 years from 1897 to the beginning of the great European War the excess of exports over imports aggregated $8,463,000,000, or an average of practically $500,000,000 per annum. During the war period the excess of exports be¬ came much greater, being in 1915 $1,094,000,000, in 1916 $2,136,000,000, in 1917 $3,634,000,000, in 1918 $2,979,000,000 and in 1919 $4,129,000,000. Thus in the period 1900 to 1919 the excess of exports over imports aggregated the enormous sum of $20,741,000,000. As a result there were large imports of gold, especially during the European War, and the excess of gold imports over exports in the fiscal years 1916 and 1917 aggregated more than $1,000,000,000, giving to the United States a stock of gold far in excess of that of any other country of the world.

As t@ the future of our foreign commerce, it is cpiite apparent that it will differ materially from that of the past. Manufacturing ma¬ terial and tropical foodstuffs will be our chief requirement from abroad and manufactures the chief material which we can offer in exchange.

Practically all of our coffee, tea and cacao come from foreign countries and will so continue in¬ definitely, while at present we bring about one-half of our sugar from foreign countries and supply the remainder from our own fields and those of our islands. On the export side, we can still supply large quantities of raw cotton, and under pressure of the war we have spared greater quantities of foodstuffs than normal, but it is a startling fact that in the 25 years preceding the present war our exports of manufacturing material and foodstuffs in¬ creased but a little over 100 per cent while those of manufactures were increasing over 500 per cent, while a comparison of the exports of manufactures in 1917 with those of earlier years would give an exaggerated percentage of growth. The mere fact that the total exports of manufactures have grown from $1,000,000,000 in 1914 to $4,136,000,000 in 1917 and continued in 1919, after the close of the war, at the rate of about $3,000,000,000 per annum, at least in¬ dicates the wonderful expansive power of our manufacturing industries, and suggests the pos¬ sibility of their being able to greatly enlarge our exports when manufactures necessarily be¬ come the chief product which we can spare in exchange for our growing requirements of manufacturing material and tropical food-stuffs.

The 10 great articles of manufacturing ma¬ terials for which we now rely on foreign countries are wool, silk, fibres, cotton, rubber, hides, copper, tin, gums and nitrates, and the five great articles of food imported are sugar, coffee, tea, cacao and fruits. Of these 10 great articles imported from abroad for manufactur¬ ing, our imports in 1917 were $1,060,000,000, against $431,000,000 10 years earlier, and the five great articles of food imported from for¬ eign countries in 1917 were $482,000,000, against $234,000,000 10 years earlier, despite the fact that our islands had practically doubled their

contributions of sugar meantime. These 15 absolutely required articles from abroad for use in manufacturing or for food aggregated in round terms $1,500,000,000 in 1917, against $716,000,000 a decade earlier.

Practically all of these great articles which we import either for manufacturing or for food are of tropical or sub-tropical production, and thus come from a section of the world which imports practically all the manufactures which it uses, for, as is well known, the tropics are not manufacturers. All of the $189,000,000 worth of rubber imported by us in 1917 was, of course, tropical, and this is also true of the $231,000,000 worth of sugar, $133,000,000 worth of coffee, $68,000,000 worth of fibres, $40,000,000 worth of raw cotton and $22,000,000 worth of gums, while the $160,000,000 worth of raw silk and $20,000,000 worth of tea was from sub¬ tropical areas, and more than half of the $216,- 000,000 worth of hides, and $58,000,000 worth of fruits originated in tropical or

sub-tropical countries. Even in the case of the great minerals imported for use in manufacturing, it happens that they come chiefly and almost ex¬ clusively from tropical countries; all of the $58,000,000 worth of tin, all of the $44,000,000 worth of nitrates and a large part of the $127,- 000,000 worth of copper imported in 1917 was mined in tropical countries. We brought into continental United States in the fiscal year 1919 $1,500,000,000 worth of tropical and sub¬ tropical products other than hides and minerals, against $335,000,000 in 1900 and $640,000,000 in 1910. Thus our purchases of articles of tropical and sub-tropical growth have quadrupled in value since 1900 and doubled since 1910, without having regard to the large increase in hides and minerals from tropical countries and not included in the above figures of imports of articles of tropical growth. In fact, about one- half of our imports from foreign countries in 1919 came from tropical or sub-tropical coun¬ tries, to say nothing of the nearly $300,000,000 worth which was received from our islands.

More than one-half of our imports come normally from non-manufacturing countries. The world's chief manufacturers are the United States, Great Britain, France, Germany, Italy, Belgium, Switzerland, Austria, Hungary and Japan. These countries are the manufacturing world, the remainder of the inhabited area forms the non-manufacturing world. In 1914, the latest normal year, our imports from the manufacturing countries totaled in round num¬ bers $873,000,000, and from the non-manufac¬ turing world $1,021,000,000. In 1917 our im¬ ports from the manufacturing countries were $693,000,000 and from the non-manufacturing world $1,966,000,000. So it may be said in very general terms that while less than 60 per cent of our imports prior to the war were drawn from the non-manufacturing countries, in 1917, writh Germany, Austria-Hungary and Belgium out of international trade, over 70 per cent ot the greatly increased imports were drawn from the non-manufacturing world.

These non-manufacturing countries from which we now draw three-fourths of our im¬ ports have in former years drawn most of their manufactures from Europe, but we have greatly increased our sales of manufactures to them since the beginning of the war. Our exports to the non-manufacturing world, still assuming

that all foreign countries except Great Britain, France, Germany, Belgium, Italy, Switzerland, Austria-Hungary and Japan may be so classed, were in 1914, the year before the war, $1,056,- 000,000, in 1917 $2,682,000,000, and in 1919 $3,211,000,000, an increase of 200 per

cent. And when we consider that manufactures form the bulk of our exports to the non-manufacturing world, and that our exports to that section have increased over 200 per cent during the war period, we may assume that the people in those non-manufacturing countries are getting a much better acquaintance with American manu¬ factures than ever before, and that we may ex¬ pect to retain after the war a considerable share of the increased export trade in manufactures thus built up, provided our manufacturers take the necessary steps to retain the increase.

Three conditions are required to enable us to retain the gains which we have made in sales of manufactures to the non-manufacturing world — goods made to suit the local markets, sales on longer credits than at home, and prices no greater than those of our rivals having cheaper labor. These require considerable in¬ creases of the capital applied to manufacturing for the foreign market. Special manufacturing establishments or parts of establishments must be maintained with which to manufacture the goods in the form required by those markets wherever they differ from those manufactured for our own markets; greater capital with which to give the longer credits required ; and an increased application of machinery to the production of manufactures, in order to turn them out at a cost no greater than those pro¬ duced by the cheaper labor of other countries. This greater use of machinery in manufacturing would not mean any reduction in the amount of labor now employed, but a greater proportion which machinery might produce of the greatly increased output. Our day of exports of food¬ stuffs and raw materials has passed, except in cases of emergency such as that of the Euro¬ pean War, and in the future we must rely upon manufactures to maintain the growth in our exports necessary to retain for us the high rank as an exporter in which we have taken pride and which has given us such prosperity. To do this the manufacturers must give to the foreign trade a greater attention and greater sums of capital than in the past.

O. P. Austin,

Statistician , National City Bank , New York.

54. INDUSTRIAL AND COMMER¬ CIAL DEVELOPMENT. The chief indus¬ trial and commercial development of the United States has occurred since the Civil War. With the termination of that historic struggle which destroyed sectional lines, the reunited nation entered upon the development of the wonderful and varied powers which nature had given the territory which it occupied. With an area nearly equal to that of all Europe, a climate ranging from the temperate to the sub¬ tropical, fertile soils which had not yet been made productive, and a great mountain section containing untold quantities of the useful minerals and precious metals, its possibilities

of production, manufacture and commerce were apparent to the thoughtful mind.

The first requisite was transportation facili¬ ties to enable its various sections to develop

and interchange their various products and move the surplus to the water's edge for ex¬ portation. The railroads of the entire country were in 1860 but 30,000 miles, in 1865 35,000 and in 1870 52,000 miles and more than one- half of this 1870 total was in the area north of the Ohio River and east of the Mississippi. The great section lying south of the Potomac and the Ohio and sweeping westward from the Atlantic to the western borders of Texas had in 1870 in its nearly 1,000,000 square miles only 13,000 miles of railway, or less than that of the State of Texas to-day, and the great moun¬ tain section had but 2,500 miles of road with which to serve its more than 1,000,000 square miles of area.

As a result of these conditions the value of the merchandise sent .out of the country in the year 1870 was but $375,000,000, or about one- half as much as that of a single month in 1919, and the value of the merchandise ex¬ changed among the people in the entire country was but about $6,000,000,000, as against more than $60,000,000,000 in 1919.

*Clearly the first duty of the country on emerging from the war and <(shaking hands across the bloody chasm** was to develop trans¬ portation facilities for the great areas north and south whose productive powers were so well established and for whose products the world was beginning to clamor. Fortunately this was rendered possible through the co¬ operation of capital drawn in part from the older countries of Europe and the loans of capital made by the government, coupled with large land grants for the construction of cer¬ tain great railway lines, these land grants con¬ sisting of the alternate sections of public lands lying on either side of the proposed railways. The public lands granted to the great trans¬ pacific lines which reached the western coast in 1869 amounted to over 30,000,000 acres and the total grants authorized by Congressional action amounted to approximately 150,000,000 acres.*

The railways of the country which were at the close of the Civil War about 35,000 miles in length grew during the next 15 years at the rate of about 4,000 miles per annum ; in the period between 1880 and 1890 the growth was at the rate of about 7,000 miles per annum, and from that time forward at the rate of about 5,000 miles annually. The railway mileage grew from 53,000 miles in 1870 to 167,- 000 in 1890, 250,000 in 1910 and 270,000 in 1919, against 225,000 in all of Europe in 1919. The co§ of this railway system of the United States is estimated at over*

$20,000,000,000.

Dividing the country into four great natural sections, the north Atlantic, the upper Missis¬ sippi, the South and the mountain area (see map on p. 372, vol. 7 of this Encyclopedia) the railways of the north Atlantic section grew from 10,000 miles in 1860 to 35,000 in 1919, the upper Mississippi section from 23,000 miles to 100,000 during the same period, the Southern section from 13,000 to 90,000 miles, and the mountain section from 2,500 miles in 1860 to 45,000 in 1919. This growth included a half dozen distinct east and west lines stretching from the Atlantic to the Pacific and a con¬ siderable number of through lines connecting the northern frontage with the Gulf and the

southern border with many interwoven branches making the surface of the country a veritable gridiron of railway lines, especially the area east of the mountain section.

Meantime, the development of the interior of the country was encouraged by other proc¬ esses. The ((Homestead)) system, by which citizens or aliens who had declared their in¬ tention of becoming citizens might obtain 160 acres of land for a home on payment of $1.25 per acre and an actual residence upon and cultivation of a part of the land, drew millions of families to the interior where these public lands were available and other millions came from Europe to take advantage of this unique opportunity of obtaining homes at a nominal cost. Immigration chiefly from Europe in¬ creased from 250,000 in the closing year of the Civil War to 387,000 in 1870, 457,000 in 1880 and 789,000 in 1882, averaging about 500,000 a year down to 1900 and then increasing to over a million a year as the development of the min¬ ing and manufacturing industries added to the attractiveness of the opportunities offered.

The great prairies west .of the Mississippi which had served in the earlier period as public ranges for large herds of cattle and sheep were gradually divided into farms as the population increased, and the productive power of the in¬ terior of the country was thus gradually en¬ larged. The number of farms in the country grew from 2,000,000 in 1860 to 2,660,000 in 1870, 4,000,000 in 1880, 4,565,000 in 1890, 5,737,000 in 1900 and 6,362,000 in 1910, the latest census year, and the number of persons engaged in agriculture grew from a little less than 6,000,- 000 in 1870 to 12,659,000 in 1910. #

Meantime, the mineral industries developed rapidly. The value of the

products of the mines was in 1870 but little more than $200,- 000,000, advancing to $400,000,000 in 1881, $606,000,000 in 1890, over $1,000,000,000 in 1900, crossing the $2,000,000,000 line in 1912, and exceeding $3,500,000,000 in 1918.

The development of the manufacturing in¬ dustries was coincidental with that of agricul¬ ture and mining, for the factories, of course, required the products .of both the farms and the mines. Not only was there plenty of raw material and coal for manufacturing purposes but the fact that manufactures formed two- thirds of the merchandise being imported sug¬ gested the importance of producing them at home, especially in view of the abundance of raw material suitable for this purpose. The value of domestic manufactures reported by the census in 1860 was $1,886,000,000, in 1870 $4,232,000,000, in 1880 $5,370,000,000, in 1890 $9,372,000,000, in 1900 $11,406,000,000, in 1910 $20,672,000,000, and in 1915 $24,246,000,000, while those best acquainted with the manu¬ facturing conditions of 1919 estimate that the census of 1920 will show a grand total of $50,- 000,000,000 worth of manufactures produced in the calendar year 1919, or 12 times as much as that of a half century earlier. The capital invested in manufactures, according to the census reports, grew from $1,000,000,000 in 1860 to $1,700,000,000 in 1870, $2,800,000,000 in 1880, $6,500,000,000 in 1890, $9,800,000,000 in 1900, $18,500,000,000 in 1910 and $23,000,000,000 in 1915. It will be observed that the growth of capital invested in manufactures was much

more rapid than the growth in value of manu¬ factures turned out, this rapid increase in ap¬ plication of capital to manufacturing being due to the growing use of machinery in the various industries and permitting the manufacturers of the country to turn out a much greater volume of products than they would otherwise have been able to produce in view of the limitation of their labor supply. The capital of the manufacturing industries, as shown by the cen¬ sus of 1915, was 22 times as much as in 1860 while the labor employed in 1915 was only nine times as much as in 1860, and the value of the manufactures turned out about 15 times as much as in 1860.

These developments of the three great in¬ dustries, agriculture, mining and manufactur¬ ing, have created a great commerce both in¬ ternal and foreign. The total foreign com¬ merce of the countrv which was but $317,- 000,000 in 1850, $687,000,000 in 1860 and $850,- 000,000 in 1870, crossed the $1,000,000,000 line in 1872, and was $1,500,000,000 in 1880, $1,650,- 000,000 in 1890, crossing the $2,000,000,000 line in 1900, in which year it stood at $2,244,000,- 000, then $3,315,000,000 in 1907, advancing to $4,258,000,000 in 1914, and with the increased demands .of the war reached $6,531,000,000 in 1916 and

$8,865,000,000 in 1918, while the fiscal year 1919 made a still higher record, $10,- 320,961,000, all of these figures being for fiscal years. The imports grew from $436,000,000 in 1870 to $850,000,000 ˆin 1900, $1,894,000,000 in 1914, all of which preceded the war, $2,946,- 000,000 in 1918 and $3,095,877,000 in 1919. The exports grew from $393,000,000 in 1870 to $1,394,000,000 in 1900, $2,365,000,000 in 1914, the year preceding the war, jumped to $4,333,000,- 000 in 1916, $6,290,000,000 in 1917 and

$7,225,084,000 in 1919. In the normal period from 1870 to 1914, imports quadrupled and exports sextupled, while during the war period, 1914 to 1919, imports increased about 75 per cent and exports increased about 300 per cent. This very large increase in exports during the war period occurred chiefly in manu¬ factures which grew from a little more than $1,000,000,000 in the fiscal year 1914 to $3,337,- 576,000 in 1919, thus illustrating the great possibilities of the manufacturing industries of the United States in their power to supply world markets.

These increases in both imports and ex¬ ports since 1870 are so great as to justify a careful inquiry as to their causes. The growth of exports is perhaps less surprising when it is considered the upper Mississippi Valley with its great possibilities in the production of cereals and meats increased its population from 13,000,000 in 1870 to 30,000,000 in 1914, and its railways from 23,000 miles to 98,000; the South with its great cotton, tobacco and timber areas increased its population in the same period from 12,000,000 to 30,000,000, and its railways from 13,000 miles to 85,000; the great Western area with its minerals, precious metals and live¬ stock increased its population from 1,000,000 in 1870 to 9,000,000 in 1914, and its railways from less than 3,000 miles to 46,000, while the north Atlantic section, the great manufacturing area, increased its population from 12,000,000 to 30,- 000,000, and its railways from 14,000 miles to

31,000.

latitude North

Vancouver]

Lake Wintii.

OltarvTf

TTLE

,oi)S tone

.INSEED

f SHEEP

’* ‘ *sheo’i%7

•‘iw

i ‘■Lowsroi

1 t > ohal p,

LUMBER

COBB

SOUTH

inneafp&Ji

tori

H’vagap

/MBAˆL HHHr\pR 4 *s ˆJ/ < ~ *J,I‘-£ˆKPpTA rW LOUB/'/iAt" ;inonaˆVr£ £P\

~Xˆ BABLt A ZtfOlArˆ

c-vˆMin)lj»o man »«

B Jfsctys/i

- 4 1’# /

pip PR. \

viaukee

ufiBfe) ft

°vfdl

naven kJX X-ONC IStAli

ew Yorkˆ-

*•‘00,0

/ LI SABL*S

‘ omirhnM V

,ioux Clt Vlour

COPPER

‘ctrrjp

HORSES

_ _ nunsta v«

NEBRASK KTq~_

V. Gfa, ,, „ woes .«« ‘V

amie

kM/ERicANMˆ

HU6S

Bluffs NˆU/- / CAmfXˆ

[enne

Omali

HEEP

hops

[ql4ss_ˆ\ ˆhorses Cr

woos

HOGS

LINSEED

-pˆ‘rado

opnngs

■ xingtoi

04 U

*HORSES 7^*

Springfield ^ CATTLE

CATTLl

HOGS

COAL

[corn

V ini dad

//OWS£S

z/wc

co/?-v

tN FRANCISCO \ MTS.

WOGSJ

0Z4«K-MTS.

TftVlequah

CORN

j. Smith

^ Okiahom;

.fruvao;1*

•Amarillo

HOGS

|uerque/

escott

e Hues st

liver

McAleskJ

Ho)

cattle

Springs;

S/L I'EfiJ

SHEEP

Blanco ^

\eston.

Soswell

fiu/r p SttVEi 9*

lattle

FPU IT

iUMBER

SWEE

COAL .04 7 S

WacoTVˆ /ELil 'Tt'

hogs \y

jistine

COTTONSEEC/OIL wfr

TˆLjr — j.1 '/Galveston Bay

Galvestonˆ

dia of the c

;sissTpp _

*‘T*BLa\Y&*

ampav. \y’

fntoniQgutyi/r

ChihuaTi

*(CM**

*Tatnp**

Chrisfi’

Laredo

Fort\My«>

Miami,

UNITED STATES

(Commercial)

Scale

fwnsvilla

*Matamoros /**

240 Statute Miles to one in

Principal Products .

Navigable Portions of Rivers ....

Most important Railroads……..

Most important Steamship Lines

COTTON

_ Tropic < -’VYMazatlan

PF Cancer

longitude West from Greenwich

Copyright, by RandA McNally &• Company

•v

.

. ,

•

.

-

v. ‘

•

• .

■

.

.

—

.

‘• *.

The result of this increase in population and transportation facilities in the various sec¬ tions was apparent in the value of the pro¬ duction of these great natural divisions. The value of farm products in the upper Missis¬ sippi Valley, including crops and livestock prod¬ ucts, increased from approximately $800,000,- 000 in 1870 to slightly less than $5,000,000,000 in 1910, the latest census year, and, of course, have very greatly increased since that time and especially in the war period ; that of the southern section grew from $600,- 000,000 in 1870 to nearly $3,000,000,000 in 1910; that of the mountain section from $65,000,000

to $800,000,000, while that of the north Atlan¬ tic section, chiefly devoted to manufacture and giving little attention to agriculture, increased

from approximately $500,000,000 to about $1,000,000,000 in the period 1870-1910. It is proper to add that these figures must be con¬ sidered as only approximations owing to the changes in census methods from decade to dec¬ ade which render impossible a close com¬ parison of the figures of the two widely distant periods, 1870 and 1910. In general terms, how¬ ever, it may be said that the value of the agri¬ cultural and livestock products of the upper Mississippi Valley were in 1910 about six times

Imports into and Exports from the United States, by Grand Divisions, 1850-1919.

(000 Omitted).

FISCAL

YEARS

Europe

North America

South America

Asia

Oceania

Africa

Imports

from

Exports ' to

Imports

from

Exports

to

Imports

from

Exports

to

Imports

from

Exports

to

Imports

from

Exports

to

Imports

from

Exports

to

1850 .

1860 .

1870 .

1880 .

1890 .

1900 .

1910 .

1913 .

1914 .

1915 .

1916 .

1917 .

1918 .

1919 .

$124,954 216,831 249.540 370,822 449,987 440,567 806,270 892,866 895 , 602 614,355 616,253 610,471 411,578 372,954

$113,862 310.273 420,184 719 434 683,736 1,040,168 1,135,915 1,479,075 1,486,499 1,971,435 2,999,305 4,324,512 3,732,174 4,634,816

$24, 137 75,083 126,544 130,077 148,369 130,035 306,767 361,935 427,399 473 , 080 591,896 766, 113 918,347 1,052,570

$24,723 53,326 68 , 962 69,438 94,100 187,595 385 , 520 617,413 528,645 477,490 733,025 1,163,758 1 ,236,359 1,291.532

$16,647 35 , 993 43,596 82,127 90,006 93,667 196, 165 217,735 222,677 261,490 391,563 542,213 567,418 568,375

$9,077 16,742 21,651 23,190 38,753 38,946 93,247 146, 148 124,540 99,324 180,175 259,480 314,559 400,902

$10,315

26,202

31,413

67,009

67,507

139,842

193,155

276,495

286,952

247,770

437,181

615,217

826,193

830,904

$3,052

11,068

10,972

11,646

19,697

64,914

60,862

115,057

113,426

114,470

278,611

380,250

447,329

603,925

$1 ,401 3,495 1,423 14,130 28,357 34,611 37,101 37,543 42,144 52,523 96,226 65,328 146,206 190,008

$208

5,373

4,335

6,847

16,460

43,391

50,890

79,103

83,568

77,768

98,776

109,315

134,891

208,351

$682 3,799 9,860 3,789 5 , 085 11,218 17,490 26,425 19,149 24,953 67,766 60,013 75,912 81,066

$977

3,228

3,415

5,084

5,082

19,470

18,551

29,089

27,902

28,520

43,591

52,733

54,299

85,157

Value of Domestic Merchandise Exported from the United States, by Great Groups of Articles, 1850-1919, Showing Percentage Which Each Group Forms of Total Exports.

FISCAL

YEAR

Total exports of domestic merchandise

Crude material for manu¬ facturing

C/

/o

of

total

Foodstuffs

crude

%

of

total

Foodstuffs

manu¬

factured

%

of

total

Manu¬ factures for use in manu¬ facturing

%

of

total

Manu¬ factures ready for use

%

of

total

1850. .

$134,901,000

$83,985,000

62.3

$7,536,000

6.0

$20,017,000

14.8

$6,061,000

4.5

$17,162,000

12. 7

1860. .

316,342,000

216,010,000

68.3

12,160,000

3.9

38,625,000

12.2

12,672,000

4.0

35,811,000

11.3

1870. .

370,616,000

213,440,000

56. 7

41,853,000

11.1

50,920,000

13.5

13,712,000

3.7

56,329,000

15.0

1880. .

823,946,000

238,788,000

29.0

256,109,000

32.3

193,353,000

23.5

29,044,000

3.5

92,774,000

11.3

1890. .

845,294,000

304,567,000

36.0

132,073,000

15.6

224,757,000

26.6

46,455,000

5.5

132,527,000

15.7

1900. .

1,370,764,000

325,244,000

23. 7

225,906,000

16.5

319,696,000

23.3

153,275,000

11.2

331,746,000

24.2

1910. .

1, 710,084,000

565 , 935 , 000

33. 1

109,828,000

6.4

259,260,000

15.7

267,766,000

15.7

499,215,000

29.2

1913. .

2,428,506,000

731,759,000

30. 1

181,907,000

7.5

321,204,000

13.2

408,806,000

16.8

776,297,000

32.0

1914. .

2,329,684,000

792,716,000

34.0

137,495,000

5.9

293,218,000

12.6

374,224,000

16.1

724,908,000

31.1

1915. .

2,71 6,178,000

510,456,000

18.9

506,993,000

18. 7

454,575,000

16. 7

355,862,000

13.1

807,466,000

29.7

1916. .

4,272.177,000

535 , 952 , 000

12.6

380,638,000

8.9

599,059,000

14.0

657,923,000

15.4

1,998,298,000

46.8

1917. .

6,227,164,000

731,990,000

11.8

531,806,000

8.5

737, 795,000

11.9

1,191,262,000

19. 1

2,942,577,000

47.3

1918. .

5,838,652,000

897,324,000

15.3

374,978,000

6.4

1,153,702,000

19.8

1,201,439,000

20.6

2,185,420,000

37.4

1919. .

7,074,012,000

1,215,961,000

17.2

719,716,000

10.2

1,785,180,000

25.2

952, 776,000

13.5

2,384,801,000

33.7

Value of Merchandise Imported into the United States, by Great Groups of Articles, 1850-1919, Showing Percentages Which Each Group Forms of Total Imports.

FISCAL

YEAR

Total

imports

Crude material for use in manufacturing

%

of

total

Foodstuffs

crude

%

of

total

Foodstuffs

manu¬

factured

%

of

total

Manu¬ factures for use in manu¬ facturing

%

of

total

Manu¬ factures ready for use

%

of

total

1850. .

$173,510,000

$11,711,000

6

8

$18,012,000

10

4

$21,466,000

12

4

$26, 163,000

15

1

$95,312,000

54

9

1860. .

353,616,000

37,073,000

10

5

35,744,000

10

1

53,771,000

15

3

23,613,000

6

7

199,879,000

56

5

1870. .

435 , 958 , 000

53,119,000

12

2

53,981,000

12

4

96,254,000

22

1

54,545,000

12

5

173,034,000

39

7

1880. .

667,955,000

131,862,000

19

7

100,297,000

15

0

118,125,000

17

7

110,780,000

16

6

196,587,000

29

4

1890. .

789,310,000

170,637,000

21

6

128,480,000

16

3

133,332,000

16

9

116,924,000

14

9

230,686,000

29

2

1900. .

849,941,000

276,241,000

32

5

97,916,000

11

5

133,027,000

15

7

134,222,000

15

8

203,126,000

23

9

1910. .

1,556,947,000

566,271,000

36

4

144,777,000

9

3

181,567,000

11

7

285,138,000

18

3

367,723,000

23

6

1913. .

1,813,008,000

635,210,000

35

1

211,747,000

11

7

194,243,000

10

7

349,402,000

19

3

408,179,000

22

5

1914. .

1 ,893,926,000

632,866,000

33

4

247,948,000

13

I

227,644,000

12

0

319,275,000

16

8

449,318,000

23

7

1915. .

1,674,170,000

575,357,000

34

4

223,230,000

13

4

285,725,000

17

1

237,177,000

14

1

335,877,000

20

0

1916. .

2,197,884,000

948,825,000

43

2

251,887,000

11

5

310,983,000

14

2

356,857,000

16

2

311,871,000

14

2

1917. .

2,659, 155,000

1,109,704,000

41

2

335,573,000

12

6

343,435,000

12

9

477,731,000

18

0

377,257,000

14

2

1918. .

2,945,655,000

1.230.252.000

41

8

372,682,000

12

7

380,227,000

12

9

540,742,000

18

4

402,670,000

13

7

1919. .

3,095,877,000

1,250, 713, 000140.

4

376,228,000

12

2

456,241,000

14

7

605,826,000

19

6

393,195,000

[12

7

Note the increasing share which raw manufacturing material and the decreasing share which finished manufactures, respectively, form of the total merchandise imported.

Relative Development of Agriculture and Manufacturing in the United States 1850 to 1915.

506

UNITED STATES — INDUSTRIAL, COMMERCIAL DEVELOPMENT (54)

3 15

5S>

*+> g**

° a

°g

Is

3 P< >

3

a

3

O

15

“id

>

*3

15

£

*3.

S

15

*3

‘a

3

o

•3

15

> >

O

“a

8

o

CO

G

O

c/5

tH

45

c

15

6

.G

W5

» H

3

aJ

4- >

C/3

a >

< 4-4

O

t-i

JO

H

3

2

o

*3 jf;3 | oU 15

^3-2 6

m

^NO'OO'fN^OO

O^OOvCN^^r*

i CN i

iCNCSfOfO

rdrd

C/3

8

3

&H

N0 > N«0 < 0i0 > 0i

‘OCNˆO»0’,OtNO

cocoroCNCNN*©ˆ

40

3

to

V

*8 5

a d

> s

oooooooo

oooooooo

oooooooo

o’ o’ o’ o* o’ o’ o* o’ oooooooo oooooooo

aoNONOOO

hoc«)‘OnOOO

ooocncocoo-hco

-h^tJucOncOCN© y* CN CN

‘G’G’G

05

+J

a

»« a

°*a

<15 O

(A

>

u

a

ooooooooo

ooooooooo

ooooooooo

o’ o’ o* o’ o* o’ o’ o’ ooooooooo ooooooooo

co o oo cn O* t>T oo 3*

00<0"'0«0

O (t) P M ■‘C N Tf N

rtrt<-i«(N'tOOO

to bo

»fiR

l~< . G • *-H

d_

&P 3 3

y

in P, <4

3 co'g

g ° a

o ° a

oooooooo

oooooooo

oooooooo

o' o' o' o' o' o' o' o' oooooooo oooooooo

w) Oi it) O >b 00 •-< rOObOMt-olOi tOO'OtNtiOO'O'l'

^riwN'oaoif')

»-i CN

/ – - S

T3T3

15

3

rs w

$ a

d «4H

G O

a>

o

oooooooo

ooooooooo

ooooooooˆ

o’ o o* o* o’ o’ O* o ooooooooo ooooooooˆ*

f-’ O 3* o* o’ a* — < * © V3 00 ˆ 00 oc «) o< g ao-0‘4‘0‘0*

WJNOON’OOOO

C5> rtrtCS’i< >0

bo

bo.S

C/5

c b c

3 3 15

g s b « a 3 3 j3

*o*y to*

I) r;”ˆ

bo 3 bP 2 cd G +»

**-> f/1*

a$

£

ooooooooo

ooooooooo

ooooooooo

t>»Hd,tbN‘0‘00

i/)rtioto

prb0f’N«5’-|0 ***t 1/5 C b*»***

‘O’d

c «

c/3^ ^*

gt 3*

O CL) ^ in bo 3 U o

n bin,

(-M C bo

15 cd

oooooooo

oooooooo

oooooooo

IdOlNKJI^NO’H

‘0’OCSW < 000

i^pPNiotb’OO

*CNtOtOt’-00©CN3**

— H H rt

aj a J /— s

aS

«HH

G’

a

ai

C C/3 s

g a

G

0)

c/) rj a> G

tOCOOOCNlOr-<00

o^^ooa>oo

O^^OOr^^rocvj

roOCNcotOCNio© ^ TH CN CN 1^ lO lO

tx

aj

fe

oooooooo

oooooooo

oooooooo

ON^Oootor^cNOO

’t^‘OO’OfO’OH

rfO’OO^NCON

a aj

OOOOOOOLO

irj’ONOOaO’HH

CC00CCCC00O\O\O\

in

rH

o\

rH

Tj

a

aJ

o

rH

CN

t/3

0)

aj

**G*

g

aj

rG

in

Q)

4-J

aJ

a

w

a>

o

**3*

s

8

‘S

TJ

a)

u

aj

a

6

o

o

in

a

a

aJ

a

I-.

a>

a

m

0)

bo

<£J

w

d

G

(U

o

a -g

o

° ^ W, o o

n

a q)

*w > (D^*

l-s

CO 2

-'3 3 +J

05 15 3

*15 *> 3 fl> • S n) 15 O*

£ G ° G

ot.s g a

a +J.3G5 C

si

U'..

C/3 rH

. – g-5 a

• °

U H r/1

xi. S

gpT? §

2

G ,3 _

-.tJ'S

^ O G _

Cpa 3 3

tO.SP Ih O "3 3'£ < 2

*2-3^^*

C 2 3 3 O

3

o . o G3

0]

a

3

a

1

G

o

X)

C 05

• 22J "»•«

Td .G T) 15 15 3 – -e

05 3 .

05

_ 15

3U

gL3

‘a 3”cj ‘’3ˆi5

rt

c n

<

w

PS

<

o

z,

(—1

u

t)

n

o

OS

Ph

H

<

u

OS

o

> *

so

VO

r— H

ON

o

H

o

00

C/5

[3

<

H

to

o

w

H

D

w

ffi

H

p<

o

H

w

s

a

o

w

o

hJ

<

t— I

OS

H

C/5

p

p

Per ct.

in¬

crease

H N H \0 rH 00

00 to to Tf ˆ-4 »o

r-i NHH(N

Oj

0)

Vi

**0*

48,000

42 , 560

00,000

00,000

00,000

00,000

00,000

oj

r-H

O fOOOOO

G

a

O’ O’ rH ^ N 00

“3

+0

G

3

O

O CN 0 O ON ^ ^

Tf< rH ^-H

4^

o

00

ooooooo O CO o o o o o O to o o o o o

O* CN o’ o’ o’ o’ O a o o o o o a 3< o o o o

ION030

HNIOO’O

T-H

Per ct.

in¬

crease

fOtOOˆONO N(N00 Tf CO Tf

« ˆ

ooooooo

ooooooo

O CN O O O O O

a c/j 0 c 0 c> 0

oj

co 00 O O O O O

03

Vi

a

00 a 0 0 0 0

cd

rH

CN CN O Tt< C'. rf<

G

CO to 00 00 O'

c

co r)> © O 00

g:

00 CN <0 CN

tfy

d

OOOOOOO

C/2

O 00 O O O O O

0 CN 0 O O O O

CN CO 0

O

— 1 —• 0 0 0 0 0

*O 3*0000*

00

r-H

CN N r-1 rf (N O

00 © 0 cˆ 00

rH lO VO CO rH

4 >ˆ

>»

rH

• H

a

a

(-1

15

a

a

p

fl OT

° I 3 1-, c 15

05

a

o

CN O rH t>» *—« IT)

lOfOiOfOˆOO

CO ˆ N CO

to

T-H

a

oooooooo

o a o o o o o O CN o o o o o

00 00 o” o’ o’ o* o’ 3< a o o o o o © CO o o o o

CN

CO

o cn o a oo

to 50 O O CO

CO to

CN

4ˆ

o

r-~

00

ooooooo

o >o o o o o o O 00 o o o o o

y* CN O o' o' o' o' 00 CN o o o o o a_ « o o o o

CN adl'to'

y* CO y* 00 CN co f*» O to

rfl r— (

4^

aj

i-.

OJ

x:

p

o

p;

« % ° ' 3

t-.S « A tJ

CN CO >

3* ' — 1

d

rtlOrt-.

co

to

a

O to o o o o o O CO o o o o o

0000000

(NOfOOOO

CO CO O O O o O

y O O O O*

O 00 oo CO o

co »o cˆ

ONOM

CO

-L O

o

00

ooooooo

ooooooo

O 3 LO O O O O*

CN -3 CO o' o' o" o' ■3 LO © o o o •3 o o o o

CN 50 CO to <0

*o *-< a co*

CN to © CO CO CN «-■

m

VI

15

G ..

O

iS o 3i

a— ^

C G 3

C/3

o

d

oj

CJ

0) 3 oj .

co^'g^-a

^>p 36

3

cd G

c o

■S<0

P O.

.8

*c5^*

43 G

0^3

UNITED STATES — INDUSTRIAL, COMMERCIAL DEVELOPMENT (54) 507

as much as in 1870, that of the South about five times as much, that of the mountain re¬ gions 12 times as much, while that of the north

Atlantic region, the great manufacturing area, barely doubled, and the area of this north Atlantic section devoted • to agriculture was practically unchanged, the tendency of the (

Manufactures Produced in the United States, 1850 to 1915; also Value of Manu¬ factures Exported and Imported.

(Values of production are those at the factory; those of exports are values at the port of exportation; those of imports are prices in country from which sent to the United States).

CENSUS

Manufactures

Manufactures

Manufactures

YEAR

produced

exported (b)

imported

1850. . . .

$1,019,000,000

$43,238,000

$121,475,000

1860. . . .

1,886,000,000

87,078,000

222,792,000

1870.. . .

4,232,000,000

120,661,000

227,579,000

1880. . . .

5,369,000,000

315,171,000

307,367,000

1890.. . .

9,372,000,000

423,739,000

347,610,000

1900.. . .

(a) 11, 406, 000, 000

804,717,000

337,348,000

1910. . . .

(a) 22, 100,000,000

1,026,251,000

652,861,000

1915.. . .

(a) 26, 300, 000, 000

1,617,903,000

573,054,000

(a) Includes estimate for home trades and neighborhood products, included in census reports prior to 1900.

(b) Includes manufactured foodstuffs, in order to render figures comparable with census figures of manufactures pro¬ duced, which include manufactured foodstuffs.

The progress in manufacturing in the vari¬ ous great areas is equally interesting. The value ,of manufactures produced in the United States was shown by the census of 1870 at $4,232,000,- 000, and the output of 1914 was recorded by the 1915 census at $24,246,000,000, though the latter figure omitted the product of the hand trades and neighborhood industries which were included in the 1870 census, and which if in¬ cluded in the 1914 figures would have brought the total value of products up to fully $26,- 300,000,000 in 1914, as against $4,232,000,000 in 1870. The value of the manufactures of the entire country in 1914 may, therefore, be said to have been more than six times as great as in 1870, while the value of the farm products in 1910 (the last census year) was about four and one-half times as much as in 1870, indi¬ cating that the growth in manufactures has been greater proportionately than that of agri¬ culture. The North Atlantic section increased its output from $2,750,000,000 in 1870 to $11,- 000,000,000 in 1914; the upper Mississippi sec¬ tion from slightly less than $1,000,000,000 in 1870 to $8,575,000,000 in 1914, the South from $350,000,000 to $3,130,000,000 during the same period, and the mountain section from $100,-

000,000 in 1870 to $1,500,000,000 in 1914. The north Atlantic section gained about $8,250,- 000,000, the upper Mississippi Valley about $7,500,000,000, the South about $2,750,000,000, and the mountain section about $1,400,000,000. In the north Atlantic section the value of the imports turned out in 1914 was about four times as much as in 1870; in the upper Mississippi section the value of manufactures in 1914 was more than eight times that of 1870; in the

South about nine times as much, and in the mountain region about 15 times as much as in 1870. The north Atlantic section produced about 65 per cent of the manufactures in 1870 and but 45 per cent in 1914; the upper Missis¬ sippi produced about 23 per cent of those of 1870 and 35 per cent of those of 1914; the South about 7 per cent in 1870 and 14 per cent in 1914, and the mountain region about 3 per cent in 1870 and 7 per cent in 1914.

It is proper here to again call attention to the fact that the figures of production of manu¬ factures in the various sections are materially affected by the fact that the census reports call all products of slaughtering, milling and dairy products as ˆmanufactures,® which gives to the upper Mississippi section a larger share of the total manufactures of the country than would be the case if the groups ordinarily considered as ˆmanufactures® were included. The flour,

meat and dairy products included in the census classification of ˆmanufactures® aggregated in 1914 about $3,000,000,000, forming about 13 per cent of the census valuation of manufactures turned out in that year, and as most of these originated in the upper Missis¬ sippi Valley they materially increased the per¬ centage with which that section is accredited in the figures of manufactures produced. If these three groups, flour, meats and dairy prod¬ ucts, were omitted from the general list of manufactures, the share which the upper Mississippi Valley produced and the remain¬ ing $21,000,000 of manufactures would be ap¬ proximately 31 per cent instead of 36 per cent as shown in the grand totals of the census which includes these three groups of food¬ stuffs as manufactures, although the labor per¬ formed in making them ˆmanufactures® is comparatively slight. The value added to the raw material by the manufacturing process, according to the census figures, is in the case of flour, meats and dairy products but about 15 per cent, while in all other manufactures the share added to the value of the raw material by the manufacturing process is approxi¬ mately 80 per cent.

*The growth in manufacturing has been the most striking characteristic of the industries and commerce of the United States. This is especially true of the more recent period. Manufactures formed but 45 per cent of the products of the country in 1850, 53 per cent in 1860 and 58 per cent in 1870. By 1880 they had so gained in their growth over the other chief product, that of agriculture, that they formed 65 per cent of the total production of the country and have remained at about that ratio in the census records since that time with the exception of 1890 when farm products were below normal, thus making the share which manufactures formed of the total production slightly more than 70 per cent. Meantime with the growing demand*of our own people upon the agricultural area and the trend of the farming population toward the cities and manufacturing towns, the share which agricultural products formed of the total exports has steadily de¬ creased despite the increased value of the total output, most of which was consumed with the country. Agricultural products, according to an estimate made by the Agricultural Depart¬ ment from year to year, formed approximately*

84 per cent of the exports of the country in 1880, 75 per cent in 1890, 62 per cent in 1900, 51 per cent in 1910, 46 per cent in 1913, the year

*Value of Farm Products in the United States and of Agriculture Products Ex¬ ported and Imported 1850 to 1918.**

(Census figures of farm products to 1910; estimate of Department of Agriculture for later years; Department of Agriculture figures on value of agricultural products ex¬ ported).

Value of farm products

Agricultural

exports

Agricultural

imports

1850

(a) $1,003, 000, 000

(c)$ 149, 000, 000

(c)$81 , 726,000

1860

(a) 1,300, 000, 000

260,280,000

129,816,000

1870

1,958,000,000

296,962,000

191,559,000

1880

1,212,000,000

694,314,000

314,617,000

1890

2,460,000,000

634,408,000

384,100,000

1900

4,717,000,000

844,616,000

420,139,000

1910

8,498,000,000

871,158,000

687,509,000

1913

(b)9, 850, 000, 000

1,123,601,000

815,300,000

1914

(b)9, 894, 000, 000

1,113,900,000

924, 127,000

1915

(b) 10,774, 000, 000

1,575,937,000

910,876,000

1916

(b) 13, 406, 000, 000

1,518,071,000

1,189,704,000

1917

(b) 19, 331, 000, 000

1,968,253,000

1,404,972,000

1918

(b) 2 1,386, 000, 000

2,281,338,000

1,614,220,000

1919

24,982.000,000

.

.

- *Valuation of farm products of United States are those at the farm; the export values are those at port of exporta¬ tion; the import values are those in the country from which the merchandise was exported to the United States.*

(a) Estimated.

(b) Department of Agriculture estimate of wealth pro¬ duced on farms.

(c) 1855; no data for 1850.

before the war, and 31 per cent in 1917, this sharp fall in the percentage during the war being chiefly due to the great increase in the exportation of manufactures for war purposes. Meantime manufactures which formed but 15 per cent of the exports in 1860

and 18 per cent in 1870 were 20 per cent in 1890, 26 per cent, in 1900, 45 per cent in 1910, 48 per cent in 1913, 66 per cent in 1917 and about the same in

1919.

This large increase in manufacturing in the United States has had a perceptible effect on

the imports for certain of the manufacturing material must be drawn from abroad even in a country of such varied production as in the United States. All of the raw silk, most of the fibres, one-half of the wool, all of the tin and a small percentage of the cotton used in the factories are necessarily brought from abroad, since we produce no silk, or jute, or sisal, or Manila hemp, or tin and only one-half of the wool which we require. As a conse¬ quence the imports of raw material for manu¬ facture increased from $50,000,000 in 1870 to $132,000,000 in 1880, $276,000,000 in 1900, $566.- 000,000 in 1910, $635,000,000 in 1913, $1,230,000,- 000 in 1918, and $1,250,715,000 in 1919.

Our demands upon foreign countries have increased in foodstuffs as well as in manu¬ facturing materials. We bring into the country all of the coffee and tea and cacao which our people consume, also about 50 per cent of the sugar consumed, while another 25 per cent comes from our own islands, Porto Rico and Hawaii, but is not classed as an import since those islands are customs districts of the United States and the merchandise coming from them not classed as imports. Our importation of foodstuffs, exclusive of that from our own islands, has increased from $150,000,000 in 1870 to $327,000,000 in 1910. $175,000,000 in 1914 and $760,000,000 in 1918. Quite naturally the manu¬ factures imported showed a much slower in¬ crease in view of the enormous quantities of manufactures turned out by our own factories, the value of finished manufactures imported having advanced from $173,000,000 in 1870 to $203,000,000 in 1900, $360,000,000 in 1912 and $499,000,000 in 1914, dropping to $403,000,000 in 1918, and $393,000,000 in 1919, this reduction being due chiefly to the fact that the European countries from which we had drawn most of our manufactures were not in position at the close of the war to export any considerable quantity of the products of their factories. The share which finished manufactures formed of the total imports of the country fell from 40

Vaiue of Merchandise Imported into and Exported from the United

States, 1790-1919.

(000 Omitted).

FISCAL YEAR

-

Exports

Imports

Domestic

Foreign

Total

1790 .

$19,666

$539

$20,205

$23,000

1800 .

31,841

39,131

70,972

91,253

1810 .

42,367

24,391

66,758

85 , 400

1820 .

51,684

18,008

69,692

74,450

1830 .

58,525

13,146

71,671

62,721

1840 .

111,661

12,008

123,669

98,259

1850 .

134,900

9,475

144,376

173,510

1860 .

316,342

17,334

333,576

353,616

1870 .

376,616

16,155

392,772

435 , 958

1880 .

823,916

11,692

835,639

667,955

1890 .

845 , 294

12,535

857,829

789,310

1900 .

1,370,764

23,720

1,394,483

849,941

1910 .

1,710,084

34,901

1,744,985

1 ,556,947

1913 .

2,428,506

37,378

2,465, 844

1,813,008

1914 .

2,329,684

34,895

2,364,579

1,893, 926

1915 .

2,716,178

52,411

2,768,589

1,674,170

1916 .

4,272,178

61,305

4,333,483

2,197,884

1917 .

6,227,164

62,884

6,290,048

2,659,335

1918 .

5,838,652

81,059

5,919,711

2,945,655

1919 .

7,074,012

151,073

7,225,084

3,095,877

Excess of

Exports

Imports

. $2,795

. 20,281

. 18,642

. 4,758

58,950 .

25,410 .

29,134

20,041

43,186

167,684 68,518 544,542 188,037 652,876 470,653 1 ,094,420 2,135,599 3,630,693 2,974,056 4,129,208

UNITED STATES- ARMY OF THE UNITED STATES (55)

509

per cent in 1870 to 24 per cent in 1900, 22 per cent in 1912, 14 per cent in 1918 and 13 per cent in 1919, while the share which raw material for manufacturing formed of the imports increased from 13 per cent in 1870 to 32 per cent in 1900, 42 per cent in 1918 and 40 per cent in 1919.

Probably not more than about 5 per cent of our manufactures are exported in normal years, though this can be only a rough approximation, as this question, although extremely important, is at the same time extremely difficult to answer in exact terms. The census, herewith indicated, includes in its classification "manu¬ factures® many articles prepared for food which are not included in the government's classifica¬ tion of "manufactures® exported. Meats, flour, dairy products and certain other articles which the census classes as "manufactures® are classed by the Department of Commerce in its export figures under the general heading of "Food¬ stuffs.® In order, however, to render com¬ parable the figures of the census with those re¬ lating to imports and exports, the Bureau of Statistics a few years ago readjusted its classi¬ fications, dividing "foodstuffs® into two groups, one of which included all manufactured food¬ stuffs. It is possible, therefore, by combining the export group "foodstuffs partly or wholly manufactured® with the two groups "manufac¬ tures for further use in manufacturing® and "manufactures ready for use® to obtain a total which represents all articles classed by the census as "manufactures.® Another difficulty which arises in attempting to compare this ag¬ gregation of the three groups with the full census classification of manufactures produced lies in the fact that the census valuation of manufactures produced is the value at the factory at the time of production, while the Department of Commerce figures of valuation of the merchandise when exported is the value at the port from which sent out of the country at the date of exportation. It thus happens that, necessarily, the valuation placed upon the manufactures when exported is in most cases somewhat in excess of that named by the manu¬ facturer in his report to the Census Bureau, since the cost of transportation from the factory to the port of exportation would necessarily be

added and in many instances the profits of the persons who may have purchased them from the manufacturer for exportation. Compari¬ sons, therefore, of the Department of Com¬ merce valuation of manufactures exported with the census valuations of manufactures pro¬ duced must be made with the clear understand¬ ing that the valuation of the merchandise ex¬ ported is probably somewhat in excess of that named for the same articles by the manufac¬ turer who reported to the census its value at the door of the factory. Even with this in¬ creased valuation necessarily included in the export figures, the ratio which the total value of manufactures exported bears to the total valuation of manufactures produced in the country is extremely small, having averaged slightly less than 5 per cent during the entire period from 1860 to 1915, the percentage which the value of manufactures exported bore to the census valuation of manufactures produced hav¬ ing been in 1870 3.1 per cent, in 1890 4.3 per cent, in 1905 4.7 per cent, in 1910 4.9 per cent, advancing to 6.7 per cent in 1915, when the de¬

mands of the war brought the exports of manu¬ factured foodstuffs to an abnormally high figure.

Manufactures are the future hope of the foreign commerce of the United States. While it is true that the country responded generously to the calls of Europe for foodstuffs during the World War it is also true that our growing population demands a constantly increasing share of our agricultural products, while the very great increase which was made in manu¬ facturing for exportation during the war sug¬ gests almost unlimited possibilities in the power of production of manufactures in the United States and especially so in view of the increas¬ ing use of capital in the form of machinery in the factories of this country, an increase much more rapid than that of other countries. Esti¬ mates by the best experts put the total value of manufactures in the United States in 1919 as probably about $50,000,000,000, while the ex¬ ports of manufactures in the fiscal years 1918 and 1919 have in each case exceeded $3,000,- 000,000 as against about $1,000,000,000 per an¬ num in the period immediately preceding the war. The world had made a much better ac¬ quaintance with United States manufactures during the war period than ever before for we were supplying in the calendar year 1918 nearly or quite one-half of the manufactures entering international trade as against about one-sixth prior to the war and with the plentiful supply of capital available our manufacturers should have no difficulty in so increasing the use of machinery in their factories as to enable them to turn out their products at as low a cost as those of the countries having a cheaper labor supply but less

plentiful supply of capital, and thus assure to the United States a steady growth in manufacturing and in exportation of the products of our factories.

0. P. Austin,

Statistician, National City Bank, New York.

55. ARMY OF THE UNITED STATES.

The army of the United States was the legiti¬ mate descendant of the old militia organizations maintained in the various colonies prior to the Revolution. The nucleus of the regular army of the nation was the small force of riflemen authorized by the Colonial 'Congress on 14 June 1775 to serve the United Colonies. Be¬ ginning then and continuing to the present the military forces of the United States consist of a regular army maintained by the Federal government and a system of State troops called for a long time the Militia and later the Na¬ tional Guard. When these forces were found insufficient, volunteers have been called for or armies have been raised by draft. The coun¬ try has never authorized compulsory universal military service and in peace times it has always been difficult to win away from civilian pur¬ suits enough men to maintain either the regu¬ lar army or the State forces. The country has always shown a just pride in the small regular army, but service in its ranks has never been popular. The splendid opportunities offered to healthy young manhood by the rapid develop¬ ment of the economic life of the new country left few youths seeking long term enlistment in regular regiments. The nation has never been enthusiastic in its attitude toward the army and such military enthusiasm as existed naturally found a congenial opportunity in the militia.

Thus the dual services intended to co-operate and supply whatever military needs might arise gradually became competitors, not of course in efficiency but in the quest for men to serve.

Washington, the most popular commander the army ever had, complained constantly that men preferred service in the less efficient mili¬ tia to that of the continental line regiments. In every war where the regular troops have re¬ quired the co-operation of the militia the early antagonism has found fresh expression and the problem of the regular army has been less that of learning how to fight a foreign foe

than to discover some means of getting rid of the mili¬ tia incubus. It is undeniable that the nation has never supported a regular army comparable to its population or its wealth. 'Safeguarded by its political isolation for a century no dis¬ aster resulted and it suited the popular preju¬ dice to assume that the militia would be ready when wanted.

The establishment of a national army school in 1802 at West Point under the title of The United States Military Academy led to the development of the only military caste in the nation. The small groups of boys educated there to become officers in the regular army passed out of its graduating classes and disap¬ peared into remote little army posts. As pro¬ fessional soldiers they knew the danger of the situation, but they always lacked numbers or influence to persuade the nation that the militia might prove a dangerously weak element in the scheme of national defense if a great danger should suddenly arise. For more than a hun¬ dred years no great external danger ever did arise and government and people smiled com¬ placently upon the militia and turned a deaf car to the warnings or complaints of the regu¬ lar. As a matter of fact the history of our wars proves that we have been always the win¬ ners, even when our fighting has been most in¬ ferior and our military measures totally inade¬ quate. Fate made the country a nation of optimists, confident that we could win wars al¬ most without soldiers. The history of the mili¬ tia in the early days of the colonies laid the foundation for this public obsession. In those times the settlers either combined for local de¬ fense or co-operated in larger groups when nec¬ essary to defend the frontiers of their colony.

When larger dangers threatened, as more particularly in the time of the French and In¬ dian wars, several colonies contributed detach¬ ments of some strength which joined the regu¬ lar British troops and served under their com¬ manders. It is well worth while to remember that the history of those early campaigns against the Indians, and later against the French and Indians, showed a marked superi¬ ority on the part of the colonial militia over the professional soldiers trained in European schools of war. Neither lacked courage or hardihood, but the militia knew how to fight the Indian and the regular soldier did not. The militia were fighting to hold back a foe who threatened soon to be ravaging the whole coun¬ try, and so brought their whole-hearted devo¬ tion to the cause. When the struggle against England began in the first days of the Revolu¬ tion the militia rallied at a moment's notice and fought British regulars, retreating from Concord, with as great skill and courage as they had displayed a generation earlier when

covering the retreat of British regulars after the disastrous defeat of Braddock at Fort Du- quesne. The minute men who inflicted heavy casualties upon the British column trying to fight their way back to Boston on 19 April 1775, gave every evidence of being worthy descend¬ ants of those other militiamen who had shown such splendid capacity for hard fighting against odds in the attacks upon the powerful fortifica¬ tions at Louisburg in 1745, and again in 1758. Two months after the affair at Concord and Lexington we find the militia of the New Eng¬ land provinces gathered in intrenched positions on Bunker Hill. Here their 1,500 hastily organ¬ ized unprofessional soldiers fought the famous battle against veteran regular troops who out¬ numbered them two to one. The British troops, all regulars, at Bunker Hill fought an American force composed entirely of militia¬ men. The British losses (89 officers and 965 men) were nearly 50 per cent greater than in any later action in the seven years' war. The losses of the American militia were 449 in all, and occurred mostly when, with ammunition ex¬ hausted, they wrere compelled to retreat across exposed ground.

After the Battle of Bunker Hill the Conti¬ nental Congress at Philadelphia perceiving that the war wrould not be confined to New England authorized the adoption of the forces already in the field as a Continental Army, owing allegi¬ ance to the United Colonies. On 14 June 1775 authority wes voted for the raising of 10 com¬ panies of riflemen in Pennsylvania, Maryland and Virginia to serve one year. These troops formed the nucleus of the Continental Army or regular forces of the United States, as we have come to call our national troops. On 15 June 1775 George Washington wˆas appointed com- mander-in-chief, and on 3 July at Cambridge, Mass., he took command of the 17,000 militia¬ men engaged in the investment of Boston.

From that time on a bitter conflict has con¬ tinued between the regular and the militiaman, and the literature of our professional army has for more than a century lamented that the early history of the country gave rise to a confidence in and reliance upon the State militia forces, wffiich has contributed to the defeat of the hun¬ dreds of measures proposed for the creation of an adequate regular army. General Washington unquestionably was distinctly opposed to the use of the militia in the struggle against the Brit¬ ish armies and frequently reiterated his belief that the cause of the colonies was likely to be lost unless Congress would raise a sufficient permanent force, enlisted for a term of several years and owing allegiance to the central gov¬ ernment only. Washington was not a soldier by profession, although he had served in the Virginia militia and had

distinguished himself in the French and Indian War. He was a man of the highest personal integrity and singularly pure in character, and these qualities won for him the respect and confidence which enabled the widely diversified elements in the new union to unite upon him as an acceptable leader. He won no great military victories and he suf¬ fered many humiliating defeats, but he held the love and faith of all parties at all times. Under his leadership the discouraged and often waver¬ ing forces held together in sufficient numbers to keep the field, until after the lapse of years which had seemed hopeless, French fleets and

armies came to help turn the tide from defeat to victory. In August 1776 Washington had on Long Island a paper strength of 27,000, but when the battle developed he could oppose only 8,000 combatants to Lord Howe's 20,000 British troops. The loss of that battle and the subse¬ quent reverses enabled the enemy to expel the Continental forces from both New York and New Jersey. Washington's complaint against the militia was based upon the short and vari¬ able terms of their service. The Continentals were enlisted at first for two years and later for three years and as the armies were composed of both Continentals and militia the plans of the commander were constantly complicated by the ever approaching departure of some of the militia units. Throughout the war the Ameri¬ can forces when operating without foreign help were singularly unsuccessful, except in minor or surprise attacks as at Ticonderoga, Stony Point, Trenton and Monmouth. The one nota¬ ble exception was the brilliant victory at Sara¬ toga when on 17 Oct. 1777, the British army under Burgoyne surrendered to an overwhelm¬ ing force of militia rallied to the defense of Northern New York under Gates, Arnold, Mor¬ gan and Schuyler.

The militia were frequently proved unreli¬ able and it is equally true that the Continentals wrote fewer victories on their colors than might have been expected of trained troops recruited from a brave and ambitious people.

The burden of Washington's complaint was that the shorter service offered in the militia, usually three, six or nine months, proved much more attractive to most men and that conse¬ quently it was difficult to get sufficient good men to enter the regular service. The history of the war prove's that when the circumstances would permit a quick

assembling and a short campaign the militia were as brave and efficient as ever.

On the other hand, they were totally in¬ efficient and unreliable when called upon to submit to the long and trying periods of in¬ active camp or garrison life.

We have indulged in this comment upon the early rivalry between the regulars and the militia because it gave rise to a situation which has persisted and has embarrassed every army administration from 1775 to the present.

In some of the darkest years of the Revolu¬ tion there were more Continentals on the army pay roll than there were British troops in Amer¬ ica and yet the effort has always been to put the blame for the failures of those years upon the militia.

Since then the claim has always been in every stage of army existence that the army itself would have been a better and more effici¬ ent instrument if the militia had been abolished. Nevertheless the States and the United States have continued to maintain the militia so that it is apparent that in the view of the country at large this branch of the military service has really been much less unworthy than it has been declared to be by its professional army critics.

In the War of 1812 the whole operations of the land forces might be admitted to have con¬ tributed little or nothing to the ultimate victory. The militia were frequently inefficient and the regulars won no decisive campaigns.

The Indian wars were frequent, sometimes

lengthy and always more costly than they would have been if the country had kept ready for all emergencies a strong regular army. The Mexican War was a brilliant chapter in the history of our army which carried an aggressive and uniformly successful campaign through great physical difficulties to complete success.

The Civil War disclosed the fact that whereas the government school at West Point had produced a fine standard of professional efficiency among officers, it had not so far nationalized them that all could be depended upon to join a national issue when opposed to sectional interests. Many of the most capable officers were from southern States and resign¬ ing their commissions in the United States army they took service in the Confederacy and sup¬ plied the skilful

leadership which kept the War raging for four years. The regular army sup¬ plied but a small fraction of the great armies called out between 1861 and 1865 and the vast majority of both officers and soldiers joined the colors utterly devoid of previous military training.

For many years preceding the Civil War there had been no need of the militia and in consequence it had degenerated into a practically worthless military asset. The State records ex¬ hibited a considerable paper strength but the regiments were little more than picturesque fea¬ tures for Fourth of July parades. When the Civil War made its demand for men in large numbers the early campaigns showed clearly that the previous decades had seen the develop¬ ment of prosperous communities and the decay of militant virtues.

The progress of the war with its long hard campaigns of varying fortune demonstrated that the nation both North and South still possessed the raw material out of which fine armies could be raised.

When the war ended in 1865 great armies of splendid veteran soldiers returned to the pur¬ suits of peace. The credit for most of the skill in training and leading those armies belongs to officers who had been educated in the regular service. Many thousands of capable and bril¬ liant officers came green into the service and learned the science of war on the battlefields, but until they had learned they were nearly as dangerous to their own men as were the enemy.

The Indian Wars which followed the Civil War were entrusted almost entirely to the small regular army which was for many years kept constantly in the far west. A very high degree of efficiency for border warfare was developed but the conditions were decidedly unfavorable to the study of modern warfare between civil¬ ized powers.

The sudden outbreak of war with Spain in 1898 made it necessary to call into the National service the National Guard of the States as well as a numerous volunteer army. The Na¬ tional Guard in a few of the States was a fairly well organized and partly trained force but in many of the States neither officers nor men had more than the most elementary preparation for service in war.

Fortunately the campaign in Cuba was a very brief one and the fine aggressive spirit of the small regular army caused the Spanish defense to crumple up with very little hard fighting.

The large forces gathered in training camps

in the States suffered heavy losses from camp diseases and showed every evidence that they would have needed much training before they could have been described as parts of an efficient and disciplined military force. The Spanish War while brief and rather trivial in the nature of its one short campaign did the country a great deal of good. The old notion that no foreign complications could ever disturb the peace of the United States was rudely and quite effectually uprooted. The -country was ready to believe that there was need to support a somewhat larger regular army and to give more attention to all of our military interests. The condition of the state troops had been shown to be far from any reasonable degree of efficiency. The next 20 years witnessed a great improvement in the quality of the National Guard in several of the States but in many places the organization continued to merit the criticism which the professional aimed at its glaring faults. Those criticisms were often permitted to seem to apply to all the forces in all of the States and the result was an un¬ fortunate antagonism between the regular es¬ tablishment and the National Guard which was hurtful to both.

The war in the Philippines meanwhile gave the regular army its first experience of foreign service but unfortunately the lessons learned there were too much like our own old cam¬ paigns in the Florida and other Indian Wars. A number of special service volunteer regiments were raised to augment the regulars in the Philippines and these regiments carefully trained to regular army standards gave excellent service.

The punitive expedition into Mexico in 1916 was in the nature of a cavalry reconnaissance by a strong regular column against guerilla forces and provided little experience of value for the great conflict in Europe. The mobilization of the National Guard taught the States many lessons of value and helped elimi¬ nate a great deal of useless dead wood which had been carried for years in the State organ¬ izations.

Since the Revolution the American armies had never been called upon to face a great conflict with a foreign power and the only experience of hard fighting with modern weapons had been that of the Civil War.

Several times in recent years serious diffi¬ culties have arisen along

the Mexican frontier and in 1916 the prospect of war with Mexico seemed so imminent that the President mobilized the National Guard on the Mexican border. No fighting developed but the guard from every State in the Union had the benefit of their first experience in distant service under cam¬ paign conditions for many years. The condi¬ tions were peculiar.

In 1792 Congress enacted the first militia law which was until 1903 the only law relating to the militia. Having become largely a dead letter Congress in 1903 passed the Dick bill de¬ signed to promote the efficiency of the militia.

The National Defense Act finally became a law on 3 June 1916 and the mobilization of the National Guard was ordered only 15 days later before either the War Department or the State authorities had become sufficiently familiar with its requirements to formulate a clear and prac¬ tical course of procedure. Under this law the

National Guard was recognized by the Na¬ tional Government as those organizations in the States whose officers and men had taken the Federal oath provided in the National Defense Act. Until this Federal oath was taken the State forces were known as the organized militia.

The State forces went to the Rio Grande with great enthusiasm but as the months passed and it became evident that there was to be no warlike service for them over the border large numbers of both officers and men demanded their release in order to return to their business and their families. Nothing else in recent years has so clearly illustrated the essential difference between regular and National Guard troops. The regular troops were ready to march out of their various posts wherever they might be and entrain for the border within a few hours after the receipt of telegraphic orders. Once there they were as contented to settle down to the monotony of border patrol duty as they had been to remain in barracks elsewhere. In short they proved to be exactly what the country expected them to be — professional soldiers without any other interest in life than the performance of military duty. At the end of 1916 the War Department issued a book of 169 closely printed pages reciting the history of this mobilization and bearing throughout evi¬ dence of the unvarying antipathy of the whole commissioned personnel of the regular army to the National Guard. The burden of the criticisms would have formed an overwhelming indictment of regular troops raised and main¬ tained at government expense in a State of constant readiness for field service. The diffi¬ culty lies in the

inability of the regular estab¬ lishment to appreciate the view point of the nation at large. The people of the United States do not expect these State auxiliary forces to be ready at a moment's notice to step out of home and civil occupation and display a degree of readiness for war equal to that of the regulars. They do expect and are increasingly providing the means for them to so far perfect themselves in organization, drill and rifle practice as to be a valuable first auxiliary to the regular army ready after a few months training in the field to face an organized enemy. Back of the Na¬ tional Guard the nation relies upon a great national force of volunteer or draft troops whose organization and training must neces¬ sarily require a much longer period. From the view point of the professional soldier it would appear desirable that the nation should consent to his advice and maintain at all times a great standing army. The fact is, however, that no argument from Washington's time down to the present has ever induced any considerable part of our people to agree to this. The settled determination of the country has always re¬ mained steadfast in adherence to the scheme of the founders for a small regular army and as large and as efficient a force of State troops as will be supported and recruited by the people of the various States.

There can be little doubt that the experi¬ ence of the nation in the noted war with Ger¬ many has greatly enlarged the vision of the country as to the technical requirements for modern warfare. The value of preliminary training is now generally recognized and it is reasonably certain that State administrations

will be more ready than ever before to co¬ operate with Federal authorities in plans to harmonize training and equipment as well as organization and paper work methods with regular army standards. The time has come for the dual services to really co-operate for the good of the country. The State troops know now how vitally necessary are training and discipline. The regular should know that the country will not permit him to lag behind any foreign service in scientific development. Both have learned how tremen¬ dous is the physical strain of modern campaigns and must recognize the necessity for great attention to physical training. It was a dis¬ agreeable revelation to the whole nation to discover that a terribly large proportion of our young men were found physically unfit for the army when summoned by the draft. Quite as astonishing was the

discovery of illiteracy, for the very rudimentary requirements found more than 24 per cent illiterate and any test which had required the equivalent of a good public school education would have resulted in a much greater disqualification.

It is slow work to build into military effi¬ ciency men who are either physically or mentally below the average.

As the United States wifi always find it necessary to hurry the training of national armies summoned in emergencies it becomes apparent that the boys of the nation ought as a whole to be better developed both physically and mentally before being permitted to leave school. The wisdom of this course would be chiefly apparent in their vastly increased eco¬ nomic value in the business affairs of the nation but it would also be a great asset in the event of a dangerous war which should require our utmost strength.

In recognition of this necessity the State of New York passed a law calling for the compulsory military training of all boys in the State between the ages of 16 and 19. The instruction was devoted largely to the physical development of the boys. Out of 200,000 regis¬ tered it was found that 85 per cent were already at work, leaving only 15 per cent in the schools at 16, 17 or 18 years of age. This bill was re¬ pealed in 1921.

It is still too soon to judge what will be the ultimate effect upon our military system of our participation in the wars and the politics of Europe. However, the expectation that, as a result of the World War, there would be a demand upon the part of the public for a larger regular army than ever before maintained by the United States did not materialize. On the contrary, the sentiment in favor of a reduction in the military forces was so great that in 1920 the Army Appropriation Bill limited the army to 150,000 men.

During the World War the armies of the United States were raised to more than four million men and half of that great total were transported overseas to a battle front where they bore a conspicuous part in the great offen¬ sive which in the summer and early autumn of 1918 drove the German armies out of the forti¬ fied lines in France which had seemed im¬ pregnable for more than three years. The outstanding feature of the American armies was the superb personal courage of the private

soldier and the splendid self-sacrificing leader¬ ship of the young line officers most of whom had never worn a uniform before 1917. The regular army divisions fought magnificently but were neither braver nor more efficient than the National Guard divisions. The regulars were transported to France very soon after the United States entered the war but it was found necessary to give them a long course of train¬ ing in the interior before they were capable of entering front line sectors. It was a valuable if humiliating lesson learned by our artillery when they found that our boasted three-inch field piece was utterly useless in modern war. The professional artillerist ought to have known that before hundreds of useless guns of this type were shipped to France in transports where every cubic foot was needed for useful material. The magnificent advance of our infantry in September and October 1918 was made possible because the French army furnished our artillery service with their incomparable <(soixante- quinze® capable of laying down a rolling barrage in front of advancing troops which would have been absolutely impossible for our own corre¬ sponding gun.

Likewise were our armies indebted for aeroplanes to their cobelligerents both French and English.

It was unfortunate that difficulties of lan¬ guage led our staff at first to arrange for the instruction of our officers in France by British rather than French corps of instructors. The British had fought magnificently for four years but they had not solved the problem of trench warfare and the errors of their system brought the cause of the Allies to the verge of disaster in the spring of 1918. After General Foch assumed the supreme command and the tide of defeat turned into victory the superiority of the French method was generally acknowledged. The American commander, General Pershing, co-ordinated his plans with the French when the American armies entered the great offensive and every detail worked splendidly.

In France the general headquarters of the American armies was located at Chaumont while the subordinate headquarters of the serv¬ ices of administration and supply were at Blois and Tours. The ports used in the enormous transport of troops and supplies were Brest, Sainte Nazaire, La Pallice and Bordeaux. A large number of American troops were landed ‘ in England and thence transported to France. So vast were the preparations in France that the arrangements were found in every way adequate for the handling of the 2,000,000 soldiers.

The modern requirements called for air, chemical, gas and many

other new services which had to be created in our army. All were thoroughly organized and functioning in the final campaign but in the course of another year would have been capable of great develop¬ ment. The army medical service had an ex¬ traordinarily healthy army to deal with but there were a vast number of wounded to be cared for and it was noticeable that the time had not sufficed to standardize this service. Hospitals were excellent, good or fair according to the individual merit of the local commanding officer. The American armies were the best paid and best fed armies in the war. They proved of the very highest fighting value due to the

superb morale of the rank and file. They went to Europe determined to win or die in the attempt. The survivors came back, were mus¬ tered out and have returned to civil pursuits with a zest that echoes their oft-expressed desire to Kget it over with.® A magnificent victory in the greatest of all wars has failed to alter in the slightest degree the national sentiment toward military affairs in general and wars in particular. The regular army, now limited by Congressional Act to 150,000 men, and the National Guard will show marked improve¬ ment in professional attainments. The nation at large will continue to believe in the invincible courage of all its sons and the continued pres¬ ence of a providence which bequeaths victories. An important task confronting the army will be the reconciling of that attitude to the necessity that the nation shall provide in peace for the scientific preparation against war whiph is likely to be the surest insurance against future disaster.

The American Expeditionary Force or A.E.F. as it was called developed in France a well- organized general staff, an essential feature of army economy and efficiency.

General John J. Pershing the commander-in¬ chief of the American Expeditionary Forces promptly recognized the necessity for a general staff and as the American army had heretofore been destitute of this important department he proceeded to organize one based upon the war experience of the veteran French and British armies. The responsibilities of the general staff were divided into five groups each wfith a chief functioning as an assistant to the chief of the general staff :

Group 1. Organization and Equipment of Troops.

Group 2. Censorship, Enemy Intelligence, Information, Preparation of Maps, etc.

Group 3. Strategic Plans, Movement of Troops, Super¬ vision of Combat Operations.

Group 4. Co-ordination of Supply, Construction, Trans¬ port for Combat, Hospitalization and Evacuation of Sick and Wounded.

Group 5. Schools and Co-ordination of Education and Training.

The first units of the expeditionary army reached France in June 1917.

The combatant forces were organized into divisions consisting of four regiments of in¬ fantry of 3,000 men with three battalions to the regiment and four companies of 250 men each to a battalion, and an artillery brigade of three regiments, a machine gun battalion, an engineer regiment, a trench-mortar battery, a signal battalion, wagon trains, headquarters staff and military police. The above with medical and other units gave a total divisional strength of over 28,000 men, about double the size of a French or German division.

Each corps was to consist of six divisions (four combat, one depot, one replacement) with two regiments of cavalry.

Each army was to have from three to five corps.

A great system of army schools was organ¬ ized in France with headquarters at Langres where the principles of general staff work were taught, and men who had shown qualities for leadership were fitted for commissions.

A school of the line taught young officers leadership requirements and the use of different weapons, including the various types of hand grenades, trench mortars, etc., peculiar to trench warfare.

The artillery school was at Saumur. The aviation school at Issoudun.

The departments of the adjutant-general, in¬ spector-general and judge-advocate-general re¬ mained with the general headquarters at Chau- mont.

The administrative and supply services were transferred to the headquarters of the Service of Supply (the S. O. S.) at Tours and included the chief quartermaster, chief surgeon, chief signal officer,

chief of ordnance, chief of air service, chief of chemical warfare, general pur¬ chasing agent, provost-marshal-general, director-general of transportation and chief engineer. The chiefs of all these branches of the service were subordinate to the commanding general of the service of supply, who was assisted by a large staff charged with the administrative co¬ operation of the various departments.

Great storage depots were built at La Pallice, Montoire and Gievres. Hospitals and barracks were constructed at many places in France. Enormous additions were built at the ports and on the lines of railw'ay communications. The forestry service cut an immense amount of timber required by the engineer corps.

The American Expeditionary Forces en¬ gaged in the heavy fighting of 1918 were in¬ debted to the French, entirely for the light artil¬ lery which made the advance of our infantry possible. Although American manufacturers had started to make the required modern artil¬ lery, not one such weapon was in service at the front up to the time the armistice was signed. The French army furnished for our aviation service 2,676 aeroplanes of pursuit, observation and bombing types. After May 1918 1,379 planes arrived in France from the United States.

While our forces were never sufficiently sup¬ plied with tanks we were indebted for all we had to the French.

In order that the moral welfare and the physical comfort of the millions of young American soldiers serving in a foreign country should be cared for as fully as possible the American commander gave every possible as¬ sistance and encouragement to the Young Men's Christian Association, Knights of Columbus, Salvation Army and Jewish Welfare Board. The Red Cross ministered to our soldiers with an efficiency and devotion incomparable on every line of communication and in every hos¬ pital.

When the great German offensive broke against the Allied front 21 March 1918 it became apparent that unity of command was a first es¬ sential if the Allied armies were to avert dis¬ aster, and General Pershing by direction of the President immediately placed all of his forces (343,000 men) at the disposal of Marshal Foch.

When the United States entered the Euro¬ pean War our army numbered 190,000 (6 April 1917) and when the armistice was signed (11 Nov. 1918) the numbers had increased to 3,665,000, of whom somewhat more than 2,000.- 000 were in France.

Civilian employees of the War Department increased from 2,000 to 25,000. For the year ending 30 June 1918 the appropriations for the support of the military establishment aggre¬ gated $8,000,000,000. For the year ending 30 June 1919 the appropriations for same aggre-

gated .$15,300,000,000. The American casualties were in excess of 302,000.

_ Killed in action, 34,625 ; died of wounds, 13,955 ; died of disease, 23,392 ; died from acci¬ dent and other causes, 5,326; wounded, 215,489. Of the wounded 85 per cent returned to duty.

In the Civil War the fatalities on the Union side were approximately 110,000. In the Span¬ ish War we had less than 1,000 men killed in battle.

With a view to imposing the burdens of this war upon the present generation, rather than upon their descendants, Congress created the War Risk Insurance against death or disability. The premiums were payable monthly by deduc¬ tion from the month's pay and were graduated according to age, averaging 80 to 90 cents per thousand per month.

On 18 May 1917 Congress passed the First Selective Service (Draft) Law, which with sub¬ sequent amendments resulted in four registra¬ tions.

*5 June 1917 — 2*1 to 30 years . 9,586,508*

5 June 1918 — 21 to 30 years . 744,865

24 Aug. 1918 — 21 to 30 years . 158,054

12 Sept. 1918— 18 to 20 and 32 to 45 . 12,966,594

Total . 23,456,021

Maryland . 13,912

Virginia . 26,678

North Carolina . 7,263

South Carolina . 6,417

Georgia . 2,679

Total in Federal service . 231,771

Militia and volunteers . 164,087

The British forces in America during the period of this war numbered about 150,000.

The cost of the war to the United States was $350,000,000 and the resulting pensions amounted to $70,000,000. The cost per capita was $123.

Troops Employed During the War with

Tripoli, 1801.

Regulars . 3,330

Troops Employed During the War of 1812.

Regulars (including 5,000 sailors and marines) . . . 56,032

Volunteers . 10,110

Rangers . 3 , 049

Militia . 458,463

527,654

British forces opposed did not exceed 67,000. This war cost the United States $86,627,000. Resulting pensions have amounted to $46,000,000

The drafted men showed a very large pro¬ portion of the young manhood of the nation to be physically unfit for military service, and very nearly 25 per cent were shown by the most ele¬ mentary tests to be illiterate. Thousands, for¬ eign-born entered the service unable to speak or read English and occasioned a new problem in face of the necessity to quickly convert them into soldiers competent to serve in an American army.

A series of Officers' Training Camps sup¬ plied much of the demand for officers. From these training camps commissions were granted to

two colonels, one lieutenant-colonel, 294 majors, 5,429 captains, 12,397 first lieutenants and 62,445 second lieutenants, a total of 80,568 officers provided by these schools of intensive training. It was an axiom with units serving in front-line sectors that (

Statistics of the Army of the United States. — There are no reliable figures as to the strength of bodies of militia maintained more or less irregularly in the colonies before the Revolution. Franklin organized a volunteer military association for the defense of the prov¬ ince of Pennsylvania in 1744. In 1755 he was colonel of a regiment and built forts for the defense of the frontier. There were irregular bodies of militia in the southern colonies and more thoroughly organized units among the New England colonies, particularly Massachu¬ setts and Connecticut.

The following shows the number of troops furnished by each State for the Continental Army during the Revolution :

New Hampshire Massachusetts. . Rhode Island . . . Connecticut. . . .

New York .

New Jersey . . . . Pennsylvania. . . Delaware .

12,947 67,907 5,908 31 ,939 17,781 10,726 25,678 2,386

Creek Indian War.

Regulars . 600

Militia . 43,921

44,521

Seminole Indian War (1817).

Regulars . 1,000

Volunteers . 5,911

6,911

Indians opposed, about 1,000.

Black Hawk Indian War (1832).

Regulars . . 1,341

Volunteers . 4,638

5,979

Indians opposed about 900.

Florida Indian War (1835-1842).

Regulars . . 12,539

Volunteers and militia . 48, 152

60,691

The war expenditures during this prolonged conflict with Florida Indians amounted to $69,- 751,611.50, although the opposing warriors numbered less than 2,000.

Indian war pensions (including service pen¬ sion) have cost the government $14,204,296.51.

Mexican War (1846-48).

Regulars . 31,024

Volunteers and rangers . 60,659

Militia . 12,601

104,284

The maximum strength of the Mexican troops did not exceed 46,000.

The cost of the war to the United States was $88,500,208.38 and the resulting pensions amounted to somewhat more than $51,000,000.

Civil War (1861-65).

Regulars . . . 67 ,000

Volunteers and militia . 2 , 606 , 341

The cost to the United States was $5,371,- 079,778.28 with resulting pensions which will be in the neighborhood of another $5,000,000,000. The strength of the Confederates probably

I

was not greatly in excess of 1,000,000 men with less than 700,000 as a maximum of effective combatants available at any one time.

The cost of the Civil War per capita is esti¬ mated at $96.

Spanish War (1898).

Regulars . 58,688

Volunteers and militia . 223,235

The cost was $321,833,254.76 and the pen¬ sions during the following 20 years have amounted to more than $57,000,000.

Opponents numbered about 228,160 men.

Philippine War (1898-1900).

Regulars . 76,416

Volunteers . 50,052

The cost was $170,326,586.11. Pension cost estimates included with Spanish War figures.

Peking Relief Expedition.

Regulars . 2,100

Comparative Strength of Service March 1917 and November 1918.

Branch

Old army Mar. 1917

New army Nov. 1918

Infantry and machine gun .

Engineer .

85,000

3,000

974,000

394,000

389,000

300,000

228,000

137,000

64,000

52,000

29,000

202,000

103,000

27,000

18,000

14,000

549,000

185,000

Field Arty, and Amm. Tr .

9,000 7,000 8,000 21 .000

Medical .

Quartermaster .

Coast Artillery .

Ordnance .

1 ,000

Signal .

3,000

Cavalry .

22,000

Air Service .

None

Motor Transport .

None

Militia Bureau .

None

Chemical Warfare .

None

Tank .

None

Tn Training .

All other .

31,000

190,000

3 , 665 , 000

Important Military Operations.

1775-1783 War with England

1790-95 War with Northwestern Indians

1794 Whisky Insurrection in Pennsylvania

1801-05 War with Tripoli

1806 Sabine Expedition in Louisiana

1811- 13 War with Western Indians 1812 Seminole Indian War in Florida

1812- 15 War with England

1813- 14 Creek Indian War in Alabama 1836-39 Cherokee Indian War

1836 Aroostook Disturbance

1838-39 New York-Canada Frontier Disturbance

1846-48 War with Mexico

1848 Cayuse Indian War in Oregon

1849-61 Navajo Indian War in New Mexico

1849-61 Indian Disturbances in Texas

1850 Pitt River Expedition in California

1851-52 YumaExpedition in California

1851-56 Indian Wars with Snake, Sioux, Yakima, Cheyenne and Arapahoe Tribes 1855-57 Seminole Indian War in Florida

1857 Gila Expedition in New Mexico

1857- 58 Mormon Expedition in Utah

1858 Indian troubles in Puget Sound Region

1858- 59 Indian troubles at Wichita, Ind. Ter., Colorado

River, Cal., Pecos and Antelope Hills, Tex., and Bear River, Utah

1859- 60 Coartina troubles in Texas and Mexico

1860 Indian campaigns against the Kiowa-Comanches in Indian Territory, and Carson Valley, Utah

1860- 61 Navajo Campaign in New Mexico

1861- 66 Apache Indian War in Arizona and New Mexico 1861-65 Civil War

1X62-67 Sioux Indian War in Minnesota and Dakota 1863-69 Indian Wars in Kansas, Nebraska, Colorado and Indian Territory.

1865-68 Indian War in the Northwest

1865-66 Fenian disturbances New York-Canadian border

1867- 81 Indian Campaigns in West and Southwest and

disturbances along Mexican border.

1868- 69 Canadian River Expedition in New Mexico

1871 Yellowstone Expedition

1872-73 Modoc Indian War in California 1873 Yellowstone Expedition, Dakota

1874-75 Indian Campaigns in Indian Territory, Wyoming, Nebraska and Dakota

1875 Indian Campaign in Nevada

1876 Powder River Expedition in Wyoming

1876-77 Indian Campaigns on the Big Horn and in Yellow¬ stone — Wyoming and Montana 1876-79 Indian Wars in the Northwest with Sioux and Cheyenne Tribes

1877 Labor Disturbances in Pennsylvania and Maryland

1877 Campaign against Nez Perces Indians

1878 Campaign against Bannock and Piute Tribes in

Nevada and Idaho, and Utes in Colorado 1879-84 Campaigns against Indians in Oklahoma, Colorado and Utah

1885 Chinese Labor troubles in Wyoming

1890- 91 Sioux Indian Campaign in South Dakota

1891- 93 Garcia Disturbances on Texas-Mexico frontier

1892 Labor Troubles at Mines of Idaho

1894 Labor Troubles, Illinois and on Pacific Coast

1895 Bannock Indians Disturbance

1898 War with Spain

1899— 1902 War in the Philippines

1900- 01 Peking Relief Expedition in China

1912- 13 Nicaraguan Expedition

1913- 14 Expeditions to Haiti and Santo Domingo

1914 Labor Disturbances in Colorado

1914 Vera Cruz Expedition

1915 Punitive Expedition into Mexico 1917-1918 European War

1919 Race Riots and Labor Strikes in United States 1919 Campaigns in Siberia and northern Russia against

Bolsheviki armies

Relative Strength of the Army to the Population.

Officers

and men Per cent

1790 . 1,273 3/100 of 1

1800 . 4,436 8/100 of 1

1810 . 9,921 14/100 of 1

1820 . 8,942 9/100 of 1

1830 . 5,951 5/100 of 1

1840 . 10,570 6/100 of 1

1850 . 10,763 5/100 of 1

1860 . 13,367 5/100 of 1

1870 . 37,075 10/100 of 1

1880 . 26,509 5/100 of 1

1890 . . . 27,089 4/100 of 1

1900 . 67,500 9/100 of 1

1910 . 77,035 8/100 of 1

1918 . 3,665,000 3}

The strength of the army on 31 Dec. 1920 was 213,067. On the same date the regular army had 18,947 in the Philippines, 14,306 in Germany, 8,927 in Hawaii, 5,600 in Panama, 1,493 in Porto Rico, 1,406 in China, 867 in Alaska and 106 in France and England.

Generals Commanding the Army or the United States.

George W ashington1 .

Henry Knox1 .

Josiah Harmar2 .

Arthur St. Clair1 .... James Wilkinson1 .... George Washington3 . James Wilkinson4. . . . Henry Dearborn1 ....

Jacob Brown1 .

Alexander Macomb1 .

Winfield Scott1 .

George B. McClellan1 Henry W. Halleck1 . . Ulysses S. Grant3. . . . William T. Sherman3. Philip H. Sheridan3. . John M. Schofield5. . . Nelson A. Miles5 .... S. B. M. Young5 .

1775-1783

1783-1784

1788-1791

1791-1796

1796-1798

1798-1799

1800-1812

1812-1815

1815-1828

1828-1841

1841-1861

1861-1862

1862-1864

1864-1869

1869-1883

1883-1888

1888-1895

1895-1903

1903-1904

1 Major General.

2Lieutenant Colonel with the brevet rank of Brigadier General.

3General.

4Brigadier General.

5Lieutenant General.

UNITED STATES — NAVY OF THE UNITED STATES (56)

517

Generals Commanding the Army of the United States — Concluded,

Adna R. Chaffee1 . 1904r-1906

Arthur Mac Arthur1 . 1906-1909

Leonard Wood2 . 1909-1917

Hugh L. Scott,2 Chief of Staff . 1917

John J. Pershing,3 Gen. Staff, C. O., A. E. F . 1917

Peyton C. March,3 Chief of Staff . 1918

From 1791 to 1904, the Cost of the Military Establishment.

1791-1811 Peace. . $5,669,930 65

1812-1816 Including war with England. 82,627,009 14

1817-1835 Various Indian Wars . 90,411,068 59

1836-1843 Florida War . 69,751,611 11

1843-1845 Peace . 13,873,146 89

1846-1849 Including Mexican War.... 88,500,208 38

1850-1860 Peace . 168,079,707 57

1861-1865 Civil War . 2,736,570,923 50

1866-1869 Peace . 583,749,510 99

1870-1897 Peace . 1,211,321,300 94

1898-1899 Including Spanish War . 321,833,254 76

1900-1902 Including Philippine War.. 391,662,681 06

1902-1904 Peace . 1,693,920,509 96

Total 1790-1904 . $7,457,970,863 54

Pensions 1790-1904 . 4,729,957,370 94

A circular issued by the War Department on 26 Sept. 1919 announced an important new policy in the training to be given enlisted men. Hereafter, in addition to military drill, recruits are to be given such educational and vocational training as will improve their effectiveness, not only for service in the army, but for success in civil life as well. Congress appropriated $2,000,000 for vocational training for the fiscal year ending 30 June 1920 and a Recruit Edu¬ cational Centre was established at Camp Upton, Long Island, N. Y. In November 1919, 800 recruits were under instruction at this school and the detachment included representatives of 43 nationalities; not only was English being taught to the foreign born, but some native born Americans were receiving their first school training. In addition to schoolroom lessons trades were being taught in model machine shops, covering a wide variety of useful occupa¬ tions, which should guarantee to all these men profitable civil employment at the end of the army enlistment. Interesting profitable em¬ ployment thus takes the place of what were formerly long irksome periods of idleness,

doubtless responsible for much of the deser¬ tion which in peace time was a great evil. See Army; Army Administration; Army Commissary; Army Medical School; Army and Navy Manceuvres; Army Organization; Army Regulation ; Army Reserve ; Army Schools; Army Staffs; Army Transport Service; Army Transportation; War, Euro¬ pean — Western Campaigns.

Bibliography. — Historical : Early Period. — Bancroft, (History of the United States) ; Parkman, Francis H., (Works> ; Fiske, John,

(American Revolution ; Sloane, (Vol. V) ; Rhodes, James Ford, history of the United States) (New York); Spanish War — Lodge, Henry Cabot,

*the American People. * War with Ger¬ many: Buchan, John, (History of the War* (Vols. XX-XXIV); Ayres' Statistical Sum¬ mary of the Army of the United States in the War with Germany; Pershing, John, (Report on Operations of American Expeditionary Forces.* Technical Histories : (Annual Reports of the War Department, including Reports from Chiefs of all Departments of the Army* ; Huidekoper, (Military Unpreparedness * ; Up¬ ton, (Military Policy of the United States.**

Edwin W. Dayton, Major, Infantry, R. L.

56. NAVY OF THE UNITED STATES.

The American navy came into existence in 1775 after the close investment of Boston by Wash¬ ington had cut off all supplies to the British troops, save such as might arrive by water. To intercept these, some small vessels were armed and manned by New England seamen, first under the auspices of Rhode Island and Con¬ necticut, and afterward by authority of the Congress which organized a Naval Committee with John Adams at its head. These little craft not only deprived the enemy of succor, but captured enough prizes to furnish the colonial army with war material, without which it could not have continued hostilities.

Early History. — In 1776 the navy had 31 cruisers mounting 586 guns, and no less than 136 privateers mounting 1,360 guns had also been fitted out. Including the flotilla on Lake Champlain, the government war vessels in serv¬ ice during the Revolution numbered in all 64, carrying a total of 1,242 guns. This force cap¬ tured 196 vessels worth about $6,000,000, and the privateer auxiliaries, numbering 792, mounting over 13,000 guns, took 600 British ships,

valued at $18,000,000. Insurance on British bottoms rose from 2 to 15 per cent. This unprecedented destruction was one of the strongest arguments which led to peace.

The Hancock, Randolph, Raleigh and other cruisers authorized by Congress were excellent ships, and the Alliance and Confederacy built toward the close of the war had no superiors afloat. They were mainly armed with 4- to 18- pounder guns. Progress, however, stopped when independence was achieved, and the ves¬ sels were sold and men discharged. In 1794 a law re-establishing the navy under the Secretary of War was enacted and six frigates authorized. Of these, three were constructed, the Constitu¬ tion, 44 guns, 1,576 tons; Constellation, 36 guns, 1,265 tons; and United States, 44 guns, 1,576 tons. The Constitution is still afloat. Three were abandoned and the material sold. Under the pressure of French spoliations, however, the navy was increased and at the beginning of the quasi-war with France in 1798 it aggregated 22 ships with 456 guns and 3,484 men. This little force during the two and a half years of hostilities captured 84 French armed vessels mounting over 500 guns. The military disci¬ pline of the navy here begins : the American officers, largely recruited from merchantmen, learned from the commanders of the British war vessels in the West Indies the traditions and customs of the older service. Then also came in the carronade or short gun, with little penetrating but great smashing power. At the end of the French War, another reduction of the navy took place. The theory that ships and guns could be called into existence when needed.

1 Lieutenant General, 2 Major General.

3 General,

as easily as log cabins, even at that early day, had become well rooted. Accordingly after cutting our force down to 15 vessels, we deemed it wise to present the Dey of Algiers with 26 barrels of silver dollars and the fine frigate Crescent to induce him to let our commerce alone. Tripoli in her turn, being thus encour¬ aged, demanded special blackmail. Thereupon the navy, once more rejuvenated, not merely de¬ stroyed the Barbary pirates, but emerged from the war in 1805 a sea power hereafter to be taken into account in the world's diplomacy. It was during these campaigns that

disciplinary routine was so highly perfected by Commodore Edward Preble that it has remained with little substantial alteration to the present day. It was then also for the first time that the American navy was accorded all the formal honors of a national service by the war-ships of other countries.

War of 1812. — When the War of 1812 with Great Britain began, the navy had 17 ships ag¬ gregating 15,300 tons and carrying 442 guns and 5,025 men. It had no yards, no docks, no ade¬ quate means of any sort for repair or refitting. The British navy, fresh from the victories of Trafalgar and the Nile, had over seven times this force on the North American station alone. Within seven months the United States ships had reduced three British frigates to wrecks and taken 500 merchantmen — a result which astounded the world. The Constitution , 55 guns, destroyed the Guerriere in 40 minutes and the Java in one hour and 55 minutes, and the United States, 54 guns, dismantled the Mace¬ donian, 29, in about an hour and a half. The subsequent sloop actions were almost equally decisive. The noteworthy fact of these duels was the destructive character of the American fire — which literally tore the British ships to pieces and converted their decks into slaughter¬ houses. Three prominent factors contributed to success.

• 1. The United States ships, and especially the frigates, were larger — 12 feet longer — and at the same time more easily manoeuvred than any which had ever before been built. The sloops-of-war outclassed those of foreign navies at every point.

2. The frigates concentrated the power of a ship of the line. They mounted long 24- pounders in broadside — an innovation startling for the times. To the Guerriere's 32 long 18's and 16 short 32's the Constitution opposed 30 long 24's and 24 short 32's. When she fought the Java she had increased the number of her long 24's to 32, so that while decreasing the number of her short guns to 22, she had aug¬ mented their size to 24-pounders. That gave the combination of low power, heavy smashing projectiles with relatively high power penetrat¬ ing projectiles which characterized the navy armament for many a year afterward.

3. The American gunners aimed their guns. They had been taught, as their fathers from the backwoods, who had harried the Hessians had been taught, to fire at targets ; to use their long cannon as they used their long fowling pieces and to send round shot into hulls at the water line, just as they were accustomed with their rifle bullets to bring down ducks on the wing. The British system then involved no

gun point¬ ing. The carronades had no sights and were laid level — point blank — with a range of about

500 yards. They were fired with the same hope of hitting something which King George's gren¬ adiers or those of his serene Highness of Wal- deck cherished when they presented fire-lock and pulled the trigger in one motion. So long as shot cut up sails and rigging and so impaired motive power the desired end was attained. The bull-dog Briton could then lay his ship close aboard the enemy and finish the fight with boarders and cutlasses. But the handy Ameri¬ can ships kept out of point blank range. Their long 24's enabled them to do this and at the same time deliberately to drill holes in the Brit¬ ish water line, while occasionally anticipating the yet distant shell fire by sending slow heavy balls against the wooden sides and annihilating whole gun's crews with the resulting shower of splinters. That is how the Wasp cut up the Frolic in 43 minutes and the Hornet demolished the Peacock in just 11 — while incidentally demonstrating the superior advantages of firing on the down roll of the ship in order to con¬ vert the adversary into a sieve, instead of on the up roll which merely clipped his wings.

In the War of 1812 the regular navy number¬ ing but 23 vessels carrying in all but 556 guns captured 254 of the enemy's craft. The value of the prizes taken by the navy and the privateers jointly was over $45,000,000. The cost of Brit¬ ish marine insurance became almost prohibitive; 13 guineas per £100 was paid to insure vessels crossing the Irish Channel. So great was the injury to British commerce that in June 1813 flour in Great Britain was $58 per barrel and lumber $72 per 1,000 feet. Before the war was over the English were building ships on the <(exact lines® of the American 44-gun frigates and cutting down some of their most famous line-of-battle ships to compete with them. After peace had been secured, the permanent establish¬ ment of the navy was fixed at 12 ships of the line, 14 first class frigates, three second class frigates, six sloops-of-war and a proportionate number of smaller vessels. The more famous craft built between 1814 and 1825 were the 74- gun ships Washington, Franklin, Columbus, Ohio and Delaware, which were armed with 12 eight-inch and 70 32-pounder guns. For a time the North Carolina with 102 guns in three tiers of port-holes on her towering sides was regarded as the most powerful war-ship afloat. Meanwhile the possibilities of steam war ves¬ sels were looming up. Robert Fulton had built the Demologos in 1813, which not only was pro¬ pelled by a midships paddle wheel — but had a queer collection of innovations, notably a bat¬ tery of long 32-pounders supplemented by a 100-pounder submarine gun and apparatus for

discharging steam into an enemy's hull. She was accidentally blown up in 1829 and was suc¬ ceeded by the wooden steam battery Fulton the Second, built in 1837 which, however, proved a failure. Four years later the Mississippi and Missouri, side wheel steamers, were constructed and they were followed in 1847 by the Susque¬ hanna and Powhatan — all excellent and serv¬ iceable vessels. The value of having the motive power beneath the water line had, however, already attracted attention to the screw pro¬ peller. In 1844 the Princeton, designed by Capt. John Ericsson, the first screw steam war vessel ever built, was launched. She car¬ ried two long 225-pounder built-up guns, capable of piercing four and one-half inches of wrought

iron, and the first of their type. She was broken tip in 1849 — but was in service long enough fully to demonstrate the naval import¬ ance of screw propulsion. The engineer corps of the navy (amalgamated with the line in 1899) was organized by Act of 31 Aug. 1842 and in 1845 the United States Naval Academy (q.v.) was established at Annapolis.

The Civil War.— The screw steam war ves¬ sel was now fully developed and those of our navy were as graceful as yachts and the most formidable of their class. Between 1856 and 1859 we built the Niagara , Colorado, Merrimac, Wabash, Minnesota and Roanoke, frigates, and the Brooklyn, Lancaster, Hartford, Richmond, Pensacola, Pawnee, Michigan, Narragansett, Dacotah, Iroquois, Wyoming and Seminole, sloops. Meanwhile the Dahlgren shell gun began to replace the older type of smooth bore. When the Civil War broke out the navy, how¬ ever, had become much reduced. Of the 90 vessels on the list, 42 were in commission and the rest unserviceable. The sailing ships still carried the ancient 32-pounders and eight-inch shell guns and only the steamers were provided with Dahlgrens — but these were regarded as monsters, their calibre having increased to 11 inches. It went to 15 and even 20 inches before the war closed — but the guns were very short, powder charges small and initial velocities seldom rose above 1,200 feet per second. These pounding weapons — true to the old principle — were supplemented by rifles mainly of the Parrott type,, which lingered long after they had been proved about as dangerous to friend as to foe. When the war opened, the navy had 1,457 officers and 7,600 seamen — when it closed the officers numbered 7,500 and the seamen 51,- 500 — 208 additional vessels

were built and 418 purchased. The total number of Confederate or British vessels captured or destroyed was 1,504, valued at $31,000,000, and the net pro¬ ceeds of property seized on the blockade which was efficiently maintained over more than 3,000 miles of coast was $20,501,927. The cost of the navy throughout the Civil War was about $314,000,000, equal to only 9.3 per cent of the government expenditure for the whole period of four years and four months. The total num¬ ber of ships of all classes in the navy in De¬ cember 1864 was 671.

The great naval development of the Civil War was the Monitor, a raft-like vessel 172 feet long over all, of 41ˆ2 feet beam and 11ˆ3 feet depth, of hold plated with five layers of one inch iron on her hull and eight layers on her single steam rotated turret wherein were in¬ stalled two 11 -inch Dahlgren guns. She revo¬ lutionized marine warfare and made the wooden steam frigate ajpout as archaic as the Roman trireme. To a limited extent also (especially in the Confederate ironclads Virginia and Ten¬ nessee and the Federal so-called ˆtin-clads® of the Mississippi) the armored casemate was sub¬ jected to test — but it is only of comparatively late years and following the great improvements in armor that the casemate has assumed a really important place in naval construction.

Reorganization.— After the Civil War, the navy as usual was rapidly reduced — the total number of vessels in commission in the fall of 1866 being but 115. The monitors were laid up at League Island and gradually destroyed. Five

which survived, though practically useless, were permitted a brief harbor service during the Spanish War. Two, however, of the more formidable class, the Miantonomah and the Monadnock, made long voyages respectively to Europe and around Cape Horn — thus for the first time demonstrating the sea-going capacity of low freeboard turret ships and dooming to final extinction the wooden man-of-war. Gradu¬ ally but steadily the depletion of the navy list continued and vessel after vessel was sold. Many were broken up under the law decreeing destruction if needed repairs should be found to cost more than 20 per cent of the value — and finally in 1881, so far as ships went, the country was little better than defenseless. In July of that year we had, as the steam navy, 13 so-called first rates (all of wood of from 2,840 to 3,173 tons measurement) of which one, the Tennessee, was at sea and four were ancient craft still on the stocks and never launched ; 20 second rates (929 to 2,300 tons, all wooden but one) and most of these old-fashioned and unserviceable; 27 third rates (410 to 918 tons), again all wooden but four, and some of the

Civil War monitors. The rest of the navy was made up of wooden sailing ships, two of which had served in the War of 1812, including some that became all but worn out decades earlier while chasing pirates in the West Indies and slavers on the African coast. The one sea¬ going flagship Tennessee (plus ˆrepairs®) in 10 years of active service gradually cost $3,800,- 000 and was ultimately sold for $34,555. Nu¬ merous other vessels built in the interval since the Civil War had meanwhile gone almost im¬ mediately from shipyard to scrap heap. ((It is often the subject of wonder,® says the Sec¬ retary of the Navy in his report for 1887, ((what has become of the $70,000,000 spent upon war vessels since the close of the war in view of the fact that there is now no navy.® The existing armament was as antiquated as the ships themselves. It consisted principally of nine-inch smooth bore and eight-inch rifle guns, all muzzle loading, and the latter had been economically concocted from old 11-inch Dahl- grens by inserting a wrought iron rifled tube in the bore. The only breech loaders in the service were those which had been ((converted® from the miserable 100 and 60-pounder Parrott rifles. This deterioration of the navy, however, extended no further than to the ships, and, at times, to the Navy Department. Throughout all that long period of corruption and decay the dis¬ cipline of the service never wavered, the attain¬ ments of the naval officers constantly advanced, drills and target practice were as scrupulously maintained on wretched wooden craft which the poorest foreign ironclad could send to the bottom with ease, as if they had been held on the most powerful of battleships, and although we had, at most, only 55 antiquated ships, every one of them too slow to run away from and too weak to fight with a war vessel of the modern build and equipment, none the less all were ready to do their best — inadequate as it was — instantly and at all times. The ships of the United States navy have often become weak in numbers and bad in construction, but the men who handle them have never retro¬ graded. In quality the personnel of the United States navy has always been the best.

520

UNITED STATES — NAVY OF THE UNITED STATES (56)

It was in 1881 that Secretary Hunt appointed an advisory board to determine the requirements of a new navy. It recommended 21 armored vessels besides 70 unarmored, together with rams, and most significant of all declared that the material of construction should be steel. That was the knell of the iron navy — although as a matter of fact, iron had never fully re¬ placed wood. Meanwhile there was not

a plant in the United States capable of making forgings for guns of more than six-inch calibre — nor one able to make armor plate or torpedoes or machine guns. In May 1887 contracts were signed with the Bethlehem Iron Company for gun forgings and armor plates and in the same year the now great naval gun factory in the Washington navy yard was begun.

The Modern Navy. — The first vessels of the new steel fleet were the Dolphin (1884) and the Atlanta , Boston and Chicago (1885). The increase after 1888 was rapid, the outbreak of the Spanish War of 1898 finding the navy equipped with 77 vessels, including several coast line battleships such as the Iowa, Indiana and Oregon and the powerful armored cruisers New York and Brooklyn. The war developed the remarkable preparedness of the navy, which practically annihilated that of Spain in a cam¬ paign of 110 days. The chief naval event apart from the battles of Santiago and Manila was the famous rush of the Oregon from San Fran¬ cisco to Jupiter Inlet, Fla., around Cape Horn, a distance of some 14,000 miles in 68 days, which she accomplished without accident, arriv¬ ing in condition for immediate service.

The history of the United States navy from the close of the war with Spain to the advent of vessels of the Dreadnought type demands but little attention. Vessels were laid down on no large scale, but those built were among the best of their type. The battleships of this period (1899-1906) were of from 12,500 to 16,000 tons displacement and about 450 feet in length. The speediest vessels of this type and period — Georgia and Kansas classes — steamed 19 knots per hour. The armored cruisers had an aver¬ age speed of 22 knots per hour. An unpre¬ cedented event in America's naval history and one of the most spectacular of cruises was the sailing of the United States battleship fleet around the world; it departed from the At¬ lantic Coast 16 Dec. 1907 and returning with¬ out mishap on 20 Feb. 1909. When the fleet sailed, Admiral Evans, in command, declared that it was ready (

An enlarged building program was in¬ augurated after 1906, and when war was de¬ clared on Germany in April 1917 the tonnage of the United States navy, including all types of vessels then under naval control, was approxi¬ mately 1,500,000. Strained relations with Ger¬ many caused the United States to enter upon a course of great naval expansion in 1916—1 7, which led to a considerable increase in expendi¬ ture, due mainly to the adoption for the first time of a continuous shipbuilding program,

The period was of three years, the total cost to be approximately $520,000,000, and in the first year four battleships, four battle-cruisers, four scout cruisers, 30 submarines and 20 de¬ stroyers were laid down, to be followed by six additional battleships, two battle-cruisers and a number of smaller vessels. With the declara¬ tion of war the program was enormously in¬ creased and accelerated; at the opening of hostilities the navy had 787 vessels of all kinds, including a large number of submarine chasers. The sum of $350,000,000 was at once appropri¬ ated for destroyers. The Secretary of the Navy on 9 Dec. 1917, in his annual report, asked for $1,000,000,000 for his department for the next fiscal year. The personnel of the navy was at the same time increased from 19,500 to 322,- 000; the naval reserves from a few hundred to 49,000; the monthly expenditure from $8,000,- 000 to $60,000,000, and ships in commission from 300 to over 1,000. The splendid work of the naval arm in the Great War is treated else¬ where. (See War, European — Naval Oper¬ ations). In 1919 a new three-year building program was laid before Congress. It called for 10 battleships, six battle-cruisers, 10 scout- cruisers and 130 destroyers, submarines, etc.

At the close of the European War the navy had increased into a fighting organization of more than 2,400,000 tons, or, if transports under naval control are added, of well over 3,000,000 tons.

In 1917 and 1918 three superdreadnoughts, the largest afloat, were added; more than 100 destroyers were built ; two superdreadnoughts to be armed with 16-inch guns were completed in 1919, while five great battle-cruisers and a fleet of fast scout cruisers were being con¬ structed. In 1919 also was inaugurated the policy of expanding the navy into two great fleets, one in the Atlantic and the other in the Pacific. Each fleet contains two divisions of dreadnoughts, with two divisions of predread¬ noughts held in reserve in each ocean, about 100 destroyers. These fleets are brought to¬ gether each year for joint battle exercises under a single command. The Panama Canal makes possible the holding of joint manoeuvres when¬ ever they are necessary. Many of the newer type of dreadnoughts and other vessels are oil-burners. The new ships under construction are all of the oil-burning type.

The dreadnoughts now number 23 and of these 20 are in commission and the others are nearing completion. In the following table are given the names and tonnage of the dread-

noughts of the American

navy :

Vessel

Tons

Vessel

Tons

Arizona .

. . 31,400

North Dakota .

20,000

Arkansas .

. . 26,000

Oklahoma .

27,500

California .

. . 32,300

Pennsylvania .

31,400

Colorado .

. . 32,600

South Carolina. . . .

16,000

Delaware .

. . 20,000

Tennessee .

32,300

Florida .

. . 21,825

Texas .

27,000

Idaho .

32,000

Utah .

21,825

Maryland .

. . 32,600

Washington .

32,600

Michigan .

16,000

West Virginia .

32,600

Mississippi .

Nevada

. . 32,000

27 500

Wyoming .

26,000

New Mexico. . . . New York .

. . 32,000

. . 27,000

Total tonnage.

630,450

In 1919 there were begun three 42, 000-ton dreadnoughts, each mounting 12 16-inch guns. The Colorado, Washington and West Virginia were the first American vessels to mount 16-inch

UNITED STATES NAVY

Copyright, Underwood & Underwood, New York

PEARL HARBOR DRY DOCK, HONOLULU

1 Opening of the water controls 9 Sept. 1919 2 The fir>t flow of water passing into the dock

guns. There is a main battery of eight on each vessel. The New Mexico, Idaho and Missis¬ sippi ‘ mount each 12 14-inch rifles. The Cali¬ fornia and Tennessee were the last vessels of the first line of the navy to mount guns of the 14-inch type ; each vessel carries 12 guns of that calibre. The Pennsylvania and Arizona each mount 12 14-inch guns; the New York, Texas, Nevada and Oklahoma mount each 10 14-inch guns; the Arkansas and Wyoming 12 12-inch; the Delaware, Florida, Utah and North Da¬ kota 10 12-inch; and the Michigan and South Carolina each have eight guns of 12-inch calibre. The oil-burners of the present fleet are the New Mexico, Mississippi, Idaho, Pennsylvania, Arizona, Nevada and Oklahoma. The old-line battleships which furnish the coast reserve for the new fleets are: Alabama, 11,552 tons; Con¬ necticut, 16,000 tons; Georgia, 14,948 ; Illinois, 11,552 tons; Indiana, 10,228; Iowa, 11,346 tons; Kansas, 16,000 tons; Kentucky, 11,520 tons; Louisiana, 16,000 tons; Maine, 12,500 tons, Minnesota, 16,000 tons; Missouri, 12,500 tons; Nebraska, 14,948 tons ; New Hampshire, 16,000 tons; New Jersey, 14,948 tons; Ohio, 12,500 tons; Oregon, 10,288 tons; Rhode Island, 14,948 tons; Vermont, 16,000 tons; Virginia, 14?948 tons; Wisconsin, 11,552 tons, making a total tonnage of this type of 283,000.

The tonnage of the navy as it now stands is as follows :

TYPE

Number

Tons

23

630,450

19

283,000

Raft Ip rniisftrs .

6

261,000

Armored cruisers .

8

4

110,500

36,815

*Q^r*rmH-r1aQQ rvrnisp.rs .*

4

25,065

13

82,250

15

47,820

38

36,055

Wirct-rlo cc dpst, rovers .

192

208,998

r'oact Hp<:trnvers .

20

6,275

17

3,150

148

118,000

46,650

225,929

130,560

37,497

33,900

42,807

900,000

92,602

j;ij .

3,353,458

- *Transport tonnage is made up of merchant vessels which in peace time are turned back to private hands subject to call by the naval authorities when an emergency arises.*

The battle-cruisers, which like the super¬ dreadnoughts, carry 16-inch guns, are among the largest and speediest vessels of their type.

They are the Constellation, Constitution, Lex¬ ington, Ranger, Saratoga and the United States; each has a displacement of 43,500 tons, mak¬ ing a total of 261,000 tons for this class. In the late war no vessel played a more im¬ portant part than the fast-going modern de* stroyer, the ship that conquered the sub¬ marine. Americas new fleet of destroyers each bears the name of a naval hero of other days. The average displacement is 1,165 tons for this plass of vessel, of which the navy has 192,

with a total tonnage of 208,998. There are 15 of the older type of destroyers of 430 tons average displacement, a total of 6,275 tons. There are 17 torpedo boats of from 142 to 280 tons, a total of 3,150 tons. Armored cruisers have an aggregate tonnage of 110,500; there are eight vessels of this type of about 14,500 tons each. First class cruisers are the Brooklyn, Charleston, Rochester and Saint Louis, of about 9,700 tons each. The Chicago, Columbia, Minneapolis and Olympia are second class _ cruisers, with an aggregate tonnage of 25,065. There are 15 third class cruisers of from 2,072 to 3,430 tons, with an aggregate of 47,820 tons. In addition there are 38 gunboats of from 190 to 1,500 tons, with a total ton¬ nage for the class of 36,055 tons. There are 148 submarines, of which about 100 are new vessels of the improved <(AA,® <(R)} and <(SB types. The total tonnage of the new sub¬ marine fleet approximates 118,000.

Navy Organization. — The President of the United States is the commander-in-chief of the navy. Its affairs are administered by the Navy Department, of which the Secretary of the Navy is the head. The Assistant Secretary of the Navy performs such duties as may be assigned him by the secretary, the most important being the supervision of naval stations in insular pos¬ sessions, the Marine Corps, War College, build¬ ing of ships in navy yards and fitting of vessels for sea. The navy is governed by the Articles for the Government of the United States Navy, and statutes of Congress, orders of the Presi¬ dent and secretary and a code called Regula¬ tions for the Government of the Navy of the United States.

The business of the Navy Department is dis¬ tributed as the secretary deems expedient among eight bureaus. The Bureau of Yards and Docks controls docks and buildings in Navy Yards. The Bureau of Equipment provides coal, all equipments of ships and electrical ap¬ pliances afloat, and supervises the Hydrographic Office and distribution of charts therefrom, the Naval Observatory, Nautical Almanac and Compass offices. The Bureau of Navigation promulgates orders, regulates details of officers and enlistment of

men, supervises the Naval Academy and all naval educational institutions, the Naval Home, keeps the service records and looks after discipline. The Bureau of Ordnance has charge of armor and armament of all kinds and mechanism thereto pertaining, besides gov¬ erning the Torpedo Station, naval proving grounds and shore magazines. The Bureau of Construction and Repair designs, builds and re¬ pairs ships and supervises docking them. The Bureau of Steam Engineering designs, builds and repairs steam machinery. The Bureau of Supplies and Accounts buys provisions, cloth¬ ing, small and contingent stores and keeps the accounts of officers and men. The Bureau of Medicine and Surgery looks after the health of the force and controls all laboratories, naval hospitals and dispensaries. The office of the Judge-Advocate General of the Navy is inde¬ pendent of the bureaus and takes charge of courts-martial and courts of inquiry, examines claims against the department and attends gen¬ erally to its legal work.

There are already certain permanent boards of naval officers which take part in the admin-

istration. The General Board, presided over by the admiral of the navy, considers questions of naval policy and strategy and advises the secretary. The Board of Inspection and Survey inspects and reports on the efficiency of ships in commission. The Lighthouse Board controls the lighthouse establishment. For the distribu¬ tion of navy yards and naval stations see Navy Yards. The navy provides vessels and officers for the Commission of Fish and Fisheries and for the nautical schools of Massachusetts and New York. It also maintains naval attaches at the United States embassies and legations at London, Paris, Saint Petersburg, Berlin, Rome, Vienna, Tokio and Peking. Jointly with the Treasury Department it manages the lighthouses and provides officers for their inspection.

Personnel. — Officers are commissioned or warranted. Commissioned officers belong either to the <(line>;> or to the ˆstaff.® The grades of line officers are admiral, rear-admirals, captains, commanders, lieutenant-commanders, lieuten¬ ants, lieutenants, junior grade, ensigns and mid¬ shipmen. The staff officers include the Medical Corps, consisting of medical directors, medical inspectors, surgeons, passed assistant surgeons and assistant surgeons ; the Pay Corps of pay directors, pay inspectors,

paymasters, passed as¬ sistant paymasters and assistant paymasters. There are chaplains of various grades, profes¬ sors of mathematics, naval constructors, civil engineers and the admiral's secretary. All line officers, excepting those appointed from the war¬ rant officers, are graduated from the United States Naval Academy (q.v.). Promotion up to rear-admiral is by seniority only — subject to physical and professional examination at each step. The office of admiral is personal and ex¬ pires with the individual holder. The staff offi¬ cers are promoted by seniority in their several corps. The warrant officers include boatswains, gunners and carpenters, in each of which corps there are two grades, chief sailmakers, warrant machinists, pharmacists and mates. The great majority are appointed from the enlisted force. Chief warrant officers rank with but after en¬ signs. Promotion in the warrant grades is by seniority.

Enlisted Men. — Only citizens of the United States can be enlisted. The recruit must be able to write and speak English, have no physical dis¬ abilities, nor be a deserter or a minor under 14 years of age. The age limits vary with the rating — thus on first enlistment, a landsman must be between 18 and 25, unless he has a mechanical trade, when he can enlist up to 35, which is for all ratings the maximum. The enlistment term is two years — no enlistments for special service are allowed. Re-enlistment requires proof of creditable discharge. En¬ listed men are classified into chief petty officers, petty officers of the first, second and third classes and seamen of the first, second and third classes. They are again classified into the seaman branch, artificer branch, special branch and messmen branch. The seaman branch in¬ cludes such petty officers as boatswains' mates, gun captains and the like, and ordinary sea¬ men, landsmen, together with the three classes of naval apprentices. The artificer branch in¬ cludes all the machinists, electricians, carpen¬ ters, firemen and coal passers, the special branch, the stewards, hospital attendants and

musicians, and the messmen branch, the cooks, stewards and mess attendants. Petty officers are appointed by captains of ships from the en¬ listed force. Two years' service at sea is re¬ quired for rating as ordinary seaman and four years for seaman. Gun pointers are selected for merit and any one is eligible who shows the necessary natural aptitude. Those who become expert receive as high as $10 per month in ad¬ dition to their regular pay.

Apprentices are enlisted between the ages of 16 and 17 with the consent of parents or guard¬ ians and must engage to serve until 21. They are instructed in the rudiments at the training station at

Newport, R. I., and at San Francisco, Cal., for six months and then go to the train¬ ing ships for a year's cruise at sea, after which they are promoted from the third class to the second and assigned to the fleet. One year later they are rated in the first class and are eligible for petty office. Their instruction is continued during their apprenticeship and they have other special privileges.

Retirement of officers is compulsory at age of 62, also for disability and under certain con¬ ditions under Act of 3 May 1899. It is volun¬ tary after 40 years' service and above the grade of lieutenant-commander. Retired officers (ac¬ cording to the law under which they retire) receive either three-fourths or one-half the sea pay of their grade on the active list or one-half their leave pay. Enlisted men can retire after 30 years' service and attaining age 50 unless physically disqualified for duty. They receive three-fourths of the pay in the rating they held when retired.

The Naval Home at Philadelphia (formerly called the Naval Asylum), built in 1832, pro¬ vides a retreat for old officers and sailors.

The faculty is mainly composed of graduate naval officers. The new buildings of the Acad¬ emy recently completed represent an aggregate expenditure of nearly $12,000,000 and form the most magnificent educational structures in the world. The War College, founded by Rear Admiral Stephen Bleecker Luce, United States Navy, in 1883 is established at Newport, R. I. It is not a school, but a place for discussion of naval problems by officers of all grades, forming committees in attendance usually during the summer months. It specially considers matters of strategy, planning of campaigns, etc.

The naval stations and constructive and re¬ pairing establishments are at Portsmouth, N. H. ; Boston, Mass.; Brooklyn, N. Y. ; League Island, Pa.; Washington, D. C. ; Norfolk, Va. ; Pensacola, Fla. ; Mare Island, Cal. ; and Puget Sound, Wash.; and naval stations at Newport, R. I.; New London, Conn.; Charleston, S. C. ; Port Royal, S. C. ; Key West, Fla.; New Or¬ leans, La.; Guantanamo, Cuba; Guam, Hawaii; Tutuila, Samoa; Cavite, P. I.; Olongapo, P. I.

Naval Policy. — It is the policy of the United States, not to nave the largest navy, but one which shall be fully adequate for the mainte¬ nance of its peace and in every particular of the highest attainable efficiency. At the present time our naval armament is somewhat below the minimum for the work demanded of it. A battleship

requires about 40 months to build and it takes six years to produce a competent naval officer. So also it takes time to train men ♦ to handle the complicated mechanism

which is essential to the modern war vessel. The training facilities of the country and the means for obtaining the enlisted force are in¬ adequate. A naval reserve is necessary from which to draw men at once in case of need. A naval militia (q.v.) co-ordinated with the reg¬ ular service is also of great value, especially lor harbor and coast defense. Several States have established such militia, but its develop¬ ment has been greatly retarded by lack of proper national encouragement and. support. The distribution of our naval force in time of peace is in two fleets and four separate squad¬ rons. The North Atlantic fleet includes the east coast of the United States and West Indies, and is divided into the Battleship, the Carribbean and the Coast squadrons. The Asiatic fleet covers the east Asiatic coast and the Philippines and is divided into the Northern and Southern squadrons; the European squad¬ ron, the South Atlantic squadron which cruises on the east coast of South America, the Pacific squadron, which ranges over the whole west coast, and the Training squadron. See also Naval Architecture; Navy, History of; Naval Service, The; Warships, Modern.

Bibliography. — For histories of the navy consult Cooper's (1839) ; Maclay's (1895-99) ; Spears' (1897) ; also Aldrich's (History of the Marine Corps. } A great deal of information will also be found in Hammersley's (Naval Encyclopedia) (1881) and subsequent editions. Niles' (Register and American State Papers) may also be consulted. The (Offlcial Records of the United States and Confederate Navies during the War of the RebellioiP contain all re¬ ports and like matter, and are published by the Navy Department. Consult also files of the Army and Navy Journal 1863 to date. For cur¬ rent progress, the yearly reports of the Secre¬ tary of the Navy and of the bureaus — the pub¬ lications of the Office of Naval Intelligence and of the United States Naval Institute are indis¬ pensable. Consult also (The United States Navy Year Book) (annual, Washington, D. C.) For the Naval Academy, consult the history of that institution by Park Benjamin, and the yearly (Registers) obtainable from the super¬ intendent, which give all qualifications for en¬ trance course, etc. For government and organi¬ zation consult Regulations for the Govern¬ ment of the Navy (current issue), and for personnel and*

stations, the current (Navy Reg¬ ister. For construction of ships consult (Pro- ceedings of the Institute of Naval Architects and Marine Engineers.**

John B. McDonnell, Editorial Staff of The Americana.

57. NAVY OF THE UNITED STATES, Chronological History of. The .following condensed history of the United States navy embodies all the essential details of every note¬ worthy sea fight in which this country has been engaged from 1775 to 1919. Leading incidents of legislative and popular interest are also in¬ cluded, all being compiled from the most au¬ thentic official and historical sources.

1775. June 12 — First sea fight of the Revolution off Machias, Me. Two small coasting vessels manned by volunteers (armed chiefly with axes and pitch- forks) under command of Jeremiah O'Brien, captured, after a severe battle, the English war cutter Margaretla, Lieutenant Moore, Americans, 1 killed, 6 wounded; English, 5 killed, 9 wounded.

1775. July 12 — Two American trading vessels (armed for the emergency) attacked and captured, in Bay of Fundy, two regular English cruisers which had been fitted out expressly to avenge the Margaretla. Jeremiah O'Brien, again, was American commander.

1775. Oct. 13 — First official step toward the establish¬ ment of United States navy, Silas Deane, John Adams and John Langdon (" Fathers of Our Navy ") being appointed a committee by Congress to fit out two war- snips to cruise against the British.

1776. Jan. 15 — Seventeen volunteers put out of New- buryport, Mass., in three whale boats (under Capt. Offin Boardman) and by clever stratagem captured an armed ship laden with provisions consigned to the British army at Boston.

1776. Jan. – First flag ever unfurled aboard an American

warship was hoisted by 1st Lieut. John Paul Jones on board the flagship Alfred, at Philadelphia. It was the " grand union " flag, having 13 American stripes with the English union jack in the field.

1776. Feb. 17 — First regularly organized naval expedition of the United States put to sea under the orders of Capt. Esek Hopkins. Its object was the capture of the island of New Providence, in the Bahamas, where there were large quantities of military stores. The fleet consisted of the 24-gun ship Alfred, 20-gun ship Columbus, 14-

gun brigs Andrea Doria and Cabot, 12-gun brig Providence, 10-gun sloop Hornet and 8-gun schooners Wasp and Fly.

1776. March 3 — American sailors and marines from Hopkins' fleet landed at New Providence, captured the two forts, made prisoner of Governor Brown, held the place two weeks and, on 17 March, sailed with the military stores.

1776. April 6 — While entering Long Island Sound, Hop¬ kins' fleet was attacked by the English 20-gun cruiser Glasgow, which was driven off only after a spirited action of several hours. The next day the fleet arrived at New London.

1776. April 17 — American cruiser Lexington, Capt. John Barry, captured English cruiser Edward after fighting one hour. Americans, 2 killed, 2 wounded; English loss much greater.

1776. May 9 — American 8-gun schooner Wasp, Capt. Charles Alexander, captured English armed vessel Betsey.

1776. June 17 — Connecticut State cruiser Defense, Captain Harding, after an all day fight, captured two English transports, having on board about 300 soldiers of the British 71st Regiment; their major (Menzies) was among the killed.

1776. July 4 — On this day England had on the North American coast 78 warships, mounting 2,078 guns. The American navy at the same time consisted of 25 warsnips, 422 guns. Of these ships only six were built for war purposes.

1776. Sept. 1 – — Capt. John Paul Jones, in command the 12-gun cruiser Providence, escaped from 28-gun English frigate Solebay, by an extraordinary manoeuvre.

1776. Oct. 11 — First battle of Lake Champlain. The American flotilla, of 15 vessels, carrying 88 guns and 700 men, under command of Gen. Benedict Arnold, made a stubborn fight against the English flotilla of 25 vessels, 89 guns and 1,000 men, under Captain Pringle. The American fleet was manned and officered mostly by soldiers, while the English craft were manned by men from the Royal navy. Although the Americans were defeated they inflicted irreparable loss and delay on the enemy.

1776. Nov. 13 — American 24-gun ship Alfred, Capt Hoysted Hacker, captured English transport Mellish and with valuable supplies for General Burgoyne's army then at Montreal. Among the

stores Were 10,000 suits of uniform.

1776. Dec. 31 — During the year 1776 the Americans captured 342 English vessels. An English account says that the damage to the West India trade alone was nearly $2,000,000.

1777. March – English 28-gun frigate Milford captured

14-gun American brig Cabot, Capt. Joseph Olney.

1777. April 9 — 28-gun American frigate Trumbull, Capt. Dudley Saltonstall, captured two English armed trans¬ ports off New York laden with military stores.

1777. May 7 — American cruiser Surprise, Capt. Gus- tavus Conyngham, in the English Channel, captured British packet Prince of Orange. So unexpected was the presence of Yankee warships in this part of the world that Captain Conyngham had entered the English cabin, where he interrupted the latter's breakfast, before the presence of an enemy was known.

1777. May – About the middle of May the 32-gun

frigate Hancock captured the English 28-gun frigate Fox. American casualties, 8 killed or wounded; the English, 32.

1777. June 1 — American frigate Hancock captured by English squadron off Halifax.

1777. June 14 — Design of present American flag adopted: the 13 stripes representing the original 13 States and a star for each State in the Union,

1777. Aug. – In this month the first submarine boat

ever invented made an attack on the British frigate Cerberus, which had it not been for imperfect mechanism, the craft would have been totally destroyed. Four of her crew were killed.

1777. Sept. 3 — On the night of this day the 32-gun frigate Raleigh, Capt. Thomas Thompson, stole into a fleet of English merchantmen and attacked the convoying war ship Druid. The Druid was reduced to a sinking con¬ dition before Americans were driven off by

superior forces.

1777. Sept. 20 — The 16-gun cruiser Lexington, Capt. Henry Johnson, captured the British 10-gun cruiser . Alert, after two nours' spirited fighting and a chase of four hours. The English commander, Eieutenant Bazely, afterward became an admiral.

1777. Nov. 13 — Capt. John Paul Jones, in 18-gun American cruiser Ranger, while in Quiberon Bay, France, received the first salute to the Stars and Stripes in Europe.

1777. Dec. 31 — In 1777 the Americans captured 467 vessels from the English.

1778. Jan. 1 — At the beginning of the year 1778 the British had on the North American station 89 warships with a total of 2,576 guns, while the Americans had 14 vessels witn 332 guns.

1778. Jan. 27 — Sailors from the United States 12-gun ship Providence landed on the island of New Providence, captured the forts and seven vessels in the harbor and carried away a large quantity of military supplies.

1778. ˆ March 7 — Our 32-gun frigate Randolph, Capt. Nicholas Biddle, in order to protect a convoy of merchantmen, attacked the 74-gun ship of the line Yarmouth. The Randolph was blown up, all but four of her 315 people perished.

1778. March 9 — The 24-gun ship Alfred captured by two English warships.

1778. April 22 — Capt. John Paul Jones lands at Whire- haven, England, and sets fire to the shipping in the harbor.

1778. April 24 — Action between the Ranger, Captain Jones, and the Drake, Captain Burdon, in the Irish Sea. The Americans captured the Drake after an action of one hour. Casualties: Americans 8; English 42.

1778. Sept. 27 — Our 32-gun frigate Raleigh, after a chase of several days, captured by English after being run ashore on the coast of Maine; all the crew escaped.

1779. Feb. 2 — First and only serious mutiny in the United States navy occurred in the 32-gun frigate Alliance at sea, while under a French commander, Pierre Landais, General Lafayette being on

board as a passenger.

1779. May 7 — Our 12-gun brig Providence, after desperate action of one hour, captured English warship of about the same force. The enemy lost 27 out of a crew of only 53. The Americans had 4 killed and 10 wounded.

1779. Sept. 23 — Famous action between Bonhomme Richard, Capt. John Paul Jones, and English frigate Serapis off eastern coast of England. Early in the battle the ships anchored side by side. The Englishman was carried by boarding. Shortly afterward the Bonhomme Richard sank.

1780. June 2 — One of the most obstinate naval battles of the Revolution fought between 28-gun frigate Trumbull, Capt. James Nicholson, and English privateer Watt, The Trumbull was dismasted and the Watt escaped. The American loss was 39; that of the enemy, 92.

1780. July 9 — Massachusetts State cruiser. Protector, Capt. J. F. Williams, blew up the English privateer Admiral Duff. Only 55 of the Englishmen were saved. Ameri¬ cans lost 6 killed or wounded.

1780. Aug. 13 — 'A large American naval and military force was captured on this day at the mouth of the Penobscot River, Me., by the British under Sir George Collier. Three of our government cruisers and a number of privateers were lost.

1780. Oct. 8 — United States ship Saratoga captured English armed ship Charming Molly. A few days after¬ ward the Saratoga was lost at sea with all hands.

1781. May 28 — Our 28-gun frigate Trumbull captured by British squadron in a night attack; many of the Ameri¬ can crew being in a state of mutiny.

1781. June 22 — United States 32-gun frigate Confederacy captured at sea by two English frigates while return¬ ing from France with military supplies.

1781. Aug. – Our 28-gun frigate Trumbull, Capt. James

Nicholson, captured off Halifax by two British frigates.

1782. April 8 — The Pennsylvania State cruiser Hyder Ally, Capt. Joshua Barney, in a desperate battle defeated English cruiser

General Monk in Cape May Roads. Our casualties were 15; that of the English, 53.

1783. In the Revolution the British had 202 warships cap¬ tured or destroyed. In all there were about 800 vessels taken from the British by our sea forces.

1785. July 25 — American schooner Maria of Boston seized by Algerian corsairs and her crew thrown into captivity. This resulted in a naval war against all the states of Barbary.

1794. March 27 — On the close of the Revolution the navy was disbanded and it was not until this day that Con-, gress took steps to create a new navy. By this act six frigates were authorized. They were the famous group to which the Constitution, etc., belonged.

1798. April 30 — Secretary of the navy added to the Presi¬ dent's Cabinet, Benjamin Stoddart being the first Secretary.

1798. July 9 — Congress declared naval war upon France because of the persistent depredations on our commerce by French cruisers and privateers.

1798. Nov. 16 — Our 20-gun warship Baltimore, Capt. Isaac Phillips, boarded by the British 74-gun ship Carnatic, while at sea, and several of the American crew were impressed out of her. This was one of the outrages that led to the War of 1812.

1799. Feb. 9 — Our 36-gun frigate Constellation, Capt. Thomas Truxtun, fought and captured French 40-gun frigate Insurgent, Captain Barraeut, after an action of over one hour. Our losses were 5 killed or wounded, while that of the French was 70.

1800. Feb. 2 — Constellation had a running fight with the French 40-gun frigate Vengeance, Capt. A. M. Pitot, which lasted five hours. Owing to the damages in his rigging, Captain Truxtun was unable to capture his opponent, who finally escaped. American casualties, 39 killed or wounded; Frencn, 160.

1800. July 14 — The captured French frigate Insurgent, Capt. Patrick Fletcher, sailed on a cruise in the West Indies and was never heard from. This was one of the first great disasters in the United States navy.

1800. Oct. 12 — The 28-gun frigate Boston, Capt. George Little, in a two-day fight with the French corvet Berceau, Capt. Andre Senez,

finally captured her.

1801. Feb. 3 — Treaty of peace with France ratified. In this war 84 armed vessels were captured from the French, while the French captured only one of our warships, the Retaliation.

1801. May 14 — The Bashaw of Tripoli declared war against the United States because we did not pay our " tribute " promptly. About the same time other poten¬ tates of the semi-piratical states of Barbary began hostile measures against the United States.

1801. July 1 — First considerable squadron of American warships crossed the Atlantic and arrived at Gibraltar. It consisted of the frigates President, Philadelphia and Essex, under the command of Capt. Richard Dale, and was sent to make war on the states of Barbary.

1801. Aug. 1 — Our 12-gun schooner Enterprise, Lieut. Andrew Sterrett, in a three-hour fight with the Tripolitan w-ar polacre Tripoli, captured her. There were no American casualties, but the Tripolitans had 50 killed or wounded.

1803. June 22 — American squadron under the command of Capt. John Rodgers, attacked a large Tripolitan war ship and nine gunboats off the harbor of Tripoli. The gun¬ boats were driven into the harbor; the warship was destroyed.

1803. Oct. 31 — While chasing a Tripolitan craft, the 36-gun frigate Philadelphia, Capt. William Bainbridge, ran aground off the harbor of Tripoli. The following day he was compelled to surrender.

1804. Feb. 16 — Lieut. Stephen Decatur with 74 volunteers manned the ketch Intrepid and, under cover of night, ran into .the harbor of Tripoli and destroyed by fire the frigate Philadelphia, which the Tripolitans had cap¬ tured the year before.

1804. Aug. 3 — Americans began that series of bombard¬ ments on Tripoli which resulted in the capture of the place.

1804. Sept. 4 — Richard Somers with 1 1 volunteers manned the ketch Intrepid (which had been fitted as a floating mine to be exploded among the Tripolitan shipping) and, under cover of night, carried her into the harbor of Tripoli. The ketch was exploded and every one of the Americans was killed.

1805. June 3 — Treaty of peace signed with Tripoli.

1807. June 22 — Our 36-gun ship Chesapeake, Capt. James Barron, attacked off the Virginian coast by the 50-gun English frigate Leopard and was compelled to surrender. Three; of the American crew were taken aboard the English ship. This outrage hastened the War of 1812.

1811. May 16 — Our 44-gun frigate President, Capt. John Rodgers, at night was fired upon by the English 22-gun warship Little Belt. The Americans promptly returned the fire and compelled the English to surrender, after which the Little Belt was permitted to proceed.

1812. June 18 — Congress declares war against Great Britain. At that time England had 1,048 warships with 27,800 guns, and the United States 17 warships with 442 guns.

1812. July 31 — Our 3-gun schooner Julia attacked in the Saint Lawrence river near Ogdensburg by the English war craft Earl of Moira and the Duke of Gloucester. The English were driven off with heavy losses.

1812. Aug. 13 — First naval action of the War of 1812. The 32-gun frigate Essex, Capt. David Porter, captured

the English 16-gun sloop of war, Alert. Only 3 of the enemy were wounded. No American casualties.

1812. _ Aug. 13 — First frigate action of the war, the 44-gun frigate Constitution, Capt. Isaac Hull, captvfred the English 38-gun frigate Guerribre, Capt. James Richard Dacres. . The battle lasted only 40 minutes, the Ameri¬ cans having 14 killed or wounded and the enemy 78.

1812. Oct. 7 — At night a boat party of Americans on Lake Erie attacked and captured the English war craft Detroit and Caledonia near Buffalo. The Americans were led by Lieut. Jesse Duncan Elliott.

1812. Oct. 17 — Our 18-gun sloop of war Wasp, Capt. Jacob Jones, after an action of 43 minutes, captured the English 18-gun war brig Frolic. The Americans had 10 killed or wounded, and the English 62.

1812. Oct. 25 — The 44-gun frigate United States, Capt. Stephen Decatur, after an action of an hour and a half captured the English

38-gun frigate Macedonia, Capt. John Surnam Carden. Our casualties were 12 killed or wounded; the enemy lost 104.

1812. Dec. 29 — Capt. William Bainbridge in the 44-gun frigate Constitution captured, off the coast of Brazil, the English 38-gun frigate Java after an action lasting nearly two hours. The Americans had 34 killed or wounded; the English, 161.

1813. Feb. 24 — The 18-gun sloop of war Hornet, Capt. James Lawrence, captured, after a sharp action of 15 minutes, English sloop of war Peacock of the same force, her commander, William Peake, being killed. The American casualties were 5 killed or wounded; that of the enemy, 38. Ttie Peacock was sunk in tne action.

1813. June 1 — American 36-gun frigate Chesapeake, Capt. James Lawrence, captured after a desperate action of 15 minutes off the port of Boston, by the English 38-gun frigate Shannon, Capt. Philip B. V. Broke. The Ameri¬ cans had 146 killed or wounded and the English 83. Lawrence was killed, his last words being " Don't give up the ship."

1813. Aug. 14 — The American 18-gun sloop of war Argus, Capt. Wm. Henry Allen, captured off English coast by British war ship Pelican (of the same force), Capt. John Fordyce Maples, after a severe action of 47 minutes in which the American commander was mortally wounded. The Americans had 23 killed or wounded; the English 7.

1813. Sept. 4 — The 12-gun schooner Enterprise, Capt. William Burrows, captured English sloop of war (of the same force) Boxer, Capt. Samuel Blythe, after an action of 40 minutes, off Monhegan, on. the coast of Maine. Both the American and English commanders were killed. Our casualties were 12 killed or wounded; that of the English, 21.

1813. Sept. 10 — Battle of Lake Erie fought. The Ameri¬ can squadron carrying 54 guns, under the command of Oliver Hazard Perry, captured the English squadron of 63 guns under the command of Capt. Robert Heriot Bar¬ clay. Our casualties were 123 killed or wounded; that of the British, 135. The direct result of this battle was the overthrow of British supremacy" in the Western territory.

1814. Jan. 29 — The United States schooner Alligator repulsed a boat attack from the British frigate Narcissus with heavy loss to the

enemy.

1814. March 28 — Capt. Davis Porter in the 32-gun frigate Essex made a heroic defense against the British warships Phcebe and Cherub at Valparaiso, Chile. After a fight of 2 hours and 20 minutes the Essex surrendered, our losses being 155 killed or wounded; that of the English, only 15.

1814. April 29 — Our 20-gun sloop of war Peacock, Capt. Lewis Warrington, after an action of 45 minutes, captured the English sloop of war (of the same force) Epervier, Capt. Richard Wales. American loss, 2 killed or wound¬ ed; English, 23.

1814. June 28 — Capt. Johnston Blakeley, in the 18-gun sloop of war Wasp, captured the English war ship Reindeer off the English coast after an action of 19 minutes, the Americans having 26 killed or wounded as against 67 for the enemy.

1814. Sept. 1 — At night the Wasp had a battle with the English sloop of war Avon of less force. The Avon was sunk after an action of 43 minutes in which the Americans had 3 killed or wounded and the enemy 42.

1814. Sept. 11 — Second battle of Lake Champlain between American squadron under Captain Macdonough and English under Capt. Daniel Pring. The American force carried 86 guns and 850 men, the English 92 guns and 1,000 men. After an action of 2 hours and 20 minutes the English were defeated, our losses being 110 killed or wounded; that of the enemy, 194.

1814. Dec. 14 — Forty-two English launches, containing 42 guns and about 1,000 men, attacked the American flotilla on Lake Borgne, Miss., and after a spirited fight defeated it, the American casualties being 41 killed or wounded; the English, 94.

1815. Jan. 15 — The 44-gun frigate President, Capt. Stephen Decatur, captured by a British squadron after

a chase of two days. The Americans did not surrender until they had 80 killed or wounded and the enemy

25.

1815. Feb. 20 — Wnile cruising off the coast of Portugal the 44-gun frigate Constitution, Capt. Charles Stewart, after an extraordinary night battle, captured English war ships Cyane and Levant, having a

total of 55 guns as opposed to the 51 in the Constitution. Our casualties were 14 killed or wounded; the English, 77.

1815. March 23 — The 18-gun sloop of war Hornet, Captain Biddle, after a spirited action off Tristan d'Acunha, captured English sloop of war Penguin of the same force in 22 minutes. American casualties, 12 killed or wounded; the English, 38.

1815. June 17 — Before the war with England had been concluded the United States had declared war on Algiers as the result of outrages on American merchantmen. A squadron under Captain Decatur appeared in the Mediterranean and on 17 June captured the Algerian flagship Mashouda.

1815. June 30 — While in the Straits of Sunda (East Indies) the 18-gun sloop of war Peacock, Captain War¬ rington, captured English cruiser Nautilus of 12 guns, the enemy having 14 killed or wounded. There were no American casualties.

1821. From this year to the close of 1825 our naval forces were actively engaged in suppressing piracy in the West Indies and slave trade on the African coast.

1832. Feb. 7 — For making a murderous attack on American merchantmen, the 44-gun frigate Potomac landed a large force of men in Sumatra and attacked the town of Qualla Battoo, killing a large number of the natives and destroying their forts.

1838. Dec. 20 — Qualla Battoo again bombarded, for repetition of outrages; this time by the corvet John Adams, Capt. George C. Reid.

1846. July 2 — A force of 250 men from American squadron under Capt. John Drake Sloat, landed at Monterey, Cal., and occupied the place in the name of the United States.

1846. Oct. 16 — American naval force under Capt. David Connor made unsuccessful attempt to capture Tuspan, Mexico.

1846. Oct. 26 — Naval force under command of Capt. Matthew Calbraith Perry captured, after a severe fight, Mexican city of Tabasco.

1846. Nov. 20 — – Boat containing 7 Americans, under command of Lieutenant Parker, entered harbor of Vera Cruz at night, boarding the enemy's bark Creole (laden with munitions of war), burned her under the guns of the fort.

1847. Jan. 8 — Capt. Robert F. Stockton led a force of about 700 American sailors on a long march inland and defeated a Mexican army at San Gabriel, Cal. The battle was resumed on the following day at Mesa and again the enemy was routed. On the 15th our sailors marched into Los Angeles in triumph; having actually conquered the lower part of California.

1847. March 10 — Steam cruiser Spitfire ran into the har¬ bor of Vera Cruz and, single-handed, engaged the Mexi¬ can batteries.

1847. March 23 — Commander Tattnall with seven small gunboats boldly ran within close range of the heaviest fort at Vera Cruz and delivered a terrific fire for an hour. So unexpected was the attack that the Mexicans were scarcely able to reply.

1847. March 24-25 — The navy and army maintained the furious attack on Vera Cruz which, finally, resulted in the surrender of that place.

1847. June 14 — Strong naval force under Capt. M. C. Perry captured Tuspan after severe fighting. At one time our sailors landed and carried the Mexican earth¬ works by storm.

1847. June 30 — Captain Bigelow with 240 sailors marched against the town of Tamultay and captured it after suffering a loss of 2 killed and 5 wounded.

1847. Oct. 1 — A force of 80 sailors under Lieutenant Craven landed at Mulije, Lower California, and defeat¬ ed a superior number of Mexicans, driving them several miles inland.

1847. Nov. 10 — Captain Shubrick landed 600. men from his squadron and captured the city of Mazatlin, Mexico.

1847. Nov. 17 — A force of sailors under Commander Selfridge captured the city of Guaymas, Lower Cali¬ fornia, after severe fighting.

1848. Jan. 30 — Lieutenant Yard with a detachment of sailors landed and surprised a body of Mexican troops near Cochori, Lower California.

1848. Feb. 6 — Lieut. Charles Hey wood of the Marines made an attack on the Mexicans at San Jose, Lower California. Attack was renewed the next day and the enemy defeated with a loss of 15 killed or wounded.

1853. July 14 — Com. M. C. Perry landed his expedition at Yokohama, Japan, and formally delivered the message of friendship from the President of the United States to the emperor. It resulted in the opening of Japan to foreign commerce.

1854. Feb. 12 — Perry appeared off Tokyo with an imposing fleet to receive the answer from the emperor.

1856. Nov. 20 — Because the Chinese forts wantonly fired on the American at Canton, a large force of sailors and marines was landed under Commander Andrew Hull Foote, and, after a two days' fight, the Cninese were defeated with a loss of about 400 killed or wounded; the Americans having 12 killed and 28 wounded.

1859. June 25 — Captain Tattnall made his famous dash to the assistance of the British and French who were sorely pressed in their attack on the Peiho forts. North China. It was on this occasion that Tattnall exclaimed " Blood is thicker than water."

1861. April 21 — Captain McCauley destroyed all United States stores at Norfolk, Va., to prevent their falling into the hands of the Confederates.

1861. May 31 — With frail gunboats Commander James Harman Wood attacked the Confederate batteries at Aquia Creek, near Washington, D. C. The attack was renewed the next day, but failed; the Nationalists having 1 killed (Commander Ward) and 4 wounded.

1861. Aug. 29 — Capt. Silas H. Stringham with a powerful squadron of wooden warships bombarded Fort Hatteras and compelled the surrender of its garrison of 615 men. The Confederate loss was 29 killed or wounded.

1861. Sept. 10 — Two gunboats commanded by Lieut. Roger N. Stembel opened fire on a Confederate battery of 16 guns near Columbus, Ky., and destroyed it.

1861. Sept. 14; — A boat party under Lieut. John Henry Russell pulled into the harbor of Pensacola and, after a desperate fight, captured and destroyed the Confederate privateer Judah. About 20 of the boat party were killed or wounded; enemy's loss, unknown.

1861. Oct. 1 — The improvised Union gunboat Fanny while operating in Pamlico Sound, North Carolina, was captured in a daring manner by a party of Confederates under Capt. Wm. F. Lynch.

1861. Oct. 5 — A regiment of Confederate troops while marching on the narrow island of Hatteras was fired upon by the National gunboat Monticello, Lieut. Daniel L. Braine, and routed with great loss.

1861. Oct. 12 — Capt. George Nicholas Hollinn with the Confederate ironclad Manassas and 6 wooden steamers came from New Orleans and put to flight the powerful Union squadron stationed near the mouth of the Missis¬ sippi River. The Richmond was nearly sunk and, by means of fire rafts, the enemy compelled our ships to flee.

1861. Oct. 28 — The little wooden gunboat Conestoga, Lieut. S. Ledyard Phelps, attacked a Confederate camp on the bank of the Cumberland River, inflicting a loss in killed and wounded.

1861. Nov. 7 — Capt. Samuel Francis Dupont with a pov- erful squadron of wooden ships captured, after a heavy bombardment, Port Royal, N. C., with a loss of 31 killed or wounded, the enemy's loss being 63.

1861. Nov. 8 — Union war steamer San Jacinto, Capt. Charles Wilkes, intercepted the English mail steamer Trent on the high seas and forcibly took out of her two Confederate agents, Mason and Slidell.

1861. Nov. 8 — Lieut. James E. Jouett led a boat party into the harbor of Galveston, Tex., under cover of night, and destroyed the war schooner Royal Yacht. The boat party had 9 casualties. The entire Confederate crew was captured.

1862. Feb. 6 — – Capt. A. H. Foote with Union gunboats attacked Fort Henry on the Tennessee River and after a severe action compelled its surrender. The Union loss was 11 killed or wounded; the Confederate loss, 16.

1862. Feb. 10 — Union gunboats under Commander Rowan attacked the Confederate gunboats at Elizabeth City, N. C., and defeated them. The Union loss was 4 killed or wounded; that of the enemy, unknown.

1862. Feb. 13 — Commander Walke in the ironclad gun¬ boat Carondelet attacked Fort Donelson, Cumberland River. After maintaining an all-day fight single-handed she retired at dark with several casualties.

1862. Feb. 14 — Union gunboats under Captain Foote made a determined attack on Fort Donelson and compelled it to surrender, the Union loss being 54 killed or wounded.

1862. March 8 — Confederate ironclad Merrimac entered Hampton Roads and, in spite of the terrific fire, totally destroyed the warships Congress and Cumberland. The Unionists had 254 killed or drowned, besides many wounded; the Confederate loss was only 21 killed or wounded.

1862. March 9 — The famous battle between the Monitor and Merrimac fought, in which the latter was finally driven off. Owing to the protection afforded by the armor none was killed and only a few wounded.

*1862. March 14 — 'Naval force under Lieut. R. S. McCook captured the city of New Berne after a desperate fight in which the navy had 11 killed or wounded, while our land force suffered much more. The enemy's loss was even heavier. **

1862. April 4 — Commander Walke in the Carondelet made his celebrated dash past the batteries at Island No. 10

in the Mississippi, which resulted in the abandonment of that post by the enemy.

1862. April 6 — Two wooden Union gunboats prevented the annihilation of the Union army at Pittsburg Landing on the Tennessee River, by pouring in a cross-fire on the charging Confederates.

1862. April 23 — Farragut, under cover of night, made his famous dash past Forts Jackson and St. Philip, which resulted in the fall of New Orleans. It was one of the most daring feats in naval history. The Union loss was 184 killed or wounded, while that of the enemy was about equal.

1862. April 25 — A naval force under Commander Samuel Lockwood captured Fort Macon, N. C., after an all-day fight.

1862. May 10 — On this day the Confederate naval force in the

Mississippi made a sudden attack on the Union naval force near Fort Pillow, but were finally driven off with a loss of three killed or wounded.

1862. June 6 — Union gunboats under Captain Davis attacked the Confederate naval force at Memphis and defeated it. The casualties were inconsiderable.

1862. June 17 — A naval and land force captured Saint Charles on the White River, after a bloody struggle in which 150 of the Unionists were killed or wounded The Confederate loss is unknown.

1862. June 28 — Farragut made his perilous dash past the Confederate batteries at Vicksburg, with a loss of 37 killed or wounded. The enemy reported no losses.

1862. July 4 — Commander Trenchard in the Rhode Island dispersed Confederate troops at Galveston, and destroyed the blockade runner Richard O'Brien, with its valuable cargo.

1862. July 9 — Two gunboats and 40 soldiers under Lieut. Charles W. Flusser forced the barricades in Roanoke River and, after a hot fight, captured Hamilton, N. C. Union losses, three killed or wounded.

1862. July 15 — -Captain Walke with a small squadron attacked the ironclad Arkansas in the Yazoo River. A running fight followed, the Arkansas speeding down the Yazoo into the Mississippi and past the great Union fleet and took refuge under the Vicksburg batteries. That night the Union fleet attacked the ram and so injured her that she was of little service. The Unionists lost 68 killed or wounded, while that of the ram was

25.

1862. July 22 — Capt. Wm. D. Porter, with several gun¬ boats, made another attack on the Arkansas and com¬ pleted her destruction.

1862. Oct. 3 — A detachment of troops with a naval force under Lieut. E. R. Colhoun, captured Franklin after severe fighting in which 15 of our seamen were killed or wounded.

1862. Nov. 24 — While attempting to capture the town of Onslow, N. C., Lieut. Wm. B. Cushing, in the gunboat Flits, ran aground and was attacked by the Confederates. Cushing pluckily defended his

vessel two days, then setting her on fire escaped with the survivors.

1862. Dec. 31 On the night of this day the famous Monitor foundered at sea while near Hatteras Shoals, her people being saved by convoying ships.

1863. Jan. 1 — Before daylight two Confederate "cotton- clad " steamers made a sudden attack on the Union squadron off Galveston, captured one vessel, destroyed another and dispersed the force with heavy loss.

1863. Jan. 9 Rear-Admiral Porter, with a strong force of gunboats, captured Arkansas Post, on the Arkansas River, with a loss of 31 killed or wounded; Confederate losses being heavier.

1863. Jan. 1 1 On this day the famous Confederate cruiser Alabama sank the National cruiser Hatteras off Galveston, after a short fight, the Confederates rescuing the survivors.

1863. Feb. 14 — The Confederates captured the Union warship Queen of the West, which had run aground in the Red River.

1863. Feb. 24 — Refitting the (>ueen of the West, the Con¬ federates captured the new ironclad Indianola after a hot fight in the Mississippi River.

1863. Feb. 28 — Commander Worden in the monitor Montauk, at long range, destroyed the Confederate blockade runner Nashville.

1863. March 11 — Union gunboats began attack on Fort Pemberton on the Tallahatchie River, but were finally repulsed on the 18th with a neavy loss in killed and wounded.

1863. March 14 — Farragut passed Port Hudson, on the Mississippi, one of his ships, the Mississippi (on which was Lieut. Geo. Dewey) being destroyed by fire. The Unionists had nearly 100 killed or wounded.

1863. April 7 — Ironclads under Dupont' off Charleston made a determined attack on the fortifications. The Keokuk was sunk and the other vessels were compelled to retire.

1863. April 16- — Rear-Admiral Porter ran his fleet past Vicksburg with little loss.

1863. April 29 — Union gunboats made an unsuccessful

attack on Grand Gulf, Mississippi River, in which they had 75 men killed or wounded.

1863. June 17 — Monitor Weehawkert, Capt. John Rodgers, captured the Confederate ironclad Atlanta, Lieut. Wm. A. Webb. The Confederates had 18 wounded; no casualties for the Nationalists.

1863. July 10 — Rear-Admiral Dahlgren made a determined naval attack on the defenses of Charleston in con¬ junction vvith our troops, but after a severe action was compelled to retire.

1863. July 15 — While in Shimonos6ki Straits, Japan, "our warship Wyoming was fired on by the Japanese, Captain McDougal returned the fire, sank some of their ships and silenced their batteries. The Americans had six killed and four wounded. The Japs suffered heavily.

1863. July 18 — A combined land and naval attack was made on Fort Wagner, Charleston, but was repulsed by the Confederates.

1863. Sept. 8 — -A boat party consisting of 400 men under the command of Commander T. H. Stevens attempted to surprise Fort Sumter, Charleston, but was repulsed with a loss of 16 killed or wounded and 102 taken prisoners.

1863. Sept. 8 — An army and naval expedition against Sabine Pass was repelled by the Confederates, the Nationalists having about 50 killed or wounded, while the gunboats Clifton and Sachem were compelled to surrender.

1864. Jan. 30 — The Confederates under Commander J. T. Wood made a night attack on Union gunboats guarding New Berne, N. C.,

and captured the Underwriter, with a loss of 39 killed, wounded and made prisoners; the Confederate loss being 28 killed or wounded.

1864. April 20 — Confederate ram Albemarle attacked Union gunboats at the mouth of the Roanoke River, North Carolina and sank the Southfield, a number of Unionists being killed or wounded.

1864. May 5 — The ram Albemarle attacked Union gun¬ boats in Albemarle Sound and, after a desperate fight with our wooden gunboats, lasting several hours, was driven back, Several of the Union gunboats were disabled. The Unionists had 29 killed or wounded; the Confederate loss was less.

1864. May 6 — The Confederates blew up the Union gunboat Commodore Jones in Four Mile Creek, killing or wounding half her personnel. Two days later they destroyed our gunboat Shawsheen.

1864. June 19 — The Kearsarge sank the Confederate cruiser Alabama off Cherbourg, France, after a severe action. The Nationalists had 3 killed or wounded and the enemy 30.

1864. June 24 — Confederate shore batteries opened an unexpected fire on two Union gunboats in the Mississippi, near Port Hudson, but were silenced after an hour of hard fighting.

1864. Aug. 5 — Farragut made nis famous dash past the forts at Mobile Bay, and on the same day captured the ironclad T ennessee, after one of the most desperate fights in naval history. The monitor Tecumseh was sunk while passing over a line of torpedoes, 93 of her crew of 114 perishing. Total Union casualties, 315; that of the Confederates being 32.

1864 Oct. 7 — Commander Napoleon Collins, in the war¬ ship Wachusett, captured the Confederate cruiser Florida, in the Brazilian port of Bahia, by boarding. Afterward the Florida was released, the attack being illegal.

1864. Oct. 28 — Lieut. Wm. B. Cushing, in a launch with 16 men, under cover of night, crept up the Roanoke River and destroyed the ironclad ram Albemarle by a torpedo.

1864. Nov. 4 — Two Union gunboats under Commander Shirk were destroyed in endeavoring to silence the Confederate batteries on the Tennessee River.

1864. Dec. 24 — First great naval and land attack on Fort Fisher, in

which the Unionists were repulsed with a loss of 83 killed or wounded to the fleet alone, while the Confederate casualties were 58.

1865. Jan. 13 — Second naval and land attack on Fort Fisher, by which the fort was captured, our sailors and marines having 35 1 killed or wounded.

1865. Feb. 17 — Admiral Porter, with a strong naval force, captured Fort Anderson, with a loss of seven killed or wounded.

1 866. Sept. — — Schooner Gen. Sherman ran aground in Ping Yang River, Korea, and her crew was clubbed to death.

1867. Jan. – United States Steamship Wachusett

visited scene of Gen. Sherman outrage, but failed to get satisfaction.

1870. Jan. 24 — United States Steamship Oneida, while steaming out of the harbor of Yokohama, Japan, home¬ ward bound, was rammed by the English passenger ship, Bombay, and sunk; 117 of her 176 men perished.

1871. June 11 — A party from the American squadron attacked Korean forts in the Ping Yang River and

carried them by storm, having 10 killed or wounded Lieutenant McKee being among the former.

1885. March 15 — Commander McCaila, with a force of sailors and marines, took posession of the Isthmus of Panama, to protect American interests.

1889. March 15 — The United States Steamship Trenton, Vandalia, and Nipsic wrecked by a hurricane at Apia, Samoa. The Vandalia was a total loss. About 50 of our officers and sailors were killed or drowned.

1891. Oct. 16 — A number of Cnileans mobbed a party of sailors from the United States Steamship Baltimore at Valparaiso, killing 2 and injuring 15. The Chilean government discountenanced the outrage and made ample atonement.

1894. Feb. 2 — The famous Kearsarge wrecked on Roncador Reef.

1898. Feb. 15 — ■ United States battleship Maine blown up in

Havana harbor, with a loss of 260 men out of a com¬ plement of 350. This was the second greatest disaster in our navy.

1898. March 19 — Battlehip Oregon sailed from San Fran¬ cisco on her famous voyage around the Horn.

1898. April 22 — Read-Admiral Sampson began the block¬ ade of the north coast of Cuba.

1898. April 25 — United States declared that war with Spain existed from April 21st.

1898. April 27 — Sampson bombarded the Cuban port of Matanzas, silencing the Spanish batteries and preventing the erection of additional fortifications.

1898. April 29 — Commander McCaila drove a Spanish gunboat into the harbor of Cienfuegos.

1898. May 1 — Dewey destroyed the Spanish fleet under Montojo in the harbor of Manila, capturing Cavite and gaining complete possession of the harbor. Our casualties were 6, wnile that of the enemy was 618.

1898. May 11 — Cervera's squadron arrived off Mar¬ tinique.

1898. May 11 — Commander Chapman Coleman Todd entered the harbor of Cardenas with the cruiser Wil¬ mington, revenue cutter Hudson, and torpedo boat Winslow. The Winslow was suddenly attacked by a concealed battery and driven off in a crippled condition. The Winslow had five killed (including Ensign Worth Bagley) and two injured.

1898. May 11 — A boat party from Commander McCaila 's squadron advanced on Cienfuegos, and under a terrific fire cut two submarine cables. We had eight killed ox wounded.

1898. May 12 — Admiral Sampson bombarded San Juan, Porto Rico, silencing the enemy's guns. Our loss was eight killed or wounded.

1898. June 3 — Hobson made his famous dash with the collier Merrimac into the harbor of Santiago. The collier was destroyed and her entire crew made prisoners.

1898. June 6 — Sampson made the first bombardment of Santiago,

the Spanish batteries being silenced. We had no casualties, but the enemy admit a loss of 54 killed or wounded.

1898. June 11 — The Spaniards began their attack on our marines at Camp McCaila, Guantanamo Bay. It was continued for several days, when a determined attack of the marines put the enemy to flight. Our loss was 28 killed or wounded; that of the enemy was greater.

1898. June 20 — Captain Glass occupied the island of Guam.

1898. June 22 — Captain Sigsbee, in the passenger steamer Saint Paul, disabled the Spanish torpedo boat destroyer Terror. No casualties for the Americans; the enemy having 2 killed and several wounded.

1898. June 30 — Lieut. Lucien Young, with small gun¬ boats, silenced the Spanish batteries at Manzanillo.

1898. July 2 — Commander Swinburne destroyed the Spanish fortifications at Tunas, after a spirited action.

1898. July 3 — Cervera's formidable squadron was com¬ pletely destroyed off Santiago after a spirited battle and chase lasting nearly four hours, by the American fleet under the immediate command of Admiral Sampson.

1898. July 15 — Commander Hunker attacked the Spanish batteries at Baracao. Only two Americans were injured.

1898. July 21 — A handsome dash was made into the port of Nipe by three gunboats under the orders of Com¬ mander Hunker, and destroyed the Spanisn cruiser Don Jorge Juan.

1898. July 25 — Commander Richard Wainwright, in the Gloucester, occupied the port of Guanica, Porto Rico, being the first regular American force to land on that island in this war.

1898. July 27 — Lieutenant Merriam, with two boats' crews, took possession of Ponce, Porto Rico.

1898. Aug. 12 — Captain Goodrich attacked and compelled the surrender of Manzanillo.

1898. Aug. 13 — Dewey's fleet assisted army in attack on Manila, which resulted in the surrender of that place; Flag Lieutenant

Brumby hoisting the first American colors over the city.

1900. May — Rear-Admiral Kempff, commanding the flag¬ ship Newark in Chinese waters, detached a body of marines, who, until the relief force arrived, co-operated witn the small force of the Allies in Peking, in defense of the foreign embassies, besieged by the Boxer revolution¬ ists. (See Peking, The Siege in.)

1907. Cruise of an American fleet around the world as a demonstration of the naval power of the United States. 1914. Mexican complications led to the occupation of Vera Cruz by marines 21 April.

1917-18. The World War. Convoy of troops t

Edgar Stanton Maclay, Author of (A History of the United States Navy. y

58. POLITICAL PARTIES. A political party has been defined by Edmund Burke as ((a body of men united, for promoting by their joint endeavors the national interest, upon some par¬ ticular principle upon which they are all agreed.® But this definition is not adequate for the political party of to-day. The latter is more than a group of persons temporarily united for promoting a single principle. It is a more or less durable organization of voters, having for its immediate purpose the election of public officials and the control of the gov¬ ernment. The members «of the party may be agreed on 'Certain fundamental principles of governmental policy; but the application of these principles will vary from time to time, and they are likely to become little more than a general tendency. Particular parties are apt to be largely controlled by certain classes or sections; and their policies are likely to be affected by the interests of their membership rather than those of the country as a whole.

In America, as in Great Britain, there have usually been only two leading political parties at one time; and this has led to the opinion that men naturally tend to divide themselves into two main groups : the conservative and the progressive, or those who favor the mainte¬ nance of order and efficient government and those who support individual liberty and freedom. But these tendencies are at best vague and indefinite, and the development of political parties can only be understood by recognizing that there are many varying and

interwoven types of opinion, and a continual process of change from one to another.

Parties Before 1789.— During the colonial period there was no formal party organization in America ; but there were political divisions corresponding roughly to the, Whigs and Tories in Great Britain, — the Tories supporting the royal governors and the Whigs usually con¬ trolling the elective assemblies. Most of the Americans had been Whigs, standing for per¬ sonal liberty and opposing centralized authority.

In the Revolution the Whigs became known as Patriots ; while many of the business and propertied classes were Tories or Loyalists, supporting the British government. But after the establishment of independence the Loyalists disappeared.

A new division appeared in the Constitu¬ tional Convention of 1787, between the dele¬ gates from the large States who favored a strong national government, and those from the small States who preferred to continue a loose confederation. The result of this division was a series of compromises in the Constitution. In the campaign for the ratification of the Constitution, the supporters were known as

Federalists, and the opponents as Anti- Federalists.

Federalists and Jeffersonian Republicans.

— The new Constitution of the United States contained no recognition of political parties ; and after it was adopted and put in operation there were for a time no clearly marked political diyisions. Washington, and other leaders, were indeed strongly opposed to parties, and the new government included both Hamilton and Jef¬ ferson at the head of the two principal depart¬ ments. But differences of opinion on ques¬ tions of governmental policy soon developed the two opposing parties of Federalists and Republicans. The Federalists, under the leader¬ ship of Hamilton, and supported by Washing¬ ton, at first controlled the central government, and favored strengthening the national au¬ thority, a strong executive and a liberal inter¬ pretation of the Constitution. More specifically they supported Hamilton's financial and com¬ mercial policy, and distrusting the excesses of the French Revolution favored neutrality in the war between France and Great Britain. The Republicans, under the lead of Jefferson and Madison, favored a strict construction of the Constitution, a limited scope of national authority and Congressional control of the government. The

Federalists included most of the business and propertied classes; but the Re¬ publicans, organizing the small farmers and city workers, before long gained control of the national government. In power the Republi¬ cans became more national in spirit. When opportuntiy was offered, the Louisiana Pur¬ chase was made, in spite of its violation of the rule of strict construction. Later, under the aggressive leadership of Henry Clay, it entered on the War of 1812, which the surviving Federalists opposed.

After the war the Federalist party disap¬ peared. The ensuing (

Democrats and Whigs. — A new alignment of parties arose after the election of 1824, which continued through the second quarter of the century. One of these, under the name of Democrats, represented the more radical wing of Jeffersonian Republicans, and controlled the national government most of the time until 1860. Originating in personal loyal tv to Jack- son and a vague but pronounced feeling for a more democratic control of the government, which was strongest in the newer parts of the country, this party represented a strong na¬ tional spirit, and in the case of Jackson there was in practice a vigorous exercise of executive leadership. But the policies of the party were affected by the traditional views in favor of strict construction, the limitation of the central government and emphasis on State's rights ; and it opposed the national bank, protective tariffs and internal improvements. Later as the slavery question became more acute the State's rights doctrines of the party aligned it in op¬ position to attempts at national restriction of slavery.

In opposition there was organized a new National Republican party, which soon merged with other minor parties into the Whigs. Un¬ der the leadership of Clay and Webster, and supported by the financial and business classes, the Whigs revived and developed some of the nationalistic policies of the Federalists. They favored a liberal construction of the Consti¬ tution ; and in particular supported the na¬ tional bank, protective tariffs and the construc¬ tion of internal improvements. At the same time, unlike the Federalists, the Whigs opposed executive dominance and favored Congressional control of the government. The Whigs were strongest in the Northeast; but had also a con¬ siderable support in the South. But while they had a larger papular following than the Fed¬ eralists, they gained control of the national government only for brief intervals; and these

temporary successes were secured by com¬ promises inconsistent with the principles of their leaders. In the end the party failed as the result of an attempt to compromise on the slavery question.

During this period the machinery of party organization was more highly developed. The system of nominating conventions was firmly established, culminating in the national con¬ ventions for the nomination of Presidential candidates and the adoption of party platforms.

Minor Parties and Factions Before 1860. — From time to time minor parties and factional divisions of the leading parties have appeared in American politics ; and some of these have played important parts in the evolution of the party system. Very ephemeral and unorganized factions were the Quids (Republicans opposed to Jefferson) and the Blue-Light Federalists (opponents of the War of 1812). The Anti- Masonic party also had a brief duration ; but by holding the first public national nominating convention (1830) marked a significant stage in the development of party institutions. Dur¬ ing the dominance of the Democrats, internal divisions arose, especially in New York State, such as Locofocos, the Hunkers and the Barn¬ burners. Later the Whigs were divided be¬ tween ˆConscience® and <(Cotton® Whigs and <(Silver Grays.®

Of more permanent influence were the anti¬ slavery parties. The early Abolitionists op¬ posed political action. But the Liberty party nominated candidates in 1840 and 1844. In the next two Presidential campaigns the Free Soil party showed an increasing opposition to the extension of slavery.

Meanwhile opposition to the political in¬ fluence of Roman Catholics and recent immi¬ grants became a factor in local elections, and, aided by the disappearance of the Whigs, led to the organization of the American party, commonly called the ((Know Nothings,® which carried a number of States in 1854, and polled a considerable vote for its Presidential candi¬ date in 1856. This party was soon absorbed by the new Republican party; although the sur¬ viving conservative Whigs formed the main support of the Constitutional Union party in

1860.

The Republicans to 1876. — Following the struggle over slavery in the regions acquired in the war with Mexico, which had resulted in the Compromise of 1850, the passage of the vol. 27 — 34

Kansas-Nebraska Act in 1854, reopening the question of slavery in those Territories, and involving the revocation of the Missouri Com¬ promise of 1820, forced the slavery issue to the front and led to a radical party revolution. At the Congressional elections in 1854 a ma¬ jority of <(Anti-Nebraska® men were elected to the House of Representatives, under various party names ; and these soon combined to form the new Republican party. This was composed of Free Soilers, most of the Northern Whigs, and Anti-Nebraska Democrats. While unsuc¬ cessful in 1856, it proved a strong opponent to the Democrats ; and in 1860, with a divided opposition, the Republicans elected Lincoln as President.

The new party was at the same time more democratic and more strongly nationalistic than the former major parties. In opposing the ex¬ tension of slavery, it asserted the power of Congress to exclude slaves from the Territories, against the opinion of the Supreme Court in the Dred Scot case. It also reaffirmed the Whig policies of a protective tariff and internal improvements, and added to these the enact¬ ment of a homestead law. With the secession of the Southern States, the work of first im¬ portance became the maintenance of the Union; and in this the Republicans received the sup¬ port of many Democrats, although the conduct of the Civil War led to an enormous increase in the work of the national government and the executive.

After the war the Republicans continued in control of the national government through the period of reconstruction ; and during this time the national authority was still further extended by the adoption of the 13th, 14th and 15th amendments to the Constitution. The Demo¬ cratic party, almost silenced during the war, gradually regained control of the Southern and some Northern States; but the Republicans retained the popular support of patriotic feel¬ ing, combined with the aid of the manufactur¬ ing and capitalistic classes fostered by their economic policy, and a highly developed po¬ litical organization.

Party Oscillations 1876-96. — After the re¬ construction of the Southern States a new period of party history begins, marked by lack of clearly defined issues and oscillating party victories. The older issues were settled ; but the Republican and Democratic party organi¬ zation remained in existence. Criticism of po¬ litical abuses under President Grant led to the abortive Liberal Republican movement of 1872; and in the reaction following the panic of 1873 the Democrats gained control of the House of Representatives. In 1876 the Republicans re¬ tained the Presidency through the findings of the Electoral Commission. The Democrats on several occasions

were successful in the Con¬ gressional elections, and elected Cleveland as President in 1884 and 1892. But during the 20 years to 1896 no party controlled both the executive and legislative branches of the na¬ tional government for more than two years at a time.

The most distinctive issue between the two parties was the tariff. The Republicans were definitely committed to a high protective policy, while the Democrats favored a reduction of rates and a revenue tariff. In their platforms

the Democrats maintained their traditional attitude toward economy and the limited ex¬ ercise of governmental powers. The Repub¬ licans continued the policy of internal improve¬ ments.

But new questions were arising which gained support in both parties. Opposition to the cor¬ rupting influence of the spoils system led to the passage of the Civil Service Law in 1883. Agitation for government regulation of rail¬ roads led to State legislation and to the Inter¬ state Commerce Law of 1887. Business depres¬ sion and opposition to the financial interests led to demands for more and cheaper currency, which resulted in the passage of compromise measures of 1878 and 1890, and culminated in the cry for the <(free coinage® of silver. The growth of monopolies led to the passage of anti-trust laws in the States and to the Sher¬ man Law of 1890.

The general condition of political unrest was indicated by the appearance of a new series of minor parties. Beginning in 1872, the Prohibitionists have regularly nominated Presidential candidates, favoring the prohibition of the liquor traffic ; but they have never polled a large vote. The Greenback party had candi¬ dates at each Presidential election from 1876 to 1884, supporting the issue of government paper currency. In 1888 there was a Union Labor party ticket. These two elements of rural and urban labor discontent were com¬ bined in 1890 in the Populist party, which polled more than a million votes in 1892. This party supported the <(free coinage® of silver, postal savings banks, a graduated in¬ come tax ; government railroads, telegraphs and telephones ; and the transfer of unused land to actual settlers. Even more radical measures were advocated by the Socialist Labor party which also had candidates in 1892.

Republican Control from 1896 to 1912. — The Presidential election of 1896 brought about an important readjustment of party lines, which ushered in another period of 16 years continuous Republican control of the national government. The Democratic National Con¬ vention of 1896, controlled by the radical wing, adopted a platform in favor of the free coin¬ age of silver and nominated for President W. J. Bryan. This brought to their support the Populists and silver Republicans; but lost the conservative gold standard Democrats in the East. The Republicans, reaffirming their pro¬ tective tariff views, now took a. positive posi¬ tion in favor of <(sound money® ; and with the support of the business interests elected Mc¬ Kinley and controlled both houses of Congress.

As a result of the brief war with Spain, the United States acquired island possessions in both the West and East Indies and became actively involved in world politics. The Re¬ publicans supported this policy of expansion ; while the Democrats opposed the militaristic and imperialistic tendencies, but without success.

The assassination of McKinley in 1901 and the succession of Roosevelt to the Presidency led to important changes in party policies. Roosevelt was an aggressive leader, who upheld the new military and international policies and acquiesced in the traditional protective tariff policy of the party, but who favored a considerable increase of social and industrial

control by the government, which was opposed by the conservative business elements. At the election of 1904 the Democrats nominated a conservative candidate ; but Roosevelt received a large support from the more radical Demo¬ crats and was triumphantly re-elected. Dur¬ ing his second term important laws were passed for the regulation of railroad rates, the gov¬ ernment inspection of foods and some super¬ vision of large industrial corporations. Largely through the influence of Roosevelt, the Repub¬ licans in 1908 nominated and elected as his successor W. H. Taft, over Bryan, who had been nominated by the Democrats for the third time.

President Taft proved much more moderate than Roosevelt ; and during his administration the Republicans became badly divided. A revis¬ ion of the tariff was enacted ; but this was not satisfactory to the more progressive Republi¬ cans. This dissatisfaction, with the growing demand for other political, social and indus¬ trial reforms, was reflected in the defeat of the Republicans by the Democrats at the Congres¬ sional elections of 1910. Another sign was the increasing vote of the Social Democratic party which had entered the

political field in 1900.

The Progressives and the Wilson Democ¬ racy. — • In 1912 came another crisis in party history, resulting in a change in party control of the national government. For many years the traditional policies of the two leading parties had been of little significance ; and each of these parties had a conservative and a progressive or radical wing. Progressive Democrats and Republicans had carried through important economic and sound re¬ forms in many States — in taxation, con¬ trol of business, the direct primary and the initiative and referendum — and some of the new leaders were in Congress. The national nominating conventions of both major parties in 1912 saw a prolonged struggle for control. In the Republican convention, the conservatives supported the renomination of President Taft, and by their control of the party machinery were able to win a formal victory. But most of the progressive Repub¬ licans who had favored another nomination for Roosevelt claimed that he had been defeated by fraud, and took the lead in organizing a new Progressive party which nominated Roose¬ velt on a platform supporting radical reforms in the interest of greater political and social democracy, and a more active national govern¬ ment. In the Democratic convention, under the leadership of Bryan, the progressive ele¬ ment nominated for President Governor Wil¬ son of New Jersey, on a less radical platform than that of the Progressives. Wilson received the support of some progressive Republicans and many moderate independents, and was elected, carrying most of the States and electoral votes, although with less than a ma¬ jority of the popular vote. Roosevelt received a larger vote than Taft.

The first term of President Wilson was marked by the passage of many important laws, — revising the tariff downward, reorganizing the banking system, controlling industrial monopolies, as well as some social welfare legislation. Under recent amendments to the Constitution a national income tax has been established, United States senators are now

elected by popular vote, prohibition of the liquor traffic has been adopted. A woman suffrage amendment has been adopted. On the outbreak of the Great War Wilson adopted a policy of neutrality, which he maintained through his first term, and in 1916 led his party to victory.*

The entrance of the United States into the war against Germany, in 1917, led to another enormous increase in the work and influence of the national government. The peace treaty and the League of Nations involve a more ac¬ tive participation by the United States in world politics. In assuming these responsibilities the Wilson Democracy departed further from the older Democracy. Its immediate effect was the return of the Republicans to power in 1920, with the greatest majority ever given on a platform reaffirming the traditional policies of that party.

Bibliography. — Bryce, James, (The Ameri¬ can Commonwealth (Part III, chs. 53-75, 6th ed., New York 1910) ; Beard, C. A., (American Government and Politics) (rev. ed., chs. 6-7, 1914) ; Croly, PL, (The Promise of American Life* (New York 1909) ; Ford, H. J., (New York 1902) ; Ray, P. O., (Introduction to Political Parties and Practical Politics) (rev. ed., New York 1913) ; Woodburn, J. A., (Political Parties Parties and Practical Politics* (rev. ed., New York 1914).*

John A. Fairlie,

Professor of Political Science, University of Illinois.

59. FOREIGN POLICY. The diplomacy, negotiations and treaties of the United States since the beginning of the national government in 1775 are connected with more than 50 foreign governments, cover a period of over 140 years and apply to a great number of subjects. To analyze the national policy either by topics or by the -governments concerned would require a volume. On the other hand, an historical survey of the successive epochs and episodes of American diplomacy may be brought into mod¬ erate space, because the main lines of policy have been simple and easy to trace.

Diplomatic Procedure. — From 1775 to 1789 Congress, as the mainspring of govern¬ ment, was the source of all diplomatic authority, the framer of instructions and the maker of treaties. During the Revolution, Congress com¬ missioned foreign ministers to mqst of the Continental great powers and they were for¬ mally received by France and Holland. After the peace, Prussia, Sweden and Great Britain entered into diplomatic relations; and in course of time all the other European states sent min¬ isters.

Under the Federal Constitution, the power to appoint ministers and ratify treaties was placed in the hands of the President with the advice and consent of the Senate ; and the com¬ missions,

correspondence and instructions all

proceeded from the President or the Secretary of State, who was practically subject to his di¬ rection. From 1797 to 1829, each of the five successive Presidents came into office with large diplomatic experience. Almost all the en¬ voys also were men of public responsibility, trained for their duties.

Since Jackson's time, both Presidents and Secretaries of State have frequently been men of small experience outside the boundaries of their own country, and sometimes of little pre¬ vious public service at home. Presidents Polk, Lincoln, Grant, Cleveland, McKinley and Wil¬ son had no previous knowledge of courts, and with one or two exceptions had hardly been out of their own country. Such secretaries as Van Bnren, Webster, Buchanan, Blaine and Hay were trained statesmen ; others came into office little known even to their own country¬ men.

Most appointments to foreign missions were made from a class of well-to-do gentlemen who were novices in politics, or from literary men, such as Washington Irving, James Russell Low¬ ell and John Hay. The policy of each succes¬ sive administration was to carry on its rela¬ tions with other countries through men of nat¬ ural force of character and sagacity who knew little of diplomatic usages. Nevertheless the diplomacy of the United States has always had the advantages of directness, vigor and free¬ dom from the complications and intrigues of European diplomacy.

Independence and Territory (1775-89). —

The first diplomatic object of the Continental Congress was to make friends abroad, who would aid the infant United States against Great Britain. The treaties with France in 1778 were contrary to all the previous tradi¬ tions of the colonies and brought about the only military alliance between the United States and any foreign power, before 1917.

The practical effect was to incline England to agree to the favorable terms of peace negotiated in Paris in 1782. With great skill and perti¬ nacity, the American envoys secured an agree¬ ment that independence should be admitted be¬ fore any other conditions were made — not as a gift or a makeweight but as a recognition of a political and international fact.

Another success was the adjustment of boundaries. Our envoys

*obtained from Great Britain an acknowledgment of territory which doubled the area of the 13 former colonies and prepared the way for an empire in the West. t Canada, for which the United States at one time * hoped, was not included; but in the Northwest and Southwest, Great Britain withdrew all claims and the Mississippi became the boundary.*

Early Expansion (1803-19). — The bounds of the treaty of 1782 excluded the United States from the natural outlet of the Great Lakes ; but the Erie Canal and the trunk rail¬ road lines later made good that defect. The United States was also left with no frontage on the Gulf of Mexico. That made it an essential American policy to secure the strip of Spanish territory which shut them off from tide-water on the south. A lucky chance, of which Presi¬ dent Jefferson skilfully took advantage, made it possible to annex the lower Mississippi in 1803, and with it the whole western part of Louisiana extending far into the Rocky Moun¬ tains. This gave a narrow approach to the

Gulf, which was broadened by the forcible oc¬ cupation of West Florida (1810-13) and by the annexation of East Florida in 1819. On the northwest, the discovery of the Columbia River (1792), the exploration of Lewis and Clark (1806) and the founding, of the post of Astoria (1811) laid the foundations for an ex¬ tension of territory to the Pacific.

Neutral Trade (1789-1815). — The United States was the first American state ; it set up a new force in the world and opened a new kind of international relations. When, in 1793, revo¬ lution and war came upon Europe and lasted WTith little interruption for 22 years, there was great danger that the United States would be swept from its moorings and drawn into the in¬ fluence of one or the other of the two warring groups, of which Great Britain and France were the leaders..

In view of this danger, Washington, John Adams, Jefferson and other statesmen advised a <(Policy of Isolation® on the ground that the United States was not primarily interested in European controversies and wars and, there¬ fore, should remain neutral. After reaching the verge of war with Great Britain in 1794 on questions of neutral trade and impressment, and actually engaging in naval war with France in 1798, the country settled down to a policy of keeping out of

hostilities and enjoying trade with both groups of powers in Europe.

This was always difficult because of the de¬ termination of both sides to seize American ships and cargoes on novel and often illegal ap¬ plications of the international law of contra- brand, blockade, free ships and colonial trade ((

The disregard to neutral rights reached its height in the attempt of Napoleon to found a ˆContinental System,® intended to cut off all the commercial intercourse of Great Britain. This led to the British Orders in Council and French decrees, which perhaps suggested sim¬ ilar acts of the British and German governments in the European War of 1914. The diplomatic protests of the Americans were disregarded; and since the United States had no military or naval force able to protect its commerce, there was nothing for it but Jefferson's policy of commercial restrictions. This took various forms such as non-intercourse, non-importa¬ tion and non-exportation, which last was car¬ ried out by the Embargo Act of 1807.

This method, which was substantially a boy¬ cott, came near success ; but in the end was ig¬ nored by both the belligerents. The interfer¬ ence with neutral trade, combined with im¬ pressments and some minor grievances, even¬ tually led to the War of 1812, in which the American cruisers and privateers captured 1,800 British ships. The territorial motive also came in ; the United States confidently ex¬ pected to conquer Canada ; but no territory was added and several areas of the United States fell for the time into the hands of the enemy.

However, the naval prowess of the Ameri¬ can ships of war and privateers made such an

impression on the British mind that & favor¬ able peace was obtained at Ghent in 1814. No agreement was reached either as to neutral trade or impressments; but the European strife was ended and both those questions were shelved. In course of time the United States secured considerable money payments . from France and other European powers for illegal captures during the Napoleonic wars.

Latin-American Policy (1815-26). — Dur¬ ing the period just discussed, a new group of nations was growing up in the Spanish-Ameri- can Empire. The LaPlata colony made itself practically independent in 1807 and there were risings elsewhere. Soon after the restoration of the Bourbon monarchy to Spain (1814) the flame of rebellion ran through the whole Span¬ ish continental area, except

the islands of Cuba and Porto Rico. By 1821 independent govern¬ ments were set up in Chile, Peru, what is now Colombia, Central America and Mexico, be¬ sides the empire of Brazil, previously a Portu¬ guese colony.

The natural policy of the United States to¬ ward these new neighbors was one of sym¬ pathy with rising republics, and friendship with powers which opened new fields of com¬ merce. The sudden appearance of these new planets in the political solar system disturbed Europe, which after Napoleon's fall was organ¬ ized in the so-called Holy Alliance. That com¬ bination of powers put down a revolution in Spain and seemed on the brink of sending a French expedition to overcome the new Ameri¬ can states, when (December 1823) President Monroe made public his famous Doctrine.

The Monroe Doctrine was a protest against any action by European powers which would extend their ((Political System® to the new world. This utterance was founded on a new principle, the converse of the Policy of Isola¬ tion. Monroe held that the eastern and west¬ ern hemispheres were politically separated : the United States did not meddle in European af¬ fairs, and European powers must not meddle in American affairs. Still deeper lay the be¬ lief that European interference anywhere in South America might create centres of influ¬ ence which would in the long run be dangerous to the United States.

The proposed joint action of Europe in America was at once given up; but the interest of the United States in Latin America for nearly a hundred years has been one of the most significant factors in our foreign policy. An effort was made in the Panama Congress (1826) to bring the American nations to¬ gether; but it was a part of the policy of the United States not to commit itself to the leader¬ ship or defense of the neighboring powers.

Western Expansion (1819-60). — The Mon¬ roe Doctrine was not meant to be a self-deny¬ ing principle which would prevent annexation. Immediately after the War of 1812 the United States began to push with all its might toward the Southwest and Far West. In the treaty of 1819 for the cession of East Florida, Sec¬ retary John Quincy Adams secured from Spain a withdrawal of all claims on Pacific Coast territory north of the 42d parallel. As a counterweight he consented to the line of the Sabine River as our southwest boundary. A movement of Americans into the Mexican province of Texas at once began, which in

1835 made that region an independent country, which at once sought admission into the United States.

This left the government face to face with Great Britain as the only other claimant to the immense Oregon country. A long-standing controversy with the British government over the Maine boundary was settled by a reason¬ able compromise in 1842. The Oregon ques¬ tion then became threatening ; after much dis¬ cussion it was settled in 1846 by running the compromise line of the 49th parallel from the Rocky Mountains to the Gulf of Georgia, and thence through the straits of San Juan De Fuca to the Pacific Ocean.

This settlement of the Oregon question brought into sharper relief the future of Cali¬ fornia, toward which President Polk bent his energies. In 1845 Texas was annexed as a State of the Union. In 1846 the United States declared war on Mexico and conquered, and occupied both California and New Mexico, which was the land bridge across the con¬ tinent. Vain attempts were made by President Pierce and President Buchanan from 1854 to 1859 to annex Cuba, part of Central America and more of Mexico. The only action taken was the treaty of 1846 with New Granada and the Clayton-Bulwer Treaty with Great Britain in 1850, by which the United States assumed a special interest and responsibility for a future Isthmian Canal.

Civil War Diplomacy (1861-72). — During the Civil War the prime policy of the United States was to insist that the Southern Confed¬ eracy could never achieve independence, and that, therefore, any recognition of independence or any military or naval aid would be an af¬ front to the United States. The old question of neutral trade came up in a new guise, when the United States blockaded most of the Con¬ federate coast and freely captured cargoes of contraband. This involved a novel doctrine of continuous voyages, to the effect that cargoes and even vessels bound for Europe to a British or Spanish colonial port, thence to be reshipped to the Confederacy, could be captured in either stage of that transportation. Great Britain raised no objection to this doctrine. The United States violently protested against the fitting out of ships-of-war in neutral ports, especially the cruiser Alabama, which was built in an English shipyard.

After the war was over, the "Alabama claims® for damages caused by such cruisers almost led to a breach with England. It was finally healed by the Treaty of Washington of 1871, in which Great Britain agreed to a set of rules which were practically a disavowal of the acts complained of. On this understanding the two countries went into the nominal arbi¬ tration of Geneva in 1872; and the arbitral commission found Great Britain liable to the amount of $15,500,000.

The Canal and Immigration (1861-81). —

Before the war ended, the United States, under the skilful guidance of Secretary Seward, was laying the foundations of a new and posi¬ tive policy in Central America and the West Indies. In 1864 a treaty was negotiated with Honduras, giving special canal rights to the United States. In 1867 Seward took advantage of the proposition by Russia to cede Alaska

for a moderate payment. He turned his atten¬ tion also to the Caribbean region, negotiated an unsuccessful treaty for the Danish Islands and another for Santo Domingo. This latter proj¬ ect was renewed and strongly urged by Presi¬ dent Grant, who could not induce the Senate to approve it. The Cuban Revolution, from 1868 to 1878, deeply interested the United States; and toward the end a proposition was made to European powers to unite in stopping the war and relieving Cuba.

Meanwhile the introduction of general mili¬ tary service into Germany raised new interna¬ tional questions about the status of immi¬ grants. Congress took the broad ground (1868) that (

The question of the right of immigration was raised in a different way by the increase of Chinese immigration under a treaty of 1868. Congress passed several bills denying the privi¬ lege to Chinese, and popular feeling pushed through statutes prohibiting the immigration of any Chinese laborers. See Chinese Immigra¬ tion.

The Latin-American question entered on a new phase when in 1879 a French company pre¬ pared to construct a canal across the Isthmus of Panama. In spite of protests by President Hayes, who declared that any such canal must be ((a part of the coastline of the United States,® Congress and the people could not be aroused. In 1881 Secretary Blaine tried hard to get rid of the Clayton-Bulwer Treaty, so as to give the United States a free hand in dealing with the canal question ; and he also made great efforts to put an end to the wars

between the South American states and to bring all the American nations together in harmony and perhaps in some form of union.

Expansion Policy (1895-1904). — For nearly 15 years after 1881 no serious diplomatic crisis arose and no new policies were adopted, except a series of Pan-American issues, beginning in 1890. In 1895 a dispute between Great Bri¬ tain and Venezuela as to the proper bound¬ aries of British Guiana suddenly drew from President Cleveland a new statement of the Monroe Doctrine, in which he denied the right of European nations to hold colonies in the Americas and declared that (

This friendship was shown in the Spanish War of 1898. Cuba had long been a source of trouble between the United States and Spain, and annexation had been predicted for many years. The Spanish government was weak and overbearing; the American people as usual sympathized with the effort to set up a republic. There seemed no end to the Civil War that began in 1895. Hence in 1898 Congress took

the momentous decision to intervene by force, adding the Teller resolution, which denied any ((intention to exercise sovereignty, jurisdiction or control over said island except for the pacification thereof.®

This little war brought about a change in foreign policy unexpected by the country. Not only was Cuba occupied, but the neighboring island of Porto Rico was conquered almost without a blow. On the other side of the world the city of Manila and eventually the whole archipelago of the Philippine Islands were oc¬ cupied by American forces. Guam, Tutuila and other Pacific islands were added. The Hawaiian Islands were annexed. Thus the United States became a Caribbean power, a Pacific power, an Asiatic power and a colonial power. In 1900 a detachment of United States troops was part of the force which marched up to Peking and released the Ambassadors to China.

As soon as the war was over President Roosevelt entered on a new and vigorous canal policy. The Clayton-Bulwer Treaty was re¬ leased by Great Britain, and preparations were made to buy out the unsuccessful French canal company. An attempt was made to negotiate a treaty for canal rights with Colombia (1903). When that

treaty was rejected by Colombia the province of Panama revolted, and its independ¬ ence was at once recognized by the Roosevelt administration. A treaty with the new republic was concluded for the virtual cession of a canal strip. Next year work began on the canal and in 1914 it was opened to traffic, under the ex¬ clusive ownership and authority of the United States government.

The growing consciousness that the United States was a populous, rich and potentially strong nation, one of the first-class powers in the world, was shown in 1902 when a German fleet was sent to enforce payment of certain claims. President Roosevelt appealed to the Monroe Doctrine and insisted that Germany should give a pledge not to seize or even to land upon Venezuelan territory.

World Power Policy (1905-14). — Another period of about 10 years passed without a de¬ velopment of new principles. The United States was busy taking care of its colonies in the Philippines and Porto Rico and its de¬ pendency of Cuba. The Venezuela episode brought out the fact that the Monroe Doctrine could be invoked to protect a country from aggression from overseas; but what should be done in case of a real injury to a European country? To meet this difficulty President Roosevelt announced as a new form of the Monroe Doctrine the policy of ftThe Big Stick,® as it was commonly called; that is, he promised to keep unruly American powers in order, so as to take away the excuse for foreign inter¬ ventions.

Hence he took charge of Santo Domingo in 1905 ; and Panama became practically an Amer¬ ican dependency. Under President Wilson Nicaragua and Haiti were brought under the control of the United States and the Danish Islands were annexed in 1917. At the same time the government assumed a responsibility for Mexico such as would prevent foreign powers intervening there. It thus became the policy of the United States to occupy the, Carib¬

bean and exercise a dominant influence in all the neighboring coast of North America.

Another evidence of a new spirit was the active part taken by delegates of the United States in The Hague conventions of 1899 and 1907. The general influence of our govern¬ ment was toward world peace, though our rep¬ resentatives were careful to give notice that we did not consider the Monroe Doctrine to be in any way set aside by The Hague conventions. In all parts of the world American commerce was pushed, American influence was felt and American diplomats were consulted. The United States took especially strong

ground for China against the oppression or looting of that country by other powers.

Policy in the World War (1914-19). — ‘ The outbreak of war in Europe in 1914 put the diplomatic policies of the United States to many severe tests. In the first place it was contrary to the genuine love of peace and desire to ad¬ vance peace which has characterized the Ameri¬ can people and government. From the Ameri¬ can point of view, every war of the United States since the Mexican War has been simply an effort to put things into a condition where permanent peace was possible. The Civil War, the frontier Indian wars, the Spanish War and the military occupation of the little Latin-American countries were all intended to lead to an enduring peace in America.

The policy of neutrality was hard either to define or to maintain, because of the natural¬ ized or unnaturalized sons of the various war¬ ring countries who were living in the United States and who naturally felt a strong desire that their native countries should be successful. The status of neutral trade was especially diffi¬ cult, because the principles of international law recognized by the United States and applied during our Civil War permitted the capture of any vessel carrying contraband to a bellig¬ erent port, and to a vessel with any cargo bound for a really blockaded port. Hence losses of American cargoes and vessels were inevitable.

This tension was much increased by the allied enlargement of contraband, first to cover such articles as rubber, copper and steel which had come to be essential for carrying on more. Then food stuffs, always a debatable point, were added ; then nearly everything that could be useful or comforting to the army or the general population. A further complica¬ tion was the insistence of Great Britain that cargoes bound to neutral ports could be seized, if there was a strong likelihood that part of them would find their way to Germany. This still further limited the markets and the sales of American business men.

It had been the practice of the world to buy munitions of war freely in any available market while the war was going on ; but the control of the sea by Great Britain prevented shipments to the Central Powers and they pro¬ tested that it was unneutral for the United States to allow shipments to their enemies. Then came drastic orders from both sides, declaring considerable areas of the open sea to be fields of war, in which any vessel, neutral or other¬ wise, might be sunk at sight. One result was the destruction of the steamer Lusitania

by a German submarine without warning (May 1915), with a loss of more than 100 American

lives. This warfare of furious orders culmi¬ nated in the German announcement of February 1917 that any vessel found approaching or leav¬ ing the British islands was liable to be sunk without warning. The United States thereupon suspended diplomatic intercourse and the con¬ troversy all but led to war.

The effect of this confusion and danger upon American foreign policy was to convince the country that the peace and the freedom of the seas, which was so dear to Americans, could only be made safe by a sufficient military and naval force to give weight to the remonstrances and demands of the United States.

Bibliography. — Crandell, S. B., (Treaties, Making and Enforcement (2d ed., 1916) ; Dun¬ ning, W. A., (The British Empire and the United States) (1914) ; Foster, John W., (A Century of American Diplomacy' (1900) and (The Practice of Diplomacy as Illustrated in the Foreign Relations of the United States' (1906) ; Fish, Carl R , (History of American Diplomacy' (1915) ; Hart, Albert Bushnell, foundations of American Policy' (1905) and (The Monroe Doctrine: An Interpretation' (1916) ; Mahan, A. T., (The Interest of Amer¬ ica in International Conditions' (1891) ; Malloy, W. M., (Treaties, Conventions, etc., between the United States of America and other Powers' (3 vols., 1913) ; Moore, John B., (A Digest of International Law' (5 vols., 1906) and Ameri¬ can Diplomacy: Its Spirit and Achievements' (1905) ; Wilson, George Grafton, and Tucker, George F., (International Law' (6th ed., 1915).

Albert Bushnell Hart, Professor of Government , Harvard University.

60. THE UNITED STATES AND THE EUROPEAN WAR. When the war broke out in the summer of 1914, the American people were amazed and surprised; there were, of course, differences of interest and attention, some persons at once taking acute and ab¬ sorbing interest, while others passed the whole thing by with a shrug of the shoulders as some¬ thing essentially without moment to their own country. It naturally took time, and consider¬ able time, for the great body of the people to understand the war ; indeed, the number under¬ standing it at the beginning was very small. The history of the

development of intelligent interest and of responsibility, as well as the growing realization that the conflict was our own or would become so, is a history of very great significance and importance. No one can, however, write that history with perfect assur¬ ance that he grasps the truth at every point, because it is fundamentally a history dealing with public psychology and is at the best in¬ tangible. The main features of the story can, however, be given with some degree of con¬ fidence.

There are obvious reasons for the absence of absorbing interest and understanding at the beginning. Few persons understood European conditions, few realized that Europe had been living with a powder magazine for decades be¬ cause there were the vast armies and navies and mutual suspicions and race rivalries and various other conditions that might in a twinkling set the continent ablaze. The whole militaristic make-up and spirit of Germany, if known at all, appeared unreal and too much out of harmony with life, as Americans knew life,

to be taken over-seriously. Furthermore, partly because of the activity of peace organizations, it looked as if the cause of peace were rapidly growing and as if war was too plainly destruc¬ tive and foolish to be feared in the modern world. Financial, economic and trade condi¬ tions binding modern nations together seemed too strong to be lightly broken even if they did not make war impossible.

There was, early in the war and even before we were directly affected, more intense interest in the East than in the country west of the Ap¬ palachians, at least such appeared to be the fact, and interest and attention gradually di¬ minished toward the West. This fact is easily explicable, although just how much weight should be thrown upon it one cannot say. To the extent that this difference existed, it can be explained by calling to mind the simple fact of distance which always affects our feelings. It was inevitably difficult for the dweller in the Mississippi Valley to comprehend the reality of a struggle which was so distant and so out of keeping with the daily life about him. No one would dare to say just how large was the proportion of the people, East or West, who in the early days sympathized with the Allies. There is certainly no ground for complaining because men did not decide before they knew the facts; but it is safe to say that the invasion of Belgium and the story of the ((scrap of paper," Germany's readiness to throw into the waste basket the most explicit provision for the maintenance of Belgium neutrality, awak¬ ened resentment, even if in a mild form, almost at once. There was, however, at the beginning practically no demand

that the American gov¬ ernment should publicly protest against the violation of Belgium, though demands of that kind were occasionally heard as the months went by. For an appreciable time, too, there was little public excitement about the German atrocities in Belgium. Many put the stories down either as gross exaggeration or as the lamentable but customary accompaniments of war, and so it may be said that the winter of 1915 was well along before there came an ap¬ preciation of the enormity of the German of¬ fenses against the unhappy civilians of Belgium. Even then, the knowledge on which judgment could be based was probably confined largely to those having the opportunity to read official reports and tales of apparently undoubted re¬ liability. Some persons — perhaps, in the ag¬ gregate, many persons — were affected and dulled in their belief by the constant assertion of German sympathizers that all stories of Ger¬ man conduct, save those of simple rectitude, were made in Great Britain. Still, it is probably true that the great majority were not materially misled by the German propagandists.

All through those trying months and espe¬ cially up to the time of the Lusitania sinking in May 1915 there was effort among the people at large to be neutral or inoffensive in their expression of sympathy for the Allied cause. Doubtless a portion of this inoffensiveness was lethargy; but even those hoping strongly for the defeat of Germany refrained generally, though not universally, from public denuncia¬ tion of Germany's conduct in beginning the war and of her method of carrying it on. Defenders of Germany, on the other hand, often quite open in their pronouncements, had every

opportunity of free statement. Opponents of Germany, it is true, were by no means all silent ; books were written and editorials in the news¬ papers were printed which discussed the evi¬ dence of Germany's guilt, but in the opinion of the writer of the present article, the out¬ standing fact is the hesitation of the people generally, even those feeling strongly in sym¬ pathy with the Allied cause, to indulge in heated declamation or to embarrass the government which had issued a proclamation of neutrality and was seeking to play the part of a neutral honestly and not merely ostensibly. Of course as the months went by expressions of opinion were stronger and more openly made. It is naturally impossible to say how much of the growing opposition to Germany was due to developing appreciation of her guilt in be¬ ginning the war and

carrying it on with a ferocity which astounded the world, and how much was due to interference with American rights on the seas and to the rising apprecia¬ tion of a German menace to our own peace and safety; but mere fear of German ambition probably played no very large part, it may be not so large a part as it should have done, in arousing American antagonism.

Before taking up other aspects of the case it is well to remind the reader that there were various things occupying the minds of the American people besides the war in Europe. Prominent among them was the trouble with Mexico. It was not at all sure that we should not be driven into a conflict with that country and it must also be remembered that the danger continued down almost to the time of our taking up arms against Germany. An entirely wrong perspective is gained if these various distractions are overlooked ; without some ap¬ preciation of the reality of internal problems and of the Mexican and Caribbean difficulties and responsibilities, one might gather the opin¬ ion that our minds were wholly taken up with purely humdrum domestic toil or with watch¬ ing the Conflict in Europe as more or less in¬ terested spectators. It is also well to remind ourselves that, during a good portion of the time we are discussing, i.e., the two years and a half between the outbreak of the war and the breaking off diplomatic relations with Ger¬ many (August 1914 to February 1917), our State Department was in part employed in dis¬ cussing with the British Foreign Office various troublesome questions arising from Britain's sea policy. It is impossible to do more here than hint at these discussions, for the whole matter is complicated and inextricably connected with the whole diplomacy of the war. We may say in a word that the discussion practically began over Britain's control, especially in the North Sea, where it was said Germany had scattered contact mines. As the months went by, argu¬ ments turned on the right asserted by the British government of seizing contraband destined ultimately to Germany though bound first to a neutral European country, and on taking American ships into British harbors for examination instead of making the search for contraband at sea. The British replies to our various protests were able and in the best of temper and there was little, if there was any, evidence of a desire to banish international law altogether under the plea of necessity, a plea

which the German government was quite ready to indulge in.

In January 1915 the German government took control of the corn, wheat and flour in Germany and it was henceforward difficult for neutrals to maintain that provisions evidently intended for Germany

were not absolute con¬ traband and liable to seizure. No one reading the documents with a fair mind will fail to see the inherent perplexities of the problem and that the United States, with no apparent intent of doing aught but preserve rights of neutrals on the seas, stated the case against Great Britain with at least sufficient directness and plainness. The subject is one that may still vex the brains of international lawyers ; but the unlearned in the law will not detect a readi¬ ness on the part of the American government to wink at British transgressions and denounce German wrongdoing, and he will not detect that British conduct is in the same category with German frightfulness and disregard of ordinary principles of law and the claims of humanity for consideration.

Though such subjects as those just men¬ tioned continued to be subjects of diplomatic discussions for many months, they sank into comparative unimportance upon the inaugura¬ tion by Germany of a plan of terrorizing on the high seas. As early as December 1914 Ad¬ miral von Tirpitz was quoted as intimating that a war of submarines on British merchantmen was impending. On 4 February the German government proclaimed the waters around Britain a ((zone of war® and announced the in¬ tention of destroying ships found there (

tha.1 year; but still it is not within the power ot the present writer to say that the bulk of the American people were ready to go to war. As the months went by, there were doubt¬ less gradual education and gradual apprecia¬ tion of the deeper significance of German as¬ sault upon international law and upon the ordinary claims of humanity, and there was a growing conviction of the menace to civiliza¬ tion in a power which stopped at nothing to win. We may, therefore, pass over the suc¬ ceeding months in which Germany gave new proofs of the character of her government and her military leaders and aroused in the Ameri¬ can mind the confirmed belief that if the world was to be a decent place to live in the mili¬ tary clique of Germany must be beaten and beaten badly at their own chosen game of war. Though there were many other causes for anxiety or for actual war, we may now mention only one — the sinking of the Sussex in the spring of 1916, in which Americans lost their lives. The promise wrung by President Wilson from the German government to observe at least some measure of respect for human life in her barbarous submarine policy was openly cast aside in January 1917 and diplomatic relations with Germany were broken

off. War seemed inevitable and though we tried arming our mer¬ chantmen and still hesitated to take the plunge, the President finally went to Congress with a war message on 2 April 1917.

During the course of the war and before our entrance, the American people had oppor¬ tunity to get acquainted in some manner with German Politik by seeing something of the activities of the German spies and the machina¬ tions of German agents in flagrant disregard of our laws to maintain our legal position as a neutral. Naturally this whole matter is still shrouded in partial darkness, but the revela¬ tions, especially in 1916, increased the growing indignation of the nation. The conclusive evi¬ dence in some cases was missing, while in others court trials were confirmatory of the existence of a system of intrigue which was exceedingly objectionable and which tended to increase dis¬ like of Germany and her works. The later revelations justified and more than justified the suspicions and rumors that were spread about before we entered the war. The seizure of the von Igel papers in New York in the spring of 1916 brought to light evidence of a conclusive character of highly-developed plans and prac¬ tices of the most reprehensible character. Not until we entered the war were the people gen¬ erally aware how fully the German embassy itself had made use of the hospitality of this country to indulge in entirely illegal and wholly unjustifiable not to say criminal practices. Long before the German Ambassador von Bernstorff was given his passports (3 Feb. 1917) the ac¬ tivities of the Austrian Ambassador were de¬ tected and his recall was demanded. These occurrences and the awakened suspicion and the thoroughly justifiable resentment account in part for the growing belief that the maintenance of peace was incompatible with American honor and self-respect and that the place of the United States was by the side of other democracies in a war against brutal warfare and shameless intrigue. We came to see that democracy could not be safe in the presence of autocratic might aided by autocratic stealth.

Meanwhile there was much discussion on the subject of preparation for war or at least adequate provision for defense. Some there were that believed early in the war that our government should make extensive prepara¬ tions ; others thought that even at such a time, and perhaps especially at such a time, when Europe was drenched with blood in a war brought on despite great armies and caused, in part, by the maintenance of vast military estab¬ lishments, the duty of the United States was not to display threatening military power. Others of course were merely uninterested, but it was hard to convince the ordinary citizens either of immediate danger or that big armies made peace secure. In May 1915 President Wil¬ son in a

speech at Philadelphia said, <(The ex¬ ample of America must be a special example; the example of America must be the example not merely of peace because it will not fight, but of peace because peace is the healing and elevating influence of the world; and strife is not. There is also such a thing as a man being too proud to fight ; there is such a thing as a nation being so right that it does not need to convince others by force that it is right.® The too-proud-to-fight expression was immediately seized upon in some quarters as highly repre¬ hensible. In the course of the succeeding months the President spoke plainly of Ameri¬ can danger and of the necessity of making preparation for conflict. In January 1916 he declared that the American people ((are ready at any time to fight for the vindication of their character and their honor. They will at no time seek a contest, but they will at no time cravenly avoid it.® Soon after this he declared that the country must prepare effectively and promptly and that not a day must be lost. In the spring months of 1916 a wave of (

As has been said earlier in this article, not all elements of the people were eager to pre¬ pare for war. Especially during the earlier por¬ tion of the period under review, there were many expressions of opposition to the war spirit and even to building up the army and navy. The Women's Peace party was outspoken in its advocacy of peace and 40 delegates went

from this country to the International Congress of Women at The Hague in April 1915. The Henry Ford Peace Expedition left this country in December of that year with the intention of putting an end to hostilities and accomplished nothing. The Carnegie Endowment for Inter¬ national Peace devoted its energies partly to the publication of important documents on inter¬ national affairs and took up various activities of a useful but uncontroversial character. The old American Peace Society was reorganized in 1916 and did a good deal in the way of dis¬ tributing material. In addition the American Union against Militarism and various other organizations came into existence. The most powerful organization connected with the move¬ ment for the maintenance of peaceful relations in the world was the League to Enforce Peace; its purpose, however, was not to bring about a conclusion of the existing war, but rather to promote and if possible secure the establishment of a system for assurance of lasting peace. The organization, taking its beginnings at a confer¬ ence early in 1915, was formally founded in June of that year. The idea

that there should be an international body, which should have the au¬ thority and the power to compel a public in¬ vestigation of controversies and differences be¬ fore nations plunged into war, attracted wide interest. In the spring of 1916 President Wil¬ son declared the readiness of the United States to become a partner in any feasible association of nations and at various other times gave clear indication of his sympathy with the prin¬ ciple. In October he said that the business of neutrality was over; <(Not because,® he said, <(1 want it to be over, but I mean this, that war now has such a scale that the position of neutrals sooner or later becomes intolerable.® The Republican platform of that year declared for the ftpacific settlement of international dis¬ putes and the establishing of a world court for that purpose,® and Mr. Hughes in his speech of acceptance advocated international organization for international justice and to safeguard world peace. The Democratic platform contained a declaration that the world has a right to be free from every disturbance (

In the early part of 1917 President Wilson in a speech to the Senate discussed fully the general problem of world peace, which must be a peace worth keeping, (

national organization to make secure the peace of the world. The nation could and did, there¬ fore, take up arms in April 1917 not merely to help in punishing Germany for insult and un¬ speakable wrong, but for better conditions in the world and for lasting peace based on jus¬ tice.

Andrew Cunningham McLaughlin, Professor of History, University of Chicago; Joint-Editor of iCyclopcedia of American Government .)

UNITED STATES, Forestry in. See

Forestry in the United States.

UNITED STATES, Painters of. This

subject receives special detailed treatment in the articles on American Lanscape Painting and Painting in the United States. For further information the reader is directed to the bio¬ graphical sketches on the foremost artists of America scattered through the several volumes of this Encyclopedia. See American Land¬ scape Painting; Painting in the United States.

UNITED STATES, Presidents and Vice- Presidents of the. In the following tables the important facts concerning the various Presi¬

dents of the United States have been condensed for convenient reference. The first table gives the place of birth of each President and, if a college man, the name of the college which graduated him. The second table gives the vo¬ cations of the Presidents and the length of serv¬ ice of each and the third table gives the cause of death and the place of their burial. The fourth table gives the place of birth and the length of service of each Vice-President. See Presi¬ dents of the United States, Family Coats of Arms of; Presidents of the United States, Graves of the; United States — President's Office; and the biography of each President in this Encyclopedia.

No. 1. Birth and Education.

PRESIDENT

Place of birth

Washington . . .

Adams, J .

Jefferson .

Madison .

Monroe .

Adams, J. Q. . .

Jackson .

Van Buren

Harrison .

Tyler .

Polk .

Taylor .

Fillmore .

Pierce .

Buchanan .

Lincoln .

Johnson .

Grant .

Hayes .

Garfield .

Arthur .

Cleveland .

Harrison .

McKinley .

Roosevelt .

Taft .

Wilson .

Harding .

Virginia .

Quincy, Mass .

Shadwell, Va .

Port. Conway, Va . . .

Virginia .

Quincy, Mass .

North Carolina 1 . . . . Kinderhook, N. Y. .

Berkeley, Va .

Greenway, Va .

North Carolina _ •.

Virginia .

Summerhill, N. Y. . . Hillsboro, N. H . . . .

Cove Gap. Pa .

Kentucky .

Raleigh, N. C .

Pt. Pleasant, Ohio. . Delaware, Ohio

Orange, Ohio .

Fairfield, Vt .

Caldwell, N. J .

North Bend, Ohio. . .

Niles, Ohio .

New York, N. Y. . . . Cincinnati, Ohio.. . .

Staunton, Va .

Corsica, Ohio .

Year

College

1732

None.

1735

Harvard.

1743

Wm. and Mary.

1751

Princeton.

1758

Wm. and Mary.

1767

Harvard.

1767

None.

1782

None.

1773

Hampden.

1790

Wm. and Mary.

1795

U. of N. C.

1784

None.

1800

None.

1804

Bowdoin.

1791

Dickinson.

1809

None.

1808

None.

1822

West Point.

1822

Kenyon.

1831

Williams.

1830

Union.

1837

None.

1833

Miami Univ.

1843

None.

1858

Harvard.

1857

Yale.

1856

Princeton.

1865

Ohio Central.

1 Tt hJ.s generally been stated that President Jackson was a native of South Carolina, but the most authentic evi- dence that could be

collected by Parton, the historian, and Kendall, his biographer, shows that he was born in Union County, N. C., about a quarter of a mile from the South Carolina line.

UNITED STATES, THE WARS OF THE

539

No. 2. Vocation and Service.

PRESIDENT

Vocation

Inaugurated

Service — Years

Washington . . .

Planter .

1789

7 y 10m. 4 d.

Adams, J .

Lawyer .

1797

4

Jefferson .

Lawyer .

1801

8

Madison .

Lawyer .

1809

8

Monroe .

Statesman .

1817

8

Adams, J. Q. . .

Lawyer .

1825

4

Jackson .

Lawyer .

1829

8

Van Buren ....

Lawyer .

1837

4

Harrison .

Farmer .

1841

1 m.

Tyler .

Lawyer .

1841

3 y. 1 1 m.

Polk .

Lawyer .

1845

4

Taylor .

Soldier .

1849

1 y. 4 m. 5 d.

Fillmore .

Lawyer .

1850

2 y. 7. m 26 d.

Pierce .

Lawyer .

1853

4

Buchanan .

Lawyer .

1857

4

Lincoln .

Lawyer .

1861

4 y. 1. m. lid.

Johnson .

Statesman .

1865

3 y. 10 m. 20 d.

Grant .

Soldier .

1869

8

Hayes .

Lawyer .

1877

4

Garfield .

Lawyer .

1881

6§ m.

Arthur .

Lawyer .

1881

3 y. 5J m.

Cleveland .

Lawyer. . .

1885

8

Harrison .

Lawyer .

1889

4

McKinley .

Lawyer .

1897

4 y. 5 m. 7 d.

Roosevelt .

Statesman .

1901

7 y. 5 m. 18 d.

Taft .

Statesman .

1909

4

Wilson .

Educator .

1913

8

Harding .

Journalist .

1921

No. 3. Death and Burial.

PRESIDENT

Washington. . .

Adams, J .

Jefferson .....

Madison .

Monroe .

Adams, J. Q. . .

Jackson .

Van Buren . . .

Harrison .

Tyler .

Polk .

Taylor. . . Fillmore . Pierce .... Buchanan Lincoln . . Johnson. . Grant .... Hayes. . . Garfield. . Arthur. . . Harrison . McKinley Cleveland Roosevelt

Year

Cause

Place of burial

1799

Pneumonia .

Mt. Vernon, Va.

1826

Debility .

Quincy, Mass. Monticello, Va. Montpelier, Va. Richmond, Va.

1826

Diarrhoea .

1836

Debility .

1831

Debility .

1848

Paralysis .

Quincy, Mass. Nashville, Tenn.

1845

Consumption .

1862

Asthma .

Kinderhook, N.Y.

1841

Pleurisy .

North Bend, O. Richmond, Va. Nashville, Tenn. Springfield, Ky. Buffalo, N. Y. Concord, N. H. Lancaster, Pa. Springfield, Ill. Greenville , Tenn .

1862

Billious fever .

1849

1850

Diarrhoea .

Billious fever .

1874

Debility .

1869 1868 1865

1870

Stomach inflam .... Rheumatic gout. . . . Assassination .

Paralysis .

1885

Cancer .

New York, N. Y.

1893

1881

1886

1901

1901

1908

1919

Paralysis of heart. . . Assassination .

Fremont, O. Cleveland, O.

Bright's disease .... Pneumonia .

Albany, N. Y. Indianapolis, Ind. Canton, O. Princeton, N. J. Oyster Bay, N. Y.

Assassination

Debilit.v .

Inflam, rheumatism.

No. 4. Vice-Presidents.

NAME

Place of birth

Term of service

Adams, John .

Jefferson, Thomas. . . .

Burr, Aaron .

Clinton, George 1 .

Gerry, Elbridge 2 .

Tompkins, Daniel D . . Calhoun, John C.3. . . . Van Buren, Martin . . . Johnson, Richard M...

Tyler, John .

Dallas, George M .

Fillmore, Millard .

King, William R.4 .

Braintree, Mass .

Shadwell, Va .

Newark, N. J .

Little Britain, N. Y .

Marblehead, Mass .

Westchester Co,, N. Y. . Abbeville District, S. C.

Kinderhook, N. Y .

Louisville, Ky .

Green way, Va .

Philadelphia, Pa .

Summer Hill, N. Y .

Sampson County, N. C. .

1789-97

1797-01

1801-05

1805-12

1813-14

1817-25

1825-32

1833-37

1837-41

1841

1845-49

1849-50

1853

1 Died 20 April 1812. 3 Resigned 28 Dec. 1832.

2 Died 23 Nov. 1814. 4 Died 18 April 1853.

No. 4. Vice-Presidents — Continued.

NAME

Place of birth

Breckenridge, John C. . Hamlin, Hannibal. . . .

Johnson, Andrew .

Colfax, Schuyler .

Wilson, Henry5 .

Wheeler, William A. . . Arthur, Chester A . . . . Hendricks, Thomas A.6 Morton, Levi P .

Lexington, Ky .

Paris Hill, Me .

Raleigh, N. C .

New York City .

Farmington, N. H .

Malone, N. Y .

Fairfield, Vt .

Zanesville, Ohio .

Shoreham, Vt .

Stevenson, Adlai E. . . . Hobart, Garret A.7. . . . Roosevelt, Theodore. . . Fairbanks, Charles W. . Sherman, James S.8. . . Marshall, Thomas R. . Coolidge, Calvin .

Christian County, Ky. . .

Long Branch, N. J .

New York City . “. .

Unionville Centre, Ohio .

New Hartford, N. Y _

North Manchester, Ind. . Plymouth, Vt .

Term of service

1857-61

1861-65

1865

1869-73

1873-75

1877-81

1881

1885

1S89-93

1893-97

1897-99

1901

1905-09

1909-12

1913-21

1921-

5 Died 22 Nov. 1875. 7 Died 21 Nov. 1899.

• Died 25 Nov. 1885. 3 Died 30 Oct. 1912.,

UNITED STATES, Sculptors of. See

Sculpture of the Nineteenth Century.

UNITED STATES, The Wars of the. As

generally regarded, the United States is rated as one of the most peaceable nations in the world, the idea being that during the 145 years of its existence it has participated in but six great wars, in all of which, parenthetically, it has been victorious. Notwithstanding the gen¬ eral credence given to this statement, it is far from being in accord with history, for, as a matter of fact, scarcely a year has passed in which either the army or the navy has not been called upon to do battle for the country. After 1900, it is true, the unpleasantness in the Philip¬ pines and outlawry on the Mexican border were the only discordant elements, but, prior to that, there were the labor disturbances ; the Indian wars and massacres and a dozen other factors that kept the United States forces almost con¬ stantly engaged in warfare of a more or less consequential character. At times, of course, some of the disturbances were little more than riots, but there were other events which seem to have been quite as thoroughly forgotten by the ordinary reader of history, but which in every respect deserve a place in the catalogue of wars. In fact the

War of the Revolution had scarcely commenced when the colonists were compelled to meet the attacks of the In¬ dians who, inspired by the English, instituted an incessant border warfare against the whites ; a warfare of brutality which culminated in the bloody massacres in Wyoming Valley, Pa., and Clinton, N. Y.

The Shays' Rebellion. — The first armed and organized rebellion against the conduct of political affairs in the United States, however, occurred in Massachusetts in 1786, when Daniel Shays organized the dissatisfied faction in the community into an armed and determined force of malcontents. The cause of this early trouble was largely a financial one. Solid money was still scarce, with paper money practically worth¬ less, and yet affairs were at such a state that debts contracted upon a paper basis were pressed for payment in solid money. As this was a period when men were imprisoned for debt, such conditions were held to be almost usurious in their effect and the orderly meetings of protest which were at first held soon de¬ veloped into violent assemblages. In August

the tide of dissatisfaction had become so strong that uprisings occurred in many parts of the State; courthouses were seized and courts were prevented from sitting; the governor announced his determination to put down the rebellion and there were several engagements between the in¬ surgents and the volunteer forces of the State. At last, in February 1787, General Lincoln sur¬ prised the rebels at Petersham, where, after a decisive engagement, they were dispersed.

The Whisky Rebellion. — The announce¬ ment that the Federal government had assumed the right to levy an excise tax was the cause of the insurrection in Pennsylvania which is now commonly referred to as the <(Whiskv Rebel¬ lion.® The act, which was passed in May 1792, was strenuously opposed on political grounds, the argument against it being that it was dan¬ gerous to the doctrine of individual liberty. In the four western counties of Pennsylvania whisky was a staple product, and, aside from its political aspect, the people felt that such a tax was an unjust discrimination against that region. The attempts to enforce the law were resisted with violence, therefore, and all citizens who advocated conformity to the law, or who quietly conformed to it were subjected to vari¬ ous kinds of ill-treatment by their neighbors. To further inflame the spirit of

opposition in¬ cendiary posters, all signed. <(Tom the Tinker,® were displayed in all directions and there was rioting and bloodshed in many places. In this emergency, President Adams assumed control of the situation and sent 13,000 troops upon Parkinson's Ferry in time to receive the peace overtures of the rebels. They were not ac¬ cepted, however, , and many arrests were made.

War with France. — One of the first trou¬ bles with which President Adams had to con¬ tend was the French question, for it had then become plain to all that America would have to. take some decided steps if she was to main¬ tain her honor against the arrogance of France. The President's policy of neutrality, following on Jay's treaty with England, had greatly ex¬ asperated France and when the American en¬ voys were ordered out of that country it became apparent that war could not be far off. In fact French and American vessels did meet on the ocean, but in the encounters that followed, thanks to Captain Truxton and his frigate Con¬ stellation, the United States did not make a dis¬ creditable appearance. In the battle with the French frigate L'lnsurgente, off the island of Nevis in the fall of 1799, as well as in her en¬ counter with the frigate La Vengeance, off Guadaloupe, in February 1800, the Constellation was victorious. Realizing that war was already under way upon the water, the United States government began to prepare her land forces. General Washington was again summoned from his retirement at Mount Vernon to assume com¬ mand of the army, but as the formal declaration of war was deferred, Napoleon's seizure of the governmental power in France gave a new aspect to the situation and a treaty of amity was soon concluded between the two countries. See United States — The War with France.

The Fries' Rebellion. — What is known in the history of Pennsylvania as <(Fries' Rebel¬ lion,® or the <(Window Tax War,® was the re¬ sult of an act of Congress, which, in July 1798, levied a direct tax of $2,000,000, of which the sum of $237,000 was apportioned as Pennsyl¬

vania's quota. In this State the tax was ap¬ praised upon houses and land, the amount assessed against each house being determined by the size and number of its windows. In some portions of the State the tax was accepted practically without protest, but the German residents of Montgomery, Lehigh, Bucks and Berks counties organized opposition to it under the leadership of John Fries. It was not long before there was open conflict between the rebels and the United States authorities, one of the acts of the insurgents being an attack upon the marshal at Bethlehem, where that official was compelled by force of arms to liberate 30 persons whom he had arrested for their op¬ position to the window tax. Under the cir¬ cumstances an appeal was made to President Adams and the militia was ordered to suppress the rebellion, which ended with the capture of Fries and a number of his adherents. Taken to Philadelphia, Fries was twice tried for treason, and, being convicted, was sentenced to death. In 1800 he was pardoned by the President.

The Barbary War. — It was not long after the signing of the treaty of peace with Eng¬ land that the Barbary powers commenced to annoy American commerce. In 1784 the Betsey was captured; in 1785 the Maria of Boston and the Dauphin of Philadelphia were seized and their crews held as captives with threats of ultimate slavery if the ransom, amounting to some $60,000, was not paid. As ransom was regarded as cheaper than force, various large sums were contributed at the command of the Dey of Algiers. To Thomas Jefferson, how¬ ever, such abject submission to a barbarous ruler was particularly loathsome and he de¬ cided to put an end to such outrages. Com¬ modore Dale was, therefore, ordered to the Mediterranean, where one of his vessels, the Experiment, soon captured a Tripolitan cruiser of 14 guns and, by 1803, war was on in earnest, culminating, on 27 April, in the bombardment of Tripoli.

Slave Insurrection, Louisiana. — In Janu¬ ary 1811 there was an uprising of slaves which extended throughout the entire parish of Saint John, La. The whites armed themselves and there were several serious battles between the two forces, more than 60 of the negroes having been killed before the slaves could be forced to surrender.

War of 1812. — The bloodless Burr conspir¬ acy; the Sabine expedition; the unwarranted attack upon the Chesapeake by the Leopard, a British two-decker; and the troubles resulting from the Lake Champlain embargo, all of which kept the United States forces engaged in more or less active service, were soon forgotten in the more important declaration of war with Great Britain (see United

States — The War of 1812), and this conflict had scarcely com¬ menced before the troubles with the Indians be¬ gan once more with the Seminole War in Flor¬ ida. The growth of the country; the expansion of. its territory; the explorations of venturesome spirits who were continually opening up new lands for settlement, all had a tendency to arouse sentiments of dissatisfaction in the minds of the red men. They saw that en¬ croachments were constantly being made upon them ; the fields of the white man interfered with their hunting and fishing; the industry and other features of civilization were distaste-

ful to them and, as original occupants of the land, one by one the various tribes began to enter their vigorous protests, protests which finally assumed warlike proportions. From the beginning of the War of 1812, therefore, almost up to the beginning of the 20th century, the soldiers of the United States have been en¬ gaged in battles with the Indians and as these almost continuous disturbances and massacres have occurred first in one part of the country and then in another the present-day submission of the red man has not been obtained without the expenditure of much money and the cost of many lives. At about the same time, through¬ out the Southern States, a spirit of dissatisfac¬ tion was also being engendered; the dishonesty of the blacks and the danger of slave insur¬ rections making rights in property insecure. Of these insurrections there were several, but the only one that attained any great degree of im¬ portance was the Turner Rebellion which broke out in Virginia in 1831.

Nat Turner's Rebellion. — Among the blacks in Virginia there was one who exerted a great influence over the slaves. His name was Nat Turner, and he firmly believed that he had been called of God to lead his people to free¬ dom. He had heard voices calling to him from the air ; he had seen strange signs in the sky and all the portents which he could interpret gave additional proof of his divine commission. Forming an alliance with three other blacks and three ignorant white men, he began his crusade by killing several families. Wherever he went there was bloodshed, while everywhere he pressed the slaves into his service until he was accompanied by a force of more than 200 persons. Unable to suppress the insurrection, an appeal to the government was made and both Virginia and North Carolina sent troops to the scene of the outrages. As the result, all the insurgents

were either killed or captured; Turner and 16 of the leading spirits were hanged and scores were punished, some most inhumanely and without trial, their bodies being decapitated and their heads impaled along the highways as a warning.*

Troubles Under Jackson's Administra¬ tion. — The political contest which shook the Union to its very centre in 1832, culminated, in all its violence, in the South Carolina doctrine of State Rights and Nullification. The origin of the trouble was the tariff: first, the tariff passed during the Adams administration, which was extremely distasteful to the South, and, second, the tariff of 1832, which was even more so, and as, at this time, there was a powerful party in South Carolina which contended that Congress had no power to impose taxes for the protection of home industries or manufactures, and who held that each State had the right to judge if Congress had exceeded its powers, and, if so, to disobey it, it was not long before the new act was declared unconstitutional. It was resolved, therefore, to prevent its enforce¬ ment in the port of Charleston, even by armed resistance, or by withdrawal from the Union. In fact, so strong was the feeling upon this sub¬ ject that the nation was threatened with dis¬ solution. President Jackson, however, refused to listen to the arguments of the nullifiers, the leaders among whom were Hayne and Calhoun, the latter having, resigned the Vice-Presidency

to accept a seat in the Senate in order that he might speak upon this question, and he at once ordered troops to Charleston. The presence of the soldiers had a quieting effect upon the bel¬ ligerents, who postponed their threatened action, and the difficulty was finally settled by the Clay compromise bill. More trouble with the In¬ dians and the (

Mormon Disturbances. — During the pere¬ grinations of the Mormons, prior to their ulti¬ mate settlement in Utah, they attempted to lo¬ cate in several places, but as their presence was not relished by other citizens, who charged them with such crimes as robbery, arson and secret assassinations, they had frequent conflicts with mobs and were driven from spot to spot until they made their final stand in Missouri, at the town of Far West, in Caldwell County. Here they were joined in 1838 by Joseph Smith and Sidney Rigdon, who, after the failure of the Mormon Bank at Kirkland, Ohio, had fled from that State to avoid arrest for fraud. To the ticubles arising from the hatred and distrust of the people of Missouri there were soon added those of internal dissensions. On 24 Oct. 1838 Thomas B. March, president of the 12 apostles, and Orson Hyde, one of the

apostles, made af¬ fidavit that Smith and Rigdon placed the teach¬ ings of the Book of Mormon and the regulations of the Church above the laws of the land and that there also existed among the Mormons a band known as the <(Danites,® organized to execute the will of the head of the Church, whether it were legally right or wrong. Under such conditions the feeling against the Mor¬ mons grew so strong that it was determined to drive them from the State. Smith and Rigdon had already been arrested on charges of treason, murder and forgery, but their adherents forti¬ fied their settlement and resisted both the popu¬ lar will and the law so strenuously that it be¬ came necessary to call out the militia to expel them. They at once turned their steps toward Illinois, where they founded the city of Nauvoo, but the authorities were to have still more trouble with them, the most serious disturb¬ ances being those of 1844, when they were driven out of Illinois, and those which fol¬ lowed the Mountain Meadow Massacre, in 1857, when an army of 2,500 men, under Col. Albert S:dney Johnston, was sent to Utah to put down Mormon resistance to United States' authority.

Alton Riots, Illinois. — The Alton, Ill., riots resulted from a popular uprising against the Saint Louis Observer and its owner, Rev. Elijah P. Lovejoy. Compelled to leave Saint Louis by reason of his anti-slavery proclivities, Mr. Love- joy took his paper to Alton, Ill. There, too, he provoked enmity, however, and several riots occurred, his newspaper plant being destroyed no less than three times. On the occasion of the last riot, 7 Nov. 1837, Mr. Lovejoy was killed.

Patriot War. — Friendly relations with

Great Britain were again endangered in 1837,

when the so-called (

Dorr Rebellion. — Although friendly rela¬ tions were maintained with all foreign powers during Tyler's administration, several internal disturbances occurred which called for quick action upon the part of the authorities. In Rhode Island, for example, the Dorr Rebellion required the presence of the United States troops, while the militia was called upon in New York to suppress the anti-rent rioters. According to the judgment of later days Thomas W. Dorr, the political reformer who led Rhode Island into its only insurrection,

was a man whose chief offense was that he was in advance of his time, for since his death every reform for which he argued and for which he was ready to fight has been freely adopted by the people of the State. According to the charter which had been granted to Rhode Island by Charles II, in 1663, no person was permitted to vote for town or State officials unless he was possessed of a certain amount of real estate. Under a subsequent statute of the legis¬ lature no person could be admitted a free man of any town, with such political privileges, un¬ less he owned a freehold estate to the value of $134 or was 'the eldest son of such a freeman, qualifications which barred fully two-thirds of all the citizens of the State from becoming legal voters. It was to these provisions that Dorr and his adherents objected and when they found that they could not accomplish their purpose in any peaceable way, recourse was had to arms. The insurgent forces, however, were defeated and dispersed upon each occasion. Dorr, who was convicted of high treason, was subsequently pardoned.

Anti-Rent Rebellion. — During this time the New York authorities were engaged in try¬ ing to suppress the anti-rent rebellion. Accord¬ ing to the statement of Willard, the historian : Under the early Dutch governors of New York certain settlers received patents of considerable tracts of land, that of Van Rensselaer being the most extensive, comprising, as it did, the greater portions of Rensselaer and Albany coun¬ ties. These lands were divided into farms of from 100 to 160 acres and leased in perpetuity on condition that the tenant pay annually, to the landlord or <(patroon,® a quantity of wheat from 22ˆ2 bushels to 10, in addition to four fat fowls and a day's service with wagon and horse. If the tenant sold his lease, the landlord was entitled to one-quarter of the purchase money. The summer of 1844 witnessed the most violent disturbances by the Anti-Rent party in the eastern towns of Rensselaer, in the Liv¬ ingston Manor, in Columbia County. The Anti- Renters formed themselves into associations to

resist the law and armed and trained bands, disguised as Indians, scoured the country, crying <(Down with the rent !® and in various ways intimidating those who favored the exe¬ cution of the law. In 1846 Silas Wright was chosen governor of the State and, by his wis¬ dom and firmness, public order was restored. By proclamation, he declared the locality in which these disorders prevailed to be in a state of insurrection ; resolute men were made sheriffs, military forces were brought into requisition and the leading Anti-Renters were not only brought to trial but were convicted.

*The Revolt in New Mexico. — The revolt * against the authority of the United States gov¬ ernment which broke out at Taos in 1847, was quickly suppressed by the Federal forces under the command of Col. Sterling Price. Montoya, the leader of the insurrection, who had assumed the role of governor, was captured, tried by court-martial and shot 7 Feb. 1847.*

Kansas Border Warfare. — Following the Mexican War (q.v.) the government was en¬ gaged in almost continuous conflicts with the Indians, while the ((Know Nothing® disturb¬ ances, which followed the organization of the American party and resulted in anti-foreign and anti-Catholic riots in various parts of the coun¬ try, caused no little trouble. As the years passed, however, the anti-slavery question had pushed itself further and further to the front and it required no inspired prophet to predict that a few such disgraceful incidents as those which accompanied the rendition of Anthony Burns in Boston would make the issue the vital one for the nation. In the meantime the Kan¬ sas border troubles, troubles which practically resulted in civil war, held the attention of the people. This sectional excitement arose from the introduction of a bill into Congress by Sena¬ tor Douglas of Illinois, which provided for the organization of that vast tract lying west of Missouri, Iowa and Minnesota, into two Terri¬ tories, Kansas and Nebraska, each of which, being exempt from the operations of the Mis¬ souri Compromise, should come in as free or slave States according to the vote of the peo¬ ple at the time of their admission. Although this bill was fiercely fought in Congress, it was passed in 1854, upon which there began a ter¬ rible struggle for the possession of Kansas. From the Northwest and the East the anti¬ slavery men flocked into the Territory, while the slavery partisans, with their slaves, rushed in from the South, each party being determined to people the new land with settlers in sympathy with their respective views. To make matters worse the Missourians — or so it was charged — crossed the borders by the hundreds and, wherever it was possible, controlled the elec¬ tions. As the result of the disruption two sets of Territorial officers were elected and civil war with all its attendant evils followed. Dur¬ ing the summer of 1856 the Territory was in constant war. Men were murdered and towns were sacked, and while both sides were guilty of violence, the Free-State party was much the less so, being confessedly in the majority. For two years Kansas suffered, but at last the op¬ ponents of slavery gained the upper hand and, in 1861, Kansas was admitted as a free State. Among the many anti-slavery leaders in Kansas none had been more prominent than John

Brown (q.v.), a man of great courage, who . believed that the liberation of the slaves could be easily accomplished if they should be given an opportunity to rise. With 21 men, therefore, Brown went to Virginia to carry out his pur¬ pose. They succeeded in seizing the United States arsenal at Harper's Ferry, but as neither the negroes nor the anti-slavery whites gave them the support for which they had hoped, they were soon overpowered by a force of marines. With the exception of two, who es¬ caped, all the participants in the revolutionary movement were either killed during the en¬ gagement or hanged afterward, the latter being the fate of John Brown.

Fenian Troubles. — Shortly after the close of the Civil War (q.v.) in the United States, lead¬ ers in the long continued struggle for the eman¬ cipation of Ireland undertook to make the United States the base of operations against England by the invasion of her Canadian pos¬ sessions. There was an organization of formid¬ able numerical strength, largely composed of a military body known as the (

Canada, going from Saint Albans, Vt., and Malone, N. Y. This force numbered nearly 2,000 men. It advanced upon Saint Armand, which the Canadians had evacuated, but on the 9th, the Canadian force returning, the Fenians were driven back, with a loss of 15 prisoners.

Walker's Expeditions. — The violation of the neutrality laws was always the excuse for the United States' interference with William Walker's various filibustering expeditions. In 1853 this famous American adventurer invaded Lower California, where, his plans failing, he surrendered to the United States authorities at San Diego. Having escaped conviction, two years later he invaded Nicaragua, where, for a time, he was successful. In 1857 he fell, how¬ ever, and on 1 May he surrendered to Commo¬ dore Charles H. Davis of the United States sloop-of-war Mary. Taken to New Orleans, he not only escaped trial, but, evading the govern¬ ment authorities who were watching him, he organized another expedition and landed at Greytown on 14 Nov. 1857. Shortly after land¬ ing, however, he was again compelled to sur¬ render to Commodore Paulding of the United States frigate Wabash. Although the United States authorities had no further trouble with Walker, his next expedition was a fatal one, for, having invaded and captured a part of Honduras, he was himself captured by the com¬ mander of the British man-of-war Icarus, by whom he was delivered to the Honduran offi¬ cials, and was shot, 12 Oct. 1860.

The Draft Riots. — The necessity of rein¬ forcing the Union army by means of conscrip¬ tion resulted in the development of a strong spirit of opposition to the government, a senti¬ ment which, in New York and Boston, cul¬ minated in uprisings that were suppressed with great difficulty. In New York City the outbreak occurred on 13 July 1863; in Boston, a day later, but while the Boston riot was suppressed by the militia within 24 hours and at the cost of only one life, in New York order was not restored until the 16th. During this period of disturbance property to the value of more than $2,000,000 was destroyed and it was estimated that fully 1,000 of the rioters fell in the various battles between the troops and the people.

Tin Horn War. — The Ku-Klux (q.v.) dis¬ turbances in the South ; the later and still fruit¬ less Fenian demonstration on the Manitoba frontier; the insurrection against Governor Kel¬ logg in Louisiana ; the race riots and massacres in several of the Southern States; the troubles arising from the opening of Oklahoma and the Cherokee Strip, and the Chinese labor riots in the West, were events which, like several of the labor uprisings of later days, have required the attention of United States troops or State militias for their suppression. Of more conse¬ quence, however, was the (

Catarino Garza, who had conducted a number of periodicals opposed to the administration of President Diaz, inaugurated the first of this series of troubles in September 1891. He was at that time living on his cattle ranch in Texas, near Palito Blanco, at which place he collected his band of revolutionists. Issuing a manifesto, in which he proclaimed the overthow of Diaz, he crossed the Rio Grande with less than 100 men, who were reinforced from time to time by sympathizers in the movement. There were many brushes with the Mexican troops and, lit¬ tle by little, the insurrectionary spirit extended. The fact that the insurgents took refuge on American soil when worsted made it necessary for the United States authorities to act, and two companies of infantry, with two of cavalry, did effective wo-rk in preventing the violation of American neutrality. The Mexican government sent a strong force to the scene of trouble and the fighting degenerated into guerrilla warfare. During the latter part of 1892 there was an¬ other gathering of insurgents, under leaders named Pacheco and Perez, the scene of opera¬ tion being several hundred miles above that of Garza's war. The rebels captured Ascension and Corralitos, driving out the American set¬ tlers who

crossed the Rio Grande into New Mexico. The Indians along the Yaqui River joined in this uprising, while another band of rebels, under the leadership of a man named Amalia, added to the complications. During this period General McCook had maintained a force on the American side of the Rio Grande and it was largely through his efforts that, in 1893, the insurgents were dispersed. The last outbreak occurred in January 1894, when two filibusters named Ochoa and Lugan attempted to revive the insurrection. They were unsuccessful, how¬ ever, being dispersed after two somewhat sharp engagements.

The Colorado War. — Disturbances resem¬ bling in intensity and bitterness the Pullman Car Company strike and the mining troubles at Coeur d'Alene, Idaho, occurred during the win¬ ter and spring of 1903-04 in the Cripple Creek mining district, Colorado. In the summer of 1903 a strike was ordered and several thousand miners went out. Three weeks after the inaugu¬ ration of the strike, an assault on two miners resulted in the ordering of State militia to the region. The presence of the soldiers was re¬ sented and rioting followed. Martial law was declared, <(bull pens® established and the leaders of the strikers arrested on various charges. Later on, prominent strikers were deported by order of the military. A state of almost civil war existed, which increased as the spring ad¬ vanced.

Boxer War.— In 1900 for the first time since the Revolutionary War soldiers of the United States fought in company with troops of the European nations in Peking during the Boxer Rebellion (q.v.).

Pacification of Cuba.— In 1906-09 United States troops were in occupation of Havana and other parts of Cuba, remaining until order was restored between the two rival parties in Cuba.

Vera Cruz Affair.— In 1914 friction devel¬ oped with Mexico over the capture of United States sailors in a Mexican harbor. The Amer¬ ican admiral demanded reparation and a salute to the American flag. This not being forth¬

coming Vera Cruz was taken by Anlericari troops in April. •

Mexican Border Embroglio. — From 1911 to 1916 and even later conditions bordering on anarchy prevailed along the Mexican front; several raids were made on American border towns and in March 1916 Major John Pershing was sent into Mexico as commander of a puni¬ tive expedition to pursue the bandit, Francisco Villa. After many weary weeks the troops were withdrawn, their object

unattained.

War with Germany and Austria. — As a result of Germany's submarine policy in the World War the United States was drawn into the great conflict in April 1917. Men and mu¬ nitions in ever-increasing numbers and quantity were dispatched to the fighting fronts, resulting in the collapse of the Central Powers in the closing months of 1918.*

The following is a practically complete list of the wars and minor engagements or disturb¬ ances in which the United States has partici¬ pated since 1775:

1775-1783

1782-1787

1786-1787

1790-1795

1792-1794

1798-1800

1799

1801-1803

1806

1807

1808-1809

1811- 1813 1811

1812- 1815 1812 1813

1813- 1814 1817-1818 1819 1823

1827

1831

1832

1832- 1833

1833- 1839 1834

1835-1836

1835- 1842

1836- 1837

1837

1838

1838-1839

1840- 1842

1841- 1846 1846-1847

1846-1848

1848

1849- 1861

1849

1850

1850- 1860

1851- 1852 1851-1853 1851-1856 1855

1856

1855-1856

1855- 1860

1856- 1858 1857

War of the Revolution, 19 April 1775 to 11 April

1783.

Wyoming Valley Massacres, Pennsylvania. Shays' Rebellion, Massachusetts.

War with Northwest Indians.

Whisky Insurrection, Pennsylvania.

War with France.

Fries' Insurrection, Pennsylvania.

War with Tripoli.

Burr Conspiracy.

Sabine Expedition, Louisiana.

Chesapeake Bay Naval battle.

Lake Champlain embargo.

War with Northwest Indians.

Slave Insurrection, Louisiana.

War with Great Britain.

Seminole War, Florida.

Peoria Indian War, Illinois.

Creek Indian War, Alabama.

Seminole War, Florida.

Yellowstone expedition.

Upper Missouri River campaign against Black- feet and other Indian tribes.

Le Fevre Indian War, Wisconsin.

Turner's Rebellion, Virginia.

Sac and Fox troubles, Illinois.

Black Hawk War.

Nullification disturbances, South Carolina. Cherokee disturbances.

Pawnee Expedition, Indian Territory.

Toledo War, between Michigan and Ohio. Seminole War, Florida.

Sabine disturbances, Southwestern frontier. Creek disturbances, Alabama.

Osage Indian troubles, Missouri.

Riots. Alton, Ill.

Heatherly Indian disturbances, Missouri and Iowa.

Mormon disturbances, Missouri.

Maine boundary trouble.

Patriot War, Canadian frontier disturbances. Dorr War, Rhode Island.

Anti-Rent Riots, New York.

Doniphan's expedition from New Mexico to Mexico.

Mexican War.

New Mexico Revolt.

Cayuse War, Oregon.

Navajo troubles, New Mexico.

Astor Place Riot, New York.

Continuous disturbances with Indians, Texas. Pitt River expedition, California.

Know-Nothing disturbances.

Yuma expedition, California.

Utah Indian troubles.

Indian wars in Oregon and Washington. Rendition of Anthony Burns, Massachusetts. Yakima Indian expedition, Washington Ter¬ ritory.

Winnas Expedition against Snake Indians, Oregon.

Attack on Canton forts, China.

Cheyenne and Arapaho troubles.

Seminole War, Florida.

Walker's expedition.

Kansas border troubles.

Gila expedition, New Mexico.

UNITED STATES ARCHITECTURE

545

1857

1857-1858

1858

1858-1859

1859

1859-1860

1860

1860-1861

1861- 1890

1861-1866

1862

1862- 1867

1863- 1869

1863

1865-1868

1865- 1866

1866- 1870

1867- 1881

1868- 1869

1871

1872

1872-1873

1873

1874-1875

1874

1875

1876

1876-1877

1876-1879

1877

1878

1879

1879-1894

1879-1880

1885

1890- 1891

1891- 1893

1892- 1896 1894

1898- 1899 1898

1899- 1902 1900

1903-1904

1906-1909

1914

1912-1919

1917-1919

Sioux Indian troubles, Minnesota and Iowa. Mountain Meadow Massacre, Utah.

Utah expedition.

Puget Sound expedition, Washington Ter¬ ritory.

Expedition against Northern Indians, Wash¬ ington Territory.

Navajo expedition. New Mexico.

Spokane and other Indian troubles, Wash¬ ington Territory.

Wichita Indian troubles, Indian Territory. Colorado River expedition, California.

Pecos expedition, Texas.

Antelope Hill expedition, Texas.

Bear River expedition, Utah.

San Juan trouble, Washington Territory.

John Brown raid, Virginia.

Cortina troubles, Texas and Mexican border. Piute expedition, California.

Kiowa and Comanche expedition, Indian Ter¬ ritory.

Carson Valley expedition, Utah.

Bannock Indian Massacre, Snake River, Idaho.

Navajo Indian expedition.

Apache Indian wars and troubles, New Mexico and Arizona.

Civil War.

New Ulm Indian massacres, Minnesota.

Sioux Indian wars, Minnesota and Dakota.

War against Indians in Kansas, Nebraska, Colorado and Indian Territory.

The Draft Riots.

Indian wars in Oregon, Idaho, California and Nevada.

Fenian raid, Canadian border.

Ku-Klux disturbances, Southern States. Campaign against Lipan, Kiowa, Kickapoo and Comanche Indians.

Canadian River expedition, New Mexico. Yellowstone expedition.

Fenian disturbances on the Manitoba frontier. Yellowstone expedition, Dakota.

Modoc campaign.

Yellowstone expedition, Dakota.

Campaign in Indian Territory.

Insurrection against Governor R. D. Kellogg, Louisiana.

Sioux Indian expedition, Wyoming and Ne¬ braska.

Black Hills expedition, Dakota.

Big Horn expedition, Wyoming.

Race riots at Austin, Miss., and Trenton, Tenn. Eastern Nevada expedition.

Sioux expedition, Dakota (Custer Massacre). Powder River expedition, Wyoming.

Massacre of negro militiamen by whites, Ham¬ burg, S. C.

Big Horn and Yellowstone expeditions, Mon¬ tana and Wyoming.

War against Northern Cheyenne and Sioux Indians.

Nez Perce campaign.

Bannock and Piute campaigns.

Ute expedition, Colorado.

Sheep-eater Indian troubles, Idaho.

“ Oklahoma Boomers ” and Cherokee Strip disturbances.

Ute Indian campaign, Colorado and Utah. Chinese miner disturbances, Wyoming.

Sioux Indian disturbances, South Dakota.

The “ Tin Horn War,” Texas and Mexican border.

Trouble with renegade Apaches, Arizona and Mexican border.

Coxey’s Commonweal and other industrial army disturbances.

War with Spain.

Chippewa Indian disturbances, Leech Lake, Minn.

Insurrection in Philippine Islands.

Boxer Rebellion.

The Colorado mine disturbances.

Pacification of Cuba.

Capture of Vera Cruz.

Mexican Border Patrol.

War with Germany and Austria-Hungary.

UNITED STATES ARCHITECTURE.

The earliest settlers within the present limits of the United States have left us little in the way of architectural remains. Leaving an old and civilized country and starting life anew in the untrodden vastness of a wild world of primeval peoples, they devoted their time and strength to clearing the land and cultivating the vol. 27 — 35

soil, living meanwhile in hastily constructed log cabins or rude houses of clay, stone and wood. The tide of immigration grew larger yearly, and soon homes were built replacing the pioneer emergency domiciles, and though not palatial in any sense of the word made

comfortable and satisfactory dwelling places. The effect of the constructive methods of the different mother countries is evident in these buildings. With the increase of wealth came the desire for bet¬ ter and more pretentious architecture. In the southwest during the 16th, 17th and 18th cen¬ turies, influenced by Spanish types, were built picturesque mission buildings (New Mexico: San Juan de les Caballeros, 1598; California: Santa Barbara, 1787), cathedrals (Saint Fran¬ cis, Santa Fe, 1713; Florida, cathedral, Saint Augustine, 1793; Louisiana, cathedral, New Orleans, 1792), and a few secular constructions (Florida, Fort San Marco, Saint Augustine, 1756; Louisiana, Cabildo, New Orleans, 1795). As the Spanish Dominion in North America took the form of conquest rather than coloniza¬ tion, the conditions making for growth and prosperity were lacking in these provinces and is reflected in the stunted architectural de¬ velopment. The long slender column of our Colonial style is not the result of an aesthetic development. The classic proportion of the column of the Georgian period was abandoned by the construction during the Colonial period through necessity as imposed by law and not through choice. The column with a height of 15 and even more diameters is not the outcome of years of development and study to improve the already well-established and accepted pro¬ portions of the Classic columns — the sudden abandonment of the columnar proportion that had satisfied both the structural and aesthetic requirements of classic design for centuries was due uniquely to an order of the British Privy Council, prohibiting the colonists from cut¬ ting down for domestic construction trees of a diameter greater than 16 or 18 inches, in order to reserve for the construction of the British ships and especially for the spar and masts, the trees of the larger diameters. The immediate result of this order was to force the colonists in the construction of a porch two stories in height to use a column in which the ratio of diameter to height was far greater than in the established classic proportion. The radi¬ cal change in the colonial column necessarily affected the established proportions of the other architectural elements to a degree in excess of the structural limitations of the materials used. And the resulting bastard style cannot be re¬ garded as the naive efforts of an artist in using forms with which he is not thoroughly familiar, as seen in the early period of develop¬ ment of the Renaissance in Europe. The lack of a developed architectural appreciation in the colonial builder is well exemplified in his use of wooden groins. This reversal of the usual development of a structural element from wood into stone is probably unique.

In the vicinity of the Hudson Valley and on Long Island the Dutch settlers constructed long, low houses of rough stone garnished with brick, with timber gabled roofs, the eaves of which projected far over the side walls. Though simple in design, these Dutch houses, like those of the immigrants of other nations who settled in the United States, show that

Old World restrictions imbued the builders with a spirit of deference to inherited customs; with the result that they followed the tradi¬ tions of their teachers, and built as they had been taught, instead of developing new ideas and methods to meet the new condition. This did not prevent them, however, from adapting to their needs available materials, and a variety of them were frequently employed in the same building; stone, brick, stucco, clap¬ boards and shingles being used together in such a manner as to result in a harmonious whole. In the houses of the more wealthy, dressed or cut stone was frequently employed, and in those of the less well-to-do or less exacting, rubble masonry sufficed. The ground floor was used for kitchen, living-room and bedchambers, and the upper floor for the storage of supplies and at times for slave quarters. In the early days dormers were sel¬ dom employed, when light was necessary windows were introduced in the gable ends. Later, the introduction of the gambrel roof with its steep slope and the elimination of waste ‘ space just inside the eaves made it possible to use the second or attic floor for bedchambers, as well as for storage.

Before the 18th century, the Dutch doorway was merely a rectangular entrance into the house, an occasional narrow transom with small square lights being the onlv attempt at adorn¬ ment. The doors were either solid or divided at mid-height. Sometimes a simple stoop was built at the entrance with settees arranged on either side. In the latter part of the century, however, more attention was paid to the en¬ trance, and during the last quarter, Georgian motifs were informally introduced with a broad individuality of treatment, which oftentimes in¬ dicated but the first inspiration. In the in¬ terior it became possible to expand the con¬ struction indefinitely on account of the lack of formality of plan. Often there were two large square rooms on the first floor front, one on either side of the hall which extended from the front to the back door ; and an oblong bed¬ room on either side at the rear. As the family expanded, succeeding generations witnessed the building of a large addition or a number of

smaller ones. Each of the large rooms had an enormous chimney, unornamented or crowned with a plain overmantel which extended well into the room. With the advent of the Georgian influence, a tendency arose toward more elabo¬ rate decoration in the doorways and in order to relieve the former plainness carved wood moldings, leaded glass fans and side lights were used.

In domestic buildings in the Dutch, German and French Huguenot settlements of Central New York, New Jersey and Pennsylvania it is exemplified in the Lefferts House, Erasmus Hall and other frame buildings of Long Island, The Memorial House, New Paltz, the Sennet House, Kingston, The Hasbrook House, New¬ burgh, Clinton Mansion, Poughkeepsie, and other stone buildings in the Hudson and Mo¬ hawk valleys and throughout New Jersey and Pennsylvania, The Schuyler Mansion, Albany, The Herkimer Home, Little Falls, and other brick buildings of the Hudson and Mohawk valleys. Crude and unrefined, frankly the products of the craftsman's art, these dwellings

so closely resemble their English neighbors in general attributes that they cannot be said to have been developed in a distinctive style such as would warrant a departure from the broad classification of Colonial.

In New England, race craft determined architectural design. Original touches where- ever introduced were not from mere caprice but from obvious local needs which the formal styles of England had not provided for, until at length there was established a type of archi¬ tecture the result of successive evolutionary types, that was a distinctively characteristic product of New England. At first small, the houses were of one or two stories, with sharp peaked roofs, stone chimneys, and small win¬ dows ; a long, narrow lean-to being frequently added in the rear to serve as the kitchen. In the earlier houses, of which the Paul Revere house in Boston is an excellent example, the original construction was of the half-timber variety, with clay, or brick and stone pugging as used in England, the clapboard casing being added later when the severity of the winters made it apparent that a more substantial form of exterior sheathing was necessary. In the interior plan, the New England house had two rooms to a floor, or three when the kitchen lean-to was added, in the latter case the room originally used as a kitchen became a sitting-room with that adjacent as a sleepingroom. A few of the larger and more elaborate houses, Governor Eaton's at New Haven among them, were architecturally more pretentious, with an E-shape design of four rooms on the first floor and several more, usually sleeping and

storerooms, on the second.

In Pennsylvania, West Jersey and Delaware the mixed nationality and clannishness of the early settlers caused the architecture of the surrounding country to fall into several sepa¬ rate and distinct channels. Each race preserved the traditions familiar to the mother country, the Welsh expressing themselves in stone con¬ struction, with sharply peaked dormers on their roofs. Low, wide doors and windows were cap¬ ped by thick, oblong stone slabs, with sometimes a hood added over the former. A peculiarity frequently found in this type of house was the continuation of the cornice from the eaves horizontally across the ends, so as to make a complete triangle with the gable cornice. In the German colonial architecture, the windows and doors were higher and less wide, while the dormer heads had the same sharp angularity as those of the Welsh. A cornice was seldom carried on the gable ends, which were left un¬ adorned. The peaked roof was common to the houses of the Welsh and German colonists ex¬ cept that the roofs of the latter had less pitch.

While these two types of houses were or¬ dinarily built of stone, the dwellings in New Jersey, although closely following them in architectural design, were often of larger pro¬ portions and of brick rather than stone con¬ struction. The Pennsylvania Quakers followed the English style at first, but gradually adopted many of the peculiarities of the Welsh and Ger¬ mans ; so that the Pennsylvania colonial farm¬ house of to-day is a mixture of the best points of the three styles. In Philadelphia, severity of style was caused by the same strong Quaker in-

Military Drill Hall, Cornell University

•

.

fluence while the easy access to white marble in considerable quantities made this a favorite ma¬ terial. Hence arose the well-known type of the Philadelphia house, with walls of red brick, white marble lintels, sills and doorsteps, and as the houses were built close to the sidewalk, with¬ out areas and with the entrance nearly on a

level with the street, a display of solid white painted wooden shutters, which carried out the chromic effect to the full. The population of the South during the colonial period was alto¬ gether English as was the architecture, though differing somewhat from the English archi¬ tecture of New England in that there was no half-timber construction and the chimneys were wholly outside the house, instead of being con¬ tained within as in the North. With a natural preference for brick and stone, the earliest southern colonists were compelled to use wood, and though later means of transportation proved adequate for supplying these materials and they were greatly used as soon as the Georgian inAuence began to be felt, the early dependence on wood created a precedent which has continued until the present time. The cities of the South were less crowded, less busy, more decidedly marked by the distinction between elegant and humble dwellings. In Mobile, Charleston and Savannah, the characteristic dwelling was rather a more stately mansion standing free or nearly so, and having broad verandas or "galleries® which, however, were not turned toward the street, but sidewise upon gardens. Savannah, however, has a very unusual plan : a succession of square, open "places® from each of which four streets lead in four directions, giving a series of square corners and allowing of an irregularity of shape in the house lots which is not known in our other cities. The typical dwelling either in brick or wood was rectangular in plan with the entrance door on one of the long fronts. The shingled or tiled roof, with a chimney at each end, was steeply pitched. The interior consisted either of a ground Aoor with an attic, or of two living Aoors with a small storage space above. The entrance house door opened directly into a large hall quite in contrast with the small entry of New England houses, and this served as a dining- and sitting-room, the kitchen being detached from the house proper. The remainder of the Aoor was occupied by one or more bedchambers. When the attic was used for domestic purposes it was the cus¬ tom to light it by long dormer windows with sharp peaked gables.

Architecture expression in the several colo¬ nies, however, differed according to locality, but was always informal in its utilitarian consid¬ eration of the requirements of early American life. The introduction of Georgian motifs in the second decade of the 18th century was ac¬ companied by a classicism lacking in the earlier folk domiciles of the colonies. In England, and in all the colonies outside of New England, the interpretation was nearly always in brick and stone. In New England, however, clapboards were almost invariably used, though they were sometimes grooved or beveled to imitate cut

stone. The New England Puritan, character was reAected in many of their domestic and public structures. Comparatively plain on the exterior, the lavishly carved and decorated in¬

terior presents the real architectural character of the structure.

In the Arst phase of the New England Georgian (1714-45) boldness of outline together with a wealth of vigorous carving over the doorways, is strongly reminiscent of the Queen Anne style, and this resemblance is further added to by heavy moldings and Aanked pilasters or carved panels. The windows, char¬ acteristically tall and narrow, were frequently crowned with a Aattened arch in place of the lintel. A rectangular transom of small square lights was often used above the entrance door. The second phase of Georgian architecture (1745-80) in New England witnessed the in¬ troduction of more straight lines and the prac¬ tical elimination of the arch in all except public buildings. Exterior and interior moldings and cornices lost their heaviness and ornamental detail was more restrained. The third phase was strongly inAuenced in interior and do¬ mestic architecture by the Adams Brothers who introduced the Classic Revival (1780-1820). Care and studied design replaced the grossness of earlier work. Columns and pilasters as¬ sumed the delicacy and grace so often met with to-day in the architecture of the New England States. During this period Charles GulAnch in the Massachusetts State House (1795-98) and Samuel Mclntire in the Pierce- Nichols house in Salem (1790) did much toward the proper expression of the New Eng¬ land artistic consciousness.

The three Georgian periods in vogue in the colonies from about 1720 to 1805 were more architecturally elaborate in Pennsylvania, New Jersey and Delaware than in New York and New England. Philadelphia, by 1750, the largest and wealthiest city in America, became the focal point around which the architecture of the Middle Colonies centred. Brick and stone were almost invariably employed for ex¬ terior construction, while in the interior, carved wood paneling, extending from Aoor to ceiling, was the usual treatment, though at a later date, damask and elaborate wall paper were often substituted. In the Arst period, bold but simple ornamental detail, both exterior and interior, combined with strong proAle moldings in high relief, resulted in the same heaviness of out¬ line found in New England during the same era. In the second phase, the decorative treat¬ ment was lighter and more elaborate, the pro- Ales of moldings being less bold and more graceful, while a close attention to detail indi¬ cates more study in the proportion and adapta¬ tion of the different classic orders. In the third period, the Areplace which

had before extended to the ceiling, under the inAuence of the Eng¬ lish architect. Sir William Chambers, was re¬ duced until it extended but halfway up the wall, but retaining much of its former classic design. Another interesting architectural dif¬ ference is the decorative point of view during this third and last phase. In the two preced¬ ing periods it had been the custom to single out individual features for decorative emphasis ; now, the entire front of the house, and often the sides and back as well, were carefully con¬ sidered and the decorative element extended to the proportions as well as to the detail of the whole. Fan lights, enriched with beautiful metal tracery became common over the doors.

Georgian architecture in the South was usually of brick construction. Kitchens and offices were built apart from the main building, which retained the wide hall and first floor bedrooms of the colonial period. Much study was given to the carved details of staircases, pilasters and pediments. The portico, which later, under the influence of the Classic Revival, assumed the imposing proportions now so familiar to us, was introduced at this time. Amply satisfying, by its dignity and breadth, the demands of the exuberant climate and the affluence of the rich southern landowners, it was, like the archi¬ tecture of New England and the Middle Colo¬ nies, an admirable index of the time and con¬ ditions. It was during the latter part of the 18th century that educational, political and humanitarian ideals forced on the national consciousness the necessity for the solution of institutional (prison, asylum and university) problems in a way that no foreign method of arrangement could satisfy. The great exemplar of what might be termed rational institutional structural philosophy in the United States was Thomas Jefferson, combining architectural knowledge and political power. The University of Virginia, at Charlotteville (1817) and his design for the Capitol of Virginia at Richmond (1785), boldly adopted from the Maison Carree at Nimes, are among the most interesting and characteristic productions of the Early Repub¬ lican Period. The solution of institutional problems found concrete expression in the erec¬ tion of the New York State Prison (Joseph Mangin, 1796-98) which planned for the separa¬ tion of the sexes and for criminal classification. The ultimate solution of the problem projected in constructed form by the works of Mangin and Latrobe (the Virginia Penitentiary, 1797- 1800, based on the Old World principle of soli¬ tary confinement) has been achieved in the new . prisons being constructed by the State of New

York at Sing Sing and at Wingdale, where the institutions embody in their organization the function of study of the individual prisoner. Consult Pilcher, L. F., CSing Sing Psychiatric Classification Prison,) (New York 1917).

Between 1776 and 1812, following the firm establishments of national, State and municipal governments, there was an immediate need for public buildings. This demand was affected by the Classical Revival of Europe and was par¬ ticularly influenced by the intimate relations which had grown up between the New Republic and France. When Washington was selected as the seat of government, it waS a Frenchman, Major Pierre Charles l'Enfant, who laid out the city. The Treasury building was the first office building. It was undertaken in 1781. The Treas¬ ury, designed by Robert Mills, a pupil of Lat¬ robe, then United States Architect, was built in 1836-39. The same architect also designed the Washington monuments in Baltimore (1815) and Washington (1836). The White House was started in 1792 by James Hoban and a year later the Capitol. The central portion was de¬ signed by William Thornton in collaboration with B. H. Latrobe and Charles Bulfinch. It was not until 1851 to 1865 that the dome and wings were added. Other well-known buildings of the Classical Period are the State House and Custom House, Boston, the City Hall, sub- Treasury and Old Custom House, New Vork

City, and the Mint, Philadelphia, the State House, Albany, N. Y. So popular did the monumental style become that buildings sprang up on every side, which, if not completely in the classic mode, were at least adorned with Greek and Roman orders which when applied to small houses served only to make them ridiculous. In large private houses and in public buildings, however, it was possible to do justice to those newly adopted architectural forms and we have many admirably dignified and graceful structures, in the cities of the country. The wave of Roman and Hellenic enthusiasm dominated the archi¬ tecture of the United States until 1860 when its strength gradually subsided. The style did not live, for architecture to be com¬ pletely successful must reflect the condition of the civilization whose activities it is planned to house. The impossibility of instilling into modern life the conditioning causes of a dead civilization made it impossible for the struc¬ tural and decorative elements that were boi- rowed for the production of Academicism and Classicism to reflect the functioning of the civilization of the 19th century. The Gothic revival of the 19th century while confined chiefly to England made itself manifest in the United States as early as 1839, when Richard M. Upjohn undertook the design and comple¬ tion (1846) of Trinity Church, New York. Of the same time was the church of Holy

Trinity, Brooklyn, N. Y., designed by Lefevre. Grace Church, New York (1840), by James Renwick and, by the same architect, Saint Patrick's Cathedral, New York (1850), are among the most successful efforts of the period. The Gothic style was for the most part restricted to churches, although a few projects as in the Harvard Library and the Yale College Alumni Hall evidence the influence of the collegiate Tudor style of England.

These very creditable pointed works were produced during an era that was otherwise represented by a host of edifices marked by careless and undiscriminating design. The super-excited political conditions that obtained throughout the United States reached their climax in the debacle of the Civil War and production and art were reciprocally inhibited. Honesty, sobriety of task and logic in construc¬ tion were in a state of stagnation. The Mur nicipal Building, Philadelphia, and the Capitol, Albany, still unfinished, are monumental ex¬ pressions of design and construction subordi¬ nated to the demands of grasping and voracious political patronage. Their errors of plan and the wholesale disregard of engineering efficiency and sanitary provisions render these costly, un- finishable piles expletives of architectural warn¬ ing. Perverted taste likewise characterizes the New York Post Office, the Army and Navy Building, Washington, both by A. B. Mullett. In the latter half of the 19th century, the United States experienced unusual activity in building due to a variety of causes, the opening up of the West, the great fires in Boston and New York and the stabilizing of business and finance after the chaotic conditions surrounding the war and reconstruction periods. This new period discovered two architects, Richard M. Hunt and Henry H. Richardson, men thor¬ oughly trained by European study and practical

ARCHITECTURE IN THE UNITED STATES

1 United States Sub-Treasury, New York City 2 Saint Patrick's Cathedral, New York City 3 Trinity Church, Boston, Mass. 4 Biltmore,

ARCHITECTURE IN THE UNITED STATES

ARCHITECTURE INgTHE UNITED STATES

9

Westover, Va. 2 Monticello, Va. 3 Capitol, Washington, D. C. 4 Saint Paul's Church, New York City

1 Independence Hall, Philadelphia, Pa. 2 Massachusetts State House, Boston, Mass. 3 New York City Hall 4 Washington Monument, Baltimore, Md

experience and possessed of a personal force that commanded attention, who established in the public mind that architecture was one of the Fine Arts, and set the profession on a sound basis, for Hunt took a leading part in organiz¬ ing the American Institute of Architects and was its first president. Among his important works are the Lenox Library, Metropolitan Museum of Art and residence of W. K. Van¬ derbilt, New York, the Breakers and Marble House, Newport, and George W. Vanderbilt's country house at Biltmore. His genius for or¬ ganized plan, standardization of style and thorough grounding in the principles of the Renaissance finally established that style in the United States.

Henry H. Richardson, a graduate of the Beaux-Arts, and a classicist by training, be¬ came dissatisfied with the finical elaborateness of the Gothic revival and turned to the simpler and more massive Romanesque of southern France. His first important work, Trinity Church, Boston, 1877, met with a great and immediate success. So freely did Richardson use the provengal forms, that he may be said to have established a style of his own which is seen to the best advantage in the county build¬ ings, Pittsburgh, the city halls of Albany and Springfield, the public libraries of Woburn, Quincy, Malden and Burlington and the Cham¬ ber of Commerce, Cincinnati. His seriousness and refined taste left a lasting impression upon the nation's art, but his selection of the Ro¬ manesque style, while it had some following, was abandoned for the Classic and Renaissance due to the influence of the later students of the Ecole des Beaux-Arts. The most important work of this period was the Columbian Exposi¬ tion at Chicago in 1892. Here the architects were given a free hand in the planning of the grounds and buildings. The result was on a larger scale than had ever been attempted be¬ fore and showed what could be accomplished by the co-ordination of landscape, architecture, sculpture and painting. Its effect was national, stimulating the imagination of a people long in¬ different to claims of beauty and impressing itself upon Federal, State, municipal and com¬ mercial buildings for over 25 years. It has also played its part in the

development of parks and boulevards and more recently in the recon¬ struction and artistic planning of cities. It is but natural that a people thus roused to better things in public affairs should display an equal concern in their immediate surroundings and that a similar uplift should be felt in the build¬ ings of domestic character. For the time being it was confined to an adaptation of the old styles to new conditions, the architect seeming more intent in reproducing the old styles than in meeting the needs of the present. In the houses erected in the last 10 years, however, there are evidences of a new creative art that is gradually being established upon the fitness of design, to the locality, climate, materials and the various needs and necessities of modern living. If in the development of his design the architect feels the need of adapting, he is forced to adapt creatively. Thus from the needs of the people, the source of all true art in all time, is gradually being evolved a functional domestic architecture in America to which the experience imagery of the past is being made

to contribute. <(In this onward movement the Federal buildings, post offices, custom houses, courthouses and other government edifices have not held the first rank. Although solidly and carefully constructed those built during the past 20 years are inferior to the best work pro¬ duced by private enterprise, or by State and municipal governments. This is explained by the fact that all participation in their design¬ ing by the leading architects of the country at large has been excluded by enactments devolv¬ ing upon the Supervising Architect at Wash¬ ington the planning of all Federal buildings, as well as a burden of Supervision and clerical duties incompatible with the highest artistic results.®

During the early part of the 20th century great attention has been given to the problem of the adequate protection of our municipalities and the training of citizen soldiery. The newer principles of military science have been formu¬ lated by Major-General O'Ryan and translated into structural form and exemplified in the Eighth Coast Artillery Armory, New York; the First Cavalry Armory, Brooklyn, N. Y. ; the Infantry Armory, Troy; Squadron A, Armory, New York; Drill Hall, Cornell University, Ithaca, N. Y. In these typical examples of mili¬ tary architecture the masses and parts of the fabric are so disposed that the attacking force may be seen while the defenders are hidden from sight and at all vulnerable portions of the struc¬ ture a possiblity provided of obtaining a cross and defile fire. The congestion of population, high cost of land, the perfection of the elevator and the invention of the skeleton or steel frame were the active forces which found their expres¬ sion in the skyscraper, a product of American ingenuity without a prototype in the whole

realm of architecture. In the early periods of its development the same system of adaptation was applied by the architects who failed to recognize the unlimited opportunity afforded by this new problem for the application of the true princi¬ ples of constructive art. Condemned as a monstrosity and outlawed by the classicists every subterfuge was resorted to in order to conceal the construction and to reduce the ap¬ parent height. The World Building and the Manhattan Life Building exemplify the appli¬ cation of this system which may be said to have reached its culmination in the Saint Paul Build¬ ing where sill and band courses were introduced in the greatest profusion in an effort to ac¬ centuate the horizontal and distract the eye from the vertical. The failure of accomplish¬ ment along these lines led to a reaction in favor of the frank acknowledgment of height, but limited still in its expression by the tradi¬ tions of the classic for the accepted principle of composition. The column was taken as the motif of the design of the fagade as exempli¬ fied in the Broadway Chambers where the capital shaft and base of the column were symbolized in the highly decorated cornice, the repetition of windows and the basement. In the American Surety Building is seen the ex¬ treme of this conception in that Bruce Price, the architect, aimed to create the impression of an entasis by varying the depth of the window- reveals through the many stories of the plain shaft. Louis Sullivan was one of the first architects who seems to have recognized the

elementary principles involved in the treatment of this new form, that of expressing upon the exterior the structural members it clothed and protected. Fundamentally, however, classic forms, admittedly changed and modified to meet the new conditions, were the controlling characteristics of the structures of this period. It was not until very recently that the logic of the problem of the tall building was fully grasped and it was realized that the fitting precedent to be followed in a problem in the vertical was to be found in the historical verti¬ cal style only. The West Street Building is an exemplification of the Gothic influence which has crystallized in its highest creative state in the Woolworth Building. In passing it is in¬ teresting to speculate on the course of this development if the tall building had made its appearance in the days of Upjohn and Renwick. In spite of the great advances that have been made in the development of a creative and scientific architecture, no style has been pro¬ duced that can as yet be recognized as new or distinctively American. From

these advances it may be that we are processing to the long- looked for American style if such be a possi¬ bility within the limits of a national dominion whose climate ranges from the heat of the tropics to the almost arctic conditions of the north temperate zone. Notwithstanding the eclecticism and unprejudiced point of view when the average American comes to judge artistic achievements, no style has been evolved in the United States that is either new or national. Commercial requirements, the demand for speed in design and construction, and the experi¬ mental conditionings that restrict the modern designer have discouraged the evolution of a typical national style. In works of a public and commercial character, the necessity for a co-operative understanding ' between the archi¬ tect and the engineer is increasingly felt. It is only when a unified resultant combining the efforts of the architect and the engineer has been achieved — a resultant in which plan and detail shall adequately and truly function with the discoveries of modern science, that a new American style will appear.

Lewis F. Pilcher, State Architect , New York State.

UNITED STATES BOARD OF MEDI¬ ATION AND CONCILIATION. See Board of Mediation and Conciliation, United States.

UNITED STATES OF BRAZIL. See

Brazil.

UNITED STATES BUREAU OF MINES, a national bureau, whose purpose is the improvement of health conditions and the increase of safety, efficiency and economic de¬ velopment in the mining, quarrying, metallurgic and miscellaneous mineral industries of this country.

UNITED STATES CHRISTIAN COM¬ MISSION, a unique and almost unparalleled as¬ sociation in its origin and operation, which came into existence during the Civil War, for the pur¬ pose of promoting the spiritual welfare of the Federal soldiers, sailors, marines, etc., while al¬ leviating, comforting and humanizing their tem¬ poral needs. It originated at a convention of

the Young Men's Christian Associations of the Northern States, called for the purpose 16 Nov. 1861, in the city of New York, and while the war lasted was in full operation. Its activities became familiar to nearly everyone throughout the entire community and the civilized world, and it received liberal and generous support in

voluntary services, money, supplies and litera¬ ture. The commission met at Washington, D. C, and organized by appointing George H. Stuart as chairman; Hon. B. F. Manierre, treas¬ urer. The commission was located at first in New York, but after the first year in Philadel¬ phia. While the central office of the commis¬ sion was in Philadelphia important auxiliary branches were organized in all the large cities and towns, whose officials and members were especially active in promoting this great mission of mercy. As the operations of the committee involved large expenditures it was necessary to make proper provision to meet them. From the commencement the finances were carefully man¬ aged. The committee resolved to incur no re¬ sponsibilities which could not be promptly met, and to this rule they steadily adhered. The policy inspired public confidence and contribu¬ ted not a little to the prosperity and efficiency of the commission. The usual mode of awaken¬ ing and continuing an interest in its behalf was by spreading information before the people through the religious and secular press, by pub¬ lic meetings, by special appeals and by enlisting the clergy to bring the subject before their con¬ gregations. This latter method was productive of large results. Lotteries, raffles and other doubtful means of raising funds, then much in vogue, sensational or clap-trap appeals, were studiously avoided. To select, commission and send forth persons to act as delegates was a most important and delicate duty. These per¬ sons represented, on the one hand, the commis¬ sion and the Christian and patriotic sentiment of the people; and on the other, had to accom¬ modate themselves to the rules of the military and naval service, commend themselves and their work to the officers in charge and minis¬ ter acceptably to the physical, mental and reli¬ gious wants of the men. To the appeal of the commission for helpers there was a whole¬ hearted response, and the difficulty arose to make a proper selection from among those who offered their services; 4,859 delegates were commissioned during the war. From its origin to its close the commission had the warm ap¬ proval of the general government and received every possible facility for carrying out its op¬ erations; transportation and telegraph compa¬ nies assisted and the American Bible and Tract societies donated for distribution thousands of their publications. The cash receipts of the com¬ mission during the four years of the war amounted to $2,524,512; the value of the stores donated was $2,839,445 ; the value of the publi¬ cations donated was $300,000. Chapels for re¬ ligious worship and temporary libraries were established in the camps; 136,152 sermons were preached and prayer meetings held, and, among other work, the delegates wrote 92,321 letters and gave the dead Christian burial, also suitably

marking the graves of the known dead. Con¬ sult ˆUnited States Christian Commission — Facts, Principles, and Progress) (1863); Me¬ morial Record of the New York Branch of the

United States Christian Commission (1866) ; Moss, 'Annals of the United States Christian Commission (Philadelphia 1868).

UNITED STATES OF COLOMBIA.

See Colombia.

UNITED STATES COMMERCE COURT, a judicial body created by an act of Congress, passed 18 June 1910. The court had jurisdiction, formerly possessed by the United States Circuit Courts, over (1) all cases for the enforcement and collection of forfeitures or penalties and for the infliction of any criminal punishment, other than the payment of money, ordered by the Interstate Commerce Commis¬ sion; (2) cases brought to annul, suspend or set aside, in whole or in part, any order issued by the Interstate Commerce Commission; (3) any case that was authorized to be maintained in United States Circuit Courts under section 3 of the act entitled, ((An Act to further regulate commerce with foreign nations and among the States,® approved 19 Fob. 1903; (4) all man¬ damus proceedings brought under the provi¬ sions of section 20 or 23 of the act entitled <(An Act to regulate commerce,® passed 4 Feb. 1887, such proceedings previously having been maintained in the United States Circuit Court. In all such cases the jurisdiction of the United States Commerce Court was exclusive. It was a court of record composed of a presiding judge and five associate judges, all of whom are appointed by the President of the United States for terms that extend from one to five years. The United States Commerce Court sat permanently in Washington, D. C., although the law permitted it to hold its sessions in any part of the United States that circumstances might make necessary. To invoke its jurisdiction a written petition had to be filed, in which the petitioner's cause of action or ground for re¬ lease was set forth. The only appeals from its decisions were to the Supreme Court of the United States The judges of this court were appointed by President Taft in December 1910. It organized 8 Feb. 1911 and was opened for business on the 15th. The court developed a reactionary policy. One of its judges was im¬ peached and removed in 1913 and the abolition of the court was demanded by Democrats and Progressives. Taft was responsible for keep¬ ing

the court in being in 1913, but it was finally abolished on 31 Dec. 1913.

UNITED STATES COPYRIGHT LAW.

See Copyright.

UNITED STATES COURTS. See

Court.

UNITED STATES CUSTOMS COURT,

a judicial body which has final jurisdiction over disputed questions concerning the customs. The act under which the Customs Court was cre¬ ated was the Tariff Act of 1909, and the appoint¬ ments of the five judges constituting this body were made by President Taft in 1910. It re¬ moved a class of cases from the Federal Cir¬ cuit Courts. It was hoped in this way to expe¬ dite customs cases and relieve commerce from unnecessary and expensive delays.

UNITED STATES DAUGHTERS OF 1812, National Society of, an organization founded for the purpose of memorializing his¬ torical events from the close of the war of the American Revolution to the formation of the

United States (as such) and till the close of the second war with Great Britain in 1815, to collect all historical, genealogical and biograph¬ ical data, to search for and bring to light any valuable documents pertaining to that period and to carefully classify and preserve the same.

This present society is the outcome of the <(General Society United States Daughters 1812,® founded by Flora Adams Darling in 1892, on the anniversary of the battle of New Or¬ leans, 8 Tanuary. Its work begins where that of the Revolutionary commemorative societies leaves off, namely, when the treaty of peace was ratified by the Congress in session on 14 Jan. 1784. The qualifications for membership are : Any woman over 18 years of age, of good character and a lineal descendant of an ances¬ tor who rendered civil, military or naval serv¬ ice during the War of 1812, or the period of the causes which led to that war (subsequent to the War of the Revolution), 14 Jan. 1784 to 2 Nov. 1815, may be eligible to membership, provided the applicant be acceptable to the society. The society was incorporated under Federal laws in 1901. There are about 1,000 members.

While the United States Marines are the oldest branch (see Marines, United States) of our fighting forces, the United States Flying Corps is our youngest arm. Although the Wright brothers had made successful long distance flights as early as 1905, and France, England and Germany quickly saw the merits of a prac¬ tical flying machine from the military point of view, the United States was reluctant to expend much time or money on the exploitation of such a new offensive and defensive weapon. And, when war was declared by the United States against Germany, 6 April 1917, in spite of the fact that for over two years the most ter¬ rific battles the world ever witnessed were be¬ ing fought in Europe, and the use of airplanes found a prominent part in the murderous activ¬ ities, this country's military equipment was without any branch of aviation or practical machines. Even the training powers stood handicapped with but ((300 training planes, all of inferior types,® the government tells us. But ((deliveries of improved models were be¬ gun® in June 1917, and by 11 Nov. 1918 (date of armistice) ((over 5,800 had been produced, in¬ cluding 1,600 of a type which was temporarily abandoned on account of unsatisfactory engines.®

Organization. — The production and opera¬ tion of military aircraft, when the war started, was under <(the Aviation Section of the Signal Corps,® created on 18 July 1914. In May 1917 an ((Aircraft Production Board was appointed by the Council of National Defense,® and in the following October, Congress passed an act creating the ((Aircraft Board® in an advisory capacity to the signal corps and the navy. The aviation section of the signal corps was split into two distinct departments in April 1918, with John D. Ryan as head of aircraft produc¬ tion and Brig.-Gen. W. L. Kenly as head of military aeronautics. The Overman bill (which authorized the President to reform and control in matters of aviation) was passed 20 May 1918, and entirely separate bureaus were formed for the production of aircraft and for military

aeronautics, both divorced from the Signal Corps. In August the arrangement was again altered so that the air service came under the control of John D. Ryan as Second Assistant Secretary of War, thus bringing the adminis¬ tration of aviation personnel and equipment un¬ der a single head. This matter of fighting, or even

reconnoitering, in the atmospheric medium was, therefore, in the nature of an experiment in the United States.

Training of Personnel. — At the outbreak of war there were in the United States two fields in which to teach military aviation — San Diego and Mineola. In another six weeks three others were adopted, <(cleared, equipped and made ready for flying,® and before the year was passed there were more than a score of avia¬ tion fields distributed over all sections of the country in active operation. They have been named in honor of flyers who have been killed in accidents. Thus we have Call Field, Wichita Falls, Tex., named after First Lieutenant L. H. Call, who was killed in an aviation accident, 8 July 1913, at Texas City, Tex.; Chandler Field, Essington, Pa., named after Second Lieu¬ tenant Rex Chandler, who was drowned (1913) under his hydro-airplane in San Diego Bay; Ellington Field, Houston, Tex., named after Second Lieutenant E. L. Ellington, who was killed (1913) in an airplane accident at San Diego, Cal. ; Gerstner Field, Lake Charles, La., named after Second Lieutenant F. J. Gerstner, who was drowned (1914) at San Diego; Hazel- hurst Field, Mineola, L. I., named in honor of Second Lieutenant L. W. Hazelhurst, who was killed (1912) by the fall of his airplane at College Park, Md. ; Kelly Field, San Antonio, Tex., named in honor of Second Lieutenant G. E. M. Kelly, who was killed (1911) by an airplane accident at San Antonio, Tex.; Love Field, Dallas, Tex., named after First Lieu¬ tenant Moss L. Love, who was killed in an airplane accident (1913) at San Diego; Park Field, Memphis, Tenn., named in honor of First Lieutenant Joseph D. Park, who was killed (1912) in an airplane accident near San Diego; Post Field, Fort Sill, Okla., named in honor of Second Lieutenant Henry B. Post, who was killed (1914) at San Diego in at¬ tempting to make an altitude record ; Rich Field, Waco, Tex., named in honor of Lieuten¬ ant Perry C. Rich, who was killed (1913) by falling into Manila Bay; Rockwell Field, San Diego, Cal., named in honor of Second Lieu¬ tenant Lewis G. Rockwell, who was killed (1912) at College Park, Md. ; Self ridge Field, Mount Clemens, Mich., named in honor of First Lieutenant Thomas Selfridge, who was killed (1908) while flying at Fort Meyer, Va., as a passenger with Orville Wright, the airplane in¬ ventor; Camp Taliaferro, Fort Worth, Tex., named in honor of First Lieutenant Walter R. Taliaferro, who was killed (1915) at San Diego; Scott Field, Belleville, Ill., named in honor of Corporal Scott, who was killed (1912) at Col¬ lege Park, Md., while flying as a passenger. This speedy construction of training fields out¬ stripped the equipment output needed for train¬ ing, which did not catch up to requirements till the end of 1917, by which time great

improve¬ ments had been made in training types. (For airplane technique see Aeroplane). About 17,000 cadets were graduated from ground schools;

8,602 reserve military aviators were graduated from elementary training schools and 4,028 aviators completed the advanced training course. Lacking the machines for specialized advanced practical training the finished course for stu¬ dents was accomplished by sending them to France to finish the course before going into action. The insufficiency of mechanics skilled in the knowledge of airplanes and motors neces¬ sitated the establishment of training schools which produced over 14,000 graduated me¬ chanics. The consequence of the intense work of the organization was that when hostilities ceased (11 Nov. 1918) there were 6,528 men training as aviators in the United States con¬ sisting of 22 per cent students in ground schools, 37 per cent in elementary schools and 41 per cent in advanced training schools. Avia¬ tor mechanics in training numbered 2,154. The number of fliers, including pilots and observers, who were trained abroad, the government in¬ forms its, up to 6 Nov. 1918 was approximately 2,300. On 11 Nov. there was the extraordinary total strength in the air service of slightly over 190,000 officers and men, a body of men greater than the United States army at the beginning of the year. These figures constitute slightly over 5 per cent of the total strength of the army, a growth from 65 officers and 1,120 men on America's entrance into the war.

Activities in Europe. — The actual fighting value of all this mighty effort to produce, in unprecedented time, a flying corps that should be worthy the proud war annals of the American military forces in former campaigns, is shown by a short relation of facts given forth from the government's documents. Early in 1918 the first squadrons composed of American per¬ sonnel appeared at the front. In the absence of any equipment of American production the French provided the airplanes from what stores they could spare. As fast as equipment was increased fresh aviators took to the field. The first airplanes received from the United States arrived in May. In all the American Expedi¬ tionary Force received by the date of the armistice 1,379 planes. The first squadron equipped with American planes reached the front in the latter part of July. The first American squadron completely equipped by American production, including airplanes, crossed the German lines on 7 Aug. 1918. On 11 June 1918 American aviators executed their first bombing raid dropping numerous bombs at Dommary-Baroncourt ; all airplanes return¬ ing in safety. By 30 Sept, there were 32 squadrons at the front; of these 15 were pur¬ suit, 13 observation and four bombing. The final

training 'of the aviators in France neces¬ sitated establishing eight different schools un¬ der American control, sufficient for 3,800 officers and 11,700 men. These were located as follows for the different kinds of aviation service re¬ quired on the <(firing line® : Tours for observers, 916 officers, 2,121 soldiers; Meucon for ((artillery firing point,® 20 officers, 110 soldiers; Issoudun for general flying, 2,175 officers, 6,100 soldiers; Clermont-Ferrand for bombardment, 120 offi¬ cers, 1,500 soldiers; Saint Jean-de-Monte for aerial gunners, 92 officers, 1,500 soldiers; Souge for artillery firing point, 259 officers, 750 sol¬ diers ; Coetpuidan for artillery firing point, 25 officers, 120 soldiers; Chatillon-sur-Seine for

observers, 204 officers, 373 soldiers. The flying personnel under instruction at date of the armistice (11 Nov.) included 1,323 pilots as¬ signed as follows : Preliminary, 126; advanced, 20; pursuit, 850; observation, 140; day bombing, 77; night bombing, 101. Observers in training included 563 artillery; 65 day bombing; 61 night bombing, being a total of 689 officers, thus pro¬ ducing an aggregate of 2,012 in training. Awaiting instruction was a personnel of 155 pilots and 59 observers. Up to 11 Nov. 1918 graduations included 6,069 pilots divided as iollovvs: Preliminary, 1,573; advanced, 2,359; pursuit, 1,160; observation, 723; day 'bombing, 77; night bombing, 101. Observers totaled 2.045, divided as follows: Pursuit, 88; artillery, 1,425; day bombing, 390; night bombing, 142.

J his intensive training to gain an efficiency that should make the flier in air ready for and able to contend against all peculiar dangers and necessities he would encounter in midair was in itself so dangerous and full of risk as to have cost the lives of no less than 159 students of the aft through accidents. The number of planes, by type, received by the American Ex¬ peditionary Force from all sources between 12 Sept. 1917 and 16 Nov. 1918 was as follows: Pursuit, for service, 3,357; for schools, 90; observation, for service, 3,421 ; for schools, 664; day bombing, for service, 421 ; for schools, 90 ; night reconnaissance, 31. General Pershing on 20 Nov. 1918, stated that a total of 4,045 pursuit, observation and bombing airplanes were in use at the front. Of this number, 2,675 were ob¬ tained from France, the others from the United States. The entire air service (including ballooning) in the zone of advance consisted ot

2,161 officers, 22,351 soldiers, a total of 24,512 on the actual fighting line; this does not include service of supply. In their details were eight American flying officers with the French armies, 49 officers and 525 soldiers with the British Expeditionary forces; all exclusive of mechanics. All these aerial forces were ap¬ portioned to the following divisions in opera¬ tion : American aero pursuit squadrons, 20; army observation, 5; corps observation, 12; day bombardment, 6 ; night bombardment, 1 ; night observation, 1.

Fighting and Casualties. — The exploits of American flying combatants in the World War were first brought before the public view by the quickly celebrated Lafayette Escadrille, composed of a body of young American avia¬ tors who, in memory of Lafayette's services to ihe United States during our War for Inde¬ pendence, volunteered active service in France.

It is stated that they had already "brought down' 30 enemy aircraft before America de¬ clared war, when they were the first to raise the Stars and Stripes on the western fighting line. They were incorporated with the Ameri¬ can Expeditionary Force under the title La¬ fayette Squadron. This brave group of fight¬ ing bird-men was cited by Marshal Petain thus : "Brilliant unit which has shown itself, during the course of operations in Flanders, worthy of its glorious past. In spite of losses which took away a third of its effectives, in a difficult sector, it has assured a perfect security to our corps observation airplanes, a complete service of reconnaissance at both high and low altitude, and the destruction, not only near the front*

lines but deep in the enemy's territory, of a great number of German airplanes and captive balloons.® The early make-up of this little band of intrepid fliers contained William Thaw, Norman Prince, Kiffen Rockwell, Elliott Cow- din, Bert Hall and Victor Chapman. The grave of the latter was discovered in April 1919 where he fell "flying inside the German lines during Crown Prince's Verdun offensive in the Spring of 1916.® Another phase of Allies co-operating with our flying corps is given in a government report : "During the last weeks of the Allied offensive, . . . squadrons of de Haviland 9's from both British and American air forces, were bombing military objectives in the German towns back of the Hun lines every day and night. Despite the opposition put up by the German air ˆsquadrons and anti-aircraft bat¬ teries, this was particularly true in the neigh¬ borhood of Saarbrucken,

Kaiserslautern, Treves and Mannheim. Here the British and American planes often had to fight their way 100 miles to their objective through squadron after squadron of fighting Hun machines, and then, after drop¬ ping their bombs, have to fight their way back the whole 100 miles to their own lines.® The casualty list at the front, although somewhat higher than that of the artillery and infantry rate, is considered a small one compared with the total strength. Up to 24 Oct. 1918 fatal accidents and battle losses amounted to 244 on the European fields. Statistics show, how¬ ever, that two aviators lost their lives, on an average, in accidents for each aviator killed in battle. Quentin Roosevelt, 65th Aero Squadron, fell fighting 14 July 1918. A table of casualties "on the front® gives the following figures : One hundred and seventy-one killed in combat; 135 taken prisoners; 129 wounded; 73 missing; 42 killed in accidents; other causes 4; a total of 554. The rapidity with which the casualty list grew with the advance in the fighting is contained in the following figures: March 1918, two; April, none; May, 27; June, 29; July, 65; August, 82; September, 181; October, 125; November 1st to 11th, 43. Some idea of the gigantic scale and complexity of tactics into which the activities of the aviation arm were developing can be seen from such a description as that at Messines Ridge. In this wonderful encounter we have the following battle formation : A squadron of fighting planes near the earth armed with guns for attacking troops in the trenches, transports, etc.; above, at a height of from 3,000 to 5,000 feet was a division of bombing machines to attack the enemy lines, and, at an elevation of 15,000 to 20,000 feet, were chasing machines for attacking enemy bombers which might attempt to drop bombs from above on the Allied bombers. Many pages of the War De¬ partment's Air Service Weekly News Letter are filled with a great number of very daring successful exploits of the individual flyers "cited for distinguished service® such as First Lieut. Frank Baer's (103 Aero Pursuit Squadron), who "brought down enemy planes on April 5, 12 and 23, 1918. On 21 May 1918, his record reached an eighth enemy plane.® George R. Phillips, pilot, 50 Aero Squadron, at La Morthomme, 23 Oct. 1918, "attacked an enemy balloon and forced it to descend and was in turn attacked by three enemy planes.

The incendiary bullets from the enemy's machines set the signal rockets in the observer's cockpit afire. Disregarding the possibility of going down in flames, Lieutenant Phillips maneuvered his plane so

that his observer was able to fire on and destroy one enemy plane and drive the others away. He then handed his fire extinguisher to Lieut. L. Brown (observer), who extinguished the flames. They completed their mission and secured other valuable information.® Second Lieut. L. Glen A. Preston, field artillery observer, 99th Aero Observation Squadron, cited for heroism in action near Andevanne. Separated, on a photo¬ graphing expedition, from his protecting planes and continuing alone, he was attacked by seven Fokkers; he drove them off and secured numer¬ ous photographs. Next day he»accomplished his mission though disputed by encounters with four separate enemy formations, one of 58 machines, another of 6, another of 7, then a formation of biplanes. He shot down one of the enemy. C'apt. Edward V. Rickenbacker, 94th Aero Squadron, is credited with destroy¬ ing 26 enemy machines. Those aviators who bring down five or more are unofficially termed ((Aces® ; Rickenbacker is justly given the title of ((Ace of Aces.® He gained his Distinguished Service Cross in October 1918. One extra bar was for voluntary patrol heroism near Billy when he attacked seven enemy planes (five, type Fokker, protecting two, type Halberstadt). He dived on them and shot down one of the Fokkers, then attacked a Halberstadt and sent it down. But the most astonishing meteoric career in the history of the Flying Corps was that of Second Lieut. Frank Luke, 27th Aero Squadron. In 17 days he shot down 18 enemy machines, then met a tragic death. Alone he attacked three <(Drachen® observation balloons, was cut off by 10 enemy planes, engaged them all, got two of them, then escaped by pretend¬ ing he was disabled. His counterfeit c

Clement W. Coumbe, Editorial Staff of The Americana.

UNITED STATES INDIAN TRAIN¬ ING AND INDUSTRIAL SCHOOL, at

Carlisle, Pa. It was established on the present site in 1879 . but its real beginning was in 1875, when 74 Indians were brought as prisoners of war to Fort Marion, Saint Augustine, Fla. When put to work at the fort they proved intelligent and trustwortny, and their skiff as workmen aroused the interest of some of the women of Saint Augustine, who established a school for them and taught them English. In 1878. when their term of confine¬ ment was over, 22 asked to stay in the East to attend school, 17 of whom were placed at Hampton Institute; Capt. R. H. Pratt of the United States army was then authorized to bring 50 more Indians from the Dakota reserva¬ tion to Hampton. He soon found that a separate school for the Indians was desirable, and the abandoned army post at Carlisle was

assigned for the uses of a school in 1879. In October of that year he brought the first Indian pupils to Carlisle. The aim of the school has always been to prepare the Indians to take part in the life of a civilized community as citizens on an equality with other citizens, and thus to free them from especial and separate supervision. The courses offered are of elementary and secondary grade, and are grouped about four central subjects, the Eng¬ lish language, history and literature, science, and form and number (including geometry and algebra). There are also excellent music and art departments. A normal department was organized in 1894 and provides instruction in psychology (elementary), pedagogics, history of education, and methods of teachings sloyd, with practice work. The industrial work is a prominent feature, half the school day being devoted to some productive industry. Instruc¬ tion and practice is given in carpentry, black- smithing, painting, harness-making, tinsmithing, shoe-making, laundry work, hospital and nurse work, sewing, household and domestic economy (including special course in bread-making), farming and dairying. Another important part of the work is the systematic physical training, gymnastic classes being arranged for boys and girls in all grades; athletic sports are also en¬ couraged, and the football team has a national reputation for excellent playing. The most dis¬ tinctive feature of the school is the ((outing sys¬ tem,® by which the school requires all its stu¬ dents to spend at least one year in some white family under the supervision of the school. During the winter they attend the public school in their neighborhood, and when not in school receive regular wages for work on the farm or in the home; a portion of these wages is placed in the school bank and draws interest. This system, which has been in force since the be¬ ginning of the schools, has proved eminently successful ; the Indians have been pleasantly welcomed in the homes to which they go, and have proved themselves, as a rule, helpful and congenial members of the family. Over 800 pupils are sent out every summer, and about half that number remain out every winter. The aim of this system is to enable the Indians to gain direct, personal experience in self-support by honest work, and an insight into the respon¬ sibilities and amenities of civilized family and institutional life in its best and most attractive forms. The united earnings of the students who were working outside, in 1909, amounted to about $40,000. A weekly paper, The Red Man and Helper , is printed in the school shop by Indians. The school is under the control of the Indian Office of the United States govern¬ ment, and is supported by government appro¬ priation. The students in 1910 numbered 1,075; the total enrolment since the beginning was more than 7,000.

UNITED STATES AND MACEDO¬ NIAN, Battle of, in the War of 1812. On 8 Oct. 1812 Stephen Decatur (q.v.) sailed from Boston with his frigate United States (rated as a 44 but carrying 32 long 24's and 22 short 42's) and on 25 October was chased by the British frigate Macedonian (rated as a 38 but carrying 28 long 18's, 18 short 32's, 1 long 12 and 2 long 9's), C apt. John S. Carden. The long 24's on the broadside of the United States so out-

weighed the long 18's of the Macedonian's broadside that 10 minutes after the battle began the scene on the Macedonian was in¬ describably confused and horrible. Carden then bore down to engage in close fighting, but the carronades of the American vessel got into play and worked fearful havoc, shooting away the masts and rigging and silencing many of the guns of the British frigate. At 11 o'clock the United States passed out of range to refill cartridges and re¬ pair a few minor injuries, whereupon the Brit¬ ish crew, believing the Americans had given up the fight, set a union jack and gave three cheers. But the United States soon resumed the fight, taking a raking position across the stern of her defenseless foe, and at 11.15 com¬ pelled her to strike, just an hour and a half after the action began. The Macedonian lost 104 killed and wounded and the United States 12. Decatur sent the Macedonian to New Lon¬ don — the only British frigate ever brought as a prize into an American port — and she was later sent to New York where, after repairs, she was placed under command of Capt. Jacob Jones (q.v.) of the Wasp (q.v.). At City Island, New York, her cabin and other portions of the ship now form part of the Macedonia Inn. Con¬ sult (American State Papers, Naval Affairs (Vol. I, pp. 280-281) ; Barnes, James, (Naval Actions of the War of 1812* (pp. 59-70) ; Brady, C. T., (Vol. I, pp. 416-422) ; Roosevelt, (Naval War of 1812 } (p. 109 et seq) ; Spears, J. R., (History of Our Navy* (Vol. II, pp. 120-151) ; Waldo, S. P., (Life of Decatur) (pp. 189-196) ; Wiley and Rines,*

UNITED STATES OF MEXICO. See

Mexico.

UNITED STATES MILITARY ACAD- EMY, a national institution at West Point, N. Y., for the education of officers for the regular army, organized in 1802. Candidates for admission must be 17-22 years

old, at least five feet four inches in height at 17, five feet five inches at 18 and upward, of good moral character and free from anything that would render them unfit for military service. They must pass a severe medical examination, and an examination in reading, writing, orthog¬ raphy, arithmetic, elements of grammar, descriptive geography, and the history of the United States. The course is four years, the pay is $848.20 per annum; an oath of allegiance is required of each cadet, also a pledge to serve the United States for eight years after graduation unless sooner dis¬ charged. Admission is secured by appoint¬ ment of the President of the United States. Each congressional district may now send two cadets, two also may come from each territory, four from the District of Columbia, two from natives of Porto Rico, four from each State at large and 80 from the United States at large, 20 of whom are selected from among the honor graduates of educational in¬ stitutions having officers of the regular army- detailed as professors of military science and

tactics under existing law. The President is authorized to appoint cadets from among en¬ listed men of 19-22 years old who have served not less than one year, provided that the total number so selected shall not exceed 180 at any one time. The annual increments are, there¬ fore : States at large, 21; congressional dis¬ tricts, 92 ; Alaska, District of Columbia, Porto Rico, Hawaii (combined), 1 each year to the source longest without an appointment ; honor schools, 5; regular army, 23 in 1919; National Guard, 23 in 1919. The appointments from a congressional district are made upon the rec¬ ommendation of the representative in Congress from that district, and those from a State at large upon the recommendations of the senators of the State. In general the appointments from each territory, honor school, etc., are made upon the recommendation of the highest authority in that territory, school, etc. Candidates are nominated as many as possible one year before admission. Those nominated are admitted either by examination or by certificate that the candi¬ date is a regularly enrolled student in good standing in a university, college or technical school accredited by the United States Military Academy, provided that the entrance require¬ ments of the course he is pursuing require pro¬ ficiency in subjects amounting to not less than 14 units of the academy examinations. A mili¬ tary staff assists the superintendent. The re¬ quirements for admission were raised in 1902. Classes at the academy are divided into groups of from 7 to 12 cadets and to each group is assigned an instructor. This arrangement makes it imperative for the cadet to prepare for reci¬ tation every day in every subject of his course and in this manner the authorities have an

adequate check on his progress from day to day. At the end of the course of four years cadets of the highest standing are recommended for all the corps of the army, especially the engineers; while those of lower standing are sent to the cavalry, field artillery, infantry, etc., but never to the engineers. No vacations are granted for the first two years. A five-day furlough is granted to cadets who have main¬ tained a worthy record. During the World War graduations of the first and second classes were advanced, the latter by almost a full year.

The course of instruction, which is very thorough, requires four years, and is largely mathematical and professional. The principal subjects are mathematics, English, French, drawing, drill regulations of all arms of the service, natural and experimental philosophy, chemistry, chemical physics, mineralogy, geol¬ ogy, electricity, history, internationaL consti¬ tutional and military law, Spanish, civil and military engineering, art and science of war, ordnance and gunnery. From 15 June to about 30 August cadets live in camp, engaged only in military duties and receiving practical mili¬ tary instruction. There are 126 persons on the military and academic staffs of the academy and 927 cadets. The whole number of cadets graduated from 1802 to 1920, inclusive, has been 6,809. See Army Schools; Military Educa¬ tion.

UNITED STATES NATIONAL MU¬ SEUM, a national depository for scientific and historical collections under the administration

of the Smithsonian Institution (q.v.), located at Washington, D. C. The beginning of the mu¬ seum was Smithson's cabinet of minerals, and other collections gathered by exploring expedi¬ tions, which had been placed under the charge of the Smithsonian Institution by the act estab¬ lishing it in 1846. The name of United States National Museum was not adopted until 1876, when the Smithsonian Institution added to the collections already made the exhibits prepared to illustrate the resources and ethnology of the United States at the Centennial Exhibition, to¬ gether with a large amount of material pre¬ sented by 34 foreign nations. In 1879 Congress appropriated $250,000 for a museum building ; but this has for some time been inadequate for the proper housing of the collections, and a new building was provided for in 1903 by the appropriation of $3,500,000. The chief means of adding to the collection are by the

speci¬ mens gathered by government explorations and surveys, by exchanges, by gift, and by limited purchases provided for in the Congressional appropriation. The museum is under the gen¬ eral direction of the secretary of the Smith¬ sonian Institution, and under the special charge of an assistant secretary and curators, appointed by the secretary; and receives an annual appro¬ priation from the government. Its collections are naturally best for matters relating to North America; the material illustrating the arts and occupations of the American Indians and the fisheries of the United States is particularly valuable; and the historical collections con¬ taining personal relics of famous Americans are interesting. The museum publishes (Pro- ceedings) and «an (Annual Report, > containing scientific ˆarticles describing or illustrating the collections ; aid is also given to students in using the collections for purposes of scientific research.

UNITED STATES NAVAL ACAD¬ EMY. See Naval Academy, United States.

UNITED STATES NAVAL OBSERVA¬ TORY, The. See Naval Observatory, The United States.

UNITED STATES NAVAL RESERVE FORCE. When the United States entered the European War, it became evident that in hav¬ ing both <(National Naval Volunteers® and the United States Naval Reserve Force, the na¬ tional government was maintaining two organi¬ zations in peace to accomplish the same end of providing reserve man power for the navy in war. To continue to carry on both could pro¬ duce only a duplication of effort with a double overhead of cost and personnel for training. It was seen that individual State effort as ex¬ emplified in the militia would result in pro¬ viding a number of miniature navies and that Naval Militia, even though it could change to National Naval Volunteers, was the lesser effi¬ cient of the two methods of developing trained man power. It was, therefore, decided to work out a means of amalgamating the ˆVolunteers® with the <(Reserve Force.® To effect the amalga¬ mation it was necessary to give special con¬ sideration to the former naval militiamen. These men, at great personal sacrifice and ex¬ pense, had for years been giving their time and energy to their State organizations and, with¬ out much aid from the national government,

had done much to prepare themselves for the government service in time of war. They were entitled to some reward for their untiring de¬ votion and, in fairness, the organizations they had so laboriously built up could not be totally destroyed without a hearing.

Accordingly the highest ranking and oldest officers of the militia were called into conference to determine the ways and means of amalgamation. The conferences went off smoothly and the officers called in met the situation fairly. Seeing the national good coming therefrom, they quickly agreed to the practical obliteration of the organization they had taken so long to build and in close harmony with the department assisted in drawing up a law transferring their personnel to the United States Naval Reserve Force. The law as drawn up was recommended to Congress for passage and was enacted in the bill approved 1 July 1918. By this act the navy was believed to be in good organization so far as providing training and utilizing man power is concerned. See Naval Militia.

UNITED STATES NAVAL WAR COL¬ LEGE. See Naval Academy, United Siates.

UNITED STATES NAVY. See United

States — Navy of the.

UNITED STATES PRESIDENTIAL

CANDIDATES. Since the establishment of the government of the United States there have been several important changes in the method of electing the candidates for the offices of President and Vice-President. Prior to 1804, for example, each elector voted for two candidates for the Presidency. The one who received the largest number of votes was then declared elected, while the candidate receiving the second largest electoral vote filled the office of Vice-President. Thus as the electoral vote at the first election showed 69 ballots for George Washington and 34 for John Adams, General Washington became the first President of the new republic, while the defeated Adams was declared its Vice-President.

During the first quarter of a century of its national existence practically no ((direct® vote was cast for the election of the two chief ex¬ ecutives of the United States. Instead of se¬ lecting the electors by a (

It was not until 1804 that electors cast their vote for both a President and a Vice-President instead of for the two candidates for the Pres¬ idency, for it was during Thomas Tefferson's first term that this matter was so widely agitated that a necessary Constitutional amend¬ ment was adopted providing for the methods of election which now prevail in all parts of the country.

Although, from an official point of view, there is no such thing as a popular vote for the election of President and Vice-President the ballots cast in the various States for the sev¬ eral electors is always regarded as the ((direct®

expression of popular opinion, and as the num¬ ber of such electors are apportioned among the several States upon a basis in keeping with the growth of population it is not strange that the popular vote and the electoral vote should not always agree in their results. In 1824, for example, as in – 1888, the can¬ didate who was defeated by the electoral

college was the one who had received the larg¬ est ˆdirect® vote. So, too, in 1876, when the dispute over the electoral vote of several of the Southern States was referred to the Con¬ gressional electoral committee, the choice of Hayes defeated Tilden, a man who had received almost 300,000 more votes from the people.

Presidential Candidates of the United States, 1789-1920.

Elec •

tior

*yea**

Name of candidate

State

repre¬

sented

Party rep¬ resented

Elec¬

toral

vote

Popular

vote

State and date of birth

State and date of death

George Washington

Va.

69

Va., 22 Feb. 1732

Va., 14 Dec. 1799

John Adams

Mass.

34

Mass., 30 Oct. 1735

Mass., 4 Tulv 1826

John Jay

N. Y.

9

N. Y., 12 Dec. 1745

N. Y., 17 May 1829

Md

6

Md 1745

MH ? A n-ril 1700

S C

6

S C 1739

S C 23 Tnl v 1800

John Hancock

Mass.

4

Mass., 12 Jan. 1737

Mass., 8 Oct. 1793

George Clinton

N. Y.

3

• • • • • •

N. Y., 26 July 1739

D. C., 20 April 1812

Samuel Huntington

Donn.

2

Conn., – 1732

Conn., 5 Jan. 1796

Ga

2

Ga., 1740

Tattipq Armˆt.rnriP

CtR.

1

Pa., 3 Sept. 1795

Benjamin Lincoln

Mass.

1

Mass., 24 Jan. 1733

Mass., 9 May 1810

Edward Telfair

Ga.

1

• • • • • •

Va., – 1735

Ga., 17 Sept. 1807

1792

George Washington

Va.

Fed.

132

(Above)

(Above)

John Adams

Mass.

Fed.

77

• •••••

(Above)

(Above)

George Clinton

N. Y.

Rep.

50

.....

(Above)

(Above)

Thomas Jefferson

Va.

Rep.

4

.....

Va., 2 April 1743

Va., 4 July 1826

Aaron Burr

N. Y.

Rep.

1

.....

N. J., 6 Feb. 1756

N. Y., 14 Sept. 1836

1796

John Adams

Mass.

Fed.

71

(Above)

(Above)

Thomas Jefferson

Va.

Rep.

68

.

(Above)

(Above)

Thomas Pinckney

S. C.

Fed.

59

……

S. C., 23 Oct. 1750

S. C., 2 Nov. 1828

Aaron Burr.

N. Y.

Rep.

30

(Above)

(Above)

Samuel Adams

Mass.

Rep.

15

.....

Mass., 27 Sept. 1722

Mass., 2 Oct. 1803

Oliver Ellsworth

Conn.

Ind.

11

.....

Conn., 29 April 1745

Conn., 26 Nov. 1807

George Clinton

N. Y.

Rep.

7

(Above)

(Above)

John Jay

N. Y.

Fed.

5

(Above)

(Above)

James Iredell

N. C.

Fed.

3

N. C., 2 Nov. 1788

N. C., 13 April 1853

George Washington

Va.

Fed.

2

(Above)

(Above)

John Henry

Md.

Fed.

2

Md., – 1750

Md., 16 Dec. 1798

S. Johnson

N. C.

Fed.

2

……

- 1733

N. C., 18 Aug. 1816

C. C. Pinckney

S. C.

Fed.

1

S. C., 25 Feb. 1746

S. C., 16 Aug. 1825

1800

Thomas Jefferson

Va.

Rep.

73

(Above)

(Above)

Aaron Burr

N. Y.

Rep.

73

(Above)

(Above)

John Adams

Mass.

Fed.

65

……

(Above)

(Above)

C. C. Pinckney

S. C.

Fed.

64

(Above)

(Above)

Tohn Jay

N. Y.

Fed.

1

.

(Above)

(Above)

1804

Thomas Jefferson

Va.

Rep.

162

(Above)

(Above)

C. C. Pinckney

S. C.

Fed.

14

(Above)

(Above)

1808

James Madison

Va.

Rep.

122

Va., 27 Aug. 1751

Va., 6 Mar. 1836

C. C. Pinckney

s. c.

Fed.

47

(Above)

(Above)

George Clinton

N. Y.

Rep.

6

(Above)

(Above)

1812

James Madison

Va.

Rep.

128

(Above)

(Above)

DeWitt Clinton

N. Y.

Fed.

89

N. Y., 2 Mar. 1769

N. Y., 11 Feb. 1826

181$

James Monroe

Va.

Rep.

183

Va., 28 April 1758

N. Y., 4 July 1831

Rufus King

N. Y.

Fed.

34

Me., 24 Mar. 1755

N. Y., 29 April 1827

1820

James Monroe

Va.

Rep.

228

(Above)

(Above)

John Quincy Adams

Mass.

Rep.

1

.

Mass., 11 July 1767

D. C., 23 Feb. 1848

1824

John Quincy Adams

Mass.

Rep.

84

108

740

(Above)

(Above)

Andrew Jackson

Tenn.

Dem.

99

153

544

N. C., 15 Mar. 1767

Tenn., 8 June 1845

W. H. Crawford

Ga.

Rep.

42

47

136

Va., 12 April 1777

D. C., 29 June 1852

Henry Clay

Ky.

Rep.

37

46

618

Va., 24 Feb. 1772

Ga., 15 Sept. 1834

1828

Andrew Jackson

Tenn.

Dem.

178

647

286

(Above)

(Above)

John Quincy Adams

Mass.

Nat. Rep.

83

508

064

(Above)

(Above)

1832

Andrew Jackson

Tenn.

Dem.

219

687

502

(Above)

(Above)

Henry Clay

Ky.

Nat. Rep.

49

530

189

(Above)

(Above)

Ga

11

Va 1770

Va. 16 Aug. 1837

jonn rtoyo.

William Wirt

Md.

Anti- Mas.

7

Md., 8 Nov. 1772

D. C., 18 Feb. 1834

1836

Martin Van Buren

N. Y.

Dem.

170

762

678

N. Y„ 5 Dec. 1782

N. Y., 24 July 1862

William H. Harrison

Ohio

Whig

73

Va., 9 Feb. 1773

D. C., 4 April 1841

Hugh L. White

Tenn.

Whig

26

735

651

N. C., – 1773

Tenn., 10 April 1840

Daniel Webster

Mass.

Whig

14

.....

....

N. H.t 18 Jan. 1782

Mass., 24 Oct. 1852

W. P. Mangum

N. C.

Whig

11

. . , . . .

....

N. C., – 1792

N. C., 14 Sept. 1861

1840

William H. Harrison

Ohio

Whig

234

1,275

016

(Above)

(Above)

Martin Van Buren

N. Y.

Dem.

60

1,129

102

(Above)

(Above)

James G. Birney

N. Y.

Liberty

7

069

Ky., 4 Feb. 1792

N. J., 25 Nov. 1857

1844

James K. Polk

Tenn.

Dem.

170

1,337

243

N. C., 2 Nov. 1795

Tenn., 15 June 1849

Henry Clay

Ky.

Whig

105

1,299

062

(Above)

(Above)

James G. Birney

N. Y.

Liberty

62

300

(Above)

(Above)

1848

Zachary Taylor

La.

Whig

163

1,360

099

Va., 24 Sept. 1784

D. C., 9 July 1850

Lewis Cass

Mich.

Dem.

127

1,220

544

N. H,, 9 Oct. 1782

Mich., 17 June 1866

Martin Van Buren

N. Y.

F. S.

291

263

(Above)

(Above)

1852

Franklin Pierce

N. H.

Dem.

254

1,602

274

N. H,, 23 Nov. 1804

N. H., 8 Oct. 1869

Winfield Scott

N. J.

Whig

42

1 , 386

580

Va., 13 June 1786

N. Y., 29 May 1866

John P. Hale

N. H.

Free Dem.

155

825

N. H., 31 Mar. 1806

N. H., 19 Nov. 1873

Daniel Webster

Mass.

Whig

1

670

(Above)

(Above)

558

UNITED STATES PRESIDENTIAL CANDIDATES

Presidential Candidates of the United States, 1789-1920 — Concluded.

Elec¬

tion

year

Name of candidate

State

repre¬

sented

Party rep¬ resented

Elec¬

toral

vote

Popular

vote

State and date of birth

State and date of death

1856

James Buchanan

Pa.

Dem.

174

1,838,169

Pa.. 22 April 1791

Pa., 1 June 1868

John C. Fremont

Cal.

Rep.

114

1,341,264

Ga., 21 Jan. 1813

N. Y., 13 July 1890

Millard Fillmore

N. Y.

Amer.

8

874,534

N. Y., 7 Feb. 1800

N. Y., 8 Mar. 1874

1860

Abraham Lincoln

Ill.

Rep.

180

1,866,452

Ky.. 12 Feb. 1809

D. C., 15 April 1865

J. C. Breckinridge

Ky.

Dem.

72

847,953

Ky., 21 Jan. 1821

Ky., 17 May 1875

Stephen A. Douglas

Ill.

U. Dem.

39

1,375,157

Vt., 23 April 1813

Ill., 3 June 1861

John Bell

Tenn.

Cons. U.

12

590,631

Tenn., 15 Feb. 1797

Tenn., 10 Sept. 1869

1864

Abraham Lincoln

Ill.

Rep.

212

2,213,665

(Above)

(Above)

George B. McClellan

N. J.

Dem.

21

1,802,237

Pa., 3 Dec. 1826

N. J., 29 Oct. 1885

1868

Ulysses S. Grant

Ill.

Rep.

214

3,012,833

Ohio, 27 April 1822

N. Y., 23 July 1885

Horatio Seymour

N. Y.

Dem.

80

2,703,249

N. Y., 31 May 1810

N. Y., 12 Feb. 1886

1872

Ulysses S. Grant

Ill.

Rep.

286

3,597,132

(Above)

(Above)

Horace Greeley

N. Y.

D. & L.

2,834,125

N. H., 3 Feb. 1811

N. Y., 29 Nov. 1872

Charles O' Conor

N. Y.

Dem.

29 , 489

N. Y., 22 Jan. 1804

Mass., 12 May 1884

James Black

Pa.

Temp.

5,608

Pa., 23 Sept. 1823

Pa., 16 Dec. 1893

Thomas A. Hendricks

Ind.

Dem.

42

Ohio, 7 Sept. 1819

Ind., 25 Nov. 1885

B. Gratz Brown

Mo.

Dem.

18

Ky., 28 May 1826

Mo., 13 Dec. 1885

Charles J. Jenkins

Ga.

Dem.

2

....

S. C., 7 Jan. 1805

Ga., 13 June 1883

David Davis

Ill.

Ind.

1

Md., 9 Mar. 1815

Ill., 26 June 1886

1876

Rutherford B. Hayes

Ohio

Rep.

185

4,036,298

Ohio, 4 Oct. 1822

Ohio, 17 Jan. 1893

Samuel J. Tilden

N. Y.

Dem.

184

4,300,590

N. Y., 9 Feb. 1814

N. Y., 4 Aug. 1886

Peter Cooper

N. Y.

Greenback

81,737

N. Y,, 12 Feb. 1791

N. Y., 4 April 1883

Green Clay Smith

Ky.

Pro.

9,522

Ky., 2 July 1832

Ky., 29 June 1895

James B. Walker

Ill.

Amer.

2,636

Pa., 29 July 1805

Ill., 6 March 1887

1880

James A. Garfield

Ohio

Rep.

214

4,454,416

Ohio, 19 Nov. 1831

N. J., 19 Sept. 1881

Winfield S. Hancock

Pa.

Dem.

155

4,444,952

Pa., 14 Feb. 1824

N. Y,, 9 Feb. 1886

James B. Weaver

Iowa.

Greenback

308,578

Ohio, 12 June 1833

Neal Dow

Me.

Pro.

10,305

Me., 20 Mar. 1804

Me., 2 Oct. 1897

John W. Philips

Vt.

Amer.

707

Vt., 13 Nov. 1813

30 June 1900

1884

Grover Cleveland

N. Y.

Dem.

219

4,874,986

N. J., 18 Mar. 1837

N. J., 24 June 1908

James G. Blaine

Me.

Rep.

182

4,851,981

Pa., 31 Jan. 1830

D. C., 27 Jan. 1893

John P. St. John

Ky.

Pro.

150,369

Ind., 25 Feb. 1833

Benjamin F. Butler

Mass.

People's

175,370

N. H., 5 Nov. 1818

D. C., 11 Jan. 1893

P. D. Wigginton

Cal.

Amer.

1888

Benjamin Harrison

Ind.

Rep.

233

5,439,853

Ohio, 20 Aug. 1833

Ind., 13 Mar. 1901

Grover Cleveland

N. Y.

Dem.

168

5,540,309

(Above)

(Above)

Clinton B. Fisk

N. J.

Pro.

249,506

N. Y,, 8 Dec. 1828

N. Y., 9 July 1890

Ill

146 933

N. Y 1823

Ill., 24 Nov. 1901

James L. Curtis

N. Y.

Amer.

1,591

Conn., 19 Feb. 1816

1892

Grover Cleveland

N. Y.

Dem.

277

5,554,437

(Above)

(Above)

Benjamin Harrison

Ind.

Rep.

145

5,175,287

(Above)

(Above)

James B. Weaver

Iowa

People's

22

1,041,028

(Above)

(Above)

Cal

264 133

N. Y., 5 Aug. 1819

Cal 1900

Simon Wing

Mass.

Pro.

21,164

1896

William McKinley

Ohio

Rep.

271

7,102,272

Ohio, 29 Jan. 1843

N. Y., 14 Sept. 1901

William J. Bryan

Neb.

Dem. & Peo.

176

6,273,624

Ill., 19 Mar. 1860

John M. Palmer

Ill.

Nat. Dem.

133,148

Ky., 13 Sept. 1817

Ill., 25 Sept. 1900

Joshua Levering

Md.

Pro.

132,007

Md., 12 Sept. 1845

Charles H. Matchett

N. Y.

Soc. L.

36,274

Mass., 15 May 1843

Charles E. Bentley

Neb.

Nat.

13,969

N. Y., 30 April 1841

1900

William McKinley

Ohio

Rep.

292

7,219,101

(Above)

(Above)

William J. Bryan

Neb.

Dem. & Peo.

155

6,357,054

(Above)

(Above)

John G. Woolley

Ill.

Pro.

208,187

Ohio, 15 Feb. 1850

Eugene V. Debs

Ind.

Soc. Dem.

99,613

Ind., 5 Nov. 1855

Wharton Barker

Pa.

M. R. P.

51,585

Pa., 1 May 1846

Joseph F. Malloney

Mass.

Soc. L.

33,413

R. I., – 1863

Seth H. Ellis

Ohio

U. R.

5,698

Ohio, 3 Jan. 1830

J. F. R. Leonard

Iowa

U. C.

1 ,059

Pa., 10 Dec. 1832

1904

Theodore Roosevelt

N. Y.

Rep.

336

7,624,982

N. Y., 27 Oct. 1858

N. Y., 6 Jan. 1919

Alton B. Parker

N. Y.

Dem.

140

5,112,565

N. Y., 14 May 1852

Eugene V. Debs

Ind.

Soc.

406 , 442

(Above)

(Above)

Silas C. Swallow

Pa.

Pro.

258,838

Pa., 5 May 1839

Thomas E. Watson

Ga.

People's

120,903

Ga., 5 Sept. 1856

Charles H. Corregan

N. Y.

Soc. L.

28,943

N. Y,, 11 Dec. 1860

1908

William Howard Taft

Ohio

Rep.

231

7,678,908

Ohio, 15 Sept. 1857

William J. Bryan

Neb.

Dem.

162

6,409,104

Ill., 19 March 1860

Eugene V. Debs

Ind.

Soc.

420,793

Ind., 5 Nov. 1855

Eugene W. Chafin

Ariz.

Pro.

253,840

Wis., 1 Nov. 1852

Thomas E. Watson

Ga.

People's

29,100

Ga., 5 Sept. 1856

N Y

1 ˆ

Thomas L. Hisgen

Mass.

Ind.

82,872

Ind., 26 Nov. 1858

1912

Woodrow Wilson

N. J.

Dem.

435

6,293,019

Va., 28 Dec. 1856

William Howard Taft

Ohio

Rep.

8

3,484,956

Ohio, 15 Sept. 1857

Theodore Roosevelt

N. Y.

Prog.

88

4,119,507

N. Y., 27 Oct. 1858

N. Y.. 6 Jan. 1919

Eugene V. Debs

Ind.

Soc.

901,873

Ind., 5 Nov. 1855

Eugene W. Chafin

Ariz.

Pro.'

207,928

Wis., 1 Nov. 1852

99 959

1916

Woodrow Wilson

N. J.

Dem.

277

9,129,269

Va., 28 Dec. 1856

Charles E. Hughes

N. Y.

Rep.

254

8,547,328

N. Y., 11 April 1862

Allan L. Benson

N. Y.

Soc.

590,579

Mich., 6 Nov. 1871

J. Frank Hanly

Ind.

Pro .

221,329

Ill., 4 April 1863

1920

Warren G. Harding

Ohio

Rep.

404

16,181,289

Ohio, 2 Nov. 1865

James M. Cox

Ohio

Dem.

127

9,141,750

Ohio, 31 Mar. 1870

UNITED STATES VICE- PRESIDENTIAL CANDIDATES

559

Vice-Presidential Candidates of the United States, 1804-1920 — Continued.

Year

Name of candidate

State repre¬ sented

Party

represented

Elec¬

toral

vote

State and date of birth

State and date of death

1804

George Clinton

N. Y.

Rep.

162

N. Y., 26 July 1739

D. C., 20 April 1812

Rufus King

N. Y.

Fed.

14

Me., 24 Mar. 1755

N. Y., 29 April 1827

1808

George Clinton

N. Y.

Rep.

113

(Above)

(Above)

Rufus King

N. Y.

Fed.

47

(Above)

(Above)

John Langdon

N. H.

Fed.

9

N. H., – 1739

N. H., 18 Sept. 1819

James Madison

Va.

Rep.

3

Va., 27 Aug. 1751

Va., 6 Mar. 1836

James Monroe

Va.

Rep.

3

Va., 28 April 1758

N. Y,, 4 July 1831

1812

Elbridge Gerry

Mass.

Rep.

131

Mass., 17 July 1744

D. C., 23 Nov. 1814

Jared Ingersoll

Pa.

Fed.

86

Conn., – 1749

Pa., 31 Oct. 1822

1816

D. D. Tompkins

N. Y.

Rep.

183

N. Y., 21 June 1774

N. Y. 11 June 1825

John E. Howard

Md.

Fed.

22

Md., 4 June 1752

Md., 12 Oct. 1827

James Ross

Pa.

5

Pa., 12 |uly 1762

Pa., 27 Nov. 1847

John Marshall

Va.

4

Va., 24 Sept. 1755

Pa., 6 July 1835

Robert G. Harper

Md.

3

Va., – 1765

Md., 15 July 1825

1820

D. D. Tompkins

N. Y.

Rep.

215

(Above)

(Above)

Richard Stockton

N. J.

8

N. J., 1 Oct. 1750

N. J., 28 Feb. 1821

4

1 771

*F)a1 9 Ssnt 1 8 Af**

Robert G. Harper

Md.

i

(Above)

rv oi. j x# ucpu 1 OTU*

(Above)

Richard Rush

Pa.

i

Pa., 29 Aug. 1780

Pa., 30 July 1859

1824

John C. Calhoun

S. C.

Dem.

182

S. C., 18 Mar. 1782

D. C., 31 Mar. 1850

Nathan Sanford

N. Y.

Rep.

30

N. Y., 5 Nov. 1779

N. Y., 17 Oct. 1838

Nathaniel Macon

N. C.

Rep.

24

N. C., – 1757

N. C., 29 June 1837

Andrew Jackson

Tenn.

Dem.

13

N. C., 15 Mar. 1767

Tenn., 8 June 1845

Martin Van Buren

N. Y.

Dem.

9

N. Y., 5 Dec. 1782

N. Y., 24 July 1862

Henry Clay

Ky.

Rep.

2

Va., 12 April 1777

D. C., 29 June 1852

1828

John C. Calhoun

S. C.

Dem.

171

(Above)

(Above)

Richard Rush

Pa.

Nat. Rep.

83

(Above)

(Above)

William Smith

N. C.

Dem.

7

N. C., – 1762

Ala., 26 June 1840

1832

Martin Van Buren

N. Y.

Dem.

189

(Above)

(Above)

John Sergeant

Pa.

Nat. Rep.

49

Pa., 5 Dec. 1779

Pa., 25 Nov. 1852

Henry Lee

Mass.

Ind.

11

Mass., 4 Feb. 1782

Mass., 6 Feb. 1867

Amos Ellmaker

Pa.

Anti- Masonic

7

Pa., 2 Feb. 1787

Pa., 28 Nov. 1851

William Wilkins

Pa.

Dem.

30

Pa., 20 Dec. 1779

Pa., 23 June 1865

1836

Richard M. Johnson

Ky.

Dem.

147

ICy., 17 Oct. 1780

Ky., 19 Nov. 1850

Francis Granger

N. Y.

Whig

77

Conn., 1 Dec. 1792

N. Y., 28 Aug. 1868

John Tyler

Va.

Whig

47

Va., 29 Mar. 1790

Va., 18 Jan. 1862

William Smith

Ala.

Dem.

23

(Above)

(Above)

1840

John Tyler

Va.

Whig

234

(Above)

(Above)

Richard M. Johnson

Ky.

Dem.

48

(Above)

(Above)

L. W. Tazewell

Va.

Dem.

11

Va., 17 Dec. 1774

Va., 6 Mar. 1860

Tames K. Polk

Tenn.

Dem.

1

N. C., 2 Nov. 1795

Tenn., 15 June 1849

Thomas Earle

Pa.

Liberty

Mass., 21 April 1796

Pa., 14 July 1849

1844

George M. Dallas.

Pa.

Dem.

170

Pa., 10 July 1792

Pa., 31 Dec. 1864

T. Frelinghuysen

N. J.

Whig

105

N. J., 28 Mar. 1787

N. J., 12 April 1862

Thomas Morris

Ohio

Liberty

Va., 3 Jan. 1776

Ohio, 7 Dec. 1844

1848

Millard Fillmore

N. Y.

Whig

163

N. Y,, 7 Feb. 1800

N. Y., 8 Mar. 1874

William O. Butler

Ky.

Dem.

127

Ky., – 1791

Ky., 6 Aug. 1880

Charles F. Adams

Mass.

F. Soil

Mass., 18 Aug. 1807

Mass., 21 Nov. 1886

1852

William R. King

Ala.

Dem.

254

N. C,, — April 1786

Ala., — April 1853

William A. Graham

N. C.

Whig

42

N. C., 5 Sept. 1804

N. Y., 11 Aug. 1875

George W. Julian

Ind.

F. Dem.

Ind., 5 May 1817

Ind., 7 July 1899

1856

J. C. Breckenridge

Ky.

Dem.

174

Ky., 21 Jan., 1821

Ky., 17 May 1875

William L. Dayton

N. J.

Rep.

114

N. J., 17 Feb. 1807

France, 1 Dec. 1864

A. J. Donelson

Tenn.

Amer.

8

Tenn., 25 Aug. 1800

Tenn., 26 June 1871

1860

Hannibal Hamlin

Me.

Rep.

180

Me., 27 Aug. 1809

Me., 4 July 1891

H. V. Johnson

Ga.

Dem.

12

Ga., 18 Sept. 1812

Ga., 16 Aug. 1880

Joseph Lane

Ore.

Dem.

72

N. C., – 1801

N. C., 19 April 1881

Edward Everett

Mass.

Union

39

Mass., 11 April 1794

Mass., 15 Jan. 1865

1864

Andrew Johnson

Tenn.

Rep.

212

N. C., 29 Dec. 1808

Tenn., 31 July 1875

George H. Pendleton

Ohio

Dem.

21

Ohio, 25 July 1825

Belg'm, 24 Nov. 1889

1868

Schuyler Colfax

Ind.

Rep.

214

N. Y,, 23 Mar. 1823

Minn., 13 Jan. 1885

F. P. Blair, Jr.

Mo.

Dem.

80

Ky., 19 Feb. 1821

Mo., 9 July 1875

1872

Henry Wilson

Mass.

Rep.

286

N. H,, 16 Feb. 1812

D. C., 22 Nov. 1875

B. Gratz Brown

Mo.

D. & L.

47

Ky., 28 May 1826

Mo., 13 Dec. 1885

John Quincy Adams

Mass.

Dem.

Mass., 22 Sept. 1833

Mass., 14 Aug. 1894

John Russell

Mich.

Temp.

George W. Julian

Ind.

Liberty

5

(Above)

(Above)

A. H. Colquitt

Ga.

Dem.

5

Ga., – 1824

D. C., 26 March. 1894

John M. Palmer

Ill.

Dem.

3

Ky., 13 Sept. 1817

Ga., – 1894

T. E. Bramlette

Ky.

Dem.

3

Ky., 3 Jan. 1817

Ky., 12 Jan. 1875

W. S. Grocabeck

Ohio

Dem.

1

N. Y., 24 July 1815

Ky., 12 Jan. 1875

Willis B. Machen

Ky.

Dem.

1

Ky., 5 Aoril 1810

Ky., 29 Sept. 1893

N. P. Banks

Mass.

Liberty

1

Mass., 30 Tan. 1816

Mass., 1 Sept. 1894

1876

William A. Wheeler

N. Y.

Rep.

185

N. Y., 30 June 1819

Mass., 1 Sept. 1894

T. A. Hendricks

Ind.

Dem.

184

Ohio, 7 Sept. 1819

N. Y., 4 June 1887

Samuel F. Cary

Ohio

Greenback

Ohio, 18 Feb. 1814

Ind., 25 Nov. 1885

Gideon T. Stewart

Ohio

Pro.

.

N. Y,, 7 Aug. 1824

D. Kirkpatrick

N. Y.

Amer.

1880

Chester A. Arthur

N. Y.

Rep.

214

Vt., 5 Oct. 1830

N. Y., 18 Nov. 1886

William H. English

Ind.

Dem.

155

Ind., 27 Aug. 1822

Ind., 7 Feb. 1896

B. J. Chambers

Tex.

Greenback

H. A. Thompson

Ohio

Pro.

Pa., 23 Mar. 1837

S. C. Pomeroy

Kan.

Amer.

Mass., 3 Jan. 1816

Kan., 27 Aug. 1891

1884

T. A. Hendricks

Ind.

Dem.

219

(Above)

(Above)

John A. Logan

Ill.

Rep.

182

Ill., 9 Feb. 1826

D. C., 26 Dec. 1886

William Daniel

Md.

Pro.

Md., 24 Jan. 1826

Md., 13 Oct. 1822

A. M. West

Miss.

Greenback

560

UNITED STATES RECLAMATION SERVICE

Vice-Presidential Candidates of the United States, 1804-1920 — Continued.

Year

i

Name of candidate

State repre¬ sented

Party

represented

Elec¬

toral

vote

State and date of birth

State and date of death

1888

Levi P. Morton

N. Y.

Rep.

233

Vt., 16 May 1824

Allen G. Thurman

Ohio

Dem.

168

Va., 13 Nov. 1813

Ohio, 12 Dec. 1895

John A. Brooks

Mo.

Pro.

Pa., 17 June 1814

Pa., 26 March 1893

C. E. Cunningham

Ark.

Union L.

W. H. T. Wakefield

Kan.

United L.

James B. Greer

Tenn.

Amer.

1892

Adlai E. Stevenson

Ill.

Dem.

277

Ky., 23 Oct. 1835

Ill., 15 June 1914

Whitelaw Reid

N. Y.

Rep.

145

Ohio, 27 Oct. 1837

London, 15 Dec. 1912

Jamps (t KipIH

Va.

People's

Va 1839

James B. Cranfill

Tex.

Pro.

Charles H. Matchett

N. Y.

Soc. L.

Mass., 15 May 1843

1896

Garret A. Hobart

N. J.

Rep.

271

N. J., 3 June 1844

N. J., 21 Nov. 1899

Arthur Sewall

Me.

Dem.

149

Me., 25 Nov. 1835

Me., 5 Sept. 1900

Thomas E. Watson

Ga.

People's

27

Ga., 5 Sept. 1856

Hale Johnson

Ill.

Pro.

Ind., 21 Aug. 1847

Simon B. Buckner

Ky.

Nat. Dem.

Ky., 1 April 1823

Matthew Maguire

N. J.

Soc. L.

N. Y., – 1850

James H. Southgate

N. C.

Nat.

Va., 12 July 1859

1900

Theodore Roosevelt

N. Y.

Rep.

292

N. Y„ 27 Oct. 1858

N. Y., 6 Jan. 1919

Adlai E. Stevenson

Ill.

Dem.

155

(Above)

(Above)

Henry B. Metcalf

R. I.

Pro.

Mass., – 1829

R. I., 10 Oct. 1904

Ignatius Donnelly

Minn.

People's

Pa., 3 Nov. 1831

Minn., 2 Jan. 1901

Job Harriman

Cal.

Soc. D.

Ind., 15 Jan. 1861

Valentine Remmel

Pa.

Soc. L.

John G. Woolley

Ill.

U. C.

Ohio, 15 Feb. 1850

Samuel T. Nicholson

Pa.

U. R.

N. C., 2 Feb. 1852

1904

Charles W. Fairbanks

Ind.

Rep.

336

Ohio, 11 May 1852

Ind., 3 June 1918

Henry G. Davis

W. Va.

Dem.

140

Md., 16 Nov. 1823

D. C., 11 Mar. 1916

George W. Carroll

Tex.

Pro.

La.. 11 April 1855

Thomas H. Tibbies

People's

Ohio, 22 May 1838

Benjamin Hanford

N. Y.

Soc.

Ohio, – 1858

William W. Cox

Ill.

Soc. L.

Ill., 5 Feb. 1864

1908

James S. Sherman

N. Y.

Rep.

321

N. Y., 24 Oct. 1855

N. Y,. 30 Oct. 1912

John W. Kern

Ind.

Dem.

162

Ind., 20 Dec. 1849

Ind., 17 Aug. 1917

Benjamin Hanford

N. Y.

Soc.

Ohio, – 1856

Aaron S. Watkins

Ohio

Pro .

Ohio, 29 Nov. 1863

Samuel Williams

Ind.

Peoples

Donald, L. Munro

Va.

Soc. L.

John Temple Graves

Ga.

Ind.

S. C., 9 Nov. 1856

1912

Thomas R. Marshall

Ind.

Dem.

435

Ind., 14 Mar. 1854

Nicholas M. Butler

N. Y.

Rep.

8

N. J., 2 April 1862

*James S. Sherman **

N. Y.

Rep.

(Above)

(Above)

Hiram W. Johnson

Cal.

Prog.

88

Cal. 2 Sept. 1866

Emil Seidel

Wis.

Soc.

Pa., 13 Dec. 1864

Aaron S. Watkins

Ohio

Pro.

(Above)

(Above)

August Gillhaus

N. Y.

Soc. L.

0

1916

Thomas R. Marshall

Ind.

Dem.

277

(Above)

Charles W. Fairbanks

Ind.

Rep.

254

Ohio, 11 May 1852

Ind., 3 June 1918

George R. Kirkpatrick

N. J.

Soc.

1920

Calvin Coolidge

Mass.

Rep.

404

Vt., 4 July 1872

Franklin D. Roosevelt

N. Y.

Dem.

127

N. Y., 30 Jan. 1882

- *Died before meeting of Electoral College. Republican votes cast for Mr. Butler, substitute nominee.*

UNITED STATES RECLAMATION SERVICE, a bureau of the Department of the Interior of the United States government created by Act of Congress, 17 June 1902, for the purpose of survey, examination, construc¬ tion and operation of works for the reclama¬ tion by irrigation of arid and semi-arid lands. Funds were provided by the Act by setting aside the proceeds of the disposal of public lands which from 1902 to 1919 aggregated nearly $100,000,000. This amount with the greater part of an additional loan of $20,000,000 — or in round numbers approximately $120,000,000 have been spent up to 1919 in works for conservation and distribution of water supply in the western part of the United States. Among the most notable of these works are the Roosevelt dam

and canals in Arizona, distributing water to the valley lands in the vicinity of Phoenix; the Arrowrock dam in Idaho; the Elephant Butte dam in New Mexico; the Gunnison tunnel in Colorado and many other works. See Hy¬ draulic Engineering.

The Reclamation Service as originally created was unique among government organ¬ izations in that it had a continuing fund and

was independent of annual appropriations. It thus could make plans for carrying out its work in consecutive order through several years as is necessary in ordinary business affairs and could give full consideration to the requirements of efficiency and economy. Since 1915, however, definite appropriations for each project have been made annually by Congress.

Origin of the Service. — The necessity for this law arose from the fact that the western two-fifths of the United States consists in great part of public land. The conditions of aridity are such that only a very small portion of this land can be utilized for agriculture. Attempts made by individuals and organizations to irrigate the lands, while successful from an agricultural standpoint and from that of the development of the country, were not profitable to the investor, hence development and the use of the resources of the West were not progress¬ ing rapidly. It became appreciated about 1900 that further progress could not be expected without direct effort on the part of the Federal government, the owner of the great body of the arid public lands. The objections to mak¬ ing direct appropriations for improving these

UNITED STATES RECLAMATION SERVICE

- *» 5t>l*

lands was met by the ingenious plan proposed by the late Senator, then Representative, Francis G. Newlands, of Nevada to the effect that money derived from the disposal of portions of the land should be used in reclaim¬ ing other portions.

Organization. — The Reclamation Service was an outgrowth of the work of the United States Geological Survey. The latter bureau was authorized by Congress, in March 1888, to investigate the extent to which the arid region might be reclaimed, this action being taken largely through the effort of the then director, Maj. John Wesley Powell. The in¬ vestigations were made by what was known as the Hydrographic Branch, measurements of water supply in many

streams being begun and also surveys of possible reservoir sites. The information thus obtained and widely diffused laid the foundations for a presenta¬ tion of the needs and opportunities of water conservation and furnished the facts for

action by Congress taken in accordance with the recommendation of President Theodore Roosevelt in his first message in 1901. As organized immediately on passage of the Act 17 June 1902, the wrork was under a chief

engineer who continued in charge, under the director of Geological Survey, until

1907, when the service became a sepa¬ rate bureau and the chief engineer was

made director, reporting to the Secretary of the Interior. Because of widely separated location of the work, in 17 Western States, and their remoteness from lines of transportation, it became necessary to develop an organization where the largest possible discretion might be exercised by the men in the field, at the same time securing proper uniformity and compliance with governmental regulations. This was brought about by having five supervising en¬ gineers each in charge of work in a group of States where the climatic conditions were similar. Under these were project engineers in responsible charge of each particular piece of work and with general authority to execute these works according to plans agreed upon in advance after conference with various technical advisers or consulting engineers as well as the chief and supervising engineers. Under this system of locally placed and care¬ fully defined authority and responsibility, operations proceeded with a rapidity and skill seldom found in governmental bureaus where the tendency has been toward excessive centralization of authority and development of so-called (

Under the original organization plans were made during the years 1902-07 for works whose completion has required all of the funds which would be available from the VOL. 27 — 36

proceeds of the disposal of public lands for a decade or more — the plans being so drawn as to permit expansion to the full limit of the available water supply in each locality. The work was undertaken in such manner as to enable completed portions of each project to be utilized before all parts were finished. It was also considered wise to start work on a broad basis in a number of localities rather than con¬ centrate it in a few places because by so doing a more nearly

normal growth of each project was possible. This is in contrast to the attempts made by private investors to complete one large project and then operate it as a whole without having had the advantage of experi¬ ence acquired through the slow growth of the component parts. Most of the works thus planned from 1902-07 have been brought to a degree of completion such that a large part of the land is being utilized. The appropria¬ tions now made annually by Congress from the reclamation funds are utilized to finish these works.

Works Built. — The principal works are those for storage of flood or waste waters and for conducting the waters thus made available from the natural streams to the lands to be watered. Besides the large storage dams there have been built many diversion dams in the rivers, turning the water into large canals built in rock or earth. These divide and sub¬ divide into smaller distributaries or laterals leading to each farm. To control the water, gates are provided in the canals and at each outlet ; also flumes and occasionally pipe lines, bridges and culverts for road crossings, as well as many other structures. The following table gives a recapitulation of the more im¬ portant of these :

Table I. Brief Summary of Construction

Results.

[To 30 June 1919.1

Item

Unit

Number or quantity

CONSTRUCTIONS

Dams . .

100

12,314

27

97

500

120

307

983

83

3,141

651

100,000

7,000

9,044

1,374

Canals, ditches and drains. . . Tunnels .

Miles .

Miles .

Dikes or levees .

Miles .

Irrigation and drain pipe .... Flumes .

Miles .

Miles .

Canal lining (concrete! .

Miles .

Roads .

Miles .

Railroads .

Miles .

Telephone lines .

Miles .

Tran emission lines .

Miles .

Canal structures .

Bridges . . .

Culverts. . . , .

Riiildinvs

MATERIALS HANDLED

Excavation:

Earth .

Cubic yards.. . Cubic yards. . . Cubic yards.. .

Cubic yards. . .

Cubic yards.. . Cubic yards. . . Cubic yards. . .

154,473,487

9,913,065

8,409,772

Indurated .

Rock .

Total .

172,796,274

Volume placed in dams:

Masonry . – .

2,087,991

10,220,671

1,203,386

TˆArt/h .

Rnckfill and crib .

Total .

13,512,048

Riprap .

Cubic yards. . . Square yards. . Cubic yards. . . Barrels .

1,892,728 819,408 3,023,446 2,971 ,330

Paving .

Concrete .

Cement .

UNITED STATES SANITARY COMMISSION

5G2

Economic Problems. — The object of the expenditure which has been made from the reclamation fund is to provide water for lands which without it would be incapable of produc¬ ing valuable crops. The original intention was to take the water to lands belonging to the United States. It was found, however, that individuals taking advantage of various land laws had already obtained possession of the lands which might be irrigated to an extent such that it was impracticable to discriminate and hence lands which had formerly been in public ownership were included in the reclamation projects, the requirements being enforced that no one land- owner should be permitted to obtain water from the government works for an area larger than that adequate for the support of a family and not to exceed 160 acres.

Although the government advanced the money and built the works, it is intended that the lands benefited shall ultimately return the cost in 10, or as later amended 20, annual instal¬ ments without interest. It is also required that until this amount is paid the owner must live upon the land or in the vicinity, the inten¬ tion being to prevent as

far as possible absentee landlordism, and to give the preference to those men and their families who are actually seek¬ ing a home, as distinguished from an opportunity for investment or speculation.

The liberal terms offered and the fact that the government was undertaking the work attracted all kinds of people, including both competent and incompetent. There is no provision by which selection can be made of persons who are qualified by strength or ex¬ perience to carry on an irrigated farm. As a result a considerable number of adventurers or restless people seized upon the opportunity in the hopes of getting from the government something for nothing and of selling out later at a profit. It followed that in the settlement of these lands there has been some shifting of pop¬ ulation, although probably less than in the case of privately builtprojects. This condition seems to prevail in most new countries where no systema¬ tic or well-planned effort has been made to con¬ trol the character of settlement. Under the Rec¬ lamation Act it was not lawful to designate in advance the qualifications of the homestead entryman or the purchaser of a farm unit irrigated at government expense. The assump¬ tion of the law has been in general that each citizen should have an equal opportunity with¬ out discrimination. Experience has shown that better results might perhaps have been obtained had it been practicable to set certain conditions of physical and financial ability and experience in handling an irrigated farm. In this connec¬ tion, however, it is interesting to note from a recent investigation on several reclamation pro¬ jects, that the average number of settlers to a farm unit ranged from 1.14 where conditions were favorable to 1.68 where conditions were unfavorable, with a general average of 1.49; showing, for Federal projects at. least, that there is little basis for the statement so often made that "throughout the newer parts of America at least three settlers in succession attempt to develop a farm before one succeeds.®

Assuming that the government gets back its investment or the greater part of it, there is no question but that the risk has been justified, even though the interest and a large

part of principal is lost. The lands irrigated are situated in the more remote and sparsely settled parts of the United States and their occupation .makes possible the development of other industries and the utilization of natural resources which otherwise might be untouched. There is thus a large indirect gam not merely in material prosperity, but in building up communities of producers whose efforts con¬ tribute not merely to the wealth of the nation, but more than this to the production of more vigorous types of citizenship. For crops

in this region see Dry Farming.

Frederick H. Newell,

Professor of Civil Engineering, University of Illinois; formerly with the United States Reclamation Service.

UNITED STATES SANITARY COM¬ MISSION, The. An organization appointed by the United States government during the Civil War, and co-operating with it in promot¬ ing the health, comfort and efficiency of the armies. It also gave aid to the navy. At the outbreak of the war, the Quartermaster, Com¬ missary and Medical Departments of the regu¬ lar army were inexperienced in caring for large bodies of men, in active service, the last war (Mexican) being in 1846-48. The medical staff could not properly initiate or execute sanitary work, as by custom, hospital construction and the transportation of sick and wounded belong to the Quartermaster Department, and the regulation of diet to the Commissary. Inspec¬ tion and the means for giving aid were imper¬ fect. The wrar prevailed from 12 April 1861 to 9 April 1865. On 15 April 1861 President Lincoln called for 75,000 volunteers, believing they would be required for only a few months. But in July of the same year 800,000 more were called for, later 300,000 and in 1864 500,-000. Of this army of over 1,000,000 men (with 15,000 regulars) 350,000 died during the war, thousands were crippled by wounds and ail¬ ments. About 190,000 of the deaths were from sickness, mainly scurvy, dysentery, diarrhoea, erysipelas and general debility, the result of insufficient sleep, clothing and food, exposure, hard marches and poor drinking water. In the early part of the war, before drafting was resorted to, one-eighth of the volunteers were in their 19th year and three-fourths were under 30 years of age.

Realizing that to do the most good there must be co-operation in a definite plan, under the auspices of the government, Rev. Dr. Bel¬ lows and Dr. Elisha Harris called a public meet¬ ing at Cooper Institute. At this meeting it was decided <(to collect and disseminate infor¬ mation upon the actual and prospective wants of the army, to establish recognized relations with the medical staff and act as auxiliary to it, to maintain a central depot of stores and open a bureau ior the examination and registration of nurses.®

Drs. Van Beuren and Harsen, representing two prominent New York medical associations, suggested to General Scott that diseased men and mere boys should be discharged from the army. Comparatively few were discharged. The surgeon-general was asked to reorganize

the medical staff and if possible have its sani¬ tary powers increased. This was not done. In May 1861 the government was appealed to to

UNITED STATES STEEL CORPORATION

563

appoint a commission of civilians, medical men and army officers, to co-operate with the Medi¬ cal Bureau (or to act independently of it) in an investigation as to preventable diseases of hospitals and camps. On 9 June 1861 the gov¬ ernment appointed <(a commission of inquiry and advice in respect of the sanitary condition of the United States forces.® The commission was to serve without pay, but had a furnished room allotted it in Washington and was (

The United States Sanitary Commission or¬ ganized 12 June 1861 with Rev. Dr. Bellows as president. Relief was to be subordinate to pre¬ vention and advice, the conclusions of the com¬ mission must (

$15,000,000.

Before the war there was no general hos¬ pital, only tent hospitals, the largest containing 40 beds. In July 1861 the commission suggested well-equipped general hospitals in pavilion form, and that these should be built under the direc¬ tion of the Medical Department, which should also arrange for the transportation of the sick and wounded and attend to their diet. The relief system was divided into general and special relief, the first attending to the wants of the inmates of general, field and regimental hospitals, and of men in camp and on the march, the second cared for the sick and needy at military depots, discharged men, paroled pris¬ oners and irregulars. The various agents of the commission were paid a moderate salary, it being found best not to rely upon volunteer agents. With each army was a medical in¬ spector, relief agents, wagons and horses, trans¬ ports if necessary and a supply depot at the base.

The special relief service cared for men on their way to and from the front, in 40 (

ties to communicate with their families. The Auxiliary Relief Corps, organized in 1864, cared for the wounded and sick sent to the depot field hospitals in the rear of large armies and also for those left behind by an army in its onward march. It furnished food, stimulants, under¬ clothing and reading matter, communicated with

the soldiers' friends, obtained express packages and provided in many instances burial. Other work was accomplished by the commission. Medical tracts, on subjects relating to army life, prepared by experts, were distributed to army surgeons. A Hospital Directory (main office in Washington, branches in other cities) was established, recording entrances, transfers and dismissals. In 1863 a (

Valuable statistics, were published in pamph¬ let form, embracing the effects on soldiers of marches, the rate of recruiting required for the losses of war, measurements of soldiers, the number of sick in various regiments and the causes of sickness, etc. The success of the commission was due to the influence of popular ideas, American civilization and thorough or¬ ganization, although it had much to contend with in the way of governmental red tape and deficiencies and the bad will of State agencies.

UNITED STATES STEEL CORPORA¬ TION, The. An industrial organization formed in 1901 by the amalgamation of the Carnegie Steel Company, the Federal Steel Company, the National Tube Company, the American Steel and Wire Company, the National Steel Com¬ pany, the American Tin Plate Company, the American Sheet Steel Company, the American Steel Hoop Company, the Lake Superior Con¬ solidated Iron Mines and the American Bridge Company. These 10 merged companies had an aggregate capital of $867,550,394, of which $459,- 936,694 was common stock, $247,613,700 pre¬ ferred, and $160,000,000 bands. Elbert H. Gary, president of the Federal Company, Andrew Car¬ negie, owner of the Carnegie Company, Charles M. Schwab, a Carnegie official, and J. P. Mor¬ gan, banker, were the principal figures in ef¬ fecting the consolidation. In the new company a capital of $500,000,000 each in common and preferred stocks was authorized, together with $304,000,000 in bonds, making a total of $1,304- 000,000. The syndicate which financed the transaction, headed by the Morgan interests, ad¬ vanced $25,000,000 in cash as working capital. In less than a year from its foundation the stockholders of the old companies had ex¬ changed their holdings for stock of the new corporation.

The steel-producing equipment controlled by this gigantic corporation comprised 149 steel works of various kinds, having an annual ca¬ pacity of 9,400,000 tons of crude and about 7,700,000 tons of finished steel ; 78 blast fur¬ naces with a pig-iron capacity of 7,400,000 tons ; over 50,000 acres of coking coal lands; over 1,000 miles of railroad; a fleet of 112 vessels engaged in traffic on the

Great Lakes, and areas of ore-bearing property, docks, natural gas and limestone properties, etc. The men who guided the destinies of the new company were J. P.

Morgan, John D. Rockefeller, Elbert H. Gary, H. H. Rogers, Charles M. Schwab, Robert Bacon, Edmund C. Converse, Francis H. Pea¬ body, Percival Roberts, Jr., Charles Steele, William H. Moore, Norman B. Ream, P. A. B. Widener, James H. Reed, Henry C. Frick, Wil¬ liam Edenborn, Marshal Field, Daniel G. Reid, John D. Rockefeller, Jr., Albert Clifford, Cle¬ ment A. Griscom, William E. Dodge, Nathaniel Thayer and Abram S. Hewitt. Charles M. Schwab was chosen president of the corpora¬ tion and Elbert H. Gary became chairman of the executive committee. Charles M. Schwab resigned the presidency in 1903 and was suc¬ ceeded by William Ellis Corey. In 1910 the latter was succeeded by James A. Farrell.

In the 20 years since its foundation the United States Steel Corporation has expended over $500,000,000 out of its earnings for the building of new plants and the extension of old ones. Its plants now have a capacity of 20,000,000 tons of steel ingots and all the pig- iron it needs.

It was soon realized that a concern con¬ trolling two-thirds of the nation's total possible output must contain enormous potentialities af¬ fecting the general welfare of industry and of the country, of its competitors, customers, em¬ ployees, or through these, the general public. Generally speaking the corporation's selling methods have not been unfair to its competitors and the consumer has fared equally well at its hands. In its treatment of its employees, it is only fair to note that it has spent great sums of money in sanitation and other methods of so¬ cial betterment. It has opened a way for its employees to become stockholders. On the other hand it has encouraged workers of alien birth, unfamiliar with American customs and ideals, with the object of being unhampered by trades unionism, from which it was supposed the alien worker might be held aloof. During the war years 1914—18, however, these ˆsafe® alien workers became imbued with ultra-radical ideas and the great strike of the autumn of 1919 was the result.

In the first nine monthsi of ifs opera¬ tions the United States Steel Corporation reported net profits of $84,779,298, of which

$61,420,304 was distributed to stock¬ holders at the rate of 7 per cent on pre¬ ferred and 4 per cent on the prior issue. In 1902 the net profits were $133,308,764, full divi¬ dends were paid and the company showed a surplus balance of $34,253,657. In 1903 began the general industrial depression which lasted well into 1904. In 1905-06 the city of Gary, Ind., was founded by the corporation which erected there a plant of the most modern standard. The corporation's net profits in 1906 amounted to $156,624,273. The year 1907 is one of the most important in the history of the Steel Corpora¬ tion. During the industrial panic of that year the corporation secured control of the Tennes¬ see Coal and Iron Company, its strongest com¬ petitor in the South. The corporation soon found itself in the toils of the law, the govern¬ ment having instituted proceedings for its dis¬ solution as a monopoly in restraint of trade. The taking of testimony was not finished until the spring of 1914 and on 3 June 1915 the United States District Court of Appeals handed down a decision that the corporation was not a monopoly in restraint of trade. De¬

pression in the industrial field caused the cor¬ poration to pass dividends in the last quarter of 1913. and again in 1914. Not until March 1915 were operations again under way to 60 per cent of capacity. As the war in Europe devel¬ oped the business of supplying steel for the materiel of war grew apace. By 30 June 1915 one-third of the corporation's output was being exported to England, France and Russia. After the entry of the United States into the war the domestic demand increased far beyond the ca pacity of the country's steel mills, and under war stress, expansion on an enormous scale en¬ sued.

The total earnings of all properties after de¬ ducting all expenses incident to operations, amounted to $208,281,104.23 in 1918. From th s must be deducted the charge for interest on out¬ standing bonds, mortgages and purchase obli¬ gations, leaving $136,902,923.36. Dividends for the year were :

Preferred, 7 per cent .

fnmmnn / Regular, 5 per cent. Common ˆ Extra, 9 per cent...

$25,219,677

25,415,125

45,747,225

In the same year the corporation mined 28,332,- 939 tons of iron ore; 5,141,365 tons of lime¬ stone; 31,748,135 tons of coal; manufactured 17,757,636 tons of coke; produced 15,700,561 tons of pig iron and 240,393 tons of spiegel and ferrosilicon ; made 19,583,493 tons of steel in¬ gots and 13,849,483 tons of rolled and other finished steel products ; also 7,287,000 barrels of cement. The average number of employees in the service of the corporation during the year and the total wages paid were as follows :

No. of Total employees salaries

Employees of subsidiary companies except of railroads under Federal

control . . . 251,350 $426,299,290

Employees of railroads under Federal

control . 17,360 26,364,234

Total . 268,710 $452,663,524

The average salary or wage per employee per day of all employees, exclusive of general ad¬ ministrative and selling force, was $5.33 as com¬ pared with $4.10 in 1917. The gross earnings in 1918 reached the unprecedented sum of $1,744,312,163. (See Steel; Corporations, His¬ tory of; Trusts, etc). Consult Berglund, Abra¬ ham, (The United States Steel Corporation (Vol. XXVII, No. 2, Columbia Univ. Press Publications, New York 1907) ; .Cotter, Arundel, (The Authentic History of the United States Steel Corporation > (New York 1916), unc- tiously capitalistic in tone and replete with ful¬ some adulation of the chief heads of the Steel Trust; United States Steel Corporation — Statement of Wages J (n.d.) ; Wilhelm, Donald, (The Story of SteeP (United States Steel Cor¬ poration, Bureau of Safety, Sanitation and Wel¬ fare, New York 1917) ; Annual Reports of the United States Steel Corporation (Hoboken, N. J., annually, 1902 —).

UNITED STATES SURVEYS. See

Surveys, United States Governmental.

UNITED STATES OF VENEZUELA.

See Venezuela.

UNITED SYNOD OF THE PRESBY¬ TERIAN CHURCH. See

Presbyterianism.

UNITED SYRIANS. See Syrian

Churches. •

UNITED WORKMEN— UNITS OF MEASUREMENT

565

UNITED WORKMEN, Ancient Order

of, a beneficial organization founded in 1868. In 1910 it had 22 grand lodges, 1,970 subordi¬ nate lodges and over 110,000 members. In the same year it paid $3,325,000 in benefits.

UNITS OF MEASUREMENT. When any physical quantity is to be measured, it is necessary to select a unit in terms of which the magnitude of the quantity is to be ex¬ pressed. We may, if we choose, select an entirely arbitrary unit for each different kind of quantity to be measured; or we may select certain arbitrary fundamental units as a basis and construct upon these a consistent system of derived units. The first method is employed (for every-day purposes) in English-speaking countries, and the second in those countries which employ the metric system. In scientific measurements, the second, or ˆlogical® system is also employed, in practically all civilized coun¬ tries at the present time.

In any system of units of measurement, it is necessary to select at least three units that are entirely arbitrary. It is customary (though not at all essential) to select, as the three fundamental units, the units for measuring length, mass and time. In the English system, the fundamental unit of length is the yard. It is said that the yard was originally defined, by royal decree, as the length of the arm of King Henry I. The United States yard is de¬ fined as fffy metres ; the metre being the fun¬ damental unit of length. The British yard is the distance, at 62°F between two lines on a bronze bar kept at the Standards Office, West¬ minster, London. The relation of the British yard to the metre, as nearly as it can be deter¬ mined is

1 yard (B ritish) = 3ˆf f .Qo°rrj metres.

The foot is then defined as the third part of a yard, and the inch as the 12th part of a foot. In the British system, the unit of mass is the avoirdupois pound, which is defined as the mass of a certain cylinder of platinum in the possession of the British government, which is

marked ((P. S. 1844® ; the letters ((P. S .» signi¬ fying ˆParliamentary Standard.® In the United States the unit of mass is the pound defined as ■g'-ij kilograms, the kilogram being the fundamental unit of mass. The British pound is a mass of platinum iridium deposited in the Standards Office, London. The United States pound and the British pound are equal as nearly as can be determined. In all civilized countries the fundamental unit of time is the second ; the second being defined as the 86,400th part of a mean solar day, or the 86,400th part of the average interval between two successive passages of the sun across the meridian of any given place. In the metric system the funda¬ mental unit of length is the metre; the metre being defined as the distance, at 0° G, between two marks on a certain bar of platin-iridium in the possession of the International Bureau of Weights and Measures, at Sevres, France. The fundamental unit of mass, in the metric system, is the kilogram, which is defined as the mass of a certain piece of platin- iridium in the possession of the International Bureau of Weights and Measures. I he kilo¬ gram was intended to be (and is, very nearly), equal to the mass of a cubic decimetre of water,

at the temperature (about 4° C.) at which water has its greatest density.

Secondary Units. — The various units that are employed in measurement, in addition to the fundamental units described above, are de¬ fined, for the sake of precision, in terms of those fundamental units. The LTnited States gallon is defined as a volume of 231 cubic inches. Measures made to contain this volume are usually standard at either 4° C. or 20° C. (68° F.). That is, they are made to hold a vol¬ ume of 231 cubic inches at one of these tem¬ peratures. State standard gallon measures are of brass and are standard at 4° C. Glass ca¬ pacity measures are usually standard at 20° C. The British Imperial gallon is defined as the volume of 10 pounds of water at 62° F. when -weighed in air at 62° F. with brass weights and with the barometer at 30 inches. The volume of the British gallon is 277.274 cubic inches. Many of the secondary units that are used in English-speaking countries are as arbitrary as the gallon; but others are derived from the funda¬ mental units in a perfectly definite way. The unit of work and of energy, for example, in English and American engineering practice, is the foot-pound; the foot-pound being defined as the work that must be done in order to over¬ come, through a distance of one foot, a force equal to the attraction that the earth exerts upon a pound of matter. (See Force; Mechan¬ ics). The attractive force that the earth exerts upon a pound of matter is often called a ((pound.® This is incorrect,

however, for the pound (like the gram or the kilogram) is a unit of mass, and not of force. The <(poundal® is the logical unit of force in the system of units in common use in English-speaking coun¬ tries ; the poundal being defined as the force which, when acting for one second upon a body having a mass of one pound, will communicate to that mass a velocity of one foot per second. The poundal is not in general use, however, because in scientific work, where precision of statement and a high degree of numerical ac¬ curacy are of paramount importance, the ((cen- timeter-gram-sccond® system of units is now almost universally employed.

The Centimeter-Gram-Second System. — The centimeter-gram-second system of units is so called because it is based upon the centi¬ meter as the unit of length, the gram as the unit of mass and the second as the unit#of time. The name of the system is commonly abbre¬ viated to ˆC.G.S.® In the C.G.S. system, the unit of force is the ((dyne® ; a dyne being defined as the force which, when allowed to act for one second upon a body having a mass of one gram, will communicate to that body a velocity of one centimeter per second. The unit of wrork in the C.G.S. system is the ((erg,® this being defined as the quantity of work that is done when a force of one dyne is overcome through a distance of one centimeter. The unit of energy is also the erg, because energy is measured by the quantity of work that it can perform. The dyne is a very small unit in comparison with the forces that we commonly have to deal with in the physical world, it being only about 2 per cent greater than the attraction that the earth exerts upon a milligram of matter. To avoid the use of inconveniently large numbers in expressing forces, a unit called the (

used to some considerable extent, a "megadyne® being defined as equal to 1,000,000 dynes. This convention of prefixing ((mega-® to indicate a unit of 1,000,000 times as great as the unit whose name follows the prefix is quite common. A quantity of work equal to 1,000,000 ergs, for example, is called a ((megaerg,® or more com¬ monly a (

The most arbitrary unit in the C.G.S. system is the ((absolute atmosphere,® which is defined as the pressure of a megadyne per square cen¬ timeter. This unit, however, has the advantage of being perfectly definite. Moreover, it is not greatly different from the

ordinary pressure of the atmosphere. At sea-level in the latitude of Paris, for example, a column of mercury 76 centimeters high, and at a temperature of 0° C., exerts a pressure of 1.0136 megadynes per square centimeter; that is, a pressure of 1.0136 <(absolute atmospheres.®

All of the electrical and magnetic units that are now in common use are based upon the centimeter-gram-second system ; and they illus¬ trate, admirably, the convenience of that system.

Electrical and Magnetic Units. — A unit magnetic pole, in the C.G.S. system, is a mag¬ netic pole of such strength that it will repel an equal pole, at a distance of one centimeter, with a force of one dyne. The intensity of a mag¬ netic field, in this system, is numerically equal to the number of dynes of force that the field will exert upon a unit pole that is placed in it. The <(moment® of a magnet is the product of the distance between its poles (expressed in centimeters) by the strength of one of these poles; and the intensity of magnetization of a magnet is numerically equal to the moment of the magnet, divided by the volume of the mag¬ net in cubic centimeters.

In electrical measurements, two distinct sets of units are employed, these being known, re¬ spectively, as the <(electrostatic units® and the "electromagnetic units,® because one is com¬ monly employed in calculations concerning static electricity, while the other is employed in work that relates to dynamic (or ((current®) elec¬ tricity. Both sets are based uoon the C.G.S. system, and it is possible that in the not very distant future a single set of units will be em¬ ployed for electrical measurements of all kinds. At present, however, this is not feasible, on account of our temporary ignorance with re¬ spect to certain points which must be cleared up before the ideal single set of electrical units can be realized. Consult Lodge, (Modern Views of Electricity J ; Maxwell, (Electricity and Mag¬ netismˆ

Electrostatic Units. — -The absolute (or C.G.S.) units for the measurement of static electricity are derived .as follows: The C.G.S. unit of "quantity of electricity® is that quantity which would repel an equal quantity, situated

at a distance of one centimeter, with a force of one dyne. The C.G.S. unit of electromotive force (or difference of potential) is that dif¬ ference of potential through which a unit quan¬ tity of electricity must be raised, in order that the work done shall be one erg. The capacity of a conductor, in C.G.S. measure, is the quo¬ tient obtained by dividing the quantity of elec¬ tricity upon the conductor

by the potential which this quantity of electricity produces in the conductor. (The capacity of an isolated sphere is numerically equal to the radius of the sphere, as expressed in centimeters). The unit of current is the current which conveys a unit quantity of electricity in one second of time.

Electromagnetic Units. — The units that are employed in the measurement of dynamic (or current) electricity are derived as follows: The unit of current is the current which, when flowing along a circular arc one centimeter in length and one centimeter in radius, produces, at the centre of the arc, a magnetic field of unit intensity. The unit of "quantity of elec¬ tricity® is the quantity of electricity that a unit current conveys in one second. The unit of electromotive force (or of difference of potential) is a difference of potential of such magnitude that to cause the flow of a unit quan¬ tity of electricity against it requires the ex¬ penditure of one erg of work. The unit of re¬ sistance is the resistance through which a unit current would be produced, by one unit of elec¬ tromotive force. The unit of capacity is the capacity of a conductor whose potential is in¬ creased by unity, by the addition to the con¬ ductor of one unit of electricity. The absolute electrical units, in the electrostatic and electro¬ magnetic systems, have not (in general) received definite names ; it being sufficient, in calcu¬ lations in which these units are employed, to speak of a certain number of (

Practical Electrical Units. — The unit of

resistance that is employed almost universally in practical electrical work is the ((ohm,® which was named for G. S. Ohm, the distinguished physicist and discoverer of Ohm's law. This is defined as equal to 1,000,000,000 (or 10°) C.G.S. electromagnetic units of resistance; the ideal standard that has precisely this resistance being called, for the sake of distinct identi¬ fication, the <(true ohm.® Many physicists have investigated the value of the ohm, as here de¬ fined, and have constructed material standards for practical work, having a resistance of one ohm, as nearly as possible. A committee ap¬ pointed by the British Association for the pur¬ pose of investigating the value of the true ohm prepared a coil of German silver wire, which, at a certain definite temperature, was supposed to have a resistance of practically one ohm ; and this coil, from the time of its acceptance

by the British Association in 1864 down to the year 1884, was the standard ohm of the world, being known, for definiteness, as the ((British Association ohm,® or, more briefly, as the f(B.A. ohm.® It is now customary to define the prac¬ tical ohm in terms of the resistance of a col¬ umn of mercury of stated dimensions and tem¬ perature, as it is found that the resistance of a solid conductor depends not only upon the material of which the conductor is made, but also upon the physical state of that material with respect to internal stresses and other cir¬ cumstances. The B.A. ohm of 1864 has a resistance equal to that of a column of pure mercury having a constant cross section of one square millimeter, and a length of 104.83 centi¬ meters ; the temperature of the mercury being 0 degrees C. This standard was subsequently found to be materially smaller than the true ohm, and the International Congress of Elec¬ tricians at Paris, in 1884, adopted, as the equiv¬ alent of the ohm, a column of mercury having a constant cross section of one square milli¬ meter, and a length of 106 centimeters ; the temperature of the mercury being 0 degrees C., as before. This standard is known as the <(legal® or ((congress® ohm. Several of the physicists present at that congress were of the opinion that the length of the column should be 106.2 or 106.25 centimeters; but the decimal being admittedly uncertain, it was finally agreed to disregard it entirely, until further experi¬ mental evidence could be had. In August 1893 an International Congress of Electricians was held at Chicago; England, France, Germany, Italy, Austria, Switzerland, Sweden, Mexico, Canada and the United States being represented. This congress adopted another and (presum¬ ably) better value of the ohm, the new standard being designated as the ˆInternational ohm.® The International ohm, which has since been adopted by the nations represented at the con¬ ference, was defined as ((the resistance offered to an unvarying electrical current by a column of mercury (at the temperature of melting ice) 14.4521 grams in mass, of a constant cross- sectional area, and of the length of 106.300 cen¬ timeters.® The conference preferred, it will be seen, to fix the sectional area by giving the mass of the column, rather than by stating the sectional area directly. The intention was, however, that the sectional area shall be sen¬ sibly one millimeter; for a column of mercury 106.3 centimeters long and having a mass of 14.4521 grams, would have a sectional area, at 0 degrees C., of between 1 and 1.00003 square millimeters. The ohm thus defined by the Chi¬ cago congress is probably very near to the true ohm.

The practical unit of current is the <(ampere,® named for the French physicist, A. M. Ampere. It is defined as equal to one-tenth of

a C.G.S. electromagnetic unit of current. The Chicago International Congress of 1893, after consider¬ ing the available experimental evidence, con¬ cluded that the ampere can be defined, for prac¬ tical purposes, as equal in magnitude to the unvarying current which will deposit 0.001118 gram of metallic silver every second from a solution of nitrate of silver in water. This particular estimate of the value of the true am¬ pere is called, for definiteness, the ˆInternational ampere.® The practical unit of electromotive

force is the <(volt,® which was named for the Italian physicist, Alessandro Volta, and which is defined as equal to 100,000,000 (or 108) C.G.S. electromagnetic units of difference of potential or as the electromotive force which is required in order to maintain a current of one ampere through a resistance of one ohm.

Of the remaining practical electrical units, the coulomb, farad, joule, watt and henry call for special mention. The coulomb is the prac¬ tical unit of electrical quantity. It may be de¬ fined either as one-tenth of the C.G.S. electro¬ magnetic unit of ((quantity of electricity,® or as the quantity of electricity conveyed by an am¬ pere in one second. The farad (named for Faraday) is the practical unit of capacity, and may be defined either as the 1,000,000,000th part of a C.G.S. electromagnetic unit of capacity, or as the capacity of a condenser which holds one coulomb of electricity, when charged to a potential of one volt. The farad is much too large for convenience, and although it is called the ((practical® unit of capacity, it is replaced, in practice, by the <(microfarad,® which is equal to the millionth part of a farad. The condens¬ ers which are in ordinary use are commonly made to have capacities of a microfarad, or of some decimal subdivision of a microfarad. The (

Dimensions. — A surface is said to have ex¬ tension in two dimensions, and a solid is simi¬ larly said to have extension in three dimensions. The volume of a cube, for example, is found by multiplying together the length, width and height of the cube; and hence we may say that the volume in question is of three ((dimen-sions® in terms of L, the unit of length em¬ ployed. This mode of expression has been extended to other units besides units of length, and the idea has proved itself quite useful in numerous ways. For example, a velocity is found by dividing a length by a time ; so that if L represents a length and T a time, we may write V = LT-1; and we say that velocity is of dimension + 1 in length, and — 1 in time. Sim¬ ilarly, force is measured by the change of momentum that it produces, in a given mass, per unit of fime. That is, it is found by multi-

plying a mass (which we may represent by M) by a velocity, and dividing the product by a time. That is, F = MV/T. Blit we already know that V = LT— l, and hence the equation becomes F = MLT— 2, and we say that force is of dimensions + 1 in mass and in length, and of — 2 in time. The equations here given are called ((dimensional equations,® since in writ¬ ing them we pay no attention to the actual nu¬ merical magnitudes of the quantities involved, but only to the ˆdimensions® of those quantities. As a further illustration of the ˆdimensions® of a physical quantity, let us consider the case of work. This is defined as the product of a force by a distance, and hence we have W = FL=MLT— 2. L = ML2T— 2, and we say

that work is of dimensions + 1 in mass, + 2 in length and — 2 in time. Kinetic energy is found by taking half the product of a mass and the square of a velocity. Omitting the numer¬ ical factor y2 (since it does not affect the di¬ mensions of the energy in any way), we have E = MV2 = M(LT— x)2 = ML2T-2, so that ki¬ netic energy is of dimensions + 1 in mass, + 2 in length and — 8 in time. That is, it is of the same dimensions in all respects as work ; which is evidently correct, since work and kinetic energy are mutually convertible. As an illus¬ tration of the determination of the dimensions of a quantity when the result is far less ob¬ vious, consider the dimensions of a <(quantity of electricity,® as expressed in electrostatic units. Let Q denote a charge of electricity, as expressed in electrostatic units. Then if a similar charge were brought near to the first one, the repulsion between the two would be found by dividing the product of the two charges by the square of the distance between them. Hence the dimensions of the repulsion between the two charges would be Q2L~ 2. But this repulsion, being a force, must be of the dimensions F=MLT— 2; and hence we have Q2L~2=MLT— 2; whence Q = M9LiT— 1 That is, <(quantity of electricity,® as expressed in the electrostatic system, is of the dimensions 2 in mass, f in length and — 1 in time. For the dimensions of other electrical magnitudes, and for the interesting facts that are known con¬ cerning the ratios of the dimensions of the va¬ rious electrical units, special works on these subjects must be consulted. Maxwell pointed out that in any equation that expresses a fact in nature, the several terms that are added to¬ gether, or equated to one another, must be all of the same dimensions ; a fact of which use has been made above, in determining the di¬ mensions of <(quantity of electricity.®

As an illustration of the kind of information that can sometimes be had from dimensional equations, in constructing a formula of which we know the general but not the precise form, let us consider the case of the pendulum. Let us suppose that we know that the time of oscil¬ lation of a pendulum, through a small arc, varies as some power of the length of the pendulum, multiplied by some power of the in¬ tensity of gravity at the place where the experi¬ ment is made, and let us seek to find what the unknown exponents are. Representing the in¬ tensity of gravity by g, and the unknown ex¬ ponents by x and y, respectively, the forego¬ ing assumption with respect to the general form of the dependence of the period upon the length

of the pendulum and the intensity of gravity gives us an expression of the form gxLv, for the time of oscillation of the pendulum. Now g, being an acceleration, is of the dimensions LT— 2; so that the foregoing expression is of the dimensions (LT— 2) Lp; but this, being the expression for the time of oscillation of the pendulum, must itself be of the dimen¬ sions T. Hence we have (LT— 2)xLt/ = T, or L x + v T— 2* = T. This being an identity, we have, by equating the exponents of T, — 2.r = 1, or x — — L And since we also have x f y ~ 0, we see that .y = + Hence the time of vibra¬ tion of the pendulum varies directly as the square root of the length of the pendulum, and inversely as the square root of the intensity of gravity. See Metric System ; Weights and Measures. Consult, also, Everett, (Units and Physical Constants. >*

Allan D. Risteen.

UNITY OF CONSCIOUSNESS. See

Consciousness.

UNITY SYSTEM OF ORGANIZATION.

A recent method of systematization of large corporations is that devised by Charles Delano Hines, frequently called the Hines system of organization. It is claimed to be based on the idea that the theory of organization is one of the branches of the science of sociology. The aim and purport of this method is to lay down scientific lines on which to bring about a solu¬ tion of problems of the complex nature found in large industrial corporations in a manner that is strictly simple and direct. The system is claimed to be applicable to governmental, educational and commercial and industrial func¬ tions though its use has been brought, so far, into practice only on several railways. The in¬ ventor of the method terms it the ((Unit

Svstem® because he starts and ends on the basis of a treatment of all social or industrial entities as divided into units. The individual is a unit, the association of a number of in¬ dividuals in a body produces a higher unit and so on into any number of units of division of a corporation however large the aggregation ; and however complex the system, it is divided into its constitutent unit parts, each part held responsible for the carrying out of its duties and each person retaining his unit value and responsible in turn for his separate individual duties. All with the aim of render¬ ing the complex conditions simple in their units of practice.

Applied to railways the plan abolishes the official titles general superintendent, superin¬ tendent of motor power, chief engineer, super¬ intendent of transportation, general store¬ keeper, etc., at headquarters. The incumbents retain their individual responsibilities but serve under the titles ((assistant general managers® of the railway; divisional officials such as mas¬ ter mechanic, division engineer, train-master, etc., assume the titles ˆassistant superintend¬ ents.® The number of officials in these capaci¬ ties are regulated as before by the requirements of the different railways. The former superior official, while losing his individual grade title, to become assistant general manager number one, or assistant superintendent number one, etc. With the absence from headquarters of a senior offi¬ cer (number one, etc,) his superior officer

places the next best adapted for the position on the post to manage as superior at head¬ quarters. This changing of positions with the underlying change of responsibilities in the system is used at times to give the officers and staff a rotation of offices. And by this method it is endeavored to fit the units into the gen¬ eral working of the whole so as to permit inter¬ changeability of the parts or units without fric¬ tion or reduction of efficiency of the machine. It is claimed to give to all a wider activity and enlarged practical knowledge of the workings of the organization in its complex entirety. The purpose is to break down the lines of demarca¬ tion, red tape, etc., frequent in railway (and other organization) management, making the offices more liquid, while initiating the indi¬ viduals into a better purview of the organiza¬ tion. The individuality is maintained of the units by their retaining each his responsibility for the fulfilment of his special duties, his personal activity being made clear to all by his individual signature appearing on all papers instead of the usual initals; this

rule is carried out through all the ranks from chief to opera¬ tor and clerk.

UNIVERSAL LANGUAGE, a general term applied in modern times to any one of those artificial languages designed for facilita¬ ting intercourse 'between peoples whose national languages differ one from the other. The need of a universal language has been keenly felt from the earliest times. In the early days of commerce Phoenician was in general use along the Mediterranean littoral ; in the Classic Ages of Rome and down to the close of the Middle Ages Latin was the common means of inter¬ communication in the Occident. Contact with the East at the time of the Crusades gave rise to the so-called lingua franca. Since the Re¬ naissance and with the rapid extension of mod¬ ern commerce and trade to all quarters of the world the need of a universal tongue has been demanding the attention of educators, finan¬ ciers, diplomats and others to a greater degree than ever before. The 19th oentury saw sev¬ eral universal language systems proposed, most of which were speedily forgotten.

Those who have examined the problem are aware that the selection of a living tongue as the universal language would at once arouse international jealousies. In this regard it may be noted that, despite its clumsy spelling, Eng¬ lish is coming into such general use through¬ out the world that the question of a universal language may be settled automatically. The universal language systems, Esperanto (q.v.), etc., are based on European spoken tongues and are, it is alleged, unsuited to universal use in that they ignore the root elements of the linguistic groups of the other continents. How¬ ever, it would be manifestly impossible to build a system including elements of all groups and the artificial systems have at least the merit that they may be acquired with less effort than the simplest of modern spoken tongues.

UNIVERSALISM. Universalism is a be¬ lief in the final triumph of good over evil in the universe. As applied to the human economy, it is a belief that God is pledged by His good¬ ness and omnipotence to put an end to sin and ultimately to save the whole family of mankind. Or, as is more commonly stated in

later years, Universalism is the doctrine that the destiny of mankind is progress onward and upward forever ; that always before man is a chance to develop and that always in man is a power to unfold, always a time and a place in which to grow and always in man a power to respond to the opportunity. Universalists claim that they find this teaching in early Chris¬ tianity, that it is the essential

doctrine of Jesus and Paul and that it was advocated by notable writers of the Early Church, the most notable advocate being Origem From the time of the Protestant Reformation to the close of the 18th century there appear many eminent theologians who either directly or by implication taught the doctrine. Special emphasis is laid by some writers on the fact that of the six great schools of Christian theology in the early centuries, four very positively taught the final salvation of all souls, one taught annihilation of the wicked and only one taught endless misery.

The organization of a church and denomina¬ tion with the name Universalist had its begin¬ ning in the United States and its first advo¬ cate was the Rev. John Murray, who came to this country from England and landed on the coast of New Jersey at a place now called Good Luck, in September 1770. The story of Mr. Murray's arrival and work in America has much of romance about it, or perhaps of Providence. The substance of those early years may well be recorded here.

Mr. Murray was brought up as a strict Cal¬ vinist and from early years was connected with the Methodists, having been made a class leader by John Wesley. Later he united with Whit¬ field's Tabernacle in London. He was a devout student of the Scriptures and during this period rather peculiar circumstances made him ac¬ quainted with the Rev. James Relly, who was preaching Universalism in London. A young Methodist woman had become a convert to Mr. Relly. Mr. Murray was given the task of reclaiming her to Methodism. In the conversa¬ tion the young woman got the better of the argument and Mr. Murray was led to investigate for himself the views of Mr. Relly, with the result that finally he became a thorough con¬ vert to Universalism. In the midst of this re¬ ligious investigation, Mr. Murray's wife, to whom he had been married but a short time, died. Disturbed by religious problems and broken-hearted by his- sorrow, Mr. Murray sailed for America, against the advice of his friends, in order that he might lose himself in the New World. As the ship in which he was sailing approached New York, it was driven by a storm over a sandbar into Barnegat Bay. The ship was too heavily laden to cross the bar at the mouth of the bay and proceed on its journey, so a part of the cargo was put on board another vessel and Mr. Murray was sent on shore to obtain food to provision the small sloop. In the search for food he met a man named Thomas Potter, who had built a church nearby his house, in which he hoped to hear some time the gospel of the final salvation of all men, the doctrine which he believed. As Murray interviewed Potter, some voice told Potter, so he says, that here was the man who would preach the gospel which

Potter had longed to hear and this proved to be the fact. It was, however, only after long persuasion and after repeatedly saying that he had come to America

to escape from himself and religious work, that Murray consented to preach the next Sunday. When the service was over Potter exclaimed: <(At last has come the man and the gospel for which I have been longing.® This was the beginning of John Murray's work in America as a Universalist minister. He preached many times at Good Luck, then in New York and at length in New England and finally he estab¬ lished what is known as <(The Independent Christian Church® at Gloucester, Mass. This was the first organized Universalist church in America. Gradually, however, other preach¬ ers, from Virginia to Maine, began to preach the doctrine that God would save all men and before the end of the century there was at least one congregation in nearly all of the leading cities of the Atlantic Coast. By his travels Mr. Murray made friends for himself and his cause, and, among others, he had close association with prominent Revolutionary leaders and served the cause of the Revolution as the chaplain of the Rhode Island brigade. The early advocates of Universalism came out from the existing denominations and brought with them some¬ thing of the peculiarities which marked the churches from which they came. John Mur¬ ray was evangelical in all points save that of the final salvation of mankind. His argument was that the sacrifice of Jesus paid the debt of sin for all mankind and that in the death of Jesus all men would be saved. Sharp con¬ troversies arose very soon between men who had come from other denominations and grad¬ ually there followed new arguments for the salvation of mankind ; and of all the men who led the early church controversies the Rev. Hosea Ballou stands out with especial promi¬ nence. Other prominent early Universalist preachers were Elhanan Winchester, George Richards, Walter Ferris, Sylvanus Cobb, De Benneville, Noah Parker, B. Streeter and Caleb Rich. They were all vigorous and individual¬ istic thinkers, some agreed with one another only on the doctrine that somehow, somewhere, sometime, all souls would be saved.

In 1785 the first real organization of churches under the name Universalist was ef¬ fected in the town of Oxford, Mass. In 1790 a more extended gathering of Universalists met in Philadelphia. At this meeting were representatives from churches in Massachusetts, New

Jersey, Pennsylvania and Virginia. This convention adopted articles of faith and a form of church government. The articles were five in number and related (1) to the Holy Scrip¬ tures, (2) to the Supreme Being, (3) to the Mediatorship of Christ, (4) to the work of the Holy Ghost, (5) to the necessity of good works. In 1803 there was held in Winchester, N. H., a convention of Universalists which produced a confession of faith that was made, later on, the basis of fellowship and faith in the Uni¬ versalist denomination. This profession of faith, like the others which had preceded it, was not adopted as an obligatory statement of faith, but only as the common ground on.whjch those gathered could unite for the organization of a convention. The articles then adopted are as follows :

"Article 1. We believe that the Holy Scriptures of the Old and New Testaments contain a revelation of the character of God, and of the duty, interest and final destination of mankind.

Article 2. We believe that there is one God, whose nature is Love, revealed in one Lord Jesus Christ, by one Holy Spirit of Grace, who will finally restore the whole family of man¬ kind to holiness and happiness.

Article 3. We believe that holiness and true happiness are inseparably connected, and that believers ought to be careful to maintain order and practise good works, for these things are good and profitable unto men."

A prominent figure at this Winchester con¬ vention was the Rev. Hosea Ballou, already referred to, who was then 32 years of age. He advocated a doctrine of Universalism quite different in many points from that of John Murray. His fundamental doctrine was the universal fatherhood and infinite love of God and he argued that the death of Christ came as the effect of this eternal principle. Also he argued that sin is a voluntary transgression of the law and not an inherited condition, that the human will is free and yet that ultimately man will conform to the will of God ; that the death of Christ was not to pay a debt to God, but to draw men away from sin; that Christ was example and inspiration to lead men to the perfect life ; that man would suffer reasonable punishment for violation of all law, but in the end would work in harmony with God. This doctrine of Hosea Ballou has sometimes been called the doctrine of salvation by character. From the appearance of Hosea Ballou a large number of Universalists turned away from John Murray toward Mr. Ballou. It was at this time also that there arose a group who called themselves Restorationists. Their particular view was that through the sacrifice of Jesus all men would be restored to a state of original innoGence. Others said man would receive all punishment in this life, but the larger number affirmed that man would enter the next life with the character he had on leaving this and that the cleansing and purifying process would continue there as here, until man would con¬ form to the laws of God and that no punish¬ ment would be everlasting.

In 1870 the centennial of Universalism was observed by a great gathering in Gloucester, Mass. This brought together noted Universal¬ ists from all over the country; among the lead¬ ers were Dr. T. J. Sawyer, Dr. A. A. Miner, Dr. E. H. Chapin, Dr. R. H. Ryder, Dr. I. M. At¬ wood, Dr. S. H. McCollester, Dr. E. C. Sweet- zer, Horace Greeley, Dr. J. S. Cantwell, Dr. C. H. Leonard, Dr. John S. Lee, Pres. E. H. Capen, Dr. A. Gunnison, Dr. Henry Blanchard, Dr. J. C. Adams.

In preparation for the celebration the Mur¬ ray Centenary Fund of $100,000 was raised and a permanent organization of the Univer¬ salist General Convention was effected. In fact, the unified work of the Universalist Church really dates from this time and has tended

steadily toward a more co-operative system of operation. In the first years follow¬ ing 1870, the general secretary, Dr. G. L. Demarest, was the chief executive officer of the body. There were chosen 11 men from different sections of the denomination for a board of trustees and through committees from this board the work of the Church was car¬ ried on. There were committees on foreign missions, on education, on increase of the min¬ istry and on finance. But as the churches mul¬ tiplied and the work became more varied, other officers were added, a special departure being the addition of a general superintendent

of churches, which has finally resulted in a system of State superintendents. At this meet¬ ing in 1870 the Winchester Profession of Faith was adopted as the basis of fellowship and all who entered the ministry were required to subscribe to this statement. Almost immedi¬ ately, however, discussions arose and decided objections grew up to certain phrases and words. This controversy continued, often resulting in much hostile debate, until 1899, when there was substituted for the original creed what was known as a statement of the principles of faith, as follows :

"I. The acceptance of the essential principles ot the Uni- versalist Faith, to wit: (1) The Universal Fatherhood of God; (2) The Spiritual Authority and leadership of His Son, Jesus Christ; (3) The trustworthiness of the Bible as con¬ taining a revelation from God; (4) The certainty of just retri¬ bution for sin; (5) The final harmony of all souls with God.

The Winchester Profession is commended as containing these principles, but neither this nor any other precise form of words is required as a condition of fellowship, provided always that the principles above stated be professed.

II. The acknowledgment of the authority of the General Convention and assent to its law."

This statement gave new freedom and indi¬ vidual congregations made their own state¬ ments of belief. The Church as a whole fol¬ lowed the philosophy of Hosea Ballou rather than that of John Murray, and replaced the trinitarism of Murray with the unitarianism of Ballou. The two denominations, Unitarian and

Universalist, were offshoots from the Congre¬ gational Church of New England, the Univer- salists emphasizing the final salvation of all, and the Unitarians the humanity of Jesus and the dignity of human nature. Gradually the thinkers of the two denominations have come to essentially the same position on the funda¬ mentals of faith Also the liberal orthodox church has gradually come to the same position, so that at the present time there exist cordial relations between the Universalists, Unitarians and Congregationalists.

The Universalist General Convention is the controlling organization, having jurisdiction over the churches in the United States and Canada. It holds biennial sessions on the Wed¬ nesday preceding the fourth Sunday in October.

The Convention is composed of : first, of its officers ; second, of the president, vice-president and secretary of the several State conventions in its fellowship ; third, of the general superin¬ tendent and the several State superintendents; fourth, of all ordained clergymen in fellowship either with such a State convention or with the General convention and, unless disabled by years or sickness, actively engaged in the work of the ministry; fifth, delegates from each par¬ ish in fellowship, each such parish being entitled to one lay delegate.

To be entitled to such lay delegates and in order that its minister be eligible to be a dele¬ gate, every parish must maintain its legal ex¬ istence and support public worship regularly and make a contribution on quota to the General Convention during each of the two years prior to the meeting of said convention. All the laws relating to the fellowship, ordination and dis¬ cipline originate in the General Convention, and it is the final court of appeal in all questions in dispute or in differences between the State conventions. The convention is a body incor¬ porated under the laws of the State of New York to hold real and personal estate. In the interim of its sessions, the interests of the

Church are managed by a board of 11 trustees, who meet three times a year, and at the bi¬ ennial session. The Church has funds aggre¬ gating $600,000. There are now about 45 State conventions also with funds, with about 900 parishes, with a church membership of 53,000 ; 750 Sunday-schools with a membership of 50,000 ; 803 edifices, total valuation, $12,000,000, and 602 clergymen in fellowship.

These figures regarding the membership of the Universalist Church

are misleading and a truer statement would be that the Universalist Church has 250,000 adherents.

As part of the Church are other organiza¬ tions, more or less independent in their activi¬ ties, but at the same time recognizing the gen¬ eral authority of the General Convention. One of these organizations is the Women's National Missionary Association, composed of women working for home and foreign missions. It has several divisions of activity and supports missions in many fields, particularly in the South and in Japan. It holds large funds of its own, the income going for missionary prop¬ aganda. It has flourishing auxiliary organi¬ zations, for the study of missions and the pro¬ motion of missionary undertakings.

Another important organization is the Young People's Christian Union, a body com¬ posed of the young people. Its special work has been to develop local unions for the pur¬ pose of training young people in religious life. It has directed the starting of new churches and supported missionaries in the South and West. It publishes a weekly paper, known as the Onward. It holds annual sessions and gives much attention to the distribution of denominational literature.

Under the direction of the board of trus¬ tees there have been formed several commis¬ sions to look after the interests of the denomi¬ nation. Of importance is the commission on social service which carries on the study of social problems of the day and distributes a large amount of literatpre in the interests of church social service. There is the commission on the ministry whose work is to increase the number of students in theological schools. Also the commission on temperance which, through a superintendent, carries on a temper¬ ance campaign and distributes a large quantity of literature.

Associated with the General Convention is the Universalist Historical Society, whose ob¬ ject is the gathering up and the preservation of books, pictures and all facts relating to the history of the Universalist Church and its men.

Connected with the General Convention also is the John Murray Association in Gloucester, Mass., which maintains the house in which John Murray lived, now filled with relics re¬ lating to the life and work of John Murray

Very early in its history the Universalist Church became the patron of higher education, believing it necessary to provide for an edu¬ cated ministry. The more important of these schools are Tufts

College, Massachusetts, the University of Saint Lawrence, Canton, N. Y., Lombard College, Galesburg, Ill., three acade¬ mies: Dean at Franklin, Mass., Goddard Sem¬ inary in Barre, Vt., and Westbrook Seminary in Maine. These schools and colleges possess buildings and equipment aggregating over

$6,000,000.

The theological schools maintained are (1) the Canton Theological School, opened at Can¬ ton, Saint Lawrence County, N. Y., in 1858. Although affiliated with Saint Lawrence Uni¬ versity, the theological school is a separate in¬ stitution in its management and property. (2) Crane Theological School, affiliated with Tufts College, Medford, Mass. This was established in 1868 as Tufts Theological School but was changed to the name of Crane Theological School in 1898, in honor of an endowment from Albert Crane of Stamford, Conn. (3) In 1881 a theological department was opened in Lom¬ bard College, Galesburg, Ill., and in 1890 its name was changed to the Ryder Divinity School, in honor of the late Rev. William Henry Ryder, D.D. In 1910 the school was removed to Chicago, where it became a part of the Uni¬ versity of Chicago, though still retaining its name.

The denomination has a publishing house and a book headquarters at 359 Boylston street, Boston. Here also are the official offices of the General Convention. Other offices are lo¬ cated in Utica, N. Y., and Western headquarters at Saint Paul's-on-the-Midway, in Chicago.

The publishing house puts forth The Univer- salist Leader, The Sunday School Helper , The Myrtle, The Onward and the Universalist Reg¬ ister. It owns copyrights to 150 volumes and has net assets of over $200,000. In the South, at Atlanta, is published the Universalist Herald.

In 1919 a great drive for a million dollars was started, to be finished in 1920 when Uni- versalists will hold a series of meetings at Gloucester, Mass., in celebration of the one hundred and fiftieth anniversary of the landing of John Murray. Great enthusiasm has been stirred by this denomination-wide drive and a large increase in church members and parish funds has resulted in addition to the General Denominational Fund.

Bibliography. — Winchester, (The Univer¬ salist Restoration ; Ballou, (A Treatise on AtonemenU ; Hanson, (Ancient History of Universalism) ; Cone, (Gospel Criticism and Historical Christianity) ; Thayer, (Universalist Theology) ; Dodge, (Christus Victor } ; Skin¬ ner, (Social Implications } ; Hall, (Soul and Body ; Newton, (The Mercy of Hell* ; Shut¬ ter, (Justice and Mercy) ; Betts, (Philosophy and Faith of the Universalist Church;* Fisher, (Brief History of UniversalismP ; Selleck,*

Lee S. McCollester, Tufts College, Massachusetts.

UNIVERSALS, logical entities which may be exemplified by instances. Universals com¬ prise attributes, which may be embodied in a situation into which but one individual thing enters, and relations, which require for their exemplification a situation wherein at least two distinct things are found. Ever since Plato regarded his universals as real existing arche¬ types of the corresponding particulars, the attribute-universals have assumed an undue pre¬ ponderance over the relation-universals. The real Ideas of Plato made way for the less autonomous forms of Aristotle, which turn the potentiality of matter into actualitv. However, these were not clearly defined as to the precise

*measure of their autonomy. This uncertainty of the Aristotelian philosophy engendered the cardinal problem of the earlier epoch in scholasticism : Are universals but a mere name used to limit a group of particular things, or are they real entities existing prior to and apart from their exemplifications? The former of these positions in known as nominalism; the latter, which was that of Plato, as realism. Realism adopted as its motto ((Universalia ante rem** ; nominalism, <(Universalia post rem.** The synthesis of this dilemma is due to Abelard whose position is summarized as (*

At the present time the extreme nominalistic and realistic views both find their most vigorous discussion in psychology. Realism dominates the older faculty-psychology, which regards thought and feeling and will as active forces, instead of mere aggregates of cognitive and emotional and voluntary phenomena. Opposing this is that nominalism which traces its ancestry back to Hume through associationism. The nominalism of experimental psychology finds in the mind but a mere aggregate — not a system — of mental states, and the various mental faculties are simply names for various sub-aggregates of these states, so that the task of the observer is done when he has given an exhaustive inventory of his atomic experience. While he may grudgingly admit one or two fundamental psychical

attributes, he is partic¬ ularly unwilling to attribute to the mind any¬ thing like a relational organization. The psychologist's reluctance to recognize order, system and structure in the mind is due to the fact that orders and systems and structures are universals of the relational type, and that the experimental psychologist has no very clear idea of the existence of universals anywhere.

The opinion of the present day, on the part of those who have brought themselves to logical self-consciousness, is strongly in favor of some sort of conceptualism. A universal is plainly more than a name. This is shown by such a statement as (

name. It is clearly not the name of John and Jane separately, for it is not enough that John should be a twin — the twin of Mary — and that Jane should be a twin, the twin of Paul. The thing that is twins is the couple consisting of John and Jane. Now, a couple is clearly a universal, subsuming its two mem¬ bers as particular instances. According to the nominalistic theory, then, it is simply the name, (

Norbert Wiener,

Editorial Staff of The Americana.

UNIVERSE. In the article Stars will be found a description in detail of those wonderful bodies which stud the sky. In the present article we consider these bodies as forming a connected whole, which we call the universe, and which comprehends creation in its widest extent. Many questions connected wi^h ihe universe are not yet answered; but our ideas of its structure are surely though slowly advancing. The object of the present article is to set forth what can be said on the subject at the present time.

The first question to rise is the oldest. Is the collection of heavenly bodies — stars and nebulae — which we see with our telescopes, a bounded whole of any kind ; or do such bodies extend through infinite space, so that those we see are distinguished from the others only by their proximity to our system? The general trend of modern science is toward the former alternative. While it is quite true that no limit can be set to the possible extent of creation, the evidence is very strong that that portion of creation which can be studied by man forms a bounded whole, having certain common char¬ acteristics which run through its whole extent. It seems almost certain that there

is a limit in every direction beyond which the stars become comparatively few and scattered, if they exist at all. Indeed, if we consider the recent testi¬ mony of the delicate photographic plate, there seems no escape from this conclusion. As is well known, the chemical action upon such a plate of the rays of light from the stars is cumulative, so that the longer the exposure to a selected region of the sky the larger will the images of the brighter stars become and the

more distinct the images of the faint ones. Excessively faint stars may, in fact, not appear upon the plate at all until the exposure has been greatly prolonged, and multitudes of such ob¬ jects can in fact be photographed in this way which are far too faint to be seen in any exist¬ ing telescope. A photograph taken by Roberts of a region in Cygnus which was particularly rich in stars was duplicated by him two years later, but with an exposure four times as long. A careful examination of the two plates showed that no additional stars had been revealed upon the second one. The same result has since been obtained in several different portions of the sky, an exposure of 10 or 12 hours showing in some cases but very few more images than an exposure of one or two hours. It must be remembered that in our universe stars of all varying degrees of size and brightness are doubtless inextricably intermingled, and that a single fainter star is not necessarily more dis¬ tant than a single brighter one, though the fainter stars are as a whole unquestionably farther away. Nevertheless it seems certain that, at least in the regions above referred to, there have been secured upon the plates records of all objects large enough to exist as self- luminous suns. And if the universe is thus limited in several different directions, we must conclude that it is as a whole not of infinite extent. Another simple consideration which is often adduced as a proof of this fact is that if the stars extended outward without limit, their infinite number would fill the whole sky with a blaze of light equal to that of the noon¬ day sun. Instead of this we have a night-sky so faint that a circle of it half a degree in diameter is almost or quite invisible to the eye. But this proof is only conclusive if we suppose the space between the stars to be absolutely free from dark matter, so that light is not perceptibly absorbed during its passage to us. That this condition is not perfectly met is certain from many considerations, but that the amount of this dark material, whether it principally con¬ sists of meteoric material, cosmic dust or atoms or ions of repelled gasses, produces but little effect upon light transmitted from a finite distance is evident from a study of the be¬ havior of light of different wave lengths which comes to us from distant stars. (See Light Velocity). But the effect, small or even un¬ detectable though it may be,

prevents our draw¬ ing any certain conclusions in regard to a uni¬ verse of perfectly unlimited extent. Another idea of the subject may be based on the prin¬ ciple that in a universe of stars, extending out indefinitely, there would be nearly four times as many stars of each order of magnitude as of the order next brighter. This is true in the case of the stars visible to the naked eye. But, when counts are made of the telescopic stars, it is found that although the number of each suc¬ cessive order increases, the ratio of increase continually diminishes, thus showing that a limit must finally be reached.

Another indication bearing on the same ques¬ tion is afforded by the Milky Way. This vast girdle, which consists of agglomerations of stars, has a unity of structure throughout its whole extent which justifies us in considering it as, in a certain sense, a single object, and it is not improbable that this represents the densest portion of our own limited universe of suns.

Another conception of the universe is gained by considering the thickness with which the stars are scattered through space ; in other words, how many stars a given volume of the celestial spaces, in the general average, may contain. Measures of parallax, and studies of proper motion, lead to the conclusion that the thickness of the stars, as thus defined, is a fairly definite quantity. To measure the volume of space we require a unit. The most convenient unit for our purpose is the volume of a sphere whose centre is in the solar system, and whose surface is at a distance represented bv a parallax of half a second. This distance is, in round numbers, 400,000 times that of the sun from the earth, a space through which light would travel in about seven years. The volumes of spheres being as the cubes of their radii, it fol¬ lows that a sphere whose surface is at twice the distance of the unit sphere, or 400,000 times the distance of the sun, will have a volume repre¬ sented by the number 8, while 100 times the radius will have a volume of 1,000,000 units. Now, the indications are that the stars are strewn through space with such thickness that, in the general average, each unit of space con¬ tains one or two of these bodies. The law ac¬ cording to which the stars thin out, and in¬ vestigations into the statistics of the stars gen¬ erally, lead to the conclusion that the parallax of the most distant of these bodies is about 0”001. This distance is 500 times that which we have chosen as the radius of our unit sphere; the volume of space included within it is, by the law of cubes, 125,000,000 and, were the stars scattered

with equal thickness throughout the whole space, the number contained would be between 125,000,000 and 250,000,000.

Although, in the general average, it is prob¬ able that the thickness of the stars in space does not vary greatly within the limits we have indicated, there are exceptions in special cases. The most notable exception is that of the Milky Way, where the stars are undoubtedly much more thickly strewed in space than they are in the central regions of the system. We also find in many regions of space collections of hundreds or even thousands of stars evidently in close proximity to each other. But outside of these collections the scattering is probably nearly uniform as far out as the limit we have mentioned.

Altogether, we may say with some confi¬ dence, that if we could fly through space to a distance over which light would require 10,000 years to travel, we should find ourselves ap¬ proaching the boundary of the stellar system, if we were not actually outside of it. But all that has been said refers only to our own visible universe, that is, to the Milky Way cluster, or cloud, of stars of which our own sun is one. It is as impossible for us to conceive of a totally empty space extending without limit in all directions from our universe as it is for our minds to grasp the conception of other, far distant, universes which perhaps more or less resemble our own, and which succeed one another throughout a space which is also abso¬ lutely endless. If such other universes exist, it can only be said that as yet we have no known means of discovering them.

Notwithstanding the darkness of the sky, it seems probable that we receive more light from

it than could be supplied by all the stars, seen and unseen, which make up the known part of the universe. This conclusion is based on the fact that the amount of light received from a circle one degree in diameter on the darkest night-sky is about equal to that of a star of the 5th magnitude, while, when we carry out the progression in the light of the stars of dimin¬ ishing orders of magnitude, we find that the total of their light could not well amount to so great a quantity as this. The source of this excess of light is yet to be investigated. Whether it is atmospheric, whether it is re¬ flected from innumerable opaque bodies, or whether it is emitted by a nebulous mass of almost inconceivable tenuity, has not yet been determined.

A remarkable feature of our relation to the universe is that our solar system seems to be very near its centre. That we are near the central

plane of the Milky Way is shown by the fact that the latter is nearly a great circle on the celestial sphere. It is true that the most exact determination yet made shows a slight displacement of our system, since the central line of the Milky Way is about one degree from that of the great circle which would pass near¬ est to it. Another basis for the same conclu¬ sion is that the stars seem about equally numer¬ ous in the direction of the two opposite poles of the Milky Way. If there is any deviation from equality, it seems likely that the faint telescopic stars are fewer in number toward the south pole than toward the north pole of the Milky Way. This view is not yet proved, and cannot be until we have more exact counts of the stars of each order of magnitude in the two hemispheres. The question whether our system is situated with equal exactness in the centre of the great girdle does not admit of settle¬ ment. All we can say is, that, up to the present time, there is no positive evidence on which to base a. statement that we are any nearer one point of the girdle than another. It is indeed true that, in the constellations Aquila and Sagittarius, which are visible in the south on autumn evenings, the Milky Way shows numer¬ ous rifts and vacant spaces which are not shown on its opposite side. This might seem to indicate that we are nearer to it in this region. But further researches are required before a definite conclusion can be reached.

It should be remarked that, even if we are at present centrally situated, the position can¬ not be permanently held. The motion of the solar system through space, by which we are carried forward on a journey of which we can see neither the beginning nor the end, at the rate of 10 or 12 miles a second, must eventually carry our posterity away from the centre of the universe, even if we are now situated near that point. But this motion will have to be con¬ tinued hundreds of thousands, even millions, of years before the displacement would be ap¬ preciable when compared with the dimensions of the universe.

Simon Newcomb.

Revised by Eric Doolittle.

UNIVERSITY. Introductory.— It is dif¬ ficult to define the American university. In a certain sense it may be said not to exist. When we speak of the English universities, the Ger-

man universities or the University of Paris, we have in mind educational institutions of distinctive if not of actually unique type whose organization and procedure are crystallized and whose aims and ambitions are clear-cut and capable of definition. The mere term uni¬ versity is misleading in America because in actual practice there is no consistent distinction between the terms college and university. Many institutions which are hardly reputable secondary schools parade under the name of college, and many institutions which are barely able to do work of collegiate grade are bur¬ dened with the title of university. Both the terms lose distinctiveness through illegitimate use.

On the other hand the confusion is worse confounded, in the minds of the lay public at least, by the seemingly indiscriminate use of the terms by thoroughly reputable institutions. The layman who has long been lead to believe that the leading American university is located at Cambridge, Mass., is puzzled when he dis¬ covers that the legal titles of the controlling bodies of this great institution are <(The Presi¬ dent and Fellows, and the Board of Overseers, of Harvard College.® As a matter of fact there is both a Harvard College and a Harvard Uni¬ versity. The title Harvard College, the original name of the institution, is now ap¬ plicable to the organization and administration of the group of courses in the liberal arts lead¬ ing to the degree of bachelor of arts, and the title Harvard University is applicable to the several departments of the institution as a whole, including Harvard College. In a some¬ what similar way Columbia College persists as a part of the greater Columbia University. There is also still a Yale College within Yale University.

Then, to turn to the other extreme, we discover that such reputable institutions as . Colgate University, James Milliken University, De Pauw University and a long list of others which might be named, which make no pre¬ tense outside of their titles of being what they are not, are not in any respect universities in the sense in which the term university is broadly used to cover the entire groups of edu¬ cational activities centred in Harvard, Yale and Columbia. In other words, the name or title alone of a higher educational institution signifies nothing in this country. We must know the history and the objects of any col¬ lege or university before we can determine Its character or its place in our educational world.

While titles are used so indiscriminately that the terms college and university have no concise meaning to the public mind, there yet remains a distinction, very clear in the minds of educators and becoming evident in practice here and there, which gains ground as

time goes on. The truth is that we do have insti¬ tutions which merit inclusion under the general term of the American university even though we yet find it difficult to give a concise defini¬ tion to that general term. The American uni¬ versity is coming to have an identity of its own even if its title is not always trustworthy. The Regents of the University of the State of New York, which, incidentally it should be said, is not a university at all but simply the corporate

title of a State Department of Education, have defined a college as follows:

"An institution to be ranked as a college must have at least six professors giving their entire time to college or university work, a course of four full years of college grade in liberal arts and sciences, and should require for admission not less than the usual four years of academic or high school preparation or its equivalent, in addition to the pre-academic or grammar school studies."

This definition has been adopted by the Car¬ negie Foundation for the advancement of teach¬ ing and under the frequent use of this agency is operating widely to give identity to the col¬ lege. The definition serves well enough at the bottom but leaves us yet without a definition of a university. The Education Law of the State of New York adds to the confusion b}' declaring, in defining its own terms, that (

Without concern about confused and con¬ fusing nomenclature, the distinction which edu¬ cators make between a college and a university is this : a college is a higher educational insti¬ tution offering mainly courses of instruction leading to the bachelor's degree; a university is a college or group of colleges or departments under one control offering courses of instruc¬ tion leading not only to the bachelor's degree but also to the master's and the doctor's degrees. There is yet another distinction, more academic than real, which would classify as colleges those institutions devoted entirely to work leading to the bachelor's degree and as universities those institutions devoted to scientific research and to the general widening of human knowledge and admitting only graduate students. The general tendency seems to be to regard as the typical American university the institution em¬ bracing the union of college and university of¬ fering both undergraduate and graduate courses. The reputable American university ap¬ proaches this definition in practice no matter what its title is. This definition covers the ac¬ tual activities of many of the leading State uni¬ versities and embraces

the ideals of all of them.

State universities help markedly to give character and worth to the American univer¬ sity as a recognized educational institution, and all that can be said with regard to the pres¬ ent status of the endowed universities applies with equal force to the State universities.

The number of endowed American universi¬ ties which have risen to places of assured prominence in the educational world is not large. The origin and development of 10 lead¬ ing institutions in the order of their founda¬ tion illustrate the problems common to the whole group and the reader is referred to the special articles under the respective titles: Harvard University; Yale University; Uni¬ versity of Pennsylvania; Princeton Univˆr-

sity; Brown University; Columbia Uni¬ versity; Cornell University; Johns Hopkins University; Leland Stanford Junior Uni¬ versity; University of Chicago.

Entrance Requirements. — The completion of a standard four-year high-school course is now the announced fundamental basis of admis¬ sion to the typical American university. In¬ deed, practically all institutions which lay claim to the title of college or university make the announcement that the four-year high-school course is the minimum basis of admission. The character of any institution which claims col¬ lege rank is readily determined by the deliber¬ ate honesty with which it administers its announced entrance requirements. Of course there is great divergence in the determination of what constitutes a standard high school, both as to its announced course of study and as to the faithfulness and thoroughness with which the course is presented. The subjects required for admission vary considerably in different universities and differ materially for admission to different courses. Entrance is calculated upon the basis of <(units,® 14 to 16 units being the usual requirement. A unit approximately represents the successful pursuit of a high school subject each school day for a school year. Thus, credit in elementary algebra, or in plane geometry, each of which is usually pur¬ sued for a full year in high school, entitles the student to one unit for college entrance. The units are usually specified as required and elective; from 10 to 12 units being required

and from three to five units being elective.

The gradual evolution of the entrance re¬ quirements may be understood from an exam¬ ination of the Harvard entrance requirements. The present terms of admission at Harvard may be said to have been over 276 years in the making. It was in 1642, though Harvard College was founded six years earlier, that the college statutes provided :

<(When any Schollar is able to read Tully or such like Classical Latin Author Extempore, and make and speake true Latin in verse and prose, without assistance, and decline perfectly the paradigms of nounes and verbes in ye Greeke tongue, then may hee bee admitted into ye college, nor shall any claime admission be¬ fore such qualifications.®

This specified reading knowledge of Latin and Greek was the essential entrance require¬ ment in all the colonial colleges, and the Har¬ vard entrance requirements remained with very slight changes, as quoted, for nearly a century. Arithmetic was required about the first of the 19th century and geography in 1807, algebra in 1820, history in 1847, physical geog¬ raphy in 1870, French and German in 1875.

The change in entrance requirements which is actually taking place at the present time may be understood by reference to the <(old® and the <(new® plans of admission announced in the latest Harvard catalog. To be admitted to the freshman class of Harvard College under the old plan a candidate must present himself for examination in certain studies. These studies must amount to 16ˆ2 units of school work, except that candidates who pre¬ sent both elementary Latin and elementary Greek will be admitted without conditions on 15ˆ2 units of school work. In not less than

five units a candidate must pass examinations with grades that are ˆsatisfactory® as distin¬ guished from grades that are (

Under the new plan, to be admitted to Har¬ vard College one must present evidence of his secondary school work, showing (a) the sub¬ jects studied by him and the ground covered; (b) the amount of time devoted to each; (c) the quality of his work in each subject. To be approved this statement must show (a) that the candidate's secondary school course has ex¬ tended over four years; (b) that his course has been concerned chiefly with languages, science, mathematics and history, no one of which studies has been omitted;

(c) that two of the studies of his school program have been pursued beyond their elementary stages. A candidate whose secondary school course is found to be satisfactory may then present him¬ self for ˆcomprehensive® examinations in four subjects, as follows: (a) English, (b) Latin, or, for candidates for the degree of S.B., French or German, or Spanish, (c) Mathe¬ matics, or physics, or chemistry. (d) Any subject (not already selected under (b) or (c)) from the following list: Greek, French, Ger¬ man, Spanish, history, mathematics, physics, chemistry.

The Course of Study. — The conventional course of study in the American university for the undergraduate has from the very beginning until recent times covered four college years. It has frequently been urged that ((there is nothing magical or imperative in the term of years,® and educators have widely discussed the desirability of shortening the college course, especially for the student who takes up pro¬ fessional study after he secures his bacca¬ laureate degree. It is now possible to secure this degree in many institutions in less than four years and to secure both the baccalaureate and the professional degrees in seven years ; but the traditional four-year course yet prevails in the main and seems not likely to give way rapidly for the great majority of students.

It is frequently urged also that the term of four years has no natural relation to a course of study. The subjects offered in the undergraduate course show bolder departures from the earlier types. The English model was followed in our universities almost exclusively until the Revolution. The degree of bachelor of arts, based upon classical and philosophical studies, prevailed. Yale followed the example of Harvard, and Princeton followed the ex¬ ample of her predecessors. It was not until 1846 that the Lawrence Scientific School was established and provision made for a course leading to the degree of bachelor of science. College catalogs present a great variety of courses of study and many degrees of prescrip¬ tion, but are commonly reducible to three types, as follows : (1) Those in which all the work for

the degree is prescribed; (2) those which pre¬ scribe part and leave the rest to the choice of the student; (3) those which contain prescribed

courses, require concentration in one or more departments and leave a certain proportion open for the free election of the student.

Graduate Work. — The graduate school of fering advanced courses of study leading to the master's and the doctor's degrees is of com¬ paratively recent growth in this country. Harvard enrolled students as ˆresident gradu¬ ates® before 1800 and Yale established a (

According to the report of the United States Commissioner of Education 31,826 baccalaureate degrees were conferred in 1915-16 by univer¬ sities, colleges and technological schools in the United States, 20,586 upon men and 11,240 upon women. In the same year 4,524 graduate de¬ grees were conferred, 3,462 upon men and 1,062 upon women. There were also 825 honorary degrees conferred. The degree of doctor of philosophy included in the above was conferred on examination by 42 institutions on 520 men and 81 women. No reputable institu¬ tion which is not adequately prepared to do so undertakes to award this degree upon ex¬ amination. It is, therefore, a reasonably safe index to the institutions, which regardless of title are prepared to do university work. The degree of doctor of philosophy was granted on examination in 1916 as follows : University of California, 22; University of Denver, 2; Yale University, 50; Catholic University of America, 3; George Washington University, 6; University of Chicago, 79; Northwestern Uni¬ versity, 3; University of Illinois, 33; Indiana University, 4; Iowa State College, 1; State University of Iowa, 8; University of Kansas, 1 ; Johns Hopkins University, 37 ; Massachu¬ setts Agricultural College, 3 ; Boston University, 5; Massachusetts Institute of Technology, 3; Harvard University, 52; Clark University, 13; Radcliffe College, 4; University of Michigan, 22; University of Minnesota, 7; University of Missouri, 5; University of Nebraska, 1; Prince¬ ton University, 27 ; Rutgers College, 1 ; Cor¬ nell University, 34; Columbia University, 88; New York University, 8; Syracuse University, 3; University of North Carolina, 2; Ohio State University, 3; University of Cincinnati, 2; Bryn Mawr College, 3; Grove City College, 3; University of Pennsylvania, 12; University of Pittsburgh, 1; Brown University, 6; University of Texas, 3; University of Vermont and State Agricultural College, 1 ; University of Virginia, 2; University of Washington, 1; University of Wisconsin, 37.

The requirements for the degrees of doctor of philosophy and master of arts are reason¬ ably uniform in reputable institutions through¬ out the country. The following statement from the Yale Catalogue for 1916—17 gives the typi¬ cal requirements for these degrees. ftThe de¬ gree of doctor of philosophy is conferred upon students of either

sex who hold the bachelor's degree from a college of high standing, and have satisfactorily completed not less than three years of graduate study and met the other pre- VOL 27 — 37

scribed conditions for the degree. Students who have received their bachelor's degree from colleges not of sufficiently high standing must expect to spend more than three years in gradu¬ ate study; the length of time to be determined in each case by the character of their previous work and the quality of the work done here. With the approval of the faculty, work of equal grade done in residence at other universities will be accepted for the degree, but not less than one year of graduate work must be done in this university. Ordinarily the final year of residence should not be devoted wholly to the completion of the dissertation, but the candi¬ date, unless especially excused by the depart¬ ment in which his major work is done, should continue some plan of study involving attend¬ ance on at least one course. It must be under¬ stood, however, that the degree is not given as a certificate of residence and work, however faithful ; it is granted only to such students as give evidence of general proficiency, power of investigation and high attainments in the special field in which the major work is done. The evidence of such attainments must be given by dissertation and by examinations. Evidence of sufficient attainments in German and French at least two years before the degree is given must be presented to the dean. The dissertation should show that the candidate has technical mastery of the field in which he presents him¬ self, is capable of doing independent scientific work, and is able to formulate such conclu¬ sions as may in some respects modify or en¬ large what was previously known. ... A gen¬ eral oral or written examination, as the depart¬ ment may determine, irrespective of examina¬ tions upon single courses, shall be held upon the whole major subject offered by the can¬ didate and upon such subordinate subjects as may be required by the department.®

<(The degree of master of arts is conferred upon men who hold the bachelor's degree from a college of high standing and have satisfac- tarily completed not less than two years of resident graduate study and met the other pre¬ scribed conditions for the degree. Work done in absentia will not be accepted. Students who have received their degree from colleges not of sufficiently high standing must expect to spend more than two years in graduate study, the length of time to be determined in each case by the character of their previous work and the quality of the work done here. Resi¬ dence at another university may be accepted for the first of these years, provided the evi¬ dence of work submitted is satisfactory to the committee on the degree. A

reading knowledge of one language other than English is required before the student will be accepted as a can¬ didate for the degree, and any department of study may make a specific requirement of a reading knowledge of French or German or both.®

Statistical Data. — The following statistics from the report of the United States Commis¬ sioner of Education for the year 1915-16 give evidence of the scope of the work of higher educational institutions in the United States : Number of institutions, 574; number of students enrolled in collegiate and resident graduate de¬ partments, 259,511, of whom 164,075 were men and 95,436 women ; number of instructors,

34,S69, of whom 28,472 were men and 6,397 women; total receipts, $133,627,211 ; productive funds, $425,245,270; benefactions during the year, $30,196,006; number of fellowships, 17,774 ; number of volumes in libraries, 20,234,734; value of library, scientific apparatus, machinery and furniture, $80,554,609; value of grounds, $87,607,540; value of buildings, including dormi¬ tories $307,159,298.

Harlan H. Horner,

Dean, State College for Teachers, Albany, N. Y.

UNIVERSITY, National. See National University

UNIVERSITY OF ALABAMA, the high¬ est educational establishment of the State of Alabama, and a part of the public school system maintained by the State. The university is ad¬ ministered through the following organizations : The College of Arts and Sciences ; School of Education; College of Engineering; School of Law; School of Medicine (at Mobile), and Summer School for Teachers, with a staff of, in the neighborhood of 100 teachers and pro¬ fessors. Some 14 buildings are grouped around a campus of 40 acres, in a tract of nearly 300 acres, adjacent to the city of Tuscaloosa. In addition to the regular university library, the institution contains a document room with some 15,000 documents and pamphlets, includ¬ ing the publications of the Federal government; a law library, engineering library, museum library, and several department libraries. It also

possesses the largest Museum of Natural History in the South. The students' interests and activities are represented by two publica¬ tions, The Crimson-White, a weekly journal, and The Corolla, an annual. The university con¬ fers the master's degree in arts and sciences; the bachelor's degree in arts, education, science, science of education, civil engineering, electri¬ cal engineering, mining engineering, chemical engineering and civil and highway engineering; in law (LL.B.) and in medicine also gives the degree of M.D.

The University of Alabama was created by an act of the Federal legislature of the United States in 1820, and to it were turned over several sections of government lands; but it was not until two years later that the trustees of the projected institution met in Tuscaloosa. The work of construction of the buildings pro¬ gressed slowly and it was not until 1831 that the university was opened to students. The university buildings were burned during the Civil War by United States cavalry (1865) ; but in 1869 they were partially replaced and the work of the institution resumed. In 1884 the Federal Congress granted to the university an additional 46,080 acres of land, in payment for the buildings lost during the war. In 1907 the State legislature of Alabama voted $400,000 to increase its equipment and sanctioned the federation of the Medical College of Alabama, at Mobile, with the State university.

UNIVERSITY OF CALIFORNIA. See

California, University of.

UNIVERSITY OF CINCINNATI. See

Cincinnati, University of.

UNIVERSITY CLUB, The, an organiza¬ tion of New York, incorporated in 1865. Mem¬ bers are required to hold a university or college degree representing a course of not less than

three years of study; or an honorary degree, in the case of distinguished personages. Gradu¬ ates of the United States military and naval academies are also eligible. The limit of mem¬ bership is 3,500, — 2,000 resident and 1,500 non¬ resident and of the army or navy.

UNIVERSITY COLLEGE, the specific title of an institution attached to various Brit¬ ish universities. (1) University College, Ox¬ ford, the oldest in the university, founded through the munificence of a bequest of Wil¬ liam, archdeacon of Durham, shortly after 1249,

consists of a master, nine ordinary Fellow's, one civil law Fellow, 15 scholars and 14 exhi¬ bitioners. The fellowships are held seven years, but may be extended under certain conditions. The scholarships ($400 per annum) are open to all who have not exceeded 19 years of age. There are seven church livings in the gift of this college. The earliest statutes of the college date from 1280. (2) University College, London, founded 1828, is closely connected with London University. (3) The name is also given espe¬ cially to three of the four colleges which form a Welsh University, namely, the University Col¬ lege of Wales at Aberystwith, University Col¬ lege of South Wales at Cardiff, and the Uni¬ versity College of North Wales at Bangor. The students of these colleges, proceeding to de¬ grees, have to go through a course at either London, Dublin, Edinburgh or Glasgow. (4) University College, Dundee, Scotland, founded in 1882, is affiliated with Saint Andrews Uni¬ versity. (5) There are other colleges bearing the title in Exeter, Nottingham, Reading, Southampton, etc.

UNIVERSITY COSTUME. See Cos¬ tume Academic.

UNIVERSITY COURSES. See Supple¬ mental Education.

UNIVERSITY EXTENSION. See Sup¬ plemental Education.

UNIVERSITY OF NORTH CARO¬ LINA. See North Carolina, University of.

UNIVERSITY OF THE PACIFIC (now

College of the Pacific), located at San Jose, Cal. It was founded at Santa Clara in 1851 under the auspices and control of the Methodist Episcopal Church; in 1871 it was moved to San Jose; about 40 years after its incorporation Napa College was consolidated with it, and the name of the University of the Pacific adopted. Later the name was changed to College of the Pacific. It is open to both men and women. The organization of the uni¬ versity includes the College of Liberal Arts, the Academy, the School of Elocution and Ora¬ tory, the School of Commerce, the School of Art and the Conservatory of Music. The Col¬ lege of Liberal Arts offers regular four-year courses, for completion of which the degree of A.B. is conferred. The work of the last two years in each course is elective, a limited amount of work in certain departments being re¬ quired according to the major chosen. The School of Commerce offers a college course in commerce, together with training for expert secretaries and accountants. The School of Elocution offers a course covering three

years ; the Art Department, a course of three years. The full course in the Conservatory of Music

extend over four years, and leads to the de¬ gree of bachelor of music. The college is situ¬ ated in the Santa Clara Valley, within easy reach of both San Jose and Santa Clara; and occupies six large buildings. The library con¬ tains 12,000 volumes; the income averages $80,000, the students' enrolment 475, and the faculty 35.

UNIVERSITY OF PENNSYLVANIA.

See Pennsylvania, University of; and con¬ sult Lippincott, H. M., (The University of Pennsylvania: Franklin College) (1919).

UNIVERSITY PLACE, Neb., thriving city in Lancaster County, _ on the Chicago, Rock Island and Pacific Railroad, about four miles northwest of Lincoln. It has a Carnegie library and is the seat of the Nebraska Wesleyan Uni¬ versity and of the State Agricultural College. Pop. about 5,000.

UNIVERSITY OF ROCHESTER, Roch¬ ester, N. Y., was established by Baptists of the State of New York in co-operation with citizens of_ Rochester, and was opened for students in 1850. Since 1900 women have been received as students, a co-ordinate college having been es¬ tablished for them under the same faculty as the college for men. A bequest for this pur¬ pose made by Lewis H. Morgan many years previously became available for this use in 1909. The university conducts curricula lead¬ ing to the degrees A.B. and B.S., also to the degree B.S., in mechanical engineering and in chemical engineering. There is a campus of over 27 acres in the centre of the residence sec¬ tion of the city, in addition to an athletic field of 12 acres for physical education. On the campus there are 11 buildings, including a beautiful Memorial Art Gallery. The library contains 75,000 volumes; thoroughly equipped laboratories and museums provided for instruc¬ tion in biology, chemistry, geology, mechanical engineering, physics and psychology ; the faculty numbers 49; the students in a recent year num¬ bered 535, of whom 271 were women.

UNIVERSITY SETTLEMENTS. See

Social and University Settlements.

UNIVERSITY OF THE SOUTH, lo¬ cated at Sewanee, Tenn. It was chartered in 1857 by the southern dioceses of the Protestant Episcopal Church ; the site and endowment were obtained, and the central building begun, when the Civil War stopped further operations and rendered the endowment worthless. In 1867 more funds were obtained largely through the efforts of Bishop Quintard of Tennessee, and the Grammar School — Sewanee Military Acad¬ emy since 1908 — (secondary grade) and Aca¬ demic Department — College of Arts and Sci¬ ences — opened to students in 1868. The uni¬ versity now includes the Sewanee Military Academy, the College of Arts and Sciences, the Theological Department organized in 1878, and a Training School for Nurses connected with the Hodgson-Emerald Hospital. The Medical Department established in 1892, the Law De¬ partment established in 1893, and the School of Pharmacy established in 1904, were discontinued in 1909. The College of Arts and Sciences of¬ fers studies leading to the degree of B.A., and a course in civil engineering. The degree of M.A. is conferred for graduate work. In the Theological Department the degree of B.D. is

conferred on all who complete the regular three- years' course (including Greek and Hebrew) who have held a Bachelor's degree for at least one year from some approved college or uni¬ versity and have presented a satisfactory thesis on a subject approved by the faculty. The course in the Training School for Nurses is three years in length. Seven scholarships are available for students in the Theological De¬ partment, and about 25 for students in the College of Arts and Sciences. A unit of the Students' Army Training Corps was established in the college in 1918. Full provision is made for physical training, and there is a general interest in athletic sports which are under the direction of the Athletic Board of Control. Seven Greek letter fraternities are represented at the university, and the students also main¬ tain two literary societies, writing, debating and musical clubs, a dramatic club, and The Sewanee Union, a social club for students, officers, mem¬ bers of the faculties, alumni and residents of the town of Sewanee. The university owns a domain of 8,000 acres in the midst of the beau¬ tiful scenery of the Cumberland Plateau; a reservation of 1,000 acres surrounds the cen¬ tral buildings, from which building lots are leased for long terms. The chief buildings are Saint Luke's Memorial Hall (Theological De¬ partment), Saint Luke's Memorial Chapel, Walsh Memorial Hall, the library with a tower modeled upon that of Magdalen College Chapel, Oxford, in which are a clock and peal of bells, Thompson Hall, Hodgson-Emerald Hospital, Hoffman

Memorial Hall (dormitory), Quintard Memorial Hall (Sewanee Military Academy), All Saints Chapel, the Carnegie Science Hall and the gymnasium (partly completed). The library contains 40,000 volumes; the students in all departments average 400, and the faculty 35.

UNIVERSITY OF SOUTH CAROLINA,

the State college located at Columbia, S. C., chartered in 1801, and first opened in 1805. In July 1863 the college was closed on account of the Civil War, many students having enlisted in the Confederate army, and the buildings were used as a hospital by the Confederate gov¬ ernment. The charter was amended in 1865, departments of medicine and law added, and the name changed to the University of South Carolina; the unsettled political condition of the State led to the closing of the institution a sec¬ ond time in 1877. The next year the charter was again altered, and the university divided into two branches, South Carolina College at Columbia and Clafiin College at Orangeburg (the latter for colored students) ; the branch at Columbia was opened in 1880 as the South Carolina College of Agriculture and Mechanic Arts. In 1882 several new departments were added and <(of Agriculture and Mechanic Arts® dropped from the name; the Law School was added in 1884. In 1887 the charter was changed for the third time, the name of University of South Carolina again adopted, and a College of Pharmacy, Graduate Department and Normal School added. In 1890 there was a fourth re¬ organization, the agricultural, mechanical, medi¬ cal and normal courses were discontinued, and the name changed to South Carolina College. In 1894 normal courses were added to the cur¬ riculum. The college now offers the following

courses: (1) Four courses: classical, Latin- science, Latin-literature, and modern literature, leading to the degree of A.B. ; (2) two courses : mathematical, physical and chemical-biological, leading to the degree of B.S., also special courses in civil and mechanical engineering by the addition of certain studies to the mathemati¬ cal physical course leading to the degree C.E. ; (3) three normal courses, one of four years, leading to the degree of A.B., one of three years and a special course of two years; (4) a two-year course in the Law School, leading to the degree of LL.B., and (5) a graduate course for the degree of A.M. The work of the last two years of the A.B. and

B.S. courses is partially elective. The special normal course is strictly professional and includes practice work. There are also normal courses for teach¬ ers given in the spring. There are 12 scholar¬ ships, besides State scholarships for each county for normal students. The library in 1916 con¬ tained about 50,000 volumes ; the students num¬ bered 578 and the faculty 38. In 1906 the in¬ stitution was reorganized under the title Uni¬ versity of South Carolina. The schools as then established were Arts, Science, Teachers' Grad¬ uate, Law.

UNIVERSITY OF SOUTHERN CAL¬ IFORNIA, located at Los Angeles. It was established in 1879 and first opened to students the following year. The institution is under the auspices of the Methodist Episcopal Church. Men and women are admitted on equal terms. The organization includes nine colleges, i.e., Liberal Arts, Physicians and Surgeons, Law, Dentistry, Theology, Pharmacy, Oratory, Fine Arts and Music; a School of Education; a University High School. In the College of Liberal Arts there are offered undergraduate courses in 21 major subjects, all of which lead to the A.B. degree. There are also offered four-year courses in electrical and civil engi¬ neering, leading to the degree of B.S. The degrees of A.M. and M.S. are offered in the graduate department. The courses in the other colleges lead to the usual degrees in professional subjects. Under authority from the State Board of Education the university is empow¬ ered to grant the High School Teachers Recom¬ mendation upon the completion of the required graduate work in the School of Education. The university campus comprises about 15 acres well located in the south central part of the city and accessible by ample car service. The colleges of Physicians and Surgeons, Den¬ tistry, Law, Music and Fine Arts at present occupy buildings in other parts of the city. A recently completed endowment campaign for one million dollars has placed the available resources at nearly two millions. New build¬ ings are projected which will be erected as soon as war conditions will permit. The library contains 35,000 volumes, the City Public Library and the County Law Library are also available for student use. In 1917-18 the faculty num¬ bered 378 while the enrolment of the student body was 4,096.

UNIVERSITY OF THE STATE OF NEW YORK, The. At the close of the American Revolution there existed in New York city an institution known, previous to that time, as King's College, which during the Revo¬

lution had become thoroughly disorganized. Its property had been largely dissipated, its course of instruction had been suspended and

many vacancies existed in its governing board. More¬ over its name, King's College, had become dis¬ tasteful to the colonists, who had now cast off all allegiance to kings. To meet and remedy these conditions, the legislature of the State of New York, at its very first session after the close of the Revolution, on 1 May 1784, passed an act entitled, "An act for granting certain privileges to the college heretofore called King's College for altering the name and charter thereof and erecting an university in this State.® By this act the corporate rights of King's College {the name of which was now changed to Columbia College) were vested in the regents of the University of the State of New York. The regents were also "empowered to establish from time to time such additional colleges as they might think proper, such col¬ leges to be a part of the State University.®

In 1787 Columbia College was made a self- perpetuating and separate governing body (see Columbia University), and the same year the act of 1784 was replaced by a new act which specifically enacts that "An University be and is hereby instituted in this State to be known and called by the name or style of the Regents of the University of the State of New York.® This act authorizes the regents to visit and inspect all the colleges, academies and schools which are or may be established in this State, to examine into the state of education and discipline, and to make a yearly report thereof to the legisla¬ ture. It also gives to the regents the power to confer degrees and to grant charters of in¬ corporation to colleges and academies.

The organization thus perfected has, with a few changes, continued to the present time. In 1894, the University of the State of New York was made a constitutional body, to be governed by a board of not less than nine re¬ gents, and their corporate powers may be modi¬ fied, increased or diminished by legislative en¬ actment.

In 1904 the jurisdiction of the regents was extended to cover the elementary schools, which previously had been under the direction of the superintendent of public instruction. The pres¬ ent objects of the university as expressed in the Education Law of 1918 are:

"To encourage and promote education, to visit and in¬ spect its several institutions and departments, to distribute to or expend or administer for them such property and funds as the state may appropriate therefor or as the university may own or hold in trust or otherwise, and to perform such other duties as may be entrusted to it."

Regents. — The university is governed and all its corporate powers are exercised by a board of regents, serving without salary, whose members are at all times three more than the existing judicial districts of the State — at present nine districts and 12 regents. The officers of the board of regents are the chancel¬ lor and vice-chancellor, who serve without salary. Subject and in conformity to the con¬ stitution and laws of the State, the regents exercise legislative functions concerning the educational system of the State, determine its educational policies, establish rules for carrying into effect the laws and policies of the State relating to education and the powers, duties

and trusts conferred or charged upon the uni¬ versity. The regents elect by ballot the presi¬ dent of the university and the commissioner of education who holds office during the pleasure of the board. The university is the State Edu¬ cation Department; charged with and under its caption, and in its name as such, it exer¬ cises the general management and supervision of all public schools and all the educational work of the State.

Degrees. — The regents under their seal con¬ fer certificates, diplomas and degrees on per¬ sons who satisfactorily meet the requirements prescribed.

Examinations. — In the secondary institu¬ tions of the university regents examinations furnish the standard of graduation and of admission to colleges. Certificates or diplo¬ mas are conferred by the regents on pupils who satisfactorily pass the academic examinations. The regents also supervise the entrance re¬ quirements to the professional schools and conduct the professional licensing examina¬ tions.

Registration. — The regents register both domestic and foreign institutions in terms of New York standards, fix the value of degrees, diplomas and certificates issued by institutions of other States and countries and presented for entrance to schools, colleges and the pro¬ fessions in New York State.

Incorporation. — Under such name and with such number of trustees or other managers, and with such powers, privileges and duties, and subject to such limitations and restrictions in all respects as the

regents may prescribe in conformity to law, the regents by an instru¬ ment under their seal and recorded in their office incorporate universities, colleges, acade¬ mies, libraries, museums and other institutions or associations for the promotion of science, literature, art, history or other departments of knowledge or of education in any way, asso¬ ciations of teachers, students, graduates of edu¬ cational institutions and other associations whose approved purposes are in whole or in part of educational or cultural value deemed worthy of recognition and encouragement by the university. No institution or association which might be incorporated by the regents may be incorporated under any other general law without their consent.

Extension. — The regents extend to the people at large increased educational opportuni¬ ties and facilities, stimulate interest therein, recommend methods, designate suitable teachers and lectures, conduct examinations and grant credentials and otherwise organize, aid and conduct such work.

Visitation. — The regents or their representa¬ tives visit, examine into and inspect institutions in the university and require annual reports, duly verified, from the various institutions of the university.

Departments and Divisions — The regents establish such departments and divisions as they deem useful in the discharge of their duties. The educational and administrative work is performed by five departments of the univer¬ sity: higher education, secondary education, elementary education, State library and science. The work of these departments is distributed among 11 divisions, namely, administration, agricultural and industrial education, archives

and history, attendance, educational extension, examinations and inspections, law, library school, school buildings and grounds, school libraries, statistics and visual instruction.

Education Building. — It is occupied ex¬ clusively by the university, including the vari¬ ous departments and divisions of the work, to¬ gether with such other work as the regents may in their discretion provide for therein. The building and the officers of the department are maintained at State expense, and are located at Albany, N. Y., the State capital. See New York, University of the State of (vol. 20, p.

238).

Convocation. — The University Convoca¬ tion is held annually in the Education Building on such dates as the chancellor and commis¬ sioner determine. Its object is to ascertain and formulate educational opinion ; to make recom¬ mendations and by the co-operation of educa¬ tional forces to advance educational interests. Its membership includes all educational' officers, teachers and others interested in the educa¬ tional well-being of the State.

Publications. — The university publications include handbooks, bulletins and reports. The purpose of the handbook is to afford accurate up-to-date information in reply to correspond¬ ents ; of the bulletins, authoritative information at stated intervals to specialists ; of the re¬ ports, permanent educational information to the public. Handbook 6, parts 1 and 2, and a list of Museum publications afford informa¬ tion regarding the university's publications.

Examiners. — Under professional laws, boards of examiners in medicine (including chiropody), dentistry, veterinary medicine, pharmacy, nursing, accountancy, optometry, shorthand reporting and architecture are con¬ nected with the university; under regents' rules the State Examinations Board ; under the Court of Appeals, the Board of Law Exam¬ iners; under the Education Law, the Teachers Retirement Fund Board.

Advisory Councils. — Under regents' rules advisory councils are appointed representing the various institutions — convocation, college, academic, library, medical, dental, veterinary, pharmacy, nurse training, music, industrial and trades, history, publications, agricultural educa¬ tion, industrial education.

Supervision. — In addition to the teachers affording instruction to the students in attend¬ ance on the various institutions of the univer¬ sity there is a body of supervisors giving their attention to the administration of the schools, namely, principals of elementary schools and of secondary schools ; deans, presidents and chancellors of higher institutions; superintend¬ ents of district, village and city schools and inspectors of the university.

Appropriations. — The State makes annual appropriations for educational purposes to the elementary schools, to the secondary schools, to the higher institutions, to the State Library, to the State Museum and to the divisions of the university. Additional appropriations are made by local authorities to school districts and to municipal districts and to higher insti¬ tutions through endowments, benefactions and fees.

Institutions. — The institutions of the uni¬ versity include all elementary, secondary and higher educational institutions which are now

or may hereafter he incorporated in this State and such other libraries, museums, institutions, schools, organizations and agencies for educa¬ tion as may be admitted to or incorporated by the university.

Education Department. — The university is the education department whose president is the commissioner of education — the chief executive officer. It is his duty also to de¬ vote himself to educational research; to the study of the educational work of the systems of other jurisdictions; to introduce and origi¬ nate, so far as possible, better methods of edu¬ cation.

The Assistant Commissioner and Director of Professional Education. — He has charge of higher education including matters relating to universities, colleges, professional and technical schools and to the execution of educational laws concerning the professions. His field of labor is the department of higher education.

The Assistant Commissioner for Second¬ ary Education.— He has charge of secondary education including matters relating to acade¬ mies, academic departments, academic schools, high schools, the training of teachers therefor, and to the State College for Teachers. His field of labor is the department of secondary education.

The Assistant Commissioner for Elemen¬ tary Education. — He has charge of elementary education including matters relating to elemen¬ tary schools, the training of teachers therefor; and of the division of school libraries. His field of labor is the department of elementary education.

The Director of the State Library. — He has

charge of the State Library and of the State Library School. His field of labor is a depart¬ ment of the university.

The Director of the Department of Science. — He has charge of the department of science and the State Museum. His field of labor is a department of the university includ¬ ing the work of the State

Geologist and Paleontologist, Botanist, Entomologist, Min¬ eralogist, Zoologist, Archeologist and the cus¬ tody of the State Museum.

Charles F. Wiieelock, Assistant Commissioner for Secondary Educa¬ tion, University of the State of New York.

UNIVERSITY OF WOOSTER. See

Wooster, College of.

UNKAR. Piute Indian name given by Wal¬ cott to a thick group of limestone, red shale and quartzite with basalt flows of Algonkian age in Grand Canyon of Arizona. These beds have a thickness of 6,830 feet, are tilted and faulted considerably, and lie on gneiss of sup¬ posed Archean Age.

UNLEAVENED BREAD, bread made without leaven or ferment and prescribed in the Jewish law (Ex. xii, 15, 17) to be used at the Passover festival; it is required in the Latin Church as one of the two eucharistic elements. The Authorized Version of Ex. xii, has <(And ye shall observe the feast of unleavened bread? and from this it has been inferred that this feast is not identical with the Passover ; but the words in italics are confessedly interpo¬ lated by the translators, and they appear to be the only ground for the inference: the Septua-gint version has no such interpolation, but

neither has it the term (azyma) for unleavened bread; it renders the passage, (

UNTERMEYER, Louis, American writer: b. New York, 1 Oct. 1885. He was educated at the Dewitt Clinton High School and en¬ tered commercial life but found writing more to his liking and became associate editor of The Masses and a contributor to the Chicago Evening Post, the New York Times, the Yale Review, etc. He is particularly happy in his parodies and is the author of several at¬ tractive volumes, notably translations from the poem of Heinrich Heine) (1917).

UNTERMEYER, Samuel, American law- ver: b. Lynchburg, Va., 3 March 1858. He took his degree from Columbia University, New York, to which city the family moved soon after the war, and he was admitted to the bar in 1879. He rose rapidly in his profession, be¬ came famous as a corporation attorney and was noted for his connection with celebrated cases. Lately he has been special adviser to the gov¬ ernment in the interpretation and enforcement of the income tax law and was active in secur¬ ing the enforcement of anti-

trust legislation. He is a leader of the Jewish race and a man whose council is sought on all important under¬ takings.

UNTERWALDEN, oon'ter-var'den, Swit¬ zerland, one of the smaller cantons, in the centre of Switzerland, bounded on the north by Lucerne and the famous lake of Lucerne, on the east by the Urner Alps which separate it from Uri, and on the south and west by Bern. The pasturage of cattle is the chief support of the inhabitants, and there is a considerable trade in agricultural produce and in wood. The surface is mountainous ; the most remarkable summits are those of Pilatus and of Titlis. The •canton is divided into two valleys, Upper and Lower (Obwalden and Nidwalden), by a forest called Ivernwald, which crosses it from north to south. Each of these valleys forms an inde¬ pendent state, but is represented by only one member in the council of the Swiss states, in¬ stead of two, as all the whole cantons are. The chief town of Obwalden is Sarnen, and of Nid¬ walden, Stanz. Area of Obwalden, 183 square miles; pop. about 17,000; area of Nidwalden, 112 square miles; pop. about 14,000.

UNTHANK, James Bryant, American college president : b. Williamsburg, Ind., 1849. He was graduated from Earlham College, Rich¬ mond, Ind., in 1874, was professor of history and logic, 1874-81, and was president of Wil¬ mington College, Ohio, for a quarter century.

UNWIN, William Cawthom, English civil

engineer: b. Coggeshall, Essex, 12 Dec. 1838. He was educated at the City of London School, and was instructor at the Royal School of

Naval Architecture and Marine Engineering, Kensington, 1868-72. Since 1885 he has been professor of engineering at the Central Tech¬ nical College of the Guilds of London. Kensing¬ ton. He has published (Wrought Iron Bridges and Roofs' (1869) ; (Machine Design' (1877) ; (The Testing of Materials of Construction' (1888) ; (The Life of Hirn' (1896) ; (Treatise on Hydraulics' (1907), etc.

UNYORO, oo-nyo'ro, British East Africa, a former native state of about 30,000 square miles, bordering on the Albert Nyanza, and now included in Uganda. Pop. estimated at

1,500,000.

UP FROM SLAVERY, an autobiography by Booker T. Washington (q.v.), published in 1901. Its author was a slave until freed by the Emancipation Proclamation. The story of his career is told with much grace and simplicity as well as extreme modesty.

UPANISHADS, oo-pa-rii-shadz', a series of mystic treatises belonging to the Vedic litera¬ ture. They are primarily about 30 in number and contain the mystical doctrine of the Hindus regarding the human soul, the nature of deity, and the process of creation. Various apocry¬ phal writings have been discovered and added, until the latest list totals about 250. They con¬ stitute part of the Brahmanas or commentaries belonging to the Veda and present the Vedic doctrine in a comprehensive form. They describe the Supreme Being, and union with the All, and many of them deal with sectarian Post-Vedic identifications of the Supreme Being with Brama, Vishnu and Siva. Though not sup¬ posed by Hindus to have been revealed in the same manner as the Vedic hymns, the Upani- shads are not assigned to human authorship, but are deemed inspired writings. These writ¬ ings breathe the spirit of all the Eastern re¬ ligions, especially Buddhism. They teach that the highest part of the individual, the atman, descends through sheaths for experiences on the earth plane. Some of them are closely con¬ nected with Yogi philosophy, and all are based on belief in reincarnation. Many of these books are also classed as Vedic literature. They ap¬ pear to have been written at various periods within about 1,000 years before the Christian era. For a further understanding of the sub¬ ject read the works of Max Muller, Annie Besant, Gough's (Philosophy of the Upani- shads' (London 1903) ; Jacob, Concordance to the Principal Upanishads and Bhagavadgita' (1891) ; and Oldenberg's (Die Lehre der Upani-shaden' (Gottingen 1915). See Brahmanas; Karma; Metempsychosis; Sanskrit; Veda). There is an English translation of the principal Upanishads by Max Muller, 2 vols.

UPAS TREE, a Javanese tree (Antiaris toxicaria) , celebrated for its poisonous quali¬ ties, which, however, have been very much exaggerated. It was long believed in Europe that this tree was a solitary one situated in a valley in Java, that the pestilential qualities of it were so great that neither herb nor animal could live within many miles of it, and that criminals alone were sent to gather poison from it, few of whom ever returned. The Javanese themselves dread this tree, and will not rest beneath it, or even pass to leeward of it. The upas tree belongs to the Urticacccu,

and the stem rises for about 60 feet before the first branch puts out. The wood itself is harm¬ less, being used for furniture, but the bark,

which is whitish, and nearly an inch thick, when wounded, exudes a viscid, milky yellowish sap, which becomes brown upon exposure and hardening into gum. From this sap, when mixed with the seeds of capsicum and other substances, a deadly arrow-poison is made, which is at first purgative and emetic in its efforts, and then narcotic, finally killing the victim by tetanic convulsions. It is called upas- antiar. When the tree is felled or the bark is much injured, the tree gives out noxious ex¬ halations which will cause cutaneous eruptions, and if the upas tree be burned the smoke from it will produce the same result. A variety is the sack tree. It has a bark, pieces of which, when soaked and beaten, can be turned inside out without tearing, and, a section of the wood having been left for a bottom, can be used as a sack. It is said that a kind of coarse cloth is made from the fibrous inner bark of the upas tree, and is worn by poor people, but that if wetted it excites an intolerable itching of the wearer's skin.

UPCHURCH, John Jorden, American me¬ chanic: b. Franklin Countv, N. C., 26 March 1822; d. Steelville, Mo., 18 Jan. 1887. He gained a wide knowledge of mechanics and engineering through practical experience, en¬ gaged in constructing large saw and flour mills, was master mechanic on the Main Hill and Schuylkill Haven Railroad in 1841-54 and in 1868 entered the machine shops of the Great Western Railroad at Meadville, Pa. On 27 Oct. 1868 he founded there the first lodge, con¬ sisting of 14 members, of the Ancient Order of United Workmen, a fraternal organization which has since extended into every State and Territory of the United States. He removed to Missouri in 1873, where he was engaged as master mechanic of the carshops of the Saint Louis, Salem and Little Rock Railroad and also s- jerintendent of the building of the shops and the purchase and erection of machinery.

UPCOTT, William, English autograph col¬ lector: b. London, 1779; d. Islington, 1845. He became assistant to Richard Porson as librarian of the London Institute (1806) but resigned (1834) to become a collector of autographs and gathered an immense number. He pub¬ lished an (Account of the principal works re¬ lating to English topography' (3 vols., 1818) ; edited (Evelyn's Miscellany' (1825) and en¬ gaged in other literary work up to the day of his death.

UPDEGRAFF, Milton, American astron¬ omer: b. Decorah, Iowa, 20 Feb. 1861. He was graduated from the University of Wiscon¬ sin in 1884, was assistant astronomer at the Washiburn Observatory, 1884-87, and from the last-named year until 1890 he held an

astronomical post at the National Observatory at Cordoba, Argentine republic, until 1890. He was professor of astronomy at the State Uni¬ versity of Missouri, 1890-99. Since 1899 he has been professor of mathematics of the United States navy. He was director of the Nautical Almanac in 1907-10; also in charge of six-inch Transit Circle of the United States Naval Observatory in 1908-10. Professor Updegraff

was in charge of an eclipse party at Barnes- ville and Griffin, Ga., in May 1900, and in 1913— 14 was in charge of geodetic and other scientific work in the American survey of Samoa. In 1915-17 he was on court-martial and other duty at the Mare Island Navy Yard. He is the author of several articles on professional topics.

UPERNIVIK, or UPERNAVIK, Green¬ land, a district in which is located Tasiusak, the most northerly settlement in the western hemisphere.

UPHAM, Charles Wentworth, American minister: b. Saint John, N. B., 1802; d. 1875. He graduated at Harvard (1821) and at the di¬ vinity school there (1824) to become pastor with Rev. John Prince in the Unitarian Church at Salem, Mass., remaining there until 1844. He was mayor of Salem (1852), president of the State senate (1857-58), and was representa¬ tive in Congress. His voluminous publications dealt with the affairs of his time and he also was editor of the Christian Review and of the Christian Register.

UPHAM, Samuel Foster, American clergy¬ man and educator : b. Duxbury, Mass., 19 May 1834; d. Madison, N. J., 5 Oct. 1904. He ore- pared for college at the East Greenwich Acad¬ emy, and graduated from Wesleyan University in 1856. He immediately entered the ministry of the Methodist Episcopal Church joining the Providence, now the New England Southern Conference. He served parishes in Taunton, Mass,, Pawtucket, R. I., New Bedford, Mass., and Bristol, R. I. In 1864 he was transferred to the New England Conference and served a church in Lowell, Mass., three separate churches in Boston, and one in Lynn, Mass., and in Springfield, Mass. In 1881 he was elected professor of practical theology in Drew Theological Seminary, Madison, N. J., where he taught until his death. He was a member of several general conferences and exerted a great influence therein. It is said that a great speech which he made

led to the abandonment of the time limit in ministerial appointments. Over 1,400 students passed through his classes. His wit was proverbial and his speech epigrammatic. He was one of the greatest preachers of his generation. His father was for 70 years a minister, and his three sons all entered the ministry.

UPHAM, Thomas Cogswell, American clergyman and educator : b. Deerfield, N. H., 30 Jan. 1799; d. New York, 2 April 1872, although his residence was Kenne- bunkport, Me. After graduating from Dartmouth College in 1818 and Andover Theological Seminary in 1821 he served two years as assistant in Hebrew in the seminary. From 1823-25 he was associate pastor of the Congregational Church in Rochester, N. H. In 1825 he became professor of mental and moral philosophy in Bowdoin College, where he served until 1867. He was one of the very earliest advocates of International peace by peace tribunals. He was a voluminous author. The most important works from his pen are (Ratio Disciplina, or the Constitution of the Congregational Churches' (1829) ; (Manual of Peace) (1830) ; Philosophical and Practical Treatise on the WilP (1834 and several later

editions) ; (Elements of Mental Philosophy' (2 vols. 1839), An Abridged Ed. (1864) ; Out¬ lines of Disordered Mental Action' (1840) ; (Life and Religious Experience of Madame Guyon) (1847, 2 vols., 1851); (Life of Faith' (1848, 1859) ; Principles of the Interior or Hidden Life' (published in 10 editions) ; Treatise on the Divine Union) (1851) ; (Re- ligious Maxims) (1854) ; (Life of Madame Catharine Adorna" (1856); Petters ./Esthetic, Social and Moral, written from Europe, Egypt and Palestine' (1855; 2d ed., 1857) ; (A Method oi Prayer — An Analysis of the Work so En¬ titled by Madame Guyon' (1859); (The Abso¬ lute Religion' (posthumous 1872). He also won the prize for his production on (The Con¬ gress of Nations' (1840), and translated Jahn's Piblical Archaeology) (182o) which passed

through at least 12 subsequent editions.

UPHAM, Warren, American geologist:

b. Amherst, N. H., 8 March 1850. He was graduated at Dartmouth in 1871 ; served on the geological survey of New Hampshire, 1875-78; on the geological survey of Minnesota in 1879— 85; also 1893-94; and on the United States Geological Survey in 1885-95. After the last- named date he was secretary and librarian of the Minnesota Historical Society in Saint Paul until 1914, and has since been its

archaeologist. He has published (The Glacial Lake Agassiz' ; (Greenland Icefields and Life in the North Atlantic, with a New Discussion of the Causes of the Ice Age' (with G. F. Wright, 1896) ; Volume I, Pescription and Explorations,' of 1 Minnesota in Three Centuries' (1908), etc.; and has edited Volumes VIII to XV (1895-1915) of the Minnesota Historical Society Col¬ lections. He is also author of many geological reports and papers in scientific and historical magazines, chiefly relating to glacial subjects and to Minnesota history.

UPJOHN, Richard, American architect : b. Shaftesbury, England, 22 Jan. 1802; d. Garri¬ sons, N. Y., 16 Aug. 1878. He emigrated to the United States in 1829 and took up his residence in New Bedford, Mass. On being appointed to direct the alterations in Trinity Church, New York, he left Boston, where he had been en¬ gaged on the designs for the courthouse for that city, and settled in New York, where he drew the plans for the Trinity Church of to¬ day, completed in 1846 and then considered the handsomest church in the United States. He also built the Church of the Ascension, the Church of the Holy Communion, Trinity Chapel, Saint Thomas' Church, and others in New York, Saint Paul's Church, Buffalo, and the Church of the Pilgrims and Grace Church in Brooklyn. For 20 years he was president of the American Institute of Architects. His civic architecture was chiefly that of Italian Renaissance, while his domestic buildings were of various styles.

UPJOHN, Richard Mitchell, American

architect, son of the preceding: b. Shaftesbury, England, 7 March 1828; d. Brooklyn, N. Y., 1903. He came to this country from England with his parents in his infancy and became a partner with his father when 20 years old. Among the many buildings erected with his co¬ operation are the Madison Square Church, the old Mechanics' Bank in Wall street, Saint

Peters Church, Albany; the Central Congrega¬ tional Church, Boston; Park Church, Hartford, Conn.; Saint Paul's Protestant Episcopal Church, Brooklyn, and Trinity Parish School, New York. His chief work was the State Capitol in Hartford, Conn., and he had fre¬ quently been employed as an expert on civic, State, and national commissions. He was a member of the American Institute of

Architects since its foundation and was president of the New York Chapter for two years. He was also a member of the Architectural League, an officer ot the Architectural Department of the Brooklyn Institute of Arts and Sciences, and a life member of the Metropolitan Museum of Art.

UPLAND PLOVER, a sportsman's name for the Bartramian sandpiper. See Sandpipers.

UPOLU (oo-p6-loo') ISLAND. See Samoan Islands.

UPPER ALTON, Ill., city, Madison County, on the Chicago, Burlington and Quincy and the Chicago and Alton railroads, two miles northwest of Alton. It is in an agricultural re¬ gion. There are roof-tile works, a machine shop, grist mill and other manufactories connected with the shipping of farm products. The edu¬ cational institutions are the Shurtleff College (Baptist), opened in 1827 and chartered in 1835 ; a high school, opened in 1885 and public elementary schools. The Shurtleff College had, in 1917, 15 professors and instructors, and 126 students. The library contained 20,000 volumes, the productive funds amounted to $176,000 and the total income to $26,766. Pop. 2,918.

UPPER CANADA. See Ontario.

UPPER HELDERBERG GROUP, a dis¬ carded term in geologic chronology, applied to the lower members of the Mid Devonic forma¬ tions — the Schoharie grit and the Onondaga or corniferous limestone. The term was derived from the Helderberg Mountains, where these rocks form the highest limestone members, while other limestones termed the Lower Hel¬ derberg group formed the basal limestone strata. To these latter, now classed as Lower Devonic, with the exception of the Manlius limestone, the name Helderbergian is now restricted. See Devonian; Old Red Sandstone.

UPPER IOWA UNIVERSITY, located

at Fayette, Iowa. It was established as Fayette Seminary in 1857, and the name was changed to Upper Iowa University in 1858. It is supported and controlled by the Upper Iowa Conference of the Methodist Episcopal Church. It has been open to men and women on equal terms from the first, and a third of the graduates have been women. The organization includes the College of Liberal Arts, the Academy, the Nor¬ mal School, the Conservatory of Music, a school of art, the School of Oratory, the Busi¬ ness College, the School of

Physical Culture, and the Summer School. The College of Lib¬ eral Arts offers a classical, a philosophical, and a scientific course, and confers the three degrees of A.B., B.Ph. and B.S. The library contains 16,000 volumes ; the students number about 400 and the faculty 17 members.

UPPER SANDUSKY, Ohio, village, county-seat of Wyandot County, on the San¬ dusky River, and on the Pennsylvania and the Columbus, Hocking Valley railroads, about

60 miles north by west of Columbus and 57 miles south by east of Toledo. It is in an agricultural and stock-raising region. The chief manufacturing establishments are machine shops, wagon and carriage works, foundries, flour mills, steam pumps and laundry machine works. The educational institutions are a high school, established in 1872, public and parish schools and a public library. There are two banks and two daily newspapers. Pop. 3,779.

UPPER SENEGAL AND NIGER, French West Africa, a colony formed in 1904 from the territories of Senegambia and the Niger, acquired in 1893. It extends south of Algeria to the northern boundaries of Dahomey, Togo, the Gold Coast and the Ivory Coast, with the Military Colony of the Niger on the east, and on the west Mauritania, the Faleme river and the frontier of French Guinea. The area is about 568,273 square miles. It includes a large part of the Sahara Desert below the Algerian boundary, the Upper Senegal Valley, over two- thirds of the course of the Niger River and all the countries in the Great Bend. The re¬ gion is largely plateau land, rising to a height of 1,600 feet. Forests occur, but the land mainly is open and well adapted to agriculture and stock raising. The natives cultivate corn, rice, cotton, millet and ground nuts, and large herds of cattle abound. Native manufactures include pottery, bricks, jewelry, leather and woven goods. The export trade in 1916 amounted to $62,000 and consisted of cotton, rubber, fruits, oil seeds, oil cacao and timber; imports, chiefly food stuffs, cotton goods, me¬ chanical implements and beverages amounted to $193,119. The Senegal-Niger Railway extends 349 miles from Kayes to Koulikoro, whence small steamers ascend the river to Timbuktu. Timbuktu has wireless telegraphic connection with the Eifel Tower in Paris and telegraph lines extend throughout the colony from Kayes to Niamey, Zinder and Lake Tchad. The col¬ ony is under civil administration with colonial judicial and educational systems. The chief towns have regional or urban schools ; at Bamako is a school for sons of chiefs and a professional school ; at Timbuktu is a Moham¬ medan superior school. The principal towns are

Ouaghadougou (pop. 19,330) ; Bobo-Diou- lasso (pop. 8,740) ; Bamako, the capital (pop. 8,734) ; Sikasso (pop. 7,825) ; Segou (pop. 8,400); Kayes (pop. 5,820); Djenne (pop. 5,450); Timbuktu (pop. 4,270) ; Goundam (pop. 3,200) ; Dori (pop. 3,400). Including 1,314 French, the total population of the colony is 5,598,973.

UPSALA, or UPPSALA, oop-sa'la, Swe¬ den. (1) A university town situated on the Fyris River near the head of a navigable branch of Lake Malar, 50 miles north of Stock¬ holm. The most prominent building is the Gothic cathedral, built in 1260-1435, and re¬ stored in 1886-93. It contains the tombs of several Swedish kings. The main building of the university is a fine Renaissance structure built in 1879-87. The university was founded in 1477. It had 2,347 students in 1915, a library of 350,000 volumes and 12,500 manuscripts, large collection of coins and paintings, a botanical garden and museum, with a statue of Linnaeus, and an astronomical observatory. It is an im¬ portant railway junction and there is a large

annual fair. The old city was wholly destroyed by fire in 1702. Pop. 27,976. (2) A lan or

district of over 2,000 square miles area, with a population of about 132,716. Its eastern front is on the Baltic Sea and the Gulf of Bothnia, and it adjoins Stockholm on the south.

UPSETTING THERMOMETER. See

Thermometer.

UPSHUR, up'sher, Abel Parker, American statesman: b. Northampton County, Va., 17 June 1790; d. Potomac River, near Washington, D. C., 28 Feb. 1844. He was admitted to the bar in 1810, practised law at Richmond, Va., in 1810-24 and in 1825 served in the Virginia legis¬ lature. He was appointed judge of the general court in 1826, was a member of the convention to revise the State constitution in 1829, and then resumed his office as judge, serving until 1841, when he accepted the appointment as Sec¬ retary of the Navy under President Tyler. On the resignation of Daniel Webster in 1843 he became Secretary of State, in which capacity he favored the pro-slavery party and also sup¬ ported President Tyler's policy of annexing Texas. On 28 Feb. 1844, in company with the

President and his party, he visited the war steamer Princeton on the Potomac River to witness the testing of a large gun. It exploded in the experiments and Secretary Upshur, to¬ gether with several others of the party, was killed.

UPSHUR, John Henry, American naval officer: b. Northampton County, Va., 5 Dec. 1823; d. 30 May 1917. He was educated at William and Mary College, entered the navy in 1841, served in the Mexican War and partici¬ pated in the capture of Vera Cruz. He was graduated from the Naval Academy at Annap¬ olis, Md., in 1848, accompanied the Perry ex¬ pedition to Japan in 1854, and in 1857-59 was flag-lieutenant on the African squadron. He was an instructor at the Naval Academy at the beginning of the Civil War and was as¬ signed to the South Atlantic squadron, with which he remained until 1862. He was then transferred to the North Atlantic squadron, was present at the engagements of Forts Royal and Hatteras and participated in the capture of Fort Fisher in 1865. He received promotion to com¬ mander in 1866, captain in 1872, commodore in 1880, was in command of the New York Navy Yard in 1882-84, and in the latter year was made rear-admiral in command of the naval forces of the Pacific. He was retired in 1885 at his own request.

UPSON, Anson Judd, American educator: b. Philadelphia, Pa., 7 Nov. 1823; d. Glens Falls, N. Y., 15 June 1902. He was graduated from Hamilton College, Clinton, N. Y., in 1843, and taught there until 1870, occupying the chair of logic and rhetoric in 1853-70. He was or¬ dained in the Presbyterian ministry in 1868, and in 1870-80 was pastor of the Second Presby¬ terian Church at Troy, N. Y. In 1880 he was appointed to the chair of sacred rhetoric at Au¬ burn Theological Seminary, in which office he remained until 1887, became vice-chancellor of the University of the State of New York in 1890, and from 1892 until his death was chan¬ cellor. He published Hnquiry into the Na¬ ture and Character of our Federal Government

(1840).

UPTON, Emory, American soldier : b. Ba¬ tavia, N. Y., 27 Au.g. 1839; d. San Francisco, Cal., 14 March 1881. He was graduated at West Point in 1861 and soon became lieutenant of the Fifth artillery. While serving on the staff of General Tyler he participated in the first battle of Bull Run, where he was wounded, and in the Peninsula and Maryland campaigns of 1862 (qq.v.). In October 1862 he was com¬ missioned colonel of the 121st New York volun¬ teers. He fought at Fredericksburg, and from Gettysburg to the Wilderness commanded a

brigade of the Sixth corps, distinguishing him¬ self at the battle of Rappahannock Station (q.v.), and especially at Spottsylvania Court House (q.v.), where he was wounded. For gallantry in the last-named action he was pro¬ moted brigadier-general of volunteers and brevetted lieutenant-colonel in the regular army. He participated in the Shenandoah campaign, was wounded at the battle of the Opequon (q.v.) and was brevetted major-general of volunteers. Later he served in Georgia and Alabama in command of the Fourth cavalry division under Gen. J. H. Wilson, and for his services at Selma was brevetted brigadier-gen¬ eral in the regular army. From 1868 to 1880 he served as lieutenant-colonel of the 25th in¬ fantry, and in the latter year was made colonel of the Fourth artillery. He originated a system of military tactics which was adopted by the government in 1867, and was commandant of cadets at West Point, 1870-75. Soon after at¬ taining his colonelcy in the regular army he suffered from mental disease and committed suicide. His publications include (A New Sys¬ tem of Infantry Tactics> (1867) ; (Tactics for Non-Military Bodies) (1870) ; (The Armies of Asia and Europe) (1878) ; and (1885).

UPTON. George Putnam, American mu¬ sical critic: b. Boston, 25 Oct. 1834; d. 19 May 1919. Graduated from Brown University in 1854 he entered journalism in Chicago a year later. He was musical critic and editorial writer on the Chicago Tribune for 25 years. He pub¬ lished (Letters of Peregrine Pickle (1870) ;*

(Lives of Haydn, Beethoven, Wagner and Liszt; (Standard Operas) (1890); (Standard Oratorios) (1891) ; (Standard Symphonies **

(1892), etc.

UPTON, William W., American jurist: b. Victor, N. Y., 17 July 1817; d. Washington, D. C., 23 Jan. 1896. In 1838 he went to Michi¬ gan where he studied law and held various offices, being a member of the legislature which located the capital at Lansing. He went to California in 1852 and was a member of the California legislature in 1856. He was prose¬ cuting attorney of Sacramento County, 1861-64. He moved to Portland, Ore., in 1865, whence he was almost immediately elected to the legis¬ lature. In 1867 he became a justice of the Supreme Court and became chief justice in 1872. In the Presidential election of 1876 the Republicans based their claim to the Oregon vote upon a telegram of Judge Upton, in which he called attention to the fact that the gov¬ ernor of Oregon could not exercise judicial powers in passing upon the eligibility of an elector. The Electoral Commission sustained

this contention, and Hayes became President. In 1877 Judge Upton was appointed second comptroller of the United States Treasury, which position he held until his resignation in 1885, during which time he passed finally upon nearly 160,000 accounts, involving about $160,000,000. In 1885 the government published his <(Digest of Decisions of the Second Comp¬ troller of the Treasury, 1869 to 1884.))

UPTON, Winslow, American astronomer: b. Salem, Mass., 12 Oct. 1853. He was gradu¬ ated from Brown University in 1875, studied astronomy at the University of Cincinnati and in 1877-79 was assistant astronomer at the Harvard Observatory. He was engaged in the United States Lake Survey as assistant engineer in 1879-80, was computer and assistant pro¬ fessor in the United States Signal Service in 1881-83, and has since been professor of as¬ tronomy at Brown University, where he was also dean in 1900-01. He served on the United States eclipse expeditions of 1878 and 1883, and was a member of private expeditions in 1887, 1889 and 1900. In 1896-97 he was absent on leave from Brown while making observa¬ tions at the Southern station of Harvard Ob¬ servatory at Arequipa, Peru. He has published (Star Atlas) (1896).

UPTON, Mass., town in Worcester County, on the Grafton and Upton Railroad, about 35 miles west by south of Boston and 12 miles southeast of Worcester. The town contains the villages of Upton Centre and West Upton. The chief industries are connected with farm products and the manufacture of straw hats. Pop. about 2,071.

UR OF THE CHALDEES. The home of the family of Abraham and the place from which he set out to find a location for his family. It was the old Babylonian city of Uru, situated on the right bank of the Euphrates River, 135 miles southeast from Babylon. It was a great and prosperous city, a centre of transportation routes by land and water, and the seat of worship of Sin the Moon God. Its modern name is Mukayyar or Mugheir. Its history has been traced as far back as 3,000 b.c. The ruins were first discovered by Taylor in 1853. Excavations in many places reveal the name and influence of Ur. The ruins are owned by Saadun, the sheik of the Montefik Arabs.

URABA, oo-ra-ba/, Gulf of. See Darien, Gulf of.

URAEMIA, a toxic condition caused by the presence in the blood of urinary constituents which normally should be secreted by the kid¬ neys. The nervous system is especially affected by the poisonous blood, as shown by mental disturbances, convulsions, headache, nausea, dyspnoea, disordered vision and coma. What the toxic material really is has not been deter¬ mined. It has been proved not to be urea alone, as was formerly believed. Some contend that the poison is a mixed product of uneliminated nitrogenous excrementitious substances ; others, that it is a newly formed albuminous substance not related to ordinary waste material, or is due to a disturbance of an internal venal secretion brought about by changed metabolic processes. Uraemia is usually associated with acute or chronic nephritis, or may result from suppres¬

sion or deficient secretion of urine from any cause.

The symptoms of uraemia depend upon whether the condition is acute or chronic. Acute uraemia may begin with a violent headache or persistent vomiting, with dyspnoea, convulsions, mania or coma. There may be only one of these symptoms present, or two or more may appear. The headache is usually occipital, and may be associated with deafness. The vomiting may be accompanied by diarrhoea, both being efforts to excrete the toxic material. The dyspnoea is frequently continuous and severe; the patient cannot lie down or sleep in any position with comfort ; there is much restlessness and tossing about ; the legs, if resting on the floor, readily swell from oedema. There is always a proba¬ bility of pulmonary oedema and cyanosis of the face and extremities. Whenever sudden un¬ controllable vomiting occurs without a known cause, or a severe and more or less continuous headache appears, uraemia should be suspected and the urine examined. The temperature in acute uraemia may be but little increased, or may rise 5° to 6° F. just before a paroxysm. The pulse varies, depending upon the condition of the heart and arteries ; it may be full and throb¬ bing, or small and hard and not especially rapid. The convulsions resemble those of epilepsy, but are not attended by a cry. They may come without warning or be preceded for a few days by twitching of the muscles of the face and hands ; and may occur frequently and persist¬ ently until coma ensues. Amaurosis may follow these convulsions for a few days, or hemiplegia or monoplegia may follow or precede them. The delirium of acute uraemia may be mild, muttering, or it may be maniacal. Coma is commonly present when there are gen¬ eral convulsions, and may appear without them, sometimes preceded by headache and dullness. The breathing is stertorous and the breath foul. The patient may recover from the

stupor or may remain in it for weeks.

In chronic uraemia the patient complains of severe occipital or frontal headache, more or less continuous. There is dyspnoea not depend¬ ent on exertion. There may be nausea, vomit¬ ing, diarrhoea and stomatitis. The breath is foul, the tongue coated with a brown offensive fur. The urine is usually increased in amount, is clear, acid, has a specific gravity of 1006 to 1010, contains albumen at variable periods, also a few hyaline or granular casts, and sometimes red blood-corpusclcs and leucocytes. The urea is often diminished.

The symptoms of chronic uraemia may last for months, but acute exacerbations with con¬ vulsions and coma may appear at any time, and such cases are susceptible to inflammation of the pericardium, pleura, meninges and endo¬ cardium. Melancholia and delusional insanity may occur. The skin frequently becomes dry and itches, and muscular cramps are common.

Uraemia must be distinguished from typhoid fever, alcoholism with coma, and from some forms of diabetes and meningitis. The prog¬ nosis of uraemia is not good, especially in albu¬ minuria patients, and those having advanced heart disease or arteriosclerosis; but patients may recover when apparently hopelessly sick.

Treatment. — Keep the patient in lied and between blankets, especially in acute attacks;

prevent him at all times from being chilled; induce free action of the skin by the hot pack, the hot air or steam bath, or the hot tub bath ; and keep the bowels free by saline purges. Diuretics, such as water (considered by many as the best diuretic), lemonade with cream of tartar, the liquor ammoniae acetatis, and the citrate of potassium, cannot be dispensed with. Cupping and poulticing of the loins (if the urine is scanty), venesection and hot saline injections are advocated. Sometimes heart stimulants, such as camphor, strychnine, digitalis and stro- phanthus are necessary. During convalescence tonics may be given and careful outdoor exer¬ cise resorted to, the patient being comfortably clad. In most cases the use of alcohol and tobacco should be interdicted. The diet is of prime importance. In acute uraemia it should be solely of milk, with seltzer, vichy or kumiss. In

the chronic form this should be the chief mode of administering food. As improvement sets in the patient may have meat broths, gruels, egg-albumen, custards, toast, baked potatoes, cereals, soft-boiled eggs, fresh fish, etc. Most authorities believe that red meats should not be given until the amount of urea found in the urine is about normal.

URAGA, oo-ra'ga, Japan, a seaport town of Hondo, in the Sagami province, 16 miles south¬ east of Yokohama. Perry Park opened in 1900 at Kurihama, a suburb, commemorates the ad¬ vent of Commodore Perry's fleet at Uraga in 1853 and the negotiations which led to the open¬ ing up of Japan again to foreign commercial and political relations. Pop. 13,000.

URAL-ALTAIC LANGUAGES, a fam¬ ily of languages of which two grand divisions are recognized by Max Muller, the Northern and the Southern. In the northern division are comprised the Tungusic, the Mongolic, the Turkic, the Finnic and the Samoyedic. The Tungusic dialects, lowest of all these in organ¬ ization, extend northward and westward from China. Of a grade a little higher are the Mon¬ golic dialects of China : in these the different parts of speech are hardly distinguished. But the Turkic dialects, chief among them the Os-manli of Constantinople, are rich in gram¬ matical forms; Turkic speech is common from the Polar Sea to the Adriatic. The Finnic division comprises the speech of the Baltic coasts and the Hungarian or Magyar. (See Finns; Hungary). Among the languages of the southern division are the Tamulic or Dravidian dialects of southern India (see Tamil) ; the Tibetan, the Taic or the dialects of Siam, and the Malaic or Malayan and Poly¬ nesian dialects. The Ural-Altaic languages all possess one characteristic feature; in them the radical or root is never obscured; also the determining or modifying syllables are usually placed at the end; the vowels in a word may be changed and modulated to harmonize with the keynote struck by its chief vowel. In the Turkish, for example, if a verb contains a sharp vowel in its radical portion, the vowels of the terminations are all sharp; but the same terminations when they follow a root with a flat vowel, modulate their vowels into a flat key; thus mck or mak being the infinitive ter¬ mination of verbs, sev-mek is the infinitive verb to love, but bak-niak is the infinitive verb to

regard. The Ural-Altaic languages are some¬ times Galled Turanian, also Finno-Tatar.

URAL (oo'ral or u'ral) MOUNTAINS, Russia, a long mountain range forming the con¬ ventional boundary between Europe and Asia, and

extending in a nearly north and south di¬ rection from the Arctic Ocean to the Caspian Sea, a distance of about 16,000 miles. The average height of its crest is 1,000 to 1,500 feet, but several peaks are over 5,000 feet, the high¬ est, Telpos, in the northern part of the chain, having an altitude of 5,433 feet. In the north the range forms a comparatively narrow ridge, destitute of trees. Further south it is covered with forests and spreads out to a width of nearly 200 miles, finally dividing on the south¬ ern boundary of Orenburg into a western and a southern outrunner, the latter known as the Mugadzhar Mountains, reaching to the Aral Sea. The principal rivers fed by the Ural chain are the Petchora and numerous affluents of the Obi, belonging to the Arctic Ocean ; and the Kama and Ural, belonging to the Caspian. The geological structure consists of an axis of granite and poryphry, covered on the slopes with palaeozoic strata. The mineral wealth is very great, especially in the central portion. The range is one of the principal sources of platinum, and gold is also found in places, iron is common, besides silver, lead, copper, rock salt and occasionally diamonds and precious stones. Considerable coal is mined in the west¬ ern area, and in time there should be a wide development of manufacturing industries. The iron output before the war for several years averaged over 20,000 tons.

URAL RIVER, Russia, a river which rises in the Ural Mountains in the northern part of the government of Orenburg, flows first south, then west, past Orenburg so far as Uralsk, then again south through the Uralsk district, empty¬ ing into the Caspian Sea through several mouths. It is 1,485 miles long and navigable to Orenburg for vessels of considerable size. Its sturgeon fisheries are important.

URALITE, a mineral which is a variety of amphibole and is produced by the alteration of pyroxene; found abundantly in the Ural region, Russia.

URALSK, oo-ralsk', Russian Central Asia. (1) The capital of the district of Uralsk, situ¬ ated on the Ural River, at the foot of the moun¬ tains, 160 miles southwest of Orenburg and 280 miles north of the Caspian Sea, on the railroad between Orenburg and Saratov. It has numer¬ ous churches, two high schools, a library, a museum and a theatre, steam mills, brick kilns and a brewery. Pop. about 47,880. (2) The

district bounded by Orenburg on the north, Turgai and the Caspian Sea on the east, Astra¬ khan on the west and the Transcaspian territory on the south. It is a desert country, lying largely below sea-level. The Ural River region, however, is fertile. A promising oil field

was opened at Emba in 1915. The area is 137,679 square miles. Population 889,600, or only 6.4 to the mile.

URANIA, u-ra'm-a, the <(heavenly one,® a title of Aphrodite, as the goddess of noble love, but more commonly the name of the muse of astronomy, a daughter of Zeus and Mne¬ mosyne. She is generally represented with a

crown of stars, in a garment spotted with stars, and holding in her left hand a celestial globe or a lyre. By Apollo she was mother of Hymenaeus and Linus. She was also the muse of astronomy. See Muses.

URANIID.7E, a family of moths. See Moth.

URANINITE, URANIN, or PITCH¬ BLENDE, a dark-green to black mineral be¬ longing to the isometric or cubical system. Usually occurs in a massive condition. Brittle, hardness 5.5 ; specific gravity, 6.4 to 9.7 ; lustre, submetallic and greasy or pitch-like ; streak, brownish-black to dark olive green; fracture, conchoidal ; composition : an oxide of uranium that may be considered a uranate of uranyl. It also contains some lead and very small amounts of other elements, among which are radium (q.v.) and the rare gaseous elements, helium. Pitchblende is the chief commercial source of uranium and radium. It is mined in consider¬ able quantities at Joachimsthal in Bohemia. Found also in many other places, as Cornwall, Saxony, Hungary, Turkey and in the United States in Connecticut, North Carolina, etc.

URANIUM, a metallic chemical element, symbol U, atomic weight 238.5, specific gravity 18.6. It was discovered by Klaproth (1789) in the mineral pitchblende and named by him in honor of Herschel's discovery of the planet Uranus. The body discovered by Klaproth was really the oxide of uranium, the free metal being first isolated by Peligot (1842). It is one of the rarer elements and occurs in nature only in combination with other elements. The prin¬ cipal minerals containing it in any considerable quantity are uraninite or pitchblende (75 to 85 per cent U2O3), a greenish mineral coming chiefly from Joachimsthal in Bohemia, though found in other places ; gummite, a hydrated cal¬ cium lead uranium silicate ; uranosplicerite, a hydrated bismuth uranite; torbernite, a hy¬ drated

copper uranium phosphate from Saxony and Cornwall ; autunite, a hydrated calcium uranium phosphate from the same regions ; uvanite, a hydrated compound of uranium and vanadium ; and carnotite, a potassium uranium vanadate. Carnotite is the most important ore in the United States. The latter carries im¬ portant amounts of radium (q.v.). Deposits are worked in Colorado and LTtah. The most important European deposits are at Joachimsthal in Austria and at various points in Saxony. The metal is prepared by heating a mixture of uranium chloride, sodium chloride, and carbon or of uranium chloride, sodium chloride and metallic sodium. It is a malleable white metal looking like nickel. It oxidizes .very slowly in ihe air at ordinary temperatures, but rapidly 1 urns to U3Os when heated above 400° F. Is soluble in mineral acids. It acts both as an acid and a basic element. We have uranous salts

URANOCIRCITE. A hydrous phosphate of uranium and barium, BaO.2UO3.P2O5.8H2O. Occurs near Keystone in the Black Hills of South Dakota and may become a source of radium.

URANOPHANE. A hydrons silicate of uranium and calcium. CaO.2UO3.2SiO2.6H2O. Occurs in Georgia, Idaho and North Carolina and may be a source of radium.

URANOSPINITE. An arsenate of ura¬ nium and calcium with probable constitution of CaO.2UO3.As2O0.8H2O. Equivalent to 47.6 per cent uranium. Found in Cane County, Utah.

URANUS, u'ra-nus, in Greek mythology, the son of Gaea, the earth, and by her the father of the Titans, Cyclopes, etc. He hated his chil¬ dren, and confined them in Tartarus, but on the instigation of Gaea, Kronos, the youngest of the Titans, overthrew and dethroned him.

*URANUS, in astronomy, one of the primary planets, and the seventh from the sun, discov¬ ered by Sir William Herschel in 1781. For many years it was called Georgium Sidus in England. The name Uranus was given by Bode. To the naked eye it appears like a star of the sixth magnitude. Its mean distance from the sun is about 1,782 millions of miles, and the length of the year 30,686.82 days, or about 84 cf our years. Its mean diameter is estimated at about 33,000 miles. Its volume exceeds the earth's about 67 times, but as its mean density is only 0.17 (the earth's being 1) its mass is only about 12jˆ times more. The length of its day is supposed to be between 9 and 10 hours. Ii has two small moons, one of nine, the other 1 3*4 days period; and two still smaller satellites of four and two and one-half days period re¬ spectively. None of them are*

believed to ex¬ ceed 500 miles diameter. They are named Ariel, Oberon, Titanic and Umbriel.

URAO. A natural sodium carbonate with composition 3Na20.4C02.5H20. Of common oc¬ currence in many lakes and lake deposits in the arid districts of western United States.

URATES, or LITHATES. Uric acid is sometimes called lithic acid and the salts of uric acid are therefore spoken of sometimes as urates or lithates.

URBAN, er'ban, the name of eight popes, given in the Latin as Urbanus, as follows:

URBAN I, Saint. He was the son of a Roman noble, Pontianus, and succeeded Calix- tus I, in 222. He suffered martyrdom in 230.

*URBAN II (Otho, or Odo of Lagny) : b. Chatillon sur-Marne, France, about 1042; d. Rome, 29 July 1099. He was a canon of Rheims, and a monk of Cluny where Gregory VII met him and invited him to Rome. He was soon after appointed cardinal and bishop of Ostia, and in 1088 he succeeded Victor III. The anti-pope Clement III was then in posses- *sion of Rome, but was obliged to flee in 1089. He returned in 1091 only to be again driven out in 1093 when Urban resumed possession of the city. At the council of Clement, in 1095, Urban preached the first crusade, and at the council of Bari in 1098 he attempted to bring about a union of the Greek and Latin churches. He maintained the validity of papal elections inde¬ pendently of the consent of Roman emperors, zealously enforced the law of priestly celibacy*

and forbade the clergy to accept ecclesiastical offices from laymen.

URBAN III (Uberto Crivelli, oo-ber'to- kre-vel'le) : b. Milan; d. Ferrara, 20 Oct. 1187. He was archbishop of Milan and succeeded Lucius III in the papal chair in 1185. He endeavored to send assistance to the Christians in the East, who were being sorely pressed by Saladoin, and after a struggle with Frederick Barbarossa was about to excommunicate that monarch when his own death intervened.

URBAN IV (Jacques Pantaleon, zhak pan-ta-la-on) : d. Orvieto,

Italy, 2 Oct. 1264. He was of French birth, the son of a shoemaker, and became successively canon of Liege, bishop of Verdun, and patriarch of Jerusalem. He succeeded Alexander IV in 1261. He excom¬ municated Manfred, king of Naples, and of¬ fered the crown to Charles, Count of Province and Anjou, and brother to Louis IX of France, which led to the subsequent wars of the Anjous for the possession of Sicily and Naples. He established the feast of Corpus Christi, first celebrated at Orvieto, 19 June 1264.

URBAN V (Guillaume de Grimoard, ge- yom de gre-mo-ar) : b. diocese of Mende, France, 1310; d. Avignon, France, 16 Dec. 1370. He was a Benedictine monk who became re¬ nowned as a professor of canon law and Scrip¬ ture and was raised to the dignity of abbot of Saint Victor at Marseilles and papal legate. He succeeded Innocent VI in 1362. He re¬ stored the papal seat from Avignon to Rome in 1367, founded many churches, and was a profound student and the patron of scholars. He was the first Pope to bless a golden rose for princes.

URBAN VI (Bartolomeo Prignano, bar- to-lom-ma'o pren-ya'no) : b. Naples, about 1318; d. Rome, 15 Oct. 1389. He was archbishop of Bari and chosen to succeed Gregory XI in 1378. The French cardinals dissatisfied with Urban withdrew to Anagni and there elected Robert of Geneva, who took the name of Clement VII, and took up his residence in Avignon. Thus was originated the famous (< Western Schism® which endured for nearly 50 years. Urban has been characterized as of harsh and violent tem¬ per, but an impartial survey of history will rather credit him with being severe and rigorous in disposition, which his enemies interpreted for their own purposes.

URBAN VII (John Baptist Castagna, kas-tan'ya) : b. Rome, 4 Aug. 1521 ; d. 28 Sept. 1590. He was archbishop of Rossano, cardinal and papal legate to Spain, and succeeded Sixtus V in 1590, but died 13 days after his election. He left his modest accumulations to be used as dowries for poor girls.

URBAN VIII (Maffeo Barberini, maf- fa'o bar-ba-re'ne) : b. Florence, 1568; d. Rome, 29 July 1644. Under Gregory XIV he was gov¬ ernor of Fano, under Clement VIII papal pro- thonotary, and in 1604 became archbishop of Nazareth (in partibns infidelium) and ambassa¬ dor to Paris. He became cardinal presbyter the next year and archbishop of Spoleto in 1608. He was elected successor of Gregory XV 6 Aug. 1623. He condemned the Jansenist tenets which then flourished in France, built the Collegium Urbanum or College of*

the Propaganda, estab¬

lished the Vatican Seminary, and issued the bull (In Ccena Domini } in its present form. He also gave the cardinals the title of Eminence, regu¬ lated the number of feasts of obligation, put forth a revised breviary, and was the author of some Latin and Italian poems. Consult Ward, (Copernicanism and Pope Paul V) (Dublin Review 1871) ; H. de l'Epinois, (Les Pieces du Proces de Galileo) (1877).

URBAN DISTRICT COUNCIL, a local

unit of administration under the English local government system, established by the Local Government Act of 1894. The district is usually circumscribed and in general was well defined as a sanitary improvement area pre¬ vious to the act. England and Wales have about 825 urban districts with populations varying from 300 to 150,000. New districts are created by vote of the county electors approved by the Local Government Board. The mem¬ bers of urban councils are elected for three- year terms by popular vote, about one-third of the members retiring each year. The suf¬ frage for the urban council elections is prac¬ tically universal, including all men and women ratepayers and lodgers qualified as parliamen¬ tary electors. Women are eligible to member¬ ship of an urban council. The chairman is selected by the elected members, all of whom serve without pay. The jurisdiction of this local unit of government is chiefly over sani¬ tation and public works. It also regulates public baths, libraries, parks and cemeteries in its territory, and in many cases owns and op¬ erates waterworks, gas and electric plants, street railways, etc. It levies a local rate for purposes of revenue and for large permanent improvements or public utilities it is em¬ powered to negotiate loans, subject, however, to the approval of the Local Government Board. Consult Annual Report of the Local Government Board; Odgers, (Local Govern¬ mentˆ (1901); and Redlich, J., and Hirst, F. W., (Local Government in England)

(1903).

URBANA, er-ban'a, Ill., city, county-seat of Champaign County, on the Illinois Central, the Wabash, the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 70 miles east of Springfield, and 110 miles south by west of Chicago. It is in an agricultural region, and in the vicinity are valuable deposits of fire¬ clay. It was settled in 1824, incorporated 6 May 1833, and chartered as a city in 1860. The chief industrial establishments are the <(Big Four® railroad shops, with 700 employees ; brick works, 300 employees, and lawn

mower and machine works, 50 employees. The principal public buildings are the county courthouse, municipal buildings, Y. M. C. A. building, the churches and schools. The educational institu¬ tions are the University of Illinois (q.v.), the Thornburn High School, public elementary schools and two libraries. There are three banks, two daily newspapers and several edu¬ cational monthlies. The government is ad¬ ministered under a charter granted by the legislature, which provides for a mayor and a council of 10 members, who are elected an¬ nually. Pop. 10,250.

URBANA, Ohio, city, county-seat of Cham¬ paign County, on the Erie, the Pittsburgh, Cin-

cinnati, Chicago and Saint Louis and the Cleve¬ land, Cincinnati, Chicago and Saint Louis rail¬ roads, about 13 miles north of Springfield and 45 miles west of Columbus. It is in an agri¬ cultural region. The chief industrial estab¬ lishments are the United States Rolling Stock Company works, carriage and wagon factories, stove works, machine shops, agricultural-imple¬ ment works, shoe factories, broom and furni¬ ture factories, woolen mills, straw-board works, water-wheel works, a tannery and a flour mill. The principal public buildings are the county courthouse, municipal buildings, churches and schools. The educational institutions are Ur- bana University (Swedenborgian) , founded in 1850, a high school (building cost $125,000), public and parish elementary schools, public library and the library of the university. There are three banks and two daily newspapers. Pop.

7,739.

URBINO, oor-be'no, Italy, a town in the province of Pesaro e Urbino, on an isolated hill in the midst of bleak and desolate mountains, 21 miles west by south of Pesaro. It is the see of an archbishop, and the seat of a university with two faculties — jurisprudence, and mathe¬ matics and natural science. Among the build¬ ings deserving of notice are the ducal palace, one of the finest edifices of the kind in Italy, and the cathedral. The chief industries are silk weaving, brickmaking, oil pressing and cheese and dairy factories. Sulphur mines are near by. Urbino is the birthplace of the painter Raphael. His house is still shown, and a statue of him was erected in 1897. From 1474 to 1626 Urbino was the capital of a duchy. Pop. of

commune about 20,000 ; of province

270,000.

URD. See Norns.

URDANETA, oor-da-na'ta, Andres, Span¬ ish navigator: b. Villafranca, Spain, 1498; d. Mexico, 3 Nov. 1568. He was appointed by Philip II chief pilot of the expedition under Miguel Lopez de Legazpe (q.v.) for the con¬ quest of the Philippine Islands. He sailed with the expedition from La Navidad, Mexico, 21 Nov. 1564 and after the capture of Cebu and Mindoro he returned to Mexico, where he died.

URDU, oor'doo, Hindustani language, the native name, now given to it by philologists, means ((camp language,® from the Turkish urdu, meaning camp. It is really the Hindi, a language of the Aryan family, with a multitude of Persian, Arabic and Turkish words intro¬ duced. These intrusions have in no wise altered or influenced the language itself, which, in inflectional and phonetic elements, remains a pure Aryan dialect. See Hindu.

/NH2

UREA, or CARBAMIDE, CO , is a

\NH2

physiologically important compound, being one of the chief nitrogenous decomposition products of animal metabolism. It appears in large quantities in the urine of carnivora ; the amount excreted by an adult human being is about one ounce in 24 hours. Urea is also present in small quantities in the blood, milk, perspiration, tears and other animal fluids. It does not occur to any great extent in the vegetable kingdom, al¬

though it has been detected in certain fungi, and in much smaller quantities in some higher plants.

Urea was discovered by Rouelle in 1773. Of historical interest is its synthesis by Wohler in 1828, this being practically the first organic compound prepared by synthetic methods. Wohler obtained it from an aqueous solution of ammonium cyanate. Urea may also be pre¬ pared (1) by treating phosgene (COCb) with ammonia; (2) by heating ammonium carbonate in a sealed tube at 140° C. ; (3) by treating cyanamide (CNNH2) with dilute sulphuric acid ; (4) by passing a mixture of ammonia and carbon dioxide through a red-hot tube. On a commercial scale urea has been obtained (1) by conducting phosgene into a mixture of phenol and dilute sodium hydroxide solution ; diphenyl carbonate (CO(OCeH5)2) is formed which upon treatment with dry ammonia yields urea and phenol; (2) by the action of catalysts, such as oxides or hydroxides of iron, chromium, tin, lead, etc., upon solution of cyanamide under vigorous agitation (Brit. 17,018) ; (3) by the treatment of a strong solution of a highly soluble cyanide with ammonia and carbon dioxide under special conditions of temperature and pressure (Can. 182,746) ; (4) by heating ammonium carbamate in the presence of one or more catalysts, the carbamate being obtained from solid carbon dioxide

and liquid ammonia (Brit. 24,042). Urea may also be extracted from urine by treating the concentrated liquid with oxalic acid, whereby the sparingly soluble oxalate is obtained; this is decomposed with calcium carbonate and filtered. The filtrate is decolorized with animal charcoal, concentrated and allowed to form crystals. .

Urea crystallizes in rhombic prisms or nee¬ dles which melt at 132° C. It is very soluble in water and alcohol, but insoluble in chloroform, ether, or ethyl acetate. Above its melting point it undergoes a series of changes yielding am¬ monia, biuret, cyanuric acid and other products. Nitrous acid, sodium hypochlorite, or sodium hypobromite decompose urea into nitrogen, carbon dioxide, and water. Heated with dilute acids or alkalis it breaks down yielding am¬ monia and carbon dioxide. With acids or salts it forms a series of addition compounds; with certain acids it forms condensation prod¬ ucts or ureids.

The amount of nitrogen excreted in the urine in the form of urea is very often a measure of the extent of the decomposition of albuminoid substances in the body; methods have therefore been worked out by Morner- Sjoquist, Pfliiger-Bleibtreu and others, for the quantitative estimation of nitrogen liberated from urea in a known volume of urine. The urine is first freed from nitrogenous impurities by precipitation with either barium compounds, or with a mixture of hydrochloric and phos- photungstic acids. The filtrate containing urea in solution is decomposed into ammonia and carbon dioxide by heating with phosphoric acid, and the total nitrogen set free as ammonia is estimated by Kjeldahl's method.

Urea has been used to a certain extent in the manufacture of dyes, Benzo-Fast Scarlet being formed from simple derivatives of the compound. Its value as plant food in some instances has been conclusively demonstrated. Its compounds with naphthalene derivatives

have been used in therapeutics, and stabilized compounds of urea with starch and hydrogen peroxide have been prepared which give hydro¬ gen peroxide when mixed with water.

V. S. Babasinian, Lehigh University.

UREDINACE.2E, the family of minute parasitic plants called rusts.

See Fungi.

UREN, William Simon, lawyer and re¬ former: b. Lancaster, Wis., 10 Jan. 1859. He was educated in the public schools, after which he took a business college course and studied law at Denver, Col., where he was admitted to the bar in 1881. He practised law at Gunnison and Denver for a few years, then traveled for his health and in 1891 settled in Milwaukee, Ore. ; in 1896 he resumed the practice of law as the senior member of the firm of Uren and Scheubel. When on his wray to Oregon he was impressed by Henry George's (

URETER, the right or left excretory duct of the kidney, which serves to convey the urine from the latter to the urinary bladder or cloaca. In man each ureter averages from 16 to 18 inches in length, and is of the aver¬ age diameter of a goose-quill. It consists of three coats, an outer or fibrous, a middle or muscular, and an inner or mucous coat. The ureter on leaving its kidney passes behind the peritoneum or lining membrane of the abdo¬ men, at the back of the latter cavity. It runs downward and inward from the lower part of the pelvis of the kidney, and enters the cavity of the bony pelvis (q.v.), passing downward and forward to open into the base of the bladder. The ureters open into the bladder each by a constricted orifice, and each in its course lies upon the psoas muscle. They de¬ rive their nerves from the inferior mesenteric, spermatic and hypogastric plexuses ; and their blood-vessels form the renal, spermatic and other arterial trunks. See Kidneys.

URETHRA, the canal leading from the bladder to the external urinary opening, and serving for the excretion of the urine. In the male the urethra traverses the penis, and its length varies from eight to nine inches. In the female it is a narrow membranous canal attain¬ ing a length of about one and one-half inches with a normal diameter of about one-quarter inch. It is thus a much more complicated structure in the male than in the female, and its anatomy and relations have to be carefully studied by the surgeon in view of the diseases to which it is subject, and also in connection with the im¬ portant operations of lithotomy and lithotrity (qq.v.). The urethra in man consists of three

coats : a mucous, a muscular, and an erectile coat. In the female the urethra is capable of great distention, so much so that it may be artificially dilated so as to permit the removal of calculi from the bladder without further operation. See Calculus ; Stricture.

URFE, Honore d', French pastoral writer: b. Marseilles, 1568; d.

Savoy, 1625. He was educated for the Church but turned to litera¬ ture and produced his

URGA, oor'ga, or BOGDO-KUREN,

Central Asia, a town, the capital of Northern Mongolia, on the Tola, at an elevation of 4,370 feet above sea-level. It contains several large Buddhist monasteries, occupied by about 10,000 monks, and is a sacred city of the Budd¬ hists, the seat of a high priest or lama. With the exception of the monasteries and temples the town is dirty and ill-built. It is the seat of the Chinese administration of Northern Mongolia, and there is a separate Chinese quarter. It is also a considerable trading centre, lying as it does at the junction of high¬ ways between Kiakhta and Peking. Before the World War the annual importations averaged nearly $8,000,000 value, and the exports $5,000,- 000. The outgoing trade is mostly in wool, hides and furs. A branch of the Mongolian bank finances most of the commerce. Buddhist Lamaism is the prevalent religion. Estimated pop. 40,000, part of whom are nomadic.

URI, oo'ri, Switzerland, a canton in the central part of the country, bounded by the Schwyz, Glarus, Grisons, Ticino, Valais, Bern and Unterwalden, and extending from the southeastern shores of the Lake of Lucerne almost to the Italian frontier. Area, 415 square miles. Capital, Altdorf. The canton is trav¬ ersed lengthwise by the narrow valley of the Reuss, which empties into the Lake of Lucerne, and which is hemmed in by lofty, glacier-cov¬ ered mountains belonging chiefly to the Glarner and Urner Alps. Large numbers of cattle, sheep and goats are raised, and excellent cheese produced. The principal mechanical industry is the manufacture of explosives and ammuni¬ tion. The canton is traversed by the Gotthard Railroad, and the tourist traffic is important. The inhabitants are chiefly Germans and Ro¬ man Catholics. Pop. 723,000.

URIAL, a wild sheep. See Oorial.

URIBE, Antonio Jose, Colombian lawyer: b. Medellin, Colombia, 6 March 1869. He was educated at the universities of Antioquia and Bogota, Colombia; was professor of the history of Spanish literature at the University of An¬ tioquia in 1891-92. He was Secretary of Agri¬ culture in 1891, member of Assembly in 1894 and from 1894 to 1911 was professor of civil and international law and of the history of diplomatics at the University of Bogota, where in 1903-04 he also was rector of the faculty of law and political science in 1903-04. He has also served as counsel to the Ministry of For¬ eign

Relations and in 1903-04 was Minister of

Public Instruction, president of the Senate in 1909 and of the House of Representatives in 1912. Mr. Uribe was one of the founders of the American Institute of International Law and is member of various European scientific and literary societies. His publications include (Reseha historica de la literatura castellana (1891) ; (Codigo de minas colombianos) (1891- 92) ; (Estudio sobre las Servidumbres segun los codigos civil y de minas de Colombia y la legis- lacion general comparadaˆ (1894) ; (Tratado de derecho civil colombiano) (1899) ; (Anales diplomaticos y consulares de Colombia* (1900, 1901) ; (E1 recurso de Casacion* (1903) ; xLa reforma administrativa> (1903) ; (Derecho mercantil colombiano) (1907) ; (Historia de la Sociedad de San Vincente de PauP (1908) ; (Supremacia moral del pontificado) (1909) ; (Anales de la Comision legislativa) (1910) ; (DiscursQs academicos y parlamentarios) (1912) ; (Federico Ozanam, apostol de la fe, apostol de la verdad, apostol de la Caridad* (1913) ; (Nulidades y Retracto en las sociedades de minas) (1913) ; xLa instruction publica en Colombia) (1913) ; (E1 proyecto de codigo*

penaP (1913) ; (Las misiones catolicas en Co¬ lombia (1913) and contributions to various legal and lay periodicals.*

URIC ACID, GH4N4O3, or NH — CO

CO C — NH 1 1 CO

NH — C— NH

occurs in the urine of carnivorous ani¬ mals, and in much larger quantities in the ex¬ creta of birds, reptiles, snails and insects. It may be present either in the free state or as acid ammonium or sodium salt. It exists nor¬ mally in the blood of birds, and as a pigment it has been detected on the wings of certain but¬ terflies. In small quantities uric acid is a con¬ stituent of normal human urine in which it was first detected by Scheele in 1776. It is produced in the human organism in large quantities when foods rich in nucleo-proteids are used, although the enzymes present in the liver convert the bulk of this product into urea. Under certain abnormal conditions it accumulates in the sys¬ tem forming urinary calculi, chalkstones, and other concretions. The tissues and joints

Uric acid may be prepared from the excreta of reptiles or birds by treatment with a boiling solution of caustic soda. The product is filtered and the clear hot liquid is strongly acidified with hydrochloric acid. The precipitated uric acid is washed with water and dried. Prepared in this way the acid is a white powder which shows the crystalline structure under the micro¬ scope. It dissolves in glycerine, piperazine, propylamine and caustic alkalies, but. is only sparingly soluble in water (one part in about 15,000 parts at 20° C., and in 1,800 parts at 100° C.). It dissolves in concentrated sulphuric acid without decomposition, and its molecular weight has been determined by the cryoscopic method, with this acid as the solvent. When uric acid is suspended in nitric acid, or chlorine water, and then evaporated to dryness, a yellow residue is formed which changes into purple-red when moistened with ammonia, or into violet

with caustic soda; this is known as the ((Mu- rexide Test® and is employed for the detection of the. acid.

Uric acid is a weak dibasic acid and may form a series of salts with the same metal. With sodium, for example, it forms 1) neutral sodium urate N32C5H2N4O3; 2) di-sodium urate NaHCsˆNXh; and 3) quadrisodium urate NaH(C6H2N403). HˆCsHˆOs).. The neutral urate is quite insoluble ; the quadriurate is quite soluble ; while the diurate may exist in a and b modifications. The a form is soluble and un¬ stable, readily passing into the b form which is stable and less soluble. This property of diu¬ rates and some other characteristics of uric acid have led investigators to the belief that the com¬ pound has two structural formulas, the <(lactam® formula given above, and the <(lactim® formula which is tautomeric with the lactam structure.

Although uric acid is almost exclusively a product of animal metabolism, its close rela¬ tion to compounds of vegetable origin has been clearly demonstrated. Chemically it is related to caffeine, the active principle in coffee, to theophylline, found in tea, and to theobromine, present in the cocoa bean. This keenship is strikingly illustrated by the relatively simple methods which have been successfully employed for the conversion of uric acid into these com¬ pounds.

V. S. Babasinian, Lehigh University.

URIEL, u'ri-el, one of the archangels of the Hebrew Midrash and apocryphal Scriptures. The name means <(the Light of God.® Uriel is described as standing on the left hand of the throne of God, where

he ministers light and forgiveness of sins to the children of Israel. He is introduced by Milton into (Paradise Lost,* and also appears in Longfellow's (Golden Legend. *

URIM and THUMMIM, in Hebrew ritual two appurtenances of the breastplate worn by the high priest. The two words, both plural, signify literally <(lights® and ˆperfections® ; in the Septuagint they are translated delosis (manifestation) and aletheia (truth), and in the Latin Vulgate doctrina (teaching or learn¬ ing) and veritas (truth). In the Hebrew Scrip¬ tures the two words are inseparable save in 1 Sam. xxviii, 6, where Urim alone occurs. The first mention of Urim and Thummim is in Ex. xxviii, 30; the other passages in which they occur are Lev. viii, 8; Num. xxvii, 21; Deut. xxxiii, 8; Ezra ii, 63; Nehem. vii, 65. They ap¬ pear to have served as an oracle through which the Divine Will might be ascertained. Jonathan Edwards writes that the High Priest's breast¬ plate was called the breastplate of judgment because ((in matters of judgment that were too hard for the judges they were to come to the Priest, who was to inquire of God by Urim and Thummim, in the breastplate, for a determina¬ tion.® The Jewish historian Josephus and some modern commentators teach that the Urim and Thummim are simply the 12 precious stones of the breastplate. Both Josephus and the ancient Rabbins held that those precious stones indi¬ cated the Divine Will by a preternatural lumi¬ nousness. Renan, interpreting the existing Hebrew texts with the aid of the Septuagint, regards the instrument of the Urim and Thum¬ mim either as a sort of chessboard or as a

whirligig cr rotating winged globe ((Hist. Peup. dTsr., > I, 275).

URINARY ANALYSIS, that branch of chemical and microscopical analysis which has to do with the detection or quantitative estima¬ tion of the constituents of urine. In practice, it is mostly concerned with the examination of the urine for such constituents as may have a known clinical significance. The average quan¬ tity of urine passed by an adult is probably about 50 fluid ounces (1,500 cubic centimeters) per day, though this may vary widely within the limits of health. The quantity is increased by drinking large amounts of water, and, tem¬ porarily, by the administration of diuretics; and it is decreased by unusual activity of the skin, as well as by several other causes. In general, the quantity of water taken into the system through the mouth must be equal, in the long run, to that which is

eliminated through the kidneys, skin, bowels, lungs and nose. The specific gravity of the urine also varies to a considerable extent, the normal specific gravity, when the quantity passed is 50 ounces per day, being about 1.020. Any cause which tends to increase the quantity of urine secreted will, In general, decrease the specific gravity, and vice- versa; the total quantity of solid matter that the urine contains in solution being normally much less variable than the quantity of the urine it¬ self. The specific gravity has a marked significance only when it is high without the urine being scanty, or low without the urine being copious. The ideal way to obtain a sam¬ ple for analysis is to save what is passed throughout the 24 hours, mix it, and take the sample from the result. Urine thus obtained is technically called <(mixed urine.® It is often inconvenient to go to this trouble, especially in hot weather, when special care must be taken to prevent the mixed product from spoiling before the sample can be prepared and transmitted to the analyst; and it is, therefore, customary to take the sample from what is passed in the morning, experience indicating that a specimen taken at this time will correspond fairly well with mixed urine. Mixed urine should always show a slightly acid reaction, and the same is true of samples taken at any time during the day, except after a meal, when the reaction may be neutral, or even alkaline. Urine often con¬ tains slight clouds of mucus or other substances, which become visible after the specimen has been allowed to stand for a short time. These are usually of no clinical importance, merely indicating some slight irritation along the uri¬ nary passages, or some recent indiscretion in diet. After urine has been passed (and more quickly in hot weather than in cold) the urea that it contains decomposes and passes into the form of ammonium carbonate ; and when the quantity of ammonium carbonate present is sufficient to make the reaction distinctly alka¬ line, the urine becomes semi-opaque from the deposition of a white cloud of phosphates, urates and other substances.

In the examination of a specimen of urine, the analyst cannot undertake to test it for every constituent that might conceivably be present as a pathological symptom. He will be guided by the general nature of the patient's illness, and will seek for those elements which may be of special significance. In the examina¬

tion of presumably healthy candidates for life insurance it is customary to look for nothing but albumin and sugar, unless the specific grav¬ ity, when considered in connection with the quantity of urine passed, is high enough to indi¬ cate the presence of an abnormal amount of some other constituent. In general practice,

however, it is often necessary to examine, not only for sugar and albumin, but also for pus, biliary coloring matters, blood-corpuscles and "casts® from the little uriniferous tubes of the kidneys. It is frequently important, too, to make a more or less accurate quantitative de¬ termination of the urea that is passed and some¬ times of the chlorides also.

A "cast® may be formed in the kidney in any one of several ways, the simplest being by the direct exudation, into a little tubule of the kidney, of some coagulable constituent of the blood. After this becomes solidified, it may eventually become discharged from the tubule with the urine and pass into the bladder in the form of a microscopic plug of approximately cylindrical shape. To detect the presence of casts and of blood-corpucles and other undis¬ solved constituents, the urine may be allowed to stand for some time in a conical glass ves¬ sel, whose sides slope down to an acute point at the bottom. After a couple of hours, or when it is judged that the solid constituents that may be present have settled to the bottom or risen to the top, or taken such other positions as may correspond to their specific gravities, a few drops are drawn off by means of a pipette from the surface and from the very apex of the glass at the bottom and also from such other levels as may appear to contain floating matters; and every sample so taken away is separately and carefully examined under the microscope. The correct identification of the different objects that such an examination reveals calls for a con¬ siderable amount of practical experience with the microscope. Much assistance may be de¬ rived, however, from Beale's

Albumin is not a normal constituent of urine and when it is present continuously and in anv considerable quantity it constitutes a grave symptom. When present, it is in solution, and hence is not at all evident to the eye until it has been coagulated by the action of heat or some other agent. In testing a sample by heat a test tube is half filled with perfectly clear urine and heat is applied to the upper part of the liquid until boiling occurs. If the boiled urine becomes turbid in the least degree, the turbidity is due either to the presence of coagu¬ lated albumin or to the precipitation of the phosphates of lime and magnesia that are nor¬ mally present in all urine. The earthy phos¬ phates promptly redissolve upon the addition of a few drops of nitric or acetic acid; but if the turbidity is really due to albumin it does not

pass away upon this treatment. The object of heating only the top part of the test tube hold¬ ing the urine is to facilitate the recognition of a precipitate, a comparison of the upper and lower parts of the test tube, in a good light, rendering the slightest loss of transparency finite visible. If no precipitate is obtained, a drop or two of nitric acid should be added and the boiling repeated. A number oi trials of tins sort should be made, the nitric acid being added, a few drops at a time, until a consider¬ able quantity of it is present. The consistent absence of a precipitate in all these tests in¬ dicates that albumin is not present. Physicians often make the serious error of adding too much nitric acid to th 3 urine at the start. This is dangerous, because if any considerable quan¬ tity of nitric acid is added at the outset, it not infrequently happens that albumin will not be thrown down at all, even when much albumin is really present. The directions given above should, therefore, be followed implicitly, the urine being first boiled without any acid at all and then again after successive additions of a drop or two have been made, until as many as 15 or 20 drops have been added.

"Heller's test® lor albumin depends upon the fact that strong nitric acid throws down albu¬ min from its solution, in the cold. In applying this test, a convenient quantity of strong, pure, colorless nitric acid is first placed in the bottom of a small test tube and an equal bulk of per¬ fectly clear urine is allowed to flow down upon it gently, the test tube being inclined so that the urine may float upon the surface of the acid and not mix with it. If albumin is present, a sharp white zone appears at the surface of separation of the acid and the urine, the thick¬ ness of this zone varying with the quantity of albumin. When normal urine is treated in this manner, a brown ring is formed at the surface of separation. In cases of fever, or when there is an excessive amount of coloring matter of any kind present, the albumin in Heller's test may be tinted, so as to appear brownish, red¬ dish, violet or greenish. Urates, when present in excess, also give a zone marked by a pre¬ cipitate; but the precipitated urates differ from albumin in being soluble when the urine is cautiously warmed without being allowed to mingle with the acid to any great extent.

In testing urine for the presence of sugar the test is ordinarily made to depend upon the fact that diabetic sugar will throw down a yel¬ lowish or reddish precipitate of oxide of copper from an alkaline solution of copper sulphate and sodium (or potassium) tartrate. ˆ The test solutions that are ordinarily employed for this purpose are known, respectively, as ((Fehling's solution® and ((Pavy's solution® (qq.v.). In making a test, about one cubic centimeter of the test

solution is placed in a test tube, diluted with about four times its own bulk of water and then boiled for a few seconds. If a pre¬ cipitate is thrown down by this treatment, the test solution has spoiled and should be replaced by a freshly prepared one. If no precipitate is thrown down by boiling the test solution alone, the suspected urine should be immediately added, drop by drop. If any considerable quan¬ tity of sugar is present, a precipitate will be obtained almost immediately. In the absence of a precipitate, however, the urine should be added, a few drops at a lime, with occasional

heating, until the quantity added is about equal to that of the original, diluted test fluid. If no precipitate is obtained, sugar, clinically speak¬ ing, is absent. It should be observed that the formation of an actual precipitate must be ob¬ served in this test; the mere decolorization of the blue test solution being no criterion of the presence of sugar. • Other methods are known for the detection and estimation of sugar in urine, but the copper test, as described above, is the one upon which physicians rely almost ex¬ clusively.

The nitrogen waste of the body passes away mainly through the urine, in the form of urea, CON2H4, and of compounds of uric acid (C5H4N4O3) with the alkalies and the alkaline earths. The approximate estimation of urea and uric acid is, therefore, often of considerable im¬ portance. The determination of urea by the well-known "hypobromite process® is based upon the fact that sodium hypobromite, NaBrO, de¬ composes urea quickly and completely in accord¬ ance with the equation CON2H4 + 3NaBrO — 3NaBr + CO2 + 2FLO +2N. The sodium bro¬ mide (NaBr) that is formed remains in solu¬ tion and the carbon dioxide (CO2) that is liber¬ ated is absorbed by the test solution, which is made to contain a large excess of sodium hydrate. The only visible product of the de¬ composition is the nitrogen gas, which is col¬ lected and measured, and which serves to indi¬ cate the quantity of urea decomposed. The hypobromite solution is made from water, caustic soda and bromine. Various proportions are used, but Tyson recommends dissolving 100 grams of caustic soda in 250 cubic centimeters of water and adding 25 cubic centimeters of bromine to the solution so formed. In practice the reaction is carried out in a special form of apparatus which has a vertical graduated tube to collect and measure the nitrogen. The ap¬ paratus is first filled with the test solution and one cubic centimeter of urine is then introduced into it by means of a pipette. The decomposi¬ tion of the urea begins at once, a copious stream of nitrogen bubbles passing up into the vertical collecting tube. In 20 minutes or less the reaction is complete and the number of cubic centimeters of free nitrogen is read from the graduated

collection tube. For great re¬ finement the volume of this gas must be cor¬ rected to standard conditions of temperature and pressure; but for ordinary clinical purposes this is not necessary and it is sufficient to read the number of cubic centimeters of gas directly from the apparatus. Multiplying this number by 0.00282, we obtain 'the number of grams of urea that the given cubic centimeter of urine contained ; and upon multiplying this product again by the total number of cubic centimeters passed by the patient, we obtain the total num¬ ber of grams of urea passed. The total amount of urea passed by a healthy adult may range from 20 to 40 grams per 24 hours.

In health, practically all of the uric acid in the urine occurs in combination with potassium, ammonium, sodium, calcium and magnesium in the form of salts known as (

for 24 hours. The nitric acid gradually re¬ places the uric acid in its combinations and the freed uric acid, owing to its insolubility, is de¬ posited upon the sides and bottom of the beaker in the form of yellowish-red crystals. These may be collected, washed with cold distilled water and then dried and weighed; the weight so obtained giving the quantity of uric acid present in 200 cubic centimeters of the urine. In health, the quantity of uric acid passed by the kidneys in 24 hours may range from 0.4 to 0.8 gram. The heavy <(brick-dust® deposit that is often observed in urine that has stood for a time, and which is frequently referred to in the advertisements of proprietary (

Allan D. Risteen.

URINARY BLADDER. See Bladder. URINARY CALCULUS. See Calculus.

URINARY ORGANS, the organs con¬ cerned in the secretion and discharge of urine ; namely, the kidneys, which secrete the urine ; the ureters which convey it to the bladder; the bladder or hollow organ in which it is stored; and the urethra, by which it is passed out of the body. All of these organs are lined with a continuous mucous membrane. See Blad¬ der; Kidneys; Ureter; Urethra; Urine.

URINE, the fluid secreted by the kidneys, stored in the bladder and discharged by the urethra. It is an excrementitious fluid, eject¬ ing

from the system substances which if re¬ tained would impair health and destroy life (retention and suppression of urine). Healthy urine consists of water, urea, uric acid, hip- puric acid, creatinin, phosphates, chlorides and sulphates, mucus and other ingredients. The abnormal matters found in the urine in various conditions include acetone, albumin, albumose, bile, blood, cystin, glucose, hemoglobin, fat, pus, spermatozoa, epithelial cells, casts, etc. (See Urinary Analysis). Normal urine is a trans¬ parent aqueous fluid, of an amber color, acid reaction, a peculiar odor, and with a specific gravity of about 1.020 when passed in the aver¬ age quantity of 50 ounces in the 24 hours. But each one of these characteristics is liable to some variations within the limits of health, as well as in disease.

As to transparency, it is quite constant, but cannot be considered an essential of normal urine, and on the other hand, because a given specimen of urine is transparent it is not neces¬ sarily normal. Urine transparent when passed frequently shows a faint cloudiness in some portion when standing, due to mucus, the slimy secretion from the mucous surface of the urinary organs. This cloudiness is most pro¬

nounced in the urine of females. Mucus can be filtered out, leaving the urine clear. Normal slightly acid urine may be somewhat turbid when passed from the presence of the earthy phosphates of calcium and magnesium, which after a time subside in the vessel, becoming a sediment. This sediment will disappear on the addition of a few drops of any acid, as nitric, but is increased by heat applied. Sometimes normal urine, on standing for a short time in a cold room, deposits a white or pink light sedi¬ ment, the mixed urates of sodium, potassium, calcium and magnesium. This is believed to be due to the lowering of the temperature of the urine. Normal urine may also be somewhat turbid from the presence of alkaline carbonates. Pathologically, urine may be more or less opaque from abnormal degrees of the above conditions, or from the presence of pus, bac¬ teria or fat, as in chylous urine, so called. As the result of disease the normal aqueous urine may become viscid or glutinous from the pres¬ ence of mucus, or mucus and pus, etc. As to the color of normal urine, it is subject to con¬ siderable variation in health. As color is due to coloring matters in solution, it is deeper or paler according to the proportion of water present. For example, after much beer or water drinking the discharge of urine is large and the color very pale. When the skin is active, excreting much water in perspiration, the amount of urine is diminished and the color darker than usual; but in winter, when the skin is less active, the urine is increased in amount and is of lighter color. As the result of disease, there may be almost an entire ab¬ sence of color, as in the copious urines of diabetes,

hysteria and convulsions. Or it may be high colored in fevers and febrile states, due to a diminution in the amount of water and the addition of abnormal coloring matters such as blood, or blood-coloring matters or bile pigments. Certain vegetable matters, such as santonin, also color the urine.

The reaction of normal mixed urine or the urine of the entire 24 hours is always acid. Freshly passed urine at different times of the day shows usually a varying amount of acidity ; but urine examined three or four hours after a meal may be neutral or even alkaline. The cause of this change is still doubtful. Urine allowed to stand for a short time, especially in a moderate temperature, sometimes increases in acidity. The cause is not definitely settled. Neutral and even acid urines standing for some time, especially in hot weather, become alka¬ line, have an ammoniacal odor, and are turbid, and sometimes an iridescent pellicle forms on the surface. The turbidity and sedimentary de¬ posits are caused by the precipitation of the crystalline triple phosphate of ammonium and magnesium, the amorphous phosphate of lime, the urate of ammonium and by bacteria.

The peculiar and characteristic odor of nor¬ mal urine becomes a <(strong odor® in highly concentrated urines, a <(putrescent® one when mucus and other organic matters are decom¬ posed, an <(ammoniacal® one when the ammo¬ nium carbonate has formed from the urea, or a sweetish one from the presence of sugar in the urine.

Certain substances ingested also give dis- t nctive odors to urine, as turpentine producing

the odor of violets, and the odors of ctibebs, copaiba and sandal-wood oil.

The specific gravity, though normally about 1.020, for 50 ounces of urine per 24 hours, when the skin is not acting freely and after copious use of water and diuretics, may descend to 1.010 or lower and yet be within the limits of health. Or when the urine becomes concen¬ trated by the drain of water through the skin or some other channel the specific gravity may rise to 1.030 or higher. The normal range may be said to be from 1.005 to 1.030, but to be relia¬ ble,

observation should be made on the entire quantity of urine passed in 24 hours. The specific gravity in diabetes mellitus sometimes reaches 1.050, and, according to Tyson, if in a copious urine the specific gravity is over 1.028 there is a suspicion of diabetes, and even if it is 1.010 or lower it is not safe to infer from this circumstance alone the absence of sugar. Specific gravity is also increased in the first stage of acute fevers, and of acute Bright's dis¬ ease. It is lowered in hysterical complaints and in all forms of nephritis except the acute.

The quantity of urine is increased in diabetes mellitus and insipidus, in hysterical and convulsive conditions, in cardiac hyper¬ trophy and all conditions which cause increased blood pressure, by the peripheral action of cold, etc. It is diminished in most forms of Bright's disease and in the early history of acute fevers and inflammatory conditions. Mor¬ bid conditions of the urine include glycosuria or .glucosuria, oxaluria, albuminuria and phos- phaturia. Consult Simon, E. C., (A Manual of Clinical Diagnosis) (8th ed., Philadelphia 1914); Reference Handbook of the Medical Sciences5 (New York 1915).

URINOMETER, an instrument for ascer¬ taining the specific gravity of urine (q.v.). It is constructed on the principle of the hydrome¬ ter, usually graduated from 1,000 to 1,040, and indicates variations in the density of urine which are of great importance in the treat¬ ment of disease.

URIU, Sotokichi, oor-i-yoo so-to-ke'-che, Japanese baron and admiral : b. Kanazawa 1854. He entered the navy early and was sent to America for study. A bill introduced by Sen¬ ator Frelinghuysen of New Jersey permitted Japanese to enter the United States Naval Acad¬ emy at Annapolis and Uriu graduated with honors. Promoted to be captain, he was attache at the French Legation in Japan, 1891-96 and afterward commanded some of the largest war¬ ships in the navy of Japan. He became rear- admiral in 1900. In 1904, outside of the harbor of Chemulpo, Korea, with his detachment he sunk the Russian warships Variag and Korietz. In this battle 100 Russians were killed and wounded, but neither ship or man on the Jap¬ anese side was hurt. He had an active part in the battles of 14 August, off Shantung and in the destruction of the Baltic fleet in the sea of Japan; was commandant at various naval stations, including Yokoska, 1909-12 ; and was made member of the Admiral's Council in 1909, in which year he and his wife revisited America. He retired in 1912.

URMY, Clarence (Thomas), American poet and musician: b. San

Francisco, Cal., 10 July 1858. He is an organist and choirmaster, and his songs and other verses deal with Cali¬

fornia themes. He has published (A Rosary of Rhyme5 (1884) ; (A Vintage of Verse5 (1897).

URN, Cinerary. See Urn Burial.

URN BURIAL, either the deposition of human ashes in a cinerary urn after crema¬ tion, or the enclosing of a dead body in two large urns placed mouth to mouth and sealed ; both methods were employed in Grecian an¬ tiquity. The Grecian pithos or wine jar had a wide mouth, and in size and shape was like the large oil-jars of southern Europe. It was used as an urn to contain human ashes ; and two such jars sometimes served as a rude coffin. Such coffins are found in ancient burying places in the Troad. See Cremation of the Dead.

UROCHORDA. See Tunicata.

URODELA, or GRADIENTIA, a division

of amphibians (see Amphibia) comprising those in which the tail persists in adult life. The skin is naked and soft, and an exoskeleton is rarely present. The body is elongated, and most of them have the four limbs well de¬ veloped, but in some the posterior limbs are wanting. The order is conveniently divided into :

(1) Perennibranchiata, which retain the gills throughout life: including the American Necturus, the blind Proteus of the under¬ ground caves of Varniola in Dalmatia, and the eel-like Siren of North America.

(2) Derotremcita, in which the gills are lost in the adult, but there is usually a persistent gill-cleft: including the newt-like Crypto-branchus and the eel-like Amphinma from North America, and the giant salamander, Megalobotraclius, of China and Japan.

(3) Myctodera, the salamanders and newts, in which the gills are lost and the gill-clefts closed in the adult : including the common newts or efts (Molge), the spotted and black sala¬ manders (Salamandra) of the European Con¬ tinent, and the American Amblystoma, the sex¬ ually mature larva of which is the well-known axolotl.

UROTROPINE, Hexamethylene tetramine, /CH2 — n = ch2

(CH2)gN4 or N / CH2 — N = CH2,was dis-

*\CH2 — N = * ch3*

covered by Butlerow in 1860. It is obtained by treating formaldehyde or paraformaldehyde with ammonium hydroxide. The reaction mix¬ ture is cooled and then evaporated with the gradual addition of ammonium hydroxide. It is filtered, and the solid product which forms in the filtrate is purified by crystallization from alcohol.

Urotropine crystallizes in shiny rhombohe- dra. It melts at 165° to 175° C., dissolves readily in cold water, not so readily in hot water. It is also fairly soluble in alcohol and chloroform. When heated with acids it decom¬ poses into ammonia and formaldehyde. It is a basic compound forming salts with a number of heavy metals, although its water solution does not react with litmus. Urotropine has been used as a uric acid solvent, and more ex¬ tensively as an internal antiseptic. It has been made to combine with acids, alkyl haloids, iodine, phenols, metallic salts, etc., forming com¬ pounds that are used as antiseptics, dusting powders, disinfectants or uric acid solvents. Urotropine has also been used in conjunction

with sodium phenate, in gas masks as a protec¬ tion against phosgene.

URQUHART, erk'art, David, Scottish po¬ litical economist : b. Brackbanwell, Scotland, 1805; d. Naples, Italy, 16 May 1877. He was educated at Oxford, entered the diplomatic service and later traveled extensively in the East. He was secretary of the British lega¬ tion at Constantinople in 1835-36, but resigned that position because of his opposition to the policy of Lord Palmerston, which he consid¬ ered as subservient to the ambitions of Russia. He was member of Parliament for Stafford in 1847-52 and maintained a vigorous opposi¬ tion to Palmerston, his Parliamentary attacks supplementing his writings for the press, and succeeding in instilling into the public mind a distrust of Russia's eastern policy. His works include (England, France, Russia and Turkey) (1835) ; (The Spirit of the East) (2 vols., 1838) ; (Progress of Russia in the West, North and South } (1853) ; (Recent

Events in the East) (1854), etc.

URQUIZA, oor-ke'tha, Justo Jose de,

Argentine soldier and politician : b. near Con¬ cepcion del Uruguay (now in Entre Rios, Ar¬ gentina), 19 March 1800; d. there, 11 April 1870. He was of mixed Spanish and Indian blood and during the war in La Plata in 1835— 42 gradually rose in influence until he became a general of division under Rosas, dictator of Buenos Aires. In 1844 he commanded the army sent against Uruguay, and in 1845, at the battle of India Muerte, he defeated Ribera. He was elected governor of Entre Rios in 1846, as leader of the federalist party. His administration of affairs was directed rather to his own glory and gain than to any benefit for the people, but he contrived to maintain a peaceful and prosperous condition of the coun¬ try while strengthening his power, meanwhile acquiring great wealth. In 1851 he turned against Rosas, allied his forces with Brazil and Montevideo, and marched into Uruguay. He forced the capitulation of Oribe 8 Oct. 1851, then invaded Buenos Aires, and on 3 Feb. 1852 defeated Rosas at Monte Caseros. Urquiza was proclaimed provisional dictator and after the adoption of a federal constitution by the provinces (excepting Buenos Aires) he was in 1853 elected President for a term of six years. In 1859 he forced Buenos Aires to join the confederation, and after the expiration of his term of office took command of the army and endeavored to quell the revolt which had arisen in that country. He was defeated by Mitre at Pavon, 17 Sept. 1861, the result being the aban¬ donment of the federalist constitution for the one since in force. He retired to Entre Rios, where he acted as governor, exercising semi- dictatorial powers, though nominally under the authority of the central government. In 1870 a formidable revolt arose, headed by his son-in- law, Gen. Lopez Jordan, and Urquiza was at¬ tacked in his palace and killed.

URSA MAJOR, er'sa ma'jor, or GREAT BEAR, a northern constellation whose seven brightest stars are well known as Charles' Wain, the Plow, the Dipper, the Septentriones, and sometimes as the Butcher's Cleaver. Two of these seven stars are called the pointers, because they and the polestar lie nearly in a

right line, and these stars direct an observer to the pole-star. The most conspicuous star of the constellation, Mizar, is noteworthy as being the first star discovered to be double or binary, and later the larger component was discovered to be also a twin. Ursa Minor, or Little Bear, a smaller constellation of the same configura¬ tion as Ursa Major, lies near the north pole, and includes the pole star.

URSID2E, the family of the bears (q.v.).

URSINUS (er-sl'nus) COLLEGE, located at Collegeville, Pa. It was

incorporated in 1869, and was first opened to students in 1870; Free¬ land Seminary, whoLe property was purchased for the college, was incorporated into the col¬ lege as its preparatory department; in 1871 a theological department was organized. The college is non-sectarian in its control, the board of directors being self-perpetuating; it is, however, affiliated with the Reformed Church in the United States, and the theo¬ logical professors are ministers of that church. The organization of the college includes the College Department, the Academy, the School of Theology and the Summer Sessions. The School of Theology has been located in Phila¬ delphia since 1898. The College Department offers six groups of studies, leading to the degree of A.B. ; the groups are the classical, the Latin-mathematical, the mathematical- physical, the chemical-biological, the historical- political, and the modern language. The de¬ gree of A.M. is conferred for graduate work. In the School of Theology the regular course occupies three years; the curriculum, in addi¬ tion to the ordinary theological curriculum, in¬ cludes a lecture course in Sunday-school work, a complete course in the English Bible, a special course in the history of the Reformed Church, and a course in sociology; graduate courses are offered leading to the degree of B.D. The Summer Session offers courses of secondary and collegiate grade, work in the latter counting toward a degree. Women are admitted to all departments except the theo¬ logical. The students in all departments aver¬ age about 200 and the instructors 18, while the productive funds aggregate $240,000, and the total income $75,000. There are 600 graduates at this date.

URSUA, oor-soo'a, or ORSUA, Pedro de,

Spanish soldier: b. Ursua, Navarre, about 1510; d. Machiparo, on the Upper Amazon, 1 Jan. 1561. He accompanied a Spanish expedition to New Granada, was governor of that country in 1545-46, and later led two expeditions from Bogota in search of El Dorado. He com¬ manded a force against the Cimarrones (fugitive slaves) on the Isthmus of Panama in 1555-57 and reduced them to subjection. In 1559 he was given command by the viceroy of Peru of an expedition to conquer the (

formed among his followers, led by Lope de Aguirre, and he was murdered.

URSULA, er-su'la, Saint, virgin martyr, ac¬ cording to the legend, a daughter of a prince in Britain. She was put to death at Cologne by a horde of Huns, some say in 384, others in 453, together with 11,000 virgins who accom¬ panied her. According to another reading the number of her companions was only eleven. The Roman martyrology mentions the saint and her virgin companions without stating their number. Some bones, said to be those of herself and her companions, are still shown to visitors. The day dedicated to her honor is the 21st of October. Saint Ursula was the patroness of the Sorbonne. Consult Baring- Gould, (Popular Myths of the Middle Ages) ; Stein, (Die Heilige Ursula) (1879).

URSULINE (er'su-lin) CONVENT AND ACADEMY OF SAINT LOUIS (Mo). Founded in 1848 by four sisters from Oeden- burg, Austria, incorporated in Missouri in 1884. It is one of the oldest houses of the order in the United States. They opened the school 2 Nov. 1848, in a small house on Fifth street. In 1849 they were reinforced by six sisters from Landshut, Bavaria, and also received con¬ siderable pecuniary assistance from the Bavarian king, Louis I. Early in 1850 the city block bounded by 11th and 12th streets and Russell and Ann avenues, was purchased for them by Archbishop Kenrick, and extensive buildings — convent, academy, day school — – mark this their present location, whence band after band has since gone forth to found houses in other localities. In 1855 a colony of 12 set out for New York and established a house of the order at East Morrisania, N. Y. In 1859, in answer to an appeal from Bishop Juncker, seven sisters left the mother house to open a school at Alton, Ill. In 1877 another band went forth to plant the standard of educa¬ tion in the beautiful valley of Arcadia, Mo. Here they established an academy that bids fair to equal the one in Saint Louis in course of time. The Saint Louis community now numbers 160 members, and besides the flourish¬ ing academy and day-school connected with the mother house, the community supplies 16 parochial schools with teachers. These schools aggregate about 1,500 pupils — thus bearing out the motto of the institute : ((Mores Scientiaque?

URSULINE SISTERS. See Orders, Re¬ ligious.

URTICACEiE, or NETTLEWORTS.

See Nettle.

URTICARIA, an inflammatory eruptive affection of the skin, also called hives and nettle-rash, the latter name referring to the resemblance of the wheals or rounded eleva¬ tions of cuticle to those

caused by the sting of a nettle. The wheals are either rounded or elongated, appearing white at first, and after¬ ward changing to red, the altered hue being more quickly assumed in consequence of rul>- bing or scratching to which the intense itching usually leads. Frequently urticaria follows upon gastric disturbance caused by eating certain fruits, shell-fish, or other foods that disagrees with the stomach fluids. It may also be due to disorders of menstruation, to various func¬ tional irregularities, or to local irritations.

Some of the balsamic drugs likewise give rise to it. The eruption appears and disappears suddenly in successive crops of wheals. In treatment it is necessary to evacuate the bowels and regulate the diet so as to restore the normal digestive condition, and cold-cream, glycerine, dilute acids, bichloride of mercury, etc., are useful, locally. Salt-water baths are recom¬ mended for relief of the itching. For internal remedies salicylates and alkalies are ad¬ ministered, and by this means the severity of an attack may often be abated and its duration lessened.

URUGUAY. (Republica Oriental del Uru- guay), smallest of the independent countries of South America, bounded on the north and northeast by Brazil, on the east by the Atlantic Ocean, on the southeast and south by the Atlantic Ocean and the estuary of the Rio de la Plata, and on the west by the Argentine Republic. Its territory extends from lat. 30° S. nearly to lat. 35° S., and the location of its principal city (or, more pre¬ cisely, of the cathedral at Montevideo) is given as lat. 34° 54′ 33″ S., and long. 58° 32′ 32″ W. Total area of the republic, 72,210 square miles (about 7,210 square miles more than the total area of New England).

Topography. — The most elevated point in the republic is somewhat less than 2,000 feet above sea-level ; the so-called mountains are, therefore, to be regarded rather as hills, which sometimes form chains — such as the Cuchilla Grande, which extends across the country, the Santa Ana range, between Brazil and Uruguay, the Cuchilla de Belen, and Cuchilla de Haedo, — but elsewhere give to the region, especially the northern districts, an irregular rolling or undulating surface. Forests or groves cover the hills in the north and generally extend along the banks of the numerous small streams (arroyos) and the larger water courses. The soil in the southwest is of uncommon fertility, being composed of detritus of great depth and rich alluvial deposits ; the southeast and south have grassy slopes and good pasture lands, the hills here forming a bold line along the shore of the Rio de la Plata, but not extending to the Atlantic Coast. Important rivers, besides the great southern estuary, are the

Uruguay, which rises in the Brazilian state of Santa Catharina, and has a course of about 1,000 miles; and the Rio Negro, which also rises in Brazil, and emp¬ ties into the Uruguay after flowing toward the southwest for about 350 miles. The latter passes through the centre of the republic ; the former marks the boundary with Argentina ; both are navigable for vessels of light draught (Rio Negro 55 miles, Uruguay 200 miles), and even large steamships navigate the Uruguay up to Paysandu. There are several shallow lakes, or lagunas, near the eastern coast. The largest of these. Lake Merin (or Mirim), about 108 miles long by 14 miles wide, partly in Uruguay and partly in Brazil, is only of sufficient depth for navigation by the light-draught steamers that maintain communication between the towns on its shores.

Climate.— The southern part of Uruguav has a remarkably pleasant, temperate and healthful climate, resembling, and in evenness throughout the year outclassing, that of the Riviera of southern France and the northwest

of Italy. Extremes of heat and cold are un¬ known in that part of the country most subject to the climatic influence of the ocean and the great estuary. Naturally, such extremes are more marked in the northern inland regions, where the lowlands in summer are decidedly hot, the thermometer sometimes recording 100° F. The cold season brings frost or snow in¬ frequently to the uplands. Taking the country as a whole, we note as unfavorable phenomena the storm-winds called pamperos and hail¬ storms that too often injure the standing crops. The average annual rainfall is about 37.19 inches ; the average annual temperature, 62° F. or 63° F., approximately; the mean temperature of winter about 55° F., and of summer between 72° F. and 73° F.

Fauna and Flora. — • The indigenous animal kingdom, although it includes 30 species of mammals, has only a few really notable repre¬ sentatives. ((Those of most commercial value are the rhea, or American ostrich, and the fur- seal. Both of these, until recently, were found in large numbers, but, owing to the systematic pursuit of the rhea and the indiscriminate kill¬ ing of the seal, both were threatened with ex¬ tinction, until the government took measures to insure their preservation and increase. One may have some idea of the vast number of ostriches that roamed the plains of Uruguay in

1909 from the fact that, during that year, more than 50,000 pounds of ostrich feathers were exported to the United States and Europe.® (Consult Zahm, J. A., Through South Amer¬ ica's Southland , New York and London 1916). The seals in large numbers live and breed on the islands near the coast, especially the Lobos and Castillos groups. More than three-fifths of the seals at these rookeries are of the fur¬ bearing variety, and the islands are now strictly preserved, no one being permitted to land upon them except the sealers during the killing month. The number annually slaughtered for their oil and skins has ranged between 10,000 and 21,000 or 22,000. The mainland fauna in¬ cludes the deer, otter, wild hog, carpincho, fox, ounce, wildcat, ant-eater, etc. There are over 500 species of avifauna, including the crane, stork, swan and wild turkey. In the work cited above, Dr. Zahm writes that, while tra¬ versing the rich, undulating plains of Uruguay, ((everywhere, within the field of view, there was a wealth of verdure and bloom that rendered the landscape as exquisite as a picture by a master® — the most conspicuous among flowers being the flor morala <(which carpets the land¬ scape with glowing bands and patches of rich¬ est purple. Go where one will, one finds massed banks of the blazing flor morala — flowers that grow in such profusion that they extinguish all competitors. Small wonder, then, is it that Uruguay has been called (The Purple Land. ® The area of forests is rela¬ tively small — only about 1,650,000 acres. Their hard and durable woods are: The nandubay (which, instead of decaying when buried in the earth, becomes petrified), urunday, lapacho, coronilla, espinello, quebracho, araza, algarroba and lignum vitae. Among the softer woods are the willow and acacia. Native palms abound in the departments of Maldonado. Minas, Paysandu and in valleys of the central and northern districts, and the poplar, pine,*

cypress, oak, eucalyptus, cedar, magnolia and mulberry have been successfully acclimated. Yerba mate is indigenous and 430 species of medicinal plants have been classified.

Mineral Resources. — The only mines that have been worked continuously for many years are the gold mines at Cunapiru, in the Depart¬ ment of Rivera, in the northern part of the republic. Work began there in 1869. The ore occurs in quartz veins intersecting dioritic rocks. In that part of Uruguay the mineralized terri¬ tory is extensive. Another auriferous zone is found near Soldado, in the Department of Minas, where both gold and copper have been extracted from pyritiferous and cupriferous formations. Copper has been found also in the Department of Maldonado. A large iron-manganese deposit, containing about 35 per cent iron and 23 per

cent manganese, exists in the Department of Rivera, near the gold mines, and there are other deposits of iron and manganese ore at Carrasco. Talc of excellent quality is mined at Las Conchillas, in the De¬ partment of Colonia, near the estuary of La Plata. Along this southern coast, especially in the departments of Colonia and Maldonado, the granite quarries command attention, and in the republic generally the quarrying industry is very important. (Consult Marstrander, R., Engineering and Mining Journal , 13 March 1915). Coal and petroleum have been found recently, the former in the departments of Montevideo, Cerro Largo and Santa Lucia.

History. — On 8 Oct. 1515 Juan Diaz de Solis sailed from Spain ; he explored the estuary of the Rio de la Plata and was slain, with some of his companions, by natives of the Charrua tribe. On 2 Feb. 1520 Magellan sailed from the Rio de la Plata, after having ex¬ plored to a limited extent the Parana and Uruguay rivers in his search for a waterway across Terra Firma. On 1 April 1526 Sebastian Ca'bot set out from Seville; he ascended the Parana to the great falls and the Paraguay to the mouth of the Bermejo. In 1527 Cabot ordered the construction of a fort in the coun¬ try east of the Uruguay River. The opposi¬ tion of the natives to the Spanish settlements was fierce and, during a century, successful : in 1603 a veteran Spanish force was routed in a pitched battle by the Charruas. In 1624 the oldest of the towns which now exist in Uruguay was founded on Rio Negro. The so-called ((Banda Oriental® (that is to say, the region east of the Uruguay River) was the subject of con¬ tention between Portugal and Spain. In 1680 the Portuguese colonists of Brazil founded Sacramento (now Colonia), thus confronting the Spaniards at Buenos Aires. In 1723 the Portuguese fortified the Bay of Montevideo, but surrendered to the Spaniards in the fol¬ lowing year, and families from Buenos Aires established themselves at Montevideo in 1726. In 1735-37 Colonia was besieged by the Span¬ iards. In 1761 it capitulated, but was restored to Portugal by the Treaty of Paris 1763. This did not put an end to Spanish colonization there ; on the contrary, immigration from the north of Spain and from Spanish settlements across the river continued throughout the 18th century. On 26 April and 28 May 1811 Jose Artigas, leader of the Revolutionary party in the Banda Oriental, routed the Spanish forces;

a confederation of the settlements east of the great river was formed,

with Artigas as Pro¬ tector. But the Portuguese captured Monte¬ video and Maldonado, and in 1822 the region in dispute was organized as the Cisplatine Prov¬ ince of Brazil. Artigas took refuge in Para¬ guay, where he died ; but his gallant, patriotic efforts had not been wasted. Other refugees, who had gone to Buenos Aires, returned to start a rebellion in the Cisplatine province, and on 23 Aug. 1825 issued a declaration of inde¬ pendence. On 24 September and 12 October in the same year the Brazilians were defeated. Then the Argentine government intervened. On 9 February and 30 July 1826 Admiral Brown, commanding the Argentine squadron, failed in his attempts upon the Brazilian fleet; but in February 1827 succeeded in destroying the ex¬ pedition sent by the Brazilian admiral, Lobo, into the Uruguay River, and on the 20th of that month the Marquis of Barbaceno, com¬ manding Brazilian forces, was defeated at Ituzaningo. On 27 Aug. 1828 the Treaty of Montevideo was signed, and the Republica Oriental del Uruguay was created, both Brazil and Argentina renouncing their claims to the country thenceforth to be known as the Eastern Republic of the Uruguay, or simply Uruguay. On 18 July 1830 the constitution was adopted and a new declaration of independence issued — this time guaranteed by both of the strong neighboring states. But, unfortunately, the po¬ litical parties — the "Colorados,® or Reds, and "Blancos,® or Whites — kept alive the tradi¬ tions of home-bred strife. Thus, in 1842, a political chief secured Argentine support and laid siege to Montevideo; in 1862 ex-President Flores, "Colorado® leader, made use of Bra¬ zilian troops to take Paysandu. On 25 Feb. 1865 Flores with his Brazilian allies took for¬ cible possession of the capital and of the gov¬ ernment; quite naturally, therefore, Uruguay was drawn into the coalition formed to resist the dictator of Paraguay, Francisco Lopez. On 17 Aug. 1865 Flores defeated a division of Paraguayans at Yatay; three years later he was assassinated during a "Blanco® rebellion at Montevideo, and ex-President Ferro, "who, though not one of the assassins, was arrested in the street with arms in his hands,® was exe¬ cuted, with other rioters. The revolution of 1870-73 ended in a "Colorado® triumph. Of the long series of disturbances which have followed, marking the efforts of "Blancos® to regain power, only one need be mentioned at present — the serious revolution which broke out in March 1903 and continued in 1904 despite the increased military force of the gov¬ ernment. Gradually the substantially prosperous republic has outgrown and subordinated law¬ less political factions; gradually the habitual uprisings against the established government have become less formidable, losing the revolu¬ tionary character and appearing rather as mere provincial riots.

In December 1908 a Supreme Court was established and the judicial system was re¬ organized. The Montevideo Port Railway was inaugurated on 16 May 1913. Dr. Baltasar Brum was elected on 1 March 1919 as Presi¬ dent of Uruguay (and inaugurated two days later) for the term ending 1 March 1923.

Government. — According to the provisions

of the constitution of 18 July 1830, the legis¬ lative branch of the government is composed of the Senate and the House of Representa¬ tives, the former having one member for each of the 19 political divisions, called departments, and the latter one for each 3,000 inhabitants or fraction exceeding 2,000. Together they compose the General Assembly, in which all legislative power is vested, and they meet annu¬ ally from 15 February to 15 June. The term of a senator is six years and that of a deputy is three. In many respects the powers of this Congress or General Assembly are similar to those of the Congress of the United States, but they extend much farther in certain directions, namely, to the granting of pardons and amnes¬ ties in extraordinary cases and electing the President of the republic (see below). The judicial power is exercised in several courts of first instance (distributed as civil, criminal, for cases affecting the treasury, for commer¬ cial cases, police and departmental), courts of appeal and the High Court of Justice. The executive power is vested in a President, who is chosen for a term of four years by a ma¬ jority of the members of the legislature in joint session of its two chambers. The President is ineligible for the term immediately following his tenure of office. He is aided by a cabinet of seven ministers, who, although appointed by him, are responsible to the Congress as well. The law of 3 March 1911, increasing the num¬ ber of cabinet officers from five to seven, es¬ tablished the following ministries : Interior and Worship; Foreign Affairs; Finance; Jus¬ tice and Public Instruction ; Industries, Labor and Communications ; Public Works ; War and Marine. Reform of the fundamental law is part of the order of the day. A new Con¬ stitution, to come into force 1 March 1919, was adopted by the two great political parties in 1917. Its basic principles are the following: (1) The next President is to be elected by the Chambers — The Senate and House of Repre¬ sentatives — as heretofore, but succeeding Presi¬ dents are to be elected directly by the people, with secret voting. The Presidential period will remain as at present, a four-year period. (2) No one can be re-elected as President until eight years shall have elapsed after his previous term. This is substituted for the provision that he must not be a candidate for re-election for the term immediately following his own tenure of office. (3) In case of vacancy occurring in the presidency, the

Chambers, by absolute ma¬ jority, shall at once elect a substitute to hold office for the remainder of the period. The provision has been heretofore that in case of the President's disability or death, the presiding officer of the Senate shall assume the presi¬ dency. (4) The President shall have direction of the army and navy, and. shall be in charge of foreign affairs and of public order at home and abroad. The prefects shall be dependent upon him alone ; nevertheless it is provided that they shall be appointed by him from candidates proposed by an important body to be known as the Council or the Council of State. (5) The Council shall submit for examination by the President matters relating to the creation or modification of taxes, to loans, to the budget, the circulating medium and to foreign com¬ merce. This includes also practically all pro¬ posed economic measures. If the President

withhold his approval the Council may prevail only by a two-thirds vote. (6) Conflicts of jurisdiction between the President and the Council of State shall be decided by the Chambers. (7) The Council of State shall con¬ sist of nine members, serving six years each ; it shall be renewed by third parts, every two years, by direct election and secret voting. The first Council shall be elected by the Chambers, six members by the majority and three by the minority. (8) The Chambers shall be para¬ mount in their control of national measures.

(9) The principle of municipal autonomy with the enjoyment of suitable revenues is adopted.

(10) Constitutional reforms may be initiated by either of the Chambers, proposed amendments requiring a two-thirds vote of the total member¬ ship of each Chamber for acceptance. The amendments shall be submitted to the succeed¬ ing legislature; and if then approved in the same form and manner their ratification shall be considered complete. (11) All forms of worship are free in Uruguay. The State does not sustain any religion. It recognizes the proprietorship of the Catholic Church in ecclesiastical edifices already built in whole or in part by national funds, except the chapels attached to asylums, hospitals, prisons and other public establishments. Churches and other places of worship are free from all taxation. (12) Inscription in the civil register is obliga¬ tory; in all elections, whether of national or of municipal officers, taking

place after 1 March 1919 the voting shall be secret and representa¬ tion shall be proportional ; very positive restric¬ tions are imposed upon military and police functionaries in respect to political activity, etc. The political parties, Colorados and Blancos, after conciliatory negotiations, agreed to ac¬ cept what has been characterized as a <(modern, smooth-running, efficient mechanism of State® in place of the old constitution which, accord¬ ing to the best opinion of the progressive ele¬ ment and financial authorities, was unsuited to present-day conditions.

Education and Religion. — This republic is spending about $5,000,000 a year for the mainte¬ nance and development of the educational sys¬ tem. Primary education is compulsory, and there has been little or no occasion for inflict¬ ing penalties for violations of the law in re¬ gard to this matter, since applications for ad¬ mission to the schools are generally far in ex¬ cess of the school accommodations. There were in 1917 1,203 elementary schools with an attend¬ ance of 120,000 pupils, approximately, the en¬ rolment of pupils having increased 23 per cent between 1908 and 1913 (from 60,683 to 91,746) and at a slower rate between 1913 and 1917. There are also 203 private schools with 19,768 pupils. The number of rural schools has nearly doubled since 1906, in which year the sum of $1,000,000 was appropriated for the erection and improvement of school buildings. A recent re¬ port of the Minister of Public Instruction con¬ tains the statements: Mixed schools have been established <(in almost all the rural districts which have a sufficient number of children of both sexes to average an attendance of not less than 30 pupils® ; and <(Since the permanence of pupils in rural schools never exceeds three years, a simple program has been outlined which can be developed in that short period, so that

when the pupil leaves school he knows how to read and write and to perform the principal arithmetical operations; has some acquaintance with geography, history and the constitution of the republic; and [this being one of the good traditions of South American schools] has been impressed with notions of the purest morality.® All schools in the republic receive frequent visits from inspectors who report directly to the minister of public instruction, and these visits are supplemented by medical inspections. A law of 1907 authorized the establishment of schools for adults, the object .being to over¬ come such illiteracy as had been the natural re¬ sult of the scarcity of rural schools up to that time. About 50 evening schools have ac¬ cordingly been established at different centres, and these are attended by 2,600 pupils. The department of Rocha leads in the practical teaching of agriculture, and the same depart¬ ment

has also established a higher commercial school. At Montevideo we find the university one of the modern organizations of this class, and of high distinction, with faculties of law, science, medicine, mathematics, agriculture and commerce ; secondary schools ; special institu¬ tions, such as the National Institute for the Deaf and Dumb, established in 1910; and two excellent normal schools, one for boys and the other for girls. State pupils at these normal schools enjoy a pension of $15 a month as a contribution assisting them to meet the expenses of residence at the capital. The provision made for supplying textbooks or pedagogical works gratuitously, under certain conditions, may also be mentioned as another example of wise lib¬ erality. The High School of Commerce of Uruguay, in its three-year course — which may be extended to four years — gives instruction in bookkeeping, accounts, geography, political economy, languages (particularly the English language) and stenography.

The cabinet officer known as Minister of the Interior and Worship has authority in rela¬ tion to the welfare of the clergy of the Apostolic Roman Catholic Church and under the constitution Roman Catholicism is the state religion; there is, however, complete toleration, and about one-third of the adult population should be classified as Protestants, Liberals, etc.

The Judicature.— The judicial system of the republic was reorganized in 1907. It now includes a High Court of five justices, the latter being chosen by the general assembly of the chambers, and the presiding officer of the court being chosen for one year by the members them¬ selves. This High Court has original jurisdic¬ tion in constitutional, international and ad¬ miralty cases, and hears appeals in cases in which the decision has been altered in the minor courts of appeal, of which there are two, each with three justices. Montevideo has three courts for ordinary civil cases, two for commercial cases, one for government cases, two for criminal cases, one correctional court and three for criminal investigation. At each department capital there is located a depart¬ mental court and there are 214 judicial sections in the republic, each with a justice of the peace court. Lesser local divisions are known as dis¬ tricts in which deputy judges have a limited jurisdiction. The death penalty was abolished

URUGUAY

Copyright. Newman Traveltalka ami Brown & Dawson, N. Y.

1 Plaza and Harbor of Montevideo

in 1907, penal servitude for 30 to 40 years being substituted.

Agricultural and Pastoral Industries. —

Although the soil is fertile and the climate favorable to agriculture, less than 4 per cent of the country is under cultivation (in 1916 about 2,000,000 acres out of a total of more than 45,000,000 acres). Uruguay is still, despite the efforts that have been made by the govern¬ ment to extend the cultivated area, essentially a pastoral country, 41,350,000 acres being devoted to sheep, cattle, etc. The chief agricultural products are: Wheat (average crop 360,000, tons) ; Indian corn (average crop 200, OCX) tons) ; linseed (average crop 27,000 tons) ; oats (aver¬ age crop 27,000 tons) ; wine (average annual production 34,000 tons) ; tobacco (average crop 1,000 tons).

The staple products of Uruguay are meats, hides and wool. A livestock census which was provided for by a government decree in Janu¬ ary 1917 shows the different classes of cattle in each department of Uruguay, but in sub¬ mitting the figures the director of the census states that they are to be considered as only partial statistics. The total number of cattle in the whole country is given as 7,942,212, the largest number in any department, 711,224, being in Tacuarembo, and the smallest number, 26,373, in the Department of Montevideo. Each of the departments of Artigas, Cerro Largo, Durazno and Salto has more than 600,000 cat¬ tle ; Paysandu and Rio Negro are in the 500,000 class ; Florida, Minas, Rivera, Rocha and Soriano show over 400,000 each, while the re¬ maining departments have in the neighborhood of 200,000 or 300,000 each. The taking of this cattle census is only one of various measures which the government of Uruguay is adopting for the development of its livestock industry, the chief source of the country’s wealth. The stock of sheep was estimated in 1916 as about 27,000,000; hogs, over 500,000; horses (statistics of 1917), 560,000. Livestock statistics are pre¬ pared, primarily, by the animal sanitary police, a well-organized force empowered to treat, to quarantine or to destroy

diseased animals. The value of wool sheared each year is given as $25,000,000. Favorable conditions of climate and pasturage, together with intelligent methods of propagation, have induced that steady in¬ crease of the flocks of sheep which has made the Uruguayan wool-clip such an important matter. As statistics show, the sheep to-day may be divided into two classes — Spanish and British, omitting the Asiatic breed. The finest sheep in the world came originally from Spain, and" the authorities of Uruguay have not only bestowed great care upon the selection and development of types that thrive best under local conditions, but also have spared no ex¬ pense in their search for the finest varieties developed in other lands. The value of the slaughtered livestock of all classes was shown in statistics submitted to the First Pan-Ameri¬ can Financial Conference to be less than the value of the ((wool crop® — about $22,000,000 as compared with $25,000,000. But in 1915 when the total value of exports of the grazing and meat industry increased nearly 50 per cent, wool exports showed no corresponding gain. An im¬ portant product of the livestock industry is tasajo (jerked beef), chiefly exported to Brazil,

Cuba and Porto Rico. In 1914 more than 11,000 tons of tasajo were shipped from Uruguay to other countries, but in 1915 only 5,334 tons.

Commerce and Manufacturing Industries.

— The value of Uruguay's imports from all countries in 1915 was $36,378,925, and of her exports to all countries, $76,222,298. The value of her imports from the United States in the same year was $7,519,654, and of her exports to the United States, $12,148,464. In 1916 the six countries leading in exports to Uruguay were, in the order of total value of such ex¬ ports: United States (which exported to Uru¬ guay, increasingly large quantities of agricul¬ tural implements, binder twine, cotton cloths, railway material, and miscellaneous manufac¬ tures of iron and steel), Argentina, Great Bri¬ tain, Brazil, Spain and Italy. The six coun¬ tries leading in imports from Uruguay in 1916 were, in the order of total value of such im¬ ports: Italy, United States, France, Argentina, Great Britain and Spain. In 1917 the imports amounted to $37,500,000 and the exports to $67,516,275. The exports were principally live¬ stock, $2,311,190; canned goods and extracts, $26,567,006 and wool, $18,601,275. The follow¬ ing tables show at a glance the chief groups of articles imported and exported:

Imports by Groups of Articles.

Sept., 1915, to Feb., 1916, inclusive.

Pesos

Groceries, etc . 5,224,587

Drygoods and notions . . . 2,123,021

Iron manufactures, stationery, ships' stores and

jewelry . 2,200,401

Electrical supplies . 42,278

Musical instruments . 27,589

Furniture and upholstery . 51, 649

Shoemakers' wares, saddlery, and skins . 124,311

Building materials, etc . 1 , 843 , 32 7

Drugs and chemical products . 101 ,229

Pharmaceutical specialties and druggists'

sundries . 112,691

Perfumery . 51,123

Inflammables . 1,102,546

Live animals . . . 2 , 462 , 404

Primary materials . 2,106,348

Non-dutiable articles . 810,832

Miscellaneous . 158,841

Total . 18,453,177

Value in currency of the United States . $19,191 ,304

Exports by Groups of Articles.

According to the Boletin del Ministerio dc Hacienda, the exports by groups of articles for the years 1914 and 1915 were as follows:

1914 1915

Pesos Pesos

Grazing and meat industry, in¬ cluding wool . 48,014,263 70,535,539

Agriculture . 1,351,190 753,166

Mine products . 2,525,573 1,109,825

Fishing and hunting . 157,234 90,463

Miscellaneous products . 99,248 561,412

Ships' supplies . 271,294 240,266

Total . 52,418,802 73,290,671

Value in currency of the United

States . $54,515,554 $76,222,298

The foreign trade of Uruguay has been studied with 3 view to ascertaining also the percentage of each of the main divisions of the imports and exports. The result appears in the following table, which shows the average of recent years, thus minimizing the effects of

such exceptional conditions as the war has created :

Imports.

Per cent.

Foodstuffs . 19.02

Textiles and manufactures of . 18.77

Iron, steel, and products of . 11.04

Stone, earth, glass, etc . 11.10

Lumber and woods . 8.15

Metals, not including iron . 8.15

Industrial oils . 3.12

Drugs . 2.24

Livestock . 1.94

Other products . 22.28

Exports.

Livestock products . 90.24

Agricultural products . 4.23

Mineral products . 4.60

Game and fishing products . .46

Ship provisions . .47

Uruguay's chief exports to the United States are leathers, meat products and wool. Her principal imports from the United States are passenger automobiles, cotton cloth, drugs and chemicals, flour, hardware and tools, knit goods, iron and steel, lubricating oil, rosin, sugar and tinplate.

The manufacturing industries of Uruguay are on a small scale as a rule, but a noteworthy exception is the immense establishment of the Liebig Company at Fray Bentos. In Monte¬ video there are flour mills and boot and shoe factories. Several woolen-mills, brick and tile works and glass and bottle factories are in operation. Other manufactures are: Furniture, cotton and linen cloth, cement, etc.

Money, Banking and Finance. — Uruguay's monetary system is based on the gold standard, the theoretical unit being the Uruguayan gold peso, divided into 100 centesimos and represent¬ ing 1.697 grammes of gold .917 fine or say 1.5561 grammes of pure gold. Its par value in terms of the currency of the United States is $1.0342 and the par value of $1, currency of the United States, in terms of Uruguayan cur¬ rency is $0.96689 pesos. But, inasmuch as Uruguay has never actually coined the peso or other gold-piece, the circulation consists of banknotes and foreign gold coins, which are legal tender at the following rates :

United States

English .

German .

French .

Belgium .

Italy .

Spanish .

Brazil .

Argentine. . . .

Eagle .

■ *$9*

66 pesos

Sovereign .

4

70

U

20 marks .

4

60

it

20 francs .

3

73

it

20 francs .

3

73

a

20 lire .

3

73

a

Doblon .

4

82

u

20 milreis .

. 10

56

a

$5 00 pesos . . .

4

66

it

Exchange rates ,are quoted normally in Montevideo as follows :

London .

London .

Paris .

Paris .

Berlin .

Berlin .

New York. . . .

90 d/s .

Sight .

90 d/s francs. . . Sight francs. . . . 90 d/s marks. . Sight marks. . . . Sight U. S. cy. .

51 11/1 6d = $1 OOpesos 50 %d— 1 00 “

5 42J =1 00 “

5 36ˆ =1 00 “

4 41 = 1 00 “

4 34 = 1 00 “

$1 00 =0.973 “

The principal banks in Montevideo are: Banco de la Republica, Banco Popular del Uruguay, Banco Comercial, Banco Espanol, Banco Frances, Banco Aleman Transatlantico, Banco Britanico de la America del Sud, Banco Anglo Sud- Americano, Banco de Londres y Rio de la Plata, London and Brazilian Bank, Limited, and a branch of the National City

Bank of New York. The first mentioned is really a state institution, its capital having been contributed solely by the government. It is administered by directors who, although ap¬ pointed by the President of the republic with the consent of the Senate, enjoy complete in¬ dependence. In this connection we quote the observations of the Uruguayan delegation to the First Pan-American Financial Conference: «Its employees are selected among the most able men, after having passed certain exam¬ inations, and the principal officials of the coun¬ try, including the F’irst Magistrate himself, take pride in not interfering with the independence of the bank, and they do their utmost to help increase its resources and credit. This bank, which to-day exercises a vital influence in the economy of the country by stimulating indus¬ tries and trade, has 24 branches and agencies distributed among the principal cities and

towns of the interior, and consequently can claim from an international point of view the financial representation of the republic. In the near future the bank will be in a position to extend its field of operations to North, Central, and South America, establishing there also agencies and branches, for its capital is rapidly increas¬ ing by means of accumulated profits.®

The budget for the fiscal year 1916-17 esti¬ mated expenses at $30,525,402.64 and receipts $29,452,776.55. For 1915—16 the figures were: $29,477,311.81 for expenses, including interest on public debts, and $29,578,000 for revenue, the chief sources of revenue, under the conditions created by the war, having been :

*Customs duties . *$12, 500 , 000*

T axes on real estate . 4,400, 000

Commercial licenses . 1 , 700 , 000

Taxes on cigars and tobacco . 1 ,250,000

Special duties for public education . 960 , 000

Post office and telegraph . 700,000

Taxes on alcohol . 805,000

Taxes on matches . 320,000

Taxes on beer . 190 , 000

Taxes on brandy . 80,000

T axes on sugar . 260 , 000

Taxes on wines . 280 , 000

Export duties on livestock . 480 , 000

Revenue stamped paper . 580,000

Stamps . 360,000

Consular fees . 360, 000

- *Custom duties yielded $17,500,000 in 1913-14.*

The revenue and expenditure for the fiscal year 1917-18 were:

Revenue Expenditure

Customs .

$12,250,000

Legislature .

$713,382

Property tax _

4,160,000

Presidency .

69,244

Trade licenses.. .

1,600,000

Ministry

Factory and to-

Foreign Affairs

511,735

bacco taxes . . .

1,200,000

Interior .

3,299.417

Stamped paper

Finance .

2,142,394

and stamps. . .

900,000

Industries. . . .

876,752

Surtaxes on im-

Public Works.

1,324,586

ports and ex-

War and Ma-

ports .

620,000

rine .

5,187,850

Other receipts. . .

8,721,428

Public instruc-

tion .

3,323,410

Total .

$29,451,428

Justice .

389,640

National obliga-

tion .

11,683,356

Total . $29,521,666

As contributors to revenue we mention the following government institutions : The Bank of the Republic, the Mortgage Bank, the In¬ surance State Bank and the electric-light and power plants, capitalized with the proceeds of

a $4,500,000 loan and constituting a state monopoly.

The public debts are : The consolidated debt, originating in a loan of £19,570,000 at 3J/2 per cent interest and 1 per cent sinking fund (the distribution of the securities being, in 1915, in Europe 69.73 per cent and in Uru¬ guay 30.27 per cent) ; the conversion loan taken by the Banque de Paris et des Pays Bas at 90 per cent net and sold to the public at 97 per cent, of which loan the holdings in Europe amount to 70.74 per cent, and in Uruguay 29.26 per cent; the guaranty debt, 4 per cent (prac¬ tically redeemed through purchase by the state of the Mortgage Bank which had these securi¬ ties as part of its capital) ; the unified interior debt, 4 per cent, $1,448,650 ($1,100,000 held in London and the balance in Uruguay) ; the In¬ surance State Bank loan, 5 per cent (the whole amount, $3,000,000, belonging to the state, ((as the bank never felt the necessity of selling bonds®) ; the 1915 interior debt loan, $6,000,000, issued at 8 per cent. In 1917 the Uruguayan government proceeded to the conversion of the last-mentioned loan (8 per cent) into a new conversion loan at 6*4 per cent, with a bonus of 5 per cent.

Transportation and Communication. — The

railroads in Uruguay radiate westward and northward from Montevideo, three lines con¬ necting the country with Brazil. They are in the main of standard gauge; their total length in 1919 was about 1,600 miles, and they carry annually about 1,800,000 passengers and 1,700,- 000 tons of freight. Plans have been made for extending the system by the addition of 1,500 miles of track. The length of tramway lines in operation is about 170 miles; the total length of departmental wagons roads or bridle paths more than 3,000 miles, and of national high¬ ways about 2,240 miles. Efforts are being made to put the highways in better condition for motor traffic. The river system is extensive and of great value for transportation, all of the following ports on the Uruguay River ad¬ mitting vessels of nine (and some even of 14) feet draft: Carmelo, Neuva Palmira, Soriano, Fray Bentos, Nuevo Berlin, Casa Blanca, Pay- sandu, Salto and Santa Rosa. On the Rio Negro the chief port is Mercedes; on the San Salvador River, the port of San Salvador, and small craft reach the interior on a dozen or

more of the Uruguay's tributary streams. Steamship communication

between Uruguay and foreign lands is maintained by transatlantic lines representing the chief nations of western Europe. Between Montevideo and New York there is a weekly service ; local transportation lines keep the Uruguayan coast in touch with the Atlantic ports of Brazil or the river ports of Paraguay, and there is a regular nightly steamship service between Montevideo and Buenos Aires. The clearances at Uruguayan ports reaches annually about 8,000,000 tons. Uruguay possesses 27 steamers of a total ton¬ nage of 20,298 tons.

Uruguay has extended its wireless service by establishing a large station at Montevideo, with a range of 621 miles, and other stations identified with the War and Marine Ministry or Department. The number of post offices in the country is about 1,200; of telegraph and telephone stations, about 60. Telephone lines have 16,518 miles of wire.

Weights and Measures. — The metric system has been adopted officially and gains ground steadily among the people in the chief centres of population, displacing such antiquated units as the libra (1.0143 pounds) ; arroba (25.35 pounds) ; quintal (101.4 pounds) ; cuadra (1.8 acres) ; fanega (30 gallons), etc. The recog¬ nized basis of thorough reform in this respect is practical demonstration of the greater con¬ venience of the new system.

Army and Navy. — The strength of the army at present is given as slightly more than 10,000 — 600 officers and about 10,200 men — and about 100,000 men receive training in the national guard. For the navy, additional ships are being constructed. The number of vessels in 1916 was 12, with 60 officers and 600 men.

Population, Political Divisions, etc. — The number of inhabitants is estimated at 1,406,000. In the northern part of the republic there are many Brazilians, who cross the border from the state of Rio Grande do Sul; otherwise the population consists principally of Spaniards or people of Spanish descent (the most numerous class), of Italian colonists and citizens and of the English, Swiss and German residents who are actively engaged in business, banking or agriculture.

The Oriental republic of Uruguay is divided into 19 departments, which with their areas, populations and capitals are as follows :

DEPARTMENTS

Area

(square

miles)

Population

Capital

Population

4,394

37,350

112,092

San Eugenio . .

10,000

1,834

Guadalupe .

10,000

5,763

2,193

5,525

1,744

4,673

1,587

4,819

256

56,272

*Villa de *Melo .*

4,000

80,275

Colonia .

15,000

53,785

22,630

Durazno . .

11,000

Trinidad .

4 , 0G0

59,916 38,955 65 , 893 373,964 65,915 35,714 44,824 45,369 74,415 59,533 54,018 58,708 39.180

Florida .

10,000

Maldonado .

11,000

Minas .

8,995

Montevideo .

376,163

5,115

3,269

3,793

4,280

4,865

2,688

3,560

8,112

3,682

72,153

Paysandu .

22,000

Fray Bentos .

12,000

Rivera .

8,000

Rocha .

5,000

Salto .

19,788

San Jos6 .

13,000

Mercedes .

15,000

San Fructuosa .

9,000

Treinta y Tres .

10,000

Total .

1,378,808

\

Bibliography. — (Anuario Estadistico de la Republica Oriental del Uruguay) (Montevideo, annual) ; Araujo, O., (Diccionario Geografico del Uruguay } (Montevideo 1912) and (Nueva Historia del Uruguay* (Montevideo 1909) ; Bollo, S., (Manual de Historia de la Republica Oriental del Uruguay* (Montevideo 1897) ; Bryce, J., (South America* (New York 1912) ; Clemenceau, G., (South America To-Day) (New York and London 1911); (Financial Confer¬ ence, Proceedings of the First Pan-American) (Washington 1915) ; Hudson, W. H., (The Purple Land) (new ed., New York 1916) ; Keane, A. H., (Central and South America) (London 1912) ; Koebel, W. H.,

URUGUAY, a river of South America, rising on the coast range of southern Brazil, flowing west on the boundary between the states of Santa Catharina and Rio Grande do Sul, then southwest between the latter state and Argentina and finally south between Argentina and the republic of Uruguay, emptying into the head of the estuary of La Plata. Its main head stream in Brazil is called the Pelotas. It is over 1,200 miles long and an important avenue of commerce, passing the towns of Salto, Pay- sandu and Concepcion. It is very broad for 100 miles from its entrance to the gulf styled Rio de la Plata and is navigable for the large steamers to Paysandu, and for smaller vessels to the rapids above Salto, above which it can again be navigated for several hundred miles.

URUMCHI, oo-room'che, or TIHUAFU, central Asia, a city of Chinese Sungaria, in the province Sin-kiang, on the northern side of the Tyan-Shan Mountains. It consists of an old and a new town, the former being situ¬ ated on the slope of a mountain which attains a height of 14,000 feet above sea-level. It was formerly of great commercial importance in the trade between Russia, Turkestan and India. Urumchi is of strategic importance and is now the administrative and military capital of the province of Sin-kiang. Pop. estimated at 25,000.

URUMIA, oo-roo-me'a, URUMIAH, or URUMIYAH, Persia, (1) a town in the west of the province of Azerbijan, situated on an extensive plain about 10 miles west of Lake Urumia and 65 miles southwest of Tabriz. It claims to be the birthplace of Zoroaster, and

in the vicinity are several mounds, supposed to have been made use of in the ceremonies of the ancient fire-worshippers. It has two col¬ leges and a seminary and is the see of a Latin bishop. The surrounding district is of great fertility, covered with groves, orchards, vine¬ yards, gardens, rice-grounds and villages. Pop. about 30,000. It was the scene of an Armenian massacre by the Turks in 1915. (2) The lake,

situated 4,300 feet above sea-level, is about 80 miles long from north to south, by 20 miles broad and has no apparent outlet. It is very shallow throughout. Numerous islands are scat¬ tered over its surface. Its waters are so salt that neither fish nor mollusca can live in it. Salt of a good commercial quality is obtained from shore deposits, the result of natural evapo¬ ration.

URUS, an extinct wild ox (Bos nrus) that roamed in Gaul and other European countries at the period of the Roman invasion, as de¬ scribed by Caesar. See Ox; White Cattle.

USAGE, in law. See Common Law.

USAMBARA, oo-zam-ba'ra, German East Africa, a mountainous district in the northeast part of the colony, bordering on the coast northwest of Zanzibar. It is extremely fertile and one of the most important parts of the colony.

USBEGS, or USBECKS. See Tuaregs.

USE, in English law, the permanent equi¬ table right, benefit or profit of lands and tene¬ ments that are in the possession of a person who simply holds them for another person, the real beneficiary. He to whose use or benefit the trust is intended enjoys the profits and is called cestui que use. All modern conveyances are directly or indirectly founded on the doc¬ trine of uses and trusts, which has been deemed the most intricate part of the property law of England.

USE AND DISUSE, one of the doctrines in that view of organic evolution promulgated by Lamarck (q.v.) which holds that variations in structure are brought about by the use, in the one case, or by the disuse in another, of organs. Conceding that physical changes due to such a cause may be brought about in the individual, the important question remains — are they inheritable? Hence, a correlated part of the theory must be disposed of under the name ˆuse-inheritance.® Followers of Lamarck are believers in the efficacy of use and disuse and -use-inheritance as factors in evolution. Others cite the evidence

that head-flattening practised by various uncivilized tribes has no hereditary result, neither tattooing. Consult the writings of Lamarck, Packard, Cope, Hyatt, Weissmann, etc. See Evolution, History of; Heredity ; Lamarckism.

USEDOM, oo'ze dom, Prussia, one of the two islands which separate the Stettiner Haff from the Baltic Sea, six miles southeast of Riigen. It is of irregular shape, 34 miles long, and 14 to 15 miles wide. Agriculture, cattle¬ raising and fishing are the chief occupations. The chief town is Swinemiinde. Pop. about

30,000.

USERTESEN, or USERTEN (known to

the Greeks as Sesortosis), the name of several Egyptian kings of the ancient royal house of Thebes. They belonged to the 12th dynasty and reigned between 2130 and 1930 b.c. Userte- sen I erected at Thebes the earliest and loftiest of the obelisks, which measured about a hun¬ dred feet from apex to base. His colossal stafue in red granite has been discovered near Tunis. Usertesen II and III completed the subjuga¬ tion of Lower Nubia. Consult Breasted, (His-

tory of the Ancient Egyptians) (New York

1908).

USHANT, ush'ant (French, Ouessant, wes-son), France, an island 15 miles off the west coast of the department of Finistere, to which it belongs ; area, six square miles. It is almost entirely composed of granite, with a bold and rocky coast, which is accessible only at some points. Fishing and the rearing of sheep are the principal occupations of the in¬ habitants. Saint Michel is the chief village. Ushant, with the surrounding islets, forms a commune having a pop. of about 2,568. Near the island in 1759 Sir Edward Hawke defeated Admiral Conflans and in 1778 Admiral Keppel and Count D'Orvilliers fought an indecisive battle.

USHER, Hezekiah, American bookseller: b. England, about 1615; d. Boston, Mass., 14 March 1676. Thomas ((History of Printing, 1810) calls him (

USHER, or US.SHER, James, Irish prel¬ ate, archbishop of Armagh : b. Dublin, 1581 ; d. Reigate, Surrey, 1656. He took orders in 1601, and in 1607 was appointed professor of divinity at Trinity College, Dublin, and chancellor of Saint Patrick's Cathedral ; in 1620 bishop of Meath; in 1623 Irish privy-councillor and pri¬ mate of Ireland in 1624 as archbishop of Armagh. His notions of church government verging toward Presbyterianism, his enemies took advantage of this to attempt to destroy his credit with James I; but he enjoyed to the last the esteem of that king. He attended Straf¬ ford in prison and at his execution. During the civil war he was a stanch adherent of Charles I, and witnessed the execution of the king. After that event he experienced civility and flattering promises from Cromwell, who finally ordered that he should be buried in West¬ minster Abbey. Archbishop Usher carried on an extensive correspondence with the learned in various parts of Europe, and was a man of great erudition. He wrote a number of works, the principal of which are the (Annals of the Old and New Testament, > which forms the basis of the Biblical chronology in King James' ver¬ sion of the Bible; (Britannicarum Ecclesiorum AntiquitatesP Consult Aikin,

USHER, John, American colonial execu¬ tive: b. Boston, Mass., 27 April 1648; d. Med¬ ford, Mass., 1 Sept. 1726. He was the son of Hezekiah (q.v.). As a bookseller he was the first in the colonies to obtain a copyright for printing, the work being a revised edition of the laws of Massachusetts. He was colonel of militia, treasurer of Massachusetts and agent in London for the Massachusetts colony for the purchase from Sir Ferdinand of Gorges of the title for the district of Maine (1677). In 1692-

97 he was lieutenant-governor of New Hamp¬ shire and again from 1702 till his death.

USHER, Roland Greene, American histo¬ rian : b. Lynn, Mass., 3 May 1880. He gradu¬ ated at Harvard (1901), taking history honors (1902) and rounding out his education in Ox¬ ford, Paris and Cambridge. He was assistant in history in Harvard (1904-07), instructor (1907-10) and professor of history since 1914, at Washington University, Saint Louis. Among his numerous writings are (The Rise of the American People) (1914) ; (Pan-Americanism) (1915) and (The Challenge of the Future.)

USKUP, oos'kup, or USKUB, anciently called SCUPI, SKOPIA, or SKOPLIE, Ser¬ bia, the capital of a district in the province of Kosovo, situated on the river Vardar, 65 miles northwest of Monastir, 110 miles north¬ west of Salonika on the railroad from

Saloniki to Belgrade and the branch line to Mitrovitza. It was the scene of a battle during the Balkan War 26 Oct. 1912. It has a handsome mosque, a castle, a Byzantine aqueduct and a modern trade-school. The chief manufactures are leather, metal ware and cloth and the town is an important trade centre for grain, wool and fruit. Pop. about 33,000.

USNEA, a genus of fruticose lichens, .at¬ tached only in one place, with a shrub-like ap¬ pearance. They are often pendulous, as is the old man's beard (U. barbata) which hangs in long tassels and festoons from the bark of trees or their branches, is gray-hued and resembles somewhat in habit the Tillandsia. Usnea is also known as necklace-moss, or hanging moss.

USPALLATA (oos-pal-ya'ta) PASS, Chile, a pass over the Andes between Chile and Argentina, 90 mdes east of Valparaiso, and at the southern base of Mount Aconcagua. Its highest point is about 12,800 feet above the sea and the Trans-Andine Railroad passes over it.

USSELINX, William, one of the greatest promoters of American colonization and founder of the Dutch West India Company, under which New Netherland, and of the Swedish West India Company, under which Delaware was settled: b. of Walloon parentage at Antwerp in 1567 ; d. 1647. In his early manhood he visited the Azores, which in 1431 had been rediscovered and colonized by the Netherlanders, and learned the (< mystery® of Spanish colonization. From this archipelago the ships bound for the New World made their starting point westward over the Atlantic — the line between Sandy Hook and the Azores being almost that made by a ruler laid on the map. In this chief centre of colonial business Usselinx gained a rich ex¬ perience, besides being in a Spanish prison for a time. From 1591, when he returned to the Netherlands, Usselinx began to .talk, and later to agitate, in favor of .Dutch trade with America. After his intense activity, by voice, pamphlets and general publicity, the Dutch West India Company, a mighty, armed corpora¬ tion was formed in 1623 for activity against the Spaniards, who claimed nearly all of America. Under the company's flag great fleets were sent to South America and in 1624 30 families of Walloons, or refugee French-speaking Belgians, to New Netherland. These began the settle¬ ment and the tilling of the soil in the area now comprising the four Middle States, New York,

\

New Jersey, Pennsylvania and Delaware. In later life Usselinx entered the service of the king of Sweden and organized the forces that led to the Swedish settlement of Delaware. Re¬ turning to Holland in 1641 he engaged in large operations in drainage and soil-reclamation, utilizing treasure dug up from sunken ships of the Spanish Armada. About 1647 he disap¬ peared from view. Within 30 years past a portrait of him was discovered and hangs in the Rijks Museum at Amsterdam. Usselinx, who was very influential in France and Germany, was a citizen of the world, believing that God ((formed the earth to be inhabited,® replenished and subdued. In addition to the Dutch bibli¬ ography consult G. M. Asher's (Essay on the books and pamphlets relating to New Nether- land) (Amsterdam 1854 — 67ˆ and the exhaustive monograph by J. Franklin Jameson, (Willem Usselinx* (New York 1887).

USSHER, James. See Usher, or Ussher, James.

USTICA, oos'te-ka, Italy, a small island in the Tyrrhenian Sea, 40 miles north of Palermo, Sicily. It is three miles long and two miles broad and has a fortified harbor with a light¬ house. It has been used as a penal colony. Pop. about 2,000.

USTILAGINACE.7E, the family of minute fungous plants called smuts. See Fungi.

USUFRUCT, in law, the right to use and enjoy the things of another person and to draw from them profit, interest or advantage without reducing or wasting them. It is the most im¬ portant of personal servitudes, servitude being the term for the right to use the property of another, whether real or personal. It may be established in any property which is capable of being used so far as is compatible with the sub¬ stance of the thing not being destroyed or in¬ jured. This right may either be exercised di¬ rectly, or may be leased or sold. The one pos¬ sessing it is termed the usufructuary. He is bound not to impair the property and must fur¬ nish security for the restoration of it. Reason¬ able wear and tear and aging and natural death of animals do not call for replacement, how¬ ever. A quasi-usufruct is recognized in the case of certain perishable things or (

USUMACINTA (oo-soo-ma-sen'ta) RIVER, Central America, formed by the junc¬ tion of three head streams, the Chixoy, Pasion and Lacantum, rising in Guatemala, for some distance in its middle course being the frontier line between Guatemala and Mexico. It

flows northwestward through the states of Chiapas and Tabasco, Mexico, and empties into the Gulf of Mexico after a course of about 400 miles. A navigable branch also flows eastward into the Laguna Terminos, opening into the Gulf of Campeachy, while another branch flows west¬ ward into the Tabasco (q.v.).

USURY. If the term ((usury® is to be de¬ fined, as in the strictly legal sense, as the illegal profit demanded by a lender for the loan

of money or other property, it will be found that this offense against society is almost as old as society itself. Even in the earliest of Biblical days, for example, usury was practised so gen¬ erally that the Lord uttered his warning against the custom : <(Thou shall not lend upon usury to thy brother, usury of money, usury of victuals, usury of anything that is lent upon usury. Unto a stranger thou mayest lend upon usury; but unto thy brother thou shalt not lend upon usury, that the Lord thy God may bless thee® (Deut. xxiii, 19, 20). Until com¬ paratively recent times the word ftusury® had many definitions and was used to embrace sev¬ eral essentially different social phenomena. In the Old English application it denoted any sort of interest upon money loaned rather than in the more modern signification which has made it applicable only to the unlawful contract ex¬ acting that the loan of money be repaid with exorbitant interest for its use. In fact, if one were to trace the history of the word back through the centuries that have passed since the Mosaic days it would be found that it had as often been applied to the strictly moral and legal methods of procuring just interest for capital invested as to those concerning which a moral if not a legal taint might be attached.

History. — The earliest interpreters of the laws of Moses certainly condemned the illegal practice of usury, and yet they did not forbid the taking of interest in payment for the loan of money, but expressly stipulated that such interest should be charged to strangers. It must be admitted, however, that this reading of the law was largely the result of the social con¬ ditions which existed in Israel at this time. In the first place the Israelities were neither a rich nor a commercial people, and the laws and regu¬ lations under which they lived were apparently not framed with the purpose of enabling them to become so. Their object, therefore, was to maintain their entity as a nation and to pre¬ serve the family inheritances which enabled them to continue happily their frugal mode of life. If the Israelites borrowed, therefore, it was not with a view to profit or to enable them to improve their condition, but simply from poverty and to secure to them some absolute necessity of life. To exact from such persons

more than was lent, therefore, would have been both sinful and unjust. The result is denoted hy the fact that among the ancient Israelites loans were made merely in cases in which there were poor persons who required assistance to tide them over present difficulties, and never for the purpose of enabling an avaricious man to increase his wealth at the expense of his poorer neighbor. This restriction, however, did not apply in the case of the stranger who was in need of financial help, and the extortion of usury was one of the several means resorted to by the Israelites to ruin the Canaanites and the other stranger-people who remained in the land.

As time passed the public attitude toward usury underwent a decided change, and society, which had branded all lending as immoral and all interest as ((usury ,» because the lending had so generally resulted in cruelty and hardship to the borrower, finally began to feel that all lend¬ ing was moral and honest, and it was under these conditions that the term <(usury® was first applied to every method of receiving interest

upon capital invested, an attitude that remained unchanged for many centuries.

One of the most interesting and instructive features in the study of the economic progress of society is that which enables one to follow the various changes that have occurred in the methods of money lending. It has already been shown that the ancient Israelites borrowed only from necessity and not from the possibility of furthering any commercial interest, and this condition, according to Grote, not only pre¬ vailed in Greece, but applied to nearly all parts of Europe during the early Middle Ages.

In its inception the economic theory of the loaning of money did not contemplate the possi¬ bility that anyone might desire to raise a loan for the purpose of investment or to secure capi¬ tal with which to carry one's business interests to a more successful outcome. In those early ages the commercial sense had not been widely developed and such business interests as those represented by the modern banker and broker were unknown, a condition that was not un¬ favorable to the extension of the practice of usury whenever and wherever there were laws permitting it. The ancient laws relating to loans read strangely to the modern student and can scarcely be comprehended if

*they are not considered in connection with the conditions of the times. If the Mosaic laws are taken as an example, the reader must place himself in a position to appreciate the Biblical point of view before he can hope to approximate fairly their justice to both borrower and lender. It must be remembered that the land (that is, the world), belonging originally to its Creator, had been given by God to the descendants of Abraham, and liberality to the poor had been one of the conditions under which this gift had been made. , Naturally, therefore, the needy Israelite felt that obtaining loans was a right which belonged to him, while the more wealthy people of Israel, feeling that all their property was a loan direct from the hand of God, did not, in the beginning at least, object to giving a small portion of their plenty for the relief of the destitute. Under such conditions the exe¬ cution of this law of lending was clearly sup¬ ported by all the force that the recommendation of the constitution itself could bring to bear upon it, and it was not until the selfishness of man commenced to exert a baneful influence that definite laws were promulgated, laws that made the duty of lending the express command of God. While the justice of such legislative enactments may be questioned, especially when viewed from the position of present-day society, their benignity is no longer a matter of doubt when the principle of the divine origin of property is accepted as the basis of ownership, and as this was the polity upon which the entire Mosaic commonwealth was constructed, the laws adopted for the government of the borrower and the lender assume a more just and reasonable position in the estimation of modern thought. In substance these laws pro¬ vided that the destitute Israelite might borrow what he required for his necessities without interest, either in money or produce ; at the end of each seven years there was a remission of debts when every creditor was supposed to remit such money or produce as he had lent, and a prospective borrower w*as not to be re¬ fused such necessities as he might require even VOL. 27 — 39*

when the year of the remission was at hand. While the Mosaic law strictly forbade the charging of interest, it did not prevent the acceptance of pledges, which were legally pro¬ tected in such manner as to prevent any hard¬ ship falling upon the borrower. For instance, the lender was forbidden to accept a mill or the upper millstone in pledge, it being held that they were too much a necessity of life; if raiment should be taken it was required that it must be returned before sunset, lest it be needed during the night, while in the case of a widow's raiment, its acceptance was forbidden under all circumstances. Under the Mosaic law a creditor was forbidden to

enter a house for the purpose of reclaiming a pledge, al¬ though he might stand without until the bor¬ rower should come to him and return it, and while the statutes did not prohibit temporary bondage in the case of insolvent debtors, they provided that the Hebrew bondsman should not be held longer than the year of jubilee, or the seventh year at the most.

If these were the laws that governed the financial relations of Israelites among them¬ selves, however, the same leniency did not apply to the Israelite's treatment of the stranger. For example: interest might be taken from a for¬ eigner, and, at the end of the seventh year, the principal as well as the interest might be ex¬ acted. Less restrictions were placed upon pledges taken from foreigners, - and the foreign debtor held in bondage was not entitled to exact his release at the coming of the jubil e, and yet even these laws were humane in com¬ parison with those of Rome, which not only provided for the enslavement of the debtor, but even permitted the creditor to put him to death, an extremity, however, to which, ac¬ cording to the best authorities, the Romans were never known to have resorted.

The provisions of the Hebrew law which permitted the lender to collect both principal and interest from a stranger and which placed the stranger at the mercy of the creditor until such loans were repaid was the beginning of the practice of usury among this people, but many centuries elasped, as it shown by ref¬ erence to Proverbs, or to the Psalms, before the exaction of usury from another Hebrew was regarded otherwise than as a discreditable act. By the time of the birth of Christ, how¬ ever, the original spirit of the law seems to have been forgotten, for the borrowing and lending of money then prevailed without re¬ gard to any race limitations.

The practice of mortgaging land and of pay¬ ing exorbitant interest for money obtained upon such surety was a Jewish custom which grew up during the days of the Captivity. Although condemned by Nehemiah as being in direct vio¬ lation of the law, and denounced by Jesus Christ, whose new law of love required the righteous man to give to all who asked of him, and to lend to his enemies, ((asking for nothing again, » the mortgaging of property has con¬ tinued throughout the East. In the beginning and for a long period 12 per cent was gen¬ erally the interest charged, but later, under Turkish rule, and despite the warnings of the Koran, which also forbids usury, from 40 to 50 per cent was exacted.

In ancient Greece the practice of usury pre¬ vailed to such an extent

that in Athens, about

595 b.c., the bulk of the population were bound in practical slavery. Originally free and small proprietors, they had continued to borrow from the rich until the majority of them had placed themselves completely at the mercy of the aristocracy, and even those who nominally owned their land were not only unable to pay the money they owed but were compelled to erect on their land huge stone pillars, monu¬ ments to advertise their debts, which bore the name of the plutocrat to whom they were so seriously indebted. At last Solon appeared and with him the reform legislation that made Athens once more a free city, for the radical remedy which he applied to the financial abuses formally put an end to the law of bankruptcy resting upon slavery, and practically overcame the evil effects of the entire system of usury. Realizing that such a serious condition re¬ quired a firm hand, Solon first proclaimed a general seisachtheia, which provided that all debts made upon the person of the debtor or upon the surety of his land should become void. At the same time his legislation stipu¬ lated that bodily security should never again be accepted and that surety in land should rest only within a portion of the property. These reforms, which were certainly distinctly modern in their character, were so effective that the evils which had once threatened the security of Athens were no longer experienced, and although the rate of interest charged upon loans was still sometimes exorbitant — a condition which must exist whenever the rate is left to be determined by free contract — the restriction of the right of attachment was the means of pre¬ venting many abuses.

The conditions exising in Rome during the early days of the nation were similar to those which prevailed in Greece, although in Rome there was no Solon to legislate reform measures that could really reform. As a result more than five centuries passed before the Ro¬ man debtor was accorded the relief that had saved Athens, and, by that time, it was too late for any legislation to preserve the identity of the middle class. In the beginning Rome re¬ sembled Athens in that the mass of its people were farmers living on their own small estates, and, as in Athens, these yeomen soon became overwhelmed by the debts that war and taxes had forced upon them. A protest was made and, in 500 b.c. the Twelve Tables were adopted as a remedy, the theory being that the stipula¬ tion of a maximum rate of interest would be all that was necessary to overcome the prevail¬ ing evil. So

far from accomplishing this pur¬ pose the attempt to regulate the rate of interest failed utterly and as no alterations had been made in the law which actually governed debt, it was less than three centuries before prac¬ tically all the free farmers had become en¬ slaved. It was not until the dictatorship of Julius Caesar, in fact, more than five centuries after Solon, that the Athenian remedy was adopted and the law of debt really abolished. It has been stated that, at this time, while the rate of interest upon first-class properties in the city of Rome was only about 4 per cent, in the provinces the rate was increased to 25 and often 50 per cent. After pronouncing the accumula¬ tion of arrears illegal, Justinian established a rate of 6 per cent for all loans except those of a mercantile character, in which case 8 per

cent was allowed, and public sentiment, at last aroused to the influence of usury upon the social and economic fabric of the nation, stamped it as such a pernicious crime.

Forbidden by legal enactments and con¬ demned by the moralists it was but natural that the practice of usury should be just as severely censured by the Fathers of the Early Church. They not only held the custom up to detesta¬ tion, but they passed regulations prohibiting a usurer from obtaining ordination, while the Council of Nice, one of the many councils which took action upon the subject, carried its decree to such an extent as to stipulate that "if anyone, after this decree, shall be found to take usury, or demand the principal with half the increase of the whole, or shall invent any such methods for filthy lucre's sake, he shall be degraded from his order and have his name struck out of the roll of the Church.® The importance of ecclesiastical disapprobation in such matters is shown by the fact that all the decrees of the Apostolic Canons ; the Council of Eliberis ; the first and second councils of Arles; the first and third councils of Carthage, and the Council of Laodicea and of Trullo, had great effect in discouraging the practice of usury among the Christian races.

The natural consequences of this general condemnation of usury by the highest tribunals of the Church was the excuse for the adoption of the usurious methods by the Jews. In their case the laws prohibiting extortionate interest had so far become a dead letter that the race question was never considered when the matter of loaning money was under discussion. Had the Jews still adhered to the ancient Mosaic law, however, its provisions which permitted them to charge interest to the stranger and to collect both principal and interest from him under the most extreme penalties for failure to

meet such obligations would have been suffi¬ cient authority for them to have become the money lenders of Europe. Moreover, since the begining of the Christian era the term "usury® had also been applied in the sense of receiving a reasonable rate of interest for the use of money loaned, and as this had long been re¬ garded as an allowable practice, one which was no more contrary to the Hebrew law of love than the ordinary acts of buying or selling merchandise for gain, they felt themselves at perfect liberty to enter this field of commerce which had so conveniently been deserted by the Christians. That they often abused their privileges and conducted their business in a manner that was far from consistent with the Hebrew principles of equity, even when ap¬ plied to the stranger, is, of course, beyond question ; but these were the abuses of a system which time had made necessary and it was such abuses that have been responsible for much of the Jewish persecution which has darkened so many pages of history, for it was undoubt¬ edly largely on account of their practice of money-lending and the determination shown by them in the collection of the last penny of both principal and interest that made the race so heartily detested and liable to such gross ill- treatment at the hands of the people. An in¬ teresting illustration of this popular animosity was exhibited at the time when Henry III granted the charters to Newcastle and Derby, for by these documents Jews were forbidden to

live in either place, and as late as 1290 they were expelled in a body from the kingdom and were not permitted to return until the days of Cromwell, in spite of the fact that, long before their banishment, Christians had already com¬ menced to accept interest upon money loaned and that the business of money lending had ceased to be exclusively a right of the Jews.

The history of usury in England begins dur¬ ing the reign of Edward the Confessor, for it was at this time that the exaction of exorbitant interest was first prohibited. By 1126 that law had so far become obsolete that the practice of usury was forbidden only to the clergy. In 1199 Richard I decreed that the rate of interest should be restricted to 10 per cent and this re¬ mained the legal rate until 1624, when it was reduced to 8 per cent. In 1651 a still further reduction to 6 per cent was made, and, in 1714, the rate was established at 5 per cent, remaining unchanged until 1833, when, during the reign of William IV, bills not having more than three

months to run were exempted from the operation of the laws against usury. Under Victoria this exemption was extended to bills payable in 12 months, and later it was enacted that bills of exchange and forbearances of money above £10 should not be affected by the usury laws. At present the legal rate of interest in Great Britain is 5 per cent, unless it can be shown that a different rate was agreed upon between the contracting parties. Even then the debtor can claim relief in court from a <(harsh and unconscionable® agree¬ ment.

Usury in the United States. — Usury was one of the subjects which received early atten¬ tion at the hands of the legislatures of the various States. In most instances the crime is defined as ((the illegal profit required and re¬ ceived by the lender of a sum of money from the borrower for its use. To constitute a usurious contract it is required that there be a loan under an agreement that the money shall be returned to the lender, together with interest greater than that fixed by law.® Of course, the laws in relation to usury vary under the statutes of the different States, but, in almost every case, by the addition of a bonus to the interest in which the sum is greater than the legal interest, the contract is held to be usurious, and, in the absence of any statute re¬ garding such usury, relief may be obtained through courts of equity. In every State, how¬ ever, care has been taken to distinguish be¬ tween usury, applying the word in the modern sense of <(unjust exaction,® and interest on capi¬ tal, for the progress of society has been in such a direction that the position of borrower and lender has now assumed an entirely different aspect. To-day the borrowing for commercial purposes represents transactions of overwhelming importance to the financial world, whereas the act of borrowing for purposes of necessity has become comparatively unimportant. As the re¬ sult circumstances have so changed that the old laws would be useless in dealing with any present-day usury evil, and the statutes enacted by the various States are of the character which seems best fitted to cope with the conditions of the times.

These laws, briefly summarized for tabula¬ tion, are as follows :

The Usury Laws of the United States.

STATES

Legal rate oJ inter¬ est, per cent

Interest allowed by con¬ tract, per cent

Penalties for usury

Alabama .

8

8

Forfeiture of interest.

Alaska .

8

12

Forfeiture of double amount of interest.

Arizona .

6

10

Forfeiture of interest.

Arkansas .

6

to 10

Forfeiture of both prin¬ cipal and interest.

California .

7

Any rate

No provision.

Colorado .

8

12

No provision.

Connecticut .

6

12

Fine and imprison¬ ment.

Delaware .

6

6

Forfeiture of principal and interest.

D. of Columbia. . .

6

10

Forfeiture of interest.

Florida .

8

10

Forfeiture of interest.

Georgia .

7

8

Forfeiture of excess in¬ terest.

Hawaii .

8

12

Forfeiture of interest.

Idaho .

7

12

Forfeiture of interest and cost of action.

Illinois .

5

7

Forfeiture of interest.

Indiana .

6

8

Forfeiture of interest over 6 per cent.

Iowa .

6

8

Forfeiture of interest.

Kansas .

6

10

Forfeiture of double the amount of usuri¬ ous interest.

Kentucky .

6

6

Forfeiture of excess in¬ terest.

Louisiana . . .

5

8

Forfeiture of interest.

Maine .

6

Any rate

No provision.

Maryland .

6

6

Forfeiture of excess, with interest there¬ on.

Massachusetts ....

6

*Any rate**

No provision.

Michigan .

5

7

Forfeiture of interest; if paid, not re¬ coverable.

Minnesota .

6

10

Forfeiture of principal and interest.

Mississippi .

6

8

Forfeiture of interest.

Missouri .

6

8

Forfeiture of interest.

Montana .

8

12

No provision.

Nebraska .

7

10

Forfeiture of interest.

Nevada .

7

12

No provision.

New Hampshire. . .

6

6

Forfeiture of three times the amount of excess interest.

New Jersey .

6

6

Forfeiture of interest and costs.

New Mexico .

6

12

Fine and forfeiture of twice the amount of excess interest.

New York .

6

6t

Forfeiture of principal and interest.

North Carolina. . .

6

6

Forfeiture of interest.

North Dakota. . . .

6

10

Forfeiture of interest.

Ohio .

6

8

Forfeiture of all inter¬ est over 6 per cent.

Oklahoma .

6

10

Forfeiture of interest.

Oregon .

6

10

Forfeiture of principal and interest.

Pennsylvania .

6

6

Forfeiture of excess in¬ terest.

Rhode Island .

6

Any rate

No provision.

South Carolina.. . .

7

8

Forfeiture of interest and liability. 4

South Dakota ....

7

12

Forfeiture of interest.

Tennessee .

6

6

Forfeiture of excess in¬ terest.

Texas .

6

10

Forfeiture of double amount of usury.

Utah .

8

12

No .provision.

V ermont .

6

6

Forfeiture of excess in¬ terest.

Virginia .

6

6

Forfeiture of interest.

Washington .

6

12

Forfeiture double the accrued interest and costs.

West Virginia .

6

6

Forfeiture of excess in¬ terest.

Wisconsin .

6

10

forfeiture of all in¬ terest.

Wyoming .

8

12

Forfeiture of interest.

- *Not more than 18 per cent can be collected on loans of less than $1,000. t On call loans of $5,000 or upward any rate of interest may be charged, f Embraces liability to separate action to the extent of double the amount of usury. § With real estate security, 10 per cent.*

*Bibliography. — Jeremy Bentham's (Defense of Usury * (1816); Bohm-Bawerk, (Capital and Interest* (London 1890) ; Hume's (Essay on In¬ terest-* ; Mommsen's (History of Rome* (Lon¬ don 1875) ; Palgrave, R. H. I., dictionary of Political Economy,* article Hnterest and Usury* (London 1910) ; White, A. D. W., (History of the Warfare of Science with Theology in Chris¬ tendom* (New York 1896) ; also Martin Luther's sermon, <(Von dem Wucher** ((The Usurer,* 1519). See Interest.*

UTAH, the 45th State in the Union, takes its name from a tribe of Indians (Utes or Yutas) whose habitat was in the region settled by

the founders of this Commonwealth. It lies between lat. 37° and 42° N. and long. 109° and 114° W., comprising an area of 84,990 square miles.

General Features. — The country is crossed, mostly north and south, by mountain ranges, the principal one being the Wasatch Range, which might be termed the backbone of the State. East of this natural wall is a region drained by Green and Grand rivers, affluents of the Colorado, and to the west is the Great Salt Lake (q.v.) and its contiguous desert. This lake extending north and south for about 75 miles, with a width of nearly 50 miles and a depth in places of 40 to 50 feet, lies in the heart of (

Scarcity of timber and fresh water have been the country's serious drawbacks from the beginning. Trees are found only in the mountains and along the water courses, which are few and far between. Along the bases of the hills the soil is naturally productive, and when irrigated brings forth abundantly. In other places it is either pure desert, hopelessly barren or so devoid of moisture and so strongly impregnated with salt and alkali that cultiva¬ tion is almost impossible. The climate is health¬ ful and delightful. The mountains around the valleys ward off the keen wintry winds and the rarity of the high atmosphere modifies the sum¬ mer heat. The average annual rainfall is about 12 inches. In southwestern Utah — the valley of the Rio Virgen — the climate is semi-tropical. The Utah scenery will compare with any in the world. Here are mountains as grand as the Alps of Switzerland and sunsets more gorgeous than those of Italy and Greece. In the south are marvelous canyons, mammoth stone bridges and giant monoliths, master works of nature, worthy to be classed with the wonders of all time.

The land, in spite of its dryness, is one of

rich and varied resources. Where agriculture has succeeded, vast quantities of cereals are raised, with all varieties of fruits and vegetables common to the north temperate zone. The mountains are nature's treasure vaults, con¬ taining inexhaustible deposits of precious and useful metals. Gold, silver, lead, copper, iron, coal and a hundred other minerals are found. The mountains and lakes could furnish salt and soda to supply a continent, and from the quarries come marble, onyx, granite and all kinds of building stones for the construction of temples, churches, schoolhouses, stately public edifices and handsome private homes, which now adorn and beautify the once empty and desolate land.

Geology. — The greater part of the rock of the interior mountain area is a series of conformable stratified beds reaching from the Archean to the late Jurassic times, with the addition of thick deposits of Cretaceous and Tertiary sedimentaries in the Plateau sec¬ tion. The raising of these beds produced the Sierras and the Wasatch, and later, by crustal dislocation within the included area, the parallel ranges in the Great Basin were formed. It is observed that certain structural features of the local geology are nearly parallel with the meridian ; hence the precious metals are found arranged in parallel longitudinal zones. It is believed that the present Great Basin was part of the land area that arose early from the ocean, that during the Mesozoic period the basin was drained into the great Cretaceous sea, which had divided North America into two continents, and which was abolished by the uplift of the Plains and Plateau region, and that the Great Plains and the Great Basin were raised to their present altitude at the beginning of the Cenozoic period, where the uplifting of the continent be¬ tween Saint Louis and San Francisco began. Erosion in places has been extensive and has exposed or carried away everything from Creta¬ ceous to Pre-Cambrian. For details of the geological features of the State consult the pub¬ lications of the United States Geological Survey.

Fauna. — The mountains of Utah abound in game — bear, deer, elk, antelope, grouse, prairie chickens, etc. ; the fresh lakes and streams are well stocked with fish in numerous varieties, and lake and river margins are the haunts of wild geese and ducks in abundance. Fish can¬ not live in the Salt Lake, owing to the intense salinity of its waters. They were once sup¬ posed to have no life, but a small brine shrimp and three kinds of insects have been found therein. These waters are eight times brinier, and consequently far more buoyant, than those of the ocean. Saltair, on the eastern shore, is one of the largest bathing pavilions in the world.

Mining.— Though primarily an agricultural State, with manufacture and stock-raising as strong subsidiary features, Utah in recent years has forged to the fore and taken a rightful place among the great mining commonwealths of the nation. Her mining history began virtu¬ ally with the advent of the railroad £1869-70), prior to which period, though mines~~had been discovered and opened, little headway had been made, owing to a lack of transportation facili¬ ties. The existence of valuable ore bodies was known to the earliest settlers, but their leaders did not encourage mining. ((We cannot eat

Estimated population, 434,083

•

COUNTIES

POP.

Pop.

4,717

Beaver .

. B 8

2,467 Morgan .

. . F 2

13.894

Boxelder .

,C 2

1,734 Piute .

. . E 8

23,062

Cache .

..FI

1,883 Rich .

. .G 1

8.624

Carbon .

H 5

131,426 Salt Lake .

. .E 3

Daggett .

. . J 2

2,377 San Juan .

. . .J 9

(Pop. inch in Uinta Co.)

16,704 Sanpete .

. .F 6

10,191

Davis .

. F2

9,775 Sevier .

. ,F7

....

Duchesne .

H 4

8,200 Summit .

. .G 3

(Pop. incl. in Wasatch Co.)

7,924 Tooele .

,..C4

6,750

E mery .

,H 7

7,050 Uinta .

. . J 4

3,660

Garfield .

. . E 9

37,942 Utah . .

. F 4

1,595

Grand .

. . J 7

8.920 Wasatch .

. II 4

3,933

Iron .

..119

5,123 Washington .

. B 10

10,702

.Juab .

.0 5

1,749 Wayne .

1,652

Kane .

E 10

35,179 Weber .

6,118

Millard .

B 6

Incorporated Cities, Towns, Etc.

496

Alpine, Utah . . . .

. F 4

331 Meadow .

. ,E 7

2,797

American Fork . .

. .F 4

459 Mendon .

. ,F 1

463

Bear River City,

1,047 Mercur .

. . E 4

Boxelder .

. ,C2

1,760 Midvale .

F 3

1,899

B eaver .

. I) 8

838 Midway .

. . G 4

2,881

Bingham Canyon

. E 3

1,014 Milford .

. .O »

1,677

Bountiful .

. F 3

353 Millville .

..Ft

[3,685

Brigham .

.E

591 Minersville .

..C8

693

Castle Dale .

*II 6**

615 Moab .

. . K 7

789

Castlegate .

. . H 5

1,227 Monroe .

. ,E 7

1,705

Cedar City .

.C 9

756 Morgan .

. ,F“

495

Centerfield .

.F 6

1,223 Moroni .

1? 6

283

Charleston .

. .64

2,280 Mt. Pleasant . . .

G 5

564

Clarkston .

..FI

4,057 Murray .

. . F 3

976

Coalville .

.G 3

2,759 Nephi .

F 5

231

Corinne .

..El

515 Newton .

. . F 1

656

Elsinore .

. E 7

31,404 Ogden .

. . F 2

525

Emery .

.G 7

254 Ophir .

. ,E 4

2,296

Ephraim .

. . F 6

648 Orangeville .

. . G 6

846

Escalante .

. . F 9

1,338 Panguitch .

..DO

3,416

Eureka .

. .E 5

620 Paradise .

. . F 1

1,218

Fairview .

.G 5

3,439 Park City .

. .G 3

1.231

Farmington ....

. . F 3

1,156 Parowan .

..1)9

651

Ferron .

. H 6

2,397 Payson .

F 4

1,202

Fillmore .

. .E 7

1,618 Pleasant Grove .

. . F 4

1,549

ForestDale, Salt

1,021 Price .

. H 5

Lake .

E 3

1,020 Providence .

..FI

875

Fountain Green

. . F 5

10,645 Provo .

. . F 4

600

Garland .

..El

533 Randolph .

. . G 1

359

Glenwood .

. .F 7

547 Redmond .

. . F 6

470

Goshen .

. .F 5

2,559 R chfield .

. E 7

1,154

Grantsville .

. E 3

1,562 Ricimond .

..FI

628

Green River . . . .

..17

1,737 St. George .

. B 10

950

Gunnison .

,.F6

693 Salem . . . .

. ,F 4

2,031

Heber .

.G 4

1,082 Salina .

. ,F 7

816

Helper .

. . H 5

117.399 Salt Lake City .

,.F3

553

Hinckley .

. D 6

1,037 Sandy .

. ,F3

800

Huntington .

. H 6

915 Santaquin .

. . F 5

699

Hydepark .

..FI

546 Scipio .

. ,E 6

1,838

Hyrum .

.F 1

746 Scofield .

. .G 5

127

Joseph .

.E 7

1,865 Smithfield .

. .F I

733

Kanab .

D 10

3,464 Spanish Fork . . . .

. . . F 4

513

Kanosh .

.E 7

1,100 Spring City .

. ,F 6

887

Kaysville .

.F 2

3,356 Springville .

. . F 4

2,964

Letii .

258 Stockton .

. ,E 4

722

Levan .

. .F 5

2,753 Tooele .

. . E 3

989

Lewiston .

.F 1

836 Vernal .

. K4

7,522

Logan .

. F 1

424 Washington .

. B 10

1,771

Mammoth .

.E 5

358 Wellington .

.11 5

2.433

Manti .

. .F 6

1,195 Wellsville .

. . E 1

534

Mapleton .

. .F 4

577 Willard .

. . E 2

485

Mayfield .

. .F 6

D

E

H

110°

109

I

42

ˆ , Malad City <■

A.

o n a

W oodruff

ht

tyowell o ˆy-ˆgWe\ **

Dayton [

Preston >

|D\ K A

-ifA

0 .

M 1 ...AvST

gfr-Aj'

ˆ rw

S&® OREGON < *.*

« Quealy

UTAH

SCALE

Statute Miles, 32 = 1 Inch.

0246810 20 30 40

42

Band McNally's New 11 × 14 Map of Utah. Copyright by Rand McNally & Co.

Ole»coe j '

Elkol»L ,,

|_ i N Cl 0 L N

I Glencoe

SALT LAKE

PACIFIC

Salt Springs

v'%

Wa-.v.,

ˆih-n Garris o n m o n s te £ ' "?'.■ ■ ■ ■*

Mt- %

, 4sU'4G,oli-HIM :'\4 4

\ 1ˆ7 % <2

1 | ffo ,-;®Gold Hill*

i li '///, v:.

40

, 4" Tooejp0 . v

Iosepa ij Aarner5j?3-'ˆ0 Do|U°

» — C jff" ? "n«uer 1

JriMvE e% 5P$S§r

" t Hr / V' – ˆ t?t.fj,,h n7ˆT«jW>»™ cfiSI

\ °Pb,r \ Valley

!•% #o4iax\ Mercur*/ V*

fL Wu ˆ 2 t] \ »

V J&5 il

/A# spai

^ % ‘s’%, S’ iaremon , ‘ >V>v/ Won»tott I

■ %,y\ I

...feoLt

.Junt, VUM„„WU .

e\l u.tt\ Wallaburg

\H»»“ V yV >% Wallabprg 1^0.

— V>\c&61. .>■ V\7i. P„.U e* T>

x^V^vian Pnrk^ Jfc (N?/,/

iff

1 PCarjbunt \ .#^.abl>y or biY‘

-rfrov^j \ T

^ roUoiPeak^ * ^.rawberry R> ifhpo /A Mapleton . X^pa’n i vfv ForxO’

.. • °Ftsfi Springs,.

*r

X^\

K JfV V‘“J ItCW-

53 • ^ c/ l7fL=, ^ .v/T y

—s c, -/I. m’y.A®

“‘Imii&ir JTintiel .,># Stiver Cil ■ Bu&Kh’orn] ■/ McIntyre^

0

M

35 -.-Ji.

fBaldy — ,v

.ay II(‘b < ‘L\r ®4, ncrPeakl °o/'g

charleston

o Holden

uClear / \w/S < (lt Luke

Hatton . –

A/Naeis r Drrˆ

J f

ˆ Volcanofˆˆ \ | > |A.”‘

-* c£-jl yˆPumice ‘ xvltUi

ˆ / B\&ckmck Mar:

‘ Iprci1 * _ W.ioscp (

r W A BJ“‘YEˆ 1 Read ˆ Vaca

« n . miitora

\ x SiEf J.b A Moscow V A

fˆSawt oo l h ‘ .rˆ;

fi

} Z e n dˆii, 1 cSnkˆ

kl„r4 ?#Rf ˆ

.ˆLahˆdttˆlfˆˆenville ‘ AˆTV#~t unctioi

« – *« ™ r -• — * – 1 y n >

ˆ Ford ˆSahara ˆBeryl _

aJable

-7t

Little Sa

>‘t V

Aatimer –

- Uj v^45l

*AT *-A=-f – /KalSf. a*

SSSiteL

I ,?al,omon$ P^alcs

,, ,, . .

;’ rjsa?® h»%° tfTs^*

*ST «r~#bprr^*

5^si^EcAS“’ ci§ifc SWp

;“l?rl.me-.~ ij | \maRMON, MTS. tjfsugar Loaf Ml. «

mugar I V i lie –

fcnT; f

A N P/f E T’E; Hur

/Goss ^Kd^Sli^r _’?/AuroP?:g=^-. / ?

Hatton. V’«Vfe/>Sls’JI’

ruz Black Roftkv \Kanosl»; (•«£ Z^v eo’cc _a V\ / vAx” ^

*Vo I ft art n3R. < = > \ ,si A.Vi“t,j ✓/7l0. .—\pt’xv’0 *

*aM/’AtebellaMt. ^Mt. Alice *

*^Elsyfe j y ‘J *

*L*xwv i L^iWv1- ^*

’: rrv i 1 ft AsS^tC A

Sevier.^Mo’n&e I V

^Peak? X) r\ wLaha -y

- ‘“T oK’ ushai ‘^m y-? _

^^Marysvale PealcT^^ FremoiV

■i ‘ . ^ — vMarysvalc < r^T ^%Th.ousand Lake

*3SL”5& Vofcano^fc y^J4(Mt. A Greenwich 1 Loa© o Mt.

IE.S R ZP/ MlttoiffK I ifc 1 \Thuiip

Minersville

r>, ingstoi/^* C.i rclevillc — l ^

t Lake sp?

»p^«ss

ft

mi

f !§

m

UKUNTUWEAP

rwiH,

^H,Pe a k $it>» Lceds0 c A \|iU Verkin

^^E**incl/IVolcano ^

-Llf’l,f’KiZ/ ,.C»V

;S46eor*f<^

^4J

’saijt’a Clar«y(«^%“rrie»»f ‘etr^r’ viry ^ bigar t‘4a,r%ort^ ^lllanllll/i

ashlugtoa §. ,

Bloomington

W^’S8’4

Mount ‘Carmc l^hil® ‘ ^ .

‘ K . ihlZF c Hp*

T j ‘/ v\C/?l

; 4 .Inhnsnn vvO \|(V A — 1 ‘

| !j,\Johnson ,\P N^C ‘ , AA

U

JL.

*M o H A *V E*

\ KAIBAB Jfc

3EgJ mT|r In

Longitude West from Greenwich

39

“ /

U, Basin ‘A LJ.

If^’-waas1

mrf

^“jpUlavajo Mt.

noocmt \ _ r- _ J

pra iMifiimtiiWi if :1T

**

I N v a j o

ifliinn/nHfflinL ,

N A V A J 0 x “etlPy . |

Peters Nipple

37

APACHE

B

D

7/2

H

iir

1 14D

UTAH

613

gold and silver,® said the State founder, Brig¬ ham Young; ((neither do we desire to bring into our peaceful settlements the rough element com¬ monly found among inhabitants of mining camps, to vitiate the morals of our youth, over¬ whelm us by numbers and drive us again from our hard-earned homes.® For these reasons he discouraged mining and advised the people to turn their attention to agriculture, stock-raising, manufacture and kindred pursuits. Most of his people — the Mormons — followed his advice, but some joined with the Gentiles in exploiting the mines. The honor of pioneering this im¬ portant industry is given to Gen. P. E. Con¬ nor, the founder of Fort Douglas, a military post on the foothills east of Salt Lake City. In' the latter part of 1863 Connor prospected in Bingham Canyon and located the Jordan mine. He afterward organized the West Mountain mining district and established a paper, The Union Vedette, heralding through its columns the opening of the Utah mines. In 1915 the mineral products of the State aggregated $61,081,633, as set forth in the following table:

Gold, ounces . 189,107 $3,908,000

Silver, ounces . 12,724,000 6,243, 939

Copper, pounds . 182,589,000 31,579,191

Lead, pounds . 219,098,000 10,166,147

Zinc, pounds . 22,643,000 3,325,362

Coal, tons . 3,083,676 5,858,994

$61,081,633

Utah ranks second among the States in the production of silver, third in lead, fourth in copper and sixth in gold. The known metal product of Utah for gold, silver, copper, lead and zinc alone, according to the United States Geological Survey, is valued at $691,301,832. The known dividends paid by the Utah metallif¬ erous mining companies is $131,000,000. The estimated contents of Utah's coal fields, by the United States Geological Survey, is 196,000,000,- 000 short tons.

Agriculture. — The Utah soils are said to be the deepest and richest in the United States, extending in some instances to a depth of 40 feet. The following table shows her agricul¬ tural production for 1915 :

Wheat, bushels .

Oats, bushels .

Barley, bushels .

Rye, bushels .

Corn, bushels .

Potatoes, bushels .

Hay, tons .

Sugar beets, tons .

Alfalfa, seed, tons .

Sweet clover, tons .

Red clover, tons .

Orchard fruit:

Apples, bushels .

Peaches, bushels .

Pears, bushels .

Orchard fruit (including cher¬ ries, apricots, plums and prunes) .

Small fruit .

Nursery products . .

Flowers and plants .

Vegetables .

Dairy products .

Miscellaneous .

Eggs and poultry .

Honey .

Livestock .

Wool, pounds .

8,225,000

$6,662,250

4,600,000

1,886,000

1,377,000

633,420

195,000

126,000

391,000

238,510

2,600,000

1,690,000

988,000

8,398,000

695 , 000

3,419,400

50,000

450,000

7,000

54,000

500

5,700

436,000

501,400

247,000

123,000

38,000

32,000

256,000

700,000

200,000

100,000

1,500,000

3,000,000

1,000,000

2,600,000

100,000

10,000,000

16,000,000

3,520,000

$47,195,680

Utah produces more sugar beets and barley to the acre than any other State ; she is tied with two other States for first place in the vield of potatoes to the acre, and is second among the States in the yield of wheat per acre.

Banking. — There are about 22 national banks, about 75 State banks, about 15 private banks and a few loan and trust companies. The national banks have deposits aggregating $22,- 000,000, capital $3,500,000 and surplus $1,600,000. The 75 State banks have deposits aggregat¬ ing $23,000,000, capital $4,500,000 and surplus $1,100,000. From 1860 to 1870 private banks de¬ veloped. In 1872 the first national bank was established and in 1873 savings banks began their activities.

Finance. — The assessed valuation is esti¬ mated as $675,000,000. In 1919 the bonded debt of the State was $3,435,000. The State treasury report for 1917—18 shows the following condi¬ tions of the State's finances :

Cash on hand, 30 Nov. 1917 . $1,223,960

Revenue, 1917-18 . 8,838,302

Total . $10,062,262

Disbursements . 8,556,750

Balance on hand, 30 Nov. 1918 . $1,505,512

Religion and Education. — Utah is the home of <(Mormonism® and the Latter-day Saints form about 75 per cent of the church membership of the State. There are Catholics, Presbyterians, Methodists, Baptists, Christian Scientists and Congregationalists in small num¬ bers. The percentage of illiterates in the popu¬ lation at the time of the last census was only 2.5, the number being 6,821, of whom 3,636 were foreign-born. Throughout the State school

attendance is compulsory on all from 8 to 18 years for 30 weeks annually, unless lawfully excused to go into employment, in which case they must be in school at least 144 hours a year. There are 642 elementary schools with 2,707 teachers and 100,096 enrolled pupils ; 45 public high schools with 742 teachers and 10,097 pupils. The State University had an enrolment in 1918 of 3,431 students distributed in its schools of Arts and Science, Mines and Engineering, Edu¬ cation, Medicine, Law, Commerce and Finance and Extension Division. The Utah Agricul¬ tural College in 1918 had an enrolment of 2,523 students. In addition to these public institu¬ tions, the Latter-Day Saints' Church operates a system comprising The Brigham Young Uni¬ versity at Provo, with 1,184 students; four normal colleges with 1,958 students and five high schools with 2,845 students. Nine other private schools are maintained as follows : All Hallows College, Westminster College, Saint Mary's Academy and Rowland Hall, at Salt Lake; Sacred Heart Academy, Ogden; New Jer¬ sey Academy, Logan; Proctor Academy, Provo; New West Academy, Vernal; Wasatch Acad¬ emy, Mount Pleasant.

Government. — The constitution, ratified by popular vote, 5 Nov. 1895, provides that the right of conscience shall never be infringed; that no public money or property shall be ap¬ propriated for the support of any ecclesiastical establishment; that the right of trial by jury shall remain inviolate ; that no law shall be passed granting irrevocably any franchise, priv-

ilege or immunity, and that all laws of a gen¬ eral nature shall have uniform operation. Per¬ fect toleration of religious sentiment is guar¬ anteed and polygamous or plural marriages are forever prohibited. Article IV declares that both male and female citizens snail enjoy equally all civil, political and religious rights and priv¬ ileges, and that every citizen of the United States of the age of 21 and upward, who shall have been a citizen for 90 days, and shall have resided in the State one year, four months in the county and 60 days in the precinct prior to an election, shall be entitled to vote thereat, excepting idiots, insane persons and unpardoned persons convicted of treason or crime.

Legislative. — The legislative power is vested in a senate and house of representatives with biennial sessions in odd years, senators to be elected for four years and representatives for two years and all to be

at least 25 years old. Till otherwise provided the senate will consist of 18 members and the house of representatives of 45 members ; but the senators shall never ex¬ ceed 30 in number and the representatives shall never be less than twice nor greater than three times the number of senators.

Executive. — The executive department in¬ cludes a governor, secretary of State, State auditor, State treasurer, attorney-general and superintendent of public instruction. A candi¬ date for the office of governor or secretary of State must be at least 30 years of age and have been a resident of Utah for the five years pre¬ ceding the election. The State auditor and State treasurer are ineligible to election as their own successors. The governor is vested with au¬ thority to veto objectionable items in a bill ap¬ propriating moneys, while approving other por¬ tions, and to veto any measure passed by the legislature, which veto, however, may be over¬ come by a two-thirds vote of both houses. In case of his death, impeachment, removal from office or inability to perform the duties of his office, they devolve upon the secretary of State.

Judiciary. — The judicial power is vested in the senate sitting as a court of impeachment, in a Supreme Court of five judges, in District Courts, in justices of the peace and other in¬ ferior courts. Supreme Court judges are elected by popular vote for 10-year terms, judges of District Courts are elected for four-year terms.

Municipal and County. — The county is the unit of local government. Biennial elections for the election of local officials are held in even years for county and in odd years for municipal officials.

Manufactures. — Among many thriving in¬ dustries may be mentioned the Provo Woolen Mills, the beet-sugar factories at Lehi, Ogden, Logan, Garland, Layton, West Jordan, Elsinore, Payson and Brigham ; also the Inland Crystal Salt Works, the International and Highland Boy Smelters in Salt Lake and Tooele val¬ leys and the electric-power plants at Salt Lake, Ogden, Provo and other places.

History. — The region of the Great Salt Lake was originally settled by emigration from the East. The pioneers were Latter-Day Saints or ˆMormons,® whose leader, Brigham Young (q.v.), led a company of 143 men, three women and two children from the Missouri River to Salt Lake Valley in the spring and summer of 1847. Prior to that time these people, owing to

religious and political differences between them and their neighbors, had migrated from sev¬ eral States, including Illinois, where their prophet, Joseph Smith, was killed by a mob in June 1844. He was a native of Vermont and of Revolutionary ancestry, as was his successor, Brigham Young, the second president of the Latter-Day Church. Leaving the main body of his followers living in wagons and log huts upon and near the Indian lands in western Iowa, President Young conducted his pioneer company across the great plains and mountains, the journey beginning at Winter Quarters (now Florence, Neb.) early in April and ending in Salt Lake Valley 24 July 1847. This journey would have been undertaken a year earlier, but for a call made by the Federal government upon the expatriated people — a call promptly met — for a battalion of 500 men, to assist in the war against Mexico. The pioneers were well armed and equipped and carried with them, in covered wagons drawn by ox and mule teams, plows and other implements, a surveying ap¬ paratus, seed-grain and a year's supply of pro¬ visions.

The great West, now teeming with populous cities and thriving villages, connected by rail¬ road, telegraph and telephone, was then a wil¬ derness, almost unknown, not only to the people of the East, who had heard of it through ro¬ mantic tales or imperfect reports from Span¬ ish and American explorers, but also to the straggling fur hunters roaming over its im¬ mense solitudes, baiting the bear, trapping the beaver, trading and consorting with the sav¬ ages and acting as guides for the occasional emigrant train or chance traveler to or from the Western Ocean. Every schoolboy familiar with the map of North America knew some¬ thing about (

The earliest of these settlements formed the nucleus of the inter-mountain empire. To the founders of this Commonwealth, more than to any other people, owing to their unity, com¬ munal spirit and systematic methods is due the redemption of arid America. They were the Anglo-Saxon pioneers of irrigation. President Theodore Roosevelt, in a public speech deliv¬ ered at Salt Lake City in May 1903, credited Utah with being the Gamaliel at whose feet the Federal government had learned valuable, prac¬ tical lessons before passing the National Irri¬ gation Law of 1902, by which the government proposed to co-operate with the people of the Rocky Mountain and Plain States in extending and building up a system of irrigated agricul¬ ture. The first fruits of that enactment, in this State, was the completion, in May 1916, of

the Strawberry Valley Reservoir and Canal, which tunnels the Wasatch Mountains and brings upon many thousands of dry acres in Utah Valley the waters impounded for this purpose eastward of that rocky range. Since 1847 over $20,000,000 have been expended upon the principal irrigation enterprises; 500 reser¬ voirs have been built, 6,000 miles of main canals constructed and 2,000 miles of laterals.

As early as 1832 a few American emigrants had settled in Oregon, which then included Washington, Idaho and other parts, and was claimed both by Great Britain and the United States. A little later a thin stream of emigra¬ tion began crossing the country from the Mis¬ souri River to California, then a Mexican prov¬ ince including the present States of California, Nevada and Utah. But none of those emigrants settled here. All shunned the desolate valley by the lake and hurried on to the green and fer¬ tile slopes of the Pacific. The Utah pioneers might have done likewise, had not their saga¬ cious leader foreseen the very probable result — a repetition of the troubles they had fled from in Ohio, Missouri and Illinois. Hence his re¬ fusal to be influenced by one of his prominent lieutenants — Samuel Brannan, who, after pilot¬ ing a ship's company of Latter-day Saints from New York around Cape Horn and to the Bay of San Francisco, and leaving them to plow and sow, build adobe houses and set up a newspaper in the San Joaquin Valley, came overland to meet the pioneers and persuade them, if possi¬ ble, to forego their half-formed design of lo¬ cating in the desert basin, and instead to join the Brannan colony on the California Coast. "No,® said Brigham Young, <(this is the placed Here, accordingly, they settled — here upon alien soil, the acquisition of which by the United States was an immediate result of the Mexican War, in which the Mormon battalion participated.

The pioneers planted their first crops im¬ mediately upon entering Salt Lake Valley. The ground was parched and burning and more than one plowshare was broken in the hard sun¬ baked soil, afterward softened and made arable by turning upon it the waters of the mountain streams. They also constructed a log and mud fort, as a means of protection against hostile Indians. This done, most of the leading men returned to the Missouri River for their fami¬ lies. Those who remained in the mountains were reinforced in the autumn of 1847 by sev¬ eral large companies of immigrants, who had followed them from the frontier. The afore¬ mentioned, with a small company of Latter-day Saints from Mississippi, who joined the pio¬

neers at Fort Laramie, and the returned mem¬ bers of the Mormon battalion, which had been honorably discharged at Los Angeles, were the colonists who struck the first blows in the founding of Utah.

February 1848 witnessed the signing of the Treaty of Guadalupe Hidalgo, ceding to the United States the provinces of New Mexico and California. In March 1849, at Salt Lake City, was organized the provisional government of Deseret, pending Congressional action upon a petition for a State government. Congress de¬ nied this petition and organized, with greatly reduced boundaries from those of the proposed commonwealth, the Territory of Utah, destined

also to be diminished in size by the formation of subsequent States and Territories. The Or¬ ganic Act was signed by President Millard Fillmore 9 Sept. 1850, but the news did not reach Utah until late in January 1851. Early in Feb¬ ruary the Territorial government went into ef¬ fect. One of the first counties was named Mil¬ lard, and its principal town Fillmore, in honor of the nation's head, by whom Brigham Young had been appointed governor.

The first 10 years of occupancy passed in comparative peace. There were wars with the red men, in which the settlers were uniformly victorious, not more by force of arms than by wise diplomacy which summed up their Indian policy in these words : <(It is cheaper to feed the Indians than to fight them.® The savages were gradually placated, and became peaceable and friendly. There were also seasons of drought and years of famine, before irrigation prevailed over aridity, and the swarming crick¬ ets and grasshoppers that devoured the early crops ceased their terrible visitations. The work of colonization was vigorously pushed, settlements being formed wherever a spring of water bubbling up from some oasis in the des¬ ert, or the smallest stream flowing from the mountains, held out hope of agricultural suc¬ cess.

Immigration was systematically carried on by the Latter-day Saints, intent upon their ideal of gathering scattered Israel from the nations. The Perpetual Emigrating Fund Company, or¬ ganized in the autumn of 1849, sent annually to the frontier 500 wagons to bring the poor to Utah. Those aided by, were expected to reim¬ burse, the fund, thus making it perpetual. Many of these immigrants, men, women and children, walked the entire distance from the Missouri River, some of them pulling handcarts over burning plains and storm-swept mountains. During the season of 1856 many perished. Vari¬ ous classes of people — -farmers, laborers, tradesmen, mechanics, merchants, manufactur¬ ers and business men, with a liberal

sprinkling of artists, musicians, writers and other profes¬ sionals, were to be found in these wagon trains. The newcomers, wherever possible, would prac¬ tise their trades or professions, but all were en¬ couraged to take up land and build permanent homes. Small holdings were the rule. There was neither land nor water for speculative pur¬ poses. Utah has at the present time 23,000 farms, averaging about 150 acres each. Nearly half a million acres have been entered for cul¬ tivation under dry-farm methods, requiring no irrigation.

Wherever settlements sprang up, they were upon soil claimed by the Indians and acquired by the United States at the close of its war with Mexico. The nation was expected to deal with the Indians, and in due time with the set¬ tlers, but until it took steps in this direction, the people could obtain no title to their homes. Much anxiety was felt by them in consequence. Twenty-one years passed after the settlement of Salt Lake Valley before the United States land laws were extended over this region. While waiting for the national government to dispose of the soil, the provisional government made temporary grants to its citizens of the lands they occupied.

Toward the close of Governor Young's sec-

ond term there was some friction between Utah and the general government, caused by reports of a rebellion in this Territory. Investigation proved the rumors groundless, and a peaceable adjustment followed. The troops sent to put down the supposed insurrection were com¬ manded by Gen. Albert Sidney Johnston, who afterward led a Confederate army and fell at the battle of Shiloh, 6 April 1862. As the com¬ mander of the Utah Expedition (1857-58) Johnston was opposed by the Utah militia un¬ der Gen. Daniel H. Wells, acting under orders from Governor Young, who had proclaimed Utah under martial law. No blood was shed but Johnston's army passed the winter outside of Salt Lake Valley. Spring brought peace commissioners from Washington, and the trou¬ ble was soon over. The Hon. Alfred Cum- ming, Utah's first Gentile executive, was wel¬ comed to Salt Lake City, and it was he who reported to the government that the United States court records, which the Mormons had been accused of burning, were found intact and in a state of complete preservation. General Johnston founded Camp Floyd, 40 miles south of Salt Lake City, and there the troops

re¬ mained until the outbreak of the Civil War, when the post was abandoned.

An event of great importance to Utah was the establishment of the Pacific telegraph line, built from both east and west and completed to Salt Lake City in October 1861. Up to that time the fastest means of communication be¬ tween the Missouri and the Pacific were the stage-coach and the pony express, superseding ox team and pack mule. The first message that went over the wire from Salt Lake City was signed by Brigham Young and contained the significant words : ((Utah has not seceded.® This telegram was to President J. H. Wade, of the Pacific Telegraph Company, Cleveland, Ohio. A similar message was sent to President Lincoln by Acting-Governor Frank Fuller. Lin¬ coln answered, congratulating the Territory and its people. In April 1862, he requested ex- Governor Young to raise, arm and equip a com¬ pany of cavalry to protect the overland mail route and telegraph line against Indians and other enemies of the government. The re¬ sponse was hearty and immediate. Neverthe¬ less a suspicion that Utah was disloyal induced Secretary of War Stanton to establish a mili¬ tary post in the vicinity of the Utah capital, ostensibly to hold the Indians in check, in real¬ ity <(to keep an eye on Brigham Young and the Mormons.® Colonel Connor and the California and Nevada Volunteers, who had enlisted for service in the East, were assigned, much to their chagrin, to this needless vedette duty. It was October 1862 when they founded Fort Douglas, already mentioned. These troops made themselves useful in subduing hostile In¬ dians, and for his gallant service in this direc¬ tion, Connor was given a brigadier-general¬ ship.

The Pacific Railroad, pushing from Omaha westward and from Sacramento eastward, found the Mormon settlements directly in its path, and was promptly aided by Utah men, who came forward with their means and helped to con¬ struct the great highway. Brigham Young, who was a Union Pacific director, took a contract from that company and built nearly 100 miles of its roadbed through the Wasatch Mountains.

The Central (now Southern) Pacific also had Utah contractors. And thus was exploded the popular fallacy that the Mormon people were opposed to this mighty enterprise. As a mat¬ ter of fact, the governor and legislature of the Territory had petitioned Congress for the con¬ struction of such a railroad as early as March 1852. When Utah's delegate presented this memorial in the House of Representatives at Washington, he was told that he was 100 years ahead of the age. In reply he invited the mem¬ bers of Congress to come over the road

when completed and visit him at his home in Salt Lake City. Twenty years later some of them actually did so.

The meeting of the Union Pacific and Cen¬ tral Pacific lines at Promontory, Utah, 10 May 1869, was an occasion of general rejoicing. The point of junction was soon moved to Ogden, 40 miles north of Salt Lake City, and between these towns was built by home capital, in 1869-70, the Utah Central, the first local rail¬ road, with Brigham Young as its president. A similar line south of the capital immediately followed. These roads, with others subse¬ quently constructed, were absorbed by the Union Pacific, which held an unbroken monop¬ oly of the railroad business in Utah until March 1883, when the Denver and Rio Grande was completed to Salt Lake City.

Utah's earliest merchants, outside the Mor¬ mon community, and excepting Captain Grant, of Fort Hall (Ida.), representing the Hudson Bay Company, were from the East. Living¬ stone and Kinkead, a Saint Louis firm, freighted a large stock of merchandise across the plains in the autumn of 1849. Goods were also brought from southern California. During the early days of money scarcity, exchange and bar¬ ter was the rule — the dry goods and groceries of the merchant for the products of farm, orchard, mill and workshop; the latter utilized at home or converted into cash in distant mar¬ kets. The first settlers coined California gold dust and made and used paper money until the national coins became sufficiently plentiful. The greatest commercial enterprise that Utah has known — Zion's Co-operative Mercantile In¬ stitution — was organized in October 1868, the object being to unify the interests of the old settlers in the face of unfriendly competition. This great house is still in existence though no longer an exclusively Mormon institution. It has an annual trade of over $6,000,000.

Many changes resulted from the coming of the railroad. Population and capital poured into Utah ; the mines, hitherto unprofitable, be¬ gan to pay; railroads and telegraphs were ex¬ tended, manufactures established and an im¬ petus was given to trade and industrialism in general. The Deseret News, the pioneer jour¬ nal of the Rocky Mountains, established in June 1850, soon had two powerful rivals, the Salt Lake Herald and the Salt Lake Tribune, the former independent, the latter anti-Mor¬ mon in tone. The Tribune was the mouthpiece of the Liberal party, between which and the People's party a long and bitter fight was waged, a period of friction between Mormon and Gentile, strongly reminiscent of the historic feuds of Guelph and Ghibelline. Churches and schools also multiplied,

supplementing the work of those already established, both secular and

UTAH

UTAH (

1 The " Edwin " Natural Bridge, Southeastern Utah. One of the group of three great arches in this part of the State, San Juan County. Reached from Thompson, Utah, or Mancos, Colorado, on the Denver & Rio Grande. Height, 104 feet; thickness at top of arch, 10 feet; width of top of arch, 35 feet; width of span, 194 feet; heighth of span, 88 feet

2 In Provo Canon, Utah, on the Denver & Rio Grande Railroad

UTAH

617

parochial.. All these, with the State University, founded in February 1850, and the old district schools, now merged into a splendid free school system dating from 1890, have placed Utah in advance, educationally, of most of the States in the Union. The percentage of illiter¬ acy for native whites is 0.4, and for the entire population, including foreign born, but 2.5.

Brigham Young, the founder of Utah, dying in August 1877, was succeeded as head of the Mormon Church by John Taylor. During the latter's administration the Federal government, by its courts and prosecuting officers, began pro¬ ceedings for the suppression of plural marriage, commonly called polygamy, which had been a tenet of the Mormon faith since July 1843, when Joseph Smith introduced it in Illinois. Never at any time did more than 3 per cent of the Latter-day Saints practise it. All, however, or practically all, believed it a divine institution, the restored marriage system of the Hebrew patriarchs, eugenically designed, under strict moral regulations, for the production of a su¬ perior race. Some of the best men and women in the community assumed its obligations, and did so with the worthiest motives, from a pro¬ found religious conviction. Plural marriage was not the Oriental polygamy of modern times. The harem or seraglio was unknown. Plurality of wives constituted the ((polygamy® or ((many marriages® — this being the definition of that somewhat misleading term. Each wife had a separate home, with her own children around her, and, as stated by Capt. Howard Stansbury, who conducted a government survey of the Great Salt

Lake in 1849-50 (consult (Stans- bury's Expedition)), the plural wife stood <(in the same relation to the man as the wife that was first married,® the union thus formed being ((considered a perfectly virtuous and honorable one.®

But the government, influenced by popular religious prejudice, set its face against this pe¬ culiar institution, and under legislation enacted by Congress in 1862, 1882 and 1887, polygamists were rigorously prosecuted ; the result being the eventual relinquishment of the inhibited prac¬ tice. out of deference to the laws of the land. This, however, was not until nearly 1,000 per¬ sons had been fined and imprisoned for infrac¬ tions of those statutes, aimed as they believed at (

The Church has been true to its pledge. While there have been some cases of new polygamy since the Mormon president, Wilford Woodruff, issued the <(Manifesto® prohibiting plural marriages, they were of a sporadic nature and entirely unauthorized, the individuals in¬ volved being alone responsible. The Church re¬ pudiates their acts, and as fast as the offenders have been discovered and proved guilty, it has dealt with them by disfellowshipment and ex- communication.

The issuance of the manifesto was followed by an era of better feeling between Mormons and Gentiles. Utah had long been a battle¬ ground, torn by dissension and ill will between these two classes of her citizens. They now <(buried the hatchet® and mingled socially, politi¬ cally and in business as never before. Drop¬ ping old feuds and abandoning local align¬ ments, the members of the People's and Liberal parties reorganized as Democrats, Republicans, etc., and began to work unitedly for the com¬ mon weal. Presidents Harrison and Cleveland, in successive proclamations, granted general amnesty to all polygamists ; the confiscated Church property was returned ; and everything done that a great and generous government could devise to cause the unpleasant past to be forgotten. As an appropriate capstone to the temple of peace thus ' reared, Utah, on 4 Jan. 1896, was admitted into the Union as a State. The Republicans elected the first officers of the new Commonwealth.

Not the least gratifying spectacle witnessed during the years that followed was that of Mormon and Gentile youths, sons of sires who had built up the State, enlisting together and standing shoulder to shoulder, fighting the bat¬ tles of their country during the war with Spain. The record made by the Utah Volunteers in the Philippine Islands, in Cuba and elsewhere is a page of history of which the

American army can well be proud; and the same is true of <(the boys in khaki® from this State who served in the Great War of 1917-18. Throughout this broad land, no people are more loyal to the flag, the constitution and the government than are the people of Utah.

The Present Status. — Utah, with her 28 counties, containing 124 cities and towns, has a collective population of 449,396, less than a third of which is found in Salt Lake City, the capital of the State. While the principal occupa¬ tions of the people are farming, stock-raising, mining and manufacturing, the learned profes¬ sions and the fine arts have many representa¬ tives among them. The average death rate is but 10.8 to the thousand ; that of the whole United States being 16.5. The bonded debt in 1920 amounted to $3,435,000. The assessed valu¬ ation of property of all kinds at the present time is $675,000,000. Most of the inhabitants of the State are Mormons, though the Gentiles predominate at Salt Lake City, at Ogden and in all or most of the mining towns. From 1905 to 1911 the Utah capital was governed by the American parly, an anti-Mormon political or¬ ganization, virtually a revival of the Liberal party. Its rule was not satisfactory, however, and in 1904 a fusion of Gentile and Mormon citizens overthrew it at the polls. Since then the commission form of government has con¬ trolled Salt Lake City.

Governors of Utah.

STATE OF DESERET.

Brigham Young . 1849-51

TERRITORIAL GOVERNORS.

Brigham Young . 1851-57

Alfred Cumming . 1857-61

Francis H. Wootten (acting) . 1861

John W. Dawson . 1861

Frank Fuller (acting) . 1861-62

Stephen S. Harding . 1862-63

James Duane Doty . 1863-65

Amos Reed (acting) . 1865

Charles Durkee . 1865-69

Edwin Higgins (acting) . 1869-70

S. A. Mann (acting) . 1870

J. Wilson Shaffer . 1870

Vernon H. Vaughan (acting) . 1870-71

George A. Black (acting) . 1871

George L. Woods . 1871-74

S. B. Axtell . 1874-75

George B. Emery . 1875-80

Eli H. Murray . 4880-86

Caleb W. West . 1886-89

Arthur L. Thomas . 1889-93

Caleb W. West . 1893-96

STATE GOVERNORS

Heber M. Wells . Republican... 1896-1905

*John C. Cutler . * ... 1905-09*

William Spry . “ ... 1909-17

Simon Bamberger . Democrat. . . . 1917-21

Charles R. Mabey . Republican. . . 1921-

Bibliography. — Bancroft, H. H., ‘History of Utah) (San Francisco 1890) ; Burton, Rich¬ ard F., ‘The City of the Saints> (New York 1862) ; Carlton, A. B., ‘Wonderlands of the Wild West> (Salt Lake City 1891); Gan¬ nett, Henry, ‘Gazetteer of Utah (Washing¬ ton*

1900) ; Jones, M. E., 'Utah (New York 1902) ; Nichols, (Mineral Resources of Utah> (Pittsburgh 1873) ; Polk, R. L., 'Utah Gazeteer* (Chicago 1909) ; Roberts, B. H., 'History of the Mormon Church) (in Ameri¬ cana Magazine, New York, June 1909-June 1915) ; Robinson, Phil, 'Sinners and Saints) (Boston 1883) ; Remy, Jules, 'A Journey to Great Salt Lake City) (London 1861) ; Stans- bury, Howard, 'Stansbury's Expedition (Phila¬ delphia 1852); Whitney, O. F., (History of Utah) (4 vols., Salt Lake City 1892-1904) ; id., 'The Making of a State : School History of Utah* (ib. 1908). Consult also (Revised Stat¬ utes of Utah> (Utah legislature 1904) ; 'Re- ports) of the Administrative Departments of the State; United States Census Bureau, Cen¬ sus of Manufactures 1915 J (Washington).*

Orson F. Whitney,

Author of ' Whitney's History of Utah?

UTAH, a lake in the State of Utah, in Utah County, about 30 miles southeast of Great Salt Lake. It is about 25 miles long from north to south and from 3 to 13 miles wide; area, 150 square miles; altitude, 4,500 feet. It is the lar¬ gest body of fresh water in the State. It is in a valley formed by the uplift of mountain ranges; on the east the Wasatch and on the west the Lake, Oquirrh and Tintic. The streams which enter the lake come mostly from the Wasatch Range. The outlet of Utah Lake is Jordan River, which flows into Great Salt Lake.

UTAH, Agricultural College of, the State agricultural and mechanical college, founded in accordance with the Land Grant Act of 1862; located at Logan, LTtah. The college is a part of the public school system and is open to both men and women. It was chartered in 1888 and opened to students in 1890; in 1901 the curric¬ ulum was considerably enlarged and an extra year's work required for entrance to the col¬

legiate courses leading to a degree. In 1903 the college organization was made more complete and effective by the establishment of five schools — the school of agriculture, the school of domestic science and arts, the school of agricultural engineering and mechanic arts, the school of commerce and the school of general science ; in 1904 a department of music was added, offering courses in vocal music, piano¬ forte, violin and theory of music. The courses offered by the various schools of the college are as follows: (1) Four years' courses in agri¬ culture, home economics, commerce, mechanical engineering and general science, leading to the degree of B.S., in

agriculture, etc.; (2) three years' courses of vocational grade in agricul¬ ture, home economics and commerce. There are also short winter courses in agriculture, in home economics and mechanical arts. The State Experiment Station is connected with the college and offers opportunity for advanced work. The institution is organized on the quarter system, being thereby in practically continuous session.

UTAH, University of, the State univer¬ sity is located at Salt Lake City. It was incor¬ porated as the University of the State of Des¬ eret in 1850 and opened to students in that year. But as it failed to secure patronage or adequate financial support, it was closed after one session until 1867. The governing board of regents, however, maintained their organiza¬ tion during this time and had general supervi¬ sion of the public school system. When first reopened in 1867 it was largely a commercial college, but in 1869 was reorganized with nor¬ mal and classical departments. In 1894 a new charter was obtained, the name was changed to LTniversity of Utah and a 60-acre tract of land on the Fort Douglas reservation was granted to the university by the Federal government. In the same year the Salt Lake Literary and Scientific Association gave $60,000 for the en¬ dowment of a chair of geology. In 1899 the legislature provided for the erection of new buildings and the removal of the university to the new site, which was first occupied in 1900. Subsequent to this the government granted the university land so that its campus was en¬ larged to 90 acres. The board of regents con¬ sists of the president of the university and the secretary of State, members ex officio, and 12 members appointed by the governor for four years. The university is open to both sexes on equal terms. The organization includes the school of arts and sciences, the school of edu¬ cation, school of mines and engineering, school of medicine, school of law, school of commerce and finance, the extension division, the graduate division, and in connection with the school of education the university high school, elemen¬ tary training school and kindergarten. The schools of arts and sciences, education, com¬ merce and finance offer courses leading to the degrees of B.A. and B.S. The graduate division offers courses leading to the M.A. and M.S. The school of medicine offers at the present time the degree of B.S., in medicine, which is granted after the student has com¬ pleted two years of premedical work and two years of professional work. The premedical and junior courses leading to a degree in den¬ tistry as well as a four-year course leading to

the B.S., in pharmacy are also offered. The school of law offers courses leading to the LL.B. The school of mines and engineering offers courses in mining and engineering lead¬ ing to a degree of B.S. The senior college of the school of education grants the teachers' high school diploma and the junior college elementary and kindergarten diplomas, which are all legal licenses to teach in the public schools of the State. Scholarships and fellow¬ ships are offered to graduate students in metal¬ lurgy and chemistry in the school of mines and engineering. The university calendar is based upon the quarter system, which permits of a summer quarter of 12 weeks, which is largely attended by students from other States on account of Salt Lake's ideal climate. The campus is situated at the base of the Wasatch Mountains, overlooking the valley of Great Salt Lake and Salt Lake City. In 1919 there are 19 buildings on the campus. The valua¬ tion of the physical plant of the university is estimated at $1,208,000. The library of the university is the largest in the State of Utah and contains 53,819 bound volumes and 20,728 pamphlets. The principal bequest received dur¬ ing the year 1918 was $50,000 for the benefit of the school of mines and engineering from the estate of James MacGregor, Terre Haute, Ind. The total number of students in the year 1921 was 4,938. The faculty numbers 160.

UTAHLITE, a compact, green variscite found in nodules near Lewiston, Utah. They have been sliced and polished and make charm¬ ing specimens. Wardite is a frequent associ¬ ate. See Variscite.

UTAKAMAND, oo-ta-ka-mund, or OOTA- CAMUND, India. See Ootacamund.

UTAMARO, oo'ta-ma'rd, Kitagawa, Jap¬ anese artist: b. Kawagoye, 1753; d. 1806. His work became widely known and his prints are well represented in the Metropolitan Museum. New York. Among his most famous series are (The Twelve Hours of the Green Houses) (1804). Consult the monograph by Goncourt (Paris 1911).

UTE, ut. See Shoshonean Indians.

UTERUS. See Womb.

UTICA, u'ti-ka, N. Y., city, county-seat of Oneida County, on the Mohawk River and the Erie Canal and on the New York Central and leased railway lines, the West Shore, etc., the Delaware, Lackawanna and Western and the Ontario and Western railroads, about 80 miles west of Albany and 50 miles east of Syracuse.

Electric lines extend to surrounding villages and towns. The railroads extending north cross the Adirondack region arid connect with the steamers on the Saint Lawrence and with the trunk lines of Canada. The railroads to the south connect with the Erie and some of the lines in Pennsylvania. The large number of passengers who transfer at Utica, ((the gateway to the Adirondacks and the Thousand Islands, » make it one of the most important stations be¬ tween New York and Buffalo.

Manufacturing and Commerce. — The chief manufactures are hot-air furnaces, hosiery and knit goods, men's clothing, machine-shop prod¬ ucts, steam fitting and heating apparatus, lum¬ ber products, marble products, paving material, foundry products and tobacco products. In

1914 there were more than 300 manufacturing establishments listed by the census, with an an¬ nual production of over $30,000,000. In 1918 the local manufactured products were estimated at fully $40,000,000 and 17,000 persons were on the factory pay-rolls. The city is famous for the excellence of its woolen, cotton and knit goods and its hot-air furnaces. Utica ships large quantities of manufactured goods, farm products, fruit, dairy products and livestock. It is a distributing centre for an extensive region extending north and south. It is an important cheese market and large quantities of flowers, especially roses, are shipped to New York.

Buildings and Improvements. — The prin¬ cipal public buildings are the Government build¬ ing, State 'armory, city hall, Y. M. C. A. and Y. W. C. A. buildings, public library, Munson- Williams Memorial building, churches, schools and business blocks. The altitude of the city is about 505 feet and the slope is sufficient to make a surface drainage. The sewer system is excellent. The water plant is owned by a private corporation which has a paid-up capital of $500,000. The reservoir has a daily capacity of about 4,010,000 gallons. There are a number of small squares and several parks. The streets are wide, paved largely with asphalt and kept clean. Forest Hill cemetery in the suburbs contains the mausoleums of Roscoe Conkling and Horatio Seymour.

Churches and Charities. — There are over 50 churches, the leading denominations being Roman Catholic, Protestant Episcopal, Metho¬ dist, Presbyterian, Baptist and Lutheran. The charitable institutions are the Utica State Hos¬ pital, the Masonic Home of New York State, Saint Elizabeth's Hospital and Home, Saint Luke's Homoeopathic, Faxton and City hospi¬ tals, Home for the Homeless (for aged

women), Home for Aged Men and Couples, Saint John's Orphan Asylum, Saint Joseph's Infant Home, Utica Orphan Asylum and the City Orphan Asylum. The Woman's Christian Association and other organizations do noble work for the relief of the needy.

Education. — The educational institutions are three high schools, the public school acad¬ emy, founded in 1843, the Balliol School (Utica Female Academy), the Utica Catholic Academy, 22 ward schools, a teachers' training school, several parish schools, a public free library of 60,000 volumes, libraries connected with each of the three high schools and libraries connected with some of the literary societies. Hamilton College (q.v.), at Clinton, is only nine miles distant from Utica and is reached by steam and electric cars.

Banks, etc. — There are eight banks and one trust and deposit company, three daily and numerous weekly and monthly newspapers.

Government. — The government is vested in a mayor and a council of 15 members, who hold office two years. The administrative offi¬ cials are appointed by the mayor, subject to the approval of the council, or are elected by the council.

History. — The original settlement was called Old Fort Schuyler, from a fort which had been erected here during the French and Indian War. It was named in honor of Col. Peter Schuyler. The territory on which Old Fort Schuyler was located formed part of a

tract of 22,000 acres, granted 2 Jan. 1734 by George II, king of England, nominally to several persons, but in reality to enure to the benefit of William Cosby, colonial governor of New York and New Jersey. In 1786 a survey of the manor of Cosby, together with a map of the same, was made by John R. Bleecker. It ap¬ pears therefrom that two houses were located near the fort on which is now the east side of Genesee street, and one house on land on the west side. Improvements had been made a little farther westward, somewhere between the present lines of Broadway and State streets, and other improvements in the eastern part of the city. Outside of these evidences of civilization was a vast unbroken forest. The occupant of the house nearest the river, on the western side of the road, was John Cunningham, and his nearest neighbor, on the same side, was George

Damuth. The resident on the opposite side was Jacob Christman. The settler toward the west was a man named Mc- Namee, and the clearings on the eastern border were designated as those of McNamee and Abraham Boom. It is not known which one of these men came first. Before that time Old Fort Schuyler was an advantageous place of trade between the outlying settlements and the Indians, as there was here a fording place across the Mohawk River and the old Indian path from Oneida Castle here intercepted the path along the river side leading to the portage of Fort Stanwix (now Rome). In 1798 the village was incorporated under the name of Utica, and in 1832 was chartered as a city. Consult (Outline History of Utica and Vicinity (Utica 1900) : Publications* (Oneida Historical Society).*

Population. — The population of Utica in

1910, 74,419; (1920) 94,156.

UTICA, North Africa, an ancient city 17 miles northwest of Carthage ; originally founded as a Phoenician colony in 1101 b.c. During the Third Punic War, Utica submitted to Rome, and became the capital of the province of Africa. Afterward it was the see of a bishop, till its destruction by the Arabs about 700. Its ruins include an amphitheatre, an aqueduct and the remains of quays, formerly connected with the sea, now nearly 10 miles distant, by the ancient river Bagradas, the course of which has since diverted to the east.

UTICA SLATE, a black, somewhat car¬ bonaceous and silicious clay slate (Carbona¬ ceous argillutyte) prominently developed in the Mohawk Valley of New York State, and deriv¬ ing its name from the outcrops in the vicinity of Utica, N. Y. It is also recognized in the Champlain Valley, and in the northern Appa¬ lachian region, but beyond these localities their beds are represented by more calcareous or silicious shales and arenytes. These shales rest upon the Trenton limestone and are succeeded by the more arenaceous Lorraine beds. The chief fossils of the Utica slates are the trilobite Triarthus beckii and graptolites of the genus Diplograptus. See Ordovician.

UTILITARIANISM, a term first em¬ ployed by John Stuart Mill, in a philosophical sense, to denominate a theory of morals that had already been formulated by the Greeks, but which reached its fullest development in Eng¬ land during the latter part of the 18th and the

beginning of the 19th centuries. Mill tells us that he adopted the word from a passing ex¬ pression in Mr. Galt's (Annals of the Parish. His definition of the term is as follows : <(The creed which*

accepts as the foundation of morals utility or the Greatest Happiness Principle, holds that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness. By happiness is intended pleasure, and the absence of pain ; by unhappiness, pain and the privation of pleasure. To give a clear idea of the moral theory, much more requires to be saul : in par¬ ticular, what things it includes in the ideas of pain and pleasure ; and to what extent this is left an open question. But these supplementary explanations do not affect the theory of life on which this theory of morality is grounded — namely, that pleasure and freedom from pain are the only things desirable as ends; and that all desirable things (which are as numerous in the utilitarian as in any other scheme) are desirable either for the pleasure inherent in themselves, or as means to the promotion of pleasure and the prevention of pain.®

Utilitarianism in England was not merely a philosophical doctrine during the first third of the 19th century. This theory of morals fur¬ nished the basis for a political and social propa¬ ganda. Of this movement Jeremy Bentham, James Mill and his son, John Stuart Mill, were successively leaders, and its objects were dis¬ tinctly radical and reformatory. The Westmin¬ ster Review was founded in 1824 as the organ of the new radicalism, and proved of great in¬ fluence in exposing abuses in the Constitution, in existing legislation and in the administration of justice. Bentham's most important work was in the field of legislative reform, while the Mills, father and son, who were better in¬ structed in philosophical principles and pos¬ sessed broader interests, upheld the cause of freedom and progress as well in social, eco¬ nomic and religious matters. The best account of this movement, which had very important practical results, is found in Leslie Stephen's (The English Utilitarians (1900).*

It is with utilitarianism as a theory of morals, however, that we are here most directly concerned. The doctrine that pleasure is the end of life, which is at present usually denom¬ inated hedonism (q.v.), was first formulated by the Cyreniacs, and in a somewhat more de¬ veloped form by Epicurus. In modern times this doctrine is found in Hobbes, who assumes that mankind is essentially egoistic, each indi¬ vidual seeking naturally what is of advantage to him. Although most of the English ethical writers of the 18th century refuse to accept the conclusions of Hobbes, they generally find dif¬ ficulty in explaining why the happiness of other men should be sought by the agent, since they assume with Hobbes that it is a natural psycho¬ logical principle that each seeks his own happi¬ ness. The tendency and obligation to seek ((the greatest happiness of the greatest number®

(an expression first employed by Cumberland) is either explained as a result of the psychological principle of association, or by taking refuge in a refined egoism through a demonstration that it pays to have regard to the happiness of others. That mankind is moved by genuinely altruistic impulses, that it is as natural to promote the

good of our neighbor as to seek our own ad¬ vantage, was perhaps first clearly stated by But¬ ler in his (Sermonson Human Nature. > Neither Bcntham nor Mill, however, provides any ade¬ quate way of passing from the psychological principle, fteach man naturally seeks his own pleasure,® to the ethical doctrine that ((hap- piness of all should be sought by each indi¬ vidual.® This latter principle, nevertheless, is that which the Utilitarians assume as the basis of their moral theory. Among the more im¬ portant English Utilitarians are Cumberland, Hume, Gay, Paley, Bentham, James Mill, John Stuart Mill and Herbert Spencer, who unites Utilitarianism with evolutionary theories.

The end of life, according to the Utilitarians, is, as we have seen, happiness. The theory thus insists that the moral quality of an act is de¬ termined by its consequences — an act being good that promotes happiness or prevents un¬ happiness, and wrong when it operates in the reverse direction. It is accordingly directly op¬ posed to Intuitionism (q.v.), which declares that there is some natural quality in acts which con¬ stitutes them good or bad in themselves, and that this moral quality can be directly known without any reference to consequences. Thus an Intuitionist would say that lying is bad in itself and is directly perceived to be such, while the Utilitarian would find that its moral quality is determined by its results to the individual and to society. As we have seen, happiness means pleasure, and the avoidance of pain. The ques¬ tion arises whether anything more than the quantity of pleasure is to be considered in judg¬ ing the morality of an action. Bentham and the older Utilitarians maintained that everything depends upon the amount of pleasure resulting from an act: <(the quantity of pleasure being equal, push-pin is as good as poetry.® John Stuart Mill, on the other hand, introduced the concept of qualitative differences in pleasures. <(It is quite compatible with the principle of utility,® he says, <(to recognize the fact that some kinds of pleasure are more desirable and more valuable than others. . . . Of two

pleasures if there be one to which all or almost all who have experience of both give a decided preference, irrespective of any feeling of moral obligation to prefer it, that is the more desirable pleasure. If one of the two is, by those who are completely acquainted with both, placed so far above the other that they prefer it even though knowing it to be attended with a greater amount of discontent, and would not resign it for any quantity of the other pleasure which their nature is capable of, we are justified in ascribing to the preferred enjoyment a su¬ periority in quality, so far outweighing quantity as to render it, in comparison, of small ac¬ count.® This doctrine of a qualitative difference in pleasures doubtless is borne out by experi¬ ence, and consequently is a practical advantage to the older Utilitarianism. But the objection has frequently been raised that to rank pleasures as higher or lower, irrespective of their quan¬ tity, is logically to abandon the utilitarian posi¬ tion. For it appears that it is only by introduc¬ ing some other standard than pleasure itself that this graduation is possible. The Epicureans and the older Utilitarians had showed that pleasures of the mind, for example, were preferable to pleasure of the body by using the quantitative standard — that is, by showing

that on account of their constancy, permanence, and the fact that they entailed no subsequent pain, they really exceeded the latter in quantity.

Bibliography. — Albee, E., (A History of English Utilitarianism (1901) ; Bentham, J., (An Introduction to the Principles of 'Morals and Legislation* ; Martineau, J., (Types of Ethical Theory* ; Mill, J. S., (Utilitarianism* ; Seth, J., A Study of Ethical Principles) ; Sidgwick, H., (Methods of Ethics) ; Spencer, H., 4Data of Ethics) ; Stephen, L., (The English Utilitarians) (3 vols., 1900).*

J. E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

UTILIZATION OF POWER. See

Power, Utilization of.

UTOPIA. Probably nothing illustrates bet¬ ter Lowell's description of a classic as ((a com¬ mentary on the morning paper® than the fact that Sir Thomas More's (Utopia, published just 400 years ago, discusses practically all the important social problems that we are most occupied with at the present time. Almost at the beginning of*

the book modern penology, that presumedly latest awakening of the social conscience, is introduced with the principle (

The other most urgent community prob¬ lems are anticipated as completely as those of penology. Eugenics was consulted by a pre¬ marital investigation ; they accustomed them¬ selves to daily military exercises but ((engaged in war only to defend themselves or their friends from any unjust aggressors, or out of good nature, or in compassion to assist an op¬ pressed nation 'in shaking off the yoke of tyranny.® It would be hard to find a more striking comment on the morning paper than this. The Utopians enjoyed religious toler¬ ance though they required their officials to be¬ lieve in a hereafter of reward and punishment because they thought that added to responsi¬ bility. They believed money the root of evil, dispensed with its use, employed gold and silver for chains on their slaves (these were outcasts of other nations saved from a worse fate) and for slop jars and other necessary utensils.

In this model kingdom every one had to work six hours a day, three before and three after the mid-day meal. They dispatched their mid-day meal, but sat long at supper while music was played and entertainments were pro¬ vided and the children were encouraged to ex¬ hibit their powers of memory and speech. They lived in model houses, each one with its garden where flowers had to be grown as well as vegetables and prizes were given to the most

successful gardeners. So as not to be spoiled by parental tenderness the children after early years were cared for by public authority. Their hospitals were so well built and organized ((that scarce one in a whole town if he should fall ill would not choose rather to go thither than lie sick at home.® No wonder that the visitor to Utopia said of Europe as he saw it

The author of 'Utopia was later to be one of the greatest of England's Lord Chancellors, the only one that ever cleared the docket of the Court of Chancery; and when the choice came between death or his conscience he ac¬ cepted the alternative with a jest on his lips.*

James M. Walsh, M.D.

UTRAQUISTS. See Calixtines.

UTRECHT, u'trekt (Dutch, u'treHt), Netherlands, the capital of the province of Utrecht, situated on the Old Rhine, where the Vecht branches off from it, 25 miles south by east of Amsterdam. It is a pleasant town with fine shaded promenades, and intersected with canals. The old fortifications are laid out in boulevards, but a double line of new forts sur¬ rounds the city. There are several very old churches, including the Gothic cathedral, built in the 13th century. The tower has a notable chime of 42 bells. Other notable buildings are those of the university, recently extended, the government building, the courthouse and the

archives, formerly the palace of King Louis Napoleon. The university was established in 1636, and has a library of 200,000 volumes and a botanical garden. There is a meterological observatory and veterinary school. The indus¬ trial establishments include pigment factories, saw-mills, breweries, two organ factories, a number of cigar factories, an iron foundry, etc. The town is one of the most important railroad and canal centres in the kingdom. Utrecht is the oldest of the Batavian cities, and was called by the Romans Traiectum ad Rhenum. In 1579 the Act of Confederation of the Dutch

provinces declaring their independence of Spain was signed here, and here the Peace of Utrecht was concluded in 1713 between the powers in the War of the Spanish Succession. The prov¬ ince lies between the Zuyder Zee and the Rhine. The northern portion is a dairy section; there is intensive agriculture along the Crooked Rhine and the southwest portion of the province is largely devoted to fruit-raising. The com¬ munal population is about 125,000; of the prov¬ ince 300,000.

UTRECHT, Peace of, the peace secured in 1713 through several separate treaties signed

by France as one party and by Great Britain, Holland, Portugal, Prussia and Savoy on the other, later acceded to by Spain, supplemented in 1714 by the Treaty of Radstadt, between Ger¬ many and France, and by the Barrier Treaty of 1715 between Austria, Great Britain and the Netherlands. Its provisions terminated the War of the Spanish Succession and recognized Philip V of Bourbon as king of Spain, he to renounce all claim to the throne of France; Savoy re¬ ceived Sicily from Spain; Prussia was acknowl¬ edged as a kingdom, renounced her claim to Orange and was granted Neuchatel and a por¬ tion of Gelderland; Austria received the Span¬ ish Netherlands, Sardinia, the Milanese and Naples; the protection of

Holland was secured by possession of certain fortified towns under the Barrier Treaty; and France recognized the Protestant succession in England, relinquished to her all claims to Newfoundland, Nova Scotia, Hudson Bay and Straits and Saint Christopher, West Indies, reserving fishery rights on the shores of Newfoundland and also confirmed England in the occupation of Gibraltar and Minorca, together with the privilege of supply¬ ing African slaves to America.

UTRECHT, Union of. In the evolution of the political life of the Low Countries, com¬ prising the region which ultimately became the kingdoms of Belgium and the Netherlands, the most notable events were the establishment of the duchy of Burgundy (1384—1482) ; the act of Charles V in detaching the Seventeen Prov¬ inces from the German Empire (1543) ; the Pacification of Ghent (1576) ; the Union of Brussels (1577) ; and the confederation of the seven northern provinces by the Union of Utrecht, under John of Nassau. In the <(01d Cradle of Liberty,® in 1579, the delegates met and formed a compact for mutual defense in 26 sections. This document has ever been re¬ garded as the foundation of the Dutch Republic (1579-1814), of which the kingdom, with more freedom than in the old regime, is but a de¬ velopment and disguise. While not a consti¬ tution, in the strict modern sense, this docu¬ ment served as such in the Dutch Republic of the United Netherlands for 215 years and was ever appealed to as the Xgrondwet® or funda¬ mental law of all the component members of the federation. The common people and the Calvinists, when religion and politics were in¬ extricably intertwined — for the Reformed Church was older than the State, or Republic, which had grown out of religion — considered that this Act of Union had made the people of the seven northern, or Protestant provinces, a nation (natie) and not merely impotent mem¬ bers of a political league, from which one of the signatories, even the Greatest Holland, could secede. They, therefore, opposed the ideas of state sovereignty, as held by Barneveldt and the Arminian party; and on this ground, even more perhaps than on questions of reli¬ gious dogma, the politics of the republic, from 1581, when the Dutch abjured Philip II, and issued their declaration of independence, were colored and dictated. The National Synod was held and the Union and national ideas pre¬ vailed, though the era was disfigured by pro¬ cedures common to the age. The issue raised between the stadtholder Maurice and the Ad¬ vocate of Holland, John of Barneveldt, so un-

fairly stated by Motley, has been expounded voluminously by Dutch authors and is to this day the root and ground of political parties in the Netherlands. Consult Motley, (The Rise of the Dutch Republic) (1855) ; Salmon, (The Union of UtrechD (1894) ; and the exhaustive serials of Dosker, (Barneveldt: Martyr or Traitor?* (1898) in the Presbyterian and Re¬ formed Review.

UTRECHT, University of, established in 1634 by the city and province of Utrecht it was closed during the French occupation (1762) and the Napoleonic conquest (1811-13) but was re¬ opened two years later and has flourished since its opening as a royal university in 1815. It is divided into five faculties and has many .laboratories and clinics. It has a library of 250,000 volumes. The average annual attend¬ ance of students is over 1,000.

UTRICULARIA. See Bladderwort.

UTSUNOMIYA, oo-tsu-no-me-ya, capital of Tochigi prefecture, which includes Shimot- suke province, on the railroad, 68 miles west of Tokio, formerly the seat of a powerful feudal lord and clan. It lies on the vast plain of the Kwanto, in sight of the Nikko range of moun¬ tains and has modern buildings. The castle site is now a park; five miles distant is the image of Kwannon, goddess of mercy, 60 feet high. This prefecture leads all in tobacco, hemp and copper; the mines of Ashio being the sec¬ ond largest in Japan, yielding $2,100,000 worth yearly. In manufactures, sericulture and weav¬ ing are foremost ; the fabrics at Ashikaga being worth $5,000,000 a year. Pop. of the prefecture about 1,044,177 ; of Utsunomiya, 54,049.

UVALDE, u-val'de, Tex., town, county-seat of Uvalde County, on the Southern Pacific Rail¬ road, about 90 miles west of San Antonio. It is in an agricultural and stock-raising region and in the vicinity are asphalt mines. Cotton and honey are shipped. The chief industrial establishments are lumber mills, a flour mill and a machine shop. There are seven churches, separate public schools for white and colored pupils. There are two banks and a newspaper. Pop. 3,998.

UVANITE, a crystalline form of pitch¬ blende.

UVAROVITE, a rare and beautiful emer¬ ald-green variety of garnet, distinguished by its content of chromium. It has a hardness of 7.5 and a specific gravity varying from 3.41 to 3.52. It is usually found

in limestone or associated with chromite. Its most celebrated localities are the Ural Mountains and Orford, Quebec, where it occurs in groups of small dodecahedral crystals.

UVULA. See Palate.

UXBRIDGE, uks'brij, Canada, a town of Ontario County, Ontario, on the Black River, and on the Toronto and Northern Railway, 36 miles northeast of Toronto. It has lumber and flour mills and manufactures iron ware, mill machinery, engines, agricultural imple¬ ments, woolens, etc. Pop. about 2,000.

UXBRIDGE, Mass., town in Worcester County, on the Blackstone River, and on the New York, New Haven and Hartford Rail¬ road, anout 19 miles southeast of Worcester. Uxbridge was formerly a part of the town of Mendon; in 1727 it was separated and incor¬ porated under its present name. In 1772 the northern part of the town was set off and in¬ corporated as Northbridge. The town includes the villages of Calumet, Hecla, Rivulet, Scott's, Wheelock's, Uxbridge, North Uxbridge and Ux¬ bridge Center. The chief industrial establish¬ ments are cotton and woolen mills, machine shops, a furniture factory and creameries. There are five churches, a high school, 17 dis¬ trict schools, a free public library. There are excellent banking facilities and newspapers. Pop. (1920) 5,384.

UXMAL, ooz'mal, Mexico, an ancient Maya ruined city, in the northwest of Yucatan, about 60 miles southwest of Merida. It has vast remains of ancient grandeur, temples, Cyclo¬ pean terraces, etc., extending over a large area. The principal ruins are the <(Casa del Gobern- adorw and the (

UZ, Syria, a historical region mentioned in the Old Testament as the scene of the story of Job and lying to the east or southeast of Palestine, probably in Hauran, the exact posi¬ tion not having been identified. Also a tribe presumed to have occupied this region and a traditional ancestor mentioned in Gen. x, 23 and xxii, 21.

UZANNE, ii-zan, Louis Octave, French writer and bibliophile : b. Auxerre, 14 Sept. 1852. He founded (1880) Le Livre, succeeded (1890) by Le Livre Moderne. In 1889 he founded the Societe des Bibliophiles Contem- porains. Among his works (translated titles) are (The Caprices of a Book-Lover (1877) ; (Her Highness, Woman) (1884) ; (Our Friends Books: Talks on Curious Literature) (1886); (Modern Bindings) ; (Physiology of the Quays of Paris * (1890) ; (The Bachelor's Prayer-*

Book) (1890) ; (The Art and Artifices of a Beauty (1902) ; Contemporaneous Egypt * (1909); (Parisiennes of the Time) (1910).*

UZZIAH, u-zi'a, or AZARIAH, king of Judah (792-740 b.c.) . See Azariah.

y

Yin the English alphabet, the 22d letter and the 17th consonant. V and U were originally one and used indis¬ criminately for the representation of the vowel u and the consonant v or w. The form V was derived by the Latins from the very ancient Greek alphabets, in which the Greek upsilon (T) was so written. In classical Greek upsilon always is a vowel, never a consonant. The classical Greek had no sign for the consonant V of the Latins : hence when a Latin word or name containing this conso¬ nant was transliterated into Greek the v was represented either by the digraph ov (ou) or by the letter /? (which, in the Cyrillic alphabet and in modern Greek, represents the consonant v ; examples: Lat. Varro, Gr.O vappuv; Lat. Vir- gilius, Gr. B tpyiXioq). Our v is a labiodental

consonant; but our w is a labial only: which of these best represents the ancient Latin con¬ sonant V? The weight of authority among modern phonologists is in favor of the theory that the Latin consonant v was a labial differ¬ ing but little, if at all, from our w. The Eng¬ lish letter v is produced by the junction of the lower lip and the upper teeth : its sound differs from that of f, which is articulated in a similar way, in being voiced while that of f is breathed : they are both continuous consonants and both belong to the class of spirants. It is worthy of note that nearly all the words in English that begin with v are derived from French or Latin. V is never the final letter of a word in English, though the final z/-sound is common, as in live, thrive. The name "doubled® was given to the character w in times before the speciali¬ zation of the form v as a consonant sign only instead of being the sign of the vowel u also. English v may be derived from Indo-Germanic hh or from p. As an abbreviation v stands for vanadium, five or Latin vide "see.® See the letter U, Alphabet.

VACA, va'ka, Alvar Nunez Cabeza. See

Nunez Cabeza De Vaca, Alvar.

VACA DE CASTRO, va'ka da kas'tro- Cristoval, Spanish jurist and administrator: b. 1492; d. 1562. A member of the audience at Valladolid, he was sent in 1540 to Peru to ad¬ vise with Pizarro regarding the government and in case of the latter's death himself to as¬ sume power. On his arrival at Popoyan he re¬ ceived word of Pizarro's assassination and the revolt of Almagro. Aided by Alonso de Alvarado and others of Pizarro's principal captains, he de¬ feated Almagro at Chupas 16 Sept. 1542 and had him executed at Cuzco for treason. He re¬ tained the government until the arrival of the viceroy Blasco Nunez Vela early in 1544, when he was imprisoned on suspicion of conspiring against the "New Laws.® He escaped to Spain

where he was imprisoned in 1545-56 on charges from which he was finally exonerated.

VACARESCO, va-ka-res'ko, Helene, Ru¬ manian writer : b. 1866. She was educated at Paris and Bucharest. Her (Chants d'Aurore) was crowned by the French Academy and her 1 Rumanian Ballads) received from the French Academy the prize Jules Favre. She is the author also of (Kings and Queens I Have Known > (1904) ; but her most famous work is (L'Ame Sereine, which brought her a prize from the French Academy in 1896. In 1909 she published (The Adventures of Two Em¬ presses.)*

VACATION SCHOOLS. See Summer

Sessions.

VACCINATION is a process of transmit¬ ting by inoculation a specific disease known as vaccinia, cowpox, or modified smallpox from one susceptible reagent to another — either from animal to animal, from animal to man, or from man to man. Nearly all the warm-blooded animals are susceptible to vaccinia, but they may vary considerably in such susceptibility; in some it is slight, only affecting a certain tissue, as the cornea; while in others it may affect the cornea, skin and mucous membranes. The term vaccination also is used in a broader sense, and is made to apply to other diseases than vaccinia. It may denote the process by which other dis¬ ease-producing agents are inoculated into a sus¬ ceptible species in such a way as to render it refractory to a given disease contracted in the natural way. The sole purpose at the present time in inoculating

vaccinia into a susceptible reagent is for the purpose, primarily, of render¬ ing it insusceptible to the disease smallpox, and the propagation, continuation and multiplica¬ tion of the specific material.

History.— To properly appreciate the subject of vaccination and its beneficent effects in the suppression and control of the much-dreaded disease, smallpox, it will be necessary to review briefly some few incidents of its early history. Credit is due to Edward Tenner (q.v.), a phy¬ sician living in the western part of England, for its discovery and application. The subject of the protective effect of vaccination contracted by persons who had been milking cows which were suffering from an eruptive disease, known then as cOwpox, attracted Jenner's attention even when a pupil. On the completion of his med¬ ical studies and return to Berkeley, the idea was ever dominant in his mind; and as soon as op¬ portunity offered, he began to make his obser¬ vations and investigations of cowpox. But facts which were so convincing to his own mind he evidently feared as unacceptable to his medical brethren, and so he made his ideas known to

c nly his friend Gardner, to whom he writes: (

Jenner's claim to priority of discovery has been subject to dispute, and the objection seems to be, in some particulars, founded on fact. There appears to be but little doubt that a farmer by the name of Benjamin Jesty, living in Downshay, Isle of Punbeck, was the first who is known to have practised vaccination. He inoculated his wife and two sons with matter taken from cows suffering from cowpox. All were affected. His wife's arm became very much inflamed and produced no small alarm in the family and no small sensation among his neighbors. Fifteen years after (1789) , the sons, together with other persons, were inoculated with matter taken from a smallpox case, as was then the custom, to protect against the smallpox contracted in the ordinary way. None of those previously vaccinated with cowpox be¬ came ill with inoculated smallpox, whereas others inoculated passed through the several stages of the disease. There was a great pre¬ judice against Jesty's experiments, and the peo-

pie would have none of them. Jesty's remark was that for his part he

ˆpreferred taking in¬ fection from an innocuous animal like the cow, • subject to so few disorders, than to take it from a human body liable to so many diseases ; and that he had experience on his side, as casual smallpox was not attended with dangers like the variolous infection, and that besides there appeared to him little risk in introducing into the human constitution matter from the cow, as we already, without danger, eat the flesh, drink the milk and cover ourselves with the skin of this innocuous animal.® Also, there is recorded that a Holsteiner, by the name of Plett, inoculated three children with matter taken from the udder of a cow suffering with <(cowpox® using his pocket knife to make the insertion. All the inoculations were successful; later when smallpox appeared all had the dis¬ ease but these children. On an examination of Jenner's papers, it seems that he makes no claim as to priority, simply recording his own obser¬ vations and giving in detail his experiments to support the theory that smallpox can be pre¬ vented by vaccination. He also proves that the prevailing opinion shared by the milkers, that cowpox contracted by them was protective against smallpox, was founded on fact. Had it not been for Jenner's brilliant, painstaking work, replete with accurate observations, in all probability Jesty's inoculations would have been lost, and a long time might have elapsed before the beneficent discovery of vaccination would have become known. The principal conclusions of Jenner's discovery may be summarized thus:

(1) That vaccinia or cowpox casually induced in man renders him insusceptible to smallpox.

(2) Only the specific agent of vaccinia or small¬ pox, and no other eruptive disease of the cow, has this power. (3) Cowpox may be induced at will from cow to man. (4) That engrafted cow- pox may be continued indefinitely from man to man, conferring on each in succession insus¬ ceptibility to smallpox, the same as could be produced by inoculation of the virus direct from the cow to man.

Origin and Distribution of Vaccinia or Cowpox. — Vaccinia in the cow is an eruptive vesicular disease, usually occurring on the teats and udder, sometimes on the muzzle and mucous membrane of the mouth and nose. It may occur in isolated instances, sometimes affecting one or only a few of the herd ; at other times it may attack the whole herd. Its origin among cattle has been the subject of much dispute, some claiming that it always occurs spontaneously, citing as examples those isolated cases not in¬ frequently met with, while others claim with equal positiveness that before an animal can have the disease it must contract it from some other source. The latter

contention is more probable, as there is no instance of an analogy to the former existing in other infectious dis¬ eases. The contagion, therefore, must be trans¬ mitted in some manner to the animal, and its source must be either an animal or man having this disease. No other conclusion seems pos¬ sible. It sometimes is met with occurring in horses, and is known as the ((grease.® Jenner demonstrated that the Hiorse grease® and cow- pox were one and the same malady, and that matter taken from the horse could be trans¬ mitted to the cow, causing an inflammation and

symptoms identical with cowpox, and, moreover, protecting equally as well against smallpox as does vaccinia. Bouley of Alfort has also made a study of the "grease® disease of horses, to¬ gether with cowpox, and concludes that they are one and the same disease. In further support of the theory that the disease is transmitted to the bovine species largely through human agencies, it is a well-known fact that it is more frequently met with among milch cows than in either the heifers or males of the same herd. The reason for this is that the cowpox virus is transferred from cow to cow by means of the milkers' hands. The prevalence of cowpox appears to be in some way influenced by the seasons, more cases having been reported occurring during the spring months than at other times of the year. Suckling calves are also quite susceptible. It cannot be said, however, that vaccinia affects only cows, or the young calf, as all animals of the bovine species can be readily inoculated with the virus and the lesions caused by such inocu¬ lations are identical with those occurring "spon¬ taneously.® Jenner supplied many countries in his time with vaccine virus, originally from the cow, and subsequently propagated from arm to arm. The American stock of vaccine virus was introduced into the United States in either 1801 or 1802 by Waterhouse in Boston, and Hosack in New York, and at the same time in the Southern States through the interest of Presi¬ dent Jefferson. Some of the strains were propagated for a long time by the arm-to-arm method. In Europe a strain of the original, re¬ ceived from Jenner in 1802, was still being propagated at Vienna as late as the 80's. The celebrated Beauagency stock, originating from a "spontaneous® case of cowpox in 1864, has furnished many strains. This was largely employed in France, Belgium, Germany and England, and was introduced in the United States in 1870 by Dr. Martin of Boston, just before the original was lost, during the siege of Paris. It is not known whether this par¬ ticular strain is in existence

at the present time. Many strains became so attenuated that they failed to cause the typical lesions and character¬ istic symptoms of vaccinia, and, most important of all, their protective property was very slight, if it existed at all. The result of employing such virus during what may be termed a pan¬ demic prevalence of smallpox was that many persons who had been previously inoculated with it contracted smallpox. This made it necessary to abandon these weak strains for others of greater strength. Such experiences are not un¬ common in the history of the vaccine virus, even as far back as Jenner's time. Jenner emphasized this point of the attenuation of the virus, and regarded it necessary to renew the strain from cases of cowpox wherever possible. Retro- vaccination, or inoculation of the cow with human virus, was often resorted to for the purpose of reviving the strain. The number of cases of natural cowpox have become ex¬ ceedingly rare during the last half of the past century, only a few instances being reported from year to year, whereas in Jenner's time the disease was very prevalent. The fewness of the cases may be accounted for by the rarity of cases of smallpox at the present time, as compared with those of the past.

The inconvenience, as well as the disappoint¬

ing results, following the use of humanized vaccine virus gradually resulted in the adoption of another method of propagating and furnish¬ ing the virus. One very prominent reason for this was the increasing fear of transferring a certain infectious disease from person to person through vaccination. Also, in transferring tuberculosis, Villeman's experiments regarding the possibility of such danger was given per¬ haps too much prominence. It cannot be denied that there is some slight possibility of the dis¬ ease being transmitted in the process of vaccina¬ tion. Unfortunately, there are cases on record where a grave constitutional disorder has been inoculated into healthy persons by vaccination. Those opposed to vaccination seized upon these accidents, and exploited them in every way pos¬ sible, as a further argument against the control of smallpox by the arm-to-arm method, and as not an unimportant factor in reviving the method of propagating vaccine virus on the bovine species. This method was known to many, and was employed as early as 1800 in France, and by several physicians in Italy at various times between 1805 and 1840 — the latter by Negri in Naples, who began the systematic use of bovine vaccine virus. It then was em¬ ployed to a slight extent in several places in Europe, but did not become of general use until many years later. Arm-to-arm vaccination was the method employed in the United States from the time of its introduction until as late as 1869, when animal vaccine

virus began to be em¬ ployed. It was not so difficult in our large cities to have available a supply of humanized vaccine virus, but with the growth and increase of the rural population it was not always an easy mat¬ ter to have this supply; so in order to meet this growing demand, bovine vaccine virus was sug¬ gested as being the most practical method of over¬ coming the difficulty. This led to the establish¬ ment of "vaccine farms,® as they were desig¬ nated, in several parts of the United States. It was not long after their establishment until the bulk of the vaccinations were performed with the bovine virus, and the arm-to-arm method became the exception to the rule. When calf lymph came into common use, the same diffi¬ culties were apprehended with regard to its at¬ tenuation as were before noted with the humanized virus. Some observers claimed to have noted the good effect of restoring a virus beginning to show attenuation, by retro-vaccina¬ tion — that is, by vaccinating the calf with the humanized virus and back again to the person ; in some instances, alternating the virus from calf to man and from man to calf. Also, Cal¬ mette and Gurin of Lille have employed rabbits for producing the virus. The Bavarian gov¬ ernment, as early as 1837, made it mandatory that this procedure should regularly be em¬ ployed for revivifying and maintaining the potency of the vaccine virus. This brings us to consider the efficiency of the virus propagated through the bovine species, as compared with the humanized virus. There are many even to-day who contend that the results following the use of bovine virus are not so good nor so typical as those of the humanized virus. The reaction following the bovine virus is milder, the sore not so large nor typical. If we are allowed to form an opinion, from the descriptions of the early writers and their drawings of the vaccine

lesions, it must be admitted that they bear out to some degree the statements regarding what is now observed, and what used to be. Follow¬ ing its application, nearly every civilized coun¬ try has adopted and employed the bovine virus. In some, vaccination is optional, while in others it is compulsory. Where vaccination is more largely employed, the frequency of attacks of smallpox diminishes in an equal ratio. Germany may be cited as an example, as a country which has employed the bovine vaccine to the greater number of its population than any other coun¬ try. Vaccination here is made compulsory. All children during their first year are required to be vaccinated, and again at the age of 12. All males subject to military

service are vaccinated on being drafted in the army (some 300,000 yearly). The official records for 1896 show that 1,518,793 were legally liable to vaccination; 1,321,348 were vaccinated with bovine vaccine virus, and 5,406 were vaccinated with virus of other sources. In primary vaccinations 96.77 per cent were successful. In secondary vac¬ cination, made at the 12th year, there were 1,143,947 legally liable. Of these i, 107, 025 were vaccinated with bovine virus and 7,165 with other virus; 91.71 per cent were successful. The wonderful immunity of the German nation to smallpox, resting entirely on its compulsory vaccination laws enacted in 1870, whereby the whole population has been vaccinated and re¬ vaccinated, not only demonstrates the benefits of vaccination per se, but also the efficacy of a virus obtained from the bovine species. Similar cases could also be cited to show the efficacy of the bovine virus. It cannot be said that the immunity conferred by it is any stronger or more lasting than that of the human¬ ized virus, but it has all the advantages and none of the disqualifications which attend the arm-to-arm vaccination.

From Jenner's time until now there has been a strong belief that there was an intimate con¬ nection between vaccinia and smallpox, and that the former was in all probability a modified or attenuated state of the latter. Gassons inocu¬ lated 10 cows with matter taken from smallpox cases, and was successful in one instance. After 10 removes the pustule resembled that of a natural vaccine vesicle. These experiments were repeated many times during the past century with more or less success. The most important of them were by Theile of Kasan, Russia (1839), who succeeded in transferring smallpox virus to a oow, and after several removes vac¬ cinated a large number of persons with such virus, the results being in every way the same as observed in the cowpox virus. Ceely, in 1839, and Badcock of England (1840), also suc¬ ceeded in variolating a cow, and obtained the same results as did! Theile. Some of this virus (crusts) was sent by him to this country in 1852, to Coale of Boston, Mass. This was used quite extensively in and around Boston with evidently good results. The Lyons commission, with Chaveau as its chairman, also made an ex¬ tensive inquiry into the nature of vaccinia and smallpox. Some of its experiments were in this particular direction. Chaveau's conclusions were that vaccinia was separate and distinct from smallpox, and although the smallpox virus could with great difficulty be transferred to the bovine species, producing lesions closely re¬

sembling those of vaccinia, on subsequent pas¬ sages through other animals it became at¬ tenuated and1 finally inert. Voigt, of Ham¬

burg, in 1881, also succeeded in transmitting the smallpox virus to a calf, and after several passages employed it for vaccinating persons. This particular strain has been employed by Voigt for all the vaccinations performed in Hamburg from 1881 to 1904, the virus being propagated directly from calf to calf, with an exception that on two occasions (1891) it was passed from calf to man, and then in 1902 from calf to rahbit. The results obtained from the employment of this strain are such as to be convincing proof of its potency during all these years, as the percentages of successful vaccina¬ tions in primary cases, ranging from 98 to 100 per cent, and the low percentage of successes in revaccination, 69 per cent, demonstrate the permanency of immunity. The most convincing proof lies, however, in the fact that the popula¬ tion of Hamburg shows fewer cases of smallpox than any other community of same size. The preponderance of evidence accumulated during the past century shows that vaccine is nothing more or less than a modified and attenuated form of smallpox. The latest researches on this subject, as set forth at length by Pfeiffer, Guar- nieri and Wasielewski, and of those in particu¬ lar by Councilman and his co-workers on the specific organism of smallpox and vaccinia, seem to leave but little doubt as to their common nature. Brinkerhoff and Tyzzer made an ex¬ tensive enquiry in Manilla in 1904 into the na¬ ture of smallpox and vaccinia, in which they show that smallpox is transmissible to monkeys and orangutan ; and that the inoculated small¬ pox behaved in no wise different from the in¬ oculated smallpox in man. Further they suc¬ ceeded in transmitting this inoculated smallpox of the orangutan to calves ; and after a few pas¬ sages in calves it was then transferred to man. These inoculations produce typical vaccine lesions and were not different from those of the so-called ˆcowpox® vaccine. Their experi¬ ments confirm those of Voigt and others to the effect that vaccinia is modified smallpox. About the end of the 19th century the value of re¬ vaccination was becoming better understood, but it required many years before this important fact was appreciated. Even now it is ignored to a considerable extent in some parts of the world, particularly in the United States.

Vaccinia has never been observed to occur spontaneously in man. It is always transmitted by inoculation. The appearance of the inocu¬ lated lesion varies somewhat, according to the manner in which the virus is inserted. The usual methods are: (1) By puncture. (2) By scarification or denudation of the epithelium (abrasion). (3) Hypodermically. If by punc¬ ture, a slight redness occurs at the point of inoc¬ ulation within 24 hours, not different from any slight wound of the skin. In 48 hours a slight redness may be seen around

the puncture, which to the touch may give a sensation of a slight elevation of the spot. At 72 hours the spot is visible, slightly elevated, slightly gray in the centre and surrounded with the faintest sugges¬ tion of a pink border or areola. In 96 hours the papule is of a dull whitish color, the border elevated and well outlined. There is usually a depression of the centre — umbilicated, the

areola is well marked; the skin around it is hard and begins to be painful and itch. From the fifth to the sixth day the process still fur¬ ther enlarges and varies from one-fourth inch to one-half inch in diameter. The centre is darker and more depressed, the periphery much more elevated and the edges of a pearly gray color. The sore is filled with a fluid, the areola is of a darker color, the skin just beyond this is softer and less painful. About the seventh day the vesicle becomes flatter, though some¬ what wider, the centre not so much depressed but covered with a crust or scab. The gray zone becomes yellowish and the areola and induration diminished. From this time onward the process gradually subsides, the crest or scale becomes thicker and more elevated, grad¬ ually contracts, and after 15 or 18 days falls off and leaves a completely healed pink and glistening surface, with small, dark depres¬ sions here and there over its area. If the inoculation is made by scarification or incision the same phenomena are observed, save that the process is hastened and is fairly well marked on the second day, with incipient but distinct areola ; the central depression, with a distinct gray, pearly margin, elevated and prom¬ inent. The areola and induration are well marked on the fourth day, the gray centre is vesicular and transparent, its external margin irregular; the central depression is quite marked, the areola a bright pink and the sur¬ rounding skin is swollen. The lesion now ad¬ vances more rapidly during the next 24 hours, when the clear vesicular zone becomes a whit¬ ish color, its borders irregular, the central de¬ pression darker and covered with a crust. The areola is not now so prominent nor the indura¬ tion so diffused. It has now reached its maxi-

no lesion development of the skin proper. In¬ stead there is a slight induration beneath it, which to the touch imparts a feeling of a small shot. This gradually enlarges until the fifth or sixth day, when it soon subsides. The con¬ stitutional symptoms in man are practically the same as those occurring in the animal. There is an elevation of temperature, loss of appetite and thirst and more or less enlargement

of the glands nearest to the lesion, which reaches its greatest increase at the height of the devel¬ opment of the pustule. If there is no secondary infection of the lesion by extraneous bacteria the temperature falls to normal, the sore heals and all symptoms rapidly subside. In some very susceptible subjects, particularly in chil¬ dren, vaccination is sometimes followed by a secondary vaccinal eruption. This may be a discreet crop of vesicles occurring at or around the point of inoculation. Sometimes, however, a general eruption may follow. This second crop will go through practically the same phases of development as does the original puncture, only that it is smaller and the indi¬ vidual vesicles have not the same amount of areola and induration of skin as observed at the site of inoculation. The local lesions of inoculated smallpox and vaccinia are quite dis¬ tinct. So also are the constitutional symptoms. In smallpox there is a period of from 12 to 14 days intervening between the exposure to the disease and the appearance of the first symptoms. In inoculated smallpox the period of incubation is much shorter, seven to eight days, before the fever and rash. In vaccinia the incubative period is from five to six days. The difference between each can be illustrated in the following temperature chart (after Hime) :

DAYS

104°

10Z£°

ioo4

98-8c

104°

\QZt

c

/

2

3

4

5

6

7

8

9

/ 0

//

!2L

3/4

/5

/€

/7

/8

/9

20

Y/

22

23

24

25

2627

2829

30

3/

32

33

35

36

37

36

39

40

7

SMALL PO

X

sj

••

T

A

A

A

!

A

V

A

lS

lx

i

/

V

V

\

A

/ 1

ft 1

Duration of disease

incubation Period / 2 days

Erupt /on

\j

r ‘

\ ‘

<30~riO da/

r

V

V

-INOCULATED

sr

j

j

<

P<

DX

I

V

\

100.4

98.8°

104°

lOP-r'

/

\

v

L

/

/

v

Duration

incubation Period

A

/

\

Dess/ cat ion /tSdac/s

7 —Q days

A

VACCINIA

k

\

V

L

0

/

**

F

§

1004

98-8°

L

A

ij

incubation

L

‘

u

Dess i cation

Du rat/ on

Sdac/s

74 da us

&£ day

‘S

A

mum development and gradually subsides, heal¬ ing from the 15th to the 18th day. When the virus is inserted by the hypodermic method,

and the needle passed into the skin, the appearance of the lesion is much the same as in that by simple puncture, but sometimes there is

Recovery from smallpox requires from 30 to 40 days or more; if inoculated, smallpox, 25 days, and for vaccinia, 22 days. The limit given, for each is for the time required for the individual to completely recover from the dis¬ ease. Does recovery mean simply that the in-

fective agent has completed the cycle of its development, and then ceases to exist, or that it is influenced or brought under subjection to certain substances in the body of the host? It is a well-established fact that recovery from any attack of smallpox usually protects the individual against a subsequent attack. So also does vaccination protect against subsequent inoculation, and also protects against smallpox. There is beyond question a change occurring in the body in some way which prevents it again becoming a susceptible reagent to these poisons, a state of resistance or immunity. Some experiments of Sternberg show that the blood of a vaccinated calf, when mixed with a quantity of vaccine virus, destroys its ac¬ tivity. The writer has also observed this. It was found that these substances begin to make their appearance in the blood of a vaccinated animal about the ninth day, and are at the height of their potency at about the 14th day, after which they gradually disappear. Even when these substances (antibodies) have dis¬ appeared, the animal will remain for a long time refractory to vaccination. It, therefore, seems more than probable that two states of re¬ sistance are brought about by vaccinia, one in which the vaccine virus is destroyed by these new substances, and that the body cells have in some manner been so modified that they are no longer in a receptive state to the virus. The same train of reasoning would seem to apply to the state of immunity following an attack of smallpox. The time when the tissues become refractory to the vaccinal process has been es¬ tablished by observation both on man and ani¬ mals. If an animal be vaccinated over a small spot of the skin in successive days, the vacci¬ nated process will develop normally on the first, second, third, fourth, fifth and sixth days; that on the seventh day will show an under develop¬ ment; the eighth day still more so, and the ninth only a slight trace, if any, and that of the 10th day not at all. The immunity is estab¬ lished about the ninth day and will continue for a period more or less long, and sometimes is permanent. Jenner has demonstrated that

immunity to both smallpox and vaccinia is very strong, as persons having previously had the cowpox, even years before and subsequently vaccinated with fresh vaccine virus, and even inoculated with smallpox, did not contract the disease. The same also was established in Jesty's cases who were inoculated with small¬ pox virus without result a number (?f years after vaccination. Immunity to vaccinia can be produced in several ways. We have hereto¬ fore dealt with the method of inoculating the skin of mucous membrane and cornea with vac¬ cine. The Lyons Commission, in 1877, demon¬ strated that a calf or horse could be rendered immune to vaccinia by injecting the virus either subcutaneously or intravenously, and after 9 to 14 days the animal would be refractory to a subsequent inoculation. Several years ago the writer made some experiments regarding this immunity, when conducting an enquiry into the serum therapy for smallpox, in which he con¬ firmed all that had been claimed by the Lyons Commission, Chaveau and others. Not only was immunity established by intravenous and subcutaneous injections of the vaccine virus, but also a rapid immunity could be induced by injecting the virus under the dura mater, or

into the brain substance. Monkeys could thus be rendered refractory to vaccinia within five days, whereas it could be caused in nine days when the virus was administered intravenously, or by inoculating the skin. It requires a very minute quantity of the virus, either in the form of lymph or pulp, to cause the typical lesion. Chaveau found that by taking lymph from a vaccine vesicle and diluting it as much as l-20000th, it would cause a typical vaccine lesion. A general vaccinal eruption sometimes occurs in calves and young horses (colts) when a considerable amount of vaccine virus is in¬ jected in the veins, the eruption making its appearance about the fifth day, shortly after the fever. The eruption appears to be nowise dif¬ ferent in appearance than that artificially pro¬ duced by minute punctures. It also resembles the secondary eruption which occasionally fol¬ lows vaccination in children. Vaccinia is chiefly confined to the tissues of the skin, but coincident to the development of the specific eruption the virus can also be demonstrated in the blood and the lymphatic glands, particularly those located near the point of inoculation. The blood, however, does not contain a very great amount of the virus, as it requires a con¬ siderable quantity, as much as 500 cubic centi¬ meters (half a litre) to be inoculated applied to a scarified skin before it will cause a vaccine le¬ sion. It has also been demonstrated to be pres¬ ent in the lymphatic glands, but it is not constant. The specific agent is to be found in these tissues only during the febrile state. Immunity can be conferred on

other animals by transfusion of the blood during the febrile stage, provided a large quantity be given. It has been frequently noted that a certain train of symptoms fre¬ quently follow where vaccinations are done a second time. This is particularly so where the virus has-been derived from calves. There is a local reaction at the point of inoculation which appears in about 24 hours after, the place becomes reddened and slightly elevated and is usually accompanied by an itching; there is a slight zone of congestion around it, and taken altogether, it has the appearance of a true vac¬ cination. It subsides in a day or so. This is not a vaccination as was once believed, but is due to a reaction known as ˆanaphylaxis.® It has nothing to do with the virus of vaccinia, but rather to the presence of the foreign protein of the calf serum or cells with which at some previous occasion the body cells have been sen¬ sitized.

Causes of Vaccinia. — Since the discovery of the disease many observations have been made from time to time on vaccinia, with a view to determining its specific cause. Nearly all such were made from a bacteriologic standpoint and numerous investigations have described various bacteria as being specific. Pfeiffer (1889) ap¬ proached the subject in another way. He noted that smallpox and vaccine lesions contained bodies which, to all appearances, resembled that form of cell-life known as protozoa (a higher type than the bacteria), and later Guarnieri made a more comprehensive study of the lesions. He chose for his field of observation the cornea, where he was better able to observe the various changes occurring in the evolution of the vaccinal lesion, and in the life history of the parasite. He found that soon after the inoculation of the cornea with vaccine virus a

certain number of epithelial cells at the point of inoculation began to undergo a change. These cells began to show small round bodies which highly refract the light, lying in the protoplasm of the cell, are surrounded with a clear zone. These bodies are usually spherical and vary in size, some occasionally attaining the size of the nucleus of the cell, while others are minute points. They vary considerably in their shape and appear to be endowed with amoeboid movements. The organism was pro¬ toplasmic, having no limiting membrane, nor does it contain a nucleus. The mode of pro¬ duction is by direct division. <(The parasite has a circular evolution; it develops from around a central point — concentrically from within outward —

hence the lesion of variola and vaccinia is circular® (Guarnieri). The an¬ nouncement of this discovery excited no little interest among those who were devoting their attention to this subject. Since then much has been added to our knowledge regarding the nature of both smallpox and vaccinia. Guar- nieri's wrork has been carefully reviewed by many, among whom that of Wasielewski has been of great service in bringing forward addi¬ tional proofs, as well as adding no little to our knowledge of the parasite found in vaccinia and smallpox. He demonstrated beyond ques¬ tion that a parasite was always found in the epithelial cells of a vaccine or a smallpox lesion, that these parasites are never found in any other lesion, nor in the healthy tissues. At¬ tempts failed to produce these in the cornea by inoculating it with material from skin scrapings, from measles, scarlet fever, chicken-pox, foot and mouth disease, bacteria or matter from non-specific postules on the teats and udder of the cow. Nor are such bodies present when irritating substances, such as cantharides, cro¬ ton oil, silver nitrate, glycerin, osmic acid, India ink, or bacteria are applied to the cornea. Further, that if vaccine virus be deprived of its activity by filtration through porcelain, it loses its power to produce these bodies. Lim¬ ited quantities of vaccine virus have been inocu¬ lated in the cornea of a rabbit and passed suc¬ cessfully from one rabbit to another for as many as 130. It would not stand to reason that any quantity of the original would be transferred to the animal last in the series, yet the lesion in the cornea is identical with the first, and the parasites are present in number, and have the same form and location in the cells. The fil¬ tration experiments also demonstrate that the bodies are larger than the bacteria, as virus sub¬ jected to this process loses its power of pro¬ ducing the vaccinal lesion. It would, therefore, appear that since these bodies are constantly present in the lesions caused either by smallpox or vaccinia, and are not observed in any other disease process, nor caused by physical or chem¬ ical agents, that they are actual parasites and are not simple changes produced in the cells by any other than these bodies. ((The

virus outside the body have so far been unsuc¬ cessful. It appears that the living body cells are required for its development. Some multi¬ plication of the bodies have been observed to occur in the epithelial cell containing these bod¬ ies when the cell is placed under artificial con¬ ditions ; but these have not been transmitted to other cells which have not been naturally in¬ fected.

All persons or animals of a given species do not contract vaccinia alike; some are quite refractory, and others so for the time being, but may be inoculated after repeated trials. In some the vaccinal lesion

develops poorly, being small yet typical and is often delayed in its evolution. Instances like these are not infrequently ob¬ served where a group is vaccinated under prac¬ tically the same conditions. Particularly is this so with animals used for the propagation of the vaccine virus. In those cases where the lesion is undeveloped, typical immunity, however, as a rule follows, and is more or less permanent. It is believed that such immunity is not so great as that following a fully developed lesion. The same insusceptibility to smallpox has also been observed. All persons exposed do not contract the disease, nor do all attacked suffer alike. However, those persons who resist the infec¬ tion at first, if continuously or repeatedly ex¬ posed, will sooner or later succumb. It is a current belief that a successful vaccination con¬ fers a lasting immunity to smallpox. While a greater proportion of those successfully vacci¬ nated are rendered refractory for a long time, there are some who will at some time or other contract smallpox. Such cases are, however, very rare. The most of them are among per¬ sons who have either been vaccinated in their infancy, or in whom vaccinal lesion was atypi¬ cal. Vaccinated persons who contract smallpox, as a rule, have it mildly, running a shorter course, with none of the usual complications. This modified form is designated as varioloid. Immunity conferred by vaccination does not last as long as that following an attack of smallpox. It was once considered so, particu¬ larly during the time when arm-to-arm vaccina¬ tion was practised. Tenner himself states that he deemed it advisable to revaccinate from time to time, in order to insure a full protection. It cannot be gainsaid that a single inoculation will be followed by a typical lesion, and that this will protect against smallpox, but for just how long it cannot be said. By comparison with the method of making multiple insertions (three or more), the cases of modified smallpox (vario¬ loid) occurring among those vaccinated by a single insertion are found to be more frequent than among those vaccinated by multiple inser¬ tions. In Sweden the multiple insertion method has been practised for many years ; the cases of smallpox are few, revaccination is not the rule. It would seem, therefore, that multiple inser¬ tions afford a greater protection than the single insertion. With regard to revaccination, two important facts are demonstrated: That many persons who were successfully vaccinated dur¬ ing infancy again become susceptible to vaccinia later, and that revaccination produces the strongest kind of immunity to smallpox. In Germany all children are required to become vaccinated during their first year and again be¬ tween the 11th and 13th. The percentages

of successful revaccinations range from 69 to 91 per cent. The number of cases of smallpox developing are practically nil. There is no nat¬ ural immunity to vaccinia any more so than there is a natural immunity to smallpox. The only immunity is a previous attack of smallpox or a successful vaccination. There may be a resistance of some degree which may vary with the individual, but repeated vaccinations will demonstrate their susceptibility by a successful vaccination.

Source of Vaccine Supply. — The usual method of obtaining a supply of humanized virus was to make two or more insertions on the arm, and when the lesions reached the vesicular stage, to open one or more of these vesicles ; the serum was taken directly from the arm and transferred to another person, or it was pre¬ served by drying on pieces of glass, ivory or threads. Some employed a small capillary tube, into which the fluid contents of the vesicle were drawn and the ends sealed in a flame or closed with wax. The usual custom, however, was to vaccinate direct from arm to arm ; especially so was this in cities where vaccination was being done continuously. The dried crust, or scab, was also used, particularly by those who could not always obtain fresh material. These crusts were often active for several months, and there were instances in which they produced the typi¬ cal vesicle even after a year or more. Great care was exercised in obtaining a crust from a typical lesion, and extra precautions were taken to keep this as dry as possible, it often being sealed in wax. At the present time humanized virus in any form is little employed, save in some of the Latin-American countries, where it is still the custom to use it ; the bovine virus having superseded it in almost every civilized country.

The method of propagation and collection of the virus is in general the same in all countries. The animals are young calves from two to six months old, sometimes cows. Heifer calves are preferable on account of greater cleanliness of the vaccinated surface, although bull calves are frequently employed. Young camels, goats and water-buffalo calves are also used in some Ori¬ ental countries. Calves are selected as for their soundness and kept under observation for a few days, when they are cleansed by a bath of soap and warm water. Just before their vaccination an area of the skin, usually extending over the whole of the abdominal surface, is carefully shaven, cleansed again with soap and water, and then with sterilized water. Some operators apply some antiseptic, like trikresol, carbolic acid or corrosive sublimate, in disinfecting the skin, removing this with

copious quantities of sterilized water. The shaven surface is then dried, and shallow incisions, just cutting through the outer layer of the skin (not drawing blood) are made with some sharp instrument. The in¬ cisions are made in long lines, or interrupted, so as to leave more or less healthy skin between them. The vaccine virus is then applied to these incisions and thoroughly rubbed in. The vaccine lesions begin to show on the second and third day, reaching full development between the fifth or sixth day. The most perfect method now in existence of propagating and collecting bovine vaccine virus is that employed by the Japanese government. Nearly all the virus sup¬ plied in Europe, Japan and the United States

has glycerine added to it in different proportions for preserving it, as well as to eliminate the extraneous bacteria. Some is furnished in the dried form, especially in the United States, but the bulk of it is glycerinized. In nearly all European countries the production of vaccine virus is under state control, although there are many private establishments which also furnish it. Germany has 25 state vaccine stations, Hol¬ land 11, Denmark 1, England 1 and 9 or 10 private establishments, Sweden 1, France sev¬ eral private, Japan 2. In the United States there are 10 stations — three State and munic¬ ipal and seven private. The State and municipal establishments are located as follows: Massa¬ chusetts 1, New York City 1, North Carolina 1. The private establishments are Pennsylvania 2, New York 1, Michigan 1, Indiana 1, District of Columbia 1, California 1. When com¬ pared with the distribution of these establish¬ ments in European countries, it will be seen at once that those in the United States are neither so numerous nor so advantageously located for supplying a virus to areas of equal extent, nor to the same number of population. In the former each vaccine establishment is supposed to supply virus to a certain territory, which is small as compared to the latter, and, moreover, the most important feature of such is that it is possible to supply a fresh virus quickly without the risk of deterioration incident to tempera¬ ture and transportation over long distances.

Bacteria in Vaccine. — The many investiga¬ tions made of the bacteria found in both the humanized and bovine virus are almost con¬ clusive that they are in no wise connected with the specific cause of vaccinia. All vaccine virus contains many varieties of bacteria, some of these may be pathogenic, but the majority are harm¬ less. Their origin may be from several sources from an antecedent virus, from the skin, from the alimentary tract of the vaccinated animal and from external contamination. Bovine virus usually contains the pus organisms, the staphylo¬ coccus aureus and

albus, the streptococcus and in rare instances the tetanus bacillus. A vac¬ cine virus may contain a great number of bac¬ teria and yet be harmless; on the other hand only a few of the pathogenic varieties, and may cause serious consequences. As a rule the number of bacteria may be taken as an index of impurity resulting either from a faulty preparation, or not subjected long enough to the action of the glycerine. Any treatment to which the vaccine tissues are subjected, with a view to freeing it from the extraneous bacteria, influences its potency to a more or less degree. If glycerine be added, the number will gradually diminish. So in order to obtain the best results it usually follows that there arrives a time when such virus is free of bacteria, or nearly so, and when its potency is very little impaired. The Japanese have discovered that vaccine virus to which glycerine has been added, can be made to withstand considerable quantities of pure carbolic acid and in such strength as to kill the extraneous bacteria, and to do so with¬ out materially impairing its potency. Further, the vaccine virus can be produced bacteria free in certain animals, such as the male rabbit and calves, as has been suggested by Noguchi, but as yet this is in the experimental stage.

The preservation of the virus in a highly potent state is all important, it is quite sensitive to heat; the hot weather of the summer months causes it to deteriorate rapidly. Low tem¬ peratures on the other hand preserve it, and particularly is this so if the temperature is be¬ low the freezing point. Elgin of this country was first to discover this fact, which was con¬ firmed by Green of England. Vaccine virus when subjected to very low temperatures and maintained thus with but little variation will remain potent for months, even as much as two years.

Vaccination. — The slight injury to the skin, necessary in inoculating with the vaccine virus, appears on first sight to be of such a trivial character that it is not always treated with the regard which is due it. Vaccination is, in the strictest sense, a surgical operation. No one at the present time would be willing to undergo a surgical operation, it matters not how slight it might be, unless he was convinced that it would be performed skilfully, and that all neces¬ sary precautions would be taken to insure its success. Vaccination is no exception, and due regard both for a successful inoculation and avoidance of complications must be kept in view. The following important points are to be considered: The condition under which the wound is made;

*the person vaccinated; the state of health ; the peculiarity of temperament, and the conditions after vaccination. The inoculation can he made in any part of the skin, the site most preferable is on the outside and middle part of the arm just over the insertion of the deltoid muscle. The site selected for vaccination should at first be thoroughly cleansed with soap and warm water, then rinsed well with clean water, followed by the application of an antiseptic solution (1 per cent carbolic acid). The skin is then allowed to dry. When this is completed the site is ready for inocula¬ tion. Small scarifications of not more than one-fourth inch square are made with some sharp, sterile instrument, for example, a lancet or needle, to remove the outer layer of the skin, care being taken during the process not to make the scarification too deep. Blood should never be drawn. * The vaccine is then, gently rubbed into the wound and allowed to become thoroughly dry. It is not advisable to protect the wound with any dressing or sub¬ stance which might adhere to it, as this is one of the most fruitful sources of septic infection. Nature has already furnished the wound with a covering which, if kept intact, will answer bet¬ ter than any artificial substance. The vacci¬ nated places should be carefully protected against irritation, especially so when the lesion begins to assume the vesicular stage. It is then of the utmost importance to prevent its being injured. If, however, the vesicle is broken and there ensue severe local and constitutional symptoms, it is of importance that it be given surgical treatment. With a pure virus, vaccina¬ tion, if carefully performed and given thorough attention after treatment, is practically without danger. Vaccination is sometimes followed with complications, the lesion being infected with pus organisms, giving rise to local abscesses ; also septicaemia, pyaemia, erysipelas, gangrene and tetanus are occasionally observed. These may be conveyed by a contaminated virus, but are*

usually from the vaccination being improperly performed or from neglect of the wound. It has been estimated that as much as 70 per cent of the septic mischief is due to the injury of the vesicle taking place during the first and second week, the unsanitary surroundings or dirty habits of the patient largely contributing to complications. That these instances are of rare occurrence is borne out by the reports from the Imperial Health Office of Germany, which show that among 32,166,619 vaccinations of children there have been 115 deaths, 67 of these being in some way connected with the operation of vaccination. This gives a rate of a little over two per million, as compared with the thousands who die from smallpox. Some¬ times a general vaccinia results. The eruption is to all appearances the same

as the initial lesion, and runs a similar course. In addition to this there are post vaccinal eruptions, ap¬ pearing from 10 to 14 days after. These may be a simple rash, a bullous eruption resembling pemphigus, impetigo, eczema and purpura. While these have no direct relation to vaccinia, their occurrence at this time is thought to be due to the vaccinia being the exciting and not the predisposing cause.

Statistics. — Some are inclined to criticise statistics concerning the protective effects of vaccination, and believe that these can be so manipulated that anything desired can be proven by them. When there is a death from smallpox, there can be but little doubt as to the cause of death, so if the deaths from smallpox be taken, a charge of manipulating statistics to suit the purpose would rest upon a slender foundation. The number of deaths caused by this disease, taken per million inhabitants, will, therefore, convey a very clear idea as to the rate among a population. London has records reaching as far back as 1629, and Geneva from 1580. In other countries, while the records are not so remote they are sufficient to give an idea of the prevalence of smallpox before vaccination. In England before vaccination, the rate was above 3,000 per million ; in London it was over 4,000 per million. Now the rate is less than 20. In Prussia the rate before vaccination was slightly over 4,000, but on the adoption of vaccination it began to suddenly decline, and continued to do so until the vaccination law of 1874 was en¬ forced, when the cases became fewer and fewer until now the rate is less than two per million. Sweden had a death rate from smallpox for 16 years prior to 1800, of 2,049 per million, while the rate from 1802 to 1811 fell to 623. In 1816 compulsory vaccination was enforced and for the next 10 years the rate was 133. From 1890 to 1889, 100 years after vaccination began to be practised, the death rate fell from 2,049 to 1.

Compulsory vaccination has been in force in France only since 1902, the rate of smallpox among the army being now four per 100,000, as compared with the experiences of 1870-71. Vaccination was introduced into Austria in 1808, and was optional until 1900, when all school children were required to be vaccinated before entering. Vaccination and revaccination are compulsory for the army and navy. Denmark since 1810 requires all children to be vaccinated before the seventh year. Revaccination is compulsory for the soldier and inmates of public institutions. Italy

has had compulsory vaccination since 1888. All children are required to be vaccinated within the first six months, and, if this is unsuccessful, to be revaccinated before they are a year old. Before the law was in effect the death rate of smallpox was 610 per million; in 1902, 9.7 per million. In Belgium and Holland it is not compulsory, al¬ though all public officials and the army are re¬ quired to be vaccinated. In the latter, while not obligatory, all children must go to school and no child can attend without being vaccinated. The teachers also must be vaccinated. India prohib¬ ited smallpox inoculations in 1880 and made vac¬ cination compulsory. Similar laws are in effect in Australia, New Zealand and Cape Colony. Vaccination is only optional in Russia, except in the army and the public service. The great majority of the people do not avail themselves of vaccination, so epidemics are not uncommon. In Persia, Siam and China little vaccination is done; therefore, smallpox is endemic. Japan has enforced compulsory vaccination since 1886, whereby the greater portion of the population has been vaccinated and revaccinated. Especially is this true of the population of large cities and on the seacoast. No provisions are made in any of the cities for smallpox hospitals proper. When a case develops it is usually allowed to remain at home, or taken to a general hospital for treatment. No quarantine measures of any kind are enforced. Notwithstanding this fact smallpox has never been known to spread from any such cases. The same also may be said with regard to the German empire, where no precautions are taken in the strict sense of the word against the spread of smallpox, the whole reliance being upon vaccination. It has been stated by those who opposed vaccination that the reason why the German empire was so free from smallpox was the superior facilities for the isolation and treatment of cases, and not vaccination. This was investigated by the Local Government Board to ascertain just what methods were employed by the government and municipalities for the prevention of smallpox. Accordingly, an agent was sent to make this investigation. He encountered serious difficul¬ ties from the very first. In Berlin he was in¬ formed by the Central Health Office that so far as it was known there were no smallpox cases in Germany. The principal cities of the four chief states of Prussia, Bavaria, Saxony and Wiirtemburg were visited. In 10 cities of these states, containing a population of over five million, or one-tenth of the population of the German empire, he did not find a single case. As a matter of history he ascertained that there had been 70 cases in seven years, 1895 to 1901 inclusive; in Cologne one case in 10 years; in Frankfort nine

cases in 10 years; in Wiesbaden 12 cases 11 years ago, but none since then; in Mainz none during 11 years; in Munich seven cases in eight years; in Nuremberg none for about 11 years; in Dresden no deaths for the past 10 years; in Leipzig eight cases in eight years and in Stuttgart none in six years. Vaccination in the United States is not com¬ pulsory to the whole population. In many of the States and the District of Columbia all children of school age must be vaccinated, and those persons who have been exposed to small¬ pox. While vaccination is generally practised in nearly all the States there are large numbers

of the population, particularly in the Southern States, principally among the negroes, who do not vaccinate. Among these smallpox is a com¬ mon occurrence. The government requires all alien immigrants to be vaccinated before being allowed to land; also all persons of the army and navy. Further instances in statistics could be cited to show the protective effects of vac¬ cination against smallpox if they were con¬ sidered necessary. The only thing which seems to be lacking in our country is a compulsory vaccination law and a strict governmental supervision of the production of vaccine virus.

Bibliography. — Baron, (Life of Jenner) (1827) ; Bohn, (Handbuch der Vaccination (1875) ; Bollinger, (Ueber Animale Vaccina¬ tion J (1879) ; Warlamont, (Traite de la Vaccine et de la Vaccination Humaine et Animale y (1883) ; Pfeiffer, (Die Vaccination, ihre Grund- lagen und ihre Technik) (1884) ; Blass, (Die Impfung und ihre Technik* (1895) ; Crandall, (A Century of Vaccination) in American Medi¬ cine (7 Dec. 1901) ; Borne, (Vaccination et Re¬ vaccinations Obligatories) (1902) ; and Immer- mann's article (Vaccination* in Nothnagel's (Encyclopaedia of Practical Medicine) (Eng. trans. 1902) ; Dauchez, (Rev. Gen. de Clin, et de TherapP (1902) ; London Lancet (1903) ; Gazette Hosp. * (1903) ; Bulletin 12, Hygienic Laboratory (1903) ; (Annales de L'Institut Pas¬ teur * (1902) ; Wasielewski, (Zeitschrift fur Hy¬ giene) (1901), and (Studies on the Pathology and on the Etiology of Variola and of Vac¬ cinia,) by Councilman, et al., in Journal of Medical Research (1904); (Vaccination, Its*

Natural History and Pathology, Copeman (1898) ; British Medical Journal (1896) ; Jour¬ nal of Experimental Medicine (1914).* *See Smallpox; Toxins and Antitoxins.*

Joseph J. Kinyoun, M.D.

VACCINATION, Opposition to. At all

times since Jenner's discovery there has ex¬ isted more or less opposition to vaccination. In England the antivaccinationists have been especially active and in that country the pro¬ visions of the Vaccination Acts have been largely rendered null through their efforts. Parents are now relieved of any penalty un¬ der the compulsory clauses of the acts if they offer proof that they have, within four months of the birth of a child, satisfied a stipendiary magistrate, or two justices in petty sessions, that they had conscientious scruples against vaccination and that they believed it would be prejudicial to the health of the child. In the United States and Canada opposition to vaccination has been sporadic and while not confined to any one region of East or West appears occasionally in many districts. On the Continent while some opposition has de¬ veloped it has made little headway, the bene¬ fits from vaccination being the most effective answer to objectors. The basis of the argu¬ ments of these objectors has been at times almost ludicrous. In the early days of vac¬ cination it was seriously alleged that vaccina¬ tion caused bovine traits to develop in the child vaccinated, that hoofs, horns, etc., would tend to develop, and bellowing would replace speech. While present-day arguments against vaccination are less assertive and less naive than this they are equally without a sound scientific basis. The chief objections alleged

for a long period have been the complications resulting by other diseases being invaccinated. Some cases of syphilis appear to have been so invaccinated but such an occurrence could not have happened if the vaccinator had taken proper care. The calf lymph now in universal use effectively prevents the trans¬ mission of syphilis. Eczema and other skin eruptions so frequent in infancy often appear after vaccination, but it is safe to say that since these infantile evils would appear in any case their appearance is only hastened and not caused by vaccination. While some real dangers attend vaccination, when considered in relation to the extent of vaccination work done, they are insignificant. Better precau¬ tions and improvements in method from year to year are continually lessening these dangers, while the very real benefits accruing to millions rendered immune to the ravages of small-pox overbalance these attendant dangers a hun¬ dred times.

VACCINE. This term has undergone a change in meaning from that which it received at the hands of Jenner, the discoverer of vaccine

inoculation for the preventive treatment of smallpox. This was a little over a hundred years ago and before the existence of modern bacteriology. Yet the principle which Jen¬ ner enunciated and which he but dimly and imperfectly understood is the same which in more recent years has been extensively elabo¬ rated by Pasteur, Koch and the entire great school of bacteriologists. It is the principle that by introducing into the animal body cer¬ tain substances of known character, immunity or protection will be conferred for a longer or shorter period against the attack of disease- producing germs which may be within that body or which may subsequently gain access to it. A vaccine or vaccine virus, according to Jenner, was the contents of a pustule upon the skin, especially upon the udder of a cow or calf suffering with cowpox, which, when intro¬ duced into the lymph or blood circulation of a human being sensitive to smallpox, protected him in some way or other from that disease or arrested the disease if it was already in its incipient stage. A vaccine as understood by bacteriologists is a preparation composed of a great number of living attenuated bacteria or a smaller number of very virulent ones, or their products, including split bacteria, bacterial toxins and filtrates of fluid cultures. The re¬ production of the bacterial cells is prevented by the use of a sufficient degree of heat, and the vaccine is preserved by the addition of a suitable antiseptic. Vaccines are conveniently prepared in the form of liquids which may be clear or turbid and with more or less abundant precipitate. Vaccines are used to prevent or cure diseases of many kinds by introducing them into the body through the mouth, the sub¬ cutaneous tissue, within the skin, within the substance of the muscles or directly into the blood circulation through a vein. The theory of vaccination presumes the presence within the blood of what are known as antibodies. Metch-nikoff refers to them as phagocytes ; they are also known as antigens. The antibodies are antagonistic to disease germs which have ob¬ tained access to the circulating blood. Their function is to attract some disease germs and

repel others. When there is mutual attraction the germ is enveloped and absorbed by the antibody and the tendency to the disease of which the germ is the specific cause is thus limited and arrested. The object of the vac¬ cine which is introduced into the circulation is to stimulate the healthy tissues to produce new antibodies and so increase the chance of de¬ stroying the invading disease germs.

It was not until 1874 that it was discovered by Traube that normal blood had bactericidal properties, this being followed by the important discovery of Behring that the serum of an artificially immunized animal may transmit im¬ munity to other animals. This

is called its bacteriolytic power and follows the injection into the animal of suitable bacteria. An in¬ jection of a suitable dose of vaccine into an animal is followed by a diminution of the bac¬ teriolytic power of the blood, this being known as the negative phase of resistance. The larger the dose the more significant the clinical fea¬ tures of this stage, including rise of temperature and other physical disturbance. After this comes the positive phase when the antibacterial power of the blood and the resistance to bac¬ terial influence are increased. By repeating these injections in increasing dosage the anti¬ bacterial and antitoxic power of the blood of the animals thus treated is increased for the disease germs against which the treatment has been directed. It is by this method of experi¬ ment, particularly in horses, that the antitoxin of diphtheria has been made available. One great merit in the use of vaccines as a thera¬ peutic agent is that they are comparatively harmless, except in those who are in a weak and toxic condition from tuberculosis or some other infectious disease.

Vaccines are of various kinds. Autogenous vaccines are derived from cultures of bacteria obtained from the blood or discharges or secre¬ tions of one who is sick or injured and are injected into the same individual upon the theory that the stimulation to the development of antibodies will be greater than if the vaccine is obtained from an external source; they are of particular value in obstinate or unusual in¬ fections in which an exact diagnosis has not been made. Their production requires con¬ siderable time and is not available for very acute diseases. Stock vaccines are those which are made from representative types of particu¬ lar organisms and are preserved for use accord¬ ing as those types are indicated as means of treatment; they are less costly to make than autogenous vaccines but are also distinctly less effective. The polyvalent form of stock vac¬ cines contains different strains of the same bac¬ terial species or one strain from different sources and is the most efficient variety of stock vaccine. Mixed vaccines are those which contain two or more strains from different spe¬ cies and are intended for mixed infections or those in which there is a variety of infecting bacteria. Consult Kolmer, J. A.,

Andrew F. Currier, M.D. VACCINE THERAPY. See Vaccine.

VACCINIACEiE, a family of Ericales, comprising several genera of trees and shrubs, and including some epiphytes. This family is

widely distributed throughout the north tem¬ perate and frigid zones, and its fruits are generally edible. The leaves are alternate, and are either coriaceous and evergreen, or thin and deciduous. The various species have pretty flowers, the lobes occasionally being reflexed; in color they range from greenish-white to deep rose. The only members of the V actiniae ecu extensively cultivated in Amer¬ ica are the cranberries (Oxycoccus) which are evergreen, woody, vine-like shrubs, growing in sphagnum bogs. They are small and slender and are somewhat trailing in habit, but have ascending or erect branches bearing oblong leaves, and pink, star-shaped flowers in clusters. The cranberries are oval, pendulous on filiform stalks and have a shining red skin and firm, white flesh, of a very acid taste. Cranberries are cultivated in lands which can be submerged, are ripe in the fall and are sent to the markets in great quantities, to be served as sauce with poultry and game. The mountain-cranberry of the southern United States is a taller shrub with thin leaves (Oxycoccus erythrocarpus) ; that of Europe (V actinium vitis-idcua) is a low, evergreen shrub, with coriaceous, oval leaves crowded onto the creeping stems. Both grow on rocky hills and mountains, and the latter is found quite around the northern world. Its flowers are small and campanulate, nodding in terminal clusters, and the fruit is a dark red globe, very acid and! called cow¬ berry. It is used locally for preserves. The so-called whortleberries (of which name ˆhuckleberry® seems to be a corruption) of Europe include not only this last species, but V actinium myrtillus and V. uliginosum. The former is the bilberry, or in Scotland the blue¬ berry, and is of varying height, but rarely ex¬ ceeding two feet, with deciduous ovate leaves. The berries, which are dark purple, with a mealy bloom, grow to the size of a black cur¬ rant and are sweet-flavored. Their juice, com¬ bined with alder-bark and alum, is said to be used by northern Russian women to dye their hair bright-red. Nearly all the fruits of the genera V actinium and Gaylussacia, in America, are known either as blueberry or huckleberry, and are equally edible and good. There is a tendency, in the markets at least, to call those berries which are black and shining huckle¬ berries, and the blue ones blueberries. They are a favorite midsummer fruit both among the Indians, who dried them, and sometimes in¬ cluded them in pemmican, and with white people. Thoreau exclaims, ((Are they not the principal wild fruit?® thinking of the great tracts the bushes sometimes cover and the prolificness of their bearing. From June to August gathering huckleberries is one of the great industries of country districts, the fields being burnt over to

promote the growth of the bushes and the prod¬ uce sent either raw to the markets, or to can¬ ning factories. Vaccinium canadense, V. penn- sylvanicum and V. nigrum are dwarf shrubs, the two latter often growing together on sandy hillsides, and furnishing the first blue and black berries of the season. Their flowers ate creamy white or pinkish. In swampy, sandy thickets one finds the tall resinous blue-tangle, or dangleberry (Gaylussacia frondosa), with scanty campanu- late blossoms, on filiform pedicels The leaves are ovate and glaucous beneath, and the delicious berries are large, globose and blue with a

bloom, and very juicy and sweet. Of all the American species of Vaccinicecu , the high-bush blueberry (Vaccinium corymbosum) is probably the most conspicuous. It is a tall, straggling shrub of damp woods, quite 10 feet high, at its best. With the leaves, in spring, it hangs out large white bell-like corollas, in racemose clusters. The berry is large and blue, and of a pleasant acidulous flavor; it is one of the last to appear in the markets. In fall, the oval leaves turn to vivid scarlet, and remain in a glow of color for a long time. Batodendron arboreum, the farkleberry, bears an inedible fruit, but attains to the dignity of a tree in the South. Polycodium stamineum is the squawberry (q.v.), or buckberry ; Chiogcnes hispidula is the snowberry (q.v.).

VACHELL, Horace Annesley, English author: b. 30 Oct. 1861. He was educated at Harrow and the Royal Military College, Sand¬ hurst. He was a lieutenant of a rifle brigade in 1883 and subsequently lived some years in California, where he wrote several novels, among which are (The Romance of Judge Ketchum) (1894) ; (The Quicksands of Pactolus) (1896); (The Procession of Life) ;

VACHEROT, Etienne, French author: b. Torcenay, near Langres, 29 July 1809; d. 28 July 1897. He was educated at the Ecole Nor- male, and returned there as director of studies in 1838, from which he was dismissed through the enmity of the Clerical party. In 1868 he was elected to the Academy. His principal works are (Histoire Critique de l'Ecole Alex¬ andra (1846-51) ; (La Metaphysique et la Science5 (1858) ; (La Religion5 (1869) ; (La Democratic Liberale5 (1892).

VACUOLE, in biology. See Cell.

VACUUM, in the strict sense, a portion of space entirely devoid of matter. The <(absolute vacuum,® as thus defined, is still a mere intel¬ lectual concept because no physical or chemical method has

yet been devised for effecting the absolute removal of every last trace of matter from any portion of space having finite, meas¬ urable dimensions. If a vessel of glass or other material impervious to air is filled with air or any other gas, and the contents of the vessel are then removed as perfectly as possible by means of a good modern air-pump, a degree of exhaustion can be attained which is so per¬ fect that no residual matter can be detected in the exhausted space, save by the most refined methods of testing. Spaces which have been partially exhausted, but which still contain a quantity of gas great enough to be easily de¬ tected, are called ((partial vacuums,® and those in which the process of exhaustion has been pushed to a very high degree are called, for the sake of distinction, ((high vacuums.® The first known method for producing a high vacuum was that of Torricelli, who filled a glass tube, closed at one end and more than 30 inches long, with mercury, and then inverted the tube

so that its open end dipped beneath the surface of a vessel also containing mercury. The atmospheric pressure is capable of sustaining a pressure only equal to that due to a mercury column some 30 inches high (see Barometer) ; so that when the experiment here indicated is performed, the mercury sinks in the tube until it stands above that in the lower vessel by only this amount. The space at the upper end of the tube, from which the mercury thus re¬ tires, was long considered to be the most per¬ fect vacuum attainable. It is not absolutely perfect, however, because it contains a small amount of mercury vapor, as well as traces of air. The method of Torricelli is not a con¬ venient one for the practical production of high vacuums, for it is often objectionable to intro¬ duce mercury directly into the space to be ex¬ hausted, and it is also difficult, in many cases, to fill such a space with mercury so completely as to exclude small bubbles of air. Hence, in the practical production of vacuums, it is usual to remove the air (or other gas) from the space to be exhausted, by means of some form of a pump. The earlier pumps that were em¬ ployed for this purpose (and which are still employed when high vacuums are not essential) were similar in principle to the <(suction pumps® that are used for drawing water. They con¬ sisted of one or more cylinders, provided with tightly-fitting pistons, and valves as nearly per¬ fect as possible. Each stroke of a pump of this kind removes a certain fraction of the mass of gas remaining in the vessel to be exhausted ; but it is theoretically impossible to produce an absolute vacuum in this manner, not only be¬ cause an infinite

number of strokes would be required, but also because it is impossible to prevent a certain amount of leakage around the pistons of such pumps. Other grave mechanical difficulties also obtrude themselves when tlw vacuum attains to a moderate degree of per fection. For the production of the high vacu¬ ums that are used in the manufacture of in¬ candescent electric lamps, and for the far more perfect ones that are needed in modern scientific research, it is, therefore, necessary to employ some other means. Geissler, in 1855, invented a mercury pump, in which advantage is taken of Torricelli's principle for the production of a vacuum. The vessel to be exhausted is not filled with mercury, but it communicates with a large bulb which can be alternately filled with mercury and emptied, by merely raising and lowering a reservoir of mercury, with which it is connected by means of a flexible tube. When the mercury is caused to run out of the pump- bulb by lowering the reservoir, the air from the vessel to be exhausted expands into the bulb ; and when the bulb is again filled by raising the reservoir, the air that the pump-bulb contains is caused to pass out through a special passage provided for that purpose, so that it does not return into the vessel that is being exhausted. By means of a mercury pump working on this principle, it is possible to reduce the pres¬ sure in the exhausted space to the 100,000th part of an atmosphere. About 1865, Spren- gel invented an ingenious and still more per¬ fect mercury pump, by means of which ex¬ ceedingly high vacuums may be obtained. In Sprengel's apparatus a stream of mercury is caused to pass down a small tube called the 'Tail-tube,® in the form of a rapid succession

of separate drops; a small quantity of air from the vessel to be exhausted being entrapped be¬ tween every two successive drops. The mercury sweeps this entrapped air down through the "fall-tube,® which discharges, at the bottom, into a cistern. The Sprengel pump is slow in its action, but by its aid it is possible to produce vacuums so nearly perfect that the residual pressure probably does not exceed the 400,000,- 000th part of an atmosphere. In producing high vacuums, it is necessary to remember that glass and other solid bodies are usually covered by a thin coating of highly condensed air (or other gas), or of water vapor, which adheres to them like a thin film of varnish. This film is quite persistent under ordinary circum¬ stances, and is not given off at once, even in a high vacuum. If the film were not removed during the exhaustion, however, it would grad¬ ually leave the glass afterward, becoming dis¬ seminated through the exhausted vessel, and so reducing the vacuum very seriously. To pre¬ vent the vacuum from being injured in this manner, the exhausted vessel is heated, by means of a Bunsen burner

or otherwise, while the pump is in action. The rise in temperature accelerates the motions of the molecules of the air-film to such an extent that these molecules fly off into the interior of the vessel, from which they are then removed by the pump. High vacuums are sometimes obtained by com¬ bining the air-pump with other devices that are suggested by chemistry and physics. Thus An¬ drews produced high vacuums by filling the ves¬ sel to be exhausted with carbon dioxide gas, re¬ moving the greater part of this gas by means of an air-pump, and then absorbing as much as possible of the remaining quantity, by means of fragments of caustic potash that had been previously introduced. Advantage has also been taken, in a similar manner, of the absorp¬ tive power of freshly-prepared charcoal, for improving the air-pump vacuums. The char¬ coal is placed preferably in a side tube com¬ municating with the exhausted vessel, and is kept heated during the exhaustion, in order to prevent it from absorbing the gas until after the pump has ceased working. The exhaustion having proceeded by means of the pump to as high a degree as is possible, or as is desired, the connection to the pump is sealed off, and the charcoal, upon being allowed to cool, then absorbs within its pores a considerable part of the gas still remaining in the vessel. The per¬ fection of the vacuum in the finished tube can be regulated, within certain limits ; for by heat¬ ing the charcoal more or less a greater or lesser part of the gas that it contains can be temporarily expelled, so as to reduce the degree of the vacuum. Dewar successfully applied liquid hydrogen to the perfecting of vacuums ; the vessel to be exhausted being provided with an auxiliary bulb which can be plunged into the liquid hydrogen after the exhaustion has pro¬ ceeded as far as possible by the direct action of the pump. The intense cold of the liquid hydrogen causes a considerable part of the residual gas in the vessel to condense upon the walls of the auxiliary bulb, which is then sealed off from the mam bulb by means of a blow¬ pipe.

For many reasons, the phenomena accom¬ panying the discharge of electricity through vacuums have been greatly studied by physicists.

VACUUM

637

A perfect vacuum would (according to received theories) be a perfect non-conductor of electric¬ ity; and although such a vacuum is unattain¬ able by experimental methods, vacuums have been prepared, through which the discharge of a powerful induction coil cannot be forced. At ordinary atmospheric pressure, the discharge

from an electrical machine, or an induction coil, passes through a gas intermittently, and in the form of thread-like bunches of sparks re¬ sembling miniature flashes of lightning. Sup¬ pose, now, that electrodes are sealed into the two opposite ends of a vacuum tube, and that the tube is gradually exhausted by a good air- pump. The discharge, at first resembling loose threads gathered together at the ends, gradually loses this appearance as the exhaustion proceeds, and after a time the whole tube becomes filled with pale light ; and when the pressure becomes reduced to about the 10,000th part of an atmosphere, the discharge assumes a stratified or striated appearance. In a vacuum tube of cylindrical form, with an internal electrode at each end in the form of a circular metal disc with its plane perpendicular to the length of the tube, we observe, as the pressure approaches the value here given, that there is a notable difference in the appearance of the tube at the two ends. The negative electrode is often covered with a soft, velvety glow, either wholly or in patches. Outside of this there is a dark space called ((Crookes' dark space,® or the (

in this respect, as though they were rigidly connected with the cathode; but they are not at all affected by shifting the position of the pos¬ itive electrode (or anode), except that since they do not extend beyond the anode, they are successively obliterated as the anode passes them. The phenomena of these vacuum dis¬ charges are very complicated, and special works dealing with these matters must be consulted for a really adequate description of them. The vacuum tubes produced at the factory of Hein¬ rich Geissler, at Bonn, Germany, were of such excellence that the expressions (

The phenomena of electrical discharges in partial and high vacuums have been investigated by many distinguished physicists ; but the name of Sir William Crookes is associated with some of the most remarkable of the discoveries that have been made, and many of the tubes that have been prepared for illustrating the properties of high vacuums were designed by him and are, therefore, known by his name. Crookes discovered, for example, that when the exhaustion of a tube is pushed considerably be¬ yond the point at which the appearances de¬ scribed above are observed, the character of the electrical discharge is again changed, and mechanical, electrical and luminous effects are to be observed, which are not manifested in the lower vacuums. Exceedingly interesting me¬ chanical effects were discovered in tubes which had been exhausted until the pressure of the residual gas was reduced to about the 250,000th of an atmosphere, and Crookes invented the radiometer for the purpose of demonstrating some of these. The radiometer consists of a glass

sphere, two inches or so in diameter, and containing a light flier or wheel provided with four horizontal arms, each arm carrying at its extremity a light, vertical vane made of mica and blackened on one side. The wheel is poised delicately upon the point of a fine needle, so that the smallest force will cause it to rotate. When the glass bulb has been exhausted so that the residual pressure is only about the 250,000th of an atmosphere, and the instrument is placed in the sunlight or exposed to any source of radiant heat, the little flier or wheel at once begins to rotate in such a direction that the unblackened sides of the vanes move for¬ ward. Numerous explanations of the operation of this little instrument have been given, but that which is based upon the kinetic theory of gases appears to be the most satisfactory. (See Gases, Kinetic Theory of). According to this view a gas consists of an enormous number of little particles, or molecules, flying about in a space that is otherwise devoid of matter. In a gas of ordinary density these particles are so numerous that they do not travel on an average more than a few millionths of an inch without colliding with one another. But when, by re¬ moving nearly all of the gaseous molecules, we make it possible for the molecules that remain to travel on an average something like an inch or two between successive collisions with one another, these residual molecules act like tiny projectiles and are capable of producing me¬ chanical effects that are not observable when the motions of the molecules are interfered with by the incessant collisions among the molecules themselves. The full theory of the radiometer

is not yet in an entirely satisfactory condition ; but in a general way we may say that when the vanes of the little wheel are exposed to a source of radiant heat, the black sides absorb heat more readily than the light ones, and hence be¬ come warmer. This means that the molecules composing the vanes are vibrating more ener¬ getically on the black sides, so that on this side they strike more energetic blows against such gas molecules as chance to come in contact with them. From the equality of action and reaction it follows that the vanes of the little flier will experience a reactionary force tending to make them revolve with the light side foremost. In order that the radiometer may work satisfac¬ torily it appears to be necessary to have the vacuum sufficiently high to ensure that, on an average, a

gas molecule which has collided with one of the vanes will strike the glass wall of the enclosing bulb before encountering another gas molecule.

The behavior of a high vacuum under the influence of electrical discharges is especially interesting. When the perfection of the vacuum is such that the average distance that a mole¬ cule of the residual gas travels between suc¬ cessive collisions with its fellow molecules is comparable with the dimensions of the tube itself (that is, when the pressure in the tube is only about 1,000,000th of an atmosphere), the position and shape of the positive electrode, or anode, appear to have very little influence upon the character of the discharge. In such a case the nature of the visible discharge appears to be determined almost absolutely by the cathode, or negative electrode, and the discharge makes it¬ self manifest in the form of a shaft of pale bluish or purplish light, extending outward into the tube in a direction approximately perpendic¬ ular to the surface of the negative electrode. If this electrode is made concave the streamer that proceeds from it (and which is known as the (

thereby caused to revolve just as a water-wheel revolves when its lower half is immersed in a running stream of water. The direction of rotation in this form of tube may be reversed readily by reversing the polarity of the two electrodes. Objections may be urged to this simple projectile explanation, however. For ex¬ ample, there are reasons for doubting if an iso¬ lated molecule of gas can receive an electrical charge in the way that the molecules of the residual gas have been assumed to be charged by the cathode. Despite this objection, it must still be regarded as probable that the projectile hypothesis of Crookes is true 'in some form or other. According to the electron theory the cathode ray consists, not of whole gas mole¬ cules but of tiny particles that are split off from the molecules. These ultimate particles, or elec¬ trons, certainly do carry electrical charges, and it is quite likely that the mechanical and other effects that are observed in vacuums where the pressure is not more than the millionth part of an atmosphere are due to the projectile-like motions of the free electrons. Crookes' experi¬ ments were carried out before the idea of elec¬ trons was developed ; but it should be said, in justice to him, that in describing his work he frequently emphasized his belief that the matter in his tubes is in a state quite different, in some respects, from any state with which we had previously been familiar; and he called this, provisionally, the (

Allan D. Risteen.

VACUUM FUMPS. So long as the vac¬ uum was of interest mainly to the physical laboratories the forms of pumps for produc¬ ing vacua were delicate contrivances, largely of glass, and of very limited performance, suitable only for experimental purposes. When the vacuum became a manufacturers' necessity, the machinery for its production took on a different phase. The limit of exhaustion possible to the laboratory air-pump (q.v.) is reached when there is no longer in the system air enough to lift the valves (by its expan¬ sion). As even the lightest valve which could be constructed ceased to work while a con¬ siderable amount' of air remained, the results were inadequate to the demands of such in¬ dustries as, for example, making of electric lamps.

For economic purposes the vacuum pump most in use is the oil-valve pump, in which the piston is of the "bucket® form and is con¬ tinually filled with oil, the piston valves being practically floated in the oil when the vacuum becomes of high degree. The piston works on the gaseous material between two basins of oil. With a double cylinder pump working in tandem the results are excellent, the vacuum reaching zjfgoo of an atmosphere (14.7 pounds per square inch) in pressure. Another pump used in commercial work is a modification of

the Sprengal mercury pump, the action of which is the reverse of the air-lift. (See Pumps and Pumping Machinery). A con¬ stantly falling column of mercury is made to float downward past a Y-branch into the mercury tube, the Y being connected with the gas reservoir to be exhausted. The falling mercury traps and drags the gas down with it in bubbles, discharging it into the basin below, where the gas escapes. The mercury is pumped up again to the feeding basin at the head of the column. The vacuum obtainable with this pump is Ttfoocrfftf of an atmosphere, but the action must be prolonged to achieve such rarefication.

For high vacuum work Gaede's molecular pump is in considerable use. It depends for its action upon the friction of gas upon the surface of a solid. Fig. 1 shows a diagrammatic

Fig. 1. — Sectional Diagram of the Gaede Molecular Vacuum Pump.

section of this pump. A cylinder (A) is made to rotate clockwise in a

casing (B) in which are two openings (E and F) connected by a slot. The opening E connects with the gaseous material to be exhausted, and the opening F is the outlet of discharge. In operation the gas is dragged from E toward F by its friction with the revolving cylinder A, and a difference of pressure at those two points is established proportional to the speed of rotation and the internal friction of the particular gas. At speeds of 8,000 to 12,000 revolutions per minute a vacuum equivalent to Ttnrihnnr.of an atmosphere has been obtained. The action of this pump is very rapid.

In Fig. 2 is shown a sectional diagram of the Langmuir Condensation pump, the most rapid of all vacuum pumps. In construction it is a cylinder of metal (E, E) having within it a smaller cylinder (F), above which is placed a shield of an inverted cup-like shape. The cylinder E is surrounded by a water jacket (W). At G is an inlet for the gaseous material to be exhausted, and at O the out¬ let for the gas. In operation a quantity of mercury is placed in the bottom of the cylinder, small openings being provided into the inner cylinder F so that the mercury circulates in both. Heat is supplied below F, and the mercury is vaporized, the vapor passing up to the top ot F and over the edge, being deflected downward by the shield S and rushing out by the annular opening A, A. The gas is dragged

downward by the swiftly moving vapor which is condensed into metallic mercury when it strikes the cool walls next the water jacket, thus forming a vacuum into which the gas flows, being urged onward by the constant stream of mercury vapor from A, A. Being

G

Fig. 2. — Sectional Diagram of the Langmuir Condensation Vacuum Pump.

crowded down to the level of O it flows out of the pump. The continually condensing mercury drops to the bottom of the cylinder and passes into the central cylinder, to be used over and over again. With a Langmuir pump of three inches outside diameter, the perform¬ ance amounts to from 180 to 240 cubic inches of gas exhausted per second, the vacuum obtained being equivalent to yuvI tnni of an atmosphere.

VADOSE WATER. See Ground Water.

VAGA, va'ga, Perino Del, or more prop¬ erly PIETRO BUONACCORSI, Italian painter: b. Florence, 1500; d. Ropie, 1547.

He was taught painting by a Florentine named Vaga (whence the name generally applied to him), by whom he was brought to the notice of Giulo Romano and other pupils of Raphael. The latter, then engaged upon his designs for the loggia of the Vatican, employed him to assist Giovanni da Udine in the arabesque work, and subsequently entrusted him with the execution of some of the principal frescoes. He thenceforth was a favor¬ ite pupil of Raphael, after whose death he rose into great reputation. Compelled to leave Rome in 1527, on the sack of the city, he went to Genoa, where he entered the service of the Prince Doria and founded a school of painting. He returned to Rome during the pontificate of Paul III, by whom he was entrusted with many valuable commissions ; and at the time of his

death probably stood at the head of the Roman school. He designed after the style of Michelangelo, and by Vasari is placed in that respect next to the great Florentine master. His works are widely distributed over Italy, the best being the (Creation of Eve) in the church of Saint Marcello in Rome. He also frescoed the ceiling of the Sala Regia in the Vatican. His artistic activity extended to the designing of tapestry, baldacchini and the execution of stucco work.

VAGANTES, va-gan'tez (wanderers, vaga¬ bonds), a term applied in the Middle Ages to the wandering bands of scholars (vagi scho¬ lars), who, during the intellectual movement which pervaded Europe during the 12th and 1 3th centuries, formed a distinct and character¬ istic class in the population, and played an im¬ portant part in the social life of the time. They were sometimes called Bacchantes — Brethren of Bacchus — from their drunken roystering habits. They were renowned for their songs, full of life and movement, and often keenly satirizing the clergy and religious orders. These Earmina Burana) form a collection, a manu¬ script copy of which is still to be found in the Benedictine abbey at Munich. The verses are in rhymed Latin, or written in macaronic style of German or French and Latin; some are Ger¬ man or French pure and simple. They deal with religious controversy, love, wine and sport ; some are absolutely frivolous ; others pious in tone. In France the vag antes were known as ((Goliardie,® probably because they generally pursued their peregrinations under the leader¬ ship of a man of gigantic stature (Goliath). Consult Hubatsch, (Die lateinischen Vagaten des Mittelalters) (1870) ; Von Barnstein, Bar¬ mina Burana Selecta* (1879).

VAGRANCY, the life or habits of an in¬ dividual without fixed habitation, or vagrant, who is classed in law as (1) an idle and disor¬ derly person, able, in whole or in part, to main¬ tain himself and his family, but who neglects to do so; (2) rogues and vagabonds, persons sus¬ pected of living by crime; (3) incorrigible rogues. A vagrant is consequently an able- bodied man without any visible means of sup¬ port and without fixed abode. His essential characteristic is <(work-shyness,® or idleness self-imposed and voluntary. In most of the United States various enactments and ordi¬ nances of more or less severity have been made for the suppression and punishment of vag¬ rants and tramps ; but such characters are stiil numerous, their number being estimated at 600,000, and their cost to the nation over $200,000,000 yearly, to the railroads, $25,000,000 and according to a recent conservative estimate $2,000,000 to the State of New York alone. A charge of vagrancy is frequently made by the police simply to justify an arrest made for other purposes for which, however, an arrest cannot legall / be made in order to prevent an offense which is imminent or in course of be¬ ing committed, or to detain a person aghinst whom a more serious charge or indictment is pending. Vagrancy laws and statutes are de¬ signed to protect the public from the depreda¬ tions of the vagrant and to relieve it of his support. Legislation, however, has not checked vagrancy due to the fact that vagrancy is a national problem, which the unit legislating

against it is the State. Uniform repressive legislation in all States is necessary to the solution of the problem.

Difficulties arise in administering such laws as we have for the control of vagrancy, owing to the fact that popular sympathy is easily aroused by the man out of work and seeking employment and many of the vagrant pretend to be going about in search of work; but though there are doubtless some unfortunate honest workmen among them (who, if they could be selected from the mass, should re¬ ceive all possible consideration and aid in securing work), the great majority of tramps form a class, who, from mental constitution, choose any course rather than work. It is hard to understand what inducements can lead them to prefer their wandering and shifty life. Apparently the freedom of it and the immunity from work are its chief attractions. They have been well described as wandering about (

An expert on sociology has stated that ff-the most effective check on vagrancy is the proper kind of education of the young during the years from 10 to 20. The schools, the home and the church must all

do their part in pre¬ paring youth for a reasonable, honest and effi¬ cient life. Child labor, illness, mental defect¬ iveness, congestion of population, truancy, orphanage, inefficiency, low wages, overwork, industrial accidents, diseases of occupation, the temptations of crime, seasonal and irregu¬ lar trades, all these causes and many more operate to produce the youthful tramp.® Con¬ sult Dawson,) W. H., (Vagrancy Problem (1910); Kelly, E., Elimination of the Tramp* (1908); Massachusetts Board to Investigate the Subject of the Unemployed, (Wayfarers and Tramps) (in Massachusetts House Docu¬ ment No. 50, 1895) ; Michigan State Library, Laws of the \ arious States Relating to Vagrancy * (1910).*

VAGRANTS. See Mendicancy.

VAIGACH, vl-gach', Russia, an island in the Arctic Ocean, belonging to the government of Archangel, separated from the mainland by the Yugor Strait and from Nova Zembla by Kara Strait, and forming with Nova Zembla the western boundary of the Kara Sea. The monu-tain chain of the adjacent mainland peninsula is continued in the island by a low chain near the east coast. Vegetation is scant, but the island is visited by Russians and Samoyedes in search ol fur-bearing animals and fish. The area is about 1,410 square miles.

VAIKUNTHA, the paradise of Vishnu (q.v.), according to the Vaishnava sect of the Hindu religion, the supreme deity.

VAIL, Alfred, American inventor: b. Mor¬ ristown, N. J., 25 Sept. 1807 ; d. there, 18 Jan. 1859. He was graduated at the University of

the City of New York in 1836 and in 1837 be¬ came associated with S. F. B. Morse (q.v.) in his telegraphic experiments. His mechanical knowledge applied to the experimental appa¬ ratus resulted in the first practicable Morse ma¬ chine. He invented the combination of the horizontal-lever motion to actuate the style ; devised the alphabet of dots, spaces and dashes which it necessitated ; and in 1844 constructed the automatic lever and grooved roller which embossed on paper the characters he originated. He was appointed assistant superintendent of the telegraph line constructed between Baltimore and Washington in 1843 and on the completion of the system, in 1844, was stationed at Balti¬ more, where he invented the finger-key, and received the first message from Washington. Consult Pope,

(The American Inventors of the Telegraph,) in The Century, Vol. XXXV (1888). See Henry, Joseph.

VAIL, Charles Henry, American Univer- salist clergyman : b. Tully, N. Y., 28 April 1866. He studied music in New York and for a while engaged in teaching it. He was grad¬ uated at Saint Lawrence University, Canton, N. Y., in 1892, and during the following year pursued his theological studies. In 1893-94 he was minister of All Souls' Church, Albany, N. Y., and from 1894 to 1901 of the First Uni- versalist Church in Jersey City, N. J. In 1901 he was nominated governor of New Jersey by the Socialist party, of which in 1901-02 he was national organizer. He has lectured in many parts of the country and has published Mod¬ ern Socialism> (1897) ; (National Ownership of Railways) (1897) ; Scientific Socialism (1899) ; (The Industrial Evolution) (1899) ; (Mission of the Working Class) (1900) ; So¬ cialism: What It Is and What It Is Not) (1900) ; •(The Socialist Movement) (1901) ; (The Trust Question) (1901) ; Socialism and the Negro Problem) (1903) ; (Ancient Mysteries and Mod¬ ern Masonry* (1909) ; (Militant and Trium¬ phant Socialism) (1914).*

VAIL, Stephen Montford, American cler¬ gyman and educator: b. Union Vale, Dutchess County, N. Y., 15 Jan. 1816; d. Jersey City, N. J., 26 Nov. 1888. He was graduated at Bow- doin College, Maine, in 1838 and Union Theo¬ logical Seminary in 1842. He joined the New York Conference of the Methodist Episcopal Church in 1842 and served Fishkill, N. Y., Sharon, Conn., and Pine Plains, N. Y. For two years he was principal of Pennington Sem¬ inary (1847-49). From 1849 to 1868 he was professor of Hebrew at Concord Biblical Insti¬ tute. He resigned because of ill health and lived on Staten Island. He was appointed United States consul to Bavaria where he served five years (1869-1874). He then retired from active service. He did much to destroy the prejudice against a theological seminary-trained ministry on the part of the Methodists. He was a strong abolitionist and several of his sermons and addresses on slavery were published. He also published (Ministerial Education in the Methodist Episcopal Church) (1853) ; (Life in Earnest: or Memoirs and Remains of Rev. Zenas CaldwelP (1855) ; 'Outline Lessons in Hebrew. Consult 'Funeral and! Memorial Services of Stephen M. VaiP (Jersey City 1881); also Minutes of the Conferences of the Methodist Episcopal Church, 1881, p. 85.*

VAIL, Theodore Newton, American capi talist : b. Carroll County,

Ohio, 16 July 1845; d. 16 April 1920. He was educated at Morristown Academy in New Jersey, studied medicine for two years and then became assistant superintend¬ ent in 1873 and general superintendent 0875- 78) of the railway mail service, Washington, D. C. He went into the telephone business C 1878— 87) and installed many systems in the principal South American cities. After 1897 he was president of the American Telegraph and Telephone Company and an officer of many corporations at home and abroad. He was a member of numerous societies, clubs, etc.

VAIL, Thomas Hubbard, American Prot¬ estant Episcopal bishop : b. Richmond, Va., 21 Oct. 1812 ; d. Bryn Mawr, Pa., 6 Oct. 1889. He was graduated from Washington (now Trinity) College, Hartford, Conn., in 1831, and from the General Theological Seminary in 1835. He took orders in the year last named, and in 1837 or¬ ganized Grace Church, Worcester, Mass. He became rector of Christ Church, Cambridge, Mass., in 1837, in 1839 of Saint John's, Essex, Conn., and was rector of Christ Church, West¬ erly, R. I., 1844-56. He was subsequently rector of Saint Thomas' Church, Taunton, Mass., 1857-63, and of Trinity Church, Muscatine, Iowa, 1863-64. In the last-named year he was consecrated first bishop of Kansas. He founded Bethany College at Topeka, Kan., and served as its president, and was author of (The Com¬ prehensive Church) (1841; 3d ed., 1883), etc.

VAILIMA LETTERS, the correspondence of Robert Louis Stevenson (1890-94) called after his home at Samoa and descriptive of his life there. They were written to Sidney Colvin.

VAISESHIKA, vi-sha'she-ka, a system of Hindu philosophy of ancient origin and closely resembling in its principles some of the con¬ clusions of modern science. It teaches that all material substances are composed of atoms me¬ chanically united and indestructible ; that the combination of these atoms in the existing world will pass away, and the existing order of things will also pass away. The founder of the system was Kanada, supposed to have lived about 500 b.c., and the system itself was long regarded as heretical, from the Brahmanic viewpoint. It is now, however, fully recognized as of. equal standing with the five other leading systems of Brahmanic philosophy, the two Mimansas, and the Nyaya, which were the three originally orthodox systems, and the Sankhya and the Yoga, which also bore for some time the stamp of heresy.

VAISHNAVAISM. See Vaishnavas.

VAISHNAVAS, vlsh'na-vas, one of the three great divisions of Hindu religion, distin¬ guished from the others by the special worship of Vishnu, but itself divided into many sects, based on the differences attending that worship. Horace Hayman Wilson has divided the Vaish¬ navas into the following sections: (1)ˆ Rama¬ nujas, Sri Sampradayis, or Sri Vaishnavas; (2) Ramanandis, or Ramavats; (3) Kabir Panthis; (4) Khakis; (5) Maluk Dasis; (6) Dadu Pan¬ this; (7) Raya Dasis; (8) Senais; (9) Valla- bhacharis, or Rudra Sampradayis; (10) Mira Bais; (11) Madhwacharis or Brahma Sampra¬ dayis; (12) Nimavats, or Sanakadi Sampraya- dayis; (13) the Vaishnavas of Bengal; (14)

/

Radha Vallabh'is; (15) the Sakhi Bhavas; (16) Charan Dasis; (1?) Harischandis ; (18) Sadhna Panthis; (19) Madhavis ; and (20) Sannyasis, Vairagis and Nagas. All these sects have their common ground in the belief in the supremacy of Vishnu over the other gods of the Trimurti. They differ, however, in the character and de¬ gree which they assign to this supremacy, and consequently in their religious devotions and practices. Their more modern teachings are outlined in the ((Ramcaritmonas® of Tulasidasa. Their chief festival, celebrated annually in Ben¬ gal and other Hindu cities, is the <(Rath Yaga.® Many of the devotees paint upright lines on their foreheads. The Vaishnavas include many monastic bodies, composed of members of vari¬ ous Hindu castes, all united in doing honor to Vishnu as chief of the Hindu triad. Consult Muller, (Six Systems of Indian Philosophyˆ (1899) ; and Macdonell, (History of Sanscrit Literature' (1914). See Brahma; Brahma- nas; Vishnu.

VAISRAVANA, vis-ra-va'na, in the pan¬ theon of the Hindu Sivaites, the god of wealth.

VALAIS, va-la (German, Wallis, vallis), Switzerland, a southern canton, abutting on France and Italy, and having an area of 2,027 square miles. The capital is Sion. The moun¬ tains and its southern border are known as the Valais Alps. The canton is surrounded by the loftiest and most magnificent mountain chains in Europe, the Bernese, Pennine and Helvetian or Lepontine Alps, all containing ridges 13,000 to 15,000 feet high, with magnificent glaciers. The Rhone flows through the whole length of the canton, forming the

largest valley in Swit¬ zerland and discharges into the Lake of Geneva. Where the elevation is not too great the moun¬ tain-slopes are covered with large and valuable forests of pines, and lower down of hardwood trees, succeeded by productive orchards ; rich pastures abound and support numerous cattle, the principal source of subsistence of the in¬ habitants. In the lower valley of the Rhone there is much arable land, the finer fruits are grown, and silkworms reared. The canton pro¬ duces a good deal of wine. In the Upper Valais, German is spoken, in the Lower, which has the larger population, French is more commonly spoken. The canton was admitted into the con¬ federation in 1553. Pop. about 130,000.

VALDAI (val'di) HILLS, Western Rus¬ sia, a range of hills in the provinces of Nov¬ gorod and Tver, averaging about 300 feet in height, but rising in Mount Popovagora to 1,080 feet. They are well wooded, and contain the sources of the Volga, Dnieper and Dima.

VALDES, val-das', Armando Palacio,

Spanish novelist : b. 1853. See Jose.

VALDES, Gabriel de la Concepcion (Placido), Cuban poet : b. Matanzas, Cuba, 18 March 1809; d. Havana, Cuba, 28 June 1844. He was a mulatto and his early life was spent in poverty. His poetry was popular and was published in different newspapers and reviews, but the sentiments expressed seem to have in¬ volved him in trouble with the authorities, as he was at one time imprisoned for several months. In 1844 he was accused of complicity in a conspiracy of the blacks against the whites, and though innocent was shot as a traitor. He was author of various romances and novels, and

his poems have been published in several edi¬ tions. Perhaps the best of his verse is his prayer, composed just prior to his death and which was translated into English by Mary Webster Chapman. Editions of his works in¬ clude (Poesias de Placido) (1838) ; (Poesias de Gabriel de la Concepcion Valdes, Placido)

(1847).

VALDES (VALDESSO VALDEZ), Juan de, Spanish-Italian reformer : b. Cuenca, Castile, 1500; d. Naples, 1544. He was brother to Alphonse de Valdes, the imperial secretary of state, and was himself secretary to Charles V in Germany. After a sojourn of 10 years he left Germany and went to Naples to occupy the post of secretary to the viceroy. There he de¬ voted himself to literature and gathered

around him a band of choice spirits, including Vermigli (see Peter Martyr), Ochino and the high-born ladies Vittoria Colonna, Julia Gonzaga, and Isabella Manriquez. Valdes and his company were enthusiastically set upon effecting the re¬ generation of the church of their day, but al¬ though they had no desire to leave the Roman obedience, they were regarded as heretics. Val¬ des wrote (Spiritual Milk) ; (The Christian Al¬ phabetˆ and some commentaries on the New Testament. He wrote in the Spanish language, but the works above mentioned are only extant in their Italian translations. Consult Stern, (Alfonse et Juan Valdez) (1869) ; Carasco, (A1- fonse et Juan Valdez > (1880) ; McCrie, (Refor¬ mation in Italy.'

VALDEZ, Melendez. See Melendez

Valdes Juan de.

VALDEZ, Alaska, city on Prince William Sound. It is the most northerly port open dur¬ ing the winter and is on the great interior Alaskan mail route. The junction of the. cable and land lines is made here. The city has churches and schools and a telephone sys¬ tem. Pop. 1,200.

VALDIVIA, val-de've-a, Pedro de, Span¬ ish soldier, conqueror of Chile : b. Serena, Es- tremadura, about 1498; d. near Tucapel, Chile, 1554. He served in the Italian wars; went to Venezuela about 1534; and soon after joined Pizarro in Peru. He aided in the defeat of Diego Almagro (q.v.) at Las Salinas. Later he led 150 Spaniards and several thousand In¬ dians in an expedition against Chile, which had been ceded by Charles V to Pedro Sanchez de Hoz. After defeating a large force of Indians he established Santiago, 12 Feb. 1541. Sub¬ sequently the Spaniards were many times at¬ tacked by the Indians and were cut off from Peru. In December 1543 reinforcements ar¬ rived, and the colony thereafter prospered. In September 1544 Valparaiso was founded, and in 1546 Valdivia marched into the Araucanian district, and in a great battle conquered the Indians. In 1547-49 he joined Gasea, the royalist, against Pizzaro, whom they defeated. In 1550-52 he established Concepcion, Valdivia, and other places. A wide uprising of the In¬ dians occurred in December 1553 and while Valdivia was endeavoring to suppress this revolt he was captured and put to death.

VALDIVIA, Chile, (1) capital of a south¬ ern province of the same name; on the Valdivia River, nine miles from its mouth, with a safe and roomy harbor, and railway connections

with the rest of Chile. The entrance to the river is fortified. The town is built on level ground, and is surrounded by apple orchards and native forest. It has an active coasting trade, chiefly with Valparaiso. Valdivia was founded in 1551 by Pedro de Valdivia, one of Pizarro's lieutenants, and it was at one time a place of great wealth. A wireless station is located here. Pop. about 10,000. (2) The

province of Valdivia has an area of 8,991 square miles. It is watered by the Tolten, Valdivia and Bueno rivers. There is a chain of small lakes along the foot of the Andes. The chief port is Corral, at the mouth of the Valdivia. Besides splendid forests it has large upland pastures, and deposits of coal. Pop. about

153,000.

VALDOSTA, val-dos'ta, Ga., city, county- seat of Lowndes County, on the Georgia South¬ ern and Florida, the Plant System and the At¬ lantic, Valdosta and Western railroads, about 150 miles southwest of Savannah. It was settled in 1859 and in 1860 was incorporated. It is in a fertile agricultural region, the prin¬ cipal products of which are cotton, fruit, corn, wheat and vegetables. The chief manufactures are cotton products, including cotton cloth and lumber products. The city owns and operates the waterworks. There are three banks and several newspapers. The government is ad¬ ministered under a revised charter of 1900, which provides for a mayor, who holds office two years, and a city council. Pop. (1920)'

VALENCIA, va-len'shi-a (Sp. va-len'the-a),

Spain, capital of a province of the same name, on the south bank of the Turia or Guadalaviar, on the eastern coast, 185 miles east by south of Madrid. The city walls were removed in 1871, and their site transformed into broad boule¬ vards, but two old gates have been left in position. Several bridges across the river lead to northern suburbs. The chief square is the Plaza del Mercado, or market-place, on the north side of which is the Lonja de la Seda, or silk exchange, a beautiful Gothic building o£ the 15th century, restored in 1892-95. The other noteworthy buildings and institutions of the city are: The cathedral (La Seo), com¬ pleted in 1482, with an octagonal Gothic bell- tower called El Miguelete; the Colegio del Patriarca, an ecclesiastical building in Renais¬ sance style (1586H605), containing a church of Corpus Christi, pictures, frescoes, tapestry, etc.; the church of San Nicolas, with fine paintings by Juanes; the university, founded in 1441, with a valuable library; the Audiencia, formerly the chamber of deputies of the kingdom of Va¬ lencia, a 16th-century Renaissance edifice; the provincial picture gallery, strong in the Valen- cian school ; the citadel, built by Charles V, now in ruins; the provincial and the military hospi¬ tal; the penitentiary; the archiepiscopal palace, etc. The fine botanical garden, the bull-ring seating about 17,000, a theatre, and some other buildings are situated outside of the boulevard line; and on the north side of the river is the charming Alameda, lined with plane-trees. El Grao, the harbor, is at the mouth of the Turia, on the north side, and beside it are sea-bathing resorts. Valencia has manufactures of silk, cigars, paper, oil, chocolate, soap, hemp and linen weaving, velvet, hat, felt, plush, fans,

gloves, hardware, leather goods, pottery, glazed brick works, etc., and a considerable and in¬ creasing trade in wine, oranges, rice, oil, silks, etc. Valencia figured in Roman, history and was destroyed by Pompey in 75 b.c. It was long the capital of a kingdom of Valencia, which came to an end in 1319. In 1812-13 it was occupied by the French under Suchet. Pop. 233,348; of province, 911,429. The area of the province is 4,150 square miles.

VALENCIENNES, France, town in the department of Nord, at the junction of the Rhondelle with the Scheldt (Escaut) 30 miles southeast of Lille. Its chief buildings and in¬ stitutions are (or rather were, since the late war almost obliterated the town) the church of

Notre Dame du Saint Cordon, a modern edifice in 13th century style, with fine stained- glass windows; an old Gothic church, with a modern tower; the town-hall, a 17th century building, with a facade of more recent date; a lyceum; a museum of painting and sculpture, rich in works of the Flemish school ; a natural history museum; a municipal library; a civil and military hospital ; an arsenal and barracks. The town suffered three severe sieges in 1793, 1815 and 1914. The district yields much coal, and among the manufactures of the town are chicory, beet-sugar, salt, potash, soap, glass, iron, woolen yarn and goods, linen, etc. The once flourishing lace industry is now extinct. Pop. of commune about 35,000. See War, European — Western Front.

VALENCIENNES-LACE. See Lace.

VALENCY is that property of elements by virtue of which they unite to form compounds. The atom of hydrogen has never been known to combine with more than one atom of another element. In terms of this property hydrogen always shows the valency of one. Its valency is therefore taken as the unit of comparison. A number of elements form compounds with hydrogen. Chlorine forms HC1, oxygen forms H20, nitrogen forms NH3, and carbon forms CH4. Therefore, with hydrogen as the unit, the valency of these elements is one, two, three and four respectively. Or, as A. W. Hofmann expressed it in 1865 : <(It takes the whole atom- power of chlorine, 35.5, to engage one atom of hydrogen ; whereas the atom-power of oxygen, 16, suffices to engage two hydrogen atoms ; and the atom-powers of nitrogen and carbon suffice, respectively, to engage three and four hydrogen atoms.® There are a number of elements with which hydrogen does not combine. The va¬ lencies of these elements can only be ascertained by indirect methods. In such instances infor¬ mation is gained by a study of the compounds of elements which can combine with hydrogen. For example, one atom of chlorine forms a stable compound with an atom of hydrogen. The same element will also form the following compounds: KC1, ZnCl2, A1C13, SnCh, MoCk, WCk. Therefore, the valencies of potassium, zinc, aluminium, tin, molybdenum and tungsten are one, two, three, four, five and six respec¬ tively. The highest valency that an element has been known to exhibit is eight. The ele¬ ments of the argon series (helium, neon, argon, krypton, xenon, niton) are remark¬ able in that they form no well-defined com¬ pounds with other elements. They are described as elements with no chemical affinity. In other

words, their valency is zero. With this prop¬ erty as a basis, elements may be classified as monads, diads, triads, tetrads, pentads, hexads, heptads and octads, the terms having reference to the valencies that are displayed in the forma¬ tion of compounds. Elements are also desig¬ nated as univalent, bivalent, tervalent, quadriv¬ alent, etc. The theory of valency has also been extended to include radicles which remain unchanged during chemical transformations. The radicles CH3, CN, CHaCO, are univalent, S04 is bivalent, P04 is tervalent, P2O7 is quadriv¬ alent, etc. As early as 1861 Crum Brown had suggested that the molecule of hydrogen is a complex of two atoms held together by a common bond, H — H. According to this sys-

/°

tern carbon dioxide is C. , ammonia is

\o

H

H O

N — H, and acetic acid is H — C — C — OH. The

\H I

H

bonds in each case represent the valencies of the elements forming the compounds. This system has also been employed by Kekule, Frankland and others, and is sometimes used at the present day to emphasize the valency of each element in a given product. The system has been found especially fruitful in the domain of organic chemistry. An element does not always exhibit the same valency. It may possess a characteristic active valency which remains constant through a large series of chemical changes, but this valency is often a dependent variable, being influenced by physical as well as chemical conditions. The tervalent nitrogen in NH3 assumes other valencies toward oxygen ; sulphur may act as a diad, a tetrad, and a hexad ; tin is a diad and a tetrad. In the compounds VCI2, VCh, VCh, and VOCla van¬ adium functions with the valencies of two, three, four

and five. The variable property of valency was recognized by some of the founders of the theory. In 1852 Frankland published a memoir setting forth his views on valency in these words : ((The compounds of nitrogen, phosphorus, antimony and arsenic especially, exhibit the tendency of these elements to form compounds containing three or five atoms of other elements ; and it is in these proportions that their affinities are best satisfied: thus in the ternal group we have N03, NH3, NIa, NS3, P03, PH3, PCla, Sb03, SbCl3, As03, AsH3, AsCh, etc.; and in the five-atom group NO NHiO, NH.J, POs, PH4I, etc. Without offering any hypothesis regarding the cause of this sys¬ tematic grouping of atoms, it is sufficiently evi¬ dent from the examples just given, that such a tendency or law prevails, and that, no matter what the character of the uniting atoms may be, the combining power of the attracting element is always satisfied by the same number of these atoms. }) It is to be noted that Frankland em¬ ployed the unit 8 for the atomic weight of oxygen, and the unit 16 for the atomic weight of sulphur.*

Kekule (1851), on the other hand, regarded valency as a fixed invariable property, asserting that this property must be considered as invari¬ able as the atom itself. He argued that varia¬ tions in valency are more apparent than real.

To him phosphorus trichloride was a true mole¬ cule formed by (

The views of Kekule could not be harmon¬ ized with certain known facts even at that early period. Our present-day knowledge shows beyond dispute that even elements of appar¬ ently invariable valencies may exhibit variation in this property under certain conditions. For instance, although the science of organic chem¬ istry has for its foundation the quadrivalency of carbon, the element may in a few isolated instances show the valency of two. Nef and others have advanced convincing arguments in favor of the bivalency of carbon in hydro¬ cyanic acid (structurally represented as C = N — H), in isonitriles R — N = C, and in fulminic acid C = = N — O-H. The case of oxygen, the prevailing valency of which is two, is equally interesting. Thus oxygen compounds have been described in which the doctrine of invariable valency breaks down. There is no doubt that in the oxonium derivatives

CHjv .H NCr

CH/ XC1

C2Hsx

c2h/

Mgl

and

*(C*H«).*

(CJL).

**

/

O

/C2H5

XC.H,

oxygen could function as

a quadrivalent atom. According to Gomberg triphenyl methyl (CeH5)3C, contains a trivalent carbon atom, although this has been questioned, and reasons have been advanced in favor of the adoption of (CSH5)3C— C(C«H6)3 as the more rational formula of triphenyl methyl. In view of these observations it is safe to assume that there are very few elements possessing constant valencies. As far as we know, hydro¬ gen, sodium and potassium always show the valency of one. Calcium and barium appear to be always bivalent. Other isolated examples of invariable valency might be mentioned; but as a rule valency is a variable property. Al¬ though the theory of valency was first formu¬ lated by Frankland, Kekule and others in the early 50's of the 19th century, its germ is to be found in the systems, theories and laws propounded by earlier investigators. Our present-day conception of valency is therefore intimately related to Lavoisier's analytical methods, Dallon's atomic theory, Gay-Lassac's volume relations, Avogadro's hypothesis, and to other theories and laws that have contributed to our better understanding of the science of chemistry during the past century. A number of theories have been proposed to explain the variable property of valency. Abegg states that each element possesses two kinds of valency, namely, normal and contra-valency. In metals the normal valency is electropositive, in non- metals electronegative. When one valency in an atom becomes saturated the remaining val¬ encies will be strongly influenced. Neff claims that the unused valencies in a compound

saturate one another, and J. van't Hoff seeks an explanation of variability in the shape and form of the atoms. According to Friend there are three kinds of valencies: 1. Free negative valency inherent in elements which can combine with hydrogen. 2. Free positive valency, the numerical value of which is not so easily de¬ termined. 3. Residual or latent valency. These differ from the free valencies in that they can only be called out in pairs of equal and opposite sign. Werner distinguishes two kinds of valency, principal or primary, and auxiliary or secondary. According to his theory nitrogen, sulphur, chlorine, oxygen, platinum, gold and other elements may in some of their compounds bring into action their secondary valencies, forming complex derivatives. With this theory Werner endeavors to explain the constitution of double salts, crystalline hydrates and complex molecules.

It is generally admitted that none of these theories can account for all known facts. Each one, however, has made its contribution to the proper appreciation of observed phenomena. We are equally uncertain as to the true nature of valency itself. Of the theories that have been put forward to clear the situation the electrochemical theory and the corpuscular or electronic theory have been most favorably received. As early as 1806 attention had been directed by Sir Humphry Davy to the relation of chemical affinity and electrical force, and attempts had been made to employ this as a basis for a theory of chemical combination. Later in the century Faraday summed up his studies on electrolysis in a general law which states that the electrical charge which is con¬ veyed by an ion of a metal in the electrolysis of a solution of a salt is directly proportional to the valency of the ion. With these earlier con¬ clusions as a basis, the electrochemical theory was revived by Helmholtz. The theory had many adherents during the latter part of the 19th century. The corpuscular or electronic theory formulated by J. J. Thomson starts with the assumption that corpuscles or electrons are constituents of all atoms ; so that the chief difference between one atom and another is not one of quality — since all atoms contain electrons — 'but is a difference of quantity, and of distribution or arrangement. The electrons carry minus charges of electricity, and yet they are ordinarily present in a neutral atom. This being the case, we should look for a corre¬ sponding positive charge, somewhere in the atom, and the hypothesis has been brought for¬ ward that the positive charges constitute the nucleus of the atom. When two electronic sys¬

tems, e.g., that of hydrogen and chlorine, come into contact, one of the electrons gets detached from the atom and describes an orbit around the other atom. Each atom was originally neutral; but the system from which the elec¬ tron was removed becomes a positive atom, and the system to which the electron is added be¬ comes a negative atom. This transfer of an electron then makes hydrogen a positive sys¬ tem and makes chlorine a negative system. Here we have a plausible explanation of the valency of an element. An atom minus one electron, or an atom plus one electron may be considered as electrically charged, and there¬ fore capable of attracting oppositely charged atoms to form electrically neutral systems. An

atom less two electrons, or, with two electrons in excess, would have twice the ability to com¬ bine. It would have the valency of two. Con¬ sult Friend, (Theory of Valency) ; Werner, (Theory of Valency) ; von Meyer, Ernst, his¬ tory of Chemistry ; Freund, (The Study of Chemical Composition* ; Muir, Pattison, his¬ tory of Chemical Theories and Laws* ; Thomson (Electricity and Matter* ; Millikan, (The Elec¬ tron. }*

V. S. Babasinian,

Professor of Chemistry , Lehigh University.

VALENS, va'lenz, Flavius, Roman emperor of the East: b. near Cibalis, Pannonia, 328; d. Adrianople, 9 Aug. 378. He was declared at 36 the associate of his 'brother, Valentinian I, who made him emperor of the East. He sub¬ dued the revolt of Procopius and was fre¬ quently with the Goths under Athanaric, who were several times defeated, and sued for peace, which was granted them (370). In 377 the Goths, driven south by the Huns, asked and were allowed to settle on Roman territory, but the terms of the treaty not being faithfully observed by the subjects of Valens, they soon took up arms, and in 378 defeated Valens and destroyed the greater part of his army.

VALENTIA. See Valencia.

VALENTINE, Saint, a bishop and martyr of the Church, who was put to death at Rome for his faith during the persecution under Claudius II, 14 Feb. 270. The custom of choos¬ ing valentines on his day is of considerable antiquity, and it was an old belief that birds began to mate on this day. On the eve of Saint Valentine's day young people of both sexes used to meet, and each of them drew one by lot from a number of names of the opposite sex, which were put into a common

receptacle. Each gentleman thus got a lady for his valentine, and became the valentine of a lady.

VALENTINE, Edward Virginius, Ameri¬ can sculptor: b. Richmond, Va., 12 Nov. 1838. He studied anatomy at the Medical College of Virginia, and began his art training at Paris under Couture. He was subsequently a pupil under Bonaiuti in Italy, and Kiss in Germany; and attended the Royal Academy of Arts in Berlin. He was president of the Richmond Art Club and the Valentine Museum; vice- president of the Virginia Historical Society; and a member of several patriotic and secret organizations. His works include (The Na¬ tion's Ward ; (Unc* Henry1* ; (Andromache and Astyanax* ; (The Blind Girl* ; ideal figures (Judas and Grief* ; bronze busts of Commo¬ dore M. F. Maury, J. V. Minor, University of Virginia, of J. R. Tucker of Washington and Lee University, John S. Mosby, A. S. John¬ ston, W. P. Johnston; heroic bronze statues of Jefferson Davis and allegorical female fig¬ ures, symbolical of the South for Richmond, Va., bronze statue of Gen. Hugh Mercer for the United States government ; statue of Gen. R. E. Lee for Statuary Hall, Washington; statue of John J. Audubon for New Orleans.*

VALENTINI, Philip Johann Joseph,

American archaeologist : b. Berlin, Germany, 1828; d. New York, 16 March 1899. He was of Italian parentage, was educated at the Gym¬ nasium of Torgau and at the University of

Berlin, making a special study of philology and jurisprudence, and in 1854, under government auspices, founded the seaport Puerto Limon in Costa Rica. While thus engaged he learned that the natives had no knowledge of their ancestors, and on his return to Germany he made a thorough research concerning the his¬ tory of early Spanish colonization in Central America. He later studied the prehistoric re¬ mains of Guatemala and the surrounding re¬ gions, and his 30 years' labor in deciphering the pre-Columbian manuscripts placed him in the front rank of American archaeologists. An achievement which added much to his repu¬ tation was his interpretation of the famous Mexican calendar-stone, concerning which he published an account, (The Mexican Calendar Stone) (1878). His other works include (The Landa Alphabet (1880); (Two Mexican Chal- chihuites> (1881) ; (The Olmecas and the Tul- tecas) (1883) ; (A Study of the Voyage of*

Pinzon to America (1898), etc.*

VALENTINIAN I, Flavius, Roman em¬ peror : b. Cibalis, Pannonia, 321 . a.d. ; d. Bre- getio, Germany, 17 Nov. 375. He entered the army and by his capacity and courage rose rapidly in rank under Constantius and Julian, and on the death of Jovian was chosen as his successor, 26 Feb. 364. He resigned the sov¬ ereignty of the East to his brother Valens (q.v.) and himself governed the West with ability till his death. He possessed great mili¬ tary skill and was a prudent administrator. His reign was occupied in campaigns against the barbarians along the borders of the em¬ pire. By his first wife he had Gratian and by the second, Justina, another son, Valentinian II, and three daughters, one of whom, Galla, became the wife of the Emperor Theodosius I. He was succeeded by Gratian and Valen¬ tinian II.

VALENTINIAN II, Flavius, Roman em¬ peror: son of Valentinian 1: b. 3 72 a.d.; d. 15 May 392. He was an infant of four years at the death of his father and received from his elder brother, Gratian, the provinces of Italy, Ulyricum and Africa as his share of the West¬ ern empire. During his minority Gratian prac¬ tically exercised supreme authority until his own death in 383. Maximus, the murderer of Gratian, paid no attention to Valentinian till 387, when he invaded Italy and Valentinian then fled to Thessalonica to seek aid of Theo¬ dosius, emperor of the East. Theodosius now governed in effect for Valentinian, who, while in Gaul, was murdered by Arbogastes, the commander-in-chief of his army.

VALENTINIAN III, Flavius Placidus,

emperor of the West, grand-nephew of the pre¬ ceding: b. about 419; d. 455. He was the son of Constantius III, by Placidia, the daughter of Theodosius the Great, and was seated on the throne of the West by Theodosius II, emperor of the East in 425. He was a weak prince, who never really ruled during the 30 years that he sat on the imperial throne; his mother, Pla¬ cidia, governing for him till her death in 450. She was succeeded by the eunuch, Heraclius. Valentinian's treatment of Bonifacius made the latter adopt the cause of Genseric (q.v.), chief of the Vandals, and thus Africa was lost to the empire. Aetius, the buttress of his em¬

pire, the emperor stabbed to death in a fit of envious jealousy (454), but next year was him¬ self slain by Maximus, whose wife he had ravished. Valentinian was the last of the Theodosian line. Fletcher's powerful tragedy of (Valentinian, produced before 1618 but net*

printed till 1647, was founded upon events in the life of this monarch. Consult Cambridge Mediaeval History) (New York 1911).

VALENTINIANS, the followers of Val¬ entinus, an Alexandrian gnostic, who in 141 went to Rome, where he actively disseminated his views up to the year 160. He propounded that in the pleroma (q.v.) there were 15 male and as many female aeons united in wedlock. The youngest aeon, Sophia (Wisdom), brought forth a daughter, Achamoth, whence sprang the Demiurge, who created mankind. This Demiurge aspired to be regarded as the only god, and led many angels into the same error. To repress his insolence, Christ descended, Jesus, one of the highest aeons, joining him when he was baptized in Jordan. The Demi¬ urge had him crucified; but before his death both Jesus the Son of God and the rational soul of Christ had separated, leaving only the sentient soul and the ethereal body to suffer. The Valentinians were divided into many sects and schools. See Gnosticism.

VALENTINUS, val-en-tl-nus, Basilus, German alchemist : b. at the end of the 14th century. He appears in history as traveling through Spain, England and Holland, and in 1413 he retired to a Benedictine monastery at Erfurt. He was far in advance of his age in knowledge of chemistry. He distinguished be¬ tween bismuth and zinc, produced pure quick¬ silver from sublimate of mercury and nitrate of quicksilver. His special investigations, how¬ ever, were in relation to antimony, and the re¬ sults he attained were accepted as ultimate for at least a century. He discovered muri¬ atic acid, ammonia, fulminating powder, sugar of lead and formulated the earliest method of quantitative analysis. His works remained un¬ published until (1677) a couple of centuries after his death, but they were known to Theo¬ phrastus Paracelsus, who appropriated as his own discoveries some of the scientific secrets which they revealed.

VALERA Y ALCALA GALIANO, Juan,

hoo-an' va-la' ra e al-ka-la' ga-le-a'no, Spanish statesman and author : b. Cabra, near Cordova, 18 Oct. 1824; d. Madrid, 18 April 1905. He studied at Granada, turned from jurisprudence to a diplomatic career, and was secretary of le¬ gation successively at Naples, Lisbon, Rio de Janeiro, Dresden and Saint Petersburg. Then he returned to Spain and wrote for El Contem poraneo, the organ of the opposition to O'Don¬ nell. In 1859 he became deputy, and Minister of Commerce and Agriculture. After serving as Ambassador at Frankf-ort, he took part in the Spanish revolution of 1868. Subsequently he was Ambassador to Lisbon, Washington (1884- 86),

Brussels, and Vienna. He was also made a member of the senate, the council of state and the Spanish Academy. While thus promi¬ nent in public affairs, his best efforts were nevertheless given to literature. His verse was finely wrought, but was criticized as the expres¬ sion rather of wide culture than of poetic inspi-

ration, and his criticisms for a certain courtesy which interferes with a clear and impartial judgment. His work in prose fiction assured him a high place not only in Spanish but in general literature. His (Pepita Jimenez (1874) marked the revival of Spanish fiction, and the detachment from French patterns. His work steadily improved, and he treated with equal skill dialogue and description, the short story and the long. He was particularly praised for a <(complete synthesis of gravity of matter and gaiety of manner.® Among the titles of his further works were (Las Ilusiones del Doctor Faustino) (1876) ; (E1 Comendador Mendoza* (1877) ; (Dona Luz) (1878) ; cPasarse de Listo* (1888); (Estudios Criticos) (1864-84); (Nue- vos Estudios) (1884) ; (La Buena Fama) (1895); (Juanita la Largo) (1896); (Genio y Figura* (1897) ; (Morsamor) (1899) ; (1858); (Canciones, Romances, y Poemas) (1885). A collective edition appeared in 1885 in the (Colec- cion de Escritores Castellanos.* See Pepita Jimenez. Consult Brunetiere, (La casuistique dans le roman de Juan Valera> in his series (Histoire et litterature,* Vol. I.*

VALERIAN, va-le-ri-an (Publius Lucinus Valerianus), Roman emperor: b. about 190 a.d.; d. about 260 a.d. He was descended from a noble Roman family and rose by degrees to the highest offices in the state. When the Em¬ peror Decius in 251 determined – to revive the censorship, Valerian was chosen by him to oc¬ cupy the post, but his death in 253 interrupted the plan and Valerian was chosen emperor. His reign was of slight importance, he accomplished little to avert the impending dissolution of the empire, and was almost constantly involved in warfare against the Persians and the barbarian tribes surrounding him. In 260 he was taken prisoner by the Persians and died in captivity. He was succeeded by his son Gallienus.

VALERIAN, the type genus (Valeriana) of the valerian family, herbs or shrubs having flowers with five-parted perianths, and funnel- shaped, short-spurred corollas, which are gen¬ erally of a pale rose-color. The calyx, which is rudimentary, when in flower,

becomes a feathery pappus at the top of the fruit. The leaves are simple or pinnate, without stipules, and the small blossoms are gathered into pro¬ fusely branched cymose inflorescences, usually terminal. They have a spicy, aromatic odor, very grateful in spring, and are sometimes so fragrant, as in the case of Valeriana sitchensis and V. officinalis as to suggest heliotrope. The latter species is the common, or great wild va¬ lerian, which is cultivated in gardens for its flowers and its root. It has an erect stem, two to five feet tall, with pinnate leaves and toothed leaflets, and very fragrant flowers in pale tones of lavender, pink and white. The ascending rhizome, with many fibrous roots, has a peculiar, pungent and most disagreeable odor, due to the volatile oil of valerian contained in it, which grows stronger and' worse when old. The taste is bitter, and like camphor, and the root is an officinal drug, which is a stimulant and anodyne, used in hysteria, and as an antispasmodic. Cats are very fond of the odor of valerian, and tear

the plant to pieces and roll in it. They are said even to dig up the roots and devour them. A bit of the root is also used as a bait for catch¬ ing rats. The carrot-like roots of Valeriana edulis, a tall glabrous plant of the western United States with undivided stem leaves, and yellowish-white flowers in elongated panicles, are eaten by the Indians either raw or dried. The Pah-Utes even grind them into flour and use it in the form of bread or mush. Nard is a name given to various species of valerian, but particularly to V. celtica, employed by Eastern nations as a substitute for spikenard in their scented baths ; it is, likewise, called Celtic spike¬ nard, and, like the Cretan spikenard (Valeriana phu), has medicinal properties similar to, but weaker than, the officinal valerian. The Greek valerian is Polemonium cceruleum, mistaken by old herbalists for the valerian described by the ancient Hellenes, and the name has been ap¬ plied to the whole genus, including the creeping American P. reptans, with delicate nodding corymbs of pale blue flowers. Centranthus ruber is the scarlet lightning or spurred or red valerian, cultivated for its oblong panicle of scarlet flowers. The African or Algerian vale¬ rian (Fedia cornucopia) is used as a salad plant in Algeria. It is low, glabrous and branching, with oval leaves, and tubular, long, pink flow¬ ers. It can be cultivated and eaten like corn salad, but is not so hardy.

VALERI ANOS, va-le-ri-a'nos, Apostolos. See Fuca, Jean de.

VALERIC or VALERIANIC ACID,

C4H9CO2H. Four acids of this composition are known. The one

ordinarily known by this name is a monobasic acid found free and as ethereal salts in the animal and vegetable king¬ doms, chiefly in valerian and angelica roots. It may be made artificially by the oxidation of ordinary amyl alcohol by chromic acid mixture. It is a colorless oily liquid, lighter than water, and possessed of a peculiar odor and a sharp acrid taste; somewhat soluble in water but very easily so in alcohol ; unites with bases to form salts called valerates or valerianates and with alcohols to form ethereal salts. These latter are frequently of a rather agreeable odor and taste and for such are much used in the prepa¬ ration of artificial fruit essences. Some of the metallic valerianates are used in medicine be¬ cause of their slight sedative action.

VALERIUS, Flaccus Setinus Balbus,

flak'us se-ti'nus bal'bus, Caius, Latin poet: b. Padua, lived in the time of Titus and Ves¬ pasian ; d. about 90 a.d. He wrote and dedi¬ cated to Vespasian the (Argonautica, a poem in eight books, in which he narrates the adven¬ tures of Jason and his companions. This epic he left unfinished. He is merely a somewhat free translator of Apollonius Rhodius, whose work he tricks out with rhetorical flourishes, while in some passages he is so obscure as to be nearly unintelligible. Consult Langen, ha¬ leru Flacci Argonautica cum notis) (1896).*

VALERIUS, Publius, surnamed Publi- cola, Roman consul and general : d. 503 b.c. He was instrumental in the expulsion of the Tarquins, and when Tarquinius Collatinus was forced to resign Valerius was elected consul in his stead in conjunction with Junius Brutus. When the Tarquins, aided by the Veientes,

\

moved against Rome in 509 b.c. they were met by the Romans under the two consuls and de¬ feated. Brutus fell in the battle leaving Va¬ lerius sole consul. He promulgated a law by which any person who attempted to usurp kingly power might be killed by any one, and another establishing the right of a plebeian condemned by a magistrate to appeal to the people. In recognition of his services he re¬ ceived the surname publicola, <(the people's friend.ˆ He was three times re-elected consul, conducted the expedition of Porsena,

and with his colleague, Titus Lucretius Tricipitinus de¬ feated the Sabines in 504. He is mentioned by Livy. His life was written by Plutarch.

VALERIUS ANTIAS, va-le'ri-us an'ti-as, Roman historian. He lived in the middle of the 1st century of our era and his work was an account of Latin history from the founding of Rome, and comprised 37 books. It abounds in exaggeration and fabulous incident. The au¬ thor draws largely on Livy, as far as that au¬ thor extends. The disjected remains of Antias are published in Peter's (Historicorum Roma- norum Fragmenta) (1883).

VALERIUS CATO, ka'to, Publius, Latin

poet. He appears to have been born in Cisal¬ pine Gaul in the 1st century b.c. During the dictatorship of Sulla, and the confusion caused by the proscriptions, he lost his estate, being then in his minority, and went to Rome as a needy student, although his talent as a critic and grammarian of the Alexandrian type even¬ tually won him credit and distinction. Two poems, (Dirae) and (Lydia, J which long passed under Virgil's name, have been attributed to him on somewhat doubtful evidence. Consult Ribbeck, (Appendix Vergiliana) (1895).

VALERIUS CORVUS, kor'vus, Marcus, Roman general: b. about 371 b.c., d. about 271. In 349, being military tribune under Camillus in his campaign against the Gauls, he accepted the challenge of a gigantic warrior to single com¬ bat, and killed his antagonist with the assistance of a raven which perched upon the helmet of Valerius and as often as he advanced upon his foe flew at the Gaul's face. A general battle then ensued, in which the Romans were com¬ pletely victorious. From this circumstance Valerius was considered one of the greatest of Roman heroes and was given the surname of Corvus (a raven). He was made consul the next year, and the same honor was conferred upon him five times afterward. In his third consulship, at the age of 29, he gained two vic¬ tories over the Samnites at Mount Gaurus and at Suessula. In 342 he was appointed dictator on his quelling through his personal popularity a mutiny in the army. He was. dictator again in 301, when he defeated the Marsi and Etrus¬ cans. He held curule dignities 21 times, re¬ peatedly enjoyed the honors of a triumph, and is referred to by the Roman writers as an ex¬ ample of the favors of fortune.

VALERIUS MAXIMUS, mak'si-mus, Roman author of the 1st century a.d. Nothing is known of his life except that he accompanied Sextus

Pompey into Asia. His name is ap¬ pended to a collection of historical anecdotes entitled (De Factis Dictisque Memorabilibus Libri IX, > which embraces a large variety of subjects, and as a historical authority is of

some value. Abridgments were made by Titus Probus, Julius Paris and Januarius Nepotianus. Those of the two last named were discovered by Cardinal Mai in the library of the Vatican. Appended to the work of Valerius Maximus is a fragment entitled (De Nominibus Praeno- minibus, Cognominibus, Agnominibus, Appella- tionibus, Verbis, > of which the first chapter only is extant. It professes to be an epitome made by Julius Paris, but probably had no con¬ nection with the work of Valerius. The best editions of Valerius Maximus are those of Tor- renius (1726); Hase (1822); Kemp (1854); Halm (1865). The work was translated into English by Speed (1698).

VALERIUS PROBUS. See Probus, Marcus Valerius.

VALETTA, val-let'ta, a fortified Mediter¬ ranean seaport, capital of Malta (q.v.), on the northeast coast of the island, picturesquely sit¬ uated on an elevated peninsula, with a large and commodious harbor on each side. The streets are narrow, the squares are spacious and handsome, and the splendid quays are lined with elegant buildings. Owing to the inequal¬ ity of the site the different streets connect by flights of steps. The cathedral, built in 1580, contains the tombs of the Knights of Malta, who are represented in white marble in full costume. The governor's residence, the ancient palace of the grand masters, has a corridor hung with portraits of knights, and an armory rich in trophies and ancient armor. A library and museum, a university, a botanical garden, a military hospital, occupying a noble building erected by the knights, and other public insti¬ tutions, are notable features. There are sev¬ eral dry-docks and the town is an important coaling station. It has a stone quarry, silk factories, a large transit trade and is the chief station of -the British fleet in the Mediterra¬ nean. Over 100 vessels are registered from this port, one-third of them steamships. Pop. 25,000.

.. yALETTE, Jean Parisot de la, zhon pa-re-so de la va-let, French soldier: b. Tou¬ louse, 1494; d. Valetta, Malta, 28 Aug. 1568. He came of a noble family of Toulouse, early entered the order of the Knights of Saint John and was elected grand master of that order in 1557. His after career was a series of ex¬ ploits in warfare with the Turks, ending with his renowned defense of Malta, lasting from 18 May 1565 till 8 September. The Turkish armament included 159 war

ships and 30,000 men; while the defenders were 8,500 men, with 700 knights, who held the fortifications heroic¬ ally in spite of awful loss and privations, till the siege was raised on the approach of a Neapolitan fleet. Valette was the founder of Valetta (q.v.).

VALHALLA. The abode of Odin as described in N-orse mythology. It was the house of joy and of vast proportions, being reported as having 540 entrances, each so broad that 800 heroes could march through abreast. Also the Pantheon, or Temple of Fame, built by Louis I of Bavaria, at Donaustauf, near Katisbon, and consecrated to all Germans who have become renowned in war, statesmanship, literature and art. Also applied generally to buildings dedicated to national heroes or the distinguished dead in various fields.

VALISE. See Trunk.

v?l-kl'rez (((Battle-Maid- ens ; Shield or Wish-maidens®), in Norse mythology, beautiful and alluring women who ride through the air clad in gleaming armor and jewels of gold, lead the battle and select the Val or Einherjar, single champions worthy of Wodin and of entrance into Walhalla. From the manes of their horses (the clouds) cords are trailing and the points of their spears scat¬ ter sparks of light. They lead the fallen heroes to Walhalla and offer them there the drinking horn. Sometimes they are of supernatural origin; sometimes the daughters of princes; they can change themselves into swans at will. They sometimes take noble heroes to be their lovers. Brunhilde in the heroic poetry of the north is a Valkyrie. Most of the names of the Valkyries contain some reference to war and battle. (See Scandinavian Language and Literature). Consult Golther,

VALLA, val'la, Laurentius (Lorenzo della Valle), an Italian humanist: b. Rome, 1407; d. there, 1 Aug. 1457. He studied Greek and Latin under Bruni and Arispa, took orders in 1431 and was appointed professor in the Uni¬ versity of Pavia the same year. Subsequently to 1433 he held the same office in Milan, Genoa and Florence, and in 1442 became secretary to Alfonso V of Naples. Pope Nicholas V sum¬ moned him to Rome and made him secretary and apostolic writer (1447) ; and he passed his remaining years in translating from the Greek, and in furious literary feuds with Poggio, Trapezuntios and others among his compeers. He was a born controversialist and reckless in the utterance of his views. He

condemned moral standards of ecclesiastical asceticism in his (De Voluptate Dialogus) (1431) ; he as¬ sailed the scholastic logic of the Middle Ages in his (Repastinatio Dialectices) ; the use of unclassical words and idioms in Latin writing was criticized in his (Elegantise Latini Ser- monis) (1471); and the claims of the papacy to temporal dominion were attacked in his (De Falso Credita et Mentita Constantini Donatione Declamatio) (1440). He wrote numerous other tractates of a destructively critical character, and made himself especially obnoxious to the professors of the current theology by his (An- notationes in Novum TestamentunP (after¬ ward edited by Erasmus), in which he attacked with much acrimony the Vulgate's translation of the Gospels and Epistles. His translation of Thucydides and Herodotus into Latin are not without authority at the present day. Consult Barozzi and Sabbadini,

VALLABHACHARYA, val-la-ba:ka're-a, a Hindu religious reformer. He flourished in the 15th century, and his followers are most influential at the present day. He is regarded as a Mahatma, or incarnation of Vishnu; and his descendants, under the title of Maharajah, or Gosain, are treated with almost divine honors. He inculcated the worship of Vishnu by his name of Krishna, in which form the god, like the Greek Zeus, did not disdain the love and company of mortal maidens. The worship of Krishna has a tendency to licentiousness, and

a reaction toward a more spiritual and exalted creed set in under Swami, Narayan about 100 years ago. Consult Mulji, (History of the Sect of Maharajahs or Vallabhacharyas in Western India (1865) ; Williams,*

(1877).

VALLADOLID, val-ya-t'ho-let'h', Mexico. See Morelia.

VALLADOLID, Philippines, pueblo, prov¬ ince of Negros Occidental; on the west coast on Guimaras Strait, 16 miles south of Bacolod. Pop. 14,000.

VALLADOLID, Spain, (1) Capital of the modern province of the same name, a garrison town, and archiepiscopal see, on the left bank of the Pisuerga, a tributary of the Douro, at the confluence of the Esgueva (largely covered in) from the east, and the Canal of Castile from the north, 100 miles northwest of Madrid. It is situated in a spacious, fertile plain and has fine streets and squares. The Plaza Mayor or de la Constitucion is the centre of the city's life. The

cathedral, begun in late Renaissance style in 1585, is still unfinished; the most in¬ teresting church is that of Santa Maria la Antigua, dating from the 12th century. Close to these two edifices stands the university, a 17th century building, with a library. Other noteworthy buildings and institutions are the Colegio de Santa Cruz, a splendid plateresque building of the 15th century, containing a mu¬ seum and some modern paintings ; the Colegio de San Gregorio, a 15th century building, now devoted to municipal purposes, with a splendid Gothic facade; the 13th century church of San Pablo, with an ornamental Gothic fagade; the royal palace, dating from the 17th century; the Convent of San Benito, now used as a bar¬ rack; two theatres; a bull-ring; general hos¬ pital, etc. The Campo Grande is the finest park of the city. The industries include iron-found¬ ing and manufactures of cloth, silks, paper, gold and silver wares, chemicals and leather. Valladolid was the capital of Spain before Madrid. It is the birthplace of Philip II and contains the house in which Columbus died. One of the foreign institutions for the training of Scottish Roman Catholic priests was for¬ merly situated here. Pop. (1910) 71,066. (2)

The province has an area of 2,922 square miles and is an agricultural region. It was formerly noted for its weaving and tanneries, but all industry has declined of late. Pop. about 300,000. See Castile.

VALLADOLID LA NUEVA, la nwa'va, Honduras. See Comayagua.

VALLANDIGHAM, Clement Laird,

American politician: b. New Lisbon, Ohio, 29 July 1820; d. Hamilton, Ohio, 17 June 1871. He was educated at Jefferson College, Pa., and was admitted to the bar in 1842. More inclined to a political than legal career, at 25 he became the representative of Columbiana County in the legislature of Ohio. In 1847 he removed to Dayton, Ohio, which he made his permanent home, and took charge of The Empire, a Demo¬ cratic newspaper, which he edited with marked ability for two years. He returned to his pro¬ fession in 1849, but sought political honors, and after two defeats was elected to the House of Representatives in 1856; was re-elected in 1858, and was in Congress at the outbreak of the

\

Civil War. He strenuously opposed the war as being unnecessary and unconstitutional, and his opposition was radical and persistent.

Failing of election to Congress in 1863, he returned to Ohio, and at political meetings op¬ posed and denounced the government and the war policy in such bitter terms, that he became the most prominent leader of the so-called "Copperheads® of the North. His extreme op¬ position to the war led to his arrest in May 1863 at Dayton, by General Burnside, com¬ manding the military department of the Ohio. He was tried by a military commission at Cin¬ cinnati, Ohio, for disloyal utterances and con¬ duct, found guilty and sentenced to close con¬ finement during the war, but President Lincoln commuted the sentence to banishment beyond the Federal lines, and he was sent south through General Rosecrans' camp at Murfreesboro into the Confederate lines. Being unwilling to es¬ pouse the cause of the Confederacy and dissatis¬ fied with his reception in the South, in a short time he ran the blockade from Wilmington, N. C., and proceeded by sea to Halifax, and later to Windsor, Canada, where he made his home for a time. While at Windsor he was nominated by the Democrats of Ohio for gov¬ ernor, against the Hon. John Brough, and was defeated by over 100,000 majority. In 1864 he returned to his home at Dayton without moles¬ tation, and took an active part in various po¬ litical campaigns in Ohio, becoming a delegate to the National Democratic Convention at Chicago.

His tragic death occurred while he was en¬ gaged as attorney in a murder case. He was illustrating to the jury the manner in which the victim was shot, when by accident he fatally shot himself with the pistol he held in his hands. Vallandigham was an accomplished and forcible speaker. His style was formed from the best models of oratory. His convictions were strong and inflexible, his integrity and courage undoubted. Consult Vallandigham, J. L., (Life of Clement L. VallandighanP (1872).

VALLE, va-la, Pietro della: b. 1586; d. 1652 ; a noted Italian traveler born of noble family. He is credited with being the first in¬ vestigator to begin that long line of research which finally led to the discovery of the records of the ancient civilization of Assyria and the deciphering of its records. During his travels he wrote back learned and interesting letters to his friend Mario Schipano, professor of medi¬ cine in Naples. He spoke Persian, Arabian, Coptic and Turkish and these languages were of great use to him in his travels during which he visited Persia, where he was well received at court in 1617

and remained for several years which were spent in the study of the country. On one of his expeditions he visited the ancient ruins of Persepolis which he examined and described with more care and intelligence than had ever been bestowed upon them by any previous explorer. He copied some of the ancient cuniform writing and discussed the characters employed in it. His letters called the attention of the world to this mysterious an¬ cient field and created an interest which was destined never to die wholly out until the rid¬ dle of its past had been solved. Della Valle's work possesses great value for he describes with exactness and intelligence the countries

through which he traveled which include Persia, India, Egyot, Turkey, Arabia and the Holy Land. It was only in 1526 that he re¬ turned to Italy after an absence of almost 10 years.

VALLEJO, val-ya'ho, Cal., city in Solano County, on Napa Creek, an arm of San Pablo Bay, and on the Southern Pacific Railroad, about 25 miles northeast of San Francisco and opposite Mare Island Navy Yard. The city was founded in 1851 and was intended for the cap¬ ital of the State. The legislature held sessions here in 1851, 1852 and 1853, but only a part of the session of 1853 was held in Vallejo. In 1866 the city was chartered. It is in a fertile agricultural section and nearby is a quick¬ silver mine. The chief manufactures are flour, leather, cement, canned fish, lumber products and canned fruits. Mare Island Navy Yard, where about 5,000 men are employed, contributes to the prosperity of the city. The principal buildings are the city hall, the Sailors' Club House, the church and school buildings. The educational institutions are two high schools, one public, founded in 1870, the other Saint Vincent's Academy (Roman Catholic), public and parish elementary schools and Carnegie Free Library. There is one Home for Orphans. The city owns and operates the waterworks. The government of Vallejo, like that of Berke¬ ley, Monterey, Oakland, San Diego, Santa Cruz and other California cities is conducted on the commission plan. Pop. (1920) 21,107.

VALLENTINE, Benjamin Bennaton,

(

VALLEY CITY, N. D., city, county-seat of Barnes County, on the Cheyenne River, and on the Union Pacific and the Minneapolis, Saint Paul and Sault Sainte Marie railroads, about 55 miles west of Fargo. It is in an agricultural and stock-raising region. The industries are connected chiefly with farm products and the shipment of

livestock, and the city is a dis¬ tributing centre for quite an extensive region. The educational institutions are the State Nor¬ mal School, public graded schools and a school library. There are good banking facilities and newspapers. Pop. 4,686.

VALLEY FALLS, Kan., city in Jefferson County, on the Kansas City Northern, the Union Pacific and Atchison, Topeka and Santa Fe railroads, about 30 miles west of Leaven¬ worth and 26 miles north of Topeka. It is in a fertile agricultural region. The river furnishes excellent water power, and the chief manu¬ factories are flour-mills, machine shop, and agricultural implement shop. There are two State banks. Pop. about 1,480.

VALLEY FORGE, Pa., village in Chester County, on the Schuvlkill River, and on the Philadelphia and Reading Railroad, 24 miles west of Philadelphia. Valley Forge is noted as the place where Washington and his army of about 11,000 men went into winter quarters, 17

Dec. 1777, after the occupancy of Philadelphia by the British. The army suffered cold and hunger on account of the poverty of the coun¬ try, but perhaps more from the incompetency of the commissary department. Despite the conse¬ quent illness of many of the men, Baron Steu¬ ben, who had been made inspector-general of the army, drilled and trained the soldiers and reorganized the army. Washington was at Valley Forge when he received the news of the consummation of the alliance with France. Washington abandoned the camp 18 June 1778, and again took possession of Philadelphia. In 1893 the Pennsylvania legislature took steps to acquire and preserve Valley Forge as a public park and historic landmark. On 19 Oct. 1901, a monument was here unveiled by the Daughters of the Revolution in memory of the soldiers who died in camp during the winter of 1777-78. The entire field at Valley Forge is practically the same to-day as it was when evacuated by Washington in 1778. The trenches thrown up by the ((ragged Continentals® may still be seen. The old stone house which Washington used for his headquarters is standing and is in a good state of preservation. In 1903 the matter of making Valley Forge a State nark was again taken up by the legislature of Pennsylvania, and the sum of $74,500 was appropriated for the purpose. To the 210 acres already owned by the State 800 acres were added.

VALLEY JUNCTION, Iowa, city in Polk County, on the Chicago, Rock Island and Pacific, and the Minneapolis and Saint Louis railroads, about five miles west of Des Moines. It has coal mines, cement works, extensive rail¬ road repair shops and stock yards. Pop. about

3,200.

VALLEY QUAIL. See Quail.

VALLEY TRAINS, stratified deposits filling valleys, and laid down by overloaded streams liowing from the melting ice fronts of glaciers. Such deposits, when more widely spread over a region, and not confined to val¬ leys, are called outwash plains. The latter are often many miles in extent, and are now ac¬ cumulating at many points along glacial fronts in Alaska.

VALLEYFIELD, or SALAHERRY DE VALLEYFIELD, Canada, a town and port of entry in Beauharnois County, on the Saint Lawrence River, and at the head of Beauhar¬ nois Canal constructed past the Saint Lawrence rapids, 30 miles by the Grand Trunk Railway southwest of Montreal. The river here is crossed by a splendid railway bridge. Valley- field is the see of a Roman Catholic bishop, and has a cathedral, college and other fine pub¬ lic institutions. The town is electrically lighted, has abundant water power waterworks, and flouring-, paper-, and cotton-mills, one of the latter establishments employing 1,500 persons. Pop. 13,000.

VALLEYS, in general, depressions of some magnitude in the surface of the land. Two great classes of valleys may be recognized, — (1) structural, and (2) erosional. The former include depressions due to folding, such as synclines ; basins due to subsidence of an area such as might occur in regions of subterranean drainage, or in volcanic regions; fault valleys which when narrow gorges, like that of the

Rhine, are known by the term of ((graben ,® and others. Erosion valleys embrace by far the more common types, such as river valleys, which range from gorges with vertical sides and completely filled by the river, to depressions many miles in width, with flat bottoms and gently sloping sides. These are carved wholly by the rivers that occupy them. The larger valleys of this type are generally found along the border line between ancient more or less disturbed, and more modern coastal plain strata which lap up against the older ones. By con¬ tinued erosion the edge of the newer strata is pushed further and further away from the older land, until a valley of great

width is pro¬ duced along the strike of the strata. Valleys of this type are well developed along the Atlan¬ tic Coast, next to the crystalline rocks of the Piedmont district. Some valleys of this type have suffered drowning, as appears to be the case in Long Island Sound. Other valleys of this type have become filled with water and transformed into lakes by the stopping up — by glacial drift or warping of the land of their outlets. Such is the case with the valleys now holding the water of some of our Great Lakes, notably Ontario. Valievs due to glacial erosion are not uncommon, although it is probable that glaciers usually do little more than deepen valleys originally formed by streams. A type not included in the two divisions mentioned is found in intra-morainal valleys within the glaciated region. Here the valley is the remnant of the plain around which hills of glacial drift are built. See Mountain; Flood Plains. _

VALLISNERIA, the typical genus of the tape-grass family. It is composed1 of aquatic plants, V. spiralis being the tape-grass or eel-grass, whose long submerged leaves are detested bv swimmers ; in Chesapeake Bay it is the <(wild celery,® upon the roots of which the canvas- back feeds, and to which are due the admirable flavor of that duck. The leaves are very long and narrow, and float just under the surface in shallow water, the plant being rooted in mud or sand. It spreads widely by stolons, so that it often forms a wide belt along the shore, which is a great refuge for the small fry of water-life, but greatly impedes the passage of boats. Vallisneria is peculiar in its arrange¬ ments for cross-fertilization. The leaves are arranged in fascicles, from the axils of which spring the flowers, only one sex on each plant. They are enclosed in a kind of bladder formed by two membranous, concave bracts. There is only one pistillate flower to a bladder, and when ready for fertilization, the envelope splits and frees this flower, its ovary elongates, and it is pushed upward by the growing stalk, until the whorl of three lanceolate sepals floats on the surface. Above them are three abortive petals, and three stigmas, by-lobed at the apices, and fringed on the edges. They project slightly between the sepals. In the meantime, the blad¬ der about the staminate flowers, which are numerous, on a short axis, and have never risen far above the mud, becomes disrupted, and the flowers, which are globular, and have their three sepals closed tightly over the stamens, float like bubbles to the surface. There they drift about, and soon open. The arched sepals become reflexed, until they look like three boats

\

tied close together at one end. Two stamens project obliquely from the point of union, tipped with masses of sticky pollen-cells. These tiny crafts are blown about by the winds, and carried by currents, on the surface of the water, sometimes covering it as with a creamy film. In the course of their travels, they almost inevitably strike against the waiting pistillate flowers, riding at anchor, with their three stigmas poised at exactly the angle to allow their fringes to detach the sticky pollen-masses from the other flower. As soon as the pollen adheres firmly to the stigmas, the pistillate flowers are withdrawn beneath the surface by the contraction of the long stalks, which as¬ sume a spiral form, and ultimately ripen fruit near the muddy floor of the stream.

Helen Ingersoll.

VALLOMBROSA, val-lom-brc/sa (Italian, <(shady valley®), Italy, a celebrated abbey sit¬ uated in a thickly wooded valley of the Apen¬ nines, about 18 miles southeast of Florence. It was founded by San Giovanni Gualberto about 1038, subject to the rule of Saint Benedict, and the institution was approved by Pope Alex¬ ander II in 1070. The original purpose of the founder was to establish separate hermitages, but a monastic mode of life soon began to pre¬ vail. The Order of Vallombrosa was strictly contemplative, was the first to admit lay breth¬ ren, and established 60 branch houses in Italy and France. The abbey acquired celebrity from its romantic situation, and its magnificent build¬ ings were erected in 1637. It was a place of reiuge for French priests during the first revo¬ lution ; in 1808 it was pillaged by Napoleon. It was appropriated in 1866 by the Italian gov¬ ernment and the building is now occupied as a school of forestry, although some monks still reside here and attend to the meteorological observatory established in 1654. The place is much visited on account of its fine scenery and the views it commands, and there are hotels for the accommodation of visitors. Vallom¬ brosa has been celebrated by Dante and Ari¬ osto, and the Miltonian quotation <(thick as autumnal leaves that strew the brooks in Val¬ lombrosa® is well known.

VALOIS, val-wa, House of, a younger branch of the Capetian dynasty, which occupied the throne of b ranee from 1328 to 1589. On the death of Charles IV, the last of the direct line of Capetians, his cousin Philip of Valois, the grandson of Philip III and great-grandson of Louis IX, was acknowledged king as the next male heir. His direct successors were John (1350-64), Charles V (1364—80),

Charles VI (1380-1422), Charles VII (1422-61), Louis XI (1461-83), and Charles VIII (1483-98). The last named, dying without male issue, was succeeded by his cousin Louis of Orleans, the great-grandson of Charles V, who ascended the throne as Louis XII (1498-1515). Like his pre¬ decessor, he left no son, and had for his heir his cousin Francis of Angouleme, the offspring of a younger branch of the family of Valois- Orleans, who became King Francis I (1515-47). After him his son, Henry II (1547-59), and his three grandsons, Francis II (1559-60), Charles IX (1560-74), and Henry III (1574-89), held the sceptre, which, on the death of the last, passed into the hands of the Bourbon family, under Henry IV. These two centuries and a

half are among the most disastrous in the his- tory of France. See France — History, and individual titles.*

VALORIZATION, val-er-i-za-shun. Act or Process of attempting to give an arbitrary market value or price to a commodity by governmental interference, as by maintaining a purchasing fund, making loans to producers to enable them to hold their products, etc., used chiefly of such action to Brazil.

VALPARAISO, Chile, province of the middle zone of the republic, bounded north by Aconcagua, south by Santiago, east bv Santiago and Aconcagua, and west by the Pacific. It has an area of 1,775 square miles and includes the island of Juan Fernandez. The surface to the north is fertile and agriculture is successfully followed there. The south is mountainous and barren. The climate is exceptionally mild and uniform in temperature, the summer mean be¬ ing about 63° and the winter 53°. Pop. 340,347 or 191.74 to the square mile. The capital is Valparaiso (q.v.).

VALPARAISO, val-pa-ri'so (Sp. val-pa-ra- e'so), Chile, the most important seaport of the republic and a centre of trade for a large part of southwestern South America. It is located on a large bay about 75 miles west by north of Santiago. The leading industries are iron foundries and machine shops, factories for making macaroni, soap, shoes, perfumery, fur¬ niture, etc. There are also tanneries and wood¬ working plants. There are seven banks, in¬ cluding a branch of the National City Bank of New York, several daily newspapers, fine de¬ partment stores, and more than 1,000 business houses enumerated in the city directory. There is an active chamber of commerce, and trade with North America is increasing steadily since the opening of the Panama Canal. There are large floating docks for repairing vessels at the port. Statues of Columbus and Lord

Cochrane, Earl of Dundonald, who founded the Chilean navy, stand in conspicuous squares. The water supply is excellent. The city is the western terminal of the railway to Buenos Aires, com¬ pleted in 1910. There are also railroads to Santiago and Los Andes. There are ocean cables and wireless telegraph stations. The harbor is excellent, and the entrances to the bay well fortified. It was the first city in South America to establish telegraph lines and to adopt gas (1856), to build aqueducts for the water supply, to use street cars (I860), etc. It has experienced several severe earthquakes. On 16 Aug. 1906, and for several days following, earthquakes and fire caused a large amount of damage to the city and surrounding towns, the greater part of the damage being done by the fire which started immediately after the first shock at 7.52 p.m. The climate is temperate. Pop. about 144,000.

VALPARAISO, Ind., city, county-seat of Porter County, on the Chicago and Grand Trunk, the New York, Chicago and Saint Louis, and the Pittsburgh, Fort Wayne and Chicago i ailroads, about 40 miles southeast of Chicago It was settled in 1836 and in 1856 was incor¬ porated. It is in a fertile agricultural section, and has a large trade in farm products. The chief manufactures are mica paint, dairy prod¬ ucts, and machine-shop products. The' city is

famous for its large school called the Northern Indiana Normal School, and known also as Valparaiso University, a great institution founded by Henry B. Brown in 1873. Its courses of study are planned to meet the needs of a large number of men and women who do not find the regular college courses available. In 1917 there were about 5,500 pupils enrolled, and the faculty and instructors numbered 220; the productive funds totaled $134,000, and the total annual income was $208,338. There are two national and one State bank, with deposits close to $2,000,000. The government is vested in a mayor, who holds office four years, and a common council. Pop. (1920) 6,518.

VALUE. Value is the most important word in the whole science of economics. Funda¬ mentally it means the esteem in which a thing is held, but under ordinary commercial condi¬ tions it means power in exchange. There is no contradiction between these two ideas, because the higher the esteem in which a thing is held, the greater will be its power in exchange under normal conditions. Under certain abnormal

conditions this would not be true. Travelers in a desert who are dying of thirst might es¬ teem water very highly, but if they had nothing to give in exchange for it, water would have very little power in exchange, even if some one came along with a supply of water. The citing of such abnormal cases as this, however, does not go very far toward clearing up the subject of value. On the ordinary market, in the ordinary commercial community, there are always many things to give in exchange for any commodity that happens to be offered; and if the commodity which is offered is highly esteemed or intensely desired, many things usually will be offered in exchange for it. If it is held in low esteem, or not intensely desired, few things will be offered in exchange for it.*

When we say that value in an ordinary com¬ mercial community is power in exchange, we must not be understood as saying it is merely a ratio of exchange. Power in exchange is power to command other desirable things in peaceful and voluntary exchange. When things are exchanged, however, they must of necessity be exchanged in some ratio, but the ratio is purely accidental and is not the real essence of value.

Value depends upon two things and two things alone : namely desirability and scarcity. Any material thing which can be transferred will have value if it possesses both these quali¬ ties and will have no value if it lacks either of them. However scarce or rare a thing may be, if nobody desires it, of course it will have no value or power in exchange. However de¬ sirable it may be in itself, if every one has all he wants of it, nobody will pay a price to get any more. Consequently it will have no power in exchange.

With a given degree of scarcity, the more desirable the object is, the higher its value, and the less desirable it. is, the lower its value. At the same time, with a given degree of de¬ sirability the greater its scarcity, the greater its value ; and the less its scarcity or the greater its abundance, the lower its value. That is to say, when everybody has nearly as much as he wants, he will not be very anxious to get any more, and he will not be anxious to pay a high price or give much in exchange for an

additional quantity. But if it is very scarce, so that every one would like to have a great deal more than he has got, then he will give a great deal in exchange for it.

The reason why scarcity makes for high value and abundance for low value is mainly physiological. Wants are satiable. When one has had

little food, hunger or the desire for food is intense. When one has had much food, hunger or the desire for food is less in¬ tense and gradually approaches the point of satiety, or actually reaches it. This is true not only of hunger but of every other human de¬ sire,ˆ — that is, for the desire for every other specific form of satisfaction. .Even music palls, especially if there is little variety. One becomes weary of looking at the same work of art or at works of art of a given type. Were it not for this principle of satiety, there is no reason why the value of a commodity should diminish as the supply increases. If the tenth apple con¬ sumed by a given person furnished as much satisfaction as the first, there is no reason why the tenfold increase in the supply of apples should not sell at as high a price per barrel as the smaller supply.

This principle of valuation as suggested above rests upon physiology and not upon social ar¬ rangements. The law of demand and supply is much deeper than the organization of the market, the type of government, or the organi¬ zation of society itself. It has its basis in human physiology.. Market values and prices are only expressions of this fundamental physiological law. See Economics.

T. N. Carver,

Professor of Economics, Harvard University. VALVASSOR. See Vavasour.

VALVE TERMS. The accompanying list of mechanical terms includes nearlv all of the principal terms generally applied to define the construction and use of the various forms of valves ; but for specific information relative to the application of these devices to particular machines, see articles in this Encyclopedia under the titles Air Compressors; Boilers; Boiler Terms; Gas; Locomotive, The; Locomotive Engine, The; Locomotive, Design and Con¬ struction of the Modern; Pumps and Pump¬ ing Machinery; Steam and Steam Engines; Valves and Hydrants.

Allen Valve. — A form of slide valve, designed to give a very rapid and full port opening. Together with the plain D-valve, it forms one of the two principal types of slide valves in use.

Angle Valve or Corner Valve. — One which is set at the angle of a pipe. It is either screwed or flanged.

Annular Seating. — A ring upon which a circular valve rests.

Annular Valve. — A disc valve which rests upon an annular seating.

Back Cut-off Valve. — A plate which slides on the back face of the main slide valve of an engine or motor, to regulate the cut-off point, and control the grade of expansion of steam. It is operated independently of the main slide of the engine by a separate eccentric capable of adjustment to the steam passages in the main slide. Back-Pressure Valve. — A valve used for preventing the return of a fluid into a pipe. A check- valve.

Balanced Valve. — An equilibrium valve.

Ball Valve. — A globular shaped lift valve with an annular seating. It is used in quick-running pumps, as it con¬ tinually shifts its position on its axis, and therefore wears uniformly. It is made in two parts, one upper and one lower, which are screwed together after the insertion of the ball.

Blow-off Valve, or Blow-off Cock. — A valve or plug- cock situated at the lowest part of a steam boiler, by which the lower portion of the contained water is periodically blown off or emptied, to prevent incrustation.

Blow- through Valve. — A valve used with a condensing marine engine to clear the cylinder, condenser, and air pump of the contained air, which is then replaced by steam, which being immediately condensed, creates a vacuum and enables the starting of the engine. When opened, it makes a communication between the steam in the valve casing and the condenser.

Bonneted Safety Valve. — A valve covered with a bonnet or casing, and connected to a waste pipe by which steam is conveyed out of a building, when the boiler is closely roofed-in. The bonnet prevents the steam from filling the building or boiler shed. A box safety valve.

Bridle. — The loop forged on a slide valve rod, or the strips in a steam chest between which the valve travels.

Brine Valve. — The blow-off valve of a marine boiler.

Bucket Valve. — The flap valve of the bucket of a lift pump.

Butterfly Valve. — A pair of flap valves arranged back to back.

Cage Valve. — A ball valve.

Change Valve. — A slide valve used on hydraulic cranes for directing the pressure into two or more cylinders at will, singly or in combination, to obtain varying degrees of power, according to the load to be raised.

Check Valve. — A wing valve inserted in a feed pipe between the boiler and the feed pump of an engine, to prevent the water returning from the boiler to the pump. The pressure of the water from the pump opens it toward the boiler, but the pressure from the boiler closes it toward the pump.

Circular Valve. — A valve circular in plan, as distinguished from a slide valve.

Cock. — A cylindrical valve consisting of a shell, cover and plug. A passageway is cut through the plug, which when turned around opposite to the discharge and entrance openings, permits the fluid to pass through. When the openings of the passageway of the plug are brought opposite to the solid walls of the shell, the cock is closed. They are of various forms — bib, flanged, gland, socket, two-way, three-way, four-way and globe cocks. The term is sometimes applied to any valve that may be opened or closed by hand.

Common Slide Valve. — The ordinary D slide valve in which the amount of the openings of the ports, both for admission and exhaust of steam, are equal, as distinguished from the exhaust relief valve.

Conical Valve. — A valve of cone-shaped section, resting on an annular seating. It has no wings, but is sometimes used in the place of the common lift valves with parallel wings, as the lift valves of a pump.

Corliss Valve. — The valve of a Corliss engine. It forms the segment of a circle and rotates in an annular seating, alternately covering and uncovering the steam port. The supply valve is closed by means of a dash piston.

Cornish Valve. — A double-beat valve used in a Cornish engine.

Cross Valve. — A valve placed at the T formed by two pipes.

Cut-off Valve. — A valve consisting of a solid plate, or one provided with cross bars and ports. It is the second valve in the arrangement for working steam expansively by means of a separate slide.

Cylinder Cock. — A pet cock.

Cylinder Escape Valve. — A valve attached to the cylinders of marine engines to allow the escape of the water of condensation and priming. It is supported by a spring and enclosed in a metal cap, which is provided as a protection for the engine attendants in case of a sudden blow-off of hot water.

Cowburn Valve. — A dead-load safety valve, or a dead¬ weight safety valve.

Dead-load Safety Valve. — A valve which is loaded by dropping annular weights over a cylindrical seating, the weight on the valve being increased or decreased according to the number of rings employed.

Delivery Valve, or Discharge Valve. — The valve through which the contents of a pump are forced into the delivery pipe.

Disc Valve. — A modified form of flap valve used in large pumps and in the air pumps of condensing engines. It consists of a rubber disc hinged at the centre, and resting on a perforated grid through which the water enters and lifts the valve. Its lifting movement is limited by a superimposed guard plate, hollowed in the upward direction.

Double-beat Valve. — A circular lift valve with two seating faces by which steam is admitted on both sides at once. Also known as an equilibrium valve. It is extensively used on larger Cornish pumping engines.

Double Disc Valve. — A valve consisting of a tapered plug having two faces fitting against two opposite seatings.

Drain Cock or Draw Cock. — A pet cock.

D Valve. — A term applied to the ordinary slide valve on account of its form, its face being hollowed out like a letter D.

Equilibrium Slide Valve. — A slide valve provided with an equilibrium ring, that is a metallic ring attached to

the back of the valve for the purpose of reducing the friction.

Equilibrium Valve. — A valve in which the pressure on each face is so nearly equalized, that it moves with the minimum of friction and the least expenditure of power.

Escape Valve. — Same as Cylinder Escape Valve.

Exhaust Relief Valve. — A slide valve so constructed that the port is fully opened to exhaust, but only partially opened to steam.

Expansion Valve. — An arrangement of two valves in the steam chest of an engine cylinder in which the steam is worked expansively. It consists of a main valve with a cut-off valve behind it.

Flap Valve. — A hinged valve, usually made of leather stiffened with iron or brass plates riveted in each face. Circular or rectangular in shape. Used in both the piston and the suction ends of the barrels of lifting pumps. The disc valve of an air pump is a flap valve hinged at the centre and lifting around the circumference.

Foot Valve. — The lowermost valve of a pump, or the valve at the aperture through which the water enters.

Four- way Cock. — A cock having four branches.

Gland Cock. — A plug cock in which the plug is covered with a gland or small casting screwed down over the packing to make it steam and water tight.

Globe Valve. — A valve with a spherical casing. An interior annular seating divides the chamber into two parts, it is therefore sometimes called a diaphragm valve.

It is generally used as a stop or regulating valve.

Governor Valve Gear. — The valve gear or mechanism by which governors regulate the opening and closing of the induction valve in automatic expansion.

Gridiron Valve. — A slide valve in which the ports are subdivided transversely by narrow bars corresponding to similar subdivisions in the cylinder ports, so as to give the necessary steam-way with a reduced travel of the valve. These valves may be double or treble ported.

Grouped Safety Valve. — A Cowburn, Dead-load Safety, or Dead-weight Safety Valve.

Head Valve. — The uppermost or delivery valve of an air pump.

Ignition Valve. — The valve of a gas engine by which the charge is

ignited or fired.

Indicator Cock. — The cock employed to make or break a communication between the piston of the indicator and the cylinder of the engine.

Injection Cock. — The cock through which supplies of water are admitted to the condensers of marine engines.

Injection Valve. — An Injection Cock.

Inlet Valve. — A foot valve.

Joy's Gear. — A valve gear in which the valve rod is worked directly through a coupling rod or link from the con¬ necting rod, and not by means of eccentrics. The neces¬ sary travel is obtained by utilizing the up and down movement of the coupling link to move a disc block to which one end of the valve rod is fastened, which slides up and down in a slot link moving in a fixed centre and placed at an angle with the rod. The engine is reversed by altering the direction of the angle of the slot link about its fixed centre.

Junction Valve. — A two-way valve which unites two pipes.

Kingstone Valve. — A wing valve used as a suction valve for a marine condenser, and as a blow-off for a marine boiler. It opens toward the sea, but is capable of closing itself in case .of the breaking of the spindle.

Lap. — The amount by which a slide valve covers the steam port at the termination of the piston stroke. It indicates the amount of cut-off of steam in the cylinder. See Exhaust Lap and Outside Lap.

Lap Circle. — The circle of a lap diagram, the radius of which represents the lap of the valve. If the laps are unequal, the diagram will have two lap circles.

Lead of a Valve. — The amount a slide valve is opened ' at the termination of the piston stroke to admit steam for cushioning. It varies from l=32-inch in low-speed, to j-inch in high-speed engines.

Lift Valve. — A disc valve fitting on an annular seating, and guided in its lift by three or more feathers which project into the body of the seating. It has a full water¬ way when the amount of lift equals one-fourth the diameter of the valve. See Mushroom Valve and Poppet Valve.

Lock-up Safety Valve. — A safety valve the spring of which is enclosed in a padlocked casing.

Minus Lap.— The internal or exhaust lead on a steam valve. It is the lead to exhaust, reducing the amount of cushioning, and is used with high-speed engines where smooth running is essential.

Mitre Valve. — A part of the annular seating of a safety valve turned to an angle of 45° in section, upon which the valve itself rests.

Mushroom Valve. — A lift valve formed in the shape of a mushroom.

Mushroom Strainer. — A foot valve formed in the shape of a mushroom, and provided with a perforated strainer plate.

Open Safety Valve. — A safety valve that has no lock-up

Outside Lap.— Lap given to a slide valve on the outer edges, as distinguished from exhaust lap. Its amount is a measure of the ratio of expansion of the steam, an early cut-off implying a high ratio of expansion.

Pet Cock. A small plug cock. One is always inserted in the end of a steam cylinder through which the water of condensation is allowed to escape when the engine is started, so as not to blow out the cylinder ends.

Piston Valve. — Any valve mounted on a piston, as one that opens and closes steam ports arranged diagonally around the seating.

Plug. — • The inner movable part of a cock, which upon being turned allows the fluid to pass through.

Plug Cock. — A cock fitted with a central plug which when rotated presents either a solid surface, or a passage through its body to the flow of the liquid.

Poppet or Puppet Valve. — A lift valve.

Pot-Lid Valve. — A hollow, cup-shaped lift valve.

Pot Valve. — A safety valve having the shape of an inverted pot. It is a lift valve with a conical pivot which drops loosely into a recess in

the crown of the pot. The lift is held and controlled by guides cast on the top of the seating, and they are not liable to stick.

Priming Valve. — A pet cock used for priming.

Reducing Valve. — A valve arrangement used for regulating the steam pressure between a boiler and its connections. The opening of the valve is controlled by a weighted lever.

Reflux Valve. — A flap valve used for the purpose of relieving the pressure of a head of water acting in a backward direction against a set of pumps; a check valve.

Regulator Valve. — A valve of the conical, double-beat, or sliding types, employed to regulate the admission of steam to the cylinders of a locomotive.

Relief Valve. — A cylinder escape valve.

Retaining Valve. — A valve inserted in the pipe of a deep-well pump in addition to the regular valves to prevent much of the water from running back between the strokes.

Return Valve. — One that allows the return of a fluid to the source of supply.

Reversing Shaft. — See Weigh-shaft.

Reversing Valve. — Any valve of reversing action, as one employed to introduce the air and gas into one or the other chambers of a regenerative furnace, as they become alternately cooled and heated.

Ring Valve. — A lift valve in which a ring is substituted for the solid disc, so as to allow the fluid to pass through on both the outer and inner edges, thus reducing the amount of lift to one-half of that required by the use of a solid disc. Valves with two rings by which the amount of lift is still further reduced, are also used.

Rotating Valve. — A cylindrical valve constructed on the principle of the plug cock, and thus differing from the disc, lift, and slide valves.

Round Body Valve. — A pump valve with a cylindrical shaped body.

Safety Valve. — The relief valve employed to prevent ex¬ cessive and unsafe pressures in steam boilers. It is usually some form of a lift valve provided with suitable mechanism to give the valve a definite

pressure. The resistance is either a lever with an adjustable weight, a spring the tension of which may be adjusted by a movable nut, or a dead weight. '5

Sand Valve. — A valve employed to regulate the escape of sand from a sand box for sanding a track.

Screw-down Valve. — A valve which is raised or depressed by means of a screw. A globe valve, or a sluice valve.

Sea Cock. — An injection cock inserted in the side of a steamship, and leading from the sea to the condenser. It is supplementary to the regular injection cock.

Seat or Seating. — The contacting surface upon which the moving part of a valve rests when it is closed. It requires to be a perfect fit.

Setting of Valves. — A term specifically applied to the adjustment of engine-slide valves, an operation of great precision, and performed in various ways according to the nature of the link motion. See article Locomotive, Design and Construction of the Modern, in this encyclopedia.

Shell. — The outer casing of a cock or valve.

Side-discharge Valve. — See Discharge Valve.

Side-disc Valve. A disc-shaped plug valve which rests against one face of a seating only; it is therefore not so tight as a double disc valve.

Slide-Valve. — – The typical valve of a steam-chest, though used with other forms of motors. It works with a sliding motion as distinguished from the motion of rotating, or of lift valves. The term is specifically applied to the valves of steam and gas engines of the ordinary type, and not to Corliss, or to lift valves. See article Locomotive, Design and Construction of the Modern, in this encyclopedia.

Sludge Cock. — The cock at the bottom of a steam boiler through which the boiler is cleaned from sludge, by peri¬ odical washings with a strong current of water.

Snifting Valve. — A relief valve which allows the escape of a fluid, or a gas, when a definite amount of pressure is

attained. In condensing engines it allows the steam and air which mingle in the blowing-through process, to pass out of the cylinder. In some gas engines, it is employed to regulate the amount of the charge admitted to the com¬ bustion chamber.

Spindle Valve. — A lift valve guided by an axial spindle or central stem.

Spiral Winged Valve. — A lift valve, the wings of which, instead of being placed at right angles to the seat, are arranged as sections of a spiral of very long pitch. By this arrangement, the valve is turned around a little on its seat at each lift, and its wear is rendered more uniform.

Spring-balance Valve. — A safety valve which, instead of being weighted, is attached to a spring balance, the grad¬ uations of which indicate the pressure.

Spring Safety Valve. — A spring-balance valve.

Square-body Valve. — A pump valve having a rectangular casing.

Starting Valve. — The valve through which the steam from the boiler, or from the connecting pipes, is admitted to the cylinder of an engine. It may be any one of the following types: A sliding disc valve actuated by a lever; a lift or poppet globe valve lifted by a screw; or a plug valve turned by a wheel.

Steam Chest. — The rectangular case or box attached to the side of an engine cylinder, and containing the slide valve and a portion of the valve rod. See Locomotive.

Steam Lap. — The amount the faces of a slide valve are extended beyond the length required to cut-off live steam exactly at the termination of the piston stroke. Used in a contrary sense to exhaust lap.

Steam Valve. — Any form or type of valve by which a steam supply is regulated.

Stop Cock. — A globe valve or stop valve, as one attached to a steam boiler by means of which the steam is turned into, or shut off from, the pipe connecting the boiler with the engine cylinder.

Stop Valve. — Any valve or stop cock used for regulating the flow of fluids.

Straight-way Valve. — A valve in which the waterway passes straight through, without making a bend.

Suction Valve. — Any valve operating by suction, as the lowermost valve in a lift pump. It is actuated by the pressure of the atmosphere beneath the valve acting against the vacuum above.

Test Cocks. — See Try Cocks.

Three-way Cock. — A cock having three branches, by which the fluid from the inlet branch may be diverted into the other two at will.

Throttle Valve. — A flat thin disc valve which lies diag¬ onally across a round pipe, closing it partially or entirely. Used in dampers or flues, and in the smoke pipes of engines leading from boilers, to regulate the passage of smoke and steam.

Treble or Triple Valve Box. — A pump valve casing pro¬ vided with suction and delivery valves, and also an inter¬ mediate retaining valve to render the supply continuous; used on stationary or portable engines for pumping water to the boiler.

Try Cocks. — Cocks inserted in the shell of a boiler at ex¬ treme high and low water marks. The upper one is the steam cock and the lower one the water cock. They are used for checking the water gauge in case it chokes up or ceases to act.

Valve Box. — The box or casing which encloses the valves, as of pumps. Also the steam chest which contains the slide valve of an engine.

Valve Bridle. — See Bridle.

Valve Casing. — The shell of a valve; a valve box.

Valve Chamber. — A valve box. The term is usually applied, however, to a steam chest rather than to an ordi¬ nary valve box.

Valve Circle. — The circle on a valve diagram, the diameter of which is equal to one-half the travel of the valve. A valve diagram has two such circles.

Valve Cock. — A cock which is operated by a lift, slide or other form of valve, instead of a plug. A globe valve is a valve cock.

Valve Diagram. — A diagram by which the position of the slide valve

for any position of the piston, or the position of the piston for any position of the valve, may be determined graphically. Therefore, the relative positions of the valve and piston at the instants of opening, cut-off, cushioning, and release, may be accurately determined. There are various methods of constructing valve diagrams. The most familiar are the polar method, Reuleux's method, and Zeuner's method, the last named being the simplest.

Valve Face. — The face on or against which a slide valve moves, as distinguished from a valve seat.

Valve Gear. — The mechanical arrangements for actuating slide valves, both for single and reversing action, consisting of slot links, rods and expansion devices, automatic or otherwise.

Valve Plate. — See Cut-off Valve.

Valve Ring. — An equilibrium ring.

Valve Rod or Valve Spindle. — The rod which passes through the stuffing box in the steam chest, and is attached

\

to the slide valve and through which the valve is actuated from the eccentric.

Valve-rod Gland. — The small casting which closes the stuffing box of the rod of a slide valve, and maintains the rod steam tight.

Valve Sector. — A slot link or a quadrant. Also specifically applied to the vertical sliding link of an oscillating cylinder engine, by which the motion of the eccentric is communi¬ cated to the valve rod weight-shaft.

Valve Spring. — A spring used for pressing the packing or equilibrium rings of slide valves against their faces.

Valve Stem. — A valve rod or spindle.

Valve Yoke. — The bridle of a valve rod.

Waste-water Cock. — A pet cock on a waste-water pipe. Water-way. — The opening or space in the bucket of a pump; the plug of a cock; or the area of a lift valve, for the passage of a fluid.

Weigh-shaft or Reversing Shaft. — The rod or shaft which forms the centre of the lever that throws the slot link for the reversing motion of an engine, into the positions for forward or backward gear.

Wheel Valve. — A lift valve of globular form, the screw of which is lifted or depressed by means of a hand wheel above.

Wing Valve. — A lift or poppet valve, the lift of which is guided by three or four feathers, wings or ribs, cast on the under side of the valve and fitting into its cylindrical seat. It may be placed vertically as in the case of an ordinary safety valve, or horizontally or otherwise, if it is pressed against its seating by means of springs.

VALVERDE, val-var'da, or FORT CRAIG (N. Mex.), Battle of. Early in February 1862 Fort Craig, on the Rio Grande, was held by Col. E. R. S. Canby, United States army, with about 3,800 men, composed of detachments from three regiments of regular infantry, two of reg¬ ular cavalry, two batteries of artillery officered and manned by regular cavalry, a company of Colorado volunteers, detachments from five regi¬ ments of New Mexico militia and some un¬ organized militia. The fort had been greatly strengthened by throwing up formidable earth¬ works. In July 1861 the Confederate govern¬ ment, attaching much importance to New Mex¬ ico, had ordered Gen. H. H. Sibley to Texas, to organize and lead an expedition for its con¬ quest. By the middle of November 1861 he had organized a brigade of four Texas mounted regiments and a battery, with which he marched from San Antonio, reaching Fort Bliss 14 De¬ cember. Early in January 1862 he began his march up the Rio Grande, with about 7,000 men; and 16 February his advance was within two miles of Fort Craig, where it was met by Canby's cavalry, upon which Sibley, satis¬ fied from the information he had obtained that with his light field guns an attack on the fort would be futile, withdrew down the river, and on the 19th he crossed to the eastern side, hoping to draw Canby out and fight him on open ground. On the 20th Canby sent a force of cav¬ alry and artillery across the river and made a demonstration on Sibley's camp, but withdrew when his artillery

opened a heavy fire. Early on the 21st Sibley made a demonstration toward the fort, while his main body pushed northward and approached the river again at Valverde. Lieut.-Col. B. S. Roberts, with cavalry, infantry and artillery, was sent from the fort to oppose the column should it attempt to cross the river ; and before this about 500 mounted militia had been sent to watch Sibley in his camp. When Roberts arrived at the ford, seven miles above Fort Craig, Sibley had already reached the river at the opposite side, and Roberts opened the battle by sending Maj. Thomas Duncan, with regular cavalry dismounted, across the river. Duncan drove the Confederates back, the Union batteries were established on the western bank, Roberts crossed his command to the eastern side

and, after some sharp fighting, by 12 o'clock drove the Confederates from all the positions they had occupied. Meanwhile the Confeder¬ ates had been reinforced from their camp, and at 12 o'clock Roberts was reinforced by Captain Selden's battalion of regulars and Col. Kit Car¬ son's regiment of New Mexico volunteers. An¬ other advance was made, the Confederate guns were silenced and McRae's and Hall's Union batteries were crossed and put in position. Canby came on the field at 2.45 p.m., bringing reinforcements from the fort, after the Con¬ federates had been driven from all their posi¬ tions to the shelter of a high ridge of sand, where, unseen, they reformed and prepared for a charge upon the two Union batteries. Sibley, wrho was sick, had turned the command over to Colonel Green of the Fifth Texas Cavalry. There was a lull in the fight, which was broken by a most impetuous assault. The Fourth Texas Cavalry made directly for Hall's battery, on the Union right, but met with such a severe fire of canister and musketry from the sup¬ porting cavalry and infantry that, when within 100 yards of the battery, it was repulsed with .great loss, falling back in disorder. This was immediately followed by a charge upon McRae's battery by the greater part of Green's avail¬ able command on foot and armed with shot¬ guns, squirrel-rifles, revolvers, lances and knives. Canister and musketry made gaps in the ranks, but did not stop them, and the battery supports gave way after a close hand-to-hand fight. Cap¬ tain McRae, Lieutenant Mishler and most of the gunners were shot down beside their .guns, all the horses were killed and the guns were cap¬ tured. A panic now ensued among the greater part of the New Mexico militia, but some of them, with the regulars and Colorado volun¬ teers, were withdrawn in comparatively good order across the river, and Canby retreated to Fort Craig, unmolested by the Confederates. Sibley buried his dead, remained two days at Valverde and moved up the river to Albu¬ querque. The Union loss was 68 killed, 160

wounded and 35 captured ; the Confederate loss, 36 killed, 150 wounded and one missing. Con¬ sult (Official Records) (Vol. IX) ; The Cen¬ tury Company's (Battles and Leaders of the Civil War> (Vol. II).

E. A. Carman.

VALVES (from Latin valvce, folding doors), a mechanical appliance or device em¬ ployed to control the flow of liquids, gases and loose material, such as sand and mud, through pipes, chutes or other forms of passages. They operate by the lifting and falling, sliding and swinging or rotating of lids, covers, balls or slides placed at the openings of or inserted in the pipe, tube or other form of passageway, as the case may be. They are usually made of metal, such as cast iron, steel, bronze and brass, often combined with leather, rubber or other flexible material, to ensure their tightness.

They are known and designated under a variety of trade and workshop names accord¬ ing to the purposes for which they are used, the particular shape or the peculiar motion of the valve, and according to the method of their operation, thus introducing such terms as globe valve, slide valve, ball valve, safety, etc., which defy classification. On the other hand, all forms of valves may be conveniently grouped

into, several definite classes according to the motion of the valve relative to the valve seat and according to the manner in which that mo¬ tion is produced.

Valves classified according to the motion of the valve relative to the valve seat are typi¬ fied by (1) those which rotate in the opening;

(2) those which lift and fall vertically from and to their seats; (3) those in which the flaps or lids are hinged to their seats and work with a swinging motion; and (4) those which open and close by sliding on and parallel to their seats. Valves classified according to the man¬ ner in which their motion is produced may be defined as (1) those operated by hand; (2) those operated by independent mechanism; (3) those operated by mechanism actuated by the machines the operation of which is controlled by the valves ; and (4) those operated by the motion of the liquid, gas or other fluid material, the flow of which is controlled by the valves.

It is quite clear that the characteristics of these primary classifications may be combined in any one valve, as in the case of a slide valve which may be operated in various ways: (1) by hand, as in the case of the ordinary screw gate valve; (2) by independent mechanism, as in the case of the hydraulic gate valve ; and

(3) by mechanism connected with the operat¬ ing medium, as in the case of the slide valve of a locomotive.

Probably the most ancient form of valves are the leather flap valve, as shown at A, Fig. 1,

and disc valve, shown at B, Fig. 1, commonly used in small pumps at the present time, and from which the present check and foot valve respectively are devised. The two most com-

Fig. i.

mon types of valves in use to-day are the "gate or straightway® and the "globe,® the former so called because of the motion of the mechanism acting as a gate in opening and clos¬ ing, and permitting when open a clear and

A — Case.

B — Cover or Bon¬ net.

C — Stem or Spin¬ dle.

D — Packing Plate or Stuffing Box.

E — Stuffing Box.

Gland or Fol¬ lower.

F — Stem Nut.

GG — Gates.

H — Gate Rings.

I — Case Rings.

J — Top Wedge.

K — Bottom Wedge.

L — Throat Flange Bolts.

M — Stuffing Box or Follower Bolts.

Fig. 2. vol. 27 — 42

Fig. 4.

Fig. 5.

\

unobstructed passageway for the fluid to pass through, the latter so called from the globular form of its casings. The gate valve is made in two types, <(parallel seated® and (

Gate Valves are usually made with bronze seats, although babbitt is used in many instances. The parallel seated gate valve with inside screw, wheel type, is shown in Fig. 2, the internal mechanism of which consists of the stem C, two gates G and two beveled-faced wedges, J K, the wedges being entirely independent of the gates (or discs) and working between them. By the action of the stem, which works through the nut in the upper wedge, the gates descend parallel with their seats until the lower wedge strikes the stop (or boss) in the bottom of the case, the gates and upper wedge continuing their downward movement until the face of the bevel of upper wedge comes in contact with face of bevel of lower wedge. The gates being then down opposite port, or valve opening, the face of the upper wedge moves across the face of the lower wedge, bringing pressure to bear on the backs of both gates, from central bearings, thus forcing them apart and squarely against their seats. In opening valve the first turn of the stem releases the upper wedge from con¬ tact with the lower wedge, thereby instantly releasing both gates (or discs) from their seats before they commence to rise. This style of valve is called the double-gate valve and when entirely opened gives a clear and unobstructed passageway. Fig. 3 represents the same type of

valve with outside screw and yoke; in this case the upper end of the stem (or spindle) is threaded and the stem is operated by a nut held vertically in the yoke and turned by the hand-wheel, which is fastened to it. The stem rises without revolving, and the gates and wedges, being fastened to the lower end of the stem, rise with it. The

operating screw is en¬ tirely outside of the valve body, where it can

be inspected and oiled, and the rising stem forms the best kind of an indicator. Fig. 4 is a bevel-seated gate valve, with inside screw of the double-faced solid wedge gate or plug type, in one piece, made wedge-shaped or taper¬ ing, braced or ribbed, and by the action of the stem working through the nut in the top closes vertically between two inclined seats or sur¬ faces in the body. To ensure perfect alignment

Fig. 7.

Fig. 8.

with the stem the plug is guided by ribs or splines in the body, which engage with grooves in the edges of the plug, and prevent it from turning and coming into contact with its seats while opening or closing. These ribs are of unequal width, to prevent the plug from being inserted wrongly after removal for repairs or otherwise. This style of valve when entirely open gives a clear and unobstructed waterway. Fig. 4 represents the same type of valve as Fig. 5, with outside screw and yoke and hand- wheel, and is operated the same as Fig. 3. Fig. 6 is a parallel-seated gate valve, operated with slide stem and lever, permitting a quick opening and closing. Fig. 7 is a gate valve with motor attached, operated by electricity. Fig. 8 is a gate valve with hydraulic or pneu¬ matic lift; in fhe former case the motive power being water to operate the cylinder, in the latter air.

Glove Valves are made with solid and re¬ newable discs ; in the former case they are of

brass and in the latter of soft metal, asbestos

\

or packing of some kind. Fig. 9 represents the most common type of globe valve. It is pro¬ vided with a vulcanized asbestos disc ring. The ring is composed of the fibre of asbestos, to which is added a waterproof vulcanizing mate¬ rial, making a very durable packing, which will

Fig. 9.

not crack or flake off. It is held centrally on its seat by guides cast on the body of the valve. It is also secured to the spindle without the use of nuts, screws, pins or wires. The vul¬ canized asbestos ring is forced into a brass holder and the metal is spun or turned over the

Fig. 10.

edges of the ring, so that it cannot drop out. This valve has a raised round seat, upon which scale, grit or sediment is less likely to lodge than on the broad flat seats sometimes used. On account of the construction of the valve seat, as will be noted in the cut, globe valves

Fig. 11.

do not permit of a clear and unobstructed pas¬ sageway. Fig. 10 shows the check stop, or as it is sometimes called back-pressure valve. This valve is used in a horizontal pipe, to pre¬ vent the backward movement of a fluid. After

the fluid has raised and passed the gate, the pressure being removed from the face of the

Sate it closes thereby checking or stopping the uid from flowing in the reverse direction. Fig. 11 represents the foot valve, its use and operation being similar to the check valve. It is used, however, in a vertical pipe and at the end of the suction pipe of a pump.

Air Valves are made for two common pur¬ poses, namely: To be placed on mains at high points where air accumulates and obstructs the

Fig. 12.

flow of water and for use on pipe lines to per¬ mit air to enter when water is drawn off, and to allow air to escape when pipes are being refilled. The former, the lever-and-float air valves, are shown in Fig. 12. When air takes the place of water about the float in the valve chamber, the float which is attached to the bronze lever drops, thus opening the small valve and allowing the air to escape. As the water •returns it lifts the float, thereby closing the valve. Fig. 13 represents the poppet air valve; when filling a line of pipe the gate remains open until the water reaches and lifts the cop¬ per float, thereby closing the gate, which re¬ mains closed while the pressure is on. Fig. 14 is an external view of a common lever safety valve. The valve consists of a gate with a

Fig. 13.

Fig. IS.

conical edge, resting on a conical seat, and is held to its seat by the pressure of a weight act¬ ing on a lever as shown. The spring safety valve is shown in Fig. 15, the spring taking the place of the lever and weight ; this style of safety valve is known as the pop safety. Fig. 16 represents a relief valve, similar in con¬ struction to the pop safety valve, but instead of being used for steam is intended for use on water mains, for the purpose of relieving the pipes of water hammer, to which they may be

\

subjected. The gate as in the pop safety valve, is held to its seat by the pressure of a spring, which is protected, as shown in the cut, by a

Fig. 14.

cast jacket, having an outlet of the same size as the inlet. The operation of the valve is as follows : When the valve is set at the pressure

Fig. 16.

desired, which is done by adjusting the hand- wheel, any excess of pressure over this opens the valve, thus relieving the mains and joints of

f Fig. 17.

any extra strain, and doing away with the breaking of pipes or blowing out of joints. The regulating valve, as shown in Fig. 17, is used to

control or reduce pressure in street mains and pipe lines or to regulate the flow of water be¬ tween reservoirs located at different levels. This valve can be placed in any position. Ow¬ ing to the manner of packing, the friction is but trifling, as can be readily understood by exam¬ ining the cut.

Valves also form the principal part of hydrants or fire plugs, and are

of two dis¬ tinct types : slide gate and compression, accord¬ ing to the valve motion.

Gate Hydrants. — Fig. 18 represents the gate hydrant, which is absolutely non-freezing, owing to the fact that the drip is positive and being in the bottom of the hydrant it drains it completely, no water being left in the barrel when the hydrant is closed, to freeze; therefore, no outer jacket, or frost case, is necessary.

Fie. 18.

The working parts are so arranged, that by tak¬ ing off the dome and packing plate, all the work¬ ing parts can be removed without disturbing the barrel of the hydrant, or doing any digging. All the working parts are of solid bronze, thus preventing rust, and the gate is rubber-faced. The operation of the hydrant is as follows: In closing, the gate is moved downward by the action of the stem through the threaded bronze wedge nut in the back of the gate, until it strikes a stop at the bottom of the projection in the back of the hydrant, when by the action of the bronze wedge nut, moving along the incline on the back of the gate, it is forced squarely against its seat without any grinding movement on either the rubber gasket, with which the gate is faced, or on the bronze Seat ring against which it closes, the projection at

the top and bottom of the gate keeping the rubber gasket away from the seat ring until it is forcerd squarely against it by the action of the wedge nut. The final turn of the stem, after the gate is closed and wedged, opens the drip valve. In opening the hydrant, the first turn of the stem closes the drip valve, after which the bronze wedge nut in back of gate is loosened, thus relieving the gate from its seat.

Compression Hydrants are of three kinds: Those with the gate opening against the pres¬ sure ; with the gate opening with the pressure;

This hydrant is particularly adapted for high pressures, on account of the ease with which it can be operated, and as the main valve closes both with and against the pressure no water ram or hammer can take place. In operation, the upper valve opens with the pressure and the

: ‘111

Fia. 19.

Fig. 20.

and the double or balance gate. The com¬ pression hydrant with gate opening against the pressure is shown in Fig. 19. It will be noticed in this hydrant that a frost case is necessary, and also that the drip being above the hydrant bottom it drains the barrel only, the water re¬ maining in the bottom when the gate is closed. The thread for opening and closing the gate is in the top of the hydrant; the gate is moved downward by turning the nut or sleeve at the top of the hydrant, through which the threaded stem works. The drip is closed during the opening of the hydrant and opened during its closing, being completely opened or closed when the gate is closed or open. This hydrant’s working parts are bronze mounted, and it has either a leather or rubber faced gate. . Fig. 20 represents the compression hydrant with a double balanced, or compensating rubber valve. It is constructed with bronze working parts and like the gate hydrant has a positive drip directly in the bottom of the hydrant, permit¬ ting no water to remain in the hydrant to freeze. All its working parts can be removed without digging, and also like the gate hy¬ drant the so-called frost case is unnecessary.

lower valve against the pressure ; in closing, the conditions are reversed. The valve or double header is thus in equilibrium and can be opened or closed without effort. As the hydrant is opened, the drip or waste outlet is at once closed, the drip valve being drawn up into the bronze drip cylinder. In closing the hydrant, the drip valve is pushed out of the bronze cylinder in the flared lower end of the same. The water in the standpipe then passes out through the corrugations of the bronze guide on the lower end of stem or valve rod. Nozzles, on all hydrants, vary in number and size, accord¬ ing to the purposes for which they are intended to be used. See Valve Terms; and for other forms of valves, see Pneumatics; Pump; Steam-hammer and Steam-engine. For valves of circulation, see Heart.

James H. Caldwell,

President, The Ludlow Valve Manufacturing Company.

VAMBERY, vam’ba-re, Arminius, Hun¬ garian traveler and scholar: b. Szerdahely, 19 March 1832; d. 1913. He studied at Pressburg, Vienna and Budapest, and then went to Con-

\

stantinople, where he lived by teaching French. In 1858 he published a German-Turkish diction¬ ary, and in 1861-64, disguised as a dervish, made a journey of exploration through Persia into Turkestan, and visited Khiva, Bokhara and Samarcand, the first tour of the kind under¬ taken by a European. In 1865 he became pro¬ fessor of Oriental languages at the University of Budapest, which position he still (1907) holds. He has written valuable linguistic works as well as volumes of travel, including (Travels in Central Asia5 (1864); (Wanderings and Adventures in Persia) (1867) ; (Sketches of Central Asia5 (1868) ; (History of Bokhara5 (1873) ; ˆCentral Asia and the Anglo-Russian Frontier5 (1874) ; (Islam in the 19th Century5 (1875) ; (Etymological Dictionary of the Turco-Tatar Languages5 (1878) ; ˆPrimitive Civiliza¬ tion of the Turco-Tatar Peoples5 (1879) ; (The Origin of the Magyars5 (1822) ; (The Coming Struggle for India5 (1885) ; (The Turkish Peo¬ ple5 (1885) ; (Story of Hungary5 (1887) ; (Western Culture in Eastern Lands5 (1906). The (Story of his Life and Adventures5 ap¬ peared in 1888 and (The Story of My Strug¬ gles5 (New York 1904). He was a frequent contributor to periodical literature in England, Germany and Hungary.

VAMPIRE, according to a superstition prevalent in many ages and countries, the ghost or spirit of a dead person which issues forth by night and sucks the blood of living persons, particularly of the young and healthy, causing them to pine away and die. Vampires espe¬ cially favor their friends and relatives with their visits, and any one whose death is caused by a vampire becomes a vampire. Among the Greeks the superstition has been so far modi¬ fied by Christianity that the original vampires are supposed in many cases to be excommuni¬ cated persons, who are kept alive by the devil, and who procure their food in this and other unlawful ways. In some places where the belief in vampires prevails, when a person dies a careful examination is made by a skilled per¬ son lest he should have been killed by a vam¬ pire and so be liable to become one; if this is suspected, the body may be pierced with a stake cut from a green tree, the head cut off and the heart burned. This is also the process for destroying the vampire spirit in a corpse be¬ lieved to be already a vampire. The belief has been treated by Philostratus and Phlegon of Tralles; has served a literary purpose in Goethe's (Braut von

Korinth5 and the operas of Palma, Hart and von Lindpainter. While seemingly a primitive and savage superstition, it has survived in many forms. Consult Ral- ton, (Russian Folk-tales5 ; Hert, (Der Wer¬ wolf5 (1862) ; Stoker, B., (Dracula5 (1899). See Werwolf.

VAMPIRE-BAT, a genus of blood-suck¬ ing bats, of the carnivorous family Pliyllosto- momidce, distinguished by leaf-like nasal appen¬ dages, three joints to the middle finger and often well-developed median incisors. They in¬ habit South and Central America. Owing to the inaccuracy of travelers' accounts, which have ascribed blood-sucking habits to a large fruit-eating species, the effect of their attacks has been much exaggerated. The true sangui- nivorous vampire bat is now known to be a small species not more than three inches in

length and distinguished by its trenchant and enlarged upper incisor and canine teeth, capable of slicing the skin like a razor ; the very much reduced molar teeth ; and the extremely narrow lumen of the alimentary canal and especially of the aesophagus, all peculiarities which adapt it to an exclusive diet of blood. This is Desmo- dus rufiis, and a second closely related bat is Diphylla ecaudata. The former is abundant in wooded regions from southern Mexico to Chile; the latter occurs in Brazil. Bates and Wallace were themselves bitten by bats during their famous Amazon journey, and other travelers have confirmed the evidence of these naturalists.

Owing to the error above referred to the large bat mentioned is still often called the vampire, and as Vampyrus the name has become permanently fixed to it in scientific nomencla¬ ture. The common species (V . spectrum) in¬ habits Brazil, and is about six or seven inches in length ; but the spread of the wing-membrane may measure over two feet. The body is cov¬ ered with a light brown hair. Consult Beddard,

(Mammals 5 (New York 1900) and the narra¬ tives of the travelers mentioned.

VAN, van, Asia Minor, (1) A town, the capital of a vilayet of the same name, 145 miles southeast of Erzerum, close to the east shore of Lake Van. It stands on an extensive plain covered with beautiful gardens and orchards; overlooking it is the citadel, in a ruinous condi¬ tion, crowning a lofty calcareous height. Ro¬ man Catholic and American Protestant missions are maintained here. Cotton cloth is the only staple article, both of manufacture and export. Van succeeded the Ivan of Cedrenus and the Byana of Ptolemy, and the

vicinity is rich in archaeological remains. Armenian massacres occurred here in 1895 and 1896. It was occu¬ pied by the Russians in 1915. Pop. of the town, about 35,000, Mohammedans slightly prepon¬ derating over Armenian Christians. Pop. of the vilayet (1915) 379,800; area, 15,170 square miles. Petroleum is found, and there are un¬ developed mineral resources believed to be con¬ siderable. (2) Lake Van, situated at a height of about 5,300 feet above sea-level, is of irreg¬ ular shape, contains many islands and has an area variously estimated at from 1,200 to 1,500 square miles. Its water is salt, but becomes brackish near the mouths of the streams. It has no visible outlet. A small herring-like fish is caught in its waters, salted and exported to Asia Minor.*

VAN AMRINGE, am'rmj, John Howard,

educator: b. Philadelphia, 3 April 1835; d. 1915. He was graduated from Columbia University in 1860, and received from Columbia and other colleges the honorary degrees of Ph.D., L.H.D. and LL.D. He was actively connected with Co¬ lumbia University as tutor, adjunct professor and full professor of mathematics, being made emeritus professor in 1910. Was dean of the School of Arts 1894-96, dean of Columbia Col¬ lege 1896-1910, and president pro tempore 1899, of Columbia University, also first president of the American Mathematical Society. He wrote a history of Columbia College and University, and many articles and pamphlets on life insurance, vital statistics, etc.

VAN BOKKELEN, bok-ke'len, Libertus, American educator and clergyman : b. New York City, 22 July 1815; d. Buffalo, 1 Nov. 1889.

VAN BRAAM

Although most of his life was spent as rector of various Protestant Episcopal churches in the States of Maryland and New York, and al¬ though during the Civil War period he was widely knowri as an Abolitionist, his chief claim to fame is doubtless his notable career as an educator. In 1845 at the suggestion of Bishop Whittingham of Maryland he established a church military school, known as Saint Timo¬ thy's Hall, at Catonsville, Md. This was the first school of its kind in the United States, and it soon became widely known throughout the South. His national fame, however, rests on the fact that in 1864 he was appointed by Gov¬ ernor Bradford as the first superintendent of public education for the State of Maryland ; and in this capacity he elaborated a comprehen¬ sive educational plan

which was incorporated in a bill entitled (

VAN BRAAM, Jacob. A Dutch soldier of fortune: b. Bergen-op-zoom, in the Netherlands, 1 April 1727. He entered the British naval service and acted as lieutenant with Lawrence Washington under Admiral Vernon, in the ex¬ pedition to Carthagena. Then, accompanying him to Mount Vernon, he became the military instructor of George Washington, giving him much instruction as to fencing, flags, fortifica¬ tion and the armies of Europe. He accom¬ panied Washington into the Ohio country in October 1753 and acted as translator of the French missives. On account of his alleged wrong rendering of one word, he received more blame than praise for his services, whilejealous rivals and enemies made it the occasion for abusive criticism and malignant attack upon Washington himself. The voluminous contro¬ versy, which arose in the Virginia colonial leg¬ islature over Van Braam's asserted mistransla¬ tion, could hardly have arisen in New York, where the Dutch language was generally spoken, and the Netherlanders' association of ideas with the use of the word ((assassin,» which was not then in the Dutch language, but common in French and English, was better understood. The ordinary meaning of this word <(assassin,® as used in military parlance at this time was not that of a dastardly or prowling murderer, but rather that of a soldier who attacks sud¬ denly without warning; and this seems to have been the method of the impetous, young George Washington, in July 1753, when he rushed upon

the French party, during which Jumonville was killed. In view of the whole situation — wind, rain, night, a flickering candle for light and a desire to be fair to both parties — the Dutch¬ man most probably did the best he could and is scarcely to be blamed. During the Revolution, Van Braam served on the British side, though in a letter to Washington, his former pupil, lie expressed personal regret at the change of rela¬ tions and the fortune of war. His subsequent history is not known. Consult the lives of Washington by Marshall and Irving; Winson's (Narrative and Critical History of America) (Vol. V).

VAN BRUNT, Henry, American architect: b. Boston, Mass., 5 Sept. 1832; d. there, March 1903. He was graduated from Harvard in 1854 and studied architecture. He served in the Union army on staff duty during a part of the Civil War period and subsequently practised his profession in Boston and Kansas City, Mo., and was the

designer of many buildings of import¬ ance, chief among which is Memorial Hall at Harvard, a work performed with W. R. Ware. Among other buildings designed by him are the First Church, Boston, and the Public Library, Cambridge. He published (Greek Lines and Other Architectural Essays) (1893).

VAN BUREN, van bu'ren, James Heartt,

American Protestant Episcopal bishop : b. Watertown, N. Y., 7 July 1850; d. 9 July 1917. He was graduated from Yale in 1873 and from Berkeley Divinity School, Middletown, Conn., in 1876, took orders in the Episcopal Church in the year last named and for more than 10 years was rector of Saint Stephen's Church, Lynn, Mass. In June 1902 he was consecrated bishop of Porto Rico.

VAN BUREN, Martin, eighth President of the United States : b. Kinderhook, N. Y., 5 Dec. 1782; d. there, 24 July 1862. His father, Abra¬ ham Van Buren, was of Dutch descent, a farmer and a tavern-keeper. He attented the village school, studied at Kinderhook Academy and in 1796, when 14 years of age, entered the law office of Francis Sylvester, where he read law and other subjects. In 1802 he entered the law office of William P. Van Ness of New York, an influential man and a close friend and de¬ fender of Aaron Burr. The latter paid consid¬ erable attention to young Van Buren. In 1803 he was admitted to the bar, returned to Kinder¬ hook and practised his profession with great success. He wps married in 1807 to Hannah Hoes, but the latter died in 1819. From 1808 to 1813 he was surrogate of Columbia County. He was in the State senate 1812 to 1820, and in February 1815 was made attorney-general, hold¬ ing this office till 1819. In 1816 he removed to Albany and entered into a partnership with Ben¬ jamin F. Butler. He was elected United States senator in 1821 and re-elected in 1827, but re¬ signed his seat in 1828 on his election to the governorship of New York. While holding the offices mentioned Van Buren became interested in politics. His father was a Jeffersonian-Re¬ publican, and Van Buren followed him politi¬ cally. The State politics of New York were factional and complex in this period. It was out of this situation that the principles involved in the spoils system were developed. It was a thoroughly established system when Van Buren was made a member of the <(Albany Regency,®

and he had in his own person experienced its operation, both to his advantage -and disadvan¬ tage. The (

toral vote was 170 for Van Buren and 73 for Harrison. His Cabinet, with a single exception, was the same as Jackson's: John Forsyth of Georgia, Secretary of State; Levi Woodbury of New Hampshire, Secretary of the Treasury; Mahlon Dickerson of New Jersey, Secretary of the Navy; Amos Kendall, Postmaster-Gen¬ eral, and Joel R. Poinsett, Secretary of War. In his inaugural address he stated his policy would be (

two years in Europe, and on his return in 1855, he lived quietly at his old home in Kinderhook. The character of Van Buren has been a matter of some controversy. He has been called the first politician-president. He was brought up in an era of politicians and was made Presi¬ dent by such men. His early political associates were men from this class, so that it is not strange that he did not measure up to the high¬ est standard of statesmanship. However, he was not entirely lacking in real ability and statesmanship. He was known as a polite, aff¬ able, good-natured, mild, courteous and dignified gentleman. He was also known as a shrewd, practical, skilful politician, and was accused of being more anxious about the means than the end. He was the (

Bibliography. — There are numerous lives of Van Buren. Consult Bancroft, George, (Martin Van Buren) (1889) ; Shepard, Edward M., (Martin Van Buren1 (Boston 1899) ; American Statesman Series, the best biography but very favorable. Contemporary campaign biographies are by W. H. Holland (Hartford*

1835) and by David Crockett (Philadelphia

1836) . Consult also a biography by William L. Mackenzie (Boston 1846), unfavorable; Orth, S. P., ,(Five American Politicians) (1906) ; West, E. H., (1911) ; Richardson, J. D.,

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

VAN BUREN, William Holme, American surgeon: b. Philadelphia, Pa., 5 April 1819; d. New York City, 25 March 1883. He was

educated at Yale and studied medicine in the University of Pennsylvania and in the hospitals of Paris, receiving his degree from the univer¬ sity (1840) and being appointed at the same time assistant surgeon in the United States army. He resigned in 1845 to. assist his father- in-law in his surgical clinics in the University of the City of New York; was professor of anatomy there (1852-66) and was surgeon of Bellevue Hospital from 1866 until the time of his death. He was the author of several stand¬ ard works.

VAN BUREN, Ark., city, county-seat of Crawford County, on the Arkansas River and

on the Saint Louis, Iron Mountain and South¬ ern and the Saint Louis and San Francisco rail¬ roads, about seven miles north of Fort Smith. It is in an agricultural region and has con¬ siderable lumber interests. The chief indus¬ tries are zinc smelting, railway repair shops, car factory, lumber products, canned fruits, cotton products, ice, cigars, wagons and agri¬ cultural implements. There are one high school and elementary schools,, good banking- facilities and a daily and weekly newspaper. Natural gas is found in the vicinity. Pop.

(1920) 5,224.

VAN BUREN, Me., town in Aroostook County, on the Saint John River and on the Canadian Pacific and the Bangor and Aroos¬ took railroads. It is in the northeastern part of the State, on the New Brunswick bound¬ ary. Van Buren was incorporated in 1881 and is an important distributing point for many of the lumber camps. It is connected by stage lines with Fort Kent, Fort Fairfield and other places. The educational institutions are Saint Mary's College, public and parish schools and Good Shepherd Academy. Pop. (1920) 4,177.

VAN CORTLANDT, kort'lant, Jacobus, American merchant: b. New York City, 1658; d. 1739. He served as mayor of New York in 1719 and after his death his estate was pur¬ chased for Van Cortland Park. The old manor house was converted into a museum.

VAN CORTLANDT, Philip, American soldier and legislator : b. Cortlandt Manor, Westchester County, N. Y., 1 Sept. 1749; d. there, 5 Nov. 1831. Graduated from King's College (now Columbia University) in 1758, he began work as a surveyor, but at the out¬ set of the Revolution received the commission of lieutenant-colonel, commanding the 4th bat¬ talion of New York infantry. In 1776 he

was made colonel of the 2d New York regiment. He fought, 7 Oct. 1777, at the battle of Saratoga (Stillwater, Bemis' Heights), in Sul¬ livan's campaign against the frontier Indians and in the Virginia campaign of 1781. He retired from the service with the grade of brigadier. A member of the New York as¬ sembly in 1788-450, he was also in 1788 a dele¬ gate to the State convention which adopted the Federal Constitution, and in 1791-94 a State senator. From 1793 to 1809 he was a repre¬ sentative in Congress. He accompanied La¬ fayette in the latter's tour of the States in

1824.

VAN CORTLANDT, Stephanus, Ameri¬ can jurist: b. New Amsterdam (New York City), 4 May 1643; d. there, 25 Nov. 1700. He was educated by the Dutch clergy of his day, engaged in mercantile life and became a member of the Court of Assizes on the estab¬ lishment of an English government (1664). He became a colonel in the King's regiment, was mayor of New York (1677-1700) and held other offices. He also was judge of the Court of Common Pleas in Kings County for several >ears and was appointed chief justice in 1700, which position he held at the time of his death.

VAN CURLER, Arendt: b. Nijkerk, Gel- derland, 6 Feb. 1620; d. drowned in Lake Cham¬ plain in 1667. Pioneer in New Netherland, founder of the Dutch peace policy with the Iroquois, initial explorer of the Mohawk Valley,

/

rescuer of French captives, he first made the settlement of Rensselaerwijk (Albany) a suc¬ cess. Though cousin of the Patroon Van Rens¬ selaer, he educated himself out of a system of semi-feudalism, bought the <(Great Flat® from the Indians, led a company of free farmers into the Mohawk Valley and founded the city of Schenectady. The personality of this far-see¬ ing man, one of the builders of the future Em¬ pire State, so far transcended his subordinate position under Governor Stuyvesant, that with the Iroquois and the French his enduring fame excels that of many men higher in office. The town (Schenectady), bay (Peru bay), and lake (Champlain) were all called ((Corlaer® after him. What was almost unique, as Parkman wrote, is, that his name, meaning <(corn ear,®

was left untranslated, and became the title, in the Indian speech, not only of every one of the governors of New York ((1882) ; and Griffis, (Story of New Netherlands

VAN DE VELDE, vel'de, Adrian, Dutch

*painter: b. Amsterdam, 1635 or 1636; d. there, 21 Jan. 1672. He was the son of Willem Van de Velde the Elder, under whom he studied, and consequently brother of William Van de Velde the Younger, the famous marine painter. While he continued his training as a landscape painter under Wynants at Haarlem, P. Wou- verman taught him to draw and paint figures, and he eventually rose to be one of the most eminent of the Dutch masters. He was equally successful in history, animals, battle-pieces, genre and portraits, but his masterpiece, now in the museum of The Hague, is a landscape in which the figures in the foreground are por¬ traits of himself, his wife and children. His pictures are highly valued by connoisseurs, and (A Pastoral Scene) (containing cows, a horse, sheep and figures, 13*4 X 12*4 inches) was sold in 1842 for $22,575. Other important pictures of his are (Starting for the Hunt5; (Winter Landscape5 ; (The Siesta,5 etc.*

VAN DE VELDE, Willem (The Elder), Dutch painter: b. Leyden, 1611 or 1612; d. Lon¬ don, 1693. He was in early life a seafaring man, and settling at Amsterdam became famous for his marines in black and white, and in order that he might witness any sea-fight that should take place at a time when the Dutch navy

swept the seas, the states of Holland placed at his disposal a small vessel from which he sketched and painted a great many pictures. He was appointed court painter by Charles II of England and his successor, James II, and en¬ joyed a royal pension until his death. His pictures are almost all in black and white and were excelled by those of his son Willem Van de Velde the Younger, who, however, doubt¬ less used the sketches, studies and drawings left by his father.

VAN DE VELDE, Willem (The Younger), Dutch painter : b. Amsterdam, 1633 ; d. Green¬ wich, 6 April 1707. He gained the delicate sense of color and marvelous power of at¬ mospheric effect from De Vlieger, but his strong drawing and knowledge of marine detail, his faculty of giving motion to waves and ships, he derived from his father, who was, however, no colorist. But while he could paint the storm, foaming waves, angry clouds and scudding vessels he was equally successful in portraying a calm ; one such picture catalogued as (A Calm, Men-of-war at Anchor,5 was sold in 1846

for $8,820, and his canvases have always been prized by English critics and connoisseurs, by one of whom he has been styled the (

VAN DER CAPELLEN, Joan Derek,

Dutch champion of American independence : b. at Tiel, 2 Nov. 1741; d. 6 June 1784. He was of a family famous since the 12th century, and descended from the chaplains or Capellani of France. In the 17th century, under Governor Stuyvesant, two men of this name and line were large owners of land on Staten Island and in the country of the Navesink and Raritan In¬ dians. Joan Derek, educated at the University of Utrecht, was a great reader of the politi¬ cal writings of the British Whigs and became a pronounced Liberal, opposed to the pro-Brit¬ ish policy of ((the Court® and Stadtholder Wil¬ liam V. Being in active sympathy with the American colonists, he struck a decisive blow in their behalf when, on 16 Dec. 1775, six months before the Declaration of Independence, as a member of the provincial legislature of Overijssel, he protested against the <(Lending of the Scotch Brigade [of three regiments, formed in Queen Elizabeth's time and probably the oldest standing army in Europe] for service in America.® For this body of veterans, King George III had in an autograph letter made earnest request. This, Van der Capellen «op- posed with all his endeavors,® considering the cause of the American colonies was that of all mankind. For this printed speech, he was thanked by Gov. Jonathan Trumbull and many Americans, with whom Van der Capellen kept up an active correspondence. Besides great activity with pen and voice, in attacking some surviving features of feudalism such as the ((corvees,® or the peasants' forced labor with¬ out pay, he worked with John Adams and with van der Kemp, Luzac and others, subscribing

VAN DER DONCK

liberally also to American bonds. Later he was active in the Patriot agitation. After his death, his tomb was blown up with gunpowder by his enemies. Ihe loan to the United States, in gold, amounting when paid back, in 1808, to $14,000,000, was invested in lands in western New York and Pennsylvania; so that the Americans got double benefit from the money. On 6 June 1908, the Holland Society of New York unveiled a bronze tablet costing $700 to V. d. Capellen's memory at Zwolle. See the abundant bibliography in Dutch, the collection of over 50 Holland pamphlets in the Boston Athenaeum; Fairchild, < Adrian Van der Kemp (1903); Griffis, (The Dutch Our Allies in the Revolution (Oneida Historical Society*

1894) ; Blok, P. J., (History of the People of the Netherlands) (Vol. V, 1912).

VAN DER DONCK, Adrian, tribune of the people, the first lawyer in New Netherland and author of the initial illustrated book de¬ scriptive of the country: b. at Breda, North Brabant. He was graduated at the University of Leyden. Appointed schout-fiscal or financial inspector of Rensselaerwijk, he served from 1641 to 1646; in which latter year he married the daughter of the Rev. Francis Doughty, an English clergyman who had fled from New England. He was active in peace negotiations between Governor Kieft and the Indians. De¬ sirous of becoming a patroon, in order to have influence in behalf of the people, he tried to purchase an estate at Catskill. Prevented by Van Rensselaer, he went to Manhattan and bought land which was variously called Colen- donk, that is, Donck's Colony, the Yonkheer's land, or, as' since shortened, Yonkers. His title was confirmed by the states-general. Able and public spirited, he was chosen in 1646 one of the Nine Men to represent the people and to act with the governor. Stuyvesant executed the orders of the Company with such drastic literalness, that in 1649 Van der Donck, acting for the commissioners, wrote out the Remon¬ strance and Petition to the states-general. In the conflict between autocracy and corporation- ism on the one hand, and the community on the other, Van der Donck's house was searched, his draft of the Remonstrance seized and he W'as imprisoned by Stuyvesant. When free, he led the people's delegates and arrived at The Hague before the emissaries of Stuyvesant, stating eloquently the people's plea for self- government. Detained in Holland four years, his alma mater made him a doctor of laws and he practised in the Supreme Court. His book, descriptive of New Netherland, encouraged emi¬ gration. It was rich in critically sifted informa¬ tion as to fauna and resources, and he warned against destruction of the forests. In pure de¬ scription, this work excels anything known in colonial literature. The map of the province and the picture of New Amsterdam in this book are those most often copied and familiar, to the average American. On his return, in 1653, to take further part in the struggle for self-government, intending also to write a full history of the colony from the beginning, he was never able to overcome Stuyvesant's im¬ placable hostility or to examine the Company's records. He died in 1655. He was author of the Municipal Board, the true founder of mu¬ nicipality and popular government on Manhat-

tan, and is deserving of the highest memorial honors. The key to his

character as to Stuy¬ vesant's is found in the chronic struggle be¬ tween autocracy and corporationism on the one hand and the people's demand for self-govern¬ ment on the other, which was incarnated in these two makers of New Netherland. His de¬ scendants under the name of Onderdonck and Vandunck, or Verdunck, were numerous. His land in later days formed part of Fordham, Philipsburgh and the Van Cortland manor, and the museum in Van Cortland Park standing on or near the site of his old home. Consult Brodhead, (History of the State of New York) (1859); Van Rensselaer, (History of the City of New York) (1909) ; and Griffis, (The Story of New Netherland) (1909).

VAN DER ESSEN, Leon, Belgian his¬ torian : b. Antwerp, 12 Dec. 1883. He was edu¬ cated at Saint John Berchmans College, Ant¬ werp, and at Louvain University. From 1906 to 1910 he was assistant professor at the Semi¬ nary of History, Louvain, after 1910 he was professor of critical history and institutions of the Middle Ages, and after 1912 special pro¬ fessor of the Flemish course in mediaeval his¬ tory and vice-president of the Seminary of History, Louvain University. In 1906-09 Dr. Van der Essen journeyed to Naples and Parma on a scientific mission from the Belgian gov¬ ernment. He has published (Het Ontstaan van Antwerpen> (1905); (Etude critique et lit- teraire sur les Vitae des Saints Merovingiens de l'ancienne Belgique (1907); (De straf — en rechterlijke vergoeningsbedevaarten in de Mid- deneeuven) (1911) ; (Geschiedenis der Mid- deneeuven> (1912) ; (Les archives farnesiennes de Naples au point de vue des Pays-Bas* (1907). He collaborated in (Biographic Na¬ tional de Belgique) (1905) ; (A Short History of Belgium* (Chicago 1916), etc.*

VAN DER GOES, goos, Hugo, Dutch painter: b. Ghent; d. Soignies, near Brussels, 1482. He was in 1465 a member of the Guild of Painters of his native place, serving as dean of the association from 1473 to 1475. He was a follower of Van Eyck, but most of the inci¬ dents related of his life have been rejected as fabulous. It is only known that he retired to a monastery, Rooden Klooster, in Belgium and died insane there. The Florence triptych now in the hospital Santa Maria, a (Madonna and Child with Angels, is undoubtedly his produc¬ tion.*

VAN DER HELST, heist, Bartholomaeus,

Dutch painter: b. Haarlem, 1611 or 1612; d. Amsterdam, 16 Dec. 1670. In Amsterdam he was the pupil of Nicolas Elias. His most famous picture is (The Banquet of the Civic Guard, which contains*

24 powerful portraits, and was painted to celebrate the Peace of West¬ phalia (1648). The work is remarkable for life-like expression, masterly drawing and clear, harmonious coloring, and Sir Joshua Reynolds said of it that it was (the first picture of por¬ traits in the world.® Numerous portraits by him are met with in the European galleries ; among them are that of (Paul Potter (at The Hague) ; (The Lady in Blue (in the London National Gallery) ; and the (Dutch Burgo¬ master* (in the Metropolitan Museum of New York).*

VAN DER HEYDEN, hi'den (or HEYDE), Jan, Dutch painter : b. Gorcum, 1637; d. Amsterdam, 28 Sept. 1712. After study¬ ing under a glass painter he turned his attention to architectural landscape on canvas, and tak¬ ing up his residence in Amsterdam he executed many views of churches, castles, palaces, open squares, streets, canals, etc. These were en- riched with elaborate figure groups, mostly painted in by Lingelbach, Van de Velde and Eglon Van der Neer. His works are to be met with in most European public galleries. His chief pictures are (View of the Town Hall in Amsterdam) and (View of the Dam Square. y

VAN DER HOEVEN, hoo'ven, Jan, Dutch scientist: b. Rotterdam, 9 Feb. 1801 ; d. 10 March 1868. He studied natural history and medicine at Leyden and continued his studies in zoology at Paris and returned to his native town as a practising physician, but in 1835 was appointed professor of zoology at Leyden University, a position he held till his death. He published many works on his special subject, the chief of which was (Handboek der Dierkunde) (Hand¬ book of Zoology, translated by Professor Clark of Cambridge).

VAN DER KEMP, Francis Adrian, Dutch-

American writer and clergyman : b. Kempen, Holland, 1752; d. Barneveld, N. Y., 1829. He received his education in the schools of Hol¬ land and graduated at the University of Gronin¬ gen. In 1777 he became minister of a church in Leyden. From the first, in religion and poli¬ tics he became a leader of the Liberal party. He joined the armed forces that were trying to gain political freedom from the Orange party. He was taken prisoner and placed in prison, but was

released in 1787. In 1788, hav¬ ing secured letters of introduction from John Adams and Lafayette, he came to America and lived for six years at Esopus on the Hud¬ son. In 1794 he moved to Barneveld, N. Y., where he passed his life, farming. He was chosen a member of many learned societies and given an honorary degree of LL.B. by Har¬ vard in 1820. He wrote many articles and also an autobiography, which though never published yet furnished material for a "Memoir® writ¬ ten in 1903 by Mrs. Helen L. Fairchild. Many of his original manuscripts are in the posses¬ sion of the historical societies of Buffalo and Philadelphia, and a few are in the library of Columbia University.

VAN DER MEER, Jan, of Delft. See

Vermeer, Johannes.

VAN DER MEULEN, mel'len, Adam Frangois, Dutch painter: b. Brussels 1632; d. Paris, 15 Oct. 1690. After learning the prin¬ ciples of his art in the studio of P. Snayers (q.v.) he was introduced by Lebrun to Minister Colbert, who commissioned him to paint several pictures for his private gallery and made him superintendent of the Gobelin tapestry manu¬ factory. He subsequently as court painter ac¬ companied Louis XIV on his campaigns in Flanders for the purpose of painting the most important scenes of the war. A great number of battle pieces, which are crowded with figures, are now in the Louvre and in the gallery at Versailles, others are at Munich, Dresden and Saint Petersburg. A good example of his skill

as a battle painter is his (Rencounter of Cav¬ alry, > a small but exquisite canvas in the New York Metropolitan Museum.

VAN DER POORTEN-SCHWARZ, van

der por'ten shvarts, J. M. H., Dutch novelist. See Maarten Maartens.

VAN DER STUCKEN, stoo'ken, Frank, American musical director: b. Fredericksburg, Tex., 15 Oct. 1858. He studied at the Con¬ servatory of Music, Antwerp, 1881-82, and be¬ came Kapellmeister at the Stadt Theatre, Bres¬ lau, Germany. In 1884 he became leader of the Arion Singing Society of New York and in 1892 accompanied it on a concert tour through Europe. He was dean of the College of Music of Cincinnati 1897-1901 and honorary dean from 1901 ; and in 1905 succeeded Theodore Thomas as musical director of the Cincinnati May Festivals. Among his musical composi¬ tions are the opera WlasdaP (Festival March, } (Festival Hymn, (Inauguration*

March,) (Pagina D'AmoreP the latter an orchestra episode.

VAN DER WEYDEN, wi'den, Rogier

(also known as Roger de Bruges, Roger de Bruxelles, Ruggiero da Brugia, Maestro Rogel and Roger de la Pasture), Flemish painter: b. Tournay, Belgium, about 1400; d. Brussels, 16 June 1464. He was the pupil of the painter Robert C'ampin in Tournay (1427), and five years later was made master of the Guild of Saint Luke in his native city. In 1436 he went to Brussels and was appointed municipal painter. He attended the jubilee at Rome in 1450, and after studying the Italian masters and antiques of Italy and painting several pictures for Italian patrons, one of whom was Cosmo de Medici, returned to Belgium and settled at Brussels. All of his pictures are distinguished by a profoundly religious spirit. They are de¬ signed and drawn with great care and power; the modeling is firm and smooth, the technique brilliant, but there is a certain dryness and leanness in the limbs, hands and feet of his figures, which sometimes almost amounts to distortion and deformity, and is only half re¬ deemed by the beauty of his faces whose ex¬ pression is radiant with faith and celestial in¬ spiration. He was the founder of the Brabant school of painting and had numerous pupils and followers, among them Memling, as well as foreigners who learned from him the use of oils in painting and helped to spread the new method and other characteristics of the Flemish studios. His chief paintings are (The Descent from the Cross, } originally painted for the church of Our Lady of Victories, at Louvain, now in the Escorial, a copy being also in the Prado Gallery; a triptych with the figure of the (Dead Christ J in the central panel; and altar- piece for Saint John's chapel in the church at Middleburgh;

VAN DEVANTER, Willis, American law¬ yer: b. Marion, Ind., 17 April 1859. He was graduated at Asbury College (now De Pauw University) in 1878 and at the Cincinnati Law School in 1881. He began practice in Marion (1884); moved to Cheyenne, Wyo., and was commissioned to revise the Wyoming statutes (1885) and was city attorney there (1887-88). He was chief judge of the Supreme Court of Wyoming (1889-90) ; circuit judge (1903-10) and associate judge of the Supreme Court of the United States from 1910 by appointment from President Taft: His decisions on import¬ ant railroad and corporation cases in connection with the Sherman Anti-

Trust Law attracted wide attention.

VAN DIEMEN, de'men, Anthony, Dutch colonial administrator: b. 1593; d. 1645. Hav¬ ing gone to India, he soon rose to the highest dignities and in 1636 was made governor-gen¬ eral. He administered the government with ability and contributed much to the establish¬ ment of Dutch commerce in India. The navi¬ gator, Abel Tasman, whom he sent with a ves¬ sel to the South Seas in 1642 gave the name of Van Diemen's Land to the island now called Tasmania, but in 1853 it was renamed for its discoverer.

VAN DIEMEN'S (van or van de'menz) LAND. See Tasmania.

VAN DORN, Earl, American soldier: b. near Port Gibson, Miss., 17 Sept. 1820; d. Spring Hill, Tenn., 8 May 1863. He was gradu¬ ated at West Point in 1842 and served in the American army with distinction during the Mexican War. Early in 1861 he joined the Confederate army, captured the steamer Star of the West at Indianola and becoming major- general in January 1862 commanded the Trans- Mississippi district. He suffered defeat at Pea Ridge and being transferred to the Army of the Mississippi was again defeated at Corinth. He was shot during a dispute and died shortly after.

VAN DUZER, Lewis Sayre, American naval officer: b. Elmira, N. Y., 29 June 1861. He was graduated at the Naval Academy (1880) and was promoted through various grades of the service to a captaincy (1911). He served in several important positions and was present as officer of the battleship Iowa at the destruction of Cervera's fleet (1898) ; also in the attack on the fortifications of San Juan, Porto Rico. He served in the Philippines (1898-1900), and in China (1900) during the Boxer Rebellion. From that time he occupied important positions, being instructor in ord¬ nance in the Naval Academy, executive officer of the steamships Marietta and Newport, was ex¬ ecutive officer of the naval torpedo station at Newport, R. I., commandant of the navy yard at Olongapo, P. I., and of the navy yard at New York (1910-13) and was in command of the battleship Utah in 1914 when he was retired at his own request. He received numerous medals. He edited the

VAN DYCK, dik, Anthonis, Flemish painter: b. Antwerp, 22 March 1599; d. London, 9 Dec. 1641. He was born of wealthy parents,

his father being Frans Van Dyck, a prominent silk merchant. Young Van Dyck very early displayed a fondness for drawing and especially

for the sketching of faces, for which he showed such talent that his father sent him, at the age of 10, as a resident pupil to the noted painter and art teacher, Hendrik Van Balen, where he made such rapid progress that at the age of 16 he had gone into partnership in Antwerp with Jan Brughel the younger as portrait painter and general artist. He is said to have inherited much of his artistic talent from his young mother, Maria Cuypers, his father's second wife, who was noted in Antwerp for her won¬ derful skill and taste in the making of em¬ broidery, much of her work in this field being real art creations. Van Dyck was not long a free lance when he attracted the attention of Rubens, who was so impressed with the boy's talent that he took him into his own household and made him his assistant. This pleased young Van Dyck, his father and his mother and the precocious pupil of the great Flemish master made rapid progress. He had wonder¬ ful power of exact observation and ability for reproduction, and his imitation of Rubens' work was so well done that to-day it is extremely difficult to distinguish the -paintings of the pupil from those of the master. Before he had reached his majority Van Dyck had already be¬ come famous in his own country and had be¬ gun to attract attention outside of it. At the age of 19 he was elected a member of the Painters' Guild and the following year he went to England on the invitation of the Earl of Arundel, who had formed a very high opinion of his talent and the superior quality of his work. Through the influence of the latter he secured a pension from the English king, James I. This introduction to the English court was of very considerable influence on his future career. He remained two years in England where he greatly increased his reputation and became very popular. The English angli¬ cised his name to Anthony Vandyke, a title under which he was destined to acquire un¬ dying fame throughout all English-speaking lands. The longing to see the great southern art capitals took Van Dyck to Italy (with the permission of the English sovereign) in 1622, where he visited Venice and Genoa and where he received a warm welcome, studied the old masters and produced fine pictures of his own, especially portraits of celebrities, among them artists, rulers, statesmen and princes. His por¬ traits of the Genoese nobility are especially notable and of great historic value because of the masterly manner in which he has reproduced the customs, dress, habits and spirit of the Italian ducal courts. Van Dyck made a most careful, detailed and loving study of the Vene¬ tian masters; and the influence of this study of Italian art was deeply reflected in his own work which became more artistic in almost every sense of the word. Under the influence of the great Italian painters of the day he gradually changed his style for the better, mak¬ ing it brighter, more realistic, softer, more re¬ fined

and more human. His wonderful power of absorption stood him in as good stead in Italy as it had under the tuition of Rubens in his boyhood. In a word, he seized the spirit of Italian art, so different from that of his own Flemish land in which he had been educated.

This is one of the greatest signs of his genius. This Italian period of his life was wonderfully prolific and resulted in many portraits of royal personages, which still adorn the walls of Italian ducal palaces and museums where they are held in high estimation. He worked in the art and picture galleries of Turin, Rome and probably other Italian cities; and everywhere he had the patronage of the local nobility, for sitting for portraits to Van Dyck had become the fashion of the day in courtly circles. On invitation of Albert and Isabella, Spanish regents of the Netherlands, he returned to the land of his birth as court painter; and here again he continued his triumphant art procession, painting all the local celebrities of his day with¬ out allowing his popularity to appreciably lower the high standard of his work. In 1631 Van Dyck went to Holland where he was literally received with open arms and where he painted the portraits of notable persons, among them Prince Henry of Orange and his queen, Prince Charles Louis and Prince Rupert of Bohemia (both then in exile).

The Earl of Arundel and the English king had, for some time, been trying to persuade Van Dyck to return to England, and finally, in 1632, they were successful. The great Flemish artist was received with all the honors that could be accorded to the ambassador of a foreign court. A fine residence, the property of the sovereign, was given to him in London (Blackfriar's dis¬ trict) and the royal favor went so far as to as¬ sign him apartments in the royal palace of Eltham, and to appoint him painter in ordinary to the royal household, with a pension of £200 a year, then a large sum of money. Thus en¬ couraged to do his best, honored with the high esteem of the English sovereign and his consort and praised by the British nobility led by the Earl of Arundel, Van Dyck now began the most notable of his many notable series of portraits. These include numerous portraits of the king, the queen and their children. Van Dyck seems to have been very happy and to have put into his work all his love of art, his cultured imagi¬ nation and the wonderful art

knowledge and technique he had acquired from constant con¬ tact with the paintings of schools so far apart as the Netherlands and Italy.

In 1634 Van Dyck returned to Antwerp where he remained actively at work for over two years. There he painted many notables and produced some of his most characteristic groups, now among the glories of Flemish achievements in art. From 1636 to 1640 he was again back in England, where he busied him¬ self painting portraits for most of the notable personages of the court, so that there are liter¬ ally scores of fine Van Dyck portraits scattered throughout the palaces of the British nobility. So popular was Van Dyck, at this period of his career, that it was a physical impossibility for him to have executed all the pressing commis¬ sions given him. The result is that he very often simply sketched his subject, painted the features and left the execution of the rest of the picture to skilled pupils and followers of his school. He invariably, however, retouched this pupils' work, where he found it not to his fine artistic taste. In 1641 Van Dyck went to Paris where he hoped to get a commission to decorate the Louvre for which he had conceived

an elaborate plan ; out he was disappointed. This probably increased his already poor health and he died the following year at a compara¬ tively young age, but easily the foremost name in art of his latter years.

Van Dyck is par excellence the ideal por¬ trait painter. While remaining true always to his subject, he had the power of casting round it a glamor which lent an air of distinction to his portraits of princes of the State and Church, of sovereigns and nobles. By instinct he was himself an aristocrat and the position he main¬ tained as the autocrat of his profession in¬ creased this inborn tendency and gave him a very broad and deep interest in the true artistic interpretation of the men of noble family and high estate that he may be said to have spent his life transferring to canvas. His portraits of the unfortunate Stuart, Charles I of Eng¬ land and the cavaliers who so strenuously sup¬ ported his cause, have done more to immortalize them and to maintain an interest in and a sympathy for them than any one other agency. Through them we form a definite visual picture of the court of Charles I and of the upper-class society of his day, such as we are unable to vis¬ ualize of any previous period in English history. His influence upon English art, and especially upon portrait painting, was greater and more lasting than that of any previous painter. Yet so peculiarly his own was his style of painting and so consummate was his art that while he had hundreds of

imitators, many coworkers and numerous pupils, he may be said to have created no school. This is because his supreme excellences is to be found in his mystical poetic touch, his idealization and his mingling of the broad, striking dramatic realism of the Flemish painters, generally translated into action and the softening, refining imaginative, poetic tem¬ perament of the South. No artist could imitate Van Dyck as Van Dyck constantly imitated, in such a realistic manner, the work of his first great master, Rubens, and the notable painters of the Italy of his day. This is because Van Dyck, Janus-like, was constantly presenting two faces, one looking toward the long past, bold, dramatic and realistic influences of his youth; and the other following the refining, softening and ennobling principles of the southern lands that were rapidly making of Italy the home of modern, as she had long been, one of the two great centres of ancient art. To outline the many existing works of art from the brush of Van Dyck would require catalogue space greater than the necessary limits of this article. His paintings, and especially his portraits, are to be found in every country of Europe and numerous examples exist in the United States and Latin America. Among his notable works, however, are 'Jacobus de Wael and his Wife) (Munich), his brilliant portraits of Genoese nobility, of Charles I, king of England and of 'Queen Henrietta) ; 'Cardinal Bentivoglio> (Rome) ; 'Portrait of A Lady and a Child;) (Morgan Collection, Metropolitan Museum, New York City) ; 'Philip of Savoy, Viceroy of Sicily > (Turin). Other portraits of members of the same noble family, most of which are still in Turin; 'Madonna del Rosario) (very fa¬ mous, in the Oratorio del Santissimo Rosario, Palermo) ; 'Raising of the Brazen Serpent* (Madrid) ; 'Christ on the Cross) (Antwerp*

SSmSaK

mm

'>l'5.>!:'-'

V fiKlK**

- £*i.yn,'-Stt . v ?*

Ml

Spates?

SPMfflBSS

Museum) ; ‘Pieta5 (Vienna, Munich, Antwerp). Van Dyck’s works have become generally known through the excellent engravings made of the best of them. He was himself one of the cleverest engravers of his day, and had he not given his best work to his paintings he might easily have attained a place second to none in the graver’s art. His etchings are very superior works of art. He was a master of the technique of drawing and this gave him an unusual advantage over most of his contempo¬ raries even in etching. This enabled him to direct, with wonderful skill, many of the best engravers of his day, whom he employed for the engraving of heads of noted personages of the different countries of Europe. In this work he frequently himself handled, with consummate skill, the graver’s tools ; and the original sketches and drawings for these notable works were his own. As issued by Hendricx these engravings numbered 100 (1645). The last of 17 editions appeared in 1759 (with 124 plates).

Bibliography. — Carpenter, W. H., (Pictorial Notices, Consisting of a Memoir of Sir An¬ thony Van Dyck with a Descriptive Catalogue of the Etchings Executed by Him5 (London 1844) ; Cust, L., (Anthony Van Dyck) (London 1900) ; Fierens-Gevaert, ‘Van Dyck) (1912) ; Guiffrey, J., (Antoine Van Dyck) (Paris 1882) ; Head, P. R., ‘Van Dyck) (London 1887) ; Heinemann, W., ‘Engravings of Van Dyck5 (London 1911) ; Hind, A. M., (Van Dyck’s Etchings5 (Boston 1915) ; Knackfuss, E., ‘Van Dyck5 (Bielefeld 1896) ; Lemcke, C., ‘A. Van Dyck5 (Vol. I, Kunst and Kiinstler, Leipzig 1877) ; Michiels, A., (Antoine Van Dyck et ses eleves5 (Paris 1881) ; Newbolt, F., Etch¬ ings of Van Dyck5 (London 1906) ; Rooses,

M. , (Chefs d’ceuvres d’ Antoine Van Dyck) (Antwerp 1901) ; ‘Antoine Van Dyck) (Paris 1902) ; Schaeffer, ‘Paintings of Van Dyck Illustrated) (Stuttgart 1909) ; Smith, A., (A Catalogue Raisonne of the Works of the Most Eminent Dutch, Flemish and French Painters) (Part III, London 1841) ; Stephens, F. G.< Catalogue of the Exhibition of the Works of Sir A. Van Dyck5 (London 1887) ; 'Biography of Van Dyck) (New York 1905) ; Szwykowski, A., Wan Dyck’s Bildnisse bekannter Personen) (Leipzig 1858) ; Wibiral, F., (L’Iconographie d’ A. Van Dyck d’apres les recherches de H. Weber5 (Leipzig 1877) ; Woltmann and Woer- mann, 'Geschichte der Malerei5 (Vol. Ill, Leipzig 1886).

VAN DYCK, Cornelius Van Allen, Amer¬ ican missionary and translator: b. Kinderhook,

N. Y., 1818; d. 1895. He was graduated at Jefferson Medical College, Philadelphia (1839), and went as a medical missionary to Syria the next year. In 1846 he was ordained a minister, became master of the Arabic language and translated the Bible into that tongue. While his Bible was being printed he taught Hebrew in the Union Theological Seminary, New York (1866-67). He was manager of the mission press at Beirut, physician to Saint John's Hos¬ pital and professor of pathology in the Syrian Protestant College (1857-82), and made many translations of medical and other texts into the Arabic.

VAN DYKE, Henry (Jackson), American Presbvtenan clergyman and author : b. German¬ town, Pa., 1U Nov. 1852. He was graduated at

Princeton (1873), the Princeton Theological Seminary (1877) and the University of Berlin (1878) ; was pastor of the United Congrega¬ tional Church of Newport, R. I., in 1878-83; and of the Brick Presbyterian Church, New York, from 1883 until his resignation in 1900 to become professor of English literature in Princeton University. He was moderator of the General Assembly of the Presbyterian Church in the United States in 1902-03. He became favorably known as both preacher and popular lecturer, and in addition to publishing several works of religious character contributed much also to general literature. In 1908 he delivered a course of lectures at the University of Paris. He went to the Netherlands as United States Minister in 1913. He resigned in 1917 and re¬ turned to Princeton. The titles of his volumes include 'The Reality of Religion5 (1883) ; 'The Story of the Psalms) (1887) ; 'The Poetry of Tennyson5 (1889; 5th rev. ed., 1894); 'Lit- tle Rivers) (1895), a collection of essays; 'The Gospel for an Age of Doubt) (1896) ; (The •Builders and Other Poems) (1897) ; (Ships and Havens) (1897) ; (The Lost Word5 (1898) ;

(Fisherman's Luck) (1899) ; (The Toiling of Felix, and Other Poems) (1900) ; 'The Poetry of the Psalms5 (1900) ; (The Blue Flower,5 short stories (1902) ; (The School of Life5 (1905); (Days Off5 (1907); 'Out of Doors in the Holy Land5 (1908) ; (Le Genie de l'Amerique5 (1909); Collected Poems5 (1911); (The Unknown Quantity5 (1912) ; (Grand Can¬ yon5 (1914) ; 'The Valley of Vision5 (1919) ; (The Broken Soldier and the Maid of France5

(1919).

VAN DYKE, John Charles, American art critic and librarian: b. New Brunswick, N. J., 21 April 1856. He was privately educated and in 1877 was admitted to the New York bar, but soon gave his attention to literature, and since 1878 has been librarian of the Sage Li¬ brary, New Brunswick. For many years he studied art in Europe, has lectured at various universities on art topics and is professor of art at Rutgers College. He has published (Books and How to Use Them5 (1833) ; Prin¬ ciples of Art5 (1887) ; (How to Judge of a Picture5 (1888) ; 'Serious Art in America5 (1890) ; 'Art for Art's Sake5 (1893) ; 'History of Painting5 (1894) ; 'Old Dutch and Flemish Masters5 (1895) ; 'Modern Flemish Masters5 (1896); 'Nature for its Own Sake5 (1898); 'Italian Painting5 (1902) ; 'Old English Mas¬ ters5 (1902) ; 'The Meaning of Pictures5 (1903), etc.

VAN DYKE, Paul, American Presbyterian clergyman and educator, brother of H. Van Dyke (q.v.) : b. Brooklyn, N. Y., 25 March 1859. He was graduated from Princeton in 1881, was pastor of the North Presbyterian Church, Geneva, N. Y., 1886-89, professor of ecclesiastical history at Princeton Theological Seminary, 1889-92, pastor of the Edwards Congregational Church, Northampton, Mass., 1892-98, and since the date last named has been professor of modern European history at Princeton University. He has published 'The Age of the Renascence5 ; 'Renascence Por¬ traits.5

VAN EYCK, Hubert. See Eyck, Hubert

VAN.

VAN EYCK, Jan. See Eyck, Jan van.

VAN GOYEN, van goi'en, Jan Josephs- zoon, Dutch painter and etcher : b. Leyden, 13 Jan. 1596; d. The Hague, in April 1656. His numerous landscapes and marines are to be found in most European galleries and in the Metropolitan Museum of New York; his (Moer-dyck> and (Panoramic View of the Environs of Haarlem) are good examples of his style. His pictures are generally painted in a tone which dominates all variegations of color — a rich brown, a tawny gold or a chilly silver tone, and he has been called the earliest "tone-painter® of the Dutch school. There is always genuine feeling in his shore landscapes, sand¬ hills, canals, rivers and village views, while his city scenes are lit up with animated figures. His etched

landscapes are rare, and he is only known to have produced five plates. Among his pupils were Jan Steen and S. Ruysdael.

VAN HISE, van hiz, Charles Richard,

*American geologist; b. Fulton, Wis., 29 May 1857; d. Milwaukee, Wis., 19 Nov. 1918. He was graduated from the University of Wiscon¬ sin in 1879, was instructor in metallurgy there * 1879-83, assistant professor 1883-86 and full professor from the last-named date, exchanging the chair of metallurgy for that of geology in 1888. He was non-resident professor of struc¬ tural geology at the University of Chicago, 1892-1903, has been connected with the United States Geological Survey from 1883 and was consulting geologist of the Wisconsin Geological Survey from 1897. Among his professional publications are Correlation Papers: Archean and Algonquin) (1892) ; Principles of North American Pre-Cambrian Geology J (1896) ;*

VAN HOONACKER, hoo-nak'er, Albin August, Belgian Biblical scholar : b. Bruges, 19 Nov. 1857. He was educated at the College of Saint Louis, Bruges, the Roulers Preparatory Seminary and the University of Louvain. In 1880 he was ordained to the priesthood and in the same year was professor of humanities at Saint Louis College, Bruges. Subsequently he was curate at Saint Martin's, Courtrai, and in 1887-89 was vice-regent of the College of the Holy Ghost, Louvain University. After 1889 he was professor of the critical history of the Old Testament and Hebrew, and after 1894 held also the chair of Assyrian and moral philosophy at Louvain University. Dr. Van Hoonacker has published (Observation critiques sur les recits concernant Bileam (1888) ; C'origine des quatre premiers chapters du Deuteronome* (1889) ; (Nehemie et Esdras) (1890) ; (Nehemie en l'an 20 d'Artaxerxes I Esdras en l'an y d'Artaxerxes IP (1892) ; Porobabel et le second temple* (1892) ; (Le voen de Jephte* (1893) ; (Le lieu du culte dans la legislation rituelle des Hebreux) (1894) ; (Nouvelles etudes sur l'histoire de la Restaura- tion juive apres l'exil de Babylone* (1896) ; (Le sacerdoce levitique dans la loi et dans l'histoire des Hebreux* (1898) ; (Le traite du philosophe syrien Probus sur les premiers Analytiques d'Aristote> (1900); (Notes sur l'histoire de la Restauration juive apres*

1' exile de Babylone> (1901);

VAN HORNE, van horn, Sir William Cornelius, Canadian railway

official : b. near Joliet, Ill., 3 Feb. 1843 ; d. 1915. He was em¬ ployed in various capacities on several lines until 1880, when he became general superintendent of the Chicago, Milwaukee and Saint Paul system. In 1882 he accepted the position of general manager of the Canadian Pacific Railway, and from 1888 to 1899 served as its president. From 1899 to 1910 he was chairman of the board of the company. In 1894 he was knighted. The Canadian Pacific Steamship Company was largely developed by him, and in the promotion of steamship traffic with Australia, as well as in other enterprises, he has rendered efficient services. He was conspicuous in his opposi¬ tion to the United States-Canadian reciprocity agreement advocated by President Taft.

VAN INGEN, William Brantley, Ameri¬ can mural painter: b. Philadelphia, Pa., 1858. He studied under leading Pennsylvania and New York artfsts and Leon Bonnat, Paris. He began as assistant to John La Farge of New York but soon undertook personal commissions and became widely known from his work at the capital at Washington, at the United States Mint, Philadelphia ; the State Capitol at Harris- burgh ; the State Capitol at Trenton, N. J., and the courthouse and post office at Indianapolis and Chicago. On a commission from Charles T. Yerkes of New York he visited Japan to make studies for a room in his residence.

VAN LAER, Alexander Theobald, Ameri¬ can artist and lecturer : b. Auburn, N. Y., 9 Feb. 1857. He was an art student at the National Academy of Design in New York under Poggenbeek in Holland. His work, chiefly of Connecticut landscapes in the vicinity of Litch¬ field, his home, was awarded medals at leading American exhibitions. Notable examples are (A Connecticut Hillside) in the National Gal¬ lery, Washington; (February Snow in the Brooklyn Museum, New York City; (On the Brandywine) in the Herron Art Institute, In¬ dianapolis. He was a member of the Interna¬ tional jury of awards at Saint Louis (1894) ; lectured on art history at Chautauqua, N. Y., and appeared in the art lecture courses in New York for 24 years, and before schools and col¬ leges in the leading cities of the country. He was elected a member of the National Academy in 1900.*

VAN LENNEP, Henry John, American

missionary: b. Smyrna, Turkey, 18 March 1815; d. Great Barrington, Mass., 11 Jan. 1889. He was of Dutch descent, was graduated from Amherst in 1837, studied theology at Andover and in 1839-69 was a missionary in Turkey. He was conversant with most

of the Oriental languages, and during the greater share of his residence in Turkey he was connected with educational institutions at Constantinople, Smyrna and Tocat. The loss of his sight com¬ pelled him in 1869 to return to the United States, where he engaged in literary work and in teaching. He occupied the chair of natural

science, Greek and modern languages at Ingham University, Le Roy, N. Y., in 1876-78 and from then until his death was principal of Sedgwick Institute, Great Barrington, Mass. He published (1870);

VAN OSTADE, Adrian. See Ostade, Adrian Van.

VAN PELT, John Vredenburgh, American architect: b. New Orleans, 24 Feb. 1874. He studied architecture at the ficole des Beaux Arts, Paris, exhibited in the Paris Salon, sec¬ tion of architecture, 1895-96, and in the section of painting in 1898. He was assistant professor of architecture in charge of design at Cornell 1897-1900 and from 1902 to 1904 was in charge of the College of Architecture there. He has written (Discussion of Composition as Applied to Art> (1902).

VAN RAALTE, Dutch clergyman and leader of the modern Pilgrim Fathers of Hol¬ land into Michigan: b. 17 Oct. 1811; d. 7 Nov. 1876. When the bigoted King William I (q.v.) of the Netherlands attempted a role like that of the Tudors of England, in order to bring the rather democratic Reformed Church under the control of the state, resistance was made to what was regarded as usurpation. In the north, in Friesland especially, there was resistance and the Separatists from the established Church sought refuge in America. One party, led by Rev. H. P. Scholte, came by way of New Or¬ leans, in 1846 and 1847, to settle in Pella and other places in Iowa. Rev. A. C. van Raalte, in 1846, came to America leading the vanguard of a great host which followed later. They made homes in Holland, Zeeland, Friesland and many other places in Michigan and Wisconsin, in which one may now count scores of Nether- land names. Some began the industry of wood¬ working, which, in its development, has made Grand Rapids (q.v.) the (

VAN RENSSELAER, ren'se-ler, Kilaen or Killian, Dutch colonizer in the New World: b. Amsterdam, 1595; d. there, 1644. He was a diamond and pearl merchant at Amsterdam; was a founder of the

Dutch West India Com¬ pany, to which on two occasions he advanced sums for the maintenance of its credit ; and sent a representative to New Netherlands to negotiate with the Indians for the purchase of territory on the west bank of the Hudson, ex¬ tending from Smack's Island to a point 12 miles south of Albany (Beeren, or Bear's Island), and into the interior two day's journey. This purchase was later increased by that of territory on both sides of the river northward and southward from Fort Orange. This tract (Rensselaerswyck) comprised in all a large part of the counties of Rensselaer, Columbia VOL 27—43

*and Albany. Van Rensselaer did not visit it, •but managed all its affairs through an agent. He sent Adriaen van der Donck as sheriff of the colony established there, and Dominie Megapolensis for the ((edifying improvement** of Dutch and savages.*

VAN RENSSELAER, Mariana Griswold,

American author; b. New York, 1851. She was known through her writings as a student and critic of art, and also participated in dis¬ cussions bearing upon politics, etc. She was president of the New York Public Education Association. Columbia University gave her the degree of Litt.D. in 1910. Her publications in¬ clude (Henry Hobson Richardson and His Works (1888) ; (English Cathedrals* (1893) ; (Six Portraits*; (Art Out of Doors* (1893);*

(Should We Ask for the Suffrage? (1894) — against woman suffrage; (One Man Who was Content* (1896); (Niagara: a Description* (1901) ; (History of the City of New York in the 17th Century* (1909) ; (Poems* (1910). She was married to Schuyler Van Rensselaer in 1873.*

VAN RENSSELAER, May King, Ameri¬ can writer: b. New York, 25 May 1848. She was educated privately and was married to John King van Rensselaer 4 Oct. 1871. She has published (Crochet Lace (1882) ; (The Devil's Picture Books* (1887) ; (The Goede Vrouw of Mana-ha-ta* (1889) ; Wan Rensselaers of the Manor* (1889) ; (New Yorkers of the 19th Century* (1899); (History of Newport* (1905); (Nonsuch Euchre and Other Games* (1907) ; (Prophetical, Educational and Playing Cards**

(1913).

VAN RENSSELAER, Stephen, American politician and soldier, known as (

1823 to 1829 he was a member of Congress. He published (A Geological and Agricultural Survey of the District Adjoining the Erie CanaP (1824). Consult Barnard, (A Discourse of the Life, Services, and Character of Stephen Van Rensselaer) (1839).

VAN REYPEN, ri'pen, William Knicker¬ bocker, American naval officer : b. Bergen, N. J., 14 Nov. 1840. He was graduated from the medical department of the New York Uni¬ versity 1862, and the same year served at the Naval Hospital in New York. He represented the medical department of the United States navy at the international medical congress at Moscow 1897, and during the war with Spain designed and fitted out the first ambulance ship ever used in naval warfare. He was retired in 1902 after 40 years' service with the rank of senior rear-admiral. In 1905 he was chair¬ man of the American National Red Cross Association.

VAN SANT, Samuel R., American states¬ man and soldier: b. Rock Island, Ill., 11 May 1844. At the outbreak of the Civil War he enlisted in the Union army and served for three years. He was elected to the legislature 1892 and 1894 and was speaker of the same body 1895. In 1901 he was elected governor of Minnesota.

VAN SANTVOORD, George, American lawyer and author : b. Belleville, N. J., 8 Dec. 1819; d. 6 March 1863. He was graduated at Union College in 1841, studied law at Kinder- hook, N. Y., was admitted to the bar in 1844 and practised at Kinderhook from 1846 to 1851, when he removed to Troy, N. Y. In 1852 and in 1856 he was a member of the Assembly, and in 1860-63 was district attorney of Rensselaer County. His writings include (Life of Algernon Sydney* (1851); Principles of Pleading in Civil Actions Under the New York Code of Procedure) (1852) ; (Lives of the Chief Justices of the Supreme Court of the United States* (1854) ; and

VAN SHAACK, shak, Peter, American lawyer: b. Kinderhook, N. Y., March 1747; d. there, 27 Sept. 1832. He was graduated from King's (now Columbia) College in 1766, was admitted to the bar in 1769, and established a law practice in New York. In 1773 he was ap¬ pointed to revise the statutes of the colony of New York, and he later served on various committees for the consideration of the meas¬ ures of the British government which resulted in the Revolution. Although greatly incensed at the action of the government he was never¬

theless opposed on general principles to the Revolution and in 1777 was summoned before the board of conspiracies to take the oath of allegiance to New York. On refusing he was sent to Boston. In 1778 he was banished, and went to England where he remained until 1785. He was then restored to citizenship in New York and readmitted to the bar. He gained a high reputation in his profession and also as an instructor in his law school. He was totally blind during the last years of his life. Among his publications are Paws of the Colony of New York) (2 vols., 1773) ; Con¬ ductor Generalis, or the Duty and Authority of

Justices, Sheriffs, Coroners, etc. (1788). Con¬ sult Van Shaack, H. C., (Life, Journal and Letters of Peter Van Shaack> (1842).*

VAN 'T HOFF, Jacobus Henrik, Dutch

chemist : b. Rotterdam, 1852 ; d. 1908. He was educated in the University of Leyden and also studied in Bonn and in Paris. His thesis (1874) on the (

VAN TWILLER, Wouter, or Walter,

*Dutch governor of New Netherland: b. Nieu- kirk, about 1580; d. Amsterdam, after 1646. He was a clerk in the warehouse of the West India Company at Amsterdam when he was chosen to succeed Peter Minuit as director-gen¬ eral of New Netherland. He arrived at the colony in April 1633, bringing with him the Spanish caravel, San Martin, captured on the voyage. Van Twiller was incompetent for his new post and in his administration there was considerable to warrant the well-know'n bur¬ lesque of Irving in (Knickerbocker. * But he devoted much attention to internal improve¬ ments, repaired Fort Amsterdam, built new windmills and other structures, secured large grants from the Indians, extended the trade with the West Indies and New England and displayed many other excellent activities. He was also alert in defense of the fur trade, by which the colony was realizing large profits. In 1633 Eelkens, who had been commissary at Fort Orange, sailed up the Hudson to within a mile of the fort in an English vessel, the William, bent on a trading enterprise for Eng¬ lish capitalists. Van Twiller soon convoyed the William out to sea with the Dutch fleet and prevented the establishment of English trade upon the river. When Winthrop wrote asserting the superior title of the English to the Connecticut Valley, Van Twiller, in a (*

'VAN TYNE, Claude Halstead, American

author: b. Tecumseh, Mich., 16 Oct. 1869. He graduated at the University of Michigan in 1896, was instructor in history at the University

of Pennsylvania 1900-03 and later professor of American history at the University of Michi¬ gan. He has written (Brief History of the United States of America) (1900) ; (1905) ; edited (The

Letters of Daniel Webster > (1902), and has been a prolific contributor of historical topics to standard reference works.

VAN VLECK, Edward Burr, American mathematician: b. Middletown, Conn., 7 June 1863. He took his degree in Wesleyan Uni¬ versity (1887) ; was graduate student of mathe¬ matics (1887) ; Fellow of Johns Hopkins, and student of mathematics in Gottingen (189CL93), and doctor of mathematics, University of Gron¬ ingen (1914). He became professor of mathe¬ matics in the University of Wisconsin in 1906. He is author of (Theory of Divergent Series and Algebraic Continued Functions) (1903), and of various monographs in mathe¬ matical journals. In 1903 he became president of the American Mathematical Society and was associate editor of its publications (1905-10).

VAN WERT, van wert, Ohio, city, county- seat of Van Wert County, on the Pennsylvania and the Cincinnati, Jackson and Mackinaw rail¬ roads, about 100 miles, in direct line, northwest of Columbus and 75 miles southwest of Toledo. It was incorporated in 1848 as a town and ob¬ tained a city charter in 1903. It is in an agri¬ cultural and stock-raising region. There are about 100 factories and mills, including flour and grist-mills, bent-wood and stave factories, oil-well supply works, etc. There are two daily newspapers and two banks. Pop. 8,200.

VAN WYCK, Charles Henry, American

legislator: b. Poughkeepsie, N. Y., 10 May 1824; d. Washington, D. C., 24 Oct. 1895. He was graduated from Rutgers in 1843, engaged in law practice, in 1850-56 was district attorney of Sullivan County, N. Y., and in 1859-63 was a member of Congress. While still holding his seat in Congress he volunteered in the Union army, served under General McClellan in the Peninsular campaign and in 1865 was brevetted brigadier-general of volunteers. He sat again in Congress in

1867-71, and in 1874 removed to Nebraska, where he was a member of the State Constitutional Convention in 1876, State senator in 1876-80 and in 1881 became United States senator.

VAN ZILE, Edward Sims, American novelist: b. Troy, N. Y., 2 May 1863. He was graduated from Trinity College, Hartford, 1884, and from 1884-86 was editorial writer on the Troy Times and on the New York World from 1886-90. He was for a time manager of the Literary Bureau of the United Press and editor of Current Literature , and he has published (Wanted — A Sensation (1886) ; (The Last of the Van Slacks) (1889); (A Magnetic Man* (1890) ; (The Manhattaners) (1895) ; (Kings in Adversity* (1897) ; (Perkins the Fakeer) (1905); Unto the Sunset* (1914); (The Game of Empires > (1915).*

VAN ZORN. This comedy of New York artist life (1914), is one of two published plays by Edwin Arlington Robinson, the other being a tragedy of modern New England, called

called (The Man Against the Sky. Although Wan Zorn) has had no public performances except a series given in a hall in Brooklyn by a semi-professional company in 1917, it is not, like so many poets' plays, a chamber-drama. It is distinctly a play for the theatre, a play of ideas such as would have found a ready welcome all over the continent. It is one of a limited number of good acting plays, which are literary as well, written by Americans. Wan Zorn) is a comedy of char¬ acter, the story of a fatalist who, in an at¬ tempt to play the part of destiny in a love- affair, runs counter to a man with a destiny better than his own. The theme and the treat¬ ment are both unusual, the dialogue is brilliant and the characters, especially the men, are not theatrical types but thoroughly real people. Anyone familiar with Mr. Robinson's poetry would recognize in Wan Zorn) the author of (Richard Cory) and Wlammonde,* his philos¬ ophy and his technique — especially his bold elisions — but no more disturbingly than he would recognize the dramatist in (Merlin) or Wen Jonson Entertains a Man From Strat¬ ford^ Wan Zorn) may be classed among im¬ portant American plays even if it remains a play without a stage history.*

Edith J. R. Isaacs.

VANADINITE, a mineral of considerable importance as an ore of the rare element vana¬ dium. It is a chloride and vanadate of lead, PbBV30i2Cl. Vanadinite is a member of the apatite group and its crystals are, therefore, hexagonal with pyramidal hemihedrism. The

prismatic crystals are sharp and smooth, or, more frequently, cavernous; sometimes they are clustered in parallel groups similar to the isomorphous mineral pyromorphite. Vanadinite has a hardness of about 3 and a specific gravity varying from 6.66 to 7.23. Its lustre is resinous to adamantine. The finest speci¬ mens (from Yuma County, Ariz.) are occa¬ sionally transparent, but usually the mineral is nearly or quite opaque. The color is very vari¬ able ; rich scarlet and other shades of red grad¬ uate through dark to very pale yellow, while more rarely the mineral is brown or gray. The variety endlichite, which contains from 11 to 13 per cent of arsenic, is regarded as an isomor¬ phous mixture of vanadinite with the lead chloro-arsenate, mimetite. It occurs in magnifi¬ cent specimens in New Mexico. Other im¬ portant localities of vanadinite are at Wan-lockhead in Scotland, where it occurs in small, globular, crystalline mases, in Carinthia and Argentina.

VANADIUM. A rare element which, in its chemical behavior, is related to arsenic, phosphorus and nitrogen. Its symbol is V, its atomic weight 51.2 and its specific gravity 5.5. It was discovered by Seffstrom in 1830 and derives its name from the Scandinavian goddess Vanadis, who corresponds to Freya in the Teutonic mythology. It is never found free in nature but exists in combination, in small quantities, in copper, lead and iron ores, par¬ ticularly the latter. It is contained in vanadinite (PbCl) PbU VO<)3, and decloisite (PbTn)a (ON)VCh and is extracted wdth great difficulty. It is widely diffused in nature, being found where deposits of copper, lead and iron are found. In the United States it has been ob-

taincd from the mineral deposits of Colorado, Utah and elsewhere. It may be reduced to a free state by heating vanadium dichloride in a stream of hydrogen and appears in the form of a silver colored crystalline powder. This powder is acted upon very slowly by the air at ordinary or even elevated temperatures, but it burns brightly and produces V2O2 when ignited. It is soluble in nitric, hydrofluoric and con¬ centrated sulphuric acids, but not in hydrochloric or dilute sulphuric acids. Vanadium forms three basic oxides V2O, V2O2 and V2O3, and two acid oxides V2O4 and V2O5. The last of these is very important and appears as a red¬ dish yellow powder, which dissolves freely in alkaline hydroxides or carbonates and forms salts which are known as vanadates. Three varieties of vanadates have thus far been com¬ posed and they are known as ortho, pyro and metavanadates,

the latter being the most stable of the three. The metavanadate of sodium is a salt of considerable importance. The vanadates carry oxygen in many chemical reactions. Vanadic acid is the most important and the best known of the compounds of vanadium. It is the final product of the oxidation of vana¬ dium and bears to that element the same re¬ lation which phosphoric arsenic and antimonic acids bear to their respective metals. Vanadic acid parts readily with its oxygen and receives it again as readilv from other substances. Thus when vanadic acid is taken into the blood it is first converted into hypovanadic acid, but when it is subsequently combined with the ox¬ yhemoglobin of the blood it is raised to hyper- vanadic acid. Metovanadic acid may exist in free condition in the form of a beautiful golden yellow substance which is sometimes used as a substitute for gold bronze. Ammonium meta¬ vanadate is used in the manufacture of the dye which is known as aniline black and also in the manufacture of vanadium ink. Thus while vanadium itself is a metal of no particular im¬ portance technically, its various combinations have a very decided value from manv points of view. In addition to the uses which were men¬ tioned in the preceding paragraphs it is im¬ portant to note the following: the pentoxide of vanadium is useful in photography as a de¬ veloper, the chloride and the trioxide are used as mordants in the manufacture of print cloths, the trioxide is also employed in the manufacture of steel and in the composition of malleable and ductile alloys.

Vanadium has also been used to a moderate extent as a therapeutic agent, the pentoxide (hypervanadic acid) being given in diseases which are due to defective metabolism, but it is a substance in the use of which there may be decided danger and there does not seem to have been enough clinical evidence thus far to justify its frequent use. It is not mentioned in the list of approved medicinal substances which is to be found in the last edition of the United States pharmacopoeia. There are those, however, who advocate its use therapeutically among whom may be mentioned Laran, Lyonnet, Martz, Mar¬ tin, Helouis and Delarne. The physiological action of vanadium salts has been investigated by Platt (Lancet , 15 Jan. 1876), by Gamgee and Larmuth (Journal of Anatomy II, 2, 1879) and by Priestley and Gamgee (Philo¬ sophical Transactions, Vol. 166, p. 12). Kobert and others ((Lehrbuch der Intoxikationen,*

309, 1893) have written in regard to its therapeutic action. Weber ((Revue de clinique et de thirapic, 1898) and Helouis and Delarne UCongris pour l'etude de tuberculoses p. 895, 1898, des comptes rendus et memoires*) have described its effect upon sick animals, especially upon horses, to which it was administered suc¬ cessfully*

in an epidemic in which the note¬ worthy symptoms were great emaciation and exhaustion.

The most extended investigations to deter¬ mine the therapeutic value of vanadium were made by Laran ((Lyon Medical xc, 1899). His experiments upon animals were made with guinea pigs, frogs, rabbits and dogs and he used a 5 per cent watery solution of meta¬ vanadate of soda with a sufficient quantity of physiological salt solution added. The conclu¬ sions at which he arrived after a very exhaust¬ ive consideration of the subject were as fol¬ lows :*

1 Vanadium compounds oxidize very readily and hence are of great value in the industrial arts.

2 Metavanadate of soda is very poisonous.

3 This salt has very little effect, in vitro, upon the digestive fluids, blood sugar, yeast and microbes.

4 In spite of its toxicity it can be given to human beings, by mouth, in doses of one to five milligrams, during the 24 hours. It is desirable to intermit its administration for two or three days during the week. It is a tasteless sub¬ stance, but is easily tolerated when it is given in the manner which was indicated above.

5 It almost always increases the appetite, the strength and the weight.

6 The urine is slightly increased by its use, there is also an increase in the urea and in the coefficient of nitrogen oxidation. In dia¬ betes it will lessen the formation, but only temporarily.

7 It stimulates the process of internal com¬ bustion and causes constant change in the blood by oxidation, the formation of vanadic acid being followed by that of hypovanadin, the latter being, therefore, an acid bearer to the tissues.

8 Metavanadate of soda has a certain value as a therapeutic agent, its action being similar to that of arsenic.

It could, therefore, be properly recommended to those who are suffering with poor nutrition or with various constitutional troubles, includ¬ ing tuberculosis, chlorosis, rheumatism, soften¬ ing of the arteries and enlargement of the veins.

Poisonous effects may be produced by its absorption when used

medicinally, when taken accidentally or when exposed to its vapors, the latter occurring frequently to those who are workers in vanadium. The lesions which re¬ sult from poisoning with vanadium are to be found chiefly in the lungs, the kidneys and the gastro-intestinal tract.

Those whose employment constantly exposes them to the influence of vanadium are frequent sufferers with tuberculosis in a form which dispose them to the occurrence of severe or even fatal haemorrhage. Such workers also suffer constantly with irritation of the nose, throat and eyes. See Mineral Production of the United States.

VANBRUGH, van-broo', Sir John, Eng¬ lish architect and dramatist: b. London, 1664;

d. 26 March 1726. He was educated in Eng¬ land and in France, entered the English army in 1686 and from 1690 till 1692 was a prisoner in France, being latterly confined in the Bastile. He acquired his knowledge of architecture dur¬ ing his residence in France. His first play, (The Relapse or Virtue in Danger) was brought out at Drury Lane in 1697. (2Esop,) founded on a French original, followed at a short interval and in May of the same year his play of (The Provok'd Wife) was performed. In 1700 he adapted Beaumont and Fletcher's comedy of and became charged with the erection of Blenheim Palace for the Duke of Marlborough. This work got him into con¬ siderable pecuniary trouble, as the money sup¬ plies, provided out of the civil list, were latterly stopped and heavy claims were made against him. Ultimately the duchess took the work out of his hands and he had difficulty in getting the money that was justly due. He built many other mansions for the nobility, for which he must have received considerable sums. From 1702 to 1711 he was comptroller of the board of works. In 1714 he was knighted by George I, in the following year appointed comptroller of the royal works and in 1716 architect of Greenwich Hospital. Vanbrugh's plays are ad¬ mirable in dramatic conception as well as in wit, but are stained with the coarse profligacy of his day. His architectural works have been praised by many but they can only be looked upon nowadays as the most pronounced ex¬ amples of the heavy English Baroco style. Con¬ sult Ward, (Sir John Vanbrugh) (1898) ; Dametzi, (John Vanbrugh's Leben und Werke)

(1898).

VANCE, vans, Louis Joseph, American magazine contributor and novelist: b. Washing¬ ton, D. C., 1879. He was educated at the Poly¬ technic Institute in Brooklyn, N. Y., and in 1900 began writing descriptive stories and poems for the magazines. His work sprung into prompt popularity and in 1907 he pub¬ lished a novel, (The Brass Bowl, which estab¬ lished his reputation. He has also written (The Bronze BelP (1908) ; (The Black Bag) (1909) ;*

VANCE, Zebulon Baird, American politi¬ cian: b. Buncombe County, N. C., 13 May 1830; d. Washington, D. C., 14 April 1894. After ob¬ taining an education at Washington College, Tenn., and the University of North Carolina, studying law and being admitted to the bar in 1853, he established himself in practice in Ashe¬ ville, N C. The next year (1854) he was sent to the State legislature and in 1858 was elected to Congress to fill the vacancy caused by the resignation of Representative Clingman. He was opposed to secession, but at the opening of the Civil War adopted the Confederate cause and became colonel of the 26th North

Carolina regiment. He was elected governor in 1862 and re-elected in 1864 and in 1870 was elected to the United States Senate, but not being allowed to take his seat there on account of his political disabilities not having been re¬ moved, he resigned in 1872. In 1876 he again became governor, and being elected to the United States Senate in 1879 retained his seat until his death. Consult Dowd, (Life of Zeb¬ ulon B. Vance (1897).*

VANCOUVER, George, English naviga¬ tor: b. 1758; d. Petersham, Surrey, 10 May 1798. He was appointed to the Resolution by Capt. James Cook in the autumn of 1771 and on his re¬ turn from a voyage around the world (1772-74) assisted in the equipment of the Discovery and as midshipman accompanied Cook on his last voyage to the North Pole, which was concluded in October 1780. During the following decade he was promoted and 1 Jan. 1790 he was ap¬ pointed to the Discovery, built for exploration in the South Sea, but the Nootka Sound dis¬ pute caused the abandonment of the project and Vancouver was placed in command of the Courageux, one of the ((Spanish armament.® On 15 Dec. 1790 he was promoted to commander and assigned to the Discovery. It was then de¬ cided to dispatch an officer to Nootka Sound (

VANCOUVER, Canada, the largest city and chief seaport of British Columbia, the fourth city of Canada in population, is situated on the Gulf of Georgia opposite Vancouver Island on the northern Pacific Ocean. Its chief harbor front is on Burrard Inlet, a spacious sheet of water, entered by a passage between Stanley Park and North Vancouver, and extending some 20 miles into the interior. Other water fronts are English Bay, from which ships may enter another arm of the sea called False Creek, on which are shipyards and other industrial estab¬ lishments. Vancouver is the western terminus of the Canadian Pacific Railway, and of the government transcontinental system known as the Canadian Northern. It is also one of the Pacific

terminals of two United States railways, the Great Northern and the Northern Pacific.

History. — The history of Vancouver as a city begins with 1885, when the Canadian Pacific Railway Company established its terminus there. Before that time the site was covered with forest of the type now seen in the adjoining Stanley Park. The first important industry es¬ tablished at Vancouver was the Hastings lumber

mills, a large plant on the harbor front whose furnace fires have not been extinguished in a third of a century. On 13 June 1886 the young city, which had been incorporated four months before, was entirely swept away by fire, but it was quickly rebuilt, and, except for brief inter¬ missions which mark the advance of all new cities, its growth in population, commerce, in¬ dustry and wealth has been rapid and continu¬ ous.

Commerce and Industry. — The trade of Vancouver has steadily increased. Exports in the fiscal year 1912 were $8,000,000. In 1916 they had increased to $15,000,000. In 1917, $29,- 000,000; in 1918, $31,000,000; in 1919, $37,000,- 000. Imports from 1916-19 were $20,000,000, $29,000,000, $41,000,000 and $47,000,000. There is a large provincial coastwise trade not in¬ cluded in these returns.

In the year ending March 1919, 1,332 sea¬ going vessels of 1,760,000 tons and 9,880 coast¬ ing vessels of 3,400,000 tons entered the Port of Vancouver. Regular steamship services include Canadian Pacific lines to China, Japan and Manila, the Blue Funnel line to the same countries, a line to Australian and New Zealand ports and to Honolulu, two lines to Shanghai, Hongkong and other Chinese ports; a Jap¬ anese line between Vancouver and various Asiatic ports, several lines connecting Van¬ couver by way of the Panama Canal with British and Mediterranean ports, South Africa, New York and ports in Eastern Canada and the West Indies. Between Vancouver, Victoria and Seattle there are double daily services by one line and daily services by others, while there are regular sailings between Vancouver and many points north and south on the mainland and on Vancouver Island. Halibut fleets and other fishing vessels operate from the port and tramp steamers from all countries may be seen in the harbor.

Among the leading industries are lumber and woodworking establishments, shipbuilding in steel and wood, sugar refining, engineering and machine works, shoe factories, assaying and metal refining, meat, fish and fruit packing, furniture factories and all the local industries which belong to a seaport and distributing cen¬ tre. The Canadian Pacific Railway has an ex¬ tensive system of wharves with over 600,000 square feet of area and 350,000 square feet of sheds. The Dominion government has a large wharf with sheds and grain elevators and is now undertaking a large program of wharf construction and the establishment of a dry- dock. There are numerous private wharves and warehouses. The harbor is administered by a commission appointed by the Federal govern¬ ment. Customs duties collected at the port in 1919 were $8,740,000, inland revenue $588,000, postal revenue $727,000, bank clearings for the year $577,000,000.

Public Utilities. — Transportation within the city, in the suburbs and up the Fraser River some 60 miles is handled by the British Columbia Electric Railway, which company also supplies electric light and power from its water¬ works at Lake Buntzen. Power is also ob¬ tained from the Western Power Company, with works at Stave Lake, and there are almost un¬ limited natural sources of water power available for further production. ‘ The water supply for the city and the surrounding municipalities is

taken from the Capilano River, which flows from a neighboring mountain. Pipes are laid to reservoirs high above any present or possible settlement so that the water is always pure and cold.

Public Buildings. — While Vancouver does not boast many splendid public buildings, some of these are in keeping with the growth and am¬ bitions of the city. The Canadian Pacific Rail¬ way station, rebuilt in 1917-18, is a large and at¬ tractive building. The Government Railway depot, opened for traffic in November 1919, is a fine structure costing over a million dollars, and near it is the station of the Great Northern which cost $500,000. These two buildings and the railway yards are situated on land several hundred acres in extent reclaimed from the tide flats of False Creek, part of which area is reserved for commercial and industrial estab¬ lishments and part for gardens and open ground.

The Hotel Vancouver, which was greatly en¬ larged and remodeled in 1917-18, is said to be the largest hotel in Canada. The General Pub¬ lic Hospital is the largest in the dominion and accommodates the greatest number of patients. All the larger Canadian banks are

represented in Vancouver and three or four of them have erected spacious office buildings. The court¬ house, built about 1910 at the cost of $1,000,000, is perhaps the finest public building in the city. There are several large churches, but none that are conspicuous for their architectural beauty.

Education. — The University of British Co¬ lumbia, now occupying temporary quarters within the city limits, is to have its permanent home some six miles out at Point Grey, on a headland overlooking the sea in two directions and commanding a remarkable view of the city and of the coast and mountains. On this site of over 500 acres some of the buildings are partly erected. University classes were opened in 1915 with 379 students. The attendance of undergraduates in 1919 was 890 with several hundred returned soldiers and others taking partial or vocational courses. The staff of in¬ struction numbers 70, with faculties in arts, ap¬ plied science and agriculture and a department of nursing, established in 1919. It is the policy of the province not to give degree-conferring powers to any other institution nor to encourage the foundation of competing schools. The Uni¬ versity is supported by annual votes of money and is administered by a board of governors ap¬ pointed by the provincial government and by a senate largely elected by a convocation of uni¬ versity graduates. Vancouver has a good equip¬ ment of public schools and high schools and in 1919 was taking special interest in the establish¬ ment of technical institutions. The public school population in 1919 was 17,000.

Government. — The city is administered by a mayor and council of eight aldermen elected by wards. For several years after 1910 its revenues were nearly all provided by taxes on real estate with improvements exempt. Van¬ couver has been cited by single-tax advocates as an example to be imitated. But after the phenomenal advance in real estate values came to an end and more stable conditions arrived, the policy was modified, and at the time of writ¬ ing improvements are taxed on half their value. Vancouver is represented in the Canadian House of Commons by two members, elected by separate districts, and in the provincial legis-

VANCOUVER

n *1 v &

ft tf ft **.. » it if %

II # » m

HH

I

4m

mˆmm

xxissm

-

1 Business District, Vancouver, Canada. Corner of Granville and Hastings Streets, showing the Bank of Commerce ˚n the ˚J.®ress street, Vancouver, Canada. Looking up Granville Street, showing the Post Office on the right

VANCOUVER

1 View of Marine Drive, Vancouver, Canada. Parking place at Point Grey from which is viewed English Bay and the Straits of Georgia. Islands of Howe Sound in foreground and Vancouver Island in the distance

2 Driveway in Stanley Park. This motor road encircles the park and is nine miles in length. This park is situated within a 15 minutes' walk from the centre of the city

lature by six, who are elected by the citizens at large.

Parks, Recreation Centres, etc. — The

pride and boast of Vancouver is Stanley Park, a forest of 900 acres with a few small clearings, one of which is an athletic field and another is occupied by a garden and zoo. The park is kept as nearly as possible in a state of nature except that walks and drives have been pro¬ vided. This wood is on a point extending into the bay and a seven-mile drive around follows the curves of the shore. There are trunks of trees 30 to 40 feet in circumference in this park, and one of the paths leads by a close cluster of 10 or a dozen trees from 7 to 10 feet in diam¬ eter. Vancouver is noted among other things for its bathing beaches, of which there are three or four within the city limits under the admin¬ istration of a park commission. Every after¬

noon in summer these are thronged with thou¬ sands of children and adult bathers.

The city is the seat of an Anglican bishop and a Roman Catholic archbishop.

Population. — The population in 1891 was 13,709; in 1901, 27,010; in 1920, 125,000. It is now considerably larger, though th© growth may not have been in the present decade so rapid as in the last. These figures relate to the incorporated city alone. Meanwhile there has been a considerable overflow into new municipalities included in ((Greater Vancouver.® The most fashionable residential district, called Shaughnessy Heights, though nearer the heart of the city than some of the wards, is part of the Corporation of Point Grey. There is only a street between the city and South Vancouver, which had in 1911 a population of 16,126. Across Burrard Inlet is North Vancouver with a population in 1911 of 8,196. It is expected that some, or all of the municipalities will before long be incorporated with Vancouver into one city. About 70 per cent of the population is of British origin. In 1911 there were 3,480 Chi¬ nese, 373 Hindus and 1,992 Japanese, but since then the Oriental population has increased.

S. Dunn Scott,

Staff of the Vancouver Daily Province.

VANCOUVER, Wash., city, county-seat of Clarke County on the Columbia River and on the Vancouver, K. and Y., and the Northern Pacific railroads, about eight miles north of Portland, Ore. It has steamer connection with the Columbia River ports and with a number of the Pacific ports. It was founded in 1828 by the Hudson's Bay Company and in 1858 was in¬ corporated. It is in a region noted for its ex¬ tensive lumber interests. There are many good farms nearby and considerable attention is giyen to raising livestock. The chief manufacturing establishments are lumber mills, flour mills, breweries, brick works and machine shops. The United States Military Department of the Columbia has its headquarters here and the Vancouver Barracks, established in 1849, is one of the best army posts in the country. In the centre of the city is a pretty park and the principal public buildings are the county court¬ house, the House of Providence, a hospital, and the schools. The educational institutions are a public high school, founded in 1889, a private high school, Providence Academv (Roman Catholic), Saint James College, public and parish elementary schools, a public library and

two school libraries. A United States Land Office is here and a regular army garrison. The government is administered under a charter of 1890 which provides for a mayor, who holds office one year, and a city council. It has one daily and two weekly newspapers and good banking facilities. Pop. (1920) 12,637

VANCOUVER BARRACKS, military post in the State of Washington, eight miles from Portland, Ore., established in 1848. The reservation includes 640 acres and is on the right-hand bank of the Columbia River.

VANCOUVER ISLAND, Canada, an is¬ land on the west coast, in the Pacific Ocean, opposite and at no great distance from the west shore of British Columbia, of which province it forms part; length, 285 miles; breadth, from 40 to 80 miles ; area, about 20,000 square miles. It has no navigable rivers, but several deep arms of the sea project far inland, forming good har¬ bors. One of the chief of these is Nootka Sound, an inlet on the west coast discovered by Captain Cook in 1778. The sound extends in a northeast direction about 10 miles inland, but in no part is it more than 500 yards broad; it embraces several islands, the largest being called Nootka, famous for the Nootka Conven¬ tion of 28 Oct. 1790 which averted war between Spain and Great Britain, consequent on a Span¬ ish seizure of British vessels at Nootka the year previously. A granite monument on a rocky islet facing the entrance to Friendly Cove, erected in 1903 by the Washington University State Historical Society, commemorates the meeting of Quadra and Vancouver, the Spanish and British commissioners whose joint names Vancouver Island bore as a title for half a cen¬ tury. A mountain chain traverses Vancouver Island from southeast to northwest at an average height of between 2,000 and 3,000 feet, the highest point being Victoria Peak, 7,484 feet in the northern half of the island. Coal is worked at Nanaimo and gold, copper and iron ore and other valuable minerals are found. Forests are numerous and the timber trade is important. Horses, cattle, sheep and pigs thrive well. The puma, the bear, the wolf, two kinds of deer, the marten and other fur-bearing ani¬ mals exist in the less settled parts of the island; partridges, snipes and many varieties of wild¬ fowl are found. The seas and lakes abound with fish. The climate is damp and cold. The harbor of Esquimalt (q.v.), on the southeast coast of the island, is one of the finest in the continent and is the chief Pacific station of the British fleet. Victoria (a city of 60,000) is the chief town and the capital of British Columbia. A railway connects Victoria with Esquimalt and the great coal-shipping port of Nanaimo, opposite Vancouver (q.v.), which is on the mainland. Pop. about 60,000, including some*

10,000 Wakash Indians.

VANDAL, van-dal, Louis Jules Albert,

French historian: b. Paris, 7 July 1853. He was educated at Paris, and appointed to a pro¬ fessorship in the Ecole des Sciences Politiques. His first literary work was a book of travel, (En Karriole a travers la Suede et la Norvege). He has devoted himself mainly to writing diplomatic history, making an exhaustive study of state documents. His works in this field are distinguished for elegance of literary form as well as for accuracy in detail and a scholarly

grasp of his subject. They include (Louis XV et Elizabeth de Russie) (1882) ; (Ambassade frangaise en Orient sous Louis XV5 (1887) ; (Napoleon et Alexandre P (1891-93) ; (L'Ody- see d'un Ambassadeur) ; he has also dealt with the internal history of France in his (Le 18. Brumaire) and (La conquete de Paris par Bonaparte.5 In 1897 he was elected a member of the French Academy to succeed Leon Say.

VANDALIA, van-da'li-a, Ill., city, county- seat of Fayette County, on the Kaskaskia River, and on the Illinois Central and the Terre Haute and Illinois railroads, about 60 miles northeast of Saint Louis, Mo. It was settled in 1816, and was the capital of the State from 1818 to 1836. The city is in a fertile agricultural region in which considerable attention is given to stock- raising. The chief industrial establishments are a paper mill, foundry, tarring plant, wagon factory, manufactory of butchers' blocks, brick works, stave factory and machine shops. The principal buildings are the old capitol, the coupty courthouse and several business blocks. The educational institutions are a high school, public graded schools and a public library. The government is vested in a mayor and common council. The city owns and operates the water¬ works. There are three newspapers and ex¬ cellent banking facilities. Pop. (1920) 3,316.

VANDALS, van'dalz, a German nation or confederation, probably allied to the Goths, who occupied at an early period the country of North East Germany on the south of the Baltic, between the Oder and the Vistula. At a later period they appear to have descended into Silesia, and occupied the country about the Riesen Mountains. In the

Marcomannian War they attacked Pannonia in conjunction with the Marcomanni and the Quadi. In the reign of Constantine they had migrated or spread them¬ selves into Moravia, whence they were trans¬ planted to Pannonia, from which they mi¬ grated again, taking an eastward direction, into Dacia. In 406 they joined a confederate Ger¬ man host which crossed the Rhine into Gaul, and from thence, after Gaul had been ravaged, the Vandals found their way into Spain, in which they established themselves under their chief Godigiselus. In Galicia they contended with success with another barbaric horde of in¬ vaders belonging to the Suevi, and having van¬ quished a confederate army of Goths and Ro¬ mans, they advanced still farther, and seized and ravaged Seville and Carthagena. Under Genseric, who had newly assumed the leader¬ ship, they crossed to Africa. In 429 they van¬ quished the Roman governor and established a kingdom, which spread over the greater part of the Roman possessions on that continent. Gen¬ seric immediately began to revive the maritime glories of Carthage, diligently cultivating the means of maritime warfare and extending his conquests to Sicily, Sardinia and Corsica. He also invaded Italy and sacked Rome in 455. The atrocities of the Vandals on this occasion have been a favorite subject of declamation, but Gibbon shows them to have been much ex¬ aggerated. Genseric concluded a long reign in peace in 477. The kingdom of the Vandals was continued under his descendants — Hun- neric. his son, who immediately succeeded him ; Gundamund, 484; Thrasimund, 496; Hilderic, 523 ; Gelimcr, 530. It was overthrown in 534

by Belisarius, the general of the eastern Em¬ peror Justinian. The Vandals adopted the Arian faith, and persecuted the orthodox Chris¬ tians. Consult Gibbon, (Decline and Fall of the Roman Empire- ; Schmidt, (Alteste Ge- schichte der Vandalen) ; Procopius, (History of his own Time.5 See Huns.*

VANDAM, Albert Dresden, English jour¬ nalist ; b. London, March 1843. He was edu¬ cated in Paris, and during the Franco-German War was correspondent for several American journals. After living in London (1871-82) en¬ gaged in literary work, he became the Paris correspondent of the London Globe in 1882. He returned in 1887 to London, where he has since resided. He is the author of SAmours of Great Men5 (1878) ; (An Englishman in Paris5 (1892) ; (My Paris Note Book5 (1894) ; (French Men and French Manners5 (1895) ; Undercurrents of the Second Empire5 (1896) ; (A Court Tragedy5 (1900), etc.

VANDENHOFF, van'den-hof, George. American actor : b. England,

18 Feb. 1820. He made his first appearance on the stage in Eng¬ land in 1839, came to the United States in 1842, and continued on the stage with great success, but in 1856 he retired, studied law, and was ad¬ mitted to the bar in 1858. He afterward en¬ gaged in giving readings and as a teacher of elocution. He published (The Art of Elocu¬ tion5 (1846); (Leaves from an Actor's Note- Book5 (1860) ; (Rules for Reading Aloud5 (1862), etc.

VANDER VEER, Albert, American sur¬ geon: b. Root, N. Y., 10 July 1841. He studied medicine in the Albany Medical College, and in the Medical Department of Washington Uni¬ versity, where he took his degree (1862). His honorary degree came from the Albany Medi¬ cal College in 1869. He was surgeon in the 66th New York Volunteers in the Civil War, and he was connected with the teaching force of the Albany Medical College from 1869 to 1905. He was surgeon in chief of the Albany Hospital, consulting surgeon at Saint Peter's Hospital; was elected regent of the University of the State of New York (1895) and became vice-chancellor (1915). He is the author of numerous professional papers dealing especially with abdominal and uterine surgery.

VANDERBILT, van'der-bilt, Cornelius,

American capitalist: b. near Stapleton, Staten Island, N. Y., 27 May 1794; d. New York, 4 Jan. 1877. He was the son of a farmer, re¬ ceived but little school education, and at 16 purchased a ferryboat with which he carried passengers and farm products between Staten Island and New York. Two years later he had control of three boats, and his ferry was well established. It was not long before he was ex¬ tensively engaged in transportation enterprises, and he came to be popularly called (

was said to^ have returned him $10,000,000. During the Crimean War, when English ship¬ ping forsook the seas, he established a steam¬ ship line between New York and Havre, France. A little later he began to transfer his capital from water traffic, and entered upon a career of railroad financiering and management, buying in 1863 a great part of the New York and Harlem Railroad, afterward obtaining con¬ trol of the Hudson River Railroad and of the New York Central, becoming president of the last-named in 1867. All these lines he managed with great ability, securing marked improve¬

ment in their organization and service. Hav¬ ing in 1869 consolidated the line of the New York Central and the Hudson River roads, he extended his system to Chicago by obtaining interests in the Lake Shore, the Canada South¬ ern and the Michigan Central lines. During the Civil War he presented the steamship Van¬ derbilt to the United States government, and for this patriotic act received a gold medal from Congress. Among his public benefactions the most noteworthy was his contribution of $1,000,000 for the founding of Vanderbilt Uni¬ versity (q.v.). His fortune was estimated at about $100,000,000, the bulk of which he left to his son, William H. Vanderbilt.

VANDERBILT, Cornelius, American finan¬ cier : b. New Dorp, N. Y., 27 Nov. 1843; d. 12 Sept. 1899. He was privately educated; entered a broker's office, and later became treasurer of the Harlem Railroad. He became first vice-president of the New York Central and Hudson River Railroad (1877) when his father assumed control, and was elected presi¬ dent of the Canadian Southern (1883) when his father retired, and chairman of the board of directors of the New York Central, and of the Michigan Central roads. He gave large sums to the educational and religious institu¬ tions of his time including the Cathedral of Saint John The Divine. He left a fortune esti¬ mated at $70,000,000.

VANDERBILT, George Washington,

American capitalist: b. New Dorp, Staten Is¬ land, N. Y., 14 Nov. 1862; d. Washington, D. C., 6 March 1914. He was widely known for his establishment near Asheville, N. C., of a vast private park of 100,000 acres known as Biltmore, on which he erected a magnifi¬ cent mansion designed by Richard Morris Hunt (q.v.). He built and presented to New York the 13th street branch of the Free Circu¬ lating Library, and gave the New York Teach¬ ers' College its site on Morningside Heights.

VANDERBILT, William Henry, Ameri¬ can capitalist: b. New Brunswick, N. J., 8 May 1821; d. New York City, 8 Dec. 1885. He was educated in the grammar school of Columbia College ; in 1838 he engaged in business, but in 1842 "failing health caused his retirement to a farm at New Dorp, N. Y. Later he was ap¬ pointed receiver and became president of the Staten Island Railroad, and (1877) on his father's death, president of the New York Central Railroad. He resigned (4 May 1883) his office as president of the Vanderbilt system and his two sons were educated to succeed him. He gave much money to educational in¬ stitutions in his lifetime,

and in 1881 presented $103,000 for the removal of the obelisk from Alexandria, Egypt, to Central Park, New York.

VANDERBILT UNIVERSITY, a co¬ educational institution of higher learning, lo¬ cated at Nashville, Tenn., founded by Cornelius Vanderbilt of New York, who in 1873 made a donation of $500,000 which was afterward in¬ creased to $1,000,000. The charter of the university was taken out in 1872 in the name of Central University. In 1873 the name was changed to Vanderbilt University. Work began in 1875 with four departments, law, medicine, theology and arts. In 1879 the de¬ partments of dentistry and pharmacy were added, and in 1886 the department of engineer¬ ing. These seven departments indicate the present organization of the university. The continued growth of the university has been made possible by gifts of various members of the Vanderbilt family, especially by William H. Vanderbilt, son of the founder, and by Cor¬ nelius Vanderbilt, F. W. Vanderbilt and Wil¬ liam K. Vanderbilt, all grandsons of the founder. A large number of gifts have also been made by others, the most notable of which was a gift of $1,000,000 to the School of Medi¬ cine, made by Andrew Carnegie in 1913. At present the productive funds of the university amount to $3,600,000. Other property amounts to $1,450,000. The annual income is $300,000. The number of students (1919), 1,000. The main campus of the university is situated in the West End portion of Nashville, and comprises a tract of 75 acres, justly celebrated as one of the most beautiful college sites in the world. Here the wotk of all departments is done except medi¬ cine and dentistry. These are located on a special campus of 14 acres in the southern part of the city, near the City Hospital. The Col¬ lege of Arts and Science has maintained from the beginning a high standard for admission and graduation, and has exercised an unusual influence on education in the South. The work of the freshman year is required. After that, all work is elective, but students are required to arrange their courses around some central group of studies. The degree of B.A. is given for all courses, although B.S. may be given for specialization in the natural sciences. The uni¬ versity is coeducational, but no special effort has been made to increase the attendance of women. It is, therefore, known chiefly as a college for men.

Vanderbilt University has 3,250 names on its register of those who served in the Great War. Worthy of special mention is the hospital unit which rendered efficient service in France. Vanderbilt University was originally affiliated with the Methodist Episcopal Church, South. An effort to bring it entirely under the control of the church was resisted by the trustees, whose position was sustained by a decision

of the Supreme Court of the State of Tennessee in 1914. Since then the university has con¬ sidered itself independent and undenomina¬ tional.

Bishop H. N. McTyeire was the first presi¬ dent of the Board of Trust, and in that capacity the chief executive officer of the university until his death in 1889. After his death the chancellor succeeded to most of his duties and responsibilities. The first chancellor was Dr. Landon C. Garland, who was succeeded in 1893 by J. H. Kirkland, who had previously held the professorship of Latin.

✓

VANDERGRIFT, van-der'gnft, Pa., bor¬ ough in Westmoreland County, on the Kis- kiminetas River, and on the western Pennsyl¬ vania division of the Pennsylvania Railroad, 25 miles east of Pittsburgh. It is situated in a beautiful valley and is noted for its manufac¬ ture of sheet steel, the Apollo Iron and Steel Company, now absorbed by the United States Steel Corporation, being situated here, and is one of the largest steel plants in the world, having eight open hearth furnaces, a gigantic continuous bar mill, 29 complete sheet mills and a large plant for galvanizing the sheets. Natural gas is used as fuel. The mills have an out¬ put of 45 carloads of finished steel a day. The town has graded schools and a high school es¬ tablished in 1900; a public library and eight churches. There are two newspapers and good banking facilities. Vandergrift was founded by the Apollo Iron and Steel Company on 650 acres of land, upon which they erected their works in 1896 and 1897. The value of the works is estimated at $5,500,000. The town is very remarkable as a successful demonstration of the economic principles and is known in the iron world as the <(workingman's paradise.® The town was laid out and sewered, and water, electric light and gas plants built, streets paved, trees planted, etc., before a single lot was sold to the employees. Nearly all the homes in the town are owned by those who live in them, ana every lot of land was sold with a stipulation in the deed that no liquors should be sold on any of them for 99 years. The mills have never closed down since they were started, except at intervals for repairs. The workmen are well paid and of unusual intelli¬ gence, and belong to no labor union, and the town has never had any labor disturbances. A borough was formed in 1915, taking

in most of the town and known as Vandergrift Heights. Pop. (1920) 9,531.

VANDERLIP, Frank Arthur, American banker: b. Aurora, Ill., 17 Nov. 1864. His boy¬ hood was spent on a farm, and after a country school education he became an apprentice in a machine shop of his native town. He studied stenography nights and next was employed as reporter on a local newspaper. He was for some time student at the University of Illinois and the Chicago University. He was succes¬ sively reporter and financial editor on the Chi¬ cago Tribune (1890-94) ; associate editor of the Chicago Economist (1894-97). He became private secretary to Lyman Gage, Secretary of the Treasury, 4 March 1897, but his knowledge of finance and his executive ability were quickly noted and on 1 June of the same year President McKinley appointed him Assistant Secretary of the Treasury. He resigned this office in 1901 to become vice-president of the National City Bank of New York, of which he has been president since January 1909. In 1901 Vanderlip visited Europe to study financial and industrial conditions, and in 1902 he went as delegate to the International Conference of Commerce and Industry, held at Ostend, Bel¬ gium. He is identified with many financial and commercial enterprises. Shortly after the entry of the United States into the World War he was made chairman of the War Savings Com¬ mittee, and in September 1917 he was appointed by the Secretary of the Treasury McAdoo to

conduct the sale of War Savings Certifi¬ cates. He has written (The American Com¬ mercial Invasion of Europe) (1902) ; (Busi¬ ness and Education) (1907) ; (Modern Bank- ing> (1911) ; (Business and Politics> (1915) ; ˆInternational Banking® of the section Banks and Banking in this Encyclopedia; also many important papers on finance and economics.

VANDERLYN, John, American artist: b. Kingston, Ulster County, N. Y., 1776; d.

there, 23 Sept. 1852. He was a pupil of Gilbert Stuart and patronized and helped by Aaron Burr, was enabled to go to Paris in his 20th year, where he studied for five years and there practised his profession for 12 more. His (Marius Among the Ruins of Carthage) was awarded a gold medal by Napoleon I. An¬ other famous picture of his is the (Ariadne in Naxos,) now in the Pennsylvania Academy of Fine Arts. This is one of the finest nudes which have appeared in the history of American art, being simple and natural in treatment, pure and delicate in tone and line and tenderly pathetic. As a

portrait painter he achieved successes not unworthy of his master Stuart. Among his sitters were Washington, Monroe, Madison, Calhoun, Clinton, Zachary Taylor and Aaron Burr. He also painted for the last-mentioned friend a portrait of himself now in the New York Metropolitan Museum of Art. Neverthe¬ less he failed in meeting with the success and appreciation he desired and expressed his bitter disappointment by declaring ((no one but a pro¬ fessional quack can live in America.® Poverty and discouragement appear to have crushed and paralyzed his energies, and in the autumn of 1852 he returned to his birthplace so poor that he was forced to borrow a shilling to pay for the expressage of his trunk to the town. He asked for a bed at the hotel and next morn¬ ing was found dead.

VANDERVELDE, Emile, Belgian Social¬ ist, statesman and author : b. at Ixelles, 1866. He took his degree as doctor of laws in the Uni¬ versity of Brussels (1885) and became doctor o i social science in 1888 when he founded the circle of student Socialists. He became a mem¬ ber of the International Socialist Bureau and was elected a deputy for Charleroi (1894) and was again chosen from Brussels (1900-06). He took a prominent part in the Great War, be¬ came the premier of the Belgian war ministry and was a member of the commission which came to the United States in September 1914 to make a protest to the American President against the German maltreatment of that people. His writings are noted for their clearness and precision and in¬ clude (Les Associations professionelles d'ar- tisans et d'ouvriers en Belgique (1892); (La question agraire en Belgique) (1897) ; (Le socialismˆ en Belgique) (1898); C'Alcoolism et les conditions du travail en Belgique* (1899); (La propriete fonciere en Belgique) (1900) ; (L'Exode rural et le retour aux champs1* (1903) ; (Le socialisme et l'agriculture* (1906) ; (La Belgique et le Congo* (1911); also an English translation Collectivism and Indus¬ trial Revolution (1901).*

VANE, Sir Henry, English statesman, fourth governor of Massachusetts : b. Hadlow, Kent, 1612; d, Tower Hill, London, 26 May

1662. He studied at Magdalen Hall, Oxford, and also for a time at Geneva or Leyden ; was a member of the retinue of the English Am¬

bassador to Vienna in 1631, and after his re¬ turn was so decided in his opposition to the doctrine and ceremony of the Established Church that he sailed for New England to ob¬ tain freedom of conscience. With royal license permitting a three-years' residence, he arrived at Boston 6 Oct. 1635. He was at the time a joint commissioner representing Lord Saye and Sele, Lord Brooke and the other patentees of Connecticut. On 1 November he was admitted a member of the church of Boston, on 3 March 1636 received the freedom of the colony (that is, was made citizen). He had already taken some part in its political affairs, having effected a conference for the adjustment of differences at which articles were drawn up for the guid¬ ance of magistrates. He was elected governor 25 March 1636. The ((fifteen great ships® then in harbor, according to Winthrop ((History of New England, ed. Savage, 1825), <(congratu- lated his election with a volley of great shot.® One of his first acts after induction into office was to make an agreement with the captains of these vessels as to the government of shipping. A difficulty arose through the request of the officers of British vessels that the king's colors might be flown from the fort. All the magis¬ trates, with one exception, were opposed, since the flag contained the cross which Endicott had but recently cut away. Reply was made that there was no king's flag in the colony, but the captains supplied one and it was hoisted on the authority of the governor and his supporter in the council. At the outbreak of the Pequot War Vane joined Roger Williams in influenc¬ ing many Indian tribes to refrain from hostili¬ ties. On 21 October he concluded a satisfac¬ tory treaty with Miantonomo, sachem of the Narragansetts. But in his interposition in ec¬ clesiastical matters he was far less successful. The Antinomian controversy was reaching a critical stage and the colony was divided into two hostile camps, one holding to <(sanctifica- tion® as evidence of ˆjustification® and the ((covenant of works,® the other to the ˆcovenant of grace.® The latter were in a minority and far less influential, and Vane, as a champion of free inquiry, took their side. The colonists, unfortunately, did not, as Upham points out, favor such inquiry (*

*were duly recognized by Williams. From 1639 to 1641 he was treasurer of the British navy, in 1640 entered Parliament for Hull, in the same year was knighted and in 1641 advocated the abolition of episcopacy and was dismissed by Charles I from the treasurership. He was head of the Parliamentary war party, was prac¬ tically leader of the Commons in 1643-46, was a commissioner to treat*with Charles I at New¬ port in 1648, but took no part in the king's trial. Under the Commonwealth he was a leader in all affairs*

of state. In 1651 he was sent to adjust Scottish affairs. When Cromwell for¬ cibly dissolved the Long Parliament in 1653, Vane, who desired to continue it, was brought into open collision with him. Vane, therefore, withdrew to Belleau in Lincolnshire, where he busied himself with literary composition. One of Milton's sonnets (1 7th) recognizes his ac¬ tivity in the Commonwealth cause. In 1656 he was imprisoned for a pamphlet against Crom¬ well's arbitrary procedure, in 1659 re-entered Parliament and having secured the abolition of the protectorate, was commissioner of the navy in the restored Long Parliament, from which he was finally expelled January 1660, generally distrusted by all parties. He was excluded from indemnity on the Restoration, held prisoner in the Tower and the Scilly Islands, and finally, after an able defense, sentenced to death for treason. His mystical religious views made him a puzzling character to his English contempora¬ ries, most of whom apparently came to think him a fanatic. He was reported at one time to be the head of an Anabaptist revolt; at an¬ other, king of the Fifth Monarchy. His abili¬ ties were never questioned, but his high princi¬ ples were once not seen so clearly as they now are. He appears briefly in Hawthorne's (Legends of the Province House) ((Howe's Masquerade). Consult biographies by Sikes (1662), Upham (Sparks' (American Biography,* 1st ser., Vol. IV, 1835), and Hosmer (1888); also Winthrop, (History of New England) (ed. Savage, 1825 or ed. 1853), and Hutchinson, (History of Massachusetts) (ed. 1765).*

VANGUARD. See Advance Guard.

VANILLA, a genus of orchids, of great economic value, on account of their fruits, which furnish the commercial flavoring-extract known by the same name. Several species fur¬ nish vanilla, the most important being V. plani- folia, indigenous to Mexico and adjacent terri¬ tories. It is a robust high-climbing plant, at¬ taching itself to trees by adventitious roots. It bears bright-green, oval, flat leaves, which are fleshy or coriaceous. The flowers are fragrant and greenish-white, with a trumpet¬ shaped lip, crinkled about the edges. When cultivated, as it is very largely, in tropical coun¬ tries, especially in Mexico and Java, the flowers must be fertilized artificially, the finest being chosen, a process carried out by insects in its wild habitat. They then set fleshy fruit, which is carefully picked just before each is ripe. These pods are from six to nine inches long and are filled with an oily pulp containing the minute seeds. They are called vanilla beans from their long, slender legume-like appearance, but are not fragrant. The characteristic aroma is due to the presence of a volatile oil (vanillin) which is developed by slow

curing and fermen¬ tation. The pod, as it appears in the markets,

✓

is chocolate-colored, wrinkled, slender and pli¬ able. In the best qualities, or <(frosted vanilla,® the vanillin extrudes its needle-like crystals, forming a delicate efflorescence on the outside of the beans. Although vanilla is a carmina¬ tive and stimulative drug, it is chiefly used as a flavoring substance, particularly for chocolate and confectionery. The Spaniards found va¬ nilla in use among the Mexican Indians, in con¬ junction with cocoa, and it is said that it was first imported into England about 1510, when other Mexican products found their way over seas.

There are several inferior qualities of vanilla, such as the Venezuelan and Brazilian varie¬ ties, brought from those countries, the latter being distinguished as vanillon, and supposed to be the product of Vanilla pompona. The pods are longer and thicker than those of V . planifolia. Guiana vanilla pods (V . guianensis) are coarse and frequently split open.

VANILLA GRASS (Savastana odorata). See Grasses in the United States; Sweet Grass.

VANILLA PLANT, a tall herb (Trilisa odoratissima) , with tubular magenta flowers in spreading corymbose panicles, growing in the southern United States. The foliage when dried has the odor of vanilla and the leaves are used by the Southern negroes to scent their houses. The vanilla plant also serves to improve the flavor of fine-cut tobacco.

*VANINI, va-ne'ne, Lucilio, Italian free¬ thinker : b. Taurisano, about 1585 ; d. 19 Feb. 1619. At Naples *and Padua he studied the new learning of the Renaissance and the newer learning of physical science, qualified as doctor utriusque juris and took orders as priest. But his ˆnaturalist® views, which were regarded as atheistic, soon brought him into collision with the Church. He taught in France, Switzerland and the Low Countries and fled from Lyons to England, where he was imprisoned. Later he went to Toulouse, where he was arrested and condemned to have his tongue cut out. to be strangled and to be burned to ashes. He was burned on the day of his condemnation. His (Amphitheatrum iEternae Providentise) (1615)*

and his (De Admirandis Naturae Arcanis) (1616) set forth his pantheistic opinions. As an independent thinker and in the doom which he suffered he has many points in common with Giordano Bruno (q.v.), although as a philos¬ opher he has no claim to be ranked with him. Consult Owen, (Skeptics of the Italian Renais sance) (1893) and monographs by Fuhrmann (1800), Vaisse (1871) and Palumbo (1878).

VANISHING FRACTION, in mathemat¬ ics, a fraction which reduces to the form $ for a particular value of the variable which enters it, in consequence of the existence of a com¬ mon factor in both terms of the fraction, which factor becomes 0 for this particular value of the variable. See Fractions.

VANISHING POINT, in perspective, that point to which all parallel lines in the same plane tend in the representation.

VANITY FAIR. Thackeray's 'Vanity Fair> is perhaps the most famous novel in the English language; certainly no critic would name the five best novels in English and not

include (Vanity Fair. It is hard for a novel to keep its place in the public mind; only a remarkable novel can do so. Each new genera¬ tion comes to novels with a new appetite, with demands for some fresh interpretation of life, some exposition, some consideration, some so¬ lution if possible, of the new problems that con¬ front it, and it finds novels of the preceding generation wofully old-fashioned. Neverthe¬ less, (Vanity Fair,* although written in 1846- 48, is not old-fashioned. Becky Sharp.e is still a familiar and intimate companion ; Sir Pitt Crawley, the Marquess of Steyne, Major Dob¬ bin are still among the best known of our acquaintances in the world of fiction.*

Of course a novel 70 years old cannot affect us in the same sort of way that it affected its first readers. To them 'Vanity Fair was a new kind of novel. They were acquainted with novels of several well-marked types, such as (Tom Jones,* an out-of-door, free-hand, pic¬ ture of a rowdy young man, (PamelaP the elaborate presentation of sentimental situations, (Pride and Prejudice,* the delicate delineation of manners, 'Ivanhoe,* the romance of ad¬ venture, and they were beginning to know Dickens; but Thackeray's detached, cynical, sentimental survey of life was new and strange. Since then novels have multiplied, they swarm like locusts, and yet 'Vanity Fair* has its own peculiar power and interest; its place in litera¬ ture is better established than ever. It was this novel that made Thackeray*

famous. And though it was followed by (PendennisP 'Es- mond) and 'The NewcomesP it stands, in the general opinion, as his most brilliant novel.

The defects in the book according to the taste of to-day are obvious enough. Artist as he is in details Thackeray lacks the power or the will to make his novel as a whole a work of art. We do not like to have the author poke his head out from the pages every little while and moralize over his characters ; we grow tired of the frequent comparisons of life to a pantomime ; we find the characters Pitt Crawley, George, Amelia, Dobbin exaggerated, out of drawing, distorted. Thackeray does not hold a mirror up to life; he holds up a warped and twisted reflector that gives the life it reflects a half comic, half satirical aspect. Thackeray's admirers are many and devoted, but for most readers he is too much occupied with the super¬ ficial relations of life, with social distinctions, with the envy and vulgarity of those below and the snobbishness and vulgarity of those above. Greater men, such as Shakespeare or Tolstoi, do not find their attention drawn to such mat¬ ters, they find their interest in experiences, emotions, passions, of a kind more deeply human, they delineate men and women as more occupied with the larger matters of life, love, work, discipline, excellence and so forth, and less concerned with the meaner failings of ill- adjusted social classes.

And yet despite these defects (Vanity Fair is a novel that represents some manifesta¬ tions of human society, with remarkable truth. In Becky Sharpe Thackeray accomplished what is commonly accepted as a very great achieve¬ ment of art, the portrait of a woman who ex¬ hibits a familiar human trait so definitely that without losing her individuality she represents a type. Such a portrait has the freshness of*

novelty, and it has also the interest that at¬ taches to the familiar. This effect Thackeray achieves with surprising swiftness and sure¬ ness. Becky Sharpe within the first page or two leaves Miss Pinkerton's academy for young ladies and we see her opening her wings like a young hawk, just fledged, casting its far- seeing, pitiless eyes about for prey. No sooner do we see that hawk glance than we watch, entranced, for the great circles through the air and the cruel pounce. Becky Sharpe be¬ longs to the order of raptores, creatures that arouse in us all a mixture of apprehension and fascination.

Every wild bird has a tragic end, and Becky's career squares with our experi¬ ences of life.

Thackeray is a master of English; his flexible sentences adapt themselves like run¬ ning water to every circumstance, they flow limpidly, they babble, they rush along, or move deep and slow. In this respect by general con¬ sent he stands at the head of English novelists, and it is perhaps his command of language that enables him to shift so easily from pathos to humor, from tragedy to comedy, from satire to sympathy; and in < Vanity Fair his style is at its best.*

Henry D. Sedgwick.

VANITY OF HUMAN WISHES, The.

Ostensibly a formal satire in heroic couplets (368 lines) published by Dr. Samuel Johnson in 1749, more than a decade after the appear¬ ance of his other notable satire, (London. > As that had followed in a way the third satire of Juvenal, so this followed the tenth. In the interval between the two Johnson's style had grown more rotund and he himself had ripened into a dignified moral essayist soon to give expression to his views of life in The Rambler. Indeed, it might be held that (The Vanity of Human Wishes) is more of a weighty essay in verse than it is of a keen satire. This point need not be pressed, how¬ ever, nor need we emphasize Macaulay's well- known comparison with the Tenth Juvenal. What mainly matters is that Johnson, al¬ though probably more of a rhetorician than of a poet, gave the readers in this essay, or satire, one of the best pieces of sententious poetry in the language. The famous portraits of Wolsey and of Charles XII of Sweden fail to impress but few readers, and there are other passages and single lines equally memorable — e.g., ((Toil, envy, want, the patron, and the jail,® and ˆSuperfluous lags the veteran on the stage)) — the first truer of Johnson's own career than the second. Tested by any standards of poetry in which an appeal to the intellect is given due weight, (The Vanity of Human Wishes) is worthy of the fame of its author; but it must be admitted that it does not touch the heart so deeply as the simple stanzas Johnson wrote on the death of his friend, the old quack- doctor, Robert Level

William P. Trent.

VANLOO, van-lo, Jacob, Dutch painter: b. Sluis, about 1614; d. Paris, 26 Nov. 1670. He was made a member of the French

Academy, and was famous in his time as a painter of portraits in the style of Der Heist and Rembrandt; scenes from fashionable life; and mythological pictures such as (Diana and

her Nymphs) in the galleries of Berlin and Brunswick, and (CEnone> in that of Dresden.

VANLOO, Jean Baptiste, Dutch painter: b. Aix, 11 Jan. 1684; d. there, 19 Sept. 1745. In 1731 he was elected to the Academy; pro¬ duced many portraits, including that of Louis XV, and mythological pictures, such as (Diana and Endymion (in the Louvre) ; (The Triumph of Galatea) (in the Hermitage at Saint Peters¬ burg). His son, Louis Michel Vanloo (b. Toulon, 1707; d. Paris, 20 March 1771), studied in Rome and Paris, in which latter city he be¬ came a member of the Academy. Settling at Madrid he was appointed court painter to Philip V, and there are three portraits of the Spanish royal family by him in the Prado Gal¬ lery and an allegorical picture.*

VANLOO, Louis, Dutch painter, son of Jacob Vanloo (q.v.) : b. Amsterdam, about 1640; d. Aix, 1712. At Paris he carried off the first prize of the Academy. His more illus¬ trious son, Charles Andre, was both painter and sculptor, and studied at Rome under Le Gros. In 1719 he went to Paris and assisted his brother Jean Baptiste Vanloo in restoring the frescoes at Fontainebleau. He was re¬ ceived into the French Academy in 1735, made professor there two years later, in 1763 director of the Academy and first painter to the king. In the Louvre are his (.7Eneas Carrying Anchises from Troy) (1729) ; (Marriage of the Virgin (1730) ; (Apollo and Marsyas) and a portrait of (Queen Maria Leczinska) (1747).*

VANN, van, Irving Goodwin, American jurist: b. Ulysses, N. Y., 3 Jan. 1842; d. Syra¬ cuse, N. Y., 22 March 1921. He was gradu¬ ated at Yale in 1863, and at the Albany Law School in 1865, and began to practise in Syra¬ cuse. In 1879 he served as mayor of that city. From 1882 to 1896 he was a justice of the New York Supreme Court, and in 1896' was appointed by the governor a judge of the Court of Ap¬ peals, to which position he was elected in 1897 for the term of 14 years. He was one of the founders of the Onondaga County Bar Associa¬ tion, and was once president of the New York State Bar Association. He lectured' in the Albany, Cornell and Syracuse law schools.

VANNES, van, France, a seaport town, capital of the department of Morbihan, on the Vannes, where it falls into a narrow inlet of the Gulf of Morbihan, 68 miles northwest of Nantes. It is a railway

junction, is a walled town, and has narrow gloomy streets over¬ hung by antiquated timber houses. The prin¬ cipal buildings are the cathedral, the modern town-hall and Jules Simon College. The town possesses a museum, rich in Celtic antiquities. The manufactures consist of coarse cotton goods, lace, leather and ropes. There are ship¬ yards and ironworks. The trade is in corn, hemp, honey, wax, butter, salt, tallow, cider and wine. Pop. (1911) 17,842; communal popula¬ tion, 25,000.

VANNUTELLI, van'noo-tel'le, Vincenzo, Italian Cardinal : b. Gennazzano, Italy, 5 Dec. 1836. At the age of 14 he entered the Capranica College, Rome, pursued his studies in philosophy and theology and graduated from the institution with highest honors. Ordained to the priesthood by Cardinal Patrizzi, 23 Dec. 1860, the following year he was named bene-

ficiary of Saint Peter's, and in 1863 was ap¬ pointed auditor to the Papal Internuncio in Holland, being auditor at Brussels in 1866. In 1875 he became an assistant in the Papal Sec¬ retariate of State, and in 1878 was named auditor of the Rota. Elevated to the titular archiepiscopal see of Sardis, 20 Jan. 1880, the distinguished churchman was subsequently ap¬ pointed Apostolic Delegate to Constantinople, sent as papal representative to the coronation of Alexander III of Russia, and later chosen Nuncio to Lisbon. At the Consistory of 30 Dec. 1889, he was created cardinal and re¬ served in petto, being proclaimed, 23 June 1890, with the presbyteral title of S. Silvestro in Capite. April 1900, Cardinal Vannutelli was appointed to the suburbicarian episcopal see of Palestrina, and became Bishop of Ostia and Palestrina, Archpriest of Saint Maria Mag- giore, dean of the Sacred College and datarius to His Holiness. He also served as prefect of the Sacred Congregation of the Council and prefect of the Apostolic Segnature (Signa¬ ture), and was entrusted with many diploma¬ tic missions, having been Papal Legate to the Eucharistic Congress of Brussels 1898; Tournai 1906; Metz 1907; London 1908; Cologne 1909, and Montreal 1910.

VANUXEM, Lardner, American geologist and chemist: b. Philadelphia, Pa., 23 July 1792; d. Bristol, Pa., 25 Jan. 1848. He was graduated from the Ecole des Mines at Paris in 1819, and in

1820-26 occupied the chair of chemistry and mineralogy at the South Carolina College. He resigned in the latter year in order to adopt geology as a profession, and in 1827-28 he was engaged under the New York legislature in studying the geological aspects of New York, Ohio, Kentucky, Tennessee and Virginia. He was State geologist for New York in 1836-42, was a promoter of the Association of American Geologists organized in 1840, and in addition to numerous scientific papers, he published

VANVITELLI, Luigi, loo-e'je van-ve- tel'le, Italian architect: b. 1700; d. 1773. He was appointed architect to Saint Peter's at Rome in 1726; and he erected, while in the prime of his powers (1752), for Charles III of Naples, the magnificent palace at Caserta with its gardens and cataract. As an example of late Renaissance architecture in Italy this palace is scarcely paralleled by any building in Europe.

VAPEREAU, vap-e-rd, Louis Gustave,

French scholar and compiler: b. Orleans, 4 April 1819; d. 1906. He was educated at the Ecole Normale, Paris; was professor of philosophy at the College of Tours, 1843-52; admitted to the bar in 1854; and about the same time made editor of the famous Uni¬ versal Dictionary of Contemporaries) (1858, with numerous later editions). Among his other important works are (Literary and Dra¬ matic Year) (1859-69) ; (Universal Dictionary of Literatures) (1876), and historical Ele¬ ments of French Literature} (1883-85). In 1870-71, during the German invasion, he was prefect of Cantal, and afterward prefect of Tarnet-Garonne. He was inspector-general of

primary schools from 1877 to 1888, and re¬ ceived the Cross of the Legion of Honor in

1878.

VAPOR, in physics, a term used to desig¬ nate the gaseous form which a solid or liquid substance assumes when heated. Vapor is, therefore, essentially a gas, and seeing that all known gases have now been proved to be liquefiable, no physical difference can be said really to exist between an ordinary gas, such as oxygen, and a vapor, such as steam. In com¬ mon language, however, a difference is usually recognized; a gas is a substance which at ordinary temperatures and pressures exists naturally in a state of vapor; while a vapor is produced by the application of heat to a sub¬ stance which

normally exists in a solid or liquid form. In technology the term vapor is more commonly restricted to denote the gaseous phase of a substance given off at a temperature below its specific boiling point. The difference has been otherwise explained to be one not so much of kind as of degree; steam in the boiler of a steam-engine being said to be in a state of vapor, while superheated steam is said to be a gas. Aqueous vapor formed on the sur¬ face of the land and water is always present in suspension in the atmosphere and when it meets with a reduction of temperature it condenses into water in the form of rain or dew, or into ice, as hoar-frost. See Gas.

VAPOR LAMPS, a form of lamp used in electric lighting in which a rarefied gas is ren¬ dered luminous by the passage through it of an electric current. All other forms of artificial light now in practical use depend for their light¬ ing properties upon the incandescence of a solid — either in the form of a filament of car¬ bon or tungsten as in the ordinary glow lamp or of a rod of carbon as in the arc or of car¬ bon in a finely divided state as in gas and kerosene lamps. The Hewitt vapor lamp, also known as the mercury vapor lamp, derives its light from the vapor of mercury, in which the passage of an electric current causes a high state of incandescence. The lamp is constructed of a glass tube having a metal sealing-in wire at each end. These wires lead the current to the electrodes, one or both of which are of mercury. The tubes are exhausted to a high degree on a vacuum pump and sealed off. This prevents any escape of the vapor which fills the tube. Three types are made: a 20-inch tube operating on direct current; a 50-inch tube adapted for either direct or indirect current; and the quartz or high-pressure lamp, for di¬ rect current only. One 330-watt Hewitt lamp will replace nine 32-candle-power incandescent lamps and give much more than twice the amount of light, using only one-third the cur¬ rent. Or the same lamp will replace 12 16- candle-power incandescent lamps, giving over three times the light for one-half the current. The light may be employed to great advantage for purposes where considerable illumination is required and where the ordinary arc light is unsatisfactory on account of its sharp and heavy shadows and its flicker. The light given is bluish green in tint and is a strictly indus¬ trial illuminant. In this field its advantages are visual acuity, low intrinsic brilliancy, natural shadows and subdued reflections. It is exten¬ sively used in foundries and machine shops,

varnishing and finishing plants, textile mills, printing plants, paper mills, clothing factories, etc. Another great field of application of the lamp is for all sorts of photographic processes. The illumination being so diffused and the light composed to a great extent of the so-called <(actinic® or chemically active rays it furnishes for this work, where there has never been a satisfactory artificial illuminant, a perfect ac¬ tinic substitute for daylight. For the produc¬ tion of a pure white imitation of average day¬ light it is supplemented by other forms of lamps which add the colored rays missing from the Hewitt lamp. For each candle-power of the mercury light is added 0.57 candle-power of Welsbach; 0.54 candle-power of tungsten and 0.50 candle-power of carbon filament. The Moore light, also called the <(vacuum tube® light, is a form of vapor lamp in which the rarefied gas used is either carbon dioxide or nitrogen. The nitrogen tubes give a warm yellow light which is soft as well as brilliant. They are extensively used in public rooms, banquet halls, restaurants, etc. The New York City post office is illuminated with a mile of these tubes. The carbon dioxide tubes give a light whose spectrum approaches most nearly to that of diffused sunlight. Color matching may be done by this light as accurately as by daylight and hence this form of illuminant is invaluable in dye houses, which formerly had to shut down early in winter and altogether on dark days. In the latest forms of the Moore lamp an automatic mechanism is provided for feeding into the tubes from time to time the fresh gas necessary to replenish the amount which becomes inert and, therefore, non-luminous. The neon tube is a form of lamp closely similar to the vapor lamps. It is dis¬ tinctly a red light, lacking seriously the proper proportion of blue rays. It is useful in many decorative effects and when skilfully assorted with Hewitt lamps affords a perfect imitation of daylight at a lower cost than for any other electric light.

VAPORIZER. See Internal Combustion Engine.

VARANGIANS, va-ran'ji-anz, or VARA- GIANS, a word meaning ((sworn men,® that is, men bound by oath to stand by each other in their undertakings, and derived from the Scandinavian varar, an oath. It is applied to Northmen who entered the service of the Byzantine emperors and were imperial guards at Constantinople, noted for their courage and fidelity, but also taking decisive part, at times, like the Praetorian guards at Rome, in making and unmaking emperors. The Varangians were not always Northmen in the restricted sense of that term, but included Saxons and other Ger¬ mans. The designation is also applieˆ to the adventurers from Scandinavia who founded principalities in Russia which were the begin¬ ning of the great Russian empire and powerful enough for a

time to threaten the overthrow of the Byzantine dominion.

VARANIDiE, Varanus, the family and type genus of the lizards called monitors. See Lizard; Monitor.

VARDAMAN, James Kimble, American journalist and legislator: b. Jackson County, Tex., 26 July 1861. He was educated in the public schools of Yalobusha County, Miss., read

law at Carrollton, Miss., and in 1882 was ad¬ mitted to the bar and began practice at Winona. In 1883 he became editor of the Winona Advance and from 1890 to 1896 edited the Greenwood Enterprise and Commonwealth. He became editor of The Issue at Jackson in 1908. Taking an active interest in politics he was member of the Mississippi house of repre¬ sentatives in 1890-96 and was speaker in 1894. Mr. Vardaman served successively as captain and major of the Fifth United States Volun¬ teer Infantry in the Spanish-American War. In 1895 and 1899 he was an unsuccessful candi¬ date for governor; was elected governor for the term 1904-08; was candidate for the senate in 1907 and in 1911 was elected to the United States Senate for the term 1913-19.

VAREC, the name in Brittany for the crude ash produced by burning seaweed. See Kelp.

VARESE, va-ra'za, Italy, a town in Lom¬ bardy, province of Como, 35 miles west of Milan, on the margin of Lake Varese. It has a church dating from the 9th century, though rebuilt several times. It is a popular summer resort and the centre of a silk-spinning indus¬ try. Paper, organs, automobiles and carriages are also manufactured and wine is bottled. Pop. communal about 21,605; town 7,721.

VARGAS, Luis de, loo'es da var'gas, Span¬ ish painter: b. Seville, 1502; d. there, 1568. He began, after the manner of Spanish painters of the period, by applying water colors to a coarse-textured cloth called ((sarga,® (serge or bunting) and the pictures thus executed were washed over with thin gum or paste. Curtains for churches and naval ensigns were manu¬ factured in this style, and the painting of sargas was practised by Sevillian artists, including Murillo long after the time of Vargas. But this great painter by breaking away from the traditional Spanish method is notable as having introduced into Seville the best Italian methods of fresco and oil. This he did after visiting Rome 1527; and attaching himself to Pierino del Vaga (q.v.). After the sack of the city in that year he fled with his master to Genoa. He did not leave Italy for his native

country until 1555. As a painter he was highly imaginative, and evinces a taste for grandeur and simplicity. His heads are beautiful and full of devotional refinement. In the Chapel of the Nativity in Seville Cathedral he painted his

VARIABLE, General Theory of Func¬ tions of Complex. See Complex Variable, General Theory of Functions of.

VARIABLE, Theory of Functions of the Real. See Real Variable, Theory of Func¬ tions of.

VARIABLE QUANTITIES, in mathe¬ matics, are algebraic symbols placed in relation¬ ship one to another, so that if different nu¬ merical values are given to a particular letter the other letters will have corresponding values or sets of values.

VARIATION, in biology, the physical de¬ parture in any direction from the mean char¬ acter of a species. When the variation in a

✓

large number of individuals, generally more or less isolated in locality, is of a marked and constant type, the group of individuals which exhibits such variation is termed, technically, a ((variety.®

Variation, strictly speaking, is regarded as distinct from the processes of evolution, which result in the formation of new species, and is limited to the individual variations within the species. Variations may be either collective or individual. The former are those arising from the carrying over of certain peculiarities of in¬ dividual variation from generation to genera¬ tion. They thus tend to become fixed; and re¬ ceive the name of ((mutations.® Individual variations may be blastogenetic — that is, in¬ born; or ontogenetic — that is, acquired through the exigiencies of individual environment. In the latter case they are called ˆfluctuations .® Discussion has been rife as to whether varia¬ tion is determinate or indeterminate ; that is, whether organisms have or have not a tend¬ ency to vary in particular ways. It is the view of the extreme Darwinists that there is primi¬ tively no tendency to any special mode of varia¬ tion, any existing tendency being the result of the selection of those individuals which chanced to vary along these particular lines. Darwin himself held to the idea that adaptation was

the secret of such observed changes, and that both the principles of natural selection and of varia¬ tion played an individual part. According to other biological observers and thinkers there is, apart from the guidance of natural selection, an inherent bias, differing in different .groups of organisms toward variation in determinate lines. This may be due to the inheritance of characters individually acquired under the stress of surrounding conditions (direct environmental determinism) ; or to constitutional tendencies inherent in the individuals of each species, analogous to the inherent tendencies of inor¬ ganic substances, to assume definite crystalline forms — (innate specific determinism). Accord¬ ing to De Vries there is, in elementary species which cross-breed, a unit characteristic which is not mated; that is, ((the differentiating mark is present in one of the parents and not in the other; while all the other units are paired in the hybrid, this one is not. It meets with no mate and must, therefore, remain unpaired. . . . These unpaired qualities constitute the

essential features of the hybrids of species, and are, at the same time, the cause of their wide deviations from ordinary rules.®

It has been claimed by certain American biologists that palaeontological evidence estab¬ lishes the existence of determinate variation. The teeth and the limb-bones of more than one series of fossil ungulates are found to exhibit variation along definite and determinate lines. The facts may be admitted ; but the reasoning based thereon is inconclusive. The variation adduced is confessedly along lines that are ad¬ vantageous to the individuals in which it oc¬ curs. It would, therefore, on the Darwinian theory, escape that elimination which would be the fate of non-advantageous and neutral varia¬ tions. If the teeth of mammals varied inde¬ terminately, and if all variations save those along one line (or several correlated lines) were neutral or non-adaptive, these latter would be eliminated through inter-crossing, while the adaptive variation would become evident. In

the fossil forms the variations along non- adaptive lines would be so slight as to escape detection, while those in a plus or minus direc¬ tion along adaptive lines would be assigned to different stages in the evolution of the variation in question.

A. R. Wallace and others have tabulated some results of the observation of variation in the state of nature; and Wallace has shown that variations in size or length of particular parts are considerable, (

On the hypothesis of indeterminate variation it must be confessed that we are to-day not much in advance of Charles Darwin, who said: <(Our ignorance of the laws of variation is pro¬ found. Not in one case out of a hundred can we pretend to assign any reason why this or that part has varied.® Darwin, however, rigor¬ ously rejected any doctrine of <(chance,® insist¬ ing that failure to discover the reasons was due solely to ignorance of well-ordered laws. It is to be remembered that the animal organism is not passive, but reacts individually to environ¬ ment; thus developing a unit characteristic which may be unpaired in mating and so estab¬ lish the foundation for a newr variety. Consult the works of Charles Darwin, Lamarck, Weis- mann and Wallace (qq.v.) also Bateson, W., (Materials for the Study of Variation) (Lon¬ don 1894) ; Cope, E. D., (Primary Factors of Organic Evolution5 (Chicago 1896) ; Daven¬ port, C. B., Statistical Methods, with Special Reference to Biological Variation5 (New York 1904) ; Lloyd, R. E., (The Growth of Groups in the Animal Kingdom5 (London 1912) ; Lock, R. H., (Recent Progress in the Study of Variation, Heredity and Evolution5 (New York 1907) ; Vernon, H. M., (Variations in Animals and Plants5 (New York 1903) ; Vries, H. de, Species and Varieties: Their Origin by Muta¬ tion5 (Chicago 1906). See Darwinian Theory; Evolution; Lamarckism; Mendel's Law; Mutation Theory.

VARIATIONS, Calculus of, a subdivision of the differential calculus by which the laws associating the variable quantities are them¬ selves subject to change. See Calculus, Varia¬ tions of.

VARICOSE VEINS, a diseased condition of the veins in which they become dilated, and assume a tortuous course, presenting to the touch, a soft elastic sensation, except in the situation of their valves, where they form hard knotty swellings, generally of a dark bluish color. This disease occurs most frequently in the lower limbs, and is indeed a very common affection there ; but it also occurs in thd veins of the spermatic cord, producing varicocele, and in those at the lower part of the rectum, form¬ ing in the latter case the tumors called bleed¬ ing piles. In the lower limbs varix is often complicated with peculiar indolent ulcers, and sometimes the varix bursts and haemorrhage takes place, which if not speedily stopped may lead to death. Varicose veins are caused by

some obstruction to the free return of . the venous blood toward the

heart under pressure of the action of the capillaries. The veins are enlarged in diameter, and lengthened through this pressure, and their walls become very thin in some cases, and may even break under the skin exhibiting more or less extravasation. Such obstruction may arise from tumors within the abdomen, enlargement of the liver causing pressure on the ascending vena cava, pregnancy, constipation of the bowels, tight gartering and other causes. As to the treatment, the first step of course is to remove the cause of the disease, whenever that is possible. If the dis¬ ease is grappled with at an early stage much good may be effected by enjoining complete rest in a horizontal posture, by bathing the limb with cold water twice or thrice a day, and by the use of a properly applied bandage or laced stocking. In moderate cases the condition may be greatly improved and is often dissipated by the continuous wearing of a snugly fitting elas¬ tic stocking. When the disease is far advanced no radical cure can be effected except by a surgical operation in which the obstructed part of the vein is excised. The patient will gen¬ erally do better to rest content with a palliative treatment.

VARILLA, va-re-la, Philippe Bunau,

French engineer and diplomat: b. Paris, 26 July 1859. He was graduated from the fLcole Poly¬ technique, entered the civil division of French engineers, planned and directed the construc¬ tion of harbor-works and railways in Algeria and Tunis, and in 1884 became connected with the De Lesseps Panama Canal enterprise, work on which had then been proceeding about two years. At his suggestion many radical changes were made in the original plans. In regard to the question of an isthmian canal he published in 1892 (Panama: Le passe, le present, 1'avenirP His active work in connection with the Panama Canal Company ended in 1888. He spoke sev¬ eral times in the United States in advocacy of the Panama route, and after the revolution (see Panama) was chosen as representative of the new republic of Panama at Washington. In the spring of 1904 he returned to France and sub¬ sequently became manager of the Madrid-Ca- ceres Railway. Among his other works as an engineer were the Kongo Railway, West Africa, and the improvements of navigable waterways in Rumania. He invented an electric excavating machine. In the Great War of 1914-18 M. ya-rilla was in active service and lost a leg during the struggle for Verdun.

VARINAS, va-re'nas, or BARINAS, Venezuela, a town in the state of Zamora, on the right bank of the river San Domingo, 80 miles southeast of Merida. It is a neat place, at the opening of a valley

about 600 feet above the sea-level, with a mean annual temperature of 82°. It has a church and a hospital and is the terminus of a telegraph line. Cacao, coffee and tobacco are cultivated in the neighborhood, but the town and its industries have much de¬ clined in recent years. It was formerly the heart of a famous tobacco district. Pop. about 5,300; formerly 12,000.

VARIOLA, smallpox (q.v.).

VARISCITE, var'i-sit, a native hydrous phosphate of aluminum, having the formula A1P04.2H20. It has a brilliant vitreous lustre,

and usually a rich grass green color, more rarely bluish or whitish, and occurs most fre¬ quently as an incrustation. A massive variety in nodular formation found in Utah is called Utahlite (q.v.). Individual crystals have orthorhombic symmetry; they are rarely well developed, being usually clustered into little sheaf-like aggregates, which densely coat the surfaces of the matrix. Its hardness is 4 and specific gravity about 2.4. Its best-known American localities are in Arkansas and Utah.

VARNA, var'nii, Bulgaria, a fortified sea¬ port town on the west shore of the Black Sea, at the mouth of a river of the same name, 160 miles northwest of Constantinople. It exports wheat, maize, cattle, attar of roses, etc., and imports woolens, metals, sugar, coffee, leather, haberdashery, machinery, etc. The harbor has been modernized, and Varna is now an eastern terminus of the Bulgarian railway system. It is the see of a Greek and a Bulgarian arch¬ bishop. In 1444 Ladislaus, king of Hungary, was defeated and slain by Amurath II, sultan of the Turks, near his town. In 1828 it was taken possession of by the Russians, but was restored to the Turks in the following year by the Peace of Adrianople. In 1854 the Crimean expedition sailed from it. It is the chief city of the district of Varna, which has an area of 2,554 square miles and a population (1918 est.) of 325,000. The city's population is about 45,000.

VARNHAGEN, varn-a'gen, Francisco Adolphe de, Brazilian historian: b. Sao Joao de Ypanema, Brazil, 17 Feb. 1816; d. Vienna, Austria, 29 June 1878. He was taken to Portugal when very young, educated in the royal military college and in 1833-34 served in the constitutional army against Dom Miguel. He afterward engaged in historical researches, returned to Brazil in 1841 and during the re¬ mainder of his life was largely occupied on various diplomatic

missions in South America and in Europe. As a historian he ranks easily at the head of Brazilian men of letters, his work displaying profound research and pre¬ sented with clearness and force. He edited and published various historical documents, contributed numerous papers to the (Revista do Instituto do Brazil,) and wrote (Noticias do BraziP (1852) ; (Historia geral do BraziP (1854-57) ; (Das wahre Guanahani des Colum¬ bus (1869) ; (L'origine Touranienne des Americains Tupis-Caribes, et des anciens Egyp- tiens) -(1876), etc.*

VARNHAGEN VON ENSE, varn'ha-gen fon en'se, Karl August, German soldier, diplo¬ mat and author: b. Dusseldorf, 21 Feb. 1785; d. Berlin, 10 Oct. 1858. He studied at Berlin, Halle, and Tubingen, assisted Chamisso in the latter's

✓

method. Among his published works are (Goethe in den Zeugnissen der Mitlebenden) (1823) ; (Biographische Denkmaler (1824-30) ; (Denk- wiirdigkeiten und Vermischte Schriften) (1843-46 ; 2 additional vols., 1859); (Tage- biicher) (1861-72) ; (Ausgewahlte Schriften)*

(1871-77).

VARNHAGEN VON ENSE, Rahel (Le¬ vin), German author: b. Berlin, 1771 ; d. 1883. She was well known in literary circles and exercised a notable influence over her hus¬ band's literary career. He published a memorial of her, (Rahel, ein buch des andenkens fur ihre freunde (3 vols., 1834; new ed., 1903), and (Galeric von Bildnissen aus Rahels Umgang) (2 vols., 1836). After his death appeared (Brief uechsel Zwischen Rahel und David Veit) (2 pts., 1861), and Briefwechsel Zwischen Varnhagen von Ense und Rahel) (6 vols., 1874-75). Consult Key, Ellen, (Rahel, eine biographische skizze) (Berlin 1907).*

VARNISH. A solution of gums or resins which is applied to the surface of objects to afford a glaze and protect the article so coated. Its use is largely decorative and applied to en¬ hance the appearance of woodwork (furniture and house fittings) as it brings out the beauties of the grain and color of woods more dis¬ tinctly and permanently and at less cost than the process of polishing, being

applied with a brush similaily to painting. Varnish is also used, as an upper or outside coating of paint to enhance and make more permanent the pigments. The ancient Egyptians were ac¬ quainted with the art of varnishing, but its origin appears to have arisen in the East. In India, China and Japan the practice of lacquer work, a species of varnish application, was known at a very early date. It has been claimed that Japan was acquainted with the art of lacquering 500 or 600 b.c., but the majority of authorities place its first usage there to the 3d century of our era, as an art acquired from their neighbors the Coreans. The natives of China and India probably knew the art much earlier than the Japanese. Varnish and lacquer work are, however, generally treated in the arts as separate and distinct. True var¬ nish does not appear to have been known in Europe till the 17th century.

A practical varnish will cover the following requirements : It must be a homogeneous fluid or solution ; must be fixed or permanent in effect as to tone of color, transparency (or opaque¬ ness), and must, on application in thin layers by brush or otherwise, dry within a short period by evaporation of its volatile solvents (alcohol, ether, benzene, spirits of turpentine, etc.), leaving a film of smooth, lustrous (some¬ times purposely dull), elastic oil and resin, im¬ pervious to its surrounding atmospheric con¬ ditions. It must when dry be free from cracks or flaws. In general varnishes may be divided into natural, oil, spirit and water varnishes. Natural varnishes so called are the group of lacquers as used in India, China and Japan and are produced in liquid form by nature as the saps or juices of trees (Rhus vernicifera) . They are generally treated under the title lac¬ quers (to which refer) and will not be con¬ sidered here. Oil varnishes: These are a prod¬ uct manufactured from linseed oil, gum resins, driers, and a solvent such as turpentine or

white spirit. The gums are largely fossil resins. Oil varnishes in commerce are frequently divided into the two general classes : carriage varnishes and cabinet varnishes ; both are of very similar character as to composition and manu¬ facture, but the best and most durable for open air use are selected as carriage varnishes, the re¬ mainder being termed and used as cabinet var¬ nishes. Spirit varnishes consist of a kind made from various resins dissolved in a volatile spirit — methylated spirit (grain alcohol dena- turized), turpentine, etc. They are generally made without oil, but some have a small ad¬ mixture of oil. Water varnishes find but small application in the industrial arts. There are lac water varnish, glazing varnish, glue varnish and crystal water varnish. The first makes a good paper varnish and is used on harness, as is also the glue varnish.

Materials used in the manufacture of var¬ nishes may be placed under the following groups : drying oils, resins, gums, solvents and coloring matter. Good drying oils are made from old linseed oil of the best quality (best Baltic preferred). It should be aged at least a year before use by being stored in containers to exclude any attack of the air. While the difference between raw and old stored oils is great, the cause is not known to science, nor have the chemists discovered the reactions caused in ageing. The selection of resins in the ingredients employed is more important than any other, for the lustre and permanence of the products depends absolutely on the qualities of the resins used. Gums as known in commerce are the exudations from trees and consist of what are termed water soluble and spirit soluble. The water soluble gums are of course not correctly used in varnishes as it is required that varnishes shall not be affected by water. For varnishes the resins available for the commercial markets are : amber, kauri, copal, dammar, shellac, mastic, sandarac, ben¬ zoin, elemi, animi, pine resin (rosin), asphal- tum. Most resins come to the market either in the form of knotty masses, drops, cylindrical pieces or blocks. In the factory the gums are divided into classes as follows : oil varnish gums, as amber, animal, copals, sandarac, rosin and kauri. Ethereal varnish resins are : all oil resins after they have been fused ; dammars, mastic, sandarac, rosin, Manila copal. Spirit varnish gums are : lac, Manila copal, sandarac, mastic, rosin, melted resins. The points or characteristics to be considered are hardness, fusibility, solubility, appearance, color. The resins mentioned under oil varnish are insoluble in oils, ether and other solvents, until liquified by fusion; rosins, some soft copals and san¬ darac are exceptions being soluble in alcohol. The gums grouped under ethereal yarnish are more or less soluble in benzol, coal-tar naphtha, turpentine, ether, acetone, etc. The enumerated spirit varnish gums are soluble in alcohol and methylated spirit. Natural coloring matters used in varnishes are: turmeric, gamboge, dragon's blood, gum accroides, aloes, etc. Some artificial or coal-tar colors also enter into the manufacture of varnishes.

Manufacture, Oil Varnishes. — The plant for this class is very simple as is the process, but carrying out of the process requires very great care and experience to produce a com-

mercially ' successful line. The stages of the process are: (1) melting

or running the resin and gums; (2) boiling the oil; (3) mixing the melted gum and boiling oil ; (4) boiling the varnish; (5) thinning the boiled varnish; (6) clearing. The gum running is a very delicate operation and the finished varnish depends en¬ tirely upon the successful outcome of this proc¬ ess. It is done in a large cylindrical copper vessel, with flat or domed bottom, known as the ((gum pot.® These pots have flanges near the bottoms which support them in the holes on top of a furnace. In modern varnish works the furnace top is flush with the floor of the gum running shed. These pots have wheels appended to ease movement from the gum running shed to the mixing shed. The pots have hood-covers which connect with flues by stove pipes to allow vent for the noxious vapors. During this running process oil is be¬ ing boiled in a boiling pot, the oil heated to 500° F. for from one to two hours. The gum is run by heat till it has a steady boil without frothing (which occurs at the start and is the chief source of danger — that of running over). The boiling oil is then added in the correct pro¬ portion and thoroughly mixed. The mixture is then poured into a <(set pot.® The mixed oil and gum are now boiled together to get it thoroughly homogeneous. The set pot is an iron vessel formed like a washing boiler and with a capacity of some 600 gallons. It is set in a specially constructed furnace to hold it. With several runs in it the mixture is boiled at a temperature of from 450° to 500° F. for a time varying from half an hour to four or even five hours, according to the kind of varnish. It has now become a viscous mass and should be clear and transparent. While in the former process the danger was from boiling over, the danger in this process is that of catching fire. For extinguishing such, should the material become enflamed, a shallow pan-shaped cover filled with sand is suspended above the set pot ready to let down and smother the fire. The next process is that of thinning. This is done by removing the set pot of boiled fluid outdoors away from any furnaces or flames where it is mixed with the turps till acquiring the necessary consistency. The next process is the necessary clearing and aging, as freshly made varnish works badly. This process is performed by placing the material in large iron tanks or cis¬ terns and, after hermetically sealing, storing for six months to two years. In this period the insoluble matter slowly precipitates and leaves a clear fluid.

Spirit Varnishes. — These can be made with the same plant as the oil varnishes. The French process is very similar to the procedure given for oil varnishes, the main difference be¬ ing that these varnishes contain little oil. They are made by running the gums, mixing with oil previously brought to a boil and the mixture boiled till stringy

(viscous) ; after which the mass is cooled and mixed with spirits. In the ˆcommon® process the resins are mixed with the solvent and kept in a warm place or heated slightly till the gums are dissolved; therefore, permitting only spirit soluble gums to be used.

Water Varnishes.— These are produced as follows : Lac water varnish contains the pro¬ portions of six ounces shellac to one and one-

half ounces borax boiled together to each pint of water. Glazing varnish is made with a mix¬ ture of egg-white and water preserved by the addition of a little carbolic acid or thymol. Dissolved albumen can take the place of white of eggs. Glue varnish is a solution of the proportions of one pound pale glue to every two gallons of water. The quality and color are dependent, of course, on the kind of glue used — white, brown, etc. It is not water proof and has the defect of being sticky, but is less permeable to water if a little bichro¬ mate of potash be added to the ready-made varnish, not during the process of manufac¬ ture. Crystal water varnish is produced by dissolving, in the following proportions, one pound of good white gum arabic to one pound of glucose to each three pints of water.

In commerce the different varnishes are known as finishing body varnish for coaches, hard drying or flatting varnish, 'elastic carriage varnish, elastic hard carriage varnish, pale oak varnish, oak varnish, hard church oak varnish, pale copal varnish, japanners' gold size, black japan, black varnish for carriage iron work, Brunswick black, gold size, balloon varnish, black leather varnish, amber varnish, copal pic¬ ture varnish, oil varnish, bookbinders' var¬ nish, patent leather varnish, photographic var¬ nish, etc.

Bibliography. — Heckel, G. B., (A Varnish Catechism for Varnish Men, (Philadelphia 1912) ; McIntosh, J. G., (London 1911) ; Bottler, M., (German Varnish-Making> (New York 1912) ; Hurst, G. H.,*

VARNISH TRADE, The. See Paint, Oil

and Varnish Industry.

VARNISH-TREE, a name given to vari¬ ous trees, yielding a sap or secretion that serves for varnish and lacquer. Rhus vernicifflua fur¬ nishes the famous Japanese lacquer (q.v.) and is one of the most important varnish trees. An¬ other very important tree is the Martaban Bur¬ mese or black varnish-tree (Melanorrhcea usi- tata)

, a tree some 60 feet high, called theetsee by the Burmese. When cut it exudes a thick, viscid, grayish juice, blistering in its effects, drying slowly and turning black on exposure. This black varnish is used extensively in Burma for lacquering various vessels, furniture, temples, etc. The fruits of several species of Semecarpus, and especially the marking nut, produce a black varnish in India. Aleurites cor data is the Chi¬ nese, and Elceagia utilis the rubiaceous New Granada varnish-tree, the latter secreting in its stipular axils a resinous substance, used by the Colombians as a lacquer. A valuable resin ex¬ udes from the trunk of the West India varnish or locust-tree (Hymencea courbaril) , a leguminous tree growing to an enormous size and living for centuries. The false varnish-tree is Ailau- thus glandulosa, or tree of heaven, from China. The Mareton Bay varmsh-tree is a tall, ever¬ green of sub-tropical Australia (Pentaceras) .

VARNUM, James Mitchell, American gen¬ eral : b. Dracut, Mass., 1749; d. Marietta, Ohio, 10 Jan. 1789. He was graduated from Rhode Island College (now Brown University), studied law and established himself in practice at East Greenwich, R. I. When the Revolution broke out, he was appointed colonel of a

regiment to be raised to the counties of Kent and Kings, and afterward received a commis¬ sion from Congress when Washington was ap¬ pointed commander-in-chief. In February 1777, he became brigadier-general ; and he com¬ manded all the troops on the Jersey side of the Delaware, when the British and Hessians took possession of Philadelphia. In 1779 he resigned his commission, was delegate from Rhode Island to the Continental Congress 1780- 82 and again in 1786ˆ87. In 1787 he was ap¬ pointed one of the judges of the Northwest Territory, and removed to Marietta, the first city established west of the Ohio.

VAROTARI, va-ro-ta're, Alessandro

*(known also as <(Il Padovanino®) , Italian painter: b. Padua, 1590; d. Venice, 1650. He was the son of Dario Varotari, a Veronese painter, who taught his son the first principles of his art. Alessandro subsequently went to Venice and thei*e devoted himself with enthusi¬ asm to the study of Titian and Paolo Veronese. The pictures he painted at Venice under the inspiration of these masters were most of them destined to adorn the churches of Padua. There are two*

examples of this painter in the London National Gallery; but his style and admirable coloring are best repre¬ sented by his (Marriage of Cana in Galilee (1622) now in the Academy at Venice; and his (Judith with the Head of Holofernes) (his grandest production), in the Dresden Gallery, a replica of which may be seen in the Imperial Gallery at Vienna.*

VARRO, Marcus Terentius Reatinus, Ro¬ man scholar and author: b. Reate, 116 b.c. ; d. 27 b.c. He received a liberal education, held a high office in the navy in the wars against the pirates and against Mithridates, and at the commencement of the civil war was serv¬ ing in Spain as legate of Pompey. When Caesar marched into that country after the reduction of Italy, Varro was obliged to surrender his forces ; but still adhering to the aristocratic party joined Pompey in Greece. His villa at Casinum was plundered by Antony, but Csesar employed him to superintend the collection and arrangement of the works in the library at Rome designed for the public use. From this time Varro lived in retirement, chiefly at his residences near Cumse and Tusculum. During the second triumvirate he was put by Antony on the list of proscribed, but by the aid of friends his life was saved, though his libraries were destroyed. He gained the favor of Augustus, who appointed him superintendent of the library founded by Asinius Pollio. Varro was called by Quintilian <(the most learned of the Romans,);> and according to his own state¬ ment he had written 490 books by 39 b.c. A list by Saint Jerome gives 74 works, containing 620 books. He wrote historical, antiquarian, biographical, critical, philosophical and geo¬ graphical treatises, besides others of a miscel¬ laneous character. Some of his works perished with his library, and only one has come down to our time entire, the treatise (De Re Rustical written when he was 80, and the best work on ancient agriculture extant. The best edition is that in the (Scriptores Rei Rusticae Veteres Latini, of J. G. Schneider (1794-97, English translation by Owen 1803). Of a grammatical treatise entitled (De Lingua Latina,* six books*

(V-X) out of the original 24 are extant, though mutilated; .the best edition is that of Muller (last ed., 1883). Consult Boissier, (Etudes sur M. T. Varro (1861).*

VARRO, Publius Terentius, Roman poet: b. Atax, Narbonensian Gaul, about 82 b.c.; d. about 37 b.c. He is sometimes distinguished from the preceding by his surname, Atacinius. He was the author of an epic on Caesar's Gallic campaigns, (Bellum Sequanicum ; (Argonaut- ica,* an epic which survives in fragments only; and satires and sonnets.*

VARUNA, the noblest of the Vedic divini¬ ties. As creator of the world and representa¬ tive of the all-encompassing heavens he rules the universe. For a reward he offers his abode hereafter; for punishment, he has fetters ever ready for the guilty. In the Vedic ritual only about a dozen hymns are addressed exclusively to Varuna and he is invoked in common with Mitra, the god of light, whose rays constantly seek out all offenders. It is his providence that protects the good and provides the remedies that prevail against the effects of sinning. His great rival in the hearts of the people is India. In the later Indian religion his dominion is con¬ fined simply to the sea. Consult MacDonnell, A. A., (Vedic Mythology (Strassburg 1897).*

VARUS, va'rus, Publius Quintilius, Roman

general. He was consul in 13 b.c., afterward proconsul of Syria, where he gained the con¬ fidence of Augustus by checking an insurrection of the Jews. Six years later he received from the emperor, with whose family he was con¬ nected through his wife, the command to intro¬ duce the Roman jurisdiction, language and re¬ ligion into that part of Germany which had just been conquered by Drusus. A general re¬ volt having been secretly arranged by Arminius, Varus was attacked by an immense host and while trying to make his escape had his whole army, consisting of three legions, cut to pieces in a pass of the Saltus Teutoburgiensis. Varus put an end to his own life. The exact scene of this battle is disputed. (See Arminius). In consequence of this defeat the Roman dominion was once more limited, roughly speaking, by the Rhine on the east and the Danube on the north.

VASA, va'sa, House of, a Swedish royal

family founded by Gustavus Vasa (Gustavus I, q.v.), who was elected king in 1523. The family held direct possession of the throne until 1654, Gustavus II (Gustavus Adolphus, q.v.) being its most illustrious representative. He was suc¬ ceeded by his daughter Christina (q.v). who never married. She assumed the government in 1644 and in 1654 resigned it in favor of her cousin Charles Gustavus (Charles X, q.v.), by whom a collateral female branch was intro¬ duced. Christina survived until 1689. The house of Vasa gave to Poland three kings, of whom the first began to reign in 1587 and the last, John Casimir, abdicated in 1668. With his death in 1672 this branch of the family became extinct.

VASARHELY, va'shar-hely, or HOD- MEZO-VASARHELY, hOd'me ze va/shar-

hely, Hungary, a large market-town in the com- itat of Czongrad, on Lake Hod and the Karoly Canal, leading into the Theiss, 12 miles north¬ east of Szegedin. Tobacco and wine are grown;

*many cattle are reared in the neighborhood and large cattle markets are held in the town. The inhabitants mostly belong to the Reformed *Chnrch. Pop. about 65,000.*

vAsArhely, or maros-vAsAr-

HELY, mar'osh va'shar-hely, Hungary, the capital of Maros-Torda County, and a royal free city, in Transylvania, on the Maros, 50 miles east of Klausenburg. Its ancient castle is now used as the garrison barracks and contains a 15th century Gothic church. In the former palace is a large library which possesses a manu¬ script of Tacitus. The town has a trade in lum¬ ber and petroleum and sugar, beer, spirits and tobacco are manufactured. Pop. about 20,000.

VASARI, va-sa're, Giorgio, Italian painter, architect and art writer: b. Arezzo, Tuscany, 30 July 1511; d. Florence, 27 June 1574. He studied under Luca Signorelli, Michelangelo and Andrea del Sarto. The Cardinal Ippolito de Medici, Pope Clement VII and the Dukes Alessandro and Cosmo of Florence, suc¬ cessively engaged him in their service. As an architect he showed great ability, and two of his designs, that of the Palazzo degli Uffizi at Florence and that of the church of Abbadia at Arezzo, are among the best of his time. As a painter he was less successful. His principal paintings are a (Lord's Supper, in the cathedral of Arezzo, and several works in the Palazzo Vecchio in Florence and in the Vatican in Rome. He has himself given us an account of his different works in Florence, Arezzo, Pisa, Venice, Bologna, Rome, etc. They exhibit all the faults of the late Florentine style. His work on the (Vite de' piu eccellenti Pittori, Scultori ed Architetti* ((Lives of Painters, Sculptors and Architects*) is of great value. He, however, fell into many errors respecting the earlier masters, owing to the imperfec¬ tion of existing accounts, and he has also been accused of partiality toward Tuscan artists. The work was first printed in 1550 and an en¬ larged and improved edition appeared in 1568. The latter forms the basis of all subsequent editions, such as that of Milanesi (Florence, 8 vols., 1878). An English translation by Mrs. Foster has been published in five volumes; an¬ other is to be found in the Bohn Library, and a*

third, by Blashfield, was published in New York.

VASCO DA GAMA. See Gama, Vasco da.

VASCONCELLOS, vas-kon-sel'lo's, Anto¬ nio Augusto Teixeira de, Portuguese author: b. Oporto, 1 Nov. 1816; d. Paris, 29 July 1878. He studied at the University of Coimbra, and in 1845 edited Illustragao. During the insur¬ rection of the following year he became an officer of ordnance under Sa da Bandeira and afterward prefect of Villa Real, secretary to the junta and editor of Revolugdo de Setem- bro. In 1850 he went to Angola and, settling afterward at Saint Paul de Loanda, was elected president of the municipal body there. Return¬ ing to Portugal he founded in 1853 a journal called Arauto. He fixed his residence later in Paris and established in 1858 the Iberian So¬ ciety for the purpose of publishing works re¬ lating to Portugal, Spain and Brazil. Among his works are (Carta philosophica do Estudo da Historia Portuguesa (1840); (Roberto*

Valenga, a romance (1846) ; (Carta do Trafico*

dos Escravos na Provincia d'Angola) (1853) ; (Le Portugal et la Maison de Bragance) (1859), and (A Fundagao do Monarchia Portu- guesa) (1860).

VASCONCELLOS, Joaquim Antonio da Fonseca e, Portuguese critic: b. Oporto, 10 Feb. 1849. He studied at Coimbra, traveled widely on the Continent, in 1883 became pro¬ fessor of the German language in the Oporto Lycee and in 1884 was made also director of the museum for industry and trade. His first work was a history of Portuguese music, (Os Musicos Portuguezes) (1870). Other works of his on the history of musical art in Portugal were (Luiza Todi (1873) ; (Ensaio sobre o Catalogo da Livraria de Musica de El-Rei D. Joao IV* (1873), and (Cartas Curiosas do Abbade Antonio da Costa) (1879). On the graphic arts he wrote (Reforma do Ensino de Bellas Artes) (1877-79) ; (Albrecht Diirer e a sua Influencia na Peninsula) (1877) ; Fran¬ cisco de Hollanda) (1879) and (Goesiana**

(1879-81).

VASCONCELLOS, Simao, Portuguese missionary and historian : b. Coimbra, 1599; d. Sao Paulo province, Brazil, about 1670. A mem¬ ber of the Jesuit order, he was sent to Brazil about 1630 and remained connected with the missions there. He wrote a (Cronica da Com- panhia de Jesus no BraziP (1663; 2d ed., 1864), a (Vida de

Joao Almeyda) (1665) and (Vida de Jose Anchieta (1666). These works are regarded as important sources for both the secular and the ecclesiastical history of early Brazil. Some of Vasconcellos' unpub¬ lished manuscripts are in the government archives of Brazil.*

VASCULAR ANATOMY OF PLANTS.

See Plants, Vascular Anatomy of.

VASELINE, a trade name for a familiar brand of petrolatum or petroleum jelly, a use¬ ful product obtained by elaborate system of filtration from crude petroleum. It is a pale- yellow, translucent, slightly fluorescent, semi¬ solid, insoluble in water, slightly so in alcohol, freely in ether and may be mixed in any pro¬ portion with fixed and volatile oils. This sub¬ stance, of American introduction, has since 1876 become of considerable importance, hav¬ ing been found an excellent substitute for lard in the preparation of ointments — its quality of never getting rancid giving it a decided value in all medical preparations over the animal fats — and it seems to furnish a good basis for soaps, pomades, cold-creams, etc., thus disput¬ ing the virtues of glycerine as an emollient. Taken internally it is said to be of efficiency in the cure of coughs, colds, hoarseness and irritation of the throat. It is extensively used in hospitals as a remedy for burns and scalds, to prevent pitting in smallpox and for every kind of skin disease, inflammation and irritation.

VASES, vaz'es, decorative vessels of vari¬ ous shapes and materials, generally with one or more handles and variously embellished and ornamented by means of relief work, incising, pigments or otherwise, and used for many pur¬ poses. The vase form usually consists of the following parts or members : rim, neck, shoulder, body or belly, stem and foot, any part of which, however, may be absent. Attachments to vases are handles and covers. Vases without feet are

✓

known as apode vases. Vase body forms are: spherical, cylindrical, oviform, pear-shaped (piriform), hemispherical, etc. Vases used by the ancients as receptacles for human ashes when the bodies of the dead were disposed of by cremation and known generally as ((cinerary vases" are usually classified as urns. The an¬ cient Egyptians used a peculiar form of vases in their funeral ritual ; they

are known as canopic vases because manufactured at Canopus (now Aboukir). They are found composed of clay, alabaster, limestone, etc. The early ones had flat lids (5th and 6th dynasties), but later the lids assumed the form of human and animal heads. These canopic vases are in sets of four and are dedicated to the Four Children of the god Horus, namely, Tuamut (jackal¬ headed) ; Qebhsennuf (hawk-headed) ; Mestha (man-headed) ; Harpe (dog-headed). They were placed at the four corners of the sar¬ cophagus and protected the viscera of the em¬ balmed apportioned as follows : Heart and lungs; liver and gall; stomach; intestines, dedi¬ cated respectively to the above deities. The Etruscans adopted these canopic vases but at¬ tempted to fashion the lids as a likeness of the deceased. The Greeks and Romans dedicated certain fancifully-made vases to the gods in their temples — these are known as ex-voto vases. The ancient Greeks and Romans made drinking vases out of rock crystal and other semi¬ precious stones which they termed diatreta be¬ cause the outside ornament was pierced and reticulated, in order, it is said, to enable the drinker to handle a cool outer surface while the contents were hot. Very interesting ex¬ amples of such are extant. Greatly admired by the Romans were the murrhine vases for which they paid their weight in gold; they were so- called from the substance of which they were made (an Oriental precious mineral termed murra) and of which we have a very indistinct knowledge. Nero paid for his cup of murra, with a handle, over $50,000. A flourishing in¬ dustry in vase production was carried on by the Romans about the 1st century a.d. at Arretium (present Arrezzo) ; _ these Arretine clay vases with their red varnish found much appreciation in their day. But the most wonder¬ ful vases dating from classical times in our possession are, probably, the Barbarini- glass vase (see Portland Vase) with its variegated layers beautifully worked into cameo carving; the vases in the excavated silver <(treasure of Hildesheim" and the ˆtreasure of Bernay" (see Silver-Ware) with their beautifully executed repousse ornament; the Orsini coupe, etc. In the catacombs of the early Christian era are found small glass vases containing a red sedi¬ ment, which analysis proves to be blood, and canonically pronounced by the Roman Church to be that of the early Christian martyrs in whose tombs they have been found. They are known as sanguinolentce. From the 16th cen¬ tury we come across beautifully turned and decorated vases of rock crystal ; noted Italian artists doing such work are Valerio Vicentino, Jacopo de Trezzo and the Misseronis. Vying in renown for vase making with the classic Greeks were the Chinese with their fictile vases. Their forms are equally numerous, chiefly rect¬ angular, octagonal, hexagonal, cylindrical, and those known to the auctioneer as single, double

and treble gourd shape, beaker form, baluster form, lance shape, gallipot form. The inverted- pear form was a favorite with the Celestials. Lovely vase forms as well as odd were produced in bronze by the Chinese ; many decorated beau ¬ tifully with cloisonne enamel, etc., are of very distant date and fetch great prices. Other won¬ derful vase makers of the Orient are the In¬ dians and Persians with their slender, long¬ necked bottle forms done in lovely intricate arabesque damascening in silver, gold, etc. Coming back to Europe we find fictile vases of artistic form and decoration of great original¬ ity in the earthenware of the Moors of Spain, the most noted being the great lustred (< Alham¬ bra" vase with its quaint flat wing handles and decoration in Arab script and painted poly¬ chrome enamel. Other quaint vase forms are found in the German Siegburg (16th century) stoneware, such as the Ringkriige (annular vases) with the open centre leaving only a circle of hollow pottery to serve as a body; the Eulen (candelabra vases) utilizing the arms and mouth for candle sockets. Coming to the 18th century we find true originality and oddity in the Sevres vaisseau a mat (masted vessel) a vase consisting of a conventionalized hull, mast and rigging. Vases in precious metals entering into the ecclesiastical service of the altar are the ciborium and the ostensorium. (See Ecclesiastical Art). Perhaps the strang¬ est use to which vases have been put is found in the <(acoustic" vases found in the walls of the old Roman theatres and public halls, which are supposed to give the room better acoustic (or hearing) value. See Greek Vases; Ce¬ ramics; Chinese Ceramics; Porcelain, etc.

Bibliography.— Birch, S.,

Clement W. Coumbe.

VASEY, va'si, George, American botanist : b. near Scarborough, Yorkshire, England, 28 Feb. 1822; d. Washington, D. G, 4 March 1893. He was brought to this country in infancy by his parents, studied medicine at the Berkshire Medical Institute, Pittsfield, Mass, and practised his profession in Elgin and Ringwood, Ill., 1848- 66. He was the botanist of the Powell Colorado Exposition in 1868 and of the Department of Agriculture at Washington from 1873 till his death. He gave his attention in his latest years almost entirely to the study of grasses, to which his publications chiefly relate. Among them are

United States (1876) ; (Agricultural Grasses of the United States) (1884) ; (Grasses of the Southwest) (1890-91); (Grasses of the Pacific Slope* (1892-93).*

VASHEGYITE, a native aluminum phos¬ phate occurring near Manhattan, Nev. It is white, massive, compact and has composition 4Al2O33P2O530H2O.

VASQUEZ DE CORONADO, vas-keth' da ko-ro-na'do, Francisco. See Coronado, Francisco Vasquez de.

VASQUEZ DE CORONADO, Juan,

Spanish administrator : b. Salamanca, Spain, about 1525; d. at sea, October 1565. He came of a distinguished family, was educated at the University of Salamanca and in 1550 went to Guatemala. He was employed in various im¬ portant government posts at San Salvador, Honduras, Nicaragua and Guatemala, and in 1562 was appointed alcalde ordinario of the provinces of Cartago and Costa Rica. His ad¬ ministration was noteworthy for its many ad¬ mirable results. He procured provisions for needy settlers, brought order out of chaos in governmental affairs, made friendly advances to the Indians, whose goodwill he won by his un¬ varying kindness and impartiality, explored Costa Rica, founded several towns, including Cartago, and in 1564 returned to Spain, leaving the colony in a most satisfactory condition. In recognition of his services he was appointed captain-general of Costa Rica, the office to re¬ main hereditary in his family, and was also made governor of Nicaragua for three years. He sailed with a large following in 1565, but met with shipwreck and was drowned in Octo¬ ber of that year.

VASSALBORO, vas'al-bur-61, Me., town on the Kennebec River and on the Maine Cen¬ tral Railroad, 11 miles northeast of Augusta. It was settled in 1760 and in 1771 was incorpo¬ rated. In 1792 a part of the town was taken for the town of Sidney. There are six villages in the town. The chief manufacturing estab¬ lishments are flour mills, machine shops and creameries. There are nine churches. The edu¬ cational institutions are Oak Grove Seminary, public schools, a business college and a school library. Pop. 2,077.

VASSAR, John Ellison, American lay preacher: b. Poughkeepsie, N. Y., 13 Jan. 1813; d. there, 6 Dec. 1878. Employed at the outset in his brother's brewery his convictions led him to leave the service and devote his time to the good of others. He was employed by the American Tract Society (1850) in mission work and during the Civil

*War was engaged among the soldiers. He was familiarly known as <(Uncle John Vassar.** His last work was done in the South. 'Consult Vassar, T. E., (Uncle John Vassar* (New York 1879).*

VASSAR, vas'ar, Matthew, American phi¬ lanthropist: b. East Dereham, Norfolk, Eng¬ land, 29 April 1792; d. Poughkeepsie, N. Y. „ 23 June 1868. He came with his father to this country in 1796 and settling near Poughkeepsie the elder Vassar established there a brewery, which was burned in 1811. Matthew Vassar then established himself in the same business and in time accumulated a large fortune. In February 1861 he delivered to trustees previously appointed for the purpose by the State legisla¬

ture the sum of $428,000 for the founding of Vassar College (q.v.). Consult Lossing, (Vas¬ sar College and its Founder (1867).*

VASSAR, Matthew, Jr., American philan¬ thropist, nephew of the preceding: b. Pough¬ keepsie, 11 May 1809; d. there, 10 Aug. 1881. With his brother, J. G. Vassar, he built the Vas¬ sar Brothers Laboratory for Vassar College, and he also erected the Vassar Home for Old Men at Poughkeepsie. He managed the family brewery business for many years and among his many benevolent bequests were the sum of $130,000 for Vassar College and $85,000 for the Vassar Brothers' Hospital at Poughkeepsie.

VASSAR, Mich., village in Tuscola County, on the Cass River, and on the Michigan Central and the Flint and Pere Marquette railroads, about 75 miles north by west of Detroit and 25 miles southeast of Bay City. It is in an agricultural region and has considerable manufacturing in¬ terest connected with lumbering. The chief manufacturing establishments are lumber mills, flour mills, machine shops, woolen mills, cream¬ eries and foundries. It has two banks and a newspaper. The educational institutions are a high school, graded schools and school li¬ brary. Pop. (1920) 1,453.

VASSAR COLLEGE, Poughkeepsie, N. Y., a college for women founded in 1861 by Matthew Vassar. His original gift to the college was 200 acres of land and $428,000 ; this was increased by his bequest of $360,000. It was incorporated as Vassar Female College in 1861, the present corporate name being adopted in 1867. The original endowment has been increased by other members of the Vassar family and later by gifts from friends of the college in various parts of the United States, until the endowment on 1 July 1918, including fellowships and scholarships, amounted to $2,- 707,075.07, with 800 acres in campus and farm. Student enrolment*

*is limited to 1,000, who may be housed on the campus ; but the pressure for admittance and the difficulty of estimating withdrawals make it impossible to maintain this limit with exactness and the enrolment for 1921 numbered 1,106. Students are 'ad¬ mitted1 on passing the examinations set by the college entrance examination board, or by an examination covering three years of prepara¬ tion in four selected subjects; this latter method takes the place of entrance by certificate from approved schools. The course of study, which is partly elective, covers four years and leads to the A.B. degree. The degree of M.A. is also conferred in course. Five fellowships for grad¬ uate work are offered and a large number of undergraduate scholarships. The funds avail¬ able for student aid in one form or another amounted in 1918 to $434,955.59. The affairs of the college are administered *by a board of 27 trustees, a president, a treasurer and a fac¬ ulty composed in 1921 of 130 members. The physical equipment of the college, exclusive of faculty residences, includes 27 buildings, seven of them dormitories, which are also residence halls; a farm of 675 acres, maintaining vegetable gardens and a model dairy, operated for die benefit of the college dining-rooms ; an open- air theatre, athletic grounds, flower gardens and conservatories, lakes and woodland. Among the more notable buildings are the Main Build¬ ing, one of the three edifices that constituted*

the college in 1865, containing administrative offices and accommodations for about 400 stu¬ dents and officers; the College Chapel, a stone building in Norman style, with a seating capac¬ ity of 1,400, containing a set of chimes and stained glass windows by John LaFarge, the Tiffany studios and the Dodge studio ; the Frederick Ferris Thompson Memorial Library, of stone, in perpendicular Gothic style, pro¬ viding space for 160,000 books .and about 600 readers and containing, in 1918, 100,000 cata¬ logued books and pamphlets; Rockefeller Hall, a modern structure for recitations and lectures, at the end of the dormitory quad¬ rangle; a Museum building containing excel¬ lent collections of minerals and fossils and nearly 3,000 mounted birds, as well as many other collections; Taylor Hall, containing the valuable art collections of the college and art lecture halls and studios ; the Swift Memorial Infirmary, containing a modern hospital equip¬ ment;

Metcalf House, a health cottage adapted for convalescents and rest cases ; the Students' Building, providing for the needs of the Stu¬ dents' Association and other college organiza¬ tions, with a large auditorium, seating 1,500, equipped with a modern stage and scenery; and the Good Fellowship Club House, erected by the Students' Association for the maids em¬ ployed in the college and devoted to social wel¬ fare work. Student self-government is in ef¬ fective operation, the students themselves as¬ suming responsibility for most of the regu¬ lations governing conduct and for the manage¬ ment of such property as the Students' Build¬ ing and the Good Fellowship Club House ana for all extra-curriculum activities, including the providing of various money-making occupations for self-supporting students. The facts that the price for rooms and board is the same for every student, the rooms being selected by lot, that there are no sororities or other clubs to which membership is not absolutely open and that no admission fee may be charged to any campus meeting, all help to maintain the fine democratic spirit that prevails. The college is distinctly Christian, but undenominational in its management. Services on Sunday are con¬ ducted by visiting clergymen of various churches and evening prayer is held in the chapel daily. The social life of the student body is under the direction of a department of wardens ; one warden resides in each house and has charge of its social interests. This department directs also an occupation bureau for the aid of students and for alumnae desiring to register for positions. The health and physi¬ cal training of t-he students are made a chief object of attention and are under the direction of a resident physician and two assistant physi¬ cians, who also control the sanitary regulations of the college.

VATHEK. This wonderful tale of the East has a curious history. It was written by William Beckford, when a young man, at the suggestion of the Rev. Samuel Henley, then an assistant master at Harrow, one of the great public schools of England. There is a tradition that Beckford wrote it out in three days and two nights, never leaving his room or taking off his clothes in the meantime. The correspond¬ ence between Beckford and Henley, however, shows that the author was engaged upon the book for several years. As a boy Beckford

was fascinated by (The Arabian Nights, and subsequently read several learned books upon Mohammedan life, customs and beliefs. In a word, all the details of his story were closely studied. Rather capriciously, he composed the tale in French and gave Henley a copy of his manuscript to translate into English. Owing to a misunderstanding between author and translator, the English version*

was published first. It appeared in the summer of 1786, with a preface and notes by Henley, who suppressed the author's name and claimed that the tale was translated directly from the Arabic. At this treatment by his translator Beckford was very angry and the next year he published the original French at Lausanne (where he was staying) and at Paris. Three subordinate tales which were to form a part of

(The History of the Caliph Vathek) is a story of mingled horror, burlesque and sublim¬ ity, varied by scenes of great beauty; and the whole is organized as a study in retribution. Vathek, a grandson of Haroun-al-Raschid, rules the Mohammedan world from his splendid palace overlooking the Babylonian city of Samarah. When we first see him he is a young monarch indulging himself in all the sensual delights of exquisite dishes, voluptuous music, delirious perfumes and troops of girls as beautiful as the houris. He has an eye so terrible that any wretch who looks upon its steadfast gaze falls to the ground and sometimes expires. He grows cruel ; he imprisons on whimsical charges his most faithful subjects and in general ad¬ ministers justice in a most haphazard manner. He comes under the influence of Carathis, his mother, magician and necromancer in league with the most malignant spirits, with ghouls even, whom she summons from the grave to do her bidding. She is surrounded by negresses with one eye, who aid her in her wicked de¬ signs; and she is so ceaseless in the pursuit of the powers of darkness that she would never sleep but for the visions of evil that then come to her. Instigated by this mother, Vathek commits the most heinous crimes. In defiance of Mohammed and Allah, he erects a lofty tower of 11,000 stairs in a vain endeavor to penetrate, by the most obscene rites, the mys¬ teries of heaven. At length he abjures his re¬ ligion and sells his soul to Eblis, the Moham¬ medan Satan, in the hope of obtaining the throne of the pre-Adamite sultans.

The agent of the transaction is a giaour, who appears in the form of a man so hideous that people shut their eyes at the first sight of him. Vathek, in one of his fits of madness, kicks him down the palace steps; other feet join in the entertainment and the intruder is kicked through the palace and streets of Samarah. i he giaour nevertheless wins over

Vathek, who obtains for his harem Nouronihar, the most beautiful

and sensuous of Oriental women. The last scene is in the magnificent hall of Eblis, where, disappointed of all their hopes, Vathek and Nouronihar and Carathis are consigned to eternal pain. With right hands upon hearts kindled by Eblis into flames, they must there tread a never-ending round of agony. No neater punishment was ever de¬ vised for the^ damned. Nor were there ever any better pieces of extravagance than the sport which Samarab has with the giaour, or the tricks which Nouronihar and "the girls of the harem play upon Bababalouk, the chief of the eunuchs.

Wilbur L. Cross.

VATICAN, The, a palace situated on the eastern sections of the Vatican Hill in Rome, the principal residence of the popes since the return from Avignon in 1377 and their official residence since the capture of Rome by the Piedmontese in 1870. It originated in a resi¬ dence built by Pope Symmachus (498-514) adjoining the Basilica of Saint Peter, but was rebuilt and greatly enlarged by subsequent popes, especially Nicholas V, Sixtus IV, Alex¬ ander VI and Julius II. The Basilica and Piazza of Saint Peter flank it on the south, while to the west lie the Vatican Gardens. Only a small part of the Vatican is residential and this part is around the Cortile di San Damaso; all the rest is used for scientific or administrative purposes. There are a large number of chapels which serve various pur¬ poses, the most important being the famous Sistine Chapel and the Cappella Paolina. The rear wall of the former contains Michelangelo's (Last Judgment, > while its side walls contain frescoes executed by Florentine and Umbrian masters between 1481 and 1483. The Cappella Paolina, which is separated from the Sistine Chapel only by the Sala Regia, serves as the parish church of the Vatican.

The Vatican contains many works of art either in its museums and collections or as a part of its interior decorations. The Museo Pio-Clementino embraces 11 separate rooms and among its treasures are the Torso of Hercules, the Belvedere Apollo and the Laocoon. In the Galleria Chiaramonti there are more than 300 sculptures, chiefly the work of Greek sculptors living in Rome. From an architectonic point of view, the Braccio Nuovo, containing statues and busts, is the best of the museum buildings. The Egyptian Museum, embracing 10 halls full of statues, sarcophagi, mummies, etc., is among the first of Egyptian collections of the second rank. The Etruscan Museum contains objects of almost every de¬ scription, giving a highly graphic picture of the art of ancient Italy and the customs of the Etruscans. These two museums are located, one below the other, at the northern end of the Giardino della Pigna.

Besides these museums, there are several galleries of paintings. The Vatican Pinaco- theca, whose nucleus was the collection of art treasures taken by Napoleon to Paris and subsequently restored to Rome, contains works by Raphael, Leonardo da Vinci, Fra Angelico, Murillo, Perugino, Titian, Pinturicchio, Guido Reni, Correggio and many other Italian mas¬ ters; while the Gallery of Modern Paintings

contains, among others, the huge picture of the promulgation of the Immaculate Conception b3r Pius IX. The Appartamento Borgia con¬ sists of six rooms adorned with Pinturicchio's paintings. In the second of the rooms the mysteries of the life of Christ are depicted. The last two rooms are situated in the Torre Borgia. One of these formerly contained the Celebrated Nozze Aldobrandini, one of the finest antique frescoes surviving from classi¬ cal times, which is now located in the Vatican Library.

One floor higher and an exact reproduction of the Appartamento Borgia in size and shape are the Stanze di Raffaello, so called because they were painted by or under the direction of Raphael. Immediately adjacent to the Stanze are the Loggie di Raffaello, while underneath the latter are the Loggie di Giovanni da Udine, a pupil of the Umbrian master. In the Galleria degli Arazzi hang the famous 27 pieces of tapestry. The studio for mosaic painting, for which the Vatican is justly famous, is said to possess nearly 30,000 dif¬ ferent shades of vitreous compostion.

The scientific materials in the Vatican are abundant and easily accessible to research workers under certain restrictions. Reference is facilitated by a great many volumes (some printed, some in manuscript) of indices, inven¬ tories and catalogues, so that information on all branches of human knowledge may be read¬ ily secured in the Vatican Archives and Library. The scientific management of the Vatican Ar¬ chives is entrusted to a cardinal and the chief groups of archival materials are the Archivio Segreto, the Archive of Avignon, the Archive of the Apostolic Chamber, the Archive of Sant' Angelo, the Archive of the Dataria. the Consistorial Archive and the Archive of the Secretariate of State. The last named contains the correspondence of the nunciatures, lega¬ tions, cardinals, bishops, prelates, princes, titled persons, military men and others. Besides these archives there are various collections, including the huge archive of the old Congre¬ gation del Buon Governo, which was entrusted with the economic administration of the Papal States from 1592. The entire collection of archives is of the greatest importance for the political and ecclesiastico-civil history of mod¬ ern times, and is of especial interest to Amer¬ icans because it

abounds in materials for Amer- can history, particularly of the period of col¬ onization. Consult Fish, C. R., (Guide to the Materials for History in Roman and Other Italian Archives } (Washington 1911).

In the importance of its materials the Vat¬ ican Library stands first among the great libra¬ ries of the world, containing approximately 50,000 manuscripts and 350,000 printed books. Because it is primarily a manuscript library and because its accommodations are inadequate to meet the demands of the general public, all readers who wish to consult only printed lit¬ erature are excluded from the library. The manuscripts are divided into 16 open divisions, or divisions subject to later accessions, and 36 closed divisions, or divisions which came to the library complete, and are separated according ta the language of the manuscript. Here are to be found the majority of the manuscripts, from the convent at Bobbio, in the Middle

Ages one of the richest collections in Europe. Here also are 3,000 manuscripts brought to the Vatican from Heidelberg in 1623 and called (

The scientific management of the Vatican Library is entrusted to a prefect, who also has charge of a Pagan Museum, a Numismatic Collection and the Museo Cristiano. The last- named was separated for a time from the li¬ brary management when the celebrated De Rossi was named prefect of the Museo, an honor intended only for him. Despite the small staff of the Library and its insufficient funds, it stands at the head of the libraries of the world in the number of its scientific publi¬ cations.

Besides the Archives and the Library the Vatican possesses an astronomical observatory, a modern polyglot printing office, a collection of inscriptions and a collection of geographical charts. The Specola Vaticana consists of the Gregorian Tower and the Leonine Tower with a connecting passageway and has acquired con¬ siderable reputation for its measurement of astrographic plates. The Galleria Lapidaria contains no less than 6,000 inscriptions in stone and numerous other inscriptional remains. Closely identified with it was the celebrated Marini, one of the founders of Latin epi¬ graphy.

There are several large state halls in the Vatican, including the Sala Regia (where the consistories are held), the Sala Ducale and the Sala Clementina, which are of great histori¬ cal importance. The neighboring Basilica of Saint Peter is regarded as a part of the Vatican only when the Pope attends some solemn cere¬ mony there. Since 1870 the Vatican has been considered extraterritorial and has conse¬ quently possessed its own military guardians, the Swiss Guards, and its own police, the gen¬ darmes; before that time it came under the civil administration of the Papal States.

The importance of the Vatican, the admin¬ istrative centre of the Catholic Church, was increased by the seizure of the Papal States and the consequent exclusive residence of the Pope in the Vatican. Business formerly trans¬ acted elsewhere, for instance, in the Lateran Palace, is now conducted here. It was here that the conclaves were held which elected Leo XIII, Pius X and Benedict XV to the papacy. It is here that the Papal Secretary of State receives the ambassadors and envoys accredited to the Holy See, so that all diplomatic affairs not transacted by correspondence are conducted in the Vatican. A number of the important Ro¬ man Congregations hold regular or special ses¬ sions in the Vatican. This concentration of administrative affairs in the Vatican inevitably follows the residence of the Pope there.

Bibliography. — Gregorovius, (History of Rome in the Middle Ages* (English transla¬ tion by Mrs. G. W. Hamilton) ; Pistolesi, HI Vaticano descritto ed illustrate,* noted for its profuse illustrations; Sladen, (How to See the Vatican,* one of the best modern works in English; Potter, (The Art of the Vatican*; Murray, (Handbook to Rome-* ; Baumgarten,

(Vatican,* in (The Catholic Encyclopedia> ; Kuhn, ‘Roma.*

Herbert F. Wright,

Sometime Librarian of the Latin Library, The Catholic University of America.

VATICAN COUNCIL, or COUNCIL OF THE VATICAN, the only plenary council of the Roman Catholic Church held since the Council of Trent in 1563. In June 1867 Cardi¬ nal Caterine sent a circular letter to the 500 bishops present in Rome at the celebration of the 18th centenary of the martyrdom of Saints Peter and Paul, inviting their replies relative to questions on points of discipline and other matters to be brought up in the proposed council. In September 1868

an invitation to attend the approaching Council was sent to Oriental bishops not in communion with the Roman Catholic Church, and to ((Protestants and non-Catholics.® The bull of convocation was promulgated on 29 June 1869, appointing 8 Dec. 1869, as the day of meeting. A few days before the latter date, on 27 November, Pius IX issued the brief, Mnltiplices inter, pre¬ scribing the mode of conciliar procedure.

The Council, which assembled on the ap¬ pointed day, 8 Dec. 1869, was the largest ever held, 749 cardinals, bishops, abbots and generals of religious orders being present, or nearly three-fourths of the Roman Catholic episcopate. The number was afterward increased to 764. The invitation to non-Catholics and others not in communion with Rome brought no response in the form of attendance. The Italian bishops numbered 170 and the Spaniards 40. On 10 De¬ cember, at the first congregation of the Council, a bull was published decreeing that if the Pope should die during the Council, that body should at once be prorogued, and take no part in the election of a pontiff, which duty was to rest with the College of Cardinals. Petitions were signed by many prelates, members of religious orders and lay Catholics, asking for the definition by the Council of the dogma of papal infallibility.

At the second session, 6 Jan. 1870, all the members present recited the Creed of Pius IV pledging loyal obedience to the Roman Pontiff, and took the episcopal oath. The Cardinals- president of the congregation, on 20 February, issued rules which should govern the debates of the Council, and the ˆConstitution on the Faith,® known as Dei Filins, was formulated and adopted. It is chiefly directed against modern rationalism. All the 667 members present signed this Constitution, and it was pro¬ mulgated at the third session, 24 April 1870, with papal confirmation.

Next followed the most important work of the Council, a decision that should put an end to all discussion on the subject of papal in¬ fallibility, already accepted as a dogma by the vast majority of the Church. The Constitu¬ tion now generally known as Pastor TEternus asserted the following propositions: (1) That a proper primacy of jurisdiction over the whole Church was conferred upon Saint Peter di¬ rectly and singly, and not mediately through any delegation to him, as chief minister of the Church, of a primacy held by the Church cor¬ porately; (2) that this Petrine primacy vests only by divine institution and right in the line of Roman pontiffs; (3) that the Pope's juris-

diction is immediate in all churches — that is, he is the universal ordinary, the actual bishop of every see (all other bishops being merely his curates and deputies), and is not a remote or merely appellate authority — so that in questions not of faith and morals alone, but of discipline and government also, all the faithful, of whatever rite or dignity, both pastors and laity, are bound, individually and collectively, to submit themselves thereto ; (4) that it is unlawful to appeal from the judgments of the Roman pontiffs to an oecumenical council, as though to a higher authority; and (5) that the Roman pontiff, when he speaks ex cathedra and defines a doctrine of faith or morals to be held by the universal Church, is infallible, and such definitions are accordingly irreformable of themselves, and not from the consent of the Church. This document was voted upon, 13 July 1870. Of the 671 members present 451 voted directly in the affirmative, 62 voted placet juxta modum, signifying approval with certain changes of expression, and 88 voted non-placet, but of these many objected not to the essence of the dogma, but to the time — one of great agitation in the political world — *as inoppor¬ tune for declaring it. After discussion the newly-defined dogma was adopted at a public session, held 18 July 1870, when 535 voted in the affirmative and only two, the bishops of Ajaccio and Little Rock, Ark., answered <(non- placet,55 these afterward joining in unanimous adoption. The Pope confirmed the action of the Council, and on 20 Oct. 1870 the Council was formally prorogued, instead of being dis¬ solved. It is, therefore, technically still in ex¬ istence. The year in which papal infallibility was declared to be a dogma of Roman Catholic faith witnessed the downfall of the Pope's tem¬ poral power, the Italian government having taken possession of Rome, 20 Sept. 1870, and Rome being proclaimed the capital of Italy, 9 Oct. 1870. See Catholic Church ; Papacy, and consult Arthur, William, (The Pope, the Kings and the People5 (London 1903) ; Fessler, Joseph, (Das vatikanische Concilium, dessen aussere Bedeutung und innere Verlauf5 (2d ed., Vienna 1871) ; Friedirck, J., (Geschichte des vatikanischen Konzils5 (3 vols., Bonn, 1877— 87) ; Manning, Henry E., (The True Story of the Vatican Council5 (London 1877) ; and (Acta et Decreta Concilii Vaticani5 (Freiburg

1892).

VAUBAN, vo-ban, Sebastien le Prestre,

Seigneur de, marshal of France, French mili¬ tary engineer: b. Saint Leger de Towcherets, near Avallon, Burgundy, 1 May 1633; d. Paris, 30 March 1707. He early entered the army, where his uncommon talents and genius for fortification soon became known, and were sig¬ nally displayed in various successive sieges. He introduced the system of approach by par¬ allels at the siege of Maestricht (1673), and distinguished himself at Oudenarde, Valencien¬ nes and Cambrai. He rose to the highest mili¬ tary rank by his merit and services, and was made governor of the citadel of Lille in 1668 and commissioner-general of fortifications in 1677. He was made marshal of France in 1703. As an engineer he carried the art of fortifying, attacking and defending towns to a degree of perfection unknown before his time. He forti¬ fied above 300 ancient citadels, erected 33 new

ones and had the principal management and direction of 53 sieges. Among the principal places fortified by him are the port of Dunkirk and the citadels of Lille, Metz and Strassburg. He was the inventor of the socket bayonet and ricochet batteries.

VAUCLUSE, France, a department in the southeast of the republic, famous for its wines and silks; paper and chemicals are also manu¬ factured. The chief towns are Avignon (q.v.), Apt, Carpentras, Orange and Vaisou. The cli¬ mate is mild and delightful. Pop. (1918 est.)

250,000.

VAUDEVILLE, a form of dramatic rep¬ resentation in which songs and dances are in¬ terspersed with dialogue. The name is a cor¬ ruption of the French Vau de Vire, a pictur¬ esque locality in Normandy, where a number of popular humorous songs were written in the 15th century. Consult Gasti, (Les vaux de vire de Jean le Haux5 (Paris 1875).

VAUDREUIL DE CAVAGNAL, Pierre Francois de Rigaud, Marquis de, French sol¬ dier and colonial administrator: b. 1704; d. 1772. As an officer of the French colonial army in New France (Canada) he came into prominence in 1746, when with French and In¬ dian troops he captured Fort Massachusetts, at North Adams, Berkshire County, Mass., the site and ruins of which are among the city's historical features. Later he was appointed governor and lieutenant-general for the king of New France and of the territory of Louisiana. Consult (Letters du Marquis de Vaudreuil au Chevalier de Levis, 1756-17605 (Quebec 1895).

VAUGHAN, Bernard, English Catholic priest : b. Herefordshire, 20 Aug. 1847. He was educated at Stonyhurst, became a member of the Society of Jesus and for years played a conspicuous part in the life of Manchester. In 1901 he went to London to work among the poor of the East End and organized bazaars for the erection of clubs for the working classes. In 1906 he drew large audiences by a series of sermons on the ((Sins of Society55 which was followed (1907) by a Lenten course on the ®Sins of Society gauged by the Passion of Christ.55 In 1910 he toured the United States, Canada and Alaska and went to Japan where he lectured before the Imperial University of Tokio and addressed the House of Peers and ladies of society. He also lectured in China and in Italy and France. He was chosen Eng¬ lish preacher at the Marian Congress in Rome (1894) and preached before King Edward VII when Prince of Wales (1902). He became chaplain to the Catholic troops of the British expeditionary forces in France during the late war. His publications include (The Roman Claims5 ; (Faith and Reason5 ; (The Tripple Alliance5 ; (The Demon of Drink in The Temple of God5 ; (The Sins of Society5 (1906) ; (Society, Sin and the Savior5 (1907) ; (Life Lessons from Joan of Arc, the Matchless Maid5 (1910); Socialism5 (1910); (The Our Father Our Country's need to-day5 0911) ; Socialism from the Christian Standpoint5 (1913) ; (The Menace of the Empty Cradle5 (1917); (The Worker's Right to Live5 (1918).

VAUGHAN, van or va'an, Charles John,

English Anglican clergyman: b. Leicester, 1816; d. Llandaff, Wales, 15 Oct. 1897. He was edu-

✓

cated under Arnold at Rugby, and at Trinity College, Cambridge, took holy orders in 1841, and was successively vicar of Saint Martins, Leicester (1841-44), head-master of Harrow (1844—59), vicar of Doncaster (1860-69), mas¬ ter of the Temple (1869-94) and dean of Llan- daff from 1879. While at Harrow he did much toward increasing the efficiency of that school, and as master of the Temple became known for pulpit eloquence and was conspicuous as one of the leaders of the Broad Church party. He married a sister of Dean A. P. Stanley (q.v.). Among his 40 or more published volumes are ; Commentaries on Acts, Revelations, Philippians) ; (Family

Prayers } ; (Discourses on Liturgy and Worship) ; (Addresses to Young ■Clergymen ; (The School of Life.**

*VAUGHAN, George Tully, American sur¬ geon : b. Arrington, Nelson County, Va., 27 June 1859. He was educated at the Kenmore University High School, Amherst, Va. (1867— 68) ; he then graduated with the degree of M.D. from the University of Virginia, and from Bellevue Hospital Medical College, New York, after which he took post-graduate courses in the New York Polyclinic, the University of Berlin, Germany, and the Jefferson Medical Col¬ lege, Philadelphia. He was appointed assistant surgeon in the United States Marine Hospital Service in 1888; surgeon in 1900 and assistant surgeon-general in 1902. During the war with Spain he served as major and brigade surgeon of the Seventh army corps. Since 1897 he has been professor of surgery in Georgetown Uni¬ versity, Washington ; surgeon to Georgetown University, Emergency and Saint Elizabeth hos¬ pitals ; and from 1902 has been assistant sur¬ geon of the United States Public Health and Marine Hospital Service. He has written Principles and Practice of Surgery * (1903).*

VAUGHAN, Henry, Welsh poet: b. New¬ ton, parish of Llansaintfraed, Brecknockshire, 17 April 1622; d. there, 23 April 1695. He was styled ((The Silurist,® because his native region was among the Silures, or folk of South Wales. He was educated at Jesus College, Oxford, and practised medicine with much success and reputation first at Brecknock and later at New¬ ton. He was imprisoned for his loyalty at the Revolution, and he was present at the battle of Rowton Heath — as surgeon with the royalist army. His first volume was Poems with the Tenth Satyre of Juvenal Englished) — a free rendering (1646); followed by (01or Iscanus) — (Swan of the Usk) (1651), the chief portion of the volume being a eulogy of that river. Thereafter his verse took on a predomi¬ nantly religious and devotional cast and greatly improved in poetical quality. In 1650 appeared the first part of (Silex Scintillians — (Sparks from the Flint, * described in its sub-title as made up of ((sacred poems and private ejacula¬ tions,® and completed in 1655 by the addition of a second part containing what are probably his best-known stanzas — <(They are all gone into the world of light.® One ((J. W.® collected (1678) various elegies, translations and other productions as (Thalia Rediviva) ; and Vaughan also published some books of prose, among them (The Mount of Olives1* (1652), a work of devotion. He abounds in occasionally felici¬ tous phrases and lines — like, as he said, Un¬*

anticipated sparks from a flinty ground.® A few of his poems have been given by critics a very high place in literature. He was practi¬ cally unknown until H. F. Lyte edited the sacred poems in 1847. A

complete edition of his works is that of Grosart (1871) ; of the poems, that of Chambers (1896). Consult the memoirs in these editions; also the essay in Brown, (Horae Subsecivae (Series I, 1858).*

VAUGHAN, Herbert, English Roman Catholic prelate : b. Gloucester, 15 April 1832 ; d. London, 20 June 1903. He was educated at Stonyhurst College and on the Continent ; was ordained to the priesthood in 1854; founded Saint Joseph's College for foreign missions at Mill Hill, Hendon; visited Maryland as a mis¬ sionary to the negroes ; and in 1872 was conse¬ crated bishop of Salford. On Manning's death he was appointed (1892) archbishop of West¬ minster, and shortly afterward was made car¬ dinal. He was a preacher of much eloquence, and proprietor of the Dublin Review and the Tablet. He displayed a marked interest in the temperance cause and in commercial education among Roman Catholics, building for this lat¬ ter purpose Saint Bede's College.

VAUGHAN, John Stephen, English Cath¬ olic bishop, brother of Bernard and Herbert Vaughan (qq.v.) : b. Courtfield, 24 Jan. 1853. He was educated at Saint Gregory's College, at the Collegio Inglese, Rome, and at the Grand Seminaire, Bruges. He became a priest in 1876, sailed to Australia where he did missionary work for three years, then returned to London where he took up parochial tasks. He was canon of Westminster (1898), delivered free Catholic lectures in the public halls of London (1890-93), resided in Rome as domestic prel¬ ate (1904—07) and then went on a lecture tour to the United States and in 1909 was created bishop of Manchester. While working in Lon¬ don, in addition to preaching he gave spiritual retreats to seminarists and to the clergy both in England and Ireland and in the United States. His writings are various and have been trans¬ lated into several languages. They include (Life after death1 ; (Thoughts for all times) ; (Faith and folly * ; Concerning the Holy Bible) ; (Dangers of the Day* ; (The Purpose of the Papacy* ; (Happiness and beauty* ; and (Time or Eternity.**

VAUGHAN, Robert, English clergyman and historian: b. 1795; d. Torquay, 15 June 1868. He was professor of history in London University; and in 1842 became president of the Lancashire Independent College at Manchester, remaining in that position until 1857. He also founded the British Quarterly Review and for 20 years was its editor. Among the more im¬ portant of his works are (Life of John de Wycliffe (1828) ; (The Protectorate of Crom- welP (1838) ; (History of England Under the House of Stuart1 (1845) ; (The Age of Great Cities) (1842) ; devolutions in English His¬ tory1**

(1859-60).

VAUGHAN, Thomas Wayland, American

geologist: b. Jonesville, Tex., 20 Sept. 1870. After graduating from Tulane University in 1889, and from Harvard University in 1893, he went to Europe, studying in the museums. He engaged in geological and palaeontological re¬ searches, making a specially of tertiary geology,

lossils and recent corals and now is connected with the United States Geological Survey. He has published (The Eocene and Lower Oligo-cene Coral Faunas of the United States, > Vol. \ I, Monograph XXXIX, Geological Survey, besides many papers on geology and palaeontol¬ ogy.

VAUGHAN, Victor Clarence, American physician, scientist and educator: b. Mount Airy, Mo., 27 Oct. 1851. He was educated at Cen¬ tral and Mount Pleasant colleges, Missouri, and at the universities of Michigan and Berlin. He was appointed instructor in the University of Michigan in 1876, made professor in 1880 and dean of the Medical School in 1891. As an educator he developed the combined- collegiate and medical course which was first formulated and given in the University of Michigan in 1890 and has since been adopted by the majority of university medical schools in the United States. He has always advocated a broad fundamental training in language, including Latin, Greek, French and German, history, mathematics and the sciences, biology, physics and chemistry; and the acquisition of profes¬ sional and expert knowledge based upon these fundamentals. His research studies have been devoted largely to the chemistry of bacteria and other proteins. He has shown that all proteins, bacterial, vegetable and animal, contain within their molecular structure poisonous groups, which though similar in physiological effects dif¬ fer in chemical construction. His contributions to science cover about 200 titles in American and European publications. He has been presi¬ dent of the Association of American Physicians and the American Medical Association, and is a member of the American Philosophical As¬ sociation, the National Academy of Sciences and honorary member of the French and Hun¬

garian Societies of Hygiene. He served as division surgeon in the Cuban campaign in 1898 and was recommended for brevet-colonel by President McKinley for behavior in the battle of Santiago. With Reed and Shakespeare he studied the causes of typhoid in the camps in 1898 and as the surviving member of this commission he wrote the report, which has been of value in eliminating this disease in armies.

VAUGHAN, Sir William, English poet and colonial planter: b. Golden Grove, Carmar¬ thenshire, 1577; d. Torcoed, England, August 1641. He was educated at Oxford, graduated in law and in 1625 became a physician. He founded the settlement named Cambriol at Newfoundland, concerning which he wrote (The Golden Fleece, divided into Three Parts, etc., by Orpheus Junior > (1626), a quaintly written combination of prose and verse notable as the first volume of poetry written in the North American colonies. He returned to England in 1625 and wrote

VAUGHAN-HUGHES, James, English surgeon: d. November 1916, aged 95. He served as a surgeon in the Crimean War and was for a time in charge of Balaklava Hos¬ pital; he attended Florence Nightingale in a transport when she was suffering from camp fever. On her recovery he borrowed Lord Dudley's yacht to convey her back to Skutari. Later he himself contracted Asiatic cholera and was nursed by Miss Nightingale and her staff

*He recorded his reminiscences in (Seventy Years of Life in the Victorian Era.**

VAUGHT'S HILL, Engagement at. On

18 March 1863 Col. A. S. Hall, with a brigade of Union infantry of 1,300 men and two guns, was sent from Murfreesboro to look after Gen. John H. Morgan, who was raiding the country to the northeast. Beyond Statesville, Hall ran into the Confederate skirmishers, and these, being pressed back, disclosed Confederate cav¬ alry in position. Learning also that Morgan, with a large force, was preparing to attack him, Hall fell back to Vaught's Hill, a steep cedar- wooded height, near Milton, about 13 miles from Murfreesboro. He was closely followed by Morgan with about 2,500 men and a battery of artillery, who made an attack at 11.30 a.m., on the 20th, before Hall had fairly taken posi¬ tion. Morgan's larger numbers permitted him to attack both Hall's flanks and rear, but he could gain no further advantage, and after an engagement of nearly four hours, in which he was several times repulsed, he finally with¬ drew, leaving his dead and many wounded on the field. His loss was

30 killed and 150 wounded, the loss in officers being very heavy. The Union loss was six killed, 42 wounded and eight missing. Consult (Official Records) (Vol. XXIII).

VAULT, an arched-covered enclosure, hence frequently used to express the arched ceiling or roof, as of a hall, room, cellar or other compartment or edifice. In a still further extension the term vault is frequently used as synonymous with a subterranean compartment, as a crypt, cellar, etc. In architecture it must be noted that vaults are ceilings not roofs, as those below ground (crypts, etc.) carry the floor above and even in the case of naves and aisles of churches the vaulting may carry a solid masonry roof, as in Milan Cathedral and the Romanesque buildings of southern France. While the art of vault construction dates back to unknown origins and the Romans excelled in the art, it was in the Middle Ages that archi¬ tecture took up seriously the important phase of creating its decoration in the actual con¬ struction itself, and vaulting was the greatest problem of the architect in his construction. The early Christian basilica, from its pagan prototype, had at the far end of its flat roof a half dome or demi-hemisphere (apse). In Romanesque architecture (say 11th century to middle 12th century) the naves and aisles of the church edifices were covered, in sequence, with the following styles of vaults: First the cupola (domical), next the tunnel vault, then the groined vault. Out of the latter developed the "ribbed,® and the Gothic era in vaulting arose.

Technique. — Various authorities divide vaults into two classes as to their construction : Solid and Ribbed, and, as to form, into Simple and Compound. Solid are those having un¬ broken surfaces whereas the ribbed refer to those with variegated inner surface planes. Simple are those vaults composed of an un¬ changed form of archway throughout. Com¬ pound vaults are those broken up by intersect¬ ing arches. A simple vault is the cylindrical, termed barrel, tunnel, cradle or wagon vault a mere arch extended in its axis to roof over

✓

a compartment or other space. The tunnel or barrel is the commonest in use and has usually a semi-circular cross section and the inner or ((vaulting surface® (intrados) has the form of a portion of a hollow cylinder. (Fig. 1). Barrel

Fig. 1. — Tunnel or Barrel Vault.

vaults may, however, have cross sections semi¬ elliptical, segmental, pointed, three centred, etc. Barrel vaults date back at least to 800 b.c. as found in the pyramids at Meroc and at Nim- roud. In the case of the aisles of church build-

Fig. 2. — Half Barrel Vault. Sectional View.

ings a half-barrel vault is frequently used having a 45 degrees segment of a circle. (Fig. 2). Another simple vault is a skew arch which has been described as (

Fig. 3. — Trumpet Arch Pendentive.

whose joints are spirals.® The annular vault also belongs to the simple series. This has its axis curved ; its intrados, therefore, is a por¬ tion of a cylindrical or hollow ring. The spiral vault also belongs here, and is an annular vault

with spiral axis; used for supporting winding stairs, etc. Still another kind belonging to this category is the expanding vault; these are smaller at one end than the other and the inner surface diminishing has a form of part of a truncated cone or elongated funnel. Such are found in Romanesque style buildings to form pendentive s (Fig. 3) to assist in reducing a square to an octagon and may occur as parts of compound vaults. Compound vaults are, as before stated, simple vaults intersecting one another. (Fig. 4). They usually are termed groined vaults on account of the groin angle

Fig. 4. — Groined Vaults.

which the two surfaces produce at their junc¬ ture. These compound vaults may be divided into: quadripartite (four-part), oblique, irregu¬ lar ‘, etc. The quadripartite form is evolved from two barrel vaults intersecting. (Fig. 4). In covering a square compartment it is the common groin vault ; in domical vaults, it is the so-called <(cloistered arch® or square dome, etc. Covering oblong compartments of such we have, among others, the (

Fig. 5. — Welsh or Underpitch Vault.

than the main and springing from a higher level, causing the groin line to assume a double curve. They are found frequently covering Roman halls and baths and appear in French Romanesque. Oblique vaults can occur with straight axes composed of equal or unequal

barrel vaults; with an annular vault intersected by a conical vault, or by an underpitch vault. (Fig. 5). Irregular vaults are those in this category which do not conform to any regular geometrical shape. This section is subdivided into tripartite and polygonal, according to whether, in the first case, they cover a triangu¬ lar space caused, for instance, from the inter¬ section of three barrel or three expanding vaults; or, in the polygonal case, whether they

1 Church of Saint Etienne-le-Vieux, France (Late Gothic) 3 Transition Romanesque-Gothic

2 Transition Romanesque-Gothic 4 Early Gothic

cover octagonal, decagonal, etc., rooms. Fan- Tracery vaulting is a solid variety common in the Later Gothic period. It contains no ribs in the construction (see Ribbed Vaulting Gothic'), but the surfaces are covered ornamentally with mullions and tracery bars enclosing panels. Saint George's Chapel, Windsor, England, is a fine example. Fan-tracery vaults can be sub¬ divided into pyramidoidal and conoidal. In the former case two halves of an inverted concave pyramidoid are set opposite each other, their bases forming the ridge of the arch. The con¬ oidal class, as its name implies, is of circular section not having angles as do the pyrami¬ doidal. Pyramidoids and conoids are called sometimes pendentives. (See Fig. 3). In Rib vaulting the surfaces are outlined into panels by a rib structure or raised frame-work. Orig¬ inally the ribbing was first constructed sepa¬ rately, then the panel filled in and supported by the ribs. Frequently in later work the rib¬ bing is a purely ornamental addition. The rib,

Romanesque, Showing Pendentives Supporting the Domes

of the Vaulting.

therefore, takes the place of the groin. And this new method of vault construction inaugu¬ rates the Gothic period. In the 12th century Gothic the former style of apse vaulting (hemi¬ spherical) gave way to the chevet vault in which the masonry courses run perpendicularly, instead of horizontally, from radiating ribs having a common keystone. These run to a wall rib or line over the heads of

the apse windows.

Historical. — Tunnel vaulting has been used at least since the Egyptian period to the Caro- lingian Empire days. The dome vault (cupola) is characteristic of the Byzantine architecture. In the Romanesque period (early 11th to middle 12th century) the naves and aisles of churches had three main forms of vaulting: the dome, the tunnel and the groined. And, as before stated,

with the ribbed vault we enter the Gothic era. The dome had for its support pendentives, either the spherical or the ˆsquinch® (see Fig. 6) or the ˆtrumpet® arch. While there have been spherical pendentives found in Byzantine architecture it was in the 6th ceiitury that this system of vaulting was used first largely. But

Fig. 6. — Squinch Arch.

the squinch is found in Roman architecture early as about 138 a.d. (Villa Adriana at Tivoli). The squinch which is a lintel, corbel or arch built into and projecting from the interior cor¬ ner of two walls, was used in the Byzantine period along with the pendentive to support the dome. The spherical pendentive is found as dome support for the Romanesque period. There are a few naves of Romanesque churches found consisting of domes supported on squinches (Notre Dame at Le Puy is a noted example) dating from 11th to 12th century. But such are of Byzantine influence and the dome passes out as vaulting medium in the Roman¬ esque while the tunnel vault comes into play, not as before with the Romans as culverts, drains, etc., but for vaulting the ceilings of

Carlovingian Vaulting, Anterior to 9th Century.

naves and aisles of stately Romanesque churches. There are four major schools of Romanesque tunnel-vaulted churches in France: Provence, Poitou, Auvergne and Burgundy (11th and part of 12th century). But with Poitou we come to tunnel-vaulted naves and

groined vaults for aisles. In the Auvergne school we find the triforium has half-barrel vaulting. In the side aisles of the Burgundy school are, usually, groined vaults, some of slightly domical form.

The nave arcade struc¬ tural arches are pointed but the nave has a tunnel vault its entire length. Other Roman¬ esque style churches have transverse tunnel vaults to replace those running longitudinally either in the nave or aisles ; some have trans¬ verse tunnel vaults over the aisles. A few Romanesque churches have groined vaulting over the nave though it is mostly restricted to the aisle bays. But the heavy, massive Roman¬ esque construction was greatly transformed by the introduction of ribs and brought about the

Ribbed Vaulting Gothic, 13th Century.

light Gothic style. Lombardy has the earliest examples of ribbed vaults (end of 11th cen¬ tury). The width of the nave now was enabled to take in the full width of the edifice, omitting the side aisles, the ribs aiding in the support. But the Anjou builders soon realized that domes could be erected almost without centring and the ribs gradually diminished till they became mere decorative torus moldings for groins and ridges. In the 12th century we have the Norman sexpartite vaulting and its variants (eight part vaulting, etc.), and the use of flying buttresses assisted greatly in permitting fancy vault construction. The various kinds of vault¬ ings exert a lateral as well as vertical thrust on the walls, hence the walls have to be strengthened either by an extra thickness of construction or by external addition of but¬ tresses. The necessary solidity is sometimes af¬ forded by a division into niches and piers and the vaulting is then specially constructed to bring the vertical and lateral thrust on the piers, leaving the walls that connect the piers to fill the function of enclosing the room space only. The Ile-de-France architects at this time were elaborating the four-part cross-ribbed vault of

rectangular plan. In the second half of the 12th century we find the beginning of the Early Gothic evolving from the Romanesque; this phase is known as the Transition period. The

Fig. 7. — Renaissance Vault Decorated with Pendentives.

Gothic (see Architecture) arch is ˆpointed® hence we find in the Transition vaulting the pointed arch with its moldings decorated with Romanesque motifs. Renaissance vaulting. This style retained all the Gothic essentials but made the arch elliptic or depressed. The arches are multiplied and often are adorned with cul- de-lampes and pendentives (Fig. 7) hanging often like stalactites from the vaulting. In later Renaissance architecture the churches are frequently built in the form of large single chambers and ceiled with barrel vaulting, in which cases deeply recessed chapels between strong piers were

introduced into the side walls, and above these the vault was pierced and lighted by lunettes. Decoration. The Romans

Crossed Arched Vaultings.

gave the barrel vault a rich decorative appear¬ ance by means of a bold cornice. With lines and cross-bands they then divided the vault surface into bays (similar to the later coffers)

or compartments each having a flower boss as its central ornament. These coffers are fre¬ quently finely molded if the size admits it. In the Renaissance barrel-vaulted rooms the richly molded coffers are frequently of slight depth. In the later Renaissance period the roof Was constructed of barrel vaulting and it re¬ ceived divisions of flat bands continuing from the pilasters of the walls, the divided spaces being given plastic decoration or sometimes re¬ ceiving painting. The dome vault was beauti¬ fully decorated in several manners. That of the old Pantheon at Rome received majestic sedate ornament by encircling it with five hori¬ zontal rings or zones each containing 28 coffers, which were surrounded with rich listels of foli¬ age and, as centres, rosettes of bronze. Look¬ ing upward in the direction of the opening in the centre the general impression is that the zones are of equal width but, in reality, they diminish all the way up as, of course, the square coffers being of -same number in a smaller circle had to be smaller in proportion to the diminu¬ tion of the circle. The perspective effect is perfect. In the case of the temple of Minerva Medica, Rome, the dome is closed on top and the lighting is done by means of the circle of windows piercing the structure above the semi¬ circular niches below.

Bibliography. — Babcock, G,

1914) ; Moore, C. H., (Mediaeval Church Archi¬ tecture of England5 (New York 1912) ; Rivo- ira, G. T., (Lombardic Architecture,5 translated by McRushforth (London 1910) ; Porter, A. K., (Mediaeval Architecture5 (New York 1909) ; id., (The Construction of Lombard and Gothic Vaults5 (New Haven, Conn., 1911) ; Ward, C., (Mediaeval Church Vaulting5 (Princeton, N. J.,

1915) .

Clement W. Coumbe.

VAUQUELIN, vo'ke-lan, Louis Nicolas,

French chemist: b. near Caen Normandy, 16 May 1763; d. 14 Nov. 1829. He studied phar¬ macy and became known to Fourcroy, who pres¬ ently made him his assistant in his philosophical researches and lectures. After being chief phar¬ maceutist in the military hospital at Melun in 1793, he was appointed inspector and professor of docimacy in the mining school at Paris and then assistant professor of chemistry in the polytechnic school and a member of the French Institute. He succeeded Darcet in the chair of chemistry at the College of France, and, resign¬ ing his inspectorship of mines, became director of the school of pharmacy just established by the government. On the death of Brongniart he received the professorship of chemistry in the Jardin des Plantes and succeeded Fourcroy in the same capacity in the faculty of medicine. He had remarkable talents for analysis ; his dis¬ coveries, among which those of chromium and glucina deserve special notice, have been useful in various branches of art and science. His < Manuel de l'essayeur5 (1812) has been super¬ seded, but his ˆemoires,5. amounting to more than 250 in number and printed in the Annales vol. 27 — 45

de chimie, the Journal des mines, the Annales du museum, and the Recueil de I'academie des sciences, in spite of their age, are still valuable.

VAUTIER, vo-te-a, Benjamin, Swiss painter: b. Morges, on the Lake of Geneva, 24 April 1829; d. 1898. He began his art training at Geneva and for some years earned his living as an enameler of metal ornaments. In 1850 he joined the classes of R. Jordan at Diisseldorf and began his study of peasant life in the high¬ lands of Bern. In 1856 he went to Paris and on his return to Diisseldorf produced the first of his Bernese pictures (The Interior of a Swiss Village Church, with Worshippers.5 From that time he gradually gained the repu¬ tation of one of the first Swiss genre painters by the series of pictures in which he portrayed scenes from peasant life not only in Switzer¬ land but in Swabia and Bavaria. His works are all distinguished by faultless drawing; robust individuality; vividness in the delineation of local and national types, and they are, more¬ over, as is natural to the subjects treated of, brimful of delightful humor. As a colorist Vautier is master of harmony and his compo¬ sition is graceful and dramatic. Among the finest and most popular of his works may be mentioned (Card-playing Peasants Surprised by their Wives5 ; (Sunday Afternoon in Swabia5 ; (Toasting the Bride5 ; (Country Fu¬ neral5 ; (Black Peter5, etc. He was also success¬ ful as an illustrator of books and his designs for Immerman's (Oberhof5 ;

Auerbach's (Bar- fussele5 and for (Hermann und Dorothea5 are very fine and have been much admired. Con¬ sult Rosenberg, (Benjamin Vautier5 (1897).

VAUVENARGUES, vo-v-narg, Luc de Clapier, Marquis de, French moral philosopher: b. Aix, Provence, 6 Aug. 1715; d. Paris, 28 May 1747. He entered the army in 1733, but resigned with broken health at 27. As a phi¬ losopher he inclines to the Stoic school and his work was warmly praised by Voltaire, of whom he was a friend; but popular apprecia¬ tion of his writings came only after his death. He wrote Untroduction to a Knowledge of the Human Mind5 (1746), followed by Reflections5 and Maxims.5 Consult Paleologue, (Vauv-enargues5 (1890).

VAUX, vaks, Calvert, American landscape architect: b. London, 20 Dec. 1824; d. Benson- hurst, L. I., 19 Nov. 1895. He was educated in London and in 1848 came to the United States as the assistant of A. J. Downing, the cele¬ brated American landscape designer, whose partner he became in 1851. He assisted in lay¬ ing out the grounds surrounding the Capitol and Smithsonian Institution at Washington and in partnership with F. L. Olmsted (q.v.), he laid out Central Park in New York. In 1865 his design for Prospect Park, Brooklyn, was ac¬ cepted and he was subsequently engaged with Mr. Olmsted in laying out parks in Chicago, Buffalo, the State reservation at Niagara Falls and at other cities and towns throughout the United States. They laid out Riverside and Morningside parks in New York, Vaux becom¬ ing landscape architect of the public parks in 1881. He designed the Museum of Natural His¬ tory (1873) and the Metropolitan Museum of Art (1874) in New York, besides other public buildings. To him is due credit for the artistic and original treatment of the transverse roads

in Central Park. He wrote (Villas and Cot- tages) (1857).

VAUX, Richard, American lawyer: b. Phil¬ adelphia, Pa., 19 Dec. 1816; d. there, 22 March 1895. He was admitted to the bar in 1836, soon after was sent as bearer of despatches to the United States Minister in London and on his arrival there was appointed secretary of the legation. In the following year he went to Brus¬ sels to assist

in reorganizing the United States; embassy there and later returned to London where he was appointed private secretary to the United States Minister, Andrew Stevenson. He returned to the United States in 1839, was re¬ corder of deeds at Philadelphia in 1842-49. In 1843 he was appointed inspector of the State prison and was also elected comptroller of the public schools, thus occupying three important public offices at the same time. He was elected mayor of Philadelphia in 1855, became president of the board of directors of Girard College in 1859, was largely instrumental in securing, in 1885, the present charter of Philadelphia, and in 1890 was elected to Congress. He published Recorder's Decisions) (1845) and Reports of the Penitentiary) (45 vols., 1842 et seq.).

VAUX, Thomas, Lord, English poet: b. Harrowden, England, 1510; d. October 1556. He was educated at Cambridge, succeeded to the barony at 13 and accompanied Cardinal Wolsey on his embassy to France in 1527. In 1530 he took his seat in the House of Lords, attended Henry VIII to Calais and Boulogne in 1532 and in 1533 was created Knight of the Bath and appointed captain of the Island of Jersey, an office he resigned in 1536. He occupied his seat in the House of Lords until 1555. Such of his verse as survives consists in the main of lyrics, which were much admired in their day. In

VAUXHALL (vaks'hal) GARDENS, in

London, formerly a fashionable place of en¬ tertainment and summer resort situated near the Thames, in the parish of Lambeth, about one and one-half miles from Westminster Bridge. They were removed about 1860 and built over.

VAVASOUR, or VALVASSOR, in feudal times, a person of rank next below a baron; one who held his lands not from the Crown but of one of the higher nobility. See Feudalism.

*VAWTER, Charles Erastus, American educator: b. Monroe County, W. Va., 9 June 1841 ; d. 27 Oct. 1905. He served in the Con¬ federate army in 1861-65, obtaining a captaincy in the <(Stonewall** brigade ; was graduated from Emory and Henry College (Emory, Va.) in 1866; studied also at the University of Vir¬ ginia (Charlottesville) ; and was professor of mathematics at Emory and Henry from 1868 to 1878. In 1878 he became superintendent of the Miller Manual Labor School at Albemarle, Va. He was considered an authority on manual training.*

VAYU, in the Hindu mythology, is the name of the genius of the air. _

Though thought of as a single personality he is a deified personifi¬ cation of the wind in the Vedic mythology, while in the Puranic mythology he fills only a sub¬

ordinate place. The legend assigns to him the paternity of the monkey god Hanuman and he also is regent of the northwest. In the Reg-Veda he is described as a real person who may be invited to partake of oblations.

VEADER, ve'a-der, or VEADER, an ad¬ ditional or supplementary month of the Jews, added sometimes after the third; sometimes after the second sacred year, care being taken that the seventh year should have no such month ap¬ pended to Adar.

VEBLEN, Thorstein B., American publi¬ cist. He was graduated at Carleton College, Minn., in 1880, studied later at Johns Hopkins, Yale, Cornell and Chicago, was instructor in political economy at the University of Chicago 1896-1900, and professor of the same there until 1906; Stanford University until 1910, and the University of Missouri since then. He has been editor of The Journal of Political Economy and has published (The Theory of the Leisure Class' (1899) ; (The Theory of Busi¬ ness Enterprise (1904) ; (The Instinct of Workmanship* (1914) ; (Imperial Germany*

and the Industrial Revolution (1915) ; also a number of papers in various journals.*

VECCHI, vek'e, Augustus Victor, Italian

*naval writer: b. Marseilles, France, 1843. He was educated in the Royal Naval School at Genoa, rose to be lieutenant in the naval serv¬ ice (1866), and resigned in 1872. He published on naval subjects several works of history and fiction using the pen-name ((Jack da Bolina.** The volumes include (Saggi Storico-Mari-nareschi* (1877) ; Reggende di Mare* (1879) ; (Nuove Leggende* (1880) ; (La Vita e le Geste del Generale G. Garibaldi* (1882) ; (Ironie Blande* (1889); (Bozzetti di Mare* (1897); (Memorie di un Luogotenente di Vascello* (1897) ; R'ltalia Marinare o il Lido della Patria* (1899). Vecchi was among the pro¬ moters of the Italian navy league (La Lega Navale).*

VECTOR, in mathematics. See Mathe¬ matics ; Vector Analysis.

VECTOR ANALYSIS. 1. A quantity

which is related to a definite direction in space is called a vector

quantity, e.g., the displacement of a point, velocity, force, axis of rotation, elec¬ tric current; a quantity having no reference to direction is called a scalar quantity, e.g., mass, volume, time, energy, electric charge. A vector quantity can be represented by a line segment if (1) the length of the segment is taken to rep¬ resent on an assigned scale the magnitude of the quantity; (2) the segment be placed in the proper direction; and (3) be given an arrow¬ head showing in which of the two opposite senses it is regarded as pointing. Such a di¬ rected line segment is called a vector. In ac¬ cordance with etymology the vector AB may be regarded as the operator which carries a moving point from A to B, and is represented by an arrow reaching from its initial to its terminal point. (Bold face type is used for vectors).

2. Equal Vectors. — The vectors AB and CD are said to be equal when the segments AB and CD are equal and parallel, and the arrow heads from A to B and from C to D point in the same sense. If AB and CD are equal and parallel, but the arrow heads are in opposite senses we say that AB = : — CDr = DC.

3. Addition of Vectors. — Two vectors AB and CD are added by drawing through the ter¬ minal point of the first another vector BE equal to the second; the vector AE is then called the sum of AB and BE, and also of AB and CD. The annexed parallelogram shows that vector addition is commutative, that is a + b = b + a. Similarly for the addition

of three or more vectors. In any closed polygon ABCDE we have AB + BC + CD + DE = AE and AB + BC + CD + DE + EA = AA = 0 whether the vertices are in one plane or not.

The difference of two vectors is the sum of the first and the opposite of the second, that is a — b— a + (— b).

4. Resolution of Vectors. — Vectors are called coplanar when they are parallel to the same plane. Any vector r, coplanar with two non-parallel vectors a and b, can be resolved into two components parallel to a and b, by constructing a parallelogram whose diagonal is r and whose sides are parallel to a and b; hence r can be expressed in the form v = xa -T yb, where x and y are scalar numbers express¬ ing the ratios of the two component vectors to the parallel vectors a

and b. Similarly by con¬ structing a parallelopiped, r may be resolved into three components parallel tc three given non-coplanar vectors a, b, c, in the form r=.ra + yb f sc.

It is usual to take instead of a, b, c, three vectors i, j, k of unit length along three rect¬ angular axes OX, OY, OZ, then r=jri+yj+^k, where x, y, s are the co-ordinates of the terminal point of r, its initial point being at O. The axes are usually taken to form a right-

z w

handed system, positive rotation about OX, OY and OZ respectively carrying OY to OZ, OZ to OX, and OX to OF.

5. Conditions for Equality. — A vector equation r=r', that is, xa + yb + sc=x'a + y'b f s' c, where a, b, c are non-coplanar, neces¬ sitates the three scalar equations x—x , y=y, z—s'. In two dimensions, the equation xa + yb=^'a + y'b, where a and b are not parallel, necessitates the two scalar equations x—x' , y=y

6. Vector of a Point. — The position of a point A may be defined by means of its vector

OA=a, drawn from a fixed origin, and A may be called the point whose vector is a, or the point a. The indefinite line AB is denoted by (a, b). The vector AB equals b — a, that is, terminal vector minus initial vector; similarly BA equals a — b.

7. Vector Equation of a Line. — Let OP=r be the vector of a running point on the line (a, b) ; then since OP=OA + AP and AP=r AB, where x is the scalar expressing the ratio of AP to AB, hence r=a + x (b — a). This equation gives the vector of P in terms of a varying scalar x.

o

Fig. 3.

Example 1. — If the segment (a, b) is di¬ vided as mi to m2, the vector of P is (mi b + m2a)/mi f me.

Example 2. — If masses m i, m2 are placed at ai, a2, their centre of gravity is (wiai + w2a2)/mi f m2. Extend this to three masses nil m, m3 at ai, a2, a3.*

Example 3. — The medians of a triangle tri¬ sect each other. Take

the origin at one vertex O, and let the other vertices be a, b, then \a and £b are mid-points, hence the equations of two medians are r = a + x Lib — a), r = b + y (ia — b). Making these equations simultaneous and equating coefficients of a and b, respectively (5), we get 1 — x—\ y, \x—\ — y, whence x—%, y = I.

8. Rotors. — A rotor is a vector magnitude restricted to lie in some fixed straight line, called its line of position, or its axis. A rotor is completely specified by its magnitude, direc¬ tion, sense, and one point on its axis; a familiar example is a force; it can be transferred to any point in its line of action, but cannot be moved out of that line. Another example is a given angular velocity of rotation about a given axis ; it can be specified by laying along the axis a segment whose length represents, on a conven¬ ient scale, the magnitude of the angular veloc¬ ity, and which points in the direction from which the rotation appears positive. This special kind of directed segment has given rise to the name rotor for any directed magni¬ tude having an axis. The resultant of any number of rotors (of the same class) whose axes meet in a point P is found by treating them as ordinary vectors, taking their vector sum and transferring it to the point P. A force R applied at P can be resolved into three components parallel to the three axes and acting at P, so that R = iX + jF + kZ.

9. Vector of an Area. — A plane area may be regarded as having magnitude and direction (orientation or facing), and can be represented by a vector normal to its plane, of length equal to the area on an assigned scale, and with an arrow pointing toward the side to which the

area is supposed to face. If a given plane area is projected on any other plane, and if the pro¬ jection is represented by a normal vector, this vector will be the projection of the vector of the given plane area.

10. Vector Sum for Faces of Polyhedron.

— The sum of the vectors representing the faces of a closed polyhedron is zero, all of these being supposed to face outwards. For, if we project the entire surface on any plane, the part farthest from the plane projects into an area whose total vector may be represented

by V, and the remainder of the surface projects into an area whose total vector is — V, pointing in the opposite direction. Thus the projection of the original vector sum on the normal to the plane is zero ; and since this is true for every plane, the original vector sum must itself be zero.

*11. Scalar Product. — The scalar product oi two vectors is the result obtained by multiplying the product of their lengths by the cosine of the angle between them. It may also be defined as the product of the length of either vector by the projection of the other upon it. The scalar product is denoted by writing the two vectors with a dot between them as a-b. This product evidently is commutative, so that a-b = b*a = ab cos 0, where a, b are the lengths (or tensors) of the vectors, and 0 the angle between their directions. If tn and n are scalars, ma.'nb~ mn (a-b). If a and b are parallel, a-b = afr; and a-a = o2. If a and b are at right angles, a-b = 0. The scalar multiplication table for the three fundamental unit vectors i, j, k is*

*i-i— j-j = k-k = l. i*j = j*i = j*k = k*j = k*i = i«k = 0*

Scalar multiplication is distributive, i.e., (a-fb)-c = a-c + b-c; this follows from the fact that the projection of a + b on the direction of c equals the sum of the projections of a and of b on the same direction.

12. Expansion of a- b. — If a = Oii-f-a2j-f-<3Bk, and b = fti + ftj-fiftk, then, applying the distribu¬ tive law and the multiplication table, we get

a-b—aibi f a2b2 + a3b3.

A trigonometrical interpretation is obtained by replacing a-b by ab cos d» dividing by ab, and noticing that

ai a2 r, a 3 , bi

- = cos alt — — cos ft, — = cos yu — – = cos a.ly

a a a b

h- — Cos ft, 43 = cos 72 where (aj, ft, 71) are the

b 0

direction angles of a, and (<12, ft, 72) are those of b. This gives the cosine formula, cos 6 = cos «i cos c2 + cos ft cos ft + cos 71 cos

72. As an application to two dimensions, we may

take c = a + b as in the figure, then

c-c = (a J b)-(a + b) = a-a + a-b + b-a + b-b =

a2Jr 2 ab cos (ir — c) + b2~a2 + b2 — 2 ab cos C, a fundamental relation in a triangle. For an application to mechanics let a, b, c rep¬ resent forces applied at O, and let r be their resultant, then r— a +.b + c. Let O be displaced to P, and let OP = d, then r-d~a-d f b-d + c-d;

but a-d is the work done by the force a in the displacement d ; hence the work done by a force in any displacement equals the sum of the amounts of work done by its components.

13. Vector Product. — The vector product of a and b is a third vector normal to the plane of a and b pointing toward the direction from which rotation from a to b is seen as positive rotation, and of length equal to ab sin 0, the area of the parallelogram formed by a, b. The vector product will be denoted by a * b after Willard Gibbs, and is read a cross b. If a and b are parallel, a x b = 0, because 0 = 0; similarly a * a = 0. The vector a * b can be conveniently regarded as the area vector (9) of the parallelogram (a, b), this area being sup¬ posed to face toward the side at which rota¬ tion from a to b appears positive. The com¬ mutative law does not hold in vector multiplica¬ tion for a x b = — b x a.

14. Distributive Law. — Vector multiplica¬ tion is distributive, that is

c x (a + b) = c x a + c x b.

First suppose that c is not coplanar with a and b ; and construct a triangular prism having the vectors a, b, and a + b for sides of base, and c for the parallel edges. The sum of the area vectors of the faces of the prism is zero (10),

and the vectors of the two opposite bases can¬ cel; but the vectors of the lateral faces pointing outward are cx (a + b), — c x a, — c x b, hence

c x (a + b) = c x a + c x b.

If c happens to be coplanar with a and b we can resolve it into two which are not coplanar with a and b, apply the preceding result, and

then combine. For the fundamental unit vectors i, j, k, the vector multiplication table is ixi— j xj = kxk = 0; i x j = — j x i = k; j x k = — k x j — I j k x 1 — – J x k — j

15. Expansion of a x b. — If a = ad--a3] + a3kf b = ˆii + b2] T b3k, then by applying the dis¬ tributive law, and the table we get a x b = (U263 — Oibi) i T (a3bi — a-ibz) j + (aift — chbi)k. There are various interpretations of this re¬ sult. From it we can easily obtain the three projections of the area of the parallelogram formed by (a, b) ; also the directions of its normal; also sin 0 in terms of the direction cosines of a and b; also the area of any tri¬ angle in terms of the co-ordinates of its vertices.

For an application to plane analytic geom¬ etry, suppose a and b both lie in the .ry-plane, then a3 = 0, 0, and axb = (flift — a2ft)k,

hence ab sin 0 = a*b2 — a2ft; this gives twice the area of a triangle one of whose vertices is at (0, 0), and whose other vertices are at (a 1, u2),

(bi, b2). Again, if we divide by ab, we can show that sin (a2 — ax) = sin a2 cos — cos o2 sin oi; and can then find sin (a2 + ai) by changing the sign of x%. Similarly we could find cos (a2 — «0 by taking the scalar instead of the vector product.

In mechanics the moment of a force a act¬ ing at 0, taken about a point P whose vector OP = r, is the vector axr; it follows from the distributive law that the moment of a resultant force about P equals the vector sum of the moments of its components. If there is a couple formed by the parallel forces a and — a acting at points whose distance apart is rep¬ resented by the vector r, then the moment of the couple is axr; and the resultant of any number of couples is a single couple whose vector is the sum of the vectors of the given couples.

16. Triple Scalar Product. — It is evident that a* (bxc) is the volume of the paral- lelopiped whose adjacent edges are a, b, c, hence a* (bxc) = b- (cxa) = c* (axb), where the letters are in the same cyclic order ; if the cyclic order is changed the sign of the triple product is altered. The dot and cross can be interchanged, for a- (b x c) = (a x b)*c.

17. Triple Vector Product. — It can be shown by expansion that the triple vector prod¬ uct can be resolved into scalar multiples of two of the given vectors, in the form

ax (bxc) = (a* c) b— (a- b)c.

18. Vector and Scalar Fields.— The the¬

ories of fluid motion, heat, electricity, etc., are largely concerned with vector and scalar fields. With every point (x, y, z) are associ¬ ated such scalars as mass, density, potential, and such vectors as velocity, force, displace¬ ment, flux, all of which are functions of (x, y, z). . . „ ^ ,

19. Directional Derivative of a Scalar Function. — If a moving point P is displaced from (x , y, z) to a neighboring position in the direction ds, the rate of change of a scalar function V (x, y, z) per unit of displacement is given by the directional derivative

dV_dVdx dVdy + dVdz = dV ^ a j ds dx ds ‘ dy ds dz ds dx

dV * , dV — cos p + — cos y = dy dz

(i cos a) j cos /9 f k cos y), in which the second factor is a unit vector in the direction of ds, whose direction angles are o, (3, y.

20. Tangential and Normal Derivatives to a Level Surface. — Let the family of level sur¬ faces for the function V have the equation V (x , y, z) = C, where C is an arbitrary constant; first let the displacement ds be tangential to the level surface that passes through P, then dV/ ds — 0, and the above scalar product is

, a, * .37,. dV , udV-

zero, hence the vector i — — + j + K – — is

dx dy dz

perpendicular to ds, that is, to any tangent to the surface, and is, therefore, normal to the surface. Let N be the length of this normal

vector, then N

the direction cosines of this vector are

L , JL (1X J- — . To find the rate of change of V N dx N dy’ N dz

in this normal direction we have

dV

dn

/• 3 V. • d V, .6 F\ .. . o,i a

(i — + j + k— ,(i cos a + jcos 3 -f kcosy) =

\ dx dy dz

(■

•Z + lIZ + i”

dx dy

m ({dv .dv k

*dz) \ dx *dy dz) N*

N 2 dV dV dV

-r^ = N = length of vector i – — {-j — + k — ; N dx dydz

hence this vector is not only normal to the sur¬ face V^C, but represents in magnitude the rate of change of V in that direction; this vector is called the gradient of V, and is de¬ noted by V V.

21. General Directional Derivative in Terms of Gradient. — Since dV/ds — VV . (i cos a + j cos /3 j k cos y), where the latter factor is a unit vector in direction ds, hence dV/ds = = N(1) cos 6, where 9 is the angle between VF and ds ; thus the derivative of V in any direction equals the projection of V V in that direction, hence V V points in the di¬ rection of most rapid increase of V.

22. Lines of the Gradient Vector. — If a point moves continuously from one level sur¬ face to another along successive gradients, the elements of these gradients form in the limit a continuous curve which is an orthogonal trajectory to the family of surfaces V(x, y, z) ■ = C, and is called a line of the vector VF; and a series of such lines, passing through the perimeter of a small closed curve traced on a level surface, is called a tube of the vector.

23. Vector Functions. — A vector whose three components parallel to the co-ordinate axis are given functions of (x, y, z) is called a vector

function ; e.g., the resultant force at the point (x, y, z) of an electric field is of the form R~iX f jF + kZ, where X, Y, Z are certain functions of (x, y, z) . The simplest electric field is that due to a point charge m which repels the unit test charge placed at a distance r with a force m/r2; the potential is V—m/r; the level surfaces are spherical; and the force F =— V V— — dV/dr=m/P along r.

24. Symbolic Scalar Product 7 ..a. — The

vector ˆoperator v ˆ + j + k is

dx dy dz

called the Hamiltonian operator, from its in¬ ventor; but when used in combination it has the shorter name of del, due to Willard Gibbs; some use the name nabla suggested by Maxwell from resemblance to the Assyrian harp; Kel¬ vin's name atled, the reverse of delta, is seldom used. The symbolic scalar product V =

(il+j|+ka7)'(i0l+ja2 + kfl]) =

da, 002 003

0# dy dz '

0

(12), where the symbolic product of r— and a 1

dx

is taken as etc. dx

25. Flux of a Vector through an Area — Divergence. — The flux of a vector a through an element of area dS is defined as the prod¬ uct of dS by the normal component of a and is accordingly represented by a-dS where dS is the vector of the elementary area (9). It is easy to see that the algebraic sum of the

elements of outward flux through the faces of an elementary parallelopiped at (x, y, z)

is (ˆ∼+ ∼ dxdydz, which is V.a per

\dx dy oz /

unit volume. In case a is the velocity at (x , y, z) of a fluid v*a is the rate at which matter is flowing out from (x , y, z) in unit time per unit volume, and is called the rarefaction or divergence at that point; and, by analogy, V.a is called the outward flux or divergence for any vector a. If a has a scalar potential, of which it is then the gradient, div a = V.77 = V2F =

— j

dx2 by2 dz2

26. Gauss' Flux Integral. — Let S be a

closed surface in the field of a, divide it into small elements, and regard each element as plane, and represent it by normal vector dS drawn outwards (9), then the flux of a

through Sy isjˆ ˆ

a-JS; and Gauss' theorem ex¬

presses this in terms of a volume integral over the space within S' by the equation

// a-dS -/// (y -a)dxdydz,

which is proved by summing up the flux out of the elementary parallelopipeds in (25). If a is the force due to a point charge, V a. = — • VJF, where V—m/r, dV/dx = — m/r2(dr/dx) =

— tnx/r*, d2 V/dx2 = — m (r2 — 3×2) /r*,

V 2 V — — m{3r2 — 3×2 — 3y* — 3 z2) /r* = 0,

except where r = 0, thus V.a = 0 except at r = 0, hence by Gauss' equation, the flux through any surface not enclosing the point charge is zero, and the fluxes through all sur¬ faces enclosing it are equal. To find this flux take a sphere of radius r with the point charge as centre, then the flux = 47rr2(m/r2) = 47rw. If there be any number of point charges the flux of force through any surface, enclosing charges whose algebraic sum is M> is 4 ttM; and for a continuous distribution of density P,

the outward flux is ing this to

p dxdydz. Equat-

a)dxdydz, for any enclosed

volume, we have 4 np=. y.a = — 72F. This is Poisson's equation. At a point where p — 0 we have V2J7 — 0, which is Laplace's equa¬ tion.

27. Tubular or Solenoidal Vector Field. —

Applying the flux theorem to the volume bounded by a vector tube and two normal sec¬ tions we see that if V.a=0 the net outward flux is zero, hence the inward flux through one sec¬ tion equals the outward flux through the other, since there is no flux normal to the vector lines ; thus, when the tube is very thin the magnitude of a varies inversely as the normal section of the tube ; hence the variation of a in magnitude and direction as we pass along a line of the vector is exhibited by the variation of the thickness and direction of the vector fila¬ ment ; and, for this reason, a vector field which has no divergence is called a tubular or solenoidal field.

28. Green's Theorem. — If in Gauss's equa¬

tion we replace a by U V V where U and V are scalar functions we get

// w v. as -/// V. (t/v V)dxdydz=

III

(VLVF+ l/V TO dxdydz*

This is called Green's theorem and has many applications; e.g. (1) if a continuous scalar function vanishes on the boundary of S, and satisfies Laplace's equation V 2 V = 0 within 5, then it vanishes at all points within S. To prove this, let U=V then by the conditions

(V Vˆxdydz = 0,

hence V F = 0 at all

points within, therefore V is a constant, which is zero by the boundary condition. (2) There is only one solution to the problem of finding a con¬ tinuous function V which shall take assigned values on S, and shall satisfy Poisson's equa¬ tion V2F = — 4tt p within .S

where pis a given continuous function of (x, y, z). For, suppose that there are two such functions Vi and Vi, then the function U = V i — V % is zero on 6 and satisfies S7 2U — 0 within, hence by (1), U — 0, that is, Vi = Vi, at all points within 5.*

29. Symbolic Vector Product yXa — Curl of a Vector. — From (17) we have

*It is shown in hydrodynamics that if a is the fluid velocity at (x, y, z), the vector just written represents double the molecular velocity of rotation at (x, v, z), or the vortex motion. This vector is called the curl of a even when a is not a velocity. When curl a = 0, the three com¬ ponents vanish, and these are the three con¬ ditions that ai, a2) a3 shall be the partial deriva¬ tives of a function V , so that a = V V, where V is the scalar potential of a. Thus the lines of a are normals to the family of level surfaces V = C, which divpde the field into laminae which are regarded as infinitesimally thin, and are hence called lamellae. The magnitude of a, that is dV/dn, varies inversely as the thick¬ ness dn of the lamella at {x, y, z) , dV being constant ; and any vector whose curl is zero is hence called a lamellar vector. Heaviside has given the name divergent to a vector whose curl is zero but whose divergence is not zero (as the velocity of a compressible fluid at a point where there is no vortex, or the electric force at a point where there is a charge) and the name circuital to a vector whose divergence is zero and whose curl is not zero (as the velocity of an incompressible fluid at a point where there is a vortex) ; a vector whose diver¬ gence and curl are both zero is sometimes called a Laplacian vector; it is both lamellar and solenoidal, as in the case of an electric field at a point where there is no charge. Helm¬ holtz has shown that any vector field can be resolved into a divergent field and a circuital field. The curl of any vector is solenoidal, for f v . (v * a) = 0 as in (17), or by differ¬ entiation. The curl of curl a is given by (20), that is*

V X(V xa) = (v-a) V — (V-V)a = v(V-a) — V2a.

VECTOR ANALYSIS

711

30. Relation between Curl and Circula¬ tion — Stokes' Theorem. — If AB is any arc

/B

a-ds is A

called the flow of a along arc AB. When AB is a closed circuit, this integral is called the circulation of a around the circuit. Stokes' theorem asserts that this circulation equals the flux pf curl a through any surface which caps the circuit ; in symbols

V x a'dS.

Sketch of Kelvin's proof : If 5 be ruled up into elementary areas, the circulation around the boundary equals the algebraic sum of the cir¬ culations about the elementary areas (by cancel¬ ing flow on lines described in opposite direc¬ tions) ; and similarly the circulation around any element dS at P equals the sum of its circula¬ tions around the three projections dS i, dS2, dS3 on planes drawn through P parallel to the co¬ ordinate axes. Now if we take a parallelogram PQRS with sides parallel to dx and dy, then the tangential components of a on the sides

PQ, RS are au — (ai + ˆ dyj , and similarly for

the other two sides, hence the algebraic sum

of flow along the four sides is dxdy.

*Summing this over dSi, and taking similar sums over dS2 and dS 3, we get the circulation around dS equal to (v * a)*dS; then integrating over the cap we get the circulation around the boundary.*

As an application of Stokes' theorem, in fluid motion, the circulation around a circuit equals the sum of the strengths of all the vortex tubes enclosed by the circuit.

31. Circulation in Electromagnetic Cir¬ cuit — Maxwell's Equations. — Faraday showed experimentally that the total electromotive force around a closed circuit (i.e., the line integral of the electric force E) equals the negative of the time-rate of change of the total magnetic induction through the circuit ; but this total induction is the surface integral of the mag¬ netic induction vector B (x. y, z) taken over any surface that caps tne circuit; hence Faraday's result may be written

fEds—iffBdS-

and comparison with Stokes' formula shows

dB

that v x E = – j-, which is Maxwell's equation

for magnetic current in an electric field. Again Ampere's experiments prove that the work done in carrying a unit magnetic pole around a closed circuit equals 4tt times the electric flux through the circuit, that is

-ds = in ff CdS.

*Comparison shows that V * H = 4ˆC, where H is the magnetic force at (x, y, z), and C is the electric flux through unit area per unit time,*

i.e., the current density; this is Maxwell's equa¬ tion for electric current in a magnetic field.

32. Vectors in a Plane — Quadrantal Ver- sor. — Consider the vector v—ix + jy, in the ˆry-plane, and perform the operation k x, then k x r=— jx + iy; the operation repeated gives kx(kxr) = — ix — jy— — r, hence (kx)2 = — 1;

and (k x) = V — 1; each of these is a sym¬ bol for the operation of turning a vector through a positive right angle in the ary-plane, and is called a quadrantal versor.

33. Versor for Angle 0. — Writing r in the form r = r (i cos 6 + j sin 0) = r (i cos 0 + k x i sin 0) = r (cos 0-|-sin0kx)i = y (cos 0 +

V — 1 sin 0)i, we see that r can be derived from the unit vector i by applying the operator r (cos 0

+ V— 1 sin 0), which is the product of the tensor r and the versor cos 0 + V— l sin 0; this versor acting alone turns a vector through the angle 0 without stretching. The product of the versor for angle 0 and the versor for angle 9′ is the versor for angle 0 + 0', thus (cos 0 +

V — 1 sin 0) (cos 0′ 4- V — 1 sin 0') = cos (0 + 0') + V — 1 sin (0 4- 0'). The complex algebraic number x + V — 1 y can be represented by the versi -tensor r (cos 0 + V — 1 sin 0) where r =V x2+y2> tan 0 = y/x.

34. Vectors and Versors for Simple Har¬

monics. — Let the vector r3 revolve with angu¬ lar velocity w radians per second; then 0 = ut + 0i, where 0i is the value of 0 when ˆ = = 0; and the ˆ-component of ri is xi — ri cos (<•>/ -fi 0). Let another vector r2 revolve with the same angular velocity, starting at the position 0—0 2, then its jc-component is x2 = r2 cos (w/ 4-

02). The vector sum (the diagonal of parallelo¬ gram) is r3— ri j r2 whose ˆ-component is x = xi f x2 = r\ cos {yt + 0i) f r2 cos (ut + 02) ; the diagonal r3 remains constant in length and revolves with angular velocity w, hence its projection is of the form ˆr=r8 cos (cot + 0j), a simple harmonic function of t with period ; hence the sum of two simple

harmonic functions with the same period and different phase angles is another simple har¬ monic of the same period, and its character¬ istic vector is the sum of their vectors. The phase angle 03 is found by adding the com¬ ponent vectors at time f — 0.

35. Time Derivatives of Simple Harmonics.

— If e — e\ cos (<•> * 0), then de/dt = — ue\

sin (w/ f 0) = aei cos (ut + 0 f |tt), whose characteristic vector has the angle 0 + and

is represented (32) by jwe, where j = V — 1; similarly d2e/d? has the characteristic vector j2w2e, that is, — ‘j2e. This enables us to elimi¬ nate the time variable from differential equa¬ tions involving simple harmonics of the same period, as in the theory of alternating electric currents.

Bibliography. — For further details and ap¬ plications consult the treatises of Gibbs and Wilson (New York 1907) ; Coffin (New York 1911) ; Burali-Forti and Marcolongo (Bologna 1909) ; Bucherer (Leipzig 1905) ; also Heavi¬ side, Electromagnetic Theory > (London 1894) ; Abraham and Foppl, (Maxwellsche Theorie d. Elek) (Leipzig 1907).

James McMahon,

Professor of Mathematics, Cornell University.

/

VEDA — VEDANTA

VEDA, va’da, the general designation of the ancient sacred literature of India. The word is from the Sanskrit root vid, “known,® and signifies primarily “knowledge® or “science.® It then came to be applied to the entire Hindu sacred literature as athe science.® For a

full discussion of the subject see the article on Vedic Literature. See also India — Religions.

VEDANTA, va-dan'ta, which means liter¬ ally the end of the Veda, or knowledge, con¬ stitutes the most impressive and comprehensive structure of Hindu philosophy. It is not synonymous with Hindu philosophy, as is gen¬ erally supposed, because the Vedanta is only one of the six main schools of Indian thought, one of which, the Vyaya, is for all practical purposes the earliest school of atheistic thought in the world. The subject of Vedanta is theistic thought, based on the texts of the Veda, principally U panishads. The Upanishads are portions of the Veda, and are recognized to lead to the realization of self; they constitute the Jnanakanda, or the part dealing with higher knowledge, while the rest of the Veda, the Brahmana and Samhita, is known as the Karmakanda, or the part dealing with rituals. The foundation on which the philosophy has been reared is the Sutras, or the formulae contained in the Vedanta Sutra, Brahma Sutra and the Sariraka Sutra. Vyasa, the author of the Hindu epic Mahabharata is said to be the author of the Sutras.

The Vedanta philosophy itself comprises several schools of thought, all of them, how¬ ever, agreeing on the Veda as the final authority. A knowledge of the history of the philosophy is necessary to comprehend cor¬ rectly the principles enunciated by the sages. The earliest speculative thought of the Hindus is contained in the Upanishads, which are at the same time extremely profound. There are 108 Upanishads; Vedantic thought, however, takes cognizance of but 18, although occasional references are made to some of the rest. In the gradual evolution of Hindu thought, these Upanishads came to a stage when the con¬ clusion was arrived at that there was but one substance or reality, self-created, immutable, imperceptible, all-knowing and external. This is the supreme spirit, the impersonal self, the absolute, atman, paramdtman, Brahman. The Brahman is Sachchidananda, i.e., life, thought and beatitude. It is life, as imparting life and manifestation to all that is known and appears to exist. It is thought, as being self-conscious, as giving consciousness to all, making appear all things that do appear. It is beatitude, as exempt from all the miseries of births and deaths, from evil, pain and sorrow, a beatitude in which there is no distinction between attribute and subject, a beatitude like the repose of dreamless sleep. Brahman is eternally pure, intelligent and free. It is pure, as free from loves and hates, passionless and un¬ affected by the limitations of form. It is in¬ telligent, as irradiating all things, as illu¬ minating the otherwise dark or unconscious modifications of the sensories and intellects of personal spirits, and as illuminating the objects of these

modifications. It is free, as unaffected by the experiences of these spirits, exempt from the implication of the unreal.

Brahman, with all these attributes, had al¬

ready been postulated in the Upanishads. The question of importance then was how to re¬ concile this postulate with existence. It is axiomatic that no speculation or philosophy is possible without admitting the existence of the individual, the universe which comprises every¬ thing else but the individual, and an entity that comprises and regulates all. All religions and philosophies, therefore, discuss the relations and inter-actions of the soul, the world and God. The meaning of existence, the purpose and aim of it, are to be sought in the under¬ standing of the relations between the three known postulates.

All speculation starts with the individual, or individual soul, called jivatman. Therefore, the necessity of reconciling the individual soul with Brahman, which is the one reality, be¬ came imperative. Vedanta philosophy has also accepted from the outset that the soul is personal only in fictitious semblance, only so long as it is implicated in the series of transmigratory states, and is in truth impersonal, one with Brahman, and is in Brahman. As Krishna enunciates in the Bagavad Gita, its apparent and fictitious individuality, and its apparent action and suffering, are the in¬ dividuality, the action and suffering of its illusory adjuncts, the organism and the facul¬ ties. The submergence of all souls into Brahman, the one soul, must be sought after and is the only truth. The true intrition, or the knowledge of Brahman is the sole method by which the parasitic growth of experience is pierced and the realization of self attained.

The earlier Vedic texts and the Sutras, which constitute the basis of the philosophy, were too vague for the practical inquirer; and being considered revelation, did not admit of doubt. Only two courses were open : either to reject them altogether or inject new thought into them by the aid of commentaries. The believer in the faith has no thought of reject¬ ing what he considers divine revelation ; so, the philosophy was built up of so-called com¬ mentaries or hhashyas. Every sage and philos¬ opher, who had a system of thought to offer, claimed only to comment on the revelations; he took no credit for himself. It is no wonder, therefore, that European scholars and students should fall into the error of believing that the Vedanta is a single system of philosophy, somewhat on the lines of Plato or Epictetus.

There are three principal schools of Vedantic thought, adwaita, that which does not recognize the existence of a second, dwaita, that which recognizes two, and Vishishtadwaita or qualified dualism. The founder of the adwaita school was Sankaracharya, who lived about the 3d century of the Christian era. He enunciated that there was only one truth, i.e., Brahman. Existence, world and all dif¬ ferentiation was built out of Maya, or illusion. Maya is the principle by which the soul mis¬ takenly identifies itself with fictitious adjuncts like the organs, faculties and the human organ¬ ism. Out of maya is created the unreal world, and maya is the case of the projection of the manifold of experience. Sankaracharya held that name and form are illusions, neither existent nor non-existent, nor both in one, neither to be explained as an entity or as non¬ entity, fictitiously proceeding from, and to, all

eternity. The illustrations to prove the maya or illusion are very telling: Existence is like the blue sky, which has no existence or attri¬ bute, like "the waters of a mirage, like the visions of a dream, like the snake seen by a dim light in a piece of rope.

Speculative thought in India has always been intimately connected with religion. Knowledge, per se, for no other purpose, had no place in Hindu philosophy. Hence, systems of philos¬ ophy are inextricably mixed up with a purpose ; in the case of Vedanta, it is the release of the soul from ignorance and the attainment of the highest. The sumnum bonum of life, accord¬ ing to all schools of this thought, was to become one with Brahman. Sankara's system did not recognize duality ; hence, maya or illusion only stands as a curtain between the soul and Brah¬ man, which have ever been one. The moment the curtain is removed, there is an automatic absorption of the individual soul in the eternal.

While this school of thought was the earliest interpretation of the Sultras and Upanishads, it has not been popular. The doctrine of illusion, as preached by Sankara, was too ab¬ struse for even the intellectuals. There was a hankering for a little more of the human touch in intellectual and religious speculation. A super-volitional Brahman had to give way to Brahman, which was the operative cause of the world. The transition did not involve any modification of the attributes ; it was still im¬ mutable, omnipresent, omniscient and incor¬ ruptible. Only, Brahman had these attributes

volitionally7 and was not a residuum of abstrac¬ tion. Brahman became the light of lights be¬ yond the darkness, and by the light of Brah¬ man all the world shone forth. Brahman had his abode within the heart. This process of reasoning led to the dualistic school of thought. Ramanuja was the originator of the new school, which, while admitting that the individual soul emanated from Brahman, and was part and parcel of it, contended that it was still a dis¬ tinctive entity. Even salvation was not the annihilation of the individual soul, although it was held to mean ((to become one with Brah¬ man.® Ramanuja admitted the existence of Maya or illusion ; but he used it to signify wrong perception, and not the perception of existence in non-existence. Sankara exalted knowledge as the means to Salvation ; but Ramanuja relegated it to a secondary place, placing (

This doctrine was not' altogether new. as it

had already been foreshadowed in the earlier texts. Just as Sankara emphasized the aspect of absorption in Brahman, which was also indi¬ cated in the Sruti, so Ramanuja emphasized the doctrine of individuality.

The third school is known as the Dwaita, or dualism, the founder of which was 'Madhava, who lived in South India about the 14th century. Madhava regarded Brahman, or the all-pervad¬ ing soul, and the individual soul as distinct en¬ tities. Salvation, according to him, was the attainment of eternal bliss by the individual soul, with the aid of Brahman. Excepting this modification, his teachings were no more than a medley of the two prior schools of Vedanta. He made his thought popular by appealing to the masses.

Besides the above three principal schools of Vedantic thought, there have been numerous other systems, which have exercised local in¬ fluence — the only ones worth mentioning be¬ ing the systems of Nilakanta and Ramananda.

As has already been mentioned, Vedanta is not pure speculation. Being a theistic system of philosophy, it is inextricably connected with cosmogony as well as practical conduct of life. Ethics is not specially emphasized in any system of Hindu philosophy, because ethical conduct is an axiom, which inevitably follows from the ac¬ ceptance of Veda as revelation and the founda¬ tion of knowledge. None but the pure can study the Vedas; and none but those conversant with the Vedas can be students of Vedanta. Enquiry into the origin and processes of existence are motivated by the need of the

in¬ dividual to attain salvation. Knowledge for the sake of knowledge has no place in the systems of philosophy built up by the Hindus ; and knowledge for any other purpose but salvation is anathematized. Therefore, Vedanta had to work up a rule of conduct for life, aiding to¬ ward the attainment of salvation. In the earlier stages of Hindu evolution, great stress was laid on ceremonial rites and the paraphernalia of sacrificial offering to the deities. The Vedant- ists rejected this rule altogether as tending to¬ ward the lowering of the soul ; thev preached the doctrine that salvation was to be attained by contemplation. Once again, they omitted all references to ethics, because they took it as axiomatic that only these that are pure in thought, word and deed are fit for meditation. The aspirant to salvation must constantly meditate on Brahman, until he attains freedom from the bondage of existence.

The belief in metempsychosis or transmigra¬ tion of souls plays a great part in Vedanta. This philosophy, or the elaboration of it, owes its existence to Buddhism. Buddha revolted against ceremonial Hinduism, and emphasized ethical conduct and contemplation. He frankly held that life was synonymous with misery and bondage, and that humanity must forever seek to emerge from the bondage in order to attain salvation. He took the text of the Vedas, enunciating the oneness of life and nature, to promulgate his doctrine of transmigration. The soul had to have a sheath in order to be part and parcel of existence. What difference did it make if it was in the hide of an elephant or the epidermis of a man? The idea was fur¬ ther developed in order to form gradations of life. A hierarchy was formed. The soul was

said to pass through every stage of life from rocks and vegetables to fish and animals, before it was allowed to be born in a human garb. He emphasized the necessity for ethical conduct by offering a higher form of existence as reward for virtue and a lower one as punishment for vice. Escape from existence was salvation, and only by pure life, austere deeds and contempla¬ tion was a soul enabled to throw off the sheath altogether, and attain Nirvana , or eternal bliss. Hinduism had to take this doctrine and incor¬ porate it within itself in order to fight the spread of Buddhism in the country. It was not averse to do so either, because it easily found sanction for it in

the Vedas. Moreover, this offered the best explanation for the inequalities of life, and gave hope to all sentient creatures of attaining salvation some day.

Vedanta took this thought up cheerfully, and elaborated it. The inquiry into the fundamen¬ tals and motives for existence was facilitated by the belief in metempsychosis. It disposed of the question: Where is the need for salvation? There was, however, a slight modification of the doctrine, as recognized by Vedanta. It did not agree with Buddhism that life was misery; it was certainly bondage, but a bondage which was consistent with the eternal law and will of Brahman. The supreme law or will of the Divine enjoined a constant process of evolution and dissolution. Brahman, overspread with il¬ lusion, manifests itself as Isvara, who allots to transmigrating spirits their several bodies and spheres of fruition, in accordance with the law of retribution, i.e., the spirits obtain the bodies they have merited by their own acts. Every¬ thing that exists, elements, sentiency, soul and sheaths has ever existed. There is no creation. It is the will of Brahman that at the end of each Manvantara or cycle, all differentiation vanishes, and souls and elements become one with him. Brahman retracts them all unto him¬ self at the dissolution of the seon.

The individual soul, however, can extricate itself from metempsychosis, and be above the law as the Brahman itself. To do so it must receive its proper nature ; the man must purify his intellect, by passing through several lives. <(Not he that has not ceased from evil, not he that rests not from sensations, not he that is not concentrated, not he whose faculties are not quiescent, can reach that self by the intui¬ tion® attainable through Vedanta. By contin¬ uous contemplation, the aspirant to salvation works against the order of evolution until he attains to the Brahma. He then becomes extri¬ cated from bodies, but lives and becomes a Jivanmukta. When he attains this stage, he is untouched by merit or demerit. The body then falls away, and the spirit is freed for ever with undifferentiated existence, undifferentiated in¬ telligence and perfect beatitude.

The Vedantic doctrine of ethics is different to that of ritualistic or popular Hinduism; as a matter of fact, it is different from those of all known religions. Vice and virtue, in their essence, are purely relative; to the adept they do not exist at all. The manifestation of Brah¬ man comprises all attributes of existence ; all that exists, therefore, is in accordance with divine purpose. To the being that is untram¬ meled by the bondage of existence, the differ¬ entiation becomes unreal,

Bibliography. — Colebrook, < Essays on the Religion and Philosophy of the Hindus } (Lon¬ don 1858) ; Deiissen, P., (Oxford and London 1904) ; Loti, Pierre, (India) (London 1906) ; Muller, Max, (Six Systems of Indian Philosophy> (Oxford 1901) ; id., (The Sacred Books of the East) (Oxford 1879-1910) ; Oman, J. C., (The Mys¬ tics, Ascetics and Saints of India (London 1903) ; Rangacharya, M., (Ramanuja Bashyam* (Madras 1903).*

VEDDER, ved'er, David, Scottish poet : b. Deerness, Orkney, 1790; d. Edinburgh, 11 Feb. 1854. He went to sea when very young, became captain of a whaler at 22, was appointed first officer of an armed cruiser in 1815, and in 1820 became tide-surveyor, an office he occupied until his retirement on a pension in 1852. He ap¬ pears to have written poetry at an early age, but his first published verse was (The Covenanters' Communion, and other Poems (1828). His poetry is graceful and fluent, and possesses both humor and pathos. His work includes Orca¬ dian Sketches) (1832) ; (Life of Sir Walter Scott) (1832); (Poems — Legendary, Lyrical and Descriptive) (1842) ; (Story of Reynard the Fox) (1852), etc.*

VEDDER, Elihu, American painter and modeler: b. New York, 26 Feb. 1836. He studied painting with Mattison at Sherburne, N. Y., and in 1856 became a pupil of Picot in Paris. In 1857-61 he worked in Italy, then re¬ turned to the United States, where he found himself disqualified for enlistment as a soldier by a defective arm. Returning to Paris in 1865, he remained there till January 1867, when he went to Rome, where he has since resided. His subjects are mostly ideal, and his work is char¬ acterized by great imaginative power and origi¬ nality, with boldness and intensity of expres¬ sion, qualities which impart to it a heroic cast. His oil paintings include the

VEDDER, Henry Clay, American Baptist church historian: b. De Ruyter, N. Y., 26 Feb. 1853. He was graduated from the University of Rochester in 1873 and from the Rochester Theological Seminary in 1876. He was asso¬ ciate editor of The Examiner 1876-92, and editor-in-chief 1892-94; and also edited The Baptist Quarterly Review (1885-92). Since December 1894, he has been professor of church history in Crozer Theological Seminary, at Chester, Pa. Among his published works are (Baptists and Liberty of Conscience) (1883); (The Decline of Infant Baptism (1890); (A Short History of the Baptists) (1891) ; (American Writers of To-day* (1894) ;*

(The Decline of the Apostolic Succession in the Church of England (1894) ; (1898) ; (The Baptists (1903).*

VEDIC (va-dik or ve'dik) LITERA¬ TURE, the literature of the Vedas or sacred books of India. The language and literature of the Aryan inyaders of India falls into two periods, the Vedic and the Sanskrit. Vedic is the English adjective formed from the noun veda, the native name for the literature. This word means ˆknowledge® (vid seen in Greek F'uˆfxEv <(we know,® Latin videre, Gothic witwm, ((we know,® English wit), which special¬ izes in the sense of ((the knowledge par excel¬ lence,® (

The people among whom this literature originated were Indo-Europeans, who had en¬ tered the peninsula of India from the north¬ west. At the beginning of the Vedic period they were settled on the Indus and in the Pun¬ jab, and throughout the period the course of their conquests can be followed eastward across the Jumna to the valley of the Ganges. Ow¬ ing to the uncertainty of all Indian chronology it is rarely possible to give exact dates to any monument of its literature. For the Vedic period this is especially true, the best that can be done is to fix the relative succession of cer¬ tain classes of writings. The oldest works are collections of material, the composition of which must have extended over several cen¬ turies. For the oldest of these, the Rig Veda, the estimates of competent scholars vary from 4000 to 1000 b.c. — about 2000 b.c. being a con¬ servative estimate. The close of the Vedic period may be approximately given as shortly before the beginning of our era.

These people were worshippers of the vari¬ ous phenomena of nature, of which their chief deities were anthropomorphic precipitates (for details see Hopkins, (The Religions of India, > Boston 1898, and the literature there cited). To these gods they offered sacrifices that they might give in return prosperity — rain, wealth in cattle and in sons, health, long life and finally safe escort to the kingdom of the dead where ruled Yama, the son of Vivasvant. They conceived also the idea that these material gifts could be made more acceptable to the gods, if accompanied by songs of praise and invocations that extolled the might of the gods and told of their wondrous works; that for¬ mulae of magic potency were also employed is but natural. The very form of the invocations implies the existence of mythological legends, and it is inconceivable that so elaborate a ritual as existed at the time of the Rig Veda and even earlier in the Indo-Iranian period, could have been introduced and maintained without some tradition of the reasons for its existence, and directions for its proper performance. In short, in this earliest

period we have existing side by side all the germs which developing at a later period and crystallizing at various times precipitated themselves in the three great types

of Vedic literature, the Sariihitas, Brahmanas and Sutras.

The religion had two aspects, a hieratic and a popular side. The first comprised the greater Vedic ceremonies, the so-called grauta-sacrifices and centred about the oblation of the intoxi¬ cating drink soma; the second comprised be¬ sides the rites connected with the home life the grhya rites — (from grha, fta house®), the practices that were more distinctly magical in nature, whose objects were to bless and to curse. It remains to be noted that with the growing power of the priesthood, their influ¬ ence reached out over this sphere also and gave to these originally popular ceremonies a quasi-hieratical character. From this follows the partition of the Vedic literature into two main subdivisions, on the one hand the trayl vidya, the (

The performance of the great grauta sacri¬ fices required the participation of three classes of priests, the Hotar, or the reciting priest, the Udgatar, or the chanter, and the Adhvaryu, to whose lot fell the performance of the manual labor of the ceremonies. To this corresponds the tripartite division of the hieratic literature for the Veda of the Hotar is the Rig, that of the Udgatar is the Sama, and that of the Adhvaryu, the Yajur Veda. In each Veda three main classes of works exist, the Sarii¬ hitas, Brahmanas and Sutras; and within each Veda these types follow one another in this order, for the Brahmanas presuppose the Sarii¬ hitas, and the Sutras the Brahmanas. But it does not follow from this that the composition of all the works of one type belongs to the same period. So that it is misleading to speak of a Brahmana or Sutra period and attempt to define them as if there had ever been a period in which, for example, the Brahmanas and nothing else were composed. Besides there existed in each Veda different schools (cara – nas), varying more or less from one another. Sometimes the difference consisted only in de¬ tails of the ritual, sometimes in the theological exposition of its meaning, sometimes it ex¬ tended to the Sariihitas themselves. In the lat¬ ter case the result is various recensions of the same Sariihita known as gdkhds (<(branches®). In the former cases the differences lead to the composition of different Brahmanas and Sutras belonging to the same Veda.

The Samhitas (from sam, a preposition comparable in meaning with ovv and Vdha, <(to put,® which appears also in Ttdy/u) are

collections made from this floating mass of lyric material and sacrificial formulae. To them the term Veda is frequently applied in a nar¬ rower sense, so that, for example, Rig Veda may mean either the Rig Veda Sariihita, or that Sariihita together with all the works of other classes dependent upon it.

The Rig Veda (from rc, a laudatory stanza, especially one that is to be recited in opposition to one that is to be sung) is the oldest and most important of these collections. It con¬ tains a little over 1,000 hymns, that consist of about 10,000 stanzas, and so are in bulk a little

less than the Iliad and the Odyssey together. The hymns are religious lyrics of evidently very diverse origin and of correspondingly un¬ equal literary merit. The mass of them, how¬ ever, are directed alike to the greater gods of the Vedic pantheon, extolling their deeds, im¬ ploring them to come to the sacrifice, accept the offerings and grant blessings to their worship¬ pers. It is from this material that the Hotar forms the Canon of the hymns that are required at each granta sacrifice. But as the order of hymns does not follow the order of their em¬ ployment in the ritual, and as the collection contains also material — for example, the fu¬ neral and wedding stanzas — not intended for this purpose, it becomes evident that the pri¬ mary purpose of the collection was not to fur¬ nish a manual for the Hotar. It has, there¬ fore, been assumed that the purpose of the collection was historic and scientific — to pre¬ serve a body of poetry the value of which was appreciated — and some of the hymns have been interpreted as secular poetry. Later investiga¬ tions, however, go to show that these hymns also are religious, and that the Rig Veda itself is a collection of mantras intended for a ritual different from the system afterward expounded in the Brahmanas and Sutras.

The hymns are distributed into 10 books, but the different principles of arrangement ob¬ servable in them show that the collection is the expansion of a still earlier collection. With re¬ gard to its tradition, — the text of the hymns had evidently suffered a number of corruptions before they were brought together in the pres¬ ent collection. The formation of the latter an¬ tedated not only the

composition of the Brahmanas, but also the formation of the other Sariihitas — the time of the redaction of these Sariihitas must, however, be carefully distin¬ guished from the time of composition of the material contained in them. From this time on the utmost care was bestowed upon the pres¬ ervation of the text, and these efforts attained upon the whole a wonderful success. An ex¬ ception is to be made for the work of certain scholarly redactors — the close of whose activ¬ ity falls between the composition of the Brah¬ manas and the time of Panini, who modernized the text to a certain extent chiefly by forcing upon it the observance of the later laws of sariidhi, — the rules that govern the contact of words in a sentence. From their hands issued the Sariihita text. For its protection was com¬ posed the Pada-patha, or <(word text,® which attempted to undo the effects of the laws of sarhdhi and give each word in its original form. Still more elaborate precautions of a similar nature were the Krama-patha, or (

The Sama Veda (from sdman, a chant) is a collection of the words to be used by the Udga-

tar at the soma sacrifice. It contains 1,549 stanzas, all except 75 of which occur also in the Rig Veda. Historically, therefore, it is the least important of the Sariihitas. In accord¬ ance with the purpose of the Sama Veda they stand not in their original context but in the order of their liturgical employment. The Sariihita exhibits these verses simply in the form of the stanzas (rcas) that form the basis of the melodies. They acquire their proper character of Samans only in the Ganas or song books, where the prolongations, repetitions and additional syllables required by the music are noted. As each stanza could be chanted in a great variety of ways,, the number of Samans is practically unlimited. The text has come down to us in the recensions of two schools, namely, the Ranayaniyas and the Kauthumas, while of the song books four are known, namely, the Gramageyagana, the Aranyagana, the Uhagana, and the Uhyagana.

The Yajur Veda (from yajus, a liturgical formula) is, as its name denotes, a collection of the sacrificial hymns and formulae and pri¬ marily those of the Adhvaryu. Like the Sama Veda, it follows in its arrangement the order of the ritual, but it is broader in the scope of its material, for the Sama Veda is limited to the treatment of the soma sacrifice, while the Yajur extends to the other granta sacrifices also. It is the Veda in which the school dif¬ ferences are most noticeable. The two great divisions are the White and the Black Yajur Vedas. The difference being that the Sariihita of the former is merely a collection of mantra material, while the Sariihita of the

latter con¬ tains not only this material which properly belongs is a Sariihita, but also a certain amount of theological exposition which should prop¬ erly be in the Brahmana. Of the White Yajur Veda we have two recensions, those of the Madhyariidinas and the Kanvas. The Black Yajur Veda exists in the following recensions: the Taittirlya Sariihita, the Maitrayani Sarii¬ hita, the Kathaka Sariihita, and the Kapisthala- Katha Sariihita.

The Brahmanas (relating to brahman, <(re- ligious formula®) are theological treatises con¬ cerned chiefly with the ritual of the sacrifice. They do not systematically describe the ritual, for they presuppose a knowledge of it, and also a knowledge of the mantra material of the Sariihita. Their object is to explain the mutual relationship of these two elements — rite and formula. This involves exegesis of the mantras and leads to the telling of many myths. Furthermore, as they are concerned not only with the external relationship of the ceremony to its formulae but much more with its internal relationship (for to the Hindu what a thing is, is never of as great importance as what the thing symbolizes), they contain masses of theological and philosophical specula¬ tions frequently of the most fantastic mysti¬ cism. In form they are throughout in prose, except for certain peculiar parts imbedded in them called the Gathas. Appended to them are certain works of a theosophical character — called the Aranyakas or Forest Books, because owing to their peculiar mystic sanctity they could safely be transmitted from teacher to pupil only in the seclusion of the forest. The Upanisads (“confidential sessions®) are esoteric

philosophical speculations concerning chiefly the nature of Atman or Brahma, the world- soul. They are also called the Vedanta, that is, <(end of the Veda® either because of their posi¬ tion or as their adherents insist in the sense of the ftfinal goal of the Veda.® Now each of these Brahmanas attaches itself to one of the Sariihitas and accordingly treats only of the portion of the ritual in which the correspond¬ ing priest is engaged. According to this prin¬ ciple they are classified: (1) Belonging to the Rig Veda; the Aitareya Brahmana and the Kausltaki or Qankhayana Brahmana to each of which is attached an Aranyaka and an Upanisad of the same name. (2) Brahmanas belonging to the Sama Veda. Of these we have the Pancavinga Brahmana, so called from its consisting of 25 books with its supplement, the Sadviriga Brahmana; the Chandogya Brahmana

with its Upanisad, and the Jaim- inlya Brahmana containing the Kena Upani¬ sad. Four other works belonging to this school, the Sama-Vidhana Brahmana, the De- vatadhyaya Brahmana the Variga Brahmana, and the Sarnhitopanisad are Brahmanas only in name. (3) For the White Yajur we have the £atapatha Brahmana in two recensions, corresponding to the two recensions of the Sariihita. (4) For the Black Yajur Veda the Brahmana material is already imbedded in the Sariihita, but there also exist as independent works the Taittiriya Brahmana, and Aranyaka, the latter containing two Upanisads in addi¬ tion to which there are the Kathaka and the Maitrayana Upanisads.

The Sutras (((threads® or ((clues®) are com- pendiums of practical rules for various sub¬ jects. Stylistically works of this class are characterized by the utmost endeavors for con¬ ciseness. The extent to which these efforts were carried is shown by the aphorism that an author should rejoice more over the saving of half a long vowel than over the birth of a son — on which depended his happiness in the next world. The name is frequently applied in a narrower sense to the Sutras that treat of religion, the so-called Kalpa Sutras. The greater part of these Sutras fall into two classes, the £rauta (relating to gruti, revela¬ tion) Sutras which deal with the elaborate ceremonies for the performance of which three fires are required and the services of a num¬ ber of priests; and the Grhya (from grha, ((house®) Sutras which deal with the simpler observances of daily life that are performed by the householder himself in the house fire. Each Sutra attaches itself to a particular Sariihita. In the case of the £niuta Sutras this con¬ nection is evidenced by their limiting them¬ selves to the duties of the corresponding priest so that a complete picture of the sacrifice can be gained only by the combination of several Sutras ; for the Gfhya Sutras the connection is not so close. All treat of essentially the same subjects, but each draws its mantra ma¬ terial as far as possible from its own Sarii¬ hita. The following Sutras have been pre¬ served: for the Rig Veda, the Gankhayana, Grauta Sutra, and the Agvalayana Grauta Sutra, and two Gfhya Sutras of the same name; for the Sama Veda, the Grauta Sutras of Magaka, Latyayana and Drahyayana, and the Grhya Sutras of Gobhila and Drahya¬

yana; for the White Yajur Veda the Grauta Sutra of Katyayana, and the Gfhya Sutra of Paraskara; for the_ Black Yajur Veda the Grauta Sutras of Apastamba, Hiranyakegin, Baudhayana and Bharadvaja, also the Manava and the Vaikhanasa Grauta Sutras. To each of these is a corresponding Gfhya Sutra and also the Kathala Gfhya Sutra.

This summary of the hieratic literature has included in the Gfhya Sutras one side of the popular religion. In them, however, we have the popular ceremonies as developed, systema¬ tized and codified by the Brahmans. Moreover, they represent the Hindu only in the natural course of his life and in his orderly and lawful desires. Fortunately the picture is completed by the Atharva Veda; so that we have a knowl¬ edge of the private life of the Hindu with a fullness of detail that is not equaled by the records of any people of a similarly remote period.

Of the Atharva Veda Sariihita two gakhas exist : one of these, the Paippalada, has been preserved only in a single manuscript and has only recently become generally accessible ; the other that of the Gaunaka school has been care¬ fully edited and extensively studied. It con¬ sists of a little over 700 hymns of about 6,000 stanzas divided into 20 books. Of these the last two are later additions, one being taken chiefly from the Paippalada Gakha, the other from the Rig Veda. Books 13-18 are devoted to special subjects; the other books contain charms for the cure of various diseases fre¬ quently regarded as possession by demons ; prayers for long life and health; imprecations against demons, sorcerers and enemies; charms pertaining to women; charms to secure har¬ mony and influence in the assembly; charms per¬ taining to royalty; prayers and imprecations in the interest of the Brahmans ; charms to secure prosperity; charms in expiation of sin and defilement; cosmogonic and theosophic hymns and ritualistic hymns. In short the Atharva touches the interests of every class of life and ranges from the highest metaphysics of the¬ osophic mysticism to the lowest bathos of sorcery. The redaction of this material is later than the redactions of the other Sariihitas and probably later than the composition of some of the Brahmanas. The material itself is of widely different ages ; some of it cannot be much older than the time of the redaction ; other parts may be among the earliest products of Vedic literary activity as some of the practices go back even to Indo-European times.

The subordinate literature of the Atharva was evolved in an order diametrically opposite to that of the other Vedas. The oldest work is the Kaugika Sutra, which gives the ritual for the employment of these hymns and has its closest analogies in the Grhya Sutras. Later the Atharvans advanced the claim that their Veda was the fourth Veda, the Sarva Vidya or Complete knowledge® that always loomed up behind the consciousness that each of the other Vedas was only the fraction of a greater unit ; that this was the Veda of the fourth priest, the Brahman, who exercised a general super¬ vision of the sacrifice,

and consequently that this important office could be filled only by an Athar- van ; finally that the Purohita or house chaplain of the king must be a member of their school.

To support these claims were needed works treating of the duties of the Brahman such as existed for the other priests in the other Vedas. Accordingly there were composed the Vaitana Sutra (a £rauta Sutra) and the Gopatha Brah- mana. Furthermore a large number of Upani- sacls came to be attached to the Atharva.

A complete Kalpa Sutra contains also a Dharma Sutra, or a collection of aphorisms on the law, chiefly from its religious side. Those of Apastamba, Hiranyakeqin and Baud- hayana — all belonging to the Taittiriya divi¬ sion of the Black Yajur Veda — have been preserved; the Dharma £astras of Gautama (Sama Veda) and Vasistha (Rig Veda) are in reality also Dharma Sutras. Kalpa, however, is only one of the six Vedangas or ulimbs of the Veda® into which tradition divides the whole Sutra literature. The others are giksd, ((pro- nunciation® ; chandas, ((metre® ; vydkarana, ˆgrammar® ; nirukta, ((etymology® and jyotisa, <(astronomy.® The beginnings of these sciences generally go back to the Brahmanas ; in the Sutras they are elaborated and then flourish in the post-Vedic period. Of special works are to be mentioned the Pratigakhyas delating to the £akha,® or phonetic treatises, whose object is to explain the relationship of the Sariihita and Pada-patha texts. For grammar the great work is that of Panini, which as the norm of the classic language requires fuller treatment under that head. Etymology is represented by Yaska's Nirukta. The Sutras are completed by the Pa- riqistas or Supplements. Finally there are the Prayogas, <(manuals® and Paddhatis, ((guides,® that give a more connected picture of the sacri¬ fice and indices called Anukraminis that treat the literature from various points of view.

*Bibliography. — The best work of reference on all subjects connected with India is still in course of publication: (Die Grundrisse der Indo-Arischen Philologie und Altertumskunde, begriindet von Georg Biibler, fortgesetzt von F. KielhonP (Strassburg 1896). It contains the fullest citation of the literature of the subject. Many of the texts have been translated into English in (The Sacred Books of the East,**

edited by Max Muller, Oxford. In English there are the translation of Weber, (History of Indian Literature> (3d ed., London 1892) ; and of Kaegi, (The Rig Veda> (Boston 1886) ; also (A History of Sanskrit Literature, > by A. A. Macdonell (New York 1900) ; Bloomfield, M., (The Religion of the Veda} (New York 1908) ; and Keith, A. B., (The Religion and Philosophy of the Veda} (Cambridge, Mass., 1917), all of which give besides a treatment of the subject a fuller bibliography.

George Melville Bolling, Professor of Greek, Ohio State University,

Columbus, Ohio.

VEEN, van, Otto van (called (

of the Guild of Saint Luke in 1602. He was a fine poet as well as a brilliant painter. His historical pictures and portraits are marked by strictness of design, natural attitudes and the most expressive faces, while the coloring is brilliant, though never attaining to the gor¬ geous and transparent lustre of his pupil Rubens.

VEERY, or TAWNY THRUSH, a small

migratory thrush (T urdus fuscescens) of east¬ ern North America. The veery ranges from the Rocky Mountains eastward, chiefly within the United States and nests throughout the northern part of its range. It is uniform cin¬ namon brown above and with very little spot¬ ting or marking underneath. The usual call note is a very clear whistle, wheen, easy to imitate. The song is much less frequently heard, but is very attractive, though so peculiar as to 'be quite characteristic. The nest is built on or near the ground, chiefly of bark, rootlets and leaves, and the four or five eggs are bright greenish-blue, unspotted. The veery is de¬ cidedly a woodland bird, preferring damp woods with considerable underbrush.

VEGA, va'ga, Garcilaso. See Garcilaso de la Vega.

VEGA CARPIO, va'ga kar'pe-o, Felix Lope de, Spanish poet and dramatist: b. Mad¬ rid, 25 Nov. 1562; d. there, 26 Aug. 1635. After studying at Alcala he joined the army, and in 1588 accompanied the Invincible Armada. About 1612 he 'became a priest, and subsequently Pope Urban VIII made him a Knight of Malta and a doctor of theology. He had already writ¬ ten and published various poems, but his produc¬ tions were now multiplied with extraordinary rapidity. Scarcely a year passed in which he did not print a, poem, and in general scarcely a month, or indeed scarcely a week, passed

in which he did not produce a piece for the theatre. He informs us that he had more than a hundred times composed a piece and brought it on the stage within 24 hours. The fame that he en¬ joyed during his lifetime was immense. The people idolized him, and he received marks of distinction from the king of Spain and Pope Urban VIII. The latter, in return for the dedi¬ cation of a tragedy on Mary Stuart, conferrred on him the title of doctor of theology and sent him the cross of the order of Malta. The profits that accrued from his works corre¬ sponded to his fame. About 450 of his dra¬ matic productions have been printed. They reveal an inexhaustible but ill-regulated imagi¬ nation, a strange mixture of the beautiful and the ridiculous, the sublime and the trivial, a rare mastery of dialogue and extraordinary facility in versification. He has been described, prob¬ ably with more epigrammatic force than strict accuracy, as the dramatist who has written the greatest number of good scenes and the greatest number of bad pieces. The Spanish Academy began a collection of his works in 1893. (See Star of Seville, The). Consult Lord Hol¬ land, (Some Account of the Life and Writ¬ ings of Lope Felix de Vega Carpio (1806-17) ; Ticknor, (History of Spanish Literature) (Vol. II, 1849; 6th Am. ed., 1888) ; Lewes, (1891) ; Farinelli, (Grillparzer*

and Lope de Vega> (1894) ; Ludwig, (Lope de Vega's Dramen aus dem Karolingischen Sagen- kreise) (1898) ; Wurzbach,

VEGETABLE FIBRE. See Fibre.

VEGETABLE IVORY, a hard, fine¬ grained, white substance which is the reserve cellulose stored in the cell-walls of the endo¬ sperm of the fruits of a species of Phytelephas, a genus of Central American palms (q.v.). The stems recline upon the ground for a few feet, and then are crowned with long, linear, plume-like, pinnate leaves, arching upward for 20 or 30 feet. The fruits lie near the ground, are globular, about as large as a man's head, and consist of several drupes, enclosed in a woody, wart-covered wall. The kernels of the drupes, or seeds, are about the size of a hen's egg, and when very young contain a clear, in¬ sipid fluid, which is used instead of water by travelers. As in the cocanut, this fluid becomes milky and sweet-flavored, and the nuts are eagerly eaten in this stage by sundry animals, but continue to thicken and harden, until, when fully ripe, the seeds are so very hard as to form a valuable substitute for

elephant ivory. These seeds are known to commerce as ivory-, or corozp-nuts, and are extensively used in making small articles of turnery, as buttons, umbrella-handles and the like.

VEGETABLES, Food Value of. The

function of food is to build up the tissues of the body and keep them in repair, to yield energy in the form of heat, to keep the body warm and to create strength to enable it to do its work. A diet to accomplish all this must contain the nutrients, water, nitrogenous substances or proteids (classified as protein), also fats, carbo¬ hydrates (sugar, starch, cellulose, etc.), and mineral matters, such as sodium chloride (com¬ mon salt) and phosphate of lime. Animal foods, meat, eggs, cheese, etc., are rich in pro¬ tein, but not in carbohydrates. With the excep¬ tion of butter, lard and the fat of pork, they yield but little heat and as a rule should be asso¬ ciated with other foods to form a complete diet. Cereals (corn, wheat, etc.), on the other hand, though classed among the vegetable foods, furnish a very large proportion of the actual nutrients in the ordinary diet and more eco¬ nomically than animal foods, for which they may be substituted. Combined with milk, fruit and nuts, they form a complete diet. Vegetables as a rule are deficient in fat and protein, but rich in carbohydrates and some of them con¬ tain beneficial juices and salts. While a vege¬ table diet is often of great service in neuras¬ thenia, gastric neurosis, etc., for healthy per¬ sons the objections to a strictly vegetable diet are based upon the large amount of material required to furnish necessary protein, the amount of residue to be got rid of by the body and the monotony of the diet. Most of the so- called vegetarians are merely non-meat-eaters, for they consume milk, butter, eggs, cheese and sometimes fish. The fact is that man is an omnivorous animal, his digestive apparatus is adapted for the digestion of both animal and vegetable foods and usually he needs both in moderation. Vegetables are too often consid¬ ered merely as a pleasant addition to the diet and not a necessity. Most families use but 12 or 15 different kinds of vegetables, whereas the

large markets in our cities have for sale through¬ out the year about 50 varieties. The United States government has recently encouraged the increased use of vegetables and through investi¬ gations and experiments has added to our knowledge of their food value. For example, the purslane and other so-called weeds have been found to be useful as food and the propa¬ gation and use as food of the roots, tubers, beans, bulbs and various plants heretofore grown and used as food almost exclusively by the Chinese, such as lily bulbs, the lotus,

taro and ginseng, are recommended to Americans. The malates, citrates and other salts found in certain vegetables are indispensable in food as they are converted into carbonates in the body and furnish some of the alkalies to the blood and other fluids. Potatoes, onions and fresh salad vegetables, such as tomatoes, cabbage, greens, lettuce, corn and cucumbers are excel¬ lent preventives of scurvy (q.v.) and in the spring, after the heavy winter diet (more or less of meat) their juices and salts are especially beneficial. These vegetables, together with oranges, lemons, limes and apples, may well be substituted for so-called spring medicines. Vegetables are also needed for their bulk, which is an important adjuvant in maintaining the necessary movements of the intestines.

Much of the indigestion following the use of certain vegetables is due either to insufficient cooking or to the fact that the vegetables are not fresh. The Irish potato, the (

VEGETARIANISM, the theory and prac¬ tice of living on vegetables and abstaining en¬ tirely from flesh food, or from all food obtained by the killing of animals. The abstinence from flesh food is the essential element in the con¬ notation of the word vegetarianism; but vege-

tarians are usually also total abstainers from alcoholic liquors, and in regard to the use of such animal products as eggs, milk, butter and cheese, and of cereals, as well as on the ad¬ visability of cooking food, different views are held among them. The average vegetarian ad¬ mits into his diet the animal products above mentioned, and there are semi-vegetarians who also eat fish. The arguments for and against a vegetarian diet fall into three main classes, physiolgical and hygienic, ethical, economic.

Vegetarians claim that man is closely akin to an exclusively frugivorous group, the apes, and widely different from carnivora, her- bivora and omnivora. They assert, what is universally admitted, that the actual state of mankind and the science of physiology both show that a complete fleshless diet is possible and readily procurable, and they argue that if such be the case any moral arguments that may be advanced against the eating of flesh ought to have decisive

weight. Anti-vegetarians object, that with a purely vegetable diet an enor¬ mous amount must be consumed in order to obtain sufficient nutriment, and that the waste products are excessive in quantity; but it is to be noticed that whatever be the force of this argument against extreme vegetarians, it can hardly be maintained against those who admit eggs, milk, etc. Vegetarians maintain that flesh¬ eating is responsible for the propagation of some of the most serious diseases, notably tuberculosis and cancer, and they contend that it hinders the development of the higher nature of man both by its physiological influence and by the necessity of systematic slaughter en¬ tailed by it. It has been objected, that if ani¬ mals now regularly slaughtered were allowed to breed unchecked the country would be over¬ run by them, but the possible answers to this argument are obvious. It is also claimed by vegetarianism that it is in such products as nuts, seeds, roots, eggs and milk, and not in the comparatively degenerate form of flesh, that nature provides the means of supporting life in its best and most nutritive form.

In a work on the subject M. Gautier says: ((The vegetarian diet is not suited to European organs. But relieved by the addition of milk, grain, butter, cheese, eggs, etc., it offers many advantages. It alkalizes the blood, it regulates the circulation, and preserves the elasticity of the arteries; … it makes one less liable to danger from maladies of the skin and of the joints, and to congestions of the internal organs. It tends to soften the disposition, — to make us more calm and less agitated, aggressive and violent. It is practical and rational. It ought to be accepted, if one follows an ideal for the establishment of an education for races of men who are to be sweet-tempered, intelligent, artistic, peace-loving, yet nevertheless prolific, vigorous and active.®

Vegetarianism is as old as the ancient re¬ ligion of Hindustan, and was taught by Plato, Plutarch and other writers of classical an¬ tiquity. One o.f the oldest pioneers of the move¬ ment in Great Britain was George Cheyne (1671-1743), a Scottish doctor, who supported it in an (Essay on Regimen,) published in 1740. Shelley's vindication of natural diet is well known. J. F. Newton's (Return to Nature, or Defense of Vegetable Regimen, > was published

in 1811, and in 1847 the Vegetarian Society was founded at Manchester. Eduard Baltzer (1814-87), a German liberal clergyman, intro¬ duced the movement into Germany, and founded at Nordhausen in 1868 a "Verein von Freunden der Natiirlichen Lebensweise.® His book on (Die Natiirliche Lebensweise) reached a fourth edition. Other leading German pioneers of vegetarianism are

Gustave von Struve (1805- 70), author of (Die Pflanzenkost, die Grund- lage einer neuen Weltanschauung (1869), in which he associates vegetarianism with social¬ ism ; and Theodore Hahn, author of (Die Naturgemasse Diat* (1859) and (Der Vege- tarianismus) (1869). Vegetarianism has ob¬ tained less hold in France than in Great Britain and Germany. Among the chief French works on it are the (Thalysie, ou la nouvelle Ex¬ istence* (1821) of Jean Antoine Gleizes (177 3— 1843) and (Le Vegetarisme rationnel scien- tifique) (1889) of Dr. E. Bonnejoy. The early leaders of vegetarianism in America were Amos Bronson Alcott (q.v.) ; Sylvester Graham (1794-1851), author of (The Science of Human Life* (1839), and Charles Lane, author of (A Brief Practical Essay on Vegetable Diet* (1847). The Vegetarian Federal Union was founded in 1889, and several societies through¬ out the world are affiliated with it. Vegetarian restaurants are comparatively common. Con¬ sult Kingsford, (The Perfect Way in Diet* (1881) ; Williams, (The Ethics of Diet) (1883), a sort of encyclopaedia of the subject; Smith,*

(Fruits and Farinacea the Proper Food for Man (abridged ed. by F. W. Newman) ; Newman, (Essays on Diet) (1883) ; Salt, (A Plea for Vegetarianism* (1886) ; Richardson, (Food for Man* (1891) ; Hills, (Essay on Vegetarianism* (1893), and Oldfield, tuber¬ culosis: Flesh-eating a Cause of Consumption. >*

VEHICLE SPRINGS, contrivances for diminishing the concussion between the body or the frame and wheels of automobiles, car¬ riages and other vehicles. The most usual form of vehicle spring is built up of finely tempered pieces of steel so formed and fastened that they strengthen each other, while allowing free play for the natural spring of each leaf, and in this manner absorb most of the vibra¬ tion and jolting caused by the wheels striking obstruction or inequalities in the road. See Springs.

VEHMGERICHTE, fam'ge-riH"te (Ger, "tribunals of punishment®), or VEHMIC COURTS, German mediaeval courts of justice. They originated in Westphalia. They were com¬ posed of free judges (Wissende , "initiated®), bound to secrecy, presided over by a Freigraf (free count), and convened in both open and secret tribunals, the latter being for more serious offenses. The emperor and the archbishop of Cologne (lord of Westphalia) were at least nominal members. Originally, in a period of confusion, when the petty baronial courts ren¬ dered inadequate justice, the Vehmgerichte at¬ tempted to judge fairly and impartially, and to enforce recognition of law. They came, how¬ ever, to employ their extensive authority in an

arbitrary manner, and to use great cruelty in punishment. Maximilian I greatly abridged their power by a new code, promulgated in 1495. In Westphalia they held secret meetings until finally abolished in 1811. Consult Lindner, (Die

\eme) (1888); Thudicum, (Fehmgericht unci Inquisition) (1889) ; Lindner, (Der angebliche Ursprung der Vehmgerichte aus der Inquisi¬ tion) (1890) ; Wiegand, (Das Femgericht West- falens) (2d ed., 1893).

VEII, ve'yi, Italy, an ancient Etrurian city, on the river Cremera, its site generally sup¬ posed to be marked by the ruins found near the modern village of Isola Farnese, 12 miles north¬ west of Rome. Veii was celebrated in the early history of Rome, with which it had several wars. The last war was between 405 and 396 b.c., when the city was taken by Camillus and laid waste. Caesar, and afterward Augustus, es¬ tablished a Roman colony at Veii ; but it had again become of little importance in Hadrian's reign.

VEIN, in geology , a mass of rock or mineral which fills fissures or cracks in other rocks. Veins are usually divided into veins of igneous rocks, of sedimentary rocks and of minerals deposited through the agency of water or gas. Veins are irregular and generally limited in ex¬ tent. The history of mining affords many ex¬ amples of promising veins of rich ore which gave out after being followed for a few feet or yards. The most important group of veins is that containing minerals, metallic or non- metallic. See Mining; Ore Deposits.

VEINS. See Anatomy; Circulation; Physiology.

VEIT, fit, Philipp, German painter : b. Ber¬ lin, 1793; d. Mayence, 18 Dec. 1877. He was grandson of Moses Mendelssohn and stepson of Friedrich Schlegel, and after studying art in Dresden he went to Rome, where he became a member of the circle of the Nazarenes (q.v.) — German Pre-Raphaelites of a religious, roman¬ tic and mediaeval tendency in art, of which Cornelius (q.v.) and Oeverbeck (q.v.) were the chief representatives. There he produced the (Seven Years of Plenty, > the (Triumph of Re¬ ligion, > the frescoes illustrating the (Divine Comedy> in the Villa Massini ; and the altar- piece (Queen of Heaven) in the Trinita de' Monti. From

1830-43 he was director of the Stadel Institut at Frankfort. Some of his large frescoes in churches won him great repu¬ tation. He published (Zehn Vortrage fiber Kunst> (1891).

VELA, va'la, Vincenzo, Italian sculptor: b. Ligornetto, Tessin, 1822; d. there, 3 Oct. 1891. He was stonemason's apprentice at the building of the bridge of Viggio, and after studying un¬ der the sculptor Cacciatori in Milan went to Rome (1870) and began the model for a statue of Spartacus, now in a private collection at Petrograd. He later on took up his resi¬ dence at Turin where he executed a series of works comprising a wide range of ideal and monumental subjects. His principal works are (Hope and Resignationˆ a statue for the tomb of the Donizetti family in Bergamo ; a statue of

(Columbus and America, etc.*

VOI, 27 -46

VELASCO, Tex., town in Brazoria County, on the Brazos River, and on the Velasco Terminal Railroad, about five miles from the mouth of the river and 35 miles southwest of Galveston. It was laid out in 1891. It had its origin in the needs of the workers who were engaged in securing deep water, by jetty-work, on that part of the coast, and finally this locality was selected as the shipping-point. The work was done by a private corporation and over $1,500,000 were expended. Large vessels load and unload at the Velasco wharves. The chief industrial establishments are an ice factory, a planing mill and a machine shop. It has a grain elevator, coal and brick yards. There are ex¬ tensive shipments of cotton and cotton products, grain, fruit and coal. Pop. 2,000.

VELASQUEZ, va-las'kath, Diego de, Spanish soldier, conqueror of Cuba : b. Cuellar, Segovi, 1465 (or 1458) ; d. Havana, 1522 (or 1523). After having fought in the conquest of Granada, he went to Espanola with Columbus in 1493, and was there prominent in warfare with the Indians. He was appointed by Diego Columbus in 1511 to effect the conquest of Cuba. With a force of 300 he landed in Cuba toward the close of the year, and encountered little resistance except from the cacique Hatuey, who was captured and killed. He assumed in¬ dependence of Diego Columbus, and directed the active campaigning through his subordinate, Panfilo de 'Narvaez, who had arrived with rein¬ forcements. The island was easily conquered and the natives enslaved. Velasquez made Santiago de Cuba his capital, and founded Trinidad, Matanzas and other

settlements. He was connected in 1517 with the expedition of Cordova, which, seeking slaves in the Bahamas, accidentally discovered Yucatan. He also fitted out the expedition of Cortes (q.v.) for the conquest of the Aztecs, and when Cortes as¬ serted independence sent Narvaez to take him prisoner (1520). Cortes defeated Narvaez, and Velasquez obtained no benefit from the con¬ quest of Mexico.

VELAZQUEZ, Diego Rodriguez de Silva

y, Spanish painter: b. Seville, 5 June 1599; d. Madrid, August 1660. He came of noble family, his father being Juan Rodriguez de Silva and his mother, Geronima Velazquez, both classified in the rank of hidalgos. At the age of 13 he began the study of painting, first under Herrera and afterward under Pacheco. From the latter he thoroughly learned the principles of draw¬ ing and of proper technique. From his earliest youth he seems to have had the settled convic¬ tion that he must paint only what he could see and sensuously appreciate. He had plenty of imagination but he always kept it subject to this sense of realism. He, therefore, appeared to have possessed much less imagination than he really did. He tried historical, religious and mythological subjects, portraits and landscapes, in fact every kind of painting that he could sub¬ ject to his all-impelling sense of the necessity of realism. He probably had this realistic tendency of his nature accentuated in early youth through the teaching of his first instruc¬ tor in art, Herrera, a very vigorous and capable painter, who had no love for the Italian influ¬ ence on art so strongly in evidence in Spain in his day. His second teacher, Pacheco, who seems to have been paid to give his best atten-

tion to his talented pupil, thoroughly grounded him in the principles of his art, subject, propor¬ tion, perspective, coloring and technique, illus¬ trating his lessons practically by visits to the best pictures in the city. The boy lived and moved in an atmosphere of art. Pacheco, the author of a critical work on painting, was a good and sure critic of art and had a masterly way of presenting, in concrete manner, the les¬ sons he wished to inculcate ; and thus he taught his pupil to feel what he himself recognized to be the true principles of art, and to carry out these principles, which he was not able to do himself with any notable success. Pacheco seems to have recognized the fact that his pupil had greater talent than he himself, and he ap¬ preciated at

its full value the faculty he dis¬ played for the minute study of detail. Noth¬ ing was too small or insignificant for him to examine most carefully in all its bearings. These traits characterize all the work of Velaz¬ quez from his early boyhood to mature man¬ hood. Under Pacheco's tuition he studied every possible effect of light and shade and tried to convey them with brush directly to the canvas. These light and shade studies he applied to buildings, inns, peasant's huts, the human face and form, and to everything, in short, that might give him a more effective grasp of the subject. He carried his realism further, in an age when Spanish painters were little given to realism, and secured human models for study of the human body at rest and in action, in light andf shade, and under varying conditions of both ; and more especially for the changing expressions of the human face. He thus became, in early manhood, a master of the depicting of feeling, expression, passion and character; and all his life he remained a student of every phase of nature, from the most flamboyant to the minut¬ est and most secret. His interest was, there¬ fore, in the life around him; and he did not require to reach out beyond it in order to com¬ plete his sense of the unity of art. His work is, for this reason, the most national of all the greater Spanish artists. Pacheco, who saw the coming greatness of his talented pupil, rewarded it in anticipation, by bestowing upon him the hand of his daughter, and he seems to have been inordinately proud of his son-in-law.

Already accounted an excellent artist in Seville, Velazquez set out for Madrid with let¬ ters of introduction to people in authority. There he studied in the art galleries and painted some good portraits. But the inducement to remain in the capital not seeming great enough, he returned to Seville. Very shortly afterward, however, he was invited to return to Madrid by no less a personage than the Minister of the Crown, Olivarez, who sent him money to pay his own and Pacheco's expenses for a second trip to the capital. Both artists were so well thought of there that Olivares induced Velaz¬ quez to send for his family, at the expense of the Crown, and to make his home in Madrid, where the young painter became the close friend of the art-loving Spanish sovereign, Philip IV, who conceived a great affection for him and considered him the greatest of all portrait paint¬ ers. This friendship lasted for more than a third of a century, through which long period it was never once in danger of being broken or disturbed. In 1628 an event happened which

made Velazquez desirous of seeing the great art centres of Europe, especially those of Italy. This event was the visit to Madrid of Rubens, the great Flemish artist, then in the height of his fame, and

still vigorous, enthusiastic and endowed with strong force of character*and the power of impressing others with the firm belief in the correctness of his own methods and the worth of his own achievements. He came to Madrid commissioned to paint certain pictures for the court. Velazquez was appointed by the Crown to be his guide, mentor and friend among all the art and art circles of the capital. In this connection he won the warm regard of Rubens who was not slow to recognize his great talent and his profound knowledge of art. The following year (1629) Velazquez was en¬ abled to visit Italy through the generosity of the king and Olivares. There he studied the great masters industriously in Venice and Rome and made copies of several notable pictures for the king. At the same time, under the inspira¬ tion of his surroundings he created much orig¬ inal work, some of it of notable strength and beauty. Among his copies were (The Last Supper) and (The Crucifixion) by Tintoretto, and works by Raphael and Michelangelo. Per¬ haps the most . notable of his original work painted at this time is (The Forge of Vulcan' (Madrid Gallery), a picture which reminds one of his famous earlier picture, (Los Borrachosg commonly known outside Spain as But in this latter picture, while his art is no surer and his conception no truer, yet both are more pleasing; and on the whole, the latter pic¬ ture is the more truly worthy of Velazquez. Both are quite Spanish in character, conception, coloring and execution. Velazquez went again to Italy in 1631.; this latter time visiting Naples in company with another famous Spanish artist, Ribera ; and while there, among a considerable amount of work, he painted the portrait of the Infanta Maria, a sister of King Philip, who also had a great admiration for her notable country¬ man.

Velazquez accompanied the king on many expeditions and the latter seems to have been very fond of his company. It is known that he went with him to Aragon on two separate occasions and that he there painted several pic¬ tures of the sovereign and members of his fam¬ ily (1642 and 1644). Naturally he was (

I

Sm*ii**ii*Z£*-**m*Zi w**mi«**WZ**Z»i

«»••.'»« >v'»« xa »4.'m.<>i.'i»ti'is

»*x-W».' >»«».>»« »*:•« »*•*» a a a«

«"i*««J*'*i*5":**®ai»»1«»l!i*»**J*»**«*J

? ««*”«** »•*«*»» av »a*4aa*x «**«»**< a •». «* sw.'aa Ik aa.aa'a

«.«->«• 4» I

Mk’*« <»«.•*• a. * a .* 4 4 '•>‘»« 4. •» 4>

.•»»<.«»« 44«tk'»a ax «•« <>m> i

xx-a «.»»•*>’•«. a »•>»»» a.aa.vi

V»-*» .. ••,4»«.i’«.»» .«,.4«*4’a«.‘fc»»t4»«l

» a >’ a • atX* 41.44’** 4x »l

I «’.»* «W4X».« «> *» «W<>*a .•»«.!«* »4’«, .< «H «».»> SSvV •»*» »*.’»*

i4»*.>4««i>4l»oi>«>t’**’<>‘t> *r4M.’>«tt’»««fca«k.)>a«*k a w.xaa* .< a: * «»'a a«;H4.<» a«*» a» »«

• .HX Ba.4a.««. •.,■*. 4tt>>4< <» 14««>4««.’»a«»

14 *» ‘x ««.>• H’» » V «>’»•• B« a4J4k«4:4‘»*.4a»B…H4S*«»’**4x* «

‘» *4.<»5t 4V*B.«4y4iHl ■ '. *»-» *Hi.*4 ***«X4.»»4 W-4x’a4»4

ix-*«t wacAk »a av* 4<.>a a «.**»* o’»*«x«>i4 «. t-. 4'*« *x » « t.<» »»o*»»t'»» k4'»«A4»«o*«

>4’«x»a’*** ax *■•… x« ax **.»•• tx-aa hw**.4><»**4'**.«x »*»,it»'<4^»»»rir*«.<4«a.>»»%^**’»4 «*.>* i

• Xk t*^4‘‘4««4»» 4f»««.‘4»a> 4»HxK«4,<»S».»l'M» 4* »». 44. • Bv> fc«T Bx **.* 4| W X^

».4BaB»>WB»4»>‘B« »* a **.4 4 W •.<»« Hv **.'»• 4

».«»#» «x a ax*. *a>‘x * 4.4. * « 4 »».■« » 4,»*a> at* xt‘aa.katara. *« axaxi i

• 44*». 4fc’» «.<***. >*44« >4*».(* 44,4.’ «• 4>‘4S 4>‘4 « «>k»>44* •>’ *« » * •

■•• la*.-* t »a.4v »«i.HH » » ‘* «av*44«i”** .’ «*.>.«’•.*• «.4 4 »» as’* at»*« «4 * ‘ 4|>M 4i«.l<.««.<4»»4'4»4.u ».,<4»«44 .44,«k «•,«<*. W»,44*a.<»BB.'>4.«.*»‘4 4 «» a a •■■ » »« *4’»»«X •»»>’»•.<»■»« «x 44«.4*»a»»«l»»i>4«4M».’«4 ** 4a*» 44 »*

»4**iHiˆ*at’***’«4«v»»‘«**»**«’* « Hi>»« «‘*W *x W4k’*-H4l
».*,4fcB«4«4.44 4 •i44»«44-*>«v4»»<'4 ■’

>*»«4‘4.W44 *44a.‘4.aa* H«*.« 4 4.4»«.>**B.4» * *,t» «« X« . i« *«
*x * •«.»*« » «»’* :»V4» <1 *.*4. * * 4'B » * 4 I «v»4. 44 » . ‘»»*.■».» .
4x’**»-**B.*k*4e.4’« * a 4X»» «>>•* 44 «4>* •>»’ »* 4 ‘X’B4« *4’
4. « 4 .»»»**’ 4 «»•»»’- »

»«*«« -aa »«».’» tx)),* tka «)4 4 4.41 »* 4. a »«‘mu a a.’* • * a»a« «x
•« aaaa.xa at.**-* «

iMk’aa.iXkajvaa.iaaat’aaiHaa.tt *.’« 4’ia;«4 ••.•a a •*.<»■• •
»x44ˆ«*'*.*»*»w***a*ka*,«'*«

ivaiw>«.44a« »V»4.1**».>4 was-.** a,’.’.’ « 4a»«44 ««.*, a*4«‘a
a*.*t «n *«•-*«

.» .4 4-**HX-**.4k»* k4’»*>44a«.Tx * *’ »• «4-aa‘4.’.i’*4v’» * * aw*
a »» 4! t » •> • .’ a 4>< *»* *»■ ave*«

la*** 4i’»* »x-a«4>’« «.<*■» a.» a a a a« » -*«c*f* >(‘»■» «,«» a a
>’«• >v»4J4 «Wxia-» S44.|«4»J>
BB4t4n4’t44t4«<.a«<>41..4«t.H4<.»
•»«4t(l«4*.ll'44*4k>ta.Wa44l>4«i«t * *l«*i

!.».« w.’*« **4* w a*** a,-**. *4’»-a4…4fc’B a<«».’:x’» •*«.■»**.’>»•
s.a*v’***.»x •• 4 »»a ast>4aa »*»

.-■a.*****’* •».«»a4k<»,*4i'»«»l »a4< ,ˆv’»’i4v<4 »«« «»'*»4 >x*w
«»•►»,».■»• »».-»w>4*«.f

ixa’%v4aa»4-«x *iu«»*4.‘ik«*t’i«.‘4an-*.»M ‘4« ‘»i%k’a»a’»4
«»44fc|»ac»4.a 4t aw ..’»» »». «« -» troa

•4‘4»4k’»». <4aa.«'4»4« »a».ik«*i«4«4.«4 »»4k<»«*.'4»4i aw.aaaaaj
'4.«4<4*.ntl.'«k'a«.4i»X.<4*4.4K«.H« n‘4»tn«.t,’*44,if44.‘44« »« . »•
»>*» a 4.‘4»14 a • »4 • ‘ .\VMJKie«*44»’«A4:K<4W*«.a*i«
4xxw»a4<»*i.'4a**a4'aa.a,'*.i4.a-4vaai4k»aavikwa*4(.4a4»w,4» *a
>‘a a X4«*a»4’a* w»»*’ w*f«a*4i.va ai.4»-.aia>4a « a.‘aa .’» a h»’«4
< iw«>a»,n»«j*k’«.a>fa.’»‘44«>4»»ff»«44‘4«4(>4«».>«»4.4«
4».ik’t«.n‘4« ao* »*.>4«t.‘4»vi»»*i

■\4»p*4»af»»>44’« «k’»aH4’ a 4»»4K4* a«.i4« aaiawax’ iS4.>*
aa.‘xaanaaa 4k‘4»44i aa n«4it»4«»4i

“k4«»-K4<4.‘aa a.ˆ • a »»'■•« x» •«.» » a.- »i ;4«.<><(* 4’a.ax’**‘s

xa*'!>»i, a.»/'k« «•

- V~ **4* «»k«a a a.

■N,«;»M^4a4v4e*»<» »k ».«4 *»»4'»«.44'a«.>4 4».4»'44 *+»*■*:
•«.»*■ aa.t* »«•<*• ■
»«l4*«<'44».>4«.Ha»4k'»«.U««,n>4.'<<>a«'<4«4.U4»4.'««44:at4>a4.

W4«.'444C*» 4, »4tk *t»M4.'4t« I '.'<4.44»»«*4*»k'»«4k*«^4'««i'4»4.
4 4 4. *4t4'«»«.>». 4<__._kf4_strong>r«»,H'»«.>f»4».»' 4«444
».,4»»i»4«.U-**.,>l'k*4v» £ 3.4k 4«A4»4 4'a.«>'4.I*»'44Xk'l ,
'^••.*4'»»4<»4*4k'»».')4aai«*a»«>a'»ak.aa4C4«*.-*» 4.i4»«
*4'.«a,»f4»»»'a»4i>*a.«k'aa'

*'»k'*w'»v«a. Hae w**3i» 44,'a *»4»4.«i4i'»k*«-.4». m4r»*;'.*4,*a4a*»
'4»'(k«»x<

k,«».4*4*ax4* * 9 .f * Z. »B 4>-**.t.'»*4k 4SJ

'■ ,L 'N ' ' •.•M'«W»<4 »«.tlk>4A4a«i.'k»4«'4«:<.-4 »•*'*
W'».H4a*,44'«W.4x>»a'«» «« .4v,».I.»a<«

v '. ... .:\«v»»4'4*n<*«.4>
»».'.-»»n»a»^4«'i'4a4.'»».'«»4'iHl.»k'»a«»'4»»k*«.«* 4»4.-»«i

' >. . . ' ' :'N'iV'»*4»ii».
%m*W4k'»«»*>w.aa#.»k4a:i»w.>t*»'.'*-««"».»»4»-»4«.«*.a*»«-
a.»aaa«.4.»a»4x'«

. . '.4%»a^ifc»ak»*#,4k'*»,»4' a»»4» a»s<»»«^aK«.44,» w,4x'» ana'* a
a.«»s «>

»W444 «40!4* **.<*» w ».«*.n'4»4.-k »«'Ma. 44-a **a <

ij»«4?*ww,ix».wa*»«4w."i**a *»44«*t a.»*'« a.-x n»4*«*>4a* •

s,. ■ l*WWil»llW.4M.k>'»»W»»,44»«.»>r>a.4»-
a«.4>'a»4»-.4a4.»:»4^4a4.>4 4«.'>ai ?V,\,>l',*|
1MMf».11Sll«4«'*»W.»»'»4'««.«k*««*'«*44»»»k,4«.*4'4a«.>»»4.!
H4,w*5n»*4i'4»4.'a*i

». •,IA'»4t«4»«.»4»4>'l 44 •»*a».«'«4.4.'»», < 44»>l»»»<'»«».>n
^Otaa^wwav'i

' •••' 1 w«»a» aiawwaa* a.a 4< »,-»»4x>4»'k'«»4.'t4ei>.«»4K4«4^**'

..•-V»WMi'»a»i*4a4..*4*Hka.^»»»«:.

V’ :-A
£>;«K#S*S*Miw3*»«»«»W44*»Wi*ww«t4**ax*4k»*5»»*»4k.a«.*a*»»x’»«.»a

- . /- •’ VJi4.l>«aa*.4a«:akx**a;4x •a4* **4’i»i*‘a.»v*.‘t
**‘a«»ik’*w.»aw’

?|..:‘»*l4«.’*45M*.’*Wi4»’»’*s‘a*ai»a**i.«ia*wx’a.»w.4k a «»<*»«.
**'»wax»a

•; . .V,.! »*«»Sw%*,’ia*’*«4a*»i4a»*.4v««.’«^«a«’***.4»*a-4»»*.«4-*«
>. ,*««4«.‘k»i

>, ‘r.,l.144.U‘4*.4«,41.>.k,«*.*4aK*V44t‘4«4x’kX*.*ta41*hi4
4t’ft«4k4^.

. [f . /.I’.. -■V aawaiHa’WW.HX 4t»4»«.44-4«.>4»’

C • .: ”” »4>4*’«4» Haa->^» *a.4’a« 4x aa.Haka*i

»4i»’«*.‘a»j4fc»w«’«»»aitaw«x-*a4».4a>s » 4x’*’»4a*«<*a- ■ •
aatkaatxaa 4i-»a.«« a*.a-4x a «i’aa>w «4 aa ax aa aa aa ai

■/ ‘• V waxaaajfrw*. a*’** at,‘i»«.»v**4x’»k«’,4*»*v4VR
VAaBa^riaai k»» ak»«.axa< . ■ / ■ t’>/, , i’?»».‘4*»atA*«.a»«4w
ax’*« a4*4« 4 4’»ai »k »«.*K *».ik«a,’» »».h’*4,«>h«.H‘44.ii

‘ K” ‘ y y,~ , !% <* W4* wa#44» ««m.H'H*>‘»4.«444 1»**.‘4«
«a*:4»4kSS <4»«*»4-

< W.4 4 •*.**» 44 • 4X-* a »a .4.»ai4»*.*.'a4.*»«»l'4»,H'i

4k44.«4’«4.<4 •.•*».H4*4‘4*«t t« a» ax»a-4*<4.* a* « a a a. aka
l’»»>k*»*4:»4 lk44< »»«4« *l'44.l*«4y*»<>‘4«*«‘4#.H44.»l«l’l
•kfti.u ki 4» »41>4.»*»4t<4»4.'»an4»x>a».«**»a.‘a« ‘kaa.a* 4^
44U‘44 «.-4».4k*404l.na«H4*.-i«.H’l«*” S >.’«« >v.. «* * 4 ,
444.-44’,‘k»..’».k»».»«,’»»l>’»4,lr > >‘44 XX a a *».4
4<,'t»1»41.<4 44tt<.'444.4aa>‘4 44444.W >’•?/ «V»BX4’4»
.IV»a‘4 4».‘t4*<4E»l>44 .4 a a* JI4 ■ a4«*’»a»/*4;«I#»*S’ y »aW
4x •« ai’*a4aa.a«*a»aa W*4X4.* ax-aa.‘a**«a«4aia»fa4Mifc* .,/

44’a.44a».ra.‘4a««-4a.4»a«.‘4«4i«4,«»««ii»4’»aji4a4. •,

44«4t a« «. «*4t».‘4*4t *av<4*4k’».'4a4.«a»»a»)a«;4,///

• » ti’tt »4«:e»i*»»4>’» •vX*:»W4«*-«ka.»4;*

.’•••»a4vk«n>(HkMt‘4a

a«.*4aai aa 44’a«.xj»»«k>fc’*av>*«.’*«wx’»«.*k*w*«’»4«*v/*-‘

n«4t«44.i»» 4* aa44a«.4*>a»ax « •.•t4<»'»« *4»4«> ./» y
a4’.k*«k’»4ak‘44,-.ka40*«4«a«»4««>‘4t*4»lis«‘4»^/, _

,4ka«.‘4«4ca««i.’*44»att<4»4*‘»<

Btr.xx* 4,-a « a»’« a aa^t.‘aata.-aaxx **.4»*atk4a««.*y .

.M44a4**.«4»‘4a.4<'(a«4a>‘aiai4«4«««*«»///’ .

441ka«.k4«4>‘a • W4t taa4»4t ‘

44 i>>i,’>anaant a«.ik»«.v .
4.«.4fc34».4a«*x>ww*4:aw.«xw«k‘a«‘a*4«4««aw»ja«*f. * – aw«*
*i*aa«W4 s.«X4 •,ti»a«.«.*aa*»4a*4aw*f»> / / • ..

ax-aa.ax aa >aa 4.

aTiaa 4*aw*awa”ai a*aa*a •a*aa*w5,<*

%‘3ts

■i‘4««.4> **i-*a«x»a • *iaa t>a»a ««.• »>i M*»».wt»

‘’/< 'Z'-'y • .

/ •• ‘s**’/ ’ ‘it*

iir&XKMt’/A W’.

: -.”.If • ‘’ ”” /Ajlit* ‘

D. DIEGO VELAZQUEZ

VELDE — VELLUM

723

Doria Palace, Rome, where it now is. Velaz¬ quez painted several other pictures of this not¬ able prelate. In Rome he was elected a mem¬ ber of the famous Academy of Saint Luke. From Rome he went to Naples and from there back to Spain, carrying with him a most notable collection of pictures and fine statuary, the lat¬ ter alone numbering over 300 pieces. About 1645 Velazquez was appointed <(Aposentador Mayor,® a sort of general court inspector, then looked upon as a high office, the reception of which betokened for

the recipient the special favor of the Spanish sovereign since the posi¬ tion was one of great trust and considerable re¬ sponsibility. In 1659 the king bestowed upon him the Cross of Santiago (Saint James), a very high honor and notable distinction, making him a (XIV of France. The pavilion for the occasion was erected on the low-lying, swampy island of Pheasants, in the river Bidassoa. The extra exertion, for a man of his age, or the emanations from the swampy island, or both, brought on a fever from which he died. Ve¬ lazquez had many pupils and imitators, and some of them approached his style of painting very closely. Among the best known of the former were Jose Leonardo, Carreno de Mi¬ randa, Juan Bautista de Maza (his son-in-law), and Pareja (his slave, whom he liberated). Himself the greatest Spanish painter, and one of the world's greatest artistic geniuses, he in¬ spired his pupils to good work. The fact that some of them, like Leonardo and Maza, ap¬ proached his own almost perfect style, is a high tribute to his talent as a teacher.

As Velazquez did not sign the greater num¬ ber of his portraits it is difficult to distinguish his work at times from that of his pupils and imitators, and much of his surviving work must be recognized by the style and mannerisms of the author. The greatest of his pupils, Murillo, whom he kept in his house for three years, cre¬ ated a new style of painting and surpassed his master in the brilliancy of his coloring. Velaz¬ quez's work displays a very close study of na¬ ture, boldness and sureness of touch, effective management of the brush, extremely accurate drawing and good coloring, dramatic force, in short, masterly execution, great originality and power. His industry and his facility for rapid and certain work were immense. Forty por¬ traits of King Philip are credited to him in addition to many others of various members of the royal family and notables of the court, buf¬ foons, dwarfs and other entertainers of the sov¬ ereign and his favorites. But though his royal pension and his position at court made him essentially a portrait painter, just as Murillo's connection with the Church made him a depic- tor of saints and Biblical subjects, yet Velazquez produced notable historical works, the greatest of which is (The Surrender of Breda ((Las Lanzas) ; and magnificent religious canvases, the most notable of which is (Christ on the Cross (Madrid Gallery). In all this work, as in his portraits, the prevailing note is that of naturalness and a consummate mastery of light and shade, combined with surpassing technique.*

For a detailed list of his paintings Consult any work on the Spanish painters.

Bibliography. — Aman Jean, (Velazquez (Paris 1913) ; Armstrong,*

W., (The Art of Velazquez* (Portfolio Artistic Monographs, Nos. 28 and 29, New York 1896) ; (Masters in Art* (Boston 1900, Vol. I) ; Bermudez, (Dic- cionario) (Madrid 1800) ; Beruete, A. de, (Ve¬ lazquez* (1906) ; Calvert and Gallichan, (Velaz- quez) (New York 1908) ; Davies, R., (Velaz- quez> (London 1914) ; Gensel, W., (New York 1906) ; Justi, C., (Velazquez und sein Jahrhundert* (2 vols., Bonn 1888; English trans., London 1889) ; Knackfuss, H., (Velaz- quez) (Bielefeld 1905) ; La Farge, John, (Ve- lazquez* (in (Great Masters,* New York 1903) ; Muther, R., (Velazquez (in Die Kunst, Vol. XXIII, Stuttgart 1905) ; Pacheco, (Arte de la pintura) (Seville 1649) ; Palormino, (Museo pictorico) (Madrid 1724; English trans. 1729) ; Stevenson, R. A. M., (Velazquez* (in (Great Masters in Painting and Sculpture,* London 1902) ; Stokes, H., (Velazquez and His Works) (London 1902).

John Hubert Cornyn.

VELDE, vel'de, Adrian. See Van de Velde.

VELDE, Willem. See Van de Velde. •

VELEZ, va'les, Colombia, a city dating from 1539, the second founded in New Granada, in the department of Santander, 100 miles north* of Bogota. It lies on the eastern slope of a spur of the Cordillera Oriental and is reached by a branch road from Maniquira»on the main highway from Bogota to Socorro. In its early years it was frequently used as a city of refuge owing to its difficulty of access. The produc¬ tion of fruits of different kinds, and the man¬ ufacture of preserves and candies, are the chief industries. Pop. (1918 est.) 9,500.

VELEZ-MALAGA, ve'leth ma'la-ga, Spain, a city in the province of Malaga, 15 miles east of the city of that name, on the Velez, one and one-half miles from the Mediterranean. It is a well-built and prosperous town, with a good harbor, but no railway communication. It has suffered seriously from earthquake and flood. It is overlooked by a Moorish castle on a high rock, formerly called the <(Key of Andalusia.® The district is exceedingly fertile, and produces sugar cane, indigo, batatas or sweet potatoes, palms, olives, oranges and other fruits. Pop. (1918 est.) 24,000.

VELIGER. See Larva ; Mollusca.

VELLORE, vel-lo-r', India, a /town and fort in North Arcot, Madras, 80 miles south¬ west of Madras city. A large pagoda, with some

remarkable sculptures, is the only notable edifice. The fort is of considerable extent, but is completely commanded by the adjoining hills. Within are a great pagoda, now used as an arsenal ; the hospital, the barracks, magazine and quarters for staff-officers. An American mission and college are established there. In a revolt of the native troops here on 10 July 1806, over 100 Europeans were massacred. Pop. about 45,000.

VELLUM. A medium, prepared from the skin of calves, for writing, painting, book-

binding and other purposes. A very prevalent misconception of the public is that parchment (see Parchment) and vellum are one and the same. As a matter of fact the finer kinds of parchment are often termed vellum in com¬ merce. Parchment, however, is produced from the skins of sheep, goats, etc., while true vellum is made solely from the skins of young calves. The difference between vellum and parchment consists not only in the delicate nature of the skin but in its polish, shining whiteness, its fineness generally and in its semi-transparent beauty not discoverable in parchment. While the skin of the calf is required to produce vel¬ lum, it is necessary that the animal be not over six weeks old, otherwise the skin is too stout for vellum and is destined for the tanner. The younger -the calf the finer the vellum ; the most beautiful and sought for is that made from the still-born calf. The process of making vellum is more costly than that for parchment. Vel¬ lum and parchment were the mediums upon which writing was done when papyrus fell into •disuse to be displaced by these more substan¬ tial materials. The art of preparing vellum was perfected by the monks during the 10th and 11th centuries. As a rule the vellum of manuscripts and deeds is white and very fine until the end of the 11th century, but some manuscripts dating from the 11th and 12th centuries present a somewhat dirty appearance and have writing rather yellowish, while other specimens are on beautiful vellum and the writ¬ ing is intensely black. Of course the condition of whiteness of old documents depends some¬ what on the care taken in preserving them. The vellum of which fine manuscripts were made in the 14th century was called ((per- gamenum abortivum,® referring undoubtedly .to the superfine vellum produced from the skins of still-born calves. The most luxuriously worked manuscripts were done on purple- stained vellum, which was termed <(oecorella.® Silver lettering was done on this (codex-pur – puro-

argentum) . Numerous manuscript works of ancient date are extant done on purple, called ˆimperial stained.® A ((grape-purple® vellum was prefen ed for writing in silver (arguriography) , crimson vellum for gold text (chrysography) , wcooled® purple for vermilion ink (rubrica). It has been claimed that purple vellum was an invention of the 13th century, but the archbishop of York, Saint Wilfrid, in the 7th century, donated to his church a book of the Evangels in purple vellum written in gold letters and bound in a cover of leaves of gold and precious stones, which he himself had written and ornamented. In the case of many vellum manuscripts only part of the page is stained, as the color was very costly to work. In miniature painting the surface of vellum is rubbed over with pumice stone to do away with inequalities in the grain ; this avoids any de¬ fects in the absorption of the pigment in using this medium. In bookbinding vellum has been utilized with very artistic effects; plain white vellum binding has been termed Dutch style, while vellum with gilt decoration has been called Italian style.

Clement W. Coumbe.

VELOCIMETER (Lat. velox (veloc -), swift, and Gr. fihpov, measure), in general, a name applied to a class of various devices for

measuring velocity, or speed, including the speed-gauge and speed-recorder for machinery. Specifically, it is used of an electric apparatus for measuring the initial speed of projectiles. Invented by Sir Charles Wheatstone (q.v.), it was improved by Col. J. G. Benton, United States army. Several more complex forms have been invented, and a simplified one by Captain Le Boulenge, a Belgian, found exten¬ sive use. See Ballistics.

VELOCIPEDE, a light carriage consisting of a simple frame-work, supported on two or three wheels, and which is driven by the feet acting on cranks attached to the axle of one or two wheels. The name was first given to the contrivance of the Frenchmen Blanchard and Mazurier, introduced in 1779. It consisted of two wheels placed tandem and connected by a horizontal bar upon which the rider sat astride, propelling the machine by a motion of the legs as in walking, but pushing forcibly backward upon the ground. Considerable speed was at¬ tained for short distances. See Bicycle.

•e.i-asn.

VELOCITY. See Mechanics.

rate at which electricity is propagated through a conductor. The velocity of electricity through a conducting wire is in all cases very great when compared with the velocities of moving bodies, such as the velocity of a railway train or of a projectile; but the velocity of electricity, any more than the velocity of a planet, of a railway train, or of a bullet, is not a certain number of miles per second fixed for all cases; it varies for a number of causes, and to such an extent that while Wheatstone found the velocity of static electricity through copper wire to be 288,000 miles per second, in the Atlantic cable of 1858 it was found to be 3,000 miles per second. Faraday showed that a submarine cable acts precisely as a leyden-jar, that the water serves as the outside coating, and that just as a leyden-jar takes time to become charged and to discharge, so a cable through which a sharp signal is sent from one end delivers the signal at the other end more or less prolonged ; that is, the deflection of 'the receiving needle is gradual, reaching a maximum and then at the same rate coming back to rest. Sir William Thomson showed that the more delicate the receiving instrument, the more instantaneous is the first appearance of the current at the receiv¬ ing end of the cable. He gives three reasons for the retardation of the electric current: (1) Charge and electrical accumulation in a con¬ ductor subjected in any way to the process of electrification. (2) Electromagnetic induction, or electromotive force, excited in a conductor by variations of electric currents either in adjacent conductors or in different parts of its own length. (3) Resistance to conduction through a solid. The first successful attempt to find the velocity of electricity was made by Wheatstone with the revolving mirror (his invention), which has been so successfully employed by Foucault to discover the velocity of light.

The velocity of a voltaic current when the earth forms part of the circuit has been de¬ termined by the United States Coast Survey to average 16,000 miles per second. The velocity of an electric current through any conductor depends upon the resistance of the conductor,

so that in economic practice the question of velocity becomes a problem of resistances.

In the use of electric meters for the meas¬ urement of inductances and capacities it is essential that the current employed shall have a

uniform speed. This is secured by the use of a device known as a (

VELOCITY OF LIGHT. See Light, Velocity of.

VELOXITE, a smokeless explosive powder invented by William Hope in 1903. It contains no nitro compound, sulphur, phosphorus, chlor¬ ate, in fact no dangerous ingredients. The flashing point of black powder is at 640° Fahrenheit, that of cordite and all nitro powders is only from 360 to 370°, while that of veloxite is about 12,000°. Veloxite stands the hammering of a sledge hammer on an anvil. The ingredients are stable and, therefore, the powder is stable. The setting up of chemical action is impossible in any length of time and in any variations of climatic conditions. Velox- itc can be made in the morning and fired in the afternoon, not requiring, as other powders do, several weeks to manufacture. It can be made cheaply, its ingredients can be purchased in unlimited quantities by the ton and it is avail¬ able for small arms as well as artillery.

VELVET, a textile made of silk and cov¬ ered on one side with a close, short, fine, soft shag, the other side being a very strong close tissue. The nap or shag, called also the vel¬ veting of this stuff, is formed of loops of the threads of the warp, which the weaver works on a long wire, which has attached to it a knife. The withdrawal of the wire cuts the loops of the warp, thus forming the nap. The loom on which velvet is woven has two warp beams instead of one, tas with other fabrics. This is necessary because velvet is a textile of two distinct parts, the pile and the ground cloth. A much larger length of thread is used for the pile in forming the loops afterward cut. The beam for the ground cloth is slung at the back of the loom, and as this is woven the pile is worked into it. Double-faced velvet is woven with the loops of the pile thread on both sides of the ground cloth. Uncut velvet, or <(terry,® is woven on wires which have no knife at¬ tached. Figured velvet is obtained by alternat¬ ing cut velvet and terry, using a loom with Jacquard patterns. Velvet brocades are made with the gold and silver threads as extra weft, the figure being wrought in by hand as with embroidery. Florence and Genoa were long noted for the manufacture of velvet, but Lyons, in France, is its principal seat; Krefeld and Elberfeld are the chief seats of velvet-making in Germany. Velveteen and plush are fabrics of cotton or wool woven in much the same manner as true velvet, except that the loops which form the pile are wrought as weft in¬ stead of warp. Corduroy and Hhickset® are of this class. Upholstery velveteens in patterns are worked by a peculiar loosening or bulging

of the weave of the ground cloth, produced by Jacquard patterns.

VELVET GRASS. See Grasses in the United States.

VELVET PLANT. See Mullein.

VELVET SCOTER, a duck. See Scoter.

VENABLE, ven'a-bl, Francis Preston,

chemist and educator: b. in Prince Edward County, Va., 17 Nov. 1856: resides in Chapel Hill, N. C. In 1879 he was graduated from the University of Virginia and later at three different times studied in Germany. From 1880 to 1900 he was professor of chemistry in the University of North Carolina and in 1900 was elected president, which position he still holds. He is a member of several chemical as¬ sociations in this country and in Germany. In 1905 he was elected president of the American Chemical Association. He has published the following: (Manual of Qualitative Analysis) (1883) ; (Short History of Chemistry) (1894) ; development of the Periodic Law) (1896) ; with Howe, (Morganic Chemistry According to the Periodic Law) (1898) ; (Study of the Atom) (1904).

VENABLE, William Henry, American author and educator : b. Warren County, Ohio, 29 April 1836. He began to teach at 17 and was professor of natural sciences in the Chick- ering Institute, Cincinnati, 1862-68, and prin¬ cipal and proprietor of the same 1882-86. He was professor of English literature in the Hughes High School, 1889-95, and has held a similar post in the Walnut Hill High School, Cincinnati, since the last-named year. Among his numerous works are (A History of the United States) (1872) ; (Jime on the Miami and Other Poems) (1872) ; (The Teacher's Dream > (1881) ; beginnings of Literary Culture in the Ohio Valley > (1891) ; bet Him First be a Man} (1894) ; dream of Empire, or the House of BlennerhassetC (1901).

VENATION (Lat. vena, vein), in botany, the arrangement of the bundles of fibro-vascular tissue (commonly called (

VENDACE, also VENDIS, a white fish

(Coregonus vandesius) , a variety of the Core- gonus (q.v.), of restricted distribution, being found in only the lakes and rivers of Sweden, the Castle Loch, Lochmaben, Dumfriesshire, Scotland, and two or three English lakes. It attains an average length of from six to eight inches. It is considered a delicacy and is taken with the sweep-net.

VENDEE, von-da, France, a western mari¬ time department formed from ancient Poitou, and deriving its name from the river Vendee. It is bounded on the north by the departments of the Loire-Inferieure and Maine-et-Loire ; on the east by the department of Deux-Sevres; on the south by that of Charente-Inferieure ; and on the southwest and west by the Bay of Bis¬ cay; area, 2,692 square miles. The surface is much diversified and is divided into three dis-

tinct parts; the Bocage (Thicket), on the north and northeast, a hilly and wooded district form¬ ing about one-half of the department; the Plaine, a tongue of land included between the Bocage and the southern limit of the depart¬ ment, a bare arid tract sloping down toward the sea; and the Marais, including all the south and west coasts, where salt marshes prevail. In the north the department is watered by tributaries of the Loire, especially the Sevre-Nantaise, and in the south by the Lay (with the Yon) and tributaries of the Sevre-Niortaise. Besides grain, which more than suffices for the home consumption, the principal crops are flax and hemp ; a considerable quantity of an indifferent white wine is also produced. For administrative purposes Vendee is divided into three arron-dissements — La Roche-sur-Yon, Fontenay-le- Comte and Sables d'Olonne, which are subdi¬ vided into 30 cantons and 299 communes ; capi¬ tal, Le Roche-sur-Yon. The inhabitants, par¬ ticularly those of the Bocage, are remarkable for the simplicity of their manners and their attachment to old usages, to the nobility of the district and to the clergy. Inspirited by such leaders as La Roche-jacquelein, Cathelineau, Charette and Sofflet, and aided by the hilly and wooded nature of the ground, they carried on from 1793 to 1796 a war in the royalist cause, which endangered the existence of the republic. The first severe check they met with was at Savenay, 24 Dec. 1793, where their forces were broken up and the survivors and their families were dragged to Nantes and drowned in masses by Carrier. In the following year a fresh out¬ break took place and the Vendeans were joined by the Chouans, but after some fighting they were pacified 'by the government granting an amnesty, freedom from military service, the free exercise of their religion and an indemni¬ fication for their losses. The landing of some thousands of emigres at Quiberon encouraged them to resume their arms, but the rising was completely quelled by the activity of General Hoche, who treated the Vendeans, however, with great mildness. In the winter of 1 799—1800, and again in 1814 and 1815, some risings took place in favor

of the Bourbons, but they were quickly suppressed by prudent and vigor¬ ous measures. The population has been nearly stationary for the past 25 years, being before the war about 440,000. See Cathelineau, Chouans and La Rochejacquelein.

vend£miaire, von-da-me-ar, the first

month in the French Revolution calendar, cor¬ responding usually with 22 September to 21 October. Memorable in the history of the Rev¬ olution is the 13th Vendemiaire of the year IV (5 Oct. 1795), when the Paris Sections, worked upon by royalist reactionaries, rose in insurrec¬ tion against the National Convention, but were crushed by Napoleon Bonaparte, then a young artillery officer.

VENDETTA, an Italian name for a blood feud ; the practice of the nearest of kin execut¬ ing vengeance on the murderer of a relative. In Corsica the vendetta is regarded as a duty incumbent on the relatives of the murdered man, and, failing to reach the real murderer, they take vengeance on his relatives. The prac¬ tice exists, although to a more limited extent, in Sicily, Sardinia and Calabria, as well as among the Druses, Circassians, Arabs, etc. It

is apparently identical with the <(feud):> which is still aroused at times in sections of the south¬ ern United States. In New Orleans, in 1890, the vendetta showed itself in strange juxtapo¬ sition to the law in the murder of the chief of police who had been instrumental in bringing to light some of the organized murders of the Mafia (q.v.).

vend6me, von-dom', Louis Joseph, Due

de, French general: b. Paris, 4 July 1654; d. Vinaroz, Catalonia, Spain, 15 June 1712. He received, in 1702, the command of the French army in the War of the Spanish Succession. After having distinguished himself in Italy, Tyrol and Belgium, the Duke of Burgundy was placed over him, and the disagreement of the two commanders caused the defeat of the French at Oudenarde (11 July 1708). Through the influence of Madame de Maintenon Ven- dome was recalled; but when the cause of Philip V in Spain began to decline the Spaniards re¬ quested Louis XIV to send them Vendome. Ou 9 Dec. 1710, he defeated the Austrian general Starhemberg at Villa-Viciosa, and having re¬ established Philip's throne soon after died and was buried in the Escurial. Voltaire gives con¬ siderable space to Vendome's accomplishments in (Le Siecle de Louis XIV. >

VENEERS AND VENEERING. Veneer

is a thin sheet of ornamental wood, or occasion¬ ally other material used as a surface to give a handsome exterior finish to cabinet articles or other work, which are made with a basis of cheaper and it may be of stronger materials. Veneering is an ancient art. The British Mu¬ seum contains some examples of Egyptian work which are many thousands of years old. From that time to the present this art has influenced the construction and design of household furni¬ ture. Pliny states that it came into general use in Rome in his day. In that wealthy capital tables veneered with rare woods were the choicest and costliest pieces of work. At a later day in Italy cabinets were veneered with ebony, ivory and tortoise-shell and inlaid with pearl and precious stones. In the Dutch and French work of the centuries that followed veneering took a prominent place in furniture decoration. In the England of the 18th century the masterpieces of Hepplewhite and Sheraton show the degree of perfection to which this art had then attained.

To the average man to-day the term ((veneer® means to cover up cheap and shoddy work, or to make a whitewood cabinet or other piece of furniture look like a mahogany one. From this false conception has arisen the idea that all veneering is bad work. It must be admitted that bad work is done, and it is in consequence all the more difficult to convince the public that veneered work, when properly done, and shows that it is veneer, is the best and most effective work for the following reasons: (1) It is the only way to use the rare woods such as ((curls® in satinwood and mahogany, <(burrs® in amboyna or walnut, and cross-grained but pretty work which would only twist if used in the solid; (2) the layer of veneer tends to strengthen and preserye the wood on which it is laid; (3) veneering gives the only opportunity for flat decoration in furniture, by using the grain of the wood for designs in panels and on wide surfaces; (4) the process needs more care

and thought in the selection of wood, its prepara¬ tion, application and finish than is required in ordinary solid work.

Cutting. — Veneers are cut in two grades or thicknesses, known as <(saw cut® and ((knife cut.® The first named are the thickest, and vary in thickness from 1/32 to 1/16 of an inch. They are cut from the log with a large circular saw, and usually yield about 12 sheets to the inch. ((Knife cut® veneers are much thinner, modern

machines making it possible to get from 50 to 100 sheets to the inch, the very thin ones being used as picture mounts, etc. These are cut with rotary and flat knives. In saw-cutting the log is well steamed and placed between two stocks, like a leg in a lathe, and under a knife for its whole length. The log is now forced round and against the knife which drops the required thickness at each revolution. By cut¬ ting spirally the grain is accentuated and en¬ larged. In knife-cutting a flat knife is used somewhat like a plane. The log is fixed on a rising table and the blade works backwards and forwards, taking off a sheet horizontally, the knife being parallel with the grain. Formerly veneers were cut by hand and were usually one-eighth inch in thickness and were planed.

VENER, va'ner, Sweden. See Wener.

VENEREAL DISEASES. See Gonor- rhcea; Syphilis.

VENEZUELA (Ital., Little Venice, from the lake dwellings on Maracaibo ; officially Los Estados Unidos de Venezuela, the United States of Venezuela), a republic lying in the northern part of South America and bounded on the north by the Atlantic Ocean and the Caribbean Sea, on the east by British Guiana, on the south by Brazil and Colombia and on the west by Colombia. It extends from lat. 0° 45′ N. to 12° 26′ N. and from long. 59° 35′ W. to 73° 20′ W., and has an area of approxi¬ mately 393,976 square miles, divided among 20 states, a federal district and two territories.

Topography. — Nature has established in this land of varied physical characteristics five main divisions: (1) The long coast-line with its picturesque harbors; (2) the highlands of all that region south and east of the Orinoco, which may be called Venezuelan Guiana, or Guiana Highlands; (3) the great central area of plains or Llanos, those wide expanses, low-lying, nearly leyel, grassy but often treeless — with, at most, groups of palms and small trees near river banks; (4) the northeastern branch of the Andes Mountains; (5) the comparatively small regions of the Lake Maracaibo Basin, etc. The coast-line and the Orinoco alone would be sufficient to give Venezuela importance in the world. Concerning the vast, more or less un¬ explored tract lying on the right bank of the Orinoco and near the headwaters of that river, Mr. Dalton has written that ((the area is pri¬ marily one huge elevated plateau about 1,000 feet or more above the sea, and from this rise a few principal mountain ranges, with some peaks over 8,000 feet high. The highest ground is found on the Brazilian frontier beginning at Mount Roraima 18,500 feet), where the three boundaries of Venezuela, British Guiana and*

Brazil meet, and extends thence westward and southward to the headwaters of the Orinoco. The whole area (about 294,600 square miles) is

well watered,® and nearly all is covered with forests ((containing rubber, tonka-beans, brazil- nuts, copaiba, and all the varied natural produce of the South American tropics.® The Llanos of the Orinoco, have a total area of 108,300 square miles. The elevation of the Llanos ranges up to 650 feet, and more than this in the mesas of the central region, but large tracts are less than 300 feet above sea-level. The whole area is traversed by numerous streams and rivers. The fourth great tract, the northeast spur of the Andes, is all divided naturally into three parts — the Caribbean range, along the shores of the sea of the same name, the Segovia Highlands, linking the former to the higher mountains of western Venezuela, and the Cor¬ dillera of Merida, or the Venezuelan Andes. The total area occupied by those mountain and hill-tracts' is about 41,800 square miles. The fifth division includes, besides the alluvial area of the lake of Maracaibo, the Coro and Para- guana lowlands and the numerous islands in the Caribbean which belong to Venezuela, and the area is estimated as about 27,800 square miles.

From Roraima the Orinoco-Cuyuni water¬ shed extends northward within Venezuela to the Sierra Piacoa, and' thence southeast along the Sierra Imataca to the British limits again. The Sierra Maigualida forms the watershed be¬ tween the Caura and the Ventuari. This south¬ ern and southeastern region is well watered by the upper Orinoco and Ventuari, with the other great tributaries, the Cuchivero, Caura, Aro, Caroni and their affluents. And yet, large as these rivers are, they are so broken by rapids that travel along them is possible only in small portable boats or rafts.

It is necessary to differentiate carefully the river system of the Llanos region, where, north of the Meta, in addition to many smaller streams which broaden out into marshy lakes or cienagas, we find the navigable rivers Arauca (the main waterway to eastern Colombia) and Apure, flowing from the Andes to the Orinoco in an easterly direction. The Apure receives many tributaries on its lett bank from the Venezuelan Andes, most imortant of which are the Portuguesa and the Guarico — the latter flowing through the state to which it gives its name, and receiving the waters of at least one stream that has its source less than 30 miles from the coast in longitude 66°. Most import¬ ant among the Orinoco tributaries from the north beyond the Apure is the Manapire. The waters of the eastern Llanos are carried north¬ ward by the Unare and Aragua

into the Carib¬ bean Sea. About 11,500 square miles are com¬ prised in the famous Delta of the Orinoco, a region of inundated forest, savannah and man¬ grove swamp, in which the water-courses called canos are not regarded as portions of the Ori¬ noco itself.

Climate and Health. — The marked climatic variations are occasioned chiefly by differences in elevation, latitude and vegetation. The Guiana Highland region is, however, exceptional on account of its comparatively uniform ele¬ vation, which tends to equalization of temper¬ atures, etc. Naturally in those parts of this region where mountain ridges rise above the general level of the plateau the temperature is lower than the average, but these constitute a small part of the whole. There is an important

difference in the meteorological conditions in the various river-valleys of the Orinoco Basin, where the "white-water® — i.e., the swiftly flow¬ ing but muddy streams, with rocky beds — are always accompanied by a clear sky overhead, and mosquitoes and crocodiles abound; on the "black-water® — the deep and slow rivers — the sky is continually clouded, but the air is free from mosquitoes. The Orinoco represents the former type, the Rio Negro the latter. The rainy season in the Guiana Highland region be¬ gins in April and lasts till November; the re¬ maining four months are fairly dry. The re¬ gion of northern Venezuela is divided climati¬ cally into three regions, the hot, temperate and cold zones. The hot zone or Ticrra caliente ranges from sea-level to an elevation of about 1,900 feet, where the mean annual temperature varies from 74° F. to 91° F. The inter¬ mediate or temperate zone, the Ticrra templada, lies between 1,900 and about 7,000 feet above sea-level, and within these limits the mean an¬ nual temperature may fall as low as 59° or 60° F. The Ticrra fria, or cold zone, including the highest peak in Venezuela, 16,423 feet, has mean annual temperatures ranging from 60° to zero. The Ticrra caliente includes the greater part of Venezuelan Guiana, the Llanos, the coastal plains, the region of the lake of Maracaibo, the lower slopes and part of the central valleys of the mountains, and the Carib¬ bean islands belonging to Venezuela. On the Llanos the hottest regions are the southern and western ; the rainfall is heavy, and the wet sea¬ son lasts from April to November. Maracaibo has the highest temperature of the cities of the coastal region; there the area around the lake is comparatively free from rain until August and September. The Ticrra templada includes the

greater part of the inhabited region of the hills. In the eastern part of the Caribbean Hills the rains last during the same months as in the Llanos, but in the Andes, particularly to the south, the seasons vary, and it is generally considered that there are two rainy seasons (light rains from April to June and heavy rains from August to November) ; but this applies rather to the eastern side of the watershed, the western side having an increasing similarity in seasons to the Llanos as one descends toward those plains. Only the higher portions of the Caribbean Hills are included in the Ticrra fria, but between Tocuyo and the Colombian frontier the greater part of the area is situated _ above 7,000 feet. There strong winds prevail and the vegetation is sparse. The snow line being normally about 14,700 feet above sea-level, only the peaks of. the hie-hest mountains are snow¬ capped throughout the year.

The death rate for the whole republic is somewhat more than 25 per 1,000, and statistical tables show the largest tolls to be exacted by malaria (paludisino) , typhoid fever, tuberculo¬ sis and gastric or nervous diseases. The Delta region is, of course, unhealthful. Statistics show that the Llanos division is by far the healthiest, with the Andes next, and then the Caribbean Hills ; and it is true that, although in some of the coast towns situated near swampy ground the death rate is high, the northern coast as a whole presents conditions favorable to health.

Geological History and Mineral Re¬ sources. — Mr. Dalton says that the geological changes which have played their part in the building up of the physical features of the country have left Venezuela in possession of splendid assets in respect to the minerals. The Venezuelan Guiana Highlands are not only formed of the oldest rocks in this republic but represent one of the most ancient land-surfaces in the world. "Xhe great elevated platform from which rise the peaks and mountain chains of Venezuelan Guiana appears everywhere to be composed of similar rocks, gneisses, horn¬ blende schists and granites, all containing evi¬ dence of great antiquity in geological time. This complex is considered to be one of the oldest members of the Archaean system. Into its crevices and joints, dykes of quartz-porphyries and felsite were forced. Later movements of the earth's crust produced a shallow sea or series of lakes over this same region, and in these waters a series of beds of red and white sandstones, coarse conglomerate and red shale were laid down to a thickness of 2,000 feet. Then the area was again elevated into dry land and again veins or dykes of basalt, dolerite and similar rocks in a molten condition forced them¬ selves into the fractures of gneisses and sand¬ stone alike. The vertical-sided, flat-topped mountains of

Guiana appear to be the result of protection that caps of igneous rock afforded to the softer sandstones immediately below. Such portions of the softer material as were thus protected from the effects of atmospheric weathering remain still as upstanding masses of horizontally stratified material, while surround¬ ing unprotected masses have been denuded from the ancient foundation of gneiss. The geologi-' cal history of the northern part oi the coun¬ try has been eventful in comparatively recent times ; for, although no volcanoes, active or recently extinct, are knowm in Venezuela, the country has repeatedly sustained earthquake shocks. The first important tremor noticed after the discovery of the shores of the Caribbean was that of 1530, wThich destroyed the fortress of Cumana. Earthquake and hurricane visited New Cadiz in 1543 and so disastrous were the results that from that day to the present Cubagua has been a desert island. In the 19th century there were three earthquakes of great severity. In March 1812 a shock destroyed great parts of Caracas, La Guaira, Barquisimeto, Merida and other towns, and in the capital alone 10,000 people were killed. The other two occurred on 13 Aug. 1868 and in 1894.

With justice this part of the world has long held the reputation of being rich in minerals. Placer workings are the chief source of gold in the Guasipati goldfields in Venezuelan Guiana, but the reefs from which it is derived have been discovered and worked at odd times ; and in British Guiana, where the conditions are similar, the gold is generally found along the later intru¬ sive dykes, the smallest dykes being the richest, while most gold is found where a basalt in¬ trusion crosses one of the older ones. Coal of fairly good quality occurs in more than one of the Cretaceous and Tertiary groups of strata, near Barcelona, Tocuvo, Coro and Maracaibo, as well as in the Andes. Iron is found in the gneiss south of the Orinoco Delta. Copper ores are fairly common in the northern cordillera,

*Lob Mono**

.Chichlb&coa

Pta.Kspada

- – — ~ (l oro

ˆ-ˆCapatarida °Dabajurbl S. IjUJ

'Casisua R,;"A|L C S

ˆ Calm re

aˆ‘v. gChuruguara0

B. Culabozo

“Capadareˆs

‘Tucuyo

Centinei-a — . Codera \Kio Chico

£>5, Juan de Cesar ‘ruh/lino \ , f yAˆjvnumM

Valle .de Upat. j

Sabainriargal

*\U a rq » I •» 1 ,u ** 1 1»*

pcOcCARABO\BOˆ

A} Vale mbt ˆ7

- *M o i}ta lbanˆ — <: iTina(jiiilhOq/_ I*

falamar

fuanta

LasNlTnas

Valencia

gUuapo

f ˆUpKire

““VWwk/ ˆ

GuanapeTˆ

j (Jdaripe guaramas

Lagunillsivj

Caicara

‘Layuneta s.4; ‘

‘MARACAIBI&

-> MuporoS

ˆ v\» OH,r«|(C

rK 8. Pedro i> ‘ˆTSuTRisu

Pt Manzanillo

S„>

r (j ,ii .m Ur’

jP’ttizs. tact) Sombrero

1 /sIlosoVˆ

8ta. Barbara

0

Aguasai

GULF OF DARIEN

Pta. Arbolete:

\ er\iv\ron

*ioS CbirigU*Pag*

rfncelejoo\J

Magangue1

•Chim a 0\|Vr

China fv

Guam I S. Carlos jrˆJ

G,uardaZ Cplahozo Tinajysrfc foritucoo.*

Tabasta ° ˆ) ˆ y _ U rucya

Barrancasˆ

‘Calvario

rmtenai

*vs. Y \ PAN DE AZUCAR v/fciWi**

xm-Z’F,

M’amo.

Guadaj

\ ‘t’lg paro ft

G uanaii foˆ— ■

Uˆpv . R

y fiuunxigˆ

PKARL Is.

AyapeJ

*|) Mural*aJ Mjfeagual A*

Simitiy

‘ˆtvguan Y r0 C uayabal

ˆT’to. 8. Felhj-

Ciudiul Bolivar,

GUARALINˆ

idllla^^Oo;ina) J\ £ Orii&_ >y/

£ t&.l&e de.tuSiUlxV olobal

/SjUooioJ ˆT»rlb«;

;AN4MdER7ˆ|M

~,jjronV:, >

GULF OF

InbrutaO 1 U,

- FernandooˆU’

ˆ J’Sla’’ Lucia Achaguns”

p ˆAˆlcogua Star Barbara

Altagracia

.Nutrias,

■SˆRafacl

Caicarg

°S. Pedro

StaA.Rosalia’ K- Suripˆi {F

IS’v icentt

Sueio

trador

Urban a

R . Capa fro’*

8. Antonio

Vribaute

JˆLAvechica

}R: Auechita

■»' ”

I'aiiuui no

*<\}± *3&~ ~1 rvˆ ˆ ˆrirbˆTˆ-ˆllr i n i d a d-'*

/fl j Sltuangce aj.eibao ; = ˆFrontinoTOˆV

A N T

lapatocgˆ

cV

Sta/Rosa del Os p*

jM/U I

ArP': Mari nil la

J. negro, J

tasduallto-

jrˆV u r uiin

V/p'uadal; ijpe d

“Kc / J X1 (

(d f (/mH h

if/MWirdi

msm

Zi paciui.ra

BOGOT

ˆToeaiinu it

CUit'ajniYi

Fto. Utria Coqui B. Corricntesˆ-ˆ Cubit ft b\

,V/SA':' vXblPG,

■sSpgarnosc

's.'igyA0 ?ˆT/

vQuibdo

GUAM! BOS

AturesJ

\RafaelAˆ >v

RKL N\A GOTO S

rni Xv %kˆ

;i'Cl -Mira floret xˆ_ luatequo

1 Y / \ C»M a «a 11

TMaipures

'Arecuna'ˆ

Pueblo' Nuevo-

Tara

IT. R OR aim'

7?. Buudo

/NoviTaˆ'An8ei

Bardpang(ˆCarakitt

GeibA

Amba- letnu <

Barrabaca

touima1

Noanapn

Gueaturiva

*i*lVW»-v*

Matareni

B. Docampudo,

)abuyaro

/ TˆMaaiviaN/ T V

*Guai ■ **

JTX

X. Caucar/MrtˆSt

Barbara / |

an Fernando de Atabn'poˆ/'^^^,

Tulua

'JLla—Vicenci6

'Guamo,

J " w T 5

I M A ,

,°E 3UMA .PAZ

',800 _C

'S. Martin ,-.

*UArrecip'al *" oˆJuan f Viejo*

*Bal taza r ■. •**

Sta.l J Cruz«

. VictOrino

Zaiiuara

JcaUflolY ˆ

■UU – y

H U I Guagua°

18,056J^^^aguara,

e

‘u ˆ

/y ˆEsmeralda’’

ˆ Buenagu a r di a (

■Branco

tvrfa

ˆ Maroa-’’

ˆMicai fTimbiqui\ ‘

Guaviare

S. Miguel

.PIC FERO 0£ LESSEPS

°Silvia

‘URACE< >

*ˆ15**

Tiriquin,

^^OREMiANAOS

Araft° paoavioa

...

< ˆTimansˆJ‘

Moroj

Tuniaco

Buena Vista”

N

oTBruno

IZ*- />

cOEstevao ‘

‘W ->, j

T ura ancr

Sta. Rosaˆ-

_ _ j dmi

[uinlia

Cucuhy

MocwoVj \ Limon

Put Util

■‘CaQˆNa.

reenwich

COLOMBIA

and VENEZUELA

SCALES

Statute Miles 123=1 Ineli. Q go 40 60 80 100 _ _ 200

s*V.

Kilometres, 201 = 1 Inch.

ˆ -!?}%, -2 Pueblo NuTToˆff”,.,

<#rNˆC“8 Bu.nlvi.uS

ˆ. Igga

Rand, McNally A Co.’a New 11 x 14 Map of Colombia aud Venezuela. Copyright by Rand McNally A Co.

*Barranq>inTla . Qedaq *

Cartagena

Baku

rbneodsti X7y

,, 8- /Carmen,

*Morrosq,,,/, *•/- ., , .*

«4teˆcorU /sr / w w.i

Puerto Quemctdu Pta. Mavzo Bu/t ia Ortar

Pta Solano

Pto. Chiramblraˆ Buena

n.t

Goroona I. Pta. Reye Guascama Pt. ˆrP

pta. Manglarcs

(Dutch) ˆ CSTONAIRR 1.

*Curacao s’-**

luTonJSSs, ˆ

raouana _ lob Roques

Avks (Bikuj Is. / jh -ˆOrchilla iˆt”XT6x ‘/>» u\°ltt _ CayoGkanuk*

ˆ (/St. Vincent

y (BMio ❖ V J

Barba

VC»^>

,ksl e s s e r

A [ueda'Q

Blanquii-la I.

**. Los DrkmakoS*

Grenada

Los Testioos

Los Frailsr

Margarita l.juan Griego

^Tobago' ^

*A.v,uncion . *0.\)e aF v -d> n''' .*

*tes-AM^* .or.,' j-. ' ,•**

*— * *•*» oCot"* '■ N Y*

1 TsKlDAD

e^KS?"1,ElWI»;-A. – ^_ , // (Bil.Ti.ll)

(as.

.. (Bbitish)

Gulf of Paria^sye\mnAo

Y'llls Jh, util

■i js^Waps^''^"1'0"

mataki

"^StaXatalina

UpataJ, Palniar.», *»SA: <,‘, _-iT „ ,•

, ,,C-

urCka hiX? t e r1ri(t 6’Ry)% ‘

PajtorqN No uoc i pat i\P X i w

Fl r£fi£oˆStffueva Pi;ovidencia \

El Laiiao ‘’U . -Tumeremds */ a. , _ ‘~T’

5chocd4 r ˆ

sl_ -i 1 ru*Jv I J{ t

7J. iVrtˆdrt/eHoViiˆ. jg JˆˆRarral Pun/ficacipnˆ i

Bahia del Chocorf Vˆ. = = | – q: < *

Pta.

Galera,

equator

329

VENEZUELA

729

and the mines of Aroa in Yaracuy have been worked for years. Asphalt is found in the Pedernales district and on the shores of Lake Maracaibo; and in the state of Monagas the Bermudez ˆlake® of asphalt covers 1,000 acres. Other minerals are galena, sulphur, marble, kaolin, gypsum, calcium phosphate, opal, onyx, jasper, quartz, feldspar, talc, mica, staurolite, asbestos, antimony, silver and tin.

Fauna and Flora. — Several species of the prehensile-tailed capuchin monkey are known in Venezuela, and many other kinds are found in the forests, including the black thumbless spider-monkeys and variegated spider-monkey ; the banded douroucouli, little squirrel-monkeys and marmosets, etc. Bats and vampire bats are abundant. There are large specimens of the jaguar and puma, and (among other large cats) the ocelot, the jaguarondi and margay. In the Andes the

((spectacled bear® is found; the raccoon tribe is represented by the kinka- jou; the weasels by the tayra, the grison, etc. The Brazilian otter is found in the rivers of the Llanos. The red Brazilian and Ecuadorean brockets represent the deer; there are two species of peccary and the manati is not un¬ common. We mention also the peculiar tree porcupine and the capybara, or <(water-hog® ; the aguti, the sloth, the great-maned ant-eater or ant-bear, the lesser ant-eater, the two-toed ant-eater and the armadillo ; finally opossums called rabipelados and the perrito de agua or water-opossum. Many of the Venezuelan birds are beautiful, but few have musical notes. Characteristic are : The manikins, with their gay plumage ; the beautiful orange-red cock-of- the-rocks; the umbrella-birds or fife-birds; the bell-birds which make a noise like the ringing of a bell; jacmars, puff-birds, trogons, the king humming-birds; the great wood night-jars and the oil-birds or guacharos. There are flocks of green parrots and of blue and red or yellow macaws in the forests. No less than 32 species of falcons or eagles are known and on the river-courses many water-birds are found — among these the herons or garzas, storks and ibises, rosy white or scarlet flamingoes, curassows and guans, the hoatzins (resembling pheasants), etc. The snakes are very numer¬ ous, poisonous varieties being the coral-snake,

rattle-snake and (

Within the vast forests of southern Vene¬ zuela the plants range from the alpine shrubs and reindeer moss ot some of the high plateaux and hills to the bamboos and orchids of the river banks. Forest giants and timber trees are : The mora, with dark-red, fine-grained wood; the mahogany and a tree resembling rose¬ wood ; the very large ceiba and mucurutu or cannon-ball tree. Specially important products of the forests are the Brazil nut, the tonka- bean (sarrapia), balata, copaiba-balsam, rubber and cinchona or quinine. In the hot lowlands the chief products are cacao, sugar, plantains, bananas, cassava, maize and cocoanuts, with dyewoods and tanning barks, including dividivi, logwood, mangrove and indigo. In the cooler uplands (lower Tierra templada) coffee, cotton, cocoa, etc., flourish near the fields of wheat and potatoes ; and a single garden may produce both roses and bougainvilleas ; a single orchard both papayas and quinces. The higher part of the Tierra templada shows us both palms and pines — in brief, a greater variety of plant life than can be found in the hot lowlands.

Political Divisions and Cities. — Venezuela is divided into a federal district, 20 states and two territories. These, as far as possible with

their areas, capitals and populations, are given herewith. The total area is about 393,976 square miles and the population is estimated at

2,850,000.

STATES

Anzodtegui .

Apure .

Aragua .

Bolivar .

Carabobo .

Co jedes .

Falc6n .

Guarico . .

Lara .

Merida .

Miranda .

Monagas .

Nueva Esparta.

Portugesa .

Sucre .

Tachira .

Trujillo .

Yaracuy .

Zamora .

Zulia .

Federal District

TERRITORIES

Amazonas .

Delta- Amacuro .

Area

(square

miles)

Population

Capital

Population

16.703

31,000

Barcelona .

13,000

29,529

19,500

San Fernando de Apure .

5,000

2,161

28,000

La Victoria .

14,000

91,868

52,217

Ciudad Bolivar .

11,686

1,794

198,396

Valentia .

49,000

5,712

9,572

104,262

139,110

Sqn Cˆarlos .

Coro .

9,452

25 , 630

220,644

Calabozo .

6,000

7,642

231,189

Barquisimeto .

27,069

4,361

108,105

M6rida .

13,366

3,068

172,874

Ocumare del Tuy .

11,155

490

90,415 51 , 121

Maturin . . .

La Asuncidn .

4 358

5,867

114,559

Guamare .

4,000

4,554

116, 142

Cumana .

12,225

4,284

124,596

San Cristбbal .

16,797

2,856

177,855

Trujillo .

10,481

2,740

102, 180

San Felipe .

17,959

13,587

75 , 493

Barinas .

6,000

25,283

182,614

Maracaibo .

34,740

743

135,730

Caracas .

90,000

108,736

45,097

San Fernando de Atabapo .

3,000

15,517

9,213

Tucupita .

4,500

730

VENEZUELA

Government. — Venezuela is a federal union of states that retain autonomy in their internal government, certain limited powers only being vested in the federal government. The Consti¬ tution now in force is that of 13 June 1914. The legislative authority is vested in a Congress of two houses — the Senate and Chamber of Depu¬ ties — the former consisting of 40 members elected by the legislative assemblies of the states for three years, two for each state, Venezuelans by birth and over 30 years of age; the latter composed of deputies chosen from each state and the federal district by a direct vote and for three years, one deputy for each 35,000 inhabitants and an additional deputy for each additional 15,000. Deputies hold office three years, must be Venezuelans by birth and over 21 years of age. Congress meets on 19 April of each year, the sessions lasting 70 days.

The executive power is vested in a President and a cabinet of ministers, who act in .con¬ junction with the President. The President is elected by the National Congress for seven years; and must be a Venezuelan bv birth and over 30 years of age, and is eligible for the constitutional period immediately following that in which he holds office. During the temporary absence of the President, the office is occupied by the minister of state designated bv him. In case there is no President, the power is exer¬ cised by the president of the Federal and Cas¬ sation Court, who must then immediately con¬ vene the Congress to elect a new President for the remaining term of the office. The cabinet is appointed and renewed by the President and is responsible to him alone. It is composed of seven ministers, in charge of the departments of Interior Relations, Foreign Relations, Finance and Public Credit, War and Marine, Fomento (Promotion), Public Works and Public Instruc¬ tion. The federal judiciary comprises the Supreme Federal and Cassation Court and courts of first instance established in the states, the federal district and the territories. The justices of the Supreme Court, seven in number, are elected by the National Congress for a term of seven years and the court meets annually.

Each of the 20 states has a legislative assem¬ bly whose members are

elected in conformity with the respective state constitutions. The ex¬ ecutive power of each state consists of a presi¬ dent and a secretary-general. The states are divided into districts and the latter into munic¬ ipalities, each district having a municipal coun¬ cil and each municipality a communal board. The federal territories are administered by governors appointed by the President of the re¬ public, the governors in turn appointing their secretaries. The federal district comprises the city of Caracas, the capital of the republic, to¬ gether with the parishes of El Recreo, El Valle, La Vega, Antimano, Macarao, Macuto and El Departmento Vargas.

Education and Religion. — Attendance at schools of primary grades is compulsory and free. The public schools are maintained by the nation, the state or the municipalities, according to circumstances. There are about 1,500 ele¬ mentary schools with an attendance of 50,000 pupils. Of secondary schools there are 102 (58 for boys and 38 for girls, the others admitting both sexes), while Caracas has a normal school for young women and another for young men,

for the practical instruction of each sex. There are 34 national schools for higher instruction and the government subsidizes 21 other schools of this grade. A degree is given at the end of a four years' course. Caracas has its famous university and Merida the University of Los Andes, both having faculties of political and ecclesiastical sciences. The university at Caracas has faculties of medicine and mathe¬ matics, while in the capital there is also a school of engineering. Instruction in the fine arts, in arts and crafts and military and naval matters is gVen in special organizations. More¬ over, there are commercial schools in Caracas, Ciudad Bolivar and Maracaibo, in which both day and night classes are held. The govern¬ ment has established at Puerto Cabello a prac¬ tical school of naval construction which is maintained in connection with the docks and shipyards. In the city of San Cristobal there has been inaugurated the Simon Bolivar School of Political Science. At Caracas a school of mathematics with courses in higher mathe¬ matics and sciences has been opened; and there has been added to the school of commerce at Caracas an institute for the study of modern languages. It is worthy of note that, in spite of the apathy of some of the states and the decreased public revenues during the European War, earnest efforts on the part of the Venezuelan government to extend the school provision and improve the entire system of education have been continued. A recent report of the Minister of Public Instruction dwelt upon the need of a new order of rural education. It was pointed out that small model farms should be attached to such schools, the distinguished official ob¬ serving: <(If

*this plan is followed throughout the republic and the small farm schools pro¬ vided with competent instructors, the benefit in the development of agricultural industry, the basis of new public wealth, will be great.® The National School of Arts and Trades for boys maintained at Caracas offers a select course in the general subjects of primary education, to¬ gether with training for various trades. In the general course mathematics is extended to in¬ clude geometry, and lineal drawing forms a special feature. The trade courses are numer¬ ous, including typewriting, lithographing, in¬ dustrial modeling, bookbinding, metal work, ironwork, carpentry, tapestry, woodwork, forg¬ ing, electrical engineering, telephoning, manage¬ ment of automobiles, etc. The Woman's School * of Arts and Trades, Caracas, is also a national institution, under the control of the Minister of Public Instruction. Applicants for admission to the school as regular students must have com¬ pleted the five years' course of elementary in¬ struction as shown by a certificate of pro¬ ficiency. While Roman Catholicism is the state religion, there is toleration of other forms of worship. The archbishop of Caracas has five suffragan bishops.*

Army and Navy. — Under the provisions of a recent law of the National Congress, the standing arm}' of Venezuela numbers about 9,000 men, including commissioned officers. The active army has infantry, artillery and cavalry.

It contains 20 battalions of infantry, with 400 men to a battalion, and eight battalions of artillery. In addition, there are reserves esti¬ mated to number about 100,000 men. The Vene-

VENEZUELA

The Grand Salon of the Federal Building in Caracas. In the centre we see the great painting of the Signing of the Declaration of Independence of Venezuela and on the ceiling are frescoes of battles of their war for freedom

VENEZUELA

2 Main Street, Caracas

1 A tourist train at the Three Thousand Level

VENEZUELA

ztielan navy consists of two cruisers, the Maris- cal' Sucre and General Salom; three gunboats, Miranda, Jose Felix Ribas and S alias; an army transport, the Zamora, the brigantine Antonio Dias, and another small craft, the San Carlos. The personnel of the navy comprises about 500 officers and men.

Agriculture and Cattle Raising.— Over 200,000 acres are devoted to coffee, on estates in the northern and western zones of the coun¬ try, and the value of the exports of coffee annually is about $14,000,000 (average of the years 1913-16, inclusive). Both cacao and sugar are produced, the number of cacao plan¬ tations being about 5,000 and the annual out¬ put of sugar about 3,000 tons. Cotton is cul¬ tivated, and is almost altogether consumed in the textile mills operating in Valencia, Caracas

established a factory for the extraction of cocoanut oil and cocoa butter and exportation of these products has already taken place. Other products are : Matches, chocolate, beer, glass, cigarettes, etc. Increase in the manu¬ facture of sugar was noted (1916-17) in the states of Zulia and Yaracuy.

Commerce. — Venezuela's foreign trade for the year 1915 amounted to $36,874,663, of which $13,470,236 represented imports, and $23,404,427 exports. The figures for the pre¬ ceding year were: Imports, $13,987,465 ; ex¬ ports, $21,520,534; total, $35,507,999. The de¬ crease for the year in imports was $517,229, and the increase in exports, $1,883,893, or a net increase of $1,366,664. The latest available statistics show volume of trade (by values and countries) as follows:

COUNTY

Imports

Exports

1915

1916

1915

1916

United States .

$8,231,400

2,847,000

678,000

675,000

500,000

814,000

164,000

$13,428,000

4,623,400

1,029,000

1,199,000

400,000

250,000

174,000

$13,647,800 644,800 3,086,000 1,119,200 500 , 000 2,180,000 1,060,000

$12,223,600

557,400

4,483,600

2,085,000

480,000

650,000

814,000

United Kingdom .

France .

Spain .

Italy .

Holland . .

Trinidad . .

Total including other countries .

$13,958,800

$21,382,800

$24,253,200

$23,530,000

and Cumana. The livestock has always been a source of national wealth, and it is thought that the extensive llanos toward the south and in the drainage area of the Orinoco River will, when better utilized, be regarded as among the best grazing lands in America. Modern refrigerating plants lately established in Puerto Cabello and in Barranco on the Orinoco have given impetus to the raising of cattle for the export meat trade. Estimates of the livestock in 1915-16 were as follows: More than 2,000,- 000 cattle, about 1,700,000 goats, 177,000 sheep, 191,000 horses, 1,600,000 pigs, etc. The agri¬ cultural and pastoral industries employ about 60,000 laborers. A presidential decree of 12 March 1917 created an experiment station of agriculture and forestry, with a garden of ac¬ climatization, to be located on lands near the city of Caracas. The purposes for which it was created were stated to be: The study of improved methods of cultivation of the princi¬ pal agricultural products of the country; in¬ troduction, selection and distribution of seeds; experiments in reforestation; report upon soils suitable to each kind of cultivation and the crops to each region ; and practical work for the training of agricultural foremen and forest rangers.

Manufacturing Industries. — As a rule, Venezuela imports all manufactured materials that are required; there are, however, several sawmills and lumber factories, using native woods, and tanning factories where leather of good quality is prepared. Two paper factories have proved commercially profitable. The mills of Valencia, Caracas and Cumana turn out cotton cloth and many finished articles of clothing. In Cumana there has recently been

The principal articles imported during recent years (from all sources, including the United States) were: Agricultural implements and ma¬ chinery, automobiles and accessories, bagging, butter, cotton, textiles, drugs and medicines, flour, lard, machinery (other than agricultural), rice, tanned or unmanufactured skins, stearin, thread and wines. The chief articles noted in 1917 as imports from the United States were cotton cloths, flour, leather and iron and steel.

The principal articles of export for 1916, with approximate values, were : Coffee, $12, 989- GOO ; cacao, $4,318,600; cattle hides, $2,025,000; balata, $809,293 ; gold, $1,408,900; goat and kid skins, $310,000; asphalt, $288,000; beef cattle, $318,000; sugar, $600,000; copper ore, $300,000; rubber, $140,000; chicle, $26,000, beef, frozen, $334,000; pearls, $172,000.

In foreign trade there is a growing pref¬ erence for the metric system of weights and measures, which was adopted by decree of 18 May 1912.

Money, Banking and Finance. — The mone¬ tary system is based on the gold standard, the unit being the bolivar, divided into 100 centimos, and weighing 0.32258 grammes of gold .900- fine, or say 0.29032 grammes of pure gold. The par value of the bolivar is $0.19295, cur¬ rency of the United States, and the par value of $1.00 in terms of Venezuelan currency is B 5.18262. _

The principal gold in circulation is Vene¬ zuelan gold of the same weight and fineness as that of the Latin Monetary Union. Prob¬ ably more American gold is in circulation in Venezuela than any other foreign gold coin.

In January 1912, the government of Venezuela issued a decree fixing the value of

the foreign gold coin circulating in the country and specifying that public offices must receive and pay out these coins at the following rates :

Bolivars

20 franc piece of France, Belgium, Italy, Switzer¬ land (fractions in proportion) . _ . 20 00

English sovereign or £ sterling (half-sovereign in

proportion) 25 25

Spanish gold onza, onza patriota, Central Ameri¬ can onza of any year, Colombian onza, etc 80 00

United States twenty-dollar gold piece (fractions

in proportion) . 104 00

German double crown or 20 mark piece (fractions

in proportion) . 24 75

Double condors of Colombia (fractions in pro¬ portion) . 100 00

Mexican onza, weighing 33.770 grammes .875-fine

gold . 100 00

Spanish Isabelina of 25 pesetas (fractions in pro¬ portion) . 25 00

The exchange rates as normally quoted in Venezuela are (for checks) :

American Gold . 3-days' sight

B 5.22 to 5.25 = $1.00

American gold . 60-days' sight

B 5.15 to 5.18 = $1.00

The three principal banking institutions are : The Bank of Venezuela (capital B 12,000,000, headquarters at Caracas and agencies at 14 other points in Venezuela, issue of bank notes constantly under $400,000) ; Bank of Mara¬ caibo (capital B 1,250,000) ; Bank of Caracas (capital B 6,000,000, branches in some of the important Venezuelan commercial centres, cir¬ culation of bank notes to the amount of about one-tenth of the issue allowed by its charter).

In April 1915 Mr. L. Elwyn Elliot wrote: < (For the last four years Venezuela has been in the agreeable position of possessing a substan¬ tial surplus of national revenue over expendi¬ ture, and as a part of this ready cash has been preserved in the country's exchequer no doubt it will assist in tiding over such financial dis¬

integration as resulted from the European War outbreak. Since the year 1910 this surplus has varied, but there has always been an addition to the national fund ; in 1912 it amounted to nearly $2,500,000 gold.®

The principal items of the budget for the year ended 30 June 1918 were:

Revenue

Customs . $2,140, 000

30% of contribu¬ tion . . . 642 , 000

Tax on import dues 535 , 000

Transit tax . 60,000

Liquor tax . 800 , 000

Tobacco . 1,100,000

Salt revenue . 1,100, 000

Stamps . 710,000

Other revenue . 625 , 000

Treasury balances. . 1,111, 600

Expenditures

Interior . $ 1 , 868 , 005

Foreign Affairs. 218,909

Finance . 2 , 905 , 7 65

War and Navy. 1,960,564 Internal devel¬ opment . 605,454

Public works. . . 636,280

Public instruc¬ tion . 540,798

Budget of recti¬ fication . 88,223

1848. Conversion of active debt interest at the rate of 4 per cent per annum.

1856. Venezuela received $1,140,000 in 4.5 per cent Peruvian bonds, as portion of debt from Peru.

1862. Loan issued at London for £1,000,000, at the rate of interest of 6 per cent per annum, 2 per cent sinking fund. Rate of issue, 63 per cent. Pledge was given of 55 per cent of import duties collected at La Guaira and Puerto Cabello.

1864. General Credit and Finance Company of London took loan of £1,500, 000, at 60 per cent issue and 6 per cent interest.

1872. Decree by which custom receipts were divided into 100 units, of which 27 per cent was allotted for the service of the external debt.

1889-1891. Public debt of Venezuela is divided into four classes: Domestic, diplomatic, foreign and bonds. In 1891 the total debt of Venezuela was as follows:

Domestic (5 per cent) consolidated. $7,595,227

Foreign (3 per cent) external . 13,450,675

Diplomatic (13 per cent) . 1,000,000

1 per cent monthly debt . 647,499

$22,693,401

Less than 14 per cent of revenues was pledged for the service of these obligations.

1895. German loan of 50,000,000 bolivars by Diskonto-Gesellschaft of Berlin, at 80 per cent issue. Bonds bearing 5 per cent interest and 1 per cent sinking fund.

1902. Consolidation of various internal debts by issue of bonds for 65,000,000 bolivars at 6 per cent.

1902. Debt of allied powers by virtue of protocols signed at Washington, totaling $7,147,386.

The annual report of the Secretary of the Treasury of Venezuela to the Congress, dated April 1915, gave the following resume of the public debt :

Internal debt:

I. National internal consol, 6 per cent —

Bolivars

1st issue . . 23,927 47 2d issue. .16,772 12

- 40,699 59

II. 1 per cent bonds,

eighth issue . 38,165 62

III. National internal 3

per cent consol 59,068,721 47

IV. National internal con¬

sol, no interest. . . 1,135,644 83

V. Treasury bonds to

bearer . 349,102 13

- 60,632,333 64

External debt:

I. National 3 per cent diplomatic (by dip¬ lomatic conventions) 9,723,291 61

II. Provisional certifi¬ cates (Spain) . 1 , 600 00

III. Diplomatic debt (3 per cent) , conver¬ sion and issue of

1905 . 101,267,650 00

- 110,992,541 61

Or a total indebtedness of . 171,624,375 25

This is equivalent to $33,000,000, which is a per capita debt of about $22.

Total . $8,824,000 Total . $8,824,000

It remains to present the following synopsis of Venezuelan loans and statements of the public debt:

1820. Debt contracted while Ecuador and Venezuela formed part of greater Colombia. It amounted to £547,- 783, for which debentures were issued.

1822. Loan by Graham and Powels for £2,000,000. Issue at

80 per cent, 6 per cent interest per annum. A portion of this loan was used to cancel the debt of

1820.

1823. Loan of $30,000,000. General revenue and tobacco

revenue pledged as a guaranty.

1824. Loan of £4,750,000 by B. A. Goldsmith and Com¬

pany, Hamburg. Issue at 85 per cent. Interest rate of 6 per cent per annum.

1834. An apportionment was made in this year for the public debt of greater Colombia, Venezuela assum¬ ing 28.5 per cent, or £1,888,396.

Transportation and Communication. — The

total length of railways in operation in Vene¬ zuela is 534 miles and the number of lines is 12 (five national and seven foreign), with an invested capital of approximately $40,000,000. There are several points along the coast from which railways extend into the interior, but only in one locality have these lines been con¬ nected. In the extreme west there are three lines approaching Lake Maracaibo, but they are independent of each other and serve quite dif¬ ferent areas of the country. Passing along the coast there are several short lines, facilitating traffic between the interior and the sea; these, too, bear no relation to each other. The only place in the republic where an extensive

development has taken place is near the capital, Caracas, and in the most populous districts of the country. From the two most important ports on the Caribbean Sea, Puerto Cabello and La Guaira, railways pass to the interior, one to Valencia and the other to Caracas.

Between these two interior points a third railway has been built, so that this rich and productive dis¬ trict is well supplied, comparatively, with trans¬ portation facilities.

Street railways (electric) are in operation in the capital. The government is giving spe¬ cial attention to the maintenance and improve¬ ment of its public roads and highways. At present two important roads are in process of construction, one 31 miles long, from Caracas to Guatire, and the other 36.6 miles long, from Maracay to Ocumare. The projected Great Western Highway, more than 700 miles long and designed to link Caracas with San Cristo¬ bal, is the greatest public work the country has ever planned. It will give access or facilitate approach to vast areas in seven states. The waterways form important means of communi¬ cation and transportation, there being no less than 70 navigable rivers in the country, with a total navigable length of over 6,000 miles, of which the Orinoco, the third largest river in South America, with its tributaries, furnishes nearly 4,000 miles. Other navigable rivers are the Meta, the Apure, the Portuguesa, the Yara- cuy and the Escalante, all of which are navi¬ gated by steamships for considerable distances. The Zulia-Catatumbo River flows into Lake Maracaibo and is navigable for small steamers, while the majority of the other rivers are navi¬ gable for steam launches and flat-bottom boats only. A regular steamship service is main¬ tained on the Orinoco, Apure and Portuguesa between Ciudad Bolivar, the principal port on the Orinoco, and the interior, as well as points along the coast. Ocean-going vessels enter Lake Maracaibo, which covers an area of 8,000 square miles, and is navigable in its entirety. Lake Maracaibo is connected with the Gulf of Venezuela and the Caribbean Sea by means of a strait 34 miles in length and from five to nine miles wide. Lake Valencia is navigated by small steamers. With its coast line of more than 2,000 miles, Venezuela possesses no less than 50 bays and 32 ports. The most important of the latter is La Guaira. Other ports at which ocean-going vessels call regularly are Puerto Cabello, Carupano, Guanta and Cumana. Ciu¬ dad Bolivar, on the Orinoco River, 373 miles inland, and Maracaibo, on Lake Maracaibo, are the most important inland ports.

A regular service is maintained by several lines of steamers between New York, New Orleans and Venezuelan ports, and European lines to the Caribbean Sea have La Guaira as a port of call. The Fluvial and Coastwise Navigation Company of Venezuela has ar¬ ranged with the government to establish a regular semi-monthly steamship service on the Orinoco River and its tributaries, extending to Port of Spain, Trinidad, as well as between Ciudad Bolivar and Maracaibo,

touching at Cristobal Colon, Port Sucre, Carupano, Guanta, La Guaira, Puerto Cabello, La Vela, and possi¬ bly at intermediate points.

There are 309 post offices scattered through¬ out Venezuela, and the telephone and the tele¬ graph are both steadily increasing in use. The

number of telegraph stations is given as 211, with wire extending 5,455 miles. The telephone services have about 13,000 miles of wire.

Population. — The number of inhabitants was about 2,850,000 in 1917 — averaging rather more than seven to the square mile. As Mr. Dalton has written, the Indians have in general been absorbed into the Spanish-speaking na¬ tion. Aboriginal inhabitants who preserve their habits and racial customs unchanged are found principally or only along the northwest frontier and in the forests of the southeast and south. The Goajiros dwell as an independent tribe among the mountains along the Colombian frontier; the Caribs inhabit forests along the banks of the Caroni and the upper Orinoco and its tributaries ; and in the remote southern re¬ gions of forest and highland there are about 16 tribes of other native races. The vital statis¬ tics for 1916 show 6,696 marriages, 74,816 births, 66,186 deaths, 8,596 immigrants and 7,637 emigrants.

History. — Dr. H. J. Spinden, of the Ameri¬ can Museum of Natural History, writes in the Scientific American , 19 Aug. 1916, that the re¬ gion now called Venezuela <(is generally recog¬ nized (by archaeologists) as the point of de¬ parture for the original culture of the West In- dies.® It is probable, also, that long before the discovery of the New World the tribes or peo¬ ples of the mainland, from the plateau of Bo¬ gota to the valley of Mexico, held communica¬ tion with tribes inhabiting the lower valleys of the Venezuelan Andes and the Caribbean Hills. Nevertheless the aborigines had advanced very little beyond mere savagery when Columbus, on 31 July 1498, coasted along the south side of the Peninsula of Paria. In 1499 Alonso de Ojeda, Amerigo Vespucci and others set sail, and, after landing several times on the penin¬ sula just mentioned, continued the voyage west¬ ward to Coquibacoa (lake of Maracaibo), where the Indian pile-dwellings on the shores of the lake attracted special attention, recalling Venice, on a very small scale; and (perhaps by Amerigo's suggestion) the name Little Venice, or Venezuela, was bestowed upon that region. Another group of voyagers in the same year touched at Margarita Island and obtained pearls from the natives. In 1500 about 50 adventurers, sailing from Hispaniola, established a settle¬ ment on Cubagua Island, near Margarita, and

naturally an uncontrolled exploitation of the pearl fisheries began. At Cumana, Manjar and a point near Barcelona on < the mainland coast, there were settlements of a different character in 1513, 1518 and 1520: Franciscan and Domini¬ can monks, engaged in missionary work at these continental stations, laid down their lives as martyrs in a noble cause. It was after studying the situation here that Bartolome de las Casas used all the force of his great talent for the suppression of the traffic in Indian slaves. Nueva Cordoba, the modern Cumana, was founded in 1521 ; Cori in 1527. The rule of the Welser (the bankers of Augsburg to whom Charles V granted the privilege of exploiting the province of Venezuela) was endured during two miserable decades, practically ending in 1545, though the grant was not formally with¬ drawn until 1558. In 1561 occurred the rebellion of Lope de Aguirre. Caracas, or Santiago de Leon de Caracas, was founded in 1567 (pre¬ sumably, though the exact date has not been

recorded) beside the Villa de San Francisco which Faxardo had built in 1560. In 1595 Sir Walter Raleigh first visited these regions of the <(Oronoca,)) as he wrote the name (compare XVI, pp. 188-192, London, Society of Antiquaries, 1812). Berrio y Oruna in 1615 led an expedition from San Thome, east of the mouth of the Caroni, in quest of the fabled city of Manoa. In 1656 a station was again founded at Barcelona by Franciscan monks, and organized attempts to civilize the Indians were so largely successful that within 150 years the Franciscans founded 38 towns with 25,000 Indian inhabitants. Other orders estab¬ lished missions in 1686. The University of Caracas was founded by Philip V in 1721. The whole of what is now Venezuela (with the ex¬ ception of the Maracaibo region) was in 1731 included in a new Capitania-General, to which Maracaibo was added in 1777.

The first definite attempt at revolt from the mother-country occurred in 1797. Its leaders were captured and executed. A Venezuelan gentleman, Don Francisco Miranda, invaded the colony at Ocumare 25 March 1806. Re¬ pulsed by . Captain-General Vasconcelos, he re¬ tired to Trinidad and about five months later made an unsuccessful landing at Coro. The first Venezuelan Congress (44 deputies elected by seven provinces) met on 2 March 1811; the Declaration of Independence by the deputies took place on 5 July 1811. The seven provinces were at that time said to be regarded as

form¬ ing a confederation of free, sovereign and inde¬ pendent states ; nevertheless, when leaders of the revolution were sufficiently strong to de¬ clare a constitution on 21 Dec. 1811, power was granted by that instrument to the central gov¬ ernment to revise the provincial constitutions. On 25 July 1812 Miranda, who had been ap¬ pointed dictator by Congress, capitulated with 4,000 men to the royalist leader, Monteverde, who was in command of only 3,000 ; four years later he died in prison in Spain. In 1813 Simon Bolivar, Venezuelan aristocrat, then 30 years of age, became the leader of the patriots. Initial successes were his ; but a rising of half-breeds of the Llanos under Boves, in behalf of the royalists, delayed the conclusion of the strug¬ gle for years. Boves with royalist forces de¬ feated Bolivar, who retired to the Antilles; an expedition of 15,000 men was sent from Spain under Morrillo; in 1815 the defeat of the pa¬ triots seemed, from the viewpoint of their Eu¬ ropean contemporaries, absolutely assured. But Simon Bolivar had gained a purely American point of view — he planned such campaigns as should liberate all of Spanish South America; and, as a matter of fact, to his brilliant leader¬ ship must be ascribed the prompt liberation of one-half of it. On March 1818 Col. Daniel O'Leary arrived with troops raised in London, consisting largely of veterans of the Napo¬ leonic wars — tried soldiers destined to play an all-important part in the liberation of Venezu¬ ela. Elections were arranged in the autumn, and on 15 Feb. 1819 Congress was installed in Angostura. In June Bolivar set out, accom¬ panied by Col. James Rook and the British Le¬ gion, on his famous march to New Granada (Colombia) ; defeated the royalists in the bat¬ tle of Boyaca on 7 August, and on 17 Dec. 1819 inaugurated the Great Colombian republic, em¬ bracing the largest part of northwestern South

America. The iast stage of the struggle begad on 28 April 1821. Bolivar was in Tinaquillo, with 6,500 men. His generals were : Paez, in command of the British unit, and the Bravos de Apure; Cedeno, with one brigade of La Guardia, and the Tiradores, Boyaca and Var¬ gas battalions; Playa, with a regiment of Eng¬ lish rifles, the other brigade of La Guardia, the Granaderos and Vencedores de Boyaca; and Anzoategui, with one cavalry regiment under a Llanero leader. The decisive battle of Cara- bobo, a victory for the patriots, was fought on 24 June 1821 by that force of 6,500, the opposing royalists numbering 5,000 men. The latter oc¬ cupied a position difficult to reach, and their de¬ feat in such circumstances proved to be such a crushing blow that, although casual fighting continued for awhile, the end was in sight. On 8 Oct. 1823 the last of the royalist adherents capitulated.

Finding her position in the Great Colombian Union unsatisfactory, Venezuela withdrew from it on 13 Jan. 1830. Bolivar, to whom the Congress had given dictatorial power in 1828, retired from office on 1 March 1830 and died of phthisis on 17 Dec. 1830 at Santa Marta. In April 1831 the new Congress of Venezuela as¬ sembled and elected General Paez as President of an independent republic of Venezuela; an embassy was sent to Bogota and Caracas be¬ came once more the capital on 25 May. On 24 March 1854, President Jose Gregorio Monagas promulgated a decree abolishing slavery in Venezuela. Public works (

We should bear in mind here the fact that during many years protests had been made by the representatives of Venezuela against the en¬ croachments of residents and officials from British Guiana. The contentions of the two parties were: On the part of Venezuela, that the Dutch, to whom the British were successors, had only claimed jurisdiction on the east side of the Essequibo River; on the part of Great Britain, that the Dutch had in 1759 and in 1769 put forward the claim that their territory in¬ cluded, not merely the Essequibo River, but the whole of the basin drained by that river and its tributaries. The British government refused to consent to arbitration of the boundary, fail¬ ing agreement by Venezuela that such parts of the Essequibo Valley as had been effectively oc¬ cupied by British colonists should be recognized as British territory. Then came the arrest men¬ tioned above.

Crespo appealed to Washington for protec¬ tion. President Cleveland took up the cause of Venezuela, and in December 1895 sent his fa¬ mous messages to Congress, in which he de¬ clared that any forcible action by Great Britain

would Constitute a casus belli with the United States. Great excitement prevailed in Ca¬ racas, associations being formed for the boy¬ cott of British goods and for national de¬ fense; but, wiser counsels prevailing on both sides, diplomatic relations were resumed in 1897. Jose Andrade became President in 1898. The boundary matter was submitted to arbitra¬ tion and finally settled on 3 Oct. 1899 by the award of the tribunal of Paris.

Cipriano Castro, who had assumed the executive power late in October (and did not receive confirmation by a constituent assembly until February 1901), was in office when Great Britain, Germany and Italy declared a block¬ ade of Venezuelan ports (January 1903)

to en¬ force payments by Venezuela to compensate foreigners for the damage to property sustained by them during various revolutions. Castro's government agreed to the arbitration of the claims by third parties and protocols with all the countries were signed within a few months. Castro was again elected, with General Gomez as one of the Vice-Presidents, and served two- thirds of his term ; but in 1909 he sailed for Europe, and then General Gomez interpreted correctly the preference of his people when by a coup d'etat, he secured without bloodshed his own safety and the Presidential power. He was established as constitutional President by virtue of the election of April 1910. The Gomez gov¬ ernment survived two rebellions in 1913, the first an uprising in the state of Trujillo and the second an insurrection in the southwest in favor of Castro, the ex-President. The insurrection¬ ary forces were dispersed. On 19 April 1914 Congress elected Gen. V. Marquez Bustillos as provisional President of the republic. A new Constitution went into effect 13 June 1914. On 3 May 1915 the Congress by unanimous vote elected General Gomez as President of the re¬ public for the term 1915-22.

Bibliography. — (Anuario Estadistico de Venezuela) (Caracas 1915) ; Arbitration Tri¬ bunal 1897, (Boundary between British Guiana and Venezuela) (London 1899) ; Beebe, M. B., and 'C. W., (Our Search for a Wilderness) (New York 1910) ; Cleveland, G., (The Vene¬ zuelan Boundary Controversy } (Princeton

1913) ; Dalton, L. V., Venezuela5 (London 1912) ; Fourtoul, J. Gil, (Historia Constitu- cional de Venezuela } (Berlin 1907-09) ; Gonza¬ lez Guinan, F., (Historia Contemporanea de Venezuela) (Caracas 1909-11) ; Humbert, J.,

1914) ; Schomburgk, R. H., (Reisen in Guiana und am Orinoko) (Leipzig 1841) ; Sievers, W., 'Zweite Reise in Venezuela) (Hamburg 1896) ; Universidad Central, Caracas, 'Catalogo de la Biblioteca de la Universidad) (Caracas 1875) ; Veloz Goiticoa, N,, Venezuela) (Washington 1904) ; Venezuelan Arbitration before The Hague Tribunal (Washington 1905).

Marrion Wilcox.

VENEZUELA, Gulf of, or GULF OF MARACAIBO, in the northwest of Venezuela, extends between the peninsulas of Goajira (in Colombia) and Paraguana, with a maximum width east to west of 165 miles, and a length of 60 miles from its opening on the Caribbean Sea to the narrow inlet communicating with Lake Maracaibo (q.v.).

VENEZUELAN BOUNDARY DIS¬ PUTE. In 1885 a crisis arose between Great Britain and Venezuela regarding the boundary line separating the latter country from British Guiana, a question which had been long in dis¬ pute. The controversy dated back to 1814, when Great Britain acquired by treaty with the Neth¬ erlands the provinces of Demerara, Essequibo and Bernice. Venezuela originally claimed her limits to be those of the captaincy-general of 1810, but contended herself with claiming the line of the Essequibo River as the true bound¬ ary. Great Britain apparently acquiesced till 1840, when she commissioned Sir R. Schom¬ burgk to lay out the boundaries which he pro¬ ceeded to do by including a large area which had before been considered by Venezuela a por¬ tion of her domain, and to the possession of which by Great Britain a vigorous protest was entered. After much diplomatic negotiation the monuments set up by Schomburgk were re¬ moved by the order of Lord Aberdeen. Other – boundaries were from time to time suggested, but none agreed on, till finally, in 1886, Great Britain returned to her contention of 1840, and claimed all the territory within the Schom¬ burgk line. The controversy continued till 1894, when a Venezuelan force entered the disputed territory and raised the flag of the latter coun¬ try at Yuruan. The following year the British police removed the flag, for which they were arrested, but finally released, Great Britain set¬ ting up a demand for reparation somewhat in the nature of an ultimatum.

The United States became a party to the dispute by the act of Congress directing the President to urge Great Britain to submit to arbitration the question whether Venezuela was entitled to the territory between the Essequibo and the Orinoco. In his annual message to Congress, 3 Dec. 1895, President Cleveland called attention to the boundary controversy and the representations made by the United States government to that of Great Britain with a view of securing the submission of the dispute to ar¬ bitration. On the 1 7th he sent a special mes¬ sage to Congress accompanied by the answer of the British government to the representations mentioned, and a recommendation that Con¬ gress authorize the appointment of a commission to determine the divisional line between Vene¬ zuela and British Guiana. The message cre¬ ated intense excitement throughout Europe and America. Both Houses of Congress passed a commission bill unanimously and indulged in much talk of war. Under the bill the Presi¬ dent announced, 1 Jan. 1896, the appointment of the following commissioners: David J. Brewer, associate justice of the United States Supreme Court; Richard H. Alvey, chief jus¬ tice of the Court of Appeals of the District of

Columbia ; Andrew D. White, ex-United States Minister to Russia; Frederick R. Coudert and Daniel C. Gilman, president of Johns Hopkins University. Subsequently the commission

organized and chose Justice Brewer for its president.

The commission invited the governments of Venezuela and Great Britain to formulate and present to it their respective cases in support of their claims. The invitation was complied with by both governments. Independently of these cases the commission gathered a great mass of evidence bearing on the claims, and continued its sittings till 27 Feb. 1897, when, Venezuela and Great Britain having signed a treaty pro¬ viding for the submission of the claims to arbi¬ tration, the commission considered its work at an end, made its report to the President and terminated its existence. The treaty between Venezuela and Great' Britain was signed in Washington, D. C., on 2 Feb. 1897, and provided for the appointment of an arbitration tribunal to determine the boundary line, consisting of five jurists, the two on the part of Venezuela being Chief Justice Fuller and Associate Justice Brewer, of the United States Supreme Court; the two on the part of Great Britain being the Rt. Hon. Baron Herschell and the Hon. Sir Richard Henn Collins ; and the fifth to be se¬ lected by the four jurists nominated in the treaty, or, in the event of their failure to agree, by the king of Norway and Sweden, the fifth jurist to be the president of the tribunal. The treaty provided that the tribunal should sit in Paris, France. The tribunal was completed by the selection of Professor Martens, a distin¬ guished Russian jurist, professor of interna¬ tional law in the University of Saint Peters¬ burg, and legal writer, as the fifth member and president. The award of the tribunal, which was delivered 3 Oct. 1899, gave Great Britain the Schomburgk line, with the exception of Ba- rima Point, at the mouth of the Orinoco, and a strip of territory between the Wenamu and Cuyuni rivers ; but it was decided that the mouth of the Orinoco should be open to the British and both banks of a part of the Cuyuni where the Schomburgk line had given them only one bank. Consult Cleveland, G., (The Venezuelan Boundary Controversy (New York 1904) ; Ralston, J. H., Venezuelan Arbitrations of 1903) (Washington 1904) ; Storrow, J. J., (The Brief for Venezuela) (London 1896) ; Strick¬ land, J., (Documents and Maps of the Bound¬ ary Question Between Venezuela and British Guiana) (London 1896) ; (United States Vene¬*

zuelan Boundary Commission, Report and Ac¬ companying Papers } (3 vols., and atlas, Wash¬ ington 1897).

VENI CREATOR SPIRITUS, veni kre- a/tor spir'i-tus, the first words of a well-known Latin hymn, which are employed as its title. The hymn is addressed to the Holy Spirit, is sung in ordination offices of the Roman Catholic and Anglican churches and at Whit¬ suntide, and formerly at the celebration of the Holy Communion. Saint Ambrose 350 a.d. is supposed by some authors to have written it. The first English version added to the Prayer Book in 1662 has been attributed to John Dry- den. The full text of the original hymn is as follows :

Veni Creator Spiritus Mentes tuorum visita;

Imple superna gratia Quae tu creasti pectora.

Qui diceris Paraclitus Altissimi D num Dei,

Fons vivus, ignis, charitas,

Et spiritalis unctio.

Tu septiformis munere Dextrae Dei tu digitus;

Tu rite promissum Patris Sermone ditans guttura.

Accende lumen sensibus Inf unde amorem cordibus;

Infirma nostri corporis Virtute firmans perpetim.

Hostem repellas longius Pacemque dones protinus;

Ductore sic te praevio Vitemus omne noxium.

Per te sciamus da Patrem Noscamus atque Filium;

Te utriusque Spiritum Credamus omni tempore.

Sit laus Patri cum Filio Sancto simul Paraclito;

Nobisque mittat Filius Charisma Sancti Spiritus. Amen.

VENIAL SIN (O. F. venial, from Lat. venialis, pardonable), in Roman Catholic theology, a term used to signify the lesser transgressions of the law of God or of the Church, in contradistinction to mortal sin, which means spiritual death, deserves eternal punishment and

demands divine power for re¬ newal. In the case of venial sin, ((grace is still left by which the sin may be repaired.®

‘

1

■

‘

} ‘

, . , • [I : . • .v

.

■

.

r ‘

! • i

■ .

‘

‘■

.

.

■

■

■

■

\

t

V

./.

'V A >

• ; f

‘V A >

• ; f

i

4

Jf

l:

r-

f Vi- ■ 5i

, ;

‘’ii

‘V

-4 .

k

re-” . ^’,’

14”

-‘4

.‘1

(•« If)

.4 >i!

!;

.’ V • (

,T’S

‘flu. ..V./’

-*•

mi’-

j ‘

7

;-7

»

i.i

• •

t

I

I

I

I

i

§

I

I

s

I

I

THE

AMERICANA

Uhivek§al

MgWLEDCEj

In Thirty Volumes

1922

CORPORATION

NEW YORK CHICAGO

cl

Copyright, 1920

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

•) * •>li>)

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY ALBANY NEW YORK

JM I p jˆj22 .©C1.A654:U7

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXVIII

ABRAMS, ALFRED W., Ph.B.

Chief, Visual Instruction Division, New York State Education Department

VISUAL INSTRUCTION

AUSTIN, O. P., M.A.

Statistician of the National City Bank of New York

WAR, EUROPEAN — THE WAR AND ITS RELATION TO WORLD COM¬ MERCE,

WAR, EUROPEAN — EFFECT OF THE WAR ON CURRENCY

BAILEY, WILLIAM L., M.A.

Associate Professor of Political Science, Grinnell College

VILLAGE, THE

BARNES, HARRY ELMER, Ph.D.

Professor of History, Clark University, Worcester, Mass.

WAR, EUROPEAN — THE WAR AND THE SMALL NATIONS OF CENTRAL AND EASTERN EUROPE

BASSETT, JOHN SPENCER, Ph.D.

Professor of History, Smith College

WAR, EUROPEAN — MILITARY OPER¬ ATIONS ON THE WESTERN FRONT WAR, EUROPEAN — NAVAL OPERA¬ TIONS

WAR, EUROPEAN — EVENTS SUBSE¬ QUENT TO THE ARMISTICE WAR, EUROPEAN — THE PEACE CON¬ FERENCE OF 191Q

BENTLEY, MADISON S., B.S., Ph.D.

Professor of Psychology, University of Illinois

VISION

BOLTON, R. RAY

Formerly Assistant Professor of Veterinary Medi¬ cine, Iowa State College

VETERINARY MEDICINE VETERINARY OBSTETRICS VETERINARY SURGERY

BRAUN, WILHELM ALFRED

New York City

CAPPS, W. L.

Rear-Admiral; Chief Constructor,. United States Navy

WARSHIPS, MODERN

CARMAN, E. A.*

General, United States Army

VICKSBURG, MILITARY OPERATIONS AGAINST AND SIEGE OF WASHINGTON (D. C.), EARLY'S AT¬ TEMPT ON

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Political Economy, Harvard University

WAGES

COCHRANE, CHARLES H.

Editorial Staff of The Americana

WAR, EUROPEAN — FIGHTING STRENGTH OF THE NATIONS WAR, EUROPEAN— WAR CASUALTIES .

COUMBE, CLEMENT W.

Technical Art Expert

VINE IN ART AND SYMBOLISM

CURRIER, ANDREW F., M.D.

Mount Vernon, N. Y.

VITAL STATISTICS

DAYTON, EDWIN W.

Major, Infantry R. L.

WAR, EUROPEAN — AERIAL OPERA¬ TIONS

DICKINSON, THOMAS H., Ph.B., Ph.D.

Associate Professor of English, University of Wisconsin

VENICE PRESERVED, OR A PLOT DISCOVERED

DODD, WILLIAM E., B.S., M.S., Ph.D.

Professor of American History, University of Chicago

WALKER, ROBERT J.

VON DROSTE-HULSHOFF, ANNETTE ELISABETH

CALLAHAN, JAMES MORTON, Ph.D.

Professor of History and Political Science, West Virginia University

VIRGINIA, THE RESTORED (OR RE¬ ORGANIZED) GOVERNMENT OF VIRGINIA-PENNSYLVANIA BOUND¬ ARY DISPUTE

CANFIELD, ARTHUR G., A.M.

Professor of Romance Languages, University of Michigan

WANDERING JEW, THE

DOIG, FRANK C.

Director of Publicity, Seattle Chamber of Com¬ merce and Commercial Club

WASHINGTON (STATE OF)

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

DOOLITTLE, ERIC, C.E.

< . Director, Flower Astronomical Observatory, Uni¬

versity of Pennsylvania

VENUS

*Deoe«sed

Contributors to Volume XXVIII — Continued

KGGERT, CARL E., B.Ph., Ph.D.

Formerly Assistant Professor of German, Univer¬ sity of Michigan

WALLENSTEIN

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

VOLUNTEERS

FAY, SIDNEY BRADSHAW, Ph.D.

Professor of European History, Smith College

WAR, EUROPEAN — THE EASTERN FRONT

FENLON, JOHN F.

President of Divinity College, Catholic University of America, Washington, D. C.

VULGATE, THE

FINCK, HENRY T., A.B.

Musical Critic, New York Evening Post

WAGNER, RICHARD

GARNER, JAMES WILFORD, Ph.D.

Professor of Political Science, University of Illinois

VETO

WAR, INSTRUMENTALITIES AND METHODS OF WAR ZONES

GRIFFIS, WILLIAM ELLIOT, D.D., L.H.D.

Author of “ The Mikado’s Empire,” *etc.*

WALLOONS

HALE, EDWARD EVERETT, Ph.D.

Professor of English, Union College

WAKE-ROBIN

HART, ALBERT BUSHNELL, Ph.D., LL.D., Litt.D.

Professor of Government, Harvard University

WAR, EUROPEAN — AMERICAN NEU¬ TRALITY

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Literature, The College or the City of New York

VIEBIG, CLARA

HAUSMANN, PHILIP W.

Editorial Staff of The Americana

WAR, EUROPEAN — PSYCHOLOGY OF THE WAR (EUROPEAN)

KALLEN, HORACE MEYER, Ph.D.

New School of Social Research, New York City

WAR, EUROPEAN — PSYCHOLOGY OF THE WAR (AMERICAN)

KLEIN, HENRI F.

Editorial Staff of The Americana

WAR, EUROPEAN — HISTORICAL IN¬ TRODUCTION

WAR, EUROPEAN — DIPLOMATIC HISTORY

WAR, EUROPEAN — ITALIAN CAM¬ PAIGN

WAR, EUROPEAN - COLONIAL AND JAPANESE CAMPAIGNS WAR, EUROPEAN — TURKISH CAM¬ PAIGNS

KNIGHT, M. M.

Lecturer on Political Science, Hunter College of the City of New York

WAR, EUROPEAN — POST-WAR PROB¬ LEMS AND RECONSTRUCTION IN THE BALKANS

LENNOX, PATRICK J., B.A., Litt.D.

Professor of English Language and Literature, Catholic University of America

VERSIFICATION

LOME, CARL F.

United States Standard Voting Macnine Company

VOTING MACHINE

McDANNALD, A. H., B.L.

Managing Editor, Encyclopedia Americana

WAR, EUROPEAN — COSTS OF THE WORLD WAR

WAR, EUROPEAN — REPATRIATION OF PRISONERS

McDonnell, j. b., b.a.

Editorial Staff of The Americana

WAR, EUROPEAN — BALKAN CAM¬ PAIGN

MEADER, JOHN R.

Labor and Service Department, Brighton Mills, Passaic, N. J.

WARS OF THE WORLD

MITCHELL, S. C., Ph.D., LL.D.

President of Delaware College

VIRGINIA CONVENTIONS OF THE REVOLUTION, THE

MOORE, J. PERCY, Ph.D.

Professor of Zoology, University of Pennsylvania

WARBLES

MASON, ARTHUR H., Ph.D.

Professor of English, New York University

WARTON, JOSEPH WARTON, THOMAS

PACK, CHARLES LATHROP

President of the National War Garden Commission

WAR GARDENS

PATTON, JOHN S.

Librarian, Library of the University of Virginia

VIRGINIA

PERKINS, GEORGE H., Ph.D., LL.D., Litt.D.

President, University of Vermont

VERMONT

PERSHING, JOHN J., B.A., LL.B.

General, United States Army; Commander-in-Chief, American Expeditionary Forces in the World War

OFFICIAL REPORT OF THE AMER¬ ICAN EXPEDITIONARY FORCES

RINES, IRVING E.

Editor of “History of the United States”

VOTE, VOTERS, VOTING

Contributors to Volume XXVIII — Concluded

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

VOLATILE OILS

RITCHIE, ALBERT C., A.B., LL.B.

Attorney-General of Maryland, 1915-19; General Counsel, War Industries Board, lyl8-19; and Governor of Maryland, 1920—

WAR INDUSTRIES BOARD

ROLFE, JOHN C., Ph.D.

Professor of Latin Language and Literature, Uni¬ versity of Pennsylvania

VIRGIL

SCOTT, ARTHUR P.

Assistant Professor of History, University of Chicago

WAR, EUROPEAN — NEUTRALS AND

THE WORLD WAR

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of Wis¬ consin

VIRGIL'S ECLOGUES

SULLIVAN, JAMES, Ph.D.

Director of the Division of Archives and History of the University of the State of New York

VOCATIONAL GUIDANCE

TUBBS, FRANK H.

Sometime Editor of “ Music Life ”

VOICE AND VOICE CULTURE

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

VISION OF JUDGMENT, THE

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia University

VICAR OF WAKEFIELD, THE

VAN TYNE, CLAUDE HALSTEAD, Ph.D.

Head of Department of History, University of Michigan

WASHINGTON, GEORGE

WARD, HENRY BALDWIN, Ph.D.

Professor of Zoology, University of Illinois

VORTICELLA

WERTENBAKER, THOMAS J., Ph.D.

Associate Professor of History and Politics, Prince¬ ton University

WAR, EUROPEAN — DIPLOMATIC NEGOTIATIONS

WILCOX, MARRION, LL.B.

Coeditor “Encyclopedia of Latin America ”

VIENNA

WILSON, LEWIS A.

Director, Division of Agricultural and Industrial Education, New York State Department of Education

VOCATIONAL EDUCATION

WRIGHT, HERBERT F., Ph.D.

Sometime Librarian of the Latin Library, The Catholic University of America

VEXILLA REGIS PRODEUNT

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can’yon), pihon (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

5

no, open

A

a

all, fall

0 or 6

not, on

ch

choose, church

* •

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. c, as in de; eu, as in ncuf; and oeu, as in

oi

oil, soil ; also Ger. eu, as in beutel

boeuf, coeur; Ger, o (or oe), as in bkonomie.

6 or oo

fool, rule

?

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

•

s

satisfy, sauce

ff

off, trough

sh ’

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

t-i

o

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

him, it

ii

between u and e, as in Fr. sur, Ger. Muller

1 or 1

A

1

between e and i, mostly in Oriental final syllables, as,

V

of, very

(consonantal) yes, young

Ferid-ud-din

y

*

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬ point, Jean, temps

‘(prime).

“(secondary) accents, to indicate syllabic stress

ENICE, ven'is, (Ital., Venezia; Ger., Venedig), northern Italy, a sea¬ port city and capital of a province in the compartment or division of Venetia, situated on about 120 islands in a lagoon or shallow bay of the Adriatic Sea (Gulf of Venice), north of the mouths of the Adige and Po, 150 miles east of Milan and 70 miles west-southwest of Trieste. The city has a compact, roughly elliptical form, the greater number of the islands being close to¬ gether and separated only by narrow canals (rii), about 175 in number, over which 378 bridges have been constructed. The city is about two and a half miles from the mainland, with which it is connected by a railway bridge of 222 arches. On the sea side, separating the lagoons from the open sea, are long narrow stretches of sandhills, known as lidi, strength¬ ened in places by masonry bulwarks. Both the lidi and the coast behind the town are de¬ fended by strong forts. Besides the canals, which to a large extent take the place of streets in Venice, there are numerous narrow lanes (calH) between the houses. The broadest street is the Corso Vittorio Emanuele in the north, and the most important business street is the Merceria, lined by handsome shops, which opens into the Piazza San Marco. The build¬ ings are mostly erected on piles. The main part of the city is traversed by the Grand Canal, about two miles long and from 33 to 66 yards in width, which proceeds from the southeast to the railway station in the northwest by a wind¬ ing course, somewhat like a letter S. It is lined along its whole length on both banks by a series of splendid palaces and houses. It is crossed by the famous Rialto bridge, in the centre of the city, built in 1588-91 and consist¬ ing of a single marble arch, and by two iron bridges. The tramways and cabs of other towns are represented in Venice by gondolas, barcas, steam launches and the steamers of the Societa Veneta Lagunare, which ply on the canal. The chief square is the Piazza San Marco (Saint Mark is the patron saint of Venice) on the southeast, continued by the smaller Piazzetta to the bank of the Canale di San Marco, and lined by some of the chief buildings of the city. It is the fashionble promenade of the Venetians and the centre of the city's life. Of islands not forming part of the main mass of the city the chief are Giudecca, on the south, separated from Venice proper by the Canal della Giudecca; Isola di San Giorgio Maggiorc, im¬

mediately east of the former, and separated from Venice by the broad

Canale di San Marco ; Isola di San Pietro, east of the main group of islands ; Murano, a mile and a half to the north, with an ancient glass industry; Cemetery Is¬ land, to the northeast ; Burano, to the north¬ east, with lace-factories ; Torcello, to the north¬ east, with an interesting cathedral ; San Laz¬ zaro, to the southeast, with an Armenian Mechitarist monastery; and San Servolo, to the southeast, with the lunatic asylum of the province. Of the sandbanks or lidi already mentioned the Lido di Malamocco fronting the city across the lagoon is a very popular well-equipped resort largely patronized during the bathing season.

Churches. — The great church of Venice is the cathedral of Saint Mark, on the east side of the square of the same name. It was begun in 830 as a brick basilica in Romanesque style and was rebuilt after the fire in 976. It was elaborately decorated and transformed into a Byzantine building in the succeeding two or three centuries, and in the 15th century Gothic elements were added. In its present form it is a Greek cross surmounted by a dome at the end of each arm and one in the centre, and it contains about 500 columns, mostly in Oriental style, with richly ornamented capitals. The in¬ terior is adorned with a great profusion of splendid mosaics and also by other artistic pro¬ ductions of great beauty, such as the bronze monument of Cardinal Zeno and the Pala d'Oro, an altar-piece exquisitely worked with jewels on plates of gold and silver. Near the cathe¬ dral stood till its fall in 1902 the square Cam¬ panile, or bell-tower, 322 feet in height, with fine bronze statues and gates, and here is the clock-tower, with two bronze giants for strik¬ ing the hours. The Campanile has been rebuilt. Among other churches are the following: Saints Giovanni e Paolo, a splendid Gothic domed building erected in 134(>-1430, contain¬ ing the burial-vaults of the doges and many magnificent monuments ; San Maria Glorioso dei Frari, a beautiful cruciform structure in Italian-Gothic style, erected in 1250-1338, con¬ taining some splendid monuments and several of the finest works of Titian and Giovanni Bellini; San Salvatore, completed in 1534 (fagade later) and recently restored, containing Titian's ˆAnnunciationˆ ; Madonna dell' Orto, with a beautiful faqade in late Gothic style and containing many fine pictures by Tintoretto and others; San Zaccaria, built in 1457-1515 in

the style of the Gothic-Renaissance transition, with fine pictures ; San Maria Formosa, an early cruciform church, often rebuilt, with good pic¬ tures by Palma Vecchio and others; San Maria dei Miracoli, erected in the style of the Early Renaissance in 1481 (restored), adorned with marble outside and beautifully decorated in the interior ; San Giacomo di Rialto, the oldest church of the city; San Rocco (1490, re¬ stored 1725), containing many of Tintoretto's works; San Sebastian (1506-18, restored), containing the tomb of Paolo Veronese and fine paintings by him ; San Maria della Salute, erected in 1631-32 in memory of the plagtie, including works by Titian and others ; San Giorgo Maggiore, on the island of the same name, begun by Palladio in 1560, with a very beautiful interior; II Redentore, on the Giudecca, erected by Palladio in 1576; San Giovanni Crisostomo, Renaissance style, ˆ con¬ taining fine painting by Giovanni Bellini and Sebastiano del Piombo ; San Marciliano, not¬ able for works by Titian and. .Tintoretto ; San Caterina, with a splendid altar-piece by Paolo Veronese; the Jesuits' church, in baroque style (1715-30), and splendidly decorated, with a fine altar-piece by Titian ; San Giorgio degli Schiavoni, with Renaissance facade and con¬ taining fine paintings by Carpaccio ; San Pietro di Gastello, on San Pietro Island, the cathedral of the city till 1807 ; San Giovanni Elemosinario (1527), containing a splendid altar-piece by Titian, *etc.* There are also churches for Angli¬ cans, Scottish Presbyterians, Waldensians, Ger¬ man Protestants, Greek Catholics, Armenians, Jews, an Italian Free Church, *etc.*

Palaces. — The Procuratie Vecchie, so called because the procurators of the republic for¬ merly dwelt in them, is an imposing group of buildings on the north side of the Piazza San Marco, and directly opposite them are the Pro¬ curatie Nuove, which together with the magni¬ ficent library building now form the royal palace. The Procuratie Vecchie were built in 1496-1520, and the Procuratie Nuove were be¬ gun in 1584. The library was begun by San¬ sovino in 1536 and is one of the finest non-ecclesiastical buildings in Italy. Its interior is adorned with ceiling and wall paintings by Paolo Veronese, Tintoretto, Schiavone and others. Facing the old Library, on the opposite (eastern) side of the Piazzetta, stands the Palazzo Ducale or Palace of the Doges, which was first erected in 800 and has been rebuilt in styles of ever-increasing grandeur after five destructions. The exterior consists of two arcades, one above the other, and is

adorned with colored marbles. It was restored in 1873-89. The Porta della Carta, a portal next to the cathedral, the incomplete court, and the flight of steps (Scala dei Giganti) leading up to the palace deserve special mention. The in¬ terior is very fine and contains a splendid col¬ lection of works by Tintoretto, Paolo Veronese and other great Venetian masters, including the ˆ Paradiseˆ of the first named, which is the largest oil-painting in the world. The building also includes the Library of Saint Mark, with its many manuscripts and other treasures, and an archaeological museum. The famous Bridge of Sighs (Ponte dei Sospiri) leads from the Palace to the Prigioni Criminali, or prison for ordinary criminals, built in 1512-97 and still in

use. The palaces along the banks of the Grand Canal are of all styles from Romanesque to Late Renaissance, among them being the fol¬ lowing : Palazzo Corner della Ca Grande (1532), now the seat of the prefecture; Palazzo Grimani (in Renaissance), a very fine building, now containing the Court of Appeals ; Palazzo Farsetti and Palazzo Loredan (Romanesque), both now used by the municipal authorities ; Palazzo Rezzonico (17th and 18th centuries), in which Robert Browning died; Palazzo Foscari (Gothic), now containing a higher commercial school ; Palazzo Cappello-Layard, the former residence of Sir H. A. Layard ; Palazzo Bernardo, said to be the oldest build¬ ing of the city, now a mosaic factory. Fondaco de' Tedeschi, a German warehouse from the beginning of the 13th century, now the chief post and revenue office ; Palazzo Ca Doro (Gothic), now the French consulate; Palazzo Vendramin Calergi (Early Renaissance), one of the finest of all, the place where Wagner died; Paul de Camerlenghi (Early Renaissante), the former repository of the treasures of the republic; and the Fondaco de' Turchi (Roman¬ esque), once a Turkish warehouse, now con¬ taining the municipal museum.

Monuments. — These include ; in the Piazza San Marco, the pedestals of the flagstaffs (1505) and the marble sarcophagus, supported by lions, of Daniele Manin, the head of the short-lived republic of 1848; in the Riva degli Schiavoni, a marble-paved quay along the north bank of Saint Mark's Canal, an equestrian statue of Victor Emmanuel II (1887) ; in the Campo San Bartolommeo, a bronze statue of Carlo Goldoni (1883) ; in the Campo San Fosca, a bronze statue of Fra Paolo Sarpi (1892) ; besides the church of Saints Giovanni e Paolo and equestrian statue of Bartolommeo Colleoni, modeled by A. Verrocchio (d. 1488) and cast in bronze by A. Leopardo, on a marble pedestal designed by the latter (1490-05), considered by Ruskin the finest work of sculpture in the world; south of the arsenal, Venvenuti's monu¬

ment (1885) in commemoration of the service of the soldiers in the inundation of 1882 ; a bronze monument to Garibaldi (1887) at the entrance to the public gardens ; and a marble statue of Niccolo Tommaseo (1882) in the Campo Francesco Morosini.

Educational Institutions, Collections, Gar¬ dens, *etc.* — The Accademia di Belle Arti, at the southern end of the older iron bridge over the Grand Canal, contains a priceless collection of paintings by Venetian masters, including Titian (his masterpiece is here), Paolo Veronese, Gio¬ vanni and Gentile Bellini, Palma Vecchio, Rocco Marconi, Pordenone, Cima da Conegliano, Paris Bordone, Carpaccio, Tintoretto and Tiepolo. The Reale Istituto di Belle Arti is situated be¬ side the academy. The Royal Institute of Sciences, Arts and Industry occupies one of the palaces on the Grand Canal. The Museo Civico Correr, in the Fondaco de' Turchi, com¬ prises both the former municipal and the Cor¬ rer collections. The town also has lyceums and gymnasia, an Armenian educational insti¬ tute, a Seminario Patriarcale, containing some sculptures and pictures, technical schools, a higher commercial school, school of industrial art, a deaf-mute school, conservatory of music, athenaeum, observatories and other similar in-VENICE

VENICE

If uˆH

nmm

Vjlr ill

Coiiyn;,‘ht Underwood & Underwood, N. Y.

2 Saint Mark’s, Interior View

1 Campanile and Doge’s Palace

stitiitions. The Giardini Pubblici, in the south¬ east, were laid out by Napoleon in 1807 on the site of monasteries which he caused to be de¬ molished ; other gardens are the Giardino Reale, behind the royal palace, and the Giardino Papadopoli, at the northern end of the Grand Canal. The chief theatre of the town is La Fenice.

Public and Commercial Buildings, *etc.* —

Among these are : the archives building, besides the Frari church, containing about 14,000,000 documents, from 883 downward; the Zecca or mint (1536), besides the royal palace; the cus¬ toms-house, at the southeast end o-f the Grand Canal ; the branch of the Banca d'ltalia in the Palazzo Manin ; the Monte di Pieta or pawn-office, in the Palazzo Corner della Regina ; the arsenal, in the south of the city, with stocks for shipbuilding and large graving-docks; the chamber of commerce; telegraph office; military prison; barracks, *etc.* New waterworks were completed in 1890. The public hospital is a large building beside the church of Saints Gio¬ vanni e Paolo, and the city also contains a mili¬ tary and a naval hospital, lunatic asylums, orphanages, a home for foundlings, houses of correction and other institutions of a like kind.

Manufactures, Trade, *etc.* — In addition to the glass and lace industries on the islands of Murano and Burano, there are in the city manu¬ factures of glass and glass beads, silk-stuffs, cottons, woolens, tobacco, soap, wax, furniture, gold and silver wares, matches, artificial flowers, machinery, torpedoes, *etc.* Shipbuilding is also a growing industry. The trade of Venice, though less important than in the 15th century, has been steadily growing for many years and is considerable, the port now, in normal times, ranking second to Genoa in the commercial importance of the kingdom. Vessels drawing 27 feet can reach Venice; a 30-foot channel has been dredged. During the Great War the port was closed. Vessels enter from the sea through the Porto Malamocco and the Porto Lido and there is considerable dock and wharf accom¬ modation in the Bacino della Stazione Marit-tima. Much modern improvement has been in¬ stituted in Venice, including careful sanitation, a new water supply from mainland sources by

means of an aqueduct, and an electric lighting and industrial supply, generated by the Cellina torrent near Belluno and transmitted to the city.

History. — The foundation of Venice is at¬ tributed to the inhabitants of the surrounding districts, who fled from the cruelty of Attila the Hun and took refuge among the islets off the mouth of the Brenta. Here, about the middle of the 5th century, they founded two small towns called Malamocco and Rivoalto and de- \ˆoted themselves to commerce. In 697 Pau-luccio Anafesto was elected the first doge or duke. In 819 the seat of government was trans¬ ferred from Malamocco to Rivoalto (Rialto), and the adjacent islands were connected by bridges. The Crusades (1096-1271) gave lucra¬ tive employment to the shipping of the Vene¬ tians and enabled them to make large additions to their territory. In 1204 the Doge Enrico Dandolo conquered Constantinople with the aid of the French Crusaders. In consequence of this the Byzantine Empire was divided and the coast districts of the Adriatic and the Leva'it,

together with numerous islands, including Can-dia, fell to the share of Venice. Lhider the suc¬ cessors of Dandolo, Genoa contrived to wrest from Venice her eastern conquests. In 1355 the Doge Marino Falieri, who plotted the over¬ throw of the aristocratic form of government, was beheaded. During the dogeship of Andrea Contarini (1367-82) Padua, Verona, Genoa, Hungary and Naples leagued themselves against Venice, which, after a severe struggle, lost all its possessions on the mainland. The tide of fortune, however, soon set again in favor of the Venetians. In 1386 they captured Corfu, Durazzo, Argos, *etc.* ; in 1405 their general, Malatesta, conquered Vicenza, Belluno, Feltre, Verona and Padua; in 1408 they gained pos¬ session of Lepanto and Patras, and in 1409 of Guastalla, Casalmaggiore and Brescello. In 1416 the Venetian fleet under Loredan defeated the Turkish at Gallipoli and in 1421 subjugated all the towns on the Dalmatian coast. The close of the I5th century is the culminating point in the history of Venice. It had a population of 200,000, and was the centre of the entire com¬ merce of Europe, With the beginning of the 16th century its power began to decline. Its commerce was gradually superseded in a great measure by that of the Portuguese in conse¬ quence of the discovery of the new sea-route to India. A league to subdue the republic was formed at Cambrai in 1508 between Pope Julius II, the emperor of Germany and the kings of France and Spain. Once again all its posses¬ sions on the mainland were taken from it. The work of destruction was all but completed by warfare with the Turks, at

intervals from 1649 to 1718, during which the Morea and the islands of Cyprus and Candia were lost and with them the ascendency in the Levant. After the French Revolution it refused to enter into an alliance with Bonaparte and the French took possession of the city in 1797. It subsequently became part of the Austrian Empire, of Napoleon's king¬ dom of Italy and of the Lombardo-Venetian kingdom under Austria, in which last it contin¬ ued from 1815 to 1866. A revolution broke out in 1848, when the citizens endeavored to re¬ establish their ancient form of government un¬ der the Presidency of Manin, but after suffer¬ ing from a 15 months' siege by the Austrians and from internal dissension, it was compelled to capitulate. In consequence of the misfortunes of Austria in her war with Prussia in 1866 the city and province were ceded to Napoleon III, under whose auspices they were united by a plebiscite to the kingdom of Italy. During the Great War Venice was repeatedly bombed by hostile aviators and some public buildings were damaged and many priceless works of art were removed to places of safety. During the great Austro-German offensives of 1916-17 hostile forces penetrated to within little more than 20 miles of the city and threatened to debouch on the Venetian plain. A large area between Venice and the mouth of the Piave was flooded, in order to provide against the Teutonic ad¬ vance. The greatest names in Venetian art are those of the Lombardi (15th and 16th cen¬ turies), Jacopo Sansovino (1477-1570), Andrea Palladio (1518-80), Vincenzo Scamozzi (1552-1616) and Baldassare Longhena (1604-75) in architecture; the Massegne (about 1400), the Buon (15th century), the Rizzi (15th century),

the Lombardi Alessandro Leopardi (d. 1522) and Jacopo Sansovino in sculpture; the Vivarini (15th century), lacopo Bellini (d. 1464), Carlo (irivelli (d. 1493 j, Gentile Bellini (1427-1507), Giovanni Belini (1428-1516), Vittore Carpaccio, Cima da Conegliano, Giorgione (d. 1510), Jacopo Palma Vecchio (1480-1528), Tiziano Vecelli (Titian, 1477-1575), Sebastiano del Piombo (1485-1547), Rocco Marconi, Gio¬ vanni Antonio da Pordenone (1483-1539), Paris Bordone (1500-70), Jacopo Tintoretto (1518-94), Paolo Veronese (1528-86),

Palma Giovane and Giovanni Battista Tiepolo (1693-1770) in painting. Consult Ruskin, ˆStones of Veniceˆ ; Hazlitt, ˆThe Venetian Republicˆ ; Mrs, Oli-phant, ˆThe Makers of Veniceˆ ; Grant, Allen, ˆVenice' ; Brovin, ˆStudies in the History of Veniceˆ and ˆVenice: a Historical Sketchˆ; Douglas, ˆVenice and her Treasuresˆ ; Hazlitt, ˆThe Venetian Republicˆ ; Hutton, ˆVenice and Venetiaˆ ; Motmenti, ˆHistory of Veniceˆ ;

< Venice in the Golden Ageˆ ; ˆDecadence of Veniceˆ ; Wiel, ˆVeniceˆ in th?, ˆStory of the Nationsˆ series.

VENICE, Bank of. The history of this remarkable institution forms one of the most instructive chapters in the annals of money, finance and banking. In 1171 the government of Venice, needing money to pay the expenses of a war upon which hung the destinies of the republic, plundered the treasury of its coins and bullion oelonging to the goldsmiths or bank¬ ers who had deposited those species in the mint and exchequer, to the amount of about 10,000,000 ducats. Unlike Genoa (see Genoa, Bank of), Venice paid its creditors, not by pledging the revenues of the state, nor by sur¬ rendering its autonomy to them, but by em¬ ploying its power and authority to create an artificial bank money more valuable than the gold and silver coins or bullion of which it had despoiled the bankers. This bank money did not consist of metal or of paper currency nor indeed of anything ponderable or portable, but merely of the registration in a book of so many artificial or imaginary ducats, repre¬ senting neither coins nor currency notes, as were made by law the only medium capable of liquidating bills of exchange.

The state opened a chamber of loans (Camera degl' Imprestiti), giving credit on its books to each of the parties it had despoiled for the amount of their loss, with interest at 4 per cent per annum. This interest being always punctually paid, it gave the creditors or assigns a permanent and reliable fund con¬ sisting of the right to demand and receive 4 per cent per annum forever. By making the assignment payable only in credits on the books of the chamber or bank, familiarly known as the Giro, it established a permanent income for the Giro, of which it could not be deprived so long as the state survived. This interest and the profits and inheritances presently to be described constituted the capital of the bank. The latter sources of income became in time so great that the allowance of the 4 per cent in¬ terest was discontinued as superfluous.

Between the plunder of Asia Minor by the Crusaders, of the Byzantine Empire by the Veneti and Latins, and the plunder of Moorish Spain by

Genoa, Castile, Arragon and others,

the stock of metallic money in Europe had fallen so low that the degradation, debasement and clipping of coins had become common. No assurance was to be had for the honest payment of a bill of exchange. By instituting an imaginary money which could neither be clipped or debased; by reforming its own coin¬ age and keeping it constant; by coining gold ducats (in 1252) containing 54 English grains of fine gold ; by establishing a fixed leˆal re¬ lation between its coined money and its imag¬ inary money, and by other measures mentioned below, the Giro gradually became a reliable centre of exchange, not only for the commercial transactions of Venice, but also for those of other states. This movement received great impetus both from the extent of Venetian com¬ merce, the supremacy of its navy and the rigidity and impartiality of its jurisprudence.

In 1423 Venice took that important step which rendered the Giro the clearing-house for practically all Europe. It required that all bills of exchange drawn upon Venice should be paid only at the bank. Such payment was made by debiting the bill-acceptor's account so and so many ducats and adding an equal sum of imaginary ducats to the credit of the bill-holder, who thus became the proprietor of so and so many ducats at the bank.

In presenting his bill of exchange for pay¬ ment the state required that the holder should effect the transaction in person, or by proxy. The transfer was made in the presence of two bookkeepers. No coins or any right to coins was involved in the transaction. The Giro kept no coins or circulating money. No en¬ dorsement was recognized or accepted. There¬ fore, the possession of the bill could not bene¬ fit a robber, whether marauding prince or foot¬ pad; it could not be passed around and used as money. Payable only at the Giro and in Giro credits, it was valueless elsewhere, valueless in other hands than those of the drawee. It was only money in and out of the Giro and only money in Giro debits and credits. This system made of the Giro a clearing-house for the entire civilized world. In this sense it was used all over Europe and its colonies.

The government of Venice prohibited the circulation of any foreign coins or paper or leather money in its dominions. ˆTt prohibited dealing in foreign coins by private or public banks. All foreign coins were required to be sold to the mint, where they were valued, paid for according to their metallic contents and re¬ coined into Venetian

pieces. All contracts made payable in coins (none of which contracts con¬ cerned the Giro) were to be liquidated at the rates for coins named in the laws. The penal¬ ties for infraction extended to entire confisca¬ tion.

The government of Venice brooked no inter¬ ference from the pontifical government. It admitted no ecclesiastics into the management of the Giro. It refused to permit the Inquisi¬ tion to be set up anywhere in the dominions of Venice: a striking contrast with the policy of Genoa.

The Giro seldom received or paid out coins or paper money. It dealt only in its own imag¬ inative money by inscribing debits and credits in its books. All coin transactions were turned over to the depository mentioned further on.

For Its transfers of accounts it made no charge.

Those who desired a safe place in which to deposit coined money and draw upon it by transfer of account (as in the Giro) were served by a branch department or depository strongly built and well guarded which was es¬ tablished for these purposes by the Giro, but without any further connection between the two institutions. The artificial money of the Giro was never mingled or confused with the actual money (coins) of the depository.

Some authorities have imagined that the ®Unit® of the money of account (the artificial or imaginary money of the Giro) was the ducat. This is somewhat misleading. Actual ducats seldom or never went into or out of the Giro. The ducat was the integer, not the ^^unit® of its money. Its unit of money was the whole amount of credits (or debits) on its books, multiplied by their rapidity of circulation from one account to another. This rapidity or velocity is conjectured to have been about twice a day, at least during its halcyon period.

The depository (caisse de comptant) was under the influence of finance, commerce and speculation ; the Giro was independent of them all. The fund of the depository ^^would be exceedingly fluctuating, because it would cor¬ respond with the changes of trade in each year and from year to year. It kept pace with the exigencies of commerce ; was perfectly elastic and impressionable to the movements of trade,^^ This depository failed three times, in 1453, 1600 and 1717. The Giro being independent both of commerce, finance and trade, paid no heed to their exigencies. Its fund was neither elastic nor impressionable. Hence it never failed, in¬ deed it could not fail, because it owed no debts.

While there was no physical relation between the imaginative money of the Giro and the ponderable and portable money (coins) of the state of Venice, the government, for the con¬ venience of merchants and others keeping ac¬ counts both with the Giro and the depository, created by decree an arbitrary relation between them of 20 per cent, so that it took a hundred ducats in Venetian gold coin to equal in

value 80 ducats of account in the Giro. The differ¬ ence was called agio. This agio was afterward raised to 30 per cent and even more, by means of a sur agio, or super-agio ; the imaginative money being always more valuable than the real.

The so-called ^capital® of the Giro in the 13th century has been estimated at about 2,000,000 ducats; in the 16th century (discovery of America and sea-route to India) about 4,000,- 000; in 1750, 5,000,000; in 1797, 14,000, 000._ When in that year Napoleon captured the Giro the spoil consisted merely of pen, ink and paper: a set of accounts. Not being able to convert these assets, he left them undisturbed and un¬ altered.

Credits in the Giro being guaranteed by the slate and transferable on its books rendered them very desirable, either as investments or as a ready and reliable means of liquidating commercial transactions. These, together with their inviolability and other advantages, explain their superior value compared with coins.

Throughout its earlier history all moneys deposited with the Giro were treated as loans to the state, credited to the depositor as Giro

money at par and handed over to the treasury. But when the commercial demand for bank money raised it to a premium over coins, the depository was established and the earlier prac¬ tice ceased. The imaginary money of the Giro had become too valuable to be sold for gold or silver coins at par.

The Council of Venice decreed that bank money should not be liable to seizure for debt, nor the subject of mortgage; a decree that assisted to still further raise its value over that of coins.

The three great decrees affecting the Giro : the provision that bills of exchange, unless otherwise stipulated and so expressed, should be payable only at the Giro; that all payments in. gross or in wholesale transactions should be effected through the Giro, and the stoppage of interest payments on the capital of the Giro are all ascribed to the year 1423, when Thomas Moncenigo was Doge. There are, however, rea¬ sons to believe that these decrees were not co¬ incidental. A later decree of the Council pro¬ hibited and severely punished all persons con¬ victed of paying or receiving coins at any other than their denominational value ; a provision that still further enhanced the superiority of bank money.

The bank (Giro) was shut one day in each week and four times in a year, each time 20 days, to balance and supervise the books. These intervals constituted a practical moratorium of 132 days in the year. During the intervals when the bank was thus shut, no bill payable in it matured, none could be protested until six days after the opening. This extended the moratorium to 138 days per annum, during the whole of which time the bank was drawing interest on such of its funds as were disposable in market; while it was paying out none. For the history of other ancient banks see Barce¬ lona, Bank of; Byzantium, Bank of; Fug-GERS, Bank of the; Genoa, Bank of; Medici, Banks of the; Tyre, Bank of.

Bibliography.— Cicogna-Soranzo, ˆBiblio-grafia venezianaˆ (Venice 1857 ; 1885) ; Daru, P. A. N. B., ˆHistoire de la republique de Veniseˆ (Paris 1853) ; Del Mar, A., <The His¬ tory of Money in Ancient Countriesˆ (New York 1884) ; id., ˆMoney and Civilizationˆ (New York 1886) and* other works; Hallam, H., ˆEu¬ rope during the Middle Agesˆ (London 1818); Hazlitt, W. C., ˆHistory of the Venetian Re¬ publicˆ (4 vols., London 1860) ; id., ˆCoins of Europeˆ (London 1893-97) ; Morosini, A., ˆStonia Veneziaˆ (Venezia 1623) ; Ricardo, D., ˆPolitical Economy and Taxationˆ (London 1877) ; Sanude, M., ˆDiari Duche de Venezia, 1490-1533ˆ (58 vols., Venice 1872-1902).

VENICE PRESERVED, or A PLOT DISCOVERED. ˆVenice Preservedˆ is hailed by some critics as ˆhhe greatest tragic drama between Shakespeare and Shelley.ˆˆ This judg¬ ment may be accepted if we are careful to ex¬ clude plays written during the lifetime of Shake¬ speare. In its very excellences, and these are of first magnitude, this play reveals how far tragedy had traveled since the Elizabethan era. In all respects of workmanship, constructive power and eloquence, the play is faultless. It lacks only that finer grasp of truth by which the prime masterpiece is distinguished from its offspring of the second generation. The

play falls short by the measure of the qualities that made it one of the most successful plays of a century, by the fact that it is essentially a

situation play, and by its sheer theatrical effectiveness.

More than any other work of this time ˆVenice Preservedˆ draws its inspiration from Elizabethan tragedy. Here again are the re¬ venge motives of the tragedy of blood. But these have now turned to conspiracy and in¬ trigue. The conspiracy that in ˆJulius Caesarˆ occupies a scene or two becomes the theme of a play. The play secured and maintained its popularity largely through the three effective parts which offered scope to the genius of suc¬ cessive generations of actors. Pierre and Jaffeir are closely studied figures of conspirators bound by oath of loyalty. Pierre is simple, trustful, direct. Jaffeir is irresolute, a lover-warrior. Belvidera is one of the favorite women char¬ acters of the 18th century stage. She is the lov¬ ing wife ˆshining through tears, like April suns in showers® for love of whor/i* the fatal diffi¬ culty first grows and who Cleopatra-like hangs upon her soldier's arms and will not let him go. The two men come from Otway's source book, but Belvidera is his own creation. The play is marred by some vulgar comedy of a type dear to Restoration audiences.

The author, Thomas Otway, crowded his 33 years full of tragedy, the written ones hardly more painful than the tragedy of his own life. The story is taken from an historical novel ˆConjuration des Espagnols contre la Venise en 1618,ˆ which existed in an English transla¬ tion of 1675. It was presented in February 1682, the part of Belvidera being taken by Mrs. Barry, to whom Otway had given his hopeless devotion. As an acting play it was popular down to the freeing of the theatres, the part of Belvidera being assumed by Mrs. Siddons and Miss O'Neill, and the parts of Pierre or Jaffeir by Betterton, Quin, Garrick, Kemble, Macready and Phelps. Editions: Noel, R., ed. ˆMermaid Seriesˆ (1888); Gollanz, I., ed., ˆTemple Dramatistsˆ ; McClumpha, C. F., ed., ˆBelles Lettres Seriesˆ (1908). Consult Gosse, E., ˆSeventeenth Century Studies.ˆ

Thomas H. Dickinson.

VENIZELO.S, vaffie-za'lds, Eleutherios,

Greek statesman : b. near Canea, Crete, of Greek parentage, 1864. He was educated at his home town, at Smyrna, and the University of Athens, practised law in Crete and was elected deputy for the district of Kedonia in the Cretan assembly in 1888. He first acquired fame in the troubled events that led to the liberation of Crete in the insurrection of 1896-97. He became the leader of his people and president of the new Cretan national assembly. But the advent of

Prince George of Greece as high commissioner of Crete was followed by a serious conflict between him and Venizelos. The prince aimed at despotic government, but Ven¬ izelos had not overthrown the tyranny of the Turk in order to set up a new despotism from Greece. He resigned his office, donned military uniform and headed the insurrection of 1905 which' culminated in the fall of the prince and his retirement to Paris. Under the new com¬ missioner. Zaimis, Venizelos returned to power with increased prestige. His fame spread to Athens and fired new hopes in Greece. In the

political confusion of 1909, when the throne trembled and the nation itself seemed on the verge of dissolution, the democracy of Greece appealed to the man who had saved Crete to come and be its savior also. The late King George, overlooking the ^^outrage® Venizelos had committed on his son the prince in Crete, joined in the appeal. Although a confirmed re¬ publican, Venizelos came to Greece, saved the dynasty and the country, carried through a re¬ vision of the Constitution and prepared the Balkan League (q.v.) of 1912. A man of un¬ swerving honesty, he used smooth words neither to his king nor the people; he boldly declared that the Crown had usurped too large a place in the function of government. He reforrned the army and na'y, swept away the oppressive taxation on the poor, set the throne on its feet and gave the country a stable administration. All this he accomplished in two 3ˆears. After the overthrow of the Turk in the first Balkan War Venizelos strove hard to avert the disaster of the Bulgarian defection from the League. When Bulgaria was crushed and defeated, Venizelos offered magnanimous concessions to soothe Bulgarian sentiments, but King Con-stari.tine, who had succeeded his father, in¬ trigued against the minister. From the begin¬ ning of the European War Venizelos was con¬ vinced that Greece must join the Allies, espe¬ cially after the entry of Bulgaria, for Greece was bound by treaty to come to the assistance of Serbia. Thwarted by his king and queen, the latter a sister of the Kaiser, and the in¬ trigues of German agents, Venizelos steadily prepared for intervention. Unable to carry his point, he finally broke with the king and set up a provisional revolutionary government at Salonica, ultimately returning in triumph to Athens as head of the government after the abdication of Constantine and the accession of King Alexander. He contributed notably to the success of the Salonica army by the reor¬ ganization of the Hellenic forces. Venizelos was the principal Greek representative at the Peace Conference in Paris, at which he advo¬ cated the liberation of Greek Asia Minor and the ./4Igean Islands from Turkish rule, as well as the union of all Greeks into one state.

VENOMOUS ANIMALS. Among the various contrivances for offense and defense found among animals the presence of a poison-apparatus, consisting of a poison gland and an organ for introducing the poison into the body of the prey, is a noteworthy feature. In some of the lower forms of animal life, such as Coelenterata, peculiar stinging-cells, termed mematocysts, are developed in the tissues. Each consists of a sac having a filament coiled up therein. On being touched the thread¬ cell ruptures and the thread is everted and enters the surface of any animal it touches with a benumbing effect. In centipedes a poison-apparatus is contained within the mouth, one pair of foot-jaws being furnished with a hooked fang which communicates with a poison-gland. Among insects, such as the bees, hornets, *etc.* (qq.v.), the sting (see Ovipositor) consists of sharp filaments, perforated for the transmission into the wound they make of a poisonous or ir¬ ritating fluid, secreted by a special gland. In the scorpions (q.v.) the poison-gland is situ¬ ated ill the last segment of the jointed tail, the

fanp: bcinp formed by the modified telson. Among higher animals the serpents (q.v.) con¬ stitute the chief group in which a venomous ap¬ paratus is present. In these animals certain modified teeth of the upper jaw form grooved fangs, which communicate with the poison-glands, formed by modifications of the salivary gltands. (See Rattlesnakes). The venom of serpents appears to act by altering the con¬ stitution of the blood and by action on the blood-corpuscles preventing the due purification of the blood. It may be remarked that in all cases the venomous matter must be introduced directly into the circulation to produce its effects. A person may swallow the poison of a snake without experiencing any evil effects.

VENTADOUR, van’ta’door, Bernart de,

one of the most famous of the early Provencal writers. He was born toward the beginning of the 12th century at Ventadour in Limousin. He early developed a talent for the poetry of the troubadours and as a traveling troubadour he is known to have visited most if not all of the Provencal countries, at the courts of all of which his talent as a singer

made him welcome. It was, however, at the court of Eleanor of Aquitaine that he was the greatest ; and it is believed that when the latter princess married Henry H of England the poet went with her to the English court. Ventadour had a strong and lasting influence upon Provengal literature and his work is still read in the Provengal countries. (See PROVENgAL Literature). Con¬ sult Raynouard and Mahn for collections of his songs; Bischoff, ˆBiographic des Trouba¬ dours Bernhard von Ventadourˆ (Berlin 1873) ; Carducci, ˆUn poeta d'amore del secolo XIP (in ˆNuova Antologiaˆ).

VENTILATION. See Heating and Ven¬ tilation.

VENTILATION, Medical Aspects of.

The air of rooms is frequently rendered more or less injurious by the accumulation of dust and other suspended matters, or by an undue proportion of one or more of the normal con¬ stituents of the air or by the addition to it of poisonous gases. Dust consists in varying pro¬ portions of spores, seeds, cellular tissue, hair, epidermal cells and other animal substances, of flint-like particles and of microscopic organisms, some of which may be disease germs. The gases which most often make the air impure are carbon dioxide, carbon monoxide, illuminating gas, hydrogen sulphide and sewer gas. The or¬ ganic nitrogenous matter thrown off from the lungs, the emanations from the skin and other impurities, mingled with carbon dioxide and watery vapor, give to the atmosphere of a room that odor which is so disagreeable to those who enter from the outer air. They are the cause of that close, oppressive sensation perceived so often in the unventilated rooms of tenements. Of the normal constituents of the air, oxygen is the vivifying principle. To diminish its nor¬ mal amount in a room by the combustion in stoves and lights and by the expired air min¬ gled with organic matters is to vitiate the atmosphere. To supply oxygen and to remove these impurities is one of the objects of venti¬ lation. An increase in the amount of carbon dioxide results from the combustion of any sub¬ stance containing carbon, from the decay and putrefaction of any animal or vegetable sub¬

stance, from fermentation and from the respi¬ ration of animals. But the amount of carbon dioxide in a room is an index of the amount of organic matter and the amount of this gas present is a guide to the respiratory impurity of the air.

The investigation of the air as to organic impurities is prolonged and

tedious, but an in¬ crease in the amount of carbon dioxide which proportionately diminishes the normal amount of oxygen is readily ascertained. Those who do not fully appreciate the conditions exhibit a tendency in cold weather to keep windows and doors closed, to put on weather-strips and to overheat apartments. Fresh air is kept out and the indoor air is fouled. Sore throats, con¬ sumption and various lung troubles result, while disease germs are afforded every oppor¬ tunity to develop. Many of the dangers arising from impure air may be obviated by suitable ventilation, by chemicals, heat and steam. Im¬ pure air undermines the health and changes the character of the blood. Suitable ventilation is the free admixture of outdoor air with that of apartments, but so modified as to temperature and velocity of current as to prevent cold drafts, which are injurious, especially to the feeble, the very young and the aged, for they lower the temperature of the body and produce internal congestions.

Ventilation should take place by night as . well as by day. In fact, night air is usually purer than day air and contains less carbon dioxide. Insufficient fresh air at night in the bedroom is often the cause of sleeplessness. The airing of one room by introducing the con¬ fined air from another is not suitable ventila¬ tion ; neither is it proper ventilation to draw the air from a cellar, or to rely entirely upon the air-chamber of a furnace. If possible the air should be drawn from above the street-level, in order that it shall be comparatively free from dust and other suspended matters. The air of a room should not only be free from any dis¬ agreeable odor, but also from a sense of close¬ ness. To maintain the air sufficiently pure for respiratory purposes, 90 cubic meters of fresh air per hour should be supplied to each in¬ dividual and each individual in health should have not less than 30 cubic meters of air-space. For the sick in hospitals even double this amount of air-space is none too much. Out¬ door air may be brought into rooms through one or more layers of fine wire gauze, woolen, cotton or linen cloth fitted in frames into the windows or arranged as screens before the open windows ; or it may enter through revolving metal wheels inserted into window-panes; or through small diagonal openings in the window-sashes ; or between the two sashes of a window, this being made possible by placing under the lower sash a board, occupying its whole width, and from three to six or more inches hieh ; or, finally, over a cloth fastened to the lower parts of the window-frame, the lower sash of the window being raised.

VENTNOR, vent'nor, England, a pleasure-resort on the southeast coast of the Isle of Wight, eight miles southeast of Newport. It is beautifully situated on a terraced site and has an excellent climate. Besides churches and chapels it has a Benedictine convent school ; a litcrar'

and scientific institution, with library

and museum ; Albert Hall ; convalescent homes and the usual conveniences of a seaside holiday resort, hotels, boarding-houses, esplanades, pier, park, *etc.* The permanent population of the urban district is about 6.500.

VENTRILOQUISM, the art of speaking in such a way as to cause a hearer to believe that the sound comes not from the person speaking but from a different source. The name orig¬ inated from the erroneous supposition that the sounds uttered were formed in the abdomen, whereas it is practice alone that produces the illusion to a high degree of perfection. The sounds are formed by the same organs as the emissions of sound commonly — the larynx, the palate, the tongue, the lips, *etc.* The art of the ventriloquist consists merely in this : After drawing a long breath he breathes it out slowly and gradually while he talks, ingeniously modi¬ fying the sound of the voice by the muscles of the larynx and the palate ; besides this he moves his lips as minutely as possible and by various contrivances diverts the attention of his audi¬ tors. This art was known to manv of the ancients, and appears to antedate recorded his¬ tory. It is practised by wandering magicians in many semi-civilized countries and is a com¬ mon form of entertainment on the vaudeville stage.

VENTURA, van-too'ra, G. D. Gioachino, jo-a-ke'no, Italian theologian; b. Palermo, 8 Dec. 1792; d. Versailles, 3 Aug. 1861. At 15. he entered the Jesuit college of his native city and subsequently was received as a novice by the Theatines. Having been admitted to holy orders as general secretary ot the order, he con¬ tributed largely to its restoration, and published ˆLa Causa dei Regolari al Tribunale del Buon Senso.ˆ He then was made censor of the press and member of the royal council of public instruction for the kingdom of Naples. He be¬ came distinguished for his funeral orations, one of which, on Pius VH, gained him the name of the ˆItalian Bossuet.® In 1824 he was ap¬ pointed general of the order of the Theatines, fixed his residence at Rome and was presented to the chair of ecclesiastical law in the Uni¬

versity of Rome. In 1828 he publishe_d his work ˆDe Methodo Philosophandi,ˆ in defense of the Christian or scholastic philosophy. This was bitterly attacked by his old friend, the Abbe Lamennais ; and, wearied of controversies, Ventura quitted Rome and spent 10 years in retirement. During this period he preached his finest sermons, including the funeral sermon of O'Connell, the liberal opinions advanced in which gave him great influence with the people. In 1848 the government of Sicily made him Minister Plenipotentiary to the court of Rome. On 4 May he left Rome and retired under the protection of the French to Civita Vecchia and afterward to Montpellier, in France. Here he wrote ˆLetters to a Protestant Ministerˆ (1849). Settling in Paris, he drew crowds to the churches of the Madeleine and Saint Louis d'Antin by the eloquence and originality of his discourses. At Paris also he published ˆHistoire de Virginie Bruniˆ (1850) ; ˆLes Femmes de I'Evangileˆ (1853) ; ˆLa Raison Philoso- phique et la Raison Catholiqueˆ (1852) ; ˆEssai sur rOrigine des Ideesˆˆ (1853) ; ˆLa Femme Catholiqueˆ (1854) ; ˆL'ecole des Miracles, ou Ics Qr'.uvres de la Puissance et de la Grandeur

de Jesus Christˆ (1854-55) and ˆLe Pouvoir Chretienˆ (1857).

VENTURA, ven-too-ra. Cal., city, county-seat of Ventura County, on the Pacific Ocean and on the Southern Pacific Railroad, about 70 miles west by north of Los Angeles and 400 miles south of San Francisco. The name of the post office is Ventura. The legal name of the city is San Buenaventura, from the name of the old Spanish mission established by the Franciscan Fathers in 1782. This mission was next to the last to be built by Father Junipero Serra and is still in use. The city is the centre of an excellent county and State highway sys¬ tem. It has rail and ocean transportation facilities and is a shipping point for the many agricultural industries of the surrounding sec¬ tion. The principal products are beans, sugar beets, oranges, lemons, apricots and English walnuts. In the county are rich oil fields. The city has light, gas and water plants, a fine court¬ house, city and county libraries, good hotels and an up-to-date bathhouse with beach at¬ tractions. Schools and church facilities are excellent. Pop. 4,342.

VENUE, in law, the place, county or dis¬ trict where an action is to be tried and whence juries are to be summoned for trial of causes. In local actions, as of trespass and ejectment, the venue is to be from the neighborhood of the place where the lands in question lie; and in all real actions in the United States the venue must be laid in the county where the property is for which the action is brought. Where a

defendant verily believes that he can¬ not receive a fair trial in the county where action is brought against him he is entitled to ask for a change of venue to a locality where there are no prejudices against him or his case. The convenience of witnesses who mav be called is another reason for granting a change of venue. See Jurisdiction.

VENUS, the Roman name of the goddess of love, identified by the Romans with the Greek goddess Aphrodite. In the Hliadˆ she is described as the daughter of Zeus and Dione, but Hesiod represents her as the offspring of Uranus, born among the foam of the sea. She surpassed all other goddesses in beauty and hence received the apple which was to be awarded to the most beautiful by Paris. She was the wife of Hephaestos (Vulcan), but would scarcely be considered a faithful consort, as she bestowed her love on the gods Ares, Dionysos, Hermes and Poseidon, and the mortals Anchises and Adonis. Among her children were Eros (Cupid), Anteros, Hymen and Hermaphroditus. She had the power of granting beauty and irresistible charms to her votaries. Among plants the myrtle, rose, poppy, apple and other fruits were sacred to her, and among animals the dove, sparrow, swan, swal¬ low, ram, hare and tortoise. The chief places of her worship in Greece were the islands of Cyprus and Cythera. Before she was identified with the Greek Aphrodite, Venus, the Roman goddess, was one of the less prominent divinities in the religion of the Romans, yet her worship seems to have been established in Rome at an early period. Here several temples were erected to her at different times and under dif¬ ferent names. In the best days of art this god-VENUS — VENUS' GIRDLE

dess was sometimes represented draped, at other times nude. The most celebrated ancient statue of Aphrodite was that in Cnidus by Praxiteles; there are copies of it in the Vatican and at Munich. Consult Cayley's ˆClassic Myths in English Literatureˆ (Boston 1911).

VENUS, in astronomy, the second planet in order of distance from the sun. The mean dis¬ tance of Venus from the sun is 67,200,000 miles; its orbit has an eccentricity of .00686 and the plane of its orbit is inclined to the plane of the ecliptic at an angle of 3° 23′ 35″. It completes one revolution about the sun in 224.7 days and as its orbit lies wholly within the orbit of the earth the planet shows phases as seen by us, being seen full when it is at its greatest dis¬ tance beyond the sun, half full when farthest to the left or right of that body and new when between the sun and the earth. During its motion around its orbit its distance from us varies enormously and hence also does its

ap¬ parent size. When at its greatest distance, of 161,200,(X)0 miles, its apparent diameter is but 9”. 5, while at its nearest approach it is but 24,500,000 miles away and its apparent diameter then is 65”.2. It is only when near the former position that the illuminated hemisphere is al¬ most entirely turned toward the earth; as the planet draws nearer, this hemisphere is steadily replaced by the dark one, so that near the time of closest approach we sec the planet only as an exceedingly narrow crescent. This is why, notwithstanding the fact that Venus draws nearer the earth than do any of the other planets, we nevertheless view it under much less favorable conditions than occur when an outer planet reaches its position of closest ap¬ proach.

The planet Venus more closely resembles the earth than does any other body in our solar system. Its diameter is but 7,700 miles, its sur¬ face gravity is 0.8 of that on the earth and it is surrounded by an atmosphere of considerable density. This last is made evident by the fact that as Venus approaches the crescent phase the horns extend far beyond the 180° points ; when very near new, a thin, bright ring due to its atmosphere has, in fact, several times been seen completely encircling the darkened ball. It is another evidence of an atmosphere that the brilliance of the disc is greatest at the limb and falls off very rapidly as the terminator is approached ; twilight effects, also, have been observed along the terminator for more than a century. As a result of the presence of this atmosphere, our knowledge of the surface markings of Venus is practically nothing. Many drawings showing shaded areas, white areas or white spots have been made from a century ago until now, but whether a part of these markings may be continental or oceanic areas dimly seen through the overlying atmos¬ phere, or whether all are merely transient cloud forms we do not know. This uncertainty also prevents any certain answer being given to the important and interesting question of the time of rotation of the planet. The earlier ob¬ servers, and many of the modern ones, be¬ lieved that this was between 23 and 24 hours ; the observations of others led to a rotation period equal in length to the planet’s year, thus indicating that Venus keeps always the same face turned toward the sun. A different line

d

of attack is furnished by the utilization of the spectroscope to determine the velocities of dif¬ ferent portions of the planet's disc toward or away from the earth. (See Spectroscopy). But the observations are very difficult and thus far the results from different observatories are contradictory.

In the course of its motion about its orbit Venus sometimes passes between the earth and the sun and is seen crossing the bright disc of the latter as a round, black spot surrounded by a thin, atmospheric ring. These occurrences are known as Transits of Venus; when the transit is central, the passage occupies about eight hours. The earliest observed transit occurred in 1639; four have since occurred, in the years 1761, 1769, 1874 and 1882. Extensive observa¬ tions were made upon the last two for the pur¬ pose of determining the solar parallax but the processes then employed have since been super¬ seded by more accurate methods. (See Paral¬ lax). The next two transits of Venus will occur as follows :

2004, June 8, 9 a.m., Greenwich M. T. Dura¬ tion 6 hours 2 minutes.

2012, June 6, 1 a.m., Greenwich M. T. Dura¬ tion 6 hours 20 minutes.

Eric Doolittle,

Director, Flower Astronomical Observatory, University of Pennsylvania.

VENUS OF THE CAPITOL, a fam9us ancient Greek statue preserved in the Capitoline Museum, Rome. The goddess is represented undraped, with her arms in the position of the still more noted Venus of Melos, her drapery being cast upon a vase beside her.

VENUS FLOWER-BASKET, one of the

glass-sponges (q.v,).

VENUS FLY-TRAP, a plant. See Dionjea

Muscipula.

VENUS GENETRIX, j en'e-triks, a statue of Venus set up in a splendid temple by Julius Caesar in the forum laid out by him just after his victorious return from his campaign against Pharnaces (46 b.c.). He

took the title from the first words of the prooemium with which the poem of Lucretius “-De Natura Rerum, ˆ then only a few years published, opens — *Hˆneadum Genetrix,® ˆMother of the Descendants of iEneas.® Julius Caesar traced his descent with that of the whole Julia gens to lulus, the son of .ˆEneas, the latter being the son of Venus, according to the Trojan cycle, by Anchises. Hence the whole Roman people were called upon to look upon Venus as their divine an¬ cestor. Hadrian added the title ˆWictrix,® victorious, to that of Genetrix, in 134 a.d. and built a double temple to her honor near the Colosseum. The statue which is commonly known as ˆVenus Genetrixˆ is the copy of a Greek original, now in the Louvre, Paris ; but the marble statue of the same name in the Vatican is really the only copy extant of the bronze statue by Arcesilaus which stood in the temple built by Caesar in his forum, the Forum Julium,

VENUS’ GIRDLE, an oceanic ctenophoran (see Ctenophora) remarkable for its shape, which is that of a ribbon, sometimes nearly five feet in length and about two inches in width — a filmy, semi-transparent undulating creature long ago named Cestus Veneris, ˆˆgirdle of

Venus.ˆˆ This shape is due to thin wing-like expansions in a vertical plane from opposite sides of the body which is in the middle of the ˆribbon,® and conforms to the ordinary ctenophoran, especially when young. Two of the ciliated swimming plates are extended along the upper and lower edge of the ribbon, and the creature swims by the aid of them and by an undulatory action. This curious and elegant jellyfish occurs frequently in warm seas, at all distances from land.

VENUS OF THE HERMITAGE, a

Parian marble antique statue discovered in Rome in 1859, and now in the Hermitage, at Petrograd. It has been only slightly restored and is a close replica of the Venus of Medici, with a somewhat less conscious pose.

VENUS' LOOKING-GLASS, a very pretty little annual plant, Specularia speculum, of the Campanulacese, which has long been a favorite in flower-gardens, and is a native of cornfields in the south of Europe. It has brilliant blue, white, or violet, Jlowers, which fold up in a pentagonal manner toward evening. This name has been extended to the whole genus. The familiar American species is S. perfoliata, a more or less pubescent, stiffly erect herb, having crowded orbicular or broadly ovate leaves, crenulate, diminishing in size toward the top, and clasping the stem closely with their cordate bases. The later rotate violet-blue corollas peer out from the upper axils, so that the whole plant looks like a leafy spike of flowers. They frequent dry and sandy fields, are common, and are remark¬ able for their dimorphic flowers. .The primary and lower flowers are small and cleistogamous, the calyx being longer than the minute corolla of valvate, connivent petals, which apparently never open spontaneously, but are self-fertilized and mature perfect seeds. The fruit is an ob¬ long capsule opening by valves near the middle.

VENUS OF MEDICI, an antique statue which was found at Tivoli in the villa of Had¬ rian in the 17th century in 11 fragments, and was deposited in the Medici Palace, whence it passed in 1680 to Florence. In 1808 it was car¬ ried off to Paris and placed in the Louvre, but in 1815 was again taken to Florence, and now stands there in the Tribune of the Uffizzi. It represents the nude figure of the Greek God¬ dess Aphrodite, rising from the foam of the sea. There is much beauty and charm in the face and form. It belongs to the decadent period of Greek art during which the repose and somewhat hieratic action of Sculpture had given place to the expression of momentary emotion.

VENUS OF MELOS, a celebrated Greek statue now in the Louvre, Paris. It is so called on account of its discovery in the island of Melos in 1820. Its date is assumed to be be¬ tween the time of Phidias and thrt of Praxiteles, or about 400 b.c. The statue rep¬ resents a majestic woman, undraped to the hips standing with the weight on the right foot and with the head turned slightly to the left. The anns are broken off, and their original position has been much disputed. The statue is also called the Venus of Milo.

VENUSBERG, vVnoos-berg. See Tann—

HAUSER.

VERA CRUZ, ve-ra krooz (Sp., vVra krooth), or VERACRUZ, Mexico, a

state bounded by Tamaulipas on the north, by the Gulf of Mexico on the east, by Oaxaca on the south, and by San Luis Potosi, Hidalgo and Puebla on the west. The area is about 30,000 square miles, and it is mostly a mountainous region, with a narrow border of hot and -un¬ healthy coast below the Sierra Madre range, which occupies its central and western por¬ tions and rises to a height of more than 12,- 000 feet above sea-level. At elevations of more than 3,000 feet, the climate is comparatively healthful and temperate, and the vegetable prod¬ ucts in their variety correspond to the various conditions of temperature and humidity. Thus, cereals are grown in the state, as well as sugar¬ cane, cotton, tobacco, cacao, coffee and vanilla ; and stock raising is carried on successfully. The natural pasturage lands in the Huasteca Potosina region are specially fine, and Vera Cruz shares them with Tamaluipas and San Luis Potosi. Mineral products are silver, gold, coal, copper, lead, iron, mercury, asphalt, marble, petroleum, and the precious stones, opals, amethysts, *etc.* But the importance of the state rests mainly upon its commercial relations with other sections of the republic, with the West Indies and South and Central America, and with the western European nations. The total annual value of imports and exports and of domestic trade is estimated at $100,000,000, many of the articles that Mexico sends to for¬ eign countries or receives from them passing through the open ports mentioned above. A list of the industrial establishments includes iron foundries, cotton, paper , woolen and saw¬ mills, and manufactories of chocolate, wax matches, *etc.* The capital city is Jalapa (q.v.). Pop. about 1,250,000.

VERA CRUZ, Mexico, the most important port on either coast of the republic of Mexico, on the Bay of Campeche, and the Mexican Railway, about 200 miles from Mexico City. As the spot whereon the Spaniards first set foot on Mexican soil, it possesses exceptional interest. The history of the ˆHeroic City® dates from the landing of Cortez, on 22 April 1519. It was not until 1615, almost 100 years later, that the title and privileges of ˆˆcity® were bestowed by Philip HI. Here the republic was proclaimed on 22 Dec. 1822, by Santa Ana. The city was bombarded by the United States forces in 1847. It had been assaulted by the French in 1838, and again in 1861. In 1914 United States troops occupied the city for many months to maintain order and protect American lives and property. The expenditure of $25,000,000 by the government in improv¬ ing the harbor the area of which is 570 acres; the building of four railways — the Mexican, the Interoceanic, the Veracruz and Pacific and the Alvarado, to its doors ; the excellence of its steamship service and the recent establishment there of headquarters for its lightTiouse service, by the federal

government, have made the city a very important element in the commercial and industrial growth of the country. The an¬ nual imports and exports exceed $90,000,000 value. At a manufacturing and wholesale point the city is rapidly advancing. It is par¬ ticularly noted for the manufacture of cigars. Lage quantities of ore, chicle, dye woods and

hides are exported. The principal buildings are the federal custom house ; the new headquarters of the lighthouse service; the church of San Francisco; the old churches of San Domingo and San Augustine, now occupied by a firm of wholesale merchants ; the Hospicio Zamora ; the military hospital ; the Hospital of San Sebastian, and several extensive cigar manu¬ factories. The famous fortress of San Juan de Ulua occupies a conspicuous position near the entrance to the harbor. The Alameda and several fine plazas provide breathing places for the public. In one of these is a bronze statue of Don Manuel Gutierrez Zamora. There are military barracks in a remote section. The financial institutions of the city are the Mercan¬ tile Bank, with $2,000,000 capital, the Veracruz Banking Company, a branch of the National Bank and an agency of the Bank of London and Mexico. Pop. about 42,000.

VERA CRUZ, Capture of, in the Mexican War. While the battles of Palo Alto, Resaca de la Palma, Monterey and Buena Vista (qq.v.) were being fought, an expedition was being organized by Gen. Winfield Scott (q.v.) to strike inland from the coast and capture Mexico City. Early in March 1847 Scott's 12,000 troops were landed at a point three miles south of Vera Cruz, and on 10 March the in¬ vestment of the city was begun, the troops under Gen, William J. Worth (q.v.) occupying the sandhills, while to the northward, carrying the line of investment around the city to the shore north of it, were the divisions of Gens. Robert Patterson and David E. Twiggs (qq.v.), Much time was lost in bringing up siege guns, mortars, etc., and therefore Scott was not pre¬ pared to begin the bombardment for some time. The doomed city was surrounded on the land side by an almost unbroken line of bastions and redans mounting 100 guns. In the Gulf of Mexico, on a reef about a mile off shore, was the stone castle of San Juan d'Ulloa (or Ulua) built in 1582 at enormous cost, garrisoned by 1,000 men and defended by 128 guns. On 18 March, when the city refused to surrender, Scott permitted the noncombatants to retire, and four days later began the bombardment. Aided by the fleet Scott hurled shot and shell into the city for the next four days and nights, 3,000 90-pound shells and as many shot, chiefly 32-pounders, being thrown frorn the

American guns. The provisions in the city soon began to run low and On the 24th the French, Spanish and British consuls sent a joint note to Scott requesting him to allow the foreigners, both male and female, and the Mexican women and children to leave the city but Scott re¬ fused, since sufficient warning had been given before the bombardment began. Firing was then resumed, but the next day, the 25th, a flag of truce appeared, and after four days of negotiations the city was surrendered, with the castle of Ulloa. During the siege 400 of the garrison were killed and 600 wounded and between 400 and 600 of the inhabitants had per¬ ished. Appointing Worth temporary governor, Scott resumed his march, subsequently fighting the battles of Cerro Gordo, Contreras, Churu-busco, Molino del Rey and Chapultepec (qq.v), and finally entering Mexico Citv in triumph. Consult Cooper, J. F., ˆ Naval Historyˆ (Vol. Ill, pp. 83-90) ; Jay, William, < Mexican Warˆ ;

Ladd, H. O., <The War with Mexico> (pp. 207-216) ; Maclay, E. S., ˆHistory of the Navyˆ (Vol. II, pp. 178-185) ; Maury, Dabney H., Hˆecollections of a Virginian in the Mexi¬ can, Indian and Civil Warsˆ (pp. 31-35) ; Schouler, James, ˆUnited Statesˆ (Vol. V, pp. 38-47) ; Scott's ˆMemoirsˆ (Vol. II, pp. 400-428) ; Wright, M. .J., ˆLife of Scottˆ (pp. 162-172) ; Wiley and Rines, ˆThe United Statesˆ (Vol. VII, pp. 229-231).

VERAGUA, va-ra'gwa, Duke of, dukedom created for the lineal descendants of Chris¬ topher Columbus : first borne by his grandson, Luis Columbus, in 1536. It was next inherited by Diego Columbus, great-grandson of the dis¬ coverer, upon whose death without issue in 1578 the direct male line of Columbus became extinct. The title was 30 years later settled upon the descendants of Isabel, sister of Luis, the first duke, and upon the extinction of that line in 1733, passed to the descendants of Francesca, sister of Diego, the second duke. The 13th incumbent in descent from Chris¬ topher Columbus, b. Madrid, Spain, 1837, was, in 1893, the guest of the United States govern¬ ment at the opening ceremonies of the Colum¬ bian Exposition, and was received with high honors by the American people.

VERATRINE, or CEVADINE, C32H490«N, a vegetable alkaloid found in certain species of Jˆcrainiin or Hellebore, and along with sabadil-line and veratridine, in sabadilla seeds. A col¬ orless crystalline powder, very acrid and highly poisonous. It is almost insoluble in water or alkalies, slightly so in ether, very soluble in alcohol. It is prepared by extracting the finely pulverized seeds with alcohol

containing 1 per cent of tartaric acid. This extract is first evaporated to a syrup and then diluted with water to precipitate the resin. To the remain¬ ing clear solution soda is added in slight ex¬ cess, and this mixture is then shaken with ether. The ether solution is separated and mixed with a light petroleum oil and filtered. The filtrate being allowed to evaporate spontaneously, crys¬ tals of cevadine separate; these are purified by recrystallization from their solution in alcohol. It is used somewhat in medicine as a liniment or ointment for external application in cases of acute neuralgia. A very small amount ‘getting into the nostrils causes violent sneezing. In homoeopathic practice it is administered inter¬ nally in high dilution, in remittent fevers.

VERATRUM (Lat. hellebore), a genus of liliaceous plants, commonly known as helle¬ bore (q.v.).

VERAZZANO, va-rat-sa’no*, or VER-RAZANO, Giovanni da, Italian navigator and explorer in the New World: b. near Florence, about 1480; d. Pico, New Castile, Spain, No¬ vember 1527. He is described as having traded with the Orient, and about 1505 entered the maritime service of France. By that govern¬ ment he was employed as a privateer, or pirate, for the capture of Spanish prizes. In 1523 he took the treasure-ship sent by Cortes to Charles V. On 17 Jan. 1524 he sailed from the Madeiras on an exploratory voyage to North America. He discovered land near Cape Fear, discovered also a bay — either New York or Narrangansett — went northeastward to lat. 50° N. and then returned to France. He was

later captured and executed by the Spaniards. The only known evidence for his discoveries is a letter from him to Francis I, published in Italian by Ramusio in 1556, there being appar¬ ently no extant French original. The genuine¬ ness of the letter has been attacked; but is skil¬ fully defended in Brevoort’s ˆVerrazano the Navigatorˆ (1874). Consult also Murphy, ˆThe Voyage of Verrazanoˆ (1875) ; Da Costa, ˆVerrazano the Explorer > (1880).

VERBECK, Guido Fridolin, a citizen of no country but honored in

Holland, America and Japan; missionary, educator and statesman: b. at Zeist, in the province of Utrecht, 1 Feb. 1830; d. Tokio, 10 March 1898. He was edu¬ cated in the languages and humanities in the Moravian Academy at Zeist, often hearing the returned missionaries, especially Gutzlaff of China. He prepared for the profession of engi¬ neer in the School of Technology at Delft. Coming to America he was engaged as mechan¬ ical engineer in Wisconsin and Arkansas (1852-56), and entering the Theologic'^1 Seminary in Auburn, N. Y., graduated in 1859, and as the ^Americanized Dutchman^^ needed for the mis¬ sion of the Reformed Dutch Church in Amer¬ ica, in Japan, went out and settled at Nagasaki. The Japanese government called him to educa¬ tional work in 1863, and thenceforward for nearly 20 years he was in its service, training up many young men who afterward became the rulers of the nation. He organized the na¬ tional system of education, superintending the foreign teachers and instructors of the Imperial University in Tokio, served as secretary to the Genro-in, or Senate, translating the constitu¬ tions of European countries, the code Napoleon, Bluntschi's ^Stattsrecht^ and various bodies of laws and regulations. He was the originator of the idea of an imperial embassy around the world in 1872, and over one-half of its per¬ sonnel were his former pupils. He was one of the translators of the Old Testament into Jap¬ anese and a member of the New Testament re¬ vision committee. Unable to claim citizenship in Holland or the United States, the Japanese gov¬ ernment awarded him the unique distinction of permanent residence and protection. He wrote the ^History of Protestant Missions in Japan^ (1872).' Consult Werbeck of Japan; A Citizen of No Country > (New York 1900).

VERBENA, a name anciently applied to any herb used in religious rites, but now restricted to a genus of plants typical of the family Ver-benacecr. The species, of which about 110 have been described, are mostly annual and perennial herbs or shrubs distributed mainly in the Amer¬ ican tropics but extending northward in the United States, where some weedy species are common in the gardens and other tilled land. They are characterized by erect or trailing stems which usually bear opposite leaves and terminal spikes, sometimes panicles or corymbs of often showy flowers, for which some of the species have become widely popular as orna¬ mental garden plants. The European verbena or vervain (V. officinalis) is an annual herb with slender paniculate spikes of small purplish flowers. It was formerly in high repute in medicine and was probably introduced into' America for such purposes and cultivated by early settlers. It has become naturalized in some places along roadsides and waste places,

but is not a troublesome weed. The showy garden verbenas are derived mainly if not wholly from South American species, the first of which were introduced into cultivation be¬ tween 1826 and 1838. V. chamce dry folia, a bril¬ liant scarlet, V. phlogiflora, a rose or purple and V. incisa, another rose or purple, were the first introduced and V. teiicrioides, a white-flowered species, appeared in gardens in 1838. These four species are the most important, since they are the chief progenitors of the garden ver¬ benas, though two other species (F. canadensis and V. tenera) have apparently been employed by florists for hybridizing. Since the progeny of these hybrids rarely produce germinable seed, the species are believed to have had a very small influence upon the present garden forms. A Brazilian species (V. venosa) is a tuberous-rooted plant whose panicled, lilac, bluish-purple or sky-blue flowers are fragrant at night. Its tubers are stored over winter in cold climates. Verbenas thrive best in rather rich, deep, light, well-drained loam. If well exposed to the sun for at least part of the day and if the stems are pegged down so as to take root they should give a constant succession of bloom throughout the summer and until frost. Consult Bailey, ˆStandard Cyclopedia of Horti¬ cultureˆ (New York 1916).

VERBOECKHOVEN, ver-book'ho-ven, Eugen Joseph, Dutch painter ; b. Warneton, West Flanders, 9 June 1798; d. Brussels, 19 Jan. 1881. His father was a sculptor and taught him to emboss and to draw. In 1821 he pro¬ duced his first large canvas, ˆThe Cattle Mar¬ ket at Ghent, ˆ and the reputation he gained by this success enabled him to settle at Brus¬ sels, open a studio, and from 1847 put forth one after the other a series of animal pictures, especially landscapes with sheep, which re¬ ceived much applause from their careful, truth¬ ful drawing and the refinement and smooth¬ ness of their execution. Of his paintings seven are in Leipzig and three in the Berlin National Gallery. There are two fine examples of this painter's work in the New York Metropolitan Museum.

VERD ANTIQUE, verd an-tek', literally, ancient green, applied to ornamental stone, con¬ sisting mainly of serpentine and usually mottled with slight traces of dolomite, iron, calcite, chromium, *etc.* Very beautiful pedestals and columns are made from it. The stone is still common in Italy. The name is extended to old bronzes, verdigrised by exposure.

VERDANTI. See Norns.

VERDE, verd. Cape. See Cape Verde.

VERDI, ver'de (Fortunino) Giuseppe (Francesco), Italian composer: b. Le Roncole, near Busseto, Parma, 9 Oct. 1813; d. Milan, 27 Jan. 1901. His earlier musical education he received from a local musician of Le Roncole and Giovanni Provesi, maestro di cuppella of the cathedral of Busseto and director of the Societa Filarmonica, there. He wrote for this orchestra several marches, a symphony and other instrumental pieces now treasured in manuscript in the Busseto library. In 1831 he went to Milan to continue his studies, but upon his application for a scholarship at the Conservatorio was rejected ˆTor want of musi¬ cal ability, according to the report of the

director. He then studied composition and in¬ strumentation with Vincenzo Lavigna. Upon liis return to Busseto, he became conductor of the Filarmonica and organist of San Bortolom-meo. From 1838 he was again at Milan, where his first opera, ˆOberto, Conte di San Bonifacio,ˆ was presented with considerable success at La Scala (1839) ; ˆUn Giorno di Regnoˆ (1840), called ˆˆun bazar de reminiscences,ˆˆ was an utter failure, but ˆNabuccodonosorˆ (1842), to a Biblical libretto by Solera, was received so well as at once to establish his reputation. H Lom¬ bardiˆ (1843) and <Ernaniˆ (1843) , with libretto from Hugo's ˆHernani,ˆ were even more pro¬ nouncedly successful. The Austrian government in both cases made objections to the revolu¬ tionary ideas contained in the works. The po¬ litical demonstrations of the time were no doubt of aid to the composer, and, in fact, the name Verdi was employed by the patriot party as an acrostic for Vittorio Emanuele Re D'ltalia. ˆErnaniˆ was the first of Verdi's works to be produced in England. He was now kept busy supplying impresarios with operas. Most of these were inferior to his earlier successes. Perhaps the worst was H Masnadieri,ˆ which Verdi traveled to London to conduct (1847), but could not redeem. Yet with ˆRigolettoˆ (1851) he entered his most brilliant period. This, with HI Trovatoreˆ (1852) and ˆLa Traviata* (1853), are classed as marking his second manner. They reveal a great advance over ˆErnaniˆ in the treatment of both voice and orchestra. Their success in and beyond Italy was very great. They confirmed Verdi's reputation and they have remained incorpo¬ rated in the general repertoire of Italian opera. Then followed another series of semi-failures. ˆLes Vepres Siciliennesˆ (1855), written for the Paris Opera, to be produced during the Universal Exhibition, had, indeed, a somewhat temporary success, and ˆUn Ballo in Masceraˆ (1859) has been at intervals revived. Orsini having recently (13 Jan. 1858) made an attempt on the life of Napoleon, the scene of the latter was changed from Sweden to Boston, Mass., and one Riccardo, Earl of Warwick and colo¬ nial governor, was assassinated instead of Gustavus III. Verdi was now working out a new method of expression, liberated from the tra¬ ditional utterance of the Italian school. With ˆAida,ˆ on an Egyptian subject, written at the request of Ismail Pasha and presented at Cairo in 1871, he first declared his third manner, re¬

vealing to a considerable degree Wagnerian influence, without, however, surrendering the leading features of Italian music. The orchestral resources were greatly increased but the vocal score was still the major part of his scheme. A ˆRequiem Mass,ˆ his only non-operatic work of considerable importance, written in 1874 in commemoration of the death of Manzoni, applied this new manner to sacred music. It was the centre of much discussion, being at¬ tacked by von Biilow and defended by Brahms. A revised version of ˆSimone Boccanegra,ˆ a work which had failed in 1857, was presented with much success at Milan in 1881 and in 1887 ˆOtello,ˆ with a libretto by Boito, who had largely rewritten that of ˆSimone Boccanegra.ˆ Here and in ˆFalstaffˆ (1893), a comic opera, with a libretto also by Boito, there is an increase in dramatic characterization. In

1898 Verdi wrote four sacred works, a ˆTe Deum,ˆ a ˆStabat Mater,ˆ an ˆAve Mariaˆ and ˆLaudi alia Virgineˆ (words from Dante). Besides these and the Manzoni ˆ Requiem,ˆ he wrote for the most part little save operas and a string quartet (1873). A chronological list of his operas is as follows: ˆObertoˆ (1839; ; ˆUn Giorno di Regnoˆ (1840) ; ˆNabuccodonosorˆ (1842) ; H Lombardiˆ (1843) ; ˆErnaniˆ (1844) ; H Due Foscariˆ (1844) ; ˆGiovanna d'Arcoˆ (1845); ˆAlziraˆ (1845); ˆAttilaˆ (1846); ˆMacbethˆ (1847); H Masnadieriˆ (1847); HI Corsaroˆ (1848); ˆLa Battaglia di Legnanoˆ (1849) ; ˆLuisa Millerˆ (1849) ; ˆˆStiffelioˆ (1850) ; ˆRigolettoˆ (1851) ; HI Trovatoreˆ (1853) ; ˆLa Traviataˆ (1853) ; ˆLes Vepres Siciliennesˆ (1855) ; ˆSimone Boccanegraˆ (1857; rev. 1881); ˆAroldoˆ (revision of 'ˆStiffelio,ˆ 1857) ; 'Un Ballo in Maschera^ (1859) ; ˆLa Forza del Destinoˆ (1862) ; *ˆDon Carlos> (1867); <Aida> (1871); <Otello> (1887); ˆFalstaffˆ (1893); ˆQuattro pezzi sacriˆ (1898). In his work Verdiˆ was greatly aided by his wife, the famous prima donna, Giusep-pina Strepponi, whom he married in 1849, after she had made a successful appearance in several of his operas.

Bibliography. — Bellaiˆe, C, Werdiˆ (Paris 1911) ; Crowest, F., Werdi: Man and Musicianˆ (New York 1897) ; Garibald, F., ˆGiuseppe Verdi nella vita y nella arteˆˆ (Florence 1904) ; Pongin, ˆVerdi, an Anecdotic History of his life and works ˆ (1887) ; Perinello, C., ˆGiuseppe Verdiˆ (Berlin 1899) ; Roncaglia, G., Giuseppe Verdiˆ (Naples 1914) ; Sofferdini, G., ˆLe Opere di Verdiˆ (Milan 1901) ; Visetti, A., ˆVerdiˆ (New York 1905).

VERDICT, in law, the finding of a jury in a civil or criminal case legally submitted to them and later recorded. A verdict is general

when the jurors render a complete decision upon the facts as established by the evidence and properly apply the law thereto as presented by the charge of the court. A verdict is special when the jury merely find the facts in detail, leaving the court to apply the law. The jury may bring in a special verdict in criminal cases, but they are not compelled to do so in any case. A verdict which is illegal may be set aside in civil proceedings, but in criminal cases a ver¬ dict of acquittal is conclusive. A verdict must be unanimous or it is void. At present the re¬ strictions surrounding a jury while they are deliberating on a verdict are very much less severe than formerly.

In criminal cases a prisoner has the right to be present when the verdict is rendered and has the further right to ®polPˆ the jury; in other words, to call each juryman by name and ask him if the verdict found is his verdict.

In case a verdict may not be found until after adjournment of court for the day, the judge, may direct the jury to bring in a sealed verdict, which is delivered to an officer of the court and held until court reconvenes. By the weight of authority a prisoner charged with felony cannot waive the right to the verdict of a jury. The verdict is usually announced by the foreman of a jury in open court. In Scotland the verdict of ˆˆnot proven® is allow¬ able in criminal cases. This acts as a bar to a second trial on the same charge, but does not exonerate the accused.

VERDIGRIS, a basic acetate of copper that is prepared by exposing copper plates to the action of dilute acetic acid or weak vinegar. It is a blue-green amorphous powder, is very poisonous and is used as a pigment, as a mordant and to some slight extent in medicine. The green rust common on copper that has been long exposed to the atmosphere also bears the name. As a pigment it is useful, mixed with white lead and as an ingredient in copper paints. As a poison it irritates, the most familiar anti¬ dote being raw white of egg and warm milk.

VERDIN, or GOLDTIT, a small yellow bird {Auriparus flavtceps) of southern Cali¬ fornia and Mexico, which is one of the most at¬ tractive in habits and voice of the birds of that region. It is allied to the titmice.

VERDUN, ver-duh, France, a fortified town in the department of the Meuse, in a valley on the river of that name, 150 miles northeast of Paris. It has a citadel, the work of Vauban, and is defended by 11 detached. forts of modern construction which extend to Toul. Probably no city in Europe is more completely fortified. The ring of forts has a circumference of over 30 miles, with a diameter of 10 miles. There are 16 main forts and 21 smaller batteries in the circle. The arrangement presents a double front to the northeast and when the Germans invaded the first line they were subject to a cross fire from adjoining heights. The most important forts are Hardimont, Vaux, Lanfee, Mardi Gras, Eix, Moulsenville, Manezel and Chatillon. These overlook the Valley of the Meuse and have proved as impregnable as modern ingenuity could devise. The principal buildings are the cathedral, which dates from the 11th and 12th centuries, the bishop's palace, and the hotel de ville. The liqueurs and con¬ fectionery of Verdun are famous. The town was captured by the Germans (after a spirited defense) on 9 Nov. 1871. In the great war some of the heaviest fighting and most severe artillery fire the world has ever seen occurred around Verdun, which was long the farthest outpost retained by the French on the north¬ east front. It was tha stronghold of the Allies' right flank, and the German hordes sacrificed scores of thousands of men in re¬ peated assaults in the endeavor to 'break through, in which they were unsuccessful. See War, European.

VERE, ver. Sir Aubrey Hunt. See De

Vere, Sir Aubrey Hunt.

VERE, Aubrey Thomas. See De Vere, Aubrey Thomas,

VERE, Edward de, 17th Earl of Oxford, English wit and poet: b. England, 2 April 1550; d. Newington, Middlesex, 24 June 1604. He was educated at Cambridge, and at 12 suc¬ ceeded to the earldom . with its hereditary dignities, including that of lord great chamberlain of England. He became prominent at the court of Elizabeth when still a boy, took his seat in the House of Lords in 1571, and was subsequently a noted figure in court circles. His wit and poetical gifts made him a favorite with Elizabeth, who showered him with atten¬ tions; he was famous for his wild extravagance which eventually dissipated his patrimony; and as his years increased he became more

than ever eccentric, while his temper, never con¬

trolled, acquired a violence which endangered even his favor with the queen. As lord high chamberlain he presided at the trial of Mary, Queen of Scots, in 1586, and at that of the Earl of Arundel in 1589. He was the author of several popular comedies which have been lost, and his poetry displays much lyric beauty. Of the latter some 23 pieces have been proved as his work, though most of it has perished with his comedies. His extant verse was collected and printed by Grosart in ˆMiscellanies of the Fuller Worthies Libraryˆ (1872).

VERE, Sir Francis, English soldier, grand¬ son of the 15th Earl of Oxford: b. Crepping Hall, Essex, 1560; d'. London, 28 Aug. 1609. He entered the army in early youth, served under the Earl of Leicester in the Netherlands in 1585, and in 1588 his conduct at the defense of Bergen-op-Zoom won for him the honor of knighthood. He prepared the way for the cap¬ ture of Zutphen in 1591, was engaged in the taking of Nimeguen in that year, and in-1592 relieved Prince Maurice at Koevorden. He remained in the Netherlands' until 1595, and in 1596 he led the expedition against Cadiz. He was pgain ordered to Holland in 1597, engaged with Prince Maurice at Tumhout, and in 1598 was appointed governor of Brill and general of the forces in the Netherlands. At the battle of Niewport in 1600 he performed service which turned the tide of 'battle in favor of Maurice, but was severely wounded and compelled to re¬ tire from the field. In 1601-02 he defended Ostend with signal success though against great odds, and in 1606 returned to England, where he was appointed governor of Portsmouth and of the island of Portsea.

VERENDRYE NATIONAL MONU¬ MENT. A government reservation just south of Sanish on the Missouri River in Mountrail county, west central North Dakota. Its area is about one square mile and it includes Crow-high Mountain, a prominent butte from which observations were made by Verendrye, the French explorer of the Northwest and the first white man known to have entered what is now North Dakota.

VERESTCHAGIN, ve-resh-cha'gen, Va¬ sili, Russian painter : b. province of Novgorod, 25 Oct. 1842; d. on board the battleship Petro-pavlosk, 13 April 1904. He was educated at the naval school in Saint Petersburg, but devoting himself to painting, he entered the Saint Peters¬ burg Academy. In 1861 he traveled in Germany, France and Spain, and in 1864 he en¬ tered the £cole des Beaux Arts at Paris, where Gerome was his master. He joined the Cau¬ casian expedition

under General Kaufmann in 1867, and in 1869 went to Siberia. In 1874 he went to India with the Prince of Wales, and afterward settled in Paris. He took part in the Russo-Turkish War, and was wounded at Plevna. Subsequently he visited all the chief cities of Europe, as well as the United States, exhibiting his pictures. They are of immense size, extremely realistic, and treat chiefly of the horrors of war. Among his war pictures are ˆAn Unexpected Attackˆ ; ˆBefore the Victoryˆ ; ˆAfter Defeatˆ ; ˆAssault on Plevnaˆ ; ˆAfter the Assaultˆ ; ˆApotheosis of Warˆ ; ˆWounded Returningˆ • ˆOur Prisonersˆ ; ˆAll Quiet at Shipkaˆ ; ˆThe Route to Plevnaˆ ; ˆThe Re¬ treat from Moscowˆ ; ˆThe Forgotten Soldierˆ ;

and, his latest work, a fanciful picture of the battle of San Juan Hill in the Spanish-American War with Roosevelt as the hero. He also took up religious subjects, and his ˆFamily of Jesusˆ and Hˆesurrectionˆ attracted some attention. He wrote reminiscences, translated into Eng¬ lish, such as Werestchagin, Painter, Soldier, Traveler ˆ (1888) ; ˆNapoleon I in Russiaˆ (1899), *etc.* On the opening of the Russo-Jap¬ anese War he accompanied the Russian forces and on the sinking of the battleship Petropav-losk went down with the ship. Verestchagin was much more than a realist ; he was in essen¬ tials a poet of tragedy. By his great war pic¬ tures he brought home to national consciences the intense significance of the pain to the indi¬ vidual in its relation to the supposed interests of government.

VERGA, ver'ga, Giovanni, Italian author and dramatist : b.* Catania, Sicily, 1840. A lead¬ ing interpreter of Sicilian life, he was most widely known as the author, among numerous short stories, of ˆCavalleria rusticanaˆ used by Mascagni for the libretto of his popular oper¬ etta. His chief works are H Malavoglia ˆ (1881) ; and ˆMaestro Don Gesnaldoˆ (1889). See Cavalleria Rusticana; and for biography and bibliography consult Croce, B., in ˆ Critical (Vol I, Bari 1903).

VERGENNES, ver-jenz', Vt., city in Ad¬ dison County, on Otter Creek, and on the Cen¬ tral Vermont Railroad about 35 miles west by south of Montpelier, 22 miles south of Burling¬ ton, and seven miles from

Lake Champlain. In the summer there are regular steamboat con¬ nections with the lake ports. There is here a fall of 30 feet in Otter Creek. The city is the seat of the State Reform School, and has public and parish schools and a public library. There is one national bank with a capital of $150,000. The industries are connected chiefly with farm products. Vergennes was settled in 1766 and in 1788 was incorporated. It was the first incorporated city in the State. During the War of 1812 the city was an important naval depot ; the fleet of Commodore McDonough (q.v.) was fitted out here. Pop. (1920) 1,609.

VERGNIAUD, vern-y5, Pierre Victurnien,

French orator: b. Limoges, 31 May 1753; d. Paris, 31 Oct. 1793. He settled as an advocate at Bordeaux in 1781, and quickly gained a large practice and was elected a deputy to the Na¬ tional Assembly in 1791. His eloquence and the charm of his personality soon made him the leader of the Girondists, but he cared little for politieal intrigue, and was rather the orator than the statesman. Representing in the Con¬ vention the department of the Gironde, he sup¬ ported in the question of the king's trial, the proposal of Salle to make an appeal to the peo¬ ple. When the decisive moment came he voted for death, and as president it was his duty to announce the result. He opposed Robespierre and the party of the Mountain, but the (jiron-dist party fell 2 June 1793, and on 31 October he was guillotined, the last of the 21 who died together. Consult Lamartine, ˆHistory of the Girondistsˆ (1847); Vatel, Wergniaud: Man-uscrits, letters et papiersˆ (1875) ; Aulard, 'ˆLes Orateurs de la Legislative et de la Conventionˆ (Vol. I) ; the Lives by Touchard-Lafosse (1848), and Verdicnc (1866); Stephens, H. M.,

<The Principal Speeches of the Statesmen and Orators of the French Revolutionˆ (1892).

VERHAEREN, ver-ha'ren, Emile, Belgian poet: b. Saint Amand, near Termonde, 21 May 1855 ; d. Rouen, 27 Nov. 1916. His works com¬ prise over 40 volumes of lyrical and dithyram-bic verses, four plays, and some monographs on painters. Though his writings had long been familiar among a small circle in America and England, it was not until the European War drove him into exile across the Channel that his reputation spread; and he became the great¬ est exponent of universal ideals in European poetry. The universities of England, Scotland and Wales conferred honorary degrees upon him and the English press published poems and articles from his pen. His last work, ˆThe Red

Wings of Warˆ contains a graceful tribute to England. ˆToute la Flandre,ˆ a series of Flemish historical and legendary studies; ‘ˆLes Flamandesˆ ; ˆLes Tendresses Premieres,ˆ and ˆLes Aubesˆ (ˆThe Dawnˆ), are some of his best works. He was accidentally killed while attempting to enter a moving train. See Dawn, The.

VERHAS, ver-has’, Jan, Belgian painter: b. Termende, 1834. He was educated in his native town and under Nicaise de Keyrer, whose painting school at Antwerp he attended. Among his works may be mentioned ˆOn the Landing Bridge at Blankenberyheˆ (1885) and <The In¬ undation.ˆ He is one of the leading genre painters of the modern Belgian school.

VERJUICE, literally, green juice, applied to the sour juice of green fruit, especially from unripe grapes or crab-apples.

VERKOLJE, Johannes, Dutch painter: b. Amsterdam, Netherlands, 9 Feb. 1650; d. Delft, Netherlands, 8 May 1693. He was a pupil of Jan Livens, who, finding him possessed of abil¬ ity, set him to finish some uncompleted pictures of Ghorardt von Zeijl, with the result that later an original painting of Verkolje’s was mistaken for one of Zeijl’s. The influence of Livens is not shown in Verkolj’s work. He settled in Delft in 1672. His work for the greater part consists of portraits, though he painted in his leisure various mythological and historical sub¬ jects. His work includes ˆMother and Child, ˆ Louvre; ˆLady and Trumpeterˆ (1678), Dres¬ den Gallery; ˆCupid and Psyche, > Liechtenstein Gallery, Vienna; Wertumnus and Pomonaˆ (1678), Worlitz Gallery, *etc.*

VERLAINE, ver-lan, Paul, French poet: b. Metz, Lorraine, 30 March 18ˆ; d. Paris, 8 Jan. 1896. He was one of the earliest and most prominent of the so-called ®Symbolistes.® Among his first works were ˆPoemes Satur-niensˆ (1865) ; ˆLes Fetes Galantesˆ (1869) ; and ˆLa Bonne Chansonˆ (1870). His next volumes ˆSagesseˆ (1881) and ˆLes Poetes Inau¬ dits ˆ (1884), a volume of literary criticism, were followed by ˆJadis et Naguereˆ (1885) ; ˆRomances sans Parolesˆ (1887) ; ˆAmourˆ (1888) ; ˆBonheurˆ (1889) and ˆParallelementˆ (1890); ˆDedicacesˆ (1894) and ˆConfessions: Notes Autobiographiquesˆ (1895). Heiscredited with introducing new possibilities of rhythm into French as a poetic medium. His collected ˆWorksˆ were published in 5 vols. (Paris 1900). Consult Lemaitre, J., ˆLes ContemporainsP

(Paris 1889) ; Thorley, W., ˆPaul Verlaineˆ (London 1914).

VERMEER, fer-mar', Johannes (errone¬ ously styled Jan van der Meer of Delft), Dutch painter: b. Delft, 31 Oct, 1632; d. there, 15 Dec. 1675. He was a pupil of Leonard Bramer and of Fabricius and painted land¬ scapes, architectural views, with special care in the painting of figures to people such scenes. He also produced some portraits and genre pic¬ tures. While during his lifetime he filled a larger place in the contemporary art world and was dean of the Guild of Saint Luke at Delft, 20 years after his death he was almost for¬ gotten, and omitted from Dutch and French ˆLives of Painters,ˆ his very name up to 1816 being confounded with that of three other Dutch artists (Van der Meers). It has been ascertained that his father was Janssoon Ver¬ meer, and written documents amply prove that his pictures were sold at a high price at a time when Rembrandt became bankrupt and poverty prevailed in Holland, One of Vermeer's finest works is View of Delft ˆ (now at The Hague) ; Dutch Townˆ (crowded with fig¬ ures) which was sold in 1872 for $1,785; and among his genres may be mentioned ˆThe Musical Partyˆ ; ˆThe Guitar-playerˆ ; and ˆYoung Woman with her Servant.ˆ

/VERMEERSCH, ver-merch, Arthur, Bel¬ gian canonist and author : b. Ertvelde, East Flanders, Belgium, 26 Aug, 1858. He was edu¬ cated at the Episcopal College, Ertvelde, at the Jesuit colleges of Liege and Namur, and at the universities of Louvain and the Gregorian, Rome. In 1879 he entered the Society of Jesus; was ordained in 1889, and in 1892 was made professor of canon law and subsequently also of moral theology at the Jesuit scholasticate of Louvain. In 1904 Dr. Vermeersch was ap¬ pointed a collaborator in the codification of canon law ordered by Pope Pius X. In 1906 his writings on the Congo question attracted general attention. He was vice-president of the colonial section at the Catholic Congress of Mechlin in 1909 and in 1910 founded La Revue Congolaise. His published works are ˆManuel sociaP (2 vols.) ; ˆQuaestiones de Jus-titiaˆ ; ˆLa nouvelie Encyclique socialeˆ ; ˆLa question Congolaiseˆ ; ˆLes destinees du Congo Belgeˆ ; ˆLe Beige et la personne civileˆ ; ˆDe Prohibitione et Censura Librorumˆ ; ˆDe Re-ligiosis Institutis et Personisˆ (2 vols.) ; ˆDe-forma Sponsalium ac Matrimoniiˆ ; ˆDe Mod-ernismoˆ ; ˆActa Santae Sedisˆ ; ˆLes missions Catholiques au Congo Beige ˆ ; ˆLa peur de I'enfant dans

les classes dirigeantesˆ ; ˆL'interet et le devoir en Belgiqueˆ ; ˆLa question Flamandeˆ ; ˆLe probleme de la natalite en Bel¬ giqueˆ ; ˆMatrimonio e neomalthusianismo saggio ecligiososo medico-sociaiˆ ; and contributions to sociological and religious journals.

VERMEJO, ver-ma'ho, or BERMEJO, an affluent of the Paraguay. See Bermejo.

VERMES, ver'mez, a class-name in the system of Linnaeus under which he grouped as *worms® all the lower invertebrate animals ex¬ cept the arthropods (his ®Insecta®). The varied components of this heterogeneous or omnibus group were first separated by Lamarck, and later have been still more minutely classified, as increased knowledge dictated until now the

old Linnaean ®class® is found to consist of nine phyla, and only a small proportion retains the name *worms,® while ® Vermes® has disappeared altogether as a scientific term.

VERMICELLI, ver-mi-sel'i or ver-mi- cheri. See Macaroni.

VERMICULITES, a large group of mica¬ ceous minerals. The word is derived from the Latin vermiculari, ˆdittle worms,® and has been applied because of the peculiar property of ex¬ foliation which they possess. Some of the vermiculites exhibit this property in a very striking manner, unfolding when slowly heated, into curious curled filaments whose resemblance to worms seems more than fanciful. They are all hydrous silicates, formed by the alteration of the micas, chiefly biotite and phlogopite. They generally retain the eminent micaceous cleavage and pearly lustre of the original min¬ eral. The laminae are usually flexible, but not elastic. Included in the group are the minerals vermiculite, jefferisite and over a dozen others.

ˆVERMIFORM APPENDIX. See Ap¬ pendicitis.

VERMIGLI, ver-megJe, Pietro Martire.

See Peter Martyr.

VERMILION, S. D., city, county-seat of Clay County; on the Missouri River at the mouth ot the Vermillion and on the Chicago, Milwaukee and Saint Paul Railroad; about 34 miles northwest of Sioux City, and 28 miles southeast of Yankton, It was settled in 1859 by a colony from the Eastern States and was incorporated in 1877, it is an agricultural

and stock-raising region. The chief manufactures are flour, wagons, sash, doors and blinds, and dairy products. There is considerable trade in farni products and livestock. The principal public buildings are the county courthouse, the opera house, and the school houses. There are seven churches. The educational institutions are the State University, a high school, founded in 1880 ; Saint Agnes' Academy, public and parish schools, and a public library. The three banks have a combined capital of $150,000. The average amount of business annually is $700,000. The government is vested in a mayor and a council of eight members, elected biennially. Pop. (1920) 2,590.

VERMILION, a bright red pigment, or the color of this pigment, obtained from crystallized mercuric sulphide.

VERMILION RANGE. See Iron Ores, Iron Ore District.

VERMIN, a term comparable to ®weed,® signifying small animals obnoxious in some particular to human plans and operations. Ani¬ mals may be regarded as vermin in one place which in another would be classed as innocent or even beneficial. Thus among English game-keepers all the weasel tribe — stoats, polecats and weasels — are typical vermin, because they kill game and eat eggs of preserved pheasants, etc., whereas in America they are regarded as useful fur-bearers; and in the United States rats, mice and the various «gophers® are the animals which mostly fall into that class. Rats and mice, especially field mice, may increase in such numbers as to destroy large quantities of grain and thus become decidedly destructive vermin, while serious loss may also be caused to

the farmer by hares and burrowing ground-squirrels, etc., especially in the Western States. Among birds, some of the hawks (see Hen-hawks) and owls are occasionally destructive to poultry and game and have been classified as vermin ; but as they feed chiefly on insects and mice, they are on the whole beneficial to man by repressing animals which are far more typically named vermin than themselves.

In the economy of nature a balance of power is rigidly observed and in the maintenance of such a balance the so-called vermin play an important part. The lemmings (q v.) present an instance of how the equilibrium is naturally restored. It is rarely needful or wise, at any rate with reference to birds and small mam¬ mals, for man to interfere when a case like that of the prairie-dogs (q.v.) of the western United States arises ; where repression is necessary, it is usually the result of previous human interference with nature's arrangements. Agri¬ culturists are beginning to recognize that the birds which visit their fields are of extreme value in the repression of the insects and their larvae which feed on the tender shoots of the grain. But even admitting that the fields may occasionally suffer from the visitation of com¬ mon birds, the damage inflicted thereby is but trifling when compared with their services in repressing the insect species. Even the much persecuted mole has been shown by Darwin to be a thorough fertilizer of the ground and the earthworm itself acts in this way also. Both animals, in fact, by their operations in turning over the soil, in bringing fresh layers to the surface and in breaking the clods, tend to open up the ground and thus to ensure favorable conditions for the germination of the seed. The despised and hunted rats al may be shown like the whelks and crabs of the sea, to play no unimportant part in nature's sanitary arrange¬ ments, by the wholesale destruction of offal and garbage in which they indulge. In America the use of the term vermin is often applied mainly to obnoxious insects, as fleas, bedhugs, lice, itch-mites, etc., that seek to live on human beings.

VERMONT, a North Atlantic State of the North American Union, situated in the north¬ western corner of New England. It is bounded on the north by the province of Quebec, the border line corresponding

nearly to the latitude of 45° 0′ 43″, but the dividing line does not coincide exactly with the parallel as it is not quite straight, being here north of it and there south, though but very litfle. The eastern boundary was fixed many years ago as the west bank of the Connecticut River at low water. Since this was done the river has in some places changed its course more or less and from this difficulty has arisen between New Hampshire and, Vermont and the matter is still undecided. On the south Vermont is separated from Massa¬ chusetts by the parallel of 42° 44’, while on the west is New York, from which Vermont is separated for 100 miles by Lake Champlain. Both the eastern and western borders of the State are irregular, but as a whole the area lies between long. 71° 33’ and 73° 25’ W. The northern border is 90 miles long and from this south the width decreases until at the Massa¬ chusetts line it is 41 miles. The length is 158 miles. The area is 9,565 square miles. The population in 1791 was given as 30,000 from

which it has slowly increased to (1920) 352,428. Vermont is thus one of the smaller States and this fact should be remembered when its re¬ sources and products are compared with those of other States. Notwithstanding this it is probably true that no other State has through the migration of its citizens to all parts of the United States, so deeply affected the character of other States where by reason of industry, thrift and intelligence they have become pros¬ perous and influential. The Vermont delega¬ tion in Congress has always exercised a power quite out of proportion to the size of the State. The capital of Vermont is Montpelier in Wash¬ ington County, a city located near the geo¬ graphical centre of the State.

At first the whole area of what is now the State of Vermont was claimed by New York and included in Albany County, the courts of that county exercising jurisdiction. In 1768 a tract east of the Green Mountains was named Cumberland County. This included approxi¬ mately what is now Windham and Windsor counties. Two years later Gloucester County was defined north of Cumberland and in 1772 on the western side of the mountains Charlotte County was formed. Finally, beginning in 1779 the present division of the State into 14 counties was made in the order given under ®State Gov¬ ernment.® The coat-of-arms adopted in 1862 consists of ®a landscape of green occupying half of the shield, on the right and left in the background are high mountains, Mansfield and Camel’s Hump, in blue with a sky

of yellow. From near the base, extending nearly to the top of the shield, is a pine tree in green between yellow sheaves of grain and a red cow on the left side of the field.® The crest is a buck's head on a scroll of yellow and blue ; the motto is ˆWermont, Freedom and Unity®; the seal is the same as the shield, but circular and without any crest and the motto encircles the border.

Climate. — The climate of Vermont is, as is common in the north temperate zone, very changeable and subject to great differences. There is also considerable difference between the mountainous and less elevated portions of the State. The Champlain Valley, which in¬ cludes most of that portion west of the Green Mountains, is more mild than elsewhere. Everywhere the winters are long and often cold while the summers are warm, but not often, nor for more than a few days, hot. The average temperature at the weather bureau in Burlington for five years (1913-17, inclusive) was 43.2° F. For each month the mean tem¬ perature for the «ame five years was as fol¬ lows : January, 19.2°; February, 15.9°; March, 27°; April, 29°; May, 52.2°; June, 63°; July, 69° ; August, 66.3° ; September, 59° ; October, 49°; November, 35°; December, 21.3°.

In most parts of the State the thermometer (Fahrenheit) in winter occasionally falls as low as 24° or lower and at times in midsummer it may rise to 90° or more, but these are un¬ usual extremes and of short duration.

Severe storms are uncommon. Notwith¬ standing the uncertainty of the climate, the longevity of the inhabitants is reported as above the average for the whole country.

The rainfall is from 30 to 40 inches. During the winter the ground over most of the State is covered with snow and there may be good

sleighing for three months or more, but some¬ times, in the western part especially, there is little good sleighing.

Physiography. — As has been shown, Ver¬ mont is long from north to south, narrow from east to west and the main physical features have a north and south trend. The Green Mountains dominate the State and have determined its physiography in a large degree. These moun¬ tains enter from Canada in two irregular ranges, uniting in one about the middle of the State and continue into Massachusetts. The range culminates in Mansfield, one point of which, the chin, is 4,406 feet above sea-level. By the range the whole State is divided into an eastern and western part and, while it is easy to pass from north to south, it is usually very difficult to find a passable road across from east to west. The mountainous character of Vermont is shown by the fact that, aside from innumerable smaller mountains and hills, there are in the State seven peaks over 4,000 feet, more than 40 over 3,000, more than 100 over 2,000 feet above sea-level. The Green Mountains are well-named for nearly all are clothed completely by forests. The trees at and near the tops of these mountains are mostly black spruce, though there are other conifers intermingled to some extent with these such as balsam fir, white spruce, cedar. Below the summits, covering the sides of the mountains, are all sorts of deciduous trees, that grow in. a northern temperate climate, especially birch, beech, maple, *etc.* So dominating are the Green Mountains that some part of the range is in sight from nearly every town in the State, but these are not the only elevations. Between them and the New York border is a consider¬ able range, the Taconics, which extend from somewhat north of the middle of the State south into Massachusetts. The principal moun¬ tains of the Taconic Range are Equinox, 3,816 feet ; Bear Mountain, 3,290 ; Dorset, 3,804, and others 2,000 to 3,000 feet high. A third series of elevations is seen in the Red Sandrock Hills. These do not form a range but are simply a few isolated hills, most of them less than 1,000 feet high, though one. Hog¬ back, is at the highest point, 1,850. Cobble Hill in Milton, Mount Philo in Charlotte and Snake Mountain in Addison County, are the best known of these. They are probaby remnants of a great mass of lower Cambrian sandstone with a little shale and quartzite, most of W'hich has been carried off. All of these elevations are near Lake Champlain, that is, they are along the extreme western border of the State. Between the Green Mountains and the Connecticut River there is a series of low mountains or hills

which extend nearly the whole length of the State, but only as separate elevations usually at a considerable distance from each other. These are the Granite Hills such as Burke Mountain, Robeson Mountain, Millstone Hill, Black Mountain, *etc.* From them come the granite which is so important an item in the industries of the State. One mountain, Ascutney, is in a class by itself, as it is of unique structure, being composed of material unlike that found elsewhere. The ^^Windsor Green Granite^^ is a syenite from this mountain.

Nestling in hollows among the numerous mountains are many lakes and ponds, prob¬

ably not less than 400 in all. Most of these are small, less than two miles long and usually narrow, but a few, as Willoughby, Dunmore, Bomoseen and Saint Catherine are several miles in length and breadth. All of these bod¬ ies of water are very attractive and many wild and romantic.

Four rivers of considerable size flow into Lake Champlain, the Missisquoi, Lamoille, Winooski and Otter. The White, Passumpsic, West and others smaller, flow east into the Connecticut and several small streams enter Lake Memphremagog on the north. Along the valleys of these streams there is much level and fertile land and everywhere charming scenery. It may easily be understood that this delightful combination of mountains, lakes, rivers and the less frequent plains gives a character and variety to the physiography of Vermont such as for restful beauty can scarcely be equaled. Excellent roads make much of this easily accessible to the tourist.

Geology. — The geological features of much of Vermont are very complex and often ob¬ scure in detail, but the general structure has been satisfactorily made out. Practically the whole of what is now Vermont was formed as rock by the end of Ordovician time. By far the greater part of the rock is Cambrian and Ordovician but there is some pre-Cambrian to be seen and very likely there is more, com¬ pletely covered. Thus Vermont is geograph¬ ically one of the oldest portions of the United States. The oldest rock, as would be expected, is found in the axis ’of the Green and Taconic Mountains, but while probably this old rock exists throughout these ranges, it is found at the surface only in a few places, the great mass of these elevations being highly metamorphic Ordovician material. The Red Sandrock Hills as before stated, are Lower Cambrian and the Granite Hills are probably upthrusts of volcanic rock formed in the Devonian. In the immediate

vicinity of Lake Champlain and on its islands unchanged beds representing Lower Cambrian and all the groups of Ordovician from Beek-mantown to Utica are well-displayed and often full of characteristic fossils, but in other parts of the State fossils, though occasionally found in limited number, are rare and mostly wanting, the rocks being schists, slates, gneiss and simi¬ lar rocks. The most abundant rock of the Green Mountains is gneiss ; formed, as has been stated, by metamorphic action from older stratified beds. There is a small strip of Tertiary, best seen near Brandon, but except very small areas, no beds appear to have been deposited until the Pleistocene. It is, however, indicated by the structure of some of the granites that these were solidified under pressure of overlying masses which, now wholly carried away, may have been of some age not now represented in Vermont.

If what has been stated above be true then for an interval of time almost incalculable the surface of Vermont lay exposed to erosional agencies by which it must have been greatly modified, for, except the narrow band of Terti¬ ary mentioned, there are no strata between the Ordovician and the Pleistocene. These latter deposits are everywhere the conspicuous fea¬ tures of the surface below the hills and moun¬ tains.

The great ice-sheet of the Early Pleistocene

and the floods that followed its melting have left abundant evidence of their activity every¬ where. Whether there was a single movement of the ice over the surface or several cannot be determined. There was one so great that if there were others before it, as in many parts of the country, all traces of them have been obliterated and we have traces of but one, that of Later Wisconsin time. By the age-long erosion before the Pleistocene and the more rapid wearing and tearing of the rocks during glacial activity enormous quantities of solid rock were crushed, ground, worn to small bits and this loose material was seized by the tor¬ rents that followed the melting of the ice and distributed in sand hills, plains and deltas, gravel mounds, clay banks and all the rest of the many and plain evidences of the work of ice, water and atmospheric forces during long geological periods.

Mineral Resources. — Although mines of iron, copper, gold, manganese have in past years been opened and worked more or less in Ver¬ mont, none of them have in the long run been profitable, though iron and especially copper mines have for a time paid for working and there are still a few deposits of copper (Chalcopyrite) which are active. Asbestos has been mined to some extent. Talc is now mined more than ever before. There is good promise of increased work at these mines and during the last few years Vermont has produced more talc than any other State. Kaolin, ochre and fire clay are dug and purified, ready for market at Brandon, Bennington and several other lo¬ calities. These industries are small when com¬ pared with the very large amount of marble, granite and slate which is annually quarried and sold. For more than a century Vermont has produced these materials in far greater quan¬ tity than any other State except Pennsylvania, which has exceeded this in slate. For many years the marble sold from Vermont was from 80 to 85 per cent of the entire sales for the whole country and, though latterly other lo¬ calities have produced considerable amounts of good marble, Vermont still produces 43 per cent of the country's total.

Marble was quarried in Vermont at least as early as 1785, but only a few blocks were taken from small quarries in Dorset and West Rut¬

land in the early days and the business did not become very important before 1850. Since this time the production and sale of marble has in¬ creased until at the outbreak of the war (1917) the annual sales reached a million cubic feet or more. While there are a few quarries out¬ side of Rutland County, most of the marble comes from that region and is generally known as Rutland marble. Here the stone is a very pure lime carbonate and is mainly the result of mere or less completely metamorphosed Ordovician limestone. The marble is mostly light in color and the variety in shade and tint is well nigh endless from pure white statuary to almost black. Blue, pink, yellow, gray and black veins, clouds and blotches are seen in different layers. These shades are distributed through a lighter mass and in varying proportion so that hardly two pieces of what are called ^^fancy marbles^^ are exactly alike. There may be more than 20 varieties, all fine, in a single quarry. On the other hand the standard varieties can readily be matched, if necessary, in color and shade.

More than 100 shades of marble can be ob¬ tained in the quarries of the Vermont Marble Company, which controls by far the greater part of the marble of the State, but about 50 are as many as are usually kept on the market. The others are quarried when called for. At Swanton, in northern Vermont, a red and white dolomite is quarried and sold largely for floor tiling as it is very hard and durable and in Roxbury a very handsome serpentine marble, verde antique, is obtained, both by this com¬ pany. These are not true marbles, but they are very beautiful for interior finish. The granite industry is of more recent development and it is only within a few years that Vermont has led the world in the production of this stone, but it has now a pre-eminence which seems certain to remain. The granite quarries are far more numerous and widely distributed than those of marble. As all the producing marble quarries are in the western part of the State, so all the granite is quarried east of the Green Mountains. It is of igneous origin and geologically later than the marble or slate. Barre, Hardwick, Wood¬ bury and Bethel are the most important granite centres, but there are many other localities that produce smaller quantities. All Vermont gran¬ ite is of lighter or darker shades of gray, no red granite being quarried, though there is a little in the State. The claim of Barre that it is the greatest granite centre in the world appears well-founded. At this place the an¬ nual payroll is reported by the board of trade as not less than $4,000,000. Mount Ascutney in Windsor, near the Connecticut River, is a pe¬ culiar intrusive mass and on its slopes there has been quarried the ^Windsor Green Granite,^^ which is a dark syenite of various shades of olive

green. Columns in the library of Columbia University and the sarcophagi of President McKinley and his wife are examples of this stone. In normal business years the mineral products of the State reach an aggre¬ gate value of about $9,000,000. Slate is found on both sides of the Green Mountains, but for a long time all that has been sold has been taken from quarries in the extreme western border in Rutland County. Though not a very close second, Vermont produces more slate than any other State except Pennsylvania. The colors are mostly shades of green and purple, though gray slate is found.

The total amount of marble, granite and slate sold is large and increasing. It is diffi¬ cult to get exact figures, but probably the sales are not less than $3,500,000 for marble, $3,500,- 000 for granite, $2,000,000 for slate.

Fauna and Flora. — Most of the larger mammals, as elk, moose, beaver, panther, have long been extinct in Vermont, though formerly common, but the deer, mink, otter, fisher, racoon, black bear are still found more or less commonly, while the weasel, skunk, woodchuck, porcupine, squirrels, etc., are common in many parts of the State. Among birds, eagles (golden and white-headed), owls, hawks and many ducks, waders and the common song-birds of New England are seen. In Lake Champlain and some of the smaller lakes many species of fish are taken and the supply is maintained by fre¬ quent stocking by the game and fish commis¬ sion. There are stringent game laws protect¬ ing mammals, birds and fish. A not inconsid¬ erable quantity of fish is shipped from Lake

Champlain to the large cities. These are mainly sturgeon, pike and pickerel.

The flora of Vermont is of great interest and beauty as it includes many species rarely found elsewhere, especially in the mountain lo¬ calities. Nearly 1,700 botanical families and over 2,000 species are growing wild in the State. The families most numerously represented are the ranunculus, saxifrage, rose, composite, heath, lily, grass, sedge, orchid and fern. Forests once covered a large part of the State, but ex¬ cept on the mountains they have largely dis¬ appeared. Originally the white pine on the lower land and spruce on the upper were the predominant species but there are now more hardwood trees where the second growth has sprung up. At present the forests outside of the higher slopes are mainly composed of 11 species of oak, 8 of birch, 22 of willow, be¬ sides maple, beech, poplar, vralnut, elm and others. The American elm grows to perfection in the river valleys and often in such localities is a most attractive feature of the landscape. At least 125 species of trees and shrubs grow native in the State. The flora of the Champlain Valley presents a number of western s_pecies not seen elsewhere in New England and the floras of the region of Willoughby Lake and Mount Mansfield have long been well-known to botan¬ ists.

Soil and Agriculture. — Although so irreg¬ ular and often mountainous over much of its surface, Vermont possesses considerable fertile land and many excellent farms and very valuable products are obtained by argricultural operations. As in most regions in which the soil is the result, directly or indirectly, of glacial work there is great variety, often within small areas. Sand, ciay, gravel, loam may all be found in the same not large field, but this is not always true. In some parts of the State there are wide stretches of heavy clay soil, elsewhere lighter and even sandy soil prevails, elsewhere loam. Large crops are raised on many of the farms, though there is, of course, in so mountainous a country, much barren or at least unproductive land. According to the latest figures, there are in the State 29,072 farms which range in size from 50 acres to over 1,000. Although there are more than 100 farms of over 1,000 acres, by far the larger number are small, the average size for the entire State being about 142 acres. The table below shows the main crops raised on the Vermont farms in normal years.

CROP

Acres

planted

Bushels

raised

Value

Com .

47,000

2,256,000

$1,895,000

Wheat .

1,000

30,000

32,000

Hay .

1,010,000

(tons), 1,515,000

21,240,000

Oats .

81,000

3,483,000

1,846,000

Potatoes .

24,000

2,592,000

2,100,000

Barley .

12,000

420,000

315,000

Buckwheat .

8,000

216,000

177,000

Rye .

1,000

20,000

18,000

In 1920 the hay crop amounted to 1,333,000 tons ; in 1920 the yield of oats was 2,835,000 bushels; corn 1,175,000 bushels; wheat 176,- 003 bushels, and barley 196,815 bushels. The potato crop in the same year was 3,510,000

bushels ; the tobacco crop, 165,000 pounds. Apples, maple sugar and maple syrup are also of importance.

The average crop per acre is much greater in Vermont than the average for the whole United States, notwithstanding the rocky nature of many farms.

The above figures should be greatly in¬ creased to be accurate in war times, for not only were many more acres of all crops planted, but the market value was much greater than be¬ fore. The latest estimates available, however, are those given.

Formerly Vermont was noted for its Morgan horses and fine grades of sheep, but of late both of these have declined to small numbers, though there are still some fine sheep raised and exported and also some horses. An effort to revive the production of Morgan horses has been made and bids fair to be suc¬ cessful. Many fine cattle are also raised and sold, especially Holsteins. The value of live¬ stock was in 1920 as follows: Horses, $8,400,- 000; cattle, $18,400,000; sheep, $455,000; swine, $1,050,000. Other animals, $450,000. The total value of all agricultural products in 1920 was $22,680,000. The value of all farm property in 1920 was estimated at $222,736,620.

When the first white settlers came to Ver¬ mont they found the Indians making in rude fashion sugar from maple sap and by methods constantly improving maple sugar and syrup have been made from earliest times. In the early spring before most farm work can be undertaken the trees are tapped and the sap boiled, often before the snow is off the ground. Seasons vary, but the average annual production is given at 10,000,000 pounds having a value of over $2,000,000.

Vermont has long been known for the quan¬ tity and excellence of its

dairy products. Much of the grain and hay raised is fed to dairy cattle and much land otherwise valuable for crops is given over to pasturage for. the same purpose. The value of these products for 1917 is given as $12,128,000. In addition to butter and cheese a great deal of milk is sent to Boston and New York. In some parts of the State, notably in the immediate vicinity of Lake Champlain, many apples, pears and other fruits are raised, the crop for 1917 amounting to $1,191,429. The extensive forests which cover the mountains and their slopes afford a large amount of lumber which is sold at a value annually of $8,500,000. There are a State forestry depart¬ ment and 11 State forests which include in all 9,555 acres. Besides these forests which are directly under the control of this depart¬ ment, ˆ other forests over the State are administered under its advice and direction.

Manufactures. — Vermont is rightly re¬ garded as an agricultural State, for a large part of its territory is in farm land, and a very large capital is invested in farms and their equipment, but the value of manufactured goods is far greater than that of the produc¬ tions of the soil.

There are no less than 1,792 establishments, employing 36,467 persons with a capital of $79,846,775 and an output valued at $76,990,974. The 36,467 persons employed in industry in 1914 received $18,617,000 in wages, and by their labor added $34,256,000 to the value of the

raw product. Thus, the wage-earner received an average wage of $510. If we allow 6 per cent interest ($4,790,820) on the capital in¬ vested ($79,846,775) and 5 per cent ($4,000,- 000) for depreciation and other charges, there remains for the captains of industry a net profit of $6,848,180, a sum inordinately high (nearly 20 per cent of the total value added by manufacture) in view of the pittance paid the wage-earner who produced it. Of the total number of wage-earners only about 215 are under 16 years of age and for most of them the hours of labor are from 54 to 60 hours per week. The principal manufactures are paper and wood pulp, lumber and wooden ware, machinery, woolen and cotton goods, flour, agricultural implements and besides in less amount many other articles.

Transportation. — Long before the coming of white men in the 16th century Lake Champlain was undoubtedly a thoroughfare for the Indians and later the canoes of these people, the bateaux of the French and boats of the Eng¬ lish went to and fro on warlike or peaceable errands and the principal rivers were also much used as highways from one part of the State to another. In 1795 Ira Allen went to Eng¬ land to urge building a ship canal which was to connect Lake Champlain and the Saint Lawrence. Another vain attempt was after¬ ward made to connect the lake and the Con¬ necticut River. In 1823 a canal from Lake Champlain to the Hudson River was finished. In 1808 a steamboat was launched on Lake Champlain and boats have been carrying freight and passengers ever since. A large amount of freight is also carried by canal I'oats which are towed up and down the lake and there are a few sailing vessels. But the lake traffic is far less than formerly before railroads skirting the shores were built. The first railroad in Vermont was completed in 1848. This ran between White River Junction and Bethel. In 1851 the Central Vermont Railroad was finished and on the west side of the State the Rutland Road about the same time and these two have always remained the principal roads. Next to these the Boston and Maine has most mileage. The Grand Trunk and Canadian Pacific pass through parts of the State, 16 other lines complete the roads of Vermont, the total mileage being 1,101. There are 115 miles of electric lines and numerous stage routes which

connect inland towns with the railroads.

Education. — As early as 1761 Vermont ap¬ propriated tracts of land for school mainte¬ nance and sums of money were voted in 1782 for the same purpose. During the years that have passed since, the school system has gradually developed and in most respects wholly changed until it has attained its present efficiency by which it is placed in the front rank of the most advanced States. For many vears the best secondary schools were the academies and in the 40's there were over 50 of these insti¬ tutions in flourishing condition. Later as the public scnools developed the academies dis¬ appeared until in 1900 only 17 remained and at present the high school more than fills their place. There are now 81 high schools and 28 junior high schools, 2,439 public schools, with 3,212 teachers and 63,962 enrolled pupils. The difficulty of securing properly trained teachers

for the rural schools led the legislature of 1915 to pass a law by which such teachers are paid by the State an allowance in addition to what they receive from the town in which they teach, this allowance to be more or less as the training of the teachers is more or less. By this law it becomes of personal interest to each person who wishes to teach to secure as complete a preparation as possible. From 1856 to 1874 the school system was controlled by a board of education with its secretary as executive officer. This board was abolished in 1874 and its duties vested in a State superin¬ tendent who was elected at each session of the general assembly. In 1894 free textbooks were provided for all public schools and in 1906 all these schools were made entirely free. In the same year the State divided into school districts each with its superintendent. In 1908 manual training was adopted in several schools, in 1910 teacher training classes were estab¬ lished and in 1912 courses in domestic science were adopted in some of the larger schools. Soon after courses in agriculture were added. Bv act of legislature, 1912, a thorough investi¬ gation of the entire educational system of Vermont was authorized and a commission ap¬ pointed to carry out the provisions of the act. This commission entrusted the survey to the Carnegie Foundation which published a report in 1914. As this report was prepared and the investigation made by educational experts it is of great value tor many of its recommenda¬ tions apply to other States as well as to Ver¬ mont. As the result of this work the school system was thoroughly revised. A board of education was appointed which elects a com¬ missioner of education under whom is placed the whole management with the aid of 66 district superintendents. The State budget for schools in 1917 was $2,246,120

and this is in¬ creased by the income from over $200,000, a fund given to the State by Arunah Huntington, available since 1886. In addition to the public schools, Vermont has four colleges, two normal schools and two agricultural schools.

University of Vermont. — The first attempt to establish a college in Vermont was that of New York as a measure of conciliation in 1772. The institution was to be located in the town of Kingsland, now Washington, on the divide be¬ tween the Connecticut and Lake Champlain. When this plan failed it was proposed to locate the college farther south in Williamstown, but finally through the influence of Ira Allen, who was a generous contributor to the new institu¬ tion, it was placed in Burlington and chartered in 1791. Ira Allen was not only active in found¬ ing the University of Vermont, but was one of its first trustees. The first class was not graduated till 1804. Until 1865 the university was little more than an arts college, but in that year the general assembly incorporated the University of Vermont and State Agricultural College and in the same year the Agricultural Experiment Station was established. Engineer¬ ing, first a department was developed into a college in 1866, the subject having been taught since 1829. A medical college, which was founded in 1809 and since 1853 affiliated with the university, was incorporated with it in 1899. An Agricultural Extension Service was begun in 1912.

Middlehnry College is located in the town

of the same name amid beautiful scenery. This college has courses in arts and sciences and is coeducational. It was chartered in 1800. It has an excellent equipment and a faculty of 40 ; it has an average of over 300 students.

Norwich University was founded as a military school in 1819. It has from the first made military instruction most prominent in Its curricula, following closely the example of West Point. In 1834 it was incorporated and in 1866, the buildings at Norwich having burned, the institution was moved to Northfield. Besides the purely military courses, instruction IS given inˆ the arts and science. The students are cadets in the National Guard and form the ˆˆfirst squadron of the first Vermont cavalry.* There is a faculty of 19ˆ and a student body, averaging 200. Many eminent men have grad¬ uated from these institutions.

Saint Michel College is located at Winooski Park. It is carried on by the Brotherhood of Saint Edmund and is distinctlyˆ a Roman Catho¬ lic institution. It is largely given to secondary school work, there being very few college stu¬ dents. It has a faculty of 14 and about 100 students.

Public libraries are found in many of the Vermont towns, many of them in good memorial buildings. In all there are 221 of these besides 14 club libraries and there is a li¬ brary commission which loans small libraries to towns not otherwise supplied. The library of the university contains 100,000 volumes be¬ sides many pamphlets ; there is an excellent State library and a historical library at Montpelier and each of the colleges has a good library. Illiteracy is decreasing. At present about 5 per cent of the whole population may be classed as illiterates.

Government. — No other of the colonies adopted as completely a democratic form of government as did Vermont in 1777. This gov¬ ernment continued until 1791, a period of 14 years, during which Vermont was an inde¬ pendent republic, as will be noticed later. In 1791, after several applications to the Conti¬ nental Congress, Vermont was admitted to the Union as the 14th State. In the beginning there was a legislature composed of one house, the delegates, one from each town, being elected by popular vote. In

addition to the legislature, or general assembly, there was a governor and 12 councillors. In 1836 a seegnd house, the senate, was added. At present the house is composed of 248 members, one from each town as at first, while the senate has 30 members, from one to four according to population, being sent from each of the 14 counties. The lieu¬ tenant-governor is president of the senate, but the house elects one of its own number speaker. The sessions of the general assembly were annual until 1870; since then they have been biennial. The counties were formed gradually. At first there were two, Cumberland and Glou¬ cester, east of the Green Mountains, and two, Albany and Charlotte, west, but later these were divided into 14 which were established as fol¬ lows : Bennington and Windham, 11 Feb. 1779; Orange, Rutland and Windsor, 22 Feb. 1781; Addison, 17 Oct. 1785; Chittenden. 22 Oct, 1787; Caledonia, Essex, Franklin and Orleans, 5 Nov. 1792; Grand Isle, 9 Nov. 1802; Jefferson, 1 Nov. 1810, — changed to Washington, 8 Nov. 1814;

Lamoille, 26 Oct. 1835. The town meeting has always been one of the most cherished insti¬ tutions of the State. This is held on the first Tuesday in March of each year. At the town meeting local officers are elected and such other business as may require the attention-of the inhabitants transacted. State officers are elected biennially on each odd year, the election being set for the first Tuesday of November. Mem¬ bers of Congress are elected at the same time. The Australian ballot is used. Even before 1920 women over 21 years of age were entitled to vote, if they paid taxes, for town officers and for all matters pertaining to schools and temperance. Women might also be elected to several of the offices and to some of the State boards.

Vermont has always been strongly Republi¬ can and at present this party is in the propor¬ tion of three to one as compared with the Democratic party. The Legislature of 1919 was made up of 30 Republicans in the Senate and 244 Republicans, 25 Democrats and 1 Inde¬ pendent in the House.

Banking. — In the early days the jpeople of Vermont appear to have had great distrust of banks and it was not until 1806 that the first State bank was chartered and then after long opposition. After an unprofitable career this bank closed in 1814, but in 1818 another at¬ tempt to start banks was made and one bank was established at Burlington and another at Windsor, one by one others followed until in 1841 there were 17 and in 1917 there were 48 national banks, with a capital of over $5,000,- 000 and surplus of $7,765,079.

There are 20 savings banks with deposits of $95,469,725 belonging to 218,372 depositors and 38 loan and trust companies with $2,050,000 capital and deposits of $47,609,696.

Like many other of the older States Ver¬ mont at first issued its own currency. The first bills were put into circulation in 1781. They ranged from a shilling to three pounds. In 1785 copper coins of the value of one cent were made and others of a different design were coined in 1888. Vermont has always greatly aided western industries by numerous loans. The assessed value of real estate in Vermont in 1918 was $170,566,493 and of personal prop¬ erty $61,772,240. Of course the actual value is much greater.

Finances. — ˆThe income of Vermont is mainly derived from direct taxes, trust funds, loans, inheritance, corporation taxes and nu¬ merous smaller sources. The real estate is ap¬ praised at $187,364,577, the personal property $74,736,570. For purposes of taxation the Grand List is fixed at $2,581,415, on which the tax for 1918 was $2.36 on the dollar. The usual running expenses are about $5,250,000. For a greater portion of its existence Vermont has been practically free from any debt, but war conditions have now and then rnade necessary a bond issue, as in 1917. There is a permanent school fund of over $1,000,000.

The Judiciary. — In 1763 an order was is¬ sued allowing ®all judges, justices and other civil officers* who had commissions from New York to have authority as far east as the Connecticut River. At that time Vermont was entirely within the jurisdiction of Albany courts, but in many cases it was almost im¬ possible to execute the decrees of these courts.

In 1778 special courts were organized in Ver¬ mont, but they did not long continue, a Superior Court taking the place, which con¬ tinued four years.

In 1781 County Courts were established and in 1782 a Supreme Court was the highest authority in all legal affairs and so continued till 1906. In 1906 the judiciary was reorganized by constituting a Supreme Court with one chief justice and at first three, later four, associate justices and a Superior Court with six judges, both elected at

each session of the general assembly. In the latter court the first judge elected was chief. Each superior judge is ex officio chancellor. The Supreme Court holds five sessions at Montpelier, one at Saint Johnsbury, Rutland and Brattleboro annually. The superior judges appoint one of their number to hold a Court of Chancery and pre¬ side in each County Court, two assistant judges sitting with him. These assistants judges are elected by popular vote. In addition to the above there are 14 municipal courts in as many of the larger towns. The Vermont judiciary has always been noted for its high standard, the soundness of its decisions, and clear-cut, logical deductions from the premises presented in pleadings ; so much so, that a law library is not considered complete in the United States without a full set of volumes of the ‘ˆVermont Reports.ˆ The State, moreover, has pursued the policy of life-tenure, notwithstanding fre¬ quent elections, or during mental competency, insuring a stability of administration that does not always obtain where the elections of judges are by the people. The contrast between courts of this character and the ®rough and ready® methods of dispensing justice to trespassers from New York in the ˆGrants,® by Ethan Allen et ah, is a paradox of Vermont’s most wonderful history.

Charities and Corrections. — The usual home for destitute poor is found in every town. The State supports a large Hospital for the Insane at Waterbury with capacity of 700 patients and makes provision for the care of 200 at the Retreat at Brattleboro. There arc hospitals for the sick or injured in many of the larger towns as well as several sanatoriums, relief associations, orphan children’s homes. State Home for the Feeble Minded, *etc.* The State Prison at Windsor has usually about 200 inmates and the House of Correction at Rut¬ land has over 700. For offenders who are minors there is a State Industrial School at Vergennes with 300 inmates. The penal insti¬ tutions of the State are administered by a State board.

Militia. — The militia of the State are under the immediate command ot the adjutant-general, the governor being ex-officio commander-in-chief. In peace times there are one regiment of infantry, a squadron of cavalry and sanitary and hospital corps, all enlisted as National Guard. In several of the larger towns there are well-equipped armories for the use of the local companies, built by State appropriations. The adjutant-general has a permanent office in the State House from which the affairs of the Na¬ tional Guard are administered. T.cgislative ap¬ propriations provide for all necessary expense.

In the State there are, in round numbers, 775,000 men of military age from whom such troops as may be needed are taken.

Religion. — The people of Vermont have in general always been a religious community. The predominant denomination for many dec¬ ades was the Congregational, but there are more than 20 other religious organizations in the State. The Congregationalists founded the first Protestant church in 1762 at Bennington, but there was a Roman Catholic chapel on Isle La Motte in 1666. This, however, was continued for only two years. The table below gives the date of the establishment of the larger denominations.

DENOMINATION

Roman Catholic .

Roman Catholic .

Congregational .

Congregational .

Baptist .

Church of England… .

Protestant Episcopal . . Methodist Episcopal. .

Universalist .

Universalist .

Free Baptist .

Place

Fort Saint Anne (chapel)

Burlington (church) .

Fort Dummer (chapel).. Bennington (church) ….

Shaftsbury (church) .

Capt. Jehial Hawley’s

(house) .

Arlinˆon (church) .

Circuit Riders .

Bennington (convention)

Barnet (church) .

Strafford (church) .

Date

1666-68

1831

1724

1762

1768

1770

1786

1788-98

1795

1803

1794

The religious denominations are Roman Catholic, Congregational, Methodist Epis¬ copal, Baptist, Episcopal and Universalist, es¬ tablished in the order given. Numerically the churches report as follows : Congregationalist, 216 churches, 22,979 members, $2,213,675 church property; Methodist Episcopal, 200 churches, 19,000 members, $1,355,000 church property; the Baptists report 115 churches, 9,439 members, $850,000 church prop¬ erty; Episcopal, 65 churches, 6,289 members; Christian Adventists, 22 churches ; Seventh Day Adventists, 27 churches, 618 members; Universalists, 54 churches, 3,204 families, $353,000 church property. In addition to these, with smaller numbers, are Lutherans, Unitarians, Christian Scientists ; other sects are very small in numbers. The Roman Catholics report 102 churches and 20 stations with congregations numbering 90,446. In early times there were many Quakers in the State and a number of meet¬ ing houses, but for many years no services have been held in any of them. At first the State granted two town lots of 200 acres each to the first permanent minister of whatever denomina¬ tion and two lots to the Society for the Propaga¬

tion of the Gospel. The former are devoted to the public schools.

History. — Samuel de Champlain was un¬ doubtedly the first white man to sail through the lake to which his name was afterward . given, it having been known to the French set¬ tlers as Lac des Iroquois. From his canoe he saw the ˆVery high mountains to the east and the valley of the lake.® Champlain tells us that his Algonkin allies with whom he sailed said that the country on both sides of the lake was then, in 1609, occupied by Iroquois tribes and that because of frequent hostilities there were no permanent villages near the lake, since they were too liable to attack by the frequent war

parties who went to and fro through the region. A half century later when the first white settlers came into the Champlain Valley they found it occupied by Algonkins, as was the whole of New England. So far as the numerous stone implements and pottery that have been found in western Vermont indicate both Iroquois and Algonkin tribes visited it if they did not form settlements. The facts are not to be fully ascer¬ tained, but all the evidence obtainable seems to show that the Champlain Valley was during several centuries prior to 1700 held now by the Iroquois, now by the Algonkins and that these latter people held the territory till finally driven out by the coming of Europeans. The New York side of the lake was, apparently, always occupied by the Iroquois as when the French and English settlers came into the region. That the Iroquois had some claim to the east side of the lake is shown by the fact that from 1798 until 1874 some of the Caughna-wagas urged a claim to a large, part of western Vermont because, as they declared, it had de¬ scended to them from their fathers. This claim was discussed for years by the Vermont gen¬ eral assemblies and carefully investigated, to be finally rejected as without foundation.

A few Indian villages were continued for some time after the white settlers took posses¬ sion of the State. The longest to remain were some Saint Francis Indians who lived until after the Revolution on the Missisquoi River a few miles below Swanton. There was a village of Coosucks on the Connecticut River in Newbury until 1725. A few Mohegans lived near Arlington and near the Massachusetts bor¬ der the Moheakunnuks lived. These latter made claim to a considerable area as late as 1767 and about 1780 a tract of land was granted them in settlement of their claim. No full-blooded In¬ dians now remain in the State, but there are still among those, counted as whites, a few who are more or less tinctured with Indian blood. Because of Champlain's discovery the territory about Lake Champlain was claimed by France and a part of it was included in New France in a map published at Paris in 1684. New France was bounded by a line drawn from Penobscot, Me., to the southern end of Lake Champlain and from there to the Mohawk River a little north of Schenectady. On the north it included the whole country drained by the Saint Lawrence. It is said that when Cham¬ plain first beheld the Green Mountains in the east as he paddled through the lake he ex¬ claimed, ®Voila les Verts Monts® and thus the name by which these

mountains have since been known originated.

This journey of Champlain was as an ally of his Algonkin comi)anions and with them they landed and attacked their Iroquois foes some¬ where near Crown Point. Although aiding ■ effectually his friends, Champlain by this at¬ tack with firearms, the first seen by the sav¬ ages, incurred the hatred of the Iroquois and this led to most direful consequences later.

From this time until 1760 the white settlers as they came into the region were subject to frequent and often terrible attacks from their savage foes. A few years after Champlain's visit, Jesuit missionaries with dauntless courage and untiring zeal visited the Iroquois tribes, suf¬ fering incredible tortures, and often death. To

protect so far as possible the French interests Fort Saint Anne was built on the western shore of one of the large islands (Isle La Motte) in Lake Champlain in 1ˆ4. The garrison was first commanded by Captain de la Motte from whom the iMand was named. The first Christian wor¬ ship was conducted here in 1666 in a small chai)el built in the fort There does not appear to have been any settlement, other than a few military outposts, in the Champlain Valley, until, in 1730, a few families came from Canada to locate at Chimney Point where they built a rude fort. The following year a more serviceable fort was built across the narrow lake on what was later called Crown Point This was named Fort Saint Frederic.

Carillon, later Ticonderoga, was fortified in 1755. The possession of these forts gave the French command of the lake, as at the points named it is very narrow and easily within range of even small guns. While the French had been moving from the north the English had come from the south and in 1724 a settlement and fort were established at Fort Dummer. Other forts, and where a fort was not needed stockades, were built in the years following and numerous Indian raids and massacres caused terror and suffering to the settlers. Of a number of settle¬ ments during these years the only one to be¬ come permanent was that at Fort Dummer.

The New Hampshire Grants. — The first grants of lands along Lake Champlain were of course made by France but after the French had been conquered in Canada by the English and had retired from Vermont as elsewhere, these grants were void and new allotments were made by the new rulers.

The territory of the new country was but very rudely divided for the most part, and New York and New Hampshire, both having been settled to a much greater extent, each laid claim to the unoccupied territory of Ver¬ mont. This dispute, which became very bitter, began in 1749. At this time Governor Benning Wentworth sent word to Governor Clinton of New York that he should grant unimproved lands as determined by King George's descrip¬ tion of the province of New Hampshire, in which it was stated that the authority of New Hampshire extended as far west as that of Massachusetts which was ˆho a line twenty miles east of the Hudson River.® The Council of New York, however, ordered the governor to reply that '^^this Province (New York) is bounded eastward by the Connecticut River.® At the time he sent his communication to Gov¬ ernor Clinton, Governor Wentworth had al¬ ready granted one township which in his honor was called Bennington. Later the question was laid before the king who some years afterward gave decision in favor of New York. The au¬ thorities of that State considered this decision as annulling all the grants made by Governor Wentworth, which by this time had become numerous.

They divided the territory which they claimed as their own, into four counties. The southwestern part was annexed to Albany, north was Charlotte, east Cumberland and north of this Gloucester Counties, these two being east of the Green Mountains. Those who had bought lands from New Hampshire were called upon to repurchase them from New York.

VERMONT.

Estimated population, 363,699

COUNTIES

Pop.

Pop.

20,010

Addison .

. .C 4

12,585

Lamoille . .

. .E 2

21,378

Bennington ….

. .C 9

18,703

Orange .

26,031

Caledonia .

.G 3

23,337

Orleans .

.F 1

42,447

Chittenden .

, .C 3

48,139

Rutland .

.O 6

7,384

Essex .

.H 2

41,702

Washington .

.E 3

29,866

Franklin .

D 1

26,932

Windham .

3,761

Grand Tsle .

. .B 1

33,681

Windsor .

Incorporated Cities and Villages

12.169*

Barre .

7,856

Montpelier .

1,330

Barton .

, .G 1

1,445

Morrisvllle .

. .E 2

4,883

Bellows Falls…

412

Newbury .

9,114

Bennington … . ,

. .C 9

136

Newfane .

42

Bennington Center,

2,546

Newport .

.F 1

Bennington…

. .09

663

North Bennington O 9

631

Bradford .

. .G 5

1,918

Northfleld .

.D 4

1,608

Brandnn …….

771

Nnrt.h Troy … . .

..FI

6,517

Brattleboro ….

1,131

Orleans. Orleans.

.G 1

1,080

Bristol .

..04

388

Plainfield . .

21,617

Burlington .

1,474

Poultney .

. .06

227

Cabot .

. .F 5

2,756

Proctor .

595

Cambridge .

1,787

Randolph .

.E 5

666

Chester . .

, .E 7

835

Readsbbro .

.D 9

339

Concord .

1,948

Richford .

.E 1

316

Derby . .

828

Richmond .

.D 3

390

Derby Line … . ,

. .G 1

14,831

Rutland .

.D 6

1,153

Enosburg Falls. .

.D 1

373

South Ryegate. .

..G4

1,245

Essex Junction .

. .O 3

6,381

St. Albans .

O 1

2,554

Fair Haven ….

. .F 1

8,781

St. Johnsbury…

.H 3

2,094

Hardwick .

. .F 2

3,250

Springfield . .

. .F 7

242

Hinesburg .

. .O 3

566

Stowe .

423

Hyde Park .

1,236

Swanton .

.O 1

1,573

Island Pond … . ,

1,483

Vergennes .

212

Jacksonville .

1,377

Waterbury .

651

Johnson .

608

Wells River .

.G 4

1,621

Ludlow .

. .E 7

1,109

West Derby .

.G 1

259

Lyndon Center. .

..G 2

430

Wilmington .

.n 9

1,573

Lyndonvllle

. .H 1

1,906

Windsor .

478

Manchester .

4,520

Winooski .

.03

1,866

Mlddlebury ….

. .B 4

1,383

Woodstock .

634

Milton .

Lougiit

‘est from Greenwich

Lacolle Jc.

Mem p h

LakA iyS

Frelighsburj

Jchforˆ ˆ

CeiUerorX |ˆte > Xewpo« Center I’

HWnirst-

‘Derby-Li!

Beecher Falis

Berltehtre

Holland

jfbrtmPim4

pof t’^^Derby

Morgan

ˆMoi

Pondˆ. W. Chariest

”’ˆighgˆE

Sheldˆ

Springˆ.

iMonigoi

‘E. t > hc{don

idA Jc.

iSheldon

p/LaA-e JfP

\Beko Pondˆ

d E. Chaˆeston

CoVe’qtry P.0|

[QiitgoˆaWˆˆntej

ifCBuB Cprnersj

Canada Jc.

ˆairfield

.Island Pond

[Bakersfieldˆ

E. Fitrfieˆ

Irasburg

Westnu

T tiers

Bioomftei

Flattsburg’

N. Cainhridgj

I fo luiowr — oTijui

I /s. Albany’^j ■*

Sv. Pr Clark P. 0/0

‘ ^E. Craft^ijj^- \ /

^raftsbur^^nfl’ Pond Sutton P.o!

\ Sihefficld

/ Greensboro ^

rM^reensboro Bend V Lyndon Center* /■‘f Lyndon P. 0.

•Dow -

^i^V^yMilton

AV.Jl/ilton . /Westfordj

.GenteryiliS

Clover—

dale

GcovetoQ

OulMbaU.

Garfield

CenteaV

Mansfii

..5ˆ Mornsvillr

Colchester]

S$iWolc/t

inderhiU,

Morrisfowao

Lyndoi

fardwick

Riverside

ictory’

‘Lyndon

Jericho o Jericho Cent*

. ‘^Lanenbatg

^ Higlu3[restleW oN. Walden oWalden

SumOT^^^Dan’ville

JobnsburjH j johnsbury 0*ntet il!

Au Sable Forks Sta.

Lunenburg

XScott

::::ˆoncord’

ibury^v®

w: Boi|ˆ Richmond ˆsˆJonesville/

* Svilliston’lQˆ’ˆ

P > nd

Cabot

Fitzdale ‘X CM

Whitefieid

.ˆAˆorcester

Wˆai’ˆlmry

Wtrt«rf«rj3

Renter

nitnaraville;

A’Sarshfista P.O. lˆE.Pcach’ai ;S AMarehSeld „ garu

.‘Pycham s V* ’ \&nesboro ♦ o . Bvnet

W«U4 Ri%-«r Pimd ˆ Mclodo« or (|[Xclndoe Falls P. 0.

ˆWcker Mills .jVˆˆRyegateˆ .* Qrotonˆv /

aterford

y. Dux^ CamelaDi HurT\|£s luntin^^K >Hun^gES

Quebec Jc.J vlViug*.Road

‘•p^T^’sWaterbu ry

Adam

e7/J∼”’ˆlline » E. Charlotte

Carnet

Charlotte

yaK’^

Middle4x

rthlehem«^-_j;^

Bethlehem Jc. r Pierce Bridge. P. 0. /

rlainfieldi

wtlHoretow

^^irmont

^ Montpelier Jc.

(de or^ 1 Pond^ iP.O.

.Ferrisburg

^‘ergennes

yort’^J^..Fall«

/^‘aitsfield

l^rre

Bristol

Pond

.Boltonvll

Profile House

Bristol

\Voods%ille

^^’cadlˆeldl

, Warren?. ˆ

Orange /,\iK

.jo’psiiaii

‘(JordoJ

, Waits River

[imeld

31 E. CorlAthl W.Sewhury

＞’etp

ˆjM/nicut or yˆKˆiNewbury

Chimney Point

Beldens

MiUdlˆburyl E. Mi.

radford

Ulebiiry /jˆ. ‘\f$iddTtbtirˆs.ˆ

Moosalaoiao ˆ = MtJ5ˆ ˆ

ˆ Du

ˆDuitrti

■AjLeicester Jc.

Bridixnrt

Piermont

jcrshire

E. Randolph.

Bread;

(Salisbury/

Haˆoˆk J t %■

RolMˆ＞n.

“y. Orwi , Orwell Sudbur

Tapper

Royalton^^

Sharon ^“‘0“ ‘ ^

Royalton o

Brandon

TheUord

^^^dckbriˆgi

ˆaysville

riverside

SQuam

Lake

- !e. Barua rd

‘5.

Barnard

‘Mhia

Holden

j PompanoosucSo/

W. HartfortL^^^^ ^Norwich^^^

|*/^wistoti w ilder mford P.O. White River Jc

^^HortohYlllej roBeusott^ Landing^

^ Hollis’t^^ Plorcntine*.^^

Sherburne

ˆlymouth

[ubbardton ?’

iN. Pomfrˆ‘

T’T “jGhittenˆliˆ-ˆ PatsfoM Mills % ˆ

.//BoˆiOScmFlorenceˆJi

Pomfret

Lake ,

Proctor

S. Pomfrˆ

ˆCastietoi

[artfpn Q’uechAˆiˆ/ˆ

, Woodstock

ItdˆBrigsB ˆ>ˆ:TaftsvilleV — Wbodstock V ‘ Bridgewaterˆ (A

‘ S. Woodstock!?ˆ .5/(1

Mew Found . Lake’

Bomoseen

Albertson.

Kutland PI

Mascon* < *

.Rutland

J/asco»ia

ˆ Lake

Shrewsbury P‘ˆ

idge* ster

iage«*i

• ■ • • mtr I- » ft «-y.rt\er*

M. Clarendon i

Hart land

Whitehall

iartland

Poultney

‘Plymouth Hartlaiˆd’Four Cors. ˆPlymouth Unionˆˆ’.”

E. Clare ndoi

Lacouia

Clarˆ

fendon

iMiddletowu

jCutting^t^c-

Springs

ultney

Windsor

k-’nsvilie

St.Caehuritti

‘yson

Belmont Jc.

Felcliville

Franklinˆ

Asculne;

Tilton

AsoutneyviJlˆw *cj* *ˆ®Amsdeu % ˆxPerkinsviˆ*

■ˆoosehorj

Franklin Jc.

(Ludlow

ireen’

I

‘Cavendiˆ

Danbjpˆi i = Four Oor&ˆftˆˆˆ Pnwletf ˆ \DorselWL

Proctorsvilie

; ‘5ˆ

W. Pawlei

Claretnonˆ’

! Dauby

GassettsI

nriugfiej

-i’-^^jTnionsville

»Rupˆ1

^^ndoi

‘’Per

“W. Rupl^*

Bear Mt. ˆ

■— ■ Bartonsvillella

KockinghSiiV:ˆ

1 ro ˆ Midwav V

\Gf?af ton I • “pX ‘^^S.v Rivewide

ˆ%.Windlfaff;ˆJ[?eUows Fmb

rjainaica

V. i’ ˆajyˆ‘tminstei; Sta,

. To w nsue UtT feO* ˆ W «ff tmiastˆXust o

W’?’. ‘ %ˆ%G re ut il

TownBfa«n3.ˆ0. .11

ContoocooK

ˆV*ˆd!iain*

‘concord

Manchesˆ quinox ˆ Ma&ch|

Henniker J<

Greenwich Jc.

V jmuo

inhall

Irejenwiclr

Isbferi^^

DialoM

ˆArlington

W/stmi aster

ˆhˆena

Arlington

Parker

Shaj

•Newfaue

[E. Putuer

New Boston

WUliamsiUe P.O.ˆ-Sˆˆ S. Nˆxˆanˆ S’pˆ*

»5fˆbummerslon

jummerston

uimerston

Ru nmerston Sta,

N , Ben o » njjtb u.?

Johnsonvillr

Hoosick Fall!

wO’*Marlboro

Mt.,.ˆrattieboro*

®rattleboro\ts

luntaiol

Petersburg Jcl

^^^ksonvillˆRˆ.

Haliffx

Halif&

V WbUln:

d a

B E R I

73ˆ30

72*50

7r*30’

Movers Jc./

S. Stratford Jc. or Coˆ P. 0.

V s S E

Base

Sla

Lincoln

“® Belmont

VERMONT

SCALE

statute Xliles, 14 = 1 Inch.

Bud McNally ‘■ New 11 x 14 Map of Vermont. Copyright by Rud McNally k Co.

Railroads- - - Electric Lines

73ˆ30

?80o

77ˆ 30’

Naturally the occupants of the lands, upon which some of them had expended much money and labor, refused to give them up or to pay for them a second time. New York granted ejectments against the settlers and sent con¬ stables to enforce them. A convention of the injured settlers was called and by it Samuel Robinson of Bennington was sent to England to lay the grievances before the king. As the result of Mr. Robinson's visit, the king com¬ manded the governor of New York to make no grants till his majesty's pleasure should be made known. This was in July 1767. The Council of New York did not wholly submit to this decree of the king but declared that it did not apply to lands not already granted by New Hampshire and continued giving grants to those who applied.

As the fees required from the grantees were from $100 to $700 or more, the governors of both States were unwilling to lose the rich harvest thus brought them and it is said that considerable fortunes were gained by each of them from this source. Ethan Allen became first known by the part he took in this con¬ troversy. The Vermont settlers resisted by force the attempts of New York sheriffs to take possession of lands held under New Hampshire grants and in some cases confirmed them by ®the beech seal® that is they flogged the sheriffs who came to enforce New York claims with what Allen called ®twigs of the wilderness.® The struggle did not wholly cease till Vermont was admitted into the Union. It was in the enforcement of the claims of the Vermont settlers that the Green Mountain Boys were organized. These were a military force, composed of daring and determined men commanded by Ethan Allen.

Allen and four brothers had come from Con¬ necticut and taken lands under grants from New Elampshire and these they were fully prepared to defend to any extent that might be necessary. In the long and sometimes severe struggle the settlers for the most part held their lands against New York.

Founders of the State. — The experiences undergone during the stormy times just de¬ scribed not only secured beyond further dis¬ pute the homes of the settlers on the New Hampshire Grants, but they

gave to these hardy pioneers a training which well-fitted them to become founders of a State that should be a power. There were many sturdy, honest and i)rave men in those days and men of strong thinking as well. It may not be altogether fair to select a few from the many, but probably most would agree that of them all Ethan Allen, Ira Allen, Seth Warner, Remember Baker, ‘I’liomas Chittenden and Jonas Fay were pre¬ eminent. Vermont would not have been what it was during the century following the Revolu¬ tion had not these men been among its citizens. Most of these are too well known to most Americans to need more than the mention of their names. Perhaps Jonas Fay is least known. He was a clerk of many public meetings, of the Council of Public Safety and wrote the declara¬ tion by which the State was established as an independent republic.

Beginning of the Republic of Vermont. —

In pre-Revolutionary times Vermont had little that could properly be called a government.

Each town was controlled by its ^^Committee of Safety® and there was no higher authority recognized. Under such conditions there was of necessity little unity. But the people were not long satisfied with this and on 13 March 1775, there came a change which was far reach¬ ing in its results. On that day Judge Chandler was to hold court at Westminster. Those in¬ terested assembled without arms, took posses¬ sion of the courthouse (illustration from draw¬ ing by Daniel Hall). This building was taken down in 1806.

At first there was no disturbance or attempt to use force to prevent the convening of the court, but a sheriff’s posse was collected to disperse the crowd and, apparently without suffi¬ cient provocation, fired upon them and mortally wounded William French — who has been called ^^The proto-martyr to the cause of Ameri¬ can liberty.®

Court House, Westminster.

No Other person was killed at the time but several were wounded and Daniel Houghton died afterward from his wounds. The sheriff’s party claimed that they were fired on first, but none of them were in any way injured and a long discussion of the affair which followed did not

establish the truth of their claim. This event has ever since l)ecn known as the ˆAVest-minster Massacre.® On 11 April 1775 a con¬ vention of Committees of Safety held at West¬ minster, adopted a remonstrance to the court of Great Britain in which they begged ®To be taken out of so oppressive a jurisdiction and either annexed to another jurisdiction or in¬ corporated into a new one.® Ethan Allen was prominent in this convention and proved himself fully equal to the emergency. For three or four years before this he had organized the settlers, forming councils of safety and military companies.

There were no organizations in the colonies more satisfactory or trustworthy than those which Allen formed and inspired with some¬ what of his own vigor and enthusiasm for free¬ dom. The new jurisdiction mentioned in the request of the Westminster Convention was probably a proposed Royal Colony which was to include the New Hampshire Grants west of the Green Mountains and all the territory north of the Mohawk River and east of Lake Ontario, the capital to be at Skenesboro, N. Y. (Vdiitehall) . It was proposed also that Philip Skene should be governor of this new province. F.than Allen, William Gililand and Jchiel Haw-

ley and other Vermonters of prominence were active in this undertaking, but the outbreak of hostilities at Lexington, 19 April 1775, only eight days after this convention finally set aside this plan. But such people as the early Ver¬ monters could not long remain inactive and ere long another convention was called to meet ^^at Mr. Cephas Kent's in Dorset.® This con¬ vention was ^^duly warned® by a committee and was to ®raise and transact whatever

business might ˆelH necessary. The warning also contained thjA/ significant article ®To see whether the convention will consent to asso¬ ciate with New 'York, or act by themselves in the cause of America.® This convention met on 16 Jan. 1776 and authorized the drawing up of a remonstrance and petition which should be pre¬ sented to the Continental Congress. In accord¬ ance with this action such document was duly prepared and presented at another convention held in the same place on the 24th of July of the same year. The remonstrance and petition were adopted by the convention and with this paper was a recapitulation of more recent oc¬ currences relating to the New Hampshire Grants and included the king's decree of 1767.

The convention begged that they might not ˆTe put under the jurisdiction of New York, but allowed to remain in that of New Hamp¬ shire.® The conditions were rapidly growing worse and were already unbearable. Various rumors of the movements of troops were com¬ mon and disturbing and the following declara¬ tion of loyalty was signed by all but one of the members of the convention.

" We the subscribers, inhabitants of that district of land, commonly called and known by the name of the New Hampshire Grants, do voluntarily and solemnly engage, under all the ties held sacred amongst mankind, at the risque of our lives and fortunes to defend, by arms, the United American States against the hostile attempts of the British fleets and armies, until the present unhappy contro¬ versy between the two countries shall be settled."

At an adjourned convention, held at the same place, 25 Sept. 1776, a covenant or com¬ pact was formulated, — 58 delegates present and ^^Cumberland and Wilmington or Draper by letter,® representing 35 towns, 10 of which were on the ®East side,® — that still further

raised the framework of the future independent State. Ethan Allen was a prisoner with the British. It was voted unanimously: ^^That suitable ap¬ plication be made to form that district of land, commonly called and known by the name of the New Hampshire Grants, into a separate dis¬ trict.® A ^^Committee of War® was appointed to act as the government, civil and military, ad interim, namely: Simeon Hathaway, Jonas Fay, Nathan Clark, Joseph Bradley, Martin Powell, Cephas Kent, Joseph Bowker, Joseph Woodward, Nehemiah Howe; 15 Jan 1777 fol¬ lowing were added from the ®East side,® Thomas Chandler, Stephen Tilden, Ebenezer Harrington, Joshua Webb, Dennis Dockland, Jotham Bige¬ low, Thomas Johnson, Elijah Gates, Nicholas White. At the October convention, and the January meeting, Ira Allen served as clerk, — both held at Westminster. Events had moved rapidly in the ^^Grants® or in the embryo com¬ monwealth. The people of the Green Moun¬ tains, loyal to freedom from Great Britain and discredited in their contention with contiguous territory, were ready to take an independent step. Accordingly, at Westminster, 15 Jan. 1777

in the CourtHouse, the following was promul¬ gated :

“ This Convention (whose Members are duly Chosen by the Free Voice of their Constituents in the several Towns on the N. Hampshire Grants) in public Meeting Assembled, in our own names and in behalf of our Constituents, Do hereby Proclaim and Publickly declare that we will at all times hereafter consider ourselves as a free and independent State, capable of regulating our internal police in all and every respect whatsoever, and that the people on said Grants have the sole and exclusive right of ruling and governing themselves in such manner and form as in their own wisdom they shall think proper, not inconsistent or repugnant to any resolve of the Honorable Continental Congress.

Furthermore, we declare by all the ties which are held sacred among men, that we will firmly stand by and support one another in this our declaration of a State, and in endeavoring as much as in us lies to suppress all unlawful routs and disturbances whatever.

Also we will endeavor to secure to every individual his life, peace, and property against all unlavdul invaders of the same.

Lastly we hereby declare, that we are at all times ready in conjunction with our brethren in the United States of America to do our full proportion in maintaining and sup¬ porting the just war against the

tyrannical invasions of the ministerial fleets and armies, as well as any foreign enemies sent with the express purpose to murder our fellow brethren and with fire and sword to ravage our defenseless country. The said State to be called New Connecticut.”

The above is not exactly in the original form, but as it was later revised and published.

At the next convention held in June the name New Connecticut, given for the reason that a large part of the original settlers had come from Connecticut, was found to be al¬ ready used for a district on the Susquehanna. For this reason the new State was renamed Vermont. There is some uncertainty as to the origin of this name.

It is generally supposed to have been sug¬ gested by Dr. Thomas Young of Philadelphia, an old and enthusiastic friend of the ˆGrants® and a trusted adviser, but this does not deter¬ mine where Dr. Young found the name. Did it come from the often quoted exclamation of Champlain, ®Voila les Verts Monts,® or did it come, as some suppose from a letter which one Saint John de Crevecoeur is said to have written to Ethan Allen asking that ˆˆas Vermont is en¬ tirely French® some of the counties have French names given them? Crevecoeur is supposed to have suggested Vermont because he had in mind L’Abbe de Vermont, reader to Marie An¬ toinette. This is given for whatever it may be worth. • As also the following statement which refers to the Rev. Samuel A. Peters, DD., LL.D., the first Church of England clergy¬ man to visit this district, and who was after¬ ward chosen Bishop of Vermont, but never con¬ secrated. Dr. Peters, in October 1763, climbed a high mountain in the ˆGrants,® where the waters of Lake Champlain could be seen on the one hand, and those of the Connecticut River on the other, and broke a bottle upon a rock, naming the territory ˆˆVerdmont,® dedi¬ cating it to God. Little credence was given to this alleged incident, because of the repeated failures to find such a location. Mounts Mans¬ field and Camel’s Hump, and Knox Mountain in Orange County, were each ascended with¬ out results ; but, in 1880, Spruce Mountain in Plainfield was selected for an ascent from Brad¬ ford, where the Peters family settled, and the conditions found at the summit served to con¬ firm the Dr. Peters’ claim.

The preamble to the Vermont Declaration of Independence, reciting the grievances of the patriots and their sufferings, entailed by the

British government, is a monument to the 72 Vermonters, who again swore fealty to the na¬ tional cause. The Continental Congress, while failing to give them any satisfactory response to numerous petitions, began to recognize its Green Mountain troops as reliable allies, and the mili-

Constitution House, Windsor.

tary was receptive of honors. Warner had been promoted to colonel, and others prominent in Vermont affairs were possessors of commissions in the Continental line. But the days were dark for the country. Outside the camp of Gen. George Washington, and this circle of Green Mountain patriots, the probability that the American Colonies would become independent of Great Britain was very faint. Gen. John Burgoyne, with an army deemed invincible, was marching southward from Canada. He was met by the Vermonters so aggressively that he likened them to ®a gathering storm on my left.^^ The convention to adopt a constitution for the independent State met in the ®01d Constitution House® at Windsor 2-8 July 1777 in the shadow of this environment. The constitution had been read and adopted, ˆsection by section,® and was about to be put upon its final passage, when news came, 8 July, of the disastrous situation in the northern department. The result at Hubbardton the previous day was unknown, but many families of the representatives lived in the route of Burgoyne's advancing and vic¬ torious army. The motion to immediately ad¬ journ was about to be carried, when the heavens, as if to complete the British general's metaphor, added the artillery of a terrific thunderstorm as a concomitant. The enforced delay caused a sober second-thought, and the business of the convention was completed before the hurried adjournment and departure occurred.

As soon as possible the new State adopted such laws as were needed and means of enforc¬ ing them. For the first time slavery was for¬

ever prohibited, freedom in religious matters, freedom of speech and of the press guaranteed and the right to vote given to every man over 21. Vermont as an independent State was not more liberal than any of the 13.

Vermont in the Revolution. — Although thus independent, Vermont did not shirk such duties as were necessary to the States in the Union. Perhaps the most spectacular event in the Revolutionary history of Vermont is the capture of Ticonderoga 10 May 1775 (on the daˆ" the Revolutionary Congress assembled) and the part taken by the ˆˆGreen Mountain Boys,® at Bennington, 16 Aug. 1777. Generalship of this character would not neglect the commissary department, and the Continental storehouse at Bennington, filled with supplies, was a reality.

Its capture by Colonel Baum's detachment would have enabled General Burgoyne to re¬ write the entire history of his ill-starred expe¬ dition. Referring again to Ticonderoga and its bloodless capture, there may exist honest doubts as to what honors may have been due to Bene¬ dict Arnold, but there was none as to Ethan Allen and Seth Warner. Supported by Warner and his ˆˆGreen Mountain Boys,® Ethan Allen entered the fortress at the head of the com¬ mand, — ˆˆside by side® with Arnold, as he wrote, 11 May 1775, — and the demand for sur¬ render, *In the name of the Great Jehovah, and the Continental Congress,® twice repeated, was made by Allen upon Commandant Delaplace. Arnold's commission to command these troops had been repudiated. The next day Warner reduced Crown Point. Making peace among themselves, Arnold and Allen swept Lake Champlain of hostile craft, troops from Con¬ necticut occupied the forts at Crown Point and Ticonderoga, and American patriots thus ob¬ tained, within a week, control of the entire waterway. These events, so quickly following Lexington battle, filled royal governmental cir¬ cles with astonishment. Governor Golden, of New York (who had temporarily returned to power), reported to the British ministry: ˆˆThe only people of this province who had any hand in this expedition were that lawless people of whom your lordship has heard much under the name of the Bennington mob,® referring to the affair of ˆ'Breckenridge farm.® The ®Green Mountain Boys® disbanded and Warner was given the command of a regiment, — composed largely, however, of the same men, — enlisted under the Continental Congress. An ®irony of fate® attended its fortunes in that the regiment was mainly engaged in the defense of New York; and yet it should be stated that the State of Vermont, after its organization, paid

the entire expenses of these soldiers. Not being recognized as a commonwealth by Congress, the indepeiident State not only defended itself from the British, but materially assisted the general cause of national independence.

A ˆTast® had been observed 18 June 1777; but disaster following disaster to America, still accompanied the British progress south. Ticon¬ deroga and Crown Point, considered hitherto as commanding Lake Champlain, had fallen, but at Bennington the tide of battle turned. Here the combined forces of Massachusetts (Berkshire County), New Hampshire and Vermont, under Gen. John Stark, won the day; and it was Warner's regiment fresh from its defeats at the north, and Hubbardton in particular, which ar¬ rived just ill time to save the field. Stillwater 19 September and 7 October, subsequently, led up to Burgoync's surrender at Saratoga l7 Oct. 1777. This series of successes, one of Cressey's 15 pivotal points of history, was thus written in favor of liberty.

A plain gray obelisk of limestone marks the site of the Continental storehouse, and com¬ memorates the Battle of Bennington, the field of which forms a portion of the landscape vis¬ ible from its lookout room. It rises from an elevation 250 feet above the Walloomsac River Valley, 301 feet 10.5 inches; base, 37 by 37 feet, — the most imposing strictly battle monument in existence. The cost, $100,000, was contributed by the three States involved in the engagement.

by subscription, and $40,000 by the national government ; erected 1887-91 a.d., by the Ben¬ nington Battle Monument Association, a Ver¬ mont corporation. In the valley is located the Soldiers' Home of the State.

The convention at Windsor, before adjourn¬ ment, created a ˆCouncil of Safetyˆˆ and en¬ dowed it with all the powers vested in the con¬ stitution just adopted. It was the acting execu¬ tive of Vermont during the Battle of Benning¬ ton. This council of 12 men was constituted by Thomas Chittenden, president; Jonas Fay, vice-president; Ira Allen (to 6 Sept. 1777), Joseph Fay (from that date to 12 March 1778), secretaries; Heman Allen, Jacob Bayley, Timo¬ thy Brownson, Benjamin Carpenter (succeeding 24 Dec. 1777 Benjamin Spencer, a Tory), Jere¬ miah and Nathan Clark, Moses Robinson, Paul Spooner, This provisional body was dissolved 12 March 1778 when the regular State govern¬ ment was inaugurated. Four days later the first legislature divided the State into two counties, Bennington on the west and Unity on the east, the Green Mountains becoming the line of official demarcation. On the 21st the name ˆˆUnity® was changed to Cumberland, and that county was divided into two ˆˆshiresˆˆ by the ˆancient line,® — the Westminster shire and the Newbury shire. Bennington County also was given two shires, — Bennington and Rutland. A readjustment of county and town lines, thus begun, was continued until permanently estab¬ lished.

The Haldimand Incident. — This was a fea¬ ture of the American Revolution that has re¬ ceived various interpretations. Its ostensible purpose was an exchange of prisoners, Ver¬ mont becoming the ina media between the com¬ manders of the hostile armies. Its effect was to keep a powerful British army inactive, — for more than four years, — in Canada on the north, and to wring from the Continental Congress a quasi-recognition of the independent common¬ wealth. Eight Vermonters only were in the secret motives, namely: Ethan Allen (lately re¬ turned from his sojourn in a British prison), Ira Allen, Governor Chittenden, Moses Robin¬ son, Samuel Safford, Timothy Brownson, John Fassett and Joseph Fay, Ira Allen, the diplo¬ mat, was the moving force. Governor Chitten¬ den became the trusted counsellor of both par¬ ties, and Ethan Allen's boldness maintained in statu quo the severe criticisms, suspicions and charges of double dealings throughout the period extending from 11 Jan. 1779 to 25

March 1783. To Great Britain was held out the hope that Vermont would become an English province, but the Americans were more difficult of management. Congress had gratefull3' ac¬ knowledged the service of Vermont during the Burgoyne invasion only to recede, and Ethan Allen promptly disbanded the Green Mountain militia, carrying consternation into the settle¬ ments exposed on the northern frontier, and perplexity to the commanders of the patriot army. The threatened dissolution and partition of Vermont among the States of Massachusetts, New Hampshire and New York was met by the annexation 5 April 1781 of 35 towns ni New Hampshire, extending eastward to the ^^ancient Mason line®; and 15 June, following, of 12 con¬ tiguous districts in New York, formerly claimed by New Hampshire, known as the ^^East and West Unions.® These boundaries were insisted

upon by Ethan Allen and accorded by the Brit¬ ish. The towns annexed promptly sent repre¬ sentatives to the Vermont legislature and the independence of the enlarged State was unques¬ tionably maintained. The militia was again mobilized, it being significant that the first offer of protection was made by Ethan Allen to New York, and Congress was perfectly well satisfied to enjoy whatever advantages thus inhered to the patriot cause.

Encouraged to believe that Congress would recognize Vermont if the ®East and West Unions® were surrendered, on 22 Feb. 1782, in the face of protests by the towns affected, the legislature reduced the State's boundaries to the present limits ; but the national body postponed action.

Admission to the Union. — After 14 years of existence as an independent republic of a very democratic kind, Vermont was at last on 14 March 1791 received into the Union as the 14th State. Although fully carrying its part in the recent war, paying its troops and paying New York $30,000 to settle its claims, the State had no debt and this policy of solvency has al¬ ways been followed during the years since. Ira Allen is credited with the construction of this financial policy. At first the property of Royal¬ ists was confiscated and much of the income of the State was thus raised and later a system of taxation was adopted. For a long time after its admission to the Union the constitution ac¬ cepted at the Windsor Convention of 1777 was retained, and many of its important features remain as greatly cherished as in the former days. No one need be surprised that Vermont has been a State which in proportion to its wealth and

population has always exercised a far greater influence in national affairs than could have been expected, if he recall the early history and understands what sort of people settled the wilderness which has become Ver¬ mont and the experiences through which they passed in the latter part of the 18th and early part of the 19th cenUiries.

The settlers of Vermont had been of New England origin and largely from Connecticut. Their ideas of freedom, crystallized in the ®Bill of Rights,® had been the expression of prin¬ ciples founded upon sincere convictions ; they had struggled to attain statehood through sacri¬ fices that were heroic because these affected the dearest spot to freemen — the home. The con¬ stitution partook of several unique elements, chief of which was that human slavery should never be legal and it was not strange immigra¬ tion of the right sort poured into the State and its territory rapidly opened up to settlement. The financial situation was attractive to men of means and the commonwealth grew apace in all that tended to influence and the sterling worth for which Vermont has ever been noted. This accounts for its political ˆ‘one-sidedness® — after the two types of citizenship, indigenous to all civilized peoples, have crystallized into two op¬ posing camps or parties — and the commanding position the State has taken in national affairs. The isolation forced upon the people by their earl}ˆ struggles accounts for the insularity of the earlier trade relations, these being with Canada, principally, rather than with the United States. The War of 1812, however, changed this fea¬ ture, presenting another opportunity for Ver¬ monters to show their mettle. With the north-
Copyrig:ht, 1892, by M. E. Watson, Bennington, Vt.

THE BENNINGTON BATTLE MONUMENT

MDut’

% -

■ 1

f

. ‘ •

I

- ˆ11

:4

- I

I

4

t

• ’tt ‘

• jj

i^-

I

y

\

[

4

■

i

y) kadi

1 .^

ern frontier again threatened by the British, the courage, patriotism and military acumen of the fathers — many of whom were alive — induced a prompt response to the call of the national government for help. As in the Revolution, so in the Second War with Great Britain, the Vermont troops were in evidence; and, at the Battle of Plattsburgh, 11 Sept. 1814, where Mac-donough commanding 14 vessels of 2,244 tons, 882 men, 86 guns, defeated the British Captain Downie, whose fleet consisted of 16 vessels, 2,404 tons, 987 men, 92 guns, it was the Vermont volunteers who silenced the shore batteries at the crucial time, and made the victory possible, again stripping the waters of Lake Champlain bare of English vessels of war. This was the last important engagement in the Northern De¬ partment and the result was joyously celebrated throughout the United States. Four months later peace was concluded. Official rolls, al¬ though imperfect, credit Vermont with; ^‘Sol¬ diers who served* 1812-14, 4,170; Plattsburgh (Vt.) volunteers, 4,620.^^ Vermont furnished one company of M men for the Mexican War, 1845-48. At the storming of Chapultepec, 12-14 Sept. 1847, two of these soldiers were the first to reach and lower the Mexican flag on the bishop’s palace. The Civil War, 1861-65, found Vermont with a nominal brigade composed of four militia regiments, of less men than the law required, armed with obsolete equipment ; not enough superannuated stuff to fit out one regi¬ ment. At the first call by President Lincoln for 75,000 volunteers, the legislature was called in emergent session, the national proclamation and State warning l3earing even date, 15 April 1861. On 25 April the general assembly con¬ vened, and, in one day, appropriated $1,000,000 for war expenses ; during the session of 42 hours, voted also $7 per month to pay Vermont soldiers in addition to the $13 per month allowed by the general government ; laid a war tax of 10 cents on the “grand list dollaP^ ; provided for the equipment of six more regiments for a term of two years, afterward extending the period of enlistment to three years; and adjourned, after providing that the existing first regiment be recruited to its full quota. This regiment was mustered 8 May 1861 and two days later went to the front. Before the 11th of May volunteers for five regiments had offered their services, where only two were needed, thus emulating the patriotic ardor of

Revolutionary days. The precedent for the $7 per month in 1861 was established by the governor and council 21 June 1794 when an extra allowance was voted to the “minute men® — Vermont’s quota of 2,139 — under a call of the United States 19 May, ultimo.

In 1861 the number of Vermonters subject to military duty was 60,719. _ At the close of hostilities Vermont was credited by the War Department with 35,242 men, an excess of its quota of 1,513. One in 10 of the total population and more than one-half of those subject to mili¬ tary service had fought for the Union. The State sent out 17 regiments of infantry; three batteries, one regiment of cavalry and three companies of sharpshooters. The First regi¬ ment were three months’ men; from the Second to the 11th (the last heavy artillery), inclusive, three years’ enlistments ; the other six were nine months’ troops. The First Vermont Brigade consisted of the Second, Third, Fourth, Fifth and Sixth regiments; the Second brigade,

of the 12th. 13th, 14th, I5th and 16th regiments. Vermonters enrolled in the regular army and navy are believed to have been in excess of 2,000; in the marine corps, 619; enlisted in Vermont organi¬ zations, 28,967; re-enlistments, 1,961; commis¬ sioned officers in the navy, 84; in the marine corps, 3. Vermont appropriated for war pur¬ poses, $9,887,353 on a total valuation of $85,- 000,000, of which $5,215,787 was paid by towns. In the Spanish-American War (1898) Vermont promptly responded, but its troops were not called into action. Admirals George Dewey and Chas. E. Clark were the notable Vermont figures of that contest. When trouble with Mexico broke out in 1916 the First Regiment of the Vermont National Guard immediately mobilized and was one of the first to reach the border where it remained until ordered home the end of September. It was officially reported as “The best National Guard Regi¬ ment in equipment and general efficiency® on the border. In July 1917 the same regiment, though with somewhat changed personnel, was drafted into the Federal service and thereby ceased to be of the National Guard. At this time the regiment mustered 55 officers and over 2,000 men and soon became the 157th Pioneer Infantry in the famous 26th or Yankee Divi¬ sion. Under Gen. C. R. Edwards the regiment won the highest commendation for its fighting qualities and general morale. It is needless to add that many other Vermonters were in other parts of the army and had active duty abroad in United States, English and French regi¬ ments.

Population. — The percentage of increase in Vermont’s population has

been quite insignifi¬ cant since 1850. The surplus of “brain and brawn® has been contributed, with the Civil War exception, to develop the West, and the cities of contiguous States. The younger gen¬ erations have, since 1837, gone out to improve the country at large ; so much so that, in 1890, there were more than 1,000 farms virtually abandoned; others were indifferently cultivated, and, others still, grown up again to primeval forest. Associations of “Native Vermonters® exist in all the larger cities of the East and West ; and the annual meetings are notable both for their distinguished personnel and the loyalty expressed for the childhood’s home amid the Green Mountains. A small percentage return to occupy the paternal acres ; quite large estates are held as summer residences and another transition stage is now in progress which bids fair to upbuild the Commonwealth and still further augment the financial statements of its later history. As to density the State as a whole is not thickly settled, the average pop¬ ulation being 39 in each square mile. The proportion of males and females is nearly equal, but the former are about 5 per cent less nu¬ merous in both native and foreign popula¬ tion. During the last 25 years there has been a slow, but continuous decrease in the popula¬ tion of the smaller towns and an increase in that of the larger towns. Because of this the population of several counties is less than 50 years ago, though, as has been seen, the State as a whole has slowly increased in number of inhabitants.

The population 18 June 1761 was 22 — the families of six actual settlers and landowners

in Bennington. The temporary population of Fort Dummer (late in Massachusetts) had not been preserved. These pioneers had been in¬ creased, in 1791, to 43,970 on the east side and 41,569 on the west side. In 1800 the population was 154,465; (1810) 217,895; (1820) 235,981;

(1830) 280,652; (1840) 291,948; (1850) 314,- 120; (1860) 315,098; (1870) 330,551; (1880); 332,286; (1890) 332,422; (1900) 343,641; (1910) 355,956; (1920) 352,428.

Governors of Vermont

BEFORE ADMISSION TO THE UNION

Thomas Chittenden . 1778-1789

Moses Robinson . 1789-1790

Thomas Chittenden . 1790-1791

AFTER ADMISSION TO THE UNION

Thomas Chittenden (d Paul Brigham, Acting

Isaac Tichenor .

Israel Smith .

Isaac Tichenor .

Jonas Galusha .

Martin Chittenden. .

Jonas Galusha .

Richard Skinner … Cornelius P. Van Nes

Ezra Butler .

Samuel C. Crafts… William A. Palmer. . Silas H. Jennison…

Charles Paine .

John Mattocks .

William Slade .

Horace Eaton .

Carlos Coolidge .

Charles K. Williams. Erast us Fairbanks. . John S. Robinson…

Stephen Royce .

Ryland Fletcher ….

Hiland Hall .

Erastus Fairbanks. . Frederick Holbrook . John Gregory Smith. Paul Dillingham ….

John B. Page .

Peter T. Washburn. George W. Hendee. .

John W. Stewart… .

Julius Converse .

Ashael Peck .

Horace Fairbanks … Redfield Proctor… . Roswell Farnham … John I. Barstow… . Samuel E. Pingree. . Ebenezer J. Ormsbee William P. Dillingham

Carroll S. Page .

Levi K. Fuller .

Urban A. Woodbury.

Josiah Grout .

Edward C. Smith… William W. Stickney John G. McCullough

Charles J. Bell .

Fletcher D. Proctor George H. Prouty. .

John A. Mead .

Allen M. Fletcher.. Charles W. Gates. . Horace F. Graham. Percival W. Clement James Hartness…

., August 1797) . 1791-1797

Governor, August 1797— October 1797

Federalist . 1797-1807

Democrat-Republican . . 1807-1808

Federalist . 1808-1809

Democrat-Republican.. 1809-1813 “ “ 1813-1815

“ •* < 1815-1820

“ “ 1820-1823

« “ 1823-1826

Adams Republican… . 1826-1828

“ “ …. 1828-1831

Fusion . 1831—1835

Whig . 1835-1841

“ 1841-1843

“ 1843-1844

“ 1844-1846

“ 1846-1848

“ 1848-1850

“ 1850-1852

“ 1852-1853

“ 1853-1854

Republican . 1854-1856

“ 1856-1858

“ 1858-1860

“ . 1860-1861

“ 1861-1863

” . 1863-1865

“ . 1865-1867

“ 1867-1869

“ (Died in office) 1869-1870

Acting Governor (Lieut.

Governor) . 1870

Republican . 1870-1872

“ 1872-1874

“ 1874-1876

« 1876-1878

” 1878-1880

« . 1880-1882

“ 1882-1884

“ 1884-1886

“ . 1886-1888

“ 1888-1890

“ 1890-1892

“ 1892-1894

« 1894-1896

« 1896-1898

» 1898-1900

« 1900-1902

“ 1902-1904

“ 1904-1906

« 1906-1908

« 1908-1910

“ 1910-1912

“ . 1912-1915

“ . 1915-1917

« . 1917-1919

» 1919-1921

“ . 1921-

Foreign Immigration. — For many years after the founding of Vermont it was almost entirely settled by native New Englanders, but there were always French Canadians and a few of more distant origin. As everywhere in the United States, with the coming of various in¬ dustries and the general influx of foreigners into the country, the foreign portion of the population increased and at present not ˆ less than 35 per cent of the inhabitants are either wholly foreign or of foreign parentage. Welsh have come to the slate quarries, Italians

to ihe marble and granite mills and quarries. Swedes to the marble works and Scotch to the granite works, and other nationalities to other industries, so that more than twenty nations are represented in the State. Of these people 14 per cent are foreign born, 24 per cent of foreign parents. Naturally, by far the greatest number of immigrants have come over the border from Canada, nearly 15,000 being French Canadians and 11,400 English Cana¬ dians. Of the other nationalities represented by over 1,000 are 5,000 Irish, 4,500 Italians, and less number of English, Swedes, Austrians, Russians, *etc.* There are only about 1,600 negroes in the State.

Bibliography. — For complete bibliography consult Gilman, M.D., ˆBibliography of Ver¬ montˆ (Burlington 1897). Consult also Bene¬ dict, G. G., ˆVermont in the Civil War> (2 vols., Burlington 1886) ; Carpenter and Arthur, ˆHistory of Vermontˆ (Philadelphia 1854) ; Collins, E. D., ˆHistory of Vermontˆ (Boston 1903) ; Conant and Stone, ˆGeography, History and Civil Government of Vermontˆ (Rutland 1915) ; Crockett, Walter, ˆHistory of Lake Champlainˆ (Burlington 1909) ; Depuy, H. W., ˆEthan Allen and Heroes of Vermontˆ (Buf¬ falo 1853) ; Hall, Hiland, ˆHistory of Vermontˆ (Albany 1868) ; Hall, B. H., ˆHistory of East¬ ern Vermontˆ (New York 1858) ; Heaton, J. S., ˆThe

Story of Vermontˆ (Boston 1889) ; Heminway, Abby M., ‘ˆHistorical Gazetteer of Vermontˆ (5 vols., Burlington 1867-80) ; Hitch¬ cock, Edward, and others, ˆGeology of Vermont> (2 vols., Claremont 1861) ; Kimball, M. J., Wermont for Young Vermontersˆ (New York 1904) ; Perkins, G. H., ˆReports of Ver¬ mont State Geologistˆ (1898 date. Biennial) ; Roberts, Daniel, ˆDigest, Supreme Court Casesˆ 1789-1905 (Burlington 1878) ; Roberts, Robert, ˆAppendixˆ (Burlingtonˆ 1911) ; Robinson, Rowland, ‘Vermontˆ (Boston 1892) ; Slade, William, Wermont State Papersˆ (Middle-bury 1883) ; Thompson, D. P., ˆThe Green Mountain Boysˆ (Montpelier 1840) ; Thomp¬ son, Zadock, ˆNatural, Civil and Statistical History of Vermontˆ (Burlington 1843, Ap¬ pendix 1852) ; Vermont Historical Society ‘Proceedingsˆ (Montpelier 1846-date, Bien¬ nial) ; Vermont HistoricaLSociety ‘Collectionsˆ (2 vols., Montpelier 1870-71) ; Walton, E. P., ‘Governor and CounciP (8 vols., Montpelier 1873-80) ; Williams, Samuel, ‘Natural and Civil History of Vermontˆ (2 vols., Burlington

1909).

George H. Perkins, The University of Vermonl.

VERMONT, University of, and State Agricultural College, located at Burlington, Vt. The University of Vermont was chartered •in 1791, and first opened to students in 1800, the first class being graduated in 1804. The State made a grant of land of 29,000 acres for the use of the university, and the governor of the State and speaker of the house were made members ex officio of the board of trustees. In 1862 the Vermont Agricultural College was chartered, but as it did not receive the support necessary to put it into operation, it was incor¬ porated in 1865 with the university under the title of the University of Vermont and State Agricultural College. Under this new charter the board of trustees consists of the governor,

ihe president of the university, members ex officio ; nine members

elected by the State legis¬ lature, three every two years, for a term of six years, and nine other members having the power to fill vacancies in their number. The College of Medicine, which prior to 1899 was a partially independent affiliated school, is one of the old¬ est medical schools in the United States, having been opened to students as early as 1809. It was suspended from 1836 to 1854, but after the latter date its growth was continuous, and in 1899 it became an integral part of the univer¬ sity under the entire control of the board of trustees. The university has maintained a steady growth from the first, except during the War of 1812 and the Civil War. In 1814-15 the college buildings were used as barracks, and all exercises were suspended; in the Civil War large numbers of students left the university to join the army. The organization of the university now includes: (1) the College of Arts and Science; (2) the College of Medicine; (3) the College of Engineering; (4) the Col¬ lege of Agriculture. Women are xidmitted to all colleges except medicine. The College of Arts offers a classical course leading to the de¬ gree of A.B., a literary-scientific course leading to the degree of Ph.B., a course in general sci¬ ence leading to the degree of B.S., a technical course in chemistry leading to the degree of B.S. in chemistry and a course in commerce and economics, leading to the degree of B.S. in commerce and economics. The A.B. and Ph.B. and general B.S. courses are largely elective after the freshman year. The College of Engi¬ neering offers courses in civil and sanitary, electrical and mechanical engineering, all lead¬ ing to the degree of B.S. In the College of Agriculture courses in animal and plant indus¬ try, teaching of agriculture and home economics are offered. Shorter courses of one or two years are also provided in agriculture. The College of Medicine offers a four years' course leading to the degree of M.D. Two years of preliminary work are required for admission to the medical college. The university also offers a seven-year combination of medical and aca¬ demic curricula leading to the Baccalaureate and M.D. degrees. The university also confers the degrees of A.M., M.S., C.E., M.E. and E.E. for graduate work. There are 56 endowed scholarships, 30 State scholarships and a stu¬ dents' loan fund. The university buildings on the campus include Old College, a reconstruc¬ tion of a building erected in 1825, the corner¬ stone of whose southern part was laid by Gen¬ eral Lafayette; Converse Hall, a dormitory; Grassmount, woman's dormitory; the Billings Library; the Williams Science Hall; the me¬ chanical buildings : the agricultural buildings ; and the gymnasium ; the medical department oc¬ cupies buildings in the city. The library at present contains 100,000 volumes. In 1904, in which year the centennial of the first gradua¬ tion was celebrated, a movement was begun by the alumni to raise a centennial endowment fund of $1,000,000. The students average 800, of whom

approximately one-half are in the de¬ partments of arts and sciences. Among the graduates have been one Vice-President of the United States, one cabinet minister, three United States ministers to foreign nations, four gov¬ ernors of Vermont and 14 college presidents.

VERNE, Jules, French novelist: b. Nantes, 8 Feb. 1828; d. Amiens, 24 March 1905. His early education was obtained in the Nantes Lycea; he then studied law in Paris, but early turned his attention to literary work, at first writing short pieces for the stage, and in 1863 attracted attention by a story, ˆCinq Semaines en Ballon,ˆ or ˆFive Weeks in a Balloon,ˆ which instantly met with popular approval. He inaugurated a new school in fiction, basing his stories on the inventions of the day, delineating wildly extravagant voyages and adventures to which he added very cleverly prepared sci¬ entific and geographical detail. The interest in his books depends entirely on incident, and though extremely entertaining, his characters are subordinate and merely inserted to sustain the narrative. Among his books, all of which were translated into several languages, are ˆLe Desert de Glaceˆ (1867) ; ˆA Journey to the Centre of the Earthˆ (1872) ; ˆTwenty Thou¬ sand Leagues Under the Seaˆ (1873); ˆMe-ridiana. The Adventures of Three Englishmen and Three Russians in South Africaˆ (1873) ; ˆFrom the Earth to the Moon Direct in Ninety-Seven Hours Twenty Minutes and a Trip Round Itˆ (1873) ; ˆThe Fur Country; or Seventy Degrees North Latitudeˆ (1874) ; ˆAround the World in Eighty Daysˆ (1874) ; ˆA Floating City,ˆ and ˆThe Blockade Runnersˆ (1874) ; ˆThe English at the North Poleˆ (1874) ; ˆDr. Ox's Experimentˆ (1874) ; ˆA Winter Amid the Iceˆ (1875) ; ˆThe Mysterious Islandˆ (1875) ; ˆThe Survivors of the Chancellorˆ (1875) ; ˆMichael Strogoff, the Courier of the Czarˆ (1876) ; ˆThe Child of the Cavernˆ (1877) ; ˆHector Servadac, or the Career of a Cornetˆ (1877) ; ˆDick Sands, the Boy Captainˆ (1878) ; ˆLe Rayon Vertˆ (1882) ; ˆKeraban-le-tetuˆ (1883); ˆL'Etoile du Sudˆ (1884); <Le Pays de Diamants> (1884); 'Le Chemin de Franceˆ (1887) ; ˆDeux Ans de Vacancesˆ (1888) ; ˆFamille Sans Nomeˆ (1889) ; ˆCaesar CascabeP (1890) ; ˆMathias Sandorfˆ (1890); ˆNord contre Sudˆ (1890); ˆThe Purchase of the North Poleˆ (1890) ; ˆClaudius Bombamacˆ (1892) ; ˆLe Chateau des Carpathes> (1892) ; <L'Ile a Helice> (1895) ; ˆLe Sphinx des Glacesˆ (1897) ; ˆLe Village Aerionˆ (1898) ; ˆThe Master of the Worldˆ (1904) ; and ˆA Drama in Livoniaˆ (1905). His comedy ˆLes Pailles Rompuesˆ was written in 1848 and produced at the Gymnase in 1850 and his ˆOnze Jours de Siegeˆ quickly followed. Several others were dramatized and ˆLe Doc-teur Oxˆ was changed to an opera. He was made a member of the Legion of Honor and his books were crowned by the French Academy, but to his

disappointment his literary worth was more fully recognized abroad than in his own country. See Twenty Thousand Leagues Under the Sea.

VERNER, ver'ner, Karl Adolf, Danish philologist: b. Aarhus, Jutland, 7 March 1846; d. 1896. He was educated at the University of Copenhagen; from 1876 to 1883 was assistant in the university library at Halle and after 1883 was professor of Slavonic languages at the University of Copenhagen. In 1875 he pub¬ lished in Kuhis Zeitschrift an article entitled ˆEine Ausnahme der ersten Lautverschiebung,ˆ which proved of far-reaching importance not only for Tculonic philosophy, but also for the

methods as well as results of Indo-European comparative grammar. In recognition of this service he was awarded by the Berlin Academy the Bopp prize in 1877, and in 1887 made honor¬ ary Ph.D. by the University of Heidelberg. He also published brief articles in linguistic jour¬ nals. See Verner's Law.

VERNER'S LAW, in phil9logy, a law of sound so named from the discoverer, Karl Adolf Verner (q.v.) who formulated it in 1875. It embodies an explanation of certain apparent exceptions to the laws for the first shifting of consonants, affecting the representation in Teutonic of the Indo-European voiceless ex¬ plosives k, t, p and the voiceless sibilant s. According to Grimm's Law p of the mater-language always equaled English / ; t = th; k = English h; h — English p; d = English t ; g = English c(k) ; bh = b ; dh = d] gh = g.

Verner pointed out that these laws or rules did not apply to all instances : he saw that t — th the begining of a word and under certain conditions (cp. the father), but ekutSv and centum, from -tom, gave not hunt/i(red) but hundred. So he said that, at the begin¬ ing of a word, or when the Mater-Language showed an Accent following the t, then t' ˆ d, not th: cp. 0erd and deed. Greek shows this Early Accent very clearly. In order to remem¬ ber Grimm's Law and Verner's Law,

it is best to start with instances, which can be collected in a Hexameter: under each word write the Greek word, then the Mater-Language con¬ sonants, then the English word with the con¬ sonant in capitals or thick type. The Laws can easily be gathered from the instances, and can then be applied to other instances. Latin: turba pedes in agris centum fert facta et in hortis. Greek: Tvpfir] nddag (ev) aypoic (e) /cardv (i) <pepe (r) derd eri(h) xˆprotg. English: THorp FeeT (in) aCres HunD(red) BeareTH DeeD GarTH (O.E).

To sum up Grimm's Law and Verner's Law for English :

1. The Hard Consonants or ˆTenuesˆ of

the Mater-Language " Aspirates, etc., in Eng¬ lish — 4

q and k (Guttural) =h t (Dental) =ˆ/i [t' = d)

p (Labial) = f

2. The Soft Consonants or ˆMediaeˆ = Hard:

I and g — c (k)

d ~ t

b (rare) ~p

3. The Aspirated Consonants = Soft :

Ih and gh — g dh — d bhˆb

From the above it is seen that Verner's Law is a modification and extension of Grimm's Law; its essential point consisting in the recognition that the diversity was connected with the original word-accent of Indo-Euro¬ pean. Consult Brugmann, K., ˆComlˆarative Grammar of the Indo-Germanic Languagesˆ ; Skeat, W W., ˆPrinciples of English Ethnologyˆ (1887) ; King and Cookson, ˆSounds and In¬ flexions.ˆ

VERNET, ver-na, Antoine Charles Hor¬ ace, known as ˆUarle VerneiPˆ French painter: b. Bordeaux, 14 Aug. 1758; d. Paris, 17 Nov.

1835. He was the son of Joseph Vernet and distinguished as a painter of the Napoleonic battles, who ever aimed at the glorification of the victor of Friedland and Fontenoy. He also painted portraits and

hunting scenes. His comic pictures are interesting and valuable as records of contemporaneous manners.

VERNET, Claude Joseph, French painter: b. Avingon, 14 Aug. 1714; d. Paris, 3 Dec. 1789. Going to Rome in 1734, he received his art¬ training from A. Manglard and returned to France (1753) to become member of the Acad¬ emy and to paint for Louis XV a series of views of French seaports (now in the Louvre). His landscapes and marines are well set-off with figures. He evidently imitated the manner of Claude Lorraine, but his pictures are fin¬ ished with a certain conventional monotone which detracts from their reality.

VERNET, Jean Emile Horace, commonly called ˆHorace Vernet.ˆˆ French painter: b. Paris, 30 June 1789; d. there, 17 Jan. 1863. He was the grandson of Claude Joseph Vernet (q.v.), and son of Antoine Charles Horace Vernet, better known as Carle Vernet (q.v.). His first master in art was his father and even at 13 he could support himself by the payments received for his drawings. He studied also under designer Moreau, the architect Chalgrin, and the painter Vincent. His ˆCapture of a Re¬ doubtˆ (1709) took the public by storm; it was a new departure from the frigid classicalism of David and was alive with modern feeling and realistic life. On the hopes kindled by this success he married, opened a studio, and established a manner of his own. He be¬ came the first representative in art of the Napoleonic war spirit with all its swagger and chauvinism, and offended the government of the Restoration b}'ˆ his anti-monarchical cari¬ catures, so that in 1822 his works were ex¬ cluded from the exhibition ; this induced him to open a picture-gallery of his own which was very successful. His increasing popularity at last induced Charles X to appoint him to the directorship of the French Academy in Rome, a post which he ably filled till the end of 1834. On his return to Paris, Louis Philippe com¬ missioned him to paint the historical galleries of the museum of Versailles, a task which occupied him five years. Among the most re¬ markable of the pictures are ˆThe Occupation of Anconaˆ ; ˆThe Assault of the Town of Constantine in Africaˆ ; ˆThe Attack of the Citadel of Antwerpˆ ; <The Fleet Forcing the Tagusˆ ; ˆThe Dog of the Regimentˆ ; ˆThc Soldier of Waterlooˆ ; ˆThe Battles of Jemap-pesˆ ; ˆMontmiraiP ; ˆFontenoyˆ ; ˆWagramˆ ; ˆThe Capture of La-Smalaˆ ; ˆThe Prayer in the Desertˆ ; <The Council of Arabs.ˆ His last great picture was ˆThe Battle of the Alma.ˆ Consult Rees, ˆVernet et Delarocheˆ (1880) ; and Dayot, A., ˆLes Vernetˆ (1898).

VERNIER, ver-ne-a', Pierre, French mathe¬ matician : b. Ornans (Doubs), 1580; d. Ornans, 14 Sept. 1637. He was captain commanding the chateau d'Ornans, counsellor of the king of Spain, director-general

of the mint for the Franche-Comte. He devoted his leisure to mathematics, and is known as the inventor of the vernier (q.v.), which was formerly attrib¬ uted to Nunez. He described this instrument in ˆLa construction, I'usage et des proprietes

VERNIER

du quadrant nouveau de mathematiqucs^ (Brus¬ sels 1631). He also wrote a manuscript ^Traite d'artillerie.^

VERNIER, a device for reading scales, in¬ vented by Pierre Vernier (q.v.). It consists of an auxiliary scale of n intervals sliding in contact with the scale to be read, and occupying therein a space of w ± 1 intervals. Each inters

val of the vernier scale will then occupy 1 ± i

n

intervals on the main scale. Let us assume that the main scale reads from right to left, and the vernier scale from left to right, and that 10 intervals in the vernier scale occupy the place of 11 intervals on the main scale. Let the 0 of the vernier scale be 12.8 intervals to the left of the 0 of the main scale. It will then be situated between 12 and 13 of the main scale. The one of the vernier scale will be at 12.8 — 1.1 on the main scale, the two at 12.8 — 2.2, and finally the 8 at 12.8 — 8.8 = 4 on the ‘main scale. That is, the figure 8 on the vernier will coincide with a graduation on the main scale. We thus see how to read to tenths of an interval : the in¬ tegral part of the number of units by which the O’s of the two scales differ is read in the . usual manner from the main scale, while the number of tenths is read by determining which index on the vernier scale most nearly coincides with an index on the main scale. This type of vernier is known as the retrograde or reverse vernier. In the direct vernier, vernier and main scale read in the same direction, and the vernier

intervals are 1 — — intervals on the main scale.

n

T

If the distance between the O’s is a -fi— the dis—

n

tance between the 0 of the main scale and c

on the vernier scale isa-t-— -pcM — -)

n \ nj

= a c AzZ-f .When b—c, this is integral, and

the reading h on the vernier scale coincides with a reading on the main scale. Verniers are used for reading distances and angles, and the principle has been applied to a form of chronosocope used in psychological experi¬ ments concerning the reaction-time. Here the main scale is represented by a pendulum mak¬ ing n oscillations per minute, the vernier by a pendulum nraking n -f-I oscillations per minute, and the interval between the times at which the two pendulums are released is measured by the number of oscillations it takes for them to swing in unison. See Diagonal Scale; Psy¬ chological Apparatus. Consult Ludlow, ˆ Subscales, Including Verniersˆ (Von Nos¬ trand's Engineering Magazine, New York

1882).

VERNON, ver'non, Edward, English naval officer: b. Westminster, England, 12 Nov. 1684; d. Nacton, Suffolk, 30 Oct. 1757. He was edu¬ cated at Westminster and Oxford and in 1700 entered the royal navy. In 1702 he was pro¬ moted lieutenant, and in 1704 was' engaged un¬ der Sir George Rooke at Malaga, continuing in the navy until 1721, when he retired on half¬ pay. In 1722 he was returned to Parliament for Penryn, but in 1726 he assumed command of the Grafton in the Baltic fleet, and later joined the forces at Gi1)raltar. He returned to

England on the conclusion of peace with Spain in 1728, and resumed his, seat in Parliament. He vehemently insisted in the House on the weakness of the Spanish colonies, and upon declaring that he could take Porto Bello, on the Isthmus of Panama, with six ships, he was in 1739 appointed vice-admiral and ?iven com¬ mand of the West Indian expedition. He suc¬ ceeded in capturing Porto Bello in November of that year, but his attack upon Cartagena in 1741 was unsuccessful. In 1742 he returned to England, and having in his absence been elected to Parliament for both Penryn and Ipswich, he chose to sit for the latter. He was promoted admiral in 1745, but in 1746 was removed from his office by reason of a quarrel with the ad¬ miralty. He continued to sit in Parliament until his death. His second attack off Carta¬ gena is introduced in Smollet's novel ˆRoderick Random,ˆ the author, together with Laurence Washington (brother of George),

having par¬ ticipated in the expedition. The latter named his estate in honor of the admiral ^^Mount Ver-non.^^ Vernon wrote New History of

Jamaica^ (1740) ; ^Original Papers Relating to the Expedition of Panama^ (1744), *etc.*

VERNON, George John Warren, 5th

Baron, English scholar and philanthropist : b. Stapleford, Nottinghamshire, 22 June 1803; d. near Derby, England, 31 May 1866. He was one of the wealthiest men in England, and de¬ voted his life to the service of letters, philan¬ thropy and reform. He entered public life in 1831 as member of Parliament for Derby and was an active supporter of the Reform Bill. In 1835 he succeeded to the title of his father and his seat in-the House of Lords, honors which hampered in some degree his political career, though he remained liberal in sentiment and a progressive and public spirited citizen to the last. His labors as a philanthropist during the cotton famine in Lancashire in 1862-63 made him much beloved, his generosity and personal exertions doing much to alleviate the widespread distress of that period.

VERNON-HARCOURT, Leveson Fran¬ cis, English civil engineer: b. London, 25 Jan. 1839. He was educated at Oxford, and studied under Sir John Hawkshaw in 1862-65, later becoming his assistant. He engaged in engi¬ neering on various waterworks and railways, went to London in 1875, where he established himself as a hydraulic engineer, and is generally recognized as an expert in his profession. He visited India in 1896 to make an inspection of the river Hugh, was British member of the jury for civil engineering at the Paris exposi¬ tion in 1900, and since 1882 has occupied the chair of civil engineering at University College, London. He has published ^Rivers and Canals^ (1882) ; ^Achievements in Engineering^ (1891) ; ^ Civil Engineering as Applied in Construction^

(1902).

VERNON, Conn., town in Tolland County, on the New York, New Haven and Hartford Railroad, about 12 miles east by north of Hart¬ ford. There are three villages and one city in¬ cluded in the town. It is in an agricultural region, and has considerable manufacturing in¬ terests, producing annually about $7,000,000 worth of goods. The chief manufactures are silk, cotton and woolen goods. The dairy and

farm products shipped from the town are quite extensive. Pop. about 9,087.

VERONA, va-rohia, Northern Italy, (1) A city, capital of the province of the same name, 68 miles west of Venice, beautifully situated on the Adige River where the last slopes of the Alps merge into the plains of Lombardy, on both sides of the Adige, which traverses the city in a wild and rapid torrent, and is crossed here by six bridges. The town is surrounded by lofty walls flanked with towers and bastions, and is entered by five gates remarkable alike for solidity and beauty. Many of the streets, though narrow and crooked, are lined by splendid mansions, particularly rich ‘in marble decorations, and there are several elegant squares. New embankments and buildings along the Adige, numerous industrial establish¬ ments, electric lighting, and street railroads are modern features. Among the more inter¬ esting buildings is the Roman amphitheatre, oc¬ cupying one side of the Piaz2a-Bra ; it is sup¬ posed to have been built in the 2d or 3d cen¬ tury A.D, The interior is nearly perfect; it is in the form of an ellipse, the transverse axis of which is 510 feet, and the conjugate 410 feet; it is 106 feet high, and on the 45 tiers of steps 27,000 spectators could be accommodated. There are about 50 churches, many of them magnificent specimens of Gothic architecture, rich in paintings and other art treasures. The cathedral is an imposing Gothic structure of the 14th century, with a choir and Romanesque fagade of the 12th; the church of Saint Zeno is a Romanesque basilica of noble proportions, with some interesting old statues and reliefs; those of Saint Anastasia, Saint Giorgio and Saint Fermo Maggiore, should also be men¬ tioned. The Palazzo del Consiglio, in the Piazza dei Signori, dates from the beginning of the 16th century; it is adorned with statues of celebrated natives of the town, among whom are Cornelius Nepos, Catullus, Pliny the Younger and Vitruvius. Close by are the im¬ posing Gothic tombs of the Della Scala family (known also as the Scaligeri), who for upward of a century (‘1262-1389) were the lords of Verona. There are several theatres, a museum with a valuable collection of antiquities, a pub¬ lic library, hospitals and numerous

literary and artistic institutions. The town carries on manu¬ factures of silks, woolens, hats, etc., and has an important trade. Verona is supposed to have been founded in the 4th, and to have been subjected to the Romans in the 2d century b.c. On the decline of the Roman Empire it was taken by the Goths, and made by Theodoric the capital of his empire. In 774 it was captured by Charlemagne, and took a lead among the Italian cities while the power of the emperors in Italy lasted. It afterward became an inde¬ pendent republic, but suffered much from the dissensions of its nobles, a state of affairs de¬ picted by Shakespeare in ˆRomeo and Juliet.ˆ Weary of the vicissitudes to which it had been subjected, it voluntarily ceded itself to Venice, under which it remained from 1405 to 1797. It then passed into the hands of the French, after¬ ward into those of the Austrians, under whom it possessed great strategic importance, as it formed a member of the celebrated ®Quadrilateral,ˆˆ or four mutually supporting fortresses (Mantua, Verona, Peschiera and Legnago)

which secured the Austrian position ip north¬ ern Italy, and formed the key to the Tyrol from the south. Here in 1822 the Congress of Ve¬ rona, consisting of European monarchs and diplomats, under the leadership of Metternich, decided upon the suppression of the Spanish revolution by the intervention of the Holy Alli¬ ance (q.v.). With the rest of Venetia, Verona was incorporated with Italy in 1866. Communal pop. about 85,000. (2) The province of Verona in the compartimento of Venice has an area of 1,185 square miles. It adjoins Austria on the north, Vicenza and Padua on the east, Ferrara on the south, and Mantua and the Lake of Garda on the west. This section was subject to air raids by the Austrians during the World War, Pop. (1918 est.) 475,(X)0. Consult Allen, M. A., ˆHistory of Veronaˆ (New York 1910).

VERONA, v?-r6’na. Pa., borough, Alle-pheny County, on the Allegheny River and the Allegheny Valley Railroad, about 10 miles northeast of Pittsburgh. It has a number of manufacturing establishments, chief of which are railroad repair shops, glass works, foun¬ dries, machine shops and powder and dynamite factories. It has a national bank and a news¬ paper. Pop. (1920) 3,938.

VERONESE, va-roˆna’ze, Paul (his real name was Paolo Caliari), Italian painter: b. Verona, 1528; d. Venice, 19 April 1588. He studied under his uncle Antonio Badile, a painter, and copied the style of Carazzola and the Veronese school, as appears from the many altar-pieces and frescoes which he executed at Verona. He went in 1548 to Mantua

where he executed frescoes for the cathedral and after¬ ward to Venice. Here he imitated Titian and Tintoretto, but at the same time appeared de¬ sirous of surpassing them by a more studied elegance and a richer variety of ornament. It soon became evident from his works that he had studied the ancient statues, and the etchings of Parmesan and Albert Diirer. His first works are frescoes on the ceiling of the sacristy in the Church of Saint Sebastian in Venice, now known to the Italians as ^^Teator di Gloria,^^ that is, the glory of Veronese. The ˆHistory of_ Esther, > in fresco, which he afterward painted in this church, excited general admira¬ tion. Among other works by him at Venice are ˆThe Coronation of the Virgin,ˆ altar-piece; the ˆMartyrdom of Saint Sebastianˆ ; ˆThe Feast at Simon's Housed (now in the Brera, Milan). It was during this time that he formed his style as a master of the Venetian school. He had already acquired the Veronese spirit of color, with its clear pale tone and soft har¬ moniousness. He was now under the influence of Titian, but he never surrendered his own individuality so far as to become an imitator. After accompanying the Venetian Ambassador, Grimani, to Rome he saw with enthusiasm the beautiful models of Raphael and Michelangelo, and painted after his return his fine ˆApotheosis of Venice,ˆ His numerous banqueting pieces are also excellent. Six at least of these are found at Venice in the refectories of the mon¬ asteries, among the best of which are the ˆMar¬ riage at Cana,ˆ comprising 120 figures, many of which are portraits. In this piece the extrav¬ agant display of almost Asiatic pomp, and the confusion of different persons and dresses have been justly censured. The air of pride in

the aspect of Christ instead of a simple expres¬ sion of dignity, the placing of the principal per¬ sonage in a corner of the picture and the con¬ fused blending of the white tablecloth and the architecture of the background have also been considered blemishes. In his ˆPilgrims of Emmausˆ Veronese violated all the unities of time, place and action. But with all these faults he displays talent and fruitfulness of concep¬ tion. In short, his works are rather to be con¬ sidered as contributions to decorative effect than either religious paintings or representations

of life in the past. They are neither historic nor devotional, but merely magnificent combinations of form and color intended to add life, warmth and variety to vast architectural spaces and to interest the spectator by their expressive faces, their gorgeous costumes and the movement and dramatic action of the scene, Veronese died in 1588. His scholars were Charles and Gabriel, his sons, and Benedetto, his brother, besides Michael Parrasio, Naudi, Maffei, Verona, Fran¬ cesco Montemezzano. Consult Weiggirer, ˆVer¬ oneses (1897).

VERONICA, ve-ron'i-ka. Saint, a woman who, when Christ was carrying his cross, lent him her veil to wipe the sweat from his face, and on receiving it back found his likeness im¬ printed on the cloth. This veil is said to be still preserved at Rome, where it is shown to only a few persons of special rank. It is com¬ monly supposed that the Saint Veronica of the legend received this name in mistake, and that it arose from a misunderstanding and corrup¬ tion of the term vera icon, true image, originally applied to the likeness itself. Various ancient witnesses, however, have identified Veronica with different persons mentioned in the Gos¬ pels. In the legend of the Clementines Ve¬ ronica is another form for Vernice, the daugh¬ ter of the Canaanitish woman who won from Jesus the recovery of her child. According to the ˆActs of Pilatusˆ and in the writings of Cassiodorus, Reginus, Cedrenus, etc., she was the woman healed by Christ of her issue, who afterward raised to Jesus a statue in bronze at Paneas. Consult Grimm, ˆDie Sage von den Christusbildernˆ (1842), and Thurston, H., ˆStations of the Crossˆ (London 1906).

VERPLANCK, ver-plank', Gulian Crom-melin, American Shakespearean scholar and legislator: b. New York, 6 Aug. 1786; d. there, 18 March 1870. He was graduated from Co¬ lumbia in 1801, admitted to the bar in 1807 and afterward traveled in Europe, In 1820 he was elected to the New York legislature, was pro¬ fessor of the evidences of revealed religion and moral science at the General Protestant Episco¬ pal Seminary, New York, in 1821-25, served in Congress in 1825-33 and was a member of the New York senate in 1838-41. He was a gov¬ ernor of the New York City Hospital in 1823-65; president of the New York Board of Emi¬ gration Commissioners in 1846-61, and from 1865 until his death was vice-chancellor of the State University. He edited ˆShakespeare's Plays, with his Lifeˆ (3 vols., 1844—47) and wrote ˆThe Bucktail Bards and the Epistles of Brevet Major Pindar Puff,ˆ political satires directed at De Witt Clinton (1818) ; ˆEvidences of Revealed Religionˆ (1824); ˆDiscourses and Addressesˆ (1833); nearly half of the Talis¬ man, an annual conducted jointly with Robert

C. Sands and William C. Bryant (3 vols., 1827-30), *etc.* His most enduring work was that performed in connection with his Shake¬ spearean studies,

VERRALL, ver'al, Arthur Woollgar, Eng¬ lish classical scholar ; b. Brighton, Sussex, 5 Feb. 1851 ; d. 1912. He was educated at Wel¬ lington College and Cambridge University; was called to the bar in 1877, and from 1874 was a Fellow of Trinity College, Cambridge, He edited ˆEuripides' Medeaˆ (1881) ; edited and translated ˆ.ˆEschylus' Sevenˆ (1887) ; ˆAga¬ memnonˆ (1889, 1903) ; and wrote ˆStudies in Horaceˆ (1883); ˆEuripides, the Ration¬ alistˆ (1895), *etc.* His ˆCollected Literary Essays,ˆ with a memoir by M. A. Bayfield, appeared in 1913.

VERRES, ver'ez, Gaius, Roman governor of Sicily: d. 43 b.c. He was the son of a Ro¬ man senator and in his earlier career a sup¬ porter of the Marian faction which he after¬ ward deserted to join the following of Sulla. He was recompensed for his conduct by a share in the confiscated estates of the defeated party, and was proquaestor to Dobella, praetor of Cilicia in 80-79. He became governor of Sicily in 73, but fairly impoverished the island by his mismanagement. The inhabitants gained the support of Cicero in 71 and Verres was brought to trial, with Cicero as prosecutor and Horten-sius as defender. While the trial was still in progress Verres gathered a large share of his wealth together and fled to Massilia, where he lived in luxury for 27 years, when he was put to death by the proscription of Antony, whose greed he had excited.

VERROCCHIO, ver-rdk'e-a, Andrea del,

Italian artist: b. Florence, 1435; d. Venice, 1488. He began as a goldsmith ; was also a follower of Donatello in the practice of sculpture and eventually devoted himself to painting. He was as skilful in marble as in bronze work, and his sculptures at Florence are distinguished for lifelike expression and strong, truthful in¬ dividuality. His best works are 'ˆThe Boy and the Dolphin,ˆ a group on the fountain in the court of the Palazzo Vecchio; ˆMadonna and Child,ˆ a relief; ˆDavid,ˆ a bronze statue; ˆDeath of the Wife of Francesco Tornabuoni,ˆ in the Bargello; and ˆDoubting Thomas.ˆ Go¬ ing to Venice in 1480 he began the colossal statue of Bartolommeo Colleoni, which was completed by Leopardi. In the Academy at Florence is his ˆBaptism of Christ, > in which one of the angels is said to have been painted by Leonardo da Vinci. There are two other pictures. Madonnas, ascribed to him, one of which is in the Museum at Berlin.

VERRUGAS, ver-roo'gas, Peru, a stream¬ let and ravine in the mountains of central Peru, spanned by a lofty viaduct of the Lima and Oroya Railway, The viaduct, with two piers, is 575 feet long and 252 feet high; it was com¬ pleted in 1891 and replaced a similar construc¬ tion with three piers opened in 1873 and de¬ stroyed by a flood in 1ˆ9.

VERSAILLES, ver-salz' (Fr. ver-sa-y), France, capital of the department of Seine-et- Oise, 11 miles southwest of Paris, is a town of royal construction, having risen up rapidly, reg¬ ularly and with great magnificence under the

directions of the sovereigns of France, par¬ ticularly Louis XIV, who made it the seat of his court, and lavished immense sums on its embellishment. It is justly regarded as one of the handsomest towns in Europe, and, having many conspicuous objects for attack by air¬ planes, was extensively .camouflaged during the World War. The palace is the most conspic¬ uous edifice, though somewhat monotonous in appearance, the buildings being more than 2,000 feet in length. It was built by Louis XIV, but ceased to be a royal palace at the revolution of 1793, and Louis Philippe converted it into a national museum. It is filled with an im¬ mense collection of statues and paintings in¬ tended to represent all the principal personages and events connected with French history from Clovis downward. The principal fagade bearing the inscription, A toiites les Gloires de la France (ˆ'To all the Glories of FranceˆO, and fronting the gardens and park, is over 400 yards long. A conspicuous feature is the Battle Gallery, 400 feet long, lined with paintings representing French victories. The window spaces are filled with the names and titles of the military heroes of France, with the dates when they gave up their lives for their country, and names of the battles where they fell. The fountains are famed for their beauty ; the water to supply them was brought 100 miles. The Orangery was planned in 1685 by Mansart, and is still one of the most delightful features of the grounds, being surrounded by observation galleries. In¬ numerable statues and vases

grace the grass plots and the shrubbery is highly cultured. The palaces of the Grand and Petit Trianon are in the north of the park. There is also in the town a fine hippodrome, military hospital, pub¬ lic library and there are excellent technical and private schools. The industries are unimportant, shoe manufacture and market gardening being the largest. The treaty of peace between the United States and Great Britain was signed at Versailles in 1783. The city was also the Ger¬ man headquarters during the Franco-German War (q.v.) from September to March 1870-71, and here Wilhelm I was declared emperor of Germany. It was also the seat of the French government from the peace until 1879. There¬ fore it was especially appropriate that Versailles was selected for the peace conference of 1919. The permanent population is about 65,000. Con¬ sult the English translation of Nolhac's Ver¬ sailles and the Trianonˆ (New York 1912).

VERSAILLES, Ky., town, county-seat of Woodford County, on the Louisville and Nash¬ ville and the Southern railroads, 14 miles south¬ east of Frankfort. It is in an agricultural region in which considerable attention is given chiefly to stock-raising. The industries are connected chiefly with the farm products. The educational institutions are Ashland Seminary (Protestant Episcopal), Rose Hill Seminary (Christian), opened in 1875, and public elementary schools. There are three banks. Pop. (1920) 2,061.

VERSAILLES, Mo., town, county-seat of Morgan County, on the Missouri Pacific Rail¬ road, about 38 miles southwest of Jefferson City. It is in an agricultural region and in the vicinity are valuable deposits of iron, kaolin, copper and lead. There are nearby large fields of bituminous coal. The products of the mines contribute largely to the prosperity of the town.

There are two banks and a high school, es¬ tablished in 1894. Pop. (1920) 1,651.

VERSAILLES, Ohio, village in Darke County, on the Cincinnati, Hamilton and Dayton and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 40 miles north¬ west of Dayton. It is in a farming section in which considerable attention is given to stock-raising. The chief manufacturing establish¬ ments are a flour mill, machine shop and cream¬ eries. The educational institutions are Saint Dennis Academy (Roman Catholic), a public high school, founded in 1884, public and parish schools and a public library. Pop. about 1,580.

VERSE, a line of poetry, consisting of a certain number of metrical feet, disposed ac¬ cording to the rules of the particular species of poetry which the author intends to compose. Also more commonly used as meaning a stanza, or combination of lines regularly recurring, whether like or unlike in measure. It may be either dactylic, iambic or trochaic, according to the foot that dominates. If the lines ex¬ hibit two, three or more measures, it is styled dimetre, trimetre, *etc.* In the broader sense verse means poetry when expressed in measured cadence, either oral or written. The origin of verse is lost in antiquity. Its cultivation in¬ dicates progress from the savage state, and it was probably an evolution from unconsciously poetic utterances of man at the dawn of human intelligence. It is doubtful if the verses of Hebrew poetry were measured, or had more of the mechanical form of poetry than an irregu¬ larly recurring cadence. The use of rhymed cadences is comparatively modern. The multi¬ plication of poetry and the growing fastidious¬ ness of taste have constantly tended to increase the varieties of verse. Grammarians have elaborately classified these, and analytically dis¬ tinguished the possible divisions of words into bars of accented and unaccented syllables. A mechanical adherence to a uniform measure is, however, irksome in poetry as well as in music; and poets who are gifted with any command of language vary their verse as their feelings dic¬ tate. These arbitrary changes it is impossible to classify. Modern French and Italian verse is almost always rhymed. In America, England and Germany there are the varieties of blank verse and rhyme. See Metre; Poetry; Rhythm.

VERSECZ, ver'ˆhets, Jugo-Slavia, a town in the county of Temesvar, 42 miles by rail south of the town of Temesvar. It is the see of a Greek bishop, and has silk-mills, and a large trade in silk and wine. There are remains of an old castle. Pop. 31,000.

VERSIFICATION. The derivation of this word from Latin versificatio, versification, from zersificare, to versify, from versus, line, verse. + facere, to make, shows that it means the act or practice, and therefore the art, of com¬ posing poetic verse. By extension, it also means the science of analyzing the principles on which that art depends, especially rhythm, metre, rhyme, assonance, and alliteration. Verse is the name given to an asseml)lage of words placed in measured and cadenced for¬ mation so as to produce a metrical effect. In poetry, rhythm signifies that measured movement of language which is produced by

VERSAILLES

The Gallery of Battles 2 Reception Room, Petit Trianon

VERSAILLES

Copyright, Underwood & Underwood, N. Y.

Corner of the Palace and Gardens. In this Palace the World Peace Conferences were held, 1918-1919

VERSAILLES

1 The Car of Apollo, the grass plot called “ Tapis Vert,” and the Palace

2 The Fountain of Latona

r

• 1

\

«

f

/

•

> •

• f./ ■ V ^

i.'.

>

\:

f:

¥

$

i f—

7 ■

■# ,

'»Tv

7

' ^ •' J '

i

/

✓

1

the regularly repeated occurrence of metrical units called feet. Metre is the measurement of verse by means of feet. Rhyme is either the correspondence of sounds in the terminat¬ ing words or syllables of different verses (end-rhyme) or the correspondence of sounds at the middle and the end of the same verse (internal rhyme). Perfect rhyme re¬ quires not only that the vowel sounds be the same, but also that the consonants preceding the vowel sounds be different and that the consonants (if any) following the vowel sounds be the same. If the rhyme is only in the last syllable, as day, way, forgave, behave, relent, misspent, it is called a male rhyme; if in the last two syllables, as bitter, glitter, tending, mcftding, it is called a female, or double, rhyme. Sometimes the last three syllables rhyme, as callosity, reciprocity, sundering, thundering, in English; tavola, favola, in Italian, and then the rhyme is called triple (Italian verso sdrucciolo) . Rhymes extending to more than three syllables are almost con¬ fined to the short odes (gazelles) in Arabian and Persian, in which the same rhyme, carried through the whole poem, extends sometimes to four and more syllables. The origin of rhyme is lost in antiquity. It is found, at least sporadically, in the early poetry of most countries, including even that of Greece and Rome. Assonance is a sort of substitute for rhyme, consisting in using the same, or similar, vowel sounds, with the following consonants different, as man, hat, penitent, reticence. It is especially common in Spanish poetry. Al¬ literation, sometimes called head-rhyme, means that all or some of the accented syllables in a verse begin either with a vowel or with the same consonants, as :

1. Apt alliteration’s artful aid

2. He i/mrgh the //zikkeste of the throng gan </irest

3. Hire robe was ful riche’ of red scarlet engreyned

In all languages known to us, poetry ap¬ pears to have been the first form assumed by literary composition. The earliest poets fash¬ ioned for themselves the metrical plan in which their works were presented. Using these poems as examples, later critics and grammari¬ ans formulated the rules and principles of verse-making for the guidance

of future poets. From time to time as poetry multiplied and taste grew more fastidious, new varieties of verse were invented, and, if found to be of merit, were adopted and took their recognized place in the republic of letters. _ It is the function of the present article to give a short explanation of the poetical forms occurring in some of the principal literatures of the world. Sanskrit, Greek, and Latin poetry is regulated by the principle of quantity, plus syllabic count. The ancient Greeks regarded the art of verse as a branch of music. According to Suidas, Lasus of Hermione, Pindar's master in music, wrote an ˆArt of Poetry,ˆ but nothing of this work has come down to us. In the 3d cen¬ tury B.C., Aristoxenus of Tarentum, a disciple of Aristotle, wrote ˆElements' of Rhythrn' (Pvdfurd, aroixsia). Of this work only brief fragments have been preserved, but they are of great im-pdrtance as showing the view of the Greeks regarding the interrelation of verse and music. It is, however, from Hephaestion, a scholiast of the 2d century a.d., au¬

thor of a work on Greek metres, entitled ˆ'YXeip'iSiov nept gerpeovˆˆ that most of our information regarding classical prosody is derived. The publication, in 1868, of the works of J. H. Schmidt, based on a close study of the surviving remains of Greek and Latin poetry, and disregarding to a large extent the views expressed by the ancient metricians, re¬ sulted for a time in setting up a different theory as to classical versification. In more re¬ cent years the tendency has been rather to revert to the teachings of the ancients. According to Schmidt, the -unit of measure for the foot is the mora, or short syllable (v-'), which has the musical value of an eighth note ; a long syllable (—) is roughly equivalent to two morse. A long syllable may be protracted in certain measures to the length of three (i—) or four (l_j) morse. Conversely, a sylla¬ ble may be so shortened, or hastened in sound, as to take up less than its normal time. These variations are best observed in logaoedic verse (q.v.). Every foot has one part accented, the other part unaccented. Thesis was the name given by the Greeks to that part on which the ictus (= = stress or metrical accent) falls; arsis was the name given by them to the unaccented part. In later times, the use of these two terms was exactly reversed; but most modern metricians now employ them in their original sense. The principal feet are Iambus (w- —), Trochee (— ˆ), Tribrach (vˆv.ˆ'ˆ), all of three morae or ˆ time; Anapaest (yˆ —),

Dactyl (— Spondee (— • —), Proceleus—

matic ˆ ˆ all of four morae or | or f time; Cretic (— • v«/ —), First

Paeon (— Fourth Paeon —), Bacchius (w -), Antibacchius (- ‘^), all

of five morae or ˆ time ; and Choriambus

(— Ionic a maiore (-

Ionic a minore (vˆ -), all of six morae

or I or ˆ time. Besides these, there are also Pyrrhic (ww), Irrational Trochee (— >), Irrational Spondee (> — , occasionally — ■ >), Irrational Dactyl Cyclic Dactyl

(Irrational Anapaest (w v-/ >), Cyclic

Anapaest ( ), Molossus (-), Am¬ phibrachys (v-/ — w), Dispondaeus (— -),

Ditrochaeus (— -W — ‘-‘),, Diiambus (cj — —),

Antispastus (v«.y - c-/). Second Paeon

(— V-/ vˆ) , Third Paeon (— w) , Epitritus Primus (yˆ -), Epitritus Secundus

(— -), Epitritus Tertius (- v..ˆ • —),

Epitritus Quartus (- and Dochmius

(w - -) .

The combinations of these various feet pro¬ duce verse. According to the nature of the fundamental foot, the verse is named iambic, dactylic, trochaic, *etc.* When the last foot of a line is incomplete, i.e., lacking one or more syl¬ lables, the line or verse is called catalectic; if the number of syllables is complete, the verse is said to be acatalectic. When a word ends within a foot, there is a break, to which the term caesura is applied ; when the end of a word and the end of a foot coincide, there is a dif¬ ferent sort of break, which is known as diaere¬ sis. The iambic trimeter acatalectic line, hav¬ ing the iambi arranged in dipodies, was used for the dialogue of the drama, tragic and comic, with much freedom of substitution of other feet for the iambi, especially in comedy. This line was called by Roman grammarians the sena-rius. The iambic tetrameter catalectic, or

septenarius, was of frequent occurrence in com¬ edy, with again great freedom of substitution, lambic metre was also used extensively by the lyric poets. The trochaic tetrameter catalectic line (seven feet and one syllable), having the trochees arranged in dipodies, was written by Solon, Archilochus, and Epicharmus, and is often found in old Attic comedy. Under the designation of trochaicus septenarius it_ was frequent in Latin comedy and in the writings of Seneca, Varro, and later Latin poets. The anapaestic line, allowing metrical equivalents in certain positions for the anapaest proper, is more common in Greek than in Latin. It is found in .ˆEschylus, Sophocles, and Aristophanes among the Greeks, and among the Romans in Plautus, Seneca, Varro, Prudentius, and later writers. The hexameter dactylic line, with sub¬ stitution of spondee and trochee in certain posi¬ tions for the dactyl proper, was the measure used in the great epic poems like the Uliad,ˆ the ˆOdyssey,ˆ and the ˆ.(Eneid.ˆ It is also the principal metre of didactic, bucolic, and satiric poetry. Joined to the dactylic pentameter, it formed the elegiac distich so well known from the poems of Ovid and some of the epigrams of Martial. Cretic and Bacchiac lines were used to voice intense emotion. Verses formerly known as Choriambic are now generally classed as Logacedic; the true Choriambus is very rare. Ionic verse is used largely by Catullus. In me¬ diaeval Latin, rhyme came into use and quantity gave place to accent. Already in the 1st cen¬ tury A.D. there are poems containing rhymes, and even somewhat earlier than that, e.g., in the poems of Ovid, rhymes occur; but the first fully rhymed Latin poem was written by Saint Augustine against the Donatists c. 393. Church hymns, like ˆPange, linguaˆ ˆ and salutaris hostia,ˆ afford an excellent illustration of the change, both as to the employment of rhyme and the subordination of quantity to accent.

From the mediaeval Latin, metrical system was developed by slow and almost imperceptible degrees the versification of the Romance lan¬ guages (i.e. Italian, French, Provengal, Spanish, Portuguese, Wallachian, and Rhaeto-Romanic), with accent, syllabic count, and rhyme as its characteristic elements. New ˆ species of rhythms, depending on the varieties of mood, were introduced. At first assonance was used instead of rhyme, as, for example, in the Provengal ˆBoecisˆ (10th century) and the French ˆChanson de Roland> (11th century); after the 12th century the assonance was gradu¬ ally displaced by full rhyme. The lines were joined together by

similarity of assonance or rhyme in groups or strophes of varying length known as laisses or tirades, corresponding loughly to the modern stanza. Finally, elaborate stanzaic forms of great beauty were invented. In. Italian in the 16th century, under the influ¬ ence of classical Latin, there were developed rhymeless verses (versi sciolti). These are found in Ariosto's comedies and in such works as Trissino's ˆSofonisba.ˆ In Spain, versos sueltos; in France, vers hlancs, and in England, blank verse were written on the Italian model. Lines of various length are used in Romance poetry — six-syllable, seven-syllable or settenario, octosyllabic, nine-syllable, decasyllabic, hendecasyllabic, twelve-syllable or Alexandrine, and fourteen-syllable. The earliest of these to occur is the decasyllabic, which has been doubt¬

fully traced to the ˆVita Sancti Faronisˆ in the 9th century, but is certainly found in the ˆBoe-cisˆ and the ˆChanson de Rolandˆ mentioned above, as well as in the ˆVie de Saint Alexisˆ (11th century). To secure uniformity of count, hiatus, elision, and contraction of words are permitted. The principal Italian verse is the hendecasyllabic, and next to it in order of frequency of occurrence is the settenario. From Provence first and later from Italy the decasjd-labic line found its way into Spain. Fourteen-syllable, eleven-syllable, nine-syllable, seven syl¬ lable, and five-syllable verses are comrnon in Spanish poetry. The octosyllabic line did not find favor in Italy, Portugal, or Spain, but it had a great vogue at an early period in France and Provence. It is found in the French and Provengal mediaeval narrative poetry, as well as in the so-called courtly epos and the older drama. It fell more or less into disuse about the middle of the 16th century, and is now con¬ fined to lyric poetry. The great French line is, however, the Alexandrine or twelve-syllable iambic measure. Taking the place of the verses of ten and eight syllables, it is found in the chan¬ sons de geste and also in didactic poetry and the drama. It reached its climax in the 16th cen¬ tury, and has never since quite lost its import¬ ance. It is the metre of the tragedies of Cor¬ neille and Racine, the comedies of Moliere and Regnard, the epic poem ˆLa Henriadeˆ by Vol¬ taire, the romantic drama ˆHernaniˆ by Victor Hugo, and of numerous other plays and poems. Trochaic verse was much cultivated in Spain and Portugal, but not nearly to the same extent in Italy, France, or Provence.

English and the other Germanic languages use an accentual rhythm in their verse system. This accentual rhythm, together with allitera¬ tion, but with scarcely any perceptible attempt at foot-division, is found in

the earliest known Germanic poetry. It is fully illustrated in what has come down to us of Old Saxon, Old Norse, and Anglo-Saxon, as, for example, in the ˆHeliandˆ and the ˆLay of Hildebrandˆ (both Old-Saxon), in the ‘ˆAtliˆ and ˆHarbardˆ lays (Icelandic), and in ˆBeowulf ˆ and the poems of Caedmon and Cynewulf (all Anglo-Saxon). In this early poetry the accented syllables are’ limited in number, but there is considerable lat¬ itude as to the number of unaccented syllables. The regular line consists of two half lines fused together by the alliteration. The follow¬ ing two verses from ˆ Beowulf > may be taken as characteristic:

Oft Scyld Scefing’ sceaˆAena f/ireatum,

monegum maeg/Aum,‘ meodo-setla ofteah.

(“Oft Scyld Scefing reft away their mead-benches from the throngs of his foes, from many a people.”)

End-rhyme is practically unknown. The earliest deliberate use of it in a Germanic dia¬ lect is in Otfried’s ˆEvangely,ˆ written in Frankish in the latter part of the 9th century. Under the influence of Romance versification, the old native alliterative unrhyming system gradually disappeared in favor of the full and regular syllabic count and end-rhyme. We have a good example of the transition stage in the combination of the two forms in Layamon’s ˆBrutˆ (c. 1200). In this long poem both rhyme and alliteration are employed and, while there is some attempt at foot-division, there is still much freedom in the number of unstressed syllables, a freedom which, like the use of alliteration,

has never totally disappeared from English versification. By the 14th century the innova¬ tion had made such headway in England that it brought about a species of revolt, which re¬ sulted in the production of the very character¬ istic alliterative and rhymeless poem, Langland's ˆPiers Plowman.ˆ <Sir Gawayne and the Grene Knyght,ˆ by an unknown author, shows a compromise, for in its main body it is a rhymeless alliterative poem, but has short rhyming lines at the end of each stanza. The beautiful lyric, ˆPearl,ˆ has a combination of elaborate alliteration and elaborate rhyme. The genius of Chaucer, however, decided the contest between the old and the new forms, and from his time the principles generally recognized in English verse are accentual rhythm and syllabic count, with free use of rhyme and occasional use of alliteration as an ornament. Freedom in the number of unstressed syllables persisted in many poems during the Middle English period, and at later times in popular ballads and in the ˆˆtumbling verse® of early modern Eng¬ lish poets. This same freedom was revived by Swift in some of his humorous pieces, by Cole-drige in ˆChri&tabel,ˆ by Scott in several of his narrative poems, and by numerous imitators down to the present day. The writers of vers litre, who are in revolt against nearly all metri¬ cal conventions, insist on this freedom as in¬ dispensable. The measures and combinations of measures in use in English versification are extremely numerous and varied. The feet most common are the iambic, the trochaic, the anapaestic, and the dactylic. There are lines of one foot, monometer; two feet, dimeter; three feet, trimeter; four feet, tetrameter; five feet, pentameter; six feet, hexameter or Alex¬ andrine ; seven feet, heptameter or septenarius ; and eight feet, octameter. The combination of the hexameter with the heptameter formed the celebrated *poulter's measure,® which had con¬ siderable vogue among 16th century writers. Perhaps it may be said that since Chaucer's time the central English line is the iambic pentameter, which, when written with every two lines rhyming together but not rhyming with what precedes or follows, forms what is known as the heroic couplet, and, when written without rhyme, is specifically called blank verse. The iambic pentameter is also a highly important line in German poetry, while in Dutch the most characteristic of verse forms

is the Alexandrine, lambic pentameter is used in English to form several distinctive stanzas, like Rime Royal, the Spenserian stanza, and the Ottava Rima. It is also used almost but not quite exclusively in the Sonnet. Rime Royal, a stanza of seven lines, is found in Chaucer's ˆTroilus and Cresida,ˆ in ˆThe Kingis Quhairˆ by James I of Scotland, in Sackville's ˆInductionˆ to the ˆMirrour of Magistrates,ˆ and in Shakespeare's ˆLucrece.ˆ The Spenserian stanza of nine lines, the last of which is an Alexandrine, was invented by Spenser for ˆThe Faerie Queene.ˆ It is used in Thomson's ˆCastle of Indolence,ˆ in Beattie's ˆ Minstrel,ˆ in Byron's ˆChilde Harold,ˆ and in Shelley's ˆAdonais.ˆ The Ottava Rima, of eight lines, is handled to great perfection in the romantic spirit by Shelley and Keats and in a humorously satirical way by Byron in ˆBeppoˆ and ˆDon Juan.ˆ The sonnet, a complete poem ill 14 lines with an intricate rhyme-scheme, has been written by some of the greatest English

poets — Spenser, Sidney, Shakespeare, Milton, Wordsworth, Rossetti, and Mrs. Browning. Blank verse proper, that is, unrhymed iambic pentameter measure, has held its ground steadily in English versification since its introduction in the 16th century by Henry Howard, earl of Surrey (c. 1516ˆ7) in his translation (1557) of the second and fourth books of Virgil's ˆˆneid.ˆ Some blank verse occurs, it is true, in Chaucer's ˆTale of Melibee,ˆ but it was Sur¬ rey who established it in English poetry. It was applied to tragedy by Sackville and Norton in ˆGorboducˆ (1565), was highly developed by Marlowe in ˆTamburlaine the Greatˆ and other dramas, was brought to perfection by Shakes¬ peare, and since his time has been the generally accepted medium for English dramatic poetry. It is used for the same purpose in German. It has also been extensively employed for epic and reflective poetry. Such representative Eng¬ lish works as Milton's ˆParadise Lost,ˆ Thom¬ son's ˆSeasons,ˆ Young's ˆNight Thoughts,ˆ Keats' ˆHyperion, ˆ Browning's ˆThe Ring and the Book,ˆ and Tennyson's Hdylls of the King> are in blank verse. An attempt was made in the reign of Elizabeth by Gabriel Harvey and some of his literary friends to naturalize in English the quantitative dactylic hexameter and other classic metres, but their efforts were a dismal failure. The dactylic hexameter based on accent instead of quantity has been used sparingly in English verse, but it attained some success as produced by Southey, Clough, Kings¬ ley, and, especially, Longfellow. It has also been successfully cultivated in German poetry, as, for example, by Schiller. Numerous lyric forms, such as the Ode, Ballade, Rondeau, Ron¬ del, Sestina, Triolet, Villanelle, and Chant Royal, made their appearance at an early stage in different European

literatures, and have been revived with varying degrees of success by some modern writers. They can be no more than mentioned in the present article, for they present a complicated technique, which may best be studied in some good book on versification. Writers of what has come to be known in quite recent years as vers litre are, as already stated, in revolt against hitherto accepted metrical con¬ ventions. They maintain that expression is the thing, and that rhyme and metre hamper the poet's full and free expression. Their definition of vers litre is *a verse-form based upon cadence.® Its unit is neither the foot nor the line, but the strophe. Its rhythm is therefore not the rhythm of foot or line, but of the strophe only, and within the strophe it must have perfect freedom of swing as determined by, and con¬ sistently with, the demands of the speaking voice and the necessity for breathing spaces. Among the vers litrists there are extremists, known as the Paroxysmists in France and the Vorticists in England, and there are many other grada¬ tions in their ranks, but there is also a com¬ paratively conservative and well-balanced Centre party. The movement is too new and its ramifications too extensive and manifold to be adequately discussed here. It may be said, however, that, whether its theory will eventually establish itself or not, much genuine, thought¬ ful, and sincere poetic work has already ap¬ peared under the aegis of vers litre. In the poetry of the various Celtic languages, ancient and modern, there is an intricate and, in many respects, a beautiful system of versification,

A\hich may, with great profit, be intensively studied by those who are interested in the general subject.

Bibliography. — Schmidt, J. H., ˆAn Intro¬ duction to the Rhythmic and Metric of the Classical Languages' (tr. by J. W. White, Boston, 1878; new ed. 1902); Christ, W., ˆMe-trik der Griechen und Romer> (2d ed., Leipzig 1879) ; Muller, L., ˆ Greek and Roman Versi¬ fication' (tr. by S. B. Platner, Boston 1892) ; Volkmann, R., and Gleditsch, H., Gˆhetorik und Metrik der Griechen und Romer' (Munich

1901) ; Goodell, T. D., ˆChapters on Greek Metric' (New York 1901) ;

White, J. W., ˆThe Verse of Greek Comedy' (London 1912) ; De Banville, T., ˆPetit traite de poesie frangaise' (2d ed., Paris 1891) ; De Souza, ˆLe rhyme poetique' (Paris 1892) ; Kestner, L. E., History of French Versification' (Oxford 1903) ; Benot, E., ˆProsodia Castellana i versi-ficacion' (3 vols., Madrid 1902) ; L'Ovidio, F., ˆLe origini dei versi italiani' (Florence 1897) ; Casini, T., ˆLe forme metrighe italiane' (ib. 1890) ; Guest, E., ˆA History of English Rhythms' (new ed. by Skeat, London 1ˆ2) ; Omond, T. S., ˆEnglish Verse-structure' (ib. 1897) ; id., ˆMetrical Rhythms' (ib. 1905) ; Mayor, J. B., ˆChapters on English Metre' (2d ed., Cambridge 1901) ; Gummere, F. B., '^A Handbook of Poetics' (Boston 1903) ; Saints-bury, G., ˆA History of English Prosody' (3 vols., London 1906-10) ; Schipper, J., <A History of English Versification' (Oxford 1910) ; Bright and Miller, ˆThe Elements of English Versification' (Boston 1910) ; Matthews, J. B., ˆA Study of Versification' (ib. 1911) ; Crapsey, A., ˆA Study in English Metrics' (New York 1918) ; Westphal, ˆTheorie der neuhochdeut-schen metrik' (2d ed., Jena 1877) ; Sievers, E., ˆ Altgermanische Metrik' (Halle 1893); Minor, J., ˆNeuhochdeutsche Metrik' (2d ed., Strassburg

1902) ; Lowell, Amy, ˆTendencies in Modern American Poetry' (New York 1917) ; id., ˆSix French Poets' (New York 1915) ; id., in North American Review, January 1917; id., in The Dial, 17 Jan. 1918; Lowes, J. L., ˆConvention and Revolt in Poetry' (Boston 1919).

P. J. Lennox,

Professor of English Language and Literature, The Catholic University of America.

VERST, or WERST, verst, in Russia, a measure of length equal to 3,5(X) English feet, or very nearly two-thirds of a mile.

VERTEBRA, a segment of the backbone. See Anatomy; Bone; Osteology.

VERTEBRATA, a group name, no longer significant in classification, for all those animals (the vertebrates) considered collectively which possess a backbone, composed of vertebrae. (See Anatomy; Osteology). , This category would include mammals, birds, reptiles, am¬ phibians and fishes. These have important characteristics in common that distinguish them from mollusks, insects, crustaceans, worms and other animals of simpler type. Yet it was not until 1797 that the distinctive char¬ acteristics were stated by Lamarck, who drew a firm line between 'J:)ackboned," or vertebrate and ^^backboneless," or invertebrate, forms. Anatomists and embryologists

have since made the distinctions that Lamarck pointed out more precise, and the more import¬ ant characteristics may be summed up as fol¬

lows : (1) In vertebrates the central nervous system, namely, the brain and the spinal cord, lies on the dorsal surface of the body, and is tubular in structure. (2) In all young verte¬ brates there is formed along the dorsal sur¬ face of the gut, and, therefore, of hypoblastic origin, a supporting rod or notochord, which in the simpler forms may persist throughout life, but in higher forms is more or less completely replaced by the backbone — an axis developed from the mesoblastic sheath of the notochord. (3) In almost all young vertebrates several pairs of slits or clefts open from the pharynx to the exterior; in some amphibians, all fishes and simpler forms they persist throughout life as respiratory organs, and are usually associated with feathery gills-in most amphibians they disappear during aaolescence ; in reptiles, birds and mammals they are practically functionless vestigial organs, which in a few cases do not even open. (4) A great part — for example, the retina — of the vertebrate eye arises as an outgrowth from the brain, whereas the eye of invertebrates develops as a direct insinking of the skin. (5) In vertebrates the heart is formed on the ventral surface, while that of invertebrates is dorsal. (6) Finally, vertebrates agree with annelids and arthropods among the invertebrates in being bilaterally symmetrical segmented animals. The segmentation is shown by the distribution of the nerves and ganglia, by the gill-clefts by the series of vertebrae, by the muscle-segments and nephridia (kidney-tubes) in embryonic life at least.

But, while our knowledge of these charac¬ teristics has become more precise, it is no longer possible to draw a boundary line between vertebrates and invertebrates with a firm hand. It can no longer be said that fishes form the base of the vertebrate series, for hag and lam¬ prey (Cyclostomi) , though in many ways more primitive, are certainly vertebrates ; the lancelet (Amphioxus) , though perhaps degenerate, can¬ not be excluded from the alliance; the Tunicata (q.v.), though almost always degenerate in adult life, are all vertebrates in their youth, and the worm-like Balanoglossus (q.v.) has also certain hardly disputable vertebrate char¬ acters. The possession of a backbone is, there¬ fore, no longer so exclusively definite a mark of the group, as it once was, but instead, the presence of a notochord. The term vertebrate has, therefore, ceased to have scientific signifi¬ cance although it remains convenient for popu¬ lar use to designate the groups more properly styled Chordata.

VERTICAL TRANSPORTATION. See

Elevator.

VERTIGO, dizziness, giddiness, or swim¬ ming of the head; a defect, real or seeming, in the equilibration of the body. Though the con¬ dition is sometimes so distressing as to be considered by the patient a disease, it is essen¬ tially only a symiptom. It is believed that the cerebellum is the centre for the coordination of muscular movements, and that impressions from the semi-circular canals of the internal ear also influence the movements necessary for maintaining the equilibrium of the body. But the essential nature of vertigo is not yet clearly determined. By some it is believed to be due to disordered cerebral circulation ; by others, to result from a disturbance of the central nerve-

ganglia. The sense of instability and of ap¬ parent rotary movement of the body or of other objects, always present, may be attended by mental confusion or loss of consciousness, or by anguish or terror. There may or may not be present also buzzing in the ears, mist or flashes of light before the eyes, nausea and vomiting, looseness of the bowels and a flow of pale urine. Vertigo may result from functional disorders of the heart or stomach, from defects in vision, from diseases of the middle ear, from some peripheral irritations (as laryngeal ver¬ tigo), from toxaemias, as in Bright's disease, from organic brain disease and from unrecog¬ nized causes. Grasset classifies vertigo under two heads, acute or accidental and chronic or habitual. Under the first head he places forms of it which attend the onset of acute infec¬ tious diseases, inflammations, influenzas and the vertigo which accompanies the stage of ex¬ citation in cerebro-spinal meningitis, that which appears with attacks of indigestion, the vertigo of acute alcoholism and of the first cigar, and the dizziness caused by swinging, dancing, sea¬ sickness or by looking down from a great height. Then there are acute toxic vertigos caused by digitalis, hemp, opium, belladonna, gelseminum, nicotin, etc., also others caused by heat, the introduction of a bougie, the suppres¬ sion of habitual

discharges, the pressure of wax or other accumulations on the drumhead, nasal obstruction and post-nasal catarrh, men¬ tal strain, emotional disturbances,' *etc.* Under the head of chronic vertigos are placed epilep¬ tic vertigo, vertigo dependent upon disturb¬ ances in the sensory nerve-centres, especially auricular vertigo, stomachic and cardiovascular vertigo.

In the treatment of vertigo the main thing is to remove the cause. Vertigo caused by in¬ digestion frequently demands a prompt emetic or purgative. The tone of the stomach may be restored by tincture of nux vomica or by dilute hydrochloric acid. Smokers' vertigo re¬ quires for relief a complete cessation from smoking, a slight laxative and bitters. For the vertigo of seasickness bromide of sodium or amyl nitrite and kola-seeds, diminishing as much as possible the drinking of liquids and the use of a tightly-drawn ventral bandage seem to be of most service. Ocular vertigo, depend¬ ent upon astigmatism, hypermetropia, paralysis of certain of the ocular muscles and various eye-strains may often be relieved by the oculist. See Brain, Diseases of; Cerebellum; Ear.

VERTUE, ver'tu, George, English engraver and antiquary: b. London, 1684; d. there, 24 July 1756. He gained the favor of Sir Godfrey Kneller, Lord Somers and others, and upon the institution of the Academy of Painting in 1711 became one of the original members. When the Society of Antiquaries was revived in 1717 he was appointed its official engraver, nearly all the plates published in Wetusta Monumental down to 1756 being his work. He was engaged in making journeys through Eng¬ land for 40 years, collecting materials and mak¬ ing drawings for a projected history of the fine arts in England. His collection came into the hands of Horace Walpole, who published a portion of them under the title ˆAnecdotes of Painting in Englandˆ (1762-71). To his own ˆCatalogue of Engraversˆ (1763) he appended

a biographical sketch of Vertue's life. Others of Vertue's best-known works are 12 ˆPortraits of PoetsL (1730); 10 ˆPortraits of Charles I, and his Friendsˆ ; and the series of English kings published in Rapin's History.ˆ

VERULAM, Lord. See Bacon, Sir Francis.

VERVAIN. See Verbena.

VERVIERS, ver-ve-a, Belgium, a town in the province of Liege, on the Vesdre, 14 miles southeast of Liege, and on the railway between Liege and Aix la Chapelle. Formerly a forti¬ fied town, its fortifications were destroyed by Louis XIV. It suffered severely in the German occupation 1914-18. It is celebrated for its manufacture of woolen goods and dyes. There are also cotton, leather and other manufactures. Pop. about 50,000.

VERY, Jones, American poet: b. Salem, Mass., 28 Aug. 1813 ; d. there, 8 May 1880. He was graduated at Harvard in 1836, and was Greek tutor there 1836-38. He became a Unita¬ rian minister in 1843, but never held a pastoral charge although he preached occasionally. In 1839 he published a small volume of ˆEssays and Poemsˆ ; the latter, among which ‘ˆThe Painted Columbine,ˆ is perhaps the best known, indicating an appreciative love of nature, and a deep religious feeling with a tendency toward mysticism, and these qualities are especially marked in his sonnets, which follow the Shake¬ spearean model. His life was mainly spent in retirement at Salem. Consult ˆ Poems and Es¬ saysˆ (1880), with memoir by J. F. Clarke.

VESALIU.S, ve-sa’li-us, Andreas, Flemish physician, founder of the modern system of anatomy: b. Brussels, 31 Dec. 1514; d. island of Zante, 15 Oct. 1564. He was educated at Lou¬ vain, Cologne, Montpellier and Paris, and was early distinguished by his knowledge of physics and his devotion to anatomical studies. The pursuit of practical anatomy was attended with so much difficulty and danger in France, that after returning to Louvain he joined the army of the emperor of Germany, and went to Italy, where in 1540 he was made professor of anat¬ omy in the University of Pavia, in 1543 in that of Bologna, and not long afterward in that of Pisa. In 1543 he published his great work on anatomy, ˆDe Corporis Humani Fabricaˆ (en¬ larged edition 1555). Senac calls it the dis¬ covery of a new world, and Haller speaks of it as ®an immortal work, by which all that had been written before was almost superseded.ˆˆ In it Vesalius exposed the errors of the Galen-ian school, who relied for their knowledge of the anatomy of the human body upon the ob¬ servations made in the dissection of the bodies of the lower animals. The work met with the fiercest opposition, but the author’s reputation constantly increased. About 1544 he was made chief physician to the emperor Charles V, and afterward to his son Philip H. He was ac¬ cused of heresy and condemned to death by the Inquisition, but his sentence was commuted by the emperor to a pilgrimage to the Holy Sepulchre. On his return he was shipwrecked at Zante. His collected works were published in 1725. Consult the study by Roth (1886).

VESICA PISCIS (literally, a fish's sound or swimming-bladder), the ovoid aureole or glory, formed by the intersection of two circles having a common radius, which, in the religious

symbolism of the early Middle Ages, is often represented encircling the whole body of the Lord Jesus. This form is supposed to have been gradually evolved out of the figure of the fish, prominent in the symbolism of the early Christians on sarcophagi and elsewhere, and whose use arose out of an anagram on the initial letters of Ijˆctovc ;tPf(Trof, 0£ov, Tidg,

Jesus Christ, Son of God, Savior: these initials formed the Greek word (fish) .

VESICANTS, or BLISTERING AGENTS, substances which, if kept in contact for some time with the surface of the body, excite such irritation as to cause effusion of serum from the true skin, leading to separation and elevation of the cuticle, and formation of a vesicle or blister. Vesicants are employed: (1) For relieving or removing the diseased condition of some internal part, by producing a determination of blood from the interior to the surface over the seat of the affection; (2) As general stimulants to the system, often beneficial in advanced stages of low 'continued fever ; (3) for the direct purpose of withdrawing serum from the vascular system, for which they are prescribed with advantage in cases of sudden effusion into theˆ pericardium or the pleura; blisters for this purpose should be of large size, and should be kept in contact with the skin sufficiently long to produce their full effect (24 hours being necessary in the case of some persons) ; (4) For removing the cuticle, to per¬ mit the direct application of various medical agents, especially mercury and morphine, to the absorbing surface of the true skin. In infancy and childhood, these agents must be used with extreme caution.

To produce vesication, Cantharidine, the active principle of Cantharides, or Spanish Flies, in one of its various forms, is generally em¬ ployed, though other substances also are used. Cantharidine is a

white crystalline substance, extracted from the powdered insects by rectified spirit, and whose composition is represented by the formula C5Ha02. It is a very active poison, and produces immediate inflammation of the skin wherever it comes in contact with it, is very volatile even at ordinary temperatures, and is soluble not only in alcohol, but also in chloroform, ether, strong acetic acid and many oils. In preparing a blister, it is expedient to sketch the desired shape and size, and before applying it the skin should be well washed with warm water. If the patient's skin is not easily acted upon, the part should be sponged with vinegar; but if it is very susceptible a piece of tissue-paper should be placed between the skin and the plaster. To insure close contact with the skin, the blister should be gently warmed, carefully applied, avoiding creases, and kept in its place by a bandage ; and to produce its full action, it should be kept on for 10 to 12 hours. If, on removal after that time, full vesication has not been produced, a hot poultice will often secure the desired effect. The raised cuticle should be punctured, to allow the escape of the serum, except in the case of children and persons of very irritable skin, when the vesications should be left unopened, and a dressing of simple ointment or spermaceti ointment on soft rag applied and repeated in 24 hours ; or the part may be at once covered with cotton-wool. The troublesome itching

which often follows application of a blister is best relieved by a bread-and-water poultice, moistened with the dilute solution of acetate of lead. Collodium Vesicans is prepared by mixing equal parts of collodium and cantharidal ether. It possesses the advantage that its strength can be rearfiily increased or diminished.

When a blistering agent with very rapid action is required, as in the state of collapse in cholera, recourse may be had to the application of boiling or nearly boiling water to a portion of the abdomen, the surrounding surface being protected by a wall of damp cloths. Cold water may be used as efficiently as boiling water ; a piece of bibulous paper, such as common blotting-paper, should be soaked in cold water, applied to the part to be vesicated, and covered with three or four folds of dry paper. A common smoothing-iron heated to 212° F. is then pressed three or four times over all ; and on removing the paper, the part will be found vesicated. In less urgent cases an almost immediate blister may be produced by saturating a piece of lint in a strong solution of ammonia, and applying it to the skin with moderate pressure. By the time the ammonia has evaporated, the required result is usually obtained. When it is desired to keep up a discharge from a

blistered surface, instead of healing it as is commonly required, or to produce a perpetual blister, the raw sur¬ face is dressed with irritants of various kinds, such as savine ointment. At each fresh dressing (in summer twice a day), the part should be cleansed in warm water.

VESPASIAN, ves-pa'zhi-an (Titus Fla¬ vius Sabinus Vespasianus), emperor of Rome : b. Reate, in the country of the Sabines, 17 Nov. 9 A.D. ; d. June 79. Being appointed commander of a legion in the reign of Claudius he acquired great reputation in Germany and in Britain, and on his return to Rome was made consul. Subsequently he was appointed pro-consul of Africa; and on the rebellion of the Jews was sent with an army into Judea (66). After subduing almost the whole of Galilee he was about to attack Jerusalem, when he re¬ ceived the news of the death of Nero (68 a.d.). After the transient reigns of Galba, (Jtho and Vitelliiis, he was elevated to the Imperial power, and reaching Rome about the middle of the year 70, was received with great rejoicing. He reformed the army discipline, and appointed a commission to settle the vast multitude of suits which had accumulated during the late troubles, besides presiding on the bench frequently him¬ self, that justice might be administered with impartiality. Vespasian favored arts, letters and learned men, particularly Quintilian, Pliny and Josephus. He rebuilt a part of the city, restored the capitol with increased splendor, and erected the gigantic amphitheater, the ruins of which are known as the Coliseum. Among important public events of his reign are the termination of the dangerous rebellion of the Gauls under Civilis, and the capture of Jeru¬ salem by his son Titus, whom the emperor had made his lieutenant in Judea.

VESPER SPARROW, GRASS FINCH, or BAYWINGED BUNTING, a well-known and abundant bird (Pooccetes gramineus), of the family Fringillid(e, found throughout the eastern United States and Canada, and rep¬ resented in other narts of temperate North

America by distinct subspecies. It is about six inches long and may be recognized by its streaked plumage, the bay or chestnut wing-patch

and the white outer tail-feathers which are conspicuously shown during flight. The three common names of this bird show the interchangeability in ordinary usage of the appellations applied to the species of Frin-gillidce and illustrate three peculiarities of this bird : the first, its habit of singing at sun¬ down; second, its abundance in grassy fields, and the third, the rather characteristic wing markings. No bird is more familiar to the stroller along country roads and byways in the New England and Middle States than the grass finch. It spends much of its time on the ground, but often perches on fences, telegraph wires and trees. Except during the breeding season it is gregarious and consorts with other ground-lov¬ ing sparrows, like which it feeds upon seeds, grains and insects for which it often searches by the roadside. When approached, the grass finch runs rapidly and seldom flies more than a few yards before alighting. It is a bold and confiding bird. Its migrations are not extensive and it leaves late, returns early, and in open seasons a few may even remain throughout the winter in the Middle States. From the latitude of Virginia and Missouri northward is its breed¬ ing ground. The nest is placed on or near the ground and is a bulky structure of weed stems, leaves and grasses, with a lining of fine grasses or hairs. The eggs are usually four or five, dull white, variously tinted and blotched at the larger end, especially with lilac and brown. Two or even three broods may be raised. As mentioned above the soft and sweet, but clear song is heard most frequently toward evening, but is by no means confined to that time. Consult Wil¬ son, ˆAmerican Ornithology.ˆ

VESPERS (late Lat. vespercB, vespers; plur. of vespera, evening), in the breviary (q.v.) of the Roman Catholic Church, the canonical hour following the nones and preced¬ ing compline, and thus the next to the last of the seven canonical hours. Also a religious service at evening.

VESPERTILipNIDˆ, ves-per-til-i-6n’i-de, a family of bats including the great majority of small insectivorous species, and especially characteristic of temperate regions. In this family the muzzle has noˆ nose-leaf, the pre¬ maxillary bones are defective and separated by a wide median vacuity, the number of incisor teeth is usually two on each side above and three below, and the tail is nearly or quite in¬ cluded in the interfemoral extension of the wing-membrane. With the exception of a few found along the southern borders all of the bats of the United States belong to this farnily, nine genera and about 25 well-marked species being included. Among them may be mentioned the long-eared bat (Corynorhinus macrotis), typify¬ ing the subfamily Plecotinae, in which the bases of the ears are joined across the top of the head, and which is found in the Southern States north to Virginia,

the well known and variable little brown bat (Myotis lucifugus), so abund¬ ant everywhere in the east, and represented by closely related species westward, the pretty and equally abundant red bat (Tasiurus borealis), the larger and much rarer hoary bat (T. cine-reus) which, like some other species, is a regu¬ lar migrant, the larger brown bat (Vespertilio huscus), the twilight bat (Nycticehus humeralis) and the pipistrelle (Pipistrellus subflavus), all of which are more or less plentiful in the East¬ ern States and whose habits are generally simi¬ lar and familiar. A very distinct species of California and the Sputhwest is Antrazous pal-lidus, which has only two incisors on each side below and a slightly marked nasal fold. It be¬ longs to the subfamily Antrozoince. Consult Miller, ˆNorth American Fauna No. 13ˆ (Washington 1897), and Allen, < Monograph of North American Bats,ˆ United States National Museum Bulletin, No. 43.

VESPUCCI, ves-poo'che, Amerigo (Latin¬ ized Americus Vespucius), Italian navigator: b. Florence, 18 March 1452; d. Seville, 22 Feb. 1512. He acquired in some fashion ®an excel¬ lent practical knowledge of astronomy,ˆˆ and v/as the greatest expert of his day in the calcu¬ lation of latitude and longitude. A clerk in the commercial office of the Medici at Florence, he made an avocation of the study of geography and the collection of globes, charts and maps. He became, too, a skilled map draughtsman. Some time between the middle of 1489 and the end of 1491 he was sent to Barcelona as repre¬ sentative of the Medici in connection with Spanish business interests of importance; and in 1493 he became connected with the commer¬ cial house of Juanoto Berardi at Seville. Berardi was in the employ of the Spanish Crown, and fitted out vessels for expeditions across the Atlantic. In 1495 he signed a contract for supplying 12 vessels of 900 tons burden in ag¬ gregate; and when he died in December, Ves¬ pucci settled the remainder of the contract and the various obligations in connection therewith. It is thus probable that Vespucci participated in the fitting out of Columbus' second voyage. Knowledge of Vespucci's career between early in 1496 and late in 1504 is based on two letters written by him, one (March or April 1503) to Lorenzo di Pier Francesco de' Medici, the other (4 Sept. 1504) to Piero Soderini, gonfaloniere of Florence. The latter gives an account of four voyages in which the writer took a part, the earlier two in the service of Spain, the lat¬ ter two in that of Portugal. The first expedi¬ tion started from Cadiz port 10 May 1497 and returned 15 Oct. 1498, and Vespucci accom¬ panied it as ˆGastronomer.® Hence, to all in¬ tents and purposes the voyage was his. As an officer of such importance, then Vespucci sailed. His account above mentioned is a cursory epistle, not an official report, and, therefore, of course — but unfortunately —

fails to supply many details that would now be of great value. He does, however, tell something of the flora and fauna of the regions visited, the natives and their customs. The letter to Soderini got into print in two editions, though it is highly improbable that Vespucci had any part in their appearance. The letter says that the expedition, after running to the Canaries, made land 1,000 leagues about west-southwest from those is¬ lands, coasted for 870 leagues along a shore so extensive that it was thought that of a conti¬ nent, passed 37 days in a fine harbor and then returned to Spain. Vespucci, then, probably sailed from Cape Honduras to a point not far

from Cape Canaveral, Fla. Thus he visited what he thought was the continent of Asia, but was really that of America, a year before Co¬ lumbus. Owing either to a typographical error or the arbitrary alteration of an editor, a proper name Lariab, in the Italian version, has ‘become Parias in the Latin. Lariab was apparently a name belonging to the country of the Huastecas around the river Panuco, while Parias was a name of a region 2,400 miles distant, on the South American east coast. This confusion of Lariab and Parias occurred despite the fact that Vespucci scrupulously gives latitudes and longi¬ tudes. As a matter of fact, at the time of the writing of the letter (1504), Columbus was sup¬ posed to have discovered Asia by a new route in 1492, and Vespucci, had he wished to antedate Columbus, must have placed his first voyage be¬ fore that date. In the letter to Lorenzo de Medici, regarding his third voyage only (14 May 1501-7 Sept. 1502), Vespucci refers to the re¬ gions visited (The Brazil coast to lat. 34° S., running thence southeast. . to South Georgia Island) as a ®new world,® because unknown to the ancients. One Giocondo, who prepared a Latin version, apparently from the Italian man¬ uscript original, gave his rendering (1504) the title ˆMundus Novus.ˆ This was put down as equivalent to what is now known as Brazil. Then the suggestion was given that Mundus Novus was the so-called Fourth Part of the earth, and ought to be called America, from its supposed discoverer, though as we now know Columbus had already reached it. Thus the name came to be equivalent to South America, and finally to

the two continents. Consult the critical and biographical notes by Winsor in his ˆHistory,ˆ Vol. II (1886) ; Fiske, <The Discov¬ ery of Americaˆ (1892) ; Harrisse, ˆDiscovery of North Americaˆ (1892).

VESSELS. See Sailing Vessels ; Steam Vessels.

VESSELS, Entry and Clearance of. Ac¬ cording to the provisions of the clearance law of 1902, the master of a vessel engaged in international commerce is required to de¬ liver to the collector of the port of departure, prior to sailing, a sworn manifest. Shippers' manifests are also required from the con¬ signors. When all requirements as to inspec¬ tion, fees, etc., have been satisfied, the collector issues clearance papers for the ship and its cargo. Coastwise vessels must take out clear¬ ance papers if they clear from one customs district to another. The masters of vessels of American registry are required, when entering from foreign ports, to deposit with the port collector their register and clearance papers and these are retained until the vessel clears. Masters of vessels of foreign registry are re¬ quired to show similar papers and then de¬ posit them with their consul until time for their clearance. The names of the vessel owners appear on the papers of American ves¬ sels. Entering vessels give copies of their original manifests to the customs officers who are also empowered to inspect the originals. Entry and clearance fees are fixed by law. Consult United States Treasury Department, ˆNavigation Laws of the United Statesˆ (1911), and Johnson, E. R., ˆOcean and Water Transportationˆ (1905).

VEST, George Graham, American lawyer : b. Frankfort, Ky., 6 Dec. 1830; d. Sweet Springs, Mo., 9 Aug. 1904. He was graduated from Centre College, Danville, Ky., in 1848 and from the law department of Transylvania Col¬ lege in 1853. In the last-mentioned year he re¬ moved to Georgetown, Mo., where' he engaged in the practice of law, removing thence to Boonville, Mo., in 1856. He was a member of the Missouri legislature in 1860-61, and at the outbreak of the Civil War he espoused the cause of the Confederacy. He served in the Confederate army in the summer of 1861, and was elected in that fall to the Confederate Con¬ gress, in which he served for three years. After the War he resumed his law practice, settling at Sedalia, Mo. He was elected to the United States Senate in 1879, and \vas reelected in 1885, 1890 and 1897. He was prominent as a committeeman in the Senate ; earned a national reputation as a debater; and was an acknowl¬ edged leader in national affairs. He was the last member of the Confederacy to act as a member of Congress. In 1903 physical

disabil¬ ity necessitated his retirement from office.

VESTA, the Roman goddess of the hearth identified with the Greek Hestia. The worship of Vesta arose from the necessity and difficulty in primitive times of obtaining fire. The cus¬ tom came about of maintaining at some point a perpetual fire for general use, and this was continued after the necessity had ceased. The flame was personified, and associated with the Penates (q.v.) as. a deity of the state. Vesta was not represented by any statue in the temple devoted to her honor, but by the symbolic fire kept perpetually burning on the hearth or altar by the vestals, her virgin priestesses. In Rome, on 1 March of every year, the sacred fire and the laurel tree shading her hearth were re¬ newed; on 9 June, the festival called Vestalia was celebrated; and on 15 June her temple was cleansed and purified. Praetors, consuls and dictators, before entering upon their functions, sacrificed at Lanuvium, where the cult was be¬ lieved to have been established first in Italy.

VESTA, in astronomy, the name of the fourth asteroid, discovered by Olbers at Bremen 29 March 1807.

VESTAL VIRGINS, women dedicated to the service of the goddess Vesta, and bound by vows of chastity for the limited period of 30 years. ˆ They were also termed vestals. The worship of this goddess is supposed to have originated in the guardianship of a central or village fire by the earliest communities of men. The difficulty of kindling fire before the inven¬ tion of the lucifer match w'as general and in prehistoric times the care of a fire for the com¬ mon use must have been a most important duty. It would naturally be entrusted to women, and preferably to those who were not distracted from it by family ties. The duty of maintaining this fire became a sacred function connected with the worship of a presiding goddess, after its original significance had been lost. Annually, on 1 March, the Latin New Year's Day, the fire was extinguished, and rekindled either by the friction of dry sticks, or, in later times, by the sun's rays being brought to a focus by a con¬ cave mirror.

The vestal virgins who had charge of the

ERUPTION OF MOUNT VESUVIUS

1

•v

*1

♦ I

u.

f

‘■ ～ ^ ■ f

c •

K

t

♦ .

j».

%

(

sacred fire were chosen by the king in the early days of Rome, and by the pontifex maximus under the republic and the empire. There were originally four and later six vestal virgins. The candidate was to be over six and under 10 years of age, free from defects, with father and mother living, and daughter of a freeborn resi¬ dent of Italy. Her hair was cut off, and she was formally initiated by the pontifex maximus, who thenceforth held toward her the relation of a religious father. The vestals had many privileges, and the honor was eagerly sought. After 30 years they could return to private life, and marry, if they chose. Violation of the vow of chastity during their years of service as ves¬ tals was punished by burial alive, and as the conviction was usually obtained on the evidence of slaves under torture, it is considered prob¬ able that some suffered who were innocent. The worship of Vesta disappeared with other pagan practices when Christianity became the religion of the empire.

VESTED RIGHTS, in law, a technical phrase, denoting a present fixed interest resting in a particular person or particular persons. They are opposed to contingent rights, which depend on some event or condition which may not come about before some other event or con¬ dition prevents their vesting. It is the general policy of lawmakers and the courts to uphold what are known as vested rights and not to al¬ low interference with them without due com¬ pensation. The 5th and 14th amendments of the Constitution of the United States are aimed to protect such rights from infringement by new legislation. See

Property.

VESTMENTS, Ecclesiastical, the gar¬ ments worn at religious services by priests and prelates of the Protestant Episcopal, Roman Catholic and other churches. Nearly all de¬ nominations, even those that repudiate vest¬ ments, expect their ministers to wear attire in¬ dicative of their vocation, and this custom is not confined to Christian ministers, but prevailed in the Jewish hierarchy, and is still maintained in the religious system of modern Jews. In the Buddhist and Hindu religions, and in pagan creeds of all kinds so far as known, the priests wear some garment or symbol to distinguish their order. For vestments worn in Roman Catholic and Protestant Episcopal churches, see Chasuble; Costume, Ecclesiastical; Stole, *etc.*

VESTRIS, Lucia Elizabeth Bartolozzi,

English actress, granddaughter of Francesco Bartolozzi (q.v.) : b. London, January 1797 ; d. Middlesex, 8 Aug. 1856. She_ was carefully educated, and at 16 was married to Armand Vestris, a member of the famous family of dancers. In 1815 she separated from him and made her debut on the Parisian stage with mod¬ erate success. Her appearance in London in 1820, however, was a marked triumph ; she be¬ came famous in ˆThe Haunted Towerˆ playing at Drury Lane, and subsequently added to her reputation in the part of ˆˆPhcebe® in ˆPaul Pry.ˆ While lessee of the Olympic in 1838 she was married to Charles James Mathews. She was afterward manager of the Lyceum and of Covent Garden.

VESTRY, a room adjoining a church where the vestments of the clergy are kept.

Hence the place of meeting of those who had the charge of parochial affairs, and subsequently the persons themselves to whom these affairs were entrusted. This is the present meaning in American churches. Vestries, under church es¬ tablishment in England, were originally en¬ trusted with the secular affairs of the church, as the maintenance and repair of the building, and the levying of church rates for this and other purposes. They latterly acquired a general control of the affairs of the parish, but by the Local Government Act of 1894 the vestries in rural parishes were superseded as regards their civil powers by the parish council or parish meeting. The vestries which formerly managed the affairs of the populous parishes of London were done away with by the London Govern¬ ment Act of 1899, under which a

number of metropolitan boroughs, each with its own mayor, alderman and council, were established in their place and in the place of other anoma¬ lous authorities. In the United States, where no connection between Church and State is rec¬ ognized ’by law, the vestry is wholly confined to its duties as a body chosen from the con¬ gregation to attend to the interests of the church. In the Protestant Episcopal Church the vestry usually consists of 10 men, of whom two are wardens. They are elected by the members, and they in turn elect the rector, as well as manage the business affairs of the church.

VESUNNA, the ancient name of Perigueux (q.v.).

VE.SUVIANITE, or IDpCRASE, one of

the commonest minerals which occur in tet¬ ragonal crystals. It is essentially a basic calcium and aluminum silicate, but all analyses show some iron and magnesium and occasionally ti¬ tanium and manganese. The crystals are gen¬ erally prismatic, terminated by the base often combined with the unit pyramid. Highly modi¬ fied crystals are not infrequent. It also occurs massive and columnar. It has a hardness of 6.5 and a specific gravity of about 3.4. Its lustre is vitreous to resinous and sometimes splendent, while its colors are usually brown to yellow and green. A blue variety from Norway . called ®cyprine,^^ owes its color to a trace of copper, Vesuvianite was so named in 1795 by Werner, who described the brilliant, brown crystals which are found in the ejected blocks of Vesuvius. The mineral has since been dis¬ covered in scores of localities, among the most noteworthy of which are the Vilui River in Si¬ beria, Achmatovsk in the Urals, Ala in the Piedmont, Monzoni in the Tyrol, Wakefield in Quebec, near Helena, Mont., and Magnet Cove, Ark. It usually occurs in metamorphic lime¬ stone and the crystalline schists, or as a con¬ tact mineral.

VESUVIUS, ve-su’vi-us, Italy, a volcanic mountain, 10 miles southeast of Naples.^ With a basal circumference of about 30 miles, it rises from the centre of a plain 2,300 feet above the sea in a pyramidal truncated cone 1,500 feet high and about 2,000 feet in diameter ; total height, 3,800 feet. In 1880 a funicular railway was laid to the summit, which was reconstructed and equipped for electrical working 1903-04, and supplemented by a new electric railway four and three-quarter miles long, from Pugliano, the

northern quarter of Resina, thus enabling visˆ itors to travel by electricity from Naples to within 250 yards of the crater. Previous to an eruption about 1838, the top was an uneven plane, but was then converted into a hollow cup, with a rim 400 feet to 500 feet broad on its west side, and not more than 50 feet on the others, and with an internal sloping sur¬ face to a depth of 500 feet. A precipitous rocky ridge, forming an arc of a circle, and 1,400 feet in height, called the Monte Somma, is situated at a short distance from the cone on the north, from which it is separated by a deep valley called the Atrio del Cavallo. Near the western extremity of this valley is the observatory es¬ tablished expressly for watching the volcanic phenomena. The lower part of the sloping plain, which rises gradually from the sea to the foot of the cone, forms a belt about two miles broad along the shore, laid out in vine¬ yards and well cultivated, though intersected at intervals by terraces of blaok calcined mat¬ ter. Beyond the cultivated belt the plain is rugged and covered with scoriae of all forms and sizes. The cone itself is covered with loose matter composed of scoriae, blocks of lava and volcanic sand, arranged in sifecessive layers by the natural force of gravitation. The form of the pyramid has been modified by side erup¬ tions and by the internal force acting upon the external matter before it has cooled. An in¬ ternal movement of elevation has been proved by the angle at which continuous streams of lava are now found, being much greater than that at which they are known to have origin¬ ally flowed. A stream of lava ceases to be continuous, and breaks into masses of scoriae at an angle of more than 3°. Monte Somma is supposed to have formed at one time a com¬ plete cone of much larger dimensions and probably of greater height than the present cone, being subsequently thrown down by volcanic forces, in the same manner as 800 feet of the present cone was carried away by an eruption of 1822. From a difference of structure imply¬ ing greater pressure, geologists have concluded that Somma was a submarine volcano, while the present is a subaerial one. Till 63 a.d., when many of the surrounding cities were damaged by an earthquake, no symptoms of activity are known to have been given forth by Vesuvius In 79 occurred the great eruption described in the well-known letters by the younger Pliny, which buried Herculaneum and Pompeii, and during which the elder Pliny perished while hastening with part of the Roman fleet to the relief of the inhabitants. Since that time there have been continuous symptoms

of activity and numerous eruptions have taken place. The first recorded discharge of liquid lava after that of 79 was in 1036. Since then there have been many violent eruptions ; the most noted were those of 1779, 1793, 1834, 1847, 1850, 1855, 1867, 1872, 1878, 1880 and 1895. The eruption of 1779 was particularly magnificent flames of fire ris¬ ing to three times the height of the mountain, and stones, scoriae, etc., being projected as high as 2,000 feet, while a river of lava 1,500 feet wide flowed for three and a half miles and ex¬ tended 600 feet into the sea. In 1872 14 dif¬ ferent orifices opened in the mountain sending forth rivers of lava that threatened to carry devastation far and wide. The villages of San

Sebastiano and Massa di Somma were almost entirely destroyed. Early in April 1906 erup¬ tions destroyed several small towns and vil¬ lages in the vicinity and created wide devasta¬ tion throughout the surrounding territory. See Herculaneum; Pompeii; Volcano.

VESZPREM, Hungary, town in the west¬ ern part of the country about 65 miles south¬ west of Budapest It contains a handsome episcopal palace, a fine cathedral, a Piarist col¬ lege, and a gymnasium. Cloth and flannel¬ weaving, silk-spinning, cultivation of wine, fruits and tobacco are the principal industries. The town on several occasions was in the pos¬ session of the Turks ; and an interesting memo¬ rial of them is a slender minaret rising from an old Gothic tower, and which long served as a watch-tower against fire. Pop. about 26,000.

VETANCURT, va-tan-koort', or VETAN-COUR, Augustin, Mexican historian : b. Mex¬ ico City, 1620; d. Mexico, 1700. He was a mem¬ ber of the Franciscan order at Puebla, in which he was held in high regard as a teacher and as a linguist. He was commissary of the Indies, a member of the provincial chapter and was actively engaged in missionary work. His writ¬ ings include various biographies and theologi¬ cal essays, in addition to his great works ˆArte de Lengua Mexicanaˆ (1673); and ˆTeatro Mexicanoˆ (2 vols., 1697-98).

VETCH, a name applied to many species of leguminous herbs, in the genera Vida, Astra¬ galus, Phaca, *etc.* They resemble pea-vines, and have pinnate, stipulate leaves and often climb over other plants by means of tendrils. The flowers are papilionaceous, of various colors, and the fruits are legumes or pods, containing the seeds. The broad or Windsor bean of Europe is one of the vetch tribe (Vida faba). The vetches are numerous, and many of them, especially the common tares (Vida sativa and V. hirsuta), are plants valuable either for

grazing livestock, to cut for green fodder or for ensilage with corn. They are rich in nitrogen, and are important not only for green manuring, or plowing under the soil, so that by decay this nitrogen may be released, but because the roots are covered with tuber¬ cles that are the home of bacteria which have the power of assimilating free nitrogen from the soil, and converting it into such a form that it may be used by the host-plant. If the roots are left Lo rot in the soil, the ground is enriched by this store of nitrogen, rendered available for other crops. Vetches, therefore, like other Leguminosce, are valuable for poor lands, where thev grow readily, and for restor¬ ing nitrogen exhausted by grass-feeding plants. The American vetch (Vida americana), with bluish flowers, grows in the moist soil of prairies and woodlands and is a valuable for¬ age-plant for the West. Vida caroliniana was highly regarded as a medicine by the Cherokee Indians, who used it for dyspepsia, cramp and rheumatic pains. Members of Astragalus, Phaca and allied genera, the American species of which are chiefly western or sub-arctic, are called milk vetches, from the notion that feeding upon them would increase the milk of goats.

Other leguminous plants known as vetches are the chickling vetch (Lathyrus sativus) grown in southern Europe for a forage-plant

and for its edible seeds, which are said, how¬ ever to produce paralysis of the lower limbs in men and animals. Some of the bitter vetches are included in the same genus, but one is Ervnm ervilia. The vetchlings are also included in Lathyrus (q.v.). The bastard hatchet-vetch is Biserriila pelecinus, with linear pods flattened transversely to the valve-edges, thus producing two sinuate false keels. The sensi¬ tive joint-vetch, Aischynomene virginica, has sensitive leaves, yellow flowers in axillary clus¬ ters and jointed pods. The kidney-vetch (Anthyllis vulneraria) has heads of flowers with permanent inflated calyces, in pairs at the ends of the branches; it was formerly sup¬ posed to have medicinal properties. The horse¬ shoe vetch (Hippocrepis coniosg) has horse¬ shoe-shaped pods and is also called

ˆunshoe the horse,® from the magic property ascribed to it of taking the shoes off any nag that stepped upon it. Consult Farmers' Bulletins (United States Department of Agriculture).

VETERANS OF INDIAN WARS OF THE UNITED STATES, Society of, an

organization formed at Philadelphia, 23 April 1896, by officers of the United States army, to keep in memory the hardships and heroism of the men who served in the Indian wars, which may now be regarded as of the past, and which had such an important and essential part in building up the States and Territories of the West. The society consists of three classes, the first composed of commisioned offi¬ cers, active, retired or honorably discharged, of the United States army, or of any State National Guard or militia, who may have served or may hereafter serve in a strictly military capacity in a section occupied by hos¬ tile Indians. The second class consists of lineal male descendants of officers who were either members of or eligible to the first class. The third class is opened to noncommissioned offi¬ cers and soldiers who have received a medal of honor or certificate of merit from the United States government for services in Indian wars, or who have been recommended for a com¬ mission, or specially mentioned by their im¬ mediate commanding officer for such services. The society is of course steadily diminishing.

VETERINARY MEDICINE. Veterinary medicine is the science and art that deals with the prevention, cure, alleviation and extermi¬ nation of disease among domestic animals. It includes the appropriate management of domes¬ tic animals, as well as the nature, causes and treatment of the disorders, to which they are subject.

History. — In Europe the first veterinary school was instituted in 1761 at Lyons; in 1776, that at Alfort, near Paris, was opened. Other veterinary schools were established in Europe as follows: Turin, 1769; Copenhagen, 1773; Vienna, 1775; Dresden, 1776; Hanover, 1778; Budapest, 1787; Berlin and Munich each one in 1790; London, 1792; and Madrid, 1793. In London, besides the older institution, now called the Royal Veterinary College, Camden-town, there was a second established at Bays-water in 1865. In 1844 the veterinary surgeons of Great Britain obtained a charter constituting them a corporation under the title of the Royal (College of Veterinary Surgeons, and empower¬ ing them to appoint examiners and grant li¬

censes or diplomas, the holders of which are members of this body (M.R.C.V.S.) .

In the United States the first step toward systematic veterinary education was the grant¬ ing of a charter in 1852 by the legislature of Pennsylvania and the securing of a subscrip¬ tion of $40,000 to serve in the organization of a veterinary school in Philadelphia. No students responded until 1859-60 when two were secured, one of whom was a graduate of the Boston Vet¬ erinary College which had been chartered in 1855. Both of these schools had a short life. Philadelphia, however, now has its veterinary school in connection with the University of Pennsylvania. In 1857 the New York College of Veterinar}' Surgeons was chartered and in 1875 the American Veterinary College was opened. These two New York City schools were maintained as proprietary institutions till 1899 when they were placed on a strictly uni¬ versity footing by consolidation under New York University. Their doors did not remain open long. In the succeeding years veterinary schools sprang into existence in many of the large cities, Chicago, Kansas City, Saint Jo¬ seph, Cincinnati, Baltimore, Washington, Grand Rapids, Detroit, *etc.* All of them were private institutions, dependent on their financial returns, with a curriculum of 10 or 12 months, representing two years of five or six months each.

On 7 Oct. 1868 Cornell University opened with a chair of veterinary medicine. Special courses of purely veterinary subjects were of¬ fered, and in the succeeding years four stu¬ dents received the Cornell degree of B.V.S. One of these organized the Bureau of Animal Industry in 1884 and for many years served as its head; another became director of United Slates Meat Inspection Service; another in conjunction with a later Cornell graduate dem¬ onstrated that the Southern cattle tick (Mar-garopus annulatus) was the carrier from beast to beast of the microbian cause (Piroplasma bigeminum) of Texas cattle fever — thus lay¬ ing the foundation of the later discovery that one mosquito (Anopheles) carries the microbe of malaria, a second (Stegomyia) that of yel¬ low fever, and a third (Culex) the blood para¬ site (filaria).

In 1894 by enactment of the New York State legislature the Cornell chair of veterinary medicine became the first State veterinary col¬ lege in America. Other State veterinary col¬ leges later were established in connection with State agricultural colleges in Ohio, Iowa, Washington, Kansas, Alabama, Colorado and Pennsylvania. A second New York State vet¬ erinary college was established at New York University in 1913.

The American Veterinary Medical Associa¬ tion in 1891 adopted an article providing that all applicants for membership should be gradu¬ ates of a recognized veterinary school with a curriculum of at least three years of six months each and a corps of instructors com¬ prising at least four veterinarians. Nearly all the schools which had not already done so soon placed themselves in harmony with these re¬ quirements. The next step in advance came in 1895 when the New York legislature enacted that at least a high school diploma represent¬ ing four years of high school work should be offered for admission to a veterinary school,

that the veterinary ciirrictilum should embrace three full years of nine months each, and that only those who had met both requirements could be admitted to the regents' veterinary ex¬ amination for license to practice in the State. Veterinary colleges now require that a ma¬ triculant must be a graduate of an accredited high school having a four-year course of study. The American Veterinary Medical Association now requires that all applicants for membership must be graduates of a recognized veterinary school with a curriculum of four years of nine months each.

Army Service. — The United States army has long had its nominal veterinarians, but many of these were uneducated men, appointed by political influence or advanced from the po¬ sition of farrier-major, and there was little to tempt professional men of character and ability into the service. The army veterinarian had practically no army status, no rights, no pros¬ pects. He was not even enlisted, there was no special provision for him duri*ilg survice, and no pension if he had to retire disabled. In the ses¬ sion of Congress for 1900 the first step was taken for the improvement of the army veteri¬ nary service by enacting that the army veteri¬ narian of the first grade must enter on the basis of an examination to be prescribed by the Sec¬ retary of War, and that he shall have the pay and allowances of a second lieutenant of cav¬ alry, while those of the second grade shall have $75 a month and the allowances of a sergeant-major. To-day the military veterina¬ rian, under the Military Defense Act of 3 June 1916 has an opening to advanced rank and nominal authority, a transfer from the Quar¬ termaster's to the Medical Department with su¬ pervision and access at least to the medical mind in the military body. The requirements for the United States army veterinary service are that the applicant must be an American citi¬ zen between 21 and 35 years of age, a gradu¬ ate of a recognized veterinary college, a person of good moral character, free from mental and physical defects, and satisfactorily pass an ex¬ amination prescribed by the surgeon-general.

State Regulations. — The first law restricting the practice of veterinary medicine was en¬ acted in New York in 1886. In 1901 12 States had veterinary medical laws. To-day each State has its Veterinary Examination Board which offers semi-annually an examination to graduates of recognized veterinary schools and issues a

certificate of ˆveterinary surgeon® to those who pass the examination satisfactorily which permits the successful applicant to prac¬ tise veterinary medicine legally within the State. Some States, especially those in which there is no recognized veterinary college, may recognize the license to practise granted by the Veterinary Examination Board of another State depending upon the need of veterinarians within the State and the opinion of the examining board.

Bureau of Animal Industry. — The Bureau of Animal Industry was established in 1884 in connection with the Department of Agriculture at Washington. The immediate cause of the formation of the Bureau was the urgent need by the Federal government of official informa¬ tion concerning the nature and prevalence of animal diseases, and of means required to control and eradicate them, and also the neces¬

sity of having an executive agency to carry out the measures necessary to stop the spread of disease and to prevent the importation of con¬ tagion into the country, as well as to conduct investigations through which further knowledge might be obtained. The Bureau deals, with the investigation, control and eradication of con¬ tagious diseases of animals, the inspection and quarantine of livestock, horse breeding, ex¬ periments in feeding, diseases of poultry and the inspection of meat and dairy produce. It makes original investigations as to the nature, cause and prevention of communicable diseases of livestock, and takes measures for their re¬ pression, frequently in conjunction with State and Territorial authorities. It prepares tuber¬ culin and mallein and supplies these substances free of charge to public health officers, conducts experiments with immunizing agents, and pre¬ pares vaccines, sera and antitoxins for the pro¬ tection of animals against disease. It prepares and publishes reports of scientific investigations and treatises on various subjects relating to live¬ stock. The effect of the work of the Bureau on the health and value of farm animals and their products is well known, and the people of the United States realize the immense im¬ portance of veterinary medicine.

Since 1884 veterinary medicine has made far more progress than during any previous period in its history. Every branch of veter¬ inary science has shared in this advance. Pa¬ thology has made the most marked progress. Bacteriological study has discovered new dis¬ eased, changed the views held regarding many others, and has pointed the way to new methods of prevention and cure through the use of bacterins, vaccines, antiserums and bacterial toxins. Many diseases

have been proved be¬ yond a doubt to be due to infection by specific bacteria or germs. Some that may be men¬ tioned are tuberculosis, anthrax, blackleg, glanders, tetanus, hog-cholera and rabies. In the United States veterinary medicine has gained distinction by the assistance and pro¬ tection it affords to the livestock industry of the country. Contagious pleuropneumonia of cattle ravaged the herds of this country for 49 years and was finally exterminated in 1887 and has not appeared here since. Foot and mouth disease has invaded the herds of this country four times (1870, 1902, 1908 and 1914), and each time it has been successfully exter¬ minated. Texas fever is rapidly disappearing from the South through the eradication of the Texas fever cattle tick. Hog-cholera, anthrax and blackleg are being successfully prevented by immunization of susceptible animals. Tuber¬ culosis is being slowly eradicated through the operation of the Tuberculous-Free Accredited Herd Plan of the Federal government and legislative measures regarding cattle reacting to the tuberculin test. The annual physical ex¬ amination of dairy cattle is also accomplishing much toward its eradication.

Veterinary medicine can offer much assist¬ ance in the study and prevention of the diseases to which the human family is susceptible. Some grave maladies of the human species are cer¬ tainly derived from diseased animals such as rabies, glanders and anthrax. Food products derived from animals often serve as a medium by which serious maladies may gain wide dis¬ tribution in the human family. Raw milk may

carry and distribute typhoid, septic sore-throat, diphtheria, smallpox and tuberculosis. Pork, if insufficiently cooked, may bring trichinosis and the tapeworm of man. Others may yet be added to the list. See Cattle, Diseases of; Horse, Care and Diseases of; Veterinary Obstetrics; Veterinary Surgery; and consult bibliography under the last named.

R. Ray Bolton,

Formerly Assistant Professor of Veterinary Medicine, loim State College.

VETERINARY OBSTETRICS. Ob¬ stetrics is the art of assisting in parturition, or in the troubles incident to birth. The giving of birth to young is the culminating act of a series of complex physiological processes, the perversion or interruption of any one of which may lead to the defeat of reproduction. Some knowledge of each process is necessary in order to grasp the significance of parturition itself. Successful parturition occurs only when the prospective mother is normal in the structure and physiological development of all her organs of reproduction, and of others which may have an essential relation thereto ; and the fetus must undergo a normal development before it can be born in a viable state. In veterinary obstetrics, therefore, is included all factors which necessarily precede and lead directly to parturition and all immediate consequences of birth which affect the health of the mother or the young. The reproductive organs of the fe¬ male consist of the ovaries, uterus or womb, vagina, vulva and the mammary glands. Of the male they are the testicles and the penis. Their specific function is the procreation of the species, including impregnation, conception, the intra-uterine nutrition and development of the fetus, its expulsion after a certain degree of development and its further nutrition for a time after birth by milk from the mammary glands until the young has acquired sufficient development to enable it to lead a wholly inde¬ pendent existence. Before reproduction be¬ comes possible the breeding animal must have reached the age of puberty or sexual maturity, the age at which ova and spermatozoa become mature and are discharged and sexual desire is established. Up to this age the reproductive organs are

dormant in so far as their specific functions are concerned and no sexual desire is manifested.

The different species of domestic animals arrive at puberty or sexual maturity at va¬ rious ages. The horse breeds at the age of two years, cattle at one to one and one-half years, sheep at 10 months to one year and the pig at seven to eight months of age. The rabbit breeds at six months of age.

Reproduction is a complex physiological process accompanied by or associated with phe¬ nomena which bear an important relation to each other. In the following order we may observe some of the processes: (1) estrum; (2) impregnation; (3) pregnancy; and (4) parturition.

Estrum or *heat® is that period of irresisti¬ ble sexual desire which occurs in non-pregnant females at regular intervals. It is closely asso¬ ciated with a physiological process taking place in the ovary called ovulation, in which an ovum or egg cell is shed from the ovary to traverse the oviducts and then the uterus where, if copu-

lation has taken place, the male cell (sperma-tozoan) and the female cell (ovum) unite, and the process of fertilization occurs. The estrual period and its interval in non-pregnant animals varies with the different species. In the mare the estrual period is 48 hours occur¬ ring at intervals of four weeks during the spring and early summer, becoming less fre¬ quent and more irregular during autumn and may be absent during the winter. Estrum in the cow is 24 to 36 hours and occurs every three weeks with considerable regularity. In the ewe the period of heat is 24 hours and recurs in from 13 to 18 (usually 16) days. The pig remains in a state of estrum for about three days and if not impregnated comes in heat again in three weeks. In carnivora estrum ordinarily occurs semi-annually in late winter and early autumn. The rabbit breeds from four to eight times a year. In all animals estrum is normally suspended during pregnancy, but exceptions to this rule may occur.

Impregnation. — Natural reproduction in animals can only occur as a result of copula¬ tion which is brought about as a result of es¬ trum of the female and the corresponding sex¬ ual excitement of the male. During copulation the semen from the male is injected into the vagina of the female, possibly in part into the uterus. The essential condition to fertiliza¬ tion or impregnation, so far as the male is concerned, is

that physiologically perfect sperm¬ atozoa shall gain the cervical canal, traverse the uterus and oviducts and meet the ovum. From among the myriads of spermatozoa in one discharge of semen, but one sperm cell is essential to the fertilization of an ovum. Fertilization or conception is the successful union of the male generative cell (spermatozoan) with the female generative cell (ovum), by which the resulting cell acquires the power of segmentation and is enabled to develop into an embryo.

Pregnancy or gestation is that period of time during which the fetus is undergoing de¬ velopment in the uterus of the mother, a period extending from the time of fertilization of the ovum until the birth of the young. The modi¬ fications which necessarily take place during this period are of a very profound character, and exert an important influence upon the life and nutritive powers of the mother. The vol¬ ume of the uterus becomes greatly increased in order to accomodate the fetus and its mem¬ branes. Pregnancy is manifested in several ways by the female. However, no single sign observed should be considered diagnostic but when several of the indications are manifested and noted in conjunction the diagnosis of preg¬ nancy may be made with certainty. The signs of pregnancy are : the cessation of estrum ; a more quiet and peaceful disposition ; a tendency to take on fat more rapidly; and the enlarge¬ ment of the abdomen so that it bulges below and to each side. Further and more positive signs are : movements of the living fetus which may be observed in the flank and along the sides of the abdomen ; touching or feeling the fetus through the walls of the flank; and aus¬ cultation of the fetal heart-beat. The earliest positive diagnosis of pregnancy may be made in the larger animals by palpation of the uterus through the rectum.

The duration of pregnancy or what is known as the period of gestation in domestic animals varies with the species. In the mare gestation is 330 to 340 days, in the cow 280 to 285 days, in the sheep and goat 21 to 22 weeks, in the pig 16 weeks, in the dog 9 weeks, in the cat about 60 days, and in the rabbit 30 days.

Parturition is the birth or expulsion of the living fetus at the natural time in a state of development which enables it to live. Although parturition is physiological it is accompanied by pain and severe exertion on the part of the mother and brings about sudden changes in the life of both mother and fetus which in a meas¬ ure imperil the well-being of each. The causes of parturition are not definitely known. On nearing the completion of pregnancy there ap¬ pear certain signs in animals which indicate the approach of birth. One of these is the in¬ creased functional activity of the milk glands ; another is the relaxation of the sacro-sciatic ligaments which allows the muscles passing over them to drop inward ; ' this causes deep hollows to appear on either side of the base of the tail; the vulvar lips become swollen and tend to stand apart more loosely than ordi¬ narily. As the time for birth draws nearer the animal appears to be somewhat uneasy and anxious, and, if at liberty, she will withdraw from other animals of her kind or of other spe¬ cies and seek a quiet and secluded place. In parturition there are certain attitudes of the fetus which make its passage possible while others render it virtually impossible. The possi¬ bility of a fetus being born alive and with¬ out assistance depends fundamentally upon which parts of the fetal body present at the outlet, and secondarily upon the relations of the parts which present to the circumference of the pelvis. The natural and normal presen¬ tation is that of the two fore-feet with the front side of the feet and knees upward or next to the tail of the dam and the nose lying between the knees. With a well-formed dam and fetus and a normal presentation parturition in animals is usually prompt and easy. When¬ ever birth becomes difficult or impossible with¬ out artificial aid the condition is known as dystocia. It has been noted that dystocia runs parallel in frequency to the confinement of the animal. Consequently those females which are most closely housed and least exercised are the ones which suffer most frequently and seriously from dystocia. The immediate causes of the dystocia are many and varied. It may be de¬ pendent upon some defect, disease, or displace¬ ment of the maternal organs such as; failure of the mouth of the uterus to

dilate ; twisting or torsion of the uterus; tumors in the vagina; dropsy in the uterus or abdomen ; undue nar¬ rowing of the passages ; the disturbance of the animal by the presence of persons ; or by un¬ accustomed and unnatural noises. Or it may be due to some disease or abnormality in the size, form, presentation or position of the fetus such as its back being turned downward or to one side in place of upward toward the spine of the dam ; the bending backwards of one or more limbs or of the head into the body of the uterus ; the presentation of the back, shoulder, or croup; the presentation of all four feet at once; dropsy or other disease of the fetus; or excessive or imperfect development of the fetus.

In overcoming dystocia in animals a number of operations may be demanded. Depending upon the animal in dystocia and the kind of dystocia present the operation for relief is selected to suit the case. The chief obstetric operations are: (1) Mutation, or changing the position of the fetus; (2) forced extraction; (3) embryotomy; (4) Caesarian section. Muta¬ tion, forced extraction and embryotomy are most commonly performed in dystocia of the larger animals (mare, cow, sheep and goat). In the smaller animals (pig, dog and cat) Caesarian section is performed. Pregnant ani¬ mals are subject to an infectious disease which frequently destroys pregnancy. The disease is infectious abortion and consists in an infec¬ tion of the fetus and its membranes which causes the death and expulsion of the fetus, or its expulsion in a living and enfeebled state at any time in the pregnancy period without di¬ rectly inducing material evidence of disease in the mother.

There are also a few accidents and diseases grouped about the act of parturition which re¬ quire great care and attention. They occur in all animals, although one or another accident or disease may be more frequent in one species than in another. Retention of the afterbirth is one of the most common and at the same time one of the most serious diseases of the puer¬ peral state. It is observed most frequently in the cow. Rupture of the uterus may occur but is not frequent. Eversion or prolapse of the uterus is a common and formidable accident, es¬ pecially liable to occur in cows. Metritis or in¬ flammation of the uterus is common and occurs in all species. Parturient paresis or milk fever is a very common malady of the parturient state, but is observed only in cows. Present methods of treatment have made milk fever a disease not to be feared if attended early, where it was once a highly fatal malady. For bibliography consult works referred to under article Veterinary Surgery.

R. Ray Bolton,

Formerly Assistant Professor of Veterinary Medicine, lozva State College.

VETERINARY SURGERY. Vc erinary surgery is the art of healing local injuries and certain diseases -of domestic animals by oper¬ ative procedure and instrumental treatment. It includes also certain operations, that when per¬ formed render animals more submissive and more serviceable to man. Surgery in all coun¬ tries is as old as human needs. A certain skill in arresting hemorrhage, the binding up of wounds, the supporting of broken limbs by splints, and the like, together with an instinc¬ tive reliance on the healing power of tissues, has been common to men everywhere. Veterinary surgery began in all probability with the domes¬ tication of the horse which occurred in Europe before the dawn of history. There is evidence that the Egyptians practised veterinary surgery in very remote times ; but not until we turn to the Greeks do we obtain any very definite information regarding the state of veterinary surgical practice in antiquity. The writings of Hippocrates (460-377 b.c.) afford evidence of investigations in comparative pathology. Dio¬ des of Carystus was one of the first to occupy himself with anatomy, which he studied in ani¬ mals. Aristotle wrote on physiology and com-VETERINARY SURGERY

parative anatomy, and on the maladies of ani¬ mals, while many other Greek writers on veteri¬ nary medicine are cited or copied from by Varro, Columella and Galen. Mago of Carthage (200 RC.) wrote a work of 28 books which was translated into Greek and largely used by Varro and Columella. Veterinary surgery in its prog¬ ress has kept pace with human surgery because the principles of surgery wherever practised are the same. Every advance made in human medicine affects likewise the progress of veteri¬ nary science, and the invaluable investigations of Davaine, Pasteur, Chauveau, Lister and Koch have created as great a revolution in veterinary practice as in human practice. Veterinary sur¬ gery is limited somewhat in its application in practice as compared with the practical applica¬ tion of human surgery. This is due to the sub¬ servient purposes for which the domestic ani¬ mals are reared and used, and to the .insur¬ mountable difficulties of diagnosis and post¬ operative control. The

amount of care and attention given to the improvement of the physical condition and general health of domes¬ tic animals is measured by the knowledge the owner has acquired as to how his animals may be best fitted to serve his purpose. The amount of medical or surgical attention given an ani¬ mal is measured by the cost in comparison with the results obtained. Perfect restoration of function being usually demanded in veterinary surgery, many operations common in human practice must either be renounced or very sel¬ dom performed. It is, therefore, often neces¬ sary to consider whether operation is justified or whether slaughter be not preferable.

Owners as a class have quite erroneous im¬ pressions of the results to be expected. Many are not satisfied even when the animal's use¬ fulness is completely restored because perhaps a trifling blemish remains. Some seem in¬ capable of understanding that a certain time is necessary for recovery. They imagine that heal¬ ing can be forced, become impatient and in a few moments destroy by clumsy interference or too early use of the animal the results of weeks of skill, afterward seeking to hold the operator answerable. In veterinary surgery the conditions for rapid healing are much less favorable than in human practice. The veteri¬ nary surgeon is handicapped in his operative work by the active opposition of the animal, the natural uncleanliness of the patient's body, the unsatisfactory surroundings in which the operation must ofttimes be performed and the hazards of anaesthesia. And he is finally ham¬ pered in his post-operative management of the case by the lack of any instinct of self-care or self-protection on the part of the patient, the difficulties of post-operative control, and fre¬ quently, the impossibility of shielding the wound from injurious external influences and the great cost of sustenance and proper care during long periods of convalescence. These limitations to veterinary surgery often render success imper¬ fect even with the greatest care and attention to detail and are so harmful against the enlarge¬ ment of the scope of veterinary surgery that there has never been a demand for the specialist from whom an elaboration of veterinary surgi¬ cal knowledge should come. On the contrary every veterinary practitioner must be more or less of a surgeon himself in order to meet the

demands of his daily work, and since his mind is occupied in so many different directions he finds little time to enrich the fund of surgical knowledge by fruitful investigations and re¬ search. He finds little opportunity to acquire that knowledge of detail, that degree of skill,

that practical experience upon which a success¬ ful surgical career actually depends. And un¬ like the human physician he is denied the op¬ portunity of consultations with the convenient specialist who by reason of a broad experience is capable of performing complicated and in¬ tricate operations against diseases which the general practitioner cannot hope even to diagˆ nose, to prognosticate or meddle with because such specialists do not exist in the veterinary profession.

There are a few men who stand out rather conspicuously as veterinary surgeons and there are a few teachers in the various veterinary col¬ leges who profess to be endowed with a su¬ perior variety of surgical skill but still it cannot be said that the ranks are richly embellished with real surgeons.

Although many of the domestic animals un¬ dergo necessary surgical operations the horse has furnished by far the largest field for the development and application of veterinary sur¬ gery because up to the beginning of the 20th century allˆ agricultural pursuits and the local transportation of people, manufactured articles and farm products were done by means of horses. This necessitated great numbers of horses in every occupation. To-day the tractor and the automobile have made such enormous inroads into our commercial and agricultural transactions that the work for the horse has all but gone, and consequently the horse has disappeared in great numbers from the cities and farms, thus very greatly diminishing the opportunities and the field for the practice of veterinary surgery in the future. Nevertheless, a high degree of skill has been attained in the application of veterinary surgery when judged by the various operations that may be per¬ formed upon the horse for the restoration of his usefulness. In surgical practice the indications and contra-indications for operation must be carefully studied. Except in case of urgent operations like tracheotomy for threatening suffocation, operation for strangulated hernia, removal of a foreign body, arrest of severe hemorrhage, dressing of a wound, etc., it is first necessary carefully to consider whether the animal's value, its chance of perfect recov¬ ery and the probable duration of its convales¬ cence Justify operation at all. When surgical treatment can only have a temporary good effect and the disease is likely to return, when im¬ provement is only to be obtained by sacrificing the animal's usefulness, or when the patient is old or its strength is too greatly reduced the operation should not be performed except on the insistence of the owner.

Surgical Procedure.— This includes (1) the restraint of the animal; (2) anaesthesia; (3) obtaining surgical cleanliness, and (4) the dressing

and care of wounds. Restraint. — Efficient restraint is a prerequisite to good animal surgery. Operation, or even local ex¬ amination, is often impossible without recourse to methods of restraint of which an exceedingly numerous choice is available. Each species of the

domestic animals is endowed with one or more means or weapons of defense. These must be reckoned with and overcome by effectual means. The animal must be rendered harmless and at the same time the operative area must be made immovable and secure. Surgical restraint methods begin with subjection by means of blinds, twitches, gags, war bridles and barnacles. These appliances are used to divert the animal's attention while injuries, diseased areas or wounds are being examined, operated or dressed. They are also used while the hobbles or casting harnesses are being applied. The method of restraint used depends upon the size and strength of the patient, the part to be operated upon and the operation to be per¬ formed. Large animals are cast and secured in the recumbent position by means of har¬ nesses with hobbles and ropes for serious op¬ eration and preparatory to administering an anaesthetic. Veterinary colleges and veterinary hospitals are usually equipped with stocks and operating tables where larg^' animals may be securely conhned for operation in the standing or in the recumbent position as desired. The smaller animals (sheep, swine, dogs and cats) are restrained for operation by tying all four limbs together or by securing them to an im¬ provised operating table. If not too large and strong they may be held firmly by a powerful assistant.

AncFsthesia. — According to its nature and extent anesthesia may be general or local. In general anaesthesia the patient is thrown into a more or less profound artificial sleep. It is not always necessary, however, to act on the entire individual. Sometimes the operation af¬ fects only a very limited area and local anaes¬ thesia suffices. Local anaesthesia may be pro¬ duced by the application of ice or freezing mix¬ tures, by spraying the part with certain liquids like ether or ethyl chloride, or by the subcutan¬ eous injection of a solution of cocaine, eucaine, stovaine, quinine and urea hydrochloride or pro¬ caine. Anaesthetics are quite as useful in animals as in man, and few important operations are performed on veterinary patients with¬ out anaesthesia, either local or general. For most minor operations the methods of restraint are sufficient, but certain operations cannot be well performed without general anaesthesia. In reduc¬ tion of hernia, delivery in cases of dystocia, in laparotomy and in all cases where one works in dangerous proximity to important organs, the animal's struggles render general anaesthesia indispensable. It is also necessary for delicate operations on or near the eye, and for all*serious

operations on horses. In ruminants, anaesthetics are seldom used except in case of difficult parturition because the ruminant does not with¬ stand anaesthesia well. In carnivora, especially the dog, its principal indications are in lapa¬ rotomy, dystocia, amputation and certain op¬ erations on the head. General anaesthesia is the result of a special action exerted directly on nerve centres by the anaesthetic agent. General anaesthetics may be administered by the respira¬ tory tract through inhalation of their vapors or by injection intravenously or subcutaneously or by administration through the mouth and digestive tract. Anaesthetics administered by the respiratory tract produce a series of phenomena in the following order; (1) A period of ex¬

citation; (2) a period of anaesthesia, or surgi¬ cal period; (3) a period of collapse or intoxi¬ cation. For horses, the best anaesthetic is chloro¬ form inhaled. For cattle chloral hydrate, whisky, brandy or rum administered by the mouth is the best. For sheep, goats and swine chloro¬ form is best, and for dogs and cats morphine injected subcutaneously followed by inhalations of a mixture of ether and chloroform should be used.

Local anaesthesia is the result of the action exerted upon the nerves in the area in which the agent is injected. Areas or parts may be anaesthetized for operation by the injection of a local anesthetic into the area to be op¬ erated, or by injecting the agent along the tract of the nerve supplying the part. Local anaesthe¬ sia may also be produced by infiltration or by producing an artificial edema in the region of the operation.

Surgical Cleanliness. — The surgeon's most formidable adversary is wound infection caused by the invasion of wounds with pathogenic bacteria which sooner or later develop and multiply, and by their activity or their products set up irritation of the tissues, inflammation, suppuration and, in certain cases, general in¬ fection of the body. Antisepsis and asepsis are two terms used to describe the method of treat¬ ment and care of wounds, accidental or opera¬ tive, as regards the bringing about of that con¬ dition known as surgical cleanliness or freedom from any of the pathogenic or wound-infecting germs. Antisepsis is that process by which in¬ fective germs are carried away and excluded from the wound, while asepsis is freedom from infective germs. In veterinary surgery asepsis will probably never obtain the same favor as antisepsis on account of the natural uncleanli¬ ness of the skin of animals, the condition of their environments and the

difficulties of post¬ operative control. Strictly considered, however, antisepsis and asepsis do not stand in opposition, but rather form mutual complements of each other ; aseptic methods being preventive, anti¬ septic curative, their association is often ad¬ vantageous. Antisepsis is resorted to when the region of operation includes a suppurating wound, a fistula or an ulcer or an infected wound. Antiseptics are then employed to dis¬ infect the seat of operation, the hands, the in¬ struments and the dressing materials.

The aseptic method is applicable to opera¬ tions upon healthy or infection-free tissues. Antisepsis is preferable in veterinary surgery on account of the chances of the wound, the hands and the instruments becoming infected during the operation. For disinfecting the seat of operation and the hands, chemical antiseptics are employed. Instruments, ligatures, drainage tubes and other materials used for dressing wounds are sterilized by being subjected to the action of boiling water, glycerine, heated oil or to a high degree of dry heat.

Some of the antiseptics most used are iodine, iodoform, potassium permanganate, car¬ bolic acid, lysol, bichloride and biniodide of mercury, boric acid, chlorazene and dichloramine-T.

The operator’s hands are not infrequently the means of infecting wounds, and the surgeon who desires to avoid after-complications wils take especial care in the disinfection of his

hands. The spaces beneath the nails, the folds of skin at their base, the folds of the skin itself and the orifices of the skin glands are all refuges for microbes, to destroy which demands the most minute precaution. In veterinary sur¬ gery the precautions taken extend to thoroughly cleansing the nails, washing the hands with hot water and soap and thoroughly rubbing them with 1 in 1,0.00 sublimate solution. The hands should be rendered aseptic and kept aseptic throughout the operation. For this reason the operator should avoid touching the skin sur¬ rounding the point of operation, the table, the straw or any object which has not been dis¬ infected.

The field of operation and surrounding parts should be most carefully cleansed. In all ani¬ mals the skin is covered with extremely numer¬ ous and varied micro-organisms among which staphylococci are particularly abundant. It is, therefore, always important to disinfect the parts. If the skin is healthy, the hair is removed with scissors or a clipper, the parts thoroughly soaped, shaved, scrubbed and washed with clean water. After lieing dried, the parts are rubbed with ether or gasoline to remove fatty materials from the surface and are finally douched or painted with tincture of iodine. This method, however, is not applicable to all surfaces. The mucous membranes require the application of mild antiseptics and irrigation, while the foot requires paring and continued soaking in a strong antiseptic for several hours.

Surgical Dressing of IVounds. — Wounds, op¬ erative or accidental, require in dressing and treatment (1) the control of hemorrhage; (2) to be placed in a position of rest, and (3) adequate provision against infection. Hemor¬ rhage is controlled by the application of thermic agents (heat or cold), chemical agents (styp¬ tics) and surgical methods. The surgical methods of controlling or arresting hemorrhage are represented by the tourniquet, Esmarch's bandage and the rubber cord, by compression, ligation, torsion, forcipressure and acupressure. Placing the wound in a position of rest in do¬ mestic animals is ofttimes a difficult ta.sk. It signifies the fixation of the margins of the wound in apposition, or the fixation of the part in which the wound has occurred. The margins of the wound are fixed by means of sutures

and bandages, and the fixation of the part is accomplished by the confinement of the animal to as little freedom of movement as possible.

All wounds must be scrupulously guarded against infection. Aseptic wounds_ should be closed by suturing and protected with a dress¬ ing of sterile cotton applied and kept in place by bandages. If bandages cannot be applied the wound must be protected by the confinement of the animal in a clean and sanitary environ¬ ment, and the application of antiseptics in_ the form of dusting powders, healing oils or irri¬ gation. Infected wounds must be thoroughly cleansed of all foreign material and necrotic tissue, provided with free drainage and frequent irrigation with antiseptics.

Bibliography. — For convenience of reference a combined bibliography of the veterinary sci¬ ences, medicine, obstetrics, surgery, etc., is here given. Buchanan, R. E., Weterinary Bacteri¬ ologyˆ (Philadelphia 1911) ; Dun, Finlay, Vet¬

erinary Medicines : Their Actions and Usesˆ (12th ed., Edinburgh 1910) ; Edelmann, R., Vext book of Meat Hygieneˆ (Philadelphia 1916) ; Ernst, W., Vextbook of Milk Hygieneˆ (Chi¬ cago 1914) ;Hemenway, H. B., Vhe Essentials of Veterinary Lawˆ (Evanston, Ill., 1916) ; Hoare, E. W., ˆA System of Veterinary Medicineˆ (2 vols., Chicago 1913-15) ; Hutyra and Marek, ˆSpecial Pathology and Therapeutics of the Diseases of Domestic Animalsˆ (new ed., 2 vols., Chicago 1916) ; Kaupp, B. F., Voultry Dis¬ eases and Their Treatmentˆ (Chicago 1914) ; Kinsley, A. T., ˆSwine Diseasesˆ (ib. 1914) ; Kitt, Theodor, Vextbook of Comparative Gen¬ eral Pathologyˆ (English trans. by W. W. Cadbury, Chicago 1906) ; Lynch, C. F., ˆDis¬ eases of Swine, with Particular Reference to Hog Choleraˆ (Philadelphia 1914) ; Law, James, ˆTextbook of Veterinary Medicineˆ (5 vols., Ithaca 1905-11) ; Malkmus, Bernard, ˆClinical Diagnostics of the Internal Diseases of Do¬ mestic Animalsˆ (4th ed., Chicago 1914) ; Marek, J., ˆLehrbuch der klinischen Diagnostik der inneren Krankheiten dcr Haustiereˆ (Jena 1912) ; Moore, V. A., Vathology and Differ¬ ential Diagnosis of Infectious Diseases of Animalsˆ (3d ed., Ithaca 1908) ; Neumann and Macqueen, Vreatise on the Parasites and Para¬ sitic Diseases of the Domesticated Animalsˆ (2d ed., London 1905) ; Ostertag, R., ˆGuide for Meat Inspectorsˆ (New York 1915) ; Pearl, R., et al., ˆDiseases of Poultry: Their Etiology, Diagnosis, Treatment and Preventionˆ (rev. ed.. New York 1915) ; Reynolds, M. H., Vet¬ erinary Studies for Agricultural Studentsˆ (7th ed.. New York 1911) ; Smith,

Frederick, ˆMan¬ ual of Veterinary Hygieneˆ (5th ed.. New York 1906) ; id., Vanual of Veterinary Physiologyˆ (4th ed.. New York 1912) ; Sisson, S., Vhe Anatomy of Domestic Animalsˆ (2d ed., Phila¬ delphia 1914) ; Williams, W. L., Veterinary Obstetricsˆ (Ithaca 1909) ; Winslow, Kenelm, Veterinary Materia Medica and Therapeuticsˆ (7th ed.. New York 1913). Consult also the Journal of the American Veterinary Medical Association (Ithaca), the American Journal of Veterinary Medicine (Chicago), bulletins of the United States Bureau of Animal Industry, State Experiment Station bulletins, *etc.*

R. Ray Bolton,

Formerly Assistant Professor of Veterinary Medicine, Iowa State College.

VETHAKE, Henry, American educator : b. Demerara, 1792; d. 17 Dec. 1866. Coming to the United States with his parents he entered Columbia College, New York, where he was graduated in 1808, and studied law. In 1813 he became teacher of mathematics at Columbia and the same year was made professor of mathe¬ matics and natural philosophy in Rutgers (then Queen's) College. From 1817 to 1821 he held a similar chair at Princeton; from 1821 to 1829 at Dickinson College and in 1832-35 at the University of the City of New York. He then was for a year president of Washington College, Lexington, Va. He was professor of mathe¬ matics from 1836 to 1855 and in 1855-59 was professor of intellectual and m.oral philosophy in the University of Pennsylvania; and was chosen vice-provost in 1846 and provost in 1854. From 1859 until his death he was professor of higher matnematics in the Philadelphia Poly¬ technic College. He published Principles of

Political Economy,ˆ and edited McCulloch's ˆDictionary of Commerced

VETILLART, va-te-yar, Marie Michel Henri, French civil engineer: b. Le Mans, France, 5 Sept. 1848. He was educated at the Ecole Polytechnique and the Ecole de Ponts et Chaussees, Paris, and in

1875-86 was resident engineer of the port and canals of Calais. In 1886-92 he was engineerin-chief of the ports of Boulogne and Calais and has since occupied that position at Havre and the ports on the Seine. The new port of Calais, the improve¬ ment of the Calais Canal and the completion of the Boulogne breakwater are among his more notable works, while to him may also be credited the first use of the water-jet for sink¬ ing the foundations of large piers and lock walls. He was a delegate to the International Maritime Congress at Washington in 1889. His writings include ˆFongage des Pieux par Injection d'Eauˆ (1877) ; ˆFondations en Ter¬ rains de Sable des quais et Ecluses du Port de Calaisˆ (1889) ; ˆLa Navigation aux Etats-Unisˆ (1892) ; in collaboration with Quinette de Rochemont, ˆLes Ports Maritimes de I'Amerique du Nord sur I'Atlantiqueˆ (1902), *etc.*

VETIVER, the rhizome and rootlets of the cuscus-grass (Andropogon squarrosus), of In¬ dia, which, when dried, is light yellowish-brown in color, aromatic, balsamic and persistent in odor, suggesting sandalwood or myrrh. It is a tonic and stimulant drug, but is chiefly used as a source of vetiver oil, an ingredient in per¬ fumery. The fibre of the grass is woven into fragrant baskets and matting, which curtains house-openings, during the hot season of India, and is always kept wet.

VETO, in political science, the right of the executive to disapprove an act or resolution of the legislature. It may be absolute as in Eng¬ land, or qualified as in the United States, where the disapproval of the executive may be over¬ ridden by an extraordinary majority of the leg¬ islature, or suspensive as in France, where the veto merely works a suspension of the law un¬ til repassed by the legislature by an ordinary majority. In England the veto is a remnant of the more extensive legislative power for¬ merly exercised by the sovereign, but which has been gradually cut down until only the negative power of disapproval is left. Since 1708 the right has never been exercised and the com¬ mentator Bagehot goes so far as to say that the sovereign would be bound to sign his own death warrant if the two houses of Parliament should send it to him. But the better opinion is that a royal prerogative is never lost by non-user and, therefore, the royal veto power still exists unimpaired, although the system of responsible cabinet government makes its use out of place. In the English colonies of America, except Maryland, Rhode Island and Connecticut, the royal veto was frequently em¬ ployed in a manner to call out the strong pro¬ tests of the colonies, and this abuse was one of the well-known counts in the indictment against the British king contained in the Declaration of Independence. None of the revolutionary State constitutions except Massachusetts gave the executive even a qualified

veto, nor was any provision for such a power made in the Articles of Confederation. The advantages of

a qualified veto, as a check upon hasty and ill-considered legislation, however, appealed Xo the framers of the Federal Constitution, and it was provided in Article I, Section 7, that every bill which shall have passed both House of Congress shall be presented to the President for his approval, but if disapproved by him it shall be returned with his objections to the House in which it shall have originated. It is made obligatory upon the House to enter the objections upon the journal and proceed to reconsider the bill. If repassed by two-thirds of both houses by a yea and nay vote it becomes law in spite of the executive disapproval. If the bill is retained by the President for a period of 10 days (Sundays excepted) it becomes law without his sig¬ nature unless the adjournment of Congress in the meantime prevents its return. This last proviso in effect gives the President an abso¬ lute veto on all bills passed during the last 10 days of the session since he has only to retain them in order to nullify them. This potent weapon is known as the ^pocket veto® and was first extensively employed by Presi¬ dent Jackson, who defeated in this way Clay's bill for the distribution among the States of the proceeds from the sale of the public lands. The veto power was used rather sparingly by the earlier Presidents. Washington vetoed two, Jefferson and the two Adamses none, Madison six and Monroe one. The most extensive use of the veto was made by Jackson, who vetoed 12 bills, by Tyler and Pierce who vetoed nine each, by Grant who vetoed 43, by Johnson who vetoed 21 and by Cleveland who vetoed 301 during his first term. Most of those vetoed by Cleveland, however, were private pension bills of little importance. Among the more important measures which have been killed by the execu¬ tive disapproval were the bank bill and the in¬ ternal improvement bill vetoed by Jackson, the two bank bills vetoed by Tyler, the Freedmen's Bureau, Civil Rights and Reconstruction bills vetoed by Johnson, the Inflation bill and the bill to reduce the President's salary from $50,000 to $25,000 vetoed by Grant, the silver coinage bill vetoed by Hayes and the Immigra¬ tion bill vetoed by Cleveland. Until Pierce's administration but one bill was passed over the executive veto, the exception being a tariff bill vetoed by Tyler. Five were passd over Pierce's veto, 4 over Grant's and 15 over John¬ son's. No bills became law by the operation of the 10-day rule until Buchanan's adminis¬ tration. During Grant's two terms 136 bills became law by this rule, 18 during Johnson's term, 13 during Arthur's and 283 during Cleve¬ land's first term.

Among the precedents which have grown up in connection with the exercise of the veto power are: that the President has no power to veto a resolution proposing an amendment to the Constitution; that he cannot veto a bill without stating his objections thereto; that he cannot recall a veto, although this was done on one occasion by Grant; and that the two-thirds of both Houses required to override the veto means two-thirds of those present, and not two-thirds of all members composing the two Houses. An oft-suggested amendment to the Constitution is the proposal to empower the President to veto particular items in appropria-

tion bills. This would enable the executive to eliminate objectionable ˆTidersˆˆ from impor¬ tant appropriation bills. At the present time all the State executives except that of Rhode Island are allowed a qualified veto over the acts of the legislature. Not until 1902 were the executives of North Carolina and Ohio given this power. In four States (Vermont, Connecticut,. New Jersey and Indiana) it in¬ cludes only the right to demand reconsidera¬ tion. In 27 States the veto may be overridden by two-thirds, either of the members present or elected ; in three States, by three-fifths ; and in the others, by a majority of those elected. In a considerable number the executive is em¬ powered to veto any item of an appropriation bill, and in a few, any section of other bills. See Acts of Congress; Bills, Course of; Executive. Consult Mason, <The Veto Power> (1890) ; Wyman and Sherwood, <Veto Power in the several Statesˆ (1907).

James Wilford Garner, Professor of Political Science, University of Illinois.

VEUILLOT, ve-yo, Louis, French author: b. Boynes, France, 11 Oct. 1813; d. Paris, 7 April 1883. He was of humble origin and be¬ gan his journalistic career in 1832, having ob¬ tained a position on one of the ministerial provincial papers. He rose from one position to another until in 1843 he became editor of UUnivers Religieux. He visited Rome in 1838 and, influenced by the impressive religious serv¬ ices of Holy Week, became an ultramontanist in his opinions, his conversion

resulting in a series of religious romances, among which are ˆPierre Saintineˆ (1840) ; ˆL'Honnete Femmeˆ (1844), *etc.* Among his other writings are ˆLes Pelerinages de Suisseˆ (1838) ; ˆLes Libres penseursˆ (1848) ; ˆLes Odeurs de Parisˆ (1866) ; ˆPoetic Worksˆ (1878), *etc.* He was the most uncompromising French ultramontan¬ ist of his day. Consult biographies by E. Veuillot (1883), and Cornut (1891).

VEVAY, ve-va', Ind., ciW county-seat of Switzerland County, on the (Jhio River, about midway, following the course of the river, be¬ tween Louisville, Ky., and Cincinnati, Ohio. It has steamboat connections with all the Ohio River ports. It is in a fertile agricultural re¬ gion in which the chief products are fruit, to¬ bacco and grain. The manufactures are flour, furniture, brick, tobacco and lumber and dairy products. The place was settled in 1805 by a colony from near Vevay, Switzerland; in 1813 it was laid out and in 1877 was chartered as a city. Pop. 1,256.

VEVEY, or VEVAY, Switzerland, a town in the canton Vaud, beautifully situated at the northeast margin of the Lake of Geneva, 11 miles east-southeast of Lausanne. The beaut}' of the town and neighborhood attracts many foreign residents and it has interesting literary associations in connection with Rous¬ seaus ˆNouvelle Heloise.ˆ Pop. 17,500.

VEXILLA REGIS PRODEUNT («Be-hold the banners of the King®), the first line of a ®world-famous hymn,® written by Vanantius Fortunatus at the time when he was living at Poitiers. Radegunda, queen of the Franks, who was living in the monastery which she had founded at that place, had obtained frorn

Emperor Justin I a fragment of the True Cross for her monastery, and the relic was forwarded to her by way of Tours in charge of the bishop of that place. Fortunatus headed Radegunda's deputation to meet the bishop's precession and chanted this hymn to salute the relic's arrival (19 Nov. 569). The word ˆ'vexilla® has re¬ ceived many symbolical interpretations, the best of which is perhaps that of Kayser, namely, that the eaele of the old Roman cavalry stand¬ ard has been supplanted by the cress and cor¬ responding changes made in the banner. The hymn originally contained eight stanzas, but the correctors of the Breviary under Urban VHI revised it entirely, making changes and sub¬ stitutions which in general are not liked by hymnologists. The Vatican Graduale (1908), however, preserves the original text, although the Antiphonary (1912) gives only the revised

text. The hymn is sung in the procession on Good Friday when the Blessed Sacrament is carried from the Repository to the High Altar, but its principal use is in the Divine Office, the Roman Breviary assigning it to Vespers from Saturday before Passion Sunday daily to Maundy Thursday, and to Vespers on the feasts of the Holy Cross. There are at least 40 Eng¬ lish translations (consult the ˆDictionary of HymnologyO of the ˆVexilla Regis, ˆ notably by Blount, by Bagshawe, by Donahoe and by Neale, the latter's being one of the best known. A fine translation, preserving, the metre of the original, was published with the Latin text and historical and exegetical comments by Hugh T. Henry in the American Ecclesiastical Review (March 1891). The text with critical and theo¬ logical notes is also to be found in S. G. Pimont, ˆLes Hymnes du Breviaire Romainˆ (Paris 1884).

Herbert F. Wright.

VIA DOLOROSA (Latin, ˆsorrowful way®), the name of a narrow tortuous street of Jerusalem, supposed to be part of the route on which Jesus carried his cross to Calvary. There are 14 stations marked by tablets. The name appears to have been bestowed in the Middle Ages and is founded on a rather doubt¬ ful tradition. The Way of the Cross, a form of devotion in the Catholic Church, is in com¬ memoration of that dolorous journey of the Savior. It consists in prayer and meditation successively before each of the 14 tablets (®Stations®) familiar in all Catholic churches, and which represent incidents in the journey of Jesus from the place of judgment to the Hill of Calvary.

VIA MALA, a remarkable defile or crevasse in the canton of Grisons, Switzerland, a por¬ tion of the Hinterrheinthal between Thusis and Zillis. The sides of the clett, wnich is about two miles in length, are immense walls of rock, almost parallel, and so hard that the disintegrat¬ ing influence of the elements appears to have little effect on them, each projection on one side corresponding to an indentation on the other, almost as perfectly as at the time they were separated. The walls have a maximum height of about 1,600 feet, and at various parts of the defile are not more than 30 feet apart at the top. The first part of this defile was long deemed inaccessible, and had received the name of the Lost Gulf, but in the early part of the 19th century a magnificent road was constructed

through the Via Mala, 400 to 600 feet above the river, by blasting and cutting a ^^notch^^ in the side of the rock. The road is necessarily steep and narrow, crosses from side to side by three bridges, and is protected from falling stones and trees by a canopy of rock overhead here, and by a wooden roofing there. So narrow is the crevasse in some places that fallen trunks and stones are sometimes wedged in between its sides above the ordinary water-level; and on the occasion of the great flood of 1834, the river, generally 400 feet below the second bridge, rose to within a few feet of it, and carried off the upper bridge.

VIADUCT. See Bridge.

VIARDOT, Louis, loo-e ve-ar'do, French art critic: b. Dijon, 31 July 1800; d. Paris, 5 May 1883. He studied law in Paris, entered journalism and was manager of the Theatre Italien, 1831-41. In the last-named year he founded with George Sand and Pierre Leroux the Revue Independante. He. .wrote ^History of the Arabs and Moors of Spain^ _ (1851) ; ^The Traditional Rise of Modern Painting in Italy (1840) ; ^The Museums of France^ (1855) ; ^Spain and the Fine Arts^ (1866) ; ^Wonders of Painting^ (1868-69).

VIARDOT-GARCIA, ve-ar-d5 gar-the'a, Michelle Pauline, French opera singer, daughter of Manuel Garcia (q.v.) and sister of Maria Felicite Malibran* (q v.) : b. Paris, 18 July 1821; d. 1910. She traveled extensively with her parents and in 1839 made her debut at London, playing in ^Otello^ and in ^La Cenerentola.^ She was married to Louis Viardot (q.v.) in 1840, but continued her operatic career until 1862 when she retired. She appeared in the great European cities with continued success through¬ out her stage life; created the parts of ®Valentine^^ in ^Les Huguenots^ and of ®Fides^^ in ^Le Prophete,^ her voice, a mezzo-soprano of three octaves, enabling her to make an artistic tri¬ umph presentation of the roles; and after her retirement from the stage she engaged as a vocal teacher and in composition, in which her work is of importance. It includes the oper¬ ettas '^Le Dernier Sorcier^ (1867) ; ^Trop de Femmes^ (1869), etc., in addition to about 60 vocal melodies and other compositions.

VIATICUM, a Latin word originally rnean-ing provision for a journey of some distin¬ guished person traveling on business for the state. The

usage has been extended in the Roman Catholic Church to signify the Euchar¬ ist administered to patients beyond hope of recovery.

VIATKA, ve-at'ka, Russia. See Vyatka.

VIAUD, Louis Marie Julien. See Loti,

Ptf.rre.

VIBERT, Jean Georges, zhofi zh5rzh ve-bar, French painter: b. Paris, 30 Sept. 1840; d. there, 28 July 1902. He studied under Barrias and Picot and exhibited at the Salon for the first time in 1863. His work was chiefly in oils, but he also possessed great skill in water-colors. His drawing was carefully accurate and he excelled as a technician, but his work is fre¬ quently marred by crude coloring. He founded the Societe des Aquarallistes Frangais, was awarded medals at the Salon in 1864-67-68 and in 1882 became an officer of the Legion of Honor. Among his best-known works are

ˆGulliver > (1870) ; ˆThe Grasshopper and the Antˆ (187.ˆ) ; Monseigneur's ˆAntechamberˆ (1876) ; ˆApotheosis of M. Thiersˆ 0878), *etc.* He wrote ˆLa Science de la peinturcˆ (1891). There are four good examples of this artist in the New York Metropolitan Museum of Art.

VIBORG, ve'borg, Finland. See Wiborg.

VIBRATION, the limited reciprocal or oscillatory motion of the particles of an elastic body or medium, in alternately opposite direc¬ tions from their positions of rest or equilib¬ rium. A complete vibration comprises a motion to and fro, but some French physicists measure it as a motion to or fro; hence the latter is one-half of the former. When vibrations are comparatively slow they are known as oscilla¬ tions, the term vibration being reserved for all the rapid reciprocal motions beyond the ability of the eye to follow. In rods or strings vibra¬ tions are distinguished as transverse, or longi¬ tudinal. The rate of transverse vibrations in rods is inversely proportional to the square of the length of the rod. When fixed at both ends, a rod vibrates in the same manner as a stretched string. When fixed at one end only it vibrates either as a whole or in segments. When bent into a U-shape, as is the case in the tuning fork, the rod divides into three vibrat¬ ing parts by two nodes near the base. The vibration of plates and discs has been exten¬ sively investigated, as in the manufacture of diaphragms for telephones, phonographs, *etc.* For the laws governing

these vibrations see textbooks in physics (sound). A vibrating bell follows the same law as a disc. The rate of vibration is directly proportional to the thick¬ ness andˆ inversely proportional to the square of the diameter. Rods vibrate longitudinally, either as a whole or in proportion to the num¬ bers, 2, 3, 4, *etc.* At the points of maximum vibration a rod suffers no change of density. Enclosed columns of air vibrate longitudinally, by alternate condensations and rarefactions. Free vibrations in air or gases proceed in straight lines from the point of disturbance. Forced vibrations, or vibrations modified by one another, or some other influence, produce circular or elliptical revolutions of the par¬ ticles of the liquid or medium disturbed. The eye does not note vibrations more rapid than about 20 to 40 per second, and the moving picture photographers take advantage of this, showing usually about 20 pictures per second, which appear as one picture, with moving fig¬ ures. In music, 16 per second is the lowest vibration the ear can note and 41,000 per second the highest. Our senses do not appreciate the vibrations above this until we come to a fre¬ quency of 370 million million when we begin to see rays of ultra red light. Beyond 833 million million vibrations the highest light, the ultra violet, begins to disappear. Another class of vibrations we recognize as electricity, another class as X-rays, another as N-rays, another as the medium through which wireless tel¬ egraphy takes place, and so on. Everything in nature vibrates ; everything has its rate of vibration. Heat is a matter of vibra¬ tion; where there is utter lack of vibra¬ tion we attain the theoretical absolute zero, for with all absence of motion there can be no heat. What limit there may be to

higher vibrations is not known, but it is claimed by oculists that the phenomena of Spiritualism, of telepathy and everything pertaining to a higher existence takes place within vibrations immensely ‘ higher than those we commonly experience and know about. The amplitude of a vibration is the maximum displacement of the -vibrating particle. The phase of a vibration is any designated portion of this displacement. The laws of vibration are the basis of modern theories

regarding sound, heat, light and elec¬ tricity. See these subjects as well as Waves AND Wave Motion.

VIBROSCOPE, an instrument invented by Duhamel for recording the vibrations of a tun¬ ing fork, by means of an attached style on a piece of smoked paper gummed around a cylin¬ der. The fork is made to vibrate and the cylinder turned, the style making a mark whose waves correspond to the number of vibrations in a second.

VIBURNUM, a large genus of shrubs, or small trees, of the honeysuckle family, indige¬ nous chiefly to the north temperate zone. Many species are cultivated for their orna¬ mental flowers and fruits. The branches and leaves are usually opposite, the latter never being compound, but are diversely toothed and lobed, and generally assume brilliant hues in autumn. Viburnums are easily grown, but gen¬ erally prefer a moist soil and sunny position, most of the American species living at the edges of open woodland. The most conspicuous of the genus both in flower and fruit are V. opulus, V. tomcntosimi and V. aJnifoliunv. The two former are the source of the garden snowballs (q.v.). Among the American viburnums is the oval-leaved V. dentatum, or arrow-wood, so called because the Indians made arrow-shafts out of its soft, light wood, as well as from that of several other species, such as V. molle. V. lentago is the sweet viburnum, sheep-berry or nanny-berry, an arborescent shrub keeping its oval, bluish-black drupes over winter. These fruits have a thin pulp and are edible, and although somewhat insipid are said to be palat¬ able after having been frozen. V. cassinoides is the early-flowering withe-rod, with gray ascending branches. Its leathery, rather dull-green, ovate leaves are sometimes used for what is called Appalachian tea. One of the commonest northeastern viburnums is the maple-leaved, or dock-mackie (V. acerifolium) , a pretty, spreading shrub growing under trees, with creamy plate-like cymes of flowers, fruits changing from red to dark blue, three-lobed maple-like leaves, which are downy beneath and assume dark purple shades in the fall. The thin bark of root and stem of the black haw (V. prunifoliuni) yields a diuretic and tonic drug. This shrub forms thickets with dense foliage, composed of finely serrulate, small, oval leaves, and bears numerous clusters of flowers, succeeded by blue-black and glaucous drupes.

The small ˆwayfaring tree® of Europe (V. lantana) is often cultivated and has elliptic foliage and bright-blue fruits, darkening to black. They are sweetish, mealy and muci¬ laginous, and are said to have been used as a remedy for diarrhoea and catarrh, and also for an ink. An inferior birdlime is extracted from the roots, and the acrid inner bark was used as

a vesicant. The young shoots furnish stems for tobacco-pipes. The American wayfaring tree is the hobble-bush (V. alnifolium) , with leaves that are nearly orbicular and turn to a deep wine-red in autumn, and handsome flowers hav¬ ing large, sterile ray-florets. It has long, flexuous, reddish branches, which are decumbent and are constantly tripping up pedestrians in the shady woods which it frequents. This fact explains the popular name. The American wayfaring tree is a companion of the white-rod except in its northerly quarters.

VICAR (from Latin vicarius, substituted, delegated), a representative, a vicegerent. The Pope of Rome is called by Roman Catholics the ˆAicar of Christ on earth.® A vicar-apostolic was formerly a bishop or archbishop of the Roman Catholic Church to whom the Pope delegated some of his jurisdiction, but the term now denotes a titular bishop in a country where episcopal sees have not yet been established, or where the succession has been interrupted. A vicar-forane is a priest ap¬ pointed by a bishop to exercise a limited juris¬ diction in a particular town or district. A bishop may appoint one or more vicars-general to assist him in the work of his diocese. A vicar-capitular is elected by the chapter of a diocese during the vacancy of the see, to hold the place of the bishop.

The term *vicar® as applied to a clergyman in charge of a parish originated in the appoint¬ ment by religious corporations of a priest to perform the pastoral duties of some benefice which had become their property. When the properties of the religious houses were trans¬ ferred to lay possession under Henry VIII the vicar became the deputy or religious represent¬ ative of the lay proprietor of the benefice, and his stipend was at the discretion of such pro¬ prietor. The vicar was and is inferior to the rector who has both the parsonage and the tithes. Parochial vicars are either perpetual, as in parishes, or temporary, the appointment of the latter being recalled at pleasure, or after a fixed time. In the Roman Catholic Church the designation is sometimes given in Europe to the assistant priest of a parish.

VICAR OF WAKEFIELD, The. <The Vicar of Wakefield; a Taleˆ by Oliver Gold¬ smith seems to have been begun during the year 1761 and was sold to a publisher in Octo¬ ber of the following year, but it remained in manuscript nearly four years, finally coming out in March 1766, when its author, thanks to ˆThe Travelerˆ (1764), was a more famous man than he had been in 1762. The Wicarˆ promptly became an English — and then a European — classic. Goethe thought it one of

the best novels ever written. A similar opinion has been agreed in by a long line of notable critics, even when so diverse as Henry James and Joel Chandler Harris. For the most part the book's charm resists analysis, but much can be ascribed to the mingled gayety and tender¬ ness with which Goldsmith therein recounts his own experiences. It is not merely that in the 20th chapter George Primrose, the ®philosophic vagabond,® claims adventures on the Continent which Goldsmith himself had had during his travels ; nor that the Vicar is studied in many respects from Goldsmith's father. It is rather that the characters so

often give utterance to Goldsmith's own mellow doctrines, and that the incidents so often re¬ flect his fresh and benign observations of life. Many passages fail to rise above conventional 18th-century prejudices : pretty notions about the state of nature and the natural man abound; the political ideas advanced are as often as not simply incredible; while the attitude of tne Primrose family toward Sir William Thornhill is of a snobbishness at which one cannot help wincing. Such matters must be classed with the ^^hundred faults® which Goldsmith ad¬ mitted ^^are in this Thing.® Doubtless he meant by ˆfaults® quite different matters, such as a certain aimlessness of structure and the absence of a high decorum, but these, if not now held to be actually the book's virtues, are yet understood to contribute to its principal charm — its easy movement of idyllic events recorded in language felicitously naive. The scene has, indeed, almost no ˆlocality® ; the purpose obtrudes itself evei'ywhere; the plot skirts melodrama at a dozen places ; not a few of the characters hint of the stage. The total effect, however, is of a reality which will not fade. Who that has read the story can pos¬ sibly forget Moses' purchase of the green spectacles or the family portrait which was too large to be hung? The tale is full of such episodes, as memorable as proverbs, hew books of the length present such a variety of life and such a sum of unsoured human wisdom. Perhaps its greatest triumph is that it reveals the most artless simplicity and virtue without either making fun of them or forgetting that the world at large is less apostolic than the Vicar's little realm. Irony, so rarely in the service of kindness, is here merely a method employed by one of the gentlest, best and quaintest of men in a novel which is as sincere and touching as a lyric.

Carl Van Doren.

VICE, Regulation of. The ˆsocial evil,® as prostitution is euphemistically termed, consti¬ tutes four-fifths of the so-callcd vice of modern life. Prostitution is defined as pro¬ miscuous unchastity for gain. It is not_ an evil peculiar to any age or country. It existed in ancient Babylon to a degree and kind almost beyond belief and in terrible forms was a part of the religious cults of the Syrians, Phrygians, Egyptians, *etc.* Similar rites were part of the idolatrous practices for which the Israelites ' were rebuked. In ancient Greece it was a matter of civic glory and prostitution was there taught as an art. Orgies took place in the baths and in the temples while the stage

reeked with obscenity. In the modern world we find the evil in every portion of the globe, in India, in Japan, in Hawaii and everywhere in pro¬ portion to our knowledge of the social life of a country's population. Although publicly con¬ demned to-day and with an ever-increasing number of the pure it is believed to be eating under the surface to a degree that comes nigh imperiling our modern civilization. It is con¬ servatively estimated that there are in the United States alone 600,000 public prostitutes and about an equal number who have sacrificed their chastity but continue to have other means of livelihood. Great cities and often the lesser cities are the homes of the prostitute, while

their male companions not only come from the cities but also from the towns and villages.

The social evil wears a specially sinister aspect in Great Britain because in no country do so many children become its victirns as in England; in no country does traffic in girls, especially that of minors, flourish as in England. On the Continent the vice is also especially prev¬ alent. German cities regulate vice as do also the Scandinavian cities. France also regulates the vice by means of registration. That country is a den of vice as can be attested by very many men of the American Expeditionary Forces. Of the evils connected with prostitution there is scarcely need to speak. Many sociologists are coming to believe that the sexual evil, in its various forms, is greater even than that of intemperance. It is considered a more constant and fundamental cause of degeneration than drunkenness. It certainly effects degeneration of a more or less pronounced type in a much larger number of persons. It persists almost to the end in the most degenerate stock, while it is at the same time operative among the healthier classes. Intemperance, however, is all but uni¬ versally the companion of prostitution. Many observers state that girls rarely can, and men rarely do, continue a fast life without drink. The saloon is often the entrance of the brothel, while the brothel as frequently leads to the saloon. An eminent authority has stated that more boys are converted to drinking habits in houses of ill fame than in the saloons. One of the great benefits of Prohibition in the United States will be the dissolution of this sinister partnership. The physical evils attendant on prostitution it is impossible to describe too strongly. These reduce youth to premature, helpless old age, transform the body into a rotten shell and affect not only the sinner but his posterity. One of the abominations of this evil is child prostitution, of the extent of which few have the remotest idea. If one is to credit the sad whispers of

grave officials of the Church as to the morals in boy choirs, or in private and public schools, one finds fearful evi¬ dence of the existence, in all ranks of society, of various forms of unnatural vice. Akin to this evil is that of the organized traffic in girls, which is declared to be world-wide. It has been publicly stated that ˆsyndicates exist ill New York and Boston for the purpose of supplying fresh yemng girls from immigrants arriving in the United States, for houses of ill fame ; agents of the business go abroad and assist in this nefarious traffic. Immigrants arriving in New York furnish 20,000 victims annually.® Much has been done by the Church and societies to protect these immigrants but the evil is still very real. When it is realized that the life of a prostitute is but five years, one can understand what a traffic there must be to recruit the 600,000 in the United States alone, not to speak of the other countries of the world in some of which the traffic is even greater.

Causes. — Destitution, inclination, seduction and drink are given as the causes of this evil in the order named. Economic necessity drives many to the haunts of vice. Stores, where girls work long hours for small pay ; the homes that have few comforts, and practically no pleasures; the streets, where girls are often cast, still unknown to sin, but in want and without

shelter; in a word, where distress and tempta¬ tion stand present as a menace to purity and rectitude. Behind every effect there is a cause ; in the case of prostitution, the real cause lies not in the girls who fall, but in the social con¬ ditions that make the fall easy, and the men who tempt to the step and furnish the money to support degradation after the step has been taken. The money returns from vice furnish a very great temptation to girls to part with their virtue. Some fall because they cannot find work; some because they do not wish to work. Prostitution costs a man money; to a woman it yields money and many a girl of indolent or lazy disposition, comely and healthy withal, soon learns that there is a market for such as she ; that she can earn more in a night by sin than she can in a week or a month by work. The stage, the concert hall, and the ball bear a large responsibility. The supreme social cause of prostitution to-day, however, is the crowded tenement, where boys and girls have no attractive home, no healthy playground and must play on the streets. There bad company captures more girls than in any other one way. The supreme cause then of the evil is the bad housing of the poor, resulting from low wages, and the poverty of_ the great masses in our cities — a terrible price to pay that a few may roll in wealth.

Regulation. — In the early ages of the race prostitution, not being considered an evil, was not legislated against; the one great iniquity being adultery on the part of the wife, who might thus foist an illegitimate heir on the property of her lord. The early Christian emperors were among the first to attempt repression of this social scourge. In the course of time the state took cognizance of the evil and set about its control. Licensing and regulation of brothels were among the earliest methods tried to con¬ trol prostitution. It is well to remember that its elimination was never contemplated, but it was desired to make of prostitutes a distinct class in the community and also to prevent dis¬ order in the brothel. From these mediaeval regulations have come the ˆsystems of control® which obtain in Europe to-day. In France the police register public prostitutes. There are recognized brothels of two classes — maisons de tolerance and maisons de passe. At the first-named class there is a weekly medical

examina¬ tion of the inmates, while all other registered prostitutes are required to present themselves for examination every two weeks at the public dispensaries. Those found diseased receive hospital treatment. There are also certain rules in regard to solicitation, etc.; the infraction of which incurs a penalty of imprisonment of from 14 days to one year. No cognizance of prostitu¬ tion is taken in the French criminal code. The penalties above stated being inflicted solely for breach of the rules or regulations, the major evil being ignored. The whole French pro¬ cedure is of doubtful legality.

In Germany the legal regulations are more explicit. While prostitution is not forbidden, women who practise it are liable to arrest unless they are under police control, that is, unless they have registered and have complied with the reflations of paragraph 361 of the code. In this way the police regulation of prostitution obtains legal sanction and the traffic is com¬ pletely under the police power. While these

regulations vary according to locality, they all include compulsory registration and weekly or bi-weekly examination. Brothels are absolutely illegal throughout the German Republic.

In Austria prostituiion is forbidden, yet the police are allowed to tolerate it under conditions and to regulate it and punish violation of these regulations. Procuration is a penal offense.

In Great Britain prostitution is regarded by the law in the light of a public nuisance. Vari¬ ous acts from 1755 on make it possible to deal with public brothels but it is generally left to the public to institute proceedings. Several cities have secured passage of special legisla¬ tion for the prevention of ˆfloitering for the purpose of prostitution or solicitation.® Fines and imprisonment for short terms are the penalties _ imposed. The defilement of girls under 13 is felony; the defilement of those from 13 to 16 is a misdemeanor punishable by two years' imprisonment. The procuration or at¬ tempted procuration of any girl or woman is also a misdemeanor and subject to a similar penalty.

The French system has been copied in Bel¬ gium, Russia, Hungary, Portuf 1 and Spain. Norway and Sweden follow in general the German plan, while Switzerland is divided be¬ tween the two. Throughout the English-speak¬ ing world the English system of moderate repression and comparative freedom obtains. All systems fail of their object. Prostitution to a greater or less extent prevails in all countries despite

regulations. In the United States at¬ tempts have been made at one time or another to introduce the registration system, but Saint Louis was the only large city which gave the system an extended trial. It was abandoned after four years of effort. The results proved an increase of 34 per cent in the number of brothels and of over 35 per cent in the number of registered women during the progress of the experiment. There was also an undoubted increase of clandestine prostitution. The per¬ centage of diseased women rose from 3.75 per cent in the first year of registration to over 6 per cent in the third year under the system. After a prolonged and embittered discussion the system was abandoned. The efforts to suppress houses of prostitution have also proved futile. In New York City, owing to the agitation con¬ ducted- by Dr. Parkhurst, hundreds of prosti¬ tutes were turned out of their houses and the places closed by the police. The parlor moralists considered this a triumph of morals. But the women were not rescued to virtue, nor were their male partners in vice so redeemed. Even if the women had been reclaimed, those men remained to seduce other women. The women, ousted from their regular places of abode, in¬ vaded the apartments of the upper middle class and the flats and tenements of those less well-to-do. In their former abodes they came little in contact with home life and childhood. Now they were scattered among the homes and children of the city. As well might we say of cases of smallpox that they should not be allowed in houses by themselves, and therefore scatter them around among homes. Similar results have followed ®moral crusades® in other American cities.

Most students of the problem would not now countenance the licensing or inspection of

houses of ill fame, since this confers the sanction of law upon the barbarous trade in women, but would simply, if they do not become too bold, permit them within certain limits by themselves and meanwhile fight the evil by raising the general moral standard of the community. The segregation system seems im¬ possible even if it were altogether desirable, which it is not. When vice is confined to a

specified district, the latter at once becomes notorious ; the thieving, lawless and seditious elements make it their rendezvous, and men fear to enter it because of the risk of identifica¬ tion. Since the income of its inhabitants must come from without, resort is had frequently to robbery, intimidation, blackmail, *etc.*

While all measures have failed, yet there is little^ hope in leaving the evil alone. Lack of restriction works no cure, as the experience of the London authorities amply testifies. Many believe that^ the evil is best reached through personal religious or ethical work, by raising the level of the standards o'f personal purity, and, above all, striving for an equal standard of morality for both men and women. On all sides it seems to be agreed that the existing dual standard of morality is, or will be, doomed, now_ that society, and especially the female portion of it, is becoming so keenly alive to its evils. Woman's increasing influence in political and economic fields is bound to be felt and her influence is assuredly for good. It is also felt that unless masculine morality is raised to a higher level, feminine morality may fall from the exalted position it has held so long, as it awakes to the full value of the fact that its purity is only playing into the hands of the impurity of the other sex. Many paths of reform have been mapped out, the chief of which are: (1) The movement started by those who believe that the purification of our social morals can only be attained by setting up for men the same high standard of chastity and purity of life as that which has been hitherto considered as binding only upon women of the protected and wife-supplying classes; (2) the course advocated by those who take an exactly opposite view, and who believe that the end is to be reached by some extension of sexual freedom to all classes of women. They regard the attempt to raise men up to that high level of morality hitherto reserved for women as a natural, impossibility or Utopian dream. They would lower the standard for women in order to bridge over the wide gulf which now exists between the average sensual man and the average chaste woman, 'and still more between the latter and the woman of the streets; (3) the views of those who avoid both these ex¬ tremes and advocate a middle course, viz., the reform of sexual morality through more liberal divorce laws. They believe that erring hu¬ manity ought to have the opportunity of re¬ trieving even its matrimonial mistakes and failures, and that the sacrifice of individuals to an absolute system is neither moral nor ex¬ pedient. To these are opposed a great number of religious bodies opposing divorce, and es¬ pecially the oldest of the Christian churches, which denies its adherents the right of divorce and urges the teaching of a more practical Christian morality as the best means of raising social standards. In the populous centres of America

prostitution, the drink evil, the pro¬

hibited drug traffic, and kindred evils have flourished because of systematic understandings between the proprietors of prohibited callings and the forces of law and order. To uncover these nefarious agreements investigations by private associations and by public officials have been instituted at frequent intervals. Of these the most sweeping were those made of the white-slave traffic in New York and Chicago.

Bibliography. — ˆHouse Reportsˆ (on White Slave Traffic, 61st . Congress, 2d Session, No. 47, Washington 1909) ; ˆSenate Documentsˆ (61st Congress, 3d Session, No. 702, ˆ ib. 1910) ; United States Immigration Commission, importing Women for Immoral Purposesˆ (in ˆSenate Documents,) 61st Congress, 2d Session, No. 196, Washington 1909) ; Chicago Vice Commission, ˆSocial Evil in Chicagoˆ (4th ed., Chicago 1912) ; Minneapolis Vice Commission, ˆReport to the Mayor) (Minneapolis 1911); New York Committee of Fourteen, ˆThe Social EviP (New York 1910) ; Committee, of Fifteen (New York), ˆThe Social EviP (2d ed., 1912) ; Kneeland, G. J., ˆCommercialized Prosti¬ tution in New York) (ib. 1913) ; Seligman, E. R. A., <The Social EviP (2d ed., 1912); Sanger, W. W., ˆHistory of Prostitution) (2d ed. New York 1895) ; Amos, W. F., ˆStatd Regulation of Viceˆ ; ˆComptes Rendus) of the International Conference (Brussels 1899) ; Fiaux, ˆLa prostitution en Belgiqueˆ ; Gibbon, E, ˆDecline and Fall of the Roman Empireˆ ; Sturmer, <Die Prostitution in Russland) ; Tar-nowsky, ˆLa prostitution) ; Zehnder, ˆDie Gefahren der Prostitution.) Consult also Bliss, W. D. P. (ed.), <The New Encyclopaedia of Social Reform) (New York 1910) ; Butler, J. E., ˆPersonal Reminiscences of a Great Crusadeˆ (1898) ; Marchant, James, ˆThe Master Problem) (New York 1917) ; Corbett-Smith, A., ˆThe Problem of the Nation) ; Flexner, Abraham, ˆProstitution in Europeˆ ; Martindale, L., <Under the Surface' ; Wilson, A., ˆSome Causes of Prostitution' ; also col¬ umns of the Shield, Vigilance, Prevention, and other periodicals.

VICE-ADMIRAL. See Admiral. VICE-CHANCELLOR. See Chancellor.

VICE-CONSUL. See Consul.

VICE-PRESIDENT. See President.

VICENTE, ve-sen'ta, Gil, Portuguese poet: b. 1470; d. after 1536. After studying juris¬ prudence at the University of Lisbon, he be¬ came

connected with the court and there was the official provider of dramatic entertainment. Spanish was then much used at the court, and in that language Vicente composed 10 entirely and 15 partly, of his 42 works. He thus be¬ came a figure also in Spanish literature, and many of his dramas were presented in Spain. These are, however, in their material chiefly Portuguese. They have been arranged as autos (miracle-plays), comedies, tragi-comedies and farces. The first class comprises 12 sacred works for performance at church festivals. Vicente's humor and abundant originality won for him the title of the Portuguese Plautus. He has been ranked with Camoens and Al-meida-Garrett among the poets of the literature. The best collected edition continues to be that of ˆFeio and Monteiro' (1834). Consult also Von Faber, ˆTeatro Espafiol anterior a Lope

de \ega^ (1832) ; Ochoa, ^Tesoro del Teatro EspahoP (1838); Quarterly Review, Vol. 79 (1846-47) ; Braga, ^Historia do theatre portii-guez no seciilo XVP (1870) ; De Oiiguella, ^Gil Vicente^ (1890).

VICENZA, ve-chent'za, Duke of. See Caulaincourt, Armand Augustin Louis de.

VICENZA, Italy, capital of a northern province of the same name, and an episcopal see, 40 miles west of Venice, beautifully situ¬ ated at the confluence of the Retrone with the Bacchiglione. It is surrounded by dry moats, now partly under cultivation, and by dilapidated walls. The city is well built, containing nu¬ merous fine mansions, many handsome streets and several elegant squares, among which the Piazza dei Signori, with its campanile, not more than 20 feet square and yet more than 300 feet in height, is conspicuous. The public buildings, though numerous, are somewhat monotonous, being almost all the work of Palladio, who was born here, or of scholars who imitated him. The most remarkable edifices are the Duomo, originally Gothic, but much injured by modern alterations ; the Basilica, or Palazzo della Ragione, an ancient Gothic building; the Pa¬ lazzo Prefetizzio, in a rich and fanciful Corin¬ thian style; the Teatro-Olimpico, regarded as the most curious if not the finest work of Pal¬ ladio ; the Museo Civico, the lyceum, a very large public library, and numerous hospitals. The manufactures are silk, v^oolen and linen tissues, leather, earthenware, hats, *etc.* There is a large trade in grain and wine. Vicenza is written Veneto in Italian, and in olden times, Vicentia; it was founded about a century before the Christian era, and became a Roman munic¬ ipal town. The province has an area of 1,056 square miles, with a population of about 518,- 238, or nearly 500 to the mile. The commercial population of the city is about 57,116.

VICEROY (French vice-roi; Latin, rex, a king), governor of a country or province rul¬ ing in the name and by the authority of a king; officer delegated by a sovereign to exercise regal authority in his name in a dependency; e.g., the lord-lieutenant of Ireland — wffio, however, is never officially so styled; the governor-gen¬ eral (or Viceroy) of India; the khedive (q.v.) (or Viceroy) of Egypt. Viceroy was the proper official designation of the governors of Naples, Spain and Peru, under the old Spanish mon¬ archy.

VICH, or VIQUE, vek, Spain, city of Catalonia, modern province of Gerona; on a hill-girt plain about .38 miles north of Barce¬ lona. Its cathedral, built about 1040, repaired and modernized about the end of the 18th century, is bold and sumptuous in the interior; and the Gothic cloisters are exceedingly rich and elegant. Corn, fruit and a poor wine are the products of the vicinity ; and the inhabitants are employed in weaving, and in manufacture of hats and paper. Vich, the Roman Ausa, was afterward called Ausona and Vicus Ausonensis, of the first part of which its present name is a cor¬ ruption. Pop. 13,000.

VICHY, ve-she, France, a town in the de¬ partment of the Abler, in a beautiful valley of the river of that name, 32 miles southeast of Moulins. It was once a place of strength and

has been celebrated since Roman times for its numerous thermal alkaline springs. There are about 40 springs in all. but the most important, 12 in number, belong to the government. The waters are drunk on the spot, are used for baths and about 2,500,000 gallons annually are bottled for export; and the salts obtained from them by evaporation are manufactured into lozenges. The temperature of the springs ranges from 59° to 106°, and the chief constitu¬ ent is bicarbonate of soda. The Vichy waters are efficacious in urinary and uterine affections, diabetes, rheumatism, gout, and similar disor¬ ders, The town is well provided with the usual accessories of a spa, and is a fashionable resort, annually visited by about 60,000 persons ; the permanent population (1918) is about 17,500.

VICKERS-MAXIM GUN. See Ordnance.

VICKSBURG, viks'berg, Miss., city, county-seat of Warren County, on the Mississippi River, a few miles below the mouth of the Yazoo River, and on the Alabama and Vicks¬ burg, the Vicksburg, Shreveport and Pacific and the Illinois Central railroads, about 45 miles west of Jackson, the capital and largest city of the State, and 230 miles northwest of New Orleans. The city has regular steamboat con¬ nections with all the important Mississippi River ports. It is in an agricultural region in which cotton is one of the principal products. It is on a high bluff overlooking the river, and the streets, though not broad, are regular, well-kept, and have a number of shade trees. The chief manufacturing establishments are cotton¬ seed-oil mills, planing mills, railroad shops, foundries, machine shops and an ice factory. In 1910 (government census) there were 47 manu¬ factories with a combined capital invested in plants of $1,235,743; and employing

1,433 per¬ sons, to whom were paid annually $695,000. The cost of raw material was $1,085,127 and the annual value of the product was $2,229,344. The city has an extensive trade in cotton and lumber products and general produce.

The principal public buildings are the gov¬ ernment building, the county courthouse, the Charity hospital, the churches and schools. The educational institutions are a public high school, Saint Aloysius College (R.C.), for boys. Cherry Street College (colored), founded in 1892, Saint Francis Xavier's Academy, public and parish schools for both races and school libraries. There is here a National cemetery which contains 16,727 graves, of which 12,723 are of unknown dead. The eight banks have a combined capital of about $1,000,000. There are two daily newspapers. The government is vested in a mayor and board of aldermen, con¬ sisting of eight members. Vicksburg was laid out as a city on the plantations of John Lane and William Vick. In 1840 it was incorpo¬ rated. It soon became a prominent distributing centre for the interior towns and a shipping point for the products of the plantations. It came into great prominence during the Civil War. The city suffered some damages in 1876, when the river cut through a neck of land. The government has since expended about $3,000,000 in efforts to divert the Yazoo River, and also to restore the harbor. Pop. 17,931.

VICKSBURG, Military Operations Against and Siege of. The advisability of

fortifying Vicksburg to aid in the closing of the Mississippi River was apparent to the Con¬ federates early in 1861, but not until after the fall of Fort Donelson, in Februarjˆ 1862, were any steps taken to garrison and fortify the place. Then General Bragg sent one regiment to oc¬ cupy it and in March guns and ammunition were sent from Pensacola. In April General Beaure¬ gard recommended that works should be con¬ structed on the bluffs commanding the river for 40 guns and that the place should be garrisoned by 3,000 men. Work was begun late in the month and six batteries had been completed by 18 May, on which day Commander S. P. Lee, commanding the advance of Farragut's fleet from New Orleans, appeared before the place and demanded its surrender, which was refused. Two days later Farragut arrived with additional vessels and transports carrying 1,500 men and a battery, under command of Gen. , Thomas Williams; a reconnaissance was made, Williams decided that his fo;;ce was too small to accomplish anything, upon which Farragut, with the greater part of his fleet returned to New Orleans, and Williams took his troops back to Baton Rouge. Upon his return to New Orleans, Farragut wˆas met by instructions from the Navy Department to clear the Mississippi, which, at the time, was obstructed only by the batteries of Vicksburg, A mortar flotilla of 16 vessels, each with a mortar, under Commander D. D. Porter, was started and reached Vicks¬ burg 20 June, and on the same day Farragut left Baton Rouge with three vessels of war and seven gunboats, carrying in all 106 guns, and a fleet of transports carrying ˆWilliams' brigade of 3,000 men and two batteries. Far¬ ragut reached Vicksburg on 25 June, andˆ Wil¬ liams' brigade was landed on the Louisiana shore, and with the assistance of 1,200 negro laborers began digging a canal across the penin¬ sula opposite the city. With his 106 guns and the 16 mortars of Porter, Farragut attacked the Confederate batteries, but they were so high, more than 200 feet above the river, that little or no damage was done them. At the time the place was held by Gen. Earl Van Dorn with 16,000 men, and 40 heavy guns were in position. Failing to silence the batteries, the mortar flo¬ tilla, with one vessel and two gunboats, were left below, and early on the morning of the 28th Farragut, with two vessels and five gunboats, ran the batteries. The firing lasted about two hours and his loss was 15 killed and 42 wounded. The damage to his fleet was not serious and he had inflicted no damage on the Confederate works. Meanwhile a Union fleet, under Capt. C. H. Davis, had descended the Mississippi and on 1 July joined Farragut above

Vicksburg. A sudden rise in the river de¬ stroyed the canal Williams was digging across the peninsula; he proposed to return to Baton Rouge and Farragut was expecting an order to return with him when, 15 July, a startling inci¬ dent took place. Early in the morning some light gunboats of Davis' flotilla had been sent up the Yazoo to obtain information of the Arkansas, an iron-plated ram known to be build¬ ing up that stream. The A/kansas was unex¬ pectedly encountered and the Union gunboats steamed back, closely followed by the Arkansas. But one of Farragut's vessels had steam up and the Confederate ram passed directly through

his entire fleet, delivering her saucy broadsides, and without injury proceeded to the shelter of the batteries of Vicksburg. Farragut was much chagrined and at once determined to run past the batteries that night and endeavor to de¬ stroy the ram in the passage. He passed the batteries with a loss of 20 killed and wounded, but did no damage to the Arkansas. On 20 July, Farragut received orders to return to New Orleans. He waited until Williams embarked his men and on the 27th started down the river, Davis on the same day going up the river to Helena. During the two months since the fleet had appeared before Vicksburg the Confeder¬ ates had but 22 killed and wounded and no material damage had been done to their bat¬ teries.

The next movement against Vicksburg was by General Grant, who, 2 Nov. 1862, moving from Corinth, Mississippi and Bolivar, Tenn., with 30,000 men drove the Confederatesˆ from Grand Junction and followed along the line of the Mississippi Central Railroad to attack Vicksburg from the rear. General Pemberton, commanding the Confederate forces, fell back behind the Tallahatchie and on the i3th Grant occupied Holly Springs and made it a depot of supplies. Another advance was made, Pem¬ berton fell back to Grenada and Grant halted south of Oxford until he could repajr the rail¬ roads in his rear, and while so engaged heard definitely that General McClernand had been given command of an independent expedition to start from Memphis and open the Mississippi, and for which McClernand had already organ¬ ized and sent some regiments to Memphis. Grant says : ®I doubted McClernand's fitness and I had good reason to believe that in fore¬ stalling him I was by no means giving offense to those whose authority to command was above both him and me.® So, to forestall Mc¬ Clernand, General Sherman, 8 December, was sent back to Memphis to take charge of the expedition which had been specially assigned to McClernand by the President and Secretary of War. Grant was about to advance from Ox¬ ford on Grenada when the

Confederate cavalry, under Forrest, broke up the lines of communi¬ cation in West Tennessee, and on the morning of 20 December Gen. Earl Van Dorn, at the head of 3,500 cavalry, dashed into Holly Springs, captured a greater part of the garrison and burned Grant's accumulated supplies. (See Holly Springs). These two raids compelled Grant to fall back, and Sherman was notified not to sail from Memphis, but he did not re¬ ceive the notification in time ; the day Holly Springs was captured he started from Memphis, with four divisions of 30,000 men, moved down the river, accompanied by Porter's fleet, and on the 29th assaulted Chickasaw Bluffs, on Yazoo River, and was repulsed with a loss of 1,213 killed and wounded and 563 missing. (See Chickasaw Bayou, or Bluffs, Battle of). General McClernand arrived at Memphis, after Sherman's departure, and following down the river assumed command and escorted by gun¬ boats, under Admiral Porter, ascended the Arkansas River and captured Fort Hindman (q.v.). On 18 December Grant had received orders from Washington to divide his com¬ mand into four army corps, with General Mc¬ Clernand to command one of them and to be

assigned to that part of the army which was to operate down the Mississippi. This ma¬ terially interfered with his plans, as he had put Sherman in command of the river expedition, so after falling back to Grand Junction, Grant decided to go down the Mississippi, unite a part of his forces with those under McClernand and assume command of the whole. The army was divided into four corps commanded by Generals McClernand, Sherman, McPherson and Hurlbut, and Grant now planned a new cam¬ paign to get below Vicksburg and operate from the south. McClernand's and Sherman's two corps were moved from the mouth of the Ar¬ kansas to Young's Point to cut a canal across the peninsula opposite Vicksburg, on very near the line followed by Williams, and by the aid of this canal it was hoped to get below Vicks¬ burg and land on the east bank of the Missis¬ sippi. The work was prosecuted from 22 January to 7 March 1863, much hard and ex¬ hausting labor being expended upon it, when there was a sudden rise in the river, the entire peninsula was flooded and work on the canal abandoned ; it was an admitted failure. An attempt was made to reach the Mississippi south of Vicksburg, from Lake Providence, La., 60 miles above the city, through Bayou Macon, the Tensas and Washita rivers into Red River and then up the Mississippi to Vicksburg. This project was abandoned at the end of March. Meanwhile efforts were being made to reach the high ground north of Vicksburg by cutting the levees at Yazoo Pass, nearly opposite Helena, Ark., and by way of the Coldwater and Talla¬ hatchie rivers gain the Yazoo River. A like movement was attempted through Steele's Bayou into Deer Creek, to reach the Sunflower River and through it the Yazoo above Snyder's Bluff. (See Yazoo Pass and Steele's Bayou Expeditions). All these efforts to flank the position on the right having failed Grant once more turned his attention to getting south of Vicksburg, by a series of bayous running from Milliken's Bend past Richmond to New Car¬ thage, and on 29 March McClernand was ordered to move his corps toward Richmond and New Carthage, with a view to making his way to the banks of the Mississippi below Vicksburg and the batteries at Warrenton and Grand Gulf. At the same time Grant suggested to Porter that the gunboats run past the Vicksburg batteries to attack those at (jrand Gulf and cover a land¬

ing in that vicinity. On the night of 16 April, Porter with eight gunboats, three transports with supplies and a number of barges filled with coal ran past the batteries, and although under fire for nearly two hours and struck many times the gunboats were uninjured. One of the transports was abandoned and burned by her commander and a coal barge was sunk. No one was killed and there were but a few wounded. On the night of the 22d six trans¬ ports protected by cotton bales, loaded with sup¬ plies, and having 12 barges in tow, loaded with rations, ran the batteries, five getting through more or less disabled, while one was sunk. Some of the barges were lost. By the 27th, Mc¬ Clernand's corps was all at Hard Times on the Mississippi below Vicksburg and McPher¬ son's was closing up. The plan was to have the nav}" silence the guns in (Jrand Gulf and to have as many men as possible ready to land

under cover of the fire of the navy and carry the works by storm. At 7 a m., 29 April, Porter with seven gunboats carrying 81 guns left his anchorage at Hard Times and steamed down the river, followed by transports and flat-boats carrying 10,000 men of McClernand's corps. Porter opened his' guns upon the Grand Gulf batteries about 8 a.m. and by 1.30 p.m. the Con¬ federate guns had not been silenced by the 2,500 shot thrown against them, and the fleet with¬ drew after a loss of 19 killed and 56 wounded. Grant now determined to move still farther down the river and flank Grand Gulf. Mc¬ Clernand landed his men at Hard Times and marched across the point opposite Grand Gulf and three miles down the river during the night, and Porter with his fleet of gunboats and trans¬ ports dropped down to the same point. Grant had heard of a good landing on the east bank of the river, and at daybreak of the 30th trans¬ ports and gunboats began ferrying the troops across to Bruinsburg, 10 miles below Grand Gulf and 32 in a straight line below Vicksburg; and at noon McClernand's four divisions of 18,000 men had been landed. At 4 p.m. Mc¬ Clernand pushed out 12 miles, fought the Con¬ federates next morning at Port Gibson (q.v.), defeated them and caused the abandonment of (Jrand Gulf. While Grant was crossing the river at Bruinsburg, Sherman whose corps had been left at Young's Point went up the Yazoo River with a division, accompanied by some of Porter's gunboats, and made a strong demon¬ stration on Snyder's Bluff, on the Yazoo, 12 miles above Vicksburg. On 3 May Grant rode into Grand Gulf. He says ; resolved to get below Vicksburg, unite with Banks against Port Hudson, make New Orleans a base and, with that base and Grand Gulf as a starting point move our combined forces against Vicksburg. Upon reaching Grand Gulf after reducing its batteries and fighting a battle, I

received a letter from Banks informing me that he could not be at Port Hudson under 10 days and then with only 15,000 men. The time was worth more than the reinforcements. I, therefore, de¬ termined to push into the interior of the enemy's country.® (See Port Hudson, Siege of). (Jrant advanced toward the rear of Vicksburg, de¬ feated the Confederates at Raymond (q.v.) 12 May; Jackson (q.v.) 14 May; and then marched vrestward on Vicksburg. The battle of Cham¬ pion's Hill (q.v.) was fought on 16 May, and General Pemberton, after his defeat, withdrew his army across Big Black River. Grant fol¬ lowed on the 17th. Pemberton tried to hold the bridge head on the east side of the stream, but his troops became demoralized and fell back across the bridge, losing 18 guns and 1,750 prisoners. Pemberton's troops on the west bank of the river covered the disorderly flight, enabling most of the troops on the east side to get over, and Pemberton ordered all his command to withdraw within the intrenched lines of Vicksburg. The fortified position at Snyder's Bluff on the Yazoo was abandoned and the garrison brought into the city, and the out¬ post at Warrenton, on the south, was drawn in. About 102 pieces of field artillery were also put in place around the exterior line of defense, which was about eight miles in length, and held by 19,000 effective men. On the river front were 40 heavy guns, with about 700 men. On

the 18th Grant closed in and on the right Sher¬ man occupied Haines' and Snyder's bluffs, and Grant established his base on the Yazoo River above Vicksburg. McPherson, on the left of Sherman, held ground on both sides of the Jackson road, and McClernand south of Mc¬ Pherson, extended toward Warrenton. The movement into position was accompanied by constant skirmishing, which continued during the morning of the 19th. From the fact that the Confederates had been defeated in several engagements and were so demoralized at the affair on the Big Black, Grant concluded that Pemberton^s entire force was so demoralized that it would yield to a vigorous attack and at 2 p.M, of the 19th ordered a general assault. Sherman on the right advanced and after hard fighting gained the ditch of the work near the Graveyard road, but could go no farther and was repulsed with a loss of 942 killed and wounded. McPherson and McClernand had over a mile to advance, and made part of it, under a heavy fire when darkness set in and they bivouacked. The next two days were spent in strengthening the position and in making roads in rear of the army to connect with its new base on the Yazoo River.

As Gen. J. E. Johnston was but 50 miles in Grant's rear collecting a force to assist Pember¬ ton, it seemed advisable to Grant that he should press matters and he ordered a general assault for the 22d. Earlv in the morning a furious cannonade was opened on the Confederate lines, in which Porter's fleet joined, and at 10 a.m. Grant's 40,000 men threw themselves against the 20,000 Confederates covered by intrenchments. As the leading columns went forward not a Confederate was to be seen, but when they had come within easy range the Con¬ federates rose up along the more than three miles of assault and delivered volley after vol¬ ley, striking down the heads of the assaulting columns, and at the same time the reserves ad¬ vanced and fired over the heads of those in the trenches. Every field gun double shotted with grape and canister joined in the defense. Sher¬ man and McPherson, in some places, reached the ditch of the Confederate works and planted their colors on the parapet, but in general the assault was repulsed and the troops fell back under shelter. On the left McClernand suc¬ ceeded in carrying a part of the

Confederate line, but its defenders from a line 100 yards in rear drove him out; but he maintained his position in the ditch and planted some of his colors on the parapet. At noon McClernand re¬ ported to Grant that he held the Confederate works and that support on the right would be followed by complete success, upon which Sherman and McPherson were both ordered to renew the assault. The assault failed. Grant says it only served to increase the casualties without giving any benefit whatever. The firing continued till dark, when the troops that had reached the Confederate works were with¬ drawn. The Union loss in this assault was 502 killed, 2,550 wounded and 147 missing. The Confederate loss was not over 500.

The result of the assault convinced Grant that Vicksburg could be taken only by siege, which was immediately begun. The investing line was 15 miles long, extending from Haines' Bluff to Vicksburg, thence to Warrenton on the

south. Artillery was put in commanding posi¬ tions, and rifle-pits and covered ways con¬ structed to connect the entire command by the shortest route. In no place were the opposing lines more than 600 yards apart, and the dis¬ tance was gradually reduced. The work was pushed forward as rapidly as possible, and when an advanced position was secured and covered from the fire of the enemy, the batteries were advanced. The work had steadily progressed from 23 May and by 25 June a sap had been run to the Confederate parapet and a mine ex¬ ploded just north of the Jackson road and a lodgment effected inside the works by two Union regiments, which, however, were driven out next day. Another mine was exploded on 1 July, but no attempt was made to take ad¬ vantage of it. Three other mines were ex¬ ploded at other points and by both sides, by which men were covered and killed and buried at the same time. The lines now were very close and the casualties on each side were from 10 to 100 every day. By 30 June Grant had re¬ ceived reinforcements raising his force to 71,- 000 men and he had in position 248 guns — 220 of which were field pieces and 28 heavy naval guns. A large part of the army was put under Sherman's command and disposed to re¬ sist the advance of General Johnston's army from Jackson to relieve Pemberton. By 1 July Grant's approaches were close up to the Con¬ federate works and at many points the ap¬ proaches had been pushed to within from five to 100 yards of the enemy and orders were given to make preparations for a general assault on the 6th. But Pemberton had concluded, after consultation with his division commanders, that it was best to surrender, as an assault was in¬ evitable and his men

too much enfeebled by hunger and constant duty to meet it, and on the 3d displayed white flags on his works and sent a note to Grant proposing an armistice to arrange terms of capitulation. Terms were agreed on and at 10 a.m. 4 July, the Con¬ federate troops marched out, each division in front of its works, stacked arms, laid their colors upon them and then returned toward the town, where they were subsequently paroled. The prisoners surrendered numbered 31,600, together with 172 pieces of artillery, 67 of which were siege guns, about 60,000 muskets and a large amount of ammunition.

Before the surrender had been completed on the 4th, Sherman, with 48,000 men, had been ordered to march against Johnston, who with oyer 30,000 men had advanced as far as the Big Black to relieve Pemberton. Johnston heard on the night of the 4th of Pemberton's surrender and next morning retreated to Jackson, closely pursued by Sherman who besieged Jackson and captured it. (See Jackson, Siege of). Grant's losses in his entire campaign from 30 April, and including Sherman's siege of Jackson, were 1,243 killed, 7,095 wounded and 535 missing. The Confederate losses in killed and wounded are not known, but in killed, wounded and captured they aggregated full 40,000 men. Consult ˆOfficial Recordsˆ (Vols. XV, XVH, XXH, XXIV, XXV, XXVH) ; Greene, <The Mississippiˆ ; Grant's ˆPersonal Memoirsˆ (Vol. I) ; Sherman's ˆMemoirsˆ (Vol. I) ; The Century Company's ˆBattles and Leaders of the Civil War> (Vols. H, HI).

E. A. Carman.

VICO, ve'ko, Francesco de, Italian astron¬ omer: b. Macerata, 19 May 1805; d. London, 15 Nov. 1848. He entered the Society of Jesus in 1823, studied and taught at the Roman College, in 1835 was appointed assistant, and in 1839 chief, of the observatory at Rome. A work by which he gained high reputation was a course of observations for the purpose of as¬ certaining the time of rotation of the planet Venus upon its own axis. He subsequently turned his attention toward the satellites and inner ring of Saturn, and also toward the nebulae, upon which he wrote some detailed re¬ ports. When the Jesuits were driven from Rome by the revolution of 1848, he went to England, and afterward came to the United States. He had accepted a proposal to become director of an observatory to be erected under his auspices in the State of New York, went to England to obtain the necessary instruments and died there.

VICO, Giambattista, or Giovanni Bat¬ tista, Italian jurist, philosopher and critic: b. Naples, 23 June 1668; d. 20 Jan. 1744. The son of a bookseller, he was educated by the Jesuits and afterward studied for the bar. Weak health prevented him from following his profession; and after nine years he obtained the chair of rhetoric in the University of Naples. In 1735 he was appointed historiog¬ rapher to the king of Naples. As he married early, and had a large family, his life was passed in poverty; and it was, moreover, embittered by family troubles, and by constant ill health. The great work which has made his name illustrious, the ˆPrincipi d'una Scienza nuova d'intorno alia comune natura delle nazioni,' anoeared 1725; but it was completely recast in an edition 1730, with the effect of making it more imposing as a system, at the expense of a great loss of clear¬ ness. A third edition, enlarged, was published shortly after the author's death. In the ˆ Sci¬ enza Nuova, ˆ Vico brought together, and at¬ tempted to fuse into a system, opinions which he had previously advanced in separate treatises. The slowness of the work in gaining its proper place in European literature must be attributed largely to its obscure and enigm.atical style. Much of the obscurity arises from an uncouth terminology, which the author often leaves un¬ explained, and (in the later and authoritative editions) from rigorous application of the de¬

ductive method to subjects which do not always admit of it. The ˆScienza Nuovaˆ was virtu¬ ally unknown out of Italy as late as 1822, when a German translation of it appeared at Leipzig.

It was, a few years later, translated into French (with some curtailment) by Michelet ˆPrincipes de la Philosophie de I'Histoire, traduits de la ˆScienza Nuova' de G. B. VicoU Paris 1827) ; and Vico has since found ˆ his proper rank among the most profound, original, and ingenious of modern thinkers.

The ˆScienza Nuovaˆ (De' Principj d'una Scienza Nuova d'intorno alia Comune Natura della NazioniU may be described as a ˆNovum Organumˆ of politico-historical knowledge. Ob¬ serving, amid the infinite variety of thoughts and actions, of language and manners, which the history of nations presents, a constant recur¬ rence of the same characteristics, and, in the political changes which peoples the furthest re¬ moved from each other in time and place have vol.28 — 5

passed through, an essential similarity of developm.ent, Vico proposed to himself the task of distinguishing amid social phenomena the regu¬ lar from the accidental ; of finding out the laws which govern the formation, the growth, and the decay of all societies; in fine, of tracing the outlines of the universal, the ideal history of society — the idea of which he himself believed to have existed from eternity in the mind of God. In doing this, he attempted, by historical criticism on the widest basis, to illustrate the interdependence of all the sciences; to show that the progress of each is related to that of all, and the progress of all of them depend¬ ent on, while also acting powerfully on, the general condition of society. While hold¬ ing that the actual state of every society is the result of a free development of the human fac¬ ulties, he attempted to give a historical demon¬ stration of the existence of a Divine Providence directing the career of nations, overruling the designs which men propose to themselves ; oper¬ ating, however, not by positive laws or arbitrary interferences, but by methods and expedients to which men freely resort — i.e., God's providen¬ tial governance of nations is not by continued miracle, but, like His rule over nature, by nat¬ ural laws. It has been said that the ˆScienza Nuovaˆ includes a system of social (as distin¬ guished from natural) theology — a demon¬ stration of God's government af the world, and of the laws in which that government consists. Vico, in these inquiries, accepted from Descartes the individual consciousness as one of the cri¬ teria of truth ; but he employed another also — the collective

consciousness, or the common sense of mankind — the accord of the race, as it may be gathered from history — in a word, authority.

It would be difficult to overrate the ingenuity and originality of many of the inquiries into which Vico was led by the attempt to delineate the ideal history of society; and he has rarely failed to express views rational and probable compared with those accepted among his con¬ temporaries. With admirable insight, he has not seldom hit on the conclusions to which in¬ creased social knowledge and more scientific conceptions have conducted inquirers in later generations. Thus, in clearing the ground for the foundation of his system, he was led to pre¬ cisely those views about Homer and the au¬ thorship of the Homeric poems which are popu¬ larly associated with the name of Wolf ; and to anticipate the general view of the credibility of early Roman history which was elaborated by Niebuhr. (See also Comte, the germs of many of whose speculations are in Vico). The be¬ ginnings of religion, the origin of poetry and language, the commencement of society (which he ascribes to the influence of a common reli¬ gious belief and worship), the foundation of the privileges of the heroic or aristocratic class, are among the earlier subjects of his speculation. He proceeds to trace the origin of jurisprudence, and to show how its development has been de¬ pendent on social changes ; and he afterward deduces from the history of ancient societies, and in some degree from the history of the governments which sprang out of the ruins of ;ffie Roman empire, the laws which govern the progress, the conservation, and the decay of nations. A monarchy, with an equality of civil and political rights as between subjects, was

his ideal of good government for advanced societies.

Vico's theory as to the law of cycles in his¬ tory — the movement being similar in different nations, and the path in successive periods also being similar through recurrence of the same forces — has been misunderstood as a positive denial of actual or possible advance. But he simply does not deal with the problem of the laws governing the advance of the race ; and his historic cycles may easily be conceived

of as fol¬ lowing each a path similar throughout to that of each preceding, yet with one continuous up¬ ward movement as with a slow spiral ascent. This law, however, he does not develop.

Though he ascribed to religion a paramount influence in forming and conserving society, and though it was one of his principal objects to demonstrate the divine government of the world, Vico did not escape the suspicion of hav¬ ing written in a spirit of hostility to religion. It was alleged that he had written so obscurely, as he often did, through the .fear of incurring ecclesiastical censures. Some critics of another school charged him, with at least equal plausi¬ bility, of having striven, both in his particular doctrines and in his consecration of the prin¬ ciple of authority, to satisfy the Roman Catho¬ lic Church. The cavils on either side are little deserving of attention ; and it is pleasant to know that Vico, though not unconcerned about the accusations against him, felt in his later years consoled for the many trials and disap¬ pointments of his life, by the completion of a work whose greatness he knew better than any of his contemporaries. In 1818 the Marquis de Villa Rosa published a collection of the whole of Vico's works, with a biography (2d ed., 1835). Vico's other works are ˆDe Ratione Studiorumˆ (1708) ; ˆDe Antiquissima Italorum Sapiential (1710) ; ˆDe Universi Juris Uno Principio et Fine Unoˆ (1720) ; ˆDe Constantia Jurisprudentsˆ (1721). There are also the French edition by Michelet, referred to above, and a German translation. Consult Flint, ˆVicoˆ (Edinburgh 1884) ; Ferrari, ˆVico et I'ltalieˆ (Paris 1839) ; Cantoni, 'ˆG. B. Vicoˆ (Turin 1867) ; Diendorfer, ˆGianbattista Vico und seine Ideenˆ (1877) ; Klemm, ˆG. B. Vico als Geschichtsphilosph und Vdlkerpsychology'

(1906).

VICTOR, Claude Perrin, Due de Belluno, marshal of France; b. La Marche, Vosges, 7 Dec. 1764; d. Paris, 1 March 1841. At 17 he enlisted in a regiment of artillery and served eight years as a common soldier. He re-en¬ listed in 1792, and for his conduct at the siege of Toulon in 1793 was made general of brigade. He served with distinction in the Italian cam¬ paigns, and Napoleon gave him the marshal's baton on the field of Friedland (1807), and later the title of Duke of Belluno. He com¬ manded the first army corps in Spain, 1808-12, and lost the battles of Talavera and Barrosa, and while commanding the Ninth corps in the fatal Russian campaign covered the crossing of the Berezina. He atterward lost the em¬ peror's favor by neglecting to occupy the bridge of Montereau-sur-Yonne, and

adopted the cause of the Bourbons, Louis XVHI giving him the command of the second division, and the presidency of the military commission ap¬ pointed to try such officers as had deserted to

Napoleon during the ˆTdiindred Days2ˆ He was Minister of War, 1821-23. His ˆMemoires Inedits ˆ was published in 1846.

VICTOR, Orville James, American author; b. Sandusky, Ohio, 23 Oct. 1827. He was graduated at the Theological Institute, Nor¬ walk, Ohio, in 1847, was on the editorial staff of the Sandusky Daily Register (1851-56), and of the Cosmopolitan Art Journal (1856-61). He edited several compilations and wrote ˆHistory of the Southern Rebellionˆ ; ˆHistory of American Conspiracies ˆ ; and popular biographies of John Paul Jones, Winfield Scott, Garibaldi and others. He died 17 March 1910.

VICTOR, the name of three popes, as fol¬ lows :

VICTOR I, Saint. He was of African birth and succeeded Saint Eleutberius as Pope about 190. He threatened to excommunicate all bishops refusing to accept the Roman compu¬ tation of Easter, but was dissuaded from this by Irenaeus. He was concerned in the Monachian controversy also, and excommunicated the Monachian leader, Theodotus. He was suc¬ ceeded by Saint Zephyrinus about 202.

VICTOR II (Gebhard, geb'hart). He was a son of a Count of Tollenstein and Hirschberg and became bishop of Eichstadt. His election to the pontificate in 1051 was opposed by his friend, the German emperor Henry HI, who did not wish to lose his counsels. He was noted for his zeal in suppression of vice and his opposition to simony. He was followed by Stephen X.

VICTOR III (Desiderius, des-i-de'ri-us). He belonged to the noble family of Benevento and early in life entered a Benedictine monastery in opposition to the wishes of his family. In 1058 he became abbot of Monte Cassino and the next year was made a cardinal. As papal vicar in southern Italy he conducted the negotiations between the Pope and the Normans in Sicily. He was elected to succeed Gregory VH, much against his will, and accepted the pontificate only after the lapse of a year. His pontificate lasted through six months of 1086 and 1087, but within this short period he closely followed out the policy of Gregory VH.

The title of Victor IV was assumed by two antipopes. Cardinal Gregorio Conti in 1138, and Cardinal Octavian, 1L59-62.

VICTOR AMADEUS I, am-a-de'us, king

of Sardinia. See Savoy, House of.

VICTOR AMADEUS II, king of Sar¬ dinia; b. 1726; d. 1796. He succeeded his father, Charles Emmanuel III, on the throne in 1773. He founded the Academy of Sciences at Turin and displayed much zeal for the welfare of his subjects. His hostility to the Revolution in France provoked a contest with that country, in the course of which Nice, Savoy and por¬ tions of Piedmont were secured by France.

VICTOR-AMADEUS II, Duke of Savoy; b. 14 May 1666; d. 31 Oct. 1732 (ruled 1675-1730) ; grandson of Victor-Amadeus I. He was an able prince and an energetic administrator. In 1684, Victor married Anne-Marie of Orleans, niece of Louis XIV, and daughter of Henri¬ etta of England ; but the overbearing insolence of the ˆGrand Monarque,> who forced him to persecute the Waldenses (q.v.), and arrogantlv

VICTOR EMMANUEL I

ordered him to contribute an auxiliary force to the French army, and give up the citadel of rurin, drove him into a league with Austria and Spain against France. In revenge, a French army under Catinat assailed Victor's dominions, and though he_ was reinforced by 4,000 Aus¬ trians under his relative, Prince Eugene, the allies were routed at Staffarda (Aug. 1690), and the victorious Catinat completed the reduc¬ tion of Savoy and Nice before the winter of 1691. The duke, aided by considerable rein¬ forcement from Austria and Spain, gallantly maintained the contest ; but a second and more disastrous defeat at Marsaglia (4 Oct. 1693), where he left 10,000 dead on the field, put almost the whole of Piedmont at the mercy of the French. The war, however, continued; the duke's obstinacy and almost romantic daring balancing Catinat's military genius ; till in 1695 Victor-Amadeus accepted favorable proposals of peace which detached Savoy from the grand alliance. In the war of the Spanish Succession, Victor took part with France (1700) and was appointed commander-in-chief of the com¬ bined armies of France and Spain; but though he was aided by the counsels of his old opponent Catinat, the Austrians, under his former ally Prince Eugene, defeated him at Chiari (Novem¬ ber 1701). In 1703 the tempting offers of Austria and Britain induced him to abandon France, and join the alliance against her. The French were routed by the duke and Prince Eugene under the walls at Turin, 7 Sept. 1706. In 1713 by the treaty of Utrecht, Duke Victor-Amadeus was rewarded by receiving the rest of Montferrat, Val-Sesia, Lomellino, and the island of Sicily, with the title of king; besides being acknowledged as heir to the Spanish throne, in case of the failure of the Bourbon dynasty. In 1720 Charles VI of Spain persuaded him to surrender Sicily in exchange for Sar¬ dinia — an exchange which in later times proved most fortunate for the House of Savoy. The latter portion of Victor's long reign was em¬ ployed in improving the administration, replen¬ ishing the exhausted treasury, encouraging agri¬ culture and industry, and advancing education. In 1730, the king abdicated in order to marry the Countess of San Sebastian, but attempting at her instigation in the following year to resume the crown, he was arrested and imprisoned, and soon afterward died. — His grandson Victor-Amadeus HI (ruled 1773-96) was compelled by

Napo¬ leon's victories to cede Savoy and Nice to the French republic.

VICTOR EMMANUEL I, king of Sar¬ dinia, son of Victor Amadeus (q.v.) : b. 24 July 1759; d. Moncalieri, Italy, 10 Jan. 1824. He succeeded to the throne on the abdication of his brother, Charles Emmanuel IV, 4 June 1802. His territories on the mainland were occupied by the French and he, therefore, resided at Cagliari until 1814, when his possessions were restored to him by the Congress of Vienna and the duchy of Genoa was added to his kingdom. He introduced various reactionary measures which resulted in a revolution and on 13 March 1821 he abdicated in favor of his brother Charles Felix.

VICTOR EMMANUEL II (Vittorio Emanuele, ve-t5're-5 a-man-oo-el'a) , king of Sardinia, 1849-61 and of Italy 1861-78: b. Turin, 14 March 1820; d. Rome, 9 Jan. 1878. He was

the eldest son of Charles Albert (q.v.), king of Sardinia, was trained in military science and in the campaign of 1848-49 against Austria was commander of a brigade. After the battle of Novara, Charles Albert abdicated in favor of his son, Victor Emmanuel, who thereupon be¬ came king of Sardinia, 23 March 1849. The new king soon showed himself faithful to the Con¬ stitution in his negotiations with Austria and finally received the title of the honest king {Re galantuomo) . With the aid of wise ministers, among whom was the celebrated Cavour, he regulated the finances, reorganized the army, secularized the Church property, gave a stimulus to trade and commerce and prepared his coun¬ try to assert its independence in an effort to unite Italy. To this end, and in order that Sar¬ dinia might claim to be a power in European politics, he sent 17,000 troops to the Crimea (1855) to fight with France and England against Russia. In the Congress of Paris (1856) Sardinia took part and her demands that Aus¬ tria should deal more leniently with the Italian provinces which she occupied were supported by France and England. Cavour also entered into an alliance with Napoleon HI when they met at Plombieres, securing France as an ally against Austria when that power invaded Piedmont 23 April 1859. Several of the Italian states having now declared in favor of Victor Emmanuel as their king, he took command of the army, and entered upon a campaign against Austria with Napoleon HI as his ally. After a series of en¬ gagements, ending with the victory of Ma¬ genta, he entered Milan with Napoleon III. The Austrians were routed and Lombardy an¬ nexed to Sardinia after the battle of Solferino, when suddenly Napoleon HI

closed the war by the Treaty of Villafranca 11 July 1859 which frustrated the hope of making a united Italy. The Italians declared their cause was betrayed by this treaty and Cavour, disheartened, retired for a time into Sv/itzerland. This period of gloom soon passed when Tuscany, Modena, Parma and the' Papal States declared for Vic¬ tor Emmanuel as their king. This was followed by the conquest and annexation of Sicily by Garibaldi ; and as the Sardinian king was now master of the peninsula, with the exception of Rome and Venetia, it was decreed by the Senate 5 May 1860 that he should receive the title of king of Italy. It had been a great personal loss to Victor Emmanuel when he was required to cede Nice and Savoy, the cradle of his family, to France; and the death of Count Cavour in 1861 was at once a grief to the king and some¬ thing that seemed, for the time, a national dis¬ aster. Yet, although deprived of his favorite minister, Victor Emmanuel gave constant aften-tion to the material interests of Italy, so that roads were constructed, the coinage was recast, tithes suppressed and the ecclesiastical estab¬ lishments placed under the control of theˆ state. Nor did he slacken his efforts to obtain the complete freedom of Italy from foreign occu¬ pation and in this he was greatly favored by 'circumstances. In the Austro-Prussian War in 1866 the Italian troops took the field in alliance with the latter power, and although checked at Custozza and Lissa, Victor Emmanuel received the cession of Venetia 7 Nov. 1866 as the re¬ sult of the Austrian defeat at Sadowa. Rome still remained in the hands of the papal

authorities, supported by France; but when the Franco-Prussian conflict began, in 1870, the French troops were withdrawn and on the 20th of September, Victor Emmanuel entered Rome, which became thenceforward the capital of Italy. The efforts of the king were now di¬ rected to the development of Italy and the maintenance of peace through a reconciliation with Austria and an alliance with Germany. His death produced profound sorrow through¬ out Italy, for he was beloved not less for his honest manliness of character than for the benefits which his courage and wisdom had conferred upon his

country. Consult Rufer, ˆKonig Victor EmanueP (1878) ; Godkin, ˆLife of Victor Emanuel IP (1879) ; Massari, ˆLa vita ed il regno di Vittorio Emanuele IP (1880) ; Capeletti, ˆStoria di Vittorio Emanuele II e del suo Regno ˆ (1894) ; Stillman, ˆThe Union of Italyˆ (1898).

VICTOR EMMANUEL III, king of Italy: b. Naples, 11 Nov. 1869. Hq succeeded to the throne, 29 July 1900, as a result of the assas¬ sination of King Humbert, his father (q.v.). As Prince of Naples he entered the army as sub-lieutenant in 1887, in 1890 became colonel and commander of the First Infantry at Naples, in 1892 major-general, in 1894 lieutenant-gen¬ eral, in 1897 commanding general at Naples. On 24 Oct. 1896 he was married to the Princess Helena (b. 1873), daughter of Prince Nicholas of Montenegro. They have four daughters, and an heir apparent. Prince Umberto, b. 15 Sept. 1904. The king is a fine numismatist and a ˆCorpus Nummorum Italicorumˆ began to appear under his direction in 1903. He was active in the command of Italian troops dur¬ ing the World War.. Consult Basletta, Witto-rio Emanuele HP (1901).

VICTORIA, vik-tori-a, queen of the United Kingdom of Great Britain and Ireland and empress of India : b Kensington Palace, London, 24 May 1819; d. Osborne, Isle of Wight, 22 Jan. 1901. She was the only child of Edward, Duke of Kent, fourth son of George HI. by Mary Louisa Victoria, youngest child of Francis Frederick Antony, Duke of Saxe-Coburg-Saalfeld and widow of Prince Ernest Charles -of Leiningen. On 24 June she was baptized by the names of Alexandrina Victoria. The reigning sovereign was George III, and there stood between her and the throne the Prince Regent, afterward George IV, the Duke of York, the Duke of Clarence, afterward William IV, and her father. On 23 Jan. 1820, her father died, only nine days after the death of George HI. The formal education of the princess began in 1824, her first teacher being Fraulein Lehzen, but from 1827 the chief direction of her studies was entrusted to the Rev. George Davys, after¬ ward bishop of Peterborough. On the death of George IV in June 1830 she became heir-presumptive to the throne. She was confirmed at the Chapel Royal, Saint James, 30 July 1835, and in May of the following year she first met her future husband. The death of her uncle, William IV, 20 June 1837, raised her to the throne, nearly a month after she had attained her majority. She elected to be known by the name of Victoria. The young queen, daughter of a Whig or even Radical father, held Whig

principles herself, and soon learned to place implicit confidence in

Melbourne, head of the Whig government, and to look to him for polit¬ ical guidance. For many years she was re¬ garded with somewhat unfriendly feelings by the Tories, but her chief favorite among the statesmen with whom she afterward came into contact was a Tory, or at least a Conservative, Benjamin Disraeli. She opened her first Parlia¬ ment, 20 Nov. 1837. Her coronation took place in Westminster Abbey, 28 June 1838.

On 15 Oct. 1839, Victoria was engaged to her cousin. Prince Albert, youngest son of the Duke of Saxe-Coburg, and on 10 Feb. 1840 their marriage was solemnized in the chapel of Saint James' Palace. In July of that year a bill was passed making Prince Albert regent in case the queen should not survive her first confinement, and on 21 November her first child, the Princess Royal, was born at Buck¬ ingham Palace. Melbourne was defeated in the House of Commons in 1841 on a vote of no confidence, and Parliament was dissolved. The Tories were triumphant at the polls, and Sir Robert Peel, whom the queen at first dis¬ trusted but soon learned to like, became Pre¬ mier. On 9 Nov. 1841 a male heir to the throne, afterward Edward VH, was born at Bucking¬ ham Palace. Victoria made her first visit to Scotland in September 1842, and in the follow¬ ing year she left Great Britain for the first time, to visit Louis Philippe at Eu and King Leopold at Brussels. When Peel in 1845 de¬ termined on the repeal of the corn-laws the queen gave him her whole-hearted support. Lord John Russell formed a ministry, with Lord Palmerston as Foreign Secretary, a posi¬ tion in which he gave her much anxiety. In 1848, the year of revolution, she made her first stay at Balmoral, which was afterward to be her residence during a large part of each year. She had already acquired Osborne, in the Isle of Wight (1844). She visited Ireland for the first time in 1849, and on that occasion the cove of Cork, where she landed, was renamed Queenstown in her honor. In 1848 and the three following years her dislike of Palmerston's foreign policy steadily increased, but in De¬ cember 1851, his wholly unwarranted approval of the coup d'etat in France caused Lord John Russel to remove him from office. During the period of the no-popery outcry which followed the re-establishment of Roman Catholic bishop¬ rics in England in 1850, the queen steadily dis¬ countenanced Protestant bigotry. Lord John Russell was defeated in 1852, and Lord Derby formed a new ministry with Disraeli as Chancel¬ lor of the Exchequer and leader of the lower House. Derby resigned in December, and at the queen's suggestion Lord Aberdeen formed a coalition ministry, including Palmerston and Russell. During the war with Russia (1854—56) the conduct of the queen won universal commendation. Early in 1855 Aberdeen was defeated on the question of the conduct of the

war, and the queen was reluctantly compelled to ask Palmerston to form a ministry. The Victoria Cross, for acts of conspicuous bravery in battle, was instituted at her instance in 1856. In 1857 Prince Albert was created Prince Con¬ sort by letters patent, and in the following year Palmerston was succeeded in the premiership by Lord Derby. Victoria interfered with excellent

VICTOR EMANUEL II

TKE YOUNG QUEEN VICTORIA (1840)

effect in the matter of the proclamation issued to her Indian subjects in 1858, and she created the new order of the Star of India the year following the Mutiny to reward native loyalty and eminent services in that country. The elec¬ tions of 1859 placed Derby in a minority and compelled her to accept another Palmerston-Russell ministry. She at once came into con¬ flict with them on the Italian question, in which her sympathies were with Austria. Distrust of the intentions of Napoleon III, which she fully shared, led to the foundation of the volunteer force in 1859, and in 1860 she formally inau¬ gurated the National Rifle Association at Wim¬ bledon.

On 16 March 1861, her mother died, and on 14 December of the same year she suffered her crowning affliction, the death of her husband, a bereavement which altered the whole tenor of her life. For many years she lived in almost uninterrupted seclusion, and only toward the very end of her reign did she return to any¬ thing like the court system of her married life.

The war between Prussia and Denmark caused her keen anxiety, her sympathies on the whole being with Prussia, while the wife of her eldest son was a Danish princess. The death of Palmerston in 1865 raised Lord John (now Earl) Russell to the premiership, and the con¬ sequent rearrangement of portfolios made W. E. Gladstone Chancellor of the Exchequer. This in¬ stitution of the Albert Medal in 1866 for bravery in rescuing at sea showed at once her devotion to her husband's memory and her quick human sympathy. The war between Prussia and Aus¬ tria was a severe trial to her, because she had near relatives on both sides, and her satisfac¬ tion at the aggrandizement of Prussia was qualified by regret at other results of the war. Earl Russell's defeat on the reform bill led to his resignation in 1866, and a Derby-Disraeli ministry came into power. Disraeli had her active support in carrying his reform bill, which was congenial to her Whig principles. On Derby's resignation in 1868 Disraeli became Prime Minister, but his defeat on Gladstone's Irish Church resolution led to a dissolution. The electors gave the Liberals a large majority, and in December 1868 Gladstone became Pre¬ mier and inaugurated a

succession of reforms which she regarded with some alarm. With Gladstone she was never in sympathy. Recog¬ nizing, however, that Irish disestablishment was inevitable, she used her influence with Arch¬ bishop Tait to secure the passage of the bill through the House of Lords. Cardwell's im¬ portant army reforms were distasteful to her, for she always tried to retain control of the army as a royal prerogative.

The dissolution of 1874 placed the Conserva¬ tives under Disraeli in power, much to the sat¬ isfaction of the queen ; and in 1876 the Royal Titles Bill, conferring upon her the additional title of empress of India, was passed. The passing of this bill may be taken as marking the formal beginning of the movement known as Imperialism, with which Queen Victoria was from the first in hearty sympathy. Disraeli was rewarded for his services by being raised to the upper House as Earl of Beaconsfield, and the new regime in India was signalized by the in¬ stitution in 1877 of the Orders of the Indian Empire and the Crown of India. Gladstone's

passionate denunciations of Beaconsfield's East¬ ern policy and of his aggressive imperialism in other parts of the world during the years 1876-79 were extremely distasteful to the queen, and his return to power after the overwhelming Liberal triumph of 1880 was far from welcome to her. She disapproved strongly of the action of her ministers in regard to the Transvaal in 1881, and during the Egyptian and Sudan troubles of 1882-ˆ5, which culminated in the unhappy fate of the brave Gordon, she never ceased to urge strong action upon her advisers. The negotiations which led to the passing of the franchise and redistribution acts of 1884 and 1885 were much aided by her influence and tact. Gladstone was defeated in June 1885, and Salis¬ bury came into office ; but in the following January she had to recall Gladstone. She was strongly opposed to the Home Rule policy which Gladstone now adopted, and was greatly re¬ lieved by its defeat in the Commons and at the polls, and by the return of Salisbury to power

(1886).

The completion of the 50th year of Vic¬ toria's reign, in 1887, was celebrated throughout all her dominions with appropriate splendor and rejoicing, and her diamond jubilee in 1897 called forth even more striking demonstrations of loyalty and respect.

The general election of 1892 placed Glad¬ stone again in power, and once more the queen had to face the question of Home Rule, but she was relieved by the rejection of the 1893 billˆ in the House of Lords. In 1894, Gladstone resigned, and the queen summoned the Earl of Rosebery to the head of the government. The Liberal government fell in 1895, and the queen again asked Salisbury to form a ministry. He remained in power during the rest of her reign. On 23 Sept. 1896 her reign exceeded in length that of George HI, till then the longest in Eng¬ lish history. When Gladstone died in 1898 she expressed sympathy with his family, but she made no pretense of admiration for his public policy and achievements. The South African War (q.v.), which began in October 1899, caused her much anxiety and pain and called forth her former enthusiasm for the army and her old sympathy with suffering. She sent boxes of chocolate to the troops at the front at Christmas, 1899, and in recognition of the bravery of Irish soldiers in the field she con¬ ceded the permission to wear the shamrock in the army on Saint Patrick's Day, and ordered the formation of a regiment of Irish Guards. She visited Ireland in 1900, after an absence of nearly 40 years.

During the last few years of her life she suffered from rheumatism, failing eyesight and a tendency to aphasia. On 15 Jan. 1901 she drove out for the last time, and from that day gradually sank till the 22d, when she peacefully passed away at 6.30 p.m. in the presence of all her surviving children except her eldest daugh¬ ter, who was slowly dying in Germany. Her reign of 63 years, seven months and two days is the longest in English history, and she out¬ lived all previous British sovereigns, being at her death three days older than George HI. Her remains rest in a sarcophagus in Frogmore mausoleum, beside those of her husband. Dur¬ ing the later years of her life she spent much of her time abroad and at Balmoral and

Osborne, and never remained in London for any length of time. Several attempts were made upon her life at various times, but none of them was of any significance or importance. In 1868 she issued ˆLeaves from the Journal of our Life in the Highlands,ˆ and in 1883 ˆMore Leavesˆ — both being very unpretentious little works corresponding with their titles. She also supervised the publication (1868) of ˆThe Early Years of His Royal Highness, the Prince Consort,ˆ and in 1874-80 supervised another life of her late husband.

To Queen Victoria and Prince Albert were born four sons and five daughters : Victoria Adelaide Maria Louisa, Princess Royal, born 21 Nov. 1840, married 25 Jan. 1858, Frederick, afterward king of Prussia and German em¬ peror, died 5 Aug. 1901 ; Albert Edward, after¬ ward Edward VH, born 9 Nov. 1841, married 10 March 1863, Princess Alexandra Caroline Marie Charlotte Louisa Julia, eldest daughter of King Christian IX of Denmark, died 6 May 1910; Alice Maud Mary, born 25 April 1843, married 1 July 1862, the Grand Duke of Hesse, died 14 Dec. 1878; Alfred Ernest, Duke of Edinburgh, born 6 Aug. 1844, married 23 Jan. 1874, the Grand Duchess Marie of Russia, be¬ came Duke of Saxe-Coburg 22 Aug. 1893, died

30 July 1900; Helen Augusta Victoria, born 25 May 1846, married 5 July 1866, Prince Frederick Christian of Scheswig-Holstein, died 28 Oct. 1917; Louise Caroline Alberta, born 18 March 1848, married 21 March 1871, the Marquis of Lome, afterward Duke of Argyle; Arthur Wil¬ liam Patrick Albert, Duke of Connaught, born 1 May 1850, married 13 March 1879, Princess Louise Margaret Alexandra Victoria Agnes of Prussia; Leopold, Duke of Albany, born 7 April 1853, married 27 April 1882, Princess Helen of Waldeck, died 28 March 1884; Beatrice Mary Victoria Feodore, born 14 April 1857, married 23 July 1885, Prince Henry Maurice of Batten-berg. Six of the queen’s children survived her, and of the nine all but the Duchess of Argyle had issue. At the time of her death she had

31 grandchildren, and of her great-grand¬ children there were 37.

Bibliography. — Biographies and sketches of Queen Victoria in great numbers are accessible everywhere. Among them may be mentioned Arnold, Wictoria, Queen and Empress: the Sixty Yearsˆ (1897) ; Benson, A. C., and Esher, Viscount, ˆLetters of Queen Victoriaˆ (1837-

ˆ1; 1908); Esher, ˆGirlhood of Queen Victoriaˆ (1912) ; Gurney, ˆChildhood of Queen Victoriaˆ (1901) ; Holmes, ˆ Queen Victoriaˆ (1901) ; the series by Clare Jerrold, ˆ Girlhood,ˆ ˆEarly Court,ˆ ˆMarried Lifeˆ (1912) and ˆ Widowhoodˆ (1916) ; the excellent ˆLifeˆ by Sir Sidney Lee (1903); Martin, ˆQueen Vic¬ toria as I Knew Herˆ (1908) ; Tooley, ˆPer¬ sonal Life of Queen Victoriaˆ (1897). Consult also the ˆGreville Memoirsˆ and the other polit¬ ical memoirs of the reign.

VICTORIA, vek-t5’re-a, Guadalupe (Juan Felix Fernandez), Mexican general and poli¬ tician: b. Durango, 1789; d. Porote, 21 March 1843. An ardent patriot he took part in the war for independence and changed his name to Guadalupe Victoria to commemorate a victory over the Spanish forces. He aided in the over¬ throw of Iturbide in 1823, was a member of the provisional government from March 1823 to

October 1824, was the Federalist candidate for the Presidency and became the first President of the Mexican republic 10 Oct. 1824. Civil war broke out in 1828, but he retained his office till the expiration of his term, 1 April 1829.

VICTORIA, in Roman mythology the god¬ dess of victory, identical with the Greek (see Nike). There was a temple in early times on the Palatine, on the site of which a new one was dedicated during the Samnite wars (294 B.C.). She was represented with wings, crowned with laurel and holding the branch of a palm tree in her hand.

VICTORIA, Australia, the southeastern state extending between lat. 34° and 39° S., and long, 141° and 150° E. It is bounded on the northeast by New South Wales; on the west by South Australia, the boundary elsewhere being the ocean; Bass Strait on the south separates it from Tasmania; area, 87,884 square miles. The greatest dimension is east and west, 480 miles. The principal cities are Melbourne, Ballarat, Bendigo and Geelong.

Topography. — The coast both at the eastern and western extremities is low and flat, and with few indentations, but in the centre, be¬ tween Cape Otway and Wilson Promontory, it is broken by large bays and skirted by perpen¬ dicular cliffs 500 to 1,000 feet in height. Among these natural harbors the most remarkable is Port Philip Bay, which, with an area of 875 square miles, and an entrance scarcely two miles wide, affords a safe shelter for the largest fleet. The entire

seaboard, which has a southern as¬ pect, is about 600 geographical miles in extent. The interior, though somewhat diversified by mountains, is chiefly distinguished by vast un¬ wooded plans, so that it has been said the plow might often be drawn continuously for 100 miles across tracts of agricultural land. The land, however, is chiefly occupied as pasture, for which it is best adapted. There are two princi¬ pal ranges of mountains near the opposite ex¬ tremities of the state. The eastern range, known as the Australian Alps, enters the state from New South Wales, where it runs south parallel to the coast. On entering Victoria it proceeds southwest, with diminishing height, to the coast at Wilson Promontory. This range has numerous ramifications north and west, covering an area estimated at 7,000 square miles. In Mount Bogong it rises to the height of 6,508 feet, in Mount Hotham to that of 6,100 and there are several other summits over 5,000 feet high. The western range, called the Gram¬ pians, lies in a direction roughly north and south, including the Sierra range on the east and the western or Victoria range, with their nucleus in Mount William (3,827 feet), at the northwest extremity of Ripon County. The Grampians and Australian Alps are distinctly connected by such ranges as the Pyrenees and the Great Dividing Range, and their united sys¬ temˆ forms a continuous watershed, sending the drainage north to the Murray or south to the ocean. The whole system has an extent east to west of about 300 miles, with breadths vary¬ ing from 100 to 150 miles, and numerous cones and extinct (apparently submarine) craters, and is composed of metamorphic rocks of granite, syenite, quartz, etc., overlain by secondary and tertiary formations. This is the region of the gold-fields.

Hydrography. — The rivers are numerous, but seldom large. In the rainy season they overflow their banks, and in summer they dry up and leave the country parched. This is the great climatic disadvantage of Victoria. The most important river is the Murray, which from its source in the eastern mountains forms the boundary between Victoria and New South Wales, deriving most of its waters from the latter and skirting the whole state in a northwestern direction, finally flowing through South Australia into Lake Alexandrina. Its length is 1,700 miles, and it is navigable for several hundred miles. Another short naviga¬ ble river is the Yarra-Yarra, on which, at its entrance into Port Philip Bay, Melbourne, the capital, is situated. Most of the other principal rivers are tributaries of the Murray, except the Snowy, which crosses the east part of the state. Lakes are numerous, but are small and liable to dry up, and often salt.

Climate and Natural Products. — The cli¬ mate of Victoria is temperate and salubrious, but liable to sudden fluctuations, and the hot winds from the interior which blow at intervals from November to February cause great discomfort. The annual fall of rain at Melbourne is 27 inches. (For the chief animal and vegetable products native to the colony, see Australia). Some of the common English quadrupeds and birds have been introduced, such as hares, rab¬ bits, deer (foreign as well as English), goats, pheasants, quails, white swans, partridges, ducks, thrushes, larks, etc., and are now be¬ coming quite plentiful. Rabbits have become so numerous in some localities as to prove a nui¬ sance. Victoria has a valuable asset in its for¬ ests, now under government management. The annual cut is about $9,000,000 in value.

Agriculture. — Besides wheat, barley and oats, fruits, and especially the vine, receive at¬ tention. C)r the 4,000,000 acres under culti¬ vation, fully 2,000,000 are under wheat. Vic¬ toria promises to become a great wine country. Tobacco is also growing into a staple. Much money has been expended on irrigation and other waterworks. Sheep-farming, however, is the chief agricultural industry, together with horse and cattle breeding.

Industries, Commerce, *etc.* — The chief mineral production is gold, which was discov¬ ered in 1851. The gold discoveries were im¬ portant not only to the then colony but to the world at large, as they made Australia for a time the chief source of supply. In 1852 the yield of gold in Victoria was 2,218,782 ounces, valued at $44,375,640; in 1856 the yield was 2,985,991 ounces, valued at $59,719,720. In 1900 the total yield of gold was 807,407 ounces, of the value of $16,148,140; since then the produc¬ tion has steadily reduced, being in 1918 about $5,000,000 in value. (See Gold). Silver, tin, antimony, iron, limestone, granite and coal are also among the minerals worked. The antimony product has increased both in quantity and value, totaling over $400,000 in 1917. Half a million tons of coal are mined annually, valued at about $3 a ton. The staple product, however, is wool. In 1869 the value of the wool ex¬ ported was $16,815,375; in recent years it has l)een as high as $30,000,000. The livestock re¬ ports of 1917 showed 12,577,000 sheep, 1,175,000 cattle and 515,000 horses. The total value of

Victorian produce exported in 1868 was $58,- 489,465; in 1883, $66,461,470; in 1900, $87,112,- 760; in 1917, $95,000,000. The primary produc¬ tion in 1915 was $175,000,000 and with the manu¬ factured value was over $100,000,000. The im¬ ports, in 1886, amounted to $91,652,875; in 1900 to $91,509,055, and in 1917 to $128,000,000. A very large proportion of the trade is direct with Great Britain. Manufacturing increases, there being in 1916 5,445 factories, employing 117,000 persons, with a capital investment of $71,000,000. Nearly all the vessels dock at Melbourne, where the annual clearances are about 7,000,000 tons.

Government, Finance, *etc.* — Victoria is di¬ vided into five districts and these into 37 coun¬ ties. The districts are Gippsland, Murray, Wim-mera, Loddon and Western. The executive is vested in the governor, who is also commander-in-chief of the state troops and is assisted by a ministry of 11 members. He is appointed by the Crown for six years and has a salary of £5,000. The legislative authority is vested in a Parliament of two chambers, the legislative council and the legislative assembly. The legis¬ lative council at present consists of 34 mem¬ bers, representing 14 provinces and holding office for six years. The legislative assembly has 65 members, representing electoral districts, and is elected triennially. Members are paid $1,500 a year in reimbursement of their ex¬ penses. A property qualification is required both for members and electors of the legislative council ; the members of the legislative assem¬ bly are elected by universal

suffrage. The rev¬ enue of Victoria amounted in the year 1917 to $59,000,000. The chief item ot expenditure is railways and public works and there is a debt, contracted chiefly on account of these, amount¬ ing in 1917 to $380;000,000. In the year 1917, Victoria had 4,176 miles of railway opened, all belonging to the government of the state; 112,- 000,000 passengers were carried in the year and 5,963,000 tons of freight. The principal lines connect the leading towns, Melbourne, Gee¬ long, Ballarat and Bendigo. There is telegraphic communication with the other Australian states and with England. There is a branch of the Royal Mint in Melbourne, where gold has been coined since 1872 and silver since January 1916. The 17 banks of the state have 682 branches and assets in 1916 of $317,000,000. The post-office and other savings banks had total deposits in 1917 of $141,6(K),000. The govern¬ ment of Victoria is protective and gives bonuses on manufactures, which have consequently made some progress. The breweries, tanneries, soap and candle works, woolen mills and meat-pre¬ serving establishments may especially be men¬ tioned. There are numerous minor manufac¬ tures for the supply of local wants. Among re¬ ligious sects the Church of England is most largely represented in Victoria, the Roman Catholic next and the Presbyterians third. At¬ tendance at school is compulsory in Victoria between the ages of 6 and 14, the attendance to amount to 40 days in each quarter-year. In the state school, education is free in certain subjects and compulsory with certain excep¬ tions. There are several colleges connected with various religious denominations, besides the Melbourne University. The number of techni¬ cal schools is increasing.

History. — Little was known of this part of Australia at the end of the 18th century. In 1802, Port Philip Bay was explored and the country and bay were taken possession of for Great Britain, the name being given in honor of Captain Phillip, governor of New South Wales. A convict settlement was established the following year at Port Phillip, but was trans¬ ferred to Tasmania (then called Van Diemen's Land) in a few months. Victoria was first colonized in 1834 and 1835 from Tasmania, after one or two other unsuccessful attempts from other quarters. It now made rapid progress, especially in breeding sheep, of which in 10 years it had 1,500,000. The population in 1846 amounted to 32,879. Melbourne had already become a municipality; in 1847 it was made a city and by 1850 the population numbered over 76,000. But the turning-point in its fortunes was the discovery of gold, which caused a rush of population from all parts. Hitherto it had been known as Port Phillip and formed part of the colony of New South' Wales, but it was now erected into a separate colony under the name of Victoria. The present system of re¬ sponsible government was introduced in 1856 and in that year also the first line of railway (Melbourne to Sandridge) was opened. Ballot voting dates from 1856, and in 1857 manhood suffrage became the basis of election for the lower house. International exhibitions are held in Melbourne usually every decade. The colony suffered much during the commercial depres¬ sion of the early nineties of the last centur>% when several banks suspended payment. The act establishing free, secular and compulsory education was passed in 1873. An income-tax law came into force in 1895. A very advanced Factories and Shops Act was passed in 1896 and an additional one followed in 1900. These provide for the fixing of minimum rates of wages. Woman suffrage was adopted in 1908 and old-age pensions in 1909. Pop. (1911) 1,315,551; (1918, estimated) 1,405,000. Of these, in 1911 577,053 were breadwinners and 60 per cent lived in towns and cities. Consult Ban-now, <The Colony of Victoriaˆ (1897) ; McCoy, Wictoria and Its Metropolisˆ (1889) ; Turner, H. G., ˆHistory of the Colony of Victoriaˆ (London 1904) ; Gregory, J. W., ˆGeography of Victoriaˆ (Melbourne 1907), and government reports. See Australia; Melbourne.

VICTORIA, vek-to're-a, Brazil, a fortified town and seaport, capital of the state of Espirito Santo, situated on the bay of Espirito Santo, 275 miles northeast by east of Rio de Janeiro. The town is regularly built and has fine streets and some striking buildings. A Jesuit college,

founded in 1551, is used as the government palace. Victoria comes next to Santos and Rio as a coffee-exporting port. It is one of the oldest Portuguese establishments in Brazil and succeeded the town of Espirito Santo, which was founded in 1535, a short dis¬ tance to the east-southeast, and was soon after¬ ward transferred to a neighboring island. Pop. about 13,000.

VICTORIA, Canada, a city on Vancouver Island, capital of British Columbia, located on the Strait of Juan de Fuca, at the southeast end of the island. It is an industrial centre and also a beautiful residential city.

Railway and Steamship Connections. — The

Canadian Pacific Navigation Company, the Victoria and Sydney Railway and the Esqui¬ mau and Nanaimo Railway are important fac¬ tors in the passenger and freight traffic of Vic¬ toria, while the Canadian Pacific steamers to China, Japan and Australia make it a port of call. There is also connection with Vancouver, the Puget Sound ports, San Francisco, the Fraser River ports and Alaska and ports in the Far East. The harbor was much improved in 1916 and 1917.

Agriculture. — The increase in home pro¬ duction in 1911 over 1910 amounted to $7,242,- 938; the estimated value of agricultural prod¬ ucts, including livestock, in 1911, being $21,641,- 928.44, whilst in 1910 the figures, were $14,398,- 900. The following figures are for 1911: Livestock, $3,648,512; dairy products, $4,280,462; meats, $743,017 ; fruits and vegetables, $5,084,- 241 ; eggs and honey, $290,285 ; miscellaneous : grain, hops, nursery stock, $7,595,411. The esti¬ mated totals for 1918 are fully 50 per cent greater.

Industries. — Victoria has certain contribu¬ tory interests, such as lumber, mining^ salmon¬ canning ‘and deep-sea fishing, which keep it to the front in a commercial sense. Its port is the first one reached by ocean vessels and the shipping business of the island naturally finds its centre there as well as a considerable and increasing shipbuilding interest. During the year the vessels arriving an^ departing number 4,000. The starting of the Esquimalt dry-dock in 1880 and the maintenance of that suburb as one of the great British naval stations and as the fortified headquarters of the Pacific squad¬ ron until recent changes helped greatly in building up the prosperity and stability of the city. Among the business interests and indus¬ tries are immense warehouses and docks, ship¬ building, hardware, breweries, boot,

shoe and trunk making, soap factories, powder works, pickling and spice factories, chemical and metal¬ lurgical works, furniture and biscuit factories, flour, feed and rice mills, iron foundries and machine shops, *etc.* There are two daily news¬ papers and several monthlies.

Public Works, Banks, Revenues, *etc.* — The city has an electric street railway, lighting and telephone systems, waterworks (established in 1873) and a new system of sewerage. The banking facilities are excellent and include branches of the Bank of Montreal, Canadian Bank of Commerce, Bank of British North America, Royal Bank of Canada and Imperial Bank of Canada. A chamber of commerce was established in 1863 with R. Burnaby as its first president and was merged in the Victoria Board of Trade in 1880.

Public Buildings, *etc.* — The great event of later years in the city's annals was the construc¬ tion of the splendid Parliament buildings which were opened with stately ceremony on 10 Feb. 1898. The cost was over $1,000,000, the build¬ ing was of gray stone, the site was admirable, the grounds were afterward improved and beau¬ tified to a striking degree and the whole ap¬ pearance of the structure was and is imposing. In it were established the Provincial Museum and the Provincial Library, the offices of the government departments and the handsome legislative chamber, panelled in Italian marble,

VICTORIA, BRITISH COLUMBIA

, ^

\

I

f

»

• I

• I

‘0

V •

/

r

f

I

\ <

- ir-’

S

/

«

r ˆ

/ M ‘ A.

. I

and echoing since then with many a vigorous debate and keen political controversy. Within the past few years a new government house has also been built as the residence of the lieu¬ tenant-governor. Of the other city buildings the Jubilee Hospital, the city hall, the custom¬ house and post office, the drillshed and Board of Trade buildings are the chief, with many churches and schools and several hospitals, or¬ phanages, *etc.* With its splendid situation, its already large trade and substantial prosperity, and the public spirit pervading all classes of her citizens, Victoria's future as one of the important cities of North America is assured.

History, Population, *etc.* — The early his¬ tory of Vancouver Island is a record of the work and business of the Hudson's Bay Com¬ pany. In 1843 Fort Victoria (or Camosun as it was first called) was erected as one of the many trading posts with which that great com¬ pany had dotted the continent from Lake Superior to the shores of Alaska. Two years later the first ship from England arrived at the fort and port. In 1850 the first British gover¬ nor of the island arrived and one year later Victoria was surveyed and the preliminary work upon the future city commenced. Mr. (after¬ ward Sir James) Douglas became governor of the island in 1851 as well as chief factor of the Hudson's Bay Company. Then came the Main¬ land gold excitement of 1858, the influx of miners, the gradual growth of population, the foundation of newspapers such as The Colonist (which is still in existence with daily and Sun¬ day issues) and the taking over of the island as a Crown colony with gradually developed representative institutions. From this time for¬ ward the progress of Victoria was steady and sometimes rapid. It was incorporated in 1862 ; was the home of the first legislature of the island in 1856; became capital of the newly-constituted colony of British Columbia in 1868. From it Sir James Douglas directed the develop¬ ment which made him the Father of the Prov¬ ince and within its confines occurred the legislative debates and discussions which ended in the entrance of British Columbia into the Canadian Confederation in 1871. The first mayor of Victoria (1862) was Thomas Harris.

From that time until the present the characteristics of Victoria have remained the same although it has grown in population from 3,270 in 1871 to 5,295 in 1881, 16,841 in 1891, 31,660 in 1911 and 50,000 in 1917. It is an Eng¬ lish town in appearance and customs and en¬ vironment with a climate not unlike that of England. Its people are of English, Irish or Scotch extraction — chiefly English. The Chinese and Japanese number about 4.000. The Anglicans, Presbyterians, Methodists ˆ and Roman Catholics are the strongest religious bodies, but there are churches of all denomina¬ tions.

VICTORIA, or KWAN-TAI-LO, kwan-ti-lo, the capital of the British Crown colony of Hongkong (q.v.), extends for upward of five miles along the southern shore of a beautiful harbor facing the peninsula of Kan-lung on the Chinese mainland. It is dominated by the Peak, a steep hill, on which are many fine resi¬ dences and up which there are an inclined plane and steam-tramway. The chief buildings are the government house, city hall, Roman Catho¬

lic and Anglican cathedrals, the large com¬ mercial houses and warehouses extending along the quays, public libraries, hospitals and clubs. A public garden and a race course are main¬ tained; the town is electrically lighted and has also gasworks and a good water supply. The population of Hongkong, about 366,000, is mostly massed in Victoria.

VICTORIA, Mexico, the capital of the state of Tamaulipas. See Ciudad Victoria.

VICTORIA, Philippines, pueblo,ˆ province of Tarlac, near the outlet of Canaren Lake, 10 miles northeast of Tarlac. It is at the inter¬ section of three roads. Pop. 10,362.

VICTORIA, South Africa, a town of south¬ ern Rhodesia, the centre of an auriferous dis¬ trict, 188 miles due south of Salisbury. It has the usual government buildings and a hospital and is protected by a fort. The climate is un¬ healthful during the rainy season. About 17 miles to the east are the tamous Zimbabwe ruins, the relics of a very ancient exploitation of the gold in the territory. (See Zimbabwe). Pop. about 25,000 natives and 100 whites.

VICTORIA, Tex., city and county-seat of yictoria County, situated at the head of naviga¬ tion on the Guadalupe River and on the Galves¬ ton, Harrisburg and San Antonio and the Saint Louis, Brownsville and

Mexico railroads, 127 miles west of Houston and 114 miles south of San Antonio. It contains jobbing and whole¬ sale houses, modern retail establishments, three banks with deposits over ˆ3,700,000. There are asphalted streets and the industrial establish¬ ments comprise cotton and oil mills, a broom factory, cotton gins, compresses and an ice factory. There are also electric-lighting and water systems. The city has a new modern high school with equipment for manual train¬ ing, three large ward schools and two parochial schools. The city is the seat of Saint Joseph's College (R.C.), Nazareth Academy, the Bronte Library and courthouse. Pop. (1920) 5,957.

VICTORIA, a genus of plants of the nat¬ ural order Nymphceacece, resembling the com¬ mon waterlily, but most nearly allied to the genus Euryale, and distinguished from it particularly by the deciduous tips of the calyx, and the sterility of the innermost stamens. Only one species is known — Victoria regia; said to have been observed first by Hanke about 1801. It was described by Poppig 1832, who observed it in the river Amazon ; and it has since been found in many rivers of the northeastern part of South American. Its leaves are orbicular, float upon the water, and attain a diameter of from five to six feet; have the margin turned up, about two inches high ; are of purplish color on the underside, and there exhibit a sort of wicker-work of ver}" prominent veins, fur¬ nished with prickles. The flowers rise among the leaves upon prickly stalks; they are more than 12 inches in diameter, white, internally rose-colored, and very fragrant. The fruit is a capsule, almost globose, with a depression on the top, about half the size of a man's head, fleshy within, and divided into numerous cells, full of round farinaceous seeds, which are an agreeable food; the plant is, therefore, called Mdis del Agiia, or ˆWater Maize, ˆ in parts of South America. For cultivation of this plant, special hot-houses have been built in some places

in Europe, and it has been introduced into India from seeds produced in England.

VICTORIA AND ALBERT, Royal Order

of, a British order instituted for women in 1862, enlarged in 1864, 1865 and 1880. There are about 70 women belonging to the four classes into which the order is divided.

VICTORIA CROSS, A war decoration in¬ stituted 29 Jan. 1856, by Queen Victoria for the purpose of rewarding individual acts of bravery performed by officers of the lower grades in the naval or military service of Great Britain, or by ˆwarrant and petty officers, sea¬ men and marines in the navy, and non-com- ˆ missioned officers and soldiers in the army.ˆˆ ' By a second warrant, dated 13 Dec. 1858, the honor was extended to non-military persons <%ho, as volunteers, had borne arms against the mutineers in India should be considered eligible, subject to the rules and ordinances,® *etc.* An annuity of £10 is bestowed together with the

decoration. Reward for any further act of exceptional bravery is presented in a bar being attached to the ribbon by which the cross is suspended, carrying with it an additional an¬ nuity of £5 with each bar. The Victoria Cross annuity of £10 may, in particular cases, be extended to £50. The present state of the Victoria Cross donation permits its award to civilians for acts of exceptional heroism in times of war. The decoration consists of a Maltese cross of bronze and was made from Russian cannon captured at Sevastopol (September 1855). The centre contains a royal crown surrounded by the British heraldic lion gardant. Below, on an escroll, is borne the inscription ˆ<For Valour.® The reverse side of the bar bears the rank and name of the recipient. On the cross is inscribed the name and date of the ˆˆaction® or campaign in which the honor was won. The clasp above, which is decorated with two horizontal branches of laurel, has a V appendage, into the orifice of which is inserted the ring by which the cross is suspended. The cross is borne on the left breast suspended by a ribbon, blue for the navy, red for the army. The Victoria Cross is the most coveted of all the British military or naval orders. By 1913 there had been 522

Victoria crosses awarded; toward the end of 1918 the number had been extended so as to include about 670 recipients surviving from former periods, those conferred during the late war still living, and those whose death had oc¬ curred subsequent to its conferment.

VICTORIA FALLS, called by the natives Mosi-oa-Tunya (ˆ‘smoke sounds there®), the greatest falls in the world, on the Zambesi River in Rhodesia, South Africa, about 100 miles below Kazungula and the confluence of the Kuando with the Zambesi. The falls ex¬ tend, in four main cataracts, over a breadth of more than a mile, the mass of water falling from a height of over 400 feet. The transverse chasrh or rocky fissure, 400 feet deep, into which the Zambesi plunges, extends straight across the course of the river, like a gigantic trough, a mile long and from 100 to 300 feet wide, the walls being composed of hard basalt. From this fissure great columns of cloud-like spray rise to a distance of 1,P00 to 3,000 feet, according to local atmospheric conditions, and are visible on a clear day 10 miles or more from the Falls, whilst the thundering roar of the Falls themselves can be heard at a distance of 20 or 30 miles. The spray clouds coupled with the noise gave rise to the native name of *Mosi-oa-Tunya.® There is only one narrow outlet to the chasm, about 200 feet wide, through which the mile-wide waters of the Zambesi have to force their way into what is called the ˆToil¬ ing pot,® owing to its whirlpool turbulence. Thence the river continues a tortuous zigzag course for about 40 miles through a canyon averaging 600 feet wide betw’een basaltic cliffs 400 feet high, before widening out again into a broad river which flows on, broken here and there by small rapids and cascades, until it pours itself into the sea some 1,000 miles away. One of the highest bridges in the world, with a span of 650 feet, crosses the gorge, a quarter of a mile below the Falls, from which, how¬ ever, the Falls are hardly visible, the bridge be¬ ing almost at right angles to them. A com¬ modious hotel has been built for the immediate accommodation of visitors and a township called Livingstone has been laid out on the north bank of the Zambesi about four miles distant. Livingstone, the great African ex¬ plorer, was the first European to see the Falls, which he named after Queen Victoria. On the brink of the main cataract an island on which he camped in 1855, the year of’ his great dis¬ covery, has “been named after him and the tree on which he carved his initials still remains. Other islands above the Falls have been named ˆˆPrincess Christian,® ˆPrincess Victoria® and ˆˆKandahar® in honor of some of the more re¬ cent visitors.

Great care is being taken by the British South Africa Company to keep

the beauty of this valuable asset of their territory free from the ravages of vandalism.

.VICTORIA LAKE, or ALEXANDRINA, or KAYINGA LAKE: brackish lagoon in the southeast of South Australia ; separated from the sea by a narrow strip of land. It receives the rivers Murray, Bremer, Angus and Finnis; and communicates with the sea by a narrow passage into Encounter Bay. It is 30 miles long and about 12 miles wide. The entrance to the lake is obstructed by a sand-bar.

VICTORIA LAND, Arctic Regions: the southernmost portion of an insular tract of Franklin Territory, Canada, constituting with Prince Albert Land and Wollaston Land, an island in the Arctic Ocean, with an area esti¬ mated at 80,000 square miles. The island is separated from the mainland by Dease Strait, Dolphins Union, and Victoria Strait. Victoria Land was discovered and named by Sir George Simpson, and was explored by Dr. Rae in 1851.

VICTORIA LAND, or SOUTH VIC¬ TORIA LAND, Antarctic regions, a vast con¬ tinental plateau south of New Zealand, ex¬ tending from latitude 71° to the South Pole be¬ tween longitudes 160° to 170° E. Victoria Land was discovered and named by the British navi¬ gator Sir James Clark Ross during his voyage of exploration, 1841-42, when he sailed along a rocky icebound coast for 450 miles, finding in lat. 78° 10’ S. a lofty active volcano 12,367 feet high and an inactive cone over 11,000 feet high, which he named respectively Erebus and Terror, after his vessels. The loftiest point of land is Mount Melbourne, which attains a height of over 14,000 feet. Since the expedi¬ tion of the Belgica (1897-99) and of the British expedition (1898-1900) under the com¬ mand of the Norwegian, Borchgrevink, Swed¬ ish, German and British expeditions have added considerably to the knowledge concerning the meteorological and other conditions of the region. The British Antarctic expedit’on which sailed on the specially built and equipped steam¬ ship Discovery from London 31 July 1901 re¬ turned to Lyttleton, New Zealand, 1 April 1904 in company with the relief steamers Morning and T erranova. The Discovery had been frozen in for 13 months at the foot of Mount Erebus. Scientific work had been maintained throughout the whole period. At Cape Adare Borchgrevink’s huts were found in good preser¬ vation; a new route to the west was discovered and a depot was established 2,000 feet up the glacier. In a dash to the South Pole, Captain Scott, Dr. Wilson and Lieutenant Shackleton (q.v.) reached lat. 82° 17’ S., further progress being impeded by the softening of the snow and the death of their dogs. The fact was estab¬ lished that the interior of Victoria Land con¬ tinued at a height of 9,000 feet and is evidently a vast ice-covered continental plateau. (See Antarctic Regions). Consultˆ

Borchgrevink, ˆ First on the Antarctic Continentˆ (1901) ; Bull, ˆThe Cruise of the Antarctic to the South Polar Regions, or the Voyage to Victoria Land, 1894-95ˆ (1896); Cook, ˆThrough the first

Antarctic Night, or the Voyage of the Belgicaˆ (1900) and reports of the South Pole dis¬ covery.

VICTORIA NYANZA, m-an'za, or UKE-REWE, oo-ke-re'we, central Africa, the largest of the Nile lakes and the second in size of the fresh-water lakes of the world, extends from 0° 45' N. to 2° 50' S., and from 32° 30' to 35° E., and lies about 3,900 feet above sea-level, between Uganda and Tanganyika Territory. Since 1901 a railroad with its terminus opposite Uvuma Island, near the northeast shore, con¬ nects the lake through British East Africa with Mombasa on the east coast and through Tan¬ ganyika Territory a line has been laid to connect Mwansa on the south shore with Tabora, on the railroad running westward from Dar-es-

Salaam on the east coast to Ujiji on Lake Tanganyika. Including the numerous islands with which it is studded, Victoria Nyanza has an area estimated at 27,000 square miles. In the southeast the largest island, Ukerewe, by which name the lake is locally known, is 25 miles long with a maximum breadth of 12 miles, but is uninhabited. In the Sesse Archi¬ pelago in the northwest are a British govern¬ ment station and Catholic and Protestant mis¬ sions. A few steamers and dhows ply on the water. The lake receives numerous inflows, the most important of which is the Kagera, the head-stream of the Nile (q.v.), which enters it on the west. Other tributaries of the lake are the Katonga on the west, the Nzoia on the northeast, the Shimiyii on the south and the Ruwana on the southeast. The lake is sup¬ posed to be partly fed by springs. The outlet of the lake, or Somerset Nile, which flows northwest to the Albert Nyanza, whence it issues as the Nile proper, was discovered by Speke on 28 July 1862. While the western shore of the lake is mostly flat, and the northern in many places marshy, the eastern shore pre¬ sents high mountains. The Victoria Nyanza was discovered by Speke, who caught sight of its southern end near Mwansa on 4 Aug. 1858, and it was afterward, in 1861-62, visited and further explored by its discoverer, along with Grant, and between January and May 1875 it was circumnavigated by Stanley.

VICTORIA REGIA, a magnificent waterlily, of gigantic size, which is found in South American streams, especially in the tributaries of the Amazon. It was discovered by Haenke in Bolivia in 1801 and, later,

was introduced with great difficulty to horticulture. The first flower that bloomed in England was presented to Queen Victoria, in honor of whom the genus was named. The Indians of British Guiana called it the water-platter, in reference to its remarkable floating leaves, which are six feet or more across, and are circular with an up¬ turned rim several inches high. These gigantic leaves are orbicular-peltate and provided with prickly petioles longer than the depth of the water on which they float — an apparent pro¬ vision against submersion by changes in river level. The leaf-tissues are full of air-spaces and canals, which render the leaves so buoyant that they can support from 100 to 200 pounds of weight; the crimson under-surface is re¬ ticulated with many veins, protected by stout, fleshy prickles. The leaf also is punctured with minute holes, possibly for the escape of water from its fenced-in upper surface. The waterlily-like flowers are more than a foot across, nocturnal and open on two successive even¬ ings. The first time a Victoria opens the inner petals over the stigma remain unexpanded and the flowers are creamy white, with a delicious fragrance. It closes the next forenoon, to open again at dark, this time expanding to its fullest extent, but has become rose-red in color and with a disagreeable odor. The flower is then closed forever and is withdrawn beneath the surface of the water. The fruits are like peas, hidden in the cells of a dilated torus or globular prickly capsule about as large as a cocoanut and the starchy nuts are called ®water-corn^^ in Paraguay, where they are used for food. The Victoria is found in shallow inlets.

lakes and pools in bogs and has tuberous ver¬ tical rhizomes moored by stout, spongy roots. It is easily cultivated in greenhouses or in out¬ door heated tanks.

VICTORIA UNIVERSITY, England. See Owens College.

VICTORIA UNIVERSITY, formerly situ¬ ated at Cobourg, Ontario, Canada, now at Toronto, and since 1890 in federation with the University of Toronto. It was founded by resolution of the Conference of the Methodist Church in Canada, held at Kingston in 1830 and was

incorporated by royal charter in 1836 under the name of ®Upper Canada Academy.® This royal charter was the first ever granted by the English government to a NonConform¬ ist body for an educational institution. In 1841 the charter was extended by the Parliament of Canada, the name was changed to Victoria Col¬ lege and power was given ^^to confer degrees of Bachelor, Master and Doctor of the various Arts and Faculties.® On 2h Oct. 1841 the first session of the college under the enlarged char¬ ter was opened, with the Rev. Egerton Ryerson as principal, and with a full arts curriculum. In 1854-55 the faculty of medicine was added and established in Toronto. In 1860 the faculty of law and in 1871 the faculty of theology were added. In 1883-84 Albert Col¬ lege, Belleville, was united with Victoria Col¬ lege and the name was changed to Victoria University. The Ontario Ladies' College, Whitby, Alma College, Saint Thomas and Columbian Methodist College, New West¬ minster, British Columbia, have since that time been affiliated. On 12 Nov. 1890, by proclamation of the lieutenant-gover¬ nor, Victoria University was federated with the University of Toronto. (See Toronto, University of). New buildings were erected in Queen's Park, Toronto, and the federation was consummated in 1892. The faculty of arts then assumed the work and relation of a college in the University of Toronto, teaching such subjects as were assigned by the Act. of Federation to the colleges. For all other sub¬ jects the students have access to the lectures' and laboratory practice of the University of Toronto under the regulations of which all de¬ grees, except those in divinity, are conferred. In addition to the work in arts above men¬ tioned provision is made for courses in the¬ ology, both elementary and advanced. The staff consists of 17 professors and lecturers and the number of students registered annually is about 375. There is also a Victoria University in Manchester, England, and in Wellington, New Zealand.

VICTORIAN ARCHITECTURE. See

Architecture.

VICUNA, Manuel, Chilean Roman Catholic prelate: b. Santiago, Chile, 1778; d. Valparaiso, Chile, 1843. He was graduated in theology from the College of San Carlos, was ordained to the priesthood and engaged in traveling mis¬ sionary work. He inherited a large fortune which he used in his charitable work, employ¬ ing a considerable share of it in building a house of retirement. In 1830 he was made a bishop and in that capacity labored earnestly for the re-establishment of the theological semi¬ nary. In 1840, when Santiago was made a

metropolitan see, he became the first archbishop. He subsequently seˆed as a member of con¬ gress of the council of state.

VICUNA, Pedro Felix, Chilian journalist: b. Santiago, Chile, 1806; d. there, 1874. He was well educated and entered journalism at an early age, becoming at 21 one of the founders and editor-in-chief of the Valparaiso Mercurio. He was subsequently connected editorially with El Telegrafo (1827); El Elector (1841); El Republicano (1845), La Reforma (1847), and other leading periodicals, and in 1865 was elected to the national Senate, where he intro¬ duced the law abolishing imprisonment for debt. He wrote ˆUnico asilo de las Republicas Hispano-Americanasˆ (1837); ˆPorvenir del Hombreˆ (1858) and ˆLa Hacienda Publicaˆ (1864).

VICUNA, a species of wild llama {Lama vicunna) which lives in the most inaccessible and precipitous portions of. the Andes near the snow-line from Peru to Bolivia, and is gen¬ erally seen in small herds. It is described as being very wild and vigilant and is much hunted for the wool and hide. The domesti¬ cated alpaca (q.v.) is by some naturalists con¬ sidered to be an offshot of the vicuna, though there is much reason to doubt this. See Llama.

VICUNA-MACKENNA, mak-ka'na, Ben¬ jamin, Chilian historian : b. Santiago, Chile, 25 Aug. 1831 ; d. Santa Rosa del Colmo, Chile, 25 Jan. 1886. He was educated at the University of Chile and early engaged in researches in national history. For his activity in the Revolu¬ tion of 1851-52 he was imprisoned and con¬ demned to death, but escaped to this country and then went to Europe. In 1856 he returned and was admitted to the bar, but political dis¬ turbances caused his exile in 1859-63. Upon his return in the last-named year he became editor of the Valparaiso Mercurio, in 1864 was elected a deputy and in 1865-66 was special envoy to Peru and to the United States. He was senator in 1871-76 and in 1875 he was a candidate for the Presidency. His works in¬ clude ˆE1 Sitip de Chilian en 1813' (1849) ; ˆRevolocidn del Peru' (1861) ; ˆHistoria de la Administracion de Montt' (5 vols., 1862-63) ; ˆHistoria de Valparaiso' (2 vols., 1ˆ8) ; ˆHistoria de las Campanas de Arica y Tacna' (1881) ; (A1 Galope' (1885), *etc.*

VIDAL, Amaud, a French poet active in the 14th century. He was closely connected with the literary movement in the South and was the first to win the golden violet of the college of the gaie science (1324) at Toulouse. He took for his subject the praise of the Vir¬ gin,

a copy of which is still preserved in the records of the Academy of Toulouse. In the same year he was honored by the same society with the title of ˆˆdoctor of the gay science" (poetry)ˆ for another poem on the same sub¬ ject. Vidal became a very popular poet and set a style of Virgin-homage which was largely imitated. He thus had considerable influence on the poetry of his day.

VIDAL, Pierre, a Langue d'oc trouba¬ dour who flourished during the latter part of the 12th and the first part of the 13th century. He was one of the foremost poets of his time, the ideal lover, adventurer, singer and song-

maker, in which his age delighted. His poetic passion was frequently allied to madness and he himself finally died insane. Good living, good fortune, adventure were his constant aim in life and his themes in song. Endowed with a fine poetic talent and a magnificent singing voice, he was welcomed everywhere through¬ out the Provengal lands as a troubadour sec¬ ond to none in grace, courtliness and lyrical gifts. The most powerful princes and nobles and the most brilliant and high-born ladies W'ere his patrons, paying homage to his charm of manners and his uncommon talent. During his adventurous life he went with Richard Coeur de Lion to Palestine. It was during this period that he seems to have gone gradually mad. His later poems show this change in the once gay singer of love ballads. In these he imagines himself a great hero, feared by the Saracens. Thus he sings ®My enemies tremble at my name, like the quail before the hawk, so well do they know my redoubtable valor. I have all the graces of chivalry; I know all the ways and practices of love. When I put on my shining armour and girt about me my sword, the earth trembles beneath my feet. Armed and mounted on my good steed, I bear down all before me. Single-handed I have taken prisoner a hundred knights ; and a hundred others have I dis¬ armed.® His companions, playing upon his in¬ firmity, had him married to a Greek woman, representing to him that she was the niece of the emperor of the East. Believing himself heir to a great kingdom he composed songs

celebrating his high estate. On his return to France, after the failure of the Crusade, he committed other insane acts which gained him the title of the mad poet. Yet, with all his madness, there is a real wealth of imagery and imagination in his poems which makes them readable to-day; for he was master of his art. He ventured into poetic forms little or not at all used by his fellow-craftsmen, and success¬ fully made very difficult poetical departures from the usages of his times. A very consider¬ able number of his manuscripts of poems have been collected, and they all tend to confirm the high estimation as a poet in which he was held by his contemporaries. In addition to love poems, his surviving work contains three in¬ teresting poetical compositions on the Crusades, a tenson composed for a troubadour poetical contest and a historical poem. All of these ex¬ hibit the same strange erratic talent coupled with eccentricities of metre, rhythm and rhyme that fitted in well with the abnormal life of the author himself. Consult Ginguene, ˆHistoire litteraire de la Franceˆ ; Soulie, F., Wiscomte de Beziersˆ ; and also the works of Nostrada¬ mus, Raynouard, Rochegude, Sainte-Palaye.

VIDAL, Raymond, a Provengal troubadour of the 12th and 13th centuries. He is said to have been the son of the more famous Pierre Vidal ; but Abbe Rive maintains that he was not his son but his father. Tradition says that lie lived at the court of Alfonso X of Castile (1252-84). Vidal was the author of a Pro¬ vencal grammar that seems to have been popu-iilar in his day and also at a later date. He also wrote ˆPatience in Loveˆ and also ˆJaloux Chatie,ˆ both in the style of the prevailing ®nouvelles.®

VIDAURRI, ve-thowr’re, Santiago, Mexi¬ can soldier: b. Nuevo Leon, Mexico, about 1803; d. City of Mexico, 8 July 1867. He came of a wealthy family of Indian extraction, was well educated, admitted to the bar in 1826 and entered political life. He was engaged in several civil wars, rose to the rank of colonel and in 1852 was elected governor of Nuevo Leon. He assisted in the overthrow of Santa Anna in 1854-55, though refusing to act in conjunction with Alvarez, and was an unsuc¬ cessful candidate against the latter for the Presi¬ dency in 1855. He assumed a species of dic¬ tatorship over the states of northern Mexico, forcibly annexed Coahuila and was long sus¬ pected of a design to establish a separate re¬ public. He withheld recognition of Comonfort as successor of Alvarez until 1856, but was then forced to grant it in order to retain his con¬ trol of the states Nuevo Leon and Coahuila. He at first participated in resistance to the French intervention in 1862-64; later became an officer in the Cabinet of

Maximilian. He re¬ signed in 1867, but after the fall of the City of Mexico he was captured and shot as a traitor.

VIDIN, Bulgaria. See Widdin.

VIDOCQ, ve-dok, Eugene Frangois,

French adventurer and detective: b. Arras, France, 23 July 1775; d. 10 May 1857. He was apprenticed to his father, a baker, at 13, and after constant pilfering robbed the shop of 2,000 francs and fled to Ostend. He soon lost his money and after living a life of vagabond¬ age entered the French army, from which he deserted to the Austrians, but later returned to the French army. His career as a soldier was one of miserable intrigue and disgraceful ad¬ venture and he was finally implicated in a forgery for which he was sentenced to eight years' imprisonment. He escaped and after further discreditable escapades settled in Paris, where he gained employment on the secret po¬ lice force. His wide knowledge of the criminal classes enabled him to render efficient service and in 1812 he was made chief of the brigade de surete. His activity in the service cleared Paris of great numbers of the criminals with which it was infested, but in 1827 he was re¬ moved from office. His subsequent career was one of obscurity and failure, though he ap¬ parently endeavored to live an honest life and he died in wretched poverty. His ˆMemoiresˆ (1828) are not regarded as authentic.

VIDYASAGAR, Iswar Chandra, Indian author, philanthropist and social reformer : b. in the autumn of 1820 at Birsinha in the dis¬ trict of Midnapur, Bengal, India; d. 30 July 1891. He was a Brahmin by birth. His father, the Kurdas Bandopadhya, was a poor man. When Iswar Chandra was nine years old, his father took him to Calcutta. They walked their way to the metropolis — such was their poverty. The boy was educated in the Sanskrit College, and in all examinations he used to be invariably at the top of his class. At this time, he suf¬ fered from extreme poverty. Quite often he was forced to go without even proper food and clothing. He received the title ˆWidyasagar® (the ocean of learning) in 1840. Popularly, he is called in India, ®Danver Sagar® — the ocean of kindness. His first work in Bengali prose,

ˆBetal Pancha Bingshali,ˆ was published in 1847 and his ˆSakoontalaˆ in 1855. But his masterpiece, ˆSitar Banawbashˆ (ˆThe Banish¬ ment

of Sitaˆ) was published in 1862. Raja Ram Mohun Roy, Iswar Chandra Vidyasagar and Akshya Kumar Datta were the fathers of Bengali prose. Vidyasagar was appointed as the Head Pandit of the Fort William College in April 1841 and the first principal of the Sanskrit College in January 1851. Apart from his scholarship, Vidyasagar was well known as a social reformer. He was the originator of the movement for the remarriage of Hindu widows. He proved from Hindu scriptures that there was no injunction against such marriages. He published his ˆRemarriages of Hindu Widowsˆ in 1855. He was vehemently at¬ tacked by the orthodox Hindus. Even his life was threatened. In this fight against orthodoxy, he was supported by two prominent men, Prosonno Kumar Tagore and Ram Gopal Chose. Ultimately, the Widow Remarriage Act was passed in 1856. The extreme poverty of his boyhood and early youth, instead of turning him into a miser, as is sometimes the case, made him a philanthropist. And it is as the benefactor of his people that the people of India cherish his memory. He gave away most of his income in charity. He supported scores of poor students and hundreds of poor widows and helped thousands of persons of all classes. To give higher education at a reasonable cost, Vidyasagar opened, in 1872, the Metropolitan College of Calcutta, entirely at his own ex¬ pense, and the income from the college he used for the improvement of the institution. This college still stands in Calcutta as a living monument to the memory of this great man.

VIEBIG, fe'bik, Clara, German novelist and writer of short stories: b. Treves, 17 July 1860. When she was nine years old, her father, a Prussian oberregierungsrat, was transferred and the family went with him to his new post at Dusseldorf, where her girlhood was spent; but she frequently returned to the Moselle scenery at Treves and in the environment, in which she took many tramps. Her father died when she was hardly of age and she was sent to live on the estate of some relatives in Posen. She went to Berlin to study music, but instead found that the stimulus of the great city, in addition to the landscapes she had already seen, was beginning to destine her for a literary career, on which she embarked in 1894. After marrying the publisher, Fritz Th. Cohn (a partner in the firm of Fontane and Company, later of Egon Fleischel and Company), she lived most of the time in Berlin and its suburbs (Schoneberg, Zehlendorf). In Germany she is the most popular of the representatives of the Zola school of naturalistic novelists and is particularly able in the powerful description of atmosphere and environment. Her delineation of sensual passion is excellent, when she is at her best, but she often descends to inartistic and careless production, reminding us sometimes of the backstairs

novel. Her language is serious and unadorned and her treatment of her ma¬ terials for the most part matter-of-fact and craftsmanlike. While her subjects are faced boldly and completely, she is sometimes gov¬ erned more by the desire to produce what the market requires than what an inner urge would

dictate. None of her works has so completely caught the spirit of the times as her novel of Berlin servant life, ‘Das tagliche Brotˆ (1901). She has also written dramas, which have met with little success. Other works are Hvinder der EifeP (1897); ˆDas Weiberdorfˆ (1900); ˆDie Wacht am Rhein ˆ (1902) ; ˆDes schlafende Heer> (1904) ; ˆEiner Mutter Sohnˆ (1907) ; ˆDas Kreuz im Vennˆ (1908) ; ˆDas letzte Gliickˆ (1909); ˆDie vor den Torenˆ (1910); ˆDas Eisen im Feuerˆ (1913). Consult ˆAusgewahlte Werkeˆ (6 vols., Berlin 1911) ; ˆBurning Loveˆ is the title of a short story in English translation in ˆGerman Classicsˆ (Vol. XIX, New York 1914) ; also Werner, Richard M., Wollendete und Ringendeˆ (Minden 1910).

Jacob Wittmer. Hartmann.

VIELE, ve’le, Egbert Ludovickus, Ameri¬ can soldier: b. Waterford, N. Y., 17 June 1825; d. New York, 22 April 1902. He was graduated from West Point in 1847, engaged in the Mexi¬ can War in 1847-48 and in the Indian warfare of 1848-52. He resigned from the army in 1853 with rank as lieutenant and in 1854—56 was chief engineer of the State of New Jersey. He was chief engineer of Central Park, New York, in 1856-57 and later of Prospect Park, Brook¬ lyn. At the outbreak of the Civil War he entered the army and was appointed brigadier-general of volunteers. He was second in com¬ mand of the land forces at Port Royal and held chief command at Fort Pulaski, Ga., planned and conducted the march to Norfolk, Va., and participated in the capture of that city. He was military governor of Norfolk in 1862-63. He afterward continued the practice of his pro¬ fession in New York, was appointed park com¬ missioner in 1883 and president of the board of commissioners in 1884. He served in Con¬ gress in 1885-87. He wrote ‘ˆHandbook of Ac¬ tive Serviceˆ (1861) ; ‘Topographical Atlas of the City of New Yorkˆ (1865), *etc.*

VIELE, ve’le, Herman Knickerbocker, American novelist: b. New York, 31 Jan. 1856; d. there, 14 Dec. 1908. He studied engineering with his father and practised as a civil engineer for some time in Washington, D. C. He has written ‘The Inn of the Silver Moonˆ (1900); ‘The Last of the Knickerbockersˆ (1901) ; ‘Myra of the Pines> (1902) ; ‘On the Lightships

(1909).

VIEN, ve-6n, Joseph Marie, French painter: b. Montpellier, 18 June 1716; d. Paris, 27 March 1809. He was a pupil of Natoire, went to Rome (1744) and returned to open a school of painting in Paris (1750). In 1775 he was director of the Academy at Rome but returned to Paris. Napoleon I made him sena¬ tor and ennobled him. His chief works are ‘Saints Germain and Vincents ; ‘Daedalus and Icarus s and ‘Cupids at •• PlayS (all in the Louvre). His principal claim to importance lies in the fact that he was the teacher of David.

VIENNA, vi-en’a (German, Wien, ven), capital of German-Austria, formerly capital of the Cisleithan part of the Austrian-Hungarian monarchy and in earlier times capital of the Austrian Empire, on the right bank of the Danube and on the Donaukanal, a narrow arm of the river, into which fall several small streams, 380 miles south by southeast of Ber¬ lin and 650 miles east by south of Paris. It

stands in a plain with the conspicuous Wiener Wald Moumain boundaries at 10 or 12 miles, distance on all sides. Most of the city rises from the right bank of the Donaukanal, on a considerable acclivity. The nucleus of the city, the Innere Stadt, comprising a small part of the whole, was formerly surrounded by a ram¬ part, fosse and glacis, but these were leveled • in 1857 and the space occupied by the Ringstrasse, a handsome boulevard averaging 5ˆ5 yards broad, forming one of the finest thorough¬ fares in Europe. The inner or old town was the court and fashionable quarter of the city until the disruption of the dual monarchy oc¬ curred in 1918. The streets here are often nar¬ row and crooked ; but on the whole Vienna is a handsome well-built town, with fine squares and spacious streets well kept. The houses are frequently built four or five stories high and occupied in flats with common stairs. The chief public park is the Prater, on the island between the Donaukanal and the river itself, about four miles long and two broad, beauti¬ fully laid out, planted and decorated. Vienna's mean height above the sea is 560 feet ; lat. 48° 12' N. ; long. 16° 22' E. ; area, 105j/2 square miles; population, 30 June 1914, estimated at 2,149,800. More than four-fifths of the inhabitants are of the German race and the German language is everywhere spoken. The remaining one-fifth is composed mainly of Slavs and Hungarians. Seven-eighths of the entire population are Ro¬ man Catholics. Protestants number between 70,000 and 80,000; Jews between 170,000 and

180,000.

A general idea of Vienna as a whole is given most conveniently when we mention lead¬ ing features of each of the 21 districts into which the city is divided Thus in the first dis¬ trict, embracing both Altstadt and Ringstrasse, we find Saint Stephen's and the Hof burg — near which are the chief government offices ; the two great museums and most important banks ; the famous street known as the Graben; the Reichsrath building, the Rathaus and the uni¬ versity ; the opera-house and the Hofburg Theatre. The second district was, in 1623, as¬

signed to the Jews; and a part of it is still inhabited by Jewish tradesmen; but another portion is devoted to the very extensive park called the Prater, which is particularly damp toward evening, owing to the close neighbor¬ hood of the Danube, bˆut otherwise remarkably attractive. It was once an imperial deer-park, but since 1776 has been opened to the public. In the third and fourth districts an aristocratic quarter, Wieden, supplements that of district number one. The 5th, 12th, 14th and I5th dis¬ tricts are given over to the minor industries ; the sixth and seventh to larger factories and shops. The eighth district is the quarter of officials and clerks ; the ninth of hospitals and •university institutes; the 10th of Bohemian fac¬ tory-hands. The 11th includes the central ceme¬ tery, factories, gas and electric works and large market-gardens. The 16th and I7th are manufacturing districts. The 13th district in¬ cludes Schloss Schonbrunn ; the 18th and 19th the villa quarters and a wine-growing region. Manufacturing is carried on in the districts numbered 20 and 21.

Industries and Commerce. — Vienna is the foremost city in all the region formerly em¬

braced in the Austrian Empire. Its manufac¬ tures include woolen, cotton and silk goods, leather, porcelain, arms, musical in¬ struments, hardware, furniture, chemicals, pot¬ tery, beer, machines, tools, scientific instruments and gold, silver, bronze and tin wares. Espe¬ cially important articles of commerce are grain, wine, cattle, coal, iron, flour and books and art publications. There is also a large inland trade. It is the centre of a great railway system. The diversion and deepening of the channel of the Danube, which brings the river nearer the city, has largely increased its shipping trade between eastern and western Europe. It has been well said that, as a commercial centre, Vienna owes its importance to its location at the point where trade-routes from the Baltic to the Adriatic cross the great highway of the Danube.

History. — Vienna appears to have been a Roman station in the 1st century. It was after¬ ward included in Upper Pannonia and received the name of Vindobona. It was taken and pillaged by Attila about 450. It was conquered by Charlemagne about 791, became the capital of the Margraviate of Austria in the 12th cen¬ tury and municipal privileges were conferred upon it in 1221. In 1278 it became the seat of the Hapsburg dynasty. About 1365 the uni¬ versity was founded. During the 14th and I5th centuries a share in civic government was ob¬ tained by the craftsmen. In 1515 Emperor Maximilian I

entertained at Vienna the king of Hungary and Bohemia and concluded mar¬ riages of his children, by which Hungary, Bohemia and Moravia were acquired by Austria. In 1529 Vienna was besieged by the Turks un¬ der Soliman H, and again, in 1683, it was de¬ fended against a Turkish army under Moham¬ med IV. During the reigns of Charles VI (1712-40) and Maria Theresa (1740-ˆ0) the city's prestige was enhanced and its popula¬ tion more than doubled. After the battles of Austerlitz and Wagram it was held by the French for a short time. From 16 Sept. 1814 to 19 June 1815 the famous Congress of Vienna was ill session, and the opinion has been re¬ peatedly expressed that the political reaction which followed retarded the prosperous devel¬ opment of the city, which then had but 239,300 inhabitants, and that the insurrection of 1848 was required to clear the way for the intro¬ duction of better conditions. The facts which claim our attention at present are these ; Vienna secured the right of self-government by elective representatives at the accession of Emperor Francis Joseph, whose reign extended from 2 Dec. 184S to 21 Nov. 1916. Activity in build¬ ing was stimulated by the removal of the forti¬ fications in 1857 and by the Exhibition of 1873. Other manifestations of an enterprising spirit were noted and in half a century the popula¬ tion has nearly quadrupled. This growth has taken place despite the Compromise of 1867 between Austria and Hungary, by the terms of which Budapest was made the capital of that part of the empire beyond the Leitha River which Vienna had long regarded as a political and social dependency. The two decades before the World War witnessed such developments as that of the transportation system, including the city railway and a network of surface lines, new waterworks, *etc.* A brief account of

conditions in Vienna while the war was in prog¬ ress is supplied by a resident, who writes that Vienna heard little of the actual fighting. ®The city is (in June 1917) full of people who seem bent on enjoyment, the cafes — where conver¬ sation about the war is taboo — are full of people from morning till night, the restaurants, where everything except bread and potatoes can be obtained, if one's purse is long enough, are crowded ; the opera and the theatres have nearly every seat booked in advance and the cinemas are filled at every performance. In the fashionable streets of the city there are on all sides fine shops full of the latest fashions which find purchasers even at the prevailing exorbitant prices.^^ In the Living Age, 15 Dec. 1917, another correspondent writes: ®But to the keen observer there are many curious dif¬ ferences which show how deeply the stupendous war has affected Vienna. The question which touches the whole population, from the highest to the lowest, most nearly is that of the food-supply. The state of semi, -starvation at which the poorer classes have now arrived has come on so gradually that they have almost come to regard it as natural and have ceased to wonder at it.® In August 1918 Italian airmen commanded by Capt. Gabriele d'Annunzio dropped copies of a manifesto over Vienna, the message telling of American participation in the war. In November 1918 conditions in Vienna were reported as follows : Little dis¬ order; order being maintained by Marshal A. von Boog; many arrests on charges of con¬ spiracy with Red Guards to proclaim Bolshevist government; desperate conditions there owing to lack of food and coal. Austria had mean¬ while appealed for an armistice (29 Oct. 1918) ; the abdication of Emperor Charles was an¬ nounced 12 November and the German-Austrian republic proclaimed the same day. It was in connection with these events that the revolu¬ tionary outbreak took place at Vienna, the soldiers forming Soviets and making demon¬ strations against the Hapsburgs. On 16 Feb. 1919 the Constitutional Assembly was elected. On 4 Sept. 1919 the Swiss Minister at Vienna brought to light a plan to restore commercial relations on a large scale between Vienna and New York.

Architecture, Painting and Sculpture. —

Only a few buildings dating from the period of the Middle Ages still remain, chief among which is the towering mass of Saint Stephen's (12th to 15th centuries), one of the most famous of cathedrals. The

other archi¬ tectural periods are distinguished as follows: That of the 17th century, mainly ecclesiastical; that of the 18th, baroque-palatial ; the Bieder-maier period, promoted by Francis I and Ferdi¬ nand I ; the Francis Joseph era ; and the modern period, commencing about 1900, examples of which are the 20th century residences of private citizens, the new palaces, the city railway struc¬ tures, the cottage quarter and the artists' colony l)uildings in Heiligenstadt. But after all it is the ®Ring,® with its monumental buildings, which gives the peculiar tone to Vienna, and the most beautiful edifice on the ^^Ring® is the Votive Church, completed in 1879. This ap¬ pears to be the original from which was taken the design of Saint Patrick's Cathedral, New York City.

Painting, according to Beiiedite developed in Vienna under the influence of foreign schools, of which those of Germany and France pre¬ dominated. It follows that there is no pre¬ cisely national Austrian art, but rather an in¬ tense and eclectic production of talents that are often distinguished but rarely personal and original. The early Vienna painters may well pass for Germans. Thus, J. E. von Steinle (born Vienna, 2 June 1810, died Frankfurt, 18 Sept. 1886); Joseph Fiihrich (Rantzau, 9 Feb. 1800 — Vienna, 13 March 1876), and, more important in the same German environment, Ferdinand Waldmiiller (Vienna, 15 Jan. 1793

— 23 Aug. 1865) and Moritz von Schwind (Vienna, 21 Jan. 1804 — Munich, 8 Feb. 1871)

— all of whom Germany claimed as her own. Hans Makart (Salzbourg, 29 May 1840 — Vienna, 3 Oct. 1884) studied under Piloty in Munich. Michel Lieb, called Munkaesy (born at Munkacs, 10 Oct. 1844; died at Endenich, 1900), whose ˆChrist before Pilateˆ and ˆBlind Milton dictating Paradise Lost to his Daughtersˆ are so well known in America, was only by residence for a short time after 1865 connected with the Viennese school. We mention also Hynais, born at Vienna in 1854; Gustav Klimt, first president of the Viennese ˆsecession,® Karl Moll and Bernatzik.

Sculpture owed more than any other art to Francis Joseph, although that ruler understood art in general and the value of its cultivation to a nation, and for that reason ^^encouraged it in every way, with his voice, his presence and his purse.® Distinguished sculptors were : Franz Zauner (1746-1822), director of the Vien¬ nese Academy and author of the neo-classic equestrian statue of Joseph II; I. M. Fischer,

successor to Zauner at the academy; Leopold Kisling (1770-1827); J. Klieber (1773-1850); J. N. Schaller (1777-1842) ; Hans Gasser (1817-68), and V. Pilz (1816-96). The new school of sculpture includes Canciani, Luksch, Franz Metzner, Adolf Bohm and Schimkowitz. The last named worked under a Viennese sculptor in New York, the late Karl Bitter.

Music. — Music has held a place of honor even from the time of Archduke Albert I, in the first years of the 13th century. Early in the 17th century the court interested itself in musical productions. Archduke Ferdinand HI, who wrote the first German opera, brought the Italian opera, then recently discovered, to Vienna, and his son, Leopold I, was an ac¬ complished musician and a patron of music-masters. Charles VI founded a musical academy at Vienna. With Maria Theresa's reign there began a series of resident composers and mu¬ sicians, Gluck being the first of that illustrious line. He lived in the Wiedner Hauptstrasse. Next came Haydn, who, though not born in Vienna, as a boy was chorister in Saint Stephen's and who died at his home in the Viennese street now called Haydngasse. Mozart lived in Vienna; the city's fame brought Bee¬ thoven from Bonn and in Vienna fame came to him. Schubert was born in Vienna in 1797 and died there in 1828. Czerny was a Viennese ; Joseph Launer, creator of the city's folk-music, and Johann Strauss the first, creator of the waltz, were inseparable friends in Vienna; the sons of Strauss, Johann the second and Ed¬ ward, duplicated in the same field their

f,/

VIENNA

1 The Opera House

2 The Bourse

•

j

>•

%,

4.*

t

r‘v

«

•’■ *

«

kv

* I

<’

Ak

t

f

J •

I

I

■ ^ i

V

;

» -v’ ■

father's successes, and another true Viennese was Otto Nicolai, composer of the ˆ Merry Wives. ˆ Brahms lived for 34 years in Vienna and there Schumann wrote much of his best music.

Education and Charities. — The university has a staff of more than 450 professors and lec¬ turers, and, in normal years, about 6,400 stu¬ dents and 1,200 occasional hearers. The Impe¬ rial Library contains 1,000,000 volumes, includ¬ ing 8,000 incunabula ; 33,000 manuscripts ; 350,- 000 engravings ; 50,000 pieces of music and 30,000 autographs. One of the greatest of all art galleries is the Vienna Art History Museum. Other important institutions are : Academy of Science, Natural History Museum, Austrian Museum of Art and Industry (on the plan of the South Kensington Museum), Academy of Fine Arts, Conservatory of Music and Oriental Academy. Secondary education is furnished mainly by the Gymnasia and Realschulen. There are also governmental technical high schools. Statistics of the latter for the winter semester of 1915-16, as compared with the win¬ ter semester of 1913-14, show 183 teachers and (in 1913-14) 3,177 students, but only 639 stu¬ dents in 1915-16. For the Vienna Agricultural High School we find 86 teachers and (in 1913-14) 1,135 students, but only 186 students in 1915-16. This shows the enormous decline caused by the war. The most famous of the city's charity institutions are the hospitals : the great general hospital ; the epidemics and clin¬ ical hospitals; the Rudolph, the Jewish, the Brothers of Mercy, Children's and Convent hospitals; and those of Princess Stephanie, Em¬ peror Francis Joseph and Empress Elizabeth.

Consult Benedite, L., ˆLa Peinture au XIX ieme Siecleˆ (Paris, n.d.), and Levitus, A. S., Hmperial Viennaˆ (London and New York

1905).

Marrion Wilcox.

VIENNA, Concordat of, also known as the CONCORDAT OF ASCHAFFEN-BURG, between Pope Nicholas V and the im¬ perial estates of Germany, in February 1448, by which that eminent pontiff agreed to certain changes in the relations between the papacy and the empire in the spirit of the Concordat of (Constance, made in 1418 by Pope Martin V with the representatives of Germany, France, England and other countries.

VIENNA, Congress of, a congress of powers assembled after the first overthrow of Napoleon to reorganize the political system of Europe, disturbed by the conquests of France. The congress assembled on 1 Nov. 1814. The principal powers represented in it were Austria, Russia, Prussia, England and France. Spain, Portugal, Sweden and other minor powers were also consulted on matters more nearly concern¬ ing them. The emperors of Austria and Russia, the king of Prussia and many other Gerrnan princes were present in person. The leading territorial adjustments effected by the congress were the following: Austria recovered Lom¬ bardy and Venetia, while Tuscany and Modena were conferred on collateral branches of the imperial house. The Infanta Maria Louisa, queen of Etruria, received the duchy of Lucca in exchange for Parma, Piacenza and Guastalla, which were given with the title of empress to VOL. 28 — 6

Maria Louisa, ex-empress of France. The le¬ gations, Benevento and Ponte Corvo, were re¬ stored to the Pope. The king of Sardinia re¬ covered Piedmont and Savoy, with the addition of Genoa. Murat retained Naples. Holland and Belgium were erected into a kingdom for the Prince of Orange, William 1. Hanover, with the title of king, returned to the king of England, and the Ionian Isles were as a republic placed under the protectorate of Great Britain, which also retained Malta, Heligoland and sev¬ eral conquered colonies. A federative consti¬ tution, with a diet at Frankfort, was established for Germany. The kings of Denmark and the Netherlands were admitted in virtue of their German possessions to the diet. Bavaria was reinstated in her Palatine possessions with Wiirzburg, Aschaffenburg and Rhenish Ba¬ varia, in return for her restorations to Austria. The demands of Prussia caused a dispute which nearly broke up the congress, but she was finally satisfied with the duchy of Posen, the Rhine Province and a part of Saxony. The con¬ gress was suddenly broken up by the restoration of Napoleon; but its acts were signed by the powers interested on 9 June 1815.

The Congress of Vienna showed a disposi¬ tion also to interfere in American affairs, and an attempt was made to introduce monarchy in the South American countries then engaged in liberating themselves from the Spanish yoke, by the establishment of a French prince as sov¬ ereign over the Argentine provinces. The peo¬ ple of Argentina rejected the proposition. These and other meditated European aggres¬ sions, encouraged by the hostile attitude toward republican institutions of most of the powers represented at Vienna, led to the declaration of principle known as the Monroe Doctrine, which for a time put a quietus on monarchical plots against American republics. Consult Hazen, ‘ˆEurope Since 1815ˆ (New York 1910).

VIENNA, Treaties of, various com¬ pacts arranged by representatives of European nations, at this capital, selected for its central position, and for the prominent part which Austria had always taken in the wars of mod¬ ern Europe prior to her defeat in 1918. The first treaty of Vienna (30 April 1725) was a mutual guarantee of dominions by Emperor Charles VI and Philip V of Spain; besides which, the former agreed to aid in the re¬ covery of Gibraltar from Britain and to aid the Pretender in supplanting George I of Eng¬ land, in consideration of Philip guaranteeing the Pragmatic Sanction. The second treaty (16 March 1731) was a joint guarantee of the Pragmatic Sanction by George H of Britain and the states of Holland. The third treaty (18 Nov. 1738) was a similar guarantee by Louis XV of France. In consideration of the revision of Lorraine and Bar (to be given meantime to Stanislas, ex-king of Poland), as well as a settlement of the Polish succession dispute, and a rearrangement of the posses¬ sions of Austria, Spain and Sardinia, in Italy. The fourth treaty (14 Oct. 1809) was between France and Austria, after the battle of Wagram and the armistice of Znaim, by which Austria agreed to resign some districts on the western border of the archduchy to Bavaria; Goritz, Friuli, Trieste, Carniola and parts of Crotia, Corinlhia and Dalmatia to France,

these provinces to be formed into the govern¬ ment-general of Illyria;

some districts of Upper Lusatia to the king of Saxony; west¬ ern Galicia, with Cracow and Zamocz, and a share in the salt mines of Wielicza, to the grand-duchy of Warsaw ; and the east corner of Galicia to Russia, a total loss to Austria of 58,170 square miles, with population of 3,500,000 and all her seaports.

The next and far the most important meet¬ ing of the representatives of European nations was the Congress of Vienna, after the first treaty of Paris, for the general settlement of the affairs of Europe. The congress, assem¬ bling 30 Sept. 1814, was composed of Tsar Alexander I of Russia, with Count Nesselrode; the king of Prussia, with Hardenberg; Lord Castlereagh, and afterward the Duke of Wel¬ lington, representatives of Britain; Prince Metternich for Austria; Count Talleyrand for France; as well as representatives of Spain, Portugal, Sweden, Rome, Germany and all the other minor powers who 'Were interested per¬ sonally in the deliberations — • the total number convened being about 500. But the represen¬ tatives of the minor states, who had expected a species of European parliament, to which all would be admitted, were sadly disappointed by the preliminary resolution of the great powers to constitute two committees, one of which would deliberate on the affairs of Germany; and the other, composed of the representatives only of Austria, Prussia, Russia and Britain, would discuss the affairs of Europe generally, and decide respecting partition of the con¬ quered districts (formerly belonging to France and her allies), and the frontier of each Euro¬ pean sovereignty. To this latter council Tal¬ leyrand, by the influence of Castlereagh, who early saw the necessity of a counterpoise to the influence of Russia and her follower, Prus¬ sia, in the conferences, was admitted (5 Oc¬ tober) ; and three days afterward it was in¬ creased by the representatives of Spain, Sweden and Portugal. The first resolution of the European committee, to rearrange Europe so as to leave the parties directly interested nothing more to do-than give their adhesion to the arrangements made for them — an arrogation of sovereignty over all Europe — was loudly exclaimed against; but the congress was one of rulers and their representatives, and not of the nations and their representa¬ tives ; so the indignant clamor on all sides was unheeded. The points at once and unani¬ mously settled were ; the constitution of Bel¬ gium and Holland into one kingdom (the kingdom of the Netherlands) ; the annexation of Norway to Sweden; the restoration of Hanover, with a large slice of Westphalia, to the king of Great Britain ; of Lombardy to Austria; and of Savoy to Piedmont. But the questions as to the disposal of Poland, Sax¬ ony and Genoa were not so easily settled. Russia and Prussia, vain of their prominent share in crushing Napoleon, were

bent on extravagant aggrandizement — Russia insisting on oibtaining the whole of the grand duchy of Warsaw (see Poland), while nothing less than the whole of Saxony and some of the trans-Rhenish provinces of Westphalia would satisfy Prussia; and both significantly hinted at the proximity of their colossal armies, with the view of awing the other powers into compliance. But

Castlereagh was not amenable to such influ¬ ences; and while steadily refusing to yield an iota to such preposterous pretensions, he joined with Metternich and Talleyrand in a secret treaty, offensive and defensive, 3 Feb. 1815, which was cordially acceded to by Hanover, Sardinia, Holland and Bavaria. The news of this agreement soon leaked out and produced considerable modification in the pretensions of the northern powers. At last it was agreed that Prussia should obtain a portion of Saxony, Posen, Cleves, Berg, the greater part of the left bank of the Rhine as far as the Saar and Swedish Pomerania; and cede East Friesland, Hildesheim, etc., to Hanover; Anspach and Baireuth to Bavaria; and Lauenburg to Den¬ mark; while Poland, except Posen, Thorn and those parts of the grand duchy which had been (1809) taken from Austria, was to be erected into a kingdom separate from Russia, but un¬ der the rule of the tsar. Austria recovered the cessions which she had been forced to make (1809), obtained also the Valteltine from Switzerland, and the establishment of collateral Hapsburg lines in Tuscany and Piombino; while Maria-Louisa obtained Parma. The Pope was replaced in his former position as a temporal sovereign; the ancient constitution of Switzer¬ land re-established; and Genoa — despite the strongly expressed aversion of its inhabitants — incorporated with Sardinia. The news of Na¬ poleon's return from Elba somewhat hurried the conclusion of these multifarious arrangements, yet the negotiations were not interrupted ; Metternich's scheme for a new confederation of the German states (the same which continued till 1866) was unanimously agreed to — the question of mutual indemnities, rectifications of frontier, etc., being subsequently settled 20 July 1819 at Frankfurt, by a territorial commission of representatives of the four great powers. The questions of the slave-trade and of the free navigation of the Rhine and its tributaries were brought up by England and also satis¬ factorily settled. Finally a formal treaty (the fifth treaty of Vienna) was drawn up and signed 9 June 1815.

VIENNA PASTE, preparation extensively used as an encaustic, though not contained in the Pharmacopoeia : it consists of a mixture of equal weights of caustic potash and freshly burned lime rubbed to powder in

a warm mortar. To 50 parts of this compound 60 parts of quicklime are added, and the whole kept in a well-stop¬ pered bottle. When required for use, the pow¬ der is made into a soft paste with a little spirit, and applied to the part to be cauterized. Vienna paste is much employed by some physicians in certain affections of the womb; and is one of the best applications to an indurated chancre.

VIENNE, ve-enn', department of western France; bounded north by the departments Maine-et-Loire and Indre et Loire, west by Deux-Sevres, which Intervenes between this and the maritime department of Vendee; 2,680 square iniles. The Vienne affluent of the Loire, is the principal river, all the other streams of the department being tributary to it; it flows from south to north and receives the Clain, Gartempe and Creuse — of which only the last is naviga¬ ble. The surface of Vienne is flat, with a grad¬ ual slope toward the north. The country con¬ sists of fertile plains, fine pasture-lands, and

extensive forests. The climate is soft, tem¬ perate and healthful. Grain is cultivated in greater quantity than is required for local con¬ sumption. On an average, more than 21,000,000 gallons of wine are produced annually. In general, however, agriculture is in a backward state. The mineral riches consist principally of iron and manganese and numerous quarries of building and other stone, including litho¬ graphic stone finer and harder than those of Munich. There are cutlery-works and a na¬ tional arms factory at Chatellerault ; forges, blast-furnaces, spinning-mills (both wool and hemp), and manufactures of serges and coarse cloth, paper-works, *etc.* Vienne is divided into fiye arrondissements — Poitiers, Chatellerault, Civray, Loudun, Montm.orillon. The capital is Poitiers. Pop. 332,276.

VIENNE, France, an ancient town in the department of Isere, on the Rhone, 19 miles south of Lyons. The river Gere passes through the town and here joins the Rhone, after hav¬ ing supplied motive power to a number of mills and factories. Vienne was the chief town of the Allobroges, is mentioned by C<esar and by Martial, who calls it the rich Vienne ; in the time of the Roman emperors it was the rival of

Lyons. Besides numerous water conduits, etc., of Roman construction, there are a Corin¬ thian temple of Augustus and Livia, remains of a theatre and an obelisk, called The Eagle, 72 feet high ; and the museum containing many relics of Roman antiquity. The cathedral of Saint Maurice, partly Romanesque, partly Gothic, was built in 1107-1251; Saint Peter's dates from the 6th century. The town was prominent under the Burgundian princes, and its archbishop dis¬ puted with his neighbor of Lyons the primacy of Gaul. In 1312 a council was held here, in which Pope Clement V pronounced the suppres¬ sion of the order of the Templars. There are manufactures of woolens, silk, gloves, paper, leather and iron goods, and trade in grain and wine. Pop, about 27,000.

VIENNE, Haute, France, a department of the Republic, formerly known as Haut-Limou- sin, bounded west by the departments of Vienne, Charente and Dordogne. It has an area of 2,130 square miles. It is watered by the Vˆienne and its tributaries — the chief of which is the Gartempe. The surface is mostly level, but traversed by ranges of low hills, of which the Monts du Limousin, which traverse the south of the department, rise in their highest summit to 3,000 feet. The Mont de Puy-Vieux, the highest in the department, is 3,200 feet above sea-level. The climate is cold, humid and fre¬ quently foggy. The soil is not fertile, and agri¬ culture is in a backward condition ; but domes¬ tic animals are reared in great numbers. Mines of iron, lead and copper are worked and China-clay, of which there is an inexhaustiPie supply, is largely exported to Russia and America. About 6,000 men are engaged in porcelain¬ making. It is divided into four arrondissements — Limoges, Bellac, Rochechouart, and Saint-Yrieix; capital Limoges. Pop. 384,736.

VIEQUES, ve-a kas, or CRAB ISLAND,

West Indies, a dependency of the United States, administratively, a district of the de¬ partment of Humacao, Porto Rico, a fertile is¬ land with several commodious ports where the largest ships can ride at anchor. It lies six

miles east of Porto Rico, about six miles from shore, is 19 miles long and four wide, has a fine climate and produces almost all varieties of fruit and vegetables that grow in the West Indies. The population of Vieques district (in which Culebra Island was included as a ward) was given as 6,642 in the census of 1899, of the town called Vieques, 2,646. The principal set¬ tlement is located on a bay on the southeast

side ; on the north is the town of Isabel Se-gunda. Latest statistics of the island prepared under the direction of the War Department of the United States show: Native whites, 2,545; foreign whites, 138; negroes, 1,036; mixed, 2,923; married, 688; single, 4,539; living to¬ gether as husband and wife by mutual con¬ sent, 1,185; widowed, 230; inhabitants 10 years of age and over who attend school, 162; 10 years of age and over who could neither read nor write, 3,288; superior education, 22; inhab¬ itants engaged in agriculture or fisheries, 1,396; trade and transportation, 225 ; manufacturing and mechanical industries, 253 ; professional service, 39; domestic and personal service, 727 ; without gainful occupation, 4,002 ; total number of dwellings, 1,273; number of farms,

yiETA, ve'a-ta, Frangois, French mathe-' matician : b. Fontenay-le-Comte, 1540 ; d. Paris, February 1603. He practised law until 1589, when he was appointed maitre des requetes under the Parliament at Paris, subsequently holding various civil offices. He was the founder of the modern algebra and the fore¬ most algebraist of his time. His works were collected and published by Van Schooten (Ley¬ den 1646).

VIEUXTEMPS, ve-Uton, Henri, French' composer and violinist: b. Verviers, Belgium, 2 Feb. 1820; d. Mustapha, Algiers, 6 June 1881. He studied at Vienna and at Paris, and made his first appearance at Paris in 1841. He vis¬ ited the United States in 1844ˆ5, 1856 and 1870, was solo violinist to the emperor of Rus¬ sia in 1846-52, and in 1870 was appointed to a professorship at the Conservatoire at Brussels. A stroke of paralysis, in 1873, left his right arm useless and he was compelled to retire. He composed numerous pieces for the violin, com¬ prising concertos, fantasies and dances.

yiGAN, ve'gan, Philippines, pueblo and capital of the province of llocos Sur, on Luzon Island and at the northern delta of the Abra River, about three miles from the coast, and 200 miles northwest of Manila. It is open to the coast trade, is on the west coast road con¬ necting it with Dagupan, and the Dagupan and Manila Railroad, and carries on an important trade with the interior of the province by means of the river. It contains brick kilns, a boat¬ building yard and a carriage factory. It has broad streets and a number of important public buildings, including the casa real, courthouse, provincial administration building and the coun¬ cil seminary; it has been an

episcopal see since 1755 and contains a fine cathedral and the bishop's palace. Pop. about 18,000.

VIGEVANO, Italy, town situated in the province of Pavia; 15 miles southeast of No¬ vara and 24 miles southwest ot Milan. It stands on rising ground on the banks of the Mora, not far from the Ticino. It is a walled town ; has an arcaded market-place, a cathedral,

and a castle of the Sforza family, dating from the 14th century; manufactures silk, linen and cotton fabrics ; and has active trade in grain and wine. Pop. 15,000.

VIGFUSSON, vig'foos-s6n, Gudbrand, Scandinavian scholar: b. Frakkanes, Iceland, 13 March 1827; d. Oxford, England, 31 Jan. 1889. He was educated at Copenhagen University and lived in Copenhagen from 1849 till 1864, devot¬ ing himself to the study of old Icelandic lit¬ erature. His first work, ˆTimatal,> on the chronology of the Sagas, was published in 1855. In 1858 he brought out the ˆBiskupa Sogur, or Lives of the Icelandic Bishops, > and in 1864 the ˆEyrbyggja Saga.ˆ He then went to England to undertake the Icelandic-English lexicon, on which he was employed from 1864 to 1871. In 1878 the Clarendon Press published his ˆStur-lunga Saga,ˆ to which he prefixed the ˆProlego¬ mena,ˆ containing a complete history of the classic literature of Iceland. This was followed by the ˆCorpus Poeticum Borealeˆ (with F. York Powell), a complete collection of the an¬ cient Icelandic poetry, with translation. In 1848 he was appointed lecturer in Icelandic and kin¬ dred subjects at the University of Oxford.

VIGIL, the day and night preceding a fes¬ tival in the Roman Catholic Church. In the early period of the Church the night as well as the day was spent in prayer and fasting, but this practice, so far as the night was con¬ cerned, was found to promote immorality, and it was given up, the vigil being celebrated in the day time only, except the midnight mass, before Christmas, which is a relic of the old custom. The term "vigil® is also applied to the devotional exercises held on the evening pre¬ ceding a festival.

VIGILANCE COMMITTEE, a term used in the United States to denote a band of citizens organized to summarily punish crime or prevent the commission of crime, in instances where the civil and lawfully constituted authorities seem powerless to enforce the law. The most noted committees in the history of the country were those formed in San Francisco and con¬ tiguous territory in the Western States, and in New Orleans, in the Southern States. In the earlier years of San Francisco the city was so overrun with the lawless element among the minps and adventurers that the administration of justice in the hands of the constituted au¬ thorities was a travesty. It was then that the v/ ork of the vigilance committee, or Vigilantes, as they were styled, began. That work was short, sharp and terrible. Thieves and mur¬ derers were hanged on every side, while others were forced to seek safety in flight. In New Orleans the last instance of the organization of a vigilance committee was in 1891, when a body of citizens took from the city jail a num¬ ber of Italians, suspected of being members of the Italian fraternity of murderers known as the Mafia, and accused of being the murderers of Chief of Police David Hennessey, and put them to death by shooting and hanging. This action produced serious complications between the Italian government and that of the United States.

VIGILIUS, vi-jil-i-us. Pope : b. Rome ; d. Syracuse, 555. During the pontificates of Agapetus I and Sylverius, Vigilius was apocrisiarius (an office nearly corresponding to the later one

of papal nuncio) at Constantinople, and having sided with the imperial government against Pope Sylverius, was sent to Rome to procure the imprisonment and exile of Sylverius. This being accomplished, Vigilius was proclaimed Pope in 537, but was not acknowledged by the entire Church as such till 540, when Sylverius died. It has been said that, according to a promise given to the empress of Constantinople, he wrote in 538 a secret letter to the heads of the Monophysites, in which he approved of their views and condemned the anti-Monophys- ite decisions of Pope Leo I. Modern critics all agree in pronouncing this letter apocryphal; and later (after 540) he refused to issue a de¬ cree in favor of the Monophysites, declaring that he would abide by the decisions of the four oecumenical councils and the decrees of popes Agapetus and Leo. When Justinian in 544 con¬ demned the so-called “Three Chapters® (the writings of Theodore of Mopsuestia, of Theo-doret against Cyril, and the Epistle of Ibas), and the western bishops generally threatened re¬ sistance to this, Vigilius was summoned to Con¬ stantinople (546)

and prevailed upon to con¬ demn likewise the “Three Chapters,® in a docu¬ ment called ‘ˆJudicatumˆ (548) ; saving, how¬ ever, the authority of the council of Chalcedon, which has refrained from condemning them. As this satisfied neither the opponents nor friends of the “Three Chapters,® Vigilius called an oecumenical council, the fifth, to settle the dispute. In the eighth session, the “Three Chapters® were condemned in nearly the same terms used by Pope Vigilius in his Uudicatum.ˆ As a matter of prudence to allow the agita¬ tion occasioned by the controversy to subside, the Pope waited some months before announc¬ ing to the Catholic world that the “Three Chapters® had been regularly condemned by the council. Vigilius then obtained the emperor’s leave to return to Italy, but died at Syracuse on the way back.

VIGNAUD, ven-yd-‘, Jean Henry, Ameri¬ can diplomatist and author: b. New Orleans, La., 27 Nov. 1830. He taught in the schools of his native city in 1852-56, and at the same time wrote for Le Courrier and other papers. In 1857-60 he was editor of U Union de Lafourche at Thibodeaux, La., and in 1860-61 was one of the founders and the editor of La Renaissance Louisianaisc, a weekly journal. In 1861 he joined the Confederate army as captain in a Louisiana regiment and was captured at New Orleans in 1862. The next year he was ap¬ pointed secretary of the Confederate Diplo¬ matic Commission at Paris; in 1872 he was translator at the Alabama Claims Commission at Geneva; and in 1873 a delegate from the United States to the International Metric Con¬ ference. He was appointed second secretary of the American legation at Paris in 1875, and first secretary in 1882, retaining this position when the legation became an embassy. He has written ˆL’Anthropologieˆ (1861) ; ˆCritical and Bibliographical Notices of All Voyages which Preceded and Prepared the Discovery of the Route to India by Diaz, and to America by Columbusˆ; ˆToscanelli and Columbus — the Letter and Chart of Toscanelli on the Route to the Indies by way of the Westˆ (1902) ; ˆToscanelli and Columbus — Letters to Sir Clements R. Markham and C. Raymond Beaz-leyˆ (1903). The publication of his ˆToscanelli

and Columbusˆ provoked considerable contro¬ versy; its aim was to impugn the purely scientific origin of Columbus' discovery. In Paris he continued to write, bringing out sev¬ eral books in French, his last contribution to the Columbus controversy being ˆHistoire Critique de la Grande Enterprise de Christophe Columbˆ (Paris 1911).

VIGNETTE, (French vignette, a flourish, a head-piece — from vigne, a vine — from L. vinea, a vine — lit., a little vine, the first vig¬ nettes having been adorned with borders of vine-leaves and grapes) : in Gothic architecture, a running ornament or embellishment of vine-leaves, tendrils, etc.; in hooks, the small en¬ graved embellishment, illustration, or decora¬ tion that precedes the title-page or chapters of a book, etc., originally bordered with a scroll of trailing plants or the like, hence the name; in general a picture, and specially a photographic portrait, displaying the head and upper part of the body only, and having no definite border, the ground shading off insensibly to an even color.

VIGNOLA, ven-yala (Giacomo Barozzi), Italian architect : b. Vignola, near Modena, 1 Oct. 1507 ; d. Rome, 7 July 1573. He received his art training at Rome, later spent two years at the French court; was architect to the Pope and after the death of Michelangelo (1564) architect of Saint Peter's. The two small cu¬ polas are his additions to that building and the principal other works which he produced are Caprarola Palace near Viterbo and the Church of Jesus at Rome, which was completed after his death by Giacomo della Porta, but not in accordance with the original plans. His build¬ ings are marked by taste and harmony, al¬ though chilling in their severity of design. He has had more influence as an architect through his work, ˆRifles of the Five Orders of Archi¬ tecture' (1563), which for a long time was con¬ sidered the standard authority, although on his theory the antique builder was restricted by narrower rules than ever actually were in vogue.

VIGNY, ven-ye, Alfred Victor, Comte de, P'rench author: b. Loches, Indre et Loire, 27 March 1797; d. Paris, 17 Sept. 1863. He en¬ tered the army at the Restoration, but resigned from the service in 1827. By thisˆ time he had published two books of verse ˆPoemes' (1822) and 'ˆPoemes Antiques et Modernes' (1826), the latter containing the ˆMo'ise' ; and ˆCinq-Mars' (1826), a work of fiction which, despite the author's study of sources, is far from being true to history. This work owes much to Wal¬ ter Scott. De Vigny made good translations of ˆOthello' and the ˆMerchant pf Venice,' and won a great triumph in 1835 with his drama of ˆChatterton.' At the highest point of his repu¬ tation, he did not, however, follow up his suc¬ cess ; and he printed

nothing further but a few poems in the ˆ Revue des Deux Mondes.’ He was elected to the Academy in 1845. Many critics regard his ˆServitude et Grandeur Mili-taires’ (1835) as his finest work. It is a col¬ lection of short stories of the army, and was based to some extent on his own experience. Its tribute to martial heroism was highly ap¬ preciated soon after the Napoleonic time. His dramas and prose fiction, particularly <Cinq-Mars,’ are much better known than his verse.

though it is chiefly by the latter that literary historians have appraised him. ®He is,” says Dowden, ˆfihe thinker among the 4)oets of his time” in France. His few informing philosoph¬ ical ideas he treated with great, though unequal skill. His general attitude was one of a rather stoic acceptance of things, and his manner has a corresponding dignity. (See Cinq-Mars). Other volumes by him are ˆLes Destinees’ (1864), and ˆStello’ (1832), the former verse, the latter prose. Consult Paleologue, ˆAlfred de Vigny’ (ˆGrand Ecrivains Frangais,’ 1891); Dorison, ˆAlfred de Vigny, Poete et Philosophe’ (1892) ; Montegut, ˆNos Morts Contemporains,’ 1st series (1882) ; Sainte-Beuve, ˆPor¬ traits Litteraires,’ Vol. VHI, ˆPortraits Contemporains,’ Vol. H, and ˆNouveaux Lundis,’ Vol. VI. (Consult his ˆLife’ by L. Seche (Paris

1910).

VIGO, ve’go, Spain, town in the province of Pontevedra, situated on the Bay of Vigo, 20 miles southwest of Pontevedra. It is the head¬ quarters of sardine and tunny fisheries. The town is old and irreguarly built, but picturesque, and the surrounding country, which is very at¬ tractive, is rich in wine, oil and fruits. A gov¬ ernment wireless station is located here. The population has doubled in 20 years, the 1918 estimate being 47,000.

VIHARA, vi-ha’ra, a word originally mean¬ ing in Sanskrit pleasure or relaxation; after¬ ward signifying a pleasure-ground, and hence a meeting-place. The temples being meeting-places for the Buddhist monks — just as places of worship in New England are called meeting¬ houses — the word was used to designate a Buddhist temple, and hence it came to be ap¬ plied to a Buddhist monastery, which in com¬ plete form includes the image-house, with images of Buddha, the dagoba, a bell-shaped dome, solid in structure, under which a relic of Buddha is supposed to be buried, the sacred Bo-tree,

surrounded by a stone terrace, and sup¬ posed to be a descendant of the Bo-tree, or sacred fig-tree, under which enlightenment came to Buddha; also a hall for preaching, a hall of assembly, and sleeping-rooms. See Buddha ; India; Pagoda.

VIJAYANAGARA, ve-ja-yan'a-ga'ra, or BIJANAGUR, be-ja-na-goor', otherwise Hampi, India, an ancient city, now in ruins, in Bellary district, Madras, 30 miles northwest of Bellary. It stands in a plain, surrounded by enormous masses of granite, and covers an area of nine square miles. On the north and west it is washed by the Tungabhadra, and in other directions is enclosed partly by natural precipices and partly by strong stone walls. Among its edifices are a magnificent temple of Vishnu with a pyramidal portico about 160 feet high, divided into 10 stories; another temple, also entered through a painted pyramidal por¬ tico ; and one of Rama, with pillars of black hornblende covered over with elaborate mytho¬ logical sculptures. These buildings, and many others beside are in the purest style of Hindu architecture and are carefully conserved by government. The ruins of the ancient city, founded in 1386, and for 250 years the strong¬ hold of a great Hindu empire, was effected by a confederation of Mohammedan rajahs, who took and sacked it in 1564. The site is still

esteemed holy by the Hindus, and is the loca¬ tion of an annual festival. Consult Sewell, R., Forgotten Empireˆ (1900).

VIKING, from the Icelandic vik, a bay or fiord, and the termination ing, implying one who belongs to or is descended from ; literally one who lurked in bays and issued thence to plunder, a rover belonging to one of the bands of North¬ men who scoured European seas during the 8th, 9th and 10th centuries. The wrong syllabic divi¬ sion of this word as vi-king instead of vik-ing has caused it to be frequently confounded with sca-king, a term which is applied to a man of royal race, who took by right the title of king when he assumed the command of men, al¬ though only of a ship's crew ; whereas the former term is applicable to any member of the bands. The

Scandinavian vikings were ex¬ cellent shipbuilders and expert seamen, and were able to navigate in the open sea by the aid of the sun, moon and stars. Notwithstand¬ ing the origin of the term, which is unpleasantly suggestive of the methods .gf Malay pirates of present or recent date, it has come to be the recognized designation of the Scandinavian ad¬ venturers who, by daring, hardihood and endur¬ ance, fought their way to thrones, and estab¬ lished kingdoms, principalities and dukedoms in all parts of Europe, from southern Russia to Britain. See Normans.

yiLAINE, ve-lan, France, a western river which rises in the department of Mayenne, flows west past Vitre to Rennes, where it re¬ ceives the Ille from the north, and with a southwesterly course reaches the Atlantic at Penestin, in the department of Morbihan, after a course of 150 miles, 80 of which are navi¬ gable. With the Ille it gives its name to the department of Ille-et-Vilaine.

VILAS, vi'las, William Freeman, Ameri¬ can lawyer and politician: b. Chelsea, Vt, 9 July 1840; d. Madison, Wis., 27 Aug. 1908. He went to Wisconsin with his parents in 1851, and was graduated from the University of Wisconsin in 1858, and from the Albany Law School in 1860, He was admitted to the New York bar, but returned to Wisconsin, was ad¬ mitted to the bar there, and had just begun the practice of his profession, when he joined the Federal army (1862). He was promoted lieu¬ tenant-colonel, and commanded his regiment during the siege of Vicksburg; he resigned from the army in 1863 and returned to his law prac¬ tice. He was professor in the Law School of the University of Wisconsin, 1868-85 ; and was a regent of the University, 1881-85 and 1897-1905. After the Civil War he was an active member of the Democratic party; from 1876 to 1886 he was the Wisconsin member of the Democratic National Committee, and in 1884 was permanent chairman of the National Con¬ vention ; and in 1885 was elected to the Wis¬ consin legislature. In the same year he was ap¬ pointed Postmaster-General of the United States, and in 1888-89 was Secretary of the In¬ terior. His course as Postmaster-General was marked by an improvement of the foreign mail service, economy of management and the negotiation of postal treaties with Mexico and Canada. In 1891 he was elected to the United States Senate for a six years' term. In 1896, being opposed to the free-silver movement, he

was one of the organizers of the National or Gold Standard Democratic party, attended their convention at Indianapolis, and was

chairman of the committee on resolutions. He edited (with E. E. Bryant) the 1st, 2d, 4th and 6th-20th volumes of the ˆWisconsin Supreme Court Reports.ˆ

VILAYET, vil-a-yet', in the Turkish em¬ pire, the most important administrative division, governed by a vali, or governor-general and a council. Each vilayet is divided into livas or saiijaks.

VILKOMIR, or WILKOMIERZ, town situated in Lithuania, government of Kovno ; on the Swenka, 130 miles southeast of Riga. It was a flourishing town in the 13th century, and continued prosperous till the I7th century, when it began to decline, in consequence of the wars with Sweden, Russia (Vilkomir being at that time a Polish town), and the Cossacks. Vilko¬ mir contains an ancient church of the 13th cen¬ tury. Flax is exported to Riga. Pop. 15,000, of whom over 50 per cent are Jews.

VILLA, vil'a, a word which in the English and Anglo-American sense means a rural, sub¬ urban, or seacoast dwelling of some size and style, as distinguished from a farm-house and which is occupied usually in the summer months by a person who has also a residence in the town or city. In the Latin it had a similar mean¬ ing but also meant originally a small collection of houses, and as the country home of a rich Roman would be likely to have around it a cluster of dwellings of retainers and slaves, it is probable that the country house became known as a villa from this fact. The French and Spaniards have enlarged on the Latin meaning, and with them it is equivalent to the English word ®town,ˆˆ either as designating an urban community, or as distinguishing town from country, Italians give about the same meaning to the word as their Roman prede¬ cessors.

VILLA ADRIANA, vel'la a-dre-a'na, or HADRIAN'S VILLA, the ruins of a splendid palace, temples, baths, theatres and other build¬ ings erected by the Emperor Hadrian, near Tibur, now Tivoli, about 15 miles east-north¬ east of Rome. The emperor spared no ex¬ pense to make it the most beautiful palace in Italy. Our modern knowledge of architecture is largely based on the designs and forms found in Hadrian's Villa. Many of the statues now in Roman museums were found there.

VILLA ALBANI, al-ba'ne, a modern Ro¬ man villa containing many works of art. It was founded in 1760 by Cardinal Alessandro Albani. The first Napoleon caused many of its art treasures to be removed to Paris. These were restored to the Albani family in 1815, and were sold, and are now in the Glyptothek at Munich, and other collections.

Prince Tor-lonia bought the villa in 1866.

ˆ VILLA ALDOBRANDINI, al-doˆbran-de'ne, a noted villa at Frascati, near Rome, built for Cardinal Aldobrandini about the close of the 16th century, and afterward owned by the Borghese family.

VILLA BORGHESE, bor-ga'se, a villa, just outside the Porta del Popolo, Rome. The founder was Cardinal Scipio Borghese, nephew

of Pope Pius V. The original museum was purchased by Napoleon I and sent to the Louvre, and another has been established in its place. The villa contains many fine sculptures.

VILLA LUDOVISI, loo-d5ˆveTe, for¬ merly one of the chief attractions of Rome until the palace and gallery of statues, and a large part of the grounds, gave way to the march of local improvement. The villa was built in the early part of the I7th century by Cardinal Ludovisi on the site of the Gardens of Sallust, and large sums were expended in beautifying the grounds and adorning the gal¬ lery of statues with a collection of antique sculptures, including the famous Ludovisi Juno and Mars. These were removed in 1891 to the Piombino palace, and the only building remain¬ ing of the Villa Ludovisi is the Casino dell' Aurora.

VILLA MEDICI, ma'de-che, a famous Roman villa, south of the Pincio, with a fine col¬ lection of casts. It was built in 1540 for Cardi¬ nal Ricci de Montepulciano, became the property of the Medici family about 1600, and passed into the possession of the Grand Dukes of Tuscany, the younger branch of that family. Here Gali¬ leo was confined, when hrs sentence to imprison¬ ment in a dungeon for advocating great as¬ tronomical truths was commuted to detention in the villa of the Grand Duke of Tuscany at Rome. In 1801 it became the home of the French Academy of Art, founded by Louis XIV. It is one of the most interesting features of the Eternal City.

VILLA NAZIONALE. See Naples.

VILLA PALLAVICINI, pal-la-ve-chCne, the celebrated residence of the Marchese Durazzo, at Pegli, on the Gulf of Genoa, Italy. Nature and art are combined to make it one of the most picturesque and enchanting spots on the globe. The decorations display taste and magnificence, and the gardens are luxuriant with the choicest plants of that genial climate, while statues, grottoes, fountains, a Christian chapel, a mosque, a Roman temple, a triumphal arch with sculptures, and other works of art add to the grandeur and beauty of the scene. The villa commands an extensive view of the Mediterranean.

VILLAFRANCA DI VERONA, vel-la- frang'ka de va-rona, Italy, a small town in the province of Verona, 10 miles south-southwest of Verona. It is of mediaeval appearance, sur¬ rounded by walls and moats. The castle is now in ruins. The preliminaries of a peace between Francis Joseph of Austria and Napoleon III of France were signed here on 11 July 1859. Pop. about 12,500.

VILLAGE, The. The term village is pop¬ ularly applied in the United States to any small community with less than 500 popula¬ tion. It is thus popularly and loosely dis¬ tinguished from the town (not to be confused with the New England town) and the city. In a few of the older eastern States (Pennsyl¬ vania, Connecticut, New Jersey, Virginia) the designation ˆboroughˆˆ is used for one or more of these classes of small municipalities.

The incorporation laws of more than half the States do not provide for incorporated vil¬ lages, but only for towns and cities. In gen¬ eral the older States are the more conservative

in this matter. New England incorporating only a very few of the many villages communities within her towns. Kansas knows only one class — the ˆˆcity.® This legal practice seems to be the evidence of the urban ambitions of small communities in this rapidly growing nation.

These incorporation laws, moreover, are very liberal in allowing communities, almost without restriction even as to number of peo¬ ple, to incorporate either as villages, towns or cities. In some cases a minimum popula¬ tion is required, but there is usually no limita¬ tion on the form of incorporation adopted, al¬ though such are beginning to appear in some States. Consequently there are many ex¬ tremely small incorporated municipalities of the village type, and even of the town and city classes. This again is indicative of an ambi¬ tion for public improvements and services which only grants of power to the

higher grades of municipality can effect.

There were no such small municipalities in the Colonial period, and reluctance even to incorporate communities which had every possibilty of becoming places of import¬ ance. There were less than a score of incorporations down to the time of the Revolution, but at that time and immedi¬ ately after much greater liberality was shown, and the number of municipalities grew rapidly. But the villages and towns had still no local self-government, although special laws were frequently passed allowing powers as local improvement districts, for fire protection, drains and the like. Out of these and prob¬ ably first in New York State came the prac¬ tice of incorporating villages. Later general laws were enacted, but it is only within very recent years that a system of village law is beginning to take form.

Consequently, this country presents to-day the unique and characteristic phenomena of some 12,000 incorporated places under 2,500, largely towns and cities. Since the United States census considers only communities of more than 2,500 population as urban, these may be said to constitute the village proper. More than half of these are of less than 500 popula¬ tion. Nor does this include the many hundreds of unincorporated villages and towns in New England where practically every town has one and usually several. Their total population is more than 8,000,000.

To these incorporated places should be added the many thousands of hamlets, or as they are popularly called, villages, found in all parts of the United States. The best commercial atlases designate 75,000 ^^places® of stated population (50 up). These are pretty villages, often in¬ land from railroads. They are more frequently found, and are less populous, in general in the older eastern and souihern States. Conservatism as to incorporation is here greater than in newer sections, hence a considerable number of them are of quite large population (100 up). There are on the average, therefore, several of these for every incorporated place. Their total population is probably more than 5,000,000.

Thus this village sphere of community life includes about one in eight of the American people. It is neither urban nor rural in its characteristics. It is distinctly intermediate. In

the past the village has turned toward the town and city, but now more and more is related to the rural. Neither urban nor rural can be rightly judged until this large intermediate vil¬ lage sphere is separated from them. Many characteristics attributed to rural life are due to the inclusion in the rural of this class of communities, and the same is true of our judg¬ ment of the urban sphere. Villages should not be included with the population of the open country, nor with the town and city proper. Indeed, many communities of several thousand population are often essentially country towns, whose population is recruited from the farm¬ ing population, and whose business and social interests are bound up with the surrounding farm district.

The tendency to incorporate village com¬ munities has been especially marked since 1890. More than half of all at present existing have been incorporated since that date. Three of the New England States (Maine, Vermont, New Hampshire) even hqiye allowed incor¬ poration, though it has only in a few score instances been availed of as yet. In the north and middle Atlantic States there is a conserva¬ tism in practice and only the larger places (over 500) are generally incorporated. In the South this has been even more marked, often not more than one place in a county being incor¬ porated and in many cases none such is found. But since 1890 and especially since 1900 many small places, particularly those on the railroads, have incorporated. In the North Central group of States incorporation of villages is most in vogue; already more than half of the total number of such are in this section, although only only-fourth of the nation is resident there.

Here, too, segregation of the incorporated village from its township has been adopted in several States. And special representation on county boards (supervisor type) has in a few cases been accorded to villages. But this repre¬ sents an extreme tendency; generally the vil¬ lage remains part of the township for township purposes, while almost everywhere the school district is separate and independent of the village corporation, and is usually more exten¬ sive in area.

Such political independence of the American village is characteristic and unique. The Euro¬ pean ^^commune^^ includes both village and farm district in one political unit. Nine-tenths of the people of Russia live in such village com¬ munities or and communal life is only

less widespread in other European countries. There is practically no open country life or isolated as in this country. Moreover, the villages are more than merely business centres for the district, as they are with us. There the farming or peasant population live in the village centres and cultivate the surrounding plots. Thus there is no motive for political separation.

In America the village has always had town and city ambitions. In the early days the great majority of the places realized those ambitions though some, missed by the railroad and by in¬ dustry, stood still or suffered decline. The later ones have little opportunity of becoming cities, and see their permanent future in rela¬ tions with their countryside. This is the under¬ lying reason for the less widespread desire to

incorporate villages to-day than formerly. In¬ corporation was usually the outcome of an ambition to become a town or city. This di¬ vorced them politically from the farming com¬ munity.

The early village was nothing more than a trading and later a shipping point.- Latterly, since the 80's, it has more and more become a place of residence for retiring farmers and others for whom there was no place in the active life of the farm. This together with the investment in village business institutions on the part of surrounding farmers, tends to bind village and countryside together in interest. Retiring farmers, too, increasingly rent rather than sell their farms on retiring. In the first days of the rise of land values they usually sold. Increasingly, too, they rent to relatives, which gives them continued concern not only with the business but social interests of the country. The village schools and churches, too, draw many farmers and their families. It has become a custom to speak of village churches as country churches. School law recognizes the facts and tendencies of farmers' use of village schools. The village has become more broadly a business and social centre for its district. The farmers are about as much concerned with village affairs and improvements as the vil¬ lagers themselves. The conditions and needs of the new agriculture give the farmer a new concern in village business and social institu¬ tions. Problems of marketing, credit and labor all interest him in the village. The vil¬ lage is now, as it was not formerly, a shipping, a trade centre.

It is probable that as in a few States of the East, following the New England custom, added powers may be given the township to enable it

to answer the needs of village im¬ provements. Already many towns and village? are being made coterminous with reduced town¬ ships. Many villages have very extensive cor¬ porate limits and in some States some town¬ ship powers, such as tax assessments, are being added to those of the village. In the future we may approximate somewhat to the con¬ ditions of the European commune.

The villages are, unlike the towns and cities, by no means uniformly growing in population. Stationary or losing numbers is exceptional among larger places, although now increas¬ ingly frequent. In the villages it is the rule. More than half are not growing in numbers. Perhaps one in four is losing rapidly.

This is in part the result of rural depopula¬ tion, and itself a large factor in such. Of re¬ cent years the villages have lost in many cases more than their farm districts. The larger towns and nearby cities have drawn trade and residents. Village youth have sought oppor¬ tunity elsewhere in the newer farming regions or more so in the cities. Moreover, an abnormally large proportion of villagers are aged (above 45 years), the youths remaining in active farming or seeking the cities. But conditions are changing so as to favor village growth and prosperity. Retiring farmers now more often seek their neighborhood centre than formerly, and the growth of village business, social activity and demands for farm labor furnish new opportunities. At present the col¬ lective village population is growing only

slightly per decade (less than 10 per cent) but conditions are favorable for a very rapid and large increase as new and cheap lands become unavailable, and more diversified agriculture spreads.

It is the exceptional village that will in future become a town. Seldom will manu¬ factures enter to contribute to their growth. They must depend upon utilizing their opportu¬ nities as business and social centres for their farm districts.

Already the graded village school, with centralization of pupils, is more important in the reorganization of rural schools than is the more noteworthy, but exceptional, movement to consolidation. The village is the natural school centre for most farming communities. And so of the rural church. Already two-thirds of the so-called country churches are in the vil¬ lages. Strictly rural churches decline and decay. The village churches find their best opportunity in serving the farming population.

The average American village, however, presents a duplication, rivalry and waste in its institutional life that is characteristic. Several churches, a large array of business places, fiercely competing for the limited opportunity are typical. There is also a keen rivalry be¬ tween neighboring places. Village life to-day is strenuous. The village that succeeds will be the one that realizes its place and function in local life.

The form and pOAvers of local self-govern¬ ment generally accorded the village is that of municipalities in general. Incorporation is by popular vote of the district and formal petition to county authorities. A chief executive officer, variously known as mayor, president, *etc.* ; a limited number of administrative officers, such as treasurer, assessor, clerk, marshal ; and a council are the constituent agencies. These are almost always elected by direct popular vote. Elections take place in general every two years, and usually in the spring. The mayor usually appoints the marshal, and in general is held responsible for police administration. Most States allow the village community to select its own justices of the peace, and often the mayor is a justice ex-officio.

Usually he has a cast¬ ing vote, but no veto. The council is a small body naturally, of three or five members, selected at large, and holding monthly meetings. The officers throughout are unpaid, paid nominally or for specific services. The school board is a separate body, also popularly elected.

The powers accorded the village are limited taxing and financial power, restricted by the necessity of referendum ; and ordinance powers. The amount of money raised for village ex¬ penses is generally small, and village govern¬ ment excites but little interest. The regular parties do not function in village elections, local parties being the rule. To consolidate the township and school district with the village would lessen the number of necessary officers, making it possible to pay salaries for regular service and increase the electoral interest in local affairs. Such offices would call out a bet¬ ter class of men for office. The local self-gov¬ ernment ot the village, township and school district is in a chaotic condition, and a great opportunity for training in democracy is thus neglected.

Village Improvement. — Village improve¬ ment is a term coming into common use, to designate all forms of civic improvement in small incorporated places. The term just came into use in New England, but may well spread to other parts of the country, as the village problem becomes a conscious one there.

The term includes both the activities of the corporation and of private enterprise for vil¬ lage betterment. Recently it has come to in¬ clude social and economic improvements other than what are generally known as municipal improvements, such as fire protection, street lighting, paving, provision of parks. An evi¬ dence of the widespread effort and attention to village improvement is the publication of a special edition of The American City, devoted almost exclusively to the town and village (since 1913).

In the past much more attention has been devoted to the physical improvement of the more enterprising villages than to other aspects. The great majority of villages (whether incorpo¬ rated as villages, towns or cities) now have some form of municipal water supply. They quite often have some portion of the business district paved, and sidewalks quite generally. Municipal ownership and operation of electric light plants is very common. Even very small places have some park area. Public lighting is customary.

Naturally these are of limited scope. Water supply often has been installed chiefly for fire protection. Sewers are seldom found in places under 1,000, although most communities have some private systems of drainage. These, from the sanitary point of view, are very imper¬ fectly guarded. Water .supply is largely from shallow wells. Garbage disposal is of the most primitive kind. Sanitary conditions in villages from these points of view are very far from desirable.

Street paving is rather^ unusual, although frequently the business district or main street is paved. Many permanent sidewalks constructed privately preceded general municipal provision for such, and in general one-fourth of village streets are so provided.

In the Middle West villages such improve¬ ments are more frequently found than else¬ where. Urban ambitions and imitation are most active here. Special influences, such as summer residents, have been strong in New England communities. But in the awakened villages and towns of these older States, and in the South, village improvement has a large future.

The growing practice of the light companies of larger towns and cities to furnish power for light in the surrounding villages is an important advance.

Village street plans have in general been based upon the supposition that the place would sooner or later become a town or city. Streets * are usually the width of a country road, and often much wider. Moreover, all streets are generally of like width. This is in marked con¬ trast with the Old World village, with its single main street, and its courts and lanes. In part this accounts for the unkempt appearance of the average village, with its little, grass-and-weed-grown streets, faint wagon track and straggling footpath. Little used for traffic, and fenced off from the private house-lots, the

street is a neglected space. There has been little attention paid in this country to town planing, even for new communities.

The lay-out of the average village is rectangular and seldom takes any account of natural features. The American village is as a result seldom either orderly or picturesque. It consequently leaves much to be desired as a place of residence for retiring farmers, and must speedily correct such a condition if it would compete with towns and smaller cities.

Most villages prescribe fire-limits and com¬ pel brick or sheeted buildings in the business district. But such limited fire-ordinances as exist are very inadequately enforced. The fire hazard is exceptionally high and the losses out of all proportion as compared with the cities. Sweeping conflagrations are all too common.

The great majority of villages, even of a few hundred people, have graded schools, in¬ cluding high school facilities of a limited range. The school is usually the best building in the place, most frequently answering to modern requirements, and* in many cases con¬ structed with some thought of its acting in some sense as a social centre.

Despair has settled down upon a great many of the villages which were settled one or more generations ago, and have seen their neighbors thrive and grow. Stationary or losing popu¬ lation, the aged and conservative character of a large proportion of the population make effort for improvement difficult. But current population movements will repopulate and somewhat change the character of village popu¬ lation. The average village will come to realize what its necessary future must be. A new civic spirit and outlook is coming to the American village. A change of front from imitation of the town and city to seeking to become an adequate village centre for its dis¬ trict is inevitable.

A first necessity of successful village im¬ provement is a vision of the scope, the place and the function of the village community in American life. Journals like the American City can do much. The organized municipal interests of the country have hitherto paid little or no attention to places other than cities and the larger towns. The Massachusetts Civic League, under the able direction of E. T. Hart¬ man, comes nearest to an organization such as is necessary for this purpose. But village im¬ provement must by no means be confined to merely physicalˆ improvement, and least of all the mere imitation of urban communities.

William L. Bailey,

Associate Professor of Political Science, Grinnell College.

VILLAGE COMMUNITIES. These are supposed to have been the primitive form of organized human society. In Africa, the South Sea Islands and among the American aborigines who have progressed beyond savage isolation the village community ex¬ ists, a survival of a system which was probably universal in the pre—historic period, and was prevalent throughout a large part of Europe, as it is to-day in Russia, long after Greece and Rome had built flour¬ ishing cities and established new forms of civ¬ ilization. In the Russian mir, a word which signifies union, all the land is held in common,

and is divided for use among the several fam¬ ilies. Such was the system of land tenure among the ancient German tribes, when they first came within the observation of the Ro¬ mans, and although at a very early date — probably before the tribes from the North swept down on the Roman dominions — private proprietorship of land had become a fixed insti¬ tution among them — the village continued to have its common or ^^green,^^ which every villager had a right to use and enjoy. This communal land system was brought to the New World by the first settlers, being represented by the Boston Common, and the *Commons^^ of New York now known as City Hall Park, and other similar public reserves.

•It is unnecessary to trace the village com¬ munity from its primitive condition through the feudal and more recent periods to the pres¬ ent day. Throughout all changes something of the commerical system survived, and the com¬ mon enjoyment of land, which had been nearly effaced by private proprietorship, is being re¬ vived in the creation and the extension of pub¬ lic parks, open to every citizen. In Russia, on the other hand, the miV, or village community, is giving way to private proprietorship, Russia in this, as in some other respects, being in a period of transition from which western Europe evoluted centuries ago.

VILLAGE IMPROVEMENTS. See Vil¬ lage Communities.

VILLAGRAN, vel-ya-gran', or VILLA¬ GE A, Francisco, Spanish soldier and colonial governor: b. Astorga, Spain, 1507; d. Con¬ cepcion, Chile, 15 July 1563. He accompanied Valdivia to Peru, was engaged with him in the conquest of Cliile in 1540^5, and in 1547-49 was deputy governor in the absence of Valdivia. Upon the death of Valdivia in the Araucanian uprising of 1553-54 Villagran became gov¬ ernor. While proceeding to march against the Araucanians he was severely defeated at Mari-guenu in February 1554. He, however,

con¬ tinued the war for months, killing the famous Indian chief Lantaro at Mataquito in 1556. He was superseded by Garcia Hurtado de Mendoza in 1557 ; and that governor, in order to be rid of his dangerous rival, sent Villagran a prisoner to Peru. On his release he went to Spain, secured a royal commission to suc¬ ceed Mendoza and returned in 1561 to take charge of the colony. He pushed the Spanish conquests beyond the Andes, and though much harassed by the uprisings of the Araucanians, continued in office until his death.

VILLAIN, or VILLEIN. See Villeins.

VILLARD, vil-ard', Henry, American journalist and capitalist: b. Speyer, Bavaria, 11 April 1835; d. Dobbs Ferry, N. Y., 11 Nov. 1900. His real name was Hilgard, but he changed it to Villard on coming to the United States in 1853. He entered upon journalistic work, writing at first for German-American journals, then as correspondent for the Cin¬ cinnati Commercial, and for the Chicago Tribune. He reported the Lincoln-Douglas debate of 1858 for eastern newspapers ; was at the National Republican Convention of 1860; and during the Civil War won a wide reputa¬ tion as a war correspondent, going to the front with the Army of the Potomac; he also

conducted a correspondents' bureau at Wash¬ ington. In 1866 he went abroad to report the Austro-Prussian war tor the New York Tribune. Inˆ 1868-71 he was secretary of the Social Science Association in Boston. In 1873 he represented German bondholders in financial dealings with some of the railroads of the Pacific Coast; going to the Northwest he organized the Oregon Railway and Trans¬ portation Company; and in 1881 by a pooling of railway interests formed the Northern Pacific Railroad Company, and was elected its presi¬ dent. The road was completed in 1883, but was involved in financial difficulties, on account of which Villard lost a large part of his fortune, and resigned the presidency of the road. He regained his financial standing with the aid of German capital, and in 1889 became one of the directors of the Northern Pacific, holding that position until 1893, when the road went into the hands of receivers. He was also interested

in Edison's inventions ; in 1890 he bought the Edison Lamp Company at Newark, and later the Edison Machine Works at Schenectady, where he organized the Edison General Electric Company, of which he was president two years. In 1881 he obtained a controlling interest in the New York Evening Post, and Nation. Consult his ˆMemoirsˆ (3 vols., Boston 1904).

VILLARI, vel'la-re, Pasquale, Italian his¬ torian : b. Naples, 3 Oct. 1827; d. Florence, December 1917. The son of a lawyer, he mi¬ grated to Florence after the failure of the inde¬ pendence movement in 1848 and began collecting new materials on Savonarola. He published the fruits of his researches in the Archivio Storico Italiano in 1856, and three years later was nominated professor of the philosophy of history at the University of Pisa, about the time that he published his ˆLife of Savona¬ rola,ˆ a work that established his reputation as a historian of wide vision and artistic represen¬ tation. His social political writings, however, exerted the most powerful influence in Italy, especially after the collapse of 1866, when he plainly told his countrymen that the nation it¬ self was directly responsible for that inglori¬ ous campaign. His second most important work, the ˆLife of Machiavelli,ˆ appeared a few 3'ears later. In 1867 Villari was elected to the Chamber of Deputies, and appointed to the senate in 1884, and became its vice-president in 1887. In the Rudini Cabinet of 1891 he was Minister of Education, when he introduced valuable reforms in the curriculum of the schools.

VILLARS, ve-lar, Claude Louis Hector,

Due DE, French soldier: b. Moulins, France, 8 May 1653; d. Turin, Italy, 17 June 1734. He entered the army in 1672, served under Turenne, Luxembourg and Crequi ; was appointed lieu¬ tenant-general in 1693, and in 1699—1701 he was Ambassador to Vienna. During the war of the Spanish Succession he received in 1702 his first independent command, defeated Prince Louis of Baden at Friedlingen, 14 October, and was created marshal. He joined the Elector of Ba¬ varia in 1703, gained a signal victory at Hoch-stadt in that year. In 1709 he succeeded Ven-dome as commander of the army in the Nether¬ lands, and in order to save Mons he engaged Marlborough and Eugene at Malplaquet, 12

Sept. 1709. He was defeated and badly wounded, but was victorious over the allies at Denain, 24 July 1712. In March 1714, he con¬ cluded the peace of Rastatt. On the outbreak of the war with Austria

he again took the field with rank of grand-marshal of France, and con¬ ducted a successful campaign with his wonted energy, although he was then 81. He resigned his command because of the unwillingness of the king of Sardinia to co-operate with his plans, but died before his recall came. His ˆMemoiresˆ (1884-92) are not regarded as au¬ thentic. Consult the biographies by Seguy (1735), Anquetil (1784), and Babeau (1892).

VILLARSIA, vil-lar'si-a, genus of gam-opetalous plants, of the natural order Gentiana-ccce, whose species are widely distributed over the world, and are either aquatic or marsh plants, with entire leaves and yellow flowers. V . nymphceoides is common in many parts of Europe, from Denmark to the Mediterranean ; and is very abundant in Holland, often cover¬ ing large tracts of the canals with its beautiful flowers and leaves. It is easily cultivated, and abounds in southern Siberia.

VILLEHARDOUIN, vel-ar-doo-afi, Geoffroi de, French chronicler: b. Villehar-douin, near Troyes, France, about 1160; d. be¬ fore 1213. He was one of the earliest of French historians, and of his life little is known save what is gathered from his ˆHistoire de la Con-quete de Constantinople.ˆ He seems to have taken an important part in the Fourth Crusade; took the cross in 1199; was one of the commis¬ sioners to arrange with the Venetians for the transportation of the crusaders ; fought at the siege of Constantinople, and gained high repute as a diplomat. He became marshal of Romaine after the establishment of the Latin empire and was granted the fief of Messina in 1207. From this time all trace of him is lost. His ˆHistoireˆ is a clear and collected relation of the events of the Crusade from 119S-1207, and is valuable both from the historical and literary standpoint. The first printed edition was that of 1585 ; later ones include Du Cange (1657); Dom Brail (1823); N. de Wailly (1872; 3d ed., 1882). Consult Sainte-Beuve's ˆCauseries du Lundiˆ (Vol. IX).

VILLEINS, serfs who grew up along with the feudal customs of Europe. A feudal lord received from his superior, on condition of military service, a grant of conquered land, which he distributed among his dependents on two distinct tenures or classes of tenure. The freemen, who were the kindred or followers of the conqueror, received their land on the same condition of military service as himself. The conquered or the serfs who were not di¬ rectly employed in domestic or personal service were allowed to cultivate the land on the tenure of menial or non-military services, either deter¬ minate or indeterminate. Such is the simple origin of villenage. In some cases the villeins were at the absolute disposal of their lord, who could sell

them or deal with them as he pleased. In others they were attached to the soil, and formed part of its movable wealth. Sometimes they held by defined services, such as making and repairing roads, felling timber, or culti¬ vating the lord's domain ; but even then the control of justice was commonly in the hands of their lord, against whose oppression they had no redress. Hallam says that in England

they were incapable of property; yet even in England, when the laws began to extend their protection to personal rights, the association of villeins with the soil established a good tenure of property, subject to customary services, which were finally commuted into money rents. Villenage appears to have died out in England, without special legislation to abolish it. The system of agricultural labor under yearly con¬ tract, with violation of contract on the part of the laborer punishable by imprisonment, which continued in England down to the latter part of the 19th century, partook essentially of villenage, as the laborers had either to face prosecution as vagrants, or renew each year the obligation of servitude, which might fairly be called involuntary. Villein is the progenitor of the modern word villain, and has degenerated in meaning.

Villenage — if the involuntary servitude of white persons not convicted of crime comes within that term — has never existed in the United States, except in the form of indentured apprenticeship, which in colonial days was prac¬ tically serfdom, and of the form of servitude known as ˆredemption,® when immigrants were sold and bound out for a term of , years to pay the expenses of their passage. ˆˆRedemption® servitude existed long after the United States became independent, and many respectable and even prominent families are descended from ®redemptioners.® Consult Page, T. W., ˆEnd of Villainage in Englandˆ (New York 1900).

The peons of Mexico and New Mexico were essentially villeins attached to the soil. Peon¬ age was abolished in the United States, 2 March 1867. See Peons and Peonage ; Serfs ; Slavery ; United States — Slavery.

VILLEMAIN, vel-man, Abel Frangois, French author: b. Paris, 11 June 1790; d. there, 8 May 1870. He was educated at the Lycee Louis-le-Grand, and in 1810 became assistant professor of rhetoric at the Lycee Charlemagne. He was subsequently professor at the . Ecole Normale and also occupied the chair of elo¬ quence at the Sorbonne. He was elected to the Academy in 1821, and in 1827 was elected with Lacretelle and Chateaubriand to draft its pro¬ test against the revival of the censorship. In 1827 he was a deputy, became a peer of France in 1832, was Minister of Public Instruction in 1838-44 and in the last-named year resigned because of ill health. After the establishment of the empire he retired from politics. He was three times awarded the prize of the Academy; in 1812 for his ˆEuloge de Montaigneˆ ; in 1814 for ˆAdvantages et Inconvenients de la Critiqueˆ ; and for his ˆEuloge de Montesquieuˆ in 1816. As a critic his keen wit, quick appre¬ ciation and brilliant command of rhetoric made him a power in French letters. His works in¬ clude ˆHistoire de CromwelP (2 vols., 1819) ; ˆ Discours et Melanges Litteraresˆ (1823) ; ˆCours de Litterature Frangaiseˆ (5 vols., 1828-29) ; ˆSouvenirs Contemporains d'Histoire et de Litteratureˆ (1856); ˆHistoire de Gregoire VIP (1873), *etc.*

VILLEMESSANT, vel-me-san, Jean Hip-polyte Cartier, French journalist: b. Rouen, 22 April 1812; d. Monte Carlo, France, 11 April 1879. He went to Paris in 1839, entered jour¬ nalism and for a time wrote the fashion depart¬ ment of the Girardin Presse, using the signa¬

ture ˆLouise de Saint Loup.® In 1854 he re-established Le Figaro as a semi-weekly, making it a daily after 1865. Consult his ˆMemoires d'un Journalisteˆ (1867).

VILLENAGE. See Villeins.

VILLENEUVE, vel-nuv', Pierre-Charles- Jean-Baptiste-Sylvestre De, French admiral: b. Valensoles, department of Basses-Alpes, 31 Dec. 1763; d. 22 April 1806, of ancient and noble family. Villeneuve entered the navy in his 15th year, and passed as captain 1793. In 1796 he was raised to the rank of ˆcaptain of divisionˆ (equivalent to commodore), and commanded the rear division at the battle of the Nile. In 1804 he was nominated vice-admiral ; and in the following year was appointed to the com¬ mand of the Toulon squadron. Having sailed to the Azores, he encountered a British squad¬ ron, under Sir Robert Calder, and a fierce fight ensued, which lasted till

dark. On the follow¬ ing morning, neither side cared to renew the engagement (for which Villeneuve was abused by Le Moniteiir, and Admiral Calder was put on trial), and Villeneuve, unable to reach Brest, returned to Cadiz, where he was strictly block¬ aded by Nelson. The severity with which he was treated by Napoleon on account of these reverses, and the further indignity of being su¬ perseded, goaded Villeneuve into the desperate resolve of engaging Nelson before his succes¬ sor could arrive at Cadiz. The memorable com-flict of Trafalgar was the result. Villeneuve, whose vessel, the Bucentaure, was completely dismasted, was forced to strike his flag; and was made prisoner, and conveyed to England, whence he returned to France April 1806. He stopped at Rennes, with the view of ascertain¬ ing the kind of reception he was likely to meet at Paris from the emperor. The result of his inquiries was unfavorable; and on the morning of 22 April he was found dead in bed, with six knife-wounds in his heart, inflicted by his own hand.

VILLENEUVE D'AGEN, vel-nuv' da-zhong', or VILLENEUVE-SUR-LOT, -sur-lo', France, town in the department of Lot-et- Garonne ; in a charming valley, 22 miles by rail north of Agen. The river Lot, which flows through the town, is here crossed by a remark¬ ably bold bridge of a single arch, with span of 118 feet and height of 59 feet. The town, formerly called Gajac, was completely destroyed in the wars of the early part of the 13th century. When rebuilt it received its present name. A great trade is carried on in wines, prunes, cattle, and iron, and there are manufactures of paper, cloth, table-linen and copperwares. Pop. 13,181.

yiLLIERS, vil 'yerz, Charles Pelham,

English statesman: b. London, 3 Jan. 1802; d. 16 Jan. 1898. He was graduated from Saint John's College, Cambridge, in 1824, was called to the bar of Lincoln's Inn in 1827, appointed secretary to the master of the rolls in 1830, the examiner of witnesses at the Court of Chancery in 1833. He was returned to Parliament for Wolverhampton in 1835 and until his death remained the representative of that constitu¬ ency. From the first he strongly advocated the repeal of the corn-laws, and he was a supporter of free trade before Cobden and Bright entered Parliament and while Gladstone still favored the corn-laws. After the formation of the Anti-

Corn-Law League Villiers became the leader of the movement in Parliament and continued to press the agitation. The accession of Bright and Cobden to the ranks of Parliamentary free traders further strengthened the cause, and Villiers saw his purpose achieved when in 1846 Peel joined their ranks. In 1859 he became a - member of the Palmerston Cabinet and also president of the Poor-Law Board, which posts he resigned in 1866. During the American Civil War he ably seconded Palmerston in his sup¬ port of the Northern States, and in later years was a determined advocate of the Union of Ireland and Great Britain. He introduced in Parliament the Union Chargeability Bill and secured its passage in 1865, supported the Penny-Postage Act and throughout his entire career never deviated from the principles of reform to which he had pledged himself on his elec¬ tion in 1835. A selection from his speeches was published in ˆFree-Trade Speeches of Hon. Charles Pelham Villiers, M.P.ˆ (2 vols. 1883).

VILLIERS, Frederic, English artist and war correspondent ; b. London, 23 April 1852. He was educated in France and studied at South Kensington and the Royal Academy. He was war artist for The Graphic in Serbia in 1876 and accompanied the Russian army in Turkey in 1877-78. He was a witness of the bombard¬ ment of Alexandria in 1882, was subsequently in Abyssinia, Bulgaria, Serbia and Burma, and in 1887 made a lecture tour in this country. As special artist and correspondent for the New York Herald and other journals he accompanied the Japanese army in 1894, represented the Lon¬ don Standard in 1897 during the Graeco-Turkish War and in 1898 accompanied Kitchener in the Sudan. During the Boer War in 1899 he was in South Africa as correspondent for the Illus¬ trated London News. He has written and illus¬ trated several books.

VILLIERS, George, Duke of Buckingham.

See Buckingham, Duke of.

VILLIERS, John Henry de, 1st Baron De Villiers: b. 1842; d. 2 Sept. 1914. He was lord chief justice of Cape of Good Hope, president of the Legislative Council, member of the Judicial Committee of the Privy Council and beccime chief justice of the Union of South Africa.

VILLISCA, vil-is'ka, Iowa, town in Mont¬ gomery County, at the

confluence of the East and West branches of the Nodaway River, and on the Chicago, Burlington and Quincy Rail¬ road, 65 miles southeast of Council Bluffs. It is in a rich agricultural region; in the vicinity are deposits of fire-clay and soapstone. The chief manufactures are clay products, which in¬ clude brick and tile, and flour and dairy prod¬ ucts. There are large shipments of fruit, wheat, corn, hay, vegetables, butter, eggs, poultry and livestock. There are two banks and a news¬ paper. Pop. 2,132.

VILLON, vel-16fi, Frangois, French poet: b. Paris, 1431 ; d. about 1484. His real name was Frangois de Montcorbier, but he adopted the name of his guardian, Guillaume de Villon, a priest. He received the degree of master of arts in 1452, and three years later fled the country because he had killed a priest. He was pardoned in 1456 when it had become clear that

the deed was done in self-defense, but imme¬ diately afterward he engaged in a series of ex¬ tensive robberies, for which he was condemned to death. While lying in prison awaiting the execution of his sentence he wrote the epitaph in which he depicts himself and his companions suspended on the gibbet. His sentence was commuted to banishment, but in 1461 he was again in prison, this time at Meung, perhaps for sacrilege. He was set free in October of that year in consequence of a jail delivery ordered by Louis XI on the occasion of his visit to the town. Nothing is known of his subsequent career. His works include ˆLe Petit Testamentˆ (1456) ; ˆLe Grand Testamentˆ (about 1461) ; and numerous ballads. The first dated edition of his works is that of 1489, and of modern edi¬ tions the best are those of Moland (1879) and Longnon (1892). There is an English transla¬ tion of much of his best work by John Payne (new ed., 1892). Andrew Lang, Swinburne and others have also made renderings. Consult Longnon, ˆEtude Biographiqueˆ (1878) ; Steven¬ son, R. L., ˆFamiliar Studiesˆ (1888) ; Schwob, ˆLe Jargon des Coquillards en 1455ˆ (1890) ; Paris, ˆFrangois Villonˆ (1901).

VILNA, or WILNA, Lithuania, (1) Capi¬ tal of the Republic and of a government of the same name, on the Vilia, 415 miles southwest of Petrograd. It was the former capital of Lithuania, but was under Russian control from 1795 to 1918. It is picturesquely sit¬ uated, partly on hills, partly on the banks of the river, and contains numerous convents and churches. The most notable buildings are the governor’s palace, the town-house and the buildings of the now suppressed university. The Greek and the Roman Catholic cathedrals

are also worthy of notice. Educational institu¬ tions are numerous, including a fine museum and large public library. The manufactures in¬ clude tobacco, lead pencils, hats, leather, etc., and there is an extensive trade in grain and timber. Vilna dates from the 10th century. Pop., of which one-half is Lithuanian, about 204,290. (2) The government, which lies on the Baltic, has an area of 16,181 square miles and is a low marshy country. It is well watered by the Dvina, Niemen and Vilia rivers, which also provide means of transportation for a large area. Pop. about 2,083,200.

VINAGO, vl-na'g6, genus of fruit-pigeons, family Columbidce, the members of which have a comparatively stout solid bill, laterally com¬ pressed; with a hard, hooked and inflated tip; the tarsi short; feet large, and formed for perching or grasping. The species, of which not many are known, are natives of tropical Asia and Africa; they inhabit forests, and are shy and timid.

VINAIGRETTE (French, from vinaigre, vinegar; from vin, wine; aigre, acid, sour), a small box or bottle (the inner cover of which is perforated) for containing a bit of sponge saturated with aromatic vinegar or the like, used to stimulate or refresh by the sense of smell.

VINALHAVEN, vl" nal-ha'ven. Me., town in Knox County, about 13 miles east of Rockland, the county-seat. The town is made of several small islands in Penobscot Bay. The

granite quarries are a source of income and the place is a favorite summer resort. Perma¬ nent pop. 2,300.

VINCENNES, vah-seii, Jean Baptiste Bis-sot, SiEUR DE, Canadian explorer: b. Quebec, Canada, January 1688; d. Illinois, 1736. He came from a wealthy family of Quebec, was a relative of the explorer Louis Joliet, and from early youth was engaged in Western expeditions. He became an ensign in the Canadian army in 1701 and was detailed to service in the West, where he became a favorite with the Miami Indians. In 1704 he rescued some Iroquois prisoners from the Ottawas; saved Detroit from an invasion by the Foxes in 1712; and after¬ ward resided successively in Miami, Ohio, and Michigan. He founded the city of Vincennes, Ind., where he built a fort and a trading-post, and in 1736 he joined the expedition against the Chickasaw Indians. The expedition was conducted by d'Artaguette and was at first suc¬ cessful, but a series of victories were followed by defeat owing to the desertion of the Miamis. Vincennes was captured and together with the commander and others of the expedition was burned at the stake.

VINCENNES, France, a town in the de¬ partment of the Seine, a southeastern suburb of Paris, just outside the walls and close to the Bois-de-Vincennes. Its large old castle, which is surrounded by lofty walls and deep ditches, was once the frequent residence of the French kings, and was long a state prison. It now forms part of the defenses of Paris. The don¬ jon or keep is a square tower 170 feet high with walls 16 feet thick. The Bois-de-Vincennes (q.v.) is a beautiful and extensive public park which contains an exercise-ground for infantry, and an area set apart for artillery purposes. There are manufactories of chemicals and hard¬ ware; also a large military school and hospital. Pop. of town, about 33,000; of commune, about

40,000.

VINCENNES, vm-senz', Ind., city, county-seat of Knox County, on the Wabash River and on the Pennsylvania, the Baltimore and Ohio, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 105 miles south¬ west of Indianapolis, and 50 miles north of Evansville, It is in a fertile agricultural region, a rich prairie section, on a gradual slope to the river. There are a round hundred of manu¬

facturing establishments, with annual products approaching $4,000,000. The chief manufac¬ tures are flour, lumber products, sewer-pipe, brick, tile, wrapping paper, iron and tin prod¬ ucts, glass, furniture, paper, agricultural im¬ plements, cement, plaster, and foundi-y and machine-shop products. The city is laid out in squares, with streets nearly all 50 feet wide. Harrison Park, the plaza at the city-hall, and the Courthouse square are the chief park-lands owned by the city. The principal public build¬ ings are the county courthouse ($400,000), the city-hall ($100,000), the government building, the old hall where the legislature met, the house occupied by William Henry Harrison when he was governor of the Territory, the church once used as the Roman Catholic cathedral, the Vin¬ cennes Sanatorium and Saint Vincent's Orphan¬ age for boys. The educational institutions are two high schools, one for white pupils and one

for colored (1882), Vincennes University, founded in 1806, Saint Rose Academy (R.C.), public and parish graded schools, a public library and three school libraries. There are four banks and three daily besides several weekly newspapers. Vincennes was incorporated as a borough in 1839 and as a city in 1856. The government is administered under the charter of 1867 which provides for a mayor, who holds office two years, and a city council. In 1900 Vincennes had a population of 10,249; (1910)

14,895; (1920) 17,210.

History. — In the vicinity of Vincennes are many Indian mounds. The first missionaries and explorers, who entered this part of Indiana by way of the river, found, where is now the city, an Indian village called Chip-kaw-kay. Vincennes is the oldest place in the State. In 1702 the French built here a fort, and for sev¬ eral years it was the seat of the empire of France in the Ohio Valley. French from Can¬ ada settled here, and the place was called ®The Post,® for over 30 years, when the name was changed to Vincennes, in honor of Frangois Morgan de Vinsenne, who had been one of the officers of the fort. In 1763 the British obtained possession of the place, but owing to disturbed conditions in the East General Gage gave the fort but little attention, so Vincennes had only a self-government until 1777, when, on 19 May Lieutenant-Governor Abbot of Detroit arrived and took possession. He called the place Fort Sackville. The British incited the Indians to attacks on the whites who were under French rule or who were in

rebellion against Great Britain. George Rogers Clark, of Kentucky, desiring to protect his country from those dis¬ astrous attacks, conceived the plan of capturing Detroit, Vincennes and Kaskaskia, and sub¬ mitted his plan to Patrick Henry, then gover¬ nor of Virginia. After much argument on the part of Clark and hesitancy on the part of Henry, the governor authorized Clark to re¬ cruit 350 Virginians for the expedition, and gave him money and ammunition. Clark pro¬ ceeded with the undertaking, and 4 July 1778 captured Kaskaskia. With the aid of Father Gibault, of Kaskaskia, Clark secured the good will of the French people of Vincennes. In 1779 (Tlark's Virginians took possession -of Fort Sackville. It was some time before the British in Detroit heard of the changes in the Ohio Valley. Then a force of 500 regulars and In¬ dians under the British commander, Henry Hamilton, embarked for Vincennes. Captain Helm, in charge of the place, did not learn of the approach of the British until they were within three miles of the fort. His garrison consisted of himself, a few inhabitants and one Arnerican soldier. The inhabitants went to their homes and Helm planted his two cannon ; he took charge of one and the remainder of his force stood by the other. When Hamilton de¬ manded a surrender. Helm said no man could enter the fort until the terms of surrender were made known. Hamilton promised them the honors of war and then Helm and his force of one man surrendered. Clark did not hear of the fate of Helm for some time. Francis Vigo (after whom the county is named), a merchant of Saint Louis, and a patriotic American, offered to go to Vincennes to attend to furnishing the garrison with supplies in accordance with

Helm's request, sent to Clark before the arrival of the British. When Vigo approached Vin¬ cennes he was more than surprised to learn that the place was in possession of the British, who at once arrested him. He demanded re¬ lease on the ground that he was from Saint Louis, but Hamilton retained him until it was discovered that the French inhabitants would cut off the source of supplies for the soldiers unless Vigo were released. Vigo was finally given his freedom, on condition that *on his way to Saint Louis he would do no hostile act to

the British interest.® This he promised, and at once took a canoe, descended the Wabash to the Ohio, then to the Mississippi and arrived at Saint Louis without breaking his pledge. As the boat touched the shore, Vigo sprang on land, then back into the boat, and started for Kaskaskia, to inform Clark about Vincennes. Clark saw at once that unless something were done the whole Ohio Valley would be lost to America. Desperate measures were resorted to, for transporting a small force of poorly clothed men was difficult at any time, but almost impossible in winter. On 5 Feb. 1779 he sent 64 men by boats, carrying provisions and am¬ munition, and with 170 men they began a march of 200 miles. There were no tents, no towns or even settlements where they were sure of find¬ ing friends. All the inhabitants of Kaskaskia accompanied them the first few miles of the journey; then soldiers and citizens knelt and the parish priest gave them his blessing, and Clark and his men marched on to Vincennes, leaving the people on their kness praying for the success of the American nation. On the 23d of February Clark and his men arrived at the heights back of Vincennes, and sending word to the French inhabitants that they were there, the hungry soldiers were soon supplied with provisions. That night the Americans marched into the town and at once began an attack on the fort. The next morning Hamil¬ ton surrendered, and the American flag was placed on the fort, and then and there the name was changed from Fort Sackville to Fort Patrick Henry. The place was held by Vir¬ ginia until 1783, when it was ceded to the United States. In 1787 the first court was held in the place, and in 1800 the Indiana Territorry was established and Vincennes was made the capital. In 1813 the territorial capital was re¬ moved to Corydon. A university and a library had been established. The first church in the Northwest Territory was built in Vincennes, in 1742, by Father Meurin, from France. The first school in Indiana was established here by Father Rivet.

Vincennes brought to the United States the great Middle West and made the Louisiana Purchase a possibility. Had it not been for the bravery, intelligence and patriotism of George Rogers Clark and his Virginians, and the devoted French of the Ohio Valley, the western limit of the United States would have been, for many years at least, the Alleghany Mountains. But Vincennes has done more for the preservation and extension of the Union; here Aaron Burr received his first and most decided check when he sought to break up the Union. The first provision made by any gov¬ ernment for the care of the insane was made by the Indiana constitution, and to Benjamin

Parke of Vincennes is due the credit of in¬ serting the clause regarding the matter. Not only may Vincennes, ®on the banks of the Wabash,® be called ®The Key to the North¬ west,® but also a historic city that was the scene of many heroic deeds. Consult Law, ˆThe Colonial History of Vincennes,ˆ and Smith in Powell's ˆHistoric Towns of the Western States.ˆ

VINCENNES UNIVERSITY, located at yincennes, Ind., non-sectarian and coeduca¬ tional, is the oldest university west of the Al¬ leghany Mountains. It includes the follow¬ ing departments : College courses leading to degrees for A.B., A.M. ; normal (teachers' training course) — accredited for classes ®A,® ®B,® ®C® ; agricultural, courses in agronomy, animal husbandry, horticulture; home econom¬ ics, courses in cooking, sewing, dietetics, house¬ hold management, home nursing, *etc.* ; prepara¬ tory, a commissioned high school under the laws of Indiana; music, courses in piano, voice and violin ; expression, courses in reading, dramatics, defective speech correction. The annual en¬ rolment in all departments averages 400 stu¬ dents ; the teaching force numbers 24. It owes its establishment to a grant of land made by Congress in 1804 in the Vincennes land district for the use of a seminary of learning. In 1806 Vincennes University was incorporated and des¬ ignated as the recipient of the land granted by. Congress. In 1830 and subsequently the legis¬ lature assumed the right to sell and rent the lands and appropriate the receipts for State purposes. The resources of the university were thus so crippled that it was forced to sus¬ pend work for a time ; but in 1843 the trustees carried the matter into the courts and finally by appeal to the Supreme Court of the United States obtained judgment in favor of the uni¬ versity.

ˆ VINCENT, vTn'sent (or VINCENTIUS, vm-sen'shi-us). Saint, Christian martyr: d. about 303. He was archdeacon of Saragossa in Spain, and in the persecution of Diocletian was put to death for the Christian faith at Valencia. The narrative of his martyrdom, called ˆPassio Sancti Vincentiiˆ (in ˆActa Sanctorumˆ under date 2 January), is very ancient, being quoted by Augustine, Prudentius, Paulinus Nolanus, Ve-nantius Fortimatus, and Gregorius Turonensis. It is full of almost incredible details of tortures and miracles.

VINCENT, vin'sent, Boyd, American Protestant Episcopal bishop : b. Erie, Pa., 18 May 1845. He was graduated from Yale in 1867 and from the Berkeley Divinity School, Middletown, Conn., in 1871. He took orders in the ministry in the last named year, was as¬ sistant at Saint Paul's, Erie, 1871-72, rector of Cross and Crown Church, Erie, 1872-74 and rector of Calvary Church, Pittsburgh, 1874—89. In 1889 he was consecrated bishop coadjutor of southern Ohio. In 1910 he was

chairman of the Episcopal House of Bishops.

VINCENT, Charles Edward Howard,

English soldier and member of Parliament : b. Slinfold, Sussex, 31 May 1849; d. 1908. Edu¬ cated at Westminster School and the Military College at Sandhurst, he served in the army 1868-73, was called to the bar of the Inner Temple in 1876 and was military commissioner

of the London Daily Telegraph at the opening of the Riisso-Turkish War in 1877. In 1878 he reorganized the metropolitan detective system and has sat in Parliament as a Conservative member for Sheffield since 1885. He has pub¬ lished ‘ˆRussia’s Advance Eastwardˆ (1872) ; ˆMilitary Geographyˆ (1873); ˆLaw of Criti¬ cism and LibeP (1877) ; ˆLaw of Extraditionˆ (1880) ; ‘ˆHoward Vincent Map of British Em¬ pireˆ (10th ed., 1902) ; ˆPolice Code and Man¬ ual of Criminal Law,ˆ which has passed some 15 editions, *etc.*

VINCENT, Frank, American traveler: b. Brooklyn, N. Y., 2 April 1848; d. 1916. He was educated at Yale and for many years de¬ voted himself to a systematic tour of the world. In 1884 he gave to the New York Metropolitan Museum of Art an extensive collection of In¬ do-Chinese antiquities and art. His published works include ˆThe Land of the White Ele¬ phantˆ (1874) ; ˆThrough and Through the Tropicsˆ (1876) ; ˆNorsk,ˆ Lapp and Finnˆ (1881) ; ˆAround and About South Americaˆ (1890) ; Hn and Out of Central Americaˆ (1891) ; ˆActual Africaˆ (1895), *etc.*

VINCENT, George Edgar, American edu¬ cator, the son of Bishop John Heyl Vincent: b. 21 March 1864 at Rockford, Ill. Graduated at Yale, A.B., 1885; Ph.D., University of Chicago, 1896; LL.D., 1911; LL.D., Yale University, 1911; also from the University of Michigan, 1913. After graduation from college he en¬ gaged for a time in literary and editorial work and spent a year abroad. He was a Fellow in sociology at Chicago while working for his degree. Thence he was promoted as assistant professor, associate professor and then pro¬ fessor and in

1900 was made dean of the junior colleges. From 1907 to 1911 he was dean of the faculties of arts, literature and science. Then he became president of the University of Minne¬ sota (1911-17). Since 15 May 1917 he has served as president of the Rockefeller Foun¬ dation of New York. At the same time is a member of the General Education Board. In 1888 he became vice-president of the Chautauqua System. Ten years later he was made principal of instruction and served as president 1907-15 and since then has been honorary president. He served a term as president of the American Sociological Society, He is author of ˆThe Social Mind and Education> (1896) ; (with Al¬ bion W. Small) ˆAn Introduction to the Study of Societyˆ (1895).

VINCENT, John Heyl, American Metho¬ dist bishop: b, Tuscaloosa, Ala., 23 Feb. 1832; d. Chicago, 9 May 1920. He was educated at the Wesleyan Institute, Newark, N. J., en¬ gaged in preaching at 18. In 1857-ˆ5 he was pastor at Galena, Ill., and at Chicago. He founded the Sunday-School Quarterly in 1865 and the Sunday-School Teacher in 1866, em¬ bodying in them the Sunday-school lesson-sys¬ tem since widely adopted. In 1874 he estab¬ lished, in conjunction with Louis Miller, the Chautauqua Assembly, of which he was chan¬ cellor 1878-1900. He was elected bishop in 1888, residing at Topeka, Kan., until 1900, when he became resident bishop in charge of the European work of the Methodist Episcopal Church. In addition to various textbooks published for the use of the Chautauqua So¬ ciety, he published ˆLittle Footprints in Bible

Landsˆ (1861); ˆThe Modern Sunday-SchooP (1887); <Unto Himˆ (1899); ˆFamily Wor¬ ship for Every Dayˆ (1905), *etc.*

VINCENT, Leon Henry, American author and lecturer: b. Chicago, 1 Jan. 1859, He was graduated from Syracuse University and since 1885 has given his time mainly to lecturing upon English and American literature. He has pub¬ lished ˆThe Bibliotaph and Other Peopleˆ (1898); ˆHotel de Rambouillet and the Pre-cieusesˆ (1900) ; -ˆThe French Academyˆ (1901); <Corneille> (1901); <Moliere> (1902).

VINCENT, Marvin Richardson, American Presbyterian clergyman : b. Poughkeepsie, N. Y., 11 Sept. 1834. He was graduated at Columbia in 1854; was classical instructor in the Colum¬ bia Grammar School 1854-58 and professor of languages in the Methodist University of Troy, N. Y., 1858-60. In the year last named he entered the Methodist ministry, but three years later became a Presbyterian and was succes¬

sively pastor of the First Presbyterian Church of Troy, 1863-73, and of the church of the Covenant, New York, 1873-88. In 1888 he be¬ came professor of New Testament criticism at Union Theological Seminary, New York, and is now professor emeritus. He is cotranslator of Bengel's ˆGnomon of the New Testamentˆ (1860-62) and author of ˆAmusement a Force in Christian Trainingˆ (1867) ; ˆThe Two Prod¬ igalsˆ (1876) ; ˆ Gates into the Psalm Country,ˆ a series of descriptions (1878) ; ˆStranger and Guestˆ (1879) ; ˆFaith and Characterˆ (1880) ; ˆThe Minister's Handbookˆ (1882) ; ˆChrist as a Teacher> (1886) ; ˆWord Studies in the New Testamentˆ (1887-1900) ; <ˆThat Monster, the Higher Criticˆ (1894) ; <ˆThe Age of Hilde¬ brandˆ (1896) ; History of the Textual Criticism of the New Testamentˆ (1899), *etc.* In 1904 he published a translation of Dante's Hnfemo,ˆ

VINCENT OF BEAUVAIS, French priest and encyclopedist: b. about 1190; d. 1264. The years of his birth and death are uncertain and those given above are most generally believed to be approximately correct. Of his personal history little also is known. It is believed that Vincent joined the Dominicans in Paris about the year 1218 and with the exception of ex¬ tended visits to Louis IX at Royaumont the remainder of his life was spent in the monas¬ tery of his order at Beauvais. Possessed of a keen, analytic and orderly mind and endowed with a remarkable capacity for work, Vincent undertook the stupendous task of compiling a systematic and comprehensive treatment of all branches of human knowledge. Louis IX helped him in procuring many of the works necessary for this task. The general title of Vincent's encyclopedia is ˆSpeculum Majus.ˆ The first part, < Speculum Naturale,> contains 32 books and 3,718 chapters; it treats of cos¬ mography, physiology, psychology, physics, the¬ ology, botany, zoology, mineraloˆ, agriculture. There is an edition of this work in the Wheeler collection in the library of the American Insti¬ tute of Electrical Engineers. It comprises two royal folio volumes, containing 694 double-col¬ umn pages of 66 lines to the column. It was probably published about 14ˆ and at Strassburg. The second part of Vincent's great work is the 'ˆSpeculum Doctrinale,ˆ in 17 books and 2,374 chapters. It deals with logic, poetry.

rhetoric, astronomy, geometry, education, indus¬ trial and mechanical arts, anatomy, surgery, medicine, jurisprudence, *etc.* The third division is the ˆSpeculum Historialeˆ in 31 books and 3,793 chapters and brings the history of the world down to 1250 a.d. A fourth part, the ˆSpeculum Morale,ˆ was included in early editions but its authenticity is questioned. The ˆSpeculum Majusˆ contains in all 80 books, divided into 9,885 chapters. It has been calculated that it would be equal to 60 volumes, octavo, of our time, which gives some idea of the magnitude of the work undertaken by this Dominican in the early 13th century. More than five centu¬ ries were destined to pass before the encyclo¬ pedic idea was again formulated and then it required a brilliant group to perform what Vin¬ cent had accomplished single-handed. Other works of Vincent are ˆDe eruditione filicorum regaliumˆ and ˆTractatus consolatorius dq morte amice. ˆ The best edition of Vincent's work is that edited by the priests of the So¬ ciety of Jesus (4 vols., Douai 1624). Consult Bourgeat, J. B., ˆEtudes sur Vincent de Beau¬ vais, theologian, philosopher, encyclopedisteˆ (Paris 1856) ; Boutaric, E., ˆExamen des sources du speculum historiale de Vincent de Beauvaisˆ (Paris 1863) ; Revue des questions historiques (Vol. XVII, Paris 1875) ; Daunon, ˆContinuation de histoire litteraire de Franceˆ ; Haureau, B., ˆNotices … de MSS. latins de la Bibliotheque Nationaleˆ (Vol. V, ib. 1892) ; Male, E., ˆL'art religieux du XIII® siecle en Franceˆ ; Fouron, ˆHistoire des hom-mes illustres de I'ordre de Saint Dominiqueˆ (Paris 1875) ; Wattenbach, W., ˆDeutschlands, Geschichtsquellenˆ (Vol. II, 1894).

VINCENT DE PAUL, Fr. van-son de p5l, Saint, founder of the Priests of the Mission: b. Pouay, Gascony, 1576; d. Paris, 27 Sept. 1660. Some of his early years were spent on the slopes of the Pyrenees tending his father's scanty flock ; but as the boy exhibited signs of re¬ markable promise he was sent to be educated first at Dax and then at Toulouse. There he completed his ecclesiastical studies and was ordained priest in 1600. In 1605, while on a voyage from Marseilles to Narbonne, he was captured by Turkish pirates and sent to Tunis, where he was in slavery for two years under three different masters, the last of whom, a renegade from Nice, he reconverted to Chris¬ tianity and induced to

escape with hirn to France. They reached Aigues-Mortes in a little skiff 28 June 1607. The next year Vin¬ cent spent in Rome, where he secured the friend¬ ship of Cardinal d'Ossat, who sent him to Paris on a secret mission to Henry IV and who after¬ ward procured his nomination to the Abbey of Saint Leonard de Chaume, in the diocese of Rochelle. The founder of the Oratory, M. de Berulle, induced Vincent to take charge of the parish of Clichy, near Paris, but in 1612 he entered the services of the Gondi family. With the assistance of *Mme.* de Gondi he began giv¬ ing missions on her estate. Leaving the family for a brief interval he returned to them in 1617. Several parish priests joined him in giving his peasant missions and after each mission a con¬ ference of charity was founded for the relief of the poor. Vincent was also deeply inter¬ ested in the convicts of the galleys, whose moral state was only on a par with their frightful physical misery. Vincent began visiting the VOL. 28—7

galley convicts of Paris and performed for them every manner of service however repul¬ sive. He thus won their hearts and also suc¬ ceeded in interesting other persons in their be¬ half, With funds he collected he managed to purchase a home and establish a hospital. Louis XHI made Vincent royal almoner of the gal¬ leys and the latter now visited Marseilles where the condition of the convicts was equally as miserable as at Paris. Missions to the convicts at Marseilles and at Bordeaux were crowned with great success. The good wrought every¬ where by his missions decided Vincent to found a religious institute of priests who would main¬ tain the work of the missions. Thus was founded the Congregation of Priests of the Mission. At Beauvais, in September 1628, Vin¬ cent began the first of his conferences and in¬ structions to candidates for holy orders. These conferences, at first of short duration, were soon extended to two or three years and gave rise to the seminaries, as these prevailed later in France. About the same time Vincent founded the Daughters of Charity. They were intended at first to assist the conferences of charity, to distribute alms and to visit the poor. When their number increased he grouped them into a community under the direction of Mile. Legras. He also secured for the poor the services of the Ladies of Charity, composed of pious women who nursed the sick poor entering the Hotel-Dieu to the number of about 25,000 annually. They also visited the prisons. Many of their numbers were of the highest rank in society. Due to them Vincent was able to col¬ lect large sums for the benefit of the poor and unfortunate. The care of foundlings was the chief new work made possible by the liber¬ ality of the Ladies of Charity. Foundlings at that time were deliberately maimed by persons who exploited them later

for their own profit. A special house and four nurses were secured and within two years 4,000 foundlings were housed there at a cost of $150,000. A generous friend placed at Vincent's disposal the sum of 10,000 livres ($50,000), with which the latter founded the Hospice of the Name of Jesus, where about 40 old people of both sexes were cared for. This generous donation stimulated others and soon all the poor of Paris were adequately provided for by the establishment of the general hospital on the lands of the Sal-petriere. About $1,000,000 was donated to this end and the king granted the land. The ad¬ ministration was committed to the Daughters of Charity and the greatest humanitarian work of the I7th century was accomplished. Many dis¬ tricts of the provinces far removed from Paris were devastated by the Thirty Years' War. Vincent sent help to the stricken people of these regions and when his treasury at last was empty he decided to print and sell the accounts sent him of the devastation of these regions. This plan was successful and resulted in the peri¬ odical called le Magasin Charitable. In the ruined provinces Vincent founded the work of the potages economiques, the tradition of which has survived to our day in the modern economic kitchen. Societies were founded to clean away the dirt which was a permanent cause of plague. Seeds were distributed to the peasants to aid them in restoring value to their land after the storm of war had passed. Young womqn were removed from the dangers of thq

military zones and sheltered in various-con¬ vents. After the peace Vincent directed his alms to the Irish and English Catholics whom persecution had driven from their country. All this charitable work had made Vincent's name a household word in France. Indeed, his work finds no parallel until we consider the humani¬ tarian work performed in France and Belgium during the late war and then we have several powerful organizations working to the same end, which makes the work of Vincent stand out as most remarkable, since practically all de¬ tails of organization and administration de¬ volved on him alone. He was well received at court, but never used his influence save for the welfare of the poor and needy. During the Wars

of the Fronde he approached the leaders in an effort to bring about peace, and failing in this, redoubled his efforts to lessen the mis¬ eries of the strife at Paris. Soup was dis¬ tributed daily through his care to over 15,000 refugees, while about 900 young women were removed from the perils of,, the streets. Vin¬ cent's charity was not confined within the boundaries of France. In 1638 he sent priests to preach to the peasants of Italy; others were dispatched to Ireland, Scotland, Poland and Madagascar; but perhaps the work abroad which most interested him was that inaugurated among the Christian slaves of Barbary, whose hard lot he had once shared. These poor Chris¬ tians, carried off by Turkish pirates, numbered about 25,000. They were treated with less con¬ sideration by their masters than beasts of burden. Vincent sent them a priest and a lay brother as early as 1645. Others followed. These missionaries did much to ameliorate the hard lot of these slaves and were able to free some of them. For others they acted as agents with their families. At the time of Vincent's death 1,200 had been ransomed through his efforts and he had expended about $5,000,000 in their behalf. At his death the poor of France lost their best friend and humanity a Christian benefactor unequalled in modern days. On 13 Aug. 1729 Vincent was declared blessed by Benedict XIII and on 16 June 1737 was canon¬ ized by Clement XII. He was declared patron of the Sisters of Charity in .1885 by Leo XIII. Saint Vincent's festal day is 19 July. Consult the lives by Abelly (Paris 1664; last ed., ib. 1891) ; Adderley (London 1901) ; Collet (Nancy 1748); Chantelouze (Paris '1860) ; Boyle (New York 1909) ; De Broglie (ib. 1899) ; Bougaud (ib. 1908). Consult also Coste, ˆA quelle date Saint Vincent de Paul est-il neˆ (in Revue de Gascogne 1911) ; id., ˆ Saint Vincent de Paul a-t-il pris a Marseille les fers d'un forcat?' (ib. 1910) ; Degert, Antoine, ˆHistoire des seminaires Frangaisˆ (Vols. I, H, Paris 1912) ; Lorti, ˆ Saint Vincent de Paul et sa missicAi socialeˆ (ib. 1880) ; Maynard, ˆ Saint Vincent de Paul, sa vie, son temps ˆ (ib. 1850-74).

VINCENTIAN CONGREGATION, named from its founder, the Roman Catholic saint, Vincent de Paul ; an association of secular priests, who, though not forming in the strict sense a religious order, are bound by vows, and are especially devoted to the duty of preaching and hearing confessions among the people, par¬ ticularly the poor. Another object of the Vincentian Congregation is the direction of episcopal seminaries and other colleges for edu¬ cation of ecclesiastics, as also to direct the

annual devotional exercises of the secular clergy, called the Ecclesiastical Retreat. (See Vincent DE Paul, Saint). At a somewhat

recent enu¬ meration the Vincentian Congregation numbered more than 700 members in France, Italy, Poland, the Levant and Algeria. The members are nu¬ merous also in the United States, and branches exist in Ireland and Scotland. The name Vin¬ centian is given sometimes also to the sister¬ hoods (of which there are several, and of which that of Charity is the most remarkable), which v/ere founded by Saint Vincent de Paul, and even to the Charitable Lay Association, better known as the Society of Saint Vincent de Paul, which has_ exten.sive ramifications in almost all the countries in communion with the Church of Rome, and which has been the occasion of some restrictive measures in France.

VINCENTIAN FRIARS. See Lazarists.

VINCETOXICUM, a genus of American vines, belonging to the milk-weed family. They have usually cordate leaves and rather large, white or purple-tinted, five-merous flowers with a cup-shaped crown, in axillary umbel-like fas¬ cicles. The United States species are found chiefly in the South. V. shortii has the odor of the strawberry shrub. Cynanthus acumnia-tum, with star-shaped, creamy flowers, called mosquito-catcher, because it secretes a viscid substance on which insects become fixed, was formerly placed in this genus. Vincetoxicum is the officinal name of the swallow-wort.

VINCI, yen'che, Leonardo da, Italian painter and sculptor: b. Vinci, Tuscany, 1452; d. Castle Cloux, France, 1519. He was the illegitimate son of Piero da Vinci, a promi¬ nent notary of Florence, and a woman of the lower class. By his father he was turned over to his grandparents at Vinci, who seem to have taken a great interest in him and to have at¬ tended to his education. When he grew older his father took him to his own house and there he lived with the other children, apparently on an equality with them and received, with them, an excellent education. He proved a good student and gradually developed an ardent desire for knowledge of every kind. But he was not a bookworm. His wonderfully keen intellect enabled him to acquire information with very little effort; and his remarkable musical and social gifts made him one of the most popular young men in Florence, then the intellectual centre of Italy and the peculiar home of art. There was nothing more natural, given his remarkable talents in so many direc¬ tions, than that he should have learned to paint, an art which was then taught to children as music is to-day. Among his first teachers was Andrea de Verrocchio. Little is known about his early studies in painting and sculpture, at which he seems to have worked with as much earnest endeavor and interest as at his studies in the natural sciences, in the latter of which he excelled all his companions.

At the age of 20 he became a member of the Painter's Guild of Florence, then one of the most notable organizations of the age. The dates and facts concerning his early work are as few and as doubtful as the information respecting his youthful studies. It is certain that he was al¬ ready a master painter in 1478 and that he was then employing others in the business of pro¬ ducing pictures. Much legend and tradition

have collected about this period of his career and immerous existing pictures, some of them completed and others unfinished, and others of them parts of larger works, have been attrib¬ uted to him without sufficient evidence of a really trustworthy character. It is known that on this latter date he was requested by the Signorina of Florence to paint a certain pic¬ ture for the Saint Bernard Chapel, in the Pub¬ lic Palace, but what this picture was or whether any of those put forward as it are really the picture in question, or his work at all, is very doubtful. That Da Vinci had advanced well in his art and made the most of his social tal¬ ents seems certain for we find him in 1482 act¬ ing as the specially commissioned bearer of a present from the famous Lorenzo de'Medici, to another character of the age, now famous in history and tradition, Lodovico il Moro, ruler of Milan. The present itself indicates the favor in which Da Vinci was regarded at court. It was a strangely-constructed, yet beautifully-sounding instrument which the young ambas¬ sador had himself invented and upon which he played with great skill and wondrous sweet¬ ness. This mission proved one of the most eventful undertakings in his life, since it was destined to connect him most intimately, for over a quarter of a century, with the city of ®il Moro.® But it seems it was not as a painter that the ruler of Milan valued him, so much as for his talents as an engineer and general man¬ ager. While in Milan Da Vinci seems to have been tireless. He was, on all occasions, repre¬ sentative and manager for the duke, and acted as the ducal engineer not only in the city but on that ruler's numerous military expeditions and undertakings ; and he appears to have had a higher reputation in his day in this activity of his life than in painting and to have prized it higher himself. Among his other activities, at this period, he planned and constructed the Martesana Canal. He was also one of the most notable figures at the ducal court, where he managed the most brilliant state affairs and public functions and festivals with consummate skill. He seems to have been also a sort of director of public works and, in this capacity, to have himself acted as architect of various public buildings. He is said to have had a hand in the construction of the very handsome Milan cathedral, but what his part was is not known definitely. Notwithstanding all these wide and

varied activities, he was carrying on painting on a very extensive scale and employing numerous talented painters to execute his designs or to do the less important parts of paintings which he was executing. About this timeˆ he wrote an important work on painting, which showed a wonderful knowledge of the art. This, it is said, was intended as a guide and mentor for his own numerous pupils. Thus occupied with so many and important activities he continued in Milan until the duke was driven out of the city in 1499. After the departure of the duke, Da Vinci went to Venice, where he remained two years, which were devoted mainly to art. Then he returned to Florence, where he seems to have been received with great favor by the Church and the artist fraternity. He secured numerous important commissions from churches and monasteries ; and some of the work that he executed in this connection, and the designs

he drew for others to paint from created a great impression upon the artists of his days. They were consequently copied and imitated exten¬ sively not only in Italy, but a little later on throughout all the Latin countries. One of the most remarkable of these was a Madonna, the design for which was worked' over by Da Vinci several times afterward, notably in his famous Madonna and Saint Catharine in the Louvre.

In the midst of his triumphs in art Da Vinci became military engineer to Cesare Borgia (1502), a position which he probably retained for some considerable time, as it enabled him to move about through central Italy, and when occasion required to make visits to other parts of the peninsula, one of which he made the fol¬ lowing year to Florence, where he served on artistic commissions and did additional military engineering. It was about this time that he painted the famous ˆMona Lisaˆ (Louvre), a portrait that has probably been more written about than any other in the world, especially during the second decade of the present cen¬ tury. Da Vinci spent four years on this por¬ trait, and it is said that even then (1503-06) he was not satisfied with it. But notwithstanding his own opinion in the matter, the art judgment of the world is inclined to pronounce it his greatest triumph. About the time of the con¬ clusion of this latter painting Da Vinci was ap¬ pointed painter to the king (Louis XH). This was perhaps the busiest period in his life. He maintained studios for painting and carried on engineering projects and studies in natural sci¬ ences in Florence and Milan, in both of which places he had numerous pupils of surpassing worth who executed his designs for him to supply the incessant demands for his art work from churches and

individuals. The art work done by his pupils in Milan was especially not¬ able, and much of it was, at one time, believed to be altogether the work of the master himself. One of the most remarkable canvases of this period is the ˆMadonna of the Grotto,ˆ of which two copies exist, one in the Louvre and the other in the National Gallery. Much discussion has taken place as to which of these is the original. It is probable that both are, though many critics pretend to see in the copy in the Louvre the more direct embodiment of Da Vinci's style and peculiar artistic qualities. However, both copies are truly worthy of the master; and if one of them was painted by a hand other than his it must have been some one who was able to enter fully into all his moods and who had worked under him so long as to have completely absorbed his atmosphere. From 1513 to 1515 Da Vinci seems to have re¬ sided in Rome, having gone there on the depart¬ ure of the French; but he returned to Milan in the latter year to take charge of the decorations and festivities attendant upon the entry of the P'rench king, Francis I, who rewarded him by appointing him court painter with an annual allowance of 700 scudi in gold. The king also commissioned him to buy up all his own pic¬ tures. This he did, and with them he accom¬ panied the French sovereign to France the fol¬ lowing year, where he seems to have remained for the rest of his life, giving his time to the study of art and sciences.

Da Vinci, in a sense, revolutionized the art of painting and drawing. His technique was

masterly and really wonderful for his age. It enabled him to work with the greatest freedom and speed and with a sureness of touch and a mastery of design, of drawing and coloring until his day unknown. His portraits, his fig¬ ures and his designs were always wonderfully true to life; and they led the artists of his age to seek for a fuller and truer expression of all the manifestations of life. This is perhaps the greatest of the many great qualities of the art expression of Da Vinci. Undoubtedly his studies in the natural sciences and, especially in physiology and anatomy, helped him solve many questions that his

predecessors had not been able to ; and the perfection of his drawing and the representation of the human and other forms seems to have quickened his already keen sense of coloring and of contrast of light and shade and of the blending of the two. He surpassed all his predecessors in the mastery he attained in the depicting of the mystical, the poetical, the sympathetic and the attractive in the human face. It is said that, his several years spent in the painting of ˆMona Lisaˆ were con¬ stant strivings to catch the fleeting manifesta¬ tions of the secret soul of his attractive and winsome subject. But he was not satisfied with mastering the atmosphere of the human face ; he turned his attention to the atmosphere of landscape; and here again he succeeded so well that he was very fond of introducing landscape backgrounds into his pictures and portraits, which he did with telling effect. His strange genius is manifested in the perfect unity, form and artistic sense of the human and the land¬ scape elements in his pictures. They seem to have been made for one another, to have grown up together. Insensibly the Italian artists of his day and of the following generation felt his power and recognized his superior genius ; and among his numerous pupils were several who understood him so well that, as we have seen, their work has been frequently taken for his. There was not a great painter in Italy for the generation following his death who did not owe much to him. Not the least of these was Raphael ; and among them were also such mas¬ ters of the graphic art as Fra Bartolommeo and Andrea del Sarto, who in turn influenced hun¬ dreds of art students in favor of the High Rennaissance whose great master was Da Vinci.

Da Vinci was an inventor of note, one of the greatest and most successful engineers of his time and perhaps the deepest thinker and most profound investigator into all the known branches of science of his age. In many of his investigations he went far beyond his contempo¬ raries.

Bibliography. — For a list of pictures con¬ sult any good history of Italian art; Da Vinci's own manuscripts, published in facsimile (Paris 1881-91 ; Milan 1891-95) ; and his ˆTrattato della pittura,ˆ which has been published numerous times (London 1802; Vienna 1882; and Rome 1890). An English edition, with original text, of his literary works, was published, by J. P. Richter (London 1883). Consult biographies by Amoretti (Milan 1803) and Paul Mtiller-Walde (Munich 1889-90) ; the biographies by Rosenberg (Bielefeld 1898; English translation 1903) ; by E. Miintz (Paris 1899; English trans¬ lation, London 1899) ; Volynsky (Saint Peters¬ burg 1900; English translation by Heaton and

Black, London 1904) ; Horne (London 1908) ; McCurdy (London 1904) ; Seailles (Paris 1912) and Gronau (New York 1903) ; also Uzzielli, ˆRicerche intorno a Leonardo da Vinciˆ (2d ed., Turin 1896 et seq.) ; and the critical works of Dr. Jens Thus (London s.d.) and Oswald Siren (New Haven, rev. ed., 1916) ; Lomazzo, G. P., ˆTrattato dell' arte della pitturaˆ (Milan 1585) ; id., Hdea del tempio della pitturaˆ (ib., 1591) ; Venturi, J. B., ˆEssai sur les ouvrages physico-mathematiques de Leon¬ ardo da Vinciˆ (Paris 1797) ; Bossi, Giuseppe, ˆDel Cenacolo di Leonardo da Vinci ˆ (Milan 1810) ; Calvi, C. L., ˆNotizie dei principali pro¬ fessor! di belle arti> (ib., 1869) ; Houssaye, Arsene, ˆHistoire de Leonardo da Vinciˆ (Paris 1876) ; Grothe, Hermann, ˆLeonardo da Vinci als Ingenieur und Philosophy (Berlin 1874) ; Berenson, Bernhard, ˆThe Drawings of the Florentine Painters ˆ (London 1903) ; Solmi, Edmondo, ˆStudi sulla filosofia naturale di Leonardo da Vinci ˆ (Modena 1898) ; id., ˆLeonardoˆ (2d ed., Florence 1907), the best critical biography; Von Seidlitz, Woldemar, ˆLeonardo da Vinci, der Wendepunkt der Renaissanceˆ (2 vols., 1909).

VINE. See Viticulture.

VINE IN ART AND SYMBOLISM.

The grape vine {vitis vinifera) figures fre¬ quently as a symbol from far distant times. In the Greek mythology Dionysius (and with the Romans Bacchus) was god of the vintage and, therefore, a grape vine with bunches of the fruit are among their attributes. Their at¬ tendants on the Bacchanalian festivals — the Bacchanals — hence had the vine as an at¬ tribute, together with the thyrsus, the latter often entwined with vine branches. For the same reason the Greek wine-cup (can-tharos) is commonly decorated with the vine and grapes ; wine, of course, being drunk as a libation to the god. In Christian iconography the vine also frequently enters. It is several times mentioned in the New Testament. We have the parable of the kingdom of heaven likened to the father starting to engage laborers for his vineyard. The vine is used as symbol of Christ based on his own state¬ ment, «I am the vine.® In that sense a vine is placed as sole symbol on the tomb of the sister of Constantine, the Empress Constantia, and elsewhere. In Byzantine art the vine and grapes figure in early mosaics and on the throne of Maximien at Ravenna it is used as a decoration. The vine as symbol of the chosen people is employed several times in the Old Testament. The vine and wheat-ear have been frequently used as symbol of the blood and flesh of Christ, hence

figuring as symbols (bread and wine) of the Eucharist and are found depicted on ostensories. Often the symbolic vine laden with .grapes is found in ecclesiastical decorations with animals biting at the grapes. At times the vine is used as syrnbol of temporal blessing. In decorative art, while the vine is not as favored as many other motifs it is frequently found in works of the Middle Ages, and in the Renaissance we find the vine as ornament on friezes, pilasters, *etc.* Its supple branches, the beauty of the leaf and the artistic formation of the bunch of grapes, all tend to make the plant one whose characteristics we would expect to find more

favor in the modern art world, more especially as the grape bunch is so prolifically used in the decorative arts.

Clement W. Coumbe. VINE-PESTS. See Grape Insect-pests.

ˆ VINEGAR is a liquor containing the acetic acid obtained by the acetous fermentation or oxidation of alcoholic liquids — hard cider, wine, beer, malt intusion, beet-root juice, fermenting molasses, dilute spirits or the like. Its color, varying from a pale yellow to a deep brownish red, and its odor and taste are influenced_ to a large extent by the materials employed in its manufacture. Vinegar obtained by acetous fermentation possesses different properties from pure acetic acid because it contains besides acetic acid and water — the essential constituents of vinegar — also small quantities of substances, which being analogous to those occurring in wine may properly be termed bouquet bodies. These substances give the vinegar an agreeable odor and taste en¬ tirely lacking in synthetic vinegar prepared from commercial acetic acid. Even if an agreeable odor is obtained in the latter by the addition of certain volatile oils and compound ethers, the harmonious bouquet peculiar to vine¬ gar obtained by acetous fermentation is never realized, the relation being homologous to that existing between artificial and genuine wine. Any one gifted with a delicate and practised sense of smell can at once distinguish acetic acid vinegar from wine, malt or fruit vinegar.

Vinegar obtained by the acetification of wine has been known from the very earliest times, being used in this form contemporaneously with wine. Many noted scientists, such as Stahl, Davy, Berzelius, Naegeli, Liebig and Pasteur studied the process of acetous fermentation, and in 1822 Doebereiner suggested that acetifi¬ cation is due to the action of oxygen on alcohol, which is converted into acetic acid and water; Liebig sought to clarify tfiis theory, and main¬ tained that by the exposure, under suitable con¬ ditions, of alcohol to the action of oxygen one-third of the entire hydrogen contained is with¬ drawn and aldehyde formed, which latter, how¬ ever, immediately combines further with oxygen and is converted into acetic acid; the forma¬ tion of vinegar from alcohol, therefore, being a partial process of combustion. Acetification is, however, a far more complicated process than Liebig supposed and later investigations have shown it to be a chemico-physiological process with the cooperation of a living vegetable or¬ ganism. It has been shown by Buchner and Weissenheimer that the acetous fermentation is due to enzymas existing in the plant cell. The presence of alcohol and oxygen alone will not suffice for acetification, the presence of nitrogenous bodies and certain mineral salts are absolutely necessary. Pasteur was the first to consider the formation of vinegar from alco¬ hol as a peculiar process of fermentation, main¬ taining that a certain organism which he termed Mycoderma aceti, the ˆVinegar ferment® or ˆVinegar yeast® (popularly known as ˆmother® of vinegar), consumes the alcohol, the nitrog¬ enous substances and the salts ; on the other hand Naegeli asserts that this organism rather decomposes the particles of the substance to be fermented into simpler compounds. This or¬ ganism, of which there are several different

kinds, consists of a single cell, its special char¬ acteristic being its manner of reproduction, which is effected by a division of the cell into two and then a separation or splitting of both. The cells form chains, which at 104° F. readily grow into long threads (involution forms). It is interesting to note that this organism not only oxidizes alcohol into acetic acid, but will also oxidize the latter into carbonic acid and water, in case alcohol is lacking. This is an important factor in storing vinegar, as if it is allowed to come in contact with air the strength of the vinegar is lessened, owing to the con¬ sumption of acetic acid by the terment.

Vinegar may be made according to the old slow process or by the newer quick process. The principle embodied in the old process is to allow wine, which is unfit for consumption as such, beer, malt-

infusion, etc., to oxidize and to draw off the vinegar formed. We may say that this slow process is an adaptation of the spontaneous souring of beer, wine or fermented liquors in general but under such conditions as tend toward an improvement of the product. While this process is employed especially for the preparation of wine vinegar it can neverthe¬ less be used just as well for making malt or fruit vinegars. In this process old oak vats or casks are thoroughly cleansed with boiling water and saturated with strong boiling vine¬ gar, whereupon the vats are filled two-thirds with the mixture of alcohol and vinegar. It is essential that the liquid contain no more than 14 per cent of alcohol, as the vinegar ferment per¬ ishes in the presence ot more alcohol ; a content of not less than 3 per cent of vinegar, while not absolutely necessary, is nevertheless bene¬ ficial as it hastens the acetification. This alco¬ holic liquid is technically termed the ®wash.® The temperature is maintained as nearly as possible at 76° F., and in a few days the acetous fermentation will have begun, which is then allowed to continue until completed, which re¬ quires from 12 to 16 weeks. The vinegar is then drawn off and stored in a cool place in barrels which are filled to the bung hole and closed air-tight, in order to prevent the vinegar ferment from gaining oxygen from the air with which to oxidize the acetic acid and thus weaken the vinegar. Before storing, however, the vinegar is commonly passed through a ®rape® or fining vat, having a layer of the residue cake from wine factories — the stems and skins of the pressed grapes. Through this it is passed again and again until every trace of alcohol has been oxidized. Another way is to draw off the .vinegar every week as it is formed and to add as much fresh ^^wash® as vinegar is drawn off. The process is practically continu¬ ous and need only be interrupted after several years, when the accumulation of tartar and sedi¬ ment renders a cleansing absolutely necessary.

Wine vinegar made according to this process obtains its peculiar bouquet from the wine em¬ ployed and contains besides all the substances of the wine either unchanged or only partly transformed, some new ones, as acetic ether and other compound ethers. In a similar man¬ ner malt and fruit vinegar may be made. The former contains the extractive substances of the malt, as, for example, dextrin, nitrogenous bodies, phosphates, etc., and the latter contains also malic acid. A very pure vinegar which

contains only a little acetic ether is made from a mixture of dilute spirits, some vinegar and a malt-infusion.

Schuetzenbach, perceiving that if the rela¬ tive surfaces of contact of the alcoholic liquid with air be greatly enlarged the formation of vinegar would be accelerated, in 1823 invented what is termed the ®new® or ®quick process.® Almost at the same time in England Ham, and Wagman in Germany, brought out similar prop¬ ositions. By spreading the liquid over as much space as possible and allowing it to percolate slowly through and diffuse over . a mass of shavings, mostly of beechwood (or similar material), a thin layer, presenting a large sur¬ face, is formed, one gallon being spread out over 100 square yards. This arrangement favors the chemical appropriation of the oxygen in the current of air caused to pass through the shavings, which not only serves to divide the liquid but also to carry the vinegar ferment, thus hastening acetification. The shavings are first ˆsoured® by soaking in -strong vinegar for 24 hours. Cleansed charcoal in pieces the size of a walnut is better even than shavings.

In this process the generator, which is technically termed a ˆgraduator,® consists of a large vessel divided into three superimposed compartments of which the uppermost serves to divide the alcoholic liquid into many fine drops ; in the middle compartment, which is the largest, acetification takes place, and the lower one is a reservoir for the vinegar formed. This appa¬ ratus is built in various forms but the most practical is that of a truncated cone, as the alcoholic liquid in its descent can spread over a constantly increasing area, and continually comes in contact with fresh air, entering from below. Fir or other durable wood, except oak, which contains too many extractive substances, is used. All metallic parts (hoops, etc.) must be well varnished, as heavy rusting will other¬ wise be caused by the vapors of the acetic acid. Various sizes have been tried, but a generator which is about 10 feet high, and three and four feet in upper and lower diameter respectively, has been found the best. A well-fitting cover in which holes are bored closes the top. The current of air is regulated by opening or clos¬ ing some of these holes, as may be necessary. The alcoholic liquid is generally introduced through a rotary sprayer. A thermometer is of course a necessary adjunct. The liquid used in this process is usually a mixture containing four and one-half gallons of 42 per cent brandy, nine gallons of old vinegar and 27 gallons of water containing some bran and crushed rye.

Dr. Bersch of Vienna recently invented the automatic plate generator which is so arranged that a formation of aldehyde and the destruc¬ tion of acetic acid already formed is impossible and that the evaporation of alcohol is almost wholly eliminated. By means of thin plates of beechwood he is enabled to have the alcoholic liquid and the air in undisturbed continual con¬ tact, so that vinegar is formed all the time. His generator has the shape of a prism eight feet high, having a base three feet square; the interior is fitted with 10 layers of very thin beechwood arranged in such a way that the liquid can descend on both sides of the plates, while the air ascends between them undisturbed. Once acetification is induced it can be main¬

tained for years, providing of course the influx of the alcoholic liquid and the admission of air are properly regulated.

Theoretically 100 grams of alcohol will pro¬ duce 130 grams of acetic acid and will require 300 grams of oxygen to oxidize the alcohol, but in actual practice the yield is less, the losses being in general due to evaporation of alcohol, caused either by imperfect apparatus, or by too rapid oxidation. In general such losses aver¬ age 15 to 20 per cent, although they sometimes amount to 30 per cent. While it is true that rapid oxidation will produce vinegar quickly, yet it is also true that in such rapid oxidation too much of the alcohol evaporates and is not Oxidized, so that what is gained in time is lost in material, which is the more expensive of the two. The fact that air which has passed a gen¬ erator still contains three-fourths of its oxygen shows that four times the calculated amount of air is necessary in order to fully convert the alcohol into acetic acid. Inasmuch as the forma¬ tion of vinegar is a process of combustion, it is self-evident that heat is developed. This fact must always be borne in mind by the vinegar manufacturer, because the vitality of the vine¬ gar ferment depends upon the temperatures to which it is exposed. Its activity is greatest be¬ tween 68 and 95“ F. (20 to 35° C) ; if this limit is passed the formation of vinegar decreases rapidly, while at 104° F. (40° C.) it ceases al¬ together, and 122° F. (50° C.) the ferment perishes. Lower temperatures do not affect the ferment as much as higher temperatures do, but a change from one to the other is not beneficial for the development of the ferment.

Wood vinegar made by the distillation of wood is used to a large extent for the manufac¬ ture of various acetates, esters, etc., and in dilu¬ tion is sometimes used as vinegar for household and preserving purposes, which practice is, how¬ ever, not advisable, as such vinegar

is injurious to health on account of the numerous secondary ingredients contained in the pyroligneous acid (q.v.). The use of such vinegar in food is forbidden by law in some States.

In the household certain precautionary measures are to be followed in the use of vine¬ gar. Vinegar, or foods prepared in vinegar, should never be allowed to stand long in copper, brass or tin vessels; even the enamel of iron and the glazing on earthenware vessels sometimes contain lead, which forms lead acetate in con¬ nection with the vinegar. Glass or porcelain vessels are best adapted for this purpose.

VINEGAR BIBLE, a Bible printed in 1717 at the Clarendon Press, in Oxford. So named because in the running headline of Luke xxii, vineyard was misprinted vinegar.

VINEGAR HILL, Ireland, an elevation 389 feet high, close to the town of Enniscorthy, in County Wexford, scene of the defeat of the Irish by General Lake, 21 June 1798. The Irish had camped here for about a month, and dis¬ credited their cause by outrages on the lives and property of the loyalists in the surrounding country. About 400 of the Irish were cut down, the remainder fled to Wexford, whither Lake marched the day after, killing all whom he found with arms.

VINELAND, N. J., borough in Cumber¬ land County, on the Pennsylvania and the

Central of New Jersey railroads, about 32 miles southeast of Philadelphia. It was founded in 1861 by Charles K. Landis, on a flat sandy soil, and widely advertised as a region suitable for small fruit farms. It was settled mainly by New Englanders, who mostly lost their invest¬ ments. In time by heavy fertilization small fruit farming was established, and manufactur¬ ing followed. The chief lines are shoe factories, sash, door and blind factories, pearl button works, glass works (in which are made flint and plate glass) and a paper box factory. Squabs are raised on a large scale. The grape juice manufacture is widely known. Other manufactures are thermometers,

chenille cur¬ tains, rugs and men's clothing. There are three banks and daily and weekly newspapers. The educational institutions are the State Train¬ ing School for Feeble-Minded Children, a high school, graded schools, the Vineland Free Public Library and the library of the Historical and Antiquarian Society. There are here also the State Home for Disabled Soldiers and the State Institution for Feeble-Minded Women. The borough has the commission form of govern¬ ment, and owns and operates the electric-light plant and the waterworks. Pop. (1920) 6,799.

VINES, Richard, English colonist in Amer¬ ica : b. near Bideford, Devonshire, 1585; d. Bar¬ bados, 19 April 1651. Educated in medicine, he was sent out in 1609 to explore Maine, then be¬ came agent to Sir Ferdinando Gorges (q.v.), and, having returned to New England, passed a winter, probably that of 1616-17, at Winter Harbor, near the Saco. Some doubt is said to be cast on the authenticity of his signature to a deed containing a patent to himself and a certain John Oldham for lands now occupied by Bidde-ford. Me., and executed in 1629, by the fact that in that year he was in England. Until 1635 he was principal superintendent of Saco, and then he was made councillor. In 1643 he again be¬ came administrator of the government of the colony. Some trouble arose in 1644 between him and George Cleaves, who had been sent out by Alexander Rigby to take possession of and administer a territory covered by what was known as the Lygonia or Plough patent and conflicting with the grant made to Gorges. Cleaves sent a messenger to Saco suggesting that the matter be left to the arbitration of the Massachusetts magistrates. Vines refused, and went to Boston to represent his case. The con¬ troversy came to nothing at the time. Vines returned to England in 1645, and went thence to Barbadoes, where he became a planter and also practised his profession.

VINES, Richard, English Puritan divine; b. Blaston, Leicestershire, about 1600; d. Lon¬ don, 4 Feb. 1656. Educated at Magdalene Col¬ lege, Cambridge, he was instituted to the rectory of Weddington, Warwickshire, 11 March 1628, and in 1630 to that of Caldecote also. He gained considerable fame as a preacher, and his first sermon before the Commons (30 Nov. 1642) increased it. In 1643 he was placed in the rectory of Saint Clement Dane's, and in 1644 made master of Pembroke Hall, Cambridge. He resigned Saint Clement Dane's on presentation to the rectory of Watton, Hertfordshire. At the Westminster Assembly he was a member of the committee for drafting a confession of faith (1645). In 1649 he refused allegiance to

a government without a king or House of Lords, and was thereupon removed from Pembroke and the rectory of Watton. From 1650 he was minister of Saint Lawrence Jewry, London. He was styled the ˆEnglish Luther,ˆˆ was greatly learned and favored a modified episcopacy. He published some individual sermons and others were posthumously collected in such vol¬ umes as ˆ‘U.eidapxˆ, Obedience to Magistratesˆ (1656), and ˆA Treatise on the Institution of the Lord’s Supperˆ (1657).

VINET, ve-na, Alexandre Rodolphe, Swiss theologian: b. Orchy, near Lausanne, 17 June 1797; d. Clarens, Switzerland, 4 May 1847. He studied for the Protestant ministry in which he was ordained in 1819, having previously been appointed, when only 20, professor of French language and literature at the gym¬ nasium of Basel. In 1829 he published his ‘•Chrestomathie Franqaise,ˆ comprising a valu¬ able survey of French literature. Subsequently he was a prolific contributor to the journal Le Semeur, and in 1837 published a selection of essays written for it under the title ˆEssais de Philosophie Morale.ˆ In the year last men¬ tioned he accepted the chair of practical the¬ ology in the academy at Lausanne, but gave it up in 1845, and seceded from the national church, holding the principle that there should be no connection between church and state. His views on this subject were enforced in his ˆEssai stir la Manifestation des Convictions Religieuses, et sur la Separation de I’Lglise et de I’Ltatˆ (1842). As a preacher Vinet was noted for eloquence and earnestness, qualities which also form the distinguishing character¬ istics of his writings. In addition to those al¬ ready referred to may be mentioned his ˆDiscours sur quelques Subjets Religieuxˆ and ˆNouveaux Discours, ˆ selections from both of which have been published in English, under the title of Wital Christianityˆ ; ˆfitudes fivan-geliquesˆ and ˆNouvelles Etudes Evangeliques,ˆ translated into English as ˆGospel Studies.ˆ His ˆHistoire de la Litterature Frangaise au XVHI Siecleˆ ; and ˆEtudes sur la Litterature Frangaise XIX Siecleˆ display considerable critical insight.

VINEYARD (vm’yard) SOUND, a pas¬ sage separating Martha’s Vineyard (q.v.) from the Elizabeth Islands (q.v.), near the southeast coast of Massachusetts. It is about 22 miles long and from three to six miles wide. There is one lighthouse where Vineyard Sound opens into Nantucket Sound and one about midway and off the coast of Elizabeth Islands.

VINGT-ET-UN, vaht-a-un, a card game played with a whole pack and with any num¬ ber of players. The cards count according to the number of pips (-or spots), the face cards counting 10 and the ace 1 or

11 as the holder chooses. The object of the game is to obtain a hand the total value of which equals 21 (hence the name). Two cards are dealt to each player, and if no one has a hand equal to 21, on the first deal, the players have the right of drawing cards in turn; if the cards drawn bring the total to more than 21 the player is out of the game. The player first obtaining a hand of 21 takes the pool or any other winning determined upon.

VINLAND, or WINELAND, the chief settlement of the early Norsemen in North

Amcr'ca, represented in modern times by part of Massachusetts and Rhode Island. The first voyager to see the north coast was Bjarne Herjulfson, who was driven thither by a storm in the summer of 986 a.d., when mak¬ ing a voyage from Iceland to Greenland, of Vvhich country his father, Herjulf, and Eric the Red, were the earliest colonists. But Bjarne did not touch the land, which was first visited by Leif the Lucky, a son of Eric the Red, about 1000 A.D. One part of the country he named Helluland, ®Stoneland® ; another Markland, ®VVoodland,^^ the modern Newfoundland and Nova Scotia. A German in his company hav¬ ing found the grape (most probably the Vitus vulpina) growing wild, as in his native country, Leif called the region Vinland. The natives from their dwarfish size they called skraelings. Two years after Leif's brother, Thorwald, arrived, and in the summer of 1003 led an expedition along the coast of New England south, but was killed in the year following in an encounter with the natives. The most famous of the Norse explorers, however, was Thorfinn Karlsefne, an Icelander, who had married Gudrid, widow of Thorstein, a son of Eric the Red, and who in 1007 sailed from Greenland to Vinland with a crew of 160 men, where he remained for three years, and then returned, after which no further attempts at colonization were made. Rafn, in his ^Antiquitates Americanse,^ - published the first full col¬ lection of the evidence which proves the pre-Columbian colonization of America. Both he and Finn Magnusen labor to show that Colum¬ bus derived his first hints of a new world from the accounts of these

old Icelandic expeditions. Finn Magnusen is believed to have established the fact that Columbus did visit Iceland in 1477, 15 years before he undertook his expedi¬ tion across the Atlantic, and so may have heard something of the long-abandoned Vinland. Consult de Costa, ˆPre-Columbian Discovery of Americaˆ (1901) ; Rafn, ˆAntiquitates Ameri-canaeˆ (1837) ; Reeves, ˆFinding of Wineland the Goodˆ (1890) ; Hovgaard, W., ˆVoyages of the Norseman to Americaˆ (New York 1914).

VINTON, Alexander Hamilton, American Protestant Episcopal bishop : b. Brooklyn, N. Y., 30 March 1852. He was graduated from Saint Stephen's College, Annandale, N. Y., in 1873, and from the General Theological Seminary in 1876. He studied later at the University of Leipzig, took orders in 1877 and was in charge of the Memorial Church of the Holy Comforter, Philadelphia, 1879—84. He was rector of All Saints' Church, Worcester, Mass., 1884-1902, and was consecrated first bishop of the diocese of western Massachusetts in January 1902.

VINTON, David Hammond, American soldier: b. Providence, R. I., 4 May 1803; d. 21 Feb. 1873. Having graduated at West Point in 1822, he was commissioned to an artillery regiment, but was transferred to the infantry 1823; became chief quartermaster on the staff of General Wool, with rank of major, 1846, and served through the Mexican War. He was chief quartermaster of the Department of Texas 1857-61 ; and was made prisoner of war in February 1861, when General Twiggs surren¬ dered to the Confederates; was exchanged after six months and thereafter was deputy quarter¬ master-general of the army till 1866, when he

was placed on the retired list. He was brevetted colonel and brigadier-neneral 1864 for Haithful and meritorious services.ˆ

VINTON, Francis, American soldier and Protestant Episcopal clergyman, brother of David Hammond Vinton : b. Providence, R. I., 29 Aug. 1809; d. 29 Sept. 1872. After gradua¬ tion at West Point, he was commissioned lieu¬ tenant of artillery in 1830. He served against the Indians in Georgia and Alabama, receiving the thanks of Congress and a land-grant in In¬ diana. While stationed at Boston, he studied law and was admitted to the bar 1834. He resigned his commission in the army in 1836; studied the¬ ology; was ordained deacon 1838, priest 1839, in the Protestant Episcopal Church. He was rector in succession of churches in Providence, R. I. (1840-42), Newport, R. I.

(1842-44), Brooklyn, N. Y. (1844-46), New York (1855-72). He declined election to the episcopate of Indiana 1848; was elected professor of ecclesi¬ astical law and polity in the General Theological Seminary, New York, 1869. He published ˆAr¬ thur Tremaine, or Annals of Cadet Lifeˆ ; ˆOration on the Annals of R. I.ˆ ; ‘ˆCommentar}ˆ on the General Canon Law.ˆ

VINTON, Francis Laurens, American military officer: b. Fort Preble, Me., 1 June 1835; d. Leadville, Colo., 6 Oct. 1879. He was graduated at West Point in 1856, subsequently studied metallurgy and was graduated at the Imperial School of Mines in Paris. When the Civil War broke out he became a captain in the 16th United States Infantrjˆ and later colonel of the 43d New York Volunteers. He partici¬ pated in the Peninsular campaign, was wounded at the action before Fredericksburg, promoted brigadier-general of volunteers in March 1863 and was professor of engineering in Columbia College 1864-77.

VINTON, Iowa, city, county-seat of Benton County, on the Red River, and on the Burling¬ ton, Cedar Rapids and Northern Railroad, about 30 miles southeast of Waterloo and 22 miles north of Cedar Rapids. It is in an agri¬ cultural and stock-raising region. The chief manufacturing establishments are a pearl-button factory, two corn-canning factories (about 1,000 employees during the corn-canning sea¬ son), flour mill and creameries. There are six churches. The educational institutions are the State College for the Blind, Tillford Academy, public schools and a public library. There are four banks and three newspapers. The gov¬ ernment is vested in a mayor and a council of eight members elected biennially. Pop. (1920)

3,381.

VIOL, an ancient musical stringed instru¬ ment which is regarded as the precursor of the modern violin. They were played on with a bow, and were usually made with six strings, though specimens are extant with three to seven strings. From these primitive viols were grad¬ ually developed the violin (q.v.), viola, violon¬ cello, and all this class of stringed instruments having a sounding box and tension screws, but without frets. Instruments with frets have de¬ veloped as guitars (q.v.). The modern viol is a shortened term for double bass viol, the lar¬ gest instrument in a stringed orchestra, having three or four strings and a compass usually of three octaves,

ˆlOLA, (1) The heroine of Shakespeare's comedy of ˆTwelfth Night. > (2) The chief figure in Beaumont and Fletcher's comedy ˆThe Coxcomb, > first played about 1613.

VIOLA, or AL'TO VIOLA, or TENOR VIOLIN, a large kind of violin, to which the part between the second violin and bass is gen¬ erally assigned. It has four gut strings, the two lower covered with silvered copper wire. They are tuned by fifths, exactly an octave above the violoncello. The music is generally written on the alto clef.

VIOLA DA GAMBA, a bass viol held be¬ tween the legs of the player; an organ-stop with metal pipe of narrow scale, and ears on the sides of the mouths, giving viol-or string-like quality.

VIOLA D'AMORE, vl-6'la da-m5'ra, an instrument of the viol tribe, which had fallen into disuse, but was revived with a degree of success by Urban at Paris. It had five or seven strings of catgut, placed and played as in other bow-instruments ; but below them, and passing underneath the bridge, were five or seven other strings of metal tuned in unison with them, which vibrated sympathetically when the form.er were played, giving to the music a peculiar resonant character. The compass was at least three octaves and a half. The strings of Urban's viola d'amore" were tuned in thirds and fourths.

VIOLACEˆ, vi-6-la'se-e, natural order of exogenous plants, of which about 300 species are known, natives of temperate and tropical countries, those belonging to the former gener¬ ally herbaceous, and to the latter generally shrubby. They have simple leaves with pjersist-ent stipules. The calyx consists of five persist¬ ent sepals, usually elongated at the base; the corolla of five hypogynous petals, unequal in the suborder Violeae, and equal in the suborder Alsodeae. There are five stamens inserted in a hypogyneous disc ; the filaments prolonged be¬ yond the anthers. The ovary is one-celled gen¬ erally with many ovules ; the style single, with an oblique stigma. The fruit is a three-valved capsule with many seeds. The best known species are the Violets (see Violet), prized for beauty and fragrance. Emetic and purgative properties prevail in the order; and some South American species, particularly of the genus lonidium, yield valuable medicines.

The IpE; cacuanha; Cuichunchul. The leaves of the Lobolobo (Conohoria or Alsodcia loholobo) are used in Brazil as spinach.

VIOLET, a genus (Viola) of mostly per¬ ennial herbs of the family Violaceco. The spe¬ cies, of which about 200 have been described, are natives of the northern and southern tem¬ perate zones. In North America there are about 80 species distributed as far south as the mountains of Costa Rica. They are all of humble growth, rarely exceeding six inches in height ; bear heart-shaped leaves upon usually long stems, and irregular flowers either solitary or two together on axillary peduncles. The capsular fruits contain numerous globular seeds. In some species cleistogamous flowers are borne close to the ground or often beneath it. These flowers are close pollinated in the bud. Of the American species cultivated in gardens only two, U palmata and V. pedata,

are well known though several others are of¬ fered for sale. Of the two mentioned the latter which is known as the bird's-foot violet, is apparently the most promising as a garden plant for improvement. The Australian violet (V. hederacece) is grown to a small extent in Cali¬ fornia. The horned violet (V. cornuta), also called bedding pansy, has long been popular in gardens for its variously colored long-stemmed flowers which appear in early spring. It is a native of southern Europe. The pansy or heart's-ease (V. tricolor) is another well-known European species which has long been popular in gardens. (See Pansy). The most import¬ ant species, however, is the sweet violet (V. odorata). This is a native of western Asia and the Mediterranean region whence it was intro¬ duced into cultivation and has given rise to nu¬ merous varieties having white and reddish pur¬ ple as well as variously tinted blue flowers, both single and double. The species is the parent of the popular florists' flower which in the United States ranks third in the list of important com¬ mercial flowers. Its season under glass lasts about seven months; that of the rose and car¬ nation, its principal rivals, about nine months. (See Floriculture in America),

When violets of ordinary quality will satisfy the needs of the grower the violet plants are not particularly exacting in their demands as to soil, cultivation, etc., but when really choice flowers are required the plants demand con¬ siderable skill and attention. It has not inre-quently happened that growers who after sev¬ eral years' success with the crop considered themselves experts have been disappointed with their repeated failures to produce good blos¬ soms. Hence he business

of growing this plant is steadily gravitating into the hands of special¬ ists. And certain sections of the country are becoming noted for their violet industry. Prob¬ ably the best known of these violet centres is the district near Poughkeepsie, N. Y.

The plants are propagated by division which may either necessitate their removal from the ground or not. In the former case the old parts are destroyed, in the latter the offshoots or young crowns are separated after becoming well rooted. In each case the little plants are set about four inches apart and transplanted to per¬ manent quarters when well established. Cut¬ tings are also widely used. They are either obtained from well-developed runners or from young unrooted crowns and treated like cuttings of geranium until well rooted and ready for transplanting in soil.

In general, the florists' violet will thrive well in any rich loamy soil, but best results are gen¬ erally obtained with soil resulting from the de¬ cay of thick sod pared from an old blue grass pasture upon sandy but rather heavy loam. This should be prepared the season previous with alternate layers of well-decayed cow manure, and after six or more months' exposure to the weather sliced, when about one and one-half pounds of bone meal should be added to each cubic yard of soil. This soil is then spread on benches or made into solid beds in the green¬ houses or frames, the former preferred. The plants are set from 8 to 12 inches asunder in rows 10 to 18 inches apart, according to the size of the variety, the single flowered varieties usu¬ ally demanding the maximum space. Most

growers agree that plantng in early spring is preferable to other times because the plants be¬ come well established, vigorous and strong, whereas if set in late spring or later they do not seem to thrive so well during the hot weather. At all times weeds must be kept out of the beds and except when needed for propagation the runners should be removed so as to divert growth toward flower production. The summer temperature should be kept as low as possible and the winter temperature between 45° and 50° at night with a maximum day temperature of 60°. The beds should be kept moist but not wet at all times and the supply of fresh air abundant. Careful attention to these two details of management is one of the most important means of

preventing the so-called plant diseases which sometimes destroy the crops of careless growers.

The above method of growing violets con¬ tinuously under glass is considered the most satisfactory since the plants are always under complete control. There »are, however, other methods which are of more or less importance, such as combining house culture with field cul¬ ture, the plants being cultivated out of doors until early or mid autumn and then trans¬ planted to the greenhouse. Large quantities are also cultivated in frames either with or without artificial heat, the plants being grown either in the field or in beds which are covered with the frames at the approach of cold weather. This method is most popular where the winter tem¬ perature is not very low, as in Virginia and southward. Violets are sometimes grown in pots but this method is considered too expensive for commercial purposes and is also likely to prove unsatisfactory and inconvenient.

Since the violet is esteemed mainly for its fragrance, the flowers should be gathered just before reaching prime condition and placed on sale as soon as possible because the odor is evanescent. A definite knowledge of the de¬ mands of the market is also essential since some markets demand bunches of certain sizes or forms and will not handle other sizes or forms profitably. The bunching demands great skill and taste and in the larger establishments is usually done by girls.

Several insects feed upon the violet, the most common being the black fly (Rhopalosihpiwi viola'), the green fly {Aphis sp.), gall-fly (Diplosis violicola), violet sawfly (Eniphytus canadensis) and the greenhouse leaf tyer (Phlyctcenia rubigallis). The red spider (Tet-ranychus telarius), which is not an insect but a mite, also lives upon the foliage. Its visitations may be prevented by due attention to ventilation and humidity of the air. The method of con¬ trolling the others seems at present to be hydro¬ cyanic acid gas, but intelligent management is considered more satisfactory. It is preventative rather than remedial. The so-called diseases are rnost effectively prevented by attention to watering, ventilation and ample space for each plant to grow in.

Consult Galloway, .ˆViolet Cultureˆ (New \ork 1900) ; Bailey, ˆStandard Cyclopedia of Horticultureˆ (New York 1916).

VIOLET FANE. See Currie, Lady Mary Montgomerie Lamb Singleton.

VIOLET-GREEN SWALLOW. See

Swallow.

VIOLET MOSS (Byssus lolithus), by some botanists ranked as a lichen, and by others as a fungus. It consists of simple articulated threads, and spreads over the ˆWiolet Stones® (q.v.) in the form of a delicate incrustation, at first reddish brown, but in a more advanced stage, yellowish green. It was formerly in use as a popular remedy for feverish cutaneous eruptions.

VIOLET STONES, certain stones found on high mountains — as in Thuringia, on the Harz Mountains and the Riesengebirge — which, in consequence of being covered with what is called Violet Moss, emit an odor like that of violets. They retain this odor a long time, and it is increased by moistening them.

VIOLIN, a musical instrument consisting of four strings stretched by means of a bridge over a hollow wooden body, and played on with a bow. The principal parts of the violin are the scroll or head in which are placed the pins for tightening and slackening the strings ; the neck, which connects the scroll with the body and to which the finger-board is attached, that is, the board upon which the strings are pressed down or stopped by the fingers of the left hand as it holds the neck in playing; the belly or upper surface of the body, over which the strings are stretched, and which has two sound-holes, one on each side in this shape ˆ ; the

hack or under side ; the sides or ribs, uniting the back and belly and completing the body; the tail-piece, a piece of wood of somewhat triangular shape, to the broad end of which the strings are fastened, and which is attached by a piece of catgut to a knob at the opposite end of the body from the head, and so is stretched above the belly ; and the bridge, ris¬ ing between the tail-piece and the finger-board, with one of the sound-holes on each side. The back and belly have both a considerable con¬ vexity, and the edge of the bridge on which the strings rest is also convex so as to allow of each being touched separately by the bow. Some instruments consist of as many as 58 different pieces, but so minute a division is not necessary. The back, neck and sides are gener¬ ally of maple or sycamore, the belly of pine or hemlock, the finger-board and tail-piece of ebony. Almost all the different pieces are fastened to¬ gether with glue. ˆ The strings are of catgut, the lowest or bass-string being covered with silvered copper wire, silver wire or even gold wire.

Instruments of the violin kind have been in use from an unknown antiquity. The viola, which preceded the violin in Europe, has been

traced back to the 8th century. In several im¬ portant respects the violin is superior to al¬ most every other instrument, and there is none which cornbines so many excellencies. Within its range it can take every interval of pitch to the minutest fraction, its susceptibility of divi¬ sion being limited only by the delicacy of ma¬ nipulation of the performer; so that it can always be played either in just intonation, or in any temperament required by the accompany¬ ing instruments. It is thus equally adapted to solo and orchestral performances. For the former it is fitted by its clear and brilliant tone, as variable in volume as in intonation, in¬ exhaustible in continuity and variety of shading,

and capable of the sharpest strokes of staccato as well as ˆ of the most sustained efforts of legato music. Its place in the orchestra is marked by these perfections as the leading one, to which the melody is entrusted. As a solo instrument it has also a peculiar faculty of imitation, not only of the tones of other in¬ struments, but of non-musical sounds, as far as they are capable of musical imitation. This and its indefinite range are somewhat liable to abuse.

As an orchestral instrument its powers are multiplied by ˆ the making of similar in¬ struments varying in size, but nearly identical in principle and form of construction. The full orchestral set consists of the violin, which is used for first and second parts ; the viola, or tenor violin; the violoncello, or bass-violin; and the violone, contra-basso, or double-bass violin, which usually accompanies the violon¬ cello at an octave of interval. The four strings of the violin are tuned at intervals of fifths, thus

_ p— — The highest range of the instrument depends to some extent upon the performer, but the ˆ high notes when forced are apt

to be thin and squeak}”. Its legitimate compass exceeds three octaves. The violin can, to a lim¬ ited extent, be made to produce harmony by

sounding two or three strings together, but this is only a tour de force, not suitable for render¬ ing a sustained composition, although a fugue in four parts for ‘a single violin has been writ¬ ten by Sebastian Bach. The viola is tuned thus, the music being written in the alto clef. Its range extends | j to the G above the treble clef. W The violoncello is tuned thus

Its compass extends to the A above the second line in the treble

_ clef. With the assistance of harmonies it may be carried one or two octaves higher. The double-bass has three, four or five strings.

The structure of the violin while closely imitated is still imperfectly understood by musi¬ cal mechanists. The finest violins are by old makers, which cannot be rivaled, and the pre¬ cise cause of their superiority, whether in the wood or the varnish used, has never been satisfactorily explained. The Cremona violins stand in the first rank, the celebrated masters of this school being the Amati, Antonio Stradi¬ vari (Straduarius), and Giuseppe Guarneri (Guarnerius) ; of German makers Stainer or Steiner and Klotz (both belonging to Tyrol) are the most celebrated; Vuillaume of the French; and Forrest of the English. Consult Abele, H., ˆThe Violin and its Storyˆ (New York 1906) ; Engel, C., ˆMusical Instrumentsˆ (London 1875) ; Hart, G., ˆThe Violin: Famous Makers and their Imitatorsˆ (Boston 1885) ; Hill, ˆAntonio Stradivariˆ (London 1902) ; Hipkins, A. J., ˆMusical Instruments, Historic, Rare and Uniqueˆ (Edinburgh 1887) ; Morris, W. M., ˆBritish Violin Makers, Classical and Modernˆ (London 1904).

VIOLLET-LE-DUC, ve-o-la-le-diik, Eu¬ gene Emanuel, French architect and historian: b. Paris, 27 Jan. 1814; d. Lausanne, Switzer¬ land, 17 Sept. 1897. He made special study of mediseval architecture in Italy and France; and became professor in the Lcole des Beaux

Arts in 1863. His great work is ˆDictionary of French Architecture from the 11th to the 16th centuryˆ (10 vols. 1854-69). His other chief works are ˆ Essay on the Military Archi¬ tecture of the Middle Agesˆ (1854) ; ‘ˆDiction¬ ary of French House Furniture from the Car-lovingian Epoch to the Renaissanceˆ (6 vols. 1854-75) ; ˆDiscourses on Architectureˆ (1858-72) ; < Chapels of Notre Dame de Parisˆ (1867-69) ; ˆMemoir on the Defense of Parisˆ (1872) ; ˆHistory of a House, ˆ ‘ˆHistory of a Fortress,ˆ ˆHistory of Human Dwelling Places,ˆ ˆHistory of a City Mansion and of a CathedraP (4 vols. 1873-78). As a practical architect he restored the east towers of Saint Ouen, Rouen,

and the cathedral at Carcassonne, besides executing many other works, among the most important of which are the restorations of the chateau of Pierrefonds and the fortifications of Carcas¬ sonne. Consult Sauvageot, Wiollet-le-Duc et son CEuvre (1880) ; Saint Paul, Wiollet-le- Duc, ses Travaux d'Art, etc.ˆ (1881).

VIOLONCELLO, ve"o-l6n-cher6 or vP'o-lon-sel'o, a powerful and expressive bow in¬ strument of the violin series, held by the per¬ former between the knees, and filling a place between the violin and double-bass. It has four strings, the two lowest covered with silver wire. It is tuned in fifths, C (on the second ledger-line below the bass staff), G, D, A, reck¬ oning upward, and is an octave lower than the viola or tenor violin. Its ordinary com¬ pass from C on the second ledger-line below extends to A on the second space of the treble, but soloists frequently play an octave higher. An eight-foot pedal stop on a pipe-organ also bears the name violoncello. Both are fre¬ quently abbreviated to 'cello.

VIOMENIL, ve-5-ma-nel, Antoine Charles du Houx, Baron de, French soldier: b. Vosges, France, 3 Nov. 1728; d. Paris, 9 Nov. 1792. He entered the army at 12, served in Hol¬ land and Llanover, became brigadier-general in 1762, and commanded a regiment in the Corsi¬ can campaign of 1768-69. He was promoted major-general in 1770, served in Poland in aid of the confederation of Bar and captured the castle of Cracow. He was appointed second in command under Rochambeau of the army sent to the aid of the American revolutionists in 1780, won the Grand Cross of the Legion of Honor for his conduct at Yorktown in 1781, and was promoted lieutenant-general. In 1783-89 he was governor ot La Rochelle, and while defending Louis XVI, during the attack on the Tuileries in 1792 received injuries from which he died.

VIOTTI, ve-ot'te, Giovanni Battista:

eminent Italian violinist and musical composer : b. Fontanetto, in Piedmont, 23 March 1753; d. 10 March 1824. From his father, a veterinary surgeon, he learned the rudiments of music, and received lessons in violin-playing from Giovanni 1764. Two years later he was placed under Pugnani at Turin. After holding for a short time the appointment of first-violinist in the royal chapel at Turin, he relinquished that office, in order to travel in Europe with Pug¬ nani. In Berlin, Saint Petersburg, Paris and London his playing created a furore. He vis¬ ited London first 1792, and was engaged there at Salomon's concerts, and for a time as leader of the orchestra in the King's Theatre. A

groundless charge of being a revolutionary agent drove him from England; nut after liv¬ ing for a time in retirement at Hamburg, he returned to London, 1795, where he continued to reside until 1818, when he settled in Paris and resumed direction of the opera there. He retired in 1822 with a pension, but, returning to London, entered into ruinous speculations. He died in London. His compositions include vio¬ lin concerts and quartettes for violin, tenor and violincello, violin duets and solos, and a few pianoforte compositions. His playing was char¬ acterized by a vigor of style and purity, as well as brilliancy and elegance, previously unknown ; and he has been considered the father of the modern violin school. Consult Baillot, F., ˆNo-tici sur Viottiˆ (Paris 1825).

VIPERID.®, family of snakes constituting with Crotalidae, the Viperina, or third suborder of Ophidia. The general characteristics of viperidse are wide angular depressed head, caus¬ ing the neck to - appear small in comparison; short, thick body; and tail tapering suddenly to a point. In some of the largest vipers, the short, unmistakable tail is only two inches in length. The head is mostly covered with scales, rarely plates, or only a few about the eyes and lips, or with extremely fine plates. The scales are carinated, often rough, even spincus. The ventral shields are broad, and the subeaudal plates in two rows. The nostrils are large, and in some species they close with a valve. This highly venomous family of serpents are furnished with a pair of long, curved fangs. In this order the upper maxillary, bearing two isolated fangs firmly fixed to it, is reduced to a mere wedge of bone, which is movably articulated, and by especial muscles rotates or rocks to and fro, and the fang with it. The action is volitional as a whole. The viperine snakes are often said to have ˆmovable® fangs, though the fangs themselves do not move in¬ dependently, but only with the bone to which they are attached. Thus, when at rest, the fang, protected by a membranous sheath, lies supine along the jaw; but when in use springs down by the rotation of the maxillary bone, just as a scythe might point downward or hori¬ zontally by the m.ovement of the handle. The fang has a canal in its

interior, connected with a poison gland, whose contents are ejected into the wound made by the fang in the act of biting. Behind the pair of functional fangs, others, in a rudimentary stage, are found, and may even create a wound, though, being as yet unconnected with the poison-duct, they do not convey venom into the wound. The lower jaw has numerous solid teeth of the ordinary form. Formerly the vipers were confounded with colubrine snakes, and even at the present day authorities differ in the ar¬ rangement of genera and species, on account of the forms running so much into each other, Dumeril gives six genera and 17ˆ species ; Wal¬ lace, three genera and 22 species, and Gray nine genera and 20 species. Strauch gives three genera; Vipera (with 20 species), Echis (with one species), and Atheris (with three species). Those of the family best known are the ˆˆRiver Jack'ˆ of western Africa, the Horned Viper or Cerastes (q.v.) of northern Africa and west¬ ern Asia, the Puff Adder of Africa, the Death Adder of Australia, Russell's Viper and the

Carpet Snake of India. The cobra de capello and the Egyptian Naja haje also belong here. The viperidae, as above mentioned, are mostly distinguished by their broad flat, angular head ; thick, heavy body ; short, tapering tail ; rough, carinated scales, and a generally hideous physiognomy, which seems to express their noxious qualities. Nevertheless, some have a handsome exterior and are adorned with dark, rich colorings and patterns. The Daboia of India is one of these, and, being of less clumsy form, has been named Vipera elegans. The true vipers, or those which have not the nasal fosse, are most largely represented in Africa, which has about 12 species. Europe has three, India two. The anomalous Death Adder {Acanthophis antarctica) of northern Australia, with its unmistakably, venomous look, is included among the vipers, nowithstanding it has a pair of fixed fangs like the FAapidee. The largest and deadliesit species are found in tropical countries. They iniiabit dry, sandy deserts, and are of retiring, sluggish nature. See Lachesis Asp; Puff-adder; Rattle¬ snake, *etc.*

VIPERS, a family (Viperidee) of venomous snakes belonging to the suborder Solenoglypha and closely related to the Crotalidtr, or pit-vipers and rattlesnakes. In the character of the poison apparatus the vipers closely resemble the rattlesnakes, under which heading a full description will be found, but they differ as a family from the Crotalidce in lacking the pre¬ orbital sensory pit and the excavation of the maxillary bone for its accommodation. None of them have the tail terminated by a rattle ; but in form, scale characters and habits they ex¬ hibit much the same range of variations as the various genera and

species of the pit-vipers. Their distribution, however, is totally different, for while the Crotalidce are scarcely represented outside of America the Viperidee are absolutely confined to the tropical and temperate regions of Europe, Asia and Africa, the latter having the greatest number and most formidable species. The family embraces 40 or 50 species, many of which are variable. The typical vipers are the characteristic poisonous snakes of most of Europe and belong to the genus Vipera, which has two rows of scales or urosteges on the short tail, the head covered almost exclu¬ sively with numerous small scales, with those at the end of the snout and above the eyes often turned upward, and the body-scales keeled.

The common viper or adder (Vipera berus) is found throughout most of temperate Europe, including England and Scotland, but is absent from large areas, while in others of different geological formation and even in well-cultivated districts it is common. It attains a length of from one and one-half to two feet, and is variously colored. Its most frequent and stable markings appear to be a brownish-yellow ground, with a series of continuous zigzag markings along the back, and a set of triangular black spots along each side. Specimens are fre¬ quently found with light tints and sometimes nearly black. The viper is the only poisonous reptile of Britain. Its bite is seldom productive oi fatal consequences, but may induce pain, sickness, fever and even delirium and as a sequence a protracted period of nervousness and

a tendency for the wound to suppurate. The effects have been known to persist for a fort¬ night or more; and in children a fatal result has occasionally followed the adder’s bite. The food consists of frogs, mice, birds, eggs, and they hunt chiefly at night, quartering the ground systematically and following the runways of meadow mice. The viper is viviparous — re¬ taining its eggs within the body till the young are hatched, and the young are known to habitually retreat into the mouth and oesophagus of the mother when threatened by danger. Like the rattlesnake vipers often collect in large numbers in caves and holes during the season of hibernation.

The common asp of southwestern Europe (V. aspis) has the_ snout plate turned up¬ ward, a character which is much exaggerated in the prominent nasal horn of V. ainmodytes, of southeastern Europe. Supra-orbital horns, re¬ calling those of the horned rattlesnake of the southwestern United States, are found in Cerastes and Clotho. The former inhabit the hot desert-region of northern Africa and south¬ western Asia, one small and very venomous species being the horned viper (C. cornutus). The asp used for suicide by Cleopatra, and of Scripture is not a viper, but one of the cobras (Naja haje). To Clotho belong the large and dangerous rhinoceros-vipers of Africa. One of the most dreaded serpents of Africa is the puff-adder (Bitis arietans) which, besides some dif¬ ferences in arrangement of the head-scales in¬ cluding the absence of any horns, has the nos¬ trils directed nearly upward. It reaches a length of five feet, and is of robust build, its apparent size being further enhanced by its habit of puffing up the body when molested. The puff-adder inhabits dry plains throughout the greater part of Africa and like the horned vipers con¬ ceals itself by partially covering its body with loose earth. In general habits it resembles the European viper but is more sluggish, and owing to its large size and the virulence of its venom is exceiedingly dangerous to man and beast. Its bite is followed by the most severe constitutional and local symptoms, including a rapid and pro¬ gressive gangrene. In Africa are found also the tree-vipers (Athens), small snakes with pre¬ hensile tails and usually bright green colors. Several species of vipers are among the most poisonous snakes of India and contribute largely to the number of fatalities resulting from snake bites in that country. The most notable are Russell's viper or ticpolonga (Daboia russellii), reaching a length of five feet, and the little, but for that reason even more dangerous, krait (Echis carinata). The name viper is also ap¬ plied erroneously to several American snakes, especially to the copperhead and moccasin (qq.v.) and to the hog-nosed snake (q.v.), the last of which is quite harmless, notwithstand¬ ing its unfortunately bad reputation and threat¬ ening appearance.

A number of mostly small, poisonous snakes of Africa and India have been separated from the Viperidee under the names Causidee and Atractaspidee. They differ variously in having large head plates, grooved fangs, no postfrontal bone or in being oviparous. The vipers of Australia are related to the cobra de capello (q.v.) and belong to the family Najidce.

Consult Boulenger, ˆCatalogue of Snakes of

the British Museumˆ (London 1896) ; Gunther, ˆReptiles of British Indiaˆ (London 1864) ; Boulenger, ˆReptiles of British Indiaˆ (London 1890) ; Anderson, ˆZoology of Egypt, ˆ Vol. I (London 1898).

VIPER'S BUGLOSS, plant of the genus Echinm of the natural order Boraginece ; hav¬ ing a calyx with five deep segments, an almost bell-shaped corolla with dilated throat and ir¬ regular limb, very long unequal filaments, and a bifid style. The species of this genus are large herbaceous plants or shrubs, rough with tubercles and hairs. Their flowers are often very beautiful. The Common Viper's Bugloss (E. viilgare), a large annual plant, is a native of Europe, growing in dry places, frequently in cornfields, and is a troublesome introduced weed in Virginia, but rather rare in the north ern States. Its flowers are at first reddish and afterward blue. It derives its name. Viper's Bugloss, from spots on its stem, which some¬ what resemble those of the viper — whence the property of healing vipers' bites was ascribed to it. Other herbaceous species are found in southern Europe, North and South America, and other parts of the world. Shrubby species are found chiefly in the Canary Islands and in southern Africa.

VIPER'S GRASS. See Scorzonera.

VIRCHpW, ver'Ho, Rudolf, German scien¬ tist : b. Schivelbein, Prussia, 13 Oct. 1821 ; d. Berlin, 5 Sept. 1902. He studied medicine in Berlin in 1839ˆ3, and in the latter year became a surgeon's assistant. From 1844 to 1846 he was assistant at the Charite Hospital, and in the latter year he became prosector there. He qualified in 1847 as a lecturer at the University of Berlin, and in that year also he was asso¬ ciated with Benno Reinhardt in founding the ˆArchiv fiir pathologische Anatomie und Physiologie und fiir klinische Medizin,ˆ world-famous as ˆˆVirchow's Archives,® which he edited alone from Reinhardt's death in 1852 till his own. He made himself known as a pro¬ nounced democrat in the year of revolution, 1848, and his political activity caused the gov¬ ernment to remove him (1849) from his pro-sectorship, but he was soon reinstated, and ac¬ cepted the chair of pathological anatomy at Wurzburg. In 1852 he became joint editor of the Cannstatt reports on the progress of medi¬ cine, which he continued in conjunction with others till his death. In 1856 he returned to Berlin as professor of pathological anatomy, general pathology and therapeutics, and direc¬ tor of the recently founded pathological insti¬ tute. He became a member of the Municipal Council of Berlin in 1859, and began his career as a civic reformer. Elected to the Prussian Diet in 1862, he became leader of the Radical or Progressive party; and in 1880-93 he was a member of the Reichstag. Virchow was a determined opponent of Bismark's policy,

and in 1865 was challenged to a duel by the ®man of blood and iron.® He exercised especial in¬ fluence in matters relating to public health, and during the wars of 1866 and 1870-71 he took an active part in organizing the army sanitary services. During his membership of 40 years in the Berlin Municipal Council he was active in promoting the sanitary improvement of the city. In 1870 he assisted in founding the

VIRDEN

Deutsche und Berliner Gesellschaft fiir Anthropologie, Ethnologie, und Urgeschichte, of which he was several times president and in 1879 he made a journey to the site of Troy, described in ˆBeitrage zur Landeskunde in Troasˆ (1879) and ˆ Alttrojanische Graber und SchadeP (1882). He visited England in 1893 and delivered the Croonian lecture to the Royal Society on ˆThe Place of Pathology in Biologi¬ cal Studies,ˆ receiving on the occasion the hon¬ orary degree of D.C.L. from Oxford. In 1898 he delivered the Huxley lecture in London, his subject being ˆRecent Advances in Physiology.'. ˆ

Virchow was the founder of cellular pathol¬ ogy, was scarcely less distinguished in archaeol¬ ogy and anthropology and was the author of many important works, among which are ˆHandbuch der speciellen Pathologie und Therapieˆ (1854-76), prepared in collaboration with others; ˆVorlesungen fiber Cellularpatho-logie in ihrer Begriindung auf physiologischer und pathologischer Gewebelehreˆ (1859), his chief work, forming in theˆ4th edition the first volume of ˆVorlesungen 'fiber Pathologicˆ (1862-71) ; ˆVier Reden fiber Leben und Krank-seinˆ (1862) ; ˆUeber den Hungertyphusˆ (1868) ; ˆUeber einige Merkmale niederer Men-schenrassen am SchadeP (1875) ; ˆBeitrage zur physischen Anthropologic der Deutschenˆ (1876) ; ˆDie Freiheit der Wissenschaft im Modernen Staatˆ (1877) ; ˆGesammelte Abhand-lungen aus dem Gebiete der offentlichen Medizin und der Seuchenlehreˆ (1879), *etc.* It was in fulfilment of the desires of Virchow that the German government erected in Berlin the Path¬ ological Institute and Museum, the greatest in¬ stitution of its kind in the world. Consult his ˆLifeˆ by Beecher (1801), and Pagel's ˆRudolph Virchowˆ (Leipzig 1906).

VIRDEN, ver'den. Ill., city in Macoupin County, on the Jacksonville and Saint Louis and the Chicago and Alton railroads, about 22 miles southwest of Springfield and 30 miles southeast of Jacksonville. It is in an agricul¬ tural region in which there are large beds of bituminous coal and valuable deposits of claˆˆ The chief manufactures are brick and tile. The principal shipments are farm, coal, clay and dairy products. There are two newspapers and a bank. Pop. (1920) 4,682.

VIRE, France, an ancient town of Nor¬ mandy, in ithe Department of Calvados, on the right bank of the Vire, 35 miles southwest of Caen. It stands on a rock, is built of granite and is surrounded by hills,

between which are the celebrated valleys of Vire — Vaux de Vire. It has an old church dating from the 12th to the 15th century and ruins of a castle of the 12th century. Its industries are cloth and paper¬ making and cotton and wool spinning. Pop.

7,000.

VIRELAY, ver'e-la (French, virelai, from virer, to turn ; lai, a lay) : a short poem of two rimes only, common in Old French ; also a succession of stanzas on two rimes, the rime of the last line of each stanza becoming the rime of the first couplet in the next.

VIREONID.®, family of American oscine passerine birds, of which Vireo (q.v.) is the typical genus ; the greenlets. The other genera are Cyclarhis, Hylophilus, Laletes, Neochloe and Vireolanius. The vireo are all small birds, less

than seven inches long and of a greenish color. They are mostly insectivorous and live in woods and shrubberies.

VIREOS, or GREENLETS, a family (Vireonidee) , of small flycatching passerine birds, restricted to America, where they range from Patagonia to Canada. They have bills conical, much compressed, decurved at the end and notched, but scarcely toothed, with numer¬ ous conspicuous rictal bristles; frontal feathers bristly and erect, or bent slightly forward ; nostrils overhung by membrane; 10 primaries; tarsus usually longer than middle toe and claw; lateral toes generally unequal. The vireos are all small, none of them exceeding about seven inches in length and their colors are plain, generally more or less greenish above, with few conspicuous markings beyond wing-bars and eye-stripes. The iris is frequently bright in color, red, yellow or pure white. The vireos are typically woodland birds, many of them preferring well-watered ravines, others swamps, while some inhabit open woods, parks or the trees of city streets. They are migratory and characteristically insectivorous and search for small caterpillars among the leaves or in cracks of the bark or capture insects on the wing, and they exhibit great activity in these pursuits. Some of the species also eat berries, particularly in the fall. Their nests are very characteristic, being deep cups composed of well-felted vege¬ table fibres lined with fine grasses, often orna¬ mented externally with bits of paper, lichens, etc., attached with spider's web and nearly al¬ ways

pendent from the twigs of a horizontal fork in a low limb. The three or four eggs are pointed, of a crystalline whiteness and spotted with sharply defined reddish-brown markings. Generally the song is weak, monot¬ onous and repeated almost continuously, but some species are excellent songsters.

South and Central America is the headquar¬ ters of this family of birds and there the great¬ est number of generic types and the greatest variety in habits are exhibited, some of the species approaching the shrikes in structure and some exhibiting marked distinctions in the colors of the sexes. All of the 12 North American species, some of which include several sub¬ species, fall within the typical genus Vireo. While the differences in the colors, form of the often stout, shrike-like bill and proportions of the body are evident enough to the initiated, no group of birds is more confusing to the tyro in ornithology, and the reader is referred for descriptions of the species to some standard work on ornithology. The red-eyed vireo (V. olivaceous) is generally the best known of the Eastern species. It is strictly a bird of the woods and is noted for its quarrelsomeness, activity and the energy and persistence with which it sings its simple lay continuously as it searches for insects throughout the hottest summer days. The warbling vireo {V. gilrus) , of still wider range and locally almost as com¬ mon, is a striking contrast to the last in thav iu forsakes the woods for the city parks and even the shade trees along much traveled streets and because of the surpassing sweetness of its song which, how’ever, is so soft that it does not always reach the ear from the tree-tops where these birds dwell. A much more con¬ spicuous songster, because of its greater power

and marked ventriloquistic ability, is the white¬ eyed vireo (F. noveboracensis) , a species which must be sought in regions sparsely timbered or covered with a scrubby growth or in thickets bordering swamps. The blue-headed vireo (V. sciitariits) is recognizable as the largest and most stoutly built of North American species, the yellowthroated vireo (V. flarifrotis) , about equal in length but more slender than the blue-head, by its unusually bright colors, while the remaining species are chiefly restricted to the west and southwest.

VIRGIL , ver'jil (Publius Virgilius Maro), Roman poet : b. near Mantua in Cisalpine Gaul, 15 Oct. 70 B.c. ; d. Brundisium, Italy, 21 Sept. 19 B.c.

The Roman writers differ greatly in the amount of biographical information which they themselves give us, and Virgil forms a marked Contrast in this respect to his friend and con¬ temporary, Horace. This is doubtless due in part to the nature of the themes which he treated, but in part also to his natural modesty and shrinking from every form of publicity. Fortunately, however, besides allusions of a casual nature in the works of other Roman writers, three ancient biographies of the poet have come down to us. The best of these is that of Aelius Donatus, of the 4th century, which, though distorted in some particulars, seems to be based upon good sources and to give accurately the main details of Virgil's life.

Virgil was born in the country, in a district called Andes, not far from the modern Pietola, three miles below Mantua on the river Mincio. His father was of humble origin and is said by some to have been a potter, by others the hired laborer of one Magius. He married Magia Polla, the daughter of his employer, and finally became himself the owner of a small estate, from which he made a living by farm¬ ing and bee-keeping. He prospered sufficiently to be able to give his son a thorough education, at first in the neighboring town of Cremona, and afterward at Naples and Rome. Of these opportunities Virgil took the fullest advantage. He was always a . diligent student and like Cicero made a thorough preparation for his life work. At Naples he took up the study of Grecian literature under Parthenius; at Rome he not only

applied himself to the regular curriculum of rhetoric and philosophy, but be¬ sides studied medicine, mathematics and nat¬ ural philosophy. He seems to have owed most to the Epicurean Siro. through whom he prob¬ ably became acquainted with the work of Lucre¬ tius, by which he was strongly influenced, as was recognized by the ancient critics. He also acquired a love for philosophical speculation which lasted throughout his life and profoundly affected his literary work. Virgil is said to have suffered constantly from dysepsia and headache and his ill-health, as well as his re¬ tiring disposition and studious habits, turned him from the usual political or military career. He held no public office of any sort and in fact spent little time in Rome, finding the milder climate of Campania and Sicily more congenial. He seems to have amassed a comfortable for¬ tune from the liberality of his patrons, for in his later life he owned several country places

and a house at Rome, on the Esquiline Hill. He enjoyed the friendship of the most dis¬ tinguished men of his day, both in the world of letters and in public life. He never married and his name is associated neither by himself nor by others with any affairs of the heart. After the completion of his course of study at Rome, we lose sight of Virgil completely for about 10 years. It seems probable that he re¬ tired to his native place and busied himself with the management of his paternal estate and with study. This quiet life was rudely inter¬ rupted after the battle of Philippi in 42 b.c. His estate was ijicluded in the proscriptions which were made in Cisalpine Gaul for the benefit of the veterans of Antony and Octavian and he is said to have had a narrow escape from death at the hands of one of the soldiers. The details of the affair are confused and un¬ certain. We know, however, that Virgil went to Rome to appeal for protection, where he made the acquaintance of Maecenas and of Oc¬ tavian. He was unable to recover his property, but seems to have been given another estate, perhaps the one which he is known to have owned near Nola in Campania. His visit to the capital had, however, much more important consequences, which influenced his whole future life. He became a member of the literary circle which Maecenas had gathered about himself, to which he was afterward the means of in¬ troducing Horace, and through the generosity of his patron was enabled to devote all his time to literary work and to study. In the year 19 B.c. Virgil undertook a journey to Greece and Asia Minor, with the intention of revising the ˆ.ˆEneid,ˆ of which he had made a preliminary draft, and then devoting the rest of his life to his favorite philosophical studies. At Athens he met Augustus, who persuaded him

-to return with him to Italy. Virgil had contracted a fever from exposure to the sun at Megara and was ill when he embarked. He died shortly after landing at Brundisium and was buried near Naples. The exact location of his tomb is a matter of uncertainty.

We know something of the poet's personal appearance from the description of Donatus. According to him Virgil was large of frame and dark complexioned, and had a certain air of rusticity. This description tallies with the authentic portraits which we possess, which form a very small part of the great number which bear his name. The best are two mo¬ saics, one discovered at Trier in 1884, the other at Susa in Africa in 1896. In character he was gentle and lovable and so extremely modest, that he is said to have taken refuge in the nearest shop or doorway to avoid notice.

Although Virgil, like nearly all of the great writers of his nation, was born outside of Rome, he is one of the most patriotic and intensely Roman of all his countrymen. He belongs with Horace to the national school ; for, though, unlike his friend, he was strongly influenced by the Alexandrine Greek writers, to whom he was introduced by Parthenius during his studies at Naples, he drew from them only what was best in their work and avoided their defects. He owes to them the cosmopolitan tone which has made him popular with all nations and all ages, and his mastery in the treatment of the passion of love. He is not an Alexandrine in the sense

in which that term is ordinarily used, but like Cicero developed a characteristic style of his own.

The first undoubtedly genuine work of Vir¬ gil which has been preserved is a collection of 10 pastoral poems, called variously the ˆEclogues ˆ (Eclogce) and the ˆBucolics ˆ (Bucolica). These were probably composed between the years 43 and 37 and are the first Roman representatives of that branch of poeti¬ cal literature. They were, however, far from being an original creation, but on the contrary are modeled on the ˆIdyls ˆ of Theocritus with a closeness of imitation which is rare even among Roman writers. The names of the char¬ acters are in most cases taken from the Greek original and the landscape has nothing which suggests the scenes amid which Virgil passed his early life, but is throughout Sicilian; and yet the genius of the poet succeeded in im¬ pressing itself on this early work and ft has always justly been given a high rank in the history of Roman literature. The ˆEclogues ˆ fall into two distinct claSSes, each represented by five poems, the purely pastoral pieces, which sing of various phases of the life of the ideal¬ ized shepherd, especially contests in song, and the allegorical poems, which introduce the poet himself and his contemporaries in the guise of shepherds. The latter are naturally the more original and they are also by far the more diffi¬ cult of interpretation. The most widely known of all is probably the 4th Eclogue, which cele¬ brates the birth of a child, about whose identity there is a difference of opinion, who is to bring back the Golden Age to Italy. It owes its re¬ nown in a great measure to the belief, which became current in the Middle Ages, that it was a prophecy of the coming of the Messiah.

Virgil's next work dealt also with the coun¬ try life with which he was so familiar and loved so much. Maecenas and Augustus are said to have suggested to him the writing of a poem on agriculture, in the hope of making farm life more attractive to the people of Italy, but the poet must have required little urging to induce him to take up a subject so con¬ genial. He had an abundance of material at hand to draw on among the Greek writers and the topic had been a favorite one with the Romans as well, though it had not as yet been treated in verse. Virgil expressly acknowledges his obligations to Hesiod, but he owes more to the Alexandrine writers Nicander and Ara-tus. In four books he writes of the manage¬ ment of fields, the growing of trees,

the rear¬ ing of horses and cattle and bee-keeping. He avoids with great skill the dryness of a didac¬ tic work by the introduction of such digressions as the praise of spring and by a general light¬ ness of touch which gives an attractive form even to the most commonplace details. He composed slowly and with loving care and polished his language and versification to the highest degree of refinement. The ˆ Georgiesˆ have justly been called the most finished poems in the Latin language and Addison even calls them the most finished of all poems.

After the publication of the ˆGeorgicsˆ in 29, Virgil set about the greater task of writing a national epic. This was a plan which he seems to have formed early in life and for which he had been preparing for many years.

He was forced against his own judgment to take it up thus early by urgent requests from Augustus and Maecenas. In this field he had not the advantage of being a pioneer, for Naevius, in his ˆBellum Punicum,ˆ and more par¬ ticularly Ennius in his ˆAnnalesˆ had treated of the early history of Rome in this way. The latter had connected the destiny of Rome with that of Troy and his epic was regarded as a great achievement. Virgil could hardly depart radically from the plan of his great predecessor, though he surpassed him not only in finish of style, but also by introducing the philosophical reflection and the breadth of treatment which distinguish history from mere chronicle. He made very free use of the works of his prede¬ cessors, and among the Greeks not only of the < Iliad ˆ and the ˆ Odyssey,ˆ but of the Cyclic poets and of Apollonius of Rhodes. The proud boast of Propertius, nescio Quid mains nascitur I Hade, as well as the subject of the epic, at once challenged a comparison with the Homeric poems which was freely accepted in antiquity; but in modern times this has been detrimental to Virgil's fame. The comparison is unfair, because the <ˆyEneidˆ and the Homeric poems really represent different types of the epic. The primitive epic, of which the Hliadˆ and the ˆOdysseyˆ are unrivaled specimens, is not represented in Roman literature and is foreign to the Roman national character. The works of Naevius and Ennius, as well as those of Vir¬ gil and the later Roman epic writers, are of the historical type and in this field the supremacy of Virgil is almost universally recognized. While the Homeric poems represent the gradual accumulations of generations of singers, the ˆ.<Eˆneidˆ was composed as a complete work of art, with a definite purpose, the glorification of Rome and of the Julian house. The introduc¬ tion of the gods of the Greek pantheon is in the nature of ®epic machinery,® since Virgil's generation had no faith in them, and the poet himself

was doubtless too much influenced by Lucretius and by his philosophical studies in general, to be an exception to the prevailing skepticism. At the same time his nature was reverent and religious, and a desire to effect a revival of the old Roman piety doubtless formed part of his plan and was thoroughly in accordance with the wishes of his patrons. The ˆ.ˆneidˆ describes the wanderings and adven¬ tures of ˆneas from the time of the fall of Troy until the establishment of his destined empire in Latium. In accordance with the regular rule of epic composition the poet plunges at once in medias res, and begins his tale with the sixth year of the voyage of his hero. The story of the earlier years is told graphically by JEneas himself at Dido's court in Carthage. While the greatness of the poem can only be fully appreciated when it is studied as a whole, it is more generally known , in part ; the last six books, though full of beautiful episodes, are less generally read because of the numerous and somewhat monotonous battle scenes which epic-tradition demanded of the poet, in which he is not at his best. Probably the most widely known part of the poem is the episode of Dido, which forms a complete epic tragedy and bears witness to the poet's familiarity with the mas¬ terpieces of Greek drama. The unhappy Car¬ thaginian queen, like .TEneas, had her mission

to perform and her empire to establish, but her plans were forced to give way before the might¬ ier destiny of ˆneas. Through the wiles of Venus, which even Juno's power cannot thwart, she falls in love with the Trojan hero and strives to detain him in Carthage. He finally leaves her in obedience to the command of Jupiter, and Dido slays herself as his ships are passing -out of sight. As she dies, she prays that there may be eternal hatred between Car¬ thage and Rome and the long and bloody strug¬ gleˆ which ended in the destruction of the city which she founded forms the sequel to the tragedy. These wars furnished a motive for a great historical epic, which, however, found no worthier .poet than the painstaking but in¬ sipid Silius Italicus, of the time of Nero and his successors. The desertion of Dido by neas finds little sympathy with the modern reader, and the ®pious .<Eneas® appears in many respects a somewhat pitiful hero, but from the ancient point of view his action was justifiable and even praiseworthy, due as it was to sub¬ mission to the will of the gods. Virgil intends .(ˆneas to be the representative of the old Roman virtues, steadfastness of purpose, en¬ durance, fidelity to a trust, courage and rever¬ ence for the gods. It is to the last quality especially, together with his devotion to his father, that he owes his epithet of pins. To the Roman reader he was the champion of civilization against barbarism, represented by Turnus and his godless associates. So far as the form of the poem is concerned, we see in it Virgil's growing mastery of the heroic hexa¬ meter and the results of his long years of study and training and we may note an advance even in the progress of the work itself. It is the hexameter of the ˆ.ˆneidˆ which deserves above all others the praise, ®the stateliest meas¬ ure ever molded by the lips of man.®

But Virgil himself was conscious that he had not realized the ideal of his youthful days. In a letter to Augustus of the year 26, in answer to a request to see the poem or at least some part of it, he writes that he feels that he has been mad to undertake so great a task. A few years later, however, he was ready to read three books to the emperor, including the 6th, in which he inserted the trib¬ ute to the young Marcellus, contained in verses 860-886. It is said that Octavia, who

\vas present, fainted as Virgil finished his effective rendering of these beautiful lines, and after¬ ward presented the poet with 10,000 sesterces (about $500) for each verse of the memorial to her son. This story confirms in a general way the statement of Suetonius about Virgil's method of composing the ˆ.(Tˆneid.ˆ He is said first to have written a version in prose, and to have turned it into verse in no special order; and he seems to have followed the same plan in putting the finishing touches to his work. That he never completed the latter process is evident from various inconsistencies which ap¬ pear in the poem, and more particularly, since absolute consistency is not demanded of a poet, from the numerous incomplete and less polished lines. It is shown also by his project of a three years' tour amid the scenes of his earlier books, and by the fact that on his death¬ bed he gave directions that the ˆˆneidˆ should be destroyed. This request was fortunately not

granted, but Augustus had the work published, with only such revision as was absolutely neces¬ sary, by the poet's friends Varius and Tucca.

Besides the works of Virgil which are un¬ doubtedly genuine, there have come down to us under his name a number of lesser poems : the ˆCulex,ˆ ˆCiris,ˆ ˆMoretum,ˆ ˆDirae,ˆ ˆ.ˆtnaˆ and the ˆCopa,ˆ together with a col¬ lection of shorter pieces, called ˆCatalepton ˆ (minor poems). Donatus and Servius attribute poems with these titles to Virgil ; and Lucan, Statius and Martial mention a ˆCulexˆ of Virgil. It is certain that the ˆ.ˆtnaˆ and the ˆDirseˆ are not his work, a fact which in itself discredits the testimony of the grammarians ; as regards the rest there is a difference of opinion. The majority of scholars are inclined to regard nearly all these poems as spurious, assuming that they were collected and attrib¬ uted to. Virgil in the time of Nero, a view which disposes of all the ancient testimony, except perhaps that of Lucan. It is argued be¬ sides that some of them are unworthy of the author of the ˆGeorgicsˆ and the ˆˆneid,ˆ an objection to which too much weight should not be given, while some, though not open to that charge, are in a manner wholly unlike that of Virgil as we know him. The arguments which have been based on certain metrical features of the poems seem to have little force. Just at present there is a growing tendency to claim these works for Virgil, and while the evidence in his favor cannot be said to be very strong, the same thing may be said of the contrary testimony. It is not likely that unanimity of opinion on

this point will ever be reached.

Virgil's fame among his countrymen was immediate and permanent. He was hailed as the Roman Homer, and the efforts of a few jealous rivals to depreciate him were of no avail. His influence on the later Roman poetry was marked, notably on Persius, Silius, Statius, Ausonius and Prudentius. The same thing is true of the later prose, for example, that of Livy and Tacitus. The ˆ.(Tineidˆ was used as a textbook in the Roman schools as early as the days of Juvenal, and was made the subject of grammatical and stilistic commentaries by numerous writers. The writers of the decline not only imitated him freely, but introduced the custom of writing Virgilian centos, by ar¬ ranging lines and half lines from his works in such a way as to give a sense entirely different from the original. This became a regular form of literary production, and they were even improvised. Among the Christians the works of Virgil escaped the general condemnation of the pagan literature, and he was believed to have received some measure of divine inspira¬ tion. From the Renaissance to the present time his influence on the poets of most European countries has been great. Dante, Chaucer, Spenser, Milton and Tennyson, as well as many others, bear testimony to their acquaintance with Virgil ; and his poems, especially the ˆˆneid,ˆ have been translated into all the principal languages of Europe. It is only in comparatively recent times that the searching methods of modern criticism, especially in Ger¬ many, have brought Virgil's fame into question, and his detractors and his champions have in many cases shown equal lack of discrimination. The most common charges brought against

him are those of inferiority to the Homeric poems and of lack of originality. The former point has already been discussed ; in consider¬ ing the latter we must bear in mind that the an¬ cient ideas about literary work differed decidedly from those of our own day, and that whole¬ sale borrowing from the work of one's pre¬ decessors was not considered to be at all im¬ proper. Furthermore, Virgil had the power which all great writers have, of making what he borrowed his own ; and, a thing which may be regarded as the supreme test, he not only imitated, but he was able to inspire imitation.

Besides the Virgil of history there is a mythical Virgil, singularly unlike the original. In comparatively early times the ancient biog¬ raphers associated prodigies, prophetic of his future greatness, with his birth and the adop¬ tion of his works by the grammarians as canons of usage gave him a reputation for vast learn¬ ing. This feeling brought about the custom as early as the 2d century of consulting the sortes Virgiliance, by opening theˆHineidˆ at ran¬ dom and drawing an omen* from the words of the first passage on which the eye fell, a custom which that work has shared only with the Homeric poems and the Bible. As early as the days of Silius Italicus we see traces of a Virgilian cult, for the younger Pliny tells us that Silius made annual pilgrimages to Virgil's tomb, and kept his birthday with more cere¬ mony than he did his own. A special series of legends of a most grotesque character grew up among the common people of Naples, who with an entire disregard of chronology and of historical truth associated his name with many marvelous inventions and with numerous undignified and disreputable adventures. These two streams of tradition united and found their way into the romantic literature of the Middle Ages, and even into works of a more serious character. They have given us the mythical Virgil, the necromancer and ally of the powers of darkness. His name was in consequence as¬ sociated in the popular mind with virga, a magician's ˆˆwand,» which led to the spelling Virgilius, and hence to our Virgil.

As regards the spelling of the poet's name, the Latin form Virgilius is established beyond question by inscriptional and other evidence as the only one until the 5th century. In English, Virgil was the current form until comparatively recent times, when ˆA'ˆergil® was introduced in common with a general reform in the spelling of Greek and Latin proper names ; this is the usual form in Germany. In England and in

America both forms are used, as may be seen from the biographical list given below.

The first printed edition of Virgil was pub¬ lished at Rome, about 1469. Since then there have been rnany editions in all countries. The standard critical text is that of O. Ribbeck, Leipzig, 1859-ˆ (containing the famous pro¬ legomena) and 1894-95 (without the prolego¬ mena). Consult Norden, E., ˆHineid, Book VP (Leipzig 1903). The best edition in Eng¬ lish is on the whole that of J. Conington, re¬ vised by H. Nettleship (3 vols., 4th ed., Lon¬ don 1881-83). Of translations, which are numerous, may be mentioned those of Coning¬ ton of the ˆJEncidˆ into prose (1872), and into verse (1873) ; of R. D. Blackmore, the well-known novelist, of the ˆGeorgicsˆ (1871),

and of C. S. Calverly, of the < Eclogues,ˆ pub¬ lished in the Works (1901). See .ˆneid; Georgics of Virgil; Virgil's Eclogues.

Bibliography. — Sainte Beuve, C. A., < Etude sur Virgileˆ (2d ed., Paris 1870) ; Collins, W. L., Wirgil,ˆ in LAncient Classics for English Readersˆ (Philadelphia 1878); Glover, T. R., ˆStudies in Virgilˆ (2d ed.. New York 1912) ; Heinze, Wergils espische Teck-nikˆ (3d ed., Leipzig 1915) ; Nettleship, Henry, ˆAncient Lives of VergiP (Oxford 1879) ; id., ˆLectures and Essaysˆ (Oxford 1885) ; Tunison, J. S., ˆMaster VirgiP (Cin¬ cinnati 1888) ; Tyrrell, R. Y., ˆLatin Poetryˆ (New York 1895) ; Comparetti, D., ˆVirgilio nel medio evoˆ (2d ed., Florence 18%) ; (Eng¬ lish translation of the first edition, Wergil in the Middle Ages,ˆ by E. F. M. Benecke, Lon¬ don 1895) ; Mackail, J. W., ˆ Latin Literatureˆ (New York 1895) ; Boissier, G., ˆThe Country of Horace and VirgiP (New York 1896) ; Sellar, W. Y., ˆ Roman Poets of the Augustan Age — VirgiP (3d ed., Oxford 1897); Meyers, F. W. H., *ˆEssays ClassicaP (London 1897) ; Leland, C. G., ˆThe Unpublished Legends of VirgiP (New York 1899) ; Miller, F. J., and Nelson, J. R., ˆDido, an Epic Tragedyˆ (Chi¬ cago 1900). Consult also Liibker, F., < Real¬ lexikon des klassischen Altertumsˆ (Vol. H, 8th ed., Leipzig 1914) ; Duff, J. W., ˆA Literary Histor > " of Romeˆ (London 1909) and Teuffel, W. S., ˆHistory of Latin Literatureˆ (Eng. trans., ib., 1891).

John C. Rolfe,

Professor of Latin Language and Literature, University of Pennsylvania.

VIRGIL, Polydore, English ecclesiastic and author; b. Urbino, Italy,

about 1470; d. there, 1555. He was educated at Bologna and ded¬ icated his first work, ˆProverbiorum Libellusˆ (1498), to the Duke of Urbino. His ˆDe In-ventoribus Rerum, ˆ which followed (1499), be¬ came popular and was translated into English, Spanish and Italian. Being appointed chamberlain to Pope Alexander VI, he was sent to England in 1501 to collect the Peter's-pence with his kinsman, Adrian de Castello, then Cardinal Santi Chrysogoni, who was soon after made bishop of Hereford. Polydore was pre¬ sented to the living of the Church at Langton, Leicestershire, in 1503, and after obtaining sev¬ eral preferments and becoming naturalized in England, he was imprisoned for sending abroad slanderous letters about Wolsey (1515), but ap¬ parently was soon released. In 1525 he pub¬ lished the first genuine edition of Gildas, the year after the treatise ˆDe Prodigiis,ˆ dialogues in an attack upon divination. His most import¬ ant work, 'ˆHistorijE Anglicae Libri XXVI, ˆ ap¬ peared in 1534; the 27th book was added in 1555. About 1550 he obtained leave from Ed¬ ward VI to return to Italy for his health's sake, without forfeiting his preferments and there he lived in Urbino until his death. His ˆ History > is a work of research, written in elegant Latin, and is the fullest narrative of the reign of Henry VH extant. He spared no pains to ensure accuracy, and a rational mind hindered him from accepting the exploits of Brut and Arthur as related by Geoffrey of Monmouth. Consult The Camden Society's translation of Polydore Virgil's ˆHistory of England.ˆ

VIRGILIA, ver-jil'i-a (from name of Latin poet Virgil), genus of leguminous trees, com¬ prising only one species, V. capensis, the Cape Virgilia, native of the Cape of Good Hope. It attains a height of 15 to 30 feet; has rose-purple flowers, pinnate leaves with small leaflets. It is cultivated as an ornamental tree. In Cape Colony the wood of virgilia is used for yokes, spars, *etc.* ; but it is not durable, being liable to be attacked by worms. The American yel¬ low-wood tree, formerly regarded as a species of virgilia, is now referred to Cladastris, a genus native in Kentucky and Tennessee.

VIRGIL'S ECLOGUES. ˆVirgil's Ec¬ logues,ˆ or Selections, also called ˆBucolics, or Songs of Herdsmen,ˆ are 10 pastoral poems, the longest of which contains 111 lines. They were written in 43-37 b.c., when the poet was 27 to 33 years old and the times were troublous with the results of Philippi, and are his first unquestioned work. They are imitations or adaptations of the idylls of Theocritus, the Greek originator of pastoral poetry, who wrote in Syracuse and Alexandria about 270 b.c., and show that their author was enamored of his original and saturated with it.

The Eclogues are separable into two groups. The first group, comprising the second, third, fifth, seventh and eighth, are in the real pas¬ toral strain, with a herdsman or shepherd soliloquizing or engaging with his fellows in a friendly contest of song. The poems of the second group, composed after the confiscations Iw Octavian in 41, which involved Virgil's own estate at his brithplace, Andes, near Mantua, perhaps soon afterward restored through the offices of powerful friends, introduce real per¬ sonages and contain many contemporary allu¬ sions. In the first and ninth the poet himself apnears in the guise of shepherd, in the sixth and tenth Varus, a governor of Cisalpine Gaul, and Gallus, soldier-poet and commissioner of lands to whom, with Varus, Virgil was under obligation, are celebrated. The fourth, in honor of Pollio, the author and statesman who was Virgil's chief patron in the recovery of his land, is the famous prophetic idyll so long thought of as a foretelling of the birth of Christ.

The Eclogues are thus a mingling of the ideal and the actual, of pastoral and political, and are imitative, conventional and artificial in the extreme. In literary history, those of the second group are important as inaugurating the pastoral convention. The shepherds of Theocritus had been real in speech, action and environment; those of Virgil's second group are poets and public men masquerading as rus¬ tics in landscapes compounded of Italy, Theocritean scenes, and the poet's Arcadia, no more real than Marie Antoinette and her court playing dairymaids in the Petit Trianon. Yet in spite of their being in parts little more than translation, in spite of their mingling of the real and the ideal in the world of nature, and their dragging of city characters into pastoral scenes, criticism has agreed that the Eclogues are poetry of a high degree of charm. Their concern is not realism, but beauty. They ex¬ press so genuine and so deep a love of beauty in nature wherever it is found, that in the reading of them the imagination is as little dis¬ turbed by the consciousness of incongruity or

artificiality as it is in the reading of Lycidas. They have always been criticized for their un¬ questioned defects, but have always been ad¬ mired and imitated as well. *Lycidas® speaks for Milton's admiration, and Pope's ^^Messiah,® inspired by the fourth, is only one evidence of his esteem. Horace, Patrarch, Boccaccio, Erasmus, Spenser, Coleridge and Wordsworth were fond of them, and Macaulay praised them beyond reason, setting them above both the <ˆneidˆ and the ˆ Georgies.ˆ

The Eclogues may be read in the prose trans¬ lation of Conington, or of Fairclough in the ˆLoeb Classical Library,ˆ and in the verse of Dryden. For appreciation, see works cited in the article on Virgil's Hlneid.

Grant Showerman.

VIRGIN ISLANDS, an island group for¬ merly known as the Danish West Indies, situated about 40 miles eastward of Porto Rico and comprising 50 islands or islets, only three of which are of sufficient size to be known, except locally, even by name. The three major islands of the group are Saint Thomas, Saint John and Saint Croix or Santa Cruz.

Saint Thomas lies nearly in a direct line east and west, and is about 13 miles long, with an average width of a little more than two miles. It is the most important of the group because of the fine harbor at Charlotte Amalie on the south side ; moreover its location on the direct line of communication between European ports and the entrance of the Panama Canal, as well as the direct line for vessels plying be¬ tween ports of North and South America, makes it a logical distribution centre for goods sent to the Lesser Antilles. Its distance from New York is 1,400 miles; from Colon 1,020 miles; from La Guaira, Venezuela, 480 miles. The commerce of Saint Thomas itself — although its imports constitute about 70 per cent of those for all three islands — amounts to less than $1,000,- 000. The chief imports are foodstuffs and wearing apparel; exports, bay rum and a few hides. Charlotte Amalie is the only town on the island. Population of Saint Thomas is about

10,700.

Saint John — area 21 square miles — lies about four miles east of Saint Thomas. In size and importance the least of the major islands, it

nevertheless possesses a harbor at Coral Bay which, according to engineers, re¬ quires only development to make it a rival of the better-known harbor at Charlotte Amalie. A very small acreage is devoted to sugarcane, but the chief industry is the growing of bay leaves and the distillation of the bay oil from which bay rum is made. The inhabitants, numbering less than 1,000 in all,, are colored or of mixed blood, with a few exceptions.

Saint Croix, the largest, wealthiest and most thickly populated of the islands, lies about 40 miles southeast of Saint Thomas and has an area of 84 square miles. Upon it are the two towns, Frederiksted and Christiansted, locally known as Westend and Bassin. Christiansted (population about 4,500) was the seat of the Danish colonial government, and the largest government house in the Lesser Antilles is located on the main street of Christiansted near the wharf. Frederiksted, though smaller (population about 3,000), is much more im¬ portant commercially. The southern districts

of Saint Croix are well suited to the applica¬ tion of modern agricultural methods, and here are found the large sugar estates, as well as a considerable acreage of sea-island cotton. The roads are excellent and many of the sugar estates are connected with the factories by in¬ dustrial railroads. The total population of Saint Croix is given as 14,000, about 10 per cent being whites of unmixed blood.

The climate of these islands is healthful. For the year ending 30 June 1915 the records furnished by the director of the colonial agri¬ cultural experiment station in Saint Croix show that the coolest weeks were 18 to 31 January with a maximum temperature of 83° F. and a minimum of 65° F., and 8 to 14 March, maximum 82° F. and minimum 66° F. The hottest weeks were 31 August to 6 September, with 91° F. as maximum and 76° F. as mini¬ mum, and 7 to 13 September, with maximum 92° F., minimum 74° F. No records of rain¬ fall are available for any of the group except Saint Croix. On that island, the average an¬ nual rainfall for 63 years* was 31.26 inches. Steamers of the Quebec Steamship Company running from

New York to British Guiana stop at Frederiksted in each direction. Their first port going south, as well as the last going north, is Saint Thomas. Until the middle of 1914 eight steamship lines were making regular calls at Saint Thomas. Monthly service between Saint Thomas and Porto Rico was formerly maintained by a steamer of the Compagnie Generale Transatlantique. The pro¬ visions of the coastwise shipping laws exclud¬ ing vessels of foreign registry now apply to this service. Saint Thomas is headquarters of the West India and Panama Telegraph Company (Ltd.), whose duplicate cables extend to the west coast of South America and connect at Jamaica with cables from the United States and Europe. Two newspapers are published in Saint Thomas and three in Saint Croix. Both of these islands are provided with telephone service. The largest amount of sugar that has been exported from the whole group in the last 15 years was recorded in 1903, when the total was 19,275 short tons. The estimate for 1916 was 16,000 short tons. The manufactures are bay rum, sugar, molasses, rum, concentrated lime juice, *etc.* There are two banks — the National and the Saint Thomas Savings Bank. The islands originally belonged to Denmark, by which they were sold to the United States in 1916 for $25,000,000. Ratifications of the treaties of sale were exchanged on 17 Jan. 1917 and the United States took possession of the islands on 31 March 1917. Consult Brock, H. G., Smith, P. S. and Tucker, W. A, ˆThe Danish West Indiesˆ (Special Agents Series, No. 129, Wash¬ ington Government Printing Office, 1917).

VIRGIN MARTYR, The, a powerful trag¬ edy by Philip Massinger and Thomas Dekker. It is based on the legend of the martyr Dorothea, slain in the reign of Diocletian. It was licensed in 1620 and was first printed in quarto form in 1622. It contains many passages of great beauty as well as several scenes most repellant in their coarseness but which in all probability are not the work of Massinger.

VIRGIN MARY, The. See Mary, the Mother of Jesus.

VIRGIN QUEEN, The, a term popularly applied to Queen Elizabeth, on account of her determination not to marry.

VIRGIN SOIL, a novel by Ivan Turgeneff, published in 1876, and in an English transla¬ tion in 1877. Turgeneff gives in Wirgin SoiP a graphic picture of the various moral and social influences at work in the Nihilistic move¬ ment in Russia. The motive of the story is deep and subtle, and developed with masterly skill and refinement.

VIRGINAL, an obsolete stringed instru¬ ment played by means of a keyboard, like the modern pianoforte. It was in form like a box, or desk of wood without legs or supports, and was usually placed on a table or stand. The strings were of metal, one for each note, and the sound was made by means of pieces of quill, whalebone, leather, or ocasionally elastic metal, attached to slips of wood which were provided with metal springs. The compass was about three to three and one-half octaves. See Pianoforte.

VIRGINIA, ver-jm'i-a, the daughter of Lucius Virginius, whom Appius Claudius, the decemvir, endeavored to carry off from her parents. Her father, finding he could not save her by any other means, slew her in the open forum and raised an insurrection, which over¬ threw the decemvirate and restored the old magistracy (449 b.c.). The story is given in Livy, and Dionysius of Halicarnassus, and one of Macaulay's ˆLaysˆ is based on it.

VIRGINIA, the chief of the 13 original States, the most southern of the Middle Atlantic group and one of the easternmost of all the States, lies on the Atlantic slope in lat. 36° 31' and 39° 37' N. and long. 75° 13' and 83° 37'. W. — half way between Maine and Florida. The extreme length from the At¬ lantic to Kentucky (east to west) is 440 miles and the greatest width, from north to south, is 196 miles. Its land surface is 40,125 square miles and water area — rivers, landlocked bays and harbors — 2,325 square miles. Vir¬ ginia, called the Old Dominion, was certainly the mother of States. The colony included the territory of nearly every Southern State in whole or in part, and that of every other State with the exception of Maine. In its present proportions Virginia's boundaries are Mary¬ land and West Virginia on the north, Mary¬ land and the Atlantic Ocean on the east, North Carolina and Tennessee on the south and Ken¬ tucky and West Virginia on the west. Capital, Richmond.

'Topography. — Physiographically the State is divided into three provinces of widely dif¬ ferent characteristics. The first of these is the coastal plain, the most eastern of the provinces, constituting the area between the Atlantic Ocean and the higher-lying Piedmont country on its west, containing 9,500 square miles of surface, nearly one-fourth of the area of the State. It is known as Tidewater Virginia. The streams crossing this province are slow with deep channels. The Piedmont plateau is the middle province and stretches from the coastal plain westward to the southeastern base of the Appalachian mountains. Its width varies from 40 miles to nearlv 175. From an altitude of nearly 1,000 feet it slopes gently eastward to

VIRGINIA.

Kstimated population, 2,192,019

COUNTIES

Pop.

Accomac …….

Pop.

36,650

.E 12

8,547

King William …

, .E 9

36,636

Albemarle .

. .D 6

9,752

Lancaster .

.E 10

25,560

Alexandria .

. .C 9

23,840

Lee .

. .B 2

19,921

Alleghany . .’

. .E 3

21,167

Loudoun .

. .B 8

8,720

Amelia .

. .F 7

16,578

Louisa .

. .D 7

18,932

Amherst .

. .E 5

12,780

Lunenburg .

. .G 7

8,904

Appomattox… .

. .F 6

10,055

Madison .

. .D 7

43,049

Augusta .

. .D 5

8,922

Mathews .

.F 11

6,538

Bath .

. .D 4

28,956

Mecklenburg …

. .G 7

29,549

Bedford .

. .F 4

8,852

Middlesex .

.E 10

5,154

Bland .

..FI

21,470

Montgomery… .

. .F 3

17,727

Botetourt .

26,886

Nansemond ….

.G 10

19,244

Brunswick .

. .G 8

16,821

Nelson .

12,334

Buchanan .

. .A 4

4.682

New Kent .

. .F 9

15,204

Buckingham …

. .E 6

153,386 Norfolk .

.G 11

52,537

Campbell .

. .F 5

16,672

Northampton…

.F 12

16,596

Caroline .

. .D 9

10,777

Northumberland

.E 11

21,116

Carroll .

. .G 2

13,462

Nottoway .

. .F 7

5,253

Charles City ….

. .F 9

13,486

Orange .

. .D 7

15,785

Charlotte .

. .F 6

14,147

Page .

. .C 6

21,299

Chesterfield .

. .F 8

17,195

Patrick .

. .G 3

7,468

Clarke . *.

. .B 8

69,729

Pittsylvania … .

. .G 5

4,711

Craig .

. -F 3

6,099

Powhatan .

. .E 7

13,472

Culpeper .

. . D 8

14,266

Prince Edward . .

. .F 6

9,195

Cumberland ….

. .E 7

7,848

Prince George …

. .F 9

9,199

Dickenson .

. .A 3

11,526

Princess Anne . .

.G 11

39,569

Dinwiddle .

. .F 8

12,026

Prince William . .

,..C8

21,225

Elizabeth City . .

.F 11

17,246

Pulaski .

9,105

Essex .

.E 10

8,044

Rappahannock . .

. .C 7

20,536

Fairfax .

. .C 9

7,415

Richmond .

• E 10

22,526

Fauquier .

. .C 3

54,497

Roanoke .

. .F 3

14,092

Floyd .

. .G 8

24,416

Rockbridge … .

. . E 4

8,323

Fluvanna .

. .E 7

34,903

Rockingham …

. .D 6

26,480

Franklin .

. .F 4

23,474

Russell .

. .B 4

18,651

Frederick .

. .B 7

23,814

Scott .

. .B 3

11,623

Giles .

. .F 2

20,942

Shenandoah … .

. .C 6

12,477

Gloucester .

.F 10

20,326

Smyth .

. .B 5

9,237

Goochland .

. . E 8

26,302

Southampton …

. .G 9

19,856

Grayson .

. . G 1

15,809

Spottsylvania . .

. .D 8

6,937

Greene .

. .D 6

8,070

Stafford .

. .D 8

11,890

Greenesville ….

. .G 8

9,715

Surry .

.F 10

40,044

Halifax .

. .G 5

13,664

Sussex .

. .G 8

17,200

Hanover .

. .E 8

24,946

Tazewell .

. .A 5

151,065 Henrico .

. .E 9

8,589

Warren .

. .C 7

18,459

Henry .

. .G 4

26,246

Warwick . .’ .

.F 10

5,317

Highland .

. .D 4

39,077

Washington … .

. .B 4

14,929

Isle of Wight …

■ G 10

9,313

Westmoreland . .

.D 10

6,338

James City .

.F 10

34,162

Wise …

. .B 3

9,576

King and Queen

. .E 9

20,372

Wythe .

. .G 1

6,378

King George …

. .D 9

7,757

York .

.F 10

Independent Cities

17,846

Alexandria .

. -C 9

89,612

Norfolk .

.G 11

6,247

Bristol .

. .B 4

25,582

Petersburg .

. .F 8

3,245

Buena Vista ….

. .E 5

39,651

Portsmouth ….

.G 11

6,765

Charlottesville . .

. .D 7

4,202

Radford .

. .F 2

5,748

Clifton Forge . .

. .E 4

156.687 Richmond .

. .F 9

20,021

Danville .

. .G 5

43,284

Roanoke .

. .F 4

5,874

Fredericksburg .

. ,D 8

11,654

Staunton .

. .D 6

32,940

Lynchburg .

. .F 5

2,714

Williamsburg …

.F 10

20,562

Newport News. .

.G 10

5,864

Winchester .

. .B 7

Incorporated Cities. Towns, Villages, *Etc.*

1,757

Abingdon .

. .B 4

204

Clifton .

. . C 9

17,846

Alexandria .

. .C 9

5,748

Clifton Forge …

618

Amherst .

, .E 5

252

Cllnchport .

. .B 3

1,090

Appalachia .

. .A 2

342

Clintwood .

. .A 3

1,324

Ashland .

. .E 8

258

Clover .

. .G 6

1,388

Barton Heights,

645

Coeburn .

. .B 3

Henrico .

. .E 9

721

Colonial Beach .

.D 10

1,632

Basic City .

. .D 5

157

Columbia .

. .E 7

2,508

Bedford City …

. .F 4

283

Courtland .

. .G 9

296

Belle Haven… .

.E 12

4,234

Covington .

. .E 3

876

Berry ville .

. .B 7

1,802

Crewe .

. .F 7

2,590

Big Stone Gap . .

. .B 2

1,795

Culpeper .

. .D 7

875

Blacksburg .

. .F 2

1,299

Damascus .

. .B 5

1,486

Blackstone .

. .F 8

20,021

Danville . “. .

. .G 5

247

Bland .

..FI

516

Dayton .

. .D 6

305

Bond, Wise .

. .B 3

1,653

Dendron .

. .F 9

433

Bowling Green .

. .D 9

703

Drakes Branch .

. .F 6

421

Boydton .

Boykins .

. .G 7

119

Dry Forks .

505

. .G 9

350

Dublin .

. .F 2

239

Branchville . -

. .G 9

122

Duffield .

. .B 3

859

Bridgewater… .

. .D 6

158

Dumfries .

. .C 9

6,247

Bristol .

. .13 4

397

East Stone Gap .

. .B 3

(P.O. Bristol, Tenn.)

322

Eastville .

.F 11

416

Broadway .

. .C 6

574

Edinburg .

. .C 6

504

Brookneal .

. .F 6

330

Elba .

792

Buchanan .

. .E 4

873

Elkton .

. .D 6

3,245

Buena Vista ….

. .E 5

2,018

Emporia .

. .G 8

653

Burkeville .

. .F 7

413

Fairfax .

. .C 9

535

Cambria .

.F 3

1,128

Falls Church … .

. .C 9

1,948

Cape Charles …

.F 12

2,971

Farm ville .

. .F 7

329

Charlotte Court

479

Fincastle .

. .F 3

House .

.F 6

369

Floyd .

6,765

Charlottesville . .

. .E 7

2,271

Franklin .

1,662

Chase City .

. .G 6

5,874

Fredericksburg .

. .D 8

1,113

Chatham .

. .G 5

1,775

Fries .

, .G 2

1,419

Chincoteague

1,133

Front Royal … .

. .C 7

Island .

.E 13

755

Galax .

. .G 1

1,568

Chrlstiansburg . .

. .F 3

599

Gate City .

. .B 3

630

Claremont .

. .F 9

324

Glade Spring …

. .B 4

794

Clarksville .

, .G 6

806

Gladeville

. .B 3

252

Cleveland .

.B 4

(P. O. Wise) . .

40?

Glasgow .

.E 5

2,452

Pocahontas ….

..FI

564

Gordonsvllle … .

.D 7

194

Port Royal .

. .D 9

165

Goshen .

, .E 5

39,651

Portsmouth … ,

. .G 11

1,917

Graham .

. .F 1

559

Potomac, Alex-

264

Grundy .

andria .

, . .C 9

315

Hamilton .

. .B 8

4,807

Pulaski .

…F 2

5,505

Hampton .

,G 11

388

Purcellville … .

. . B 8

4,879

Harrisonburg… .

.D 6

4,202

Radford .

…F 2

162

Haymarket ….

. .C 8

• 251

Remington ….

…C 8

802

Herndon .

. .C 9

743

Richlands .

… A 4

1,817

Highland Park,

156,687 Richmond ….

…F 9

Henrico .

. E 9

393

Ridgeway .

…G 4

138

Hillsboro .

, .B 8

43,284

Roanoke .

…F 4

288

Hills ville .

. G 2

967

Rocky Mount .

. . G 3

236

Holland .

• G 10

379

Roundhill .

…B 8

869

Honaker .

. .A 4

3,849

Salem .

…F 3

516

Houston .

. .G 6

1,628

Saltvllle .

…B 5

600

Iron Gate .

.E 4

283

Scottsville ….

… E 6

297

Ivor .

G 10

1,431

Shenandoah …

.. .D 6

383

Jonesville .

, .B 2

456

Shendun, Rock-

196

Kenbridge .

.G 7

ingham .

. .D 6

432

Keysville .

. .F 7

110

Singerglen .

. .-.C 6

281

La Crosse .

. .G 7

1,278

Smithfleld .

. -G 10

1,733

Lawrenceville …

. .G 8

3,516

South Boston. .

…G 6

366

Lebanon .

, .B 4

732

South Hill .

. .G 7

1,597

Leesburg .

, .B 9

218

Stanley ton ….

…C 7

2.931

Lexington .

. .E 4

11,654

Staunton .

. .D 6

318

Louisa .

.D 8

483

Stephens City. .

. . B 7

192

Lovettsville .

. .B 8

762

Strasburg .

…C 7

1,218

Luray .

. .C 7

388

Stuart .

. . G 3

32,940

Lynchburg .

. .F 5

7,008

Suffolk .

. .G 11

139

McDowell .

.D 5

169

Tacoma .

…B 3

1,217

Manassas .

. .C 9

698

Tangier.Accomac E 12

2,727

Marion .

, .B 5

478

Tappahannock . ,

…E 9

3,368

Martinsville .

. .G 4

1,230

Tazewell .

, . .A 5

263

Mlddleburg .

. .C 8

240

Tlmberville ….

…C 6

363

Middletown … . ,

, .B 7

431

Troutdale .

. .B 5

260

Mineral .

. D 8

296

Uppervllle .

…C 8

240

Monterey .

.D 4

47 5

Urbanna .

. .E 10

228

Mt. Crawford … .

.D 6

682

Victoria .

. .G 7

479

Mt. Jackson ….

. .C 6

578

Vienna .

…C 9

221

Mt. Sidney ……

.D 5

1,928

Vinton .

…F 4

975

Narrows, Augusta. D 5

270

Virgllina . .

…G 6

3,500

National Soldiers

320

Virginia Beach . .

.G 12

Home .

.F 11

485

Wachapreague . ,

, .E 12

160

Newbern .

. .F 2

570

Wakefield .

…G 8

106

New Hope .

.D 6

1,427

Warrenton ….

…C 8

638

New Market ….

. .C 6

235

Washington …

…C 7

20,562

Newport News . .

.G 10

331

Waterford … . ,

…B 8

89,612

Norfolk .

.G 11

1,064

Waverly .

342

North Tazewell .

..A 5

1,389

Waynesboro … .

…D 5

1,866

Norton .

. .A 3

1,397

West Point. …

. .E 10

246

Occoquan .

. .C 9

70

Wlehle, Fairfax

.. .C 9

1,001

Onancock .

.E 12

2,714

Williamsburg . .

..F 10

674

Orange .

.D 7

5,864

Winchester… .

…B 7

168

Pamplin City …

. .F 6

328

Windsor .

. .G 10

470

Pearisburg .

. .F 2

806

Wise .

. .B 3

792

Pennington Gap

. .B 2

1,314

Woodstock ….

…C 6

25,582

Petersburg .

. .F 8

3,054

Wytheville _

…G 1

2,394

Phoebus .

.G 11

136

Yorktown .

. .F 11

XoDgituOe Wwtyfrom Greanwich,

inrastcr

Shippeosburgy h

iloKtowu;

WESTERN PORTION

Xoobˆvjl 0ˆ

.rrhˆter

ladˆi

lltˆford

X’ontfSTllle

taiubersburi

MfCuoDelli

Jcˆ, .0 U\CH/＞’N A ˆ r ti udjˆ JUb6«*

0”””“’

-Quarry

V.

Sˆ-alc* Same a* 3Iuln Mai

■Jkrttcersburff

Tiptop

•OTnyˆfd “MU «ˆˆˆKQWrB”‘7.～’7

Delta’

jborouf

p€no»*-y^^*^

Grove

,eC«vAX;

jQlaasbon)

bUcsbiiˆ

Savage J <

Ihovale

Colley

rJˆCumherlabJi

r7 > ˆ

‘bfl(IRoaB

Jter.keleX’s^^

Salem

tVeˆtniuosler

OreejD Sprung

UrUlgetony of «• ^‘S

•ederlrV

‘•TOi’vnaend Foresˆ

l/

I Masaeyˆ

iˆnn

larinn

■ˆrederlcliˆcˆ ushtogˆ‘Jc. ‘

tWev’erlon

iˆr V

?ˆ＞f?2»ortfClror JJ roolr ’”(4 .-ˆ”’”’SpephtTiitˆ

tˆFiRECrERI/ˆ

K jii’M’luniOsierX’ ˆ Keni8toT»Q/c)j{«,.＜

‘jirlbcamtgti Cilj/, „ rX

ˆliddleˆoX Pigy’?

Qtoˆ

- ”/uˆiert’iouˆ Ainlliihˆ Lucketi

‘ˆj’lˆ- Torˆ KorrisXjˆ)eep ‘V . T. •’-ˆ/ Foiqt .3rftur|ce’Ri’?ˆ Fli l!’ ‘ ”
EegTsland

KonMiVVf#SK.‘ˆ ‘ #

vˆ:jˆ/ˆ3§baVson

!!inga(tffi?ˆdgeit»ter ˆ

‘ J’-. ■(_ •“‘t? «w I f > ;SLt > iirt«

‘Mourn

_Arˆˆolia .Ic./’ pL > Uld® > \

I ‘ yliˆ ˆ

.Odentb’

’bmap*ˆ.

‘ilulO’ODˆ ‘

tAphburo,

ˆAldie]

‘l«iarri

VIRGINIA

aˆtttic. , bdioril

. ˆIrero ‘*r«clas;ˆi ^^^Idlcburg Bin > a/SˆA

■• ‘ V«Bi

/leoafVˆ

I P«t{4 CFiiwV’”ˆ

Fairfaxˆ

ˆ/*ˆ’!rfn gu, V

Cllftrtn

. Aecounx St’/j •

Cˆb?o’ˆYUIejˆ_ ˆ J’ˆadpunO ˆ

ˆVSHINAGTHJir

I o J jFl > per <

il Sem. 0iUli,oro

SCALE

statute Jliles, 2S =1 Inch.

ir: indywltfˆ

, Oxford-

“(haˆˆiaTˆ W k r t

f’A ‘

:5? L’™p#yiSprlln(f»ˆU9ncj\ ˆ.sjjEdomˆ

ift N G/H’ˆiyOcfcVd S’.. «ˆ/;;®f-c/’ . ° V?

(U:)d MeN«ty*i Tˆ** nsMaacofV Copfrtila by TUsilAlciitllr Ctˆ.-

>ˆ/‘Wy5lWland\W i l.”L 1 A *1

ilt’T

ˆˆˆfˆmiagˆoa sjˆVXˆuantlco

Jlddlson

JVVujiZ/j

Unatei

£ret < n«&ur < 4

U*”* 7

•(.‘hanicsv.lUf

!rt.ek

Sallkburyi

ˆai;(woˆ.

CamdeD-OD-Gauley

‘L W Foljiy “V* !jˆSS”“?e

> ~ t® ““sCtto”

Y”ˆ4i;ˆˆ-a<vS£‘’(Gl ® ‘V OJurn

V’ˆˆ45tesfcTˆˆˆ> V-pw

‘WOTsyY”ˆpAi,

i24’a«</ ‘ RVˆeiTˆb

/ˆ«n A . ,ˆx«nglonCV\ˆoiV n.iˆ V«*doir.

tEagle

‘Berlin’

XCaheyttiiTaQˆ

ˆonte¥i < leg30

foutbj

Fifii

.§b5: ,l’f

Leonardtowa

KING

lom*

»• iRFf ederlclfa*

BˆSUr,ˆ Siu

»«lsj Iranla© fiSPOTSYLVANIA fe,.

ail.l’IcOtAQl JF .iliiir O

P*rttoUaˆˆ Q %«‘l»»

® * Gwtone V.

‘i0S T M.p RˆlVˆd .

ˆar’RbW

anno«l®l?\ O ˆ “N ˆ ˆWMviTte WgharM lleatlis

- |enireCro*rf*Xˆ-oˆˆˆ, V Lju2ˆˆi’Jf LAh

il\j?ˆ* - (

JftappoAawiaci iWIbt* /\»4eade7n»J?*rˆ7＞)rr ＜ˆ ** \p u I ney 8 JW f

1ˆ\ JHcyai. ‘ˆVw] ˆˆWocdSlano y’. !

A R\Q /L I N Ei «” ‘

“■lˆowllog «lWdt＜*.

fu»dl«oa3li8

aaUM???!

:yff\ rrntMwjTnM

fV Siifj

ˆbhenfC \Di*|iol

/ V ■

%oL .\marylli8 p

Jayelle»Hli‘

V -‘Ibercn* IfˆxxJrWflre ‘ * > a/C« > .««Tl|lvlBBleBWfi/F L U’

(potrdwooo

Thuimooi

liJfKtdcaˆ

tvAN N I iˆ < C’r. ,

lntona’ˆˆˆ_SwB&ˆ55ˆ*iˆ«8

h- > ‘-.ˆxyi

fiwdˆTtoˆ CniiTtw a . ‘*KˆV4SK Uordtˆi iftore i/#”’”* ‘■«’,\ˆi/r\

“l-t I P.,0 vO’ H A T A N

■”-.nbolaii

f < 3&e2ton

fy Olivtrˆ ˆsj ˆ■x— jd

■ Z,Acqˆiac,(y////y//Y

beSrUbui

jWoewcIl

!^^’4ˆcVaho^^^iˆ4-i＞-7^^

＜-P!r‘”“ˆ%Seiycaati& J .Abbott

. 1ˆ. r M .aˆ A

•Quffmiˆ

aAlderso/

“king ˆ

fˆtna 44%

Ajblaodt

~l

IVllHamoV irtna WlLUAM.gˆ*yˆ

SL.iKˆS&i: _

.(ˆueen yy4 i ˆMlODLE.fii4««4jˆ

ˆ ˆFrfcJrnˆxij’AitLX

i® # ˆoodf Cf i»» Ci’* |rrˆLOUCEST£R?E ˆGftucestcr t C

fg|pt44jfe<lg«i 0 ,

*/o‘ˆn»..

!%V,‘in>imjll’Pj

Slingray.‘Ptt/r

PS

bgpricAct iitUi’X

y y ‘t’oioQˆ

/ <- <»•

ykv I .. ˆti«o

Jˆfefourtˆ \(tev

ˆbeaxtle ˆ Suˆhaˆ Tkv

hvˆSrT. „ j

*gˆefH.r.aOjfaCe_ˆ- jj

,HlOH5U)i.

o oMclVora r«,.. Hosncj boMcfiAcg - o> SnoorfSidi

i ‘ˆ*ˆ.ˆAeppfˆ■<i$ ˆ-fjf A M 1

t»n8 K ˆ

/ •Ifinˆogllsv pSlˆT ˆ

iwj. IwiofaU I R I N <r? E 0 W A ft DjV Ofdn

/l-ˆj 8 £10 Fq .ˆ _ . , n

) ˆ yvAuˆrUA t>;

Jrneiiix; -y (.’, |i. -—jf ˆrfi-ainftegfOJU I if ColesCBtrrjˆT’rakes;ˆ /j

A ˆ0*

sS^^Prlneeton • ika-*

,;^'-^f««irr,‘7B > r™ar.p

SrS > h,„5’^'^ > ^y 3.»

A - - - fTedroM

EOF ^O R, Cf ^ia > nl > ^ut < 6ve < > Otur HiirAlbu liadee. oJ\

L Moneta

ClX * o’w.- vjc V

ytˆ HeB’ltl.‘tQaa.ˆ JV/JK

ˆlendolr

ˆToano

CHARLES CITY /

m»4a CCKai’Ics’ Sj3L»Wi/If«» Vharl

.P*«abV(;k>

KjCI R R I N C E XUrtli

!/ˆi;-ˆ“wl’riorc

vVfL’* ‘•t’,.oree-®“”ˆ«’®l

e>>oˆao

- p Jt ■ Xˆaa>«in

1 Templeton ˆ jJwnWtel

tOr*”” Burte • /X _ V

ˆwSuJi/

iaveajo rˆurry rtJ>i,

”C&ui bria

fewtrs.-

i D I N W„1 D D/I E j\

‘Itkiiind liuii.t’«;ˆBi,„„id(iIi

• — X II 1 9

1u«EennY®ˆ“ˆ_

Ktt < !W«tf!lbij.CM*

ˆJh’O iBiM* ˆbrisTlju

lftrJ4,«,PtMJ«*

s;v > ;c?.iiieˆi4ˆfe”X4

• AuttlnyUlesSˆ-ˆiˆW YiS n7r

3 R A Y

-vr. Jiidc’lieiHˆnef A»/eoa;‘UY7r£ • *gggarA b/ irt/»on.*ˆca5b LotiotoNˆPrr**

ji-iM T’/t”~P

■ ELIZABˆI CHY ;23x.\j

lon;ˆˆ

ffiuolcV’oc ‘BtJdSaˆ.v [hoc.bik£ > J > :A’iˆ

-ti-

[ejsrUIe

ijjgg-Wherfˆ Vˆ*ˆ

Jttaitoetc ＞’CTrWrO’ci

M 3ˆL E 0 ˆ ˆ \ ;Qntˆd»n\

WIGHT/

.tlntarl

Clarkton;

Gretna

[enbndge

, .umario

I V u N £ N B I

ˆalyifˆ ®-ˆd»oijInren rˆFlncbleT OyTsy »

“““tnsg ■— .ˆv

laˆB jiigctnpi/ZaSˆˆ ˆ

feoudaˆ “““sr-r

pi«puf > llraiˆl?rove Mo%nMOr(‘«i ˆ -/Nathalie Nolam X

l/c7ii«a • \ _ T

7.enais\ Cwm »oa28 «£►

f : \ Clover iW\ >

\ˆ8U1 HUlb Stltb o

‘niˆrrˆiMh

Temon -fly?llˆnsAˆ JlTawiSiial 4\ˆ*Xvlˆf Trapˆ

ijrkadale

CAalA

• r ■”’*

lalrostOQ f 5o»a»«

‘iripniaUeaw

yntTBir

“v^

[)i7～FdrlttfarJ« , Tngrd

JUalnaiioil

fell CtmI r .4«Vˆ JtUuoJ. 5>ˆ ˆ-ˆx*

ImdnsDepo

YorrelUjˆf

UroHnaxˆ ‘y\/>ˆ 3

I ˆinporlaiˆ

ccrlcbtoaˆ Wnf/ifUchcockyy JpieiDAObolsonrUlrf 2?Hj»A Claris gp Valentines/

”rorideBcaa’

tTre*»lˆ

(roTt’“ j “••fc,,‘Pi~‘B,.

■A,’ N ® R F oVl Kl

/ˆ2’“”“’ ”>3

L_,tr““|Mˆ7iac5j«b“ o*”’**

\ Norw»a«ttˆˆB<fc

GREENSVILLE

jPakippebC

Q Barley ‘ _ “

WbJey V.y?5liap«| ,8om0rUi% /Z > ritmnj

Moor A

Gasbur? f

E^^DutUIb

S\z^>r7?.

,R\veF

an altitude of 200 to 400 feet. This province differs from the coastal plain in the nature and origin of its surface features and in the age, kinds and structure of its rocks. Here is the only area of free-burning coal to be found in the eastern part of the United States contigu¬ ous to tide\yater. This section is known as Piedmopt Virginia. Its extent is about 15,500 square miles.

From the southeastern slope of the Blue Fidge the Appalachian Mountain province in Virginia stretches to the western boundary of the State, but physically the province extends northeast and southwest far beyond these lim¬ its. Within Virginia it covers about 16,250 square miles, with these characteristic di¬ visions: (1) The Blue Ridge, easternmost

range of the Appalachians, a mountain belt from 3 to 20 miles in width, extending from Harper's Ferry in a southwesterly direction across the State, advancing from an elevation of 1,200 to more than 4,000 feet. The rocks are igneous pre-Cambrian, Cambrian, sand¬ stones and shales and silicious sediments of the same age; (2) the Great Valley and (3) the Alleghany ridges, bounded by the Blue Ridge on the southeast and the Alleghany front on the northwest. The rocks are limestone, shale and sandstone ranging in age from Cambrian to carboniferous.

Five peaks in Virginia exceed 5,000 feet in elevation and 17 fall between 4,000 and 4,500. Nine thousand seven hundred square miles of the State's surface have an altitude from 0 to 100 feet above tide; 10,500 square miles from 100 to 500; 5,950 square miles from 500 to 1,000; 4,700 square miles from 1,000 to 1,500; 4,200 square miles from 1,500 to 2,000; 6,800 square miles from 2,000 to 3,000 and 600 square miles from 3,000 to 4,000.

Rivers. — The chief rivers in Virginia are the James, Potomac, Rappahannock, York, Blackwater, New River, Holston, Mattapony, Pamunkey, North Anna, South Anna, Rapidan, Chickahominy and Shenandoah. All of them are historic, but the James is the best known. Rising in the Alleghany uplands, it passes through several mountain

gorges into the Great Valley which it leaves at the beautiful water gap in the Blue Ridge at Balcony Falls. Thence it winds its way through the most his¬ toric country in Virginia to the Atlantic. The Roanoke rises in Montgomery County, in Southwest Virginia, passes through the Blue Ridge by the Roanoke Water Gap, where its name is changed to Stanton River, on to its confluence with the Dan, where it recovers its original name. New River rises on the Pied¬ mont plateau, and, unlike the general trend of Virginia water courses, flows westward through the Blue Ridge, across the Valley of Virginia, through the Appalachians into the Great Kan¬ awha and eventually mingles its flood with that of the Ohio. The eastern Virginia rivers — the Pamunkey, the Chickahominy, the York, the Blackwater — are sluggish, unpicturesque streams of great value to the country they drain. There are occasional fresh-water lakes.

The largest features of the drainage system are the tidal estuaries which have invaded the coastal plain as far as the ®fall line^^ belt, dividing it into peninsulas long and narrow in outline. The greatest of these estuaries is, of

course, Chesapeake Bay, to which the estuaries of the Potomac, the Rappahannock and the James — from 150 to 200 miles long — and the smaller ones of the York, the Wicomico, the Piankatank and the Nansemond rivers and of Mobjack Bay and many of lesser tide pay their constant tribute. The rivers of the coastal plain are tidal with low velocities and are navigable as far inland as the Piedmont border — the so-called ®fall line belt.®

Climate. — Virginia lies within the temperate zone and, speaking broadly, there are no great extremes of heat and cold. The temperature is quite stable from day to day in the coastal plain. The mean temperature is: Winter 39.8°, spring 56.8°, summer 77.2°, autumn 60.8°. The average number of days each year with a maximum temperature above 90° is 28; below 32°, 55. Greater ranges in the monthly and sea¬ sonal mean occur in the elevated area known as the Piedmont province. Alarked changes occur suddenly, but not frequently ,in winter. Mean temperature : Winter 35.8°, spring 55.3°, sum¬ mer 75°, autumn 57.4” ; annual 55.9° ; average number of days each year with maximum tem¬ perature above 90°, 25 ; below 32°, 72. In the Great Valley province the valleys become filled with heated air in the day and at night cool currents flow down the mountains into the val¬ leys. For this reason the greatest differences in mean daily and monthly temperatures occur here. Mean temperature : Winter

33.8°, spring 52.7°, summer 71.3°, autumn 55.1°, annual 53.2° ; average number of days each year with minimum temperature above 90°, 13 ; below 32°, 98. The average annual precipitation in the coastal plain province is 46.61 inches ; the Pied¬ mont 42.50 and the Great Valley 43. The pre¬ vailing direction of the wind is northeast in the coastal plain ; northwest m the Piedmont plateau and west in the Great Valley; mean annual velocity for the State 6.3.

Geology. — The coastal plain is composed of sediments, mostly sands, clays and marls, rang¬ ing in age from lower cretaceous to quarter¬ nary. The beds strike in general from north to south, with a low easterly dip. The Pied¬ mont plateau is formed of a mixture of highly metamorphosed sedimentary and igneous rocks of prepaleozoic and early paleozoic age, with exposures of fresh rock less numerous than farther north. The rocks are crystalline with gneisses and schists. The abundance and excellence of the granite make them important in commercial work. There are areas of triassic sediments and over parts of the south central portion of this province are found volcano-sedimentary rocks. The Blue Ridge is composed of pre-Cambrian igneous rocks with Cambrian sandstones and slates on the north¬ west and on the southeast, in places, by silicious sediments of the same age. The Valley of Virginia and the Alleghany ridges are com¬ posed of paleozoic sedimentary rocks ranging in age from Cambrian to carboniferous.

Minerals. — Coal is by far the largest min¬ eral interest of the State. The annual output has been about 8,000,000 short tons, of which more than nine-tenths was bituminous, and its value at the mines has been somewhat in ex¬ cess of $8,000,000. In 1916 the output was 9,707,474 short tons, valued at $10,261,424. Prac¬ tically all of it-was mined in the mountains

of southwest Virginia, in the counties of Wise, Tazewell, Montgomery, Lee, Russell and Pulaski, although there is coal elsewhere. Iron is mined in the Valley and Piedmont provinces of the west and southwest. At Crimora, in the Valley of Virginia, more manganese has been taken than from any other mine in the United States. In 1916 the output of manganese and carboniferous iron ores was 40,117 long tons, valued at $217,136. Other mineral productions for the year 1916 were : Coke 1,242,332 short tons, value $1,695,361 ; clay products, including brick and tile, clay mined and sold and pottery, $1,695,361 ; limestone $1,087,247 ; iron ores 486,798 long tons, $1,000,118; soapstone and talc 28,355 short tons, $564,228; granite $451,697; mineral waters 2,313,616 gallons, $248,906; slate 36,007 squares, $165,483; sand¬ stone $66,217.

Natural Attractions. — The best known and perhaps the most visited of the natural attrac¬ tions of the State is the Natural Bridge, 14 miles from Lexington in the county (Rock¬ bridge) named for it. This great bridge, in the formation of which human agency had no part, is 215ˆ2 feet high, measuring from the top of th« span to the creek which flows under it. In the same county, 12 miles southeast of the Warm Springs, is the ˆBlowing Cave,® which emits a constant current of air which is strongest in dry, frosty weather and weakest in long periods of rain. ˆRegular inspirations and expirations of air by caverns and fissures have been probably enough accounted for by supposing them combined with intermitting fountains, as they must, of course, inhale air while their reservoirs are emptying themselves and again emit it while they are filling, but a constant issue of air only varying in its force as the weather is dryer or damper will require a new hypothesis.® Sixteen miles northeast of the Warm Springs, in Bath County, is a spring whose waters ebb and flow. At intervals, in the dryest weather of summer, the water flows out as if suddenly released from a dam, and continues at flood 10 or 12 hours, and then gradually declines. In the same kind of weather the periods of flow will vary from two to three days and sometimes occur daily. There are numerous caves. The most noted are Weyer's in Augusta County and the Luray caverns in Page. Crabtree Falls, near the sum¬ mit of the Blue Ridge mountains, in Nelson County, consist of three descents, the longest leap being 500 feet. Balcony Falls, at the meeting of Rockbridge, Amherst and Bedford counties, where the James makes its way through the Blue Ridge, is a scene but little inferior to the

spectacle of the passage of the Potomac through the same mountains at Harper's Ferry. Mountain Lake, in Giles County, 3,500 feet above the sea, is the antithesis of Lake Drum¬ mond in the Dismal Swamp. Scott County furnishes a Natural Tunnel by which buffalo made their way through the mountain. The use of it by the Virginia and Southwestern Railroad illustrates the change which has taken place since the days of Daniel Boone.

Agriculture. — Livestock is the most con¬ siderable interest, the value of the product of 1917 being estimated at $200,000,000, an in¬ crease of $158,973,000 over 1900. Dairy prod¬ ucts have grown from $1,900,000 in 1900 to $17,-

000,000 in 1917, and. In the same period, poultry from $2,(X)0,0()0 to $13,000,000, and orchard fruits from $2,663,000 to $7,000,000. Corn is the great Virginia crop. Wheat has moved up to second place from fourth, changing places with tobacco. Crop products and their value for 1917 (the value of the 1900 product in each case known is given in parentheses, for com¬ parison) as estimated by the Commissioner of Agriculture are : Corn, 66,700,000 bushels, value $100,000,000 ($16,300,000) ; wheat, 19,300,000 bushels, value $38,600,000 (ˆ,200,000) ; potatoes, 17,300,000 bushels, value $33,000,000 ($2,500,- 000) ; tobacco, value $32,000,000 ($7,670,000) ; peanuts, value $7,000,000 ($2,261,000) ; oats,

5,000,000 bushels, value $3,000,000 ($1,104,000) ; rye, 1,000,000 bushels, value $2,500,000; buck¬ wheat, 500,000 bushels, value. $625,000; all trucks, value $15,000,000 ($5,000,000) ; miscel¬ laneous, value $11,000,000 ($470,000).

Fisheries. — The product of fish and oysters reached the value of approximately $18,000,000 in 1917. Attention to oyster planting yielded an enormous increase of food. The value of fish and oysters in 1900 was $7,000,000.

Manufactures. — In 1916, 2,793 manufactur¬ ing plants in 53 industries reported to the Virginia bureau of labor and industrial statis¬ tics. Capital, $183,063,795.43 ; wages, $62,504,- 658.75; persons employed, 132,934; value of product, $379,529,528.04. This summary in¬ cludes the production of coal and coke but not the capital invested nor the wages paid. The industries with products valued at more than $3,000,000 annually were : Iron and machinery, $69,905,517.39; tobacco stemmers and rehandlers, $22,672,814.80;

cigars, cigarettes and cheroots, $17,808,239.53; cotton mills, $16,322,036.07; tan¬ neries, $16,208,548.86; peanut factories and coffee roasters, $14,873,579.59; flour mills, $14,- 064,076.30; coal and coke, $11,539,641.57; paper and pulp mills, $10,881,349.98; tobacco factories, $10,056,714.14; woodenware, iDaskets, boxes and shooks, $9,359,171.92; boots and shoes, $6,152,- 066.30; overalls and shirts, $4,676,605.11; sash, doors and blinds, $4,602,140.61 ; printing, en¬ graving and binding, $4,235,746.19; knitting mills, $4,138,526.18; trunk and bag factories, $3,237,508.69, and artificial ice, $3,101,367.60. Stable labor conditions, much raw material, in¬ cluding the best of steam coal, abundant water power and almost unsurpassed transportation facilities by rail and water are favorable.

Tobacco Industry.— Tobacco became the most important industry in Virginia in the first decade of the colony; at the beginning of the fourth (1642) it had become the sole legal tender currency. It has always ranked near the top of Virginia staples. In 1916 it was second; in 1917 the fourth, corn, wheat and potatoes hav¬ ing first, second and third places. The value of the product in 1917 was $32,500,000 ($18,863,000 in 1916). Danville, Lynchburg and Richmond are the largest tobacco markets in Virginia and among the largest in the United States.

Forest Products. — According to the best available information the total amount of mer¬ chantable timber in the State is approximately 30,000,000,000 board feet, of which about 11,000,- 000.000 are oak, principally white, red, black and chestnut oak. About 9,000,000,000 board feet are yellow pine, mostly short leaf and loblolly, and the remainder chestnut, yellow

poplar, maple, beech, sweet gum, hickory, bass¬ wood, hemlock, white pine, cypress, black gum, black locust and black walnut, approximately in the order named. In the coastal plain the tim¬ bered areas and cleared areas are about equal in extent. The dominating species is loblolly pine (Pimis taeda) , with oaks, sweet gum, cypress, yellow poplar and hickory. There are considerable areas of white cedar and juniper in the Dismal Swamp section. In the Piedmont plateau probably rather more than half of the area is wooded, the typical timber being a mix¬ ture of yellow pine and hardwoods, the hard¬ woods predominating except on lands that were formerly cultivated. The yellow pine is chiefly short leaf {Pimis echinata), with considerable amounts of loblolly pine on the eastern edge of the region. The hardwoods are the various oaks, hickory, yellow poplar, chestnut and some maples. There are still considerable areas of practically virgin timber in the more inacces¬ sible parts of the mountains.

Transportation. — There were, in 1916, 26 steam railways with operating revenues ex¬ ceeding $100,000 a year, and 20 with operating revenues under that total, with an aggregate mileage in Virginia of 4,777.61. The longest of these within the State are the Norfolk and Western, 1,176.78 miles; Southern, 884.78; Chesapeake and Ohio, 783.50; the Virginia Rail¬ way Company, 333.51. Other important rail¬ ways are the Seaboard Air Line, Atlantic Coast Line, the Virginia and Southwestern, the Nor¬ folk Southern ; the Carolina, Clinchfield and Ohio; the New York, Philadelphia and Nor¬ folk; the Richmond, Fredericksburg and Potomac, and the Louisville and Nashville Railway. Communication with every section of the State and with every leading port and city is ample, and is expanding as increased facili¬ ties are required. Mileage of electric railways in the State in 1916 was 486.9. In tidewater Virginia the waterways are a vast means of transportation.

Commerce. — The imports of merchandise into Norfolk, Newport News and Portsmouth during the year ending 30 June 1917 amounted to $17,986,946; Richmond, $767,399; Peters¬ burg, $575,661 ; a total

for the State of $19,- 330,006. All exports were recorded at New¬ port News, Norfolk and Portsmouth and amounted to $137,009,596. Hampton Roads is unsurpassed in harbor facilities — it is the largest and safest on the Atlantic Coast — and the cities on its shores are of great and in¬ creasing importance in foreign, coastwise and internal commerce. In a decade Virginia im¬ ports have increased fivefold and exports ten¬ fold.

Banks and Banking. — At the close of busi¬ ness 11 December 1917 there were* in Virginia 148 national banks with a capital of $19,918,000 and deposits of $151,988,000, .and 288 State banks and trust companies with a capital of $13,663,710 and deposits of $91,503,926.73. De¬ posits in the Federal Reserve Bank, Richmond, on 7 Dec. 1917 were $97,149,000.

State Government. — Seven of the State officers — governor, lieutenant-govCrnor, attor¬ ney-general, secretary of the commonwealth, commissioner of agriculture and immigration, superintendent of public instruction and State treasurer — are elected by the people every four years. The adjutant-general and the members

of the Corporation Commission are appointed by the governor, and other commissioners and the judiciary are elected by the legislature. The legislature is elected every four years and meets biennially in even years in sessions limited to 60 days, which may be extended without pay. The governor's salary, $5,000. Representatives in Congress are 10. The present constitution was proclaimed in 1902.

State Finances. — On 1 Oct. 1919, the State debt was $22,912,216, of which $5,518,754.16 were Riddleberger bonds (Act 1882), $15,360,- 765.96 Century bonds (Act 1892) and $2,467,- 605.85 the school and college and asylum and church certificate debt. The assessed valuation — about two-thirds of the actual value — on the •land books of 1919 was : Personal property, $535,859,124; real estate, $797,414,198; mineral lands, minerals, improvements, machinery, etc., under development $9,180,894; mineral lands, minerals, etc., not under development, $17,- 951,995; standing timber, $1,725,557. Receipts (including balance, etc.) for the year ending 30 Sept. 1919 were $13,836,382; disbursements (including amounts paid ta sinking fund), $12,651,765. The balance, 1 Oct. 1919, was

$1,184,617.

Charities and Corrections. — The State pro¬ vides four hospitals for the insane — the East¬ ern at Williamsburg, the Western at Staunton, the Southwestern at Marion and the Central, for colored insane, at Petersburg — an epileptic colony and a colony for the feeble-minded (Madison Heights), two sanatoria for the tuber¬ culous (Catawba and Charlotteville), a school for the deaf and blind (Staunton), one for colored deaf and blind (Newport News). Pri¬ vate philanthropy maintains 33 orphanages, 7 foundling hospitals, 2 placing-out agencies, 3 travelers' aid societies, 4 juvenile protective as¬ sociations, 8 Salvation Armies, 3 industrial schools, 15 organized charity associations, 8 social settlements, 10 homes for the aged, 12 visiting nurse associations, 6 dispen¬ saries (not connected with medical colleges as hospitals, of which 23 do charity work), and 7 maternity and rescue hospitals. In 1916 2,532 white persons and 2,366 colored were supported in almshouses at an annual per capita cost of $123.29; 3,037 white and 2,901 colored were given outdoor relief. There were 741 convicts in the penitentiary 30 Sept. 1916; 878 were received during the year (56 less than the previous year) ; released by discharge, death, pardon and escape, 891 ; per capita cost of maintenance for the year (based upon opera¬ tion and average attendance), $160.96. Jail commitments in 1916, 29,426, a decrease of 2,599 from 1915.

Education. — The Virginia free school sys¬ tem dates from 1870. It is controlled by the State Board of Education, composed of the gov¬ ernor, the attorney-general, the superintendent of public instruction, three members from the faculties of State institutions for higher educa¬ tion, one county and one city superintendent of schools. In 1915 the public school population (between the ages of 7 and 21) was 657,513; number of schools, 12,343 ; pupils enrolled, 474,- 210; teachers, 12,507; revenue, $7,215,602.57; total cost of public schools in 1919, $9,155,363. For technical and advanced education the State has made provision as follows: The University of Virginia, Charlottesville; Virginia Military

Institute, Lexington ; William and Mary Col¬ lege, Williamsburg; Virginia Polytechnic Insti¬ tute, Blacksburg; four female normal schools (at Farmville, Radford, Harrisonburg and Fredericksburg). In addition to these are Washington and Lee University located at Lex¬ ington, and colleges founded by religious de¬ nominations, as follows : Randolph-Macon

College for men, Ashland ; for women, Lynch¬ burg; Hampden-Sidney College, near Farm¬ ville; Emory and Henry, at Emory; Richmond College (coeducational), Richmond; Roanoke College (coeducational), Salem; Bridgewater College, Bridgewater, and Lynchburg College (formerly Virginia Christian College), Lynch¬ burg. Hollins College, at Hollins, Martha Washington College, Abingdon, and Sweet-Briar College, Sweet Briar, are institutions for the higher education of women, as is Westhampton College, Richmond, co-ordi¬ nate with Richmond College. The Miller Man¬ ual Labor School in Albemarle County is an in¬ dustrial school for orphansˆ and half orphans, and Blue Ridge Industrial' 'School for moun¬ tain boys and girls. There are law schools at the University of Virginia, Washington and Lee University and Richmond College, and for medical education a school at the University of Virginia, Charlottesville, and the Medical Col¬ lege of Virginia, Richmond; theological semi¬ naries for white students at Richmond and Alexandria, and for colored at Richmond, Lynchburg and Petersburg. For the higher edu¬ cation of colored students are the Hampton Normal and Agricultural Institute, at Hamp¬ ton, and the Virginia Normal and Industrial Institute at Petersburg.

Religion. — The total number of communi¬ cants or members of churches in Virginia in 1906 was 793,546. In numerical strength the 10 largest denominations stood in the following order: Baptist, Methodist, Presbyterian, Ro¬

man Catholic Protestant Episcopal, Disciples or Christian, Lutheran, Dunkers or German Bap¬ tists, Christian (Christian connection) and United Brethren. There are 5,965 Sunday schools, with 50,226 officers and teachers and 430,452 scholars.

Population. — In 1790 the population of Vir¬ ginia was 747,610; 1800. 880,200; 1810, 974,600;

1820, 1,065,116; 1830, 1,211,405; 1850, 1,421,661; 1860, 1,596,318; 1870, 1,225,163; 1880, 1,512,565; 1890, 1,655,980; 1900, 1,854,184 1910, 2,061,612.

The population (1910) was divided by sex and race as follows: Male 1,035,348; female 1,026,- 264; white 1,389,809; negro 671,096; Asiatic 168; Indian 539. There were 27,057 of foreign birth, of whom 3,687 were English, 2,450 Irish, 4,228 German, 4,379 Russian and 1,2ˆ Scotch. The United States Bureau of the Census gave Vir¬ ginia's population as 2,309,187 on 1 Jan. 1920. The population of the chief cities by that enu¬ meration was — Richmond, 171,667; Norfolk, 115,777; Roanoke, 50,842; Portsmouth, 54,387; Lynchburg, 30,070.

Colonial History. — Herjulfsen, a Norse¬ man, sailing the Greenland Sea, and storm-driven westward to the coast of Labrador, was the first European to see the shores of North America. He was incurious, and did not land. Lief Ericsen, 15 years later (a.d. 1001), landed in 41Jˆ° N. lat., well within the patent of Vir¬ ginia territory which James I granted to the London Company six centuries later. For 300

years these prowlers of the sea occasionally vis¬ ited the northern shores of the continent, sailed away and left no trace. The greatest date in the annals of discovery is 1492, the year the Italian, Christopher Columbus, commissioned by the royal pair of Spain, reached the Western World. Thereafter the Spanish had no part in the new country soon to be called Virginia, and the English entered upon the scene, led by a Venetian-born sailor, Cabot, and by a sure in¬ stinct for colonizing and possessing. They claimed all the continent from the Spanish pos¬ sessions on the south to the French on the north. This vast territory was the original Virginia, the first of the American colonies settled by the English. Jamestown, on the James River, was founded 13 May 1607 by 105 colonists sent out by the London Company, to whom James I had granted South Virginia, as it was then called in distinction from the territory to the north¬ ward, named North Virginia. The colonists were mostly worthless adventurers ; Wingfield, the president of the colony, proved dishonest, and the whole enterprise was only saved from a disastrous end by the courage and energy of Capt. John Smith. (See Smith, John). In 1609 the London Company was reorganized and received a grant of territory extending 200 miles north, and the same distance south of Old Point Comfort, and westward to the Pa¬ cific. The government council was superseded b}ˆ a governor to be appointed by the company's council in England, and to have the sole super¬ intendence

of local affairs. Lord Delaware was appointed governor. Sir Thomas Gates lieuten¬ ant-governor, Sir George Somers admiral, Christopher Newport vice-admiral and Sir Thomas Dale, high marshal, all for life. Nine vessels with 500 colonists, including 20 women and children, set sail at once. Gates, Somers and Newport accompanied the fleet, but the governor was detained for some time in Eng¬ land by his private affairs. The three officers all embarked in the same vessel and were cast ashore on one of the Bermudas ; one of the other vessels was lost, but the remaining seven arrived in safety in the James River. The old government was abrogated, but none of the of¬ ficers of the new one having arrived. Smith re¬ tained the government, as the charter author¬ ized him to do, but the new colonists, like the old, were mostly a profligate set of adventurers, whose whole study seemed to be to create dis¬ turbances. Smith was soon after severely wounded by an accident and obliged to return to England for surgical aid, and left a colony of 500 persons well supplied with arms, provi¬ sions and goods for traffic with the Indians, and provided with a fort, church, storehouse and 60 dwellings and a good stock of domestic animals. After his departure the colonists gave them¬ selves up to riot and idleness, and a party of 30 seized a vessel belonging to the colony and sailed away as pirates. Six months after Smith's departure only 60 colonists remained. At this juncture Newport, Gates and Somers, with 150 men arrived from the Bermudas in vessels which they had built there. Finding the condition of things at Jamestown, they resolved tc abandon Virginia and sail with the remnant of the colonists to Newfoundland to seek food and a passage home from the fishermen. As they descended the river (10 June 1610) they met Lord Delaware, who had just arrived from

England, bringing supplies and colonists. He persuaded them to return to Jamestown, took measures for procuring supplies, established a trading-post at Hampton at the entrance to James River, and punished the Indians for their barbarities toward the colonists by attacking and burning several of their villages. His health failing, he returned to England, leav¬ ing Captain Percy as his deputy. He was soon superseded by Sir Thomas Dale, who arrived with 300 settlers and some x:attle. Under Dale property, theretofore held in common, was di¬ vided among the colonists. The right of prop¬ erty in land in America was then first recog¬ nized. He was followed in the governor's of¬ fice by Sir Thom.as Gates, who brought 350 more colonists. New settlements were com¬ menced at Henrico, some distance above James¬ town, and at the junction of the Appomattox and the James, then called New Bermuda. The laws made for the colony were harsh and strict, and occasioned much dissatisfaction. In 1616 Dale, who had resumed the government of the colony at the departure of Gates, returned to England, and soon after Captain Argali was ap¬ pointed deputy-governor. He used his office so much to the distress of the colonists that Lord Delaware sailed from England to resume his duties, but died on his passage, at the mouth of the bay which bears his name. George Yeardley now appointed governor (1619) and knighted, deserves to rank as the first Amer¬ ican Democrat. He called the first legis¬ lative body ever constituted in Virginia to meet at Jamestown on 30 July 1619. Its membership was composed of two elected representatives from each of 11 boroughs of the colony. This house of burgesses was the first act in the long drama of self-government in Virginia.

Twelve hundred colonists were sent over during this year, among whom were 90 respect¬ able young women, who were disposed of to the planters as wives at the cost of their passage. Among the new colonists were 100 sent by the king's special order from the prisons, to be sold as servants to the planters. This was the first instance in which felons had been sent to a British colon}ˆ and despite the protests of the colonists the}'- continued to be sent in increasing numbers to Virginia for 100 years. In 1619 a Dutch trading vessel brought to Jamestown

20 negroes, who were sold as slaves for life. The number did not much increase for the next 40 years, being limited to a few cargoes brought in by Dutch traders. More settlers arriving, nev/ plantations were established on the York, James and Potomac rivers, and on the eastern shore of the Chesapeake Bay.

In 1622 occurred a bloody war between the colonists and the Indian tribes led by Opechan-canough, the brother and successor of Pow¬ hatan. On the night of 22 March 350 persons were massacred, and in a brief period Indian murders, sickness and famine reduced the num¬ ber of the colonists from 4,000 to 2,500. In 1624 the London Company was dissolved and the colony passed under the direct charge of the Crown, except during the period of the Com¬ monwealth, 1649-60. Its condition at this time was not prosperous, tobacco being the only arti¬ cle of export which paid a profit. In 1630 a fort was built at Point Comfort and salt works were established at Accomac. In 1632 the laws of the colony were revised and consolidated, and.

though occasionally troubled by the Indians, and by vicious and vagabond colonists, it seems to have maintained a fair share of prosperity for a number of years. In 1641 Sir William Berke¬ ley became governor, and being a staunch loyal¬ ist soon came into collision with the parliament. The colony remained firm in its adherence to the Stuarts till March 1652, when an English fleet which had been sent to Barbadoes to reduce that island to submission visited the Chesapeake and arranged terms of capitulation with the loy¬ alists ; and Berkeley's commission being de¬ clared void, Richard Bennet, a Puritan settler in Maryland, was elected governor. On the res¬ toration of Charles H, Sir William Berkeley returned and was elected governor. The right of suffrage, which had been almost universal during the protectorate, was limited by act of 1670 to freeholders and householders, not so much from the pressure of the royal authority as from the aristocratic views of the prominent planters. The code of the colony was again revised in 1662 and the Church of England re¬ established and severe laws were passed against ˆ"nonconformists, Quakers and Anabaptists.ˆˆ The rapacity of the courtiers of Charles II, upon two of whom, Arlington and Culpeper, he had bestowed a patent of the Virginia colony, and the heavy taxation encouraged for his own purposes by Sir William Berkeley, led to great discontent, which in 1676, on the occasion of a levy of fresh taxes to provide against a threatened attack from the Indians, culminated in what is known as ˆBacon's rebellion.® (Sec Bacon, Nathaniel). Berkeley met with large pecuniary losses in this rebellion and when it was fairly quelled he

was so relentless in his verˆeance on all who had participated in it as to wing down upon himself the royal displeas¬ ure. In the winter of 1677 he visited England to justify his conduct, but died before having an interview -yvith the king. Lord Culpeper was then governor for a time and was followed by Lord Howard of Effingham, both rapacious and greedy. In 1689 the colonial government reluctantly proclaimed William and Mary. In 1705 the fifth colonial revision of the code took place. By it the slave was declared real estate, and thus, like the Russian serf, attached to the soil. This provision remained in force while Virginia continued a colony. In 1698 Williams¬ burg, founded and named in honor of William III, became the capital of the colony. In 1754 hostilities broke out with the French, who had built a line of military posts along the western slope of the Alleghenies and at the headwaters of the Ohio ; and in this war George Washing¬ ton first entered the service of his country, commanding the colonial troops at the battle of Fort Necessity (1754), and being placed at the head of the Virginia forces after Braddock's defeat in 1755. The assertion by Parlia¬ ment in 1764 of the right to tax the colonies without their consent called forth an earnest petition, memorial and remonstrance from the Virginia house of burgesses in December of that year ; and the stamp, mutiny and quartering acts passed by Parliament in 1765 led to the adoption of resolutions denying the right of any foreign body to levy taxes upon the colony.

In the first colonial Congress, which met in New York 7 Oct. 1765, Virginia was not repre¬ sented, her legislature having adjourned before the issuing of the Massachusetts circular; but

its action was approved at the next session of the legislature. The passing of Townshend's measures of indirect taxation iDy Parliament pro¬ duced a remonstrance on the part of the Vir¬ ginia legislature and a renewed assertion of their exclusive right of self-taxation and of trial by a jury of the vicinage. The name of Thomas Jefferson appears for the first time in connec¬ tion with these resolutions, which were passed 16 May 1769. Lord Botetourt, the ro3ˆal gov¬ ernor, at once dissolved the assembly, but its members in their private capacity met and en¬ tered into a non-importation agreement, which was very generally signed by the merchants and planters of the colony. The commerce of Vir¬ ginia with Great Britain was at this time larger than that of any other colony. In March 1773 the house of burgesses, under the zealous advo¬ cacy of Patrick Henry, Jefferson and R. H. Lee, appointed a committee ®to obtain the most clear and authentic intelligence of all such acts of the Parliament or ministiy as might affect the rights of the colonieˆˆ ; and the same committee were authorized to open a 'correspondence and communication with the other colonies. On the passing of these resolutions Lord Dunmore, the newly appointed governor, dissolved the assem¬ bly. In the autumn of 1774 a conflict occurred between the Indians under Logan, Cornstalk and other chiefs and a Virginia force of about 1,200 men, at Port Pleasant, on the Ohio River. The Indians were defeated, but the Virginians had 60 or 70 killed and a large number wounded. The Virginia convention which met at Richmond 20 March 1775 to appoint dele¬ gates to the new Continental Congress, took measures for enrolling companies of volunteers in each county. On 21 ApribCovernor Dunmore ordered the powder belonging to the province to be taken from the public store at Williams¬ burg and placed on board an armed vessel in the river. Learning this, Patrick Henry collected some companies of volunteers, marched upon Williamsburg and compelled the king's receiver to give bills for the value of the powder taken away. On 23 November Lord Dunmore with a British and Tory force took possession of Nor¬ folk. He was driven from it 3 December, but, in January 1776, returned with a larger force and bombarded it. He continued a predatory warfare along the whole Virginia coast through the ensuing summer, but was finally driven southward. The Declaration of Independence was proposed in the Continental Congress by the Virginia delegates under instructions from the convention of the colony. In the summer ot 1779 the British General Matthews made -a descent upon the coast, destroyed Norfolk,

took Portsmouth and Gosport, destroying the vessels of war building there, and burned or took 130 merchant vessels on the James and Elizabetii rivers. In January 1781 Gen. Benedict Arnold captured and burned Richmond, then a vil¬ lage of 1,800 inhabitants; but being pressed by the militia under General Steuben and some French frigates in the Chesapeake, he was forced to escape with a few prizes to Newport, R. I. In the spring and early summer of the same year Cornwallis and Phillips plundered the greater part of eastern Virginia, seizing and destroying property to the value of not less than $10,000,000. The surrender of Cornwallis at Yorktown on 19 Oct. 1781 virtually closed the war.

State History. — Independence won, the arts of peace took the place of war's strateg}ˆ The first achievements of statesmanship in Virginia were the bill exempting dissenters from tribute to the established church, the statute for re¬ ligious freedom (1785) and the act abolishing primogeniture. There was also prompt re¬ sponse to the new Commonwealth's Federal obligations. To hasten the ratification of the Articles of the Confederation of the Union, Virginia ceded to the general government her vast territory northwest of the Ohio. Her statesmen realized that the Articles under which the colonies had achieved their independence were not suited to accomplish a union of States and were the first to call a convention to re¬ model the government. In September 1786 tlie convention met at Annapolis to ^^consider the subject of a national convention,® but onhˆ a minority of the States were present and it adjourned to give place to a fuller convention, which assembled in Philadelphia in May 1787 when every State but Rhode Island was repre¬ sented. Virginia's members w'ere George Washington, John Blair, James Madison, George Mason, James McCltirg, Fdmund Randolph and George Wythe. Washington was elected presi¬ dent In September a committee reported the document w'hich became the Constitution of the United States. The Virginia Convention, called to ratify the compact, met in Richmond in June 1788 with Marshall, Madison, Monroe, Mason, Nicholas, Henry, Randolph, Pendleton, Lee, Washington, Wythe, Innes, Bland and Grayson in the membership.

The alien and sedition lawˆs, which Congress passed during the Adams administration, were aimed at troublesome French emissaries and authorized the punishment of all such aliens as the President should judge dangerous to the peace and safety of the United States. Vir¬ ginia statesmen, led by Jefferson, regarded these enactments as a dangerous invasion of the lib¬ erty of the citizens of the States, for in

their strict interpretation of the Constitution each party to the Federal compact had ^^an equal right to judge for itself as well of infractions as of the mode and measure of redress.® The famous ˆResolutions of ’98-’99,® written by Jefferson, were the first formal expression of the principle of states-rights and the policy of a strict and narrow construing of the Consti¬ tution. For many years after the adoption of the Federal Constitution Virginia maintained a predominant influence in the affairs of the na¬ tion ; of the first five Presidents, four were natives and residents of that State, and each of them w’as reelected for a second term; and since that period four other natives of the State, one of them at the time of his incum¬ bency a resident of it, have filled that high olfice.

In the convention wFich met in Richmond in 1829 to revise the State constitution sat many distinguished statesmen, among them Madison, Monroe, John Marshall and John Randolph of Roanoke. The Constitution enacted by the Convention of 1829-30 wˆas revised in 1850, the 1850 Constitution in 1882 and that in 1901-02. Th-e successive changes register, in a measure, the development of the State in a material way, and, much_ more truthfully, the evolution of its spirit and ideals.

At the time of the secession of the Southern

States at thcˆ close of 1860 and beginning of 1861, a majority of the people of Virginia were strongly attached to the Union, but they also sympathized with the seceding States. At an extra session the legislature passed a bill (23 Jan. 1861) appropriating $1,000,000 for the defenseˆ of the State and issued a call for a convention, the members of which were to be elected 4 Feb. 1861. The number of delegates elected to the State Convention was 152, of whom the greater part were ˆConditional® Union men, a few in favor of immediate secession, and about as many unconditional Unionists. The convention met at Richmond 13 February and on 10 March the committee on Federal re¬ lations submitted several reports. The majority report, composed of 14 resolutions, avowed the doctrine of State rights, condemned all interference with slavery as dangerous, asserted the right of secession and defined the circum¬ stances under which Virginia would be justified in exercising that right, viz., the failure to procure such guaranties from the Northern States as she demanded, the adoption of a war¬ like policy by the general government or the attempt to exact payment of duties from the seceded States, or to reinforce or recapture the forts. The majority resolutions were dis¬ cussed and adopted as far as the 13th, when the capture of Fort Sumter by the Southern forces and the consequent proclamation of the President calling for troops, led to the passing on 17 April of an ordinance of secession by a vote of 88 yeas to 55 nays. Twelve of those voting nay were not long after expelled from the convention. The people of the State had by a majority of 52,857 required that the action of the convention should be submitted to their decision and a vote on the ordinance of seces¬ sion was accordingly ordered to take place on the fourth Thursday of May. The State gov¬ ernment, however, proceeded as if the ordinance had already been ratified by the people. The Federal flags were removed, troops to the num¬ ber of 10,000 were called out by the governor, and loans effected for their arming and equip¬ ment ; and on 25 April the convention passed an act for the adoption of the constitution of the provisional government of the Confederate States of America. The State convention on 29 April appointed delegates to the Confederate congress and invited that congress to make Richmond the seat of

government of the South¬ ern Confederacy ; an invitation which was ac¬ cepted soon afterward. The popular vote was taken as provided in the ordinance 23 May and resulted in a majority of 94,000 in favor of the secession ordinance. Eastern Virginia voted almost unanimously for it, while the western counties were as unanimous against it. The convention of western Virginia, representing about 40 counties, met at Wheeling on 11 June, passed a declaration of independence from the action of the State convention, declared vacant the offices held by all State officers acting in hostility to the Federal government, and took measures for the establishment of a provisional government. Virginia was the centre of the war zone in the East and became the scene of some of the most important battles of the Civil War (q.v.), among them being the two battles of Bull Run, Winchester, Fredericksburg, Chan-cellorsvillc, the Peninsular campaign and the battles of the Wilderness campaign. Virginia

troops throughout the conflict played a valuable part. The military operations in Virginia were distinguished by desperate fighting and this is particularly true of the warfare north of the Rappahannock. Richmond was the strategic capital of the Confederacy. The Federal forces came to occupy the greater part of the State; and the customary effects of war were seen in the desolation of the country. Every section was invaded and at the time of the surrender at Appomattox Court House (9 April 1865), the Confederate army and civilians were threatened with famine. General Lee, commander-in-chief of the military forces of the Confederate States, and ˆStonewall® Jackson and J. E. Johnston, comrnanders of (Confederate armies, were all Virginians.

The Civil War was the last notable event in connection with the history of Virginia. Since that time there have been numerous political dif¬ ficulties. The Reconstruction acts granted to negroes the right of voting for delegates to a State convention. In 1868 a new constitution was adopted. _ Among various new features therein embodied was that of negro suffrage. There was much dislike of the new instrument, which was not submitted to popular vote until July 1869, when it was adopted by a large ma¬ jority, though the clause disfranchising Confed¬ erate officials and demanding an oath of past loyalty was rejected. G. C. Walker was elected governor; United States senators were also chosen, the 14th and I5th amendments were ratified and the military occupation, never re¬ quired, was brought to an end. On 26 Jan. 1870 Virginia was readmitted to the Union. There was soon trouble in connection with legislation respecting the State debt. By a

bill passed in 1871 two-thirds of the debt of Virginia was funded into bonds, the coupons of said bonds to be held receivable in payment for taxes as¬ sessed. The remaining one-third was held to be the suitable share of West Virginia, though the latter State refused to admit such obligation. In 1872 the Virginia State legislature repealed the tax-coupon arrangement of the law ; but the courts decided that the State was under obli¬ gation to receive the bonds, even should the treasury be thereby kept bankrupt. At that time $17,000, 0(K) in these bonds had been funded. Attempts toward a compromise were made and conflicts between Federal and State courts were frequent. In 1891-92 a settlement was finally arrived at. The bondholders received for bonds and coupons amounting to $23,000,000 the sum of $19,000,000 in new century bonds. During the period of discussion regarding the State debt, politics was much affected by the question ; a ^^Readj lister® party was formed, finally ab¬ sorbed by the Republican, and elections were based on the matter. The negro vote was divided. A constitutional convention, held in 1901-02, had as its chief objects in view the re¬ striction of the suffrage and financial retrench¬ ment. The new constitution was proclaimed 19 May 1902 but was not submitted to popular vote. Virginia has been throughout almost steadily Democratic in Federal politics. In 1860 it voted for John Bell, the Constitutional Union nominee, and in 1872 for Grant ; but otherwise it has consistently supported the Democratic national candidates. In 1881 the 100th anniver¬ sary of the surrender of Lord Cornwallis to Washington at Yorktown was cclcl)rated by the

laying there o£ the cornerstone of a national memorial (18 October). At the time of the Spanish-American War in 1898 an extensive military camp, Camp Alger, was established and maintained near Falls Church, Fairfax County.

Governors of Virginia.

STATE

Patrick Henry . 1776-79

Thomas Jefferson . 1779-81

Thomas Nelson, Jr . 1781

Benjamin Harrison . 1781-84

Patrick Henry . 1784-86

Edmund Randolph . . 1786-88

Beverley Randolph . 17 88-9 1

Henry Lee . 1791-94

Robert Brooke … 1794-96

James Wood . Democratic-Republican 1796-99

James Monroe . “ “ 1799-1802

John Page . “ “ 1802-05

William H. Cabell…. “ “ 1805-08

John Tyler, Sr . “ “ 1808-11

James Monroe . “ “ 1811

George William Smith (act’g) Dem.-Republican (1 mo.) 1811

Peyton Randolph (acting) …. (1 week) . 1811-12

James Barbour . 1812—14

Wilson Cary Nicholas Republican . 1814-16

James Patton Preston “ . 1816-19

Thos. Mann Randolph “ * • . 1819-22

James Pleasants, Jr. . “ . 1822-25

John Tyler . 1825-27

William B. Giles . 1827-30

John Floyd . Democrat . 1830-34

Littleton Waller Taze¬ well . “ . 1834-36

Wyndham Roberton

(acting) . “ . 1836-37

David Campbell . 1837-40

Thomas W. Gilmer… Whig . 1840-41

John M. Patton (act¬ ing) . “ . 1841

John Rutherford (act¬ ing) . “ . 1841-42

John M unford Greg¬ ory (acting) . “ . 1842-43

James McDowell. … “ . 1843-46

William Smith . Democrat . 1846-49

John Buchanan Floyd “ . 1849-52

Joseph Johnson . “ . 1852-56

Henry Alexander Wise “ … 1856-60

John Letcher . “ . 1860-64

William Smith . “ . . 1864-65

Francis H. Pierpont.. Provisional (Republican) 1865-68

Henry H. Wells . Provisional . . 1868-69

Gilbert C. Walker…. Provisional (Republican) 1869-70

“ “ Governor . 1870-74

James Lawson Kemper . 1874-78

Frederick W. M. Holliday . 1878-82

William Ewan Cameron . 1882-86

Fitzhugh Lee . 1886-90

Philip W. McKinney . 1890-94

Charles T. O’Ferrall . 1894-98

J. Hoge Tyler . 1898-1902

Andrew Jackson Montague . 1902-U6

Claude A. Swanson . 1906-10

William Hodges Mann . 1910-14

Henry Carter Stuart . 1914-18

Westmoreland Davis . 1918-

Bibliography. — Books on Virginia history by Howison (1846-48), Campbell (I860), Stith (1866), Cooke (1883), O'Neill (1885), Drake (1894), Bruce (1896) ; Howe, Wirginia Histor¬ ical Collectionsˆ (1845) ; Keith, ˆHistory of British Plantations in Americaˆ (1737) ; Hale, ˆTransatlantic Pioneersˆ (1886) ; Wingfield, ˆA Discourse of Virginiaˆ (1860) ; Kercheval, ˆA History of the Valley of Virginiaˆ (1850) ; Jefferson, ˆNotes on the State of Virginiaˆ (1787) ; Forrest, ˆNorfolk and Viciniteˆ (1853) ; Foote, ˆSketches of Virginiaˆ (1855) ; Jones, ˆArmy of Northern Virginiaˆ (1880) ; Boyd, ˆResources of Southwest Virginiaˆ (1881) ; Waddell, ˆAnnals of Augusta County, Va.ˆ (1888) ; Pearson, ˆHousehold Scenes in the Old Dominionˆ (1853) ; Summers, ˆHistory of Southwest Virginiaˆ (1903); Wertenbaker, ˆPlebeian and Patrician in Virginiaˆ (1910) ; Mrs. Stanard, ˆColonial Virginiaˆ (1917); Fir-ginia Magazine of History and Biography ; books on the Civil War and Virginia State Re¬ ports.

John S. Patton,

Librarian, Library of the University of Virginia.

VIRGINIA, Ill., city, county-seat of Cass County, on the Chicago, and Eastern Illinois, and the Baltimore and Ohio railroads, about 30 miles west by north of Springfield. It is in a rich farming section and the chief indus¬ tries are connected with farming and dairying. The city has a high school, elementary schools and the library of the Central Illinois Science Society. There are good banking facilities and two weekly newspapers. Pop. about 1,501.

ˆ VIRGINIA, The Restored (or Reorgan¬ ized) Governrnent of. An irregular govern¬ ment whose legitimist pretenses were recognized by the United States government in the crisis of the Civil War. Its most useful achievement was the erection of West Virginia, and its other

chief interest was its service as a fore¬ runner of reconstruction in Virginia. The pas¬ sage of the Ordinance of Secession by the Virginia Convention at Richmond (on 17 April 1861) was solidly opposed by the delegates of the northwest counties who immediately began a movement for separate action in favor of the Union under the Constitution, resulting in a pre¬ liminary anti-secession convention at Wheeling, in May 1861, and a second convention which met at the same place in June and, acting under the right of revolution, declared vacant the offices held by the secessionists of the east, elected new officers and reorganized the gov¬ ernment under the name ˆRestoredˆˆ or «Reorganized® government of Virginia.

This reorganized government, whose validity was acknowledged by President Lincoln, and which was represented ‘by Francis Harrison Pierpont, acting as governor, entirely ig¬ nored the existence of the legal State government at Richmond. Its first gen¬ eral assembly, composed largely of for¬ mer members of the Virginia legislature, promptly took vigorous action against con¬ federates of the western counties, declared the proceedings of the Virginia secession conven¬ tion null and void, and finally (August 1861) took the last step of alienation from Virginia by an act providing for the formation of a new State and the call of a convention to form a constitution for it. In May 1862 it gave the consent of Virginia to the formation of the new State from Virginia territory. After the organization of the new State of West Virginia had been completed — by formation of a new government, approval of its constitution by Congress and proclamation of the President — the ˆˆRestored’ˆ government of Virginia folded its tents and moved to Alexandria, where its jurisdiction, reduced to a small strip of ter¬ ritory within the Union lines, existed only in the shadow of the Federal armies. Here under its reelected governor (Pierpont) and its tiny legislature, and recognized by the Lincoln gov¬ ernment at Washington, it continued to exist throughout the period of the Civil War, its chief work being the framing of a new Vir¬ ginia constitution expressing the Union senti¬ ments of its Potomac legislators. At the close of the war, in May 1865, with its validity recognized by President Johnson, it moved to

Richmond and remained the government of Vir¬ ginia iiiilil April 1867 when, by an order of General Schofield, Governor Pierpont was re¬ placed by General Henry H. Wells. Consult Callahan, J. M., ˆSemi-Centennial History of West ˆ Virginia' (1913) ; Eckenrode, H. J., ˆPolitical History of Virginia during the Re¬ construction' (1904).

James M. Callahan.

VIRGINIA, University of, the State uni¬ versity located at Charlottesville, Va. As early as 1779 Thomas Jefferson presented to the Vir¬ ginia assembly his plans for public education, which included a university. This scheme was not, however, immediately carried out ; and after 1814 Jefferson devoted himself largely to the work of founding a university in accord¬ ance with his ideal. It was finally established by act of the State legislature in 1819 ; and was first opened to students in 1825. From 1850 to 1861 was a time of especial prosperity and large attendance ; during the war the college suffered a large loss of students, but neverthe¬ less continued in session ; after that its work continued successfully with gradually increas¬ ing attendance. In 1895 the Rotunda, Annex and some adjacent smaller buildings were de¬ stroyed by fire, but the Rotunda, restored ex¬ actly and three other large buildings were for¬ mally opened in 1898. Since this several other important buildings have been added. The government of the university is vested in a board of visitors of nine members appointed by the governor with the approval of the senate for terms of four years. The organization of the university comprises five departments: (1) The Academic Department; (2) the Depart¬ ment of Engineering; (3) the Department of Agriculture; (4) the Department of Law; (5) the Department of Medicine. The work in these departments is grouped in 22 distinct schools, each offering an independent course, under the direction of the professors who are responsible to the board of visitors alone for their work. The work in the Academic De¬ partment is entirely elective; the courses are arranged in seven groups from each of which one course must be elected; the other courses required may be elected from these seven, or from an eighth, including courses in law, medi¬ cine, engineering, *etc.* The degree of B.A. is conferred for the completion of 10 under¬ graduate courses chosen from the eight groups ; the degrees of M.A. and Ph.D. are conferred for graduate work, suitable graduate courses being offered in each school. The Depart¬ ment of Engineering offers four courses lead¬ ing respectively to a degree in civil, mining, mechanical and electrical engineering; the de¬ grees conferred are civil engineer, mining engi¬ neer, machanical engineer and electrical

engi¬ neer. The faculty numbers 70; the average an¬ nual attendance of students is over 1,200. The students maintain an athletic association, hav¬ ing charge of athletic sports, two literary so¬ cieties, several department and graduate socities and a Young Men's Christian Association. The original buildings of the university were planned by Jefferson and are purely classic in style; the more recent additions have been made to harmonize with and complete his plan. The central group encloses a quadrangle, 1,000 feet in length and 300 feet wide. The dominant

structure of this group is the Rotunda, the library building at the north end, modeled from the Roman Pantheon ; other buildings around the quadrangle are the main academic building, the physical laboratory, the mechanical labora¬ tory and original buildings designed by Jeffer¬ son. Parallel with the latter are the eastern and western ˆTanges" of dormitories ; outside the quadrangle group are the chapel, the natural history museum, the chemical laboratory, the medical building, the observatory, the infirmary, several dormitories and the gymnasium. The campus also contains an athletic park, recently laid out, comprising 21 acres. Tuition in the Academic and Agricultural departments is free to Virginia students ; the university awards scholarships to accredited schools ; and there are several alumni scholarships, and a number of special scholarships. The general library contains over 90,000 volumes ; and in addition there are law and other departmental libraries.

VIRGINIA CITY, Nev., city, county-seat of Storey County, on the Virginia and Truckee Railroad, about 200 miles northeast of San Fran¬ cisco, and 21 miles northeast of Carson City. It is on the eastern side of Mount Davidson, about 7,825 feet above the level of the sea. It was settled in 1859, when the famous Comstock Lode was discovered and chartered as a city in 1864. Mines under the city have produced nearly $400,000,000 in gold and silver bullion. There is still considerable silver mining in the vicinity. The city has a daily supply of 10,- 000,000 gallons of water for use for domestic and mining purposes, brought from the Sierra Nevada Mountains, 30 miles west, at a cost of $2,500,000.. The principal mines are drained by the Sutro tunnel (4 miles long, cost $4,500,000) at a depth of 1,650 feet. The deepest mining works have a depth of 3,300 feet. Numerous great mining plants have been erected in the city at a cost of from $350,000 to $1,000,000 each. The city has gas and electric light plants and a daily newspaper. The Miners' Union Library, the courthouse, churches and schools are the principal buildings. The population has decreased

from 10,900 in 1880 to 1,200 In 1920, a fact mainly due to the decline in the price of silver.

VIRGINIA CONVENTIONS OF THE REVOLUTION, The. The change from colony to commonwealth in Virginia was made by means of five conventions, called together between 1774 and 1776. These conventions are important not only as marking the transition of this ancient colony to statehood, but also be¬ cause they greatly influenced the course of con¬ tinental or national affairs. For example, they had to do with the summoning of the First Continental Congress, and with the appoint¬ ment of delegates thereto so decisive as Peyton Randolph (its first president), George Wash¬ ington and Patrick Henry. The constitutional principles formulated by these conventions, es¬ pecially by the one in 1776, which drafted the Virginia constitution, were later built into the Federal structure.

First Convention (1 Aug. 1774). — The cir¬ cumstances which led to the calling of the first Virginia convention were as follows: During the session of the House of Burgesses, as the popular liranch of the colonial legislature was called, news arrived from Boston of the

V

126

decision upon the part of the British ministry to close that port as a punishment for the destruction of the famous tea. The indigna¬ tion felt upon every hand in Virginia headed up in a resolution, passed on Tuesday, 24 May, to appoint the first day of June as a day of fasting and prayer to God to avert this doom from Boston. As soon as this action of the legislature became known to the royal governor. Lord Dunmore, he in high dudgeon dissolved the House of Burgesses. The following Sun¬ day afternoon, when only a score or so of the late burgesses remained in the sleepy little capi¬ tal of Williamsburg, a messenger arrived from Boston, bringing a circular letter, appealing to the colonies for united support, and advocating the cessation of all trade with Great Britain. The responsibility for a final answer to this appeal from Boston was too grave for the Committee of Correspondence at Williamsburg to assume alone. After consultation, it was decided the next morning at a meeting of the 25 burgesses remaining iˆ , town, to ask the counties to appoint deputies to a convention, which should consider the question of the cessation of all trade relations with Britain, and should select delegates to the proposed Continental Congress. The time named for this convention was 1 August, and the place Williamsburg. This summons, the original of which is in the Virginia State Library, was evidently written by Peyton Randolph, the moderator, whose name stands first in the list of signers. Then follow the names of Thomas Jefferson, George Washington, Henry Lee, *etc.* This call for a Virginia Convention has the same significance in the progress of the Vir¬ ginia Revolution as the meeting of the Tiers-Etat in the Versailles Tennis Court, 15 years later, in the French Revolution. It was in both instances an assertion of the sovereignty of the people over against the prerogative of the Crown. Sympathy for Boston in its sufferings had called forth in Virginia the representatives of the sovereign people, whom royal writs did not summon nor royal governors dissolve. The first Virginia Convention met in Williamsburg, on 1 Aug. 1774, and remained in session six days. Fifty-six counties and four boroughs were represented; the counties by two dele¬ gates each and the boroughs by one each. Peyton Randolph, the former speaker of the House of Burgesses, was made president. Dele¬ gates were chosen to represent Virginia in a General Congress, namely, Peyton Randolph, George Washington, Richard Bland, Benjamin Harrison and Edmund Pendleton. In support of Boston, it was agreed to buy no goods, ex¬ cept medicines, from Great Britain, after 1 November ; and neither to

import slaves nor purchase slaves imported, after that date, from any place whatsoever. The delegates further declared that unless American grievances were redressed by 10 Aug. 1775, they would stop all exports of their produce to Britain. Provision was made for future sessions of the convention should the condition of the country demand* This meeting was also the means of making known to the public Thomas Jefferson's paper, afterward entitled Summary View of the Rights of British America,^^ a forerunner of the Declaration of Independence. For the pro¬

ceedings of this convention, consult the files of the Virginia Gazette, 4-11 Aug. 1774.

Second Convention (30 March 1775). — The second Virginia convention was held at Richmond, 20 to 27 March 1775. It sat in Saint John's Church, which crowns an eminence overlooking the valley of the James, The his¬ toric church is still used as a house of wor¬ ship, the spot being indicated where Patrick Henry stood as he made the famous speech in favor of arming the colony. The members were grouped into two parties, the one conservative, deprecating radical measures and relying still upon reconciliation with Great Britain; the other aggressive, believing that pacific means had been exhausted, and urging that the colony be armed. Peyton Randolph, the president, was the leader of the former group. Patrick Henry was the mouthpiece of-the latter. For three days neither party committed itself. But upon the fourth day a resolution was adopted, thank¬ ing the Assembly of Jamaica for its memorial to the king in behalf of the American colonies, and expressing an ardent desire for peace. This seemed to Patrick Henry to savor of servility. He thereupon brought forward his famous reso¬ lution for putting the colony in a condition of defense, asserting that ^^a well-regulated militia, composed of gentlemen and yeomen, is the nat¬ ural strength and security of a free govern¬ ment.® Despite opposition this resolution was carried, chiefly by the passionate eloquence of Henry, and the military resources of the colony were at once directed to be organized and made efficient. The convention appealed to the peo¬ ple for contributions for the relief of the in¬ habitants of Boston, ^suffering in the common cause of American freedom.® The former delegates to Congress were reelected, Thomas Jefferson being made alternate for Peyton Randolph, in case the latter could not attend. The people were asked to choose delegates to represent them in convention for one year.

Third Convention (17 July 1775). — Mean¬ time, events moved

rapidly. The battles of Lex¬ ington and Bunker Hill, the session of the Sec¬ ond Congress at Philadelphia, Lord Dunmore's seizure of the powder in the magazine at Wil¬ liamsburg and his subsequent escape to a Brit¬ ish man-of-war lying at Yorktown, had wrought the mind of the patriots to a high state of ex¬ citement. The governor threatened the colony with fire and sword. Such were the circum¬ stances under which the third convention met at Richmond, on 17 July 1775. Some changes of consequence had occurred in the membership of the body. Fifteen days before the planters came together at Richmond, George Washing¬ ton had taken command, under the old elm at Cambridge, of the American army. His place as a delegate was taken by his neighbor, George Mason, whose mind for the next year was to be engaged in the constructive work of the Vir¬ ginia Commonwealth. For nearly a month, the convention suffered more or less distraction, owing to the absence in Congress of such ex¬ perienced leaders as Henry, Jefferson and R. H. Lee. The legal status and methods of this body differed materially from those of the previous conventions. Both the outward circumstances of the colony and the inner movement of thought strengthened the hands of the delegates and forced the convention to assume responsi-VIRGINIA CONVENTIONS OF THE REVOLUTION

bilities undreamt of by the score of ex-burgesses who had suggested the calling of the first con¬ vention. Lord Dunmore had fled. The royal government was dissolved. The convention was driven to meet this new turn in affairs. No longer content with resolutions, it followed legislative methods and gave to its acts tht forms of law, terming them ordinances. One hundred and fifteen delegates were present. The leading measures acted upon by this convention were, to organize the military forces for the defense of the colony, to create an executive organ to act during the recess of the convention, to provide adequate revenue for the provisional government and army of the colony, to estab¬ lish executive county committees, to regulate the election of delegates to the convention and to elect new representatives to Congress. As the bare enumeration shows, these were tasks of no little difficulty. Interest attaches to the slip of paper (in the Virginia State Library) upon which the tellers made their report of the ballots for representatives for Congress : ^^Pey-ton Randolph 89, Richard Henry Lee 88, Thos. Jefferson 85, Benj. Harrison 83, Thos. Nelson 66,

Richard Bland 61, George Wythe 58,ˆˆ *etc.* A representative in Congress ˆˆshall be allowed for every day he may attend therein the sum of 45 shillings,ˆˆ which sum was reduced by the convention the following year to 30 shillings per day, to be paid by the treasurer of the colony. The Committee of Correspondence was converted into the Committee of Safety, which directed, during the recess of the convention, both the military and civil affairs of the nascent State. On 17 Aug. 1775 the first Committee of Safety, consisting of 11, was elected, the tellers on this occasion being Richard Henry Lee, Thomas Jefferson, Benjamin Harrison and Pat¬ rick Henry. The convention adjourned 26 Aug.

1775.

Fourth Convention (1 Dec. 1775). — The fourth convention met at Richmond 1 Dec. 1775, but, after organizing, removed to Wil¬ liamsburg. As Peyton Randolph, who had signally served as speaker of the House of Bur¬ gesses, president of three previous Virginia con¬ ventions and president of the first two Con¬ gresses, had died, in Philadelphia on 22 Oct. 1775, Edmund Pendleton was chosen president in his place. The chief measures that engaged the attention of this convention were the in¬ crease of the army for the defense of the colony (nine regiments, enlisted for two years) against the Tory forces commanded by Lord Dunmore, who held Norfolk and the adjacent region; the establishment of an admiralty court; the appointment of a commission of five men in each county to try the causes of those deemed <ˆenemies of America®; the authorization of the county courts to elect severally a sheriff for one year, and instructions to the Virginia dele¬ gates in (jongress to urge the opening of the ports of the colonies to the commerce of the world, excepting Great Britain and the British West Indies. The Virginia troops were merged into the Continental army and the superior officers were hereafter commissioned by Con¬ gress. The convention adjourned 20 Jan. 1776. While this convention was in session, the Vir¬ ginia troops routed the forces of Lord Dun¬ more at Great Bridge 9 Dec. 1775. On 1 Jan. 1776 Dunmore burned Norfolk, the chief town

in Virginia, having about 6,000 inhabitants and continued to ravage the coasts until summer. Being dislodged from Gwynn's Island in Chesa¬ peake Bay by Andrew Lewis, he fled to New York and thence to England.

Fifth Convention (6 May 1776). — ‘The growth of the idea of American independence was slow in the Old Dominion. The burning of Norfolk on 1 January and the successes of Washington in the early spring in ousting the British from Boston, precipitated opinion in Virginia. The election of delegates to the May convention took place during April and the two points which constantly recur in the in¬ structions given them are independence and representative government. For instance, the freeholders of Charlotte County, on 23 April 1776 said to their representatives: ^^We give it in charge to you to use your best endeavors that the delegates which are sent to the General Congress be instructed immediately to cast off the British yoke.® The fifth convention met on 6 May 1776, at Williamsburg, 66 counties and corporations being represented by 131 delegates. Tw^enty-nine of these were new members, whose selection is perhaps attributable to the increase of religious dissent in the colony. Among the new members were James Madison, recently from Princeton College, and Edmund Randolph, son of the king’s late attorney-general, who had taken ship with Lord Dunmore for Eng¬ land. George Mason, owing to sickness, did not take his seat until 18 May, bringing perhaps in his pocket both a declaration of rights and a draft of a constitution for the anticipated com¬ monwealth. The convention was at once a legislative, constituent and executive body. The three great measures of constructive policy which it formulated were : First, the instruc¬ tions to the Virginia delegates in Congress to propose independence; second, the bill of rights, and third, the constitution of Virginia. Its ses¬ sion lasted 51 days, a brief space, considering the novel and momentous task of organizing a commonwealth. Edmund Randolph tells us that the resolution instructing the delegates in Con¬ gress to propose the declaration that ®the United States are free and independent States® was ^ffirawn by Mr. Pendleton, proposed by General Nelson, and enforced by Mr. Henry.® The first drafts of the motion for independence in the convention were found some years ago in the Virginia State Library, by William Wirt Henry and may be seen in his ^Life of Patrick Henry. ^ They were endorsed by the clerk, ®Rough Resolutions, Independence.® After the passage on 15 May 1776 of the resolution in¬ structing the delegates in Congress to propose independence of Britain, the British flag was at once struck on the capitol at Williamsburg and the colonial colors hoisted in its stead. At night, the town was illuminated and the people were jubilant. On 27 May, Archibald Cary preseruted to the convention the ^Declaration of Rights,® which had been originally drawn by George Mason. In it the well-known guarantees of personal liberty are admirably stated. It was in the discussion of the articles in this ^^Declara¬ tion® bearing upon religious toleration, that James Madison came forward for the

first time, emphasizing the distinction between religious liberty and toleration and contending boldly for an expression of outright religious liberty.

Ill consequence, the convention declared in the 16th article, that ®all men are entitled to the free exercise of religion, according to the dic¬ tates of conscience. The ®Declaration^^ thus framed has bees the Magna Charta of Vir¬ ginia, forming an integral part of every con¬ stitution since that day. It is the bed-rock of republican government. The original draft of the ^^Declaration of Rights,® in Mason's own handwriting, was presented to the State of Vir¬ ginia, 15 Feb, 1844, by Gen. John Mason, the last surviving son of George Mason of Gunton Hall. This copy now hangs on the wall of the Virginia State Library. Seven different schemes of government are known to have been before the convention. From these was evolved the first constitution, which was finally adopted on 29 June 1776 — the natal day of the common¬ wealth of Virginia. This constitution provided for a bicameral legislature, called the House of Delegates and senate, elected by freeholders. The executive was to be a governor, elected annually by the house and senate on joint bal¬ lot. He was to be assisted! by a privy council, consisting of eight members chosen by the legis¬ lature. The judges of the Supreme Court of Appeals, judges of admiralty and attorney-gen¬ eral were elected also by the legislature and continued in office during good behavior. All laws were to originate in the house of dele¬ gates, but were, except money bills, amendable by the senate. The convention immediately elected Patrick Henry as governor and Edmund Randolph as attorney-general. The new gov¬ ernment went into operation at once. After making provision for an increase of troops and for the vigorous prosecution of the war the convention adjourned on 5 July 1776. The Com¬ monwealth of Virginia was thus launched upon its historic development. See United States — Formation of State Constitutions.

S. C. Mitchell, President, Delaware College.

VIRGINIA CREEPER, a very ornamental American climbing shrub

(Farthenocissus qiiin-quefolia). It is frequently confounded with poison-ivy and the two plants often grow to¬ gether; but it should be remembered that the innoxious creeper is distinguished by its leaves, which are not shining and are palmately parted into five divisions, whereas the poison-ivy's leaves have but three leaflets and are glossy. The small, white, five-parted flowers, with spreading petals, are in ample pariicles, but are not so conspicuous as the fruits, which consists of dark-blue berries, on red pedicels. They are ripe in autumn and are set off by the rich tones of crimson which the foliage assumes at that season. The Virginia creeper or American ivy or woodbine, as it is variously styled, is one of our most decorative vines. It travels over rocks and fences, sending out delicate trailing branches, with the leaves regu¬ larly diminishing in size down to the folded ones near the curving tip. It soon starts climb¬ ing by numerous tendrils, which are often tipped with disc-like enlargements that adhere to rough surfaces of walls or trees and is fur¬ ther supported by aerial roots, springing from the stems,

VIRGINIA DEER, QUAIL, *etc.* See

Deer, Quail, *etc.*

VIRGINIA EXPOSITION. See James¬ town, Va.

VIRGINIA FENCE, a rail fence common in the United States and Canada, known also as snake-fence, worm-fence and stake-and-rider fence. It consists of tiers of split rails laid horizontally in a zig-zag manner, the ends rest¬ ing on each other and generally braced or kept in place by a pair of posts driven slantingly into the ground at the angle formed by the inter¬ section of two tiers.

VIRGINIA MILITARY INSTITUTE,

a State school located at Lexington, Va. It was established in 1839 by act of the legislature and opened to students in the same year. It is gov¬ erned by a board of visitors consisting of the superintendent of public instruction and the adjutant-general, members ex-officio, and nine other members appointed from different sec¬ tions of the State by the governor with the approval of the senate. In accordance with the laws of Virginia the professors and officers hold commissions in the State militia, and the stu¬ dents are organized as a military corps of cadets. The school played an important part during the Civil War ; in April 1861 the cadets were or¬ dered to Richmond, where they

took part in drilling volunteers ; in 1862 the Institute was reopened, and in May 1864 the cadet corps was ordered out for active service and took a lead¬ ing part in the battle of New Market, Va. During the war the cadets were in active service 13 months. In June 1864 the buildings and equipment were burned by the Federal army ; in October 1865 the Institute was reopened, the buildings and equipment rapidly restored and the course of instruction greatly improved and extended. The regular course covers four years and though largely scientific and techni¬ cal include some general culture subjects. The work of the first two years is the same for all and includes English, a foreign language, science, mathematics and drawing, none of the courses being elective; at the end of the second year students may elect between courses in civil engineering, applied chemistry and electricity; the degree of B.S, is conferred for the com¬ pletion of any of these courses. There is also postgraduate work offered leading to the de¬ grees of C.E. or M.S. For military instruc¬ tion and drill the cadets are organized in a battalion of four companies ; the discipline is strict, the regulations iDeing based on those of West Point. Instruction is given in infantry and artillery tactics, ordnance and gunnery, mili¬ tary science and the art of war and military engineering. A certain number of cadets, not less than 50, are admitted each year as State cadets, \vithout charge for tuition or board. The Institute is located outside the city on a hill overlooking Wood's Creek; the new aca¬ demic building was completed in 1900. The library contains about 15,000 volumes, the stu¬ dents number 675 and the faculty and military staff 34. Since the foundation of the school in 1839 there have been about 7,000 matriculates, of whom 2,500 became full graduates.

VIRGINIA-PENNSYLVANIA BOUND¬ ARY DISPUTE. Several years before the American Revolution the rapid increase of set¬ tlements in the transmontane region beyond the western limits of Maryland, and especially along

the waters of the Monongahela, precipitated a bitter boundary dispute

which threatened to result in open hostilities in the disputed ter¬ ritory. Virginia — on the basis of certain words of an early charter — claimed territory at least as far north as the 40th parallel, which would have included the ^key to the West® at Fort Pitt (now Pittsburgh). Pennsylvania threat¬ ened to. renew her claim to the line of 39° as originally demanded b.v the Penns before the establishment of the Mason and Dixon line as the boundary between Maryland and Pennsyl¬ vania. In 1773 Governor Dunmore of Virginia, determined to resist the claims of Pennsylvania jurisdiction recently exercised throueh courts established at Hanna's Town (now Greens-burg), sent to Fort Pitt a trusted representa¬ tive, Dr. John Connolly, who established a rival court and rival magistrates, thus beginning a struggle which was postponed only by the Revolution.

From 1774 to 1780 Virginia courts continued to sit in western Pennsylvania on territory claimed by Pennsylvania. Finally, following negotiations of 1779 an agreement for a survey to establish the boundary was reached in June 1780. A temporary survey was completed in 1781 and a permanent survey, under a joint boundary commission, completed the extension of the ^Mason and Dixon® line to the south¬ west corner of Pennsylvania in 1784, and es¬ tablished the western boundary line of Pennsyl¬ vania in 1785-86.

James M. Callahan.

VIRGINIA POLYTECHNIC INSTI¬ TUTE, The, located at Blackburg, Mont¬ gomery County, Va. It was established as the Virginia Agricultural and Mechanical College by the State of Virginia in 1872, in accordance with the provisions of the Land Grant Act of 1862. (See Colleges, Land Grant). In the same year it was opened to students. Its name was changed by authority of the legislature in 1896 to Virginia Polytechnic Institute. It is under the control of a board of visitors, con¬ sisting of the superintendent of public instruc¬ tion of the State, the president of the State board of agriculture and immigration, ex-offi- cio members, and eight members appointed by the governor with the approval of the senate. One-half of the eight members are appointed every two years for terms of four years. The Institute offers 15 degree courses, leading to the B.S. degree, and a two-year short course in practical agriculture, a farmers' winter course of one month and in the summer a special course to members of the boys' corn clubs from over the State. The B.S. courses embrace courses in general science, in agriculture, in horticulture, in agricultural engineering, in preparatory veterinary medicine, in applied phys¬ ics, in applied chemistry, in chemical engineer¬ ing, in metallurgy and metallography, in ap¬ plied geology, in applied biology (preparatory

course for the study of medicine), in civil engineering, mechanical engineering, electrical engineering and in mining engineering. Graduate work is also offered, looking to the degrees of M.S., C.E., M.E., E.E. and E.M. Each course includes elements of general culture, while in all of the degree courses Engli.sh, modern lan¬ guages, mathematics and political science are required. Laboratory practice or practical work VOL. 28 —9

in the shops or fields forms an integral part of each course and consumes about one-half of the number of hours. It is readily seen, therefore, that, while the Institute is a techni¬ cal school, the endeavor is to give well-rounded courses. In addition to the practical work re¬ quired, students are given the opportunity to pay part of their expenses by manual labor. Instruction in military science and tactics and drill is required of all students. The battalion of cadets consists of five infantry companies, a signal corps, drum corps, staff and band. The State agricultural experiment station, the State entomological wmrk, the State livestock sanitary work and the extension division are departments of the Institute under control of the board of visitors. In addition to the above courses, there have been introduced for the session 1918-19, under the Smith-Hughes Act, courses in agricultural education and industrial education. The president of the Institute is also, by virtue of his office as president, head of these various departments. Under the guid¬ ance and by aid of the Institute authorities, ex¬ tension work in all agricultural subjects and farmers institutes are conducted in various portions of the State. Two literary societies are maintained, each of which occupies a well-furnished hall. The Institute is situated on the crest of the Alleghanies at an elevation of 2,160 feet. The campus contains more than 100 acres and the farm about 450 acres. The plant consists of about 70 buildings, including the shops and farm buildings. The shop build¬ ing is a new one recently completed, covering approximately one and one-quarter acres of ground, made of stone and reinforced con¬ crete, is thoroughly equipped with most mod¬ ern machiner)ˆ and is, in fact, one of the most commodious and up-to-date shops in the East. The library is housed in a large and handsome building of native stone and contains about 28,000 bound volumes and 80,000 pamphlets. The income is derived from the Morrill Act of 1862, the Nelson Act, the Adams Act, the Smith-Lever Act and from the appropriations from the State of Virginia. The faculty of the In¬ stitute, including officers, numbers about 60 and the total matriculation of students during the year averages 560.

VIRGINIA QUAIL, or COLIN: bird

(Ortyx Virginiana) of family Tetraonidcs, abundant in North America east of the w'estern plains ; in some parts commonly known by the name of quail, in others by that of partridge. In size it is intermediate between the common quail and the common partridge of Britain. The prevalent color of the plumage is brownish red, underparts whitish ; but all parts are more or less mottled with different colors. The feathers of the head are capable of being erected into a sort of crest. The call of the male is popularly regarded as resembling the words ®Bob White,® and this name is often given to it. The coveys of the Virginia Quail often approach houses in winter and mingle with domestic poultry. Great numbers are killed by guns and taken in snares ; and in the western and southern States many hundreds were often caught in a day by parties of men on horseback, driving the coveys into a great cylindrical net. It has been introduced into parts of Europe and may almost be regarded

as naturalized, though rare in England There are several species of allied genera in Mexico, California and northwestern America, of which one, the California Quail {Lophortyx Calif ornicus) , is remarkable for its long and beautiful black crest. See Partridge.

VIRGINIA RESOLUTIONS, The, in

American history, a set of resolutions drawn up by James Madison in 1798, They were simi¬ lar in import to the Kentucky resolutions (q.v.) drawn up the same year.

VIRGINIA UNION UNIVERSITY,

Richmond, Va., an institution of higher learn¬ ing for colored students, combining Wayland Seminary opened 1865 in Washington, D. C., and Richmond Theological Seminary, opened in 1865 in Richmond, Va., the union taking effect in 1899. It is a member of the Association of Colleges for Negro Youth and its special work is the

training of leaders. It was established and is in large part maintained by the Ameri¬ can Baptist Home Mission Society, but is Christian rather than denominational, welcom¬ ing teachers and students from many de¬ nominations. There is an endowment fund of $83,000 for salaries, scholarship funds, of $14,000, and a library fund of $4,000, which are supplemented by contributions. The grounds comprise 45 acres adjoining Hertshorn Me¬ morial College ; six handsome granite buildings, power-house and athletic field constitute a very efficient equipment. Annual tuition fees are $20; boarding expenses from $129 to $140. The degrees of B.A., B.S. and M.A. are conferred. The faculty numbers 18. The average annual enrolment of students is 300. The graduates since organization number over 4,000.

VIRGINIANS, The, a novel by William Makepeace Thackeray, published in 1859. It is a sequel to ˆ Henry Esmond,ˆ and revives a past society with the same brilliant skill as char¬ acterizes the first book.

VIRGINIUS AFFAIR, The. The «yir-ginius affair® occurred in the harbor of Santiago de Cuba in 1873 and almost caused a war be¬ tween the United States and Spain. The Virginius, a ship registered in the New York custom-house 26 Sept. 1870 as the property of an American citizen, was captured on the high seas near Jamaica by the Spanish man-of-war Tornado, 31 Oct. 1873. The reason given was that she was about to land men and arms in Cuba, which was then engaged in the ®Ten Years' War® against Spain. ˆ At the time of capture the Virginius was flying the American flag. She was taken to Santiago. President Grant remonstrated with the Spanish govern¬ ment, and through the United States Minister to Spain, Gen. Daniel E. Sickles, demanded the release of the Virginius and her crew.

Spain was at that time a republic, under President Castelar, and while his government was asking for time to obtain information and was making promises, the authorities in Cuba determined to take matters into their own hands. On 7 Nov. 1873 the captain of the Virginius, Joseph Fry, and 36 of the crew, were shot. The next day 12 of the most promi¬ nent passengers were also shot. When the news of this action became known in the United States the excitement was intense, meetings were held, and the bloody work was denounced.

President Grant authorized the putting of the navy on a war footing, diplomatic relations were on the point of severance and war was imminent. Meanwhile President Castelar made the excuse that his

orders to stay proceedings were received too late to prevent the crime.

Several times it seemed that hostilities could not be avoided. Once General Sickles sent for a ship to take him from Spain. At last, how¬ ever, on 29 November, a protocol was signed between Secretary Fish and Admiral Polo, by which Spain agreed to surrender the survivors of the crew and passengers of the Virginius, together with the ship, and to salute the flag of the United States on 25 December. If, how¬ ever, it should be proved in the interval that the Virginius had no right to fly the United States flag, the salute should be dispensed with, though Spain should disclaim any intention to insult the flag. Three days* before the time agreed on. Secretary Fish announced himself as satisfied that the Virginius had no right to fly the flag, and the salute was dispensed with. On 23 January Admiral Polo made the dis¬ claimer agreed on. The Virginius was de¬ livered to the United States navy at Bahia Honda on 16 December with the American flag flying. She was, however, unseaworthy and, encountering a heavy storm off Cape Fear, sank. The prisoners who survived were surrendered on 18 December at Santiago de Cuba, and landed in safety in New York. _

VIRGIN'S-BOWER. See Clematis.

VIRGO, ver'go, the sixth sign of the Zo¬ diac, and also the name of a constellation which formerly marked this sign, but is now in the sign Libra. It contains the bright star Spica, and an interesting double star and a spiral nebulae; it is on the meridian in the evenings of May and June. See Astronomy.

VIRIATHUS, vi-ri'a-thus, Lusitanian pa¬ triot: d. 140 B.C.. He was originally a herds¬ man, but became a leader in the 10 years' strug¬ gle against the Roman power about 151 b.c. He conducted a successful defense against the Roman army, defeating them repeatedly and finally hemmed in their forces and compelled the conclusion of a treaty of peace in order to save the army. The independence of Lusitania was acknowledged, and she became an ally of Rome, a treaty ratified by the Roman Senate. In 140, however, Servilius Caepio succeeded to the consulship in Further Spain, invaded Lusi¬ tania and by bribery secured the murder of Viriathus, after which he conquered the country.

VIROQUA, vi-ro'kwa, Wis., city, county-seat of Vernon County, near the Kickapoo River, and on the Chicago, Milwaukee and Saint Paul Railroad, about 85 miles northwest of Madison and 22 miles south of La Crosse. The city is in an agricultural region, and is noted for the abundance of trout and game in the near vicinity. There are large

shipments of grain, farm products and livestock. To¬ bacco growing and sorting is an important in¬ dustry. Railway ties and poles are cut and shipped ; there are also machine shops. Pop.

(1920) 2.574.

VIRUS, morbid poison; the contagion of an infectious disease. It is the morbific principle, associated with a germ that is the medium for communicating disease between men and

animals. The term more especially designates those peculiar poisonous matters which can re¬ produce themselves under favorable conditions to an endless degree. The poison of the cobra is a specific virus which, when introduced into the human system, acts as a most virulent poison ; but the poison is not multiplied within the human subject, and one person affected by the poison cannot communicate the disease to another. In like manner, morbid products from decaying vegetables under certain conditions of heat and moisture may possibly originate the virus of malarial fever; but the virus is not propagated within the human organism, or, at all events, never in such a form as to render it capable of producing the same disease in others. By somie the virus of the contagious or infectious disease is supposed to be a contagium vivum seu animatiim, the theory being that the virus consists of living beings or low organisms. Such views have been advocated by Kircher, Lancisi, Vallisneri, Reaumur, Linne, Henle, Roberts and others ; and although the theory of a contagium vivum is not as yet complete, the discussion of it is the most important which has ever engaged the attention of medical men. The most prominent characteristic of each specific virus is that it can reproduce itself Vvˆithin the human organism, and to an unlimited extent, each virus preserving its own specific¬ ness. Experience and observation tend to con¬ firm the hypothesis that each specific disease breeds true, though, in the course of ages, it is possible that changes within certain limits may take place, as is the case in animals and plants. The natural conclusion follows that diseases of this class do not originate spontane¬ ously, but are propagated each from its own kind, though some contend that they do not originate, even in our own day, spontaneously or autochthonously. Another remarkable pe¬ culiarity belonging to many, but not to all, diseases propagated by a specific virus, is that a single attack of the disease successfully sur¬ mounted produces absolute or relative im¬ munity (q.v.) for a certain length of time, or even for the remainder of life. Others hold the theory that the germ is a result not a cause of the poison and disease. See Bacteria; Diseases, Germ Theory of; Lymph.

VIS MAJOR, a civil law term used to de¬ note an inevitable accident, that is, one which could not have been avoided by the exercise of care because it is the result of the operation of the forces of nature.

VISALIA, vi-sa’H-a, Cal., city, county-seat of Tulare County, on the Kaweah River, and on the Visalia and Tulare Railroad, about 40 miles, in direct line, south of Fresno and 10 miles north by east of Tulare. It

was settled about 1850, laid out as a town in 1852, rnade the county-seat in 1853 and incorporated in 1874. It is in an agricultural region, and the chief manufactures are canned fruits. There are ex¬ tensive shipments of farm products, fruit and canned goods. Long distance electric power has been installed and there are planing mills, machine shops, an ice factory, *etc.* The city has three banks and two daily newspapers. Pop. (1920) 5,753.

VISAYAN (ve-sa'yan) ISLANDS, or VISAYAS, the central and largest group of the Philippine Archipelago, lying between lat.

•

9° 5' and 13° N., and between long. 121° 49' and 125° 51' E. ; south of Luzon, and north of Mindanao; land area, 23,502 square miles; total area, 77,840 square miles. It consists of the islands of Bohol, Cebu, Leyte, Masbate, Negros, Panay, Romblon and Samar and their dependent islands, numbering in all 490. Many of the dependent islands are of geographical and commercial importance ; chief among them are Lapenin, Grande and Panglai (belonging to Bohol), Mactan (Cebu), Bilarian and Panaon (Leyte) and Guimaras (Panay). The staple products, hemp, sugar, tobacco, coffee, rice, cotton, corn and cocoa, of the archipelago are cultivated, the production of hemp being especially important in Cebu, Leyte and Samar. All the islands are well wooded; the best varieties of hardwoods grow in abundance, and many resin and gum trees. The mineral wealth is also of importance, the first coal discovered in the Philippines having been found in Cebu. Gold, silver, iron and copper are also found; though these are mined to some extent, the mineral resources are by no means fully ex¬ ploited. The mechanical industries of these islands include sugar manufacture, weaving, the making of sugar sacks and cheese-making (in Cebu). Stock-raising and the trepang, pearl shell and pearl fisheries are also im¬ portant industries. There is a large export trade in the products of agriculture, the manu¬ factures and the fisheries. The land transpor¬ tation facilities are especially good in Bohol, Cebu, Leyte, Negros, and the province of Iloilo, Panay.

VISAYAS, ve-sa'yas, or BISAYAS, a Malay people of the Philippine Islands, inhabit¬ ing the Visayan Islands (q.v.), and the north¬ ern and eastern coast of Mindanao. At the time of the arrival of the Spaniards they had a written language and considerable culture of

their own; they practised the custom of tattoo¬ ing, and were, therefore, called by the Spaniards Pintados (painted men). They were easily Christianized, and joined with the Spaniards in helping to subdue the Tagals. They are a docile and industrious people; particularly the inhabitants of Bohol are good mechanics, and for their success in trade have gained the name of the ^^Chinese of the Philippines.^^ Their language shows a variety of dialects, of which the most important are the Cebunao and Panayano.

VISCACHA, the Lagostomus trichodacty-lus, a stout rodent belonging to the family Chinchillidce, and resembling a marmot. It is from 18 inches to two feet long, plus the tail, which measures from six to eight inches. The fur is mottled gray bove, yellowish-white be¬ neath ; a dark band stripes each cheek, and a white band is on the muzzle, running back on each side almost as far as the eye. Viscachas are nocturnal, live in communities and resemble rabbits in their habits, but are less active. They are found on the pampas, from Buenos Aires to Patagonia. These animals have the strange habit ot dragging all sorts of hard and apparently useless objects to the mouth of their burrows, where bones, stones, thistle stalks and lumps of earth may be found collected into a large heap, sufficient, according to Darwin, to fill a wheelbarrow. They form the principal

food of the wolves, pumas and jaguars of their country.

VISCAINO, ves-ka-ehio*, Sebastian. See

Vizcaino, Sebastian.

VISCELLINUS, Spurius Cassius, first Roman agrarian agitator. He was victorious over the Sabines as consul (502 b.c.) and in his second consulship (493) made a treaty with the Latins, which was advantageous to both parties. In his third consulship (486) he pro¬ posed a measure by which the plebeians should have a share in the ager publicus. The patricians immediately accused him of mak¬ ing favor with the commons in order that by them he might be chosen king and set on the throne of the recently expelled Tarquins. He was condemned to be thrown from the Tarpeian rock, in the execution of which sentence his own father took part.

VISCHER, fish'er, Peter, German sculp¬ tor: b. Nuremberg, 1455 ; d. there, 7 Jan. 1529. He was invited bv Philip Elector Palatine to Heidelberg, but soon returned to Nuremberg, where he executed a great many works with the assistance of his five sons. Among his most celebrated works, whose architectural parts combine Gothic with Renaissance features, while his figures have all the realism of the Renaissance, may be mentioned ˆThe Tomb of Bishop John IVˆ in the cathedral at Breslau (1496) ; the ˆTomb of Archbishop Ernestˆ in the cathedral at Magdeburg (1497) ; the ˆTomb of Saint Sebaldusˆ in the church of that dedication at Nuremberg; and the ˆTomb of Eitel-Friedrich H von Zollern and of his wife in the church at Hechingen. Other well-known works of this master are : the relief 'ˆCrowning of the Blessed Virginˆ in Erfurt cathedral ; a similar relief in the Schlosskirche at Wittenburg, tombstones for Margareta Tucherin in the cathedral of Ratis-bon and the Eisen familv monument in the Agidienkirche at Nuremberg; theˆ epitaph of Helene of Mecklenburg in Schwerin cathedral. Consult Berthold Daun ˆPeter Vischerˆ (Biele¬ feld 1905).

VISCONTI, vis-kon'te or ves-kon'te, an old Milanese family, celebrated for its political consequence and its patronage of science. His¬ tory makes mention of the Visconti in the 11th century; but they disappear from the time of the destruction of Milan by Frederick Barbarossa, when, with some other noble families, they were obliged to yield to

the superior power of the opposite party, the Torriani or family Della Torre. The first of the Visconti who laid the foundation of their greatness was Ottone: b. 1208; d. 1295, created archbishop of Milan in 1263, and perpetual lord of Milan in 1277, who gained the ascendency over his enemies, and bequeathed his power to his nephew, Matteo : b. 1250 ; d. 1322. The latter was, however, driven into banishment by the Torriani, but after living in exile seven years had the address to obtain the title of imperial vicar 1294, which he soon exchanged for that of lord-general of Milan (1311). Matteo trans¬ mitted the supreme power to his eldest son, Galeazzo: b. 1277 ; d. 6 Aug. 1328, who was overpowered by his enemies and thrown into prison by Louis of Bavaria in 1327, but was soon afterward released. His son Azzo: b. 1302; d. 14 Aug. 1329, who succeeded him and in¬

creased the extent of his dominions, acquiring nearly all of Lombardy, was not less distin¬ guished for his pacific virtues than for his mil¬ itary talents. His uncle Lucchino: b. about 1287; d. 24 Jan. 1349, succeeded him. The latter extended the dominions of the family, and was the first of the name who was distinguished as a patron of science and art. He corresponded with Petrarch. After his death in 1349 his brother, Giovanni: b. 1290; d. 5 Oct. 1354, arch¬ bishop of Milan, assumed the reins of govern¬ ment. He was a zealous patron of letters. He appointed a commission of six learned men to compose a commentary on Dante, fostered the University of Bologna and received Petrarch on his arrival at Milan with the highest marks of distinction. Giovanni was succeeded by his nephew, Matteo H, d. 1355; Barnabo, d. 1385; and Galeazzo H, d. 1378. Matteo's two brothers, who shared their estates on his death, though eminent for their warlike talents, len-dred themselves obnoxious by their cruelty and other vices. Galeazzo, however, continued to treat Petrarch with the same respect that his predecessors had shown him, and employed him in several negotiations. He was succeeded in 1378 by his son, Gian* Galeazzo : b. about 1347 ; d. 3 Sept. 1402, who imprisoned his uncle Barnabo in the castle of Trezzo, and took upon himself the sole government (1385). In him the Visconti family reached the summit of its grandeur and splendor. In 1395 he received from the Emperor Wenceslas the ducal dignity; and his territories were more extensive than those of any of his predecessors. Pisa, Siena, Perugia, Padua and Bologna were subject to his sceptre; and he had already shown a disposition to assume the title of king of Italy, when his ambitious projects were cut short by his death of the plague. He fostered science and art, collected the most distinguished scholars at his court, restored the University of Piacenza and connected that of Pavia with it, and

founded a large library. He built the celebrated bridge over the Ticino at Pavia, and began the magnificent cathedral at Milan. Gian Galeazzo left three sons, Giammaria; d. 16 May 1412 ; Filippo Maria : d. 13 Aug. 1447, and an illegitimate child, Gabriel: d. September 1408. Giammaria succeeded to the dukedom, and was assassinated, after which Filippo Maria reigned alone till his death. His natural daughter, Bianca, had been married to Francesco Sforza, who was named Duke of Milan in 1450. Consult Sismondi, ˆHistoire des Republiques Italiennesˆ (1826-33); Symonds, ˆThe Age of the Despotsˆ (1875).

VISCONTI, Ennio Quirino, Italian ar¬ chaeologist: b. Rome, 1751; d. Paris, 7 Feb. 1818. He was the son of Giovanni Battista, and_ from his earliest years was trained in the habits of an antiquary. He continued the work begun by his father entitled HI Museo Pio Clementino Descritto,ˆ of which he wrote the greater part and which extended to seven volumes, the last appearing in 1807. In 1785 he was appointed keeper of the Capitoline Museum. In 1798 he was one of the five con¬ suls of the Roman Republic, and during a consulate of seven months founded the Roman Institute. In 1799 he left Italy and settled in Paris, having been appointed an administrator of the museum of the Louvre, and professor

of archaeology. His archaeological works are very numerous, and among the most popular are ˆDescription des Antiques du Musee RoyaP ; ˆDescription des Vases peints du Musee ˆ ; Dconographie Grecqiieˆ ; and Gconog-raphie Romaine.ˆ

VISCONTI, Louis Julius Joachim,

French architect: b. Rome, 11 Feb. 1791; d. Paris, 1 Dec. 1853. His architectural studies were prosecuted at Paris under Percier and Fontaine, and at 17 he entered the Ecole des Beaux Arts. In 1817 he was superintendent of building on the Paris Wine Market; in 1822 inspector of building to the city government ; and 1825 architect of the great library of Paris. His most important works are the tomb of Napoleon I, under the dome of the Invalides; and the additions to the

Louvre, which latter he did not live to complete.

VISCONTI-VENOSTA, va-nos'ta, Emilio Morquis, Italian statesman; b. Milan, 22 Jan. 1829; d. 1914. In 1846 he entered journalism as a liberal and for a time was an adherent of Mazzini. In 1859 he was appointed by Cavour royal commissioner at Garibaldi's headquarters in Lombardy, was elected to the Chamber of Deputies in 1860 and was Minister of Foreign Affairs 1863-64, 1866-67 and 1869-76. He be¬ came senator in 1886, was Minister of Foreign Affairs for a fourth time 1896-98 and in the Pelloux Cabinet held the same post 1899-1900, as also in that of Saracco, 1900-01. His foreign policy was characterized by an ardent desire to retain the goodwill of France.

yiSCOSITY, that property of a fluid or semi-fluid which resists rapid change of shape or arrangement of parts; the indisposition of a body, by reason of internal function, to yield to the force of gravity, pressure, etc., and flow readily. All substances, ranging from gases to solids, are supposed to possess this property in a greater or less degree. A note¬ worthy instance of viscosity is exhibited by sealing wax; for while it is quite rigid in re¬ sisting forces quickly applied, it will change shape greatly under the action of a small force (its own weight, for example) applied con¬ tinuously for a long time. Molasses, tar, asphalt and manv other substances also illus¬ trate this property in a striking way; while water, alcohol, air and other liquids and gases, as shown by suitable experiments, possess the same property in a very slight degree. Bal¬ four Stewart defines viscosity as ®a property which prevents freedom of vibration and which ultimately converts vibrations into heat.® In practice, the hard metals exhibits no noticeable viscosity, but the fact that a long bar of the hardest steel will bend of its own weight shows the property. The viscosity of a medium is measured by the quotient of the tangential stress developed along any plane in the me'dium, by relative motion of its parts, divided by the rate at which the velocity of the medium is changing with distance perpen¬ dicular to that plane. More briefly, this measure, which is commonly called the co¬ efficient of viscosity, may be defined as the quotient of the resultant tangential stress at any point of the medium divided by the result¬ ant angular velocity of the medium at the same point.

VISCOUNT, vfkownt, a British title of nobility, next in rank to that of earl, and immediately above that of baron. It was first conferred by letters patent on John, Lord Beaumont, by Henry VI, in 1440. The title is frequently attached to an earldom as a second title, and is held by

the eldest son dur¬ ing the lifetime of the father.

VISCOUS FERMENTATION, an un¬ desirable form of fermentation that sometimes accompanies alcoholic or acetic fermentation. It yields a gum-like ropy substance that injures the fermenting mass.

VISE, vis (Old French, vis, a screw, a wind¬ ing stair; from Latin vitis, a vine), a spiral or corkscrew staircase, the form most generally used in mediaeval buildings in which the steps wind round and rest at one end on a perpen¬ dicular pillar called the newel, and at the other end rest in the wall ; the newel itself : in mechanics, a gripping appliance of wood or iron, consisting essentially of two movable jaws moved by a screw and used to hold an object in place while work is being performed on it; it may be either portable or fixed to a work-bench.

VISE, ve'za, or VISA, ve'sa (French, vise, pp. of viser, to put one's visa to; from Latin visus, pp. of videre, to see), indorsement made on a passport or the like, denoting that it has been examined by the proper authorities to show that it is in order.

VISEU, ve'sa-6, Portugal, city of the prov¬ ince of Beira; in a wide, fruit-producing plain, 1,300 feet above sea-level, 50 miles northeast of Coimbra. Its cathedral is a striking flam¬ boyant edifice and contains excellent pictures by Gran Vasco, the Portuguese Fra Angelico. In the vicinity is the old Roman camp. Cava de Viriato. The town, one of the oldest in the country, contains other Roman as well as Gothic and Moorish remains. A large fair is held here. Pop. 8,000.

VISHNI-VOLOTCHOK, vich'nl-vo-lo-chok, Russia, town situated in the government of Tver, on the river Tzna, about 230 miles southeast of Saint Petersburg by railway. It is on the Vishni-Volotchok water-route con¬ structed by Peter the Great, connecting the navi¬ gation of the Baltic and Caspian seas by means of the Volga, *etc.* There is a very extensive transit trade. Pop. 16,000.

VISHNU (ˆWish,® to work, encompass, or Vis,® to penetrate, related to the Latin ®vis,® energy, activity), the second god of the Hindu triad or trimurti, but worshipped as the supreme deity by the Vaishnava sect, which numbers about 60,000,000. Their belief, however, does not prevent, them being votaries of deified heroes, and of thus presenting various atti¬ tudes toward their supreme deity and of di¬ viding themselves into numerous sub-sects, in accordance with their various interpretation of his activities. Vishnu was originally one of the nature gods, probably the sun, but as he progressed from the position of one of a vast number of deities to that of the supreme god

of the Vaishnava, he gathered to himself most of the powers and attributes of the other gods of his own pantheon, and in addition to these other attributes of deities belonging to tribes of India possessing other religious ideas, organization and myths. It seems probable

that the numerous incarnations of Vishnu, which are variously definitely given as from 10 to 24, had their origin in attempts to ex¬ plain the many and contradictory forms in which the god is safd to have appeared upon earth at various times. This, too, would ex¬ plain the more than a thousand epithets, phrases and names applied to him to describe or define his power, grandeur, attributes and spheres of action, to which numerous tribal myths contributed. There are at present 20 distinct Vaishnava sects scattered throughout India, out of the 43 sects of the Hindu religion ; and there are 42 towns and cities that have famous shrines looked upon as sacred places. Of these 20 are especially sacred as directly connected with incarnations of Vishnu. The orthodox Vaishnava adherents hold to 10 incarnations of Vishnu, but they do not all agree as to what these incarnations were. How¬ ever the general Vaishnava opinion now gives them as follows in their order of happening: Fish, Tortoise, Boar, Manlion, Dwarf, Parasu Rama, Rama Chandra, Krishna, Buddha and Kalki or white horse. Under each of these incarnations Vishnu is said to have appeared with some definite object in view, and so about them has grown up a vast amount of legendary and religious lore, myth, tradition and poetry which have woven themselves into the life of the Indian people, whether or not they be of the Viashnava sect.

Vishnu is a personification of the preserv¬ ing power and of the sun ; though some claim that the sun is the type of Vishnu. Nine of his incarnations have taken place, but his tenth, that of the white horse, is still to be assumed. When this shall have been accomplished, he will have assumed five different animal and five different human forms — Vishnu, Brahma and Siva together form the trinity of the Hindu religion. At one time these were dis¬ tinct Hindu deities. Their rival claims for recognition were finally met by making them three forms of the one supreme god. This was, however, a creation of the priests and ecclesiastical students ; while the great mass of people continued to retain their belief in a multiplicity of deities. As the worship of Vishnu spread more widely over India it took in tribes formerly unaffected by the so-called Hindu religion. These brought with them into the faith myths, religious ideas, superstitions and traditions to many of which they continued to cling tenaciously. All this added vastly to the body of traditional lore connected with Vishnu and undoubtedly was the cause of the popular belief in his many incarnations, each of which, in all probability, represented some tribal deity or some mythological

character of an older faith. Thus Vishnu is sometimes time, at others, the earth, water, air, space. He is the creative power, and even of him was born Brahma. Vishnu is thus a manifestation of himself. He is represented either in his own person or in that of his incarnation or avatara. Quite frequently he is repre¬ sented as having four arms and bearing in each of his hands one of his four symbols, a disc, conch-shell, mace, lotus (or sometimes a sword). These have been variously inter¬ preted; but now the shell (or trumpet) is the sign of battle; the disc is emblematic of his

solar origin ; the lotus of his creative power, since from the lotus that sprung from Vishnu was born Brahma ; the mace, emblem of physical power and the punishment of the wicked. One representation of Vishnu presents him as resting on a huge, coiled, many-headed serpent; others picture him as reclining upon the lotus while above his face rise the many heads of the serpent that guards and shades him. Again he is seated upon a throne in¬ dicative of his supreme power, or as the culture god, he drives the plough or handles the tools of the artisan ; or he rides on the swift Garuda, an animal with the body of a man and the head, beak, wings and talons of an eagle. In the Rig-Veda he is represented as ^^striding through the seven regions of the earth^^ and ^planting his feet in three , ways.^^ This metaphorical language is explained as being a picture -of the sun at rising, at midday and at setting.

The growth of the divine attributes given to Vishnu is clearly exhibited in the sacred Hindu writing. In the Rig-Veda he is a repre¬ sentation of the personified sun; and there are internal evidences to show that his worship must have stretched back into an age when the sun was looked upon as a powerful living personage. Here he represents solar light, fire and lightning and he has not yet grown to be the supreme deity, nor is he even re¬ garded as the equal of the other great Hindu gods of the Vedic period. But the literature constantly gathering about the Hindu pantheon began to be of very great extent and to take to itself an epic character. In this literature Vishnu begins to play a very important role, and in the Sanskrit writings the Mahabbharata and Ramayana he occupies the centre of the stage as the figure of chief interest. In fact the latter of these writings may be considered one long epic in praise of Vishnu, the supremely powerful and illustrious of the gods, the incomparable, the all-wise, all-seeing, the eternal presence, the maker of heaven and earth, the supreme ruler of the spacious firmament. As the war god, he commands an innumerable host of monkey-warriors. Almost countless

are the attributes of his majesty, and boundness the extent of his dominion and power. Yet behind this pre-eminent position attained by Vishnu in comparatively modern times in which the Hindu mind approaches the position of monotheism, where one deity takes the supreme place, and the others become helpers in the work of looking after the uni¬ verse, and are ultimately softened down into saints and other less heathen-sounding names, there constantly appear the grotesque faces and attributes of the ancestral nature deity and imaginative mythology of a primitive race. Vishnu appears in animal incarnations. From the depths of the waters of generation he sends forth from his navel the lotus from which Brahma is born ; as the ever-existing tortoise he bears on his back the universe; as the filler ot all space he has the power to contract himself into the form of a dwarf. In the so-called in¬ carnations accounting for the many attributes gathered to himself by Vishnu from the other deities, the supreme god is said to be the champion • and defender of gods and men. This taking over the powers and attributes of

other deities made it easy for other creeds to come under the wing of Vishnu. The local deity became an incarnation of the supreme deity and as such continued to hold his place in the hearts of his people, often to the extent of making Vishnu himself a somewhat shadowy character ; and it led, as already stated, to the growth of a great number of sects in which there are really wider differences of faith and practices than between the different branches ot the religions which have their origin in the Jewish faith, so far is the Hindu religion from being a unity. Vishnu makes his home in his glorious paradise, Vaikintha, where he is sur¬ rounded by the 1,000 Gopis or shepherdesses who are eternally and passionately in love with him. There, too, with him is his matchless wife Sita or Sri (q.v.).

Vishnu is represented as a very kind deity, and to this, undoubtedly, is due the increase of his popularity throughout India. His festivals are joyous and some of them tend to be licentious. Flowers are his most characteristic offerings and his crowded temples are decorated with

them.

Bibliography. — Balfour, E., < Vishnuˆ (in Encyclopaedia of India,ˆ London 1885) ; Bournouf, ˆLa Bhogavata-Puranaˆ (Paris 1840) ; Hillebrandt, ˆVedische Mythologieˆ (Breslau 1910) ; Hopkins, E. W., ˆReligions of Indiaˆ (Boston 1895) ; Langlois, ˆHarivansaˆ (Paris 1834) ; Lassen, Hndische Alter-thumskundeˆ (Bonn 1852-66) ; Macdonell, A. A., ˆVedic Mythologyˆ (Strassburg 1897) ; Moor, ˆHindu Pantheonˆ ; Muir, W., ˆOriginal Sanscrit Textsˆ (London 1858-63) ; Muller, M., ˆGhips from a German Workshopˆ (New York 1872); Wilkins, W. J., <Hindu My¬ thologyˆ (London 1901); Williams, W. J., ˆHinduismˆ (London 1877) ; Wilson, ˆTrans¬ lations of the Vishnu Puranaˆ (London 1864) ; ˆHindu Sects.ˆ See India; Hinduism; Vaish-NAVAs; Veda.

VISHNU, Institutes of, a work of stand¬ ard authority in the religious faith and prac¬ tice of the Hindus. In its recognized and partly modern form it consists of 100 chapters of legal precepts and aphorisms, put under the name of Vishnu, originating from the early Vedic school called the Cathas, but much added to in subse¬ quent times. See India; Sanskrit Language AND Literature; Vep.a; Vishnu.

VISIBLE CHURCH, an ecclesiastical term meaning the Church, as seen by man, not as it appears to God. It includes the whole body of professing Christians, sorne of them regenerate, others unregenerate, as distinguished from the Invisible Church, consisting of all those who are worthy in the sight of God to be members of His Church.

VISIBLE SPEECH, the name given by its inventor, Alexander Melville Bell, to a sys¬ tem of alphabetical characters designed to rep¬ resent every possible articulate utterance of the human organs of speech. It is based on an ex¬ haustive classification of the possible actions of the different organs concerned in speech, and to every organ and every mode of action of an organ a symbol is assigned. Of these radical symbols there are in all 30, and by combinations of these 30 symbols some hundreds of char¬ acters may be formed to represent the sounds of the human voice; but little more thqu 100

characters are actually required for all the as¬ certained sounds of different languages, and only two-thirds of the 30 radical symbols are required in forming the signs or letters neces¬ sary for the writing of any European language. In form the letters are as simple as those of the Roman alphabet. After completing this system, Mr. Bell submitted

it to the considera¬ tion of a large number of gentlemen well quali¬ fied to judge of its value, and allowed it to be tested in their presence in such a manner as to make quite clear its efficiency for the pur¬ poses for which it was devised. See Deaf, Education of the.

VISIGOTHS, viz'i-goths, or WEST GOTHS, the western branch of the Goths (q.v.), who, after the death of Theodosius, broke into Italy under the leadership of Alaric, and captured Rome in 410. Alaric died later in the same year before he had matured his plans, and after his death his brother-in-law Athaulf, who was placed at the head of the nation, turning toward Gaul, made new con¬ quests on both sides of the Pyrenees. He reached Barcelona, where he was murdered in 415; but his successors continued to extend their dominions in Gaul and Spain. Wallia made a treaty with the Romans, and in return for cer¬ tain services received under their nominal suze¬ rainty, though in virtual independence, western Aquitania, with Toulouse as capital. He died in 419. His successor, Theodoric I (419-451), was treated by the Romans as an independent ruler, and took part in the victory over Attila on the Catalaunian Fields in 451, Euric (466-483), third in succession to Theodoric, conquered the Suevi and other races, and is considered the founder of the Visigothic kingdom. Clovis, king of the Franks, on pretense that it was un¬ just to let the heretic Visigoths possess the fair¬ est portion of Gaul, attacked the peaceful Alaric, Euric's successor, and defeated him at Vougle in 507. The Franks obtained possession, with¬ out resistance, of most of the cities in southern Gaul, and the kingdom of the Visigoths would have been in great danger had not Theodoric, king of the Ostrogoths, undertaken its defense. While guardian of the Visigothic prince, his grandson, he embraced the favorable opportu¬ nity to make himself master of a part of the ter¬ ritories still belonging to the Visigoths in south¬ ern Gaul ; and after a long separation of the two nations there existed for a time an intimate con¬ nection of the Ostrogoths and Visigoths. After his death, dissensions arose among the Visi¬ goths, and the pernicious influence of differences of religion became more and more evident. The kingdom of the Visigoths arose again with new energy under Leovigild (568-586), who totally subdued the Suevi, improved the laws, limited the power of the nobles, made Toledo the royal residence and tried to render the regal power hereditary. His son Recared adopted the Cath¬ olic faith on his accession (586-601), upon which the divisions of the people ceased, and Goths and Spaniards became one nation. Under his reign was held the Council of Toledo. His conversion had the most important influence on the character of the government. As soon as the Catholic faith became the established re¬ ligion, the clergy, who had been completely sub¬ servient to the

king under the Arian form of Christianity, acquired a predominant influence.

and constituted a hierarchy under the direc¬ tion of the papal authority. The Arian bishops had lived quietly in their dioceses, and had no influence on the public administration ; but the Catholic bishops obtained an active par¬ ticipation in public affairs. The grandees of the kingdom, usurping the rights of popular repre¬ sentatives, remained no longer the first class in the state ; the mode of choosing the king was altered in favor of the bishops ; and under weak kings these found it easy to place themselves at the head of the state and to procure exemption from all public burdens. As early as 633 the regulation was made that those secular grandees alone, should be admitted to the councils who should be pronounced worthy by the bishops. Internal disturbances facilitated the conquest of the country by the Saracens, who were settled on the north coast of Africa. In 675 these Mo¬ hammedans had begun their attempts to settle in Spain, and during the rt.ign of the weak Roder¬ ick were enabled to execute their project. The Goths were defeated in 711 at Xeres de la Fron-tera ; the king was slain, and the Saracens spread themselves over the greatest part of the coun¬ try. (See Spain). The remainder of the Goths, who, after the downfall of the kingdom, fled to the mountains of Asturia and Galicia, founded there new kingdoms, in which the con¬ stitutions of the Visigoths were in part retained, and which, when their descendants broke forth from their fastenesses and wrested from the Moorish settlers one tract after another, finally gave rise to the kingdoms of Spain and Portu¬ gal. The traces of the public institutions of the Visigoths were preserved in the laws. The most ancient collection of Spanish laws, the Fuero Juzgo, or Forum Judicum (see Fuero), is drawn from the ancient laws of the Visigoths ; and many of their institutions have been re¬ tained to the present day in the provincial laws of Castile and Catalonia. The Spanish language contains a strong admixture of the Gothic ele¬ ment. Consult Hodgkin, Htaly and her In¬ vadersˆ (1880-85).

VISION, the sense of sight. Visual sensa¬ tions include brightness qualities (blacks, whites and grays), and color qualities (reds, greens, yellows, purples, etc.). They are produced by the action of light upon the eye and, taken in conjunction with certain other sensations, which are set up in and about the eye by the func¬ tioning of muscles and tendons, they give rise to the visual perception of objects and processes in the outside world. A descriptive account of vision has to deal (1) with the visual appa¬ ratus, both as a dioptric or refracting

mech¬ anism, which conveys light-rays to the retina, and as a nervous organ, which transforms the vibratory stimulus into neural excitation and transmits it to the brain ; (2) with the sensations of brightness and color as regards their quality, number, classification, etc.; (3) with the specific processes which underlie and condition visual sensation ; and (4) with those perceptions of things and events which come to mind through the avenue of sight.

The Visual Apparatus. — This ' apparatus consists of the eye, the optic nerve, subcortical centres (of the corpora quadrigemina and thal-ami), and terminal or central areas in the cor¬ tex of the occipital lobes. It is generally believed that visual sensations are directly cor¬

related with the functions of the last or cere¬ bral part, only, of the visual mechanism; the office of the eye, the optic nerve and the lower centres being the transmutation of ether-vibra¬ tions, the transmission of nervous impulses to the brain and the setting up of various move¬ ments — such as rotation of the eyes, accommo¬ dation and winking — which are important fac¬ tors in visual perception.

In the human adult, the eye is a spheroi¬ dal mass having an antero-posterior diameter of about one inch. The central part of its front surface (the cornea) possesses a higher convex¬ ity than the remaining oqaque surface. It is seen from a lateral position as a bulging trans¬ parent covering. The eye is invested with three coats and its interior is divided into two cham¬ bers; a smaller anterior cavity containing the aqueous humor and a larger' posterior cavity filled with the vitreous body. Between the two chambers lie the iris (the colored part of the eye), its circular opening (the pupil) and the crystalline lens.

The function of the refracting mechanism, which includes the cornea, the aqueous and vitreous humors, and the lens, is to focus the light entering the eye, and to project upon the retina a small inverted image of the object seen. The eye is essentially a small camera. It dif¬ fers, however, from the ordinary photographic camera in adjusting its focus for different dis¬ tances by changing the convexity of its lens — not by altering the position of its sensitive sur¬ face, the retina. The process of increasing the convexity of the crystalline lens is known as accommodation. It is compassed by the reflex action of the ciliary muscles which permits the lens to bulge forward in viewing near objects and to flatten out in viewing distant objects. The retinal focus is thus maintained. The eye rests in its socket on a cushion of fat, and is turned in its orbit by the joint action of three pairs of antagonistic

muscles, the internal and external recti, the superior and inferior recti and the superior and inferior obliqui. Since the twˆo eyes function as a single organ (binocular vision), it is important that they move together and thus bring the images of an object upon corresponding retinal areas. The turning in¬ ward of the eyes in their common fixation of an object is called convergence.

The true nervous end-organs for vision lie in the retina. The retina is a complex structure, of no less than eight strata or layers, which forms the innermost coat for the posterior part of the eye. Within it are the rods and cones, which stand closely connected with the neural elements leading to the brain, and which are probably the seat of those changes that trans¬ form the light-energy transmitted to the eye into the immediate stimulus for nervous excita¬ tion. The neural elements (nerve-fibres) which transmit the excitation unite near the centre of the retina, pierce the outer investments of the eye at the porus opticus — called also the ˆffilind spot,® because the retina at this point is insensi¬ tive to light — and continue as the optic nerve. The two optic nerves come into communication below the brain, in the median plane of the bod}', and form the optic chiasma. Beyond the chiasma there is a second division, a part of the fibres of both nerves passing to each hem¬ isphere of the cerebrum,

Sensations of Color and Brightness. —

Visual sensations include the colors seen in the solar spectrum, a series of purples ranging between red and violet, and all the grays, whites and blacks. Colors proper (that is, excluding mere brightness qualities) form a closed series in which one may pass by small gradations from any quality, as red or green, through every other quality, and arrive finally at the starting point. For this, it is only necessary to join the red and violet ends of the spectrum by inserting the pur¬ ples. The closed color-series naturally falls into halves. The one half contains the reds, oranges and yellows, which obviously belong to a single group of qualities, the ®warmˆˆ colors ; the other half, the greens, blues and violets, the ˆˆcoldˆˆ colors. The line of division falls in the purples on the one side, and in the yellow-greens on the other, both these colors including transitional points between the two types. Within each group, again, may be distinguished two sub-types, the red and yellow types in the one, the blue and green in the other. To each group belong several neighboring qualities which merge gradually into one another. To complete the classification of visual sensations it is neces¬ sary to bring the color sensations into relation with brightness (the gray series). That an inti¬ mate relation obtains between the two series is shown by the fact that each color has itself a certain brightness ; the yellow of the spectrum, for example, has a brightness corresponding to a light gray, while spectral blue corresponds in brightness to a medium gray. Moreover, it is possible to pass gradually from any color to a pure brightness. This transition occurs, for

example, in the fading of painted surfaces into gray. In such a case, the richness or saturation of the color is said to be reduced. The relation of color tones (colors in the narrower sense) to each other, to brightness and to saturation is represented in the accompanying figure (Fig. 1). The vertical axis (W Blk) of the double pyramid represents the gray series frorn white

to black. The letters around the base (G, 01, Y, Or, etc.) stand for color tones at maximal saturation. The saturation of any tone is rep¬ resented by the length of a perpendicular dropped from the point in the base where the color is found upon the gray axis ; the bright¬ ness of any tone, by the point where this per¬ pendicular strikes the axis. The inclination of the base brings the perpendicular from yellow (Y) higher up the axis than the perpendicular from the blue (B). This is in accord with the greater brightness of the former color. The number of pure brightness that can be discriminated is estimated to lie between 650 and 800 ; the number of color tones — reds, greens, violets, *etc.* — is about 150.

To produce the large number of possible color tones it is not necessary to have recourse to a corresponding number of wave-lengths ; for, given a small number of tones, properly chosen, it is possible to produce all the others by the process of color-mixture. One of the most common methods of mixing colors is by the use of pigments ; another is by rapid rotation of the color-wheel, which carries two or more sectors of colored paper or cardboard. At a certain rate of revolution of the color-wheel the ob¬ server ceases to see the separate sectors and sees instead a single homogenous color which is dif¬ ferent from either of the sectors used. The tone of the ®mixed® color depends upon the re¬ lation of the colors mixed. If two colors stand near each other in the spectrum, the ®mixed® color is intermediate: for example, red and yel¬ low mixed give an orange; violet and red, a purple. There is, however, for each color, a ^^complementary^^ color which when mixed with it in a certain proportion gives — not a color tone at all, -but — a pure gray or white. It should be noted that, in every case, it is stimuli that are mixed and not sensations ; that the mixture is of physical or physiological processes not mental processes. A ®mixed® color is as simple, psychologically, as any other.

Visual sensation depends not only upon the light stimulus to which the eye is exposed and upon the mixture of stimuli ; it depends also upon (a) the part of the retina stimulated, (b) the stimulation of adjacent areas and (r) cer¬ tain more or less permanent effects left by the stimulus upon the visual organ.

(a) It is only in the central part of the retina — the part lying about the fovea or spot of clearest vision — that all the colors are seen ; further out toward the periphery of the retina lies a zone in which reds and greens are not sensed (only blues and yellows), and, still fur¬ ther out, an outermost zone whose stimulation gives rise to brightness sensations only. That is to say, the normal eye is totally color-blind over a part of its sensitive area and partially color-blind over a second part. Abnormal color¬ blindness, then, which is relatively common in the race, maybe regarded — at least in its com¬ moner forms — as an extension to the fovea of the normal color-blindness of the normal eye.

The eye is a chemical sense ; that is, chemical processes are interpolated between the reception by the eye of light-waves and the neural proc¬ esses that are ultimately set into function by them. Two special results follow from this fact. First, stimulation is not strictly confined to the part of the retina directly affected by light; and,

secondly, nervous excitation continues after the external stimulus has ceased to operate, (b) The first of these results, retinal irradiation of chemical or photo-chemical processes, is strik¬ ingly demonstrated by the phenomena of con¬ trast, A patch of white looks whiter if it is placed on a black surface; black looks blacker in the neighborhood of white. In a similar manner, the saturation of a color (for example, red) is enhanced if it is brought near a com¬ plementary color (blue-green) ; and, finally, a gray in the immediate neighborhood of a color (for example, green) is tinged, under certain conditions, with the complementary of that color (purplish red). The last case, induction of a contrast color upon a gray, may be observed in the shadows of snow, which often look blue under yellow sunlight. The general effects, both of brightness and of color contrast, are, more¬ over, frequently to be seen in clothing and in interior decorations. The fundamental law of contrast is that the contrast effect is always in the direction of the opposite brightness or of the complementary color, (c) The result of continued stimulation of the eye is to change the condition of excitability of that organ. If large colored glasses be worn before the eyes for several minutes the unnatural hue of ob¬ jects, which is at first very noticeable, gradu¬ ally disappears. With blue glasses, objects at first look bluish, but finally return to their proper tones. The eyes are said to have be¬ come blue-adapted. A similar effect is produced if only a small part — not the whole of the retina — is exposed for some moments to colored light. A piece of red paper, for ex¬ ample, hung on a gray wall and fixated steadily gradually loses its saturation and approaches a gray. But not only is the excitability of the eye altered under continued stimulation ; it re¬ mains altered, as noted above, even after the exciting cause has ceased to operate. When the blue glasses are removed the landscape looks yellowish ; the observer is yellow-sighted. Sim¬ ilarly, when the red paper is removed, a bluish-green patch appears upon the gray wall. The first result is due to general adaptation, the second to local adaptation. In both instances, adaptation forms a predisposition for seeing colors which are complementary to the original, stimulating colors. The result of local adapta¬ tion (as the bluish-green patch induced by the reddish paper) is a negative after-image. Adaptation and after-images follow the same course with brightnesses as with colors. It is, for example, a matter of common observa¬ tion that confinement in a darkened room en¬ hances the brightness of objects seen subse¬ quently in full light ; that exposure to a strong light

(sunlight on snow) tends to reduce the apparent brightness of objects seen afterward in moderate illumination, and, finally, that fixa¬ tion of a dark or a light area, induces a nega¬ tive after-image of the opposite brightness. All these phenomena illustrate the effects of adapta¬ tion.

Theories of Visual Sensations. — These theories aim to set forth the conditions under which the sensations arise. The most import¬ ant in the field are the rival theories of Her¬ mann V. Helmholtz and E. Hering. The Helm¬ holtz theory provides for three primary sensa¬ tions, red, green and blue (or violet), which

rest upon three distinct processes of excitation, in the visual apparatus. To explain the large number of spectral qualities, it is assumed that these three processes, combined in varying pro¬ portions, give rise to all possible color qualities, and that in equal amounts they produce gray. The theory, which was outlined by Thomas Young and elaborated by Helmholtz, was de¬ signed primarily to account for the facts of color-mixture; that is, for the production of a large number of ®intermediate^^ qualities and of grays by means of a few ^elementary® sensa¬ tions. These facts of color-mixture it covers well; but it fails — particularly in its traditional form — to explain many other facts of color vision, notably the possibility of obtaining gray in the absence of color tone (as in color-blind¬ ness, peripheral vision and from stimuli of small extent). Recently, important modifications and additions have been introduced into the theory which have, in a measure, removed its deficiencies.

The Hering theory rests upon a basis quite different from that of the Helmholtz theory. Hering posits three retinal substances ; but he makes each of these the seat cff antagonistic processes — processes of assimilation or build¬ ing up and of dissimilation or tearing down. To each of these processes in each ‘substance corresponds a ^^primary® color. Assimilation of one substance gives rise to blue; dissimilation of the same substance, to yellow. This sub¬ stance is called briefly the blue-yellow substance. Similarly the other two substances are called the red-green substance and the black-white substance. Blue, green and black correspond to the three assimilative processes ; yellow, red and white to the three dissimilative processes. All forms of stimulation affect the black-white substance ; but certain wave-lengths produce no effect upon the other two substances. More¬ over, the black-white substance appears in great¬ est quantities, is most widely distributed through¬ out the visual apparatus and is most easily set into function.

Since assimilation and dissimila¬ tion are opposed processes, the principle of an¬ tagonism assumes great significance in Hering's theory: the principle is, indeed, its most char¬ acteristic feature. Its application to comple¬ mentary colors — where the opposed processes in the several substances cancel each other — to contrast, to adaptation, to after-images, etc., fol¬ lows naturally from the fundamental concep¬ tion. Although the Hering theory is open to attack on various technical grounds, it undoubt¬ edly covers the whole range of visual sensation rnore adequately than its rival. There is con¬ siderable that is hypothetical in both theories. This is, however, a fault that recent work on the histology of the eye and on the function of the retinal elements is doing much to remedy. Within the last few years several new theories of visual sensation have come into the field. Most of them may, however, be regarded as rnodifications of one or other of the more clas¬ sical theories just discussed. Their value and their relation to the older theories must be sought in the current literature of the subject.

Visual Perception. — It is characteristic of visual perception that all objects seen are spatial objects; that is, they occupy some place, some position in the spatial world ; and they possess, likewise, spatial properties, form, distance,

direction, *etc.* This characteristic, it should be noted, is shared by tactual perceptions ; but it is not a mark of perception in general — not, for example, of the perceptions of melody, harmony and rhythm. Since all visual percep¬ tions are spatial, the chief problem they offer to psychology is the analysis of the spatial factors and the search for the conditions under which these factors operate.

The simplest factor in visual space is exten¬ sion. Every visual sensation comes to conscio.usness as an extended sensation. A color is always ^^spread out®; its parts are adjacent. In this respect, colors and brightnesses are essentially different from tones and noises, which lack the attribute of extension. Space, as it is perceived, is an orderly arrangement of ex¬ tended objects. It never exists by itself alone. There is no such thing, in perception, as *mere® space or ®empty® space. Only by abstraction are the spatial properties removed from objects; only by abstraction, as in mathematics, does empty space come into existence. Even such quasi-abstract constructions as the line and the point do not properly figure in the psychology of space. It is, however, customary, within psychology, to distinguish two-dimensional and three-dimensional spaces; not because they dif¬ fer fundamentally, but because they rest in part upon different conditions. The retina, be¬ ing an extended organ upon which stimuli fall in patterns — thanks to the refractive functions of the transparent media — forms a natural sub¬ strate for the perception of surface magnitudes. But the retina is not so well adapted for tridi¬ mensional perception — perception of solid ob¬ jects. A special provision for depth-perception is made, however, in binocular vision ; that is to say, in the difference of the two retinal im¬ ages which are thrown upon the two eyes by a single object. This difference in binocular images depends upon the different positions from which the two eyes observe the object. Now it is conceivable that the two unlike images should have come to consciousness as two dis¬ tinct objects. But, as a matter of fact, they do not, except under unusual circumstances — as when one squints or presses with the fingers upon one eyeball. They do not even come to consci¬ ousness as two discrepant views of the same object. The difference in retinal images func¬ tions solely in the

perception of depth or solid¬ ity. This is the principle involved in stereo¬ scopic vision. Binocular perception of depth may be produced artificially by means of the stereoscope, an instrument which presents to the two eyes, under favorable conditions, two slightly different plane pictures of an object. Stereoscopic vision derives secondary aid, in ordinary perception, from linear and aerial per¬ spective, from the known size of objects qf reference, from change of position of the ob¬ server as well as of objects from distribution of light and shade, *etc.*

The spatial functions of the eye depend as well upon ocular movements and the sensations which these arouse as upon the immediate retinal factors just considered. It has been demonstrated by many lines of experimentation that were the eyeballs set firmly within the head without the possibility of movement (a condition which is approximately in the case of certain fishes) visual perception of objects

would be enormously handicapped. In the first place, movement allows the eye to travel over the object, exploring it from point to point; in the second place, it sets up sensations both in the external muscles that rotate the eye and in the internal muscles of accommodation ; and, finally, it is probable that to these factors must be added articular sensations from the rubbing of the eyes in their sockets. All these sensa¬ tions, muscular, tendinous and articular, play important roles in the determination of the spatial properties and relations of objects.

The eyes, regarded as perceiving organs, may be said, then, to fall into three parts ; the retinas, which mediate visual sensations proper, and which .function as a true double organ, the dioptric media, which focus the rays of light upon the retinas, and the movement-apparatus, which both alters the position of the retinal image and itself contributes kinaesthetic sensa¬ tions from muscle, tendon and orbit.

Consult Calkins, ˆIntroduction to Psychol¬ ogyˆ (1901), ch. ii. ; James, ˆPrinciples of Psy¬ chologyˆ (1896), Vol. II, ch. XX ; Kuelpe, ˆOut¬ lines of Psychologyˆ (1895), pp. 351-373; Stout, ˆManual of Psychology; (1899), pp. 141-170; Wundt, ‘ˆHuman and Animal Psychologyˆ ; Titchener, ˆExperimental Psychology,ˆ Vol. I (1901), Part II, ch. i. For the structure and functions of the eye, consult also general text¬ books of physiology. See Eye.

Madison Bentley,

Professor of Psychology, University of Illinois.

VISION, Defects of. The conditions classed as defects of sight or vision are mainly due to anomalies in the structure of the eye, causing errors of refraction and other visual irregularities. Among the more common of thety defects is that of astigmatism (q.v.), which is usually characterized by a symmetry in the curvature of the cornea (q.v.) in different meridians. Color-blindness (q.v.) is a serious disability in certain occupations. Day-blindness (nyctalopia) is a condition in which one sees better in a dim light than in a bright light, due to some opacity in the cornea, the crystalline lens, *etc.* It occurs in amblyopia (q.v.) and other affections which produce dimness of vision. Night-blindness (hemeralopia), on the other hand, is a state in which the person af¬ fected has norm]al vision in an ordinary light, but in twilight becomes suddenly blind. Double vision (diplopia) occurs when, as in some cases of squinting, each eye sees things separately. This deftyt arises from derangement of the visual axis, sometimes through muscular par¬ alysis.

In longsightedness or farsightedness (hy¬ peropia or hypermetropia) objects are seen dis¬ tinctly only at a range beyond that belonging to normal vision. Owing to the shortness of the eye-cavity the lenses are unable to converge the ra3ˆs to a focus within the limits of the eye-chamber, the image being, therefore, formed (theoretically) behind the eye. This defect is corrected by the use of convex lenses, which by converging the rays of light cause the image to fall on the retina. Shortsightedness or near¬ sightedness (myopia) is the reverse of long¬ sightedness in causes as well as in effects. In this, owing to the too great power of the crys¬ talline lens or to the extension of the eye-cavity too far backward images from objects at some

distance are formed in front of the retina, mak¬ ing the sight confused, if not entirely defective, for things beyond a certain limited range, while rendering it very clear for near objects. For remedying this condition biconcave glasses are employed, which, unless the myopia is serious, need be used only for looking at objects far ofif.

Shortsightedness and longsightedness are usu¬ ally congenital.

Presbyopia is a defect similar to hyperopia and usually comes on with advancing years, naturally beginning from the 40th to the 45th year. It is due to diminished focusing power and lessened elasticity of the lens, the result of which is that the image of a near object is not clearly form'ed on the retina, but is formed be¬ hind it, while distant objects are seen as well as ever. Convex lenses are used for remedying this condition.

Strabismus or squinting is a deformity often seen, and is ascribed to want of parallelism in the visual axes when the effort is made to direct both eyes to an object at the same time. It may be due to loss of power (paralysis) of one or more of the eye muscles ; and t-his may depend on a merely local affection, or may be a symptom of serious brain disease. But in the majority of instances and in all ordinary cases no such condition is present. The squint is said to be convergent when the squinting eye is directed toward the nose, and divergent when it is directed toward the temple; the convergent is much the more common. Concomitant strabismus is a variety of Vvhich the amount con¬ tinues about the same in all positions of the fixation-point. When the direction of the eye or eyes is upward or downward the squinting is said to be vertical. Convergent squint usually comes on during childhood, most often from the second to the seventh year. It is sometimes due to defective sight in the squint¬ ing eye, from congenital abnormality, severe inflammation or injury; but very often no such condition is present. In a large proportion of cases it is accompanied by hypermetropia, and is due to the increased effort of accommodation required to see near objects, being associated with an increased and disproportionate effort of convergence. In such cases, if suitable glasses can be worn as soon as the squint begins to show itself, it may be prevented from becoming permanent. In other cases the pres¬ ence of a squint may be traced to worms, the irritation of teething, *etc.* ; and it disappears when the cause is removed. Divergent squint is very rarely present without considerable de¬ fect in the sight of the squinting eye, except where it is the result of over-correction of a convergent squint by operation. It is often associated with myopia as the other form is with hypermetropia. The surgical operation for the correction of a squint consists in the division of the muscle whose excessive activity leads to the faulty position — in convergent strabismus the internal rectus, in divergent the external. It is often necessary to operate on both eyes in the same manner, even where the squint is monocular. In some cases it is requisite in addition to shorten the opj)osing muscle. See Astigmatism ; Eye ; Ophthalmia ; Senses; Vision.

VISION OF ANIMALS. See Eyesight IN THE Lower Animals,

VISION OF BIRDS. See Eyesight in THE Lower Animals.

VISION AMONG FISHES. See Eye¬ sight IN THE Lower Animals.

VISION OF JUDGMENT, The. If we

accept Byron's ˆDon Juanˆ as something more than satire, his Wision of Judgmentˆ is by far his finest satirical poem and, with the ex¬ ception of Dryden's ˆAbsolom and AchitopheP (q.v.), is the best of its kind in English litera¬ ture. It sprang directly from the last phase of a long-standing quarrel with Southey, the poet-laureate, whom Byron detested as a Church¬ man, a Tory and a literary man-of-all-work ; but, more remotely, it had its origin in a com¬ plex of personal, political and literary causes. George III died in 1820 and in 1821 Southey wrote a preposterous panegyric of the dead king entitled ˆA Vision of Judgment,ˆ which shows Michael and Satan contending for his soul, with victory to the former, of course, and ushers George into heaven, where he is en¬ thusiastically acclaimed. In his preface Southey attacks what he terms ˆffhe satanic school, meaning thereby chiefly Byron and Shelley. In this Southey blundered : he had provoked the most pitiless and brilliant satirist of the age. B3'ron had been waiting for the chance. Southey's absurd poem suggested a means of flaying the poet-laureate himself ; of showing up George III as a model of private virtue but of public vice, and of attacking Tory poli¬ tics and the whole reactionary political policy of European statesmen in general. Byron takes Southey's title for his own poem and for the method of his satire employs a travesty of the original, using the trial scene before the gate of heaven, only changing the tone of the whole from the would-be sublime to the intentionally ridiculous. The metre and the style of Byron's poem are those of the purely satiric portions of his ˆDon Juan,ˆ with its Italian ottiva rima, or eight-line stanza, its free and often burlesque rhymes, its realism, its sudden drops from the sublime to the ridiculous and its equally sud¬ den rises from pure burlesque into poetry. The ˆVision of Judgmentˆ is perhaps the only poem in which satire becomes truly sublime and one of the very few in which poetry and humor exist not merely side by side but are actually fused. Throughout its 800 lines there is no flagging of the wing of its superb energy. In indignation, in wit, even in humor, it has been equalled by other satires, but in high imagination, its attainment of the sublime, it remains unapproachable. Satire more scathing was never compressed into smaller compass ; yet its scorn does not seem

petty or spiteful : it has much of the Olympian quality of Dryden. Though without the masterful characterizations of ˆAbsolom and AchitopheP (q.v.), it not only flies higher but sustains its flight even better, and it is not without its great lines that linger in the memory. Who can forget that

“ between his Darkness and his Brightness

There passed a mutual glance of great politeness ” ?

The Wision of Judgmentˆ was published in the first number of John Hunt’s periodical The Liberator, in October 1822. The whole of the Tory press rose in its wrath ; no English satire ever aroused a greater storm of abuse. A king had been made ridiculous; a great

party system had been attacked by a renegade and an agnostic. Hunt was prosecuted and was fined £100. The satire has survived the storm, as it has survived the political system which it ridiculed. Goethe called its stanzas on George III ˆˆthe sublime of hatredˆˆ ; Swin¬ burne said that in it Byron gave satire wings to fly with. It was the last of the great verse satires written in English and it could have been written only by the poet who was on the whole the greatest of English verse satirists. Consult Fuess, Claude M., ˆLord Byron as a Satirist in Verseˆ (ch. IX).

Marion Tucker.

VISION OF SIR LAUNFAL, lan’fal, The, a poem by James Russell Lowell, founded on an Arthurian legend and published in 1845.

VISION OF MIRZA, mer’za, The, a fa¬ mous allegory by Joseph Addison, which ap¬ peared in No. 159 of The Spectator.

VISION OF PIERS PLOWMAN, perz plow’man. The, an English poem of the 14th century, ascribed, chiefly on the ground of in¬ ternal evidence, to William Langlande (q.v.) or Longland, a monk of

Malvern, in spirit a Car¬ lyle of the Middle Ages, crying out against abuses, insisting upon sincerity as the first of virtues. This poem belongs to the class of dream-poems and reflects both the England of the 14th century and the visionary, child-like mediaeval mind. Internal evidence fixes its date about 1362. Forty manuscript copies of it, be¬ longing, for the most part, to the latter end of the 14th century, attest its popularity. Three distinct versions are extant, known as Texts A, B and C. The probable date of Text A is 1362-ˆ3; of Text B, 1376-77; of Text C, 1398-99. The variations in these texts are consider¬ able. An imitation of the poem, called *ˆPiers Plowman's Crede,ˆ appeared about 1393. The poet's vocabulary is similar to that of Chaucer and several dialects are combined in it, the Midland dialect dominating. The metre is al¬ literative, long lines, divided into half-lines by a pause. Each line contains strong, or accented, syllables in fixed number and weak or unac¬ cented syllables in varying number. Consult Jusserand, ˆPiers Plowman: a Contribution to the History of English Mysticismˆ (1893).

VISITATION, in an ecclesiastical sense, the visit of inspection by a bishop, archdeacon, elder or other authority to the churches within his jurisdiction. In the Protestant Episcopal churches the term is applied to an annual assem¬ bly of clergy and church-wardens, for the pur¬ pose of admitting church-wardens-elect to office, reviewing the condition of the parish, answer¬ ing inquiries relating thereto from the superior ecclesastical authority and receiving a charge from the bishop or his representative. Under the church establishment in England, the annual visitation is of an official as well as religious character and acts of Parliament bearing on Church affairs are then formally communicated to the clergy and laity. The Salesian Sisters are often termed Sisters of-the Visitation. There are 21 convents of this order in the United States.

VISITATION, Right of, the act of a naval commander who visits a ship of another nation to ascertain her character, and the object of her voyage. In time of war, a search is likely

to follow if the replies to inquiries are not satisfactory.

VISITATION NUNS. See Orders, Re¬ ligious.

yiSITA'TION OF THE SICK (ecclesi¬ astical). This is an office of the Anglican Church for the comfort and consolation of sick persons. It is founded on the offices of ancient liturgies and, with some exceptions,

is prac¬ tically the same as Extreme Unction.

(ecclesiastical). A festival celebrated on the second of July, to commemorate the visit of the Virgin to Elizabeth, the mother of John the Baptist, as described in Luke i, 39-56.

VISITATIONS, Heralds', periodical cir¬ cuits formerly performed by the provincial kings-at-arms in England, to take cognizance of the arms, pedigrees and marriages of the nobility and gentry. The earliest visitation, in pursuance of a royal commission, was made by Thomas Be-nolti, Clarencieux, 1528-29: thereafter the visi¬ tations were repeated at periods varying from 25 to 30 years : the latest commission was dated 13 May 1686, and under it some pedigrees were recorded as late as 1703-04. The records of the visitations contain a mass of historical and genealogical information of great value : they form the principal source of evidence regarding the hereditary right to bear arms in England.

VISITING CARD, a card bearing one's name, and sometimes an address, etc., used to send in as an announcement when calling, and for other social purposes governed by the customs of the time and place. It is probable that some form of evidence of a call on absent friends was used in very early times, perhaps originally among the Chinese or some other Oriental nation. It is somewhat uncertain when European custom first adopted the de¬ vice, but it is generally stated that visiting cards were first used, in the Western World, by the Germans in the 16th century. The court of Louis XIV, of France, the centre of .ˆthe fashion and etiquette of the 17th century, seized upon the custom as peculiarly apropos to the manners of the time, but added many an elaborate touch to the plain German taste in cards, in finish, execution and adornment. Thus, under Louis XV, engravings even of real or fanciful landscapes were added and, later, an autograph signature beneath the en¬ graved picture. When England followed the lead of France in the use of visiting cards, in the 18th century, they came into use every¬ where, with a return to their early simplicity; and, while they vary in size, shape and style of announcement, the modern tendency is de¬ cidedly in favor of simplicity and avoidance of ostentation.

VISOKO or VISOKI, a town of Bosnia, on the river Bosna, 15 miles northwest of Serajevo. It has a good trade in leather, to¬ bacco and carpets. Pop. about 5,000.

VISSCHER, Cornells, a Dutch engraver who lived about 1629-62. His

portraits, the best known of which are ˆˆThe Ratcatcher® and ‘ˆSusanna at the Bath® are among the finest examples of Dutch engraving. In the last 15 years of his life he produced about 150 plates.

VISSCHER, William Lightfoot, American author; b. Owingsville, Ky., 25 Nov. 1842. He

was ˆ graduated LL.D, from the University of Louisville, but never practised law. He served throughout the Civil War, and was then ap¬ pointed to a judgeship in Kentucky, which he held for a few months. Thereafter he was engaged in newspaper work for nearly 40 years, became a prominent public lecturer and acted for several seasons in drama. He is the author of ˆCarlisle of Colorado ˆ ; ˆWay Out Yonder ˆ ; ˆThou Art Peter ˆ ; ˆ Fetch Over the Canoe ˆ ; ˆTen Wise Men and Some More ˆ ; ˆAmos Hudson’s Motto ˆ ; <The Pony Ex¬ press ˆ ; ˆBlack Mammy ˆ ; ˆHarp of the South ˆ ; ˆBlue Grass Ballads ˆ ; ˆChicago, an Epic ˆ ; ˆPoems of the South ˆ ; ˆMy Lady of the Is¬ land.ˆ He has been acclaimed the ®Poet of the South.®

VISTULA, vis’tu-la (German, Weichsel), a river of central Europe, about 750 miles long, navigable from Cracow. It rises on the fron¬ tiers of Galicia and Silesia, on the northern declivity of the Carpathian Mountains, flows first north-northwest through the foothills, then eastward past the town of Cracow, forming from a point about 15 miles below Cracow the boundary of Galicia and Kyeltsi, till it receives the San on the right bank, when it turns north¬ west through the Polish provinces. A little north of Warsaw it is joined by the Bug; then it flows westward entering West Prussia a little south of Thorn, and after traversing Marienwerder divides into two branches, of which the eastern, the Nogat, empties into the Frisches Haff ; the western divides again about five miles from the Baltic into an eastern and a western branch, the latter, the Dantzic Vistula (which is much the larger) , proceeding toward Dantzic, the former to the Frisches Haff. A new chan¬ nel cut since 1895 from the head of the Dant¬ zic branch now carries most of the water di¬ rectly to the Baltic. The mouths

were heavily fortified by the German government. The navigation of this river is important, especially to Poland, though often obstructed by ice or shallow water. The canal of Bromberg con¬ nects the Vistula, through the Netz and Warthe, with the Oder. Several navigable rivers empty into it. The area of its basin is about 76,000 square miles.

VISUAL INSTRUCTION is commonly considered as synonymous with teaching through the use of pictorial representations. In a wider sense it includes all instruction by which the material world reaches the mind through the sense of sight. The process is by no means a newly devised one. The human race has at all times depended upon the eye more largely than upon any other organ of sense for learning about material objects.

Photography has been the chief factor in the fuller use now being made of the visual method. By it even the most remote objects of every variety may be represented with a large degree of accuracy, and pictures of them may easily be placed before any observer. The expense involved is relatively very small. Photo¬ graphic processes of producing plates from which excellent pictures are quickly made in enormous quantities on a printing press have made pictorial expression so common that it no longer attracts special attention. Schools, pub¬ lishing houses and business concerns of all kinds have been quick to recopˆnize the effect¬

iveness of the visual presentation of ideas and are making very large use of this form of ex¬ pression. Man's first means of communicating his ideas to others was spoken language. But he soon had occasion to make a record of his notions for the benefit of those at a distance or of a later time, and so invented symbols. These consisted of rude drawings and of char¬ acters known as the alphabet. The early pic-tographs expressed only a few simple ideas. Words formed from the alphabet do not directly suggest ideas. They come to have con¬ tent only through much study and long famili¬ arity with them. To the spoken and the writ¬ ten word must be added the picture form of ex¬ pression. In considering the value of visual instruction it is important to recognize the fact that pictures serve not merely to make a pleas¬ ing appeal to the eye, but have actually come to be a universally used mode of representing the physical world to the mind. Appreciating this fact, the problem is to determine the mental laws according to which the learner is af¬ fected by them and the special fields of useful¬ ness of visual presentation. That the true place of pictures as a means of expressing ideas may be understood and uˆed most

effectively there needs to be a clear appreciation of the relative value of language and pictures in conveying ideas. An analysis of the whole body of ideas to which man has occasion to give expression must lead to the conclusion that pictures are best calculated to represent material objects. In other words they present to the mind facts to be perceived. Higher ideals and abstract relations must for the most part continue to be expressed through the medium of language.

All notions of the objective world are got¬ ten through the senses, chiefly sight. The pri¬ mary function of the mind by which the in¬ dividual has experience with material things is called perception. The powers of judg¬ ment, imagination and reasoning are absolutely dependent upon perception. They will work true only as perception has been clear, exact and vivid. Obviously one's first dealing with an objective field of study should be through observation. Children need to begin their studies through visual aids. More mature minds are dependent upon a visual presentation whenever they enter upon a new field of study that has to do with objective realities.

The perceptive facts that may be acquired through theˆ medium of the eye are form, size, position, which inhere in every object, and some¬ times color and sometimes motion. Pictures do not directly convey any other notion. Where the mind seems to see more than these elements, it is only by inference made possible through ex¬ perience. The quantitative element is an im¬ portant factor in visualization. Understand¬ ing how large an object is requires a known standard of measure._ There must be compari¬ son, doubtless involving the function of judg¬ ment. One's practical interest in the position of an objectˆ or part of an object usually lies in knowing its place in relation to something else already known. Form is dependent upon relative position of parts. The clearness and fullness with which the mind grasps such factors determine the accuracy and vividness of the visualization.

A clear distinction is to be made between

visualizing an object and looking at a picture of it. The latter may be little more than the physical act of keeping the eye directed to the picture. The mind may remain very largely passive. Visualizingˆ is strictly a mental act. It involves the exercise of several mental func¬ tions. In the end the phenomenon observed, though absent, is imaged in the mind. The image is more than the recollection of some¬ thing impressed upon the mind. A small amount of mental reaction may be sufficient to enable the mind to recognize an object when again presented, but a complete visualization involves a full analysis of the phenomenon and a later synthesis of parts. There must be a rebuilding in the mind of the thing observed and the mental image is probably never pre¬ cisely like the object. The mind appropriates only what concerns its ends or interests.

There is among teachers and others who think upon mental processes an interest in the ques¬ tion of the relation between visualization and imagination. Some would see an opposition between the use of visual aids and imagination. These persons, however, fail to analyze the mental processes involved and to discover the nature of what should be avoided. It is im¬ possible to perceive too much or too accurately. On the other hand true visualization is imagi¬ nation. ˆ Every mental image is made up of perceptive elements. Without them there could be no material out of which to build the re¬ constructed image. This statement gains force if one keeps in mind the distinction between the mere remembrance of a past visual impression and the construction within the mind of a men¬ tal picture, the latter being the highest form of visualization. Reproductive imagination is little more than memory. To visualize has come to be a phrase in common use. It is usually employed as equivalent to ˆhmagine the thing or situation.® What the objector really fears is the lack of ‘ability to create entirely new combinations in a visualization of some¬ thing not corresponding to what has already been observed. This creative power doubtless varies naturally in different individuals and is also susceptible of cultivation. The danger is not so much that the visual presentation will be used too extensively as that its use will be unintelligent. There are limits to the fields of usefulness of pictures as an educational

agency. Unquestionably a person may continue so fully absorbed in observation that insufficient atten¬ tion is given to the exercise of other mental functions. The arguments for the use of pic¬ torial expression must remain unshaken so long as such expression is confined within its fields of special usefulness and full mental reactions are secured.

An incentive for the use of pictorial repre¬ sentation is the belief that it is specially in¬ teresting. Interest as a motive for effort plays a large part in the modern educational pro¬ gram. The nature of interest may, however, be misinterpreted and dependence upon it may be carried too far. According to the et3ˆology of the word Interest (inter-esse) the implica¬ tion is that the mind is in the object or idea under consideration. Mental energy hangs upon what is actually before the mind. It is de¬ veloped by the mode of approach through such elements as the mind can easily comprehend,

which are necessarily certain objective facts. The objective elements, such as form, color and motion, attract attention, though atten¬ tion at the beginning is passive and may re¬ main so. True interest on the other hand is an active principle. It is difficult to arouse, particularly in untrained minds, hence with childreh and uneducated adults objects and their pictorial representations may advanta¬ geously be used to attract attention and initiate interest. One must have some experience with an object of study before an interest in it can be aroused. The problem of the educator is to convert into active interest passive attention ‘ to the physical elements that for the time hold the mind. Failure to secure adequate mental reaction means the loss of the advantages of the visual presentation.

There is a very direct relationship between impressions and memory. Abstract ideas are not only difficult to acquire but they are not easily retained in mind. The mind is so con¬ stituted that it depends upon the law of asso¬ ciation. There is a very strong tendency to as¬ sociate a general notion with a particular illus¬ tration of it. So while the mind should move on to the general or abstract it cannot do so without first detecting the truth in some par¬ ticular concrete illustration of it. The sense presentation, chiefly visual, is surely the easiest if not the only approach to the higher and more difficult idea. Further such idea is again brought into the field of consciousness through recalling one or more of the specific illus¬ trations from which it was originally derived. Without much experience with the ma¬ terial world and the people who move in it one cannot go far in

the exercise of the higher function of judgment, reason and restrained, well-ordered emotions. One has but to visual¬ ize the ordinary schoolroom in which pupils commonly receive eight or possibly 12 years of their formal education to be convinced that there are forceful arguments in favor of a larger introduction of the visual means of instruction. Even when the picture expresses but a small part of the idea to be presented it may often serve as a suitable starting point about which to build a group of related thoughts.

There is need for recognizing the fact that visual representations like language vary greatly In significance, expressiveness and other respects. The rules of grammar and rhetoric have been fully developed and stated. It is understood that words should be selected and combined with a view to precision, clearness and force. There are rather definite standards for judging the value of oral and written speech. But there is still much carelessness and indifference in the selection and use of picture expression. This condition probably grows largely out of the fact that pictures are so often used merely as supplementary to the lan¬ guage form of expression, that they are com¬ monly prepared by inferior mechanical pro¬ cesses and by persons not thoroughly acquainted with the ideas to be expressed and that those who are supposed to learn from them are con¬ tent with a very superficial observation of them. The chief standards for selection and use of pictures are their authenticity, truthful¬ ness, expressiveness, quality and attractiveness.

When a verbal statement is made one prop¬ erly asks what authority there is for it? What weight can be attached to it? So with a pic¬ ture one should want to know its source. What evidence is there to show that it expresses what is purported? There is particular need for applying this standard to pictures used to illustrate history. On any adequate test many of those appearing in books on history would be found altogether unreliable. The pictures have been thrown in to catch the eye but with¬ out having been as critically examined as the text.

A picture may be attractive but untruthful. This is particularly likely to be the case with, fanciful drawings where the illustrator lacked specific knowledge of the subject or was in¬ different to the criterion of truthfulness. A picture may of course be authentic and yet not truthful, for example, a reproduction of Leutze's ˆWashington Crossing the Delaware.ˆ A challenging attitude s'hould be assumed toward a picture both as to its authenticity and its truthfulness. In the matter of expressive¬ ness pictures of all sorts vary as much as do verbal expressions. There is much trash in pictures. Many of them have little significance, while some are worth long study. A picture that is full of significance commands repeated attention. In education the selection of pic¬ tures is largely a work of elimination.

The quality of pictorial expression should be judged as critically as that of verbal ex¬ pression. There is no more excuse for care¬ lessness and indifference in one case than in the other. Rarely does a poorly made photograph or drawing actually give full and accurate expression. A picture is defective to the de¬ gree to which the observer is unable to see in it the idea intended to be expressed. Many factors, including quality, enter into the at¬ tractiveness of a picture. While a pleasing ap¬ pearance is very desirable it should not obscure the importance of the other factors. The tend¬ ency is to produce merely an appeal to the eye rather than to the mind.

As to forms or types pictures may be classed as prints, lantern slides and films. Prints are pictures or drawings made by transfer from engraved plates, lithographic stones, photo¬ graphic negatives or the like. They are used in books, magazines, pamphlets and other publi¬ cations or appear alone. A stereograph is a pair of photographic prints made in a particu¬ lar way. They bring out the third dimension or depth better than the single print. They are of advantage only where

perspective is an important feature to ‘be observed.

Obviously a print is suitable for individual study rather than for class instruction. It is usually too small to be observed by several persons at the same time.

A lantern slide is a photographic positive on a glass plate. The image is projected upon a screen giving a picture sufficiently large for effective instruction. Slides are pre-eminently the form of pictures suitable for class use for instruction by visual means. The attention of every memlˆier of a class or audience can be directed to the same thing at any moment, which is essential to class instruction, and there is ample opportunity for close observation and discussion.

A motion picture consists of a succession of images projected on a screen from a film with such rapidity as to produce the effect of move¬ ment. The chief function of such pictures is to tell a story. They are not well adapted for the observation of any of the aspects of ma¬ terial things other than motion. The distinctive place of the motion picture is iri the field of entertainment though it may have some supple¬ mentary educational value in showing processes when other related facts are known. There is no possible advantage to be derived from the motion picture for representing objects that are static, such as buildings, works of art and phys¬ iographic features of the earth. Motion is sometimes so characteristic of a living form or mechanical contrivance as to be in itself an object of interest and when the moving form cannot be examined a pictorial representa¬ tion of the movement is distinctly useful, for example, for most persons the movement of a seal.

For educational uses, aside from the ques¬ tion of expense, the chief weaknesses of the motion picture are the absence of discussion while observation is going on and a consequent lack of training in observation and in the power of verbal expression. The deeper and more significant features to be observed are over¬ looked, true mental reaction is weak, and study is superficial. The same results may attend the use of still pictures but are much less likely.

It is important at least, so far as the school course is concerned, to determine for what studies the visual method is best adapted. Ob¬ viously its principal field of usefulness is in those studies that deal with physical phenomena that cannot be brought into the schoolroom, such as geography, industries, nature study, physiography and art.

Few pictures can be used to advantage in teaching mathematics, though success in mathematical, studies doubt¬ less depends very largelyupon ability to visual¬ ize. The chief elements dealt w*ith are size, form and position. Of these ideas the quantita¬ tive stands foremost, ideas of how much, of more or less. Some unit of measure is visual¬ ized in relation to the thing measured. A pupil who visualizes readily has little trouble with geometry, while one who depends chiefly upon verbal memory struggles with it in vain.

Spelling is in large part a visualization of the form of ’words, secured particularly by at¬ tention to the construction of syllables. Hence spelling is now learned more by observation than by the repetition of letters in a fixed se¬ quence. The form of words is visualized.

Reading as an exercise in learning to recog¬ nize and pronounce words is not taught through pictures, though learning the content of certain words is to a large extent acquired by associa¬ tion of word and picture. Further, after a pupil has acquired some facility in the more mechanical aspects of reading, the interpretation of a picture may be made a powerful incentive to read for thought getting.

In the field of literature pictures should be used sparingly and with caution. Language is pre-eminently the medium in which literature is expressed. The material objects mentioned are but incidental and for the most part would be readily visualized if visual instruction has had its proper place in those studies where il

IS most applicable. Such value as pictures have in this study is altogether secondary, such as stimulating an interest and creating a motive for reading. A motion picture may give in part someone's interpretation of the story, which is hut the literary skeleton, but it tends to relieve the pupil of the need of effort and hinder his acquiring insight into literary expression by substituting a lower objective. The photoplay may doubtless express dramatic situations and acts but is not in itself literary expression. To elementary training in the use of language ob¬ servation of pictures is a great aid, for it leads to a body of definite notions to be expressed. If observation has been orderly, expression will he clearer, more accurate, more vivid and better organized. This is on the assumption that the learner is actually required to prove what he has gotten from the visual presentation.

History introduces so many factors that lie outside of the observation and experience of the student that a visual presentation is extremely helpful, but in this field of study, pictures should be selected with the clearest understanding of the purposes they are to serve. It is useless to expect to re-act history before the physical eye. The study calls for true visualization, the crea¬ tion or building of mental pictures out of the material which the student collects. So far as pictures truly and authoritatively represent material features belonging to an earlier time such as places, utensils, dress, monuments, cus¬ toms and modes of living, they are an aid to the student in his attempt to put himself into the historical environm.ent. The possibility of using visual aids successfully becomes small when the student reaches such vital things in history as character, ideals, motives of action, political, civil and social problems, policies and the like.

In the natural sciences, nature study and geography, and any other study that deals with material objects, pictorial expression may be used with particular effectiveness and become necessary for positive results when the objects of study cannot be observed directly or through types. Practically every feature of artistic productions can be expressed by pic¬ tures and drawings. Form, size and position are the elements that enter into every class of art conception and color is

usually an important element. All these factors may be perfectly represented by still pictures and here verbal description fails utterly. The field includes painting, sculpture, architecture and the minor arts. A verbal description of Amiens cathedral would be quite unintelligible to one not con¬ versant with architecture.

Too much may be claimed for the visual pres¬ entation but on the other hand the importance of it for certain purposes cannot be denied. After the fields of its special usefulness have been determined and the aids have been selected with due reference to their value it still remains to use them in a way suited to the purposes to be attained. What is the visual method?

At the outset, there is some difference of opinion as to whether pictures should be used merely as illustrations of a general statement of a truth or as the means of approach to an understanding of a truth. The practice of the former is probably the more. common. It must be admitted that there is a place for each, but

the latter Is more in need of encouragement. The studies most in need of visual presentation are generally acknowledged to be inductive in character. In the use of pictures then let ob¬ servation come first. On the whole, reading may better follow than precede observation. This is particularly true when there is an in¬ tensive use of pictures with special reference to teaching pupils how to pursue the study rather than to give him merely some general information about it. Granting that the pri¬ mary feature of the method is observation one has only to follow the recognized rules for ob¬ serving. The procedure is not essentially dif¬ ferent whether the object itself or its pictorial representation is observed.

In leading pupils to study a picture It is usually advisable to give them a start. Avoid a question like, ®What do you think this pic¬ ture shows?® for by such a question attention is scattered instead of concentrated and there is likely to be guessing. Rather direct the class to note a particular feature and tell about it. Have a definite purpose in using a picture. It probably expresses some facts not pertinent to the immediate end in view. Do not suppress a disposition on the part of the pupil to see for himself, but lead him to report his observations along chosen lines.

First ascertain just what perceptive facts are shown. When these have been clearly and accurately expressed, call for judgments. What does the pupil infer that is not actually shown? Some additional points of interest merely asso¬ ciated with the object may be stated, but in doing this the instructor has departed from a visual presentation. In the main leave such additional information for separate presentation or for the pupil to get from reading.

A picture is not seen as a whole. It must first be examined as to the features that make it up. It is exceedingly important that begin¬ ners be led to make their observation in such an orderly way that the mind will not waver in its search for the content of the picture but will quickly detect one feature and then pass on to another. Such ability to read a picture is developed rapidly under proper guidance.

The following are some of the advantages to be derived from the proper use of visual aids to instruction: a keener interest in the subjects studied, a growth in voluntary attention, clear and more definite percepts of the things in¬ volved, truer and-more vivid mental images, much better results in oral and written expres¬ sion, increasing ability to grasp new truths when presented.

Alfred W. Abrams,

Chief, Visual Instruction Division, New York State Education Department.

VISWAMITRA, vis-wa'mi-tra, personage prominent in the legendary history of India ; a descendant of King Pururavas, who was an an¬ cestor of Kusika. According to several accounts, Viswamitra was maternal uncle of Jamadagni. He had 100 sons, 50 of whom were, for an offense that they committed, degraded by him to be¬ come outcasts, and the progenitors of the Andhras, Pundras, Sabaras, Pulindas, Mut-ibas and other frontier tribes, which in the Vedas are called Dasyus, or robbers (see Veda). His fame is founded chiefly on the remarkable fact that though by birth a Kshattriya, or a

man of the military caste, he gained admission iiUo the Brahmaiiic caste, after a long contest \yith the Rishi Vasishtha. A kind of consecu¬ tive biography of Viswamitra is given in the first book of the Ramayana. Its substance is as follows : Roaming over the earth with his armies, Viswamitra came to the hermitage of Vasishtha and was received by the saint in the most sumptuous style. Vasishtha could afford thus to entertain the king, because he pos¬ sessed a fabulous cow of plenty, that yielded ‘ him everything that he desired. Viswa¬ mitra becoming aware of the source of Vasishtha’s wealth, wished to possess the cow, and offered to purchase her from Vasishtha. The saint refused the offer, and the king seized her, intending to carry her off by force. But the cow resisted, and ultimately displayed her supernatural powers in producing from different parts of her body numerous peoples, by whose aid Vasishtha destroyed Viswamitra’s armies. The king then had re¬ course to his magical weapons, but he was de¬ feated by those of Vasishtha,;, and in his humili¬ ation he exclaimed: ˆContemptible is the might of a Kshattriya; a Brahman’s might alone is might and to attain the rank of a Brahman he immediately resolved to practise the utmost austerities. Accordingly he went to the south, and performed severe penance for 1,000 years. At the end of this period, the god Brahman ap¬ peared, and announced to him that he had be¬ come a Rajarshi, or royal Rishi. Not satisfied with this degree of holiness, Viswamitra con¬ tinued his austerities, and at the end of another 1,000 years the god Brahman conferred on him the dignity of a Rishi. Not yet satisfied, he went on practising still fiercer austerities, though interrupted by the allurements of a heavenly nymph whom the gods sent to him for that purpose : thus he attained the rank of a Maharshi, or great Rishi. After another 2,000 years of still more rigorous penance (again interrupted by the gods, as before), the gods, headed by Brahman, came to acknowledge that he had now become a Brahmarshi, or Brahmanic Rishi; and Vasishtha himself was compelled to acquiesce in the result. For other legends relating to this contest, consult Muir’s ˆOrigi¬ nal Sanscrit Textsˆ (Vol. I, London 1858).

VITA NUOVA, ve’ta noo-o’va (It. ˆThe New Lifeˆ), an early work by Dante, completed probably in 1307.

VITACEiE, a natural order of exogenous plants, known also as Ampelideae and Sar-mentaceae, of which the common vine may be regarded as the type. About 260 species are known, natives of warm and temperate climates, all shrubs, mostly climbing ; with simple or com¬ pound leaves, with or without stipules, lower leaves opposite, upper leaves alternate ; the flower stalks racemose, opposite to the leaves, sometimes as in the vine, by abortion, changing into tendrils. The only plant of the order of much value in an economical view is

the vine ; nor are there any fine fruits except the grape, and that of species so slosely allied to it as to be probably mere varieties. Species of the genus Cissus and of Ampelopsis are sometimes planted for ornament. Cissus antarctica is the Kangaroo vine of New Holland; and Ampelopsis quinque-folia, often called Virginia Creeper, is a fre¬ quent ornament of the fronts of houses both in

America and Europe, attaching itself to the wall by tendrils terminating in a peculiar kind of sucker and climlnng to a great height.

VITAL STATISTICS. By this term is meant the statistical record of facts which per¬ tain to life and death in any given community. The term is sufficiently comprehensive to in¬ clude the records of the smallest kind of a village, or those of a nation, or even of all the nations of the world. Vital statistics may even be said to constitute a science, ‘and such a science, indeed, as requires very considerable knowledge in mathematics and mnemonics to master it. It is well defined in the statement that it ˆcomprises analysis and synthesis of facts concerning the life-history of popula¬ tions.® Its practical utility in the history of communities is very great, and is increasing every year. Any community which’ pretends to keep a record of its doings must have vital statistics, hence all civilized nations must have them. It not only enables a nation to know where it stands, but where it stands with refer¬ ence to other nations. It informs those who seek such information as to the prevalence of disease and death, it suggests sanitary meas¬ ures for the relief of unsanitary conditions, it encourages habits of careful observation and thoughtfulness on the part of those by whom statistics are provided and it is the foundation for the census, a regular system for which was first established in the United States. The early censuses were taken for political purposes, but in the seventh census of 1850 many new data were introduced, particularly mortality records. In 1910 the attempt to enumerate deaths was discarded, reliance being placed upon the re¬ sults of actual registration in the registration area. This area for deaths, up to 1915, included 25 States, or 4.13 per cent of the area of the country, and 66 per cent of the population. Among the Southern States it includes only Kentucky and Virginia and part of North Caro¬ lina. While the birth registration is more de¬ fective than that of deaths it is fairly well known that more than 2,500,000 of babies are born in the United States every year though less than half of them are recorded. A registration area for births has not yet been organized; many States have good laws on this subject which, however, are not

enforced. A model law was passed in Pennsylvania in 1905, one provision of it being that primary schedules for vital statistics must be uniform. A stand¬ ard death certificate is now used in nearly all of the United States. Now the census includes not merely a count of the people every 5 or 10 years, in a city. State or nation, as any-liody knows who has ever examined the bulky volumes of the census of the United States, but many other matters of great importance. The registration of vital statistics in the United States belongs to one of the bureaus of the Census Department. It collects statistics of death obtained from State registration and is supple¬ mented by municipal returns from cities in States which as yet have no efficient registration laws.

Vital statistics when well prepared and ac¬ curate give valuable information, not only in regard to disease . and death, but as to the number of the people and as to birth, age, sex,

color, race, occupation and conjugal relations. They are also the basis of data for life insur¬ ance calculations and they are concerned with the estimation of ratios in regard to births, marriages and deaths and with the manipula¬ tion of figures for making a great many im¬ portant deductions. It is essential that these fundamental statements should be accurate but unfortunately this is not always the case. There is, therefore, an element of possible error in vital statistics which must almost always be con¬ sidered. ‘ They, however, usually permit con¬ clusions which are approximately true, and by the aid of corrections they can be brought still nearer to the truth.

The vital statistics of the United States are by no means complete for the entire country. Bulletin 109 published by the Census Bureau 1 Oct. 1911, and which gives the mortality rec¬ ord to 1 Jan. 1911, declares that in only 21 of the States are the mortality statistics complete (at date), while in 16 otlfer States they are given only for one or more of the large cities. This’ constitutes the so-called registration area of the United States. Other tables of vital statistics are equally incomplete and for some of the States they are wanting altogether. Much remains to be done, therefore, to place these data upon a basis which is as scientific and as accurate as the best records of the nations of Europe. The United States is practically the only civilized nation which lacks an effective system of vital statistics. It is a subject which might well be taught in the medical schools, under the supervision of the government. ˆ It is to be hoped that this end will be attained in the census of 1920. The subject will be considered in this article under the divisions of population, birth, marriage, death, disease and life tables.

Population. — This is the first fact which will be sought in preparing the vital statistics of any community. It is obtained by the cen¬ sus which is taken once in 10 years by the nation, once in five years or oftener by some of the States and cities. It is inaccurate in vari¬ ous localities, sometimes from the dishonesty or incompetency of the enumerators and some¬ times from the fault of those from whom infor¬ mation is sought. Revision of the last census in many of the cities and towns showed remark¬ able variations from the figures

which had been obtained by the official gatherers.ˆ When the population of two or more places is known we have the first factor or element for making comparisons between these places.

In the interval or intercensal years, when a direct count is not taken, an increase of popula¬ tion is usually presupposed, and is estimated by comparison of the two previous census enumera¬ tions. This is an inaccurate method, further¬ more a decrease instead of an increase is often known to be the fact. Increase of population, for a given period, is due to the excess of births over deaths, as recorded in the archives of the board of health, or other office of regis¬ try, and to this must be added the excess of those who come into a community over those who leave it. Diminution of population is due to excess of deaths over births and to removals from the community.

Population may increase slowly or rapidly and is greatly influenced by prosperity or the reverse, by sickness, by climatic conditions or

by the advantages or disadvantages of residence in the given community.

Make-up of population refers to the relative numbers of males and females, and their ages. It also includes details as to color or race, and nationality. In many communities, especially in those which are large and highly organized, there is an excess of females over males. This is especially apt to be the case in manufacturing communities, while in pioneer settlements there is always an excess of males. In villages and small towns, especially in farming communities with their preponderance of outdoor work, this is also the case.

Age statistics are usually arranged according to decades, except that the infant population in¬ cludes those who are under one year of age. Stillbirths, of course, make no addition to the population, but a record of them is important for it may lead to deductions which are of great significance for a given community. Age statistics have a very important relation to mortality statistics. The highest mortality rate is in infancy, and as this rate in some localities is extreme, it should call for study and investi¬ gation in such localities, especially when the total mortality rate is unusually high.

Color is an important detail in the records of population. There are many communities in which there is but one color, black, white, red or yellow, but on the other hand the United States is a very composite

nation, and hence there is a very positive necessity for the color distinction for a large portion of the popula¬ tion. The statement applies even to a greater degree in regard to nationality. As there may be 20 or more nationalities in a single city the necessity for classification is apparent enough.

The sparse population in certain farming districts, especially in the less fertile or the newly-settled portions of the country, or in those which are unfavorably located from sani¬ tary or commercial conditions, the crowded pop¬ ulation of the great cities where opportunities for labor are abundant, the overcrowding of the slums and the abnormal housing of multitudes of human beings in many of the factory cities and villages furnish material for vital statistics which are invaluable from a sociological stand¬ point. They are also the basis of some of the most educating calculations with regard to mortality and morbidity rates.

The rule was formerly accepted by statisti¬ cians as generally applicable that the greater the density of population the higher the death rate, but the many sanitary improvements in housing arrangements in recent years, especially in localities where the density of population is great, have considerably modified this rule. The mortality rate in such localities is now much lower than it was a few years ago and this improvement applies not to the United States only but to the civilized world. ^^Public health is purchasable. Twenty-five thousand lives can 6e saved in New York State within the next five years.^^ (H. M. Biggs, commissioner of health of New York.)

Statistics in regard to population are taken periodically or intermittently, while those which relate to birth, death, marriage and disease, which are sometimes called registrar's returns, are constantly in the process of making. Every community, large or small, has them as an

essential portion of its records or archives. In the record of diseases, especially those which are of an infectious or contagious character, the list is increasing from year to year. It is easy to see that many valuable deductions and com¬ parisons can be made from such records, es¬ pecially in regard to sanitary and hygienic im¬ provements. In all places of any considerable size they are now under the control of boards of health which are usually endowed by the legislatures with ample legal powers.

In using statistics of this character it is not only desirable that they should be accurate but that they should be extended over as long a period of years as possible. This permits comparisons, the establishment of averages and the drawing of conclusions which would, not otherwise be possible. In making comparisons it must be remembered that data should be of the same class or kind, for only such admit of comparison.

Births. — Making a record of births is a custom which is at least as old as civilization. It was a standing custom in ‘the Roman Empire at the foundation of the Christian era, to go back no further, and has been continued ever since by the town or parish clerk or notary, or by the clerk of the church. It is now one of the functions of the board of health and physicians, midwives and others are authorized or compelled by law to report all births within a given time of their occurrence, usually within one or two days. These records are usually in¬ accurate because those who should report them are frequently careless and negligent about it, or the authorities are careless in enforcing the law. Many births which are unattended by physicians or midwives are never recorded. A proper penalty, but not one which is too severe, ought to be inflicted when this law is disobeyed. This trouble could be remedied in part, at least, by having vital statistics returned by those who are engaged in public health nursing. However true it may be that physicians ought always to make birth returns, the very busy and the very careless will not do it accurately and promptly although there is a risk of losing their license to practice.

Bearing In mind the facts which have been mentioned and remembering also that in some of the States there is no law requiring the registration of births, deaths, marriages and sickness, the statement concerning the imper¬ fect character of our vital statistics

and their consequent want of value will be found correct.

Crude birth-rate Is estimated at so many per thousand of the population. The birth-rate must also be considered in preparing tables with reference to the number of women of child¬ bearing age and with reference to legitimacy and illegitimacy.

Stillbirths, as already stated, do not form an element in population, but they must be registered. They have been estimated at from 2.5 to 4 per cent of all births, and this estimate is probably too low. There should also be a record of abortions though this would undoubt¬ edly be very difficult to obtain, particularly on account of the great number of criminal abor¬ tions. If it were possible the entire number of pregnancies per year should be tabulated.

The birth rate of different countries or cities or States is often a matter of study and

comparison. It Is usually higher In the cities than in the country. The rate is higher when times are prosperous than when they are ad¬ verse, as economists noted a century ago. It is higher in manufacturing communities than in those which are residential, higher among the ignorant than among the intelligent.-

The birth rate of the countries which were engaged in war is of exceeding importance and will be increasingly so in the near future. Al¬ ready the French government is offering prem¬ iums to women who bear two or more children, whether legitimately or illegitimately, and other nations which have lost so heavily in men will probably do the same. The importance of accurate registry will be very great in all these countries.

A high birth rate often, but not necessarily, means a high death rate, for. the mortality in infancy, as already stated, is higher than at any other period of life, but a high birth rate may also mean that the population is a vigorous one. A low birth rate may signify a low death rate but it may be followed by a high death rate.

For a number of years the birth rate in most of the civilized countries of the world has been declining, and in view of the increasing cost of living in all of them it will probably continue to decline. It is declining in England, it is de¬ clining in the United States, while it has been declining in France for so many years that it causes persistent alarm to her government.

Marriages. — A record of marriages is equally as important as that of births, and the custom of keeping it is almost equally ancient. It is the bond of the family and one of the most important props of civilization. Both Church and State have kept marriage records and con¬ tinue to do so. It seems unnecessary that there should be a double record.

In countries in which Church and State are united, the Church will insist upon its right to this record, and in those which are like our own, and in which Church and State are sepa¬ rate, the right of the State to keep it should be insisted upon. It is so insisted upon wherever there are boards of health and a license or permission to marry must first be obtained from the local government, while the record of the marriage performance is preserved.

A custom which is increasing in its frequency is the giving and receiving of a certificate of health, after a suitable examination, by those who are about to marry. It is a desirable custom and if it were universally insisted upon like the marriage license it would prevent a great deal of the disease which follows marriage between those who are physically unfit. Tables of vital statistics should, for completeness sake, include the physical condition of those who marry, at the time of their marriage.

Marriage rates, like birth rates, are esti¬ mated at so many per 1,000 of the population, the number of persons who are actually married being double the number of the marriages. A better record would include those who are of marriageable age. The marriage rate varies and fluctuates in accordance with certain condi¬ tions. It increases in times of commercial prosperity with abundance of labor, and in com¬ munities in which the occupations are healthful and productive of vigor and vitality. It

diminishes during hard times, during war and at times when the physical condition of those who are of marriageable age is lowered by dis¬ ease, especially by epidemic disease or by dis¬ ease which results from unhealthful occupa¬ tions. In many communities there are more marriages during the summer than during the winter. An unusually high marriage rate may be followed by one which is correspondingly low, as when great business prosperity is fol¬ lowed by great business depression. This is simply the verification of a well-settled eco¬ nomic law. It has been observed that more women than men marry several times during their lives. This must mean either that the incli¬ nation to marry repeatedly is more common in women than in men, or that women, more than men, feel the need of a home and of other things which marriage is supposed to afford, or that marriageable women live longer than marriage¬ able men.

The age at which marriage is consummated is greater now than formerly. This is perhaps due to the increasing sense of the responsibilities which are connected with marriage, which is a hopeful indication, or it may be due and often is due to inability to support a family in early life, in consequence of the increase in the cost of living, according to present standards. The fact that so many women are now working at gainful occupations, and that so many elect a career from their own efforts, in preference to the cares of a household, is an additional rea¬ son for the change in the marriage rate. The marriage age is an important factor in reference to population. Children who are born of mature parents are much more likely to be vigorous and healthy than those of the imma¬ ture and the aged.

The statistics of divorce are intimately associated with those of marriage. In a country like the United States, in which divorce pre¬ vails to' such an alarming extent, it is especially desirable that the records should be made with the greatest care and accuracy. The spreading of such facts before the people ought to act as a deterrent to this great evil and to develop habits of greater thoughtfulness and wisdom before marriage is entered into.

The ratio' of divorces to marriages in the different States is a matter of importance for record, and so is the actual number of divorces which are granted in the several States, and the relation of that number to the population in each State.

Deaths.— The death record, or the mortal¬ ity statistics, is probably prepared with a greater degree of accuracy than are the other records. For various reasons births and marriages may escape the record, whether intentionally or un¬ intentionally, but the record of a death is not easily evaded.

Those whose duty it is to report deaths — doctors, midwives and others — are not likely to neglect this duty, and in those cases in which death occurs from violence or from unexplained causes, the coroner, who is an official in every county, has a responsibility in making the rec¬ ord which he is unlikely to neglect.

The following table of death rates in the registration area of the United States, which, as before stated, embraces 21 States and one or more cities or towns in 16 others, is interest¬

ing and shows the comparatively low mortality rate throughout a large portion of the country.

Death Rates from All Causes Per 1,000 of

Population.

AREA

Annual

Average

1900—

11

1906

1907

1908

1909

1910

Registration area . .

15.8

15.7

16.0

14.8

14.4

15.0

Registration cities.

16.8

16.9

17.1

15.7

15.4

16.1

Registration States.

15.5

15.7

15.9

14.7

14.2

14.7

Cities in registration States .

17.0

17.4

17.5

15.9

15.4

15.9

Rural part of registration States… .

13.8

13.7

14.0

13.3

13.0

13.4

Registration cities

in other States…

16.5

15.6

16.3

15.4

15.6

16.9

The death rate of a community is the ratio of the deaths to the entire population, and the unit of time is one year, though death rates are stated and also computed for shorter periods. In many States the board of health publishes a weekly or monthly bulletin of deaths in con¬ nection with other vital statistics. In compar¬ ing the death rates of different localities the rate per year 1,000 of population is the measure of comparison. The death rate may be found by dividing the actual number of deaths by the nurhber of thousands in the population.

This is the crude death rate and in many places, especially large cities or places in which there are large institutions, such as hospitals, almshouses and penitentiaries, it is decidedly inaccurate.

Deductions must, therefore, be made for the deaths in such institutions, which are usually far more numerous than in the community at large. Additions must be made if any con¬ siderable numbers of the population have gone to other places and died there.

Suppose, for example, that a large number of people with tuberculosis in an advanced stage were transported to another place, and died within the period for which the death rate of the first place was taken. It would manifestly be unfair to charge this mortality to the second place in preparing the death rate of the first.

The death rate should also be analyzed and modified with reference to

age, sex, race, occu¬ pation, density of population and any unusual influence such as an epidemic, an earthquake, or any other abnormal experience.

The influence of age in such a computation is very considerable, when the deaths include a large number of infants, or a large number of very old persons. Infant mortality varies between 90 and 300 or more per thousand births. In the crowded tenement houses, in the homes of vice and intemperance, among the children of diseased parents, and during the heat of summer the death rate among infants is always very high. In manufacturing towns it is very high but it varies with the town.

Thus in Fall River, Mass., with its over¬ crowded tenement houses, the rate is 239.7 per 1,000, while in Lynn, Mass., where the factory people have better pay, better Louses and more salubrious work, it is only 140.7 per 1,000. In

Boston, with its intelligence and all its civic advantages it is 188.2 per 1,000, and for the entire State of Massachusetts it is 160.4 per

1,000.

Causes for high infant mortality are pre¬ mature birth, heredity, intemperance, early marriage, neglect, carelessness, ignorance, bad food, unsanitary surroundings, bad industrial conditions and infantile diseases.

The influence of sex upon the death rate is noticeable in those communities in which fe¬ males predominate in the population, the aver¬ age life of females being greater than that of males, except between the ages of 10 and 20.

The influence of race is becoming more and more striking as the higher races acquire greater freedom from morbidity and greater longevity. The less favored races are still very sensitive to certain diseases, particularly in crowded cities, in unsanitary surroundings, and when bad habits are acquired. The mortality among negroes is very great, especially from such diseases as tuberculosis and the venereal diseases, though there has bieen very great im¬ provement in this direction, especially during the last 15 years. Indians have a high mortality rate as they adopt the habits and customs and vices of civilized life, though education is also bringing improvement to them. The Chinese are far less influenced by unsanitary condi¬ tions than either negroes or Indians.

The influence of occupation upon disease and mortality is just beginning to be adequately realized. There are many occupations which will produce disease and shorten life, no matter what safeguards may be thrown around them ; there are others which are and always will be hazardous to life and limb, there are yet others which can be made relatively safe when there is greater interest in the welfare and happi¬ ness of human beings than there is in ex¬ ploiting them as a means of making money.

Those who work in certain kinds of phos¬ phorus are bound to suffer injury under any possible precautions, those who put up the frames of

steel buildings, who work on tele¬ graph poles and who handle electrified wires are always in danger and those who are grind¬ ers of tools are great sufferers from disease, but their work can be so safeguarded that the danger may be eliminated to a great extent.

Some of the occupations which have a large element of danger, in addition to those which have been mentioned, are those of caisson work¬ ers, in which the workers must sustain a pres¬ sure of five or six atmospheres, miners, molders, and slaters, of workers in iron furnaces, in potteries, in chemicals and metals, in electrical establishments, *etc.* A very large class of diseases are known as occupational diseases and the publication of statistics upon such subjects is doing much to enlighten the public in regard to the need of drastic legislation and regulation concerning them.

It would hardly seem necessary to comment upon the influence of density of population upon mortality, so evident is it to anybody who has given it the slightest attention. It is not merely the crowding which induces morbidity and mortality, it is the accompaniments — un¬ sanitary conditions, bad air and what is almost inseparable from them, ignorance, immorality, intemperance and poverty.

Causes of Death. — These are usuall}ˆ con¬ sidered from the standpoints of diseases and injuries, but there are many deaths which do not seem to be attributable either to disease or injury, as in the case ot those who die in ex¬ treme old age, without pain, without sickness or injury, with nothing but a sudden stopping of the machinery, like the running down of a clock.

The classification and record of diseases and injuries as causes of death is very important and is becoming more and more elaborated by boards of health, throughout the country. In preparing statistical tables the causes of death are noted as a ratio of mortality from all causes, or as a definite proportion of the living population.

In census bulletin 109, which has already been referred to, the following rate of mor¬ tality is given, from 20 causes, in the order in which the relative number of deaths occurred ; (1) Tuberculosis, (2) Organic Diseases of the Heart, (3) Diarrhoea and Enteritis (at all ages), (4) Pneumonia (lobar and undefined), (5) Acute Nephritis, (6) Accidents, (7) Can¬ cer and other Malignant Tumors, (8) Cerebral Haemorrhage, (9) Broncho-pneumonia, (10) Premature Birth, (11) Congenital Debility, (12) Old Age, (13) Typhoid Fever, (14)

Bronchitis, (15) Diseases of the Arteries, (16) Diphtheria and Croup, (17) buicide, (18) The Puerperal State, (19) Otner Diseases of the Stomach excepting Cancer, (20) Diabetes, This table is not very complete, but it may give to the public at large a general idea of the rela¬ tive mortality from these particular causes.

Climate and temperature have much to do with the death rate. Thus it has long been ob¬ served that the lowest mortality is that which occurs in the beautiful month of June, while the highest is in blustering March, when so many people, especially among the aged, are enfeebled as the result of the severities of the winter.

Disease. — An important part of the statis¬ tics of boards of health is the registration of infectious disease. Beginning, as it did years ago, with the registration of smallpox, it was quickly followed by the registration of the diseases which are known as Zymotic, including those which are so common during childhood, measles, mumps, scarlet fever, diphtheria, whooping cough and chicken pox.

The necessity for enforcing the law in re¬ gard to reporting and recording these diseases is quite as great as the necessity for a rigid quarantine. Personal feeling or prejudice should play no part in a matter like this which has so great a bearing upon the health and well-being of the entire community.

Public Health Nursing. — This is an occu¬ pation but recently established. It means that the trained nurse goes into the homes of the poor, the ignorant and the dirty where vital statistics of importance are constantly avail¬ able, and statistics also which have a decided bearing upon the welfare of the entire com¬ munity. It would seem especially desirable that those who are engaged in this work should always have with them blanks for the collec¬ tion of such important data. They could cer¬ tainly gather many important facts which other¬ wise would be lost, including legitimate and

illegitimate births, infectious diseases, re movals on account of

disease, deaths especially among infants and stillbirths. Both in large and small cities and villages where this service has been established should this plan be car¬ ried out. It would be a great assistance to doctors and in many instances would provide the necessary correction for their defective re¬ turns.

Life Tables. — Life tables are prepared for the purpose of estimating the probabilities of life and death. They are of importance in all interests in which it is necessary to forecast the future of large numbers of people for com¬ mercial or other purposes. They are indis¬ pensable for life insurance companies since they enable them to fix their insurance rates upon a basis which has been found to be suf¬ ficiently accurate for business success, during a long series of years, and with constant obser¬ vation and study.

In constructing a life table the factors which are necessary are the population, the age and sex distribution, the returns of death for a year or a series of years, arranged according to sex and age at death, and certain mathematical formulae.

These tables, together with certain necessary corrections, permit the determination of the following propositions :

(1) The mean lifetime. This is the sum of the ages at death, in a given community, di¬ vided by the number of deaths.

It becomes reliable only when the con¬ stitution of the population is uniform and the observations are carried over a long period.

(2) The probable duration of life. This is the age at which one-half of any number of children who have been born will have died, so that they will have an equal chance of dying before and after that age. It is also called the equation of life.

(3) The mean duration of life. This is the probable duration of life from the date of birth.

(4) The expectation of life, or the mean after-lifetime. This is the average of years which an individual of any given age will live, as shown by a life table.

Bibliography. — Harrington and Richard¬ son, Manual of Practical Hygieneˆ (1911); Census Bulletin 109, Mortality Statistics, 1910; Newsholme, ˆElements of Vital Statisticsˆ (1899) ; Farr, ˆEnglish Life Tableˆ (1864) ; Longstaff, ˆStudies in Statisticsˆ (1891); Fisher, ˆThe Mathematical Theory of Probabili¬ tiesˆ (1915) ; Bowley, ˆThe

Measurement of Social Phenomena^ (1915) ; Elderton and Fip-pard, ^Construction of Mortality and Sickness Tables^ (1914); Yule, Hntroduction to the Theory of Statistics^ (1912) ; Henderson, ^Mortality Laws and Statistics^ (1915) ; Wil¬ bur, C. F., ^Federal Registration Service of the United States, its Development Problems, and Defects.^

Andrew F. Currier, M.D., Associate Surgeon, New York Woman's Hos¬ pital.

VITAMINES. See Nutrition of Man.

VITASCOPE. See Biograph.

VITEBSK, ve-tebsk', West Russia, (1) the capital of a province of the same name, on both sides of the Dvina, 70 miles northwest of Smolensk, and 380 miles south of Pctrograd.

- It has more than 30 churches, including six Roman Catholic, two synagogues, an old palace, a theatre, a gymnasium and a hospital, manu¬ factures of mead and leather, and an active transit trade. Pop. (1918 est.) 112,000. (2)

A western province surrounded by Pskov, Smolensk, Mohilev, Minsk, Vilna, Kovno, Courland and Livonia; area, 16,983 square miles. The surface is in general hilly; in the depressions are numerous marshes and more than 2,500 lakes, of which the largest are Lubahan, Rasno, Nevel, Sebesh and Osvea. The chief rivers are the Dvina, Mesha, Kasplja, Ulla, Drissa and Evst. The soil is far from fertile, and the harvests, except under the most favorable conditions, are insufficient for the wants of the population. The principal occu¬ pations are agriculture, cattle rearing, hunting and fishing, besides tanning, weaving, and the manufacture of brandy and tobacco. Flax, linseed, hides, building timber and fancy wares are exported. Pop. 2,000,000.

VITELLIUS, vi-teri-us, Aulus, Roman emperor: b. Rome, 24 Sept. 15 a.d. ; d. there, 22 Dec. 69 a.d. He gained the favor of Tiberius, Caligula, Claudius and Nero in turn, though he was possessed of neither ability nor ambition, being a man of profligate character and a glutton. In 68 he was sent by Galba to command the legions in Germany, was pro¬ claimed emperor in January 69 by his troops, who murdered Galba, and in July 69 he entered Rome as emperor. He was noted for gluttony and other excesses, spending enormous sums for these purposes, and made no preparation to meet the forces of

Vespasius, who had been proclaimed emperor by the troops in the East and was advancing upon Rome. His army proved indifferent to his fate, he was dragged from the palace by a common soldier, and put to death in the Forum.

VITELLUS (Latin vitellus), the yolk of an egg. In the domestic fowl the egg yolk consists ‘ of casein (forming 14 per cent), albumen (about 3 per cent), fats, some of which contain phos¬ phorus (about 30 per cent), a little grape-sugar, and mineral constituents (about 1.5 per cent), in which there is great preponderance of potas¬ sium compounds and phosphates. Of the pig¬ ments of the yolk we know only that there is both a yellow and red pigment, and that one of them at least contains iron. As a food, the yolk is one of the most highly concentrated forms of nourishment. In pharmacy it is em¬ ployed for administering substances insoluble in water (e.g., the oils and resins in form of emulsions). See Egg.

VITERBO, ve-ter’b5, Italy, an episcopal city in a beautiful and fertile valley in the province of Rome, 42 miles northwest of the city of Rome. The chief edifices are a Gothic cathedral containing the tombs of four popes, and numerous fine paintings; an ancient and dilapidated episcopal palace; the Palazzo Pub-blico, *etc.* The trade is chiefly in sulphur and iron. About two miles from the city are the celebrated sulphur baths of Viterbo which was the chief town of the allodial possessions of the Countess Matilda, which were given by her to the popes, and formed part of the patri¬ mony of Saint Peter. Pop. about 20,000. There are manufactories of paper, playing cards, leather and textiles.

VITET, ve’ta, Ludovic, French author: b. Paris, 18 Oct. 1802; d. there, 5 June 1873. He became a journalist and literateur and in 1830-51 also held various posts in the French civil service. From 1871 he was representative of Seine-Inf erieure in the National Assembly, being elected vice-president of the assembly in Feb. 1871. In 1845 he was chosen to the Acad¬ emy. He published four dramatic poems deal¬ ing with French history, ˆLes Barricadesˆ (1826) ; ‘Etats des Blois >

(1827) ; <La Mort de Henri HP (1829); and /La Ligue> (1844). But his chief works are in prose, and largely historical in character. Among them are ˆFragments et Melangesˆ (1846) ; *ˆEssais Historiques et Litteraresˆ (1862) ; ˆEtudes sur I'Histoire de I'Artˆ (18M) ; ˆLettres sur le Siege de Parisˆ (1871) ; ˆEtudes Philosoph-iques et Litteraresˆ (1874) ; and ˆLe Comte DuchateP (1875). Consult the notice by Guizot in the posthumous ˆEtudes Philosoph-iques et Litteraresˆ (1874).

VITEX, a genus of trees or shrubs belong¬ ing to the Verbenacece and widely distributed in warm climates. The leaves are opposite and are usually palmately compound with three to seven leaflets. The flowers are of medium size, with a short tube and oblique, five-cleft limb, which is sometimes slightly bilobate. They are arranged in more or less dense, branched cymes and are purple, blue, white or yellowish. The handsome, deciduous shrub, Vitex agnus-castus, native to the shores of the Mediterranean, has many popular names, such as Abraham's balm, or monk's pepper-tree, but is particularly known as the chaste-tree, or agnus-castus, from its suppositious virtues in the way of dispelling love and preserving vir¬ tue. Its leaves are aromatic, its sap is said to be poisonous and it is much cultivated on ac¬ count of the paniculate cymes of bright, bluish-purple flowers ; it is not hardy, however, north of Philadelphia.

Several species of Vitex produce valuable wood, as, for instance, the lignum-vitae of Queensland {V. lignum-vitce) and the puriri, or New Zealand teak (V. littoralis). This last is a robust tree, sometimes five feet in diameter, yielding short lengths, often curved, of a brown, heavy, durable timber, suitable for shipbuilding and for other purposes, and con¬ sidered to be imperishable in water. The flow¬ ers on its spreading branches are nearly an inch long and are hairy and dull-red in color. V. capitata is the bois lezard of upper South America. The evergreen, V. pubescens, and the V. umbrosa, of the West Indies, are known respectively as the tree-vitex and as the box¬ wood or fiddle-wood. V. trifolia is known in India as the wild pepper-tree and yields a sweet, greenish medicinal oil. The aromatic leaves of V. negundo, of the same country, are believed to alleviate headache, and a vapor bath is pre¬ pared from them for the benefit of fever and rheumatism ; while its ashes are largely em¬ ployed as an alkali in dyeing.

VITICULTURE, or VINE-GROWING,

The vine is any climbing plant, especially if shrubby, as the hop-vine, the vines of melons ; but the name particularly belongs to a plant of the genus Vitis of the natural order Vitaceae, having pentamerous

flowers (five-toothed calyx, five petals, five stamens), and the petals united

into a kind of hood, and deciduous. The most important species is the grapevine {vitis vinifera) , from the fruit of which wine and raisins are made. Until the ravages of the Phylloxera made it important to secure a more vigorous stock, this was the only species planted, to any extent in Europe. Owing either to inherent weakness of the plant or to lack of suitable climatic conditions, varieties of this species do not thrive in the United States except in Cali¬ fornia and possibly a limited area in the South.

The grapevine has large, angular, lobed, toothed, and more or less hairy leaves. The stems are numerous and branching, very long, and of rapid growth, with many tumid joints, the outer bark readily splitting and peeling off, the woody tissue abounding with vessels of large size, from which, at the seasons of active vegetation, if the branch is ■ wounded or cut across, the sap pours in prodigious quantity. The fruit-stalks, much branched, are opnosite to the upper leaves, or in their stead are tendrils. The flowers are small, greenish white, and fra¬ grant. The fruit is a round or oval berry, two-celled and four-seeded, varying much in size and color — in the small Corinth or Currant Grape, about one-fourth of an inch in diameter; in the largest varieties, more than half an inch ; green, yellow, red, purple and sometimes varie¬ gated, but the color is entirely in the outer skin, the juice being always colorless, and while the pulp of the grape is wholesome, nutritious and gently laxative, the skin is astringent and indigestible. Some of the ovules are often abortive, or even all of them in the fruit of old vines of some varieties, e. g., the seedless Ascalon or Sultane raisins. The vine attains large size, the stem being sometimes 18 inches in diameter (a vine in California is said to have a diameter of 36 inches), so that the wood, which is very hard and durable, has been used for making furniture, statues, *etc.* It attains very great age, continuing fruitful for at least 300 or 400 years.

The grape is one of the most valuable of fruits, not only for its use in the manufacture of wine, and as the source from which brandy, vinegar and tartaric acid are obtained, but also because, both in a fresh and dried state, it forms not a mere article of luxury, but a great part of the food of the inhabitants of some countries. Dried grapes, under the names raisins and currants, are a considerable article of commerce. Fresh grapes are commonly eaten with bread in Syria, and some other countries in which they abound. The useful¬ ness of some

varieties of the pˆrape is increased by its ability to keep fresh for many weeks if stored in a cool airy place. The number of varieties described in works on the culture of the grape and in the catalogues of nurserymen is already among the thousands, and many new kinds, obtained from seed and by hybridization, are introduced every year. Under the name Ampelography (Gr. ampelos, a vine), this sub¬ ject has been elevated by German writers almost to the rank of a science.

It is doubted of what country the grapevine is a native, nor is it known at what time — certainly very remote — its cultivation was first introduced into southern Europe. It is now found wild in parts of Europe, but is rather naturalized than truly native. It seems prob¬ able that it is indigenous in the hilly countries

south of the Caspian Sea, where it is very abundant and luxuriant, climbing to the tops of the loftiest trees and producing large bunches of delicious fruit.

ˆ The cultivation of the grape and the mak¬ ing of wine are of most remote antiquity, as appears from the Scripture history of Noah and from many passages of the most ancient authors. The mythological fable of the marches of Bacchus relates to the extension of the cul¬ ture of the vine from Asia into Europe. The earliest records of the manner of cultivating the vine are by the Roman authors Virgil and Columella. The vine was introduced into southern France probably as early as into Italy; it is said to have been brought to Marseilles by the Phocaeans, about b.c. 6ˆ0, and its cultiva¬ tion was early coextensive with civilization in all the countries near the Mediterranean. In Iˆly, so much of the land was occupied by vineyards that Emperor Domitian, fearing a scarcity of corn, issued a restrictive or pro¬ hibitory edict, A.D. 81, which continued long in force, through fear that the abundance of fine wine might tempt the barbarians of the north to invade the country. The vine was introduced into southern Germany about b.c. 3d century. Augustus preferred the Rhaetian wine to all other. The first vineyards on the Rhine and Moselle were planted by the Emperor Probris (a.d. 281) . Under the Merovingians, the culture of the vine extended greatly in France and Germany. Charlemagne derived considerable revenue from the vineyards even of the north¬ ern parts of his empire. The Huns who remained in a number of settlements on the Rhine after the expedition of Attila into Gaul in 451, brought thither from Pannonia the arts of cultivating the grape, and of making wine, and Hunnish grapes and Hunnish wine were long in high repute. In the Middle Ages, the monks were the first to plant vineyards and to make wine in many parts of Europe.

The cultivation of the vine was introduced into England by the Romans. At the time of the Norman Conquest there seem to have been vineyards in southern and southwestern Eng¬ land, and though they afterward disappeared, successful attempts were occasionally made to re-establish them ; and one at Arundel Castle in Sussex yielded about

the middle of the 18th century large quantities of wine. Of late years, the cultivation of the vine has much increased in southern England, in gardens, on the walls of suburban villas and of cottages, but chiefly for the fresh fruit, though wine of moderately good quality is made in small quantities for domestic use.

The vine is a hardy plant, so far as en¬ durance of severe winter frosts is concerned; but it requires for the ripening of its wood, as well as of its fruit, a considerable summer heat continued for several months. A very moist climate is unsuitable to it. It produces abundant fruit in warm climates, such as India; but the juice passes too rapidly into acetous fermentation to be used for making wine.

In Europe the cultivation of the vine forms an important branch of rural economy as far north as Coblenz on the Rhine; but in some countries, particularly Greece and the Ionian Islands, raisins are the chief part of the produce of the vineyards.

The cultivation of the vine was early intro¬

duced by the Spanish and Portuguese into the Azores, the Madeira and Canary Isles and America. The first vines were carried to the Cape of Good Hope by the Dutch in 1650; but while the vines of Madeira and those of the limited district of Constantia at the Cape of Good Hope have long had high celebrity, and those of Canary and Teneriffe have been im¬ ported in considerable quantities into Europe, it is only of late that much attention lias been given to the cultivation of the grape in the other parts of South Africa.

The early settlers of the northern portion of the United States found grapes growing wild, but for a long time little attention was given to their cultivation. From about 1620 in Vir¬ ginia and 1683 in Pennsylvania, many efforts, which resulted in failure, were made to grow European varieties; but about 1771 the culti¬ vation of these sorts was successfully estab¬ lished on the Pacific Coast. With two ex¬ ceptions the American varieties now under cultivation have been originated since 1820, and as late as 1850 there were only six or eight varieties supposed suitable for general culti¬ vation. The first marked success was with the Catawba, which came into notice about 1835, and which, though lacking in hardiness, was extensively planted. Nearly all the varieties now grown have been originated since 1860.

Besides V. vinifera, produced in California, the species of grapes

grown in the United States are as follows : V. lahrusca, the north¬ ern Fox grape, native of the Alleghany Moun¬ tain region and found from Canada to South Carolina — the source of more cultivated varie¬ ties than any other native species; among these are the Catawba, Concord, Hartford, Prolific and other popular sorts : the foxy flavor of the original largely disappears when varieties are brought under cultivation; V. riparia (with which V. cordifolia is often confounded), the Frost grape, from which we have the Elvira, Clinton and Taylor; V. CBstivalis, the Summer grape, from which have come the Cynthiana, Herbemont and Norton's Virginia; V. lahrusca., the northern Fox grape, native of the Alleghany grape and Sugar grape; V. viilpina, or rotundi-folia, the southern Fox grape, from which have come the several varieties of the Scuppernong. A large number of hybrid varieties, many of great value, have been originated. Some varie¬ ties succeed over a large area and undˆ- widely differing conditions of soil and climate ; but many sorts valuable in certain circumscribed localities do not thrive elsewhere. There is, however, little difficulty in finding kinds of good quality and a sufficient degree of hardiness for any portion of the United States. The following are among the rnost popular varie¬ ties: 'Black Grapes — Concord, Hartford, Pro¬ lific, Moore's Early, Wilder and Worden; Red Grapes — Agawam, Brighton, Catawba, Dela¬ ware, Salem and Vergennes; White Grapes — Diamond, Lady, Martha and Niagara; Foreign Grapes — Black Hamburg, Flaming Tokay and White Frontignan.

As seedings do not reproduce the parent variety, but often differ widely from it, they are grown only to procure new sorts or to ob¬ tain hardy stocks on which to graft the more delicate European kinds. Propagation is ef¬ fected by cleft-grafting (see Graftage), layers or cuttings. Grafting is to be done just before

cold weather sets in, and at a few inches below the surface of the ground. The soil is to be pressed around the graft to its upper bud, and a small inverted flower-pot placed over it so that the scion may not be loosened when the soil, which must be piled around and upon it in sufficient quantities to prevent freezing is remˆoved in the spring. This method often fails, but when successful it secures vigorous growth and very early fruitage. It is valuable particularly for testing any sorts and for utiliz¬ ing strong bearing vines which yield a poor quality of fruit. In Europe whip-grafting of varieties of V. vinifera upon roots or cuttings of American sorts — principally varieties of Vitis riparia, which are not liable to injury by the Phylloxera — is very extensively practised. In America large quantities of vines are grown from layers. In spring the cane from which plants are to be grown is fastened to the bot¬ tom of a trench six inches deep. A new plant soon springs from each bud. When these plants have made a growth of eight to 10 inches the trench is carefully filled with soil. In autumn the cane is cut between the shoots and the latter can be transplanted. Somewhat inferior plants can be obtained by laying down, in July, shoots of the same season's growth and covering at once with soil. The most common method of propagation of the vine is by cuttings. These are made in the fall from well-ripened wood of one seas'on's growth, cut into pieces six to eight inches long (each having two or three buds), cut off smoothly close to the lower bud and one inch above the upper one. In the spring these cuttings are planted, three inches apart, in a trench with a sloping side, against which they are placed. The soil must be firrnly packed in the lower portion of the trench, which is then to be filled more loosely as high as the upper bed of the cutting, which should be a little below the surface of the ground. After the shoots are a few inches high the trench is to be filled completely. The Delaware and a few other varieties will not grow well in this way, but can be started from cuttings only two or three inches long, each having but one bud. These cuttings are rooted in sand by the aid of artificial heat. _

Though the vine will grow in a great variety of soils it thrives best in soil rather light and dry. A granite or limestone formation is de¬ sirable ; and gently-sloping hillsides, especially if they face the south or southwest, are m.ore favorable than valleys or level fields. In a wet location the land should be thoroughly under¬ drained. Deep plowing is essential, and sub¬ soiling is desirable. Moderate quantities of well-

rotted stable manure should be incorpo¬ rated with the soil and ground bones arid fer¬ tilizers rich in potash will tend to promote vigorous and healthy growth of the vines. Planting may be either in spring or in fall. For the fruit garden many growers prefer vines two years old, but where planting is on an extensive scale those one year old are con¬ sidered best. The distance apart of the vines varies with the character of the variety, from six to eight feet for the small-growing sorts to 10 by 10 feet for the more vigorous kinds. At the time of planting the tops of the vines should be cut back to two or three buds, and it is often desirable to shorten the roots. Planting should be carefully done, and during the first two

seasons low growing crops, as beans or po¬ tatoes, may be grown between the rows ; but fertilizers must be liberally used or the other plants will retard the growth of the vines. Whether any other crop is grown or not, suffi¬ cient cultivation must be given to keep the soil mellow and prevent growth of weeds and grass. In the fall of the first year the top of the vine should be cut to a single cane with three buds. The second season this cane should be tied to a stake four feet high, the lateral shoots pinched off when about five inches long, also the end of the. vine when the top of the stake is reached. The third season, a trellis upon which the vines can be trained, is requisite : this may be made of posts, reaching six feet above ground, 20 feet apart, on which are fastened four lines of galvanized wire. The fruit borne this season will be on branches from the main stem ; but in later years the laterals must be cut back to three buds, after the leaves have fallen in autumn, from which will grow the new wood on which fruit will be borne the next season. Summer pruning consists in pinching back the young shoots on which fruit has started, but which are not intended for bearing canes the next year. This must not be overdone, as it is important to leave foliage enough to shade the fruit and fully to elaborate the sap. If the vine shows tendency to overbear, the fruit should be thinned when it is quite small, care being taken to remove the smallest and most imper¬ fect clusters. Girdling the vine consists in re¬ moving from the bearing canes, near the base, a ring of bark three-sixteenths to three-eighths of an inch wide. It is done, at the north, early in July, and hastens the ripening of the fruit about 10 days. The fruit is rendered somewhat softer, and seems more liable to crack; but the size is considerably increased and the flavor is fully maintained. It is to be practised only on canes which are to be removed the next season. If the best quality is to be secured, the fruit must remain on the vine till it is fully ripe. When the fruit is gathered, the stems should be cut rather than broken. Only the varieties with

thick skins can be safelv sent to distant markets, and shipments ought always to be in basket? or boxes of thoroughly seasoned wood. In cold regions it is necessary to give the vine protection during the winter. Some varieties require less than others, but where the cold is severe it is well to at least lay the vines on the ground at the approach of winter. Evergreen boughs are useful for covering. Where these cannot be had, two or three inches of soil may be thrown over the tops. Gravel or sand an¬ swers better for covering than clay or other compact soils.

The principal diseases of the American vine are mildew and black-rot. The causes of mil¬ dew are supposed to be certain peculiar condi¬ tions of the atmosphere, neglect of pruning, lack of mineral elements in the soil, and lack of constitutional vigor of the plant. Dusting the affected foliage every two weeks with flow¬ ers of sulphur, when the leaves are wet, is a common remedy. To prevent black-rot the leaves may be sprayed every 10 days, during the growing season, with the Bordeaux mixture as used for preventing the potato-rot. A pre¬ ventive of both mildew and black-rot, which is rapidly growing in favor, is the use of paper bags, which are put over the clusters when the

fruit is quite small, and fastened around the stems with common pins : the two-pound size is generally used. This method is useful also in preventing injury to the fruit by bees and other insects. The chief enemy of the European vine-grower is the Phylloxera (q.v.), which has pused imrnense losses. The remedies con¬ sist in submerging the ground with water seven or eight weeks each winter, or the application of chemical insecticides, e.g., sulphocarbonate of potassium,, or bisulphide of carbon, in sufficient quantities to reach the infested roots; but these are far too costly for general use. Preventive measures are the planting in soil containing 60 per cent of sand (an expensive method which can be employed in but few localities), and the grafting of the European varieties on hardy American sorts. The principal enemy of the vine-grower in this

country is the rose-bug, which often proves very destructive by eating the flowers. Hand-picking and dusting with pyrethrum powder are the leading remedies.

The juice of ripe grapes contains consider¬ able grape-sugar (see Sugar), small quantities of a glutinous, substance, and of extractive, bitartrate of potash, tartrate of lime, a little malic acid, and other ingredients, suspended or dissolved in water. The rapidity with which it passes into a state of fermentation after being expressed from the fruit is remarkable.

For the making of wine, the wine-trade, the qualities and uses of wine, the different kinds of wine, ‘ etc., see Wine and Wine-Making. Concerning the other commercial products of the grape, see Brandy; Vinegar; Tartaric Acid; Raisin; Currant.

VITORIA, ve-tore-a, Spain, an episcopal city, capital of the province of Alava, situated on a height overlooking an extensive plain watered by the Zadorra, 30 miles south of Bilbao. The old parts of the town are poorly built, but the new town is well laid out in spacious streets and squares and is electrically lighted. The principal buildings and establish¬ ments are the 12th century fortress-cathedral, three other churches, one of them adorned with a fine altar-piece by Velazquez, a handsome modern palace of deputies, an academy of music, theatre and prison. The chief manufac¬ tures are furniture, candles and articles in leather. There is a brisk trade, especially in steel and iron, grain and wine, as well as in the manufactures mentioned. It was the scene of two battles, the first fought in 1367, in which the Black Prince gained a victory for Pedro the Cruel; the second on 21 June 1813, in which the Duke of Wellington concluded his series of great Peninsular victories, defeating the French under King Joseph and Marshal Jourdan. Pop. (1918 est.) 35,000.

VITREOUS ROCKS, volcanic rocks with a glassy texture, due to rapid cooling which prevented the crystallization of the magma. They are comparable to the .glassy slag of furnaces. They break with a conchoidal frac¬ ture and are dark undercrossed nicols. The chief volcanic glasses are obsidian, perlite and pitchstone (qq.v.). Pumice is a cellular variety which is represented by the frothy slag of blast furnaces.

VITRIFIED FORTS, the name given to certain prehistoric hill fortresses principally found in Scotland and formed of stones heaped

together. The materials of which they are constructed are perfectly or partially vitrified or rendered glasslike by the action of heat. It is now generally believed that the vitrifica¬ tion was intentional, being effected by means of piled-up fuel.

VITRINGA, Campegius, eminent Dutch divine and commentator: b. at Leeuwarden, in Friesland, 16 May 1659; d. 31 March 1722. He studied at Franeker and Leyden, at which last place he received the degree D.D. in his 20th year. In 1681 he was appointed professor of Oriental languages ; and two years later received the chair of theology in the University of Franeker, where he died. Vitringa is regarded as one of the most learned and laborious divines of his age, and has left many excellent and erudite works, chiefly commentaries on portions of the Scriptures, nearly all in Latin ; among his works are ˆCommentarius in Jesaiamˆ ; ˆAna-crisis Apocalypseos Johannis Apostoliˆ ; ‘ˆCommentarius in Jeremianˆ ; ˆCommentarius in Zecharaiamˆ ; Wetus Synagogaˆ ; ˆDissertationes Sacraeˆ ; ˆTypus Theologicae Phopheticae, *etc.*

VITRIOL, a common name for ordinary commercial sulphuric acid and for certain salts derived from it. Ordinary concentrated sul¬ phuric acid is more specifically known as oil of vitriol; sulphate of iron or copperas is green vitriol; sulphate of copper or blue stone is blue vitriol ; sulphate of zinc, white vitriol. A dilute sweet aromatic solution of pure sulphuric acid is known in medicine as elixir of vitriol.

VITRIOL, Oil of, or VITRIOLIC ACID,

a name once applied to sulphuric acid (q.v.).

VITRUVIUS, Pollio, vi-trooVi-us p61’i-5, Marcus, Roman architect and military engi¬ neer, supposed to have flourished in the time of Julius Ciesar and Augustus, but of whose parentage and place of nativity no certain knowledge is obtainable. The most probable opinion is, that he was born at Formia, a city of Campania, now called Mola di Gaeta. The Veronese, however, claim him as a fellow citi¬ zen and have erected a monument to his mem¬ ory. He appears to have been liberally edu¬ cated; and that he traveled for information and improvement we learn from his writings. The only public edifice which he mentions as constructed from his designs is a basilica at Fanum Fortunae (now Fano) in Umbria. He wrote at an advanced age his work ˆDe Architectura Libri Decern,ˆ dedicated to the em¬ peror (without doubt, Augustus, although he is not named). This treatise, valuable as a compendium of those of numerous Greek archi¬ tects,

was first printed at Rome about 1486; and among modern editions, the most valuable are those of Schneider (1808) ; Stratico (1825-30) ; and Rose and Muller-Strubing (1867), with index by Nohl (1876). An English trans¬ lation, with commentaiy by William Newton, appeared in 1771, republished 1791, and a new translation by W. Wilkins, with an intro¬ duction, containing an Historical View of the Rise and Progress of Architecture among the Greeks,ˆ in 1812-17. This was reprinted in Cambridge in 1914.

VITTORIA COLONNA, ve-tˆ>‘re-a k5-lon’na. See Colonna Vittoria.

VITTORIO, vit-to’re-6, Italy, a city of the province of Treviso, formed in 1879 by the in¬ corporation of the episcopal see of Ceneda and the town of Serravalle, situated at the en¬ trance of Santa Croce Valley about 22 miles north of Treviso. The chief features are an ancient citadel and a cathedral. Mineral springs make Vittorio a favorite health resort. It has silk industries and manufactures of tex¬ tiles, paper, *etc.* Pop. 12,500.

VITUS, Saint, a name which appears in the martyrologies as belonging to a certain Christian who suffered under Diocletian. He owed his conversion to the teaching of a pious nurse Crescentia and her husband, Modestus. His festival is set in the Roman calendar on 15 June. As a saint of succor he is invoked for protection against sudden death, and against many diseases and distempers, notably chorea, which is commonly called Saint Vitus’s dance.

VIVANDIERE, ve-van-de-ar, in the French army, a girl or woman who sens provisions and liquor. The dress of thet vivandieres is gen¬ erally a modification of that of the regiment to which they are attached.

VIVARINI, ve-va-re’ne, Antonio, styled also Antonio da Murano, Italian painter : b. Murane about 1410; d. about 1470. He painted between 1440 and 1446 with Johannes Ale-mannus, and their work is signed Joannes et Antonins de Muriano fecerunt.ˆ After 1450 Antonio painted with his brother Bartolommeo, and an altar-piece designed by

them is in the Pinacoteca at Bologna. One of Antonio's finest works is an altar-piece, dated 1446, and now in the Venetian Academy. At the Lateran in Rome is an altar-piece, the work of Antonio alone, and the Berlin Museum contains his ˆAdoration of the Kings. ˆ

VIVARINI, Bartolommeo, bar-t6-l6-ma'o, Italian painter, brother of Antonio Vivarini : b. Murano; d. after 1499, the date of his latest picture. He painted religious pictures in tem¬ pera with a brilliancy and power equaling the effects of oils, and his ˆ Saint Augustine En¬ throned ˆ (in the gallery of the Academy of Venice), is a majestic figure distinguished by grandeur of conception and powerful execu¬ tion. There is a ˆMadonna and Childˆ of his in the London National Gallery, and his ˆ Death of the Virginˆ was sold in London for $1,100 in 1886.

VIVERRID.®, the family of the civets (q.v.).

VIVIAN, viv'i-an, Herbert, English au¬ thor : b. England, 3 April 1865. He was grad¬ uated from Trinity College, Cambridge, in 1886, has traveled extensively, was editor of the Whirlwind in 1889, special correspondent of the London Morning Post in 1898-99, of the Daily Express in 1899-1900, and in 1901 revived the Rambler. He has published ˆServia, the Poor Man's Paradiseˆ ; ˆTunisia and Modern Barbary Piratesˆ ; ˆAbyssiniaˆ ; ˆThe Servian Tragedyˆ ; Htaly at War,ˆ *etc.*

VIVIAN, Thomas Jondric, American au¬ thor: b. Cornwall, England, 3 Aug. 1855. He was educated in France, came to the United States, where he engaged for a time in teaching, and since 1886 has been engaged in editorial work. His writings include ˆ Seven Smiles

and a Few Fibsˆ ; ˆEverything about Our New Possessionsˆ ; ˆLuther Strongˆ ; translation from Catulle Mendes' ˆThe Fairy Spinning-wheel,ˆ *etc.*

VIVIAN GREY, a novel by Benjamin Dis¬ raeli, published in 1827-28. It was his earliest essay in fiction, and despite serious faults of construction and character delineation, achieved great success, its unusual representation of the hero as a man-of-the-world no doubt having much to do with its popularity.

VIVIANI, ve've-a'ne, Rene, French states¬ man : b. Sidi-ibel- Abbes, Algeria, 8 Nov. 1863. He was an associate worker on the Petite Repnb-lique, becoming Socialist Deputy for Paris. In 1893 he was appointed Minister of Agriculture in the Clemenceau Cabinet. With the creation

of the Ministry of Labor by M. Clemenceau, M. Viviani received the post. With the con¬ struction of the Briand Cabinet he was also a member. June 14, 1914 he was elected Prime Minister of the 57th ministry of the Repub¬ lic taking the portfolio of Minister of Foreign Affairs, which (Aug. 26) he passed over to M. Theophile Delcasse.

VIVIANITE, a mineral having the com¬ position of a hydrous phosphate of ferrous iron, Fe3(P04)2 -|- 8H2O; sometimes called Prussian blue. It often occurs in globular masses showing stellate-foliated structure, also earthy or as an incrustation. Distinct crystals are comparatively rare. They are rhonoclinic prisms, usually transparent and of metallic-pearly to vitreous lustre. They exhibit strong pleochroisrn and green, steel-blue to indigo-blue colors. The cleavage parallel to the clino-pinacoid is highly developed. The hardness of vivianite is 1.5 to 2 and its specific gravity is about 2.63. It is often associated with pyrite, pyrrhotite or limonite and is also found in the clay beds, peat bogs and the green-sand forma¬ tions. Many curious occurrences are noted in mineralogical books. The original locality in Cornwall, England, has produced many fine specimens, also Australia, Allentown and Mul-lica Hill, N. J.

VIVIEN DE SAINT-MARTIN, ve-ve-an de san mar-tan, Louis, French geographer and author: b. Saint-Martin-de-Fontenoy, France, 17 May 1802; d. Paris, 3 Jan. 1897. He early devoted himself to geography, his first work ˆCarte Electoraleˆ appearing in 1823. He founded and conducted in 1828-30 Biblio-mappe, a geographical journal, and subse¬ quently was engaged for many years in various labors of translation and editing. He was one of the founders of the Paris Geographical So¬ ciety, and in 1863-76 he edited the ˆAnnee geographique,ˆ a post which he resigned to as¬ sume direction of the ˆNouveau Dictionnaire de geographie universelle.ˆ His works include ˆDescription de I'Asie Mineureˆ (2 vols., iM5) ; ˆ Etude sur la geographie grecque et latine de rindeˆ (1848-60) ; ˆ Atlas universal de geog¬ raphie, moderne, ancienne, et du moyenageˆ (1877), *etc.*

VIVIPAROUS ANIMALS, those animals which bring forth their young alive ; dis¬ tinguished from oviparous animals, that lay eggs. Properly speaking, the name should be limited to that form of reproduction seen in Mammalia alone, in which the young during

the whole course of their development are con¬ tained within the parent body, and bear to the parent organism a definite and intimate degree of relationship. Thus in Mammalia the young animal is contained within a special cavity, the uterus or womb, and is nourished by the blood of the parent during its development, while only at birth does it pass from the body of the parent to the outer world. Viviparous is sometimes applied in botany to plants that germinate from a seed or bud while retained on the parent plant. See Mangrove; Anatomy, Comparative.

VIVISECTION, the dissection of an animal while alive; physiological experiments on liv¬ ing animals. It is practised with the view (1) of increasing physiological knowledge; (2) of confirming known facts; (3) of giving dexterity in operative surgery. Strictly, vivisection im¬ plies only ‘^cutting,” but the term is now ex¬ tended to include all kinds of experiments on living animals. The practice of vivisection can be traced back almost to the earliest periods of medicine and surgery, and was in vogue in the Alexandrian school. In recent years much opposition has been excited against it, and those adverse to the practice, the so-called anti-vivisectionists, have endeavored to restrict or wholly abolish vivisection by harsh measures. It is alleged that animal experimenters prac¬ tise much needless cruelty, but even apart from this, some have taken the extreme view that any experiments on living animals, with the object of advancing medical and surgical knowl¬ edge, are, on moral grounds, unjustifiable. Those who advocate vivisection point to the gains which have accrued to physiology, and also directly to the healing art, by experiments on living animals. The circulation of the blood, and the existence of the lacteals, were thus established; and nearly all our present knowl¬ edge of the functions of the nervous system has been thus obtained, and could never have been afforded by the most minute anatomical research. In consequence of the knowledge thus obtained we no longer divide a motor nerve, and thus paralyze the face, in the hope of re¬ lieving tic douloureaux, while we now see our way to a more rational mode of treating epilepsy, various obscure forms of paralysis, *etc.* Without vivisection we could never have clearly understood the causes of the sounds of the heart, and without the knowledge of these the stethoscope would have been useless in the diagnosis of cardiac diseases ; nor should we without vivisection have known anything of the true nature of many mysterious diseases. The Hunterian treatment of aneurism by liga¬ ture, which has saved hundreds of human lives,

was worked out by experiments on liv¬ ing animals, and so have been the improved methods of the transfusion of blood. The study of anaesthetics, which, after prolonged in¬ vestigation, led to the introduction of chloro¬ form, was unquestionably accompanied by the suffocation of many animals; but the vast amount of misery spared to humanity by the general introduction of anaesthetics into surgery and midwifery practice more than counter¬ balances the pain inflicted in the experiments. The discovery of the healing power of diph¬ theria antitoxin, wherel)y countless lives of infants and children suffering from this dis¬

ease ha\e been cured, is a direct outcome of animal experiments. If vivisection were abol¬ ished the manufacture of antitoxin would per¬ force cease. The lower animals themselves have shared in the benefit, for (to mention only one instance) the discovery of the cause of anthrax in sheep made by means of vivisection has lesulted in not only saving the lives of vast numbers of these animals (an enormous eco¬ nomic gain), but in preventing the sufferings of sheep attacked by the disease. By experiments on living animals must be sought the solution of such questions as the best means of restor¬ ing to life persons apparently drowned ; why chloroform sometimes kills, and how those suf¬ fering under apparently fatal effects can be best recovered. These and similar considera¬ tions lead the advocates of vivisection to the conclusion that experiments on living animals performed — always with care to avoid need¬ less pain — with the object of advancing medi¬ cal, surgical or toxicological knowledge, and of thereby relieving human and animal suf¬ fering, or prolonging human life, are not only justifiable, but are a matter of duty. The Vivisection Act of 1876 regulates and restricts to a certain degree the practice of vivisection in England.

The literature on the subject is extensive. Consult Wivisection,ˆ 500 prize essays (Bos¬ ton 1898) ; pamphlets issued by the Research Bureau of the American Medical Association (Chicago 1909-13) ; ˆReportsˆ of the Ameri¬ can Humane Association (Chicago 1895-99) ;

ˆ Reportsˆ of the Royal Commission (London 1907-12) ; Keen, W. W., ˆAnimal Experimenta¬ tion and Medical Progressˆ (Boston 1914), the best work on the subject. The American anti-vivisectionists publish the Journal of Zoophily (Philadelphia), the Open Door (New York) and the National Humane Review (Albany).

VIZAGAPATAM, ve-za”ga-pa-tam’, India, a town, capital of a district

of the same name, in the Madras Presidency, on the Bengal coast, about 180 miles northeast of Masulipatam. It is a military station and has a good harbor, a modern water supply, sanitary system, hemp manufactures, and an export trade in rice and sugar. Pop. about 50,000.

VIZCAINO, veth-ka-e'no*, Sebastian, Span¬ ish navigator; b. Huelva, about 1550; d. Acapulco, Mexico, about 1615. After being prominent in Mexico he headed exploring ex¬ peditions from Acapulco to Lower California, 1596-97, and in 1602-03 along the California coast to latitude 43°, discovering the bay which he called Monterey, and sent a vessel which appears to have reached the mouth of the Columbia. He also sailed to Manila and Japan, 1611-14, carrying Franciscan missionaries to Japan, and was the earliest to attempt to estab¬ lish commercial relations between Spain and Japan. His reports of his voyages to Cali¬ fornia were printed in Torquemada's ˆMonar-quia Indianaˆ (1615), and the greater share of his narratives, including that of his voyage to Manila, was included in De Navarrete's ˆColeccion de Viajes y Descubrimientosˆ

(1625-29).

VIZETELLY, viz-e-tel'i, Edward Henry

(ˆˆBertie Clare®), English journalist and war correspondent, son of H. R. Vizetelly (q.v.) :

b. Chiswick, England, 1 Jan. 1847; d. London, 13 April 1903. He was educated at the Imperial Lyceum, Saint Omer, France. At the outbreak of the Franco-Prussian War he became special correspondent for the New York Times and the London Daily News, served as orderly officer on the staff of Garibaldi, and was present at Dijon and at Langres; subsequently he en¬ gaged in the Kabyle insurrection of 1871, served in the Russo-Turkish War of 1877-78 and in the Greek insurrection of the latter year. He founded the Cyprus Times in 1881 and the Times of Egypt at Alexandria in 1882. At the bombardment of Alexandria on 11-12 July 1882 he was the only Englishman in the city, and during the firing sent half-hourly dispatches to London. In 1888 he commanded the New York Herald relief expedition sent in search of Stanley in Africa, and met him in East Africa in 1889. He was the author of ˆReminiscences of Bashi Bazoukˆ ; ˆFrom Cy¬ prus to Zanzibarˆ ; ˆThe Warrior Woman. ˆ His son Henry Edward is a member of the First Central Ontario regiment on active serv¬ ice in France (1918).

VIZETELLY, Ernest Alfred, English

author, translator and war correspondent; Chevalier of the Legion of Honor; French medal of the War of 1870-71 : b. 29 Nov. 1853; son of H. R. Vizetelly. He was educated at Lycee imperial Bonaparte, now Condorcet, Paris. During the Franco-German War (1870) he became a newspaper correspondent (young¬ est on record) and artist for Daily News, Pall Mall Gazette, and Illustrated London News; was in Paris during part of the German siege; passed out, joined the Army of the Loire, at¬ tached to Staff of Third Division 21st Armv corps; was in Paris throughout the Com¬ mune; continued acting in a journalistic capacity on the Continent until about 1886 he became an editor and reader to Vizetelly and Company, publishers. After the liquidation of that business, conse¬ quent upon a prosecution for publishing trans¬ lations of some of Zola's novels, Mr. Vizetelly reverted to journalism; but in later years pre¬ pared or edited English versions of most of Zola's works, besides producing ˆThe Hep-tameronˆ (English Bibliophilists' edition, 5 vols., 1894) ; ˆThe True Story of the Chevalier d'Eon> (1895); <With Zola in England> (1899); ˆBluebeard, Comorre the Cursed and Gilles de Raisˆ (1902) ; ˆ Emile Zola, Novelist and Reformerˆ (1904) ; ˆThe Anarchists, their Creed and Recordˆ 0911) ; also ˆThe Scorpion, a romance of Spainˆ (1894) ; ˆA Path of

Thorns, a story of French Life^ (1901) ; ^The Lover's Progress^ (1902) ; ^Le Petit Homme Rouge: The Court of the Tuileries^ (1907); ^The Favourites of Henry of Navarre^ O910O ^The Favourites of Louis XIV^ (1912) ; ^Re¬ publican France (1870-1912)^ (1912); ^My

Days of Adventure^ (1914) ; ^My Adventures in the Commune of Paris^ (1914) ; Hn Seven Lands> (1916).

VIZETELLY, Frank (Francis) Horace,

American lexicographer, author, editor, ency¬ clopedist ; b. Kensington, London, 2 April 1864, educated in schools of the Christian Brothers, Saint Servan, Normandy (1870) ; Lycee Baudard {Sieve couronne), Nogent-sur-Marne, France (1871-7-5), ai-d Arnold College, East¬

bourne, England (1876-80), Litt.D., Orienial University, Washington, D. C. ; LL.D., Saint John's College of the University of Maryland. In the fall of 1882 entered the firm of Vizetelly and Company, publishers, where he served as apprentice under George W. Redway. On the withdrawal of Redway (1883), he assumed management of the wholesale and export de¬ partment — a position he held until February 1891. From 1^0 to 1890 he contributed articles on cycling to The Cyclist, Coventry, and Wheeling, London. In 1901 he investigated the conditions prevailing in the detention camps of the Boer prisoners of war, at Ber¬ muda, the only civilian accorded that privilege bv the British authorities, and published his report in the leading American and English newspapers. Owing to the prosecution of his father, and the heavy losses entailed thereby, he left the business in the hands of his elder half-brother, Arthur (died April 1916), and sailed for New York City, 22 Feb. 1891. He joined the editorial staff of the Funk and Wag-nalls Company 6 April 1891 ; assistant editor of the ^Standard Dictionary^ (1891-95); associate editor of same, new edition, 1903 ; managing editor, 1905 ; managing editor Funk and Wag-nail's ^New Standard Dictionary^ (1908-13) ; general editor, 1913- ; associate editor of the Home and Country Magazine, 1893-94; one of the editors of Hoyt's ^Cyclopedia of Practical Quotations^ (1895) ; one of the editors of Merck's 1896 Hndex of Chemicals and Drugs^ (1895) ; associate editor of the ^Standard Dictionary^ abridgments, student edition, 1897; Comprehensive, 1898; Concise, 1901, and Vest Pocket, 1906, and supervising editor of the new editions, 1913-18; office editor of more than 100 miscellaneous publications on English public speaking, medicine, history, social reform, travel, *etc.* ; managing

editor ˆColumbian Encyclopediaˆ (40 vols., 1898) ; revising editor of the ˆCyclopedia of Classified Datesˆ (1899) ; contributor to ˆAppleton's An¬ nual Encyclopediasˆ ; ˆThe New International Encyclopediaˆ (1905) ; secretary of editorial board and manager editorial department of the Qewish Encyclopediaˆ (12 vols., 1901-05) ; editor of ®The Lexicographer's Easy ChaiPˆ {The Literary Digest), 1904-09, 1912-, and editor-in-chief of the Standard Reference Bureau, 1913- ; also of departments of pro¬ nunciation and typography on the ˆNew Schaff-Herzog Encyclopeaia of Religious Knowledgeˆ (12 vols., 1905-11) ; editor of Department of Pronunciation of ˆStandard Bible Dictionaryˆ (1908-09). Elected Fellow of the Royal So¬ ciety of Arts, London, 1903; and various other societies.ˆ Publications: ˆThe Preparation of Manuscripts for a Printerˆ ; ˆA Desk Book of Lrrors in Englishˆ ; <The Development of the Dictionary of the English Languageˆ ; ˆEssen¬ tials of English Speech and Literatureˆ ; ˆA Desk Book of 25,0(X) Words Frequently Mis¬ pronouncedˆ ; <A Dictionary • of Simplified Spellingˆ ˆThe .Soldier's Service Dictionary U ˆA Desk Book of Satire, Sarcasrh, Cynicism and Ironyˆ ; ˆEnglish Idioms and Idiotismsˆ ; 'A Desk Book of Prefixes, Suffixes, Bases and Sterns,ˆ and many miscellaneous articles and reviews to the periodical press.

VIZETELLY, Henry Richard, English newspaper proprietor, editor, publisher and

writer; b. London, 30 July 1820; d. Tilford, near Farnham, England, 1 Jan. 189-1. He came of a family of printers and stationers, was edu¬ cated at Clapham and at Chislehurst and was later apprenticed to a wood-engraver, an art in which he became proficient, his most notable work as an engraver being a series of illus¬ trations drawn by Birket Foster for Long¬ fellow's ˆ Evangeline.ˆ He took a promi¬ nent part in founding The Illustrated London News in 1842, and was one of the founders oi the. Pictorial Times in 1843, a pioneer enter¬ prise in illustrated journalism; published the first English edition of *ˆ1111010 Tom's Cabinˆ in 1853; established the Illustrated Times in 1855; the Welcome Guest in 1858; and in 1865-76 was correspondent of the

Illustrated Lon¬ don News at Paris and at Berlin. He was appointed representative of the British gov¬ ernment on wines at the Vienna Exposition in 1873 and at Paris in 1878, and for his labors at the former was created by the Austrian em¬ peror chevalier of the Order of Franz-Joseph of Austria. In 1880, with the aid of his sons Arthur (1881) and Frank (1882), he estab¬ lished a publishing house in London and en¬ gaged in issuing translations of the works of foreign authors, chiefly Russian and French, and in 1884 began to publish translations of the works of Emile Zola. The literal transla¬ tions of the works of the novels of the French realist, however, aroused a storm of protest, and in 1888 he was indicted on the charge of publishing obscene libels, and, on the advice of counsel, pleaded guilty and agreed to with¬ draw the edition of Zola's works. Thereupon he was fined £100 ($500) and required to enter into his own recognizances to be of good be¬ havior for a period of six months. In 1889, in harmony with his understanding of the un¬ dertaking given, he decided to issue an expur¬ gated edition of the works of Zola. Notwith¬ standing the deletion of all the passages to which objection had been raised, he was in¬ dicted a second time, and, being then 71 and broken in health, he, following advice of. coun¬ sel, again pleaded guilty, and was sentenced to three months' imprisonment as a first-class misdemeanant. He occupied the time of his detention in writing his reminiscences to the year 1870. His writings include a series of monographs on wines, entitled ˆWines of the World> (1875); ˆFacts about Sherry> (1876); 'Facts about Champagneˆ (1879) ; 'Facts about Port and Madeira> (1880) ; 'The Story of the Diamond Necklaceˆ (2 vols., 1867) ; 'Berlin under the New Empireˆ (2 vols., 1879) ; 'Paris in PeriP (3 vols., 1882) ; and two volumes of literary reminiscences; 'Glances Back through Seventy Yearsˆ (1893), *etc.*

VIZIER, vi-zer', a title given to high politi¬ cal officers in the Turkish Empire and other Mohammedan states. In Turkey, the title is given to the heads of the various ministerial departments into which the Divan or Minis¬ terial Council is divided. The president of the Divan or Prime Minister is known as Grand Vizier.

VLADIKAVKAZ, vla-de-kav-kaz', Russia, a fortified town in Caucasia, capital of Terek district, situated on an elevated plane at the northern base of the Caucasus, about 90 miles north of Tiflis, with which it is connected by

a military road through the Dariel gorge. It is connected by rail with

Rostov and with Petrovsk on the Caspian, and is rapidly de¬ veloping as a commercial centre. Pop. about

79,343.

VLADIMIR I, vla'di-mir or vla-de'mir, Saint, "the Great,® Russian emperor, son of the Grand Duke Sviatoplav : d. Beresyx, Rus¬ sia, 15 July 1015, He received from his father in 972 the government of Novgorod, notwith¬ standing his illegitimacy, and the remainder of the empire was divided between the lawful heirs, Jaropalk and Oleg. Jaropalk killed Oleg in a quarrel in 977, and Vladimir escaped a similar fate only by flight. In 980, Vladimir returned with an army, overthrew and caused the assassination of Jaropalk and became sole ruler of the empire. He then extended his boundaries from the Black Sea to the Baltic, and founded his capital at Kiev. While be¬ sieging the Christian city of Cherson in the Crimea he decided to demand the hand of Anna Romanovna, sister of Constantine IX, the Byzantine emperor, in return for a cessation of hostilities. The demand was granted, and by this princess, Vladimir was converted to Chris¬ tianity. The Greek Church was established in Russia and Vladimir's subjects willingly em¬ braced the new faith. The character of the emperor seems completely to have changed after his conversion. He built churches and monasteries, abolished capital punishment, and in his private life substituted chastity for the former licentiousness. He divided his empire among his 12 sons, and after his death was canonized in the Greek Church, and in 1782 the "Vladimir Order® was founded by Catha¬ rine H. Consult Karamzin, 'History of Russia> (1816).

VLADIMIR II, Monomachus, Russian emperor, great-grandson of Vladimir I : b. 1052; d. Kiev, Russia, 19 May 1126. Contrary to the Slavonic law, he succeeded to the throne in 1113. He possessed both valor and ability, and under his wise rule, Russia enjoyed a period of great prosperity. He married Gida, daughter of Harold of England, and the famous Valde-mar of Denmark was his grandson. He wrote a "Testament,® which is valuable as a picture of the manners and opinions of the day. Consult Rambeau, 'History of Russiaˆ (1886),

VLADIMIR, Russia, (1) a town, capital of the government of same name, on a lofty and wooded bank above the Klyazma, 105 miles northeast of Moscow. It is one of the oldest towns in Russia ; and has a 12th century cathe¬ dral, a theological seminary, considerable manu¬ factures and a trade in fruit, particularly cher¬ ries. From 1157 to

1328 it was the residence of the Russian grand princes. It was twice sacked in 1238 and 1410 by the Tatars. Pop. about 43,522. (2) The government has an

area of 18,864 square miles. It has an undu¬ lating surface with a general slope toward the east, and is not very fertile. The drainage is all carried to the Volga by the Oka and its tributary, the Klyazma. The province is rich in archaeological remains of the Palaeolithic and subsequent ages. There are important manu¬ factures of linens and woolens and several blast-furnaces. Before the war the production of textiles was about $125,000,000 annually. Pop. about 2,225,900.

VLADIVOSTOK — VOCATIONAL EDUCATION

VLADIVOSTOK, vla-de-vos-tok’, Asiatic Russia, a fortified seaport town of eastern Si¬ beria, on the harbor of the Golden Horn in the Gulf of Peter the Great, Japan Sea. It was founded in 1861, and is an important naval station of Russia, and the eastern terminus of the Trans-Siberian Railway, the first sod of which was cut at Vladivostok, 24 May 1891, the line being opened in December 1901. The harbor is surrounded by hills which are well fortified. It has large dry docks, waterworks, electric street railways and street lighting plants, two large shipbuilding yards and 60 new mechanical shops. Vladivostok is an open port and has lines of steamers running-to Japanese and Korean ports, and a line opened in 1900 to Seattle, Wash. Ice-breaking steam¬ ers keep the harbor open in the winter months. A Japanese squadron bombarded Vladivostok early during the Russo-Japanese war of 1904, but without inflicting any serious damage. During the World War the supplies sent from the United States for the Russian armies were mostly landed at Vladivostok. Pop. about 91,464, including soldiers and numerous Chi¬ nese, Japanese and Koreans. See Trans-Siberian Railway.

VOCATIONAL EDUCATION. Voca¬ tional education is that education whose chief aim is to fit for productive capacity. That vocational education which is specialized to the preparation of lawyers, pl \ysicians and teachers is called professional; ˆat which is designated to train the bookkeeper, clerk, stenographer or commercial traveler, including business leadership, is called commercial ; that which is organized with reference to the needs of the bricklayer, the machinist, the shoe¬ maker, the metal worker, the factory hand and higher manufacturing pursuits is called indus¬ trial ; that which conveys skill and knowledge looking to the tillage of the soil and the man¬ agement of domestic animals is called agri¬ cultural ; and that which teaches the girl dress¬ making, cooking and the management of the home is called education in the household arts or homemaking.

The term vocational education has come to be applied somewhat loosely to cover the field of industrial, agricultural and homemaking education ; ‘particularly has it come to mean in¬ dustrial education of

less than college grade for boys and girls, and other persons, over 14 years of age.

The early American colonists appreciated the importance of industrial training for chil¬ dren and in some cases provided for it by law. A Massachusetts law of 1642 provided for the putting forth by the towns as ˆapprentices the children of such as shall not be able and fit to employ and bring them up … and they are to take care that such as are set to keep cattle be set to some other employment withal, as spinning up on the rock, knitting, weaving, tape, *etc.* They are also to provide that sufficient quantity of materials, as hemp, flax, etc., may be raised in their several towns, and tools and implements provided for working out the same.ˆˆ Virginia in 1646 advanced an elaborate plan for industrial education for poor children who were to be sent up to James City to be employed in the public flaxhouses under such master and mistresses as shall be ap¬

pointed in carding, knitting and spinning. These and other laws seem to be reproductions of antecedent English laws of the same nature.

Between 1824, when the House of Refuge for delinquent boys was established in New York City, and 1875 American reformatories for juvenile delinquents provided industrial work which, while at first not of an educative character, gradually became so by the substi¬ tution of the domestic industries of the institu¬ tion, farming, gardening, carpentering, blacksmithing, plumbing, painting, bricklaying, fur¬ niture making and printing for the contract work originally provided. For many years the reformatories for juvenile delinquents were almost the only institutions providing trade training for pupils 14 years of age and over.

The modern system of industrial education may be traced in part for its origin to the manual training movement. Calvin M. Wood¬ ward and John Daniel Runkle were closely con¬ nected with the beginning and growth of man¬ ual training in America. Woodward who was a professor of applied science and mathematics at Washington University, Saint Louis, and Runkle who was a professor of mathematics at Massachusetts Institute of Technology, saw the exhibit of the Imperial School of Moscow, Russia, at the Centennial Exhibition in 1876 and became interested in the form of manual training developed by Victor Della Vos. The idea of Della Vos was that of pure manual training, not to make a product but to train a worker in certain tool processes. Woodward founded the first manual training

school in America in Saint Louis in 1880.

Between 1890 and 1905 manual training was introduced into approximately 200 cities of over 8,000 population. About 1905 there began a strong tendency to criticize manual training. This criticism assumes two forms: (1) that manual training courses as phases of general education should have more real educative value than the formal schemes of exercises that have prevailed in the past; (2) a demand for the substitution of actual special trade training for those intending to become industrial work¬ ers. Manual training in consequence giving place to (1) industrial arts courses in the grade schools and higher schools, and (2) trade preparatory courses in industrial schools.

Little or no attention was .given by the pu-lic school systems to industrial education up to 1900. The first work was undertaken by private enterprises and philanthropy about 1850 in the direction of special industrial education when Cooper Union and the Mechanics Insti¬ tute of Philadelphia, the Ohio Mechanics' In¬ stitute of Cincinnati and the Virginia Me¬ chanics' Institute began to offer instruction at night in drawing, mathematics and science for the benefit of those employed in industrial occupations during the day time. The first forms of industrial education in America open to the general public, but under private super¬ vision and control, thus were supplemental or related courses. Later on shop was offered on a trade extension basis.

The private trade school for boys over 16 years of age represents tlie first attempt to deal with the problem of industrial training in day school. In 1881 the New York Trade School offered four-monlh courses in the building

trades to young men between the ages of 17 and 24. During the next 20 years a few such schools were founded, such as the Williamson Free School of Mechanical Trades, near Phila¬ delphia, the Baron de Hirsch Trade School of Aew York City and the Milwaukee School of 1 rades, all under private control.

The report of the Massachusetts Commis¬ sion on Industrial and Technical Education issued in 1906 jpointed out that large numbers of boys and girls were leaving school at the age of 14 and before graduation from the elementary school, and that such children made little economic progress during the two or three years following. The first trade preparatory schools for children from 14 to 16 years of age were founded in Rochester, N. Y., and Albany, N. Y., in 1908 and 1909. Many of these trade preparatory schools have been organized in New York, Massachusetts, Con¬ necticut and other States. Special State aid for this type of education was furnished by several States, including New York, Massa¬ chusetts, New Jersey, Pennsylvania, Indiana, Wisconsin and Connecticut.

As a resultant of a long campaign on the part of the National Society for the Promotion of Industrial Education, now called the Na¬ tional Society for Vocational Education, a Fed¬ eral act called the Smith-Hughes Act was in February 1917 passed by Congress and ap¬ proved by President Wilson. This act pro¬ vides for the promotion of vocational education in agriculture, the trades and industries and homemaking; it also provides for the encour¬ agement of teacher training courses for the preparation of teachers of those subjects. The act provides for extensive annual appropria¬ tions to aid the States in this work under a co-operative plan.

The ternis of the Smith-Hughes Act will determine the course of vocational education in the United States for many years. Under this act the Federal government does not pro¬ pose to undertake organization and immediate direction of vocational training in the States, but does agree to make from year to year sub¬ stantial contribution to its support. It under¬ takes also to pay over to the States annually certain sums of money, and to co-operate in fostering

and promoting vocational training and the training of vocational teachers.

The Federal government bases its reasons for cooperation with the States upon four fundamental ideas: (1) that vocational edu¬ cation being essential to the national welfare it is a function of the national government to stimulate the States to undertake this new and needed form of service; (2) that Federal funds are necessary in order to equalize the burden of carrying on the work among the States; (3) that since the Federal government is vitally interested in the success of vocational educa¬ tion, it should purchase a degree of partici¬ pation in this work; and (4) that only by cre¬ ating such a relationship between the central and local governments can proper standards of educational efficiency be set up.

The terms of the Smith-Hughes Act are administered by the Federal Board of Voca¬ tional Education, Washington, D. C. This board is also charged with the important duty of the vocational rehabilitation of injured soldiers and sailors who served in the World voi . 28 — n

War. Every State in the Union has accepted the provisions of the Smith-Hughes Act.

There are four types of trade or industrial schools or classes recognized by the Smith-Hughes Law: (1) Evening industrial; (2) part-time or continuation; (3) unit trade pre¬ paratory schools ; and (4) general industrial schools in cities under 25,000. The evening industrial schools give instruction supplemental to the day employment of persons 16 years of age or over who have entered upon a par¬ ticular trade or industrial pursuit. These schools are important and popular everywhere. The unit trade preparatory schools provide trade instruction to children 14 years of age and over preparatory to entrance to a specific trade or industrial occupation. The general industrial school in cities of 25,000 and under provides instruction in closely allied industry groups, as the metal trades, the building trades, the printing trades for the preparation of those who wish to prefjare themselves for useful employment; these schools will be as near like the trade preparatory schools as it is possible to have in the small community. The various part-time classes will furnish appropriate in¬ struction to children over 14 years of age who have entered upon employment. This instruc¬ tion may be trade extension, or supplementary, or general education, and must be given during regular working hours, 8 a.m., and 5 p.m., and for not less than 144

hours per year. A large number of States have compulsory continu¬ ation school laws, including Wisconsin, Penn¬ sylvania, New York, New Jersey.

Lewis A. Wilson,

Director, Division of Agricultural and Indus¬ trial Education, Neiv York State Department of Education.

VOCATIONAL GUIDANCE. Vocational guidance is interpreted as the effort of teachers, or others entrusted with work connected with teaching, to study the aptitudes and capacities of young people in school or college, or else¬ where, with a view to placing them, in the trades or professions for which they seem best adapted. Those who do this work are not necessarily teachers of these trades or profes¬ sions, but they must be familiar with the gen¬ eral character of them and the opportunities which they offer. They must also be in close touch with those who are doing the actual teach¬ ing, or giving the vocational training, which is of course to be distinguished from vocational guidance.

The importance of guiding youth wisely in the selection of a career has been recognized in all ages, but as an organized system, worked in connection with schools, it is of comparatively recent growth. The Germans may, perhaps, be said to have begun systematic work with it. The horizontal stratification of society over there, where following in the footsteps of one's father is the usual thing, made the task simpler than in the United States where there is a ver¬ tical stratification, and the ideal of all is to rise to the top. In the struggle to get up which ensues the usual idea is to get away from the trammels of ancestral tradition, and to try to find success in far different fields. Under such a system where every youth is 'given a free choice and where the ideal of a Lincoln, or an Edison, or a Carnegie, is constantly held

up as a possibility, it is but natural that thou¬ sands should enter the struggle to rise higher, and that but few would succeed. Young people

try to enter trades and professions for which they are ill-adapted and have no capacity, or which are already crowded by competition. The result is that by way of contrast, Germany, by guiding, if not virtually dictating, the trades and the walk of life into which the youth should go, presents cases of fewer misfits, less wreck¬ age and a larger number of skilled workmen. In spite of the fact that the opponents of the German system point out that it is essentially undemocratic, that it cramps freedom of choice and opportunity, and is a contributing factor to the deadening grind which seemingly leads to a greater number of suicides among young peo¬ ple, this is felt to be a lesser evil than the lack of skilled workmen and the frightful num¬ ber of failures which result from the free-for- all policy of America which permits so many thousands to enter trades and professions for which they are not fitted.

As early as 1881, Lysander S. Richards pub¬ lished a book on guidance entitled ˆVocophy.ˆ After a lapse of some time the subject was again taken up, and with increasing vigor, dur¬ ing the first two decades of the 20th century. A bureau for vocational guidance was estab¬ lished in Boston in 1908. In other places similar efforts were made by teachers and others, par¬ ticularly in the schools.

Closely following the vocational guidance movement came one paralleling it and calling for vocational teaching and training, so that the two have worked hand in hand. School boards, special committees in colleges, business and indrustrial firms and organizations, clubs and religious associations gave the subject their attention. Legislatures of many States appro¬ priated considerable sums for its promotion.

Advocates of vocational guidance maintain that it should begin in the lowest school and continue through college, and even into the business and professional world. The teacher should seek to find out the aptitudes and ca¬ pacities of pupils and develop them to the end that the best along such lines in a pupil should be developed. The student should be guided in an intelligent choice of elective studies. As the pupil progresses the work of guidance should go into the hands of a counsellor or group of counsellors who make a business of guiding students and of studying the qualities required by and the opportunities in the various trades and professions.

The work of the professional counsellors does not end there. They follow up the work of the student when placed to see that the proper progress is made and if any possible errors in placement have been made. Not less important, perhaps, is their obligation to study the actual surroundings into which the young workers are called upon to

go. If they are found to be bad, the counsellor works in co¬ operation with the employer for improvement. A further part of the cooperation is to try to guide to the employer the kind of worker that is needed and to keep such worker in the con¬ tinuation classes in school or college, which will improve his knowledge and skill.

The colleges have been less quick to take up with vocational guidance than the schools

and outside agencies. There has been a tend¬ ency on their part to let the student ^^find him¬ self® by himself, but this has not been true of all of our higher institutions.

The difficulties encountered in vocational guidance in America have arisen from the ambition of the student, and of his parent, some¬ times one and sometimes both, to prepare for a trade or profession for which he is obviously unfitted. Even the foreigners, who come to this country and are accustomed to the idea of careful guidance, feel a resentment against any restriction on perfect freedom of choice, re¬ gardless of what may be said of their aptitudes and capacities. A truth often expressed is that they came to America to get free from the very restrictions which the advocates of vo¬ cational guidance would place upon them. They would rather have^ a chance at the highest and fail than never have had any chance at all. They do not care for the wreckage of too am-bitously chosen careers and even less for the effect of such on our industrial community. The hope springs eternal in their breasts that they will succeed where others failed.

In addition to the above the most serious problems before the counsellor in vocational guidance to-day are: (1) to devise the most accurate system possible for estimating the apti¬ tudes and capacities of those to be guided ; (2) to avoid that kind of vocational guidance, which, because of the financial and social position of the youth, would place him in a horizontal stra¬ tification, such as is common in European coun¬ tries, and deny to him the opportunity which democracy offers of rising to the top.

Bibliography.— Brewer, ^The Vocational Guidance Movement^ (1918) ; Sullivan, <A Bib¬ liography Concerning Vocations^ (1916). In the above two practically all of the important books on the subject will be found listed.

James Sullivan,

Director of the Division of Archives and His¬ tory of the University of State of New York.

VODKA, a Russian intoxicating liquor, dis¬ tilled from potatoes, rye and occasionally other sources; much used by the peasants. Early in the World War its use was prohibited by the tsar. This cut off the government revenue, which was considerable. During the chaos that followed, vodka was manufactured in an irregular way almost as fully as before the war.

VOGDES, Israel, American soldier: b. Wil-hston. Pa., 4 Aug. 1816; d. New York, 7 Dec. 1889, He was graduated at West Point and served in Florida against the Seminole Indians in 1849-56. He was captured by the Confed¬ erates 9 Oct. 1861 while repelling their attack on Santa Rosa Island, Fla. ; released in August 1862; and as brigadier-general of volunteers commanded Folly Island, S. C., in April-July 1863. He was promoted colonel. United States army, 1 Aug. 1864; commanded the defenses at Portsmouth and Norfolk in 1864-65; was brevetted brigadier-general. United States army, in April of the year last named ; and was re¬ tired at his own request in January 1881.

V OGEL, fo'gel, Eduard, German explorer ; b. Crefeld, Prussia, 7 March 1829; d, Wara, Wadai, about 8 Feb. 1856. He was educated at Leipzig and at Berlin, making a special study of astronomy and natural science. In 1851-53

he assisted Hind at Bishop's Observatory in London, and in the latter year was selected by the English government to conduct an ex¬ pedition to join that of Clapperton, Barth and Overweg in central Africa. He sailed from England, 20 Feb. 1853, and on 13 Jan. 1854 reached Knka, the capital of Bornu. From this point he made several expeditions into the surrounding country, and on 1 Dec. 1854 met Barth near Zinder. He penetrated south to Yacobi and the Benue, and on 1 Dec. 1855 returned to Kuka. From this time his notes of his explorations cease, but subsequent infor¬ mation discloses that he set out to the east on 1 Jan. 1856, reached Wara in Wadai, and was there

assassinated. For his notes consult ˆErin-nerungen an einen Verschollenen,ˆ by his sister, Elise Polko (1863) ; also Pahde, ˆDer Afrika-forscher Eduard VogeP (1889).

VOGEL, Hermann Wilhelm, German photochemist and spectrum-analyst : b. Dob-rilugk, Lower Lusatia, Prussia, 26 March 1834; d. Berlin, 17 Dec. 1898. He studied at the Royal Industrial Institute of Berlin, in 186(>-65 was an assistant in the mineralogical museum of the University of Berlin, and from 1884 was director of the photo-technical laboratory of the Technical Institute there. He twice visited the United States (1870, 1883). His studies were directed in particular to the proc¬ esses of photo-chemistry, the absorption-spec¬ trum and the spectra of oxygen, nitrogen and hydrogen. His silver-tester, photometer for pigment-printing and! heliotype-printing, and universal spectroscope were introduced into general use. Among his writings was a ˆHandbuch der Photographie,ˆ of which numerous editions appeared. His ˆDas Photographische Pigmentverfahrenˆ was also frequently re¬ printed.

VOGEL, Sir Julius, Australasian states¬ man; b. London, 24 Feb. 1835; d. near there, 12 March 1899. He was educated at the London University College School and at the Royal School of Mines, and in 1851, attracted by the discoveries of gold in Australia, went to Mel¬ bourne. He engaged in journalism, and in 1861 established in Otago, New Zealand, the Daily Times, the first and still the leading morning newspaper in that colony. In 1863 he entered the New Zealand House of Representa¬ tives and in 1869 he was appointed colonial treasurer, and subsequently was postmaster-general, commissioner of customs and prime minister. He resigned the latter office in 1876 and was agent-general for New Zealand in London in 1876-81. In 1884 he re-entered New Zealand politics, was elected to Parliament and again appointed treasurer, but in 1888 resigned and returned to England. He was afterward engaged under the New Zealand government in London until his death. He greatly furthered immigration to New Zealand, was instrumental in building railways, was active in bringing about the Australian federation, and secured the passage of a law for inscribing colonial stocks. He was knighted in 1875. His writ¬ ings include ‘ˆGreat Britain and Her Coloniesˆ (1865); ˆOfficial Handbook of New Zealandˆ (1875) ; ˆA. D. 2000,ˆ a novel, *etc.*

VOGEL VON FALCKENSTEIN, fagel fon fal’ken-shtin, Eduard, German army officer ; b. Breslau, 1797; d. 1885. After a preliminary

education he entered the military service in 1813 and in the following year won distinc¬ tion at the battle of Montmirail. For the next 40 years little was heard of him as he advanced from grade to grade, becoming lieutenant-gen¬ eral in 1858, in which year also he was placed in command of the Fifth Army corps. In the war with Denmark, in 1864, he served as chief of staff and in the war with Austria, two years later, he was given an army to sup¬ press the Hanoverians, Bavarians, Hessians and other allies of Austria among the small German states. He defeated the .troops of these states in succession at Langensalza, Kissingen and Frankfort. Soon after peace was declared he was given command of the First corps. He was a member of the North Ger¬ man Reichstag in 1867-70 and in the latter year was in command of troops on the Baltic front. He retired three years later. Consult Wengen, ˆGeneral Vogel von Falckenstein und der hannoversche Feldzug, 1866ˆ (Gotha 1886).

VOGELWEIDE, fo'gel-vi-de, Walter von

der. See Walter von der Vogelweide.

VOGHERA, Italy, city, province of Pavia, on a fertile elevated plain, in a district rich in vineyards, orchards and cornfields, 24 miles east-northeast of Alessandria by railway. The Via Emilia passes through the town and divides it into two parts. There are several handsome squares, of which that of the Duomo is the chief ; the streets are adorned with porticoes and there is an old castle, built by Galeazzo Vis¬ conti 1372. Silks, linens, canvas and leather are manufactured. Pop. 14,651.

VOGLER, fd'gler, Georg Joseph, German musician and composer, known as the ˆˆAbbe Vogler® : b. Wurzburg, 15 June 1749; d. Darm¬ stadt, 6 May 1814. He studied at Bamberg, Mannheim, Bologna and Padua ; was ordained priest at Rome 1773; and made Knight of the Golden Spur and prothonotary apostolic and chamberlain to the Pope. Returning to Mann¬ heim in 1775 he established there his first school of music. From 1786 to 1799 he was nomi¬ nally resident at Stockholm, where he con¬ ducted another Tonschule; but he was con¬ stantly touring Europe as a performer on the organ. In 1807 he settled at Darmstadt as kapellmeister, and there conducted his most successful school, at times giving concerts in German cities. Vogler made a great stir in his time as theorist and organist, not being ex¬ celled on the instrument. He attempted revo¬ lutions in organ-building. He is known as the subject of Browning's ˆAbt Vogler.ˆ

VOGT, f6kt, Karl, Swiss naturalist: b. Giessen, Germany, 5 July 1817;

d. Geneva, Switzerland, 5 May 1895. He was graduated from the University of Bern in 1833 and was associated with Agassiz in the preparation of ˆL'Histoire naturelle des poissons d'eau douce de I'Europe centraleˆ in 1839. He was ap¬ pointed professor at Giessen in 1847, where his political opinions soon caused his dismissal, but in 1852 he was chosen to the chair of ge¬ ology at Geneva, which position he occupied until his death. He led an expedition to the North Cape in 1861 and in 1878 was elected a member of the Swiss National Assembly. He was an advocate of Darwinism and a strict materialist. His works include ˆPhysiologische

Briefeˆ (1845-56) ; ˆOcean und Mittelmeerˆ (1848) ; ˆDie Saugethiere in Wort und Bildˆ (1ˆ3), *etc.*

VOGUE, vo-gii-a, Charles Jean Melchior,

Marquis de, French archaeologist : b. Paris, 18 Oct. 1829; d. 1914. He was a student of Orien¬ tal religion, languages and art, traveled in Syria and Palestine in 1853-54 and 1861-62, was Ambassador at Constantinople in 1871-75, and from then until 1879 occupied that office at Vienna. He became commander of the Grand Legion of Honor in 1879, was elected to the French Academy in 1901 and was president of the Agricultural Society of France. His pub¬ lications include ˆLes Eglises de la Terre-Sainteˆ (1859) ; ˆL'architecture civile et re-ligieuse dans la Syrie Centraleˆ (1865-77) ; Hnscriptions Semitiquesˆ (1869-77) ; ˆMemoires de Villarsˆ (1889) ; <Le Due de Burgoyne et le Due de Beauvilliersˆ (1900) ; ˆLe Maitre de la Merˆ (1904) ; ˆUne Famille Vivaroiseˆ (1912), *etc.*

VOGUE, Eugene M,arie Melchior, Vi—

COMTE DE, French critic and historian, cousin of C. J. M. Vogue: b. Nice, France, 25 Feb. 1848; d. 1910. He was educated at Paris, served in the Franco-Prussian war, entered the government service in the Department of For¬ eign Affairs in 1871, was attache at Constanti¬ nople in 1873, secretary of the legation at Saint Petersburg in 1876,

and in 1882 resigned to enter upon a literary career. He was elected to the Academy in 1888 and in 1893-98 was depute de I'Ardeche. His publications include ˆSyrie, Palestine, Mont Athosˆ (1876) ; ˆLes portraits du sieclеˆ (1883) ; 'ˆLe Roman russеˆ (1886) ; ˆCoeurs russesˆ (1894) ; ˆJean d'Ag-reneˆ (1898) ; ˆLe rappel des ombresˆ (1900) ; ˆTrois Drames I'Histoire de Russieˆ (1911), *etc.*

VOICE, the Human, the sound that pro¬ ceeds from the mouth when the air is driven through the windpipe, as modified by the vibra¬ tions of the vocal cords. These cords are ligaments in the larynx, attached to the hyoid bone. It is not speech (q.v.), that word de¬ scribing the formation of arbitrary combina¬ tions of sounds to express ideas. The voice is simply used in speech, but it may also be used in yelling or other inarticulate noises. When the voice is reduced to a mere breath, it is called a whisper. Most dumb men have voices, but like animals they cannot form words or use intelligent speech. Domestic animals all understand more or less speech, and usually will obey commands, yet they can¬ not talk. However, the voice of the dog and cat are familiar in every locality, but they do not speak nor sing. The register or scale of the human voice is about two and a half oc¬ taves on the average, or nearly six octaves in the extremes of bass and soprano, and this permits its use in singing. See Voice and Voice Culture.

Loudness of the voice is dependent upon the force and intensity of the blast of air coming through the glottis, assisted by free movement of the vocal cords. The pitch of the voice de¬ pends on the rapidity of the vibrations, this being accomplished by the tension of the cords, altering their length, thickness and elasticity. Modulation of the voice is accomplished

through the action of the lips, tongue, teeth, *etc.* There is very little air pressure in the voicing of a whisper. It has been likened to or compared with the pressure of a mercury column of 35 millimeters, while a medium tone, represents a pressure on the mercury column of 175 millimeters, and the highest pitch of the hu¬ man voice about 900 to 990 miillimeters. The larynx (q.v.) is the organ of the voice. The two vocal cords or bands of cartilage in the larynx are much like two rubber bands, subject to variable tension, and positioned so that the air forced through the lungs tends to sepa¬ rate or stretch them. The individual learns to play upon these two strings automatically, sounding high and low notes, and varying the effects in all the ways characteristic of the human voice. Man may be said to possess an interior orchestra, the lungs being the organ bellows, the cords the

violin strings, the mouth the horn, the cheeks the sounding boards,, the throat the pipe, the lips the pipe-valve, and so on. The hyoid bone and the glottis and epiglottis also play an important part in the mechanism operating the vocal cords, as may be understood by consulting the article on Anatomy; Laryngoscope, the instrument used for examining the glottis and larynx.

The voices of children are high-pitched or treble. When the boy attains puberty, there is a change in the larynx, and he sounds lower, usually bass notes. The lower, middle and upper registers of the voice involve a shifting of the laryngeal positions, and this is why a slight conscious effort is required of a singer in going from the natural voice to the fal¬ setto. In regard to the highest development of the human voice in song, the action of the three hollow spaces, nasal, oral and laryngeal, has much to do with the modification and modulation of the singer's voice. These spaces are to the vocal bands what the violin is to the strings ; and for every tone and vowel the mucous membrane of the spaces named must be drawn into a special position (including the position of the larynx) before the air in the spaces can be brought into vibration by the ac¬ tion of the vocal bands. But the vibration of the cords alone is never the tone. The sur¬ faces of the mucous membranes are drawn into different shapes, particularly fit to pro¬ duce tone waves or to disturb them, and to pro¬ duce in such tone-waves not only fundamental tones, but overtones. The tongue is a' large and direct agent in formation, in the middle or oral space, as it is connected with the upper part of the larynx, its derangement in action being alone sufficient to utterly destroy tone, or, on the contrary, when well adjusted and hang¬ ing normally in relation to the other voice parts, to give what is termed the silvery quality to the voice. These spaces are as important in producing the modification and modulations of the singing voice as are the vocal cords and intrinsic muscles of the larynx ; there being no doubt, that the movements of the larynx de¬ pend upon and are controlled by the muscles and movements outside that organ. The con¬ trol of the motive power, the breath, is of the utmost importance in maintaining the fixa¬ tion and cord stretching of the vocal mechan¬ ism. Consult ˆ Sound and Speech Waves as Revealed by the Phonographˆ (Proceedings,

Royal Society, Ecliiil)iirgh 1897) ; Scripture, E. W., ˆSpeech Curvesˆ (1906) ; Jennings, A., ˆThe Voice and Natural Developmentˆ (Lon¬ don 1911) ; Faulkner, R. B., ˆThe Tonsils and the Voiceˆ (Pittsburgh 1913).

VOICE AND VOICE CULTURE. The

art of singing was developed to meet the de¬ mands of modern music. That which we under¬ stand as the science of voice culture, or the means of cultivating the singing voice that it may be used as a musical instrument, came into being after music had shaped itself to ex¬ press strong emotional sentiment. In the clos¬ ing years of the 16th century the attempt to restore Grecian art in its several branches led to the invention of new forms of musical ex¬ pression. Previous to that time, little, if any, music was written for the solo voice. There was no demand, therefore, for especial train¬ ing for singing. The new forms given to music were (1) the opera, in which dramatic action was united to musical setting of the story. The story was given out by single voices, by two in dialogue, by three, four or more in unison or harmony. The plot of the opera was, from, the beginning, in comedy or tragedy and secular in nature; (2) oratorio, which certainly at first was much like the opera, except that the story was from sacred writ. A form of composition invented at this time was recitative which was, and ever has been, for the single voice. Advances in these forms of composition have exacted more and more of singers. Invention of modern music created the need of special training of the singing voice and advance into larger forms of musical expression and has kept the demand for greater skill on the part of vocalists ever in¬ creasing. A modern music came into recogni¬ tion in Italy (in Florence, about the year 1600) the first definite system of voice culture began there. It was devised by the composers that their operas and oratorios might be sung as they wished them sung. There was no definite plan accepted for general use during the 1st century of modern music.

Every composer sought some means by which to have his compositions well sung, and each followed his own course. In 1686 was born one destined to establish a semblance of order. Niccolo

Porpora, born at Naples, be¬ came a composer. His operas were very florid and none were found among singers able to cope with them. His earnestness for his own interests made him, an educated man for his age. devise a better system of vocal training than had ever been used. And for the first time was established a vocal method. It was the beginning of the Old Italian method, some form of which was continued to our own time. Unfortunately, Porpora lett no record of his manner of teaching. We must judge what he did from the demand his music made. His writing for solo voices called for great flexibil¬ ity and range of voice and his phrases were of great length. We must suppose from this that his pupils were taught to sustain the breath a long time, to sing smoothly and rapidly and to touch with delicacy and lightness the notes in the extremes of the voice. Probably his personality was commanding and that he curbed with masterful hand all attempts on the part of his pupils to depart into anything outside

these few requirements. Farinelli, one of his greatest pupils, departed from the simplicity of Porpora's rules, but not until after Porpora passed away. It is known that Porpora kept his pupils many years at work on the simplest exercises. It is related that Caffarelli, one of his most noted pupils, studied a single page of exercises for seven years and when he finally became restless, the master said; ^^You may go now ; you are the greatest singer in Europe.^^ Perhaps one reason why so little is known of Porpora's vocal method is because he did not remain long enough in one place to found a school which could preserve records. He wished for fame as a composer and went from city to city to make his works known. His pupils followed. That, on the other hand, spread the good vocal teaching. In every large city of Italy and in many Austrian and Ger¬ man places the effect of his good teaching was felt. Porpora lived till 1767 and will ever have the honor of establishing vocal method. It was not, so tar as we know, scientific, yet it was definite and could be understood. His pupils who continued at Naples maintained his tradi¬ tions conscientiously for a century. Others who were attracted to London, Paris and Vienna kept up a form of Porpora's vocal method. Farinelli, after a wonderful career as singer and politician (having been the power behind the throne of Philip V of Spain), re¬ tired to Bologna where he passed the last 23 years of his life. Bologna had the honor of establishing the first great music school (which began in 1482 and was the musical centre of the day. Farinelli did not become a singing teacher by making it his profession, but he trained many of the singers who were con¬ nected with the theatre. In this way, he more than any other, handed down the Porpora method. Nearly all the composers of the day came into

contact with that method and for the first time in the history of music, vocal method influenced composition. Mozart had singing lessons with pupils of Porpora. Haydn was accompanist to Porpora for three jˆears. Rossini was born into the Bologna life. Bellini, Donizetti and Mercadante were all educated at Naples where the traditions were most rigor¬ ously preserved.

Into our own day the influence of the Old Italian method has been projected through two •distinct lines: that of Francesco Lamperti and of Manuel Garcia. Each has, perhaps, departed from the old rules, necessitated by the changed conditions of music. Before considering the work and vocal methods of these two men it is well to see if in the remark of Mancini, him¬ self a great singing teacher and a fellow pupil of Farinelli, we may gain a little more definite knowledge of the principles of Porpora. Man¬ cini says regarding Farinelli, ®The art of tak¬ ing and keeping the breath, so softly and easily that no one could perceive it, began and died with him. The qualities in which he excelled were the evenness of his voice, the art of swell¬ ing its sound, the Portamento, the union of the registers, a surprising agility, a graceful and pathetic style and a shake so admirable as it is rare.® So far as known there is no more com¬ plete description of vocal method of that day.

Lamperti, judging from his pupils who are very well known, kept most closely to that method. He was born in 1813 and when seven

years of age entered the Conservatory at Milan for the study of piano and composition. He was ambitious to manage opera companies when he became a man and shaped his training for the theatre. He associated himself, eventually, with the manager of the small theatre at Lodi. That seems to have been his only venture in theatrical management, but it served to shape his life in an unexpected manner. Financial resources being small he was forced to train the local singers for the solo parts. He was so successful that many of those peasants at¬ tracted attention and were engaged for the theatres of London, Paris, Saint Petersburg and other European cities. It makes the most striking example in history of the power of one man to create a school of singing. Their successes led many great artists to visit Lamperti at Lodi, and his popularity caused the government to make him professor of singing at the Milan Conservatory in 1850. For the next 25 years many of the greatest singers studied with Lamperti and this made Milan the centre of the operatic world. In 1875, Lam¬ perti was retired on a pension, but continued as a private teacher until his death in 1893. Even Lamperti did not write a vocal method. Mr. Griffith, one of his earnest pupils, gathered slips of paper on which he wrote comments for his pupils and from them has given us a little idea of the method. One remark by Mr. Grif¬ fith is, ˆBasing his teachmg upon the study of respiration, the taking and retention of the breath by means ot the abdominal muscles alone, and the just emission of the voice, he thoroughly grounds his pupils in the produc¬ tion of pure tone.® That is not unlike the remark of Mancini about Farinelli's method. If the Old Italian method has come into our day in any degree of purity it has come through the adherence of Lamperti to those principles of breath control.

Manuel Garcia, Sr., was born eight years after Porpora died. In 1812, when 37 years of age, he studied at Naples under Anzani, who was particularly zealous in preserving tradi¬ tions. Garcia, too, was to be an impresario and his thought was given to the training of singers for his own companies. But, with these duties, he saw the advantage of having a school at London. This was established in 1823. His own children were trained by him and three of them became celebrated. Maria,* known as Madame Malibran, was one of the greatest singers of any age but lived to be but 28 years of age. Madame Viardot-Garcia (1821ˆ1910), served as accom¬ panist for her father and learned his method more from absorption than from actual lessons. She grew up

in the highest musical life of the day. Manuel Garcia, Jr. (1805-1906), became one of the most important men in connection with vocal method. He sang for a few years in his father's companies, but elected to adopt teaching as a profession. He was one of the first men to become a vocal teacher who did not have special interest in producing his own operas or in preparing singers for his own companies. It is probable that he has the honor of establish¬ ing the vocation of voice teaching on profes¬ sional lines. Whether that be so or not he made scientific investigation of the voice on which he established a distinct vocal method. He invented the laryngoscope, a device for examining the

throat, including the vocal chords and larynx. This has become universally adopted by phy¬ sicians. Garcia was able, with his examina¬ tions, to announce definite facts about the ac¬ tion of the throat in singing. Action had been observed previously through sensation and be¬ cause it had manifested itself .through the outer flesh. It is worthy of remark that al¬ though earlier teachers were obliged to walk by faith rather than by sight they had not gone far from correct ways. Nor did Garcia's discoveries add much knowledge. It permitted him and his followers to move with greater certainty. It led to the formation of vocal method on the idea ot tone-placement. The registers of the voice assumed more definite position as factors in method. Whether Garcia became so interested in the scientific action of tone production and its reflection in chambers of resonance, as to obscure his views of respiration, or whether he became convinced that respiration was not important, does not appear. But he ignored very thoroughly that which was fundamental in Lamperti's work. He established a method with new basic prin¬ ciples, and that method sprang into popularity. At that time in the history of vocal method there were two distinct systems : one based on empiricism ; the other on science. The first took into account the sound of the tone and judged what would make it good ; the other explained the scientific action which would produce good tone. As each method has pro¬ duced many noted artists there need be no com¬ ment on the merits of either. The advocates of both schools have held quite closely to the tenets of the two great leaders, although modifications, as well as additions, have been made. Modern music continues its greater de¬ mands and discoveries in science compel further adjustment of deductions based on scientific vocal research.

In 1845, Mathilde Graumann, now Madame Marchesi, became the pupil of Garcia, the in¬ ventor of the laryngoscope. For a time she

acted as assistant to Garcia and, as it was just the time of Garcia's deep study which led to the establishment of a new vocal method, it is reasonable to suppose that she was influenced by that in forming her own. Her husband, Salvator Marchesi, was also a pupil of Garcia. The ˆˆMarchesi® method is more often men¬ tioned than is any other today and it has the Garcia principles for its foundation. Many of the great opera singers have been guided in their education by Madame Marchesi. It is, however, a matter of comment that these artists differ radically in vocal method, and probably the teacher has considered the indi¬ viduality of her students more than she has adherence to vocal method. Nor would this necessitate departure from Garcia's principles, for such is the subtlety of the mind in dealing with vocal machinery, there is always need of adaptation of method to traits of mind which are individual. And that ability so to adapt may constitute the ˆMarchesi® method. It may be even the establishment of a new method.

Italy, ever the home of opera, has adopted vocal method which more dramatic music de¬ mands. Language is a factor in creating or changing vocal method. The flowing tone of the Italian, with every word ending in a vowel

or liquid consonant and with guttural and harsh consonantal combinations almost eliminated, does not lend itself well to the tone placement of the Garcia school. ˆ Nor is the method of Lamperti sufficiently vigorous to meet dramatic demand. A cornpromise seems to have been effected. Breathing is the basis of it, and it is the breathing of the upper chest, with the ab¬ dominal rnuscles held inward with great firm¬ ness. This enables its votaries to utilize to a certain extent the scientific tone placement of Garcia. The combination leads to tone produc¬ tionˆ with a degree of harshness which was foreign to the older Italian method. Few pro¬ fessional singers have become prominent under its leading.

Opera demanding extremely dramatic voice has found favor in Germany, and vocal method has been devised on lines which are not part of either of the older schools. Nor is it pos¬ sible to make explanation of the German method on scientific grounds. The voice is used explosively and with less attempt to sus¬ tain the smooth flow of tone which has ever been deemed essential to good singing. Yet the public has learned to enjoy German sing¬ ing, which is most convincing proof that there is reason for it. Wagner, it is said, did not hope that his operas would ever be sung well nor could they be given in any school of voice training which existed when they were written. In the German method of training the voice is found a way b}ˆ which the operas can be sung. And this class of music is the only one to which that method can be applied. Explosive tone is quite out of place in the music of song writers even among Germans.

Language has influenced the formation of a method in vogue among the French singers. The nasal consonants of the French language call for decided nasal resonance, and the vocal teachers of Paris seek to obtain such resonance as the predominating factor in tone production. In the department of breathing they exact high chest breath control. With this as foundation and with exaggerated nasal resonance tkere is shrillness of tone emission. The difference be¬ tween French method and modern Italian lies in the point of resonance of tone. The Italian places the tone in the forward part of the mouth, and the French in

the nasal chambers, while both use high chest breath control as foundation.

The other nations have no distinctive vocal methods. England and America have been con¬ tent to follow the lead of other peoples. Many individual teachers have, through their strong personality, made reputations as teachers, and the public has accredited them with vocal methods quite their own. Thus, VVilliam Shakespeare made international reputation as having a vocal method. In some particulars it is individual, but it is based on that of Fran¬ cesco Lamperti which wˆas as nearly as can be the Old Italian method.

One system which had no special home but which has scientific basis and has many advo¬ cates is the ˆˆovertoneˆˆ method. Theory claims that every musical tone is compound in that it consists of the vibration of the tone-producing organ as a whole for the initial tone and the vibration of its aliquot parts as added tone. For example, the tone made by the stroke of

the hammer on the piano string vibrates the string its whole length, its half length, quarter length and eighth length. Also, the divisions at the third, fifth, sixth and seventh of the whole vibrate. Sensitive ears can detect the lower multiples of the rate of vibration of the note struck Using the piano string one can demon¬ strate the truth of this theory. The tones added to initial tone have been called ®harmonics,ˆˆ ˆffipper partials® and ˆffivertones.® Some vocal teachers believe the vocal chords have action which corresponds to that of the piano string and have constructed a vocal method which seeks to incorporate upon the initial tone an abundance of ˆffiarmonics.® Other teachers of the overtone method claim that every part of the resonance chamber of the throat and mouth is a point of birth of ˆharmonics.® They then seek to make junction of these voices with the initial tone made by the vocal chords. One ingenious scientist has shown this theory can be illustrated by a series of flames which regis¬ ter what vibration of aliquot parts is given each tone. Photographs are made of the flame. It makes a visible record which enables a student of sufficient intelligence to direct his practice.

In the studios of vocal teachers ®open and closed tone® method is often spoken of, but it is doubtful if a distinct vocal method has ever been built on this idea. Garcia advocated using open tone in the low voice and closed in the upper. Lamperti advised open tone through¬ out the voice, at least in practice on exercises and vocalizes. It would

seem as if ®open and closed tone® method is a varying adjunct of several methods, rather than distinct vocal method by itself.

In the last few years a theory has been ad¬ vanced which may serve as ground for a new method. It is, that tone is primordial substance, present in everything, as is electricity ; that by stimulating vibration in the vocal machinery at the proper rate to make audible the tone which is present, our musical tone is produced. Voice culture, in this system, consists of stimulating the sounding machinery at just the right degree of vibration, soliciting above all, such counter¬ balance of effort that the act of singing is unfelt and the appearance of effort hidden. This method further contemplates that transmission of tone is made ampliation of the vibration of the vocal machinery.

Examination of all methods of training the voice in vogue emphasizes the belief that none can have universal endorsement. This comes about because there are so many views of music and of the requirements for singing modern music. All unite in saying that singing should be without effort; but such is the difference in perception of sensation that what seems effort¬ less to one appears charged with effort to an¬ other. The latter fact points out the need of some scientific pleasure by which test may be made of this important element in singing. A barometer or thermometer would establish_ a vocal method. The one to invent such an in¬ strument has not been found. Garcia opened the way for scientific examination of the voice, but no one has advanced in the science and Garcia's discoveries did not create a method generally endorsed. Among vocal teachers it is comman saying that there are two vocal methods, the good and the bad. Each believes

his to be good, but as they differ very much all cannot be good. All know that breath must be used to create vocal tone; that tone emission must be with comfortable action in the throat ; that transmission of tone must be generous and the tone given be vibrant. The way to secure these constitutes good method. Every teacher has his own way by which to attain these de¬ sirable ends, and the individuality prevents gen¬ eral acceptance of any one system. Again, vocal teachers who depend on their individuality are little likely to invent any scientific testing ma¬ chine. Method which can have universal ac¬ ceptance and application will come only from deductions made by practical teachers working out the suggestions which scientific men make, which will come from invention. The telephone came near showing new forms of transmission and reception of tone. It supplied the idea that tone is awakened into audible vibration and en¬ dorsed the teachers of the ˆPrimordial® method. Nor is it certain but that further experiments in which electricity plays an important part will supply views on which to ‘base vocal method. It is a subject of vast importance. In this, vocal methods for singing have been considered be¬ cause training the voice for that art is supposed to be the most important and extended training the voice can have. When we think of the large number of actors, elocutionists and public speakers and recall that each needs to use true principles of voice culture, the importance of having a definite and universally applicable vocal method seems almost imperative. When we realize that the constantly used conversational voice would be an infinitely more valuable im¬ plement of communication between human be¬ ings were it cultivated as it might be, the need of perfect (and universal) vocal method as¬ sumes large proportions. If, as many believe, voice culture is one of the most valuable proph¬ ylactic and therapeutic agents known, such need is absolutely imperative.

Schools of music have been established in all large cities, and of course the study of sing¬ ing has been made prominent. It has not, as a rule, been the chief study. It has been forced to fourth place, composition, piano and instru¬ mental playing having been given precedence. Wherever the study of singing has been given special prominence it has attracted more stu¬ dents to the school and has made more lasting impression on music. Thus, Lamperti made Milan with its conservatory, noted. The Royal Academy at London has, since

the day of Han¬ del, had a large number of great vocal teachers and that has given power to the school. The New England Conservatory and the Chicago College of Music have produced many excellent singers, but the fact remains that none has ad¬ vocated special vocal method. Training has been on lines widely separated and left entirely to the judgment of individual teachers. As all have produced results, although using means so different, it is evident that training the voice for singing modern music can be had through the personality of the teacher developing the musi¬ cal nature of the student. This has taken the place of method. Many teachers, in late years, have written treatises on singing and which are intended, although frequently not so claimed, to be descriptions of vocal methods. Garcia's method was described in a book issued about

1865. It has since been revised and simplified. Madame Seiler, Madame Marches! and Messrs. Randegger, Behnke and Alberto Bach have de¬ scribed their methods in print. Nor must we forget some very excellent works by American writers. Frederic Root, D. A. Clippmger and Edmund J. Myer have written deafly and well on vocal methods. As their works are the latest and they are men grown into the strong thought of present activity, their writings have definiteness which was lacking in many earlier works. There is a growing belief that Ameri¬ can teachers are taking the most advanced posi¬ tion with regard to certainty in method, and that study of singing can best be prosecuted with such teachers. That which is most evident in their work is that they combine scientific with empirical teaching, and they bind the whole to¬ gether with directing power of intellect and soul. At no time has it been possible to ensure that anyone possessing any degree of vocal re¬ sources shall become an acceptable singer as it is now. This is true, in spite of the fact that never before has music demanded so much of singers.

Judging from methods of the past and pres¬ ent we may believe that the voice for singing can best be trained on the following general lines, allowing, of course, that individual natures demand departures and special applications.

There are three general departments : phys¬ ical, intellectual and spiritual. The latter refers to the intuitional and emotional action of the spirit of man. The physical training has in it development of respiration, freedom of the throat and reverberation of tone. Respiration demands that muscles of inspiration and expira¬ tion shall be made free and strong and made to balance their action so as to

deliver breath press¬ ure to the vocal chords, which make initial tone, in such way that tone is made without ap¬ parent effort. This corresponds to the way of the Old Italian method. It seems a simple thing, but the old singers evidently found it necessary to study and practise it every day for years and perhaps for a lifetime. Freedom of the throat means that tone of every gradation of power, from softest to loudest, shall be emitted in purity; that elasticity of muscles shall permit constant and instantaneous changes in the larynx ; that the Chambers above the larynx which influence quality shall be supple ; and that the organs which regulate articulation shall not be interfered with, even in the slightest degree, while performing their duties. Reverberation has in it the whole matter of tone-placement, vibration and transmission of musical sounds. Such use of physical training draws, then, from the empirical ways of the old school, the scien¬ tific method of the Garcia S3ˆstem and the ways of the ˆˆovertone® method.

The intellectual department of modern method demands of the student knowledge of anatomy and physiology ; directing power of the mind ; and familiarity with psychology. Educa¬ tion of the objective mind is the controlling factor in this part of vocal method. To small extent has it been used in any earlier methods. It is probable that in that department the strongest factor in modern vocal method is found. For the intuitional or emotional side has ever been used and perhaps singers of the past (notably Farinelli) cultivated this side to perfection,

VOICING -

Intuitional influence in modern method is not left to chance as possibly it has been before. A real student of our times is led to understand his relation to the controlling force of the universe and to utilize the power he may obtain through what is often termed ˆhigher thought,ˆˆ But it is not left to be expressed ˆflntuitionally.® That is, the student learns what imagination, sentiment, will and the like are, and then, through his objective mind (intellectual depart¬ ment) directs’ their influence upon the physical parts. For it is now known that, however care¬ fully, correctly and thoroughly the machinery of voice is used, there is a voice better , and more beautiful than such machinery can, by itself, produce. The development of vocal method, thus very briefly outlined, is engaging the serious attention of the best American teachers who make teaching a profession, and there is evidence that such study is making a new vocal method.

Frank H. Tubbs.

VOICING. See Reed, Flue, AND Stringed Instruments, Care of.

VOIRE DIRE (Latin veritatem dicere) , in law, preliminary examination of a juror as to his competency. When a juror is supposed lia¬ ble to objection for incompetency or otherwise, he is sworn first, not in the cause, but on the voire dire — that is, to answer questions relating to his incompetency; and if it thus becomes ap¬ parent that he is incompetent, he is discharged without further examination.

VOIT, foit, Karl von, German physiologist: b. Amberg, Bavaria, 31 Oct. 1831 ; d. 1908. He was educated at Munich, Wurzburg, and at Gottingen, and in 1863 became professor of physiology at the University of Munich. He was early engaged in scientific researches, his first achievement of importance occurring in 1854, when he proved the presence of urea in the muscular tissues of cholera patients. He subsequently made a specialty of questions of digestion and assimilation. His works are numerous, and among them are included ˆPhysiologisch-chemische Untersuchingenˆ (1857) ; ˆUeber die Kost in offentlichen Anstaltenˆ (1876) ; ˆUntersuchung der Kost in einigen offentlichen Anstaltenˆ (1877). He also con¬ tributed to Hermann's ˆHandbuch der Physi¬ ologies (1881).

VOITURE, vwa-tur', Vincent, French poet and letter-writer: b. Amiens, France, 1598; d. 26 May 1648. He made his literary studies in Paris, then entered the service of Gaston, Duke of Orleans, and with him made a tour in Spain. He won the friendship of Cardi¬ nal Richelieu by his epistle on the taking of Corbie, esteemed his chef-d'ccuvre. He was made chamberlain by the king 1638. His poems mostly are chansons and rondeaux. More fa¬ mous than his verses are his letters, in which French prose style was brought to a degree of finish never before reached. The first edition of Voiture's ˆQjiuvres> appeared at Paris 1650; new revised editions with annotations have been issued by Roux, 1856, and by Ubicini, 1856; a separate revised edition of the H.ettresˆ was published by Uzanne, 1856. Consult Magne, E., Woitureˆ (Paris 1911); Rahstede, ˆWan-derungen durch die franzosischc Literatur,

Vincent Voitureˆ (Oppeln 1891 ; Sainte-Beuve, ˆCauseries du lundiˆ (XII, Paris 1851-62).

VOKES, voks (Theodosia) Rosina, Eng¬ lish actress: b. 1858; d. Torquay, Devonshire, 27 Jan. 1894. She first appeared at the Al¬ hambra Palace, London, in the ˆBelles of the Kitchen.ˆ Then she married Cecil Clay and for a time retired. In 1885-93 she toured North America. She took leading parts in <The Par¬ venu,ˆ ˆThe Schoolmistress,ˆ ˆThe Milliner's BilU ˆThe Circus Rider,ˆ ˆMaid Marian,ˆ and

ˆA Pantomime Rehearsal.ˆ

• •

VOLAPUK, v5-la-peek', a proposed uni¬ versal language invented about 1879 by Johann Martin Schleyer, of Constance, Germany. The name means ˆSvorld-speech,® being based on English world and speak, and a number of the vocables are modified English words, the total number in the language being about 14,000, some 1,300 being root-words. In structure the language is simple and extremely regular, and the orthography is entirely phonetic, the words being pronounced as they are written, and vice versa. Its alphabet comprises 27 letters, namely the vowels a, e, i, o, u, d, d, u, and these 17 con¬ sonants, b, p, h, y, g, k, I, r, m, n, s, j, c, x, z. The vowels are pronounced as in German, the con¬ sonants as in English, except that g is always hard, s is always sharp, c is like j, and z is equal to ts. There are 10 other consonant signs for sounds peculiar to various languages : there are no silent letters and no diphthongs. About 40 per cent of the root words of Volapiik, which usually are nouns, are from English, the rest are chiefly from German, French and Latin. In choosing root words the desiderata were brevity, clearness and ease of utterance : every root word consists of one syllable, a vowel be¬ tween two consonant sounds; man is mayi, dom is house (Lat. damns), tim is time; and root words are formed from ordinary words either (1) by substituting a consonant for a final vowel: Eng. pay becomes pel, Fr. mer (sea) becomes mel; or (2) consonants and vowels are dropped: Lat. pons (bridge) becomes pon, Eng. state becomes tat; or (3) the most im¬ portant syllable alone is retained: Lat. sapientia (wisdom) becomes sap. Here are some ex¬ amples of root words from different languages: From Eng. gift, giv, lady, lad, woman, vom; from Lat. finis (end) comes fin, flumen (river) tensio (stretching) ten. From these root words, which are nearly all nouns, are formed the other parts of speech — verbs, adjectives, adverbs — by proper prefixes and suffixes. Nouns have four cases, namely, nominative, genitive, dative and accusative. The nomi¬ native is the unmodified root, for example, vol, world, is in the nominative case. The genitive adds a, vola, of the world; vola, piik, world's speech. The dative and accusative

respectively add e and i to the root ; z'ole, to the world, voli, the world (objective case). The pronouns I, thou, he, she, it, are ob, al, om, of and os, and they are declined like nouns ; oba, of me, ooe, to me; ala, of thee, ale, to thee; and so on. The tenses of verbs, except the present, are formed by prefixing the vowels a, e, i, o, and u to the root; thus Idfob (Idf, love, ob, I) is I love, dlofob, I loved, eldfob, I have loved, ilofob, I had loved, oldfob, I shall love, nldfob, I shall have loved ; by putting al, thou, om, he,

of, she, in the place of ob, I, we get the forms for thou hast loved, he will love, she had loved, *etc.* By similar devices the various moods are indicated, for example, the ending os added to the present indicative loforn,, he loves, makes it optative, may he love, Idfomds. The passive voice is formed by prefixing p or pa. Thus,

paldfon, to be loved, paldfob, I am loved,

pdlofob, I was loved, pelofob, I have been

loved, polbfob, I shall be loved, pulofob, I shall have been loved. The adjective is the noun with ik suffixed : gud, goodness, gudik, good ; yun, youth, yunik, young. The adverb is

formed from the adjective by adding o: gudik, good, gudiko, well. In pronunciation every syllable is long and the accent is always laid on the last syllable of the word. Volapiik was re¬ ceived with great favor immediately after the scheme was published, but later declined. See Esperanto Language; Etymology; Language, Science of.

VOLATILE OILS, or ESSENTIAL OILS, vegetable oils distinguished by the pos¬ session of pungent, characteristic odors, and by the fact that they can be vaporized without de¬ composition, and usually without any consider¬ able residue. The volatile oils differ from the ®fatty oils,® or ®fixed oils® (of which olive oil is an example), from a chemical point of view, in containing little or no true fat.

The known volatile oils are very numerous, and are obtained from plants, or parts of plants, or from vegetable exudations, mainly by the action of heat or pressure, or by the solvent action of fats, chloroform, petroleum ether or carbon tetrachloride. In some cases, as in the extraction of the essential oil in orange peel, a portion of the oil may be obtained by plac¬ ing the material containing it in horse-hair bags, and subjecting it to pressure. Distillation is also commonly employed, the plants or parts of plants containing the oil being placed in a still with water, the contents of the still being constantly stirred and heated by means of a steam-jacket. The boiling points of the volatile oils are mostly higher than that of water, but as they possess a considerable vapor tension at the boiling point of water, they distil over at that temperature in sufficient quantity to make the process commercially practicable. In some cases it is found to be advantageous

to raise the boiling point of the water in the still some¬ what by the addition of salt. When the oil that is to be prepared is injured by exposure to the temperature of boiling water, it is customary to extract the oil by macerating the plant with grease. In the preparation of perfumes, for example, it is common to treat the flowers con¬ taining the oil with pure lard or paraffin, which is kept fluid by a water-bath. The fat extracts the volatile oil, and when the charged fat is afterward shaken up with alcohol it gives up the oil, in large measure, to the alcohol. The process known as ®enfleurage® is essentially the same as the one just indicated, except that it is not conducted by the aid of heat, the grease being allowed to remain in contact with the flowers for a longer time, at a lower tempera¬ ture; the oil then being recovered from the fat by means of alcohol, as before.

The following are some of the more familiar of the essential or volatile oils:

Oil of Bitter Almonds. — Prepared by dis¬ tilling the pulp that is left after the fixed oil contained in the almonds has been expressed by pressure. As at first prepared it contains a considerable quantity of prussic acid, and in this stage it is very poisonous. After it has been freed from the prussic acid -it is known, commercially, as ®Oil of bitter almond, S. P. A® (without prussic acid). When thus purified the oil consists mainly of benzaldehyde, CeHsCHO, and boils at 179° C.

Oil of Bergamot. — Prepared from the unripe fruit of Citrus bergamice, by squeezing the rind by hand and wiping the expressed oil off v/ith a sponge, the sponge being squeezed at intervals into a collecting vessel. It contains a consider¬ able quantity of the hydrocarbon citrene. CioHie, together with other compounds whose precise nature has not yet been thoroughly investigated. The oil is extensively used in perfumery. Oil of bergamot is also made synthetically.

Oil of Cloves. — Obtained by distilling the flower buds of Caryophyllus aromaticus. It consists of a mixture of sesquiterpene and euge-nol and is heavier than water.

Oil of Eucalyptus. — Prepared by distilling the leaves of the eucalyptus tree. It is pale yellow in color and is used in medicine and in perfumery. Its chief constituent is eucalyptol or cineol, CioHisO.

Oil of Lavender. — Prepared by the distilla¬ tion of lavender flowers, the best quality being made from Lavandula vera. Oil of spike is an inferior variety, prepared from Lavandula spica. Oil of lavender is used in perfumery and oil of spike is extensively employed in porcelain painting.

Oil of Lemon. — Prepared from scarcely ripe lemon rinds by the sponge method, de¬ scribed above under Oil of Bergamot. An in¬ ferior variety is also prepared by distilling the residues remaining from this process. Oil of lemon consists chiefly of limonene, CioHie, a hydrocarbon which resembles the citrene of oil of bergamot, but which differs from it in certain particulars. Oil of lemon is used in confectionery and perfumery.

Oil of Origanum, Oil of Thyme, or Mar¬ joram Oil. — Obtained by distillation from cer¬ tain species of marjoram.

Oil of Peppermint. — Prepared by distilling the herb Mentha piperita. It consists chiefly of a solution of menthol in various terpenes and is used in medicine and as a flavoring, espe¬ cially in confectionery.

Attar (or Otto) of Roses. — Prepared by the distillation of certain species of roses and especially from Rosa damascena, which is culti¬ vated in Turkey. It is used extensively in per¬ fumery and, on account of its high commercial value, is often (and perhaps always) adul¬ terated. The most common adulterant is ^^geranium oil,® which is manufactured expressly for adulterating attar of roses, by distilling a species of grass that grows in India.

Oil of Turpentine.— Prepared by distilling the resinous exudations from certain species of pine trees. American oil of turpentine is prepared chiefly from Pinus australis and con¬ sists mainly of dextro-pinene, a hydrocarbon having the formula GoHie, and boiling at 156° C.

Allan D. Risteen.

VOLBORTHITE — VOLCANO

VOLBORTHITE. A vanadium ore, a hydrous vanadate of copper barium and cal¬ cium, occurring in Arizona and Colorado.

VOLCANIC ASH. See Pyroclastic; also Tuff.

VOLCANIC BOMBS. See Pyroclastic.

VOLCANIC NECK, or PLUG, the hard igneous plug filling the throat of an old volcano. Such volcanic necks often resist erosion and stand out as buttes as in the Mount Taylor region of New Mexico or in the Puy region of France.

VOLCANIC ROCKS. Those igneous or pyrogenic rocks which have reached the sur¬ face through volcanic necks or through fissure eruptions. Volcanic rocks were formed in all ages of the earth's history, but were generally more or less restricted geographically. Con¬ trasted with them are the rocks which cooled beneath the surface to which the name plutonic is generally applied. Extrusive (effusive) and intrusive, or on its surface, extrusive. The plutonic. At best this distinction is only one of convenience and has no great scientific value. Among the more important rocks of this type may be mentioned obsidian, pumice, rhyolyte, trachyte, felsite, andesite and basalt (qq.v.). See section on Igneous Rocks in article on Rocks.

VOLCANISM, a term used to describe all the phenomena dependent on the movement of fluid or molten rock, whether within the earth, intrusive, or on its surface,ˆ extrusive. The latter is the popular conception of volcanism and is manifested througli the activity of volcanoes. See Batholith ; Volcano; Lac¬ colith, etc.; also the section on Volcanism in the article on Geology.

VOLCANO (Ital. volcano; from Lat. Vulcanus, the god of fire; originally the vol¬ cano of Etna, the fabled abode of the god), an opening in the crust of the earth from which proceeds heated gases, volumes of steam, eruptions of ashes mixed with scoriae and large stones and molten rock called lava. The phe¬ nomenon is chiefly limited to certain regions in different parts of the earth, known as volcanic districts; and in these districts established and permanent vents may continue constantly send¬ ing forth steam and other vapors, like Strorn-boli on one of the Lipari Islands in the Medi¬ terranean ; or eruptions of more severe char¬ acter may take place at irregular intervals. The matter thrown out from volcanoes generally accumulates around the openings or craters till they build up a hill, or

even a mountain several thousand feet high; but the vent may continue for a long time at a low level, and is even formed beneath the sea, sometimes without rising above the surface. Instances have oc¬ curred of a volcanic eruption suddenly form¬ ing an island in the midst of the sea. ˆ Other volcanoes that have been suddenly raised up have remained permanently in the form of mountains. Such is the volcano of Jorullo (q.v.) in Mexico. The greatest volcanic moun¬ tains, as Etna, Hecla and Vesuvius, are pro¬ duced by accumulations of volcanic matters, as beds of lava, ashes and scoriae, sometimes alter¬ nating with beds deposited beneath the sea charged with the vestiges of marine animals,

the collection of which must have occupied long periods of time. The form of the cone depends on the nature and material of the eruption. Ash forms steep slopes; fluid lava, low flat cones. Volcanoes sometimes remain inactive so long as to lose their peculiar character ; but they may at any time break forth again. Vesuvius was not known to the ancients as a volcano, though it was apparent from the form of the moun¬ tain and the materials of which it was com¬ posed that such must have been its character at some former period. Volcanoes which show outbursts of more or less frequency are called active. Those known to have been active in historic times, but long quiescent, are called dormant. Ancient volcanic activity took place in Hungary, central France, eastern United States, the eastern Rocky Mountains, the British Isles and other places, of whose erup¬ tions no record exists. Such are termed ex¬ tinct volcanoes, but many so-called extinct vents become active again. The Mississippi Valley is almost without evidence of volcanism since very early geologic times. Probably the most general understanding of a volcano is of a conical hill or mountain. There is, how¬ ever, no limitation as to height, some compara¬ tively low volcanoes, such as Pelee and Sou-friere, manifesting violent and disastrous eruptions, while, on the other hand, such lofty peaks as Kilimanjaro, Cotopaxi and Popocata-petl are of a volcanic character.

As generally considered, a volcano is divided into three fundamental parts — the base, or ele¬ vation proper; the cone, rising steeply from the base ; and the crater, the depression occurring at the summit of the cone. These parts are not invariably present in distinct form in all volca¬ noes ; in many, eruption takes place without any crater. Nor do eruptions always proceed from the crater, when present ; the crater being lo¬ cated at the summit of the cone, while activity is in many cases exhibited independent of the crater by supplementary craters in

additional cones, broken out on the slopes of the moun¬ tain. These are known as parasitic cones and craters. Craters of course vary greatly in size and sustain no proportional relation to the mountain or elevation. Haleakla (island of Maui, Hawaii), 10,000 feet, has a crater of 20 miles' circumference ; but the crater of Orizaba (Mexico, on the boundary between the states of Vera Cruz and Puebla), three and one-half miles high, has a crater with a diameter of less than 1,000 feet.

The causes of volcanic action are still much obscured, though various explanatory theories have been advanced. In early times, the rising cloud of dust attending an eruption, lit by the glow of the lava, came readily to be regarded as mingled smoke and flame, and blacksmith-gods were thought to have their forges in the subterranean regions. At the present time many believe that volcanic lavas are made up of still uncooled portions of a once molten earth squeezed out by compression. Many geologists, however, no longer believe that the earth was ever a molten mass. These latter ac¬ count for lava in various ways. Some believe that the rocks are hot enough to melt, if not prevented from doing so by pressure, and hold that whenever folding produces an arch or anticline the pressure is removed from the

rocks below and they at once become fluid. Others hold that heat is generated by friction during great crustal movements, causing the rocks to melt. Other and more complicated views are held, but they are all little more than speculation, and the problem is still unsolved. Volcanoes are, in general, to be found in areas where the earth's crust is of an inferior strength. These areas are naturally ocean-basins, the territory bordering on such basins, or the ranges of mountains marking or flank¬ ing the outlines of the continents. With the possible exception of Wrangel (Alaska) no active volcano exists far inland save in a dis¬ trict which is either the scene of a compara¬ tively recent displacement or is marked by an instability in the earth's crust. One of the chief lines of distribution surrounds the Pacific Ocean, running along the western coast of South, Central and North America; the Aleutian Islands, Kamchatka and the Kurile group; Japan, Formosa, the Philippines, the Moluccas, the North Hebrides, New Zealand and South Victoria Land. Ih'cluded within this line are numerous other volcanoes, such as Kil-auea, Mauna Loa and Mauna Kea (Hawaii) and those of the Polynesian Islands. In the Atlantic section are the Antilles, the Canaries, the Azores, the Cape Verdes, Iceland, Madeira, *etc.* The European line follows the Mediter¬ ranean and is continued into eastern Asia, about the Caspian. It includes the Lipari Islands, the .ˆgean Islands, Etna, Vesuvius, Ararat and Demavend. J. W. Judd (Wol-canoesˆ 1881) estimated that there are from 300 to 350 vents of customary activity. There are perhaps about an equal number whose latest activity was at a date comparatively re¬ cent. Submarine volcanoes are known at many points.

The phenomena of volcanic activity are numerous and varied. A great portion of the material upheaved in an eruption is lava. The kinds of rock composing this are largely silica and silicates, those containing a relatively small percentage of silica being called basic and those containing considerable silica acid. The acid variety of lava is usually the lighter colored; sometimes it does not move from the lava vent and when it does it generally proceeds a short distance pnly,_ solidifying in a thick mass be¬ cause of its viscosity. The basic is much more liquid and covers the slopes of the mountain or spreads over the adjacent plains. Examples of the latter are the basic flows that cover 200,000 square miles in the Deccan and bury most of the Columbia and Snake River plateau. When lava is imperfectly fused and large quan¬ tities of steam are present, the lava becomes, as it approaches

nearer the surface, filled with bubbles, which continue to expand, lightening the lava and facilitating its upward movement. At the surface the lava is torn apart by the steam, the fragments being hurled high in the air. These fragments are known as cinders or pumice and, when finer, ashes. Mudflows, such as destroyed Herculaneum, are merely mixtures of volcanic ash with water from steam or fall¬ ing rain. Violently explosive eruptions are most common in volcanoes that have long inter¬ vening periods of quiet, because the vents be¬ come choked. The Krakatoa (q.v.) eruption of 1883 was extremely violent. The volcano on

the Lipari Islands is in almost constant erup¬ tion but vessels passing do not fear danger. There are also numerous accessory phenomena, such as earthquakes (see Earthquake) ; elec¬ tric and magnetic disturbances and various acoustic manifestations. The explanations of these phenomena have not yet been satisfac¬ torily reached. One of the most remarkable examples was the disturbance of the magnetic field throughout the world which accompanied the Pelee eruption of 8 May 1902. Contrary currents of air also occur, some advancing be^ fore the clouds of the eruption, others moving toward the volcano, apparently into vacua caused by the abrupt explosion of steam. The geysers of Yellowstone Park, the solfataras (vents from which proceed sulphurous fumes) of Italy, etc., are signs of a decreasing volcanic activity in the areas where they, occur. Consult Darwin, Wolcanic Islands^ (Woyage of the Beagle^ 1839) ; Lyell, ^Principles of Geology,^ (Vol. I, 1872) ; Green, Westiges of a Molten Globe^ (1874) ; Dana, J. D., '^Characteristics of Volcanoes^ (New York 1890) ; Judd, J. W., 'Volcanoes^ (New York 1881) ; Scrope, 'Vol¬ canoes^ (1872) ; Mallet, 'Volcanic Energy^ ('Philosophical Transactions^ of the Royal Society 1873) ; Russell, I. C., 'Volcanoes of North America^ (New York 1897) ; Heilprin, 'Mont Pelee and the Tragedy of Martinique^ (1903) ; Geikie, Sir A., 'Ancient Volcanoes of Great Britain^ (London 1897) ; Hull, E., 'Vol¬ canoes, Past and Present^ (London 1892) ; Hitchcock, C. H., 'Hawaii and Its Volcanoes^ (Honolulu 1909) ; Iddings, J. P., 'The Prob¬ lems of Volcanism^ (New Haven 1914) ; Bon-ney, T. G., 'Volcanoes^ (London 1898). Con¬ sult also articles on individual volcanoes, Pelee, Krakatoa, *etc.*

VOLCK, folk, Adalbert J., American art connoisseur b. Augsburg, Germany, 14 April 1828, a scion of the famous Strakonitch family of Poland; d. 26 March 1912. His youth was spent at the art centres of Nuremberg and Munich, where he frequented the studios of the masters there assembled. Becoming involved in the Revolution of

1848 he was obliged to flee the country and made his way to America After visiting various cities he in 1849 settled in Baltimore and thenceforward devoted the greatest portion of his time and immense energy to the varied forms of art. About the year 1859 he established himself in the suburb of Catonsville and when the Civil War broke out shortly afterward he espoused the Southern cause and soon became a special agent of the Confederate government, scorning any pay and frequently running the blockade into Virginia as the carrier of despatches. When General Butler on 13 May 1861 seized Baltimore, Dr. Volck's artistic ire was roused and he began making a series of cartoons of the Northern leaders, which have come to fame as the years have passed. Published surreptitiously at first by the artist himself, they have since been re¬ published a number of times. He was a per¬ sonal friend of President and Mrs. Jefferson Davis and had the good fortune to sketch a portrait of Stonewall Jackson on the field not long after the second battle of Bull Run. Another phase of Dr. Volck's many sided artistic career was his notable connection with amateur theatricals in Baltimore shortly after

the close of the Civil War. The success of his artistic efforts on the stage was truly astonishing and will long be remembered by those who were fortunate enough to see them. The closing years of his long life were spent in the midst of his own artistic creations with which his home in Baltimore was literally filled. The last important piece of silversmithing ex¬ ecuted by the artist was a memorial shield to Southern women made in the year 1909. It was dedicated by the venerable craftsman to the women of the South ^'as a continual re¬ minder to those of the present generation of the splendid example of self-sacrifice, endur¬ ance and womanly virtues displayed during the war between the States, and which still exists as an important factor in making the New South greater and more prosperous than ever.® These are his own words in explanation of the thought that inspired him while at work on this beautiful creation of the imagination.

A fuller account of his life and work may be found in George C.

Keidel's ˆCatonsville Biographiesˆ (1915). ˆ

VOLE, a small rodent, belonging to the muridce, and distinguished by the enamel of the rootless molar teeth being folded in the form of a double series of alternating triangles. The name is of British origin, and while used in Canada and Australia is seldom heard in the United States. The ears are very short and rounded, and the soles of the feet are hair¬ less and tuberculate, while the tail is relatively short. The body is stout and heavy, the legs short and the movements clumsy. The voles and their immediate allies form a subfamily {MicrotincB) of the Muridce, the meadow-mice (q.v.). Consult Miller, N. A. Fauna No. 12, United States Department of Agriculture; Bailey, id. No. 17 ; and Stone and Cram, ˆAmerican Animals,ˆ New York, 1902.

VOLGA, vol'ga, a river in Russia, the long¬ est in Europe. It rises among marshes and small lakes beside the Valdai Hills, in the gov¬ ernment of Tver, at an elevation of about 550 feet above sea-level, and falls into the Caspian Sea by many mouths, at Astrakhan. Its basin has an area of about 563,300 square miles, and its entire course, including windings, is about 2,400 miles in length, while its fall from source to embouchure is only 630 feet. It flows at first southeast about 90 miles to Zubtzof, thence generally northeast past Tver to Mologa, thence east by south past Yaroslaf, Kostroma and Nijni-Novgorod, to the vicinity of Kasan. Here it turns south, flows circuitously south-south¬ west, past Simbirsk and Saratof to Tsaritsyn and Sarepta, making a marked eastward bpd at Samara, and thence southeast to the Caspian. At Tsaritsyn it sends off a branch, the Akhtuba, which flows parallel to the main part of the river, and is connected with it by many cross branches. Its principal affluents are the Oka and Kama, the one joining it from the south¬ west, the other from the northeast. Some geographers have held that the Oka is really the main stream, being larger and having a greater drainage area than the Volga above the junction. The Volga is navigable almost from its source, and below Nijni-Novgorod it floats quite large vessels; but its navigation is irn-peded by shallows and sandbanks, and in winter by ice. Passenger steamers similar to

those of American rivers ply upon it. The most important river ports, in the order of traffic, are Novgorod, Tsaritsyn, Rybinsk and Astrakhan. Before the war about 10,000 ves¬ sels annually passed into the river mouth. By a judicious system of canals it communicates with the Caspian, Baltic, Black and White seas. It has a large delta of eight large and 190 smaller streams, spreading to an extreme width of 75

miles. The principal channel is on the southwest side of the delta, and is normally about four miles wide at the mouth. Several of the delta streams flow approximately paral¬ lel to the main channel for 150 miles from the discharge in the Caspian. The short railway from Tsaritsyn to the river Don has diverted much of the traffic from the lower Volga and the Caspian to the lower Don and the Sea of Azov. The banks of the Volga are fertile, and often well-timbered. The river abounds in fish, particularly sturgeon, carp and pike of extraor¬ dinary size.

VOLHYNIA, v61-hin'i-a, Russia, a south¬ west government, bounded north by Grodno and Minsk, east by Kief, south by Podolia, and west by Austrian Galicia and Poland; area, 27,699 square miles. The capital is Zhitomir; the peo¬ ple are mostly Slavs. It was a part of Poland before its absorption by Russia in 1794. In the south there are spurs of the Carpathians, but the north is low. The whole drainage is car¬ ried to the Dnieper by numerous small streams. The Western Bug is the largest river. The climate is mild, equable and in general health¬ ful. Immense forests cover a large area of the northern section ; the southern portion is mainly agricultural. The soil is almost all remark¬ ably fertile, producing abundant crops of all kinds of grain, particularly wheat of excellent quality. Beets and tobacco are important crops. The products exported are mainly timber, grain, cattle and wool. Pop. about 4,241,800.

VOLITION. See Will.

VOLK, Douglas, American artist: b. Pitts¬ field, Mass., 23 Feb. 1856. He acquired his art by study at Rome, Italy, and with Gerome in Paris (1873-78). He exhibited at the Paris Salon in 1875. He was instructor at Cooper In¬ stitute, New York (1879-94; 1908-12) ; instruc¬ tor of the Art Students' League ; organized the Minneapolis School of Fine Arts (1896) and has been instructor in the National Academy of Design, New York, since 1910. He has won innumerable medals and is a member of many societies. Good examples of his work are found in most American collections, e.g., in the Carnegie Museum, Pittsburgh, Pa. ; in the Corcoran Gallery at Washington, D. C. ; in the Pittsfield Museum ; in the Minnesota Capitol ; in the National Museum at Washington; in the Montclair (N. J.) Art Museum; in the Metro¬ politan Museum of Art, New York; in the National Arts Club; in the Rochester Memorial Art Gallery; in the Muskegon, Mich., Art Museum; in the Omaha Art Museum and in the Portland, Me., Art Society, *etc.*

VOLK, Leonard Wells, American sculptor: b. Wellstown, N. Y., 7 Nov. 1828; d. Osceola, Wis., 19 Aug. 1895. He was employed as a marble

cutter in his father's shop and devoted his spare time to modeling, producting a bust of Henry Clay among his first pieces of work.

Later he studied art in Italy (1855-57) under the patronage of Stephen A. Douglas, and on his return established himself in Chicago, where he modeled a bust of Douglas. He produced many works, including the life size statues of Douglas and Lincoln (1876) in the Illinois State Capitol.

VOLKMANN, folk man, Alfred Wilhelm,

German physiologist ; b. Leipzig, Germany, 1 June 1801 ; d. Halle, Germany, 21 April 1877. He was educated in Leipzig, London and Paris, was appointed professor of physiology at Dorpat in 1837, and in 1843 accepted the chair of physiology and anatomy at the University of Halle. He made a specialty of the study of the nervous and optic systems. He writings in¬ clude ˆAnatomy of Animalsˆ (1831-33) ; ˆThe Independence of the Sympathetic System of Nervesˆ (1842) ; ˆElasticity of Musclesˆ (1856); < Physiological Researches in the De¬ partment of Opticsˆ (1863-64), *etc.*

VOLKMANN, Richard von (ˆˆRichard Leander®), German surgeon and author, son of Alfred Wilhelm Volkmann (q.v.) : b. Leip¬ zig, Germany, 17 Aug. 1830; d. Jena, Germany, 28 Nov. 1889. He was educated at Halle, Gies¬ sen and Berlin, in 1857-67 was private-docent of surgery at Halle, becoming professor of sur¬ gery and chief of the hospital at that univer¬ sity in 1867. He was a surgeon in the army during the wars of 1866 and 1870-71, becoming surgeon-general in the latter war. He was eminent as a lecturer, made many important investigations in surgery and pathology, and was among the pioneers in introducing the surgi¬ cal methods of Lister into Germany. He wrote ˆTraumereien au franzosischen Kaminen Marchenˆ (1871; 24th ed., 1894); ˆAus der Burscheuzeitˆ (1876); ˆGedichteˆ (1877); while among his professional writings are ˆBeitrage zur Chirurgieˆ (1875) ; ˆBe merkun-gen fiber einige vom Krebs zu trennende Geschwiilsteˆ (1858), *etc.*

VOLKMANN, Wilhelm Fridolin, Ritter VON VoLKMAR, German philosopher : b. 1821 ; d. 1877. He was born and educated at Prague, where he later was made professor of philoso¬ phy. He is probably the most conspicuous ex¬ pounder of the general principles of Herbart's psychology. These are set forth in his ˆLehrbuch der Psychologies (3d ed., by Cornelius,

1884-85).

VOLLON, v6-16h, Antoine, French painter: b. Lyons, 20 April 1833 ; d. 1900. He studied at Lyons and Paris, and exhibited for the first time at the Salon in 1864. At the following year's exhibition he received a medal, also at the salons of 1868 and 1869. He was remark¬ able for his technique and although he painted figures and landscapes excelled in the delinea¬ tion of still-life. Among his pictures of this kind are ˆArmorˆ ; ˆCuriositiesS ; <Sea Fish,s and ˆThe Pumpkin,ˆ this last being in the col¬ lection of William Schaus, New York.

VOLNEY, vol'ni (Fr. vdl-na) , Constantin Frangois de Chasseboeuf, Comte de, French author: b. Craon, Anjou, 3 Feb. 1757; d. Paris, 25 April 1820. He traveled in Egypt and Syria, and urged upon France the conquest of the former in his ˆConsiderations sur la guerre actuelle des Turcs avec les Russesˆ (1788). Elected to the National Assembly in 1789, he

was imprisoned for opposition to the Terror, and on his release made a tour of the United States, described in ˆTableau du climat et du sol des Etats-Unis d'Amerique^ (1803). After his return he became senator. His best known work is ˆLe mines ou meditations sur les rev¬ olutions des Empiresˆ (1791), a vision of a historico-philosophic sort, in which, near the ruins of Palmyra, representatives of all civiliza¬ tions and faiths pass by and are reviewed. Consult Berger, ˆEtudes sur Volneyˆ (1832) ; Barni, *ˆLes moralistes Frangaisˆ (1873).

VOLOGDA, v6ˆ16g-da, Russia, (1) a town, capital of the government of the same name, on the Vologda, in the southwest of the gov¬ ernment, in a beautiful district extensively oc¬ cupied with gardens, 35 miles east-southeast of Petrograd. It consists chiefly of old wooden houses, with a few stone .buildings in the modern style in the chief square, and has manu¬ factures of linen, lace, soap, candles, glass, leather, *etc.* Pop. about 41,600. (2) The

government of Vologda in the northeast of Russia is bounded north by the government of Archangel; east by the Ural Mountains; south by Perm, Viatka, Kostroma and Yaroslaf ; and west by Novgorod and Olonetz ; area, 155,265 square miles. The surface consists generally of a plateau covered with woods, lakes and morasses. The drainage almost wholly be¬ longs to the basin of the Northern (Dcean, most of the rivers being tributaries of the Dvina. The great wealth of the government consists in its forests, which furnish timber and charcoal. Pop. 1,772,200.

VOLPONE, or THE FOX. Jonson was a colossus. An autocrat, a scholastic, a rider of hobbies, a combatant, he overstrides the or¬ dinary men who swarm about his ankles and snap at his shins. Wolpone, or The Foxˆ was the play with which Jonson's most fortunate period began. In 1598 he had introduced the comedy of humors, and in 1605-06 returned to this form with Wolpone.ˆ It is significant of Jonson that Wolponeˆ should have been pro¬ duced in college halls and should have been dedicated to the ˆˆtwo famous universities.® Not a college man himself, Jonson's plays served to reconcile the universities with the popular drama after their long alienation. Jonson sought to apply to popular drama the academical rules for which the learned had been contending. He tells us in the prologue that the play was done in five weeks without collaborator and that no eggs or custards are broken for comedy.

In spite of his assumption to check up his fancy by reference to rules of the ancients, the play is quite loose in construction. It violates the unities of place and action. It has a vaguely moving under-plot of topical hits re¬ volving around Sir Politick Would-be and his talkative wife. After the first act the plot resolves itself into a succession of stage tricks, the changing of disguises and identities, the farce of confusion and doors. When the plot seems on the point of running out, Volpone disguises himself as Barabas had done in <The Jew of Maltaˆ and goes forth to seek new complications.

The author's purpose of moral censure is revealed in the characters. Volpone is the Fox who starts out to best ®the Vulture, Kite,

Raven and Gorcrow.ˆˆ More than a miser he is a wily villain who serves his turn by pitting knave against knave. But Volpone himself is dwarfed by his familiar servant Mosca. Mosca, the parasite of Latin comedy, becomes in this play the purest example of malevolence in Eng¬ lish drama. lago had the charm of heroism; Bosola of ˆThe Duchess of Malfiˆ is given moments of doubt. Not so with Mosca. fear I shall begin to grow in love with my dear self,® she Says. In the end he proves that there is no honor even among thieves of his ilk. These two are the chief figures. All the others are dupes or fools, with the exception of Celia, the passages of whose tragic story seem torn from another and more elevated type of play.

ˆVolponeˆ was played at the Globe Theatre in 1605, and later at the universities. It was printed in quarto in 1607. After the Restora¬ tion it was revived, and according to Downes ˆproved very satisfactory to the town.® It was last done, unsuccessfully, by the elder Colman, a century later at the Haymarket. Coleridge praised the play for ˆfertility and vigor of invention, character and language.®

Thomas H. Dickinson.

VOLSCI, vol'se, an ancient Italian tribe dwelling in Latium, on both sides of the river Liris (Garigliano). They had a republican government. Their principal city was Corioli, from which Coriolanus derived his surname. After having several times endangered the Roman state, they were conquered and ab¬ sorbed in the Romans, and thus disappeared from history as a distinct people, like the other tribes of Latium (338 b.c.).

VOLSK, v5lsk, or VOLJSK, Russia, a town in the province of Saratov, on the Volga, 80 miles northeast of Saratov. It has a technical school, normal school, etc., ironworks and tanneries. Large quays extend along the river, and trade is carried on in tallow and skins with Petrograd, in fruit with Nijni Novgorod, and in corn with Astrakhan and Rybinsk.

VOLSUNGS, vol'soongs, a heroic race cele¬ brated in old German legend. Volsung or Wal-sung, the grandson of Odin, stands forth as the original ancestor. The most interesting and romantic figure in this line of heroes is Volsung's son, Siegmund. Sigfried or Sigurd, hero of the ˆNibelungenlied,ˆ is the same race. The old Icelandic Volsungasaga, which has been followed by William Morris in his ˆ Story of Sigurd the Volsungˆ contains the original legend.

VOLT. See Electricity; Volta, Alessan¬ dro.

VOLTA, vol'ta, Alessandro, Italian phys¬ icist and pioneer in electrical discovery: b. Como, 18 Feb. 1745 ; d. there, 5 March 1827. In 1777 he paid a visit to Switzerland, where he became personally acquainted with Haller at Bern, Voltaire at Ferney and De Saussure at Geneva. Two treatises, published in 1769 and 1771, in which he gave a description of a new electrical machine, laid the foundation of his fame. In 1774 Volta became rector of the gym¬ nasium in Como and professor of physics. In 1779 he was transferred from Como to Pavia to fill the chair of natural philosophy in the uni¬ versity of that city. Here he occupied himself

entirely with electrical researches. He had previously (1777) invented the electrophorus (q.v.), and his invention of the electroscope (q.v.) (also 1777), was an important improve¬ ment. His observations upon the bubbles which arise from stagnant water led him also to some valuable discoveries in regard to gases. The electrical pistol, the eudiometer, the lamp with inflammable air, the electrical condenser and other inventions, are among his claims to re¬ nown. He next turned his attention to some of the atmospherical phenomena, such as the nature of hail, and subsequently increased his reputation b}ˆ the invention of the Voltaic pile (1800). In 1782 he had made a tour through France, Germany, England and Holland. In 1794 he received the Copleian medal from the Royal Society of London, for his paper upon the condenser ; and in 1801 his electric appa¬ ratus attracted so much notice in France that Napoleon invited him to give an 'account of his invention before a commission of the In¬ stitute, and when the commissioners made their report, proposed that a gold medal should be awarded the inventor in recognition of his services to science. He was also decorated with the cross of the Legion of Honor and the order of the Iron Crown,* and was raised to the dignity of senator of Italy, with the title of count. In 1804 he resigned his professional duties. Antinori edited a collection of his works (1816). Consult Mocchetti, Wita del Conte Voltaˆ (1838).

VOLTA, West Africa, a river of Upper Guinea, which, rising in the Kong Mountains or highlands behind the Ashanti country, runs south between Ashanti and Dahomey, and reaches the Bight of Benin through the east part of the British Gold Coast at Adda. To left and right of its mouth it forms great lagoons, and on the bar across the mouth a heavy surf runs. With its chief tributary the Black Volta its total length is about 850 miles, 250 of which are navigable in the

flood season.

VOLTA BUREAU, The, Washington, D. C., for the increase and diffusion of knowl¬ edge relating to the deaf, was founded and endowed by Alexander Graham Bell (q.v.) in 1887. It was the outgrowth of extensive re¬ searches he engaged in during the years 1878-83, to determine the causes of deafness and to what extent the human race is susceptible of variation by selection. The bureau derives its name and its endowment from the fact that the Volta prize, created by Napoleon, was con¬ ferred by France upon Dr. Bell for the inven¬ tion of the speaking telephone. The 50,000 francs received was invested in laboratory equipment and experiments that resulted in the invention of the phonograph-graphophone. From his share of the amount received from the sale of the fundamental patents of the talking-machine industry, and for discovering and giving Graphonic art commercial practi¬ cability, he set aside the sum of $100,000 as an _ endowment fund ®for the increase and diffu¬ sion of knowledge relating to the deaf.® Housed in a building of classical architecture, the Volta Bureau was the property of its trus¬ tee, Alexander Melville Bell, and his successor, Charles J. Bell, from 27 June 1887, until 1909, when, at the suggestion of its founder, it was presented with other property to The American

Association to Promote the Teaching of Speech to the Deaf, an association founded and en¬ dowed by Dr. Bell in 1890. In furtherance of its primary purpose, the Volta Bureau has printed, or reprinted, and freely distributed, in the form of leaflets, pamphlets or books, several hundred thousand contributions to knowledge in the hope that persual would serve to broaden views concerning the deaf. It has published a few books that it sells at cost or less. It maintains a fireproof reference library, and is endeavoring to include in its unique col¬ lection of literature relating to the deaf a copy of every book, periodical, pamphlet and leaflet relating to any phase of deafness and published in any part of the world during any period. Among its other functions, the Volta Bureau serves as a world's clearing-house, or

medium of exchange, between the schools and the vari¬ ous associations of the deaf in all parts of the world. It distributes among foreign schools and associations the reports and literature of American schools and associations and vice-versa. It also serves as a bureau of informa¬ tion for parents and friends of deaf children, for physicians, otologists, the clergy, and all who desire available information concerning any phase of deafness. For the benefit of its members the association maintains a teachers' agency at the Volta Bureau, where parents, school officials and others who are members may secure names and addresses of available teachers, free of charge. The Volta Bureau publishes The Volta Review; The Speech and Speech-Reading Magazine, an illustrated monthly periodical presenting helpful essays on live subjects of vital interest to thinking men and women working to promote the welfare of the deaf and for the betterment of humanity.

VOLTAIC BATTERIES. See Electric Batteries.

VOLTAIC CELL. See Electric Batter¬ ies.

VOLTAIC PILE, the galvanic pile as first devised by Volta. See Electricity.

VOLTAIRE, vol-tar, Jean Frangois Marie Arouet, French author and freethinker: b. Paris, 21 Nov. 1694; d. there, 30 May 1778. He was destined for the legal profession, but his inclination for literature was so decided that he never seriously entered upon it, and the suc¬ cess of his first tragedy ˆCEdipe,ˆ brought out in 1718, decided him. It is traditionally re¬ corded that this play was finished, and that two cantos of his ˆHenriadeˆ were written in the Bastille, where he was confined (May 1717, to April 1718), on account of certain satirical verses on the regent, the authorship of which was ascribed to him. The success of his tragedy at once made him the fashionable poet of the day, and for the next eight years he re¬ sided mainly at Paris. It was about the be¬ ginning of this period that he changed his paternal name of Arouet into Voltaire, which latter name is most probably explained as an anagram of Arouet 1. j. (le jeune — the younger, he having an elder brother). Voltaire suffered a second imprisonment in the Bastille in 1726, the occasion of which was his sending a chal¬ lenge to the Chevalier Rohan, by whom he had been insulted. This imprisonment lasted but a month, and on being liberated Voltaire de¬

termined to seek greater liberty in England, whither he had been

invited by Lord Bolingbroke. His residence in England lasted till 1729, and there he acquired some knowledge of English literature (Shakespeare, Pope, Swift, Addison), and made himself acquainted with the writings of the English freethinkers, Toland, Tindal, Collins, Shaftesbury and others. After his return he lived chiefly at Paris till 1734. In the course of his second Parisian residence he raised himself from very moderate circumstances to a condition of affluence, not by literary labor, but by monetary enterprises in connection with a government lottery, the corn-trade and army contracts. From 1734 to 1749 his principal place of residence was at Cirey, in Lorraine, where he lived with the Marchioness due Chatelet, with whom he had become intimate in July 1733. The death of the marchioness in 1749 deprived him of his retreat, and in the following year he accepted the often repeated invitation of Frederick the Great to come and live at his court at Potsdam. Here he was received with the greatest honor, but the good understanding with the king did not last long, and in 1753, after numerous un¬ pleasant scenes, Voltaire quitted the Prussian court. Before returning to France he visited one or two of the minor courts of Germany. At Frankfort, Frederick caused him to be de¬ tained in order to recover from him a collec¬ tion of poems by the king containing a number of satires on several princes, some of which Voltaire had maliciously exhibited at the courts he had visited. Early in 1755 he removed to Geneva, and for the remainder of his life lived mainly either in Switzerland or close to its borders. About 1758 he fixed his residence with his niece, Madame Denis at Ferney, in the Pays de Gex, a district that at one time be¬ longed to the counts of Geneva, and from this time this was his sole place of abode. Under his care the village of Ferney, which in 1758 was a part of an estate he acquired, contained only 49 peasants in a miserably poor condition, became a thriving place, and in 1778 numbered 1,200 inhabitants, among whom Voltaire lived almost as a sovereign prince. In his retire¬ ment he became known to all Europe as the patriarch of Ferney, and received a constant succession of visits from persons of rank and farne, and kept up an immense correspondence, v;hich included in its range most of the crowned heads of Europe. In February 1778, impelled by the desire of hearing once more the applause of multitudes, he went up to Paris, where he was hailed by all classes with bound¬ less enthusiasm. But the sudden change in his manner of life was too great a strain on his strength and he soon collapsed. He was buried at the Abbey of Scellieres, between Nogent and Troyes, of which his nephew, the Abbe Mignot, was commendator. At the revolution his re¬ mains were transferred to the Pantheon (1791).

During his whole life Voltaire was an inde¬ fatigable writer. The long list of his produc¬ tions embraces works in almost every branch of literature : in poetry, the drama, romance, history, philosophy, criticism and even science. Nearly all his works are strongly animated by a spirit of hostility to the Christian religion and its representatives. This brought him into conflict with the religious element and the gov-

crnment, and a great part of his later jˆears was spent in exile on account of his extreme rabid criticism of religious thought and belief. It was mainly in order to be out of reach of the government that he lived so much at a distance from Paris, on the frontiers of France, whence he could easily make his escape for a while, when he thought it ad¬ visable, into Holland or Switzerland. At Cirey and Ferney he could be more outspoken than he had dared ‘to be when he lived chiefly at Paris. From Ferney he issued all his most direct attacks upon Christianity and Catholi¬ cism, the ˆSermon des Cinquante,ˆ ˆExtrait des Sentiments de Jean Meslier,ˆ ˆLa Bible enfin Expliquee.ˆ At the same time he was a chief contributor to the ˆEncyclopedie,ˆ and indeed its leading spirit. Yet he had no sympathy with the atheistical views that are found ex¬ pressed in some parts of that work. He upheld theism with as much zeal as he denounced Christianity and priestcraft, and even came to be looked upon as reactionary by the atheistical spirit of the time. It ought to be mentioned also that his hatred of fanaticism, although often the cause of violence and injustice on his part, was the mainspring of some of the most honorable actions of his life, as in the case of the Calas family. See Calas, Jean.

The works of Voltaire on which his literary fame is now generally held to rest, are his philosophical novels such as ˆZadig,ˆ ˆCandide,ˆ ˆL’lngenuˆ ; his histories (ˆSiecle de Louis XIV,ˆ ‘ˆHistoire de Charles XIP), his correspondence, and more than all, perhaps, his poetical epistles, satires and occasional poems of a light character, iii which the typical Frenchman is exhibited in his most complete manifestation, full of wit, gaiety, vivacity, ease and grace. Several of

his tragedies, among which may be mentioned ˆZaireˆ (usually reckoned his masterpiece in the dramatic art), ˆAlzire,ˆ ˆMerope,ˆ ˆMahometˆ (translated into German by Goethe), and ˆRome Sauvee,ˆ had great success in their own day, but the French do not assign to them a high place in their literature. Voltaire attempted comedy also, but in this he was still less successful. He seems to have been deficient in a sense of humor. ˆ The best of his comedies is ˆL'Enfant Prodigue.ˆ We should not omit to mention that Voltaire was always a great lover of the drama, and that wherever he settled for any length of time one of his first aims was to get a theatre established in the place, sometimes in his own house. Occasionally he acted himself. The ˆHenriade,> an epic poem, with Henry IV of France as hero, is another work of his, which, though not highly esteemed now, had great suc¬ cess, and exercised a powerful influence when it first appeared. (See Candide). Of the numerous editions of the works of Voltaire, the best are those of Beaumarchais, with introduc¬ tions and notes by Condorcet (1784-90), Beuchot (1828 et seq.), and Moland (1877ˆ5). The chief biographies are those by Desnoires-terres, Woltaire et la Societe Frangaise au XVHI Siecle> (2d ed. 1887) ; Mahrenholtz, Woltaires Leben und Werke> (1885) ; Parton, <Life of Voltaireˆ (1881); Hamley, <Voltaire> (1877); Ballantyne, Woltaire's Visit to Englandˆ (1893) ; and Espinasse, Woltaireˆ (1892). Consult also Strauss, D., < Voltaire: Sechs

Vortrage> (1870); Morlcy, John, <Voltaireˆ

(1872) ; Maugras, Woltalre et Jean Jacques Rousseauˆ (1886) ; Rabaud, ˆEtudes Historiques sur TAvenement de la Toleranceˆ (1892) ; Campardon, ˆDocuments Inedits sur Voltaireˆ (1893) ; Deschanel, ˆLe Theatre de Voltaireˆ (1886) ; Lion, ˆLes Tragedies et les Theories Dramatiques de Voltaireˆ (1896) ; Lounsbury, ˆShakespeare and Voltaireˆ (1902) ; Calmettes, ˆChoiseul et VoltaireJ (1902) ; Price, W. R., ˆSymbolism of Voltaire's Novelsˆ (New York 1911) ; Tallentyre, G. S., Woltaire in his Lettersˆ (New York 1919).

VOLTAISM, a term early applied to gal¬ vanism, from the fact that Volta's explanations of Galvani's experiments on frogs led to the correct appreciation of the sources of the electricity generated.

VOLTAMETER. See Coulometer.

VOLTERRA, v61-ter'ra, Daniele da (Ric—

ciARELLi, Daniele) Italian painter: b. Volterra, Italy, 1509; d. Rome, 4 April 1566. He studied painting at Siena, and afterward went to Rome, where he gained the friendship of Michelangelo, who not only instructed him, but gave him de¬ signs for some of his works. His fame rests chiefly on a series of frescoes in the Church of La Trinita de' Monti, Rome; and of those of the ˆDescent from the Cross ˆ is well known by Toschi's engraving. Fie was employed by Paul IV to drape the figures in Michelangelo's <Last Judgmentˆ and thus earned for himself the soubriquet of ˆT1 Braghettone® (The Breeches-maker). In the latter part of his life he ap¬ plied himself also to sculpture.

VOLTERRA, Italy, town situated in the province of Pisa, on a tableland about 1,600 feet above sea-level; 51 miles by rail east-south- east of Leghorn. It is surrounded by Cyclo¬ pean walls, in better preservation than any other structures of the kind in Italy. The gate called VArco, and the remains of baths and of an amphitheatre, are interesting vestiges of an¬ tiquity; the cathedral, municipal palace and Pretorio are monuments of the Middle Ages; and the Mastio, a prison, is a modern edifice. Volterra contains a college, numerous schools and a library of 120,000 volumes. Wine, oil, corn and mulbefry-trees are grown in the lands belonging to the town, which also possesses considerable mineral wealth. Pop. 16,784.

Volterra, anc. Volaterrcu, was one of the most powerful and important of the Etruscan cities and came into the possession of Rome 474 B.c. ; after the fall of the empire it suffered much from the invasion of barbarians.

VOLTURNO, vol-toor'noˆ Italy, a river which rises in the province of Campobasso, flows southeast to its junction with the Calore, and then west past Capua into the Mediter¬ ranean, 20 miles southeast of Gaeta, after a course of 112 miles. Garibaldi won a victory over the army of the king of Naples on its banks in 1860.

VOLUME, the bulk occupied by a body; the amount of space a thing occupies, as the ■ volume of water in a pond, or of air in a room. The volume of a body may be ˆTeal® or ®apparent® ; the real volume being the space occu¬ pied by the actual substance of which the body is composed, after making allowance for the pores or interstices that may be present; while the apparent volume is the space included

within an imaginary surface which just takes in the body, interstices and all. The ^^apparent volume^^ of a heap of coal, for example, in¬ cludes the ®real volume® of each separate fragment of the coal, and also the empty spaces between these fragments, as they lie in the pile. See Mensuration; Weights and Measures; Metric System ; Units.

VOLUMETRIC ANALYSIS, in chemis¬ try, analysis consisting in submitting the sub¬ stance to be estimated to certain characteristic reactions — the chemist employing for such re¬ actions liquids of known strength, and, from the quantity of liquid employed to induce the reaction, determining the weight of the sub¬ stance to be estimated by means of the laws of equivalence. The idea of this method sug¬ gested itself first to Gay-Lussac in considering how most readily to determine the amount of silver in an alloy of silver and copper; but the method itself did not come into general use till a considerable time afterward. The liquid reagents of known strength are called standard solutions; and the amount employed may be es¬ timated either by weight or by volume, but the latter being the easiest of application, is uni¬ versally employed — ‘hence the name Volu¬ metric Analysis. In order that a reaction may be applicable in Volumetric Analysis, it must satisfy these two conditions: (1) It must not occupy much time; (2) the termination of the reaction must be easily recognized and unmis¬ takable to the eye. These conditions limit the number of volumetric processes. In addition to the ordinary chemical apparatus, Volumetric Analysis requires graduated glass vessels of different kinds for measurement of the stand¬ ard solutions. Of these the most essential are : (1) Pipettes, glass vessels of the form of Figs. 1 and 2, intended for the delivery of the stand¬ ard solution : Fig. 1 showˆs a vessel provided with a single mark upon the neck, while Fig. 2 shows one divided and graduated through its whole length into cubic centimetres (c.c.), ac¬ cording to French scale; (2) flasks graduated for the contents in various sizes from one-tenth of a litre to five litres, and used for prep¬ aration of standard solutions; (3) burettes, or graduated tubes for measuring liquids used in an analysis. The best burette for general pur¬ poses is known as Mohr’s burette (see Fig. 3) ; and its lower part is attached to an India-rub¬ ber tube and spring-clamp or clip (Quetsch-Halin). Its principal advantages over other forms are, that its constant upright position en¬ ables the operator at once to read off the num¬ ber of degrees of standard (or test) solution used for any analysis, while the quantity of fluid to be

delivered can be most accurately regulated by the pressure of the thumb and finger on the clamp ; moreover, as it is not held in the hand, no error is likely to arise in the measurement from the heat of the operator's hand. Its greatest drawback is that it cannot be used for those test-solutions which decom¬ pose India-rubber.

The standard solutions, known also as test or titrated solutions (from French titre, which signifies the standard of a coin), may be divided into: (1) Such as are immediately prepared by weighing a substance of known composition, dissolving it, and diluting it to the required vol¬ ume; (2) such as are prepared by approximate

mixture and subsequent exact analysis. The greatest care is indispensable regarding both the graduation of the measuring instruments and the strength and purity of the standard solutions, which must be protected from evap¬ oration and other hurtful influences by being kept in bottles of one or two litres capacity, provided with well-ground stoppers'.

Volumetric methods are usually classified as follows, according to the principles on which they are based: (1) Analysis by saturation, when the quantity of a base or an acid is meas¬ ured by the quantity of acid or base required for exact saturation — a point to be determined by test-papers, tincture of litmus, *etc.* (2) Analysis by oxidation and reduction, when the quantity of the substance to be determined is found by the quantity of chlorine, bromine, io¬ dine or oxygen to which it is equivalent (re¬ garded as oxidant) ; or by the "quantity of chlor¬ ine, bromine, iodine or oxygen which it requires to pass frorn a lower to a higher stage of oxida¬ tion : the chief oxidizing agents are permangan¬ ate of potash and bichromate of potash ; while the reducing agents chiefly used are protoxide of iron and hyposulphite of soda. (3) Analysis by precipitation, when the determination of a

Pig. 1. — A Pipette, containing 10 c.c.

Fig. 2. — A Pipette, containing 50 c.c., divided through its whole length in c.c.; being thus graduated for measuring the delivery of fluids.

Fig. 3. — a, the India-rubber; b, the slips made of brass wire, by which the India-rubber tube can be closed at will.

substance is effected by precipitating it in some insoluble and definite combination. We have space for an example of only one of these three forms and, selecting the last for its historic in¬ terest in its application to the determination of silver, we give Sutton's account of the process : ^^Suppose that it is desirable to know the quantity of pure silver contained in a coin. The coin is first dissolved in nitric acid, by which means a

VOLUMOMETER

bluish solution containing silver, copper, and probably other metals, is obtained. It is a known fact that chlorine combines with silver in the presence of other metals to form chlor¬ ide of silver, which is insoluble in nitric acid. The proportions in which the combination takes place are 35.5 of chlorine to every 108 of silver; consequently, if a standard solution of pure chloride of sodium is prepared by dissolving 58.5 grains of the salt — i.e., 1 eq. sodium (~23) plus 1 eq. chlorine (=ˆ-35.5) or 1 eq. chloride of sodium — in so much distilled water as will exactly make up 1,000 grains by meas¬ ure, every single grain of this solution will combine with 0.0108 of a grain of pure silver to form chloride of silver, which precipitates to the bottom of the vessel in which the mixture is made. In the process of adding the salt so¬ lution to the silver, drop by drop, a point is at last reached when the precipitate ceases to form. Here the process must stop. On looking care¬ fully at the graduated vessel from which the standard solution has been used, the operator sees at once the number of grains that have been necessary to produce the complete decom¬ position. For instance, suppose the quantity used was 520 grains ; all that is necessary to be done is to multiply 0.0108 grain by 520, which shows the amount of pure silver present to be 56.16 grains. By volumetric analysis as com¬ pared with ordinary analysis, much time, labor and expense are saved ; at the loss, however, often of due accuracy, unless the greatest care be taken that the standard solutions are of proper strength, and the instruments accurately graduated. An analysis can thus be completed in 15 minutes that would formerly have occu¬ pied a day or more. Independently of its ap¬ plication to pure chemistry, it facilitates to a great extent the chemical analysis of wine, of waters, of manures, soils, *etc.* Consult Mohr, ˆLehrbuch der Chemischen-Titriermethodeˆ ; Rieth, ˆVolumetrische Analysisˆ and other handbooks of analytical chemistry.

VOLUMOMETER, an instrument for de¬ termining the specific gravity of a solid by m.easuring the amount of water or other liquid displaced by it. A simple form is a flask hav¬ ing a long narrow neck, and an opening at the side through which the solid may be introduced. The neck is graduated from the bottom upward. In using, the flask is filled

to the zero mark with a fluid ; on turning it on its side the stopper can be removed and the solid intro¬ duced; when turned back to an upright position the liquid is forced up the stem and the volume reading is the amount of liquid displaced by the solid. From this the specific gravity can be easily calculated.

VOLUNTARY CONTROVERSY, a C9n-troversy begun in Scotland in 1780, and which continued obscurely until 1831, when it began to excite general interest, resulting at length in disruption of the Scottish Presbyterian Church, and to that remarkable action, by which, as a protest against state interference, on Tuesday, 23 May 1843, 396 ministers and professors re¬ nounced all claim to the benefices they had held in connection with the Establishment, de¬ claring them to be vacant and consenting that they should be dealt with as such. By this memorable act of self-sacrifice in obedience to principle these ministers and teachers gave up

an annual income amounting to at least $500,000. See Free Church.

VOLUNTARY CONVEYANCE, m law, transfer of property, real or personal, without any valuable consideration. Voluntary convey¬ ance comes into question mostly in cases of bankruptcy, when a debtor's estate is insuffi¬ cient to meet the claims of creditors. The first English statutes regarding voluntary convey¬ ance were 13 Elizabeth, ch. 5, for protec¬ tion of creditors, and 27 Elizabeth, cli. 4, for protection of subsequent purchasers : the law as determined in Elizabeth's time is ac¬ cepted generally throughout the United States even where it has not been re-enacted in stat¬ utes. At one time a voluntary conveyance made when the maker of it was a debtor, even if he possessed many times the amount of the debt, was held fraudulent within the intent of 13 Elizabeth, ch. 5 ; but now the proportion of the debt to the whole estate is taken into account and voluntary conveyance is not re¬ garded as prima facie fraudulent unless the property conveyed constitutes a large ratio of the debtor's estate.

VOLUNTARYISM, or THE VOLUNTARY SYSTEM, a term applied to the support of ministers of religion and their churches by the voluntary contributions of - the people, as opposed to the connection of church and state, and the support of the ministry from tithes or general taxation. Whenever the clergy receive stipends from the state, it is evident that the taxpayer, in addition to the volun¬ tary support, if any, which he gives to some particular church contributes through taxation to the support of an established church or of state-recognized

churches in general.

In ancient times state and church were in¬ separable, and opposition to the church was re¬ garded as treason to the state. This relation existed throughout the Middle Ages, and until a comparatively recent period, under the papacy, with the important difference that the state was regarded and treated as subordinate to the church, and as bound to obey its decrees. In the countries which accepted the Protestant doctrines in one form or another the relations of church and state were reversed, and the state, as represented by the sovereign, assumed control of the church, a fact which had much to do with the spread of the Reformation. While the conditions of the connection were changed, however, the tie between church and state be¬ came, in Protestant countries, even stronger than before, an ever-present and jealous mon¬ arch uniting in his own person the hereditary civil power of the Crown, and the religious authority which had formerly been exercised by a distant pope. Dissentees from the estab¬ lished church became rebels, whereas before they had only been heretics, and the devastating civil wars of the 16th and 17th centuries were the outcome, in a large, if not a principal de¬ gree, of this new relation.

The dissentee from a church establishment did not seek to put a voluntary system in its place. If he triumphed in England or immi¬ grated to America his aim was to create an established church of his own, and doom to stake or scaffold any intruder who disagreed with him. The colonies of Rhode Island and Maryland the former founded by Protestants,

the latter by Roman Catholics, were framed on the plan, then novel to the world, oi toleration in matters of conscience, accompanied by its correlate, the voluntary system.

While the world has made admirable prog¬ ress toward complete liberty of conscience, while the prison and scaffold no longer menace dissenters from an established creed, and men can be friends, and acknowledge each other's good qualities although differing pole-wide

— to use Whittier's expression — in religious opinions, the voluntary system is still almost confined to the United States, Mexico and the leading British colonies. State-supported churches are the rule, even in France and Ger¬ many, where all creeds are on an equal foot¬ ing, in Switzerland, where absolute liberty of conscience is decreed by law, the magistrates keep a certain degree of supervision over religion, and Brazil, while providing in her Constitution for absolute separation of Church and State, still supports the ecclesiastics who were in receipt of state support when the new relation came into force. '*

In the United States, saving the fact that church property is usually exempt from taxa¬ tion, the voluntary system prevails everywhere, and only chaplains in the army and navy, and those who say prayers before public bodies, as at the opening of the United States Senate, receive pay from the public treasury. This universal voluntaryism did not come about with independence, or even with the adoption of the Federal Constitution. The first amend¬ ment to the Constitution of the United States provided that Congress should make no law respecting an establishment of religion, or pro¬ hibiting the free exercise thereof. This, of course, did not affect the power of the several States to create or continue church establish-rnˆents. The convention which framed a con¬ stitution for Massachusetts provided in the ^^Bill of Rights,® that "the legislature shall au¬ thorize and require the several towns, parishes and precincts to make suitable provision at their own expense for the institution of the public worship of God, and the support and maintenance of public Protestant teachers of piety, religion and morality, in all cases where such provision shall not be made voluntarily.® Officers known as tithingmen were appointed to collect the dues, and if a taxpayer defaulted, distress and even imprisonment followed. This system amounted to State support of the Con¬ gregational Church, and it was not until 1815 that dissenters from the prevailing creed were released from paying taxes to maintain the ministers of the majority.' The involuntary system was abolished altogether in Massa¬ chusetts in 1833. In Connecticut the constitu¬ tion of 1818, while giving every society of Chris¬ tians, power to tax the members of such society, permitted any member to escape this obligation by giving notice of withdrawal in writing. And now, as for many years past, without any pro¬ vision of the Federal Constitution to coerce the States, and by force of enlightened public opinion, voluntaryism in the maintenance of ministers and churches prevails everywhere throughout the republic, and in no country in the world is religion better supported, while the clergy also, conscious of their freedom from State control, are self-respecting in their

personal attitude, and devoted to the service of God and of their flocks.

VOLUNTEER STATE. A name given to the State of Tennessee.

VOLUNTEERS. Persons who enter mili¬ tary service of their own free will and not by constraint or compulsion. In the United States, especially during the Civil War, volunteers in¬ cluded solders of all bodies other than the regu¬ lar army, but practically governed by the same laws when in service. In general the army of volunteers comprises to all intents and pur¬ poses, (1) the regular unpaid forces of the State militia which when called into actual service receive pay from the government and are subject to the rules and articles of war, and (2) that class of troops which may from time to time be raised by Congress on occasions of national emergency. In the United States, by act of Congress, in 1914 the volunteer forces are raised, organized and maintained only dur¬ ing the existence of war, or while war is imminent, and only after Congress shall have authorized the President to raise such a force. The term of enlistment in the volunteer forces is the same as that for the regular army, ex¬ clusive of reserve periods, and all officers and enlisted men composing such volunteer forces are mustered out of the service of the United States as soon as practicable after the Presi¬ dent shall have issued a proclamation announc¬ ing the termination of the war or the passing of the imminence thereof. When volunteer forces are to be raised the President issues his proclamation, stating the number of men de¬ sired for each arm, corps and department, within such limits as may be fixed by law, and he prescribes such rules and regulations as may be necessary for the purpose of examining, organizing and receiving into the service, the men called for. The power to organize volun¬ teer forces includes the power to provide, within such limits as are or may be prescribed by law, the officers and enlisted men of all grades and classes, and the trained nurses, male and female, that may be necessary in the various arms, corps and departments. When three-fourths of the prescribed minimum enlisted strength of any company, troop or battery, or when three-fourths of the prescribed minimum enlisted strength of each company, troop or battery comprised in any battalion or regi¬ ment of the organized land militia of any State, Territory or the District of Columbia, organized as prescribed by law and War Department regulations, volunteer and are accepted for service in the volunteer army as such company, troop, battery, battalion or regiment, such or¬ ganization may be received into the volunteer forces in advance of other organizations of the same arm or class from the same State, Territory or District, and the officers in the organized land militia service with such or¬ ganization may then, within the limits pre¬

scribed by law, be appointed by the President, by and with the advice and consent of the Senate, as officers of corresponding grades in the volunteer army and be assigned to the same grades in the said organization or elsewhere as the President may direct. All enlisted men received into the service in the volunteer forces, as far as practicable, are taken from

the several States _ and Territories and the District of Columbia in proportion to the re¬ spective populations thereof. When the rais¬ ing of a volunteer force has been authorized

. Congress and after the organized land militia of any arm or class has been called into the military service of the United States, volunteers of that particular arm or class may be raised and accepted into said service regard¬ less of the extent to which other arms or classes of said militia have been called into said serv¬ ice. The volunteer forces are subject to the laws, orders and regulations governing the regular army in so far as such laws, orders and regulations are applicable to officers or enlisted men whose permanent retention in the military service, either on the active list or on the retired list, is not contemplated by exist¬ ing law, and no distinction is made between the regular army, the organized militia while in the military service of the United States, and the volunteer forces in respect to promo¬ tion or to the conferring upon officers or en¬ listed men of brevet rank, medals of honor, certificates of merit or other rewards for dis¬ tinguished service, nor in respect to the eligibil¬ ity of any officer of said army, militia or volun¬ teer forces for service upon any court-martial, court of inquiry or military commission. The organization of all units of the line and of the signal troops of the volunteer forces is the same as that prescribed by law and regulations for the corresponding units of the regular army. When military conditions so require, the Presi¬ dent may organize the land forces of the United States into brigades and divisions and such higher units as he may deem necessary, and the composition of units higher than the regi¬ ment is as he may prescribe. To each regiment of infantry, cavalry and artillery and to each battalion of engineers and signal corps troops, there is attached the same personnel of the Medical Department as are attached to like organizations of the regular army. The or¬ ganization of the coast defense, of machine-gun detachments, establishments of the Medical De¬ partment, remount depots, military trains, secret-service agencies, military prisons, lines of communication, including their supply depots, and of other adjuncts that may be necessary in the prosecution of war and the organization of which is not otherwise

provided for by law, IS as the President may from time to time direct.

Except as otherwise provided the Presi¬ dent is authorized, by and with the advice and consent of the Senate, to appoint all volunteer officers required, but the number and grade of such officers does not exceed the nurnber and grade of like officers provided for a like force of the regular army. All appointments below the grade of brigadier-general in the line of the volunteer forces are by commission in an arm of the service and not by commission in any particular regiment, and officers in each arm of the service are assigned to organizations of that arm and transferred from one organiza¬ tion to another in that arm, as the interests of the service may require, by orders from the Secretary of War. To provide the staff officers necessary in the various staff corps and depart¬ ments in time of war or while war is imminent, and that are not otherwise provided for, the President is authorized to appoint, by and with

the advice and consent of the Senate, such num¬ ber of volunteer staff officers of grades au¬ thorized by law for the regular army as he may find necessary for such corps and departments. The total number of such staff officers so ap¬ pointed, including all such officers of the or¬ ganized militia called into the military service of the United States, does not exceed the ratio of one officer to 200 enlisted men for all militia and volunteer forces called into the military service of the United States. The number of volunteer staff officers appointed in any grade in the various staff corps and departments does not exceed in any staff cofps or department the proportionate strength of regular officers of the corresponding grade as established by law for the corresponding staff corps or department of the regular army. The President may ap¬ point, by and with the advice and consent of the Senate, volunteer chaplains at the rate of one for each regiment of volunteer infantry, cavalry and field artillery, and one for every 12 companies of volunteer coast artillery raised, with rank corresponding to that established by law for chaplains in the regular army.

In appointing the volunteer officers the President may select them from the regular army, from those duly qualified and registered pursuant to section 23 of the Act of Congress, approved 21 Jan. 1903, from the country at large, from the organized land militia of the District of Columbia and, upon the recommen¬ dation of the various governors, from the or¬ ganized land militia of the several States and Territories in proportion, as far as practicable, to their respective populations, and, as far as compatible with the interests of the

military service, from the localities from which the troops with which the officers appointed upon said recommendation are to serve have been recruited. In appointments from the country at large preference is given those who shall have had honorable service in the regular army, the national guard or the volunteer forces, or who have been graduated from educational in¬ stitutions in which military instruction is com¬ pulsory. At the same time, not to exceed one regular army officer may hold a volunteer com¬ mission in any one battalion of volunteer en¬ gineers or signal troops, or in any one bat¬ talion of volunteer field artillery, and not to exceed four regular -.rmy officers may, at the same time, hold commissions in any one regi¬ ment of volunteer cavalry, field artillery or infantry, or in any 12 companies of coast ar¬ tillery, including their field and staff. Regular army officers appointed as officers of volunteers do not thereby vacate their regular army com¬ missions nor are they prejudiced in their rela¬ tive or lineal standing therein by reason of their service under their volunteer commissions. The temporary vacancies created in any grade not above that of colonel among the commis¬ sioned personnel of any arm, staff corps or department of the regular army, through ap¬ pointments of officers thereof to higher volun¬ teer rank, are filled by temporary promotions, according to seniority in rank of officers holding commissions in the next lower grade in said arm, staff corps or department, and all tem¬ porary vacancies created in any grade by tem¬ porary promotions are in like manner ˆ filled from, and thus create temporary vacancies in.

the next lower grade, and the vacancies that remain thereafter in said arm, staff corps or department, that cannot be filled by temporary promotions, may be filled by the temporary appointment of officers of such number and grade or grades as maintain said arm, corps or department at the full commissioned strength authorized by law. In the staff corps and de¬ partments subject to the provisions of sections 26 and 27 of the Act of Congress, approved 2 Feb. 1901, and acts amendatory thereof, tem¬ porary vacancies that cannot be filled by tem¬ porary promotions are filled by temporary de¬ tails made in the manner prescribed in said sections 26 and 27 and acts amendatory thereof, and the resulting temporary vacancies in the branches of the army from which the details are so made are filled as hereinbefore in this section prescribed. Officers temporarily pro¬ moted or appointed under the terms of this section are so promoted or appointed by the President, by and with the advice and consent of the Senate, lor terms that do not extend beyond the termination of the war .or, if war shall not occur, beyond the passing of the imminence thereof, as defined by the President's proclama¬ tion, and upon the expiration of said terms said officers are discharged from the positions held by them under their temporary promo¬ tions or appointments. Officers temporarily promoted under the provisions of this section do not vacate their permanent commissions, nor are they prejudiced in their lineal or rela¬ tive standing in the regular army under per¬ manent commissions, by reason of their serv¬ ices under temporary commissions.

All returns and muster-rolls of organiza¬ tions of the volunteer forces and of militia organizations while in the service of the United States are rendered to the adjutant-general of the army, and upon the muster out of such organizations the records pertaining to them are transferred to and filed in the adjutant-general's office. Out-regimental and out-medical officers serving with volunteer troops or with militia organizations in the service of the United States, in the field or elsewhere, keep a daily record of all soldiers reported sick or wounded, as shown by the morning calls or reports, and deposit such reports, with other reports, in the adjutant-general's office.

In time of war or while war is imminent all organizations of the land forces in the mili¬ tary service of the United States are recruited and maintained as near their prescribed strength as practicable. For this

purpose the necessary rendezvous and depots are established by the Secretary of War for the enlistment and train¬ ing of all recruits, and in order that officers may be available for recruiting duty the Presi¬ dent is authorized, by and with the advice and consent of the Senate, to appoint officers of volunteers of the proper arm of the service, in numbers not to exceed at the rate of one major, four captains, five first lieutenants and five second lieutenants for each organized regiment of cavalry, field artillery or infantry, each three battalions of engineers or each 12 companies of coast artillery; for purposes of instruction and discipline, troops at recruit depots may be organized into companies and battalions, at the discretion of the Secretary of War, with noncommissioned officers and

privates of such grades and numbers as may be prescribed by the President. The recruit rendezvous and recruit depots are under the direct control of the Secretary of War and render their reports and returns to the adjutant-general of the army. To maintain the organ¬ ized land militia organizations in the military service of the United States at their maximum strength the recruiting rendezvous and depots in any State or Territory may, at the request of the governor thereof, enlist and train re¬ cruits for the organized land militia organiza¬ tions in the service of the United States from said State or Territory. In the organization of a recruiting system, after Congress shall have authorized the raising of volunteer forces, the President is authorized to employ retired officers, noncommissioned officers and pri¬ vates of the regular army, either with their rank on the retired list or, in the case of en¬ listed men, with increased noncommissioned rank, or he may, by and with the advice and consent of the Senate, appoint and employ re¬ tired officers below the grade of colonel, with increased volunteer commissioned rank, not to exceed in the case of any officer one grade above that held by him upon the retired list, or retired enlisted men with volunteer commis¬ sioned rank not above grade of first lieutenant. Retired officers and enlisted men while thus employed are not eligible for transfer to the field units, but receive the full pay and allow¬ ances of the respective grades in which they are serving, whether volunteer or regular, in lieu of their retired pay and allowances. Upon the termination of the duty or, in case of those given volunteer rank, upon muster out as volunteers said retired officers and enlisted men revert to their retired status.

Except as otherwise specifically prescribed by law, all officers are subject to such assign¬ ments of duty and such transfers as the Presi¬ dent may direct. Medical officers of volunteers when detailed as

consulting surgeons do not exercise command over the hospitals to which they may be assigned for duty, except by virtue of their commissions they may command all enlisted men. Medical inspectors are detailed for duty with each army, field army or army corps and division, and for the base and lines of communications, and no officer is detailed for duty as a medical inspector except he be experienced in military sanitation. All officers and enlisted men of the .volunteer forces are in all respects on the same footing as to pay, allowances and pensions as officers and en¬ listed men of corresponding grades in the regular army.

In accordance with a proper military policy for the United States as prepared by the War College Division, general staff corps in addi¬ tion to any forces that may be maintained and trained in time of peace, provision must be made for vastly increasing such forces in time of war. These must come from the untrained body of citizens and provision for raising them is contained in the Act of Congress ap¬ proved 25 April 1914. This act meets the mili¬ tary needs for raising volunteer troops as far as concerns the enlisted personnel, except in two particulars: first, that under the exist¬ ing laws certain organizations of the militia, with numbers far below the full strength, can

enter the volunteer force in advance of other similar volunteer organizations from the same State ; and second, _ no volunteers of any arm or branch can be raised until all the militia of that particular arm or branch have been called into the service of the United States.

Edward S. Farrow,

Consulting Military and Civil Engineer. VOLUNTEERS OF AMERICA, The, a religious body organized from former members of the Salvation Army (q.v.) in 1896 by Comrnander and Mrs._ Ballington Booth and con¬ sisting of six regiments, embracing nine com¬ panies or central societies and nearly 100 self-supporting posts, not including outposts. The chief official is elected by the members as com¬ mander-in-chief,

and by the directors as presi¬ dent. There are headquarters in New York City and branches in the principal cities of the United States. The minor councils of officials throughout the country are represented by a Grand Field Council. They give an immense number of free lodgings and meals to those out of work, at 57 principal institutions. Their Vol¬ unteer Hospital, in New York, has treated in one year 22,000 old and 12,000 new cases. Homes are maintained for friendless young •vyomen, and there is a branch for child protec¬ tion. The Prison League is an important de¬ partment of volunteer activity. It maintains leagues in 30 States and records over 70 per cent of criminals returned to honest living. There is an aggregate annual attendance of 1,000,000 persons at the hall meetings and 2,000,000 at the open-air meetings.

VOLUSENUS, Florentius. See Wilson, Florence.

VOLUTE, a spiral scroll used in Ionic, Corinthian and Composite capitals, of which it is a principal ornament. The number of volutes in the Ionic order is four. In the Corinthian and Composite orders they are more numerous, in the former being accompanied by smaller ones, called helices. See Architecture.

VOLUTE WHEEL, a volute-shaped wheel that in rotating presents its open mouth to the air, wffiich is thus gathered into the tube and discharged through the hollow axis. It is a common and effective sort of blower. Also, a water-wheel with radial or curved buckets, in which the periphery of the wheel is surrounded by a volute-shaped casing or scroll.

VOLVOX, a minute aquatic plant {Volvo x globator), in the form of a pale green globule floating about in the water. Under the micro¬ scope it is seen to be a spherical membraneous sac, studded with innumerable green points giv¬ ing exit to cilia, which enable it to roll over and over in the water. Within the sac are various dense globules, generally green in summer, but often of an orange color in autumn and early wdnter. They are zoospore-like bodies, each sending a pair of cilia through separate orifices. There is a reddish-brown spot and a contractile vacuole.

VOLVULUS, volVulus (Latin volvo, I roll or twist) : in medicine, term denoting a twdsting of the intestine, producing obstruction to the passage of its contents, A disorder of a different kind, but with similar symptoms and often similar results, is Intussusception (q.v,)* Therp grg fhfce distinct yaneties of rotator/

movement capable of giving rise to volvulus — (1) A portion of intestine may have become twisted on its own axis, and in that case even semi-rotation brings the intestinal walls into con¬ tact, so as to close the passage; this is a rare condition, occurring only in the ascending colon. (2) The mesentery (q.v.), or a part of it, may be twisted into a cone, dragging the intestine with it ; the mesentery being the axis, and the intestine being rolled up on it ; this form occurs in the small intestine. (3) a single por¬ tion or a coil of intestine may afford the axis round which another portion with its mesentery is thrown, so as to compress it, and close the passage. A coil of small intestine, the sigmoid flexure or the csecum (see Digestion), may form the axis. All these varieties occur chiefly in advanced life, and their seat is commonly toward the posterior unyielding wall of the abdominal cavity, the smoothness and yieldinp" nature of the parts anteriorly render¬ ing such an event almost impossible. The symptoms of twisting of the intestine, especially of the sigmoid flexure, the most common seat of the affection, are usually distinctly marked from the beginning. Great pain is suddenly experienced in a small circumscribed spot of the abdomen, obstinate constipation usually set¬ ting in from that date. If the sigmoid flexure, which lies just above the rectum, is the seat of the twisting, the abdomen soon becomes dis-tpded, especially on the left side, the disten¬ tion being much more marked than when the twist is in the small intestine, as might physio¬ logically have been expected. Vomiting, often constant and copious, is usually present. These cases are so desperate in their nature that it is needless to enlarge on their treatment. At¬ tempts to remove the displacement by inject¬ ing water or air into the intestine through a long tube have often been made, but with slight success. Operations for relief of 'this and other intestinal obstructions, e.g., intussuscep¬ tion, have until recently been very often fatal ; but of late the progress of surgery — especially in connection with antiseptics — ˆhas greatly re¬ duced the ratio of fatal results. Intestinal ob-struotions produced either by Volvulus or by other causes have been successfully treated by surgical means; diseased portions of the in¬ testine (e.g., the appendix vermiformis'ˆ have been cut out and the separated parts reunited by sewing (enterorrhaphia) . In the treatment a few rules are universally applicable, viz., wherever symptoms such as aoove described oc¬ cur, aperients should be given only by the rectum, while opium should be freely given l)y the mouth. Leeches and hot fomentations should be applied to the seat of pain, and all solid food should be prohibited, the nourish¬ ment being given solely in fluid form.

VOMER, one of the bones of the skull. See Head; Skull.

VOMITING, the ejection of the stomach's contents through the mouth, mainly by spas¬ modic contraction of the abdominal muscles, as¬ sisted by the active cooperation of the mus-ciflar walls of the stomach ; the diaphragm re¬ mains fixed, affording a firm surface against wffiich the stomach is pressed by the abdominal muscles. Relaxation of the sphincter at the cardiac orifice of the stomach Is necessary, as its contraction will resist j;he power pf all thp

expulsor muscles combined, explaining the vio¬ lent and vain efiforts to vomit, often seen and experienced; the act is preceded by a deep in¬ spiration, the glottis being spasmodically closed during the paroxysm. It may be produced by irritating substances applied 'to the mucous membrane of the stomach, the impression being conveyed by the pneumo-gastric nerves and the motor nerves of expiration, as after taking common emetics ; by irritation in other parts of the body, transmitted by reflex nervous ac¬ tion, as in strangulated hernia, the passage of calculi and during gestation ; and by impressions received through the sensorial centres, whether emotional or sensational, as from tickling the fauces, disgusting sights or odors and in sea¬ sickness ; even the recollection of these sensa¬ tions may cause vomiting in very impression¬ able persons. It is a common symptom of many diseases of the stomach and intestines, and arises from sympathy in affections of many other organs ; it is sometimes nervous or spas¬ modic. Exclusive of the treatment proper for the special disease of which it.may be the symp¬ tom, effective remedies for vomiting are ice; ef¬ fervescing potions, mercurials, prussic acid and various narcotics, creosote, chloroform and etlier. In many birds and some mammals, the contents of the stomach are ejected as a means of offense, as in the petrels and vultures, and the llama. Vomiting is usually more easily in¬ duced in children than in adults. It is a fre¬ quent accompaniment of pregnancy (see Ob¬ stetrics), and is often prominent in disease of the kidneys (q.v.), tuberculosis (q.v.), *etc.* Vomiting is in many cases entirely salutary, and in such cases is to be encouraged and as¬ sisted. By concentrating on the desired object many persons are able to vomit at will and thus rid' themselves quickly of fermenting food that has failed to digest in the normal manner.

VON DROSTE-HULSHOFF, dro-zt'-hul'- shof, Annette Elisabeth, German poetess : b. Munster, Westphalia, 10 Jan. 1797; d. Meersburg on Lake Constance, 24 May 1848. She en¬ joyed the advantage of association and friend¬ ship with many noted men of letters, exhibiting always a decided distaste for so-called feminine occupations and devoting herself altogether to intellectual pursuits, especially such as gave stimulus to her lively imagination. Thus while still a young girl she contributed to the Kinder-und Hausmarchen of the brothers Grimm. Her formal education, too, was carried further than was usual for a girl of her day. A devout Catholic, her collection of religious lyrics 'ˆDas geistliche Jahr,ˆ of which the first half was written in 1820 and the second in 1839, makes a universal appeal and belongs to the_ finest re¬ ligious poetry of the 19th century. In 1825 she . made her first journey to Cologne and the Rhine country, where she made the acquaintance of A. W. Schlegel, Karl Simrock, and later of jA. dele Schopenhauer, the sister of the philoso¬ pher. In the following year her father died and in 1829 her brother Ferdinand. With the unimportant exception of two trips to the Rhine in 1828 and 1830 and a visit to her sister Jenny, who had married Baron Josef von Lassberg in Switzerland, she lived in quiet seclusion, first in her birthplace, and from 1841 to her death with the Lassbergs in Meersburg on the shores of Lake Constance. Here an old ac¬

quaintance with Levin Schiicking, 17 years her junior, whom the baron called to Meersburg in 1841 to catalogue his library, deepened into some¬ thing like an unrequited passion, and in that year she produced an entire volume of lyrics. Since 1814 she had been in delicate health and now began visibly to decline. Sheˆ died in the year of the revolution, 1848, and is buried in Meersburg. Levin Schiicking became, her rnost appreciative biographer. Her best non-religious lyrics are ˆHaidebilder,ˆ in which \vith a deli¬ cate appreciation of. nature she pictures the lonely moors of her native Westphalia. For her ballads, in W'hich she is even more success¬ ful, the gloomy legends of this district are her favorite subjects. She also wrote a number of longer epic poems, among them ˆDas Hospizˆ and ˆDie Schlacht im Loener Bruch. One of the very best German novellen is ˆDie Juden-buche.ˆ The softer notes of sentiment are lacking in almost all of Annette von Droste-Hiilshoff's verse, which is pervaded through¬ out by an earnestness, a chastity and selflessness which frequently borders upon acerbity, even in form and diction. She is generally regarded as Germany's greatest woman-poet. A few selected titles from a large bibliography are the fol¬ lowing: ˆCollected Works, ˆ edited by Levin Schiicking (3 vols., Stuttgart 1879) ; id., by Elizabeth von Droste-

Hiilshoff (Paderborn 1884-87) , with a biography by \^^ Kreiten ; ˆLetters of Annette von Droste-Hiilshoff and Levin Schiicking,ˆ edited by Theo Schiicking (Leipzig 1893) ; Schiicking, Levin, ˆAnnette von Droste, ein Lebensbildˆ (Hanover 1862) ; Busse, Karl, ˆAnnette von Drosteˆ (1903).

■VViLHELM Alfred Braun.

VON EMMICH, em'icH, Otto, German army officer: b. Minden, Westphalia, 1848; d. 1915. He became a lieutenant (1868), took part in the campaign of 1871, v/as promoted to colonel (1897) and became commander of an infantry brigade (1901). He was raised to the rank of general of infantry (1909) and during the early days of the World War commanded the Ger¬ man army of the Meuse and laid siege to Liege. Afterwˆard he won distinction in the Galician campaign and in East Prussia. In 1913 he was elevated to the nobility.

VON HOLST, fon hoist, Hermann Ed¬ uard. See Holst, Hermann Eduard.

VON MANNLICHER, fon man'liH-er, Ferdinand. See Mannlicher, Ferdinand von.

VONDEL, von'del, Joost van den, Dutch dramatic poet: b. Cologne, 17 Nov. 1587; d. Amsterdam, 5 Feb. 1679. His parents, who were Anabaptists, removed to Holland while he was a child, and the poet afterward adopted the Arminian faith, but finally died in the bosom of the Roman Catholic Church. Nature had endowed him with extraordinary . talents, and he derived little aid from education. Devoting himself entirely to the cultivation of Dutch poetry, Vondel first learned Latin and French in the 30th year of his age. His works display genius and elevated imagination, and embrace lyric and didactic poems, satires, an epic and some 30 tragedies, some of which are founded on Biblical subjects and bear such titles as ˆLucifer,ˆ ˆNoah,ˆ ˆJephtha,ˆ *etc.* These enjoy a high reputation in Holland, and the inter¬ spersed choruses may be regarded as the finest

lyrical productionsˆ of the Dutch muse. The best collective editions of his works are those by Jan van Lennep (1850-69) and Unger (1890 onward). The dramatic poem ˆLuciferˆ (1654) is his greatest work and by some critics is sup¬ posed Jo be the source of the inspiration of Milton's ˆParadise Lost,> but this may reason¬ ably be doubted. English translations of Von-del's <Lucifer> (1898); <Samson> (1903); and ˆAdamˆ (1903) have been made by C. Van Noppen. Consult ˆLivesˆ by Baumgartner (1882) ; Hack (1890) ; Looten, ˆEtude litteraire sur Vondel> (1889) ; Muller, ˆUeber Miltons Abhangigkeitˆ (1891).

VONNOH, von'no, Bessie Potter, Ameri¬ can artist: b. Saint Louis, Mo., 17 Aug. 1872. She studied in Italy and Paris and was awarded medals at the Paris Exposition (1900) and the Saint Louis Exposition (1904) and at San Francisco. Among her works is ˆThe Young Motherˆ (Metropolitan Museum, New York). She is an associate of the National Academy. She is represented in the Metropolitan Museum of Art, the Chicago Art Institute, the Corcoran Art Gallery at Washington and the Brooklyn Museum. Besides the picture which hangs in the Metropolitan Museum she has produced ˆMother and Childˆ (1905) ; ˆA Modern Ma¬ donnaˆ (1905) ; ˆBeatriceˆ (1906) and others.

VONNOH, Robert William, American art¬ ist: b. Hartford, Conn., 17 Sept. 1858. He studied at the Massachusetts Normal Art School, Boston, 1875-79 ; was instructor there in painting and drawing, 1879-81 ; in 1881-83, and again from_ 1886 to 1891, studied in Paris, teaching in the interval at the Museum of Fine Arts, Boston. He acquired a manner in which realism and impressionism are emphasized by dramatic effects and boldness of treatment in light, color, *etc.* Whether in portrait, figure or landscape painting, his work has individuality and interest, and his success particularly as a portrait-painter has been marked. From 1891 to 1896 he was principal instructor in portrait and figure painting at the Pennsylvania Acad¬ emy of the Fine Arts. He has exhibited much in this country and in Europe. Among his works are ˆSad Newsˆ ; <Miss Mildred Blairˆ ; ˆLittle Louise.ˆ

VOODOO. See Voudoo.

VOORHEES, voor'ez, Daniel Wolsey,

American legislator: b. Liberty, Ohio, 26 Sept. 1827; d. Washington, D. C., 10 April 1897. He was graduated from Indiana Asbury (now De Pauw) University in 1849, admitted to the bar in 1851 and engaged in law practice at Coving¬ ton, Ind. In 1858-61 he was United States

dis¬ trict attorney for Indiana, and he was attorney for the defense of John E. Cook during the latter's trial for participation in John Brown's raid. He was member of Congress in 1861-66 and in 1869-71, and from 1877 to a few months before his death. United States senator_ from Indiana. He was a member of the Finance Committee throughout his entire career in the Senate, and an advocate of free and unlimited coinage of silver until 1893 when he cast his vote to repeal the silver-purchase clause of the Sherman Act. He was largely instrurnental in securing the erection of the Congressional Li¬ brary building, and was noted as an orator.

VOORHEES, Edward Burnett, American agricultural chemist: b. Mine Brook, N. J., 22 June 1856; d. 1911. He was educated at Rut¬ gers College and became director of the New Jersey Agricultural Experiment Station in 1893 and served as president of the State Board of Agriculture (1902) and the New Jersey Con¬ servation Commission (1909). He headed the association of agricultural chemists in 1894. He was the author of various valuable papers and received the Nichols research medal in 1902. His publications include ˆFirst Principles of Agriculture > (1896) ; ˆFertilizersˆ (1898 ; 9th ed., 1907) ; ˆForage Cropsˆ (1907; 2d ed., 1911).

VOORHEES, Philip Falkerson, American naval officer: b. New Brunswick, N. J., 1792; d. Annapolis, Md., 26 Feb. 1862. He was appointed midshipman in the navy in 1809, served in the War of 1812, participated in the capture of the Macedonian and the Epervier, and received a Congressiohal medal of honor for his services. He attained rank as captain in 1838 and was assigned to command the Congress, in which capacity he captured, in 1844, an Argentine squadron and an allied cruiser which had fired on an American ship. His action was com¬ mended in home and foreign diplomatic circles, but he was tried by court-martial. His course was vindicated, and in 1847 he was assigned to command the East Indian squadron, a position equal to the rank of rear-admiral, which had not then been established in the United States navy.

VOORSANGER, foor'sang'er, Jacob, American rabbi and educator : b. Amsterdam, Holland, 13 Nov. 1852. Taught at the theologi¬ cal seminary of his native city, he came to the United States about 1870, and was i*abbi at Philadelphia (1873-76), Washington, D. C. (1876-77), Providence, R. I. (1877-78), and Houston, Tex. (1878-ˆ86). Since 1886 he has been rabbi of Temple Emanu El, San Fran¬ cisco, Cal. He edited The Sabbath Visitor for three years, besides making

numerous contribu¬ tions to leading Jewish weeklies. In 1884 he was elected professor of Semitic languages at the University of California. He has written ˆMoses Mendelssohn, Life and Worksˆ ; ˆChronicles of Emanu El.ˆ He founded in 1895 a weekly, Emanu El.

yOPADEVA, vo-pa-da'va, celebrated gram¬ marian of India; whose date, given by some as the 12th century, is, according to Burnouf's in¬ vestigation, the second half of the 13th century. He wrote a grammar entitled ˆMugdhabodhaP held in high repute, especially in Bengal ; it was commented on by Durgadasa (text and commentary edition at Calcutta 1861). It differs from the great work of Panini in arrangement and terminology, and is of far less value, though very serviceable in giving many later Sanskrit formations. Vopadeva composed other works; and a general though doubtful tradition makes him author of the ˆBhagavata-Purana.ˆ

VORARLBERG, for-arFberg (the land in front of Arlberg, a mountain ' in the. Algau Alpine system) : province of the republic of Austria, formerly administratively united with the Tyrol ; bounded east by Tyrol, south by the Swiss canton Graubunden, west by the principality of Liechtenstein and the canton of Saint Gall, north by Bavaria, 1,003

square miles. Where 'the land approaches the Lake of Constance and the Rhine and in the valley of the Ill, the country is a fertile plain ; the rest is alpine. About one-third of the sur¬ face is foresit (Bregenzer Wald). Cattle and timber are the chief products. The manufac¬ ture of cotton fabrics is a considerable in¬ dustry in Vorarlberg, employing 180,000 spindles and 4,000 power-looms ; a home industry for the women is the manufacture of embroidery for insertions, edgings, *etc.* Bregenz, the capital, is a centre for manufacture of woodenwares. Vorarlberg has, as a rem¬ iniscence of its ancient condition as an inde¬ pendent state, its own assembly or Landtag, consisting of 19 members, one representing the chamber of commerce, four the towns and 14 the parishes. Pop. (1920) 133,212.

VORONEZH, v6-ro'nezh, Russia, (1) The capital of a government of

same name, on a height above the Voronezh, near its ’confluence with the Don, 290 miles south-southeast of Mos¬ cow. It consists of a high town, a low town and three extensive suburbs’* — is well built and has a cathedral, an episcopal palace, town-house, g3ˆmnasium, diocesan seminary, arsenal, hospital and poorhouse, manufactures of v.‘oolen and linen cloth, soap and vitriol, numerous tanneries, a considerable trade in corn and tallow, and im¬ portant fairs and markets. Voronezh was founded in 1586 and has interesting associa¬ tions of Peter the Great, and of the poets Niki¬ tin and Koltsoff. It suffered three disastrous fires in the 18th century, but was rebuilt on each occasion. Pop. about 94,800. (2) The

southern government of Voronezh has an area of 25,443 square miles. It is intersected by the Don, which receives the whole of the drainage, partly through its tributaries, the Voronezh and Khoper. The soil is generally fertile, and large crops of grain, tobacco and sugar beets are raised. The breeding of horses and sheep is an important industry. Manufactures are consid¬ erable and there is an extensive trade. Pop. about 3,687,000.

VOROSMARTY, ve’resh-mart-y, Michael, Hungarian poet : b. Nyek, comitat of Stuhl-wcissenburg, 1 Dec. 1800; d. Budapest, 19 Nov. 1855 He studied in Pest, practised for a time as an advocate, in 1848 was a member of the National Assembly and was twice imprisoned for political reasons by the Austrian government. A memorial to him was placed at Stuhlweissen-burg in 1866. Among his poems and dramas were ˆKing Solomonˆ (1821) ; <The Victory of Faithfulnessˆ (1823) ; ˆZalans Flightˆ (1825) ; ˆCserholom> (1826) ; <Erlauˆ (1828) ; ˆCsongor and Tiindeˆ (1831) ; ˆBanus Marotˆ (1838). Gyulai prepared a collective edition (1864 ; 2d ed., 1ˆ4) and a biography (1864; 4th ed., 1896).

VORPARLIAMENT. A preliminary gath¬ ering of several hundred Liberal leaders who met 31 March 1848 to provide means to call a national German Parliament to deal with the demand for a reorganization of the political system. They ‘decided on an assembly elected directly by the people without distinction as to rank, religion or property to meet at Frankfort to draw up a constitution. There was much dis¬ agreement between the monarchial and repub¬ lican factions and the latter seceded from the meeting and attempted to start an insurrection

which was promptly suppressed. After the dis¬ solution of the

Vorparliament its work was continued by committees until the national Par¬ liament assembled. See Germany — ˆHistory.

VORSE, Albert White, American editor: b. Littleton, Mass., 18 Aug. 1866. He was grad¬ uated from Harvard in 1889, was-connected with the Philadelphia Press, 1891-93, the New York Mail and Express, 1894-96 and subse¬ quently with the Illustrated American and the Criterion, 1899-1901. He has published ‘ˆThe Laughter of the Sphinxˆ (1900).

VORTEX, a whirlpool or eddy; any fluid rotating around an axis; specifically that por¬ tion of a fluid mass that is in a whirl. The name is applied to pools, waterspouts, whirl¬ winds, and on a larger scale in cyclones and storms generally. Descartes supposed certain vortices to exist in the ether of space endowed with a rapid rotary motion and filling all space, and by these he accounted for the motions of the universe.

VORTEX ATOM, an atom assumed to be a vortex ring in a non-frictional ether. See Vortex Motion.

VORTEX MOTION, the motion of a fluid in a closed curve ; it is unequal, that is, the fluid does not rotate as a mass. If two vortices of unequal size approach, the smaller floats through the larger one. One of the most striking ex¬ amples of vortex motion is seen in smoke rings emitted occasionally by locomotives and other high pressure steam-engines when exhausting sloyvdy. Similar and more definite rings are easily produced also by devices now common in physical laboratories. Helmholtz, who was the first to investigate the theory of vortex motion, showed that vortex rings and filaments, or combinations thereof, in a perfect liquid (which is an ideal frictionless fluid of constant density) are indestructible. Extending this idea to per¬ fect fluids, Lord Kelvin suggested that the atoms and molecules may be vortex rings or filaments, or combinations thereof, in the ether. The mo¬ tion of a mass of fluid is known if the motion of every infinitesimal portion, or particle, of the mass is known. The motion of a particle is investigated b}ˆ referring the successive posi¬ tions it occupies in its journey to a set of three straight lines, or axes, which pass through the same point and are mutually rectangular. With respect to these axes the motion of the particle may assume either one of two characteristic types. It may move without rotation about either of the axes, or it may move with rota¬ tion about one or rnore of the axes. The for¬ mer type isˆ called irrotational motion, and the latter type is called rotational motion, or vor¬ tex motion. The vortex type of motion is by far the more common in nature and manifests itself in

an infinite variety of ways. For the theory of vortex motion and references to the literature of the subject, consult Lamb, < Hydro¬ dynamics.ˆ

VORTEX RING. See Vortex Motion.

VORTICELLA, v6r-ti-sera, type of a family (Vorticellidce) of attached or free forms of peritrichous ciliates (animalculae) , in which the adoral zone of cilia, where seen from above, forms a right spiral (dexiotropic), while a sec¬ ondary circlet of cilia near the aboral end may be either permanent or transient. The true ypr-

ticellids, represented well by the common bell-animalcule, are without a permanent second cir¬ cle of cilia, and the peristome may be com¬ pletely included within a peristome fold which contracts sphincter-like about it. The stem is either firm and constant in length, or flexible and capable of being contracted suddenly when it becomes a short close spiral. The individuals also are mounted on a single unbranched stalk or grouped on a tommon branching stalk in colonial existence. The simplest type of repro¬ duction is longitudinal division, which may re¬ sult in producing two individuals in a branched stalk, or one of the two may become detached and, propelled by a newly-formed circle of cilia near the basal end, lead a free existence for a time. Soon the free form settles down and de¬ velops a stalk. Conjugation has been observed and always takes place between a stalked form and a free-swimming form produced by bud¬ ding. The bell-animalcule has long been a fa¬ vorite object of microscopical study from its abundance and easily observed structure and ac¬ tivities. Ehrenberg (1838) made an extensive study of these organisms, and maintained that they possessed the complete organ systems of higher forms. The demonstration of their uni¬ cellular nature necessitated the abandonment of this view. The group is rich in number and va¬ riety of species. They are found in all sorts of aquatic environments but are exceptionally abun¬ dant in some type.s of polluted streams.

Henry B. Ward, University of Illinois.

VORTIGERN, vor'ti-gern, a semi-mythical British king of the 5th century, who, according to Gildas, Bede, Ethelwerd and the ˆOld Eng¬ lish Chronicle,ˆ invited Hengist (q.v.) and Horsa to assist him against his enemies, the Piets and Scots. Whether invited by Vortigern or not, the newcomers are said to have turned against him and wrested from him the Kentish territory. There is something like unanimity in the chroniclers regarding Vortigern's char¬ acter. They make him tyrannical and licen¬ tious, and of course he came to a violent end in conflict.

VOS, v6s, Geerhardus, American Presby¬ terian theologian : b. Heerenveen, Holland, 14 March 1862. He was educated at the seminary of the Holland Christian Reformed Church at Amsterdam and at Princeton Seminary and was professor of theology in the former in¬ stitution 1ˆ8-94 and since the year last named has held a similar post at Princeton. He has published ˆThe Mosaic Origin of the Pentateuchal Codes ˆ (1886) ; ˆDe Verbondsleer in de Gerefomeede Theologieˆ (1891) ; ˆThe Teach¬ ing of Jesus ˆ (1903), *etc.*

VOS, Maarten de, Flemish painter: b. Ant¬ werp, 1532; d. there. 1603. He studied in Antwerp under his father, Pieter de Vos, and De Vriendt, and at Venice under Tintoretto, established a school of painting in his native city in 1538 and became one of the most popu¬ lar artists of his day, hundreds of engravings of his paintings and drawings being made. Among his works are ˆThe Triumph of ChrisD ; ˆCaesar's Penny ˆ ; 'ˆThe Marriage at Cana,ˆˆ in the cathedral at Antwerp; ˆ Saint Luke Paint¬ ing the Portrait of the Virgin.ˆ He is some¬ times stvled ®the Elder,® in distinction from his son .Maarten (b, 1576; d. 161'3), also an artist.

yO.SE, George Leonard, American civil engineer: b. Augusta, Me., 19 April 1831; d. 1910. He was educated at home and at Salem, Mass., studied at the Lawrence Scientific School at Harvard and began his career as assistant engineer on the Kennebec and Portland Rail¬ road. He was associate editor of the American Railway Times in Boston (1859-63), removed to Pans, Me. (1866) where he was engaged in railroad projects, was professor of engineering in Bowdoin College (1872-81) and held a similar chair in the Massachusetts Institute of Technology (1881-86). He was the author of several standard works on professional sub¬ jects, notably ˆBridge Disasters in America: The Cause and the Remedyˆ (1887).

VOSGES, vozh, a European chain of moun¬ tains about 100 miles

long, partly on the fron¬ tiers of France and Alsace, partly in Alsace, extending from north-northeast to south-south¬ west, nearly parallel with the Rhine, and form¬ ing a continuation of the Jura Mountains, which separate France from Switzerland; the breadth varies from 20 to 45 miles. The high¬ est summit, Ballon-de-Guebwiller (the sum¬ mits are generally called ballons), has a height of 4,685 feet above the surface of the sea. The existence of this ridge, averaging 3,000 feet in height, forms a natural barrier, and confined the German attacks in the World War to the northern area of France. The Vosges Moun¬ tains have a gentle declivity and on the eastern and southern sides are covered with vineyards. Great part of the Vosges is densely wooded, and, besides abounding in game, they possess great mineral wealth, including silver, copper, iron, lead, coal and antimony. Thev also con¬ tain excellent pasturage and the inhabitants breed many cattle. The Ill, Lauter, Moselle, Meurthe, Saar and Saone rise in this chain of mountains.

VOSGES, France, an eastern department bounded on the north by the departments of Meuse and Meurthe, on the east by Alsace, on the south by the departments of Haute-Saone and on the west by Haute-Marne ; area, 2,303 square miles ; capital, Epinal. The department derives its name trom the mountain-chain which bounds it on the east, and sends out ramifica¬ tions over the greater part of its surface. Its south portion is traversed east to west by the chain of the Faucilles. In the lower grounds, on an elevated but tolerably flat tract, grain, hemp, flax and potatoes are extensively raised. The wine produced is indifferent, but the de¬ partment has long been famous for its kirsch-wasser made from the produce of extensive cherry-plantations. The principal rivers are the Meuse, Mouzon, Madon, Moselle, Saone and Meurthe ; but none of them are navigable within the department. The minerals include argentif¬ erous lead, copper, iron, antimony, cobalt, marble, millstones, slate, kaolin and fine agates. The chief manufactures are the famous Gerome or Munster cheese, cotton and linen cloth, lace, musical instruments, woodenware, nails, iron, steel and iron ware, paper, leather, pottery and glass. Pop. 433,914.

VOSS, fos, Johann Heinrich, German poet and translator: b. Sommersdorf, near Waren, Mecklenburg, 20 Feb. 1751 ; d. Heidelberg, 29 March 1826. He early began to write verses ˆnd some of these contributed to the ˆGottingen

Musenalmanachˆ led to a correspondence with Boie, upon whose invitation he went in 1772 to Gottingen. Here he studied the classical and modern languages and was one of the founders of the Gottinger Dichterbund. The editorship of the ˆMusenalmanachˆ was handed over to him by Boie in 1775; in 1778 he was made rector of Otterndorf in Hanover, in 1782 at Eutin. In 1781, after the publication of sev¬ eral treatises, he produced his German ‘ˆOdyssey,ˆ a work which has rendered this grand poem national with the Germans (new ed. by Bernays, 1881). This has been called ®the most perfect rendering of Homer into a modern tongue. In 1793 appeared his trans¬ lation of the Hliad,ˆ and that of the ˆOdys¬ sey, ˆ in a new form, in which, however, it did not please so much as before, the former dis¬ playing greater truth and naturalness. He published in 1795 an idyl in the epic form called ˆLuise,ˆ printed first in 1783, but now produced with improvements. His translation of the whole of ˆVergiP (1799) was revised for the edition of 1821. .In 1805 he went as professor to Heidelberg, where he remained till his death. Voss rendered good service to the study of classical antiquity and threw fresh light upon many subjects. As a translator he exhibited wonderful command of language and great skill in the handling of metres. Among his translations that of Homer’s works is un¬ doubtedly the greatest ; we may also mention, in addition to his ‘ˆVergil, ˆ his *ˆHesiodˆ (1806) ; ˆHoraceˆ (1806) ; ˆTheocritus, Bion and Moschusˆ (1808); ˆAristophanesˆ (1821); ˆTibullusˆ (1810) ; ˆPropertiusˆ (1830) and selections from ˆC)vidˆ (1798). He also under¬ took, with his sons, a translation of Shakes¬ peare which was completed in nine volumes in 1829, but this translation cannot stand a com¬ parison with Schlegel’s. Consult lives by Paulus (1826) ; by Herbst (1872-76); Prut/., ˆDer Gottinger Dichterbundˆ (1841).

VOSSIUS, Gerardus Johannes, Dutch classical scholar and theologian: b. near Heidel¬ berg, 1577 ; d. 17 March 1649. In 1578 the fam¬ ily returned to Holland and settled at Dordrecht, where Vossius went to school. He distinguished himself at the University of Leyden, and at the age of 22 returned to Dordrecht, to become principal of the high school. He was a most assiduous and indefatigable student. While principal of the theological college of Le3ˆden 1614—19, he published a work on Pelagianism, ˆHistoria Pelagiana,ˆ in which he spoKe of the Arminians in an apologetic tone, and thereby brought upon himself

the wrath of the Calvinistic Dutch clergy which caused him to be deprived of his office in the theological college. In 1622 he was appointed professor of rhetoric and chronology, and afterward of Greek, in the University of Leyden. In 1626 he ‘was invited to England; but accepted only a prebend (from Archbishop Laud), in Canterbury Cathedral, of the value of $500 per annum, without being re¬ quired to live out of Holland. He was also made LL.D. of Oxford. In his book <De His-toricis Latinisˆ (1627) he retracted at least some of his former expressions of opinion, and 1632 he was appointed professor of history in the new university at Amsterdam, where he seems to have completed the great works on which his fame rests. Among the most impor¬

tant not mentioned above were ‘ˆAristarchus, sive de Arte Grammatica, Libri VIP ; ‘De His-toricus Grsecis, Libri IVˆ ; ‘Commentariorum Rhetoricorum, sive Oratoriarum Institutionum, Libri VP ; De Veterum Poetarum Temporibus, Libri H.ˆ In 1649, as he was climbing the ladder of his library, it broke ; he fell under the shelves and books and died of his injuries.

Vossius’ children were remarkable tor beauty, accomplishments and learning. Grotius said of him, in epigrammatic Latin, that it was doubt¬ ful whether by his books or his children he had contributed most to adorn the age. Five of his sons, Denis, Francis, Gerard, Mathew and Isaac, are known as authors.

VOSSIUS, Isaac, Dutch classical scholar: b. Leyden, 1618; d. February 1689, the only son of Gerard Vossius, who survived him. He was carefully educated by his father, and at the age of 21 he published an edition of the ‘Periplusˆ of Scylax, the Greek geographer, with Latin translation and notes. He afterward traveled in Italy, collecting valuable manuscripts. In 1648 he tooK up his abode at the court of Queen Christian of Sweden, whom he taught in Greek ; but in 1658, in consequence of a quarrel with Salmasius he returned to Holland. In 1670 he came to England, procuring favor through his father’s merits, and was made LL.D. of Oxford, and, though he had become an open scoffer at religion he was appointed by Charles 11 a canon of Windsor 1673, and had apart¬ ments assigned him in the castle, where he died. His works are numerous, and though marred by his levity and lack of judgment, some of them have been of value in ancient history.

VOTE, VOTERS, VOTING. As defined by legal authorities the word vote, as commonly used, has three meanings: (1) A ballot; (2) “the

expression of wish, or choice, or prefer¬ ence, to the exclusion of the means by which, or method through which, that result was ac¬ complished; the suffrage, voice, or opinion of a person in some matter which is commonly to be determined by a majority of voices or opinions of persons who are empowered to give them ; the formal expression of a will, preference, wish or choice of the voter for or against any measure, any law, or the election of any person to office, or in regard to any measure proposed, in which the person voting has an interest in common with others, either in electing a person to fill a certain situation or office; or in passing laws, rules and regula¬ tions; (3) the expression of choice by or through a ballot, or by outcry, or any other means by which the choice of the voter may be lawfully made, ˆ known or communicated to others in the given instance; the wish of an individual in regard to any question, measure or choice, expressed by word of mouth, by ballot or otherwise;ˆ that by which the will, preference or opinion of a person is ex¬ pressed.® (‘Cyclopedia of Law and Procedure,ˆ Vol. XL, pp. 223-224, New York 1912).

Considered by itself, courts have ruled that the ballot E “nothing but a written note or communication from an elector addressed to the government, expressing the choice of the elector, but which has not as yet been de¬ livered® ; and again, as regards the election of public officials, the ballot has always meant “a paper so prepared by printing or writing thereon

as to show the voter’s choice, and Wote by-ballotˆ [has always meant] the deposit of such paper in a box in such a way as to conceal the voter’s choice if he so desires.ˆˆ Hence as the terms ®voteˆˆ and ˆˆballot® are sometimes con¬ fused, the courts have always distinguished be¬ tween them, regarding the ballot, under our form of voting, as the instrument by which the voter expresses his -choice between two candi¬ dates or two propositions, whereas the vote is his choice or election between the two as ex¬ pressed by his ballot. Illegal ballots do not constitute votes and are not counted in de¬ termining

the result. See Ballot.

Mode of Expression. — Since the vote merely expresses the will of the voter, the choice may be made either viva voce, by the use of the ballot, by a show of hands, by a division of the house or meeting, *etc.* The machinery or means through which the choice is expressed is termed an election. From the earliest times the term ^^voting by balloB^ has been used to distinguish open, viva voce or public voting, and secret voting. Most of the States require that all votes shall be by ballot and courts have decided that ^voting by ballot signifies a mode of designating an elector's choice of a person for an office by the deposit of a ticket, bearing the name of such person, in a receptacle pro¬ vided for the purpose, in such a way as to secure to the elector the privilege of complete and inviolable secrecy in regard to the person voted for.® If secrecy in voting be required, then the only method is by ballot, and a ballot that does not secure secrecy of the vote is not a ballot within the meaning of the law. A Virginia court has ruled: ®The vote by ballot ex vi termini implies a secret ballot. The secrecy of the ballot is a right which inheres in the voter and of which he cannot against his will be lawfully deprived. It must be, how¬ ever, in some degree subordinate to the right to vote by ballot, of which it is but a part; and the main object, which is the right to vote, must not be defeated by a too rigid observance of the incidental right, which is that of se¬ crecy.® See Elections ; Primary, Direct ; Primary, Presidential Preference; Corrupt Practices Acts ; Minority and Proportional Representation.

Voters. — The word voter is commonly used in the senses: (1) A person who casts a bal¬ lot at an election; an elector who actually votes ; (2) a qualified voter; a person possessing the necessary qualifications entitling him to vote. ®The possession of political rights is not es¬ sential to citizenship . minors

may be citizens; ^ citizen^ is not synonymous with ^elector ^ or ^voter^ although the word is sometimes so used in statutes, constitutions and city charters.® (^Corpus Juris,^ Vol. XT, pp. 774-75, article ^Citizens®). A person may be a citizen and not an elector and an elector may not be a voter. One court has ruled : ®There is a difference between an elector, or person legally qualified to vote, and a voter. In common parlance they may be used indis¬ criminately, but strictly speaking they are not the same. The voter is the elector who votes — the elector in the exercise of his franchise or privilege of voting — and not he who does not vote.® The «vote of the people® means only those people who are qualified electors

or voters. See Electoral Qualifications ; Woman Suffrage; Aliens; Naturalization; Citizenship and Education; United States — Suffrage; Electoral Frauds and Safeguards Against.

Challenge of Voters. — See Elections.

Registration of Voters. — See Elections.

Residence of Voters. — See Electoral Qualifications.

Canvass of Votes. — See Elections.

Voting Districts. — See Elections.

Polling Places. — See Elections.

Voting Process. — See Elections.

Majority, Minority and Plurality. — See Elections; Pri¬ mary, Direct; Primary, Presidential Preference,

Tests for Suffrage. — See Electoral Qualifications.

Disfranchisement. — See Electoral Qualifications; Woman Suffrage; Elections; Aliens; Naturalization; United States — Suffrage.

Voting Frauds. — See Electoral Frauds and Safe¬ guards Against; Corrupt Practices Acts; Elections; Electoral Commission; United States — Disputed Elec¬ tions. ,

Party System. — See Convention, Political; Elec¬ tions; Ballot; Caucus; Congress; Primary, Direct; Primary, Presidential Preference; United States — Beginnings of Party Organization.

Presidential Elections.— See Elections; Electoral Qualifications; Electoral Commission; Electors, United States Presidential; Pri.mary, Presidential Preference; United States — Disputed Elections,

Proportional Representation. — See Minority and Pro¬ portional Representation; Apportionment; Congress; District; *etc.*

Caucus. — See Convention, Political; Primary, Di¬ rect; Elections,

Primaries. — See Elections; Primary, Direct; Pri¬ mary, Presidential Preference.

Classification of Voters. — ˆMany terms have been applied to voters or to certain elements of the population who often vote in racial or social groups. Supposedly the voters of these groups influence party action or are an asset to a par¬ ticular political party. Thus we have the ˆTrish vote,® the ˆˆGerman vote,® the ®negro vote,® the ˆda'bor vote,® the Catholic and Mor¬ mon votes, the Wenal vote® (the vote that can be bought in the ®open market®), the rural and city votes (the struggle between which has sometimes resulted in distinct breaks with old party organizations — ■ such as the Grangers and the Populist party, q.v.), the ˆpopular® vote, the ˆfindependent® vote, *etc.*

The Independent Vote. — This term is used to distinguish the vote cast for other than the ˆTegular® or partisan candidate. Under the popular conception of ˆTegularity® all the mem¬ bers of a party must vote the straight party ticket at all times and everywhere, irrespective of conditions or candidates. Independent movements seldom capture the ®straight-out® party man who makes ˆTegularity® the chief article of his political creed. Sometimes the independent vote results in disciplining the party, since it carries with it a warning to party managers that public opinion has ceased to favor the policies advocated or the candi¬ dates presented b}' them. Often the independent vote purges the party of its vicious elements by inflicting defeat at the polls and thus dis¬ crediting the party leaders (which is especially noticeable in municipal elections), and its con¬ scientious attitude always tends to preserve party purity. Politicians have recognized its influence and generally seek to gain its ad¬ herence, as in Iowa, where the Republican platform for many years contained a so-called ˆ'bad-man plank,® under which members of the Republican party pledged themselves to vote against any unworthy candidate nominated by

any party. This independence of a portion of a party constituency has sometimes played havoc with the ˆTegularˆˆ party and has often resulted in the formation of independent par¬ ties, usually known as

third parties. Since the firm establishment of the Democratic and Re¬ publican parties, more than 20 of these minor parties have been organized, but most of them have disappeared after conducting one cam¬ paign, their members being reabsorbed into the regular parties or passing from public notice. Only one (the Prohibition party, q.v.) has re¬ mained continuously active since 1872, with organizations in nearly every State. The for¬ mation of this party and also of the Socialist, Granger, Farmers' Alliance, Populist, Green¬ back and other parties (qq.v.) was not due entirely to independent movements within cer¬ tain political organizations but resulted pri¬ marily from advocacy of economic principles or reform theories, the adherents of these policies later endeavoring to obtain more wide¬ spread recognition for their doctrines by enter¬ ing the political field, thus making them par¬ tisan issues. While only one of these parties has ever been represented in the electoral col¬ lege (the Populist in 1892), still they have exerted a great influence not only politically through policies subsequently appropriated by one of the ®regulaPˆ parties which could secure their adoption by legislative bodies but (as in the case of Prohibitionists) also in the daily lives of the people through legislation passed either at their instigation or under their pres¬ sure. The labor vote also has influenced the passage, by old-line parties, of remedial legis¬ lation which has benefited all classes, but some of which undoubtedly has been enacted purely as a ®catch-penny® scheme. As examples of wholly independent movements or what might be termed ˆparties of protest® may be men¬ tioned the Radical Republicans of 1864 who nominated Fremont; the "Straight-out® Demo¬ crats of 1872; the "Gold Democrats®; the "Sil¬ ver Republicans® ; the "Independent Party® of 1908; the fusion movements in New York City against Tammany Hall, and the Progressive party, the last named being formed in 1912 as a protest against the "steam-roller® methods of the Republican National Committee (which rep¬ resented the regular or "stand-pat® element of the party) in deciding contests over delega¬ tions pledged to Taft and Roosevelt. Reform movements seldom succeed themselves and the winning and holding of a city or State on the bare proposition that one organization is better than another rarely occurs ; in order to hold their positions against experienced machine politicians an equally efficient organization must be created by the independents who differ radically among themselves as to methods, whereas the machine especially emphasizes orthodoxy and places a ban on the liberty of dissent. On the other hand the independent vote has compelled the adoption of many measures that are not purely party matters, the progressive elements in both or all parties overstepping party lines and by union forcing the party bosses to accept their dictum. As

instances of such movements may be cited the initiative, referendum and the recall, civil serv¬ ice reform, woman suffrage, direct election of senators, direct primaries, child labor and

liquor legislation, *etc.* (qq.v.). See also American Political Issues; United States — Beginnings OF Party Organization; United States — The New Democracy and the Spoils System.

The Popular Vote. — In the United States the expression “popular vote® is. subject to several interpretations but is commonly used to denote the expression of the public will by the voters of the land as distinguished from the votes of legislative bodies or of the elec¬ toral college (q.v.). The term is a misnomer, however, since millions of women have not yet secured full suffrage and nowhere can any election be complete since various classes of the population (prisoners, mental defectives, minors, in some States paupers and vagrants, etc.) are denied the elective franchise. (See Electoral Qualifications). Under the Con¬ stitution members of the lower House of Con¬ gress are elected by popular vote but the Con¬ stitution provided indirect elections for two other classes of national officers. (1) Senators were to be elected by the various State legisla¬ tures but owing to the defects of this system of indirect election a widespread demand arose for popular vote for senators which resulted in the adoption of the Seventeenth Amendment to the Constitution (q.v.) in 1913. Now senators may be designated in only one of two ways — either by popular vote of the whole State or by a temporary appointment by the governor to fill a vacancy in such States where the statutes permit such appointments. (2) The Presidential electors were to be chosen in •whatever way the States might designate and in some States for many years the legislatures chose these electors. Whether chosen by popular vote or by the legislature, the electors were intermediary in the election of the Presi¬ dent and thus no votes were ever cast direct for Presidential or Vice-Presidential candi¬ dates. See also Primary, Direct; Primary, Presidential Preference.

Preferential Voting. — The prevalence of the direct primary idea (q.v.) has resulted in the enactment of legislation which practically elim¬ inates nominations by bare pluralities when there are a number of candidates. Five States and a few cities have adopted what is called preferential voting, the voter being allowed to designate one or more choices for each office. In Idaho, candidates must receive a majority to be nominated and the voters may indicate one choice only or first and second choices. If a majority of the first choice votes for any office are

not cast for one person, both the first and second choices are counted for that office. In the Washington direct primary system, the voter indicates only one choice for an office if his party has less than four candidates, but if there be four or more candidates the voter may designate both first and second choices. If a party has four or more candidates and no one obtains 40 per cent of the first choice votes, the second choice votes are added to the first. In Minnesota and Wisconsin the designation of second choices is permitted, but should no one receive the first; choice vote's required for nomination, the one who receives the lowest number of first choice votes is eliminated and his votes are divided among the candidates whom the votes had indicated as their second

choice. This process of elimination is con¬ tinued until one candidate has the required num¬ ber of votes. In Oregon, first, second, third and other choices for two State offices are permitted and if no one receives a majority of first choices, the second choices are added and third choices also if this be necessary to give one candidate a majority. In 1917 Newark, N. J., adopted the commission form of gov¬ ernment, with five commissioners. In the elec¬ tion of November 1917, the Republicans and Democrats each put forward five candidates, besides which 70 others entered the contest for the commissionerships. Each voter cast his ballot for any five candidates ; he was permitted to vote for one or more of the men bracketed together and then to vote for the remaining numbers of his five outside the brackets; but to vote in the brackets for all five party choices he must vote for each man separately. After expressing his preference for the first two, the voter might express a second choice for five others ; then for five others as his third choice; and then for five others as his ^^other choice,® which in reality was his fourth choice. The process of elimination then took place as above indicated. See also Primary, Presi¬ dential Preference; Elections.

Compulsory Voting. — 'The abstention of voters from the polls is a recognized evil for •which the remedy commonly proposed is com¬

pulsory voting, secured by imposing penalties for failure to vote. If more than a fourth of the electors abstain from voting, a very inade¬ quate expression of public opinion is obtained and oftentimes the result of an election would have been entirely different had the stay-at- homes voted, since a mere plurality of those voting decides most contests in the United States. A large portion of those not voting do not remain away from the polls either vol¬ untarily or from unworthy motives. Many are debarred by tax qualifications; others are kept away by a change of residence shortly before election, or by reason of their employment (such as sailors, railroad employees, traveling men, students, etc.) ; and more than 300,000 men of voting age are deprived of the fran¬ chise as insane, paupers, prisoners or deficient in the educational tests required by some States. Sickness, accident and the infirmities of age account for the absence of thousands, since over 600,000 voters are over 70 years of age, while errors in registering or in casting ballots deprived many of votes. In the South thousands of negroes and many whites have been deprived of their votes by laws enacted with that one object in view. Hence some esti¬ mate that not more than 20 per cent of the absentees fail, to cast a ballot through negli¬ gence. Nevertheless, various remedies have been tried both in this country and in Europe. In Belgium, Switzerland and someˆ other Euro¬ pean countries punishments are inflicted on non¬ voters. In Belgium, for the first offense, the culprit is at once cited to appear before a jus¬ tice, who reprimands or fines him; the second offense is more severely punished, and the name of the refractory citizen is published by the magistrate and posted on the gates of the town-hall. The man who, without excuse, has ab¬ stained from voting four times in 10 years is considered unworthy of citizenship ; his name is

stricken from the poll lists, and for 10 subse¬ quent years he is debarred from holding any public office. In 1636 the general court of the Plymouth colony provided that *for default in case of appearance at the election without due excuse, each delinquent to be amerced 3ˆ-ster.® The custom continued certainly beyond 1671, for in the revision of the laws then published the fine was put at 10 shillings. Other colonies had similar laws, Virginia maintaining hers throughout her history. Her first law on the subject made the fine 100 pounds of tobacco, and in 1662 this was increased to 200 pounds. Some of the New England towns fined free¬ men who came late to the town meeting. None of the States have revived the colonial idea of a_ money fine, probably because the evil is diminishing, rather than increasing. Some of the States (as Illinois) have attempted to penal¬ ize persons

who fail to vote by requiring that jurymen be drawn first from among the non¬ voters, but this would benefit the suffrage more than the jury system because those neglecting one civic duty could not be considered ex¬ ceptionally eligible for the paid performance of a more responsible public service. Another penalty proposed is the disfranchisement of the voter who once omits to vote until he shall have purged himself by paying a fine. But this would work no hardship to most of the apathetic citizens and to a large number of non¬ voters would do an injustice since they stay away through no fault or choice of their own. Furthermore, many abstain from voting as an effective rebuke to party leaders because they consider the party candidate unworthy and are unwilling to vote for the candidate of any other party. The most effective remedy appears to be in educating the voter to his civic responsi¬ bilities, in rendering the voting process easy, in presenting live, vital and interesting issues, and in persuading the individual voter that his ballot is of the utmost importance. To a considerable extent interest in elections has been quickened in those States which have direct legislation and direct primaries.

Cumulative Voting. — See Minority and Proportional Representation.

Bibliography. — Beard, C. A., ˆAmerican Government and Politicsˆ (New York 1914) ; Bacon, E. M., and Wyman, M., ˆDirect Elec¬ tions and Law Making by Popular Voteˆ (Bos¬ ton 1912) ; Bishop, C. F., ‘ˆHistory of Elections in American Coloniesˆ (New York 1893) ; Donaldson, W. T., and Roseberry, L. H., ˆAbsent Votingˆ (in National Municipal Re-” view, Vol. Ill, pp. 733-737, Philadelphia 1914) ; Dickey, F. W., <The Presidential Preference Primaryˆ (in American Political Science Re~ view, Vol. IX, pp. 467-487, Baltimore 1915) ; Donaldson, W. T., ˆCompulsory Votingˆ (in National Municipal Review, Vol. IV, pp. 460-465, Concord, N. H., 1915) ; Ford, li. J., ˆRise and Growth of American Politicsˆ (New York 1898) ; Hart, A. B., ˆActual Governmentˆ (New York 1908) ; Hull, R. M., ˆPreferential Voting and How It Worksˆ (in National Municipal Reviezv, Vol. I, pp. 38ˆ00, Baltimore 1912) ; Haynes, F. E., ˆThird Party Movements Since the Civil Warˆ (in The Nation, Vol. CIII, pp. 511-512, New York 1916) ; Holls, F. W., ˆCom¬ pulsory Votingˆ (in ˆAnnals of the American Academy of Political and Social Scienceˆ for

April 1891, pp. ˆ 586-614) ; Johnson, L. J., ˆPreferential Votingˆ (in National Mtinicipal Review, Vol. Ill, pp. 83-92, Philadelphia 1914) ; Luetscher, G. D., < Early Political Machinery in the United Statesˆ (Philadelphia 1903) ; Lowrie, S. G., ˆSecond Choice Nominationsˆ (in American Political Science Review, Vol. V, pp. 600-604, 1911) ; Mechem, F. R., ˆLaw of Public Offices and Officersˆ (Chicago 1890) ; McCrory, G. W., ˆAmerican Law of Electionsˆ (Chicago 1897) ; McKinley, A. E., ˆSuffrage Franchise in the Thirteen American Coloniesˆ (Philadelphia 1905) ; MacMillan, D. C., ˆElec¬ tive Franchise in the United Statesˆ (New York 1898) ; Macy, Jesse, ˆParty Organization and Machineryˆ (New York 1912) ; Merriam, C. E., ˆHistory of American Political Theoriesˆ (New York 1910) ; Ostrogorski, M., ˆDemoc¬ racy and the Party System in the United Statesˆ (New York 1910) ; Shepard, E. F., ˆCompulsory Votingˆ (New York 1891) ; Sloane, W. M., ˆParty Government in the United Statesˆ (New York 1914) ; Stanwood, Edward, ˆHistory of the Presidencyˆ (Boston 1912) ; Tyson, R., ˆVarious Voting Systemsˆ (in The Arena, Vol. XXXIX, pp. 59-64, 1908) ; Woodburn, J. A., ˆPolitical Parties and Party Problemsˆ (New York 1914).

Irving E. Rines,

Editor of ˆHistory of the United States?

VOTING MACHINE. The wave of bal¬ lot reform which swept over the United States of America immediately after the year 1888 firmly established the Australian or blanket ballot as a factor in the election of practically all the States of the United States of America. This ballot was intended to encourage freedom of choice on the part of the voters and while it seemingly makes it easy to split the ticket (or to cast an independent ticket) it ofttimes dis¬ franchises the voter because of his mistake in marking it. The introduction of the Aus¬ tralian ballot opened the way for voting ma¬ chines and demonstrated the need of them. The voting machine is a mechanical Australian bal¬ lot, having for its object the correcting and preventing of the abuses to which the Australian ballot system is susceptible and expediting the returns. It accords to each voter his full vot¬ ing privilege; it prevents him from making mistakes that would take his ballot out of com¬ pliance with the law, and makes it unnecessary for the judges to inspect the ballot to deter¬ mine its legality. The machine counts the bal¬ lot for each

candidate at once, making it a part of the total vote. When a vote is cast, the op¬ erating devices are automatically reset and the machine is again ready for operation by an¬ other voter. Machines include safeguards against frauds by election officers. They make it more easy for the voter to accomplish his work and prevent him, to a great extent, from making a partial or complete failure in voting. The use of them compels secrecy, reduces the amount of labor involved on the part of elec¬ tion boards, secures greater economy in the expenses of election and gives the returns at once on the closing of the polls.

The Requisites of a Complete and Legal Voting Machine. — A voting machine must enable a voter to cast his vote in secret ; that is, so that no one can see or know for whom

he has voted. The method of voting must be simple and within the comprehension of all classes ; so that illiterate or blind persons, after receiving instruction, can vote without assist¬ ance. It must be convenient in its operation. It must permit a voter to vote for all the can¬ didates nominated by any party, or to vote in part for the candidates of one party and in part for the candidates of other parties and provide for voting for persons who are not nominated by any party for any office. It must give the voter perfect freedom in his selection from any of the candidates without regard to their position on the machine. For some offices, but one candidate is to be voted for, for others two or more may be nominated by each party. It must be beyond the power of the voter to vote for more persons than he is entitled to vote for, or to vote twice. It must permit a voter to change his vote or correct a mistake, while he is in the booth; to split his electoral vote; voting on questions; limited or restricted voters (females or others) to exercise their rights under the law, but not to exceed them, either for ˆ candidates or questions. It must count, positively and accurately, every vote cast. It must prevent defective ballots. The counters should be so placed that they can be conveniently examined before and after the election. All the moving parts should be con¬ trolled by locks, so that the register of the vote shown on the counters cannot be changed, thus maintaining a permanent record during the time prescribed by law. The voting machine must be so constructed that it cannot be unlawfully manipulated by anyone, under conditions that prevail in elections legally conducted. It must be able to bear the most rigid scrutiny of ex¬ pert mechanics and others qualified to judge of the merits of such mechanism. There must be simple and positive action of the working parts, which must be so related that if mis¬ placed by the voter either

by accident or de¬ sign, no injury will result from the further operation of the machine.

The first voting machine built and actually used in an election was the invention of Jacob H. Myers ; it was used in the election of the town of Lockport, N. Y., in 1892 and attained considerable use elsewhere in that State. This machine was legalized in the State of New York, as well as the States of Connecticut and Michigan. Afterward improved machines began to make their appearance. The inventions of Sylvanus E. Davis and Alfred J. Gillespie re¬ sulted in the Standard and United States Stand¬ ard Voting Machines, which have attained the greatest use and perhaps the greatest celebrity in the voting-machine art. These machines are used extensively in the States of New York, Connecticut, Wisconsin, Michigan, Indiana, New Jersey and California. The election for the entire city of Rochester, N. Y., in 1898 was held by 73 of these machines and the election was the first complete and convincing demon¬ stration of the practicability of using voting machines on a large scale. In Buffalo, N. Y., these machines have been used in the elections since 1899; the returns from all of the 108 elec¬ tion districts with over 60,000 voters have been received and tabulated at the city hall in 35 minutes and papers sold on the streets within one hour after the closing of the polls, although

the ticket was of considerable size, containing some 150 candidates.

The United States Standard Voting Machine has an upright keyboard, on which the party rows of candidates and keys therefor are ar¬ ranged in horizontal lines with the lines of the offices transverse thereto. At the end of each party row, a lever is provided by means of which all of the keys of that party row may be moved together to a voting position over the names of the candidates nominated by that party; or the keys may be moved separately to a voting position over the names of the can¬ didates for which the voter desires to vote. Before the voter can arrange his ticket he must enter the booth by closing the curtain around him to shield himself from the public, after which he pulls either a party lever for straight ticket voting or a

releasing lever, to unlock the keys to enable him to prepare his ballot inde' pendently. The machine affords the voter an opportunity to cast a straight party ticket, to split his ticket, to correct mistakes, to vote for candidates not in nomination and gives him all facilities to cast only a legal vote, which is sure to be counted as he indicates. If constitutional amendments or questions are submitted to the people, they can be voted on, provisions being made to vote ®yes^^ or ^hio^^ on all such ques¬ tions or amendments. By opening the curtain the voter counts his vote and sets the machine for the next voter. The total vote for each candidate and question is given at once at the close of the election. The machine is also equipped with lockouts which are operated by the election officers to prevent particular voters from voting for offices or on questions on which they are not entitled to vote.

The machine is provided with a protective counter which counts up to 1,000,000 and can¬ not be reset, and reliably indicates whether the machine has been operated or changed after it has been prepared for an election, or after the close of an election.

The Abbot machine has had some use in the State of Michigan, being legalized by the laws of that State. It has all of the candidates for one office mounted on a slide, which can be ad¬ justed according to the wishes of the voter. He can move the office slides to the right or to the left, so as to bring the name of the candidate desired into line with the operating bar, by the operation of which the vote is registered on counters. The machine is lim¬ ited, however, in that it cannot group; that is, provide for the voting for two or more candi¬ dates on one office line, which is always neces¬ sary when two or more candidates are to be elected to an office.

The Bardwell machine, which has been used to a limited extent, has the candidates arranged in office lines and party rows. When the voter enters the booth, he is furnished with a key which he inserts in the key-hole belonging to the candidate he wants to vote for awd turns it half way around. This counts a vote for that candidate and locks the other candidates for the same office from receiving a vote, and by repeating this operation on other office rows the voter is enabled to cast his vote as he de¬ sires for the whole ticket. In case he has made a mistake by casting a vote for the wrong can¬ didate, he can witlnbr.": this vote by again

inserting the key in its key-hole and turning it backward. Straight party tickets are counted on separate counters, the operation of which, by the voter, locks the balance of the counters against operation, but the total of the counters must be added to the counters of the candidates of that party at the end of the election. The machine is so arranged that it is impossible for two persons to vote at the same time or for a second voter to vote before the preceding voter has left the booth by the opposite direc¬ tion from which he entered it. Consult Cleve¬ land, F, A., ˆOrganized Democracyˆ (New York 1913) ; Luddington, A. C., ˆAmerican Ballot Lawsˆ (Albany 1911) ; National Mu¬ nicipal League, ˆConference for Good City Governmentˆ (New York 1910).

Carl F, Lome,

United States Standard Voting Machine Com¬ pany.

VOTIVE CROWNS. See Crowns and Coronets.

VOUCHER, in law, (1) a book, docu¬ ment or other instrument verifying the truth of accounts, showing the payment of a debt or the like. Any instrument which strength¬ ens oral evidence or may be used in its place has been held to be a voucher. (2) Formerly, a person summoned into court to defend the title of a tenant on a general warranty against another claiming title ; also, the proceeding in such suit.

yOUDOO, or VOODOO, certain super¬ stitious rites and beliefs brought originally from West Africa. There it was characterized by serpent worship and incoherent and licentious dances and sometimes by human sacrifices. In the Southern States, before the Civil War, voudooism was generally practised among the slaves, and voudoo doctors were common. Many of these doctors were skilful poisoners, and Vvˆhile the great mass of their professed art was a rank imposture, still they possessed enough of devilish skill to render them objects of wholesome dread. Their services were more often invoked in destructive than in curative offices. If a negro desired to destroy an enemy, he sought the aid of the voudoo, who, in many cases, would undertake to remove the obnoxious one and the removal was generally accomplished through the medium of poison. No doubt exists that in many cases the victim of a voudoo died from sheer fright, for whenever a negro had reason to think that he was possessed by the spell of the voudoo, he at once gave up all hope, thus hastening the accomplishment of the end toward which the energies of the sorcerer were directed. Their incantations and spell workings were

always conducted with the greatest secrecy, no one being allowed to wit¬ ness the more occult and potent portion of their rilual.

VOUET, voo-a, Simon, French painter: b. Paris, 9 Jan. 1582; d. there, 30 June 1649. At 14 he went to London where he was already able to make a living by his art, and going to (Con¬ stantinople in 1611 obtained many commissions there. The next year he studied the works of Paul Veronese at Venice and was later made president of the Roman Academy, but was presently recalled to Paris and made court painter by Louis XIII. The progress of French

art was much advanced by him and among noted pupils of his were Lebrun, Lesueur and Mignard.

VOUSSOIR, voo-swar', in architecture, one of the stones which form an arch of a bridge, vault, etc., always cut more or less in the shape of a reversed truncated pyramid or wedge. The under sides of the voussoirs form the intrados or soffit of the arch and the upper sides the extrados. The middle voussoir is the keystone of the arch. See Architecture.

VOW, a solemn promise made to perform some act or to follow out some line of con¬ duct, confirmed by an appeal to the Supreme Being, or supernatural power, to favor or to punish the maker of the promise according as he fulfils or breaks such promise. Some vows bind those who make them to perform a cer¬ tain act out of gratitude for a particular favor, as in the case of Jephthah; others comprehend the performance of certain limited duties dur¬ ing a whole lifetime, as the marriage-vow and a sovereign's coronation oath, and others, again, gue a particular form to the entire character of a man's life, as the monastic and priestly vows. Among Roman Catholics vows are di¬ vided into two kinds : solemn, those taken in the face of the Church ; and simple, those made in private. Bishops are considered to have the power of releasing from simple vows generally; but the power of dispensing in important sim¬ ple, and in all solemn vows rests with the Pope ; the vows specially reserved for papal dispensa¬ tion were :

that of absolute and perpetual chas¬ tity, entering into a religious order, maTcing a pilgrimage to Rome or Compostella, or of set¬ ting out on a crusade. See Orders, Religious.

VOWEL (from the French voyelle; Latin, vocalis), a simple articulated sound, which is produced merely by breathing, accompanied by a constriction in the larynx, a greater or less elevation or depression, expansion and contrac¬ tion of the tongue and contraction or ex¬ pansion of the lips. The vowel sounds of the English alphabet are imperfectly represented by five letters, a, e, i, o, u (and sometimes w and y) ; the deficiency of our alphabet is, therefore, apparent when it is remembered that there arc at least 13 distinct shades of vowel-quality in the spoken language as heard in the words ale, an, ask, ah, all; ell, err; eel, ill; old, ore; pull, ooze. The long sound of i, as in ire, and of y, as in by, although represented by one letter, are really compound vowel sounds or diphthongs. The French simple vowel sounds u and eu, and the German o and ii, are not heard in the English language. See the articles under the several letters.

VOYAGEUR, vwo-ya-zher', a French-Canadian term for traveler. It was specifically applied to a class of men employed by the fur companies in transporting goods by the rivers and across the land to and from the remote stations of the Northwest. They were nearly all French-Canadians or half-breeds.

VOYNICH, voi'nich, Ethel Lillian Boole,

English novelist : b. 1864. She was a daughter of G. Boole (q.v.), and was married to W. M. Voynich, a Polish writer in England. She is the author of ^^ussian Humor ^ ; ^Stories from Garshin^ ; ^Thc Gadfly,^ a very striking story

which excited much attention (1897) ; ^Jack Raymond^ (1901) ; ^ Olive Latham^ (1904) ; ^Six Lyrics^ (1911).

VOYSEY, voi'zi, Charles, English thcistic clergyman: b. London, 18 March 1828; d. 1912. He was graduated from Oxford in 1851. took Anglican orders and was curate of Hessle, Yorkshire, 1852-59, of Creighton, Saint An¬ drews, Jamaica, 1860-61, and of Saint Marks, Whitechapel, London, 1861, but lost the last position on account of a sermon of his against endless punishment. He was vicar of Hea-laugh, Yorkshire, 1864—71, but having published in 1865 sermons declared to be opposed to the Bible and the 39 articles, he was prosecuted in

the Chancery court and the case being taken to the judicial committee of the Privy Council he was deprived of his living and forced to pay the costs in 1871. He subsequently founded the Theistic Church in Swallow Saint Piccadilly, London, the church being supported by the Woysey establishment fund.^^ Among his pub¬ lished works are ^The Sling and the Stone^ (1872-93) ; ^Theism as a Religion of Common Sense^ (1894) ; ^Theism as a Science of Natural Theology and National Religion^ (1895) ; ^Testimony of the Four Gospels con¬ cerning Jesus Christ^ (1896); ^Testimony of the Four Gospels^ (1907).

VRAS, vras, Stanko (also known as Jacob Fras), Serbo-Croatian poet: b. Zerovec, Styria, 1810; d. 1851. After studying at Gratz, he be¬ came editor of the magazine Kolo. At that time a number of literary men were interested in combining the Serbo-Croatian language with the Slovene into a common tongue which they called the Illyrian. In this medium, Vras wrote many poems of no mean merit. The vivid local coloring of his works makes him the most prominent figure of the poets of his nationality. His writings and letters were col¬ lected under the title ^Djela^ (4 vols., Agram 1863-64, the fifth volume in 1877).

VREDENBURG, Edric Walcott, English novelist : b. Para, Brazil, 29 March 1860. He was educated at Tonbridge School, Kent, en¬ tered the army and was a lieutenant in an Essex regiment. He has since given his attention to writing novels as well as stories and verse for children. Among his works may be cited ^The Haunted House in Berkeley Square^ ; ^A Bitter Inheritance^ ; ^At the World's Mercy^ ; ^By the Queen's Command.^

VREELAND, Herbert Harold, American railway president : b. Glen, Montgomery County, N. Y., 28 Oct. 1856. He received a common school education and worked his way upward from a humble position to that of railway presi¬ dent. In 1893 he became president and general manager of the New York Metropolitan Street Railway Company and was prominent in the consolidations which subsequently placed all surface railways on Manhattan Island under one management.

VRIENDT, frent, Frans de. See De

Vriendt, Frans.

VRIESLAND, fres'lant. See Friesland.

VRIHASPATI, vre-has'pa-te, or, as in Vcdic works. Br'iiiaspati (from

Skr. brih, probably hymn, prayer, and pati, protector, lord) : in Vedic mythology, the guardian of the

li3mns or prayers addressed by the pious to the gods; therefore, considered as mainly instru¬ mental in insuring the efficacy of the sacrifice. He is ˆhhe first-born in the highest heaven of supreme light/ˆ because the prayers reach him first ; he is ˆˆseven-faced, because his faces are the seven Vedic meters, and he is ˆattended by all the companies of gods,® or ˆˆrepresents all gods,® when the sacrifice is performed. Being to that of a priest and spiritual teacher, he is sometimes also identified with Agni. His func¬ tion of guardian of the hymns being similar to that of a priest and spiritual teacher, he is further represented as a priest of the gods, who himself ˆcelebrates worship,® and as im.parting ˆSdrtuous-instruction.® In the epic and Ptiranic mythology, five figures especially as preceptor of the gods and R'ishis, as such causing them to perform sacrifices.

VRYHEID, fri'hld. South Africa, a town of Natal, pˆior to the South African War, 1899-1902, belonging to the Transvaal Republic. It is about 280 miles north of Durban by the rail¬ way through Pietermaritzburg, Ladysmith and Dundee, in the centre of a district containing coal, gold and other minerals. It has Dutch Reformed, Anglican, Wesleyan and other churches, a masonic temple, schools and mineral springs. The district of Vryheid was ceded to a party of Boers by Dinizulu, a Zulu chief, in 1884 and was constituted a separate state under the title of the New Republic. In 1888 it was incorporated in the Transvaal. The white pop¬ ulation of the district is about 5,800; of the town, 2,400.

VUG, VUGG, or VUGH, a small cavity in a rock mass. The term is sometimes used in the same sense as geode (q.v.), but by many it is restricted to minute cavities produced by shrinkage in the process of replacement.

VUILLAUME, vwe-yom, Jean Baptiste, French violin maker; b. Mirecourt, 7 Oct. 1798; d. Paris, 19 Feb. 1875. He settled in Paris in 1818, and imitated the instruments of Stradi-varius, the Amatis and Maggini. He came to stand with Lupot at the head of French musical instrument makers of the 19th century. Long journeys were made by him after special kinds of woods, and he was constantly experimenting

toward improvements. He received many dis¬ tinctions. In the Paris Exposition in \ˆ7 he was ranked above competition.

VULCAN, the Roman god of fire and pa¬ tron of metallic handicrafts; the son of Jupiter and Juno, and identical with the Greek He¬ phaestus. According to mythology, Vulcan was Ugly and deformed, and Juno, ashamed to own such a child, dropped him from heaven, when the infant god, falling into the sea, was rescued and adopted by Thetis, who kept him till nine years of age. He was then restored to his parents. Soon after his return to Olympus, Vulcan took his mother's part in one of the quarrels between husband and wife ; Jupiter, enraged at Vulcan's audacity, flung him from heaven. The youth alighted on the island of Lemnos, breaking his ankle in the fall; here he raised forges and workshops, and became the chief of artificers. Some poets, however, fix his workshop on Olympus, another on Etna, where Cyclops was his chief assistant. He fashioned Pandora, and had Venus given him

for his wife, by whom he was father of Cupid. Vulcan is represented bearded, covered with dust and soot, and toiling hard at his forges. Consult Gayley, C. M., ˆClassic Myths, in Eng¬ lish Literatureˆ (Boston 1911).

VULCAN, in astronomy, the name of an assumed planet between the Sun and Mercury. In 1859 M. Lescarbault, a village physician of Orgeres, France, saw a small dark planet-like body pass across the sun's disc. The planet was called by anticipation Vulcan, but its exist¬ ence still remains unconfirmed, though M. Porro and M. Wolf of Zurich reported seeing its transit in 1876.

VULCANISM. See Volcanism.

VULCANIST, the name applied to an old school of geologists at the end of the 18th and the beginning of the 19th centuries, who held that most rocks, but particularly the basalt, were due to volcanic or igneous agencies. They were opposed by the Neptunists led by Werner, who believed that this rock in com¬ mon with most others was the product of crystallization from water.

VULCANITE, the harder of the two forms of vulcanized caoutchouc (see Vulcanization). It is differentiated from the softer product (soft rubber) in containing a larger quantity of sul¬ phur and being cured at high temperatures. In color it is dark brown, almost black, but it

may be made jet-black by litharge or red by ver¬ milion. It is not affected by the caoutchouc solvents, or by the mineral acids and alkalies. It is much used for the plates of electrical machines. The other applications of it are, of course, very numerous. Ebonite is a rarer name for it. See India-Rubber; Rubber Manufactures, American.

VULCANIZATION, a method of so treat¬ ing caoutchouc (q.v.) with some form of sul¬ phur as to effect certain definite changes in its properties and obtain a softer or harder prod¬ uct. The former is known as soft rubber, the latter as vulcanite (q.v.). The method of preparation of soft rubber goods is followed largely, but an increased proportion of sulphur together with high heat renders the product hard. The process of vulcanization was in¬ vented by Charles Goodyear (q.v.), who ob¬ tained his first patent in connection with it in 1844. See India-Rubber; Rubber Industry in THE United States.

VULCANO, vol-ka'no, or VOLCANO,

vdl-: most southern of the Lipari Islands (q.v.), in the Mediterranean, 12 miles from the north coast of Sicily, about seven miles long and three miles wide. Near the centre is a crater one-fourth of a mile in circumference, which constantly emits smoke and vapors. The highest point of this crater, which is also the highest point of the island, is 1,601 feet. Only the south part of the island is fertile. The products are grapes, wine, fruit, corn and flax.

VULCANOLOGY, that branch of geology that treats of the process of Vulcanism, or the movements of molten rock in or on the earth. See Volcano; Mountains; section on Igneous Rocks in article on Rocks, and section on V olcanism in article on Geology.

VULGATE, The, is. the Latin translation of the Bible, due mostly to Saint Jerome (q.v.),

which has been adopted as the authorized Bible of the Roman Catholic Church. The name, vitigata bihiliorum editio, which means common or current edition of the - Scriptures, was first applied to the Septuagint and then to the Old Latin Version derived from it; but after Saint Jerome's new translation came into common use, it inherited the name. Some scholars still speak of the Old Latin Vulgate or the Greek Vulgate; but the name, used without qualifica¬ tion, properly applies only to the official Roman Catholic Bible.

Place in History. — Neglected •for a long time, the Vulgate has during the last few decades won back from scholars a recognition of its intrinsic excellence, its • importance for the study of the Bible text, and its place in history. In English-speaking countries, this is due mainly tp the labors of Anglican divines, such as Westcott, Wordsworth. White, Scrive¬ ner and Burkitt. Westcott, for instance, re¬ gards it as ®not only the most venerable, but also the most precious monument of Latin Christianityˆ® Its great antiquity and the ex¬ ceptional qualities of its translator make it a most valuable aid toward the recovery of the original text. Its New Testament, in its re¬ vised form, is contemporary with the oldest Greek manuscripts and embodies a much earlier text. The Old Testament antedates by several centuries the oldest Hebrew manuscripts. Al¬ most from the time of its publication, the Vul¬ gate has had a very great influence upon the religion and civilization of Europe. It gradu¬ ally became the Bible of Europe; it has been called the book of the Middle Ages. Latin then was the language of the educated and the Vulgate their Bible. From it was derived the theological language of Europe and much of its thought. Hebrew idioms came through it to enrich our daily speech. National literatures took their rise in ventures to translate it : its text called forth the most beautiful work of the illuminators of manuscripts. Poetry, paint¬ ing and music owed to it much of their in¬ spiration and grandeur. ˆ ®It was the real parent,® says Westcott, ˆdirectly or indirectly, of all the vernacular versions of western Europe,® except the Gothic of Ulphilas. The translators of the Protestant versions had it constantly in hand; though it was ®the guide® rather* than the source of their work. Upon English Bibles, its influence is very marked, particularly upon the Authorized Version. The Psalter of the Prayer Book, still used in wor¬ ship, is a translation of the Vulgate: such naturally, too, are all modern Roman Catholic versions, like the English Douai Bible.

Latin Bible Before Saint Jerome. — The Vulgate, we have implied, was preceded by an earlier Latin Bible, and its history cannot be properly understood, without some account of the forerunner. Throughout the 4th century, this Old Latin Version, as it is called, was read in all the churches of northern Africa and western Europe, but the tradition of its origin seems to have perished. It is known that it was based, not on the original Hebrew, but upon the Greek of the Septuagint. This is its most notable difference from the Vulgate. It can be traced back with certainty to the middle of the 3d century and, with great probability, even a century earlier. Its place of origin is unknown ; nor even can we determine whether

there were several distinct translations, made in different times and countries, or originally but one. The Old Testament has survived in a few books and many fragments, but these do not shed much light on their origin ; and the many manuscripts of the New Testament furnish to scholars no satisfactory solution. The old Latin Version is historically important by reason of its influence upon the Vulgate; moreover, despite its variations, it is a witness of the highest value to the current New Testa¬ ment text of the 3d century. The books and fragments of the Old Testament also aid in determining the text, and sometimes the ar¬ rangement, of the Septuagint. Certain books of this ancient version, we shall see, were re¬ vised by Saint Jerome and incorporated in the Vulgate; a few were adopted without change and remain part of the Catholic Bible. It was the corrupt condition of the existing Latin text that caused Saint Jerome to undertake, first, a revision and then a translation of the Bible. We must remember that in his day, toward the end of the 4th century, the old version had been in circulation about 200 years. It is easy to see to what chances of corruption it was ex¬ posed. Experience proves that no manuscript can pass through many hands without the in¬ troduction of frequent changes and in the case of this old version, more than the ordinary causes of corruption seem to have been at play. Saint Augustine (q.v.), a younger contempo¬ rary of Saint Jerome, was so conscious of the almost innumerable variations in the current text that he advanced the theory — or possibly we should say, handed down the tradition — that there were almost innumerable distinct translations. Saint Jerome goes even further, stating that there were nearly as many types of text as there were manuscripts. This much is clear, that the confusion was almost hopeless and very perplexing, whether we consider pub¬ lic worship or private devotion. There was an urgent need of a revised text, and Latin Christendom was most fortunate in possessing two men fitted to furnish it, Damasus the Pope and Jerome the scholar.

Damasus was the most distinguished pontiff of his century and left to posterity the fame of an enlightened and energetic reign. As to Jerome, Westcott does not exaggerate in saying that he was the one man in 15 centuries capable of the task he ac¬ complished ; without him, in all probability, Europe would have had to wait till the Renais¬ sance for a translation comparable to the Vul¬ gate. The history of his life is in great part the history of its production.

Saint Jerome (Eusebius Hieronymus, as he was called) was born of Christian parents at Stridon, on the borders of Dalmatia and Pannonia, now Szalad in Hungary, probably be¬ tween 340 and 346 a.d. His father, Eusebius, a man of education and means, perceived the ability of the boy and sent him to Rome, at an early age, to complete his studies. There he awoke to the love of literature and, despite some aberrations, was strengthened in the love of religion — the two impulses which dominated his life and have left their impress on western Europe. Unconsciously, he was all along preparing himself for his great task, the translation of the Bible. He acquired a firm grasp of the Latin idiom, through his deep study of its literature, and laid the foundations

of his subsequent thorough knowledge of Greek ; at the same time, he was fostering that religious spirit which later caused him to devote himself to sacred rather than secular studies. He was baptized in Rome about 366. Not long aftˆr, he removed to Trier, in Gaul, and later (370) to Aquileia in North Italy where in the company of other young men of talent and piety, he vigorously pursued the study of theology. The company breaking up in 373, Jerome traveled in the East, visiting Greece, Asia Minor and Syria. At Antioch, in Syria, a dream decided the work of his life : Christ, in an apparition, reproached him with being a Ciceronian and no Christian. Henceforth he gave himself to sacred studies and religious practices ; in his old age, how¬ ever, he was able to reconcile with them the reading and teaching of pagan literature. In the summer of 374, he retired to the desert of Chalcis, east of Antioch, where he spent five years in study and prayer. During this period, under the instruction of a Jewish rabbi, he made a diligent study of Hebrew; at this time, too, began his correspondence with Pope Damasus, which led later to such happy re¬ sults. Jerome was ordained priest at Antioch, in 379, though he appears never to have ex¬ ercised the functions of his office. In 380, we find him in Constantinople, the capital of the empire, where he fell under the spell of the winning and cultivated Saint Gregory Nazian-zen. At length, in 381 or 382, he returned to Rome. He was soon admitted into the closest intimacy with Damasus, which lasted till the Pope's death, in December 384. It was during this period (in 383) that Jerome, at the request of the Pope, revised the Old Latin Version of the gospels and shortly after, of the remaining books of the New Testament. His Roman Psalter was also published about this time. Jerome had great popularity and influence at Rome under Damasus, and, nat¬ urally, had made some enemies ; their opposition increased after his patron's death and caused him to leave Rome forever, in August 385. He returned again to the East; his eager, inquisi¬ tive mind and his spirit of piety both impelled him to visit all the holy places of Palestine and to study its topography, cities and tradi¬ tions. Finally, in the autumn of 386, he settled at Bethlehem, near the cave of the Nativity, and built a monastery, over which he hence¬ forth presided. In this retreat, duringˆ the last 34 years of his life, he ˆscorned delights and

lived laborious days® of study, writing and meditation: their fruit was given to the world in his famous epistles, his commentaries and controversial writings, but above all in his translations of the Sacred Books. In his work on the Hebrew text, he was almost constantly assisted by learned rabbis. He died in 420.

Revisions of Old Latin Version. — New Testament. — Jerome's work as a reviser and translator began with the gospels (383). These books were the most important and familiar, and also, because of their wide circulation, the most corrupt in text. The task which Damasus committed to him was not a new translation, but merely a revision of the familiar text. For this, Jerome collected and consulted the best Greek manuscripts he could find, and with their guidance, corrected the Latin wherever the sense required it. Shortly after the rest of

the New Testament was corrected in the same way, though more slightly, it appears. All this work became part of the Vulgate: Jerome never made a fresh translation of the New as he did of the Old Testament.

Old Testament. — The Psalter, the prayer-book of the Church in daily worship, was the first book retouched by Saint Jerome. In the course of his life he published three editions of the Psalter; it will be convenient here, for clearness sake, to speak of all three. The first or Roman Psalter, published at Rome in 383, was adopted there for public services and continued in use till the time of Pius V (1566). For this revision, Jerome had recourse only to the Greek text. It never became part of the Vulgate and has gone out of use, except that the invitatory psalm (94) in the Breviary (q.v.) and the quotations from the Psalter in the Missal are taken from it. This revision itself becoming corrupt, through the errors of copyists, a second revision was‘ called for. This, published at Bethlehem in 387, is the Gallican Psalter, so called, because it was adopted for public worship in the churches of Gaul. It was based likewise upon the Greek text, but is a more critical recension than its predecessor. It is now used through¬ out the Latin Church and has been incorpo¬ rated in the Vulgate; yet it is not Jerome's best edition ,of the Psalter. This is conceded to be his third or Hebrew Psalter, a new translation made directly from the Hebrew (probably

392).

Other books of the Old Testament were revised by Jerome according to the Septuagint (q.v.) : he himself mentions Job, Proverbs, Canticle of Canticles and Chronicles by name, but it is believed, from his words, that he re¬ vised all the books of the Septuagint which are contained in the Hebrew Canon. All, how¬ ever, have perished except Psalms, mentioned above, and Job.

Translations from the Hebrew. — Jerome's work as a reviser made him thoroughly ac¬ quainted with the great variations of the Sep¬ tuagint text and threw him back, more and more, upon the Hebrew as the one standard. There, thanks to the watchfulness of the rabbis, he found instead of the confusing variety of the Septuagint an almost perfect agreement in the manuscripts. The controversy with the Jews, who taunted Christians with using a corrupt text, had great weight in determining Jerome to translate the Hebrew Bible. His friends, too, were repeatedly urging the task upon him, so he finally set about it, not following any set plan (he began with Samuel and ended with Esther), but translating such books as his friends re¬ quested. This translation, therefore, it appears, contrary to the impression of many, was not undertaken as an official work, destined for pub¬ lic services. He intended it primarily for the eyes of his friends and desired them, out of a fear of controversy, to keep it private. For about 15 years, from 390 to 405, he labored at this great task and succeeded in translating all the books of the Hebrew Canon (same as the Protestant Canon). Of the remaining books of the Old Testament, which are accepted as inspired by the Roman Catholic Church, he translated Tobias and Judith from the Aramaic, and from the Greek the passages of Daniel and Esther, which are not found in the Hebrew

(Dan. iii, 24-90, xiii-xiv; Esther x, 4-xvi, 24). There is ground for believing that he translated or revised the books of Maccabees. Wisdom and Ecclesiasticiis he left untouched, and passed over Baruch.

Reception of the New Translation. — Je¬ rome's friends could not keep their good things to themselves; his translations, eagerly sought and copied, and soon widely circulated, raised a storm of opposition. The gospels, indeed, though sanctioned by the authority of Pope Damasus, had been bitterly attacked by many; but when his Old Testament was published and the extent of its variations from the Old Latin rendering of the Septuagint became known, Jerome found enemies in every quarter. The Septuagint was popularly regarded as an in¬ spired translation, according to the well-known legend; to vary from it was to corrupt the word of God. So Jerome was sacrilegious and pre¬ sumptuous in daring to correct the venerable text : he was disturbing the faith of the people. Even the great Augustine at first did not ap¬ prove of his translation. >. Jerome defended himself with more than his usual warmth, es-specially against the charge of disrespect to¬ ward the Septuagint : for had not he spent years of his life rendering it faithfully into Latin? Gradually the storm subsided; part of his work won favor and public recoˆition; the bitter attacks were passed — he died in peace and was recognized as a Saint and Doctor of the Church.

Vulgate During the Middle Ages. — It was long centuries, however, before the translation of Jerome became the Vulgate or official version. Old memories and affections were entwined around the ancient text and the new was looked upon as an intruder; just as in our own day, the Revised Version has thus far made no ad¬ vance in public favor. At Rome, Jerome had great prestige because of his many friends there, his reputation as a scholar, and the patronage extended to him by Damasus. Many of the clergy admired and used his version and the example of Rome was followed in different parts of Europe. The remote provinces, like Britain and Africa, clung to the old. In the 6th century we see the new ˆ translation current almost everywhere except in Africa; yet Pope Gregory the Great, who saw the beginning of the next century and died (604) just 200 years after Jerome had completed his trans¬ lation, did not enforce its usage. His marked preference for it, however, turned the tide in its favor and it spread rapidly all over Europe. In the 9th century it was used throughout the

Church ; yet it is a curious fact that the Old Latin survived till the 13th century wherever the heresy of the Albigenses prevailed, and even, in Bohemia, till the 15th century (Berger, p. 74).

Corruption. — The old Bible did not die without leaving traces of itself upon its success¬ ful rival. It must be remembered that in the early Middle Ages the Bible circulated, not in one volume, but in separate books ; it easily happened, then, that a new manuscript was copied, according to the books at hand, partly from the old, partly from the new translation. Many readings of the Old Version, too, found their way into the new, particularly in the gos¬ pels and epistles, where the familiar text, dwell¬ ing in the memory of the scribe, displaced Je¬ rome's corrected text. In the synoptic gospels.

containing so many parallel passages, the text of one gospel was often substituted for the text of another. Occasionally, though not fre¬ quently, a phrase was altered to give clearer expression to a dogma. Other sources of error existed, but the chief of all was the perennial one — the carelessness of scribes.

Efforts to counteract this downward tendency were unceasingly made during the Middle Ages. Cassiodorus, Alcuin, Lanfranc, Stephen Hard¬ ing and many others are mentioned as strenu¬ ous laborers in this field. Roger Bacon, we are told, spent nearly 40 years correcting and ex¬ plaining the sacred text. Schools even were established for the purpose of recovering, dif¬ fusing and handing down to posterity the pure text of God's word. Often the supposed cor¬ rections were themselves mistakes ; yet they were perpetuated in many manuscripts, with the chance of being accompanied by new errors in every new copy. Their importance, however, must not be exaggerated. The many manu¬ scripts of the Vulgate which we inherited from the Middle Ages show, so far as they have been examined, that these mistakes are seldom seri¬ ous from a dogmatic or devotional point of view. Only the printing press seemed capable of preventing their multiplication, for the schol¬ ars of that time, as White says, had used all the remedies that could be applied before the invention of printing.

Printed Vulgate. — The press, at first, did little toward the restoration of a pure text. The best texts, it is believed, were preserved in the most handsome manuscripts and these were too costly to be sent to the printing shop. In¬ ferior texts were consequently the first printed and little criticism was applied to correct them. The famous Complutensian Bible made an attempt at a critical edition of the

Vulgate, but its success was slight. Stephanus, a French Protestant, was somewhat more successful. The printing press was rhultiplying Bibles rapidly and mistakes as well, it may be said. According to White, during the first half century following the invention of printing, in 1436, it is com¬ puted that 124 editions of the Vulgate were printed; another count, from 1471 to 1599, enu¬ merates 179 editions.

These editions were not mere reproductions, one of another ; many different manuscripts had been consulted and many editors were at work, each using his judgment (or his whim) in the correction and choice of texts. To add to the variety, several new Latin translations, by both Catholics and Protestants, were put forth.

Decree of the Council of Trent. — It is

easy to see how bewildering must have been this immense variety of old and new translations. A standard text had become imperative. It was necessary, too, since the question of the Canon of Holy Scripture was debated, to determine which books should be included in the Catholic Bible. Accordingly, in 1546, the Council of Trent closed the Canon, accepting as sacred and canonical all those books which the tradition of the Church and especially the Council of Florence had declared to be inspired ; more¬ over, the decree specified that they were ac¬ cepted ®as they were had in the Latin Vulgate,® In the same year the council ordered that the Vulgate be printed in as correct a text as possible and requested the Pope to carry out

the measure. These two important points — the books included in the Vulgate and the text authorized by the Roman Catholic Church — call for separate and somewhat detailed treat¬ ment.

Books Included in Vulgate. — First, we give a list of the Vulgate books, in their proper order, according to the names which they bear in the Douai translation. These names, it will be seen, often differ from those of the Author¬ ized Version; they are derived from the Septuagint through the Latin, while the Protestant names come in part from the same source and in part directly from the Hebrew. We subjoin the latter wherever the difference is notable. The books of the Old Testament are; Genesis, Exodus, Leviticus, Numbers, Deuteronomy, Josue (Joshua), Judges, Ruth, I and II, Kings (I and II, Samuel), III and IV, Kings (I and II Kings), I and II Paralipomenon (Chronicles), I Esdras (Ezra), II Esdras, or Nehemias, Tobias, Judith, Esther, Job, Psalms, Proverbs, Ecclesiastes, Canticle of Canticles (Song of Songs), Wisdom, Ecclesiasticus (Sirach), Isaias, Jeremias, Lamentations, Baruch, Ezechiel, Daniel, Osee (Hosea), Joel, Amos, Abdias (Obadiah), Jonas, Micheas (Micah), Nahum, Habacuc, Sophonias (Zeph-aniah), Aggeus (Haggai), Zacharias, Malachias, I and II Maccabees. In the New Testament, the books and their names are identical with those of the Authorized Version, except that the last book is called in the one Apocalypse and in the other Revelation. The Vulgate, as finally adopted by the Roman Catholic Church, is a mosaic : it is made up of direct translations from Hebrew, Aramaic and Greek, of revisions of Old Latin, according to the Septuagint and the Greek New Testament, and, lastly, of Old Latin translations unrevised.

Differences Between Roman Catholic and Protestant Bibles. — The foregoing list will have made clear the most striking difference between the Vulgate and the ordinary Prot¬ estant Bible of to-day — the inclusion of Tobias, Judith, Wisdom, Ecclesiasticus, Baruch and I and H Maccabees among the sacred books of the Bible on an equal footing with the rest. These books were formerly printed in Prot¬ estant Bibles, sometimes as integral parts of Scripture, sometimes with an undefined stand¬ ing, more frequently as being unequal to the

other books, but useful ^^for example of life and instruction of manners.® With them may be classed the additions to Esther and Daniel, mentioned in the fifth topic. All these portions of the Vulgate are now generally excluded from English Protestant Bibles but find a place in the Lutheran. They are still used in the public services of the Anglican Church. Sub¬ tract these books from the Vulgate list and the order of the books in the two Bibles will be found identical. Many minute differences, which cannot be noticed here, are found in the inner arrangement, but more particularly in the numbering of the contents of several books. Textual divergences, naturally, are the most numerous, but their extent and im¬ portance have been greatly exaggerated. The Canon remains the only really great difference.

Official Text of Vulgate. — The order of the Council of Trent, promulgated in 1546, that an pfficial text of the Vulgate be printed, remained

unfulfilled till the reign of Sixtus V (1585-1590). The attempts of previous pontiffs had led to little result. Sixtus summoned a com¬ mission of cardinals and scholars and en¬ trusted them with the work; not content with this, he applied himself vigorously to the task, with more energy than critical acumen and with no scrupulous deference to the opinions of the commission. The edition, called after him the Sixtine, was completed and published in 1590, a few montns before the death of the Pope. It was soon found to contain numerous errors, and all copies of it were recalled two years later by Clement VHI, who published a new and more correct text (1592). The Clementine Vulgate has ever since remained the official Bible of the Roman Catholic Church.

Sixtus V had prefixed a Bull to his edition, declaring that it must be held as ®the true, lawful, authentic and undoubted® version of the Scriptures ; he forbade anyone, under penalty of excommunication, to print a dif¬ ferent edition of the Vulgate. This prohibition was also contained in the Clementine Bull. The effect of it was to put an end to the intolerable confusion of texts ; indirectly, too, it is gen¬ erally believed to have impeded the recovery of the true text of Saint Jerome. Some writers. Catholic and Protestant, have tried to extract from these Bulls a dogma of textual accuracy; this position is stultified by the action of Pope Clement, who recalled the ˆauthentic® version of Sixtus and published another ˆauthentic® version, differing from the former, it is said, in 3,000 places. The popes consider matters of discipline, but not of dogma, as subject to rectification. The action of

Clement merely constitutes his edition the official Bible of the Church and guarantees its general trustworthiness and its freedom from doctrinal or moral error. The Clementine Vul¬ gate, claimed to be better than any predecessor, but not to be perfect ; it will probably give way itself to a more perfect version when modern scholarship shall have arrived at assured re¬ sults.

Value of Vulgate Text. — Modern scholar¬ ship, however, is far from having settled the exact text either of the Old or of the New Testament and Jerome's version remains one of the best witnesses to the originals, though its value is not uniform throughout. His revision of the gospels, to quote Bishop Westcott, ˆTepresents the received Greek text of the 4th century, and so far claims a respect, speaking roughly, equal to that of a first-class Greek manuscript.® Jerome, it should be remembered, sought out the best manuscripts of his day; the type of text he followed corre¬ sponds partly to that in greatest favor at present, partly to another now no longer known. His revision of the rest of the New Testament was not so thorough and probably let many inaccuracies remain; he himself in his commentary on the Galatians departs at times from the received Latin text.

In the Old Testament Jerome followed a text almost identical with the Massoretic, and, therefore, of the greatest value. His transla¬ tion shows him to have been *a good, but by no means immaculate, Hebrew scholar.® In gen¬ eral, his work was done with the greatest care

and light was constantly sought from learned Jews. Tobias and Judith, however, in whose canonicity he did not believe, were translated hurriedly. Almost all scholars would agree with the judgment of White, who says, in summing up this matter : ®We may confidently assert that the general standard of the transla¬ tion is a very high one.®

Literary Qualities. — The language of the Vulgate was based upon the common con¬ versational Latin of its day, used by all classes of the

people; it differed greatly from the literary Latin and contained many words and forms considered archaic or rude. Despite the flavor which this origin frequently gives to the language of the Vulgate, the translation is greatly admired for its simplicity, clearness, flexibility, force and majesty. In the poetical and prophetic books it is unsurpassed. These fine_ literary qualities may be attributed to the genius of Jerome; yet they are present also in books which he did not touch. The Latin lan¬ guage, indeed, seems peculiarly adapted to render Hebrew thought and feeling; thus the Vulgate has ever been a favorite with literary men who love both the Bible and the language of Cicero, especially in continental Europe.

English Translations of the Vulgate. — The first English translation of the entire Vul¬ gate is commonly attributed to Wyclif (d. 1384). The second is the work of Roman Catholic scholars in exile, who published, the New Testament at Rheims, in 1582, and the Old at Douai, in 1609. The Rheims-Douai Version has remained ever since the Bible of English-speaking Catholics; passing through numerous editions, it has lost much of its original roughness and Latin phraseology and approached more closely to the King James Version. Scholars acknowledge its ˆanxious fidelity,® whether in praise or blame, as well as its very great influence upon the interpreta¬ tions and vocabulary adopted by the Authorized Version. See Bible; Bible) Versions of the.

Bibliography. — White's lengthy article, Wulgate,-* in Hasting's ˆDictionary of the Bibleˆ (to which we are particularly indebted) ; also in same Dictionary, article, ˆLatin Versions,ˆ by Burkitt; Westcott, on Vulgate, in Smith's ˆDictionary of the Bibleˆ ; Kenyon, ˆHandbook to Textual Criticism of New Testamentˆ ; ˆOur Bible and the Ancient Manuscripts,ˆ by the same; Gigot, ˆGeneral Introduction to the Scripturesˆ ; Berger, ˆHistoire de la Vulgate pendant les premiers siecles du moyen age.ˆ In Vigoroux, ˆDictionnaire de la Bible, ˆ articles ˆJerome, ˆ ˆLatines Versionsˆ ; Kaulen, ˆGeschichte der Vulg.ˆ For fuller biography, consult White; also for list of Vulgate manuscripts. Consult also bibliography appended to article on the Bible.

John F. Fenlon,

President of Divinity College, Catholic Uni¬ versity of America. Washington, D. C.

VULPIUS, vool'pe-oos, Christian August,

German writer: b. Weimar, Germany, 23 Jan. 1762; d. there, 25 June

1827. He was educated at Jena and at Erlangen, and under the direc¬ tion of his brother-in-law, Goethe, he was later secretary of the court theatre at Weimar. He was appointed first librarian and overseer of the cabinet of coins in the library at Weimar

in 1797, a position he occupied until his death. He wrote numerous plays, romances, etc., which were popular in their day, but are now scarcely remembered with the exception of ˆRinaldo Rinaldini, der Rauberhauptmannˆ (1797), which has been translated into various languages, and widely imitated. He also edited HCuriositaten der physisch-literarisch-ar-tistisch-historischen Vor-und Mitweltˆ (10 vols., 1810-23), and <Die Vorzeitˆ (4 vols.,

1817-21).

VULTURE, any of various birds of prey which habitually feed on carrion. The vul¬ tures of the Old and New Worlds are quite distinct, the former constituting a family {Cathartidce) already sufficiently described un¬ der the articles Carron-crow, Condor and Turkey-buzzard; while the latter are much more nearly related to the hawks and eagles (Falconidce) , of which they are considered to be a subfamily (Vulturince) or to form an allied family (Vulturidce) . This group is distin¬ guished by the possession of a strongly-hooked compressed bill ; by short tarsi covered with reticulated or small polygonal scales. The mid¬ dle toe is longer than the tarsus, and the hinder toe is a little elevated. The claws are blunt, but more or less hooked. The head and neck are frequently naked or covered with a light down. A large crop exists and the intestinal casca and syrinx, wanting in the Cathartidce, are present. There are numerous other differ¬ ences in skeletal and other parts. The cinere¬ ous vulture {Vultur nionachiis) is distinguished by the presence of a ruff of feathers, and by the crest borne on the back of the head. It in¬ habits Europe, Asia and Africa, and is com¬ mon. It may attain a length of three or four feet, and its color is a chocolate-brown with the naked head and neck blue. A long tuft of feathers springs from the base of the wings. The bird inhabits wooded situations and nests in trees as a rule, and appears to content itself with carrion, but rarely ventures to attack liv¬ ing animals.

The genus Otogyps, including the O. calvtis, or Pondicherry vulture, and the 0. auricularis or sociable vulture, is distinguished from the

preceding genus by having a bare head and neck, with long wattles dependent from just be¬ low the head. The sociable vulture inhabits South Africa. It is colored a general blackish-brown, and its average length is four feet. The naked head and neck are light red. The Pondi¬ cherry vulture inhabits India, and is about three feet in length. Its head and neck are flesh-colored, and the chest bears a tuft ot white feathers, the plumage generally being dark or blackish-brown. .The genus Gyps is repre¬ sented by the griffin or fulvous vulture (G. ful-vus), and is distinguished by the bill being swollen or distended at the sides, the head and neck being covered with short down, and the neck possessing a ruff of long pointed or downy feathers. The griffin vulture inhabits Europe, Asia and Africa. It attains a length of four feet, and is of a general yellowish-brown tint, the tail and wing quills being black and the neck ruff white. The head is covered with white down. It is abundant about the Mediter¬ ranean countries, and builds its nest on cliffs. It is noted for its activity and great powers of flight. The Egyptian vulture {Neophron

percnoptcrits) inhabits south Europe, Egypt and Asia. It is white, the quill-feathers of the wings being dark brown or black, and the face, bill and legs chiefly yellow. It is of small size and trirn build. This bird is also known under the designations of ^^Pharaoh's chicken® and ®white crow,® and is protected by laws from be¬ ing injured. Besides carrion it devours all kinds of refuse left by the larger vultures and small reptiles, insects, *etc.* In the weak bill and some other respects the Egyptian vulture some¬ what approaches the CathartidcF. The cele¬ brated lammergeier or bearded vulture (GypcFtiis harbatus), a genus and species distinguished from the preceding by the head and neck being feathered, and by the cere being concealed by bristly hairs, resembles the eagles in appear¬ ance and habits and is now generally con¬ sidered as the representative of a subfamily (Gypcetimr) of the Falconidae. (See Lam¬ mergeier). Consult Dresser, ˆ Birds of Europeˆ (London 1881), and Blandford ˆBirds of Brit¬ ish Indiaˆ (London 1895).

VYASA, vya'sa (®the redactor or ar¬ ranger®), also called Krishna, the author, ac¬ cording to tradition, of the Vedas, the Mahabharata, the Puranas — of all ancient Sanskrit literature. It is evident that in this name is embodied the fact that these works have from time to time undergone recension. The name Homer has exactly the same mean¬ ing as Vyasa.

VYATKA, or VIATKA, ve-a'ka, Russia, (1) a town, capital of the government of same name, advantageously situated near its centre in a beautiful district at the confluence of the Klinovka with the Vyatka, 250 miles west of Perm. Its houses are surrounded by gardens, and there are also public gardens. It has two cathedrals and also monasteries. There is steamer communication with Kazan. Pop. about 60,100. (2) The government is bounded

on the north by Vologda, east by Perm, west by Kostroma and south by Kazan, has an area of 59,329 square miles. The chief river is the Vyatka, which joins the Kama, a tributary of the Volga. There are low hills, especially in the north, and forests of fir.

oak, elm and birch are extensive. Flax and hemp are important crops and among the chief minerals are iron and copper, which are ex¬ tracted and smelted. There are manufactures of woolen, linens, potash, leather, firearms, metal goods, *etc.* Pop. about 4,062,000.

VYAZMA, or VIAZMA, Russia, ve-az'ma, town of the division of Great Russia, govern¬ ment of Smolensk, on the Vyazma, 109 miles east-northeast of the town of Smolensk. It is mentioned first 1239, and, after being controlled successively by the Lithuanians and Poles, , it finally became Russian 1634. Vyazma has active trade in grain, flax, hemp-seed, tallow, etc., and is the entrepot for goods exported to Petrograd and Riga. Pop. about 13,000.

VYERNY, vyer'ni, Turkestan, capital of the district of Semiryetchensk, formerly in Rus¬ sian territory. The city is situated at an alti¬ tude of about 2,500 feet above sea-level and is 2,700 miles southeast of Moscow. It dates from 1854 when it was founded on the site of an old Kirghiz colony. Earthquakes are fre¬ quent and several have proved disastrous es¬ pecially that of 1887, in which over 330 perished. Pop. 36,400.

VYRNWY, a river of Wales, rising in the northwest of Montgomeryshire, and after a cir¬ cuitous course of some 35 miles

fallipg into the Severn on the Shropshire border. Lake Vyrnwy, not far from its source, the chief res- •ervoir of the Liverpool waterworks, completed in 1892, was formed by constructing a huge dam across the river valley, a former glacial lake basin, the result being an artificial sheet of water about five miles long with an area of 1,121 acres and an available capacity exceed¬ ing 12,000 million gallons. The length of the embankment is 1,260 feet, its height 60, the length of the aqueduct to Liverpool 68 miles.

VYSHNY-VOLOTCHEK, vish'ni-e vo'lo-chek, Russia,, capital of a commune in the dis¬ trict of Tver, in the neighborhood of the Tsna River Valley and 225 miles south by east of Petrograd. Cotton goods are manufactured to a considerable extent and there is a thriving trade. Pop. 17,600.

Wthe 23d letter of the English alpha¬ bet. It serves both as consonant and vowel ; as consonant when it begins a word or syllable, and as vowel at the end of a word or syllable, where it forms a diphthong with a vowel preceding it, as in how, grew. Its sound is that of a weak-voiced bilabial formed by rounding the lips as for pronouncingˆ oo, then contracting the aperture so that the voice issues with some friction. W is srlent in many words and positions; examples; gunwale, sword, two; wrap, -wrong, wright. W may be derived from primitive Indo-Germanic v or gh. Wh is usu¬ ally derived from kv. Words beginning with wh, are pronounced as though the aspirate pre¬ ceded, as indeed it did in written Anglo-Saxon : thus whey, what are sounded hwey, hwat: but there is a tendency both in Britain and the United States to drop the aspirate in such words or to minimize it, so that when, what, white become wˆen, inf at, w'ite: nor is this mispro¬ nunciation restricted to the vulgar; it may be heard in the speech of the cultivated class ; but it is a vice of speech parallel to that found among the lower-class Cockneys early in the 19th century, when they confounded v with w, saying vile for while and wile for vile, varden for warden, and so on. W is silent in the words who, whom. W in whole and in whoop is silent and intrusive, not existing in Anglo-Saxon hal, hoi, nor in French houper. In Ger¬ man w is a consonant only and represents very nearly the sound of the English v, but is bilabial instead of labia-dental ; hence the English forename Edward is in German written Eduard. The consonant sound of w in the Gothic lan¬ guages is generally replaced in the Romance languages by gu; for example, Walter, Gualtier, William, Guillaume, war, guerre. Terminal ow, as in sorrow, is usually of guttural origin. The form (the letter v doubled) and the name of this consonant (double u) were both a true form and a right name in the 7th century when w first came into use. At that time — 13th century — and long after, the one charac¬ ter V (V) stood for the consonant v and the vowel sound u {oo), and its name was oo; at the same time it was used as the sign of the consonant now represented only by v: thus, while in form w is what it is called in French, double vay, or double ve, in sound it is for us what its name in English denotes, that of double u. W in chemistry is the symbol for tungsten. See U ; V ; Alphabet.

WAAGEN, va'gen, Gustav Friedrich, Ger¬ man art-historian: b. Hamburg, Germany, 11 Feb. 1794; d. Copenhagen, Denmark, 15 July 1868. He was educated at Breslau, Dresden, Heidelberg and Munich,

in 1830 was appointed

director of the picture gallery at the Museum of Berlin and he accepted the chair of history of art at the University of Berlin in 1844. His publications include ˆKunstwerke und Kiinstler in England und Parisˆ (3 vols., 1837-39); ˆKunstwerke und Kiinstler * in Deutschlandˆ (1843-45) ; ˆDie Gemaldesammlung der kaiser-lichen Eremitage in Saint Petersburgˆ (1864) ; ˆDie vornehmsten Kunstdenkmalerˆ (1866-67), *etc.*

WAAHOO, or WAHOO. (1) A small tree (Ulmus alata) of the southern United States, having small ovate, often falcate, leaves and spreading branches, which form an open, rounded head. The branches have wide, wing¬ like corky ridges, which have suggested the name winged elm. The tiny samaras are edged with a silky fringe. The tree, while growing naturally in damp places, is a valuable road¬ side shade-tree, where it is hardy. It has a chocolate-colored fine-grained, heart-wood, which has been used in the South for wheel-hubs. (2) The spindle-tree (q.v.) (Euonymus americanus) is also called waahoo. (3) The burning bush {U. atropurpureus) , a laxative American shrub, exhibiting bright scarlet pen¬ dulous capsules in the autumn. (4) The bear-berry (Rhamnus Purshiana), common on the Pacific Coast of the United States, and the source of cascara sagrada.

WAAL, wal, Netherlands, the Dutch name for the lower course of the Rhine, which enters the country a few miles southeast of Arnheim, flows through the province of Gelderland, to its confluence at Gorinchem with the Meuse, and thence continues westward through a many-channeled delta to the North Sea.

WABASH, wa'bash, Ind., city, county-seat of Wabash County, on the Wabash River and on the Cleveland, Cincinnati, Chicago and Saint Louis, and the Wabash railroads, about 90 miles northeast of Indianapolis and 45 miles west of Fort Wayne. It is in an agricultural and stock-raising region, but it has consider¬ able manufacturing interests. The ®Big FouPˆ railroad shops are located here. The other manufactures are flour, paper, spokes, carriages, automobiles, motor trucks, furniture, tires, woolen goods, machine-shop products, wooden ware, baking powder, shoes and hats. There are railroad repair shops, lumber and coal yards. The principal public buildings are the Soldiers' Me¬ morial Hall, Masonic Temple, Woman's Or¬ phan Home and the county courthouse. There are three parks. The educational institutions are a high school, graded schools, Wabash City library, and a high

school library. There are four banks and two daily newspapers. The first settlement was made in 1837 and the same year the town was incorporated. In 1866 it was

chartered as a city. The government is admin¬ istered under the charter of 1866, which pro¬ vides for a mayor, who holds office two years, and a council. Pop. (1920) 9,872.

WABASH, a river which has its rise in Mercer County, in the western part of Ohio, flows west into Indiana, where it takes a gen¬ erally western course, to Logansport, then flows southwest to Covington in Fountain County, then nearly south past Terre Haute, to the Ohio River. For about 200 miles of its sinu¬ ous lower course it forms the boundary be¬ tween Indiana and Illinois. The total length is about 600 miles.ˆ It is the largest tributary of the Ohio entering it from the north. The Wabash is navigable to Covington, about 300 miles, and when the water is high, to Lafayette. From Terre Haute to Huntington, the river is paralleled by the Wabash and Erie Canal which connects the river with Lake Erie.

WABASH COLLEGE, located at Crawfordsville, Ind. It was established by four Presbyterian missionaries in 1832, was first opened to students in 1833 and obtained a char¬ ter from the legislature in 1834; the present site of the college was purchased in 1835. Though affiliated with the Presbyterian Church the college is non-sectarian in control ; the board of trustees number 21, of whom four are representatives of the alumni. Wabash is dis¬ tinctively a small college aiming to give thor¬ ough c9llege training but not to do technical or university work. It is not coeducational, in which respect it stands almost alone among the col¬ leges of the West and Middle West. Formerly the college conferred three degrees, A.B., B.Ph. and B.S., requiring a thorough course in Greek for the A.B. degree. All

college courses now lead to the single degree of A.B. The course includes 104 hours of prescribed work, and 84 hours elective. Special courses are arranged by which technical and professional courses may be shortened in certain approved schools. There is a fellowship in English, a students' loan fund and many prizes. A summer school under private control is conducted on the col¬ lege grounds, work in which may count toward a degree. There is also a preparatory course. The college grounds contain 40 acres located in the heart of the city. On this campus are South Hall (occupied by the biological depart¬ ment and the museum). Centre Hall, the gym¬ nasium, Peck Scientific Hall and Yandes Li¬ brary Hall. The library contains over 51,000 volumes ; the average annual attendance of students is 350.

WABASHA, Minn., city, county-seat of Wabash County, on the Mississippi River, and on the Chicago, Milwaukee and Saint Paul Railroad, about 65 miles southeast of Saint Paul. The southern end of Lake Pepin, an expansion of the Mississippi, is about two rniles above the city. Wabash is in a fertile agricul¬ tural region, and has several manufactories, chief of which are flour and oatmeal mills, foundry, railroad shops, lumber mill, soap fac¬ tory and a church furniture factory. Grain and livestock are shipped by water. There are banks and newspapers. Pop. about 2,622.

WACCAMAW, a tribe of North American Indians who, in the 18th century, lived on Waccamaw River of eastern South Carolina. They are last mentioned in 1755, after which date, it

is supposed, they became incorporated with the Catawbas.

WACCAMAW, a river which has its rise in the southeastern part of North Carolina, and is the outlet of Waccamaw Lake. It flows south into South Carolina and joins the delta of the Great Pedee on the southern boundary of Horry County. Below the confluence of the rivers, the stream is often called Waccamaw. It enters the ocean through Winyah Bay. From the source of the Waccamaw to the Great Pedee is about 130 miles.

WACE, was, an Anglo-Norman poet: b. Island of Jersey, about 1115; d. about 1184. His Christian name is generally believed to have been Richard or Robert. He was patron¬ ized by Henry H of England, who made him a canon of Bayeux, Normandy. Two important works by him remain, the ˆBrut d'Angleterre,ˆ and the ˆ Roman de Rou,ˆ a history of Rollo and the dukes of Normandy, including the con¬ quest

of England.

WACE, was, Henry, English Anglican cler¬ gyman : b. London, 10 Dec. 1836. He was edu¬ cated at Marlborough, Rugby, King's College, London and Brasenose College, Oxford. He served curacies at Saint Luke's, Berwick Street, London, 1861-63, and Saint James', Piccadilly, 1863-69, and Grosvenor Chapel, 1870-72, was chaplain of Lincoln's Inn, 1872-80 and preacher there, 1880-96. He was professor of ecclesiasti¬ cal history in King's College, 1875-83, in 1881 became a prebendary of Saint Paul's, and in 1883 chaplain to the Archbishop of Canter¬ bury and principal of King's College. He was Boyle lecturer (ˆChristianity and Moralityˆ) (1874-75) and Bampton lecturer (ˆThe Foun¬ dations of FaithO (1879), but is best known as joint editor with Sir W. Smith of the great ˆDictionary of Christian Biographyˆ (1877-87), and is himself, the editor of the ˆSpeaker's Commentary on the Apocrypha' (1886). His latest works are ˆProphecy, Jewish and Chris¬ tian' (1911) ; ˆSome Questions of the Day'

(1914).

WACHSMUTH, Charles, American pale¬ ontologist : b. Hanover, Germany, 1829 ; d. 1896. Abandoning a legal education because of ill health, he came to America and settled in Bur¬ lington, Iowa (1854). He made important studies among the crinoids of the Burlington limestones. His ˆNorth American Crinoidea Camerata' (1897), was published posthumously.

WACHUSETT, wa-chu'set. Mount, an isolated peak in Worcester County, Mass., seven miles southwest of Fitchburg. The alti¬ tude is 2,018 feet, and the view from the sum¬ mit, embracing a picturesque valley and several small bodies of water, is most beautiful.

WACKE, wakay, German miner's term for a soft, earthy variety of trap-rock of grayish-green color, resembling indurated clay, and readily crumbling down when exposed to the weather. It is a sedimentary rock of basaltic or trap material ; is often vesicular, and when the cavities are filled it becomes an amygdaloid.

WACO, wa'k5, a subtribe of the Wichitas (q.v.). Sometimes written Hueco.

WACO, Tex., city and county-seat of McLennan County, on the Brazos River at the mouth of the Bosque, and on the San Antonio and Aransas Pass, the Missouri, Kansas and

Texas, the International and Great Northern, the Houston and Texas Central, the Texas Central, and the Gulf, Colorado and Santa Fe railroads, 60 miles east of the geographical centre of the State, and 94 miles north by east of Austin and 85 miles south by west of Dallas. Waco is in a fertile agricultural region in which grain and cotton are the chief products. The chief manufactures are cotton products, printing plant products, men's clothing, wagons and carriages, watches, foundry and machine-shop products, saddlery and harness and min¬ eral and soda waters. The city is the principal interior cotton market of the State and is the great distributing centre between Austin and Dallas. It is well laid out, with fine broad streets, of which 75 miles are permanently paved, while the others are paved with ma¬ cadam and gravel. Fourteen hard-surfaced macadam roads connect the city with the smaller neighboring towns. It has an excel¬ lent sewage system with over 100 miles of mains. The waterworks are owned by the mu¬ nicipality. There are a number of artesian wells. A tubular well system furnishes daily 2,000,000 gallons of water. There are 12 parks comprising 355 acres of which Cameron Park (130 acres) is the principal and among the most beautiful in Texas. Waco is noted for its healthfulness, cool in summer, mild in win¬ ter. Several bridges span the Brazos River. The principal public buildings are the govern¬ ment building, county courthouse, churches, schools, banks the Carnegie library. Masonic temple, the Amicable building, the highest in the Southwest, the Hotel Waco, Hotel Raleigh and the Texas Cotton Palace, wherein is held an annual exhibition of the superior products of agriculture, horticulture, stock-raising, tex¬ tile industries, *etc.* The city has hospitals, sanatoriums and an orphans' home.

There are nine banks, five of which are national. The combined capital is $2,663,000 with deposits aggregating $15,000,000. There are 62 churches, representing nearly all de¬ nominations. The educational institutions are 29 in number, 17 of which are public schools and the remainder private, such as Baylor Uni¬ versity, the Academy of the Sacred Heart, Paul Quinn College, Central Texas College, Saint Basil's College, Providence Training School, *etc.* There are two business

colleges, which have a high standing, and several school li¬ braries. The municipal receipts and expendi¬ tures are about $500,000. The chief items of expense are the schools and the interest on the bonded and floating debt. The total tax rate (city, county. State, special road) was $2.85lˆ in 1917 assessed on valuation of 65 per cent in the city.

The site of Waco was selected, long before the advent of the white man, as a camp-site by local tribes of Indians on account of the abundant springs and the natural protection afforded from storms, cyclones, *etc.* The In¬ dians named the site Huaco, which the whites corrupted to Waco. It was surveyed as a town in 1849 and incorporated in 1850. Its growth in population has been steady and has more than kept pace with the growth in com¬ merce. The rich surrounding country fur¬ nishes raw products sufficient for the support of a large manufacturing and commercial city. Waco has a commission form of government.

In 1917 the McArthur army training camp, cov¬ ering 15,000 acres, was established to the west and northwest of the city, while to the south was constructed the Rice Flying Field for the training of army aviators. Pop. (1920) 38,500.

WAD, a soft black mineral, consisting chiefly of the oxides of manganese, MnOa and MnO, but with varying percentages of one or more other metallic oxides and also water. Sev¬ eral permanent varieties and many minor varie¬ ties have been named, thus %og manganese® contains iron, silica, alumina and baryta besides the usual much larger percentage of the man¬ ganese oxides and water. Asbolite or ^^earthy cobalt® contains oxide of cobalt up to 32 per cent. Lampadite contains from 4 to 18 per cent of oxide of copper. Wad frequently occurs in loosely aggregated masses which thus seem very light, but its specific gravity rarely falls below 3, and is sometimes as much as 4.26. Though, usually so soft as to soil the fingers, its hard¬ ness may be as high as 6. Besides the common amorphous form, reniform masses and incrusta¬ tions are frequently found, while beautiful ar¬ borescent infiltrations of wad occur in seams of quartz and other minerals (see Fig. 12 under Mineralogy). Wad and the closely related mineral psilomelane are important ores of man¬ ganese and occur abundantly in very many lo¬ calities.

WADAI, wa-dr, or WADAY, French Equatorial Africa, an extensive and semi-xivil- ized negro state in Central Sudan, between Kanem and Bagirmi in the west and Darfur in the east. In 1899 it was recognized

as within the French sphere of influence, and in 1903 a French protectorate was established. In 1911 a French force occupied Arada, a few miles north of Abeshr, the capital, and in 1913 Ain Galakka. With dependencies its area is esti¬ mated at 170,000 square miles and its popula¬ tion at about 1,000,000. It consists principally of an elevated plateau, very fertile in some parts, producing abundantly maize, millet, in¬ digo, cotton, *etc.* Ivory and slaves are also largely dealt in. The inhabitants were warlike, and exercised tributary rights over several neighboring settlements ; their aggressive policy was somewhat checked by the Mahdi who in¬ flicted a crushing defeat on the sultan of Wadai's forces in November 1888. This sultan, Brahim, was deposed in 1901 and succeeded by Sultan Abugazali. The kingdom of Wadai dates from 1635. The prevailing religion is Mohammedan. Capital, Abeshr, which has car¬ avan communication with Benghazi, on the coast of Tripoli.

WADDEL, James, Presbyterian clergyman: b. Newry, Ireland, July 1739; d. 17 Sept. 1805. With his parents he settled in Pennsylvania while yet a child. Waddel was educated in Nottingham, Pa. ; was licensed to preach 1761, and removing to Virginia was pastor of Presbyterian churches 1762-75, and then became a planter in Louisa County, Va., and conducted a classical school, preaching_ on occasion. Two years later he became blind, but continued and even multiplied his labors. His fame as a preacher was great and widespread, as appears from William Wirt's sketch of the man and his manner in <The Brit¬ ish Spy.ˆ President Madison declared that Waddel ^^spoiled him for other preaching,®

Patrick Henry named him as one of the two greatest orators he had ever heard.

WADDELL, wod-del', James Iredell, American naval officer: b. Pittsboro, N. C., 13 July 1824; d. Annapolis, Md., 15 March 1886. He was appointed midshipman in the United States navy in 1841, became lieutenant in 1855 and in 1861 resigned, his commission in order to join the Confederate navy the next year. He was engaged in the

repulse of the Union forces at Drewry's Bluff, James River, Va., was sent to England by the Confederate government in 1863 and in 1864 took command of the Shenan¬ doah, with which he began a piratical cruise against the commerce of the United States which lasted 13 months. He carried the Con¬ federate flag around the world, captured 38 ves¬ sels and sailed under the Confederate flag for six months after Lee's surrender. He then turned his ship over to the British government which in turn transferred it to the hands of the United States consul at Liverpool. After re¬ siding abroad for several years Waddell re¬ turned to the United States and in 1875 be¬ came a commander in the service of the Pacific Mail Steamship Company.

WADDELL, John Alexander Low, Ameri¬ can engineer: b. Port Hope, Ontario, 15 Jan. 1854. He was graduated from Rensselaer Poly¬ technic Institute in 1875, and in 1876-77 was engaged in engineering work on the Canadian Pacific Railway. He was assistant professor of rational and technical mechanics at the Rensselaer Institute in 1878-88, and in 1882-86 was professor of civil engineering at the Im¬ perial University of Japan. Since 1887 he has been engaged as a consulting bridge engineer. He is a member of various American and for¬ eign societies, and in 1888 was decorated by the emperor of Japan, Knight Commander of the Order of the Rising Sun. In 1918 he was elected Correspondant de I'lnstitut de France dans I'Academie des Sciences, the first American engineer to receive this signal honor. He was also decorated by the Grandduchess Olga of Russia for his services as principal engineer of the Trans-|Alaska-Siberian Railway. He has published ˆDesigning of Ordinary Iron Highway Bridgesˆ (1884); ˆA System of Iron Railway Bridges for Japanˆ (1886) ; ˆDe Pon-tibusˆ (1898) ; ˆSpecifications for Steel Bridgesˆ (1900); Engineering Specifications and Con¬ tractsˆ (1907) ; ˆNickel Steel for Bridgesˆ (awarded Norman Medal 1909, of American Society of Civil Engineers) ; ˆAlloy Steel for Bridgeworkˆ ; ˆBridge Engineeringˆ (2 vols., 1916). With Harrington, J. L., he edited ˆAddresses to Engineering Studentsˆ (1911).

WADDING, wod'ing, Luke, Irish Francis¬ can friar: b. Waterford, Ireland, 16 Oct. 1588; d. Rome, 18 Nov. 1657. After studying theology at the Lisbon Jesuit Seminary he entered the Franciscan Order in 1605, and became professor of divinity in the University of Salamanca. He went to Rome in 1618, where he founded the Irish Franciscan College of Saint Isidore (1625), served as papal councillor in the con¬ troversy with the Jansenists, whose tenets he held at first, but presently renounced ; and was procurator of his order (1630-34). He wrote ˆAnnales Ordinis Minorumˆ (1626-40; new ed., 24 vols. 1731-47) ; ˆScriptores Ordinis Minorumˆ (1660; new ed., 1806); and

edited

Calasio's posthumous ˆBiblical' Concordanceˆ (1621) and the works of Duns Scotus (1620).

WADDINGTON, w6d'ing-t6n, George, English educator: b. Tuxford, England, 7 Sept. 1793; d. Durham, England, 20 July 1ˆ9. He was educated at Trinity College, Cambridge, and received a fellowship there in 1818ˆ He traveled in foreign countries for several years, was appointed commissary and official of pre¬ bend at Masham in 1833 ; was prebendary of Ferring, Chichester Cathedral, in 1833ˆ1 ; and from 1840 until his death was dean of Durham. His writings include journal of a Visit to Some Parts of Ethiopiaˆ (1822) ; ˆA Visit to Greece in 1823 and 1824ˆ (1825); ˆHistory of the Church from the Earliest Ages to the Reformationˆ (1833) ; ˆHistory of the Refor¬ mation on the Continentˆ (1843), *etc.*

WADDINGTON, Samuel, English poet: b. Boston Spa, Yorkshire, 9 Nov. 1844. He was educated at Brasenose College, Oxford, became a contributor to the leading English journals and reviews, and besides editing-several anthol¬ ogies, such as ˆEnglish Sonnets by Living Writersˆ (1881), and 'ˆSonnets of Europeˆ (1886), published also ˆA. H. Clough: A Mono¬ graphˆ (1883); ˆPoemsˆ (1896); and 'ˆCol¬ lected Poemsˆ (1902) ; 'Chapter of My Lifeˆ (1909); 'Some Views respecting a Future Lifeˆ

(1917).

WADDINGTON, Fr. va-dan-ton, William Henry, French statesman and diplomat: b. Saint Remi-sur-fiAvre, Eure-et-Loir, 11 Dec. 1826; d. Paris, 13 Jan. 1894. He was educated at Trinity College, Cambridge, England, for some years devoted his attention to archaeo¬ logical research, was admitted in 1865 to the Academie des Inscriptions et Belles-Lettres, and did not enter politics until he stood un¬ successfully for the department of the Aisne in 1865 and 1869. Minister of Public Instruc¬ tion in the extremely short-lived Cabinet of Dufaure, 19-24 May 1873, he was elected sena¬ tor for the Aisne in 1876 and was again Min¬ ister of Public Instruction in 1876-77. In De¬ cember 1877 he received the portfolio of For¬ eign Affairs, in 1878 took a distinguished part in the Congress of Berlin, and 4 Feb. 1879 be¬ came Prime Minister. His delay in the matter of needed

reforms lost him the support of all parties, and he retired 27 December. He held the London embassy in 1883-93. His writings include editions of the edict of Diocletian (1864) and Le Bas' 'Voyage ArcKeologiqueˆ (1867-77) ; an essay on 'The Protestant Church in Franceˆ (in 'Cambridge Essaysˆ 1856), and 'Melanges de Numismatique et de Philologieˆ (1861). Consult *Mme.* Waddington, 'Letters of a Diplomat's Wifeˆ (1906).

WADE, wad, Benjamin Franklin, Ameri¬ can lawyer and political leader: b. near West Springfield, Mass., 27 Oct. 1800; d. Jefferson, Ohio, 2 March 1878. In 1821 he went to Ohio, where after spending a few years in farming he took up the study of law, was admitted to the bar in 1827, and in 1831 formed a partner¬ ship with Joshua R. Giddings (q.v.), and built up a large practice. In 1837 he was elected to the State senate as a Whig, where he procured a resolution against the annexation of Texas; he also opposed the Kentucky Slave Bill, and on this account failed of re-election in 1839; but was again elected in 1841. He took active

part in the campaign of 1840, and in 1847 was elected the presiding judge of the Third Ju¬ dicial Court of Ohio, where he acquired high standing as a jurist. In 1851 he was elected to the United States Senate, and reelected in 1857 and in 1863, thus serving throughout the Civil War. He was a most vigorous opponent of slavery, voted to repeal the Fugitive Slave Law and in opposition to the Kansas-Ne-braska Bill. As an orator, he was forceful, carrying conviction by his sincerity. After the election of Lincoln in 1860, he opposed any compromise between the North and the South; from 1861-62 was chairman of the joint com¬ mittee on the conduct of the war, and advo¬ cated a vigorous policy and the immediate emancipation of the slaves. In 1864 he opposed the policy of the President and moderate Re¬ publicans in regard to Reconstruction, and with Senator Davis issued the Wade-Davis mani¬ festo strongly criticising the President's policy. He advocated wholesale confiscation of Confederately-owned property in the North, the arming of the blacks and execution of

South¬ ern leaders. He was elected president pro tempore of the Senate, and was thus acting Vice-President of the United States in 1865, after Lincoln's assassination. He was criticized for voting for Johnson's impeachment, which if oc-complished would have resulted in his own elevation to the Presidential office; but after the excitement had subsided, even his op¬ ponents were convinced of his disinterested¬ ness. His ability in debate, fearlessness and honesty gave him a leading position in the Senate and commanded the respect of his asso¬ ciates. Consult Riddle, ˆLife of Benjamin F. Wade> (1886).

WADE, James Franklin, American officer: b. Jefferson, Ohio, 14 April 1843 ; d. 24 Aug. 1921. Educated in the public schools, he entered the Union army as first lieutenant. Sixth United States Cavalry (14 May 1861), became colonel of the Fifth cavalry (1887) and was major-general of volunteers (1898), serving in the war against Spain, and was head of the Cuban evacuation commission. He became military governor of Cuba (1899), was promoted major-general of the United States army (1903) and succeeded General Davis in command of the division of the Philippines (1903-04). He became commander of the Atlantic division (1904-07) and in the latter year he retired.

WADE, Sir Thomas Francis, English diplomatist : b. London, 25 Aug. 1818 ; d. Cam¬ bridge, 31 July 1895. He studied at Trinity College, Cambridge; entered the army in 1838; in 1841 was promoted lieutenant in the 98th regiment, detailed for service in China; and was successively interpreter at Hongkong and vice-consul at Shanghai. From 1861 to 1871 he was a member of the British legation at Peking and from 1871 to 1883 Ambassador there. In 1868 he married Amelia, a daughter of Sir John Herschel. In 1888 he was made the first professor of Chinese at Cambridge University. His large and important Chinese library is now in the possession of that insti¬ tution. He published ˆThe Peking Syllabaˆˆ (1859); ˆYii-yen Tzu-erh Chi: A Progressive Course in Colloquial Chineseˆ (1867) ; and other standard works on China and the (Chinese.

WADELAI, wa-de-li, central Africa, a military post in the equatorial province of the Egyptian Sudan, on the Nile not far below the Albert Nyanza. It is on the Uganda tele¬ graph line and was famous as the chief station of Emin Pasha (q.v.), governor of the province, who, after the Mahdist rising, was cut off from civilization and who was re¬ lieved by Stanley.

WADESBORO, wadz'bur-6, N. C., town, county-seat of Anson County, on the Sea¬ board Air Line and. the Atlantic Coast Line railroads, about 100 miles southwest of Raleigh and 50 miles southeast of Charlotte. It is in an agricultural region in which the chief products are cotton and tobacco. The principal buildings are the county courthouse, the Anson School Institute, opened in 1854, and the churches and schools, for both races. There are two newspapers and two banks. Pop.

(1920) 2,648.

WADHAM (wod'am) COLLEGE, Oxford University, England, was founded in 1610 by Dorothy, widow of Nicholas Wadham of May-field, Somersetshire, England, for a warden, 15 fellows, 15 scholars, two chaplains and two clerks. One of the fellowships was diverted in 1857 to the endowment of the chair of ex¬ perimental philosophy. The scholarships have an annual value of $400 and are tenable for five_ years; and there are besides 10 Hody exhibitions (six Greek, four Hebrew) of $250, two Wright exhibitions (1874) for scholars of Manchester Grammar Schools, *etc.* Wadham College presents to 12 livings. The 17th century college buildings and the college garden are attractive features; the library is rich in rare Spanish books. Among Wadham's distinguished alumni are Admiral Blake, Sir Christopher Wren and Frederic Harrison.

WADI, wa'de, or WADY (Arabian, ®ra-vine®), in Palestine and Arabia, either a river or river valley, _ or the basin of a torrent. Renan thinks this word was adopted by the Greeks and corrupted into oasis. It has passed into the Spanish guad, with which many of the Spanish river names begin; thus Wadi-1-Kebir (Arab. ®great riverU appears as Guadalquiver, Wadi-l-hajarah («river of stones®) as Guadalaxara. The ravines of Malta commonly go by the name of vyed or wied, a corrupted form of wadi.

WADLEIGH, George Henry, American naval officer: b. New Hampshire, 28 Sept. 1842. He was graduated from the United States Naval Academy in 1863 and was assigned to blockade duty with the West Gulf squadron, serving until the close of the war. He was commissioned master in 1865, commander in 1880, served on the Arctic expedition in search of the Jeannette in 1881, was promoted captain in 1894 and in 1895-97 was in command of the Minneapolis on the coast of Asia Minor, en¬ gaged in the protection of American mission¬ aries. He commanded the flagship Phila¬ delphia in the

Pacific station during the Spanish War and after the conclusion of peace was in command of the Wabash at the Boston navy-yard. In 1902 he was promoted rear-admiral and was retired the same year.

WADLIN, Horace Greeley, American statistician: b. Wakefield, Mass., 2 Oct. 1851,

He studied architecture in Salem and in Boston, Mass., and in 1875-79 was engaged in the practice of that profession in the latter city. He was appointed special agent for the Massachusetts Bureau of Statistics of Labor in 1879 and upon becoming its chief in 1888 abandoned his professional practice. He re¬ signed this position in 1903 to accept the post of librarian at the Boston Public Library, be¬ coming librarian emeritus in 1917. He was a member of the Massachusetts legislature in 1884— 88, was supervisor of the United States census in 1890 and in 1900 and also of the Massachu¬ setts census of 1895. He has published ˆReports on Statistics of Labor of Massachu¬ settsˆ (14 vols., 1888ˆ1901) ; ˆAnnual Statistics of Manufactures of Massachusettsˆ (16 vols., 1888-1901) ; ˆDecennial Census of Massachu¬ settsˆ (7 vols., 1895), *etc.*

WADSWORTH, wadz'werth, James, Amer¬ ican soldier: b. Durham, Conn., 6 July 1730; d. 22 Sept. 1817. He was graduated at Yale 1748. He was brigadier-general of Connecticut militia 1776; was commissioned major-general 1777, and ordered to New Haven, there to or¬ ganize the defense of the coast towns. He was later chosen judge of the Common Pleas of New Haven County; was delegate to the Con¬ tinental Congress 1783-86, and member of the executive council 1785-90.

WADSWORTH, James, American edu¬ cator: b. Durham, Conn., 25 April 1768; d. 8 June 1844. He graduated at Yale 1787. In 1790, in company with his brother William, he removed to the Genesee Valley, western New York, and through the rise in value of land, large quantities of which they had purchased, he became one of the richest landholders in the State. He gave much effort and much money to

advance popular education, publishing and circulating, at his own expense, works on this subject, and employing lecturers to speak on it. As early as 1811 he recommended the establishing of normal schools, and 1838 pro¬ cured the enactment of the New York School Library Law. He founded and liberally en¬ dowed a library and scientific institution at Gencseo. In selling his land he always stipu¬ lated that two tracts of 125 acres each, in every township, should be given, one for the support of a school and the other for a church. He died at Geneseo.

WADSWORTH, wods'werth, James Sam¬ uel, American soldier : b. Geneseo, N. Y., 30 Oct. 1807; d. 8 May 1864. He was educated at Hamilton College, Harvard and Yale, though he was not graduated from any one of these institutions ; studied law with Daniel Webster, and was admitted to the bar in 1833. He did not, however, practise his pro¬ fession, his attention being given to the management of his extensive estates in western New York. He enlisted as a volunteer in the Union army early in 1861 ; was appointed a brigadier-general in August of that year; and became military governor of the District of Columbia in March 1862. In that year also he was the Republican candidate for governor of New York, but was defeated by his opponent, Horatio Seymour (q.v.). He was engaged in the battles of Fredericksburg, CTiancellorsville, Gettysburg and the Wilder¬ ness as commander of a division and was

mortally wounded in the last-named battle, dying two days later.

WADSWORTH, James Wolcott, Jr.,

American legislator : b. Geneseo, N. Y., 12 Aug. 1877. He was graduated at Yale in 1898. The Spanish-American War was in progress at the time of his graduation where¬ upon he enlisted in Battery A, Pennsylvania Light Artillery, which was one of the batteries of General Grant's brigade during his campaign in Porto Rico. On the conclusion of the war Private Wadsworth was discharged from the volunteer army but early in 1899 made a voyage to the Philippines while the war was in progress and later made a tour around the world. He came home and immediately took charge of his father's livestock business at Mount Morris in 1899 and managed a ranch at Paloduro, Tex., 1911-13. He was elected member of assembly from Livingston County (1905'-10) and was speaker of the house (1906-10). He was delegate to the National Republican Convention of 1908, 1912 and 1916 and was elected United States senator for the term 1915-21, by a

handsome majority, receiving 639,112 votes against 571,- 010 for his Democratic opponent. He v/as re¬ elected in 1920. He is a member of the Loyal Legion, the Spanish War Veterans, the Grange and other organizations.

WADSWORTH, Peleg, American revolu¬ tionary soldier : b. Hiram, Oxford County, Me., 1748; d. 18 Nov. 1829. Having graduated at Harvard, he was first a schoolmaster, then a merchant. At the outbreak of the Revolutionary War he was made captain of a com.pany of minute-men. He was later appointed adjutant-general for Massachusetts ; was present in the battle of Long Island; was commissioned briga¬ dier-general of militia 1777 ; was second in com¬ mand in the Penobscot Expedition 1779, and was taken prisoner; atter release he was again cap¬ tured in his house by British soldiers and held prisoner at Castine, Me., February-June 1781, when he escaped. He was elected member of the State senate of Maine 1792, and representa¬ tive in Congress 1793-1807. (Congress granted him a large tract of land in Oxford County, Me., in recognition of his military services ; he settled on this land after retiring from Con¬ gress, and greatly developed its resources.

WADSWORTH, Ohio, village in Medina County, on the New York, Pennsylvania and Ohio Railroad, about 30 miles south of Cleve¬ land and 12 miles southwest of Akron. It was settled in 1816 and in 1865 was incorporated. It is in an agricultural region in which tobacco is one of the important vegetable products. In the vicinity are large beds of coal, valuable sandstone quarries and extensive deposits of fire-clay. There are also deposits of clay and ochre. The chief manufactures are door and window screens, wagons and carriages, steam injectors, flour and machine shop products. There are eight churches, a normal school, graded public schools and a library, two banks and a newspaper. Pop. (1920) 4,742.

WADY-HALFA, wa’de-hai’fa, Egypt, the capital of a second-class district in the Sudan, on the east bank of the Nile, one mile below the second cataract and at the junction of the branch lines of the military railroad to Khartum

WAFER

and Kerma. Its notable features are two an¬ cient temples. Pop. with suburbs about 3,200.

WAFER, (1) a thin circular cake of un¬ leavened bread, generally stamped with the Christian monogram, the cross, or other sacred symbol and used in the Roman and several other churches in the administration of the Eucharist. (2) Originally, a small disc of dried paste, now a disc of gummed paper, used for sealing letters, *etc.*

WAGER, a promise to pay (money or the like), dependent on some event or disputed fact or circumstance ; a bet. It is retroactive, working both ways, for the bettor receives in return a promise of a thing esteemed of like value, should his intention prove to be correct. It is a contract of honor, being unrecognized by the law. By statutes of England and the United States, all contracts or agreements, whether by parole or in writing, depending on wagers, are null and void, and money due thereon cannot be recovered in any court of law. Insurance is not regarded as a wager, however, because it is leˆtimate in business. See Gambling; Horse-racing.

WAGER, or WAGERING, POLICY, in

insurance law, a pretended insurance, in which the insured possesses no legal interest in the subject matter of the insurance or the risk in¬ sured against. Therefore, it is really a wager be¬ tween insurer and insured that the uncertain event referred to will or will not take place. The *stakesˆˆ of the insurer are represented by the sum insured; those of the insured, the paid premium. See Insurance.

WAGES. Wages are the remuneration of labor, either mental or physical. This remu¬ neration includes not simply that which is paid by one man to another in the form of wages, but that which a man earns with his labor even when he works for himself. In short, it is that quantity of wealth which comes to one during a given period of time because of the exercise of his own powers, physical and mental. It does not include that which comes to him as the result of labor previously performed by himself or others or which comes to him through the ownership of capital or land, though the return which he receives at a given period for capital which he himself had previously ac¬ cumulated might conceivably be called deferred wages for his previous labor and thrift.

There have been some objections to calling labor a commodity and wages the price of a commodity. Whether labor be a commodity or not, there can scarcely be any doubt that the wages of labor have some features in com¬ mon with the prices of commodities. A kind of labor which is very intensely desired or needed will generally command a high wage, just as a commodity which is intensely desired or needed will command a high price. In both cases, however, the desire or need must be somewhat specific. It is not enough to say that air is very much desired or needed in the sense that we could not get along without it. It is not intensely desired or needed in the sense that we ordinarily want more than we have got. Similarly it is not enough to say that a given class of unskilled labor is intensely desired or needed in the sense that we could not get along without it. It sometimes happens that ˆ given class of unskilled labor is not intensely

desired or needed in the sense that we do not need any more than we have got, or at least do not need it with any great degree of in¬ tensity.

The problem of wages is one of the most acute of our social and economic problems be¬ cause on this problem depends the problem of poverty. Poverty must, however, be distin¬ guished from dependence, which may result from injury, incapacity or a variety of causes. Poverty in a general sense results only from low wages. There can be said to be poverty in a community when there are considerable numbers of laborers capable of working who cannot sell their labor at a high price or for good wages. Until this situation can be re¬ moved no community is free from reproach. Until it can create conditions under which every one who is capable of working can sell his labor at a good price or can command good wages for his labor, it will not have solved the problem of poverty. It may cover up the problem by decreeing high wages, or by taking something from one class of people in order to pay it to another class. This is obviously no cure and is certain in the course of time to bring about worse conditions than those which it is designed to cure. The only real and permanent cure is the creation of such condi¬ tions as will enable every normal laborer, with¬ out government interference or compulsion of any kind, to sell his labor on the open market at a good price, or to command high wages for his labor under the normal opera¬ tion of the laws of demand and supply. So long as it remains true that an employer of labor need not take any trouble to find help, but can merely take his pick among the numerous ap¬ plicants for jobs, the forces of demand and supply are working to the disadvantage of that

class of labor. The reproach of poverty cannot be removed until the opposite symptoms show themselves, that is, until the average laborer never has to look for a job, but can take his pick among several jobs which are offered.

There need not be the slightest difficulty in bringing about this condition. A proper re¬ distribution of human talent which will multiply the number of employers, either actual or po¬ tential, and diminish the number of laborers, especially of the unskilled or ignorant sort, will ultimately bring about the right condition. If we could double the number of employers look¬ ing for men and halve the number of men look¬ ing for employers, we should very mate¬ rially changed the relation of supply and de¬ mand. Each laborer would then be able not only to get good wages but take his pick among thej'obs offered. He would not need any social legislation to protect him because he could then dictate his own terms, not only as to sanitary and social surroundings, but also as to all the conditions of employment. So long as he is dependent upon governmental authority to pro¬ tect him against undesirable conditions of labor, he is not really a free man. His real free¬ dom will be achieved when the forces of the open market enable him to take care of himself.

The necessary redistribution of skill and talent may be brought about in a variety of ways, or by the concerted pursuit of a program working in many directions. First and fore-rnost should be mentioned, of course, an effi¬ cient educational system which should make

ignorance and lack of skill to disappear and with them ignorant and unskilled labor. It should greatly multiply the number of persons capable of entering those occupations where men and women are now scarce. This in itself would tend to double the number in the em¬ ploying classes and halve the number in the un¬ skilled classes. Howeyer, the beneficent effects of such an educational system might easily be counteracted in any community by the importa¬ tion of masses of ignorant and unskilled labor¬ ers. A very careful selection of immigrants would be absolutely essential as a supplement tc the educational system. There should, of course, be no restriction upon immigration of people who are capable of entering those occu¬ pations where men and w'omen are scarce. In fact, every encouragement should be. offered to immigrants who are capable of entering the employing classes, but there should be an abso¬ lute exclusion of those who are only capable of entering the ignorant and unskilled classes.

Even with a beneficent educational system and a selective immigration policy, the benefi¬ cent effects on the distribution of talent and of wealth might be in part counteracted by what is sometimes called selective birth rate. If the people who regularly enter the more well-paid occupations should continue to marry late and have small families, while the people ill the poorly paid occupations marry early and have large families, this itself would tend toward a bad distribution of skill and talent, thinning people out at the top and thickening them at the bottom. This, however, is the most diffi¬ cult phase of the whole question to handle. It is not difiicult to construct an educational system or a selective immigration policy, but the problem of increasing the birth rate among the intellectual classes and decreasing it among the unskilled and ignorant classes seems well-nigh insoluble. Probably nothing except a superior kind of moral teaching which will in¬ crease the family-building ambition and dimin¬ ish the spawning tendency is the only effective remedy.

Thomas N.. Carver.

WAGNER, Charles, French Protestant leader: b. Wibersville, Alsace, 3 Jan. 1852; d. 12 May 1918. At the age of 14 he was sent to Paris to school ; was graduated at the Sorbonne in 1869; and studied theology at Strassburg and Gottingen. He was the pastor of a small parish in the

French province of Vosges until 1882, when he went to Paris, and there opened a Sunday-school and later began preaching. The publication of his book ˆJeunesseˆ (ˆˆYouth») in 1891 marked him as a leader in the ethical movement in France and his influence continually increased. Besides serving a” pastor to a large congregation, he took an ac. -e part in many philanthropic and charitable undertakings, and in this work came into cordial relations wdth men of all shades of religious belief. His other publications trans¬ lated into English include ˆThe Soul of Thingsˆ ; ˆBy the Firesideˆ ; ˆThe Better Wayˆ ; ˆThe Simple Lifeˆ ; <On Life’s Thresh¬ oldˆ (1905). Of these ˆThe Simple Lifeˆ attracted particular interest in the United States and w’as widely commended by religious and ethical leaders. In the fall of 1904 Pastor Wagner visited the United States, where he

{ˆ9

made numerous addresses and gained material for ˆMy Impressions of Americaˆ (1906).

WAGNER, vag’ner, Moritz, German natu- • ralist: b. Baireuth, 3 Oct. 1813; d. Munich, 31 May 1887. He studied at Erlangen and Munich and made extensive scientific journeys in 1852-55 through North and Central America and the West Indies; in 1857-60 through the Andes from Panama to Ecuador. He was made professor of geography and ethnology at Munich. Among his writings are ˆTravels in the Regency of Algiersˆ (1841) ; ˆThe Caucasus and the Land of the Cossacksˆ (1847) ; Uoi-irriey to Colchisˆ (1850) ; Uouriiey to Ararat and the Armenian Highlandsˆ (1848) ; ˆTravels in Persia and in the Land of the Kurds ˆ (1851) ; ˆScientific Travels in Tropical Americaˆ (1870) ; ˆThe Darwinian Theory and the Law of Migration of Organismsˆ (1868).

WAGNER, Richard, German composer, creator of the modern music drama : b. Leip¬ zig, 22 May 1813 ; d. Venice, 13 Feb. 1883. His father, a clerk in the police court, who had been appointed chief of police by Marshal Davoust during the French occupation of Leipzig, died when Richard was only six months old; and the widow, left with seven children, mar¬ ried, nine months later, Ludwig Geyer, a well-known actor, playwright and portrait painter, as well as a tenor. His appearances at the opera in Dresden, where he lived, gave young Rich¬ ard opportunity to become familiar with the operas then in vogue, his favorite being Weber’s ˆFreischutz,ˆ which made a deep

impression on him and determined the direction of his own genius to such a degree that it has been aptly said that it was Weber who wrote the first “Wagner Operas. When Geyer died, Richard v/as eight years old and he had not, up to that time, shown any special talent for music; in¬ deed, he played the piano so badly that his teacher told him he would never amount to anything. His poetic talent began to manifest itself when he was 11. Shakespeare became his model and at 16 he had completed a tragedy, a sort of compound of Hamlet and Lear, in Avhich he killed off so many of the characters (42). that most of them had to be brought back as ghosts to prevent the play from coming to an untimely end. It was his desire to set this to music that first decided him, at 16, to be¬ come a musician. He took some lessons and after a few preliminary trials wwote a piece concerning which he himself said afterward that ‘ Beethoven’s ninth symphony appeared like a simple Pleyel sonata by the side of this mar¬ velously complicated overture.ˆˆ These youthful extravagances were prophetic of the man who was to revolutionize the opera by his bold de¬ fiance of all conventions. In 1830 he entered the University of Leipzig as a student of philol¬ ogy and esthetics; but music claimed most of his attention, and he wrote, among other things, a symphony which showed such a remarkable mastery of the methods of classical composition as to indicate that he could have become one of the great masters in the concert field had not the inclination of his genius taken him into the operatic domain. He wrote his first opera at VViirzburg, where he had secured an engage¬ ment as chorus master ; it wˆas entitled ˆThe Fairies,ˆ but was not performed till five years after his death at Munich.

His second opera, ˆDas Liebesverbotˆ (based on ˆMeasure for Measureˆ), had a deservedly , unsuccessful production at Magdeburg. Then lie accepted an appointment as conductor at Kdnigsberg, where he married a pretty actress, Minna Planer; and in the following year he moved again, to the Russian town of Riga, where he wrote the libretto and the music of the first two acts of ˆRienzi.ˆ This opera was planned on such a big scale that he knew he never could have it properly produced at a pro¬ vincial theatre, wherefore he boldly resolved to go to the headquarters of spectacular opera — Paris — and try there to rival the popular idol, Meyerbeer, in his own field. With his wife and a huge Newfoundland dog he embarked at Pillau for London ; the voyage lasted nearly four weeks ; three times the ship was tossed by vio¬ lent storms and it was during these that Wagner got the realistic ®local color® for his ˆFlying Dutchman, > the story of which was engaging his attention at the time. Paris did not prove hospitable to the German musician. He tried in vain to have one of his operas produced ; no one cared for the French sbYigs he wrote and which he was finally glad to sell in Germany at $4 apiece; he could not even get a place as chorus singer in a Boulevard theatre. Luckily he found a music publisher, Schlp < 5inger, who paid him for proof-reading and arranging popu¬ lar melodies and operatic scores for piano and cornet and other instruments. Wagner also wrote some interesting musical essays and novel¬ ties which were printed and paid for and which contain many autobiographic details. He com¬ pleted ˆRienziˆ and also wrote the music of the ˆFlying Dutchmanˆ ; but finally after nearly three years of starvation and numberless disap¬ pointments, left Paris for Dresden, whence he had received a request for his ˆRienzi.ˆ

With the return to Germany begins the sec¬ ond period in Wagner's. life. ˆRienziˆ was pro¬ duced at Dresden 20 Oct. 1842 and proved such a brilliant success that there was a demand for his other opera, ˆThe Flying Dutchman,ˆ which was given 2 Jan._ 1843, only about 10 weeks after ˆRienzi.ˆ This proved to be less of a success; the performance was poor and the audience was puzzled and displeased when in place of the usual airs and processions it found an opera without arias, duos and dances — an opera so new in form and spirit that few could understand it. Only four performances were given. However, ˆRienziˆ had made Wagner the hero of the day; he was appointed royal conductor and kept that position about six years. His

next opera, ˆTannhauser,ˆ departed more wndely still from the accepted models. It was produced 19 Oct. 1845 and, to Wagner's chagrin, seemed to give pleasure only in so far as it resembled the old-fashioned operas. However, he persevered in his path of reform and wrote Hˆohengrin.ˆ It Mˆas finished in 1848, but he could not even get it accepted for perform¬ ance. Nor could he get any attention for his plans for reforming the Dresden Opera. He became more and more dissatisfied with his posi¬ tion, and when, in 1849, the Revolution broke out, he foolishly joined the insurgents. The re¬ sult was that he had to seek safety in flight; his companions were caught and imprisoned, while he succeeded in reaching Weimar where Liszt took care of him and provided him with the means of escape to Switzerland. In that home

of political refugees he dwelt during most oˆ the years — more than a decade — that he was exiled from Germany. For six years he com¬ posed no more operas, devoting his time to writ¬ ing essays on musical and dramatic subjects by way of explaining his theories. Little attention was paid to these and he might have starved but for the assistance of Liszt and other friends. All this time the plans for his great ˆNibelung Tetralogyˆ were slowly maturing in his mind. In 1852 the poems were finished and printed and 1 Nov. 1853 he began to write the music for ˆRheingoldˆ ; it was finished the following year and ˆDie Walkiireˆ was completed by March 1856. In the meantime he had unwisely accepted an offer to conduct a series of Philharmonic concerts in London (1855). _ Queen Victoria and the public were kind to him, but the press treated him shamefully, his music being de¬ scribed as an ˆflnflated display of noise and ex¬ travagance,® as void of melody, *etc.* He got only $1,000 for four months' work. Returning to Switzerland, he finished ˆDie Walkureˆ and began the third opera of the Nibelung Tetralogy, ˆSiegfried. ˆ When he had got to the middle of the second act, he despaired of ever finishing and producing this great cylic work, and so abandoned it for the time being (in June 1857) and began his ˆTristan und Isolde,ˆ which, being a separate work, would, he hoped, re-establish his connection with the stage. He completed it in 1859, but seven years elapsed before he suc¬ ceeded in producing it. In 1860 he gave a series of concerts in Paris ; they resulted in a large deficit. In the following year Napoleon ordered a performance of ˆTannhauser.ˆ Wagner was given to understand that he must introduce a ballet in the second act; he refused to do so, and the members of the Jockey Club took their revenge by creating such a disturbance that Wagner declined to allow more than three per¬ formances to be given. He thus received only $150 for a year's hard work. Immediately

after this disaster he wrote the poem for his only comic or humorous opera, ˆDie Meistersinger,ˆ of which he had made a sketch as early as 1845.

It was while composing this opera that the most important event of his life happened. He seldom had much money, but when he had he spent it with artistic lavishness, nor did he hesitate to live beyond his means. The failure, through no fault of his, of a Russian concert project, left him so deeply in debt in Vienna, that, to escape prison, he had to hide in Ger¬ many. On 3 May 1864, he was preparing to disappear in the Suabian Alps, there to com¬ plete his <ˆMeistersinger> score, when a message arrived from the new king of Bavaria, Lud¬ wig H, who invited him to come to Munich to live there at his expense, to compose operas and produce them. Wagner wept for joy, and promptly proceeded to Munich, where ˆTristan und Isoldeˆ was produced on 10 June 1865 and ˆDie Meistersingerˆ 21 June 1868. But Wagner's enemies made life so unpleasant for him that he left Munich and took up his abode in a villa on Lake Lucerne, where, after completing his comic opera, he took up ˆ Siegfriedˆ and finished that (1869). The fourth and last opera of the Tetralogy, <G6t-terdammerung,> was not completed till 1874. His plan of having a special theatre for the Te¬ tralogy built in Munich having failed, notwith-

i it

. t

W’ˆV~ _ ˆ ‘ U • ii T

■’ ■■ ‘ > ‘• /* ■ ■ - :;-.tfc:;sˆ;

I!l ■■■..’■■■ ‘ V” tˆ:ˆ” “,•■•?:!’ V’.

“‘jri ■’)’-■■■ i’

’ • *,’ r* •- - *‘ˆiir ‘ I . . (Ax* ■

ˆ /i T ■ 1 » . V -ˆ ,. * r c—.‘-l- ■

•£’ .IHSytˆr’ !•■•-,.:•• 4ˆ.-.., lU-; , ■ oxi

i - I.. ‘ ‘ , … £■>,-(‘; -.‘Ir,;, ..-. ■ ., . . ? ■ -T-.x”’

standing the king’s friendship, he now chose Baireuth as the best place for such a theatre, in which his novel work could be presented in exact accordance with his intentions. To secure the large sum needed, Wagner societies were founded in the cities of Europe and America. In August 1876 three complete per¬ formances of the Tetralogy were given, before audiences including two emperors, a king and many musical and other celebrities. But the deficit of $37,000 discouraged a repetition of the festival. In 1882, however, after the com¬ pletion of ˆParsifal, ˆ another was held de¬ voted entirely to that work; 20 performances were given in July and August. In the follow¬ ing

February, Wagner died at Venice and his remains were taken in a special funeral train to Baireuth. After his death his widow (Cosima, the daughter of Liszt, whom he had married in 1870, four years after the death of his first wife) continued the festivals, which soon became enormously profitable. ˆParsifaP remained a Baireuth monopoly until 24 Dec. 1903, when Manager Conried produced it at the Metropolitan Opera House, New York, the* re¬ ceipts being over $200,000 for 12 performances.

In personal appearance Wagner was barely of medium stature ; his head was large in pro¬ portion to his body, his forehead massive, his chin prominent, his lips refined, his eyes keen, yet kindly in expression. His life was full of disappointments, which left their traces in the lines of his face. He was 44 years old before any of his operas were heard in Vienna, Munich or Stuttgart, and 56 before any of them were sung outside of Germany. This, of course, was largely due to the fact that he refused to make any concessions to popular taste, except ˆ in ˆRienzi.ˆ The next three operas — ˆFlying Dutchman, > ˆTannhauser,ˆ and ˆLohengrinˆ — created an entirely new style, and by the time the public had become accustomed to that, he made another equally great steo forward in his ˆTristan, ˆ ˆMeistersinger,ˆ ˆNibelung Tetral¬ ogyˆ and ˆParsifal. ˆ These were derisively re¬ ferred to as ®music of the future,® by way of burlesquing his idea of the ˆˆart work of the future.® This idea was that music, sculpture, poetry, painting and architecture had had their day as separate arts, and that the art work of the future was the music-drama, inˆ which all these arts are united inseparably. His wonder¬ ful pictorial imagination is best exemplified in ˆParsifal. ˆ Being almost as great a poet as he was a composer, he always wrote his own libret¬ tos, whose theatric and literary merits place him among the world's greatest playwrights, although they must not be judged apart from the music any more than the music must be judged apart from the plot, the scenery and the action. He preferred mythical, supernatural subjects to the historic. His' operas are not, like those of his predecessors, a mere mosaic of unconnected arias, duos, choruses and orchestral interludes, but, especially in those of the last period, every part is connected with every other part by means of leading motives, or characteristic musical phrases which are associated with a particular person, incident or dramatic emotion, and which recur in the music whenever the person or dramatic idea with which they are associated recurs in the play. This practically gives the faculty of definite speech to the orchestra, the

beauty and emotional power of which he further enhanced beyond all precedent by an endless variety of new tone colors and expressive har¬ monies. He also created an entirely new style of dramatic vocalism, which it took the singers years to master, but with which they are now celebrating their greatest triumphs; to-day Wag¬ ner's operas are more popular and profitable than any others. Apart from his operas, the list of Wagner's works includes some mediocre pianoforte pieces, several good songs, and, for orchestra, the ˆSiegfried Idyll, ˆ and three marches, the ˆHuldigungsmarsch,ˆ the ˆKaiser-marschˆ and the ˆPhiladelphia Centennial.' This last, like his other miscellaneous works, is mediocre. His literary works comprise 10 volumes of dramatic poems and essays on musical and philosophical subjects, some of them wordy and wearisome, others extremely keen and suggestive ; English version by Ellis, who is also translator of Glasenapp's monu¬ mental biography in five or six volumes. The letters of Wagner to Liszt and other friends are extremely valuable ; full use is made of them in the most elaborate biography in the Eng¬ lish language, by Finck (1893). Other bio¬ graphic and critical books are by Ashton (1902), Julien (1886), Tapper! (1883), Muncker (1891), Liszt, Wolzogen (1883), Pohl, Nohl, Porges, Hueffer, Chamberlain (18%), Nietzsche, Schure, Kufferath, Oesterlein, Dannreuther (in Grove), Henderson (1901), Krehbiel (1891), Finck (1893), Glasenapp (1876-1911), Koch (1907), Wagner, R., ˆMein Leben' (1911) ; thematic guides by Wolzogen, Kobbe, Heintz, Freda Winworth.

Henry T. Finck,

Musical Critic, New York Evening Post.

WAGNER, Rudolf, German physiologist : b. Baireuth, Bavaria, 30 July 1805; d. Gottin¬ gen, Germany, 13 May 1864. He was educated at Erlangen, Wurzburg and at Paris, was ap¬ pointed professor of zoology at the University of Erlangen in 1833 and in 1840 was called to that chair at the University of Gottingen, where he remained until his death. He pub¬ lished ˆLehrbuch der vergleichenden Anatomieˆ (2 vols., 1834-35) ; ˆHandwdrterbuch der Physiologie' (4 vols., 1842-43) ; Worstudien zu einer wissenschaftlichen Morphologie des menschlichen Gehirns als Seelenorgansˆ (2 vols., 1860-62), *etc.*

WAGNER, Siegfried, German musical con¬ ductor, son of Richard Wagner (q.v.) : b. Lu¬ cerne, Switzerland. 6 June 1869. He was in¬ tended for an architect, but being bent on adopting the profession of his father, he left the Polytechnic school and studied music under Kniese and Humperdinck. He became a musical conductor in 1893, traveling in this capacity on the Continent and in England and in

1896, and again in 1899, conducted t.he performances of ˆDer Ring des Nibelungenˆ at Baireuth. He is the composer of the operas ˆDer Barenhauter' to his own text (1899) and ˆHerzog Wildfang' (1901), and various or- 'chestral pieces.

WAGON, a four-wheeled vehicle for the transport of goods or passengers, drawn gener¬ ally by horses. To enable the vehicle to turn as quickly and in as little space as possible, the fore pair of wheels are often made smaller

than the hind pair, and to increase this advan¬ tage still further the axle of the fore-wheels is frequently fixed to the bottom of the vehicle by a swivel joint, in which case the safts are attached to the fore-axle. The framework of the wagon is usually mounted on springs. See Carriage.

WAGONER, Okla., city and county-seat of Wagoner County, on the Missouri, Kansas and Texas, the Saint Louis, Iron Mountain and Southern and the Missouri, Oklahoma and Gulf railroads, 16 miles north of Muskogee. It has a Carnegie library and has adopted the commission form of government. Its leading industries are grain elevators, flour mills, cotton gins, a cottonseed oil mill, a wagon-wood factorv, foundry and machine shops. Pop.

(1920) 3,436.

WAGRAM, va'gram, Austria, a village on the left bank of the Rossmach, 12 miles north¬ east of Vienna, famous for the great battle be¬ tween the French under Napoleon and the Austrians under the Arch4vke Charles, on 5 and 6 July 1809. Napoleon had obtained rein¬ forcements after the severe loss which he sus¬ tained at Aspern ad Essiing, and was able to thrown an army of 150,000, with 550 cannon, acress the Danube on 5 July. The Austrians, who occupied a strong position at Wagram, were immediately attacked, but the first

day with little success. On the following morning the archduke fell upon the French centre under Massena, and then upon their left, producing confusion ending in total rout. A successful attack upon the Austrian left and centre by Davoust and MacDonald compelled the arch¬ duke to retreat, which he did leisurely and in good order, carrˆdng with him about 7,000 pris¬ oners, but leaving behind him 25,000 dead and wounded on the field, the French loss being probably about enual. On the 12th an armistice was signed at Znaim, and negotiations were commenced for a peace, which was concluded on the 14th October at Schonbrunn, and by whiclt Austria ceded all her .seacoast to France; Bavaria and Saxony were enlarged at her ex¬ pense ; part of Poland in Galicia was given to Russia, and Joseph Bonaparte was acknowl¬ edged king of Spain.

WAGSTAFF, Blanche Shoemaker, Amer¬ ican editor and author: b. New York City, 10 July 1888. She is a daughter of the late Henry F. Shoemaker (b. 28 March 1842; d. 2 July 1918), the pioneer railroad man, who laid out 3,000 miles of western railways and became chairman of the board of directors of the Cin¬ cinnati, Hamilton and Dayton. He served in the Civil War as lieutenant of the 27th Pennsylvania Volunteers and subsequently organized the Har-riman National Bank and the Trust Company of America. The earliest paternal American ancestor of Mrs. Wagstaff was Peter Shoe¬ maker, a Quaker, who came to America from Holland in 1680 and settled in Germantown, Pa. Her mother was Blanche Quiggle, daugh¬ ter of Col. James William Quiggle, LL.D., some¬ time deputy attorney-general of Pennsylvania and State senator. On 29 April 1907 Miss Shoemaker married Alfred Wagstaff, Jr., and has one son, Alfred Wagstaff, 3d. She was edu¬ cated at the Breariey School and Miss Spence's School, New York. Mrs. Wagstaff is a promi¬ nent critic on the New York Times Book R'eview ; is a contributor to Harper's, Hearsi's, The Smart Set, the New York Herald and other periodicals, contributing editor of the Van Nor-den Magazine and the International Magazine, and editor of the Poetry Journal, Boston. In 1910 her Greek drama, ˆAlkestis,ˆ was staged at the Hudson Theatre, New York, by the Co¬ burn Company, and was later played before col¬ leges, *etc.* Among her public services during the late war were the following: Chairman of the National Woman's Service League, 1917; desk lieutenant of the War Camp Community Service; volunteer in the Second Federal Re¬ serve District; Liberty Loan writer and member of the Vigilantes Association (Authors' Amer¬ icanization Propaganda).

Mrs. Wagstaff 's publications include ˆSong of Youth, ˆ poems (1906) ; Woven of Dreamsˆ poems (1907);. ˆAtysˆ (1909); ˆAlkestis,ˆ drama (1911); 'ˆEris,ˆ drama (1913); ˆNar¬ cissusˆ (1917) ; 'Book of Loveˆ

(1917) ; ‘Leaves in the Wind,ˆ poems (1920) ; the songs, H Never Knewˆ ; ‘Motherˆ ; ‘Adorationˆ ; ‘Hopeˆ ; ‘You Took the Springˆ ; also epi¬ grams, sociological essa3’s and government treatises on the Libert}ˆ Loans during the war. She has contributed also to the anthologies : ‘Gar-deri of Lifeˆ ; ‘Lyric Yearˆ ; ‘Young Ideaˆ ; ‘Fifes and Drum.sˆ ; ‘World and Democracyˆ ; and to the volume of war poems issued for the blind by the Board of Education, New York, and verses recited for Y. M. C. A. hospitals with the American Expeditionary Forces.

Mrs. Wagstaff is a member of the Pen and Brush Club, the Poetry Society of America, the Authors’ League, the Pennsylvania Society, vice-president of the Dante League, the Hugue¬ not Society, the Badminton, Colony, Sound I each Golf Club and of the National Association of Women Painters and Sculptors. She is the possessor of an admirable collection of Shelle-yana.

WAGTAIL, a small passerine bird of the family J\Iotacillidce,- so called from the habit of jerking the long tails when runing or perch¬ ing. In this family, which also includes the pipits (Anihiis), or titlarks (q.v.), the bill is slender, straight, and notched at the tip; the tarsi veiy long and slender for a passerine bird; the wing with nine primaries and elon¬ gated inner secondaries, and the tail long. About 100 species are known, most of them belonging to the Old World. North America has four species of pipits and three wagtails, one of which (Budytes flavus) is abundant in Alaska, the others (Motacilla alba and M. ocularis) are strao-Mers from Europe and Asia, respectively. The wagtails inhabit meadow-lands and nastures, and frequnt pools and streams. They are agile runners, and have an easy, undulating flight. The food consists of insects, worms, snails, etc., especially such as may be found by wading. Their nests, built on the ground, contain from four to six eggs. A well-known European species is the pied wagtail (Motacilla yarreUii), a permanent resi¬ dent in Great Britain. The white wagtail (M. alba) is common in France an 1 southern Europe, is widely distributed in Asia and oc¬ casionally wanders to Greenland; it resembles the preceding species, hut is rather slender in form, and has the throat and part of the head and neck alone black, the general color of the

upper parts being of a light ash gray. The bhie-headed wagtail (Budytes flavus) is about SIX and one-half inches long, yellowish green above, bright yellow below, the head bluish gray except for the yellow throat and white superciliary stripe. This species is distributed extensively over Europe and Asia, and breeds plentifully in Alaska. The nest is formed of roots and moss sometimes lined with feathers, and placed in a hollow on the ground. The name of water-wagtail is in the United States often given to the water-thrush.

Consult Dresser, ˆBirds of Europe' ; See-bohm, ˆBirds of Asia' ; and the writings of Nelson, Turner and Murdoch.

WAH, the Nepalese name of the panda (q.v.).

WAHABEES, wa-ha'bez, WAHABIS, or WAHABITES, a Mohammedan sect, founded in Arabia about 1745 by Abd-el-Wahab, a mer¬ chant as well as an Oriental scholar of high attainments, who could not help observing the corruption both in doctrine and in practice prev¬ alent ˆ among the professed sons of Islam, especially the Turks, He deemed it his mis¬ sion, not to teach a new religion, but to purge the innovations and errors which had crept ˆ into the old faith, and to restore the doctrines andˆ observances to strict harmony with the teachings of the Koran and the Sunna.

WAHKIAKUM (the name of a former chief). A tribe of the Chinookan stock of North American Indians, formerly living near the mouth of Columbia River, in Washington. They were originally a part of the Chinook tribe, but separated in the latter part of the 18th century, under Chief Wahkiakum, whose name they afterward assumed. They were first noted by Lewis and Clark. A county in south¬ western Washington bears their name.

WAHL, William Henry, American scien¬ tist: b. Philadelphia, Pa., 14 Dec. 1848. He was graduated from Dickinson College, Carlisle, Pa., in 1867, studied at the University of Hei¬ delberg and subsequently made a special study of mineralogy, geology and chemistry. He was professor of physics and physical geography at the Central High School at Philadelphia in 1873-74; resident secretary at the Franklin In¬ stitute and editor of the Journal of Franklin Institute in 1870-74, and in 1876 became editor of the Philadelphia Polytechnic. He was

as¬ sociate editor of the Engineering and Mining Journal in 1878-80, editor of the New York Manufacturer and Builder in 1880-82 and then resumed his former post at the Franklin In¬ stitute. He published ˆGalvano-plastic Manipu¬ lations' (1883) ; ˆPreparations of Metallic Alloys' (1893) ; ˆHistorical Sketch of the Franklin Institute' (1894), *etc.*

WAHOO, wa-hoo'. Neb., city, county-seat of Saunders County, on Cottonwood Creek, and on the Chicago, Burlington and Quincy and the Union Pacific railroads, about 50 miles west of Omaha. If is in a fertile agricultural region in which the principal products are wheat and corn. The chief shipments are wheat, corn and livestock. The principal in¬ dustries are flour milling and cement works. There are 11 churches, a high _ school, ele¬ mentary schools and a public library. The Luther Academy, under the auspices of the Evangelical Lutheran Church, was chartered

in 1883. There are three banks and two news¬ papers. Pop. 0920) 2,338.

WAHOO. See Waahoo.

WAHOWPUM («willow people"), a small tribe of the Shanaptian stock of North American Indians, occupying the village of Hahau on the north bank of Columbia River, near the mouth of Olive Creek, in Klickitat County, Wash. They have never been officially recognized.

WAHPEKUTE (ˆˆshoot among deciduous trees"), a division of the Santee of the Dakota confederacy of the Siouan stock of North American Indians. They are now officially re¬ garded as ®Santees," of whom there are 1,300 under the Santee Agency, Nebraska.

WAHPETON, wa'pe-tun {Wa'qpe'tong-wong, ˆMwellers among deciduous trees"). A division of the Dakota confederacy of the Siouan stock of North American Indians. Like the other Dakota tribes they live largely by hunting and were noted warriors. There are now 1,030 Sissetons, ®cut-heads," and Wah-petohs under the Devils Lake Agency, North Dakota, and 1,950 Sissetons and Wahpetons under the Sisseton agency. South Dakota, but the numbers of the individual tribes are not known. Consult McGee, ˆThe Siouan Indians' (15th Report, Bureau of American Ethnology, Washington, 1897).

WAHPETON, wa'pe-ton, N. Dak., city, county-seat of Richland County, in the south¬ east corner of the State, at the confluence of the Red River of the North and the Sioux Wood River, and on the Great

Northern, the Northern Pacific and the Chicago, Milwaukee and Saint Paul railroads, opposite Breckenridge, Minn., and about 43 miles south of Fargo. It was settled in 1872 by M. T. Rich, became a village in 1881 and in 1884 was chartered as a city. The chief industrial es¬ tablishments are flax fibre works, flour mills, machine shops, wagon factory an'd lumber mills, ft has grain elevators and lumber yards. The principal buildings are the county court¬ house, churches and schools. There are eight churches. The educational institutions are the Red River Valley University, the State Acad¬ emy of Science, the Lutheran Bible School and public and parish schools. The three banks have a combined capital of $160,000. The gov¬ ernment is vested in a mayor and a council of six members elected biennially. About one-half the population are Scandinavians, Germans and Bohemians combined, the rest are American-born. Pop. (1920) 3,068.

WAHSATCH MOUNTAINS, a range in the State of Utah, the eastern boundary of the Great Basin, extending from the north boundary of the State south nearly to the Colorado River. Several peaks are nearly 12,000 feet high; at the base and among the foothills are deep canyons. Silver in large quantities is found in these mountains. See Rocky Moun¬ tains ; Utah.

WAIAM, wLam (so called from their prin¬ cipal village), a small tribe of the Sbahaptian stock of North American Indians, also known as Des Chutes, Wyams, *etc.* Their chief village was on the Columbia River, where Celilo now is. They took part in the Wasco treaty of 1855

and are now on Warmspring Reservation, Oregon.

WAIILATPUAN (wi' e-lat'poo-an) IN¬ DIANS (Wai'letpu, plural of Wai'elet, ^^one Cayuse man®), a linguistic stock of North American Indians, consisting of the Cayuse and Molala tribes. The former originally occupied the mountain country on the heads of Wallawalla, Umatilla and Grande Ronde rivers, in Oregon and Washington ; the Molala resided on Molala Creek, west of the Cascades in Oregon. The former tribe bore a high reputation for in¬ telligence and bravery, but

on account of their fighting propensities, which led them to make constant war against the Shoshoni and other tribes to the west, they were never very nu¬ merous. In 1838 a Presbyterian mission was established among them by Dr. Marcus Whit¬ man, at the site of the present Whitman, Wash. In 1847 smallpox carried off a large part of the tribe, and the Indians, believing the missionaries to be the cause of it, attacked and destroyed the mission 27 November and killed Whitman and 13 others. 'In 1854 the Cayuse numbered 126, of whom there were but -few pure-bloods, the majority being intermixed with Nez Perces and Wallawallas. Of the 374 so-called Cayuse now on Umatilla Reservation, Oregon (which they share with the Umatillas and Wallawallas), only a few retain their own language. This reservation was set aside in 1855. There are perhaps two dozen survivors of the Molala tribe on Grande Ronde Reserva¬ tion, Oregon. Consult Mooney, ˆGhost Dance, Religionˆ (14th Report, Bureau American Eth¬ nology, Washington, 1891).

WAIKATO, wi'ka-tq. New Zealand, the principal river of North Island, flows first into Lake Taupo and then out of it north to Mana-kan Harbor on the west coast with a total course of 170 miles. Mercer, Hamilton and Havelock are the chief towns along its banks. Between the Upper Waikato, Lake Taupo, Mount Ruapehu and the west coast lies the mountainous and picturesque ®King Country,® occupied mainly by Maoris under their king, who till 1884 resolutely opposed the survey or settlement by Europeans of the lands within their aiikati or frontier.

WAINEWRIGHT, wan'rit, Thomas Grif¬ fiths, English art critic and forger: b. Chiswick October 1794; d. Hobart Town, Tasmania, 1852. He studied art in London, wrote art critiques for the London Magazine, on which Lamb, Hood, Cunningham, Hazlitt and De Quinccy were at the time (1820-23) collaborators, and exhibited at the Royal Academy in 1821-5(). In 1826 he forged an order on the Bank of Eng¬ land for £2,250, in 1837 was sentenced at the Old Bailey, to transportation for life, to Van Diemen's Land (Tasmania). He wˆas also be¬ lieved to have been concerned in several poison¬ ing cases, to obtain money. He appears as Varney in Bulwer's ˆLucretiaˆ and Dickens' ˆHunted Down> was based on his career.

WAINWRIGHT, wan'rit, Jonathan May-hew, American Protestant Episcopal bishop : b. of American parents, Liverpool, England, 24 Feb. 1793; d. New York, 21 Sept. 1854. He was graduated at Harvard College in 1812, studied theology and took holy orders, and was rector of Grace Church, New York, 1821-34. He was rector of Trinity Church, Boston, 1834-

38, and assistant in charge of Saint John's Chapel, New York, from the last-named year till November 1852, when he was consecrated provisional bishop of New York. He was one of the founders of the University of New York, and was considered one of the most eloquerLt American pulpit orators of his time. His publications include ˆSermons on Religious Educationˆ (1829) ; ˆLessons on the Churchˆ (1835); ˆThe Pathway and Abiding Places of Our Lordˆ (1851); ˆThe Land of Bondageˆ (1852), *etc.*

WAINWRIGHT, Richard, American naval officer: b. Washington, D. C., 17 Dec. 1849. He was graduated from the United States Naval Academy in 1868, was promoted lieutenant in 1873, lieutenant-commander in 1884, and was executive officer on board the battleship Maine at the time of her destruction in Havana Harbor in 1898. In the war which followed he was in command of the Gloucester and took part m the naval battle at Santiago, 3 JuU 1898, in which he destroyed the Spanish tor¬ pedo boats Furor and Pluton. He was super¬ intendent of the Naval Academy in 1900-{)2 and in 1903 was assigned to the command of the Newark, in 1907 to the Louisiana, and in 1908, commanded a division of the Atlantic fleet. He was retired in 1911.

WAIT, John Cassan, American lawyer and civil engineer: b. Norwich, N. Y., 4 June 1860. He was graduated from Cornell as a civil engi¬ neer in 1882, and from the Harvard Law School in 1891. In 1887-94 he was instructor and assistant professor at Harvard and in 1896-97 was in charge of the New York State canal improvements. He was associate editor of the Railroad Gazette in 1894-95 assistant prporation counsel for the city of New York in 1900-03, and published ˆCar Builders' Dic¬ tionaryˆ (1895) ; ˆEngineering and Architec¬ tural Jurisprudenceˆ (1897) ; <Law of Con¬ tractsˆ (1901); ˆPoems of Industry and La¬ borˆ ; < Calendar of Invention and Discoveryˆ (1903), *etc.*

WAIT, William Bell, American educator of the blind : b. Amsterdam, N. Y., 25 March 1839; d. New York City, 25 Oct. 1916. He was graduated from the Albany Normal College in 1859, and in the same year became a teacher in the New York Institute for the Education of the Blind. ˆ Later he studied law, and was also at one time superintendent of schools at Kingston, N. Y., and from 1863-1905, was principal of the Institute for the Education of the Blind. In 1905 he was made emeritus principal, which rank he held until his death. At the beginning of his work for the blind in 1863, Mr. Wait began an

exhaustive study of the touch system of writing and reading, his efforts resulting in the famous New York point system. He followed this success by the introduction of a system .of tangible musical notation. In 1894 he with the invention of the kleidograph, a machine for embossing the New York point system on paper, a practical typewriter for the blind now in use. Later he “invented the stereograph, a machine for embossing metal plates to be used in printing books for tlie blind. His next step was to invent a machine for embossing both sides of the leaf. He also was instrumental in obtaining an annual grant

of $10,000 from Congress for publication of books for the blind.

WAITE, Henry Randall, American editor and clergyman: b. Copenhagen, N. Y., 16 Dec. 1845. He was graduated at Hamilton 1868, then was engaged in journalism till 1870; studied theology in the Union Theological Seminary, New York, and in 1871-74 was pas¬ tor of the American church in Rome ; was edi¬ tor of the International Review 1876-77, and in the meantime and till 1880 pastor of a Presby¬ terian church in Pelham, N. Y. In 1891 he be¬ came acting pastor of a Congregational church in Brooklyn. Waite was president of the Politi¬ cal Science Association of New York 1876-77; special officer of the United States census 1880-83; editor of the Boston Citizen 1885-86; then editor of Civics in New York. He has published ˆThe Motive of St. Paul’s Lifeˆ ; Hlliteracy and the Mormon Problem.ˆ

WAITE, wat, Morrison Remick, American jurist, seventh chief justice of the United States: b. Lyme, Conn., 29 Nov. 1816; d. Washington, D. C, 23 March 1888. He was graduated from Yale in 1837 ; studied law, and in 1838 moved to Ohio, where he was admitted to the bar in 1839. He began the practice of his profession in Maumee City, later moving to Toledo. In politics he was at first an active and influential member of the Whig party, and was elected to the Ohio State legislature in 1849 ; later he took part in the organization of the Republican party; was an ardent sup¬ porter of Lincoln ; and was nominated for Con¬ gress in 1862, but failed of election. His na¬

tional reputation dates from the time of his appointment by President Grant as one of the counsel to represent the United States before the tribunal for the consideration of the Ala¬ bama claims at Geneva ; associated with him were Caleb Cushing and William M. Evarts, the latter a college classmate. His reply to Sir Roundell Palmer, establishing Great Britain's liability for permitting the Confed¬ erate cruisers to coal in British ports during the Civil War, was considered a model of legal argument in its clear, direct and logical pres¬ entation of the law and facts. In 1873 he was chosen by both political parties as a delegate from his county to the convention for revising the State constitution of Ohio, and was made president of that convention. In the same year he was appointed chief justice of the national Supreme Court, the appointment being ap¬ proved by a unanimous vote of the Senate. Many of the most important subjects of adjudi¬ cation came before the court during his term of office. Among them were the following: The constitutionality of the enforcement act; interpretation of the latest constitutional amend¬ ments; rights and powers of the State to con¬ trol and regulate the charges of railroads; the polygamy cases; federal control over elec¬ tions; power of the President to remove from office; power of States to prohibit the liquor traffic; repudiation of State debts and the true meaning of the 11th amendment; questions arising out of the violence of the Chicago an¬ archists, and the exclusion of the Chinese. His work was marked by the strictest attention to detail, and by a rigid enforcement of the rules and precedents of practice of the court ; it was hiˆ custom to keep watch of the docket and aC'

quaint himself in advance with the character of the cases about to be reached. In all questions his decisions were entirely uninfluenced by political considerations ; and all parties and sections united in commending his absolute fairness. A prominent lawyer of the South said of him : *He could hold in his steady and equal hand the balance of justice undisturbed.^^

WAITS, the king's minstrels, who in Eng¬ land and other countries used formerly to guard the streets at night and proclaim the hour. The name was afterward applied to the town's musicians, who, however, did not perform the duties of watchmen, and to private bands, w'hen employed as serenaders. In modern times the waits are musicians who play during the night hours on the approach of the Christ¬ mas or New Year seasons, and call at the houses of the inhabitants for donations. While this custom exists to some extent in the United States, the term ®waits® is not used here.

WAKAMATSU, wa-ka-ma-tsoo, a city of Japan formerly named Aidzu, for centuries the centre of politics and culture and considered the strategic key of northwestern Japan, with a castle built in the 14th century and the seat of a clan ever loyal to the Tokugawa shoguns of Yedo. Around this last stronghold of the already lost cause, the imperial armies gathered in 1868. The great castle sustained a siege of one month, even boys and girls performing prodigies of valor. The doomed garrison sur¬ rendered 6 November, ending the civil war. The castle and most of the city were given to the flames leaving a level waste of ashes. Of the defeated clansmen large numbers became active in the Russo-Greek Catholic and other Christian churches, while in 1877 hundreds of expert swordsmen, who had old scores to settle with Satsuma, aided powerfully in suppressing Saigo's rebellion. From this disaster of 1868, the city has made recovery largely through the chemical, lacquer, zinc and other industries, until now, it is among the foremost in promise in the empire. Electric lighting is general in houses and factories and the power plant, con¬ taining six 10,000 horsepower dynamos, erected in 1915, is the largest in the Orient. Of the chemicals imported, in 1913, before the war, no fewer than 40 are now made at this place. In the Aidzu valley a development of 500,000 horse power is possible. Lake Inawashiro, 1,000 feet higher, or 1,680 feet above sea level, is five miles distant. Close to the rapids of the Nippachi River, three nests of dynamos are planned. Thus the waters, utilized for ages in the work of irrigation, will be freshly utilized for cheap power and manufactures. Consult Noss, ˆTohoku, the Scotland of Japan> (1918).

WAKASHAN (wa'ka-shan) INDIANS (from Waukash, the Nootka word ˆˆgood,® which, when heard by Captain Cook, was sup¬ posed to be the tribal name), a linguistic stock of North American Indians, consisting of the Aht and Haeltzuk divisions with their numer¬ ous tribes, occupying the northern half and the western part of the southern half of Vancouver Island, the opposite mainland of British Colum¬ bia, and a small area about Cape Flattery in¬ habited by the Makah, one of the Aht tribes. The stock has also been referred to as Nootka and Nootka-C'olumbian, the term Nootka being

the first name applied to the Mowachat, an Aht tribe. Of the Aht division there are some 20 tribes, numbering in all about 3,100 individuals, of whom there are 414 Makah un¬ der the Neah Bay Agency, Washington, the remaining tribes being under the West Coast Agency of British Columbia. The 17 Haeltzuk tribes numbep in all about 2,500 souls, of whom about 1,900 are under the Kwawkeweth Agency, British Columbia.

WAKATIPU, wa-ka-te'poo. New Zealand, a picturesque lake in the South Island with an area of 112 acres. Queenstown and Glenorchy, on the borders of the lake, are favorite tourist resorts, on account of the magnificent moun¬ tain scenery in the vicinity.

WAKAYAMA, wa"ka-ya'ma, Japan, a town on the island of Hondo, situated on the east coast of the channel leading into the eastern end of the Inland Sea, 35 miles by rail south¬ west of Osaka. It is an important* centre of the cotton industry. Its noted features are the princely Kishu palace, and* the beautiful tem¬ ple of Kijmijdera, said to have been founded in 770 A.D. Pop. 77,700.

WAKE, William, English prelate : b. Blandford, Dorsetshire, 26 Jan. 1657 ; d. Lambeth, 24 Jan. 1737. He was graduated from Oxford, took orders in the Anglican Church in 1676, and in 1688 he became preacher at Gray's Inn. In 1689 he was appointed chaplain in ordinary to William and Mary, and also received a canonry of Christ Church, Oxford. From 1693 to 1706 he was rector of Saint James', West¬ minster, became canon residentiary and dean of Exeter in 1703, from 1705 to 1716 he was bishop of Lincoln. In 1716 he was enthroned arch¬ bishop of Canterbury. He took part in negotia¬ tions during 1717-20 for the union of the Anglican and the GalHcan churches, and in his relations with Nonconformists showed a liberal spirit. His chief works are ˆThe State of the Church and Clergy of England in their Councils, Synods, Convocations, Conventions, and their other Assemblies, historically deducedˆ (1703) ; ˆThe Genuine Epistles of the Apostolical Fa¬ thersˆ (1693) ; and ˆPrinciples of the Chris¬ tian Religion in a Commentary on the Church Catechism.ˆ

WAKE, originally an annual festival held on the anniversary of the day on which a parish church was consecrated and dedicated to a saint, the celebration being begun on the preceding day (the eve or vigil). On the eve of the anniver¬ sary the parishioners attended service in the church, the floor of which was strewed with flowers and rushes, and the altar and pulpit were decorated with boughs. Tents were

planted in the churchyard to supply the people from surrounding parishes who were expected on the morrow, that day being observed as a holiday. They soon degenerated into mere country fairs, and were long characterized by wild riot and licentiousness. Statutes were at various times directed against holding markets in churchyards and showing all goods except necessary refreshments on the great church fes¬ tivals, but they seem to have been little re¬ garded. Country wakes on some saints' festi¬ vals are still kept up in certain English parishes.

A lyke or liche wake (Anglo-Saxon, lie, a corpse) is the watching of a dead body by night

by the relatives and friends of the deceased. The custom arose no doubt from the dread of remaining alone all night in the presence of the dead or from the fear that malignant spirits would interfere with the corpse. The practice, once general, is now confined in the United States to a part of the foreign element, and is on the decline with them. Wakes are some¬ times attended by scenes of disorder and in¬ toxication, but as a rule they are conducted with decency and show sincere respect for the dead.

WAKE FOREST COLLEGE, located at Wake Forest, N. C., 16 miles northeast of Raleigh. It was chartered in 1833, as the Wake Forest Institute, under the auspices and control of the Baptists of the State ; it was first opened to students in 1834, and in 1838 the charter was amended, its privileges enlarged and the name changed to Wake Forest College. The greater part of the endowment was lost during the Civil War, but the college con¬ tinued its work and regained its financial pros¬ perity, The system of independent «schools^^ is now an established feature of the college organization ; these schools are 15 in number, as follows : Latin, Greek, English, modern languages, mathematics, astronomy, chemistry, biology, physics, moral philosophy, history and political science, the Bible, pedagogy, law and medicine. There are preparatory courses offered in Latin, Greek, mathematics and Eng¬ lish. The college confers the degrees of A.B., B.S., LL.B. and A.M. (for graduate work). In the A.B., and B.S., courses a part of the work is elective, the electives being some¬ what limited, however, in accordance with the degree to be obtained. For the degree of LL.B., the full course in the School of Law must be completed, also the course in the School of History and Political Science. Students are admitted to the School of Medicine, either as medical students or as undergraduates, if taking the B.S., course. The completion of the

course admits to the third year of any good medical school. With the aim of encouraging ministerial education, it has been the custom of the college to organize a special class, studying different phases of pastoral work or theology; this is outside the regular work of the School of the Bible, and does not count toward a degree ; a pastors' course of one month was inaugurated in 1902 for those pastors who could obtain a month's leave of absence from their churches. The college has a pleas¬ ing location on high ground ; its buildings in¬ clude the main building, the Heck and Wil¬ liams Building (library), the Wingate Memorial Building (chapel and audience hall), the Lea Laboratory (chemistry) and the Gymnasium. The productive fund is about $500,000; the library contains over 25,000 volumes, the students average annually 500, and the faculty

WAKE ISLAND, an islet of rock in the Pacific Ocean, lying 1,550 miles northeast of Guam, and 3,000 miles east of Luzon, Philip¬ pines. It belongs to the United States as a Pacific outpost of the Philippine Archipelago. It is about one square mile in area, and its importance is due to the fact that it is on the cable route between the United States and the Philippines.

WAKE-ROBIN

WAKE-ROBIN, the first of John Bur-roiighs collection of essays, which in its charm and character may well stand as an ex¬ ample of all. It is mostly about birds and their ways, but it has also essays and passages that show his wider knowledge and love of nature and the outdoor life in general. Bur¬ roughs is a great naturalist ; one would not exactly say a great scientist, for he rarely puts into scientific form the observations and generalizations that science seems to demand. Yet he is a great naturalist, for his life has been passed in observing nature and learning her secrets. ˆWake-Robinˆ (the popular name of the white trillium) is an invitation to come and do likewise. It was written mostly in Washington, where in the 60's, Burroughs was a department clerk, but it is made out of recollections of earlier days in the Catskill country where he was born and brought up. It has more in it of birds than of other things, but it is full of the flavor of outdoor life, ˆˆLook about you,ˆˆ he says, «and see the beauti¬ ful and wonderful things all around. In ˆWake-Robin ˆ we have an invitation to the fields and the

woods, to the daily pleasures of bird and flower or fish and deer, of the nat¬ uralist or the camper. John Burroughs and Henry D. Thoreau are the two chief masters in a form of literature in which America is pre¬ eminent, the literature of nature; and if one will read ‘ˆWake-Robinˆ (as well as ˆWaldenˆ) one will know why. The book has not only the keen observation that detects every fact, but the humanity that enables one to put the fact so as to be interesting to those of lesser powers.

Edward Everett Hale.

WAKEFIELD, Edward Gibbon, English colonial statesman: b, London, 20 March 1796; d. Wellington, New Zealand, 16 May 1862. Educated at Westminster School and Edin¬ burgh High School, he became associated in a subordinate capacity with the legations at Turin and Paris. About 1826 he turned his attention to colonial affairs and worked out the scheme of colonization usually known by his name. Its cardinal features were the abolition of free grants of land for agricultural pur¬ poses (then so readily obtained that none cared to remain dependent, and laborers were at once transformed into landed proprietors) ; and the careful control of emigration. His views were first publicly expressed in ˆA Let¬ ter from Sydneyˆ (1829). The National Colonization Society was founded in 1830 to carry out his ideas, and in the following year his plan was adopted by the government for New South Wales. The South Australian As¬ sociation was formed in 1834, and included many eminent men, and under its auspices the colony of South Australia was founded in 1836 on Wakefield’s principles. He accom¬ panied Governor-General Lord Durham to Canada in 1838 as adviser, and had an import¬ ant share in drawing up the report in which Durham embodied his proposals for settling the Canadian difficulty. Wakefield was the moving spirit behind the New Zealand Association of 1837, which forced the British government to annex New Zealand. He was subsequently a prime mover in founding the Anglican settle¬ ment in New Zealand, and in 1852 he went to New Zealand and plunged into colonial politics.

After the breakdown of his health in 1854 he lived in retirement till his death. All subse¬ quent English colonial development has followed the ideas formulated by Wakefield. He was equally able as a theorist and a director of practical details. Consult Rusden, ˆHistor}’ of New Zealandˆ (1883) ; Gisborne, ‘ˆNew Zea¬ land Rulers and Statesmenˆ

(1892) ; Garnett, ˆLifeˆ in ˆBuilders of Greater Britainˆ series

(1898).

WAKEFIELD, Gilbert, English clergyman and controversialist: b. Nottingham, 22 Feb. 1756; d. London, 9 Sept. 1801. He was edu¬ cated at Cambridge, took orders, but re¬ nounced the Anglican communion after hold¬ ing two curacies, was classical tutor in non¬ conformist academies at Warrington (1779-83), and Hackney (1790-91), He was im¬ prisoned two years in Dorchester jail for a so-called seditious libel in answer to Bishop Watson, for which his political friends con¬ soled him with a gift of £5,000. He published editions of Bion and Moschus, Virgil, Horace and Lucretius; ˆChristian Writers of the First Three Centuries on the Person of Christˆ (1784), left unfinished; Hnquiry into the Ex¬ pediency and Propriety of Social Worshipˆ (1791), the necessity for which he denied; ˆAn Examination of Paine's Age of Reasonˆ (1794) ; ˆSilvia Critica,ˆ a collection intended to illustrate the Scriptures from the stores of profane learning (1789-95). He was a man of wide learning, but although very amiable in ordinary life extremely bitter as a contro¬ versialist. After leaving the Church of Eng¬ land he never attached himself to any other religious society, although practically a Unita¬ rian. Consult his autobiography, entitled ˆMemoirsˆ (1792).

WAKEFIELD, England, an episcopal city, in Yorkshire (West Riding), on the river Calder, nine miles south by east of Leeds, The Cathedral of All Saints, founded 1329, is mainly in the Perpendicular style, with a lofty tower and spire, though including work of earlier and later dates. Saint Mary's Chantry, on the ancient bridge across the river, is a decorated structure of the time of Edward HI, restored in 1847. Besides several other places of worship, the chief buildings and institutions of the town include the town-hall, a fine build¬ ing in French Renaissance style; a large corn-exchange; a market-house and an industrial and fine art institution (1890), containing a museum, laboratory and lecture-room. The in¬ dustrial 'establishments comprise woolen mills, soap and artificial-manure works, iron-foundries, boiler-works, agricultural implement manu¬ factories, wire-rope works, machine-works, corn-mills, malting-works, breweries, *etc.* There are many collieries near the town, and market¬ gardening is carried on in the vicinity. The trade, especially in corn, is very extensive, and is facilitated by railway connections as well as by the river Calder and canals. Wakefield is mentioned in ˆDomesday Book.ˆ It was the scene of a Yorkist defeat in the Wars of the Roses, 31 Dec.

1460. In 1888 it was made the seat of a bishopric, formed mostly out of the diocese of Ripon. Pop. 52,300.

WAKEFIELD, Mass., town in Middlesex County, on the Boston and Maine Railroad,

WAKEFIELD

about nine miles north of Boston. It is sur¬ rounded by farms, and has about 25 manufac¬ tories, chief of which are iron and brass foundries, piano, rattan goods and shoe fac¬ tories, flour mills, and machine-shops. The an¬ nual product of these exceed $3,000,000. The town contains the villages of Greenwood, Mont¬ rose and Wakefield, in each of which are graded schools. There is one high school and a public library containing about 15,000 volumes. There are two banks and two daily newspapers. Pop.

(1920) 13,010.

WAKEFIELD, R. I., village in Washing¬ ton County; at the head of Point Judith Inlet, an arm of the Atlantic Ocean, and on the Narragansett Pier Railroad, about 26 miles south by west of Providence. _ It is in a part of the State devoted to farming and market gardening. The village has cotton and woolen mills and several small industries. It has a savings bank, trust company and a newspaper. Pop. about 2,200. In 1910 the population was included with that of South Kingston town, which had a total of 5,176!'

WAKELEY, Joseph Beaumont, American clergyman: b. Danbury, Conn., 1804; d. New York City, 27 April 1876. Apprenticed to a hat maker in his native town, he studied for the ministry and was admitted to the Methodist Episcopal Conference in New York (1828). He settled in Poughkeepsie (1857) and was subsequently appointed to a church in Lexing¬ ton avenue, New York City. He published a number of works including ˆHeroes of Method¬ ismˆ (1856) ; ˆLost chapters recovered from the early history of Methodismˆ (1858); ˆAnec¬ dotes of the Wesleysˆ (1869) ; ˆPortraiture of the Rev. William Cravensˆ (1869) ; ˆA Prince of Pulpit Orators — Whitefieldˆ (1871); <The Temperance Cyclopediaˆ (1875) ; ˆThe Wes¬ leyan Demosthenes: Joseph Beaumontˆ (1875).

WAKEMAN, Henry Offley, English histo¬ rian : b. near Worcester, 25 Sept. 1852; d. Basel, Switzerland, 27 April 1899. He was educated at Christ Church, Oxford, was a Fellow of All Souls from 1877 to his death, and was admitted a barrister of the Inner Temple in 1877. His publications are: ˆThe History of Religion in Englandˆ (1885) ; ˆWhat Has Christianity Done for England?ˆ (1886) ; ˆThe Church, and the

Puritans, 1570-1660ˆ (1887) ; an edition (with Hassall) of a volume of ˆEssays Intro¬ ductory to the Study of English Constitutional Historyˆ (1887) ; ˆEurope, 1598-1715ˆ (1894) ; introduction to the History of the Church of England from the Earliest Time to the Pres¬ ent Dayˆ (1896; 5th ed., 1898).

WAKEMAN, Thaddeus Burr, American philosopher: b. (jireenfield Hill, Conn., 23 Dec. 1834. He was graduated from Princeton in 1854, and was admitted to the bar in 1856. He translated Goethe's religious poems, and made a specialty of the study of positive philosophy. He was president of the Liberal University of Kansas City, and has published ˆAn Epitome of Positive Philosophyˆ ; ˆLiberty and Purityˆ (1881) ; ˆEvolution or Creation, > *etc.*

WAKEMANITES, certain fanatics who were supposed to be harmless until they com¬ mitted a murder at New Haven, Conn., in 1855. Their leader was an old woman named Rhoda Wakeman, supposed to have been insane. Her

followers obeyed her as a prophetess and be¬ lieved she had been raised from the dead. At her bidding they murdered a farmer, Justus Matthews, who, she said, was possessed by an evil spirit. The authorities prevented further tragedies by taking prompt action against all concerned in the crime, and the sect became extinct.

WAKER, Thomas Leonard, Canadian scientist : b. Chinguacousy, Ontario, 30 Dec. 1867. He was graduated at Queen's University with honors in chemistry and mineralogy (189()) and at Leipzig (1895). He was assistant in the geological survey of Canada (1890-93), fellow in chemistry in the school of mines, Kingston (1893-95), assistant superintendent geological survey of India (1897-1902), and since 1902 has been professor of mineralogy in Toronto University. He has contributed to many scientific publications.

WAKONDA, the term expressing in the Sioux dialect the native abstract idea of the supernatural element of the universe. It is not peculiar to the Sioux alone as there are parallel terms in other languages. Consult Wissler's ˆNorth American Indiansˆ (New York 1912).

WALAM OLUM, otherwise known as the *Red Score® of the Lenni Lenape or Delaware Indians, and supposed to be a record of the migrations of the tribe. The wˆord ˆˆOlum® signifies a record, and

®Walam,® painted. Red is the color used. ^^Olum® was commonly ap¬ plied to a notched stick, an engraved piece of wood or bark; but it is not unlikely that the engraved stone gorgets, notched along all their edges, or partly so, are to be included as rec¬ ords. The notching is too inconspicuous to be considered as ornamentation, but is so cleanly cut and defined that some serious purpose was evidently in mind in making it. The historic ^AValam Olum,® for which we are indebted to Rafinesque, is declared by Antony, a Dela¬ ware Indian, to be a genuine composition of a member of that tribe. This composition or record of events during the wanderings of the people, is asserted by Brinton to be ^'not of foreign origin, but wholly within the Cycle of the most ancient legends of that stock® — ■ the Algonkin. If read aright, it is a record of wanderings from the Labrador region south¬ ward and westward, and again eastward to the Atlantic Coast of the middle United States. As a record of a migration that was possibly more extensive and fateful to these people than any one other of which they had knowledge, too much value has been placed upon it. Those ethnologists who have strongly leaned to the extreme modernity of man in America have thought they found evidence therein that the whole Atlantic seaboard, and for many leagues inland, was uninhabited and had so remained for all time until this wandering, described in the Walam Olum, took place. This conclusion does not seem to be supported by the results of geological research. Entirely too much has been made also of the assumption that the mi¬ gration of the Lenni Lenape, supposedly de¬ scribed in the ^^Walam Olum,® was their only one.

WALBRIDGE, Hiram, American lawver; h. Ithaca, N. Y., 2 Feb. 1821 ; d. 6 Dec. 1870. Ill childhood he settled with his parents in Ohio,

there received his education and was admitted (o the practice of law 1842. While Texas was still an independent State, Walbridge emigrated thither with the purpose of establishing four newspapers in different quarters for advocacy of annexation to the United States; but before his plan could be executed, the State was an¬ nexed. He then

returned to law practice in Toledo, Ohio, and removed to New York in 1847. He represented a New York district in Congress 1853-55.

WALCH, Garnet, Australian dramatist : b. Broadmarch, Tasmania, 1 Oct. 1843. He was educated in Tasmania, England and Germany, and on his return home he joined the staff of the Sidney Punch and worked on other papers, after which he founded the Cumberland Times. Among his publications are many farces and extravaganzas, burlesque pantomimes and come¬ dies. These include ˆTrookilentos,ˆ an extrava¬ ganza; ˆHead Over Heels ˆ ; <On the Cards ˆ ; ˆA Little Tin Plateˆ ; ˆWith the Compliments of the Seasonˆ ; ˆLarrakin Jackˆ ; ˆHer Evil StarU ˆHumble Pieˆ' ˆPerfidious AlbionO ˆProof Positive,ˆ and ˆRobbery Under Arms,ˆ the latter of which ran continuously in Aus¬ tralia for over 10 years.

WALCHEREN, varner-en, Netherlands, an island in the province of Zeeland, at the mouth of the Scheldt, approximately circular, about 11 miles in diameter. A bridge connects with South Beveland and a railway to the main¬ land. It is well wooded and fertile and fruit is abundant. It contains the towns of Flush¬ ing, Middleburg (the capital) and Veere, and has a population of about 40,000. It is protected from the sea by strong dikes. The island is noted for the Walcheren expedition of 1809, one of the most complete failures in British military history. The second Earl of Chatham, eldest son of the great Chatham, was dis¬ patched to the island in command of a force of about 40,000 for the purpose of capturing Antwerp and destroying Napoleon's arsenals on the Scheldt. Instead of pressing forward against Antwerp, he persisted in the siege of Flushing, which was not captured before the greater port had been reinforced and strongly fortified by the French. Chatham returned to England with the bulk of his force, leaving a garrison of 15,000 on the island of Walcheren. The garrison was attacked by fevers and other diseases, and when orders were received from the government to destroy Flushing and return home, only a small number were fit for duty.

WALCKENAER, val-ke-nar', Charles Athanase, Baron, French savant and author: b. Paris, 25 Dec. 1771 ; d. there, 27 April 1852. At 17 he went to study at Glasgow and Oxford; served as director of transportation in the army of the Pyrenees in 1793; became mayor of Paris ill 1816 and prefect of the department of Nievre in 1824 and pf Aisne in 1826. In 1830 he left the public service, and in 1840 became secretary to the Academy of Inscriptions. He was a voluminous writer. His first publication was an <Essai sur I'Histoire de I'Espece Hurnaineˆ (1798), and in 1802 he published ˆL'Histoire Abregee des Insectes des Environs de Parisˆ and in 1805 ˆTableau des Araneides,ˆ

an im¬ portant contribution to entomology. Among his later works may be cited ˆLe Monde Mari¬ timeˆ (1819) ; ˆNouvellc Collection des Rela¬

tions des Voyagesˆ (21 vols., 1826-31); ‘ˆAn¬ alyse Geographiquc des Itineraires des Anciensˆ (1839) ; ˆHistoire de la Vie et des Poesies d’Horaceˆ (1840) ; ˆMemoires sur Madame de Sevigneˆ (1842-52), which he left incomplete.

WALCOTT, wol’kot, Charles Doolittle,

American geologist: b. New York Mills, N. Y., 31 March 1850. In his youth he took up geol¬ ogy and by 1876 rose to the post of assistant State geologist of New York. He was ap¬ pointed to a like office in the United States Geological Survey in 1879, became palaeontolo¬ gist in 1883, chief palaeontologist in 1891 and in 1893 was appointed geologist in charge of geology and palaeontology, and director of the Geological Survey in 1894. He was acting assistant secretary of the Sniithsoii-ian Institution in 1897-98, on 23 Jan. 1907 he was elected secretary, and in 1902 was elected chairman of the board of trustees for the National University founded by Andrew Carnegie. He also served a term as president of the Geological Society of America. He has made a specialty of Cambrian researches, and in 1888 laid the results of his labors before the International Geological Congress in Lon¬ don. His writings include ˆThe Trilobiteˆ (1881) ; ˆThe Cambrian Faunas of North Americaˆ (1885) ; ˆThe Taconic System of Emmonsˆ (1888) ; ˆThe Fauna of the Lower Cambrian or Olenellus Zoneˆ (1890) ; ˆCorrela¬ tion Papers, Cambrianˆ (1891) ; ˆCambrian Geology and Paleontologyˆ ; ˆThe Cambrian Fauna of Chinaˆ ; ˆThe Cambrian and its Problems in the Cordilleran Regionˆ ; ‘ˆEvi¬ dences of Primitive Life,ˆ *etc.*

WALDECK, valMek or wofidek, Germany, a free state consisting of Waldeck proper ana Pyrmont, whence the title Waldeck-Pyrmont, sometimes given. Waldeck proper, with an area of 407 square miles, is enclosed by the Prussian provinces of Westphalia and Hesse-Nassau; and Pyrmont, with an area of 25 square miles, is enclosed by Prussia, Brunswick and Lippe. Both sections are mountainous, and belong to the basin of the river Weser. In the western Upland, it attains in the Ettelsberg an elevation of 2,726 feet. Much of the soil is un¬ suited for agriculture, but the lower valley of the Eder and the northeast of Waldeck proper are fertile. The chief industries are agriculture and the rearing of cattle, sheep, pigs, *etc.* Manufactures are of small extent: the

most important are tobacco and cigars (Pyrmont), liqueurs (Arolsen) and machines (Wetterburg). There are iron mines at Adorf. The constitu¬ tion bears date 15 April 1919. Under the Em¬ pire the princely dignity was hereditary in the male line, but on the extinction of the male line it fell to the female line. The Diet consists of 21 members elected directly for three years. By the Treaty of Accession of 1867, renewed in 1877 and 1887, the internal ad¬ ministration is carried on by a Landesdirektor appointed by the Prussian government with the approval of the prince. Its courts of justice are subject to those of Cassel and Hanover, and its troops form a battalion of a Prussian infantry regiment. Arolsen is the capital and residential town. The Reformation was intro¬ duced under Count Philip IV in 1526. The imperial field-marshal, George Frederick (1664-‘ 92) was the first of its rulers to assume the

\

style of prince. In 1712 the ruler, Anton Ulrich, was created a prince of the empire. Waldeck supported Prussia in the war of 1866, and en¬ tered the North German Confederation in the following year. The Treaty of Accession of 1867, which makes the prince a merely nominal sovereign, was the result of a desire expressed by the Diet for union with Prussia. Pop. 66,432, of whom about 10,000 are in Pyrmont. The inhabitants are nearly all Lutherans.

WALDECK-ROUSSEAU, val-dek-roo-s5, Pierre Marie, French statesman: b. Nantes, 2 Dec. 1846; d. Paris, 10 Aug. 1904. He studied law*, was admitted to the bar at Nantes, was elected deputy for Rennes in 1879, and in 1881 v/as made Minister of the Interior in Gambetta’s Cabinet. This portfolio he held also with great success in the Ferry Ministry of 1883-85. In 1886 he was called to the Paris bar, and, though he continued to participate until 1889 in the debates of the Chamber of Deputies and in that year published a collection of ˆ Discours Par-lementaires,ˆ he then withdrew temporarily from public life and became one of the fore¬ most of French advocates. His best known case was the defense of De Lesseps (q.v.) in the Panama Canal matter. In 1894 he returned to politics as senator for the department

of the Loire, in 1895 was an unsuccessful candidate for the presidency, and in 1899 was summoned by Loubet to form a ministry. On the second attempt he succeeded in assembling in support of the Republic a cabinet including such diverse elements as Millerand, the Socialist, and Gen¬ eral de Gallifet, who had so severely put down the Commune in 1871. He himself took again the Ministry of the Interior, and during the second Dreyfus trial, the strikes at Le Creusot, the prosecution and condemnation of Deroulede, and other troubles, he suppressed the disorder hitherto prevalent and enforced a regard for the law. The Associations bill of 1901, by which he asserted the religious associations were for the first time made subject to the rules governing others, was the principal event of the latter part of his administration. At the general election of 1902, Republican victory wˆas complete, and Waldeck-Rousseau, regard¬ ing his service as accomplished, resigned 3 June 1902. He had proved himself one of the strongest figures in recent French politics. He further published ˆ Discours Prononces dans la Loire ˆ (1896) ; ˆQuestions Sociales‘ (1900) ; ˆAssociations et Congregations’ (1901); ˆLa Defence Republicaine’ (1902) ˆPour la Republique’ (1905), and ˆL’Etat et la liberte’ (2 vols., 1906) contain his collected speeches. Consult Ernest-Charles, ˆWaldeck-Rousseau’ (1902).

WALDEMAR I, val’de-mar, or wolMe-mar (The Great), king of Denmark: b. 1131; d. 1181. He succeeded Eric V in 1147, was famous for his expeditions against the pirates of the Baltic and successful in exacting from Magnus VI, king of Norway, a treaty which secured the pre-eminence of Denmark. Walde-MAR H (the Victorious), younger son of the preceding, succeeded his brother Canute VI, in 1202. He made warlike expeditions into Sweden, Norway and Germany, raised a powerful navy and revised the laws of his kingdom. He died in 1241. Waldemar HI, eldest son of the preceding, was regent from 1219 to 1231. Waldemar IV, third son of

Christopher H, was in Bavaria at the death of his father in 1333. In 1340-44 he recovered part of his kingdom in war and obtained some further successes against Sweden in 1353 and 1357; eventually he was glad to obtain peace by large concessions.

WALDEN, warden, John Morgan, Amer¬ ican Methodist bishop: b. Lebanon, Ohio, 11 Feb. 1831 ; d. Daytona, Fla., 21 Jan. 1914. He was graduated from Farmer’s (now Belmont) College, near Cincinnati, in 1852, and afterward engaged in teaching and in journalism. He was a member of the Topeka legislature in 1857 and a delegate to the

Leavenworth con¬ stitutional convention in 1858, returning in that year to Ohio where he entered the Methodist Conference. He became minister in the Cin¬ cinnati Conference Methodist Church in 1858, was one of the publishing agents of the Metho¬ dist Book Concern in 1ˆ6-84, and in the last-named year was elected bishop. For several years he was elected a member of the Ecu¬ menical Methodist Conference.

WALDEN, Treadwell, American Episco¬ pal clergyman : b. Walden, N. Y., 25 April 1830; d. 21 May 1918. He was graduated at the General Theological Seminary in 1853, took priest's orders in the Episcopal Church in 1856 and held charges in Newark, N. J., Christ Church, Norwich, Conn., 1857-63 ; Saint Clem¬ ents, Philadelphia, Pa., 1863-68; Saint Paul's Cathedral, Indianapolis, 1869-72; Saint Paul's, Boston, 1873-76 and Saint Paul's, Minne¬ apolis, 1882-85. He published bLays of a Lifetime' (1856) ; ˆThe Sunday School Prayer Book' (1860) ; ˆPrivations and Suffer¬ ings of United States Officers and Soldiers in Confederate Prisons' (1864) ; ˆOur English Bible and its Ancestors' (1870) ; ˆAn Unde¬ veloped Chapter in the Life of (Thrist' (1882) ; ˆThe Great Meaning of Metanoia' (1896).

WALDEN, N. Y., village in Orange County, on the Walkill River, and on the New York Central and Hudson River railroad (.Walkill Valley branch) ; 75 miles north by west of New York and 13 miles northwest of New¬ burgh. The date of the first settlement is un¬ certain, but it was before 1768; the village was incorporated in 1855. It was first known as High Falls, owing to the fall of 40 feet in the river at this point. It is in an agricultural region, noted for its dairy products and in a valley famous for its picturesque scenery. It has large cutlery works, woolen mills, a soap factory, engine works, foundries and machine shops. There are two banks, one of which is a national bank. Pop. 5,036.

WALDEN; or, LIFE IN THE WOODS,

the record of Henry D. Thoreau's famous experiment of Walden published at Boston in 1854. In 1845 Thoreau, impelled by the desire ˆ of proving that man could be en¬ tirely independent of his kind, retired to the shores of Walden Pond, near Concord, Mass., and there built a hut with his own hands and kept it in order for two years. His livelihood was gained by the cultivation of a few acres, by his labor as a surveyor and by odd jobs as carpenter, etc., for his neighbors. His vaunted independence was still far from realization, but this life of a recluse gave him time for introspection. He read and wrote a great deal

and became very familiar with the wild life of the neighborhood. Birds answered his call and beasts approached him without fear, as in the case of Saint Francis of Assisi. *-Waldenˆ is the record of his experiences and the key to hisˆ mental processes during that interesting period. Because of the author's high standing as naturalist, litterateur, poet and above all as interpreter of nature the work is of the greatest interest and has also great psycholog¬ ical value. The work is free from the ped¬ antry of science, is replete with interesting facts in natural history, not, however, retailed disjointly. The permanent interest of the work, one of the greatest of woodland books and one of the most original works in American litera¬ ture, is due to the variable charm, contradic¬ tions and surprises in which it abounds as does nature herself. Consult the work in the new edition of Thoreau's works (Boston 1906) and Thoreau's ˆ Waldenˆ (in ˆMacmillan's Pocket Classics,ˆ New York 1911).

• WALDEN UNIVERSITY, an institution for the education of the colored race, located at Nashville, Tenn. It grew out of a school for adults and children established by the Freedmen's Aid Society; in 1866 it was char¬ tered as Central Tennessee College. It is under the control of the Methodist Episcopal Church. In 1900 the name was changed to Walden Uni¬ versity in honor of Bishop John M. Walden. The university includes the following depart¬ ments : (1) Collegiate department; (2) aca¬ demic department (preparatory) ; (3) normal department; (4) commercial department; (5) law department; (6) Braden Bible Training School; (7) music department; (8) Meharry Medical College; (9) industrial department. The collegiate department offers two four years' courses, the classical and the scientific ; and two corresponding preparatory courses of three years. The normal department offers a course five years in length (instead of four years, as formerly) ; the first three years are the same in rank as the college preparatory course ; the completion of this course entitles the student to the degree of bachelor of pedagogy. The academic department offers a two years' English course and a two years' teacher's preparatory course. In all these courses the daily study of the Bible is

required. The law department, which was the first law school for colored students established in the South, has a two years' course. The Braden Bible Training School offers a theological course, correspondence courses in theology and a missionary and deaconess training course. The theological course is two years in length, with a year of postgraduate work; the mis¬ sionary training course includes studies in in¬ dustrial department and the medical school. The Meharry Medical College was founded in 1876; it offers a four years' medical course, which may be completed in three years by those holding an A.B., or B.S., degree; the dental college, the pharmaceutical college and the nurses' training school are also a part of the medical department. The industrial depart¬ ment includes the trade schools, the school of domestic science and art and the Walden In¬ dustrial School The trade schools give instruc¬ tion and practice in carpentry, sloyd, painting, paper-hanging, calcimining, masonry and plas¬

tering, and landscape gardening for men, and in sloyd for women ; the school of domestic science provides instruction in cooking, sewing, laundry work, etc., for women ; the industrial school is for the industrial training of children and serves also as a model school for normal department. When the students attain suffi¬ cient proficiency in industrial classes, work is furnished them by which they may pay a por¬ tion of their expenses. The students maintain two literary societies. The university buildings (1910) on the campus include the administra¬ tion building, seven other brick buildings and seven wooden buildings; the medical college is located in another part of the city. The library contains over 6,000 volumes ; students of the law department also have access to the State Law Library. The students at the last re¬ port numbered about 500, mostly in the medi¬ cal department. Many of the graduates are teachers ; other are doctors and lawyers.

WALDENSES, wql-den'sez, a mediaeval sect that owes its origin and name to Peter Waldus (Waldo), a rich citizen of Lyons, al¬ though some writers attribute the appellation Waldenses as from vallee (valley), and called them Vaitdois, or dwellers in the valleys, whilst others have traced their origin to the earlier sects of Henricians and Cathari. About 1170 Waldo, moved to repentance for his sins by the sudden death of a friend, came to the deter¬ mination to imitate the mode of life of the apostles and primitive Christians, gave his goods to the poor and by his preaching collected numerous followers, chiefly from the class of artisans, who, from the place of their birth, were denominated Leonists, or the poor of Lyons; Sabatati or Insabatati, on

account of their wooden shoes or sandals (sabots) ; Humiliatists , on account of their profession of humility; and were often confounded with the Cathari, Patarenes, Albigenses, and others, whose fate they shared. Their chief strong¬ holds were, and still are, in the mountain tract of the Cottian Alps, southwest of Turin. In their fanatical contempt of the clergy and their opposition to the Roman priesthood the Waldenses resembled other sects of like char¬ acter In the Middle Ages; but, going beyond the design of their founder, which was merely to preach penance and a life of poverty, they made the Bible alone the rule of their faith, and rejecting whatever was not founded on it as not conformable to apostolical antiquity, they renounced entirely the doctrines, usages and traditions of the Roman Catholic Church and formed a separate religious society. They were, therefore, excommunicated as heretics at the Council of Verona in 1184, but they did not suffer a general persecution until the war against the Albigenses, whom they closUy re¬ sembled in the extravagances of their doc-trines_ and customs, after they had spread and established themselves in the south of France, under the protection of the counts of Toulouse and Foix. At that time (1209-30) many Wal¬ denses fled to Aragon, Savoy and Piedmont. In Languedoc they were able to maintain themselves till 1330; in Provence, under severe persecution, till 1545. when the parliament at Aix caused them to be driven out of the coun¬ try; still longer in Dauphiny; and not until the war of the (Tevennes were the last Waldenses

expelled from France. In the middle of the 14th century single congregations of this sect went to Calabria and Apulia, where they were soon suppressed; others to Bohemia, where they were called Grubenheimer, because they used to conceal themselves in caverns. They soon became amalgamated with the Hussites ; and from them the Bohemian brethren derive the apostolic consecration of their bishops. Their doctrines rest solely on the Bible, which, with some catechisms, they printed in their old dialect, consisting of a mixture of French and Italian. In this language their worship was performed till their old Barbes (uncles, teachers) became extinct in 1603. They then

received preachers from France and since that time their preaching has been in French. These teachers form no distinct priesthood and are supplied from the academies of the Calvinistic churches. Their rites are limited to baptism and the Lord's supper, respecting which they adopt the views of Calvin. The constitution of their congregations, which are chiefly em¬ ployed in the cultivation >of vineyards and in the breeding of cattle, and which are connected by yearly synods, is republican. Each congre¬ gation is superintended by a consistory of elders and deacons, under the presidency of the pastor, which maintains the strictest moral dis¬ cipline and adjusts small differences. After they had entered into a religious communion with the Calvinists, in the 16th century, they were also exposed to the storm which was in¬ tended to sweep away Protestantism, and this was the cause of their extirpation in France and their checkered fate in Piedmont. Those who had settled in the marquisate of Saluzzo were totally suppressed by 1633 ; and those in the other valleys, under the jurisdiction of the court of Turin, were subjected to severe perse¬ cution, often occasioned by their own aggress¬ iveness. Aided by the mediation of the Prot¬ estant powers, they finally procured a new, though more limited, ratification of freedom by the treaty concluded at Pinerolo 18 Aug. 1655. The persecution exercised in 1685 through French influence obliged thousands to emigrate into Protestant countries, including the English colonies in North America. In London they united with the French Huguenots; in the Netherlands with the Walloons; in Berlin with the French congregations; and nearly 2,000 went to Switzerland. Some of these returned by force to Piedmont in 1680, and with those who had remained, maintained themselves under many restrictions, to which an end was finally put in 1725 in consequence of Prussian media¬ tion.

The Waldenses were not permitted to enjoy full religious freedom and civil rights until the establishment of the kingdom of Italy, but now they do so not merely in their old valleys of Lucerne, Perusa and Saint Martin, but gen¬ erally throughout Italy, and they have churches in Turin, Rome, Venice and elsewhere. Their church service is under the direction of a synod. After long negotiations, in the way of which great difficulties were thrown by the op¬ position of the Tubingen theologians, several hundreds of the above-mentioned fugitives settled in Wiirtemberg in 1699, where their de¬ scendants now form several parishes. They are next to the Calvinists in the simplicity of

their worship and in their ecclesiastical consti¬ tution, but in intellectual cultivation are behind the other Protestants. (See

Reformation; Religious Sects). Consult Leger, ‘ˆHistoire generale des eglises evangeliques des vallees de Piemont ou Vaudoisesˆ (1699) ; Dieckhoff, ˆDie Waldenser im Mittelalterˆ (1851) ; Her¬ zog, ˆDie romanischen Waldenserˆ p853) ; Melia, ˆOrigin, Persecution and Doctrines of the Waldensesˆ (1870) ; Montet, ˆHistoire litteraire des Vaudois du Piemontˆ (1885); Preger, ˆDie Verfassung der franzosischen Waldenser in der alteren Zeitˆ (1890) ; Bom-piani, ˆShort History of the Italian Waldensesˆ (1897) ; Schaff, ˆCreeds of Christen¬ domˆ (1877-78) ; Lea, H. C., ˆHistory of the Inquisitionˆ (New York 1906).

WALDENSTROM, Peter, Swedish church reformer: b. Lulea, Sweden, 20 July 1838. Hav¬ ing passed the high school 1857, he studied theology, but meantime became professor in a high school, which position he held for over a generation. He was ordained minister of the Swedish Lutheran Church in 1864, but never re¬ ceived a pastoral charge; he resigned his min¬ isterial rank in the state church in 1882, in order to be free to labor for the ˆevangelical national institution,ˆˆ a movement for the reform of religion in Sweden. Waldenstrom had for years cooperated with the ˆfinstitution,ˆˆ and had be¬ come one of its strongest leaders, zealously promoting evangelical reform by voice and pen. The movement has ever been called by its Lutheran opponents ˆˆWaldenstromism.® After the death of Rosenius, founder of the move¬ ment, Waldenstrom became editor of the jour¬ nal Pietisten, the organ of the evangelical insti¬ tution. Later the movement took the name Svenska Missions Forbundet (Swedish Mission Union) ; in its strong reaction from the ecclesiasticism of the state church, it has organized churches on essentially congregational princi¬ ples. Dr. Waldenstrom was a m.an of learn¬ ing and an impressive public speaker. He visited the United States about 1890. He pub¬ lished a great many books and pamphlets, and in 1883 began a new version of the New Testa¬ ment with notes.

WALDERSEE, val’der-za, Alfred, Count von, German soldier: b. Potsdam,. Prussia, 8 April 1832 ; d. Hanover, 5 March 1904. He entered the Prussian artillery of the guard in 1850 and in 1866 was assigned to the general staff and promoted major. During the Bo¬ hemian campaign he was connected with the general headquarters, after the peace became a member of the staff of the 10th army corps, and in 1871, at the outbreak of the Franco-Prussian War, was made chief-of-staff to the Grand Duke of Mecklenburg-Schwerin, com¬ mander of one of the divisions. Promoted colonel and commander of the 13th Uhlans, his subsequent advancement was rapid. In 1880 he became a general, in 1882 lieutenant-general, in 1888 general of cavalry. Upon von Moltke’s resignation as chief of the general staff

(1888), Waldersee was chosen as succes¬ sor; and it was very generally believed that he would follow Bismarck in the chancellorship, for which, however. Count von Caprivi was selected. Waldersee became commander of the ninth army corps in 1891. in 1898 inspector-general, in 1900 field-marshal of the empire.

H'e married a New York woman, nee Miss Lee, At the time of the Boxer outbreak in China (see Boxers) he was placed in command of me German forces in that country and from 27 Sept. 1900 to 4 June 1901, by approval of the powers, comrnanded the allied armies there. His activities in China contributed largely to a speedy adjustment of difficulties, while he was at the same time successful in preserving har¬ mony among the allies.

WALDIS, Burkard, val'dis, German rhym¬ ing fabulist: b. about 1490; d. about 1557. He was a Franciscan friar, but on returning from a pilgrimage to Rome, embraced the doctrines of Luther. He wrote a charming drama in Low German, ˆThe Parable of the Prodigal Sonˆ ; translated the ˆPsalterˆ into German verse; and wrote ˆˆsopus,ˆ a collection of about 400 rhymed fables and drolleries,

WALDMULLER, vald'muhl-ler, Ferdi¬ nand George, Austrian painter: b. Vienna, 15 Jan. 1793; d. 23 Aug. 1865. He was very suc¬ cessful as a painter of peasant life, and also drew much of his inspiration from the life of childhood. Among his principal works are ˆTwo Tyrolese Huntsmen Restingˆ (1829) ; ˆBeggar Boy on the Bridgeˆ (1830) ; ˆSoup Day at the (Tonventˆ (1858) ; ˆ After SchooP (1841) ; ˆSun¬ day Afternoonˆ (1846) ; ˆPalm Sundayˆ (1855), and ˆEvening Prayerˆ (1864).

WALDMULLER, Robert, pseudonym of Charles Eduard Duboc, a German poet and miscellaneous writer: b. Hamburg, 17 Sept. 1822; d. 1910 His best work is ˆVillage Idylls> (1860). Other works are ˆTravel Studiesˆ (I860); ˆSorrow and Joy,ˆ a romance (1874); ˆBrunhild,ˆ a drama (1874).

WALDO, wSrdd, Daniel, American Con¬ gregational clergyman : b. Windham, Conn., 10 Sept. 1762; d. Syracuse N. Y., 30 July 1864. He was drafted as a solaier in the army in 1778 and was arrested and captured by the Tories and carried to New York, where he was con¬

fined for two months, and then exchanged. After graduation at Yale in 1788 he studied theology, and in 1792 was ordained pastor of the Congregational Church in West Suffolk, Conn. Here he continued till 1809, when he resigned his charge, having for some time acted as a missionary in the States of Pennsylvania and New York. In 1810-11 he preached at Cambridgeport, Mass., after which he served as a missionary in Rhode Island till 1820, and was settled for 12 years at Exeter, Conn. ; and afterward resided in the State of New York, without any stated charge. In 1855 he was made chaplain of the House of Representatives.

WALDO, Frank, American meteorologist: b. Cincinnati, Ohio, 4 Nov. 1857. He was graduated from Marietta College, Ohio, in 1878, subsequently studied at Harvard, and in 1882-83 was in Europe on United States govern¬ ment service. Upon his return to the United States he became instructor in astronomy at Radcliffe College, and was later engaged in teaching meteorology at the Corcoran School of Science, Columbian University. He after¬ ward accepted the position of junior professor in the United States Signal Service, and later became professor of meteorology in the United States naval aviation detachment, Massachusetts Institute of Technology. Pie published

ˆModern Meteorology' (1893) ; ˆElementary Meteorology' (1896), and is author of numer¬ ous memoirs and articles on popular science.

WALDO, Lillian D., American social worker: b. (3hio, 1867. She was educated in private schools, in the New* York hospital training school for nurses and in woman's medical college. She founded (1893) and was head of thd Henry Street Settlement, or¬ ganized the district nursing work in connection with it and originated the first municipal school for nursing (1902). She became a noted lec¬ turer at the Columbia Teachers' College, the Boston School of Philanthropy and the Boston School for Social Workers, and the plan of a Federal children's bureau originated with her ; she became president of the school halls association and also served on the State com¬ mittee of immigration (1890). The National Institute of Social Science gave her its gold medal, and Mount Holyoke College gave her the degree of LL.D., in 1912. She wrote ˆThe House on Henry Street' (1915), and numerous pamphlets and reports bearing on her work.

WALDO, Peter, French merchant: b. in the later half of the 12th century. See Wal—

DENSES.

WALDO, Samuel Lovett,* American por¬ trait painter: b. Windham, Conn., 6 April 1783; d. New York, 16 Feb. 1861. He had a studio in Charleston, S. C. In 1806 he went to Lon¬ don and painted portraits for many years with success. He returned to New York in 1809 and opened a studio where he became popular as a portrait painter. His works include portraits of Peter Remsen and David Grinn (New York Historical Society).

WALDOBORO, wordo-bur-o. Me., town, port of entry, Lincoln County, at the mouth of the Medomak River, and on the Maine Central Railroad, about 26 miles southeast of Augusta, and 12 miles west of Rockland. It was set¬ tled in 1749 by a colony of Germans, and in 1773 was incorporated. It is in ap agricultural section. The chief manufacturing establish¬ ments are a shoe factory, machine shop, men's clothing factory and creameries. Formerly the town was noted for its shipbuilding. The principal public buildings are the United States custom-house, the churches, schools and the bank Pop. about 2,656.

WALDSEEMOlLER, Martin, the scholar who gave America its name: b. at Freiburg, Germany, about 1480; d. about 1521. He. was regarded as an able young geographer by the little group of learned men of his native heath. His ˆCosmographiae Introductio' and his map of the world (the latter prepared as a globe also: ˆHam in solido quant phno^^), both publishedˆ at Saint Die in 1507, attracted much attention, and originated the name ˆAmerica." The name confidently proposed for the trans¬ atlantic lands, and at the same time actually conferred upon the new ^^quarta orbis pars,^^ in the little Latin treatise and on the huge wall-map and globe, was so promptly and generally caught up that its originator himself was powerless to recall it. When he issued his ˆ Carta Marina,' in 1516, he had changed his opinion as to the relative value of the achieve¬ ments of Columbus and Amerigo Vespucci, for

the word America does not appear on the map of 1516. But it was too late to impose a name less significant and less appropriate. Of the Waldseemuller map of 1507, 1,000 copies were printed, yet all but one were destroyed or lost, and the same fate had overtaken the Carta Itinararia Europae of 1511, and the Carta Marina of 1516. The Carta Itinararia was the first to be recovered ; the more interesting maps of 1507 and 1516 did not come to light until 1901, when their discovery created a sensation. In The Geographical Journal for February 1902 we read : ®Ever since Humboldt first called attention to the ˆCosmographiae Intro¬ duction no lost maps have ever been sought for so diligently as those of Waldseemuller. It is not too much to say that the honor of being their lucky discoverer has long been considered as the highest possible prize to be obtained among students in the field of ancient cartog¬ raphy, But until the last few months no specimen of either the globe or map has ever been seen or heard of in modern times. A few months ago the geographical world was suddenly startled Toy a brief announcement that Waldseemiiller's long-lost map of 1507, to¬ gether with another of his of 1516, had been found by Prof. P. Joseph Fischer of Feld-kirch, in the library of Prince Waldburg at Wolfegg Castle.® In the excellent work by Fischer and Wieser (see below) it is written that ® Johann Schoner had the two Waldseemul¬ ler maps bound in the form of an atlas. To this circumstance we owe the preservation of the two precious cartographic monuments, while those copies that were mounted as wall-maps perished — as it seems, without exception — in consequence of their enormous size.® The assertion, so commonly made, that Wald¬ seemuller intended to bestow the name America upon the southern continent only, ap¬ pears at first sight to find support in the map of 1507, but is disproved by a comparison of the map with the explanatory passages in the Hntroductio.ˆ The Greek form pf his own name on the 'map of 1516 is Ilacomilus, show¬ ing plainly his preference for that spelling toward the end of his rather short life. The fact that his name does not stand in any form upon the map of 1507 is additional evidence of juvenility. He appears to have been so young that his signature might have made good work seem less authoritative then. He was perhaps 25 years old when he produced a word that was to fill a place in all languages during all later ages, He was canon of Saint Die at his death, which was before 1522.

Bibliography. — Fischer and Wieser, JDie aleste Karte mit dem Namen Americaˆ ; Humboldt, ˆKritische Untersuchungenˆ ; d'Ave-zac, ˆMartin Hylacomylus Waltzemiillerˆ ; Harrisse, ˆBibliothecaˆ ; ˆDecouverteˆ ; Fiske, John, ˆThe Discovery of Americaˆ (Boston 1902) ; and the copy

of the original ˆCosmographiae Introduction in the New York Public Library.

WALDSTEIN (Walston), Sir Charles, English archaeologist : b. New York, 30 March 1856. Educated at Columbia and Heidelberg universities he became university lecturer in classical archaeology at Cambridge, England, 1880-82. He was appointed director of the Fitzwilliam Museum there 1883-89, a Fellow

of King's College, Cambridge, 1893, and has been Slade professor of fine arts at same col¬ lege since 1895. As director of the American School of Classical Studies at Athens (1889-95) and professor (1895—97), he directed ex¬ cavations with signal success at Plataea, Eretria, *etc.* He was honored with knighthood 'by George V in 1913. He has written <Excavations at the Heraion of Aegosˆ ; < Balance of Emotions and Intellect> (1878) ; < Essays on the Art of Phidiasˆ (1885) ; ˆThe Word of John Ruskin> (1894) ; ˆThe Study of Art in Universities> (1895) ; ˆThe Surface of Thingsˆ 0899); ˆThe Jewish Questionˆ (1899); ˆThe Expansion of Western Ideals and the VVorld's Peaceˆ (1899) ; ˆThe Argive Heraeumˆ (1902) ; ˆArt in the Nineteenth Centuryˆ (1903) (with L. Shoobridge) ˆHerculaneum, Past, Present and Futureˆ (1908); ˆ What may we Read?ˆ (1912) ; ˆGreek Sculpture and Modern Artˆ (1914) ; ˆAristodemocracyˆ (1916; new ed., 1917) ; ˆWhat Germany is Fighting Forˆ (1917) ; ˆPatriotism, National and Inter-nationaP (1917).

WALES, walz. Prince of, the title given to the eldest son of the English sovereign since the time of Edward I (1301). From that time he also bore the title of Duke of Cornwall, and later those of Earl of Chester (1393); Prince and High Steward of Scotland, Duke of Rothesay. Earl of Carrick, Baron of Renfrew and Lord of the Isles (1707) ; and Earl of Dublin (1849). Edward Albert, b. 23 June 1894, succeeded to the titles 6 May 1910, when his father George V became king of England.

WALES, Great Britain, a former Celtic kingdom in the central western peninsula, now an administrative division of England, and a principality, which gives the title of Prince of Wales to the heir-apparent of the British crown. It has an area of 7,466 square miles, divided into 12 counties. For the names, areas and popula¬ tions of the counties see the article England; and for statistical matter see Great Britain.

Wales is composed of a peninsula, with the island of Anglesey at its

northwest extremity, joined at the Menai Strait by two remarkable bridges ; a number of smaller islands lie chiefly at a short distance from the southwest coast. The peninsula, washed north and west by the Irish Sea, and south by Bristol Channel, and bounded west by the four English counties, Cheshire, Shropshire, Hereford and Monmouth, is 135 miles long; where widest 95 miles, and where narrowest only 35 miles broad. It is very mountainous, particularly in the north di¬ vision, where Snowdon, the culminating point of South Britain, rises to the height of 3,571 feet; is intersected by beautiful valleys, trav¬ ersed by numerous streams, including among ofhers the Severn, vvhich has its source within it; and is rich in minerals, particularly copper in the north, and coal and iron partially there also, but much more extensively in the south. The Silurian formation, so called after the Silures, the ancient inhabitants of the princi¬ pality, covers more than two-thirds of the whole surface, extending continuously from the mouth of the Conway to the vicinity of Saint David's Head; but is succeeded in the south by the Old Red Sandstone, above which lies the mountain-limestone and the large and valuable coal-field. Besides the Severn, the principal rivers are

the Dec, which has part of its lower course in peshire ; the Clwyd, in Denbigh and Flint ; the Conway, forming the boundary between Denhigh and Carnarvon ; the Dovey and the united Kheidiol and Ystwith, which have their mouths near the centre of Cardigan Bay; the Teify, separating Cardigan on the north from Carmar-Pembroke on the south; the Cleddy and Cleddeu, remarkable chiefly from contribut¬ ing, by their junction, to form the splendid es¬ tuary of Milford Haven; the Towy and Bury, which both fall into Carmarthen Bay ; the Ebwy and Taf, which have a common estuary in Bris¬ tol Channel ; the Romney, which forms part of the boundary between Wales and England; and the Usk and Wye, which, though rising in the principality, have only the earlier part of their course within it. The lakes are numerous, but the largest, Bala, is only four miles long and scarcely one mile broad. The climate is mod¬ erate and equable, though somewhat keen in the loftier districts. In all the counties humidity is in excess, the average fall of rain in the princi¬ pality being 34 inches, while that in England is only 22. Both climate and surface render Wales more adapted for pasture than agriculture. The soil seldom possesses great natural fertility, ex¬ cept in some of the vales, of which those of the Clwyd in the north, and of Glamorgan in the south, are celebrated for productiveness. The latter, rather a plain than a vale, is of some extentˆ and grows excellent wheat. The system of agriculture might be improved. The minerals are valuable and the south contains some of the largest coal and iron works in the kingdom, as well as the copper works of Swansea. Of manufactures, the most important are woolens. The principal articles are flannel, for which the principality has long been famous, cloth chiefly of a coarser description and hosiery. The in¬ habitants are almost purely Celtic, being the de¬ scendants of the early Britons, who were able to maintain themselves here when the rest of the country was overrun by the Germanic in¬ vaders. One of the most striking native fea¬ tures is the female dress, consisting generally of a plain or checked gown, a mantle, a hand¬ kerchief of gay colors around the neck and shoulders and a black beaver hat, broad-brimmed and tapering to the form of a truncated cone. All classes are distin¬ guished by civility and hospitality. Many curious superstitions, handed down by im¬

memorial custom, still retain their hold. The Welsh cherish their Brythonic or Cymric lan¬ guage with great affection. They have trans¬ planted it to America, where it prevails in some districts and is represented by newspapers. In 1891 there were in Wales 508,000 people who knew no English, or at least habitualfy spoke Welsh. Most of the upper class belong to the Established Church, but the majority are Non¬ conformists, the most numerous bodies being the Congregationalists, the Calvinistic Metho¬ dists and the Baptists. Sec Celtic Peoples; Cymri ; Celtic Languages ; and also British Education, British Fisheries, Agriculture Since the 18th Century and The Mining In¬ dustry in the section Great Britain.

History. — Previous to the Roman occupa¬ tion, Wales was chiefly inhabited by three Brit¬ ish tribes, called the Silures, Dimetse and Ordovices. During the later period of the Roman oc¬ cupation, perhaps from the reign of D'odetian, VOL, 28 — 15

the subject part of the island was divided into four provinces, of which one, including the country from the Dee to the Severn, was called Britannia Secunda. It was after the invasion of the Saxons that the country acquired a distinc¬ tive national character, as the refuge of the van¬ quished Britons who were gradually driven to the west, and many of whom migrated to Brit¬ tany (q.v.), France, whence the name, and sim¬ ilarity of the Breton language to the Welsh. From this period till the final conquest of the country by Edward I there was a succession of petty wars between the rival chiefs or kings into which both countries during a great part of the Saxon period were divided, and some more systematic efforts of the larger mon¬ archy to absorb the smaller. Among the great¬ est of the Welsh heroes of the early period was Cadwallon. After being defeated by Edwin of Deira, or Northumbria, and compelled to flee to Ireland, he returned and defeated the Saxons in numerous battles, but was at last defeated and slain by Oswald of Northumbria in 635. While the border territories continued to be contested in incessant warfare between the two races, Offa of Mercia built the celebrated dyke (see Offa's Dyke) known by his name to guard the marshes which he had conquered. In the mid¬ dle of the 9th century Roderick, or Rhodi Mawr, succeeded in uniting the whole of Wales into one principality, but he divided it among his sons into three principalities, called respec¬ tively Gwynedd (or North Wales), Ceredigion and Dyved (or South Wales), and Powys (com¬ posed of parts of the counties of Montgomery, Salop and Radnor). Soon after this the Danes began to invade Wales. The country was again reunited in the 10th century under Howel, surnamed Da, the

Good ; but as the English mon¬ archy also acquired unity it gradually prevailed over the smaller principality, and Athelstane re¬ ceived tribute as the sovereign of Wales, al¬ though his sway in the country was only nomi¬ nal. The claim of the conqueror being resisted, William invaded the country and compelled the Welsh princes to do homage, but they continued in virtual independence and became troublesome to the succeeding Norman monarchs by allying themselves with their disaffected subjects. Wil¬ liam and his successors tried to break their spirit by granting fiefs in Wales to Normans and English on condition of conquest, and Henry I introduced into the country a colony of Flemings. Henry I, Henry H, John and Henry HI, all made with various success a series of efforts to reduce the Welsh princes to submis¬ sion. Llewellyn and David, princes of North Wales, successively did homage for that domin¬ ion to Henry III. On the death of David, Lle¬ wellyn revolted against Edward I, but was de¬ feated by Henry, and in a subsequent revolt waa again defeated and slain by the Earl of Mor¬ timer, 1284. His brother David, who followed his example, was taken and executed. Edward I created his eldest son Prince of Wales, and from this time Wales was united with England.

Wales shows a steady growth in population, gaining nearly 200,000 between 1901 and 1911, when the total was 1,647,290. The estimate for 1918 is 1,805,000.

Bibliography. — Arnold, ˆStudies of Celtic Literatureˆ (1867); Borrow, ˆWild Wales; its People, Language and Scenerˆ (1901) ; Bund, ˆThe Celtic Church of Walesˆ (1901) j

WALES

Edwards, ˆWalesˆ (1901) ; Rhys and Jones, ˆThe Welsh Peopleˆ (1900); Stephens, ˆLiterature of the Kymry> (1876) ; Watt, ˆSketch of Welsh Literatureˆ (1863); Lloyd, J. E., ˆHistory of Wales ˆ (2 vols.. New York 1911) ; Evans,

H. T., ˆWales and the Wars of the Rosesˆ (ib. 1915) ; Bumpus, T. F., ˆCathedrals of England and Walesˆ (3 vols., ib. 1906) ; Stone, Gilbert, ˆWales: Her Origins, Struggles, and Later History, Institutions, and Mannersˆ (London 1915).

WALES, University of (in Welsh, Prifys-gol Cymrti), a British institution established by charter in 1893, and formed by the union or association of three existing colleges, the Uni¬ versity College of Wales, Aberystwyth, founded in 1872; the University College of North Wales, Bangor, founded in 1884; and the University College of South Wales and Monmouthshire, Cardiff, founded in 1883. Each of the colleges has a women's hall of residence, that of the last being known as Aberdare Hall. There are no special university buildings apart from those of the colleges, but there aro temporary offices at Newport, Monmouth. The university has power to grant degrees in arts or literature, science, law, theology and music; but the constituent colleges do not supply a full course of instruc¬ tion in each of these susbjects, the necessary courses for the degrees of B.A., and B.Sc., being at present those chiefly provided. As regards theology, instruction is furnished by a number of theological colleges in the principality, at which students may qualify for the degree of B.D. The classes are open to persons of either sex above the age of 16 years. The first ma¬ triculation examination of the university was held in 1895. The students number about 1,400, though there was a falling off of about 30 per cent during the war.

WALFISH, wol'fish, or' WALVISCH, BAY, West Africa, a harbor and small terri¬ tory belonging to Great Britain since 1878, on the coast of Southwest Africa, close to the parallel of 23° S. The harbor, frequented by whale fishers, is a good one, and is formed by a sandy spit of land which projects northward parallel with the coast, and ends in a point known as Pelican Point. It receives the river Khuiseb at its head and just beyond the north¬ ern frontier of the territory is the mouth of the river Swakop, where the German authorities constructed a new harbor, known as Swawkop-mund. The enclave is included in Cape

Colony for administrative purposes. There is a tram¬ way line to Rooikop and railway communication since 1915 with Swakopmund 21 miles. The area is 430 square miles and the population 3,076, of whom about 144 are white.

WALFORD, wal'ferd, Lucy Bethia Col-quhoun, English novelist ;'b. Portobello, Scot¬ land, 17 April 1845; d. 1915. She was married to A. S. Walford of Cranbrooke Hall, Essex, in 1869. Her first novel, ˆMr Smith, ˆ appeared in 1874, and in certain respects it has not been surpassed by any of her later works, although she gained in ease of dialogue and description. A sound ethical purpose underlies all her many novels, among the best of which are ˆ Cousinsˆ (1879) ; ˆTroublesome Daughtersˆ (1880) ; ˆThe Baby's Grandmotherˆ (1885); '^The Arch¬ deaconˆ (1899) ; ˆSir Patrick, the Puddockˆ (1900) ; ˆCharlotte' (1901) ; ˆThe Enlighten¬

ment of 01ivia > (1907) ; ˆLenore Stubbsˆ (1908) ; ˆRecollections of a Scottish Novelistˆ (1910); ˆMemories of Victorian Londonˆ (1912) ; ˆDavid and Jonathan on the Rivieraˆ

(1914).

WALHALLA, val-hal'la, VALHAL, or VALHALLA, the great hall of the Scandi¬ navian gods, the warriors' heaven of the Vikings. Here the heroes slain in battle feasted with Odin, drinking mead from the udder of the goat, Heidrun, and eating the flesh of the boar, Saehrimnir, which was cooked every day, and became whole again after each daily ban¬ quet. The hall was lighted by gleaming swords, roofed with shields and the seats covered with coats of mail. Apart from feasting, fighting their battles over again was the favorite pas¬ time of the heroes admitted to Walhalla. See Scandinavian Mythology.

WALKE, wak, Henry, American naval of¬ ficer : b. near Portsmouth, Va., 24 Dec. 1808; d. Brooklyn, N. Y., 8 March 1896. He was ap¬ pointed midshipman in the navy in 1827, was promoted lieutenant in 1839 and in the Mexican War was executive officer on the Vesuvius, en¬ gaged at the capture of Vera Cruz. He was promoted commander in 1855 and in 1861 was assigned to duty with the Mississippi flotilla, receiving rank as captain in 1862. He com¬ manded the squad of gunboats which assisted Grant at Belmont; was engaged at the battles of Forts Henry and Donelson, Island No. 10 and Fort Pillow;

successfully passed the Vicks¬ burg batteries ; and in 1863 was transferred to the command of the Sacramento and sent in pursuit of the Alabama. He was promoted commodore in 1866, rear-admiral in 1870 and in 1871 was at his own request placed on thˆ retired list.

WALKEM, George Anthony, Canadian politician: b. Newry, Ireland, 1834; d. 1908.

He came to Canada in his youth, was educated at McGill University and was called to the bar in 1859. As a member of the legislative council (1864-70) he played an active part in securing the admission of British Columbia (1870) and was made a member of the pro¬ vincial legislature. He was a member of the Cabinet (1872-74), was Premier (1874-76) and in 1882 was appointed a puisne judge of the Supreme Court.

WALKER, Amasa, American political economist: b. Woodstock, Conn., 4 May 1799; d. North Brookfield, Mass., 29 Oct. 1ˆ5. A prominent merchant of Boston from 1825 to 1840, he was known also as an abolitionist in 1843, and 1849 visited London and Paris re¬ spectively to attend the international peace con¬ vention of those years, and in 1848 took a leading part in the formation of the Free Soil party. In 1848 he was a representative in the State legislature, in 1849 State senator, in 1851-52 secretary of State, having been elected by the united Free Soil and Democratic vote.

He was a member of the House of Representa¬ tives in 1862-63, to complete the unexpired term of Goldsmith F. Bailey. From 1842 to 1849 he was professor of political economy in Oberlin College ; and he published ˆThe Nature and Uses of Money and Mixed Cur¬ rencyˆ (1857) and ˆThc Science of Wealth: /

A Manual of Political Economyˆ (1866 ; 7th ed., 1874).

WALKER, Asa, American naval officer : b. Portsmouth, N. H., 13 Nov. 1845; d. 7 March 1916. He was graduated from the United States Naval Academy in 1866, re¬ ceived promotion to lieutenant in 1870 and to commander in 1894. ‘He was on duty at the Naval Academy in 1873-76, 1879-83, 1886-90 and in 1893-97. In the last-named year he was placed in command of the Concord and in

1898 was engaged with her in the battle of Manila Bay. He received rank as captain in

1899 and was assigned to duty at the Naval War College, Newport, R. I. He was a mem¬ ber of the naval examining board at Washing¬ ton in 1900-01 and in 1903 took command of the San Francisco.

WALKER, Benjamin, American soldier; b. England, 1753; d. 13 Jan. 1818. Arriving at an early age in New York, he there became a merchant ; served as captain and as aide to Baron Steuben and General Washington in the Revolutionary War. After the war he was secretary to the governor of New York and later was a broker in New York. He was naval officer there during Washington’s administra¬ tion, and was representative in Congress 1801-03. For many years before his death he was manager of the Earl of Brute’s great estates in the centre of the State.

WALKER, Francis Amasa, American economist and soldier; b. Boston, 2 July 1840; d. there, 5 Jan. 1897. He was the son of Amasa Walker (q.v.), was graduated at Amherst in 1860, began the study_ of law, which he gave up to enlist in the Union army, and served through nearly the whole of the Civil War. His rank during the greater part of the war was that of lieutenant-colonel, and in 1865 he was brevetted brigadier-general of volunteers. He taught Greek and Latin at Williston Seminary, Easthampton, Mass., from 1865 to 1868, and in the latter year was con¬ nected with the staff of the Springfield Re¬ publican. After serving as head of the Bureau of Statistics of the Treasury Department,ˆ in 1870 he was made superintendent of the ninth census

and in 1872 became commissioner of Indian affairs. From 1873 to 1881 he was pro¬ fessor of political economy and history in the Sheffield Scientific School at Yale and in 1877-79 was lecturer at Johns Hopkins University. He was the representative of the United States at the International Monetary Conference, Paris, in 1878. In 1880 he was appointed super¬ intendent of the 10th census. Accepting the presidency of the Massachusetts Institute of Technology in 1881, he continued in that posi¬ tion till his death. He was president of the American Statistical Association from 1882 to 1897 and of the American Economic Associa¬ tion in 1885-92. He was an earnest advocate of international bimetallism, was deeply inter¬ ested in all economic questions, particularly those concerning wages and profits, upon which he wrote with effective clearness and force. His work has exerted a marked influence upon economic study. His writings include ˆThe Indian Questionˆ (1874) ; ˆThe Wages Question> (1876) ; ˆMoneyˆ (1878) ; ˆMoney in Its Relation to Trade and Industryˆ (1879) ; Hˆolitical Economy' (1883); H.and and Its

Rent' (1883) ; ˆHistory of the Second Army Corps' (1886) ; ˆLife of General Hancock' (1894) ; ˆThe Making of the Nation' (1895) ; and Hnternational Bimetallism' (1896). Con¬ sult ˆPublications of the American Statistical Association,' Vol. V (1896-97), for bibliog¬ raphy and biographical notices.

WALKER, Frederick, English painter; b. London, 26 May 1840; d. Saint Fillans, Perth¬ shire, 4 June 1875. After an ordinary school education he worked for a time in an archi¬ tect's office, and then pursued his art studies at the British Museum, in an art academy and in the Royal Academy schools. He became an apprentice to Whymper, the wood engraver, in 1858 and soon afterward began to provide drawings for Good Words, the Cornhill Mag¬ azine and other periodicals. He illustrated the ˆAdventures of Philip' and the ˆDennis Duval' of Thackeray. He exhibited his first oil picture, ˆThe Lost Path,' at the Academy in 1863. He was elected an associate of the Old Water-color Society in 1864 and in 1871 he became an associate of the Royal Academy. His principal pictures in oils w'ere ˆWayfarers' (1866), by some considered his best oil-paint¬ ing; ˆBathers' (1867) ; Wagrants' (1868), in the National Gallery; '^The Old Gate' (1ˆ9); ˆThe jPlough' (1870) ; ˆAt the Bar' (1871) ; ˆThe Harbour of Refuge' (1872), in the National Gallery; and ˆThe Right of Way' (1875). Among his more numerous works in water-color the following may be mentioned ; ˆPhilip in Church' (1863) ; ˆThe Young Patient' ; ˆThe Shower' ; ˆThe Village School' ; ˆJane Eyre' ; ˆRefreshment' ; ˆSpring'; ˆAutumn'

(1865); ˆThe Bouquet' (1886) ; ˆThe Gondola' ; Hn a Perthshire Gar¬ den' ; ˆThe Housewife' ; ˆThe' Rainbow' ; and ˆThe Fishmonger's Shop.' Consult Marks, ˆLife and Letters of Frederick Walker'

(1896).

WALKER, George, Irish Anglican clergy¬ man ; b. of English parents in County Tyrone 1618; d. Boyne, 1 July 1690. He was educated at (jlasgow University, took orders and in 1674 became rector of Donaghmore, near Dun¬ gannon. In April 1689 he was made joint gov¬ ernor of the besieged town of Londonderry after the traitorous governor, Lundy, had been allowed to escape and did much to inspire the heroic defenders in the siege of 105 days. He received the thanks of the House of Commons, and had honorary degrees conferred upon him by Cambridge and Oxfoid. He fell at the battle of the Boyne, being at the time of his death bishop-designate of Derry. His ˆTrue Account of the Siege of Londonderry' (1689) and Vindication' of it are reprinted in Dwyer's 'Siege of Londonderry' (1893).

walker, Henry Oliver, American mural painter ; b. Boston, 14 May 1843. He studied art in Paris under Bonnat (1879-82) and then opened a studio in New York city where he became noted for his beautiful figure com¬ positions, notably JEros et Musa' and ˆMusa Regina' (at the National Gallery, Washing¬ ton), and ˆMorning Vision' (at the Metro¬ politan Museum, New York). His notable mural decorations may be seen in the library of Congress at Washington; in panels at the Massachusetts State House; in the Essex County Court House, New Jersey; in the

Capitol at Saint Paul, Minn. ; and in ˆWisdom Attended by Learning,ˆ in the Appellate Court, New York. He received a gold medal at Charleston in 1902 and was made a mem¬ ber of the National Academy the same year.

WALKER, Horatio, Canadian i)ainter: b. Listowel, Ontario, 1858. He was practically self-taught but studied miniature work in Toronto and then went to New York City (1885) where his work was speedily appreciated. His favorite subjects were taken from the life of the French-Canadian people. His work won gold medals at Buffalo, Saint Louis, The Pennsylvania Academy of Fine Arts, Charleston and The Pan-Pacific Exposition at San Francisco. Among his notable works are ˆThe Harrowerˆ (Metropolitan Museum, New York), ˆOxen Drinkingˆ and ˆAve Mariaˆ (Corcoran Gallery, Washington), ˆ Sheep Yard by Moonlightˆ (National Gallery, Wash¬ ington), ˆSheepshearingˆ (Albright Art Gal¬ lery, Buffalo), ˆThe Woodcutterˆ and ˆMilk-ingˆ (Saint Louis Museum). He is a mem¬ ber of the National Academy of Design and of the Royal Institute of Painters in Water-colors of London.

WALKER, Hugh, Scottish author; b. 7 Jan. 1855. He was educated at the universities of Glasgow and Oxford and is professor of English literature at Saint David's College, Lampeter, South Wales. He is the author of ˆThree Centuries of Scottish Literatureˆ (1893) ; ˆGreater Victorian Poetsˆ (1895) ; ˆThe Age of Tennysonˆ (1897) ; ˆBiographical Sketch of Lord de Tableyˆ (1903) ; ˆThe Literature of the Victorian Eraˆ (1910) ; ˆOutlines of Victorian Literatureˆ (1913) ; ˆThe English Essay and Essayistsˆ (1915). He edited ˆThe Merry Devil of Edmontonˆ in ˆTemple Dramatists Series,ˆ contributed to ˆThe Cambridge Modern Historyˆ and ˆCam¬ bridge History of English Literature,ˆ and to American and English periodicals.

WALKER, James, American college presi¬ dent and Unitarian clergyman : b. Burlington, Mass., 16 Aug. 1794; d. Cambridge, Mass., 23 Dec. 1874. He was graduated from Harvard in 1814, studied for the ministry and was pastor of the Unitarian Church, Charleston, Mass., 1818-39. He was professor of moral and intellectual philosophy at Harvard 1839-53 and president of Harvard University 1853-60. From 1831 to 1839 he edited the Christian Examiner. He edited the works of Dugald Stewart and Thomas Reid, published a ˆMemoir of

Josiah Quincyˆ (1867) and delivered lectures on ˆNatural Religionˆ and ˆThe Philosophy of Religion.ˆ He was famous as a pulpit orator.

WALKER, James, American artist : b. England, 3 June 1819; d. Watsonville, Cal., September 1889. He emigrated to the United States and settled in New York City early in Hfe. In 1884 he went to San Francisco to paint a picture for a private gallery. It was a French battle-piece and his success was so complete that he became widely known as a painter of military pictures. His principal works are ˆThe Battle of Lookout Moun¬ tainˆ ; ˆThe Battle of Chapultepecˆ ; and ˆThe Repulse of Longstreet at Gettysburg.ˆ

WALKER, James Barr, American clergy¬ man; b. Philadelphia, Pa., 29 July 1805; d. Wheaton, Ill., 6 March 1887. He worked at anything to which he could turn his hand for years but finally studied law in Ravenna, Ohio, was graduated at the Western Reserve Col¬ lege (1831) and engaged in editing several religious papers. At last he abandoned every¬ thing for the ministry and was licensed by the Chicago presbytery (1841). He became pastor of a church at Sandusky and also was lecturer at Oberlin College and at the Chicago Theological Seminary. His chief writings are ˆThe Philosophy of Skepticism and Ultraismˆ (1857), ˆPhilosophy of the divine operation in human redemptionˆ (1862), ˆPoemsˆ (1862), ˆThe living question of the Ageˆ (1869) and ˆThe doctrine of the Holy Spiritˆ (1870). His writings were translated into many languages.

WALKER, John, English actor and lexi¬ cographer ; b. Colney Hatch, Middlesex, 18 March 1732; d. London, 1 Aug. 1807. He was for a time. engaged by Garrick at Drury Lane, was a leading member of the company at Crow Street Theatre, Dublin, 1758-62 and was at Covent Garden 1762-67. ˆ In 1768 he left the stage, and, after conducting a school at Ken¬ sington for two years, became a lecturer on elocution. His published works include, among others, ˆA Dictionary of the English Lan¬ guage, answering at once to the Purposes of Rhyming, Spelling and Pronouncingˆ (1775; latest ed., 1888) ; ˆElements of Elocution' (1781); 'ˆA Rhetorical Grammar' (1785);

ˆThe Melody of Speaking Delineated' (1789) ; ˆA 'Critical Pronouncing Dictionary and Ex¬ positor of the English Language' (1791), his chief work, which was long regarded as a standard for pronounciation.

WALKER, John Grimes, American rear-admiral; b. Hillsboro, N. H., 20 March 1835; d. York Beach, Me., 16 Sept. 1907. He was graduated

from the_ Naval Academy in 1856 and during the Civil War was employed in the blockading service and in the Mississippi squadron, becoming lieutenant-commander in 1862; in 1866 he was promoted to the rank of comrnander for gallantry. He was chief of the Bureau of Navigation 1881-88, became commodore in 1889 and commanded the squadron of evolution 1889-93. In 1894 he was appointed to protect American interests in the Hawaiian Islands, was commissioned rear-ad¬ miral the same year and retired in 1897. From 1899 he was president of the Isthmian Canal Commission.

WALKER, Jonathan, American advocate of abolitionism; b. Cape Cod, Mass., 1799; d.

I May 1878. In early life he was captain of a fishing-vessel ; was railroad contractor in Florida 1840; aided slaves to escape thence in an open boat 1844, but the party were taken to Key West by a wrecking-sloop, which found them helpless at sea. * Walker was carried in irons to Pensacola, held for some time in prison chained to the floor of a dark cell, and on being tried was convicted, fined, condemned to the pillory, branded S.” (slave-stealer) on the right hand, and ordered to be confined in prison till the fine was paid. He was liberated after

II month’s imprisonment on payment of the fine by friends in the North. He then for some years delivered lectures on slavery, and in 1850

settled in Muskegon, Mich. W'alker's history suggested to Whittier the topic of his ˆMan With the Branded Hand. >

WALKER, Leroy Pope, Confederate sol¬ dier: b. Huntsville, Ala., 8 Feb. 1817; d. there, 23 Aug. 1884. Educated at the universities of Alabama and \ irginia, he was admitted to the bar (1837), practised in Moulton, Ala., served as solicitor of his circuit and was a memb'er of the ::!)tate legislature and speaker of the house (1847—49). He removed to Huntsville and became leader of the Southern bar. President Davis made him Secretary of War. He resigned (1861) but immediately joined the Southern army only to give up his commission on account of ill health (1863) and to resume his law practice (1865). He was delegate to the Democratic National Con¬ vention (1876) and to the Chicago (Conven¬ tion (1884).

WALKER, Mary Edwards, American physician and dress reformer : b. Oswego, N. Y., 26 Nov. 1832; d. 22 Feb. 1919. She was notably in advance of her age in her views on dress reform and suffrage and was the only woman expressly given permission by Congress to wear male attire. At the age of 23 she was a graduate physician, having se¬ cured her degree from The Syracuse Medical College and began practice in Columbus, Ohio, but soon returned to Rome, N. Y. When 29 years of age she practically discarded female attire and when commissioned as first lieuten¬ ant to serve on the surgical staff she always appeared in male attire. After spending four years on the battlefields she was awarded a Congressional medal of honor for bravery. After the war she became notable for her lectures on dress reform and suffrage and lectured abroad as well as in this country, al¬ ways appearing in a frock coat or full evening dress. She was a familiar figure in Washing¬ ton for years. Her death followed sometime after an accident which resulted in a fall on the Capitol steps at Washington and which caused her for a time to remain in the Federal hospital at Fort Ontario.

WALKER, Robert J., American legislator: b. Northumberland County, Pa., 23 July 1801 ; d. Washington, 11 Nov. 1869. He grew up in the midst of an enlightened community and he was graduated at the University of Penn¬ sylvania, at the head of his class, when he was

only 18 years old. A little later he mar¬ ried the granddaughter of Benjamin Franklin, Mary Bache, daughter of Richard Bache and sister of the famous Alexander Bache, one of the founders of the Smithsonian Institution. Walker began the practice of law at Pitts¬ burgh in 1822. Two years later he was an advocate of the election of General Jackson to the presidency and he seems to have exerted considerable influence upon the attitude of Pennsylvania. But the lure of the lower South was too strong for him and he moved to Natchez, Miss., in 1826, where he promptly became one of the leaders of the community. In the land speculations which paralleled the removal of the various tribes of Indians from Mississippi and Alabama, 1830-36, he made what was considered a large fortune. But he ‘vas a natural politician and he entered the race for the United States Senate against George

Poindexter. It was a spectacular contest which attracted national attention. Walker was suc¬ cessful and once in the Senate, President Jackson promptly made it known that Walker was his friend. From the day of Walker’s en¬ trance into national politics, he was a constant and unremitting advocate of the annexation of Texas. _ In the campaign of 1844, Walker was the chairman of the National Democratic Com¬ mittee, as we should now say, and he was more responsible than any other man for the nomina¬ tion and election of Polk. He was Secretary of Treasury in the Polk cabinet and he wrote the tariff of 1846, generally recognized as the best of tariffs before the Civil War. He man¬ aged the finances of the government, almost without advice or counsel from the President, during the Mexican War. For the first time in American history, government securities con¬ tinued to sell at par or above throughout a war. At the close of the Polk administration. Walker became a lawyer and a lobbyist in Washing¬ ton. He was sent to Europe by the directors of the Illinois (Central Railroad to sell bonds and purchase building supplies. He was coun¬ sel for certain mining interests in California from which he received a fortune in the form of a fee, in 1858, amounting to some hundreds of thousands of dollars. But he could not keep aloof from politics and President Buchanan made him territorial governor of Kansas in April 1857. Once in Kansas, Walker endeavored so to arrange the tangled affairs of the war-torn Territory that he was to be returned to the United States Senate. ˆ But he failed, more be¬ cause the President withdrew his support than from any lack of wisdom in dealing with the Kansans. When the President withdrew his support Walker resigned and became a public supporter and advocate of Stephen A. Douglas for the Presidency. That completed the breach

between Walker and the South where he had al¬ ways had influence. When Lincoln, and not Douglas, became President, Walker set up a magazine in New York which he called the Con¬ tinental Monthly and in which he supported strongly the cause of the Union. When the war ˆ was at its most doubtful crisis. President Lin¬ coln sent Walker as a commissioner of the Treasury to Europe to borrow money on the best terms he could and to discredit the Con¬ federacy in any way he might. Walker suc¬ ceeded beyond expectation, for he secured loans of $3(X),(X)0,0()0 in gold at a time when the government needed gold quite as much as the armies needed men. On the return of Walker to the United States, he became once more a lawyer and lobbyist in Washington and as such had a good deal to do with the pas¬ sage of the act appropriating the necessary money for the purchase of Alaska. His work and character were not of the kind that en¬ hanced his reputation for integrity. Flis death was passed almost unnoticed in the press of the country and his burial place has been almost entirely forgotten ; but not many men of his generation had more to do with the growth and development of the country. The facts about Walker are to be found only in governmental documents, ˆThe Diary of James K. Polk,ˆ and contemporary newspapers.

William E. Dodd,

Professor of History, Chicago University.

WALKER, Sears Cook, American mathe¬ matician and astronomer : b. Wilmington, Mid¬ dlesex County, Mass., 28 March 1805 ; d. Cin¬ cinnati, Ohio, 30 Jan. 1853. He was graduated at Harvard College in 1824,ˆ taught school near Boston for two years and in 1827 removed to Philadelphia, where also he engaged in teach¬ ing. His parallactic tables, first prepared in 1834 for the latitude of Philadelphia, reduced the time needed for computing the phases of an occultation to less than half an hour. In 1837 he was invited to prepare a plan for the or¬ ganization of an observatory in connection with the Philadelphia High School, and from its equipment in 1840 until 1852 he published in the ˆProceedings of the American Philosophical Societyˆ and the American Journal of Science frequent and copious observations and investi¬ gations which he had made. In 1841 he pub¬ lished a valuable memoir on the periodical meteors of August and November. In 1845 he took part in the Washington naval observa¬ tory, where on 2 Feb. 1847, four months after the detection of the planet Neptune, he made the discovery that a star observed by Lalande in May 1795 must in fact have been this planet. By subsequent alternating computa¬ tions of Pierce and Walker, the former in¬ vestigating the perturbations and the latter the orbit, the theory of Neptune was at once placed on a footing comparable with that of the other large planets. In 1847 he was invited to take charge of the longitude computations of the United States Coast Survey, an office in which he continued until his last illness. By the joint labors of Walker and Bache the method of telegraphic longitude determinations was de¬ veloped and successfully carried out as early as 1849, with greater precision than was at¬ tained in Europe 10 years later. The intro¬ duction of the chronographic method of re¬ cording observations belongs to Walker and Bache. The prosecution of the telegraphic method of longitude soon led Walker to the discovery that the time required for the trans¬ mission of the galvanic signal was measurable, and the velocity by no means as high as had been supposed.

WALKER, Thomas, American planter: b. Gloucester County, Va., 25 Jan. 1715; d. 9 Nov. 1794. Having been educated at William and Mary College, he became a physician at Fredericksburg, Va. He made an expedition in 1750 to the region that now is the State of Kentucky — 13 years before Daniel Boone en¬ tered it from Tennessee. The Walker Moun¬ tains in southern Virginia are named after Walker. He served as commissary general under George Washington in Braddock's army;

was commissioned on behalf of Virginia to treat with the Six Nations at Fort Stanwix, N. Y., 1768; commissioner to treat with the Indians at Fort Pitt (Pittsburgh) 1777. He acquired a great estate by marriage toward the close of his life. His son John Walker served with distinction on General Washington's staff during the Revolution ; he was United States senator a few months in 1790.

WALKER, Thomas Leonard, Canadian scientist: b. Chinguacousy, Ontario, 30 Dec. 1867. He was graduated at Queen's University with honors in chemistry and mineralogy (1890) and from Leipzig (1895). He was assistant in the

geological survey of Canada (1890-93), Fellow in chemistry in the school of mines, Kingston (1893-95), assistant superintendent geological survey of India (1897-1ˆ2), and since 1902 has been professor of mineralogy in Toronto Uni¬ versity. He has contributed to many scientific publications.

WALKER, Timothy, American clergy¬ man; b. Woburn, Mass., 27 July 1705; d. 1 Sept. 1782. He was graduated at Harvard 1725, and having studied theology became (1730) minister of the Congregational Church at the Penacook plantation fnow Concord, N. H.). When, 1740, the title of the Penacook settlers to their land was held by the province of New Hampshire to be null, and new claimants demanded possession, the courts deciding favorably to thern. Walker undertook the defense of his people's rights, and thrice visited England to maintain their cause ; finally the king in council decided the suit in favor of the people of Penacook. Walker's theological belief was mildly Calvinistic. In the Revolution he was an ardent patriot. He held the pastorate at Concord 52 years. His daughter married Count Rumford. Walker's son Timothy Walker (b. 26 June 1737 ; d. 5 May 1822) was graduated at Harvard 1822, and at first was a preacher; then became active in political life of the Revolutionary time and the period subsequent — holding many important offices.

WALKER, Timothy, American jurist: b. Wilmington, Mass., 1 Dec. 1806 ; d. Cincinnati, Ohio, 15 Jan. 1856. He was graduated from Harvard (1826), taught mathematics in North¬ ampton, Mass., studied at Harvard Law School (1829-31), removed to Cincinnati the latter year and was admitted to the bar. He es¬ tablished the Cincinnati Law School with Judge Wright and had charge of it until 1844. He founded the IVcstcrn Lazv Journal in 1843, and was active in his profession until his death. In 1842-43 he was presiding judge of the Ham¬ ilton

County Court of Common Pleas. His chief work was ˆAmerican Introduction to American Law.ˆ

WALKER, William, American adven¬ turer: b. Nashville, Tenn., 8 May 1824; d. Trujillo, Honduras, 12 Sept. 1860. After study of law and medicine, he was a journalist in New Orleans and San Francisco, and practised law in Mapˆsville, Cal. In 1853 he organized a filibustering expedition against Lower Cali¬ fornia and the Mexican state of Sonora. On 4 November he arrived at La Paz, made the Mexican governor a prisoner and proclaimed a new regime to the inhabitants of Lower Cali¬ fornia. In a few weeks difficulties arose. Re¬ inforcements did not appear, desertions greatly reduced his force, and he was obliged to re¬ treat across the border into California and sur¬ render himself and band to a detachment of United States regulars. He was tried (May 1854) at San Francisco, for violation of the neutrality laws, and acquitted. But Walker was soon planning new conquests. Taking ad¬ vantage of insurrectionary troubles in Nicaragua, and to some extent abetted by American capitalists interested there, he landed at Realejo, 11 June 1855; and, having with his followers and a few natives won some trifling battles, managed to accomplish a peace which recognized Rivas, leader of the party favored

by Walker, as President and Walker himself as generalissimo. Many Southerners joined him asˆ recruits, and on 1 March 1856 he had, it is said, 1,200 troops. The Pierce administration proclaimed the neutralit}ˆ laws, and made at¬ tempts at prosecution, but expeditions sailed with comparative freedom from San Francisco and New Orleans to .Walker's aid. Finally, Vijil, a priest, the diplomatic representative of what was really the Walker government, was received 14 May 1856, though the North and many conservative Southerners condemned the action. The envoy did not remain long at W'ashington. Rivas absconded, and in June Walker got himself elected to the Presidency. In September he published a decree repealing all laws against slavery, which had not existed in Nicaragua for 32 years. Undoubtedly he believed that such a procedure would obtain for him valuable support in the slave States. But the United States government declined to recognize him or his ministers, and his arbitrary acts provoked a native insurrection. At last he was held between Lake Nicaragua and the Pacific by an allied army of native Nicaraguans and Costa Ricans, and on 1 May 1857 he gave himself up to Com. C. H. Davis of the United States 'sloop-of-war Saint Mary's, under a treaty of capitulation obtained from Costa Rica. He was taken to New Orleans, and quickly began plotting to organize a new ex¬ pedition. Arrested for violation of the neu¬ trality laws, he was released on bail, which he forfeited, going with about 200 followers, aims and supplies to Greytown, where he ar¬ rived 25 November. In early December Com¬ modore Paulding, United States navy, of the W abash, compelled him to surrender. Walker presented himself as a prisoner of state at Washington in January 1858, but President Pierce declined to hold him as a prisoner, on the ground of his illegal apprehension on for¬ eign soil. A. H. Stephens wrote in 1858 that the reason for the opposition to Walker wˆas that *if successful, he would introduce African slavery thereˆˆ [Nicaragua]. Walker was re¬ ceived with more or less of an ovation in the Gulf States. In October 1858 he sailed again from Mobile, but was arrested at the mouth of the Mississippi, tried at New Orleans and ac¬ quitted. In June 1860, with a small force, he went to Trujillo to stir up revolution in Hon¬ duras. His followers were reshipped to the United States, while he was

condemned and shot. He published <The War in Nicaragua^ (18^), in justification of his acts. Consult Joaquin Miller's poem < Walker in Nicaragua^ ; Doubleday, ^Reminiscences^ (1886) ; Roche, ^Story of the Filibusters^ (1891).

WALKER, William David, American Protestant Episcopal bishop: b. New York City, 29 June 1839; d. 2 May 1917.^ He was gradu¬ ated from Columbia University (1859), from the General Theological Seminary (1862), was vicar of Calvary Chapel, New York (1862-83) and missionary bishop of the northern district (1883-96). He was transferred to western New York (1896) and was appointed by President Cleveland a member of the United States board of Indian commissioners (1897). He also served as a select preacher to the Uni¬ versity of Cambridge, England. In 1900 Presi¬ dent Roosevelt appointed him one of the

special commissioners to investigate the con¬ ditions among the Indians of New York State. He was author of ^The Relation of Wealth to Labor, ^ and ^ God's Providence in Life.^

WALKER, William Hultz, American in¬ dustrial chemist : b. Pittsburgh, Pa., 7 April 1869. He was graduated at the Pennsylvania State College (1890) and the University of Gottingen (1892), was professor of industrial chemistry at Harvard (1905-08) and became identified with the production of high class art glass in America. He was president of the American Electro-Chemical Society in 1910 and is an authority on industrial chemistry in the United States.

WALKER, William Johnson, American philanthropist; b. Charlestown, Mass., 15 March 1790; d. 2 April 1865. He was graduated at Harvard 1810, then studied medicine, and prac¬ tised as a physician in Charlestown. He became heir to a large estate late in life. His benefac¬ tions to colleges and to charitable and benevo¬ lent institutions were very liberal, amounting to $1,400,000, of which $400,000 was bestowed dur¬ ing his life.

WALK^IR, William McCreary, American naval officer: b. Baltimore, Md., 2 Sept. 1813; d. 19 Nov. 1866. He became midshipman in the United States navy 1827 ; passed midshipman 1833 ; lieutenant 1838, and while lieutenant com¬ manded a vessel in Wilkes's exploring expedition. He served on the home station 1843-44, and in the Mediterranean squadron 1844-46; com¬ manded the frigate Constellation 1855-56. He attained the rank of captain 1862; through

the Civil War he served with distinction on the steamer De Soto of the Atlantic Coast blockad¬ ing squadron.

WALKER, William Sidney, English Shakespearean scholar: b. Pembroke, Wales, 4 Dec. 1795; d. 15 Oct. 1846. He was educated at Trinity College, Cambridge, becoming a Fel¬ low of his college in 1820. Unorthodox views regarding eternal punishment prevented him from taking orders, and accordingly he had to resign his Fellowship in 1829. His friend Moul¬ trie edited in 1852 a collection of his ˆPoetical Remains,ˆ and W. N. Lettsom compiled from his papers the works entitled ˆShakespeare's Versification, and its Apparent Irregularities explained by Examples from Early and Late English Writersˆ (1854) ; and ˆA Critical Ex¬ amination of the Text of Shakespeare, with Remarks on his Language and that of his Con¬ temporaries, together with Notes on his Plays and Poems ˆ (1860), which are of the utmost value to students of Shakespeare and Eliza¬ bethan literature.

WALKER, Williston, American church historian : 'b. Portland, Me., 1 July 1860. He was graduated from Amherst College in 1883 and from Hartford Theological Seminary in 1886. He was professor of church history at the latter institution 1889-1901, and since 1901 has held a similar post at Yale'University. He has published ˆThe Creeds and Platforms of Congregationalismˆ (1893) ; ˆA History of the Congregational Churches in the United Statesˆ (1894) ; ˆThe Reformationˆ (1900) ; ˆTen New England Leadersˆ (1901) ; ˆJohn Calvinˆ (1906) ; ˆFrench Trans-Genevaˆ (1909).

WALKER LINE. See Boundaries of the United States.

WALKERTON, wa'ker-ton, Canada, capi¬ tal of Bruce County, Ontario, 65 miles north¬ west of Guelph, on the Sangeen River, 32 miles south of Owen Sound, and on the Wellington, Grey and Bruce Railroad. It is a thriving and growing town, with extensive water power, several dour and planing-mills, iron foundry, tanneries, furniture and rope factories and other industrial establishments. It has two news¬ papers and several banks. Pop. about 3,162.

WALKERVILLE, wa'ker-vil, Canada, a town of Essex County, Ontario, on the Detroit River, two miles northeast of Windsor, near the outlet of Lake Saint Clair and connected by ferry with Detroit, Mich. It has shipbuild¬ ing yards, a distillery, automobile factories, planing-mills, engine and wire works, foundries and other industrial establishments. Pop. about

5,000.

WALKILL RIVER. See Wallkill River.

WALKING DELEGATE, an official con¬ nected with a trade union, whose duty it is to visit the various places at which members of his craft are employed and personally ascertain that no laws of that particular trade guild are violated by the workmen ; also, in cases where an unexpected strike has been ordered by the executive board, it devolves on him to notify men connected with the union to cease work. The term became opprobrious and has been largely superseded by business agent. See Unionism.

WALKING FISH. See Mud-skipper; Serpent Head,

WALKING-LEAF. See Ferns and Fern Allies ; Leaf-insect.

WALKING PURCHASE, The. In 1682 William Penn (q.v.) purchased of the Delaware Indians a tract of land in the present coun¬ ties of Bucks and Northampton, Pa., bounded on the east by the Delaware River and in the interior at a point as far as a man could walk in three days. Penn and a party of Indians started on the walk, beginning at the mouth of Neshaming Creek. At the end of a walk of a day and a half Penn concluded that it was as. much land as he wanted, and a deed was given to the lands at that point — about 40 miles from the starting place. In 1737 after Penn's death the tract was increased by a party of expert walkers to a point 70 miles in the interior in¬ stead of 40 miles. See Delaware Indians; Penn, William.

WALKING STICK, a cane, wand, stick, or rod prepared for use in walking, -either as an assistance in supporting and steadying the walker, or for ornament. The habit of using walking-sticks is of great antiquity; and in modern times the supply of such articles con¬ stitutes a large branch of trade in the United States, as well as in European countries, espe¬ cially in Great Britain, France and Germany. London is a great mart for all kinds of walk¬ ing-sticks, and over four and one-half million sticks in the raw state, to be afterward

dressed and mounted, are annually imported into Great Britain. These consist chiefly of the small stems or canes of certain palms, as the Malacca cane, and others called Whangee and Penang

Lawyers ; the woody stems of some small species of bamboo also are used, besides straight shoots of orange, cinnamon, myrtle and other shrubs ; oak, ash, hazel, sloe, thorn and other native trees and shrubs also are used. The prepara¬ tion and sale of walking-sticks are extensively carried on in Hamburg, and the finer sorts are richly and tastefully mounted in Paris.

WALKING STICK, or STICK-INSECT,

a wingless orthopterous insect of the family PhasmidcB, so-called becaused in its slender, elongated form and greenish-gray hue, it re¬ sembles a dry twig so closely as easily to be mistaken for one when not moving. Those of the eastern United States {Diapheromera femorata) are also called walking bug and walk¬ ing twig. Some species are several inches long. They are near relatives of the mantids and are natives of sub-tropical and the warmer tem¬ perate regions and walk gently among the branches of trees, reposing in the sun, with their long antennae-like legs stretched out in front. They feed upon the green parts of plants, but are rarely numerous enough to do much dam¬ age. Consult Howard, <The Insect Bookˆ (New York 1901). See Aralia.

WALKYRIE, or VALKYR, in Scandi¬ navian mythology, one of a company of nine or more beautiful maidens, attendants of Odin (q.v.), who, clad in brilliant armor and adorned with golden ornaments, ride through the air, order battles, and distribute the death-lots ac¬ cording to Odin's commands. Fertilizing dew drops on the ground from the manes of their horses; light streams from the points of their lances, and a flickering brightness announces their arrival in the battle. With their charming glance they rejoice the glazing eye of the hero, and lead him to Walhalla (q.v.), where they act as his cup-bearers. Two Walkyries, Hrist and Mist, are cup-bearers to Odin himself. The name is derived from the Icelandic Valkyrja, and means literally "chooser of the slain,® from valr, the "slain® and kojora, to "choose.®

They differ in origin; some spring from Elves and other superhuman beings; some are daughters of princes, who in their lifetime are numbered among the Walkyries, showing all their qualities, and when

they die their spirits become Walkyries. They ride generally in companies of three, or of three times three or four times three, and have the gift of changing themselves into swans — hence sometimes called swan-maidens. They often choose noble heroes for lovers. Whoever deprives a Walkyrie of her swan-robe gets her into his power. But the song of the Walkyries sounds terrible, as, sitting on a hill, they weave the fateful battle-web. Theˆ Walkyries were frequently con¬ founded with the Norns or Destinies. They were conceived also under the figure of the clouds; thus, Hrist signifies “dark sky,® and Mist signifies “quaking.® Most of the names of the Walkyries, however, relate to war and battle. The Walkyries were known also as battle-maidens, shield-maidens and wish-maidens.

WALL-CRJIEPER, a small bird (Ticho-droma muraria) of the European Alps, which frequents walls and perpendicular rocks in preference to trees, on whose rough trunks its relatives, the creepers (Certhia), make their living. It is about six inches long; plumage

light gray, with bright crimson on the shoulders, the larger wing coverts and the inner webs of the secondaries; the rest of the wings black; tail black, tipped with white. Called also spider-catcher.

WALL DECORATION. See Mural Painting.

WALL-EYED PIKE, or GLASS-EYE,

one of the pike-perch {Stizostedion vitreum) of the central part of the United States, so-called in reference to its large staring eyes; also absurdly called salmon or jack-salmon in some parts of the South. Its body is elongate, back arched, head subconic, long; cheeks, gill-covers and top of head more scaly; dorsal spines high; dark olive, mottled with brassy; sides of head vermiculated ; first dorsal fin with a large black patch on the hinder margin. Length one to three feet. It reaches its greatest development and abundance in the Great Lakes region and upper Mississippi, but is also found southward, eastward and northward to Georgia, Pennsyl¬ vania and Assiniboia, respectively. In

lakes it inhabits the deep holes or areas where the bottom has been scoured by inflowing streams. Ill rivers it loves to hide under logs and rocks in the deep holes beneath dams and falls and amid swiftly flowing waters. It is a predaceous fish and devours all smaller species. The wall¬ eyed pike is a prolific spawner and great num¬ bers -of the fish congregate on shallow, well-cleaned bottoms for this purpose. Because of the fine quality of its flesh and the large size (10 to 30 pounds) which it attains, this fish is highly valued and in the Great Lakes region ranks next to the white-fish in commercial im¬ portance. The smaller sand-pike or sauger (S. canadense) has a similar but less extended distribution and similar habits. Consult Jordan and Evermann, ˆAmerican Food and Game Fishesˆ (New York 1902).

WALL-FLOWER, a cruciferous herb (C heir ant hits cheiri) of southern Europe, where it blooms on rocky cliffs and walls. The plant itself is not handsome, having crowded, twisted, lanceolate leaves, but is cultivated for the sake of its flowers, which are large and in short, head-like, terminal racemes. The petals are four, clawed and spreading, have a velvety sur¬ face and range in color through all shades of yellow and orange to a rich mahogany brown. They are frequently variegated with these hues, and might be the ˆˆstreaked gilly-flowers, which some call nature's bastards,® scorned by Perdita, of the ˆWinter's Tale.ˆ One of their common names, moreover, is gilly-flowers _ or wall-gilly¬ flowers. Wall-flowers are biennials, blooming from early spring until autumn, and are offered for sale in French and English cities during the winter. They have a strong and delicious odor of violets.

The native wall-flower of Australia is a leguminous plant {Pultencea daphnoides). In the United States, a cruciferous plant of dry plains, with orange-yellow large flowers, is known as the western wall-flower {Erysimum as per uni).

WALL PAINTINGS. See Mural Painting.

WALL PAPER, or PAPER HANG¬ INGS, called by the French hapier teint, orna¬ mental, decorated or colored paper affixed to

the walls of houses as a substitute for the ancient tapestry hangings. The Chinese appear to have employed paper for this use from time immemorial, and the English claim to have first introduced the practice into Europe. On the other hand, the French assert that printed paper hangings were first made at Rouen as early as 1620 or 1630 by

one Frangois, and that the art was perfected in the latter part of the 18th century by Reveillon in Paris. It has cer¬ tainly prospered more in France than in any other country; and so much taste and skill have there been developed in the manufacture, that the French papers have been sought for in preference to all others. Some of the Paris factories employed 3,000 or more workmen as early as 1875. Establishments are located in nearly all the large cities of Europe. In the United States the first wall paper factory was established in 1790 by John B. Howell at Al¬ bany, N. Y. Paper was at that time made only in sheets, and had to be joined before being printed. Color was then applied by means of a brush to form the background of the design, and the latter was subsequently printed upon the paper from wooden blocks, as many blocks being used as there were colors in the pattern, each block having a part of the pattern upon it in one color. One block was printed the whole length of the paper before the next color was applied. It should be stated that this method of printing by means of blocks still prevails, but only in connection with designs which, on ac¬ count of their dimensions, or through some other peculiarity, cannot be printed on the cylin¬ der-machines that have practically supplanted block or hand work, as it is termed. The method of applying color to the background by means of a handbrush has, however, been done away with altogether. It does not appear that any other factories were established until about the year 1810, at which time a man named Bori-ken was engaged in the business. The Howell firm had meanwhile sold out their Albany busi¬ ness to Lemuel Steel, and, after a short experi¬ ence in New York and Baltimore, had finally, in the year 1820, located at Philadelphia, Pa., where they have been established ever since, the present owners comprising the third and fourth generations engaged in the business. It was not until 1844 that any decided advance was made in the growth of the industry. About that time paper in continuous lengths came into more general use, and the necessity of joining sheets together was obviated. In that year, also, the first machine for printing wall paper was imported from England and introduced into the Howell factory. While very crude, as it printed only a single color, it had a stimulating effect on the business, inasmuch as it enabled goods to be produced at a reduced price, and increased the volume of the business. As near as can be ascertained, the entire pro¬ duction of wall paper in the United States at that time did not exceed $250,000. The second printing apparatus was imported from England in 1846, this one printing six colors. Machines were subsequently built in this country, at first by the machinists connected with wall paper factories, but after a time a specialty of this machine was made by William Waldron of New Brunswick, N. J.

The printing machine of to-day is unques¬ tionably a great improvement on that originally

imported into this country, although the princi¬ ple of its operation is practically the same. It is designed on lines similar to rotary litho¬ graphic and cloth-printing machines, with a large central drum or cylinder. The paper passes over the cylinder, the pattern being printed on it by means of rollers on which the design has been placed, each roller represent¬ ing one of the colors used in the design. These rollers are registered so accurately that the paper, in passing over the rotating cylinder, receives impressions in correct position from each of the surrounding rollers. The paper is hung up by an automatic process as it leaves the machine, and passes into drying-racks which are usually several hundred feet in length, after which it is rolled up in lengths of 8 to 16 yards, and is ready for market.

While the printing-machine is the most prominent mechanism of the business, yet other factors have contributed largely to the progress made by this industry. Among them are the grounding-machines, which furnish the back¬ ground color to the papgr; the bronzing-ma-chines, which apply bronze powders to certain of the surfaces ; the embossing-machines, which give various textures to the goods after they have been printed ; the pressing-machines, which are used to emboss the design in relief ; the contrivance that is used to hang up the paper after it leaves the printing-machine ; and a host of similar devices that enable the manu¬ facturer to produce novel effects and manufac¬ ture the goods more rapidly than before, and at a lessened expense. It is these contrivances that have led to the tremendous progress achieved by this industry in the last 60 years, and more particularly within the last 30 years (the pace having been accelerated each year), so that the United States has long been inde¬ pendent of foreign manufacturers. The most notable machine improvements follow: (1) Soon after the introduction of the printing machine one McKernan invented a contrivance for festooning the paper automatically as it leaves the printing-machine and passes on to the

drying-racks. This was undoubtedly a long stride in the process of making wall paper, in¬ asmuch as the speed of the printing-machine could be increased to the full capacity of the drying-racks connected with it. (2) The single (or continuous) process of making wall paper was introduced about the year 1870. Formerly the ground color had to be applied by one ma¬ chine, after which the paper was dried and rolled up and next passed through the printing-machine to receive the impressions of the de¬ sign thereon. In the continuous process the paper passes through the machine which applies a ground color for the design, and then passes through a drying apparatus that is termed a *hot box,® or into drying-racks, and then auto¬ matically passes into the printing-machines which applies the colors of the design, saving a double handling of the goods and involving less waste. (3) The method of applying bronze powders to wall paper automatically was intro¬ duced about the year 1872, although, as it was conducted in. secret for some time by one or two firms, the discovery may, have been made at an earlier date. This method reduced the cost of making bronze (otherwise termed gold) papers, and led to an increased demand and

output for them. (4) The next discovery was the application to wall paper of bronze pow¬ ders in a liquid state; that is, mixed with an adhesive material (made from potato-starch) of sufficient density to keep the bronze powders in solution without impairing their lustre. This was first placed upon the market about 1882, and as the new process enabled the use of as many different shades of bronze as there were colors in the desiˆ, the opportunity was af¬ forded for producing many new and brilliant effects, and for superseding in a large measure bronze or gold goods made by the former method. While the mechanical part of the business has made vast strides, there is yet another feature that outranks it in importance, and that is the artistic element. The American people have a constant craving for something new, and the manufacturer is taxed to the full extent of his powers to satisfy this de¬ mand. On no industry does this demand fall more heavily than on wall paper manufacture, and by no occupation has the demand been more fully satisfied.

WALL OF SEVERUS. See Hadrian’s Wall.

WALL STREET «CORNERS.» Since 1835 the famous corners in the American stock market have been as follows :

YEAR

Stock

Starting price

Higji price

1835

Morris Canal .

30% below par.

. 150

1835

Harlem River R.R ....

123 .

. 200

1835

Harlem Railroad .

60 .

. 164

1863

Harlem Railroad .

112 .

. 180

1865

Prairie du Chien .

60 …

. 250

1867

Milwaukee &. St. Paul .

47 .

. Ill

1869

Gold .

A small premium …. 160

1872

Northwestern .

Around par… .

. 230

1881

Hannibal & St. Joe… .

98 (in one day) .

. 200

1901

Northern Pacific .

170 (in one day)

. 1,000

In recent years these corners have been discouraged, as tending to precipitate a general panic.

WALL-TILES. See Tiles.

WALL-TREES, fruit-trees trained on walls ˆ for better exposure of the fruit to sunshine, and for sake of the heat radiated from the wall. Brick walls are preferred; and have a great advantage in the regularity with which the nailing can be accomplished ; but trees are often trained on stone walls also, and sometimes on the walls of houses. Trees are trained on walls in hot houses as well as in the open air. Flued walls are often used, the fruit being thus partially forced by artificial heat ; and screens of various kinds, as of reeds, canvas and oiled paper, are sometimes employed to protect blossoms in spring. Woolen nets also are much used for this purpose, and a net even with wide meshes

affords much protection from spring frosts. Wall-trees intended to occupy the wall permanently are generally trained in the nursery with a dwarf stem only five or six inches in length, so that the branches may cover the whole wall, and no available part of it be lost. It is usual, how¬ ever, in planting to introduce riders alternately with the permanent wall-tree; the riders are grafted or budded on tall stocks, and occupy part of the wall till the wall-trees have become large enough to require it all. The chief modes of training wall-trees are known as fan training and horizontal training. In fan training the

* X-. * are arranged like the spokes of a fan ;

in horizontal training a main stem is led up, from which they are spread out horizontally on sides. Different modes are preferred for different kinds of trees, and the art of the gar¬ dener is shown in keeping to his plan of training and laying in branches, so as to fill the space, and make every part of the wall productive. There is a Dutch mode of training, which consists in leading two chief branches horizontally right and left, and training shoots from them straight up to the top of the wall. Riders are trained frequently in a star-like form, some branches being led downward, to fill the wall as quickly as possible. It is necessary for the gardener, in training wall-trees, to consider the habit of each kind particularly whether fruit is to be ex¬ pected chiefly on young branches or on the spurs of older branches. Superfluous branches must in all cases be carefully removed, and among these are to be reckoned all fore-right shoots, or branches which project straight from the wall.

WALLA WALLA, wol'a wol'a (ˆTushing Ayaterˆˆ), a tribe of the Shahaptian stock of North American Indians, formerly occupying the country about the lower Walla Walla River, and along the east bank of the Columbia River from the Snake nearly to the Umatilla, in Washington and Oregon. Their language re¬ sembles that of the Nez Perces. By treaty of 1855 they were assigned to the Umatilla reser¬ vation in Oregon, where they numbered about 400 in 1917. See Shahaptian.

WALLA WALLA, Wash., city, county-seat of Walla Walla County, on the Walla Walla River, 28 miles east of the Columbia River, and on branch lines of the Northern Pacific and the Union Pacific railroads, close to the Oregon line, 150 miles southwest of Spokane. A United States fort was established near the site of the city in 1857, and around this fort grew up a trading post and settlement; it was first cailed Steptoeville, but when the town was incorporated in 1859 the name of Walla Walla was adopted. It was incorporated as a city in 1862 and received a second charter in 1884. The city is situated about 15 miles west of the Blue Mountain range, at an altitude of 1,060 feet; it is surrounded by the beautiful and fertile Walla Walla Valley, over 100 miles in length, forming a part of the ˆInland Empireˆˆ between the Rocky and Cascade ranges, and consisting of a belt of agricultural land, the larger part under cultivation, which yields large crops of wheat, oats and barley, as well as al¬ falfa, vegetables and fruits. The dairy interests are large. In this valley the city of Walla Walla is the centre of trade. It contains an extensive plant for the manufacture of farm machinery and implements, gas and electric-power works, two flourishing mills and lum¬ ber mills ; and has five banks, of which two are national banks. Among its notable public insti¬ tutions are the United States Land Office, United States District Court, an Odd Fellows' home for the State of Washington, the Stubble¬ field home for indigent widows and orphans, with $135,000 of perpetual endowment, and two hospitals. Fort Walla Walla joins the city on the west, and six miles to the west is the monu¬ ment to the memory of the martyred pioneer and patriot, Marcus Whitman. Walla Walla

is also of importance as an educational centre; it has a public library and an excellent system of public schools, including a large high school, and is the seat of the far-famed Whitman Col¬ lege and Academy, a Roman Catholic seminary for girls and an academy for boys, and the Saint Paul's seminary for girls (Protestant Episcopal), while Walla Walla College is lo¬ cated two miles outside the city near the fort. There is a handsome Carnegie library and a commodious Y. M. C. A. building. The city has an excellent supply of pure water from mountain streams, and a first-class system of waterworks owned and operated by the munic¬ ipality. The government is vested in a mayor, elected annually, and a council of seven ; the city officials are mostly elected by popular vote. There are two daily and several weekly news¬ papers. Pop. 15,503. Consult Lyman, ˆHis¬ tory of Walla Walla Countyˆ (1901).

WALLABOUT BAY, a small arm of the East River, extending into Long

Island at Brooklyn, opposite the southeast corner of Manhattan Island. It is separated from the river by an island, which, with the land border¬ ing the bay, belongs to the United States, and is the site of the Brooklyn navy yard. During the Revolution the British prison-ships were stationed in Wallabout Bay.

WALLABY, a native name applied to va¬ rious small kangaroos (q.v.), especially those called brush-kangaroos, which frequent dense scrub-jungle and have great leaping powers. One of the largest species is the red-necked {Macropus ruficollis), which is 40 inches or more long, with a tail 30 inches in length; it is South Australian, and is represented in Tas¬ mania by the smaller Bennet's wallaby. Sev¬ eral other species occur in Australia and Bor¬ neo, one of which (M. theditis) is very common and known to the colonists as pademelon (q.v.).

WALLACE, wol'as, Alfred Russel, Eng¬ lish naturalist and philosopher : b. llsk, Mon¬ mouthshire, 3 Jan. 1823; d. 7 Nov. 1913. He was educated at Hertford Grammar School, and afterward articled to a land surveyor and architect. Later when resident at Leicester as English master at the collegiate school he made the accquaintance of Henry Walter Bates, like himself an enthusiastic entomologist, and in April 1848 the two sailed from Liverpool on a journey to the Amazon Valley, which marks an epoch in scientific travel. They ascended the Tocantins in August 1848, and in the fol¬ lowing year ascended the Amazon. In March 1850 they separated, Wallace taking the basin of the Rio Negro for his ground and Bates that of the Solimoens or upper Amazon. Wal¬ lace returned to England in 1852, and in 1853 published ˆA Narrative of Travels on the Am¬ azon and Rio Negro. ˆ Another result of this journey was a small work on ˆPalm-Trees of the Amazon and their Usesˆ (1853). Of still greater importance to the progress of modern biological geography and philosophy was his eight years' residence (1854-62) in the islands of the Malay Archipelago, because it led him to the formulation of his theory of natural selection, and produced that scientific classic, ˆThe Malay Archipelago, the Land of the Orang-Utan and the Bird of Paradise: a Nar¬ rative of Travel, with Studies of Man and Natureˆ (1867). His natural selection theory

was contained in a paper ˆOn the Tendency of Varieties to Depart Indefinitely from the Orig¬ inal Type,ˆ which he sent to Mr. Darwin in 1858, and on 1 July of that year it was read at a meeting of the Linnaean Society with a state¬ ment of the practically identical theory which Darwin had been elaborating independently for many years. His work in Malaysia is fittingly commemorated by the application of his name to the imaginary line (Wallace's Line) between Bali and Lombok, which, as he showed, marked the boundary between an Asiatic and an Austra¬ lian fauna in the archipelago. In 1870 he pub¬ lished ˆContributions to the Theory of Natural Selection,ˆ and in 1876 issued the first thor¬ oughly scientific treatise on zoogeography, ˆThe Geographical Distribution of Animals, with a Study of the Relations of Living and Extinct Faunas as elucidating the Past Changes of the Earth's Surface.ˆ This subject was further de¬ veloped in the more popular work, Hsland Life, or the Phenomena and Causes of Insular Faunas and Floras, including a Revision and attempted Solution of the Problem of Geological Climatesˆ (1880). ˆTropical Nature and other Essaysˆ (1878) contains suggestive papers on sexual se¬ lection, color in nature and similar subjects, and was reissued, with modifications and additions, in one volume with ˆContributions to the Theory of Natural Selectionˆ in 1891. In ˆDarwinism: an Exposition of the Theory of Natural Selec¬ tion, with some of its Applicationsˆ (1889), he gives a final and masterly statement of the theory of organic evolution as he conceives it, with abundant illustrations from his first-hand knowledge of the facts. He stands by pure Darwinism, refusing to admit the additional elements, such as sexual selection, which Dar¬ win himself adopted in his later works. He refuses to extend evolution to the development of mind, and he adopts Weismann's views on heredity. In short, he holds by organic evolu¬ tion only in so far as it is consistent with or required by a spiritual interpretation of man and nature. His position was, therefore, very much higher than that of Darwin, and went far to remove the barriers between materialism and religion.

Wallace's work was by no means confined to natural history. In 1ˆ6 he issued a work on ˆThe Scientific Aspects of the SupernaturaP ; and in 1875 gave in ˆMiracles and Modern Spiritualismˆ a full statement of his spiritual¬ istic faith. He issued in 1885 a pamphlet en¬ titled ˆForty-five Years of Registration Statis¬ tics, proving Vaccination to be both Useless and Dangerous.ˆ He gave evidence before the recent Royal Commission on the subject, and in 1898 published Waccination

a Delusion, its Penal Enforcement a Crime,ˆ in which he en¬ deavored to prove that the majority report of the commission is opposed to the best evidence laid before it. In ˆLand Nationalization: its Necessity and its Aimsˆ (1882) he compares the landlord-and-tenant system of land tenure with an occupying tenancy under the state, and strongly advocates the latter. A land nation¬ alization society, of which he is president, has been formed to disseminate the principles of his book. ˆBad Times: an Essay on the Present; Depression of Tradeˆ (1885) is another contri . bution to economics. He prepared the volume "Australasiaˆ (1879) in Stanford's ˆCompen¬ dium of Geography and Travel,ˆ and to the

new issue contributed the first of two volumes on Australasia, dealing with Australia and New Zealand (1893). Other works are ˆThe Wˆonderful Century, its Successes and its Failures,ˆ a review of the 19th century (1898) ; ˆStudies, Scientific and SociaP (1901) ; "ˆMan's Place in the. Universeˆ (1903); <My Life> (1905); Hs Mars Habitable?ˆ (1907); AVorld of Lifeˆ (1911) ; ˆSocial Environment and Moral Prog¬ ressˆ (1913) ; ˆThe Revolt of Democracyˆ (1914). He was awarded the Royal Medal of the Royal Society in 1868, the Gold Medal of the Societe de Geographie in 1870, the Darwin Medal of the Royal Society in 1890, the Foun¬ der's Medal of the Royal Geographical Society and the Gold Medal of the Linnaean Society in 1892. Consult Marchant, James, ˆAlfred Rus¬ sel Wallace: Letters and Reminiscencesˆ (Lon¬ don 1916).

WALLACE, Charles William, American teacher of English dramatic literature : b. Hop¬ kins, Mo., 6 Feb. 1865. He was educated at the Western Normal College, the University of Nebraska, where he took his degree in 1898, the University of Chicago, the University of Heidelberg, and took his Ph.D. at Freiburg (1906). He was early known for his Shakes¬ pearean studies and (1904-09) did special re¬ search work on Shakespeare and the Tudor-Stuart drama in "ˆEuropean Archivesˆ which he continued on behalf of the University of Nebraska (1909-16). His publications include ˆLyrics for Leisure Momentsˆ (1892) ; ˆThe Children of the Chapel at Blackfriars, 1597-1603ˆ (1908) ; ˆThree London Theatres of

Shakespeare's Timeˆ (1909) ; ˆShakespeare and his London Associatesˆ (1910) ; ˆThe Evolution of the English Drama up to Shakespeareˆ (1912); ˆThe First London Theatreˆ (1913).

WALLACE, Sir Donald Mackenzie, Eng¬ lish writer: b. 11 Nov. 1841;

d. Lymington, 10 Jan. 1919. He was educated at the uni¬ versities of Edinburgh, Berlin and Heidel¬ berg, and at the Ecole de Droit, Paris He was private secretary to the viceroy of India in 1884-89, attended the tsarvich during his tour in India and Ceylon in 1890-91, was direc¬ tor of the foreign department of the London Times in 1891-99. He published ˆ Russiaˆ (1877; new ed., 1905, 1912); ˆEgypt and the Egyptian Questionˆ (1883) ; ˆThe Web of Em¬ pireˆ (1902), *etc.*

WALLACE, Henry, American agricul¬ tural writer and leader: b. near West Newton, Pa., 19 March 1836; d. Des Moines, 22 Feb. 1916. He was of Scotch-Irish extraction. The first 20 years of his life were spent on his father's farm, in Westmoreland County, Pa. In 1856 he pursued a preparatory course in Geneva Hall, Logan County, Ohio, and, the following year entered the junior class of Jefferson Col¬ lege, Washington, _ Pa., whence he graduated in 1859. After teaching a year in Columbia College, Kentucky he entered Allegheny Theological Seminary, Allegheny, Pa. Subsequently he continued his theological studies . in the United Presbyterian Seminary at Monmouth, Ill. His active service in the ministry was begun in 1863, as pastor of the United Presby¬ terian congregations of Rock Island, Ill. and Davenport, Iowa, and was married the same year to Miss Nannie Cantwell, of Mansfield, Ohio. In 1871 he assumed the pastorate of

the United Presbyterian Church at Morning Sun, Iowa, which he filled until 1876. In 1877, because of failing health, he retired from the ministry and settled on a farm at Winterset, Iowa. Within a year he was editing a farm page , on a local paper. In 1879 he bought an interest in the Winterset Chronicle. In 1883 he became editor of the' Iowa Homestead. In 1895, with his two sons, he founded Wallace's Farmer at Des Moines, Iowa, of which he rernained in editorial control during the rest of his life. Although this paper was primarily established as an exponent of Iowa agricul¬ tural interests, where it wielded a powerful in¬ fluence, it soon had a circulation which ex¬ tended far beyond the bounds of that State. Mr. Wallace was appointed by President Roose¬ velt as a member of the Country Life Com¬ mission in 1908, and gave his whole time to the work of that commission for four months. Incidental to his editorial work, he wrote sev¬ eral books which were of practical value, namely, ˆClover Farming, > ˆ How to Make Good Dirt Roads, ˆ ˆThe Skimmilk Calf,ˆ ˆTrusts and How to Control Themˆ and ˆUncle Henry's Talks with a Farm Boy,ˆ of which the last mentioned perhaps was most widely cir¬ culated and read. In 1910 he was president of the National Conservation Congress. In ,1911 he was selected as national chairman of the Men and Religion Movement. In 1913 he was appointed by Governor Clarke, of Iowa, with former Secretary of Agriculture James Wilson, to investigate agricultural conditions in Great Britain. His death occurred 22 Feb. 1916 in the First Methodist Episcopal Church of Des Moines, at a meeting of the Interdenomina¬ tional Laymen's Missionary Convention, of which he was chairman.

WALLACE, Horace Binney, American scholar: b. Philadelphia, Pa., 26 Feb. 1817; d. Paris, France, 16 Dec. 1856. He was gradu¬ ated at Princeton (1835) ; studied medicine, chemistry and law but never adopted a profes¬ sion and devoted himself to literary pursuits. He traveled in Europe (1849-52). A mental disease impelled him to suicide. He was the author of ˆStanley, or the Recollections of a Man of the Worldˆ (Philadelphia 1838) ; aided Griswold in preparing ˆNapoleon and the Mar¬ shals of the Empireˆ (2 vols., 1847) ; wrote ˆArt, Scenery and Philosophy in Europeˆ (1855); and, with J. S. Clarke

Hare, edited ˆAmerican Leading Cases in Lawˆ (2 vols., 1847) ; ˆSmith's Leading Casesˆ (2 vols., 1852), and White and Tudor's ˆLeading Cases in Equityˆ (2 vols., 1852).

WALLACE, John Findley, American civil engineer: b. Fall River, Mass., 10 Sept. 1852. He was educated at Monmouth College and the University of Wooster, and in 1869-70 was engaged in railway service. In 1871 he became assistant engineer of the United States Engineers, and was appointed county surveyor and city engineer in 1878. He has been engaged as chief engineer and superintendent on vari¬ ous railroads since 1879, and in 1891 entered the service of the Central Railroad, becoming general manager of the Illinois Central system in 1902. In 1904 he was appointed chief engi¬ neer in charge of building the Panama Canal. On 29 March 1905 he with the other mernbers of the commission resigned, was reappointed

on 3 April, but again resigned 24 June 1905. From 1906 he has been prominently identified with important corporation work.

WALLACE, Lewis (better known as ˆˆLewˆOi American soldier and author: b. Brookville, Franklin County, Ind., 10 April 1827 ; d. Crawfordsville, Ind., 15 Feb. 1905. He studied law; at the beginning of the Mexican War en¬ listed as second lieutenant in the First Indiana Infantry; in 1848 began professional practice, which he carried on at Covington, Ind., and Crawfordsville, Ind., and for four years was in the State senate. At the outbreak of the Civil War he was appointed adjutant-general of Indiana and soon afterward colonel of the 11th Indiana Volunteers; on 3 Sept. 1861 was made a brigadier-general of volunteers; and for ability displayed in leading a division at Fort Donelson (q.v.) was made major-general of volunteers 21 March 1862. He participated in the second day's fight at Shiloh, and in the advance on Corinth; was president of the court of inquiiy regarding Don Carlos Buell (Novem¬ ber 1862) ; in 1863 prepared the 'Cincinnati de¬ fenses and later was made commander of the Eighth army corps, with headquarters at Balti¬ more. At the battle of the Monacacy (9 July 1864) he was defeated, but detained the enemy until Wright, with reinforcements, could reach Washington before Early. In 1865 he resumed law practice; in 1878-81 was governor of New Mexico, and in 1881-85 was Minister to Turkey. His fame as a writer rests principally upon ˆBen Hur,ˆ a tale of the time of Christ, to which he devoted .some seven years. It was immensely popular. Though his syntax was not always of the best, Wallace had a most charm¬ ing and unique method of enthusing and hold¬ ing the reader. The book sold into the

hun¬ dreds of thousands and has become a standard classic. He also wrote a ˆLifeˆ of Benjamin Harrison (1888) ; and ˆThe Prince of Indiaˆ (1893). See Ben Hur.

WALLACE, Sir Richard, British art col¬ lector: b. 1818; d. 1890. He is reputed to have been a natural son of Maria, Marchioness of Hertford, wife of the 3d marquis, but during his lifetime he was supposed to have been the son of the 4th marquis, who was but 18 years his senior. However, it was under the auspices of Maria that he was educated at Paris, where he collected many fine objets d'art, selling these in 1857 at considerable gain. After this, he devoted himself to assisting the 4th marquis in making elaborate art collections. On the death of the Marquis of Hertford in 1870, Wallace in¬ herited his unentailed property, also the fortune of that lord which included Hertford House, London, a Paris residence, Irish estates at Lis¬ burn and splendid art treasures. During the siege of Paris (1871) Sir Wallace distinguished himself by his philanthropic services to the city, equipping several ambulances, and found¬ ing the Hertford British Hospital for the relief of the sufferers. In recognition of his services, he was created a baronet (1871). He sat in Parliament for Lisburn from 1873-85. He was one of the British commissioners to the Paris Exposition in 1878; a trustee of the National Gallery of London, and also of Ireland. He was made Knight Commander of the Bath and Commander of the Legion of Honor. On the death of his wife, the Hertford-Wallace

collection was left to the English nation, which secured Hertford House as its repository.

WALLACE, Str V/illiam, Scottish patriot and hero; b. probably Elderslie, Renfrewshire, about 1272; d. London, 24 Aug. 1305. Owing to the want of contemporary Scottish records, the real facts regarding his life and achieve¬ ments remain in much obscurity, many inci¬ dents resting solely on the authority of Blind Harry, who wrote about 200 years later, and can hardly be regarded as a serious historian. Wallace is represented as having been for some years engaged in a partisan war against the English before what is represented by Blind Harry as the turning-point in his career took place, the burning of the town of Lanark and the murder of Hezelrig, the sheriff. This inci¬ dent is ascribed to May 1297. Soon afterward he attacked Ormesby, the justiciar, while holding a court of justice at Scone, and Bek, bishop of Durham, at Glasgow, whom he put to flight. Among the followers of Wallace about this time was William of Douglas, the representa¬ tive of a great Border family, which subse¬ quently contributed invaluable aid to the war of independence. Sir Henry Percy and Sir Henry Clifford were sent to repress the Scottish rising. Wallace took most of the northern fort¬ resses, and was besieging the Castle of Dundee, when he heard that the enemy was advancing upon Stirling. He took up a position encom¬ passed by a loop of the Forth in front of the Abbey Craig, a hill near the Abbey of Cam-buskenneth. Surrey determined to attack him, and the English crossed the*Forth on a narrow bridge from early morn till near noon, while the Scots were drawn up as spectators of their passage on the hill (11 Sept. 1297). When Wal¬ lace deemed the enemy sufficiently divided he attacked those who had crossed with his whole force, sending at the same time a detachment to secure and hold the head of the bridge. The victory was complete. Cressingham was killed and Surrey fled to Berwick. After this Wallace appears with the title of guardian of the kingdom, which was temporarily cleared of the English, and is found conducting an inva¬ sion, or series of organized raids, into England. In 1298 Edward entered Scotland with an army estimated at 7,000 men-at-arms and 80,000 foot¬ men. Wallace retired before him, wasting the country, but was at length overtaken at Falkirk in a position where he was compelled to fight. He drew up his army on an inclined plain with his horsemen, about 1,000, in the rear (22 July 1298). The footmen were arranged in circles, the bowmen in the centre, and the spearmen

in the front rank kneeling. In this order they resisted for a time the attacks of the English men-at-arms, but the circles were gradually broken and the army routed. After this Wal¬ lace for a time disappears from the scene. The council of regency which succeeded him carried on the war for some time with spirit; but on 9 Feb. 1304 they and their followers were ad¬ mitted to King Edward's peace. Wallace was excepted by name. He was then in the country, and every exertion was made to secure his ap¬ prehension. It was effected through Sir John de Menteith, governor of Dumbarton Castle. He was conveyed to London, through which he was carried on 22 Aug. 1305. He was put on trial at Westminster before a special commis¬

sion, and was executed for treason and rebel¬ lion, though he had never recognized Edward, and the latter explicitly claimed dominion over Scotland as a conqueror only. He appears in literature in Porter's ˆScottish Chiefsˆ (1810), and Buchanan's AVallace: A Tragedyˆ (1856). Besides the histories of Scotland and others re¬ lating to the period consult the biographies by Carrick (3d ed., 1840) ; Tyler (2d ed., 1845) ; Moir (18ˆ), and Muirson (1898) ; the edition of Blind Harry by Jamison (J820) ; and Ste¬ venson, ˆWallace .Papersˆ (1ˆ2).

WALLACE, William, American manufac¬ turer: b. England, 1825; d. Washington, 20 May 1904. Early in life he came to the United States with his father and established the firm of Wallace and Sons at Ansonia, Conn., which soon became one of the leading manufactories of copper and brass alloys in the United States. Becoming associated with Moses G. Farmer (q.v.), they began the manufacture of a com¬ pound telegraph wire, consisting of a steel core and an electrotyped copper covering, thus giv¬ ing conductivity and strength, combined with lightness. In 1876, at the Centennial Exhibition, he brought out the Farmer-Wallace dynamo ma¬ chine, with which the buildings were success¬ fully lighted, being the earliest general electric lighting in this country. A year or two later he devised a plate arc lamp for use with this ma¬ chine, by means of which a number of arc lights could be placed in series on the circuit, thus originating the series method 'of arc lighting. For several years before his death he was en¬ gaged in scientific investigations, especially in work with the microscope.

WALLACE, William Harvey Lamb,

American soldier: b. Urbana, Ohio, 8 July 1821 ; d. Savannah, Tenn., 10 April 1862. He removed with his father to Illinois in 1833, studied law and in 1846 was admitted to the bar. At the outbreak of the

Mexican War he en¬ listed as a private, later becoming adjutant, and served at Buena Vista and in other operations until the end of the war, when he returned to his law practice. He became district attorney in 1853 and in 1861 he was appointed colonel of volunteers in the Union army. He com¬ manded a brigade at Fort Donelson, February 1862, was promoted brigadier-general and in the battle of Shiloh commanded Smith's old division. The brigade withstood an assault of six hours and was last to leave the field, Wal¬ lace falling, mortally wounded.

WALLACE, William Vincent, Irish musi¬ cal composer: b. Waterford, 1 July 1813; d. Chateau de Bagen, in the Pyrenees, France. 12 Oct. 1865. He gave evidence of great musi¬ cal ability, became a skilful player on several instruments and in 1829 was organist in Thurles Cathedral. His enthusiasm was stimulated by hearing Paganini play in 1831 and in 1834 he played a violin concerto composed by himself. He went to Australia in 1835 and worked at sheep-farming, but soon returned to music and traveled to New Zealand, where he had a rornantic escape from assassination by the Maoris. His later travels proved very profit¬ able from a financial point of view. He re¬ turned to London m 1845 and toward the end of that year his popular opera of ˆMaritanaˆ was produced at Drury Lane with great success. *ˆMatilda of Hungaryˆ (1847)

was damaged by an exceedingly bad libretto. After a voyage to America He again settled in England in 1853, and in 1860 ˆLurline,ˆ a better work than ˆMaritana,ˆ was' produced with even greater success at Covent Garden. Other operas were the ˆ Amber Witchˆ (1861) ; ˆLove's Triumphˆ (1862) ; ˆThe Desert Flowerˆ (1863) ; and ˆEstrella, ˆ the last left unfinished at his death.

WALLACE, Idaho, city and county-seat of Shoshone County on the Northern Pacific and the Oregon-Washington railroads, 130 miles east of Spokane. It is the centre of the Coeur d'Alene district. In 1892 it was in¬ corporated. Pop. about 3,000.

WALLACEBURG, Canada, town in the province of Ontario, Kent County, on the Pierre Marquette, Grand Trunk and Canadian Pacific railways and on the Sydenham River, 17 miles northwest of Chatham._ It has flax, glass and lumber manufacturing interests. Pop. about 3,800.

WALLACE'S LINE, an imaginary line, so called in compliment to Afred Russel Wallace (q.v.), separating the Oriental from the Aus¬ tralian faunas. It passes between the Sulu and Philippine Islands, along the Straits of Macas¬ sar and between Lombok and Java. The fauna west of this line is strikingly different from that east of it, although the opposite shores of dividing waters are sometimes only a few miles apart. See Zoogeography.

W ALLACHIA, w6-la'ki-a, southern Europe, a former principality, united with Moldavia in 1861 to form the kingdom of Rumania. See Rumania.

WALLACE, wol'ak, James William,

American actor: b. London, 24 Aug. 1795; d. New York, 25 Dec. 1864. He made his first appearance on the stage when a child. In 1813 he began his permanent career, playing as Laertes in < Hamletˆ at Drury Lane. He made his first visit to the United States in 1818 and subsequently for 20 years lived alternately in England and in the United States, playing at different times in all the principal cities of the Union. In 1820 he became stage manager at Drury Lane and in 1837 opened the National Theatre in New York. This was destroyed by fire in 1839 and in 1852 he opened Wallack's Lyceum, rebuilt as Wallack's Theatre in 1861. His career as actor and manager was uni¬ formly successful and in the presentation of comedy he had few equals. As a manager he was greatly aided by his knowledge of stage-effects and his artistic adaptation of scenery and costumes. Consult Wallack, Lester, < Mem¬ ories of Fifty Yearsˆ (1889).

WALLACK, John Lester, American actor,

son of James William Wallack (q.v.) : b. New York, 1 Jan. 1820; d. Stamford, (Zonn., 6 Sept. 1888. He made his debut as an actor in New York in 1847, succeeded his father as manager of Wallack's Theatre, New York, in 1864 and conducted it with great success. He adapted several French comedies to the American stage, and in 18ˆ retired after having been identified with the American stage as actor and manager for 40 years. He wrote < Memories of Fifty Yearsˆ (1889). Consult Mackay and Wingate, 'Famous American Actors of To-dayˆ

(1896).

WALLAS, Graham, English author: b. Sunderland, 31 May 1858. He was educated at Corpus Christ! College, Oxford (1877-81), was a classical schoolmaster (1881-90), uni¬ versity extension lecturer (since 1890), lecturer London School of Economics (since 1895), pro¬ fessor in political science, London University (1914), member of Royal Commission on Civil Service (1912-15), Lowell lecturer, Bos¬ ton (1914). He is the author of one of the 'Fabian Essays^ (1889) ; 'Life of Francis Place^ (1897) ; 'Human Nature in Politics^ (1908) ; 'The Great Society^ (1914), *etc.*

WALLASEY, w61'a-si, England, an indus¬ trial town suburban to Liverpool, in Cheshire, two miles northwest of Birkenhead, near the seaward extremity of the Wirral peninsula, protected by the notable Wallasey embank¬ ment. The town was destroyed by fire in 1857 and rebuilt. It has a workingmen's institute, a 16th century reorganized grammar school and is noted for its municipal ownership of public utilities, water, gas, electric-lighting, street railways, baths, cottage hospital, *etc.*

WALLENSTEIN, val'len-stln or wol'en-stln (or more recently Waldstein), Albrecht Wenzel Eusebius Von, Duke of Friedland and Mecklenburg, and Prince of Sagan, German soldier: b. Hermanic, Bohemia, 15 Sept. 1583; d. Eger, Bohemia, 25 Feb. 1634. He studied under the Jesuits at Olmiitz and after accepting the Catholic faith finished his studies at the universities of Altdorf, Bologna and Padua. In 1617, on assisting the Archduke Ferdinand in the latter's war against Venice, he was raised to the rank of count and made a colonel. When Bohemia revolted, he raised a regiment of cuirassiers for the emperor and fought against Thurn and Bethlen Gabor. When the estates of the vanquished Bohemians were confiscated in 1620 and sold to imperial adherents at nom¬ inal prices, he purchased extensive tracts, including the domains of Friedland and Reich-enberg. In 1623 he was made Duke of Fried¬ land and in 1624 his collective estates were elevated to a principality. He now applied him¬ self to the care of these dominions. When the emperor was involved in new troubles by the Lower Saxon League in 1625 he offered to rais'e 20,000 men for the imperial service by his own efforts. In return he was to have full control in the hostile provinces. Before he had com¬ pleted his levy he was named generalissimo and field-marshal, and then set out at the head of 30,000 men to co-operate with Tilly (q.v.). On 25 April 1625 he gained a victory over Count Mansfield at Dessau and when

that gen¬ eral proceeded at the close of the year to Hun¬ gary to join Bethlen Gabor, he followed and brought Bethlen to conclude a truce. In the campaign of 1627 he conquered Silesia, drove the Danish king out of Germany and forced his way into northern Jutland, bought from the emperor the dukedom of Sagan at a price in which his military expenses were reckoned. The estates of Mecklenburg having been for¬ feited in the war, he was invested with them, first as security for his expenses and afterward as a regular fief in 1629. The attempt to take Stralsund was wholly unsuccessful (1628). In 1630, owing to the jealousy of the nobles, Wal¬ lenstein was deprived of his command.

When Gustavus Adolphus invaded Germany,

Wallenstein attempted to negotiate with him on his own accouni, but the distrust of the Swedish hero frustrating his intentions, he listened to the earnest entreaties of the emperor and again took the field, having procured a formal capit¬ ulation securing to himself almost absolute power. After some partial successes he en¬ countered the king of Sweden at Liitzen, 16 Nov. 1632, in which battle “Wallenstein was defeated and Gustavus killed. After the death of the Swedish king he had reopened negotia¬ tions with the enemies of the emperor, by whose assistance he hoped to place himself at the head of affairs in Germany. The matter pro¬ ceeded slowly as his offers were received with much distrust, especially by the German princes ; he resumed hostilities to make his value felt, then reopened negotiations. His proceedings were known at the court of Vienna; but he was at the head of an army largely consist¬ ing of foreigners, many of whose leaders were personally pledged to him alone. The emperor was not strong enough to remove him and was base enough to have recourse to assassi¬ nation. On 24 Jan. 1634 he signed a secret patent conferring the command of the army on Count Gallas, who was instructed to arrest Wˆallenstein and his associates and throw them into prison. On 18 February an open procla¬ mation was made commanding the army to obey only Generals Gallas, Piccolomini and others named. Wallenstein left Pilsen with some of his confidential associates on the 23d to take refuge in the fortress of Eger, which he reached on the 24th. Here he was assassinated on the evening of the 25th. The plenipotentiary of Saxony and Brandenburg had reached Zwickau and the plenipoteniary of France Frankfort, on their way to Wallenstein’s headquarters, when they received word of his death. The emperor openly rewarded the assassins, among whom were two Scotchmen and two Irishmen, Gordon, Leslie, Butler and Devereux. Wal¬ lenstein’s overtures to the enemies of the empire have been represented by his partisans as rtises de guerre.

A vigorous controversy has been waged over the matter. As an organizer and leader of armies he must be ranked among the great commanders. In a time of excessive confusion he maintained a statesmanlike control of diffi¬ cult affairs. His career was made the basis of Schiller’s trilogy of ˆ Wallenstein. > Consult the lives by Forster (1834) ; von Ranke (5th ed., 1895) ; Aretin (1846) ; Hurter (1855) ; For¬ ster’s ed. of the ˆBriefe Wallensteinsˆ (1828-29) ; Schebek, ˆDie Losung der Wallenstein-fragеˆ (1881) ; Bilck, ˆBeitrage

zur Geschichte Wallensteinsˆ (1886) ; Schulz, ˆWallenstein und die Zeit des Dreissigjahrigen Krieges ˆ (1898). See Thirty Years' War.

WALLENSTEIN. This work of Schiller is a massive drama in 10 acts artificially so divided that the first part, called the ˆˆPiccolomini,® with the introductory poem called ˆˆThe Camp,® is about as long as the second part called ®The Death of Wallenstein.® It is often wrongly called a trilogy, nor is it strictly right to speak of a ˆPiccolomini® tragedy. Its central theme is the revolt of the imperial general-in¬ chief against Kaiser Ferdinand II which led to the defection of his troops and his assassina¬ tion on the night of 25 Feb. 1634. The tragedy was the outgrowth of studies for Schiller's

ˆHistory of the Thirty Years' War,ˆ the first part of which appeared in 1791, but the mass of historical detail was so enormous that it was not completed till 12 Oct. 1798, after two years of intensive work. It is the first, per¬ haps the greatest, work of the mature Schiller, whose study of aesthetic principles and the philosophy of Kant, of Shakespeare's dramas, of which he translated Macbeth, along with the counsel of his new friend Goethe, made him realize in contrast with his earlier subjective work that strict objectivity is the fundamental law of the highest art. He no longer identifies himself with his favorite character and the hero becomes a stern, though intensely human, inordinately ambitious character of the Na¬ poleonic type, yet lacking the Corsican's im¬ petuous initiative.

Although Schiller was not a scientific his¬ torian he divined the nature of the real Wal¬ lenstein in spite of prejudiced and defective sources. The general who had conquered Prot¬ estant Germany and laid it prostrate at the feet of the kaiser, only to be supinely dismissed by his weak master, has been recalled from private life to save Ferdinand's throne from the suc¬ cessful Swedes. He is beaten at Liitzen by Gustavus Adolphus, who loses his life. Retiring to Bohemia he wastes valuable time in nego¬ tiations pointing to the end of the war, until the emperor, alarmed at the capture of Regens¬ burg, orders and implores his stubborn, perhaps already disloyal, general to drive back the enemy. It is winter and Wallenstein refuses. He summons his generals, who pledge him their support, which action is misconstrued at "Vienna. Secret orders relieving the soldiers of their obedience are sent to Octavio Piccolomini and amid the general defection Wallenstein flees to Eger, where he is assassinated.

Wallenstein was a realist without faith in the noble side of human

nature. For him every man has a price. Originally faithful to the kaiser, he learns to despise him after the disgrace of his dismissal and transfers his al¬ legiance, as Schiller makes it, to an ideal of Germany; but his enemies claimed he sought the crown of Bohemia. His dictator's power and his negotiations with the Protestant states caused him to toy with the idea of treason but he lacked the resolution to cross his Rubicon and vacillated; this Schiller has finely deline¬ ated in Wallenstein's devotion to astrology and his waiting for the right conjunction of the stars. He underestimates the power of the ideal to which Schiller gave concrete expression in his creation of the roles of the lovers. Max Piccolomini and the general's daughter, Thekla, neither of whom ever existed. In a certain sense the ideality of these two pure souls destroys Wallenstein at the critical moment when it is thinkable that Max's example would have saved the general. Some critics have con¬ demned the Max and Thekla scenes, but un¬ justly, for they represent a part of the moral force by which even the elder Piccolomini was undoubtedly animated even though he too is urged on by motives of ambition and a disloy¬ alty to his trusting friend, strongly suggestive of Judas Iscariot. However, it would be wrong to regard Piccolomini merely as a stage villain. He is the living representative of the opposi¬ tion, of those forces which are concretely ex¬ pressed by Kaiser Ferdinand, his ministers and

the imperial state. ˆ Another remarkable cre¬ ation of Schiller's is the Grafin Terzky, whose admiration for her brother-in-law is more nearly love and whose intrigues as a sort of female Mephistopheles or Lady Macbeth reveal the ambitious and treasonable side of Wallenstein's character as in a mirror.

The success of the drama was immediate and sustained and the more so because it af¬ forded so many parallels with the rising career of Napoleon, though of course through no intention of Schiller's. The rimed, ˆˆcorduroy-road® verse of the *Camp® is followed up by the blank verse of the drama proper, the diction of which is differentiated only in accordance with character, never with mental equipment, as

was the classical principle and the stern, forbidding, supposedly taciturn hero displays at times a volubility, which is, to say the least, unexpected. And so it is with all the principal characters, whose speeches are expected to reveal all of what they think and which many keep silent.

Editions. — (First) : Wallenstein, Tubingen 1800. Cotta; (Best): Sakular-Ausgabe, Werke 1904 — Vol. V, J, Minor; (Critical): in Karl Goedeke's Historischkritische Ausgabe. Vol. XII, Stuttgart 1872; (American School) : Max Winkler, Macmillan 1901. For criticism consult Calvin Thomas's ˆLife of Schillerˆ (New York 1909) ; Wilhelm Scherer in ˆHistory of German Literatureˆ (trans. by Mrs. F. C. Conybeare. New York 1893) ; Karl Werder, Worlesungen fiber Schiller's Wallensteinˆ (Berlin 1899) ; Gus¬ tav Freytag, ˆTechnik des Dramas' (Leipzig 1898; trans. by E. T. MacEwan, Chicago 1895). There are many English translations of Wal¬ lenstein, the most celebrated being by Samuel Taylor Coleridge.

Carl E. Eggert.

WALLER, wol'er, Edmund, English poet: b. Coleshill, Hertfordshire (now in Buckingham¬ shire), 3 March 1606; d. Beaconsfield, 21 Oct. 1687. He was educated at Eton and King's College, Cambridge, and was returned a mem¬ ber of Parliament for Amersham before he was 18. In 1625 he was returned for Chipping Wy¬ combe and he sat for other places in several Parliaments, including the ˆ Long Parliament. On the death of his wife in 1634 he courted Lady Dorothea Sydney, whom he celebrated in his verses under the name of ˆSacharissa,ˆ and Lady Sophia Murray, whom he distin¬ guished by the name of ˆArmoret,ˆ both with¬ out success. In Parliament he at first opposed the court party, but retained his place in the Long Parliament and openlyˆ expressed his royalist sentiments after the Civil War began. He was sent as a commissioner from Parlia¬ ment to the king after Edgehill and soon after this occurred the incident called Waller's plot. Its nature is not clearly understood, though Waller made an abject confession of all he knew, including the names of his confederates, some of whom, his near relatives, were put to death. This event in his life is introduced in Beatrice Marshall's story ˆAn Old London Nosegayˆ (1904). He was imprisoned for a year, fined £10,000 and exiled. During this exile the first collection of his poems was published in 1645. In 1653 he obtained per¬ mission from Cromwell to return to England and in 1654 he addressed a < Panegyric to the Lord Protectory In 1656 he recommended him

in another poem to assume the royal title. Shortly after a poem on the death of the lord-protector, he addressed one to the king on his majesty's happy return. The proceedings of Monk apparently had not been anticipated. He again sat in Parliament, at intervals of cessa¬ tion, till the reign of James H. Burnet says his popularity in Parliament was great, but he did not take pains to understand its business, but only studied to gain applause, being a vain and empty though a witty man. His poetry was celebrated for elegance and polish at a time when these graces had been comparatively little studied, but it is destitute of all great qualities. The one most quoted is ˆGo, Lovely Rose.ˆ Consult Gosse, H7th Century Studies® (1897) ; and Thorn-Drury's ˆWaller's Poetical Worksˆ (with biography, 1893).

WALLER, Frank, American artist and architect: b. New York, 12 June 1842. He was educated at the Free Academy in New York, studied art in Rome (187(>-71), and the next year made a sketching tour in Egypt. He was a founder and the first president of the Art Students' League and since 1888 has de¬ voted his attention to architecture. Among his paintings may be cited ˆTombs of the Caliphsˆ (1874) ; ˆA Caravan in the Desertˆ (1878) ; ˆEventide: Venice' (1883) ; ˆHop Pick¬ ing' (1885). He published ˆReport on Art Schools' (1879) and a ˆReport' of the Art Students' League.

WALLER, Thomas McDonald, American politician: b. New York, about 1840. Being an orphan newsboy in New York, he was adopted into the family of a resident of New London, Conn., and assumed the family name instead of his own surname Armstrong. He studied law, was admitted to the Connecticut bar 1861, and quickly reached high rank as an advocate. He was elected as Democrat to the Connecticut legislature 1867-68, 1872-76, and in his last term was speaker of the house. He was Connecticut secretary of State 1870, mayor of New London 1873, State attorney 1876-83, governor 1882. He was United States Consul General at London 1885-89. He then returned to the practice of law in New London, and repeatedly refused to again hold office.

WALLIN, vaTlen', Johan Olof, Swedish poet and ecclesiastic: b. Dalarna, Sweden, 15 Oct. 1779; d. Upsala, Sweden, 30 June 1839. He studied at Upsala and in 1806 was pastor of the Royal Military Academy. He subsequently held pastorates at Solna, Ulriksdal and Vesteras and in 1837 was made archbishop of Upsala. His hymns and religious songs are in high repute in Sweden and he was called by Tegner ˆˆDavid's Harp of the North." Among his poems are ˆThe

Educator,' a didactic poem in Alexandrines ; verses on George Washington, ˆHomesickness' and ˆThe Angel of Death,' one of his best-known poems. He was a notable pulpit orator. His collected works in two volumes appeared in 1848.

WALLING, William English, American economic writer : b. Louisville, Ky., 14 March 1877. After graduation at the University of Chicago (1897) he did graduate work in eco¬ nomics and sociology (1899-1900), was factory inspector of Illinois (1900-01) and was resident at the university settlement in New York (1902-05). He is a member of various sociological

societies. His publications include ˆRussia's Messageˆ (1908) ; ˆSocialism as It Is> (1912) ; ˆThe Larger Aspects of Socialismˆ (1913) ; ˆProgressivism and Afterˆ (1914) ; ˆSocialism and the Warˆ (1915). He edited ˆThe Social¬ ism of To-Dayˆ (1ˆ6) and ˆState Socialism Pro and Con> (1917).

WALLINGFORD, wol'ingford, Conn., borough, New Haven County, on the Quinnipiac River and on the New York, New Haven and Hartford Railroad, about 22 miles south of Hartford and 12 miles north of New Haven. The borough has broad, regularly laid-out streets, lined with large elm trees. The chief manufacturing establishments are sterling silver, silver-plate and nickel works, a rubber goods factory and brass goods factories. Britannia and ironware are among the manufactures. The government census gives the number of indus¬ trial establishments of the whole town (which includes two villages, East Wallingford and Yalesville, besides the borough) as 70. The town is one of the oldest settlements in Con¬ necticut ; it received its present name in 1670. In 1850 a branch of the Oneida Community (q.v.) was located here; for some years it pros¬ pered and was largely in control of the town, but on the dissolution of the parent body the Wallingford Community disorganized. The property is now owned by the Free Masons and the State Masonic Home has been erected here. There are two banks and two daily and two weekly newspapers ; also six churches, a public high school, the Phelps School for Girls, a number

of graded schools and a public library. Pop. (1920) 9,648.

WALLINGFORD, Vt., a town in Rutland County, on Otter Creek and the Bennington and Rutland Railway, nine miles south of Rutland, 59 miles southwest of Montpelier and about 11 miles southwest of Killington Peak. Included in it are the villages of Wallingford, South - Wallingford and East Wallingford. It has two hotels, four churches, a public high school and manufactures of harness, tinware, coffins and caskets and agricultural implements. Pop. about 1,719.

WALLINGTON, N. J., borough of Bergen County, almost adjacent to Passaic and nine miles north of Newark. It has lumber mills, chemical works and a handkerchief factory. Pop. (1920) 5,635.

WALLIS, wol'is, John, English mathemati¬ cian ; b. Ashford, Kent, 23 Nov. 1616; a. Ox¬ ford, 28 Oct. 1703. He was educated at Em¬ manuel College, Cambridge, took holy orders and in 1641 became chaplain to a Yorkshire baronet. He was one of the first members of the scientific association which became later the Royal Society and in 1649 was appointed Savilian professor of geometry at Oxford. He was particularly skilful in the art of cryptog¬ raphy, or deciphering ; and having by this means been enabled to render considerable service to the royal cause, he was on the restoration of Charles H made one of the royal chaplains. In 1661 he was one of the divines appointed to revise the Book of Common Prayer; and when the Royal Society was founded in 1663 his name was included in the list of the earliest members ; he added much to the reputation of that body by valuable contributions to the ˆPhilosophical Transactions.ˆ Modern al¬

gebra owes much of its completeness to his elucidation of the principles. Among his mathe¬ matical works the most important are 'ˆArith-metica Infinitorumˆ ; ˆMathesis Universalis, sive Opus Arithmeticumˆ ; WIechanica, sive de Motu Tractatus geometricusˆ ; ˆDe Section-ibus- Conicis Tractatusˆ ;' and his 1 Algebra.ˆ He also published editions of Archimedes, Ptolemy, Aristarchus and Porphyry. His com¬ plete works, including various treatises on theology, were published at Oxford (1692-99).

WALLIS, Sir Provo William Parry, Eng¬ lish naval officer: b. Halifax, Nova Scotia, 12 April 1791 ; d. Funtington, near Chichester, England, 13 Feb. 1892. He entered the British navy as a midshipman in 1804 ; served against the French and in the War of 1812 with the United States was second lieutenant on the Shannon. He was on board this

ship in the fight with the Chesapeake and upon the disablement of the captain and death of the lieutenant, Wallis took command and conducted the prize to Hali¬ fax, receiving promotion to commander in recognition of his services. He was aide-de- camp to the queen in 1847-51 and in the last-named year was promoted rear-admiral. He became vice-admiral in 1857, admiral of the white in 1863 and of the fleet in 1877. Con¬ trary to the usual rule of retirement at the age of 70 Wallis was retained on the active list until his death and for many years he was the only surviving flag-officer who had fought in the Napoleonic wars and in the war with America in 1812.

WALLIS, Severn Teackle, American law¬ yer: b. Baltimore, Md., 8 Sept. 1816; d. there, 11 April 1894. He was graduated from Saint Mary's College, Baltimore, in 1832 and was admitted to the bar in 1837. He became cor¬ responding member of the Royal Academy of History at Madrid in 1843 and in 1849 went to Spain as United States agent to examine the title to public lands in East Florida as affected by the treaty of 1819. He was elected to the Maryland legislature in 1861 and there took a firm stand against action of the North in regard to the Civil War. He was imprisoned by the Federal government for 18 months, together with other prominent Marylanders, and then released. He resumed his law practice and in 1870 was elected provost of the University of Maryland. He published ˆGlimpses of Spain' (1849) ; ˆA Discourse on the Life and Charac¬ ter of George Peabody' (1870), *etc.*

WALLIS ARCHIPELAGO, Pacific Ocean, a group of islands northeast of Fiji, with an area of 40 square miles. They were placed under a French protectorate in 1887, have a French resident and are in regular communi¬ cation with Noumea. Pop. about 6,000, mostly industrious and peaceable Polynesians.

WALLKILL (wal'kil) RIVER, a river taking its rise in Sussex County, N. J., and flowing north and northeast through Orange and Ulster counties, _N. Y. About six miles from the Hudson it joins the Rondout Creek and below the junction the stream is some¬ times called the Wallkill. The Wallkill is about 120 miles in length and furnishes con¬ siderable water power.

WALLON, va-16n, Henry Alexandre,

French historian: b. Valenciennes, France, 23

pec, 1812; (1. 13 Nov. 1904. He was educated in the Normal School at Paris and in 1840 was appointed to the chair of modern history and geography at the Sorbonne. He was elected to the Legislative Assembly in 1849 but resigned in the following year ; became a member of the National Assembly in the year 1871; and in 1875-76 was Minister of Public Instruction. The complete establishment of the republic was largely due to his amend¬ ment, the ˆAmendment Wallon,ˆ carried 30 Jan, 1875, which subsequently gave him the sobriquet ˆ'ˆFather of the Republic.ˆˆ In 1876 h'c became a member of the Senate. His writings include ˆDe I'Esclavage dans les Coloniesˆ (1847) ; ˆJeanne d'Arcˆ (2 vols., 1860) ; ˆLa Vie de Jesus et son Nouvel His-torienˆ (1864) ; ˆLa Terreur, Etudes Critiques sur I'Histoire de la Revolution Frangaiseˆ (1872) ; 'ˆLes Representants du Peuple en Mission, etc,ˆ (1793-94; 5 vols., 1888-90), *etc.*

WALLOONS. Of these descendants of the ancient Gauls, of whom Csesar wrote ˆTorum omnium fortissimi sunt Belgae® (the bravest of all these [tribes] are the Belgians) we write only in their relations to American history. In modern geography, the people speaking the old French, or Romaic language, with many added elements, the Walloons (first so-called in Holland Dutch) inhabit the southern half of bi-lingual and di-ethnic Bel¬ gium and portions of France, Luxembourg and Rhenish Prussia. The home of the _ Belgic Walloons being a tract of country which has been the eternal battle ground of Celt or Frank and Teuton, not being militarily de¬ fensible, they have suffered from the invasions oi Csesar, Alva and the German Emperor Wil¬ liam of our day. When in 1567 the Spanish army entered with fire and sword, 100,000 of the Protestant people of the Belgic Nether¬ lands fled to England. An equal or greater number were refugees in the Dutch Republic, — here called 'ˆToreignersˆˆ (Walloons); where, besides several regiments of Walloon soldiers, 70 Walloon churches were formed, whos's history is known. In Leyden, hundreds of these refugees who spoke French v/ere neighbors of the Pilgrim Fathers of New England. Led by Jesse de Forest, they applied to King James of England for help to settle as a body in Virginia; but could get no en¬ couragement, except as they would agree to scatter. When tbe Dutch West India Com¬ pany was formed, a new ship, the New Netherland,

was freighted with seeds, cattle and other things necessary in a colony and Jesse de Forest's company of Walloons, that is, French-speaking refugees from the Belgicˆ Nether¬ lands, took passage across the Atlantic. They were under the protection of the armed ship Mackerel. Besides daily worship, song and prayer, these people had with them an officer of the Reformed Church (his title being ˆˆComforter of the Sickˆ O by whom four couples were joined in wedlock on the ship, which arrived in the Mauritius (Hudson) River in time to prevent a settlement by and to nullify the claims of the French. On Man¬ hattan, which was named New Avesnes, eight families were left ; several at the Walloon's Bocht, or Cove (the Wallabout), on the East River (Brooklyn) ; and others at the head of

navigation in the Iroquois country (Albany) ; while the four newly-wedded couples were sent on a yacht around the Boompjes Hoek (or Little Tree Corner, now Bombay Hook) into the South, or Delaware River and settled at Gloucester, N. J. These Walloons were the first real colonists or homemakers in the Middle States and the first to till the soil of New Netherland, introducing the peach, pear, quince and the Marguerite, flower or daisy. The first white children born in any of the four States between Delaware Bay and Canada were their offspring. The Dutch women in New Netherland previous to 1624 were wives or kin of fishermen or fur traders, who were not farmers or settlers; there being no mili¬ tary occupation or civil government in New Netherland until 1624. After the first large company of Dutch immigrants, nearly 300 in number, had arrived, tne first of several congregations of the Reformed Church in America was organized on Manhattan, with pastor, consistory and administration of the sacrament, in 1628. During two generations the domines, or pastors, were required to preach in French as well as Dutch. When New Netherland first received a civil govern¬ ment, in 1624, Peter Minuit, who had been a church officer in the Walloon Church at Wesel, was appointed governor. Then the official name of Nova Belgica, or New Belgium, or what is now the known area of Middle States, then under one administration, was bestowed. In a few generations, the Walloons were swallowed up by intermarriage in the body of the Dutch; or, after 1685, among the Hugue¬ nots ; but the first homemakers of our four Middle States were the same stock as the Walloons of 1914-18, who fled so numerously to Wales, England and Holland, because of the German invasion. At Amersfoort, in 1918, they erected a handsome edifice as a me¬ morial of gratitude to the Dutch. The first white child born under the flag of the Dutch Republic in America, 6 June 1625, was Sarah, daughter of Simon de Rapallo, or in Dutch Ra-

pelje. Thousands of Americans, who imagine themselves descendants of the Huguenots from France, could trace their lineage direct from the Walloon refugees of 1567. In the old Belgic Netherlands and in Belgium almost every one of the movements for reform, or revolution, has been led by the Walloons. In Scott's novels, several of his ^^Flemings^^ were, as their language showed, Walloons. Consult Griffis, ^The Story of New Nether¬ lands (1909) ; '^Belgium the Land of Art^ (new ed., 1919) ; Leslie's ^History of Greater New Yorks (1898) ; De Forest, ^The De Forests of AvesnesS (1900) ; and De Forest, ^A Walloon Family in Americas (2 vols., p. 705) ; Poujou, D. J., '^Histoire et Influence des Eglises Wallonnes dans les Pays-BasS (1902).

William Elliot Griffis.

WALNUT, a tree of the genus Juglans and of the family Jnglandacece. The species, of which about 10 have been described, are na¬ tives of the northern hemisphere, being con¬ fined to the temperate parts. In America they are found as far south as Mexico. They are characterized by rough bark, compound leaves aromatically fragrant when bruised, staminate flowers in catkins, pistillate flowers in few to

many-flowered racemes and followed by large drupes with inedible husks and hard nuts, the kernels of which are valued in some species for food, dessert or the oil they yield upon expression. A majority of the species are prized for park planting because of their hardiness and the graceful form they acquire when well established. For this purpose the most esteemed in America is probably the black walnut {Jug Ians nigra), which has a range from the New England States to Minnesota and southward to the Gulf States. It is a graceful and imposing tree which often reaches 150 feet in height, has usually an erect trunk and a broad airy round top. It is also valued to some extent for its rough hard-shelled nuts which are often seen in the mar¬ kets. Its wood is one of the most highly prized native woods, being used extensively for furni¬ ture making, interior finish of houses where ^natural woods® are used, its deep brown tint making rich contrasting effects with other woods. Several other species also furnish nuts found in various

markets wHere the trees are native and the husks of several are used for dyeing and tanning. The species most esteemed for its nuts is, however, the Persian or ®English® walnut (Jnglans regia), which is indige¬ nous from China to southeastern Europe. It has been cultivated for centuries in the Med¬ iterranean region, whence it has been taken to mild climates throughout the world. The tree is only about half as large as the preceding species but is much the same in appearance. Its nuts have smoother, softer shells and usually finer-flavored kernels. This nut is one of the most important in the world. Only during the closing half of the 19th century, how¬ ever, has it been grown commercially in the United States and here only in California. The crop marketed in 1915 from this State was officially estimated at about 14,300 tons, worth approximately $4,250,000. Besides these home supplies large quantities are imported from the Mediterranean region but these importa¬ tions will probably dwindle into insignificance when Californian orchards come into full bearing.

Since the trees seem to be exacting in their demands, the areas in which they can be culti¬ vated are somewhat restricted. They are con¬ sidered susceptible to frosts after their growth has started though fairly hardy while dormant; they seem to be unable to stand hot weather since the nuts are more or less injured; they seem to fail upon lands in which standing water is nearer the surface than 20 feet, also in soils with hard clay subsoil and in poorly drained soils. They are thus almost restricted at present to the deep alluvial soils of the four southern counties of California, but by planting varieties which vegetate late in the spring and by avoiding the conditions mentioned it is be¬ lieved that the region of successful cultivation may be extended even to northern counties. The seeds are planted about 12 inches asunder in nursery rows four feet apart, cleanly culti¬ vated, irrigated during midsummer and hardened off by withholding the water in autumn. They will usually be under two feet in height when one year old when they are root-grafted to de¬ sirable varieties. The grafts will often grow eight feet during the first year. Either when

one year or two years old the plants are set in permanent quarters about 50 feet apart. Little pruning is needed except to correct bad form, the branches being started about four feet from the ground. The orchards are kept cleanly cultivated throughout the season, the first plowing in spring being at feast -six inches deep. Irrigation is also given if needed; al¬ ways during the winter. The trees of even the most precocious varieties rarely produce profitable crops before six years old and 10 years is nearer the average age. Trees reach full

hearing when about 20 years old and continue for 30 years or more. Some trees in Europe are said to be more than 100 years old. When the nuts begin to fall they are shaken down, gathered by women and children usually and spread on trays for a week to dry. The nuts are then graded into sizes by passing them over sieves after which they are dipped in a bath of sal-soda, chloride of lime and sulphuric acid to bleach the brown shells and give them the ecru tint demanded by the market. After dipping they are rinsed in clear water. Formerly sul¬ phur was used for this purpose but it was found to impair the quality of the nuts and has been abandoned. After drying the nuts are again graded into light and dark. The latter with the broken ones are used by confectioners ; the former are shipped to market in sacks holding about 110 pounds. Consult United States Department of Agriculture, Division of Pomology, ˆNut Culture in the United Statesˆ ; University of California Bulletin No. 231.

WALNUT INSECTS. The hickory and locust tree borer {Cyllene pictus) is the chief in¬ sect preying on the black walnut in the United States. The common June beetle, the larvae of the luna and the regal moths, several kinds of underwing moths and altogether 45 species of insects are described as attacking the tree. Consult Packard, A. S., ˆInsects Injurious to Forest Treesˆ (Washington 1890).

WALPI. See Tusayan.

WALPOLE, wokpol, Horace, Earl of Or-FORD, English wit and letter-writer ; b. London, 5 Oct. 1717 ; d. there, 2 March 1797. He was the fourth son of Sir Robert Walpole (q.v.). He was educated at Eton and King’s College, Cambridge, on leaving which (1739) he traveled tw’O years on the Continent. Returning in 1741 he took his seat in the House of Commons as member for Callington, Cornwall, and sat for various constituencies up to his resignation in 1767. He always took a lively but superficial interest in politics, inclining sentimentally to extreme opinions. His parliamentary career requires no particular record, but it may be mentioned that in 1757 he exerted himself earnestly in behalf of Admiral Byng (see Byng, John). In 1747 He purchased Straw¬ berry Hill, near Twickenham, where he erected a Gothic villa, laid out the grounds with minute ingenuity, and made it a principal busi¬ ness of his life to_ adorn and furnish it accord¬ ing to a fantastic but refined and educated taste, with objects of curiosity and antiquarian interest, rare prints,, pictures, books and manu¬ scripts. His maintenance was provided for by some sinecure appointments. To his antiquarian taste he added authorship, first in verse and

afterward more extensively in prose, and in 1757 established a private printing-press at Strawberry Hill, at which he printed not only his own vvorks but those of others, his editions often selling at very high prices on account of the small number printed. In 1791 he suc¬ ceeded his nephew in the peerage. He never took his seat in the House of Lords, and ap¬ pears to have avoided rising his title. His works are numerous. His first publication was a description of Sir Robert Walpole's pictures, printed privately in 1747, under the title of ˆ.<ˆides Walpolianae.ˆ In 1757 a popular satire appeared called Letter from Xo Ho, a Chinese Philosopher at London, to his Friend Lien-Chi, at Peking.ˆ ˆFugitive Pieces in Verse and Prose, ˆ and 'ˆCatalogue of the Royal and Noble Authors of England,ˆ with lists of their works, appeared in 1758. 'ˆAnecdotes of Paint¬ ing in Englandˆ were published in 1762-71. ˆThe Castle of Otrantoˆ (1764), a romance, regarded as the prototype of the work of the ˆSchool of Terror,ˆ which subsequently became popular, is very variously estimated. Praised by Byron and Sir Walter Scott, it is pro¬ nounced by Hazlitt dry, meagre and without effect. ˆThe Mysterious Mother,ˆ a tragedy, and ˆHistoric Doubts on the Life and Reign of Richard HI,ˆ appeared in 1768. The works on which his reputation now chiefly rests are his ˆLetters, ˆ of which the best edition is that edited by Peter Cunningham (1857-59), and ˆMemoirsˆ and journal, ˆ a series embracing the reigns ot George H and III from 1751 to 1783. Walpole is almost unanimously pro¬ nounced the best of English letter-writers, whose unfailing ease and vivacity in treating of politics, art, foreign affairs and other topics are unlike anything els-e in English literature. The memoirs are more bitter and cynical, but both are valued as a storehouse of the more evanescent traits of contemporary history, be¬ ing full of passing topics and occurrences, anecdotes, characters and portraits. Though keen and able, he was not an accurate or im¬ partial observer. Want of depth and earnest¬ ness in his own character, his party prejudices, his vanity and love of effect, tempered all he wrote, and detract from the weight of his evidence. Few writers, however, are more uni¬ formly entertaining. Walpole's manners were affected, both personally and as a writer. He was as fastidiously aristocratic in his personal notions as he was sentimentally liberal in his political opinions, and in

both he was probably conventional rather than sincere. Of the value of his writings as a chronicle of current events much has been made, but there is a tendency to ascribe to him elegance alone, to the neglect of his substantial literary merits. The com¬ plete works appeared in an edition of 1798. Consult Cunningham's edition of the ˆLetters' (1857-59) ; Warburton's of the ˆMemoirsˆ (1851) ; Robins, ˆCatalogue of the Classic Con¬ tents of Strawberry HilP (1842) ; Macaulay's essay in the Edinburgh for October 1833 ; Cob-bett, ˆMemorials of Twickenhamˆ (1872) ; Seeley, HLorace Walpole and His Worldˆ (1884), and the ˆLifeˆ by Austin Dobson (1890; 2d ed., 1893).

WALPOLE, Sir Robert, Earl of Orford, English statesman: b. Houghton, Norfolk, 26 Aug. 1676; d. there, 18 March 1745. He was

educated at Eton and King's College, Cam¬ bridge, and became a good classical scholar. On the death of his elder brother in 1698 he resigned his scholarship, in 1700 entered Par¬ liament as member for Castle Rising and in 1702 was elected for King's Lynn. He became a leader of the Whig party and soon distin¬ guished himself by attention to business, and, though not an orator, by practical debating power. In 1708 he was appointed Secretary-at- War and entrusted with the management of the House of Commons. He was one of the man¬ agers of the impeachment of Sacheverell (q.v.) (1710), though privately opposed to that meas¬ ure. Soon after this the Whigs were dis¬ missed from office. On the meeting of Parlia¬ ment in 1712 he was convicted of a high breach of trust and notorious corruption, the charge being due wholly to party hostility. He was expelled from the House of Commons and im¬ prisoned in the Tower. By his party Walpole was regarded as a martyr. He refused to make any submission and wrote a pamphlet in his own defense. He remained in prison, or held his levee in the Tower, till the prorogation. He was returned again for King's Lynn, after the dissolution in 1713 and resumed his place and influence in the House. In the first min¬ istry of George I (1714) he was appointed paymaster of the forces. He was also in 1715 made chairman of the committee to impeach the late ministers, Bolingbroke, Ormonde, Ox¬ ford and Stafford. In October he was made First Lord of the Treasury and Chancellor of the Exchequer. In April 1717, a split having occurred in the ministry, Walpole resigned and made himself formidable in opposition. He opposed the quadruple alliance and the South Sea Scheme, in which, however, he did not disdain to speculate and make a fortune. In 1720 he again took office as paymaster of the forces, and was entrusted with the measures rendered necessary by the failure of the scheme. On the resignation of Sunderland he again

became Chancellor of the Exchequer and First Lord of the Treasury, 3 April 1721, and for 21 years held the highest office in the state without interruption. During his long administration the Hanoverian succession, to which he was zealously attached, became firmly established, a result to which his prudence and political sagacity largely con¬ tributed. He promoted by an enlightened pol¬ icy the commercial prosperity of the nation, and relieved the weight of taxation by many improvements in the tariff. He was the first English minister after the Restoration to make particular study of commerce and finance, and it was he who laid the basis for the free-trade and colonial policies of Great Britain. To the war with Spain he was decidedly averse. In Februar}ˆ 1742, two days before his resignation, he was created Earl of Orford. So long a period of office did not of course pass without opposition. In 1733 his important excise bill failed to pass, and during the later years of his ministry he encountered increasing difficulties. When, after successive defeats in Parliament, he resigned, he was consulted by the king as to his successors and allowed to stipulate for his own immunity. An attack was soon made upon him in Parliament, and a committee of secrecy appointed to inquire into his administration.

The committee's report charged him with hav¬ ing used undue influence at elections, with granting fraudulent contracts, and with pecula¬ tion and profusion in the use of secret service money. The king exerted himself to frustrate the inquiry, and the committee did not gain credit for impartiality. The prosecution against Walpole was dropped for want of evidence. He took little further part in public affairs, but was frequently consulted by the king. Walpole has been characterized by Burke as an ˆˆintelli¬ gent, prudent and safe minister.® He was ambitious for power, but had above his con¬ temporaries an understanding of true national interests. Consult various standard histories of England; Coxe, ˆMemoirs of Sir Robert Wal¬ poleˆ (1798) ; the studies by Ewald (1877) and John Morley (1890) ; ˆˆHistorical Sketches of the Reign of George IP in Blackvuood's foi April 1868; ˆOriginal Papersˆ (ed. Mac-pherson 1775)

; King, ˆPolitical and Literary Anecdotesˆ (1818) ; Maephersion, ˆAnnals of Commerce,ˆ vol. Ill (1805) ; Courtney, <Parliamentary Representatives of CornwalP (1889).

WALPOLE, Sir Spencer, English histo¬ rian, son of Spencer Horatio Walpole (q.v.) : b. England, 6 Feb. 1839; d. London, 8 July 1907. He was educated at Eton and entered the war office in 1858. He became inspector of the fisheries in 1867, lieutenant-governor of the Isle of Man in 1ˆ2 and in 1893-99 was secretary to the post office. He was knighted in 1898. He wrote ˆA History of England from 1815ˆ (1878-86) ; ˆThe Electorate and the Legislatureˆ (1881) ; ˆLife of Sir John RusselP (1889) ; ˆThe Land of Home Ruleˆ (1893), *etc.*

WALPOLE, Spencer Horatio, English statesman: b. 11 Sept. 1806; d. London, 22 May 1898. He was educated at Trinity College, Cambridge, was called to the bar in 1831 and in 1846 became queen's counsel. He was Home Secretary in 1852 and in 1856-82 sat in Parlia¬ ment for Cambridge University. He was again Home Secretary for a few months in 1858, and was an unofficial member of the Cabinet in 1867-68. From 1887 until his death he was high steward of Cambridge University.

WALPOLE, Mass., town in Norfolk County, on the New York, New Haven and Hartford Railroad, about 20 miles southwest of Boston. It contains the villages of South Wal¬ pole, Walpole and East Walpole. It was settled in the 17th century, but was laid out as a town about 1720, and in 1724 was incorporated. The chief manufacturing establishments are a large paper mill, a furniture and a cotton factory. There are eight churches, a high school and 15 district schools. Pop. 5,490.

WALPOLE, N. H., town in Cheshire County, on the Connecticut River and the Fitch¬ burg Railroad, about four miles below Bellows Falls and 19 miles northwest of Keene. It is in an agricultural region. The place was founded in 1745 on a site granted by Massachusetts in 1735, and in 1752 confirmed or re-granted by New Hampshire. There are six churches, a high school, several graded and district schools and a public library which contains about 6,000 volumes. The bank has deposits amounting to nearly $300,000. Pop. about 2,668.

WALPURGA, val-poor'ga, WALBUR-GA, or WALPURGIS, Saint, German abbess: b. England; d. 778. She was sister of Saint Willibald, first bishop of Eichstadt, in Germany, and niece of Saint Boniface, the

apostle of the Germans. She went, like her uncle and brother, to Germany as a missionary and became, about the middle of the 8th century, abbess of a con¬ vent at Heidenheim, in Franconia. She must have been a learned woman, as she was con¬ sidered the author of a Latin description of the ˆTravels of Saint Willibald.ˆ After her death she received the honors of a saint, was believed to work many miracles, and chapels in her honor were built in many places. From the circumstance that in German almanacs the name Walpurgis has been accidentally placed, sometimes alone, sometimes together with the names of the apostles Philip and James, against the first of May, the night previous to the first day of May, so famous in German legends for the assembling of the witches, has been called Walpurgis Night. The first of May is an im¬ portant day for the German cultivator; many contracts are made at this time; the labors of the field assume new activity, *etc.* It is not strange that, on so important a day, the devil and the witches were supposed to be more active than usual and to assemble in a par¬ ticular place to organize the work of evil. This superstition, however, may have had its origin in the ancient German mythology. Hence straw was burned in many places on Walpurgis Night, with a view of dispersing the malignant beings — a custom still preserved in some places. The chief convocation of the witches was considered to take place on the Brocken. Many customs connected with the first of May in Germany originated in this superstition.

WALPURGIS-NIGHT, the night preced¬ ing Saint Walpurgis Day (1 May), on which, according to the old popular superstition among the Germans, witches rode on broomsticks and he-goats to an appointed rendezvous at the old places of pagan sacrifice — notably the Brocken or highest peak of the Harz Mountains — there to enjoy themselves with their master the devil at the great pagan festival of May-day.

WALRUS (from Swedish hvalross, whale-horse), an arctic marine pinniped mammal of the genus Odobcunus, of which two species are recognized — the Atlantic (O. r osinar us) , and the Pacific (O. pacificus, or O. obesus). The walrus is allied to hair seals (see Seals and Sealing), from which it is distinguished by having the upper canine teeth largely developed, and grow¬ ing from persistent pulps to form tusks. These may attain a length of 15 inches or more, and grow downwards, and slightly inwards. They serve the animal as weapons, as tools in dig¬ ging up from the sand of the bottom of the sea the rnollusks upon which it mainly subsists, and in climbing out upon ice-cakes or rocks of the shore. They are much larger in the males than in the females.ˆ The walrus is ordinarily 10 to 12 feet long, with a girth as great, but occasion¬ ally attains a length of 20 feet.

The muzzle is abruptly truncated, with long and remark¬ ably strong bristly moustaches; small eyes; external ear wanting, though the orifice is dis¬ tinctly visible; hind limbs short, connected by a membrane which covers the tail; fore limbs strong and stumpy, all with five digits. The

fur IS of a tawny brown color, and the hide is so thick that it has been likened to a tough, flexible coat of mail.

Walruses are gregarious and are found on the seashore and on ice floes. They are said to be monogamous, and the female brings forth at nine months one calf, usually on the ice floes. In disposition they are quiet and inoffensive unless attacked, or during the mating season, or when their young are in danger, when they become desperately aggressive and furiously attack the hunters on the ice or in boats. The walrus is now confined to the regions within the Arctic Circle, though its extinct ancestors had a much wider geographical range, occurring numerously in ancient times as far south as Denmark and Nova Scotia in the Atlantic and about the Aleutian Islands on the northwest coast. Owing to reckless slaughter by sealers and whalers, they are greatly decreased even in the Arctic seas, and the few remaining seek un¬ frequented spots in high latitudes. The tusks ˆ yield a valuable ivory, their blubber a fine oil, while the hide is most serviceable. Consult Allen, ˆNorth American Pinnipedsˆ (Washing¬ ton 1880) and standard authorities.

WALSALL, wal'sal, England, a manufac¬ turing town of Staffordshire, eight miles north-northwest of Birmingham. The environs present much fine scenery and the town is handsomely built. The chief buildings and es¬ tablishments are a modern parish church, with tower terminating in a lofty spire, and other places of worship; a free grammar, blue-coat charity and other schools; a town-hall and jail; a public library; county court, a handsome structure with a Doric colonnade ; a technical school and four public parks. The situation of the town gives it great advantages for carry¬ ing on the iron manufacture, which forms a leading industry; the chief articles

consisting of ironmongery, including coach and carriage harness mountings, buckles, chains, locks, keys, screws, files, edge-tools, gas-tubes, *etc.* Sad¬ dlery and harness are extensively made and are the staple of the town. There are also brass and iron foundries, machine shops, tanneries and establishments for currying, dyeing and japanning hides, malt-works and clothing fac¬ tories ; and in the vicinity extensive lime-works and both coal and iron pits. Walsall is of con¬ siderable antiquity, but the existing town is almost entirely of modern origin. Pop.

92,130.

WALSH, Francis Patrick, American law¬ yer: b. Saint Louis, Mo., 20 July 1864. He was educated at Saint Patrick's Academy and was admitted to the bar (1889). He was a member of the Kansas City Tenement House Commis¬ sion (1906-08) ; president of the Kansas City Civil Service Board (1911); chairman of the Federal Commission on Industrial Relations (by appointment of the President), on which he conducted the investigation of conditions in Colorado (1914) ; in charge of the case of stock-yard employees (1918) ; was appointed member of the National War Labor Board (1918). In February 1919 he was one of the delegates dispatched by the Irish Race Con¬ vention at Philadelphia to attend the Peace Conference at Paris in an effort to secure a hearing there for the Irish republican delegates. With "his colleagues, ex-Governor Dunne of

Illinois and Mr. Ryan of Philadelphia, he visited Ireland and was joint author of the re¬ port of conditions there, which stirred the English press and public to set about a settle¬ ment of the Irish question. He is a member of the American Bar Association and of the Missouri State Bar Association.

WALSH, James Joseph, American physi¬ cian, lecturer and author : b. Archbald, Pa., 12 April 1865. He was educated at the parish school, WilkesBarre, Pa., Saint John's College, Fordham, N. Y., and the universities of Penn¬ sylvania, Paris, Vienna and Berlin. He was at one time assistant editor of Medical News and collaborating editor of The International Clinics. Since 1898 he has practised his pro¬ fession in New York. In 1900-05 Dr. Walsh was adjunct professor of medicine at the New York Polyclinic School, and from 1905 to 1912 was professor of nervous diseases and the his¬ tory of medicine, and dean of the

medical faculty of Fordham University. Since 1906 he has been professor of physiological psy¬ chology at Cathedral College, New York City. He has lectured extensively on literary, his¬ torical and scientific subjects, and in 1916 was recipient of the Lsetare Medal from Notre Dame University. Dr. Walsh is a member of the American Association for the Advancement of Science, the American Medical Association, the New York Historical Society, *etc.* His published works are ˆMakers of Modern Medi¬ cineˆ (1907) ; ˆThe Thirteenth the Greatest of Centuriesˆ (1907; 3d ed., 1910); ˆHistory of the New York State Medical Societyˆ (1907) ; ˆThe Popes and Scienceˆ (1908) ; ‘ˆEducation, How Old the Newˆ (1910) ; ˆPastoral Medi¬ cine,ˆ with Austin O'Malley (1906) ; ˆMakers of Electricity,ˆ with Brother Potamian (1909) ; ˆCatholic Churchmen in Scienceˆ (1906, 1909) ; ˆOld Time Makers of Medicineˆ (1911) ; ˆMod¬ ern Progress and Historyˆ (1912) ; ˆThe Cen¬ tury of Columbusˆ (1914) ; contributions to ˆThe Catholic Encyclopediaˆ (1905-14) ; ˆThe Encyclopedia Americanaˆ (2d ed., 1916-19). In 1901 Dr. Walsh received the degree of LL.D from Fordham, in 1909 that of Litt.D. from Georgetown and in 1910 that of Sc.D. from Notre Dame university. He is director of the sociological department of Fordham University and trustee of the Catholic Summer School of America.

WALSH, Robert, American lawyer: b. Baltimore, Md., 1784; d. Paris, France, 7 Feb. 1859. He was educated at the Roman Catholic College, Baltimore, and at the Jesuit College, Georgetown, D. C., traveled in Europe until 1809, and on his return studied law and established a law practice at Philadelphia. Later he entered journalism and in 1811-13 pub¬ lished the American Review of History and Politics, the first quarterly issued in the United States. He edited the American Register in 1817-18, and in 1819 established the Philadelphia National Gazette, which he conducted until 1836. He revived the American Review in 1827 and edited it until 1837. He removed to Paris in 1836, was United States consul there in 1845-51 and continued his residence in that city until his death. He wrote ˆLetter on the Genius and Disposition of the French Republicˆ (1810) ; ˆAppeal from the Judgment of Great Brit¬ ain Respecting the United Statesˆ (1819) ;

ˆDidactics; Social, Literary, and PoliticaP (1836), *etc.*

WALSH, Thomas, American critic and poet : b. Brooklyn, N. Y,, 14 Oct. 1875. He was educated at Georgetown University and at Columbia University (Ph.D. 1895). At various times Mr. Walsh has served on the staff of ˆWarner's Library of the World's Best Liter¬ ature,ˆ the Hnternational Encyclopedia,ˆ the New York Globe, the Bookman and ˆThe Cath¬ olic Encyclopedia.ˆ He composed and read the dedication ode to the Prison Ship Martyrs, Brooklyn, 14 Nov. 1908; .the Reunion Poem on the Battlefield of Antietam, 16 Sept. 1910; and poem at the unveiling of the John Carroll Monument at Georgetown, D. C., 3 May 1912. Dr. Walsh is a contributor in prose and verse to English and American magazines and re¬ views, and has published ˆThe Crusaders' (1897) ; ˆThe Prison Ships and Other Poemsˆ (1909) ; ˆThe Pilgrim Kingsˆ (1915) ; ˆEleven Poems of Ruben Darioˆ (1916) ˆGardens Over¬ seas and Other Poemsˆ (1917).

WALSH, Thomas Janies, American legis¬ lator; b. Two Rivers, Wis., 12 June 1859. He was educated in the public schools and in 1884 was graduated in law at the University of VVis-consin. He taught school, becoming principal of the high school of Sturgeon Bay, Wis. ; in 1884 he began the practice of law at Redfield, S. U., and in 1890 removed to Helena, Mont. Since 1907 he has been member of the law fiiTti of Walsh and Nolan. Mr. Walsh was identified with a number of land and livestock com¬ panies in Montana ; was Democratic candidate for Congress in 1906 and served as delegate to the Democratic national conventions of 1908, 1912 and 1916. A4r. Walsh was candidate for United States senator in 1910; in 1912 he was elected senator for the term 1913-19 and was re¬ elected for the term expiring in 1925.

WALSH, William, Irish archbishop: b. Dublin, Ireland, 1841 ; d. there, 8 April 1921. He was educated at the Catholic University of Ireland and at Maynooth College, spending three years on the Dunboyne establishment in post¬ graduate theological studies. He became pro¬ fessor of theology at Maynooth 1867 ; vice-president, 1878; president, 1880, chosen by unani¬ mous voice of the Irish bishops. Before the Parliamentary "Bessborough Commission,ˆˆ 1869-70, Walsh, as proctor for the bishops and ten¬ ants, conducted their case against the Duke of Leinster, landlord, with great skill and discre¬ tion ; his acts in this investigation had much influence in determining the tenor of the Land Act of 1881. At the death of Cardinal McCabe in 1885, the clergy chose Walsh vicar-capitular ; they also named him to Rome for archbishop of Dublin. The British Cabinet had a different sort of

candidate for the place, and the Pope's choice at first seemed to coincide, but the wishes of the Irish clergy and laity at length prevailed. Walsh is considered by the Irish the first arch¬ bishop of Dublin after the death of St. Lawrence O'Toole, who was free from the taint of ˆCastle influence.® He traveled extensively in Europe and was conversant with the polity of the Con¬ tinental nations. He testified before the Parnell Special Parliamentary Commission 1888-89, and did much to discredit Richard Pigott, the per¬ jured witness of the London Times and the British government, 1888-89. He was active in

questions of popular education, trade strikes and temperance. He wrote extensively for reviews, and published many books, e.g., ˆDe Actibus Humanis,ˆ a treatise on one branch of moral theology; ˆHarmony of the Gospel Narrative of the PassionU ˆLiturgical Music of the Mass_ of the Deadˆ : ˆGrammar of the Gregorian Music. ˆ On questions of secular concern he pub¬ lished ˆA Plain Exposition of the Land Act of 1881; ˆAddresses,ˆ on various subjects; ˆAd¬ dresses on the Irish University, Questionˆ ; ˆStatement of the Chief Grievances of the Catholics of Ireland in the Matter of Educa¬ tion,ˆ *etc.*

WALSINGHAM, wohsing-am. Sir Francis, English diplomat : b. Chiselhurst, Kent, about 1530; d. London, 6 April 1590. He studied at King's College, Cambridge, and traveled on the Continent until early in the reign of Queen Elizabeth. He was introduced to public serv¬ ice by Cecil. His first embassy was to France, about 1561. He resided in France as Ambas¬ sador from August 1570 to April 1573, and on his return was made principal Secretary of State and a privy-councillor, and soon after knighted. In 1578 he was Ambassador to the • Netherlands, in 1581 to France and in 1583 to Scotland. After having the chief direction of the measures for the discovery of Babington's conspiracy, he was appointed one of the com¬ missioners for the trial of Queen Mary in 1586. He was afterward made chancellor of the duchy of Lancaster. He retired from public life some time before his death. It is some¬ what remarkable that so little is known of Walsingham's career; but he worked in secrecy and dealt mainly in intrigue. He is said to have had 53 private agents and 18 spies at foreign courts, and many stories are told of his diplomatic profundity. In his private character Walsingham is said to have been ascetically strict in his morals and puritanic in his re¬ ligious zeal. An account of Walsingham's em¬ bassy to France appeared in a work by Sir Dudley Digges, entitled ˆThe Complete Am¬ bassador,ˆ published in 1655; and a work en¬ titled ˆArcana Aulicaˆ has been wrongly ascribed to Walshingham himself.

WALTER, wal’ter, John, English pub¬ lisher: b. 1739; d. Teddington, Middlesex, 16 Nov. 1812. He was first engaged as a coal merchant, in which business he accumulated a considerable fortune, but lost it in subsequent operations as an underwriter. In 1782 his at¬ tention was attracted to an invention of one Henry Johnson, who had patented in 1778 and 1780 printing units known as logotypes, which substituted entire words or syllables instead of type characters of single letters. In 1784, hav¬ ing purchased the Johnson patents, he opened a printing office in London known as the Logographic Office, and engaged in publishing books. On 1 Jan. 1785 he issued the first number of a small newspaper. The Daily Universal Regis¬ ter, sprinted logographically,® which was really the first number of the Times, though that name was not assumed until 1 Jan. 1788, when The Times, or Daily Universal Register ap¬ peared, the alternative title being dropped in the succeeding March. The Times was not im¬ mediately a success, and the logographic process eventually had to be abandoned, but Walter seems to have derived some profit from

his book printing, and gradually the Times became a power in the land. In 1786 Walter was convicted of having printed a libel, the offense having been the statement that the dukes of York, Clarence and Cumberland were insincere in their congratulations on the king’s recovery. He was sentenced to a year’s im¬ prisonment in Newgate, to stand in the pillory for one hour, pay a fine of £50 and to enter into recognizances for his good behavior for seven years. He was subsequently sentenced to a second year’s imprisonment before the expiration of the first and further fines of £200 on other libelous charges, but was par¬ doned after 16 months at Newgate. Broken in health and spirit at his continued misfortunes Walter retired from the management of the business in 1795,

WALTER, John, English editor and pub¬ lisher, son of the preceding: b. London, 23 Feb. 1776; d. there, 28 July 1847. He was studying for the ministry at Oxford, when in 1797 or 1798 his father summoned him to London to assist in the management of the Times. From the

date of his assumption of the management a new spirit was manifested in the paper, and in 1803 he became sole manager. He main¬ tained an independent course, which, while it made the reputation of the Times, cost its editor the little official patronage it had en¬ joyed. For 18 years the firm had been printers for the board of customs, but in 1805, in con¬ sequence of criticism of Lord Melville's ad¬ ministration of the admiralty department, he was deprived of the employment. His enter¬ prise had increased the circulation of the Times from 1,000 to 5,000 copies in 10 years, notwith¬ standing the continued opposition of the gov¬ ernment. In 1805 he made arrangements for obtaining foreign news, and in 1807 sent Henry Crabb Robinson (q.v.) to Germany, the first of the afterward numerous class of special correspondents ; and though every measure pos¬ sible was used by the government to delay his foreign despatches, Walter frequently published foreign information days before the same intel¬ ligence was officially received by the govern-nient. He afterward frankly admitted that smuggling was the only means by which he could obtain French journals. Ultimately the Times took its place as the leading English journal, and Walter may be considered as its real creator. On 29 Nov. 1814 he issued his paper printed by Konig's steam cylinder press, the first paper to be printed by that method. (See Printing Presses). He acted as editor of the paper until after ,1810, but from that time entrusted a share of the editorial work to Sir John Stoddart. In 1832-37 he sat in Par¬ liament for Berkshire, but resigned in the latter year because of differences with his con¬ stituents ; was returned for Nottingham in 1841, but was unseated in the following year. His later years were spent chiefly in retirement.

WALTER, John, English publisher: b. London, 8 Oct. 1818; d. 3 Nov. 1894; grandson of the founder of the Times. He was educated at Oxford, and was called to the bar 1847; was in Parliament as liberal conservative 1847-65 and 1868-85. His conduct of the Times — though successful on the whole — was not in all respects characterized by the wisdom and shrewdness which marked the regime of his

father and grandfather. The Times was mulcted in substantial damages and had to pay enormous law costs for having become the dupe of a perjurer. The third John Walter erected a new office for the Times, and for himself a magnificent house in the suburbs of London.

WALTER, Thomas Ustick, American architect: b. Philadelphia, Pa., 4 Sept. 1804; d. there, 30 Oct. 1887. His early training was re¬ ceived

in the office of William Strickland, and in 1830 he launched out for himself, building the Moyamensing Penitentiary in 1831. In 1847 he completed the Girard College building from his own designs, a building which has always been admired for the classic purity of its pro¬ portions. This classical motif he carried out also in his extension of the national Capitol at Washington, D. C., to which he added its noble dome. He erected many public buildings at Washington, including the Post Office and the Government Hospital for the Insane. He was one of the original members of the Ameri¬ can Institute of Architects, professor of archi¬ tecture in Franklin Institute, and lecturer on architecture in Columbia College.

WALTERBORO, S. C, town, county-seat of Colleton County, on the Charleston and Sa¬ vannah Railroad (Plant System), about 50 miles west of Charleston. It is in an agricul¬ tural region, in which cotton is one of the chief products. It has cotton mills, a cotton oil mill, lumber mills^, naval stores, lumber yards and large storehouses. There are two banks and one newspaper. Pop. (1920) 1,853.

WALTERS, wal'terz, William Thompson, American merchant and art collector : b. on the Juniata River, Pa., 23 May 1820; d. Balti¬ more, Md., 22 Nov. 1894. He was educated as a civil engineer, but became interested in the coal and iron industry, and while in charge of a smelting establishment in Pennsylvania pro¬ duced the first iron manufactured from min¬ eral coal in the United States. He removed to Baltimore in 1841, and established himself as a wine merchant there in 1847. He was presi¬ dent of the first steamship line between Balti¬ more and Savannah and was one of the reor¬ ganizers of the Southern lines. In 1861-65 he resided in Europe, where he traveled widely in the interest of art, and purchased numerous additions for his collection. He was United States commissioner at the Paris expositions of 1867 and 1878, and also to that at Vienna in 1873. His private collection was one of the largest and most valuable in the United States, and his annual exhibit of his gallery for charity netted $30,000 for the poor of Baltimore. He wrote ^Barye^ (1885); ^Notes Upon Certain Masters of the 19th (Century ^ (1886), *etc.*

WALTERS COLLECTION, art collection begun by William Thompson Walters of Balti¬ more who had been art commissioner to the Paris expositions of 1867 and 1878 and to the Vienna Exposition of 1873 and who acquired a remarkable collection of French and Chinese art work, and Greek, Roman and Italian sculp¬ ture. The collection was augmented and suit¬ ably housed b}'" his son in a building opened to the public in 1909. Consult Gruelle, R. B., ^Col¬ lection of W. T. Walters^ (Boston 1895) ; and Bushnell, S. W., ^Oriental Ceramic Art

Col¬ lections of W. T. Walters^ (New York 18^).

WALTHALL, worilial, Edward Carey, American soldier: b. Richmond, Va., 4 April 1831; d. Washington, D. C., 21 April 1898. Ad¬ mitted to the bar in 1852, he began practice in Coffeeville, Miss., and was district attorney for the 10th judicial district of Mississippi 1856-61. He then entered the Confederate army as lieu¬ tenant, becoming brigadier-general in December 1862 and major-general in June 1864. He especially distinguished himself at the battle of Missionary Ridge, where he led his brigade over a ridge and held back the Federal troops till the Confederate army made its escape; and he covered the retreat of General Hood's army after the defeat at Nashville. He practised law in Grenada, Miss., 1871-85, when he was appointed a United States senator to fill out the unexpired term of Lucius Q. C. Lamar. He was elected for full terms in 1888 and in 1892, was chairman of the committee on military affairs and served on the committees on the improvement of the Mississippi River and on public lands.

WALTHAM, worthara^ Mass., city in Mid¬ dlesex County, on the Charles River and on the Boston and Maine Railroad, 10 miles west of Boston. It is connected by electric railway with Boston, Newton, and surrounding towns.

Waltham was settled by farmers in the early days of the colony. The first incorpora¬ tion was that of Watertown, which then em¬ braced the territory now included in Wal¬ tham. In 1738 Waltham was set off from Watertown and incorporated as a town; and in 1884 it was granted a city charter. The chief manufacturing establishments are the two famous watch factories. At the American Waltham Watch Works, the first successful attempt was made to manufacture watch movements, on a large scale, by machin¬ ery. It is now the largest watch factory of its kind in the world. In 1814 a cotton mill was erected here, the first in the United States in which, under the same roof, the raw material was put through all necessary forms, even through the bleachery and the dye works, and came out the finished cotton cloth of the mar¬ ket. Other manufactories are saddlery and

harness works, foundry and machine shops, wagon and carriage factories, emery wheel works, lumber mills, furniture factories and men's clothing factories. The value of the annual products is about $10,000,000.

The principal public buildings are the gov¬ ernment building, the municipal buildings, banks, churches and schools. There is one large park and a number of small squares. The water¬ works are owned and operated by the city. The main business streets and many of those in the residential sections are paved. The roads leading to the near-by villages and towns are well made and kept in good repair. The pure water, favorable climate and good sew¬ erage make the place most healthful. There are 17 churches representing 10 different de¬ nominations. The educational institutions are the Massachusetts School for the Feeble-Minded, the Waltham Nurses' Training School, the Notre Dame Normal Training School, a public high school and two private schools doing high school work. Saint Mary's School (Ro¬ man Catholic) and Waltham New Church School (New Jerusalem Church). There are

several commercial schools and Mcllor's Com¬ mercial College, public and parish graded ele¬ mentary schools, public evening schools, sev¬ eral private schools, a public library which con¬ tains about 40,000 volumes and several school libraries. There are two banks, one national and one state, and two daily newspapers. The government is administered under a charter of 1893 which provides for a mayor elected annually and a common council. The mayor appoints, subject to approval of the council, the majority of the administration officials, but the l)oard of education is chosen by popular vote. Pop. 30,891. Consult Hurd, ˆHistory of Mid¬ dlesex County.ˆ

WALTHAM ABBEY, or WALTHAM-HOLY-CROSS, England, a market town of Essex, 12 miles north by east of London, on the left bank of the Lea. It consists chiefly of one irregular main street, and has a spacious Nor¬ man church, which once formed the nave of the famous abbey church of the Holy Cross, wLere King Harold is buried. There are here gov¬ ernment manufactures of gunpowder and per¬ cussion-caps, cordite and small-arms, besides breweries, flourmills, *etc.* The old abbey of Waltham was founded or enlarged by King Harold in 1060 and is said to have once pos¬ sessed a fragment of the cross on which Christ suffered. In the neighborhood are the village of Waltham Cross, and an ˆˆEleanor cross,ˆˆ recently restored. Pop. about 9,000.

WALTHER, Karl Ferdinand Wilhelm,

Lutheran minister and author : b. Langenchurs-dorf, Saxony, 25 Oct. 1811; d. 7 May 1887. He was for a time pastor at Braunsdorf, Saxony. He emigrated to America with a large colony of his countrymen 1839, and settled in Perry County, Mo. He became pastor in Saint Louis 1841. He founded and edited Der Lutheraner and a German theological journal entitled Lehrc iind WeJwe. He was a leader in the extreme Lutheran confessionalism, or strict adherence to the dogmatical standard, and was colloquially termed ®the Lutheran pope.® He organized in 1846 the Missouri Synod, which was the germ of the Synodical Conference. He was professor in the Lutheran Theological Seminary at Saint Louis from 1850 until his death. He was charged with holding Calvinistic principles, which he denied, and with which his doctrine of universal redemption would be quite inconsist¬ ent. He published a number of theological works in German ; numerous sermons ; and ˆAmerican Lutheran Pastoral Theologyˆ (1872).

WALTHER VON DER VOGELWEIDE,

vabter fon der fo'gH-vi-de, German lyric poet of the class of Minnesingers: b. about 1160; d. about 1227. He was descended from a noble but not wealthy family, whose castle, Vogelweide, is supposed to have been situated in Tyrol. Walther resided at the court of Fred¬ erick, the eldest son of Leopold VI, duke of Austria and on Frederick's death in 1198 left the court of Vienna and entered on a series of wanderings. He remained longest at the splen¬ did court of the Landgrave of Thuringia, who had always around him a circle of poets and instituted that celebrated poetic contest, the war of the Warburg (1207), in which Walther took part. Walther shows himself, in his po¬ litical poems, a warm partisan of the imperial interests against the Papacy. The Emperor

Frederick II was also a patron, and bestowed on him a small fief. His poems, all of which are lyric, have been published by Lachmann (1827). Consult Milmanns, ˆLeben und Dich-ten Walthers von der Vogelweideˆ 0882); Schonbach, ˆWalther von der Vogelweide, ein Dichterlebenˆ (1895).

WALTON, wal'ton, Brian, English Biblical scholar: b. Yorkshire, 1600; d. London, 29 Nov. 1661. He was graduated at Cambridge and from a curacy advanced through many prefer¬ ments to a prebend in Saint Paul's. At the Restoration he was made chaplain to Charles H and bishop of Chester. His greatest work is ˆBiblia Sacra Polyglottaˆ (6 vols. folio 1,657). This work comprises the Hebrew original of the Old Testament, the Samaritan Pentateuch, the Chaldee, Syriac, Arabic, Persian versions and the Latin Vulgate with various readings, notes, etc., still thought to be ®the most com¬ plete Biblical apparatus in any language.® He wrote in 1658 his ˆDissertation on the Antiquity and Authority of His Texts,ˆ in later editions called the '^Prolegomena,ˆ under which name it was published in the original Latin (1827-28). ˆThe Considerator Considered,ˆ *etc.* (1659) was written in answer to Dr. John Owen's, ˆVindication of the Purity and Integrity of the Hebrew and Greek Texts, ˆ etc., a criticism on Walton's great Biblical work.

WALTON, Frederick Parker, Canadian lawyer: b. Nottingham, England, 28 Nov. 1858. He was educated at Lincoln College, Oxford (1883), Edinburgh University (1886), and re¬ ceived honorary degrees from Aberdeen Uni¬ versity (1906) and McGill University (1911). He was admitted to the bar (1886), was lec¬ turer on Roman law at Glasgow University (1894-95), was legal secretary to the Lord Advocate (1895) and (1897-1912) was dean of the law faculty at McGill University. He ■was joint editor of the Juridical Review and (1912) was appointed legal adviser to the Brit¬ ish administration in Egypt. He is author of several law works including ˆThe Workmen's Compensation Act, with Commentaryˆ (1910).

WALTON, George, American patriot : b. Frederick County, Va., 1740; d. Augusta, Ga., 2 Feb. 1804. He was apprenticed to a carpen¬ ter, but

studied law at night by the light of pine-knots, in 1774 was admitted to the bar, and began practice in Augusta. Together with three others he called a meeting at Savannah 27 July 1774 for the purpose of discussing measures of resistance against the arbitrary proceedings of Great Britain, and was one of a committee inviting cooperation from the sister colonies. Later he was one of the committee which prepared a petition to the king and in 1776 was sent as a delegate to the Continental Congress. He was one of the signers of the Declaration of Independence, and continued a delegate to Congress until 1781. He was ap¬ pointed colonel of militia in 1778 and com¬ manded a battalion under Howe when Savannah was captured by the British in September 1778, was seriously wounded, taken prisoner, and held until September 1779. He was chosen governor of Georgia in the following month, was chief justice of the State in 1783. 1787 and 1793; reelected governor of Georgia in 1789, and in 1795-96 was United States senator.

WALTON, Izaak, English author: b. Staf¬ ford, 9 Aug. 1593; d. Winchester, 15 Dec. 1683. After receiving a school education in his native town he went to London and was apprenticed to an ironmonger. In 1618 he was made free of the Ironmongers' Company and seems to have retired with a competency in 1644. The statement frequently made that he was a semp-ster or haberdasher is unsupported by research. He early became closely acquainted with Dr. John Donne, Sir Henry Wotton and other famous men ; and was a strong royalist and the friend of prominent royalists. Doubtless, after Marston Moor, he devoted himself much to fishing. Walton's fame rests on ˆThe Compleat Angler, or the Contemplative Man's Recreation : Being a Discourse of Fish and Fishing, Not Unworthy the Perusal of Most Anglers.ˆ It was published in 1653, and went through five editions in his lifetime. The fifth edition, is¬ sued in 1676, contained, as a second part, Charles Cotton's treatise on fly-fishing, written to correspond with V/alton's, and designated Hnstructions how to Angle for Trout or Gray-ling in a Clear Stream.ˆ The chief subsequent editions are those by Moses Browne (1750), SJr John Hawkins (1760), Major (1824), Sir Nicholas Harris Nicolas (1836), Jesse and Bohn (1856), Marston (1888), Harting (1893), Lang (1896). There is a facsimile reprint of the first edition by Elliot Stock (1876). repub¬ lished in 1877, 1880 and 1896. Lowell wrote the introduction for an American edition in 1889. Walton also wrote almost equally famous biographies of John Donne (1640), Sir Henry Wotton (1651, in 'ˆReliquiae Wottonianseˆ), Richard Hooker (1665), George Herbert (1670), and Robert Sanderson (1678). The first four were published

together in 1670, and have been often reissued, as for instance, under the editorship of A. H. Bullen (1884) and Austin Dobson (1898). Besides the short pieces of poetry in his works, Walton wrote other occasional and prefatory verses, which are to be found in R. H. Shepherd's ˆWal-toniana ˆ (1878). The charm of ˆThe Com¬ pleat Anglerˆ is due to its purity and simplicity of style, the ease and unaffected humor of the dialogue, and its exquisite pictures of natural scenery, combined with the picture that it presents us of the writer's own sunny and benevolent nature. One Richard Franck, a Commonwealth soldier, displayed his contempt of a royalist angler's practical acquirements in his ˆNorthern Memoirˆ (1694). Consult farther the lives by Zouch (prefixed to the ˆLivesˆ in 1796; separately printed 1823) ; Nicolas (prefixed to the edition of the ˆCom¬ pleat Anglerˆ 1836), the basis of later works; Marston (1888) ; also Tweddell, ˆ Izaak Walton and the Earlier English Writers of Anglingˆ (1854), and Blakey, ˆLiterature of Anglingˆ

(1856).

WALTON, N. Y., village, in Delaware County, on the New York, Ontario and Western Railroad, about 175 miles northwest of New York, and 30 miles northeast of Binghamton. It is in an agricultural and dairy region, and the industries are connected with farm and dairy products. It has a foundry, machine shops, novelty works, and furniture factory. There are eight churches, a high school, graded elementary schools, and a school library. There

is one national bank capitalized for $50,000, and a nevrspaper. Pop. (1920) 3,598.

WALTZ, Jean Jacques, French writer: b. Colmar, Alsace, 1873. He studied at the Beaux-Arts in Paris, became a contributor to the Durchs-Elsass and was made a chevalier of the Legion of Honor. For satirizing Ger¬ man character in his sketches he was ordered sent to prison for a

year (1914) but escaped to France where he served in the army during the Great War. He has published the volumes, ˆL'Histoire d'Alsace racontee aux petits enfants d'Alsace et de Franceˆ (1913), and ˆProfesseur Knatschke; oeuvres choisies du grand savant allemand et de sa fille Elsaˆ (1915), and ˆMon Village,ˆ his village sketches which attracted to him the attention of the German authorities and resulted in his conviction and sentence to imprisonment.

WALTZ, a dance executed by any number of couples, the gentleman having his arm around his partner's waist, the couple wheeling around on an axis of their own, and at the same time moving around the room. The music is written in triple time in crotchets or quavers. Compositions in waltz form are often not intended for dance tunes. The style of the waltz has varied much with the period and the country. See Dancing.

WALWORTH, wal'werth, Ellen Hardin,

American writer: b. Jacksonville, Ilk, 20 Oct. 1832; d. 23 June 1915. She was married to M. T. Walworth (d. 1873) in 1852. She was one of the three founders of the National Society of the Daughters of the American Revolution in 1890: was director-general of the Women's National War Relief Association in 1898; and one of the first three women elected to the school board under the New York law. She was prominent in various club movements, and lectured and wrote extensively. Her writings include ˆBattles of Saratogaˆ (1891) ; ˆParlia¬ mentary Rulesˆ (1897), *etc.*

WALWORTH, Reuben Hyde, American jurist: b. Bozrah, Conn., 26 Oct. 1789; d. Sara¬ toga, N. Y., 21 Nov. 1867. He was mainly self-taught, was admitted to the bar in 1809 and settled at Plattsburg, N. Y. He soon rose to eminence in his profession. He sat in Con¬ gress 1821-23, removing to Saratoga in the last-named year, was a circuit judge 1823-28 and chancellor of New York 1828-48. His decisions as circuit judge are included in ˆCowen's Reportsˆ (9 vols., 1824-30) ; as chan¬ cellor, in ˆPaige and Barbour's Reports,ˆ 14 vols. (1830-49). He published ˆ Rules and Orders of the Court of Ch'ancereyˆ (1829) ; ˆGenealogy of the Hyde Familyˆ (1864).

WAMBAUGH, Eugene, American lawyer: b. Brookville, Ohio, 29 Feb. 1856. He was graduated at Harvard (1876) and was awarded his LL.D. (1880) and his LL.D. from the State University of Iowa (1892).ˆ After admission to the bar (1880) he practised at Cincinnati (1880-89), was professor of law at the State University of Iowa (1888-92) and since that time at the Harvard Law School, He was an editor of the

American Political Science Re¬ view (1906-13) and (since 1915) assistant to the Judge-Advocate-General. He is author of ‘The Study of Cases> (1892, 1894), ‘Cases for Analysisˆ (1894), ‘Cases on Agencyˆ (1896),

‘Cases on Insuranceˆ (1902), ‘Littleton s Tenuresˆ (1903), ‘Cases on Constitutional Lawˆ (1915), ‘(juide to Articks of Warˆ

(1917).

WAMPANOAG (“Eastern land®), a tribe of the Algonquian stock of North American In¬ dians, closely related to the Massachusetts tribe, whose language they spoke. They were some¬ times called Pokanokets, from their principal village, and Massasoits, from a prominent chief. The Wampanoags resided on Narragansett Bay, in Bristol County, R. I., and Bristol County, Mass., but originally they claimed the territory between Narrangansett Bay and Paw¬ tucket River and the Atlantic, including the islands of Nantucket and Martha’s Vineyard. The Cape Cod branch of the tribe were visited by Gosnold in 1602, and by other whites at an early date. In 1617 many of their nurnber per¬ ished from disease, prior to which time they claimed to have had 5,000 warriors, or about 18,000 souls. When the Plymouth Colony was planted in 1620 the Wampanoags inhabited 30 villages ; Massasoit was their chief, and the treaty which he made with the colonists was faithfully observed by him until his death. He was succeeded by his son, popularly known as “King Philip,® who, chafing under the ill-treat¬ ment which his people had suffered at the hands of the whites, aroused the resentment of all the Algonquian tribes from the Merrimac to the Thames (except the Wampanoags of Cape Cod and Martha’s Vineyard), and in 1675 began a war against the whites which con¬ tinued for two years and proved to be the most disastrous Indian conflict in New England his¬ tory. The Indians were ultimately overcome, but not until Philip and other leading chiefs had been killed, and the Wampanoags and Narragansetts almost exterminated. Those who could, fled to the interior tribes, many captives were sold as slaves, and others joined the various “praying Indians® of southern Massachusetts.

WAMPUM, SEAWAN, PEAG or SHELL MONEY, a fabric bearing beads formed of the interior of shells, arranged in patterns or designs, formerly much used by North Ameri¬ can Indians as a medium of

exchange among the Indians of the Atlantic Seaboard States. Not merely did it serve the Indian as a medium of exchange and a standard of values, but worn as an ornament it was his badge of wealth and position, in the hands of the chiefs his record book and ledger, and through the favor of the Great Spirit its possession became in no small degree the passport to the happy hunting grounds of the future world. The use of wampum constituted a bond of union among the Indians such as was scarcely supplied by language, religion or racial customs. Wampum was made from shells, usually clam or oyster, and it was therefore not surprising that the coast dwellers were the most prolific producers of it. The black beads were made from the dark "eye® of the shell, the scar indicating the point of muscular attachment, while the white ones were taken from the outer parts. Black beads ˆ were known as sacki, white ones as wompi, and the black were usually considered twice as valuable as the white. Purple beads were also used. The fabrics were made up as belts, necklaces, bracelets and occasionally as

scabbards. The beads themselv'cs were simply little shell cylinders about one-eighth of an inch in diameter and one-fourth of an inch in length. They were polished smooth by being rubbed against stones, and were bored by means of a flint awl, many of which are still to be found in the shell heaps along the New Eng¬ land Coast. The English colonists were com¬ pelled to use wampum as a medium of ex¬ change with the Indians for more than half a century. Three dark or six white beads were swapped for an English penny. Rhode Island recognized it officially as late as 1670. In New • York it was used until after the end of the cen¬ tury — as for instance in the payment of the ferriage between New York and Brooklyn. It was used in Southern Connecticut as late as 1704, and in the backwoods regions of the northern and middle colonies well down into the 18th century.

W A N A M A K E R , w6n'a-ma-ker, John, American merchant: b. Philadelphia, 11 July 1838. He received a common school education, and began his business career at 14 as errand boy in a store. In 1861

he established, with his brother-in-law, a clothing store under the firm name of Wanamaker and Brown, which in 1869 became the firm of John Wanamaker and Company. He soon became the foremost merchant of Philadelphia. His success is at¬ tributable to his early comprehension of ad¬ vertising, and of the principle of the depart¬ ment store. He was the first in Philadelphia to expend large sums in the newspapers, and to hire high-priced men to write and systematize advertising. After building up an enormous establishment in Philadelphia, he observed the decadence of the A. T. Stewart business in New York, and in 1896 purchased the building, and proceeded to revive the trade of his dis¬ tinguished predecessor. In a short time the historic Stewart block on Broadway, from Ninth street to 10th street, proved too small, and in 1903 he erected a ˆSkyscraper® annex on the block south. Mr. Wanamaker has been active in the public life of Philadelphia, and took a prominent part in the movement to secure pure water for the city, in 1886-87, and in other reform movements, and has taken part in State and national politics as an ˆˆanti-machine® Re¬ publican. In 1888 he was a presidential elector, and in 1889 entered President Harrison's Cabi¬ net as Postmaster-General. During his term of office he established the sea post offices, and strongly favored a postal telegraph system. He has taken an active part in religious 'vvork, was for several years president of the Philadelphia Young Men's Christian Association, and in 1858 organized a small Sunday school which became the Bethany (Presbyterian) Sunday school, one of the largest in the United States.

WANAPUM INDIANS (®river people®), a tribe of the Shahaptian stock of North American Indians — the Sokulks of Lewis and Clark. They range along both banks of the Columbia in Washington from above (Jrab Creek down to the mouth of Snake River. Having never made a treaty or gone on a reservation, they are not yet officially recognized by the government. They number about 200.

WAND OF MERCURY. See Divining Rod.

WANDERING CELLS, or PHAGO¬ CYTES. See Phagocytosis.

WANDERING JEW, a traditional person¬ age. See Jew, The Wandering.

WANDERING JEW, The, was one of the most popular of the long series of widely and eagerly read novels that gave Eugene Sue a foremost place among the novelists of the mid¬ dle period of the 19th

century in France. It remains, with the ˆMysteries of Paris® the only one that still continues to find readers. It appeared as a serial in the newspaper Le Constitutionnel (1844-45), and created some¬ thing of a sensation, provoking by the abund¬ ance of controversial matter it contained a great deal of discussion, both bitter attack and ardent defense. It returned to thoˆe lower regions of Paris life and to those pictures of wretchedness and crime for which not long before the public curiosity had been excited by the ˆMysteries of Paris,® and exploited the then prevalent interest in social reforms, in the amelioration of the condition of labor and the elevation of the proletariat. It was thus a vehicle for the dissemination of the generous theories and dreams of Fourier, Leroux and others. It exhibits with realistic detail the in¬ tolerable lot of the working classes, especially of the women, and elaborates a program of profit-sharing, of community living, and of other industrial improvements. It also at¬ tacks the abuses to which certain institutions were liable, such as private asylums for the insane, convents, *etc.* In these respects Sue was a forerunner of Hugo and Dickens. But these elements are submerged in a rushing tor¬ rent of melodramatic blood and thunder. A multitude of actors struggle in a world-wide web of intrigue relentlessly spun around them by the subtle cunning of the arch villain, Rodin. The means for his iniquities Sue repre¬ sents as furnished by the vast, secret and per¬ fectly disciplined organization of the Jesuits, of whose society he is a devoted but not unsel¬ fish member. So the book added to its other interests that of a violent attack on the Jesuits, at that time the objects of much suspicion and of drastic repressive measures in France, Switzerland and elsewhere. The legendary figure that gives the novel its title plays but an occasional and unimportant role in the story, intervening once or twice in the action, but for the rest serving only as a vague symbol of the restless striving that is the lot of poor human¬ ity. If the book is still read, in spite of so much in its matter that no longer interests us to-day, and also in spite of its inordinate length of more than 1,200 closely printed pages, it is because the story is told with real art and the pictures are drawn with vividness and color. It is accessible in English trans¬ lation.

Arthur G. Canfield.

WANDERING JEW, a name applied to various plants — in Great Britain to the beef¬ steak or strawberry geranium (Saxifraga sar-mentosa) and to the Kenilworth ivy (Linaria cynibalaria) . Zebrina pendula, a leafy rapidly growing plant, with lance-ovate leaves glossy and bright green or purplish above with broad silvery stripes, is also known as the wandering jew; it will grow either in sun or shade, or in

water alone. Another wandering jew is a spiderwort (q.v.). *

WANDERLEY, Joao Mauricio, Baron CoTEGiPE, Brazilian statesman : b. Barro do Sao Francisco, Pernambuco, Brazil, 23 Oct. 1813;

Rio de Janeiro, Brazil, 13 Feb. 1889.ˆ He studied law and soon entered politics, joining the Conservative party, and from 1842 was repeatedly elected deputy. In 1856 he became senator, holding the office until his death and acting as president of the body in 1882 and 1885. He was created a baron in 1868, was Minister to the Platine republics in 1870, and concluded the treaty of peace with Paraguay. He was a Cabinet officer in nearly all the Con¬ servative cabinets and in 1885 organized the ministry .which secured the general emancipa¬ tion law.

WANDEROO. 9r WANDERU, a large

monkey (Macacus silenus) of southern India, especially the country bordering the Malabar Coast. The wanderoos have long, slim bodies, covered with black hair, and, tufted tails. The head looks very large, because of a mane, or ruff, and beard, which sticks out around the face, and is either gray or white, enhancing the sly look of the broad face, dull eyes and broad muzzle.

The name is also given generally to mon¬ keys of the genus Semnopithecus. S. ursinus is the great wanderoo of Ceylon, and Eastern zoologists often restrict the name to this species alone. They live in small classes or groups of a few dozen individuals, are very intelligent, and make more agreeable pets in captivity than most monkeys. The gray beard and solemn mien gives them a venerable appearance sharply contrasting with related species.

WANDSWORTH, wandz'werth, London, England, a metropolitan and parliamentary borough on the south side of the Thames. Area, 9,107 acres (the largest of the London boroughs). It includes the districts of Put¬ ney, Clapham and Streatham. Wandsworth proper is situated close to the Thames, near the mouth of its small tributary, the Wandle,

and is built between and on the slopes of two hills. New Wands¬ worth, a suburb of recent growth, lies to the east and south of both stretches of Wandsworth Common, beside which are the Surrey County prison, the county lunatic asy¬ lum, *etc.* It was the site of a French Huguenot settlement after the revocation of the Edict of Nantes, when important industries were intro¬ duced. Paper making, brewing, hat making and dyeworks are among the manufactures. Pop. about 311,360. Consult Arnold, <History of Streatham^ (1886) ; Grover, ^Old Qap-ham^ (1887) ; Coward, ^Wandsworth and Put¬ ney^ ; with a ^Chapter on PreHistoric Age^ by G. F. Lawrence (1893) ; Hammond, ^Bygone Wandsworth^ (1896), and ^Bygone Putney^ (1898) ; Jackson, ^Putney: Past and Present^ (1883); Mitton and Geikie, JPutney, Hammer¬ smith and Fulham^ in ^Fascination of London^ Series (1903) ; Morden, ^History of Tooting Graveney^ (1897); Rudolf, ^Clapham before 1700 A.D.> (1904).

WANG SHIH-FU, Chinese dramatic poet. He lived in the 13th century, was the creator of the Chinese opera ^Thsa-Khi, and composed

13 plays, of which only two survive. The ^Hsi Hsiang Chi,^ or ^Story of the Western Pavilion^ — like all Chinese plays, a sort of novel in dialogue — is his best work and ob¬ tained and still holds great popularity with the Chinese. It has been called by Giles ®of all plays of the Mongol dynasty, the one which will best repay reading.^^ The other is the comedy ^The State Minister's Feast. ^ The former was partly translated into French by Stanislas Julien, the eminent French sinologue, in ^Europe Litteraire.^

WANG YANG-MING (a.d. 1472-1529) . in Japanese, Oyomei (q.v.), a Chinese philoso¬ pher, who has probably influenced the mind of modern China, though largely through Japan, in the direction of action and reform, more than any other teacher since Confucius, Men¬ cius, or the mediaeval reconstructor of the an¬ cient thought, Chu Hi (q.v.). In Japan this Oyomei philosophy formed the mental food and furnished the motive to the reformers who since 1868 have modernized their country. Largely through the thought of Wang, thus embodied and reformulated by Japan, China has received the new mind that enables her to harmonize modern and Occidental ideas with her age-old orthodoxy. In the history of Chinese thought we recognize Confucius as the transmitter of ancient tradition, who handed down in good literary form the ethics, ritual and world of thought in which the Chinese patriarchs lived, showing man in harmony with the universe and its laws. To this Confucian system Mencius (q.v.) gave fresh ex¬

position and popularity, especially in its appli¬ cation to government. Then followed cen¬ turies of commentary. Meanwhile the rivals of Confucianism were Taoism (q.v.) and Budd¬ hism — one the more speculative native and the other the more metaphysical Hindoo faith — gained adherents, the former with the schol¬ ars and the latter with the masses, in whose minds the three systems blended. It may be truly said that China extended her empire more through the propaganda of culture than by the sword. In the 12th century there was an out¬ burst of populism, with a challenge of old ideas, compelling to deeper thought. The Chinese thinkers led by (3hu Hi (q.v.) (1130-1200) recast and made restatement of the national faith, virtually blending Hindoo and Mongol ideas. Through his commentary on the classics, Chu Hi gave an interpretation, by which Con¬ fucianism took the form of a creed, which became the virtual religion of most gentlemen in all the lands of eastern Asia, and which became the official orthodoxy, approved by gov¬ ernments, to doubt or impugn which might, in varying means of displeasure, mean ban, perse¬ cution, imprisonment or death. Chu Hi was a realist, believing that things exist in their own right, apart from the mind. Against this sys¬ tem Wang Yang-miug, an idealist of the monist type, protested. From this point of view nothing exists apart from the mind. To know was to be. Knowledge and action, in the superior man, were one. Finding fault with the commentators later than Confucius, including Chu Hi, whom he accused of adulterating with Buddhist no¬ tions the ancient purity of Confucianism, Wang called for a return to the ancient classics. He thus brought the primitive system, as taught

by the master, into its true domain of prac¬ tical ethics. This achievement of Wang in the realm of thought ranks him, relatively, and results, with the great European masters, Augustine, Luther, Calvin and Kant ; for his teachings have revolutionized the thinking of a fourth of a human race. Yet so far from being a man of books and study only, Wang was a statesman and successful general, whose victorious campaigns over the rebels in south¬ ern China fill a brilliant page in the history of the empire, under the Ming dynasty

(1368-1644). Descended from a long line of military heroes and scholars, Wang saw the light on the 30th day of the ninth month a.d. 1472. The usual portents attending the birth of a great man are related by his biographers. Unable to speak until five years of age, he astonished his grandfather by then repeating the contents of his books, saying, remember what I heard you read.® With his father, he visited the capital and surprised the elders with his poetic ability. Besides training in horsemanship, archery and the military art, he became an adept in the system of the Taoists and Bud¬ dhists, being made at 28 a member of the Hanlin or Imperial Academy. After appoint¬ ment to higher offices and further study of Taoist and Yoga doctrines, he built a home near the Yang-ming grotto, resigned office and lectured to the students who flocked to his chair. Made inspector of the army, he shielded faithful officers, but thereby fell into disfavor with a powerful eunuch at court. He was exiled and lived for some time in the mountains as Kweichow, here receiving the great enlighten¬ ment — the duty and delight of ˆinvestigating things for the purpose of extending knowledge® — and wrote a commentary on the Five Clas¬ sics. Restored to honors, rank and office, he put down the rebels in southern China, thereby greatly extending and consolidating the empire. During his prolonged activities in the field, he never ceased his meditations or discourse on the great problems of being, life, duty and the ideals of conduct. Yet desphe his military success and civic honors, his jealous enemies charged him with heterodoxy, and the heresy-hunters poisoned even the mind of the emperor against him. In time, however, imperial favor returned. He was made viceroy and loaded wdth fresh honors, his disciples multiplied and the voices of slander were hushed. After the last of his victories he established a college for the subdued people. Worn out with his manifold labors, he visited his ancestral temple, ordered his coffin made, and in full possession of his faculties, with parting words to his disciples, closed his eyes in death, at the age of 57. His body was reverently washed and arrayed for burial by his disciples and ˆhhe noise of weeping shook the earth.® He was buried at Hungchi, a few miles from Hangchow (q.v.). Posthumous memorials, in defenseˆ of Wangˆs orthodoxy and in praise of his virtues, were sent to the emperor. Thousands of his fol¬ lowers came to his tomb to mourn. Pos¬ thumous honors were awarded by imperial edict in 1567 and again in 1583, when the emperor commanded sacrifice to be made to the Teacher (Wang) in the Confucian Temple, after sacrificing to Confucius. Beyond this, higher honors to a subject could not be paid. Wang’s effigy is still preserved in many temples

in China. In Japan his philosophy received relatively wider acceptance and thus mediately, through Japan, the Chinese intellect was re¬ fertilized in our own day to the renovation of his own country. Consult ˆThe Philosophy of Wang Yang-mingˆ (translated by Prof. F. G. Henke, Chicago 1916).

WANTAGE, won'taj, England, a market-town in Berkshire, in the fertile vale of the White Horse, 13 miles southwest of Oxford. There are an interesting old church, a town-hall, corn exchange, grammar school and cottage hospital. Iron and brass founding and the manufacture of bagging and jute goods are carried on. King Alfred, to whom there is a statue by Count Gleichen, erected in 1877, was born at Wantage, as was also Bishop Butler. Pop. 3,628.

WANX RIVER. See Cape River.

WAPAKONETA, waˆpa-kon-ˆ'a, Ohio village, county-seat of Auglaize County, on the Auglaize River and on the Cincinnati, Hamil¬ ton and Dayton Railroad, about 30 miles north of Piqua and 13 miles south by west of Lima. It is in an agricultural region and in the natural gas and petroleum belt. The place was visited by whites in the early part of the 19th century and some settlements made. It was laid out as a village in 1833. Where the village now stands was the site of an Indian village of importance, the meeting place of certain tribes. In 1831 it was the scene of the signing of the treaty whereby the Shawnees and Senecas relin¬ quished their lands to the government. Wapa-koneta was the last place in Ohio occupied by the Indians. The chief manufactories are fur¬ niture, wagons, carriages and carriage wheels, machinery, refrigerators, woodworking ma¬ chinery, *etc.* There are three banks, two na¬ tional and one private, and one daily and two weekly newspapers. Pop. (1920) 5,295.

WAPELLO, wa-pel'5, Iowa, town, county-seat of Louisa County, on the Iowa River and on the Burlington, Cedar Rapids and Northern Railroad, about 25 miles north of Burlington and 20 miles south of Muscatine. It is in a rich agricultural region in which the principal products are wheat, corn, vegetables and fruit. Considerable attention is given to stock-raising. The manufacturing establishments are flour and lumber mills, fruit and vegetable canneries, agricultural implement shops and creameries. The town makes large shipments of grain, canned goods, hay and livestock. There are two banks, one State and one private, and two newspapers. Pop. 1,532.

WAPENTAKE, or WAPENTAC, in Eng¬ land, an ancient county among some of the northern shires, still retained in Yorkshire. It corresponds

to the ˆhundred® of the southern counties. The word means ˆweapon-touching® and refers to the custom of the chiefs of a particular district meeting at a certain day at a specified spot, when the head chief, alighting from his horse, raised his spear in the air, and the inferior chiefs, also on foot, touched this spear with their lances, and so acknowledged their fealty.

WAPINSCHAW, or WAPENSHAW,

(A. S. weepen, a weapon; sceawian, to view, to look at — -lit., a weapon-shoiv), a review of per¬ sons under arms, formerly made at certain

times in every district of Scotland. The name is now familiarly applied to a gathering of the volunteer corps of a district for purposes of inspection, for shooting, *etc.* The Wapinschaw, or periodical gathering of the people for the purpose of exhibiting their arms, was ordained by various Scots statutes of the 15th and 16th centuries, which directed each individual to be armed on a scale proportioned to his property. In the time of war or rebellion, proclamations were issued charging all sheriffs and magis¬ trates of burghs to direct the attendants of the respective wapinschawings to join the king's host. During the reign of the later Stuarts, attendance on the wapinschaws was enforced with considerable strictness; and in addition to military exercises, sports and pastimes were carried on by authority at these gatherings. The Covenanters, disapproving of the sports at these gatherings, did what they could to dis¬ courage attendance.

WAPITI, an Indian name of the great North American deer ((ˆervits canadensis), known in the West as ˆˆelk,® but more like the red deer than the European or true elk (q.v.). It formerly ranged from the mountains of the Carolinas to lat. 56° to 57° N., but is now nearly extinct, except in the northern Rocky Moun¬ tains. It is closely allied to but considerably larger than the stag, standing about 64 inches at the shoulder; yellowish brown on upper parts ; sides gray, long coarse hair in front of neck, like a dewlap ; antlers large, often ex¬ ceeding

four or even five feet in length ; brow-tine duplicated. In the Northwest it is repre¬ sented by several related species, but the East¬ ern wapiti seems doomed to extinction, except as bred in captivity. During the winter these noble animals gather in large herds and feed on the open hills. The antlers are shed about March and the new ones are complete by September. The bucks fight fiercely and not infrequently with fatal results at the pairing season; and the stronger ones are polygamous, gathering into their herds every available cow and guarding them and the young with jealous care. They eat almost everything of a vege¬ table nature, leaves and twigs as well as grass and herbs. During the summer, when they are much troubled by mosquitoes and flies, they are fond of entering the water and of wallowing in mud holes. See Deer.

WAPPˆUS, va-pa'oos, Johann Eduard,

German geographer; b. Hamburg, 17 May 1812; d. .Gottingen, 16 Dec. 1879. He was educated at the universities of Gottingen and Berlin, and in 1833-34 traveled in Brazil and the Cape Verde Islands. He became a tutor at Gottingen in 1838, was appointed adjunct professor there in 1845, and from 1854 until his death was full professor in that university. His most widely known work is his edition of the Stein-Hdrsch- elmann ˆHandbuch der Geographie und Statistikˆ (1871), of which he wrote the volumes on ˆUniversal Geographyˆ (1849) ; ˆNorth Americaˆ (1855) ; ˆCentral and South Americaˆ (1867) ; and ˆBraziP (1871). His other writ¬ ings include *ˆUntersuchungen fiber die geo-graphischen Entdeckungen der Portugiesen unter Heinrich dem Seefahrerˆ (1842) ; ˆDeutsche Auswanderung und Kolonisationˆ (1846) ; ˆAllgemeine Bevdlkerungsstatistikˆ (1859-61), *etc.*

WAPPATOO, an aboriginal name of the root of the common arrowhead (Sagittaria latifolia) which was a favorite food of the North American Indians.

WAPPERS, vap-ar, Gustav, Baron, Bel¬ gian painter : b. Antwerp, 23 Aug. 1803 ; d. Paris, 6 Dec. 1874. Educated at the Art Academy of his native city under Van Bree and Herreyns, he went to Paris and devoted himself to copying the masterpieces of the Venetian School and subsequently studied the style of Rubens, Jor-daens and the Flerriish painters. He made his first great hit in 1830 by a large picture repre¬ senting the ˆBurgomaster Van der Werf of Leyden in the Spanish Siege. ˆ Wappers sur¬ rounded himself with a number of young paint¬ ers and under the enthusiasm he kindled a new school

of Belgian painting came into existence. In 1832 he was appointed professor and eight years later director of the Art Academy of Ant¬ werp; from 1846 to 1853 he was president of the Belgium National Museum and in 1847 was ennobled. Among his principal pictures are ˆThe People of Brussels Tearing up the Procla¬ mation of Prince Frederickˆ 0835, in the Mu¬ seum at Brussels) ; ˆThe Entomologistˆ (1836, formerly in Saint Michael's Church, Louvain) ; ˆThe Madonna in Clouds Surrounded by An¬ gelsˆ ; ˆCharles IX Shooting Down the Huˆe-notsˆ ; ˆAnne Boleyn Taking Leave of Eliza¬ bethˆ ; ˆBoccaccio Reading His Decameron to Johanna of Aragonˆ ; ˆThe Capture of Rhodes by the Turks, ˆ *etc.*

WAPPINGER (®the east®), a confederacy of the Algonquian stock of North American In¬ dians formerly occupying the territory extending eastward from the Hudson River, between the neighborhood of Poughkeepsie and Manhattan Island in New York to the valley of the Con¬ necticut River in Connecticut. They were closely related to the Mohicans, and by most authorities are regarded as having been a .part of them. The component tribes of the Wappinger con¬ federacy were: (1) the Wappinger, which formed the principal tribe and which occupied Dutchess County, N. Y., about Poughkeepsie and Wappinger Kill; (2) the Recgawawancs ; (3) Wecquaesgeeks ; (4) Sintsinks ; (5) Kitch-awanks; (6) Tankitekes; (7) .Nochpeems; (8) Siwanoys; (9) Sequins or Mattabesecs. As Connecticut became colonized by the whites, the eastern tribes of the confederacy gradually sold their lands and almost dwindled away, the sur¬ vivors finally joining the Indians at Scaticook, Conn., and Stockbridge, Mass., while a few went to Canada. The Hudson River tribes became involved in war with the Dutch colonists in 1640, which continued for five years, the Indians losing 1,600 of their number and the Wappingers being the chief sufferers. The sur¬ vivors retained their tribal customs until 1756, and continued to occupy a tract in Westchester County, when most of them joined the Nanti-cokes, then living under Iroquois protection at Chenango, near Binghamton, N. Y., and finally became merged with the Delawares. Some of them also joined the Moravian and Stockbridge Indians, while a few still resided in Dutchess County just before the American Revolution.

WAPPINGERS (wop'm-jerz) FALLS, N. Y., village, Dutchess County, on Wappinger Creek, about two and one-half miles from its

mouth at New Hamburg and seven miles south of Poughkeepsie. It is connected with Pough¬ keepsie by an electric line, and has the ad¬ vantage of the steamer traffic on the Hudson. The river port used by the village is New Hamburg. The name of the village is that of a tribe of Indians who once inhabited this sec¬ tion. The creek here falls over a series of high ledges which form picturesque cascades, and also furnish water power for several manufac¬ tories. The chief industrial establishments are print-works, established in 1834; overall and sheeting factory, machine shop, grist mill and creameries. The village has a union school, public and parish elementary schools and a school library. There is one bank and a news¬ paper. Pop. 3,742.

WAR. The last resort for the settlement of disputes is the appeal to physical force, whereby the weaker is either compelled to yield to the demands of the stronger, put to flight, or, in the last extremity, slain. War is resorted to either for advantage or for vengeance. The one party possesses something which the other has resolved to seize, or has inflicted some real or supposed injury on the other, which he de¬ termines to punish by the infliction of a corre¬ sponding chastisement. War and law are quite opposed to each other, but while opposed they are also related. The ultimate means of enforc¬ ing law is by physical force, but in every society the aim of law is to put down every appeal to force except on the part of the magistrate, and equally to restrict his use of it to the enforce¬ ment of the law. Where there is no organized society, every individual family, or group, en¬ forces its own claims and appeals to force are consequently frequent, but as society extends its organization these partial appeals to force are declared illegal and put down. But the society, however extended, is still partial; out¬ side of it exist other societies with independent laws and different interests. Between these, disputes are liable to arise, which, failing mutual accommodation, can only be settled by force. In each society, moreover, the central authority is liable to vicissitudes of strength. _When it is active and vigorous, the whole society is kept in equilibrium and repose; when it is weak or idle, private or party interests assert themselves, the laws are disobeyed and the central authority may be defied and overthrown. Thus, three conditions of

warfare arise according to the degree of organization of society: the state of private war, when no great central authority has been established, or when it has been wholly destroyed; the state of civil war, when such an authority, having been established, has decayed, and the society arranges itself in dif¬ ferent parties for the purpose of maintaining the old or establishing a new central authority ; and the state of international war, when states sufficiently powerful to control their own sub¬ jects quarrel among themselves. In each of these states war is conterminous with and op¬ posed to law.

The aim of law is always to control war, and either suppress it or render it subservient to its own enforcement or re-establishment; the aim of war is either to supplement the impotence of law or accomplish some object forbidden by it. Hence the peculiarity of all laws relating to

war. They are fluctuating in their nature, be¬ cause the power to enforce them is frequently wanting; yet they are necessary and in the end efficacious, because force can be applied in favor of law as well as against it, and it commonly becomes the interest of society in the long run so to apply it. It follows also from these condi¬ tions that as there are three states of warfare, so there are three relative states of law opposed to them : international law is opposed to inter¬ national war, national law to civil war, and natural law to private war. In each case law forms the boundary of war and war of law, so that where one is strong the other is weak. International law may thus be defined as con¬ sisting of those common principles which still continue to be recognized and observed by bel¬ ligerents. The persistent disregard of any prin¬ ciple of law by a belligerent would annihilate it as a principle of international law, and as the belligerent has already set the power of its immediate antagonist at defiance, the only con¬ siderations which can enforce its observance of an international law are its own respect for its principle, or its fear of the power of neutrals. In like manner national law is opposed to and limits civil war. In as far as either party sets the national law at defiance the law is abrogated and can only be re-established by force; in as far as it is observed it controls the action of both parties. Private war is opposed by natural law because there is no positive law recognized bj'^ the parties. Violence is limited only by the power of conscience of the belligerents.

During the Great War of 1914-18 practically the entire industries of the nations involved \rere diverted from the usual channels to the one great task of keeping the armies in the field supplied. Great science and skill are applied to the conduct of military operations and the principles on which they ought to be conducted are carefully investigated in the light of experience. In the progress of society certain usages of war have come to be generally recognized. These have varied greatly at different times and in different countries, but the changes in them have been in general favor¬ able to the interests of humanity. The Hague tribunal has done much to codify these rules of warfare and to make their acceptance more general. Prisoners of war are no longer put to death, nor are they reduced to slavery, as was frequent in ancient times ; and their treat¬ ment has become increasingly mild and kind. Quarter is now generally granted in battle whenever it is sought, although in the late war it was at times found almost impossible to grant it due to the necessity of detailing men to conduct prisoners to the rear, thus depleting the forces for attack. A state of war is ended by armistice, treaty or conquest, although it is more true to say that hostilities are brought to an end by an armistice while a state of war con¬ tinues until a treaty of peace is concluded, signed and ratified by the belligerents. See Contraband; International Law; Prisoners OF War; Prize; Prize Courts and Prize Juris¬ diction; Strategy; Tactics; Treaty; War In¬ strumentalities; War Indemnity; War Wounds; War Zones. And consult Bord-well, Percy, ˆLaw of War between Bel¬ ligerentsˆ (Chicago 1908) ; Holland, T. E., ˆLaws of War on Landˆ (Oxford 1908) ;

Higgins, A, P., ˆWar and the Private Citizen: Studies in International Lawˆ (London 1912) ; Beaty and Morgan, <War: Its Conduct and Legal Resultsˆ (ib. 1915) ; Brewer, D. C., ˆRights and Duties of Neutralsˆ (New York 1916) ; Hnstructions for the Government of Armies of the United States in the Fieldˆ (Washington 1863) and ˆThe Laws and Usages of War at Seaˆ (ib. 1900) ; Spaight, J. M., ˆWar Rights on Landˆ (London 1911) ; Wehberg, H., ˆCapture in War on Land and Seaˆ (London 1911).

WAR, Censorship of the. One of the many paradoxes of the Great War fought for freedom and democracy against autocracy and irrespon¬ sible authority was, that the democratic cham¬ pions were themselves compelled, for the pur¬ poses of their war of liberation, to adopt many of the methods and principles against which, they fought. In all the belligerent countries, in democratic America as in autocratic Ger¬ many, there was built up a vast bureaucratic machinery, a veritable college of propaganda, having for object the shaping, of political opinion by the centralized government. This result was achieved mainly by manipulating the dissemina¬ tion of information ; autocratic and generally secret bodies deciding that the knowledge of such and such facts should be withheld from tlie public, such and such other facts emphasized and perhaps especially prepared for their con¬ sumption. In this way governments were in a position to determine the opinion of their citizens through control of the knowledge on which such opinion was based. This was the method, in all its purity, pursued by Prussia for so long, the very cornerstone of the system which gave the conscience of her people into the keeping of her government, and made pos¬ sible certain moral results which appalled the world.

The official justification of a censorship as it affected both the individual and the press of the Entente countries was that its object must be realized if the war was to be won. This object was threefold: To prevent information of military value from reaching the enemy; to acquire similar information for the home gov¬ ernment; and to check the dissemination of in¬ formation useful to the enemy or prejudicial to the home government. In the course of the war it became apparent that in the censorship there lay ready to hand a weapon, the full value of which was perhaps not anticipated prior to the war. It was used to restrict commercial and financial transactions intended for the benefit of enemy governments or persons residing in enemy countries.

As might be anticipated the censorship regu¬ lations of the several belligerents differed some¬ what. In Germany, due to the predominance of the military caste, the press afforded no problem, nor indeed in France. On the pretext of preventing the leakage of military informa¬ tion, Germany established a censorship which was constantly employed for the suppression of opinion and the stifling of political criticism. Foreign correspondents, in the early years of the war at least, were permitted to visit the ad¬ vanced German lines, but their dispatches were subjected to the stringent regulations of the mili¬ tary authorities, and persons so visiting the fronts were not permitted to leave Germany before a period of six weeks had elapsed.

One of the results of the German censorship was the dissemination within Germany of a considerable body of clandestine literature, most of which originated among German revo¬ lutionists in neutral Switzerland. In occupied Belgium, where the German censorship^ was more rigorous 'than even in Germany itself, Belgian journals were smuggled in and import¬ ant passages were copied and circulated by un¬ derground routes. The most interesting and defiant of these secret journals was La Libre Belgique, which the German authorities were unable to suppress despite the utmost vigilance.

France issued no licenses to correspondents, and for a long time England permitted but 12 American correspondents to remain in London ! Newspaper men found soon after the out¬ break of war that the day of glory for corre¬ spondents had passed. Belgium was the only country that made any exceptions in this matter, but the part of Belgian territory that remained unoccupied by the enemy was so small that this action afforded comparatively little relief.

With countries like England and the United States having numerous routes of trade and communication always open, the task of the censor was not as simple as in France and Ger¬ many; yet England moved 1(X),000 men to the Continent without any news of it reaching the public. To the press itself belongs the credit for this silence. The government was then un¬ prepared for the exercise of censorship and the press itself was the governing factor in the mat¬ ter. Later the British censorship was devel¬ oped to a high state of efficiency and rendered excellent service despite many tactical blunders. In this connection, it may be noted that news of the heroic stand of Britain's troops at the first battle of Ypres was not permitted to reach the public for four months after the event, and then its appearance was due to the patriotism of Lord Northcliffe who was willing to incur the displeasure of Kitchener and the War Office that England might learn of the heroic conduct of her sons.

American military censorship in France and other countries in which American troops op¬ erated was exercised by a department of the army's secret service and the little manual en¬ titled ^ Field Service Regulations,^ defined the rights and limitations of war correspondents as guaranteed and decreed by the War Department. The American system* worked great hardships on the correspondents ; the personnel of the mil¬ itary censorship bureaus often comported them¬ selves in a vindictive manner toward certain correspondents w'ho had ventured a protest against the methods of the censor. At home, the Committee

on Public Information, beaded by George Creel, was in effect a board of cen¬ sors without a censorship, since its control of the press through its control of the news sources was as complete as that of any censor in any of the warring nations. The American prtˆs, howeyer,ˆ imposed upon itself a voluntary cen¬ sorship in agreeing to the suppression of all matter which might be of aid to the enemy. The committee above named was designated to advise with publishers and writers in the ad¬ ministration of this voluntary censorship.

WAR, Civil. See United States — Causes OF the Civil War, Military Events of the Civil War, Political Events of the Civil War, *Etc.*

WAR, EUROPEAN — HISTORICAL INTRODUCTION (1)

VˆAR, EUROPEAN, the great conflict, brought to an end in 1918, changed not only the boundaries of nations, but practically every in¬ terest and character of human life. It created a gigantic upheaval among the hitherto accepted fundamental principles underlying government, law, international relations, democracy, freedom, commerce, industry, finance, labor, *etc.* Over a score of thrones crumbled and their former occupants sought security in exile. Revaluations and restatements have become necessary in all fields of endeavor. The conflagration in 1918 involved 93 per cent of the world's population, the countries classed as neutral had a combined population of only 130,000,000 whereas the countries which participated in the war had a combined population of over 1,700,000,000.

The war also brought to the front the eminent men of all nations; many of them new to fame, but whose names have now become household words. The biographies of these will be found under their respective names. The campaigns and battles brought into prominence nationalities, provinces, rivers, cities and towns previously little known. Descriptions are found in their proper places throughout the work.

In this section there is presented a complete general statement written by competent scholars and authorities on the causes, course, and de¬

termination of the war, showing every phase of the political, military, naval, economic and administrative aspects — a scientifically devel¬ oped and connected history of events, together with a number of articles showing how the war has effected modern life The subject divisions of this department are as follows:

1. Historical Introduction

2. Diplomatic History

3. Chronological Survey of

the War

4. Fighting Strength of the

Nations

5. Military Operations on

the Western Front

6. The Eastern Front

7. Italian Campaign

8. Colonial and Japanese

Campaigns

9. Turkish Campaign

10. Balkan Campaign

11. Naval Operations

12. Aerial Operations

13. The Armistices

14. Events Subsequent to the

15. Diplomatic Negotiations

during the War

16. General Pershing's Re¬

port

17. The Peace Conference

18. The Peace Treaties

19. American Neutrality

20. Neutrals and the War

21. The War and the Small

Nations

22. Post-War Problems and

the Balkans

23. Costs of the War

24. War Casualties

25. Repatriation of Prisoners

26. Psychology of the War

27. The War and Its Relation

to World Commerce

28. Effect of the War on

See also Financial Problems and the World War; Food Problems and the War; In¬ surance, Industrial; Medical Science and the World War; National Ideals and the War; Submarine Warfare; War, Instrumentalities and Methods of; War Pensions; War Risk Insurance; War Wounds; War Zones; ar¬ ticles on the countries engaged, the rulers, presi¬ dents, premiers, etc., of these countries.

1. HISTORICAL INTRODUCTION.

Wars are invariably concerned with issues of great magnitude, although they frequently arise from unimportant circumstances. This is es¬ pecially true of the European War which broke out in 1914. It would be rash, however, to de¬ scribe any — or even all — of the political events of the past as ^^causes® of the war : they were incidental circumstances contributing to an accumulation which rendered war extremely probable. The direct cause of the war was the German ultimatum to Russia on 1 Aug. 1914; it was that which converted a local quarrel be¬

tween a first-rate and a fifth-rate power into a world-wide conflict. The critical situation was created by the murder of the Archduke Franz Ferdinand of Austria and his wife at Serajevo on ^ 28 June 1914. Turning from direct to oblique causes, it will be found that these had been smoldering beneath the visible surface for many years and only needed a slight breath to produce a gigantic conflagration. History that is still in the making or is not yet crystallized gives rise to a confused mass of controversy and contradiction ; each participant ^^hath his quarrel jusV^ and the student of current events is largely cast upon his own resources and in¬ clinations to form a judgment from the con¬ flicting material at his disposal. Certain out¬ standing features of the past may, however, serve as a guide to read the riddle of the times in which we live.

Perhaps the most prominent of these fea¬ tures is the marvelous rise of modern Germany since its unification in 1871. The excellence of the educational system of the German people, their technical training, scientific research and machine-like precision had all contributed to make them the most formidable competitors to the older and more slowly-moving nations of Europe. Economy in production and skilful

labor enabled them to flood the markets of the world with their wares ; in the chemical indus¬ try they were almost supreme; in shipbuilding and machine construction they rivaled Great Britain ; their financial standing was of the highest ; German capital stood behind the great¬ est enterprises, and magnificent German ocean steamships ploughed the Seven Seas. In short, Germany was in a fair way to conquer the world by the peaceful arts of commerce and in¬ dustry. Above all, the German army was re¬ garded as the greatest and most efficient fight¬ ing machine on earth, while the ever-growing German navy, created in 15 years, stood second only to the British. German settlers and com¬ mercial branches of German firms — as well as banks — were scattered throughout the five continents, and German blood flowed in the veins of nearly all the European royal families. The ubiquitous penetration and expansion of Germany became a world wonder; her real and most profitable colonies were the countries she had never owned.

Increasing prosperity not unnaturally begets ambitions and aspirations which overflow the narrow confines of artificial frontiers, and this appears to have been the case with Germany. Her leaders of thought had for many years ex¬ pounded the patriotic doctrine of German su¬ periority and greatness. They argued, not with¬ out reason, that a nation which had achieved so much in the past was both capable and worthy of greater achievements in the future. Many of Germany's severest foreign critics ascribe a large share of responsibility for the war to the influence of Trietschke, Mommsen, Nietzsche, Frobenius, von Bernhardi and Count Reventlow. Each of these was an exponent of the gospel of force, of the survival of the fittest among na¬ tions, and of the natural predominance of the strong over the weak. Treitschke, paraphras¬ ing what Luther said 400 years earlier, de¬ scribed war as the ˆMrastic medicine of the hu¬ man race® ; he taught that the hope of banish¬ ing war was not only meaningless but *immoral,® and that* its disappearance would turn

the earth into a great temple of selfishness.ˆˆ He also expressed the

utmost contempt for the ˆtottering British Empire.ˆˆ Nietzsche instilled a new beatitude, ˆBlessed are the war-makers, for they shall be called, if not the children of Jahve, the children of Odin, who is greater than Jahve.ˆˆ Mommsen preached hatred of England in his historical lectures and Count Reventlow and other writers issued pamphlets and articles aimed mainly or entirely against Great Britain. German fiction abounded in thrilling narratives of successful wars against England. Professor Delbriick compared the historical development of England with that of Holland, which, ˆˆwithout ever having been over¬ come in war, sank in the course of a single generation from the position of a great power to a state which is scarcely mentioned in his¬ tory. In his sensational book, ˆGermany and the Next Warˆ (1911), General von Bernhardi weighed up the possibilities of a European war with remarkable accuracy and stated that Ger¬ many must acquire more possessions in Africa — if necessary, at the cost of such a war. Years ago General von der GoltP wrote that ˆhhe pre¬ diction of a final struggle to assure the exist¬ ence and grandeur of Germany is not a mere fancy born in the minds of ambitious fools,ˆˆ but that it would ˆˆcome one day inevitably, vio¬ lent and serious as is every decisive struggle between peoples of whom the one desires to have its superiority over the others definitely recognized.ˆˆ In 1900 a book appeared in Ber¬ lin entitled ˆDeutschland beim Beginn des Zwanzigsten Jahrhundertsˆ (ˆGermany at the Beginning of the 20th Centuryˆ), in which the writer stated : ®We consider a great war with England in the 20th century inevitable.ˆˆ On 18 Jan. 1900 the Koloniale Zeitschrift remarked, ®The old century saw a German Europe; the new one shall see a German world.ˆˆ Two months later (28 March) the same journal said, ˆTn the history of the world the 20th century will be called the German century.® In ˆThe Reckoning with Englandˆ by C. Eisenhart (Munich 1900), we are shown how Germany first destroys the Japanese navy, and afterward, while Great Britain is fighting Russia in Asia, Germany destroys the British fleet; finally, the ˆinsolence® of the United States is punished by their utter defeat. Whatever weight might be attached to such bellicose utterances, their sources and the unanimity of sentiment per¬ vading them could not fail to attract respectful attention. Even so high an authority as Prince von Billow, then imperial chancellor, spoke in the Reichstag on 10 Nov. 1912 of ®the determina¬ tion of Germany to make its strength and capa¬ bility prevail in the world.® So long ago as 23 Sept, 1898 the kaiser himself proclaimed at Stettin that Germany’s future lay upon the water, while the year before (18 June) he had declared in a public speech at Cologne that *the trident (of Neptune) must be in our fist.® Reduced to simple terms, Germany aspired to become a ˆˆWeltmacht® or world power with extensive

oversea possessions such as the British Empire is composed of. To promote this object the Bismarckian doctrine of ^^blood and iron® was sedulously instilled into the minds of the people by the ruling military caste. The German Navy League (Flottenverein) carried on a nation-wide propaganda by lectures and cine¬ matograph shows, while the members of the

Pan-German League (Alldeutscher Verband) supplemented the campaign with pamphlets bearing such titles as ^The Fatherland in Danger^ ; ^The British PeriP ; ^The Next War,^ *etc.* Throughout the agitation we invariably find Great Britain staged as the background of the scene. (See Pan-Germanism). The clear¬ est explanation of this phenomenon was per¬ haps that of the late Joseph Choate, former United States ambassador to Great Britain : ^^But there was, and is, one insuperable obstacle in the way of this magnificent dream of a future world empire for Germany, and that is the accomplished, existing, actual world empire of Great Britain, of which England is the heart ; and unless this obstacle can be removed, so that it shall never stand in the way again, the grand ideal of Germany's future can never be real¬ ized;®

Having thus far traced the fundamentals of German policy as proclaimed by Germany's representative spokesmen and revealed in her popular literature, it must be added that there existed two widely-differing schools of thought as to procedure in bringing that policy to fruition. While the militant section favored the forcible abolition of the British Empire, the other and more moderate point of view ad¬ vocated a ^working arrangement® with Great Britain, whereby the British Empire should be left intact and Germany given a free hand to expand elsewhere. Under the terms of such an understanding, according to Bernhardi's in¬ terpretation, England would have had to give up her claim to a predominant position through¬ out the world and recognize ®that Germany possesses equal rights, side by side, with her,® and to agree beforehand to ®any increase of Germany's power on the continent of Europe® ; to ^^any possible change of the map of North Africa® ; to ^^offer no opposition to Germany's economic expansion in Asia Minor,® and ®no longer oppose the development of Germany's sea power by the acquisition of coaling stations.® Such an agreement, he believed, would pssure European peace, and that ®a powerful counter¬ poise would be created to the growing influence of the United States.® The result would have ^ffhe most far-reaching advantages, not only for England and Germany, but for all civilization® ; but the basis of all negotiations between the two

countries ®would have to be the demand that England would have to leave the Triple En¬ tente.® When, however, the writer asked him¬ self the question, whether it was likely that England would enter upon such an agreement with Germany, he answered it with an ˆhm- conditional no.® (ˆOur Future: A Warning to the German Nation, > 1912).

Contrary to general outside opinion, the Ger¬ mans are not essentially a warlike race ; it was the stern Prussian military system that con¬ verted them into excellent fighting material. One must distinguish between Prussians and Germans. _ The former are a mixture of Slav and Finnish compounds, with a groove-like genius for unimaginative bureaucracy ; the latter an industrious, peaceful and docile race. As one authority puts it, the Prussians were *the best machine-makers in the world, and their machine was all Germany.® Certain it is that no nation was so thoroughly and scientifically prepared for war as Germany. The Germans are a prolific race, and oversea colonies were

considered a vital necessity for their growing population. Large numbers emigrated every year to other countries. Transplanted on for¬ eign soil, these were entirely lost to the home¬ land within two generations, losing their nation¬ ality and not infrequently their mother tongue unless they settled in German colonies, and very few did that. Emigration, however, had fallen off considerably during recent years before the war, owing to industrial progress at home. Some German authorities have even asserted that economic pressure and over-population were not the reasons for German emigration, in proof of which statement they pointed to the enormous number of foreign laborers, Italians, Hungarians and Russians employed in the country in normal times. But although the Germans were over 100 years too late to join in the scramble for colonial possessions and did not enter the lists until long after Spain, Por¬ tugal, Holland, France and England had staked out the best claims, they were nevertheless fairly successful in acquiring foreign territories. Dur¬ ing about 16 years of colonial activity (1884-1900) the German Empire was able to

annex some 1,028,020 square miles of territory with an estimated native population of about 12,000,- 000. In addition to this France had ceded to Germany in 1911 over 107,000 square miles of African (Congo) territory with a million popu¬ lation. The total number of Germans and other whites scattered over their colonial empire barely exceeded 25,000, composed mainly of troops and officials. The reason of this was the fact that desirable German emigrants had al¬ ways exhibited a strong predilection for the English-speaking lands, while large numbers of them also settled in South America, South Africa and all the European countries — every¬ where excepting in German colonies. Thus it appeared that German colonial acquisitions even at the average rate of 70,000 square miles per annum failed in the primary object of provid¬ ing new homes for (German settlers, though it must ‘be conceded that former German East Africa (Dar-es-Salam), was the only possession that offered any attractive prospects ; all the others were too distantly isolated, undeveloped, or unhealthy. It is worthy of note that Germany obtained all her former colonies while she had no navy; and those she had acquired, as Bernhardi confessed, ®in agreement with England.^^ Since 1900, when the German Navy Bill for doubling the strength of the fleet was introduced and passed, the only colonial addition to the empire consisted of the French Congo cession already mentioned, given by way of *com-pensatioffiˆ over Morocco (q.v.). Up to the last few years of the 19th century we find Great Britain aiding the expansionist aspirations of Germany. The kaiser’s telegram to President Kruger on 3 Jan. 1896 marks the turning point in British policy and the transformation of British sentiment toward Germany.

The violent epidemic of Anglophobia which swept over Germany during the South African War gained the popular support for the Navy Bill, the preamble to which set forth that ˆUermany must have a fleet of such strength that even for the mightiest naval power a war with her would involve such risks as to jeopard¬ ize its own supremacy.^^ Not unnaturally, the British people read in the measure a direct challenge to themselves. Subsequent v, aves of

Anglophobia spread in Germany during the Morocco crisis in 1906, the Austro-Serbian crisis of 1908, and the Agadir incident of 1911. Fresh navy bills were introduced after each of these events, with England ever held up as the danger point. There was no secrecy about German ambitions ; they were publicly declared and indited to the world by the emperor himself, his leading lieutenants and a large school of writers. If it is true that the spirit of a nation is reflected in

its literature, in the utterances of its leaders and the course of its domestic and foreign policies, no student of the ante¬ cedents of the European War can afford to ignore the testimony supplied by the Pan-Germanic propaganda. «God has called us to civilize the world,^^ proclaimed the kaiser at Bremen; Dr. Giesebrecht asserted that ®Domination belongs to Germany because it is a superior nation, a noble race, and it is fitting that it should control its neighbors® ; while another popular writer, Herr Bley, stated, ®We are the superior race in the fields of science and art … the best colonists, the best sailors,

the best merchants.® Field-Marshal Bronssart von Schiˆllendorf wrote: ^^Do not let us forget the civilizing task which the decrees of Provi¬ dence have assigned to us. Just as Prussia was destined to be the nucleus of Germany, so the regenerated Germany shall be the nucleus of a future Empire of the West. And in order that no one shall be left in doubt, we proclaim from henceforth that our continental nation has a right to the sea, not only to the North Sea, but to the Mediterranean and Atlantic. Hence we intend to absorb one after another all the provinces which neighbor on Prussia. We will successfully annex Denmark, Holland, Belgium, Northern Switzerland, and then Trieste and Venice; finally Northern France from the Sambre to the Loire. This program we fear¬ lessly pronounce. It is not the work of a mad¬ man. The Empire we intend to found will be no Utopia. We have ready to our hands the means of founding it and no coalition can stop us.® It may be noted that the proposed annex¬ ations included, besides portions of France, four independent states and also territory belonging to Germany's two partners then in the Triple Alliance. Coming, as it did, from a field mar¬ shal in the German army, such a pronuncia-miento could hardly pass unheeded. Thus the German people, half consciously though in¬ evitably, became aggressive and belligerent in spirit under the highest official and academic guidance.

The British people had witnessed the won¬ derful growth of Germany with mixed feelings of admiration and uneasiness. They had seen German enterprise invade all markets of the British Empire. Unprotected by tariff barriers, the United Kingdom especially was flooded with commodities bearing the legend, ^^Made in Ger¬ many.® Yet the British continued to buy Ger¬ man goods because they needed them ; because they were cheaper than the home product or because British-made equivalents did not exist. Until quite recent years, indeed, England was entirely dependent upon Germany for the car¬ bons used in the searchlights of the British navy. Not only did the energetic Teuton run the conservative Briton close in every foreign market, but had even elbowed him out alto¬ gether in some. So far

from adopting the

mother country's system of free trade or, more correctly, of free imports, the British self-governing dominions raised protective tariffs, in some cases granting preferential rates to the homeland. The economic necessities of a nation dictate its policy to a greater degree than purely political considerations, and it is in the domain of economics that perhaps one of the principal underlying causes of the war may be found. Nations, like individuals, live by their labor; their purchasing power is strictly regulated by the extent of their earning capacity. Growth of population, demands increased production, for the disposal of which markets are essential. Great Britain and the United States were Germany's chief commercial rivals; in America she was faced with a formidable tariff wall, while similar restrictions confronted her in the British Do¬ minions. The United Kingdom alone clung to ®free trade,® but its abolition seemed within measurable distance. The tariff reform and ˆImperial Preference® campaign inaugurated by Joseph Chamberlain in 1903 gained millions of supporters throughout the* empire and at home, and the probability loomed large that the vast territories it embraced would be closed to Ger¬ man trade. For years before the war Germany stood in a critical position. Her great indus¬ tries had been built up under the fostering in¬ fluence of the Zollverein. Bismarck's protec¬ tionist policy during the period 1880-91 had evoked reprisals from neighboring nations, and the number of open foreign markets diminished. At the same time Bismarck neglected to create a colonial empire capable of becoming a na¬ tional receptacle for the over-production at home. An industrial crisis ensued and a stream of emigration followed. Between 1891 and 1907 Germany concluded a number of commercial treaties with other countries and soon began a vast exportation of raw and manufactured products, aided by a flexible but precarious banking system of financial and industrial credit. German banks were constantly being drained by advances to manufacturers and traders, and frequent appeals for foreign capital became necessary. Enormous sums were bor¬ rowed from French banks and, to a less degree, from British

financiers. Recurring interna¬ tional political crises and rumors of war be¬ tween 1906 and 1911 instantly closed these sources of fluid cash, and when, on such occa¬ sions, the creditors pressed for settlement, the German banks were obliged to pay with real money instead of promissory notes. An in¬ structive object-lesson on the intimate relation¬ ship between finance and politics was furnished by the Agadir crisis in 1911. On 1 July the German cruiser Panther arrived at Agadir. Two months later Germany required $12,000,000 immediately, which was raised in the United States at 6 and 7 per cent ; in normal times this money could have been obtained in Paris at 3 or 4 per cent. The system of making lavish advances to clients militated against the main¬ tenance of adequate funds in hand, and it was not always easy for German savings banks to meet their liabilities in periods of panic, under the stress of which industry, trade and finance all suffered.

It was from outside, however, that German industry was more directly threatened. Even more than open markets in which to sell her goods, Germany needed an open market from

which to buy other essential products, a real ^^matter of life and death.®* With ever-increas¬ ing commercial and industrial competition to fight against, practically all the progressive coun¬ tries had erected tariff walls to protect their home industries, the United Kingdom alone ex¬ cepted. Germany herself was strongly pro¬ tected by import duties, and when other states adopted like measures to favor their own in¬ dustries, a conviction gradually grew among the German people that their country was being encircled, hemmed in, and deprived of its place in the sun; that a great conspiracy was afoot to throttle their national existence. In time, England came to be regarded as the instigator of this supposed plot, although the legend did not come into existence until the Anglo-French rapprochement in 1904.

Closely Qonnected with the economic factors lay the question of overseas expansion, of colo¬ nization or at least the procuring of colonies by Germany. Bismarck, the creator of the former German Empire, could not foresee the great industrial nation that would arise on the foun¬ dations he had laid. He discouraged coloniza¬ tion in his own country and encouraged it in France and Russia. He had brought Germany to the zenith of her influence at the Berlin Congress (q.v.) and made her the dictator and umpire of Europe. After a victorious war, Russia emerged empty-handed from that his¬ toric gathering;

Austria, a passive spectator and a potential German ally, was compensated for Sadowa by being presented with Herzegovina and jBosnia and the prospect of an outlet on the Mediterranean via Salonica. With the gates of Constantinople closed against her, Russia turned toward Central Asia, and France, still smarting under her defeat of 1870-71, was skilfully guided into a series of colonial adventures. (See France and the War; Italy and the World War). Germany stood aloof from colo¬ nial enterprise. Bismarck made an ally of Aus¬ tria, embroiled France with Italy in northern Africa and successfully manoeuvred the Italian kingd9m into partnership with Germany and Austria to form the Triple Alliance (q.v.). But while this undoubtedly strengthened Germany's position in Europe, Bismarck committed two grave errors in sacrificing a colonial empire and making an enemy of Russia. He seems to have realized the latter mistake when it was too late, for he devoted the remaining years of his ad¬ ministration to determined efforts to restore friendship with Russia. At the Conference of Berlin in 1884 Bismarck half-heartedly accepted Togo, Kamerun and Southwest Africa to satisfy public clamor, though in principle he remained hostile to colonial expansion, regarding Ger¬ many's real historical mission as anchored in Europe. Between 1885 and the fall of Bis¬ marck in March 1890, Germany acquired her former East African possession and some Pa¬ cific island groups. Her colonial expansion ended in 1899; there was no useful unclaimed territory left.

From the seeds sown by the Treaty of Frank¬ fort in 1871 and the Berlin Treaty in 1878, Europe reaped a harvest of tragic results. By

* Her most pressing necessity was iron, as it still is to-day. The German iron-mines are not many years distant from exhaustion; just over the French border, in the basin of Briey, there is ore enough to last for 250 years.

the first instrument France lost Alsace and Lorraine; it left behind

ineradicable sentiments of hatred and revenge and converted Europe into a great armed camp ; the second granted an undeserved new lease of life to the Sick Man of Europe and violated that great prin¬ ciple of nationalities which has become the foundation of the political morality of Europe. The Serbs were the first of the Balkan peoples to throw off the Turkish yoke in 1804, and when the Bosnians rose in 1875 their kindred in Ser¬ bia and Montenegro cheerfully responded to the battle cry against the historic foe. Their victory seemed assured and the freedom of Bosnia accomplished when Austria intervened, and the subsequent Congress deprived Serbia of the fruits of her sacrifice and left Bosnia nominally under Turkish suzerainty but actu¬ ally in the possession of Austria. Macedonia was handed back to Turkey, and Serbia was left to struggle against a new and powerful enemy, whose road to Salonica she barred by the mere fact of her geographical existence. Austria led Serbia into a disastrous war with Bulgaria in 1885, and was mainly responsible for the second Balkan War of 1913. Two fur¬ ther direct results of the Berlin Congress must be noted : It brought together the two nations which had suffered at the hands of Bismarck — France and Russia — into an alliance which placed Germany, situated in the centre of Europe, between two powerful enemies, one on each border. By saving the Turkish Empire from Russia, Bismarck had placed the Sultan Abdul Hamid II under obligations, with the result that shortly after, in the early 80's, German penetration in the Near East began to assume the shape of a settled policy which, under William II, developed into a quasi pro¬ tectorate over the Mohammedan world and a program of German expansion via the Balkans and Constantinople to Mesopotamia and the Persian Gulf. During the 20 years of his rule after Sedan, Bismarck pursued a cautious policy of conservative concentration to consolidate the position he had won for Germany. His sacri¬ fice of Russia's friendship at the Congress was unavoidable : he had to choose between that country and Austria, though he afterward con¬ cluded a ˆreinsurance treaty® with Russia, by which means he believed that he had isolated France and rendered her innocuous. He had no liking for England, yet he was careful not to endanger friendly relations with that country. ®If I should discover that we might lose touch with England,® he told the Reichstag on 26 Jan. 1889, *I should act cautiously and endeavor to avoid losing England's goodwill.®

Not long after the retirement of Bismarck, German foreign policy began to shape a course that puzzled and not infrequently alarmed the chancelleries of the Old and the New Worlds. Concisely stated, that policy amounted to an insistent demand to play a leading part in the guiding and ordering of international affairs everywhere. Within two

years of his acces¬ sion the new emperor, William II, had ˆdropped the pilot® and taken full command. Whereas Bismarck had been content to make Germany the foremost power in Europe, Wil¬ liam II undertook to transform her into a “Weltmacht® or World Power. There were but four stales at the time to which the term world

power could strictly be applied — Great Britain, United States, Russia and France. As has al¬ ready been pointed out, Germany was a late comer in the competition for places in the sun ; the hope of creating a new world power could hardly, apparently, bˆe realized without the men¬ ace or exercise of force. It is significant enough that all of those four existing world powers were subsequently arrayed in armed conflict against Germany; that they were ac¬ tively supported on land and sea by eight other independent states, while yet another 15 re¬ publics and one kingdom (Siam) signified their sympathy with the enemies of Germany by declarations of war or severance of diplomatic relations. Hemmed in on either side by France and Russia — one of them a mortal enemy — Germany beheld across the North Sea the is¬ land fortress of Great Britain, a country de¬ voted for centuries to the principle of prevent¬ ing any single power from dominating Europe. The British navy, furthermore, possessed the ability to close both exits from the North Sea to the Atlantic. Germany’s only possible avenue to the outer world, following the line of least resistance, consequently lay to the south. Yet even a maritime outlet through friendly terri¬ tory to the Mediterranean via the Adriatic or .ˆgean would avail little in wartime without command of the sea. An overland route, through the Balkan, Peninsula furnished the one alternative, and the road must necessarily lead through either Rumania or Serbia, in order to establish communication with places beyond Europe. But Rumania’s situation on the Rus¬ sian frontier offered no guaranty that such a passage could be kept open during war, hence the choice of a German corridor to the East was perforce limited to Serbia, a poor, sparsely populated country. To Austria, Serbia was a thorn in the flesh, a real danger to the stability of the former Dual Monarchy by reason of the Pan-Serbian agitation which threatened to de¬ tach territories and millions of Austrian subjects from the empire. Serbia also stood in the way of the Austrian ˆˆDrang nach Osten® policy — the march to Salonica. To Germany, on the other hand, an independent Serbia was a stub¬ born obstacle that blocked the road to Con¬ stantinople and beyond. The idea of Serbian unity, embracing the Jugo-Slavs (Croats and Slovenes) contained within itself the destruc¬ tion of the Turkish and Austrian empires and the formation of a new independent state from the broken fragments of these two empires. Five centuries of

Turkish effort had failed to stifle Serbian nationality, and upon that same rock the Hapsburg Empire beat in vain for 40 years, only to shatter itself in the end.

Besides Germany and Austria, there were two other powers Which claimed interests in the Balkans — Russia and Italy. Of the four, the claims of Austria were no doubt the most justifiable. She was the next-door neighbor to the peninsula and her existence was threat¬ ened. Italy's interest was centred upon Albania, and more particularly the fine harbor of Valona, on the eastern shore of the Strait of Otranto and less than 50 miles from the Italian Coast. The first object of her policy was to prevent Austria from acquiring the port, while Austria strove to keep it out of Italian hands on ac¬ count of its strategic position at the entrance

to the Adriatic. The two allies in the Triple Alliance worked actively against each other with the Albanian tribes, establishing rival edu¬ cational institutions and medical missions in the country and seeking to extend their influ¬ ence over the local chieftains. This procedure resulted in a stalemate which was recognized ill a mutual self-denying ordinance concluded in 1906, by which both powers agreed to ab¬ stain from any attempt to obtain political do¬ minion over the coveted territopˆ ; the matter was hung up till a more propitious moment might arrive for one or the other. While Italy desired to see Serbia strong enough to be troublesome to Austria, she supported Austria in preventing Serbia from gaining an access to the Adriatic, and since 1912 her policy has been markedly anti-Serb. The interest of Russia in the Balkans was rather sentimental than practical. Beyond a portion of Rumania, which is not strictly a Balkan state, none of the Slav states touched her territory. But Russia had constituted herself the protector of the Balkan Slavs, and had certainly centributed more than any other European power in liberating them from Turkish rule and securing their inde¬ pendence. While Austria was concerned in keeping the Slavs down and divided among themselves, Russia labored and intrigued to strengthen and unite them — under her he¬

gemony. In how far this was part and parcel of Russia's aims on Constantinople may some day be revealed. Certain it is that the respec¬ tive policies of Austria-Hungary and Russia in the Balkans were utterly irreconcilable ; an ac¬ cession of diplomatic ˆ“ˆprestige® for the one meant a setback or defeat for the other. Bis¬ marck had desired Austrian expansion toward the East, and was perhaps not ill content that her policy in the Orient should clash with that of Russia, for in this way Austria would have still more need of Germany and would gradually fall into dependence on Berlin. The process by which this was accomplished was not continuous ; there were interludes of cooperation with Russia — as in the Macedonian question between 1903 and 1908; but, throughout, the ties with Germany in the Triple Alliance tended to be drawn closer, even before the final breach with Russia over the Mitrovitza Railway in 1908. The securing of this railroad passage by Austria involved the destruction of Serbia and the virtual in¬ corporation of the western half of the Balkan Peninsula in the Monarchy, thereby opening a gate for the indefinite expansion of Germany eastward. For many years Austria employed methods of repression against Serbia. She had shut out the Serbs from the sea ; it was her systematic policy to prevent any railways being built by Serbia, which might have provided outlets for her trade. In 1906 Serbia concluded a Zollverein (tariff or customs union) with Bulgaria. As soon as this was declared, Aus¬ tria closed her frontier against Serbia and broke off negotiations for the renewal of the Treaty of Commerce with Serbia. As 80 per cent of Serbian produce passed into Hungary, a deadlock ensued and Serbian farmers were threatened with ruin ; in the end Serbia had to submit to the terms dictated by Austria, which compelled her to buy her chief imports, includ¬ ing guns and ammunition, in the Austrian mar¬ kets, and which made Serbia more than ever

a vassal of Austria-Hungary, politically and economically. When the Serbians turned their attentions to Macedonia, they came into colli¬ sion with Bulgaria. In 1908 Austria violated the terms of the Berlin Treaty by the annexa¬ tion of Bosnia-HerzegOYina — a challenge to Russia to contest Austrian suprˆacy in the Balkans. Russia encouraged Sei”bia and Monte¬ negro to resist this final separation from their fellow Serbs and war appeared imminent in 1909, when the intervention of Germany con¬ firmed Austria's action. The dreams of gran¬ deur cherished by the Southern (Jugo) Slavs were until then still vague and undefined when the annexation translated them into action. Austria's step was an act of defiance to Slav¬ dom, for it thrust a wedge into the very heart of the lands which the Southern Slavs

regarded as their inheritance, and seemed to dissipate forever their dream of ultimate union. Russia, though diplomatically supported by France and Great Britain as signatories to the Berlin Treaty, retired from the controversy, perforce leaving Serbia and Montenegro to withdraw their claims. Austria and Germany had gained a great diplomatic victory; Russia had been driven from the field and Serbian aspirations seemed finally shattered. The incident was ap¬ parently closed; it emphasized the intention of Austria — supported by Germany — to allow no treaty obligations to interfere with her plans of aggrandizement.

Meanwhile, great changes had been taking place on the international chessboard. The Gerrnan emperor's demonstrative visit to Constan¬ tinople and Palestine had led to valuable rail-y/ay concessions into Asia Minor and ultimately into Mesopotamia. German military instruc¬ tors, financiers and engineers were sent to Tur¬ key, and Germany became the doctor to the Sick Man. In every crisis that set in — the Ar¬ menian and Macedonian atrocities and the Cre¬ tan insurrection — Germany stepped in and paralyzed European intervention. In 1897, while the hands of Abdul Hamed II still reeked with the blood of 200,000 Christians, the Cross and the Crescent were united in a strange alliance. The Bagdad Railway concession was granted at that time. Farther afield, German policy was active in the Far East. The Chino-Japanese War of 1894-95 drew attention to the helpless¬ ness or defenselessness of China. The sud¬ den emergence of Japan as an up-to-date naval and military power had alarmed Rus¬ sia, who scented a possible obstacle to her Far Eastern policy. In framing the treaty of Shimonoseki, Germany joined with Rus¬ sia and France in coercing Japan to sur¬ render the chief fruits of her victories in Man¬ churia. Russia stepped in later and seized Port Arthur while Germany acquired Kiao-Chau and the Shantung Peninsula from China. At two intervals of 10 years each Japan reaped her revenge against both those powers. The Tsar Nicholas was skilfully encouraged to expend his resources in a struggle with Japan for the mas¬ tery of the Far East. (See Japan — Russo-Japanese War). Other regions fell within the perspective of Germany. South America par¬ ticularly attracted the kaiser's attention. That continent contained a large German population, but official activity was impossible there on ac¬ count of the Monroe Doctrine, unless England

could be embroiled with the United States and British naval power enlisted as an ally. Early in the Spanish-American War a German at¬ tempt was made to organize a European coali¬ tion against the United States, an effort that was frustrated by Lord Salisbury in London, Lord Pauncefote in Washington, and Captain Chichester with a British squadron in Manila Bay. We have it on the unimpeachable testi-rnony of Sir Valentine Chirol, who was spe¬ cially invited to Berlin by Prince von Billow at the time, that in October 1901 informal conver¬ sations were initiated in Berlin for a treaty of alliance between Great Britain and Germany, by which each party would have guaranteed to the o'ther all their existing possessions through¬ out the world except in Asia. ®There Germany had no intention of placing her sword at Eng¬ land's disposal against Russia… . One of

the most singular features of this proposal was Germany's insistence that the provisions of this alliance should extend to the American conti¬ nent, though neither in South nor in North America had Germany herself any possessions to be safeguarded. The peculiar insistence of Germany on this point was, it was urged, a proof of her singular disinterestedness… .

But the snare was laid in vain. It was too obvi¬ ously an attempt to commit us (Great Britain) to unlimited liabilities which would have some day compelled us to toe the line in a German campaign against the Monroe Doctrine and thus fatally embroil us with the United States. • … The wooing throughout was entirely on

the German side; and, after listening to what Germany had to say, Great Britain very soon indicated that conversations on such lines were not to her taste.® (Considt Quarterly Review, October 1914, p. 415). The feverish restless¬ ness of German policy created a widespread sense of alarm among other powers, induced them to reconsider their mutual relations and to draw closer together. The first move in this direction was the conclusion of a defensive treaty of alliance between Great Britain and Japan in 1902. In 1904 Great Britain and France composed their differences by the Anglo-French Agreement, popularly known as the Entente Cordiale. The next year, while Russia was suffering defeat in Manchuria and thus temporarily eliminated, Germany opened the Morocco controversy which led to the con¬ ference at Algeciras, at which Germany se¬ cured the recognition of her claim, but failed to shake Anglo-French friendship.

In 1907 came the Anglo-Russian Agreement, thus form¬ ing a counterpoise to the Triple Alliance. The immediate object of the so-called Triple En¬ tente was a mutual insurance against German pretensions. The terms governing the alliance between France and Russia were unknown to the British government up to the outbreak of the European War. On the other hand. Great Britain was not bound to her partners in the Entente by any conditions whatever, «no secret engagement,® as Sir Edward Grey told Parlia¬ ment on 3 Aug. 1914. ˆ The Entente, in fact, was simply a diplomatic group, not a strict alliance. German statesmen quickly realized, however, that this group meant the restriction of their ambitious intentions. It henceforth be¬ came their policy to break up — or break through — what they conceived to be an iron

ring that had been forged around them. The Bosnia-Herzegovina crisis in 1908 brought war within measurable distance ; from that stage it only remained a matter of time. In 1911 Italy declared war upon Turkey and annexed Tripoli and Cyrenaica, a move contemplated for many years. In the same year another Moroccan crisis darkened the political horizon. On this occasion Germany asserted that the French military occu¬ pation of the Moorish Empire formed a new situ¬ ation, and that without some sort of compensa¬ tion she would be unable to tolerate the existing state of affairs. The German gunboat Panther and the cruiser Berlin were sent to the closed port of Agadir, a manceuvre provocative to France. War again hung in the air, and Ger¬ many was eventually bought off by the cession to her of 100,000 square miles of French Congo territory. This was the last German attempt to break up the Triple Entente.

While Turkey had the Italian War on her hands, the Balkan League suddenly declared war on her and began hostilities in Octo¬ ber 1912. Germany expected an easy vic¬ tory for her friends the Turks. They were defeated, however, and the war was a crushing blow to both Austria and Germany. Besides, a formidable, resurrected Serbia now stood in the way, and behind her loomed the substantial power of Russia, protector of the Slav nations. Three haunting preoccupations hovered in the minds of German statesmen — the ˆ‘Slav Peril® (Russia), the ˆYellow Peril® (Japan), and the ˆˆBritish Peril.® Of the three, they probably feared Russia the most. Her marvelous re¬ cuperative power, increasing prosperity, suc¬ cessful Balkan policy and, above all. her friendly relations with France and England, had firmly impressed the German mind that Slaventum and Germanentum must sooner or later come into collision. On the other hand, if

Germany feared Russia, as considerable evi¬ dence seems to prove, it was nothing but fear of Germany that drove France, Great Britain and Russia into each other's arms. Undoubt¬ edly. that group was a standing menace to Germany should she attempt to translate any ambitious projects into action. One by one Germany saw her avenues to expansion closing up around her. The Slav renascence had shut the door to the Near East; the proximity of Japan made the Far East too dangerous; South America was hedged by the Monroe Doctrine; Africa was already parceled out, and in almost every other part of the world there stood the empire of Great Britain. Here, indeed, was an impasse that could only be broken through by force. Germany's navy had reached a high stage of efficiency; she was already the strong¬ est military power in the world, maintaining a peace army of nearly a 1,000,000 thoroughly trained men backed by millions more of equally efficient reserves. All these circumstances con¬ spired to breed a conviction that war — some¬ how or somewhere — was inevitable, and that the sooner it came the better. In Austria-Hun¬ gary and Italy, furthermore, Germany had two powerful allies, while she also felt confident of the support of the Mohammedan world. The obstacles to be considered were France, Great Britain and Russia. Of these, France alone was presumably not a match against Germany; Russia had not sufficiently recovered from her

war with Japan, while Great Britain, it was supposed, would not fight. The opinion had long prevailed among military experts in Europe that Germany alone would he well equal to the task of dealing with France and Russia. The German plan of campaign in the event of a conflict with the Dual Alliance was well known years before the war. To take the route through Belgium, strike a decisive blow at France, dic¬ tate terms in Paris, and then turn with full force to the East before Russian mobiliza¬ tion could be completed. This was the essence of the strategy actually adopted, as it had fre¬ quently been discussed in French, German and British military periodicals. Signor Giolitti re¬ vealed in the Italian Chamber of Deputies on 5 Dec. 1914 that during his premiership in August 1913, while the Balkan peace conference

was sitting in Bucharest, Austria communicated to Germany and Italy her intention of taking action against Serbia as a ^^defensive^^ measure. Italy refused to consider the plan; Signor Giolitti, absent from Rome at the time, sent the following message to 'the Italian Foreign Minister: ^Tf Austria intervenes against Ser¬ bia it is clear that a casus fccderis cannot be established. It is a step which she is taking on her own account, since there is no ques¬ tion of defence, as no one is thinking of at¬ tacking her … and we must hope for ac¬

tion on the part of Germany to dissuade Aus¬ tria from this most perilous adventure.^^ From this it is evident that Austria intended proceed¬ ing against Serbia just a year before the war broke out. Italy refused to countenance Aus¬ trian aggression in 1913 and again in 1914, after war had been declared on Serbia, on the ground that it was an aggressive and not a defensive undertaking. There was also an understanding that Italy's obligation to the Triple Alliance should cease if the war in which Germany and Austria engaged should involve England as an enemy.

British relations with Germany during the years preceding the war are dealt with else¬ where. (See Great Britain and the World War). It only remains here to consider Eng¬ land as a potential enemy of Germany — from the German viewpoint as matters stood in 1913-14. The British army was then a negligi¬ ble quantity in a hypothetical struggle in which millions alone counted. The aerial branch of the British fighting forces had been neglected, and England did not possess a single airship that could carry more than two or three men. The only thing to be feared at worst was the British navy, and that could do little harm so long as the German fleet remained in harbor and the German coasts were well mined. That German shipping would temporarily disappear from the seas was a foregone conclusion, but a violent offensive campaign would not last long; lightning tactics had not failed to win the day for Prussia in 1864, 1866 and 1870-71. There were other considerations that apparently precluded the probability of England joining in the fray. In addition to the Irish trouble, the smoldering animosity of Boer irreconcilables was expected to break into flames at the vision of recovering their independence, while the native populations of Egypt and India would probably rise in revolt and overthrow British rule. German naval expansion and the Pan-German propaganda had opened the eyes of many far-seeing public men in the British Isles ; some, indeed, had counseled preparedness for 15 years before the war. Germany, they held, had no need of a great navy to protect her commerce, as alleged, since no one threatened that commerce, which could ride the oceans as freely and safely as the trade of any other country, even into the ports of London,

Liver¬ pool and Cardiff. There were some extremists who proposed that England should demand ex¬ planations and order Germany to limit her warship building program. Others, again, suggested that both powers should agree to a ˆˆnaval holiday,® but the three offers actually made to this effect were met with a candid non possumus by Germany. Thus the race of piling up floating armaments continued with unabated zeal and lavish expenditure. To each big German naval budget England replied with a correspondingly bigger one. Writers on both sides of the North Sea frankly dis¬ cussed the prospects of an Anglo-German war. Under the operation of such mental stimulants it is hardly surprising that, by degrees, the conviction gradually crystallized in the minds of the British and German peoples that a war between them was inevitable. The Liberal Party in Parliament and the radical press clamored for reductions in both army and navy estimates, expressing a fear of ˆflrritating Germany.® The other side (Conservatives and Liberal Unionists) retorted that Germany was not afraid of irritating Great Britain. The persistent efforts of Germany to secure the neutrality of England during 1912-14 ®in any conflict that might ensue® presents strong evi¬ dence that she neither intended nor perhaps expected England to participate in a war against her. Then came the Serajevo assassinations, which supplied the necessary spark to produce a conflagration. Much criticism has been leveled against Germany in general and the ex-Kaiser in particular for provoking or forcing the war. Judging from our present knowledge and es¬ pecially the revelations of Prince Lichnowsky (q.y.), it is difficult to doubt that Germany desired the war; it is not equally certain that the former emperor could have preveq,ted it had he chosen to do so. It is not improbable that he was not entirely master of the situation, for circumstances may force the hand of the strong¬ est ruler just as economic and geographical pres¬ sure may drive a nation even against its own will. In a sense, Germany was in the position of a full-grown man compelled to wear the clothes of boyhood. All great nations through¬ out history have been built up by war and conquest. As history never stands still, those nations maintained their pre-eminence only so long as they were strong enough to defend and hold what they had gained. The late tsar's peace manifesto of 1898 gave a powerful Im¬ petus to international idealism throughout the civilized world, especially in the United States and Great Britain. Well-meaning writers like the Russian banker Bloch (whose great work, ˆLa Guerreˆ inspired the tsar), and Mr. Nor¬ man Angell, in his book, ˆThe Great Illusion,' have advanced many apparently cogent arˆ- ments that war was no longer possible. Looking back over the two decades 1898-1918 we en¬ counter a series of great international conflicts.

At the time the peace and disarmament mani¬ festo was launched the Spanish-American VVar was in progress ; Kitchener was reconquering the Sudan; the South African War broke out in the following year; the next year (1900) all the great powers were rushing ships and troops to China; in 1904-05 Russia and Japan were at war; since then there have been numerous revolutions, regicides, some Balkan wars and the greatest war of all.

Henri F. Klein,

Editorial Staff of The Americana.

2. DIPLOMATIC HISTORY. The spark that was indirectly responsible for the out¬ break of the world conflagration was kindled in the little city of Serajevo, the capital of the former Austro-Hungarian province of Bosnia, on Sunday, 28 June 1914. On that day the archduke Francis Ferdinand, nephew of the late Austrian emperor Francis Joseph II and heir to the throne of Hapsburg, paid an in¬ formal visit to Serajevo with his morganatic wife, the Duchess of Hohenberg. As comman¬ der-in-chief of the army, the archduke had at¬ tended some manoeuvres in the province, when he suddenly decided to inspect the troops in the capital. Driving slowly along in automobiles toward the Filipovitch Parade, where the troops were drawn up, a black parcel was thrown on the open hood of the archduke's car. He picked it up and threw it over .the back of the car. It fell in the street and exploded in front of the second car, in which Count Boos Waldeck and the governor's aide-de-camp were seated. Both those officers and a number of spectators were wounded. A compositor named Cabrinovitch, a native of Herzegovina, had thrown the bomb and was promptly arrested. The remainder of the party then proceeded to the town hall, where an address was read by the mayor. The inspection over, the civic au¬ thorities endeavored to dissuade the archduke from riding again through the city. They had heard rumors and had received threatening let¬ ters. The archduke, a stern, determined man, resisted all entreaties — including those of his wife — and insisted on visiting those who had been wounded by the bomb explosion. On their

way to the hospital along the Appel Quay an¬ other bomb fell close to the car, but failed to explode. Immediately a young Bosnian stu¬ dent named Prinzip sprang out from the crowd and fired at the archduke with a Browning pis¬ tol. Of three shots the archduke received two — one in the neck, which later proved fatal — and one reached his wife, who was struck in the body while attempting to shield him. The two victims were carried into the Government House, where the last sacraments were admin¬ istered during a few moments' consciousness. Within an hour both were dead. The crime evoked a feeling of horror throughout the civ¬ ilized world ; universal sympathy went out to the venerable emperor on the latest tragedy of his tragic life. To a great extent public opinion outside of the Dual Monarchy lay with Aus¬ tria, especially, when it was given out that the Serajevo murders had been plotted by a band of Serbian agitators, alleged to have been en¬ couraged by the Serbian government to propa¬ gate a revolutionary movement among the Serb population of Bosnia and Herzegovina. That such a movement had been in progress for many years was undoubtedly true; while the

alleged complicity of the Serbian government was never established, it was suggested tUat it had been guilty of criminal negligence in not curbing the unauthorized activities of the se¬ cret political societies engaged in Pan-Serbian propaganda. Competent observers were not slow to realize that the incident of the murder opened the way to unlimited possibilities in bringing to a head the triangular feud that had been smoldering for years — the quarrel be¬ tween Austria-Hungary and Serbia on the one part, and the conflicting Balkan policies pur¬ sued by Austria and Russia on the other.

The Austro-Serbian quarrel was of com¬ paratively recent origin. For many years the two states had been on excellent terms with each other. On 28 June 1881 they concluded a secret alliance, the principal terms of which were : that there should be a stable peace between the coun¬ tries ; that neither would tolerate political, religi¬ ous or other intrigues against the other, that if the prince of Serbia (Milan) should take the title of king (which he did the following year), Austria would recognize the title. On 9 Feb. 1889 the treaty was prolonged till 13 Jan. 1895. In a ^very confidential® declaration to the Austrian envoy at Belgrade on 19 March 1889 the three Serbian regents (during the minority of King Alexander), MM. Ristitch, Protitch and Beli-markovitch, stated that ®the Royal Regency has no scruples in adopting the point of view of strict and faithful observation of these international stipulations. This task will be the easier for us since we

ourselves attach the p’reatest value to seeking all the means suitable to assure the development of the good and cordial relations which so happily exist between Serbia and the powerful neighboring Monarchy.®

For many years Serbia had struggled for economic emancipation. Uo to 1905 this little nation of farmers and stock-breeders remained in industrial dependence upon Austria. Aus¬ tria’s dream was to incorporate Serbia into her empire, and whenever the latter displayed signs of political independence, Austria ap¬ plied economic pressure by closing her markets to Serbian cattle. In 1906 the Serbian Premier, Pashitch, began to resist the Austrian tariff war that had broken out the previous year. He proposed and carried through a customs union between the three Slav Balkan states. Serbia, Bulgaria and Montenegro, thus laving the foun¬ dation for that Balkan League which six years later defeated the Turks.

Direct communication was needed between the Danube and the Adriatic to complete Ser¬ bian independence; when claims were presented to annex a strip of the Adriatic coastline in No¬ vember 1912, a war with Austria seemed im¬ minent. Meanwhile, 8 Oct. 1912, Montenegro had begun operations against Turkey and ush¬ ered in the first Balkan War. Within a few days after the Balkan allies had joined in the hostilities, Austria beheld the Serbs in posses¬ sion of Uskub, of Old Serbia, of a large piece of the Sanjak of Novi-Bazar, and making rapid strides for the Adriatic Coast, an unexpected proceeding that threatened to nullify Austria’s consistent policy of 30 years : Serbia had broken her fetters and was no longer under Austrian tutelage. Under Italy and the World War it is shown that in August 1913, at the close of the second Balkan War, Austria proposed to start war against Serbia and endeavored

to enlist Italian support for the venture. The prompt refusal of Italy to countenance any such aggression merely postponed the war to a later date. Ten months after came the Serajevo tragedy. For 18 months before that a violent press campaign against Serbia had been raging in

Austria-Hungary, and it needed only a slight aggravation of the situation to provoke a con¬ flict. The assassinations provided the Austri¬ ans with the necessary lever for action. Un¬ fortunately, the Serbians had not enjoyed a very enviable reputation in Europe since the murder of their King Alexander and Queen Draga in 1903, and it was generally felt that Austria would be justified in exacting reparation for the Serajevo outrage; indeed, little sympathy with Serbia existed in either France or Great Brit¬ ain. It was otherwise with Russia, the pro¬ tector of the Slav nations, the country which, curiously enough, had been the principal agent in liberating the Balkan Peninsula from Turk¬ ish rule and securing that freedom for the small nations which she denied the people within her own borders. It was no sˆgret in Europe that Russia would never stand aside and see Ser¬ bia perish, a contingency which could be re¬ garded only as an Austrian victory over Rus¬ sia. Therein lay the great danger to the peace of Europe — of the world.

The murders happened on 28 June. For 25 days no word nor sign emanated from the Vi¬ enna Foreign Office. Anti-Serb riots broke out in Austrian territories ; mobs in Vienna threat¬ ened the Serbian legation, while the Austro-Hungarian press clamored violently for the chastisement of Serbia. Disinterested powers began to exercise what influence they possessed in endeavoring to reconcile justice with peace. But while the trend of public opinion both in Austria-Hungary and Germany was plain enough, the intentions of the Austrian govern¬ ment were shrouded in mystery. On 7 July the Serbian minister in Vienna, M. Yovanovitch, wired to his government ˆWhether it is proved or not that the outrage has been inspired and prepared at Belgrade, they [the Austrians] must now or later solve the question of the so-called Great Serbian agitation within the Hapsbtirg Monarchy.® As late as 20 July the same minister wrote : ®It is very difficult, al¬ most impossible, to discover here [in Vienna] anything positive as to the real intentions of Austria-Hungary… . There is, however,

no place for optimism… . That which is

chiefly to be feared, and is highly probable is, that Austria is preparing for war against Ser¬ bia.® Not alone in Serbia was there anxiety; a feeling of intense uneasiness hovered over Europe, where the consequences of any possible action on the part of Austria were fully appre¬ ciated. On 22 July the Hungarian Minister-President stated in Parliament that the situa¬ tion did not warrant the opinion that a serious turn of events was necessary or even probable. The very next day came the first’ premonition of the approaching storm, when Count

Berchtold (q.v.) launched the fateful ultimatum at Belgrade. In this document the Austro-Hun¬ garian foreign minister reviewed the past rela¬ tions between the two countries and called upon the Serbian government to publish a regretful and semi-apologetic declaration on the front page of their Official Journal on 26 July. The following 10 demands were also made: That

the Serbian government should undertake (1) to suppress any publication which incited to animosity against Austria; (2) to dissolve a certain nationalist society (Narodna Odbrana) and prevent others from being formed; (3) to eliminate all anti-Austrian doctrines frorn pub¬ lic instruction; (4) to remove from military service and administrative departments officers and officials guilty of plotting against Austro-Hungarian integrity; (5) to accept the collabo¬ ration in Serbia of Austro-Hungarian govern¬ ment officials to assist in suppressing the move¬ ment ; (6) to take judicial proceedings against persons accessory to the assassination plot, Aus¬ trian officials to take part in the investigations; (7) to arrest Major Voija Tankositch and a state employee named Milan Ciganovitch; (8) to prevent cooperation of Serbian authorities conducting traffic in illicit arms and explosives across the frontier, and punish those who had facilitated that traffic in aid of the perpetrators of the Serajevo crime; (9) to explain utter¬ ances of high Serbian officials who expressed hostility to the Dual Monarchy; and (10) to notify the Austro-Hungarian governrnent that the above demands have been complied with. This ultimatum was to be accepted in 48 hours, by 6 o'clock on Saturday evening, 25 July 1914.

The charges formulated against the two Ser¬ bian officials mentioned in the document were those of having aided and abetted the perpe¬ trators of the crime. Three principals had been arrested on the spot: Nedeljko Cabrinovitch, who threw the first bomb; Trifko Gra-besh, who threw the second bomb, and Gavrilo Prinzip, who had fired the fatal shots. These three had originally in their possession (accord¬ ing to the Austrian statement) six bombs and four Browning pistols with ammunition. Ci¬ ganovitch and Tankositch were accused of hav¬ ing supplied these weapons ; the former was alleged to have instructed the three conspirators how to use the bombs and to have given Prin¬ zip lessons in handling the pistol in a certain forest. Ciganovitch was also charged with having enabled the assassins to smuggle the weapons across the frontier. Furthermore, the bombs were said to be hand grenades from the arms depot of the Serbian army at Kragujevatz. These details appeared in a brief sum¬ mary annexed to

the ultimatum.

While the Serbian reply to the Austrian ulti¬ matum was pending, the German ambassadors in Saint Petersburg, London and Paris called upon the respective foreign ministers of Rus¬ sia, Great Britain and France and informed them that Germany approved the form and sub¬ stance of the Austrian note, adding that, if the quarrel between Austria and Serbia were not localized, dangerous friction might arise be¬ tween the Triple Entente and the Triple Alli¬ ance. Sir Edward (now Lord) Grey, on behalf of the British government, at once informed Count Mensdorff, the Austrian ambassador in London, that he had never before seen one state address to another independent state so formidable a document. He specially depre¬ cated the imposition of a time-limit at this stage of the proceedings, as it allowed no time for mediatory measures. On 24 July the Ger¬ man government communicated a note to the powers declaring the guilt of Serbia and that the Austrian demands could only be regarded as ^equitable and moderate,® emphasizing at the

same time that ^cvery interference of another power would, owing to the different treaty ob¬ ligations, be followed by incalculable conse¬ quences.® In reply. Sir Edward Grey reminded the German ambassador in London, Prince Lichnowsky (q.v.), that some days before the latter had expressed a personal hope that Eng¬ land would endeavor to. use moderating influ¬ ence with Russia, but now, in view of the seri¬ ously stern character of the Austrian note and the shortness of time allowed, he (Sir Edward) felt quite helpless so far as Russia was con¬ cerned, and he did not believe any power could exercise influence alone. The only chance he saw was that the four disinterested powers, Germany, France, England and Italy, should work together simultaneously at Saint Peters¬ burg and Vienna in favor of moderation in the event of the relations between Austria and Rus¬ sia becoming threatening. The British repre¬ sentative at Belgrade was at once instructed to the effect that Serbia should give Austria the fullest satisfaction ; that ®she certainly ought to express

concern and regret.® The ultimatum brought forth the following from that influen¬ tial German newspaper, the Rheinisch-West- phdlische Zeitung, on 24 July:

The Austro-Hungarian ultimatum is nothing but a pretext for war, and this time a dangerous one. As it seems, we are on the brink of an Austro-Serbian war. … It is a shame if the Imperial Government had not required that demands of this kind should be sub¬ mitted to it beforehand. Our one duty now is to de¬ clare that we are not under any obligation to launch into a war to further the aggressive policy of the Haps-burgers.

Everything depended upon Germany at this critical juncture; as the Russian foreign min¬ ister, M. Sazonov, said a few days later, the key of the situation was to be found at Berlin. Privately the German foreign minister ex¬ pressed his doubts as to the ultimatum ; ˆ offi¬ cially, the German government regarded it as ˆequitable and moderateˆˆ and ˆdesired urgently the localization of the conflict,® although, on this date, 24 July, there was as yet no conflict to localize. On that same morning M. Sazonov summoned the French and British ambassadors in Saint Petersburg and bluntly told them that Austria's action meant war, and he asked for the support of France and Great Britain. The French ambassador pledged the support of France, as was inevitable under the terms of her alliance. The British ambassador. Sir George Buchanan, could give no such assurance on behalf of his country. The next day, 25 July, Sazonov made the following gloomy though truthful prophecy to Buchanan : Austria's ac¬ tion,® he said, ®is in reality directed against Rus¬ sia. She aims at overthrowing the present status quo in the Balkans and establishing her own hegemony there. I do not believe that Germany really wants war, but her attitude will be decided by yours [the British]. If you [Great Britain] take your stand firmly with France and Russia there will be no war. If you fail us now, rivers of blood will flow, and you will in the end be dragged into war.® The British ambassador replied that England puld play the role of mediator at Berlin and Vienna to better purpose as a friend who, if her coun¬ sels of moderation were disregarded, might one day be converted into an ally [of Russia] than if she were to declare herself Russia's ally at once. (British ˆWhite Paper, > Exhibit No.

17). To this M. Sazonov answered, ˆˆUnfortu¬ nately Germany is convinced that she can count upon your neutrality.® This assertion suggests the question, would there have been no war if Great Britain had from the beginning declared herself an active partner in the Triple

En¬ tente? On 30 July, two days after the war had begun between Austria and Serbia, President Poincare expressed the same opinion to the British ambassador in Paris : ®The President is convinced that peace between the powers is in the hands of Great Britain. If His Majesty's government announced that England would come to the aid of France in the event of a conflict between France and Germany as a re¬ sult of the present differences between Austria and Serbia, there would be no war, for Germany would at once modify her attitude.® (Sir F. Bertie to Sir E. Grey; op. cit. 99).

To return to the ultimatum. Acting on Rus¬ sian advice, the Serbian government yielded all the 10 points with two reservations — articles 5 and 6 — which they asked to be permitted to submit to The Hague Tribunal. At 6.30 on the Saturday evening, half an hour after the ex¬ piration of the time-limit, the Austrian minis¬ ter, Baron Giesl, left Belgrade, having an¬ nounced that nothing short of complete accept¬ ance would suffice. Serbia urged that the two points to which she could not categorically agree were of a nature calculated to subvert her sovereign independence and contrary to her constitution. From this stage began a week of feverish diplomacy to avert the impending catas¬ trophe. All the governments concerned have since published more or less of the official cor¬ respondence that was flashed from capital to capital during those momentous days. Whereas the German side laid the blame for the war first on Russia and later on Great Britain, the British, French and Russian authorities accused Germany — and not so much Austria — of being primarily responsible. The British diplomatic record was first issued as a ˆ White Paper ˆ on 5 Aug. 1914 and later published in pamphlet form with the heading, 'ˆGreat Britain and the European Crisis.ˆ It gives what purports to be a complete account of all the communications that passed between the Foreign Office and its representatives in European capitals from 20 July to 4 Aug. 1914, with two memoranda written in London by Sir E. Goschen and Sir M. de Bunsen, former ambassadors to Berlin and Vienna ; these are dated 8 August and 1 September respectively. There seems no rea¬ son to believe that important documents were omitted. The French Wellow Bookˆ appeared in November 1914 in French and English and contains a complete record of the negotiations. The Russian ˆOrange Book> (September 1914) is less complete. The Austrian ˆRed Bookˆ did not appear till January 1915 and gives a detailed statement of Austro-Serbian relations. It contains very little information of Austro-German relations, but much space is devoted to the negotiations with Russia. The Serbian ˆBlue Bookˆ and the Belgian ˆGrey Bookˆ cover less ground, but contain the full texts of important documents. On 4 Aug. 1914 the Ger¬ man government issued a

^^provisional memo¬ randum® entitled ®Vorlaufige Denkschrift und Aktenstiicke zum Kriegsausbruch.® It contains fragments of dispatches; also the telegrams ex¬ changed between the kaiser and the late tsar,

excepting the one from the latter suggesting that the Austro-Serbian problem be laid before The Hague Tribunal. An English translation issued by the German government bore the title of the German ‘^White Book.^ Both the Ger¬ man and Austrian records leave much to be de¬ sired ; they are not consecutive narratives and produce no evidence of German ^^diplomatic pressure® having been exerted on Austria in favor of moderation or a desire to preserve peace, as Germpn statesmen had frequently as¬ serted.

Diplomatic relations between Austria and Serbia were severed on 25 July, though war was not immediately declared. The next day M. Sazonov told the Italian Ambassador that Russia would employ all diplomatic means to avoid a conflict and that she did not give up hope that mediation might lead Austria to a less uncompromising attitude; but that Russia could not be asked to allow Serbia to be crushed. Thus the alternative that faced Europe on 25-26 July 1914 amounted to this: Unless Austria was willing ,to suspend her ac¬ tion she would inevitably and quickly come into collision with Russia. The unexpected ultimatum, the short time limit, and the refusal to extend it in order to permit mediatory dis¬ cussion, justified the general belief that Austria was determined to institute military operations against Serbia at once. In view of the enormous disparity existing between the relative military strength of Austria and Serbia, such a lightning campaign would almost inevitably end in the defeat and occupation of Serbia, thus producing the very situation — that of a fait accompli — which Russia was equally determined to pre¬ vent. Geography made it impossible for Russia to send military assistance into Serbia; she could only act upon Austria herself, and what¬ ever steps might be taken with the object of restraining Austria would necessarily have to be immediate and decisive. Only two ways of

exerting pressure were feasible — either a formal announcement to Austria that an attack on Serbia would be regarded as a declaration of war against Russia, which was liable to provoke war immediately — or a continuance of friendly negotiations accompanied by a partial mobilization on the Austrian frontier to strengthen the diplomatic protest. The alliance between Austria and Germany being specially directed against Russia, it was not improbable that either method would lead to war, though the second alternative, eventually decided upon by Russia, gave the better promise of a pacific result. According to the French acting foreign minister, M. Bienvenu-Martin, the Imperial Council of Ministers met in Saint Petersburg on 25 July in the presence of the tsar, when the mobilization of 13 army corps intended eventually to operate against Austria was con¬ sidered. This mobilization, however, was only to be made effective if Austria were to bring armed pressure to bear upon Serbia, and not till after notice had been given by the foreign minister, upon whom devolved the duty of fix¬ ing the day, with liberty to continue the negoti¬ ations even if Belgrade should be occupied. Russia's policy to this stage had been clearly defined and openly avowed. She had success¬ fully advised Serbia to submit to all possible demands, but had also declared that she would not desert her if war nevertheless should ensue.

Mobilization, if only partial, was obviously necessary to back up this determination. It rernained for Austria to decide whether the satisfaction of ˆpunishing Serbia® was worth embroiling, so far as could then be foreseen, herself, Germany, Russia and France in* a general war.

From the German point of view, as ex¬ pressed at the time by all the German ambas¬ sadors, the turn of events depended upon Russia ; the latter had only to withdraw and acquiesce in any action taken by Austria. On 21 July the Russian ambassador at Vienna had been assured that the forthcoming demands on Serbia ®would be thoroughly acceptable.® He accepted this assurance and went away on his summer vaca¬ tion, with the result that there was no Russian representative in Vienna when the crisis be¬ came acute; furthermore, half the ambassadors in Europe were away on leave at the time President Poincare of France and his foreign minister, M. Viviani, were on the sea, returning from a visit to Russia. All the German and Austrian accredited diplomats were at their respective posts. While the French and British correspondence shows the endeavors of the Triple Entente to compose the quarrel, we have to search the records published at a much later date in order to arrive at any knowledge of

what were the intentions of Germany and Austria.

It was not until nearly a year after the close of the war that the world outside of Austro-German official circles was permitted to learn of two important events which took place in Potsdam and Vienna on the 5th and 7th of July, 1914, respectivelv. On the first date the Austro-Hungarian Ambassador at Berlin, Count Szdgyeny, lunched with the German emperor at Potsdam and delivered to the latter a memo¬ randum on the Balkan situation together with a personal letter from Emperor Francis Joseph. These two documents had been carried from Vienna to Berlin by Count Hoyos of the Aus¬ trian Foreign Office. The memorandum had been prepared by the Austrian Foreign Office before the Serajevo murders, which led to some slight changes being introduced at the end of it. On the following day the German emperor dis¬ cussed the matter with the Chancellor and as a result of the conference Austria was given assurances that Germany would support her ally in whatever steps might be necessary to deal with Serbia. It was this event which gave rise to the story of an alleged imperial council at Potsdam, at which the Kaiser was supposed to have asked all the military, naval and financial personages present whether all were prepared for war.

Toward the end of 1919 there was pub¬ lished in Vienna a second Austrian Red Book, edited by Dr. Roderich Gooss and approved by the Austrian republican government. This record revealed that a ministerial council had been held in Vienna on 7 July 1914, two days after the Potsdam interview. Count Berchtold presided over the meeting, at which were pres¬ ent Count Stiirgkh, Austrian Premier ; Count Tisza, Hungarian Premier; von Bilinski, joint Minister of Finance; General von Krobatin, War Minister; General Konrad von Hoetzendorff, chief of staff, and Rear-Admiral von Kailer. Count Hoyos acted as recording secretary ; the minutes as published bear the signatures of

Rerchtold, TToˆˆos and the Emperor Francis Joseph, the last-named addinjˆ, have taken note of the contents of this note. 16 Aug. 1914.®

In opening the session Count Berchtold stated that ^^the Ministerial Council had been convened to discuss the measures to be taken to remedy the evil internal conditions which obtained in Bosnia-Herzegovina in connection with the tragedy of Sera'jevo. In his opinion there were various internal measures, the appli¬ cation of which to Bosnia seemed to him to be in order against the critical situation, but, first of all, clarity should be reached on the question whether the time had not arrived to rpider Serbia harmless for good by the applica¬ tion of force. Such a decisive blow could not be struck without diplomatic preparations, and he had therefore got into communication with the German government on the subject. The latter had led to a very satisfactory result, as both the German emperor and Herr von Bethmann-Hollweg had most emphatically assured us of the unconditional support of Germany in case of warlike complication with Serbia… . He realized that a war with Serbia might lead to a war with Russia, but Russia was at present following a policy which, taking a farsighted view, aimed at a combination of the Balkan states, including Rumania, for the purpose of utilizing them against the Monarchy at an opportune moment… . The logical conclusion to be drawn from these considerations would be to get a start on our opponents and, through a timely settlement with Serbia, put a stop to the process of development already in full swing, which might not be possible later. Count Tisza agreed that the situation had changed during the last few days because of the facts estab¬ lished by the investigation, and because of the attitude of the Serbian press, and he emphasized the fact that he, too, considered the possibility of war measures against Serbia closer at hand than he had believed immediately after the Serajevo assassinations. He would never con¬ sent, however, to a surprise attack upon Serbia without preliminary diplomatic action, as seemed to be t>]e intention, and as, unfortunately, had been discussed in Berlin by Count Hoyos, be¬ cause it was his opinion that in such a case we would occupy a very bad position in the eyes of Europe and would very probably have to reckon with the hostility of all the Balkan States except Bulgaria… . We ought first to formulate unconditional demands *upon Serbia and only present an ultimatum if Serbia did not yield to them. These demands must be severe, indeed, but not impossible of fulfilment… . But he must emphasize beforehmid that with such action we must aim at the diminution of Serbia's power but not at her complete destruction, because on the one hand* Russia would never permit that without a life-and- death struggle, and on the other because he, as Premier of Hungary, would never be able to agree to the annexation of a part of Serbia to the [Austrian] monarchy… . It was not Ger¬ many's affair to determine if we should now strike Serbia or not. He personally was of the opinion

that it was not unconditionally necessary at the present moment to make war.®

Count Berchtold, however, maintained that military action against Serbia was the only solution that could be effective; that a purely diplomatic victory was of no value, and that

mobilization should be carried out swiftly and secretly. Final details were arranged at a second ministerial council on 19 July. (Consult New York Times Current History, Dec. 1919.)

War was declared on Serbia 28 July 1914. On 29 July Dr. von Bethmann-Hollweg, (German Imperial Chancellor, told the British ambassador that he was ^^pressing the button® as hard as he could in Vienna, but was not sure whether he had not gone so far in urging moderation at the Austrian capital that matters had been precipitated rather than otherwise. On the sur¬ face it appeared as though every one of the powers was working hard to preserve peace with, apparently, one exception — Austria, for on the rnorning of the day when the ultimatum had expired ˆ the Vienna press comments left ˆffhe irnpression that the surrender of Serbia was neither expected nor really desired.® Great Britain participated in three attempts for peace. Seconded by Russia she had urged Vienna to extend the time limit and together they had begged Germany to join in this effort. Berlin consented to pass the message on to Vienna. Nothing availed to avert the catastrophe. Aus¬ tria had refused extension of time; the German ambassador in Vienna told his British colleague there that the Serbian concessions were a sham ; that Austria was determined to punish Serbia; that Russia would keep quiet during the process and, finally, that Germany knew very well what she was about in backing up Austria in the matter. (ˆWhite Paper,ˆ No. 32). Austria had disclaimed any intention of taking Serbian terri¬ tory, though Russia certainly did not believe that Austria, once at war, would or could stop short of crushing Serbia entirely. Every diplo¬ mat foresaw what would happen unless Austria or Russia gave way : Russia coming to the aid of Serbia would inevitably bring Germany to the side of Austria; France would just as inevi¬ tably join Russia.

So far, at least five nations would be in¬ volved. There yet remained two unknown quantities — Great Britain and Italy. True, Italy was a partner with Germany and Austria in the Triple Alliance, but very few who had followed European affairs closely since 1905, seriously believed that Italy would join her allies in a war against France. The

conditions which had originally led Italy into that alliance no longer existed. Above all, and this was a circumstance of which the outside world was unaware until two months after the end of the war, namely, that Italy and France had con¬ cluded a secret treaty in 1902. For Italy it was a ˆTeinsuranceˆˆ treaty precisely as those which Bismarck had concluded with Russia. By this instrument Italy and France mutually undertook not to participate in any war against the other. Signed in November 1902, the text of this treaty remained strictly secret ; the mutual promise therein made and kept contribu¬ ted decisively to maintain the peace of Europe for 12 years, and when the Great War came, the pact of 1902 was found to be so completely in harmony with Franco-Italian sentiments and interests that one might say no diplomatic act was ever more ratified by peoples and events. In the circumstances, therefore, the existence of this treaty being unknown at the time, the Central Powers probably expected Italy would preserve a ˆTriendly neutrality.® An important question asked, not only by Europe and the

world at large, but by the British people them¬ selves was — ■ what would Great Britain do?

On 26 July 1914 Sir Edward Grey submitted to Paris, Berlin and Rome his proposal for the ambassadors of those three disinterested powers to meet him in conference in London, suggesting that Austria, Russia and Serbia should meanwhile suspend all active military operations pending the result of the conference. France and Italy agreed at once and Russia de¬ clared her readiness to stand aside; Germany alone rejected the proposal on the ground that it would practically constitute a ˆˆcourt of arbi¬ tration® and proposed instead that Austria and Russia should negotiate directly with each ether. Considering that those two powers followed two utterly irreconcilable policies, the German counter-proposal promised little hope of a peaceful solution. However, negotiations were actually begun between Saint Petersburg and Vienna when Austria suddenly declared war. Moreover, as Austria had refused even to discuss the Serbian reply,

there could hardly be useful grounds for negpfiation with Russia, seeing that the Serbian reply was the paramount point at issue in the whole dispute. M. Sazonov urged Sir Edward Grey to induce Ger¬ many to indicate, even at the 11th hour, under what terms she would consent to work for a peaceful settlement. The final stage of the crisis was reached on 29 July: Russia was par¬ tially mobilizing in her southern provinces ; the Austrians w'ere bombarding Belgrade ; Bel¬ gium was mobilizing for self-defense; the Ger¬ man High Sea Fleet was recalled to port and the British navy was concentrating in the North Sea. Never, perhaps, in its long history had the world experienced a more dramatic day. At 4 in the afternoon Sir Edward Grey tele¬ graphed to Berlin as requested by M. Sazonov, urging the German government, if they did not like the idea of the ambassadors' conference in the form he had suggested, to suggest any other form they pleased. ˆMediation,® he said, ®was ready to come into operation by any method that Germany thought possible if only Germany would press the button in the interests of peace.®

At midnight, a council of war was held at Potsdam, presided over by the kaiser. Judging from what followed immediately after that meeting, there is reason to believe that its de¬ liberations were concerned less with the ques¬ tion of peace or war than with the problem of Great Britain's attitude in the event of war. Straight from the council chamber, the Im¬ perial Chancellor sent for the British ambassa¬ dor and made ®the following strong bid for British neutrality®: So far as he (the Chan¬ cellor) was able to judge the main principle which governed British policy, ®it was clear that Great Britain would never stand by and allow France to be crushed in any conflict there might be. That, however, was not the object at which Germany aimed. Provided that neu¬ trality of Great Britain were certain, every as¬ surance would be given to the British Govern¬ ment that the Imperial Government aimed at no territorial acquisitions at the expense of France should they prove victorious in any war that might ensue.® (0/>. cit. No. 85) The ambassador then asked the chancellor about the French colonies, to which the latter replied that he was unable to give a similar undertaking in

that respect As to Belgium, he said that it de¬ pended upon the action of France what opera¬ tions Germany might be forced to enter upon in Belgium, but when the war w'as over, Bel¬ gian integrity would be respected if that coun¬ try had not sided against Germany. Continu¬ ing, the chancellor said that ever since he had held office he had labored to bring about an understanding with England. What he had

in mind was a ˆgeneral neutrality agreement® be¬ tween England and Germany and that ˆˆan as¬ surance of British neutrality in the conflict, which the present Crisis might produce, would enable him to look forward to the realization of his desire.® At this stage the ambassador presented the following note he had received from Sir Edward Grey earlier in the day: … ˆˆThe Chancellor may rely upon it that this country will continue, as heretofore, to strain every effort to secure peace and to avert the calamity we all fear. If he can induce Austria to satisfy Russia and to abstain from going so far as to come into collision with her, we shall join in deep gratitude to his Excellency for having preserved the peace of Europe.®

Within a few hours the British answer to the German proposal arrived in Berlin : ®His Majesty's Government cannot for a moment en¬ tertain the Chancellor's proposal that they should bind themselves to neutrality on such terms. What he asks us in effect is to engage to stand by while French colonies are taken and France is beaten so long as Germany does not take French territory as distinct from the colo¬ nies. From the material point of view such a proposal is unacceptable, for France, without further territory in Europe being taken from her, could be so crushed as to lose her position as a great power, and become subordinate to German policy. Altogether apart from that, it would be a disgrace for us to make this bar¬ gain with Germany at the expense of France, a disgrace from which the good name of this country would never recover. The Chancellor also in effect asks us to bargain away whatever obligation or interest we have as regards the neutrality of Belgium. We could not enter¬ tain that bargain either… . You should

speak to the Chancellor in the above sense, and add most earnestly that the one way of main¬ taining the good relations between England and Germany is that they should continue to work together to preserve the peace of Europe ; if we succeed in this object, the mutual relations of Germany and England will, I believe, be ipso facto improved and strengthened…

And I will say this: If the peace of Europe can be preserved, and the present crisis safely passed, my own endeavor will be to promote some arrangement to which Germany could be a party, by which she could be assured that no aggressive or hostile policy would be pursued against her or her allies by France, Russia, and ourselves, jointly or separately … If this present crisis, so much more acute than any that Europe has gone through for generations, be safely passed, I am hopeful that the relief and reaction which will follow may make possible some more definite rapprochetnent between the Powers than

has been possible hitherto.® On the same day (30 July) that Sir Edward Grey made this unequivocal declaration of British policy, he also telegraphed to the British am¬ bassador in Berlin, ®I have warned Prince

Lichnowsky [German ambassador in London] that Germany must not count upon our stand¬ ing aside in all circumstances.^^ A slight ray of hope flashed across the darkening sky; Aus¬ tria seemed for the moment to tremble at the storm she had raised and Prince Lichnowsky informed Sir Edward Grey (30 July) that the German government would endeavor to influ¬ ence Austria, after taking Belgrade and Ser¬ bian territory near the frontier, to promise not to advance further, while the powers endeav¬ ored to arrange that Serbia should give satis¬ faction suffleient to pacify Austria. The terri¬ tory thus occupied ^Svould of course be evacu¬ ated when Austria was satisfied.^^ This simple plan originated with Sir Edward Grey himself and provided an admirable exit from the politi¬ cal impasse. It allowed Austria to retire gracefully and save her face, while Serbia was ^^chastised.® But a military plus a diplomatic victory in the Balkans for Austria could hardly be agreeable to Russia. Moreover, Austria had broken off conversations with Saint Petersburg by the declaration of war. The British ambas¬ sador in Rome wired on 30 July that the Italian foreign minister ^Tad reason to believe that Germany was now disposed to give more concil¬ iatory advice to Austria, as she seemed con¬ vinced that we I Great Britain] should act with France and Russia and was most anxious to avoid issue with us.® But he added, ®It would be useless to ask for anything less than was contained in the Austrian ultimatum, and Ger¬ many would support no proposal that might imply non-sacccss for Austria… . There

was still time so long as Austria had received no check.® Germany had handed the proposal to Austria ‘(respecting Serbian territory) on 29 July, and that same night Russia offered to stop all military preparations, if Austria would recognize that the conflict with Serbia had be¬ come a question of general European interest and would

eliminate from her ultimatum the points which involved a violation of the sov¬ ereignty of Serbia. This offer came late at night ; during the day the German ambassador had informed M. Sazonov that Germany had decided to mobilize if Russia did not stop her military preparations. This statement is not mentioned in the German ˆWhite Book.ˆ Sazo¬ nov replied that the Russian preparations had been caused, on the one hand, by the obstinate and uncompromising attitude of Austria and on the other hand by the fact that eight Austro-Hungarian army corps were already mobil¬ ized. Russia decided then to mobilized all her strength.

The British reply to the German neutrality proposal was handed to the chancellor on 31 July, and on the same day Austria at last agreed to do the very thing she had refused to do in the first days of the crisis, namely, to discuss the whole question of her ultimatum to Serbia. Russia asked the British government to assume the di¬ rection of these discussions. Conversations took place in Vienna and negotiations were resumed in Saint Petersburg; Sir Edward Grey begged the chancellor to encourage them and for a few hours there seemed to be a hope of peace. Un¬ fortunately, there were various stumbling blocks in its path, besides the obviously deter¬ mined militancy of Austria, namely, mobiliza¬ tion and mutual suspicion. Austria, being actu¬ ally at war, was naturally continuing her mobili—

zation ; Russia had begun to mobilize on her Austrian frontier, while Germany may be said to have been more or less mobilized for years. Each side complained of the other's mobiliza¬ tion, and in each case the stereotyped retort was to the effect that ˆ%e cannot afford to lose the time which is being employed by other powers in making preparations against us.® Undoubt¬ edly, there was justification in preparing for the worst, it being the first duty of a government to provide its country with adequate defense and to be prepared for every possible emer¬ gency. The other obstacle, suspicion, was per¬ haps equally formidable. Austria mistrusted Serbian assurances ; Russia suspected Aus¬ tria's intentions with regard to Serbia's inde¬ pendence and integrity, and furthermore mis¬ trusted the entire Austrian policy in the Bal¬ kans, a sentiment that was fully reciprocated by the Dual Monarchy. Germany suspected the Triple Entente of aggressive designs against her; France, Russia and England suspected Ger¬ many of aggressive designs and regarded Aus¬ tria as her tool; Belgium suspected German in¬ tentions with regard to her

neutrality, and so on. Overshadowing all was the determination on the part of Germany to force the war that was long regarded by her statesmen as ®inevitable.® On this point we have the evidence of Prince Lichnowsky in his famous ˆMemoran¬ dumˆ : was to work for the localization of

the conflict. It naturally only needed a hint from Berlin to induce Count Berchtold to content himself with a diplomatic success and put up with the Serbian reply. But this hint was not given. On the contrary, we pressed for war… . We rejected the British proposals of

mediation … and Count Berchtold was

even ready to satisfy himself with the Serbian reply. … In view of these indisputable facts, it is not surprising that the whole civil¬ ized world outside Germany attributes to us the sole guilt for the world war.® These words of the former German ambassador in London have been amply corroborated during and since the war by the numerous revelations which emanated from highly authoritative Ger¬ man sources.

As a preliminary to the resumed conversa¬ tions Sir Edward Grey suggested

“ that, in the event of this mistrust preventing a solu¬ tion being found by Vienna and Saint Petersburg, Ger¬ many might sound Vienna, and I would undertake to sound Saint Petersburg, whether it would be possible for the four disinterested Powers to offer to Austria that they would undertake to see that she obtained full satisfaction of her demands on Serbia, provided that they did not impair Serbian sovereignty and territorial integrity… . Austria has already declared her

willingness to respect them. Russia might be informed by the four Powers that they would undertake to pre¬ vent Austrian demands going the length of impairing Serbian sovereignty and integrity. All the Powers would of course suspend further military operations and preparations.”

In reply to this proposal the German for¬ eign minister assured the British ambassador that both the kaiser, at the request of the tsar, and the German Foreign Office had been urging Austria to show willingness to continue discus¬ sions. Reports from Vienna, he said, had been of a promising nature — but Russia’s mobiliza¬ tion had spoiled everything. On 31 July, while negotiations between Austria

and Russia were in progress. Sir Edward Grey told Prince Lich¬ nowsky that if Germany could get any reason¬ able proposal put forward which would make

it clear that Germany and Austria were striving to preserve European peace, he would support it at Saint Petersburg and Paris. He further assured the prince that, if Russia and France unreasonably rejected such a proposal, ^^His Majesty's Government would have nothing more to do with the consequences.'^ During the day Sir Edward received two dispatches, one from Saint Petersburg, announcing that general mo¬ bilization had been ordered ^4n consequence of report received from the Russian ambassador in Vienna to the effect that Austria is determined not to yield to intervention of the Powers, and that she is moving troops against Russia as well as against Serbia. Russia has also reason to be¬ lieve that Germany is making active military preparations, and she cannot afford to let her get a start.'^ The other message, from Berlin, confirmed the Russian mobilization and an¬ nounced that a state of Kriegsgefahr (Immi¬ nence of War) would be proclaimed at once. According to the chancellor, ^4t could only be against Germany that Russian general mobiliza¬ tion was directed.® So fari Germany had not been involved in the dispute, which rested pri¬ marily between Austria and Russia.

Realizing that the prospects of a peaceful so¬ lution were growing more remote every hour. Sir Edward returned to the problem of Bel¬ gium. Cabling to the British ambassadors at Berlin and Paris, he expressed a hope that the situation was not irretrievable, but that in view of a prospect of a mobilization in Germany it became essential to the British government, in view of existing treaties, to ask whether France and Germany each were prepared to respect the neutrality of Belgium so long as no other power violated it. In a note to Brussels he assumed ^Hhat the Belgian government will maintain to the utmost of their power their neu¬ trality, which I desire and expect other powers to uphold and observe.® France immediately promised to respect that neutrality; Germany made no direct reply. Four days later, on 4

August, Prince Lichnowsky was instructed to assure the British government that, ®even in the case of armed conflict with Belgium, Ger¬ many will, under no pretense whatever, annex Belgian territory® ; that the German army could not be exposed to French attack across Bel¬ gium, ˆVhich was planned according to abso¬ lutely unimpeachable information,® and that ˆ‘Germany had consequently to disregard Bel¬ gian neutrality, it being for her a question of life or death to prevent French advance.® (German troops had entered Belgium on that day). On 1 August Prince Lichnowsky asked Sir Edward Grey whether, if Germany gave a promise not to violate the neutrality of Bel¬ gium, England would engage to remain neu¬ tral. Sir Edward replied that he could not give such a promise; that the attitude of Great Britain would be determined largely by public opinion, to which the neutrality of Belgium would appeal very strongly. The prince then pressed Sir Edward to formulate conditions on which England would remain neutral, and ˆ‘even suggested that the integrity of France and her colonies might be guaranteed.® The British minister ®felt obliged to refuse definitely any promise to remain neutral on similar terms,® and said that England must ˆˆkeep her hands free.® On the same day the British min¬

ister at Brussels reported that ˆ‘Belgium ex¬ pects and desires that other Powers will ob¬ serve and uphold her neutrality, which she in¬ tends to maintain to the utmost of her power.®

On 31 July Germany suddenly dispatched an ultimatum to Russia demanding that she should countermand her mobilization within 12 hours; the time limit to expire at 11 o’clock the next day. The British ambassador in Paris an¬ nounced that the German embassy there was packing up. Late in the evening the French government advised their representative in London that Germain army corps frora Metz, Cologne, Treves and Strassburg had been moved close to the frontier and that German patrols had already entered French territory. It must be borne in mind that at this time Aus¬ tria and Russia were engaged in negotiations, for on 1 August Sir Edward Grey wired to Sir E. Goschen in Berlin,

“ I still believe that it might be possible to secure peace if only a little respite in time can be gained be¬ fore any Great Power begins war. The Russian Gov¬ ernment has communicated to me the readiness of Austria to discuss with Russia … and to accept a basis of mediation which is not open to the objections raised in regard to the formula which Russia originally suggested. Things ought not to be hopeless so

long as Austria and Russia are ready to converse, and I hope that the German Government miay be able to make use of the Russian communications referred to above, in order to avoid tension. His Majesty's Government [British] are carefully abstaining from any act which may precipitate matters."

On presenting this note to the German Secre¬ tary of State, Sir E. Goschen *spent a long time arguing with him that the chief dispute was between Austria and Russia, and that Ger¬ many was only drawn in as Austria's ally. If, therefore, Austria and Russia were, as was evi¬ dent, ready to discuss matters and Germany did not desire war on her own account, it seemed to me [Sir E. Goschen] only logical that Germany should hold her hand and continue to work for a peaceful settlement.® In reply, the minister attributed Austria's acquiescence to German in¬ fluence at Vienna, and that all would have been well had not Russia mobilized against Germany. But Russia by abstaining from answering Ger¬ many's demand that she should demobilize, had caused Germany to mobilize also, and that Ger¬ many ˆ must regard the refusal to answer as ˆcreating a state of war.® Here it is apposite to quote ff)3m the Paris Matin of 5 Feb. 1919, which published a statement made by the for¬ mer Italian premier. Signor Salandra, to the effect that after Austria had begun hostilities against Serbia and had found that Russia was mobilizing. Count Berchtold hesitated and wanted to turn back, but that ˆGermany inter¬ vened and obliged her ally to continue the war.®

During the time from 29 to 31 July an ex¬ change of telegrams took place between the kaiser, the tsar and King George. The kaiser drew the attention of the tsar to the menacing character of the Russian mobilization and to the continuance of his own activity in the direction of mediation. The tsar responded on the 31st, thanked the kaiser, and pointed out that it was technically impossible to discontinue mobiliza¬ tion, which had been rendered necessary by Austria's action. The tsar promised that his troops would undertake no provocative action so long as the negotiations with Austria con¬ tinued. The German Emperor replied that the responsibility for the safety of his kingdom

(Prussia) compelled him to take retaliatory rriea^res. ®My efforts to maintain the peace of the world have now reached their utmost possible limit,® said the kaiser, declaring that it lay with the tsar to avoid war by ordering cessation of military measures. The tsar's suggestion to submit the Austro-Serbian quarrel to The Hague Tribunal wejnt unanswered. The kaiser also telegraphed to King George an out¬ line of his communications to the tsar, who replied with a personal appeal to the emperor ®to leave still open grounds for negotiation and possible peace.® In one dispatch to the tsar, the German Emperor declared that ®the pro¬ posals made by the German government in Vienna were conceived entirely on the lines suggested by Great Britain, and the German government recommended them in Vienna for their serious consideration.® This statement seems to indicate that Germany, while offering no suggestion of her own, apparently consid¬ ered the British proposals as sufficiently satis¬ factory for Austria to accept — if they were intended to be accepted. ®Owing to the action of Russia,® reads the kaiser's message, ®the Austrian answer … was not given.® It may be left to future historians to speculate on the problem, if it promised a solution of the diffi¬ culty, why that answer was not given. Ac¬ cording to the German <White Book> Russian troops are said to have crossed the frontier the same afternoon that the tsar's telegram was sent. ^ This publication bore the subhead, ®How Russia and her Ruler betrayed Germany's Con¬ fidence and thereby made the European War.® The first Russian troops entered German ter¬ ritory on 3 August, three days after the dec¬ laration of war by Germany.

Meanwhile, in the evening of 31 July, the German ambassador in Paris called on the French foreign minister, informed him of the ultimatum that had been sent to Russia, and said that he would return at 1 p.m. on the fol¬ lowing day to learn what attitude the French government proposed to adopt in the circum¬ stances. He returned next morning and was told that the French government failed to comprehend the reason prompting his communi¬ cation of the previous evening. It was pointed out to him that general mobilization in Russia had not been ordered until after Austria had decreed a general mobilization and that the Rus¬ sian government was ready to demobilize if all powers did likewise. ®It seemed strange to the French government that in view of this and of the fact that Russia and Austria were ready to converse, the German government should have at that moment presented an ulti¬ matum at Saint^ Petersburg requiring imme¬ diate demobilization by Russia. There was no difference between France and Germany, but the German ambassador

had made a menacing communication to the French ˆ and had re¬ quested an answer the next day, intimating that he would have to break off relations and leave Paris if the reply was not satisfactory.® The ambassador stated ®that he had packed up.® Later in the day he received his answer, namely, that the French Republic ˆˆwould be forced to consult her own interests.® The German ambassador then announced to the French premier that a state of war existed between Germany and France. At 3.40 p.m. (1 August) a general mobilization of the French army was

ordered. The troops nearest the German fron¬ tier were ordered to leave a zone of 10 kilo¬ meters between themselves and the German boundary line, in order to avoid a collision. On the same day German troops entered Lux¬ embourg.

In the morning the British Cabinet held a meeting and after its close Sir Edward Grey gave the French ambassador, M. Paul Gambon, an assurance that if the German fleet came into the Channel or through the North Sea to under¬ take hostile operations against French coasts or shipping, the British fleet would give all the protection in its power. This assurance was given subject to the policy of the government receiving the support of Parliament and was not to be taken as binding the government to take any action until the contingency of action by the German fleet took place. On 3 August Germany demanded permission from Belgium to send troops through that country on the pretext that this proceeding would help Bel¬ gium. to prevent the violation of her territory. Berlin was, of course, well aware that France had already solemnly promised to respect the neutrality of Belgium. About the time the German ambassador in Paris was carrying out his instructions, M. Sazonov was expressing his gratitude to the British government, ˆˆwhich had done so much to save the situation,® and that ˆ4t would be largely due to them if war were prevented.® Even at this late hour, when Russia, France and Germany were already tech¬ nically at war, there were indications of Austrian wavering. Acting on instructions from Count Berchtold, the Austrian ambassador in Paris assured the French foreign minister that there was no intention on the part of Austria to im¬ pair the sovereignty or territorial rights of Serbia. Simultaneously, the Russian ambas¬ sador in Vienna was ˆffiegged® by Count Berch¬ told to do his best to remove the wholly errone¬ ous impression in Saint Petersburg that the ®door had been banged® by Austria on all further conversations. Special attention was drawn to the fact that the conversations %ad not been broken off by Austria-Hungary.® This naturally gives rise to the

question. If negotia¬ tions had not been broken off by either of the two principal disputants, who did break them off? As M. Sazonov described the situation, ^^Germany was unfortunate in her representa¬ tives in Vienna [the late Herr von Tschir-schky] and at Saint Petersburg [Count Pourtales]®; the former was *a violent Russophobe who had urged Austria on,® and the latter had represented to his government that ˆRussia would never go to war.® He (M. Sazonov) ˆffiad accepted every proposal that had been held out to him. He had accepted the proposal for a conference of four, for mediation by Great Britain and Italy, for direct conversation be¬ tween Austria and Russia; but Germany and Austria had either rendered these attempts for peace ineffective by evasive replies or had re¬ fused them altogether.®

A time limit of 12 hours was attached to the German ultimatum to Belgium, with a threat, in case of refusal to permit the passage of German troops, to treat Belgium as an enemy. Without hesitation the Belgian government answered that an attack upon their neutrality would be a flagrant violation of the rights of nations, and that to accept the German proposal would be

to sacrifice the honor of a nation. ®Conscious of its duty, Belgium is firmly resolved to repel aggression by all possible means.® Dur¬ ing the day the French ambassador in London asked Sir Edward Grey what England would say about Belgian neutrality. The minister replied that the violation of Belgium was a more important matter than the Luxembourg raid, and added, ®we are considering what statement we should make in Parliament to¬ morrow — in effect, whether we should declare violation of Belgian neutrality to be a casus The French government offered the support of five French army corps to the Bel¬ gian government. The latter replied (3 Au¬ gust) : ®We are sincerely grateful to the French government for offering eventual support. In the circumstances, however, we do not propose to appeal to the guarantee of the Powers.®

Meanwhile, what was the attitude of Italy, a partner of Germany and

Austria in the Triple Alliance? The full conditions of that alliance were never made public till October 1919. Con¬ trary to general belief, the treaty contained no detailed military provisions; its spirit being purely defensive in case of an unprovoked attack upon any one of the partners. It was definitely laid down, however, that Italy was not expected to come to the aid of Germany in a war with Russia, while in 1896 Italy had notified her partners that she would not join them in any war in which France and England were aligned on the same side against the Central Powers. Furthermore, Italy was not to be called upon to fight against England. (New York Times, 24 Oct. 1919). Italy's attitude in the great crisis is explained in the following message from Sir Edward Grey to the British ambassador in Paris on 3 Aug. 1914: ®The French ambassador made the following com¬ munication: 4n reply to the German Govern¬ ment's intimation of the fact that ultirnatums had been presented to France and Russia, and to the question as to what were the intentions of Italy, the Marquis di San Giuliano [Italian Foreign Minister, d. 16 Oct. 1914], replied that the war undertaken by Austria, and the con¬ sequences which might result, had, in the words of the German ambassador himself, an aggress¬ ive object. Both were therefore in conflict with the purely defensive character of the Triple Alliance, and in such circumstances Italy would remain neutral.ˆ In making this com¬ munication, M. Cambon was instructed to lay stress upon the Italian declaration that the present war was not a defensive but an aggress¬ ive war, and that, for this reason, the casus fcederis under the terms of the Triple Alliance did not arise.® On the news of the German declaration of war reaching England, all the naval reserves were called out and a partial moratorium was proclaimed in order to avert a financial crisis.

German troops invaded Belgium on 3 August, when the king of the Belgians telegraphed to King George : ^^Remembering the numerous proofs of your Majesty's friendship and that of your predecessor and the friendly attitude of England in 1870 and the proof of friend¬ ship you have just given us again, I make a supreme appeal to the diplomatic intervention of your Majesty's Government to safeguard the integrity of Belgium.® Sir Edward Grey immediately instructed the British ambassador

in Berlin to protest against the violation of a treaty to which Germany, in common with England, was a party, and to request an assur¬ ance that the demand made upon Belgium would not be proceeded with and that her neutrality would be respected. Next morning (4 August), however, the German minister in Brussels handed the Belgian foreign

minister a note to the effect that as the Belgian govern¬ ment had declined the well-intentioned proposals submitted to them by the Imperial government the latter would, deeply to their regret, be com¬ pelled to carry out, if necessary by force of arms, the measures considered indispensable in view of the French menaces. A state of war now existed also between France and Germany, for on the evening of 3 August the Gernian ambassador in Paris had handed the following document to the French premier: ®The German military and administrative authorities have as¬ certained that a number of hostile acts have been committed on German territory by French military aviators. Some of the latter have vio¬ lated the neutrality of Belgium, invading its territory. [Here follow some fictitious details of alleged attacks on Nuremberg, etc.]. I am directed and have the honor to inform your Excellency that in consequence of these aggres¬ sions the (German Empire considers itself at war with France, due to the acts of this latter power.® An interesting sequel to the German charges came to light 22 months later. In June 1916, Professor Schwalde, editor-in-chief of the German Weekly Review of Medicine, pub¬ lished in that periodical : ®It is false that French aviators threw any bombs on Nuremberg on 2 Aug. 1914. The Mayor of the city recently wrote to the general commanding the Third Bavarian Army Corps that he never had any knowledge of any bombardment of the stations of Nuremberg, Kissingen, or of Niiremberg-Ansbach before or after the declaration of the war.®

To return to 4 Aug. 1914. Germany made one more attempt, through her ambassador in London, to dispel any mistrust that might sub¬ sist on the part of the British government with regard to German intentions, by repeating most positively the assurance that, even in the case of armed conflict with Belgium, Germany would under no pretense whatever annex Belgian ter¬ ritory. ®Please impress upon Sir Edward Grey that the German Army could not be exposed to French attack across Belgium, which was planned according to unimpeachable informa¬ tion. Germany has consequently to disregard Belgian neutrality, it being for her a question of life or death to prevent a French advance.® Simultaneously, Brussels announced that Ger¬ man troops had entered Belgian territory, and that Liege had been summoned to surrender by a small party of Germans who, however, were repulsed. The die was cast. Sir Edward Grey now instructed the British ambassador in Berlin to say that a satisfactory reply to his telegram was expected in London by fnid-night. ˆTf not, you are … to ask for your passports, and to say that His Maj¬ esty's Government feel bound to take all steps in their power to uphold the neutrality of Bel¬ gium and the observance of a treaty to which

Germany is as much a party as ourselves.® Sir Edward Goschen delivered this message to Herr von Jagow, who at once replied that he was

sorry to say that his answer must be ®No,® as German troops having crossed the frontier that morning, Belgian neutrality was already vio¬ lated. The foreign minister explained that Germany had been obliged to take this step as she had to advance into France by the quickest and easiest route, so as to be able to get well ahead with her operations and endeavor to strike some decisive blow as early as possible. By adopting the more southern route they could not hope, in view of the paucity of roads and the strength of the fortresses, to get through without formidable opposition entailing great loss of time. Rapidity of action was the great German asset, while that of Russia was an in¬ exhaustible supply of troops. Sir Edward Goschen pointed out that this accomplished vio¬ lation of Belgium rendered the situation exceed- iiigˆy .grave, and asked whether there was not still time to draw back and avoid possible con¬ sequences. The minister replied that it was impossible for Germany to draw back. At a later interview in the evening the British am¬ bassador again asked the .same question and received the same answer, namely, that it was too late. Sir Edward Goschen then called upon the German chancellor and found him ˆVery agitated.® The chancellor ˆˆat once began a harangue, which lasted about 20 minutes.® He said that the step taken by the British govern¬ ment was terrible to a degree; just for a word — ˆneutrality,® a word which in war time had so often been disregarded — just for ˆˆa scrap of paper® Great Britain was going to make wJlr on a kindred nation who desired nothing better than to be friends with her. All his efforts in that direction had been rendered useless by this last terrible step, and the policy to which he had devoted himself since his accession to office had tumbled down like a house of cards. What England had done, he said, was ®unthinkable® ; it was ®like striking a man from behind while he was fighting for his life against two assailants.® He also held Great Britain responsible for all the terrible events that might happen.

The British ambassador protested strongly against that statement and said that, just as it was considered a matter of life or death for Germany to violate Belgian neutrality for strategical reasons, so was it also a matter of life and death for the honor of Great Britain that she should keep her solemn engagement to do her utmost to defend Belgium's neutrality if attacked. That solemn compact simply had to be kept, or what confidence could anyone have in engagements given by Great Britain in the future? The chancellor said, *But at what price will that compact have been kept… .

Has the British Government thought of that?® The ambassador hinted that fear of conse¬ quences could hardly be regarded as an excuse for breaking solemn engagements, but ®his Ex¬ cellency was so excited, so evidently overcome by the news of our action, and so little disposed to hear reason, that I refrained from adding fuel to the flame by further argument. As I was leaving he said that the blow of Great Britain joining Germany's enemies was all the greater, that almost up to the last moment he and his Government had been working with us and supporting our efforts to maintain peace between Austria and Russia. I said that this was part of the tragedy which saw the two

nations fall apart just at the moment when the relations between them had been more friendly and cordial than they had been for years. Unfortunately, notwithstanding our efforts to maintain peace between Russia and Austria, the war had spread and had brought us face to face with a situation which, if we held to our en¬ gagements, we could not possibly avoid…®

About 9 p.M. Sir Edward Goschen dis¬ patched a telegraphic report of the interview, but the message never reached the Foreign Office in London. At 9.30 the German Under¬ secretary of State called on the ambassador and expressed his deep regret that the very friendly official and personal relations between them were about to cease. He also ^casually® asked whether a demand for passports was equivalent to a declaration of war. Sir Edward Goschen replied that there were many cases where diplomatic relations had been broken off and, nevertheless, war had not ensued ; but that in the present case the British government expected an answer to a definite question by 12 o'clock that night, and that in default of a satisfactory answer they would be forced to take such steps as their engagements required. The German official said it was, in fact, a declaration of war, as the Imperial government could not possibly give the assurance required either that night or any other night.

Not long after the minister had departed, Berlin was startled by a flying sheet, issued by the Tageblatt, stating that Great Britain had declared war on Germany. The immediate re¬ sult of this news was the assemblage of an excited and unruly crowd before the British embassy. The small force of police which had been sent to guard the embassy was soon over¬ powered, and the attitude of the mob became more threatening. ®We took no notice of this demonstration so long as it was confined to noise, but when the crash of glass and the landing of cobble stones into the drawing-room, where we all were sitting, warned us that the situation was getting unpleasant, I telephoned to the Foreign Office an account of what was happening. Herr von Jagow at once informed the chief of police, and an adequate force of mounted police, sent with great promptness, very soon cleared the street. From that moment on we were well guarded, and no more direct unpleasantness occurred.® After order had been restored Herr von Jagow called at the embassy and expressed his regrets. He said that the behavior of his countrymen had made him feel more ashamed than he had words to express. ˆTt was an indelible stain on the reputation of ‘ Berlin.®

Next morning (5 August) the kaiser sent an aide-de-camp with the following message: ˆˆThe Emperor has charged me to express to your Excellency his regret for the occurrences of last night, but to tell you at the same time that you will gather from these occurrences an idea of the feelings of his people respecting the action of Great Britain in joining with other nations against her old allies of Waterloo. His Majesty also begs that you will tell the King that he has been proud of the titles of British field-marshal and British admiral, but that in consequence of what has occurred he must now at once divest himself of those titles.® In his report on the incident Sir Edward Goschen stated that the above message ®lost

none of its acerbity by the manner of its delivery » At 11 a.m. the British ambassador was handed his passports, and the last thread between England and Germany was broken. Sir Edward Goschen paid

a glowing tribute to the great assistance rendered ®to us all® by the American ambassador, Mr. Gerard, and his staff. ˆUndeterred by the hooting and hisses with which he was often greeted by the mob on entering and leaving the Embassy, his Ex¬ cellency came repeatedly to see me to ask how he could help us and to make arrangements for the safety of stranded British subjects. He extricated many of these from extremely diffi¬ cult situations at some personal risk to hirn-self, and his calmness and savoir-faire and his firmness in dealing with the Imperial authorities gave full assurance that the protection of British subjects and interests could not have been left in more efficient hands.®

At this particular stage (5 Aug. 1914) the European situation presented a strange mosaic of international complications. Austria was at war with Serbia, but npt with Russia; nor with France and England. ‘Germany was at war with Russia, France, England and Belgium, but not with Serbia; Italy had declared her neutrality. While German troops were al¬ ready operating in France and Belgium, Russia still abstained from attacking Austria. The Russian ambassador had been instructed to remain at his post in Vienna till war should be actually declared by Austria. This only hap¬ pened on the 6th, when Count Berchtold in¬ formed the foreign missions in Vienna that the Austrian ambassador at Saint Petersburg had been instructed to notify the Russian gov¬ ernment that, in view of the menacing attitude of Russia in the Austro-Serbian conflict and the fact that Russia had commenced hostilities against Germany, Austria considered herself also at war with Russia. On the 10th, France declared war on Austria, and on the 12th Great Britain followed suit. The participation of Japan in the war was due partly to considera¬ tions of policy based upon her alliance with Great Britain, who asked her (in August 1914) to safeguard their joint interests in the Far East, and partly to an unforgotten incident that happened nearly 20 years before. In 1894-95 Japan had defeated China in war and had failed to get satisfaction commensurate with her victory owing to the diplomatic inter¬ vention of Russia and Germany. (See His¬ torical Introduction in this department). Japan had wiped off her score with Russia 10 years later in a great war, and after another decade the opportunity was offered her of settling with Germany. But while grievances sometimes rankle in the minds of nations for many years, they are not often seized upon as a pretext for war. Since 1902 Japan had been an ally of Great Britain. The treaty existing between the two countries had been renewed in 1905 and revised in 1911. Its provisions were operative only in the Far East and covered the maintenance of general peace in Eastern Asia and India, the preservation and integrity of China, and the principle of equal

opportuni¬ ties for the commerce and industry of all nations in China, besides the maintenance of the territorial rights and defense of the special interests of the contracting parties in Eastern Asia and India. It was also provided that ®if

by reason of unprovoked attack or aggressive action, wherever arising, on the part of any other power or powers, either party should be involved in war in defense of its territorial rights or special interests, the other party will at once come to the assistance of its ally, and will conduct the war in common, and make peace in mutual agreement with it.® A new article was added in 1911 to the effect that ˆ“should either high contracting party conclude a treaty of general arbitration with a third power, it is agreed that nothing in this agree¬ ment shall entail upon such contracting party an obligation to go to war with the power with whom such treaty of arbitration is in force.® This proviso presumably had specially in view the Anglo-American unlimited Arbitration Treaty signed in 1911, but not subsequently ratified by the United States Senate. On 15 Aug. 1914 Japan delivered an ultimatum to Germany de¬ manding (1) an immediate withdrawal of all German armed vessels from Japanese and Chinese waters, and (2) the unconditional de¬ livery of the leased territory of Kiao-chau at a date not later than 23 August, at noon, in order that it might be restored to China. As no answer was received by the specified time, Japan promptly declared war on that day and proceeded at once to active hostilities against the German forces stationed on the Tsing-tau Peninsula. In 1914 Japan possessed twice the naval and military strength which she had when she began the war with Russia in 1904. The wheel of fate had come full circle with a vengeance. The participation of Turkey in the war on the side of Germany and Austria-Hun¬ gary was the consummation of a process that had been in operation for many years. Germany began to take a more than platonic interest in the decadent Turkish Empire not long after the signing of the Berlin Treaty in 1878. A German military mission under Gen¬ eral von der Goltz was sent to Turkey to assist in reorganizing the Turkish army and a group of German financiers began to apply for railway concessions. The kaiser visited the sultan in 1889, and not long afterward the plan of a German railroad through Turkish territory to the Persian Gulf began to assume shape. In 1898 the kaiser again visited Constantinople and this time made a spectacular tour of the Holy Land, proclaiming himself under all cir¬ cumstances the friend of the 300,0(X),000 Mo¬ hammedans in the world. Both (jermany and Austria-Hungary had a ®Drang nach (Jsten® or ®push toward the east® policy in view, the former seeking an outlet from

her geographic¬ ally encircled position and the latter a pre¬ dominance in the Balkans. The situation was well explained by the Frankfurter Zeitung a few months before the outbreak of the Euro¬ pean War, on 7 Jan. 1914: ^^A war with Eng¬

land, France and Russia at the time appears, fortunately, to be ever more improbable, but the possibility of such a conflict cannot be ex¬ cluded … The Triple Alliance countries

[Germany, Austria and Italy], which are com¬ pelled to have recourse to large armies, cannot hope to compete successfully with the fleets of England and France on the high seas …

Where, then, shall the Triple Alliance countries look for their raw material if their sea routes are cut off? There is only one means of land communication, and it leads through Rumania,

Bulgaria and Turkey into Asia Minor The states lying on the eastern border of Hungary and Asia Minor have, indeed, no choice ; They rnust be the friends and allies of the Triple Alliance, or they must reckon with the unflinching hostility of the Triple Alliance in any conflict which threatens their inde¬ pendence. Austria, too, has no choice. Either the countries on the Lower Danube must be her friends, or she must exterminate them … The German military mission in Constantinople is not merely helping to reorganize the Turkish army out of pure joy … Bismarck could

not have foreseen that this territory would one day become so essential a route for German imports that we should not, if necessary, shrink from a conflict with Russia to maintain our freedom of trade there.® Thus those Balkan states which did not fall in with the plan would have to be exterminated. By an agreement in 1894 Rumania was linked to Austria ; Bulgaria was evidently regarded as ^^safe,® while Serbia remained the sole obstacle. During the first month of the European War Turkey maintained an uneasy neutrality. The escape of the Goebcn and Breslau into the Dardanelles hastened matters. German men, gold and arms were sent to Turkey through Bulgaria and Gen. Li¬ man von Sanders became a high official in the Turkish army. The army was mobilized and large quantities of war stores were

dispatched to Bagdad and Syria; the Dardanelles forts were strengthened and an approaching Jehad (holy war) was preached by German agents. The kaiser was represented as a convert to Islam and stories were circulated of Moham¬ medan uprisings in British, Russian and French territories. Egypt was believed to be ready to revolt, and the khedive's sympathies had al¬ ready been secured. The sultan, a mere figure¬ head, and his grand vizier and finance minis¬ ter were opposed to war, while the Turkish people were by no means hostile to the Allies. Directly after declaring war against Germany, Great Britain took over two Turkish battle¬ ships then in course of construction in England, which had been ordered by the Turkish gov¬ ernment. These vessels, the Sultan Osman and Reshadieh, were renamed Agincourt and Erin and were added to the British navy. The Turkish people were offended at this action, but they had little regard for the Young Turk Party ruled by Talaat Bey and Enver Bey. It was announced that the Goeben and Breslau had been purchased by Turkey to replace the other two vessels, but it soon became evident that the German ships, while flying the Turkish flag, were commanded and manned by Germans. They were repaired under German direction and made cruises in the Black Sea. The Allies protested against this procedure when Turkey suddenly denounced the capitulations under which European residents in Turkey had always enjoyed extraterritorial rights (9 Sept. 1914). Finally, on 29 October, the Breslau and some Turlash war craft appeared off the Crimea and bombarded Theodosia and Novo-rossisk at the entrance to the Sea of Azov, both unfortified towns. The Allied ambas¬ sadors in Constantinople had their telegraphic communications cut off and could not get in touch with their governments. A Turkish squadron shelled Odessa on 30 October and the Goeben bombarded Sevastopol on 2 November,

although Turkey was still at peace with Russia. The Turkish ambassadors in London and Paris stated that their government was acting under duress, that the German guns had been turned upon (iionstantinople, and that an apology would be forthcoming. On 3 November a joint Brit¬ ish and French squadron bombarded the en¬ trance forts of the Dardanelles, and two days later Great Britain declared war on Turkey, simultaneously annexing Cyprus. The khedive of Eˆpt, Abbas Hilmi II (q.v.), was at the time in Constantinople plotting with the Turks and Germans to oust the British ; whereupon the latter deposed him, proclaimed Egypt a British protectorate, and appointed his uncle, Hussein Kamil, sultan. Russia, meanwhile, invaded Asia Minor from the Caucasus. Ac¬ cording to the Greek ˆWhite Bookˆ laid be¬ fore the Greek Chamber on 18 Aug.

1917, M. Theotokis, Greek minister at Berlin, tele¬ graphed to Athens from Berlin the day Great Britain declared war against Germany (4 Aug. 1914) : ®The Emperor informs me that an Alliance has to-day been concluded between Germany and Turkey. Bulgaria and Rumania are also taking their stand alongside of Ger¬ many … The Emperor added, AVhat I

ask to-day is the execution of what the two sovereigns [of Germany and Greece] have often discussed.ˆ® Italy came in against Austria on 23 May 1915, and Bulgaria against Serbia on 14 October of the same year. On 19 Oct.

1915 Italy declared war on Bulgaria. In March

1916 Portugal precipitated a crisis with Ger¬ many by seizing 36 Austrian and German ships in the Tagus, and on the 9th of the month Germany issued a declaration of war. See Great Britain and the World War; France AND THE War; Germany and the War; Italy AND THE World War; United States and the European War; War, European — American Neutrality, *etc.*

Henri F. Klein,

Editorial Staff of The Americana.

3. CHRONOLOGICAL SURVEY OF THE WAR. The following tables present a chronological outline of the more important international events preceding the war, and also of the principal occurrences during the progress of the war. The seeds of the present lie in the past; economics, geography, ideals and aspirations shape the bent of history; the oublic utterances of leaders of thought and action reveal the trend of events and illumine the converging paths of causes and effects.

The tables are divided into

1. Pre-War Events.

2. Declarations of War.

3. Western Front.

4. Eastern Front.

5. Southern Front.

6. Naval Operations.

7. Colonial Campaigns.

8. Rulers and Principal

Statesmen.

1. PRE-WAR EVENTS.

1870

19. — Franco-German war begins. 10. — German Empire proclaimed.

1871

an. 18. — First German Emperor proclaimed, day 10. — Peace of Frankfort; France loses Alsace and part of Lorraine.

WAR, EUROPEAN— CHRONOLOGICAL SURVEY OF THE WAR (3)

May

July

June

May

March

June

April

Jan.

June

Dec.

April

Mav

Aug.

Sept.

Oct.

Dec.

1875

6. — London T imes reveals (through Blowitz) German plan to attack France: “ England, the guar¬ antor of Belgian neutrality, will not have Belgium touched … joelgium will not be

touched and England will remain quiet.” Intervention of Tsar Alexander II and Queen Victoria,

1878

— Treaty of Berlin.

1879

Austro-German alliance.

1880

German colonial expansion begins.

1882

Triple Alliance formed.

1884

Professor Treitschke, in ‘ Deutschlands Kaempfe “We have reckoned with France and Austria. The ˆ reckoning with England has still to come; it’ will be the longest and most difficult.”

1886

Pan-German League founded,

1888

15. — Accession of William II as King of Prussia and

German Emperor.

1889

14. — Emperor declares: ” For me, every social demo¬ crat is synonymous with enemy of the nation and of the fatherland.”

1890

— German Emperor declares at Bremen: “ It is a tradition in our house [Hohenzollem] that we regard ourselves as chosen by God to govern and guide the people … We Germans

fear God and nothing else in the world.”

18. — Fall of Bismarck.

17. — Great Britain cedes Heligoland to Germany.

1895

— End of Chino-Japanese War. German inter¬ vention. Marquis Ito tells Mr. (Sir Valentine) Chirol, “ Japan will never forgive Germany.”

1896

3. — German Emperor’s telegram to President Kruger.

1897

18. — German Emperor declares at Cologne: “ That

trident [of Neptune] must be in our fist.”

16. — German Emperor orders his brother to employ

the ” mailed fist ” in China.

1898

19. — Spanish-American War.

— Incident in Manila Bay between Admiral Dewey and the German Admiral von Diederich; British squadron under Captain Chichester interposed. At Birmingham, Joseph Cham¬ berlain, British Colonial Secretary, advocates Anglo-American alliance. German Navy League formed. Thayer's ' Life of John Hay ' (New York 1915) quotes German Emperor: " If I had had a larger fleet I would have taken Uncle Sam by the scruff of the neck."

23. — Tsar Nicholas II issues Peace Manifesto.

23. — German Emperor declares at Stettin: " Our future lies upon the water."

— Anglo-French crisis over Fashoda.

10. — End of Spanish-American War.

1899

Feb. 26. — Prince Radziwill, representing the kaiser at the funeral of Felix Faure in Paris, says: " There is the United States, whose pretensions and riches are becoming a danger for us all."

March 9. — British First Lord of the Admiralty (Goschen) suggests limitation of navies.

May 18. — First Peace Conference at The Hague.

Oct. 11. — South African W'ar begins; outbreak of German

Anglophobia.

" 18. — German Emperor declares at Hamburg: "Ger¬

many is in bitter need of a strong fleet.",

Nov. 9. — Lord Salisbury, British Premier and Foreign Minister, describes Germany as " That one of the Continental States with which we have for many years entertained relations of sym¬ pathy and

friendship beyond all others.”

“ 30. — Chamberlain advocates alliance between Great

Britain, United States. and Germany.

1900

Jan. — Prof. Hans Delbriick in North American Review:

“ So the German nation … has now

directed its hate against England. England must have no illusions on this point …

The experience of history shows that in the long run monarchies have always overpowered democracies . , . The House of Hohen¬

zollem never can be separated from the fortune of the nation.”

Feb. 8. — Introduction of new German Navy Bill with hostile preamble. Fleet to be doubled. Admiral von der Goltz declares: “ Our chances of success in a war against England grow more favorable every day.”

March — Sir R. Blennerhassett in the London National Review “ But the true reason why an increase of the [German] navy is supported by ministers and politicians is to prepare for a struggle with England.”

April — German Emperor’s message to Daily Express (London): “ Tell the British people that my first hope, now and always, is the preservation of international peace ; my second, the consoli¬ dation and maintenance of good relations between Germany and Great Britain.”

July 5. — German Emperor at Kiel: “ The ocean is indispensable for Germany’s greatness, but the ocean also reminds us that neither on it nor across it in the distance can any great decision be again consummated without Ger¬ many and the German Emperor.”

Sept. — L. J. Maxsc (editor) in National Review (London) :

“Germany … has secured her position

as the first military power in Europe by smashing Austria and France in turn. She has now turned her attention seawards, and is bent on becoming the first naval power. England stands in her way, and therefore must be smashed.”

Oct. 18. — Count von (Prince) Biilow becomes Imperial German Chancellor.

Nov. 12. — Lord Landsdowne becomes British Foreign Minister.

1901

Jan. 22. — Death of Queen Victoria; accession of Edward VII.

1902

Jan. 30. — Anglo-Japanese Treaty of Alliance.

Feb. — Gerrrtan vice-admiral. Livonius, on ‘ The German North Sea Fleet and British Sea Power ’ in Deutsche Revue, declares that British naval supremacy was established in spite of inferior numbers and that “ a superiority on the part of Great Britain [in tactics and training] can¬ not any longer be discovered; on the contrary, we may boldly accord this superiority to ourselves.”

Feb. 23. — Prince Henry of Prussia arrives in New York.

May — A German squadron under Prince Henry of Prussia — by permission of the British Admiralty — visits naval bases and harbors in Irish waters.

“ 31. — End of South African War.

June — Sir Rowland Blennerhassett, in National Rev ieiv “ The desire to overthrow the British Empire, and to substitute for it a great Germ.an dominion, was quite as strong in the days of Mr. Gladstone as it is at the present moment.”

“ 19. — German Emperor at Aix: “ No thought is bom

of science which is not first utilized by us in order later to be taken over by other nations.”

June 28.ˆ — Triple Alliance renewed.

July — “ The conclusion is irresistible that the Kaiser is either the powerless friend or the secret enemy of England.” Maxse, in National Review.

“ 11- — Mr. Balfour succeeds Lord Salisbury as Premier.

Dec. — Berliner Tageblatl says: “The views of the English Press, although we would not deny that they are of a certain importance, are known to be the opposite of the views of the English government and also of the Admiralty. The latter knows very well that the creation of an English North Sea Fleet is, on the one hand, politically unnecessary, and at the same time false policy, and, on the other hand, an open sign of hostile intentions against Ger¬ many.”

1903

Feb. — Sir R. Blennerhassett: “ The virulent hostility of Germany to England is the work of Prussia. The ultimate object of Prussian policy is the overthrow of the British Empire. The highest authority in the fatherland has told us that the trident ought to be in the hands of Ger¬ many. It must therefore be forced from the grasp of England.” (National Review).

May 1. — King Edward in Paris; inception of the “ Entente

Cordiale.”

1904

Feb. 8. — Russo-Japanese War begins.

April 8. — Anglo-French Agreement signed.

July 12. — Anglo-German arbitration treaty.

Sept. — “It is impossible for Great Britain to be on equally good terms with France and Germany. Any attempt to become so will result in making enemies of both.” (National Review).

Dec. — Ratification of the Anglo-French Agreement by the French Parliament.

1905

March 22. — German Emperor at Bremen: “ God has called us to civilize the world: we are the missionaries of human progress… . We are the salt

of the earth.”

“ 31. — German Emperor at Tangier.

June 6. — Fall of M. Delcass6, French Foreign Minister; German intimidation of France.

Aug. 8. — New Anglo-Japanese Agreement. French Fleet

visits England.

Sept. 5 — Peace of Portsmouth (N. H.); end of Russo-Japanese War.

Dec. 5. — Resignation of Balfour Ministry.

Nov. — Great German Navy Bill passed.

Dec. — “ Great Britain is the sole objective of these frantic preparations… . The entire

naval literature of Germany … is saturated with the idea of a war with

England, and the people have gradually become im¬ pregnated with the obsession of their Sovereign ‘ who regards himself as the divinely appointed executor of the British Empire.” (National Review) .

1908

Feb. 14. — German Emperor’s private letter to British First Lord of the Admiralty (Lord Tweedmouth) pointing out that the British Navy was suffi¬ ciently strong.

April 16. — Mr. Asquith becomes premier.

June — German Emperor declares at Doberitz, “ It seems likely that people wish to isolate and provoke us. We shall be able to stand it.

. . So let them attack us; we shall be ready.”

Oct. 7. — Austria-Hungary annexes Bosnia and Herze¬ govina. European crisis.

1909

July — Dr. von Bethmann-Hollweg succeeds Prince von Btilow as Imperial Chancellor.

Aug. — Gerrnan Chancellor makes overtures to secure British neutrality in the event of a Continental War.

1910

Admiral Mahan, U. S. N.: “ For reasons

absolutely vital, Great Britain cannot afford to surrender the supremacy at sea… .

The British navy is left the sole military force in the world superior to anything that Germany can as yet bring into the field… . This

removed, neutral or fallen in power, Germany … becomes the dominant naval state of

the world, as well as the predominant country of Europe.” (‘ Interest of America in Inter¬ national Conditions ’).

May 6. — Death of King Edward; accession of George V.

Aug. — German Emperor declares: “ Looking upon myself as the instrument of the Lord, regard¬ less of the views and opinions of the hour, I shall go my way.”

1911

1906

Jan. — General election in Great Britain; overwhelming victory of Liberal-Radicals; Campbell-Ban¬ nerman premier.

“ 16. — Algeciras Conference opens; Great Britain sup¬

ports France.

Aug. 15. — King Edward and German Emperor meet at Kronberg. Kaiser describes approaching Hague Conference to Sir Charles (now Lord) Hardinge as “ great nonsense.”

Sept. — German Emperor informs Mr. (Lord) Haldane that Germany would not entertain disarma¬ ment proposals.

une

lUg.

a

Sept.

1907

“ The Germans are afflicted with the severest attack of swelled-headedness known to modern history. The British are practically ignorant of this dangerous state of mind in their greatest rivals.” Dr. Emil Reich, a Hungarian, in ‘ Germany’s Swelled Head ’ (London) ; re¬ printed as ‘ Germany’s Madness ’ (New York

1914).

15 — Second Peace Conference opens at The Hague.

— Herr Bebel, leader of German Socialists, at the ˆcialist Congress in Stuttgart: “If it is the aim of the Imperial government to make Germany the most powerful empire in Europe, and Prussia the most powerful state in that empire, they may be sure of my support.”

31. — Anglo-Russian Agreement signed, completing the Triple Entente.

1. — German Emperor at Munster: “ The Gerrnan people will be the block of granite on which our Lord will be able to elevate and achieve the civilization of the world.”

Dr. Paul Rohrbach: “ Egypt is a prize which for Turkey would well be worth the risk of taking sides with Germany in a war with England.”

March 30. — German Chancellor declares disarmament prob¬ lem insoluble.

July 1 . — German cruiser Panther at Agadir; Morocco crisis.

“ 15. — Germany demands territorial compensation from

France, consisting of the whole of the French Kongo from the coast to the river Sanga, and also French right of pre-emption to the Belgian Kongo.

“ 21. — Mr. Lloyd George, speaking for the British gov¬

ernment, warns Germany.

“ 24. — Germany prepared to make concessions to

France.

Sept. 26. — Turco-Italian War begins.

Oct. — Appearance of General von Bernhardi’s sensa¬ tional book, ‘ Germany and the next War.’ Empire Magazine (London) declares: “All that we can do is to await Germany’s pleasure — Peace or War — and prepare for the worst.”

Nov. 4. — Franco-German agreement on Morocco.

“ 27. — Sir Edward Grey, in Parliament: “ One of the

essential conditions of our friendships with France and with Russia in the last few years has been the certain knowledge that neither they or we wished to pursue a provocative or aggressive policy… . German strength

is by itself a guarantee that no other country will desire or seek a quarrel with Germany.”

Dec. — “ If a nation constantly proclaims that it is the strongest and greatest people on earth, that its destiny is to dominate the world …

what wonder that its neighbors take it at its word, and insure one another’s prosperity and safety by and understandings ? ’ ‘ Round

Table (London).

Dec.

May

March

April

Oct.

- «

U

a

Dec.

Feb.

March

U

May

a

Aug.

U

Sept.

Oct.

Nov.

Dec.

WAR. EUROPEAN — CHRONOLOGICAL SURVEY OF THE WAR (3)

6. — Premier Asquith in Parliament states explicitly that the British government was bound by no military engagements which would compel it to go to war without the consent of Parliament.

9. — Lord Haldane, former war minister, declares: “ The thing I most desire is to see Germany expand herself overseas ”

1912

“ Europe is drifting slowly but steadily towards an awful catastrophe . . this formid¬

able evil is threatening England, but it does not originate in England… . Germany

is the storm-centre, the volcanic zone, in international politics.” Charles Sarolea (a Belgian), in ‘ The Anglo-German Problem.’

“ Edward VII, son of a Coburger, grandson of a Saxon princess was never an enemy of Ger¬ many.” ‘ Monarchs and Men,’ by Maxi¬ milian Harden.

— Mr. A. J. Balfour, in the German magazine Nord und Sud: “ If Englishmen were sure that a German fleet were only going to be used for defensive purposes, i.e., against aggression, they would not care how large it was… . But does Germany make it

easy for Britain to take this view?”

— Germany endeavors to obtain unconditional pledge of neutrality from Great Britain during any war into which Germany “ might be forced.” British offer “ Naval Holiday.”

— German naval increase.

— Lord Roberts declares that ” Germany strikes when Germany’s hour has struck.”

8. — Balkan War begins.

15. — End of Turco-Italian War.

30. — ” Do not let us talk as if the Kaiser could play the part of a Genghiz Khan or an Attila, ravening around the world at the head of armed hordes to devour empires and king¬ doms.” London Evening Standard edi¬ torial.

5. — Canada offers three dreadnoughts to British navy.

1913

Prince von Biilow, former German Imperial Chancellor, in his book, ‘ Imperial Germany “ The fleet was to be built while we main¬ tained our position on the Continent, without our coming into conflict with England, whom we could not as yet oppose at sea.

Patriotic feeling must not be aroused to such an extent as to damage irreparably our rela¬ tions with England, against whom our sea power would for years still be insuffi¬ cient.”

17. — M. Poincar6 elected President of France.

— Three Years’ Service Bill in France.

24. — Mr. Asquith in Parliament declares that Great Britain is under no obligation by treaty to participate in any European War. Sir W. Byles, M. P.: ” I believe that England has

no enemy.”

26. — Mr. Churchill proposes a “ naval holiday ” to Germany.

— Second Balkan War.

10 — Mr. L. V. Harc9urt, British Colonial Secretapˆ: ” I can conceive of no circumstances in which Continental operations by our troops would not be a crime against the people of this country.”

— Italy refuses to agree to an Austrian attack on Serbia.

10. — End of Balkan War.

30. — Lord Roberts, on his 81st birthday, in message to the nation: “Fellow citizens and fellow Britishers… . Arm yourselves! …

Arm and prepare to quit yourselves like men, for the day of your ordeal is at hand.”

1 1 . — Great increase in Austro-Hungarian army.

— German Emperor and General von Moltke visit King of the Belgians. General tells King Albert of war with France: “ We must settle the business once and for all.”

1. — Lord Haldane, in Edinburgh: “Our relations with Germany are twice as good as they were two years ago.”

17. — Liberal-Radical deputation to Mr. Asquith pleading for reduction in naval expendi¬ ture.

30. — Sir John Brunner, former M. P., issues a circular among members of the National Liberal Federation urging pressure on the government to reduce British armaments.

1914

Jan, 1. — Mr. Lloyd George, Chancellor of the Exchequer, quoted in Daily Chronicle: “ This is the most favorable moment for 20 years to over¬ haul our expenditure on armaments … .” Anglo-German relations were far more friendly than for years past; Germany in par¬ ticular must be precluded from any idea of challenging British naval supremacy, and that a revolt against military supremacy was spreading through western Europe.

“ 15. — Lord Haldane: “ There is far greater prospect

of peace than ever there was before. No one wants war.”

Feb. 4. — Plans in London to celebrate 100 years’ peace between’ Great Britain and United States. Radical disarmament meeting at Queen’s Hall.

“ 5. — Daily News (London)’ declares: “ The German

bogey has vanished.”

“ 24. — Berliner Post demands immediate war.

“ 28. — Lord Roberts heads deputation to Premier

urging preparations for home defense.

March 4. — German press campaign against Russia begins.

“ 25. — German Emperor’s visit to Vienna.

April 21. — British King and Queen in Paris.

“ 28. — Sir Edward Grey repeats the premier’s state¬

ment that Great Britain is under no European military obligations whatspever.

May 14. — German Foreign Secretary informs the Reich¬ stag that negotiations with England “ were being conducted on both sides in the most friendly spirit.”

June — Anglo-German agreement concerning Africa.

“ 5. — Admiral Sir Percy Scott declares battleships

obsolete owing to submarine developments.

* 11. — Sir Edward Grey repudiates alleged Anglo-Russian Nava) Convention, and again de¬ nies that Great Britain is under any obliga¬ tion to participate in a European war.

“ 25. — British squadron at Kiel festivities.

“ 28. — (Sunday) Assassination of Archduke Francis

Ferdinand of Austria, and wife, at Serajevo. British first battle cruiser

squadron under Admiral Beatty at Kronstadt in the Gulf of Finland.

July 5. — Potsdam W'ˆar Council presided over by the emperor, who asked each man in turn, " was he ready for war? " All replied " yes " except the financiers, who asked for two weeks' de¬ lay. (Baron Wangenheim to United States Ambassador in Constantinople).

* 16. — British Ambassador in Vienna warns Sir Ed¬

ward Grey of impending Austrian aggression against Serbia.

" 18-20. — King George reviews at Spithead the largest fleet ever assembled in British waters.

" 20. — French President visits tsar, accompanied by

French premier and Foreign Minister.

" 22. — German Foreign Secretaiy informs British

charg6 d'affaires in Berlin that there could be no outside interference between Austria-Hungary and Serbia.

" 23. — Austrian ultimatum to Serbia.

" 25. — Serbian reply rejected.

" 27. — Sir Edward Grey proposes a conference; pro¬

posal rejected by Germany.

" 28. — Austria-Hungary and Serbia at war.

" 29. — Russia begins to mobilize.

" 31. — " State of War " proclaimed in Germany.

Aug. 2. — German ultimatum to Belgium.

" 3. — King of the Belgians appeals to King George.

" 4. — British ultimatum to Germany.

2. DECLARATIONS OF WAR.

1914

July 28. — Austria against Serbia.

Aug. 1. — Germany against Russia.

“ 3. — Germany against France.

“ 4. — Great Britain against Germany on expiration

of ultimatum, 1 1 p. M.

“ 4. — Germany against Belgium.

“ 6. — Austria against Russia.

“ 8. — Montenegro against Austria.

“ 9. — Serbia against Germany.

“ 10. — France against Austria.

“ 12. — Great Britain against Austria.

“ 12. — Montenegro against Germany.

“ 23. — Japan against Germany.

“ 25. — Austria against Japan.

“ 28. — Austria against Belgium.

Oct.

30.—

Nov.

5.—

5.—

May

23.—

U

23.—

Aug.

20.—

Oct.

4.—

<4

14.—

44

15.—

44

16.—

44

18.—

March

9.—

Aug.

27.—

44

27.—

U

28.—

a

30.—

April

6.—

U

8. —

U

9.—

July

2.—

u

22.—

Aug.

4. —

44

14.—

Sept.

23.—

Oct.

27.—

Dec.

7.—

Russia against Turkey.

Great Britain against Turkey. France against Turkey.

1915

Italy against Austria-Hungary.

San Marino against Austria-Hungary. Italy against Turkey.

Russia against Bulgaria.

Bulgaria against Serbia.

Great Britain against Bulgaria.

France against Bulgaria.

Italy against Bulgaria.

1916

Germany against Portugal. Rumania against Austria-Hungary. Italy against Germany.

Germany against Rumania.

Turkey against Rumania.

1917

United States of America against Germany. Cuba against Germany.

Panama against Germany.

Greece against the Central Powers.

Siam against the Central Powers.

Liberia against Germany.

China against Germany and Austria.

Haiti against Germany.

Brazil against Germany.

United States against Austria-Hungary.

1918

April 25. — Guatemala against Germany. May 7. — Nicaragua against

Germany.

“ 25. — Costa Rica against Germany.

July 15. — Haiti against Germany.

“ 19. — Honduras against Germany.

Diplomatic Relations Broken,

1917

April 8. — Austria with the United States.

“ 10. — Bulgaria with the United States.

“ 13. — Bolivia with Germany.

“ 21. — Turkey with the United States.

May 17. — Honduras with Germany.

J line 1 1 . — San Salvador with Germany.

“ 17. — Santo Domingo with Germany.

Oct. 6. — Uruguay with Germany,

“ 6. — Peru with Germany.

Dec. 9. — Ecuador with Germany.

3. WESTERN FRONT.

u

M

M

tt

U

ti

u

u

u

H

H

44

44

44

44

44

Sept.

44

44

44

1914

2. — Germans invade Luxemburg.

3. — Germans invade Belgium.

4. — Bombardment of Li6ge.

7. — Germans enter Li6ge.

9. — First British troops land in Francs.

12. — Belgian victory at Haelen.

15. — Last Li6ge forts fall.

17. — Belgian government moved to Antwerp.

19. — Belgian army retires to Antwerp.

20. — Germans enter Brussels.

21. — French retire from Alsace-Lorraine.

22. — French defeat at Charleroi.

23. — Battle of *Mons.* Germans in Namur.

24. — Germans take Tournai. French retreat.

25. — Battle of Landrecies. Germans take Sedan.

26. — Battle of Le Cateau. Destruction of Louvain.

27. — British occupy Ostend.

28. — Capitulation of Longwy.

31. — French army falls back.

1 . — Germans take Soissons.

3. — French government moves to Bordeaux.

British reach the Marne.

5. — End of the great retreat. Marshal Joffre and

General French meet.

6. — Battle of the Marne begins.

Sept.

7.—

8.—

U

9.—

44

10.—

H

11.—

a

12.—

M

13.—

a

23.—

44

28.—

Oct.

1 —

44

3.—

44

4.—

44

6.—

44

8.—

44

9.—

44

13.—

44

21.—

44

31.—

Nov.

10.—

44

17.—

Dec.24-25. —

Jan.

8.—

tt

15.—

44

lo¬

Feb.

ll.—

44

21.—

44

26.—

March 10. —

44

18.—

44

20.—

April

14.—

44

15.—

44

22.—

May

16.—

41

26.—

44

31.—

June

4 —

44

6.—

41

15.—

July

Aug.

1.—

12.—

iT

17.—

Sept.

8.—

44

23.—

44

30 —

Oct.

12.—

44

13.—

Nov.

14.—

Dec.

15.— i

Jan.

29.—

44

31.—

Feb.

21.—

44

25.—

March 5. —

44

17.—

44

30.—

44

31.—

April

1-5.—

44

10.—

44

25.—

May

1-2.—

44

15.—

44

24.—

June

7.—

44

15.—

44

16.—

44

23.—

July

1.—

Aug.

3.—

Sept.

3.—

u

12.—

Oct.

18.—

44

24.—

Nov.

2.—

44

15.—

44

18.—

Dec.

15.—

44

19.—

Feb.

14.— :

March 5.- “ 7-12.-

Fall of Maubeuge.

Germans under Von Kluck in retreat. Great stroke by General Foch.

Fighting along the Marne. Von Bulow’s army in retreat.

End of Battle of the Marne.

French enter Chalons.

Germans on the Aisne. Beginning of trench warfare.

Battle of the Aisne begins.

Germans take Saint Mihiel.

Attack on Antwerp begins.

Antwerp forts destroyed.

Belgian government moves to Ostend.

British troops reach Antwerp.

Germans bombard Arras.

Antwerp bombarded; garrison retires.

Fall of Antwerp.

Germans take Lille.

First battle of Ypres begins.

British thrust back at Ypres.

Germans take Dixmude.

End of first battle of Ypres.

■ British air raids on Brussels and Cuxliaven.

1915

Battle of Soissons begins.

End of battle of Soissons.

German air raid on England (Norfolk) .

British air raid on Zeebrugge.

Zeppelin raid on Calais.

Severe fighting in Champagne.

Battle of Neuve Chapelle.

Zeppelin raid on Calais.

Zeppelin raid on Paris.

Zeppelin raid on Northumberland.

Zeppelin raid on East Anglia.

Second battle of Ypres. Poison gas first used by the Germans.

Battle of Festubert. Zeppelin raid on Calais. Zeppelin raid on Southend, near London. Zeppelin raid on London.

Zeppelin raid on London.

Zeppelin raid on England.

French air raid on Karlsruhe.

Severe fighting in the Argonne.

Zeppelin raid on England Zeppelin raid on England.

Zeppelin raid on England.

Great Allied offensive opens.

French success in Champagne.

Severe Zeppelin raid on London.

Edith Cavell shot.

Fighting for the “ Labyrinth ” in Artois.

Sir Douglas Haig succeeds General French as British commander-in-chief.

1916

Zeppelin raid on Paris.

Zeppelin raid on England, 67 killed.

German attack on Verdun begins.

Verdun: Fort Douaumont captured.

Zeppelin raid on England: 70 casualties.

Heavy bombardment of Verdun.

Germans take Malancourt.

Zeppelin brought down in the Thames.

Zeppelin raids on England.

German gains at Verdun.

Zeppelin raids on England.

Zeppelin raids on Scotland and England.

Fight for Vimy Ridge.

Germans capture Cumieres.

Verdun: Germans take Fort Vaux.

Germans renew Verdun attack.

Germans reach nearest point to Verdun, barely four miles.

Fall of Thiaumont and Fleury.

Somme battle begins.

French recapture Fleury.

British take Guillemont.

French advance on the Somme.

French capture Sailly-Saillisel.

French retake Douaumont and Thiaumont. Germans evacuate Fort Vaux.

British victory on the Ancre.

Battle of the Somme ends.

French victory at Verdun.

Marshal Joffre retires, succeeded by General Nivelle as commander-in-chief.

1917

British penetrate to third German line near Arras.

Great German attack on Verdun.

French successes in Champagne.

March 17. — British take Bapaume.

“ 18. — Germans retire from Peronne.

“ 19. — Great advance begins on Hindenburg Line.

“ 31. — French and British successes.

April 3. — German retreat to Hindenburg Line.

“ 6. — Second battle of the Aisne begins.

“ 9-21. — Battle of Arras (Vimy Ridge).

“ 12. — Battle of Lens.

“ 16. — General Nivelle’s offensive on the Aisne opens.

“ 23-28. — Battles of the Scarpe.

May 3-June 15. — Fighting on Hindenburg Line.

“ 4. — Capture of Craonne.

“ 16. — General P6tain succeeds General Nivelle as

commander-in-chief.

June 7-12. — Battle of Ypres (Messines Ridge).

“ 26. — Battle at Lens.

July 5.— German counteroffensive on the Aisne.

July 11-Aug. 16. — Battles of the coast.

Aug. 17. — Germans fire Saint Quentin Cathedral.

“ 20. — French gains near Verdun.

“ 24. — French capture Hill 304 (Verdun).

Sept. 8. — French capture Chaume Wood, Verdun.

“ 20. — Battle of the Menin Road.

Oct. 4. — Battle of Broodseinde Ridge.

Nov. 20. — Battle for Cambrai.

Dec. 5. — Cambrai: British withdraw, relinquishing much conquered territory.

July

u

1918

March 21. — German spring offensive began. British driven back near Amiens and Ypres.

“ 24. — Germans retake Bapaurfie and Peronne.

April 1 1. — Armentieres retaken by the Germans.

“ 14. — Foch becomes commander-in-chief of the Allied

Forces in France.

“ 26. — Germans take Kemmel Hill.

May 27. — Germany’s second great offensive is launched.

“ 29. — Germans take Soissons.

“ 30. — Germans advance to within two miles of

Rheims.

June 1. — Germans capture Neuilly Heights and reach Chateau-Thierry.

“ 4. — Americans help to drive back German forces

across the Marne.

“ 11. — Allied counteroffensive begins from Montdidier and Noyon. German advance stops. 10. — French attack on Marne salient.

18. — Allied counteroffensive begins. Soissons is recovered by the Allies.

“ 19. — Germans begin retreat back over the Marne.

“ 21 . — Americans and French take Chateau-Thierry.

Aug. 3. — Allies advance to the Aisne and the Vesle on a 30-mile

front.

“ 4. — Fismes recovered by the Allies.

“ 6. — The 27th German Division is put out of action

on the Somme salient.

“ 8. — Allied forces on the Somme salient drive a

wedge in the German position. The Lys salient is evacuated by the Germans.

“ 10. — Montdidier recaptured by the French.

“ 29. — Bapaume and Noyon recovered from the Ger¬

mans.

“ 30. — German retreat in Flanders.

“ 31. — Kemmel Hill retaken by the Allies.

Sept. 1. — Peronne recovered from the Germans.

“ 3. — Germans retreat from the Sca^e to the Somme.

“ 12-14. — Americans eliminate the Saint Mihiel salient.

Verdun-Toul Railway opened to the Allies.

“ 26. — Americans and French attack in the Argonne.

“ 27. — The American 27th Division takes part in

attack which breaks the Hindenburg Line.

“ 30. — Belgians retake Roulers.

1 . — French take Saint Quentin.

6. — Americans take Saint Etienne. Le Cateau evacuated by the Germans.

* 6. — First Peace Note sent by the German govern¬

ment to the American president.

“ 8. — President Wilson replies to German Peace

Note.

“ 9. — Cambrai and Roncroi recovered by the Allies.

“ 12. — (German government dispatches a second

Peace Note to the President of the United States.

“ 14. — President Wilson in his reply states that the

conditions of peace must be left to the military advisers, illegal and inhumane practices must cease and the German people must change their government.

“ 17. — Ostend, Bruges and Lille recovered by the

Allies.

Nov. 4. — Valenciennes taken by the British.

* 7. — Americans capture Sedan, thereby cutting one

of the main German lines of communication and break the backbone of Teuton resistance in the West.

“ 9. — Maubeuge taken by the British. William II

abdicates.

Oct.

H

Nov. 10. — William II flees to Holland. British reach environs of Mons, scene of their defeat in the early days of the war.

* 11. — Germans sign armistice. Hostilities cease at

11 A. M.

Dec. 6. — Americans enter Mainz and Belgians enter

Diisseldorf.

” 8. — British enter Cologne.

1919

Jan. 18. — Peace Conference opens at Versailles.

May 7. — German delegates receive Peace Terms.

June 28. — German and Allied delegates sign the Treaty at Versailles.

Aug.

it

u

M

ft

ft

ft

ft

ft

ft

ft

ft

Sept.

ft

ft

ft

ft

ft

ft

ft

ft

ft

ft

ft

ft

Oct.

ft

ft

ft

ft

ft

ft

Nov.

ft

ft

ft

ft

ft

Dec.

ft

ft

ft

ft

ft

Jan.

ft

ft

ft

Feb.

ft

ft

ft

ft

ft

March

ft

ft

ft

ft

ft

4. EASTERN FRONT.

1914

5. — Russians cross into East Prussia.

7. — Russian invasion of East Prussia.

10. — Austrians invade Russian Poland.

14. — Russian victory at Sokal.

16. — Russian victory at Gumbinnen.

20. — Russians take Lyck and Goldap.

21. — Germans defeated at Frankenau.

23. — Russians capture towns in East Prussia.

25. — Russians approach Koenigsberg.

26. — Battle of Tannenberg begins.

27. — Russians seize Tarnopol and advance on

Lemberg.

31. — Russians heavily defeated at Tannenberg; they evacuate East Prussia.

1. — Battle of Lemberg begins.

2. — Russians fall back to the Bug.

3. — Lemberg surrenders to Russians.

4. — Russians advance into Carpathian passes.

Austrian attacks fail.

6. — Great battle begins between the Vistula and

the Dnieper.

7. — German advance into Russia begins.

8. — Russian successes in Galicia.

10. — End of Galician battles; Austrians defeated and retire toward the San.

12. — Austrians defeated at Tomasov. Russian retirement to the Niemen.

15. — Germans invade Russia. Russians take

Czemowitz.

20. — Russians attack Jaroslav.

22. — Przemysl invested by the Russians.

23. — Jaroslav surrenders to Russians.

28. — Russians hold Galicia, invade ‘’^^ungary and

threaten Cracow.

1. — Battle of Augustovo begins.

4. — Russians again in East Prussia.

5. — German advance on Warsaw begins.

9. — End of Russian advance in East Prussia.

10. — Germans in Lodz.

15. — Battle on the Vistula begins. Siege of Przemysl raised for three weeks.

25. — Germans retire from the Vistula. First attempt on Warsaw fails.

10. — Cossacks enter Posen; cut German railroad line.

12. — Russians 20 miles from Cracow.

13. — Second German assault on Warsaw begins.

14. — Russians driven back to Kutnow.

23. — Russian front broken near Lodz.

27. — Russians begin to evacuate Lodz.

7. — Second battle for Warsaw begins.

8. — Indecisive battle near Cracow.

12. — Russians retreat from Cracow.

15. — Sortie by garrison of Przemysl.

18. — Russian retreat ends on the Bzura.

25. — Second German attack on Warsaw fails.

1915

4. — Russian advance in Bukovina begins.

17. — Russians hold most of Bukovina.

18. — Austrians retake Czemowitz.

31. — Germans begin third attack on Warsaw.

4. — German advance checked.

6. — Russians reappear in East Prussia and advance

to Tilsit.

7 . — German advance begins. Russian retreat in

East Prussia. Russian defeat near the Niemen.

12. — German army invades Russia.

24. — Germans take Przasnysz.

26. — Russians retake Przasnysz.

28. — Germans begin retreat from North Poland.

8. — Russian success. Germans retreat to the

frontier.

13. — Russians breach the defences of Przemysl.

17. — Russians occupy Memel.

21. — Germans retake Memel.

22. — Przemysl surrenders to Russians.

25. — Russians cross the Pruth.

April

U

u

u

May

a

ti

u

«

tt

a

June

«

U

U

u

u

M

tf

u

July

u

H

H

«

M

«

M

M

«

«

4f

M

tf

«

a

«

Oct.

u

u

Nov.

Dec.

17. — Austrians attack near Stryj.

22. — Attack ends in failure.

25. Second Austrian attempt at Stryj.

28. Mackensen's great offensive against Russians in Galicia begins. Battle of the Dunajec.

2-Germans cross the Biala; take Ciezkowice.

7-Gerrnans cross the Wisloka at Jaslo; Russians driven back.

8. — Germans break Russian line; cross the Wistok. 11. — Russians retire to the San.

15. — Great battle of the San begins. Fighting at Opatov between Austrians and Russians. Austrians retreat to the Pruth. Germans take Jaroslav.

17. — Austro-Germans force the crossing of the San.

18. — Austrians defeated at Opatov.

19. — Germans take Lutkov.

31. — Germans storm forts at Przemysl.

1. — Germans capture Stryj.

2. — Germans regain Przemysl.

7. — Germans force the Dniester at Zuravno.

8. — Three days' battle on the Dniester.

11. — Russian victory on the Dniester.

12. — Mackensen's " phalanx " advances.

14. — Russians retire on Grodek.

1 7 . — Russians begin to evacuate Lemberg.

20. — Russians defeated at Rava Russka.

22. — Austrians recover Lemberg and Galicia.

28. — Austrians capture Halicz.

2. — Austrians take Krasnik.

4. — Russians driven from the Wisnitza.

5. — Battle of Krasnik.

7. — German advance on Warsaw checked.

9. — Austrians defeated at Krasnik.

14. — Germans capture Przasnysz.

15. — Russians prepare to abandon Warsaw.

16. — Battle of Krasnostav.

18. — Russian defeat at Krasnostav.

20. — Germans take Radom and Windau; advance on Kovno.

22. — Germans invest Ivangorod.

26. — Heavy fighting before Warsaw.

30. — Germans occupy Lublin and Cholm.

31. — Germans occupy Mitau.

4. — Germans occupy Ivangorod.

5. — Germans enter Warsaw. Russians prepare to

evacuate Riga.

7. — Germans repulsed near Riga.

12. — Fighting near Dvinsk. Germans repulsed near Mitau.

15. — Germans capture Vlodava and storm Kovno.

18. — Germans cut Brest-Litovsk railway.

19. — Fall of Novo Georgievsk.

23. — Germans capture Ossowietz. Russians retire.

25. — Germans take Brest-Litovsk.

26. — Germans capture Bialystok.

28. — Great German attack on the Dvina.

1. — Germans storm Grodno.

5. — Tsar Nicholas takes command of Russian armies.

12. — Germans cut Petrograd-Vilna Railway.

16. — Germans take Pinsk.

18. — Capitulation of Vilna.

3. ; — Great battle for Dvinsk begins.

10. ˆ — German attack on Dvinsk fails.

18. — German attack on Riga.

11. — Russians drive Germans back from Riga.

15. — Austrians drive Russians across the Styr.

27. — Great battle between Austro-Germans and

Russians at Toporoutz. Russian success.

1916

Jan. 1. — Russians win on the Styr and the Strypa.

“ 8. — Russians take Chartorysk.

“ 19. — Russian attack near Czemowitz.

Feb. 2. — Austro-Russian fighting in Bukovina.

March 17. — German offensive in the north.

June 3. — Russians take 13,000 Austrian prisoners.

“ 10. — Austrians routed near Czemowitz.

“ 17. — Russians take Czemowitz.

“ 24. — Russians hold most of Bukovina.

“ 29. — Russians take Kolomea.

July 4 — Russian patrols enter Hungary.

“ 7. — Russian offensive on Riga front.

* 19. — Russians cross Carpathians and threaten Hun¬

gary.

“ 23. — Hindenburg’s Riga line pierced.

“ 28. — Russians capture Brody.

Aug. 10. — Lemberg reinforced by Turkish troops. Rus¬ sians take Stanislau.

“ 15. — Russians capture Jablonitza.

“ 21. — Russians press through Carpathians.

“ 28. — Fighting on Transylvania frontier. Rumania

in the war.

« 30. — Rumanians drive Austrians out of Kronstadt.

Sept. 3-1 i. — Rumanians occupy Orsova, Hermannstadt and Helimbar.

Sept. 28-30. — Germans defeat Rumanians at Hermann¬ stadt.

Oct. 8. — Austro-Germans recapture Kronstadt; Ru¬

manian army in retreat.

* 11. — Austro-German invasion of Rumania.

“ 18-28. — Teutons checked in Transylvania.

“ 22. — Russian defeat in Galicia.

* 23. — Rumanians lose Constanza.

Nov. 3. — Rumanian successes.

“ 9-12. — Russo-Rumanian offensive in Transylvania,

“ 21. — Teutons take Craiova.

Dec. 6. — Teutons capture Bucharest.

1917

Jan. 5. — Russian offensive begins near Riga.

“ 23. — Russians forced back near Tirul marshes.

Feb. 1. — Russian line broken near Halicz.

“ 11 . — Germans driven back near Halicz.

March 8. — Russian revolution begins.

“ 15. — Russian government overthrown. General

Alexeieff commander-in-chief. Abdication of the Tsar Nicholas II.

April 6. — German victory on the Stokhod.

“ 14. — Germans bombard Brody.

May 4. — Russians attack in Rumania. Disorganization of Russian army sets in. Generals resign. Brussilov commander-in-chief.

June 17. — Russian offensive in Galicia.

July 1. — Russian advance on Lemberg.

“ 10. — Russians take Helicz. Teuton counteroffensive

develops.

“ 24. — Teutons capture Tarnopol. Russian and

Rumanian attacks fail. Teutons enter Rus¬ sian territory.

Aug. 3. — Russians retreat in Bukovina, abandoning

Czemowitz.

“ 15-16. — Rumanians check Germans near Marasechti.

“ 21. — Germans attack near Riga; cross the Dvina.

Sept. 2. — Russians retire from Riga.

“ 21. — Germans capture Jacobstadt.

Oct. 12. — German expedition seizes Oesel Island.

Nov. 8. — Bolsheviki overthrow Kerensky.

Dec. 22. — Peace negotiations opened with the Central Powers at Brest-Litovsk.

1918

Jan. 6. — Armistice proclaimed.

“ 10. — Mutiny of Russian Black Sea fleet.

Feb. 1 . — Ukrainian Republic recognized by the Central

Powers.

“ 9. — Peace signed at Brest-Litovsk between Ger¬

many, Austria-Hungary, Bulgaria and Tur¬ key on one side, and the Ukrainian Rada on the other.

* 10. — Bolsheviki make formal announcement that

Russia is out of the war.

“ 18. — Germany reopens hostilities against Russia.

“ 25. — Germans capture Reval.

March 3. — The Bolsheviki sign peace treaty at Brest-Litovsk with the Central Powers.

“ 3. — Peace negotiations open between the Central

Powers and Rumania.

* 5. — Germans land troops on the Aaland Islands.

“ 7 . — Finland and Germany sign a treaty of peace.

“ 13. — Germans enter Odessa.

“ 14. — Soviet Congress agrees to ratify the Treaty of

Brest-Litovsk.

* 1.9. — Allies protest against German-Russian peace.

April 5. — Japanese and British marines land in Vladivos¬ tok.

“ 8. — Germans occupy Charkov.

* 30. — Germans take Viborg.

May 1. — Germans occupy Sevastopol, where they also find most of the Russian Black Sea fleet.

“ 7. — Germany and Rumania sign a treaty of peace

at Bucharest.

Aug. 15. — Allied forces move 100 miles from Archangel along the Vologda Railway line.

Nov. 1. — Republic of Hungary proclaimed. Republic of

German Austria proclaimed.

5. SOUTHERN FRONT.

1914

July 28. — Austrians bombard Belgrade, evacuated by Set' bian army.

Aug. 6. — Austrians fail to cross the Danube.

“ 12. — Serbians and Montenegrins enter Bosnia.

“ 16. — Austrians capture Shabatz.

“ 17 . — Serbs defeat Austrians near Shabatz.

“ 18. — Serbian victory on the Jadar.

“ 23. — Austrians driven out of Serbia.

“ 26. — Austrians evacuate Novi Bazar.

Sept. 6. — Serbs take Semlin.

Sept.

8.-

15.-

Nov.

3.-

Dec.

2.—

u

6.-

a

15.-

Feb.

19.—

April

May

25.—

1.—

U

8.—

a

9.—

ti

18.—

ti

23.—

ii

28.—

u

30.—

June

4.—

7.—

a

9.—

a

15.—

16.—

18.—

u

21.—

u

28.—

“ 29-July

July

2.—

“ 17-20.—

Aug.

6.—

U

8.—

u

10.—

“ 21-22.—

Sept.

13.—

20.—

Oct.

3.—

U

4.—

M

5.—

U

7.—

U

9.—

u

11.—

u

12.—

u

15.—

ft

16.—

ft

22.—

ft

24.—

ft

29.—

Nov.

5.—

ft

6.—

ft

12.—

ft

14.—

ft

23.—

Dec.

2.—

ft

8.—

ft

9.—

ft

10.—

ft

19.—

ft

20.—

ft

21.—

ft

30.—

Jan.

9.—

ft

10.—

ft

13.—

ft

23.—

Feb.

14.—

March 28. —

April

14 —

ft

17.—

May

14.—

ft

18.—

ft

26.—

ft

27.—

ft

29.—

ft

31.—

June

5.—

ft

25.—

ft

27.—

Aug.

6.—

ft

9 —

ft

17.— :

ft

25.—

ft

27.— ;

■ Second Austrian attack begins.

• Austrians driven across the Drina. Third Austrian attack on Serbia.

erbians retake Austrians.

Belgrade; Serbia cleared of

1915

• Allied squadron bombards Dardanelles forts.

- British troops land in Gallipoli.

■ Turkish attack in Gallipoli.

■ Slight Allied advance on Krithia. •

■ Australians storm Turkish trenches at Sari

Bahr.

• Turks attack Australian position.

• Italy enters the war. Austrians begin opera¬

tions against Italy.

• Turkish success in Gallipoli.

• Italians capture Cortina.

Third Allied attack on Krithia and Achi Baba, Gallipoli.

Italians begin advance on Trieste.

• Italians take Monfalcone.

• Italian attack on Podgora position.

Severe fighting in Gallipoli.

Italians defeat Austrians at Plava.

Great Allied attack in Gallipoli.

Italians capture Castlenuovo.

1. — Turkish attacks repulsed in Gallipoli. Italians begin attack 6h Gorizia.

- Italian successes on the Isonzo and at Podgora.

British attack on Achi Baba; landing at Suvla Bay.

New Zealanders take Chunuk Bair. Gen. Sir Ian Hamilton takes command in Gallipoli. Turks recapture Chunuk Bair.

- Allied attack on Suvla fails.

British Dardanelles losses to date 17,608 killed. Bulgarian mobilization.

Russian ultimatum to Bulgaria.

Allies landing troops at Salonica.

Bulgaria in the war.

Teutons and Bulgarians begin invasion of Serbia. Germans take Belgrade.

Serbia appeals to Greece for help.

Bulgarians attack Serbia.

Fighting between French and Bulgarians.

New British commander in Gallipoli, Sir Charles Monro.

Bulgarians capture Uskub. Italian advance on the Isonzo.

Germans open Danube route to Constantinople. British fight Bulgarians near Lake Doiran.

Allies fail to unite with Serbians.

Fall of Nish, Serbia.

Germans hold Belgrade-Constantinople Railway. Austrian air raid on Verona.

Serbia overun; army retreats into Albania. French troops withdrawing from Serbia to Greece.

British evacuation of Gallipoli begins.

Fran co-British force retreats into Greece Greeks hand Salonica over to Allies.

British attack at Cape Helles (Gallipoli).

Suvla and Anzac evacuated.

Italian troops land at Avlona, Albania. German air raid on Salonica.

1916

Gallipoli finally evacuated.

Austrians capture Mount Lovtchen, Monte¬ negro.

Austrians enter Cettinje.

Austrians hold Scutari and Montenegro. Austrian air raid on Milan.

Austrian attacks in Gorizia.

British air raids on Constantinople and Adrianople.

Italians capture the Col di Lana Austrian offensive in the Trentino.

Italians retire in the Trentino.

Bulgarians advance into Greece.

Austrians on Italian territory.

Italians evacuate Asiago and Arsiero.

Italian towns taken by Austrians.

Austrian advance into Italy.

Italians recover Asiago and Arsiero.

Austrians retreating from Italy.

Italians open offensive on the Isonzo.

Italians capture Gorizia.

Serbians recommence hostilities.

Bulgarians enter Kavala.

Entry of Rumania into the war.

Sept.

Oct.

Nov. 1. —

“ 19.—

Dec. 8. —

6

10

11

14

1.

19

8

— Bulgarians capture Tutrakan, Dobrudja.

— Italian advance on the Carso.

— Greek fleet surrendered to Allies.

French take over Greek mails and telegraphs. New Italian offensive on the Carso.

Allied and Serbian troops enter Monastir. Allies proclaim blockade of Greece.

1917

May 14.

“ 15-23. June 4. —

“ 5.—

“ 11.- “ 2‘5 —

Aug. 20.—

“ 27.-

“ 29.-

Oct. 24-

Nov.

Dec.

U

28.

29. 10. 11.

23. 5.

24.

30.

Jan. 29. Feb. 24. March 11. April 6.

“ 13.

June 15.

17.—

July 7.-

Sept. 1.- “ 16.

Oct. 2 —

18.

23.

25.—

26.

27.

29.

2.

3.-

5.-

14. -

15. -

16. - 27.- 29.-

30.—

Nov.

3. -

4. -

— Italian offensive in Isonzo opened.

— Italian successes.

Italians proclaim Albania an independent state under Italian protection.

M. Jonnart (French) appointed High Com¬ missioner for the Allies in Greece.

- Abdication of the King of Greece.

- M. Venizelos again Premier of United Greece.

- Second Italian offensive on Isonzo and the

Carso.

- Capture of Mount Santo.

- Italians advance on Bainsizza Plateau.

- Great Austro-German offensive against Italians

opens; Italian front shattered for 20 miles from Tolmino. Teutons take 10,000 prisoners.

- Italians lose Gorizia again.

- Fall of Udine.

■ Fall of Asiago.

- Italian line established on the Piave, after

losing over 250,000 prisoners since Oct. 24.

■ Austro-German attacks checked.

- Austro-German offensive on Asiago Plateau.

- Italians regain several positions.

• French troops assist Italians.

1918

■ Italians ‘pierce enemy’s line near Asiago.

• Turks take Trebizond.

Turks retake Erzerum.

Turks occupy Ardahan.

Turks take Batum.

Austrians start offensive from the Asiago Plateau to the sea.

Malinoff succeeds Radoslavoff as Premier of Bulgaria.

British bombard Constantinople from the air. British advance in Macedonia.

First and second Bulgar lines in Macedonia carried by British.

Franco-Serb troops advance in Serbia.

French capture Prilet, Macedonia. Anglo-Greek and Franco-Greek forces join in pursuit of the Bulgars in the Doiran area.

Bulgarians retreat all along the line, leaving the Monastir-Prilep-Gradsko road in the hands of the Entente.

Serbs take Veles. British take Strumnitza. Bulgaria seeks an armistice.

Bulgaria signs armistice and surrenders.

Serbs enter Nish.

Greeks enter Drama.

Ferdinand of Bulgaria abdicates.

Italians capture Durazzo.

Czech revolution breaks out in Austria.

Serbs take Krushevatz.

British and Italians cross the Piave.

Austria appeals to Secretary Lansing for an im¬ mediate armistice.

Austrian command on Italian front armistice. Entire Turkish forces Tigris, numbering 7,000, surrender, granted armistice.

Italians in the Trentino cross the frontier.

Italians take Trent. Serbians occupy Belgrade. Austria accepts truce terms.

demands on the Turkey

Austrian

June

1919

2 . — Austrian delegates receive peace terms from the Versailles Peace Conference.

10. — Austria signs Peace Treaty at Paris.

6. NAVAL OPERATIONS.

1914.

Aug. 2. — Germans bombard Libau, Russia.

“ 5. — German mine-layer Konigin Luise sunk by

British destroyer.

“ 6. — British war vessel Amphion sunk by mine.

“ 13. — Dar-es-Salam, German East Africa, bombarded

by British.

“ 15. — Japanese ultimatum to Germany.

“ 28. — Battle in the Bight of Heligoland. New

Zealand fleet seizes German Samoa.

Sept. 3. — Allied warships bombard Cattaro.

“ 10. — German warship Emden in Bay of Bengal.

“ 11- — British seize New Pomerania.

** 22. — British cruisers Aboukir, Cressy and Hogue sunk by German submarine.

Oct. 29. — Turkish warships raid Odessa.

“ 30. — Emden destroys a Russian and French warship off Penang.

Nov. 1. — British squadron defeated off Coronel, Chile.

“ 3. — German cruisers bombard Yarmouth. Allies bombard Dardanelles forts.

“ 9. — Emden destroyed by the Australian cruiser Sydney.

“ 18. — Engagement in the Black Sea.

Dec. 8. — Battle of the Falkland Islands; German squad¬ ron of von Spee destroyed.

* 16. — German cruisers bombard Scarborough and Hartlepool, England.

Jan.

U

Feb.

March

«

April

May

«

U

u

«

a

June

July

tf

a

a

u

Aug.

U

a

a

44

u

u

14

Sejpt

Oct.

M

a

u

u

44

Nov.

m

m

m

Dec.

m

1915

1. — British battleship Formidable torpedoed.

24. — Naval battle in the North Sea: Blucher sunk. 18. — German ” blockade ” of Great Britain begins.

25. — Bombardment of Dardanelles forts renewed.

5. — Allies bombard Smyrna.

6. — Great attack on Dardanelles.

14. — German warship Dresden sunk by British off Juan Fernandez.

18. — Allied Dardanelles attack fails. Irresistible, Ocean and Bouvet sunk.

28. — Russians bombard Bosphorus forts.

31. — Germans bombard Libau.

27. — British submarine enters Sea of Marmora. French warship Leon Gambetta sunk.

7. — Lusitania sunk.

9. — Germans capture Libau, Russia.

12. — British warship Goliath sunk.

24. — Austrian raid on Italian coast.

26. — British warship Triumph torpedoed, Gallipoli.

27. — British warship Majestic torpedoed, Gallipoli. 30. — Action in Baltic between Germans and Russians.

2. — Russo-German action off Gothland.

8. — Italian cruiser Amalfi sunk by Austrian sub¬

marine.

11. — Kdnigsberg destroyed, East Africa.

18. — Austrian submarine sinks the Giuseppe Garibaldi in the Adriatic.

25. — Italians occupy island of Pelagosa.

2. — German transport sunk by British submarine in the Baltic.

9. — Turkish battleship sunk by British submarine.

11. — Italian submarine sinks Austrian submarine.

1 2. — Turkish transport sunk by British seaplane.

14. — British transport Royal Edward sunk.

16. — Russo-German action in Gulf of Riga.

18. — Moltke torpedoed by British submarine.

19. — German submarine sinks the Arabic.

20. — Russians defeat landing operations on the

Gulf of Riga.

21. — Germans evacuate the Gulf of Riga.

23. — Allied fleet bombards Zeebrugge.

4. — Hesperian sunk by German submarine.

7. — Allied fleet bombard Belgian coast.

19. — British transport Ramazan sunk in the iEgean Sea.

21. — British bombard Bulgarian coast.

22. — Russian squadron bombards Varna.

23. — German cruiser sunk in Baltic by British

submarine.

26. — British transport Marquette torpedoed in the

iEgean Sea.

29. — British minesweeper Hythe sunk, Gallipoli.

5. — American protest against the maritime policy

of England and France.

7. — Italian liner Ancona sunk by German submarine. 14. — British submarine lost in Sea of Marmora.

17. — British hospital ship Anglia sunk by rnine.

16. — German cruiser Bremen sunk in Baltic.

24. — French liner Ville de Ciotat sunk in the Medi¬

terranean by a submarine.

30. — British liner Persia sunk in Mediterranean.

1916

Jan. 2. — British passenger steamer Glengyle sunk in

Mediterranean.

“ 7. — Italian steamer conveying 400 Montenegrin

recruits from America sunk by mine in the Adriatic; 200 lives lost.

• 8. — British warship King Edward VII sunk by

mine in North Sea.

« 15. — German raider Moewe captures British steamer

Appam’QK Madeira…

“ 18. — Bulgarian coast bombarded by Franco-Bntish

warships.

Feb.

U

U

U

M

U

44

U

44

U

44

U

44

M

U

U

April

a

May

June

U

Aug.

U

U

u

Oct.

44

44

Nov.

44

a

44

44

a

Dec.

u

M

U

1. — The Appam, manned by a German prize crew, arrived at Norfolk, Va.

6. — Austro-Italian action in the Adriatic.

8. — French cruiser Amiral Charner sunk by sub¬

marine.

11. — British war vessel Arethusa sunk by a mine. 26. — French transport Provence II sunk in Medi¬ terranean; over 3,000 lives lost.

28. — Fight between the British war vessel Alcantara and the German raider Greif in North Sea; both sunk.

1. — British Primula sunk in Mediterranean.

4. — Raider Moewe returns to Germany.

9. — British warship Coquette and a British torpedo

boat sunk by mines.

12. — British warship Fauvette sunk by mine.

16. — Dutch liner Tubantia sunk by Germans.

18. — Dutch liner Palembang sunk by Germans.

22. — Germans sink liner Minneapolis, used as a

transport, in Mediterranean.

24. — Germans torpedo the Sussex in the channel.

25. — British destroyers and seaplanes raid Zeppelin

sheds in Schleswig.

30. — Hospital ship Portugal sunk by Turks in Black

Sea.

31. — British warship bombards Smyrna.

21. — German auxiliary cruiser and a submarine attempt to land arms in Ireland. The cruiser is sunk; arrest of Casement.

25. — German squadron and Zeppelins raid Lowestoft and Yarmouth, England.

31. — Battle of Jutland.

1 . — End of battle of Jutland.

5. — British war vessel Hampshire sunk with Lord

Kitchener on board, off the Orkneys.

2. — Italian superdreadnought Leonardo da Vinci

blown up in Taranto Harbor.

13. — British destroyer Lassoo torpedoed or mined

off Dutch coast.

19. -'- British light cruisers Nottingham and Falmouth

torpedoed and sunk. German battleship of Nassau class torpedoed by submarine E-23.

25. — British armed boarding steamship Duke of

Albany torpedoed and sunk by submarine in the North Sea.

7. — German war submarine U-53 reaches Newport,

R. I.

8. — U-53 torpedoes five vessels outside of Nantucket.

20. — Russian battleship Imperatriza Maria sunk by

internal explosion near mouth of the Danube.

23. — British minesweeper Genissa torpedoed and

sunk.

26. — German destroyer attack in English Channel.

British destroyer Flirt lost and Nubian dis¬ abled. Empty British transport Queen sunk. 1. — Dutch vessel Aldambt, being taken by German prize crew into Zeebrugge, rescued by British scout craft and five German destroyers put to flight. Italian torpedo boats raid Austrian naval base at Pola.

4. — Russian fleet again bombards Costanza.

10. — Baltic port west of Reval shelled by German destroyers, six to nine of which are sunk by the Russians.

21. — British hospital ship Britannic sunk by mine

or torpedo in the ˆEgean Sea.

24. — British hospital ship Braemar Castle sunk by

mine in .Egean Sea.

26. — German naval raid on Lowestoft, England.

British trawler Narval sunk.

8. — French battleship Suffren sunk by submarine northwest of Lisbon.

10. — German commercial submarine Deutschland completes her second voyage to the United States.

14. — British horse transport Russian sunk in Medi¬

terranean by submarine. Seventeen Ameri¬ cans lose lives on “ warship.”

27. — French battleship Gaulois sunk by submarine

in the Mediterranean.

1917

Jan. 1. — British transport Ibernia sunk by submarine

in Mediterranean; 120 men and 33 of crew missing.

“ 7. — British seaplane carrier Benmy-Chree sunk by

gunfire at Kastelorizo, Asia Minor.

“ 9. — British battleship Cornwallis sunk by sub¬

marine in Mediterranean; 13 lives lost.

“ 14. — Japanese armored cruiser Tsukuba destroyed

by internal explosion in Yoksuka Harbor.

“ 17. — British Admiralty announces German raider

sunk eight British and two French vessels between 12 December and 12 January; crews put on board three captured craft, one of which reaches Pernambuco, Brazil.

f.88

WAR, EUROPEAN— CHRONOLOGICAL SURVEY OF THE WAR (3)

Jan. 18. — German Admiralty announces that the Yarrow—

dale, captured by German raider, was taken to a German port on 31 December, with 469 prisoners.

“ 22. — Division of German destroyers encounter light

British naval force off Holland; one of former surtk. Similar action off Schouwen Bank; one British destroyer torpedoed. German destroyer V-69 puts into Ymuiden badly wrecked.

“ 25. — British auxiliary cruiser Laurenlic sunk by

submarine or mine off the Irish coast. Light German warship raids Suffolk coast caus¬ ing loss of life.

“ 26. — New British minefield off Jutland coast

announced from Scandinavia.

Feb. 22. — Seven Dutch ships torpedoed outside of Fal¬ mouth; three sunk.

“ 25. — German destroyers bombard Broadstairs and

Margate.

March 22. — German Admiralty announces arrival at home port of commerce destroyer Moewe from second voyage, having captured 22 steamers and five sailing craft.

“ 23. — Loss of battleship Danton in Mediterranean

by torpedo, on 19 March, announced by

French Admiralty.

April 2. — American armed liner Aztec torpedoed off French coast.

“ 7. — Two German destroyers torpedoed off Zeebrugge; one sunk.

“ 10. — British hospital ship ˆalta mined in the Channel.

“ 17. — British hospital ships Donegal and Lanfranc

sunk by submarines in Channel.

“ 20. — Six German destroyers attempt a raid on

Dover; two and possibly a third sunk by British destroyers Swift and Broke in old-style naval combat.

“ 26. — German naval raid on Ramsgate.

May 2. — British destroyer loses 62 men by striking

mine in Channel.

“ 10. — Eleven German destroyers emeˆing from

Zeebrugge forced back by Commodore Tyrwhitt, operating light naval force from Harwich.

“ 12. — Zeebrugge bombarded by Tyrwhitt with

assistance of air squadron.

“ 15. — Austrian light cruisers and destroyers sink 14

British drifters operating in the Adriatic; they are driven off by British cruisers Dartmouth and Bristol, French and Italian destroyers, and Italian airmen, who sink one cruiser outside Cattaro.

“ 26. — British hospital ship Dover Castle torpedoed

in Mediterranean.

“ 29. — British Admiralty announces sinking of auxiliary

cruiser Hilary by torpedo in North Sea. British torpedo-boat sunk in collision.

June 2. — British transport Cameronian sunk by sub¬ marine in Eastern Mediterranean.

“ 5. — Commodore Tyrwhitt, with squadron of light

cruisers and destroyers engages six German destroyers in running fight and sinks the S-20.

“ 13. — British armed merchantman Avenge torpedoed

in North Sea.

“ 27. — French armored cruiser Kleber strikes mine

off Point Saint Mathieu.

July 9. — British battleship Vanguard, dreadnought class,

destroyed by internal explosion while at anchor.

“ 17. — British Admiralty announces that British light

squadron has sunk four and captured four German merchant craft ojf Holland.

“ 30. — British armored cruiser, Ariadne, torpedoed

and sunk.

Aug. 14. — British destroyer sunk by mine in the Channel.

Sept. 1 . — British light forces sink four German mine¬

sweepers off the coast of Jutland.

“ 9. — German submarine U-293 interned at Cadiz.

Oct. 2. — British armored cruiser, Drake, torpedoed off

the north coast of Ireland.

“ 5. — Official Washington bulletin announces wreck,

on Aug. 2, of the German raider, the See Adler, on Lord Howe Island.

“ 7. — German submarine U-293 escapes from Cadiz.

“ 15. — British Admiralty announces the sinking by

tonjedo with the loss of all hands of the minesweeping sloop Begonia and the auxiliary cruiser Champagne.

“ 16. — American destroyer torpedoed but reaches port.

“ 17. — British destroyers Mary Rose and Strongbow,

convoying 12 Scandinavian merchantmen, attacked by two German raiders off Shetland and sunk with nine of the escorted vessels.

” 17. — American transport Antilles, homeward bound,

torpedoed with a loss of 67.

Oct. 18. — Russian battleship Slava sunk by gunfire in the Gulf of Riga.

“ 20. — British submarine in Gulf of Riga sinks German

transport and torpedoes a dreadnought.

“ 23. — British destroyer sunk in collision.

Nov. 2. — British sink German auxiliary Marie and 10

armed patrol ships in the Cattegat.

“ 5. — American converted yacht Alcedo torpedoed.

“ 14. — British destroyer and monitor sunk off Jaffa,

Palestine.

“ 17. — Light cruiser fight off Heligolaiid; Germans lose patrol boat and one cruiser is crippled.

“ 19. — American destroyer Chauncey sinks in collision in war zone.

Dec. 6. — United States destroyer Jacob Jones torpedoed off Scilly Isles.

“ 9-10. — Italian destroyers penetrate harbor of Trieste and torpedo the Austrian battleship Wien.

“ 17. — Sir Eric Geddes announces loss of 11 vessels in a British convoy in the North Sea.

“ 29. — British Admiralty announces the sinking of three British destroyers.

1918

Jan. 7. — Mutiny among the German sailors at Kiel naval base.

“ 9. — British destroyer Raccoon strikes a rock off the coast of Ireland and goes down with her crew of 105.

“ 12. — Two British torpedo boat destroyers on Scottish coast lost with all on board but one.

“ 20. — The ex-German cruiser Breslau sunk, and the Goeben damaged off Imbros.

Feb. 5. — American steamer Alamance torpedoed, six of

crew lost.

“ 6. — Tuscania, American transport, torpedoed off

the coast of Ireland, 101 lives lost.

April 1 4. — Announcement of probable sinking of the United States collier Cyclops. This vessel’s fate remains one of the greatest mysteries of the war.

“ 22. — British carry out naval raids at Zeebrugge

and Ostend. They blocked the entrance to the Bruges Canal by sinking vessels filled with concrete. The Ostend Harbor was blocked.

May 9. — A second raid upon Ostend was carried out

by British naval forces. The old Vindictive was filled with concrete and sunk partly .athwart the ship channel.

“ 31. — United States transport President Lincoln sunk;

four officers and 22 men lost.

June 2. — The schooner Edward H. Cole sunk by a sub¬

marine off the New Jersey coast.

July 7. — British naval air forces bombard Constanti¬

nople.

“ 11. — United States steamship W estover sunk by a

submarine.

“ 19. — American cruiser San Diego sunk off Fire

Island.

“ 21 . — German submarine sinks three barges off Cape

Cod.

Aug. 7. — Mutiny of German sailors reported from

W ilhelmshaven .

Nov. 7. — German naval crews revolt at Kiel and Ham¬

burg. The German navy passes into the control of revolutionaries.

“ 21. — German fleet surrenders to the British.

1919

June 2 1 . — German crews sink most of the German fleet at Scapa Flow.

7. COLONIAL CAMPAIGNS.

1914

Aug. 23. — Tsing-tau bombarded by the Japanese.

“ 26. — Allies conquer Togoland.

“ 29. — Samoa captured by New Zealand forces.

Sept. 11. — Australian expedition captures New Guinea and the Bismarck Archipelago Protectorate.

“ 27. — German Southwest Africa invaded by General

Botha.

Oct. 28. — De Wet’s Rebellion in South Africa.

Nov. 5. — Cyprus annexed by Great Britain.

“ 7. — Tsing-tau falls to the Japanese.

“ 21. — Basra, on Persian Gulf, occupied by British.

Dec. 8. — De Wet’s Rebellion suppressed.

* 17. — Egypt proclaimed a British Protectorate, and

a new ruler appointed with the title of ‘ Sultan.

1915

Great Britain.

April 26. Allied troops land on the Peninsula of Gallipoli,

May 12. — Union of South Africa troops under Botha.

occupy Windhuk, capital of German South¬ west Africa.

June 3. — Amara, on Tigris, captured by British.

July 15. — Conquest of German Southwest Africa completed.

Dec. 1. — General Townshend, forced to retreat from

Ctesiphon, retires to Kut-el-Amara.

“ 19.— British forces withdrawn from Anzac and

Suvla Bay.

1916

April

ti

May

June

%ept.

Dec.

8. — Evacuation of Gallipoli completed.

18. — Kameroon conquered.

24. — Rebellion in Ireland.

29. — General Townshend surrenders to the Turks at Kut-el-Amara.

2. — Irish rebellion suppressed.

21. — Grand sherif of Mecca takes Mecca, Jeddah and Taif.

4. — Dar-es-Salam, German East Africa, sur¬ rendered to the British.

21. — British occupy El Arish, Sinai Peninsula.

1917

Feb. 24. — British capture Kut-el-Amara.

March 11. — Bagdad captured by the British.

April 23. — British occupy Samarra station, north of Bagdad.

June 29. — General Allenby takes command of the British forces in Palestine.

Sept. 28. — British rout Turks at Ramadie on the Euphrates.

Oct. 31. — British take Beersheba.

Nov. 7. — British take Gaza.

“ 17. — Turks evacuate Jaffa, which is thereupon

occupied by the British.

“ 18. — Sir Stanley Maude dies in Mesopotamia.

“ 24. — General Marshall takes command of British

forces in Mesopotamia. ‘

Dec. 1. — German East Africa conquered.

“ 9. — British take Jerusalem.

Reigning Sovereign: George V, King and Emperor.

H. H. Asquith.

D. Lloyd George. Viscount Haldane.

Sir Edward Grey.

Earl Kitchener.

Winston Churchill.

Earl Curzon.

Marquis of Lansdowne. A. Bonar Law.

Austen Chamberlain. Arthur J. Balfour. Lord Robert Cecil.

Earl of Selborne.

Sir F. E. Smith. Arthur Henderson.

G. N. Barnes.

J. C. Smuts.

Viscount Milner.

Sir Eric C. Geddes.

Lord Rhonnda.

Sir Auckland C. Geddes. Sir Edward Goschen.

Lord Northcliffe.

Lord Cunliffe.

Lord Reading.

Louis Botha.

Sir Robert Borden.

John Redmond.

Premier Hughes of Aus¬ tralia.

Premier Massey of New Zealand.

France.

President: Raymond Poincare.

Georges Clemenceau. M. Viviani. Alex)andre Ribot. Leon Bourgeois. Theophile Delcasse. General Maunoury. Alexandre Millerand. Aristide Briand.

Jules Guesde.

M. Emile Combes. General Gallieni. M. Painleve. Albert Thomas. Stephen Pichon. M. Klotz.

Italy.

Reigning King: Vittorio Emanuele III.

Antonio Salandra. Vittorio E. Orlando.

Antonino San Giuliano. Nitti.

Sidney C. Sonnino. Gabriel D'Annunzio.

\

Russia.

Reigning Emperor: 1914— 17 Nicholas II, Emperor of all the Russias.

S. D. Sazonoff. ^^ice-Admiral Grigorovich.

General Sukhomlinoff. Stiirmer.

1918

Feb. 20. — British occupy Khan Abu Rayot, 14 miles

north of Ramadie.

" 21. — British take Jericho.

March 9. — British occupy Hit, on the Euphrates.

April 5. — Japanese and British marines land in Vladi¬

vostok.

" 27. — Kifri, north of Bagdad, captured by the

British.

June 14. — Turks occupy Tabriz, Persia.

Sept. 19. — Allenby breaks Turk line in Palestine between Rafat and the sea. . J

" 22. — Allenby advances beyond Nazareth.

" 23. — Acre and Es Salt, Palestine, taken by British

forces.

* 26. — Amman, Palestine, occupied by the British.

Oct. 1. — Damascus falls to British.

“ 22. — Turks evacuate Tabriz.

“ 26. — Aleppo occupied by the British.

“ 30. — Turk forces on Tigris surrender.

“ 30. — Armistice granted to Turkey.

Nov. 25. — Surrender of last remnant of the German forces in East Africa.

Belgium.

Reigning King: Albert.

Ch. de Brogueville. M. J. Diavignon.

H. Carton de Wiart. M. A. Hubert.

A. van de Vyvere. P. Segers.

M. Vandervelde. Cardinal Mercier.

Portugal.

President of the Republic: Dr. Manoel Arriaga. Bernardino Machado.

On 27 May 1915 Arriagla resigned the Presidency land on the 29th Theophilo Braga was elected Provisional President.

On 6 Aug. 1915 (Machado was elected President of the Republic.

Serbia.

Reigning King: Peter I.

N. P. Pashitch. D. Stephanovitch.

8. RULERS, PRESIDENTS AND PRIN¬ CIPAL STATESMEN OF THE BELLIG¬ ERENT COUNTRIES DURING THE WAR.

United States.

President: Woodrow Wilson.

Montenegro.

Reigning Sovereign: Nicholas I.

E. Popovitch.

Greece.

Reigning Sovereign; Konstantinos, succeeded 12 June 1917 by Alexandros (died 1920).

William Jennings Bryan. Robert Lansing.

William Gibbs McAdoo. Carter Glass.

Newton Diehl Baker. ThomJas Watt Gregory.

A. Mitchell Palmer. Albert Sidney Burleson. Josephus Daniels.

Edward M. House.

James W. Gerard.

Walter Hines Page. David R. Francis. M. T. Herrick. William G. Sharp. Theodore Roosevelt. Elihu Root.

William H. Taft. Herbert Hoover. Henry C. Lodge. Thomas S. Martin.

Eleutherios K. Venizelos.

Japan.

Reigning Sovereign: Yoshihito.

Count Okuma. Baron Kato. General Oka. ˆ • Admiral Yashiro. Viscount Oura.

M. Ozaki. Ichiki. Taketomi. Baron Ishii.

WAR, EUROPEAN — FIGHTING STRENGTH OF THE NATIONS (4)

Germany.

Reigning Emperor and King: William II.

Crown Prince Frederick William.

Dr. von Bethmann-Hollweg. Herr von Jagow.

Herr Delbriick.

Dr. Karl Helfferich. Admiral von Tirpitz. Admiral von Capelle.

Herr Dr. Lisco.

Herr Kuhn.

Friederich von Pourtales. Herr Dr. Solf.

President Herr Haven-stein.

Dr. Michaelis.

Count von Hertling.

Prince Max of Baden. Maximilian Harden.

Count von Reventlow. Matthias Erzberger.

Count Brockdorff-Rantzlau. Johann von Bernstorff. Prince Lichnowsky.

Dr. von Kuehlmann.

Austria-Hungary.

Reigning Sovereign: Franz Josef I, Emperor of Austria and King of Hungary, succeeded Decem¬ ber 1916 by Emperor Karl.

Count Leopold Berchtold. Stephen Baron Burian. Count Stephen Tisza. Dr. Karl Renner.

Bulgaria.

Reigning King: Ferdinand.

M. Radoslavoff. M. Blakoff.

Tonchefif. Christo Popoff.

M. Pecheff.

Rumania:*

Reigning King: Carol I, succeeded ii Oct. 1914 by Ferdinand I.

T. Majoresco. A. Constantinesco.

T. C. Bratianu. N. G. Cantacuzene.

A. Marghiloman. A. Radonici.

Take Jonescu.

Turkey.

Reigning Sultan: Mohammed V, succeeded 3 July 1918 by Mohammed VI.

Prince Said Halim Pasha. Enver Pasha.

Ibrahim Bey. Jemal Pasha.

Halil Bey. Talaat Bey.

4. FIGHTING STRENGTH OF THE NATIONS. Manpower. — The peace armies of the seven great powers before the opening of the Great War in 1914 totaled less than 4,500,000, or about 12>ˆ per cent of those finally engaged. If to these be added the trained re¬ serves, then the available armies figure over 18,000,000, or nearly one-third of the final total of combatants and about that numberˆ were enrolled early in 1915. The best estimates obtainable are placed below.

The Armies of

1914.

Standing army

Trained

reserves

Untrained

reserves

Austria .

472,716

800,000

(182, 000 English (316,000 Colonial

(750,000

1 116,000 Colonial

1,284,000

251,000

130,000

1 ,347,284

2,700,000

Germany .

3.200,000

3.000,000

Great Britain. .

France .

} 477,000

} 3,151.000

4,687,000

1.000,000

70,000

3,500,000

1,622,000

Russia .

6,000,000

Italy .

1,350,000

U nited States . .

Totals ….

4,301,716

13,932.284

18,172,000

If to these we add 117,000 for Belgium’s brave little army, 500,000 for Rumania and Ser¬ bia, and 500,000 for the smaller nations that

came in later, we have a grand total of 5,500,000 for the armies before the war, on a peace foot¬ ing. This total is an under-statement of the forces ready to fight because Germany had pre¬ pared, and so had Austria-Hungary, and Russia was mobilizing very fast, so that these three very probably had another 5,500,000 under arms. France was not generally credited at that time

with the totals here given, and she had prob¬ ably not a fourth of them immediately avail¬ able at the time of Germany's declaration of war, but they were in the service, and brought to duty with remarkable celerity. In supplies of ammunition, the armies of the Central Powers were far the best equipped, and it was this superiority that enabled the Centra! Powers to take and hold the lead in the war for three years. Germany's trained reserves were actually in her army at the time of the Declaration of War, and by the time fighting was really begun she had 4,500,000 men in the ranks. Rus¬ sia did the same thing, and within two months had as many or more troops than Germany; but they were not as well positioned or as well commanded, and hence not nearly as effective. And further, the supplies of ammunition be¬ hind them were inferior. By 1 Jan. 1915, France* had 4,800,000 men enrolled, and Great Britain about 500,000. Austria's total at the same period was over 2,000,000, so that 1915 opened with 11,000,000 men in the field for the Allies and about 8,000,000 for the Central Powers. Most of these were raised by conscription, though Great Britain adhered to the volunteer system for many months, and there were also many volunteers in the French and Belgian armies. The development of the armies in the leading nations is here summarized.

France. — Starting with 19 army corps and 800,000 mˆn, France rapidly enrolled her re¬ serves and undertook intensive training of more men, raising her total to 5,000,000 within six months. The new recruits were arranged in four classes, and taken in as they were ready, and the army strength at its greatest was 6,300,000. More were enrolled, but the losses prevented the number from increasing.

Great Britain. — England's land forces at the outset were trifling, less than 200,000 being immediately available. By the fall of 1915 she was able to place in France 1,000,000 men, but it was not until the summer of 1917 that she had 2,000,000 men in the fighting area. There was severe criticism of the slowness, and a new Mili¬ tary Service Act was passed early in 1916, which provided for systematic conscription and de¬ velopment of the army. In January 1918, the

total of British and colonial troops was raised to 7,500,‘000, .of which England contributed 60 per cent, Scotland 8 per cent, Wales 3.7 per cent, Ireland 2.3 per cent, while the other 26 per cent was divided between Canada, India, Aus¬ tralia, *etc.*

Italy. — Having had time to prepare, Italy came into the war with her standing army of 515,000, plus 245,000 mobile militia and 340,000 territorial militia. There was rapid develop¬ ment and training, so that by the autumn of 1917 the Italian army totaled 3,500,000. This was gradually increased to 5,500,000, her great¬ est total. In the last year of the war her losses were enormous, the wounded, dead, missing, and prisoners depriving her of over 2,000,000, so that at the time of the armistice she had but 2,800,000 under arms.

Russia. — The vast population of Russia was thoroughly militarized in the years preceding the war, and it is claimed that 13,000,000 men were more or less trained. At least 5,000,000 were available at the outbreak, and early in 1917 it is stated that almost 11,500,000 were credited to the army. This number was steadily reduced,

the losses in both East Prussia and on the Austrian front being enormous, and probably not more than 5,000,000 were under arms at the time of the Russian debacle.

Belgium. — Brave little Belgium, which bore the first onslaught alone, started the war with 117,000 troops, increased to 137,000 by volunteers within two months, and was gradually swelled thereafter to 180,000 in the autumn of 1917, and 267,000 at the close of the war.

Serbia. — No country suffered more than un¬ happy Serbia. Starting with a few hundred thousand troops, she was so beset that soon one-fourth of her population was mobilized, and over 700,000 men put in the field. This meant practically all the active men of the nation. In the first two years there were 171,000 battle deaths in this little army, and at the close only 150,000 men remained to return to rehabilitate their devastated territory.

Greece. — The Greeks had 230,000 men in their army at the date in 1917 when they en¬ tered the war, and about many at the close, their

losses being 87,000.

Portugal and Japan. — Portugal mobilized 750,000 men and Japan had a standing army of 800,000, but neither of these saw much service.

Turkey. — Before the war Turkey had com¬ pulsory military service, and an army of over 100,000. She first mobilized about 210,000, and later her war strength was brought up to 750,000, with 150,000 more in training. The casualties were severe, totaling about 400,000, and about 60,000 deserters added brought down the army at the close to about 400,000 men.

Rumania. — By means of conscription Ru¬ mania came into the war with about 290,000 troops, who were reorganized under French direction and increased to about 400,000 at the highest total.

Bulgaria. — The 36 regiments of Bulgaria presented a war strength of 280,000, increased from about 60,000 on a peace footing. ˆ

United States. — Entering the war in April 1917, with only 200,000 troops, _ the United States by volunteers and by selective draft had over 4,000,000 men in the service when the armistice was signed. Over 2,000,000 troops were on the fighting ground within 18 months, and their efficiency, and the well-known fact that they were continuing to come in, trained and fresh, at the rate of 70,000 a week, had much to do with the Germans' sudden decision to give up the struggle.

Germany. — The following table affords a clear idea of the German forces, and the time and manner of their increase :

German Armies.

1914, August .

Additions .

Class 1914 .

1915, Landsturm .

Class 1915 .

More Landsturm .

Class 1916. .

Wounded returned .

1916, Wounded returned .

Landsturm, second .

Class 1917 .

Wounded returned .

Class 1918 .

1917, Wounded returned .

Class 1919 .

Wounded returned .

1918, Class 1920 .

4,500,000

800,000

450,000

1,100,000

450,000

150,000

450,000

300,000

200,000

450,000

450,000

300,000

450,000

150,000

450,000

100,000

250,000

Austria-Hungary. — Germany's ally had nearly 3,000,000 men in the field before the war was six months old. She trained and mobilized men steadily until near the end, enrolling a total of 6,500,000. Her losses were so stupen¬ dous that she was credited with only 1,500,000 at the close.

The grand total of men enrolled in the various armies is shown under the subheading War Casualties, being over 56,000,000, of whom 7,553,600 were slain, 16,937,000 wounded and 6,729,000 missing or prisoners. Making allowance for the wounded who returned to fight, there were about 30,000,000 under arms at the close, as against 19,000,000 at the begin¬ ning of 1915.

Armaments of the Belligerents. — The

Great War was fought mainly with established types of weapons and arms, machine guns and rifles, field pieces, howitzers, etc., doing most of the work of throwing deadly metal and explosives. The difference as compared with earlier wars lay largely in the methods of attack and defense, and the vastly increased amount of powder and explosives employed. The air¬ craft added a scouting feature which did away with the value and importance of cavalry, that figured so prominently in earlier conflicts. The anti-aircraft gun was the one novel firearm used to any degree. The use of bursting shells instead of solid shot was inaugurated at the outset by the Germans, and proved so effective that the large howitzers were developed as fast as possible. The tank was the first suc¬ cessful radical fighting machine introduced on the Allied side, and did much to offset the advantages won earlier by* the Germans from the illicit use of gas. These weapons and mech¬ anisms are all described elsewhere, but it is desired to record here the numbers and use made of them in the war.

The production of artillery by the three leading* nations among the Allies is a fair guide for the artillery employed, since the amount of manufactured and unused artillery at the close would about offset the amount avail¬ able at the outset by France and Belgium. This

production, up to the close of the fighting, was 57,000 gunbodies and complete artillery units ; and 6,500,000 machine guns and machine rifles and ordinary rifles. The details follow of the three nations' production during the war:

Gun-body production during the war:

Great Britain . 11,852

France . 19,492

United States . 4,275

Total . 35,619

Complete artillery units:

Great Britain . 8,065

France . 11, 056

United States . 2,005

Total . 21,126

Artillery ammunition, unfilled rounds:

Great Britain . 138,357,000

France . 156,170,000

United States . 38,623,000

Total . 333,150,000

Artillery ammunition, complete rounds:

Great Britain . 121,739,000

France . 149,827,000

U nited States . 17,260, 000

288,826,000

Total enrolment

11,000,000

Total

While the United States figures are very much lower than those of the other Allies, it should be remarked that, at the time of the armistice, the United States had caught up, and was producing as many shells and explosives as either of. her Allies.

Machine guns and machine rifles:

Great Britain . 181,404

France . 229,238

United States . 181,662

Total . 592,304

Ordinary rifles:

Great Britain . 1,971,764

France . 1,416,056

United States . 2,506,742

Total . 5,894,562

Rounds of rifle and machine ammunition:

Great Britain . 3,486,127, 000

France . 2,983,675,000

United States . 2,879,148, 000

Total . 9,348,950,000

Smokeless powder: Pounds

Great Britain . , . . 294 , 290 , 000

France . 343,950.000

United Sates . 632,504,000

Total . 1.270.744,000

High explosives:

Great Britain . 771,122,000

France . 701,438, 000

U nited States . 329,762, 000

Total . 1,802.322,000

The United States production of armament, etc., also included 1,975,000 helmets, 666,000 pistols and revolvers, 1,895 tractors, 366 tanks, 1,547 locomotives, 20,023 railway cars, 37,607 motor trucks and 6,981 ambulances.

The total of ordnance delivered to the Ameri¬ can Expeditionary Forces from the home country and the Allies was

75 mm. guns . 2,031

4.7 in. guns.ˆ . 64

155 mm. howitzers . 747

5 in. seacoast guns . 26

6 in. seacoast guns . 72

155 mm. guns . 242

8 in. howitzers . 237

9. 2 in. howitzers . 37

75 mm. anti-aircraft guns . 78

14 mm. magazine guns . 8

Other guns . 3

Total artillery . 3 , 545

The German infantry used the Mauser maga-2ine rifle mostly, and Austria and Turkey em¬ ployed the Mannlicher. The Germans used both light and heavy howitzers, introducing the larg¬ est known, with great distance capacity. The Austro-Hungarians used a field howitzer of 1,000 pounds, throwing a 30-pound shell, and a much lighter mountain howitzer, throwing a shell of 10.6 pounds. France employed the Lebel magazine rifle, and howitzer batteries of four and 6.2 inches. England manufactured the Lee-Enfield rifle ; their regular army had field pieces throwing 13-pound and 18-pound shells, and howitzers of 40-pound and 60-pound ca¬ pacity. All these weapons are described under other headings in this Encyclopedia.

Charles H. Cochrane, Editorial Staff of the Americana.

5. MILITARY OPERATIONS ON THE WESTERN FRONT. 1. General Strategy and Numbers. — Viewed as a whole the World War ended as it began, in an attempt to take Paris. That was in accordance with the Ger¬ man war plan, made many years before and taken out of the general staff's pigeon-holes in 1914. The plan failed to work as expected and four years of bitter fighting followed. Early in 1918 Russia had been worn down to surrender and Germany threw herself on her exhausted enemies of the western front to overwhelm them. She herself was tired almost to the point of collapse, but she had made a magnificent fight, won many local victories, and her spirits were high. Another thrust and victory ! She made it as she made the first, pushing again down to the Marne. She failed as she first failed, in nearly the same place, and in the same kind of a blow on the right flank of the great German salient. Her second defeat was inflicted by the same man; for it was Foch who gave the decisive blow at the first battle of the Marne, and it was he who won the victory of 1918. Between the first and second battles of the Marne were fought many fierce battles in the West, and they had their places in the final victory. The losses entailed on the Germans broke their recuperat¬ ing power and made it impossible to withstand the Entente Allies and the

United States in 1918. The history of the operations on the western front is the history of these two great battles and of the four years of thrust and counter¬ thrust that came in betvvˆeen.

In the beginning Germany was better pre¬ pared for war than any of her opponents. Her system of military training was believed to be as nearly perfect as human skill could make it. The general staff was excellent, the large num¬ ber of minor officers were well trained and spirited, the private soldiers were obedient and attached to their officers for the most part. The whole army had confidence in itself and was inspired by traditions of German military glory. For many years the whole nation had lived for the day that was now on them. Hardly a soldier in the army but knew that there were to be strong thrusts at France first and then at Russia, and they all believed that the war would be won quickly. Besides these considerations the army was abundantly furnished with mu¬ nitions and supplies. Close students of mili¬ tary science had observed that the machine gun was a wonderful new instrument of defense and the army was well supplied with it. They also knew that Belgium and France were count¬ ing on the protection of their barrier fortresses, and for taking the forts they had developed great howitzers, they and their allies the Aus¬ trians, which fired from a safe distance would destroy any fort in Europe. They had accumu¬ lated, also, a vast supply of high explosive shells. They had developed tractors for moving heavy guns which hitherto had been thought immov¬ able. They had prepared a vast number of motor trucks for moving troops quickly on the excellent roads of Belgium and France. In aviation they had miscalculated. The Zeppelin was to prove a failure against the airplane, but their opponents had not come thoroughly to appreciate the military value of airplanes. The Germans were the best prepared of the bellig¬ erents, and they had chosen the time and place for opening the war.

The French army was well trained and there was an excellent general staff. The spirit of the rank and file was as good as the spirit of the Germans. If one had confidence in victory, the other had the memory of 1870 to wipe out. The Frenchman fought for his country's existence. If the German won, the fate of France was sealed. In munitions the French were at a disadvantage with the Ger¬ mans.

They were well supplied with an excel¬ lent light field gun, the celebrated 75 mm., and had a sufficient quantity; but they were lacking in heavy guns and in high explosives. The British, whose interest in defense had centred chiefly in their navy, had a small army well equipped in the manner that was considered proper before the war between China and Japan. Like the French they were poorly supplied with machine guns and high explosives. So far as equipment was concerned, the German and Aus¬ trian armies at the beginning of the war had an advantage over the armies of their opponents.

As to numbers of trained soldiers who could be assembled quickly, Germany and Austria had a similar advantage. In the German first line were 1,500,000 men, with a second line of an additional 1,000,000. Behind these were reserves amounting to 4,500,000, giving her a total strength of 7,000,000. It is believed that she threw into France and Belgium by the middle of October considerably more than 2,000,000 men. Austria's first-line army contained about 1,000,- 000 men increased by 1,500,000 by the middle of October. In all she was able to raise about 4,000,000 men. Her troops, however, were of various nationalities and some of them were not to be trusted in fighting against Serbians and Russians.

On the side of the Entente the strongest mili¬ tary power was France. She had about 1,500,000 men in the first line and 500,000 in the second line with 2,000,000 in reserve. Most of her first line troops had seen actual service in Africa, which proved of great value in the first months of the Great War. The regular army of Russia numbered about 1,000,000 with at least 3,000,000 in reserve. She could, of course, call up a vastly larger number from her un¬ trained population, but she did not have the equipment for them, nor could she expect to import it in sufficient quantities after Germany closed the Baltic, which the German fleet would undoubtedly do as soon as war was declared. The only other avenues of importation into Rus¬ sia were by the Black Sea, which Turkey might interrupt ; through Bulgaria, which would be closed if Bulgaria joined Germany in the war; through Archangel, connected with the interior by a single track railroad ; and by way of Vlad¬ ivostok, whose long distance from the seat of war made it but a slender reliance. As for Great Britain, her regular army numbered 250,- 000 well-trained men. She had, also, nearly 700,000 militia in various stages of training. By the middle of October she had 150,000 men in the fighting area in France. The Belgian army numbered 263,000 on paper, but half of them were needed to man the forts, which were the country's main reliance for defense, and the remainder were not in a good state of training. Serbia had an army of 250,000 men, with as many more who could be called into the field. Her hardy

population furnished superior sol¬ diers, as their conduct in the Balkan War had

shown. She had an excellent general staff, but her weakness lay in her lack of artillery and other equipment.

Germany's grand plan of operations, often discussed before the war began, was to over¬ whelm France in a sudden and furious attack; and she thought her superior strength would make this an easy task. She considered Russia a slight menace for some months after the campaigns opened, because of the expected slowness of Russian mobilization. She thought that 250,000 men placed along the East Prussian and Polish frontier would hold back any army Russia could send against her territory for several weeks after the war began. She as¬ signed to Austria the duty of attacking Russia from Galicia, believing that such an attack would keep the tsar busy until the work was dene in France. This plan came to its defeat at the battle of the Marne.

In the long series of trench engagements that followed in France and Belgium two factors come prominently into view. France had to throw in her fighting force as freely as a sense of necessary economy of man power permitted, while Great Britain strained her energy to raise and train armies to take over a due pro¬ portion of the battleline. Both nations had to set to work in the most industrious manner to manufacture cannon, machine guns and air¬ craft to make up for the deficiency with which they began the war. There were many months during which their troops held trenches without adequate weapons of defense, exposing their un¬ protected bodies in the most heroic manner while the industries of France and Great Britain worked day and night to produce the vast stores of munitions that were needed. In meeting this emergency they were aided by the British com¬ mand of the sea, which allowed the allies to buy freely in neutral countries. It had long been an accepted principle of international law that neutrals could sell supplies to a belligerent, pro¬ vided the same facilities were extended to all parties to the war. To have reversed this rule during the war would have been an act favor¬ able to Germany, and the Entente would have been justified in pronouncing it a violation of neutrality.

Following her grand plan, therefore, Ger¬ many concentrated her armies against France until her forces exceeded those of her opponents in that region as seven exceeds four. Her superiority in heavy cannon

and other weapons, as well as in rapid means of transport, was ever greater. Her supreme command thought that her success was assured.

France had made preparations for invasion on her eastern frontier. A series of strong forts, according to prevailing ideas of military science, had been erected from the Swiss border to Longwy, at the southern bounds of Belgium. It comprised the fortresses of Belfort, Epinal, Toul, Verdun and Longwy, with many outlying forts and battery positions. A fortress, in the sense here used, is a strong central position with outlying forts at a distance of from four to eight miles, so placed that their guns can cover most of the intervals between the forts themselves. In these intervals trenches were constructed to be held against infantry attacks. The forts were generally made of strong con¬ crete walls and contained cannon whose range was about six miles. Between the great for-

tresses along this line, 150 miles long, were many smaller forts and well-defended ridges, so that the French had a right to feel that their eastern border was well defended.

But north of Longwy the line of defense was weaker. Here began the border of Bel¬ gium, which France had long believed would protect her against Germany. It is true that there were many indications that Germany would not respect Belgian territory nor the neutrality of Luxemburg, the southwest corner of which touched France on a border of 15 miles, just east of Longwy. She expected that fortress to give her security in this quarter, if Germany, violating international law, massed troops in that neutral duchy. As to Belgium, it was believed that its people would resist a German attack until the French could send help, but if that failed there was a fortified line just southwest of the Belgian frontier in which were the fortified towns of Lille, Maubeuge and Mezieres, the second being very strong. The line connected with the Longwy area along the high ground northeast, of the Meuse, but west of Lille it was in the air. It was not a strong line, but the French thought it would derive additional strength by the support of the Belgian fortresses of Liege and Namur.

In considering possible lines of defense the French High Command

had to choose between looking for the enemy either along the eastern border or through Belgium. They considered the former the more probable, and their beˆt efforts of defense were spent there. Probably for this reason the Germans chose the latter as the surest way to finish France in a quick blow ; for they could never hope to penetrate the eastern line of fortresses in the six weeks during which they expected to crush their west¬ ern foe.

Now the Belgian area of operations is like this : Draw a straight line on the map from Longwy to the Dutch border on the north and the distance is 90 miles. For the first 70 miles from Longwy the line crosses two broken, forest-clad and rather thinly populated regions, the southern Ardennes and the wooded valley of the Meuse, the northern border of the latter being the Meuse River from Namur to Liege, where it turns northward to the Dutch border by way of Maestricht. This wooded region is not favorable for manoeuvring large armies, although the Germans proved that it was pos¬ sible to send them through its roads in order to concentrate heavy forces in the region be¬ yond. North of this wooded region lies the Belgian plain, thickly populated in 1914 and devoted to many kinds of industry in which lived a body of skilled workers. North of the Meuse Valley this plain runs in a narrow neck, 20 miles wide, as far east as the German borffer near Aix-la-Chapelle. It is crossed by the Meuse north of Liege, and the river, if well fortified, would make a good line of defense. The Belgians, however, had done much to de¬ fend Liege, but they did nothing to hold the river bank. Thus it was possible for an in¬ vading army that was in superior force to cross the river out of reach of the guns of Liege, sweep around the town, and take it by siege operations. The Germans, when they had de¬ cided to attack through Belgium, proposed to enter Belgium through this gateway, mass their

troops in the plain, sweep around to the west of Namur until the place was either taken or masked, and then pour down past Lille, Peronne and Amiens to the vicinity of Paris. If the French tried to hold Maubeuge, or the country south of it, the superior German army would encircle them from the west and repeat the tactics by which great French armies were captured in 1870 at Sedan and Metz.

The plan of the French High Command was as follows : It would concentrate the best troops on the eastern front. If the Germans met them there great battles on equal footing would follow. The French wanted nothing better than to meet the foe as equals. If, how¬ ever, the Germans came through Belgium they would be checked by the

Belgians, who, rein¬ forced by troops from France, would hold back the German advance at Liege, Namur and Maubeuge, while the mairi French forces would break through the German defenses into Alsace and Lorraine, seize the Rhine and produce con¬ sternation in Germany itself. We shall see what befell this plan.

2. Serbia Leads the Fighting.-— Serbia was the incidental cause of the war which Germanic and Slavic rivalries brought on. The Austrian ultimatum of 23 July 1914, if accepted, implied the subordination of Serbia to the plans of the Teutonic empires. It also meant the defeat of Russian prestige, already badly damaged when Austria established definite sovereignty over Bosnia in 1908. Serbia chastised and humili¬ ated, the idea that Russia was the protector of the Slavic Balkans would vanish into air. Russia was thus bound by her best inter¬ ests to help Serbia; and Serbia, if she did not mean to live the rest of her days as a crouch¬ ing figure at the feet of Austria, awaiting the fate of Bosnia-Herzegovina, must now stiffen her back before the big bully. She showed her¬ self willing to stiffen it ; for bravery was one of the cardinal virtues of her people, who in other respects had many shortcomings. Through her borders was seen the spirit of grim deter¬ mination to meet the crisis of her history in the manliest way. The suppressed Slavs of Austria, whose resentment of Hapsburg rule had brought on the dark deed at Sarejevo, thrilled, also, at the thought of helping Serbia against the tyrant who had wronged them.

It was 28 July when Austria-Hungary de¬ clared war on Serbia. She probably had plans for a quick invasion of the country; but the rapid mobilization of Russia on the Austrian border made it unwise to attempt to put them into operation at the moment. She contented herself with establishing a protecting force along the border, waiting for a good oppor¬ tunity to humble the Serbians. But her gal¬ lant foes were not disposed to allow her to take her own time. They forced the fighting at once, being too wise to allow the opportunity to pass unused when their enemy was fully engaged in other quarters.

The kingdom of Serbia was divided from Austria-Hungary by three rivers : the Danube on the north from the Rumanian border to Belgrade, the Save on the north also, from the northwestern corner of the kingdom to Bel¬ grade, where the Save unites with the Danube, and the Drina on the west from near the boundary of Montenegro to its junction with

the Save at Racha. The capital, Belgrade, was so exposed to the enemy that it was not de¬ fended seriously, the government being moved to Nisch soon after war was declared. The Serbian High Command had determined that the first thing to be done was to drive back the Austrian forces in Bosnia-Herzegovina and give the Slavic inhabitants an opportun¬ ity to join the armies fighting against their oppressors. Serbia's policy was to hold the northern frontier, protected by the Danube and Save rivers, with as few soldiers as were needed there and to concentrate the remainder of her armies on the Drina, crossing it, if possible, in order to liberate the Bosnians. She had no fear of trouble on her western front, where Montenegro, Slavic in spirit, was ready to de¬ clare war against Austria, and did declare it on 7 August. On the east was her old enemy, Bulgaria, built up in recent years as a Teutonic friend and soon to be an open ally. If Bul¬ garia kept out of the war, Serbia, with the support of gallant little Montenegro and the friendly neutrality of Greece, would probably be able to defend her country, so full of mountain passes, from general invasion. The weakness of her situation was found in two circum¬ stances: (1) A campaign in Bosnia, if succˆ cessful, could hardly be maintained by so weak a state as Serbia. The Slavs there might well hesitate, therefore, to rise against Austria until it was evident that Russia had weakened her very materially in operations in other fields ; (2) Bulgaria was a menace. Filled with hatred for the conduct of Serbia in the Balkan wars, emboldened by the idea that she was to become the Germany of the Balkans, she was ready to swoop on her ancient enemy when the time of crisis left that enemy in no state of security.

In the first days of the war Austria as¬ sembled two armies near Belgrade, one to the east and one to the west. They both tried to cross the rivers into Serbian territory but were driven back by the Serbs with severe losses. Then the scene of combat shifted to the Drina at a point opposite the Bosnian capital, Serajevo, where the Serbs hoped to initiate their campaign in Bosnia. Here a combined Serbian and Montenegrin force crossed the border and won initial successes; but it was impossible to continue the campaign on account of a counter movement which the Austrians made on the Save, 40 miles west of Belgrade. Protected by a severe bombardment they threw a heavy col¬ umn across the river at Shabatz and occupied the town on 16 August. The Serbs concen¬ trated quickly and beat the enemy in a severe battle on the 17th.

The plans of the Austrians had been cleverly' made. The northwestern corner of Serbia, between the Drina and the Save, is a peninsula whose neck is 25 miles wide. Op¬ posite Shabatz is the little river Jadar, and on the I7th its banks were occupied by 80,0(X) Austrian troops that had crossed from the Bosnian side of the Drina. This force was slightly behind the Serbs concentrated at Sha-i)atz and stood in a position to close in and surround them. The plan was defeated by the courage and alertness of the Serbian crown prince and the able staff that assisted him. Turning from the battlefield of Shabatz im¬ mediately after his victory over the first body

of Austrians, he moved on the army that was lying on each side of the Jadar on the 18th. In a four days' battle he completely routed it, driving it back across the Drina and taking a large number of prisoners and guns. By these two brilliant victories the crown prince freed his country of her invaders and gave them such a smarting blow that they could not resume the offensive at once.

The invasion of Bosnia, suspended to meet the attacks at Shabatz and the Jadar, was now resumed. Although they were handicapped by lack of materials the Serbs advanced slowly and took the Bosnian town of Vishegrad, 10 miles within the enemy's territory, on 14 Sep¬ tember. This success prompted Austria to re¬ new her efforts in the northwestern angle of Serbia. Concentrating about 100,000 men op¬ posite the little river Jadar she crossed at three places between Jania and Liubovia. The Serbs again attacked, and with their usual vigor. The first and second columns were driven back into Bosnia, but the third managed to fortify the bridgehead at Liubovia, where they remained. These operations, known as the battle of the Drina, occurred between 8 and 17 Sept. 1914.

Thus far Austria's best troops had been used against Russia in Galicia, and the operations against the Serbs had been left to troops of the second line. By the end of October the Ger¬ mans were strongly engaged against Russia, and Austria-Hungary felt that it was time to make an effort against Serbia in keeping with her strength. She thus made plans for the winter campaign which led to her disastrous defeat in the Battle of the Ridges. Her decision pleased Germany, since Turkey was just coming into the war, and that accomplished it was only necessary to crush Serbia and use a little more judicious diplomacy with Bulgaria in order to open the railroad from Berlin to Constan¬ tinople.

For delivering this blow Austria organized an army of seven corps, nearly 300,000 men. It is not thought that the Serbs were more than 200,000, and they had a slender supply of ammu¬ nition, their only means of getting it from the outside world being through Antivari, in Monte¬ negro, by pack mules over the mountain trails. Greek neutrality did not permit the open im¬ portation of munitions through Salonica.

Early in November the Austrian advance be¬ gan on a large scale. A strong column crossed the Danube at Semendria and advanced south¬ ward along the railroad that parallels the Great Morava River. If not opposed it would reach Nisch 110 miles southward. But the greater part of the invading force crossed the Drina in two columns, one near the Jadar and an¬ other opposite the head waters of the Western Morava, 70 miles to the south. Against this triple force the Serbian crown prince stood with his chief army in the hills overlooking the Jadar. But he did not dare remain here for battle, lest the first and third Austrian columns should turn his flanks and cut off his com¬ munications with Nisch. Drawing back into the hills, he took a strong position on two elevations, the Maljen and the Rudnik or Suvobor ridges, which run across central Serbia 50 miles south of Belgrade. In front of him was the central Austrian column, flushed with

the confidence its unopposed advance for 40 miles into Serbian territory gave it. To the southwest the third column stood before Ush-itza, faced by a determined Serbian force well placed in the hills.

If the Austrians had attacked promptly they might have won a victory, but they waited two weeks. They were so sure of their position that they sent away two corps to help in the defense of Cracow, threatened by the Russians. In this interval the Serbs received a much needed sup¬ ply of ammunition from the Entente Allies through Greece, by what means we have not yet been told. It gave new courage to the Serbians, who now prepared to force the battle. Their artillery was admirably placed on the hills and commanded .the Austrian lines. On 3 Decem¬ ber they delivered their attack. King Peter, old and ill, came out to the battlefield and sent his soldiers forward with a ringing proclama¬ tion. Any man who desired might go home, he said, and no

punishment would be inflicted ; ®but I and my sons,® he added, %tay here.® Not a man left the lines. During the afternoon of the 3d and throughout the 4th and part of the 5th the battle raged furiously, Serbian in¬ fantry and artillery inflicting great damage on the foe. On this third day, however, the Aus¬ trians could stand no more. They broke their lines and the Serbs rushed through, dividing them into two ˆmasses who sought to escape through the narrow passes among the hills. From the 6th to the 15th the pursuit was main¬ tained until the invaders were driven out of Serbia at all points. Belgrade, which had been occupied, was recovered, and the victors had 40,000 prisoners and many guns as the reward of their bravery. It was reported that the killed and wounded among the Austrians numbered 40,000. In this heroic way did the Serbs justify the confidence of their king and again proved themselves equal to any warriors in the world.

3. The Campaign in Belgium. — Germany ordered mobilization on 1 August. It was com¬ pleted on 12 August, three days before the proc¬ ess was achieved in France. But the Germans did not wait for complete mobilization before they moved on Belgium. On 2 August they in¬ formed the Belgian government of their inten¬ tion to attack France through Belgium. A similar notice was given to Luxemburg on the same day. Both were accompanied with the assurance that the rights of person and prop¬ erty would be respected if no opposition was offered to the German forces. Luxemburg was too small to raise objection and the Germans promptly occupied the duchy, filling it with troops destined to march on Longwy. In Brus¬ sels, on 3 August, King Albert laid the com¬ munication before the Belgian Chambers, who refused the demand and resolved to defend their country to the utmost.

On 4 August 12 regiments of German cav¬ alry crossed into Belgium and followed the road south of the Dutch border to the Meuse, occu¬ pied the town of Vise, and seized the west bank of the river, driving back a weak Belgian force that retreated to Liege. On the same day Gen¬ eral von Emmich commanding the 10th corps crossed into Belgium and approached Liege directly. It was that day also, that the Ger¬ man Chancellor, announcing to the Reichstag the presence of German troops in neutral Bel¬

gium, said: ®We are now in a state of neces¬ sity, and necessity knows no law. We were compelled to override the just protest of the Luxemburg and Belgian governments. The wron'g — I speak openly — that we are com¬ mitting we will endeavor to make good as soon as

our military goal is reached.®

On 5 August von Emmich appeared before Liege and demanded permission to pass through the town. Receiving a refusal he formed his forces in line of battle and undertook to pass through the spaces between the eastern forts. The Belgians had about 20,000 men in Liege and received the Germans so steadily that the assault was beaten off with heavy losses. Von Emmich then used his artillery, which outranged the artillery of the Belgians. Placing it at a safe distance he poured a heavy fire of high explosive shells • on the easternmost of the 12 forts defending the town. These works were supposed to be the highest achievements of the art of military defense. They were constructed of heavy concrete turrets, the walls sometimes 12 feet thick. They were conical turrets flush with the surface of the ground, with disap¬ pearing guns operated by men who lived well protected beneath the surface. At first the Germans used their ordinary heavy artillery. With their high explosives they were able to destroy the medhanism of the disappearing gun in one of the forts. This made an opening through the line of ring-forts through which attackers began to work their way, despite the spirited opposition of the infantry. Next day, the 6th, another fort was silenced, opening a still wider gap and giving the Germans an ap¬ proach to the town from the southeast. A venturesome party of hussars saw the oppor¬ tunity and galloped into Liege. They hoped to seize General Leman, the Belgian commander, but he escaped them. Two more forts were destroyed this day, and thus the whole eastern side of the town was uncovered. The Belgian infantry remained in their positions and held back the men of von Emmich's command, but they were not numerous enough to hold the lines south of the place also. By this time the attacking troops were being heavily reinforced, and General Leman withdrew from the town, lest he be surrounded and captured, drawing off in the direction of Namur, where the main Belgian army had taken position. The forts on the west and north of Liege held out sev¬ eral days longer. The last fell on the 15th, by the Belgian account, although the Germans claimed that it fell earlier. In this fort, Loncin, was General Leman, when a shell penetrated and exploded the magazine. He was found in the ruins, unconscious and near death from the fumes of the explosives and taken prisoner by the victors.

Thus the invaders were delayed at Liege until the middle of August. Through the place ran the four-track railroad from Aix-la-Chapelle into France, a main dependence of the Germans for the transportation of heavy stores. As long as the forts held! out this line could not be used by the Germans for concentration to the westward. During the interval, however, they were crossing the Meuse in large numbers,

deploying into the plain north of Liege and working along the south bank of the Meuse west of the town until on the 12th they seized

BELLEVlULE’^’

ˆ=:ˆ::ˆˆTpE

FEDEmiSˆ: BOURRUS%’

FECRO/SEˆF’ˆ

GermonFi/Ie rhiˆrZ’/i

FT. DES ft DEC

saxtelleˆ-ˆIjˆuˆˆ

•Snˆry-fa- ˆPerche > >.

oBras P/euryˆ

VFTDEDOUˆONT %.FT.DE FAUX

Pt

ˆnyP

FT

•ˆOUUIN

JiˆERDUN

‘ˆ:FT.DE BELRUPTˆ

oBs/rupf ChaMˆo?) Sous-yes-CoTei

ˆF-T:0.U ROZELUER

ˆyfl ˆT.DEˆUDA/NV/LLL & ˆ|•ˆ• Scale of Miles.

O \y/ˆux Pery’/ˆˆˆ

%rJi, jK pr-DES bARTS ˆ

‘<?5 Bas VenAo ‘ˆ‘J Oˆoirieux

F m A A c B*’

ˆFT. BE LePeAUˆ-

lˆlongueF/JJˆ — *

BEUGE // f’

ERFONTAINr

Paryn

Pau/monJ >

.re

‘ DElHAUTimm

oJ/ereˆ

\

DE

‘ˆLA/yPRECOURT.

G/yney Q ft. DE DOGNWJlˆifˆˆ ifiFTDE LOA/GCRAMfi

hies.

GRAyo UXEGNEY

PAm

Darn/euPeˆ

ˆFT. .

‘o/Eoi

SAyCHE\

PE _

PkPT DE G/RANCOUR‘

w ˆ

FFiPE. T/ERAofˆGPPˆˆˆˆ’

-tlT ‘a*

FT.DELA FO/FREAX

ˆ•FTDES ADELPPES

ˆ \

Tlk > RAZJMONT

PINAL’ˆˆtl

PT. DE LA MOUCHE

‘kiurenr u

c

oermomagnˆ

ˆtduˆlbert:ˆ.

FT.DER0PPE\ ˆa/dOi

Railroads

FTPESBABRES}

FT. PENFˆTˆ ROCHEREAU

FT.PU Mr FAUP&Sˆˆ

* ■

PencouriFprpu BP’oyt

MAIN FORTRESSES OF THE WESTERN FRONT Railroad Stations =ˆB! K=r Roads . . — — Canals

lue - … _

PT ® PonBy/ne

TLA M/OT7E F7;ˆDE=ˆˆ

■fT,LAdPliiˆˆOyCWRT:ˆ ‘ˆ‘USr/CE * fm/s N

LFORT I

hk-FT.DES Hn? PERCHES “

I. ,

ONT

VOX /ana O

‘^•FTPE FEZ EL 0/S

o

Scale of Miles

Rand McNally A Co., N. Y.

Forts ’itt*

•T*

Huy, midway between Liege and Namur. About the 15th, having completed their mobiliza¬ tion, they began to pour into Belgium in great waves, filling every road with men, artillery and supplies.

The defense of Liege was pronounced a great achievement by the Entente. Considering the weakness of the defenders and their lack of training, it was a good piece of soldiery work; but it was not as successful as the news¬ papers reported. The Germans suffered mod¬ erate losses but accomplished all they attempted. However, they did not take Liege with a coup de main, as they had expected. The resistance of General Leman was spirited. To see this * small nation which might have found refuge in timid counsels, stand to arms and oppose resolutely the overwhelming force of those who violated her sovereignty, aroused the ad¬ miration of every country that was not obsessed with the German view that might gives right. In the United States, in particular, it was re¬ ceived with enthusiastic sympathy, and found immediate expression in large contribution for the relief of the suffering Belgians.

In the general plan of Belgian defense Liege was only an advanced post. Mobilization had been completed on the 6th, and the main Bel¬ gian army under the king had taken position along the small river Geete on a line that had Namur on the right and Diest on the left. It thus covered Brussels and Antwerp, and the king hoped to hold it until help came from Great Britain or France. If enough troops could be assemhled here to hold back the in¬ vaders for a time, not only would

Belgium be protected in its richest parts but northeastern France would be saved. The French, however, refused to move a corps until moibilization was complete, that is until the 15th of the month; and the British did not arrive in sufficient num¬ bers to save their gallant allies. Looking back¬ ward, we have to admit that no allied* forces could have been thrown into Belgium in time to repel the vast numlbers that were thrown against it.

While King Albert stood before his two chief cities the advance guard of' German troops continued to enter his country. They threw out before them a screen of cavalry that ran up to the front of the Geete line and con¬ cealed the arrival of troops in eastern Belgium. This situation lasted until the middle of the month, and the Belgians began to fancy that they could retain their position until the French and British arrived. During this period the French were establishing a line along the bor¬ der, the scene of their mobilization. It ran northward and reached the Belgian boundary south of Namur. Connected with the Belgian line at that place, would it be carried on in increased strength to Antwerp? That was a question that dominated the situation in the north until the middle of October. If this line as first established could have been held the richest part of Belgium would have been saved from German fury. But to hold it the French and British must come in strength and come quickly. The thin Belgian line could not withstand the forces the Germans were assem¬ bling near Liege and along the Meuse.

On 18 August King Albert saw signs of a

strong attack on him and decided to wait no longer for the sorely needed help. He aban¬ doned his Geete line and drew off to the north¬ ward, where he tried to make a stand before Brussels. It was high time that he looked to his safety; for the armies of Generals von Kluck and von Biilow, about 500,000 men in all, were moving a;gainst his force of 100,000. As he fell back he broke his line near the southern end, leaving Namur to its fate. The Germans poured through the breach and von Biilow quickly invested the fortress, bringing up the fatal great guns which had eaten away the defenses of Liege. Von Kluck, who marched north of von Biilow, drove the Bel¬ gians out of Louvain and pressing on entered Brussels, King Albert withdrawing to the de¬ fenses of Antwerp. The king may have ex¬ pected his opponent to follow him and besiege the place or occupy the coast towns ; but von Kluck was after other game. Leaving other troops to hold back the Belgians in front of Antwerp, he swung through the

central part of the Belgian plain to the Sambre River and took his place on the right of von Biilow, who was already making sad havoc with the outlying forts at Namur. The remainder of his story belongs to the history of the campaign in France.

It only remains to tell the fate of Namur. Von Biilow brought up his great howitzers with tractors and great teams of horses and opened fire. One after another the forts fell in a bom¬ bardment that lasted little more than 24 hours. The garrison, consisting of 12,000 Belgian inˆ fantrymen and two French battalions who ar¬ rived at the last moment, held out until the 23d and barely escaped as the Germans moved into the city. They fell back to the protection of the French lines and later took their places by the side of the king when he had moved his Ant¬ werp army to the line of the Yser in the vicinity of Nieuport. Thus ended the attempt to block the German advance through Belgium. The fall of Antwerp was delayed for nearly two months, because the Germans preferred to give their efforts to their futile march into France.

It was during this early period that most of the heartless incidents occurred which shocked the world under the general description of *Belgian Outrages.^^ In the story there was, prob¬ ably, a certain amount of exaggeration, but at bottom there was undoubtedly a great deal of truth. The German is a hard master. His phrase, ^^This is war,® sums up much relentless cruelty. He arrived in Belgium with the con¬ viction that the population was truculent and ready to wage guerrilla warfare, when oppor¬ tunity offered. He decided to employ such a course of repression as would strike terror to the people. It is also true that the Belgians were bitterly incensed at their wrongs and hated their conquerors fervently. There seems to have been enough sniping by the inhabitants to de¬ mand some kind of notice by the military au-tliorities ; but good administrators would have found a more humane way of dealing with it than to seize hostages and shoot innocent men as warnings. When the Belgians found that their labor went to the support of their op¬ pressors they ceased to work. This led to at¬ tempts to make them work and finally to forced drafts of laborers, men and women, to be sent

away to German towns. Worse things than these occurred in a country where the native women were frequently left to the mercy of unrestrained soldiers.

Two incidents in this series of ‘black horrors stood out then and shocked the world. One happened at Aerschot. The story that is oftenest told has it that the German officer com¬ manding in the town was being entertained by the burgomaster. As the evening advanced the guests were e:jtcited and called for more wine. The daughter of the host brought it into the room, and one of the officers offered her the kind of insult that drunken soldiers too frequently offer to woman. The young brother of the girl resented this action, words followed, and the officer was killed. This was construed as an attack on the Germans by the inhabitants, and next morn¬ ing. the burgomaster and other prominent citizens were shot by the Germans. Then the town was delivered to the torch. Two-thirds of the houses were destroyed after they had been looted. Visitors to the place found the streets deserted, and”the ruined houses littered with furniture and clothing that had been ‘broken or scattered about in sheer wan¬ tonness. The sidewalks were slippery with spilled wine and bristled with broken bottles. Ruin and blood bathed the town testifying to the energy of the German fury.

The incident at best was a ghastly display of lawlessness. The destruction of Louvain was accompanied by every token of barbarism. The city contained many buildings of the Gothic style, survivals of the Middle Ages. It had, also, a university whose library was rich in ancient manuscripts. Its church of Saint Peter was a notable edifice and contained some famous paintings beside rare carvings. In this town on 26 August was a body of German troops com¬ manded by Major von Manteuffel, when firing occurred during the evening and several Ger¬ mans were injured. The inhabitants explained it by saying that a body of Germans that had marched against Malines, then occupied by Bel¬ gian troops, had been repulsed and thrown back on Louvain. Coming into the town in the dark¬ ness they were mistaken for Belgians and fired on by the Germans in the town, many of whom were drunk. They returned the fire and sol¬ diers were wounded in each party. This story of the origin of the trouble was confirmed by the inhabitants and published by the Belgian offi¬ cials. The Germans alleged that there was a conspiracy by the inhabitants, who fired on the soldiers. There is little question that most of the German soldiers, seeing their fellows wounded, believed this to ‘be the origin of their wounds. Major von Manteuffel made no careful investigation, took the readiest explanation that suggested itself, and ordered the town destroyed. The work was carried out systematically. Houses were

looted and fired by bands of soldiers who passed from ‘block to block. The university with its library and Saint Peter’s Church, with a large number of the handsomest old residences, were reduced to ruins. Only the city hall was left standing of all the early architectural monuments. An American news¬ paper correspondent, Mr. Arno Dosch-Fleurot, who passed through Louvain, where his train remained two hours, saw the effects of the fire

from the railroad station 24 hours after the disturbances began. He writes as follows :

“ It was not until we came in sight of Louvain that we realized the extent of the destruction. Some of us had not been able to credit it until we saw it with our own eyes. I was prepared to find one or two of the more troublesome quarters destroyed, but the first thing that caught my eye was the roofless church of St. Pierre. Across the Grand Place the Hotel de Ville still stood, but everything in between, a distance of half a mile, and everything for a mile beyond, to the farthest rampart, was burnt. All the handsomest houses in the northern end of the city were bare brick and stone walls. There were a few buildings along the ramparts to the east still standing, but these, too, were burning when our train went on two hours later. My first inclination, as the train pulled in, was tp go through the ruined town, but the train had hardly come to a stop before a soldier, drunk both from excitement and drink, shoved his head into the window and cried with an expressive gesture, ‘ Three cities razed 1 Three! There will be morel ’ ” ‘

Another soldier appeared and threatened to kill the reporter, mistaking him for an English¬ man, ‘but a third soldier pushed him aside with the remark: ®He’s drunk.® Of the final act in the tragedy the observer reports as follows :

“ About a hundred English prisoners were led across the Place de la Station and, after they had been placed in cars, a long line of citizens of Louvain were brought around in a circle under guard. I could not make out at first what the purpose of tnis was as my view was temporarily cut off by a cow that was led to the main entrance of the station. But presently a bayonet was run into the neck of the cow, and, as it fell, I could see a group of about 15 men, in civilian clothes, closely guarded. The long line of Louvain citizens was being led around them. It was difficult to make out what was going on. I asked the soldier at our window and he said carelessly, ‘ Oh, those are the

civilians who returned today to shoot us after we had burned half the town. We are going to shoot some of them.'

“ The outer line of civilians kept marching in a circle until they had all passed close to the men in the center. Then the line opened and the inner group passed out to the right. A group of soldiers followed. After an interval of only a minute or two, hardly time for absolution, we could hear the rifles of the firing squad. Evidently the careless soldier knew what he was talking about. * Hear that,' he said, as the rifles cracked. ‘ What did I tell you? ’

“ Immediately some one climbed on a gun carriage among the group of citizens standing motionless before the station entrance. I could not hear a word he said, but his expressive gestures showed he was exhorting his fellow townsmen to accept their fate and yield to the conquerors. While he talked, the butcher in the foreground skinned the cow with professional coolness, and began carving the carcass.”

Many a Belgian village and small town paid as dearly as the city of Louvain for the un¬ submissive spirit with which it took up the yoke of the conquerors. It would seem that ‘the Ger¬ man High Command at the time was so sure of winning pre-eminence in world affairs that they thought they could afford to ignore the judg¬ ment of public opinion in the world.

4. The French Border Offensive. — It has been said that the French High Command had made plans for an early quick offensive against the German frontier south of Belgium. They lost no time in putting it into effect. On 7 August, eight days before their mobilization was complete, they pushed troops into Alsace, oc¬ cupied Altkirk on the 8th, and took Miihlhausen on the 9th. France ‘burst forth into peals of rejoicing when it was announced that the ®lost provinces® were being recovered. The Germans, however, rallied on the night of ‘the 9th and recovered Miihlhausen. Then another French army, commanded by General Pau, was sent into the province, which retook Miihlhausen and oc¬ cupied a considerable portion of the slopes of the Vosges Mountains. Feeling that all was going well here the High Command then under¬ took a similar movement in Lorraine. Here a French force crossed the border on the 12th, moving steadily forward. In a week they had

penetrated the province from 15 to 20 miles and had crossed the railroad connecting Metz and Strassburg. The Germans had expected the attack and were ready to fight a defensive war¬ fare, while the main strength of their armies for the time was thrown against Belgium. The French found them strongly placed at Morhange and charged impetuously. Then be-carne apparent the new type of warfare, for which the French were not prepared. Rush¬ ing forward the lines came under the fire of the heavier type of German field gun. These pieces outranged the French 75's, which were useless against the enemy and not close enough to support their infantry. When the F'renchmen charged forward they suddenly came to strong wire entanglements. Here they were exposed to heavy fire and lost many men. Under the circumstances the 15th corps, from Marseilles, broke confusedly and carried other troops with it in disorder to the rear. The Germans delivered a counterattack, pressed back the French, and it was not until General Foch, commanding the 20th corps, had used his greatest efforts that the retirement was checked and imminent disaster averted. To save the day, the army which had won successes in Alsace was shifted to Lorraine, thus relinquish¬ ing most of the ground won there. When these two movements ended the French stood in general along the line which for 40 years had separated France from her ®lost prov¬ inces.®

The German army in this section, com¬ manded by the crown prince of Bavaria, now pressed forward, hoping to seize Nancy. It was met with great steadiness by the French under General Castelnau and failed in its effort. Three weeks later, while the battle of the Marne was being fought, it renewed the attack and was again defeated in a great battle. Thenceforth to the end of the war there was no more seri¬ ous fighting on the battleline from the Moselle to Switzerland.

A third French offensive was undertaken along the line east of the Meuse Valley and north of Verdun. Here two French armies commanded by Generals Ruffey and De Langle de Cary took the offensive, the first attacking the German crown prince in front of Longwy, and the second attacking the Duke of Wiirttemberg, near Neuf chateau. Each met the same disadvantage that their fellows encountered at Morhange. Their guns outranged, the men lost heavily before the German barbed wire and fell back from the encounter. Here again the Ger¬ mans took the offensive at once, and the French retired behind the Meuse. But they fought bravely as they went and did much damage to their foes.

The combined French offensives were thus brought to disastrous ends by the German su¬ periority of equipment. Herein was a rnost significant fact in the war. Improved machines of destruction were to be the order of the day. In no other war in history did the contest open with such decided advances in the weapons of war since the last previous struggle ; and in no other war were such improvements made in the weapons actually in use while the conflict lasted. One of the consequences was that in no other war have men been killed so freely. Never before did the actual combatant have so

little chance for his life in the presence of the enemy.

5. From the Sambre to the Marne. — We

come now to the main German offensive in France, a campaign of three weeks, extending from the time Germany completed her mobiliza¬ tion and threw her massed troops on the de¬ fensive line of the Sambre to the time she en¬ countered the smashing counterstroke of the French and British south of the Marne, that is from 20 August to 5 September. First as to commanders : At the head of the Ger¬ mans was General von Moltke, nephew of the great general of the Franco-Prussian War and chief of staff when the war began. He was esteemed a master of war according to Ger¬ man methods, and his name aroused confidence and enthusiasm in his army. Experience, how¬ ever, was to show that he relied too much on prepared formulas, that he was not keenly alive to the opportunities that presented themselves and that his influence was broken by his failure to carry out the long cherished plan success¬ fully. His failure to defeat the French at the Marne and his neglect of the opportunity to seize the Channel ports in the first weeks of the war led to his resignation on 22 Oct. 1914.

The chief of the general staff in France was General Joffre, then little known outside of army circles. To the soldiers, however, he was known for a level-headed and straightforward man, a faithful engineer officer who had done well in constructing colonial fortifications. No one who knew him disliked or distrusted him. To the soldiers he was endeared by his simple manners and his readiness to respond to every demand that the service made upon him. The first weeks of the war, when the fortunes of France seemed dark, found him cheerful and always master of himself. He had able assist¬ ants who trusted him as much as he trusted them.

The two great bodies of troops that faced each other in France were

organized in field armies of about 200,000 men each. As they stood in the last days of mobilization the Ger¬ man armies were as follows: 1. The 1st Army, under General von Kluck, made up of four army corps and a body of cavalry, about 200,000 men and stationed near Cologne. 2. The 2d Army, under General von Bulow, con¬ sisting of three corps and a large body of cavalry, stationed on the Rhine just south of Cologne, about 200,000 men. 3. The 3d Army, under the Duke of Wurttemberg con¬ sisting of four corps and a body of cavalry, stationed in the Moselle Valley in front of the Belgian Ardennes, containing more than 200,000 men. 4. The 4th Army, under the German crown prince, consisting of three corps, sta¬ tioned near Treves to the east of Luxemburg, and containing nearly 150,000 men. 5. The 5th Army, under the crown prince of Bava¬ ria, consisting of four corps, stationed just south of Metz, about 200,000 men. 6. The 6th Army, under General yon Heeringen, consisting of two corps, stationed at Strass¬ burg, about 100,000 men. Just as the opera¬ tions began still another army was organized under General von Hausen, partly by drawing two corps from the 3d Army, and it was assigned position just south of the 2d Army. As the march was taken up most of

these armies were strengthened by the addition of troops just arrived from Germany. The whole assemblage of troops numbered more than 1,0(K),000 at first. The armies stood in a line 190 miles long, although it was not con¬ tinuous. It faced toward France, and the plan, as soon revealed, was for the lower part to move forward slowly toward the west, while the upper part swept into Belgium and bent around to the southwest and then moved on toward Paris. As this part had further to go its movements were as rapid as possible, and to that end a large number of motor trucks were used. To the 3d Army was assigned a direction due west, through the Belgian Arden¬ nes, in order that it might come into close sup¬ port of the 1st and 2d armies and the new army of General von Hausen. It struck the French defenses at Dinant and south of it. These several armies were ordered to move into position in such a way that they would come into a continuous line north and west of Verdun, and swing round to the south with that place for a pivot.

Opposite to them General Joffre assembled six French armies. In the

angle between the Sambre and the Meuse, south of Namur, was one under General Lanrezac; northeast of Sedan stood another under General De Langle de Cary; in front of Longwy stood a third under General Ruffey; in front of Nancy was a fourth, under General Castelnau ; a fifth, under General Dubail, stood on the border of upper Alsace ; while the sixth, under General Pan, was to the east of Belfort facing lower Alsace. From the time the French offensive on the border was checked these armies were on the defensive. Conscious of the superior strength of the Germans, General Joffre or¬ dered his commanders to feel the enemy and wait for a favorable time to deliver battle. He had a seventh army, but generally known as the sixth, under General Maunoury, but more of it later.

Another army opposed to the Germans was the relatively small British force commanded by General French. The British mobilized on 3 August and on the night of the 7th an ex¬ peditionary force began to embark for France. Ten days later 150,000 merr had landed. It was considered a great 10-day achievement to as¬ semble and equip this force and gather the ships to transport it to France with the neces¬ sary artillery, horses and supplies. The point of concentration in France was Amiens. Gen¬ eral French had an early conference with Gen¬ eral Joffre and it was agreed that he should move northward as soon as his force was ready and take position by the side of the Belgians who were then holding the Geete line across Belgium. At this time the French lines were being extended as rapidly as possible to the region south of the Sambre, and it was thus expected that the allied line would be made safe from Antwerp to the Swiss border. The British expedition contained two army corps; the first under General Haig, and the second under General Smith-Dorrien, aggregating about 80,000 men, and a cavalry division under General Allenby. General French had objected to the appointment of Smith-Dorrien, wishing General Plumer instead. In Haig and Allenby he had great confidence. He had a third corps

in France, but as it was not completely or-ganizecf he moved forward with his first and second corps and Allenby's cavalry. ˆ By this time the Belgians had opened the gap in central Belgium and General French found himself obliged to take position west of the French army under Lanrezac in a liii" running from Binche through Mons to Conde, with his cav¬ alry a little farther west. He thus held the ex¬ treme allied left, his left flank in the air.

Neither Joffre nor French realized how many Germans were in

Belgium, and they both thought Namur could hold out a month, checking the invaders. It was their plan, there¬ fore, to drive back their opponents in this sec¬ tion, swing the British and Lanrezac round to the north and re-establish the line the Belgians had been forced to relinquish. They soon learned their error. In fact, they were so badly outnumbered that von Kluck, on the Ger¬ man right, was ever extending his line west¬ ward, trying to get around the British position. In order to avoid being surrounded here, as Napoleon HI had been surrounded at Sedan, it became necessary for the Allies to fall back continually.

The Germans got their heavy guns before Namur on the 20th, the day von Kluck en¬ tered Brussels, and the place was occupied on the 23d, the last fort being silenced two days later. The air service of the British and French was as good as that of the Germans, but it was relatively undeveloped. It did not reveal to the commanders the vast concentration of the enemy in Belgium. They did not know that in these critical days three great armies, more than 600,000 men, were moving on Lan¬ rezac and French. Von Hausen was coming up just to the south of Namur, von Billow had enveloped it and was marching southward, and von Kluck was moving with great rapidity on Mons and the region to the west.

Lanrezac was at Charleroi, which von Bil¬ low's forces reached on the 22d. Furious at¬ tacks occurred at once and the place changed hands several times on this day, the French at last standing their ground. But at this mo¬ ment the news came that a part of von Hau¬ sen's army had forced its way across the Meuse south of Namur and was threttening Lanrezac's communications. He decided that a with¬ drawal was necessary and made the move in good order. Next day, the 23d, the remain-: der of von Hausen's army in a hard battle forced the crossing of the same river at Dinant, eight miles south of his position in front of Charleroi, and he continued his retreat until his line rested on the forts at Maubeuge and Givet.

Meanwhile the British at Mons were pre¬ paring to receive the attack of von Kluck, which they expected hourly. All through the day on the 22d they heard firing in the distance and thought it the guns before Namur, 30 miles away. By some strange chance Lanrezac failed to inform them of his withdrawal and they worked hard on-entrenchments, thinking it was for them to protect the western part of the allied line. Late in the afternoon some of von Billow's men appeared on their right and tried to turn it. General French's two corps were holding a line 25 miles long, about 3,000 men to a mile. General French thought that only

two German corps were in front of him and felt that his own-two corps were sufficient to deal with them. In the afternoon of the 23d his line was strongly attacked throughout most of its length, but with especial severity at Mons and eastward. In this battle the British soldier showed great courage and inflicted heavy losses on the enemy. Although, pushed back by a por¬ tion of von Kluck's army on his extreme right, General French still held his position at night¬ fall with great pressure on his entire front. About 5 o'clock in the afternoon he learned from Joffre that Lanrezac was in full retreat that von Kluck had, not two, but three corps on the British front and another thrown out to the westward, trying to turn the British left. It

the left flank to drive the British into the de fenses of the toWn, while Lanrezac had con¬ tinued to retreat on the east. General French decided that the only course left was to con¬ tinue the retreat during the night, allowing only a few hours for rest. Next day the German pressure was a little less and the army reached Le Gateau, a march of 15 miles, the British line extending along a front of 25 miles. Here Gen¬ eral French was joined by 11,000 fresh troops of the fourth division, drawn northward from the still unorganized third corps.

Le Gateau had been selected as a place for recuperation : it proved to be the scene of a fierce battle. As the first corps, under General Haig, was settling down to sleep behind its out-

m

StPd*

D’i9ppe

\Alberfy 3refe(A/

4

Louvain

G I u.

■ Mons/ Us.”®*

. ‘^jC/jar/ero/^i

^ tT

^ro/ine/ ‘J/

‘ Arras

Beauvais.

•feiALUX

cnat&atf…

P fCrao^ne

”“‘7 A ^4

Soissons

//. It

C^/ e’

‘ontfaucon

r :: Reims® \ ‘%

Seniis J , \ ^ ^ I l®Verdun

I m Menei)oo/d% ! 1 | I

BvretZ’

PARIS

Chateau Th/ern/’y

* Cha/onssu\

fame

MAP SHOWING THE

at the outbreak of war

1914

Farthest Advance of Germans _ ˆAdvance Line of German Armies Scale of MilfcS 0 10 10 30 in

ˆsfern

ay

Vitrˆle-Francoˆ

ˆBar-ie-Duc

Nancˆ

® Rand fˆcNgUy & Ca.MV

\Ghau/770/7t-en - Bassˆvi/

was at once evident that the British position was perilous. The commander decided to fall back and ordered his heavy transport trains to move southward at once. He directed his army to hold their position until nightfall, then get what rest they could and begin to retreat at dawn the next day, the 24th. Thus began the celebrated retreat of the British army through northern France.

The 24th was a hard day, the Germans press¬ ing strongly on the retreating columns ; but Allenby's cavalry, riding from one point to an¬ other, where danger was greatest, gave much relief, and the infantry turned now and again to fight off the enemy when he came too close for comfort. At nightfall the army had gone back 10 miles and stood at Maubeuge. Its posi¬ tion was critical; for von Kluck was pressing

posts near the village of Landrecles, a fresh German corps attacked suddenly in the dark¬ ness, thinking to make short work of the ex¬ hausted British soldiers. But the men stood to their arms and during three hours beat off a strong assault along their whole line. They were materially helped by the arrival of two French divisions, who came up

on their right flank, and at midnight the Germans gave up their battle.

At dawn on the 26th the retreat was resumed. Haig's corps, stiff and sore from the previous marching and the night battle of the 25th, could only hobble along. Smith-Dorrieifls and the fourth division were in better condition, but in the early dawn they were so fiercely attacked by the Germans at Le Gateau that they could not hope to move off safely. Hastily entrenching

they prepared to resist to the end. Charge after charge was repulsed. At 3 p. m. their po¬ sition was critical, when General French ordered them to break off the battle and withdraw as safely a§ possible. Fortunately, the Germans had also suffered too much to continue the fight and .did not pursue as vigorously as was expected. Falling on some of the last units that withdrew they inflicted great losses, but the corps got away, tired, thristy and completely shaken, jt marched through the night in front Qf the pursuing foe until in the early morning t>f the 27th it halted at Saint Quentin. That day help came from the French and the pur¬ suit slackened, so that the British arrived at the Oise River on the 28th, wherfi they were in tomparative safety.

The five days' retreat from Mons was a bit¬ ter experience for the British Expeditionary Force. They only barely escaped complete dis¬ aster and lost heavily, but they fought with signal courage. General French was chagrined at his treatment by Lanrezac, who certainly should have communicated, with him as soon as he fell back. He was also aggrieved by the failure of the French to send him support in the five bitter days of retreat. On the other hand, it is claimed that General French him¬ self was nearest to von Kluck and should have known first of the superior concentration on his own front, that he di(f not begin the retreat as promptly as he should have begun it, and that he did not recognize that the French were also hard pressed by the armies opposed to them. Lanrezac, it must be remembered, did not make a general retreat on the 22d, but only swung back his right to adjust it to the thrust of von Hausen, south of Namur. It was not until the 23d that von Hausen seized Dinant and forcd the French army to fall back along the whole line. A few hours later Joffre gave his

warning to the British commander. Of course, Lanrezac should have communicated both pieces of information to General French, whose safety was closely related to any changes on the French front; but it was only the second move that put the British force in dire peril, and in re¬ gard to that movement the delay in communicat¬ ing with General French was not great. The traditional distrust of the British soldier of the military efficiency of the French was not dis¬ pelled until after the battle of the Marne, and General French, who had both the faults and virtues of his countrymen, felt that he was the victim of Gallic instability. However, he did not lose confidence in Joffre and his book, H914ˆ bears abundant evidence of his friendly appreciation of the generous and tactful atti¬ tude of the French generalissimo. Lanrezac was removed at the end of the retreat, although he had fought magnificently on the retreat and inflicted on the Germans at Guise the heaviest defeat they experienced before the battle of the Marne.

The withdrawal of the British from Mons to the Oise was the most spectacular feature of the general retreat; but we must not forget that it was only a part of the general movement. Von Kluck made the most powerful demonstra¬ tion of all the German generals, but east of him came in turn von Biilow, von Hausen, the Duke of Wiirttemberg, the crown prince of Germany and the crown prince of Bavaria, all of whom were in motion as far as Verdun in unison

with the general German sweeping movement. Facing them were the Allied armies in the fol¬ lowing order: the Britsh, Lanrezac, Langle de Cary, RulTey and Castelnau. The French thrust across the border started a few days before the Germans began to swing their line for¬ ward. The counterthrusts followvving that move¬ ment were really synchronized with von Kluck's, von Billow's and von Hausen's movements. As von Kluck advanced and threatened to turn the left of the great line, it became necessary for the interior part of the French line to fall back. The Germans in front of it followed and fought when they could. It was thus that they crowded Lanrezac at Guise, whose retreat from Charleroi gave them the idea that he was shaken. His splendid reply, a bad defeat for his opponents, showed that his army was intact and left him opportunity to continue his retro¬ grade movement unhampered. The world was surprised to see what a small check the French fortresses gave to this advance. Between the 23d, when Namur fell, and the 28th, when the line reached the Oise, Longwy, Montmedy, Hir-son, Mezieres and Lille, all the northern fort¬ resses but Maubeuge, fell to the enemy. Maubeuge, with a garrison of

30,000, did not suc¬ cumb to the 11 -inch howitzers until 7 Septem¬ ber.

A story was told in connection with the siege of this place that should be remembered as an illustration of the bad effects of illy-con¬ sidered assertions. It was said that before the war a Belgian had built an engine factory at Lanieres, near Maubeuge, the real owners of which were the Krupps, of Essen, and that when the Germans arrived they uncovered con¬ crete foundations at the factory on which they placed 16ˆ -inch howitzers for use against the forts of Maubeuge. Investigation showed that they did not use guns of that calibre in this ac¬ tion but 11-inch howitzers, fired on their own wheels. It was also recalled that Lanieres is southwest of Maubeuge, while the German guns attacked it from inside the Belgian frontier and to the northeast. The story seems to have originated with a Paris newspaper. It was widely repeated and went far to give the Ger¬ mans their reputation for unusual abilitv in espionage. It was responsible for a wave of hysterical searching for prearranged gun posi¬ tions in London, which, in the end, proved to be mostly fancy.

6. The Battle of the Marne. — At the Oise the British obtained a day's rest. The Ger¬ mans were nearly as tired as their opponents and needed respite from their heavy marching. The line then ran from Verdun almost straight to Guise, where Lanrezac's victorious army stood, and then curved through Saint Quentin until it came to Novon. Behind it about 12 miles was a position through La Fere, Laon and Rheims, at which the French High Command had been expecting to stand against the invaders. Joffre visited General French on the 29th and talked over the situation. His conclusion was tha,t it would be unwise to offer battle until the British had recovered from their recent trying experiences. Accordingly, he ordered all the armies to retire south of the Marne. From 30 August to 3 September the retirement went on, the Germans following and striking wher¬ ever opportunity offered. The British proceeded to the Grand Mbrin, the French on the east

placing themselves in a line that ran through Provins, Sezanne, Maily and Bar le Due. The Germans followed and were crossing the Marne at

many places on 4 September. Their rapid march into the heart of northern France to a line east of Paris itself gave them the assur¬ ance of victory. Day after day strong cities fell into their hands; Lille, Peronne, La Fere, Saint Quentin, Noyon, Rheims, Soissons, Chateau-Thierry, Chalons and many others. ˆWictory after victory ran the news back to the Fatherland. The German High Command thought the British crushed and the French so weakened that only a smashing blow was needed to finish them. It was at this point that a movement was made to deliver the smashing blow.

On 1 September von Kluck, on the western end of the line, was at Senlis, north of Paris, and the German crown prince was west of Ver¬ dun, 115 miles due east. In between were the armies of von Billow, von Hausen and the Duke of Wiirttemberg, in all considerably more than 1,000,000 men. On that day orders were given to draw the lines in. As the crown prince moved southward he veered to the west, and as von Kluck moved southward he veered to the east. The result was that late on the 5th the line was only 90 miles long and proportionately denser and more powerful. This concentrated force was to be thrown on the French with the intention of breaking through at the centre and crushing the two wings in detail.

Two facts served to defeat this scheme : (1) At the French centre was an army under Foch, newly constituted and ready to die in its tracks. Foch had saved the day at Morhange, and he was to save it several other times during the course of the war. It was a bit of extremely good fortune that he was at the critical point in the battle of the Marne; (2) Joffre had as¬ sembled a strong army on von Kluck's right, unsuspected by the Germans, which was ready to play an important part when the proper mo¬ ment arrived. It came into touch with the enemy on 28 August. All the way down from the Sambre von Kluck knew a body of French reserves were operating off his right flank, but his cavalry took care of them, pushingˆ them southward and occupying Lille, La Bassee and Amiens. When he heard of troops on his left after the 28th he thought they were of the sarnc character. His mistake was very costly. This 6th Army, as it was called, numbered 100,000 on 5 September, and was led by General Maunoury, one of the best French commanders.

It was 1 September that von Kluck veered eastward at Senlis. He crossed the Marne at Meaux and arrived at Coulommiers, 12 miles south of the river. The other German armies had kept touch on the east and stood, in gen¬ eral, from 12 to 15 miles to the south of the Marne. The order, west to east, was von Kluck, von Billow, von Hausen, the Duke of Wurttemberg, whose lines ran across the river at

Vitry-le Francois, and the crown prince, whose lines turned northward to the west of Verdun. South of them stood in order the British, Franchet d'Esperey who had superseded Lanrezac, Foch, with his new army, De Langle de Cary, and Sarrail who had superseded Ruffey and faced the crown prince, looking north¬ westerly. Maunoury was within the fortified area around Paris and faced eastward.

On 3 September Joffre learned that von Kluck was trending eastward. Divining the purpose, and also seeing the opportunity it gave him, he decided that he must strike before the German concentration became effective. A blow against the German flank at this moment would fall as a disconcerting surprise, and if the whole French force struck at the moment the German commander-in-chief would not have time to rearrange his line of battle.

The defenses of Paris itself were entrusted to General Gallieni, an old man, but one of the best men among the older officers of France. He it was who discovered von Kluck's east¬ ward movement and told Joffre of it. Next day the two men had a conference in Paris and a plan of attack was prepared. Von Kluck had left one corps, about 40,000 men, north of the Marne to protect his communications. It was proposed that Maunoury should fall on this force, sweep it back beyond the Ourcq River, cut von Kluck's communications and attack him in the rear. To enable him to achieve success it was necessary for General French to de¬ liver a simultaneous attack on von Kluck's ad¬ vanced corps and thus hold them in their tracks south of the river, so they could not be sent to meet Maunoury. To carry out the plan it was arranged to reinforce Maunoury with troops from the city of Paris.

These arrangements made, Joffre and Galli¬ eni visited General French and told him what was expected of him. French replied that he needed 48 hours to get his army in condition for attack, an interval which would have en¬ abled the Germans to proceed so far with their concentration that the plan would not have been feasible. Joffre had no authority over General French and left him to co-operate to the best of his ability. It seems that General French was too much aggrieved over recent mishaps to attempt a hazardous movement in depend¬ ence upon the French in another great manoeu¬ vre. Slow in action and hard to convince, he was not the man for the situation in which he found himself. His removal from the chief command later on was partly due to the belief that he did not do all he could have done in the battle now beginning.

On 5 September Joffre issued his order com¬ manding his men to engage the enemy. feel it my duty,® he said. Ho remind you that it is no longer the time to look behind. We have but one business on hand — to attack and repel the enemy. An army which can no longer ad¬ vance will at all cost hold the ground it has won and allow itself to be slain where it stands rather than give way.® All the commanders of armies were directed to assume the offensive.

Early on the 6th Maunoury struck von Kluck's exposed flank. One part of his army fell on the lone single corps on the Ourcq, and the other moved around to the north to cut the German's line of communication. Von Kluck, finding the British did not press his southern front, left his cavalry to hold them in check and with the remainder of his army hastened to the northern side of the Marne. Maunoury thus found himself facing a superior army and saved himself only by the most heroic fighting. He was not crushed, as he might have been, and he punished von Kluck severely, forcing him to draw back to the Aisne after four days of heavy losses. General French followed von

Kluck leisurely, pushing back the German cav¬ alry, and crossing the Marne on the 9th, more than two days after von Kluck had crossed it. Had he fought as vigorously as Joffre expected, his 100,000 men would have made the battle of the Ourcq a German disaster.

It has since been disclosed that the German armies aimed primarily at cutting off the French armies and not at taking Paris. This plan, von Kluck himself asserts, failed for two reasons : First, the crown prince kept urging a general advance, insisting that there were no French troops in Paris, and, therefore, that von Kluck, who was on the German right flank, was free from all danger. Consequently when 160,000 men appeared on von Kluck's right the latter

with great courage, but they could not hold their lines intact. On the right they were driven back three miles and a dangerous gap was made between them and the next army to the east. Their left had also suffered so much that it was merely able to hold its own. But the

fighting had placed the Germans in a precarious position; for as their line stretched out to push back his two flanks it became very thin in the centre. This was the situation on 9 September when Foch borrowed a corps from d'Espereˆ, who was relieved from immediate necessity by the retreat of von Billow. He placed this corps on his left flank, moved one of his own corps from that point and placed it oppo"site the attenuated German centre, held by the Prussian

Cologne

Hasselt Ij

Calais

‘ogne

Omer

Namur Charleroi .

Mans

Coblenz’

DInant

V Neufchqteau ˆ

ˆerorme

©SHJuentin

i.LUX’?..

Vˆuxcmbti

A miens\

ˆLoon

Craonne

- Rethe! ‘P

Beauyais

ˆre-enCriampeaoˆf!/////

ˆCˆirri/:le-rrancotˆ9iˆfˆ

Chaumonfen

I

tfaucon \ ˆrdun ˆ iXiSˆlˆlh/e’lA.

Bˆreujr

PARisˆˆd

3tDie\

• \

MAP SHOWING

BATTLE OF MARNE

1914

L ine before battle Sept 5ˆ Line after battle Sept. 13 1!’ SˆOle of Miles

10 to 30 46

Troyes

® Rond M ‘Nolly &. Co .NY.

was left no choice but to retreat; second, the original German plan drawn in Berlin before the war called for an army of 2,000,000 to fol¬ low* the attacking army. That army failed to appear.

Von Kluck’s retreat left von Billow’s right flank exposed and he also had to fall back, Franchet d’Esperey pressing him all the way across the Marne in a vigorous battle. Still farther east was von Hausen, before whom Stood Foch with the newly formed 9th Army. It was here that General von Moltke had ex¬ pected to break the French line. He did not relinquish his plan because of von Kluck’s with¬ drawal to the Ourcq. Reinforcing von Hausen heavily he poured his ultimate strength against Foch, whose centre was at La Fere-Champe- noise. The Frenchmen took the punishment

Guards. Then, late in the afternoon, he sent it forward against the Guards. It cut them through like a knife going through cheese. At the same time he ordered a general attack all along his line. The result was that von Hausen’s army, cut through in the middle, broke into dis¬ orderly flight, streaming northward. The French pressed on after them, and followed them to the Aisne, the Duke of Wiirttemberg and the German crown prince shifting their lines on the east, so that they kept touch with the retreat.

The battle of the Marne, as history has named this general engagement, was fought on a line 90 miles long, but within its scope were two encounters which, in previous wars, would have been called great battles. One was on the Ourcq River, where Maunoury with 200,000

WAR, EUROPEAN

C’opyrijrht, Underwood A. Underwood, N. Y.

2 British machine-gun squad repelling German massed attack

1 French and Americans advance to grenade attack

WAR, EUROPEAN

1 French soldiers attacking house under rain of shells

Copyright, Underwood & Underwood, N. Y.

2 French direct volume of smoke and flame against Germans

Copyright, International Film Service

men met and fought off von Kluck with 300,000 men for four long days, until at last von Kluck, fearing to be caught on his southern flank, moved off on the morning of the 10th and left his adversary in possession of the field. The other was at La Fere-Champenoise, where Foch, after being beaten on each flank, cut through his opponent's centre at the moment of crisis and made a yawning chasm in the great German line. Joffre's plan was excellent, and all the French armies fought well, but it was Foch's genius that lifted the engagement from the level of a drawn battle and made it a great French victory. Of this general the commander-in-chief said, in allusion to the work of 9 Sep¬ tember, that he was ^^the first strategist in Europe.®

In the battle of the Marne the French fought with fierce courage, throwing themselves un¬ stintedly on their antagonists, who were better supplied with long range field guns and machine guns. Their light artillery, however, the 75's, proved their superiority, and without them the battle could not have been won. As it was, more' than half of the 300,000 casualties were on the French side. But the battle was

worth what it cost. It saved France from the heel of the conqueror. It saved Europe from passing under Teutonic domination.

One other feature of the battle remains to be noticed. East of Foch stood De Langle de Cary and east of him Sarrail, his right running northeasterly to the defenses of the fortress of Verdun. Against these two armies pressed the legions of the Duke of Wurttemberg and the German crown prince in bitter attacks. They could not break through but inflicted heavy losses before they were forced to draw back to keep touch with the general retreat to the Aisne. It was during these days, 12 September, that the Germans seized the strong position of Saint Mihiel, south of Verdun, and held it until it was taken' by the troops of the United States just four years later to a day.

Another affair, not a part of the battle of the Marne, but synchronized with it, was the second battle of Nancy. This city had beaten off one attack when the Germans moved forward after their victory at Morhange. Two weeks later they moved forward again, more than 300,000 strong. It was their object to take the city and come in behind the eastern end of the line that defended the Marne. Opposed to them was a French army under General Castelnau, much weakened by having to send troops to the armies engaged to the westward. It held a defensive position in the hills from Pont-a-Mousson to the little river Meurthe, covering Nancy. The kaiser himself was present to encourage the Germans and to make a triumphant entry into Nancy if his army was victorious. General Castelnau proved himself a master of defensive tactics many times in this war, and this battle was no exception. The enemy fell heavily on his lines but were beaten off with great losses. At the end Castelnau stood firmly in his tracks, and the Germans gave up the struggle. Had they won, they would have closed in behind Sarrail and DeLangle de Cary, defending the region around Verdun, and it would have been rare good fortune on their part if they had escaped complete encirclement. At best they would have been forced southward and Verdun, the buttress of French strength in this region,

would have remained in German hands during the war.

7. The Race for the Sea. — When the Ger¬ mans were forced back across the Marne they did not stop until they had crossed the Aisne, 40 miles north of the scene of their defeat. The allied armies pursued

vigorously and crossed the river hard after them. They did not go much farther; for the Germans en¬ trenched themselves in the hills overlooking the Aisne. For several days there was a ding-dong battle along the whole line, the most notable feature being the fighting of the British near Soissons. After crossing the Marne on the 9th General French recovered his fighting spirit, and from that time on the British army did all it could have done.

Here began trench warfare for the dura¬ tion of the war. Two systems of trenches were constructed from the Oise to the Swiss border, between them the cheerless waste of No Man's Land. To locate the battleline at this time take a map of France and begin at the Oise just south of Noyon, then pass the pencil eastward to Craonne, on the Aisne, a distance of 40 miles, then carry it eastward around the northern side of Rheims and on to the northern defenses of Verdun, thence southward to and around the western edge of Saint Mihiel and due east to Pont-a-Mousson, on the Moselle, and thence southward to the Swiss border. The re¬ sult will show where the general line stood 20 Sept. 1914. Rheims was thus left to the French, but it was won by General Foch after hard fighting. At once began the demolition of its splendid cathedral by the German artillery. The deed was defended on the ground that the cathedral towers were being used as observa¬ tion posts by the French, an allegation that the French denied. Battering this handsome cathe¬ dral into ruins was bitterly resented in France and shocked the feelings of the neutral world.

The first efforts against the Aisne line showed General Joffre how useless it was to attempt to defeat the entrenched enemy by di¬ rect assault, and he tried to turn his line. He moved General Castelnau and most of his army from Nancy and placed them on his extreme left flank with orders to pass around Noyon and get behind the German line. Castelnau acted promptly, but when he turned around Noyon he found before him the crown prince of Bavaria, his old antagonist at Nancy, and there he halted, his army facing east. His efforts to get behind von Kluck thus proved futile. Trying again Joffre assembled an army north of Castelnau's, giving the command to Gen. de Maud'Huy with orders to strike in behind the elongated German line. De Maud'¬ Huy made the attempt, only to find that the Duke of Wurttemberg was before him with an ample army. The practical result was that the entrenched line was extended from Noyon to La Bassee, step by step, and thus was formed that great angle which disfigured the map of France throughout the remainder of the war.

In the latter part of September General French became anxious to move northward, where his forces would be nearer their bases of

supplies and have the added incentive of fighting to protect the Channel ports, that were, in a sense, the outer defense of Britain. As soon as French troops could be found to

replace them in the Aisne line Joffre consented to the transfer, which was made between 3 and 19 October. The object of the Allies at that time was to recover Lille, which von Kluck's cavalry had taken in August, and push¬ ing on to the northeast to touch hands with King Albert at Antwerp. If the movement succeeded the international battle line, turning north at Noyon, would be continued through northern France and central Belgium, so that the Ger¬ mans would be kept away from the Belgian seacoast. It was even hoped that Liege might be recovered and the invaders deprived of their main line of communication in the north.

To carry out this plan it became necessary for Antwerp to hold out against the Germans who were pressing it as hard as they could. With its outlying forts and redoubts it was considered the strongest place in Europe, next to Paris. Against these forts the great howitz¬ ers of the enemy were concentrated and a bom¬ bardment was opened on 29 September. The stories of Liege and Namur were repeated. Fort after fort crumbled, aijd by 7 October the city was in flames, so that the king dared not longer risk the capture of his army. As it was, he had stayed too long — at the urgent request of Mr. Winston Churchill, of the British Cabi¬ net. That impetuous man visited Antwerp after the French staff and King Albert had decided to withdraw, and by offering British aid induced them to stay two days longer. The promised help did not arrive. Only a division of marines came into the city, and a division of infantry arrived at Ostend without being able to reach Antwerp. As the Belgian force moved out on the 8th the Germans pressed northward to cut them off. All escaped but one division, which was forced to cross into Holland and submit to internment. The Belgians drew back toward France, leaving their enemy to occupy the coast as far as Nieuport. Zeebrugge and Ostend thus fell to the Germans, who made of them sub¬ marine bases, from which much damage was later done to British shipping.

8 The German Drive for the Channel Ports. — Early in October the

German High Command formed a new design. It had failed in its great objective of destroying the French army and taking Paris. It now wished to reach the Channel ports of Dunkirk, Calais and Boulogne, cut the British line of supplies, and place the southern coasts of England within reach of the long-range German cannon. If it could extend the line directly west from Noyon to the sea it would be materially short¬ ened, the French would be cut off from the British and made an easier victim of later campaigning, and a large and wealthy portion of France would be brought under German control. If the line reached the sea south of the Somme all the work of dislodging the in¬ vaders would have to be done from_ a line still farther south, and it is doulbtful if it could have been carried through successfully. Here, as in the Marne campaign, the Germans failed by a narrow margin. The design pleased the German people because it was directed against Great Britain. The kaiser himself went to Flanders to cheer his troops, and his whole available strength was put into the effort.

Joffre's action in defense was not originally a mere act of resistance. It began as an offen¬

sive, the object being to close the gap between de Maud'Huy, whose northern flank was near La Bassee and the Belgian army which, having moved out of Antwerp on 8 October, was fall¬ ing back along the Belgian Coast. There was still hope that the wavering line could be stabil¬ ized somewhere near Antwerp. If that city could not be saved, possibly Zeebrugge or Os¬ tend could be made the northern terminus of the line of defense.

North of La Bassee the line was held, for the most part, by the British, as far as the northern outskirts of Ypres, in Belgium. Far¬ ther on it was held by some French troops, south of Dixmude, and beyond this to Nieu-pqrt, on the sea, it passed into the hands of King Albert's army, which had withdrawn from Antwerp along the seacoast, followed by the German army that had pressed it out of that city. Besides these main elements, the forces contained a corps of Indian troops, Ghurkas, Sikhs and Rajputs, long trained to fight for the British in India. They had been landed at Marseilles and carried thence to the areas behind the British lines, where they first served as supporting troops. There were, also, native troops from Africa, Sengalese, Moroccans and Turcos, fighting with the French. It was a striking complex of nationalities assembled to wage with the last available ounce of strength the battle for the preservation of cixdlization. Europe had seen nothing like it since the hosts of Martel met the

Moslems at Tours in 732 and drove them south of the Pyrennees.

To direct operations in the north Joffre sent General Foch, whose splendid work at La Fere-Champenoise and Rheims had revealed his emi¬ nent military capacity. Hither came, also, on a visit, the aged General Roberts, of the British army. He wished to see again his beloved In¬ dian corps, most of whose native officers looked on him as their best friend. He was hand¬ somely received and spent several happy days in the camps. Looking over the plans Foch had made for the battle he said simply, as was his way: «You have a great general.ˆ On this visit he was stricken with illness and died at British headquarters on 14 November. Be¬ tween Foch and French was ever good under¬ standing, and the British soldiers, realizing how completely their battles were for the safety of the empire, spent life and strength as few other soldiers have spent them. On 20 Oct. 1914, the Allied line was well established though thinly held. Including de Maud'Huy's sector, from Albert to La Bassee, it was 100 miles long, and its defenders were about 500,000. Against them were thrown probably three times that number, fighting under the eye of the kaiser himself. Just as the battle began, 22 October General von Moltke, German Chief of Staff, re¬ tired from office on the plea of bad health. He was succeeded by General von Falkenhayn.

To break through the Allied line the Ger¬ mans had the choice of four points of attack: Nieuport, Ypres, La Bassee and Arras. If they had concentrated all or most of the strik¬ ing force at either of them they could hardly have failed to break through to the coast. They chose, however, to attack at all simul¬ taneously, and they failed at all.

The first attempt was at Nieuport, on 18 October. The Belgians were exhausted and

dispirited by their retreat from Antwerp, but they met the attack bravely. Nevertheless they were being' pressed back steadily when three British monitors, built for service in shallow water, got inshore and opened fire on the Ger¬ mans on the beach, driving them inland sev¬ eral miles so that Nieuport itself was saved. The attack was renewed a few miles south of the town with great force. The Germans

crossed the canalized Yser and seemed about to press on to the rear of Nieuport, when the Belgians managed to construct a dam across the canal, so as to flood the area held by their foes, who fell back with some losses. The battle then shifted to Dixmude, still farther south. Here again the superior force of the

Germans seemed about to carry the day when their opponents cut the dikes and let the waters of the canal flow over their field of battle. The Germans were caught in the flood, their artil¬ lery was swept away, a large number of men were drowned, and the survivors were forced to scramble to the small pieces of high ground, where a great many were made prisoners. This feature of the general attack lasted from 18 October to 10 November and was hotly contested at all times. It was a signal failure for the Germans.

Four days after it began, 22 October, they opened a severe battle against Smith-Dorrien, who stood with the British second corps at La Bassee, continuing it with intense fighting for 10 days until 2 November. The British were outnumbered but fought courageously although they suffered severely. When the Germans grew tired of attacking they pushed the

British line back two miles, losing a great many men, but they did not break through. Probably they would have succeeded if they had brought up fresh troops and kept up the fight a week longer; for the second corps was almost at the limit of endurance, and no re-enforcements were in sight. But by this time the kaiser was putting all his strength into the attack on Ypres and drew off some of his troops to that area. The battle of La Bassee thus came to an end, and the net result was a German defeat.

Meanwhile, the Germans had opened a third battle at Arras, where Gen. de Maud'Huy was confronted by the army of General von Kluck, who attacked on 24 October. After fighting two days without success the battle receded. Then Gen. de Maud'Huy assumed the offensive and forced back von Kluck until the town of Arras, which had suffered severely from the German bombardment, was out of danger. The battle of Arras, 24 October to 1 November, was rated by the Germans as one of their impor¬ tant engagements. It was of the greatest im¬ portance to the Allies; for if the French had given way at this point, the British armies in the North would have been completely divided

from the French, and would have been forced to surrender or withdraw under trying circum¬ stances.

The fourth and most formidable of these attempts to reach the sea was made against Ypres, defended by the first British corps un¬ der the immediate command of General Haig. On 20 October Haig's men were four miles northeast of Ypres. At that time the two bat¬ tles to the south, just described, had not been begun. The Germans had screened their opera¬ tions so well by cavalry that General French did not know how far their concentration had proceeded. Bent on carrying forward the plan agreed upon between him and Joffre, he or¬ dered Haig to move forward, if possible, with the hope that he might reach Ghent and Bruges, and open the way into northern Belgium. Haig's men had just arrived from the Aisne and were tired, but they responded with firm¬ ness to the order to advance on the 20ih, and in doing so brought on the first battle of Ypres. The Germans were on their front in over¬ whelming numbers and threw themselves on the British most furiously. South of Haig's corps were Allenby's cavalry, the third British corps, under General Pulteney, and a French cavalry corps, under General Conneau., South of Conneau came Smith-Dorrien, whose battle at La Bassee has been described.

When Haig was given the order to move forward, if conditions on his front warranted he was four miles northeast of Ypres, astride the road to Bruges, with a front eight miles wide. He tried to execute the order on the 21st. The Germans were massed in front of him and attacked furiously. It was soon evi¬ dent that he would have all he could do to hold his own. Joffre promised to send rein¬ forcements, but he gave warning that they could not arrive before the 24th.

The interval was a period of bitter combat. Attack after attack was delivered, now at one point and now at another. Frequent breaches were made in the lines, but the Germans seemed to have had little idea what to do when they

had gone through and the British always re¬ paired the damage before serious consequences occurred. The Germans were trained to mass tactics and lacked initiative enough to utilize a new situation.

The expected assistance arrived late on the 23d and early on the 24th, and con¬ ditions changed for the better, though they still remained serious; for despite the help from Joffre the Germans were greatly superior in numbers. The exhausted defenders had no op¬ portunity to obtain rest and continued for days in the trenches, where they had to repel many charges.

From the 24th to the 29th the battle was waged fiercely along the line from Zonnebeke to Hollebeke, here one thrust and there an¬ other. On the 29th the enemy attacked in overwhelming force all along this part of the line. There was nothing to do for the de¬ fenders but to stand in their tracks and die or beat back the tide that ever flowed on. Many a unit was wiped out or reduced to a handful of men, but there was no surrender. For three days the terrible struggle went on. On the 31st a French cor*ps and a body of cavalry arrived and the Germans were forced back from the positions they had gradually won in the preceding days.

But the battle was not over. The kaiser was determined to have Ypres and kept bring¬ ing up other troops. These movements pro¬ duced a lull in the battle. On 6 November the bitter struggle was renewed and continued for three days. Then came an interruption. On the 11th two brigades of Prussian Guards were brought up, and the kaiser made an earn¬ est appeal to them for a victory, giving the en¬ couragement of his presence. They were his favorite troops and they went forward with the parade step. The British fired coolly and with telling effect, but the Prussians penetrated the British trenches. Then they hesitated, as if they knew not what to do next. The British left them no time to determine. A shower of shrapnel threw them into confusion and then the British charged and drove them back into their trenches. This was the last German ef¬ fort in the first battle of Ypres.

While this period of fighting was going on east and southeast of Ypres, equally heavy attacks were made on Bixschoote, five miles north of the town. If the place had been taken Ypres would have fallen and the British would have been forced to retire. Bixschoote was defended by General Dubois, with the ninth corps and some French Territorial troops and cavalry. With the greatest courage his men fought off the German attacks, inflicting great slaughter. By 15 November quiet reigned in this part of the line also. A few days later winter fell on the trenches, with rain, sleet and snow, and aggressive military operations ceased.

On the 17th another French corps arrived, sent by Joffre, of whom it was said in another connection that there was never a time when, in

dire need, he could not find a fresh divi¬ sion to relieve a hard-pressed sector. The new arrivals gave General French an oppor¬ tunity to withdraw his troops for the recuper¬ ation they so much needed. Through four weeks they had stood the heaviest encounters the Germans could deliver against them. They

had died in great numbers, 40,000 killed and wounded out of something more than 150,000. One division, the seventh, lost 356 of its 400 officers and 9,664 of its 12,000 rank and file. The German losses are not known, but they must have been far in excess of the losses of their opponents. The kaiser had made a stu¬ pendous effort, based upon the theory that if men were sent forward persistently in great masses they would carry any position. The theory failed here, as in other battles in this war. When the fighting was over, the Channel ports were safe from the hands of the am¬ bitious emperor. If he had struck for them when he first entered Belgium, instead of chasing rainbows in the valley of the Marne, the story would most probably have been different, and the outcome of the war would certainly have been placed in serious doubt.

Grand Scale Preparations, 15 Nov. 1914 to

1 July 1916.

1. A Year and a Half of Preparation. —

Looking back to the history of the World War as a whole it is seen that Germany assumed the offensive in the beginning of the strug¬ gle and kept it until the spring of 1917. This statement applies to the large features of strategy. She knew what her adversa¬ ries could do, took liberties with them and managed to carry on the struggle without endangering her own position. The result was that she was able to strike in the West and in the East as occasion seemed to demand and thus apply her strength where it seemed likely to yield the best results.

This was due to Great Britain’s state of unreadiness. Had the British army been as strong in 1914 as in 1917 such a course would have been impossible; for with 1,500,000 trained troops ready to attack by the side of an equal number of Frenchmen, and with an overwhelming supply of munitions with which to smother the German entrenchments, the kaiser could not have divided his army in order to attend to the menace in the East, and in one field or the other he

would have been pressed to disaster. These speculations, how¬ ever, would not be complete without the state¬ ment that if Great Britain had been as well prepared as France in the beginning it is not likely that the war would have occurred.

The plan of the German High Command in 1915 was well made. Granted that Great Britainˆ would not at first become a serious factor in the war and that France alone could not do any great things, she contented herself in 1915 in playing a defensive game in the West and throwing her entire surplus energy into the Eastern theatre of operations. It was already evident that Austria was no match for Russia, not even in a defensive war. Nor could Bulgaria and Austria combined deal with Russia and Serbia. Strong German efforts were necessary here if the balance was to be kept even.

For the time being results seemed to justify her expectations. When the year opened the Russian army of General Brusiloff was south of the main passes of the Carpathians, ready to March through the plains of northern Hungary, and the Entente Allies were talking con¬ fidently of an expected capitulation by the

eastern half of the Dual Empire. Then fol¬ lowed the battle of Dunajec, which forced Briisiloff to retire from the Carpathians with the rapid reconquest of Galicia. This cam¬ paign was not ended before the great German drive on Warsaw was begun, and by the end of the year Poland was occupied and Riga was all but held in the tight German fist. So com¬ pletely was Russia’s attention claimed that she could do nothing to help Serbia, and all that luckless country was overrun but the south¬ western corner. It was only by prompt action that the Entente Allies could fortify and hold Salonica, in Greece, and thus bar the Central Allies from that important means of access to the .Tfgean Sea.

By these operations the Germans came into possession of the railroad from their own country through Austria to Nish, in Serbia, thence to Sofia, in Bulgaria, and thence to Constantinople. The ®Berlin-to-Bagdad® route was thus made a reality. It was a means of sending supplies to Turkey and helping her inaugurate a campaign against the

British at the Isthmus of Suez; and it gave a great stimulus to the Pan-German sentiment. The war revealed the weakness of Austria-Hun¬ gary. In fact, she was like putty in the hands of Germany, and Bulgaria and Turkey were little less than dependent provinces. Greece was kept from coming over to the side of the Central Allies by nothing but the fear of the British and Erench fleets. Before the war a great central confederacy under the direction of Germany was a dream of the Pan-Germans; at the end of 1915 it was all but a reality.

Later events showed how little it profited Germany to spend 1915 chasing this South¬ eastern rainbow. All that she gained in that quarter but increased her obligations to de¬ fend. If the day came when her strength at home was so much exhausted that she could no longer succor these outlying states they would fall with a crash which would endanger her w'hole structure. Her real menace was in the West, and it would have been better for her, but not for the world, if she had given it her best and earliest efforts. Save Galicia and draw Brusiloff from his threatened conquest of Hungary, if necessary, but after that con¬ fine the eastern campaigns to the defensive. Such a course would have enabled her to throw heavy armies against the forces in France and Flanders at a time when they were little prepared to meet her.

Meanwhile, the task of raising an army was going forward in Great Britain in a truly British manner. On 6 Aug. 1914, Parliament voted an increase of the army by 500,000 men, to be raised on the voluntary principle and voted a credit of £100,000,000. The preceding day Lord Kitchener had been appointed Sec¬ retary of War, and he immediately issued a call for 1,000,000 men. To the troops who went to France in the first expedition he gave the uncomforting assurance that they could ex¬ pect no reinforcements from across the Chan¬ nel for at least six months.

The spirit of the British people was all that could be desired. Recruiting offices were swamped by the numbers that offered, and men stood in line day after day to get up to the

doors. The greatest difficulty was to obtain equipment and supplies. To put into operation the vast and intricate machinery of production and distribution necessary to fit out an army demanded organization and reorganization. During the first months the newly recruited men suffered much inconvenience and some hardship because the supplies were not ready. To manufacture arms and artillery required even

greater time. Existing plants were in¬ adequate and trained mechanics were lacking to produce half of what was needed. More¬ over, when the war began British labor, long schooled in the idea that wars are made by capitalists and for the benefit of capitalists, did not fully realize how vitally the outcome would affect the very basis of British life. It took time and some disasters to show them how essential their efforts were to the success of the British arms.

The war found British political life in its accustomed jangling state. Party spirit had to be subdued, and a prime minister had to be found in whose ability and disinterestedness the people had confidence. All these elements of internal weakness were well known to the Germans, who were as well prepared for war in economic as in military matters. But their delay in the West gave the British people the opportunity to remedy these deficiencies. In fact nothing could have worked better to show the British their defects than the very tri¬ umphs which Germany made in the Southeast. There is nothing the Briton holds more essen¬ tial than the preservation of the empire. To talk about *Berlin-to-Bagdad^^ was the Ger¬ man's strongest challenge to the Briton.

Throughout the autumn and winter of 1914-15 vast preparations went on in camp and factory. Compared with what had been done before the war, and what the average man ex¬ pected when the war began, the results were excellent ; but compared with what was needed they were not satisfactory. The situation de¬ manded every soldier the country could spare from industry and every ounce of industrial energy in the munitions works that could be spared from the production of the essentials of life. To obtain such results no means were adequate short of compulsory service. Every man in the United Kingdom pught to be at the disposal of the government to do that part in the war which he could do best. Such was the course pursued in France and in Germany. But it was a course as foreign to British ideals as to American ideals. The existing voluntary system was firmly rooted in the British de¬ mocracy, and a democracy changes its point of view slowly.

By the end of 1915 it became evident that the voluntary system had yielded to the governm.ent most of the men it was going to yield. While a large number had joined the colors it was evident that there was still a great num¬ ber who would never join under the voluntary system. It was also observed that a propor¬ tionally large number of these were persons with nobody dependent upon them. Opinion, therefore, slowly formed for forcing such per¬ sons to take their share of the burden of na¬ tional defense. It came to its triumph when on 14

May 1916, Parliament passed a general con¬ scription act applying to all males from 18 to

41 years of age. Passage of the law not only made it certain that the full soldier strength of the country would be called out, but it abolished the sense of inequality which dwelt in the popular mind as long as many able-bodied men remained free from military serv¬ ice. We must, however, not forget that the voluntary system served England well in the beginning of the war. By the end of 1914 2,000,000 Britons were in service in the army, and a large number volunteered during the following year. In May 1916 it was said in Parliament that more than 5,000,000 men were then in the military and naval service of the country.

Equally important was the lack of muni¬ tions. It did not cease until the Ministry of Munitions was created in July 1915, with Mr. Lloyd George at the head. His influence with the labor unions was great, and he induced them to waive some of their restrictions on industry. He well said that if the British and French armies had been as well supplied with shell as their opponents they would have been able to drive the Germans out of France and Belgium by midsummer in 1915. No story of the campaigns on the western front is com¬ plete without fullˆ recognition of that other campaign in Britain herself to bring her re¬ sources of men and things into as full state of service as Germany had at the beginning of the war. It was not fully accomplished until late in 1916. While it was going on the men in the fields of Flanders had to mark time, relying to a large extent on the efforts of the French to enable them to hold what they had.

Not that the western front was quiet throughout the year 1915. On the contrary, it saw some severe encounters, most of them initiated by the Entente Allies. They were all based upon an imperfect realization of the changed conditions of war. They were begun with the idea that vigorous action would en¬ able the attacking party to break through the enemy’sˆ line of defense and produce conster¬ nation in his rear. They all failed because there were not enough artillery and trained soldiers. These failures, however, had their uses. They taught the leaders what mammoth efforts had to be made, and they contributed

their parts to the necessary work of wearing down the German morale and man power.

ˆ 2. France in Aid of Russia. — During the winter of 1914-15 and early in the following spring the French conducted several isolated campaigns that had an important influence on operations in theˆ East. For France was a faithful ally and it had long been agreed be¬ tween her and Russia that when, in that great war which both nations had expected, Germany flew at one the other would strike her in the rear. As soon, therefore, as she turned from the first battle of Ypres to the eastern front, France proceeded to carry out her promised part and by severe blows forced Germany to use reserves which otherwise would have been sent to the East. To this process Joffre, speak¬ ing to a careless inquirer, gave the name «nib-bling.® But he was under no delusion about the situation. He was fighting as he had to fight to bring relief to a hard-pressed ally. M©r« than that he would not undertake.

France had lost heavily in the campaigns of 1914 — some estimates putting the figure at nearly 1,000,000 — and it was evident that the end was not yet. Wise policy demanded that the strength of her armies be conseˆed to meet the great blows that would come in good time.

The first of these isolated operations was undertaken in Alsace in December 1914, while General von Hindenburg was making his as¬ sault on the Bzura-Rawka line. A feint was made along the western slopes of the Vosges Mountains, and in the extreme southwest, oppo¬ site Miihlhausen, there was an advance until the town of Thann was reoccupied and the village of Cernay, the key of Miihlhausen, was threat¬ ened. After long-continued fighting the French took Hartmannsweilerkopf, from which they could see the great manufacturing city, not more than 10 miles away. Farther they could not go. Miihlhausen remained inˆ German hands, but 350 square miles of Alsatian terri¬ tory, including several villages, were redeemed from the hands of the Teuton and the tricolor was unfurled in their market-places. In this fighting much of the success was won by the Chasseurs Alpin, who descended the snow-covered mountain sides on skis.

Another effort was the attack known as the battle of Soissons. It began on 8 Jan. 1915, just as the Hungarians were demanding German aid to repel the Russian movements in Bukowina. At Soissons the French held the town, situated on both sides of the Aisne, and the flat meadow beyond with the foothills, while the Germans were on the

ridges that marked the beginning of the northern plateau. A weak division, about 12,000 men, held the French lines and was ordered on the 8th to take two hills that dominated the plateau in the region east of the town. They carried out their orders with good effect, but the Germans brought up two corps and counterattacked with great energy. Heavy rains had come in the interval, and the flooded river had carried away two of the three bridges by which ammunition and reinforcements could be forwarded. Thus cut off from succor, the French troops were hopelessly outnumbered and forced to escape as well as they could. By hard fighting the major part escaped to the south hank, losing 5,000 men and a considerable number of guns. Encouraged by their success the enemy now made a determined attack in mass against Soissons itself. Here the bridge was intact and the French brought up reinforce¬ ments and repelled the assault. The Germans spoke of the battle of Soissons as a great vic¬ tory. It was an unsuccessful French offensive which involved German losses of nearly 10,000 men and resulted in a German advance of one mile on a three-mile front. It was fought be¬ tween 8 and 19 Jan. 1915.

A third attack was delivered in the Cham¬ pagne region during February and March, at the time when von Hindenburg was winning the battle of the Masurian Lakes. In Cham¬ pagne the battle line ran east and west between Rheims and the Argonne Forest. Behind the German position from five to eight miles ran a railroad on which the army was accustomed to bring up the supplies for a long sector. If it was cut the German transport service would be seriously weakened and it might become nec-

essaiT to reorganize the line of defense. Gen¬ eral Toffre's purpose, therefore, aside from drawing reserves away from the East, was to reach this^ road or bring it within effective range of his artillery.

The battle opened on 16 February with a violent artillery duel followed by an infantry charge. It was directed against the German position opposite Beausejour Farm, where there was a depression flanked by two hills on which the enemy had strong artillery defenses. The charge failed but it was renewed from day to day and at last succeeded on the 27th when some French Colonials were brought up.

Hard fighting now ensued until the arrival of re¬ serves from Flanders in the middle of March. At its close the French had not reached the coveted railroad. They had lost severely, more than 100,000 men in killed and wounded, while their opponents, fighting on .the defensive, had lost less than that number. Aside from its effect on the fortunes of the Russians, the battle of Champagne must be considered a French defeat.

These operations stand, out as distinct strokes in a series of minor operations from the Swiss border to the northern end of the French line at La Bassee, a distance of more than 400 miles. Sniping was constant, as opportunity offered. The artillery kept up its persistent work. Where the trenches were close enough together hand grenades were hurled from one to the other. It was at this time that trench raids were inaugurated, and they soon became frequent. They kept the men in training and were a means of gaining information. Now and again some more substantial attack was carried through, gaining a bit of trench, cut¬ ting off an obtruding angle, or seizing an eleva¬ tion on which some machine guns or sharp¬ shooters were stationed. In the Argonne, espe¬ cially, there was much of this kind of fighting. The French line at this point ran along a gap in the forest, from Varennes to Vienne le Chateau, following a road from one end of the gap to the other. The Germans had pressed down toward this pass from the north, which was all important to the French, since it was the link between their armies on the east and west. Forest fighting went on here all winter, and the French had the better of it, gaining ground on the north and holding it. Still another movement that is noteworthy here was an attack by the French on the Heights of the Meuse south of Verdun, Here the Ger mans had pressed westward nearly to the banks of the river. There was danger that they would cut off communications and force the abandonment of the fortress. General Sarrail commanded the French forces here and had well won the thanks of the country for his faithful and skilful defense of the greatest fortress of the French frontier. In February he started operations to drive the intruders back from the edge of the Heights. He took Les Eparges and the high ground around it, which, when fortified, became a safeguard of Verdun on the southeast. At the same time operations conducted by other French forces near Pont-a-Mousson carried the Germans back from one to two miles. Saint Mihiel, at <he angle between Verdun and Pont-a Mousson,

however, remained safe in German hands. It was too strong to be stormed, and the French contented themselves with holding firmly the

sides of the salient, knowing that the point would not be advanced if the sides remained intact.

In all this fighting the net results were small. It would be incorrect to say that this was no more than the commanders had ex¬ pected. At that time neither side had that re¬ spect for the fighting qualities of the other that each came to have in time. Nor did either side fully realize the conditions and limi¬ tations of the new style of war. Painfully and slowly and at great cost in life they were to learn how hard it is to take well-defended trenches. If the armies that faced one an¬ other at the end of the first winter of the war could have known how long their struggle was going to be, and if the nations behind them could have known what sacrifices were to be demanded, it is doubtful if the contest would have been allowed to go on.

3. The British Struggle in Flanders. — The first battle of Ypres closed with the futile as¬ sault of the Prussian Guards on the British posi¬ tion, 11 Nov. 1914. The Germans had made many costly charges and were satisfied to sus¬ pend the engagement. Already heavy work had begun in the East, and their reserves were demanded for it. The tired British were re¬ lieved temporarily by French troops whom Joffre sent, but they were eventually back in the trenches, wading through mud and slush, standing sentinel in the wearying winter days, and always ready to challenge the foe.

This spirit became aggressive when it was learned that the enemy had withdrawn some of his troops to serve in the East. Some isolated attacks were made on his lines with good re¬ sults, and this led the officers in command of the Indian troops in the trenches at Givenchy, two miles west of La Bassee, which, the Ger¬ mans held, to attempt to drive them from the latter position. An attack was opened before dawn on 19 December. Two lines of trenches were carried but the straggling dawn showed them unprotected on their flanks and they had to be abandoned in the succeeding night. The Germans seem to have decided to give the Indians a lesson. On 20 December they drenched their lines with shrapnel and trench mortar bombs and sent forward their infantry in heavy formation. The Indians in Givenchy fell back, and that important place passed into enemy hands. General French ordered up English and Welsh troops to restore the lines, which the Indians had given up on a two-mile front. By hard fighting this object was at¬ tained. The Indians had been two months in the trenches and were dispirited by the hard¬ ships, to which they were unaccustomed, and by their heavy losses. They never adapted themselves to the monotony of trench warfare.

This affair left the troops facing one an¬ other at this section in a state of tenseness, and another struggle of the same character occurred from 25 January to 6 February. It was brought on by the Germans, who were sup¬ posed to wish to have some success for cele¬ brating the kaiser's birthday, 27 January. They succeeded in taking Givenchy but were

promptly thrown out. They took position in a brickfield where the kilns and stacks made ex¬ cellent defenses, and some bitter fighting en¬ sued before they were at last driven back. Much hand-to-hand fighting occurred in this region and the losses were severe on each side.

Thus two sharp blows had been given in this region and bad blood was nowise abated by the results. A third was about to follow, and it was to be a much greater effort than either of the others. By the end of winter the British had been heavily reinforced. In No¬ vember 1914 the Territorial troops, fresh from intensive training in England, began to come over by battalions. By the end of February they had arrived in divisions. A whole division of Canadians were also on the spot, full of that vigor which the American air gives to those who have breathed it deeply. There were, also, troops of British stock assembled from many far flung imperial garrisons, shivering in a climate that had nothing in common with the tropical scenes from which they had been abruptly shifted. In all. General French had about 500,000 men when spring opened. He organized them into two field, armies, in each of which were three corps. Over the first arm> General Haig had command, over the second was General Smith-Dorrien. The first stood on the southern part of the British line, from Estaires to La Bassee, where it joined the French army of Gen. de Maud'Huy. The sec¬ ond held the front from Estaires north to the point of the Ypres salient, where it connected with the French forces organized into an army under General D'Urbal. This was the largest body of British soldiers assembled up to that time and it was better equipped with arms and artillery than any other force. But for all that, experience was to show that, it was not well enough supplied for the demands of the new type of warfare.

General French and his officers were con¬ fident that they could break through the Ger¬ man lines. The people at home shared their feeling, and there was a general expectation that something would be done commensurate with the great effort that had been expended. It was thought that only the coming of spring and the diminution of the mud that filled the trenches and covered the surface of the north country were needed for the realization of these hopes.

The scene selected for attack was that which had witnessed the two affairs just de¬ scribed. Three and a half miles north of Givenchy was Neuve Chapelle, a straggling vil¬ lage which had been in British hands early in the war. It was later taken and held by the Germans and made an inconvenient salient in the British lines. Behind it was the Aubers Ridge commanding the approaches to Lille. To cut through the lines here and -seize this ridge would have an important effect upon the whole German position in this region. After due deliberation it was decided to make the attempt, and preparations were made in the most careful and elaborate manner.

By this time it was known to all men that the war was an artillerists' war to a larger ex¬ tent than in any preceding struggle. The Ger¬ mans had foreseen this fact, but it was left for the French, with their keener wits, to show

how the best use was to be made of the vast numbers of cannon that were assembled. In their fighting in Champagne they had used what they called the curtain of fire, later known as the ^"barrage.® Placing their 75's close to¬ gether side by side with identical range and firing rapidly they were able to drop a continu¬ ous line of exploding shells at a given distance. Then by increasing the range by successive brief intervals they gradually moved this cur¬ tain forward. As it went it demolished wire entanglements, trenches and their defenders and permitted the infantry, who were held in check as they advanced behind the moving cur¬ tain, to pass unscathed across No Man's Land and occupy and organize the enemy's trenches. By raising the range still more the artillery could m.ake it impossible for the enemy to de¬ liver his counterattack before the newly estab¬ lished lines were safely occupied. The value of the barrage against entrenchments was well established in the war. It was at Neuve Chapelle that the British used it first. Al¬ though it appears simple to the inexperienced observer, it is a very delicate affair and de¬ pends for success upon exact cooperation be¬ tween infantry and artillery, as well as upon good staff work and perfect transmission of orders by telephone.

At this point the British had control of the air and were able to mass their artillery with¬ out detection by the foe. At 7 :30 on the morn¬ ing of 10 March they opened the most concen¬ trated fire the scene of war had yet witnessed. The troops were massed in the trenches in front of Neuve Chapelle and went forward at 8:05, when the barrage was shifted to the back German areas. The houses of the village were now leaping into ruins and no Ger¬ mans in them were able to escape. At 8:35 the artillery shifted to the area back of the vil¬ lage, and the infantry followed into the ruined streets, where some dazed Germans were left to surrender. So far as Neuve Chapelle itself was concerned, the attack was a success. A hole had been blown in the German line a mdle and three-quarters wide, and the British troops who had been assembled in the forward trenches were in the village safely established in newly constructed trenches. It was a part of the plan to have them followed with a strong column in support which would rush through the gap and seize the ridge to the east that led into Lille. This feature of the pro¬ gram miscarried for three reasons: (1) The gap was not wide enough to permit extensive operations through it. The German positions on each side of it enabled the undisturbed enemy artillery to enfilade the troops in the gap and confine them closely in their trenches ; (2) the necessity of bringing up the support¬ ing columns promptly was not understood, with the result that it was not until four o'clock in the afternoon that they were sent forward, and at that time the Germans had organized strong defenses on the ridge; (3) the intense bombardment had made such heavy demands on the stock of ammunition that there was not enough at hand to carry on the action on the scale that was necessary to in¬ sure success. The result was, therefore, that this action, which began so well, did not ˆneld the full fruit that had been expected. The

Copyrijˆht., Underwood A Underwood, N, Y.

1 Ruins of Ypres

IN THE WAKE OF BATTLE

2 Ruins of Albert Cathedral

WAR, EUROPEAN

1 French children watching arrival of Americans (Soulosce)

2 French peasant family return to find their home in ruins

Copyright, Underwood & Underwood, N. Y.

German salient was flattened out, but the fur¬ ther advance toward Lille w'as not realized. During the 11th and 12th the British made in¬ effective and costly attempts to widen their position. On the latter day the Germ.ans made the expected counterattacks, but their thrusts were badly coordinated and caused little trou¬ ble to the British. On the night of the 12th General French, recognizing that the effort had spent itself, ordered the army to organize their trenches in the ground gained and give over the offensive. Although the battle of Neuve Chapelle yielded no territorial results com¬ parable to the sacrifices, it taught the British a useful lesson in the conduct of massed at¬ tacks on enemy trenches. They lost 12,811 killed, wounded and missing and estimated that their opponents lost nearly 20,000.

This blow aroused the Germans to retali¬ ate. On 14 March theyˆ assembled a great many cannon under cover of mists opposite Saint Eloi, a position just north of the Messines Ridge, at the inner point of the salient the Germans had driven into the line south¬ east of Ypres during the first battle at that place. If the position was taken, the entire British line in this sector would be in danger. The bombardment they opened on the British trenches at 5 p.m. is described as ®tremendous,ˆˆ showing that they also had profited by the lesson of Neuve Chapelle, and it was re¬ inforced by the explosions of two

mines under the British defenses. Then the infantry at¬ tacked in heavy masses, forcing their oppo¬ nents out of the crumbling trenches at many places. By bringing up light artillery they then enfiladed the position to which the de¬ fenders still clung, and by nightfall the village was in their hands. Under cover of darkness, however, the British organized a strong coun¬ terattack, which, delivered at 2 a.m., retook all the positions lost that were deemed of impor¬ tance. In this battle the first of the Canadian regiments came under fire, the Princess Pa¬ tricia's Light Infantry, with such good results that the spirits of both Canada and Britain were raised to an enthusiastic pitch.

■One blow provoked another in this ding-dong fighting on the western front. Saint Eloi was a German offensive and the British reply to it was an attack, opened on 17 April against Hill 60, an important elevation in the flat coun¬ try north of Klein Zillebeke. To take it would push back the German lines at a point where they were within three miles of Ypres. The position was seized by the British on the l7th, the Germans counterattacked on the 18th and desperate fighting followed on the hill itself until the 21st, when the Germans were driven off and the British remained in possession, with heavy losses on each side.

It was while this affair was in progress that the second battle of Ypres began, the German reply to the attack on Hill 60. The first step was a heavy bombardment of the town^ of Ypres with 42-centimetre shells.^ The object was to block the streets and interrupt the bringing up of reinforcements by the roads that led through the town. As these roads led to the northeast of Ypres and Hill 60 was on the southeast, it indicated to the British that the scene of attack was about to be shifted. Their forecast was confirmed on the evening

of the 22d in a most gruesome way. The time was five o'clock and there was a steady wind from the northeast. Artillery observers no¬ ticed a bank of greenish vapor m.oving from the front of the German lines toward the Allied trenches. It came on along a front of more than four miles, part of it held by soldiers of the Ninth French Army and part, on their right, held by the third and second brigades of the Canadian division. The vapor rolled along by the breeze was asphyxiating gas. The Germans had prepared to use it, and in order to break the shock of horror to the minds of their own people had previously circulated the false story that the Entente Allies were using it. The French and Canadians knew not what it was until it was on them. Says General French: ^Tt was at first impossible for any¬ one to

realize what had actually happened. The smoke and fumes hid everything from sight and hundreds of men were thrown into a comatose or dying condition, and within an hour the whole position had to be abandoned, together with about 50 guns.^^ In the Canadian trenches the fumes were less severe, .and the men stood their ground, though many of them suffered greatly. To their left a gap had opened in the line four miles wide, leav¬ ing their flank exposed, forcing them to bend back their line and to hurry forward their brigade reserves. Fortunately the Germans did not advance hastily, probably because of fear of their own gas. The approaching dark¬ ness was some relief, also, and by the next morning General French had sent forward five battalions, which with the two reserve bat¬ talions of the Canadians had to repel the Ger¬ man attempts to penetrate the gap during the 23d. It was not until late on the 24th that effective reinforcements arrived, and by that time the losses in the lines were so heavy that the reinforcements did not restore security. The retiring French had abandoned their ar¬ tillery and the reinforcements had no means of keeping down the artillery fire that raked the field over which they had to fight. The Germans continued to employ gas and the Canadians had a second encounter with it on the 24th; but they had learned that to fix a wet handkerchief over the face gave much relief and by sticking to their posts they ob¬ served that the gas quickly passed by, whereas those who ran were longer within its grasp.

The week of sheer slaughter that followed has no redeeming feature other than the cour¬ age of the men who met it. The Germans threw themselves with special vigor on the two Canadian brigades who carried themselves, as General French said in his report, ®with a magnificent display of tenacity and courage.^^ If there had been a break where they stood the enemy would have turned the whole east¬ ern front of the Ypres salient out of its posi¬ tion, and the result would have been disaster. On 1 May General French ordered the troops on the east to be drawn into positions nearer the town. His lines of communication in the salient were under hostile fire from the heights north and south of the trenches, and thus les¬ sened the difficulty of supplying the troops while he shortened his lines by three miles and gave opportunity to the occupants to take longer rest periods. The retirement was effected

quickly and without the knowledge of the Ger¬ mans, who continued to shell the trenches after they were abandoned. Hard fighting continued until 13 May, when the Germans ceased to at¬ tack, They had been fighting for no territorial gains. To take Ypres at the expense of the British, to shatter their morale and to waste the strength of the British army was all they had in mind. They had not succeeded in the first of these objects nor in the second; but they had taken heavy toll of their adversaries.

The lesson of the battle was written plain for the eyes of all to read. The British army was fired with as great courage as any that ever answered the summons of battle, but it did not equal its opponents in organization. None realized this better than the British them¬ selves. They took the lesson to heart, realizing that ultimate victory could not come until their own organization was improved.

The introduction of poison gas will ever be associated with the second battle of Ypres, although asphyxiating shells had been used earlier. The gas was chlqrjne and being drawn into the lungs produced acute bronchitis, con¬ gesting the face until it was lividly purple and producing most intense pain. Those who first encountered it ran backward, thus accom¬ panying the gas as it was wafted onward. Run¬ ning and gasping caused heavy breathing, which resulted in the inhalation of larger quantities of the deadly fumes. The British authorities set at work to provide respirators, and by 8 May the army was supplied with appliances that were effective for preventing the worst effects of the gas. The use of this gas and the stories of the excruciating pain it produced shocked the neutral world. On 7 May carne the news of the destruction of the Lusitania. It seemed that the Germans were determined to give one proof after another that they were callous alike to the feelings of humanity and the esteem of civilized peoples.

4. The Allied Offensive of 1915. — When the second battle of Ypres occurred the British and French were prepared for a coordinated offensive against the German front at points south of the Ypres salient.ˆ It was their in¬ tention to cut through the intricate system of railroads in this portion of France by which the enemy got his supplies for the part of his line north of the angle at Noyon and south of Ypres. If such a blow succeeded it would necessitate the readjustment of a large section of the line. It would also force him to draw off reserves that otherwise would be used in the Russian campaign. The battle was under¬ taken primarily as the Franco-British offensive of the spring of 1915. The allied High Com¬ mands did not think that they were reduced to the necessity of keeping the defensive. The French army

was called out to the extent of its numbers. The British army stood at 500,000, the greatest land army Britain had ever pos¬ sessed. It was believed that they were suffi¬ ciently supplied^ with munitions. Certainly they had quantities far in excess of any that a preceding British army had possessed. It was spring and the time for an advance.

The Germans were cognizant of the British preparations and opened the second battle of Ypres and carried it on for three bitter weeks in the hope of drawin,g off the British forces and so preventing the movement. They pro¬

duced such a critical state of affairs in the salient that the French were forced to open the battle in order to draw off the Germans from Ypres. It was a well-judged feature of the German policy that seeing themselves threat¬ ened by this double attack at a time when their general western policy was the defensive, they concluded that the best course was to antici¬ pate one of the proposed blows. Their attack on the British succeeded in turning aside most of the energy that was due from that source, fighting while the French were still unready to strike a blow. When that blow came the British were so far spent that they were of little weight, and most of the attention of the Germans was given to the French. We cannot withhold our admiration for the good general¬ ship and daring that would try this alert strat¬ egy, truly Napoleonic in concept, of dividing the foe and striking first one and then the other of the parts.

The British portion of the double spring offensive was against Aubers Ridge, near Festubert, a mile north of Givenchy; the French portion, known as the battle of Artois, was staged in the 10-mile sector between Lens and Arras, eight miles south of Givenchy. The pressure on the British lines at Ypres did not entirely stop the British preparations at Festu¬ bert; and General French opened his projected attack at that place on 8 May. It was a short and cutting thrust and netted him 8,000 casual¬ ties in a few hours without any noteworthy gain. On 16 May the attack was renewed three miles to the southward, at Festubert itself, but the gain was slight and the losses great. In both of these engagements the British suffered from lack of high explosive shells, which alone could destroy the enemy’s wire entanglements. The same lack had been felt at the first and second battles of Ypres, but little had been done to remedy the deficiency. The reappearance of it in these two engagements and the resulting heavy sacrifices of life caused an outburst of indignation in Great Britain, The shell scan¬ dal, as it was called, was one of the painful

experiences of Great Britain's war, but it led, finally, to a better organization of the War Department with a fuller realization of the altered character of warfare. How slowly the officials changed their views is shown by the fact that when General French returned from the scene of slaughter at Aubers Ridge he re¬ ceived a dispatch ordering him to send 20 per cent of his reserve ammunition to Gallipoli. It is difficult to relieve Lord Kitchener, Secretary of War, of serious blame for this situation. Splendid soldier as he was, and always doing his utmost for his country, he had not yet realized how much had to be done to make the British war machine equal to the demands on it.

ˆ The controversyˆ over munitions became a chief subject of political interest at this period of the war. Mr. Asquith, the Prime Minister, was an optimistic man and could not be brought to see the need of more ammunition. General French made many requests to the Secretary of War and they came to the knowledge of the Prime Minister. The opposition newspapers took up the cry. But Mr. Asquith set the criti¬ cism aside in a speech in which he said that the army had all the ammunition it needed. At this time the Gallipoli expedition was de¬ manding a large part of the products of the

munitions mills, which was another untoward effect of that expedition. After the battle of Festubert, General French took the extraordi¬ nary step of appealing to Mr. Lloyd George, sub¬ mitting to him copies of his ignored requests with a memorandum of the actual need of the situation. At the same time he gave a startling statement to the London Times that laid bare the situation. The upshot was the overthrow of the existing government and the installation of a Coalition Ministry, with Lloyd George as Minister of Munitions. From that time mat¬ ters improved. The public did not understand that high explosives were necessary in trench warfare. Ordinary shrapnel had no effect on entrenchments, dugouts and machine-gun nests, in making which much concrete was used. The more powerful high explosive shells were needed to pulverize these works, reduce the artillery to inefficiency, destroy wire-entangle¬ ments and thus make it possible for charging troops to advance without slaughter. General French was undoubtedly a man of little tact and he had acquired the

reputation of a man who complains, but he was right in holding that the British suffered heavy and needless re¬ pulses at Ypres and Festubert because the ammunition was not in conformity with the re¬ quirements of the most modern type of warfare.

The French government had not failed, as had the British, to profit by the lessons of nine months of actual war. As soon as it found itself in the struggle it turned all its energy to the manufacture of heavy guns and ammu¬ nition. By the spring of 1915 it had made long strides forward in these respects. When it opened its portion of the double offensive, therefore, it was prepared to make a heavy impression on the German lines. It was not able, however, as we shall see, to cut them completely, largely because^ the Germans had also utilized the interval since the beginning of the war to carry forward the same kind of improvements. They had prepared such strong defenses in cannon, machine guns and trenches that even the improved means of offense were not able to obtain a decisive result.

It was 9 May 1915 that this offensive, the battle of Artois, opened, between Lens and Arras. In this region we are no longer in the flat and water-logged country that surrounds Ypres. The surface is broken with many de¬ pressions in which were stone or brick villages which made excellent machine-gun defenses. The German lines at this point made a salient about five miles in front of Lens, crossing the heights of Notre Dame de Lorette at the ex¬ treme angle and taking within their limits the villages of Ablain, Carency, La Targette and Souchez. The soil was chalky and easily cut into trenches with dugouts. At the southern end of the salient, two and a half miles from Arras, was an intricate series of trenches known as the Labyrinth. The position as a M'hole was one of the strongest in the theatre of operations, but to take it would be decisive for a large portion of the western front. It would mean the capture of Lens, important as a centre of roads and as the area whence France had drawn her most considerable supply of coal, so essential to her manufactures of munitions. , ^ ,

Against the place the French massed seven army corps and 1,100 cannon. General Foch,

who was in superior command of operations along the entire French front north of the great angle at Noyon, came to the place and assumed direction of the attack. His plan was to use the tactics employed first by the British at Neuve Chapelle, and repeated later by the Germans at Dunajec, of blowing a great hole in the enemy's

trenches and sending through massed columns before they could bripg up troops enough to stop the movement. The Germans defending the position were von Billow's army, which took a prominent part in the Marne campaign of 1914, and it was rein¬ forced with three new divisions a few days before the French began their battle, probably because they had received intimation of what was coming.

It was 9 May, the day after the British opened their futile attack against Aubers Ridge, that the French delivered their assault. The initial bombardment was the most intense yet seen on the western front. Says Mr. John Buchan : ®It simply ate up the countryside for miles.® The trenches from one end of the sector to the other were reduced to powder intermixed with broken guns, rifles and human debris. During the course of the day more than 300,000 shells were fired. The infantry went forward behind the barrage at 10 o'clock in the morning. On the southern side of the salient they crossed the trench lines for large gains, at one place two miles and a half. North of the point of the angle they were face to face with the ruins of Carency, which the Germans filled with defenders, and with ma¬ chine guns on the top of the heights of Notre Dame de Lorette. It took four days to batter these places into ruins. Into the former 20,000 shells were thrown before it was taken. Under previous conditions the German line would have been broken and the attacking force would have swept on into Lens. But here a new situ¬ ation appeared. The defenses were so intri¬ cately constructed that a break at one point did not carry the adjacent trenches with it. What happened, therefore, was that under the attacks of the French the lines of the Germans resolved themselves into a series of little forts, held by machine guns manned by resolute bands of defenders. To take these places required extravagant artillery treatment and careful ap¬ proaches of expert marksmen. In these cir¬ cumstances the advance was slow. It was not the less steady. The ruins of villages fell one after the other. At Souchez was a sugar re¬ finery whose broken walls swarmed with ma¬ chine guns. It changed hands several times but at length remained with the French. The Labyrinth required days of persistent fighting. One set of trenches but protected another, and underground passages enabled the defenders, beaten at one corner, to appear safely at an¬ other. By the end of May the French had beaten in the salient, but they had not taken Lens. The struggle went on as bitterly as ever but it was of little profit to either side. The Germans are supposed to have lost 60,000 men in the struggle, and the French could have lost few less. But as an attack the battle of Artois was a failure. Vimy Ridge, south of Lens, was the key to the position for which the French were struggling, and it remained in German hands when the fighting

died down at the middle of June.

316 WAR, EUROPEAN — MILITARY OPERATIONS, WESTERN FRONT (5)

Now came the inevitable lull after a great effort. Great stores of munitions had been used up, and it would require time to collect what was required for another great attack. That such a renewed attack would be made went without saying; for it was of the Allied plan to keep trying until they at last found the means of breaking through the German resist¬ ance. ˆ Each attempt had its lesson. Neuve Chapelle showed that it was necessary to have great masses of reserves ready to follow the first charge through a breach made by masses of artillery. Second Ypres showed that it was necessary to have high explosives in vast quan¬ tities and to take precaution against gas. The experience of the battle of Artois confirmed the already established fact that the strongest en¬ trenchments could be pierced, but also revealed the immense power of defense in scientifically constructed entrenchments lavishly supplied with machine guns. The Allies were encour¬ aged by reflecting that they were ever growing in strength a.s the volunteers of Great Britain came through preliminary training. There was, in midsummer, 1915, no question about holding out in the West until Great Britain was ready. Germany herself had taken the defensive in the West, and the time was approaching to deter¬ mine if her defensive could be broken.

The next great Efttack of the Allies came on 23 September, the British striking at Loos and the French in Champagne. In the three months' interval between its inception and the battles at Festubert and in Artois a steady series of small engagements occurred at vari¬ ous points in the long line. Sometimes the in¬ itiative was with one side and sometimes with the other, but the result was always the same. A heavy bombardment, a charge of infantry into a demolished trench, and then the inevit¬ able countercharge, with the result that the place seized was held under distressing fire or given up because its retention cost more than it was worth. But the total result was little more than the steady loss of lives. The gen¬ eral situation was not affected.

The most notable of these isolated opera¬ tions was the German attack, conducted by the imperial crown prince, on the French line in the Argoniie Forest. This favored leader had not acquitted himself well

in the preceding fighting, and murmuring against him had al¬ ready begun in Germany. It is believed that he was allowed to have another try in the hope that he would restore his damaged reputation. He was reinforced until he had 50,000 men along a front of eight miles, and the move¬ ment was inaugurated on 20 June. The three weeks of fighting that followed was a series of infantry battles in small sections. The terrain lent itself well to machine-gun defense, being protected by undergrowth and many ra¬ vines and rocky ledges. It yielded the Ger¬ mans an average advance of 400 yards on the entire line and was not commensurate with the sacrifice. The Argonne was long a debated region between the two sides, and many lives were lost before it was_ finally taken in October 1918, when the Americans and French con¬ ducted great flanking movements on each side, while American troops, at great cost, carried the forest lines northward by heroic efforts.

Throughout the summer preparations were going forward for a great Allied advance in

September. The place selected for the main blow was in the Champagne sector, the scene of the battles of the preceding February. The object was to cut the railroads that supplied the German lines east of the great angle near Noyon. This done a general readjustment of lines would be necessary. In support of this main thrust plans were made for a strong blow at the defenses of Lens, chiefly to engage the Germans in the northern sector and prevent very heavy concentrations in Champagne. The particular point of the Lens defenses to be at¬ tacked was Loos, three and a half miles north¬ west of Lens, although the battle was pressed on a front that extended nine miles north and five miles south of Lens. In this supporting movement the British had the area to the north and the French the area to the south. In the main attack, in Champagne, the operations were conducted wholly by the French. The battle opened in each area on 23 September.

In the Champagne it extended from Auberive to Massiges, a front of 15 miles. The new French guns were present in the greatest abun¬ dance and there were vast stores of ammuni¬ tion. The bombardment lasted two days. The German trenches had been constructed with great skill and sitrength in the chalky soil. They were intricately laid out and supplied with large dugouts. The advanced position consisted of four or five parallel lines and was 500 yards deep. The bombardment re¬ duced it to powder. As the infantry came forward on the 25th the position was unde¬ fended except for stray machine

guns manned by some survivors in the dugouts. Leaving de¬ tachments to ^mop up® these survivors the columns went forward to the second line of trenches. As the men went they sang snatches of the Marseillaise and that other song of the Revolution, the Carmagnole. The second line was better defended by the German infantry and machine guns, while the hostile artillery had the French under accurate range. Now the losses were great, but there was no faltering. The men went on to the positions of the guns cheering and throwing themselves on the gun¬ ners in irresistible force. Orders now issued to bring up the guns and the batteries went forward in gallant style under bursting shells. ®For the first time since the Marne,® said an artillery officer, «we were galloping to battle, guns and limber jolting and shells bursting all around us.® A part of the French line pen¬ etrated the second German line of defense. Late in the afternoon the advance had to be suspended on account of the heavy weather, which made it impossible for the artillery to obtain accurate observations. Next day it was resumed, but the Germans brought up rein¬ forcements and the progress was more diffi¬ cult. The French guns going forward were heavily impeded by the mud which soon churned up in the chalky soil. In the end, it was decided to give over the attempt to go farther and the French found that their total gain was from one to two miles on a 15-mile front. They had taken 25,000 prisoners, 150 cannon, and vast quantities of munitions and small arms. Their own losses were about 120,000; but the enemy's were larger still.

In this second battle of Champagne the French failed to do what they had set out to do, penetrate the German defenses, cut the

railroads, and force a retrograde movement in great force. It was under the direction of General Petain, destined to come into greater prominence at Verdun. It was undertaken in the fullest confidence of success. For months the newly established munitions works had piled up reserve ammunition and it was used without stint or economy. The .lesson of Neuve Chapelle, improved upon by the Germans at Dunajec, was still further developed by the French in this battle. The attack was staged on a front wide enough to permit fair operation through its broken section, and there was no trouble about the necessary reserves,

thus re¬ moving the defeats of Neuve Chapelle. But it did not result, as Dunajec resulted, in a great victory for those who projected it. The reason was simple. Dunajec was fought against an army that had not anticipated this kind of tactics. At Champagne the Germans

had prepared for just such an attack. The long interval of quiet was improved by the erection of rear defenses. The lines were forti¬ fied with innumerable strong places which re¬ solved themselvˆ'es into forts as the intervening spaces were carried, thus giving time to check the attackers at the rear lines. Finally, the lateral railroad 'behind the line enabled the Germans to bring up reserves and stop the gap before the French charges had entirely overcome the resistance. It failed on the sec¬ ond day, when the decimated French armies found that these newly arrived forces would also have to be defeated and others behind them, before they could hope to stand free in the open country behind the enemy's en¬ trenchments.

Nevertheless, the results of the battle of Champagne gave the French and British a great feeling of satisfaction. If it had not given

them a complete decision, it had shown that their newly planned organization was success¬ ful. It had bitten deeply into the enem3ˆ's de¬ fenses. It was a kind of blow thast he dared not have repeated frequently; for by it he, being on the defensive where losses ought to be relatively light, had indeed lost more than the French. It showed that the German su¬ premacy in the art of war was broken. The months of work in munition factories and arsenals had borne satisfactory fruit. It only remained to continue what had been so well begun.

Let us now turn to the Lens sector, where the British attacked at Loos on a five-mile front, and the French, fighting at their side, attacked to the southward on a 10-miIe front. The movement, as we have seen, was designed as a supporting operation for Petain's battle in Champagne, and began on the same day, 23

September. General Foch was in superior com¬ mand of both attacks, but General French as commander-in-chief of the Britisti armies in France had the direction of the attack on Loos. Both armies were well supplied with ammuni¬ tion, and the British had received many

troops of the New Army of volunteers raised and trained since the war began, but not yet sea¬ soned by actual battle experience. At that time the British forces in France numbered as many as 1,000,000 and were organized in two armies, the first, commanded by Sir Douglas Haig and the second by General Plumer. It was Haig's army that held the lines opposite Loos.

The French troops had for their main ob¬ jective the Vimy Ridge, three miles south of Lens, overlooking a wide stretch of coun¬ try to the eastward. If it were taken and held the Germans would be forced back for a con-

Conde-tex Aufry

h'en/id -le

siderable portion of their lines. Foch's men battled hard for the position when the infantry was sent forward on the 25th on a six-mile front. The bombardment had destroyed the German trenches but machine gunners held out in the ruins and a heavy barrage and a massed counterattack were encountered. Nevertheless the French infantry worked away systematically day by day, and notwithstanding the heavy German reinforcements they carried their lines to the top of the Vimy Ridge on its western side. The enemy clung to the eastern edge and the narrow plateau on the top became No Man's Land. Here on the 28th the two armies faced one another ready for the final effort, which, it seems, would have freed the ridge from German control, when General Foch, at the request of General Joffre, sent his famous ninth corps to take over the trenches just north of Lens, where the British were in trouble through creating too narrow a salient in the enemy's lines. The withdrawal of this corps made it necessary to stabilize the French lines where they were.

Meanwhile, the British battle of Loos had been in progress since the. 25th. As it was launched four separate attacks were made to the

northward, designed to hold as many of the enemy as possible in these positions, so that the main attack might meet less resistance. These operations were as follows: (1) In the Ypres salient where General Allenby attacked the Germans at Hooge, winning ground in a brilliant dash only to give it up in the face of heavy artillery concentration ; (2) at Bois Grenier, where some of the first and second German trenches were taken before the enemy's concentration forced the attackers back to their original position; (3) at Neuve Chapelle against the Moulin du Pietre, where the In¬ dian troops with some British units fought a losing battle by rashly charging through the German trenches beyond the reach of aid from their supports ; (4) at Givenchy, where a slight advance had to be given up before the end of the day. These engagements probably justified their purpose of holding the attention of the enemy while his lines were attacked elsewhere and are not to be judged by immediate results. In the third of them occurred an unusual battle incident. The authorities had adopted the plan of placing tried British battalions in the In¬ dian brigades. Two of these brigades charg¬ ing in the heavy mist found the trenches oppo¬ site them undefended and went on without stopping to ^^mop them up,® with the result that Germans reoccupied them and attacked the advancing column from the rear. As the reserves did not come up the two brigades in the front suddenly shifted from victors into hard pressed and perilously situated men. They cut themselves out with great losses, especially the second and fourth Black Watch, serving with the Bareilly brigade of the Meerut divi¬ sion.

Meanwhile the operations known as the battle of Loos were under way on a line of four miles, between La Bassee and Lens. The country was flat and was littered with mining villages and slag heaps, out of which the Ger¬ mans had constructed excellent defenses. The British artillery was very strong and made sad work with many of these positions. It could not however, destroy all the machine guns, which

the Germans used in greater numbers in each succeeding battle, and there was work to do in all parts of the field. It was well done; for when the assault was delivered at 6:30 on the morning of the 25th the first and second German lines were taken along their whole front. Before Loos the attack was especially brilliant. The 15th division, all Scottish, com¬ posed of New Army men, here faced the enemy. Told to take Loos and Hill 70 the high slope beyond it, they streamed forward, subduing whatever resistance was offered until they ad¬ vanced four miles from their starting point and passed beyond the last of the German de¬ fenses. One of their sergeants cried to his men, as

they raced forward: ®Hold your swear¬ ing, lads, and keep your breath. The next stop ’s Potsdam.® At the end of the day the victors, exhausted by their efforts but deter¬ mined, were fortifying their positions and pre¬ paring for the enemy’s counterattack. Hill 70 commanded Lens and in that town the Germans were making hasty efforts to remove the heavy guns while it was’ time. The Highlanders hung on to the hill but in diminished numbers.

At this point, during the afternoon of 25 September the cause of the Entente Allies stood at a crisis. If the charge of the High¬ landers had been supported in force, the hole they knocked in the German defense could not have been mended. If a great British and French army had been sent through to the rear of the German lines, the most serious con¬ sequences would have ensued. The failure was a keen disappointment to all Britons. The cause of failure was the bad arrangements for reserves. The battle began with no other British reserves than the brigade each division kept in support. At 9:30 on the morning of the 25th, when the Highlanders were in Loos, General French placed two newly arrived divi¬ sions, under the orders of General Haig, who was in command on the field of battle. They were then eight miles from the scene of action and did not arrive at the front until late in the night. Next morning they broke before the German counterthrusts. From that time the battle consisted of a series of vain attempts to hold what had been taken. At last the area of British operations was narrowed by turn¬ ing over the southern part of the line to the French on 28 September-2 October. The bat¬ tle, so nearly a great victory, yielded the British an advance of two miles on a four-mile front. The enemy’s line was bent back but it was not seriously altered. The British lost 45,000 killed and wounded, a heavy toll, but probably equaled by the losses of the Germans. One of the results of the battle was the resignation of General French on 15 December and the promotion of General Haig to the chief com¬ mand of the British forces in France.

Thus the threefold offensive — in Cham¬ pagne, at Vimy and at Loos — came to its end without achieving its objective but with substantial advances toward it. Within the en¬ suing month came several reacting assaults by the Germans, but none of them made notable gains. The best of their armies were en¬ gaged on the eastern front, and the counter¬ attacks were no more than local affars, un¬ dertaken to keep up the spirits of the soldiers. They fell away with the coming of winter and the two armies settled down to the weary fight

against cold and wet. The next action of note was the German attack at Verdun.

5. The Battle of Verdun. — The end of November^ 1915, saw the German army at the height of its success in the eastern area. Rus¬ sia had been driven back to the eastern borders of Poland, Riga was all but taken, Serbia was overrun and rendered a conquered province, Bulgaria and Turkey were active and com¬ plaisant allies, Austria-Hungary was converted into a willing tool, and the dream of a ®Berlin-to-Bagdad® line of communication seemed to be an actuality. To the German High Command it seemed only necessary to wage a defensive war in this region and turn with concentrated energy to the western area in order to make the cause of Germany triumphant over all opposition. The decision was quickly taken and preparations made with great care and energy. A great breaking-through movement against the French line of defense was proposed, to be followed by the same kind of turning strategy against the severed wings that had characterized the plans that went awry at the first battle of the Marne. The point selected for the blow was Verdun. Why was this place selected? Several reasons can be given: (1) The Verdun angle was a spearhead thrust far into the German defenses ; for their lines on the east ran south from it to Saint Mihiel, a distance of 25 miles, and on the west sloped off to Vauquois, about the same distance, the rounded point of the angle between Btain and Maucourt being about five miles wide; (2) Verdun in French hands held the Briey coal fields under long range fire, and it was considered irnportant to free these fields from that menace, since the ore was needed in the manufacture of munitions essential to the conduct of the war; (3) the Germans had ample railroad facilities in front of Verdun, enabling them to bring up troops and supplies as freely as were needed; (4) here the crown prince commanded, he had not been very successful in previous movements, and for dynastic reasons it was desirable that he should have the honor of winning a great victory; (5) Germans had a strong sentiment for Verdun, partly through feelings that had endured from the 16th century when as one of the three bishoprics it was the bone of con¬ tention between France and Germany and partly because several attempts to take it during the course of the war had been thwarted by the defenders.

Verdun was important to the irirench for three reasons: (1) Its

successful defense so far had made holding it a point of honor; (2) as long as it was held it was an effective bar against German operations in the upper Marne Valley, that much contested avenue of approach to Paris; (3) it protected the Argonne, another important obstacle to German progress in this region. If Verdun were taken, therefore, it would be necessary for the_ French to make extensive readjustments in their lines of defense, and it might well happen that they could not make them safely in the face of such heavy pressure as Germany could now bring to bear.

In the beginning of the war, Verdun, one of the main forts of the eastern defense, had been changed into a fortified area to comply with the progress of the science of siege operations. Its steel and concrete forts no longer constituted the chief features of the defense, but outlying

trenches had been dug, and as the war pro¬ gressed these trenches had been improved and supplied with dugouts and wire entanglements of the strongest kind. It was by this means that the place was able to meet the strong bombardment that was about to come upon it. Verdun, however, had one weakness, and it may well have been a reason why the Germans decided to make their grand attack at this place. One standard gauge railroad led into the place, from Sainte-Menehould, but it passed within five miles of the German guns at Vauquois and its use was subject to interruptions. There was a narrow-gauge railroad from Bar-le-Duc to Verdun, but to use it meant great delay in unloading and reloading at the junction point. The Germans believed it would be impos¬ sible for the defenders to obtain the munitions over these roads to withstand the attack they proposed to make. The French, however, had provided an excellent motor-transport service from the main railroads into Verdun, and it proved sufficient for their battle needs.

The German line in front of Verdun ran from Btain, east of the town and in the Plain of the Woevre, to Ornes, where it rose to the heights of the Meuse and crossed them to Bra¬ bant on the Meuse. Thence it crossed the river to Forges and Malancourt and reached the edge of the Argonne four miles west of Vau¬ quois. South of £;tain it continued across the Woevre Plain in a southerly direction, climbing the heights of the Meuse just east of Les Eparges and passing thence to the western environs of Saint Mihiel. The whole line, from Saint Mihiel to the Argonne, was 60 miles around the loop, whereas straight across country from end to end it would have been only 28. The

section of the line selected for attack was on the north, alongˆ the heights on the east, or right, bank of the river from Ornes to Brabant in the first phase of the battle and across the hills on the west bank from Forges to Avocourt in the second phase. From Ornes to Brabant is eight miles and thence to Avocourt it is nine. The Heights of the Meuse are from five to eight miles wide in this region. In trying to advance along their crest from the north, the Germans showed that they preferred that way of ap¬ proach to an attack against Btain and across the Woevre Plain, which would have brought them to the foot of the Heights at Eix, only five miles from Verdun. They perhaps chose wisely; for to have climbed the escarpment at Eix in the face of French defense would have been very difficult.

Their reliance was massed artillery with which they expected to repeat the experience of Dunajec. On the eight-mile stretch from Ornes to Brabant they concentrated an unheard of number of guns, from four-inch calibre to 13-inch howitzers. Airmen flying over the woods in which these guns were assembled re¬ ported that they lay like apples in a basket. The plan was to pulverize one section after another of the French lines so that the infantry could go forward without serious opposition. To support the artillery the Germans brought up new troops until there were 14 divisions, at least 230,000 rifles, in the sector from Ornes to Brabant, and there were ample numbers in the other sections.

The French are said to have anticipated the attack at Verdun. If the statement is true they

were gravely responsible for carelessness in failing to make better preparations. In the critical sector they had three divisions of Ter¬ ritorial troops, by this time inured to warfare and dependable for good results, but not equal to the best troops. It was for them to hold the lines until reinforcements arrived. General Herr was in command of the sector, which was in the eastern area under General Dubail until the middle of December, when it was trans¬ ferred to the central area under Gen. De Langle de Cary. The northern defenses of the town were in a weak condition. Having given up the policy of manning the forts, the authorities had removed the guns from those positions for

use elsewhere. The lines had been indicated and the strong positions had been occupied, but

the intervening trenches had not always been constructed and there was a lack of scientific engineering by which full advantage was taken of the natural features of defense. For an ordinary assault the preparations were adequate, but for the effort the Germans were about to make there were neither fortifications nor sol¬ diers adequate to the defense. An investigation conducted by General Petain pronounced Gen¬ eral Herr guiltless of the sad state of defense of the position.

The storm broke on 21 Feb. 1916 during a heavy fog which favored the Germans. A deluge of fire accurately ranged by the map descended on the French positions. The first lines were held thinly, as was the French cus¬ tom, and fell back as well as they could

through the frightful barrage to the supporting lines. At noon the enemy advanced without opposition, took the first line unopposed, and most of the first line of support. In the after¬ noon the French won back the support lines in the Woods of Caure, but those in the Woods of Haumont were not recovered. Hurried efforts were made to construct strong rallying lines in the rear, and the troops were ordered to resist until the last in order to permit these lines to be finished.

Now followed a period of bitter fighting. It was for the French a matter of staying until the last possible moment and repeating the process in a position slightly in the rear. The bombardment was intense. Nothing like it had been seen in any other battle of the wˆar. On

22 February Haumont was won by the Germans after a heroic defense. Its loss imperiled Bra¬ bant which was evacuated on the night of the 22d. Next day the attacks were renewed with unflagging violence. The heavy German guns could not be moved easily and their aim became less efficient as the target became more removed. Theˆ French artillerists handled their 75’s brilliantly; the Territorials did all that was de¬ manded of them; and as the enemy came on in massed formations a great toll of life was taken. On this day attacks were made on the French line in the Woevre, and it was decided to draw

them back to the foothills of the Heights of the Meuse, so that Ornes was given up. At this time the French line had been driven back on an average of a mile and a half in three

iˆDamvillers

iS/Vry

-1 —

Roods

Rol/roads

Danneˆouxˆ ConsenvoL

F/abas,

Senon

raucoi

ˆcftTcduRfˆ

laucoUi

■um’iere.

Y

tui

‘ˆFsnes ∼CFianii

fPdcdurf ˆ

BefBe/oinˆ

VERDU

ˆFT\S0U//U£

yrml)

FT CHAUMFˆ

IfT SARTFLLEdˆ

MAP SHOWING

BATTLE OF

VERDUN

0 12 3

. German Line Feb. Id/ 6 xGermanLme Oct /S IS

r/\/yp//£Ljjˆ

BELRUPr * FTROZELUFP

ˆaur/Ci

ˆ UtXC. Lf

Miles Vr

Senoncourf

FTdudTomdlfi

f^r HAUDA/Nir/^LE

Les Epargi Co. N.

WAR, EUROPEAN

1 Ruins of Zonnebeke Church after German offensive

Copyright, Underwood & Underwood, N. Y.

2 The Ruins of Peronne

WAR, EUROPEAN

fc. - f ‘

”*7

* ■

llfpS

*

♦ V* 7

^ -PH **

copyright, Cmlerwood tV I’luleiwotMl, Y,

1 Shell-holes in a wooded valley on the Meuse near Verdun

2 German trenches of the “ Fille Morte ”

days’ fighting. In the centre it made a loop around Beaumont and there throughout most of the 24th the tide of death rose high. In the afternoon the Germans surrounded the place but the French managed to escape capture. On this day there was a general retirement.

February 25th was a decisive day in the battle. When General Joffre realized on the 24th how serious was the attack on Verdun he sent thither General Castelnau with authority to act as he saw fit. He had previously ordered up reinforcements, among them the famous 20th corps which had saved Nancy under Castelnau. Only two brigades had arrived by the morning of the 25th and the 20th corps was not on the field until afternoon of that day. The first act of Castelnau on arriving at Verdun was to direct General Petain, commanding the second army, to come to Verdun with his staff. His immediate response and the vigor he infused into the operations perhaps saved Verdun for the French.

The retiring army reached the reserve po¬ sitions during the night of the 24th. The trenches were well constructed and afforded comfort to men who had been fighting inces¬ santly with little cover during four days. They began on the Meuse near Vacherauville, fol¬ lowed the

crest of the Cote du Poivre (Pepper Hill), passing south of Louvemont and Cham-brettes Farm, and turning southeastward until they reached the edge of the Heights at the gorge of Vaux. The tired French troops stood in them on the morning of the 25th awaiting the onslaught of the German, himself conscious that before him were exhausted troops in their last line of defense and that reinforcements were about to arrive. He massed his superior forces for a final crushing blow, believing that victory was in his grasp. The dogged defense made by the Territorials that day cannot be forgotten in French history.

When day broke it was snowing and bitterly cold, a bad thing for the attacking parties, since it made them more distinct against the horizon. But the Germans showed little caution that day. They had men in abundance and thought little of losses. A few miles to the north the kaiser and his staff stood on the twin peaks near Ornes watching the operations through glasses, and no one dared falter under such conditions. His troops attacked at each end of the new line, at the Cote du Poivre on the west and at Douaumont on the east. At Poivre the Germans came up time after time and were driven back con¬ tinually by the 75's and the riflemen. The place was never in danger. At Douaumont the attacks were heavier and more stubborn ; for the position was rightly believed to be the key of Verdun. Once fortified with German guns the French lines would be forced back from the surrounding hills. Wˆith reckless regard for their men the kaiser's officers sent up unit after unit against the well placed French lines. They seem to have thought that each blow that failed would weaken the defense to some extent, and that eventually it would be so weak that the attack would carry through. It would be diffi¬ cult to describe the slaughter endured by the brave Germans that day as wave after wave was urged forward into the French barrage. The valley through which they approached was cov¬ ered with the dead and wounded. At its exit the prostrate bodies lay in piles where the

fugitives were caught trying to get away. But they ever came on. As evening fell they were rallied for a final attempt. The kaiser was waiting to announce victory, and already per¬ sons in the government confidence in Berlin were waiting at the telegraph wires for the word that would confirm the good news. This last charge was the most violent. The infantry of two corps was sent forward against the crest of Douaumont on a line two miles long. They fell in swaths at the crest as they tried to cross the narrow plateau in front of the French

lines. Wave after wave had thus been mowed down and the mowers were tired and sickened with their work, when at the very close of the day came the 24th regiment of Brandenburgers, one of the crack units of the German army. In nar¬ row formation it plowed its way through the de¬ fenses east of the town of Douaumont and broke through the lines at the site of the ruined fort, and here it stood-during the night, behind it the lines forming anew. The kaiser seized the moment to announce to his people that Douau¬ mont was taken.

Late in the afternoon General Petain arrived at Verdun. A few hours later came the 20th corps. The new commander seized the situa¬ tion promptly. The new troops were ordered to the front and the next morning they delivered a counterattack which drove all the Germans from the crest around Douaumont, except a few Brandenburgers who managed to hold out in the ruins of the fort. The 25th of February had proved a Black Friday for the Germans. At a tremendous loss they had won a precarious hold on the crest of a ridge, and at an early hour next morning they lost it.

Now followed three days of hard and des¬ perate lunges at first one and then another place in the French defense. A great many lives were sacrificed uselessly in an attempt to cut through in the centre, between Poivre and Douaumont. Another effort was an attempt to make a great flanking movement by way of the Woevre Plain to the Heights south of the line of defense, but the two corps to which the task was assigned were crushed when they at¬ tempted to climb from the plain to the Heights. When Castelnau arrived in Verdun on the 24th the officers there were ready to give up the place. He declared that it must be held. Petain took the same ground. It was then that the French soldiers, high and low, joined in the vow, ^^Ils ne passeront pas’”^ (®They shall not pass®). All France poured its soul out in those words. To have given up Verdun after that would have been a moral defeat.

The first week of the fighting had shown the Germans that they could not break through the French lines by frontal attacks and they decided to shift their efforts to the western side of the Meuse. Now came a pause while the heavy artillery was being transferred. The first stage of the battle of Verdun was over, and it had yielded the Germans nothing but a serious loss of men. It is true their lines had been advanced four miles along the northern portion of the Heights of the Meuse, but against this gain place the fact that the element of surprise was expended and the French, thoroughly aroused, were present in force and bringing up men all the time. West of the river the French were placed on a ridge known as Cote de I’Oie (Goose Heights),

shaped something like a ham The small end is on the river opposite Brabant and is about a mile wide, while the large end is five miles due west and is two and a half miles wide. This ridge is bordered on the north and on the west by a brook with narrow meadows above which the ground rises to a height of from 150 to 225 feet, the highest point being at the western end, an elevation known as Mort Homme (Dead Man). Still farther west are two hills, known as Hills 304 and 287, whose slopes reach to the vicinity of Avocourt, eight miles west of the Meuse. In the beginning of the battle the French lines ran along the narrow part of the ridge for three miles at the foot of the northern slope and then crossed the brook and took in the villages of Bethincourt, Haucourt and Malancourt, and then it ran southwesterly until it took in Avocourt and proceeded thence to the Argonne. Since the Germ'ans had carried their line forward on the east bank for four miles, this strong position on the west bank enfiladed their advance along the eastern bank and con¬ vinced them that nothing could be done until they had cleared the west bank. The key of this ridge was Mort Homme, its highest point. It stood at the centre of the position and if held and fortified by the Germ.ans it would force the relinquishment of the positions on each side. If this hill could not be taken the next best tactics was to sweep around Hills 304 and 287 at Avocourt, turning the whole elevated area. Such was the work to which the German army gave itself as soon as it real¬ ized that the way along the Heights of the Meuse was blocked at Douaumont and Poivre. The fighting in this region falls into two phases, which we may recognize as the second and third stages of the battle of Verdun. The first concerned the capture of the Cote de I'Oie, the second was an attempt to turn the defenses by way of Avocourt. But we must remember that while these operations were in progress there were many supporting blows on the east¬ ern side of the river, designed mainly to hold French troops in that section while superior forces attacked on the western side.

The second stage of the battle opened on 2 March, when the Germans began an active bombardment on the line from the Meuse to the Argonne. It steadily grew stronger until it was intense on the 5th. General Petain interpreted it correctly as the precursor of a new movement and prepared accordingly. He was not deceived by a

holding attack made on Douaumont, which resulted in the loss of the village of that name but did not shake the French hold on the ridge above it.

On 6 March the infantry battle on the west side began on the end of the line opposite Bra¬ bant. The Germans followed the plan used on the eastern side, subjecting a section of the line to severe artillery fire and then send¬ ing the infantry forward, a process that was successful against the weak line of Territo¬ rials at the beginning of the battle. It was the practice of the French in the World War to use their men with economy. When they stood in a position that was not essential to the main plan of the battle the policy was to make the enemy pay as dearly as possible for it but to give it up when holding became very

costly. Such was the policy adopted at Ver¬ dun. There was a steady recession until the critical positions were reached at Douaumont, on the east side, and at Mort Homme on the west side and then the time had come to stand in one's tracks and die, if necessary. This policy was understood by the French soldiers. It was put into use on the west side of the Meuse in the battles that occurred in the sec¬ ond stage, from 6 March to 17 March. The net result was a gradual drawing back to the Mort Homme position, from the east end of the Cote de I'Oise until all the narrow portion, corresponding to the shank of the ham, was in German hands. But the French line would yield nothing around the eastern base of Mort Homme. Many of the enemy gave up life in trying to drive them from this position. On the 14th a main effort was made against Mort Homme. Forward went 25,000 men in five waves. In general they were checked, but a portion of them, Silesians, managed to lodge themselves just under the crest of a hillock, called 265, a spur of Mort Homme. They drove the defenders from the hillock, and news went to Berlin and the neutral world that Mort Homme was taken. It was false. Hillock 265 had the same relation to Mort Homme that the town of Douaumont had to the ridge of Douaumont, it was an outpost and useless unless the main position was carried. It was the German's nearest approach to Mort Homme for many days.

While these operations went on severe blows were delivered on the east side of the river, with the purpose of attaining Douaumont from the east. Here at the village of Vaux and the old fort of the same name the Germans fought desperately for three days to establish them¬ selves, 9-11 March; but they were repulsed with great losses. Wherever the enemy appeared there Frenchmen appeared ready to

oppose him. All France watched the struggle, as, indeed, all the world watched. The Germans sent up division after division, and Joffre did the same thing. It is said that every division in the French and German armies had gone through the Verdun trenches when the battle ended. When the second stage of the battle was at an end the crown prince was beaten, but he was unwilling to admit it. To withdraw now, he felt, would be a blow to his prestige. It was decided that he should have another try, and this time it was to be around the extreme western end of the French defensive position west of the river. Here we come to the third stage of the battle, the attack on Avocourt.

West of Mort Homme isˆ Hill 304, which is higher than Mort Homme and commands it. It, in turn, is approached by Hill 287 on the west, and the western slopes of that are reached from the woods north of Avocourt. Through these various positions, therefore, woods. Hill 287, and Hill 304, the Germans proposed to take Mort Homme, which, in turn, would enable them to clear the west bank of the river, and which, finally, would make it possible to clear the east bank and outflank Douaumont on the west, and so enter Verdun. It was a long series and it had taken a month's hard fighting to develop the relations of one part to the other, but reflection seemed to confirm the German faith in the series. They felt that

they had at last worked it out to a logical state- — take Hill 304 and hard fighting will accomplish the rest.

On 17-20 March they delivered an intense bombardment on the trenches around Avocourt, and on 20 March began the long and desperate fighting that continued until 9 April. They first tried to advance by way of Avocourt Wood. By using flame throwers they gained a foothold in the woods and built a redoubt as a base for further advance. At the same time they drove forward in Avocourt Wood until Petain decided to spend some of his valuable forces in a counterattack. It was worth what it cost ; for it drove the invaders back from the position. At the same time he withdrew from the village of Malancourt but took such a strong position at the foot of Mort Homme that the position they won was worth nothing to the Germans. This happened late in March. After a breathing spell the

Germans became active again on 3 April, fight¬ ing hard for the approaches to Mort Homme on the north. By 8 April they had driven up to the foot of the hill on the northern end and to the foot of Hill 304 on the northwestern side. They then massed five divisions and rnade a final attack on the 9th, comparable in intensity to the great attack on Douaumont on 26 February. Here, as then, they had driven forward by piecemeal attacks until they stood within touching distance, as it were, of their main objective. Here, as then, they gathered their utmost strength and made a final assault along their whole line. The 9th was a day of great effort and a day of great slaughter for the Germans. They came on in close formation, only to be destroyed by the French artillery. Driven back they rallied and came forward again, and again they were forced back by the shower of death that fell from the hills. At nightfall their grand offensive was a gigantic failure.

For a time it now seemed as if the German High Command was willing to acknowledge defeat, since the battle front was comparatively quiet for nearly four weeks. The renewal of the conflict was probably due to political pres¬ sure in Germany, where so much had been said about the great victory that was to crown the sacrifices that the ruling class did not dare confess defeat. The part of the struggle that came after this lull has been called the second battle of Verdun, but it was, properly, only a deferred part of the first battle. It was taken up and carried on in dogged determina¬ tion but without a clear feeling that victory would be worth its cost. In this part of the battle three stages are also observed, one on the west and two on the east side of the Meuse.

Before they began a change had occurred in the French command. General Petain had succeeded De Langle de Cary in command of the middle portion of the great battle line, stretching from Soissons to Verdun, and Gen¬ eral Nivelle, under his supervision, was in command of the second army defending Ver¬ dun. The change in command did not mean a change in tactics.

The fourth stage of the battle, the first after the lull in April, was an attempt to sweep back the defenses on the west bank of the river. It began with a severe bombardment on 3 May against Hill 304. During four days

artillery and infantry made alternate attacks on this hill without success. At last it was assaulted with the equivalent of an army corps

against two regiments defending it. Five times they rushed forward and were repulsed, the last time in a fierce counterattack that was delivered in the darkness. Next day, the 8th, the top of Hill 304 was so violently swept by hostile fire that the French drew their lines down to its base, yielding the position for which they had taken heavy toll. From 17-21 May Mort Homme was carried in the same kind of a concentration. Then came a period of great rushes and counter-rushes to carry the lines farther along the river bank. They yielded the Germans nothing and cost them tremen¬ dously. At the end of the month the line of battle on the west side was about a mile south of the crests of Hill 304 and Mort Homme and ran straight east and west, to the river on one hand and to Avocourt and the Argonne on the other. Now the battle died down in this part of the field.

The next and fifth stage of the battle of Verdun belongs to the story of the eastern side of the river and here the offensive was taken by the French. The object was to press back the enemy at Douaumont and to draw off some of the troops being used on the other side of the river. After a two days' bombardment the infantry went forward on 22 May and took most of the ruins of Fort Douaumont out of the hands of the Germans. Only the northeast corner held out, defended by machine guns in great numbers. Here the French held on despite the maddening crash of shells over their heads until the 24th, when two fresh Bavarian divisions recovered what three French regiments had won. Thus ended the French offensive without profit. The sixth stage of the battle was a series of operations around the right end of the line that ran across the Heights of the Meuse. In this position they had gradually worked forward until they were within five miles of Verdun at some points. At Douaumont they had high ground from which they could observe all the ground to the city. They had found it impossible to go forward in a straight line from that elevation, and they decided to make the attempt by their left flank. Blocking their way on the left stood Fort Vaux, held by determined French soldiers. Its guns covered a wide area right and left and protected the strong Fort Souville, which was the last strong protective work of Verdun.

On 31 May, a heavy bombardment was begun, and the next day an infantry attack was made. There were some gains west of Fort Vaux and others to the east, and the next step was to make a converging assault on the fort from three sides. Some idea of the intensity of the fighting in this section may be obtained from the fact that for three months an average of 8,000 shells a day had fallen on this fort. On 2-3 June the infantry were again employed, and again Bavarians were used in wave after wave. They were received by the garrison in cellars and among the ruins of the concrete construction, with Major Raynal

in command. The name of this heroic man deserves special mention in a series of opera¬ tions in which heroic deeds were common. Under his indomitable will the garrison held

out until 6 June and did not surrender until it was reduced to a mere handful. On 7 June came a massed attack on a long stretch of trenches. The result was an advance as far as Fleury. Here was the farthest advance of the Germans in the battle, although there was heavy fighting until the end of June. Indeed the battle flared up occasionally until August. But it is better to say that it did not continue in its proper form beyond 30 June, which was the 130th day of its continuation. At its close the Germans were three and three-quarters miles from Verdun at the nearest point.

The battle of Verdun, as an incident in the military history of the war, is a long fog of slaughter in which only the larger divisions of operations stand out, as the six stages into which it here has been divided for the con¬ venience of the reader. It was a series of bombardments any one of which may safely be pronounced the severest of the war up to the time when it occurred. To carry a position, of a few yards after such artillery preparation frequently demanded charge after charge, but the Germans were willing to pay that price for a slight gain. In 130 days They went forward on an average of four miles along their entire front. But this does not express the actual rate of advance in the later part of the struggle. From 9 April to 30 June the progress on the east bank was one mile while it was a mile and a half on the west bank. At this rate the city of Verdun might have been taken in another three months, but at such cost as would have revolted the world. To hold it had long been no more than a matter of honor with the French, and so deeply had they bitten into the German resources of men and material that this sense of honor was well satisfied many weeks before 30 June. It would be no dis¬ credit to give up a place which had been so well defended whenever the High Command saw fit to take the step.

The Germans came to the battle of Verdun fresh from victories over Russia and Serbia, convinced that by massing artillery and men they could break down all resistance, as in the East. They miscalculated in

failing to appre¬ ciate the endurance of French soldiers under artillery fire. ®Passeront pas^^ sang the poilu and he made the sentiment good with his life. It was he more than any general that won the battle for France. No figures have been given to show how heavily he lost. It is certain that he took heavier toll than he gave, and the estimate he made of the loss of the enemy at 300,000 seems no exaggeration for the whole battle. It is likely that the French losses were not more than two-thirds as heavy.

There is an addendum to the battle of Ver¬ dun, that may as well be mentioned here. The battle of the Somme, which began on 1 July, drew away the German forces in increasing numbers, and finally the Verdun front was left in a comparatively weak condition. General Nivelle took advantage of the opportunity and made a sudden attack on 24 October. A short bombardment leveled the German trenches and the infantry went forward two miles on a front of four and a half miles on the eastern side of the Meuse. Douaumont and several positions on its west were thus recovered. Artillery was then concentrated against Fort Vaux and made the place so hot that the enemy left it on

2 November. It was now only necessary to move the guns forward and repeat the tactics of 24 October. Thus a second bite was taken in enemy territory on 15 December when the Germans were thrown back for two miles be¬ tween the Woevre Plain and the Meuse. They were thus in the positions from which they had begun their attack along the Heights of the Meuse on 21 February. All their gains on the east bank were nullified, and the world was given additional evidence of the defeat they had suffered in the great battle. By this time the Germans themselves had come to realize it, as was shown by the removal on 29 August from the position of chief of staff of General von Falkenhayn, who was chiefly responsible for the battle.

Minor Operations.

1. Supplementary Engagements Early in 1916. — During the first half of 1916 the bat¬ tle of Verdun overshadowed the fighting in all other parts of the Western area. Into this struggle were drawn the best of the French forces; for it was here that the fate of France seemed at stake. It was the evident purpose of the German High Command to deal France a death-‘blow and that done to turn at leisure against the British in the northern section of the line. To use a term common in German newspapers, France was to be ®bled white.® The result

showed how wisely the French High Command husbanded French resources, doing the greatest amount of damage with the smallest amount of loss. The end of the strug¬ gle saw the French badly shaken, no doubt, but still strong and only awaiting a period of re¬ cuperation to go on with the struggle.

In making their plans the Germans counted on a state of unreadiness in the British army. It is true that the number of Britons in arms was 5,000,000, and it is true that munitioning had progressed to a remarkable degree; but the New Army lacked something in training for the vast task of the war. As a machine it needed ˆtuning up® and concentration at some point at which the weight of men and material could be made to count. Everywhere there was an ex¬ pectation that it would soon take the offensive on a grand scale, but it could not be ready until the summer. Perhaps, if the Germans had not forced the fighting at Verdun the grand of¬ fensive would have been delayed until the au¬ tumn, when there would have been a mighty co¬ operating attack by the armies of the two nations. By striking one of them early in the year the Germans wisely anticipated such a dou¬ ble attack.

The inactivity of the British during the bat¬ tle of Verdun led to some criticisms. German influences in neutral countries indulged in sneering remarks about the willingness of the British to let France sacrifice herself, evidently hoping to create dissension between the Allies. Probably some echoes of this attitude appeared in the French press; but the responsible organs of opinion in France understood the situation too well to be caught by such a bait. In one respect the British gave material help to their Allies : Early in the year they took over the Arras sector previously held by the 10th French Army under General d'Urbal, so that their lines extended from the Somme River to Pilkem at the northern limit of the Ypres salient, a

distance of 80 miles. Beyond them was a short sector in the hands of the French and beyond that the Belgians held the line to the sea. The extension of the British lines to the Somme, besides releasing the 10th French army for serv¬ ice elsewhere, gave the British some solid ground for their future operations and thus made their work much

easier, when it began, than it had been in the flat and soggy area around Ypres.

In fact, during this interval the British were niaking steadv preparations for a great attack in the region just north of the Somme. Weeks were spent in collecting guns and ammunition in that section and in organizing the intricate sys¬ tem of transportation behind the lines that was necessary to enable the army to move prop¬ erly in a large-scale modern battle. The Ger¬ mans seem to have known that some such an attack was imminent, for they did not weaken their lines before the British troops but deliv¬ ered several sharp_ holding blows in that quar¬ ter. One of their plans was to organize a strong mobile artillery force which traveled up and down the sector, shelling trenches at vari¬ ous places and opening the way for sharp in¬ fantry attacks. The British troops called this artillery force ®the flying circus.® These iso¬ lated attacks did not alter materially the rela¬ tive positions of the two sides in the north, al¬ though the net result was probably with the Germans. But they afforded the newly-organ¬ ized British army some valuable training, for they were on a larger scale than the trench raids which had by this time become of almost nightly occurrence. Most of them were deliv¬ ered in the Ypres sector, where sharp local ac¬ tions occurred from February to May, one side attacking and receiving a counterattack, only to be succeeded by the reverse process a little later. The net result of these affairs was prac¬ tically nil. It was an unpleasant business, as the surface of the earth was a broad mud-sluice interrupted by numerous shell-holes, into which the soldier who slipped was liable to drown. It is told of one column that was sent forward to cover a distance of 200 yards that it took hours to cover it with no other obstacle in their way than the mud. The sufferings of the men were great, and especially those of the British, whose positions were generally on the plain, while their adversaries were on the hills and had the range of their trenches and lines of supply. As the time approached when the British could be expected to be ready for their great offen¬ sive, the Germans made a series of sharper thrusts in the Ypres salient Some writers have spoken of them as the third battle of Ypres. The term is not applicable to operations that call to mind the first and second great effort at this place, where the design was to break through to the Channel ports. In this case the object was merely to retain the British forces in this section and prevent concentration on the Somme.

The first of the series occurred on 2 June between the village of Hooge and Hill 60, where Canadians held the British trenches. An intense bombardment of four hours was fol¬ lowed by a massed infantry attack by nine or 10 battalions. The attackers came forward con-

fidentlv, thinking that the guns had left them nothing to do. But the crumbling trenches sheltered a few who had strength and reason cnoucrh left to rise and fight desperately, some

of them with undamaged rifles, some with the butts of broken weapons or with entrenching tools, and some with naked fists. The fierce battle lasted well into the night, the Princess Patricia's Canadian Light Infantry and the Canadian Mounted Rifles bearing the brunt of it. At nightfall the Canadians fell back to re¬ organize, yielding their enemies a gain of 700 yards. Next day came a counterattack through which most of the lost ground was recovered, but so destructive a rain of shells fell upon it that it could not be held; nor could the Ger¬ mans stay in it under the British fire. It be¬ came a new addition to No Man's Land.

On 6 June the enemy attacked again, this time at Hooge and to the northward. The ac¬ tion opened with heavy bombardment and the explosion of several mines, with the result that Hooge itself was occupied. It proved a bad gain for the Germans ; for their line which had formerly been on high ground overlooking the British in the plain, was now brought down to the plain also. The Canadians, however, were not willing to leave the situation as it was. Their pride was aroused and they made a coun¬ terattack on 13 June and took the most import¬ ant part of their old trenches. But Hooge was not recovered. After this the Ypres sector re¬ turned to the less exciting practices of night raids and intermittent bombardments. The at¬ tacks in June and in the preceding months had not interfered with the preparation for the Somme drive, they had not reduced the British holdings materially, and we must consider them failures.

2. First Battle of the Somme. — The battle of the Somme lasted from 1 July to 30 Nov. 1916. It was a grand effort by the British and French armies to penetrate the German de¬ fenses at a vital point and force the Germans out of a large portion of occupied France. Three million men fought here on the two sides and a third of that number were killed, wounded or captured. It was undertaken after a great deal of preparation had been made. Verdun was launched by the Germans in order to anticipate the part France would take on the Somme. The losses of France at that point lessened somewhat her striking force in the North, but not more than the German striking force was lessened. Was the battle of the Somme fought too soon? Undoubtedly it would have been better to have waited a few weeks longer, as first intended, but there is little to suggest that the ultimate result would have been

satisfactory to the Entente Allies if they had waited. The battle was undertaken as a decisive thrust against the Germans in the West, to begin their defeat, if not to encompass it actually. Joffre and Haig worked together in good hope, striving to make the best possible preparations, and although the terrific grind of death was going on at Verdun the preparations for the great battle were not interrupted. Time and again Haig offered to break them off and send help to Verdun. Joffre's reply was ever that the French could take care of Verdun and that the British should go on with their prepa¬ rations for the great battle. At last, however, the June fighting showed that French endur¬ ance was wearing thin on the Douaumont pla¬ teau. Then Joffre consented that Haig should play his part, and the great battle was opened

on 1 July in order to take pressure off Verdun. It probably saved the fortress from capture.

The place selected for the attack was 35 miles north of the great angle in the battle line near Noyon, on the Oise. If the British could break through here and the French a little southward and sweep along in*a straight line to the east they would get behind a large section of the German line and force it to fall back. If they could go through with dash and reach Saint Quentin, 40 miles in the rear, they would

cut vital railroad lines and make it impossible for the Germans in the sector just east of Noyon to get out safely with their heavy guns and other materials. The blow was to be given by two great armies, British and French, one on the north and one on the south side of the Somme River. The British line of advance was a sector from Gommecourt to Maricourt, on the north bank of the Somme, a distance of 18 miles. The French sector of advance extended from Maricourt across the Somme to Fay, eight miles southward. The country was dry rolling ground, a comfort to the British, who were weary of fighting in the water-logged fields around Ypres.

The direction of the 18-mile sector of the British advance line was generally southeast, but at Fricourt it turned due east for four miles

and then resumed its southeasterly course. This jog in the line was the place at which the Brit¬ ish were to win their most notable success in the battle. Another thing to be remembered is that the national highway from Amiens to Cambrai, and thence on to Valenciennes, Mons, Namur, Liege and Cologne cut this sector at

its middle point. It passed through Albert, two miles west of the line, and Bapaume, nine miles northeast. This highway, an old Roman road, was the axis of the British battle as planned; but by the failure of the attack of the northern wing it became the northwestern limit of the area of actual progress. The British went about their preparations for battle with that careless indifference for their foes that cost them so dearly in the first two years of the war. They made slight efforts to conceal their activities, as though they thought concealment unnecessary. Thus warned, the Germans made unusual de¬ fensive preparations. . The chalk3" soil lent itself to entrenchments, and they spent days and nights in making dugouts strong enough to resist bom¬ bardment. Behind their first line they con¬ structed a second line, and behind that a third was begun. When the attack was delivered this particular sector was the best defended in the entire German line.

For the attack the British had an army under Gen. Sir Henry Rawlinson containing 20 divi¬ sions, in all about 250,000 infantry, besides ar¬ tillery, engineers and other troops. The French had two armies to the south of the British, one commanded by General Fayolle and another by General Micheler. The first took an active part in the initial stages of the battle and had an in¬ fantry strength of a little more than 50,000 men, while the second did not come into the struggle until it had passed into its later stages. Under Fayolle, who was an excellent com¬ mander, were the famous 20th corps — the Iron Corps — which saved the day at Nancy in Sep¬ tember 1914, and turned the tide at Verdun on the fateful 26 Feb. 1916, and an equally famous unit, the Colonial Corps. They were consid¬ ered the flower of the French shock troops. In artillery the French were well supplied, and they had been using it long enough to know how to get the best results out of it. The British had a larger supply than ever before, but not as much as the situation required. Nor had they yet learned how to use it with the most precise re¬ sults. Their troops, newly organized and well trained in the camps of instruction, lacked actual experience in large-scale fighting. They were especially weak in coordination of infan¬ try and artillery service, showing themselves so eager to go ahead in the battle of the Somme that they often ran into their own barrages. In the latter part of the battle the supply of artil¬ lery was

larger, which illustrates the disadvan¬ tage the British were under in having to begin the fighting before all their preparations were made.

The Germans on the opposite side were parts of two field armies, one commanded by Rupprecht, crown prince of Bavaria, and the other by Gen. Otto von Below — not to be con¬ fused with the von Biilow who fought at Kluck's left in the battle of the Marne. For purposes of strategj% however, von Below was under the direction of Rupprecht, as Fayolle and Micheler were under the direction of Foch, who commanded the northern great section of the French line. The Germans had about 20 divisions in the sector attacked, but they were continually shifted during the battle. It was said that each side put in more than 100 divi¬ sions while the engagement lasted.

General Haig opened the battle on 1 July ^^after the fiercest artillery bombardment of the

Remembering that the failure at Neuve Chapelle was because the breach in the enemy line was too narrow and at Loos because the supports were not sent forward quickly enough, he now attacked on an 18-mile front and as¬ sembled a great mass of troops to follow up the success of the first moment. He expected the artillery to level the opposing trenches, as on former occasions. The Germans, however, had constructed their dugouts so deep that they were safe from a fire that leveled the trenches on the surface, and when the barrage lifted the defenders came to the surface with their ma¬ chine guns, which were in great numbers, and opposed unbroken lines to the attacking parties all the way from Gommecourt to Fricourt.

The British advanced with their traditional courage, singing and jesting in the assurance that they were going to occupy abandoned trenches. They were met with a withering fire but did not falter, rushing forward to the work of the moment in succeeding waves. Then the German guns opened on the areas behind them, cutting off the supports and making it as un¬ safe to retreat as to go forward or to remain stationary. The hours of the slaughter of • brave men that now followed can best be under¬ stood by saying that at the end of the day the British losses amounted to 50,000, or more, and that the German

lines on the section indicated stood intact. Southeast of Fricourt, however, there was better success. The German treiiches were penetrated for a mile on a seven-mile front ‘and 3,500 prisoners were taken, with a number of machine guns and other materials. It was a bad return for the effort made, and the cost was so heavy that for weeks the authori¬ ties did not dare let all the facts be known at home.

The French also attacked on 1 July from Maricourt to Fay. The Germans had taken no extraordinary precautions against them, think¬ ing the Verdun fighting had left them too much exhausted to be feared. The attack, there¬ fore, delivered with the best French troops and supported by artillery that had learned its les¬ sons well at Verdun, was unexpectedly success¬ ful. It went forward nearly two miles on the entire front, and yielded 6,000 prisoners. Al¬ though the net result of the day’s fighting was small. General Haig did not falter in his pur¬ pose. Setting his teeth with British determi¬ nation he began to hammer away at the part of the line which had yielded to his initial blow, and for five months ate his way into it. He did not break through, as the British public ex¬ pected in the beginning, but he forced the Ger¬ mans to readjust their lines to the northward and eventually to move back on all that front on which they had stood so steadily during the first shock of the battle. To the Germans the initial attack was a victory. They concluded that the British effort was measured by the re¬ sults of the first day’s fighting and argued that the onslaught at Verdun, apparently so near to victory, could go on. They wˆere soon unde¬ ceived. The continued assaults of the British w’ere adapted to the experience gained on 1 July. There was to be no more assaulting a long line but the artillery fire was to be con¬ centrated on small sections, as the Germans were doing at Verdun. The area of activity was small, about 50 square miles, but nearly 1,000,- 000 men fell in that area, and after the bitter

experience of 1 July the British losses were not excessive.

To understand the main features of this stage of the fighting it is necessary to consult the map. Haig’s chief objective was Bapaume, important because several roads centred at it and because once attained the British would be beyond the previously constructed German lines and in a position to force a further retirement on each flank. To reach Bapaume from the British front, a distance of eight miles at any point in the arc from Gommecourt to Maricourt, it was necessary to penetrate five lines of de¬ fense. The British and French

trenches ex¬ tended across the base of the angle made by the Somme^ and the Ancre rivers, the surface of which is generally flat and low. Back of the first German trench the ground rose 150 feet to a ridge that interposed its barrier across the lines of access to Bapaume all the way from the Ancre to the north and south road that con¬ nects Bapaume with Peronne. On the south¬ ern and western edge of this ridge — which was from two to three miles wide — was the sec¬ ond German line of defense. North of it three lines interposed before Bapaume, all constructed after the attack of 1 July. They were strong obstacles to the British advance.

In his report of the battle General Haig di¬ vided the British operations into four stages : (1) The fighting from 1 July to 14 July, which took the first German line and the intervening country up to the ridge; (2) the fighting from 14 July to 14 September, during which the British pressed onward, step by step, taking one hill and fortified village or farm after another, until they finally had firm grasp on the whole crest of the ridge; (3) from 14 September to 23 October, during which they drove the Ger¬ mans^ slowly down the slopes that lay beyond the ridge; (4) from 9 November to 15 Novem¬ ber, during which, after a short interval of quiet on account of bad weather, the fighting shifted to the region of the Ancre Valley and an attempt was made to carry the new line northward up to the Ancre and the old line eastward, so as to cut off a slice of German holdings immediately west of Bapaume. In all these operations the British fought in the Verdun way, with heavy concentrations of artillery of all calibres that pulverized the enemy's defenses and left the infantry little to do but clean up the remnants of the garrisons that had held the de¬ molished positions. During all this period the French on the south fought brilliantly, carrying their lines forward more rapidly than the Brit¬ ish and taking large numbers of prisoners. At the end of the season they were within a mile of Peronne, south of the Somme, and had well passed the road from Bapaume to Peronne north of that river. To describe these stages of conflict in detail would involve the repetition of a series of small engagements each of which demanded heroic conduct. The operations of the first stage were chiefly clearing actions. Fricourt and Contalmaison, two strongly forti¬ fied villages, had to be taken and a number of wooded slopes had to be cleared of machine guns ere the army stood before the second German line. The area to be cleared was two miles by eight, and some idea of the nature of the fighting may be had when it is said that it required hard fighting by 250,000 men for 12

days to complete the work. But it was well done by the 13th, and the army proceeded at dawn on the 14th to attack the second line of defenses, the battle thus passing into the second stage. The line of advance was from La Boiselle to Delville Woods, just east of Longueval, a distance of six miles. Both positions were taken by hard work, and in the second the British encountered that kind of forest fight¬ ing that made the conquest of the Argonne such a difficult task for the American soldiers two years later. To drive out the defenders was hard enough and it was done more than once, but the place was well covered by German artillery and it was impossible to hold it until the surrounding areas were taken also. For 13 days the two sides contended for Delville Woods, until the British soldier gave them the name ˆDevil's Woodsˆˆ ; but they remained at last in British hands.

Of the villages attacked one of the most difficult to take was Pozieres, which stood on the Albert-Bapaume road at the southern edge of the ridge. Strong forces were thrown against it on 23 July, it being a part of an attack on the whole advanced line. The ruins of the town were fortified with covered trenches and strewn with machine guns. In the early morn¬ ing two divisions converged on it, one from the southwest, a Midland territorial division, and another from the southeast, an Australian division. The Midland men advanced with little opposition to the edge of the ruins, but the Australians met fierce attacks from a sunken road that ran parallel to their own course. They cleared away the opposition and reached the town where they fought hand to hand from one ruined house to another until they fairly divided the town with their opponents. The struggle went on for three days and on the fourth most of the place was won. It now remained to force back the foe from the environs, a process that had to be fought for step by step under heavy cannonading. Behind the town three-quarters of a mile was a windmill, on high ground that overlooked the entire ridge and the slope that ran away to Bapaume. In a cloud of explod¬ ing shells the Australians held on four days always groping their way toward the coveted ruins of the windmill. Early in the morning of the 30th they went forward in the darkness, grappled with the defenders, and established their trenches at the edge of the labyrinth that protected the windmill. Here they lay for five days in thick and stifling heat that tried even the men from the antipodes. But on 4 August, in the coolness of the night, they rushed the positions at the windmill and in the parts of the town that had not been taken,

advancing from 400 to 600 yards on a front of 3,000 yards. They fortified their gains and held them against the enemy's counterattacks. Then the process of slowly crawling forward was taken up again, this time the direction being toward the north¬ west, where the strong position known as Moquet Farm with the village of Thiepval blocked their way. On the right, south of the angle at Longueval, the village of Guillemont still held out. It was the only part of the German first line of defense that had not been taken. It fell 3 September to troops from southern and western Ireland.

The third stage of the battle, 14 September to 23 October, saw the British extend their

lines down the northern and eastern slopes of the ridge. The defenses here had been com¬ pleted since 1 July and were very strong. They stood just beyond the edge of the crest of the ridge. The British, therefore, were now going down the slope as they advanced, which made their task somewhat easier. At the same time they reached out on the west and took Thiepval and Moquet Farm, a vital part of the line they had not been able to carry in the attack on 1 July. They carried their lines within three miles of Bapaume on the south and stretched out in a broad bulge to the eastward. It seemed that only a. vigorous push was needed to carry them to Bapaume itself.

Before this could be made General Haig thought it necessary to widen his salient on the west, and in doing that he carried the battle into its fourth stage The weather had already shown signs of approaching winter and a fortnight of rain and mud had convinced the Germans that vigorous operations were impos¬ sible. They were thus thrown off their guard, when the British, taking advantage of a clearing spell, made a sudden and powerful attack on . 13 November on Beaumont Hamel, where the battle line crossed the Ancre, the scene of a bloody repulse on 1 July. The British had learned much since that repulse, one of the most important acquisitions being the proper method of coordinating a creeping barrage and an infantry attack. A division of Highland Territorials went against this place, strongly fortified by trenches with an extensive system of subterraneous chambers filled with troops. They advanced in a deep fog at the crack of dawn and were in the German trenches before their attack was suspected. Then followed several hours of fierce hand-to-hand fighting in which the Highlanders closed one entrance aftef another until the underground defenders were trapped and surrendered. Other parts of the attacking line carried forward their positions. The fighting was renewed next

day and Beau-court was taken by the naval division, which had already distinguished itself at Antwerp and Gallipoli. It was not until the 18th, when icy rains had again set in, that the battle was given over. At that time three square miles of most difficult territory had been taken with 7,000 prisoners and much valuable material, and at a cost in killed and wounded that was com¬ paratively small. But the battle of the Somme ceased with this engagement in obedience to the command of ®King Mud.®

In following the battle through its four stages no mention has thus far been made of the brilliant operations of the French south of the British area. Striking out on 1 July they made at once large gains on both sides of the Somme and repeated the action as often as gains seemed necessary to round out the ad¬ vance in the northern part of the sector en¬ gaged. When the battle ended they had ad¬ vanced from Maricourt to Rancourt and Bou-chavesnes on the road from Bapaume to Peronne and were within a mile of Mont Saint Quentin, which commanded Peronne on the north. South of the river they had reached La Maisonette, a mile and a half from the same town and stood within two or three miles of the Somme for several miles below the town. To go further was only to spend strength for a river which could not be crossed until

Peronne was taken and which w'ould be reached without a struggle if that town succumbed. Further operations, therefore, on the south of the river but waited on the situation north of it. The more rapid success of the French as compared with the gains of the British was due partly to the greater difficulty of the country before the British lines, partly to the better state of preparation of the enemy in that region, and partly to the fact that the French had a better trained army. The British forces in the beginning of the battle lacked battle experience. Every day it progressed brought them improve¬ ment in this respect. Fighting day by day the same kind of battles the veterans of Cham¬ pagne and Verdun were fighting in plain view of them, they could but contrast their methods of warfare with the methods of their Allies. This period of four months' hard battling gave the finishing touches to their military education.

It was in this respect that the battle of the Somme, extending from 1 July to 18 November, had its chief significance and not in the fact that it netted the Allies a gain of 200 square miles of French territory and the capture of 80,000 German prisoners. Germany had begun the war with one trained army against her in the West, she had allowed it to go on until two such armies sood before her on that front. At the same time she had suffered heavy losses. In the battle of the Somme her casual¬ ties were perhaps 500,000 against 750,000 for her antagonists. The unbalanced ratio of losses was particularly noticeable in the first weeks of the battle. As the British soldiers learned the tricks of modern fighting they learned the art of taking care of themselves in perilous situations. In the later stages of the battle the losses were better balanced.

The battle of the Somme has an added in¬ terest because it was here tanks were first used against the enemy. This new battle machine was developed by British army experts out of the Holt farm tractor, of Peoria, Ill. It was an armored car whose locomotion was arranged on the caterpillar principle, which enabled it to cross the roughest ground and demolish the ordinary obstacles of a battlefield. The rna-chines were manufactured in England with great secrecy, and when they appeared in action in the attack on Courcelette on 15 September the British soldiers were as much atonished as the Germans. Twenty-four of them were sent forward ahead of the troops, and 17 sur¬ vived the battle. They struck terror to the hearts of the enemy, who thought that only Germany could invent new machines of war. They were designed as instruments of offense, and although they were useful in that capacity, their greatest service was in demolishing wire entanglements and opening the wˆay for the advance of the infantry. Before the tank ap¬ peared the wire was left to the action of high explosive bombardments, which were not effect¬ ive in less than several hours. By devising a light and speedy tank the Entente Allies were able to send it forward with a barrage, clean up the wire in an hour, while the long range guns isolated the opponent's front lines and placed them at the mercy of an infantry charge. In this kind of service the tank found its great¬ est value. It restored the element of surprise to battle tactics.

3. German Retreat in 1917.— The year 1917

w*as a period of hard fighting on the western front. Hardly a sector from Verdun to the North Sea but saw severe battle. During 1916 the French had played a waiting game, leaving time for the British army to reach the state of veteran effectiveness. Their one great strug¬ gle,

at Verdun, was a defensive battle. The one great attempt of the British, the battle of the Somme, was in reality a massive bit of ad¬ vanced training. In 1917 both armies were at the highest state of efficiency. They kept the enemy on the defensive throughout the year, delivering many small blows and several mighty ones. The reader who is impatient with mere detail may wish to hurry on to the decisive year of 1918, when the great tragedy produced a vast sweeping movement which led to the dramatic close of 11 November. But we must remember that 1917 has its place in the general story. Here was put into full operation that process of attrition that lowered the fighting strength and morale of the Teutons, gave con¬ fidence to their opponents, and made possible the victory of 1918.

For Germany 1916 was a bad year. Having brought Russia to a standstill in 1915 she had tried to win a decision in 1916 by forcing France to a separate peace. She failed in that and opened an ineffectual campaign for peace in December of the same year. Perhaps she did not expect it to succeed, but it at least satisfied the growing feeling of the Germans that a fair offer should be made to end the war in a compromise. Her offer was refused but she still hoped that it would eventually be accepted. Let Germany fortify herself on all sides, hold¬ ing to what she had won, and when her enemies had spent themselves in further fruitless assaults they would come to reason and make terms. Russia was no longer a terror; for Brusiloff in his last reviving gasp had failed in the campaigns in Volhynia and on the Dniester, despite apparent victories. Ru¬ mania, forced into the war by a treacherous Russian ministry, had been given such a drub¬ bing that no other Balkan state was likely to dare German wrath. In keeping with this policy of impregnable defense Germany decided to draw in her western battle front and establish it in a position which, as she believed, would resist the sternest efforts that could be brought against it.

This decision implied the belief that her line as it existed in the winter of 1916-17 was not satisfactory, and for that opinion there was a good reason. Before the July offensive of 1916 the line had made a great western bulge between Arras and Soissons, and it was here that the French and British delivered their blows in the long drawn out battle of the Somme.ˆ The result was that the salient was beaten in at the middle, between Albert and Chaulnes, leaving two small salients at the ends of what had been a large flat one. The line, therefore, between Arras and Soissons had in it two undesirable angles. Moreover, at the inner part, where the French and British cut deeply in the battle of the Somme, the line was very soft, being recently constructed, and during the winter the British improved every spell of

fine weather to take another bit from the hands of the enemy. It was not of her own volition that Germany decided to shorten

her line, but through the realization that the defenses she was holding were not dependable.

To meet the difficulty the so-called Hindenburg line was constructed. Beginning near Arras it ran in a straight line to a point on the Oise five miles southwest of La Fere, and then gained the Aisne near Soissons in a westerly bending curve across the plateau that lies be¬ tween Laon and the mouth of the Aisne, where it united with the old trench system. It was about 70 miles long, which was about 15 miles less than the old line. It was in reality a system of trenches four or five miles wide in well-selected positions, the trenches protected by deep wire entanglements and many redoubts and other points of concentration. The trenches themselves represented all that had been learned in trench construction during the two and a half years of the war. There were many dugouts and concrete chambers well beneath the danger point from high-explosive shells. The Germans believed that it could not be taken. In their own words it was the Siegfried Stellung, al¬ though their opponents persistently called it the ˆHindenburg line.® The section at Arras was expected to have to sustain severe attacks, and to make assurance stronger a switch line was constructed eight miles east of the town, starting at Drocourt to the northeast of Arras and joining the Siegfried line at Queant.

Their preparations made they began to with¬ draw their heavy guns and supplies early in March. It was not until 10 March that the retirement began to be observed by the Allies, who were then pressing forward on Bapaume in their deliberate fashion. Their task became easier from day to day, and on 17 March they ordered a general forward movement on a 45-mile sector. The resistance was weak and the troops pressed forward. Bapaume, Chaulnes, Roye and Nesle were occupied with little diffi¬ culty. This process was kept up until the end of the month, the Germans fighting hard in rearguard actions with many machine guns in position. They conducted the retreat ably and with small losses. They surrendered a region containing 600 square miles, 18 miles wide at the widest point — west of Saint Quentin —

and five miles wide at its narrowest — just south of Bapaume, where the operations of the British had already eaten far into the old trenches.

The British and French following after them found the abandoned country a wilderness. Every art of a shrewd and unfeeling foe had been used to make it a desert, incapable of supporting any kind of shelter for hostile armies. Under international usages it is allow¬ able to destroy what could have been con¬ sidered useful to the enemy in carrying on his war. In the past this had been construed as applying to public property, roads, bridges and private property that obstructed the line of fire. By no nation had it been interpreted as giving the right to destroy orchards, churches, farm¬ ing implements, and other means of industry. The Germans had given the rules their broadest interpretation. No building of any kind was left standing, trees of all kinds, orchards, even the young trees that would afford shelter to no living thing larger than a hare, were cut down systematically, and the graves them¬ selves had been rifled. The towns and villages were stripped of their able-bodied inhabitants.

who were sent into the back areas to work in support of the German cause. Household furni¬ ture was carried away or broken up and de¬ stroyed. The Germans, obsessed by the phrase, ^^This is war,® had lapsed into barbarism, throwing away all the restraints that civiliza¬ tion had put on the conqueror's impulse to mistreat his victim. German newspapers re¬ counted the excesses of German soldiers in this moment with pride; and the outside world has not had any evidence of a protest by any German preacher of Christian living, or others whose profession was to uphold humane ideals in Germany.

The devastation of this region cost Germany dearly. It is true it made it difficult for the Allies to fight across the devastated area; but they had only to attack in adjoining sectors. In a military sense, therefore, it was of slight advantage to the perpetrators. But its bearing on the morale of the Allied soldiers was tremendous. Here before their eyes was an argument the most ignorant could understand. It transcended the party differences, the pro¬ letarian unrest, and the many other impulses which might undermine the will to fight to the utmost. The Germans had just offered their antagonists a drawn peace and had been refused in disdain. The Siegfried line announced that the German reply was ˆHammer away until you change your mind.® How foolish to do a thing at that very moment w'hich only strengthened the will of the enemy to continue to spurn a compromise!

4. The Battle of Arras. — When the Ger¬ mans retreated. General Haig had already begun to renew the process of gradual encroachments, as in the later stages of the battle of the Somme. He wished to apply the same process to the Siegfried line, believing it would be pierced, but yielded to the wishes of Gt.'neral Nivelle, who had succeeded Joffre in the chief command of the French armies. Nivelle's plan was to deal heavy blows at each flank of the new German line and he asked Haig to attack on the north at Arras, he himself proposing to strike on the Aisne. Haig was not under the orders of the French commander-in-chief, but he recognized the more important character of the French fighting in their own country and put away his own plan and adopted that of his colleague. Arras was the northern pivot of the Siegfried line. It was nine miles south of Lens, the city of coal pits, and in the interval was Vimy Ridge, all but taken by the French in 1915 when they fought a companion battle to the British battle of Loos. It was the highest point in the vicinity of Lens and overlooked a large part of ˆ the sector. Haig massed his artillery and infantry in order to carry this sector, 12 miles wide. On 4 April he opened a bombardment that was more intense than any which had been delivered on any battlefield of the war. For four days it fell on the German positions, and when the infantry went forward on the 9th they found the first line German trenches in a state of ruin. The second was better held but it was taken after hard fighting. Next day the battle was carried against the third line, which yielded to fierce attacks in which there was much hand-to-hand fighting. In these three days the British advanced from two to four miles on a front of more than 10 miles. Vimy Ridge was carried by Canadian

troops, and the strong fortress known as the Harp was taken with the aid of tanks. It was necessary, however, to halt at this point until the artillery could be moved up. The three days of fighting netted 12,000 prisoners and 150 guns, and they left the Germans with a gaping hole in their vaunted impregnable line of de¬ fense.

During the succeeding days active prepara¬ tions were made for continuing the battle. Engineers constructed roads through the con¬ quered region, while the infantry tried to widen the gap by eating away the lines on each side. The process was made difficult by rain

which fell steadily. The Germans brought up rein¬ forcements, and delivered a strong attack astride the Bapaume-Cambrai road, 15 miles south of Arras, hoping to draw off the British troops to that place. The effort was unavailing, for the assault along the road was disastrously repulsed. On 16 April General Nivelle began his great offensive on the Aisne which did not yield the results expected. As his situation be¬ came unfavorable it was necessary for General Haig to aim his blows at strategic points in order to force the enemy to concentrate for their projection and thus save Nivelle from great pressure. In this way the battle of the British was deflected from the immediate ob¬ jectives, which might have been taken in the new type of battle Haig had adopted and delivered against positions he could have little hope of taking.

The battle of Arras lasted from 4 April to 17 May, and it was followed by three weeks of intermittent attacks of a minor nature. It resulted in the advance of the British line on a front 22 miles long, for the most part to a depth of four miles. Six miles of the Siegfried line was taken in this movement, a thing the Germans had thought could not happen. It was at Bullecourt, two miles from Queant, where the Drocourt-Queant, or Wotan, line left the main system, that the Siegfried line vvas first cut. The feat was performed by Australian troops on 3 May, who not only passed the trenches themselves but took the series of con¬ crete machine-gun positions behind them. Then they repulsed a counterattack that seemed for a time comj)letely to master them. With the Ger¬ mans surging up on three sides of them until they were huddled in barely 500 yards of trenches, they stood their ground until support arrived and slowly won the adjacent space until they had elbow room. Against them were sent the famous ˆCockchafers,® of the 3d Prussian Guard division, to win back the lost section of the impregnable line. The British guns promptly placed a close barrage behind them, while the Australians left their trenches and charged into the advancing Prussians. ˆ Caught between the barrage and the Australians the ˆˆCockchafers® took refuge in the abandoned trench by which they had approached, where they were all but destroyed. The incident settled the fate of the Bullecourt position. Within a week another mile was sliced off the Siegfried line, just south of Bullecourt, and means were found to make the gain secure. When the battle ended the British had taken more than 20,000 prisoners and 257 guns. The German losses were estimated at 350,000 which was in excess of the estimated British losses.

The most significant thing in the battle, how¬

ever, was the fact that it confirmed to the Allies their confidence in the battle for limited ob¬ jectives as a means of eating steadily through the strongest defenses the Germans could con¬ struct. It confirmed the lessons of the later fighting in the battle of the Somme. Here was a method by which the Germans could be de¬ feated, if the Allies would follow it long enough. It was only necessary to persist until the line was_ worn thin. Steady fighting and the in¬ fliction of losses would finish the task in good time. And so the British took heart. They felt that the result was assured.

5. The Second Battle of the Aisne. — When General Haig struck at the northern end of the Siegfried line near Arras he acted in agreement with General Nivelle, who was about to strike at the southern end at Laon. The task of the Frenchmen proved harder than the task of the British ; for Laon is situated on a plain pro¬ tected by very strong positions which the Ger¬ mans had well fortified. Ten miles to the west and 10 miles to the south ran the battle¬ line; for the city was in the great angle of the lines. Due west it was protected by the Forest of Gobain whose strength the French had felt in their pursuit of the retreating Ger¬ mans early in April. Rebuffed here Nivelle turned his attention to the south and east of Laon, But here the Germans had the advantage of strong positions. Their line ran along the heights that border the Aisne River, limestone spurs in which an excellent trench system had been cut. Nature had so arranged them that one commanded the other, so that if the French took the nearestˆ they would come under fire of other positions. This line of heights began at the Ailette, a small stream seven miles north of the Aisne, and stretched away to the east, passing around the angle in the line, to the vicinity of Craonne, a distance of 25 miles. On the crest of the heights ran from east to west for a distance of 16 miles the celebrated Chemin des Dames. It was an ex¬ cellent artery of communication behind one of the strongest positions in France.

General Nivelle decided to break through this line and take Laon. He had won fame in the war by hard and brilliant blows. The slow and methodical fighting of Haig was not in keeping with his temperament, which was ardent. His best work had been the recovery of the positions north of Verdun in two swift and powerful blows for which the most elaborate and accurate preparations were made. He proposed to follow a similar method bn the Aisne and on a much grander scale. But there was this difference. At Verdun he used the method-of the limited objective, while on the Aisne he proposed to smash through the line and reach Laon on the second day of his battle. Since each part of the opposing defenses commanded the adjoining part so completely, he determined to attack in force all along the line at the

same instant. Not only along the heights north of the Aisne, but far eastward to the high ground that runs away to the east of Rheims he decided to carry his battle. Along a front of 50 miles he proposed to launch the flower of the French army in one grand charge.

On 6 April began the bombardment that pre¬ pared the way for the actual attack. It lasted with increasing fury until the 16th when the infantry went over the top at 6 a.m. on a day

that groaned with a storm of sleet and snow. Important advances were made at various points and 11,000 prisoners were taken It was not doing badly but it did not lead the French to the gates of Laon. Next day the snowstorm with a driving wind continued, but the French soldiers did not falter. They held stoutly to what they had won, despite heavy counterattacks and even made gains in the region of their advance on the 16th. Far to the right, east of Rheims, where the Germans were placed on a strong series of hills, between Nogent I'Abbesse and Moronvillers, the battle waged fiercely. This position did not actualy bar the way to Laon, but it was a bulwark behind which the Germans would organize dangerous flank attacks if the French should advance in the direct line to the Laon plain. It was a weak point in General Nivelle's plan that it demanded so many difficult things to insure success. The attack on the Moronvillers position was entrusted to General Anthoine. He had 75,000 men to carry a position seven miles wide defended by 80,000 infantry and an artillery force of 1,000 guns. He him¬ self was trained as an artillery officer and well knew the need of artillery' in carrying the position before him. He massed a vast number of guns against the German position which con¬ sisted of three lines of defense, one at the foot, another on the slope, and another at the crest of a ridge that ran across his area of battle and had strong commanding positions on each side. General Anthoine knew that his guns had first to destroy the German positions, and he did not neglect his barrages through seven en¬ tire days. The infantry went forward at dawn on the I7th and penetrated the first German line with little difficulty. On the flanks it stopped at the second line, but the centre burst through that barrier and seized and held the crest of the slope before it. Next day the centre secured its advanced position and the flanks worked away to

extend their lines up the slopes. The 19th and 20th brought heavy counterattacks, but the French held their positions for the most part. From the 21st to the 28th there was fighting for local gains only. The battle seemed to have come to a breathing spell.

The pause was accompanied by a feeling of depression. In reality the progress was not discouraging. In 12 days 20,780 prisoners had been taken with 175 guns. In view of the neces¬ sity that the German strength should be eaten down by the hammering process this was not a bad showing; but it caused great dissatisfaction, mainly because Nivelle had talked so confidently about breaking the line on the first day that the French people were seized with despair be¬ cause the brilliant program was not realized. His losses had been heavy, but not beyond the normal cost of such gains under such con¬ ditions. But the murmuring was a serious thing. It indicated a lack of confidence at a time when discouragement was dangerous.

On 28 April the Premier, M. Ribot, visited the battle front with M. Painleve, the Secre¬ tary of War, and held a conference with the general in command. The result was that Gen¬ eral Nivelle was removed from his position and General Petain took his place as commander-in¬ chief on the northern and northeastern sectors, where the main battle was being fought. At the same time General Foch became chief of

staff, a position for which he was eminently fitted by training and temperament. General Nivelle's plan of battle was a survival of the prevalent idea of the early months of the war. It looked to a break through the line, as in the strategy of other days, with a sVeep around the rear and the capture or stampede of a con¬ siderable portion of the opposing force. It failed because under existing conditions it was impossible to take all the lines of defense before reinforcements could be brought up to fill the gap that an intense attack had made. The new strategy looked to wearing down the man power of an opponent. A break through was reserved for the time when the line should be too thin to resist longer. Petain believed in the new strategy, and so did Foch, with a slight difference. From the time Petain controlled the military policy the battle along the Aisne en¬ tered a new stage, in which the purpose was to take limited objectives.

No further hopes were entertained of taking Laon. It would be sufficient to complete the struggle for the heights as a means of bettering the enemy's position, and not, as Nivelle in¬ tended, as a

preliminary step to a move on Laon. Thus Petain took up his work. He saw that it was necessary to take Craonne and the California Plateau that ran west of it, com¬ manding the view of the region to the north as far as the plain around Laon. He decided also to finish the 'Winning of the positions for which Anthoine had been fighting around Moronvillers. The second of these tasks was com¬ pleted in a gallant charge after an intense bom-ˆ bardment on 20 Alay. The first demanded a' more extended battle. The days of 4 and 5 May saw bitter fighting for Craonne and the California Plateau. To rush up the slopes un¬ der fire from the machine guns of the Germans, to dig in on the crest and to repel successive counterattacks were tasks for which the French infantry were fitted by long campaigning. Hav¬ ing obtained a foothold, the next thing was to extend their lines until the whole of the plateau was held, an end that was achieved by the mid¬ dle of the month. On the 16th the French were in possession of most of the famous Chemin des Dames, from its eastern end at Craonne to its western end near Fort de Malmaison. On the 20th the Germans delivered a great counter¬ stroke along this whole line, but it failed with heavy German losses. From that time the bat¬ tle front became quiet.

Reverting to the original plans of General Nivelle, we shall recall that after the Germans fell back to the Siegfried, or Hindenburg, line a design was formed to smash in each end of this line, and that General Haig undertook the task at the northern end while Nivelle un¬ dertook it at the southern end. The results were the battles of Arras and the Aisne. Both failed of their ends. Although fought fiercely and with moderate success for the Allies, they left unshaken the pivots at which they were aimed. They inflicted severe losses on the enemy, considerably more than half a million casualties. This was their only value ; for the slight gains of territory were without signifi¬ cance in the main trend of the war.

6. The Third Battle of Ypres. — When General Haig began the battle of Arras he post¬ poned a plan he had made for a strong offensive in the Ypres sector with the general design of

breaking through the German defenses, recov¬ ering the Belgian Coast

and turning the invaders out of Belgium. As soon as the French opera¬ tions on the Aisiie ceased he proceeded to put this scheme into execution. Twice before had the British sustained heavy battle in this sec¬ tor. On each occasion they were weak and were forced to hang on by sheer sticking abil¬ ity with great losses. In these battles they were forced back on Ypres until on the east they stood hardly two miles in front of the town, while the Wytschaete-Messines Ridge, three miles south of it and commanding the surround¬ ing plain for several miles, fell into the hands of their opponents. The existing situation was annoying, and if the Germans should have the opportunity to assume the offensive in large numbers they would be in position to start with a great initial advantage in some forward move¬ ment. The attack about to be described did not yield the British the Belgian Coast, but it en¬ abled them to gain important ground east of Ypres, ground which, if held by the Germans in their April drive of 1918, would have car¬ ried them in the-initial attack a long way to¬ ward the Channel ports. General Haig's first procedure was to attack the Wytschaete-Mes¬ sines Ridge and thus remove the menace that hung over Ypres on the south. This position, which was a salient, was six miles long on the top of the ridge, but the German lines that ran around its western slope were 10 miles long. It was defended with three lines, one at the base of the western slope, one on the crest of the ridge and another along the base of the salient, which was well down the eastern slope of the ridge. A mile further east was a fourth line, passing through the town of Warneton, on the Lys. Besides these lines were many con¬ crete machine-gun posts, redoubts and battery positions, skilfully placed to enfilade every pos¬ sible avenue of approach. To take the third line was to hold the ridge : to penetrate the fourth was to break through the existing system of German defense.

At this time Great Britain had about 2,250,000 men under arms in France and Belgium. They were organized in five field armies, which in the .spring of 1917 lay as fol¬ lows, from north to south : In Belgium, the Ypres sector, the 2d Army under General Plumer; in the Lys-Lens sector, the 1st Army under General Horne; in the Arras sec¬ tor, the 3d Army under General Allenby, soon to be succeeded by General Byng; in the Bapaume sector, the 5th Army under General Gough; and in the Saint Quentin sector, the 4th Army under General Rawlinson. They v/ere well-trained men, seasoned by the Somme and Arras fighting, the equal of the Germans and French in fighting qualities; and they were amply supplied with artiller}" and ammunition.

The Germans on the same front were com¬ manded at this time by the

crown prince of Ba¬ varia, who had risen steadily as a commander since the war began, somewhat to the discom¬ fiture of the imperial crown prince, whose fail¬ ure at Verdun was notable. From the North Sea to the region just south of Ypres lay the German 4th Army, commanded by General von Arnim, who had come to be considered one of the best German commanders in the field. South of his command was the 6th Army under Gen. Otto von Below. The Germans had

ample forces ; for by this time the Russian front had become quiet, and it was possible to move troops freely from that area to France. General von Arnim was keen enough to ob¬ serve signs of activity behind his opponents' lines late in May 1917, and rightly concluded that he was going to be assailed in the Ypres region. He also divined that the attack would begin at the Wytschaete-Messines Ridge; for he could see that it was a thorn in the side of the British, who could not attack on a large scale without first removing this obstacle.

General Plumer, commanding the 2d Army, was a vigilant and tireless officer, and he had been in position before the ridge for two years when the great attack was made. As early as July 1915 he began to construct mines under this position, taking advantage of the clay subsoil which lent itself to mining. Twenty-four mines were constructed, 20 of them in the zone it was at last decided to at¬ tack. One of these was destroyed by the Ger¬ mans, but the 19 others were intact and filled with over 1,000,000 pounds of ammonal when the critical day arrived. The Germans knew well that the mines were being constructed and countermined, and many battles were fought underground between the hostile mining parties. Behind the lines railroads were constructed on the surface and pipes were laid for the distri¬ bution of water in the trenches with provisions for carrying them forward as soon as the lines had been advanced. So well were the plans made that running sterilized water was deliv¬ ered to the soldiers iri half an hour after they had won a new objective.

The day of attack was 7 June, after a hurri¬ cane of shell had been poured on the ridge for several days. The guns on the British side fell away somewhat during the night of the 6th, but the German guns continued to roar as on the preceding days. At 3:10 in the morning there was a convulsive shock and ^^a sound compared to which all other noises were silence.® Nineteen mines went off at once, flames rushing up like volcanoes, carrying trenches, concrete emplacements, solid stones and twisted human bodies in one fire-lit mass. Great

clouds of heavy gases mushroomed the sky and slowly drifted away as the artillery resumed its work.

Three army corps were in front of the ridge and sprang from their trenches at the first tremor of the explosion. They plunged forward into the clouds of smoke and dust, overran the first German line of defense, which had suf¬ fered severely from the bombardment, and gained the crest of the ridge with 19 craters where the second line had been, from Hill 60 on the north to the edge of Messines on the south, a distance of more than four miles. Brave Germans held out in isolated positions, fighting desperately in a dazed condition, but they slowly yielded to the advance of the men of the 2d Army. By 3 o'clock in the after¬ noon the British field guns had been carried forward by a miracle of the transportation de¬ partment, and the attack on the third line was made with such quick effect that by nightfall this position, the objective set by General Plumer for the first day of the battle, was fully reached. At an unexpectedly small cost to his own army he took 7,200 prisoners and 67 guns and inflicted a great loss on the enemy.

On the afternoon of the 8th General von Arnim brought up fresh troops and counterattacked along the new front, but they were beaten off easily by the British who consolidated their lines and settled down in the new trenches in security, two and a half miles in front of the position they had occupied for nearly three years.

In General Haig's plan Messines was but a preliminary stroke to a renewed battle of Flanders. It relieved Ypres from danger on the south. The next thing was to press back the Germans on the east of the town. Here they sat on a series of hills, each a little higher than the one on its west side, running back to the ridge at Passchendaele eight miles east of Ypres. Through these positions General Haig proposed to fight his way by means of the limited objective. In his way stood skilfully constructed lines of small concrete forts, which the soldiers called ®pill-boxes,^^ large enough for 20 to 30 men armed with machine guns, and strong enough to resist the shells of light artillery. These works were devised by the Germans in lieu of the deep dugouts which could not be used in the soil of this part of Flanders.

In order to deliver the proposed blow on the Ypres front General Haig redistributed his armies. First he extended the front of the 3d Army so that it held all the ground be¬ tween the limit of the 1st Army at Arras and the limit of the French near Saint Quentin. As this process went on the 5th Army, which was thus forced out of the southern trenches, was moved northward and placed in line just north of the 2d Army, which held the sector immediately south of the point of the Ypres salient. As the 3d Army continued to extend southward the 4th Army also moved northward and took position on the coast in the Nieuport sector. Thus the battle line was arranged as follows : At Nieuport, on a front of four miles, the 4th Army; south of it, on a 20-mile front but protected in part by the inundated area, were the Belgians; next, on a front of five miles, was the French 1st Army with General Anthoine for commander, fresh from his successes at Moronvillers ; then came the British 5th Army on a seven-mile front from Boesinghe to the sector of the 2d Army, which carried the line southward as far as the Lys at Armentieres.

Out of the troops in this area General Haig arranged two striking forces. His 5th Army with the help of the French on its left and of the 2d Army on its right was to drive the Germans off the hills east of Ypres. That done the other striking force, the 4th Army, -was to work forward along the coast keeping in touch with the fleet off the Belgian shore.

The affair at Messines was over by 12 June, and it would have been well if the 5th Army had been pushed forward immediately; for the task before it was long and the five months left for field operations before the winter set in were none too much for the work in hand. But delays occurred, and it was not until the last days of July that a start could be made. While affairs were in suspense, the Germans, suspecting the intentions of their opponents, made a lunge at the 4th Army at Nieuport and drove a part of it to the west side of the Yser. It was not an important battle, but it took from the British a portion of their bridge¬

heads on the east of the stream, which would have been serviceable if they had been called upon to carry out their portion of the original plan of campaign. During the month of waiting the Allied artillery searched out the weak spots in the enemy’s line with the utmost care. Many times the trenches were drenched with gas, in the use of wLich the British had become expert. At 3:30 in the morning of 31 July the whole line from a point two miles north of Boesinghe to the Lys, a

distance of 15 miles, broke into a crashing barrage behind which the French and British infantry rushed forward to the first lines of the enemy, faking them at once. They then charged the second lines which were taken for the most part, though the resistance was hard in some parts. At the end of the day all the objectives of the French and the 5th Army had been won and in some cases they had been exceeded, while more than 6,000 prisoners had been taken. It was a brilliant beginning and the army rested from its day's work in contentment. That night began four days of steady rain and the ground turned into seas of mud. It was not until 16 August that it was possible to renew the battle. On that day a general attack was launched. It succeeded on the northern part of the line, but through the resistance of a formidable system of ®pill-boxes® in the region along the Menim road and three miles north of it the advance was held up from the beginning, although there was desperate fighting and great expenditure of courage on both sides. Next day the rain re¬ turned in torrents and there was a fortnight of steady downpour. It was a full month before the water receded into the streams and the ground became dry enough for waging battle.

Meanwhile, General Haig revised his method of fighting. For two weeks he had encountered a new system of defense devised by General von Arnim : Holding his first line with only enough troops to disorganize an advancing line he massed his troops in the second line and threw them on the foe as they came into the zone of fire of the second line. In this way his counterattacks were made very effective. At the same time he placed his ®pill-boxes® in such positions that they completely raked the area of approach. By this means he repelled the British in their attack of 16 Auˆst with heavy losses. It was a new fashion in fighting and became known as ˆelastic defense. General Haig gave it careful consideration during the month of enforced idleness while he waited on the weather. The best thought of his officers was given to the machine-gun defenses. By a system of careful observation the ®pill-boxes® were located and marked on the map and high explosive shells were fired at them when the battle was renewed. In this way many of them were destroyed, while the air was so filled with the fumes of the explosives that the men inside were rendered unfit for fighting. Another way that proved effective was to approach the work behind a barrage and suddenly make holes in the barrage on each side of the ˆffiill-box,ˆˆ allowing the infantrymen to gain the unpro¬ tected rear where hand grenades quickly dis¬ posed of the defenders.

By such methods on 20 September a second advance in the same region proved successful. The troops worked their way forward across

lines of defense that seemed beyond human ability to

WAR, EUROPEAN

Copyright, International Film Service

1 British soldiers run to their gun when a German Fokker is sighted

2 Two air-fighters placing a bomb on the wings of their plane

WAR, EUROPEAN

\

1 French aeroplane brought down in German lines and found by Americans when they advanced 2 The start of a gas attack as viewed from the air

Copyright, Ititeruational Film Service

take. On 26 September another advance was made, and still another on 4 October. Then came a long series of struggles for limited ob¬ jectives, all fought through in rain or mud. It was remarked when an unusual downpour came it was a certain sign that a British attack was scheduled for that particular moment. Thus through October the lines crept forward, and on 6 November the town of Passchendaele was gained with the ridge which dominated the surrounding positions. The weather had done its worst, but pluck and courage had triumphed. The third battle of Ypres, 31 July to 6 Novem¬ ber, had ended with the British on high ground and the Germans seven miles east of the ruined town.

Nevertheless the battle was a British failure. It was undertaken as the first stage of a large campaign. All that had been won in more than three months was on the plan for the first fort¬ night. When it ended there was no opportunity to go on with the original plan. The 4th Army at Nieuport was not called into action, and the Germans sat securely for another winter in the coast towns of Belgium. But the failure was not due to bad fighting or defective leader¬ ship ; never did the British acquit themselves better. They took 24,065 prisoners and 74 guns and slew many; but their own losses were heavier than the losses of the Germans. Two things were against them in this struggle: the weather, which should have been foreseen, as it was ordinarily bad in Flanders, and the re¬ moval of German divisions from the Russian front. But the struggle was not all lost. It served to reduce the man power of the Germans and to push them back on the east from dangerous proximity to Ypres and Hazebrouck. They were by that much — five precious miles — further away from the Channel than they would have been when in April 1918, they made their last great drive in that direction, and nearly reached the hills southwest of Ypres from which the glistening waters of the Channel can be seen on a clear day. In finding the balance of loss and gain the conclusion may be that the operations were worth all they cost in death and miserable living.

While the third battle of Ypres was being fought wiJh so much difficulty during the months of August to November General Petain conducted two brilliant minor engagements which had important local results and served to restore the drooping spirits of the French people, so badly shaken by the failure of the second battle of the Aisne. The first was at Verdun and the other was on the crest of the Heights of the Aisne, where the great battle was broken off before the Germans were driven from their footholds.

In the Verdun engagement the French were under the immediate command of General Guillemat and the Germans were under General von Gallwitz. The first had reason to believe his opponent was about to undertake some aggressive movement on the west bank of the Meuse, where the Germans held Hill 304 and Mort Homme, positions not affected by Nivelle's brilliant thrusts of October and December 1916. General Guillemat made his arrange¬ ments with great thoroughness. From 7-17 July he conducted several actions with limited objectives which gave him advantageous points for an attack along his line on both sides of

the river. He opened the battle in the early dawn of 20 Aug. 1917, after three days of intense bombardment which played havoc with the German advanced trenches. All his objec¬ tives were won, and in the fighting of the suc¬ ceeding fortnight the Germans were pushed back on each side of the river until they stood, on 9 September, practically vffiere they began the great battle on 21 Feb. 1916. In these engage¬ ments the French took more than 10,000 pris¬ oners and inflicted heavy losses in killed and wounded.

General Petain then turned to the Heights of the Aisne, where the Germans still held out on the northern edge of the elevation west of the California Plateau. At this point the plateau was three miles wide and six long and the two lines faced each other across it. Gen¬ eral Maistre was in immediate command of the French troops and made careful preparations for the attack. On 17 October he began a bom¬ bardment of intense fury and six days later the infantry attacked at dawn, driving forward two and a quarter miles on a four-mile front and taking 8,000 prisoners. Within the next four days the French continued their advance until the whole plateau was in their hands and the northern slopes down to the meadows border¬ ing the Ailette River. From the newly won heights they had a view of Laon six miles away.

The year 1917 was now coming to a close. So far as fighting in the west was concerned the Germans had lost the initiative, their only action in that character being the purely de¬ fensive fighting of the spring retreat. It was followed by the battles of Arras and the second Aisne struggle, the third battle of Ypres, and the two blows of the French just described. In all of them the Allies were merely pounding on the German stonewall. It is true Nivelle's battle was inaugurated with the view of making a grand breach through which a decisive blow could be delivered. Haig's plans for Ypres also contem¬ plated B. grand offensive which would have a decisive influence on the course of the war. But both efforts resolved themselves into mere shock attacks under the pressure of dire neces¬ sity. Haig at Arras and Petain at Verdun and on the Aisne Heights were merely fighting for limited objectives, taking toll of lives and territory as they could without im¬ agining that they would do much to end the war in that particular effort. Of the same nature was the battle of Cambrai, 20 Nov. to 7 Dec. 1917, which General Haig precipitated as soon as he could break off the battle of Ypres.

The conduct of this battle fell to General Byng, commanding the 3d Army, who made his preparations with great skill. Instead of using a long bombardment to destroy the enemy's wire entanglements he

employed a large number of tanks sending them forward behind a barrage. By using the greatest care all the tanks were brought into position secretly, and the attack was a complete surprise for the Germans. The tanks made great gaps in the wire through which the infantry quickly passed. The outposts fell at once and the main line went soon afterward. By 10:30 a.m. the strongly tunneled reserve line of trenches was taken and the attacking force confronted only a series of enemy rear positions. Against these places the attack was continued on the 21st, with some important gains. But the German resistance

was not broken, and at the close of the day the British troops were exhausted and the Germans were bringing up fresh divisions. Here the lines remained five days with hard fighting and little advantage for either side.

The battle had now reached its crisis. The British had driven a salient into the German positions 10 miles wide and six deep, but they were unable to go farther and their opponents were concentrating superior forces against them, preparing to pinch out the newly formed salient. Had General Haig been able to bring up an equal number of fresh troops and carry the movement on to a complete success it would have been well to proceed with the battle. Otherwise, prudence demanded that he break off the contest, fall back to a favorable position

tions known as the battle of Cambrai on the night of 7 December with his lines about two and a half miles nearer Cambrai than when the battle opened on 20 November. In the first week of the fighting the British took 10,500 prisoners and held 60 square miles of territory that had previously been occupied by the Ger¬ mans. They had also inflicted losses. that were heavier than they had sustained.

The battle of Cambrai was the last of the blows of attrition in the west. In the future a way was to be found to break through the trench system that had existed from September 1914, although neither side was to find a way by which the breach could be made to result in one of those great encircling movements that was the dream of military

men on each side.

ˆ , CoqnTcourL % ,

DCROISlLLES ˆ BuJˆsy

\Bullecourf—

Noreui/ˆ

LaynJˆi

Naˆes

Inchy-en-Ariois^

uounon

vSlx

Fremicourf

ˆHdiˆrhdout

Pro/ille

BERTINCOURT

l Ruyau/couri- %

MAP SHOWING

BATTLE OF

CAM B R Al

Scale of Miles.

■ » ‘ •

O I z 3

Line -Nov’. I9, 1917 \Furfhesf Adi/ance of Br/t/sˆh - Noiˆ. 27, /9

Railroads .

> » >

Roads

Gauzeaacourk

WaUncourTˆ Mo/deco (/ o ejz

f lˆl/isrˆˆˆ9po/?/?ecourl 2ˆMalfnc(ˆ Mau/sTam x

Hˆ/cour!

Epehˆ

VendhuHe

Beau’remr

in the salient, and be satisfied with what he had won. To adopt such a course required more self-control than the British general displayed. Following the impulse to hold on in an extreme situation he remained where he was and re¬ ceived the storm that General Ludendorff was preparing with great care. It broke on 30 November. A strenuous attack was delivered on each flank of the salient, while a furious charge was delivered on its centre. This triple action lasted from 30 November to 3 December, the British lines being pushed back on both flanks until the salient became dangerously narrow. Then General Haig was forced to realize that he must draw back his advanced lines. During four days’ fighting he carried out the task of readjustment and ended the opera-

The Cambrai battle was notable for the success with which tanks were employed in it. These instruments of war, first used in the battle of the Somme, were originally hailed as a very dangerous fighting machine. They were con¬ sidered a kind of mobile machine-gun nest. The Germans caught at the idea and tried to improve on it by making still larger tanks, assuming that they would be more formidable through being larger. As a fighting machine’, however, the tank was only moderately successful. Its best service was against wire entanglements, and it was in the battle of Cambrai that this use was given its earliest perfect demonstration. It was here shown that the tank, by doing the work of the initial bombardment, made it pos¬ sible to employ the element of surprise, pro-

1 Tank going into action crossing an unused trench

2 Tank moving to the support of troops at the capture of Juvigny

WAR, EUROPEAN

Copyright, luternational Film Service

1 Infantry ahead of a tank that had just charged a trench

2 French whippet tanks going into action at Villers Cotterets, west of Soissons

vided there were adequate air protection and care in assembling the surprising forces.

The Deciding Campaign of 1918.

1. The Crisis of the War. — In the beginning of 1918 the will to war was visibly lower in the peoples of Europe. Austria, Bulgaria and Turkey were at the limit of their powers and their peoples had become apathetic. On the side of the Entente the Russian war spirit had disappeared and with it went the old Russian government. In Italy war weariness had made vast strides ; and it was known that only the presence of British and French troops in large numbers had stayed the tide of collapse late in 1917. In France and Great Britain the burden of war was heavy and although the people did not talk of quitting, a disposition to discuss terms showed that they longed for peace. In Germany there was a great deal of suffering and a corresponding desire for peace; but national pride was fed by the achievements of the army and overcame the popular war weariness. It was much to the German that his countiy had held her own for three and a half years against the strongest states in Europe, and while doing so had won great victories. A nation still gain¬ ing victories in the field could not be expected to cease fighting and ask for peace; but if vic¬ tory should

turn to defeat, her restrained war weariness was likely to have full sway, and startling results might be expected.

Germany, however, saw no reason to fear such an untoward turn of events. On 3 March she completed her conquest of Russia by forcing the Bolshevik government to sign the treaty of Brest-Litovsk. Since the beginning of the year it had been evident that this government was at her mercy, and the process of transferring troops from the Eastern Front to the west, which had been carried on to some extent in 1917, now went on apace. Her Eastern Front no longer existed. In 1914 her plan was to crush France and then throw all her strength against Russia. After many months of hard fighting she had succeeded in crushing Russia and was about to throw all her force into the work of winning a victory in France.

General Ludendorff's memoirs contain in¬ teresting light on the German view of the situ¬ ation at the time. He had choice in 1918, says the author, of two policies, to attack or to take the offensive behind strong entrenchments. He adopted the first course for several reasons : (1) It was necessar}'- to win a great victory to keep the German prestige alive in Austria-Hun¬ gary, Bulgaria and Turkey; (2) it was likely that the Allies would break through any way if 'the defensive policy was assumed; and (3) there was every reason to win a decision before the Americans arrived in force. Having come to this conclusion orders were given for com¬ plete preparations for an attack on the grandest scale.

The sector chosen for the blow was north and south of Saint Quentin, which was believed to be the weakest point in the Allied line. Other sectors were debated and rejected, the Ypres region because the ground there was too muddy in the early spring, and the sector of the Chemin des Dames because it was too strong. Ten weeks were given to special training for the at¬ tack. In the beginning Germany had 192 divi¬ sions in France, and more than half of them

were placed opposite the British lines. For breaking-through tactics she set aside 70 of the best.

For meeting the fate gathering against them the Allies were badly situated. In the first place they had the exterior lines of a great angle. By massing troops on the interior the Germans could strike at one side

or the other with concentrated force, and the Allies could not quickly move reinforcements around the point of the angle. The railroads within the an¬ gle were numerous and well planned for com¬ munication across its area, while those to the west of it ran off to the south toward Paris, and those on the south side of the salient ran off to the southwest.

Another disadvantage of the Allies was in their disunited command. The German armies moved at the direction of one will, which hap¬ pened to be the will of General Ludendorff, a master of the military art. While General Petain and General Haig were always in per¬ fect accord they were nevertheless acting in separate spheres of activity. In an emergency there was no time to ask for cooperation, even though it was certain that it could be obtained for the asking. This division of the command was a weakness well understood by the military experts on each side, and efforts had been made for its removal. In November 1917, after the disastrous campaign in Italy, the Allied War Council at Versailles was created to obtain greater unity of action. Its functions, how¬ ever, were only advisory. Its first members were General Foch, for France, Gen. Henry Wilson, for Great Britain, and General Cadorna, for Italy, and later General Bliss for the United States. The creation of the council was chiefly the work of Mr. Lloyd George, who spoke so frankly about the need of unity that he aroused a storm among his political enemies at home. It soon appeared that the council had little real authority, and the three eminent men first appointed resigned to be followed by persons of less prestige. Then — in February 1918 — an attempt was made to increase the authority of the council. At this Sir William Robertson, the British chief of staff, resigned. Immediately a popular outcry was raised against the Prime Minister, but he appealed to the good sense of the country and weathered the storm. He did not dare, however, to go farther in his efforts in favor of unified command. That was a step which only a vast disaster could wring out of the Briton.

While, therefore. General Ludendorff with much skill massed the entire German energy in the great salient whose point was on the Oise, the British on the west side and the French on the south side of the salient waited his at¬ tack in confidence. They did not believe he could break through. They took no effective means to reinforce each other as need should be. Neither general had large reserve forces to re¬ pair a breach, if one were made. Each counted on the old methods that had held good at Ypres, the Somme, the Aisne and Verdun, by which it was possible to hold back any assault with only a slight dent in the line of defense.

2. The Offensive of 21 March. — The Ger¬ man blow was expected by the Allies. All through the late winter the newspapers had talked about it. As the weather became warm in March and the blow did not fall there was a

tendency to decry the danger. Whether it would fall on the British north of the Oise, where the 5th Army under General Gough was in position, or on the French along the Aisne positions it was impossible to say. The Ger¬ mans promoted these doubts by making prepara¬ tions for attack at each place, and near Ypres as well. Later on they attacked at each of the other places, so that none of the preparations were wasted.

The 5th Army of the British held a front, of 41 miles, from the Oise to Gouzeaucourt, 10 miles southwest of Cambrai. It had 11 divi¬ sions in line and five in reserve. North of it, as far as Arras, a front of 23 miles, was the 3d Army under General Byng with 10 divisions in line and five in reserve. These 31 divisions probably contained more than 500,000 men. Most of them became involved in the battle that was about to begin.

The Germans had determined to attack be¬ tween Croisilles and the Oise, a front of 50 miles, which included all of Gough's and nearly two-thirds of Byng's sectors. In their first line in this area they placed 37 divisions, about 500,000 men, as the German divisions contained about 13,500 men each. They 'assembled large supports behind the first line and brought them up as needed. They concentrated efforts at certain points which were critical for hold¬ ing the spaces near them and here they out¬ numbered the British as much as three to one. Two of these important points were near Saint Quentin and one was near Cambrai. The German High Command took care that the breach to be made was wide enough to permit extensive operations, if the plans went as desired.

The attack was made in the morning of 21 March. A persistent fog hung over the country. At 4:45 an intense bombardment with all kinds of guns was opened. A large number of gas shells were thrown against the British back areas and the gas was held down by the moist air,

producing great confusion. High velocity shells fell that day 20 miles behind the front line along most of the area attacked. The men in the trenches suffered frightfully. The fog was so dense , that their gunners could not see 50 yards ahead, and no one knew what to shoot at or what to expect. Communication with the rear was impossible except by wireless. In this confusion the men lay in their trenches awaiting attack. It came but not as in previous battles. In one place it came at eight o'clock, at others it arrived later. By 10 the attack was general. The defenders could not see the ap¬ proaching troops until they were actually upon them. Specially selected troops were sent ahead to try out the weak spots in the defense. When a breach was made signals were sent up and other troops were rushed forward to improve the advantage that had been gained. Thus it; happened that the line was penetrated at many places while at many others it held firmly. This process of penetration was known as in¬ filtration, and under it the line of defense crumbled until it was reduced to broken bits, each battling for its existence. In many cases the broken remnants held their own, fighting off the German assaults until the last. In other cases they fell back from one place to another as they could, fighting delaying actions. At one o'clock the fog lifted, but two hours earlier the

advanced line had been generally taken and the second line was being assailed, heavily in places. All through the afternoon the struggle went on and when night came the Germans had worn the second line thin 10 miles north of Saint Quentin and had made large gains at the southern end of Gough's line. During the night the British made some readjustments of their positions and prepared for severe attacks on the following day. Airplanes reported heavy con¬ centrations behind the enemy's lines.

Next day the situation was clearer though no less critical. General Byng's army held its own though hard pressed. General Gough, however, was forced back through the system of trenches that served for the second line of defense. They proposed to stand firmly at the third line, but in the afternoon a gap was made in the thin line of defenders as they fell back and the Germans poured through in large numbers. They seized the third line before it could be made secure and during the night General Gough was forced to withdraw to the east bank of the Somme, a distance of eight miles. Later in the night he came to the bitter conclusion that he could not afford to stand on the east side of the river and risk battle against the masses of opponents that were following him, and he issued a second order

directing the army to cross to the west side. The movement was executed. with difficulty, so great was the Ger¬ man pressure.

While it was being carried out a still greater danger occurred in the area north of Peronne, where no friendly river offered cover. This part of the lines was firm at first but had to fall back to keep its adjustment with the southern part. In the afternoon of the 23d, while the withdrawal was in progress, a gap appeared at the point where the 3d and 5th Armies joined, the Germans threw themselves into it and turned against each edge in order to widen the gap. Now did the quality of British courage that has been called ®bull-dogˆˆ show itself in thq most valuable manner. Beaten battalions stood in the breaches and fought until they were a shadow of their ordinary strength. A brigade of South African troops held one position until it contained only 100 unwounded men. Team¬ sters, engineering units, men separated from their commands, and any others who were swept backward before a retreating army were rallied, and the gap was filled with them. Thus it was that by hook and crook the Germans were held back until the lines could be reformed. The 24th and 25th were critical days, and only the stoutest resistance by men already at the point of exhaustion saved the day for the sal¬ vation of Britain. By the 24th French sup¬ ports began to arrive on the southern section of the line attacked. Next day they were present in larger numbers and took over a 12-mile section of the line north of the Oise, the dis¬ placed troops being moved northward to help the hard-pressed division there.

The events of these four days made a pro¬ found impression in France and Great Britain. Face to face with complete disaster the rulers now discarded their opposition to a unified command. Representatives of each govern¬ ment held a meeting in France, at which the critical decision was taken, 25 March, to ap¬ point Gen. Ferdinand Foch commander-in-chief of the Allied armies in France with unlimited

ˆ n

Ostendˆ

F.

Nieuporfi

iDunkirl

Xmmude

Allied Line March 2f, 1318 German line dull/

> , St.Omei:^

^^ou/oane.

i^Qzed/vrsi

-Ypre^

Kerrhv’ BaiHeuL _

, lArmeritiere^^

MryiHeli^^^^drri

^qV.e’iifiey

MonfreuH

Bruges //^

wLaBassee ‘

ZhosmJ

V

yTens-*^

StPoHL^—^

^4

DouIIens.

ARRAS^

M^uvi/LeBo/rc

tbbey///e -P

SerreMj0 > ^^^,

« ■ I . ff'Ha/rwf. ‘ XGamblesYf^f^

lenciennes—

\

Maubei^c^^

larcoing.

PT^QUENTIN

‘ ■ r\ c, * E

^Perofin

AMIEN

ˆPoix

i • • ‘/We’rmtˆcb

VfllersDreronneuˆXy • • • •ˆ;

‘•Ribemonfˆ

log

ˆ0

Morau/J ^^^‘Ariri ilers .

0ourremqnche9mˆ’jY’ˆHoLje: : : ; 7/: ; : : \ 1 c’

: : ; i

://::: \Qumr.P!:LPˆˆiˆ‘k ˆ?ˆ7i9 > 4A

J. D ˆjiˆs ‘ˆyss ˆ ˆ

T *re550*ˆˆ%ijA|ˆ . . ‘iˆ:le:Chatdbi\8nizL/ˆ

ur-Matˆ iPˆˆsaˆrˆSx.}. “x. • . . •• . . T. •

0ˆ

*L*rsonwˆ

Chaumorrfm

CBeaumis

”Ideufchafe!

Meruˆ

‘ Crepy

€L

”houA

A.

ˆyˆBeaumoni

Befz

ˆ , , ;ˆrismes;_ Q’uic’nuie . Gueu.

• • Tardenpjˆ

IREIIˆ

I PARIS

|’^^•s57//?s

W-Jˆis Meau\

Belleauˆ

)hateauˆTFiieri5‘

‘f.d

Dbrniahsˆ Cpnde-en-

■PourCi

ˆChcdlJlonjsur-Marne 87 < 7zyje

A ˆ W

Brie // “ˆy x’cv

MoMmort

Aoulommiers ©Band Mˆtslallu 8: Go. N.ii

bma

Roods

Rai /roods -i , ,

Scale in Miles

10 15

iia-ist-i-i3

V

- p

V

/

\

■V

I

I

* I

* #

I

‘ t

- i

I

»

*

t

• ‘A ‘;■ •

I

authonty. It was the best day's work of the war on the side of the Entente Allies. The man named was the greatest general the war brought to the front. He was a master of mili¬ tary science, a great strategist, a well-poised commander in difficult times, a genius for seizing the right moment for an offensive and a leader who knew how to inspire confidence in his subordinates. In taking this step the Allied statesmen were supported by the peoples of their own countries, and particularly by the in¬ fluence of President Wilson, who was begin¬ ning to rnake the United States felt in the higher policies of the war.

Foch took command at once. During the first day the situation seemed desperate. The 19th British^ corps, just south of the Somme, had been driven back 20 miles in five days and was at the point of collapse. Twenty miles to the west was the important railroad centre of Arniens. If it fell the entire line of communi¬ cation between French and British armies would be demolished. The Germans realized their opportunity and were pouring their forces into this sector to take the city if possible. Could the weary 19th corps withstand them? The situation was saved by a motley brigade of men gathered up behind the lines, among them the 11th Regiment of American Engineers who had been constructing bridges behind the British lines. The brigade was commanded by Brigadier-General Carey. The 26th was thus a day of grave danger, but it was weath¬ ered without a collapse, probably because the Germans were nearly as weary as the British. They had outrun their transports and heavy guns and there was a slight weakening of pres¬ sure on the 27th at the centre of the great salient that a week's fighting had created.

The engagement now passed into another stage. It had as its special local problem the capture of the Paris-Amiens Railroad, the main line of communication behind the Allied defenses. South of Amiens the road bends eastward four miles before it resumes its south¬ ward course to the capital, and at this point it is only seven miles from Amiens. Could the Germans cut through to this bend? On the 28th they were only seven miles to the eastward at Demuin. General Foch

was collecting a mobile force, a mass of manceuvre, to throw into this part of the field, and the railroad which the Germans were trying to capture was the line by which they would have to arrive. Could the Britiˆ hold on until the expected French forces could detrain? That was the fateful question.

General Haig concluded that Gough's 5th Army was unequal to the task of defense and withdrew it, putting in its place a body of hastily organized troops called the 4th Army to which General Rawlinson with his staff was transferred from the old 4th Army. For five days they held back the attacks of their oppo¬ nents, whose only gain was to thrust a sharp angle to the west at Moreuil, where they were five miles from the Paris Railroad. It was retaken two days later, passed to the Germans on the next day, and was recaptured by the British on the day after that, which was 1 April. On this day the French were arriving in force and took over the line to a point five miles south of the Somme. After two days of relaxation the drive was renewed on 4 April, when the French were driven back by massed

attacks until the line stood two miles from the railroad. It went no farther, for two French armies now arrived and the line was made safe. Four months later the Allies were able to drive back their opponents until the line was a safe distance from the railroad. But the battle itself came to an end with the German attacks of 6 April, which ended disastrously for the Ger¬ mans. The armies in the salient were exhausted and it was necessary to let them rest while other armies took up the task of defeating the British,

Thus ended the operations which some persons have called the second battle of the Somme, but which is persistently referred to as the drive of 21 March. It was a surprise attack on a vast scale and in superior numbers. In the beginning the Germans threw 64 divisions against 32 British divisions. When it ended the Germans had used more than 80 and the British had used 49 divisions. In the beginning the Germans had used such concentrations, which their interior lines made possible, that they were in ˆ the ratio of three or four to one at the points of actual contact. As they marched forward they came to the region they had devastated in the preceding spring and found it harder to move their troops behind their own lines. The battle came to an end when the Germans in the salient had exhausted their strength and gone as far ahead of their heavy artillery as they dared go. They made an ad¬ vance of 30 miles at the deepest point and announced the capture 70,000 prisoners and more than 1,000 guns.

On 23 March they began a long range bom¬ bardment of Paris with a battery of 8.4-inch guns, firing from a position 70 or more miles from the city. When the first shell arrived French experts were astonished at the feat. Some refused to believe that it was fired from a cannon, suggesting that it was dropped from an airplane flying so high that the macliine was invisible. But the arrival of the shells at regular intervals of 20 minutes disproved that theory. Like the dropping of bombs on London and other English towns, the military effect was slight. It was meant for an ˆttack on the French morale; but Parisians paid little atten¬ tion. On Good Friday one of the shells struck the church of Saint Gervais in the older part of Paris, while the edifice was filled with worshippers, wrecking the building and killing 75 and wounding 90 of the worshippers. At a time when Germany was bending all her efforts toˆ end the war with an early peace she chose this means of terrifying her foes into sub¬ mission, and only goaded them into fury. Had she offered the world a first evidence of respect for humane feeling by suspending her bombard¬ ment on Good Friday, as she might well have done, the effect on the Parisians would have been much more favorable to the German cause. It wasˆ in the battles in front of Amiens that the British first used their small tanks, ˆ %hippets,® companions to the small tanks of the French.

3. Reaching for the Channel Ports. — Gen¬ eral Ludendorff did not mean to break off the battle for Amiens, but only to suspend it while the guns could be brought up and his soldiers could get some rest. In the interval he proposed to strike elsewhere. He knew that Haig had drawn strength from the lines near Ypres and

he assembled nine divisions for a sharp blow north of La Bassee. He hoped to do two things: break through to Bethune and on to Hazebrouck, connected by rail with Dunkirk, 25 miles away; and draw off strength from the Amiens front in anticipation of a renewal of the struggle there. He did not mean that the battle in this section should be a major engage¬ ment. He had enough troops to make this a powerful blow without weakening his strength in the newly-established Amiens salient. He overlooked the fact that he was now fighting not the British army merely but Foch's Allied army. The French reserves were now freely at the disposal of the British with no

more de¬ lay than was necessary to bring them to the requisite point by the exterior line of com¬ munication. Had he been dealing with the British alone he would probably have used up their resrves in the north and reached his ob¬ jective there.

On 9 April, just as the battle was receding before Amiens, an attack was made on a 12-mile front from La Bassee to the Lys, near Armentieres. It came after a terrific bombard¬ ment with gas shells and hiˆh explosives, and there was a German advance of from three to four miles at the centre of the sector. Next the battle was extended to the area north of the Lys for eight miles with further gains on the whole region involved. On the north it reached the Wytschaete-Messines Ridge, which the British managed to hold after severe fight¬ ing. ˆ Theˆ battle had begun with nine German divisions in the attack, but it was extended on the second day until 16 were engaged. On the 4th Ludendorff had concluded that he had an opportunity to break through to the coast and began to put in his reserves without re¬ straint. On this day six British divisions ar¬ rived behind the lines and were thrown into the battle as rapidly as they could be carried for¬ ward. 'They arrived none too soon ; for the massed German attacks were being held back with difficulty.

General Haig now realized how serious the situation had become and made the most care¬ ful preparations to meet it. He drew in his lines from Passchendaele, thus shortening his lines and ridding himself of a sharp salient which it might be difficult to hold. To his men he sent a ringing order of the day 11 April, which shows in what situation was his army and in what spirit it was called upon to stand and fight. It ran as follows :

"Three weeks ago to-day the enemy began his terrific attacks against us on a fifty mile front. His objects are to separate us from the French, to take the Channel ports, and to destroy the British army. In spite of throwing already 106 divisions into the battle, and enduring the most reckless sacrifice of human life, he has made little progress toward his goals. We owe this to the determined fighting and self-sacrifice of our troops. Words fail me to express the admira¬ tion which I feel for the splendid resistance offered by all ranks of our army under the most trying circumstances.

"Many among us are now tired. To those I would say that , Victory will belong to the side that holds out longest. The French army is moving rapidly and in great force to our support. There is no other course open to us but to fight it out. Every position must be held to the last man. There must be no retirement. With our backs to the wall,

and believing in the justice of our cause, each one of us must fight to the end. The safety of our homes and the freedom of mankind depend alike upon the conduct of each one of us at this critical moment."

The French began to arrive on the 16th. The five days' interval was a period of severe trial, the Germans slowly eating their way for¬

ward. On the 13th there was an all-day desper¬ ate struggle to hold Neuve Eglise and Wulver-ghem, keys to Mont Kemmel, a most important position, and success came but by a hair's breadth. Despite these efforts the Wytschaete-Messines ridge was taken and a long swoop was made to the west of its lower extremity. From Ypres to the southwest lies a series of hills about six miles north of the Lys River, making a barrier to Hazebrouck. The German attack had faced westward at first ; but it turned north¬ westward after the fourth day, 12 April, and be¬ came a furious struggle to carry these hills. Out in front of the group stands Mont Kemmel which the enemy had to take if he advanced on Hazebrouck. He threw himself against it on 17 April in great strength and was repulsed with heavy losses. On the same day an attempt was made to break the lines north of Ypres. Ludendorff probably thought that the lines here would be weak through withdrawals for the southern areas, and he employed numbers that would have overwhelmed a weak line of defense. If he had taken Haig unawares and got behind the force in Ypres he might have made large captures of men and materials ; but Haig was too careful to be caught napping. The northern line was held in strength and the attack only resulted in heavy German casualties.

The attack on the Lys-Ypres sector went through the same stages as the drive of 21 March. First came the furious onslaught against an enemy that could only fall back shattered but filled with the determination to hold on to the last ; then a desperate fight against time in the expectation of French reinforce¬ ments; and at last the hardening of the line when the French arrived. On the Lys the first of these stages came on the 12th, the second lasted until the 18th, and the third lasted after a slight intermission, from the 25th to the 29th. In the second stage was the first attack on Mont Kemmel, which was a failure. The position was 200 feet higher than the surround¬ ing hills and the Germans were very anxious to take it. On the 25th they made heavy con¬ centrations and carried the hill. Despite their great efforts they could not go farther. The French, who held this part of the front, and the British, who were to the northeast, read¬ justed their lines and stood at bay. On the 29th they received a tremendous attack from

11 divisions so massed that there were from six to eight bayonets to the yard. By sheer weight it succeeded at first, but the French delivered a swift and powerful counterstroke which drove back the assailants in some places nearly a mile and checked their advance in all other places, so that on the whole they lost rather than gained on that day. General Ludendorff, as he says in his memoirs, decided that to continue his efforts to reach Hazebrouck was too costly and allowed the battle to come to an end.

When he opened the attack he expected it to be an action subsidiary to the fighting before Amiens. The success of the initial attack was so great that he could not resist the temptation to follow it up, and at last he threw so much energy into_ it that_ the Amiens battle suffered. On 23 April he tried to revive that action by opening an attack on the section of the line between the Somme and the Ancre. Four divi¬ sions were used and the town of Villers Bre-tonneux was seized ; but in a brilliant counter-

stroke the British recovered all that was lost and took 1,000 prisoners. The battle was not reopened on this quarter. The German armies in the salient and on the Lys were too tired to continue the aggressive, and the fighting shifted to a field in which fresh troops were available.

4. From the Aisne to Chateau-Thierry. — The new scene of action was the line southeast of Laon where the second battle of the Aisne was fought. While the attack was delivered against strong positions, the Germans knew them to be held by troops exhausted in the recent fighting. Here we find repeated the purpose with which the Lys attack was begun. The new movement was inaugurated to draw Allied troops from Flanders, where it was proposed to renew the struggle as soon as opportunity offered. But as the initiative did not shift from Flanders to the Somme, it was not destined to shift back from the Aisne to Flanders.

The advance was begun on 27 May 1918. P’orty divisions from the imperial crown prince’s army were assembled with great secrecy in the line opposite the Aisne positions on a front of 30 miles, 25 of them in the first line of attack and 15 in the reserve line. The Allied line was

held by seven divisions, four French and three British, with a thin supporting line in the rear. The British troops had seen heavy fighting in the March and April operations and were in this part of the battleline for rest. The position was weakly held, not because Foch thought it too strong for attack, but because he was in dire need of troops in other sectors. He had a right to feel that I.udendorff would not drive southward into the region south of the Aisne, since he could not reach Paris that way without making a wide detour which would leave his flanks exposed to Foch's blows. In fact, Ludendorff admits that he had made no plans to sweep southward. His objective was the Vesle line and the railroad from Soissons to Rheims, an advance of from five to 10 miles. By going that far he expected to draw French troops from Flanders and so weaken the lines there that he could resume his progress toward the Channel. At one end of the objective was Rheims and at the other Soissons, and it was supposed that the French would do much to protect these important places.

The right centre of the attacking line was opposite the Chemins des Dames position, which was held by French troops. When the Germans advanced after a bombardment of three hours these troops were swept off their feet. Three divisions in their rear tried to form a line at the border of the Aisne but they, also, were overwhelmed and forced to retire so quickly that they could not destroy the bridges. At nightfall the Germans had gone forward to the Vesle and even crossed it. At its greatest depth the advance was 12 miles, which was more than had been made on any day in either of the two preceding drives. The British fought steadily and gave ground slowly, but the breach of the line on their left made retreat inevitable. The net result of the day's fighting was to estab¬ lish a salient 16 miles broad at the base and 12 miles deep. Next day it was widened until the base was 25 miles and three miles added to the depth. The third day, 29 May, the Germans threw their strength against the western side of the salient and took Soissons, which the local leader had not tried to take at first, since it

was not one of the original objectives. By this time Ludendorff was ready to enlarge his plans, and he had brought up fresh troops. Accord¬ ingly, on the 30th he let the army have its way and it rushed forward to the Marne, whose northern bank it took from a point three miles east of Dormans to a point four miles east of Chateau-Thierry, making a salient 30 miles deep and 35 miles wide at the base. It was too narrow for its depth, and Ludendorff lost no time in trying to widen it.

He first brought strong pressure against the western side, a forest region from Compiegne to Villers-Cotterets. On 31 May he had some success pushing westward from the inner side of the salient, and southward from the adjacent part of the old line. But already Foch's reserves were coming up and the advance was short. The attacks were pressed for several days, but whhout success. Within the same period strong efforts were made to take Rheims but they like¬ wise failed. From the standpoint of military science the German divisions in the salient were in a trap, and they should withdraw if they could not widen the base of the salient.

The first attempts having failed Ludendorff took time and prepared a blow so heavy that he thought it could not fail. On 9 June he threw 15 divisions on the French lines defending the forests around Compiegne, advancing on the line from Montdidier to Noyon. Foch was ready for them and offered steady resistance. In two days' fighting the Germans gained six miles on a narrow front; but the Forest of Com¬ piegne, running into the centre of the angle the line made before it turned south near Soissons, could not be taken and the western side of the salient stood firm. Ludendorff then projected an attack on the eastern buttress, but for that he made such elaborate preparations that the affair was a battle in itself. His venture on the Aisne, however, had led him into the Marne salient, and he was so involved that he had to relin¬ quish, at least for a tim.e, his plans for Flanders. The successes of the first three drives had made the German soldiers overconfident. In the offensive just ending they had taken 55,000 prisoners and 650 guns, and they had raced from river to river so rapidly that they concluded that the French army was used up. They were soon to have occasion to regret their hasty conclusion.

5. The Beginning of German Defeat. — We have seen that General Ludendorff tried in vain to widen the salient into which the ardor of his troops led him by attacking on its western side. His next move was to try to widen it on the east. Several sharp attacks were made on the lines in front of and east of Rheims, but they were all repulsed. Then he determined to make Rheims a part of his next major action, He proposed to cross the Marne southwe.st c.f this ancient city and move eastward on both banks while a powerful force attacking east of Rheims pressed the lines back and enabled the two forces to pinch out the Rheims salient. He expected to reach Epernay and Chalons and by seizing the railroads to Paris cut the vital line of supplies for the Allied forces in Lorraine and Alsace. In his previous drives during this year he had reached more than his immediate objec¬ tives. It seemed to him most probable that he would do the same thing in the drive he now projected. The German people, carried away by the ease with

which their armies had reached

the Marne, believed the last eflfort before victory was at hand. Thev called the approaching battle the Siegessturm, the ^^stroke of victory.®

Operations opened at midnight of 14 July. The artillery positions had been arranged by Colonel Bruchmuller, who had made this arm so efficient in the battles of 21 March, 9 April and 27 May. The effect of the opening cannon¬ ade was terrible in the whole area of the attack. The front trenches were destroyed by four o'clock in the morning, when the infantry ad¬ vanced. They crossed the Marne from Fossoy to Chatillon and pushed back their opponents four miles on a sector 10 miles long. North of the river they advanced three miles on a 10-mile sector. But Rheims was not shaken. From a point eight miles southwest of it to another seven miles east of it the line remained as it was. Still farther east, where the shock was greater, the Germans gained slightly through the deliberate policy of General Gouraud, who held the opposite lines. He arranged his defenses in deep formation, his battleline from two to four miles behind his outposts. When the attack came he withdrew from the. .front positions with all his advanced field guns, and the worst of the shock was spent before his main line was reached. By delivering prompt counter¬ attacks he prevented infiltration. His battle was conducted with remarkably slight losses, and it inflicted heavy casualties on his foes.

On 16 and 17 July the attacks were con¬ tinued, the heaviest fighting being southwest of Rheims, on both banks of the Marne. On each day there was an advance of two miles on a narrow front, the result being that on the morn¬ ing of the 18th the attack had gone about as far as it could be expected to go, while the eight divisions making it had suffered heavy losses and were exhausted. General Foch had received ample notice of what was coming from prisoners and deserters and had made preparations to meet it. Of the four great drives of the Ger¬ mans in 1918 this was the least successful. It had apparently reached its limits when it was suddenly eclipsed by movements Foch made in another part of the field. It passed so quickly from the gasp of failure to the desperate fight to escape from the Marne salient that the

observer is likely to forget how bad the German situation would have been even if there had been no counterstroke on the 18th.

Foch's preparations were carefully made. From a point opposite Soissons, in enemy hands, to Rheims, the lines of defense were held by the following armies : the 10th under Mangin, between the Aisne and Faverolles; the 6th under Degoutte, between Faverolles and Vaux, a mile west of Chatean-Thierry ; the 5th under de Mitry, between Vaux and Dormans; and the 9th under Berihelot, from Dormans to Rheims, beyond which was the 4th under Gouraud. With the forces under Mangin were the 1st and 2d divisions of United States soldiers, with Degoutte was the 26th, and with de Mitry was the 3d with the 4th in support. The 42d, or ^^Rainbow Division® was with Gouraud, near Prunay, but it was about to be sent to Degoutte. Other American divisions were in reserve south of the Marne and were sent for¬ ward to de Mitry as the battle was being fought. (For the part played by the Americans see next section).

In thrusting themselves into the salient the

Germans lost the advantages of that well-arranged system of roads that had favored them in most of their previous operations in France. One main highway led into the area, from Soissons to Chateau-Theirry, and it was well to the west of the centre of the salient. From this road, near its central point, a lateral branch ran off to the east near (Julchy-la-Ville, leading to Fere-en-Tardenois, seven miles to the eastward, and to Ville-la-Tardenois, 13 miles still further eastward. Besides the two roads, which were but one for 10 miles south of Soissons, the only means of travel in the salient were the parish roads, small and without system. Three miles north of Oulchy the Soissons road was only six miles from the eastward point of Foch's lines. If these six miles were eliminated it would be difficult to supply the forces in the southern part of the salient. At no point was this north and south road more than 14 miles from the French positions. It was tempting fate to leave their vital line of communication exposed to attack while they hammered away at objectives 20 miles distant; but the Germans believed the French reserves used up. They were preparing for a fifth great drive, this time ˆ on Paris direct, and thought that eight divisions, with six more in support, were enough to hold the line on the west side of the salient.

Foch's plan was to seize this vital road, but he went farther than that. The war had many times proved that no offensive was worth while

after the defenders had time to bring up their reserves. All the gains hitherto made on the Western Front had been made by massing troops secretly and driving forward for a few days until the opposite side could hurry up enough men to stop the progress. Then it be¬ came too costly to try to go farther. Hitherto one great lunge had been followed by weeks of preparations for another, with the result that only a few such strokes could be made in a year. Foch decided to follow a modified form of the same tactics. Instead of putting all his energy into one crushing blow, he put it into several alternating blows, striking first at one place and then at another, and drawing the Ger¬ man reserves to each place attacked, but break¬ ing off the attack before it reached the stage at which his losses were most serious. Thus, as long as he could keep the initiative he broke up the enemy's masses of reserves, which had already been reduced seriously by his four great drives. It was an excellent plan for the situation then at hand and for a leader of such brilliant action as Foch. It is doubtful if it would have succeeded earlier in the year, when the Germans were greatly superior in numbers. It could hardly have succeeded in any event if the soldiers of the United sStates had not been on hand in large numbers. Another new feature in Foch's method of fighting was the use of the quick counterattack to break up in¬ filtration. It was impossible for the Germans to find the weak points in his line while they were forced to meet his charges.

Foch's hour of action arrived as the Ger¬ man drive of 14-17 July came to its period of stabilization. The decision was his. Petain and Fayolle, whom he consulted as the French gen¬ erals nearest in authority, were doubtful, but Haig gave his approval and took over addi¬ tional trenches in order that French troops in

the Ypres sector might aid in the proposed attack.

The task of delivering the blow was allotted to Mangin and Degoutte. Their reinforcements were assembled secretly in the forest of Villers-Cotterets and in the wooded region south of it. At 4 :30 in the morning of the l&th Mangin went forward without artillery preparation, his in¬ fantry was preceded by a large number of the small French tanks which the British called ^^whippets.^^ At the same

hour Degoutte at¬ tacked, in some places without preparation. The whole area involved was from Fontenoy to Belleau, a distance of 25 miles. The Germans were not prepared for the attack. They had come to the conclusion that ‘the French were exhausted and they had left this flank in the

Boehn commanding in the salient treated the attack as a local affair and ordered a counter¬ attack against Mangin, who received the blow firmly on the 19th and pushed forward a little, clinching his hold on the vital road. Then von Boehn came slowly to the conviction that the game was up and ordered a retreat which began at 9 P.M., 20 July. At the same time he con¬ centrated his reserves against Mangin, expect¬ ing, as it seems, that the French would try to crush in the salient in the neighborhood of Soissons. But Foch’s orders were for Mangin to hold his hand. Degoutte, de Mitry and Berthelot, however, were sent forward to press the retreating enemy. They gave him no relief. De Mitry and Berthelot pressed the retreating eight divisions to the Marne and held the south-

hands of weak or exhausted troops. The re¬ sult was that the line crumbled at the first stroke. Mangin, who gave his arm full swing, drove forward from four to eight miles, reach¬ ing the vicinity of Soissons on the south and bringing the Chateau-Thierry road under his guns. Degoutte’s advance was less extensive, but that was by design. He was at the pivot of the moving line and was held back for an ad¬ vance of from two to four miles, which was easily achieved.

These events did not alarm the German High Command. So completely was it con¬ vinced of the impotence of the enemy at this point that it refused to believe that the attack of the 18th was a serious menace to the eight German divisions south of the Marne. Von

ern bank of the river by the evening of the 20th. Next day Degoutte made a brilliant ad¬ vance in the angle east and west of Chateau-Thierry, the 26th American division reaching Epieds, more than five miles from the starting point. At the same time American and French

troops under de Mitry forced a crossing of the river, causing the Germans to abandon the town of Chateau-Thierry.

At this time the Germans were hastily try¬ ing to remove the vast quantities of materials they had taken to the region just north of the Marne in anticipation of a further advance. To protect them until they could be taken away it was necessary to stand and fight. As von Boehn showed fight Degoutte began to press on toward Fere-en-Tardenois. On the 25th he was

within three miles of that important centre of communication. Von Boehn realized that he could not hold back Degoutte's forces much longer and gave the order to retreat from the Marne, sacrificing a large amount of material which he had not been able to move.

Days of hard fighting followed from 25-31 July. Degoutte, de Mitry and Berthelot pressed the southern part of the salient in furious ef¬ forts to break it and force their way through. Von Boehn resisted with great firmness. His machine gunners served him well in those stark days and paid dearly for it with their lives. But they gave time for the main body of the army to fall back to the upper Ourcq with a line ex¬ tending eastward through the hill south of the road that runs from Oulchy le Chateau to Ville-en-Tardenois. By the 29th reinforcements had arrived in large numbers and heavy counter¬ attacks were made in various parts of the line. The same was true on the 30th and on the 31st, despite brilliant local affairs by the French and Americans. The Germans held a line along the watershed between the Ourcq and the Vesle and seemed to be about to settle* down to trench Avarfare again. Then Foch threw in Mangin in deadly earnest, who during some days had slowly worked ahead in a humdrum way. The German line ran from Soissons to Bligny near Rheims, with Fere-en-Tardenois at the centre. Four miles west of this middle point was Hill 205, commanding the entire region for several miles. Here Mangin struck on 1 August and captured the hill and held it against strong counterattacks. The victory meant that von Boehn's line was pierced and he lost no time in retiring to the Vesle. The French, British and Americans pursued swiftly. Soissons was entered with little resistance and on 4 August the line ran straight between Rheims and Sois¬ sons,

which means that the Marne salient was destroyed. In the operations between 15 July and 4 August the Allies took 40,000 prisoners and a large quantity of guns and supplies.

In these operations the troops of the United States played an important part. The 1st and 2d divisions were with Mangin and won his farthest advance on the 18th to the 20th, capturing 7,000 prisoners and 100 guns. The 26th division held the right wing of Degoutte's army and took Torcy and Belleau in the first day of the engagement. On the 21st it crossed the Soissons-Chateau-Thierry road and pur¬ sued the Germans to Epieds, and on the 24th it was relieved by the 42d division. The 3d and 4th divisions were on de Mitry's left and crossed the Marne when Degoutte's at¬ tack uncovered Chateau-Thierry. They took position on the right of the 26th and pressed the retreating enemy. In the fighting on the Ourcq the A»mericans took notable parts. The 42d di¬ vision took and held Sergy, although the place changed hands five times before the Prussians who contended for it were finally beaten off. The division then met and defeated in a fierce hand-to-hand conflict the celebrated fourth Prussian Guard division, which was sent to drive the Americans into the Ourcq. The 32d division fought with equal distinction in Meu-niere Wood and drove its enemy before it, though greatly outnumbered. American divi¬ sions followed the enemy to the Vesle and seized Fismes before the Germans could get to it. They then crossed the Vesle and estab¬

lished themselves in a position that served for a jumping-off place in further operations.

When the Germans retreated from the Marne in 1914 they outnumbered their opponents and had better equipment. When they retreated in 1918 they were in weaker numbers and had lost the superiority in equipment. Much fighting had worn down their strength and their morale was undermined. Hardly a man in the army that did not realize that Germany could no longer hope to win the war. The enterprise which started so well had ended in gloom for the Teutons. Von Boehn had used up all the reserves of the group of armies commanded by the imperial crown prince and had drawn on the reserves of other groups. Ludendorff had but 26 reserve divisions and gave over all thought of maintaining the offensive. But he believed he could retain what he held until the end of the autumn and utilize the winter to build up another force that could prevent defeat.

Three facts were against him: (1) The German people were sick of war

and had lost confidence in the promises of their rulers. They were willing to give up the contest and accept defeat. It is true a large part of the army stood to their arms in the most trying circum¬ stances ; but an increasing number showed signs of discouragement. It became difficult to get men back from furloughs, or to get them out of hospitals, or to keep them in the spirit which warranted sending them into battle. The divi¬ sions that were bad became worse, so that it was not safe to use them in the critical work that was demanded, and this made it necessary to use the good troops for longer and more fre¬ quent periods. (2) The arrival of the troops from the United States in great numbers placed the Germans at a disadvantage. They not only gave Foch the initiative, but built up his mass of manoeuvre until he could strike where he chose. (3) In Foch the Germans had an adver¬ sary of unusual capacity. He was not the man to let an opportunity slip. At the moment when they were most in need of rest, he was able to strike as he had not been able to strike before. His hard blows but increased the disintegration of German morale, and the line was cracking most seriously when the revolution in Germany precipitated general defeat. Germans had borne themselves as ruthless conquerors before the world for four years, but the tables were turned on 1 Aug. 1918, when the war entered its fifth year.

The Last of the German Resistance.

1. Weakening the German Front. — At the Vesle Foch, pursuing the retreating Germans who had been beaten back out of the Marne salient, decided to stay his hand. It was not his plan to attack when the enemy's line hardened, but to arrest the battle and strike elsewhere. Having the initiative he was able to choose his course, and his opponents were forced to send reserves hither and thither as he struck. Mean-yhile their unprepared sectors were pounded into jelly, their fighting men were used up, and their will to war was undermined on seeing themselves defeated in one place after another. From 8 Aug. to 26 Sept. 1918 this process went on. Blow after blow softened the German line. When it was sufficiently weakened Foch would mass his blows at important points and drive through for critical positions.

The first of these softening blows was launched on 8 August, east of Amiens, on a 14-mile front, at the place where the Germans had approached nearest to the Paris-Amiens Rail¬ road. The attacking force was composed of British and French troops under the temporary command of General Haig, The British por¬ tion was composed of Canadians and Austra¬ lians brought for the purpose from the north¬ ern section of the British line. The French, who held a three-mile front on the right, were under the command of General Debeney. Tanks, most of them ˆwhippets,® had been assembled to the number of 400, and the ground, as it happened, was dry and without enclosure, which just suited tank operations. Everything else was favorable, especially the atmospheric conditions, for a heavy fog, like that which hung over the Saint Quentin front on the morn¬ ing of 21 March 1918, now covered the Amiens front when the Canadians, Australians and French went forward at dawn on the morning of 8 August. By using skilful deceptive meas¬ ures the impression had been made on the Ger¬ mans that the attack would fall on the Ypres sector, and the movement at Amiens was a com¬ plete surprise. It opened with a bombardment of four minutes which, says Mr. Buchan, was ®so intense that the enemy's defenses disappeared as if wiped out by a sponge.® Then the tanks went forward, followed by the infantry.

In the centre the German lines cracked and dissolved, and the attackers easily penetrated them from four to seven miles. The surprised Germans were captured in large numbers, some of them while at breakfast, others while work¬ ing in the harvest fields behind the lines. The Canadian cavalry got behind the enemy's posi¬ tions and captured a railroad train near Chaulnes. On the right flank the Frenchmen found stronger opposition but they fought their way steadily forward and stood by the side of the British when night fell. On the left flank the Canadians went forward at first, but later in the day the Germans rallied and recovered part of the territory they had lost in this quarter. Next day, however, they renewed the attack with the help of a regiment from the 33d divi¬ sion of United States troops, recovered the lost area, and took a little more. At the same time the centre and right flank were carried forward for about three miles.

This deep dent in the German line was five miles north of the important town of Montdidier. Southeast of it was the French army of General Humbert. He saw the opportunity to deal a telling blow and seized it. On 9 August, while the British were advancing to the north, he threw his army against the line in front of him, without waiting for reinforcements. Taken by surprise the defenders made less than the usual resistance. In a day and a half Humbert advanced eight miles, cut the road to Roye, and thus forced the surrender of the Montdidier

garrison, for whom this road was the only avail¬ able way of retreat. With it was taken a large quantity of supplies. For the next five days the Allies ate into the German defenses, until on the iSth the British were but two miles from Chaulnes and the French four from Roye, both important centres of communication. General .Humbert had also taken the ridge southwest of Lassigny and overlooked a wide belt of the enemy's lands, thus forcing their further retreat.

In one week's fighting the Germans lost 30,000 prisoners and probably suffered an equal loss in casualties, an actual shrinkage of their force by five divisions. Amiens was safe and the Germans were not within 15 miles of the Paris Railroad. It was estimated that Ludendorff was left with but 16 fresh divisions in reserve on the Western Front. With such re¬ duced^ reserves he could not hope to resume the offensive. In these operations the German sol¬ dier showed a notable lowering of his fighting spirit, especially the machine-gun units, who manifested less willingness to hold forlorn posi¬ tions to the last. In the ease with which the Allies penetrated his lines on 8 August, says Ludendorff, he saw the first indication that the German army was beaten.

By 15 August Foch was convinced that it would not be wise to press the enemy further in the Amiens sector and he turned to another area. East of the Oise was General Mangin, who had played such an important part in the fighting on the western side of the Marne sa¬ lient. On 18 August Foch sent him forward for a mile on a 10-mile front. Von Boehn, who commanded the Germans in this fighting, in dire need of men, chose to consider Mangin's at¬ tack a feint and drew back to his battleline. On the 19th Mangin attacked on a larger front and ran forward for four miles on the eastern bank of the Oise. On the 20th he advanced three miles on a 16-mile front facing north¬ east toward the Ailette and taking 8,000 prison¬ ers and 200 guns. By this time von Boehn had come to realize the seriousness of the attack and sent three of his precious reserve divisions. Foch, following his plan, ordered Mangin to stay his hand.

He was ready to spring an attack elsewhere. The place selected was the sector in front of Bapaume, where the British had fought the bat¬ tle of the Somme in July 1916. Here stood the British 3d Army under the immediate com¬ mand of General Byng, and they were ordered to attack on a nine-mile front on 21 August. Heavy fogs again hung over the field of battle and shielded the assailants. Tanks were also present in large numbers. The result was that the German lines were broken and a gain of from two to three miles was made. Next day an attack

was made a few miles to the south, resulting in the capture of Albert,

By this timeˆ it was evident that the Ger¬ mans were seeking to withdraw to their Sieg¬ fried line, which they had occupied before the 21 March drive. Foch quickly realized their in¬ tention and ordered that the blows be redou¬ bled. The Oise divided the great angle of the battleline, and the contest now fell on each side of it, the French fighting to the south and a few miles to the north of the river and be¬ yond them, in the north, the British. Each day saw some advance. By 1 September the Brit¬ ish had pressed on 14 miles east of Albert. The}ˆ had also carried the fight into the Arras sector, where Bapaume was taken by New Zealanders with a great quantity of military supplies and by the end of the month they stood fairly against the Drocourt-Queant switch-line. On 1 September Peronne was captured by Aus¬ tralians. The French area saw but little fight¬ ing during these last days in August, it being Foch's plan that the region immediately on the

Oise should advance slowly. It was well that it was so, for the fighting of June and July had severely taxed the French , soldiers, whereas the British in the north, in general, had been unemployed since the spring. Their man¬ ner of fighting showed their excellent condition. By 1 September they had only warmed to the contest, which was carried on in one blow after another, the Germans recoiling and rarely at¬ tempting a counterstroke. In fact, Ludendorff at this time had no other thought than to get safely behind his Siegfried line. He was pressed so closely that he found it very hard to fall back at all, and the daily reverses with large captures of prisoners showed him how perilous it was to stay at that place. In the campaign north of the Somme, near Bapaume and Arras, lasting 18 days, the British took 50,000 prisoners and 470 guns. Four German divisions were thus drawn into the British prison camps and as many more were accounted for in the casualty lists. On the last of the days counted, that is, on 2 September, Canadian troops broke through .the Drocourt-Queant switch-line on a six-mile section and carried the Germans back three miles to the Canal du Nord, which was but seven miles from Cambrai. South of the switch, however, the Sieg¬ fried, or Hindenburg, line still held and it was to stand for many days yet.

The reader will note that many of the critical positions taken in these operations were carried by Colonial troops, from Canada, Australia and New Zealand. That these men should have been so often in the posts of greatest hardship is witness to their hardy fighting quality. It does not mean, however, that there was any weakening of the fighting capacity of the men from the United Kingdom. On every field they proved their courage and devotion.

The Drocourt-Queant switch-line was broken on 2 September. The waterline along the Canal du Nord held tight for awhile and the British did not press it hard. They con¬ tented themselves with forcing the Germans back on their Siegfried line. At the same time the French to the southward. Generals Debeney, Humbert and Mangin, had worked their way forward as far as they could until all the. ground taken by the Germans in their offensives of 1918 had been recovered. Foch was wearing down his opponent's strength while conserving his own. Since the beginning of the Allies' at¬ tacks on 18 July, when he took the initiative, he had inflicted losses of 500,000, and the arrival of the Americans on the line had given him an equal number of fresh troops. In comparison with Ludendorff, therefore, his relation to the enemy had improved by a million men, minus the number by which the German was strength¬ ened by those he received from the new class and from the men who were sent back to the army from the hospitals. It is probable, how¬ ever, that Foch received nearly as many men from these two sources as the Germans. It is certain that he grew relatively stronger as his opponent used up his reserves under Foch's well devised plan of softening the line without making a great effort to break through. By 26 September, although he had shortened his line and thus saved more than 30 divisions, Ludendorff was still in a precarious position. He could only hold his own by rapidly rein¬ forcing points attacked, exposing other points

from which he took the reinforcements, so that they were continually smitten by the watchful Foch.

It was at this time that the United States troops under General Pershing launched their first independent attack against the Germans, driving them from the Saint Mihiel salient on 12 September in a well-planned and well-exe¬ cuted action. Fuller description of the enter¬ prise belongs elsewhere in this sketch ; but it is well to remember that the reduction of the salient not only showed friends and enemies what kind of soldiers the men of the new army were, but it actually removed a menace to the Allied position around Verdun and cleared

the way for later operations, either up the Meuse Valley against Sedan or across country to the northeast against Metz. To threaten either of these important points was a serious thing in the fighting.

The significance of these weeks of continu¬ ous blows was that they cleared the way for greater strokes to come. They interfered with Ludendorff's orderly withdrawal to strong po¬ sitions, they weakened the morale of his army, they reduced his fighting strength and they cut off the last projecting salient that protected the approaches to his vital line of communication at Sedan. As preparations for the final stage of the war they derived additional significance from the progress of events on the Eastern Front.

It was 15 September that Gen. Franchet d'Esperey began the campaign that resulted in an offer of surrender by Bulgaria on the 26th. It was on 19 September that General Allenby opened the campaign in Syria by which he de¬ stroyed the Turkish armies under Gen. Liman von Sanders, took 60,000 prisoners, occupied the ancient city of Damascus on 1 October and thus reduced the government at Constantinople to the point at which its surrender was only a question of days. The effect of these disasters on the spirits of the German soldiers in France was striking. The least enlightened of them could not fail to see that with Bulgaria and Turkey out of the war Austria would be forced to capitulate and that done the end could not be deferred many weeks.

2. The United States and the War. — When the war began President Wilson, following a custom established by Washington in 1793, is¬ sued a proclamation of neutrality and the vast majority of the American people supported his action. It was plain that the conflict grew out of the ambitions and rivalries of European states, running back through many interna¬ tional congresses, matters with which the people of the western world had nothing to do. In trying to carry out a neutral policy President Wilson, however, soon aroused opposition from each of the belligerents. The broad interpreta¬ tion Great Britain and France gave to the rules of international law concerning contraband, blockade and the right to seize goods bound to the ports of the northern neutral nations of Europe was firmly contested by the Washington governrnent. The protests were not effective and claims for damages grew daily in numbers and sum totals against the day when an in¬ ternational tribunal would be asked to pass upon them. At the same tim.e Germany gave grounds of offense by conducting a complex system of espionage and propaganda within the United

Clearing station for the wounded in ruined church at Neuville

1 Commanders of the Allied Armies. Pˆtain (in front). (Left to right) Joffre, Foch, Haig, Pershing, Gillain (Belgium), Albrecht (Italy), Haller (Poland). Photograph taken 8 Dec. 1918 at the Ceremony of the Presentation of the Baton of Marshal of France to General P6tain.

2 An American Cemetery at Romagne, near the Argonne

States, by sending out supply ships from Amer¬ ican ports to succor her cruisers at sea, and by using her submarines against Allied merchant¬ men in such a way that she slew American citi¬ zens who were conducting themselves within the provisions of international law. The destruc¬ tion of the Lusitaniaˆ a British transatlantic liner, on 7 May 1915, by which 102 American citizens, including women and children, were killed, was the most striking instance of this series of complaints. Against the second and third kinds of wrongs the government protested to the authorities at Berlin; but as to the first, espionage and propaganda, it was difficult to cite concrete actions on which to base formal complaints. But the evidence of interference were numerous, and it is probable that they contributed little less than the submarine policy to the state of irritation that carried the Ameri¬ can people into the war.

In the first months of the war the American attitude was accepted in London and Paris as the natural course for the United States to fol¬ low. But as the magnitude of the conflict came home to the people of the Entente nations they began to turn their eyes to the United States. They had come to realize that it would tax their best energies to

defeat Germany and they wished the help of the western republic. By this time it was clear that Germany was fighting for world power. If she was successful she would impose crippling terms on her European oppo¬ nents and gather strength for a new and more ambitious contest. As to liberal government, it would probably pass into a state of subservi¬ ency if a victorious German military autocracy placed its heel on the necks of the self-govern¬ ing peoples of Europe. In view of these reflec¬ tions the sorely pressed people of France and Great Britain easily came to believe that the United States had as great an interest in the defeat of Germany as any other free nation. British and French blood, said they, was being spilled as much for liberty on the Mississippi as on the Thames ; and they added that it was a discredit for the Americans to leave other peo¬ ple to win their battles for them. By the end of 1916 many Americans had come to hold this opinion. It was their war as much as Eu¬ rope's, they thought, and they wished their gov¬ ernment to take its place by the side of those who fought to suppress liberal government.

In the mind of President Wilson another motive was forming, broader and more idealistic. To defeat one dangerous nation only to turn the world over to the play of forces which would soon bring up another who in turn would have to be defeated was a cheerless prospect to himˆ as to many another man on each side of the At¬ lantic. It became his purpose to try to get the world to adopt a league of nations to enforce peace by cooperation, and he announced in sev¬ eral speeches that by virtue of the part neutrals would have to take in readjusting world af¬ fairs after the war, the United States would have to take a part in keeping with their strength in arranging those parts of the peace which had to do with permanent international relations. When Germany issued her ruthless submarine decree on 31 Jan. 1917, he sev¬ ered diplomatic relations and announced that the execution of the decree would be an act of war, which the nation must repel with force. Thus the United States went into the war; but

President Wilson, in his speech to Congress, 2 April 1917, declared that the object of the fighting was to make the world safe for de¬ mocracy and to establish a system under which the horrors of war on a grand scale would be abolished. There is nothing in the American constitution giving the President the authority to declare the object for which the nation fights; but the warm approval given his speech of 2 April by political friend and foe seems to indi¬ cate that his ideas were approved by the people of the United States.

The accession of the powerful western re¬ public gave new courage to the exhausted states of the Entente alliance. Germany dis¬ counted its significance, saying that money and supplies might be furnished to her enemies, but that it was physically impossible for the Ameri¬ cans to send a great army across the Atlantic. The assertion seemed but too true to many a Frenchman; and Joffre, in Washington, in May 1917, urged that American troops, if only a division, be sent to France at once to reassure the French people and show them that American troops would fight by the side of the French poilus. Thus it was that the first American division was sent to France in June and July 1917, and General Pershing was made com¬ mander of all the forces sent by his government to fight in France.

During the remainder of the year 1917, active preparations proceeded for the transmission of American troops to France. Engineering forces went over in large numbers to construct depots for supplies, docks for unloading, and railroad tracks for the accommodation of the large number of locomotive and freight cars that were needed by an army of 2,000,000. Other pioneer divisions followed. By the end of the year 195,- 495 troops had been embarked, and at that time they were going at the rate of 48,000 a month. When the Germans opened the drive of 21 March it became evident that the success of the Allies demanded the arrival of much greater numbers of Americans, and Great Britain limited her own supplies of food in order to place ships at the disposal of the United States. Thus it was possible to transport 244,345 men in May, 297,000 in July and 283,000 in August. When the armistice was signed on 11 November the United States had embarked 2,045,169 men for service in the World War. About half of this number were available for service under General Foch when he opened his heavy drives on the German lines in August 1918.

To support this large number of men in France demanded the utmost exertion on the part of the United States, and the system of communications and depots that was created was one of the notable achievements of their part in the war. When they came into the field they found the British were using the channel ports of France to the limit of capacity. If the Americans could have used them also it would have produced great confusion in trans¬ portation to have given them control of rail¬ roads crossing the areas behind the British lines. It was logical for them to take over Atlantic ports south of the channel, and four were as¬ signed them : Brest, Saint Nazaire, La Pallice and Bordeaux. With a lavish expenditure of money and energy docks were built, railroad sidings were constructed, warehouses were

erected, bakeries and other manufacturing plants that ministered to the needs of an army were established, and camps of instruction for the air service and for other arms were established. The American Service of Supply represented American business energy at its best, operating as it did with unlimited funds at its disposal. That it used a vast amount of money was evi¬ dent to all; but it obtained the desired results in an astonishingly brief time.

Great doubt was felt in friendly as well as in hostile countries about the possibility of train¬ ing the Americans into an efficient army. It was not until the battle of the Somme, two years after the war began, that the British could be said to have converted their untrained men into modern soldiers. Could anything

better be expected from the men of the United States? The doubters did not realize that the Americans had the advantage of knowing all the mistakes of the British. Also, they showed a great willingness to learn how the trick was done. When they arrived in France they made no objection to serving by battalions under French and British officers. American brigades were placed by the side of British brigades in the trenches. This docility in instruction made a deep impression on the European soldier, who was ever jealous of bis nationalism. Under these conditions officers and privates learned the game of _ war thoroughly and waited patiently for the time when they should act as a distinct arniy with a distinct area of operations and distinct objectives.

When the German offensive of 21 March 1918 broke on the British lines in front of Cambrai and Saint Quentin, four American divisions in France, numbering about 28,000 men each, were in such an advanced state of training that they could be used as combat troops.

On 28 March General Foch was made head of all the armies of the Entente in France. On the same day General Pershing visited him to place at his disposal the entire American force in France. The words he used in making the tender are worthy of repetition. come to say to 3ˆou,® he said addressing General Foch, ®that the American people

would hold it a great honor for our troops were they engaged in the present battle. I ask it of 3ˆou in my name

and in that of the American people. There is at this moment no other question than that of fighting. Infantry, artillery, aviation — all that we have are yours to dispose of as you will. Others are coming which are as numerous as will be necessary. I have come to say to you that the American people would be proud to be engaged in the greatest battle in history.® The time was opportune, and Pershing's utterance, widely reported, enthused the tired and doubt¬ ful people of France and Britain. At that time the speed with which the Americans could get into the battle was the supreme question. Ger¬ many was pressing for a decision before the weight of American help could be felt against her. The French and British were grimly set to hold on until the American troops could take

MAP OF

FIRST

AMER ICAN

some of the pressure off their lines and enable them to turn the tide of battle.

A few days later Foch ordered the 1st American division into the trenches in front of Cantigny, near Montdidier, and here on 28 May the division, under the command of Major-General Bullard, charged the enemy's trenches and took the town of Cantigny in a well-fought engagement. The manner in which it was carried through attracted attention and gave great satisfaction to the large number of people who were waiting to see how the Americans would fight. The London Evening News ex¬ pressed the common feeling when it said : '^Bravo, the Young Americans ! Nothing in to-day's battle narrative from the front is more exhilarating than the account of their fight at

port, with the result that the marines pffered heavily. Finally guns were brought up in great numbers and the woods were raked thoroughly. Then the marines went forward and took the position. The battle of Belleau Woods was a test of courage well met. It became a standard for the endurance of the army.

On 15 July the Germans opened their fourth drive, crossing the Marne from Dormans to a point west of Jaulgonne, a distance of 15 miles. On the right flank of this attack they encount¬ ered the 3d American division, who, pressed back, quickly rallied and drove the enemy across the river on their immediate front with heavy losses and then gave aid to the French on their right. Here they held their own for five days, until the heavy attack of Foch on the west side

/)a/7?/narc

Co//7acou/rt

Prle.

?o a cs … . .

9a /ro a c/s , , t , , i

en -

II “ V

yPauta vesnes

Bor/nes

fpaaˆ -Bezu

P C/ˆ

noj

ˆ/n/y

Montegoaye

. *lˆont*iiers

St-Germa/n

”n jijeai/

ˆ£trˆ///y

.Cou/omSs

Ger/pp/yay Zc/cy

€/7 - O/yccv/s - 3 oc cryˆ

la l/b)ˆ

WOOp.ˆ-ˆit

?oc/reˆcAˆs ❖

MAP SHOWING

BATTLE NEAR

CHATEAU-THIERRY

Scale oj Miles

I _ I - 1 — I

0 12 3

. _ l/r?e 6ˆ.»Ju/v£ *S*d

I Ac/tcancecj/ l//7e 8 *S*8

SO/SˆO£S

*foc*M£Ts

■ PWˆceZ/esˆ

0/7

CHATEAU ˆERRY

I

f5 > ”^9

OO-

^0

m

»/ r //es/es

•jm. y, L cc-Afo/ˆyr/e

ory ry/>//w A7//!k\^^ \

Paac/ Af//*a*/y d Co,/.

Cantigny. It was clean-cut from beginning to end.®

Already the third German drive had begun, breaking the Aisne front and sweeping down to the Marne. On 30 May two other American divisions, the 2d and the 3d were thrown against this tide, meeting it at Chateau-Thierry and a little northwest and east of it. They went into action at once, taking over the lines from the exhausted Frenchmen who had been fighting with little rest for five days as they fell back. Here again the Americans proved satis¬ factory. The advance of the Germans was checked and on 6 June a portion of the Arnericans, a brigade of the United States marines, began a six-day attack on Belleau Woods. It was undertaken without adequate artillery sup-

of the Marne salient caused the withdrawal of the troops south of the Marne, when they followed and took part in the pursuit which drove the Germans out of the salient.

Three American divisions took part in the operations of the 18th, by which Foch seized the initiative and crushed in the western-side of the salient, from Fontenoy, north of the Aisne, to Vaux, northwest of Chateau-Thierry. The parts taken by the 1st, 2d and 26th divisions in that attack have already been described, as well as the fighting of the 3d, 4th, 42d, and other divisions in the southern part of the great salient in the last 10 days in July (see page 344). General Pershing proved himself a hard hitter. He threw in one division after another, giving them their first taste of

fighting on a large scale. They showed that they were to be depended on, meeting some of the best German troops on equal ground. These days placed the new American army beyond the stage of tutelage. They proved its reliability, and henceforth it was placed on the footing of military equality with the other armies enlisted in the task of defeating Germany.

By the first of September the American divisions that had followed the retreating Ger¬ mans were being withdrawn, in pursuance of a plan that was made with the approval of Marshal Foch for a distinctly American attack on the Germans. The point selected was at Saint Mihiel, where the battleline passing west¬ erly from Pont-a-Mousson reached the Meuse and bent sharply northward until it passed around the defenses of Verdun, keeping for the most part on the east bank of the river. The position was very strong and the Germans had held it for four years when the Americans gathered the best trained of their divisions in that part of France and made ready to atta(ˆ the forces in the angle. General Pershing, in command of the force, had under him, besides the Americans, the 2d corps of Colonial French troops which he placed oppoMte the angle itself, in such a position that they could enter the town as soon as the Germans withdrew. He had also a French division which he placed, with the 26th American division, in a position to carry the Heights of the Meuse north of Saint Mihiel. Seven other American divisions were placed in line east of the town to Port-sur- Seille, five miles east of the Moselle, and other divisions were held in support. The plan of campaign was to attack the defenses on each side of the town at the same time and pinch out the garrison. It was made less difficult than it might seem by the fact that all the roads that fed the German lines in the inner angle must pass through Vigneulles which was only five miles from the position at which the 26th stood and eight from the point at which the Americans approached it on the other side of the salient. If this place could be reached the retreat of the Germans in the interior parts of the angle would be cut off.

The attack opened on 12 September, the fourth anniversary of the occupation of Saint Mihiel by the Germans. The enemy had re¬ ceived intimation of what was coming and feel¬ ing unable to reinforce the garrison in the angle had decided to withdraw. They began the movement about the 10th but proceeded in a leisurely . manner

because they did not expect the attack until the l5th. When the Americans advanced, the work of evacuation had not progressed very far, but the lines of defense were in an unstable condition. They yielded easily to the Americans who attained all their objective of the first day of the engagement. Late in the evening they learned that the Ger¬ mans were escaping out of Saint Mihiel, and two regiments set out for Vigneulles in the night. They reached the place in the early morning and bagged a large number of the enemy who had gone far enough to feel secure. The Americans took more than 16,000 prisoners and 443 guns. They readjusted their lines across the Woevre Plain in nearly a straight line from the northern defenses of Verdun to the Moselle River near Pont-a-Mousson. In some places it was within 20 miles of Metz and some

persons thought it only remained to move on that position. But Saint Mihiel was not directly a step toward Metz. The position as held by the Germans was an annoying salient thrust forward into the Allied territory and prevented an advance against Sedan, the truly vital part of the German lines in this part of France. It would have been impossible for the Americans to go forward up the Meuse with Saint Mihiel in German hands. Later we shall see how that movement was conducted.

3. Breaking a Weakened Line. — -The fight¬ ing just described by the Allied armies in Au¬ gust and September accomplished two important things. It softened the German resistance and prepared the way for a break through, and it removed the Saint Mihiel salient which was an obstacle in the way of further operations. With the course thus cleared Foch did not wait a day before putting his plans into operations for a great forward move. He followed his plan of striking all along the line, keeping the enemy engaged at many points ; but his main efforts were made at two critical positions. If he could break through at them he would place the enemy's communications at his mercy and force him to fall back in confusion with the prospects of capturing a large portion of his armies. The two places selected were opposite the strong road centres of Cambrai and Saint Quen¬ tin and along the west bank of the Meuse to Sedan and Mezieres, on the great supply lines from Germany by way of Luxemburg and Metz. The first of these attacks, was left to the British, the second to the soldiers of the United States. General Ludendorff knew that he had lost the initiative, and did not expect Foch to give him any rest. Although 'he knew not where the blow would fall, he was ready to cover whatever place should be attacked so far as his straitened resources would permit. His

soldiers were also conscious of his difficult position. They had begun to doubt their even¬ tual success and their morale was broken to a notable extent.

The first of the two attacks was made by the Americans. As soon as the Saint Mihiel salient fell General Pershing moved his heavy artillery through Verdun, now safe from hos¬ tile shells, to the region north of the town and between the Meuse and the western edge of the Argonne Forest. Then he drew off his best-trained divisions to the same region and took over 20 miles of trenches with a force which he organized as the 1st Army. The American lines on the east of the Meuse were held by the re¬ mainder of his forces which he began to re¬ organize into a 2d Army. At this time the 2d Army held the line from Port-sur-Seille to the Meuse, a distance of 42 miles. The 1st Army held the line from the Meuse to Vienne-le-Chateau, a distance of 23 miles, the last eight of them being through the Argonne For¬ est. To the west of the Americans was the French army under General Gouraud, holding the sector between the Argonne and Rheims. Foch's orders were for Pershing and Gouraud to advance simultaneously, but the forces un¬ der the former were looked upon as the spear¬ head of the movement. On 25 September both commanders were ready and a heavy cannon¬ ade was opened. It was especially intense in the sector of the 2d American Army, the de¬ sign being to give the enemy the impression

1 Observation post and machine-gun nest near Grande Prd 2 Horn operated by compressed air used to give \varning of a gas attack

Co])yiiglit, liiternatioiuil I'ilm Service

WAR, EUROPEAN

1 Dugouts in a hillside near St. Mihiel, a third line position

2 War scars outside a German dugout

Copyright, Underwood & Undeiwood, N. Y

that a great attack was about to be made against Lorraine, with its valuable coal mines. The ruse succeeded, since it induced the Germans to strengthen the defenses of Metz.

During the night the artillery fire was con¬ centrated along the line between the Meuse and the Suippe, a distance of 40 miles, and after three hours the infantry went forward at 5 :30 on the morning of the 26th. Near the Meuse the Americans found weak resistance and went forward for seven miles. In the Argonne they met stout opposition and barely advanced. Just east of the forest they advanced about two miles. The next day they continued the strug¬ gle, despite strong counterattacks, and took the fortified hill on which was the town of Montfaucon, from which the imperial crown prince was said to have viewed the battle of Verdun. It was Pershing's plan to hold back the line in the Argonne and flank the enemy out of the place ; but the enthusiasm of the troops on the line that ran through it would not be stayed, and they began to work their way forward as the flanking forces day after day ate into the strong defenses on their right. The Argonne had long been considered by the Germans an impregnable position, and it had been used as a place of recuperation for divisions that had been severely used in battle elsewhere. It con¬ tained moving-picture theatres, barracks and excellent quarters for the officers. Its defenses were elaborate. The surface was broken with ravines and outcropping stony ledges and it was covered with dense undergrowth. The roads and paths were well known to the Ger¬ mans who had mapped them accurately and held them under artillery range. The forest was full of machine-gun nests placed at the most advantageous points. Against this posi¬ tion General Pershing sent his 77th and 28th divisions, the former being composed of drafted men chiefly from New York City. The persist¬ ence with which these city-bred men stuck to their task was one of the surprises of the en¬ gagement. The 28th was a National Guard di¬ vision from Pennsylvania.

After the initial advance Pershing held back the divisions nearest the river and con¬ centrated his efforts along the edge of the Ar¬ gonne.

By 4 October he had brought up his artillery and was ready for another step for¬ ward, and on that day two miles were wrung out of the enemy's hands by hard fighting. Then followed six days of stern encounter, at the end of which the Argonne was clear of Germans and the Americans stood 12 miles north of the position occupied when the attack began on 26 September. They had broken the old line of defense, known by the Germans as the Brunhilde line, and behind it the slighter Freya line. Before them was the Kremhilde line, an intricate system of trenches, to pene¬ trate which General Pershing summoned all his resources.

Meanwhile the French under General Gouraud had been advancing in the most gallant manner. Before them was the extensive and difficult system of trenches which had defied their best efforts in the two battles of Cham¬ pagne. But their attack of the 26th was so overwhelming that these strong positions were pulverized and taken by the French with about 10,000 prisoners. General Gouraud then at¬ tacked the supporting trenches which yielded

slowly. As Pershing worked his way up the eastern side of the Argonne and through its tangled undergrowth, the French pushed for¬ ward on the western side, the two armies com¬ ing into touch at Grand Pre, at the northern edge of the Argonne, on 10 October. Along the left flank of his attacking column he encoun¬ tered strong resistance but overcame it, going forward three miles. To renew his attacks he needed fresh troops and Pershing loaned him the 2d American division. Thus strength¬ ened he assaulted the enemy's line on 4 Octo¬ ber, the day Pershing made his second lunge east of the Argonne. The 2d division carried Blanc Mont, a strong position commanding the region north of Somme Py, carrying the de¬ fenders back three miles. The French pressed their advantage and there was a general advance of five miles. The impetus thus gained was not lost in the succeeding days. In the fighting of Pershing and Gouraud from 26 September to 11 October, a steady progress was obtained; but it did not achieve all that Foch expected of it. It was his design to break through quickly to the Sedan-Mezieres Railroad and cut off the troops in the Rheims-Cambrai sector from their supplies while they were so hotly engaged that they could not retreat. But the progress of his right was held up by strong fortifications. In front of Pershing stood the Kremhilde line, a series of well-placed trenches from three to five miles deep that was to test his courage for many days yet.

Meanwhile the v/hole Allied line west of Gouraud was the scene of

heavy fighting. On the 27th, the day after the attack on the right, Haig was given permission to deliver the at¬ tack on the Cambrai-Saint Quentin line. It was a difficult task, for before him was the strong Siegfried position. This system of trenches at the critical part of the great line ran for the most part along the banks of the Scheldt Canal. Between Bellicourt and Vendhuile the canal ran through a tunnel for a little more than 5,000 yards. The Germans filled this tunnel with canal-boats and walled up the ends. The boats were converted into sleeping-quarters, and the towpaths made excellent corridors. They thus obtained a vast subterranean cham¬ ber, in which more than 12,000 men were con¬ cealed so far below the surface that they were safe from the largest shells. Lateral shafts led to a village several hundred yards away enabling the men to come and go without detection from the air. North and south of the tunnel the canal was 60 feet wide and the banks were steep. Against this sector of the well-con¬ structed Siegfried line General Haig decided to throw his army. If he broke through com¬ pletely he would have a clear way to Hirson on the railroad that supplied the rear of the battleline. Thus, while Pershing was battling his way toward Sedan, and Gouraud was strug¬ gling for Mezieres, Haig sent forward a strong portion of his army in the direction of Hirson, all important points on the vital railroad sys¬ tem. As we shall see, these three main thrusts were supplemented by other blows against other parts of the great line of battle, deliv¬ ered simultaneously to keep the Germans busy.

The main British blow was to be given be¬ tween Vendhuile and Holnon, a sector 10 miles wide. But Haig would not make his first on¬ slaught there, partly because it was the strong-

est part of the Siegfried line and partly because he wished to deceive the enemy and induce him to concentrate elsewhere. He accordingly opened a heavy bombardment against a section of 30 miles, including the point to be attacked in main force. Following this he made a strong attack with the 1st (Horne) and 3d (Byng) Armies in the section north of Vendhuile. On the morning of 27 September, the day after the attack began in the Argonne region, these two armies went forward on a 13-mile front. Their most determined effort was made in the region in front of Cambrai. Four divisions, three of them

Canadians, led the attack across the Canal du Nord and opened the way for other divisions to follow. By nightfall the lines were carried forward three miles on an eight-mile front with the capture of 10,(XK) prisoners and 200 guns. Next day the fighting was renewed and the British advanced to the bank of the Scheldt Canal, three miles south¬ west of Cambrai.

By this time the Germans were busily en¬ gaged in two important contests, and Foch thought it time to add to their embarrassments. On the 28th he sent forward a force of Belgian, French and British troops, urider the command of King Albert of Belgium, on a 20-mile front in Flanders. It was directed against the Ger¬ man army of General von Arnim which had be¬ gun to feel the effect of Ludendorff's strait¬ ened circumstances. Having used up their gen¬ eral reserves, the Germans were now forced to take from one part of their line to protect an¬ other; and as von Arnim had seemed to be the German general in least immediate danger, troops had been taken from him to strengthen the lines elsewhere until he had only five divi¬ sions left. They were no match for the supe¬ rior forces of Foch, and in two days' fighting were forced back to a maximum depth of eight miles. The Allies were within three miles of Roulers on the road from Ypres to Ghent, and they took 10,000 prisoners. It began to appear that King Albert's army would outflank the entire German line at its northern end.

Nor was this all the misfortune that came upon Ludendorff. He well knew that Haig's forces before the Saint Quentin section were massed for an attack and dared not weaken his line there. While he waited at this point for the expected blow Foch gave still another thrust. This time it was between the Ailette and the Vesle in the Chemin des Dames re¬ gion. Generals Mangin and Guillaumat were sent forward on the 28th and in a three days' combat carried their opponents back more than three miles. It was hard fighting in the best manner of the French, to whom the certainty that retribution was at hand had brought a state of exalted courage that would take no denial. By their side fought Italian divisions.

On the 28th, therefore, Foch was pressing the Germans in five places : along the Meuse, west of the Argonne, in front of the Chemins des Dames, in front of Cambrai and east of the Ypres salient. In each place his troops were advancing slowly despite the dogged fighting of the best German units. Then came Foch's great blow at the tunnel sector of the Sieg¬ fried line. Here stood the British 4th army under the command of General Rawlinson. For two days his guns had poured a steady fire

on the German trenches, and his infantry had been thrown forward against some of the ene¬ my's outposts, crushing them in. Serving in his force at a point opposite the strongly-for¬ tified tunnel was the 2d corps of United States troops, consisting of the 27th and 30th divisions. ' On 27 September a regiment of the •27th division carried some of these outposts in front of the tunnel and thus brought the two divisions directly vis-d-vis with that formidable position.

The main attack was made at dawn 29 Sep¬ tember, the two American divisions going for¬ ward side by side with some of the best British troops. Behind them were Australians and other British troops in support. South of the tunnel sector the North Midland troops, 46th division, Englishmen, crossed the canal on mats, portable boats and life-belts and carried the German trenches on the east bank in a desperate battle. Nofth of the tunnel other British troops drove back the foe and a portion of them entered the outskirts of Cambrai. Against the tunnel sector the two American divisions charged with determination. The 27th en¬ countered stiff resistance but penetrated the German lines and a part of them went forward for a considerable gain. But the main body was held up by having to defeat the large num¬ ber of the enemy who swarmed up from the underground chambers. Here they fought all day on the Siegfried line. In the evening Brit¬ ish and Australian troops came up in support and going through their lines pressed the Ger¬ mans back still farther, and the 27th was sent to the rear to recuperate. Meanwhile the 30th had gone through the section of the Siegfried line on its front, taking Bellicourt and Nauroy and holding them against counterattacks, after w'hich the division was withdrawn to rest but ordered back into line almost immediately.

Meanwhile, the British troops were carry¬ ing on the struggle in this vital part of the Ger¬ man defenses. The breach at the tunnel was of vital importance and the troops that poured through opened beyond it fan-like, always en¬ countering the ˆ stiffest kind of resistance. South of the British the French army of Gen¬ eral Debeney moved against the defenses of Saint Quentin, carried them and entered the town on 1 October. These were serious days for the Germans, each 24 hours bringing them a new disaster. On 30 September it was an¬ nounced that Bulgaria had accepted an armis¬ tice that amounted to complete surrender. Next day Saint Quentin fell and to its loss was added the capture of Binarville by Pershing, and Conde and Marvaux by Gouraud. On this day, 1 October, Mangin pushed on in the Aisne Valley, clearing a considerable part of the south¬ ern bank of the

Ailette. The British also ad¬ vanced in the region of Cambrai, taking a firmer hold on the adjacent positions. On the same day they announced that for the previous two months they had captured 123,618 Germans and taken 1,400 guns.

On 2 October this policy showed its fruits when the Germans began to withdraw on a front extending from Lens to Armentieres. The move was made necessary by the pressure of the Allies on each side of this sector, that is, at Cambrai in the south and on the Roulers front in Belgium, where a force of Belgians and British were advancing. To increase the

piessure at the latter point Foch sent forward a French army under General Degoutte. Some days passed ere it got into action, but in the south the French armies were actively engageˆ advancing at Saint Quentin slightly and mak¬ ing some gains on the Aisne and northwest of Rheims. In the Champagne General Gouraud took an important step toward Vouziers. On this day came news that General Allenby had taken Damascus on 1 October with 7,000 pris¬ oners.

On 3 October the French armies kept up their pressure in the south and the British went forward near Cambrai and in Belgium. They also occupied Lens and Armentieres, long con¬ tested by the Germans, whose voluntary with¬ drawal at this time indicated how hardly they were pressed in other quarters. The British followed after them and came next day within six miles of Lille, which they hoped to take without a destructive cannonade. The day of 4 October, also, brought them heavy counter¬ attacks in the sector between Saint Quentin and Cambrai, which they repulsed with steadiness. On this day Generals Gouraud and Pershing, having brought up their guns, made a new at¬ tack which gave each of them an important step forward. The first, with the aid of the 2d division of the United States troops, took Blanc Mont commanding the region north of Somme Py. It was so important a gain that next day, the 5th, Gouraud moved forward on a line running east to the Argonne, advancing as much as five miles in some parts of it. On the east of the Argonne Pershing made import¬ ant gains that flanked the formidable forest and enabled the lines within its recesses to move forward two kilometers. On the 5th, also, the

British delivered telling blows against the Sieg¬ fried line south of Cambrai, where it remained intact. They weakened its resistance and pre¬ pared the way for a more serious blow a few days later. On this day it was announced in Berne that Austria had appealed to President Wilson through the Swiss government for a Peace Conference, at which terms should be discussed. Next day, 6 October, it was an¬ nounced that Germany joined in the appeal and asked for an immediate armistice on the basis of the Fourteen Points and supplementary de¬ mands announced by President Wilson. This action gave the war a sudden and decisive turn. It was the beginning of surrender and the Ger¬ mans could not hope to resume their battle with any pretension of victory after it was an¬ nounced. In the Allied countries it was re¬ ceived with an air of disappointment. For more than four years the Germans had seemed to have the advantage : now that they were clearly facing defeat should they be allowed to escape punishment by crying ®Kamerad®? For several days the request was the chief object of debate in the newspapers, until President Wilson sent a reply designed to make Germany specify her terms of submission.

Meanwhile, there was no relaxation of mili¬ tary efforts. Winter was approaching and it did not behoove Foch to allow the enemy respite under cover of negotiations until he could place himself behind its friendly pro¬ tection with immunity for another quarter of a year. Steady pressure, therefore, continued on 7 October and on the 8th the British with the aid of the French army of General Debeney

hurled themselves on the softened Siegfried line south of Cambrai and swept it away on a 20-mile front, advancing three miles in most of that sector. In this act the 30th United States division took an important part at the point where the French and British elements ap¬ proached one another, taking the towns of Brancourt and Premont after severe fighting. Next day the blow was repeated on a more ex¬ tended front and with even greater success. The weakened condition of the enemy was shown by the fact that he staggered back nine miles at some parts of the 3()-mile sector in which he was attacked. On this day, the 8th, Cam¬ brai, for four years an objective of the Allies, was occupied and 10,000 prisoners were taken. On the Meuse the day was signalized by a re¬ newal of the attacks of General Pershing, who was now hard against the Kremhilde line. In a great thrust he took Romagne and thus drove an initial wedge into the system, beginning a

steady series of advances which were destined to carry him through the entire series of trenches and bastions, at the end of the month. On 10 October Generals Rawlinson and Debeney continued their attacks east of Cambrai and Saint Quentin. Le Cateau was taken by the British and the Germans were forced back to the Selle River, where they undertook to or¬ ganize a line of defense. It was a slender hope ; for there was no time for constructing proper trenches and the pursuers, turning every stone to get up their guns, could not be expected to delay more than a few days before drenching the new lines with another of the concentrated cannonades before which no human beings could stand. On 17 October the attack was re¬ newed and the Germans were pushed back with little effort until they stood behind the Sambre Canal. Here the British were within 20 miles of the railroad through Hirson.

The effect of Rawlinson's advance was to produce two salients, one to the north and one to the south. To the south Laon was the cen¬ tre of the new salient. It was so exposed that the Germans began to draw in their lines on its front as early as 10 October. Here General Mangin held the lines on the French side, and beyond him in turn came Guillaumat, Berthelot and Gouraud, all of whom kept up steady pressure during these critical days. On 13 Oc¬ tober Gouraud made a great effort and advanced until he all but had Rethel in his grasp. This was fair warning to the Germans and they did not dare ignore it. On that day they withdrew from Laon and La Fere, long their firm pivots in the great angle of their line of defense on the Western Front. The French occupied these places and prepared for still further progress toward the vital railroad behind their enemy's front.

To the north of Rawlinson's line of advance began the great angle in the line which swept around Douai and on to Lille and then turned eastward into Flanders, passing in front of Courtrai and Roulers before it recovered its northward direction and reached the sea at Nieuport. Against this salient Foch now turned his most active efforts. By this time Degoutte was in a position to aid effectively the Belgians and British on the northern side of the salient. Heavy pressure was, therefore, put on the lines in front of Roulers, where the Belgians had been slowly advancing for several days. On 14

October the place was taken and the adjacent lines were carried forward on a 12-mile front. Next day the effort continued with even better results, and an advance of from three to five miles was obtained on a front of 25 miles, with a total result of 14,000 prisoners in the two days. On the 16th the German line in Belgium, from Lille to the sea, became mobile and turned back, the defenders retreating so fast in some parts that the pursuers lost contact with them. The explanation is that Ludendorff had been forced to draw heavily on this line in order to resist the blows of Rawlinson and the French in the south. He knew that the Flanders line was in no condition to resist a hard drive north of Lille, where the Allies had come within 20 miles of the Dutch border. If they drove this distance they might capture the Germans in the coast towns of Ostend and Zeebrugge. With that resourcefulness and quick determination which characterized all his actions he knew there was no time to wait, once Foch turned his attention to this northern sector; and the next few days were characterized by rapid with¬ drawal from the Belgian seacoast. In order that this might be done, it was necessary for the line to swing back in an orderly way, the Nieuport end coming around to Bruges and then to the boundary of Holland, east of Ghent. By this means the Lille-Courtrai positions be¬ came a pivot. It was Foch's chief purpose to take these positions and break up the plans of his opponents.

On 17 October the movement continued. The Germans stiffened their resistance at the pivot, but the wing swung back on a 30-mile front for a distance of 12 miles at its eastern end. Os¬ tend was evacuated and received a British naval force that came to it from the sea, while the Belgian force in Nieuport hurried forward by land. On the same day Belgian patrols entered Bruges, the Germans falling back toward Ghent. South of the pivot the British pressure was irresistible and Lille and Douai were occu¬ pied. Still farther south Rawlinson crossed the Selle River, taking another mile or two from the distance that separated him from the rail¬ road north of Hirson. On the 18th and 19th the same tactics were pursued, and the coast region was cleared, the Belgians coming into contact with the Dutch boundary northeast of Ghent. During this period heavy fighting con¬ tinued around Courtrai, the British going ahead slowly. They gained Courtrai on the 20th and pushed on toward Tournai. Next day there was heavy fighting before that town and Valen¬ ciennes without notable success. The French were before Ghent, where the Germans held them at bay. Meanwhile, the French in the south had made slight advances between the Oise and the Serre and before Vouziers, while Pershing was eating into the German defenses west of the Meuse. Taken all in all, it is evi¬ dent that the army of the kaiser, though badly handled,

was making a good fight for its ex¬ istence. The men were very tired and the re¬ serves were used up ; but the soldiers displayed much tenacity in these days, holding where or¬ dered to hold and falling back in good order when directed to fall back. The immediate ob¬ ject of their commanders was to get safely be¬ hind the Scheldt and make a stand there. From Valenciennes north this river was deep and broad enough to make a good defense position.

To the south it was not a barrier and it was here that Haig attempted his next advance, going forward 24 and 25 October between the Scheldt and the Sambre and taking 9,000 pris¬ oners in two days. On the second day the French opened a drive on a 40-mile front, Debeney between the Oise and the Serre and Man-gin on the southeast of the Serre, both advanc¬ ing for clear gains. East of Mangin was Guillaumat who also moved forward. This progress was resumed 27 October and there were gains of as much as five miles, and on the 28th two miles were made. During this period compara¬ tive quiet reigned in Flanders, but it was broken on the 31st when there was an advance on a 15-mile front between Deynze and Avelghem, the Germans fighting hard and stopping when they reached the banks of the Scheldt.

By the end of October the exchange of notes between Germany and the United States had proceeded far enough to show that peace was imminent. Each side was straining every nerve to fight its best in these last days, the Allies to force their opponents as near to de¬ feat as possible, and the Germans to maintain their positions and give basis to their claim that they were not beaten to the point of submis¬ sion. How well they carried out this plan is shown by the fact that although the British fought hard during the month of October they took only 49,000 German prisoners, whereas they took 66,300 in September and 57,318 in August. The Germans were conducting a suc¬ cessful retreat in Flanders and offering a stout resistance in other parts of their lines. It seemed that they were in a fair way to protect their communications until winter arrived and caused the Allies to suspend their attacks. Their calculations were defeated by the success of the United States troops in breaking through the German defenses on the Meuse.

General Pershing spent the last half of Oc¬ tober in turning the Germans out of the Argonne Forest by flanking them. That done he brought up his heavy guns in front of the strong system of defenses that extended across the open country from Grand Pre to the Meuse. At the end of the month he had made several attacks on it but not in

force. On 1 November he opened an overwhelming artillery attack on the system and followed it with an infantry movement that carried him forward four miles. The next day he continued his advance, com¬ pletely freed the German defenses, and rushing forward in motor trucks took Buzancy, the railhead by which the Germans in this sector received their supplies. His quick action so dis¬ concerted them that they fell back in confusion. He followed closely, giving them no time to construct new defenses and on the 6th his troops arrived in that part of Sedan that lies south of the Meuse River. At the same time he threw a portion of his army across the Meuse and was in a position to advance on Metz when it seemed wise.

This sudden break-through completely cut the German line of communications through Metz and Luxemburg. It made it impossible to hold the line of defenses north of the Aisne and in the Champagne, and it was followed by a rapid retreat throughout this area. In fact, it placed the Germans in a precarious position throughout that portion of their lines that did

not depend on the railroad through Liege for its supplies. The effect was seen in the evacu¬ ation of Valenciennes and its occupation on 2 November by the British. On the same day General Gouraud made a notable advance on Pershing's left. On the 4th Haig went forward three miles on a 30-mile front, taking 10,000 prisoners and 200 guns ; and Debeney on his right won two miles. On the 5th the Germans drew back on a 90-mile front from the Scheldt to Rethel allowing their opponents to advance five miles in some places, but in Flanders they were able to hold their line. Next day the feat was repeated, the British advancing on their whole line an average depth of six miles, and the French making a similar advance north of the Aisne. Each day now added great gains

Front, dying away as a life goes out of the human body after a long strife with disease. No more the heavy breathing that sounded through the house, or the coming and going of the attendants, or the hushed expectancy; in its stead the strange quiet of absolute rest. That is the

way the first days of peace seemed to a world that had given more than four years to the sole business of watching, serving, pray¬ ing and dying for the war in France.

In testifying in 1919 before a Parliamentary investigating _ committee Field Marshal von Hindenburg is reported to have said that the war was lost through the breaking down of the ®home front.^^ It was a military man's way of looking at the situation. It is true that the de¬ fection at home, the longing for peace and the

Ostenˆ

)%Anfiverp

mGcommont

Co 6 /an

‘amur

hnfreuiˆ

xComorai

‘ˆTOuen/k

.Luxemburq

‘uen

Reims

vauci

Chaumon/A

© *Jtancf Ox MX

ENGLAN

Evreux

PARIS

MAP SHOWI NC

FINAL BATTLE LINE

I - 1 - - - Miles

0 10 20 30 <JO

of territory. The Germans dared not wait in their tracks with Sedan in hostile hands but strove hard to get out of danger before they found themselves out of supplies. Thus, Gou¬ raud pursuing them invested Mezieres on the 8th and Debeney took Hirson on the 9th. The British pushing on east of Valenciennes came to Mons 10 November, where the war began for them on that fatal day, 20 August, in 1914.

Next day, 11 November, the armistice went into effect and the fighting was at an end. The long battle line which for four years had roared night and day came to a sudden state of quie¬ tude, and soldiers came out of the trenches and cut capers where an hour before to be seen was as good as to die. Thus ended the long period of trench warfare on the Western

hatred of the people for the system that had brought them to their state of suffering had re¬ acted powerfully on the army. But the ques¬ tion may arise: How far is the military class justified in testing the endurance of a people in support of war? and had not the war leaders in 1918 demanded all the sacrifices of the people they had a right to demand? The war in Ger¬ many had gone on until every economic factor in the country's life was exhausted. Men had died in vast numbers and there was no prospect that they would gain anything by continuing to die. The nation believed that it was time to end the war. In a proper sense the war ended itself. That is, it fought itself out to its own finish. Political conditions did not end the war. The political condition that von Hindenburg

saddled with the responsibility for the defeat of Germany was itself a result of the war. It was bred in the war. For it the war leaders must assume responsibility.

In a narrower sense we may ask whether or not Germany was

defeated in a military way. Up to 1 November it was not possible to say she was defeated. Her lines were heavily beset but they still held. Then came Pershing's break through and the capture of Sedan. After that Germany was defeated. It is true her armies were not back to the Rhine, but they were isolated and pressed by greatly superior foes. With heavy losses they might have drawn back through the roads in the Ardennes in the cold, but it would have been as Napoleon retreated from Moscow, with a victorious enemy harassing at every step, and in the spring the coup de grace. Ludendorff was beaten when he surrendered. He was too good an officer to give up, too soon. By prolonging the war he could have inflicted more punishment on the opponents of Germany and a greater amount on Germany herself, but he could not have ob¬ tained better terms. It is a wise general who knows when he ought to lay down the sword.

The honor of breaking through the German defenses was not all Pershing's. Rawlinson's feat north of Saint Quentin was equally valor¬ ous. Moreover, Pershing could not have reached Sedan if French, British and Belgian armies had not been fighting hard in other sec¬ tors to hold the attention of the Germans. Against the German ring blows were being de¬ livered simultaneously in several places, wear¬ ing thin the iron ring. It was the blows of the men from* the United States that first broke through. If they struck harder they had not struck so long. Fresh, ardent and brave, they were in a position to reap the fruits of the service of those who had fought and died be¬ fore they came into the war. The defeat of Germany was won by all who fought against her.

Bibliography. — Of general works the best is Buchan, John, ˆNelson's History of the Warˆ (24 vols.. New York and London 1915ˆ19). Its point of view is British, and it contains little on the military controversies rising out of the war. It deals with all phases of the war, and may be pronounced a successful contemporary account of the struggle. A shorter but more critical work is Simonds, Frank H., ˆHistory of the World Warˆ (3 vols… Garden City 1919). The first volume appeared in two parts as ˆThe Great Warˆ (to the fall of Antwerp; New York 1914) and ˆThe Great War, the Second Phased (to the end of ˆe second battle of Ypres, 1 May 1915; ib. 1915). The author was one of the best American military ex¬ perts who wrote for the newspapers during the war. He writes very clearly, but at times his descriptions are needlessly prolix. Doyle, Sir Arthur Conan, ˆA History of the Great Warˆ (Vols. I-V, New York and London 1916-19) is a dry summary of facts without perspective or philosophy. Belloc, Hilaire, ˆThe Elements of the Great Warˆ (Vols. UII, ib. 1915-16) is an ambitious work that was not finished. The same may be said of

Murray, Col. A. M., ˆThe ˆFortnightly® History of the Warˆ (Vol. I, ib. 1916). Another similar work is Le Quex, William and Wallace, Edgar, <The War of Nationsˆ (4 vols., London). A small French

work is Zurlinden, General, <La guerre de liberation, 1914-18ˆ (2 vols., Paris 1919). An informing commentary on events in France is Reinach, Joseph, ˆLa guerre de 1914-16: Les commentaires de Polybeˆ (Vols. I-XVI, ib.

1916) , comments day by day published first in Le Figaro, Paris newspaper; The New York Times' ˆCurrent History of the Warˆ (9 vols., December 1914-November 1918) contains some valuable documents, as well as many important papers. Johnson, Douglas W., ˆTopography and Strategy of the Great Warˆ (New York

1917) is interesting because it traces the relation of geography and physical conditions to the strategy of campaigns. On American participa¬ tion in the war two books are available : McMaster, John B., ˆThe United States in the Great Warˆ (2 vols., ib. 1918-19) and Bassett, John S., ˆOur War with Germanyˆ (ib. 1919).

The beginning of the war brought forth a great number of books of personal experience in the war areas, some of them dealing with trench life, others with specific campaigns, and others with various phases of experience in the Vvˆar. Many sprightly narratives were thus produced, and some of them will endure as vivid portrayals of the life of the times. Of this class of books the following are among the best: Beith, John Hay {pseud. Ian Hay), ˆThe First Hundred Thousandˆ (Boston and London 1916); id., <A11 in It> (ib. 1917); Powell, E. Alexander, ˆFighting in Flandersˆ (New York and London 1914) ; Davis, Richard Harding, ˆWith the Alliesˆ (New York 1914) ; Huard, *Mme.* Frances (Wilson). ˆMy Home in the Field of Honorˆ (ib. 1916) ; id., ˆMy Home in the Field of Mercyˆ (ib. 1917) ; Belmont, Capitaine Ferdinand, ˆLettres d'un officier de Chasseurs Alpins, 1914-15ˆ (Paris 1916); Malleterre, General, ˆLtudes et im¬ pressions de guerreˆ (2 vols., ib. 1917) ; Morlae, Edward, ˆA Soldier of the Legionˆ (Boston 1916), on the campaigns of the Foreign Legion; Kipling, Rudyard, ˆFrance at Warˆ (Garden City and London 1915) ; and La Motte, Ellen N., ˆThe Backwash of Warˆ (New York 1916)*, observations in hospitals. Several newspaper correspondents wrote connected accounts of events, mostly reprinted from their journalistic work, among them being: Gibbs, Philip, ˆThe Soul of the Warˆ (New York and London 1915; id., ˆFrom Bapaume to Passchendaeleˆ (New York

1917) ; id., ˆThe Battles of the Sommeˆ (ib. 1917) ; id., ‘ˆThe Way to Victoryˆ (2 vols., ib. 1919). Mr. Gibbs puts much color into his letters and declared that he tried to portray the spirit of the British army; Cobb, Irving S., ˆPaths of Gloryˆ (ib. 1915), behind the German lines; Hedin, Sven Anders, ˆWith the German Armies in the Westˆ (New York and London 1915) ; Palmer, Frederick, ˆMy Year of the Great Warˆ (New York 1915) ; id., ˆMy Second Year of the Warˆ (ib. 1917) ; id., ˆAmerica in Franceˆ (ib.

1918) ; Gibbons, Herbert Adams, ˆParis Re-bom> (ib. 1915) ; and Whitridge, F. W., ˆOne Am’erican’s Opinion of the European Warˆ (ib. 1914).

Arrtong the books dealing with particular battles or campaigns are the following: French, Viscount John D. P., U914ˆ (Boston and Lon¬ don 1919), defends his conduct of the war; Ferris, C. H., ˆThe Campaign of 1914 in France and Belgiumˆ (New York and London 1915) ;

WAR, EUROPEAN

Copyright, Underwood & Underwood, N. Y.

LONELY VIGILS

1 Lone French trooper on guard on one of the early battlefields

2 British sentry on outpost duty on Western Front

WAR, EUROPEAN

1 French sniper firing from a trench

Copyright, International Film Service

2 French sentinel with gas mask before his cavern

Copyright, Underwood & Underwood, N. Y,

WAR, EUROPEAN — THE EASTERN FRONT (6)

Simonds, Frank H., ˆThey Shall not Passˆ (Garden City 1916), on the first weeks of the Battle of Verdun; Dugard, Henry, ˆThe Battle of Verdunˆ (trans. F. A. Holt, New York 1917), deals with events from 21 February to 7 May; Buchan, John, ˆThe Battle of the Somme; First Phaseˆ (New York and London 1917); Whitton, Frederick E., ˆThe Marne Campaignˆ (Boston and London 1917) ; Mc¬ Gill, Patrick, ˆThe Great Pushˆ (New York 1916), on the battle of Loos; Christian-Froge, R., ˆMorhange et les Marsoins en Lorraineˆ (Paris 1917) ; Monseigneur Tissier, Lveque de Chalons, <La guerre en Champagne au diocese de Chalonsˆ (Paris 1916), vivid description of actual war in a small locality.

On the war in Belgium consult the follow¬ ing: Whitlock, Brand, ˆBelgiumˆ (2 vols., New York 1919) ; Gerlache de Gomery, A. V. J. de, ˆBelgium in War Timesˆ (trans. by B. Miall, ib. 1918) ; Waxweiler, Emile, ˆBelgium Neutral and Loyal: the War of 1914ˆ (ib.

1915) ; Mokveld, L., ˆThe German Fury in Belgiumˆ (trans. by C. Thieme, New York and London 1917), by a Dutch newspaper corre¬ spondent; Kellog, Vernon L., ˆFighting Starva¬ tion in Belgiumˆ (Garden City 1918) ; and Hunt, Edward Eyre, ˆWar Breadˆ (New York

1916) , on the work of the Hoover Commission in Belgium.

Many books appeared that attempted to interpret the war or to account for it. Some of them were mere expressions of indignation or partisanship; but others were serious and re¬ strained. Of the latter class were the follow¬ ing: Muir, Ramsay, ˆBritain's Case against Germ'anyˆ (New York and London 1914) ; Cramb, John A., ˆGermany and Englandˆ (New York 1914) ; Millioud, Maurice, 'ˆThe Ruling Caste and Frenzied Trade in Germanyˆ (Bos¬ ton and London 1916) ; ˆThe Oxford Pamphlets on the War, 1914-15ˆ (New York and Oxford University 1914-), by Oxford professors; Ox¬ ford Faculty of Modern History, ˆWhy we are at Warˆ (New York and London 1914) ; Beck, J. M., ˆThe Evidence in the Caseˆ (New York 1914), an impassioned examination of the diplomatic evidence of Germany's responsibility for the war; Cheredame, Andre, ˆThe Pan-German Plot Unmaskedˆ (New York and Lon¬ don 1916), widely read at the time of publica¬ tion; Swope, Henry B., Hnside the German Empireˆ (New York 1917), conditions in Ger¬ many during the last three months of 1916; Ackerman, Carl, ˆGermany, the Next Republicˆ (ib. 1917), described forces that were leading Germany to discard autocracy; Cobb, Irving S., < Speaking of Prussiansˆ (ib. 1917), serious views of Prussians as the author found them; Morgan, J. H., (trans.), <War Book of the German General Staffs (New York and London 1915), a literal translation of Germany's official ˆUsages of War on Landˆ ; Dominian, Leon, ˆThe Frontiers of Language and Nationality in Europeˆ (New York 1917) ; Fried, Alfred H., ˆThe Restoration of Europeˆ (trans. by L. S. Gannett, New York 1916), German argument against militarism; Wallace, William (trans.), ˆModern Germany in Relation to the Great War> (ib. 1916), essays by 17 German pro¬ fessors, appeals to American opinion; Francke, Kuno, ˆA German-American's Confession of Faithˆ (ib. 1915), a moderate statement of the other side; Mach, Edmund R. Otto von, <What

Germany Wantsˆ (Boston 1914) ; id., ˆGer¬ many's Point of Viewˆ (Chicago 1915), by one of the more reasonable of the German propa¬ gandists; Villard, Oswald G., ˆGermany Em¬ battled; An Interpretationˆ (New York 1915), opposed to militarism but sympathetic with the German people; Naumann, Friedrich, ˆCentral Europeˆ (trans. by C. M. Mere¬ dith, New York and London 1917), the hopes of the Pan-Germans; Freytag-Loring- hoven, Hugo F. P. J., Freiherr von, ˆDeductions from the World Warˆ (ib. 1918), glorifies militarism, written to preserve the hold of the military party on the popular mind in Ger¬ many while the war was at its worst stage ; and Wetterle, Emile, ˆBehind the Scenes in the Reichstagˆ (trans. from French by G. F. Lees, New York 1918), by an Alsatian representa¬ tive of the Reichstag who sympathized with F ranee.

On the Serbian campaigns consult, besides the chapters in Buchan's ˆNelson's History of the War,ˆ the following special books; Gordon-Smith, Gordon, ˆThrough the Serbian Cam¬ paignˆ (London 1916) ; Jones, Fortier, ˆWith the Serbs into Exile,ˆ (New York 1916) ; Askew, Alice and Claude, ˆThe Stricken Land: Serbia as we saw itˆ (New York and London 1916) ; Krunich, Milutin, ˆSerbia Crucifiedˆ (Boston 1918) ; Reis, Rudolphe A., ˆComment les Austro-Hongrois ont fait la guerre en Serbieˆ (Paris 1915) ; Thompson, Louis L., ˆLa Retraite de Serbieˆ (ib. 1916) ; Barby, Heniˆ, ˆLa guerre mondiale avec I'armee Serbeˆ (ib. 1918) ; and Gibbons, Herbert Adams, ˆThe New Map of Europeˆ (New York 1914), on Serbia's relation to the outbreak of the war.

John Spencer Bassett, Professor of History, Smith College.

6. THE EASTERN FRONT. 1. The Strategic Situation on the Eastern Front. — To understand the war on the Eastern Front, between Russia and her Teutonic enemies, one must grasp the significance of the map: the great Polish salient, the railways, and the gen¬ erally flat character of the terrain. Russian Poland, l‘ith its political and railway centre at Warsaw on the Vistula, projects westward like a great wedge of Russian territory driven between the German provinces of East and West Prussia on the north and the Austrian province of Galicia on the south. The wedge is roughly 200 miles from north to south, and 250 miles from east to west. Its western point is only 180 miles via Posen (or Prussian Po¬ land) from Berlin, and it touches the whole eastern frontier of one of Germany's richest and most valuable provinces — Silesia. This Silesian boundary is a purely artificial one, easy to cross in either direction. But the Russian strategy did not aim at crossing it, at any rate, at the outset of the war, partly on account of lack of adequate railways and transportation, and partly because of the danger to which the Russian flanks would have been exposed. Russia

could not afford to run the risk of having a Russian army in the Polish salient ^^pinched^^ by a German-Austrian thrust southward from East Prussia and northward from Galicia. Obviously no direct western ad¬ vance against Silesia could be undertaken by Russia until she had safeguarded her flanks by the conquest of East Prussia and Galicia

— until her armies were in possession of the Lower Vistula and of the passes of Carpathian Mountains. Russia's first strategic task, there¬ fore, was to occupy East Prussia and Galicia on the two sides of the Polish salient.

The railways available for the movement of Russian troops were very inadequate as com¬ pared with, the splendid system of strategic rail¬ ways which Germany and Austria had con¬ structed. Germany had 17 lines of railway leading to the Russian frontier, which, it was estimated, would enable her to send 500 troop trains daily, so that she could concentrate some 600,000 men on that border within a few days of a declaration of war. On the Russian side there were only six railway lines. So, too. with Austria. The Carpathians had been pierced by seven railways so that troops could be poured from Hungary into Galicia and up to the Russian border at the rate of 250 trains every 24 hours. As against this Russia had only four lines. The German and Austrian railways consisted not only of the great trunk lines for commercial use, but connected with these were also numerous strategic lines running parallel and close to the frontier with many small branches shooting out railheads to the towns on the frontier. From such railheads troops could be rapidly detrained and military supplies sent forward by automobile trucks, The Russians, however, had no such network of railways parallel to the frontiers; they had nothing but the few trunk lines which crossed the frontier at right angles. Thus Germany could shift her army corps very rapidly along the Russian frontier as needed. Russia could not shift hers nearly so quickly, and only slowly could she bring up reinforcements from the vast interior stretching to Siberia and the Caucasus. This inferiority in railways will explain several of the severe reverses which Russia

suffered after apparent initial successes. Germany's advantage in the matter of railways, however, became less and less as she invaded Russian territory and found herself handi¬ capped by lack of railways and by bad roads ; the further German armies penetrated Russia, the more they were slowed down uri|p finallv brought to a standstill.

The character of the terrain, together with the inadequacy of the railways, had long be¬ fore the war determined the Russian general staff not to attempt to defend the western part of the Polish salient; for the country is a vast, flat, monotonous, open plain (the name ˆPoland® comes from the Slavic ®polye® mean¬ ing steppe or plain). Over this plain German armies rapidly mobilized in Silesia could easily sweep. Moreover, a large Russian army in the western part of the Polish salient was al¬ ways in danger of having its line of communica¬ tions through Warsaw cut off, or of being sur¬ rounded by German and Austrian armies com¬ ing south out of East Prussia, or north out of Galicia. Therefore Russia had selected the Vistula River as the first line of defense. Ris¬ ing in western Galicia, near Cracow, at the corner where the German, Austrian and Russian empires met, the Vistula flows for 1(X) miles northeastward, and forms the boundary between Russian Poland and Galicia. In this region it receives the flood of water which tumbles north¬ ward from the slopes of the Carpathian Moun¬ tains in the Dunajec, Wisloka and San rivers.

Thenceforth a majestic river, unfordable, sel¬ dom crossed by bridges, and subject to terrible floods, the Vistula forms one of the most serious military obstacles in Europe in its course northward to the Baltic. In the 19th century it had been further strengthened as a defensive position in its middle course by the construction of fortifications near its banks at Ivangorod, at Warsaw, and at Novo Georgievsk where the Narev joins the Vistula. As a fur¬ ther protection against attack from East Prussia other forts (Zegrje, Ostrolenka, Lomza, Ossowietz and Grodno) had been stretched eastward from Novo Georgievsk to Kovno. These for¬ tresses formed Russia's famous Narev-Bobr- Niemen line of defense. It derived such addi¬ tional strength from the swamps, ponds and forests to the north that Hindenburg twice failed in his efforts to break it.

On the south, however, toward Galicia there was no such good line of defense. The bound¬ ary was purely artificial. Here Russia was left vitally open, between Lublin and Cholm, to an Austrian thrust from the southwest which could strike behind Warsaw and the Vistula, and advance on Brest-Litovsk, as was to happen in 1915. Owing to this

danger and to the belief jof Russian artillery experts that the Vistula I fortresses were out of date, it was decided by Sukhomlinov, Minister of War, after the Russo-Japanese War, that Russia's main line of de¬ fense should be moved 75 miles eastward, from the line of the Vistula to the famous Brest-Litovsk line. This is formed by the Niemen and Bug Rivers. It is protected in the north by the Niemen-Bobr-Narev rivers and for¬ tresses, and in the south by the fortresses of the Volhynian triangle — Rovno, Dubno and Lutsk. Unfortunately, in accordance with Sukhomlinov's plan, the old fortified outworks of the Vistula line were destroyed in 1912, be¬ fore the new Brest-Litovsk line had been com¬ pleted. But this mistake did not prove as fatal as might have been the case, because Ger¬ many's plan of crushing France first, before turning east to deal with Russia, gave Russia not only time to mobilize behind the Brest-Litovsk line as planned, but even to change her plan, begin a forward movement in Poland, and make a vigorous offensive in East Prussia and Galicia.

2. Russian Mobilization and Commanders.

— Russian mobilization, for which the prelimi¬ nary orders were probably given on 25 July 1914, took place more rapidly than the Germans had supposed possible. It was accompanied by great demonstrations of national enthusiasm and patriotism. The people felt that this was a war of defense against the hated German im¬ perialists who had so long been threatening Russia outwardly and exploiting her inwardly through cornmerce, industry and office-holding. The prohibition of the use of vodka at the same time saved the Russian peasant from his greatest weakness and undoubtedly, for the time at least, added to the efficiency and speed with which mobilization was accomplished. It was complete, so far as the first armies were concerned, by the middle of August 1914, and gave Russia nearly 2,000,000 troops available on the Brest-Litovsk line. In addition to these there were 2,000,000 more men ready in Siberia and the Caucasus, and many millions more who could be eventually mustered into reserve

Frontiers of August t /At4

Russians. Jnyad/ng fast Pruss ancf Gai/c/a SepfemDer/j it9/4 m I-Pennenkompf - Sa/nsonou i tuerts, RussPg, Brus/hu

German Austrian Armies, Sepf./.9ˆ{

Postern front Aprit 25i *9*S, befot *be G*vot *Puss*an Retreat

pastern Front fouember J9/S otter *be Great Russ*on Retreat mjfrˆ

Area twn by Russians in tPtG ˆ Scales

Fait roads

\37-It-l-IS

EASTERN FRONT IN 1914, 1915 AND 1916

V)teper

7’- ”” > ■

50

.•

“‘f’ - I ‘iVˆ.v -rˆ ,

‘J f

ijV’. r. - ˆ ‘

|A’

jr

4«^

4-.’ ^ V /’■ . ■ • ,r:; :^v- ‘iiM’-

r ■■

r-:

p, ■^.

t » •

■ ^ •*»* k.. •

.< >

. n’:-

“I’

. Ik/ T-”

*■

• V

• ,■

. ••1*

*-• ,:■

j, .-r

Sli < ’

i 1

‘5rr»’-^^-“ ‘

%■’

. »• “““ ‘•»-4l < ^.. -

l„..* ■

-. *f ‘I**

• • •« r

P“-

»

V\

« ^ ‘

«

* • •

%

.*? > >

• .» • .. -^

t

.

1

‘V..

‘ r

-V - •

#

\

J H

1

■?»’

7rW:

*

\ •

!, >?*•*

•

/■

j4’f

r .tfc.

^ ” ■

‘ f

‘■ ■<

/ ‘

f ii

* I

I

l’” ”■’■^‘ii.*’ 3’ ‘ —

‘^’ k1 » ^’^**’

y - • i’ 1

a

3^’*

‘n-

•‘I’.

* •>

♦ ^

.:’- o.‘r- -ij- ■ … / ■ _. •;«ii 9 .

. V ^

iL -t’

»•

ir * ‘

“A

JiU

^ ^ y j ‘W. ^ /.fli

, T r H V. .

‘ iW-*-

-” ‘ *- V’-‘

t

ralllˆP— ‘■’ ^^r». *”’”^^*sV

WAR, EUROPEAN— THE EASTERN FRONT (6)

35©

formations and sent to the front, if arms could be found for them.

The man selected as commander-in-chief of all these forces was the tsar’s uncle, the Grand Duke Nicholas, He was a striking figure, power¬ fully built, and well over six feet in height. In spite of his 59 years, he was full of energy and force. Having received his military educa¬ tion at the famous General Staff Military Academy at Petrograd, he afterward had seen extensive experience in cavalry commands. As inspector-general of cavalry before the war he had come to know most of the cavalry leaders and practically all the prominent officers. Severe and fiery in temper, he nevertheless had the respect and sympathy of the troops he was to command. He was every inch a soldier, and his appointment as commander-in-chief was highly hailed with enthusiasm by the whole Russian press and people. Sukhomlinov as¬ signed to him as his nearest assistant, that is, as chief of the general staff. General Yanushke-vitch, only 42 years old, but believed to be a brilliant strategist — a second Moltke. He had had, however, very little war experience and was to disappoint sadly the hopes which had been placedˆ in him. The real strategic ability in the Russian command lay in the half dozen army group leaders and staffs like Alexeiev-Brussilov, Ivanov, Russky, Kornilov and others — men who had risen by virtue of sheer ability and learned war in the bitter experiences of the Manchurian campaigns.

From the moment it became clear that Ger¬ many was striking her main blow first against France and W’as merely standing on the de¬ fensive in the east until France could be crushed, Russia decided to change her original strategic plans. She gave up the idea of standing on the defensive behind the Brest-Litovsk line. To aid her hard-pressed

French ally she decided to undertake two great offensives, one into East Prussia, the other into Galicia. This was good strategy. An invasion of East Prussia was expected sooner or later to force Germany to send troops to the Eastern Front and thus relieve the German pressure on France in the west. Similarly an early invasion of Galicia, which the Germans did not expect, would check or defeat the Austrian invasion of Serbia, and would also have a demoralizing effect on Austria's hold on her oppressed Slav and Rumanian subjects. If Russian troops were able to reach the Carpathian passes and threaten an invasion of Hungary, Hungarian allegiance to the Central Powers might begin to weaken. Russian success on these two flanks to the north and the south was also the necessary prelimi¬ nary, as has been pointed out above, to any great advance by the Russian centre westward through Warsaw. Such an advance was desir¬ able, if possible, to protect Russia's own mining and industrial cities in the wˆestern part of the Polish salient, and to threaten those of her enemy across the border in Silesia. For these offensives the Russian forces were organized into five armies arranged in two army groups, each under a commander-in-chief with his own staff.

The Northwest Army Group, which was to strike into East Prussia, consisted of two armies — Rennenkampf's and Sarnsonov's — under the command of General Zhilinsky, ap¬ pointed through the favoritism of the Minister

of War Sukhomlinov, The ultimate disaster at Tannenberg was due in no small degree to Zhilinsky's failure to coordinate the operations and protect Samsonov's left flank. His two subordinates, how'ever, were men of unques¬ tioned ability, with brilliant military records. Rennenkampf, in charge of the most northern army, with his base on Kovno, was to drive straight west across the frontier of East Prussia toward Koenigsberg. Samsonov fur¬ ther west, with his base on Warsaw, was to march north along the line of the Warsaw-Dantzig Railway, strike the flank of the Ger¬ mans who would be retreating before Rennen¬ kampf's superior forces, and then unite with Rennenkampf for a victorious advance to the banks of the Lower Vistula. This invasion of East Prussia would deprive Germany of one of her richest agricultural regions and spread consternation in the minds of the Junkers whose great estates lay in East Prussia.

The Southwest Army Group, destined for the invasion of Galicia, was placed under the command of General Ivanov, with his base on Kiev. His chief-of-staff was General Alexeiev, later to be famous throughout

the world as chief-of-staff to Nicholas II, after the tsar took over the supreme command from the Grand Duke Nicholas in September 1915. Alexeiev, after receiving his first baptism of fire in the Russo-Turkish War of 1877-78, did not enter the Military Academy at Petrograd until several years later. But when he did so, he at once distinguished himself. He had already served as chief-of-staff to Ivanov 10 years before in the Japanese War. He there W'orked out the strategical plans which won honor for them both and fitted him for the high duties he was to undertake later on. His character was of the highest. Even in the supreme position of practical commander-in¬ chief after 1915, he retained an unusual mod¬ esty, simplicity and accessibility, which en¬ deared him to all who had to deal with him directly. Though he might have dined daily at the tsar's table it was characteristic of him that he usually preferred to take his meals at the staff officers' mess, because he could save time by discussing military matters during meal time with officers ˆ who had come to headquarters from the various armies.

The right wing of the Southwest Army Group was a small army under General Evart. His movements were so closely directed by his commander-in-chief that this army is often referred to as Ivanov's army. It was based on Brest-Litovsk and its object was to check General Dankl's greatly superior Austrian force. Dankl had early crossed the Russian frontier near the San River with the hope of striking north along the right bank of the Vistula to take Ivangorod and Warsaw in the rear. The Russian strategy could afford to let him come on, provided the Russian centre and left wing succeeded in their drive against Lemberg and Przemysl. For in that case, Dankl's communica¬ tions would be threatened and he would be in danger of being overwhelmed by the new forces which the Grand Duke Nicholas could move to Poland from the interior of Russia.

General Russky's army, forming the centre of this Southern Army Group, and General Brussilov's army, forming its left wing, made up the force which was to invade Galicia. The

Russians expected great things from it, and they were not disappointed. Riissky was one of the most scientific of Russian officers, who as professor at the Petrograd Military Academy had helped to train, and was personally ac¬ quainted with, a large number of the younger officers. In the war with Japan he had been chief-of-staff to General Kaulbars and since then had been one of Sukhomlinov's right hand men in the reorganization of the Russian forces. Closely associated with him, was General Radko-Dmitriev. This remarkable man, by birth a Bulgarian, became closely identified with Russia after 1878 when Russia dominated Bul¬ garian politics. He completed his military studies at the Petrograd Academy, served 10 years in the Russian army and ultimately re¬ turned to his native land where he became chief of the general staff in 1902. In the Balkan Wars, as commander of one of the Bulgarian armies which won the battles of Kirk Kilisse and Lule Burgas, he became the popular hero of the war. But disgusted with the quarrels among the Balkan allies which fol¬ lowed, he accepted an offer to re-enter the Russian service with the rank of general.

General Brussilov's name was little known when the war broke out. He had not received the higher training at the Petrograd Military Academy, nor enjoyed any marked opportunity to test his abilities. Most of his service had been passed in the school for cavalry officers where he had more to do with the technicalities of troops than with their uses in fighting. But by his ability in Galicia in 1914 and in 1916 he was soon to prove the wisdom of his selection. He became in fact one of the greatest popular heroes_ of the war, but in 1917 he was forced to resign by the Bolshevists.

Russky, with his base at Kiev, moved south¬ west from the fortresses of Lutsk and Dubno and crossed the Galician frontier between Sokal and Brody during the last week in Au¬ gust. He aimed to interpose his right wing be¬ tween Dankl and the second Austrian army under Auffenberg. He could then menace Lemberg from the northeast. Meanwhile Brussilov came west along the Lemberg-Odessa Railway as soon as it became clear that Ru¬ mania intended to remain neutral. His original task had been to protect Odessa and southwest Russia from an attack by the Hohenzollerns in Rumania; but, relieved of this task by Ru¬ mania's decision, he was able to enter Galicia near Tarnopol and occupy the country as far south as the Dniester River. He could then co-operate with Russky by menacing Lemberg from the opposite side on the southeast. Russky and Brussilov each had over 250,000 men and together outnumbered Auffenberg's army which was stretched across Galicia east of, and cover¬ ing, Lemberg. The Austrian staff was appar¬ ently not aware of the close connection be¬

tween the movements of Russky and Brussilov. They supposed that they had only Brussilov to face at Lemberg, as Russky would be com¬ pelled to go to the assistance of Evarts' army on the Bug.

Such was the favorable situation for Rus¬ sia, as may be seen by a glance at the map, at the successful beginning of the East Prussian and Galician campaigns after a month of war. Only in the extreme western point of the

Polish salient had Russian soil been seriously overrun. Here German troops from Silesia poured across the frontier near Kalisch and seized the Polish mining districts, but did not for the moment advance far toward Warsaw. The atrocities which they committed, similar to those in Belgium but less known, did not make them any more beloved by the already bitter Polish population. The Grand Duke Nicholas, on the contrary, made a successful bid for Polish loyal support by a proclamation on 15 August, promising the Poles reunion and home-rule : *Poles ! The hour has sounded when the sacred dream of your fathers and your grand¬ fathers may be realized. A century and a half has passed since the living body of Poland was torn in pieces, but the soul of the country is not dead. It continues to live, inspired by the hope that there will come for the Polish people an hour of resurrection and of fraternal recon¬ ciliation with Great Russia. The Russian army brings you the solemn news of this reconcilia¬ tion, which obliterates the frontiers dividing the Polish peoples, which it unites conjointly under the sceptre of the Russian tsar.^^ The real fate of Poland, however, was not to be decided at once by any choice which the Polish people might make as between Russian and Teuton. It was to be decided by the ultimate fate of the vast contending armies which were about to strike one another to the north and the south of the Polish salient in East Prussia and Galicia and the vaster armies on the battlefields of France.

3. The Russian Invasion of East Prussia (August-Septcmber 1914), and the Battle of Tanncnberg. — The Germans had not expected that Russia would attempt to invade East Prus¬ sia almost immediately after war was declared. They had counted, and counted too confidently, upon the supposed slowness of Russian mobili¬ zation, upon the inadequacy of the Russian railways, and upon the vast distances over which Russian troops would have to move to reach the German frontier. The whole German strat¬ egy was based upon the concentration of a crushing force which should annihilate French resistance. After that, Germany could turn eastward to deal with

Russia at her leisure. Therefore Germany did relatively little for the protection of ‘her East Prussian frontier. The number of German troops east of the Vistula was not greatly increased during the first three v/eeks in August, and probably did not ex¬ ceed four corps, that is, less than 200,000, half of whom were first-line troops (the 1st corps at Koenigsberg and the 20th at Allenstein) and the rest Landwehr. In addition to these four corps there were several cavalry divisions and a large force of motor cyclists. The latter were particularly valuable for moving rapidly through the long stretches of forest and moor country to defend quickly the narrow necks of land be¬ tween the innumerable lakes. Aside from the first-class fortress of Koenigsberg, which was the centre of defense, and the fortified areas of Memel and Dantzig, which like Koenigsberg, could receive provisions and reinforcements by sea, if besieged, there was only one other fort¬ ress in East Prussia. This was Fort Boyen, at the eastern end of the Masurian lakes, opposite Suwalki. But even this fortress did not play an important part in the war. It was not in

fortresses that the Germans put their trust, but in armies and in the nature of the country. The whole southern part of East Prussia, known as the Masurian Lake Region, is an almost impassable line of defense. It is cov¬ ered with a tangle of forests, swamps, ponds and lakes, through which a few good roads run. To one who knows thoroughly the paths and connecting necks of dry land, who knows which ponds have a hard bottom and are fordable, and which are a bottomless slime, who knows how to go blindfolded through the dark forests, it is not impossible to lead an army through. There was one man in Germany, an obscure general in retirement, who knew all this, Paul von Hindenburg.

Warsaw-Dantzig railways, the ground is higher and better suited to military operations. Here the German government had encouraged the peasants to build houses of stone with very heavy loopholed walls toward the Russian frontiers. They were practically blockhouses and

did the Germans some good service in checking the advancing Russians. They were proof against the only light artillery which the Russians were able to bring up. But even after the Russians had captured them they were no great shelter to the invaders, because the walls on the German side were thinner and afforded no protection against German artillery. Many of these blockhouses were also connected by secret underground telephones with stations

rMe/ve/-

Suwa/k,

ˆ/enste/n.

Grodrio

‘arsaw

Bres/au

.*u6*/n

f'e/ce

MAP SHOWING

O F

G ERMAN Y

Buss *a*73 farthest Actuar/ce *3*4

Po/ieˆ

four/o

yy/ej

It/t/ra

< > >

yStett/zi

GERMANY

L Posen® ,

B/e/sf

Brest -utoysk

Brescten

V V

Lutsk

N..

Some years before the war a land company of promoters had proposed to reclaim this re¬ gion for agriculture. Hundreds of square miles were to be cleared of forests. The lakes and swamps were to be drained and the wild country turned into prosperous farms for German peas¬ ants. Von Hindenburg energetically opposed the reclamation scheme. It is said he hurried to Berlin and interviewed the kaiser in person ; he pointed out that this eastern wilderness was worth to Germany many army corps and a dozen fortresses. Why destroy the defense which Nature had provided and throw one of the oldest provinces of the Prussian monarchy open to easy Russian attack? His arguments prevailed and the wilderness remained.

To the east and west of the Masurian Lakes, however, near the Kovno-Koenigsberg and the

further to the west, so that after Russians had advanced, German spies were able to send in¬ formation of their movements. Very few de¬ fense trenches had been dug by the Germans, and most of their barbed wire was still stacked up in coils when the Russians made their first invasion.

The speed with which Russia mobilized came as a surprise and shock to the Germans in East Prussia. On 3 August, only two days after the declaration of war, the German garrison in Memel, on the Baltic Coast, just inside the German frontier, was called upon to drive back a Russian detachment from Libau. A few days later Russians did actually occupy Tilsit on the lower Niemen, where a century before Napoleon and Alexander I had met to divide the world between themselves. Another indi-

cation of the speed with which Russia moved may be seen in the fact that Gourko's cavalry division, which in peace time had its quarters in Moscow, was mobilized and transported so rapidly and efficiently that it was able to de¬ train at Suwalki on 6 August and to cross the frontier before daylight on 11 August. It pushed on quickly to Marggrabowa on the German strategic railway, cut the line, de¬ stroyed the station and telegraph and telephone wires and seized valuable information as to the German plans and the location of troops. These cavalry patrols, sent forward to reconnoitre the situation, were speedily followed by the two main Russian armies which were to invade East Prussia — the army of the Niemen under Gen¬ eral Rennenkampf and the army of the Narev under General Samsonov.

The 1st Army under Rennenkampf was to move rapidly westward from the Niemen along the line of the Kovno-Koenigsberg Railway, where the ground was good. It would drive back the smaller German force opposed to it and threaten Koenigsberg from the east. The 2d Army under Samsonov, moving northwest from the Narev and Bug rivers, between the railways running into East Prussia from Bialystok and Warsaw, would advance more slowly through the difficult country of the western half of the Masurian Lake Region. Having passed this barrier it would reach the main-line railway from Berlin to Petrograd, which passes through Eylau and Allenstein. It would then be on good ground, would join up with the 1st Army, and together the two armies could close in on Koenigsberg; or leaving Koenigsberg besieged they could advance to the Vistula and menace Berlin. For three weeks all went so successfully that Russian hopes ran high. On 27 August, in anticipation of victory, a fete was held in Petrograd, and by the sale of flags $100,000 was raised to be given to the first Russian soldier who entered Berlin. But 27 August marks the high-water mark of the East Prussian venture, as one may see by fol¬ lowing a little more closely each of these armies.

General Rennenkampf had under his com¬ mand the four army corps whose regular head¬ quarters were comparatively near the frontier — the 2d (Grodno), the 3d (Wilna), the 4th (Minsk) and the 10th (Riga) ; he had also the 1st and 5th rifle divisions and Gourko's cav¬ alry division. By the end of August he had also the support on his left flank of a new 10th Army under General Pflug, composed of two of the best-trained army corps — the 22d (Fin¬ land) and the 3d Siberian — two divisions of the famous Cavalry Guards from Petrograd, and six less well-trained divisions of reserves (53d, 54th, 56th, 57th, 72d and 76th). But not counting these later arrivals, Rennenkampf had in the army of the Niemen nearly 200,000 of Russia's best troops. He,

therefore, consider¬ ably outnumbered the Germans under von Frangois. He accordingly pushed rapidly across the frontier with his main force about 10 August and occupied Stallupoenen, the station just inside the Prussian frontier, where the strategic railway parallel to the frontier crosses the main line from Berlin to Petrograd. Fif¬ teen miles farther west, at Gumbinnen, the Ger¬ mans felled thousands of trees to make an

abattis for their hastily constructed trench posi¬ tions. They hoped thereby to protect Insterburg, 10 miles farther west, where the main¬ line railway crosses the Pregel. Insterburg was important strategically, both as a railway centre and as an outpost for the defense of Koenigsberg, the capital of the province. But on Sunday, 16 August, Rennenkampf bom¬ barded Gumbinnen effectively. Then; in a dashing frontal attack, he rushed the German positions. A Russian flanking movement aimed at the Insterburg Railway caused von Frangois to give up the trenches in front of the town on 20 August. The Germans fell back as hastily as possible to the cover of the heavy protecting guns of the circle of forts around Koenigsberg, where they were shut in. A Russian detach¬ ment had already occupied Tilsit on the lower Niemen and the tsar's flag was hung out from the ancient town hall, where it fluttered tri¬ umphantly for three weeks. By the fourth week in August, about the time the English were beginning the retreat from Mons, Rennen¬ kampf had successfully occupied more than a third of the sacred soil of East Prussia.

Having reached the outskirts of the Koenigs¬ berg forts, however, Rennenkampf was brought to a halt. He had begun to feel the lack of organization in his rear and the difficulty of bringing up supplies of munitions and other military material. There was, to be sure, much food and fodder in this rich agricultural region of highly scientific farming, which stirred the admiration of the Russians. And this food was requisitioned wherever the retreating Ger¬ mans had not been able to set fire to the barns bursting with the recently harvested grain. Nevertheless, to _advance beyond Koenigsberg without waiting for the organization of rail¬ way support from Russia, Rennenkampf rightly judged would be hazardous. He could not safely move too far in advance of the reserves which would soon be coming up from the mobi¬ lization forces in the interior of the Russian Empire. He could, moreover, afford to halt, in order to wait for, and link up with, the 2d Army, under Samsonov, coming up from the south.

The first news from Samsonov's army had been wholly favorable. He

crossed the frontier and was advancing slowly but steadily through the Masurian Lake Region. He had even taken a good many prisoners. By 27 August his leading columns had reached the main-line rail¬ way at Allenstein, a considerable town of 40,000 inhabitants, with military barracks and machine shops. There he ordered the inhabitants to produce a stated amount of food and provi¬ sions in the market place at 8 o'clock of the following morning. Then suddenly all news from him stopped. No communication could be had either with Samsonov or with any of his staff. After waiting two days in anxiety the commander-in-chief, Zhilinsky, sent orders to Gourko's cavalry division, which was attached to Rennenkampf's left flank, to make a dash through the enemy's line toward Allenstein to get evidence of the condition and whereabouts of Samsonov and his army. Though this was an extraordinary order and a very perilous mission, and though his troops were weary from patrol work, Gourko did not hesitate for a moment. Starting long before daylight on

the morning of 30 August with three regiments of cavalry and one battery of mounted artillery, he crept through the German lines between Koenigsberg and the eastern end of the Masu¬ rian Lakes, which were still held by the Ger¬ mans. Then he rode for 30 miles behind the German lines, tearing up railways which he crossed and blowing up bridges. Soon after noon he was able to see with the naked eye the buildings and barracks of Allenstein, and found strong forces in front of him. He called up his battery and opened fire on the German re¬ serves, but speedily became convinced that he was face to face with greatly superior numbers, and that it would be folly to try to force his way into the town of Allenstein. He thought for a moment of firing a few rounds from his artillery into Allenstein, but unwilling to harm the peaceful civilian inhabitants, he refrained. Had he but known it at the time, the German army headquarters staff was at that moment in the town, and he might have done it incal¬ culableˆ damage. But he now decided it was high time to make his way back and report on what he had learned. He could hear heavy firing to the south. But he could not get into touch with any of Samsonov's troops,

though he had expected to find them near Allenstein. His scouts had brought information that several German dead had been found lying about on the ground, showing that evidently Samsonov's men had been fighting very recently in this neighborhood. Under the circumstances, he felt that he had done all that was possible and that he ought to bring back quickly such information as he had gathered. The Germans were lying in wait for him on his return, but by choosing a slightly different route and under the cover of darkness, he managed to rejoin the Russian lines south of Insterburg, having lost only a few men who were shot in the dark from a Ger¬ man ambush. He found that during his 24 hours' absence Rennenkampf's army had begun to re¬ treat to the east. He learned also that at dawn on 30 August, only a few hours after he had started for Allenstein, a second message had come from General Ghilinsky countermanding the order for the dash through the German lines. This counter-order had been sent to overtake Gourko, but it was impossible to reach him. On 30 August Gourko had ridden over 60 miles, and displayed the same keen judgment, tact, thoughtfulness for others and general ability which were to win him rapid promotion to be commander of the 6th Army in November 1914, chief of the Russian imperial staff in November 1916 and commander-in-chief of the whole Eastern Front in March 1917. No more delightful and informing book on the Eastern Front has appeared in English than his ˆWar and Revolution in Russia 1914-1917ˆ (London 1919), from which the account in the preceding paragraphs is summarized. The explanation of the two days' silence from Samsonov, of the order to Gourko to dash behind the German lines to Allenstein, of the heavy firing he heard there to the south, followed by the counter¬ manding of his orders and the eastward retire¬ ment of Rennenkampf's left flank, all lay in one tragic word — Tannenberg.

General Samsonov entered the war as a popular and highly-esteemed general. He had commanded the Siberian Cossacks with great

distinction at the battle of Liao-Yang in the Manchurian campaign. He had a high repu¬ tation among Russian common soldiers. He had accordingly been given command of the 2d Russian Army which started north from the Narev River toward the western end of the Masurian Lakes soon after Rennenkampf crossed the Prussian frontier from the east. Like Rennenkampf's army, Samsonov's con¬ sisted of four army corps and several divisions of cavalry, i.e., nearly 200,000 men. It ad¬ vanced on a front of about 20 miles toward theˆ railway quadrilateral at the corners of which are the four Prussian towns of

Eylau, Al¬ lenstein, Soldau (just south of Tannenberg) and Ortelsburg, Within this area are the swamps and forests of the western Masurian Lakes. Samsonov had placed the 13th and 15th Army corps in the centre with the heads of their vanguards in line and in close contact with each other. On the outside flanks of these central army corps, at a distance of about a half day's march and marching slightly to the rear, were the 6th Army corps on the right and the 1st Army corps on the left. It was understood that the main attack was to be borne by the two cen¬ tral army corps, whilst those marching slightly to the rear on the flanks were to serve as a pro¬ tection from envelopment. In case the central army corps were held up by battle, the flanking corps could in their turn move ahead to get round the flanks of the enemy, which was holding up theˆ two central army corps. But these plans, owing in part to tactical errors on the part of the corps commanders on the flanks, were never carried out. And in the end the two corps in the centre were left entirely without support. They were surrounded by a living wall of Germans and had no option but to lay down their arms and surrender, as the French had done at Sedan just 44 years before.

At first Samsonov had had unusual success in threading his way through the tangle of forest and lakes in the Allenstein quadrilateral. His caivalry patrols met with little serious opposition until 20 August, when he found the vanguardˆ of the German 20th Army corps from Allenstein strongly entrenched in the centre of the quadrilateral in a line running from north¬ east to southwest. But using his artillery to cover the attack, Samsonov had his troops rush the German trenches with hand grenades and cold steel. After severe fighting, by noon of the next day, he had completely routed the Germans. Some fled toward Koenigsberg and some west toward the Vistula. The Cossacks pursued with vigor and took many prisoners. Samsonov then pushed rapidly forward and on 27 August was able, as we have seen, to occupy the town of Allenstein. Its citizens were ordered to supply 120,000 kilograms of bread, 6,000 kilograms of sugar, 5,000 kilograms of salt, 3,000 kilograms of tea and to have them ready in the market place by eight o'clock on the following morning.

By this time the victorious advance of Ren¬ nenkampf and Samsonov had virtually put out of action the first field army of East Prussia; all that was left of it was either in retreat or was being shut up inside the Koenigsberg lines. The Russian patrols were advancing toward the Lower Vistula. Panic-stricken fugitives, with wild stories of universal burnings and slaugh¬ ters, were beginning to arrive in Berlin, spread-

ing general consternation throughout Germany. At the same moment on the Western Front fugitives fleeing from von Kluck's army were beginning to arrive in Paris. It was clear that the German authorities had miscalculated the whole eastern situation and that something must be done, and done quickly, to save East Prussia.

For the Germans there were many reasons why East Prussia must be freed from the in¬ vader at once, if possible. If the panic-stricken fugitives from the regions east of the Elbe were allowed to spread through Germany they might dampen German spirits and weaken German morale, despite the apparently extraordinary German victories in Belgium and France. From a strategic point of view no German ad¬ vance in Poland was possible so long as Rus¬ sians stood in East Prussia on the northern flank of the Polish salient. Moreover, a great part of the officers in the German army came from the Junker families, with estates in the invaded region, which they were keen to re¬ cover. Sentimental reasons also urged the immediate deliverance of the sacred soil of East Prussia ; for this was oiie of the oldest provinces of the Hohenzollerns. It had been conquered by the blood and sweat of the Teu¬ tonic Knights nearly 700 years ago. It was the cradle of the Prussian monarchy, and in the capital Koenigsberg, a Brandenburg elector had first placed on his head the royal crown. To the kaiser it came as a personal affront that his hunting lodge in the forests at Rominten, where he used to spend some weeks every autumn, should be desecrated by Cossack bands. For these reasons the German general staff ordered at once the concentration behind the Vistula of a relieving force, made up probably of reserves drawn from central Germany, and not, as Gourko frequently asserts, from troops taken from the Western Front. It speaks highly for the kaiser's intelligence, or for the excellence of the German military machine, that he was able to pick out of obscurity and retirement to com¬ mand this relieving army, the one man in all Germany who was probably best capable of coping with the critical situation.

Outside of a small military circle in Ger¬ many Hindenburg was practically an unknown man when the Great War broke out. Born of an old Prussian military family, near the middle of the 19th century,

he received at the age of 18 a lieutenant's commission in the Prussian War against Austria in 1866. In 1886 he was promoted to the position of professor in the War Academy and lectured for several years on applied tactics. As he had meanwhile been a staff officer at Koenigsberg and became inter¬ ested in the problem of the defense of East Prussia, it was quite natural that in his lectures he gave much attention to the Masurian Lake Region. He worked out theoretical battles there with his students, and so came to have a perfect theoretical as well as a good practical knowledge of the region where three of his greatest battles were to be fought. He never wasted time, as so many German officers were accustomed to do, in playing cards and idling. He is said to have boasted that he never read a poem or any other literary work after the Franco-Prussian War. All his time was ab¬ sorbed in military studies. In the evenings he

would sit pondering over maps spread out be¬ fore him, marking movements of troops, direct¬ ing armies and fighting imaginary battles. In talang walks across country he would still play the soldier, ordering his boy to carry out evolu¬ tions with imaginary troops, or halting the family party on a ridge to unfold his plans for a battle there. It was his dream to lead an army corps against the enemy. But in 1911, having already reached the rank of commanding general and being 64 years of age but still in full strength and vigor, he resigned his com¬ mission, in order, as his brother has assured us, ®to make room for the younger men.® He retired to Hanover to live on his pension. When the war broke out he instantly offered his services, but after three weeks of waiting he heard nothing. Then on 22 August came a dispatch giving him command of the German armies in East Prussia — in the region which he had long studied and knew so well. He arrived by special train on the Eastern Front in the afternoon of 23 August and be¬ gan at once one of those rapid concentrations of troops for a surprise attack for which he soon became so famous.

Hindenburg saw that the two Russian armies had not yet established touch with each other. There was still time to strike them separately, first Samsonov and then Rennenkampf. Accordingly he drew in with all pos¬ sible speed the troops in front of Rennenkampf and massed them against Samsonov's columns, advancing into Allenstein on 27 Aug. At the same time he sent the greater part of the fresh forces which he brought from Ger¬ many southward on the railroad from Eylau toward Tannenberg to crush in Samsonov's left flank. These German troops attacked before Samsonov's supporting column could come up to afford protection to the two central columns. By this

unexpected attack Samsonov's whole left flank was bent back and thrown into con¬ fusion. Some effort was made by the Russians to retrieve the situation under the supposition, false as it soon turned out, that this first attack from the west toward Tannenberg was the main German attack. But meanwhile Hindenburg had shifted a large part of his troops around the edges of the quadrilateral through Eylau and Allenstein to Ortelsburg. Here from the east they attacked and crushed in Samsonov's right flank which had been left as unprotected as his left flank.

By the evening of 28 August Samsonov's position was desperate. The head of his two central columns had been driven back from the neighborhood of Allenstein where Gourko in his ride behind the German lines found only scattered dead. The sides of the central col¬ umns had been crushed in by Hindenburg's two attacks from the west and the east, and his rear was being enveloped by an encircling movement of German troops who were cutting off all chance of retreat. The two outside corps which were to have protected his flanks had not ap¬ peared, and in fact he had lost all touch with them. Thus surrounded, the 80,000 men of the two central corps were driven in upon them¬ selves into the shades of Tannenberg wood, absolutely helpless and unable to use their artil¬ lery. In the swamps and forests they fought desperately, but without any possibility of find-WAR, EUROPEAN — THE EASTERN FRONT (6)

ing their way back to the Russian frontier. By 31 August practically all of the Russian soldiers in the two central corps, aside from those who were drowned or killed, had to lay down their arrns and surrender, and Samsonov himself perished in the rout. The first German reports gave 30,000 as the number of Russian prisoners taken in the battle of Tannenberg, but by the end of August the num.ber had risen, with but slight exaggeration, to 90,000. Hindenburg's victory was so immense that the German official reports were at first received with incredulity abroad, but fuller details only confirmed the magnitude of Russia's disaster. Tannenberg was the most complete and decisive victory which the Germans won in the whole war. Hindenburg sprang at once from the obscurity of a general in retirement into the position of the greatest German hero of the war, and his fame was deserved; for he had outmanoeuvred his enemy and made the best use of all the means

at his disposal.

On the Russian side Samsonov did not sur¬ vive the battle for whose loss he was in part to blame. He had made the mistake of advanc¬ ing the headquarters of the central corps even though he was entirely wdthout information as to the movements of the corps on his flanks. He had supposed they would hold in check any enveloping or flanking movement which the Germans might attempt. In reality these corps on the flanks were never in proper close touch with the two central corps (for which failure the army commander, Zhilinsky, was in part responsible) and instead of checking Hinden¬ burg's troops, they began to retreat to Russia as soon as they felt strong German pressure.ˆ

During the battle they not only failed to give support to Samsonov's two central corps, but they did not even keep him informed of their movements. Several times during the battle of Tannenberg, Samsonov had inquired anxiously if any news had been received of the corps on the flanks. Each time the answer was in the negative. Samsonov was in part to blame for moving his headquarters so far to the front that he infringed one of the elementary rules of military strategy, that which provides that the commander of an army shall choose as his head¬ quarters some spot where information can be readily brought to him and whence he can com¬ municate with all the forces under his com¬ mand.

Hindenburg did not attempt any pursuit of the few scattered remnants of Samsonov's army. It was not worth his while. Instead, he shifted his troops rapidly to the northwest to try to cut off Rennenkampf's army and envelope it, just as he had enveloped Samsonov's. Rennenkampf, on learning of Samsonov's catastrophe, should have prepared to retreat at once; but he hesitated. He declined to admit at first that the disaster at Tannenberg had rendered his own position untenable, and sealed the fate of the Russian invasion of East Prussia. But as it began to be clearer that Samsonov's army was annihilated, and as reports began to come in of increasing German forces threatening his own left flank and line of retreat, he seems to have completely lost all self-control. He at last gave orders for the retreat which should have been given earlier. Then he fled in a motor-car for the Russian frontier, leaving his forces to get through the hazards of their

difficult retreat as best they might. His army lost 30,000 in prisoners before it could reach its line of defense in Russia. Such was the

humiliating end to the Russian invasion of East Prussia.

4. The Russian Occupation of Galicia, August-September 1914. — Lemberg is the most important city in Galicia, the administra¬ tive capital of the province and a populous commercial centre. It boasted of three famous cathedrals, a university and a library which contained unique treasures of Polish history and literature. For many centuries it was a strongly walled city, but of its old defenses nothing remained in 1914 but the citadel, an obsolete fortress without military value. When Lemberg fell, the Austrian government, seek¬ ing to minimize its loss, explained that the city had been abandoned in order to save its his¬ torical monuments from destruction. As a matter of fact Lemberg was not in serious danger; the operations of Russky and Brussilov which led to its fall took place many miles from the city; and, in any case, the Rus¬ sian generals took care to spare the Galician cities from unnecessary damage, since it was to their interest to appear as the deliverers, not the enemies, of the Polish and Ruthenian popu¬ lations. Lemberg's greatest value, however, lay in the fact that it was the strategic key to the railway system of eastern Galicia. Auffenberg, therefore, when he saw himself threatened by the Russians under Russky and Brussilov, drew back from the frontier and undertook to entrench himself well in front of, and protect¬ ing, Lemberg. His position was a strong one : his front was protected by the Gnila Lipa, a river which flows southwesterly through diffi¬ cult wooded hills into the Dniester at Halicz ; his right rested on the Dniester at Halicz ; and his left stretched north toward Rawa Russka. His army was not a good one; it was com¬ posed in large part of Slavs and Rumanians who had long been oppressed by the Hapsburg monarchy and fought with no enthusiasm for their oppressors. In fact, for them an Aus¬ trian defeat might 'mean political liberty. Most of their officers were Austrian Germans, or Magyars, who gave orders in a language the soldiers could not understand.

The fight for Lemberg began at the end of August 1914 'and lasted a week. Brussilov, after two days of fierce fighting, threw his left wing across to the south bank of the Dniester and occupied Halicz. He was then able to wheel northward toward Lemberg and drive in on Auffenberg's exposed right flank. On 1 September the rest of Brussilov's army, under Radko-Dmitriev, carried the line of the Gnila Lipa, while Russky, farther north, drove back the Austrian left wing. By so doing, Russky was able to interpose his Russian troops be¬ tween Auffenberg's communications, and was beginning to encircle Lemberg from the north. With both wings driven back in a curve about Lemberg, Auft'enberg's position became peril¬ ous. It began to be like that of Samsonov at Tannenberg. But unlike Samsonov, the

Aus¬ trian saw his danger in time. Early on Thurs¬ day morning, 3 September, he decided to aban¬ don Lemberg. He retreated to Grodek, a more defensible position 16 miles to the west, on the railway from Lemberg to Przemysl ; but he was hard pressed by the Cossacks. His

machine-guns, abandoned with their ammunition, were turned against the fleeing Austrians by the pursuers. His demoralized men threw away equipment which could not be easily replaced. Soldiers of Slavic or Rumanian speech, who had no love for their Austrian and Hungarian officers, took the opportunity to desert by thou¬ sands to the Russian side. By his retreat from Lemberg Auffenberg lost 100,000 in prisoners alone, a great number of guns, vast stores of munitions, and the control of the great oil wells in eastern Galicia near Kolomea and Stryj.

At Grodek a chain of lakes and hills run¬ ning north and south gave the Austrians a strong position in which to make a stand and recover themselves — provided their flanks were

without any natural or artificial defenses. _ It was a serious gap in the Russian defensive line, and it is significant that it was through this gap east of the Vistula that Hindenburg penetrated successfully in 1915 after he had failed in three attacks on Warsaw from the west side of the Vistula. Advancing through this gap at the end of August 1914, Dankl was threatening to cut the Kovel-Lemberg .Railway and then attack Brest-Litovsk. The Grand Duke Nicholas, however, though handicapped by Russia's slower mobilization and inadequate railways, had been able to push forward Gen¬ eral Evart's army in time to check the Austrians before they reached Lublin or Cholm or the connecting railway. After Auffenberg's retreat from Lemberg, Dankl in turn found himself

MAP SHOWING

RUSSIAN INVASION

G A L“l C I A

(AUSTRIA-HUNGARY) Russians, Farfbesf *ic*yance

Miles

ˆnto Ga/f ‘c/a /974’(5

.

acˆ$

, 1 1 ‘ “‘X P’S’ ” 2 /IP/zdi

[ZSQky Asj ‘

“/ir

HUNG

*-ta,ˆaape§t’

© Rand M-Na//y <$• Co. AfK’

Erofocf

zernowtz .

ROU MANIA’

safe. Russky quickly saw that a direct frontal attack on the Grodek position would be costly in men and time. Instead of a direct attack he could better accomplish his purpose — the cap¬ ture or forced retreat of Auffenberg’s army — by a wide sweeping movement around Grodek to the north, which would bring him in on Auf¬ fenberg’s rear between Grodek and Przemysl. This flanking movement, however, brought him into conflict with the Austrian army under Dankl, and led to the fierce fighting commonly known as the battle of Rawa Russka 6-10 Sept.

1914.

This Austrian army under Dankl, at the out¬ break of the war, had crossed the San and ad¬ vanced northeastward between the Vistula and the Bug rivers in a flat country which was

in a perilous position. His right flank and his communications to the San River were seri¬ ously threatened by Russky who was advanc¬ ing through Rawa Russka. Dankl might have sought to save himself in either of two ways. The more prudent would have been to fall back on the San and secure sure touch with Auffenberg well to the west of Lemberg. A bolder course, however, was to attack at once the army of Evart in front of him before it could be reinforced, disperse it and take Russky in the flank. He chose the bolder way. On 4 September he attacked toward Cholm. But the Russians were unexpectedly strong and the at¬ tack broke down. Thereupon the initiative passed to the Russians. Ivanov, who had come up from Kiev with more troops to strengthen

Evart's extreme right, struck heavily toward Krasnik and rolled back Dankl's left wing. Assisted by Radko-Dmitriev, Russky then completed Dankl's discomfiture by driving a terrific blow through Rawa Russka which dis¬ persed in confusion the remnants of Auffenberg's left wing, and compelled Dankl's iso¬ lated troops to retreat in haste across the San toward the protecting fortresses of Przemysl and Cracow. Such was the battle of Rawa Russka which completed the Russian success at Lemberg and opened all Galicia to Russian invasion.

The loss of Lemberg opened the way for Brussilov to the Carpathian passes and to Hun¬ gary ; and it made possible the extraordinarily rapid Russian advance toward Cracow along the two main railways which run west from Lemberg by way of Jaroslav to the north and by way of Przemysl to the south. Cracow is the key to Vienna through the Moravian gap where the Carpathians flatten out, and to Ber¬ lin through the valley of the Oder River. Once in possession of Cracow, Russia might hope to strike a Napoleonic blow at either of the Teu¬ tonic capitals. A Russian invasion of the Hun¬ garian Plain through the Carpathian passes would endanger the transportation of the in¬ valuable oil supply which Germany was buy¬ ing for her vast automobile transport service ; for the oil wells of neutral Rumania were now the only considerable source of oil left to the Germans after their loss of the Galician sup¬ ply. Politically also such an invasion of Hun¬ gary would gravely embarrass Austria; for the dominant Magyars in Hungary cared little for the Dual Monarchy, but much for their own in¬ dependence. With their regiments badly disor¬ ganized at Lemberg and Rawa Russka and the sacred soil of Hungary trodden by the Cos¬ sacks, they might become dangerously luke¬ warm in their allegiance to the Teutonic Alli¬ ance. It was this political danger after Lem¬ berg which made Germany assume an ever-in¬ creasing control over the direction of the Aus¬ trian forces and ultimately forced her to trans¬ fer to the Eastern Front some of the best Ger¬ man divisions, although they were sorely needed in France. After Lemberg, accordingly, Hindenburg virtually took over the supreme com¬ mand from the Archduke Frederick and his chief-of-staff, Hoetzendorff, who were partly responsible for the Lemberg disaster. They had made the strategic mistake of dividing the two Austrian

armies in such a way that they advanced on divergent lines and were opened to Russky's quick thrust between them. They had also underestimated the speed with which Russia could mobilize and advance to the fron¬ tier. Dankl and Auffenberg also fell under a cloud and had to accept the direction of Ger¬ man staff officers assigned to their armies. The change not only gave Austria abler leaders, but it gave an even greater unity to the strategy with which the Central Powers conducted the war — a unity which was still sadly lacking in the unco-ordinated actions of the Allies on the Eastern and Western fronts.

To repair her losses in Galicia, Austria had speedily to recall from Alsace four of her best army corps which she had too confidently con¬ sented to send to the Western Front. And in Serbia also she was forced to abandon the of¬ fensive and draw behind the frontier the rem¬

nants of another army which had been de¬ feated at the Jadar River (23 August). It may be noted that the Austrian defeats at Lem¬ berg and Rawa Russka coincided with German repulses and retreat at the Marne. Except for Samsonov's unhappy disaster at Tannenberg, the second week in September would have seen all the armies of the Central Powers in re¬ treat or rout. Had Tannenberg not released Hindenburg's army, it would have been from her trenches in the West that Germany would have had to draw army corps to repair the Galician situation. In the fall of 1914, how¬ ever, she was content to use mainly the troops already on the Eastern Front. She relied on the effect which she hoped Hindenburg could se¬ cure by moving these troops rapidly along Ger¬ many's frontier railways for attacks on War¬ saw. Before turning to these attacks on War¬ saw, the Russian advance toward Cracow, fol¬ lowing the battles of Lemberg and Rawa Russka, may be briefly related.

After Lemberg and Rawa Russka there was no pause in the Russian advance toward Cra¬ cow. This great Austrian fortress was the main strategic objective of the Russians, who now made some shifts in the commanders. Russky, who had commanded so brilliantly at Rawa Russka and was noted for his strategic ability, was shifted to the command of the Warsaw area. Here, at the centre of the great Russian Front, which now extended nearly 900 miles from East Prussia to the Carpathians, he at first merely flung out Cossack patrols west of Warsaw toward Lowicz and Lodz, but kept the main part of his troops east of the Vistula. Meanwhile Ivanov began to devote his whole attention to directing the Southern Army Group advancing through

Galicia to¬ ward Cracow. Ivanov himself personally com¬ manded the army which formed the right wing, Radko-Dmitriev commanded the centre ; and Brussilov still had charge of the left wing. Mak¬ ing use of the great amount of Austrian rolling stock captured at Lemberg, Ivanov moved his infantry rapidl}ˆ westward along the main rail¬ way in northern Galicia and captured Jaroslav on 23 September. This fortress was sur¬ rounded by 20 redoubts and had been expected to offer a stout resistance. Its capture was an important gain for Russia, because, in addi¬ tion to being a considerable city on the main railway, it controlled a branch line running 20 miles south to the even greater fortress of Przemysl. Jaroslav offered, in fact, an excel¬ lent base for the investment and siege of Przemysl from the north. Przemysl also was a first-class modern fortress surrounded by a strong group of outlying concrete forts and by a further defense line of entrenchments and fortified positions. It sat astride the Upper San, and, being on one of the main lines from Lemberg, it controlled supplies going east or west. In it had been accumulated a huge quan¬ tity of ammunition which was to have served as Auffenberg's reserve supply. Its ordinary garrison was 30,000 men, but it was increased by 100,000 more of Auffenberg's retreating men w'ho sought safety behind its walls — in viola¬ tion of the military maxim that ^^a fortress should be defended in the field.® As the dan¬ ger of a siege became likely, some of the civil¬ ian inhabitants were sent out of the city, but it soon appeared that there were still far too many

mouths to he fed. Przemysl was also strategic¬ ally important in relation to the Carpathian passes. South from the city, ran a railway which split into two at the watershed between the San and the Dniester, the western branch running through the Lupkow Pass, and the eastern branch running through the Uzsok Pass to join the network of railways in the Hungarian Plain. Przemysl was, therefore, a strategic point of utmost importance, to which the Austrians should have been able to send re¬ serves from Hungary. They were only pre¬ vented from doing so by the speed with which Dmitriev and Brussilov struck westward after the fall of Lemberg.

Dmitriev, pushing westward north of the Dniester along the Lemberg-Sambor Railway, succeeded by 23 September in shutting off Przemysl on the south, just as Ivanov, by cap¬ turning Jaroslav, was preparing to shut it off on the north. Not caring to risk the loss of life and the delay which would have been involved in an attempt to take the fortress by assault, Dmitriev left part of his infantry to sit down before Przemysl and starve it into submission. Having thus masked the fortress, he joined the rest of his forces to Ivanov's and continued to press westward along the railway toward Tar-now and Cracow. On 29 September his cavalry was at Dembica, only a hundred miles from Cracow.

Meanwhile Brussilov, at the extreme south¬ ern end of the Russian Front, occupied Stryj and pushed forward so rapidly toward the west¬ ern Carpathians that he was able to seize the Dukla Pass on 28 September. His Cossacks even penetrated a short distance into the Hun¬ garian plains. By the end of September, the Russian advance in Galicia seemed irresistible ; the gateway into Hungary was opened ; the fall of Przemysl was momentarily expected; and it seemed that Cracow would soon be reached.

At this moment Hindenburg came to the rescue of Austria. He began the first of his great strategic attacks on Warsaw which were meant to place the Germans east of the middle Vistula and thereby force a Russian retirement from western Galicia. For, if the Russians were driven out of Warsaw and forced back toward Brest-Litovsk, it would be unsafe to have the Russian left wing in Galicia protrud¬ ing so far beyond the Russian centre. Ivanov and Dmitriev would have to draw back to the San or the Bug to align themselves with Russky's centre. This was the aim of Hindenburg's three successive assaults on Warsaw, in grand Napoleonic style, in October and Novem¬ ber 1914. Though he failed each time to take Warsaw, he partly succeeded in checking the Galician advance and in preventing the trans¬ fer of troops from the Russian centre to the Russian left. This is the simple explanation of the apparently confused movements in west¬ ern Poland in the fall of 1914. If kept constanly in mind one may easily follow the three assaults on Warsaw and note their interrela¬ tion with events in Galicia.

5. Hindenburg's Frontal Attacks on War¬ saw, October-December, 1914. — Hindenburg had the invaluable military quality of giving up a plan quickly the moment he was convinced that it was not likely to succeed. Instead of holding on doggedly to a doubtful effort, he

would quickly work out and put into operation some new scheme which would surprise the enemy in another quarter. In his supreme at¬ tacks on Warsaw, he was able to use the net¬ work of railways which run around on the Ger¬ man side of the frontier to move troops back and forth around the edges of the Polish salient in the great arc from East Prussia to Cracow. The Russians had no good air service and could not learn of these movements until they were well advanced, and when they learned, their transportation service was so poor in Poland that it was difficult for their troops to move quickly to the threatened area. Though the Germans moving on outer lines always had many more miles to travel than the Russians, moving on the inner lines, nevertheless Ger¬ many's strategic railways always gave Hin¬ denburg a great advantage. But if his sur¬ prise attack did not succeed quickly it was doomed to failure, since the delay would give the Russians time to concentrate a sufficient number of troops for the defense. A quick surprise attack, by shifting troops on the stra¬ tegic railways, is the key to Hindenburg's three frontal attacks on Warsaw, as it was the main factor in his great victory at Tannenberg.

Assistance to the Austrians in Galicia and Hungary, though the main, was not Hinden¬ burg's only, motive in trying to take Warsaw. This city, with its population of three-quarters of 2. million, was the administrative and his¬ toric capital of Poland. If he could occupy it, the Poles, who were not enthusiastic for Rus¬ sian domination, might yet be won over to the Teutonic League by a promise of Polish inde¬ pendence ; or a revived Poland might be brought indirectly under German control, by the establishment of a German prince as king of Poland. If such political aims proved im¬ possible, at any rate Warsaw would form ideal winter quarters for the German army. Possess¬ ing three bridges across the Vistula and being the centre of the Polish railway lines, such as they were, Warsaw would form an excellent advanced base, far in the enemy's territory, from which an advance could be made in the spring to Russia's Brest-Litovsk line of de¬ fense. The capture of Warsaw would put the Germans east of the Vistula, deprive Russia of this great river as a line of defense and ren¬ der untenable the Narev-Bobr line of fort¬ resses. East Prussia, as well as western Gali¬ cia would then be relieved from further dan¬ ger from a Russian invasion. How did Hin¬ denburg propose to take Warsaw by a frontal attack from the west?

By 1 October Hindenburg had decided that he could not break through the Niemen line of defense. He, therefore, withdrew from the Kovno-Grodno front to positions within the East Prussian frontier, where he left only a few troops to serve as a screen. No large num¬ ber was necessary to protect this frontier, be¬ cause he could bring

the main body of his troops back again quickly by rail if the Rus¬ sians should make any considerable attack — just as he had done at Tannenberg. Further¬ more, Prussia was ^^self-contained® since the lakes, swamps and forests made it difficult to operate in the whole region from the Masurian Lakes to the Niemen.

By 5 October he had shifted the bulk of the German forces in East Prussia by rail

around the frontier of Silesia, and was advanc¬ ing with incredible rapidity along the railway line from Kalisch toward Lodz and Warsaw. To his East Prussians he had joined additional troops from central Germany, though probably not from the Western Front, as General Gourko supposes (ˆWar and Revolution in Russia,ˆ pp. 90, 100).

By 16 October the main German force had reached the outskirts of Warsaw and begun the great three days' battle for its possession. German dirigibles and aeroplanes flew over the city dropping bombs in the direction of the main railway station on the east side of the Vis¬ tula. They did little material damage, but they caused a panic among the inhabitants and even among some of the Russian soldiers who saw these monsters of the sky for the first time. Then came showers of propagandist leaflets in Polish, Hebrew and Russian, promising Polish auton¬ omy and making all sorts of religious and racial appeals. One pamphlet designed for Polish Ro-m.an Catholics bore a colored picture of the Virgin and Child, flanked by medallions of the Pope and the kaiser, that versatile believer who elsewhere was being represented as a convert to Mohammedanism — it was at this moment that Enver Pasha decided to bring Turkey into the war on the side of Germany. To co-oper¬ ate with the main force at Warsaw and to con¬ centrate as great a force as possible at the point of attack, Hindenburg sent a smaller army from Thorn up the west bank of the Vis¬ tula toward Lowicz and Warsaw, but it moved slowly and was checked by Rennenkampf who hurried troops from the Niemen front and prevented it from taking part in the assault on Warsaw. Hindenburg had also ordered for¬ ward a strong body of Austrians, strengthened

by German troops, who were to advance from Cracow by way of Kielce and Radom. They were to take the fortress and railway junction at Ivangorod, and then cross the Vistula where the river narrows at Josef ov south of Ivan¬ gorod.

When the Grand Duke Nicholas perceived the nature of this concentration of Germans and Austrians moving from southwest Poland toward the Vistula, he took no chances. He re¬ solved to run no risks on the plains west of the Vistula, \yhere he would have to rely for sup¬ plies on divergent railway lines, and where the broad and muddy Pilica would cut his army in two. On the whole Russian centre he called in behind the Vistula all of Russky's troops ex¬ cept a screen of cavalry, keeping in touch with the enemy and bodies of entrenched infantry protecting Warsaw and the Ivangorod bridge¬ head. In Galicia he ordered Ivanov to aban¬ don the advance on Cracow, to retire behind the San to form the alignment of the centre, and to send some of his troops to strengthen the centre. Ivanov's retirement necessitated for a moment the relaxing of the siege of Przemysl. Hindenburg's threat at Warsaw thus enabled the Austrians to force an opening on the west side of Przemysl and to pour pro¬ visions into the fortress. But it was only for a moment. A few days later Dmitriev again en¬ closed it tightly and kept it closed until it was starved into surrender six months later.

To return to the assaults on Warsaw and Ivangorod (15ˆ19 Oct. 1914). Warsaw, from the Russian standpointˆ lies on the wrong side

of the river — the left or west side. But it was defended by a circle of 11 outlying forts, some six to eight miles distant from the city itself. Fortunately the railways merely skirt the city and cross to the Praga suburb on the east side, where is situated the main station to which converge the railways from all Russia. If nec¬ essary, the Russians could abandon Warsaw, blow up the three bridges across the river to Praga, and yet not lose control of the all-im¬ portant Praga Railway terminal. But as it turned out, Warsaw did not have to be aban¬ doned in 1914. Just as Hindenburg was furi¬ ously assaulting with superior numbers the outer trenches and forts west of the city, new Russian troops were beginning to arrive from the far corners of the empire. The famous Siberian Rifle regiments, after nearly a month's weary journey in closed freight cars, were rushed from Praga through the streets of War¬ saw to charge the Germans with cold steel. They

were the first instalment of eight full corps which came to Warsaw and Ivangorod within the next few days and represented the completed results of Russian mobilization. They were among the finest troops in all Russia, ow¬ ing to the care with which they were selected and the considerable practice in actual warfare which they had had with nomad tribes on the borders of the empire. Their arrival saved Warsaw. After three days of furious fighting (16-18 October) Hindenburg saw that the city was not to be taken by surprise. It was not worth his while to sit down to a siege, for the Russian defenders daily grew in numbers while his own forces were limited unless help came from the Western Front, which he could not yet expect. Farther south, Ivangorod was de¬ fended in a spirited fashion by General Schwartz, who did not allow the enemy either to get their big guns within range or to take the bridgehead — the only bridge over the Vis¬ tula between Warsaw and Galicia. Still far¬ ther south, at Josefov, where the Russians were weak and had no railroad to support them, the Germans managed to throw over a pontoon-bridge and crossed with a considerable force to the right bank. But on 21 October Russky fell upon them at the little village of Kazimirjev, half-way between Ivangorod and Josefov. No German escaped back over the Vistula. Hin¬ denburg then ordered a general retreat to the Silesian frontier, but Russky, crossing the Vis¬ tula in force, gave the retreating invaders no rest. In the wooded country and along the muddy banks of the Pilica, he attacked the Ger¬ mans and Austrians, causing very heavy losses among the latter. As they retired toward Sile¬ sia, the Germans fought desperately and bravely, and by their rearguard actions man¬ aged to protect their guns and marching col¬ umns of infantry. It was an orderly retirement, not a rout.

As the Germans advanced toward War¬ saw, they took great pains to construct excellent communications : the broad-gauge of the railways was altered on the Kalisch lines to fit the narrow-gauge German rolling stock; causeways were built for the artillery, and great stretches of forest were felled by the engineers for corduroy roads for the automobile trans¬ ports. If they were to spend the winter in Warsaw, the (Germans wanted plenty of means for bringing up supplies, and good communica-

tions with Germany would be necessary for a further Invasion of Russia in the spring of 1915. Now, however, at the end of October 1914 as Hindenburg retired, he demolished all the preparations of roadways as carefully and systematically as he constructed them three weeks before. He blew up all the railway sta¬ tions, water towers and bridges. He was even said to have a machine which twisted steel rails into the shape of corkscrews. He blasted out great holes in the roads. The tele¬ graph lines were cut and the posts sawed off. In short, the whole country of southwest Po' land was thoroughly devastated so as to make it virtually impassable for an army. _ But the curious thing, not noticed at the time, was that the policy of devastation was carried out in west and southwest Poland only. In north¬ west Poland Hindenburg's troops took just as much pains to keep the communications good and the country free from devastation. Why this difference in Hindenburg's treatment of southwest and northwest Poland? Because he was already planning a second surprise attack on Warsaw, this time from tli,e northwest. If the Germans struck a blow from the northwest, they would find favorable conditions for ad¬ vancing, while the Russians would have no road or railway by which to return for the defense of Warsaw. Again, railroads, speed and sur¬ prise were the factors in a second attack on Warsaw which Hindenburg was planning, and the Russians unwittingly played into his hands.

Russky had been so encouraged by the fail¬ ure of Hindenburg's first attack on Warsaw

SECOND GERMAN ATTACK ON WARSAAˆ

NOVEMBER 13™ TO DECEMBER 30™ B)4

that he made the grave mistakeˆ of following him too far to the west. He disregarded the original Russian strategic plan of not risking

an advance of the Russian centre far into the Polish salient until the wings were in secure possession of all of East Prussia and Galicia. He

did not even take warning from the ruined state of the country which Hindenburg left behind him in southwest Poland. In pursuit of the retiring Germans and Austrians, Russky had moved his whole army far west of the Vistula to the Warta River close to the Silesian frontier. His Cossacks even crossed into Ger¬ man territory west of Kalisch (12 November) and cut the Cracow-Posen Railway. In his eagerness to assist Dmitriev, he had shifted his army somewhat to the south so that his left wing was able to capture a town on the Galician frontier only 20 miles from Cracow. On 13 Nov. 1914, at the moment when Hinden¬ burg was starting his second great attack on Warsaw, Russky's front, as may be seen by the accompanying small map, ex;tended in a curve from the neighborhood of Cracow on the upper Vistula toward Plock on ihe lower Vistula. But most of his troops were con¬ centrated along the Warta, because it was here that the Germans appeared to make a stand after th'eir retirement. The northern end of his line between the Warta and the Vistula was made very thin ; for no enemy seemed to be near. Here, in fact, there was practically a gap between the Russian centre and the Rus¬ sian right wing on the Narev-Niemen line. It was through this gap, only 40 miles wide, that Hindenburg began to pour an irresistible force. He had collected this force by transporting German troops by rail northward from the Silesian frontier around to Thorn on the Vis¬ tula. To these he added more of the East Prussian army under General von Frangois. He had also several corps from Germ.any. Ludendorff was assisting Hindenburg at the staff headquarters, and Mackensen was in im¬ mediate command.

Russky's position soon became desperate. His thin right wing was exposed to attack on the flank and rear. In fact his whole line stood practically with the enemy at its rear, and was in danger of being cut off from Warsaw. For Russky was further from Warsaw than Mackensen's advancing troops. Moreover, he had to make all his movements over country in which the roads and railways had been sys¬ tematically destroyed, while Mackensen had a relatively well-ordered territory to march through. Russky iS to blame for allowing him¬ self to be thus caught too far from his base in a bad country, with too long and thin a front. But he retrieved himself admirably. He succeeded in drawing his right wing from its exposed position, although in so doing he lost many thousand prisoners. He then ordered a general retreat toward Lodz, in order to get behind the Bzura River. This river rises west of Lodz and flows northeastward past Lowicz until it joins the Vistula half-way between Warsaw and Plock. Owing to a bend in the Vistula, the Bzura gave the Russians the short¬ est line between the Lodz region and the Vis¬ tula for

defending Warsaw. If the Russians could hold the banks of the Bzura they could retain possession of the railways from Lodz and Piotrkov. The Rawka River, flowing into the Bzura from the south, should also be noted ; it affords some protection to an army retreat¬ ing eastward toward Warsaw.

By 20 November a week after he first be¬ came aware of Mackensen's advance, Russky had succeeded in retiring most of his right wing behind the Bzura, near Lodz. Siberian levies which had just arrived in Warsaw were hurried up to the front, and reinforcements were hastily summoned from Rennenkampf's arniy opposite East Prussia. With these Si¬ berian troops Russky was able to maintain a very stubborn resistance on the Bzura. But on 23 November two of Mackensen's corps broke through the Russian line between Lodz and Lowicz. For a few hours the Russians in Lodz were in a most perilous situation, hav¬ ing to fight an enemy on their front, flank and rear. Here, at what is called the Battle of Lodz, though the fighting was some distance from the town, took place the fiercest and most desperate hand-to-hand fighting which had yet occurred on the Eastern Front, and, as usual when it came to bayonet work, the Russians got the upper hand. With reinforcements which kept coming up they checked and very nearly surrounded the two German corps which had broken through the Russian line. The Ger¬ mans in their turn — or at least these two corps — were in a dangerous position. They were now entrapped as in a narrow-necked bottle, caught between three fires, and able to keep open only the very narrowest line of communi¬ cation with the rest of the German army. Russky tried valiantly to cut off this narrow neck of the bottle, and so to ^^pocket® completely the two German corps which had broken through the Russian line. For three days (24-26 November), night and day, but especially at night, the fierce struggle went on between the 60,000 Germans trying to break out of the ever narrowing circle of Russian troops, and the Russians trying to cut them off or surround them. The Russians almost succeeded. It is said that one of the kaiser's sons, fearing cap¬ ture along with these army corps, escaped in an aeroplane over the Russian line. The Rus¬ sians

on their side were so confident of suc¬ cess that orders were given to have rolling stock collected at _ Warsaw to take away the prisoners. But owing to the new troops which Mackensen hurled forward to widen the open¬ ing of the ^^pocket,^^ and owing to tactical errors on the Russian side for which Rennenkampf was blamed, the living circle was not closed and the Germans escaped from the peril¬ ous pocket into which they had been led by their first success. Rennenkampf was dismissed after this; his troops had been counted upon to close the exit but they were late ; the popular notion, however, that he was pro-German and a traitor — easily believed on account of his German name and his disgraceful flight from East Prussia — probably had no basis.

After this severe fighting at Lodz, Russky shortened his front still further, giving up the city and withdrawing eastward to a position be¬ hind the Bzura and the Rawka, where he dug himself in and stood fast. For the first time on the Eastern Front the fighting ceased to be a se¬ ries of strategical movements over great areas. It settled down for nearly four months into the war of fixed positions — trench warfare — which had already become familiar on the Western Front soon after the battle of the Marne. The Russians, however, had as yet no barbed wire to protect their trenches, and they

were beginning to run short of ammunition, especially artillery supplies. But they man¬ aged to protect themselves in the trenches by all sorts of hand-grenades made from materials found on the spot, such as empty tin cans, shell cases and gas pipes. Several times the Ger¬ mans made prolonged efforts, supported by hur¬ ricanes of artillery fire, to drive the Russians from this Bzura-Rawka line back toward War¬ saw. At Christmas they used asphyxiating gas bombs for the first time. By this means they got into some of the Russian trenches, but with poetic justice were overcome by their own gas. Those who were thus unconscious but not actu¬ ally killed were buried in the trenches where they lay, by order of the Russian officer who supposed they were dead. The rest were driven out in a counterattack. A few hours later some Russian soldiers who had been partially asphyxi¬ ated in a wood and had recovered came back to hospital quarters for relief and treatment. It was not until then that the Russian officers be¬ came aware of the barbarous new weapon that the Germans were using. Again during the first week in February 1915 heavy assaults, pre¬ ceded by gas and long artillery preparation, were made against the Russians behind the Bzura-Rawka lines. But the Germans gained only a few thousand yards.

6. The Winter Battle of the Masurian Lakes, February 1915. — In the first week of February 1915 Hindenburg was finally con¬ vinced that the attacks on the Bzura-Rawka trenches were merely resulting in a wasteful and futile expenditure of German manpower. He concluded that it was impossible to take Warsaw by a frontal attack from the West and turned again to East Prussia, to a point farther east of Tannenberg and the scene of his first great victory. Again using his favorite method of a very rapid surprise attack, depending on a quick concentration by strategic railways, he launched against the Niemen-Narev line the strongest single army which Germany had yet put into the Eastern war area. It was Hinden- .burg's culminating effort. If it succeeded, the communications between Warsaw and Petrograd would be cut; the Niemen-Narev line of fortresses would become useless to Russia; Warsaw could be easily taken from the rear, and Przemysl would be relieved from the vari¬ ous besieging armies which by starvation were bringing it day by day nearer to surrender. Austria was instructed by Hindenburg to aid his plan by attacking vigorously at the Car¬ pathian passes. This Austrian offensive would prevent the transfer of any troops from the Galician front to strengthen the Russian line threatened in the north, and Russia would be speedily forced back behind the Bug to Brest-Litovsk and the Pripet Marshes.

The Winter Battle of the Masurian Lakes began on 7 Feb. 1915 just as the final assault on the Bzura was dying away. The moment was favorable for Hindenburg because the Rus¬ sians, under General Sievers, had been making a slight advance in East Prussia with the idea of drawing off German troops from theˆ War¬ saw front. The Russians had no suspicion of this tremendous winter attack. Sievers had about 120,000 men, but had allowed them to become dispersed among the Masurian Lakes, when he suddenly realized thˆt he was being counterattacked and completely outflanked by

a German force twice as large as his own. One German army moved along the railway from Koenigsberg toward Kovno and was be¬

ginning to encircle the Russian right flank; the other moved on the railways from Koenigs¬ berg toward Bialystok and threatened to sur¬ round the Russian left. Sievers had to struggle back 70 miles over half frozen lakes and through blind forests choked with snow drifts in his effort to regain his line of defense behind the Niemen and the Narev. In this retreat he lost at least 30,000 men and 80 guns. Berlin cele¬ brated the victory as a second Tannenberg. But Siever's army was not annihilated as Sam¬ sonov's had been, and by 20 February he was able to entrench himself. With reinforcements he even counterattacked when the Germ.an thrust had spent its force. By the first week in March he won his way back to a corner of Prussian soil at Lyck, where the East Prussian frontier bulges into Russian territory. He doubtless would have won back a larger foot¬ hold in East Prussia had not the Russian short¬ age in rifles and ammunition begun to make itself cruelly felt. So serious was the shortage in hand rifles that in the ˆWinter Battle® of the Masurian Lakes Russia actually had trained but unarmed men come up behind the fighting line ready to fill up the gaps and take up the weapons of the dead. Men were even flung into the firing line armed only with a bayonet in one hand and a couple of bombs in the other, or even only with wooden clubs. With the courage and ferocity of combats in a prirflitive age they rushed close enough to throw their bombs and they charged with cold steel or the clubs. When it came to the fierce hand-to- hand fighting the Germans always gave way. By 10 March 1915 the fighting on this part of the front' died down. Warsaw was not to be taken from the Russians by way of East Prus¬ sia. There remained one other way which Hindenburg had not yet tried — the way through Galicia with an advance on the rear of War¬ saw from the southeast. This brings us to the struggle for Przemysl and the German attack on the Dunajec.

7. The Russian Capture of Przemysl, 22 March 1915. — Ivanov's campaign in Galicia for the capture of Cracow had necessarily been somewhat checked by Hindenburg's assaults on Russky's lines in front of Warsaw. Ivanov had transferred some of his troups on the left of the Russian front to Russky in the centre, and he had drawn back his columns which had been advancing on Cracow; for if Warsaw fell, and it might happen, Russian troops too far west in Galicia would be in danger of being cut off. Brussilov also had had to give up some of the Carpathian passes which he had occupied in the fall of 1914, in spite of the fact that the possession of these passes was essential to any future advance in Cracow. During the winter of 1914-15 Brussilov had kept up a continuous struggle, with alternating success and failure, for the possession of these Carpathian passes. As soon, however, as Warsaw seemed to be safe from Hindenburg's assaults, he began to

press forward more vigorously and all the passes of the Carpathians were reoccupied.

Of more military importance was the cap¬ ture of Przemysl. This first-class fortress, dominating western Galicia and controlling two

of the railways from Galicia into Hungary, had been completely surrounded and cut off by Ivanov and Radko-Dmitriev on 27 Sept. 1914, during the first Russian occupation of Galicia. Starvation soon began to threaten it, for the Austrians had not collected any great amount of provisions there, never supposing that Rus¬ sian armies would reach it. When it became clear that a siege was likely to take place, the Austrian commander sent off some of the ci¬ vilian population. But those who departed were more than equaled by the large number of soldiers, perhaps 100,000, from Auffenberg's army, who took refuge in the fortress after their defeat at Lemberg. In the middle of October 1914 Hindenburg by his first assault on Warsaw had brought a momentary relief to Przemysl. Frightened at Hindenburg's ad¬ vance toward the middle Vistula, the Russians in Galicia had withdrawn their advance column and raised the siege on the west of the city. For several days large quantities of food and ammunition were hurried into Przemysl and the fortress had leisure to prepare for a second, longer and grimmer siege. After the failure of Hindenburg's first assault on Warsaw the Rus¬ sian ring again closed round Przemysl. In the defense of this fortress the Austrians showed as much incompetence as in their initial campaigns before Lemberg and Rawa Russka. They kept within the fortifications far too great a proportion of the civilian population, whose mouths had to share the insufficient stock of provisions. The excessively large Austrian military force — nearly 150,000 men — was packed inside the outer intrenchments and did little to strengthen the defenses or to worry the enemy by aggressive tactics. The Austrians depended wholly on the protection of their heavy guns planted in concrete emplacements. Instead of shifting them in that system of ˆmobile defense® which the French used so cleverly at Verdun, they allowed the Russians' heavy shells to blow up some of their guns and destroy their outer works. However, the Russians did not care to pay the cost of human life and possible failure which a general assault on the strongly fortified works mig'ht entail. They waited for starvation to do its work. By 1 March 1915 food and fuel had become very scarce, and the morale of the besieged army was *growing* perceptibly worse. Many of the civil population, who were not allowed the same rations as the soldiers, had already died of cold and hunger. On 13th March the Russians

carried by assault a segment of the outer line of fortifications to the north of the fortress. They fortified the ground they had captured and from it were able to begin a bom¬ bardment of the inner circle of forts. This sealed the fate of Przemysl. Four days later the garrison made a feeble attempt at a sortie in the direction of Lemberg, but they were driven back suffering heavy loss of killed in addition to 4,000 prisoners left in the hands of the Russians. With the failure of this sortie General von Kusmanek and his staff lost all courage and hope. Early on the morning of Monday, 22 March 1915, the Russians were startled by the noise of great explosions and then by the sight of heavy columns of smoke, rising above the city. The Austrians were blow¬ ing up their ammunition and guns and destroy-WAR, EUROPEAN — THE EASTERN FRONT (6)

mg other war material. Then a white flag ap¬ peared and Austrian officers brought a formal letter of surrender.

The capture of Przemysl, as has been well said, was not a Russian achievement so much as an Austrian disgrace. The fortress fell like an overripe fruit. The action is not to be com¬ pared with any of the great sieges of history, for it was not a case of a strife of inflexible wills or an issue determined by overmastering skill and strength; nor did it prove of any permanent or decisive value to Russia. To be sure, it deprived Austria of the 120,000 soldiers who surrendered as prisoners of war and were shipped to Russian prison camps or to Siberia. Russia also acquired a considerable stock of ammunition and guns, both large and small, which the defenders had not had time to de¬ stroy. And it improved Russia's railway con¬ trol in Galicia. But as we shall now see it did not give her a rock of strength such as Verdun gave the French, which could be defended against the strategy of Hindenburg and Mackensen. Within three months of their capture of Przemysl the Russians themselves in turn were forced to evacuate it as fast as they knew how, because Mackensen had won_ the decisive battle of the Dunajec and was driving eastward through Galicia with irresistible force.

8. The Battle of the Dunajec and the Great Russian Retreat of 1915. — By 25 April 1915 the Russians thought they had consolidated their occupation of Galicia by the capture of .Przemysl and by an extension

of their control of the Carpathian passes. By this same date Hindenburg had practically completed the prep¬ aration for Mackensen's big attack on the Dunajec which was to force the great Russian retreat of 1915. It is well to note the position of the Eastern Front at this moment, as indi¬ cated on the map. Practically all of Galicia, except Cracow and the territory west of the town of Tarnow and the Dunajec River, was within the Russian lines ; in Poland Russia had been forced by strategic reasons and by Hindenburg's persistent attacks to give up the Polish salient as far as a line which curved west of Kielce and the Rawka River; on the northern flank the battle front practically followed the East Prussian frontier except that the Ger¬ mans controlled the Vistula below Plock, and the Russians had a foothold in East Prussia at Lyck. Perhaps the Russians might have held this line except for three great handicaps by which they suffered severely: (1) The lack of good communications for the rapid transfer of troops from one part of the front to another; of this nothing further need be said as it has been discussed above. (2) Treachery at home. The more we know about the war on the East¬ ern Front the more it becomes clear that both at the front and in high circles around the tsar treachery was continually at work among pro-German sympathizers. At the front Ger¬ man commanders always seemed to be well informed ahead of time of any movements the Russians were about to make. But it was im¬ possible to get rid of all the traitors, particularly as both the military and civil service in Russia were filled in large numbers by the so-called Baltic Germans. These ˆBaltic Barons, » who owned large landed estates in Courland and Esthonia, were subjects of the tsar by the chance that the regions had been annexed by

the Romanovs a century or more before; but in their culture, sympathy and family ties many of the Baltic barons were far more closely in sympathy with the Prussian Junkers than with the tsar's government. One of the results for which they confidently hoped from the war was that Germany would seize and again con¬ trol the Baltic provinces which had originally been conquered from the native Letts and Esthonians by the Teutonic knights seven cen¬ turies before. It was not merely among the military officers that traitors were to be found. Much more dangerous were the pro-German sympathizers at court around the tsarina, a Ger¬ man princess. These were the men who by their intrigues secured the dismissal, or counteracted the influence, of true Russian liberals and patriots who wanted to speed up the manu¬ facture of munitions and conduct a vigorous war for the early victory of the Allies. The situation was summed up in the pathetic cry attributed to the little tsarevitch : ®When the Germans

win papa cries, and when the Rus¬ sians win mama cries.®

(3) The shortage of ammunition and guns, however, was the most serious cause of Russia's forced retreat in 1915. The experience of the first weeks of the war had shattered all calcula¬ tions as to ammunition, based upon the lessons of the Russo-Japanese War. The stock of mu¬ nitions on hand, which was considerable, was generously dealt out at the beginning and aided materially in the Russian occupation of Galicia and East Prussia ; but by October 1914, a short¬ age, especially of artillery ammunition, began to make itself felt. For months batteries in ac¬ tion did not receive more than four shells per day per gun — and this at a time when the Ger¬ mans made profuse use of an apparently in¬ exhaustible supply. As Russian soldiers were killed or taken prisoners, Russia lost such a large part of her stock of small arms that the new formations of men who were called into being in the winter of 1914-15 could not be completely supplied with rifles and equipment. Unfortunately no plans had been made for in¬ creased production of arms and ammunition during the war, so that when the shortage be¬ came dangerous nothing was ready to remedy it. Generous offers of munition were made from abroad especially from America and from Japan. But the Americans wanted time to pre¬ pare machinery to begin production on a vast scale, and the Russian Ministry of War could not make up its mind to place great orders because it feared that the American firms could not, or would not, make deliveries soon enough to meet the crisis. Japan furnished some small calibre rifles, but they could not use the same cartridge as the standard Russian ®five-clip® magazine rifles. For lack of equipment Russia actually had to disband several hundred thou¬ sand men who had been called up for military service. And in some battles trained but un¬ armed men stood behind the front ranks ready to step forward and take the guns of those who were killed. This shortage, of course, inevitably had a very bad effect upon the morale of the soldiers. It not only explains in part the great Russian Retreat of 1915, but it began to sow in the minds of the men a distrust of the efficiency and integrity of the tsar's government. The distrust was greatly increased after the Great Retreat and was one of the main direct

causes of the overthrow o£ absolutism by the Revolution of March 1917. And the distrust was justified, as is proved by the patriotic but futile efforts of Rodzianko, president of the Duma, who tried in vain to get munitions pro¬ vided. He visited the fronts. ‘He saw soldiers armed with nothing but sticks. He was told by the Grand Duke Nicholas : ^^An army can¬ not go on fighting without rifles or boots.® He tried to get production of munitions speeded up by calling a Zemstvo congress and then by a special conference. But for many precious months he was thwarted by the chaos and in¬ trigue in the Ministry of War and by the per¬ sonal rivalry between Sukhomlinov and the Grand Duke Sergius. Some of the chaos and intrigue was later exposed in the famous Suk¬ homlinov trial. In justice to the liberals and the patriots in Russia, however, it should be added that by August 1915 a war trade com¬ mittee was organized under the able leadership of A. T. Guchkov, who later became the first Minister of War after the Revolution. This committee energetically began to organize a great number of private firms, both large and small, for the manufacture of’ ’guns and muni¬ tions, so that the shortages were gradually made up. By the spring of’ 1917 the generals at the front were at last made happy by being able to reckon upon a fairly adequate number of shells for the artillery and on about 100,000 4.8-inch trench mortar bombs. But the supply came too late to be of any avail in the spring of 1915; and, by the irony of fate, when the munitions were plentiful in 1917 the soldiers did not care to use them, for they had been demoralized as a result of the Revolution.

Thus handicapped by lack of transportation facilities, by treachery at home and by lack of munitions and officers, the long Russian front of 900 miles could not withstand the great offensive which the Germans had planned _ in Lithuania and on the Dunajec for the spring of 1915. In April and May 1915, German armies pushed rapidly over the Niemen along the Baltic Coast and took the important Lettish seaports of Libau and Windau. Advancing further through Courland, where they found much support from pro-German ^^Baltic Barons,® they advanced to the Duna River and threatened the great industrial city and seaport of Riga, with its 600,000 inhabitants. Here, however, the Letts, who had bitterly hated for centuries the domination of the German landlords and capitalists, hastily organized vol¬ unteer rifle-battalions and heroically maintained the defense of their chief city. Their quick action and the natural defense formed by the broad waters of the Duna River and b’y the swamps near its mouth prevented the Germans for more than two years from capturing Riga. The city did not fall into German hands until September 1917, when the military

chaos caused by the Revolution had destroyed all Russia's power of resistance. By advancing to the Duna the Germans had gained control of the greater part of Lithuania and Courland. This region was now organized by the Germans as ®Ober-Ost,® i.e., as the military occupation dis¬ trict of the supreme command in the East. It was provided with German officials, German postal service, German money, German colonists, and in fact treated in every way as if it were

to become a permanent part, in accordance with Pan-German dreams, of the German empire in the East. While the Russian general staff was occupied in the north with this forced retire¬ ment to the Duna, at the other end of their long line, in Galicia, they were about to be struck an irresistible blow by Mackensen's ˆphalanx.® Though the Russians did not know it, Hindenburg had been quietly massing troops. by rail¬ ways during March and April 1915, for a great blow on the Russian line in Galicia. In true Napoleonic fashion he had concentrated upon a single point — the Russian line behind the Dunajec River — a force which has been esti¬ mated at nearly 1,000,000 men. It was com¬ posed partly of Austrian troops; but its great strength came from the large number of Ger¬ man units which included some of the finest of the German forces drawn from the Western Front, like the Prussian Guard Reserve corps and the 10th corps which had once been with von Kluck. It included also some ®assault divisions® which were created by skimming the cream from the first-line troops. These picked German troops, under the very able com¬ mand of Mackensen, formed a powerful thrust¬ ing force, or ˆphalanx® — just the weapon needed for breaking through an enemy line. Not less important was the fact that the phalanx was supported by a mass of heavy artillery with an unlimited amount of ammunition. Hindenburg intended to break through the Russian line completely. He hoped thereby to accomplish several strategic purposes ; he would demor¬ alize the Russian troops in front of him, capturing or routing them, thus enabling him to recover Przemysl and Lemberg, and clear Galicia of the enemy; he could then strike at Warsaw from the south and east, on the right bank of the Vistula, and easily force the Russians to evacuate it; and he would cut off and capture Brussilov's arniies in the Car¬ pathian passes before they could secure their line of retreat. He succeeded, as we shall see, in clearing Galicia and taking Warsaw but not, thanks to Brussilov's brilliant manceuvres, in cutting off the Russians in the Carpathians.

The Russian front behind the Dunajec, south of the town of Tarnow, was commanded by Radko-Dmitriev. He was utterly unaware of what

was being prepared against him, almost up to the very moment when the blow came. Only in the last days of April did he begin to realize that a great force was concentrating against him. He applied instantly to Ivanov for two additional corps. By some blunder of a staff officer, the request never reached Ivanov. Dmitriev was thus left to meet the enemy with no more than his winter strength of men and with a pitiful shortage of ammunition for his guns.

On Saturday, 1 May 1915, the great German batteries were suddenly loosed; 700,000 shells were hurled into the shallow Russian trenches, completely demolishing the works and some¬ what demoralizing the men. For the bravest of men cannot continue to fi,ght in trenches which have ceased to exist. The awful storm of German artillery was followed by the attack of the ˆphalanx® which crossed the Dunajec, and its tributary the Biala, on pontoons in greatly superior numbers on a 20-mile front south of Tarnow. After 48 hours, on Sunday

night, the Russian defense collapsed under the terrific German pressure, Dmitriev was not routed, but he lost very heavily in men and guns as he_ fell back to the protection of the Wisloka River 20 miles to the east. But he had prepared no entrenchments on the eastern bank of the Wisloka so that the reinforcements which were hurried up were of little avail. For five days — until Friday, 7 May — his troops bravely clung to their hastily-made shallow trenches on the eastern bank of the Wisloka. But again the German artillery and Mackensen's charging phalanx made the Russian case hope¬ less. Again Dmitriev had to fall back rapidly between the railways leading to Jaroslav and Przemysl.

any attempted. Przemysl was evacuated by the Russians, on 2 June, after it had been held by them only a little more than two months. Gour-ko's Sixth Army was hurriedly called from the Northern Front, to save the fortress, but before it could even reach the Galician frontier Przem¬ ysl had already fallen. Therefore, the 6th Army, without being

detrained, was railed through to Lemberg. In a three-days' battle (8-11 June) south of that city, near Stryj, Gourko supported Brussilov in such a vigorous attack that the Russians captured 15,000 prison¬ ers and compelled the Germans to retire tempo¬ rarily to the right bank of the Dniester. But Ivanov and his staff by this time seemed to have lost heart and faith in the possibility of bringing

*?cssa*7s/art/7estˆ

" acˆiˆance //7to ˆaZ/c/a /He

ZlosZro-ˆerma/? .he aZZer-t /fuss*a*7s Z/eZrea/ yro/r? <?aZ/cZa SepZ *5* s/s

\ — ♦

l/ladimir

T/as/oJpˆˆ

rrze/TiL

//euSo/iI

MAP SHOWING

AUSTRO-GERMA

G A lT C 1 A

(au Stria-hungary; Sc(z/e o/ AfZ/es ˆ

0 to 20 30 40

ernowh . ˆ _

(c) *farra* & Co, AZ,)Z

Dmitriev's retreat in the centre of Ivanov's army in Galicia seriously endangered the right wing near the Polish salient under Evart and the left wing scattered among the Car¬ pathians under Brussilov. But ˆ Ivanov and the Grand Duke Nicholas were quick to see the disaster which would follow if a wide gap were allowed to open between the centre and these two wings. The Russian general staff, therefore, at once made up its mind to a retreat which should be as rapid but as orderly as pos¬ sible. Skilful counterattacks by Evart and by Brussilov against the less formidable Austrian troops on Mackensen's flanks helped to check the onslaught of the German phalanx in the centre, and to preserve the contact between the different parts of the Russian front. But no permanent stand could be made, nor in fact was

Mackensen's advance to a halt. On 20 June the strong position at the Grodek Lakes and Rawa Russka had to be abandoned after heavy fight¬ ing. This necessitated, two days later (22 June), the Russian evacuation of Lemberg. After nine months the capital of Galicia, with its invaluable railway connections, _ was once more in Austrian hands. The Russians fought rearguard actions along the rivers east of Lem¬ berg, and finally came to a halt 20 miles east of Tarnopol near the boundary between Galicia and Russia.

Such was the first move in the Great Rus¬ sian Retreat of 1915. By the battle of the Dunajec, Hindenburg had recovered Galicia for Austria, just as he had recovered East Prussia for Germany by the battle of Tannenberg. These were the two great decisive battles of the war

on the Eastern Front. By 1 July 1915 the line of the Eastern Front had been approximately restored to its position at the beginning of the war on 1 Aug. 1914, except that at the northern end the Germans were now across the lower Niemen and in possession of the Russian terri¬ tories of Lithuania and Courland. But though the front lines were in somewhat the same po¬ sition there was a vast difference in the general situation. In August 1914 Germany had only very weak forces on the Eastern Front and had not established a close coordination with Aus¬ tria. Russia had the advantage of the initiative, with a rapidly mobilized army and a good stock of munitions and equipment. In July 1915 Hindenburg had vast, victorious, well-disci¬ plined troops and the supreme, unified command on the Eastern Front; Russia had lost all her advantages and w'as suffering terribly from lack of munitions, officers and transportation facili¬ ties, as well as from a weakened morale due to these handicaps and the forced retreat from the Dunajec. The Russian centre was still thrust forward into the Polish salient west of War¬ saw. It was this salient which Hindenburg now proposed to ®pinch® by an a1,t,ack from the north upon the Narev-Niemen line and by a great flanking attack from the southeast. He had failed in the frontal attacks on Warsaw from the west in the autumn of 1914; but in 1915, owing to the changed conditions noted above, he was to succeed easily in taking War¬ saw by aitˆ attack from the south to the east of the Vistula. But he did not succeed in enveloping and pinching into surrender the Rus¬ sian armies within the Warsaw salient. They managed to effect the masterly second move in the - Great Russian Retreat of 1915 — the with¬ drawal from the Bzura-Rawka position 300 miles eastward to the Pripet Marshes and the meridian of Baranovichi.

On 5 July 1915 the battle for the Warsaw salient began. Mackensen's phalanx, turning north from Galicia and supported by Austrian troops under Archduke Joseph, aimed a blow from the south to cut the Warsaw-Kovel Rail¬ way near Lublin and Cholm. On the rising ground near Krasnik the Russians under Gen¬ eral Evart fought doggedly for four days (5-9 July) to check the German advance, and suc¬ ceeded

temporarily. For a week more this vital railway connecting Warsaw with southern Russia was safe. But on 16 July Mackensen attacked again at Krasnostav, to the east of Krasnik, and drove the Russians back to within 10 miles of the railway near Cholm. It was evidently only a matter of a few days before the railway would be reached and cut.

Meanwhile, on 14 July, on the northern side of the salient. General von Gallwitz had suc¬ ceeded in breaking through the Narev line of defense with a great German force. Having crossed the Narev between Ostrolenka and Novo-Georgievsk, he was threatening to cut the northern railway which ran from Warsaw to Petrograd and formed the connecting link be¬ hind the great fortresses of Ossowietz, Grodno and Kovno. If Mackensen and Gallwitz cut these two railways on the two sides of the War¬ saw salient, the Russian forces would have been left with only the central railway which runs due east from Warsaw to Brest-Litovsk. This single railway would be wholly inadequate to

supply the large Russian army in the Polish salient if it should try to hold on to its posi¬ tions, and equally inadequate to bear the strain of a retreat if it should ultimately be forced to retire.

In this critical situation, on 18 July, the Grand Duke Nicholas wisely decided to abandon Warsaw in order to save his army. It was a bitter decision, but it was in accordance with prudence, honor and sound strategy. The civil population of Warsaw was partially evacuated and began its melancholy exodus toward the unknown east, crowded in cattle trains, jammed into wagons, or forced to plod helplessly on foot. The troops which had clung to the trenches behind the Bzura and Rawka rivers throughout the crucial winter 1914-15 were quietly withdrawn to the Blonie lines on the outskirts of Warsaw or were sent eastward over the Vistula bridges on the first stage of the great retreat. The heavy guns, some sup¬ plies, and the remainder of the troops were moved out of Warsaw and dispatched to Brest-Litovsk. By 3 A.M on 5 August the last Rus¬ sian soldiers fighting rearguard actions with the pursuing German cavalry had left Warsaw and crossed the Vistula; the sound of heavy explosions announced that the three Vistula bridges were being blown up and that Warsaw was finally abandoned to the enemy.

F A L L OF

VVARSAW

Aug. 1915

0 m zo 3oMIfes ˆ *fa* /roads

G B ˆ

Suwa/A/ˆ

)

H

Oesowe/i

,Os/ro/enAc

ˆLomza

Pˆ±usj

GeorQ/ev<s/

ˆPoshan F-

rp o*

Orojeci

ˆARSA

ˆSied/ec

N D

‘CO-

/?.

/fa dorr?

■■■ Fa/Z/iˆˆ/ne

(ˆ/fANO MfA/ALLy & CO M V.

ˆirangorod

The abandonment of Warsaw and the ad¬ vance of the German armies led in quick suc¬ cession to the fall of the great fortresses which had hitherto protected the two sides of the Warsaw salient. Ivangorod had fallen on

4 Aufjiist; Kovno was battered into ruins and surrendered on 7 August, with a loss of 20,000 prisoners and all the guns; Novo-Georgievsk did the same on 19 August; Brest-Litovsk, the great Lithuanian border fortress, fell a week later on 25 August. These capitulations were heavy blows, for these fortresses had been counted upon to hold out for a much longer time as a check to the advancing forces of the enemy. But they were manned only with new and insufficiently trained men, their ammunition was rapidly exhausted, and the fortification works could not stand against the concentrated fire of the German heavy artillery. Conse¬ quently the morale was low and there may have been truth in the stories of treachery which found general

credence. The rapid fall of these fortresses greatly increased the embarrassment of the retreating army.

The retreat from Warsaw toward Brest-Litovsk was also greatly embarrassed by the flight of great masses of the Polish population which blocked the roads along which the Rus¬ sian troops had to move. In addition to the poor people from the city of Warsaw, the panic-stricken peasants east of the Vistula hurriedly loaded their household goods, their children and their old people, on carts, and having collected the large and small cattle, joined the unbroken ceaseless tide of humanity moving from west to east. These pitiful waves of humanity, moving without any order, over¬ flowed the highways and adjoining fields and quickly consumed all local supplies. Thousands upon thousands died of disease, starvation and exhaustion in this terrible exodus. Those who survived so clogged the roads that many a time the Russian soldiers had to fight battles simply to clear the road for the retreat of the troops. At this disheartening crisis on 5 Sept. 1915 the tsar himself decided to assume the supreme command. He alleged a chivalrous motive ; he did not desire to take away anyone's laurels in time of victory, so he came in when things looked gloomiest. In reality his appoint¬ ment meant a victory for Rasputin and the in¬ triguing party at court which took this oppor¬ tunity to make a scape-goat of Grand Duke Nicholas and get rid of him by sending him off to the Caucasus front. In spite of all the diffi¬ culties and discouragement Alexeiev conducted to success the retreat which the Grand Duke Nicholas had begun from Warsaw to the Pripet Marshes. Except for the soldiers and guns in the fortresses which surrendered, the greater part of the Russian army was preserved intact. And this was worth more than the soil which had been abandoned. By the end of September there came a lull on the Eastern Front, except at the northern end where the Germans made several fruitless attempts to capture Riga. The German armies found that it was increasingly difficult for them to move in the region east of Brest-Litovsk. The German army was weary after the hard campaigns in Galicia and Poland. It had lost some of the effectiveness of its striking power ; moreover, winter was coming on, and Hindenburg sagely decided that it would be wiser not to run the risk of attempt¬ ing to succeed where Napoleon had failed. In¬ stead of seeking a final settlement of the war on the Eastern Front by pushing on to Moscow or Petrograd in a winter campaign, he allowed the German army to settle down into the fixed

positions of trench warfare for the winter of 1915-16. The Eastern

Front, therefore, from 1 Nov. 1915 to 4 June 1916 ran, as may be seen by the line on the map, in a general north and south line along the meridian of Baranovichi. The Russians still held firmly to Riga and the Duna River, which was a strong natural line of defense. But they had been compelled to evacuate Pinsk and Baranovichi itself and the Great Headquarters had been moved back to Mohilev. Farther south, the Front followed the Goryn River, a branch of the Pripet, in such a way that the Russians retained posses¬ sion of Rovno and Tarnopol.

It has been estimated that up to the close of 1915 the Germans had captured nearly 2,000,000 Russian prisoners, mostly untrained reserves and fortress troops ; but the Russians had taken an even larger number of prisoners, about 200,000 Germans and nearly 2,000,000 Austrianˆ Many of the latter, however, were really Rumanians, Czecho-Slovaks and Galicians who were deserters rather than actual prisoners captured in (battle; they could be trusted, and were set to work in Russian villages. The Ger¬ mans were sent farther east. They afterward helped the Bolsheviki in eastern Russia and Siberia. The most important thing about the retreat of 1915 was the depressing effect it had on the masses of the Russian people. It was not the loss of territory nor the great loss in prison¬ ers, however, which they felt most. The lack of munitions, the conviction of the inefficiency and even treachery of the tsaPs autocratic govern¬ ment, and the apparent hopelessness of the struggle, sank deep into the hearts of the Rus¬ sian people. Nor were they reassured by the tsar's message at Christmas, 1915 : ®I will con¬ clude no peace till we have chased the last foe from our soil ; and I will make no peace save in unison with our Allies, to whom we are bound, not by paper treaties, but by affection and our common sacrifice.® On the contrary, the masses felt an increasing discontent with the existing regime and its court intrigues, and an increasing sense of the uselessness of any further fighting. To the Great Retreat must be attributed in part at least the Revolution of March 1917, and the socialistic military collapse which followed it four months later in July 1917.

9. Brussilov's Summer Offensive in 1916.

— 'During the crucial winter of 1915-16 there was a careful mobilization of Russian industries with a view to subordinating all manufacture to the one great aim of increasing war material and improving the transportation on the rail¬ ways. The result was that the deficiencies which had so largely caused the Great Retreat in 1915 were largely made up and the outlook seemed much brighter from this point of view.

General Alexeiev, who had become chief-of- staff in September 1915, when Nicholas II be¬ came commander-in-chief, planned to wait until the summer of 1916 before undertaking an of¬ fensive. This would give a longer period for accumulating munitions. It was also hoped that the Allies in the west could by that time launch a great offensive, and that the Central Powers, struck on both fronts at once, and unable to transfer troops in either direction, could at last be forced down to defeat. But two unforeseen events caused Alexeiev to undertake offensives earlier than he had intended. These two events

were the German attack on Verdun and the Austrian attack on Italy.

To lessen the German pressure on Verdun, Alexeiev consented to an offensive by Kuropat-kin on the Northern Front against the Germans in Courland. The attack was to be made from the line of the Duna River between Riga and Dvinsk; but the Germans got warning in time to call up plenty of reserves. And the failure to secure any permanent marked success clearly showed that an advance made under the con¬ ditions of trench warfare in that region, during periods of frosts or winter thaws, placed the attacking armies in a much more difficult posi¬ tion than the defending forces. Even if the attacking troops were able to carry the enemy trenches and make any considerable advance, the frozen ground prevented them from digging themselves in ; the attacking forces were then at once exposed to the merciless fire of the enemy's artillery. A similar Russian offensive in April, farther south, opposite Vilna, had no better success. Both these activities, however, may have served their purpose in relieving a little the intensity of the German pressure on Verdun. ˆ ˆ

Much more important for Russia was the Austrian advance into Italy in May 1916. To draw off some of the Austrian forces by a renewed Russian attack on Galicia, Alexeiev consented to allow Brussilov to begin his great summer offensive a month earlier than had been originally planned. General Brussilov, in recog¬ nition of the great skill with which he had with¬ drawn the extreme Russian left in 1915, had superseded Ivanov in command of the Southern Army Front. This

extended nearly 300 miles from the Pripet River and Marshes south to the Rumanian frontier. Brussilov had under him four armies with able commanders: Kaledine with his headquarters at Rovno; Sakharov threatening Brody; Scherbachev astride the Galician frontier near Tarnopol; and Lechitsky ready to cross the Dniester and oc¬ cupy Bukovina. Opposed to Brussilov were five German-Austrian armies under the nominal su¬ preme command of Archduke Frederick. They numbered altogether about 750,000 men, which was less than half the forces which had been placed under Brussilov. Instead of trying to break through any one point in the enemy's line, it was Brussilov's plan to try out the whole front with what may be regarded as an immense reconnaissance. His objective point was not yet determined. He would wait until he had tested out the strength of the enemy's line before he decided on a special strategic aim.

Accordingly on Saturday, 3 June 1916, Brus¬ silov opened a steady bombardment along his whole front with as great an intensity as his guns permitted. As the front was nearly 300 miles long the cannonade could, of course, not compare in intensity with the terrific bombard¬ ments which preceded the attacks at Neuve Chapelle, the Dunajec or Verdun. It did not disrupt the trenches, but it ploughed many broad alleys through the German barbed wire entanglements. After 20 hours of such artillery preparation, on Sunday morning, 4 June, the waves of Russian infantry sprang over the parapets to attack along the whole front. In the north, opposite Kaledine, the Austrian front was completely broken by noon of the first day. The Russian bayonets carried

the Austrian trenches, while the Russian bar¬ rage cut off all communications with the rear. The result was that the fine Austrian trenches and dugouts proved death-traps. Austrian soldiers huddled together in them could not escape and were captured in thousands by the triumphant Russian infantry. That day in Lutsk the birthday of the Archduke Frederick was being celebrated, when news came that the Austrian front was swept away and that the enemy were approaching the gates. Confidence was placed for a moment in the great strength of the Lutsk defenses; but Austrian demorali¬ zation was so complete that at 8:25 p.m. on Tuesday, 6 June, the vanguard of Kaledine's columns entered the city and took possession of a great booty of guns, shells and provisions. Many thousand Austrian wounded who had no time to escape were also taken prisoners. By the capture of Lutsk, Kaledine was able to reach and cross the Styr during the next few days and to reach a point within 25 miles of Kovel.

On the extreme south, while Kaledine was sweeping upon Lutsk, Lechitsky had achieved an equal success by crossing the Dniester, rout¬ ing the Austrians under Pflantzer-Baltin, and advancing into Bukovina. On 16 June he cap¬ tured Czernovitz, the capital of the province, and on 23 June he took Kimpolung, the most southerly town in Bukovina. The Austrian resistance had completely broken down and all of Bukovina was in Russian hands. In the centre, between Kaledine and Lechitsky, Sak¬ harov and Scherbachev also advanced with suc¬ cess and took many thousand prisoners, but they occupied much less territory. June 23 may be said to mark the end of the first stage of Brussilov's offensive. Within three weeks his armies had captured 4,000 officers, 194,000 men, 219 heavy guns, 644 machine guns and vast quantities of war material. It was one of the most rapid and spectacular advances in the his¬ tory of the war; but it left the Russian line with two great salients — at Lutsk and in Bu¬ kovina — which were dangerously open to Ger¬ man counterattacks on their sides.

It was necessary for Brussilov to straighten out his line by advancing the northern end near the Pripet Marshes and the centre be¬ tween Tarnopol and Brody. This was done successfully during July. A new ai- my under General Loesch managed to push forward on Kaledine's right flank, thus advancing the Rus¬ sian front north of Lutsk. In the centre, Brus¬ silov learned in some way probably by means of his excellent spy service among the local population — that the Germans were preparing a great counterattack for 18 July, and he de¬ cided to strike strongly and speedily before the counterattack had time to mature. On the night of 15 July Sakharov struck heavily at the German line north of Brody, and captured 13,000 prisoners as well as three huge ammuni¬ tion dumps which the Germans had just pre¬ pared for their counterattack. With this initial success Sakharov and Scherbachev pressed forward toward Lemberg and the Dniester, cap¬ turing large numbers as they advanced. By 15 August Brussilov's line was straightened out and the second stage in his offensive came to an end. The magnitude of his success may be measured by some figures and by the desper¬ ate efforts which Hindenburg took to save the situation. In the 10 weeks of his extraordinarily

successful offensive Brussilov's armies had ad¬ vanced from 30 to 60 miles on a 300-mile front, thus occupying 15,000 square miles of terri¬ tory, as may be seen in the shaded area on the map. He had captured 7,754 officers, 350,000 men, 405 heavy guns, 1,326 machine guns, and vast stores of ammunition and supplies. As the Austro-'German killed and wounded prob¬ ably more than outnumbered the prisoners they lost, he may be said to have virtually annihi¬ lated the force which stood opposed to him when he began his offensive on 4 June. To meet the crisis, Hindenburg had transferred 15 divisions from the Western Front, where they had been sorely needed to check the Somme offensive; 16 infantry divisions and three cav¬ alry divisions from the Eastern Front north of the Pripet; seven Austrian divisions from the Italian Front, where they could ill be spared as Cadorna was about to begin his counter¬ offensive ; one division from the Balkans, and two divisions from Turkey. These reinforce¬ ments, which Hindenburg hurried forward with his usual vigor and resourcefulness, began to restore the balance by the middle of August.

At the same time Brussilov's offensive began to slow down in an ominous way. We know now that he was beginning to suffer from the same handicap as in 1915 — lack of ammuni¬ tion. He had shot away too quickly what had been accumulated with such difficulty during the winter of 1915-16. Worse than that, he had exhausted his reserves, for his success had been won only by a prodigal expenditure of man¬ power. The Germans claimed 264,000 prisoners, and if we estimate that the Russians who were the attacking force lost twice as many in killed and wounded as in prisoners, this means that Brussilov had lost three-quarters of a million men in those 10 weeks. They could not be replaced rapidly enough to continue the offensive which he had begun so brilliantly. Moreover, many Russians had been used, un¬ wisely as it seems, in an abortive offensive north of the Pripet; this was meant to take advantage of the fact that the Germans had withdrawn so many men from that part of the front; but it was not undertaken on a large enough scale to insure success. It merely used up reserves which could have been employed to better advantage south of the Pripet. It began to be clear that Brussilov had undertaken a task for which Russian resources were again to prove inadequate.

Thus in September 1916 Brussilov's summer offensive, which had begun so brilliantly, grad¬ ually died away. As the rainy and stormy weather came on he had to settle down in the trenches along the line which he had wonˆ by the middle of August. His great offensive,

together with that of the Allies on the Somme, had failed to crush the Central Powers to sub¬ mission. Except as he had drawn valuable German troops from other fronts his victorious advance was to have no permanent value in the future ; for all that he had won, and far more in addition, was surrendered almost with¬ out a struggle in the next summer, when the Revolution and the Bolsheviki brought on a total military collapse in Russia.

10. Revolution and Military Collapse in Russia, March-July 1917 . — The murder of Rasputin, the overthrow of the traitors around the tsar's throne, and the triumph of the

Liberals and the Patriots, which resulted in the almost bloodless Revolution of March 1917, seemed at first a great advantage for the Allies. Autocracy at last was overthrown and Russia seemed whole-heartedly to have joined in spirit and in fact the great democracies of the West. But almost immediately the results of the Revolution were seen to have disastrous effects upon the discipline and efficiency of the army. Alexeiev, Evart and many other tried officers were dismissed ˆffiy fhe voice of the people,ˆˆ and inexperienced or incompetent men were put in their places. Capital punishment was abolished as the penalty for desertion, treason and other military crimes, with the result that officers could no longer maintain discipline. Agitators and demogogues, who had never smelt powder and had lived quietly in the interior cities, began to appear among the soldiers at the front. They harangued groups of soldiers, in defiance of the officers, telling the men that they had the right to choose their own officers; that now that tsarism and im¬ perialism were overhrown it was no longer necessary to fight at all ; that only the capital¬ ists wanted a continuance of the war; that now the time had come for the soldiers to return to their homes and enjoy their new freedom by dividing up the land of the nobles and the government. Soldiers began to desert by thou¬ sands, for no one wanted to remain in the ranks if lands were going to be divided up at home in his absence. Soviets, or Councils, of soldiers began to 'be formed everywhere and to assume an authority which should have be¬ longed to the officers and the high command. General Gourko, who had become commander-in-chief, soon after the Revolution, exercised great tact and did his best to preserve some semblance of discipline. He attended meetings of the Soviets, and wherever he was person¬ ally present was able to dominate the meeting by his personality and to hold the soldiers to their duty by his patriotism and arguments. But it was a hopeless task to try to neutralize the influence of all the agitators.

At the same time the Germans were quick to make the best of the situation. Instead of beginning an offensive with guns, they began an offensive with propaganda. Pamphlets in favor of international socialism and other forms of pacifism were showered upon the Russian line. Russian outposts were invited to fraternize with their German ˆbrothers.® Hopes of a speedy peace and an end of the horrors of war were held out. The *democratization® of the Russian army was having such a demoralizing effect that it was only a matter of weeks before the Germans would find no fighting force worth the name to oppose them at all. Under these alarming conditions the Russian commanders made most urgent appeals to the provisional government to take steps to restore discipline. Brussilov, Kornilov, Russky, Gourko and many other most notable and able officers threatened to resign in a body if something were not done.

At last in May 1917 when Guchkov had been succeeded by Kerensky as Minister of War, some real efforts were made to restore morale and discipline. The death penalty was reimposed and it was decided that one of the best ways of restoring discipline and vigor to the army would be to undertake an offensive.

Thereupon Kerensky in his official position as Minister of War made a tour of the front. With impassioned and burning speeches he be¬ sought the soldiers to stand fast against the treacherous Germans and defend their new-won freedom. He pointed out that to cease lighting before the Allies had triumphed in the West would be an act of dishonor for Russia and of disaster for democracy ‘every¬ where. Russians would soon find that they had merely exchanged a Romanov for a Hohenzollern despot. He spoke with the sincerity of conviction and usually provoked a temporary enthusiasm among his hearers. But in some places the poison of Bolshevism had sunk so deeply that his speeches were received with mockery and derision. At Riga a soldier in the trenches started to enter into a dispute with him ; whereupon Kerensky screamed at him : <ˆHold your tongue when the Minister of War is speaking to you.® At other points he found it prudent not to

attempt to speak at all.

It was finally decided that the offensive which it was hoped would restore discipline and patriotism should begin at 9 a.m. on Sun¬ day, 1 July 1917. It was to ,§tart from the front in Galicia which Brussilov had won the year before. Its strategic aim was to capture Lemberg and Stanislav. If this started well a secondary offensive would be undertaken in the north toward Wilna for the recovery of Lithuania and the Baltic provinces. The hours during the fierce bombardment which preceded the time set for the infantry to go over the top were nerve-racking moments for the offi¬ cers. No officer felt sure that his men would obey the command to advance. One of • the corps commanders was seen silently praying during the fateful minutes preceding the ap¬ pointed hour. Would his men go over the top or not? He hoped so, but he could not feel sure. When, punctually at 9 a.m., his troops swarmed over and the attacking masses rolled forward, the general devoutly crossed him¬ self. But all the generals were not equally fortunate. Many mutinies broke out on the eve of the attack. In many places the Soviets of soldiers, instead of obeying instantly the command to advance, would sit down and debate the wisdom or desirability of the orders given them; and the result of the debate was that too often they concluded not to do what they had been told. This new idea of ˆliberty® and the wholesale desertions from the ranks was soon to nullify in less than a fortnight all the preparations and efforts of the govern¬ ment and the officers to make the July offensive a success.

However, the offensive started auspiciously at the outset, considering the circumstances. It showed that there was still a real fighting spirit in a great many of the Russian soldiers. This was further shown by the formation of many ˆˆBattalions of Death® and by the enlist¬ ment of battalions of women. During the fight¬ ing of 1 and 2 July Kornilov's men made good progress toward the Stanislav-Lemberg Rail¬ way. Altogether the Russians on the Galician front took 20,000 prisoners and over 100 guns in the first two days of fighting. This was due in part to the fact that the Russians out¬ numbered the enemy two to one and that they were stiffened by the presence of a considerable number of British and Belgian armored cars.

There were also a good many French and British aeroplanes, though not enough to cope with the Germans. The Russian airmen also did excellent work themselves and were well-supplemented by balloon observers. Moreover, there was an abundance of artillery of all

calibres, trench mortars, machine guns and es¬ pecially of ammunition. Never had the Rus¬ sian army been so well equipped. But .instead of improving with action and success, the Rus¬ sian soldiers grew daily less reliable. Divisions voted that they would not remain in the front¬ line trenches more than 24 hours, and only so long on the condition that they would be strictly on the defensive and not ordered to attack. When the Germans began to rally for a counter¬ attack, Russian units deliberately disobeyed their officers and even retired from the line, thus opening dangerous gaps which weakened the morale of neighboring units. By 20 July the whole Russian front in GaHcia was com¬ pletely demoralized and in disorderly retreat. The Germans and Austrians did their best to complete the demoralization by attacks on the retreating rear — engagements which were mis¬ represented in the German bulletins as ®hard-won battles.® The details of this dismal col¬ lapse of the last Russian offensive need not be given. By August all that Brussilov had won in 1916 was lost, almost without a blow. The Eastern Front was pushed back to the position which it held in the winter of 1915-16. Such were the early effects of Bolshevism upon the army. It was a very bitter situation for the officers, the Liberals and the true friends of the Allies in Russia. But they could do nothing. Patriots like Gourko and Kornilov who tried to stem the tide of demoralization and to back up their arguments with the threat that they would resign, were arrested and im¬ prisoned as dangerous traitors to the new Rus¬ sian republic.

11. The Disappearance of the Eastern Front in Chaos, 1918-19. — On 1 Sept. 1917 a further change in the military situation came through the easy German capture of Riga. A German fleet shortly afterward occupied the Gulf of Riga and enabled the Germans to es¬ tablish a foothold in Esthonia and Livonia. From their new position in the Baltic provinces the Germans were able to threaten the Russian capital, Petrograd. But Germany did not want to use the Russian military collapse as an oc¬ casion to make a militai'y conquest of Russia. She wanted peace on her Eastern Front so that she could transfer her armies to the West¬ ern Front where the ultimate issue of the war would have to be decided. Moreover, it was not necessary to conquer Russia by armies in order to dominate Russia politically and eco¬ nomically. This kind of a domination could be better secured by the indirect means of creating little puppet states, ruled or controlled by Ger¬ man princes, politicians, merchants and capital¬ ists, and dependent on German armies for their existence. In fact, in the autumn of 1917, there loomed before Pan-German eyes a far greater dream of Eastern empire than was con¬ ceived of in the Bagdad Railroad project, which meanwhile was receding into the background

of German hopes owing to Allenby's victories in Mesopotamia and Palestine. Instead of the Bagdad Railway there swam before German e3'^es the grander prospect of controlling all of

western Russia, through the small states of Fin¬ land, Esthonia, Letvia and Poland; all of the rich grain lands and the coal, iron and other minerals of southern Russia through the puppet-states of Ukrainia, Georgia, Transcaucasia and others. Thus would Germany come into touch with China and Persia and threaten once more the English control in India. This great dream raised high German hopes and led to the negotiations with Lenin ˆ and the Bolsheviki which resulted in the infamous Treaty of Brest-Litovsk of 3 March 1918. This treaty

chaos at home and the Eastern Front ceased to exist. Germany was able, as she had calculated, to transfer the best part of her troops to the Western Front to take part in Ludendorff's last great effort to reach a decision by breaking through the Anglo-French line to the channel ports or to Paris,

But fortunately for Russia the Peace of • Brest-Litovsk was not to be allowed to stand. Three factors overthrew it: (1) The 55,000,000 Finns, Esthonians, Letts, Lithuanians, Poles, Ukrainians and others saw through the veil of

fETROGRAO

*IWenden

Oy}/7s/f

]/l/komir

O’febsk

\Dunllo\/ifzˆ

/ Uda

/ •

Grodno i

ˆmo/ensk

\hˆohi/6r

rarsawl

Breslau-

BREST—

Kursk

mLufsk

•Dubno

larnopoi

Kharkov

VIENNA

S^airjiiniefz

\Boloshani

udapest

‘herson

MAP SHOWING

AT TIME OF THE

BREST - LITOVSK TREATY

ˆ Scale of Miles ˆ

DECEMBER 5™ 1917 - MARCH xmˆˆCrˆTLibau ˆ‘9ˆ

)) 4 - Rai /roods I \ ˆ ‘v

y’s E r\ˆ I a

was based on the deceptive formula of ®no an¬ nexations, no indemnities, and self-determina¬ tion.® But by the terms of the treaty, as interpreted by Germany, the Bolsheviki^ under ®no annexations® allowed Russia to be virtually deprived of 26 per cent of her total population, 27 per cent of her arable land, 37 per cent of her average crops, 26 per cent of her railway system, 33 per cent of her manufacturing in¬ dustries, 73 per cent of her total iron produc¬ tion and 75 per cent of her coal fields. Under ^^no indemnities® they saddled Russia with a gigantic ‘but as yet uncollected payment by way of war tribute, with a promise of free export of oil, and an unfair commercial treaty. Un¬ der the guise of ^self-determination® 55,000,000 former subjects of the tsar were handed over against their will to the practical control of German agents. The Russian soldiers were withdrawn to fight a civil war within Russia against the forces of law and order which \vere opposed to the Bolsheviki. So Russia fell into

German deception. They refused to be bound by a treaty which they had no share in making and which was contrary to their interests. The Liberals or ^^Whites,®* in Finland and Esthonia waged a determined war against German domi¬ nation. The Ukrainians murdered the Ger¬ man Ambassador and overthrew the German puppet, Skoropadski. The Germans soon found that it. would be no easy task to maintain the domination which they had planned to visit upon these new nationalities. (2) The patriotic elements in Russia itself refused to accept the rule of the Bolsheviki and to recognize the treaty by which they had sold out Russia to the enemy. These patriotic elements gradually collected around Admiral Kolchak in Siberia; they established the so-called Omsk govern¬ ment with a view to restoring law and order by the holding of a constituent assembly which would give Russia a true democracy instead of a proletarian despotism. Several of the former loyal generals like Kaledine, Denikin

and Yudenich placed themselves in touch with Admiral Kolchak to work for the overthrow of Lenin, Trotsky and the whole Bolshevik group. The Allies also gave material aid. An Allied army landed at Archangel to protect the Allied stores of munitions, and to advance, if possible, to join up with Kolchak's army which was to move west into Russia from Siberia. The Archangel enterprise, however, was too small, was not vigorously pressed and did not find the support which it had hoped from the anti-Bolshevik element in northern

backed by the loyal elements in Esthonia and Letvia, and supported by English battleships, was advancing on the Bolsheviki in Petrograd. But these anti-Bolshevik forces were not suc¬ cessful. Foreign intervention seemed to have consolidated the power of the Bolsheviki and strengthened it instead of weakening it. The exercise of power and responsibility appears also to have made the Soviet government some¬ what less violent and uncompromising. Recog¬ nizing this the Baltic States entered into nego¬ tiations with it in December 1919.

Russia. It had to be abandoned in the sum¬ mer of 1919. Japan and the United States also sent munitions and troops to Vladivostok to protect the munition supplies there from falling into the hands of the Bolshekivi. They were also to aid Kolchak by giving support to the Czecho-Slovak soldiers in Siberia, by keeping open the Trans-Siberian Railway, and by pro¬ tecting supplies which were to be forwarded to Kolchak and the Omsk government. (3) But the great and deciding factor was the entrance of American soldiers upon the West¬ ern Front, the failure of Ludendorff's last effort, and the defeat of Germany which re¬ sulted in the armistice of 11 Nov. 1918. With Germany beaten, the Allies expressly provided in the Peace Treaty of 28 June 1919 with Ger¬ many (Art. 116) that the Brest-Litovsk Treaty should be abrogated.

In November 1919 Kolchak was advancing on the Bolsheviki in Moscow from the east and Danikin from the south, while Yudenich,

Bibliography. — Gourko, Basil, ˆWar and Revolution in Russia, 1914-1917ˆ (New York 1919) is by far the best single volume on the Eastern Front; its author by ability and tact rose during the war from the position of divi¬ sion commander of cavalry to be chief-of-staff and commander-in-chief until his arrest and imprisonrnent by the Bolsheviki; it discloses both the inner political and military motives of Russian leaders by one who was in a position to know; itˆ seeks to justify Russia against Western critics; it unfortunately has no maps. Good sketch maps and narratives are to be found in such general histories of the war as Buchan, John, ˆNelson's History of the Warˆ (24 vols., London 1914—19) ; Simonds, Frank H., ˆHistory of the World Warˆ (New York 1917 —) ; The New York Times ˆ(Turrent His¬ tory of the Warˆ (monthly, 1914 —) ; Morse, John, ˆAn Englishman in the Russian Armyˆ (London 1916), a vivid account of an escape ahead of German forces from Silesia into

Poland in the early weeks of the war and of German atrocities ; McCormick, Robert R , < With the Russian Army > (New York 1915), enthusiastic portraits of Russian personalities by an American National Guardsman; Pares, Ber¬ nard, ˆDay by Day with the Russian Armyˆ (London 1915), by a well-informed student of Russia; Washburn, Stanley J., ˆField Notes from the Russian Frontˆ (London 1915) ; ˆThe Russian Campaign, April to August, 1915ˆ ; (London 1915) ; ˆThe Russian Offensive, 5 June to 1 Sept. 1916ˆ (London 1916), volumes by an American war correspondent containing excellent photographs, but the military infor¬ mation, owing to the Russian censorship, is slight; Dillon, E. J., ˆThe Eclipse of Russiaˆ (New York 1918), by a student of Russian philology, is based on part of Witte's papers and explains the diplomatic background of the war, German treachery and the causes of the overthrow of Nicholas II; Wilcox, E. H., ˆRussia's Ruinˆ (London 1919), valuable on German treachery and Bolshevism in Rus¬ sia;

Wilton, Robert, ˆRussia's Agonyˆ (New York 1919), an excellent survey of social, political, and military conditions by the Petrograd correspondent of the London Times; Grow, M. C., '^An American in the Russian Fightingˆ (New York 1918) ; Stebbing, E. P., ˆFrom Czar to Bolshevikˆ (London 1918) ; Long, R. E. Crozier, ˆBook of the Russian Campaignˆ (London 1915) ; Alexinsky, Gregor, '^Modern Russiaˆ (new ed., London 1915) ; ˆRussia and the Great Warˆ (London 1915) ; Graham, Stephen, ˆRussia and the World Warˆ (London 1915) ; Fraser, John F., ˆRussia of Todays (London 1915) ; Standing, Percy C., ˆThe Campaign in Russian Polandˆ (London

1914) ; Frisch, Rene J., ˆGuerre de 1914-1915 : Operations russo-austro-allemandesˆ (Paris

1915) ; Stienon, Charles, ˆLa (Juerre sur le front Russeˆ (articles in the Paris Correspondant, 1916-18, later collected in book form) > Hedin, .Sven A., ˆKriget mot Ryssland^ (Stock¬ holm 19l5), contains 400 pictures and 11 maps; Taslauanu, Octavian C., ˆTrois mois de cam-pagne en Galicieˆ (Paris 1915), an interesting diary by an intelligent Rumanian, with a map, of his movements with the hated Austrian army from August to November 1914; Fried-richsen, M. H., ˆDie Grenzmarken des Euro-paischen Russlandsˆ (Hamburg 1915), good brief statistical account of the lands and peo¬ ples on the Eastern Front; Ganghofer, L. A., ˆDie Front im Ostenˆ (Berlin 1915) ; Brandt, Rolf, ˆFiinf Monate an der OstfronD (Berlin 1915); Lindenberg, Paul, ˆGegen die Russen mit der Armee Hindenburgsˆ (Leipzig 1914) ; ˆBeim Armee-Commando Hindenburgsˆ (Stutt¬ gart 1915) ; Ganghofer, A. L., <Der Russische Niederbruchˆ (Berlin 1916) ; Reinhold, Karl, ˆHindenburgs Siegeszugˆ (Leipzig 1916) ; Wertheimer, Fritz, Hm Polnischen Feldzug mit der Armee Mackensenˆ (Stuttgart 1915) ; Won der Weichsel bis zum Djnestrˆ (Stutt¬ gart 1915) ; Niemann, Hans, _ ˆHindenburgs Winterschlacht in Masuren, 7. bis 15. Februar, 1915ˆ (Berlin 1915) ; Madelung, A., ˆMein Kriegstagebuchˆ (Berlin 1915), a Swede's ac¬ count of the campaign in Galicia and the Car¬ pathians; Skowronnek, F. R. B., <Hindenburg, der Befreier des deutschen Ostensˆ (Berlin 1915) ; ˆOber-Ost,ˆ a valuable official state¬ ment of Hindenburg's ˆSupreme Command in

the East,^^ describing in detail the German or¬ ganization of the conquered lands of the Letts, Lithuanians and Poles ; von Michaelsburg, J., Hm belagerten PrzemysP (Leipzig 1915); Vic, Jean, Wa litterature de la Guerreˆ (Paris 1918) gives on pp. 379-390 a valuable list of articles in French periodicals relating to the Eastern

Front; Hinrichs, Hlalbjahrs-Katalogˆ (Leipzig), gives a complete semi-annual list of all works published in Germany; separate re¬ prints of books on the war have been pub¬ lished as ˆDeutsche Kriegsliteraturˆ ; Kerner, R. J., ‘ˆSlavic Europeˆ (Cambridge 1918) is an invaluable bibliography in Western European Languages of the history of the Slavic peoples as a background to the war.

Sidney Bradshaw Fay,

Professor of European History, Smith College.

7. ITALIAN CAMPAIGN. The chain of historical and diplomatic events which brought Italy into the World War is described under Italy and the War (q.v.). At the time of the declaration of war against Austria-Hun¬ gary on 23 May 1915 the population of Italy was estimated at a little over 35,000,000. The Italian Army, raised by universal conscription, had a peace strength of about 15,000 officers and 290,000 men and a total war strength of roughly 3,270,000 men, of which number 1,070,000 were only partially trained. The able-bodied men annually recruited for service were divided into three sections, partly by exemptions and partly by lot. The first lot — about one-third of the whole — were fully trained; the second undergoing a recruit course and a few repeti¬ tion courses in later years, and the third per¬ forming no service at all. The full period of service was two years with the colors, six years on forlough, and four years in the mobile militia (consisting of fully-trained reservists only). In recent pre-war years large numbers of the last class were called up for brief ˆTe-fresheFˆ trainings (see Italy — The Italian Army). At the outbreak of war there were 12 army corps, each composed of two infantry divisions (in the Rome district three). The or¬ ganization of the permanent army comprised 96 regiments of line infantry, 12 regiments of Bersaglieri (sharpshooters), and eight Alpine regiments (Alpini), in all 389 battalions; 150 squadrons of cavalry; 263 horse, field, mountain and heavy batteries; and 190 companies of for¬ tress artillery and technical troops. On mobili¬ zation a division of mobile militia was added to each corps, bringing its strength up to 37,000 men and 134 guns.. Each division comprised two brigades of infantry and a regiment (five battalions) of field artillery. The brigade con¬ tained two regiments, and the latter three bat¬ talions each. A cavalry division comprised two brigades of two regiments each, and two bat¬ teries of horse artillery. On peace footing there were 29 cavalry regiments. The Ber¬ saglieri, with the picturesque feathers on their hats, were the light infantry. A regiment of four battalions of these troops — three of in¬ fantry and one of cyclists — ’Was attached to each corps. Six battalions of Carabinieri formed a military police force

recruited from the regular army, while the Alpini (26 bat¬ talions of the first line, with 36 batteries of mountain artillery) were special frontier troops for the defense of the northern borders. To

some extent the line regiments suffered from having their best men taken for the select corps of Alpini, Bersaglieri and Carabinieri. Al¬ together, the available field force may be esti¬ mated at over 1,000,000 trained men, with a reserve of about 2,000,000 in the territorial militia, the third class, with normally only 30 days' training. The infantry was armed with the six-millimeter Mannlicher-Carcano magazine rifle, pattern 91. A part of the territorial militia still had the Vetterli-Vitali, model 70/87. Officers were equipped with sword and auto¬ matic pistol. The Italian field artillery was at the time in process of re-armament. It pos¬ sessed about 100 field batteries armed with the 75-millimeter Krupp quick-firing field gun, a large number of Krupp howitzers, siege and for¬ tress guns, and siege trains of very large calibre.

The Italian navy, which had gained con¬ siderable experience during the Tripolitan War of 1911-12, consisted at the outbreak of war of six dreadnoughts launched between 1910 and 1913, and two more were nearly completed, as against four vessels of that class belonging to Austria. The Italian dread'noughts were su¬ perior in speed and gun power. All were armed with 12-inch guns. Italy also possessed eight pre-dreadnought battleships under 20 years of age and three over, all heavily armed, of good speed, and well protected; 10 armored cruisers, all but one under 20 years old, as against only two on the Austrian side ; and 16 light cruisers, nine being over 20 years old; 33 destroyers (and 10 building); 65 torpedo boats and 19 sub¬ marines. The total naval personnel before the war was about 40,000. The Italian aviation arm was far superior to the Austrian, both in quality and quantity. Already, in August 1914, Italy had a greater aeroplane fleet than Great Britain, namely, 25 squadrille (of seven ma¬ chines each) in Italy and three squadrille in Africa — about 200 machines. During the nine months of neutrality the Italian government had been

building and buying aeroplanes and train¬ ing pilots at a great rate, so that in May 1915 the country was well supplied with all kinds of aircraft — Curtiss waterplanes and flying-boats, Borel monoplanes with floats, Breguet seaplanes, Bossi flying-boats, Savoia-Farman seaplanes, and some half-dozen Italian-built and two German-built dirigibles. Though strong in her naval and aerial branches, Italy had no land army in the modern sense when the war broke out in 1914. She had men, rifles and field guns, and not too many of the last. Many gaps in organization were filled up in the period of neutrality, but it was impossible to bring the equipment up to the required standard. Italy's industrial resources were strictly limited and not easy of development. The country produced neither coal nor iron, and the output of her steel works was small. Nor was it easy to sup¬ plement deficiencies from outside. England, France and Russia had earlier calls on neutral resources and Italy could only secure, so to speak, the leavings. For a year at least after entering the war Italy had to rely on the heroism of her soldiers to make up for lack of munitions.

General Count Luigi Cadorna (q.v.) was appointed commander-in-chief of the Italian armies in the field, with General Porro (q.v.) as his chief of staff. The Duke of the Abruzzi

(q.v.) was placed in command of the High Sea Fleet; and his two brothers, the Duke of Aosta and the Count of Turin, held respectively the ranks of lieutenant-general and inspector-general of the cavalry.

With an extensive coastline of over 4,000 miles to protect (including Sicily, Sardinia, Elba, etc.), Italy has numerous fortified places on the coasts and islands. Spezzia; the prin¬ cipal naval port, stands near the head of a commodious bay, 56 miles southeast of Genoa by rail. Formidable batteries bristle on the hills that overlook the bay and the island of Pal-meria, which guards the entrance. Here the large Italian warships are built, repaired and fitted out. Taranto, at the southeastern ex¬ tremity of Italy, is an important naval base and arsenal. A fleet operating from this base guards the entrance to the Adriatic. Ancona, on a promontory of the Adriatic, 127 miles southeast of Ravenna by rail, was formerly a government arsenal and contains shipbuilding yards and engineering works. Other fortified places are Genoa, Vado, Gaeta, Monte Argentaro and some works in the Straits of Messina, while there are also bases at Naples and Venice for building and repairing ships.

The naval situation in the Mediterranean underwent a marked change

in May 1915. Dur¬ ing the preceding month the French fleet had entered the Adriatic with the object of round¬ ing up the Austrian fleet if it were at sea. French battleships steamed up on the Italian side and, crossing the Adriatic, approached Cattaro, the Austrian naval base, from the north, while cruisers and destroyers advanced up the eastern shores. This movement resulted in the discovery of only three enemy warcraft — the small cruiser Zenta and two destroyers. The two latter fled and the Zenta was sunk. A subsequent bombardment of Cattaro apparently produced small results. Blockading forces .were meanwhile established in the Otranto Channel, and the enemy was thus cut off from all sea communication with the outside world. The French fleet was still blockading this port when Italy entered the war, but it labored un¬ der serious disadvantage owing to the distance from its nearest base. The disadvantage was somewhat modified, though not removed, when the British admiralty placed the naval estab¬ lishment at Malta at the disposal of the French authorities for refitting and repairing their ships. The entrance of Italy as a belligerent, with bases closer to the scene of operations, suggested a reconsideration of the naval posi¬ tion; and thenceforward the Italian navy, sup¬ ported by several British and French units, be¬ came responsible for the blockade.

Natural conditions in the Adriatic were overwhelmingly favorable to Austria-Hungary. This landlocked sea, approximately as long as the North Sea, has a mean breadth of about 100 miles. On the Italian side the water is shallow and for many miles southward of Venice there is no single port suitable for a naval base. On the Austrian side the Dalma¬ tian coast and Trieste presented a series of deep-water ports, fringed by a number of islands offering shelter to torpedo craft and even larger ships engaged in cross-raiding. The Austrians took advantage of the geographical position when Italy entered the war. In ac¬ cordance with a scheme that was evidently

pret)arcd in advance, units of the Austrian fleet, including battleships, began to terrorize the Italian population along the shores of the Adri¬

atic, where the towns and villages were devoid of defenses against bombardment from the sea and by aircraft. The Italians, however, soon devised an effective reply. Close to the water¬ side, a railroad runs all the way down their coast. Armored trains were speedily equipped and manned by naval gunners ; scouting opera¬ tions by small naval craft and aeroplanes pro¬ vided a satisfactory check on these raids and forced the Austrian fleet to inactivity, confined within the shelter of elaborate minefields dom¬ inated by powerful coast artillery and supported by flotillas of destroyers and submarines.

A more complicated problem presented itself on the Italo-Austrian frontiers. Here was a huge rampart of natural and artificial strong¬ holds winding a snake-like course of 484 miles, a battlefront exceeding any other in the war for almost insuperable obstacles. All the dis¬ advantages and handicaps of strategy, geog¬ raphy and climate fell to the Italian side. Aus¬ tria held the crests of the Alps, the heads of the principal valleys, all the Alpine passes and all the crossings of the Isonzo. From Switzer¬ land to the Julian Alps the frontier followed the crests of the hills at an elevation of 7,000 to 10,000 feet, while a mountainous zone sepa¬ rated the frontier from the plains. Between the Julian Alps and the Adriatic there were no natural obstacles to prevent the advance of armies on a broad front. Thus Italy's northern front fell into three distinct sectors — the first of high mountains, forming the re-entrant an¬ gle of the Trentino; the equally formidable wall of the Dolomites and the Carnic and Ju¬ lian Alps, and the space on the east between the main Alpine chain and the Adriatic.

The Trentino, somewhat detached from Aus¬ tria, was connected with it by the Pusterthal and the Brenner Pass, by which two routes alone there is railway communication. Moun¬ tain buttresses protected the Trentino salient, and an enemy attempting its conquest would have to advance mainly by the Adige Valley, only to be confronted by the strongly-fortified town of Trent, after overcoming which he would have to struggle through a wilderness of lateral valleys and subsequently force the main ridge of the chain at the Brenner Pass. Flank attacks on the containing wall of the Trentino were all but impossible, for Austria had converted it into an immense fortress bristling with guns. High up in the hills on the western side lies the Stelvio Pass, the highest carriage pass in the Alps, over 9,000 feet above sea-level. Here three frontiers meet among the clouds — Swiss, Italian and Austrian. Farther south, below the Ortler Massif, lies the Tonale Pass, offering no better passage for a large army. The frontier described the form of a huge horseshoe around nearly the northern half of Lake Garda and passed through the lake near its northern end.

That little piece of the lake was in Austrian territory. Here the Italians quickly introduced a flotilla of gunboats and bot¬ tled up the Austrians in their narrow end of the lake. This little ˆsquadron® patrolled the treach¬ erous waters of Garda at all times and in all weathers, braving those sudden hurricanes — equal to anything on the open sea — for which the lake is notorious. Italian trenches and barri-

cades of barbed wire ran from the Stelvio Pass down to the water's edge of the lake, continu¬ ing on the opposite shore and eastern side of the salient, where conditions were still worse for invasion from the Italian side. The passes of the Dolomites offered no route northward to the Pusterthal. Thus the Austrian position i]) this sector consisted of a hollow headland of mountain jutting into the Italian plains be¬ low, a barrier that was strengthened by the deep depression of Lake Garda, as it compelled an attack from the Italian plain to be made from distant bases east and west of the lake.

The next section of the Austro-Italian front — the Dolomite and Carnic ranges — formed a vast barrier of ramparts. Through the main pass, Ampezzo, runs the great high¬ road known as the Strada d'Alemagna (over 5,000 feet high) from Belluno to Toblach. In part it is a mere defile threatened by many dan¬ ger points, while a number of passes farther eastward are mere bridle-paths, and there are none of military value to the southeast. On the Austrian side the Carnic Alps needed no fortifications, but at Tarvis there were military works to defend an approach from the Tagliamento to the Drave and to support (on the right) an Austrian concentration on the Isonzo. Tarvis was also an important point in the event of an Italian offensive against Vienna. Some old forts at the Predil Pass and Flitsch far¬ ther south had been modernized by Austria, thus making the Isonzo a powerful defensive position. Behind this the lines of the Save and Drave still remained to cover the approaches to Gratz and Vienna. The third portion of the frontier was the lowlying ground between Cividale and Lake Marano, a narrow front barely 30 miles wide, protected from behind (on the Austrian side) by the Isonzo line and some six miles of plain in front of Gorizia.

For many years the chief military interest of Italy was her northwestern frontier facing France, while the Austrian borderland was somewhat neglected. In late years, owing to improved relations with France, the situation changed and the centre of politico-strategic gravity shifted to the northeastern frontier, where considerable work

was carried out to prepare Italian troops and railroads for war on that side. Fortifications on a moderate scale existed before the war; the road from Stelvio Pass was barred by the works at Bormio, and from the Tonale Pass by others at Ponte di Legno, while Rocca d'Anfo guarded the exit from Giudicaria. The chief Italian frontier fortress in this theatre was Verona; other for¬ tified zones of assembly had been prepared on the Adige and the Tagliamento. The Astico group of defenses, nearest Verona, extended from Arsiero to Asiago and connected with the works of Val Logra and San Pietro on the frontier. Several forts lay scattered along the upper Brenta and upper Piave, while farther east efforts had been devoted to the Tarvis line and the railroad from Osoppo to Pontebba. Thus the Italian covering troops on the fron-Jier had generally strong support behind them; assembly positions had been organized for both offensive and defensive operations; the left flank of Italian armies in Venetia had been made fairly secure ; and finally, operations to¬ ward the upper Adige and the Pusterthal had been facilitated.

The general idea originally was that the Italian armies might assemble behind the Brenta with their flanks resting on Venice and Verona, and that as they advanced eastward their left would be secured by troops and works in the upper valleys of the rivers. With these leading ideas the railway policy of Italy in general conformed. Of great importance, also, was the question of the seasons. The av¬ erage Alpine pass is only free from snow for about five months in the year, and the mule-tracks over the highest cols (defiles) for not more than three months. Before the French Revolution it was not the custom for armies to begin operations in the Alps before July, and usually those armies went into win¬ ter quarters at the end of October. Later on, lower and more accessible sectors of the Alps were crossed between April and December, and the higher Alps between May and November. It has been said that there is no prospect on earth quite like the immense irregular cres¬ cent of serrated peak and towering mountain wall that is thrown around Italy on the north, as it unrolls itself from the plains of Lom¬ bardy and Venetia. In the t(3ˆth of the Aus¬ trians — ˆ and of

nature, as it were, as well — the Italians carried the line of entrenchments across wooded hills, meadows, torrents and snow-clad slopes. In. many places the trenches had to be blasted out of the rock, and were re¬ inforced with concrete or anything that mili¬ tary science or nature could offer to render them invulnerable. The outstanding feature of the campaign when it opened was that the Ital¬ ians were always going up while the Austrians only needed to come down. The former were below, and the latter high above on that immense natural rampart of mountains. The possession of theTrentino or Italian Tyrol was a matter of vital importance to Italy. The kingdom was protected by the powerful mountain barrier against invasion from France and Switzerland. But by retaining the Trentino after withdraw¬ ing from Italy in 1866, and by occupying the mountain passes down to the foot of the mountains as far as Lake Garda, Austria oc¬ cupied with her army a wide breach in Italy's defense. The Austrians could thus easily in¬ vade the country and strike at Verona, Padua and Venice by marching to the east, or at Bres¬ cia and Milan by turning to the west. The po¬ sitions held by Austria in the Trentino, in Istria and in Dalmatia were largely inhabited by Italians who suffered severely under Aus¬ trian rule : the short-sighted policy of Austria had earned her the bitterest hatred of the Italians.

A royal decree was issued from Rome on 22 May 1915 ordering the general mobilization of the army and navy. A supplementary mobili¬ zation order called up the third category of the service classes from 1885 to 1895 — men who had not received any military training. Eleven provinces were declared to be in a ˆ'state of waPˆ from the 23d, as well as the Adriatic coastlands, islands and all fortresses. All Austrian ships lying in Italian harbors were immediately sequestrated. War was de¬ clared at midnight, and the step was followed by a prompt advance on the part of the Ital¬ ians across the Austrian frontiers in southern Tyrol, Carnia and Friuli. It was soon appar¬ ent that the main military effort would be made

against the line of the Isonzo, which had been heavily fortified by the Austrians, and that while converging attacks would be initiated upon the Trentino, a determined effort would be made to seize all the crests of the Alps which had been left, after 1866, in Austrian hands. The lack of branch railroads made it necessary to concentrate the Austrian offensive at certain defined places, namely, Trent, Tarvis and Gorizia : conversely, an Italian offensive must aim at the same points — and at one more : the junction of the Pusterthal line at Franzen-feste. If that point could be taken the com¬ munications of the whole of the

Trentino sa¬ lient would be cut. But this was just the hard¬ est point for the Italians to reach, as the whole complex system of the Dolomites lay to the south and east of it. Briefly put. General Cadorna's plan was to hold on the north and push toward the east, Trieste, where the southern sector offered the best prospect for the devel¬ opment of a big offensive. Here the natural obstacles were much less formidable. At 3.30 in the morning of 24 May 1915 the first act of war took place at Venice. The inhabitants were aroused by the booming of guns and screech¬ ing of sirens. Austrian (or German) aero¬ planes, flying at a great height, dropped bombs on the sleeping city, a storehouse of art treasures. Austrian battleships bombarded the Italian coast from Venice to Brindisi.

Austria at the moment was preoccupied with Galicia, retrieving a long series of disasters with the aid of German troops under Mackensen. Not unprepared for the Italian attack, Austria had long maintained a strong army on the southern front, composed principally of Landwehr and Landsturm, among the latter some levies of Tyrolese mountaineers. This army was commanded by the archduke Eugene and Gen. Conrad von Hoetzendorf. It was not until three-fourths of Galicia had been recon¬ quered from the Russians that Austrian troops were withdrawn from that theatre and placed opposite the Italians. Within a few days after commencing operations the Italians had seized some important mountain positions in the Trentino as well as others toward Trieste; on 2 June they were crossing the Isonzo and establishing themselves on the slopes of Monte Nero, north of Tolmino. They won all the lower passes of the Dolomites and made breaches at the Tonale Pass and in the Carnic and Julian Alps. They occupied the Montozzo Pass (9,585 feet), Ponte Caffaro and Monte Baldo on the Trentino front, the Dolomite valleys and several footholds in the Carinthian Alps. On the east the Italians were on Aus¬ trian soil almost up to the Isonzo. The moun¬ tain troops of the Bersaglieri performed re¬ markably strenuous feats in dragging heavy artillery to the tops of snow-covered peaks and driving Austrians from apparently impregnable positions. Italian destroyers shelled Monfalcone near the northern head of the Gulf of Tri¬ este 31 May; it fell on 9 June and two days later the Italians had taken Gradisca.. On 2 July a severe struggle began for the Carso Plateau, the highway toward Trieste. At the same time vigorous attacks were launched against Gorizia on the Isonzo, along the banks of which the Italians maintained a strong pressure from Tolmino to the sea below Monfalcone. Simul¬ taneously blows were delivered farther north,

and Fort Malborgetto in the Carnic Alps was bombarded. The Austrian second line east of Gradisca was under lire by 30 July, while aerial raids harassed the railway to Trieste. But progress was slow and dillicult, and it was not until 22 October that the Italians were able to make a substantial advance on the Isonzo sector, when over 5,000 prisoners were taken in a week. The crests along the Alpine front fell one by one to the Italians; some progress was made in the Trentino, but the subsecpient opera¬ tions were restricted to that and the Isonzo fronts until the end of the year, by which time there were nearly 500,000 Austrian troops chained down to a mere passive defensive.

During November the offensive continued, renewed repeatedly, until in the first week in December a Scottish mist — nebbia Inglese, the Italians called it — settled down and lay im¬ movable over the front, and the Italians ad¬ mitted reluctantly that the capture of Gorizia must wait. Some other important events had happened during the first months of Italy's war. Although Italy had not declared war on Turkey, hostilities had been begun in Asia Minor against the numerous and prosperous Italian colonies. The repatriation of Italian subjects was pre¬ vented and their property was not respected. Italy declared war on Turkey 20 Aug. 1915 and adhered to the Pact of London, 1 December the same year. On 2 October Bulgarian troops appeared on the Serbian frontier; on the 4th Russia sent an ultimatum to Bulgaria ; on the 6th an Austro-German army invaded Serbia; Belgrade was occupied by them on the 9th; by the 18th Bulgaria was at war with Serbia, Russia, France, Italy and Great Britain. The Entente Allies' horoscope looked black indeed during the late summer of 1915. The Russians had been defeated in Galicia; Warsaw fell to the Germans on 4 August; Great Britain and France had suffered some 112,000 casualties on the Gallipoli Peninsula; Serbia, now overrun also by Bulgarian troops, was in a most des¬ perate position. Treaty obligations bound Greece to come to the aid of Serbia against Bulgaria; when that assistance was asked for (11 October), it was refused. Serbia's only hope lay in the success of a possible counter¬ move from Salonica, but there was only a small force of less than 15,000 French and British troops stationed there, in imminent danger of being themselves attacked by the Greeks. The Allies could thus

render no aid to Serbia. When Uskub fell to the Bulgarians on 25 Oct. 1915, the doom of Serbia was practically sealed. By the middle of November that nation had nothing left to defend of its own territory, and the broken remnant of its army struggled pain¬ fully through the mountains of Montenegro toward Scutari and the port of San Giovanni di Medtia on the Adriatic, while another column was in full retreat toward Durazzo. Two circumstances alone saved them from extermination, namely, that the Austro-German forces did not heavily press the retreat, and that Essad Pasha (q.v.) in Albania had definitely de¬ clared himself in alliance with the Entente Powers. Besides the Serbian troops the train of stragglers included many Serbian families, women, children and old men, toiling on foot over snow-clad mountains and through foaming torrents. Many died by Bie wayside. This was the situation which the Italian navy was called

upon to face in the dark days of December 1915 — the feeding, clothing, disinfecting and healing of the survivors of an heroic little nation, some 200,000 all told. They had all to be conveyed across 40 miles of water sown with floating mines and open to submarine and destroyer attack, as well as aerial bombs. Be¬ tween them, Italy, France and England supplied the necessaries of life. As only small ships could enter the harbors of Medua, Durazzo and Valona, rnarshes and rivers had to be bridged, but finally the refugees were safely carried to the genial climate of Italy for recuperation. While the great task of rescue was in progress at Valona, troops were pushed up into the surrounding country and a strong detachment posted to guard the hills around the harbors of Medua and Durazzo. According to an eye¬ witness, early in December there ˆTegan to trickle down the Montenegrin and Albanian heights the forerunners of such a flood of famished, dirt-engrained and pestilence-stricken hurnanity as can seldom have been seen in the Christian era.ˆˆ From parties of twos and threes the stream swelled to hundreds and thousands. Day and night the naval and military doctors, with soldiers, sailors and orderlies worked among the victims to alleviate their sufferings. Nor was this the only contribution of the Italian navy to the Entente cause during the early stages of its activities. Already in July iL had converted the whole of the Adriatic into a close controlled military area like the North Sea ; it had forced the Austrian navy to under¬ take only furtive operations, carried out air raids, and effected several landings on the opposite shore. Marines had been landed at Valona already in 1914, seven months before Italy entered the war.

The rather easy advance of the Italians dur¬ ing the first few months

made it appear as though the Central Powers were willing to let Italy seize the particular territory which she wanted from Austria, a quite logical conclusion, since, if Germany and Austria were defeated, Italy would get that territory anyway; whereas, in the opposite case, Italy would lose the con¬ quered lands again at the peace table. While the Italians maintained a more or less defensive attitude on the Trentino front, it was against the Isonzo line that their main efforts were concentrated. In that direction lay the road to Trieste, and Gorizia was the key to the situation, for it stood in the way of any real advance across the Carso (German, Karst) Plateau. Gorizia, furthermore, was a formid¬ able entrenched camp defended by 200,000 men, and its flanking positions showed a width of over 60 miles. A steady pressure was kept up during the winter along the whole line ; Italian gains were made at several points, some thou¬ sands of prisoners were taken, and 25 Austro-Hungarian divisions kept employed. At the end of November continuous rains flooded the country and thick fogs paralyzed the action of artillery. But the Italians dominated the Isonzo from the northwest of Gorizia, so that the bridgehead at that place could no longer be used as a starting point for an offensive action by the Austrians. By the end of the year the Italians had taken 30,(X)0 prisoners, five guns, 65 machine-guns, many bomb-throwing mortars, thousands of rifles and much ammunition.

No outstanding events occurred on the Aus-tro-Italian front during the first quarter of 1916. With the advent of spring hundreds of thousands of laborers began to arrive on the scene and were put to work under the engineers. This army of brawny if unskilled labor repre¬ sented the annual emigration from Italy to other countries. Under engineer supervision they built roads, light railways, barracks, bridges ; they bored trenches out of the solid rocks, scooped underground galleries of im¬ mense size and number, and constructed an elaborate system of aerial railways from peak to peak along the mountain chains. Steam rollers and camions soon rumbled along the roads which some weeks before had been im¬ passable for mud. Almost from the beginning of hostilities the Austrians had retired behind the Isonzo gorge, on the

course of the river above Monte Sabotino. For two years this remained the general position, the Italians occupying the western bank of the gorge, the ridge of Monte Planina and Monte Corada.

Hostilities were resumed about the middle of March 1916 in the hill country. In the previous November a bold rCAind-topped spur called the Col di Lana had been captured west of the Falzarego Pass by Italian troops under Col. Peppino Garibaldi, but the summit could not be held while the Austrians retained their foothold on the northern slopes. After three months of strenuous labor the Italians had cut a tunnel from which to blast the enemy from his position. Before the end the Austrians grew suspicious and began countermining, but in the wrong direction. On the night of 17 April 1916 the mine was sprung by the Italians, and what was left of the Austrian position was carried by the bayonet. The explosion formed a crater 150 feet wide and 50 feet deep. On 27 March the Austrians attacked in force the heights northwest of Gorizia, and with such effect that the Italian centre was driven in. The position was, however, restored next day by a counterattack and the enemy effort was not renewed here. During April some daring exploits were carried out by the Alpini on the great Adamello Glacier to the northwest of Lake Garda, where 300 Alpini left the Rifugio Garibaldi on skis, climbed the glacier by night in an Arctic snowstorm 10,000 feet above the sea, and drove the Austrians from the rocks in the early morning. On the 29th 2,000 Alpini followed the same route and dislodged the enemy from the main crest, thereby gaining a position on the flank of the Austrian lines in the Val Giudicaria. Throughout the winter the Austrians had heavily strengthened that part of the Trentino sector between the Val Lagarina and Val Sugana, and had brought powerful batteries to the Folgaria and Lavarone plateaus southwest of the city of Trent. The Italians, though aware of the concentration, anticipated no more than a local attack. This sector was under the command of the archduke Charles, afterward Austrian emperor, who was preparing here one of the major offensives of the war.

Between the two vals above mentioned, through which the Brenta and Adige rivers respectively flow, lies a comparatively small area with a frontage of less than 30 miles, where the Austrians had collected some 2,400 heavy guns, including 40 12-ˆinch Skoda howitzers, and several German naval guns. About 350,000

men were here concentrated to make a deter¬ mined attempt to break the Italian line at this point and force a passage through the Alpine

peaks to the Venetian plain. While the Italians were devoting all their thoughts and energies to preparations for a new offensive against Gorizia and Trieste, the Austrians gave them a nasty surprise where they least expected any¬ thing to happen. It is probable that-Austria wished to forestall the very offensive the Ital¬ ians were planning, for on 14 May a violent bombardment from the Austrian side blasted a gap in the Italian front lines, which had to fall back in the centre. Austrian infantry were thrown forward on the I7th; the Italian moun¬ taineers put up a series of gallant fights, but they were outmanned and outgunned. By the 18th they had lost valuable ground and many prisoners. A fierce resistance at the southern end of the sector, at the Passo di Buole, how¬ ever, saved the important strategical position at Monte Pasubio and prevented the crumpling up of the defenses and a probable Austrian dash through to the plains. On the 20th General Cadorna decided to withdraw his centre to a position well in the rear, a movement that was completed in good order by the 24th ; but the Austrian rush did not permit the preparation of new defenses. By the 25th the Austrians were attacking Pasubio and Coni Zugna; and on the 27th they were south of Galmarara, a tributary of the Assa on the left. Next day they occupied a mountain north of Asiago and the Italians evacuated that town. Two days later the Aus¬ trians had driven a wedge between Pasubio and Arsiero along the river Posina still farther to the south. Eastward of Arsiero a terrific on¬ slaught on Monte Cengio gained that position also for the enemy. General Cadorna had meanwhile brought up his reserves (the 5th Army) to assemble in and around Vicenza and prepared for his counterstroke. The greatest danger at the end of May was in the Astico valley, where the Austrians had captured the rock sumrnits of Pria Fora and Cimone, and were pouring through Arsiero down the valley itself actually on the level of the great plain. The Italians had been driven far back behind their prepared lines and had no trenches nor fastnesses in which to make a stand; they fought the invaders hand to hand and by des¬ perate fighting thrust them back over the preci¬ pices of Pria Fora. These actions saved Italy in the early days of June 1916. Arsiero was abandoned, and on 1 June an Austrian army order informed the troops that only one moun¬ tain stood between them and the Venetian plain. Within three days the Austrians were only 18 miles from Vicenza and the trunk line. On 7 June Cadorna announced that the enemy offensive had been checked. The new army had been equipped with guns and on the 12th a counteroffensive began in the Val Lagarina and on the Posina-Astico front. On the 13th a violent struggle raged around the last Italian position south of the Posina; the defenc'ers lost 70 per cent of their men, and from the 15th to the 17th the Genoese troops on Monte Pau repulsed what proved to be the last

of the great Austrian attacks. In the latter half of June the crisis passed; the Italians recovered ground on the Asiago Plateau, while a timely diversion was furnished by the Russian victory

in the Biikovina and the great British offensive on the Somme in France. What advantage Austria had gained on the Italian front she more than lost on her own territory in Galicia. General Cadorna now began to dis¬ patch men and guns back to the Isonzo front, in preparation for the great attack on Gorizia. Here we may leave them for a short space while we trace the activities of the Italian navy.

We left the Italian navy preparing to cope with the task of saving the remnant of the Serbian army and such of the civilian popula¬ tion of Serbia as had been able to make their way to the coast and survive the ordeal. Old King Peter himself, racked with rheumatism and almost blind, had made his way in disguise along the same rough road on horseback, accom¬ panied by a few soldiers and officers. While the refugees were streaming into Medua and Durazzo, the Italians were preparing a great clear¬ ing-base for their reception at Avlona, 60 miles farther south, erecting hospitals and weather¬ proof huts. During December 1915 and January-February 1916 the tragic finale of the first Balkan campaign was enacted on the Albanian Coast. By the middle of January the Austrians had captured Cettinge and overrun Montenegro, and the defeated army of that little state was also in full retreat, decimated by hunger and disease. What was left of that army fought its way back to Podgoritza and Scutari, whither the government and the king and queen had already retired. The royal party was taken on Italian warships within a few miles of the Austrian port of Cattaro, together with the Entente diplomatic representatives. Scutari fell to the Austrians on 23 Jan. 1916; Medua followed shortly after, and there began a great general movement toward Durazzo, still thronged with refuerees by thousands. For weeks the process of feeding, medical relief and systematic embarkation had been going on, subject to hourly perils of aerial, naval and land bombardment. Those who were sufficiently restored were marshalled into long columns and

sent to Valona by the road which had been con¬ structed by Italian engineers. All those unable to travel on foot had to be shipped from Du¬ razzo to Valona, whence large steamers con¬ veyed them to Italy, Corfu and Biserta in Tunis, where the French government had made preparations to receive them. Owing to Aus¬ trian pressure the position at Durazzo became untenable, and it was decided to evacuate the town on 26 February. There were yet 6,000 persons besides 1,300 wounded and sick to be removed. The Italian garrison of 2,000 men (reduced from 5,000) retired southward fight¬ ing rear actions and holding the enemy. The Austrians were dropping shells (from the land) on to the harbor quay, to which bombardment Italian destroyers replied. In the morning of 25 February the cruiser Libia entered the harbor, joined in the bombardment of the encroaching Austrian lines and succeeded in silencing several batteries. The heavily-laden transports having safely reached the sea, a party of marines was landed; other Italian cruisers arrived and an intermittent cannonade was kept up for that day and the ensuing night. On the 26th, the day of evacuation, rough weather prevailed on the sea and hampered operations. Twelve steamers and a hospital ship protected by de¬

stroyers entered the harbor ; two battleships and a destroyer flotilla waited outside to hold the sea in the event of Austrian naval opposition. Notwithstanding that the Austrian land bat¬ teries concentrated their fire upon the only avail¬ able gangway, the sick and wounded were carried on board the hospital ship under a hail of shells. All movements had to be carried out in full sight of the enemy. The Italian rear¬ guard surrounding the town had retired be¬ fore the ever-increasing pressure of the invest¬ ing armies. The dock was still crowded with refugee Serbian soldiers ; the Austrian fire in¬ creased in fury and searched every foot of the harbor. At this critical stage 100 Italian sailors landed, crept on all fours along the beach toward a great dump of thousands of sacks of flour. With these they built a breastwork, constructing two effective trenches to enable the retiring troops to reach the gangway. They then returned to their ships. Two Italian cruis¬ ers now returned, opened a violent fire on the Austrians and drew their fire in return. Mean¬ while, a swiftly-moving procession of stretchers bearing wounded Serbs, Montenegrins and Al¬ banian refugees was passing under cover of the flour-sack trenches. By eight o'clock at night 10, (KX) individuals had been embarked; no one was left behind. General Ferrero was the last to leave the shore. There yet remained a great accumulation of stores, horses and mules to be destroyed to prevent their falling into enemy hands. This was accomplished by a few shots form the cruiser Puglia

and as the 12 crowded transports, the hospital ship and the convoy drew out into the darkness, guided by a fast destroyer flashing signals, the burning town of Durazzo appeared like a giant volcano in eruption. Between 12 Dec. 1915 and 22 Feb. 1916 no fewer than 11,650 refugees, invalids and wounded persons were transported from the Albanian Coast to Brindisi, Marseilles, Lipari and Biserta; 130,840 Serbian soldiers were landed in Corfu and 4,100 at Biserta, ne¬ cessitating the employment of six large Italian liners, two French cruisers, one French and five Italian hospital ships, two Italian ambulance ships and 15 Italian, 15 French and four small British steamers. These vessels made 216 suc¬ cessful voyages from San Giovanni di Medua, Durazzo and Foci della Vujussa to Valona; 87 trips from Valona to Corfu and others to Brin¬ disi, Marseilles and Biserta. During March 1916 altogether 13,068 men and 10,153 horses belonging to the Serbian cavalry were trans¬ ported from Valona to Corfu, and during the whole period under review nearly 23,000 Aus¬ trian prisoners of war were shipped from Va¬ lona to Sardinia. Some 22,000 tons of food, fodder, hospital stores and medicines were landed at the three Albanian ports, while to safeguard the execution of this great under¬ taking there were employed 170 cruisers, de¬ stroyers, torpedo-boats and motor-boats, the majority being under the Italian flag. The principal organizer and director of the work was Vice-Admiral Emanuele Cutinelli-Rendina of the Italian navy. Mr. Balfour paid a grate¬ ful tribute to ˆffhe energy and ability displayed by the Italian fleet® in the transportation of the Serbian army from Albania (House of Com¬ mons, 23 Feb. 1916).

Italian, French and British warships pa¬ trolled the Adriatic; a former German liner, taken by the Italians, was fitted up as a floating clubhouse where the young officers of the Entente submarines congregated in their few leisure hours.

Owing to the extreme cautiousness of the Austrian fleet, the Italian navy was not permit¬ ted to distinguish itself in any great sea fight. Yet its position and that of its Allies was one of continuous peril from

submarines and float¬ ing mines, calling for eternal vigilance. By day and night frail vessels went nosing through perilous channels between hostile islands into harbors bristling with well-placed batteries and not infrequently crowded with powerful battle¬ ships too shy to seek the open sea. The Aus¬ trians launched thousands of floating mines, and these had to be removed by minesweepers. But time did not pass without occasional en¬ counters. On 5 Dec. 1915 an Austrian cruiser and some destroyers raided the port of San Gio¬ vanni di Medua, sinking two small steamers and a few sailing vessels. On 28 December an Aus¬ trian destroyer flotilla set out from Cattaro to bombard Durazzo. The land batteries were shelled and a couple of ships sunk when they were engaged by a combined squadron of Ital¬ ian, French and British light vessels. Two Austrian destroyers were accounted for; the rest hurried back. During a later bombard¬ ment Essad Pasha and 300 of his followers were taken off by an Italian warship. Twice during February, while the Serbian -transporta¬ tion was at its height, Austro-German U-boats laid mines in the Durazzo roadstead; on 19 oc¬ casions U-boats attacked the convoys, but with¬ out success. The small ambulance ship Mare-chiaro was carrying 120 wounded Serbian sol¬ diers when she struck a mine outside Durazzo. The vessel caught fire and, though its com¬ mander and a large number of the crew per¬ ished, everyone of the wounded was taken off in safety. The sole survivor of a mined Italian submarine, a sailor named Arturo Vietri, swam for 14 hours off Trieste before he was picked up by a friendly motor-boat in the dark. Italy suffered some early misfortunes at sea; she lest the battleships Benedetto Brin (29 Sept. 1915) and the Leonardo da Vinci (2 Aug. 1916) by internal explosions ; the armored cruisers Amalfi and Giuseppe Garibaldi were torpedoed in July 1915; three torpedo-boats and two sub¬ marines were also sunk by 5 Aug. 1916. After a nine months' mine-laying career in the Adri¬ atic, the German UC-12 was trapped and sunk on 16 March 1916; the Italians subsequently raised the submarine and discovered 14 bodies on board; they were German sailors from Kiel, where the vessel was built. It had been transported in three pieces overland to Pola on the Adriatic, where she arrived in June 1915 and engaged in sowing mines against Italy long before that country declared war on Germany. Five other U-boats fell to Italian guns. The Austrian submarine U-12 (not to be confused with the German one just rnentioned), was tor¬ pedoed and sunk by an Italian submarine on 11 Aug. 1915. Two days later the U-3, after being rammed by an Italian cruiser, was blown out of the water by a French torpedo-boat.

We left the Italian army at that stage in June 1916 when the back of the Austrian of¬

fensive was broken. On 16 June the Italian counteroffensive began, when two columns of Alpini drove the Austrians from a high peak above the Val Sugana. The Italians now began to climb again up that mountain staircase, down which the enemy had half descended. By the 25th they had begun to force the pace of the Austrian withdrawal, pounding their positions between the Brenta and the Adige. They re¬ covered Arsiero on the 27th and in two days the Austrians had lost more than half the ground they had won in six weeks' fighting. As the Austrians retired they contracted their front, thus compensating for the loss of divi¬ sions which had been hurried to check the Rus¬ sians on the borders of Galicia. Thus the Trentino offensive turned to failure for Aus¬ tria, with a loss of hardly less than 120,000 in casualties and prisoners. Yet though defeated on this front they made another attempt else¬ where — to dislodge the Italians from the edge of the Carso Plateau. Here, on 29 June 1916, the Austrians employed poison gas for the first time on the Italian front, causing a frightful massacre and driving whole regiments, stag¬ gering and dying as they went, out of their trenches. Had the Austrians followed up the gas attack with all their infantry they might have gained a great victory. Colonel Gandolfi with a handful of men in gas-masks saved the day. During May Cadorna had swiftly and secretly carried men from the Isonzo to the Trentino front; he now took them back for a greater effort, for it was on the Isonzo that the real Italian counter-blow was to fall. The move came with dramatic swiftness and effect. While the Austrians reckoned on Ca¬ dorna to continue his pressure in the Trentino, that commander was laying his plans elsewhere. For the past six months the engineers had sup¬ plied a network of roads, gun emplacements and warlike provision of every kind in the Gorizia zone, where the actual task was entrusted to the 3d Army under the Duke of Aosta. It involved not only the capture of an immensely difficult bridgehead under Monte Sabotino, just north of the city, but the overcoming of de¬ fenses literally hewn in the rocks.

Gorizia was indeed regarded as impregnable. The artillery preparation opened on 1 August along the whole Isonzo front. On a quiet Sun¬ day morning, 6 Aug. 1916, the region was aroused by a still more tremendous bombard¬ ment, heavier than any yet heard on the Italian front. Immediately afterward the Italians surged up through secretly-driven saps in the rock against the Monte Sabotino heights and in one exulting, irresistible rush carried the hill. After defying Italy for 15 months, Sabotino and its defenders were captured almost without loss within a few hours after the bombardment began. The heights of San Michele, just below the town, were stormed at the same time. With

these key positions in hand, the Italians had won the necessary bridgehead. This brilliant movement was carried out by the 6th Army corps under General Capello, with whom served, as chief of staff. Col. Pietro Badoglio, who later became the right-hand man of the future commander-in-chief. General Diaz. On Sunday evening and for several days afterward thousands of Austrian prisoners poured down the roads, passing the up-coming Italian regi¬ ments. At dusk the Abruzzi brigade stormed

the strong Oslavia line; a brigade of the llth division advanced against the key-position of Podgora, which was taken with desperate fight¬ ing. For two days small garrisons resisted on the summit, particularly an Austrian major, who with 40 men made such a gallant stand that when they were eventually overborne, the

\

ˆ Orezencpi.ˆ t

c.

MAP SHOWING

BATTLE OF

GORIZIA

I *ta*zan L/rre

” Auzza i %Chiapovˆy7a

.< • 1.%

Zap’o)

Zfi •

Vf vida/e •

% /i

1 S.F/or/ar)6% Pevmak

_ ..fe

rodporaˆ

jjˆCormonˆ

/g X R I A -

P/a\ZaC

‘h{l

TJLRIZOVA

Z’ZJiTBA.TI

)

H U N G A R Y.y

ˆ o»« “”

II5?)fxtbrielc

\Cern/ ‘c’di , ,, < i ‘i\v

ORIZ]

ˆetro

Po//hi}ˆa

Grad/scc

Pudc

W/r \ ˆOBERLO ˆ ,

te H‘ * PAA.TEAU rCo men k Xaar-tina m ˆ ■ *(J* / T

Kaaraafo ˆEppqccn/ aSW/a

mfalcoi

«7(” i/Vadresma ■Fa

ˆl>:A

Sea *e q* :■

fa./rQac/s.. fioaoji .

8

ˆULF oy

,\r/?/£5 7-£

© AA/ˆO M9 NALL V <

Italian commander ordered his men to present arms to the prisoners. By 8 August all the heights on the western bank of the river Isonzo were in Italian hands, and the time was ripe for the final drive on Gorizia itself. ˆ Its speedy fall was now inevitable ; the Austrians evacuated the town in haste and the victorious Italians entered it on the 9th. The enemy had suffered 80,000 casualties and lost 12,000 in prisoners. The retreating Austrians were pur¬ sued across the highlands of the Carso, across the tributary river Vallone; Doberdo, Oppacchiasella and smaller places in the hinterland were occupied by the Italians.

The Italian offensive now entered on its sec¬ ond phase, with Trieste as the direct objective. As a preliminary, the enemy would have to be driven beyond the Vallone depression, since from that position -he menaced Gorizia and barred progress on the Carso. The Doberdo Plateau was cleared by the Italians on the 10th and the Austrians were thrown eastward across the valley. They held their ground near Monfalcone for two days longer, when their resist¬ ance was broken and the whole of the western butt-end of the Carso was in Italian hands. By 15 August the whole Isonzo defense system had disappeared; between Trieste and the Ital¬ ians there still lay a difficult country, though

without aii}ˆ elaborate fortifications such as the Isonzo line had boasted. Yet the Carso was in truth the most terrible battleground in Europe; waterless and dusty, scorching hot by day and icy by night, it w’as a natural defensive barrier for the Austrians. To make any impression on the rocky floor of the Carso pneumatic drills and dynamite were essential. The Austrian first line had been blasted and drilled out of the limestone rock with machinery similar to that used in making the Saint Gothard and Simplon tunnels. The snipers’ covers were armored with iron plates an inch thick cemented into the rock.

Italy had now been at war 15 months with Austria, but not with Germany. The situation was anomalous, even unique, for Germany was supplying Austria with her most important munitions of war; German officers, soldiers and sailors had been the chief managers of

Austria's campaign against Italy so far. The state of ®peaceˆˆ with Germany ended on 27 Aug. 1916, when Italy declared war against that country. On the same day Rumania declared war on Austria. Austria had been indebted to German assistance for such successes as she had won in the field. In the early stages of the war, when she had to 'depend upon herself, Austria suffered an unbroken series of reverses ; after the first fatal step had been taken in 1914, she had the least zest for war among all the Teu¬ tonic League, for at the worst she stood to lose much, and at the best to gain little. Her loose internal structure and the variety of races in her empire did not permit any solid national in¬ tegration. Her alien peoples rose against her and had to be suppressed. Up to January 1916 as many as 3,460 civilians had been executed for treason — ˆ330 in the Trentino, 287 in Trieste, 60 in Fiume, 208 in Istria and Dalmatia, 800 in Bosnia, 720 in Bohemia, 245 in Moravia, 480 in Galicia and 330 in Bukovina. While the Hun¬ garians were entirely on the side of Germany, the German element in Austria was not of one mind, and the army soon lost its admiration for its highly efficient ally. The Emperor Francis Joseph died on 21 Nov. 1916 in his 86th year — the oldest sovereign in the world. He had been defeated in every war he had engaged in, and he died in the shadow of defeat. He was suc¬ ceeded by his great-nephew, the archduke Charles, a nephew of the murdered archduke Francis Ferdinand.

By 15 Aug. 1916 the Italian advance had reached its limit for the year. With brief pauses between the efforts General Cadorna pressed his advance in great successive blows. Success was more substantial and more rapid in the northern half of the Carso front; in the more difficult southern end, the Austrians held a specially strong position at Hermada from which their artillery dominated the country far to the west. In a big rush on 14 September the Italians took the important town of San Grado on the river Vippacco, an affluent of the Isonzo. On 10 October came a twofold thrust, break¬ ing the Austrian line just southeast of Gorizia between Sober and Vertoiba; while south of the Vippacco a further bend was forced in the enemy front. A fresh double blow fell on 1 November, when the Italians cleared the heights east of Gorizia, whence the enemies had been shelling their lost city, while in the middle of

the front, from the Vippacco to the main road east and west through Oppacchiasella a two-mile advance was made. Over 8,000 prisoners were taken in two dajˆs. The Austrians every¬ where were now back on their third line; the section just mentioned consisted of re¬ cently improvised defenses ; their greatest strength lay around the heavily fortified posi¬ tion at Hermada, where formidable batteries were concealed. To capture this sector meant a great concentration of guns and other prepara¬ tions. Winter set in meanwhile; rain fell in torrents during November and December, and by Christmas the weather was so unfavorable that Cadorna was obliged to postpone his next effort till the following spring. Frost and snow soon made the Isonzo front as arctic a region as the glacier posts in Trentino or the icy peaks of the Dolomites. Throughout the bitter winter a perpetual toil proceeded behind both fronts to improve positions, create gun emplacements and communication trenches and generally adopt all the safeguards that fore¬ sight could devise to ensure success. Italy now had Germany openly against her as well as Aus¬ tria, and the spring was certain to bring some important developments from the other side.

The political .situation in Italy deserves a passing notice. On 10 June 1916 the Salandra ministry was defeated, having lost touch with the nation, and was succeeded by a cabinet formed on national lines by the veteran states¬ man, Signor Boselli (q.v.), who retained Baron Sonnino in the foreign office. The new minis¬ try was strengthened by the accession of Signor Bissolati, the Socialist reformist leader, who was the head of an advanced section clamoring for a more vigorous prosecution of the war and especially demanding war with Germany, which followed, as already stated, two months later. During the autumn and early winter the ex¬ treme Socialists endeavored to bring about peace negotiations, for which German agents were assiduously working. They were strongly opposed by Signor Bissolati, who declared in the Chamber (13 Oct. 1916) that any state har¬ boring thoughts of peace at that time would be guilty of an act of treason. ^^The germ of war,^^ he said, ®can only be killed by destroying Aus¬ tria as a state, and by depriving Germany of every illusion of predominance.^^ Almost alone among the Allies, Italy had an avowed anti¬ war and pro-German party to deal with. A mo¬ tion in favor of immediate peace engineered by a Jew of German extraction in the Chamber at the end of November was defeated by a majority of 293 to 47 votes, on which occasion the pre¬ mier declared, ^^We seek not the peace of a day, but the peace of new centuries.®

During the first quarter of 1917 little oc¬ curred on the Austro-Italian front beyond oc¬ casional raids and counter-raids, though intense activity prevailed behind the lines. The Aus¬ trians had constructed some 2,000 miles of mili¬ tary roads since the previous summer between the Adige and Cadore. There was every indi¬ cation that the Central Powers were meditating an offensive as soon as weather - permitted, and it was the Allies' policy that Italy should strike first. Though as yet no unity of command ex¬ isted among the Allies, there was considerable more unity in the higher staff work than was generally supposed. General Robertson of the British army and General Foch's chief of staff.

General Weygand, visited the Italian com¬ mander in March to discuss plans. Italy had meanwhile raised and trained new regiments, increased her guns and output of munitions and greatly strengthened her aerial arm. An Austro-German offensive was daily expected during March and April; it was thought that another attempt would be made to put Italy out of the war altogether by a renewed drive through the Trentino. Between December and March the Italians had carried out extensive defense works in the Trentino, despite a se¬ vere winter in the high mountains. But the ex¬ pected attack was not, as we shall see, launched till the autumn. The Italian plan was to en¬ gage the enemy on the whole Isonzo line from Tolmino to the sea by an intense artillery en¬ gagement in order to keep him in doubt as to where the infantry were to be employed. By simultaneously showing vigorous activity in the Trentino the enemy would be held off in that quarter. Cadorna's intention was to strike hard with his left on the Isonzo against the heights from Santo to the north of Plava, and then, when the enemy had concentrated his reserves there, to deliver his main attack on the southern Carso toward Hermada. Artillery preparation began on 12 May, assisted by heavy British guns ; by the morning of the 14th it had grown to immense fury; demonstrations were made at different points on a front of nearly 20 miles. The Austrian first-line trenches were blown out of existence by the cannonade ; infantry raids met little opposition from the dazed and shat¬ tered Austrians. French batteries had also ar¬ rived in the zone of Gorizia and the middle Isonzo ; had the unity of front been complete at that time, there might also have been some French and British divisions on the spot to take part in the drive on Bainsizza and thus have prevented the disaster that was to follow. But the German divisions came instead, while practically the whole of Austria's effective strength, some 960 battalions, were facing the Italians. Some 6,000 guns, mainly heavy and medium calibre, held a superiority of 25 per cent over the Italian

artillery effectives. Al¬ ready in June 1915 the Italians had forced their way across the Isonzo and secured a precari¬ ous bridgehead at Plava. For two years they had held this position and extended it to in¬ clude the hamlet of Zagora, a mile down the stream, _ on the lower slopes of Monte Kuk. It was this position which became the base for the offensive of May 1917. There had been uninterrupted fighting in this sector, but neither side could dislodge the other. Here the Aus¬ trian trenches were only a few yards above those of the Italians on the precipitous sides of Kuk; there was only room for one set of barbed-wire entanglements to serve as a de¬ fense for both sides. This remarkably close proximity existed for nearly two years. An¬ other weakness of the bridgehead position was the fact that only one narrow road ran down from Verhovlje Pass to Plava bottom, and it was overlooked at a distance of less than a mile by the Austrian artillery on Monte Kuk. Every¬ thing that could ‘uot be carried down to Plava by mules through the forest tracks had to be transported in full sight of the enemy down the exposed road. A second roadway had been constructed and was opened a few days before the offensive began in May 1917. The term

WAR, EUROPEAN

1 Camouflaged Italian marine gun

Copyright, International Film Service

2 An Italian gun crew at rest during a lull in the fighting

Copyright, Underwood Jt Underwood, N. Y.

WAR, EUROPEAN

Copyright, Underwood & Underwood, N. Y,

2 Italians moving camouflaged gun to the front

1 Shell-swept forest on the peak of Mount Grappa

ˆTndgeheaTˆ implies control of that end of the bridge — in this case a permanent one — which IS nearest to the enemy.

In the morning of 14 May a pontoon was thrown across the river opposite Zagora, a lit¬ tle farther downstream. The main effort was directed on a five-m.ile front between Salcano, northwest of Gorizia, and Plava. Infantry ad¬ vanced by the two bridges and stormed a hill east of Plava and the northern spur of Monte Kuk; Zagomila (an Austrian fortress) fell to one Italian brigade, while a Campobasso regi¬ ment _ struggled up the slopes of Monte Santo. By nightfall the Austrian second line. 800 feet above the stream, held up the attack. Two bat¬ talions of Bersaglieri and Alpini surprised the enemy in the dark and forced a passage of the river near Bodrez, between Plava and Tolmino, where they organized a bridgehead and held their ground. The attack was renewed all along the line at dawn ; the northern and south¬ ern summits of Monte Kuk were captured; on Monte Santo the Italians were obliged to with¬ draw ; the result of the day's fighting gave the Italians the western gate of the Bainsizza Plateau, also Monte Vodice, and a wide range of observation over the enemy's communica¬ tions for the front on San Gabriele, During the assault on Hill 174 north of Tivoli by the Italians, the Austrian batteries heavily bom¬ barded the city of Gorizia from their hill posi¬ tions and seriously damaged many of its build¬ ings. On the first two days of the battle the Italians took over 3,000 prisoners, a mountain battery and 30 machine guns. The Austrians launched fierce counterattacks on succeeding days against Kuk, Vodice and the Central Carso position, but failed to dislodge the victors. Fresh Austrian batteries had been rushed from the Russian front and placed in position on the Carso ; these were now shifted again to the north of Gorizia. The battle raged fiercely till 22 May, not only on the Isonzo, but in the Adige Valley and between Asiago and the Val Sugana, particularly around the Tooth of Pasubio, a rock tower of the peak which was the key of the Italian line west of Asiago. The small troop of Bersaglieri and Alpini

which had crossed the Isonzo at Bodrez was withdrawn on the 18th. Their little bridge had quickly been shattered and they were left on the ene¬ my's side of the river with hundreds of pris¬ oners and the stream behind them. On 23 May the 3d Italian Army under the Duke of Aosta struck on the Carso : The second act of the drama began. For 10 hours every available gun sprayed a torrent of fire, and in the afternoon the Italian infantry went forward. The enemy lines, cut in the solid rock of the plateau, were broken from Kostanjevitza (or Castagnavizza on the hill road to Trieste) to the sea. Jamiano and its surrounding hills on the road far¬ ther south were also taken in the first day's bat¬ tle, which yielded over 9,000 prisoners. Some 130 military and naval aircraft harassed the Austrians from the rear, while a squadron of British monitors bombarded the Austrian flank along the coast. While the left wing of the Duke of Aosta's force carried out a demonstra¬ tion from Volkovniak southward, the centre and right led the main attack, storming the Aus¬ trian trenches south of the Kostanjevitza-Hudi- Log road, and swept beyond Lukatic. Jamiano, Bagni and a number of low hills west of the

mouth of the Timavo were carried by the bayo¬ net. Deceived by the feint beyond Gorizia, the Austrians were completely taken by surprise; despite the most determined counterattacks, they lost both their first and second positions the first day. By 26 May the Italians had reached the foot of Hermada, a natural fortress 1,000 feet high, guarding the road to Trieste. The Austrians put up a brave defense and counterattacked at many points ; they man¬ aged to recapture a hill east of Gorizia, but lost it a few hours later. One effect of the Italian advance was to free Monfalcone from its daily bombardment by the guns of Hermada, for al¬ though that fortress had not been captured, its chief batteries were now diverted in other direc¬ tions.

During a pause on the Isonzo the 1st Army in the Trentino made a swift attack in the mountains between the Adige and the Brenta. After driving the enemy up the Tonale Pass on 10 June, the Italian infantry carried the Ag-nello Pass on the frontier line due north of Asiago and captured nearly the whole of Monte Ortigara east of Cimi Undid. On the 16th Italian troops advanced over the glaciers of Adamello, northwest of Lake Garda, and cap¬ tured a strongly-fortified position 11,000 feet high on Corno Cavento.

An acute political crisis convulsed Rome during this period, centring round the national war aims as they affected Italian claims in the Adriatic and in Albania. Italian troops had in June occupied Yanina,

formerly a part of Al¬ bania, but at this time included in Greek Epirus. The object of the occupation was to assist the Allies in Macedonia, but the Greek government, still under pro-German predominance, made a strong protest. The various questions were dis¬ cussed in a 10-days' secret session of the Ital¬ ian Chamber. The Boselli Cabinet survived that crisis, but its position was precarious ; there v/as a general feeling that it had failed in en¬ ergy and foresight. Albania was declared by Italy an independent country under her protec¬ tion, 3 June 1917.

To return to the Isonzo, By the end of May 1917 the Italian offensive had prospered, though scarcely up to the expectations of its promoters. A halt for rest was called on the 30th, when the weather broke and the battle had virtually died away. Prisoners to the number of over 15,000 had been taken, some 20 guns and a large stock of war material. Between Kostanjevitza and the sea the Italian line had been advanced up to two and a half miles on a five-mile front; the Timavo was crossed and some obstructive marshes successfully passed, while a footing had been obtained on the slopes of Hermada. But the heights around Kostanjevitza in the north and Hermada with its tunneled rocks still stood firm : the two pivots of the Austrian line had not been shattered. Uneasiness prevailed among the Austrian High Command at the Italian suc¬ cesses. A council of war was held at Laibach, from which an urgent summons for help was sent to Berlin. Men and guns were sent from the stagnant Russian front, but they arrived too late to influence the result of the battle. How¬ ever, a great Austrian counterstroke was de¬ cided upon. It opened on 1 June with a severe bombardment of the ridge of Fajti Hrib and in¬ fantry attacks at Tivoli and the southern crest of Vodice. The fire grew in intensity and on

4 June the Austrians made an attempt to storm Fajti Hrib with picked troops that won a foot¬ ing inside the Italian positions. The Italians charged, recovered the ground and annihilated the storming party. The enemy was checked, hut the Italian new line was badly placed, and a few days later (5 June) the outposts were driven in and the right

wing was forced back from the slopes of Hermada. A lull fell on the scene ; the counterstrokes had cost the Austro-Germans 24,000 prisoners and nearly 80,0(X) killed and wounded. The Italians now stood at the gates of Trieste — ˆ the edge of Hermada in the south and of the Bainsizza Plateau in the north, the key to San Gabriele and San Daniele in the Ternovanerwald. During the last days of August and the first week in September the Italian position on the Bainsizza was highly critical on account of imperfect communications. Fresh enemy battalions and batteries were con¬ stantly arriving from disintegrated Russia. If the Austrians had now been able to attack the isolated force on the Bainsizza before it could prepare its trenches, there would have been every chance of success.

Great preparations were in progress on the Italian side for an assault in force on San Ga¬ briele and the Bainsizza position. In that direc¬ tion and over the Carso lay a possibility of breaking the Austrian resistance. Batteries and troops were requested from the French and Flanders fronts, but there the Allies were al¬ ready committed to extensive operations and could spare no infantry till those operations had been carried out. On purely military grounds the French and British commands were obliged to refuse the Italian request ; the centre of gravity lay on the Western Front, and any de¬ feat that might have been inflicted upon Aus¬ tria in the field would not have struck any de¬ cisive blow at the power of the principal antag¬ onist, Germany; while any weakening of the Western Front by withdrawing troops for op¬ erations elsewhere was not unlikely to court dis¬ aster. Italy was thus perforce left to her own resources and had to do the best she could with the rnaterial at hand. Russia was gradually dropping out of the war and a mighty German effort was to be expected on the Western Front. The Papal Peace Note, which contained the phrase, ˆˆuseless slaughter,ˆˆ was utilized by the ®defeatisfˆ sections to convey the impression among the Italian people that their propaganda was supported by the Holy See. Industrial troubles were spreading in big Italian cities; the government was vacillating and unpopular; the land was full of pacifist talk and an insidi¬ ous peace campaign was sowing discontent among the troops. A speedy victory in the field was imperative.

The attack opened on 18 Aug. 1917 with a violent artillery preparation along the whole line from Tolmino to the sea — the so-called ® Ju¬ lian front.® General Cadorna's intention was to test or ˆffeel® the enemy's front by general at¬ tacks to find a weak spot; once that was found, the attack could be pressed hard with the ob¬ ject of seizing one or other of the three key positions — the Austrian bridgehead at Tol¬ mino ; Monte San Gabriele ; and Hermada, spread

over a line of 30 miles. During the night of the 18th the Italians constructed 14 bridges over the Isonzo and began crossing the river from Plava northward to Santa Lucia.

Their first rush on the 19th carried the front Austrian trenches the whole length from Plava down to the sea (25 miles). The main attack was delivered in the Carso Plateau heights, where almost half of Austria's fighting strength was concentrated, composed mainly of Ruthenes, Poles, Czechs, Slovenes and Serbo-Croats. Facing this force was the Italian 3d Army under the Duke of Aosta, while General Capello directed the 2d Army against Bainsizza. General Cadorna soon discovered the weak spot in the enemy's defense : it lay on the heights of the Middle Isonzo — the key position of Monte San Gabriele. A furious battle raged for over two weeks round that moun¬ tain and on the Bainsizza Plateau. lˆonte Santo was captured by the Italians on 27 Au¬ gust; two days later the main centre of the battle shifted beyond Santo to the higher peaks of the Bainsizza Plateau; on a front of 12 miles the Italians had advanced about four miles. The Austrians under Gen. Borojevich von Bojna stubbornly contested their progress. San Gabriele fell to the Italians on 4 September; the fierce bombardment had reduced its de¬ fenses to a ^^gruesome slaughter-house.® There was less progress on the Carso front, where General Diaz captured the village of Selo ; and in the Hermada region the Italians recovered some lost ground. Austrian counterattacks were beaten off and nearly the whole of the ground was held. From the beginning of the offensive the Italians had taken over 30,000 prisoners, while the enemy claimed 6,000. The Italian success had been considerable, but the collapse of Russia had prevented a decisive vic¬ tory. Both sides settled down exhausted on the ground where they found themselves; from the Italian point of view, the situation appeared to be secure. It will be noted that all the battles on the Julian front were comparatively short ones, the explanation being that on such diffi¬ cult terrain the human machine cannot long bear the strain demanded.

In the midst of imagined security, when not a few on the Italian side believed that the year's operations were nearly over on their front, there fell, like the proverbial bolt from the blue, that tremendous cataclysm which almost ruined Italy and the Allied cause. It was known that German troops had arrived to rein¬ force the Austrians, but the enemy's new strength had been underestimated; and besides, there were dark forces at work far behind the battleline. The Italian Parliament met on 16 Oct. 1917. Commander-in-Chief and Minister of War had assured the country that the Julian front was quite safe. The

official Socialist party had welcomed the Papal Peace Note and demanded that ®This winter no one must be in the trenches.® Scarcity of food and domestic mismanagement were charges laid upon the government's shoulders. The premier was an old man of 80 and other ministers had ex¬ hibited little firmness in handling domestic mal¬ contents. The soldiers at the front also had their grievances; general lack of education among the rank and file presented an ideal soil for the sowing of tares by Socialist and Bol¬ shevik propagandists. The specious argument, ®What are we fighting for? Let's go home,® proved an irresistible fascination for many war-weary but nevertheless patriotic soldiers. Nor is this spirit to be wondered at when the

'///innv"

l*i

■iiyr ^ -^ih

””*■ A ’S w//i > ”#ni«’

|^\,.”ll’*«t’siy^

.wi^lv.wv

KM’CSli’W

6 ‘ll

•<

10’S

III’

111.

o

to

*3 CO -

\f)

severe hardships they suffered are taken into consideration. The Russian army had given the example of throwing away their arms and refusing to fight.

The night of 23-24 October was dark and on the Caporetto, where stood the 2d Italian Army under General Capello, who at the time lay sick with fever. A violent bom¬ bardment from the Austrian side broke out during the night; in the storm of shells were some emitting a new kind of poison gas. In the morning of the 24th Cadorna realized what was coming. Before the Alpini guarding the pass leading down from the Caporetto had recovered from the surprise of the fierce but very short bombardment, the German infantry, pouring down the pass at an extraordinary speed, werê among them. The Italians were bayonetted in hundreds and the remainder of the troops at this point fled in panic. At Tolmino, farther south, whence the Austrians had never been driven from the west bank of the Isonzo, they broke through the Italian lines at the first rush. The left and right of the line held, but the defenses being ruptured at Tolmino and Caporetto, the whole 16-mile sector from Plezzo to Tolmino collapsed in 24 hours. Here ensued, not a retreat, but a dis¬ astrous rout; hundreds of guns and great quantities of stores were abandoned to the enemy. In the afternoon the enemy was across the river attacking the reserve lines ; by the evening he was on the slopes west of the Isonzo. The struggle and retreat continued uninterruptedly throughout the 25th and 26th ; on the 27th the German com¬ mander, von Below, entered the Italian city of Cividale. In Rome the Boselli Cabinet fell on the 25th ; the first news of the disaster arrived next day, while Signor Orlando was

engaged in forming a new government. In 12 hours the Italians had lost the Bainsizza ; it had cost 20 days' hard fightine to capture it. The Austro-German avalanche increased in velocity on the 27th, and the only hope now left for the Italians was a possible stand on the Tagliamento, the Piave, or, as a last resort, the Adige, involving a considerable sacrifice of home territory.

Though the troops to the south, the Italian 3d Army, occupying the Bainsizza, Gorizia and the Carso, made a desperate effort to check the torrent, they were obliged to fall back in accordance with the retirement in the north. Gorizia was evacuated on 28 October and occu¬ pied by the Austrians. By that day the enemy claimed to have taken 100,000 prisoners and 700 guns. Udine, the seat of the Italian main headquarters, fell to the Austrians on the 29th. Capello's broken army streamed in wild dis¬ order back to the Friulian Plain, uncovering the Duke of Aosta's flank and jamming him be¬ tween the invaders and the Adriatic. Though temporarily vanquished, the spirit of the nation was not crushed ; it rose gallantly to the call of danger ; people and leaders faced the crisis with commendable fortitude. The overwhelming magnitude of the disaster led the Italian com¬ mand to overestimate the forces against them, for it was the new tactics and not weight of numbers that had carried the Austroˆ Germans farther than their expectations or intentions provided for. But Ludendorff, who had planned the campaign, was not prepared for such a great triumph as now lay almost within his grasp —

the annihilation of Italian resistance. All now depended upon the 3d Army, and it did not fail its country in the crisis. Something like a million men, hampered with heavy naval guns, v/hich had to be dragged through swamps and ferried on rafts through floods and blinding rainstorms, were engaged in the retreat ; it was a race against time to reach the Tagliamento before the enemy. The enemy pressed close on their heels, and on 5 November Borojevich von Bojna's Austrian army operating on von Below's left forced a passage of the Tagliamento near Pinzano, about 40 miles from the mouth of the river. Cadorna still held the middle and lower river, but the position was too precarious in which to remain. The Adige, 60 miles to the west, promised the best defense, but that would uncover Venice, the key to the Adriatic and the whole of Italy's defense. By 8 November the enemy had taken 2,300 guns and nearly a quarter of a million prisoners. Large bodies of Italian troops surrendered every day. The pursuit continued and an attack was made concurrently upon the Tyrolean front, the Asiago sector falling to the Austrians on 10

November. By this time the main Italian forces were every¬ where back on the Piave ; thanks to the wintry weather setting in they were able to hold this ground.

The first news of Caporetto brought the Allies of Italy to her side, but assistance did not arrive until the Italians had borne the brunt at the storm and fought the enemy to a stand¬ still. A French contingent under General Fayolle crossed the frontier before the end of October; a British force under General Plumer came on 10 November. Early in that month Mr. Lloyd George, three high British officers, the French Premier, M. Painleve and General Foch arrived in Italy. They met the Italian Premier, Orlando, Sonnino, the Foreign Min¬ ister, and other officials at the village of Rapallo, 16 miles from Genoa, on 5 November. Out of that meeting there sprang the Allied Council of Versailles and the much-needed unity of command on the Western Front. General Cadorna was transferred to Versailles and General Diaz was placed in command of Italy's armies. General Badoglio became chief of the general staff*. During the next six weeks the Austrians delivered numerous attacks along the Piave and near Asiago, where Hoetzendorf was in command, but at the end of the year the Italians were still holding the line of the Piave. On 10 Dec. 1917 it was announced that French and British troops were in the firing line on the Italian front. The British were stationed at Montello, a critical point in the new defense system. Fighting continued throughout the winter; in January the Italians scored some local successes, and by the end of that month military experts decided that the Caporetto campaign was over. Italy had saved herself, but her military strength had been shaken to its foundations and she had lost much war material. On the enemy side, the unexpected success had raised fresh hopes and particularly confidence in the new style of tactics. Yet the disaster was not altogether without profit to the Allies ; it brought about that unity of purpose and effort which had hitherto been lacking, and it also united the Italian nation and produced both military and civil reforms.

On the last day of the year 1917 the French

army and artillery came into action west of the Piave, with the result that the Austrians had to abandon their large bridgehead at Zenson, northeast of Venice. The winter was severe and fighting was confined to artillery duels for several weeks. On 29-30 Jan. 1918 the Italians recaptured the Val Bella and Rosso Heights and made 2,600 Austrian prisoners. On 9 May another important success was gained by the capture of the fortified Monte Carno Peak, north of Pasubio. By this time it was evident to the Allied Command that a great Austrian offensive was planned on the Italian front to synchronize with a German attack in France. The next battle opened on 15 June, on the whole front, from the Asiago Plateau opposite the British, around by Grappa, Montello and the Piave down to the sea. After a terrific bom¬ bardment the Austrians carried with little re¬ sistance almost the whole front line of the Allies, which included three British and three French divisions. But their success on the mountains was of short duration, for the British drove them out again with great slaughter and pursued them into their own lines, where all resistance ceased. The French and Italians also speedily recovered themselves' on the mountain front. The Austrian storming parties were harried with instant counterattacks at every point. At two places the enemy had crossed the Piave on the first day of the attack; by the third day it was apparent that the offensive was not only a failure, but that the attempt might be converted into a disaster. The Piave had been low when the enemy had crossed; now it rose rapidly and washed away the bridges by v/hich he had come over. The Italians gained the initiative by 21 June; most of the Austrians were driven back across the river with heavy losses ; after eight days' fighting those of the enemy who remained on the west bank slipped back in the night ; during that time the Entente Allies had taken 16,000 prisoners. The Italians followed the enemy across the river, recovering ground with little trouble. By 1 July the Asiago position had been restored and a week later the Italians had cleared the whole Piave delta and secured the safety of Venice. Besides the French and British, there was also a body of Czecho-Slovaks fighting on the Italian front; the first American contingent arrived there on 31 July. On 14 July the second battle of the Marne had opened and the German command was preoccupied with the last desperate throw. Dur¬ ing August a series of raids were carried out against the Austrians, but throughout the violent fighting on the Western Front and the period of the Bulgarian and Turkish collapse, the Italians were kept, as part of the general strategy of the Allies, marking time until Foch was prepared for his great thrust. On 15 Sept. 1918 Austria sent a peace note to all belligerents, including

her ally, Germany. Neither the Entente Allies nor the United States treated these overtures seriously, for it was known that the dual monarchy was in dire straits and on the verge of collapse. On 6 October General Diaz offered Lord Cavan, who had succeeded General Plumer when the latter went back to Ypres in March, the command of a mixed Italian-British army for the coming offensive.

There were strong reasons for the com¬ parative inactivity on the Italian front during the early autumn. A number of troops had

been loaned to Foch and the Austrians held the superiority in men and guns over the Italians. The Austro-Hungarian state was crumbling, and Diaz wisely stayed his hand until the process of internal decay had become accelerated. On 23 October — the anniversary of Caporetto — all was ready for the last great effort. Diaz now had at his disposal 51 Italian divisions, three British, two French, one Czecho-Slovak and one American regiment. According to the plan of campaign the battle was to begin with a feint by the 4th Arm}ˆ under General Giardino around Monte Grappa, after which the main attack was to be delivered between Montello and the Ponte di Piave to cut the line connect¬ ing the Austrians in the mountains with those in the plains. At 5 a.m. on 24 October the Italians opened fire and at 7:15 the infantry advanced. The ruse succeeded, for the Austrians believed the Grappa sector to be the main objective. Meanwhile gome British troops had taken pos¬ session of the island of Grave di Papadopoli in the middle of the Piave, and on the 26th the Italian artillery began to play on the real objective indicated above. Here immediate suc¬ cess was obtained by the three armies on a 30-mile front — the 12th fought its way up the Piave Gorge and cut the Austrian communica¬ tions with the Grappa massif ; the 8th Army, from Montello, passed over the bridges con¬ structed by the British, and the 10th Army crossed via the Papadopoli Island. By 30 Octo¬ ber the Austrian front had been cut in two. From this moment the gradual retirement of the Austrians became a rout; their resistance weakened all along the line. Czech and Polish battalions surrendered wholesale, as also did many Hungarian units ; only a few Austro-German bodies maintained their discipline and resistance. By 31 October the enemy was flung back across the Livenza; the Duke of Aosta's 3d Army was over the Piave everywhere down to the sea, while away up north Asiago had been retaken. The Grappa front collapsed on 1 Nov. 1918; on the 2d the British from the Asiago Plateau rested on Austrian soil ; the roads to Trent and Trieste lay open. More than 300,000 prisoners and 5,000 guns had fallen to the victors. The Pope appealed to Great Britain (1 November) in behalf of

Austria's plea for a separate peace. On 29 October an Austrian flag of truce party had approached the Italians in the Adige Valley, but as it could show no proper cred^entials it was sent back. Next day another white flag arrived with General von Weber and seven other plenipotentiaries. The terms of an armistice were presented by Gen¬ eral Badoglio oji 3 November; these were prornptly accepted and on Monday, 4 Nov. 1918, hostilities ceased between Austria and Italy. The victory was decisive and overwhelming; Austria collapsed under military and internal pressure just as her ally followed a week later. Of all the Allies' enemies Germany alone re¬ mained, and she was preparing to hoist the white flag. At the close of the war it was re¬ vealed that Italy had mobilized 5,000,000 men out of a population of 35,000,000; she had lost nearly 470,000 killed and close to 1,000,000 wounded, of whom more than half were crippled for life. Besides fighting her own battles with comparatively little material help from her Al¬ lies, Italy sent 250,000 men to the French front, where they held part of the line between

Rheims and Chateau-Thierry. Since early 1917 Italy kept 100,000 men over military age building roads in France. An Italian brigade also cooperated with the British forces in Mesopotamia under General Allenby from the spring of 1917. During the last year of the war Italy had youths of 19 in the fighting line ; early in 1918 boys of 18 and 17 had been called up and enrolled for the army and navy. Aus-tro-Germans holding the invaded provinces of Italy after Caporetto damaged 431 industrial plants, causing a loss of over $57,000,000. While the Italian navy had no opportunity to fight any great sea battle, it performed an enormous service to the Allied cause and displayed bril¬ liant examples of individual valor. On 9 June 1917 Commander Luigi Rizzo with two small torpedo boats forced his way by night into the port of Trieste after cutting the big steel haw¬ sers at its entrance, sank the battleship Wien, damaged the Budapest and got safely away. On 9 June 1918 Rizzo performed an amazing feat of audacity in attacking two Austrian dreadnoughts and three destroyers with two submarine chasers off Premuda, an island bor¬ dering the Dalmation Coast. In the gray dawn he slipped through between the destroyers and sank the 20,000 ton dreadnought Szent Istvan, badly damaged the other dreadnought and got away again in 20 minutes.

The enemy squad¬ ron was making for the Italian shore when the unexpected meeting occurred. In the early hours of 14 May 1918 Lieut.-Commander Mario Pellegrini led a raiding party escorted by de¬ stroyers into the strongly-fortified Austrian military port of Pola, eluding the observation of the scouts and searchlights. Here lay Aus¬ tria's fleet of battleships, cruisers and destroyers, fenced off by a chain of mines and a heavy steel net from bank to bank, and encircled by a terrace of land-batteries. After penetrating these obstacles, Pellegrini torpedoed a super¬ dreadnought, sank his own boat, as arranged beforehand, and with his comrades swam ashore to be taken prisoners. On 1 Nov. 1918 Commander Rossetti and one companion en¬ tered Pola with a ®naval tank® and sank the Austrian superdreadnought Viribus Unitis, then already in the hands of the Jugo-Slavs, who had seized the Austrian fleet in that har¬ bor a few days previously, and now protested strongly against the battleship being destroyed. That vessel had carried the Archduke Francis Ferdinand to the Dalmatian Coast on the way to his death at Serajevo and had conveyed the bodies of himself and his wife back to Trieste. In all the sea and land engagements the Italian aviators — of whom one of the most daring was D'Annunzio, the soldier-poet — played a conspicuous role with a courage excelled by none of the belligerents. The mercantile marine, also, kept the flag of Italy flying over sub¬ marine and mine-infested waters, transporting the necessary war material and troops without which victory would have been impossible. The terms of the armistice laid Austria-Hungary open to the Allies for military operations ; all the outworks of the Teutonic League had fallen ; the central keep of Germany alone remained, and that, too, was destined soon to fall.

In February 1919 the Italian delegates pre¬ sented before the Reparations Committee of the Peace Conference a statement of Italy's naval losses in the war. These consisted of eight capi¬

tal ships, eight submarines, and 25 smaller craft The Italian merchant marine lost 880,000 tons of shipping, or 57.5 per cent of its total tonnage.

Henri F. Klein,

Editorial Staff of The Americana.

8. COLONIAL AND JAPANESE CAM¬ PAIGNS. Africa. — At the outbreak of war the colonial possessions of Germany in Africa, Asia

and the Pacific covered an area of considerably over 1,000,000 square miles, with a total popula¬ tion of about 15,000,000, of whom some 25,000 only were whites and the rest natives or abor¬ igines. The defense forces were composed of roughly 5,000 German and 4,000 regular native troops. In Africa the colonies were German East Africa, German SouthWest Africa, Togoland and the Cameroons (Kamerun) ; in Asia, Kiao-chau or Tsing-tau, a protectorate in the Chinese province of Shantung; in the Pacific, the Bismarck Archipelago, Samoa Islands, Kai¬ ser Wilhelm's Land (New Guinea), the Caroline, Marshall, Solomon, Marianne and Pelew Is¬ lands. Although these colonies would have be¬ come automatically cut off in any case by the British blockade of the North Sea, it was essential to the Entente Allies that they should be occupied as soon as possible because of the assistance they could otherwise render with their wireless stations, coaling depots and other es¬ tablishments to the German warships — von Spee's China squadron and the commerce raiders outside of European waters. The Goehen and Breslau were in the Mediterranean ; three German light cruisers, the Bremen, Dres¬ den and Karlsruhe were known to be in the Atlantic and a fourth, the Konigsberg, was sta¬ tioned off East Africa with her base at Dar-es- Salam, while von Spee with five cruisers had left Kiao-chau before war was declared. A few gunboats, of little fighting value, were sta¬ tioned on the West Coast of Africa and one in Australasian waters — the Geier.

Togoland. — The first Allied blow against German colonies was struck on 8 Aug. 1914, when a British cruiser captured Lome, the capital of Togoland, without firing a shot. The German forces fell back 100 miles inland to Atakpame. French and British territory en¬ veloped the colony — about the size of Ireland — on three sides, and the coastline was open to naval attack. Defense was obviously impos¬ sible. Captain Bryant crossed the western frontier with the Gold Coast Regiment and a French force entered the colony from the other side — Dahomey. In two days the whole of Southern Togoland fell to the Allies ; on 27 August the government station at Atakpame was taken with very few casualties. The wireless installation was destroyed and the Germans surrendered. A Franco-British administration was set up, and in a few weeks normal peace conditions prevailed again.

Cameroons. — The Cameroons presented greater difficulties owing to the_ wider area in¬ volved and lack of communications. Hemmed in between French Equatorial Africa and Nigeria, the colony was entered from the French Kongo and by British columns from the Nigerian frontier about 25 Aug. 1914. One of the latter, a mounted infantry detachment of the West African Frontier Force under Lieuten¬ ant-Colonel Maclear, reached the Benue River and seized a German oost.

Advancing to the

river station of Garua, they attacked the forts on 29 August, captured one fort, but were driven back next day across the frontier by a violent German counterattack, in which a well-directed machine-gun fire killed several British officers, including Maclear, and accounted for 40 per cent of the native troops. Two other British detachments that crossed the frontier also met with disaster. At the end of August one col¬ umn occupied the German station of Nsana-kong and the other had taken Archibong. Early in September the Germans made a de¬ termined attack on the positions and compelled the invaders to retreat. Their ammunition be¬ ing exhausted, the British garrison fought their way through by bayonet charges and re¬ gained Nigerian territory with heavy losses. The complete failure of the land attack is at¬ tributable to inadequate preparation, topographi¬ cal ignorance and the rainy season then in prog¬ ress. A joint naval and military operation was now begun from the mouth of the Cameroon River. A Franco-British force was convoyed b}' the cruiser Cumberland, the French cruiser Bruix and the gunboat Dwarf. On 4 Septem¬ ber the Germans attempted to* wreck the Dwarf by an infernal machine; on 16 September the German merchantman Nachtigall tried to ram the gunboat, but was herself wrecked with a loss of 36 men. Another attempt, made a few days later with spar torpedoes,* likewise miscarried. The Germans having sunk some steamers to block the passage to the port of Duala, several days were spent by the Allies in clearing wreck¬ age and mines. On the 27th they reached Duala, and a short bombardment resulted in un¬ conditional surrender. The neighboring coast town of Bonaberi also surrendered to Brigadier-General Dobell, and the Cumberland took pos¬ session of nine merchant ships of the Hamburg-Amerika and Woerman lines, containing gen¬ eral and homeward cargoes and considerable quantities of coal. These vessels, together with the German gunboat Soden, were added to the British navy. Meanwhile a French force had arrived by sea from Libreville in the French Kongo. Under cover of a French cruiser they attacked Ukoko on Corisco Bay, sank two armed vessels and completed the conquest of the coast. The Germans retreated inland by rail and along the Wuri Valley, making a stand at Japoma, the terminus, and Jabassi, on the Wuri. Fighting stubbornly,

they were pushed back from Japoma by a French column on 8 October and from Jabassi by the British — on a second attempt. From this stage the Germans were reduced to a desultory defensive. Col¬ umns of French Colonial infantry under Colo¬ nel Mayer and British troops under Dobell moved along the two railroads leading to the interior. Dense forests through which they passed concealed enemy snipers ; they reached Edea. 50 miles from Duala, and occupied the town on 26 October, the Germans falling back on Yaunde. They returned later, however, and made a desperate effort to recapture Edea. Dur¬ ing November the German capital, Buea, and its seaport Victoria were taken by the Allies ; in December they had gained the whole of the

* This is a well-known method: a torpedo is fixed on a raft made of spars and towed in the dark to the ship, where it is attached. Naturally this can only be done in the case of the ship being at anchor or in a harbor. The torpedo is fired either by electric wire or an automatic time clock.

northern line, including Nkongsamba and Bare. Skirmishing continued on the frontiers; a Brit¬ ish force crossed from Nigeria and occupied Ossidinge, which surrendered ; French columns entered from the Tchad region in the north ; French and Belgians intruded from south and east, and gradually a wide circle was formed around the defenders. The campaign developed slowly; swamps, forests and tropical, heat im¬ peded operations and the Allies had occasional difficulties with hostile tribes of natives. The siege conditions then prevailing in Europe were here reproduced in miniature. The Germans held on during the whole of 1915 ; they lost Eseka in May, Ngaundere, Lome and Garua in June, by which time there were nearly 10,000 Allied troops in the colony engaged in rounding up the enemy, whose force consisted of about 4,000, scattered over a country half as large again as the German empire and perfectly adapted for guerrilla warfare. Broad, deep rivers, rocky heights and elephant grass up to 20 feet high, provided ideal defenses and cover. To guard their lines of communications the Al¬ lies had to establish blockhouses every 20 miles and garrison them. After the fall of Duala in September 1914 the seat of the German govern¬ ment was transferred to Yaunde, about 120 miles inland. In March 1915 the Allies began a concerted move on Yaunde. Their widely-scattered columns were checked by topographical conditions and frequent digressions necessary to clear

adjacent regions. The rainy season inter¬ vened and operations were held up until Octo¬ ber. Meanwhile, in August, an attempt by Gen¬ eral Cunlift'e to reduce the German stronghold on the mountain Mora, 1,700 feet high, had failed. The main advance on Yaunde began 9 October. After severe jungle fighting over a wide area the Allied columns closed in on the Germans and entered Yaunde on 1 Jan. 1916. After marching and fighting apart for 17 months those columns converged on their objective within a few days of one another. The bulk of the German troops not already prisoners es¬ caped into Spanish Guinea ; the garrison on Mora surrendered on the offer of generous terms 18 Feb. 1916. The conquest of the coun¬ try was complete; the white prisoners of war were sent to England and the native troops to their homes. A joint Franco-British adminis¬ tration was established.

German SouthWest Africa. — This great territory of about 322,000 square miles had a population of about 15,000 whites and some 100,000 natives, chiefly Hottentots, Bushmen and Bantus, when the war broke out. Its southern frontier bordered on Cape Colony and the gov¬ ernment of the Union of South Africa immedi¬ ately undertook to defend its borders with its own troops. The declaration of war by Great Britain against Germany revived the smoldering disaffection among a remnant of the Boer irreconcilables and culminated in the Beyers Re¬ bellion (q.v.). About 10 Aug. 1914 the Germans abandoned their two principal stations on the coast, Liideritz Bay and Swakopmund, and re¬ tired to the inland capital, Windhoek, 200 miles from the coast, carrying with them all military stores^ By the end of August they had made small incursions into British territory, skirmish¬ ing with the farmers over the border. On 8 Sept. 1914 the premier of the Union, General Botha, announced in the Cape Parliament that

the government had decided to carry the war into German territory. A majority in both Houses supported the proposal. Fighting on a small scale developed in the southeastern an¬ gle of the frontier ; a German blockhouse was captured at Raman's Drift on 15 September, and on the 18th an^ expedition arrived-by sea and raised the British flag over the town hall of Liideritz Bay. General Botha called for 12,000 troops.

In an action fought at Sandfontein, in the desert between Raman's Drift and Warm-bad, on 26 September, a detachment of 200 British troops was compelled to surrender after their ammunition had given out. The incident raised considerable suspicion owing to the ap¬ pearance of treachery that surrounded it. Gen¬ eral Botha found reason to suspect the loyalty of Lieut. -Col. .S. G. Maritz, then in command of a Union force in the northwest. He had fought with the Boers in the South African War, 1899-1902, and had later assisted the Germans against Morenga in the Herrero campaign. Botha sent Colonel Brits to relieve Maritz of his command. The latterˆ replied with an ultimatum and a threat to invade the Union of South Africa (8 Oct. 1914). Maritz boasted that he had am¬ ple guns, rifles, ammunition and money from the Germans and that he would overrun the whole of South Africa. In addition to his own rebel commands he had a force of Germans under him, and held the rank of a German general. He had also signed an agreement with D.r. Seitz, governor of German SouthWest Africa, guaranteeing the independence of the Union as a republic and ceding-Walfish Bay and other portions of the Union to Germany. A wide¬ spread conspiracy revealed itself, implicating a number of Boer leaders with a considerable fol¬ lowing. Martial law was immediately declared throughout the Union and the government took energetic steps to suppress the rebellion. By the close of the year Botha had taken 7,000 rebel prisoners; their leaders were killed, captured and scattered. On 25 Jan. and 3 Feb. 1915 the last rebel commandos surrendered and the cam¬ paign against German SouthWest Africa was vigorously resumed under the command of Gen¬ eral Botha. A feature of the campaign was the attitude of the natives, all tribes uniting with an eager desire to-help the Union troops against their former masters. They were not permitted to join in the fighting, but they were employed as scouts and transport drivers.

In January 1915 the British occupied Swakopmund, the terminus of the line to Windhoek and of that running to Grootfontein and Tsu-mab. They also held Liideritz Bay, whence an¬ other line runs to Windhoek by way of Keetmanshoop and gained control of the Orange River to the south. General Botha's army con¬ sisted of about 30,000 men, composed of South African Mounted Rifles, Transvaal Horse Ar¬ tillery, Durban Light Infantry, Kaffrarian Rifles, Imperial Light Horse, Bechuanaland Rifles, Enslin's Horse, Diamond Field Horse, South African Railway Engineers, South Afri¬ ca Motor Corps, Queenstown Rifles, Natal Po¬ lice, Natal Carabiniers, Zululand Mounted Rifles, Pretoria Regiment and some of the Transvaal Scottish. More than half were mounted; many wore no particular uniform, especially the Boer

commandos. The principal difficulty before theni was that of transport. The theatre of operations was a dreary, water¬

less desert. All stores and much of the water had to be brought from Cape Town and con¬ veyed into the interior -by -ox-carts, automobles or by a sea-route of 500 to 700 miles. Inland, even water had to be carried for man and beast, while the temperature was from 100° to 113° in the shade. Large gangs of natives were employed day and night shoveling the drifting sand from the railroad tracks.

Dividing his forces into two main armies. General Botha took command of the northern group and started 22 Feb. 1915 from Swakopmund along the railroad toward Windhoek. Lit¬ tle progress was made during the first month, most of the time being spent in reconnoitring the strength and whereabouts of the enemy. The southern group, under General Smuts, op¬ erated in three separate columns, one from Liideritz Bay on the west, one from the Cape frontier on the south, and the other from Kim¬ berley across the Bechuanaland frontier on the east. The plan of campaign was to conduct an enveloping movement against Windhoek along the two railroads. Owing to the desert nature of the ground the enemy could not hope to main¬ tain a defensive if once dislodged from those lines. Sweeping the scattered German forces before them, the southern columns effected a junction at Keetmanshoop in April and began a united movement northward. Meanwhile Botha, in the north, had fought his way on to Windhoek and occupied the place, which sur¬ rendered with 3,000 whites and 12,000 natives. The German forces, however, had retired northward to Otavi, the junction for Tsumab and Grootfontein. Botha reached Otavi by forced marches on 1 July 1915. Here the Ger¬ mans made their last serious stand. Cut off from further retreat by a flying column under General Brits, the Germans surrendered uncon¬ ditionally on 9 July 1915 with 204 officers, 3,293 of other ranks, 37 field guns and 22 machine-guns. About 1,500 Germans were already in British hands. By 15 July the rest of the Ger¬ mans had surrendered and the Union of South Africa undertook the administration of the ter¬ ritory.

German East Africa. — This, the greatest and richest of Germany's colonies, was about twice the size of the German Empire in Europe. It contained a population of 8,000,000, including about 5,500 whites. It was bounded on the north by British East Africa and the Victoria Nyanza ; on the west by the Belgian Kongo and Lake Tanganyika; on the southwest again by British territory and Lake Nyasa ; on the south

by Portuguese Mozambique and on the east by a coastline of 600 miles on the Indian Ocean. The principal seaports were Dar-es-Salam (the capital), Bagam-oyo, Saadani, Kilwa, Mikin-dani, Tanga and Pangani. The two railroads — the strategic Usambara line, from Tanga to New Moshi (220 miles) and the Central, from the capital to Ujiji (780 miles), were completed in 1912 and 1914 respectively, and were intended to be connected with the Cape to Cairo route. A network of good roads spread through the whole territory. The military and police force consisted of about 3,000 natives and 300 Ger¬ mans, well organized and equipped. At the out¬ break of war a number of German reservists were brought from the east and landed at Dar-es-Salam. With these and with recruits taken from residents and native tribes, the German

fighting force in the colony was raised to some 3,000 whites and 5,000 natives. The British strength in the adjacent colonies was almost negligible. The King's African Rifles scattered in British East Africa and Uganda numbered barely 1,000; and in northeast Rhodesia and Nyasaland only small bodies of police and a few white volunteers were available. Particu¬ larly vulnerable to hostile attack were the 584 miles of the Uganda Railway, in parts only 50 miles from the German frontier.

Hostilities began on 13 Aug. 1914, when the British cruisers Astrcra and Pegasus made an attack on Dar-es-Salam and landed parties which destroyed the wireless station, the gun¬ boat Moewe and the floating dock. At the same time a British steamer on Lake Nyasa captured the German steamer Von Wissmann with captain and crew. Some days later the Germans attacked Karongwa, a British port on that lake, bringing 400 men against a garrison of 50, but reinforcements arrived and the Ger¬ mans were thrown back over the frontier. They next attacked Abercorn on Lake Tanganyika, but were beaten off by a detachment of Rhode¬ sian police. Skirmishing continued along the southern border while the Germans prepared for their main stroke — the invasion of Brit¬ ish East Africa. They seized a small frontier post at Taveta and another at Vanga on the coast during the latter part of August. Mean¬ while, the British were collecting all available strength to protect the Uganda Railway. White

colonists, Arabs, Indians and Somalis were hurriedly recruited and deployed. Reinforce¬ ments from India arrived at Nairobi on 3 Sept. 1914 under Brig.-Gen. J. M. Stewart, who took supreme command. He came in the nick of time, for the Germans had set out to wreck the line at Maungu. A force of 600 Germans ad¬ vanced along the Tsavo River, making for the bridge, but were driven back after a two-days' engagement. On 10 Sept. 1914 the Germans crossed the frontier close to the Victoria Ny-anza and occupied the town of Kisi, but they W'ere dislodged on the 12th and retired to Ka-rungu, a British post on the lake. Two British steamers forced them back over the border and sank two German dhows, A German force was moving along the seacoast under cover of the cruiser Kbnigsherg to attack Mombasa. A small British force halted them at Gazi for several days until Indian troops arrived on 2 Oct. 1914, and Mombasa was saved.

The German offensive slackened during Oc¬ tober; the defenders held the line and awaited the arrival of another expeditionary force from India, which reached the coast on 1 November, under Major-General Aitken. With two gun¬ boats this force anchored off Tanga, the Ger¬ man post, and demanded its surrender. The Germans temporized for a day while strength¬ ening their position and collecting further troops. In the evening some British troops were landed, but their advance was stopped. More men were landed next day (4 November) and a general attack opened. They reached Tanga, but were driven .back to their ships un¬ der a fierce fire, losing nearly 800 men. Inland, an attempt to recapture a British fort held by the enemy north of Kilimanjaro also failed, though the Germans evacuated the fort on 17 November. A German force broke into Uganda on the 20th and compelled the garrison of Ky-aka Fort to retire. Outpost skirmishes con¬ tinued through December, and in the middle of January 1915 a British garrison at Jassin, 20 miles inside German territory, was compelled to surrender after a desperate defense. The British withdrew from German territory, but Germans still remained on British ground. On 8 Jan. 1915 the British occupied the island of Mafia and on 28 February blockaded the coast. In June an expeditionary force under General Stewart was sent to attack the German base at the port of Bukoba, on the west of Victoria Nyanza. In less than a week the place was de¬ stroyed with its boats and wireless installation and the enemy defeated, with most of his artil¬ lery and rifles captured. In July the Kbnigsherg was destroyed in the Rufiji River, where she had lain for eight months. (See War, European — Naval Operations). During the rest of the year indecisive fighting raged on land and the great lakes.

During 1916 nearly the whole of German East Africa was conquered under the command of General Smuts, who succeeded General Smith-

Dorrien in February. The (German strength was now estimated at 16,000, of whom 2,0(X) were whites and the ofhers natives. They still held stretches of British territory and had established a large entrenched camp at Taveta along the Uganda Railway and were drawing their supplies from their own railhead at Mpshi. ˆ General Smuts decided to recapture this territory before the rainy season. Starting from Mombasa one column advanced along the Uganda Railway, while another column made a flanking operation from Longido, northeast of Kilimanjaro, their objective being Krahe, an im¬ portant post on the German railway to Moshi. A turning movement by a detached troop under General Van Deventer forced the Germans to evacuate Taveta 9 March. Four days later the British were over the border and had seized Moshi, where fhe two columns joined forces and pressed the enemy out of the Kilimanjaro region. The war was now carried into the ene¬ my's country. One German station after an¬ other fell into British -hands until at last Tanga, the terminus on the coast, was captured on 14 Nov. 1916. Dar-es-Salam, which had been strongly fortified arxi equipped with the naval guns taken from the Kbnigsherg, surrendered on 4 Sept. 1916. While General Smuts was sweeping the colony from the north, the Portu¬ guese and Belgians operated from their own territories, south and east. The Belgians cap¬ tured Ujiji on 3 August. Though the Germans had lost all their important positions their power of resistance was not broken. A strong remnant of their fighting forces was still at large. Throughout the year 1917 they con¬ ducted a harassing guerrilla warfare in the south and southeast of the colony. The rounding-up process was extremely difficult for the British, as the Germans had well learned the art of bush-fighting. On 1 Dec. 1917 General Van Deventer reported that the German com¬ mander, von Lettow-Vorbeck, had crossed the Rovuma into Portuguese East Africa and that the protectorate, now administered by Great Britain, was clear of the enemy. In the sum¬ mer of 1918, however, they were still skirmish¬ ing in the neighborhood of Lake Nyasa, and not until 25 Nov. 1918, two weeks after the

armistice, did the final remnant of the German forces surrender.

Asia: Kiao-Chau. — This former German colony is a district of about 200 square miles, situated on a sheltered bay in the province of Shantung, China, and surrounded by a neutral zone. The town of Tsing-tau was a naval sta¬ tion and most of its 5,000 German inhabitants were marines. Germany had spent $100,000,000 in fortifying the place by land and sea, and its excellent harbor made it an ideal base for the German Pacific Squadron, which had sailed hence at the outbreak of war. Japan delivered her ultimatum to Germany on 15 Aug. 1914, demanding the evacuation of Kiao-chau. The period of grace expired on 23 August and Japan declared war. On the 27th the Japanese opened the campaign by occupying some of the small islands outside of the harbor and diligently sweeping for mines. On 2 September they landed troops at the northern base of the penin¬ sula to isolate the fortress from the land. The heavy rains interfered with this project, how¬ ever, and the Japanese began an attack from the air, dropping bombs on the ships left in the harbor and on places of military value. The railway station at the head of the bay was taken by storm 13 September, which brought the Japanese within 20 miles of Tsing-tau. They reached the chief of the outer defenses, Prinz Heinrich Hill, on the 27th and took it on the 28th. This gave the Japanese commander, Gen¬ eral Kamio, a gun position from which he could cover the inner defenses. The British com¬ mander in North China, General Barnardiston, arrived from Wei-hei-wei with a small British force and landed on the seaward side of the peninsula on 23 September to co-operate with the Japanese, whom they joined on the 28th. The invaders advanced to within five miles from Tsing-tau and drew a cordon across the peninsula. The Japanese squadron in the mouth of the harbor bombarded the forts, which re¬ sponded with a lavish expenditure of ammuni¬ tion. Noncombatants were permitted to leave the town on 15 October, when a party of women and children and a number of Chinese were conducted through the Japanese lines. The lat¬ ter now opened a fierce bombardment and con¬ siderably damaged the forts on Kaiser Hill and litis Hill; the first land bombardment began on 31 October. On the following day the British warship Triangle silenced the forts on Bismarck Hill, and on 2 November the Austrian cruiser Kaiserin Elisabeth was sunk in the harbor and the floating dock was blown up by the Ger¬ mans. The Japanese troops were meanwhile driving the German infantry down the penin¬ sula, and by 6 Nov. 1914 the Allies had reached the edge of the last redoubts. Early next morn¬ ing preparations were made for a final assault, when white flags were raised on the Observa¬ tory tower and the remaining central forts. Representatives of the opposing

forces met dur¬ ing the day and at 7 :30 p.m. the German admiral in command, Meyer Waldeck, signed the terms of surrender. On 10 November the colony was transferred to the Japanese general and nearly 3,000 prisoners were sent to Japan, while the German commander and his staff were permit¬ ted to retain their swords. The Japanese lost 236 killed and 1,282 wounded, and the British 12 killed and* 61 wounded. The Japanese also lost a cruiser, a destroyer and three minesweepers.

German losses have not been announced. The strength of the Japanese and British forces was 22,980 and 1,500 respectively. It was officially slated that Japan would administer the terri¬ tory of Kiao-clau until the end of the war and then open negotiations with China.

Other German Colonies. — Germany pos¬ sessed about 100,000 square miles of territory in the Pacific, mostly in New Guinea, where the possessions were officially known as Kaiser Wilhelm's Land, situated in the northern part of the southeastern section of the island, alto¬ gether about 70,000 square miles, containing a population of some 500,000, of whom 300 were Germans. A large number of islands around the coast were included, the Bismarck Archi¬ pelago, New Pomerania, New Mecklenburg, New Lauenburg, Admiralty Island and New Hanover, with 200,000 natives and 300 Chinese and Germans. The Solomon Islands, to the east,. were part German and part British, while north of New Guinea lay the Carolines, the Pelew and the Marianne or Ladrone Islands, bought from Spain in 1899. Samoa, the other German South Sea possession, contained about 500 Europeans, British and Germans chief!}', some 1,500 Chinese and a native population of 15,000. The Australian squadron and the Brit¬ ish China squadron patrolled the Pacific hunt¬ ing for German cruisers. An expeditionary force of about 1,500 men sailed from Welling¬ ton, New Zealand, on 15 Aug. 1914, escorted by the battle cruisers Australia and Melbourne and the French cruiser Montcalm, arrived at Apia, Samoa, 28 August and took possession of the German islands without opposition. The Ger¬ man officials were left at their posts. On 11 Sept. 1914 a British force arrived at New Pom¬ erania, where some German troops were con¬ centrated. After a short fight they surrendered ; two days later the Solomon Islands were sur¬ rendered. Kaiser Wilhelm's Land capitulated and a British garrison was placed ashore. By the end of September the Pacific possessions of Germany had nearly all fallen. In November the Japanese took the Marshall

Islands and the other northern group and handed them over to Australia. See War, European — Naval Op¬ erations.

By the terms of the Treaty of Versailles handed to Germany on 7 May 1919 Germany was deprived of all her colonies. France and Great Britain were instructed to make joint recommendation as to the future of Togoland and Cameroon. Mandates for the rest of the colonies were apportioned as follows : For German East Africa, Great Britain ; South¬ west Africa, the Union of South Africa (Brit¬ ish) ; Samoan Islands, New Zealand; other Pacific possessions north of the Equator (Marshall, Pelew, Caroline and Ladrone groups), Japan; those south of the Equator were placed in mandatory control of Australia, excepting Samoa (already mentioned) and Naura, which latter was placed under the Brit¬ ish Empire.

Henri F. Klein,

Editorial Staff of The Americana.

9. TURKISH CAMPAIGNS. Mesopo¬ tamia and Syria. — Turkish politics under¬ went a profound change after the disappear¬ ance of Abdul Hamid H in 1909. In his re¬ lations with Europe that monarch displayed

a suppleness and tact which no statesman of his time ever managed to overcome. The Turks gained their footing by the sword, and by the sword alone could they be made to relinquish an inch of it against their will. Knowing perfectly and to a nicety the aims and rivalries of the western powers, Abdul Hamid played one against the other with consumm.ate skill and kept at bay the urgent and per¬ sistent demands of Europe for reforms and the supervision of them. At the commencement of his reign Abdul Hamid utilized England to keep Russia out of Constantinople and to withstand her demands at Berlin. Later on he leaned on the Triple Allianee until it began to crack, and then again he turned to Russia as soon as there were signs of a dual combination between her and France. Still later he used German ex¬

tortion against British sentiment and Russian diplomacy against German encroachment and vice versa as occasion arose. But for years before his downfall, German infiltration had gradually undermined the uneasy autocracy which he had so laboriously built up ; the lead¬ ing lights of the ®Young Tfirk^^ party, young in their ideas rather than years, were instantly taken under German patronage as soon as their revolution had been crowned with success. The next sultan, Mohammed V, became a mere figure-head in the hands of Enver Pasha, a personal friend of the kaiser, and what may be literally described as the ^^bonds® between Tur¬ key and Germany became closer than ever. Ger¬ many could not avert the defeat of the Turks in the Balkan War because to appear openly in the conflict would have precipitated a European war, and she was not yet ready for that. The effects of the German penetration now became apparent. The strength of Turkev had been so weakened by that struggle that she could no longer stand alone, hence Germany controlled her army, managed her finances, railroads and even her government. Turkey was an essen¬ tial wheel in the German machine for the real¬ ization of a great plan. We have it on the authority of the Greek minister in Berlin that the kaiser told him, on 4 Aug. 1914, the day Great Britain declared war on Germany, that an alliance had been concluded between Ger¬ many, Turkey and Bulgaria. If, thereafter, Turkish officialdom entertained any misgivings about entering the war on the side of the Central Powers, such anxiety was forcibly re¬ moved by the demonstration made in the Bos¬ phorus on the arrival there of the Goeben and Breslau. The German military mission in Constantinople took charge. The sultan, ^^a quiet, easy-going, gentlemanly old man,® as United States Ambassador Morgenthau de¬ scribed him, was entirely under the domination of Enver and Talaat Bey, and those two were pro-German to the core. The training by von der Goltz and Liman von Sanders had turned the Turkish soldier into an incomplete Ger¬ man ; that training had brought nothing more than defeat in 1912-13 against the Balkan League, and it is little to be wondered at that many Turkish officers and the more intelligent class of ®01d Turks® had little relish for the adventure toward which they were heading. The bombardment of Russian Black Sea towns (30 Oct. 1914) by the two German warships fly¬ ing the Turkish flag led the Allies to declare

war on Turkey 5 Nov. 1914. See Turkey and THE War; War, European — Historical In¬ troduction and Dipl«matic History.

At the time of its entry into the war the Turkish Empire had an area of 710,000 square miles and a population of about 30,000,000. As a

result of the Balkan Wars (q.v.) Turkish possessions in Europe had been reduced from 65,350 square miles to 10,882 square miles ; and the population therein from 6,130,200 to 1,890,- 100. In Asia Minor Turkey had 193,540 square miles and a population of 9,090,000; in Armenia and Kurdistan, 72,000 square miles, population, 2,500,(XX) ; in Mesopotamia, 143,250 square miles, population, 1,400,000; in Syria, 114,530 square miles, population, 2,890,000; in Arabia, 170,300 square miles, population, 1,050,000.

The peace strength of the Turkish army was about 17,000 officers and 250,000 men, which could be raised to something like 800,000 if the necessary equipment could be provided. The soldier's pay was 25 cents a month and their families received an allowance of $1.20 per month. Enver Pasha was made commander-in¬ chief and the German military mission under Liman von Sanders constituted the general staff. During the mobilization a process of ˆrequisitioning® was resorted to under govern¬ ment auspices, which consisted of officials enter¬ ing stores and dwellings and seizing anything that captivated their fancy, giving in return some worthless paper ˆreceipts.® Much of the stuff thus collected was sold again and re¬ stolen by officials. A few of those plundered who had influence enough were fortunate in receiving at least a percentage of the value of their goods ; by far the bulk — or its proceeds — went into official pockets, while the government appropriated the remainder. Ostensibly for mili¬ tary purposes, the officers *even carried off women's silk stockings, corsets and baby slip¬ pers® (Ambassador Morgenthau). In the 15 divisions of the regular Turkish army raised to war strength there were some 300,000 men of all arms ; this number was to be augmented by 10 more divisions. Though orders were later issued to raise the total to 50 divisions, it is doubtful if the Turks ever had more than 5(X),(X)0 men in the field at any time during the war.

Her geographical position prevented Turkey from being of any direct assistance to Ger¬ many, for the interests of the latter lay in Europe. Bulgaria, Greece and Rumania were still at peace, hence there could be no attempt on the part of Turkey to regain possession of Thrace. Consequently, there was no room for an offensive in Europe nor any need of a de¬ fensive. Italy being also neutral at the time, a descent upon Tripoli was equally out of the question. But Turkey was in a position to strike a useful blow against Russia in Trans¬ caucasia which would divert troops from the Eastern Front; and against Great Britain in the Sinai Peninsula in an attack on the Suez Canal. This latter move, it was expected, would pre¬ cipitate the long-fomented uprising of the Egyptians and compel England to keep in Egypt the troops which were there in training — Aus¬ tralians and Indians —

and also, perhaps, to send further reinforcements from her slender reserve at home. The attempt, if Successful, would cut the short route to India and might

help along the uprising expected in that direc¬ tion. _ Thus practically all that Turkey had to fear in the way of an attack was in the Dar¬ danelles, the entrance to which had been strongly fortified by heavy Krupp and Austrian Skoda guns. But already in September 1914 the Brit¬ ish government in India knew that Turkish agitators were at work on the northwest frontier preaching a jehad or holy war against the white infidels. Hence neither England nor Russia was taken by surprise when Turkey was swept into the maelstrom of war. The Turkish — • or rather German — plan was to strike against the Russians in the Caucasus and cut off access to the oilfields ; to send an expedition to Egypt; and to seize Basra near the head of the Persian Gulf, where the works and pipe¬ lines of the Anglo-Persian Oil Company — the liquid fuel store of the British navy — were sit¬ uated. This oil concern, it may be mentioned, was formed in 1909 with the object of working a concession granted in 1901 to a Mr. W. K. D'Arcy for 60 years, with the exclusive rights to work petroleum deposits throughout the Persian Empire except in the provinces of Azerbaijan, Ghilan, Mazendaran, Asdrabad and Khorasan. In 1914, before the war, the British government had contracted with the company for the supply of oil-fuel for the navy. The total share capital amounted to $20,000,000; of this sum the government subscribed $11,000,000, thus con¬ trolling the majority of votes in the company.

The element of surprise, from which the Turks and their allies hoped so much, proved a failure, for already on 2 November a British warship attacked Akaba, at the head of the Red Sea, and a combined French and British squad-ren bombarded the Dardanelles forts, which latter was not only a fruitless proceeding, but also served to put the Turks on their guard. Meanwhile, even before the declaration of war, two other items of preparedness for what they knew was coming had been brought about by Russia and Great Britain. A Russian column

had crossed the Turkish frontier from the extreme northwest corner of Persia, and occupied Bayazid, near Mount Ararat, while other columns entered Kurdistan from the east in a movement upon Van. Yet more Russian troops were crossing the frontier from Erivan; they took the town of Kara Kilisse, but were held lip by the Turks from penetrating farther into the country. The British were likewise ready ‘in the Persian Gulf. The government of India had sent a force to Bahrein Island in the gulf under Brigadier-General Delamain, and on 7 Nov. 1914 this force, composed of British and Indian troops, arrived at Fao, where a Turk¬ ish fort defended the entrance of the Shatt-el- Arab, the estuary which unites the Tigris and Euphrates. Between those two rivers lies the land called Mesopotamia. Already in September the Turks had dispatched troops southward from Bagdad to prevent a hostile landing on the gulf ; by a forced march these had reached Basra about the same day that the British were disembarking men at Saniyeh, on the Turkish bank of the estuaˆ, the other (eastern) bank being Persian territory. Here the British pre¬ pared an entrenched camp and waited for the rest of the force to arrive. A skirmish with ihe Turks from Basra occurred on 11 Novem¬ ber; on the 13th General Barrett came up with the remainder of the Indian contingent. The

main Turkish army was reported on the 17th to be advancing in force from Basra, when General Barrett decided to attack at once, a particular incentive being the fact that there were Europeans in Basra whose lives might de¬ pend on the timely arrival of the British. Ac¬ cordingly, the whole force moved out and reached Sahain, which was found to be de¬ serted. British gunboats accompanied the ex¬ pedition, steaming slowly up the Shatt-el-Arab on the right of the marching troops. After passing Mohammerah, where the Karim also empties itself into the estuary, though from the opposite side, the Turkish army was found posted at Sahil, nine miles from Sahain, with its left resting on the estuary and its right, where the artillery was concentrated, hidden in groves of date palms. Muddy open ground lay between the opposing forces. The weight of the British attack was thrown against the Turkish left, where the gunboats were able to assist by enfilading the enemy’s trenches ; the right was to be held while the left was turned away from the river and in¬ cidentally from the Basra route. The British troops had to advance in the open before a heavy fire which was badly directed and caused little harm. Before the attackers could reach the front line the Turks broke and fled, with the British in close pursuit. The British casu¬ alties were only 38 killed and some 350 wounded, while the Turks in their retreat lost over

1,000 men. The road to Basra now lay open. Part of the British force was placed on two river steamers headed for Basra, with gunboats steaming ahead. The rest of the troops were sent after the flying Turks so far as the diffi¬ cult ground permitted. Below Basra the Turks had sunk three steamers in the fairway to pre¬ vent the passage of the oncoming British. A Turkish battery posted to cover the barrier was quickly silenced and the obstructions speedily blown out of the water. The expedition, both on land and water, pushed rapidly ahead and entered Basra, which the Turks had evacuated, on 22 Nov. 1914. The desert column entered shortly after. The Turkish customs-house had been set on fire, the only building in the place which would have been capable of holding the military stores. So far, however, as lack of ma¬ terials permitted, a base camp was prepared and set in order. On 3 December an Anglo-Indian detachment was sent to Kurna, where part of the retreating Turks had established themselves. Three gunboats, two armed launches and an armed yacht conveyed the troops, who were put ashore four miles below Kurna, on the western bank of the Tigris, while the gunboats went ahead to reconnoitre. They found the enemy strongly posted with batteries covering the navigable channel, some 50 miles above Basra. The gunboats shelled Kurna and the troops advanced under heavy fire. Colonel Frazer, who commanded, finally led his men back to the camp four miles away and sent a message to Basra for reinforcements, reporting the enemy too strongly situated. Gen¬ eral Fry arrived with more troops and on 7 December the British captured Mezera, on the opposite bank, and drove the Turks across to Kurna. Next day a rear attack on Kurna was decided on. By a circuitous route the British had reached north of the city and prepared to attack. The same night, however, before the

battle had even begun, the Turks asked for terms. Unconditional surrender was demanded, and the next day (9 November) the Turkish garrison laid down its arms. The British took 1,500 men and nine guns. The advance to this stage had covered 120 miles from the gulf; Kurna and Mezera, respectively on the western and eastern banks of the Tigris, were converted into entrenched camps. A wide re¬ gion

had now to be protected and General Bar¬ rett had perforce to mark time until further re¬ inforcements — ˆ then on the way — should ar¬ rive from India. The first Turco-German project had failed.

In the neighborhood of Mount Ararat the frontiers of Russia, Turkey and Persia meet. Here the limits of Persia form a salient stretch¬ ing into Transcaucasia, a corner which had fre¬ quently been the scene of Russo-Turkish con¬ flicts. The subsidiary Russian operations in this region during November 1914, already re¬ ferred to, died away toward the early part of January 1915. Meanwhile, a greater struggle had developed in Transcaucasia and on the Ar¬ menian frontier. Three rejpforced Turkish army corps had been concentrated at Erzerum during October 1914 under the command of Hassan Izzet Pasha. On the outbreak of hos¬ tilities Enver Pasha, accompanied by a German staff, took charge of the operations. He had altogether about 150,000 men; opposed to these was a Russian army under General Vorontzov composed of about 100,000 men. A weird con¬ glomeration of races, creeds and languages ex¬ ists in Cau'casia, where some 70 dialects are current and where Turk and Russ had been at grips for centuries ; indeed it is doubtful if that region ever enjoyed any long spell of peace since Noah's ark settled on Ararat. To reach the theatre of war the Russians had to traverse difficult mountains, passes and river beds. The movement now to be described was — to Rus¬ sia — rather a secondary operation ; prudence advised a defensive until the severe winter was over. This, however, was not the plan of Enver Pasha, who had formulated an ambitious and skilful campaign to be carried out at once. The great fortresses of Kars and Erzerum, situ¬ ated about 50 miles on each side of the fron¬ tier and consequently 100 miles apart, were the concentration bases respectively of Russia and Turkey in Asia. Enver Pasha's plan was to en¬ tice the Russians over the boundary from Sarikamish and to hold them while his left centre executed a wide enveloping movement against Sarikamish, and his left made a circuit to at¬ tack Kars in the rear, a form of strategy based on German principles copied from Napo¬ leon. The successˆ of such a movement, how¬ ever, depended entirely upon an accurate time¬ table, according to which the participating bodies of troops could arrive at their specified objectives at the correct moment. Considering that the Turks would have to perform their evolutions across such obstacles as snow-clad mountains, through passes and over rivers, the chances of the scheme working satisfactorily were remote. The Russians fulfilled the first part of the Turco-German expectations during the first half of November 1914 by crossing the frontier from the neighborhood of Sarikamish and occupying Koprikeui on the 20th. They were thus well on the

road to Erzerum. The

11th Turkish corps was detached to do the ˆffiolding® part; the 10th corps was sent from north of Koprikeui to cut the road between Sarikamish and Kars ; the 9th corps was to swing round between the 10th and 11th; while the 1st corps, which had been landed at Trebizond on the Black Sea, was to strike at Ardahan and move on Kars via Alexandropol.

So far things looked promising ‘ and the Turks attacked on 14 Dec. 1914. Koprikeui was cleared of the Russians, who were driven back some 10 miles to Khorasan ; the 9th and 10th corps had struggled through severe weather and reached the road between Sari¬ kamish and Kars by Christmas Day; the 1st corps had struck inland up the Choruk Valley across a pass 8,000 feet high during a blizzard and now looked down upon Ardahan. But the hardships endured by the three traveling corps had worn the men out, and when they arrived at their appointed destinations they were half starved and short of guns and ammunition. General Vorontzov fell upon the 10th corps (28 December) and defeated it in a fierce four days’ battle ; he next turned upon the now iso¬ lated 9th corps and almost annihilated it; the Turkish general, Iskan Pasha, surrendered with his staff (including German officers) after a gallant resistance. Duly, according to sched¬ ule, the 1st _corps entered Ardahan on 1 Jan. 1915 exhausted. Two days later they were driven out again back to the Choruk Valley, in which direction the remnants of the flying 10th corps were also speeding. Meanwhile the 11th corps drove the Russians back from Khorasan and Vorontzov was obliged to recall his troops pursuing the 10th corps and throw them into battle against the 11th. This latter was also crushed after a three days’ fight in deep snow, and by 17 Jan. 1915 it was retreating to Erze¬ rum. The Russian right cleared the Choruk V’alley; Turkish transports escorted by war¬ ships attempting to land troops and provisions at Trebizond were sunk by a Russian Black Sea squadron and the warships, Breslau and Hamidieh, were chased back to the Bosporus. Thus ended the Turkish project in failure after three weeks of heroic struggle amid high mountains and deep snowdrifts, with a loss estimated at over 60,000 men. For a time, at least, Russia was secure from attack in the Caucasus.

The third item in the Turkish program fared no better than the two preceding. A suc¬ cessful attack on Eg^^pt could only be carried out by one of two means — by sea or across the Sinai Peninsula. The requisite command of the sea being absent, the only alternative was

the land approach. Yet here certain difficulties stood in the way: to reach the canal involved crossing a waterless desert of some 100 miles. Three routes were possible, namely, along the coast from Syria, 120 miles, without water; the southern road, from the head of the Gulf of Akabah, at the head of the Red Sea, 150 miles, equally without water ; and through the centre of the peninsula, where there was no road at all. Another serious problem would present itself if and when any one of the three routes had been successfully negotiated by an army. The Suez Canal, which would have to be crossed before a direct attack could be made on Egypt, pos¬ sessed a virtue not usually associated with

canals — it could accommodate the greatest bat¬ tleships armed with the heaviest guns. The hope of a general uprising among the natives, however, seemed to outweigh this obstacle in the Turco-German view, and an attack on the canalˆ was duly decided upon and prepared for. Politically the Sinai Peninsula is part of Egypt and has an eastern frontier line drawn almost straight from Rafa near the Mediterranean in a southeasterly direction down to the Gulf of Akabah, leading to the Red Sea. On the north¬ ern coast,ˆ some 30 miles west of Rafa, an Anglo-Egyptian post was established in normal times, the garrison of which was withdrawn in October 1914, when it was reported that a band of 2,000 Bedouins was marching on Egypt. Be¬ yond a skirmish between the Bikanir Camel Corps at Katiyeh, 26 males northeast of El Kantara, nothing happened on the peninsula till the end of January 1915, when small advanced parties of the enemy crossed by the north¬ ern route and were driven back at various points. British airmen had the region well un¬ der observation, so that a surprise was hardly possible. But these isolated attacks were merely feints to cover the advance of the main force destined to reconquer Egypt. On 2 Feb. 1915 the van of the Turkish army reached the covering sand dunes on the east of the canal on a front facing Ismailia. Here they deployed and waited till dark. Though stealthily carried out, these manoeuvres had not passed unobserved by the British on the opposite bank at Toussoum. The Turks now attempted to launch a number of pontoons

which they had carried across the desert with them, as well as rafts made of empty petroleum cans. Those engaged in this proceeding were simply mowed down with ma¬ chine guns and their primitive floating apparatus were riddled with bullets and sunk as soon as they appeared. They brought some artillery into action during the night and early next morning the battle had extended from Ismailia to the Great Bitter Lake, a front of, roughly, 12 miles. Three British gunboats, an armed trans¬ port and two French guardships took part in the fray, heavily shelling the enemy positions. Turkish fire fell off early in the afternoon ; two columns of Indian troops were thrown across the canal and quickly cleared the sand hills, tak¬ ing 600 prisoners. The rest of the Turkish army were in retreat, dragging their guns with them, leaving 400 dead on the ground. What happened to the shattered host of originally 12,000 men, with a waterless march of 120 miles before them, has not been told. By 8 Feb. they were more than 20 miles away from the canal, and on the 12th a big force of them was annihilated at Tor, near Mount Sinai. A Brit¬ ish warship bombarded the fort and govern¬ ment buildings at Akabah and another British vessel took possession of the Turkish fort at Sheik Said, at the southwestern corner of Ara¬ bia. The war had begun disastrously for the Turks. They had fought everywhere with their oldtime valor ; badly led and worse equipped, they vainly starved and suffered like heroes. No further attempt was made on Egypt during 1915, but in July an unsuccessful effort was made to reach Aden.

The objects of the British campaign in Mes¬ opotamia were to secure the neutrality of the Arabs, to safeguard British interests in the Per¬ sian Gulf, to protect the oilfields and generally

to maintain British authority in the East. We left the British force established at Kurna, 120 miles from the sea, awaiting reinforcements. These arrived in April 1915 and General Nixon took supreme command. The Turks lay on both sides of Basra, preparing for a new at¬ tack. During January 1915 fighting had devel¬ oped north of Mezera with a force of 5,000 Turks, and early in March an enemy army of 12,000 was located near Ahwaz on theˆ Karun, where a small British garrison was stationed to guard the oil pipe-line. A reconnoitring expe¬ dition of 1,000 fell in with the enemy and was compelled to retire with considerable loss. It became apparent that strong forces of Turks and Arabs were gradually forming a circle around the whole of the territory in British oc¬ cupation. On 12 April the Turks made a de¬ termined attack on Shaiba, southeast of Basra, to recapture the latter place. By next day the enemy had gained a

position north of the Brit¬ ish front, from which they were dislodged by a bayonet charge. On the 14th the British stormed the enemy's trenches to the south, four miles distant, and drove the whole force, at least 15,000 strong, into headlong retreat, cap¬ turing a mass of war material and prisoners, the former including automobiles and river boats. The fighting calmed down toward the end of April, but at the close of May the Turks again became active north of Kurna. Early in the morning of the 31st a British force surprised them, shelled and stormed their positions, and on 1 June the Turks fled in haste on steamers and boats, leaving their camps behind them. A British flotilla gave chase, captured some heav¬ ily laden lighters and sank one of the steamers. On 3 June the British took Amara, a military station on theˆ Tigris 75 miles due north of Kurna. The ejected garrison of Amara under Nureddin Pasha withdrew some 150 miles far¬ ther up the Tigris to Kut-el- Amara, whence a; river channel called the Shatt-el-Hai runs dueˆ south to Naseriyeh on the Euphrates, 100 miles' northwest of Basra. This channel could be used by the Turks to attack the British rear at Basra, and it became imperative for the British to secure Nasariyeh and the river line thence back to Basra before advancing to Kut. In July 1915 a British expedition under General Gorringe crossed the marshes from Kurna due west about 70 miles to Nasariyeh, where they found the Turks strongly entrenched on both sides of the river. Gunboats had meanwhile steamed up the Euphrates from* Basra. A com¬ bined land and water attack soon dislodged the enemy (25 July 1915), who retreated up the Shatt-el-Hai toward Kut-el-Amara, which now became the next objective on the way to Bag¬ dad. Early in August the British advanced on Kut-el-Amara, an undertaking that began with a victory and ended in disaster.

It must be explained here that the Mesopo¬ tamia campaign was carried on under the direc¬ tion of the government of India. It was that government which had secretly dispatched from Bombay the first Anglo-Indian force to the Per¬ sian Gulf early in October 1914 in the event of Turkey throwing in her lot with Germany. The general objects aimed at have been described. In three weeks' operations Basra, the key to Mesopotamia, had fallen to the British at a small cost. In view of this success the Secre¬ tary of State for India (in London) gave his

consent for the expedition to push on to Knrna. Though the force had meanwhile been doubled, it had only been provided with less than half its proper scale of medical equipment and the river transport was not sufficient for its require¬ ments. General Nixon, the commander, was in¬ structed (a) to retain complete control of the lower portion of Mesopotamia, comprising the Basra vilayet ; (b) so far as possible to secure the safety of the oilfields; and (c) to submit a plan (1) for the effective occupation of the Basra vilayet; (2) for a subsequent advance to Bagdad. After much correspondence between India and England,ˆ the Secretary of State (Lord Crewe) sanctioned successively the ad¬

vance to Amara, to Nasariyeh and to Kut-el- Amara, or Kut, but no farther. The very day after the taking of Basra, 23 Nov. 1914, the Indian government's political agent in Mesopo¬ tamia, Sir Percy Cox, forwarded to India, after consultation with General Barrett, a rea¬ soned proposal for such an advance, which was sent on to Lord Crewe in London, who, how¬ ever, was not prepared to sanction it ®for the present.ˆˆ In accordance with his instructions, clause (c). General Nixon submitted a plan for an advance on Bagdad, which was forwarded to Simla (India) on 30 Aug. 1915, but it was not communicated to the viceroy (Lord Hardinge) or the Secretary of 'State; and the com¬ mander-in-chief in India, Gen. Sir Beauchamp Duff, wrote on the plan, ˆUnless we can get back troops from France, Egypt, or elsewhere, I fear that Bagdad, invaluable as its capture would be, is out of the question.®

Meanwhile, General Townshend was leading his division up the Tigris toward Kut. He found the enemy, nearly 10,000 strong, waiting for him on a six-mile front on both banks of the river some seven miles below Kut. Gen¬ eral Townshend's expedition consisted of about 11,000 Anglo-Indian troops and a few hundreds of British Territorials from Egypt. The enemy positions were strongly entrenched and the river blocked by booms. Three brigades under Townshend were led by Generals Fry, Hoghton and Delamain. On 27 Sept. 1915 the Brit¬ ish made a feint attack on the Turkish right; Fry and Hoghton crossed the left bank of the Ti¬ gris over pontoon bridges, the former attacking

the Turkish centre the next day, while the latter with his own and Delamain's brigade made a wide detour around some marshes and fell upon the Turkish flank. In a few hours that flank was crumpled up; fighting was carried on un¬ der a scorching sun; the British troops were parched for want of water and fatigued with 30 hours' marching and fighting. The Turks gave way and began to retire upon Bagdad, fol¬ lowed by British cavalry and the river flotilla. A rernarkable feature of the Lattle was the com¬ parative ease with which so strong a position could have been carried with a little over 400 casualties on the attacking side. In two days Townshend held Kut, and the enemy was nearly 100 miles away by the end of the month. On 3 October, when Townshend was pursuing the Turks and had almost reached Azizie, 50 miles north of Kut, General Nixon wired to London, consider I am strong enough to

open road to Bagdad, and with this intention I propose to concentrate at Azizie.^^ It seemed the general's idea was that contained in the plan he had sent to India, namely, that he would follow the disorganized Turks into Bagdad. But, owingˆ to unsuitable and insufficient trans¬ port facilities, Townshend was unable to over¬ take and again defeat the Turks before they had time to reorganize in a new position at Ctesiphon. On realizing his inability to continue, he wished to return to Kut, but General Nixon still pressed his proposal on the government and ordered him to concentrate at Azizie. Mr. Aus¬ ten Chamberlain had meanwhile (27 May) suc¬ ceeded Lord Crewe at the India Office and had followed the latter's cautious policy with re¬ gard to the Mesopotamian campaign. He imrnediately telegraphed to the viceroy that it was ˆhmperative to stop the further advance of Gen¬ eral Nixon's force.® Orders to this effect were sent to Nixon on 5 October, and the advance on Bagdad was, therefore, apparently abandoned. But a cabinet meeting in London on the 4th, the day before Chamberlain's wire, considered that ˆhf forces available are sufficient to take and hold Bagdad, political reasons were thought to make its occupation

desirable.® On the 8th Mr. Chamberlain telegraphed to India, ®The Cabi¬ net are so impressed with great political and military advantages of occupation of Bagdad that every effort will be made by us to supply the force that is necessary. We do not wish to attempt it with insufficient forces.® In reply to a question as to what reinforcements he would need, Nixon gave his opinion that his present force would suffice to take Bagdad, but that he would require another division and one cavalry regiment to occupy the place perma¬ nently. He also asked for more river craft. The general staff at the War Office decided that Nixon should have two more divisions, which would take some two months to reach him. Some cavalry, infantry and artillery were sent up to Townshend, though by no means suffi¬ cient for the attempt. In a dispatch to the viceroy on 21 October, Mr. Chamberlain added a warning that some 60,000 Turks might be concentrated at Bagdad by January, though only about 10,000 were in that district at the time. To this the viceroy responded that ˆffhe right policy was to take the risk.® On 23 Octo¬ ber the fiat went forth from London, ˆTf Nixon is satisfied that the force he has is sufficient, he may march on Bagdad.® Unfortunately, the warning about the possible Turkish concentra¬ tion was not forwarded to General Nixon, be¬ cause the telegram containing it was marked ˆˆprivate,® and he was left in the dark on this most important point. On receiving his in¬ structions to advance. General Townshend pro¬ tested — an exceptionally rare step for a sol¬ dier to take. As subsequent events proved, both he and the cautious statesmen* at home were in the right ; the government acted on what proved to be the mistaken advice of the experts. Far more important than additional troops was the question of transport, and that, it appears, was the point overlooked by the mili¬ tary authorities — the possibility of rapidly moving the proposed large reinforcements up¬ river from Basra to Bagdad, a distance of 500 miles.

General Townshend had at his disposal about 15,000 men by this time, but practically no re¬

serves to support him, the remainder of the troops in the country being required to guard the lines of communication, which were 290 miles from Kut to Basra, and would be pro¬ longed to 500 miles if the expedition advanced to Bagdad. Besides this, his men were physi¬ cally debilitated by their previous strenuous fighting in the hot months, and his British bat¬ talions were 30 per cent below strength. About one-third of the force were white soldiers, Brit¬ ish regulars and territorials ; the rest were In¬ dian troops. A motley collection of paddle steamers, sloops and flat-bottomed punts formed the flotilla

that was to accompany the expedition. British aeroplanes reported that the enemy was falling back on Ctesiphon, his last defense south of Bagdad. Although govern¬ ment sanction to the scheme was given on 23 October, Townshend did not actually move for¬ ward till the middle of November, a delay of six weeks, due to insufficiency of the river transport for the movement of supplies. More¬ over, it was uncertain when the promised rein¬ forcements of two divisions from Europe would arrive at Basra, from whence their trans¬ port to the front must take weeks or even months. Speed was the prerequisite to success ; Townshend was aware that if he could not fore¬ stall the enemy the latter would most probably forestall him. During the concentration sup¬ plies and transport animals had been sent up. Throughout the period of preparation fre¬ quent skirmishes occurred with the Turks, who had pushed out advanced detachments to within seven miles from Azizie, where the bulk of the British troops had arrived by 23 October.

On 11 Nov. 1915 Townshend's cavalry bri¬ gade and one infantry brigade advanced from Azizie and occupied Kutunie (14 miles) with¬ out opposition, and by the 18th his whole force was concentrated here, together with his river flotilla. The advance was continued on the 19th, moving by both banks of the river; after offering slight opposition the Turks fell back toward Ctesiphon, their stronghold. The Brit¬ ish force on the left bank of the Tigris reached Lajj on the 20th ; that on the right bank and the boats arrived the following day, when both land forces combined on the left bank. The Turkish force at Lajj was attacked on the same day and driven out. It was evident that the Turks did not intend to offer any determined resistance, being content to let the British stretch their line of communications and tire themselves out until they should arrive at Ctesi¬ phon, where the Turkish position was en¬ trenched on both sides of the river. With the least possible delay Townshend pushed on to his goal, for he had learned only on the 17th that 30,000 Turks were on the march down from Anatolia, which would augment the enemy to more than 40, (X)0. To meet this force there were barely 25,000 British troops in all Mesopotamia, including lines of communica¬ tions. Already at Lajj the aeroplane scouts had reported, ˆffhey are coming on in thousands.® For months the Turks had been constructing their defenses, consisting of an extensive sys¬ tem of entrenchments forming two main posi¬ tions. The first line on the right bank ex¬ tended from the river for three miles to the southwest, with the second line about five miles farther upstream. A continuous line of trenches and redoubts stretched for six miles

on the left bank, with a second line two miles to the rear, running parallel with the first for three miles, and then turning northward for another three miles to the Diala River. Be¬ tween the two extremities of the first and sec¬ ond lines on this side the Turks had formed up a straight line of reserves against a flank at¬ tack, thus forming practically a square, with the Tigris as the right flank. A mile behind the second line a pontoon bridge across the Tigris connected the left wing with the right on the other bank, while the Diala was bridged at two points near its junction with the Tigris, and these crossings were commanded by entrench¬ ments. According to reports Nureddin Pasha, the Turkish commander, had over 13,000 regu¬ lar troops and 38 guns ; against these, plus a formidable position, Townshend had only some 11,000 effectives available. But the majority of the enemy were troops that had already been defeated several times in Mesopotamia. More¬ over, before the battle, General Townshend was not informed of the proximity of Turkish rein¬ forcements — apart from the 30,000 referred to above — ■ whose arrival on. the scene was to change his victory into defeat. The Turk has a fine reputation as a fighter; up to this stage of the Mesopotamian campaign the Turks had been driven back from one position to another so long as they retained a large proportion of Arab troops in their ranks. These were rather a source of embarrassment, for they hated the Turks, who never cared to learn their lan¬ guage or understand them, and as a subject race they were stirred by no feelings of patriot¬ ism — a virtue which is replaced by tribal ad¬ hesion and religious fraternity. But on the other hand, as time went on and the proportion of Arab troops diminished, the stouter Turks took their place, and the Turkish army in Meso¬ potamia became a very efficient German-trained machine of devoted soldiers. Heavy reinforce-rnents of this type arrived at the battle in the nick of time.

In a night march from Lajj, General Town¬ shend with his force covered the nine miles to Ctesiphon on 21-22 Nov. 1915 and attacked the Turkish position on the left bank at the centre and on the northeast flank, round which the cavalry w'as thrown to hinder a possible retire¬ ment. A severe fight developed and lasted from dawn throughout the day. Early in the morn¬ ing bodies of enemy troops

were observed mov¬ ing northward, giving the impression that they were retreating from Ctesiphon. The British cavalry attacked that flank which was apparently in retreat, when it wheeled into line and made a stand that revealed an overwhelming force. On the front the British pressed on, stormed the first line, captured eight guns and estab¬ lished themselves in the trenches. They were subjected to fierce counterattacks by fresh re¬ serves. Townshend's men penetrated to the second line and captured those trenches as well, but the enemy continued to pour reserves into the field and forced the British to abandon the advanced positions shortly before nightfall and retire to the first-line trenches. In the con¬ flict the captured guns changed hands several times. The British casualties were heavy, and the 23d was mainly devoted to collecting the dead and wounded. The Turks also lost heav¬ ily; the battlefield was covered with killed and

wounded and many of the trenches were choked with their dead. Those troops which had held the front line were practically annihilated. More reserves came up and attacked the British in their captured trenches during the whole night of the 23-24 November, but these were repulsed with heavy loss. In the first day's battle the British took 1,300 prisoners. On the 24th the wounded and prisoners were removed from Ctesiphon to Lajj, where the flotilla was banked in, being unable to advance, owing to the Turkish batteries on the right bank. Be¬ yond artillery action there was little activity on that day. Townshend still held the enemy's front line, but it became increasingly apparent that he was hopelessly outnumbered. Matters looked threatening on the 25th ; large enemy columns were advancing down the left bank and also in¬ land, as if to turn the British right flank, while hostile cavalry menaced the rear. To make things worse, Townshend was short of sup¬ plies ; he had lost over 4,000 men in killed and wounded; his air force had suffered a series of accidents during the battle ; several of his ma¬ chines had been obliged to descend within the enemy's lines ; his men were w'orn out, and he had no reserves to draw upon. Furthermore, he was nine miles from his nearest base at Lajj. In these circumstances he perforce de¬ cided to avoid another engagement and with¬ drew to Lajj during the night of the 25th. He remained here during the 26th, but the position was most unfavorable for defense, so he with¬ drew unmolested back to Azizie in the night of 27-28 November, Engagements were fought with advanced Turkish cavalry near Kutunie on 29 November and on the 30th at Umm at-Tubal, about 25 miles below Kut, where the river ship¬ ping was in difficulties in shallow'' water. The British continued their retreat upon Kut. fight¬ ing rearguard actions without

intermission. On 1 December the wdiole Turkish force attacked at Umm at-Tubal, but was repulsed after a se¬ vere fight, during which Townshend took ad¬ vantage of a successful counterattack by his cavalry against a column attempting to en¬ velop his right flank, to break off the fight and retire by echelons of brigades. He reached Kut with the exhausted remnant of his troops on 3 December. Thus ended the Pyrrhic victory of Ctesiphon, in which the British lost about 700 killed and 3,800 wounded — a loss of over 30 per cent.

During the retreat the river gunboats Shai¬ tan (Devil), Comet and Firefly were run ashore and had to be abandoned. Townshend at once took steps to withstand a siege in Kut until the arrival of reinforcements which were coming from overseas. Two Indian divisions had arrived in Egypt from the Western Front en route for Mesopotamia. The defenses of Kut w'ere improved ; sick and wounded and 1,350 Turkish prisoners were sent by water to Basra, leaving only an armed tug with Town¬ shend, On 6 December the cavalry brigade and a convoy of transport animals were marched dowm to Ali A1 Gharbi ; on the same day the Turks closed the northern front, and on the 7th the investment of Kut was complete. On the 8th the Turks began bombarding Kut from three sides and Nureddin Pasha called upon Townshend to surrender. The British position lay in a U-shaped loop of the Tigris; the town

stands at the southernmost end of the penin¬ sula (about a mile wide) thus formed, while the northern defenses were some 3,200 yards from the town. The British cavalry now at Ali A1 Gharbi was reinforced with infantry and guns from Basra ; behind this advanced de¬ tachment a relief force was organized under Major-General Aylmer, who on 4 Jan. 1916 ad¬ vanced along both banks of the Tigris from Ali A1 Gharbi toward Sheikh Saad and at¬ tacked the Tifrks three-and-a-half miles east of the latter place. Heav}'^ fighting developed on both banks, and on the 9th the enemy was forced from his positions at Sheikh Saad, re¬ tiring upstream about 10 miles to another forti¬ fied line at the junction of the Tigris with the Wadi River, 25 miles from

Kut. Aylmer drove the Turks from this line on the 14th, compelling a further retirement of five miles. General Nixon, the commander-in-chief of the British Expeditionary Force in Mesopotamia, resigned, owing to ill-health, on 10 January and was succeeded by Lieut. -Gen. Sir Percy Lake. Throughout these operations heavy rain and high wind caused great discomfort to the troops and made movement most difficult, both by land and river. The Turks had established across the river a series of very strong posi¬ tions. Nearest to Kut, eight miles away, was the Es-Sinn position ; farther down, toward the British, came successively the Sanna-i-Yat, Fel-lahieh and Umm-el-Hanna defenses. Flanking these last-named positions on both sides of the river were marshes, and the entire country was roadless. Three further important attempts were made to relieve Townshend's beleaguered army. Between 19-23 Jan. 1916 Aylmer endeav¬ ored to force a defile held by the Umm-el-Hanna lines on the left bank. The enemy front trenches were actually rushed, but supporting troops lost direction and under heavy fire failed to reach the objective, when a counterattack caused the abandonment of the conquered ter¬ rain. A period for rest and reorganization fol¬ lowed in February. On 7 March Aylmer de¬ cided, in view of the possibility of his troops being flooded out by the cutting of the dikes, to leave the three lower lines of Turkish defense and to drive against the stronger but final line at Es-Sinn. With this object two columns made a difficult forced night-march through the desert right across the enemy's front. One column reached the appointed spot unobserved, the other came too late to achieve the purpose — the capture of the Dujailah redoubt. After a whole day's fighting almost within view of Kut the attempt failed and the columns retired again to the Wadi lines. Fresh troops began to arrive up-river during March and a renewed at¬ tack was planned on the left bank. Major-Gen¬ eral Gorringe took over the command of Ayl¬ mer's corps on 12 March. On 4 April General Maude's division stormed the Umm-el-Hanna position, 23 miles from Kut. During the night of 8-9 April an assault was made on the Sanna-i-Yat lines, but without success.

The third desperate effort to relieve Kut had failed. Within the town itself matters looked black. Heavy Turkish bombardments had be¬ gun 10 Dec. 1915, followed by infantry charges, which were repulsed. On the 23d and 24th Nureddin Pasha made a furious attempt ˆ to storm the place, and even succeeded in piercing

the British line. Throughout the winter the Turks maintained an impenetrable ring around the besieged garrison. Food grew scarce ;

the natives and the dealers in Kut hid all their stock of foodstuffs and lived on the rations served out by the British until a systematic search unearthed large quantities of provisions. Aeroplanes from the relief columns outside the ring flew high over Kut, but could not descend owing to the close proximity of the Turkish guns. There was but one flour mill in Kut, and from that the Turks had removed the millstones when they abandoned the place. The deficiency was remedied by British aviators carrying a set of millstones in their areoplanes and dropping them within the lines. During the cold weather firewood was doled out by the half-pound. It became necessary to slaughter the horses and battery bullocks for food. The native population was fed by public soup kitchens. Scurvy broke out among both the military and the civilians. While the three attempts at relief were being carried out the Turks kept up a stream of high explosive bombs, which they fired into the town from trench mortars. Enemy aeroplanes began in February to drop bombs on the town, not on the military works. The natives were the prin¬ cipal sufferers by these raids ; nor did the mark¬ ing of hospital buildings with conspicuous Red Cross signs avail, for a bomb was dropped on the main hospital, killing 30 of the sick and wounded inmates. On 8 March 1916 the Turk¬ ish (or German) commander sent an officer under the white flag to demand surrender — ■ in vain. Rations were still further reduced; Townshend was nearing the end of his resources when a heroic but vain attempt was made to break the blockade of the river. The Julnar, one of the fastest steamers on the Tigris, manned by a volunteer Royal Navy crew under Lieutenant Firman, R. N., and Lieutenant-Commander Cowley, R.N.V.R., started in the dark from Fellahich on 24 April with 270 tons of supplies on board. Under fierce fire from both banks the devoted ˆTorlorn hopeˆˆ ran the gauntlet through the Sanna-i-Yat and Es-Sinn defenses to the vicinity of Megasis fort, a total distance of some 15 miles. Both officers fell on the deck, Cowley at the wheel ; at full speed the unguided vessel rushed on in a sinking con¬ dition and grounded on a mudbank. For the next few days Kut was provisioned by sacks of flour and food dropped from aeroplanes, a measure which, had it been adopted earlier, might have enabled Kut to hold out till the arrival of relief. The provisions thus supplied were far short in quantity of what was needed; they were doled out in quarter rations. On 27 April General Townshend, acting on wireless instructions, went out to treat with the Turkish commander, Khalil Pasha, who demanded un¬ conditional surrender. There was nothing else to do. The 28th was spent in Kut preparing for the inevitable : guns and rifles were smashed, officers and men snapped their swords under their feet ; field glasses were destroyed and re¬ volvers thrown into cesspools ; ammunition was dumped into the Tigris in the night, and

on 29 April 1916 the British flag was hauled down and the white flag took its place. A weary, half-starved and broken force laid down its arms after a gallant resistance of 143 days. It

consisted of 2,970 British and 6,000 Indian troops, with an army of about 5,000 camp followers.

The fall of Kut created a painful impres¬ sion among the Allies in general and through¬ out the British Empire in particular. A parlia¬ mentary commission was appointed in August 1916 to inquire into the operations in Mesopo¬ tamia and to report thereon. The commission, which was invested with many of the powers of the British High Court of Justice, examined on oath over 100 witnesses, including Mr. Austen Chamberlain and Lord Crewe, respectively sec¬ retary and late secretary of state for India, Lord Hardinge, viceroy of India, two ex-com- manders-in-chief in India, General Nixon, and all the chief officials concerned in the Meso¬ potamian campaign up to the summer of 1916. General Townshend, being a prisoner of war, naturally could not testify. The commission consisted of Lord George Hamilton, chairman. Lord Donoughmore, General L3htclton, Ad¬ miral Bridge, Lord Hugh Cecil, M.P., and three other members of Parliament. The commis¬ sioners issued a voluminous report in June 1917. They found that while the ’Conditions of the campaign in Mesopotamia required a standard of preparation and equipment above the ordi¬ nary, the Indian army was not even up to the ordinary standard in these matters on the out¬ break of the war. This was due to the cam¬ paign of military economy which, by agreement between the home and Indian governments, had been pursued in India for many years before the war. The supply of artillery had been cut down both in quantity and quality; the number of troops available for immediate mobilization was reduced, and the army generally was only equipped for frontier warfare against savage tribes. The Indian army was, therefore, in all respects in a less favorable position to confront modern troops than it was at the time of the South African War, 1899-1902. The commis¬ sion placed the chief responsibility

upon the Indian government and recommended certain alterations in the administrative system to in¬ sure closer cooperation between the military and civil departments. The undertaking of the expedition was not condemned : ®Up to the date of the advance on Bagdad (says the report) continuous victory has been achieved … We are of opinion — reviewing the operations as a whole — that it may now [1917J be truly as¬ serted that, in the many parts of the world in which the Allied forces have been engaged, no more substantial results or more solid victories have been achieved than those won by the gal¬ lantry of the British and Indian armies on the stricken plains of Mesopotamia.®

While the events so far described in this chapter were being unrolled in the southeastern theatre of war, other things, partaking of the nature of a sideshow, were hapnening farther east, in Persia. That country was neutral, and remained so during the war. But the German minister in Teheran, Prince Reuss XXXI, had been sowing the seeds of Pan-Germanism in Persia since the summer of 1914 and had suc¬ ceeded in gaining the sympathies of several Persian ministers, the gendarmerie, under Swedish officers, and some of the tribesmen for the German cause. Risings were fomented throughout the country; British civilians were

arrested in Shiraz and Yezd, and there seemed every probability of Persia being dragged into the whirlpool in accordance with the German ˆ‘Holy War® scheme. The revolt of the 6,000 gendarmes led to the murder of a British and a Russian vice-consul. Immediate steps became necessary to prevent the flame from spreading and to protect the legations. The Russians in Transcaucasia were nearest to the spot, and in the middle of November 1915 General Yudenitch dispatched two columns into the country; one, under General Baratov, pushed southwestward through Hamadan to Kermanshah, on the way to Bagdad. A small cavalry force established communication with the British Mesopotamian force. The possession of Kermanshah was strongly disputed, and the Russian column was held up before reaching the southern plains. The second column advanced through Kum and Kashan to Ispahan, the ancient capital, on 20 March 1916. The first column entered Teheran at the end of November, but the German, Turk¬ ish and Austrian ministers had departed from the city on the 14th, after endeavoring to induce the young shah to accompany them and thus put himself into German hands. Torn by conflict¬ ing advice, the 17-year-old shah followed the wiser counsels of Prince Firman Firma and a few others and took a strong stand for

the Al¬ lies. He refused to go and join the Austro-Ger- m?in-T.\r'k\sh. co7'ps diplomatique waiting for him six^ miles away at the village of Shah Abdul Azim. His decision led to an interesting sequel three years later, when he stepped from a spe¬ cial train in London and was welcomed by King George and the Prime Minister on 31 Oct. 1919. On the following day (1 November) he was conducted in royal state to the Guildhall as the guest of the lord mayor, and in reply to the latter's speech of welcome Ahmed Shah re¬ ferred in fluent French to ®the strong bonds of friendship which ha^e existed for so lone be¬ tween Persia and Great Britain.® To return to 1916. While the Russians were operating in northern Persia, Sir Percy Sykes, many years a resident in the country and author of perhaps the best history of Persia, led the British column of intervention in the south. The native gen¬ darmerie was disbanded in 1916 and the Persian government accepted a British offer to place at their disposal a number of British officers to organize a new force.

It is now time to introduce a new belligerent, one whose name has not 3''et appeared in these records — the Senussi brotherhood, a tribe of Mohammedans forming a kind of religious fraternity and inhabiting the great stony plateau known as the Libyan Desert in North Africa, between Egypt and the Italian territory of Cyrenaica, which, together with Tripoli, had become Italian by the war with Turkey in 1911-12. After the close of that war, the Turks had not withdrawn the whole of their forces from that territory as agreed upon by the Treaty of Lausanne. Those troops which re¬ mained — ^ either forgotten or neglected — con¬ tinued a spasmodic and desultory campaign against the Italians with the aid of Arab tribes from the interior. Those tribes inhabiting the Libyan Desert acknowledge in a loose way the authority of the Senussi of Solium, an author¬ ity more religious than political. In November 1904 the British government had notified Turkey

and Italy that the western frontier of Egypt ran up to and included Solium. During the Tripolitan war the Italians established a block¬ ade of the Cyrenaican coast to some 100 miles east of Solium, to

which the British government objected. The Italian claim was waived and an Egyptian force occupied the fort of Solium in December 1911. For the following three years an irregular warfare had been conducted by these Arabs against the Italians, as mentioned, and also against the extension of French rule in the Central Sudan. When the European War broke out the Turks had on their side in Northern Africa a respectable force of at least 30,000 men, consisting of a nucleus of Turkish troops, with Arab, German and Turkish officers, some 5,000 well-trained Senussi, and a liberal supply of field artillery and machine guns. Con¬ sidering that Turkey possessed not an inch of territory in Africa in 1914, it must be regarded as remarkable that such preparations could have been made under German auspices on Italian and Egyptian (British) territory. Hitherto the Grand Sheikh of the Senussi, Sidi Ahmed Sherif, had lived on terms of friendship with Anglo-Egyptian authority; he and his people were not opposed to British rule in Egypt, and his official representatives lived in Cairo in cordial relations with the government. By the end of 1914 the whole interior of Cyrenaica was held by the Senussi, and when Italy entered the war in May 1915 the Italian army of occupation fell back to the coast, leaving the inland tribes¬ men to their own devices. Signs of unrest soon began to appear, due to the intrigues of Nuri Bey, a half-brother of Enver Pasha, who came to Tripoli to negotiate with the Senussi and the Tripolitan Berbers. He met with little success at Solium, for he had nothing to offer beyond promises. The subsequent arrival of Gaafer Pasha, a German convert to Islam, with money and arms, altered the case. By November 1915 all was ready, with Gaafer Pasha in charge of the campaign. The chief danger to be feared on the British side was that a ^^holy war® in western Egypt might spread disaffec¬ tion in that region. From Alexandria a rail-read runs along the coast for about 150 miles westward to Mersa Matruh, a Mediterranean port; beyond that there lay the Egyptian forts of Sidi Barani and Solium, respectively 150 miles and 200 miles from Mersa Matruh. The garrisons were withdrawn from the forts to Matruh, where a considerable force was con¬ centrated, consisting of a New Zealand brigade then training in Egypt, detachments of the Aus¬ tralian Light Horse and the British Yeomanry, and the 15th Sikhs, Indian infantry, altogether about 3,000 men. In November 1915 the Senussi made a swift raid over the frontier; they were joined by the Bedouins of the Walid AH tribe, and quickly overran nearly 200 miles of Egyp-tain territory. An advanced force of 1,200 Arabs reached the outskirts of Matruh on 13 Dec. 1915, and were driven back with heavy loss. On Christmas Day an on¬ slaught by 3,000 Arabs was completely routed by the British infantry, the cavalry sweeping up most of the enemy's transport and supplies. Another attempt was

made by the Arabs on 13 Jan. 1916, which also failed; on the 23d Major-General Wallace, reinforced by part of a South African brigade,ˆ fell upon the enemy in two columns and inflicted a crush¬

ing defeat on 4,500 Turks and Arabs, driving them back in utter confusion. Before long the tribesmen quarreled among themselves ; many of them came half-starved into the British lines and begged to be protected against their former allies. The south Africans and the Dorset yeomanry under Brig.-Gen. H. T. Lukin pur¬ sued the fleeing enemy and defeated him again when attempting a stand at Barani. The Dorsets ®with one yell hurled themselves upon the enemy, who immediately broke,® reported Col¬ onel Souter, who commanded the Dorsets. ®In the midde of the enemy's lines my horse was killed under me, and by a curious chance its dying strides brought me to the ground within a few yards of the Senussi general, Gaafer Pasha.® (26 Feb. 1916). The Pasha and his whole staff fell prisoners to the British. On 9 February General Peyton took command of the operations and proceeded to follow the enemy up to Solium on the Italo-Egyptian frontier. The British columns were supported by units of the navy operating along the coast, landing supplies and munitions where required. British aeroplanes kept the oases spread through the desert under constant observation while a trans¬ port train of 2,(K)0 camels kept all units pro¬ vided with necessaries. Large numbers of Bed¬ ouins and prominent sheikhs deserted from the enemy and appealed to General Peyton for pardon. On 9 March a general move began from Barani in the direction of Solium ; the first column, comprising all the infantry and slow moving troops, started with orders to secure a foothold on the inland plateau by the Nagb Medean Pass. These were followed by two battalions of infantry, a camel corps company and some armored cars under General Lukin along the top of the escarpment, while the re¬ mainder of the forces pushed ahead by the coast. In the morning of 14 March both col¬ umns approached Solium. Aviators reported that the enemy was evacuating his camps ; a hostile camp was located some 20 miles to the west, where the armored cars, under the Duke of Westminster, were sent. In the engagement which followed here all the enemy's guns and machine guns were captured, together with a number of prisoners including Turkish officers. The only British casualty was one officer slightly wounded. iSollum was reoccupied, and the northern column of the enemy was eliminated. In about three weeks the country had been cleared for 150 miles, the Turkish commander and all his artillery captured, and the rest of his troops scattered far beyond the Egyotian frontier. It was known that, somewhere about 75 miles west of

Solium, within Cyrenaica, about 95 British prisoners were held by the Senussi. These were survivors from two Brit¬ ish vessels torpedoed off the coast in the pre¬ vious November. To effect their deliverance the Duke of Westminster was dispatched on 17 March with a light armored car battery and some motor ambulances. A distance of 120 miles had to be covered through an unknown country against an enemy of unknown strength, but the expedition returned safely with all the prisoners rescued. The Senussi campaign was over. The Walid Ali tribes surrendered in such numbers that it became a serious problem for the British to supply food and provide a special branch of administration for their protection and control. Meanwhile, a subsidiary campaign

had been in progress in the western Sudan, where Ali Dinar, Sultan of Darfur, had ruled since 1899 under British-Egyptian suzerainty. This potentate assumed a defiant attitude when Turkey entered the war and prepared to attack Kordofan. In May 1915 an Egyptian force under Colonel Kelly defeated the Darfur troops and occupied El Easher, the capital. Ali Dinar fled westward ; he was pursued, overtaken 6 November at Sugai, in French Central Africa, and killed. With his death the rebellion was crushed.

From the burning, waterless deserts of Africa we return to the frosty Caucasus and that region beyond known as Transcaucasia, where we left the broken Turkish force re¬ treating through the snowdrifts before the Rus¬ sians in January 1915. During that winter the Turks had been carrying out a series of whole¬ sale massacres and deportations among the hap¬ less Armenians, whose country then belonged, split into three unequal portions, to Turkey, Russia and Persia. A representative meeting of Russian Armenians assembled in Tiflis, Cau¬ casus, during August 1914, was promised auton¬ omy for Russian Armenia bythe imperial gov¬ ernment, to take effect after the war if their people would loyallv support Russia in the con¬ flict. The proposal was agreed to, and nearly 200,000 Armenians served with the Russian colors. A similar meeting of Turkish Arme¬ nians was held

about the same time in Erzerum, at which a delegation of the Turkish Com¬ mittee of Union and Progress attended. Here, also, a promise of autonomy was offered on the twofold condition that the Turkish Armenians not only should support Turkey in the war, but also induce the Russian Armenians to rise against Russia. If these terms were accepted, the three severed portions of Armenia were to be reunited under Turkish suzerainty. The Turkish Armenians, however, were quite willing to remain loyal to their government, but de¬ clared their inability to agree to the other pro¬ posal, that of inciting their compatriots under Russian rule to insurrection. There was a deep significance behind the Turkish proposal ; the plan was to draw the Persians, Kurds, Tatars and Georgians into a holy war against the Allies, and in order to carry this project it was necessary to make sure of Armenia, for if that country were hostile its geographical position would hamper cooperation between the Mohammedan races included in the scheme.

The rejection by the Turkish Armenians of that one condition led to serious consequences for themselves and incidentally proved of in¬ estimable benefit to the Allies, for if the whole nation had gone against Russia, that country might have encountered defeat instead of vic¬ tories early in the war, with the result that the Central Powers could have transferred large armies from the Eastern to the Western Front already in 1915 instead of 1917. From the moment of Turkish participation in the war the destruction of Armenia was decided upon. The ghastly story of how this program was carried out has been vividly described by many author¬ ities and eye-witnesses, notably, American mis¬ sionaries, Mr. Henry Morgenthau, United States Ambassador in Turkey, Lord Bryce and Dr. Harry Stuermer, a former German army officer and war correspondent (ˆTwo Years in Con-stantinopleO- Thousands of the Armenian pop¬

ulation of Asia Minor were either killed on the spot during 1915 or else deported into the most inhospitable parts of the Turkish Empire, there to die of starvation, exposure and exhaustion. The total number of those who were thus done to death is not exactly known, but it was large enough to brand the procedure as ˆˆone of the most shamelessly brutal race massacres of all time® (<War Cyclopedia,ˆ issued by the United States government, 1917). The instigators of these atrocities, which spread over the first eight months of 191ˆ were Enver Pasha and Talaat Bey; the latter told Mr. Morgenthau in Con¬ stantinople, ®I am takjng the necessary steps to make it impossible for the Armenians ever to utter the word autonomy during the next fifty *

years.® Irregular bands ravaged the district around Erzerum and Bayazid, slaughtering mercilessly and driving the wretched survivors into Russian territory. Many thousands were butchered like sheep at Bitlis, Diarbekr, Angora, Van, Trebizond, Mush, Jebel Musa, Urfa and Mosul. It was estimated that over half a million perished, while great numbers of women and children were sold into slavery. It was the climax of five centuries of Turkish domination.

Throughout the spring and summer of 1915 the Russian and Turkish armies in Transcau¬ casia fought several engagements of which little news leaked out. The Russians were holding the southeastern gate while greater events were happening on their far-flung eastern lines in Europe. Early in May an action was fought at Dilman, just inside the Persian frontier, north¬ west of Lake LUmia, in which the Turks were severely handled by the Russians. Early in September the tsar nominally took personal command of his armies and the Grand Duke Nicholas was sent to the Caucasus as governor and commander-in-chief. The Turkish forces in this region were increased to some 100,000 men in anticipation of a Russian move. It seemed to be the Russian plan to detain as many Turkish troops in this theatre as possible to prevent reinforcements being sent to Meso¬ potamia or the Dardanelles. On the other hand, a Turkish embarrassment elsewhere would place the grand duke in a position to strike a blow from behind. Beyond inflicting a slight defeat on the Turks near Van in October there was no immediate resumption of hostilities. The Persian revolt was crushed by 20 Dec. 1915, and on 17 Jan. 1916 the Russians made a sudden attack on the Turkish centre at Koprikeui and broke it over a front of 66 miles. The Turks retreated in haste on their stronghold at Er¬ zerum, 60 miles away, with the Russians close on their heels. On the 21st the latter were already shelling the fortress, but the attack was temporarily held up by severe weather. On 11 February the Russians launched a fierce assault, and after a five days' struggle Erzerum sur¬ rendered (16 February) with 235 officers, 12,750 men and 312 guns. Pressing swifty on¬ ward, General Yudenitch, the Russian com¬ mander, led his Cossacks into Mush and Akh-lay, pushed south and entered Bitlis on 2 March. Two days later a Russian force was landed at the Black Sea port of Atina and passed rapidly along the coast to Trebizond, which fell to them on 18 April. The Turks rallied a little after the surrender of Kut and temporarily re¬ covered some lost ground in Armenia, but by the middle of July the Russians were again

on the move, capturing Baiburt, between Trebizond and Erzerum on 15 July and Erzinghian, 100 miles west of Erzerum, on the 25th. This rapid and victorious advance was made pos¬ sible by the power of the Russian Black Sea fleet, which dominated that inland water so long as Russia remained in the war. The addi¬ tion of the Goehen and Breslau to the Turkish fleet was never more than a temporary annoy¬ ance. Turco-German submarines were sent out on several occasions and copied the tactics of the U-boats generally in sinking not only mer¬ chantmen but also hospital ships ; they had no success of any consequence against the Rus¬ sian fleet, nor did they interfere with the block¬ ade of the Bulgarian and Turkish coasts and ports. Under the control of Vice-Admiral A. V. Kolchak, who succeeded to the command in August 1916, the Black Sea fleet was brought to a high level of efficiency, comparing very favor¬ ably with the Baltic ships. The entry of Ru¬ mania into the war on 27 Aug. 1916 did not affect the naval position. A severe loss befel the Russians on 20 Oct. 1916 in the destruction by fire and explosion of the dreadnought Impera-tritsa Marie with 200 lives. In regard to its use of submarines and aircraft the navy also did effective work in the Black Sea. On one oc¬ casion, during a seaplane raid on Derkos, north¬ west of Constantinople, a machine was damaged and compelled to alight on the water. While descending the two occuptants observed a Turk¬ ish schooner, and by means of their machine gun drove the crew from the deck, leaving the way clear for them to board and capture the vessel. With the capture of Erzinghian the whole of Turkish Armenia was now in Russian hands. During August the Turks recovered Mush and Bitlis and lost them again within 17 days. On 30 Sept. 1916 Turkey declared war on Rumania.

Yet again a fresh belligerent appears upon the scene, this time to throw in his lot with that of the Allies as against Turkey — Hussein ibn Ali, the Grand Shereef of Mecca. Shortly after the surrender of Townshend at Kut, this Arabian potentate notified the British govern¬ ment that he could no longer stand aside and witness the continued subjugation of the Arabs to their Turkish rulers. He asked for money, arms and food for his troops, and before they had been promised him broke out into rebellion against the Young Turkey party and their Ger¬ man masters and declared the independence of the Hedjaz. The Arabs had suffered badlv at the hands of the Turks, and were not

unmind¬ ful of the fact that millions of their coreli¬ gionists lived contentedly under the protection of Great Britain and France, who respected their creeds and permitted absolute religious freedom. What contributed largely to bring about the unlooked-for intervention of the Arabs was the proclamation issued to Indian Mussulmans by the Agha Khan (q.v.) at the outbreak of the war. Also, the Indian govern¬ ment had announced in November 1914 that the holy places of Arabia, including the Holy Shrines of Mesopotamia and the port of Jed¬ dah, would be immune from attack or molesta¬ tion from the British forces so long as there was no interference with pilgrims from India to the holy places and shrines in question. The governments of France and Russia had

given similar assurances. Hussein ibn Ali and his family carried all the Arabs of the Hedjaz with them when independence was declared on 9 June 1916. They immediately backed their challenge with deeds by attacking and capturing the Turkish garrisons in Taif, Mecca and Jed¬ dah. They next opened up communications with the British fleet in the Red Sea so that the arms and food they required for their campaign could be brought to their coasts. The Shereef's two sons, Feisul and Ali, raised their father's flag of revolt in Medina on 13 Tune. The Turks were not unprepared to meet the new situation ; they had brought down large forces from Syria in anticipation of hostilities. Feisul rallied all the tribesmen and villagers around Medina, but shrank from an attack upon the holy city itself. They tore up a part of the Hedjaz Railway with their bare hands, in the absence of explosives, and threw the rails down the embankments. But they refrained from cutting the water conduit and refused to clear their way by fighting through the streets. By this scrupulous regard for the city containing their holiest shrine — the tomb of the Prophet — - they lost their opportunity. The Turkish gar¬ rison in Medina, encouraged by the inactivity of the rebels, made a sortie early in the morning, took the garden suburb of Awali by surprise, massacred some hundreds of v/omen and chil¬ dren and set the place on fire. By the time the havoc had been wrought, Feisul dashed up with his Arabs mounted on camels and har¬ assed the rear of the retiring Turks. Yet he still wavered when his men demanded to attack the fortress outside the city walls; they even rushed to the charge without him, but they were stopped by well-directed artillery fire, a new experience to the sons of the desert. The Turks sent out an enveloping force to cut off the Arab van, a move that was detected by Feisul a mile to the rear. Under a withering shrapnel fire he now took the lead against the sortie force, maintaining the struggle till nightfall, when his

ammunition was nearly exhausted. He had no reserves and was also running short of food. The British were meanwhile establishing a base for Feisul at Rabegh on the Red Sea, about 100 miles north of Jeddah. The Turks were well provided with guns, machine guns and aeroplanes ; they repaired the broken rail¬ road, received further supplies from Syria, and made an advance toward Rabegh, to the north of which Feisul had retired with his disheart¬ ened followers. Immediate action was impera¬ tive to check the Turkish advance, for, with Rabegh once in their hands, Mecca would be in danger. In consultation with British naval officers in the Red Sea, Feisul determined to risk leaving the Mecca road undefended and carry his whole force away from Yenbo and attack Wejh, 200 miles farther north along the Hedjaz coast, striking against the Turkish com¬ munication with Syria — the Hedjaz Railway. By this move he hoped to compel the enemy to divert a considerable force for defensive pur¬ poses and perhaps abandon the march on Mecca. Feisul placed his younger brother Zeid in com¬ mand of a handful of men to make a show of resistance in the hills, and requested his elder brother Abdullah, who had been blockading Medina on the east, to move across the railway north of Medina and pretend to threaten the

Turks' line of communication directly. Though Abdullah had no adequate force to perform any serious enterprise, he succeeded in cutting up some scattered Turkish units. Feisul embarked all his arms and stores from Yenbo el Bahr on British ships and divided his 10,000 men into nine units, to move northward separately and concentrate at Um Lejj by 14 Jan, 1917. On arrival here he provided his men with fresh sup¬ plies from the ships and embarked a landing party to be used in the attack on Wejh in cooperation with the navy. With the rest of his army Feisul set out on a march of 150 miles along a route notoriously short of water. Many camels died on the road ; a Royal Indian marine ship put into an uncharted bay on the coast and supplied the caravan with water in the middle of a dry march of 75 miles. The navy and the landing party had settled the business at Wejh before the army arrived on the scene ; Feisul was in time only to cut

off some of the escaping garrison and capture all their reserves of arms and equipments. The ships' guns supported the landing parties, and after some difficult street fighting in the town the Arab§, cleared the Turks out to the last man. The whole proceeding took 36 hours. The British warships took other landing parties and set them ashore at Dhaba and Moweilah, so that by the middle of Febru¬ ary 1917 the whole northern end of the Red Sea up to the Gulf of Akabah was cleared of the enemy. This picturesque campaign, of which but little was heard at the time, demon¬ strated once more the overwhelming advantage which sea power gives to an inferior and ill-equipped force over an enemy superior in strength but dependent entirely on land commu¬ nications. In November 1916 the Grand Shereef took the title of king of the Hedjaz, and was definitely recognized as such by the Allies. Per¬ haps the principal factor in establishing the new kingdom and restoring the Caliphate to the de¬ scendants of the Prophet was Col. Thomas Law¬ rence, a young Englishman and graduate of Ox¬ ford, who was studying archaeological inscrip¬ tions in Mesopotamia when the war broke out. He was then 26. Without any knowledge of mil¬ itary affairs, Lawrence was appointed an officer in the British army. Dressed as an Arab, in a costume he wore like a native, he traveled through the country and united the various tribes against the Turks. His profound knowl¬ edge of the land and its languages made him an important personage in the eyes of the people. He had lived among Kurds, Arabs, Turks and Egyptians; he was a friend of Kitchener when the latter was High Commissioner for Egypt, and he even bore the title of Prince of Mecca. Mounted on a camel, he led the Bedouins into many fights against the Turks, who, with their German allies, soon discovered that some mys¬ terious power inspired the Arabs. ˆThrough their spies,ˆˆ wrote Lowell Thomas, ®they learned that Lawrence was the guiding spirit of the whole Arabian Revolution. They offered a reward of $500,000 for him, dead or alive. But the Bedouins would not have betrayed their idolized leader for all the gold in the fabled mines of Solomon.ˆˆ (Asia, New York, Sep¬ tember 1919.)

We now turn again to Egypt, where the Turkish attack on the Suez Canal had failed signally in 1915. From the beginning of hos¬

tilities the Anglo-Egyptian garrisons had been withdrawn from the Sinai Peninsula, where there was nothing of importance to protect. This desert region was at that time the only spot in the world where British territory was occupied by enemy forces, though for the reason that it was not defended. The Turks had the run of the ground,

occasionally skirmishing with British mounted patrols. Early in' 1916 the British had reoccupied the region of Katia, east of the canal, and were laying a light railway to that place. In May reports came that the Turks were preparing for another attack; in the middle of July a Turkish force of about 10,000 began moving west from El-Arish, car¬ rying heavy guns manned by Germans and Aus¬ trians, and accompanied by an Arab camel corps under a German officer. Moving along the coast, the expedition was harried by Brit¬ ish monitors from the sea. A Scottish terri¬ torial division was stationed 23 miles from the canal at Romani and spread seven miles to the coast at Mahamdie; Australian and New Zea¬ land troopers protected the right of the line, while mounted detachments harassed the ene¬ my's left. On 3 August the Turks delivered their attack. For over 20 hours the battle raged, and on the afternoon of the 4th the whole British front advanced. The result was quickly decided; the enemy line was completely smashed; Turks, Arabs and Germans fled in confusion, followed by British cavalry sweep¬ ing up masses of prisoners, guns and equip¬ ment. By the 7th the enemy had retreated 20 miles ; he made a stand on the 9th, but was again pushed back. The enemy resistance was broken, and it now remained to clear the rest of the peninsula. Several heavy actions were yet to be fought, but by the end of February 1917 the Turks had been thrown back across the frontier at Rafa. The province of Sinai was freed after a two years' undisturbed oc¬ cupation ; only a few scattered patrols re¬ mained behind, all that was left of the army destined to reconquer Egypt, Turkey's prom¬ ised reward for her participation in the war on the German side.

There is little more to add concerning the Russian operations in Armenia and Persia. Early in 1917 General Baratov began a fresh offensive against the Turks by pressing south¬ ward through Persia toward the common Allied objectives at Bagdad and beyond. He reoccu¬ pied Hamadan, which he had lost to the Turks the previous August, and caused the enemy to retire toward the Mesopotamian bor¬ der, where they were attacked and dislodged from the Assabad Pass. The Russians occu¬ pied Kermanshah and Harunabad, and by 17 March were at Kerind, only 150 miles from Bagdad. A squadron of Cossacks, composed of five officers and 110 men, crossed the Push-tikuh hills through snow-laden passes 8,000 feet high, covered 180 miles and reached the British camp at Ali Gharbi in Mesopotamia on 18 May. If report be true, the night of their arrival was celebrated with song, dance and hilarious conviviality. During May the main Russian body was obliged to retreat before su¬ perior Turkish pressure and abandon positions on the border, including Khanikin. He fell farther back to Kermanshah, where he was still 250 miles from the

army’s main base at

Kasvin, Another move backwards to Hamadan became necessary, and that place also had tc be abandoned. But the Turks were not able to attempt any fresh incursion into Persia. Re¬ volt again flamed up in Persia ; the government fell into difficulties and it seemed for a time as though German intrigues would gain the sup¬ port of the country for the long-desired holy war. In the Caucasus the Russians held their ground ; there was little fighting, the occupa¬ tion of Van on 17 March being the chief inci¬ dent of note. By degrees the Russian Trans¬ caucasian campaign began to fall off; both Russia and Turkey had weighty preoccupations nearer at home. In May 1917, before Russia dropped entirely out of the war, the Goehen and several Turkish torpedo boats proceeded to Sevastopol, where the former German battle¬ ship sustained some damage which the dock¬ yard workmen refused to repair. When, after the armistice, the Allied fleet found the Goeben in Stenia Bay, in the Bosporus, she had a Turkish crew on board under a Turkish ad¬ miral, Arir Pasha ; the Germans on leaving had taken all the plans of the ship and her engines, with the fire control and other instruments, so that the Turks could only find out details of her mechanism by actual inspection. In Asia as well as in Europe the contribution of Russia to the Allied ultimate success had been enormous. Her great battles of 1915 and 1916 were of vital importance to the Allies as a distraction for the enemy while they trained their manhood and prepared a machine, equal at first, and later superior, to that possessed by the principal enemy.

After the surrender in Kut of General Townshend in April 1916, the British authori¬ ties in Mesopotamia and at home profited by the lesson of failure and began elaborate prepa¬ rations commensurate with the task yet to be accomplished. On 28 Aug. 1916 Gen. Sir Stanley Maude took supreme command in Mesopotamia. Before any active operations could be undertaken with reasonable prospect of success it was necessary to improve the health and training of the troops, who had suffered severely from the intense summer heat, and

to perfect the precarious lines of communications. Other desiderata were to de¬ velop the army's resources and to assemble re¬ serves of supplies at the front. Basra re¬ mained the headquarters ; its port was devel¬ oped; railways were laid; men and material ar¬ riving from overseas were transported and placed in requisite position; everything that foresight could devise was promoted to assure success. During the latter part of October the new commander-in-chief in India, Gen. Sir Charles Monro, arrived in Mesopotamia and m.ade an extended tour of the theatre of opera¬ tions.

At the beginning of December the enemy still occupied the same positions on the Tigris which he had held during the summer. Stra¬ tegically, the British had the better situation. The Turks had withdrawn the bulk of their troops from the right bank of the Tigris, with the result that their line of communication was but an extension of the battle front. The Brit¬ ish first objective now was Kut. By 13 Dec. 1916 the British opened their offensive; the troops were divided into two commands ; one.

under General Cobbe, was to hold the enemy to his positions on the left bank of the river and to picket the right bank as far as Es Sinn ; the other, under General Marshall, with cav¬ alry, was to secure and entrench a position on the Shatt-el-Hai by a surprise march. This program was duly carried out and Marshall gained control of the Hai waterway, threat¬ ened the enemy communications, and cut off another communication between the Turks in the Khadairi Bend, east of Kut, and those far¬ ther west. The next move was to capture that bend, lined with Turkish trenches, an opera¬ tion that required two weeks of severe and miainly hand-to-hand fighting. Then followed two months of further hard fighting for the strong Turkish lines on both banks, and when these were captured Kut was almost sur¬ rounded, the Turks still holding fast at Sanna-i-Yat. The point of attack decided upon was Shumran, five miles above Kut. Some feint movements by British and Indian troops de¬ ceived the enemy, who hurried troops from Shumran to Sanna-i-Yat, and when the main attack was delivered on 23 Feb. 1917 the Brit¬ ish crossed the river where it was 340 yards wide by means of three ferries and began building a bridge for the passage of troops. English and Gurkhas were employed in this enterprise under heavy fire. Meanwhile, Gen¬ eral Cobbe, with Seaforth Highlanders and a Punjabi battalion was engaged in storming the Sanna-i-Yat lines, which fell to his men on the 24th, after they had cut their way through six lines of trenches. By the combined operations the Turks were completely outflanked; they evacuated Kut

and retired on Bagdad. But this proved to be only the first stage in the British campaign. On the 26th the gunboats were 30 miles beyond Kut chasing the Turks; on 5 March British cavalry approached Bag¬ dad; the Ctesiphon position was passed next day, and on the 7th the advanced force came into contact with the Turks along the Dialah River, a tributary of the Tigris, where the enemy made a stand before Bagdad, only eight miles away. By a rapid advance against determined resistance and a violent dust storm General Cobbe reached Bagdad railway sta¬ tion (10 March) on the right bank; Marshall on the left shore forced the Dialah and entered Bagdad on the 11th. In the afternoon the gun¬ boat flotilla anchored off the British residency.

Bagdad, one of the oldest cities in the world, the city of romance, was lost to the Turks. The effect of its fall was far-reaching. While it restored British prestige it struck at Turkish pride and deprived Germany of a territory which, on account of the famous railway, played an important part in the Teutonic scheme of expansion. On 19 March General Maude issued a proclamation in Arabic to the people of the Bagdad vilayet, from which the following extracts are taken : . . Our

armies do not come into your cities and lands as conquerors or enemies, but as liberators.

For 200 years have the merchants of Bagdad and Great Britain traded together in mutual profit and friendship. On the other hand, the Germans and Turks, who have de¬ spoiled you and yours, have for 20 years made Bagdad the centre of power from which to as¬ sail the power of the British and the Allies of

the British in Persia and Arabia… . But

you people of Bagdad are not to understand that it is the wish of the British government to impose upon you alien institutions… . O

people of Bagdad, remember that for twenty-six generations you have

suffered under strUnge tyrants who have ever endeavored to set one Arab house against another in order that they might profit by your dissensions. This policy is abhorrent to Great Britain and her Allies, for there can be neither peace nor prosperity where there is enmity and misgovernment. Therefore I am commanded to invite you … to participate in the management of your civil affairs in collaboration with the political rep-lesentatives of Great Britain who accompany the British Army, so that you may be united with your kinsmen in north, east, south and west in realizing the aspirations of your race.® Anglo-Indian cavalry continued to hunt the Turks from Bagdad along the road to Mosul, while another force was dispatched up the Dia-lah, driving the enemy toward Teheran, on the road from the north of which the Russians operating in Persia were pressing another Turk¬ ish force, which latter was now in peril of being caught between the two Allied armies, but the Turkish commander extricated his troops by skilful tactics. On 23 April the Brit¬ ish column operating on the right bank was in Samarra. Between 24-30 April a Turkish counterattack from Jebel Hamrin near the Per¬ sian frontier ended in disaster; the Turks were put to flight, pursued by British cavalry. A radius of 80 miles around Bagdad was now clear of the enemy; the city was safe from molestation and the wearied troops were per-miitted to rest. By 9 May the railroad was put in order and trains were running regularly over the 70 miles to Samarra, the terminus. The Turks were now obliged to withdraw their secondary force on the Euphrates, the situa¬ tion there being no longer tenable after the fall of Bagdad. Since July 1915 they had been stationed about Samawa, 40 miles above Nasariyeh on the Euphrates, whence they now moved upstream to Ramadie, 28 miles north of Feluja and about 40 miles below Hit. A Brit¬ ish column from Bagdad crossed the interven¬ ing country between the two rivers to Feluja and during July began to push along toward Ramadie. Owing to the excessive heat they postponed operations till September, when, on the 28th, they fell upon Ramadie with dra¬ matic suddenness, circled the positions and caught the enemy in a trap. After a battle lasting a night and a day the Turkish com¬ mander, Ahmed Bey, surrendered with 145 unwounded officers and over 3,000 men, 23 guns and much other material. A month later a similar event occurred at Teskit, on the Ti¬ gris, 100 miles above Bagdad, where the Turks had established a base with a view to retaking Bagdad. This position was suddenly attacked on 2 Nov. 1917, when it was broken up and 2,300 prisoners captured. At the height of his great achievements General Maude died sud¬ denly in Bagdad on 18 November and was suc¬ ceeded by General Marshall.

We return now to the extreme eastern bor¬ der of Egypt, where the

Turks had been driven out of the Sinai Peninsula in February 1917. From this point the British started out

to achieve a task that had been attempted so long ago as the 11th, 12th and 13th centuries — - the reconquest of the Holy Land. The des¬ ert railway was being extended to Rafa and in March 1917 General Murray moved against the Turkish stronghold of Gaza, in Palestine. The latter is a country smaller than New Jersey, contiguous to the Mediterranean, 50 to 60 miles broad and 110 miles long. Geographically it is a part of Syria, from which it has never had a separate existence; except among West¬ ern Christians, its proper name in the East is ^^Syria® or its Oriental equivalents. The coun¬ try, approaching it from Egypt, is difficult to traverse, changing from the Sinai desert to stony hills. Not caring to risk his army too far from the coast — •being dependent upon sea¬ borne supplies — General Murray decided to direct his main attack against Gaza, and to assist it by a diversion along the Wadi Ghuzze to cover his right flank. The enemy's plans, as it turned out, consisted of standing upon the defensive at Gaza and to throw his chief strength against the British right.

That plan was perfectly sound, for, even if the British did get into Gaza, they would not be able to hold the place should the Turks on the right succeed in cutting between the invaders and their base at Rafa. Something like this actually happened. Murray attacked south of Gaza on 26 March; the Turkish defenses were stormed and the British entered the town, but the mobile column protecting Murray's right along the Wadi Ghuzze was hopelessly out¬ numbered and could not resist the full weight of the enemy thrown against it. Attacked both in flank and rear, the British perforce fell back, although they had taken 950 prisoners including the Turkish general in command and the entire staff of a Turkish division. The British casual¬ ties were about 4,000; those of the Turks nearly twice as many. Gaza remained in Turkish hands, and the enemy entrenched in a strong line from Gaza southeastward to Beersheba, about 30 miles. For the British it was a costly failure; yet they had mauled the Turks so severely that they, also, were unable to follow up their semi-victory. Nothing happened for the next three months. Meanwhile, General Murray had been recalled home and at the end of June his successor, Gen. Sir E. H. H. Allenby, arrived in Egypt. If Murray's task was diffi¬ cult, that now facing Allenby was much more so, for in the interim the Turks had constructed six groups of formidable works on their Gaza-Beersheba line at parallel distances of 2,000 yards, provided with excellent

lateral communi¬ cations. On this front were now assembled some 180,000 troops with a good sprinkling of German officers, including one general, Kress von Kressenstein, who as colonel had taken part in the two abortive Suez Canal expeditions. The British force was strictly limited by the quanti¬ ties of supplies and water that could be trans¬ ported. The Turks, on their side, were well provided with water and railroad communica¬ tions, connecting with Jaffa and Damascus, be¬ sides several light military railways.

Altogether, the prospects were not inviting; but even here, as in most human arrangements, there was a flaw and General Allenby discovered it. There was a gap of about four miles be¬ tween the Beersheba defenses and those of

1 Regimental officers mapping enemy positions while under fire

2 British rifle grenade and trench periscope

Copyright, International Film Service

2 Operating a daylight lamp-signal device in a shell-hole

Ruweika, a gap so rugged in conformation and so elevated that any

artificial defense appeared superfluous. Instead, therefore, of attacking at the Gaza end of the line, Allenby decided to begin at the Beersheba end, where attack was least expected. In case of success in this sector and assuming sufficient speed of movement, there was a possibility of outflanking the enemy. It Would have to be a surprise attack stealthily prepared. The preparations were matured dur¬ ing July, August and September. Great guns were brought across Sinai ; a British squadron lay off the shore to co-operate in a feint attack on Gaza, while a picked force with six days' supplies was dispatched at night by a wide de¬ tour toward Beersheba. On 31 October all was ready for the grand assault. The bombardment of Gaza began on the 27th and kept up through the 29th; on the 30th the warships joined in. Meanwhile, the Beersheba force reached its destination, stormed the defenses and captured the town. Successive attacks were launched against Gaza on 1 November with tanks on the land side and bombardment from the warships. For a week the struggle raged, and on the 7th the Turks, after a gallant resistance, could hold out no longer and Gaza fell ; the same evening British pursuers were nearly 10 miles beyond Gaza. From this stage the Turks were not allowed to rest. On 17 Nov. 1917 Joppa was captured and on 9 December the British were in Jerusalem. The Holy City fell for the 18th time in its long history. Though the Turks had flred from positions close to the city and from the Mount of Olives, no British gun was sighted within a considerable distance from the walls. Bethlehem had been occupied and passed the day before.

Two days after the surrender of Jerusalem General Allenby entered the ancient city on foot, accompanied by his staff, the commanding offi¬ cers of the French and Italian detachments co¬ operating with the British forces and American, French and Italian military attaches. Martial law was proclaimed and the general announced that property and all sacred bˆuildings would be protected. On 25 Jan. 1918 the War Office in London issued General Allenby's first dispatch, in which he stated that during the operations fiom 31 Oct. 1917 to 9 Dec. 1917 over 12,000 prisoners were taken, while among the mass of war material captured there were about 100 guns, many machine guns, 20,000,000 rounds of rifle ammunition and 250,000 rounds of gun ammuni¬ tion. More than 20 aeroplanes had been destroyed by British airmen or burnt by the enemy to avoid capture. Both from a political and military view the British occupation of Jerusalem was a most important event, for it still further reduced Turkish prestige and exer¬ cised a profound influence upon the greater part of the Christian world. Nor was the prospect of losing so important a place underrated on the enemy side, for as soon as Jerusalem was re¬ ported to be in danger, frantic efforts were made to save it. Enver

Pasha came post haste from Constantinople and lectured the Turkish com¬ manders, while the German strategist Falkenhayn hurriedly covered the 300 miles from Aleppo to the front, but found that he was unable to stave off the inevitable. An Arab prophecy had been current for centuries that a deliverer would come to Jerusalem from the West. There had been considerable speculation

in the country in 1898 when the former kaiser visited the city, but the wise expounders of The Law had asserted that the real saviour would bear a prophet's name and would enter on foot. In the minds of the peasantry of Judaea General Allenby fulfilled these conditions, for by a peculiar coincidence his name somewhat re¬ sembles the Arabic for ®the prophet,® which is ®al nebbi.® Colloquial Arabic being a very elastic language, ^^Allenby® and ®Alneby® may easily become synonymons terms.

The retreating Turkish army had been cut in two sections by the rapid British advance along the coast and the dash between Joppa (modern Jaffa) and Jerusalem. One force was only a few miles north of Joppa; the other held a line across the roads leading from Jeri¬ cho east of Jerusalem to Nablus, about midway between the River Jordan and the Mediterra¬ nean. The British line stretched from Jerusalem northwestward to Jaffa, taking up roughly half of the territory between the Dead Sea and the Mediterranean. It was essential first to protect that line and push it forward, involving an ad¬ vance on a 12-mile front to a depth of six miles, by which the distance between Joppa and the enemy would be increased to eight miles. But before this movement could be carried out a great deal of labor had to be expended on im¬ proving the roads and in bringing up fresh sup¬ plies from Egypt. These latter were trans¬ ported over the railroad which had been laid down behind the advancing force; in other words, the iron road followed the army. Heavy rains now turned the roads into quagmires and movement was slow and difficult. The Turks launched several attacks on the Allied positions on the main motor road to Damascus. By de¬ grees the front was pushed ahead; by 5 Jan. 1918 already 13 miles had been covered ; the Turks had a base at Nablus (the ancient Shechem), about half-way on the road to Nazareth. Allied airmen bombed the base and behind it, causing much damage. Further progress was made in the middle of February, when the oper¬ ation was expanded eastward toward Jericho and the Hedjaz Railway. During 1917 the allied Arabs had been operating

successfully along that railway; under the leadership of the ˆmysterious® Colonel Lawrence they attacked and defeated a large Turkish force at Maan, 120 miles southeast of Gaza, on 7 July. About 700 Turks were reported killed, 650 captured and several guns taken. By this battle the Arabs gained control of a line from Maan to Akaba, the port at the head of the Gulf of Akaba, whence the Egyptian frontier line runs almost straight across Sinai to Rafa. East of the Jordan lay strong divisions of Turks, whose communications were continually harassed and pillaged by elusive bands of Arabs. Allenby began a drive eastward on a 15-mile front to the Jordan Valley, 19 Feb. 1918, battered down ob¬ stinate resistance and within two days a detach¬ ment of Australians rode into Jericho. The aim was to drive the enemy across the Jordan and to seize the crossings, in order to prevent them from raiding the country west of the Dead Sea. It was also desirable to gain a point of depart¬ ure for operations eastward, to pass over north of the Dead Sea with a view to interrupting the Turkish line of communication to the Hedjaz, in conjunction with the Arab forces based on Akaba. Amman, a station on that railway, was

to be the first objective. The difficulty of the ground was a greater obstacle than the enemy's opposition, which appeared to weaken with the discouragement of frequent defeat. Of deadly machine-gun fire there was ample for the Allies to face; it was the cold steel assaults that in¬ spired most respect. Aeroplanes scouted high over the Jordan Valley and the shores of the Dead Sea, dropping bombs on El Kerak, on the eastern side and on sections of the railway. On 4 March Allenby's left moved northward on Shechem, where a big tributary of the Jor¬ dan, Wadi Auja, lay in the way. The rocky defiles of the Robbers' Valley concealed numer¬ ous machine-gun nests. After storming the height of Tel Asur British troops crossed the Wadi Auja on the 9th while the foothills over¬ looking the Plain of Sharon and along the coast were partially cleared. On the banks of the Jordan a two weeks' fight for the Ghoraniych bridge ended by the Turks blowing it up. Allied engineers threw bridges across the river and toward the end of the month a sudden raid was made through the

mountainous region on the east upon Es Salt, which was strongly held by Germans and Turks. Many of the troops had to swim across the Jordan in the night at cer¬ tain parts of the river, while some were able to use the bridges in face of fire and a strong current. Es Salt was found to be evacuated on 25 March; Australians and New Zealanders ad¬ vanced beyond and reached the railway line, where they were able to carry out some demoli¬ tion before enemy reinforcements compelled their withdrawal back to the Jordan.

Except for a garrison left on the east bank to hold a bridgehead, all the Allies were back across the Jordan by 2 April. The Turks now returned from the east and reoccupied a strong position at Shunet Nimrin with some 5,000 men, about 10 miles from the river. An attempt was made to cut off this force by a roundabout movement to the north of it, to retake Es Salt and hold it if possible till Feisul with his Arabs could come up from the south. The Arabs, as already stated, had their base at Akabah. In January 1918 they had captured the high ground about Uheida, within seven miles of Maan ; while another Arab force had seized the whole of the Hish Forest up to and including Shobek, 20 miles north by west of Maan, and destroyed some 22 miles of the enemy's light railway, along which they had transported wood for their locomotives. Still another Arab patrol raided Jauf ed Derwish, a station 30 miles north of Maan, which they held for three days, during which they burnt the building and destroyed some rolling stock. In these operations the Turks lost a number of killed, prisoners and guns. Another band of Arabs captured Tafile at the south end of the Dead Sea in January, where the Turks surrendered. On 26 January a strong Turkish force attempted to recapture Tafile, but was driven back with severe loss, over 450 killed and 300 taken prisoners. In March they returned, accompanied by German infantry, when the Arabs retired

The raid on the Shunet Nimrin position commenced in the morning of 30 April ; the advanced works were captured, but a strong resistance rendered it impossible to go farther for the moment; the cavalry sent round north of the place arrived at their destination and took Es Salt, where an Australian brigade

was left This body was attacked and separated by Turkish cavalry on 1 May and one section was driven back through the foothills to the Wadi el Abiad, abandoning nine guns and part of their transport. Those of the Australians left in Es Salt were now cut otf with but one line of retreat or supply till the main road could be opened by the capture of Shunet Nimrin. A combined Allied attack on this position

began on 2 May, but at the same time two Turkish bat¬ talions with heavy guns arrived at Es Salt and made a desperate attempt to overcome the Aus¬ tralians there, though without success. To ward off this blow the force for Shunet Nimrin had to be weakened and called off, as Turkish re¬ inforcements were approaching Arab assist¬ ance had been expected, but it did not material¬ ize in time. The Australians withdrew from Es Salt, closely followed by the enemy, who, how¬ ever, was held off without difficulty and all the Allies got safely back over the Jordan by 4 May. Meanwhile, great events were preparing on the Western Front for the last mighty effort, and troops were collected from every available theatre of war to assist in striking the final blow. Little as they could be spared, men were sent from Syria to France; the reorganization of the forces prevented further operations on any large scale beyond a policy of active de¬ fense. Divisions were withdrawn from Pales¬ tine and Mesopotamia, also nine Yeomanry regiments, five siege batteries, 10 British bat¬ talions and five machine-gun companies : all embarked for France. These were replaced by Indian cavalry regiments from France and native battalions from India. During May, 14 British battalions more were withdrawn for France, with only two Indian battalions to re¬ place them. During June, July and August more men arrived from India. While all this shifting had been going on, the enemy had not been neglected ; many raids took place. But the Turks had received a considerable ˆstiffening® of German troops, and their resistance grew stronger by degrees. Advance was made on the British left along the coast in June in a series of minor battles and daring raids. The Indian troops were admirably adapted for this style of warfare, Pathans, Sikhs and Gurkhas partic¬ ularly distinguished themselves in stealthy ap¬ proach and sudden pouncing upon the enemy lines. During the summer an event of con¬ siderable importance had happened far behind the Palestine front: an iron swing bridge across the Suez Canal had been completed at A1 Kantara (Arab, ®the bridge®), thus establishing direct railway communication between Cairo and Palestine — for the first time. This very modern link between the land of the Pharaohs and Judaea facilitated rapid transport of sup¬ plies to the fighting line. On 27 May 1918 the last tremendous German offensive began in France; tlie Germans were at the height of their great sweep toward Paris when, on 13 July, the Turks emulated the example of their allies by making a most determined attempt to rush the Jordan crossings and recover Jericho. They made some progress at first, but on the next day the Australians counterattacked and re¬ stored the position, capturing many Germans, including 12 officers and a number of guns. A strong Turkish force concentrated on the east of the Jordan was surprised in a dashing charge

by the Jodhpur (Indian) Lancers and sought safety in flight.

During all this period the Arab allies were busy harassing the Turks along the Hedjaz Railway, not permitting the latter to restore communication between Maan and the north. South of Mann a detachment of the Imperial Camel Corps attacked and captured the station at Kalaat el Mudawara, destroying the water tower and pumps, with the result that no water was now to be had for a distance of nearly 100 miles south of Maan ; Medina was definitely cut off from the north. Since the declaration of their independence the Arabs had cleared the Red Sea coast of the enemy for 800 miles and disposed of 40,000 Turkish troops.

In order to keep the narrative abreast with the events, we must now direct our glance to Mesopotamia, where we left the British in pos¬ session of Bagdad under the command of the new generalissimo. Sir W. R. Marshall. If one will consult a map of the quondam Turkish Empire and observe the relative posi¬ tions of Bagdad and Jerusalem, the whole strategy of the two commanders is at once ap¬ parent. They are working along on parallel lines with the Great Nefud or Arabian Desert stretched between them. Follow the two lines upon the map and it will be seen at once that the junction where the two armies — provided they are successful — must eventually meet is the ancient city of Aleppo, outside the northern rim of the desert. The last important action under General Maude was the surprise and cap¬ ture of Ramadie on 28 Sept. 1917. The Anglo-Indian force which accomplished this exploit was opposed early in October by other Turkish forces northeast of Ramadie on the Jebel Hamrin hills on the Euphrates side of Mesopo¬ tamia. On the Tigris side of the country the enemy was entrenched up the river above Bag¬ dad in front of Daur, his left wing stretching across to Ramadie. Marshall was sent to expel the Turks from their forward position on the right bank of the Diala and to hold them in front while a main attack was delivered against their left flank. The plan succeeded ; the enemy was dislodged from a very strong position, but, owing to the low water of the Diala at the

time, most of the Turks made their escape and got over to the right bank In the middle of October a Turkish army corps undertook a counter¬ demonstration, advanced eight miles north of Samarra and entrenched. These operations, begun under General Maude, were continued fiy Marshall toward the end of November, when the Diala was forced by night and the whole position between Mirjana and the Nahrin oc¬ cupied on 3 Dec. 1917. An infantry brigade meanwhile advanced along the Jebel Hamrin and drove the enemy toward the Sakaltutan Pass and Nahrin River ; another infantry brigade cleared Kishla Suhaniya, occupied the pass after the Turks withdrew in the night, and on 5 December a combined column pushed forward against Kara Tepe, carried the position next day and put the Turks to flight. Prisoners were taken and 100 dead were buried by the British. In this engagement a Russian detach¬ ment cooperated. Khanakin was occupied by the Allies on 9 December, and the next two months were mainly devoted to consolidating positions and constructing bridges across the Euphrates, to which side of Mesopotamia the

next main attack was to be transferred. On 9 March 1918 a surprise assault on Hit, in the cen¬ tre of the oil country, was entirely successful, while a dashing cavalry coup netted 3,000 prisoners. The next place to fall was Khan Bagdadie, some 22 miles northwest of Hit; pur¬ suit was kept up till the rains intervened ; by the first week of April over 5,000 prisoners were taken. At the end of the month the advance was resumed up the road to Mosul. The Allies were now half-way between Bagdad and their goal at Aleppo. The Turks kept on the move, harassed by cavalry which swept up large numbers of prisoners. Numerous minor operations were in progress during all the time.

German emissaries were busy stirring up cer¬ tain tribes on the Persian border with gold and promises, notably some sections of the Sinjabis. With the assistance of some friendly tribes a small British column fought a brief action with the Sinjabis, defeating them with heavy loss (25 April 1918). The result of this little battle was useful, for the pro-enemy chief of the Sinjabis (who was known to be in German pay) was himself wounded. The German agents fell into discredit ; a profound impres¬ sion in favor of the British was created among the surrounding tribes, and the line of com¬ munication into Persia was safeguarded from serious raiding.

Little by little the Mesopotamian columns pushed ahead, fighting many engagements, dis¬ lodging the enemy from inconvenient positions and securing control of roads, rivers, ravines and natural

fastnesses. Substantial gains were made during May along both the Tigris and Euphrates, while Allenby was slowly forging ahead on the other side of the desert. Each commander met with checks and minof reverses ; wherever an effort failed, a repeated attempt rarely proved unsuccessful. All strategic move¬ ments were but preliminaries to the great deci¬ sion. As the Allies advanced, the Turks time and again retired after an engagement or evacu¬ ated positions without excessive resistance. In this manner various places were occupied by the Allies. To add to the difficulties famine stalked among the civilian populations on the route, necessitating a combined c.ampaign of fighting with the enemy and alleviating suffering. Cleaning up indescribably dirty towns and intro¬ ducing the elements of sanitation was yet an¬ other of the many tasks to be faced. It must be remembered that during the summer of 1918 there were still some Russian troops in Persia who had not yet shared the general demoraliza¬ tion of their brethren in Europe. Persia was relapsing into anarchy and the Russians were retreating to the Caspian. Urgent calls came to Marshall to send troops into the country, where famine also prevailed. Mr. and Mrs. Stead, two American missionaries, were en¬ gaged in strenuous relief work in the neighbor¬ hood of Kermanshah. At the end of May General Marshall dispatched troops in automo¬ biles as far as Kasvin to take over that place from the retreating Russians. Though a mere side issue, this was an operation of considerable difficulty and magnitude. The Allied mission under General Dunsterville arrived at Kasvin on 1 June 1918; on the 8th the Russians stationed there marched away for Enzeli to take ship thence for Baku. A small British detachment accom¬ panied them. On reaching Mandjil three days

later they found the bridge at that place held by a native tribe called the Jangalis, with whom were several German officers. After a vain effort to parley on the part of the Germans, the Russians attacked, assisted by British light armored cars, captured the bridge, and moved on to Resht and Enzeli. During July some street fighting occurred in Resht when a small detachment of Anglo-Indian troops were at¬

tacked by the Jangalis. About 100 of the latter were killed, when the tribe made an agreement not to assist the Turks any further. At this time the government of Baku (on the Caspian) was Bolshevik, and strongly opposed to British intervention. Actions were fought near the port between Turks and Tatars on one side and Russians and Armenians on the other. On 26 July the Bolshevik government was over¬ thrown and its place taken by a Centroˆ Caspian Dictatorship. The latter at once applied to the British for aid, but before it could arrive the Russian commander who had brought his men out of Persia had marched them away again along the Caspian. On 4 August a small mission of British officers with one platoon as escort arrived at Baku, where they received an ovation on marching through the town. The Turks attacked Baku the next day and were driven back with many losses. More British reinforcements continued to trickle into the town and took over portions of the defenses. General Dunsterville tried to rouse the popu¬ lation into an energetic mood, but they seemed to think it was no longer necessary for them to fight now that the British had come. Twice toward the end of August the Turks attacked Baku with artillery and bayonet charges, op¬ posed at first only by a handful of British troops and Armenian irregulars. On 14 Sep¬ tember the Turks returned to the attack with considerable reinforcements. They scaled the heights and had nearly succeeded in taking the town when a counterattack by Russians, Brit¬ ish and Armenians held the fort for a while; the Russians lost all their officers and the Ar¬ menians were overcome. The weak British force could do little more, so it was decided to withdraw them on three vessels which had been earmarked for their use. The town was at the mercy of the enemy, who occupied all the high ground and could shell the harbor at 3,000 to 5,000 yards. The Baku government was informed of General Dunsterville's de¬ cision ; the sick and wounded were carried on board in the evening and at 10 o'clock the three ships set sail without lights closely iollowed by another in which it had been possible to col¬ lect ammunition and explosives. This latter vessel was struck by gunfire from the guardship at the mouth of the harbor, but the others slipped away unscathed, and all four arrived safely at Enzeli. The British detachment had held the Turks out of Baku for six weeks; the latter were obliged to bring up large rein¬ forcements before they could capture the place.

We must now cast a brief glance over North¬ ern Persia. The Turks entered Tabriz on 16 June 1918. During June, also, about the time Dunsterville was leading his detachment into Persia, small bodies of troops were dispatched to Bijar and Miana to safeguard the long line of communication and to establish friendly relations with the local

tribes in the northeast¬

ern corner of the country. A road runs through Bijar to the Urmiah district, where it was known that the Assyrians, Nestorians and Jelus had been successfully resisting the Turks during the early summer. In July it was de¬ cided to get into communication with these tribes by aeroplane, and to send them by convoy assistance in the shape of ammunition, ma¬ chine guns and money. This convoy reached Sain Kala on 23 July, but the Assyrians were 10 days late in meeting it, and their eventual arrival coincided with the occupation of Ur¬ miah by the Turks, who drove all the Assyrians cut, massacring many and pursuing them along the road to Sain Kala until checked by the British advanced troops. The whole of the Assyrians who survived — men, women and children — then streamed along the Sain Kala-Bijar road from 3 August onwards, and finally over 50,000 arrived at Bijar, whence they were evacuated unmolested to Hamadan. Large numbers fell by the way from privation and cholera. The British military authorities fed the refugees and sent them on in batches of 3,000 at a time down the Persian line of com¬ munication to Bakuba, where a great refugee camp had been formed. Men capable of bear¬ ing arms were organized into a fighting force, and others were employed on the roads and elsewhere. A small British detachment had also been kept at Miana, on the Kasvin-Tabriz road, and on 1 August news was received that the Turks in Tabriz were collecting transport, apparently with the aim of raiding the British communications, then held by weak parties of troops. The Turks eventually attacked an ad¬ vanced post of irregulars on the road about 45 miles northwest of Miana, and for several days the posts had to fall back fighting against superior forces of Turks, who occupied Miana on 9 September, taking up a strong position south of that place. Meanwhile General Mar¬ shall had sent such reinforcements as he could spare, and the Turkish advance was brought to a halt.

Mention has been made of the situation of the Turkish Armenians in the war. We have seen how the two branches of that race were willing to pledge loyalty to their respective governments, Turkish and Russian. They fought in both armies, and were betrayed by both governments ; for, under the Turks, they were rarely entrusted with weapons, but were made to perform all the menial tasks of the camp and battlefield. After the downfall of the Romanoffs, the Russian Armenians sup¬ ported first the Provisional and then the Ker¬ ensky government, in the despairing hope that some measure of benefit might accrue to their unhappy country. When Kerenskv went down

before the Bolshevik avalanche, the Russian Armenians made common cause with their brethren under Turkish rule. For a month the Armenians at Van held a Turkish army at bay during April 1915, keeping a division of the enemy and thousands of Kurds employed; two months later, some 10,000 Armenians of Sassun armed with obsolete weapons, fought 50,000 Turks and Kurds. On neither occasion did the Russians, who were within easy distance, come to the rescue. Armenian men and women oc¬ cupied the trenches and fought with the cour¬ age of despair at Urfa for 40 days against a

Turkish division. Later, in Cilicia, a few thou¬ sand Armenians near Zeitun fled into the moun¬ tains and struggled against an army of Turks for over 40 days. They managed to reach the Mediterranean Coast, whence they were picked up by a French cruiser, which conveyed them to Egypt, where they enlisted in the British and French armies. In the Caucasus the Arme¬ nians contributed in no small measure to the defeat of the Turks in the early stage of the war and still more in the later part of the campaign. After the Turks had surrendered. General Liman von Sanders expressed the opin¬ ion that their collapse was due to the fact that the Turks, ®against my orders and advice, sent all their available forces to the Caucasus and Persia, where they fought the Armenians.® Kerensky said on 20 Aug. 1918 that, ®of all the races of the Caucasus, the Armenians alone stuck to their posts, organized volunteer forces and by the side of their Russian comrades faced the formidable assaults of the enemy and turned his victorious march into a disas¬ trous rout.® During the war the Turks launched five separate offensives in the Cau¬ casus ; four of these were defeated mainly by the Armenians, and in the other case the Rus¬ sians who were chiefly responsible for vic¬ tory were commanded by an Armenian general, Nazarbekoff. On 3 Oct. 1918 Lord Robert Cecil wrote that ‘^the service rendered by the Armenians to the common cause can never be forgotten.® - After the Russian Caucasus Army of over 200,000 men abandoned the country they left 30,000 Armenians facing nearly 70,000 Turks. An arrangement between the Caucasian Armenians, Georgians and Tatars lasted only a

few weeks, for in May 1918 all the three races declared' their respective territories as in¬ dependent republics. The Armenians, however, were soon called to fight for their independence, for the Turks sent large armies against them. In two fierce encounters the latter were routed with enormous losses and were glad to nego¬ tiate for peace, the preliminaries of which.were signed on 4 June 1918. This treaty' was not ratified by the new republic, born out of blood¬ shed, rapine and centuries of oppression.

The multifarious fighting, skirmishing and manoeuvring for positions that took place dur¬ ing the summer of 1918 have been touched upon ; they form the overture to the sensa¬ tional drama that was shortly to be enacted. Three years before there had been a subsidiary operation on the banks of the Suez Canal and an unheralded landing at the head of the Per¬ sian Gulf. Against innumerable difficulties and in the face of numerous setbacks, the Allies had slowly crept across the Sinai Peninsula and up along the Syrian Coast on the one part, and up along the banks of the Tigris and the Euphrates on the other. Like an insidious fatal disease which begins from the feet and relent¬ lessly works its course up to the heart, so the British and Allied detachments had gradually worked upwards from the lower extremities of a diseased and decrepit polity, laming its mem¬ bers to the trunk. The coup de grace was now to be dealt swiftly and mercilessly. «The Last Crusade,® as Mr. John Buchan terms it, «was now approaching its climax, and the Crusaders would have startled the souls of Saint Louis and Raymond and Richard the Lionhearted could they have beheld that amazing army.® Only a

modest portion of it was drawn from the West¬ ern peoples. Algerian and Indian Moslems, Arab tribesmen, men of the thousand creeds of Hindustan, African, negroes, Frenchmen, Ital¬ ians, Armenians, Americans and Jewish bat¬ talions all united for a common purpose, were among the liberators of the Holy Land of Christendom.

In Syria the Turkish army, under Liman von Sarrders, a German, held a line from the north of Joppa on the coast right across Syria, over the Jordan, and down its eastern bank to the Dead Sea. Some distance east of that line, near Maan, were the Arabs under the Shereef Feisul ; they were to play a certain part in the coming offensive. The enemy's total strength was estimated by General Allenby at 4,000 sabres, 32,000 rifles and 400 guns; the garrison at Maarr and the posts on the Hedjaz Railway north of it consisted of some 6,000 rifles and 30 guns ; his general reserve of only 3,000 rifles with 30 guns was scattered

between Tiberias, Nazareth and Haifa; the total ration strength amounted to about 104,000. Allenby had at his disposal two cavalry divisions, two mounted divisions, seven infantry divisions, one Indian infantry brigade, four unallotted battalions, and a French detachment equal to an infantry brig¬ ade, making a total in the fighting line, of some 12,000 sabres, 57,000 rifles and 540 guns — a superiority in numbers over the enemy, espe¬ cially in mounted troops. The main attack, which opened on 19 -Sept. 1918, was preceded by a minor thrust up the road between Jericho to El Mugheir, where this highway meets a* track from Shechem to the Jordan crossing at Jisr ed Damieh, which crossing enabled the enemy to transfer troops from the west to the east bank at pleasure and interrupt the communica¬ tions of a force in the hills of MoaL All the enemy's communications to Damascus ran north¬ ward converging some 25 miles upon El Afule and Beisan, which, with Deraa, were the vital points to be struck at. Deraa was beyond Allenby's reach, but not beyond that of the mobile Arab army, which was in a position to dislocate all traffic. El Afule, in the plain of Esdraelon, and Beisan, in the Valley of Jezreel, were within reach of Allenby's cavalry if his infantry could break through the defensive systems and make a gap for the cavalry to rush through. It was essential that this gap should be created at the beginning of the operations in order that the cavalry might reach their destinations, 45 and 60 miles distant, before the enemy could make his escape. Moreover, which¬ ever route the cavalry followed, the hills of Samaria, or their extension toward Mount Carmel, had to be crossed before the plain of Esdraelon and the Valley of Jezreel could be reached ; and it was most important that the enemy should not be given time to rnan the passes. For this reason Allenby decided to make his main attack in the coastal plain rather than through the hills north of Jerusalem, where the ground afforded the enemy positions of great natural strength. A rapid and decisive advance was necessary, hence the route along the coast would enable the cavalry to pass through the hills of Samaria into the plain of Esdraelon at their narrowest point, thus ensur¬ ing greater speed and less likelihood of being checked.

The Turks had constructed two defensive

systems on a 10-mile front along the coastal plain at Jiljulieh, the ancient Gilgal. The first, 14,000 yards in length and 3,000 yards deep, ran along a sandy ridge in a northwesterly direction from Bir Adas to the sea, and consisted of a series of works connected by continuous fire trenches. The second, or Et Tireh system, 3,000 yards in the rear, ran from the village of that name to the mouth of the Nahr Falik. The ground on the enemy's extreme right was marshy and could be crossed only in few places. The terrain between the Allied front line and the Turkish defenses was open and could be overlooked from the enemy's works on the foot¬ hills round Kefr Kasim, By reducing the strength of his forces in the Jordan Valley and withdrawing his reserves from the hills north of Jerusalem, General Allenby concentrated five divisions and the French detachment, with 383 guns, for the attack on these defenses. In addition, two cavalry and one Australian mounted divisions were available for this front. Altogether the Allied strength on the front of attack represented 35,000 rifles against 8,000, and 383 guns against 130.

In order to prevent the Turks from discover¬ ing the decrease in strength in the Jordan Valley, a series of demonstrations were carried out Jn that region by Australian, New Zealand, Indian and English troops to induce the enemy to believe that an atttack was coming east of the Jordan, either in the direction of Madeba or Amman. A mobile column of the Arab army was meanwhile assembling at Kasr el Azrak, 50 miles east of Amman, accompanied by British armored cars and a French mountain battery. The real objective of this column was the railway north, south and west of Deraa. It was hoped that the demonstrations just re¬ ferred to would enable the Arab concentration to pass unobserved. The concentration on the front of attack was carried out by night, and every precaution was taken to prevent any in« creased movement becoming apparent to the enemy. The many groves round Ramleh, Ludd and Joppa were utilized to conceal troops during the daytime, though the chief factor in the secrecy maintained was the supremacy in the air which had been won by the Royal Air Force by continual wearing down of the enemy's aircraft throughout the summer. During one week in June 100 hostile aeroplanes had crossed the Allied lines ; during the last week in August the number had decreased* to 18. Several were shot down within the next few days, with the result that only four machines ventured to cross the line during the period of concentration. While the concentration was nearinq* completion the enemy's railway communications at Deraa were attacked by the Royal Air Force and by the Arab army, which had moved into the Hauran. The line and station buildings were

damaged on 16 and 17 September; on the 16th the Arabs, who had been joined by several local tribes and some Druses, destroyed a bridge and a section of the line ; on the next day extensive demolitions were carried out north and west of Deraa, thus cutting off all through traffic to Palestine. On the morning of 18 Septem¬ ber all was ready for the stroke. During the night one corps swung forward its right on the east of the Bireh-Nablus road and a division captured El Mugbeir with stern hand-to-hand

fighting. At 4:30 in the morning of 19 Sept. 1918 the artillery in the coastal plain opened an intense bombardment lasting 15 minutes, under cover of which the infantry left their positions of deployment. Two torpedo-boat destroyers assisted, shelling the coastal road to the north, clearing the way for the cavalry. The blow fell with such force that the Turkish line was completely broken in about four hours' fighting; the level plain helped to a rapid ad¬ vance while the naval guns swept the roads. So swift and complete was the Turkish de¬ moralization that the infantry was able, after marching five miles, - to swing eastward at the railway junction and advanced base of Tul Keram, and capture it. In this direction dis¬ organized bodies of the enemy were streaming in wild flight, pursued by the 60th division and the Australian Light Horse, with a composite regiment of Chasseurs d'Afrique and Spahis (Sepoys) attached. Turkish troops, guns, motor lorries and transports of every description were struggling to escape along the road leading to Messudie and Nablus. The confusion was. added to by the persistent attacks of the English and Australian flying corps, which wrought great havoc. The British infantry covered 12 miles in half a day; through the broken line of the coast fl3dng columns of cavalry passed to com¬ plete the rout and. round up the surprised enemy. The Desert Mounted Corps crossed the hills of Samaria, entered the plain of Esdraelon at El Lejjun, seized El Afule and sent a detachment to Nazareth, the site of the Yilderim Head¬ quarters. Sufficient troops were left at El Afule to intercept the Turkish retreat there, while the remainder of the corps rode down the Valley of Jezreel and seized Beisan. An¬ other corps rode along the line Hableh-Tul Keram, through the hills and converged on Samaria and Attaro, sweeping the retreating Turks into the arms of the cavalry left at El Afule. This last-named place, south of Naza¬ reth, contains ˆ the junction of the line from the port of Haifa connecting with the Jerusalem Railway. The Australian Light Horse had al¬ ready cut the line at Anebka, west of Samaria. The whole region was thus surrounded ; on the second day (20 September) no fewer than 18,000 prisoners, 120 guns, four aeroplanes and a large mass of war material

and rolling stock fell to the victors. The scattered remnants of the Turkish army were endeavoring to cross the Jordan fords in theˆ small section open to them, but were almost without roads to reach them. Those which fled north before the advancing in¬ fantry were rapidly gathered in by the cavalry, who had established themselves in Nazareth and Beisan by 20 September. The northward roads from Jericho and Jerusalem meet at Beisan, together with two others from the city of Samaria and from across the Jordan. The cavalry racing down the Samaria highway reached and occupied Jenin, and thus blocked for the fleeing Turks another group of roads spreading fanwise toward the north. Other detachments pursued such bodies of the enemy as were struggling in the direction of Damascus as far as Tiberias, Semakh, and Es Samrah on the shores of the Sea of Galilee. When the British cavalry reached Nazareth, the site of the enemy headquarters, fighting developed in the streets and some 2,000 prisoners were taken.

General Liman von Sanders had already made his escape, but his papers and some of his staff were taken. The enemy resistance was broken on 20 September; on the 21st the Turkish rear¬ guards were driven in. On the 22d the New Zealand Mounted Rifles and the British West Indies Battalions seized the bridge at Jisr ed Damieh, thus cutting off all hope of escape for the enemy in that direction. Early in the morn¬ ing parties of Turks, numbering from 50 to 300, began to approach Beisan, preceded by white flags. On the 24th the 20th Cavalry Corps met with occasional opposition, and its advance was hampered by large numbers of Turks who surrendered. Great quantities of transport and numerous guns were found abandoned by the roadsides. On a five-mile stretch of road 87 guns, 55 motor trucks and 842 vehicles were found. Part of the garrison of Haifa, which was attempting to reach Tiberias, was inter¬ cepted and attacked in moonlight by the 18th Lancers, who killed a large number and cap¬ tured 300. While the Indian (Mysore) Lancers were clearing the rocky slopes of Mount Car¬ mel the Jodhpur Lancers charged through the defiles and, riding over the enemy’s machine guns, galloped into the

town of Haifa, where a number of Turks were speared in the streets ; 1,350 prisoners and 17 guns were taken. The small garrison of 150 men holding Acre at¬ tempted to escape, but was overtaken and cap¬ tured. All the Turkish armies west of the Jordan had been accounted for and the terrain was cleared.

There yet remained the 4th Turkish army east of the Jordan, whose position was no longer tenable. By the morning of 23 Septem¬ ber it was in full retreat on Es Salt and Amman, hotly pursued by the Anzacs and bombed from the air. The New Zealanders captured Es Salt and 380 prisoners ; Amman fell on the 25th. Those of the Turks who retired northward along the Hedjaz Railway and the Pilgrim route were harassed by aeroplanes and the Arabs, who had occupied Maan on 23 September. On the 28th these Turks fell in with British patrols at Leban station, 10 miles south of Amman ; es¬ cape was impossible, and on the 29th the Turk¬ ish commander surrendered with 5,000 men.

The road to Damascus, the next objective, was now open. The Desert Mounted Corps was dispatched in two columns on 25 Sep¬ tember to occupy the city and intercept the re¬ treat of the remnants of the 4th Turkish army. The Australian Light Horse captured Semakh, south of the Sea of Galilee, on 24 September after fierce hand-to-hand fighting ; they occu¬ pied Tiberias the following day. Two days later cavalry started from Haifa and Acre for Nazareth, for the route now led northeastward to Damascus. By the evening of 30 September, after considerable fighting all along the road, the Australians had closed the exits from that city, which was entered on 1 October amid scenes of great enthusiasm. Throughout the drive on Damascus the Arab Camel Corps formed the extreme right of the Allied advance, and the Arabs were the first to enter the city. After the Turkish and German troops in the city had been collected and guards had been posted, the British troops were withdrawn. The day before Damascus fell, the inhabitants were delighted to witness a brisk fight between Turks and (Germans, provoked by excessive German

demands for vehicles. Several were killed on both sides, and of many similar skirmishes be¬ tween the Turks and their German allies evi¬ dence was forthcoming in the shape of numer¬ ous German corpses all along the line of retreat. One of the first acts of the Arab administration was to restore the electric lighting system in Damascus. This was in working order by the evening of 2 October, although the plant had been disused for weeks under the Turks. The street car

service, stopped by the incapable Turkish administration in 1917, was resumed on 5 October. A further act was the removal, by order of the Arab commander-in-chief, of the bronze wreath which the German Emperor had imposed upon the tomb of Saladin in 1898. The senior descendant of Saladin, Shukri Pasha El Ayytibi, was appointed head of the Arab ad¬ ministration of Damascus. On 3 October the Shereef Feisul, commander-in-chief of King Hussein's northern army, arrived outside the old city which had once again passed into the power of his race. An automobile had been placed at his disposal, but Feisul, with a strong sense of the historical fitness of things, preferred to make his entry into Damascus much in the same way as did the Emirs of those Arabs who took Damascus in the 17th century, the Amorite Arabs who re¬ turned to it in the 19th century, the Aramean Arabs who set up their kingdom in Damascus in the 14th century b.c, Aretas, king of Arabia, when he occupied the city in 84 b.c., and Khalid Ibn Walid when he stormed part of the city from its Byzantine garrison in 634. Thus the Shereef Feisul, accompanied by some 1,500 of his kinsfolk and adherents, entered Damascus at full gallop and rode furiously through the streets to the accompaniment of a crackling feu de foie and shouts of victorv, a thrilling exhibition of the typical Arab la'ab el banid or ^^powder play.^^ This proceeding undoubtedly impressed the inhabitants with the reality of his arrival far more vividly than would have an orderly procession of numerous battalions following upon the unimpressive passage of high-powered automobiles.

French cavalry had meanwhile pressed on up the coast past ancient Tyre and Sidon to the Syrian port of Beirut. Tyre and Sidon enthusiastically received a division of Indian troops ; they arrived at Beirut on 8 October, where they were warmly welcomeil by the popu¬ lation, who handed over 660 Turks, including 60 officers. French and British warships en¬ tered the port on the llth. Within a week Tripolis, the smaller port, had been captured together with its railway junction town, Homs. Baalbek was occupied by an armored car sec¬ tion on the 9th and took over 500 Turks v/ho had surrendered to the inhabitants. From Homs the pursuit continued toward Aleppo, where some 20,000 Turks and Germans were reported. The 5th cavalry division and the armored car batteries were sent ahead, starting out on 20 October. On the nip-ht of the 26th the Turkish rearguard withdrew to a oosition near Deir el Jemel 20 miles northwest of Aleppo. By this time the Allies had advanced over 300 miles since the 19th of September, had taken 75,000 prisoners, including 200 officers and 3,500 men of German or Austrian nationality. About 360 guns had been captured, over 800 machine-guns, 210 motor trucks, 44 automobiles, 3,500

animals, 89 railway locomotives and 468 car-7 iagcs and trucks. The operations had extended over an area of 2,500 square miles. Aleppo fell on 26 October with little resistance. The much-prized railway line which was to link Germany with the Persian Gulf was cut and in the hands of the Allies ; the German commander of the Turkish armies in Syria had fled.

Things had meanwhile not prospered in the Turkish capital. Sultan Mohammed V had died on 3 July 1918 and had been succeeded by Wahid-ed-Din. The new ruler appeared to ex¬ ercise more authority than his predecessor had been able to exert. Enver Pasha and Talaat Bey, the leading spirits of the Committee of Union and Progress, were at loggerheads and blaming each other for the country's misfor¬ tunes which neither could avert. German pros¬ pects of victory were vanishing in the West, while the blows administered in Syria and Mesopotamia were shaking the foundations of the Empire. Enver and Talaat both resigned on 10 October when their case was palpably hopeless and it became necessary to secure their own safety before the approaching storm. A new cabinet was formed, but' the situation was too serious to be restored by reshuffling the cards. The Turkish government appealed to President Wilson on 14 October to use his in¬ fluence to secure a much-needed armistice. No answer was forthcoming.

For the last act of the drama we must again turn to Mesopotamia, where little had happened during the summer beyond the work of preparation and consolidation accompanied by occasional fighting. In this theatre of war an interesting side-light on the British char¬ acter is afforded in General Marshall's Dis¬ patch of 1 Oct. 1918: ^^The manufacture of prepared bitumen and lime continues at Hit [captured 9 March] on a large scale. Some 4,000 tons of bitumen and 5,350 tons of lime have been exported during the last four months, and it has been found possible, after meeting all government demands, to allow of private enter¬ prise in this industry… . uninterrupted progress has been made in the opening up and development of the country… While

Allenby was advancing on Aleppo, Marshall began to move in Mesopotamia. Operations were begun on 24 October with an attack on the strong Turkish position at Fathah, where the Tigris flows throug'h the Jebel Hamrin. This was carried by Indian divisions on both banks of the river. By a ride of over 50 miles the 11th Indian Cavalry Brigade forced a crossing over the Lesser Zab in face of opposition, and by a further ride of over 50 miles got right around the Turks and astride their lines of communication at Hurwaish, where they were joined by an armored car brigade. Out-ma¬ noeuvred on the east bank and driven back on the west bank the Turks fell back to their sec¬ ond line at the confluence of the lesser Zab, a position of great natural strength. On 25 October another Indian division also forced a crossing of the Lesser Zab and drove back to the west bank of the Tigris all Turks who were east of the river, while yet another Indian divi¬ sion closed up to the enemy who were now all on the west bank. Very severe fighting ensued ; the hilly ground, indented with ravines and pre¬ viously prepared for defense, was all in favor of the Turks, who fought with the greatest

stubbornness. After continuous fighting the Turks were forced back on their third position on the hills covering Shergat, on the 27th. All that day Turkish reserves tried to break through the 11th Indian Cavalry Brigade, which barred the road to Mosul, but without success, though the arrival of enemy reinforcements compelled the brigade to draw back its right to cover its rear. On the night of 27-28 October two brigades of Indian cavalry and one of infan¬ try held the enemy, and on the morning of the 28th the Shergat position was assailed. Though exhausted by their continuous fighting and marching through the rugged hills the Indians pushed forward and attacked until nightfall. The Turks were now fully hemmed in, and on the morning of the 30th General Ismail Hakki surrendered with his whole force, about 7,000 men. The victory was decisive ; the enemy was broken in Mesopotamia as well as in Syria. Mosul, facing the ruins of ancient Nineveh, lay undefended, and Marshall entered it without op¬ position on 3 November. Toward the end of October General Townshend was liberated by the Turks and sent to inform Vice-Admiral Sir Somerset Gough-Calthorpe, in the yEgean, that they wished to open negotiations for peace. Townshend carried out his mission with the result that Turkey surrendered unconditionally to the Allies on 30 Oct. 1918. The armistice convention signed on that day provided for the opening of the Dardanelles and the Bosporus to the Allies ; secure access to the Black Sea, and Allied occupation of all the forts lying along those two historic waterways. All Allied prisoners

were to be collected in Constantinople and handed over unconditionally to the Allies. The Turkish army was to be immediately de¬ mobilized except for such troops as were re¬ quired for the maintenance of internal order. All war vessels in Turkish waters were to be handed over and interned. The Allies were to have the right to occupy any strategic points if necessary. Allied ships were to be given free use of all ports and anchorages in Turkish occupation and the denial of their use to the enemy. Wireless, telegraph and cable stations were to be controlled by the Allies,v'r|Turkish government messages excepted. All -•'railways were to be placed under Allied control. Tur¬ key was required to surrender all garrisons in the Hedjaz, Assir, Yemen, Syria and Mesopota¬ mia to the nearest Allied commander; all Turk¬ ish officers in Tripolitania and Cyrenaica to be surrendered to the nearest Italian garrison ; while all Germans and Austrians, naval, military and civilian, were to be evacuated from the Turkish dominions within one month. Under these and a few minor conditions hostilities be¬ tween the Allies and Turkey ceased at nooA, local time, on Thursday, 31 Oct. 1918.

Little remains to be told. The war with Turkey ended with the complete and unques¬ tioned triumph of sea power; the decisive factor was the hold of the Allied fleets on the zEgean and Eastern Mediterranean. The lesson is an old one — • that he who commands the sea, commands Egypt, Palestine and Syria. Sea power permitted Maude, Allenby and Mar¬ shall to be supplied with men and material from India, where their transports and supply ships were beyond reach of the U-boats. After the failures at Gallipoli the operations against the Turks were directed toward Palestine and,

from the Persian Gulf, through Mesopotamia. The Turkish attempt upon Egypt was a feeble elfort. Being deprived of sea communications, they only succeeded in bringing some 12,000 men up to the Suez Canal, an inadequate force that was easily repulsed. It was a different story when the British, having overcome the difficulties of the desert of Sinai by laying a railroad and a pipe-line bringing water from the

Nile into Judaea, began an advance with their left flank supported by the naval forces of the Allies, and with the power of relying success¬ ively upon Gaza, Joppa, Haifa and Beirut as sea-bases. Had it been necessary, there was yet another port at their disposal further north, that of Alexandretta.

On 11 Nov. 1918 the appointments of Ad¬ miral Calthorpe as High Commissioner at Con¬ stantinople, and of Rear-Admiral Richard Webb as Assistant High Commissioner, were an¬ nounced. On the same day the French de¬ stroyer Mangini and the British destroyer Shark entered the Dardanelles, from which the mines had been swept, and proceeded to Constan¬ tinople. Two days later, the Allied fleet, with Admiral Calthorpe's flag in the Superb, passed through and anchored in the Gulf of Ismid. On 18 November Admiral Amet, commanding the French squadron in the Bosporus, was ap¬ pointed High Commissioner of the French Re¬ public to the Turkish government. By 5 December the Turkish vessels, including the Gocben, w'ere interned.

Dardanelles Campaign.- — The first Allied attack on the Dardanelles took place on 19 Feb. 1915 by a joint squadron of British and French battleships. Among the reasons which dictated this enterprise was the belief that a forcing of the Dardanelles, leading to the capitulation of Constantinople, would bring about an immediate collapse of the Turkish power, or at any rate of the German regime in Turkey. There was, furthermore, the great advantage, given success, of reopening the ice-free route to Russia through the Black Sea and of liberating the huge stock of grain that was lying idle in the ports of southern Russia. Briefly put, the enterprise undertaken by Great Britain and France was an attempt to find a short cut which would at the same time have afforded a spectacular triumph. It is the es¬ sence of war to discover the weak point of the enemy and to attack that point in force. As it turned out, the Allies had chosen the strongest point in the Turkish defense, and the venture was in consequence a failure, for the project had not 'been carefully thought out and the preparations had been made in a hurry. After bombarding the fortifications protecting the straits for nearly two months it was de¬ cided that a naval attack alone could not hope to force a passage, and that troops would be necessary to obtain military command of both shores. Once that lesson was learned, prepara¬ tions were undertaken for a combined naval and military attack. As it happened, the Brit¬ ish had carried out a long-range bombardment of the forts at the entrance to the straits so early as 3 Nov. 1914, which committed no ap¬ preciable damage and only served to put the Turks on their guard. Between_ that day and 19 Feb. 1915 no further offensive operations were undertaken in this theatre of war beyond seizing the island of Tenedos. The Turks,

therefore, had plenty of time with German aid to put the straits into a strong state of de¬ fense, if, indeed, they were not already in that condition before the war broke out. Even so, the Allies did not know in April 1915 how near they were to success; that the Turks had only a few shells left and were getting ready to evac¬ uate the peninsula. The abortive naval attack is described elsewhere in this section under Naval Operations.

Though the Allies made a secret of their in¬ tentions to dispatch an army to Gallipoli, the enemy appeared to be well aware of the fact, for considerable efforts were made to intercept the troops during their transport. A Turkish torpedo-boat fired three torpedoes at the trans¬ port Manitoii, all of which missed ; about 50 men from the transport were lost, owing to the capsizing of a boat in the water, but the British cruiser Minerva and some destroyers chased the Turkish vessel, ran her ashore and destroyed her on the coast of Chios. On the same day the British submarine E-15 ran ashore on Ke-phez Point about 10 miles inside the strait and the crew were captured. To prevent the sub¬ marine from being of service to the enemy,, two picket boats from H.M.S. Triumph and Maj.estic, manned by volunteer crews, ran the gauntlet of a very heavy fire and got near enough to the submarine to torpedo it and ren¬ der it useless. The boat from' the Majestic was sunk, but the crew were saved by the other boat, and the exploit ended with only one casualty. Gen. Sir Ian Hamilton was appointed to the command of the military part of the ex¬ pedition. He left London with his staff on 13 March 1915 ; traveling in a special train via Marseilles he reached the base at Tenedos on the 17th, the day before a great naval attack by the entire fleet was to take place. Hamilton witnessed the bombardment and then cabled to London his ˆreluctant deduction® that the whole of the troops under his command would be re¬ quired to enable the fleet effectively to force the Dardanelles. The British Cabinet accepted this decision. Hamilton had arrived at the con¬ clusion, after sailing along the outward shores of the peninsula, that a landing was feasible at the extreme southern point. He ordered nearly all the transports to proceed to Egyptian ports, where he would be able to work out in detail their distribution for the projected landing. He was accompanied by General d'Amade, commander of the French expeditionary force. The generals were convinced that, while land¬ ing-places were few and difficult, it was essen¬ tial to land at several of these at once, and to threaten to land at others, to act by way of surprise and to wait for favorable weather. The last consideration involved delay until near the end of April. During the afternoon of the 24th the troops which had then arrived at

Tene¬ dos were transferred to the warships and fleet sweepers, on which they were to approach the shore ; they started off about midnight, the landing being planned to take place at five dif¬ ferent spots early in the morning after a half-hour's bombardment by the warships.

The principal elements of warfare are per¬ sonnel and geography — the men who do the fighting, and the place they have to fight in ; everything depends upon these two factors. The British commander, whose biography ap¬ pears elsewhere in these volumes, had served

with distinction for nearly 40 years in every British war and had been a spectator in the Russo-Japanese War of 1904-05. The French commander, General d'Amade, had had a dis¬ tinguished military career in North Africa, Madagascar and Tonkin, and on the Western Front in 1914. The Turkish commander was the German Gen. Liman von Sanders, for¬ merly chief of the Military Mission at Con¬ stantinople. He was appointed to the Darda¬

nelles forces or 5th Army on 29 March. The Allied expedition, in the words of General Ham¬ ilton, was ˆRlrawn from all parts of the French Republic and of the British Empire.ˆˆ The bulk of the force was provided by Great Britain, for the French military authorities decided not to detach even a single division from the main the¬ atre of war in order to take part in subsidiary operations. They had none too many men to guard the long Western Front, but they cguld draw upon forces not belonging to the regular army — the Fusiliers Marins, the Armee Colo-niale and the Foreign Legion ; these three bodies furnished the French expeditionary

force. General Hamilton had under him as chief of staff Maj.-Gen. W. P. Braithwaite; Lieut.-Gen. (Sir W. R. Birdwood who com¬ manded the

Australian and New Zealand Arm3-Corps, the famous ®Anzacs;^^ and Maj.-Gen. A. G. Hunter-Weston, in command of the nucleus of the force, 29th division, composed almost wholly of regulars. This latter comprised the 86th brigade of infantry — 2d Royal . Fusiliers, 1st Lancashire Fusiliers, 1st Royal Munster

Fusiliers and 1st Royal Dublin Fusiliers; the 87lh brigade — the 2d South Wales Borderers, 1st King's Own Scottish Borderers, 1st Royal Tnniskilling Fusiliers and 1st Border Regi¬ ment; the 88th brigade — 2d Hampshires, 4th Worcesters, 1st Essex and a territorial bat¬ talion, the 5th Ro'al Scots. The cavalry" con¬ sisted of a squadron of the Surrey Yeomanry; tlie artillery included two batteries of the 4th (Highland) Mountain brigade. There were also two naval brigades and a brigade of Royal Marines. Within easy call, stationed in Egypt, there was a large number of experienced Indian troops and a Territorial division in

training. Altogether, the expeditionary force consisted of about 120,000 men.

The geographical difhcnlties to be over¬ come by an army attempting the conquest of the Gallipoli Peninsula are tremendous. Con¬ stantinople, ^^the queen city of the earth,® has been endowed by nature not only with the most magnificent panorama of scenery in the world, but also with an impregnable bulwark against aggression from the west in the shape of the peninsula which guards the historic waterway known as the Dardanelles, the Hellespont of the ancients. From the sea the peninsula appears to rise abruptly out of the blue waters of the JEgean Sea. The Gallipoli shores are steep — though not high — bluffs, only broken here and there by ravines marking the beds of water courses. The peninsula is a tableland 52 miles long, varying in breadth from three miles to 12, and presents a sinuous shore line of over 150 miles. A limited number of small coves af¬ ford facilities for landing, but each of these coves is commanded from

adjacent bluffs, in other words, controlled by gunfire. The only exception of any consequence is Suvla Bay, on the western side, where the shore is flat, but also overlooked by hills from both sides and from inland. The element of surprise was wholly eliminated, as any landing would have to be made in full view of the enemy and within reach of his guns. The country is a mass of rocky ridges rising to a height of over 700 feet from the sea; the hills are so steep and sharply cut that to reach their tops in many places is a matter of sheer climbing. There is little cultivation, only a few villages, and no properly constructed roads, while most of the land is covered with dense scrub from three to six feet high, with stunted forests in the hollows. Methods of communication are so primitive that the usual way from one village to another is not by land, but by boat along the inner or outer coast. There are two groups of forts. The first is at the entrance — on the north side. Cape Helles and Sedd-el-Bahr, with a few adjacent batteries; on the opposite shore, Kum Kale and Orkanieh. These forts were not heavily armed, for in any case they would be at a disadvantage against a long range attack from heavy battleships at sea. As a matter of fact, these forts were but the outposts of the real defense, and that was situated some 14 miles up the straits to where the width is .less than a mile, and no great battleship could get so far as this without running considerable risk. Here, within a distance of a few miles there is a sharp double bend, from where guns com¬ mand the whole water area and can also direct their fire end-on against vessels attempting to make the passage. This constricted part of the Dardanelles is called the Narrows, and around here lie the forts of Chanak or Sultan-ieh Kalessi, on the Asiatic side, and Kilid Bahr on the European shore, above which the slopes bristled with batteries commanding every angle of approach. Batteries lined both sides of the low ground from Chanak up to Nagara, both on the Asiatic side. In addition to the irn-possibility of a number of ships manoeuvring in so small a compass, even if they got so far, there was the invisible danger of submarine mines, plus a number of torpedo tubes mounted in concealed positions, and a land torpedo is a nfore powerful missile than that discharged

from a ship, while its aim can be more accurate. Furthermore, the descending current could be employed to carry drifting mines to meet the advancing fleet. Altogether, the Gallipoli Pen¬ insula and the hill country on the Asiatic side presented two tremendous fortresses manned by powerful armies, estimated at no fewer than 200,000 men. The forts in the Narrows mounted 14-inch Krupp guns, a number of 11-inch guns, and lighter ordnance from six to nine-inch, while the

outer forts had some 10.2-inch artil¬ lery, besides field howitzers. During the winter Krupp shells had been accumulated in Con¬ stantinople in preparation for the attack which the Turks exnected. It would perhaps be more correct to say the Germans expected, for they were the directors of the Gallipoli defense. It was small wonder, then, that the Allied fleets found it a hopleless task to force a passage through the straits without the assistance of a land force, which must first overcome the interior forts and silence the batteries before vessels could penetrate even half-way into the Dardanelles. Mr. Henry Morgenthau, the Amer¬ ican Ambassador in Constantinople at the time, has recorded the wild fear that prevailed in that city during January 1915 that the British navy might force the Dardanelles — even be¬ fore the naval campaign of the Allies had begun. Both Turkish and German authorities confessed their belief to the Ambassador that the straits could be forced if the British were prepared to lose a few ships. According to Talaat Bey, the Turkish expedition to Egypt, which ended so ignominiously in failure, was undertaken merely to divert England from making an attack on the Dardanelles. In the middle of March, just before the close of the Anglo-French naval bombardment of the Galli¬ poli forts, all arrangements had been made in Constantinople to move the government, banks, archives, women and children over to Asia Minor; moreover, cans of petroleum had been placed to fire the city as soon as the British should appear in the Sea of Marmora, and a special point had been made of preparing to dynamite the famous mosque of Saint Sophia to prevent its falling baek into the hands of the Christians. On 18 March the last great Allied bombardment had occurred ; the same evening General Martens, the German chief technical officer in the Dardanelles, told an American correspondent that he expected the British back next morning early, and if they came, he ex¬ pected to be able to hold out for a few hours only. But the Allied fleet did not return until it was too late. From a military point of view, there should have been a renewal of the naval attack on effective lines, or the whole Gallipoli project should have been given up, for a pre¬ liminary naval success alone could render mili¬ tary cooperation advisable.

General Hamilton had picked out six spots round the southern point of the peninsula to land his troops. Two faced the straits ; the others the - open sea. These landing places or ˆff)eaches® were designated by letters of the alphabet for want of distinct geographical defini¬ tions. Inland from these beaches the Turks had constructed a vast labyrinth of trenches and barbed-wire entanglements, which were plainly visible from the ships at sea. The two spots facing the straits were (1) a sandy

beach inside Sedd-el-Bahr about 300 yards across.

facing a semi-circle of steeply-rising ground, designated Beach V ; and (2) a small beach by Eski Hissarlik, on the east of Morto Bay, designated Beach S. The others were (3) a small sandy beach just south of Tekke Burnu, Beach W ; (4) half a mile north of this was another small break in the cliffs, Beach X; (5) two miles further up the coast the mouth of a small stream indenting these cliffs. Beach Y 2 ; with another, one mile and a half up a scrub-covered gully which looked as if active infantry might be able to scramble up on the heights, Beach Y. The next (6) was about 12 miles farther up, above Gaba Tepe. As already mentioned, the troops set out from Tenedos on 24 April 1915 and were to be landed early in the morning of the 25th. The landing was begun at 4:20 a.m. Two main landings were to take place — the first at a point just north of Gaba Tepe, the second on the southern end of the peninsula. In addition a landing was to be made at Kum Kale (a promontory on the Asiatic shore), and a demonstration in force to be carried out in the Gulf of Saros (Xeros) near Bulair. The night was calm and very clear, with a brilliant moon, which set at 3 a.m. ; the battleships Queen, London and Prince of Wales were delegated to land the troops north of Gaba Tepe, while the battleships Triumph, Majestic and the cruiser Bacchante were to cover the landing by gunfire. In this landing a surprise was attempted. There was no sign of life on the shore ; a thin veil of mist hung motionless over the promontory; the sea was as smooth as glass. As soon as it was light enough (5 a.m.) a violent bombardment of the enemy's defenses was begun. Meanwhile the troops were being rapidly transferred to the small boats in which they were to be towed ashore. Not a move on the part of the enemy; and except for a few shells thrown from the Asiatic side of the straits the guns of the fleet remained unanswered. The tows drawing the troops to the Gaba Tepe landing failed to maintain their exact direction and landed the men more than a mile north of the spot selected. The boats approached the land in silence and darkness, and they were close to the shore be¬ fore the enemy stirred. Then, suddenly, about a battalion of Turks was seen running along the beach to intercept the line of boats. Not a word passed among the invaders — all remained perfectly orderly and quiet in the boats await¬ ing the enemy's fire, which soon opened and caused many casualties among helpless targets. The moment the boats touched bottom, the Australians leaped ashore and went straight for the enemy with fixed bayonets. So vigorous was the onslaught that the

Turks made no attempt to withstand it and fled from ridge to ridge pursued by the 3d Australian brigade. The 1st and 2d brigades came shortly after and were all disembarked by 2 p.m., by which time 12,000 men and two batteries of Indian moun¬ tain artillery had been landed. The disembarka¬ tion of more artillery was delayed, erwing to the enemy's heavy guns firing on the anchorage and forcing the transports to stand farther out to sea. The wild, rough nature of the ground, the necessity for sending any formed detachments as quickly as they landed to the critical point of the moment, and the headlong valor of the scattered groups who had pressed farther in¬ land than was intended, all led to confusion and

mixing up of units. Eventually the mixed crowd of fighting men, some advancing from the beach, others falling back before the oncoming Turkish supports, solidified into a semi¬ circular position with its right about a mile north of Gaba Tepe and its left on the high ground over Fisherman's Hut. During this period parties of the 9th and 10th battalions charged and put out of action three of the enemy's Krupp guns. Meanwhile, the disem¬ barkation of the Australian division was being followed by that of the New Zealand and Australian division —-two brigades only. For four hours, from 11 a.m., about 20,000 Turks attacked the whole line ; with the assistance of the naval guns the attack was repulsed. Late in the afternoon the Turks made a third de¬ termined counterattack against the 3d brigade, which stubbornly held its ground. Constant at¬ tacks were launched by the Turks during the night, but the line held firm, notwithstanding that the men had had practically no rest during the previous night and had been fighting all day over a most difficult country exposed to heavy shrapnel fire in the open. Very serious casualties were incurred. Persistent attacks by the Turks for the next few days prevented the reorganization of the units, thus making any advance impossible until that could be done. On the night of 2 May an effort was made to seize a commanding knoll in front of the centre of the line, but the enemy's machine guns were too scientifically placed, and 800 men were lost without advantage beyond the infliction of a corresponding loss to the enemy. An attempt to seize Gaba Tepe on the 4th also failed, owing to the interminable maze of barbed wire. Tlic Turks also lost heavily; some 24,000 men were constantly kept fighting, many being killed and wounded by the Australian snipers. The scene of this particular landing of the Australians and New Zealanders has since become known as ^^Anzac Cove.^^

The first troops landed at Y Beach, the next, the King's Own Scottish

Borderers, landed down the coast on the Gulf of Saros. These arrived in two battleships and two transports off Cape Tekeh. At 4 a.m. they approached in the boats covered by fire from H.M.S. Goliath. The landing was successfully and expeditiously carried out, the troops gaining the top of the high cliffs overlooking this beach without being opposed, a piece of good fortune due to the well-placed fire from the ships. They were followed by the Plymouth Battalion Royal Marines, who met with severe opposition on the top of the cliffs, where fire from covering ships was of little assistance. After hcav}ˆ fighting they were forced to re-embark on the 26th. ˆ The landing of the 2d Battalion Royal Fusiliers at Beach X was met with heavy fire from the cliffs on both sides. The Implacable came close in shore and bombarded those positions until the boats had reached the beach. The men were all landed by 7 a.m. An hour later the Euryalus approached Beach W and the Implacable Beach X, subjecting both spots to a fierce bombardment, which was kept up until the last moment before landing. But the fire did not have the expected effect on the wire entanglements and trenches, for the troops en¬ countered a withering fusilade from rifles, ma¬ chine guns and pom poms, and found the ob¬ structions on the beach undamaged. The

J.ancashire Fusiliers rushed some Maxim guns cleverly concealed in the cliffs, but suffered heavy losses in taking possession of the beach and its approaches. The W and V beaches were the only two of any size in this area on which troops, other than infantry, could be landed, and failure to capture Beach X might have produced serious consequences, as the landing at V was held up. Turkish snipers swept the shore and a fierce infantry battle was carried on around it throughout the entire day and the following night. The boats' crews also lost heavily and had not the satisfaction of being able to return the fire. During the night of April 25-26 the enemy attacked continuously, and it was not until the afternoon of the 26th, when Beach V was really captured, that the British position on W was secured. Beach V caused the most trouble, for its flanks were strongly guarded by the old castle and village of Sedd-el-Bahr on the east and

perpendicular cliffs on the west, while its whole foreshore was covered with wire entanglements. As at all the other places, the first landing here was made in boats ; but the experiment was tried of landing the remainder of the covering force bv means of a collier, the River Clyde, which had been specially prepared for the occasion by having large ports cut in her sides, and gang¬ ways built whereby the troops could reach the lighters which were to form a bridge to the beach. The same as W, Beach V was heavily bombarded, with a similar result, namely, that the defense was not put out of commission. When the first troops attempted to land they were met with a murderous fire from rifles and machine guns, which was not opened until the boats had cast off from the steamers. Nearly all the men of the first trip were killed or wounded ; a few managed to find slight shelter under a bank on the beach ; one boat entirely disappeared and in another there were only two survivors. As soon as the boats had reached the beach the River Clyde was run ashore under a violent fire toward the eastern end where she could form a convenient breakwater during future landing of stores and other supplies.

As the steamer grounded, the lighters which were to form the bridge to the shore were run out ahead of the collier; but they failed to reach their proper stations, and a gap was left between two lighters over which it was impossible for men to cross. Some at¬ tempted to land by jumping from the lighter which was in position into the sea and wading ashore. This method proved too costly in life, the lighter being soon heaped with dead ; the disembarkation was ordered to cease. Com¬ mander Unwin, R.N.. with a handful of mid¬ shipmen and sailors left the River Clyde and, standing up to their waists in water under heavy fire, got the lighters into position. Though the bridge to the shore was now pass¬ able, it could not be used ; any one appearing on it was instantly shot down, hence the troops remained on the steamer till dark. A launch and a pinnace manned by volunteer crews from the warship Albion attempted to complete the bridge next morning, but the Turkish fire rendered the undertaking impossible, and the work was finally carried out in the dark. No more troops were landed on Beach V, and those originally intended for this spot were diverted

to Beach W. Some of the troops, as already mentioned, found shelter of a precarious nature on the shore, whence they could not emerge as the Turks directed an uninterrupted fire against their cover. For a whole day they lay hidden ; the warships and some Maxims mounted

in the River Clyde did their best to keep down the enemy's fire. Many heroic deeds were per¬ formed in rescuing wounded men in the water. During the night of the 25th-26th the men remaining in the steamer were able to land under cover of darkness and obtain some shelter on the beach and near the village of Sedd-el- Bahr, for the possession of which now began a most stubborn fight, which continued until the afternoon of the 26th, supported' by gunfire from the Albion. When that vessel ceased fire the troops charged and stormed Hill 141, the capture of which effectively cleared the enemy from the neighborhood of Beach V, which could now be used for the disembarkation of more troops.

The detachment detailed for Beach S, at Eski Hissarlik Point, consisted of the 2d South Wales Borderers. Their landing was delayed by the current, but by 7 :30 a.m. it had been successfully accomplished at the cost of some 50 casualties. A half-company of Dublin Fusiliers had landed without opposition at Sedd-el-Bahr ; they made several attempts to enter the village of that name, but were com¬ pelled to withdraw with heavy loss. On Beach S the Borderers and a detachment of the Lon¬ don Field Company (Royal Engineers) were landed in boats; little opposition was encoun¬ tered, and the subsequent enemy attacks were easily repulsed with the aid of the covering ships. The landing at Kum Kale was under¬ taken by the French. This point is on the Asiatic side of the Dardanelles, and it was of great importance to prevent the enemy from occupying positions on this side, whence gun¬ fire could be brought to bear on the transports off Cape Helles. After a strong preliminary bombardment the French began to land about 10 A.M., and by the afternoon their whole force was ashore. When they attempted to advance to Yeni Shehr, their immediate objective, they were stopped by heavy fire from concealed trenches south of Kum Kale village. During the night of the 25th-26th the Turks made several counterattacks, all of which were re¬ pulsed. During one of these fights 400 Turks were captured, their retreat having been cut off by the fire from the battleships. On the 26th, when it became apparent that no advance was possible here without entailing severe losses and the landing of large reinforcements, the order was given for the French to withdraw and re-embark. By the evening of 27 April the Allied forces had established themselves on a line some three miles long from Eski His¬ sarlik northwest to a point on the Gulf of Saros, 3,200 yards northeast of Cape Tekke — the mere tip of the peninsula. All the beaches except Y, which had been abandoned, were in working order so that an advance could be undertaken. On that day the Queen Elizabeth, the most powerful vessel afloat, performed a remarkable feat of naval gunnery in sinking

— in three shots — a Turkish transport in the Dardanelles at a distance of nine miles, firing over a range of hills from the other side of the peninsula.

The troops holding the short line at the tip were the 29th division less two battalions, on the left and in the centre; four French bat¬ talions on the right, and beyond them the South Wales Borderers on the extreme right. The heavy casualties which the landing entailed had made this line dangerously thin, but it was essential to make a move quickly before the enemy could recover and receive fresh rein¬ forcements. A general advance was therefore ordered for 28 April. The 29th division was to march on Krithia, the French were to extend their left in conformity with the British movements and to retain their right on the coast line .south of the Kereves Dere. Al¬ though by this time the troops had had no proper rest for four days, they responded vigorously to the call. It was soon discovered that the enemy trenches and wire entangle¬ ments presented almost insuperable obstacles to a rapid advance. The French reached to within a mile of Krithia and could get no farther ; the Turkish resistance grew stronger; nearly the whole Allied line was thrown into the battle; ammunition was running sho.r.t and the men were exhausted. The small amount of trans¬ port was insufficient to keep them supplied. For the time being hopes of securing a footing on Achi Baba, a 600-foot hill, had to be aban¬ doned. The best that could be expected was to hold what had been taken. A partial retire¬ ment was ordered, in which the Worcester regiment suffered severely. During the day's fighting the units got mixed up; the French had lost many officers and needed time to re¬ organize. April 29 was devoted to straighten¬ ing the line and consolidating the positions. Nothing happened on the 30th. More French and Indian troops had meanwhile arrived and were formed into a reserve. On the night, of 1 May the Turks opened a hot shell fire and delivered a series of fierce attacks in three solid lines. The enemy officers carried colored Bengal lights to fire from their pistols, red indicating to the Turkish gunners that they w'ere to lengthen their range; white that the Allied front trenches had been stormed; and

green that the main position had been carried. The Turk method was to crawl on hands and knees until the time came for the final rush. The first momentum of this ponderous on¬ slaught fell upon a brigade whose officers had nearly all been killed or wounded, so that when the Turks came right on without firing and charged into the trenches with the bayonets they made a big gap in the line. This was instantly filled up by the 5th Royal Scots (Territorials), who faced to their flank and charged the enemy with the bayonet. The storm next broke in fullest violence against the French left wffiich was held by the Sene¬ galese, who gave ground after several charges and countercharges. A company of the Wor¬ cesters wˆas throwm into the gap and the po¬ sition was maintained for the night. At 5 in the morning the Allied line again advanced, and by 7 :30 the British left had gained some 500 yards, while the centre and right also gained some ground wdth the French left, but the remainder of the French line was unable to make progress. Enemy machine guns now battered the British centre and left; it was found impossible to hold the ground, and the

whole line w'as withdrawn to its former trenches. The enemy also had lost many men and spent a day (2 May) burying his dead under a red crescent flag. At 9 that night they again attacked the whole Allied line, making their chief effort against the French, where the ground was favorable to approach. For the next few days the French were again attacked with severe losses, and a portion of their line was taken over by the 2d Naval brigade. The Allied losses up to this stage had been extremely heavy; exclusive of the French, the Allies had 177 officers and 1,990 other ranks killed; *412 officers and 7,807 other ranks wounded; 13 officers and 3,580 other ranks missing. The first battle for Krithia had failed. The second attempt began on the 6t'h. Both sides had drawn heavily upon their stock of energy and munitions; each side had fallen back (the Turks half a mile), and it seemed clear that whichever could first summon up spirit to make another dash must secure at least a few hundreds of yards of the ground between the two fronts. Even so small a portion of territory, whatever it niight mean to the enemy, was a matter of life or death to a force crowded together under gunfire on so narrow a tongue of land. For three days (6-8 May) a violent battle raged on the western end of the peninsula; the net result was an Allied gain of 600 yards on the nght and 400 yards on the left and centre. Th-ˆ French had made a valuable capture of ground from which the enemy made desperate efforts to dislodge them on the 9th and 10th. On 11 May, the first time for 18 days and nights, the 29th British division was withdrawn from the firing line and replaced by the 42d division and the 29th

Indian Infantry brigade, both newly arrived ashore. During the whole of the fight¬ ing the naval guns on the ships took a promi¬ nent part, though the enemy's main position had not been seriously touched. From time to time Turkish warships from Nagara (bej'ˆond the Narrows, in the straits) tried to intervene, but the Queen Elizabeth kept them off. The forti¬ fied works at the Black Sea end of the Bos¬ porus ˆ were occasionally shelled by Russian warships, while one Russian vessel, the Askold, was attached to the French squadron off Gallipoli.

After the second battle for Krithia a period of trench fighting and siege tactics followed, but points of vantage were gained and lost in many days of heroic effort. A notable instance was the capture of the Gurkha Bluff, a pre¬ cipitous point from which enemy machine guns had frequent!}ˆ held up the left of the attacks. During the night of 10-11 May the Gurkhas started off to seize this bluff. Their scouts descended to the sea, worked their way for some distance through the broken grounci along the shore, and crawled on hands and knees up the precipitous face of the cliff. On reaching the top they were heavily fired on. As a surprise the enterprise failed, but as a reconnaissance it proved very useful, for on the 12th a grand attack was carried out with the 29th Indian brigade (to which the Gurkhas be¬ longed) with the cooperation of the Manchester brigade and two battleships. Early in the evening the Turkish trenches were bombarded by land and sea, while under cover of this fire the Gurkhas once more crept along the shore

and assembled below the bliifT (now called "Gurkha BlufY») and, the attention of the Turks being taken up with the bombardment, they swiftly scaled the cliffs and carried the position with a bayonet rush ; their machine-gun section was hurried forward, and at 4:30 a.m. a second double company was rushed up to join the first. An hour later these two double com¬ panies extended and began to entrench. At 6 A.M. a third double company of the fiery Gurkhas advanced across the open from their former front line of trenches under violent fire and

established themselves on a diagonal line on the newly captured redoubt. Numer¬ ous exploits of this nature took place ; indeed, no day passed without something of the sort being attempted or achieved either by the French or the British.

Turning now to where the Anzacs had landed and dashed for the cliffs, their line formed a rough semi-circle inland from the beach with a diameter of about 1,100 yards. The firing line was everywhere close to the enemy's trenches and in all sections there were continuous sanping, counter-sapping and bomb attacks. The Turks scattered their shells over the trenches and beaches with a liberal hand. As many as 1,400 shells fell on Anzac Cove within an hour, and these were of all calibres, from 11 inches to field shrapnel. The Anzacs were perched on the cliffs of Sari Bair, about three miles above Gaba Tepe. Their special mis¬ sion was to hold as large a body as possible of the enemy in front of them ; to keep open a door leading to the vitals of the Turkish position ; and to lessen the strain at Cape Helles. On 9 May a night assault, supported by enfilade fire, was carried out on the enemy's trenches in front of Quinn's Post; the ground was taken at the point of the bayonet. At dawn on the 10th a strong counterattack forced the Anzacs to evacute the trenches and fall back. In this fight the Allied guns wrought great havoc, for on that day two Turkish regiments lost 600 killed and 2,000 wounded. A sortie was made on the night of 14—15 May from Quinn's Post with the object of filling in Turkish trenches in which bomb throwers were inconveniently active. The attempt failed with a loss of 70 casualties ; the commander, Gen. Sir W. B. Birdwood, was wounded. Qn 14 May General Gouraud arrived and took over from General d'Amade the command of the French expedi¬ tionary force. On 15 May Maj.-Gen. W. T. Bridges, a highly popular officer commanding the Australian division, was severely wounded and died a few days later. Born in Scotland and educated in Canada, General Bridges ob¬ tained his commission in the New South Wales artillery in 1885 and had served in the South African War of 1899. In 1904 he was Inspector-General of the Commonwealth Military Forces.

Turkish reinforcements had meanwhile arrived in great numbers — according to pris¬ oners' accounts, 30,000 fresh troops under the command of Liman von Sanders. These were thrown against the Anzacs on 18 May and a stiff battle accompanied by intense artil¬ lery fire raged for over a day. Repeated bayonet attacks by the Turks were repulsed with much slaughter; over 3,000 dead were lying in open view of the British trenches. During the next four days negotiations took place for a

suspension of arms. The first move in this direction occurred on 20 May, at 5 in the after¬ noon, when white flags and red crescents (the Turkish equivalent to the Red Cross) began to appear all along the line. A Turkish staff officer, two medical officers and a company commander came out into the open. They were met by Major-General Walker, commanding the Australian division, half-way between the trenches. The staff officer explained that he was instructed to arrange a suspension of arms for the removal of dead and wounded. He had no written credentials, and he was informed that neither he nor the Australian general had the power to arrange such a sus¬ pension of arms, but that at 8 p.m. an oppor¬ tunity would be given of exchanging letters on the subject, and that meanwhile hostilities would recommence after 10 minutes' grace. At this time some stretcher parties on both sides were collecting wounded, and the Turkish trenches opposite were packed with men stand¬ ing shoulder to shoulder two deep. Matters were less regular in front of other sections, where men wdth white flags came out to col¬ lect wounded. Meanwhile it was observed that columns were moving in the valley up which the Turks usually brought their rein¬ forcements. On hearing the report of these movements. General Birdwood ordered his trenches to be manned against a possible attack. As the evening drew in the enemy's concentra¬ tion continued, and everything pointed to his intention of making use of the last of the day¬ light to get his troops into position without being interrupted by British artillery. A mes¬ sage was therefore sent across to say that no clearing of dead or wounded could be allowed during the night, and that any negotiations for such purpose should be opened through the proper channel and initiated before noon on the following day. Immediately after this inter¬ esting interlude the stretcher and other parties fell back and general fire broke from both sides. In front of the British right masses of men advanced behind lines of unarmed men holding up their hands. Firing grew fiercer all along the line, accompanied by a heavy bombard-rcent of the whole British position, leading to the belief that the attack was prearranged. Machine-gun and rifle fire continued until about 4 in the morning. Negotiations were resumed on 22 May with the representatives of Essad Pasha (who must not be confounded with Essad Pasha of Albania), resulting in arrangements for a suspension of arms from 7:30 A.M. until 4:30 p.m. on 24 May. The whole¬ sale funeral ended about 3 o'clock on that day: some 3,000 Turkish dead were removed or buried in the area between the opposing lines — No Man's Land. The whole of these had been killed or had died there of wounds on or since the 18th, a space of seven days. Punctually on the

expiration of the time limit hostilities recommenced.

The next great effort to advance in the south of the peninsula was made on 4 June. To distract the enemy's attention from that theatre of war the Anzacs began a series of demonstrations and sorties after sunset on tliat day. In the south, fighting had gone on uninterruptedly during May up to the night of 4 June. On the day of the general attack the

enemy's front line of trenches ran fromˆ the west of the Kereves Dere in a northerly direc¬ tion to the sea. The Allied battle line from right to left was held in this order: The French expeditionary force, the Royal Naval division, the 42d East Lancashires, and the 29th division. The British front alone was little over 4,000 3ards, and the total infantry available amounted to 24,000 men, including a reserve of 7,000. At 8 in the morning the artillery overture broke out, lasting, with half an hour's intermission, until noon, when the range was extended and the infantry advanced with fixed bayonets. The assault was immediately successful. On the extreme right the French 1st division carried a line of trench, while the 2d division with a gallant dash captured a strong redoubt for which they had already fought three desperate contests. Only the extreme left of the French v/as unable to gain any ground — a feature destined to have an unfortunate effect upon the final issue. The 2d Naval brigade rushed forward; the battalion from H.M.S. Anson captured the southern face of a Turkish re¬ doubt which formed a salient in the enemy's line, the Howe and Hood battalions captured trenches fronting them, and by 12:15 the whole Turkish line forming their first objective was in their hands. In five minutes the Manchester brigade of the 42d division had stormed the first line of Turkish trenches and 25 minutes later had carried the second line, making a prog¬ ress of 600 yards. On the left the 29th met sterner opposition. In most places the Turks crossed bayonets with them, but after a struggle of some minutes the front line was taken. On the extreme left the front Turkish trench was so situated that it had escaped the artillery bombardment, leaving the

barbed wire obstacles intact. The result was that, though -the 14th Sikhs on the right flank pushed on despite losses amounting to three-fourths of their effectives, the centre of the brigade could make no head¬ way. A company of Gurkhas actually forced its way into a Turkish trench, but the failure of the rest of the brigade threatened them with isolation, and they were withdrawn. Mean¬ while, reinforcements were rushed to the left to make a fresh attack. On the right, the Turks poured in fresh reserves and forced the French 2d division to fall back from the redoubt they had won, which retirement un¬ covered the right flank of the Royal Naval division. These also had to retire with heavy loss from their conquered terrain, thus exposing in turn the Howe and Hood battalions to en¬ filade fire so that they, also, could do nothing but retreat across the open under galling rifle and machine-gun fire. By 1 :30 p.m. all the gains had been lost again in this section, while the Collingwood battalion, which had rushed to the rescue, was practically annihilated. All the bravery and sacrifice of the first charge appeared to have gone for naught. The Manchesters were still holding on to their captured trench, while every effort was made to sustain them by sending reinforcements, but it soon became clear that their position was untenable. In this dilemma orders were issued for a fresh attack in force at 3 p.m., an arrangement that was twice postponed at the request of General Gouraud, who finally reported that he could do no more that day with any chance of suc¬ cess, By 6:30, therefore, the Manchesters had

to be extricated from their perilous position from the second Turkish lines. There was-some difficulty in persuading them to retreat to the front Turkish line which they had taken in the first five minutes. Several other Allied attacks were frustrated ; at the close of the battle the net result was an advance of from 200 to 400 yards on a front of nearly three miles. Further attempts were made on the Turkish defenses on 21 June, in which the French lost 2,500 men; the enemy's loss in counterattacks was estimated at 7,000. Yet the French had succeeded in storming the first and second lines on their front. On the 27th the British left carried four Turkish lines and advanced about a mile. Further severe fighting took place from 28 June to 2 July, between which dates the Turks were reported to have lost over 5,000 killed and 15,000 wounded. On 5 July the Turks made another big attempt to drive the Allies into the sea, though the venture failed. Throughout July there oc¬ curred at intervals minor attacks by one side or the other, such as characteristic trench warfare produces, with little results. Early in August the Turks announced the loss of one of their battleships, the Hairredin Bar-harossa, sunk bv a submarine.

Other Turkish vessels were sunk about the same time. Against this, however, had to be set the loss of a large British transport, the Royal Edward, sunk by a submarine in the .ˆEgean Sea with a loss of about 1,000 men.

• A new armv was landed at Suvla Bay on 6 August and an attempt was made to capture the summit of Sari Bair and Chunuk Bair ridges by simultaneous attacks by the Anzacs and the new army. The Anzacs reached the objective, but the attack from Suvla did not make the progress expected, with the result that, as had happened too often in this campaign, the temporary victors had to retire from the ground they had captured. The two armies came into touch, however, making a front of about 12 miles. Another assault was simultaneously de¬ livered at the south, but no decisive result was gained. At the end of September the fighting on Gallipoli again resumed the form of un¬ eventful trench work. The campaign had simply failed; from the first it had been a policy of sacrificing armies for acres. Gen¬ eral Hamilton apparently still believed in suc¬ cess, but the British government had lost faith ; they decided to write the expedition off as a bad debt. The stream of men and munitions dried up ; wounds, sickness and fatigue left their marks upon the discouraged soldiers. On 11 Oct. 1915 Lord Kitchener, then Minister for War, cabled to Hamilton asking for his estimate of the losses likely to be involved in an evacua¬ tion of Gallipoli. Hamilton replied in terms showing that such a step was *unthinkableˆˆ to him. On the 16th he was recalled. Failure was written large across the Gallipoli-Dardanelles carnpaigns. The only event of irnportance which remains to be recorded is the withdrawal of the troops. Hamilton was succeeded by Gen¬ eral Monro, and during the short interregnum General Birdwood took command. Monro arrived with instructions to report on the situa¬ tion, as to whether the peninsula ought to be evacuated on military grounds or another at¬ tempt made to carrˆˆ it. He reported that ˆffhe mere fringe of the coast line had been secured.

The piers and beaches upon which they de¬ pended for all

requirements of personnel and material were exposed to registered and ob¬ served artillery fire. Our entrenchments were dominated almost throughout by the Turks… The force, in short, held a line possessing every possible military defect . . An evacuation presented difficulties as great as a landing; since every corner of the peninsula was exposed to hostile fire, it was not possible to withdraw any of the troops from the shell-swept area. The troops were enervated by disease; in con¬ sequence of terrible losses there was a dearth of officers. General Monro considered that no advance could reasonably be expected from the positions held by the expeditionary force, and that the troops here locked up should be di¬ verted to a more useful theatre of war. Evac¬ uation was decided upon. Winter set in with heavy storms ; hurricanes and torrential rains swept the peninsula ; floods spread over the country, filled the trenches and cut off com¬ munications. Troops, animals and supplies not needed for a long campaign were to be taken off first. Next were to come the men, guns, animals and stores except those required for a defensive during a certain period ; and the last batch were to withdraw as rapidly as possible leaving behind, if necessary, guns, animals and stores not required for the time being. The three men upon whom the task now devolved were Generals Monro and Birdwood and Ad¬ miral Sir Rosslyn Wemyss. They began with Suvla. This was a wise step, for it could afford the enemy no clue, since the removal of these troops did not necessarily indicate abandonment of the expedition. From 10-18 Dec. 1915 the surplus of the force at Suvla gradually melted away to seaward. While the front was held, corps behind the lines were withdrawn to the embarkation beaches first, with full pro¬ vision in the event of attack. Intermediate positions were prepared for this purpose. The final withdrawal from here was timed for the night of 19-20 December. The sea was calm and the moon was veiled by hazy clouds ; the covering ships had taken up their positions, ready to open fire if the enemy showed any activity. Everything went smoothly; when the fiist batch had gone far enough, the men in the trenches left them ; every vehicle and gun was embarked. Anzac and Suvla were cleared ; what little had to be left behind was destroyed. The Turks grew suspicious; the movement took them completely by surprise ; ˆ they were not conscious of the operation until it had been completed. Not a single life was lost, and only three men were wounded. The enemy now hurried his liberated troops and guns from Suvla and Anzac to the southern end of the peninsula, strengthening his batteries on both sides of the straits. No attempt was made to remove the Allied army from the south; it appeared as though the British authorities at home were still unwilling to give in. The po¬ sition of ihat army grew more perilous as the Turks increased their strength; after a delay of

eight days orders came from London to withdraw the remainder of the force from the peninsula; already the bulk of the French troops had beep taken off by their own ships, and most of their section of the line had been taken over by the Royal Naval division and the 86th brigade. The embarkations were con-VOL. 28 - 28

ducted in the night time ; by daylight nothing unusual could be observed by the enemy. Meanwhile, the Turks continued to bombard the Allied lines, to which the battleships re¬ sponded. The remainder of the French troops were taken off first. The final withdrawal was to take place during the night of 8 Jan. 1916. With some trouble owing to the weather the embarkation was duly carried out according to program; the guns which had been ordered from London to be brought away were left to cover the movement and destroyed at the last moment. By 3:30 a.m. the last man had been taken on board. The store and ammunition dumps which had been left were provided with tirneˆ fuses for their destruction. As the last parties left the shore these broke out into flames at different points, illuminating the darkness. Magazines of munitions and explosives blew up in rapid succession; red lights flared up over the Turkish lines ; their heavy artillery burst into a furious bombardment of the empty beach; the last ship steamed away, and the illfated Gallipoli campaign was over. Altogether the tragic adventure had cost the British Empire the lives of 1,785 officers and 31,737 other ranks ; 3,010 officers were wounded, and 75,508 of other ranks; missing and prisoners amounted to 258 officers and 7,431 of other ranks; making a total of casualties of 5,053 officers and 114,676 of other ranks. These figures do not include the heavy French losses. In due course a com¬ mission was appointed to inquire into and report on the causes of the failure. In a scholarly criticism of the campaign published in London, December 1919, by Maj.-Gen. Sir C. E. Callwell, K.C.B., the writer expresses the opinion that the principal cause of the failure was ®not so much the consequence of topographical conditions nor of the dispo¬ sition of the enemy forces, nor of bad luck, as it was the upshot of a factor that had not been taken sufficiently into account. This factor v/as the rare fighting qualities that the Osmanli soldier was to display in the campaign …

But if Sir Ian Hamilton and his staff at the outset underrated Ottoman valor and grit, if they assumed too readily that the opposition that would be offered by this soldiery would not be of the most whole-hearted type, they were only following the lead of governments which, in a happy-go-lucky mood and confident that the enemy would crumble up before a show of bluff, had dispatched the expedition on a

mis¬ sion of which they had failed to realize the danger, and for which suitable preparations had not been made by them in advance.® (ˆThe Dardanelles. >) Henri F. Klein,

Editorial Staff of The Americana.

10. BALKAN CAMPAIGN. The supreme importance of the Balkan States in the Euro¬ pean struggle is denied by no one to-day. While there may have been animosities between the Great Powers of such nature that they would ultimately lead to a general conflict, and that if the Balkans did not furnish the proximate occasion, such occasion would have arisen else¬ where, the incontestable fact remains that the Balkans provided the occasion. A great part of the Jugo-Slav race lived under the rule of Aus¬ tria-Hungary and as their national consciousness grew intense they became ever more dissatisfied with that alien rule. Serbia, now become an

independent state, had championed the Pan-Slav movement with the object of uniting all Jugo¬ slavs under her flag. It thus became well-nigh imperative for Austria-Hungary to crush this state, which fomented unrest among the subjects of the dual-monarchy and at the same time to strike a blow at Russian prestige in the Balkans. The murder of the Austrian crown prince at Serajevo furnished Austria her op¬ portunity. The insulting ultimatum to Serbia followed and war burst forth. Russia, the big Slav sister, refused to stand aside and see Ser¬ bia crushed and, to settle accounts with Aus¬ tria, she cast the die in favor of war and the great conflict began.

War Strength of the Balkan States. —

Before the World War few realized the great strength of the Balkan States. The brilliant de¬ fense of Serbia in 1914 proved an enlightening example, as did also the rapid campaign of 1912 when Serbia, Bulgaria and Greece de¬ stroyed in a few weeks the remains of the Turkish Empire in Europe. The forces of the Balkan States represented in 1914 a total of about 1,300,000 men. Of this number

Serbia put about 250,000 men in the fiMd, together with a territorial reserve of 50,000; Montenegro, her ally, had 50,000 seasoned veterans ; Rumania had an army of 500,000, Greece 250,000 and Bul¬ garia 350,000.

First Attack by Austria-Hungary. — On

25 July 1914 Serbian mobilization began and three days later 10,000 Serbians were massed for the defense of Belgrade, the national capi¬ tal. The main Serbian forces were concen¬ trated at Lazarevatz, Arangelovatz and Palanka on a line just south of Obrenovatz, Belgrade and Semendria. Austria at first contented herself with an intermittent bombardment of Belgrade, but on 12 August she threw strong columns across the Drina and Save in the northwest cor¬ ner of Serbia. These forces had as their objective the capture of the Serbian arsenal at Kragujevatz. Putnik, the Serbian commander-in¬ chief, moved the bulk of his forces westward to the Jadar Valley to meet the Austrian inva¬ sion from the northwest, at the same time send¬ ing a force to repel the Austrian column which had crossed the Save at Shabatz. Putnik aimed to prevent a junction of the Austrian forces. On 16-17 August he completely routed an Aus¬ trian force of 60,000 on the Shabatz-Lechnitz, a line near the Bosnian frontier. In the week following the Serbs drove this success to its conclusion farther to the south, taking Tzer, Iverak and Shabatz and crossing the Dobrava. In this nine-day struggle about 400,000 men were engaged; the losses were heavy, probably about 10,000 killed and 20,000 wounded on the Austrian side and 18,000 killed and wounded Serbs. The latter took over ˆ 4,000 prisoners, quantities of rifles and other military stores and a great number of cannon. The first Austrian attack had failed. Serbian and Montenegrin forces now attempted to penetrate Bosnia, while on 1 September another Serb force invaded the region between the Save and the Danube. The Austrians were reinforced, however, and pro¬ ceeded to develop an attack along the line of the Drina from Jarak to Liubovia. The Serbs in consequence were obliged to retire to their own territory. After six weeks of desultory fighting the Austrians began an advance over

the whole frontier. Valievo fell on 11 Novern-ber ; on the 20th the Serb centre was driven in near Lazarevatz and by the end of the month the Austrian front extended from Belgrade in the north along the line of the Belgrade Rail¬ way to the western branch of the Morava in the south.

With the assistance of the Montenegrins the Serbians made valiant efforts to penetrate to Serajevo. They succeeded in placing their armies on Austrian soil and on 10 September recovered Semlin. They also succeeded in thwarting an attempt of the Austrians to cross the Save. The Serbs also planned a siege of Ragusa and actually invested that city in the middle of O'ctober but toward the latter part of the month both they and their Allies, the Montenegrins, were in retreat to the Serbian frontier across the Drina. The cause was partly the exhaustion of their supply of mu¬ nitions and partly because Austria's regiments had received strong reinforcements of crack Bavarian regiments. The Serbs made a gallant stand at Valjevo about the middle of November but were obliged to retreat. This retreat un¬ covered the Serbian positions on the Danube and the Serbs were compelled to evacuate Bel¬ grade, the capital (the government being tem¬ porarily removed to Nish). General Franck with an Austrian army corps formally entered and occupied Belgrade on 2 December, but he was not destined to remain long in possession of the Serb capital. The Serbs received a supply of sorely needed ammunition on 3 De¬ cember and King Peter visited the army and by his presence and bearing did much to restore the somewhat shattered morale of his troops who had endured terrific hardships and had met severe losses in defending their* native land.

Here it is appropriate to state the purpose of the Central Powers. Trench warfare had be¬ gun on the Western and Eastern Fronts and Britain, the chief antagonist of the Central Powers, was unscathed by the war. The only effective way of reaching her was to attack such of her colonies as were accessible by land. The strategy of the Central Po- \vers, therefore, had for object the crushing of Serbia and the bring¬ ing of Bulgaria into the war on their side. With Serbia eliminated by conquest and Bul¬ garia fighting by their side the road from Berlin to Constantinople would be cleared for the passage of German munitions and other war supplies and skilled personnel and Ger¬ many could satisfy the needs of the thousands of Turkish troops who were in sore need of arms, ammunition and trained leaders. With German aid via the Balkans the Turkish armies would be enabled to direct attacks against Egypt via the Isthmus of Suez and against India through the valleys of the Tigris and Euphrates. With Egyˆpt conquered India would be isolated and British rule in North Africa brought to an end, and with India menaced it was hoped that Britain might be induced to save her empire by deserting her Allies. Such were the aims which formed the m.otive for the crushing of Serbia — the neces¬ sary preliminary step in the scheme of conquest.

Serbia, undeterred by these successes of the enemy, resumed the

offensive on 2 December, took Suvobor on the 5th and drove back the in¬ vaders to Valievo. The five Austrian corps in Serbia became separated and a retreat more or

«

less disorderly followed to the border. On 15 December the Austrians were driven out of Belgrade which they had held from 29 Novem¬ ber. About 40,000 prisoners were taken by the Serbs and Austria left 50,000 killed and wounded behind her in her retreat.

At this stage Serbia was too exhausted to follow up her advantage, while the Russian pressure on another front demanded the serious attention of Austria. For several months the only fighting on the Balkan front was some desultory firing across the Danube. Meanwhile

many asked Rumania to permit the forwarding of military supplies through her territory to Turkey. Rumania refused this demand. At the same time the Entente vainly strove to adjust the differences between the Balkan States and sought to re-establish the Balkan League. On the whole the less said of Allied diplomacy at this juncture the better. It failed altogether to appraise the situation. On 6 March 1915 a po¬ litical crisis developed in Greece. Venizelos, who advocated the entry of his country into the war on the side of the Entente, and who had

Map Showing Balkan Theatres of War

the Serbian forces had been decimated by ty¬ phus, Turkey and Italy had become belliger¬ ents and fresh problems were thrust upon the Balkan States. From the beginning of the war Germany and Austria had sought the support of Bulgaria and tried to make her resent the treatment meted out to her at the hands of Greece and Serbia after the

second Balkan War. Rumania had ambitions to take under her aegis the millions of Rumanians in Transyl¬ vania. The latter nation was not molested until von Hindenburg had driven back the Russians and restored German prestige in the East. When the Turkish demands for munitions ne¬ cessitated prompt and effective measures Ger-

sought an understanding with Bulgaria even to the extent of ceding to her part of West Thrace in order that Greece might have a free hand to realize her national aspirations in Asia Minor, now retired from the premiership in defeat owing to German intrigue. Events were little altered, however, and he was returned to power on 21 August. The Entente powers were now bringing pressure on Serbia, Rumania and Greece to satisfy the claims of Bulgaria and Serbia yielded. Bulgaria in July secured a concession concerning the Dedeagatch Railway from Turkey but the agreement was not pub¬ licly acknowledged until 22 September. Fol¬ lowing this acknowledgment the mobilization

of the Bulgarian army was announced. Greece responded on 24 September with a coun¬ ter-mobilization order. Rumania already on 4 Aug. 1915 had voted a war credit of $20,000,000 and was watching closely the concentration of Austrian forces on her frontier near Brasso in retaliation for her refusal to permit supplies to pass through to Turkey and for the recently im¬ posed embargo on cereals.

Conquest of Serbia. — Above have been re¬ counted some of the diplomatic moves which resulted in Bulgaria going over to the Central Powers. *Serbia never had a choice in the mat¬ ter of remaining neutral. Rumania inclined to the Entente and Greece was torn by German court intrigue. The crisis, for Serbia at least, came late in September 1915 when Field Marshal von Mackensen, fresh from his successes in the drive from Galicia to beyond Warsaw, massed 250,000 Austro-German troops and 2,000 heavy guns on her northern frontier. Simultane¬ ously the Entente Powers learned that German and Austrian officers were being appointed to posts on the Bulgarian

staff and in the army which Bulgaria was concentrating on the Serbian eastern border. In ‘October Bulgaria broke relations with the Entente and entered the war on the side of the Central Powers. Meanwhile the Entente had ibeen more success¬ ful in their negotiations with the Greek premier, Venizelos. They secured his consent to the land¬ ing of British and French troops at Saloiiica to co-operate with Serbia, and perhaps with Greece, who, in case of an attack by Bulgaria on Serbia, was bound by treaty to come to the assistance of the latter. On 5 Oct. 1915 Allied forces began to arrive at Salonica.

The Austro-German drive under von Mack¬ ensen had for object the opening of part of Serbia east of the Morava to Nish and east¬ ward to the Bulgarian frontier. This route is marked by the passage of the Orient Railway from Berlin to Constantinople, by which Ger¬ many intended to supply Turkey with war ma¬ terial. The plan of the drive was as follows : The main army under von Mackensen was to march south along the Morava Valley from Belgrade; an Austrian army was to drive east¬ ward along the western Morava, while a third army from Bulgaria was to move westward with Nish as the converging point for all three. A second Bulgarian army was to close the Serbian retreat below Nish by moving west by north from Slivnitza in the general direction of Leskovatz. This army would also cut off any Allied aid to Serbia from Salonica or the south. The Serb defense was to hold back the centre, escape the crushing sides, and retreat into the mountains of Montenegro in case no help arrived from the Allies.

On 6 Oct. 1915 the Austro-Germans under von Mackensen, von Keovess and von Gallwitz crossed the Drina, Save and Danube. Bel¬ grade was occupied on the 9th. Although they fought heroically the Serbs were pushed back mile by mile by forces immeasurably superior to them. On 17 October the Teuton allies were 15 miles south of Belgrade and on the same day the Bulgarians cut the railway line at Vrania, thus isolating Nish (the temporary Serbian capital) from ‘all Allied help from the south. By the 20th the Bulgarians had pierced the line farther south at Koprili (Veles) and con¬

trolled about 100 miles of railway in the heart of Serbia.

The French tried to relieve Serbia by invad¬ ing Bulgaria between Doiran and Strumnitza north of the Vardar River. The French after stubborn resistance drove the Bulgarians back across the river, but to the north the Bulgarians advanced and on 22 October occupied Uskub, the ancient capital of Old Serbia ; another Ger¬ man force crossed the

Danube at Orsova and General Bojadieff led another Bulgarian army across the Timok and northward to Prahovo. The French established communication with the southern Serb army, and after being reinforced by British troops drove the Bulgarians out of Koprili (Veles) on the 25th and out of Uskub on 27 October. Koprili was retaken on the 29th and Pir-ot fell to the Bulgarians on the same day. General von Gallwitz with a Ger¬ man army took Milanovatz and Kragujevatz on 1 November. The Bulgarians entered Nish on the 5th. Bulgarians, Austrians and Germans pressed on from three sides in north Serbia, but in the south a Franco-British line stretched ■from Ghevgelt to Lake Doiran. By 28 Novem¬ ber the north Serb forces had been driven into Montenegro and Albania and but a small strip of Serbia in the south remained unconquered. The Germans had succeeded in their main ob¬ ject — the opening up of the rail route between Germany and Constantinople through Nish and Sofia.

Mackensen pressed his drive so quickly and the Allies had sent such inadequate forces (about 73,000 under General Sarrail) to aid Ser¬ bia that adequate military relief was rendered impossible. Monastir fell to the Bulgars on 2 December and with it went the last point of resistance in the Serbian kingdom. The last sad remnant of Serbia's scattered armies fled over the mountains to the coasts of Albania and Montenegro, hotly pressed by the Austrians and Bulgarians. Thousands perished on this flight and civilian refugees hampered the move¬ ments of the military. Mount Lovtchen was taken by the Central Powers on 10 Jan. 1916; Cettinje, the capital of Montenegro, fell on the 13th, and Scutari on the 23d. San Giovanni di Medua, the Albanian port, whence many of the Serb refugees had escaped to Corfu, fell on the 25th. Durazzo was taken soon afterward and Serbia, Montenegro and Albania lay prone un¬ der the iron heel of the Central Powers.

The French had taken over the Greek island of Corfu and there the Serbian veterans were recuperated and re-equipped in the sum¬ mer of 1916 in preparation for the reconquest of Serbia from the south, jointly with the Franco-British forces based on Salonica. While the Serbs were being driven westward these Franco-British forces were being driven down over the Greek frontier by the Bulgarians. The Allied base at Salonica was consolidated, and on 30 Dec. 1915 it was raided from the air by the enemy. On 28 Jan. 1916 the cape and fort commanding the harbor were occupied by the Allies because it 'uˆas found that Greece was yielding to the blandishments of the Central Powers. General Sarrail, the Allied com¬ mander, replied to the air raid by arresting the Austrian, Turkish, Bulgarian and German con¬ suls, placing them on a war vessel and dispatch¬ ing them to Athens.

Salonica was again

raided from the air on 1 Feb. 1916 and among the killed were three Greek soldiers. Greece was still vacillating and matters remained at this pass for several weeks. Finally, on 26 May 1916. Bulgaria, supported by German troops, dernanded of Greece the right to occupy the fron¬ tier fortress of Rupel which laid open the port and fortress of Kavala. Greece withdrew her garrisons from Rupel without protest. On 3 June the Allies occupied the government bu¬ reau in Salonica and proclaimed a state of siege; on 6 June a ˆpacific® blockade of the Greek coast was announced and on the 21st Al¬ lied demands were made upon the Greek gov¬ ernment for the demobilization of the Greek army, the setting up of a new government, the holding of new elections and the dismissal of pro-German police and other officials. These demands were complied with. On 22 June Bulgarian forces crossed the Mesto in the north¬ east corner of Greece. The Greek garrison of Nea Petra withdrew without offering resist¬ ance. On 28 August the Bulgarians entered Kavala itself. On 11 August the first Italian contingent arrived at Salonica, followed shortly afterward by the new Serbian army, eager for the reconquest of its native land. The British now forced the Bulgars along the Struma; the French were on the Salonica-Bel- grade Railway at Doiran and at Fiorina. The Serbians were placed in the Lake Ostrovo dis¬ trict and soon occupied the city of that name. On 27 August 1916 Rumania declared war on the Central Powers and interest at once shifted to the new war fronts in the Balkans created by this decision. Greece still hesitated, but the national movement, led by Venizelos, on 30 Au¬ gust, established a provisional government at Salonica and set about raising a Greek volun¬ teer army to serve with the Allies and to help drive the hated Bulgar from Macedonia. The king of Greece continued to favor the pro-Ger¬ man element and the Allies countered with their second naval demonstration. Further pressure was brought on the government by the En¬ tente, and German ships interned in the Piraeus were seized. The Nationalist movement, how¬ ever, headed by Venizelos, spread rapidly espe¬ cially in Crete. On 12 September the 4th Greek

army corps surrendered to the Bulgars at Kavala without firing a shot, the excuse being that they sought protection from the Allies. In September also interest was revived in the mili¬ tary operations. A Russian contingent was now co-operating with the other Entente forces. On 14 September the French and Serbs stormed Gornichevo and. part of the Malka Nidje ridge; on the 15th the Allies took the heights above Fiorina and the French and Russians entered the town the same day. In the four weeks fol¬ lowing the Entente forces had pushed north¬ ward to within a few miles of Monastic. The Bulgars, however, were in strongly-fortified po¬ sitions in front of the town. One of these was driven in on 16 Nov. 1916. At the same time the British crossed the Struma and took sev¬ eral villages on its northern bank. The Allied fleets aided operations in this region by block¬ ading the coasts from the debouchure of the Struma to that of the Mesto.

In the meantime the Greek political situa¬ tion had developed rapidly. Venizelos, as al¬ ready stated, had announced his provisional

government; on 9 October at Salonica he is¬ sued a final warning to the king, in which he said he regarded Greece as a democratic state with a king at its head, but with two govern¬ ments, of which the provisional government alone held a mandate from the people. On 11 October Admiral D'Artige du Fournet, com¬ mander of the Allied fleet off Athens and the Piraeus, demanded the surrender of the Greek fleet, control of the police, the lifting of the wheat embargo and many other similar measures. King Constantine was planning a coup from Thessaly, but the Allies seized an ammunition train bound thither and the king's scheme died aborning. The Allies granted a subsidy of $2,000,000 to Venizelos to enable him to equip his volunteer divisions which were to co-oper¬ ate with the Allied forces based on Salonica.

Rumania followed her declaration of war on 27 August by an invasion of Transylvania through the passes of the Transylvanian Alps. The Austro-Hungarian forces caught unawares, retired, and Rumania found herself in posses¬ sion of an extensive region including the towns of Hermannstadt, Sepsi Szt. Gyorgy, Kronstadt (Brasso), Petroseny and Kezdi Varsarhely.

The Austro-German Drive against Ru¬ mania.-ˆ The menace which Rumania's entry into the war offered to Bulgaria and Hungary, Germany's allies, caused Germany to make a special and immediate effort to crush this new foe, whose oilfields and cereal stores formed a much-needed prize. Von Mackensen, con¬ queror of Poland and of

Serbia, was chosen to lead a Bulgar-German army north through the Dobruja. This front was lightly held by the Rumanians whose main forces were maintain¬ ing an offensive in Transylvania. Tutrakan, a fortress on the Danube, fell to von Macken¬ sen on 6 September and he took Silistria three days later. The Rumanians, reinforced by some Russians, fell back by 20 September to the Rasova-Tuzla line, a few miles south of the Bucharest-Kustenje (Constanza) Railway. There in strong positions they were for a time able to hold the Bulgar-German forces and even to push them slightly backward. To make a diversion, at this stage the Russian fleet bom¬ barded Varna, the Bulgarian port on the Black Sea, and threatened to land a force in von Mackensen's rear. The Rumanians also on 4 October crossed the Danube at Riahovo in an¬ other attempted demonstration. Both these movements were mere diversions and lacked real force. On 19 October von Mackensen re¬ newed his offensive and pressed forward vig¬ orously. Constanza was evacuated by the Ru¬ manians on 22 October; Rasova fell the next day and Tchernavoda on the 2Sth. Here the great bridge across the Danube had been blown up by the Rumanians. Von Mackensen kept pushing northward on the Dobruja side of the river, but on 3 November it was announced that the Russian General Sakharoff had taken com¬ mand in the Dobruja and the Russian threat from the western side of the Danube now checked von Mackensen's advance.ˆ

Meanwhile the Rumanian campaign in Tran¬ sylvania came to grief. On 20 September the Rumanian line extended from the Russian left at Dorna Watra in Bukowina southward to Or-sova near the Iron Gate of the Danube. The Austro-Hungarians began a counteroffensive

late in September and at this juncture General von Falkenhayn arrived to take command of the Austro-German forces in Transylvania. He pushed the Rumanians back to the mountain passes with little difficulty and on 30 September almost succeeded in cutting off the main Ru¬ manian army at the Roten Thurm (Red Tower) Pass, south of Hermannstadt. By the end of October von Falkenhayn had forced his way through the chief passes and was from 15 to 20 miles within

the Rumanian frontier. Ru¬ mania, insufficiently prepared and unsupported to the extent hoped and expected from Russia, and unable to resist the sweeping advance of von Mackensen in the southeast and that of von Falkenhayn in the northwest, made a brave and desperate stand, fighting stubbornly for every foot of soil it yielded to the Central armies. Just before the retreat the Rumanian oil fields had been wrecked by a British expedi¬ tion commanded by Sir John N. Griffiths, but by 1 Jan. 1917 the entire oil-bearing region was in German hands and the Rumanian court and government were fugitives at Jassy in the north corner of the country. Von Mackensen en¬ tered Bucharest on 6 December — his birthday. Rumania made a brave attempt to hold the northern Dobruja with its rich grain fields in the neighborhood of Braila. The main bridge¬ head of the Danube fell on 3 Jan. 1917 and the fate of the Dobruja was sealed. Braila fell on 5 January. On the 7th the Germans reached the lower Sereth and on the 8th took Focsani, capturing great numbers of prisoners and guns.

Von Mackensen advanced slowly in the early months of 1917, his attempt to reach Hungary through the Gyimes Pass on 14 Janu¬ ary was unsuccessful ; on the 20th he captured the Fundeni bridgehead on the Sereth, 25 miles above Galatz. General Gurko arrived in Janu¬ ary to take charge of the Russian armies on the Rumanian front; an offensive begun on 1 February in the Bukowina yielded over 1,000 prisoners. To the end of March the fighting fluctuated but the Allies were being constantly pressed back. In July 1917 the Rumanians co¬ operated in the offensive led by General Korni-loff in Galicia. The Rumanian army had been reorganized by an advance in March of $200,- 0(X),000 by Great Britain. After the Russian failure the Rumanians still fought with sur¬ passing valor to hold on to Moldavia. In Au¬ gust a bloody battle was fought for 14 days around Marasesti with varying success. By September the Germans appeared to have been fought to a standstill. The Central Powers, however, considered Rumania conquered and in October von Mackensen was called to lead the Austro-German drive on Italy.

Greece Enters the War. — During the heroic stand of Rumania against superior odds the Allies were endeavoring to bring about a satis¬ factory situation in Greece. After much oppo¬ sition from the king and the pro-German ele¬ ment the Allies landed troops on the Isthmus of Corinth on 11 June 1917. Constantine and the crown prince abdicated, and Alexander, the king’s second son, ascended to the throne. Venizelos became Premier on 25 June and on the 30th Greece severed diplomatic relations with Germany and became a belligerent on the side of the Entente. Allied troops were gradually withdrawn from the strategical points they had

been holding in Thessaly and the occupied is¬ lands. On 4 June Italy proclaimed Albania an independent state under Italian protection. Ital¬ ian troops occupied Janina on 8 June despite the protests from Athens, but this force was withdrawn after the Venizelos government, friendly to the Entente, had been established at Athens.

The Serbian Front in 1917. — ˆThe fighting was of a very minor character, no great opera¬ tion being undertaken on this front in 1917. Of great importance, however, was a confer¬ ence, lasting six weeks, which took place at Corfu between the Serbian government and delegates from the Jugo-Slav provinces of Aus¬ tria-Hungary. On 27 July the terms of agree¬ ment reached were said to involve the setting-up of a Serb-Croat-Slovene state with a single flag. The nations thus united would form a state of about 12,000,000 inhabitants. At this conference was born the idea of the Jugo-Slav state, later recognized by the Entente and given formal recognition in the Treaties of Peace of

1919.

The Campaign of 1918. — Fortune which had so long perched on the standards of the Central Powers in the Balkans as elsewhere went over definitely to the Allies in 1918. In the early months of 1918 the Central Powers had their own way in the Balkans. In December 1917, however, the Russian defection was complete. Part of the Rumanian front, formerly held by some 500,000 Russians, was now defended by the Rumanians alone. The armistice between Russia and Germany in December carried a compulsory armistice for Rumania but the Ru¬ manian soldiers refused. Bessarabia proclaimed its independence 15 December and appealed for help to Rumania. Rumania sent an expedition¬ ary force to Kishinev, the capital of Bessarabia, in January 1918 and thus committed an act of hostility against the Maximalist regime in Rus¬ sia. The Treaty of Brest-Litovsk concluded on 3 March 1918 left Rumania completely isolated and cut off from all Allied help. The Central Powers proceeded to impose a peace on Ru¬ mania and on 7 May 1918 the Treaty of Bucharest was signed. Under its terms Ru¬ mania lost the entire Dobruja. A larger terri¬ tory than that lost by Bulgaria in 1913 was to be given back to her, the port of Constanza was placed under the dominion of the Central Powers, Rumania being granted certain rights of access. The Transylvanian frontier was rectified in such manner that Hungary re¬ ceived 2,000

square miles of territory and Aus¬ tria 920 souare miles south of .Czernowitz. A clause subsequently added to the treaty wrote off the requisitions of $2S0,(X)0,000 already made by Germany on Rumania, so that this may be regarded as a species of indemnity. Rumanian state deposits, placed in Moscow early in the war, were transferred to the Central Powers. Rumania was obliged to grant a most-favored nation agreement to Germany and Austria. No export dues were to be levied on petroleum. Control of the railways was to be given to Germany. A new Danubian Commission was to be set up, from which British, French and Ital¬ ian representatives were to be excluded. The Rumanian army was to be reduced to 30,000, and only 160 rounds of ammunition per rifle were allowed. Rumania never in spirit accepted

these humiliating terms other than as a tem¬ porary neeessity.

Greece and Albania in 1918. — A mutiny fomented by German agents broke out among the Greek troops at Lanna in February 1918 but it was soon suppressed. The Greek army took its place beside the British on the Struma front and on 30 May fought its first major action and won it. It took the enemy position at Skra di Legen, west of the Vardar, with the aid of French artillery. On 6 July 1918 French and Italian troops, with British monitors aiding from the sea, pushed north along the Albanian coast from Valona, crossed the Vojusa and reached the heights beyond. Other French and Italian troops had worked inland and now threatened Berat from the east. By the 23d Berat and the whole surrounding region had been occupied. The Austrians, however, re¬ ceived reinforcements and were reorganized by General Pflanzer-Baltin. The Italians, under Ferrero, soon found themselves in difficulties and in August withdrew from the Semeni River tc the Malakastra Ridge. Here thev remained until the Serbs and Allies opened Macedonia in September and paved the way for the recon¬ quest of Albania.

Serbia Reconquered by the Allies. — Not

until 15 September did the reorganized Serbian army and its Allies

begin a serious offensive northward. From the occupation of Monastir in the fall of 1916 there had been no large scale operations on this front. A strong ad¬ vance involved great difficulty because of the terrain. To reach Uskub, the strategic centre, the only practicable route was by way of Prilep and the Babuna Pass, which was threatened by the Bulgars who held the Selechka range east of Monastir. The plan evolved in the Allied attack of September 1918 was to dislodge the Bulgars by a drive from the east. The French and Serbs on a 16-mile front worked their way through the mountains about Dobro-polie to a depth of about five miles and took the ridge of the Sokol, Trnavska, Rovovska and Brazonsta. On 16 September a Jugo-Slav division occupied the Kosyak massif. The Tcherna River was reached on the 18th. Both Germans and Bulgarians began to give ground and by the 20th they were in full re¬ treat, pursued relentlessly by Serbian cavalry. Greek and British forces east and west of Lake Doiran now created a powerful diversion by striking at the Belasitza ridge ; at the same time the French sent a new force eastward. The fighting front now extended about 100 miles and over its entire length the enemy was in retreat. The French and Serbs had pushed the centre by 23 September about 40 miles to the region about Negotin and had cut the railway which afforded communication to the Bulgars falling back from Monastir and Prilep and those in retreat from Lake Doiran. The French threatened to turn the Babuna Pass by taking Vozarci and Kavadar. By 25 September the Allies held the entire Vardar Valley Railway from Gradsko to Ghevgeli. At the extreme eastern end of the front the Bulgars destroyed their stores and hastened to withdraw within their frontiers. The British followed closely, entered Bulgarian territory 26 September on the way to Strumnitza, and turned the flank of the Belasitza ridge from which the enemy at

once retired. The Serbs and French turned the Babuna range with equal success and took Koprili (Veles) and Ishtip on the 26th. These advances threatened to cut off the first and second Bulgarian armies from the forces around Uskub.

Bulgaria was now beaten and angry with her allies who heeded not her demands for aid. She was especially angered at the Rumanian settlement and feared Turkish demands for territory. To end a situation fast becoming in¬ tolerable she sought a separate peace on 27 September, applying to the Allies for an armis¬ tice. The application was referred to Gen. Franchet d'Esperey, Allied commander at Salonica and successor of Sarrail. He refused to cease

hostilities but agreed to receive properly accredited representatives. Bulgaria agreed to unconditional surrender and on 30 September her career as a belligerent ended under the terms of an armistice which secured Allied control of her territory. Uskub was at once entered by French troops and the Serb government pro¬ ceeded to transfer thither its government from Corfu. Ferdinand of Bulgaria abdicated on 6 October and after a reign of six weeks Prince Boris left Bulgaria which on 4 Nov. 1918 was proclaimed a republic. Austro-German forces continued to offer small resistance to the Serbs and Allies in Serbia after the capitulation of Bulgaria. On 1 October Ferrero led his Ital¬ ians against Berat. Italian and British warships raided Durazzo which was occupied by Italian troops on 15 October. The Serbs took Dibra, while the French took Prisrend and Mitrovitza. A small German force tried to hold Nish but the Serbs advanced rapidly and occupied it on 13 October. Tlˆe Danube was reached by the Franco-Serb forces on 19 October and on 1 No¬ vember the Serbs entered Belgrade. Serbia was liberated; her ancient enemy, Austria-Hungary, was fast crumbling away internally, and the age-old dream of a South-Slav state had become possible of realization.

J. B. McDonnell, Editorial Staff of The Americana.

11. NAVAL OPERATIONS. Resources and Problems. — In the beginning of the World War Great Britain was the greatest sea power and Germany the second. As to what rank should be assigned to the navies of France, Italy, Russia and Austria-Hungary opinions differ. Taking the battleship as a means of comparison the available statistics would have ranged the great nations thus: Great Britain 60, Germany 33, the United States 30, France 22, Japan 15, Italy 11, Austria-Hungary 9 and Russia 7. In submarines the announced statis¬ tics were: Great Britain 75, France 64, the United States 30, Russia 30, Germany 27, Italy 19, Japan 13 and Austria-Hungary 6. So many of these boats were of old type that the statis¬ tics are not as valuable as they seem. The total tonnage of the British navy in 1914 was 2,714,106 and the tonnage of the German navy was 1,306,577.

In July 1914, 216 ships, about half the strength of the British navy, assembled in a grand review in British home waters and passed before the king. When the international situ¬ ation became threatening the government, 26 July, ordered the fleet to remain assembled. The result was that when Great Britain declared war

on 4 August, the vessels were at their assigned station, stripped for action and well supplied with stores. From that moment the ships dis¬ appeared, so far as the civilian population of Great Britain could see. Admiral Sir John Jellicoe, who had seen many years of service, was commander of the fleet and Mr. Winston Churchill was first Lord of the Admiralty. The French and Russian fleets were considerable, but they did not compare in strength with the British forces, which at once assumed the lead in the naval defense of the Allies. As Germany had the chief naval strength on the side of the Central allies, it was left mostly to the British fleet to hold her navy in check and to fight whatever battle would have to be fought against this great antagonist. The French fleet had its main naval base at Toulon, on the Mediter¬ ranean, and its chief duty would lie in that sea. Here, also, was the Austrian fleet, with its main base at Pola, on the Adriatic. It became the first purpose of the French fleet, with the help of such British ships as served in these waters, to keep the Austrians shut up in this port. Later on Turkey came.Jnto the war and it was necessary to see that her ships did not come out of the Dardanelles. On 24 May 1915, Italy entered the war against Austria-Hungary, and her fleet, which contained some excellent new ships, was a further aid in keeping the Mediterranean free of the ships of the Teutonic allies. As for Russia, her navy was divided into two fleets, each in a landlocked body of water. One was in the Baltic, the natural entrance to which, the sound, was treated as territorial water by Denmark and mined. The other was in the Black Sea, the entrance to which was closed by Turkey. With the aid of two strong German ships, the Goeben and the the Turkish

fleet was able to dispute the Black Sea with the Russian forces there. In the Baltic Germany was vastly stronger than Russia, so that she controlled the sea and maintained uninterrupted communication across it with Sweden and through Sweden with Norway.

These tasks were all of minor importance compared to that assumed by the British navy in the North Sea. This was a triple task. Pri¬ marily it was to watch for the German fleet, and encounter and defeat it if opportunity offered. It was also to establish and enforce such means of interference with Germany's foreign trade as would reduce her ability to carry on the war. When the British ships dis¬ appeared

from view at the beginning of the war they were ranged in three fleets; the first, second and third. In each of them there were general squadrons of battleships, cruisers and destroyers, with submarines and minesweepers. The first fleet was made up of the most power¬ ful ships, dreadnoughts, superdreadnoughts and powerful battle-cruisers. The three fleets taken together were called the Grand Fleet, or the Home Fleet, and it was cherished by the British people as the first line of defense. Outside of the North Sea when the war began were several fast German cruisers which started immediately to attack British merchantmen, and it became the duty of the British navy serving on the high seas to chase down and destroy these ships, or force them to intern in neutral waters. While on this service the British men-of-war also sunk German merchantmen, with the result that Ger¬ man commerce was driven from the seas. In

the two first months of the war 10 per cent of the German and Austrian merchant ships were sunk at sea.

The German fleet was in an excellent condi¬ tion. Most of the ships were modern and well designed. The service was organized in a spirit of democracy, the officers being taken for the most part from the middle class. German science had been employed freely in develop¬ ing efficient naval mechanism, and the aptness of the Germans for seafaring life had made it possible to supply the navy with admirable sail¬ ors. The commander-in-chief, under the kaiser, was Admiral von Ingenohl, a man of recognized ability. At the head of the Navy Department of the government was Admiral von Tirpitz, a resolute man to whose devotion and energy the development of the German navy was chiefly due. His espousal of the cause of ruthless submarine warfare showed how little he valued humane feeling in war, but such a trait ought not to blind us to his merits an an organizer and administrator.

The actual presence of the British Home Fleet in the North Sea when war began made it necessary for the Germans to give up their long-cherished project of a quick raid in force on the coasts of Great Britain. It also forced them to keep themselves much in their own harbors. They hoped that the opportunity would come to sally out and crush their oppo¬ nents when divided. For this purpose the Kiel Canal was well adapted. Its mouth was pro¬ tected by mine fields and the well-fortified island rock of Helip'oland. It formed a safe passage-way for the greatest ships into the Bal¬ tic Sea and permitted them to sally forth at will for any sudden attack that fortune might enable them to

make. It was Germany's boast in 1914 that her navy would adopt a stay-inside policy until by single enterprises of fast cruis¬ ers and submarines, and by mines, she had re¬ duced the opposing navy to a state of numerical equality and then her High Seas Fleet would go out and defeat its enemy in battle. It was an amateurish boast; for no trained naval man would have predicted that the losses would have been preponderatingly on the British side in the preliminary stage of picking off ships.

Fighting in Distant Seas. — The period of actual fighting was ushered in with a series of minor attacks, which seemed larger in the day of their occurrence than now. On 2 August a German cruiser bombarded the Russian port of Libau. On 5 August a British destroyer en¬ countered the German mine-layer Koenig in Luise and sank her in six minutes, but the next day the light cruiser Amphion was sunk by one of the mines the Koenigin Luise had laid. In¬ cidents like these, however, signified little in the general course of the war at sea. But a more important affair took place in the Mediterranean. When war began two German ships, the Goe¬ ben, a battle cruiser with a speed of 28 knots, and the Breslau, a light cruiser of equal speed, were off the coast of Algiers. They fired a few shots at the shore defenses and turned to escape through the Straits of Gibraltar but were headed off by British warships which chased them eastward. They outsailed their pursuers and on the morning of 5 August ap¬ peared at Messina, where the officers made their wills and deposited their valuables with the German consul, and then the vessels sailed

WAR, EUROPEAN

Copyright, International Film Service

2 Timing a depth-bomb

1 Firing an anti-aircraft gun aboard a sub-destroyer

away, their bands playing ˆHeil dir im Siegcrkranz.ˆ The Gochcn and Breslau now turned toward Constantinople, where they ar¬ rived in_ a few days, eluding a British squadron sent to intercept them. These vessels played an important part in the train of events which brought Turkey into the war on the side of Germany. When Turkey openly made war on 1 November these two ships were taken into the Turkish navy, and renamed; they did much to keep the Russian fleet from dominating the Black Sea.

In the southern Pacific Ocean other work awaited the navies of the Entente. Here Ger¬ many held several island colonies, with a total area of about 100,000 square miles. To take this territory was especially desired by the in¬ habitants of Australia and New Zealand. Fit¬ ting out expeditions under the care of British and French warships they seized one posses¬ sion after another, in general without serious fighting. On 28 August German Samoa was taken, on 11 September New Pomerania sur¬ rendered, on 13 September the Solomon Islands were taken over, and a few days later German New Guinea capitulated. Farther north the Japanese were carrying on the work of con¬ quest at Shantung, completing the task on 10 November with some aid from the British navy.

More striking were the careers of the Ger¬ man cruisers Emden and Koenigsberg, which, stationed at Tsing-tau before the war, set out at once on careers as commerce destroyers. The Koenigsberg destroyed the Pegasus in Zanzibar Roads, on the east coast of Africa and then took refuge in the Rufigi River, hoping to escape the British cruisers sent against her. Her hiding place was discovered and after an eight months' blockade she was destroyed by monitors on 11 July 1915. The Karlsruhe, an¬ other raider, had a brief career of commerce destruction. Her fate was long in doubt but it has been agreed that she was wrecked in the West Indies. Two converted cruisers, Prins Eitel Eriedrich and Kronprinz Wilhelm,, came to New¬ port News, Va., in the spring of 1915, after in¬ flicting much damage on Allied commerce. The Kaiser Wilhelm der Grosse was sunk by the British

cruiser Highflyer near the Cape Verde Islands. In December 1916, two German raiders, the Mowe and the Seeadler, got out to sea and did much damage to commerce. The first re¬ turned in a few weeks, but the second con¬ tinued in the southern Atlantic and Pacific waters. She was finally wrecked at the island of Mophea, near Tahiti, in the south Pacific. Her crew escaped in a sloop to the Easter Islands, Chilean territory, and were interned until the end of the war.

The experiences of the Emden make a more dramatic story. She left Tsing-tau at the be¬ ginning of the war and joined a German squadron under Admiral von Spee in the southern Pacific. A few days later she was de¬ tached for separate duty and proceeded to the lanes of commerce off the southeastern coast of Asia. The consternation that ensued was like that created by the Confederate States raider, Alabama, during the American Civil War. In the course of two months the Emden captured 17 ships, most of which were sunk. The total loss amounted to several millions of dollars. Captain Mueller, her commander.

proved himself a brave and resourceful man on many occasions. On one occasion he sailed boldly into the harbor of Penang flying a neu¬ tral flag, the ship disguised by the erection of a dummy fourth smokestack made of canvas. In the early dawn she entered the harbor un¬ challenged. A Russian cruiser was anchored by the side of the channel. Two torpedoes and several rounds of shell finished her. Observing that other ships were coming into the harbor Captain Mueller turned to escape. He en¬ countered a French torpedo boat and sunk her with three broadsides. Picking up her survi¬ vors he hastened to the open sea, the whole af¬ fair having occurred within a half-hour. By this time all the Allied naval ships in the East were searching for the raider, and it was not safe for Mueller to remain in the ordinary sea lanes. Other dangers occurred also in the capture of the Emden's collier and supply ship in Sumatran waters. Standing out into the Indian Ocean she appeared on 9 November off the Cocos, or Keeling, Islands, 550 miles southwest of Sumatra. A party went ashore to destroy the cable and wireless stations. The operator managed to send a message, ˆStrange warship off entrance,^^ which brought the Aus¬ tralian cruiser Sydney to the scene. Abandon¬ ing his shore party Captain Mueller tried to elude the Sydney in a running battle that had lasted less than two hours, when the Emden was forced on a reef in a sinking condition, her decks covered with dead and wounded. Captain Mueller was taken prisoner along with the other survivors. In her hasty depar¬ ture from Keeling Island the Emden

abandoned her landing party, headed by Lieutenant Miicke. The series of events which marked the home¬ ward journey of this party make one of the most exciting stories of the war. Their first action was to fortify themselves and proclaim martial law. Then fearing the Sydney would return and make them prisoners they took pos¬ session of a small schooner and set sail for the Sumatran Coast, where the Dutch authorities gave them scant welcome and sent them on their way with few supplies. Turning prow west¬ ward they finally encountered a small German trading vessel, which was still dodging the British and Japanese patrol on the Asiatic Coast. She took them on board and landed them in Arabia at Hodeidah on the lower part of the Red Sea. They tried to cross the desert to Medina but were opposed by Arabs and forced back to the sea. After many adventures on native boats and fighting against the Bed¬ ouins on the shore they at last reached El Ula on the railroad that ran south from Damascus and were thus able to reach Germany by way of Turkey after five months of wandering. Lieutenant Miicke's exploits in this long trip made him a hero in his own country and won the admiration of many people of other lands.

When the Emden set out on her career as a raider she was detached from a German squad¬ ron in the Pacific commanded by Admiral von Spee, and bound for the western coast of South America to destroy such Allied mer¬ chantmen as it encountered. Two large and fast armored cruisers, the Gneisenau and Scharnhorst, and three fast light cruisers, the Dresden, Leipzig and Nurnberg, composed the squadron. They found such a welcome in

the harbors of Colombia and Ecuador that the British government made emphatic protest to the governments of these countries against the violation of neutrality. Passing down the coast von Spec came to Coronel, a few miles south of Concepcion, Chile. Here on 1 Nov. 1914 he encountered a British squadron under Rear-Admiral Sir Christopher Cradock, sent out to protect the trade routes on the two sides of the southern part of South America. The British squadron consisted of two armored cruisers, the Good Hope and the Monmouth, a light cruiser,

the Glasgow., and an armed liner, the Otranto. In armament the British ships were inferior, but in speed were superior to the Germans ; and Admiral Cradock would have been justified in avoiding an engagement. But he chose to accept battle and allowed the Ger¬ mans to take position to his east, so that his ships were clearly outlined for the Germans against the long afterglow of the sunset sky. In two hours the Good Hope and the^ Mon¬ mouth had gone down with their crews, includ¬ ing the commander of the squadron. The Glasgow and the Otranto h^d been ordered to fall out of line before the battle and escaped to safety. The conflict was really a duel be¬ tween two British and two German armored cruisers with the advantages of speed, range of guns, thickness of armor and atmospheric con¬ ditions in favor of the latter. Probably Admiral Cradock was to blame for failing to recognize these facts. The battle seems to have gone against him from the beginning; for von Spee got the range first and damaged the best guns of the Good Hope before they could be brought into action.

The news of the engagement seemed to show the superiority of German ships and offi¬ cers, and the pride of the British was touched to the quick. Immediately a squadron of supe¬ rior strength was sent out under Rear-Admiral Sturdee, consisting of two battle cruisers, the Invincible and the Inflexible, armed with 12-inch guns and capable of a speed of 28 knots, and three armored cruisers, the Carnarvon, Kent and Cornwall. With the Glasgow this squadron was in the south Atlantic by the end of November, whither von Spee had come to escape the Japanese, who were combing the Pacific to discover his whereabouts.^ By a ruse Rear-Admiral Sturdee enticed him to the Falkland Islands and met him there when he arrived on the morning of 8 December. He came expecting to find an unsupported British warship which was to become an easy prize. To his surprise he saw a superior squadron steam out of a landlocked harbor and fled, Sturdee coming close behind him. At 2 p.m. the Brit¬ ish battle cruisers had the range and opened a deadly fire. Von Spee realized that the game was up and turned to fight for his life. The S charnhorst and Gneisenau were opposed by the Invincible, the Inflexible and the Carnarvon and sank, the first at 4 p.m. and the second at • 6 P.M. The light cruisers, the Niirnberg, the Leipzig and the Dresden did not stand for the battle but turned southward, pursued by the Kent, the Glasgow and the Cornwall. By 9 p.m. the first and second were below the waves, but the Dresden managed to escape in the night. She was sought relentlessly and finally discov¬ ered and sunk by the Kent and the Glasgow on 14 March 1915 at Juan Fernandez. In the bat¬

tle of the Falkland Islands the Germans, like the British at Coronel, fought bravely against a superior force and went down with their ships. But in one respect there was a difference : At Coronel the victors were unable to save any of the defeated crew from the water because of a very heavy sea; at Falkland Islands the vic¬ tors gave themselves to saving life as soon as the defeated enemy vessel hauled down their ensigns. Unfortunately it was a difficult mat¬ ter. The British sailors did what they could by throwing ropes, logs of wood and mats to the Germans in the sea. But the water was icy-cold and many of the unfortunate ones became numb and relaxed their hold before they could be reached. It is reported, also, that many were attacked by the albatrosses who picked at their eyes. While they fought off these vul¬ tures, numbed hands lost their holds and the victims slipped off and were lost. About 200 men were rescued from the waters, but Admiral von Spee and two of his sons were lost. As at Coronel no ship on the victorious side was damaged and but few men were lost.

Standing Guard in the North Sea. — Al¬ though the encounters in remote seas were the most striking thing the belligerent navies were doing in the first months of the war, the work of most importance was keeping the German High Seas Fleet blocked up in German har¬ bors. For this purpose the British fleet kept constant station. It had to be ready for sud¬ den attacks, sweep up German mines continu¬ ally and lay mines of its own, and be always on the lookout for submarine attacks. All this was hard work, and few people realized its ex¬ tent and labors.

Most people in the Entente countries ex¬ pected a great battle for supremacy, and it is probable that ˆ many Germans entertained the same expectation. In fact, it was part of the policy of each side to entice the fleet into bat¬ tle, either in small encounters or in large engagments, the Germans by raids or by setting traps in which they might throw a superior force against some part of their opponents' fleet. In general the Entente Allies were con¬ tent to play a waiting game, but at times they tried to draw their enemy out of his mine-pro¬ tected harbors by sending forward weak squad¬ rons in the hope that they might precipitate a fight and maintain it until the main British fleet came up. Several isolated achievements marked the first work of this war, the major¬ ity being favorable to the Germans. On 3 Sep¬ tember a German mine destroyed a gunboat, the Speedy, in the North Sea. On the 5th the light cruiser Pathfinder was torpedoed by a German submarine off the Scottish Coast, an exploit for which the Germans paid on the 13th when their light cruiser, the Hela, was de¬ stroyed by a British submarine in the North Sea. On the 22d three

British cruisers were patroling the Dutch Coast when one of them, the Aboukir, was torpedoed and began to sink. Her companions, thinking she had struck a mine, came up to save the crew. First one, the Hogue, and then the other, the Cressy, was tor¬ pedoed, with the result that all were lost with 680 out of a total of 1,459 officers and men. However, none of these affairs had important influence on the progress of the war.

Few large-scale naval actions were fought

during the ˆvar, but one occurred on 28 August in the Bight of Heligoland, and it is typical of the battles in which each side sought the advan¬ tage of numbers, with the result that the Ger¬ mans drew off when it seemed that they would he brought into a general engagement with the British High Seas Fleet. The battle was planned by the British authorities to get an opportunity to overwhelm the Germans. Having recon¬ noitred the waters around Heligoland they sent out on the 27th a submarine flotilla to serve as scouts. Next day they sent forward two de¬ stroyer flotillas, _ followed by a battle cruiser squadron, a cruiser squadron, a light cruiser squadron, and all to rendezvous before Heligo¬ land in the morning of the 28th. The subma¬ rines with two small destroyers in attendance arrived in front of Heligoland early on the 28th and revealed themselves. Behind them, but out of sight were the other squadrons. The German ships, according to their custom, were behind the island, but seeing the submarines they came out, thinking to make an easy cap¬ ture. Then followed a sharp battle between two of the British cruisers that quickly arrived and two German cruisers and some destroyers. It developed into a duel between the opposing cruisers, in which the Germans got the worst of the encounter. Meanwhile the heavier Brit¬ ish ships were out of sight, and the Germans sent out two additional cruisers, recalling one of the first in the fight because -of her severe damages. This led the British to call for help, and about noon Admiral David Beatty arrived with a squadron of five battle cruisers. He found two British light cruisers, the Arethusa and the Fearless,, heavily

engaged with two Ger¬ man light cruisers, the Mainz and the Koln. About the same time two other British light cruisers, the Falmouth and the Nottingham, arrived and joined in the battle. Beatty might well have suspected the Germans of a ruse by which, if he stood to fight, he might have suddenly found himself confronted by the superior German fleet. But putting aside any such doubts he went boldly into the battle, where his 13.5-inch guns soon settled the fate of the Mainz, the Koln and the Ariadne. This done he steamed away for home ports, accompanied by the remainder of the expedition. The net result was the destruction of three German light cruisers, the serious damaging of an¬ other and the destruction of one destroyer and the serious damage of seven others. The British set the stage for the battle of Heligo¬ land and fought it according to their plan. Their lighter craft were sent forward to engage the enemy in the hope that he would be drawn out in such numbers that the superior British ships could cut them off. The Germans did not send out their heavy ships and lost those they sent. They were at a disadvantacre in the engagement ; and even their opponents bore witness to the courage and skill with which they fought their ships, staying by them to the last and going down when they sank. No British ship was sunk, and but one, the Arethusa, was badly damaged.

The next naval event of importance in the North Sea was a German raid on Yarmouth, 2 Nov. 1914. Three German battle cruisers, two armored cruisers and three light cruisers composed the raiding party. They appeared be¬ fore Yarmouth at eight in the morning and

bombarded the place for 15 minutes at a 10-mile range. Little damage was done because of the long range, and on their return to Germany one of the armored cruisers, the Yorck, struck a mine and sank. The purpose of the expedi¬ tion seems to have been to see if such could be made. From the accounts in the British newspapers the German authorities had a good opportunity to see the effects and to observe in what manner the next attempt could be made an improvement.

The next attempt came on 16 December with a squadron of three battle cruisers, and one armored and one light cruiser under Rear-Admiral Funcke. The expedition reached a point off the coast of England north of Flam-borough Head, Yorkshire, in the early morning, the weather being foggy and cold. Dividing into two columns, one proceeded to attack Scarborough and Whitby and the other at¬ tacked Hartlepool. At Scarborough the town was shelled for 45 minutes. Many shells were fired at a wireless station in the suburbs, but many

others were sent without discrimination into the thickly populated residential sections. Churches, hotels, the gasworks, the water¬ works, and whatever building was large enough to attract attention became targets. Nor could the attackers plead inability to distinguish ob¬ jects from a distance; for the shots were di¬ rected as much into the residential district when the ships were but 500 yards from the shore as when five miles away. Eighteen persons were killed, most of them women and children, and about 70 were wounded. Passing north the column steamed past Whitby firing all the time and killing five and wounding two persons. The second column opened fire on Hartlepool about eight o'clock. A small gun¬ boat and two destroyers in front of the place were forced to flee from a vastly superior attacking force. A small fort with antiquated guns stood in front of the town, garrisoned by some Territorials, who manned the guns and returned shot for shot, but without effect. One of the attacking ships gave her especial atten¬ tion to this battery. The other made an in¬ discriminate attack on the civilian portion of the town. The gasworks were destroyed, one of the shipbuilding yards was damaged, churches, schools and hospitals were hit, and the streets were severely damaged. The killed numbered 119 and the wounded more than 300. Among those injured were several children on the way to school.

These attacks were evidently made to strike terror in the minds of the British people. They had another effect. To shoot down old men, women and children was horrible and exasperat¬ ing to the British, who have ever prided them¬ selves on their humanity for the defenseless. The story of the attacks of 2 November and 16 December stimulated the war spirit in Great Britain and promoted volunteering. It was an argument for war that the most ignorant could understand. Of the four towns assailed in these two raids, only one, Hartlepool, had fortifications of any kind, and the old fort at that place was inconsequential. In delivering the assaults the Germans, who must have known the conditions on shore, showed no desire to distinguish between public losses and losses to be inflicted on private individuals.

The raids were hailed as deeds of heroism

in Germany, as in fact they deserved to be hailed, in so far as it was not concerned with the attacks on civilian noncombatants. The British fleet was keeping a most careful watch, with plans made to destroy whatever German naval force should emerge from the protected areas of their foes. To sally forth and take a turn in the very centre of the enemy's waters was a courageous deed. The second raid came near being a perilous one; for the British fleet was prepared for such an attack and instantly set out to trap the raiders. As the British came within eight miles of them the fog in¬ tervened and gave the Germans an opportunity to escape unscathed.

On 24 Jan. 1915, Rear-Admiral Hipper with three battle cruisers, six light cruisers and a flotilla of destroyers set out from Wilhelms-haven to make a third raid. The British navy seems to have had an intimation of what was coming. That morning Vice-Admiral Beatty with six battle cruisers, four light cruisers of the ®town® class and three others, and a number of destroyers steamed out into the North Sea. About 7 A.M, the Germans w.ˆre sighted off the Dogger Bank and turned to flee. The British pursued and having faster ships overhauled them, running, not behind their enemy, for fear of mines, but on a parallel course Soon after nine the interval was 10 miles and Beatty, who led in the Lion, opened fire. One of the German battle cruisers, the Bluecher, had a speed of only 24 miles and began to fall behind, and her fate was soon sealed. As the pursuing ships overhauled the Bluecher each took shots at her. Finally a torpedo struck her in a vital part and she turned over and sank. Her crew jumped into the water and boats from a British crusier began to rescue them, when German aircraft appeared and dropped bombs, probably under the impression that it was a British vessel that was sinking. Mean¬ while Beatty's flagship, the Lion, was damaged by a shell so that it had to abandon the fight. He transferred his flag to a destroyer and afterward got aboard a battle cruiser, but for a time the command was with Rear-Admiral Moore, who decided that it was better to cut short the pursuit. He had come within 70 miles of the German minefields and believed that Admiral Hipper was trying to lead him into a trap. The escape of the Germans was a great disappointment to the British. In the fight off the Dogger Bank all the advantage of weight, range and speed was against the Germans. The British people, who naturally wanted striking results, thought Hipper should have been sur¬ rounded and crushed ; but prudence directed that the best ships of the British for speed and offense combined should not be placed too near the minefields. The Germans lost the battle cruiser, Bluecher, and had two other battle cruisers seriously damaged. The British lost no ship,

but the Lion was so badly damaged that it was necessary to tow her, and it was with difficulty that she was taken into a home port. Soon after this battle the German gov¬ ernment removed Admiral von Ingenohl and gave the command of the fleet to Admiral von Pdhl.

Now there followed a year in which the two fleets had no encounter, the Germans showing themselves still unwilling to come out for battle. As to what efforts the British made to draw

them out it is impossible at this time to make a statement. During the interval the enforce¬ ment of the blockade of German ports, fighting the submarine by the British and French in the Atlantic, and by the same powers in con¬ junction with the Italians in the Mediterranean, were the chief features of naval activity in the World War. These were important events and will be taken up in the proper place. It was not until the Battle of Jutland, 31 May 1916, that the world had another opportunity to note a measuring of strength between the two hostile fleets in the North Sea.

On 30 May the British fleet sailed from its bases on one of its ordinary cruises through these waters. The evidence seems to show that the German fleet was in the habit of mak¬ ing short sallies into the same region, passing through their minefields into the region north and west of Heligoland. These sallies were usually made at such times that they did not coincide with the presence of the British in the same waters. But on the cruise of 30-31 May it was the fortune of the two fleets to meet off the coast of Jutland, which forms the western peninsula of Denmark. The British fleet was sailing in two divisions. One was composed of battle cruisers chiefly, but it also contained a squadron of the largest battleships with an enveloping flock of light cruisers, and it was under the command of Admiral Beatty. The other was composed chiefly of battleships, it also contained a squadron of battle cruisers with light cruisers and was under command of Admiral Jellicoe. The two divisions steamed across the Nbrth Sea on the morning of 31 May, Beatty taking a course along lat. 56° 30’ and Jellicoe along the parallel of 58°. At noon Beatty, finding himself within 50 miles of the coast of Jutland, turned sharply northward and expected to join Jellicoe. The weather was calm and hazy and the sea was as smooth as a pond. At 2 ;20 p.m. the British light cruiser, Galatea, proceeding on Beatty’s eastern flank, signaled ®enemy vessels to the easBˆ and five minutes later repeated the information with the statement that the vessels were numerous. The enemy was sailing southward, and Beatty al¬ tered his course to south-southeast,

intending to get in between him and the base at Heligoland. At the same time he sent out a seaplane which reported at 3 :30 p.m. the presence of the German cruiser squadron, consisting of five battle cruisers with the usual number of attendant cruisers and destroyers. Beatty was in slightly superior force and placed his ships . in battle line at once and fighting began at 3 ;48 p.m. He did not doubt that the heavy German fleet was somewhere to the southward, while Jellicoe was two and a half hours away in the north. But he was looking for the German fleet and had found it, and he did not hesitate a moment. It was his duty to engage the Germans, even though the two divisions united against him, and to hold them in their position if possible, until Jellicoe arrived and gave them the benefit of his heavy armaments. It was certain that Beatty would place his ships in a precarious position for the time being, but he would have to endure it until reinforced. The engagement began when the two divisions were both sailing southeast, the range being 18,500 yards, about 10j4 miles.

The first stage of the battle lasted an hour.

dicing which the firing was constant. It was difficult to determine what damage was done to the Germans but the British lost two battle cruisers, the Indefatigable and the Queen Mary. The German aim was excellent in this part o£ the engap-ement. Beatty had sent his light cruisers ahead and at 4:42 p.m. they reported that the German battle fleet, under Admiral von Scheer, was at hand. To run in to its iron embrace was more than he bargained for and he turned backward, hoping to draw the com¬ bined fleet toward Jellicoe. The running fight that followed as he fled made the second stage of the battle. As it progressed the weather became misty, which was bad for the British. Being to the westward of their foes and near sunset their hulls were visible to the Germans, while the mists obscured the latter. At 5:50 p.m. Jellicoe's battleships were sighted, and half an hour later the engagement had entered its third stage, in which the combined British fleet was in contact with the combined German fleet. Admiral Hood in the Invincible led the third battle cruiser squadron and wheeled into

line, bringing himself into range of 8,000 yards from the enemy. He was instantly covered with an intense fire from many kinds of ships of war. In a few minutes the Invincible blew up, probably because her magazines had been reached by a German shell. Admiral Hood perished with the ship. Other casualties oc¬ curred as the ships of Beatty and Jellicoe per¬ formed the delicate operation of forming in one battle front under the fire of a strong and skil¬ ful enemy. But the work was done and at 6:50 P.M. the united British fleet formed one long line, parallel to the enemy's line, which it overlapped because of its superior strength. Both fleets were steaming southward, it being the intention of the British to head the Germans off from their bases.

The moment was now dramatic for the two navies. For years officers and men had looked forward to the day when the strength of one should be measured against the strength of the other, and here side by side off the shores of Jutland were the majority of the capital ships of each nation hard at work, one against the other. More than two hours of daylight was to be expected in this latitude, and no British sailor present thought that many of the Ger¬ mans would be afloat when it ended. But here came one of those unexpected turns of the weather which so often favored the Germans on land and sea. The mists thickened and fell down on the surface so that distant objects were no longer visible. Frequently it became so thick that German ships were lost altogether. Its effects were heightened by German smoke screens. Under these conditions a squadron of British cruisers ran between the German and British battleships, which were actively engaged, and only got out with severe losses. In the third stage of the battle the main purpose of the Germans was to escape, but the British had worked around them and stood between them and Heligoland, The closing down of the mists broke up formations and the action resolved itself into a series of small engagements, the Germans using every opportunity to slip away in the obscurity. Nor was it possible to see how much damage was done to them. In the half-light a ship would be seen to be hit or on

fire and she would drop out of line, but it was impossible to determine how seriously she was damaged. Darkness came about 9 p.m., and throughout the first half of the night intermit¬ tent outbursts of firing broke the stillness. During this period the British had reason to beware of submarines, but the destroyers were deployed successfully, all the time the fleets steaming southward. At dawn on 1 June the British fleet was 100 miles north of .Heligoland, but the Germans had disappeared. Jellicoe and Beatty lay in position until 11 a.m. awaiting

the appearance of the foe, and when he did not come they sjowly returned to British ports. They had met the_ enemy and fought him in hard battle in which he had escaped severe losses only by reason of the mists and the ar¬ rival of darkness.

When the world received its first news of this battle it received it by way of Germany, and it was represented as a German victory. ^^The gigantic fleet of Albion, ruler of the seas^^^ said the kaiser, ^^which, since Trafalgar, for a hundred years has imposed on the whole world a bond of sea tyranny, and has sur¬ rounded itself with a nimbus of invincibleness, came into the field. That gigantic Armada ap¬ proached, and our fleet engaged it. The British fleet was beaten.® The Germans announced their own losses as one old-type battleship, the Pommern, three small cruisers, Wiesbaden, El-bing and Frauenlob, and five destroyers. Later they admitted the loss of a battle cruiser, the Lutzow, and a light cruiser, the Rostock, con¬ cealed at first ®for political reasons.® Against these acknowledged losses were the undisputed

British losses of three battle cruisers, the Queen Mary, Indefatigable and Invincible, three armored cruisers. Defence, Black Prince and V/ arrior, and eight destroyers, which in ton¬ nage was nearly double the tonnage of the ships mentioned by Germany. Admiral Jellicoe reported that there was every reason, to be¬ lieve the enemy had lost three battleships, one battle cruiser, five light cruisers, six destroy¬ ers and one submarine. He based his opinion on testimony taken from liis officers and care¬ fully compared. But in his memoirs, published in 1919, he did not repeat this statement. In fact, his general testimony of the low visibility during ’the action, due to the mists and smoke screens, goes far toward discrediting reports of losses his own officers thought they observed in the moment of battle. In his later account he contented himself with pointing out that the Seydlitz, a battle cruiser, was injured so badly that she had to be beached, that at least four German battleships were torpedoed, but with what result he did not

say, and that all their other capital ships were severely damaged. Other statements by Admiral Jellicoe seem to be important in this connection. He declared that the British battle cruisers were not as well protected by armor as those of the Germans and he said that in several respects their mechanism was not so good as that of the Ger¬ man ships, insomuch so that he ordered im¬ provements made after the battle. It was gen¬ erally admitted that the German aim was ex¬ cellent early in the battle. All these things considered, the results can be accounted for by supposing that many German ships, though se¬ verely damaged, escaped to their home ports and were thus not placed among the lost. That the German naval power was severely damaged in the battle is unquestionable. Captain Persius, in the Berliner Tageblatt, 18 Nov. 1918, said the ˆFleet's losses were severeˆˆ in this engagement and that the authorities ad¬ mitted that the ˆbattle must and would be the last.ˆˆ In fact the German fleet did not again leave the protection of the Heligoland region, except for a short cruise in August 1916, until it made its tragic journey to Scapa Flow 21 Nov. 1918. Whatever we say about actual losses, the battle of Jutland marks the change of the naval policy of Germany from a series of attempts to lure the British into battle when divided to a quiet stay-at-home policy.

Naval Operations in the Mediterranean. — While the North Sea was the most important field of operations for the naval forces of the Entente Allies, the Mediterranean Sea was not without significance. Here the Austrian fleet had its base, and it was necessary to keep it bottled up_ in its Adriatic harbor; for if it came out it would have menaced French and Italian communication with Africa and Brit¬ ish communication with Egypt, East Africa and India. To keep these fleets in har¬ bor the Allies had the French fleet and such ships as Great Britain could spare from serv¬ ice in the North Sea and from the work of chasing down the fewˆ German cruisers that raided their commerce in the beginning of the war. After Italy came into the war against Austria-Hungary, 23 May 1915, her navy gave assistance in this service. The blockade was effective from the beginning. At no time did

the Austrians, in whose navy were several mod¬ ern battleships, dare risk battle in the open sea. As for the Turks, with the German battle cruiser Goeben and the light cruiser Breslau added to their originally trivial fleet, they did not dare risk battle on the Mediterranean but were content to make raids against Russian ports on the Black Sea. Even in this service they were not successful; for the Goeben re¬ ceived serious damage in a fight with Russian warships off the

Anatolian Coast, 18 Nov. 1914. By this time German officers were in control of the Turkish navy and the Goeben was repaired and sent out to raid the oil port of Batum, 10 December, but the Russian squadron drove her back to Constantinople forthwith. By reason of the strength of this squadron the control of the Black Sea was in Russian hands throughout the war. Thus shut up in their harbors the allies of Germany were forced to confine their naval efforts to submarine warfare, of which more anon.

Meanwhile the British admiralty, under the leadership of Mr. Winston Churchill, launched the attack on the Dardanelles, which began as a naval affair. The controversy respecting this attack has engaged the pens of many critics, none of whom have so far been able to show that the step was wisely taken. Constantinople is 175 miles from the .<Eigean Sea, the approach being first by the Dardanelles, 50 miles, thence across the Sea of Marmora, 115 miles, .and thence up the Bosporus 10 miles. The first of these passages-varies from three-quarters of a mile to five miles wide. The shores of the straits are generally high and forts and bat¬ teries were placed at favorable points. The narrowest part, called the Narrows, is* 14 miles from the entrance. The main defenses were here, although there were strong forts at the en¬ trance. The current in this part of the straits was strong, reaching four knots an* hour when the wind favored, and it enabled the Turks to send down drifting mines with serious effects. For the military capacity of the Turks the Brit¬ ish and French authorities had little respect, and the British thought in the autumn of 1914 that it would be easy to force the Dardanelles and hold the entire passage to the Black Sea. If that could be done the vast stores of grain in southern Russia would be delivered to the hungry Allied peoples, and the moral effect would be good upon Bulgaria, Rumania and Greece, who still hesitated between neutrality and actual support of Germany. The French and British did not take into account the great change the Germans had made in the Ottoman army. Under General Liman von Sanders it had been reorganized and drilled into an ex¬ cellent defensive force with more than 200,000 men in the capital. German engineers had re¬ paired the forts along the Dardanelles, mounted improved Krupp cannon and had trained men to serve them under the direction of German superior officers. More than this, an ample supply of munitions was accumulated in Con¬ stantinople, carried thither by means of the railroad through Rumania and Bulgaria. These forts, strongly held and defended, would have to be demolished before the Allied fleet could appear at Constantinople, where, it was be¬ lieved, the terrified Turks would immediately sue for mercy. All this was to happen through

the sole efforts of the navy, without the co¬ operation of even a moderate land force. The scheme seems to have originated with Mr. Winston Churchill, First Lord of the Admiralty, who was sure of its feasibility. It appears, moreover, that no technical navy man ventured to point out how difficult it was to destroy strong and well-defended land batteries with naval artillery.

The attack began on 19 Feb. 1915, and lasted until the middle of April. It falls into three periods : first, the attack on the outer forts, at the entrance of the straits ; second, the attack on the Narrows; and third, the period of desul¬ tory fighting that followed before the attack was renewed as a land attack with naval co¬ operation. During the first phase affairs pro¬ gressed favorably. It was opened 19 February by five British and three French battleships, covered by destroyers, the chief command being with Vice-Admiral Carden assisted by Rear-Admiral Guepratte. After a day's bombardment the Turkish forts' were still firing, but the work ■was renewed on the 25th, after an interval of bad weather. In this day's business the British used the superdreadnought, Queen Elizabeth, just from the hands of the makers, whose eight 15-inch guns made her, with her four com¬ panions of the same class, the most powerful fighting engines on the seas. The result was to prove eventually that she had her limitations when fighting against land defenses. But her service was good on the 25th and at the end of the day the outer defenses of the Dardanelles had been silenced. On the 26th the mine¬ sweepers were sent into the straits and cleared the waters so that several of the attacking ships went in and bombarded the works along the banks and below the Narrows.

To the people at home it seemed that the task of forcing the straits had begun auspiciously; but the main Turkish defenses at the Narrows had not been reached. When the attacking battleships approached this position they were in a restricted channel and not able to lie dis¬ persed as when they were on the .ˆFˆgean. They were also in the current, and thus huddled together invited attack by drifting mines.

On 6 March the approach on the Narrows began, and in five days the fortifications just below them were reduced. On 18 March came the main assault. Sixteen battleships, one of them the Queen Elizabeth, wˆere sent into the straits, and a concentrated fire was poured upon the forts on each side of the position. After an hour and a half these did not return the fire. It was concluded that they were destroyed, and a squadron was ordered forward, when all the forts reopened fire. At the same time it “was discovered that the current was full of drifting mines, loosened by the Turks at this opportune time when they could hardly fail to find victims. First sunk was the French battleship Bouvet. An hour and a half later the British battleship Irresistible was struck by another mine and sank. Later on the Ocean, another British battleship, encountered a mine and sank in a few minutes. At sunset the commanders were forced to admit failure and withdrew from the straits. They did not renew the attempt in the same manner, but for a month kept up desultory attacks on such forts as were within range from the Figean and the lower reaches

of the Dardanelles. The navy had tried its hand and failed because “the task was beyond the power of the navy. The next turn was the army’s.

In the later stages of the fighting at Gallipoli the navy rendered important aid in shelling the shore to protect land operations and in sending submarines into the Sea of Marmora to de¬ moralize the Turkish communications. Of the latter kind of activity were the achievements of the submarines E-11 and E-14, which dived under the Turkish mines and into the Sea of Marmora, sunk three gunboats, three transports and three store ships, and forced the commander of the Turks to bring up his supplies in a roundabout way on the Asiatic side of the straits. An Australian submarine, the AE-2, which attempted a similar work, was sunk in the beginning of the expedition. It was prob¬ ably these things that prompted the Germans to submarine retaliation, and it came with fatal effect. On 12 May a Turkish submarine sank the battleship Goliath. On the 26th a German submarine appeared and sank the British battle¬ ship Triumph, and the Majestic on the following day. Against such an attack the big ships of the navy were powerless, and they were ordered home at once, the Queen Elizabeth going with them. Throughout the summer and autumn the navy stood by the futile expedition guarding supply boats and transports and shelling the enemy on shore in aid of some new attempt to go forward in the hopeless task of advancing on Constantinople. When it was evident that the troops must be

withdrawn the navy fur¬ nished the boats and skilfully handled them; the process of withdrawal being completed with only trivial losses.

The Submarine Campaign. — In the begin¬ ning of the war the submarine was considered mainly an instrument of offense against war¬ ships. It was so used in the war between Japan and Russia in 1904 and in the first months of the war the submarine was generally spoken of in the same way in German discussions. When, however, it became evident that the German navy was to be shut up indefinitely in harbor by the British fleet, the German mind turned to the submarine as a commerce destroyer. It was the one way Germany had of striking back in the war on the sea.

Elsewhere has been related the origin of the controversy between Great Britain and Germany over the extension of the definition of contraband and blockade. On 26 January the German government took over all the corn and flour in the empire, thus making grain a mu¬ nition of war. England began at once to seize it as contraband. Germany hastened to declare that she would not use imported grain for mili¬ tary purposes, but that did not change matters, since imported grain only took the place of domestic grain that went to the army. The next step was a notice from Germany that after 18 Feb. 1915, the waters around the British Isles would be held an area of war in which enemy merchantmen would be destroyed by submarines. It was a recognized rule of international law that a cruiser might sink an enemy merchant vessel if it was impossible to put a prize crew aboard and send her to port, but that in such cases the crew and passengers must be placed in safety. Nothing was said to imply that the

vessel must not be sunk if the crew and passen¬ gers were not saved, since it would always be possible to save them on a cruiser.ˆ As regards the submarine the case was otherwise. It could not take such persons aboard, and in many cases the attack to succeed must be so quick that it would not be safe to wait while boats were being manned. In the absence of any rule on the subject Germany undertook to make her own rule, and it was wholly in her favor. She torpedoed

enemy merchantmen on sight, with¬ out warning or waiting to allow the lowering of boats. Declaring the British ports blockaded by submarines, she claimed the right of sinking neutral ships found in the forbidden waters, without examining their papers to see whither they were bound or what they carried. The submarine was a new instrument in warfare, and it was to be expected that Germany would desire some kind of a modification of the rules of naval warfare in regard to its use ; but the position she took transcended the ordinary con¬ cept of blockade as much as it violated the sense of humanity which is fundamental to the prog¬ ress of international law.

In the long war that now' began between the submarine on the one hand and the naval forces of the Entente Powers on the other Germany and Austria scored their best success at sea. They had found a weapon that their enemies had great difficulty in parrying, and they im¬ proved it greatly during the war while they used it most assiduously. It was a difficult warfare to follow, partly because the encounters were isolated and unrelated to one another, and partly because it was the design of each side to keep secret the methods of attack as well as of defense.

Germany's first submarine decree took effect on 18 Feb. 1915. Before that date she had sunk several merchantmen of the Allies, but now sinking became a regular thing. By 31 March she had d'estroyed 28. Since the British Isles produced but a small portion of the food and raw materials they used, it was Germany's pur¬ pose to cut off their commerce and force them to make peace or starve. The small proportion the destroyed ships bore to those that came and went showed how inconsiderable was the strain put upon British industry. On neutrals the effect was more serious, since it was for them a matter of principle. Holland, the Scandi¬ navian countries and Spain bore the affront with as good grace as possible ; for they were too weak to challenge the actions of the great German empire. But all eyes turned to the United States, the one neutral in the world strong enough to dispute Germany's pre¬ tension to modify international law. The action of that power, however, was limited by the conduct of the Entente Allies who had also overstepped law in their blockade, their wide extension of contraband, and their interruption of American trade with the neutrals in northern Europe. Between the two infractions of in¬ ternational law stood the United States. If they declared war on either nation they would by that act become the supporter of the other. It was a difficult choice ; but most Americans felt that if the time came when it must be made the only possible thing would be to oppose the nation that killed American citizens, even women and children, ravaged Belgium, intro¬

duced poison gas in warfare, and stood for the domination of the world by a strong military autocracy. German statesmen took no notice of this feeling. They considered the United States an unwarlike state and a negligible quantity in the war. Meanwhile President Wilson's policy was to avoid war, if possible. Many a time an American President has found himself in such a position as to demand that he exert him.self to hold back the popular feeling for war until the resources of diplomacy are exhausted, and in fulfilling such a duty he has become unpop¬ ular. In the situation before him Mr. Wilson tried to induce Germany to bring her conduct within the international law rule of cruiser warfare.

The attack on the Lusitania, 7 May I9l5, made it hard to restrain public opinion, but the President's course was firm and diplomatic¬ ally courteous. It took three notes to convince the German p-overnment that it must take cog¬ nizance of American public opinion. The first indication of a tendency to yield was late in May, when Berlin gave notice that reparation would be made for the destruction of the Gulflight, an American ship which Germany now admitted was attacked by mistake. Unluckily for her purpose this disclaimer was followed close by the news that the N ehraskan,, another American ship, had been sunk under circum¬ stances equally exasperating, and in respect to this affair Germany was forced to send another apology and offer of reparation. As to. the main point of contention, the destruc¬ tion of Americans aboard the merchant ships of belligerents, she showed no disposition to yield, and on 21 July, President Wilson sent his third Lusitania note insisting that the United States would not yield in any respect the rights of her citizens to travel under the pro¬ tection of international law and declaring that the repetition of such acts as occurred in the sinking of the Lusitania w'ould be held as ^'^deliberately unfriendly.® On 19 August the British liner, Arabic, was sunk by a submarine under conditions similar to those of the tragedy of 7 May. The American press flamed forth, demanding instant action. Before official cog¬ nizance could be taken Germany requested the President to wait for official investigation, and on 1 September she submitted the information that before the Arabic was destroyed she had instructed her submarine commanders to sink no liners ^^without warning and without safety of the lives of noncombatants, provided that the liners do not try to escape or offer resist¬ ance.® She thus seemed to yield all that was asked, and the situation assumed to be easy. For some time after this it seemed that she intended to use submarines in accord with the rules of cruiser warfare, but on 24 March 1916, came the news that the British cross¬

channel steamer, Sussex, had been torpedoed by a submarine with the resulting death of sev¬ eral American citizens. After a brief corre¬ spondence the American government demanded the assurance that liners and freighters should no longer be sunk without warning and without regard to the safety of persons on board, threatening to sever diplomatic intercourse if the assurance was not given. Next day (19 April) President Wilson laid the matter before Congress in a candid speech which was generally

approved. Germany was now face to face with an ultimatum. She decided to yield, and in a note of 4 May 1916, gave definite assurances that merchant ships were to. be dealt with under the rules of international law and not ^^sunk without warning and without saving human lives unless these ships attempt to escape or offer resistance.^^ She added, however, the statement that she ex¬ pected the United States to induce Great Britain also to observe the rules of international law, which led Secretary Lansing to reply that the United States could not admit that the rights of her citizens were held conditionally. Here the controversy rested until the end of January 1917. In the interval a few ships were sunk in apparent violation of the promise of 4 May, but there were usually some extenuating cir¬ cumstances, and it was generally accepted that Germany was trying in good faith to live up to her word.

Behind the events just described was a con¬ troversy within German governmental circles. Adrniral von Tirpitz, head of the naval adminis¬ tration, belongd to the German school which held that all means of distressing the enemy are justifiable. He favored relentless submarine warfare from the beginning. Chancellor von Bethmann-Hollweg took the diplomatist's point of view. B was his to make diplomacy success¬ ful, and he was in conflict with the military authorities in regard to submarine warfare. On 16 March 1916, von Tirpitz resigned and was succeeded by Admiral von Capelle. Then came an outburst of popular indignation ; for the sub¬ marine policy was approved by the masses of Germans, who wished to strike Britain in any way possible. The

political part of the govern¬ ment had the support of the kaiser for the time being and had its way in the end.

By the end of the year, however, it was evident that Germany was not winning the war and the military party became more than ever insistent on the unrestricted use of submarines. So great was the protest that the statesmen could not withstand it, and on 31 Jan. 1917, the German government announced the immediate resumption of unrestricted warfare. The com¬ munication awakened a storm of protest in the United States and left that nation no choice between war and inglorious submission. Ger¬ many was prepared for the declaration of war that came on 6 April. She did not believe the United States would be a serious factor in the fighting and she believed that the gain from the destruction of Britain's commerce would m.ore than offset the military damage America could inflict on Germany. Happily in each respect she was to find herself mistaken.

The year following 1 Feb. 1917, was the year of supreme test for the submarine. During the period of restricted use the Germans had been actively engaged in improving this type of craft, making it larger and capable of wider cruising radius and heavier armaments. When the war began it was believed that a submarine's cruising range was little more than 300 miles. In February 1915, German submarines were working in the Irish Sea, 1,000 miles from Kiel, and three months later they were in the Mediterranean, 2,500 miles from their bases. In the latter achievement it was believed that they were aided in their progress by supply ships dis¬ guised as neutral traders. In July 1916, the

world had a still more striking demonstration of the development of the submarine, when the Deutschland, a submarine of commerce, reached Baltimore, Md., a distance of more than 4,000 miles from Hamburg. On 7 Oct. 1916, the Ger¬ man U-53 arrived at N'ewport, R. I., remained in port a few hours, and sailed for home without taking in supplies, loitering two days near Nan¬ tucket where she sunk eight vessels, two of them neutrals. When unrestricted warfare began in February 1917, the best German U-boats had an operating radius of 10,000 miles, a surface speed of 25 miles an hour, and carried six-inch guns with a range of 6,000 yards. It is probable that the possession of these improved vessels served to whet the desire for unrestricted use of them. So confident were the defenders of the policy that they promised the people that three months of it would see the British on their knees suing for peace. How near they came to making good their

threat the allied public did not know until the war ended. Admiral Sims is authority for the statement that in April 1917, when he arrived in England to represent the United States in naval matters, the sinking reached nearly 900,000 tons a month, which was three or four times the amount announced officially. At that time and until the end of the war the earnest efforts of Britain, the United States and France were concentrated in combatting the activities of sub¬ marines.

The means employed for this purpose were such as experience dictated. By carefully stretching nets across the British Channel that means of exit had been closed. Steps were now taken to establish a mine barrage from Scotland to the coast of Norway, consisting of a line of several mines one above another. It was a gigantic undertaking but was accom¬ plished. largely through the efforts of American naval engineers. To combat the submarine itself depth bombs were used. When these powerful explosives went off near a submerged U-boat the concussion was likely to damage the delicate m.echanism of the boat or crush its thin sides. From June 1917 to November 1918, more than 2,000,000 United States troops were carried across the Atlantic to the battlefields of France, despite the submarines. Careful convoying kept them safe. In general the same thing was true of the vast supply service that supported these troops in France, and of the regular trade with Great Britain and France. In the beginning of the war the British did not use the convoy method, partly because of the demand it made on the navy for destroyers, which were needed in other capacities, partly because it was a slow system of moving ships, and partly, per¬ haps, of an inherent British unwillingness to admit that they were forced to extreme meas¬ ures by their enemies. Mflien the American navy became available the convoy system became more feasible than when it depended on the navy of the Allied powers, already fully em¬ ployed in guarding the ports in which the Ger¬ man and Austrian fleets were shut up. The construction of destroyers also promoted the use of convoys.

The most considerable event in connection with the warfare against the submarines was the attack on the submarine bases at Zeebrugge and Ostend, on the Belgian Coast. These two ports not only harbored the submarines that went out

to the southern coasts of England but a large number of destroyers and light cruisers that were accustomed to raid the fishing fleet and otherwise disturb Allied shipping in the North Sea. If these bases could be closed the de¬ stroyers set to watch them could be used against submarines on the ocean lanes and the mine fields in the North Sea could be extended so that the region would be free from the craft of the enemy. The ports were well fortified and defended by mine fields, but a plan was made to enter them and block their channels and its execution was entrusted to Rear-Admiral Keyes, who had seen good service at the Dar¬ danelles. It involved the sinking at night of ships laden with concrete in the narrow channels. It was believed that once they were sunk the shifting sands of the coast would accumulate around them and make obstructions not easily removed.

The assembled expedition consisted of five old cruisers to serve as block-ships, a small fighting cruiser, the Vindictive, for attack in the harbor, two ferryboats, and a number of destroyers and motor launches. It sailed for the Belgian Coast on 22 April 1918, its move¬ ment timed to arrive at Zeebrugge by midnight. At sea the flotilla divided, three block-ships going to Zeebrugge and twm going to Ostend. At the latter place the project was simply to take the two vessels into the harbor as far as possible and sink them. At Zeebrugge the work was more difficult ; for there was no harbor proper at this place. The canal from Bruges here^ reaches the sea and to protect it from shifting sand a mole 54 metres wide and more than a mile long was thrown out in front of its mouth. On the mole was a garrison of 1,000 men well supplied with machine guns and small artillery. The plan was to attack the mole from the outer side in order to draw the attention of the defense, while the block-ships passed around its end into the harbor and thence into the canal. An old submarine was filled with explosives and sent forward against a portion of the mole near the shore where it became a viaduct in order to allow the wash of the tides underneath. The object was to explode her when she was in position, destroy the viaduct, and thus isolate the garrison on the end of the mole. Motor launches and de¬ stroyers were to make smoke screens behind which the vessels were to operate. The expe¬ dition was timed to arrive at midnight and to finish its work by 1:30 a.m., for the shore batteries had a range of 16 miles and the vessels should be out of their reach when dawn appeared about 3 o’clock.

As the expedition neared Zeebrugge the smoke screen was liberated

and the northeast wind carried it toward the shore. Monitors began to shell the shore works, as they had often shelled them before. The garrison, con¬ trary to expectations, deserted their posts on the mole and sought cover on the shore. Then the wind shifted and the line of approaching ships was revealed to the Germans, who sent up star shells and opened a terrific fire. But the Vindictive continued her course and laid her nose alongside the outer wall of the mole, being held in position by one of the ferryboats on the other side. Bluejackets leaped on the mole and despite the hail of shell that swept it ad¬ vanced toward the shore, finding no one before

them. Meanwhile the old submarine had been steered straight for the viaduct. A mass of German soldiers waited on it, seeming to think she wished to surrender. Her commander drove her between the piles of the viaduct, pressed the button that ignited the fuses, and jumped into a boat with his men and escaped. A minute later she blew up with a great column of flame that made a yawning breach in the viaduct and carried to their deaths the unfortunates who were upon it.

While these things happened the three block-ships reached the inner harbor and steered for the mouth of the canal. One of them fouled her propeller in some harbor nets, drifted toward the shore and was sunk by the batteries. The other two entered the canal and were sunk in positions slanting across it effectively barring its passage. The crews of these ships escaped to the destroyers for the most part. This done the signal for re-embarkation was given, when those on the mole who still survived went aboard the Vindictive and the ferryboats, and the flotilla steamed away as rapidly as possible. Many a brave man was slain, but the survivors reached England in a burst of glory. The deed they did was in keeping with the achievements of Drake and Sir Richard Grenville. It raised the navy, in the minds of Englishmen, from the monotony of machine-like routine to the dash¬ ing adventures of the days of chivalry.

The portion of the expedition that had gone to Ostend did not have the same good luck. Discovered before they entered the outer harbor they became targets for a fierce bombardment and the vessels sank before they found the entrance to the inner harbor. The attempt was renewed on 9-10 May and with better success. The Vindictive, scarred in the first fight, was taken with great boldness into the harbor and sunk in a position that blocked the channel for all but small ships. The expeditions against Zeebrugge and Ostend did not end the warfare of the submarine, but materially restricted it. The Germans made efforts

to remove the block-ships, but Allied aircraft visited the spots con¬ stantly, dropping bombs, driving away the work¬ ing parties and damaging the repair apparatus.

All the time the steady work of snaring the submarine went on. Each month the shipyards turned out more destroyers and the munitions works more and more effective depth bombs. The mines grew more powerful and more nu¬ merous, so that the barrages were larger and deeper. To get a submarine out of the bases on the German Coast now took the work of mine¬ sweepers for eight or nine days. Their trips became more infrequent because of this delay. At the same time the number that fell victims to the destroyers increased, though it was never as large as the public thought. As the process of destruction advanced the trained officers were killed, the sailors began to protest against the service, ana the U-boats that got out to sea showed more timidity about attacking, all of v/hich lessened the efficiency of the service. V\ˆhen the submarines were called in by the German admiralty late in October 1918, they came willingly, flying white flags in their jour¬ neys across the North Sea. When the war was over there was much curiosity among the Allies to see how many would be surrendered. The terms of the armistice demanded that Ger¬ many give up all she had. On 20 November

she sent a first instalment of 20 vessels to the designated rendezvous off Harwich, where tliey were handed over in grim silence. Later on it was found that she had an additional 102 com¬ pleted and 170 uncompleted submarines in her territorial waters, and these also were sur¬ rendered. It was estimated that she lost 216 during the war. Thus passed out of her hands the most successful weapon she used in her naval war. She had built a great navy and trained many sailors to serve it well, and she had used the submarine so skilfully that her conquerors were aghast and did not dare leave in her hands so deadly an implement of destruc¬ tion.

Bibliography.-— For the general story of naval operations in the war consult Buchan, John, ˆNelson’s History of the Warˆ (24 vols.. New

York and London 1915-19) in which the operations at sea are treated fully, but the author shows less detachment in these chapters than elsewhere in the book ; consult also Bassett, John S., ˆOur War with Germanyˆ (New York 1919) ; Jellicoe, Viscount John R., <The Grand Fleet, 1914-1916ˆ (New York and London 1919) ; Pollen, Arthur H., ˆThe Navy in Battleˆ (London 1919), a technical discussion of the British naval policy during the war; Hurd, Archibald S., ˆThe British Fleet in the Great War> (New York and London 1918), also technical ; Hurd, Archibald S., and Bashford, H. H., ˆHeroic Record of the British Navy: a short history of the naval war, 1914-1918ˆ (Garden City 1919), a popular narrative ; Dixon, William M., ˆThe British Navy at Warˆ (Bos¬ ton 1917), brief popular description of the navy at war; Gill, C. C., ˆ Naval Power in the War, 1914—1918ˆ (New York 1918), by an officer of the United States navy: discusses the main phases of the naval war with ability, but has little to say that is informing on the part taken by the United States; Newboldt, Sir Henry J., ˆSubmarine and Anti-Submarineˆ (New York and London 1919) ; Frost, Wesley, ˆGerman Submarine Warfareˆ (New York 1918), claims to rely solely on evidence gathered at the American consulate at Queenstown ; Kaufman, R. W., ˆOur Navy at Workˆ (In¬ dianapolis 1918), on life and experiences in the American navy; Cornford, Leslie C., ˆThe Merchant Seaman in Warˆ (New York 1918) ; Lauriat, Charles E., Jr., ˆThe Lusitania's Last Voyageˆ (Boston 1915) ; Kipling, Rudyard, ˆSea Warfareˆ (Garden City and London 1917) ; and Miicke, Hellmuth von, ˆThe Em-den'* trans. by White, H. S. (Boston 1917), Captain Miicke's story of his experiences on the Eniden and after she was destroyed.

John Spencer Bassett, Professor of History, Smith College.

12. AERIAL OPERATIONS. The his¬ tory of what was accomplished by American aviators in the last months of the World War contributes a glorious chapter to the annals of the army. It must, however, be admitted that the credit belongs to the aviators and the race which produced such splendid youth full of the intelligence, courage and hardihood de¬ manded by this branch of the seryice. The ˆˆArmyˆˆ as a parent body can claim little credit for the work that was done between August and November 1918. French and British Allies supplied both the materiel and the training without which our most brilliant flyers must

have remained on the ground. From 1908 to 1916 aviation in the United States army re¬ ceived little assistance from the general staff. In April 1917, the United States had two avia¬ tion fields and 55

airplanes. The National Advisory Comrnittee on Aeronautics having ac¬ quired a scientific knowledge of some of the air problems declared 51 of these machines to be obsolete and the other four obsolescent. In the spring of 1917 when the United States entered the World War that great conflict had been in progress some 32 months. It is humiliating to American pride to admit that our professional military establishment appears to have learned almost nothing from the con¬ flict abroad that could be made use of when America joined the Allies in April 1917. The army possessed a general staff and under the direction of that corps of selected experts the service schools were teaching officers the tac¬ tics and strategy of the Civil War. The artil¬ lery branch of the service believed its three-inch field piece to be equal to any light artillery weapon ever invented. The potential value of tanks had been demonstrated by an officer of the National Guard more than a dozen years before, but the value of the model then built was recognized by France and ignored at home. The Wright Brothers had been experimenting with heavier-than-air flying machines for a long time but the United States army had less than 100 qualified flyers when war was de¬ clared. It is doubtful whether there was any¬ one in the military establishment who realized that not one of these flyers was competent to meet in an air duel a war-trained pilot. An aviator able to fly a plane would have been an easy victim, of an opponent skilled in the tactics of air fighting which required an ability to execute a variety of manoeuvres which were quite unknown in the United States. Air fighting had made more progress between 1914 and 1917 than any other technical service.

At the outbreak of the war the chief use of aeroplanes was in reconnoitring enemy posi¬ tions and correcting artillery ranges. Some raids were made and some explosives dropped but little more than moral effect was expected from these exploits. But by the time the United States entered the war a much wider program had been evolved for the air forces. Great air snuadrons operated in offensive undertakings with well-planned technique. It was a common practice of the enemy to set an aerial trap by dispatching at a comparatively low altitude several large slow machines such as were used for photographing or bombing which offered an inviting target for Allied attack. When half a dozen Allied planes flew to the apparently easy conquest of an incau¬ tious enemy they were liable to fall victims to an unexpected assault by very fast enemy Fokkers which had been flying much higher and waiting for the opportunity to dive down and deliver a raking fire from' the rear upon (he unsuspecting Allied squadron. The plain flying man would have been the most helpless of victims in such a combat. Only the skilled fighter could hope to

convert defeat into vic¬ tory by the instant execution of the ˆGenverse-menU and a ®zoomˆˆ which would put him on the enemy tail and in possession of all the ad¬ vantage of position which a few seconds be¬ fore had threatened death and destruction.

Not only were these manoeuvres of air fighting unknown in the United States in 1917 but that country had no machines which would have admitted of their execution. Vrilles, Piques and Virages demanded not only skilled pilots and dependable motors but a strength of structure and materials beyond anything we possessed. Even the French Nieuport, a fight¬ ing plane much favored before the Spad was developed, often stripped her wings and crashed under the sudden strain of some of these terrific demands.

Prior to the entrance of the United States into the war nothing was scarcer in America than the truth. Every Allied effort was her¬ alded as a ˆˆgreat advance® or a most ˆskilful strategic retirement.® Each German attack was widely proclaimed as the Huns' last ex¬ piring effort.

Amid all the misinformation published, the news as to aerial conditions was perhaps the most misleading. In the early summer of 1918 the writer crawled into a listening post in front of Bethincourt and was asked by an in¬ telligent American infantryman a question that might have been asked by millions of puzzled Americans if they had been situated where the truth was apparent. The soldier said, ˆMajor, can you tell me what is the matter with Uncle Sam? I got a two months' old newspaper in the mail from home, and it says the Allies are masters of the air. This morning the Huns came across and shot down three French ar¬ tillery balloons back of this sector and a few days ago I saw them shoot down four bal¬ loons, and they went back safe and sound. Down in the State I come from, folks all thought that some clever Yankees would in¬ vent new things that would wind up this war quick and easy, almost as soon as we got started. We've been in the war 16 months now and we can see for ourselves that the papers are just fooling the folks at home.® That boy was one of the

thousands who gave their lives two months later to win the victory that came to valor if not to genius.

Between May and November 1918 American squadrons trained and equipped by the French came rapidly into the fighting area, where for daring and ability they had no superiors. The American Air Force at the front in¬ creased from three squadrons in April 1918 to 45 squadrons in November 1918. When the armistice was signed these squadrons had an equipment of 740 planes. Altogether 2,698 planes were sent to the zone of the advance for American use, and of these 667 were of American manufacture. Of these 2,698 planes dispatched to the front only 1,162 remained when the armistice was signed.

At that time we had at the front 20 pursuit squadrons, 18 observation squadrons and seven bombing squadrons with 1,238 flying officers. There were also 23 balloon companies. The first American flyers were the Lafayette Escadrille, an organization of Americans serving in the French army who were transferred to the American service in December 1917.

The most successful American squadron was the 94th pursuit squadron (the ˆ‘Hat in the Ring Squadron®) which was the first to go over the enemy’s lines — the first to destroy an enemy machine — and which shot down the last

German aeroplane which fell in the war. This squadron boasted eight aces, including Capt. Edward V. Rickenbacker, its commander, American ˆˆAce of Aces.® Frank Luke, who was killed after 18 victories in six weeks and Ham¬ ilton Coolidge, a brilliant pilot, killed by a German shell, which having missed a bombing plane at which it was aimed, struck his fast¬ flying Spad by accident square under the cen¬ tre of the engine. Douglas Campbell of the 94th was the first simon-pure American ace, having entered the war with the Americans and earned all his victories in that service. He had scored seven victories before being badly wounded. Maj. Raoul Lufbery, with 18 vic¬ tories to his credit, 17 of which were scored while he was with the Lafayette Escadrille, v/as killed when he leaped from a burning Spad fired by a flaming bullet from an enemy Albatross which he was attacking near Nancy.

Quentin Roosevelt was a pilot in the 95th squadron and had been made a flight comman¬ der shortly before he was killed in a disastrous battle with the most famous of all German squadrons,

Baron von Richtofen's ˆFlying Cir¬ cus.® This enemy unit equipped with red-nosed Fokker planes was manned by the most ex¬ pert airmen in the German service. Familiar with every trick of aerial combat and flying machines capable of great speed, fast climbing ability and extreme flexibility of movement the Flying Circus was for a long time the terror of the skies from Flanders to Verdun. The Loezer Circus was another celebrated German air squadron.

It was the chief glory of the American air service to have finally conquered these most dangerous opponents who represented the ut¬ most in skill, daring and equipment evolved bˆ' Germany during the war. A brief description of a battle fought on the afternoon of 10 Oct. 1918 over Dun-sur-Meuse may serve as an ex¬ ample of how these dangerous enemies were finally vanquished. The 94th squadron had been ordered to destroy two enemy balloons, one at Dun-sur-Meuse and the other at Aincreville. On this mission 14 Spads of the 94th squadron flew toward the German lines with eight planes from the 147th squadron covering the right flank and seven planes from the 27th squadron protecting the left. It was known that along this front north of the Verdun-Argonne sector the Germans had concentrated their best air units including the red-nosed von Richtofen Circus, the yellow-bellied fusi-lages of the Loezer Circus and the checker¬ board insignia of the No. 3 Jagstaffel. The Germans also had on this front the new scout machine — the Sieman-Schuckard — ˆ driven by a four-bladed propeller and capable of a much faster climb than even the French Spad. This ability to climb fast is a tremendous advantage, as it enables a skilful tactician to gain the ceib ing, i.e., secure an overhead position from which to fire or dive upon his opponent. Some new Fokker planes were equipped with four instead of two machine guns and, therefore, were capable of projecting a perfect shower of bullets upon an opponent. Captain Ricken¬ backer commanding the 94th squadron assigned to Lieiitenants Coolidge and Chambers the task of setting fire to the balloons and directed all of the participants in the surprise raid to

assemble in formations as arranged at 3,000 feet above Montfaucon at 3:40 (15:40 French time) o clock. With the two balloon Strafers in the lead the entire force were to fly toward the Dim-sur-Meuse gas bag, intent upon protecting Coolidge and Chambers from German air forces certain to fly to the defense of their balloons, especially as the afternoon was clear. The en¬ suing battle is of special interest because the secret intelligence reports conveyed the informa¬ tion that the enemy had gathered here the strongest air force ever concentrated since the beginning of the war.

The American raiders turned from the ren¬ dezvous over Montfaucon toward their first objective with the commander flying his Spad several thousand feet above the flotilla to watch its progress.

Over the lines they were welcomed by a tre¬ mendous outburst of ^^archies^^ which, however, failed to injure any of the Americans. Inside German territory the Dun balloon was in sight andˆ presently 11 Fokkers were observed flying to its defense from the direction of Stenay. Presently eight more could be seen coming up from Metz and it was evident that although the whole German front was falling back their methods of interior communication were still most effleient. The 147 th squadron under Lieut. Wilbur White of New York was at this time separated from the rest of the Americans by nearly a mile and von Richthofen's men passed under the American commander as they drove on to attack the dislocated unit. Having allowed them to pass, Rickenbacker banked sharply and gaining speed as he came down from the ceiling promptly secured a position close on the tail 'of the last of the Fokkers. His first stream of shots set fire to the Ger¬ man's fuel tank and the next moment the Ger¬ man aviator leaped from the blazing machine, and due to his equipment with an umbrella parachute settled to safety within his own lines. A similar device might have saved many an American aviator from the torture of roasting to death in a falling plane on fire. The Ameri¬ can ace immediately ®zoomed^^ up to regain the advantage of the ceiling and by that time a regular battle was being fought by the remain¬ ing 10 Fokkers and the eight Spads of the 147th squadron. The German leader selected the rear Spad for his own attack, and to protect his comrade Lieutenant White ^^zoomed^^ up and with a renversement rushed to the rescue of the apparently doomed American. White was one of the bravest as well as most skilful of the American airmen and as he completed his manoeuvre he made a direct plunge upon the German. Without firing a shot White rammed the Fokker head-on while the two machines were approaching each other at tremendous speed and the mingled debris fell in a heap on the banks of the Meuse far below. By an act of unsurpassed heroism the American com¬

mander had saved the life of his subordinate, sacrificed himself and destroyed an enemy. The German squadron having seen their leader killed by this extraordinary attack abandoned the fight. Meanwhile the German balloon com¬ pany had succeeded in pulling to earth their huge balloon, but Lieutenant Brotherton of the 147th squadron piqtied upon it through a storm of projectiles until a ˆTaming onion® set fire

to his wings and he fell into the German posi¬ tion. At the same moment two Fokkers suc¬ ceeded in manoeuvring into a position on the tail of the Bpad flown by one of the most fa¬ mous of the American air fighters, Lieut. James Meissner. This American ace was saved by the prompt attack of Captain Ricken¬ backer, whose accurate shooting destroyed one ot the Fokkers and drove the other off. Lieu¬ tenants Coolidge and Chambers, although failing to get the balloon, each shot down a Fok¬ ker, so that on that afternoon the famous 94th squadron added four victims to their score, all from the elite of the German air service.

This battle occurring as it did as part of the Meuse-Argonne offensive, the greatest battle ever fought by American troops, clearly dem¬ onstrated the quality of the brave Allied air¬ men who had fought and died to hold the en¬ emy in check until Americans could be trained and equipped to take up and help complete the task. German airmen were dangerously efficient.

Our brave boys inherited the splendid tra¬ ditions of both the French and British air services. They knew the story of that great Frenchman, Lieut. George Guynemer, who met his glorious death on 11 Sept. 1917 while en¬ gaging five German Albatross machines in a battle where 40 German planes were up under the direct command of von Richthofen. At the time of his death Guynemer had accounted for S3 enemies, of whom 25 had been shot down by the end of 1916 and the other 28 in a little more than eight months of 1917.

Among the stories of British air heroes they remembered that of Lieut. R. A. J. Warneford, V.C., who was killed so long ago as 17 June 1915, 10 days after he had destroyed a great German Zeppelin raider near London. It would be a cheap folly to attempt to belittle either the skill or the courage of the German flying serv¬ ice, which against the best efforts of French, British, Belgian, Russian, Italian and American airmen maintained a hard struggle for the mas¬ tery of the air for more than four years. They met unexpected efficiency and strength in

the first days of the war from the few but de¬ voted airmen of Belgium, whose skilful recon¬ naissance did much to rob the early German at¬ tacks of their ^*^surprise® value. Russia, like Germany, had for two years before the war kept strictly secret her aerial development and when the storm broke the tsar's armies were surprisingly well equipped with both men and machines.

The German air service in addition to excel¬ lent mechanical equipment had the advantage of a superior cooperation on the part of other branches of the military service. The British and especially the American airmen have de¬ manded a complete separation from bureau¬ cratic army control. The Americans have been almost a unit in declaring that they were pre¬ vented from becoming a factor in the war un¬ til in France they practically escaped from the paralyzing influence of their own War Depart¬ ment and general staff. It appears to be an undeniable fact that we had never achieved even in the last days of the war any such sys¬ tem of cooperation between our artillery and our air service as that which distinguished the enemy. The German anti-aircraft guns were able by a well-understood system of shell sig-454

nals to warn their airmen while far up in the skies of the approach of an enemy and to indi¬ cate the altitude at which the foe was flying. Two black puffs characteristic of the German archies breaking in front of one of von Richt¬ hofen's men were a notice that the observers on the ground had something to say. If that signal were followed by another puff 2,000 feet higher the German airman knew that an enemy had been detected flying at an altitude 2,000 feet higher than his own level. Thus warned, the man in the Fokker could choose fight or flight while there was still time to make a choice. When the various branches of an army maintain a liason as close and efficient as that, all are glad to belong to the team. Our army theoretically is all one team entirely committed to teamwork, but in the World War the air service at least seemed like a poor relation de¬ pendent entirely upon its own initiative and re¬ sources.

In considering the development of aviation in connection with the war we may begin with the estimate that before the war the warring nations had spent about $100,000,000 on air equipment and

possessed at' the outbreak of hostilities in the aggregate 5,000 aeroplanes and 100 dirigibles. In the autumn of 1914 various European powers sought aeroplanes, and more especially equipment in the American market with the result that by the end of that year the factories were running to capacity.

At that time military opinion maintained that in view of limited production the air ma¬ chines were too valuable to be used in actual fighting and were far more useful for recon¬ naissance and range-finding. A noticeable im¬ provement in the duration of flight indicated in¬ creased control and greater reliability and en¬ durance on the part of the newer models. In 1915 the sales of aeroplanes and parts in the United States were estimated at $5,000,000, and large factories were operating in the United States and Canada, including the Curtiss Com¬ pany in Buffalo; Wright Aeroplane Company, Dayton, Ohio ; Glenn L. Martin Company, Los Angeles, Cal. ; Sturtevant Aeroplane Company of Massachusetts ; Burgess Company, Marble¬ head, Mass. ; Thomas Company, Ithaca, N. Y., besides many smaller concerns.

In the field of war, biplanes and triplanes were being used and military aeroplanes had been so far improved that it was possible for the aviator to take hands and feet from the controls long enough to use a camera, drop a bomb, consult a map or aim and fire a weapon.

Congress in 1915 appropriated the small sum of $300,000 for army aeronautics and al¬ though American factories were producing much aeroplane materiel very little progress was made in developing personnel. In that year air battles began to be fought between squadrons operating as organized units and there were many duels between single oppo¬ nents. The opinion began to gain ground that the best way to dispose of an enemy aeroplane was by attack in the air with another plane. Experience had shown that a machine might be hit by many bullets fired from the ground and yet not disabled. The French organized aero squadrons (escadrilles) with bombing planes, gun planes and chasers. France at that time Avas using Bleriot two-seaters with Gnome motors — Clement-Bayard, Caudron, Henry,

Maurice Farman, Morane-Saulnier and Voisin machines. A political-military scandal had led to an early war prohibition of the use of Blc-riot, Deperdussin, Nieuport and R. E. P. mono¬ planes. Later the Nieuport came into very gen¬ eral use, although its wings proved unreliable when subjected to the terrific strain of piques, vrilles and

other sudden strains which resulted from the new tactics of air fighting.- In 1917 and 1918 American flying cadets were trained largely on Nieuports, and our aviators did their first fighting in these machines. In the sum¬ mer of 1918 they were first equipped with the much superior Spad. •

As early as 1915 the Germans were using huge battle planes equipped with Mercedes en¬ gines and two machine guns. Many of the French and German aeroplanes were armored on the bottom to permit low flying. On 16 Feb. 1915, 40 French and British aeroplanes and seaplanes bombarded the German lines in Bel¬ gium. In August of that year 32 battle planes attacked and bombed German munition fac¬ tories at Saarbriicken and later in the same month 62 Allied planes raided Dellingen.

The year 1916 was notable in military aero¬ nautics for improvements in aeroplane engines b}-ˆ both French and Germans. The Germans improved the Mercedes engine and put the Oberussel nine-cylinder air-cooled rotary motor in their Fokker monoplanes. They also used the Benz motors extensively. France devel¬ oped the Hispano-Suiza which weighed only 2.42 pounds per horsepower. England at that time had 500,000 people employed in the air service including many noncombatants and it was re¬ ported that the British expenditures for the year on the air service reached $250,000,000. in America the Wright-Martin Aircraft Cor¬ poration absorbed the Wright Company, Glenn L. Martin Company, and others. The Curtiss Aeroplane and Motor Corporation had been greatly developed. When the United States War Department in November 1916 called for bids for 148 service twin-motored hydro-aero¬ planes for coast artillery use, 12 manufacturers submitted proposals, offering both biplane and triplane types. The United States export busi¬ ness in heavier-than-air machines for 1916 amounted to somewhat less than $4,500,000. A much applauded event in American avia¬ tion was a successful flight of 12 aeroplanes from Mineola, Long Island, to Princeton, N. J., on the occasion of the Yale-Princeton football game. In December eight aeroplanes flew from _ Hempstead Plains, Long Island, to Philadelphia.

In England as decided a novelty was the new ®Blimp,ˆˆ a combination of dirigible and aeroplane machines. These miniature airships proved very serviceable for scout and patrol duty over the waters of the British Channel vffiere they easily sailed in circles above the fastest transports and hospital ships en route to or from ®Blighty.» The Blimps undoubt¬ edly contributed much to the immunity from subrnarine attack of the ships which ferried armies of men back and forth across the chan¬ nel. Great progress was made by the Germans

with their Zeppelins and when the British were enabled to inspect one of those giant raiders, the L-33, forced to earth in England, indications were found that this machine had been devel¬ oped to a point which would make possible a

non-stop flight of at least 1,500 miles at 60 miles an hour or better with favoring winds.

In 1916 the Germans made more than 30 air raids on England, destroyed considerable prop¬ erty and killed or injured several hundred peo¬ ple. Thirteen Zeppelins were destroyed.

Formidable fleets of gigantic aeroplanes carrying many tons of high explosives rained destruction on lines of communication and cen¬ tres of supply far back of the entrenched fronts. Valuable progress was made in the art of photographing the trench areas.

In 1918 the aerial operations of both sides reflected the intensity of effort characteristic of the climax of the World War.

Both London and Paris suffered severely in air raids, although improved aerial defense systems devised for the protection of both capi¬ tals succeeded in destroying a number of the raiding machines.

British aviators raided and bombed German positions in Belgium and German Lorraine, in¬ cluding Mannheim, Treves, Saarbriicken and Thionville. They also bombed Mainz, Stutt¬ gart, Cologne, Coblenz, Freiburg, Zweibrucken and Kaiserlauten, causing fires and explosions in munition plants and motor-works. In a sec¬ ond raid on Saarbriicken in May five German planes were shot down. British naval airmen frequently raided Bruges, Ostend and Zeebrugge, dropping tons of explosives. During the war the air raids on England caused the death of 1,570 people and the injury of 3,941. One hundred and ten raids were carried out by airships and aeroplanes.

In 1917 and 1918 great progress had been made in both construction

and skill in handling aeroplanes in war. Speed, manoeuvring ability and armament had been so far developed that the smaller scouting and fighting machines attained a velocity of 150 miles per hour. The German Gotha biplane and the British Handley-Page biplane carried several men, several guns and from one to two tons of explosives. The Italian Caproni triplane carried three tons pi bombs. German baUle planes were armed with guns which used four kinds of bullets — ordi¬ nary, perforating, incendiary and explosive.

On 24 July 1917 President Wilson signed an aeronautical appropriation bill amounting to $640,000,000. During the year specifications for aircraft construction and materials were formu¬ lated by the International Aircraft Standard Board of the Advisory Commission of the Council of National Defense.

The various American manufacturers com¬ bined in an organization called the Manufac¬ turers Aircraft Association, Incorporated. The Aircraft Board was established.

The protection afforded to rnilitary ineffi¬ ciency by the military censorship practically eliminated criticism of conditions abroad by labchng as a traitorous pro-German any writer who might try to communicate undesired facts. Nevertheless in the spring of 1918 the American public was rudely awakened from the dream that all was well by news which man¬ aged to reach home, largely because of the critical situation which developed when the re¬ inforced German attacks so nearly drove a wedge between the British and the French. The news was that American armies at last arriving in great strength were proceeding to

the firing-line deficient in aircraft. After the rosy, boastful announcements issued in 1917 from government sources Congress w'as shocked to learn that the American aviators in France lacked aircraft, both for training and for fight¬ ing. Orr 21 May 1918 a reorganization was ef¬ fected of the air service previously under the Signal Corps of the army. The public in gen¬ eral was both uneasy and resentful and the President requested former Justice Charles E. Hughes to conduct an investigation. The charges were that early in the year $691,851,- 866.47, appropriated by Congress for the fiscal year ending 30 June 1918, had been expended with practically no results. It was alleged that rnembers of the Aircraft Board had been finan¬ cially interested in contracts. German and dis¬ loyal influences had retarded work. Graft had been permitted. On 25 Oct. 1918 the Hughes

report was submitted and showed that investiga¬ tions had been conducted in most of the larger plants having government contracts. Nearly 300 witnesses had been examined and 17,000 pages of testimony taken.

The report showed that of the $691,851,- 866.47 appropriated the actual amount dis¬ bursed for aviation purposes up to 30 Sept. 1918 was $139,186,661.33, subject to a consider¬ able reduction for salvage.

Responsibility for inefficiency and delay in organization and work was placed upon re¬ sponsible officers in the Signal Corps and Jus¬ tice Hughes pointed out that the provisions of the criminal statutes do not reach inefficiency.

The investigation as to personal interests disclosed reprehensible conditions exposed at great length and it was recommended that offi¬ cers found to have had -transactions in behalf of the government with corporations in whose profits they had an interest should be prose¬ cuted under the Criminal Code. Subsequently it was announced that as no benefit had been gained by the relations found to exist between the officials and the contractors the officers criti¬ cised in the report, Lieut.-Col. G. W. Mixter and Lieutenant-Colonel Vincent were pardoned by the President prior to any prosecution.

The aircraft program delay was attributed to the reason that plans adopted had failed, but the subsequent appointment of civilians J. D. Ryan and W. C. Porter to take charge of air¬ craft production led to better organization and progress. In the selection of contractors and distribution of work, methods had been so poor that one part of the government program im¬ peded another.

The report discussed misleading public statements made by official authority, but arrived at no definite conclusion. Causes of delay were attributed largely to lack of knowledge and capacity in the Signal Corps. Con¬ tractors' profits were discussed and the employ¬ ment of German sympathizers was regarded as unavoidable because of great scarcity of skilled labor.

Equipment of the army was reported as fol¬ lows. The American Expeditionary Force be¬ tween 12 Sept. 1917 and 16 Nov. 1918, had re¬ ceived from all sources :

Pursuit Planes For Service 3,337

Observation Planes “ “ 3,421

Day Bombing Planes “ “ 421

Night Rcconnaissaince “ 31

For Schools

it ii

u it

90

664

85

456

WAR, EUROPEAN — AERIAL OPERATIONS (12)

Among other planes received were 2,285 training planes, 30 experimental planes and 108 miscellaneous, making a total of 10,472.

Eight different schools under American con¬ trol had been established in France and desig¬ nated for training 3,800 officers and 11,700 men.

At Tours-Observers

At St. Jean de Monte-Aerial Gunners

At Souge - Artillery Firing Point

At Coettquidan - Artillery Firing Point

At Macon - Artillery Firing Point

At Chatillon - sur - Seine-Observers

916 Officers 2,121 Soldiers

,175

U

6,100

U

120

a

600

1

92

M

1,500

u

159

U

750

u

25

u

120

u

20

u

no

i(

204

u

333

a

The Liberty engine intimately connected with the effort to develop efficient aeroplanes in the United States was developed in 1917 and put in quantity production in 1918. By autumn of the latter year the monthly output had reached 3,878 motors by the various factories engaged in its manufacture. By the time various dif¬ ficulties and defects had been overcome and remedied this engine in its final 12-cylinder type combined high power with lightness and reliability.

Two months after the armistice was signed the War Department anounced that the Loening two-seater monoplane in recent tests at Dayton, Ohio, had developed a speed of 145 miles an hour with a full military load including four guns. In these tests the Loening plane carrying two passengers climbed 25,000 feet. This monoplane is American designed and American built. It is driven by an eight-cylinder 300-horsepower Hispano-Suiza engine and carries fuel for three and one-half hours' flight. In September 1919 Maj. R. W. Schroe-der at Dayton, Ohio, climbed 31,800 feet in 68 mJnutes in a Le Pere biplane. In connection with the general discussion of the scandals cov¬ ered by the Hughes report it may be as well to refer here to the controversies regarding the air service in the United States army which were widely discussed in Congress and elsewhere through the latter part of 1919 after the return of the expeditionary forces from abroad. Under the leadership of Maj. (formerly Brig.- Gen.) B. D. Foulois, chief of air service, Amer¬ ican Expeditionary Forces, the airmen seemed to be unanimous in demanding the consolidation of every aircraft activity now in existence in the United States under one central department of government and under one responsible head. This proposition for the creation of a Depart¬ ment of Aeronautics met strong opposition from the War Department which showed a determina¬ tion to retain active control of all military organizations.

The airmen point to the woeful record of War Department control from 1908 to 1918. The military aviator is the only soldier re¬ quired to risk his life in the pursuit of peace time duties and therefore demands such control of equipment and organization as will reduce to a minimum the risk of life and limb. He asks that those who control his destiny shall be devoted solely to the task of making the air service as safe and efficient as the nature of the work will admit.

The statistical summary of the war with Germany published in 1919 by the general staff

says that the expenditures for the air service up to 30 April 1919 amounted to $859,291,000 — 6 per cent of army war expenditure. In No¬ vember 1919 Major Foulois published a state¬ ment that if the United States were called upon to fit out an expedition ˆ for service in Mexico it would take at least six months or a year to equip efficiently such an expedition with up-to-date aircraft.

As these two statements, one by the general staff as to expenditures and the other by the late chief of air service in France as to post¬ war conditions, may both be assumed to be correct, it would appear needful that some competent authority should tell why, immedi¬ ately after spending $859,291,000, the country has nothing to show for it except a dozen aviation fields and the memory of a great corps of trained airmen disbanded and lost.

This situation is important because all mili¬ tary authorities predict that future wars will be fought out increasingly in the air. For the first time in England's history her fleet was unable to protect English homes from enemy attack in this war. It is certain that even an ocean will not suffice to protect the American seaboard cities from aerial attack in future wars. Control of the air is the only sure safe¬ guard.

Statistics of the Air Services. Balloons. — Before the armistice, America produced 642 observation balloons and received 20 from the French. Forty-three of our balloons had been destroyed and 45 given to the French and British. At the end of the war we had remain¬ ing 574 balloons. At that time the Belgian army had six, British 43, French 72, and the Germans 170 on the Western Front. Thus the American army had at the end of the war nearly twice as many observation balloons as the enemy and the Allies combined had at the front.

Air Squadrons, — ■ In addition to purely American operations two full squadrons were attached to the British Royal Air Force in March and June 1918 and remaining with the British throughout the war participated in the following engagements : Picardy Drive, Ypres, Noyon-Montdidier, Viellers, Bray-Rosieres- Roye, Arras, Bapaume, Canal du Nord, and Camhrai.

Strictly American operations began in the middle of March 1918, when an American pursuit squadron using French Nieuport planes took up patrol duties on the front from Villeneuve-les-Vertus.

By May several squadrons representing all types of serviceˆ pursuit,

observation, bomb¬ ing — were in active service using foreign-built planes.

In November there were 45 American squad¬ rons on duty at the front with 740 planes. Of the total number of planes (2,698) sent for American use to the zone of advance only 667 or one-quarter were of American make. Of the 2,031 planes from foreign sources nine-tenths were French.

The planes sent to the zone of the advance were about two-thirds of the service planes re¬ ceived by the American Expeditionary Forces. The other one-third were used in back areas. The American Air Service bore a prominent part in the three major American operations of the war.

WAR, EUROPEAN — AERIAL OPERATIONS (12)

Chateau-Thierry (July 1918).— The Ger¬ mans at the start had a decided superiority in the air, but the American squadrons, com¬ prising four pursuit, three observation and two balloon companies, rendered valuable service. Contact was established with German airmen three to 10 miles within the enemy lines and photographs were taken showing the entire front as well as the deep rear terrain. The German concentration for the attack of 15 July was reported in detail including the location of the German reserves. The Allied concentration for the counterattack was so well covered that the enemy was surprised.

Saint Mihiel (September 1918). — In this operation the American first army was aided and protected by the largest concentration of air force ever made, of whom about one-third were American and the other two-thirds were French, British and Italian squadrons operating under American control.

The American air force consisted of 12 pur¬ suit squadrons, 12 observation and three bomb¬ ing squadrons with 15 balloon companies. American service planes recorded 4,000 flying hours during the week of the Saint Mihiel offensive.

Enemy back areas were kept under bom¬ bardment day and night. Their reserves and ammunition dumps were located for American long range artillery. Propaganda was dropped. Photographic records were made showing every movement in the enemy lines and of his re¬ serves, and the finished photographs showing these movements were frequently delivered to headquarters within half an hour of the occur¬ rence. Fast pursuit planes armed with machine guns flew low over the German lines firing directly into their infantry. The fog lying low in the Meuse valley compelled the day bombers and the artillery observers to fly very low.

Meuse-Argonne (September to November 1918). — In this great final battle of the war the Germans had effected a very thorough dis¬ tribution of strong air forces along the southern sector of the front and it was not possible to effect against them so heavy a concentration as that made at Saint Mihiel. Less assistance was rendered by French and British airmen but the American force was considerably larger.

During the six weeks' struggle heavy losses W'ere suffered but replacements were brought forward so promptly that in the final stage of the conflict the available American strength was greater than at the start.

Summary. — When the United States entered the war the Allies furnished the designs of their planes and between that time and the end of the war supplied us with 3,800 service planes. Aviation training schools in the United States graduated 8,602 from elementary courses and 4,028 from advanced courses. More than 5,000 pilots and observers were sent overseas.

The total personnel of the air service, officers, students and enlisted men increased from 1,200 at the outbreak of the war to nearly 200,000 at the close. Up to 30 Nov. 1918 more than 8,000 training planes were made in the L'nited States. Three thousand two hundred twenty-seven De Haviland Four observation and Day bombing planes were completed and 1,885 shipped overseas. Thirteen thousand five hun¬ dred seventy-four Liberty engines were com¬ pleted and 4,435 shipped to the American Ex¬

peditionary Forces and 1,025 delivered to the Allies.

In November 1918 Germany's air force con¬ sisted of nearly 2,700 machines divided as follows: bombing machines, 200; for infantry

liason, 250; reconnaissance and artillery ob¬ servation, 1,100; fighting, 1,100.

American Air Casualties. — Revised figures issued by the United States War Department show that the American flying forces at the front sustained 583 casualties during the war. The figures show the number of casualties among the aviators in each branch of the air service and also among American flyers serving with the Allied armies. The figures include the killed and injured in flying accidents at the aerodromes in the zone of advance. The casu¬ alties were distributed as follows :

American Armies Number cent

Pursuit pilots . 184 31

Observers . 150 26

Observation pilots . 105 18

Bombing pilots . 43 8

Balloon flyers . 4 1

Total with A. E. F . 491 84

With British . 64 11

With French . 25 4

With Italian . 3 1

Total . 583

Of the 583 casualties 36 per cent consisted of deaths in combat, while 11 per cent occurred at aerodromes. The record in this respect follows :

Per

Number cent

Killed in combat . 208 36

Prisoners . 145 25

Wounded in action . 132 22

Killed in action . 41 7

Missing in action . 29 5

Injured in accident . 25 4

Interned . 3 D

Total . 583

French Air Casualties. — ’The total casu¬ alties to pilots, observers and gunners killed, wounded, taken prisoners and missing amounted to 7,555, 63 per cent., out of a total of 12,000 pilots, observers and gunners.

List of Aces. United States. — An official re¬ port by the War Department showed there were 63 ®Aces® — men downing five or more enemy machines — in the American army when the war ended.

American Aces

Captain Edward V. Rickenbacker, of Columbus, Ohio premier “Ace ” of the American air force, 26 victories.

First Lieutenant Frank Luke, Jr., of Phoenix, Ariz., who was killed in action, was second on the list of “Aces ” with 18 victories.

Maior Victor Raoul Lufbery, of Wallingford, Conn., who was also killed in action, was third with 17 victories.

Captain Reed G. Landis, of Chicago, and First Lieutenant David E. Putnam, of Brookline, Mass., who was killed in

action, had 12 victories each.

Lieutenant Fields Kinley, Gravette, Ark… 10

Lieutenant G. A. Vaughn, Jr., No. 441 Washington

avenue, Brooklyn . 10

Lieutenant J. M. Swaab, Philadelphia . 10

Lieutenant Thomas G. Cassady . 8

Lieutenant C. E. Wright, Cambridge, Mass . 9

Lieutenant W. P. Erwin, Chicago . 9

Captain E. W. Springs, Lancaster, Pa . 9

Lieutenant H. R. Clay, Jr., Ft. Worth … 8

Major James A. Meissner, No. 45 Lenox road,

Brooklyn . 8

Captain Hamilton Coolidge, killed, Boston . 8

Captain G. F. Lamer, Washington . 8

Lieutenant P. F, Baer, Ft. Wayne, Ind . 8

Lieutenant F. O. D. Hunter, Savannah . 8

Lieutenant W. W. White, deceased. No. 541 Lexing¬ ton avenue. New York . 8

American Aces — Continued

Lieutenant C. Jones, San Francisco . 8

Captain R. M. Chambers, Memphis . 7

Lieutenant Harvey Cook, Toledo . 7

First Lieutenant Lansing C, Holden, No. 103 Park

avenue. New York . 7

First Lieutenant Karl Harold J. Schoen, deceased,

Indianapolis . 7

First Lieutenant Wendel A. Robertson, Fort Smith,

Ark . 7

First Lieutenant Leslie J. Rummell, No, 798 South

11th street, Newark . 7

Lieutenant L. A. Hamilton, deceased, Burlington,

Vt., or Pittsfield, Mass . 7

Lieutenant J. O. Creech, Washington . 6

Second Lieutenant Howard Burdick, No. 175

Remsen street, Brooklyn, N. Y . 6

Lieutenant C. L. Bissel, Kane, Pa . 6

Major Harold E. Hartney, Saskatoon, Canada …. 6

Captain Douglas Campbell, Mount Hamilton, Cal . . 6

Captain J. C. Vasconcelles, Denver . 6

Captain Edgar Tobin, San Antonio . 6

Lieutenant E. P. Curtis, Rochester . 6

Lieutenant Sumner Sewell . 6

Lieutenant R. A. O'Neill, Nogales, Ariz . 6

Lieutenant Donald Hudson, Kansas City, Mo …. 6

Lieutenant M. K. Guthrie, Mobile . 6

Lieutenant W. H. Stovall . 6

Lieutenant J. D. Deane, missing in action. Concord,

Mass . 6

Lieutenant A. R. Brooks, Framingham, Mass . 6

Lieutenant R. O. Lindsay, Madison, N. C . 6

Lieutenant M. Stenseth, Twin Valley, Minn . 6

Lieutenant F. K. Hays, Chicago . 6

Lieutenant H. C. Klotts, no address . 5

Lieutenant-Colonel W. Thaw, Pittsburgh . 5

Major D. M. Peterson, Honesdale, Pa . 5

Captain H. R. Buckley, Agawam, Mass . 5

Major C. J. Biddle, Philadelphia . 5

Lieutenant J. Knowles, Cambridge, Mass . 5

Lieutenant J. A, Healey, No. 361 Union street,

Jersey City . ‘ . 5

Lieutenant Innis Potter . 5

Lieutenant F. M. Symonds, No. 20 West Eighth

street, New York . 5

Lieutenant G. W. Furlow, Manchester, Minn…. 5

Lieutenant A. E. Eusterbrook, Fort Flagler, Wash. . 5

Lieutenant B. Baucom, Milford, Tex . 5

Lieutenant Harold McArthur . 5

Lieutenant J. S. Owens, Baltimore . 5

Lieutenant J. E. Wehner, deceased. No. 124 East

28th street. New York . 5

Lieutenant J. J. Scenley, Chicago . 5

Lieutenant E. M. Haight, Astoria, N. Y . 5

Lieutenant H. H. George, Niagara Falls . 5

French Acest

Name

Lieutenant Fonck .

♦Captain Guynemer .

Lieutenant Nungesser .

Captain Madon .

♦Sub-Lieutenant Boyau .

♦Sub-Lieutenant Coiffard … Sub-Lieutenant Bourjade …

Captain Pinsard .

♦Sub-Lieutenant Dorme … .

♦Lieutenant Guerin .

Sub-Lieutenant Haegelen … Sub-Lieutenant Marinovitch

Captain Heurtaux .

Captain Duellin .

Captain de Slade .

Adjutant Ehrlich .

Lieutenant de Romanet .

♦Lieutenant Chaput .

Captain d'Argueeff .

Captain de Turenne .

Lieutenant Sardier .

Sub-Lieutenant Ambrogi …. ♦Sub-Lieutenant Demeuldre.

Adjutant Garaud .

Sub-Lieutenant Nogues .

♦Sub-Lieutenant Navarre…

Sub-Lieutenant Jailler .

Lieutenant Hughes .

Captain Leds .

Sub-Lieutenant Tarascon…

Captain de Sevin .

Sub-Lieutenant Daladier… . Sub-Lieutenant Casale .

Aeroplanes

and

balloons

75

53

43

41

35

34

28

27

23

23

22

22

21

20

19

19

18

16

15

15

14

14

13

13

13

12

12

12

12

12

12

12

12

French Aces — Continued

Aeroplanes

and

Name balloons

Adjutant Artigault . 12

Sub-Lieutenant Guyon . 12

♦Adjutant Lenoir . 11

♦Adjutant Montrion . 11

Sub-Lieutenant Herisson . 11

Lieutenant Ortoli . 11

Adjutant Berthelot . ‘… . 11

Sub-Lieutenant Maunoury . 11

Sub-Lieutenant Nuville . 11

Sub-Lieutenant Bouyer . 11

Lieutenant Bozon-Verduraz . 11

♦Sub-Lieutenant Quette . 10

Sub-Lieu tenant Herbelin . . 10

Sub-Lieutenant Waddingto’n . 10

Captain Lahoulle . 10

Adjutant Mace . 10

Adjutant Pezon . 10

♦Captain Matton . 9

♦Captain de la Tour… 9

Sub-Lieutenant Condemine . 9

Adjutant Chainat . 9

Adjutant Douchy . ‘ . 9

Sub-Lieutenant Dorme . 9

Sub-Lieutenant Gros . 9

Sub-Lieutenant Coadou . 9

Sub-Lieutenant Dousinelle . 9

♦Sergeant Gerard . 8

♦Adjutant Gasser (ampute) . . 8

♦Sub-Lieutenant Sauvage . 8

♦Sub-Lieutenant de Guingand . 8

♦Adjutant Chef Lapaasse . 8

Sub-Lieutenant Vial . 8

Adjutant Pillon . 8

Adjutant Chavannes . 8

Adjutant Barbreau . 8

Adjutant Vitalis . 8

Sub-Lieutenant Viallet . 8

Sub-Lieutenant Coste . 8

Lieutenant Bonneton . 8

Lieutenant Poupon . 8

Sub-Lieutenant Martenot de Cordoux . 8

Commandant Massenent de Maroncourt . 8

Adjutant Bizot . 8

Marechal des Logis Moissinac . • 7

♦Sub-Lieutenant de Rochefort . 7

♦Adjutant Petit . 7

♦Captain Doumer . ˆ

♦Captain Auger . 7

♦Sergeant Bosson . 7

Sub-Lieutenant Languedoc . 7

♦Sub-Lieutenant de Mortemart . 7

♦Captain Derode . 7

♦Lieutenant Marty . 7

Captain Echard . 7

Sub-Lieutenant Flachaire . 7

Sub-Lieutenant Bretillon . 7

Sub-Lieutenant Sayaret . 7

Lieutenant Lachmann . 7

Adjutant Perronneau . 7

Marechal des Logis Santelli . 7

Commandant Vuillemin . 7

Sub-Lieutenant Pendaries . 7

Sub-Lieutenant Thomas . 7

Lieutenant Le Coq de Kerland . 7

Adjutant Delzennes . 7

Sub-Lieutenant Loste . 7

♦Captain Raymond . 5

♦Adjutant Delage . 5

♦Sub-Lieutenant Covin . 5

♦Sub-Lieutenant Pegoud . 5

Sub-Lieutenant de Bonnefoy . 5

Sub-Lieutenant Fraissinet . 5

Sub-Lieutenant Soulier . 5

Sergeant du Bois D'Aische . 5

Marechal des Logis Rousseau . 5

Adjutant Blanc . 5

Sub-Lieutenant de Marmier . 5

Sub-Lieutenant Condouret . g

Sub-Lieutenant de Cazenove . 5

Sub-Lieutenant de Pradine . 5

Marechal des Logis Dubonnet . 5

Dr. Camplan .

Lieutenant Battesti .

Captain Gastin .

Captain Lefebvre .

Adjutant Regnier .

Sub-Lieutenant Delannoy

Captain Mezergues .

Lieutenant Romatet .

Private Martin .

♦ Deceased.

t Official list supplied by the French embassy.

* Deceased.

French Aces — Continued

Aeroplanes

balloons

*Sub-Lieutenant Delorme . 5

*Sub-Lieutenant Hasdenteufel . 5

*Sub-Lieutenant Cordonnier . 5

♦Marechal des Logis Hauss . .!!!!.!!.. 5

♦Adjutant Petit Delchet . i 5

♦Adjutant Lobert . 5

♦Captain Lecour-Grandmaison . 5

Sub-Lieutenant Bloch . 5

Sub-Lieutenant Borzecky . 5

Adjutant Chef Costes . 5

Adjutant Hamot . 5

Lieutenant de Bonald . 5

Lieutenant de Boigne . 5

Lieutenant Cassady . 5

Sub-Lieutenant Plessis . 5

Sub-Lieutenant Barbaza . 5

Adjutant Caillau . 5

Lieutenant Favre de Thierrens . 5

Sub-Lieutenant Portron . 5

Captain Sabattier . 5

Lieutenant Leroy . 5

Adjutant Naudin . 5

Sub-Lieutenant Guertiau . 5

Marechal des Logis de Gaillard . 5

Sub-Lieutenant Guiguet . 5

Adjutant de Gennes . 5

Lieutenant Homo . 5

Adjutant Henriot . 5

Adjutant Rousselle . 5

Sub-Lieutenant Gaudernien . 5

Adjutant Lienhart . 5

Captain Malavialle . 5

Adjutant Buisson . 5

Sub-Lieutenant Wertheimer . 5

Sub-Lieutenant Risacher . 5

Lieutenant Cayol . 5

Sub-Lieutenant Regnier . 5

English Aces

♦Captain Mannock . 73

Major Bishop . 72

Major Collishaw . 51

♦Captain Little . 47

Captain MacElroy . 46

♦Captain Ball . 44

Captain MacLahen . 43

♦Captain MacCudden . 44

Captain Fullard . 42

♦Major Stanley Dallas . 39

Captain Beauchamp-Proctor . 38

Major Barker . 33

Captain Gilmour . 31

Captain Hazel! . 30

Lieutenant Claxton . 30

Lieutenant Lionel B. Jones . 28

tCaptain Woollett . 28

Captain Jordan . 25

Lieutenant MacCall . 21

Lieutenant Cobby . 21

Lieutenant MacEwen . 20

Lieutenant Harrisson . 20

Lieutenant MacClaugary . 19

Captain Burden . 17

Lieutenant Falkenberg . 15

Lieutenant Highwood . 14

Captain Mellings . 13

Lieutenant Baldwin . ‘ 13

Lieutenant Ross . 12

Lieutenant Lale . 12

Lieutenant Reed . 11

Lieutenant Hubbard . 10

Captain Whistler . 10

* Deceased

t Downed 13 in one day.

The above’list of British Aces is incomplete. It is under¬ stood that the Official Air Record while in transit from Field Headquarters in France to the War office in London was destroyed by enemy action at sea. Efforts to reconstruct the record from accounts of survivors, field reports, etc., will probably never adequately replace the records destroyed.

German Aces.

The Berliner Zeitung a?n Mittag on 24 April 1918 stated that of the 41 German aviators who had shot down 15 or more opponents from the beginning of the war up to that date 19 had been killed in action and two had been reported missing. The list of the fallen aces with year

of their death and the number of their victims follows :

Captain von Richthofen (d. 1918) . 80

Lieutenant Boss (d. 1917) . 50

Captain Boelcke (d. 1916) . 40

Lieutenant Gontermann (d. 1917) . 39

Lieutenant Max Mueller (d. 1918) . 38

Lieutenant Kurt Wolff (d. 1917) . 34

Lieutenant Schaefer (d. 1917) . 30

Lieutenant Allmenroeder (d. 1917) . 30

First Lieutenant von Tutschek (d. 1918) . 27

Lieutenant Boehme (d. 1917) . 24

First Lieutenant Bethge (d. i918) . 20

Lieutenant von Eschwege (d. 1917) . 20

Lieutenant Frankl (d. 1917) . 19

Lieutenant Wintgens (d. 1916) . 18

Lieutenant Baldamus (d. 1917) . 18

Lieutenant Hess (d. 1917) . 17

First Lieutenant Immelmann (d. 1916) . IS

Lieutenant Dossenbach (d. 1917) . 15

Lieutenant Schneider (d. 1917) . 15

Lieutenant Menckoff (captured October 1918 by

Lieutenant Avery, 95th Squadron) . 37

The two aviators reported missing were:

Lieutenant von Buelow . 28

First Lieutenant Dostler . 26

In March 1918 Germany claimed 102 aviators each of whom had shot down more than seven aeroplanes or. balloons in battle, and that the total number of their victims up to May 1918 was 1,698. In the same period 43 of these aces had been killed and three were missing. Several others had been disabled and retired from the air service.

Edwin W. Dayton, Major, Infantry, R. L.

13. THE ARMISTICES. Bulgaria.— Bul¬ garia was the first of the Central Powers to con¬ fess her complete war exhaustion. Her surˆ render to the Entente was the first of the clos¬ ing scenes of the end of the World War. Gen. Franchet d'Esperey in command of French, British, Italian, Greek, Serbian and Slavic forces carried out a brilliant offensive in the fall of 1918, opening the road to Sofia. The Bulgarians sued for a separate armistice and one containing terms of unconditional sur¬ render was granted on 30 Sept. 1918, when fighting ceased.

The armistice terms, all of which were of a purely military nature, were substantially as follows :

Bulgaria to evacuate all Allied territory, de¬ mobilize her army as rapidly as possible ; all rolling stock and other means of transport to be turned over to the Allies.

The Allies to be allowed to pass through Bulgaria if necessary to future military opera¬ tions.

Control of the Danube and Bulgarian mer¬ chant marine on that waterway to be given to the Allies.

All important strategic points to be occu¬ pied by the Allies if they wished.

In case part of Bulgaria is occupied this to be done by French, English and Italian troops. Parts of Greece and Serbia evacuated by the Bulgars to be occupied by Greek and Serbian forces respectively.

The armistice to continue in operation until the conclusion of a general peace. See The Peace Treaties in this series.

Turkey. — Turkey was the next power of the Central Alliance to surrender to the Allies. Her army was routed in Palestine by Allenby. Aleppo, the main base of supplies, fell late in October and utter route and disaster faced Turkish arms. On 14 Oct. 1918 the Spanish

Ambassador at Washington, D. C., presented to Secretary of State Robert Lansing a note from the Turkish charge d'affaires at Madrid, asking the President of the United States to initiate immediately negotiations for an armistice. In the note the Turkish government declared that it ^^accepts as a basis for the negotiations the program laid down by the President of the United States in his message to Congress of 8 Jan. 1918, and in his subsequent declarations, especially the speech of 27 September. In order to put an end to the shedding of blood, the Im¬ perial Ottoman Government requests that steps be taken for the immediate conclusion of a gen¬ eral armistice on land, on sea, and in the air.^^ The Turks sent General Townshend, the British general captured at Kut-el-Amara early in the war, to Vice-Admiral Cathorp, Allied com¬ mander of the iEgean fleet, to ask for terms. Accredited agents were sent by both sides to the island of Lemnos and after a discussion, lasting three days, the te.rms of an armistice were handed to the Turks. The latter accepted these terms on 30 Oct. 1918 and. the armistice went into effect the next day. The terms were as follows :

Terms of Armistice Granted to Turkey by THE Entente.

The terms of the Allies' armistice to Turkey, as given out at London i Nov. 1918 were as follows:

I. The opening of the Dardanelles and the Bos¬ porus and the access to the Black Sea. Allied occu¬ pation of the Dardanelles and Bosporus forts.

II. The positions of all mine fields, torpedo tubes and other obstructions in Turkish waters are to be indicated and assistance given to sweep or remove them, as may be required.

III. All available information concerning mines in the Black Sea is to be communicated.

IV. All Allied prisoners of war and Armenian in¬ terned persons and

prisoners are to be in Constantinople and handed over unconditionally to the Allies.

V. Immediate demobilization of the Turkisli army, except such troops as are required for surveillance on the frontiers and for the maintenance of internal order. The number of effectives and their disposition to be determined later by the Allies after consulta¬ tion with the Turkish government.

VI. The surrender of all war vessels in Turkish waters or waters occupied by Turkey. These ships will be interned in such Turkish port or ports as may be directed, except such small vessels as are required for police and similar purposes in Turkish territorial waters.

VII. The Allies to have the right to occupy any strategic points in the event of any situation arising which threatens the security of the Allies.

VIII. Free use by Allied ships of all ports and anchorages now in Turkish occupation and denial of their use by the enemy. Similar conditions are to apply to Turkish mercantile shipping in Turkish waters for the purpose of trade and the demobilization of the army.

IX. Allied occupation of the Taurus tunnel system.

X. Immediate withdrawal of Turkish troops from northern Persia to behind the pre-war frontier already has been ordered and will be carried out.

XI. A part of Transcaucasia already has been ordered to be evacuated by Turkish troops. The re¬ mainder to be evacuated if required by the Allies after they have studied the situation.

XII. Wireless, telegraph and cable stations to be controlled by the Allies. Turkish government messages to be excepted.

XIII. Prohibition against the destruction of any naval, military or commercial material.

XIV. Facilities are to be given for the purchase of coal, oil, fuel and naval material from Turkish sources after the requirements of the country have been met. None of the above materials are to be exported.

XV. The surrender of lall Turkish officers in Tripolitania and Cyrenaica to the nearest Italian garrison. Turkey agrees to stop supplies and

communication with these officers if they do not obey the order to surrender.

XVI. The surrender of all garrisons in Hedjaz, /\ssir, Yemen, Syria and Mesopotamia to the nearest Allied commander, and withdrawal of Turkish troops

from Galicia, except those necessary to maintain order, as will be determined under Clause 6.

XVII. The use of all ships and repair facilities at all Turkish ports and arsenals.

XVIII. The surrender of all ports occupied in Tripolitania and Cyrenaica, including Misurata, to the nearest Allied garrison.

XIX. All Germans and Austrians, naval, military or civilian, to be evacuated within one month from Turkish dominions, and those in remote districts as soon after that time as may be possible.

XX. Compliance with such orders as may be con¬ veyed for the disposal of equipments, arms and am¬ munition, including the transport of that portion of the Turkish army which is demobilized under Clause 5.

XXI. An Allied representative to be attached to the Turkish Ministry of Supplies in order to safeguard Allies' interests, this representative to be furnished with all aid necessary for this purpose.

XXII. Turkish prisoners are to be kept at the dis¬ posal of the Allied Powers. The release of Turkish civilian prisoners and prisoners over military age is to be considered.

XXIII. An obligation on the ˆrt of Turkey to cease all relations with the Central Powers.

XXIV. In case of disorder in the six Armenian villayets the Allies reserve to themselves the right to occupy any part of them.

XXV. Hostilities between the Allies and Turkey shall cease from noon, local time, Thursday, 31 Oct.

1918.

Austria. — With Bulgaria and Turkey out of the war the surrender of Austria was rendered inevitable. In the great Italian drive in October-November 63 Austrian divisions were ex¬ hausted. On 4 Nov. 1918 the war office at Rome reported : ^^The Austro-Hungarian army is de¬ stroyed. It suffered heavy losses in the fierce resistance of the first days of the struggle, and ill pursuit it has lost an immense quantity of material of all kinds, nearly all its stores and depots, and has left in our hands about 300,000 prisoners, with their commands complete, and not less than 5,000 guns.^^

On 29 October Austria-Hungary sent a note to the Secretary of State of the United States requesting an immediate armistice on all fronts and the commencement of peace negotiations, stating: ^immediately after having taken di¬ rection of the Ministry of Foreign Affairs, and after the dispatch of the official answer to your note of 18 Oct. 1918 by which you were able to see that we accept all the points and principles laid down by President Wilson in his various declarations, and arc in complete accord with the efforts of President Wilson to prevent fu¬ ture wars and to create a league of nations, we have taken preparatory measures, in order that Austrians and Hungarians may be able, accord¬ ing to their own desire and without being in any way hindered, to make a decision as to their fu¬ ture organization, and to rule it. Since the ac¬ cession to power of Emperor King Charles his immovable purpose has been to bring an end to the war. More than ever this is the desire of the sovereign of all the Austro-Hungarian peoples, who acknowledge that their future destiny can only be accomplished in a pacific world, by being freed from all disturbances, privations and sor¬ rows of war. This is why I (Count Andrassy, the new Foreign Minister) address you directly, Mr. Secretary of State, praying that you will have the goodness to intervene with the Presi¬ dent of the United States in order that in the interest of humanity, as in the interest of all those who live in Austria-Hungary, an im¬ mediate armistice may be concluded on all fronts, and for an overture that immediate ne¬ gotiations for peace will follow.®

In a note explaining to the Austrian people

this plea for peace the Austrian government said :

^^Austria was obliged to conform to the methods of President Wilson, who had succes¬ sively replied to the three members of the Triple Alliance, and act apart from her Allies. The monarchy, which has formally adopted Presi¬ dent Wilson's line of action, shares his opinion, as was shown by the emperor's manifesto to the peoples which, in proclaiming the federalization of the monarchy, exceeded President Wilson's program. Ho\yever, the complete reorgani¬ zation of Austria can only be carried out after an armistice. If Austria-Hungary has declared herself ready to enter into negotiations for an armistice and for peace, without awaiting the result of negotiations with other states, that does not necessarily signify an offer of a sepa¬ rate peace. It means that she is ready to act separately in the interests of the re-establish¬ ment of peace."

On 31 October Austria sued for an armistice at the fighting front. The terms to her came from the headquarters of General Diaz on 1 No¬ vember and were accepted the same day to take effect from 3 p.m. 4 Nov. 1918. These terms were even more severe than those imposed on Turkey. They comprised 18 clauses, divided into military and naval articles as follows :

Terms of Armistice Granted to Austria by

THE Entente.

Military Clauses.

I. The immediate cessation of hostilities by land, by sea, and air.

II. Total demobilization of the AUstro-Hungarian arniy and immediate withdrawal of |all Austro-Hun¬ garian forces operating on the front from the North Sea to Switzerland.

Within Austro-Hungarian territory, limited as in Clause 3, below, there shall only be maintained an organized military force reduced to pre-war effectives.

Half the divisional, corps and army artillery and equipment shall be collected at points to be indicated by the Allies and United States of America for deliv¬ ery to them, beginning with all such material as exists in the territories to be evacuated by the Austro-Hun¬ garian forces.

III. Evacuation of all territories invaded by Austria-Hungary since the beginning of the war.

Withdrawal within such periods as shall be deter¬ mined by the Commander-in-Chief of the Allied forces on each front of the Austro-Hungarian armies behind a line fixed as follows: From Pic Umbrail to the north of the Steivio it will follow the crest of the Rhetian Alps up to the sources of the Adige and the Eisach, passing thence by Mounts Reschen ami Brenner and the heights of Oetz and Zoaller. The line thence turns south, crossing Mount Toblach and meeting the present frontier Carnic Alps. It follows this frontier up to Mount Tarvis, and after Mount Tarvis the water¬ shed of the Julian Alps W the Col of Predil, Mount Mangart, the Tricorno (Tergiou), and the watershed of the Cols di Podberdo, Podlanisoam and Idria. From this point the line turns southeast toward^ the Schneeberg, excludes the whole basin of the Save and its tributaries. From Schneeberg it goes down toward the coast in such a way as to include Castua. Mattuglia and Volosca in the evacuated territories. It will also follow the administrative limits of Jhe present province of Dalmatia, including the north Lisarica and Trivania, and to the south territory limited by a line from the (Semigrand) Cape Planca to the summits of the water¬ sheds eastward, so as to include in the evacuated area all the valleys and watercourses flowing toward Sebenico. such as the Cicola, Kerka, Butisnica and their trioutaries. It will also include all the islands in the north and west of Dalmatia from Premuda, Selve, Ulbo, Scherda, Maon, Paga and Puntadura, in the north, up to Meleda, in the south, embracing Santandrea, Busi, Lisa, Lesina^, Tercola, Curzola, Cazza and Lagosta, as well as the neighboring rocks and islets and passages, only excepting the islands of Great and Small Zirona, Bua, Solta and Brazza.

All territory thus evacuated shall be occupied by the forces of the Allies and the United States of America.

All military and railway equipment of all kinds, including coal belonging to or within those territories, to be left in situ and surrendered to the Allies, accord¬ ing to special orders given by the Commander-in-Chief of the forces of thj associated powers on the different fronts. No new destruction, pillage or requisition to be ^o^e by enemy troops in the territories to be evacuated by them and occupied by the forces of the asso¬ ciated powers.

IV . The Allies shall have the right of free move¬ ment over all road

and rail and water ways in Austro-Hungarian territory and of the use of the necessary Austrian and Hungarian means of transportation. The armies of the associated powers shall occupy such strategic points in Austria-Hungary at times as they may deem necessary to enable them to conduct mili¬ tary operations or to maintain order.

They shall have the right to requisition on payment lor the troops of the associated powers wherever they may be,

V* Complete evacuation of all German troops within fifteen days, not only from the Italian and Balkan fronts but from all Austro-Hungarian territory. Internment of all German troops which have not left Austria-Hungary within the date.

VI. The administration of the evacuated territories of Austria-Hungary will be intrusted to the local au¬ thorities, under the control of the Allied and associated armies of occupation.

VII. The immediate repatriation without reciprocity of iill Allied prisoners of war and internal subjects of civil populations evacuated from their homes, on conditions to be laid down by the Commander-in-Chief of the forces of the associated powers on the various fronts. Sick and wounded who dannot be removed from evacuated territory will be cared for by Austro-Hungarian personnel who will be left on the spot with the medical material required.

Naval Conditions.

I. Immediate cessation of all hostilities at sea and definite information to be given as to the location and movements of all Austro-Hungarian ships. Notification to be made to neutrals that freedom of navigation in all territorial waters is given to the naval and mer¬ cantile marine of the Allied land associated powers, all questions of neutrality being waived.

II. Surrender to the Allies (and the United States of fifteen Austro-Hungarian submarines completed between the years 1910 and 1918, and of all German sub¬ marines which are in or may hereafter enter Austro-Hungarian territorial waters. All other Austro-Hun¬ garian submarines to be paid off (and completely dis¬ armed and to remain under the supervision of the Allies and the United States.

III. Surrender to the Allies and the United States with their complete armament and equipment of three battleships, three light cruisers, nine destroyers, twelve torpedo boats, one mine layer, six Danube monitors, to be designated by the Allies and the United States of

America. All other surface warships, including river craft, are to be concentrated in Austro-Hun¬ garian naval bases to be designated by the Allies and the United States^ of America, and are to be paid off land completely disarmed and placed under the super¬ vision of the Allies and the United States of America.

IV. Freedom of navigation to all warships and merchant ships of the Allied and associated powers to be given in the Adriatic and up the River Danube and its tributaries in the territorial waters and terri¬ tory of Austria-Hungary. The Allies and associated powers shall have the right to sweep up all mine fields and obstructions, and the positions of these are to be indicated. In order to insure the freedom of naviga¬ tion on the Danube, the Allies and the United States of America shall be empowered to occupy or to dis¬ mantle all fortifications or defense works.

V. The existing blockade conditions set up by tht Allies and associated powers are to remain unchanged, and all Austro-Hungarian merchant ships found at sea are to remain liable to capture, save exceptions which may be made by a commission nominated by the Allies and the United States of Amerida.

VI. All naval aircraft are to be concentrated and impactionized in Austro-Hungarian bases to be desig¬ nated by the Allies and the United States of America.

VII. Evacuation of all the Italian coasts and of all ports occupied by Austria-Hungary outside their na¬ tional territory and the abandonment of all floating craft, naval materials, equipment and materials for inland navigation of all kinds.

VIII. Occupation by the Allies and the United States of America of the land and sea fortifications and the islands which form the defenses and of the dockyards and arsenal at Pola.

IX. All merchant vessels held by Austria-Hungary belonging to the Allies and associated powers to be returned.

X. No destruction of ships or of materials to be permitted before evacuation, surrender or restoration.

XI. All naval and mercantile marine prisoners of the Allied and associated powers in Austro-Hungarian hands to be returned without reciprocity.

Germany. — Germany, the greatest and most powerful member of the Central Powers, was the last belligerent to lay down her arms on the terms set by the Allied and associated powers. On 5 October negotiations began between the United States and Germany. These negotiations were brought to an end on 5 November when President Wilson informed the German govern¬ ment that Marshal Foch had been authorized by the Allies to open negotiations with the properly accredited representatives of Germany.

On 7 November came the announcement that Germany's representatives had been appointed and were about to start from Spa, Belgium, the location of German general headquarters. On 8 November they received at Marshal Foch's headquarters the terms of an armistice of 35 clauses, the most severe and drastic ever de¬ manded from a great power. After several days of delay and parley the German representa¬ tives accepted the terms and signed the armis¬ tice at 5 A.M. (Paris time) on 11 Nov. 1918.

The terms of the armistice follow :

I. Military Clauses on Western Front.

I. Cessation of operations by land and in the air six hours after the signature of the armistice.

II. Immediate evacuation of invaded countries: Belgium, France, Alsace-Lorraine, Luxemburg, so ordered as to be completed within fourteen days from the signature of the armistice. German troops which

have not left the above-mentioned territories within the period fixed will become .prisoners of war. Occu¬ pation by the Allied and United States forces jointly will keep pace with evacuation in these areas. All

movements of evacuation and occupation will be regu¬ lated in accordance with a note annexed to the stated terms.

III. Repatriation, beginning at once and to be completed within fourteen days, _ of all inhabitants of the countries above enumerated, including hostages and persons under trial or convicted.

IV. Surrender in good condition by the German armies of the following war material: Five thousand guns (2,500 heavy, 2,500 field), 30,000 machine guns, 3,000 minenwerfer, 2,000 airplanes (fighters, bombers — firstly, all of the D. sevens and night bombing machines). The above to be delivered in situ to the Allied and the United States troops in accordance with the detailed conditions laid down in the note (Annexure No. i) drawn up at the moment of the sign¬ ing of the armistice.

V. Evacuation by the German armies of the countries on the left bank of the Rhine. The coun¬ tries on the left bank of the Rhine shall be admin¬ istered by the local troops of occupation under the control ˆ of the Allied and United States armies of occupation. The occupation of these territories will be determined by Allied and United States garrisons holding the principal crossings of the Rhine — Mayence, Coblenz, _ Cologne — together with the bridgeheads at these points of a thirty-kilometer radius on the right bank and by garrisons similarly holding the strategic points of the regions. A neutral zone shall be re¬ served on the right of the Rhine between the stream and a line drawn parallel to the bridgeheads and to the stream and at distance of ten kilometers from the frontier of Holland up to the frontier of Switzerland. The evacuation by the enemy of the Rhine lands (left and right bank) shall be so ordered as to be completed within a further period of sixteen days — in all, thirty-one days after the signing of the armistice. All move¬ ments of evacuation and occupation are regulated by the note (Annexure No. i) drawn up at the moment of the signing of the armistice.

VI. In all territories evacuated by the enemy there shall be no evacuation of inhabitants; no dam-

age or harm shaW be done to the persons or property

tbe inhabitants. No person shall be prosecuted for offenses of participation in war measures prior to the Sluing of the armistice. No destruction of any kind shall be committed. Military establishments of all kinds shall be delivered intact las well as military stores of food, munitions and equipment not removed during the time fixed for evacuation. Stores of food of f I kmds for the civil population, cattle, etc., shall be left in_ situ. Industrial establishments shall not be impaired in any way and their personnel shall not be removed.

VII. Roads and means of communication of every kind, railroads, waterways, main roads, bridges, telegraphs, telephones, shall be in no manner impaired. All civil and military ˆrsonnel at present employed on them shall remain. Five thousand locomotives and 150,000 wagons in good working order with all neces¬ sary spare parts and fittings shall be delivered to the associated powers within the period fixed in an-nexure No. 2 and the total of which shall not exceed 31 days. There shall likewise be delivered 5,000 motor lorries (camion automobiles) in good order within the period of 36 days. The railways of Alsace-Lor¬ raine shall be handed over within the period of 31 days, together with all pre-war personnel and material. Further the material necessary for the working of railways in the countries on the left bank of the Rhine shall be left in situ. All stores of coal land material for the upkeep of permanent wiays, signals and repair shops shall be left in situ. These stores shall be main¬ tained by Germany in so far as concerns the working of the railroads in the countries on the left bank of the Rhine. All barges taken from the Allies shall be restored to them. The note, Annexure No. 2, regu¬ lates the details of these measures.

VIII. The German command shall be responsible for revealing within the period of 48 hours after the signing of the armistice all mines or delay-acting fuses on territory evacuated by the German troops, and shall assist in their discovery and destruction. It also shall reveal all destructive measures that may have been taken (such as poisoning or polluting of springs, wells, etc.) under penalty of reprisals.

IX. The right of requisition shall be exercised by the Allied and the United States armies in all occu¬ pied territories subject to regulation of accounts with those whom it may concern. The upkeep of the

troops of occupation in the Rhineland (excluding Alsace-Lorraine) shall be charged to the German Government.

X. The immediate repatriation, without reciprocity, according to detailed conditions, which shall be fixed, of all Allied and United States prisoners of war, in¬ cluding persons under trial or convicted. The Allied powers and the United States shall be able to dispose of them as they wish. This_ condition annuls the previous conventions on the subject of the exchange of prisoners of war, including the one of July 1918 in course of ratification. However, repatriation of Ger¬ man prisoners of war interned in Holland arid in Switzerland shall continue as before. The repatriation of German prisoners of war shall be regulated at the conclusion of the preliminaries of peace.

XI. Sick and wounded who cannot be removed from evacuated territory will be cared for by German personnel, who will be left on the spot with the medical material required.

II. Disposition Relative to the Eastern Frontiers of Germany.

XII. All German troops at present in the terri¬ tories which belonged to Austria-Hungary, Rumania or Turkey, shall withdraw immediately within the frontiers of Germany as they existed on August i, 1914. All German troops lat present in the territories which before the war belonged to Russia shall likewise withdraw within the frontiers of Germany defined as above as soon as the Allies, taking into account the internal situation of these territories, shall decide that the time for this has come.

XIII. Evacuation by German troops to begin at once, and all German instructors, prisoners, and civilians as well as military agents now on the terri¬ tory of Russia (as defined before 1914) to be recalled.

XIV. German troops to cease lat once all requisi¬ tions and seizures land any other undertaking with a view to obtaining supplies intended for Germany in Rumania and Russia (as defined on August i, 1914).

XV. Renunciation of the treaties of Bucharest and Brest-Litovsk and of the supplementary treaties.

XVT. The Allies shall have free access to the territories evacuated by the Germans on their eastern frontier either through Danzig or by the Vistula in order to convey sunplies to the populations of those territories and for the purpose of maintaining order.

III. Clause Concerning East Africa.

XVII. Evacuation by all German forces operat¬ ing in East Africa within a period to be fixed by the Allies.

IV. General Clauses.

XVIII. Repatriation, without reciprocity, within a maximum period of one month, in (accordance with detailed conditions hereafter to be fixed, of all interned civilians, including hostages under trial or convicted, belonging to the Allied or associated powers other than those enumerated in Article Three, with the reservation that any future claims and demands of the Allies and the United States of America remain unaffected.

XIX. The following financial conditions are re¬ quired: Reparation for damage done. While such

armistice lasts no public securities shall be removed by the enemy which can serve as a pledge to the Allies for the recovery or reparation for war losses. Im¬ mediate restitution of the cash deposit in the National Bank of Belgium, and in general immediate return of all documents, specie, stocks, shares, paper money, together with plant for the issue thereof, touching public or private interests in the invaded countries. Restitution of the Russian and Rumanian gold yielded to Germany or taken by that power. This gold to be delivered in trust to the Allies until the signature of peace.

V. Naval Conditions.

XX. Immediate cessation of all hostilities at sea and definite information to be given as to the location and movements of all German ships. Notification to be given to neutrals that freedom of navigation in all territorial waters is given to the naval and mer¬ cantile marines of the Allied and associated powers, all questions of neutrality being waived.

XXI. All naval and mercantile marine prisoners of the Allied and associated powers in German hands to be returned without reciprocity.

XXII. Surrender to the Allies and the United States of America of all submarines (including sub¬ marine cruisers and all mine-laying submarines) now fisting, with their complete armament and equipment, in ports which shall be specified by the Allies and the United States of Amerida. Those which cannot take the sea shall be

disarmed of the personnel and ma¬ terial and shall remain under the supervision of the Allies and the United States of A_ˆmerica. The sub¬ marines which lare ready for the sea shall be prepared to leave the Germlan ports as soon as orders shall be received by wireless for their voyage to the port desig¬ nated for their delivery and the remainder at the eai-liest possible moment. The conditions of this article shall be carried into effect within the period of 14 days after the signing of the armistice.

XXIII. German surface warships, which shall be designated by the Allies and_ the United States ot America, shall be immediately disarmed and thereafter interned in neutral ports, or for the want of them, in allied ports, to be designated by the Allies and the United States of America. They will there remain under the surveillance of the Allies and the United States of America, only caretakers being left on board. The following warships are designated by the Allies: Six battle cruisers, ten battleships, eight light cruisers, including two mine-layers, fifty destroyers of the most modern type. All other surface warships (including river craft) are to be concentrated in German naval bases to be designated by the Allies and the United States of America, and are to be completely disarmed and placed under the supervision of the Allies and the United States of America. The military armament of lall ships of the auxiliary fleet shall be put on shore. All vessels designated to be interned shall be ready to leave the German ports seven days after the sign¬ ing of the armistice. Directions for the voyage will be given by wireless.

XXIV. The Allies and the United States of America shall have the_ right to sw'eep up all mine fields and obstructions laid by Germany outside German territorial wiaters and the positions of these are to be indicated.

XXV. Freedom of access to and from the Baltic to be given to the naval and mercantile marines of the Allied and associated powers. To secure this the Allies and the United States of America shall be empowered to occupy all German forts, fortifidations, batteries and defense works of all kinds in all the entrances from the Cattegat into the Baltic, and to sweep up all mines and obstructions within and without German territorial waters, without any question of neutrality being raised, and the positions of all such mines (and obstruc¬ tions are to be indicated.

XXVI. The existing blockade conditions set up bv the Allied and associated powers are to remain un¬ changed, and all German merchant ships found at sea

are to reimin liable to capture. The Allies and the United States of America shall give consideration to the provisioning of Germany during the armistice to the extent recognized as necessary.

XXVII. All naval aircraft are to be concentrated and immobilized in German bases to be specified by the Allies and the United States of America.

XXVIII. In evacuating the Belgian coasts and ports, Germany shall abandon in situ all merchant ships, tugs, lighters, cranes and all other harbor materials, all materials for inland navigation, all aircraft apparatus, materials and stores, all arms and armaments, and all stores and apparatus of˜ iall kinds.

XXIX. All Black Sea ports are to be evacuated

by Germany; all˜ Russian war vessels of all descrip¬ tions seized by Germany in the Black .Sea are to be

handed over to the Allies and the United States of

America; all neutral merchant vessels seized are to be

released; all warlike and other materials of all kinds

seized in those ports are to be returned and German materials as specified in Article Twenty-eight are to be abandoned.

XXX. All merchant vessels in Germian hands be¬ longing to the Allied and associated powers are to be restored in ports to be specified by the Allies and the United States of America without reciprocity.

XXXI. No destruction of ships or of materials to be permitted before evacuation, surrender or resto¬ ration.

XXXII. The German government will notify the neutral governments of the world, and particularly the governments of Norway, Sweden, Denmark and Hol¬ land, that all restrictions placed on the trading of their vessels with the Allied and associated countries, whether by the German government or by private Ger¬ man interests, land whether in

return for specific con¬ cessions, such as the export of shipbuilding materials or not, are immediately cancelled.

XXXIII. No transfers of German merchant ship¬ ping of any description to any neutral flag are to take place after signature of the armistice.

VI. Duration of Armistice.

XXXIV. The duration of the armistice is to be thirty days, with option to extend. During this period, if its clauses are not carried into execution, the armis¬ tice may be denounced by one of the contracting par¬ ties which must give warning ^^8 hours in advance. It is understood that the execution of Articles Three and Eighteen shall not warrant the denunciation of the armistice on the ground of insufficient execution within the period fixed except in the case of bad faith in carrying them into execution. In order to assure the execution of this convention under the best conditions the principle of a permanent international armistice commission is admitted. This commission will act under the authority of the Allied military and naval com¬ manders in chief.

VII. The Limit For Reply.

XXXV. This armistice to be accepted or refused by Germany within seventy-two hours of notification.

This armistice has been signed the Eleventh of No¬ vember, Nineteen Eighteen, at 5 o'clock (o. m.) French time.

F. Foch,

R. E. Wemyss, Erzberger,

A. Oberndorff, VViNTERFELDT,

Von Salow.

On 14 December the armistice terms were renewed for the period ending 17 Jan. 1919, during which the conditions that were unful¬ filled were to be completed. To the general terms as given above was added the following provision : ®The Allied High Command re¬

serves the right to begin meanwhile, if it thinks it wise in order to assure new guarantees, to occupy the neutral zone on the right bank of the Rhine to the north of the bridgehead of Cologne, up to the

Dutch frontier. This occupation will be announced by the Allied High Command by giving six days' notice.^^

Meanwhile from 12 November the Inter¬ national Armistice Commission was in daily session at Spa, Belgium, in the former seat of the Great German Headquarters. Representa¬ tives of the United States, Great Britain, France and Germany attended. Maj. Gen Charles D.

Rhodes and staff represented the United States; with Maj. Gen. Sir Richard C. Haking and staff for Great Britain, and General Nudant and staff for France.

The Germans complied to the letter in the surrender of the stipulated war vessels and gave up every submarine, the total number being 122. These vessels were interned at Harwich. Eng¬ land, while the great vessels of war were interned at Scapa Flow. Further drastic con¬ ditions were demanded by the Allies and asso¬ ciated powers in January in renewing the armistice for the month ending 17 Feb. 1919. They included retribution for cruelty by Ger¬ mans to prisoners of war, restoration of ma¬ chinery and goods taken from the invaded por¬ tions of France and Belgium, the placing in a safe place of German gold then stored in Berlin, German ships to be given over to carry food supplies to European countries, and all sub¬ marines on the stocks to be surrendered.

A further revision occurred one month later. The new agreement was signed on 16 Feb. 1919 and provided (1) that Germany must complete the terms of all previous agreements; (2) the armistice can be denounced by one of the con¬ tracting parties on three days' notice; (3) it is renewed for an indefinite period; (4) a large part of Posen is relinquished by Germany to Poland; (5) all offensives against Poland must be abandoned. Further provisions regarded the demobilization and disarmament of German forces, upon completion of which certain fea¬ tures of the blockade wˆould be released. For further details of the armistice period see the Events Subsequent to the Signing of the Armistices immediately following.

14. EVENTS SUBSEQUENT TO THE SIGNING OF THE ARMISTICES. The German Armistice Extended. — When the armistice was signed on 11 Nov. 1918 several things that grew out of the war between the Teutonic Allies and the Entente Allies were unsettled and had to run their course. Most of them were connected in one way or an¬ other

with the sad state of affairs in Russia, while others had to do with the terms of the armistice itself, and still others grew out of the long delay in completing the treaties and get¬ ting them accepted by the nations that were parties to the conflict. It now remains to ex¬ amine these later phases of the war. They should be regarded as the lingering upflaring of the fierce conflagration whose flames had run through hidden piles of national prejudice into the surrounding stubble and threatened at times to bring about renewal of the catas¬ trophe the rest of the world had done so much to suppress. The armistice contained not only certain advanced statements of the terms of peace that were to be incorporated in the treaty and certain acts of submission that Germany was required to make, as the surrender of materials of war and railroad equipment, but it embodied, also, temporary arrangements for the government of occupied regions in Ger¬ many, the distribution of food there, and administrative action in carrying out the vari¬ ous agreements of surrender and reparation. Thus the armistice was to a large extent an ad¬ ministrative instrument ; and its importance may be understood by remembering that under it the international relations of the chief nations

of Europe and America, with the exception of Russia, were carried on for more than a year.

To execute so large and complicated an agreement was not an easy task. In the first place, Germany was suspected of bad faith at every point. She had only herself to blame ; for she had used bad faith as a weapon of war so freely that no one trusted her when she said that she was unable to go further. Was not her republican revolution only a pre¬ tense? Many excellent people thought that German rulers had their people so well in hand that they could have them go through the form of a revolution and then change back to the autocracy at the will of the leaders. Against this widespread distrust the Allied leaders could not appeal to their people with¬ out producing the impression of being too lenient with the enemy, or something still worse. It was also evident that many Ger¬ mans felt they had not been beaten, and it was not desirable from the Allies' point of view to have them continue in that opinion. The best assurance that they did not try the same thing again was to make them feel that it did not pay. How to

carry the situation through successfully from this point of view was most important.

Still more perplexing was the execution of the terms in the armistice which had been adopted as a means of penalizing Germany for her damages to Belgium and France. She had been required to surrender at once 2,500 heavy and 2,500 field guns, 25,000 machine guns, 3,000 minenwerfer, and 1,700 airplanes. This was in the nature of drawing the fangs. She also promised to evacuate France, Belgium, Luxemburg and Alsace-Lorraine at once, to withdraw from the west bank of the Rhine, to place the important military centres of Cologne, Coblenz and Mayence in Allied hands with the region east of the river 30 kilometers from each of these towns. The first came to be occupied by British troops, the second by Americans, and the third by French troops. She was required to hand over in 31 days 5,000 locomotives and 150,000 freight cars in good working order, and 5,000 motor lorries in 36 days. She was to repatriate at once and without reciprocity all prisoners of war and persons taken away from occupied districts to work, she was to withdraw her troops from Rumania, Turkey, Austria-Hungary and Rus¬ sia and she was to renounce the Treaty of Brest-Litovsk and the supplementary treaties. She was required to surrender 10 battleships, six battle cruisers, five light cruisers (including two mine-layers), 50 destroyers of the most modern type, and to surrender within 14 days all her submarines that were ready for sea and the others as soon as possible. There were many other minor conditions looking to the end of the war; but two provisions made it clear that the war was not to be considered as finished. It was declared that the existing blockade of Teutonic countries was not to be relaxed, except as the Allies might determine in order to save life from starvation, and it was agreed that the armistice was to expire in 30 days, that it might be renewed, and that either party could denounce it for non-fulfil¬ ment on giving 48 hours' notice. The general

nature of an armistice is to suspend hostilities, the relative strength of the contestants to be left as it is, while the dinlomats meet to see if a treaty can be made. The armistice of 11 Nov. 1918 went further than this. In demanding the surrender of war materials and the occupation of the west bank of the Rhine it went beyond the ordinary function of creat¬ ing a suspension of hostilities without preju¬ dice to either side. It became a sort of sur¬ render by Germany; for she gave up all

when she gave up her artillery and fleet, and ad¬ mitted the Allies to the east bank of her Rhine River. The armistice did not provide for German demobilization. That was not necessary; for the weary soldiers were going home as fast as they could and the new govern¬ ment was but too glad to reduce an army it could neither pay nor control.

The execution of the armistice was a mili¬ tary matter and fell under the jurisdiction of the Supreme War Council at Versailles, at the head of which was Marshal Foch, who was not disposed to take a sympathetic view of Germany's difficulties. In fact, no Frenchman felt disposed to be generous to a foe who had reduced France to the last stage of exhaustion. Germany was in sore distress, no doubt, but her factories were intact : her population and credit were badly smitten, but so were the population and credit of France. It had been Germany's deliberate purpose in the war to reduce French industry to such a state that it could not recover in time to get into the race before Germany had far outdistanced her. Should this design be allowed to have its sway? France and her Allies now had the whip hand; they would be less than human if they did not use the opportunity to reduce the high-handed German plans. The French people demanded firm assurances against the overtopping in¬ dustrial power of Germany. Thus it happened that when the armistice period of 31 days came to an end there was a demand that it should not be renewed on the same terms. But good feeling predominated and the terms were not changed materially when the period was ex¬ tended to 17 Jan. 1919.

By the end of another month, however, the dissastisfaction in France was greater and the Germans were forced to agree to hand over to France 58,000 agricultural machines of various kinds and to allow the Allies to hold that part of the fortress of Strassburg that lies on the east bank of the Rhine with the adjacent territory. In discussing these matters Erzberger, the head of the German commissioners, demanded of the Allied commissioners that a preliminary treaty should be made out and sub¬ mitted to his country, which, he said, had de¬ manded such a treaty six times already. The request was not granted and the German com¬ missioners returned to Berlin feeling that new demands, they knew not how severe, might be made on them when the next day of renewal arrived on 17 February.

By this time the position of France in the negotiations was well defined. She looked for protection against future attacks by Germany; for with the time-honored Franco-Russian alliance gone, she naturally desired protection against a foe in whom was great power of

recuperation. She also was keen for getting as

reparation every possible concession out of Germany. The reply to her demand was that if German industry was prostrated to benefit French industry Germany could not be ex¬ pected to make reparation for the damages done. Perhaps in the French demand there was a disposition to render German industry so weak that it would no longer be a formid¬ able competitor of French industry; and the French demand that the Saar coal fields be given to France and the Silesian fields to Poland seemed to support such a theorv. To the American and British delegates this went be¬ yond the principle of a just peace, and they began to act together for restraining France. The agreement of 17 January just mentioned was allowed by them, partly because it seemed wise to satisfy the demand of the French farmers for machinery with which to begin their spring work, and partly because it seemed but a good precaution that if France held Strassburg west of the Rhine the opposite region should be clear of German soldiers. Be¬ yond this they were unwilling to go at that time.

It was evident that as long as the armistice was in the hands of military men it would tend to become more severe. Marshal Foch was a stern commander and looked chiefly to military ends. Matters came to a crisis when on 8 February in a meeting of the Supreme Military Council, President Wilson moved the creation of a Supreme Economic Council to deal with the purely economic matters affecting the rela¬ tions of the Entente and Teutonic Allies, the council to contain not more than five members from each of the interested states. The sug¬ gestion had the approval of the British and not being opposed by the other delegates it was adopted. The Supreme Military Council also voted to add two economic experts to the permanent commission which had the super¬ vision of the execution of the armistice. At a conference held on the same day and at the same place it was agreed that 4,000,000 tons of German merchant ships, -passenger and freight, should be placed at the disposal of the Allies under a commission headed by E. N. Hurley to carry home American and Australian troops and to take food back to Europe. This was in accordance with the feature of the armistice by which the Allies undertook to send food into Germany, if it was found to be needed there. Allied experts had

been through Ger¬ many by this time and reported that while there was sufficient food in the areas behind the for¬ mer German army, there was great want in the interior, where the inhabitants showed the ef¬ fects of the blockade very plainly.

The proposition to allow the German ships to take food to Europe brought up the ques¬ tion of payment. It was the purpose of the Allies to allow the Germans to buy food in Allied markets. But where were they to get the money for payment? The thrifty French saw at once that to pay money for food would be to reduce the funds that could be used im¬ mediately for reparation purposes, and they ob¬ jected to such proceedings. At this time the American Congress was considering a bill to make available a fund of $100,000,000 to fur¬ nish food to the European countries that needed it. It was supposed at first that a part of the fund could be used to aid the Germans and

Austrians, but an amendment was added pro¬ viding that none of the money appropriated should be used in aiding the enemies of the Linked States. This halted the negotiations where they were, the Germans steadfastly re¬ fusing to hand over their ships until they were assured they would return to them with food.

While this matter was being debated the time approached for another renewal of the armistice. It came just when the Peace Con¬ ference was becoming most keenly aroused over the question of reparations and the de¬ militarization of the Rhine Valley. Marshal Foch, backed by an overwhelming French sen¬ timent, held out on one side, and President Wilson, with the support of Lloyd George, stood on the other. The French press was bit¬ ter against President Wilson, and it was evi¬ dent that it got its stimulus from the goveriv ment. So tense was the situation that Presi¬ dent Wilson was reported to have threatened to urge the removal of the conference from Paris. It was not within the French plan to carry their agitation too far, and at this point Clemenceau agreed to a compromise. ˆ It was decided in the Supreme War Council on 12 February that the Germans must demobilize their army to such a number that it would not be feared by the Allies in their demobilized condition, and that they should cease their military operations in Posen against the Poles. On the 17th this decision was submitted to the German delegates. Erzberger, speaking for them, said that the German army was already reduced to 200,000 men. As for the fighting in Posen, he said that the Poles under the Fourteen Points claimed lands that were never Polish and tried to seize them, forcing the Germans to a defensive war. Their protest

made no impression, however, and they were compelled to sign a renewal of the armistice on the terms of the Allies. It was some gain that the period was to be indefinite and it could be denounced by either party on three days' notice. They were given the assurance informally that if the armistice was executed the blockade would be lightened. The sur¬ render of the German ships was again taken up and it was suggested that the Germans al¬ low the seized German property in the United States to be sold in payment for the food taken to Germany. Erzberger replied that the Ger¬ man government had no power to take and hand over the property of individuals : that would be Bolshevism. As nothing was done about the shipping at this meeting, the matter came up on 6 March 1919, before the Allied Economic Commission at Spa. Again the Ger¬ mans refused to give up their ships unless as¬ sured that food would be brought back to their own ports. As for payments, they offered to give any security that was demanded. Here the French objected to any pledges which would weaken Germany's ability to pay money in the reparation account. It was the same old im¬ passe, but the French showed their hand when they suggested that the United States advance the food and take long-term obligations in pay¬ ment. It was hard for the United States in the Paris negotiations to live down the idea that they were in the affair to play the part of generous god-mother to suffering nations. When the French realized that no such part

would be taken in the existing crisis they con¬ sented to a compromise ; but it was not until the commission had adjourned at Spa and the matter came up before the Council of Ten in Paris on 8 March. It was then agreed that Germany could obtain 300,000 tons of food a month and that she was to pay in potash or in some other such product of her country, or by using her surviving credit in neutral coun¬ tries, or in extreme necessity by dipping into her gold reserve then in Germany. Mr. Her¬ bert Hoover, whose management of food dis¬ tribution in Belgium and in the United States had made him one of the distinguished men of the day, was placed in charge of the distri¬ bution of the food when it arrived on the Con¬ tinent. The rationing of Austria was held up by Italy in the same way that France in¬ terfered in Germany and the affair was ad¬ justed in a similar manner. At the time popu¬ lar discontent was apparent in most

European countries, and it was generally believed that if food was not .obtained the people would turn to Bolshevism.

The Revolution in Germany. — The Ger¬ man Empire of Bismarck's making ended with the abdication of the kaiser during the night of 9-10 Nov. 1918. At the same time the king of Wiirttemberg renounced the throne and within two or three days the kings of Bavaria and Saxony were deposed. In rapid succession every other hereditary ruler in Germany passed off the political stage, the former kaiser cap¬ ping the process when on 28 November he re¬ nounced the royal crown of Prussia. In their places were organized revolutionary govern¬ ments, in which the leaders of the Socialist party played active parts. In imperial affairs the lead was taken by a cabinet with Frederick Ebert for Prime Minister, a leading Socialist who had been placed in the position of chan¬ cellor in the last moments of the old regime. But the time was too feverish for a quiet transi¬ tion from a monarchy to a republic.

Among the opponents of militarism were several different groups, each with its ideal for the government of the country. The example of Russia was before them. In fact, Russian influence had played a considerable part in precipitating the crisis in Gerrnany, and one of the first things was to organize a Soldiers' and Workmen's Council, which proceeded to form a soviet in Berlin. Then came Dr. Karl Liebknecht and Rosa Luxemburg, extreme communists, creating a following who called themselves Spartacides, in allusion to Sparta-cus who led the Roman slaves in a crupde for freedom. For tv/o weeks the political pot boiled violently. Then good sense began to prevail. On 25 November it was agreed that the Soldiers' and Workmen's Council should be the repository of supreme power provision¬ ally, and it took up the work of organizing the forces of government in a deliberate way, thus showing how much better trained for self-gov¬ ernment were the workers of Gerrnany than the workers of Russia. State councils of sol¬ diers and workmen were called on to send depu¬ ties to a grand conference at Berlin on 16 De¬ cember, which, when it met, ordered general elections held for choosing delegates to a con¬ stituent convention, the date of election being 16 Jan. 1919. Here was the first step out of the welter

of struggling parties. Probably the second was in appointing Gustave Noske to command the military forces of the new government, a man who was true to the government then existing and willing to use the forces of law and order at peril to his own popularity.

The evident trend of things toward a con¬ servative revolution alarmed the Spartacides, who continued to agitate for a Bolshevist regime. Eichhorn, the commander of the Berlin police, was of their party and facilitated their designs. Finally the government felt strong enough to order his dismissal. This was the occasion of a general revolt by the Spartacides. Great processions appeared in the streets, armed and threatening the government. Sol¬ diers were called out and conflicts began on 6 Jan. 1919. The Spartacides were w'ell armed and seized a number of important strong buildings, which they converted into forts. For nine days the city was in a state of actual war, many of the best buildings were looted and oth¬ erwise damaged, and it was estimated at the time that 1,300 fell on the side of the rioters. On 15 January Dr. Liebknecht and Rosa Lux¬ emburg were arrested in their hiding places. Mobs assailed them in the street and both were killed, Liebknecht, it was reported, by sol¬ diers while trying to escape his guard, and Rosa Luxemburg by a mob of reactionaries who beat her down in the streets and carried off her body. After this the city returned to a state of comparative order.

Next day came the elections. In the brief period of discussion that had intervened six parties had developed, partly as continuations of older groups. The two Socialist factions, majority and independent, continued to exist, and by their sides arose a group calling itself democratic, persons who wished a democratic government without Socialism. Another group was the Catholic Centre. Two others were the German Nationalists and the People's Party, including in one or the other the wealthy bour¬ geoisie and the landed aristocracy. The first three could be relied upon to support a repub¬ lic against monarchy, the last two would favor the old regime, and the attitude of the fourth on such a question was doubtful. Under the circumstances the world waited with anxiety the announcement of the results of the voting. It came after much delay, showing that the Majority Socialists had 166 seats in the Con¬ stituent Assembly, the Independents 22, the Democrats 75, the Centrists 93, the German Nationalists 37 and the People's Party 23, with five irregulars, whom the conservative press called ˆffhe wild ones.® Thus the cause of re¬ publicanism had 263 out of the 421 delegates, a clear majority. The election returns showed, also, that it had the support of about 19,000,000 out of the total of 28,000,000 voters. The call for the elections had adopted universal suf¬ frage, which swelled the total number of votes to nearly half of the population and resulted in the choice of 28 delegates who were women.

The Constituent Assembly met at Weimar on 6 Feb. 1919, in the celebrated court theatre altered to serve the occasion. The

(Spartacides and their sympathizers had demanded that the place be Berlin, but there was too much radi¬ calism in the air at the capital for the quiet de¬ liberations of the Assembly, and Weimar was

chosen. At the first meeting 397 delegates were present. Dr. Eduard David, a prominent leader in the old Social Democratic party, was selected for president of the body. The chancellor un¬ der the existing government, Herr Ebert, made an address in behalf of the government. Ger¬ many, he said, was *done forever with princes and nobles by the grace of God,® and the sen¬ timent was cheered by most of the members. When he referred to domestic problems he was interrupted by the independents, who had come to realize that the trend of sentiment iii the As¬ sembly was to ignore extreme Socialistic ideas. On matters connected with the foreign situa¬ tion, as the armistice and the terms of the com¬ ing treaty of peace, there was not the same di¬ vision of opinion, and it behooved the speaker to dwell on them. Cheers greeted his demand for the immediate release of the 800,000 Ger¬ mans held prisoners by the Allies and his allu¬ sion to the proposed union of Germany and Austria. ®We turn,® he said,* to all the people of the world for justice. We ask that our eco¬ nomic life be not destroyed. The German peo¬ ple have fought for inner self-determination. It cannot be perfected from the outside.® There can be no doubt that the German people believed sincerely that it was a great wrong to weaken Germany's economic life. If we could forget the sad havoc their government had played with the economic life of the rest of the world we might share their opinion. In the hour of subjection they insisted that it was not the German people but the militarists who brought ruin on the world, forgetting that in the first months of the war German professors, German newspapers, German political parties, and even the Socialist party gave the world the most solemn assurance that Germany stood as one man for the war.

On 8 February a provisional constitution, prepared by the Ebert cabinet, was offered in the Assembly and on 11 February it was passed unanimously, to be in force until a per¬ manent constitution was adopted. It provided for a legislature of two houses and a chief executive to be known as the ˆProvisional State President.® An attempt to have a re¬ public formally adopted proved a failure, but

the form was nevertheless republican. Next Herr Ebert was chosen President, and immedi¬ ately the ringing of bells announced to the world that Germany's first ruler elected by her own people had taken the reins of authority. Of the man himself Theodor Wolff, the journal¬ ist, said : ®Ebert is no shining light, nor has he studied as much as some others, but he is the incorporation of good common sense. When after a day's work he sits behind a good bottle of wine, his hands folded over the table, this natural wisdom shows to the best advantage.® It was common sense that had brought Fred¬ erick Ebert, the saddler, from low rank to the leadership of his party in time of crisis. At the end of his first year in office his record was clear of notable errors, and he had car¬ ried the German government safely through a period of unusual turbulence.

When the Spartacides realized that the Con¬ stituent Assembly was overwhelmingly op¬ posed to the rule of the proletariat, they tried to overthrow it. The Berlin Council of Sol¬ diers and Workmen appealed to the state councils of soldiers and workmen, urging them

to demand a national soviet on the Russian model. They threatened to call a national con¬ gress of soviets as a rival to the Constituent Assembly. The most immediate result of their agitation was the outbreak of workmen's riots in many parts of Germany. In Bremen, Magde¬ burg, Hamburg, Augsburg, Nuremburg, in many places in Saxony and elsewhere out¬ breaks occurred, beginning as political pro¬ tests but generally resulting in looting. The most notable disturbance, however, was in Ba¬ varia, where Kurt Eisner, an Independent So¬ cialist, had made himself the chief authority in November, when the king of Bavaria was forced out of his royal office. He was a fear¬ less man of ability and good sense, probably the most capable of the leaders of the radicals in this period of violent opinion and action. He gave mortal offense to the defenders of the old regime when in a speech at a Socialist con¬ gress in Berne he charged that the militarists brought on the war, and in another speech ar¬ raigned the management of the .German prison camps as cruel to the inmates. On 21 Feb. 1919 he was assassinated by a young lieutenant of the former privileged class as Eisner walked through the streets. The radicals seized the op¬ portunity to break into revolt and one of them shot Auer, Minister of the Interior, as he was about to inform the Diet of the death of Eisner, whom he, as a Majority Socialist, had opposed on various' occasions. The disorders continued several days but were suppressed by the authorities, a Socialist government emerg¬ ing from the disorders with Herr Hoffman at its head.

Now followed three months of critical ex¬ istence for the existing form of society in cen¬ tral Europe. Germany's Socialism was only skin deep. After it had been three months in power and had progressed far enough in prac¬ tical politics to begin to make a constitution it became evident that it did. not mean to over¬ throw private ownership nor adopt state con¬ trol of industry, at least so far as the consti¬ tution of the new Germany was concerned. The Socialists had taught the masses to believe that capitalism was the basis of their misery and could hardly complain now if the masses turned against them and followed the fervid preachers of communism. Thus came the fe¬ verish springtime of 1919. Fortunately Berlin had the first outbreak, early in March, and suppressed it through the stern measures of Noske, who sent 50,000 soldiers into the city and used cannon freely against the fortified places of the rioters. Five hundred persons were 'said to have been killed in the fighting that lasted from the 7th to the 14th of March, many of them harmless bystanders. The bit¬ ter nature of this conflict showed the govern¬ ment how to deal with the insurgents, and the soldiers remained true to it. Soldiers usually follow a capable government that knows its own mind. Of the three classes of society, aristocrats, middle class and proletariat, the first supported the government and some of the third. The second was the backbone of the majority in the Constituent Assembly.

A week after the suppression of this out¬ break a still worse revolt occurred in Hun¬ gary. Count Michael Karolyi, a wealthy Hun¬ garian, was a friend of the Entente and was exiled from Austria-Hungary during the war.

taking refuge in France and the United States. Returning to his country as the World War came to its end he raised a revolt against the Haps'burgs. The people accepted him as one who stood well with the victors and who was, therefore, able to soften the expected punish¬ ment. They placed him at the head of their government, republican in form, and he formed a cabinet in which the prevailing opinion was moderate Socialism. As an administrator be was not a success and it was soon evident that he could not stave off the dismemberment of Hungary. On 19 March the Allies demanded to be allowed to place troops in the neutral belt set off in the armistice

between Hungary and Rumania, the inhabitants of which were almost entirely Magyars. The demand de¬ stroyed the prestige of Count Karolyi and placed him in despair so that he resigned, pass¬ ing the government over into the hands of the Socialists. The new cabinet was mostly inef¬ ficient ; but among them was Bela Kun, for¬ merly a secretary of Lenin, who was a com¬ munist and a man of action. He became Min¬ ister of Foreign Affairs, dominated the situa¬ tion, and formally established a soviet gov¬ ernment, announcing that it was in ^^military and spiritual unity® with Russian Bolshevists. The movement made rapid progress and by the 24th Bolshevism was established in most Hun¬ garian towns.

This revolution had a stimulating influence over the German radicals and they boasted that their own country would follow in the foot¬ steps of Hungary before the end of the year. Strikes were occurring daily, city after city broke into rioting, now Dresden, now Diisseldorf, now Nuremburg, and after them, many others. One week news came that all Saxony was on the point of revolt, later came assurance that Brunswick was in the hands of the radi¬ cals. It was estimated that one-third of the workers of Germany were communists, and their feeling was being stimulated by many ac¬ tive agents from Russia, well supplied with funds by the Bolshevist government there. All this came when the Peace Conference was passing through its darkest days, just at the time when President Wilson threatened to leave Paris if the nations at the peace board did not abate their demands for spoils. More¬ over, the pinch of hunger was at its highest pitch in these early months of the year when the stocks of the preceding scant harvest were lowest. Many a wise man of the day thought it impossible to keep Bolshevism from sweep¬ ing over central Europe from the Danube to the Rhine.

That the tide was stayed was due to the Weimar government under the newly-chosep President, Frederick Ebert. Confident that it had the support of a majority of the working¬ men it did not hesitate to use force to put down the local revolts. Its most notable task of this nature was at Munich, where the em¬ bers of dissatisfaction had burned since the death of Kurt Eisner. He was not a commu¬ nist, but the radicals could point to his assassi¬ nation as an act of perfidy on the part of the capitalistic faction. Early in April Bela Kun arrived in the city from Hungary to plead the cause of the soviets. The next day a new soviet republic was proclaimed by the radicals

and it was announced that relations would be established with Russia

and Hungary. The Hoffman government moved to Bamberg. To these two governments in Bavaria was added a third a few days later when the communists in the city rose, drove out the soviet govern¬ ment and set up a Council of Ten to rule in true revolutionary fashion, a revolutionary tri¬ bunal, according to the newspapers, being set up to try persons suspected of opposing the Ten. This move was met by the Weimar gov¬ ernment with the announcement that an army would reduce the communists and restore the Hoffman government. After some delay the troops appeared before the city, led by Noske himself. On 30 April the red army offered to parley, but the only terms offered were uncon¬ ditional surrender. They hesitated, but 2 May Noske forced the battle and took the city with¬ out much resistance, capturing the red leaders, several of whom were shot summarily. It was reported that 5,000 persons were arrested for complicity in the revolt. This course terri¬ fied the communist's leaders in Germany. The government had showed ability and determi¬ nation to enforce order and comparative quiet began to return to the distressed country.

Meanwhile Hungarian Bolshevism was un¬ disturbed. No power existed in Hungary to put it down, and it might have been left to its ' own course but for its relation to the terri¬ torial question. The subcommission of the Peace Conference of Hungarian boundaries in¬ terpreting the principle of racial self-determi¬ nation, reported that Rumania on the east, Jugoslavia on the south, and Czechoslovakia on the north and northwest should have im¬ portant parts of what had been Hungary. The kingdom had been a series of different races held together by the politically superior Mag¬ yars, and now the non-Magyar elements were about to be cut off and Hungary left with noth¬ ing more than the rich Danubian Plain. The three states that benefited by the report did not await the action of the Peace Conference, but making' the esˆtablishment of Bolshevism a pre¬ text massed troops to march into the territory they expected to receive. The diplomats in Paris were in no condition at that time to pre¬ serve the status quo and sent General Smuts to Budapest to try to make a compromise. His efforts failed and Rumanian, Serbian and Czech armies crossed into Hungary on 25 April. To save its face the conference sent Gen. Franchet d'Esperey to take command in the name of the Allies, but he seems to have exerted little authority over the Rumanians, who marched quickly to the Theiss River and threatened to enter the capital. Bela Kun was thoroughly alarmed and offered to make peace by recognizing the territorial claims of the in¬ vaders. At the same time he seized many of the prominent citizens as hostages. In the Ru¬ manian army, led by its king, were many Mag¬ yars whose efforts gave the Rumanian invasion the character of a

counter-revolution. Bela Kun's soldiers were untrained and unwarlike, and he asked for an armistice with terms. The Rumanians demanded that the communist army be disarmed, war material be surrendered and the hostages be given up, the Rumanians to be left in possession of the right bank of the Theiss for a depth of 12 miles. The Hungarians re-470 WAR, EUROPEAN — EVENTS SUBSEQUENT TO THE ARMISTICES (14)

fused these terms and decided to fight for their existence. At the same time the Peace Con¬ ference, not wishing to start a war in Hun¬ gary which might lead to problems that could not be settled easily, induced the invaders to stop where they were and imposed a blockade on the Hungarian Bolshevists. They even in¬ vited Bela Kun to send an agent to Paris that he might talk over the situation with the view of adjusting all differences. On 24 June 1919 there was a revolt of the conservatives in Budapest, but the communists suppressed the uprising, taking many prisoners. Up to this time Bela Kun had ruled without bloodshed, but now he became severe. He had taken 50 cadets of the military academy who resisted in the telegraph office until they were induced to surrender, and 40 of them were executed sum¬ marily. As July passed the effects of the blockade were plainly felt. The hungry inhab¬ itants read a proclamation from the Allies that they would not make peace* with their Bolshe¬ vist government and murmurings became louder. Finally Bela Kun bowed to the storm and resigned on 31 July, receiving the promise of a safe conduct out of the kingdom. A mod¬ erate Socialist cabinet was formed to succeed him.

Then affairs took an alarming turn. The Rumanian army marched on the capital, de¬ spite the orders from Paris to keep away, and occupied the city 30,000 strong. The Allies or¬ dered ft to withdraw, but it stood in its tracks. On 7 August the Archduke Joseph proclaimed himself governor of Hungary and organized a coalition ministry, and a week later he formed a cabinet out of the friends of the old regime. To most people it seemed that he was taking the country headlong into a Hapsburg restora¬ tion and the Hungarians were as much alarmed as the Allies. On 23 August a messenger from the Allies appeared with a peremptory order to the archduke, giving him two hours to resign his assumed governorship, with the alternative of having the order published in Budapest. He yielded with as good grace as possible and the government passed over to a Moderate Social¬ ist cabinet. It then remained to get rid of the Rumanians. By some fancy they had formed a scheme for joining Rumania and Hungary in an economic union and King Ferdinand had

come to the city as a conqueror. It was after¬ ward explained that he came incognito. But the pressure of the Allies was not to be ig¬ nored. Rumania was given to understand that she would be subjected to economic pressure if she refused to leave the city, and on 14 August she gave notice that she would withdraw. At this time the Allies sent a commission of inter¬ allied generals to Budapest, with orders that they should command in rotation. Finally on 7 -September the Rumanian army at last began to leave the city and a week later it was an¬ nounced that British troops would take their places. Thus ended the troubles that were closely related to the Bolshevist revolution in Hungary. In Bela Kun's day the soviet sys¬ tem was established throughout the country. The lands were nationalized, and the govern¬ ment of the proletariat was established. The leader was an honest devotee to the system of henin, and tried hard to make his plan work, 'i'hc opposition from the outside, with the pres¬

sure of hunger, was too much for him. But his fall did not overthrow all that he had set up.

While these commotions rocked Germany, the Constituent Assembly continued its work of making a constitution. On 31 July 1919 the completed constitution was laid before the Constituent Assembly, which had changed its name to the National Assembly, and was adopted-by a vote of 262 to 76, the negative votes coming from members of the German National and the German People's parties on the one hand and from the Independent Social¬ ists on the other, both extremists. The affirma¬ tive votes came from the middle groups and represented the strength of the supporters of republicanism.

The constitution itself is far removed from the old form of government. Thougli Ger¬ man in character it is essentially republican and in its first clause it declares as much, although the word Reich is used to name the govern¬ ment. In the draft itself the legislature was called the Reichstag, but a protest was made against the name after the constitution was adopted and it was announced that it would be dropped. The members are to be chosen by the people for a term of four years. There is a President elected by the people for seven years. He represents the government under in¬ ternational law, makes treaties and receives and sends diplomatic agents. He may use the armed forces of the country to preserve order or useˆ them against a defiant state, but in each case his power is subject to a veto by the legis¬ lature. He has the pardoning power, but not the right to proclaim amnest3ˆ His orders are to be countersigned by the

chancellor or by the ministers whose departments are affected. The chancellor in some respects is a kind of vice-president, _ but he is also the responsible head of the ministry. He and the other ministers are appointed by the President, in the same way as British ministers are appointed by the king. The chancellor has charge of foreign policy. The legislature, that is the Reichstag, may remove by ˆ hiipeachment the President, chancellor, or ministers when indictment has been brought by a petition signed by 100 mem¬ bers. There is an imperial council in which each state has a representative for each million inhabitants it contains ; but each state has at least one representative, and no state can have more than two-fifths of the whole number. Thus the overwhelming influence of Prussia is reduced, and to guard against too much power in the hands of the Berlin voters it is provided that one-half of Prussia's representatives must come from the provinces. Ordinarily the coun¬ cil must consent to all bills introduced into the legislature, but the government may introduce bills known to be disapproved by the council, and laws may be submitted by a plebiscite if the President desires it. A majority vote in the legislature will repeal a law. The consti¬ tution may be changed by a two-thirds vote of the legislature, but for this purpose there must be a quorum of at least two-thirds of the members.

The federal character of the German gov¬ ernment is preserved, but the powers of the individual states are much reduced. A very large number of powers are specifically assigned

to the central government, as the control over foreign affairs, citizenship, colonies, immigra¬ tion, customs, posts, telegraphs, railroads, ship¬ ping, coinage, weights and measures, mother¬ hood, repopulation, labor conditions, price fix-ing, the socialization of national resources, paper money, manufactures, theatres and educa¬ tion. The states must have liberal forms of government and grant the suffrage to all men and women in the election of their legisla¬ tures. It was specifically provided that an im¬ perialˆ law should be superior to a state law. A citizen of a state is to be a citizen of the empire with equal rights in all other states.

There are many provisions relating to the rights and status of person.

Privileges of birth are abolished but titles may be used merely as parts of the names of individuals, and no more titles of nobility are to be conferred. All titles that are created in the future will refer to the occupations of the recipients, but academic titles will be awarded as in the past. Freedom of speech is guaranteed. Especial attention is given to the protection of motherhood, and it is provided that illegitimate children shall have the same moral and social protection as legiti¬ mate children. No state church is to exist but all people are to have freedom of belief. Com¬ pulsory education is required for all children for eight years with continuation schools in technical, professional or occupational subjects as the ability of the pupils may warrant, but in this connection no distinction is to be made on account of social status or religion. Pupils are to be taught civic ideals *in the spirit of popu¬ lar Germanism and of international reconcilia¬ tion.® It was probably by design that the su¬ premacy of international law was specifically recognized.

Under the circumstances it was inevitable that the constitution should contain socialistic doctrines ; but they are moderate in nature. Private property is ˆsafeguarded by the con¬ stitution® and the right of inheritance is guar¬ anteed. Confiscation is not to occur without due process of law and without compensation. Entails are dissolved. ˆPrivate economic enter¬ prises® may be taken by the state, but only with compensation, and it can be arranged that when thus taken over the employers and the employees shall participate in their administra¬ tion under the supervision of the state. Elabo¬ rate regulations are made for the protection and functioning of labor. The right of laborers to organize and bargain is recognized, and a na¬ tional economic council is created and is 1o be consulted in making laws affecting laljor. 1 hese provisions arc far short of the ideals of the radical Socialists. It remains _ to be seen to v/hat extent the government will undertake to carry them into practice. The fact that they are mostly permissive seems to indicate that the constitution makers were not willing to en¬ danger the revolution by attempting to estab¬ lish an out-and-out socialist regime.

Under this constitution Herr Ebert became the first President of the imperial republic of Germany. He was inaugurated 21 Aug. 1919 in the court theatre at Weimar, where the sessions of the National Assembly had been held, a brilliant audience wilnessing the cere¬ mony. Only the scats of the Independents and the German Nationalists were vacant. *It is a

thorny office,® said the president of the assem¬ bly in inducting him into office, ®which in the hardest times the Fatherland has laid upon your shoulders, but with an easy conscience you can claim to be free from all blame or responsibility in the countiy's wretched po¬ sition.® It was a true speech. The task of the President is severe. National bankruptcy threatens, the obligations of the peace treaty must be met, and precautions against a counter¬ revolution must be taken. The hope of the future for Germany is in the common sense of the German people and their leader.

One of President Ebert's first difficulties was the withdrawal of the army of General von der Goltz from the Baltic provinces, where it had remained under the pretext of keeping the Bolshevists back. Its commander was one of the best leaders of the Junkers, and it was be¬ lieved that his force was but a rallying point for monarchists in anticipation of the time when he would proclaim a restoration of the Hohenzollern dynasty. To the protests of the Allies at Paris little attention was paid. Finally they became insistent and announced that they would restore the blockade against food for Germany if the troops were not recalled. The threat proved effective and on 4 Oct. 1919 the troops began to leave the provinces. They had numbered about 40,000 and President Ebert was probably as pleased as the Allies themselves to see them demobilize.

Another incident that aroused feeling be¬ tween the Allies and Germany was the demand that Germany should make restitution for sink¬ ing the German naval ships at Scapa Flow as the treaty of peace was about to be signed. The British found in the cabin of one of the ships when she was raised to the surface a letter from the government which seemed to authorize the admiral in command to sink the ships. As they were surrendered as pawns of war the Allies demanded that a specified amount of tonnage in merchant ships should be sur¬ rendered. After many protests an agreement was made by which Germany promised to sur¬ render merchant tonnage in satisfaction of the claim. The acceptance of the terms removed the last obstacle to exchange of ratifications, and that last act of the process of making the treaty was consummated at Paris 10 Jan. 1920, when Germany, Great Britain, France, Italy, Japan and many small nations exchanged rati¬ fications and brought their war to an end. The United States was not represented at the cere¬ mony since the treaty was still under considera¬ tion in the Senate.

The Bolshevist War in Russia. — The Rus¬ sian Bolshevist government concluded an ar¬ mistice with Germany 15 Dec. 1917 and accepted the treaty of Brest-Litovsk 3 March 1918. Lenin, its guiding mind,

accepted the terms re¬ luctantly and it was understood that he would not carry them out if he could help it. But time was needed to organize the revolution, and the peace, bad as it was, gave him time.ˆ The empire wˆas crumbling at the edges and it was freely predicted that it would break up into small states. Finland, the Baltic provinces,. Poland and the Ukraine seemed assured of separate existence in tlie European part of the old empire, and it was not possible to predict what would happen with Siberia. But the main

± i i

portion of European Russia was in the hands of the Bolshevists, a minority of the popula¬ tion, and they were striving hard to retain the position of authority they had assumed. A social and industrial class well organized under the repression of the old government, sup¬ plied with a trained and devoted corps of lead¬ ers, and convinced of its purposes, they had the advantage of being the only authority that com¬ manded obedience.

The outside world had some difficulty in dis¬ covering just what kind of a government they were setting up. That it was driving along the same course that the French revolution followed was clear and as reports came of terror after terror in ˆDarkest Russia® the outside world became horrified. The former tsar was exe¬ cuted 17 July 1918 and his immediate family is said to have been killed soon afterward. There is good evidence that the horrors were not all on one side. Stories from the returned agents of other government'ˆ indicate that some of the severest repression was committed by the anti-Bolshevists in the towns they took from the Bolshevists. It was class war in its 'worst form, and to most non-Russian people it was horrible — so horrible that time is necessary to discover its real nature.

At bottom, the system rests on the soviet, the unit of the organization. Each factory or shop had its organization of workers before the revolution, with central organization, and they had come to look upon themselves as a kind of invisible government organized and ready to spring into life when opportunity of¬ fered. Strong leaders went and came among them, and when they proved themselves too strong for

their own safety they fled to neutral countries. The revolution of 15 March 1917 opened the doors for their return, and once back they made their plans to seize the gov¬ ernment. There is reason to believe that they had honeycombed the old army with their in¬ visible organization. They believed it was their revolution and struggled to keep it from passing into the hands of the bourgeoisie, whom they considered their enemies. Thus the workmen and soldiers, organized by soviets, became the governing portion of society. When they came into power the revolution was 10 months old. They found the peasants, a large majority of the population, in possession of the landed estates and extremely fearful lest a counter-revolution dispossess them. With the peasant they formed a kind of bargain, allow¬ ing them representation in the central soviets at a rate unequal with the workmen. Against the upper classes they warred consistently. To vote one must be a member of the soviet, and to join it one must be a workingman. The lack of food aided Lenin. There was, he announced, a certain amount of food and he allotted it to the workers first. If a rich man would not work he might die of starvation. Another thing that helped Lenin was the fact that his enemies were supported by foreign powers, and by France and Great Britain in particular. These two states had loaned Russia vast sums before and during the war. They were now fighting, said the Bolshevists, in order that these loans be made secure. According to their philosophy the war was fought by these two countries to save the investments of rich men through sacrificing the liyes of poor They

also had an advantage in the existence of many political parties in Russia, small organizations that had sprung up in the early days of the rev¬ olution, each with an idealistic or social raison d'etre that made it difficult to obtain union against the common foe.

It was 26 Jan. 1918 when the Bolshevists dissolved the Constituent Assembly in Petrograd, met to make a constitution, and took the direction of affairs. At that time no armed opposition to the government existed. The Tsarists, largely an officer class, had made no attempt against the revolution. But oppo¬ sition to the Bolshevists appeared in several quarters. In the first place, the suppressed races on the western border, Poles, Finns and Baltic people, had assumed independence and were in arms to defend themselves against re¬ conquest. They were not anti-Bolshevist so much as anti-Russian, but they served to weaken the Bolshevists while others were fight¬ ing them. Elsewhere the Bolshevists were op¬ posed by three large groups of ˆ armies who fought in the name of anti-Bolshevist Russia. In them

were various kinds of Russians, some of them supporters of the Duma, the republican government which sprang up after the tsar was forced to abdicate. Some were defenders of the old bureaucracy, and others were Socialists who rejected the communism of the Bolshe¬ vists. Between these widely different elements was at first a tendency to subordinate differ¬ ences and give all their efforts to theˆ one aim of defeating Lenin. But in time jealousies grew up and seriously weakened the efforts that were put forth.

The strongest of these forces was that which Admiral Kolchak commanded in Siberia. When the revolution occurred a Socialist gov¬ ernment was set up in Siberia, but after the fall of Kerensky it was replaced by a Bolshe¬ vist government, which might have continued to exist but for the appearance of the Czecho¬ slovaks. These people were a body of prison¬ ers taken from the Austrians, who fought in the last days of the old Russian regime against Austria, whom they hated. When the Russian front gave way they were left to their own resources. They dared not go back to Austria, where they were considered traitors. They were opposed to the Bolshevists and were at¬ tacked by them. Defending themselves they moved into the region east of Moscow and finally were promised that they might go through Siberia to Vladivostok and thence by water to Italy, where they would be thrown against Austria, their most hated enemy. The Bolshevists soon repented of this promise and opposed their departure, so that the Czecho¬ slovaks had to cut their way out of Russia in Europe. They managed to capture $200,000,000 in gold from the Bolshevists at Kazan and car¬ ried it with them to Omsk. While they were falling back a meeting of anti-Bolshevist fac¬ tions was held 24 Sept. 1918 at Ufa and an All-Russian Directory was created. Soon after it made Omsk its headquarters. Here there was an Omsk government already organized on a broad basis, that is, it embraced all who fa¬ vored the overthrow of the Bolshevists and it had, in general, a leaning toward liberal gov¬ ernment. The Directory, however, was strongly Socialist and retained in its army the committees which had broken down the discL

plme of the old army. The natural result was a clash and on 28 November a group of Cossack officers arrested the leading directors

and de¬ clared the government non-existent. In their place they proclaimed Admiral Kolchak supreme regent. This excellent officer had come to Omsk from Vladivostok and thrown in his fortunes with the Omsk government. He soon showed good organizing ability and for a time was the hope of the anti-Bolshevists in Siberia. He was, however, essentially a military man. Although he promised the people who sup¬ ported him a constitutional form of govern¬ ment, he did not keep his word for many months. He accordingly was distrusted as a reactionary and eventually lost the cordial sup¬ port of many of his own followers. He took no steps to settle the land question, probably because to do so would alienate either the landlords or the peasants, both of whom he needed as supporters. Nor did he call a Con¬ stituent Assembly, probably for the same rea¬ son. He did, however, declare for universal suffrage, but it was evident that the Constitu¬ ent Assembly when it met would not be bound by such a declaration. For over a year after his elevation he ruled effectively. He received large quantities of supplies from the Allied Powers, and the Czechoslovak forces were or¬ dered by the Allies to stay where they were and keep the Trans-Siberian Railroad safe from local Bolshevists, while a joint Japanese-Ameri- can force that was landed in Vladivostok kept the port open for communication with the outside world. A force of American engi¬ neers under Mr. John F. Stevens kept the trans-continental railroad in repairs. Kol¬ chak's government conscripted the men of fighting age or received them as volunteers, and British and French officers trained them into an army. In the spring of 1919 he began an advance into European Russia and nearly reached Samara, where the railroad crosses the Volga, less than 600 miles from Moscow and more than 1,000 miles from Omsk. While he was advancing, other anti-Bolshevist forces were also pressing back their foes, so that he seemed to be on the verge of victory. But it was impossible to conduct a campaign against a numerous enemy with only one railroad to bring up supplies more than 1,000 miles, and he was forced to fall back. Some of his con¬ scripted Siberians were not loyal and deserted to the Bolshevists. The enemy followed him across the Ural Mountains,ˆ and by autumn they were threatening Omsk itself.

Meanwhile, the second _ army resisting the Bolshevists was operating in the south. Here a force known as the Volunteer Army was or¬ ganized soon after the Bolshevists became su¬ preme in Moscow. At first a small body of persons who had come together in protest against the doings at Moscow and Petrograd, it was at length joined by the Don Cossacks, a large and devoted body of good fighting men. About the beginning of the summer of 1918 this force was under the

command of Denikin, a capable leader and administrator. Fighting through the summer, autumn and early winter he cleared the northern shores of the Black Sea of Bolshevists and drove them out of the Kouthern part of the Ukraine which had fallen into Bolshevist hands when the German troops were withdrawn after the signature of the

armistice, 11 Nov. 1918. At this time Denikin was recognized as supreme authority by the Volunteer Army and by the Don Cossacks; but he announced that he was under the supreme command of Kolchak. In this position of sub¬ ordination he was relieved of the necessity of devising a political policy, a thing which would certainly have embarrassed him sorely, since he had under him peasants. Socialists and bureaucrats. In public he professed to believe in universal suffrage, but he opposed the di¬ vision of Russia and was not clear in his pro¬ nouncements on the distribution of lands. Like Kolchak he was a good military man but with¬ out good political sense.

The third anti-Bolshevist force was the Provisional Government in northern Russia, based on the coast at Archangel and Mur¬ mansk. _ It was organized at the suggestion of the Allies out of persons who opposed Bol¬ shevism early in August 1918. Tchaikovski was its chosen head, a leader of the Social Rev¬ olutionists. His policy was to put down the Bolshevists and then to settle things in a Con¬ stituent Assembly. He was promised and re¬ ceived a body of troops composed mostly of British and American soldiers, with enough from other Allied Powers to make it possible to refer to it as an interallied army. The ar¬ rival of these troops in the summer of 1918 gave the Allies the hope that they could pene¬ trate to Petrograd, rally the Russian con¬ servatives and re-establish the Eastern Front. The Bolshevists offered such effective resist¬ ance that Tchaikovski did not get far from his bases of supplies. By the spring of 1919 it was evident that little was to be expected from the expedition. In the United States and in Great Britain the labor element demanded the with¬ drawal of the troops, and by the end of Octo¬ ber 1919 all the Allied forces had been with¬ drawn except some technical units wihose serv¬ ices were deemed essential to the country. At the end of the year the purely Russian govern¬ ment of the north continued to exercise author¬ ity in a narrow region, but it seems to have been because the Bolshevists were giving their attention to more important operations in other sections.

In the early autumn of 1919 the forces op¬ posed to the Bolshevists of

Europe were hold¬ ing a line of strategic positions that ran with a great sweep from Archangel to the Volga. Loosely connected with the northern Russian front was the line of the Finns to the Gulf of Finland. South of the gulf the Baltic States, Esthonia, Latvia and Lithuania, carried the line southward to the Poles, who carried it to the south until it nearly reached the left flank of Denikin's army, which after an interval ran east¬ ward to the Volga. Denikin's front itself was 700 miles long, held by posts. In October this long line became active at two points and for a time such rapid gains were made that the Allied press jubilantly predicted the imminent col¬ lapse of Bolshevism. The first was on the Baltic front, where there was an army of Rus¬ sians, Letts, Esthonians and Lithuanians under General Yudenitch, operating between Dvinsk and Gatchina. On 13 October Yudenitch began a quick advance on Gatchina and took it, bring¬ ing his forces within 25 miles of Petrograd on its south side. At the same time Deniken was more than ordinarily active in the region

south 01 Moscow, taking Orel about 400 miles from that city. Both actions seem to have taken the Bolshevists unawares, with the result that they offered little resistance. The anti-Bolshevists took this to mean that their enemy was demoralized, and they formed rosy hopes of his speedy collapse. Predictions ran that Yudenitch would take Petrograd and Denikin would take Moscow in a short time. In fact Yudenitch arrived at Tsarskoe-Selo and Tavlovak, 17 and 15 miles respectively from Petrograd. But after a week of fighting he found the resistance stiffen Trotsky had arrived in Petrograd and put new courage in the defenders. A few days later the Bolshevists brought up heavy reinforcements, outflanked Yudenitch and forced him back into the boundaries of Esthonia. Yudenitch's army was greatly diminished by desertions to the Bolshevists.

At the same time the tide turned in the south. Denikin's advance .toward Moscow was suddenly interrupted and he was forced back, his soldiers left him for the Bolshevists in large numbers, and the Bolshevists began a counter-movement, which by 10 Jan. 1920 had

carried them to the Sea of Azof at Rostof-on- ihe-Don, thus cutting Denikin's forces into two parts. At the same time they threw a column around his eastern flank, and it was reported that they had taken Krasnovodsk, on the east¬ ern shore of the Caspian, opposite Baku, and the point from which a railroad runs to the Persian border at a distance of 300 miles. It was further reported that Bokhara, within 20 miles of the Afghan frontier, was also in their hands. In the trans-Caspian re¬ gion they seem to have encountered little op¬ position ; but they won a position of great dan¬ ger to the British in India, where there was al¬ ready great unrest. Nor was this the limit of their successes. In Siberia Bolshevist pres¬ sure was applied against Kolchak, already weakened by the dissatisfaction his incompe-tcncy in administration was producing. When the Bolshevists crossed the Ural Mountains his troops deserted by the thousaxsd. He swore stoutly that he would never give up Omsk, where he had a vast store of supplies and rail¬ road material. But almost immediately he was forced to flee or be surrounded by the active Bolshevist cavalry. Turning eastward he car¬ ried what supplies he could but had to aban¬ don large quantities. He lost .39,000 of his men as prisoners, 5,000 loaded railroad cars and 75 locomotives. His objective was Tomsk, 600 miles east of Omsk, but he was not able to stand there and continued to Krasnoyarsk, 375 miles farther east. On 9 January it was re¬ ported that he had been forced out of this po¬ sition and was in retreat on Irkutsk, on the west shore of Lake Baikal and 1,562 miles east of Omsk, where his retreat began. Meanwhile his civil government had undergone a revolu¬ tion, for which his ruthless violations of per¬ sonal liberty were responsible. Kerensky, in Paris, declared that his administration was ®a shameless and unpunished system of pillage.^^ The Czechoslovaks in Vladivostok revolted against him, but were put down by one of his representatives, with the passive assistance, it seems, of the Japanese. Of these Oriental peo-1)1 f. 80,000 were said to be in the region around Vladivostok. The government of the United

States had viewed their possible active inter¬ vention in Siberia with great concern, and for this reason chiefly, the Japanese had played a waiting game in eastern Siberia. But the ap¬ proach of the Bolshevists along the transcon¬ tinental railroad was a threat at their own safety; and they announced that they would not idly see Bolshevism planted in Manchuria. At the same time they declared that they would not appropriate any. territory they might occupy in eastern Siberia. It was assumed that they would meet the Bolshevist advance at Lake Baikal and try to halt it there.

Thus, at the beginning of the year 1920 the fortunes of Bolshevist Russia were good. On the southeast and east her enemies were all but crushed. On the west the Baltic states were ready to give up the struggle. Esthonia held a conference with them at Dorpat in De¬ cember, in which a treaty of peace was all but made on the basis of mutual recognitions of independence and the renunciation by Esthonia of her alliance with the Western powers. The negotiations broke off, however, when the Bol¬ shevists demanded that the Esthonians expel or intern the remnant of the army of General Yudenitch, which had taken refuge within their borders. The Western powers insisted that this army be left where it was in order that it might at least serve to hold Bolshevist troops in the west who might otherwise be sent into the southeast. Representatives of Latvia, Lithuania, Poland and Finland were at Dor-pat informally, and it was believed that they would have favored the treaty offered to Es¬ thonia, if it could have been accepted. Early in January 1920 the Esthonians made an ar¬ mistice with Bolshevist Russia, and it was an¬ nounced that Yudenitch's army would be sent by water to join the anti-Bolshevists in south¬ ern Russia.

With established peace on their western border and victories won in the Far East, Rus¬ sian Bolshevism presents itself as one of the most important results of the World War. So far it seems to have succeeded in uniting the Russian Empire, except for the Baltic states and Poland, which in 1917 was considered a difficult thing to do. It has been strengthened at home by the political incompetence of the anti-Bolshevist Russians and by the fact that it was the most promising force in Russia for national unity. It is not a democratic form of government : in its present state it is as auto¬ cratic as the government of the tsar. It sets out to force every man to become a proletarian, and then it means to keep him a proletarian until all men choose to remain in that state. If that condition is reached the coercion of the leaders may be relaxed, and Bolshevism may become democratic. It remains to be seen how it can swing itself into the world move¬ ment for self-government which has been the underlying force in political development for the past seven centuries. At present that seems to be the most serious problem of the Bolshe-John Spencer Bassett, Professor of History, Smith College.

15. DIPLOMATIC NEGOTIATIONS BY THE VARIOUS NATIONS DURING THE WAR. United States. — On 4 Aug.

1914, seven days after Austria-Hungary had declared war on Serbia, President Wilson

issued a formal proclamation of American neutrality. In this document he summed up the laws and principles of international law which persons residing in the United States must obey in order to observe neutrality, and, on the other hand, warned the belligerent powers not to infringe upon the rights of neutral peoples. Citizens of the United States were prohibited from originating a military force in aid of a belligerent, and were warned that while they might manufacture and sell within the United States arms and munitions of war, they must not transport such articles upon the high seas for the use of a belligerent.

On the subject of wireless communication President Wilson issued a special proclamation on 5 August. ˆTt is now ordered,^^ he said, ^^by virtue of authority vested in me to estab¬ lish regulations on the subject, that all radio stations within the jurisdiction of the United States of America are hereby prohibited from transmitting or receiving for delivery mes¬ sages of an unneutral nature, and from in any way rendering to any one of the belligerents any unneutral service during the continuance of hostilities.^^

These proclamations were followed by an¬ other on 18 August appealing to the American people for a broad observance of the spirit of neutrality. ^^The effect of the war upon the United States will depend upon what American citizens say or do. Every man who really loves America will act and speak in the true spirit of neutrality, which is the spirit of im¬ partiality and fairness and friendliness to all concerned. The spirit of the nation in this critical matter will be determined largely by what individuals and society and those gath¬ ered in public meetings do and say, upon what newspapers and magazines contain, upon what our ministers utter in their pulpits and men proclaim as their opinions on the streets… . I venture, therefore, my fellow-countrymen, to speak a solemn word of warning to 3ˆ011 against that deepest, most subtle, m.ost essential breach of neutrality which may spring out of passion¬ ately taking sides. The United States must be neutral in fact as well as in name during these days that are to try men’s souls.®

In the first days of the war the firm, of J. P. Morgan and Company was approached upon the subject of financing a loan of $100,000,000 to the French government, the proceeds of which were to be used exclusively to establish a credit for the purchase of American goods by the French people. The transaction was in¬ terrupted, however, by the announcement of Secretary Bryan, on 15 August, that ˆSoans by American bankers to any foreign nation which is at war is inconsistent with the true spirit of neutrality.®

The superiority of the Allied Powers upon the sea made it impossible for the Central na¬ tions to import munitions from America. Therefore, they held it unneutral for the United States to sell powder, guns or shrapnel to any of the belligerents. On 15 October Rob¬ ert Lansing issued a statement giving the olfi-cial interpretation of the Department of State upon the obligations of neutrals in this matter. «In the first place,® he said, ‘bt shouhl be un¬ derstood that, generally speaking, a citizen of the United States can sell to a belligerent gov¬

ernment or its agent any article of commerce which he pleases. He is not prohibited from doing this by any rule of international law, by any treaty provisions or by any statute of the United States. It makes no difference whether the articles sold are exclusively for war pur¬ poses, such as firearms, explosives, etc., or are foodstuffs, clothing, horses, etc., for the use of the army or navy of the belligerent. Further¬ more, a neutral Government is not compelled by international law, by treaty, or by statute to prevent these sales to a belligerent. Such sales, therefore, by American citizens do not in the least affect the neutrality of the United States. It is true that such articles as those mentioned are considered contraband and are, outside the territorial jurisdiction of a neutral nation, sub¬ ject to seizure by an enemy of the purchasing Government, but it is the enemy’s duty to pre¬ vent the articles reaching their destination, not the duty of the nation whose citizens have sold them. If the enemy of the purchasing nation happens for the time to be’ unable to do this, that is, for him, one of the misfortunes of war ; the inability, however, imposes upon the neutral Government no obligation to prevent the sale.®

Despite this clear statement several bills were introduced into Congress, when it con¬ vened in December, to place an absolute em¬ bargo upon the exportation of arms and muni¬ tions of war to belligerent nations. Although great pressure was brought to bear on sena¬ tors and representatives to vote for these meas¬ ures, by German sympathizers, especially in the Middle West, they failed of

passage.

Secretary of State Bryan further elucidated the position of the government of the United States on this important point. ®Those in this country,® he said, ˆSvho sympathize with Ger¬ many and Austria-Hungary appear to assume that some obligation rests upon this Govern¬ ment, in the performance of its neutral duty, to prevent all trade in contraband, and thus to equalize the difference due to the relative naval strength of the belligerents. No such obliga¬ tion exists ; it would be an unneutral act, an act of partiality on the part of the Government, to adopt such a policy if the Executive had the power to do so. If German}ˆ and Austria-Hun¬ gary cannot import contraband from this coun¬ try it is not, because* of that fact, the duty of the United States to close its markets to the Allies. The markets of this country are open upon equal terms to all the world, to every na¬ tion, belligerent or neutral.®

Neutral Trade. — The war from the outset involved the United States in _ a diplomatic siruggle for the preservation of its rights as a neutral. It became the purpose of Great Brit¬ ain to prevent Germany from obtaining sup¬ plies of a warlike character from overseas countries. In this she could not fail to run counter to the interests of the United States, as that country was the great storehouse to which Europe must turn for everything it needed during the herculean struggle. In fact the situation was in many ways analogous to that during the years preceding the War of 1812, when the United States suffered so se¬ verely from the British Orders in Council and the commercial decrees of Napoleon Bonaparte.

The Declaration of London, signed by the

representatives of 10 leading powers in 1908, was intended to supply an international code relative to the matter of blockade, contraband, continuous voyages, convoy, unneutral service and indemnity for seizure. The declaration contained specific schedules of contraband and also a list of articles which should never be classed as contraband,

this list to include cotton, rubber, metallic ores and other raw materials. Unfortunately, however, it was ratified by only one power — the United States.

At the outbreak of war the American gov¬ ernment directed its representatives to inquire of the various belligerent countries whether they would agree that the Declaration of Lon¬ don be applicable to naval warfare during the conflict. Austria-Hungary and Germany as¬ sented, but Great Britain ˆdecided to adopt generally the rules and regulations in question, subject to certain modifications and additions.ˆˆ These additions were found to contain a new list of contraband, much* more extensive than that agreed upon by the delegates of the Lon¬ don conference. As the terms of the declara¬ tion required its acceptance as a whole the American government then withdrew its sug¬ gestion and announced that it would insist that its rights be defined only by the existing rules of international law and the treaties of the United States with the belligerents.

The problem for Great Britain was how to control trade to her enemies through neutral countries. The extent to which she could in¬ jure the Central Powers depended upon her ability to prevent transshipment of goods sent from overseas countries to Holland, Denmark, Italy and other neutral powers. On 30 October 1914 she ruled that conditional contraband con¬ signed to a neutral port was liable to seizure when the ultimate destination was plainly the enemy.

On the list of conditional contraband was placed foodstuffs, and over this there soon de¬ veloped a controversy with Holland and the United States. The British government claimed also the right to prevent the Germans from being fed through Holland by holding up shipments of food in excess of Dutch needs. Her attitude in regard to other conditional con¬ traband was similar.

Late in September two cargoes of copper were seized and requisitioned by Great Britain. In October three more shipments consigned ®to orderˆˆ in Italy were detained at Gibraltar. This was followed by the seizure of three American tankers, the John D. Rockefeller, the Brindilla and the Platuria.

Commerce was further endangered by the planting of mines by the various belligerents. Great Britain abstained entirely from the use of mines in neutral waters during the first two months of the war, but found it necessary to adopt counter-measures in order to cope with the German policy of mine-laying. On 3 Nov. 1914 the British admiralty declared the whole North Sea a military zone. ˆWithin this area

merchant shipping of all kinds, traders of all countries, fishing craft, and all other vessels will be exposed to the gravest dangers from mines which it has been necessary to lay and from warships searching vigilantly by night and by day for suspicious craft.^^ In justification of this it was declared that the Germans had scat¬

tered mines on the main route from the United States to England and that peaceful ships had already been blown up by this agency.

Injury done to the commerce of the United States by the policy of Great Britain finally brought forth, 26 Dec. 1914, a protest from the government. It viewed with concern, it said, ^ffhe large number of vessels laden with Ameri¬ can goods destined to neutral ports in Europe which have been seized on the high seas, taken into British ports, and detained sometimes for weeks by the British authorities.®

On 7 Jan. 1915 a preliminary reply was sent. His majesty's government concurred, it said, in the principle that neutrals should not be interfered with by 'a belligerent save when absolutely necessary to protect its safety, but claimed the right to interrupt contraband des¬ tined for an enemy country. As to the extent of British interference there had been much misconception. Exports from New York to Denmark, Sweden, Norway, Italy and Holland for the month of November 1914 were more than twice as great as for November 1913. ^^That the existence of a state of war on such a scale has had a very adverse effect upon cer¬ tain great industries, such as cotton, is obvious; but it is submitted that this is due to the gen¬ eral cause of diminished purchasing power of such countries as France, Germany and the United Kingdom, rather than to interference with trade with neutral countries.® The Brit¬ ish government pointed out that the exports of copper and foodstuffs to neutral powers adja¬ cent to the Central nations had increased rap¬ idly and that the presumption was clear that the bulk of the shipments were intended not for their own use, but for belligerent peoples.

^^We are confronted with the growing dan¬ ger that neutral countries contiguous to the enemy will become on a scale hitherto unprece¬ dented a base of supplies for the armed forces of our enemies and for materials for manufac¬ turing armament.®

The German government now took a step which further complicated the problems of neu-traE. On 26 Jan. 1915 the Federal Council pro¬ claimed the nationalization of food supplies, and seized all stocks of

corn, wheat and flour. Although the government gave formal assur¬ ance that foodstuffs imported from the United States would not be used for military or naval purposes, the effect upon British policy was in¬ evitable. On 22 January the Wilhelmina, loaded with flour, grain and other foodstuffs, cleared from New York for Hamburg. ®The new German decree … creates a novel situa¬

tion,® declared the British foreign office in a statement issued 4 Feb. 1915, ®and it is probable that if the destination and cargo of the Wilhelmina are as supposed, the cargo will, if the vessel is intercepted, be submitted to a prize court in order that the new situation created by the German decree may be examined and a decision reached upon it after full considera¬ tion.® The Wilhehnina, under stress of weather, entered Falmouth Harbor 9 February where she was seized and her cargo held for the prize court.

Germany now took a step of the utmost im¬ portance to neutrals. Feeling her helplessness against the British battle fleet, she deliberately determined to wage against her shipping a war

of extermination with submarines. On 4 Feb. 1915 she established a war zone about the Brit¬ ish Isles. ^^The waters around Great Britain, including the whole of the English Channel, are declared hereby to be included within the zone of war, and after the 18th inst. all enemy merchant vessels encountered in these Waters will be destroyed, even if it may not be possi¬ ble always to save their crews and passengers. Within this war zone neutral vessels are ex¬ posed to danger since, in view of the misuse of the neutral flags ordered by the Government of Great Britain on the 31st ultimo and of the hazards of naval warfare, neutral vessels can¬ not always be prevented from suffering from the attacks intended for enemy ships.^^

A few days later Great Britain submitted a second note to the United States concerning trade restrictions. Touching the important matter of foodstuffs, it said, ^“An elaborate ma¬ chinery has been organized by the enemy for supply of foodstuffs for the use of the Ger-m.an army

from overseas. Under these cir¬ cumstances it would be absurd to give any defi¬ nite pledge that in cases where the supplies can be proved to be for the use of the enemy forces they should be given complete immu¬ nity by the simple expedient of dispatching them to an agent in a neutral port. The rea¬ son for drawing a distinction between food¬ stuffs intended for the civil population and the armed forces itself disappears. In any coun¬ try in which there exists such tremendous or¬ ganization for war as now obtains in Germany, there is no clear division between those whom the Government is responsible for feeding and those whom it is not.^^

In the meanwhile Germany hastened to urge the United States to defend its right to ship foodstuffs to belligerents for civilian use, by protesting against the seizure of .the VV ilhel-niina. Should Great Britain use her naval su¬ premacy to cut off all overseas supplies, the effect upon the Central Powers would be most serious. Through Count von Bernstorff, her Ambassador at Washington, she offered assur¬ ance that the imported foodstuffs would be consumed by the civilian population exclusively. On 15 Feb. 1915 the Ambassador presented a note in which Germany offered to recede from the submarine campaign in return for the strict adherence of Great Britain to the rules of the Declaration of London. The United States promptly transmitted this note to the British Ambassador.

Sir Edward Grey replied in a note of 19 Feb. 1915. Pointing out that the brutal treat¬ ment accorded the Belgians by Germany, the destruction of merchant ships and innocent lives by the German mines, the firing on unde¬ fended British towns by German cruisers, the bombing of cities by airships, he declared^ it right for England «to take retaliatory meas¬ ures even if such measures were of a kind to involve pressure on the civil population.^^

On 20 Feb. 1915 the United States addressed to Great Britain and Germany identical notes suggesting a basis of settlement founded on expediency rather than on international law. It was proposed that neither should sow float¬ ing mines on the high seas, or in territorial waters, that neither plant on the high seas an¬ chored mines save within range of harbors;

that neither use submarines to attack merchant¬ men save for the purpose of visit and search; that each forbid its merchant ships to use neu¬ tral flags as a ruse de guerre. Germany was to promise that foodstuffs imported from the United States should be consigned to

agencies designated by the American government which should have entire charge of their distribution, and that such foodstuffs were not to be requi¬ sitioned by the German government. Great Britain was to agree not to make foodstuffs absolute contraband and not to interfere with them when consigned to American agencies in Germany.

The German government replied that it was prepared to agree to the proposal concerning floating mines, but would not renounce the use of anchored mines for purposes of offense. It practically accepted the provision concerning submarines, but insisted that the merchant ves¬ sels attacked must be unarmed and not resist by force. The regulation of importation of food ■ seemed to be in general acceptable, but Germany insisted that enemy governments must allow also the admission of the raw ma¬ terials on the list of the Declaration of Lon¬ don.

That the American compromise was en¬ tirely unacceptable to Great Britain was made clear by an announcement which she issued jointly with France, concerning the German war zone decree, and the retaliatory measures decided upon. ®The German declaration sub¬ stitutes indiscriminate destruction for regu¬ lated captures. Germany has adopted this method against the peaceful trader and the noncombatant, with the avowed object of pre¬ venting commodities of all kinds, including food for the civilian population, from reaching or leaving the British Isles or northern France. Her opponents are, therefore, driven to frame retaliatory measures in order in their turn to prevent commodities of any kind from reach¬ ing or leaving Germany. These measures will, however, be enforced by the British and French governments without risk to neutral ships or neutral noncombatant lives, and in strict ob¬ servation of the dictates of humanity. The British and French governments will, there¬ fore, hold themselves free to detain and take into port ships carrying goods of presumed enemy destination, ownership or origin. It is not intended to confiscate such vessels or cargoes unless they would otherwise be liable to con¬ fiscation. Vessels with cargoes which sailed before this date will not be affected.^^ The word blockade was purposely omitted from the note, but the measures announced were plainly a blockade of the German coast.

This measure, which threatened to end all direct commerce between Germany and over¬ seas countries, caused great dissatisfaction in the United States. On 5 March Secretary Bryan addressed a note to Great Britain and France asking how the embargo on German trade was to be enforced. In proposing to take into custody all ships trading with Germany, they had claimed a right belonging only to a state of

blockade. Yet neither vessels nor car¬ goes were to be confiscated unless otherwise liable to condemnation, which proposed a course of action as if no blockade existed. In his reply of 13 March 1915 Sir Edward Grey ad-

milled lhal his government proposed *lo es¬ tablish a blockade to prevent vessels carrying goods for or coming from Germany.® The failure to claim the right to confiscate ships or cargoes was due only to reluctance to exact from neutral vessels all the penalties of a breach of blockade.

At the same time a long memorandum was handed Ambassador Page, containing Great Britain's reply to the American suggestions con¬ cerning a basis of concessions. The German government, it said, had not accepted the pro¬ posals, and it might appear that _ to point to this fact would be for Great Britain a suffi¬ cient answer. But it desired to make a fuller statement of its whole position. Great Britain, in her conduct of the war, had observed strictly the rules of international law and the dictates of humanity. Germany, on the other hand, had been guilty of many grievous of¬ fenses ; it had maltreated the civilian popula¬ tion of Belgium and northern France, it had been cruel to British prisoners, it had bom¬ barded open coast towns, it had bombed by aircraft places of no military importance. Ger¬ many as well as the Allies had declared a blockade. *The difference between the two poli¬ cies is, however, that while our object is the same as that of Germany, we propose to at¬ tain it without sacrificing neutral ships or noncombatant lives, or inflicting upon neutrals the damage that must be entailed when a vessel and its cargo are sunk without notice, exami¬ nation, or trial.®

Great Britain was unquestionably within her rights in stopping direct trade with Germany, but an attempt to blockade trade with neutral

countries to prevent possible access to German territory was a far more dubious matter. Stirred to action by a guarded reference in the order to the possible necessity of blockading neutral ports the United States government, in a note of 30 March, took occasion to , enter a new protest. ®Such a blockade,® it said, ®would constitute, were its provisions to be actually carried into effect as they stand, a practical as¬ sertion of unlimited belligerent rights over neutral commerce within the whole European area, and an almost unqualified denial of the sovereign rights of the nations now at peace.® The novel feature of the blockade ˆfls that it embraces many neutral ports and coasts, bars access to them,' and subjects all neutral ships to approach them® to the same penalties as vessels bound for enemy ports. Such limita¬ tions on ships of a neutral nation were a dis¬ tinct invasion of its sovereign rights.

In the meanwhile the enforcement of the blockade order brought serious loss to Ameri¬ can shippers. During the month of March 73 vessels carrying American cargoes, almost all of which were bound for neutral ports, were diverted to the port of Kirkwall alone. Goods were seized on mere suspicion that they were destined for the enemy. Detained vessels, moreover, were compelled to pay storage, har¬ bor and other charges in advance of judicial determination of the validity of the seizures. To preserve the rights of American citizens in proceedings in the British prize courts, the United States government served on Great Britain a formal caveat against the substitution of her own enactments for international law. ®The Government of the United States,® it

said, ˆ"will insist upon their rights under the principles and rules of international law, as hitherto established, governing neutral trade in time of war, without limitation or impairment by orders-in-council or other municipal legis¬ lation by the British Government, and will not recognize the validity of prize-court proceed¬ ings taken under restraint imposed by British municipal law in derogation of the rights of American citizens under international law.®

Despite this warning the United States gov¬ ernment permitted the blockade to continue and even refused for months to renew its protests. Damage to American shipping continued to be extensive, and pro-German interests in America brought pressure on the administration to take action. The government, however, felt dis¬ inclined to hold Great Britain to strict ac¬ countability while it was suffering so grievously from wrongs at the hands of Great Britain's

arch enemy — Germany. It held that the de¬ fense of trade rights was of less importance than the protection of American lives from the deadly activities of the German submarines.

Submarine Warfare. — The German war zone decree went into effect on 18 Feb. 1915, and a campaign of submarine frightfulness en¬ sued without delay. It so happened, however, that the first serious clash between the United States and Germany came not as the result of a U-boat sinking, but of the attack upon an American vessel, the Frye, by an auxiliary cruiser, the Prince Eitel Friedrich. Despite its unlawful act this vessel entered Newport News 10 March, for protection against British war¬ ships. The United States promptly presented a claim for damages amounting to $228,059.44. Herr von Jagow, the German Foreign Secre¬ tary, maintained that the sinking of the Frye was quite in accordance with the principles of international law, since it was not possible to take the prize into a German port, but because of the Prussian-American treaty of 1799, the owners of the ship and the cargo would be com¬ pensated even if the court decided that the cargo was contraband.

On 1 May 1915, the following notice ap¬ peared in a number of American newspapers :

“ NOTICE I

“ Travelers intending to embark on the Atlantic voyage are reminded that a state of war exists between Germany and her allies and Great Britain and her allies: that the zone of war includes the waters adjacent to the British Isles: that, in accordance with formal notice given by the Imperial German Government, vessels flying the flag of Great Britain, or of any of her allies, are liable to destruction in tlios^i^ waters and that travelers sailing in the war zone on shii)s of Great Britain or her allies do so at their own risk.

“Imperial German Embassy.

“ ‘Washington, -D. C., April 22, 1915.”

This notice was published in accordance with wireless orders from the Berlin Foreign Office as a warning to persons booked for passage on the Cunard liner Lusitania which sailed from New York the same day. It was inserted in the newspapers under the notice of the sailing of the Lusitania, and shows that that great vessel had been deliberately singled out for destruc¬ tion.

A week later (7 May 1915) the Cunarder was attacked without

warning by a German submarine off the Irish coast, and went down with no less than 1,153 persons. Of the 188 Americans on board, 114 perished. A cry of

horror went up from all parts of the United btates. American citizens had been sent to their death by the deliberate action of the Ger-men government. From all sides pressure was brought upon President Wilson to demand prompt reparation for the. outrage. Had he so wished, he might have brought the country into the war at once upon the tide of popular indig¬ nation caused by this event. The feeling of resentment was increased by the undisguised elation of the German people at the sinking. The news was received in the consulate at Philadelphia with cheers. Throughout the Ger¬ man Empire it was celebrated as though it had been a great victory. Cities were decorated, school children were given a holiday, and a medal was struck to commemorate the event. Dr. Dernburg, the kaiser's spokesman in Amer¬ ica, immediately tried to allay indignation in America by a published defense of the sinking. ˆAVe have done and will do the best we can to avoid such trouble,® he said ; ˆTut we cannot allow Americans to be used as shields to get articles of war into the hands of the Allies. The death of the Americans might have been avoided if our warning had been heeded. We put in ad¬ vertisements and were careful to put them in next the advertisements of the Cunard line's sailing dates.®

A few days later the German Foreign Office sent a note which was delivered to Secretary Br3'an. *The German Government,® it said, ˆffiesires to express its deepest sympathy at the loss of lives on board the Lusitania. The re¬ sponsibility rests, however, with the British Government, which, through its plan of starving the civilian population of Germany, has forced Germany to resort to retaliating measures. In spite of the German offer to stop the submarine war in case the starvation plan was given up, British merchant vessels are being generally armed with guns, and have repeatedly tried to ram submarines, so that a previous search was impossible.®

On 11 May, President Wilson delivered an address in Philadelphia before an audience of 4,000 people. That the occasion would be util¬ ized by the President to give an intimation of the policy to be followed

by the government was anticipated by everyone. Although not mentioning the Lusitania bˆ' name, he made one statement which all the world accepted as an indirect reference to the sinking. ®The ex¬ ample of America,® he said, ˆˆmust be a special example. The example of America must be an example not of peace because it will not fight, but of peace because peace is the healing and elevating influence of the world and strife is not. There is such a thing as a man's being too proud to fight. There is such a thing as a nation's being so right that it does not need to convince others by force that it is right,®

The President afterward explained that these words did not foreshadow the policy of the administration toward Germany. He was de¬ fining only a .personal ˆattitude. However, many both in the United States and Germany still believed that under no circumstancesˆ would the government permit the submarine sinkings to lead to war.

On 13 May 1915, the first Lusitania note was made public. The recent violation of American rights on the high seas, it said, formed a series

of events which the government of the United States, had observed with growing concern, distress and amazement. It was loath to believe that these acts, so contrary to the rules and practices of modern warfare, could be sanctioned by the German government. The United States could not accept the creation of a war zone, oi admit ®the adoption of such measures or such a warning of danger to operate as in any degree an abbreviation of the rights of Amer¬ ican shipmasters or of American citizens bound on lawful errands as passengers on merchant ships of belligerent nationality; and that it must hold the Imperial German Government to a strict accountability for any infringement OI those rights, intentional or accidental.®

Secretary Bryan, on 31 May, made public the reply of von Jagow. The United States was wrong in assuming that the Lusitania was an unarmed merchantman, he said. In reality one of the largest and swiftest of the British auxiliary cruisers, carrying cannon con¬ cealed below decks, and contraband ˆincluding no less than 5,400 cases of ammunition intended for the destruction of the brave German sol- ' diers.® Gerrnany had a right to destroy this ammunition intended for the enemy. For the loss of American lives the British company was responsible by attempting to use neutral citizens as protection for explosives. Had it not been for the firing of these explosives the vessel would not have sunk so quickly and many lives would have been

saved.

This answer did not satisfy the American people. With the exception of the (ierman-American papers, the press was almost unani¬ mous in its criticism. It was agreed that the note was evasive, unconvincing and in no way met the demands of the American government.

While a second Lusitania note was in prepa¬ ration Secretary of State Bryan resigned from the Cabinet, at the same time giving to the press a statement of differences of opinion with the President which had led to this action. There were two chief points upon which agree¬ ment had been impossible. Mr. Bryan warmly advocated the submission to an international commission of the disputes with Germany, and he was in favor of ˆwarning Americans against travelling on belligerent vessels or with cargoes of ammunition.® ®Why should an American citizen be permitted to involve his country in war,® he said, ˆffiy travelling upon a belligerent ship when he knows that the ship will pass through a danger zone?®

The resignation of Mr. Bryan had little effect upon public opinion in the United States, but it created the impression in Germany that American councils were divided and that a large faction in the country were opposed to war under any circumstances.

The second Lusitania note was made public 11 June. The German government, in explain¬ ing the sinking of the Falaba, had contended that an attempt on the part of a merchant vessel to escape attack and secure help released the commander of the attacking submarine from all obligation to respect the lives and safety of those on board, even after the attempt had been relinquished. This contention the United States government vigorously combatted. ˆˆNothing but actual forcible resistance.® it said, ®or continued efforts tb escape by flight when

ordered to stop for the purpose of visit on the part of the merchantman has ever been held to forfeit the lives of passengers and crewdˆ

In regard to the Lusitania, the German note had stated that the United States government must have been unaware of the fact that the vessel had carried masked guns, trained gun¬ ners and ammunition. ^^Were these statements true,® the note replied, ®the Government of the United States wˆould have been bound to take official cognizance in performing its recognized duty as a neutral power and in enforcing its national laws. It was its duty to see to it that the Lusitania was not armed for offensive action, that she was not serving as a trans¬ port, that she did not carry a cargo prohibited by the statutes of the United States, and that if, in fact, she was a naval auxiliary of Great Britain, she should not receive her clearance as a merchantman, and it performed that duty and enforced its statutes with scrupulous vigilance through its regularly constituted officials® The government of the Unite'd States was able, therefore, ˆffo assure the Imperial German Government that it has been misinformed…

^^Whatever be the other facts regarding the • Lusitania, the principal fact is that a great steamer, primarily and chiefly a conveyance for passengers, and carrying more than a thousand souls who had no part or lot in the conduct of the war, was torpedoed and sunk without so much as a challenge or warning and that men, women and children were sent to their deaths in circumstances unparalleled in modern war¬ fare… .

^^The Government of the United States is contending for something much greater than mere rights of property or privileges of com¬ merce. It is contending for nothing less high and sacred than the rights of humanity which every government honors itself in respecting and which no government is justified in resign¬ ing on behalf of those under its care and authority… .

^^The Government of the United States, therefore, deems it reasonable to expect that the Imperial German Government will adopt the measures necessary to put these principles into practice in respect to the safeguarding of Amer¬ ican lives and American ships, and asks for assurances that this will be done.®

The German note in reply, which was pub¬ lished in America 8 July 1915, was neither con¬ ciliatory nor convincing. It once more tried to place the blame for submarine frightfulness upon Great Britain. The case of the Lusitania, it said, showed with horrible clearness to what jeopardizing of human lives the misdeeds of the Allies were leading. All distinction between merchant vessels and war ships had been done away with by the arming of British merchant¬ men and by the ramming of submarines.

the commander of the German submarine which destroyed the Lusitania, the note con¬ tinued, ˆ“had caused the crew and passengers to take to the boats before firing a torpedo this would have meant the sure destruction of his own vessel. After the experiences in sinking much smaller and less seaworthy vessels, it was to be expected that a mighty ‘ship like the Lusitania would remain above water long enough even after the torpedoing to permit pas¬ sengers to enter the ship’s boats. Circumstances of a very peculiar kind, especially the presence

on board of large quantities of highly explosive materials, defeated this expectation. In addi¬ tion, it may be pointed out that if the Lusitania had been spared, thousands of cases of muni¬ tions would have been sent to Germany’s ene¬ mies and thereby thousands of German mothers and children robbed of bread winners.®

In America the note was bitterly condemned. ˆˆThe fact that the Germans have thrice re¬ sponded to the demands of the United States with evasive notes,® said one journal, ®that they have with such scant courtesy as to border upon insult neglected the demands of the United States for reparation for the Lusitania incident, and have offered nothing as to the future pro¬ tection for American interests which the United States can consider with dignity or safety, has not failed to impress itself upon the American mind.®

President Wilson replied in a note of 21 July 1915. He declared the German note ˆUnsatis¬ factory because it fails to meet the real differ¬ ences between the two governments, and indi¬ cates no way in which the accepted principles of law and humanity may be applied in the grave matter in controversy, but proposes, on the contrary, arrangements for a partial sus¬ pension of those principles which virtually set them aside… .

ˆˆIllegal and inhuman acts, however justifi¬ able they may be thought to be against an enemy who is believed to have acted in contra¬ vention of law and humanity, are manifestly indefensible when they deprive neutrals of their acknowledged rights, particularly when they vio¬ late the right of life itself.®

The note closed with a warning. ®Friendship itself prompts® this government ˆffo say to the Imperial German Government that repeti¬ tions by the commanders of German naval ves¬ sels of acts in contravention of those rights must be regarded by the Government of the United States,ˆ when they affect American citizens, as deliberately

unfriendly.®

While the relations between the two nations were thus strained, news reached America that the British liner Arabic, while on her way from England to New York, had been torpedoed off the coast of Ireland, and had gone down with a loss of 44 persons, two of whom were Ameri¬ can citizens. Since the vessel had not been warned, since it carried no ammunition, the sinking seemed clearly to come within-the President's definition of an act ˆdeliberately unfriendly to the United States.® Many people expected that diplomatic relations would be broken off without further delay.

After a careful investigation of the incident Ambassador Page made a report to the govern¬ ment at Washington. From the evidence at hand it appeared that the Arabic had made no attempt to escape, had offered no resistance, had not tried to ram the submarine, and that the torpedo had been discharged without warning.

i he seriousness of the issue seems at last to have alarmed the German government and a decision was reached to modify the submarine campaign to conform if possible to the Presi¬ dent's wishes. On 1 September Ambassador von Bernstorff sent Secretary of State Lansing a note foreshadowing Germany's action. «With reference to our conversation this morning,® he said, ®I beg to inform you that my instruc¬ tions concerning our answer to your last Lusi-

tania note contains the following passage: ˆLin¬ ers will not be sunk by our submarines without warning and without safety to the lives of non-ccmbatants, provided that the liners do not try to escape or offer resistance,ˆ Although I know that you do not wish to discuss the Lusitania question until the Arabic incident has been definitely and satisfactorily settled, I de¬ sire to inform you of the above because this policy of my Government was decided on be¬ fore the Arabic incident occurred.®

Despite this assurance, the German govern¬ ment, after an inquiry of

its own into the sinking of the Arabic, refused to admit any obli¬ gation or grant any indemnity in the matter. The report of the commander of the submarine showed that the Arabic had apparently at¬ tempted to ram his vessel and that he had discharged the torpedo without warning to es¬ cape being himself sunk. But, continued the note, ®the German Government is unable, how¬ ever, to acknowledge any obligation to grant indemnity in the matter, even if the commander should have been mistaken as to the aggres¬ sive intentions of the Arabic A

From this position, however, the Imperial government soon retreated, and on 5 Oct. 1915, Count von Bernstorff informed Secretary Lans¬ ing that such stringent orders had been issued to submarine commanders as to make a recurrence of cases similar to that of the Arabic out of the question. In regard to the Arabic sinking itself, Germany regretted and disavowed the act, had so notified Captain Schneider, the com¬ mander of the submarine, and would pay indem¬ nity for the loss of American lives. On 7 Nov. 1915, the situation was complicated by the sink¬ ing of the Ancona, an Italian liner, by an Aus¬ trian submarine. The Ancona attempted to es¬ cape, but when fired upon and hit, stopped its engines. The vessel sank quickly and over 200 persons were lost, among them being nine Americans. Secretary Lansing made a demand for reparation and disavowal. Information at hand showed, he said, that after the vessel had stopped and before all the crew and passengers could take to the boats, she had been torpedoed and shelled, and that by drowning and gunfire American citizens had lost their lives. The con¬ duct of the submarine commander could only be ^characterized a wanton slaughter of defense¬ less noncombatants.® The United States there¬ fore demanded that the officer be punished and that reparation be made for the American citi¬ zens killed or injured.

The Austro-Hungarian government replied 15 Dec. 1915. The note was evasive, and in tone calmly insolent. The United States gov¬ ernment had blamed the submarine commander sharply, it said, ‘but had failed to specify upon what evidence it based its conclusions. Aus¬ tria-Hungary was in no way concerned with the attitude of the United States government in regard to submarine warfare as expressed in its notes to Germany, and could not be ex¬ pected to shape its policies in conformity thereto. No reference whatever was made to the demand for reparation, disavowal and pun¬ ishment for the submarine commander.

Secretary Lansing, on 19 Dec. 1915, an¬ swered this note. Baron Zwiedinek, he said, the Austrian Charge d’ Affaires, had transmitted a

report of the Austro-Hungarian Admiralty it¬ self on the sinking. In this report it was ad-VOL. 28 — 31

mitted that the vessel had been torpedoed after it had come to a stop and while passengers were still on board. This admission was enough to fix on the commander of the submarine the responsibility for having violated willfully the laws of nations. ^^The Government of the United States therefore finds no other course open to it, but to hold the Imperial and Royal Government responsible for the act of its naval commander and to renew the definite but re¬ spectful demands made in its communication of the sixth of December.®

The Austro-Hungarian government, prob¬ ably inspired from Berlin, now surrendered, and in a note of 29 December, agreed that hostile private ships, in so far as they did not flee or offer resistance, ®may not be destroyed until the persons on board have been placed in safety,® and announced that the officer who had sunk the Ancona had been punished, and prom¬ ised indemnity.

On 24 March 1916, the Sussex, a French passenger steamer, was torpedoed without warn¬ ing in the Channel, and although she kept afloat, some 90 persons were killed or wounded. The Sussex had never been used as a troop ship and carried no armament. An examination of the hull of the vessel by American officials established the fact that it had been a German made torpedo and not a mine that had caused the explosion.

In a note touching upon this affair the Ger¬ man government admitted that a strange vessel had been torpedoed in the Channel on 24 March, but contended that it was not the Sussex but a war vessel. The commander of the sub¬ marine had made a sketch of the ship, and the lines were those of a cruiser or mine-layer, not of a passenger ship.

On 19 April 1916, President Wilson's reply to the German note was printed in the news¬ papers. It was pointed out that all the cir¬ cumstances of the case mentioned in the Ger¬ man note corresponded exactly to the case in point, except the difference between the sketch and the lines of the Sussex, which was undoubt¬ edly due to the inaccuracy of the drawing. ^^The Government of the United States,® the Presi¬ dent continued, ®is forced by recent events to conclude that it is only one instance, even though one of the most extreme and most distressing instances, of the deliberate method and spirit of indiscriminate destruction of merchant ves¬ sels of all sorts,

nationalities, and destinations.

… . The Government of the United States has been very patient… . ® But the time

had now come for definite promises. Unless Germany ˆshould now immediately declare and effect an abandonment of its present methods of submarine warfare against passenger and freight-carrying vessels, the Government of the United States can have no choice but to sever diplomatic relations with the German Empire altogether.®

The German reply was handed to Ambas¬ sador Gerard on 4 May. It contained a defi¬ nite promise in regard to the future conduct of the U-boat campaign. ®The German Govern¬ ment… . notifies the Government of the

United States that the German naval forces have received the following orders: Hn ac¬ cordance with the general principles of visit and search and destruction of merchant vessels recognized by international law, such vessels.

both within and without the area declared as a naval war zone, shall not be sunk with¬ out warning and without saving human lives, unless these ships attempt to escape or offer resistance.ˆ

®The German Government is confident that, in consequence of the new orders issued to its naval forces, the Government of the United States will now also consider all impediments removed which may have been in the way of a mutual cooperation towards the restoration of the freedom of the seas during the war as suggested in the note of 23 July 1915, and it does not doubt that the Government of the United States will now demand and insist that the British Government shall forthwith observe the rules of international law universally rec¬ ognized before the war as they are laid down in the notes presented by the Government of the United States to the British Government on 24 Dec. 1914, and 5 Nov. 1915. Should the steps taken by the

Government of the United States not attain the object it desires to have the laws of humanity followed by all belligerent nations, the German Government would then be facing a new situation, in which it must reserve itself complete liberty of action.®

On 8 May, Secretary Lansing replied, accept¬ ing Germany's abandonment of the policy which had so menaced the good relations between the two countries, but expressly rejecting the at¬ tached condition. ^^The Government of the United States feels it necessary to state that it takes for granted,® he said, ˆfihat the Imperial German Government does not intend to imply that the maintenance of its newly announced policy is in any way contingent upon the course or result of diplomatic negotiations between the Government of the United States and any other belligerent Government, notwithstanding the fact that certain passages in the Imperial Govern¬ ment's note of the fourth instant appear to be susceptible of that construction.

®In order, however, to avoid any possible misunderstanding, the Government of the United States notifies the Imperial Government that it cannot for a moment entertain, much less dis¬ cuss, a suggestion that respect by German naval authorities for the rights of citizens of the United States upon the high seas should in any way or in the slightest degree be made contin¬ gent upon the conduct of any other Government affecting the rights of neutrals and noncom¬ batants.®

Thus in victory for the United States ended, for the time being the long diplomatic quarrel over unrestrained submarine warfare. President Wilson had forced Germany to acknowledge the principle of visit and search, had wrung from her a promise not to sink merchant vessels without warning, unless those vessels attempted to escape. It was a great triumph for the prin¬ ciples of humanity and for moderation in war¬ fare. It now remained to be seen how far Germany would adhere to her promises.

Peace Notes and America's Entry into the War. — On 9 Dec. 1915 Chancellor von Belb-mann-Hollweg announced that Germany was ready for peace. This was accepted by the belligerent powers as an invitation to a gen¬ eral discussion of peace terms, and in fact it was followed by a series of speeches and de¬ bates by the statesmen on both sides, but so profound was the distrust that in the end the

discussion came to nothing. Exactly a year after his first suggestion the

chancellor again announced to the Reichstag that the Central Powers were ready to enter into peace negotia¬ tions. The emperor, he said, in a deep moral and religious sense of duty toward' his nation and, beyond it, toward humanity, considered that the moment had come for official action toward peace. The official German note, which followed on 12 December, spoke of the war as having been forced on the Central Powers, boasted of their success in recent military opera¬ tions and the impregnable situation they then occupied. Yet they made the proposal to enter forthwith into peace negotiations. Their aims they declared were not to shatter or to annihi¬ late their adversaries.

This proposal was received with coldness in all the Allied countries. It was generally re¬ garded as an attempt to reap the benefit of successes that had reached their climax and to come to terms before the tide of war turned. Premier Briand spoke of the proposal as a ^^crude trap.® In every Allied country speeches by responsible men revealed the conviction that no good could come from overtures that made no guarantee against a repetition of aggression, that contained no hint of reparation. Lloyd George stated that Great Britain would con¬ tinue the struggle until she could secure ^^complete restitution, full reparation, effectual guar¬ antees.®

It was in the midst of this unpromising situ¬ ation that President Wilson, on 18 December, presented his peace proposal. Identical notes were telegraphed to each of the belligerent capitals suggesting that ®an early occasion be sought to call out from all the nations now at war such an avowal of their respective views as to the terms upon which the war might be con¬ cluded and the arrangements which would be deemed satisfactory as a guaranty against its renewal or the kindling of any similar conflict in the future, as would make it possible frankly to compare them.® The President pointed out that the ˆobjects which the statesmen of the belligerents on both sides have in mind in this war are virtually the same, as stated in general terms to their own people and to the world,® and that ®in the measures to be taken to secure the future peace of the world the people and Government of the United States are as vitally and as directly interested as the Governments now at war.®

It -was stated that the President ®has long had it in mind to offer® the suggestion for peace, which was in no way associated with the recent overtures of the Central Powers.

Three days later Secretary Lansing, in ex¬ plaining the reasons for sending the note, said : ˆTt is not our material interest we had in mind

when the note was sent, but more and more our own rights are becoming involved by the bel¬ ligerents on both sides, so that the situation is becoming increasingly critical.

mean that we are drawing nearer the verge of war ourselves and, therefore, we are entitled to know exactly what each belligerent seeks in order that we may regulate our conduct in the future.®

The Central Powers replied in practically identical notes on 26 December. They failed to state their peace terms, but proposed ˆffin imme¬ diate meeting of the delegates of the belligerent

States at a neutral piace.ˆˆ Before answering President Wilson's proposals, the Allies, 30 Dec. 1916, presented a joint reply to the German oner of the 12th. The German note, it said, contained only a ˆˆsham offer,® an attempt ˆffo justify in advance a new series of crimes,® It was ˆˆempty and insincere,® a mere ˆˆwar ma¬ noeuvre.® ˆˆOnce again the Allies declare that no peace is possible so long as they have not se¬ cured reparation of violated rights and liber¬ ties, recognition of the principle of nationali¬ ties, and of the free existence of small states, so long as they have not brought about a settle¬ ment calculated to end, once and for all, causes of long-standing menace to the nations, and to afford the only effective guarantees for the future security of the world.®

The Central Powers defended their case in notes addressed to the neutrals, issued by Ger¬ many and Austria-Hungary 11 Jan. 1917. The motives of the Central Powers in issuing their proposal of peace were set forth, and the moral pretensions of the Allies ridiculed. <ˆThe sin¬ cerity which our enemies deny to the proposal of the four allied powers cannot be allowed by the_ world to these demands if it recalls the fate of the Irish people, the destruction of the freedom and independence of the Boer Repub¬ lics, the subjection of Northern Africa by Eng¬ land, France and Italy, the suppression of for¬ eign nationalities in Russia, and, finally, the oppression of Greece, which is unexampled in history.® The schemes of the Allies, ˆaccording to the

statements of their responsible states¬ men, are directed, among other things, toward the conquest of Alsace-Lorraine and several Prussian provinces, the humiliation and diminu¬ tion of Austria-Hungary, the disintegration of Turkey, and the dismemberment of Bulgaria. In view of such war-aims, the demand for repa¬ ration, restitution and guarantees in the mouth of our enemies sounds strange.®

On 10 Jan. 1917, the Allies gave a joint re¬ ply to the note of President Wilson, supple¬ mented by a separate note from Belgium. Their war-aims had been formulated on many occa¬ sions by the chiefs of their divers govern¬ ments. ^^Thc civilized world knows that they imply, in all necessity and in the first instance^^ the restoration of Belgium, Serbia and Mon¬ tenegro with indemnities ; the evacuation of the invaded territories of France, Russia and Ru¬ mania, with just reparation ; restitution of prov¬ inces or territories wrested in the past from the Allies by force or against the will of their populations ; liberation from foreign domination of Italians, Slavs, Rumanians and Czecho¬ slovaks ; enfranchisement of populations sub¬ ject to the bloody tyranny of the Turks and the expulsion from Europe of the Ottoman Empire ; the creation of a free Poland from Russian, German and Austro-Hungarian territory; a reorganization of Europe founded upon respect of nationalities, and full security and liberty of economic development for all nations; interna¬ tional agreements to guarantee territorial and maritime frontiers against unjustified attacks.® On 22 Jan. 1917, President Wilson unex¬ pectedly appeared before the Senate and de¬ livered an address which caused a profound sensation in Europe. First of all, he said, there must be peace without victory. Victory would mean peace forced upon the loser, a victor's terms forced upon the vanquished.

American cooperation in guaranteeing peace must depend on the nature of the settlement it¬ self. Since both sides had stated that it was not their intention to crush their antagonists, it must be a peace between equals. It must be a peace founded upon an equality of rights among the nations, irrespective of their size or strength ; it must be a peace based upon the principle that governments derive all their just powers from the consent of the governed. The acceptance of this principle, he said, would im¬ ply the inviolable security of life, of worship, and of industrial and social development to all the peoples who have hitherto lived under governments not responding to their wishes. Every great people should be assured of direct access to the sea. Freedom of the seas should be assured. There must be limitations of arma¬ ments, military and naval.

The mass of discussion which this address called forth in Europe and America was in¬ terrupted by a note from Germany on 31 Jan. 1917, announcing the immediate resumption of ruthless submarine warfare. This note took cognizance of the President's address, and Ger¬ many declared herself ready to accept self-government and equality of rights for all na¬ tions, the freedom of the seas, the open door, and the repudiation of comnelling alliances. But since the attempts of the Central Powers to bring peace had not succeeded, it was now necessary to fight to the bitter end. Thus forced to fight for existence the Imperial gov¬ ernment could not neglect the full employment of all the weapons which were at its disposal.

Two memoranda accompanied the note. ^^Germany will meet the illegal measures of her enemies,® said the first, ^^by forcibly prevent¬ ing after 1 Feb. 1917, in a zone around Great Britain, France, Italy and the eastern Mediter¬ ranean, all navigation, that of neutrals included, from and to England, from and to France, *etc.* All ships met within that zone will be sunk.® The other memorandum defined the boundaries of the barred zones, and the open routes through them and stated the rules for the guidance of American shipping.

This note threw down the gauntlet to the United States. That diplomatic relations would be severed at once was considered certain. Either the President must act, or make a com¬ plete surrender of all he had gained through long months of patient diplomatic endeavor. In fact on 3 Feb. 1917, Mr. Wilson announced to Congress that relations with Germany had been severed. think you will agree with me,® he said ˆffhat, in view of this declara¬ tion, which suddenly and without prior intima¬ tion of any kind, deliberately withdraws the solemn assurance given in the Imperial govern¬ ment's note of the 4th of May 1916, this govern¬ ment has no alternative consistent with the dignity and honor of the United States but to take the course which, in its note of the 18th of April 1916, it announced that it would take in the event that the German government did not declare and effect an abandonment of the methods of submarine warfare which it was then employing and to which it now purposes to again resort. I have, therefore, directed the Secretary of State to announce to his Excel¬ lency the German Ambassador that all diplo¬ matic relations between the United States and the German Empire are severed, and that the

American Ambassador at Berlin will imme¬ diately be withdrawn; and, in accordance with this decision, to hand to his Excellency his passports.

The President still trusted that the Ger¬ man authorities would not ro so far as to de¬ stroy American ships and take American lives on the high seas. Should this, however, hap¬ pen, he would take the liberty of coming again before Congress to ask that authority be given him to use any means necessary for the pro¬ tection of American seamen and other citizens.

Germany, meanwhile, had actually begun the sinking of merchant vessels without warning. But the damage done to American shipping was

more in apprehension than in fact, as the fear of sinking had kept hundreds of vessels in har¬ bor. President Wilson, therefore, appeared again before Congress and requested that the authority be given him to supply merchant ships with defensive arms. This request met with vigorous opposition from a small group of senators, and by an active filibuster, was held up for some days. In the end it was passed by an amendment of the Senate's rules which pro¬ vided that by a two-thirds vote a measure might be brought to an immediate vote.

In the meanwhile the country was further aroused against Germany by the publication by the Associated Press of a plan to embroil the United States in war with Mexico and Japan. On 19 Jan. 1917, the German Minister to Mex¬ ico had been instructed bv Foreign Minister

Zimmerman to propose an alliance with Mexico against the United States.

^^On the first of February,^^ the instructions said, *we intend to begin submarine warfare un¬ restricted. In spite of this, it is our intention to endeavor to keep neutral with' the United States of America. If this attempt is not suc¬ cessful, we propose an alliance on the following basis with Mexico: That we shall make war together and together make peace. We shall give general financial support and it is under¬

stood that Mexico is to reconquer the lost terri¬ tory of New Mexico, Texas and Arizona. The details are left for settlement.

«You are instructed to inform the President of Mexico of the above in the greatest confi¬

dence as soon as it is certain that there will be an outbreak of war with the United States, and suggest that the President of Mexico, on his own initiative, should communicate with Japan, suggesting adherence at once to the plan, and at the same time to offer to mediate between Germany and Japan. Please call to the atten¬ tion of the President of Mexico that the em¬ ployment of ruthless submarine warfare now promises to compel England to make peace in a few monlhs.^^

During the month of March news reached the United States that three American merchant ships, the City of Memphis, the Illinois and the Vigilancia, had been sunk by German subma¬ rines. This news influenced President Wilson to call Congress into extraordinary session on 2 April 1917.

The President's address to the Congress follows :

I have called the Congress into extraordinary session because there are serious, very serious, choices of policy to be rnade immediately, which it was neither right nor constitutionally permissible that I should assume the responsi¬ bility of making.

On the 3d of February last I officially laid before you the extraordinary announcement of the Imperial German Gov¬ ernment that on and after the first day of February it was its purpose to put aside all restraints of law or of humanity and use its submarines to sink every vessel that sought to approach either the ports of Great Britain and Ireland or the western coasts of Europe or any of the ports controlled by the enemies of Germany within the Mediterranean. That had seemed to be the object of the German warfare earlier in the war, but since April of last year the Imperial Government had some¬ what restrained the commanders oi its under-sea craft, in conformity with

its promise, then given to us, that passenger boats should not be sunk and that due warning would be given to all other vessels which its submarines might seek to destroy, when no resistance was offered or escape attempted, and care taken that their crews were given at least a fair chance to save their lives in their open boats. The precau¬ tions taken were meagre and haphazard enough, as was proved in distressing instance after instance in the progress of the cruel and unmanly business, but a certain degree of restraint was observed.

The new policy has swept every restriction aside. Vessels of every kind, whatever their flag, their character, their cargo, their destination, their errand, have been ruthlessly sent to the bottom without warning and without thought of help or mercy for those on board, the vessels of friendly neutrals along with those of belligerents. Even hospital ships carrying relief to the sorely bereaved and stricken people of Belgium, though the latter were provided with safe conduct through the proscribed areas by the German government itself and were distinguished by unmistakable marks of identity, have been sunk with the same reckless lack of compassion or of principle.

“ I was for a little while unable to believe that such things would in fact be done by any government that had hitherto subscribed to humane practices of civilized nations. Inter¬ national law had its origin in the attempt to set up some law which would be respected and observed upon the seas, where no nation has right of dominion and where lay the free high¬ ways of the world. By painful stage after stage has that law been built up, with meagre enough results indeed, after all was accomplished that could be accomplished, but always with a clear view, at least, of what the heart and conscience of mankind demanded.

“ This minimum of right the German government has swept aside, under the plea of retaliation and necessity and because it had no weapons which it could use at sea except these, which it is impossible to employ, as it is employing them, without throwing to the wind all scruples of humanity or of respect for the understanding that was supposed to underlie the intercourse of the world.

“I am not now thinking of the loss of property involved, immense and serious as that is, but only of the wanton and wholesale destruction of the lives of noncombatants, men, women, and children, engaged in pursuits which have always, even in the darkest periods of modern history, been deemed innocent and legitimate. Property can be paid for; the lives of peaceful and innocent people cannot be. The present German submarine warfare against commerce is a warfare against

mankind.

“ It is a war against all nations. American ships have been sunk, American lives taken, in ways which it has stirred us very deeply to learn op, but the ships and people of other neutral and friendly nations have been sunk and overwhelmed in the waters in the same way. There has been no discrimination.

“The challenge is to all mankind. Each nation must decide for itself how it will meet it. The choice we make for ourselves must be made with a moderation of counsel and a temperate¬ ness of judgment befitting our character and our motives as a nation. We must put excited feelings away. Our motive will not be revenge or the victorious assertion of the physical might of the nation, but only the vindication of right, of human right, of which we are only a single champion.

“ When I addressed the Congress on the 26th of February last I thought that it would suffice to assert our neutral rights with arms, our right to use the seas against unlawful inter¬ ference, our right to keep our people safe against unlawful violence. But armed neutrality, it now appears, is imprac¬ ticable, Because submarines are in effect outlaws, when used as the German submarines have been used against merchant shipping, it is impossible to defend ships against their attacks as the law of nations has assumed that mer¬ chantmen would defend themselves against privateers or cruisers, visible craft giving chase upon the open sea. It is common prudence in such circumstances, grim necessity indeed, to endeavor to destroy them before they have shown their own intention. They must be dealt with upon sight, if dealt with at all.

“The German government denies the right of neutrals to use arms at all within the areas of the sea which it has pro¬

scribed, even in the defence of rights which no modern pub¬ licist has ever before questioned their right to defend. The intimation is conveyed that the armed guards which we have placed on our merchant ships will be treated as beyond the pale of law and subject to be dealt with as pirates would be. Armed neutrality is ineffectual enough at best; in such cir¬ cumstances and in the face of such pretensions it is more than ineffectual; it is likely only to produce what it was meant to prevent; it is practically certain to draw us into the war wˆhout either the rights or the effectiveness of belligerents.

There is one choice we cannot make, we are incapable of rnaking; we will not choose the path of submission and suffer the most sacred rights of, our nation and our people to be Ignored or violated. The wrongs against which we now array ourselves are no common wrongs; they cut to the very roots of human life.

With a profound sense of the solemn and even tragical step I am taking and of the grave responsi¬ bilities which it involves, but in unhesitating obedience to what I deem my constitutional duty, / advise that the Congress declare the recent course of the Imperial German Government to be in fact nothing less than war against the Government and people of the United States; that it formally accept the status of belligerent which has thus been thrust upon it; and that it take immediate steps not only to put the country in a more thorough state oj defence but also to exert all its pmver and employ all its resources to bring the government of the German Empire to terms and end the war.

“ What this will involve is clear. It will involve the ut¬ most practicable cooperation in counsel and action with the governments now at war with Germany, and, as incident to that, the extension to those governments of the most liberal financial credits, in order that our resources may so far as possible be added to theirs.

“ It will involve the organization and mobilization of all the material resources of the country to supply the materials of war and serve the incidental needs of the nation in the most abundant and yet the most economical and efficient way possible, “-esj:

“ It will involve the immediate full equipment of the navy in all respects, but particularly in supplying it with the best means of dealing with the enemy’s submarines.

“ It will involve the immediate addition to the armed forces of the United States, already provided for by law in case of war, of at least .500,000 men, who should, in my opinion, be chosen upon the principle of universal liability to service, and also the authorization of subsequent additional incre¬ ments of equal force so soon as they may be needed and can be handled in training.

“ It will involve also, of course, the granting of adequate credits to the government, sustained, I hope, so far as they can equitably be sustained by the present generation, by well conceived taxation.

“ I say sustained so far as may be equitable by taxation, because it

seems to me that it would be most unwise to base the credits, which will now be necessary, entirely on money borrowed. It is our duty, I most respectfully urge, to pro¬ tect our people, so far as we may, against the very serious hardships and evils which would be likely to arise out of the inflation which would be produced by vast loans.

“ In carrying out the measures by which these things are to be accomplished we should keep constantly in mind the wisdom of interfering as little as possible in our own prepara¬ tion and in the equipment of our own military forces with the duty — for it will be a practical duty — of supplying the nations already at war with Germany with the materials which they can obtain only from us or by our assistance. They are in the field and we should help them in every way to be effective there.

“ I shall take the liberty of suggesting through the several executive departments of the government, for the considera¬ tion of your committees, measures for the accomplishment of the several objects I have mentioned. I hope that it will be your pleasure to deal with them as having been framed after very careful thought by the branch of the government upon whom the responsibility of conducting the war and safeguarding the nation will most directly fall.

“ While we do these things, these deeply momentous things, let us be very clear, and make very clear to all the world, what our motives and our objects are. My own thought has not been driven from its habitual and normal course by the unhappy events of the last two months, and I do not believe that the thought of the nation has been altered or clouded by them. I have exactly the same thing in mind now that I had in mind when I addressed the Senate on the 2 2d of January last; the same that I had in mind when I addressed the Congress on the 3d of February and on the 26th of February. Our object now, as then, is to vindicate the principles of peace and justice in the life of the world as against selfish and autocratic power, and to set up among the really free and self-governed peoples of the world such a coficert of purpose and of action as will henceforth insure the observance of those principles.

“ Neutrality is no longer feasible or desirable where the peace of the world is involved and the freedom of its peoples, and the menace to that peace and freedom lies in the existence of autocratic governments, backed by organized force whicn is controlled wholly by their will, not by the will of their

people. We have seen the last of neutrality in such circurn-stances. We are at the beginning of an age in which it will be insisted that the same standards of conduct and of respon¬ sibility for v/rong done shall be observed among nations and their governments that are observed among the individual citizens of civilized states.

“ We have no quarrel with the German people. We have no feeling toward them but one of sympathy and friendship. It was not upon their impulse that their government acted in entering this war. It was not with their previous knowl¬ edge or approval. It was a war determined upon as wars used to be determined upon in the old, unhappy days, when peoples were nowhere consulted by their rulers and wars were provoked and waged in the interest of dynasties or of little groups of ambitious men who were accustomed to use their fellow men as pawns and tools.

“Self-governed nations do not fill their neighbors’ states with spies or set the course of intrigue to bring about some critical posture of affairs which will give them an opportunity to strike and make conquest. Such designs can be success¬ fully worked out only under cover and where no one has the right to ask questions. Cunningly contrived plans of decep¬ tion or aggression, carried, it may be, from generation to generation, can be worked out and kept from the light only within the privacy of courts or behind the carefully guarded confidences of a narrow and privileged class. They are happily impossible where public opinion commands and insists upon full information concerning all the nation’s affairs.

“ A steadfast concert for peace ♦can never be maintained except by a partnership of democratic nations. No auto¬ cratic government could be trusted to keep faith within it or observe its covenants. It must be a league of honor, a partnership of opinion. Intrigue would eat its vitals away; the plottings of inner circles who could plan what they would and render account to no one would be a corruption seated at its very heart. Only free peoples can hold their purpose and their honor steady to a common end and prefer the interests of mankind to any narrow interest of their own.

“ Does not every American feel that assurance has been added to our hope for the future peace of the world by the wonderful and heartening things that have been happening within the last few weeks in Russia? Russia was known by those who knew her best to have been always in fact demo¬ cratic at heart in all the vital habits of her thought, in all the intimate relationships of her people that spoke their natural instinct, their habitual attitude toward life. The autocracy that crowned the summit of her political structure, long as it had stood and terrible as was the reality of its power, was not in fact Russian in origin, character, or purpose; and now it has been shaken off and the great, generous Russian people have been added, in all their native majesty and might, to the forces that are fighting for freedom in the world, for

i’ustice, and for peace. Here is a fit partner for a League of lonor.

“ One of the things that has served to convince us that the Prussian autocracy was not and could never be our friend is that from the very outset of the present war it has filled our unsuspecting communities, and even our offices of government, with spies and set criminal intrigues everywhere afoot against our national unity of counsel, our peace within and without, our industries and our commerce. Indeed, it is now evident that its spies were here even before the war began; and it is unhappily not a matter of conjecture but a fact proved in our courts of justice, that the intrigues which have more than once come perilously near to disturbing the peace and dislocating the industries of the country, have been carried on at the instigation, with the support, and even under the personal direction of official agents of the Imperial Govern¬ ment accredited to the Government of the United States.

“ Even in checking these things and trying to extirpate them we have sought to put the most generous interpretation possible upon them because we knew that their source lay, not in any hostile feeling or purpose of the German people toward us (who were, no doubt, as ignorant of them as we ourselves were), but only in the selfish designs of a government that did what it pleased and told its people nothing. But they have played their part in serving to convince us at last that that government entertains no real friendship for us, and means to act against our peace and security at its con¬ venience. That it means to stir up enemies against us at our very doors the intercepted note to the German Minister at Mexico City is eloquent evidence.

“ We are accepting this challenge of hostile purpose because we know that in such a government, following such methods, we can never

have a friend; and that in the presence of its organized power, always lying in wait to accomplish we know not what purpose, can be assured security for the democratic government of the world. We are now about to accept the gage of battle with this natural foe to liberty and shall, if necessary, spend the whole force of the nation to check and nullify its pretensions and its power. We are glad, now that we see the facts, no veil of false pretense about them, to fight thus for the ultimate peace of the world and for the liberation of its peoples, the German peoples included; for the rights of nations, great and small, and the privilege of men everywhere to choose their way of life and of obedience.

“ The world must be made safe for democracy. Its peace must be planted upon the tested foundations of political

liberty We have no selfish ends to serve.. We desire no conquest, no dominion. We seek no indemnities for onr-selves, no material compensation for the sacrifices we shall freely make. We are but one of the champions of the rights of mankind. We shall be satisfied when those rights have been made as secure as the faith and the freedom of nations can make them.

“Just because we fight without rancor and’ without selfish object, seeking nothing for ourselves but what we shall wish to share with all free peoples, we shall, I feel confident, con¬ duct our operations as belligerents without passion and ourselves observe with proud punctilio the principles of right and of fair play we profess to be fighting for.

“ I have said nothing of the governments allied with the Imperial Government of Germany because they have not made war upon us or challenged us to defend our right and our honor. The Atistro-Hungarian government has, indeed, avowed its unqualified indorsement and acceptance qf the reckless and lawless submarine warfare, adopted now without disguise by the Imperial German Government, and it has therefore not been possible for this government to receive Count Tarnowski, the Ambassador recently accredited to this government by the Imperial and Royal Government of Austria-Hungary; but that government has not actually engaged in warfare against citizens of the United States on the seas, and I take the liberty, for the present at least, of postponing a discussion of our relations with the authorities at Vienna. We enter this war only where we are clearly forced into it because there are no other means of

defending our rights.

“ It will be all the easier for us to conduct ourselves as belligerents in a high spirit of right and fairness because we act without animus, not with enmity toward a people or with the desire to bring any injury or disadvantage upon them, but only in armed opposition to an irresponsible government which has thrown aside all considerations of humanity and of right and is running amuck.

“We are, let me say again, the sincere friends of the Ger¬ man people, and shall desire nothing so much as the early re-establishment of intimate relations of mutual advantage between us, however hard it may be for them for the time being to believe that this is spoken from our hearts. We have borne with their present government through all these bitter months because of that friendship, exercising a patience and forbearance which would otherwise have been impossible.

” We shall happily still have an opportunity to prove that friendship in our daily attitude and actions toward the mil¬ lions of men and women of German birth and native sym¬ pathy who live among us and share our life, and we shall be proud to prove it toward all who are in fact loyal to their neighbors and to the government in the hour of test. They are most of them as trtie and loyal Americans as if they had never known any other fealty or allegiance. They will be prompt to stand with us in rebuking and restraining the few who may be of a different mind and purpose. If there should be disloyalty it will be dealt ■with with a firm hand of stern repression; but if it lifts its head at all, it will lift it only here and there and without countenance except from a lawless and malignant few.

“It is a distressing and oppressive duty, gentlemen of the Congress, which I have performed in thus addressing you. There are, it may be, many months of fiery trial and sacrifice ahead of us. It is a fearful thing to lead this great, peaceful people into war, into the most terrible and disastrous of all wars, civilization itself seeming to be in the balance.

“ But the right is more precious than peace, and we shall fight for the things which we have always carried nearest our heart — for democracy, for the right of those who submit to authority to have a voice in their own governments, for the rights and liberties of small nations, for a universal dominion of right by siich a concert of free peoples as shall bring peace and safety to all nations and make the world itself at last free.

“ To such a task we can dedicate our lives and our fortunes, everything that we are and everything that we have, with the pride of those who know that the day has come when America IS privileged to spend her blood and her might for the princi¬ ples that gave her birth and happiness and the peace which she has treasured.

“ God helping her, she can do no other.”

The same evening a resolution was intro¬ duced into each House declaring that a state o£ war existed. After a debate of 13 hours the resolution passed the Senate. On the morn¬ ing of 6 April 1917, the House also passed the resolution by the vote of 373 to 50.

The example of the United States had a pro¬ found effect on other neutral states. On 10 April, Brazil severed diplomatic relations with Germany. The same day Argentina endorsed the action of the United States. Bolivia sev¬ ered relations with Germany 13 April. Para¬ guay and Uruguay recognized the justice of

the course of action of the United States. Cuba declared war on Germany.

The Pope’s Peace Note and the Fourteen Points. — On 1 Aug. 1917, Pope Benedict XV addressed a note to the rulers of the belligerent peoples. The note spoke of the Pope’s impar¬ tiality during the war, his good will to all, and of previous endeavors to bring the peoples and their rulers to more moderate resolutions. He invited the warring

powers to agree on the following points ; the replacement of the force of arms by the moral force of right ; reciprocal disarmament ; the acceptance of the principles of arbitration with penalties to be laid on any state refusing to arbitrate a national question or to accept the decision ; in¬ demnity for damage done ; the waiving of the cost of the war; entire and reciprocal condona¬ tion; Belgium to be evacuated with guarantees for her political, military and economic inde¬ pendence; the German colonies to be returned in payment for the evacuation of the occupied regions of France; territorial questions such as those concerning Alsace-Lorraine, Trieste, Trent, to be submitted to peaceful negotiation; community of the sea to be established. ®Such are the principal bases,^^ he said, ^%hereon we believe the future reorganization of the peoples ought to be builU^

The Pope's note* called forth a number of comments from the leading statesmen of both sides. The reply of President Wilson dated 27 August was generally accepted as expressive of the sentiment in all the Allied nations. The appeal of his Holiness, said Mr. Wilson, was in effect a proposal to return to the status ante helium, with certain modifications. But it was clear that no part of the program could be carried out unless there was a firm and lasting basis for it. ®We cannot take the word of the present rulers of Germany as a guarantee of anything that is to endure, unless explicitly supported by such conclusive evidence of the will and purpose of the German people them¬ selves as the other peoples of the world would be justified in accepting. Without such guar¬ antees treaties of settlement, agreements for disarmament, covenants to set up arbitration in the place of force, territorial adjustments, reconstitutions of small nations, if made with the German Government, no man, no nation could now depend on. We must wait some new evidence of the purposes of the great peoples of the Central Powers.®

As months passed and the war continued there grew up an insistent demand, in Germany as well as in the Allied countries, that the nations at war with the Central Powers should make a new statement of their purposes and aims. This demand Premier Lloyd George attempted to meet, by an address delivered 5 Jan. 1918, to the delegates of the British trade unions. A more elaborate statement followed from Presi¬ dent Wilson on 8 January, summarizing the ^^program of the world's peace® under 14 heads.

Open covenants of peace, openly arrived at, after which there shall be no private inter¬ national understandings of any kind, but diplo¬ macy shall proceed always frankly and m the

public view. , . . ,

«2. Absolute freedom of navigation upon the

seas outside territorial waters, alike in peace and ‘in war, except as the seas may be closed in

whole or in part by international action for the enforcement of international covenants.

^^3. The removal, so far as possible, of all economic barriers and the establishment of an equality of trade conditions among all the nations consenting to the peace and associating themselves for its maintenance.

M. Adequate guarantees given and taken that national armaments will be reduced to the low¬ est point consistent with domestic safety.

®5. A free, open-minded and absolutely im¬ partial adjustment of all colonial claims, based upon a strict observance of the principle that in determining all such questions of sovereignty the interests of the population concerned must have equal weight with the equitable claims of the government whose title is to be determined.

®6. The evacuation of all Russian territory and such a settlement of all questions affecting Russia as will secure the best and freest coopera¬ tion of the other nations of the world in obtain¬ ing for her an unhampered and unembarrassed opportunity for the independent determination of her own political development and national policy and assure her of a sincere welcome into the society of free nations under institutions of her own choosing; and, more than a welcome, assistance also of every kind that she may need and may herself desire. The treatment accorded Russia by her sister nations in the months to come will be the acid test of their goodwill, of their comprehension of her needs as distin¬ guished from their own interests, and of their intelligent and unselfish sympathy.

®7. Belgium, the whole world will agree, must be evacuated and restored without any attempt to limit the sovereignty which she enjoys in common with all other free nations. No other single act will serve as this will serve to re¬ store confidence among the nations in the laws which they have themselves set and determined for the government of their relations with one another. Without this healing act the whole structure and validity of international law is forever

impaired.

®8. All French territorv should be freed and the invaded portions restored and the wrong done to France by Prussia in 1871 in the matter of Alsace-Lorraine, which has unsettled the peace of the world for nearly fifty years, should be righted in order that peace may once more be made secure in the interests of all.

^^9. A readjustment of the frontiers of Italy should be effected along clearly recognizable lines of nationality.

®10. The peoples of Austria-Hungary, whose place among the nations we wish to see safe¬ guarded and assured, should be accorded the freest opportunity of autonomous development.

«11. Rumania; Serbia and Montpiegro should be evacuated; occupied territories restored; Serbia accorded free and secure access to the sea; and the relations of the several Balkan States to one another determined by friendly counsel along historically established lines of allegiance and nationality; and international guarantees of the political and economic inde¬ pendence and territorial integrity of the several Balkan States should be entered into.

ˆ42. The Turkish portions of the present Ottoman empire should be assured a secure sovereignty, but the other nationalities which are now under Turkish rule should be assured

an undoubted security of life and an absolutely unmolested opportunity of autonomous develop¬ ment, and the Dardanelles should be perma¬ nently opened as a free passage to the ships and commerce of all nations under international guarantees,

®13. An independent Polish State should be erected which should include the territories in¬ habited by indisputably Polish populations, which should be assured a free and secure access to the sea, and whose political and economic in¬ dependence and territorial integrity

should be guaranteed by international covenant.

®14. A general association of nations must be formed under specific covenants for the purpose of affording mutual guarantees of political in¬ dependence and territorial integrity to great and small States alike.”

Secret Treaties. — When the World War broke out in the summer of 1914 Italy, although a member of the Triple Alliance, declared her neutrality. Her interests lay counter to, rather than in accord with, those of Austria-Hungary and Germany. Moreover, under Article VII of the Alliance, she put forth a claim at the Aus¬ trian Court for territorial compensation con¬ tingent upon the invasion of Serbia. This claim was vigorously resisted, but on 20 Dec. 1914, Count Berchtold yielded the principle. The Italian Foreign Minister Sonnino next pro¬ ceeded to demand that the compensation should be made from Austro-Hungarian territory itself. He made it clear that what was wanted was the Trentino and Trieste. After long negotiations, Baron Burian, who had succeeded Count Berchtold as Minister of Foreign Affairs, inti¬ mated that any cession of Austro-Hungarian territory was impossible, and countered with de¬ mands for compensation because of the Italian occupation of the Dodecanese Islands during the war with the Ottoman empire. Whereupon Italy withdrew her former proposals and served notice on Austria-Hungary that she would re¬ gard an invasion of Serbia as a violation of the stipulations of the Triple Alliance.

Germany here intervened to prevent war, and Austria-Hungary was persuaded to agree to the principle of cession of territory. Since, how¬ ever, Italy insisted upon immediate cession and Austria-Hungary resisted this demand, Germany offered to guarantee that the cession should be made at the conclusion of peace. This Sonnino refused, and 24 March 1915, Burian agreed ®to a cession of territories in the southern Tyrol, including the city of Trent.^^ Sonnino replied that the offer was inadequate. On 8 April 1915, Sonnino made his final demands. Italy must have all the Italian Trentino and a part of Istria. Trieste was to be constituted a free state. In return Italy was to pay 200,- 000,000 lire in gold, and guarantee neutrality during the war.

The refusal of Count Burian was a foregone conclusion, and Italy immediately came to terms with the Allies in a secret treaty signed at London. According to this agreement, Italy was to enter the war on the side of the Allies, and in return for this, there was allotted to her, if she could conquer it, a mass of Austro-Hungarian territory on the coast of the Adriatic, including all of Gorizia, Gradisca and Istria, with

the city of Trieste, top-ether with the coastal province of Dalmatia as far as a line just north of Spalato. In addition she was to

receive most of the Dalmatian islands, and practically all of the Trentino. On 3 May 1915, Italy declared herself no longer bound by the Triple Alliance and on 23 May pronounced a state of war with Austria-Hungary.

Immediately after the outbreak of the World War the late King Carol of Rumania an¬ nounced to his advisers his desire to align the country with the Central Powers. The majority of the council refused to give their assent, and Rumania remained neutral. Italy's declaration of war against Austria-Hungary was generally believed to presage the entrance of Rumania upon the side of the Allies, and in fact con¬ versations between Italy and Rumania on the subject had actually taken place. They were without avail,* however. In April and May 1916, arrangements were entered into with Ger¬ many and Austria-Hungary for the purchase and shipment of Rumanian grain which seemed to foreshadow an alignment with those powers. This also proved to be unfounded, and on 17 Aug. 1916, Rumania signed a secret treaty with the Quadruple Alliance by which she agreed to enter the war on the side of the Allies.

It was stipulated in this treaty that France, Great Britain, Italy and Russia should guaran¬ tee the territorial integrity of the kingdom of Rumania in the whole extent of its frontiers; that Rumania should engage to declare war on Austria-Hungary under the conditions stipulated in an accompanying military convention ; that Rumania should cease to make economic and commercial exchanges with the enemies of the Allies; that France, Great Britain, Italy and Russia should recognize Rumania's right to annex certain territories in Austria-Hungary, chiefly occupied by Rumanian populations ; that both Rumania and the Quadruple Alliance should agree not to make peace separately. The military convention stipulated that Rumania was to attack Austria-Hungary on 28 August; that the Russian army was to aid by vigorous action, especially in Bukowina ; that the Russian fleet should guard the Rumanian coast, having the right to use the port of Constanza; that Russia was to send two divisions of infantry and one of cavalry to aid Rumania against the Bulgarians ; that the Allies were to make an offensive immediately from Salonica; and that Rumania was to receive munitions and war materials from the Allies by way of Russia.

When the United States seemed likely to enter the war, Japan feeling it wise to insure her reward for her participation in the opera¬ tions against Germany, sought certain definite promises from the Allies. Viscount Monoto, the Japanese Minister of Foreign Affairs, took the matter up with the British Ambassador at Tokio early in 1917. On 16 February, the Am¬ bassador replied :

«My dear Excellency: With reference to the subject of our conversation of the 27th ultimo, when your Excellency informed me of the desire of the Imperial Government to re¬ ceive an assurance that on the occasion of a peace conference his Britannic Majesty's Gov¬ ernment will support the claims of Japan in regard to the disposal of Germany's rights in Shantung and possessions in the islands north of the equator, I have the honor under instruc¬ tionsˆ received from his Britannic Majesty's principal Secretary of State for Foreign Affairs

to communicate to you the following message from his Britannic Majesty's Government:

ˆHis Britannic Majesty's Government ac¬ cede with pleasure to the request of the Japan¬ ese Government for an assurance that they will support Japan's claim in regard to the disposal of Germany's rights in Shantung and posses¬ sions in the islands north of the equator on the occasion of the peace conference ; it being understood that the Japanese Government will in the eventual peace settlement treat in the same spirit Great Britain's claims to the German islands south of the equator.ˆ

To a like inquiry addressed to France, a favorable reply was received. ˆˆThe Govern¬ ment of the French Republic is disposed to give the Japanese Government its accord in reg¬ ulating at the time of the peace negotiations questions vital to Japan concerning Shantung and the German islands in the Pacific north of the. equator. It also agrees to support the de¬ mands of the Imperial Japanese Government for the surrender of the rights of Germany possessed before the war in this Chinese province and these islands.®

The Russian Ambassador wrote briefly to Viscount Monoto on 20 February, committing Russia to support the Japanese claims, while Italy gave her promise after negotiations con¬ ducted at Rome.

The Debacle in 1918. — ‘On 25 Jan. 1918 Count von Hertling, Imperial German Chan¬ cellor, and Count Czernin, Austro-Hungarian Foreign Minister, made answer to the state¬ ments of war aims set forth by Premier Lloyd George and Pi”esident Wilson. The reply of the former was equivocal and most unsatisfac¬ tory while that of the latter went far to meet Mr. Wilson’s demands. Czernin, however, re¬ fused to discuss the principle of self-determina¬ tion for the peoples of Austria-Hungary, hold¬ ing that to be a matter of domestic policy for his government.

On 11 Feb. 1918 President Wilson in an ad¬ dress to the Congress laid down four principles the acceptance of which, he believed, would pave the way to a discussion of the terms of peace. These four principles were in substance: (1) Each part of the final settlement to be based on the justice of that particular case; (2) peo¬ ples and provinces not to be bartered as chat¬ tels from one sovereignty to another; (3) ter¬ ritorial settlements to be made in accord with the aspirations of the populations concerned; (4) national aspirations to be satisfied as far as possible without perpetuating or sowing seeds of discord.

About this time the Lichnowsky Memoran¬ dum (q.v.) was made public and created a profound impression in Allied and neutral coun¬ tries since it proved from an enemy source England’s conciliatory attitude in the summer of 1914 and Germany’s encouragement of Austria’s attack on Serbia. In June there followed the revelations of Dr. Wilhelm Muhlon, a director of the Krupo works at Essen. In his book, <The Devastation of Europeˆ he wrote: «Peo-ple blame our diplomats for muddling the war. My opinion is that these diplomats have been handicapped by the power, the vacillating char¬ acter and the continued interference of the kaiser in their work. Only men who would dance to his piping could remain in office… .

On 24 June 1918 the German Foreign Min¬

ister, von Kiihlmann, stated that the war could not be won by arms alone and that peace would come only through negotiation. In the weeks following this statement it became apparent that a fast-growing number of Germans saw the hopelessness of victory on the field, and

there was an ever-increasing public opinion in favor of a peace by negotiation. On 4 July President Wilson in an address at Mount Vernon re¬ affirmed the war aims of the United States and declared that there could be no compromise. ®What we seek is the reign of law based upon the consent of the governed and sustained by the organized opinion of mankind.®

Dissension among the Central Powers had now become evident. Bulgaria's aims con¬ flicted with those of Turkey and Hungary be-carne estranged from Austria. In August the United States after much discussion arrived at an agreement with Japan in regard to joint intervention in Siberia. In September, the Aus¬ trian government sent a note to all other gov¬ ernments proposing a conference to discuss peace terms but not in a binding manner; Ger¬ many proposed to Belgium to restore her eco¬ nomic and political independence on certain con¬ ditions, one of which involved the restoration of the German colonies. The result of these peace efforts was negligible; in the field the offensive had now passed to the Entente and the will to conquer had seized hold of their peo¬ ples. The prospect of defeat, very apparent in October 1918, accentuated the differences be¬ tween Germany and her Allies. On 30 Septem¬ ber von Hertling resigned the chancellorship and von Hintze, von Kiihlmann's successor, re¬ signed the portfolio of Foreign Affairs. Prince Max of Baden, a moderate in politics, became chancellor on 2 October and Dr. Solf was made foreign secretary. Scheidemann and Bauer, Socialists, and Erzberger and Groeber, Cen¬ trists, became members of the new ministry which set about making radical changes in Ger¬ many's political system. On 5 October Prince Max's message of peace to President Wilson was made public in the United States. The note, which proved the first step which led to the conclusion of hostilities, accepted as a basis for peace the program laid down by the Presi¬ dent in the ®14 Points® message of 8 Jan. 1918, and in his address of 27 September at New York, in which the President had restated the purposes of the war. In the American reply dispatched 8 October, the President said : ^^The good faith of any discussion would manifestly depend upon the consent of the Central Powers immediately to withdraw their forces every¬ where from invaded territory.

«The President also feels that he is justified in asking whether the imperial chancellor is speaking merely for the constituted authorities of the empire who have so far conducted the war. He deems the answer to these questions vital from every point of view.®

Dr. Solf, the German Foreign Secretary, re¬ plied on 12 October, saying the chancellor spoke «in the name of the German government

and of the German people.® To this the United States replied on the 14th to the effect that the con¬ ditions of an armistice must be left to the mili¬ tary authorities. Dr. Solf replied on 21 October accepting the proposal to evacuate occupied ter¬ ritories and stating that U-boat commanders had been enjoined from torpedoing passenger ships.

On 27 October Germany requested proposals for an armistice and was referred to Marshal Foch. Meanwhile, Bulgaria had capitulated and Aus¬ tria had initiated separate proposals for an ar¬ mistice. Hostilities ceased on the Austrian front on 4 November, and a few days later German delegates arrived at French Great Headquarters to receive the terms of the armistice, which they signed at 5 a.m. (French time) on 11 Nov. 1918. See The Armistices in this section.

Thomas J. Wertenbaker, Associate Professor of History and Politics, Princeton University.

16. FINAL REPORT OF GEN. JOHN J. PERSHING. General John J. Pershing, Commander-in-Chief of the American Expeditionary Forces in Europe, submitted his final report to the Secretary of War, Newton D. Baker, late in November and it was made public 13 Dec. 1919. The complete report follows verbatim ;

GENERAL HEADQUARTERS, AMERICAN EXPEDI¬ TIONARY FORCES

September i, 1919.

To the Secretary of War:

Sir: I have the honor to snjbmit herewith my final report as Commiander-in-Chief of the American Ex¬ peditionary Forces in Europe.

Part I.

Period of Organization. — I assumed the duties of this office on May 26, 1917, and, accompanied by a small staff, departed for Europe on

board the S. S. Baltic May 28. We arrived at London on June 9 and, after spending some days in consultation with the British authorities, reached Paris on June 13.

Following the rather earnest appeals of the Allies for American troops, it was decided to send to France, at once, i complete division and 9 newly organized regiments of Engineers. The Division was formed of regular regiments, necessary transfers of officers and men were made, and recruits were assigned to increase these units to the required strength.

The offer by the Navy Department of one regiment of Marines to be reorganized as Infantry was accepted by the Secretary of War, and it became temporarily la part of the First Division.

Prior to our entrance into the war, the regiments of our small army were very much scattered, and we had no organized units, even approximating a division, that could be sent overseas prepared to take the field. To meet the new conditions of warfare an entirely new organiziation was adopted in which our Infantry divi¬ sions were to consist of four regiments of Infantry of about treble their original size, three regiments of Artillery, 14 machine-gun companies, one Engineer regi¬ ment, one Signal battalion, one troop of Cavalry, and other auxiliary units, making la total strength of about 28,000 men.

Military Situation. — In order that the reasons for many important decisions reached in the early history of the American Expeditionary Forces may be more clearly understood and the true value of the American effort more fully appreciated, it is desirable to have in mind the main events leading up to the time of our entry into the war.

1914. — Although the German drive of 1914 had failed in its immediate purpose, yet her armies had made very important gains. German forces were in com¬ plete possession of Belgium and occupied rich industrial regions of northern France, embracing one-fourteenth of her population and about three-fourths of her coal and iron. The German armies held a strongly fortified line 468 miles in length, stretching from the Swiss border to Nieuport on the English Chiannel; her troops were within 48 miles of Paris and the initiative re¬ mained in German hands.

In the east the rapidity of the Russian mobilization forced Germany, even before the Battle of the Marne, to send troops to that frontier, but the close of 1914 found the Russian armies ejected from East Prussia and driven back on Warsaw.

The entry of Turkey into the war, because of the moral effect upon the Moslem world and the immediate constant threat created against Allied communications with the Far Bast, led to an effort by the Allies in the direction of the Dardanelles,

1915. — Italy joined the Allies in May and gave their cause new strength, but the effect was more or less offset when Bulgaria entered on the side of the Central Powers.

The threatening situation on the Russian front and in the Balkans was still such that Germany was com¬ pelled to exert an immediate offensive effort in those directions and to maintain only a defensive attitude on the western front. German arms achieved a striking series of successes in the vicinity of the Mazurian Lakes and in Galicia, capturing Warsaw, Brest-Litovsk, and Vilna. The Central Powers overran Serbia and Montenegro. Meanwhile, the Italian armies forced Aus¬ tria to use approximately one-half of her strength against them.

In the west, the French and British launched offensives which cost the German armies considerable loss; but the objectives were limited and the effect was local.

The Dardanelles expedition, having failed in its mis¬ sion, was withdrawn in January, 1916. In Mesopotamia the Allied operations had not been successful. Although the British fleet had established its superiority on the sea, yet the German submarine blockade had developed into a serious menace to Allied shipping.

1916. — Germiany no doubt believed that her advantage on the eastern front at the close of 1915 again warranted an offensive in the west, and her attack against Verdun was accordingly launched in the spring of 1916. But Russia was not yet beaten and elarly in June, aided at the same time by the threat of an Italian offensive in the west, she began the great drive in Galicia that proved so disastrous to Austria,

Rumania, having entered on the side of the Allies, undertook a promising offensive against Austria. The British and French Armies attacked along the Somme. Germany quickly returned to the defensive in the west, and in September initiated a campaign in the east which, before the close of 1916, proved unfortunate for Russia as well as Rumania.

Retaining on the eastern front the forces considered sufficient for the

final conquest of Russia, Germany prepared to aid Austria in an offensive against Italy. Meanwhile, the Russian revolution was well under way and, by the midsummer of 1917, the final collapse of that government was almost certain.

The relatively low strength of the German forces on the western front led the Allies with much confidence to attempt a decision on this front; but the losses were very heavy and the effort signally failed. The failure caused a serious reaction especially on French morale, both in the army and throughout the country, and at¬ tempts to carry out extensive or combined operations were indefinitely suspended.

In the five months ending June 30, German sub¬ marines had accomplished the destruction of more than three and one-quarter million tons of Allied shipping. During three years Germany had seen practically all her offensives except Verdun crowned with success. Her battle lines were held on foreign soil and she had with¬ stood every Allied attack since the Marne. The Gerrnan general staff could now foresee the complete elimina¬ tion of Russia, the possibility of defeating Italy before the end of the year and, finally, the campaigns of 1918 against the French and British on the western front which might terminate the war.

It can not be said that German hopes of final victory were extravagant, either as viewed at that time or as viewed in the light of history. Financial problems of the Allies were difficult, supplies were becoming ex¬ hausted and their armies had suffered tremendous losses. Discouragement existed not only among the civil popu¬ lation but throughout the larmies as well. Such was the Allied morale that, although their superiority on the western front during the last half of 1916 and during 1917 amounted to 20 per cent, only lodal attacks could be undertaken and their effect proved wholly in¬ sufficient against the German defense. Allied resources in man power at home were low and there was little prospect of materially increasing their armed strength, even in the face of the probability of having practically the whole military strength of the Central Powers against them in the spring of 1918.

This was the state of affairs that existed when we entered the war. While our action gave the Allies much encouragement yet this was temporary, and a review of conditions made it apparent that America must make la supreme material effort as soon as possible. After duly considering the tonnage possibilities I cabled the following to Washington on July 6, 1917:

Plans should contemplate sending over at least 1,000,000 men by next May.

Organization Projects, — A general organization project, covering as far as possible the personnel of all combat, staff, and ladministrative units, was forwarded to Washington on July ii. This was prepared by the

Operations Section of my staff and adopted in joint conference with the War Department Committee then in Prance. It embodied my conclusions on the military organization and effort required of America after .a care-iul study of rrench and British experience. In for¬ warding this project I stated:

It is evident that a force of about 1,000,000 is the smallest unit which in modern war will be a complete, vˆll-balanced, and independent fighting organisation. However, it must be equally clear that the adoption of thts size force as a basis of study should not be con¬ strued as representing the maximum force which should be sent to or which will be needed in France. It is taken as the force zvhich may be expected to reach France in time for an offensive in 1918, and as a unit and basis of organization. Plans for the future should be based, especially in reference to the manufacture of artillery, aviation, and other material, on three times this force — i. e., at least 3,000,000 men.

With a few minor changes, this project remained our guide until the end. While this general organiza¬ tion project provided certain Services of Supply troops, which were an integral part of the larger combat units, it did not include the great body of troops and services required to maintain an army overseas. To disembark 2,000,000 men, move them to their training areas, shelter them, handle land store the quantities of supplies and equipment they required, called for an extraordinary and imrnediate effort in construction. To provide the organ¬ ization for this purpose, a project for engineer services of the rear, including railways, was cabled to Wash¬ ington August 5, 1917,

followed on September 18, 1917, by a complete service of the rear project, which listed item by item the troops considered necesslary for the Services of Supply.

In order that the War Department might have a clear-cut program to follow in the shipment of personnel and material to insure the gradual building up of a force at all times balanced and symmetridal, a com¬ prehensive statement was prepared covering the order in which the troops and services enumerated in these two projects should arrive. This schedule of priority of shipments, forwarded to the War Department on October 7, divided the initial force called for by the two projects into six phases corresponding to com¬ batant corps of six divisions each.

The importance of the three documents, the general organization project, the service of the rear project, and the schedule of priority of shipments, should be em¬ phasized, because they formed the basic plan for pro¬ viding an army in France together with its material for combat, construction, and supply.

American Front and Line of Communications.— Before developing plans for a line of communications it was necessary to decide upon the probable sector of the front for the eventual employment of a distinctive American force. Our mission was offensive and it was essential to make plans for striking the enemy where a definite military decision could be gained. While the Allied armies had endeavored to maintain the offensive, the British, in order to guard the Channel ports, were committed to operations in Flanders and the French to the portion of the front protecting Paris. Both lacked troops to operate elsewhere on a large scale.

To the east the great fortified district east of Verdun and around Metz menaced central France, protected the most exposed portion of the German line of communica¬ tions, that between Metz and Sedan, and covered the Briey iron region, from which the enemy obtained the greater part of the iron required for munitions and material. The coal fields east of Metz were also covered by these same defenses. A deep advance east of Metz, or the capture of the Briey region, by threatening the invasion of rich German territory in the Moselle Valley and the Saar Basin, thus curtailing her supply of coal or iron, would have a decisive effect in forcing a with¬ drawal of German troops from northern France. The military land economic situation of the enemy, therefore, indicated Lorraine as the field promising the most fruitful results for the employment of our armies.

The complexity of trench life had enormously in¬ creased the tonnage of supplies required by troops. Not only was it a question of providing food but enormous quantities of munitions and material were needed. Upon the railroads of France fell the burden of meeting the heavy demands of the three land one-half million Allied combatants then engaged.

The British were crowding the Channel ports and the French were exploiting the manufacturing center of Paris, so that the railroads of northern France were already much overtaxed. Even though the Channel ports might be used to a limited extent for shipments through England, the railroads leading eastward would have to cross British and Frence zones of operation, thus mak¬ ing the introduction of a line of communications based on ports and railways in that region quite impracticable.

If the American Army was to have an independent and flexible system it could not use the line behind the British-Belgium front nor those in the rear of the French front covering Paris.

The problem confronting the Ameridan Expeditionary Forces was then to superimpose its rail communications on those of France where there would be the least possible disturbance to the arteries of supply of the two great Allied armies in the field. This would require the utmost use of those lines of the existing French rail¬ road system that could bear an added burden. Double- ˆack railroad lines from the ports of the Loire land the Gironde Rivers unite at Bourges, running thence via Nevers, Dijon, and Neuf chateau, with lines radiating therefrom toward the right wing of the Allied front.

was estimated that these with the collateral lines available, after considerable improvement, could handle an additional 50,000 tons per day, required for an army of 2,000,000 men. The lines selected, therefore, were those leading from the comparatively unused south-Atlantic ports of France to the northeast where it was believed the American Armies could be employˆ to the best advantage.

In the location of our main depots of supply, while it was important that they should be easily accessible, yet they must ˆIso be at a safe distance, as we were to meet an aggressive enemy caplable of taking the offensive m any one of several directions. The. area embracing Tours, Orleans, Montargis, Nevers, and Chateauroux was chosen, as it was centrally located with regard to all points on the arc of the

western front.

The ports of Saint Nazaire, La Pallice, and Bassens were designated for permanent use, while Nantes, Bordeaux, land Pauillac were for emergency use. Several smaller ports, such as Saint Malo, Sables-d'Olonne, and Bayonne, were available chiefly for the importation of coal from England. From time to time, certain trans Atlantic ships were sent to Le Havre and Cherbourg. In anticipation of a large increase in the amount of tonnage that might be required later, arrangements were made during the German offensive of 1918 to utilize the ports of Marseilles and Toulon as well as other smaller ports on the Mediterranean.

For all practical purposes the American Expeditionary Forces were based on the American Continent. Three thousand miles of ocean to cross with the growing sub¬ marine menace confronting us, the quantity of ship tonnage that would be available then unknown and a line of communidations by land 400 miles long from French ports to our probable front presented ditnculties that seemed almost insurmountable as compared with those of our Allies.

For purposes of local administration our line of communications' in France was subdivided into districts or sections. The territory corresponding to and im¬ mediately surrounding the principal ports were, respec¬ tively, called base sections, with Ian intermediate section embracing the region of the great storage depots and an advance section extending to the zone of operations, within which the billeting and training areas for our earlier divisions were located.

In providing for the storage and distribution of reserve supplies an lallowance of 45 days in the base sections was planned, with 30 days in the intermediate section and 15 days in the advance section. After the safety of our sea transport was practically assured, this was reduced to a total of 45 days, distributed pro¬ portionately. When the Armistice wlas signed all pro¬ jects for construction had been completed and supplies were on hand to meet the needs of 2,000,000 men, while further plans for necessary construction and for the supply of an additional 2,000,000 were well under way.

General Staff. — The organization of the General Staff and supply services was one of the first matters to engage my attention. Our situation in this regard was wholly unlike that of our Allies. The French Army was at home and in close touch with its civil government and war department lagencies. While the British were organized on an overseas basis, they were within easy reach of their base of supplies in

England. Their problems of , supply and replacement were simple as compared with ours. Their training could be carried out at home with the experience of the front at hand, while our troops must be sent as ships were provided and their training resumed in France where discontinued in the States. Our available tonnage was inadequate to meet all the initial demands, so that priority of material for combat and construction, as well as for supplies that could not be purchased in Europe, must be establishefl by those whose perspective included all the services and who were familiar with general plans. For the proper direction and coordination of the details of administra¬ tion, intelligence, operations, supply, and training, a General Staff was an indispensable part of the Army.

The functions of the General Staff at my head-

quarters were finally allotted to the five sections, each under Ian Assistant Chief of Staff, as follows: To the First, or Administrative Section — ocean tonnage, priority of overseas shipments, replacement of men and animals, organization and types of equipment for troops, billeting, prisoners of war, military police, leaves and leave areas, welfare work land amusements; to the Second, or Intelli¬ gence Section — information regarding the enemy, in¬ cluding espionage and counter-espionage, maps, and censorship; to the Third, or Operations Section — strategic studies and plans and employment of combat troops; to the Fourth Section — coordination of supply services, including Construction, Transportation, and Medical Departments, and control of regulating stations for supply; to the Fifth, or Training Section — tactical training, schools, preparation of tactical manuals, and athletics. The same system was applied in the lower echelons of the command down to include divisions, except that in_ corps and divisions the Fourth Section wias merged with the First and the Fifth Section with the Third.

As the American Expeditionary Forces grew, it was considered advisable that, in matters of procurement, transportation, and supply, the chiefs of the several supply services, who had hitherto been under

the Gen¬ eral Staff at my headquarters, should be placed directly under the supervision of the commanding general. Services of Supply. At General Headquarters, a Deputy Chief of Staff to assist the Chief of Staff was provided, and the heads of the five General Staff sections became Assistant Chiefs of Staff.

The General Staff at my heiadquarters thereafter con¬ cerned itself with the broader phase of control. Under my general supervision and pursuant to clearly deter¬ mined policies, the Assistant Chiefs of Staff, co¬ ordinated by the Chief of Staff, issued instructions land gave general direction to the great combat units and to the Services of Supply, keeping always in close touch with the manner and promptness of their fulfillment. Thus a system of direct responsibility was put into operation which contemplated secrecy in prep¬ aration, prompt decision in emergency and coordinate action in execution.

With the growth of our forces the demand for staff officers rapidly increased, but the available number of officers trained for staff duty was very limited. To meet this deficiency, a General Staff college was organ¬ ized at Dangres on November 28, 1917, for the instruc¬ tion of such officers as could be spared. An intensive course of study of three months was prescribed, embrac¬ ing the details of our staff organization and administra¬ tion, and our system of supply, and teaching the com¬ bined employment of all arms and services in combat. Officers were darefully chosen for their suitability and, considering the short time available, graduates from this school returned well equipped for staff duties and with a loyal spirit of common service much accentuated. The Staff College carried to completion four courses of three months each, graduating 537 staff officers.

Training. — Soon after our arrival in Europe careful study was made of the methods followed by our Allies in training combat troops. Both the French and British maintained continuously a great system of schools and training centres, which provided for both theoretical and practical instruction of inexperienced officers and noncommissioned officers. These centers were required not only to train new troops, but to prepare officers and soldiers for advancement by giving them a short course in the duties of their new grades. These school systems made it possible to spread rapidly a knowledge of the latest methods developed by experience and at the same time counteract false notions.

A similar scheme was adopted in August, 1917, for our Armies in which the importance of teaching through¬ out our forces a sound

fighting doctrine of our own was emphasized. It provided for troop training in all units up to include divisions. Corps centers of in¬ struction for noncommissioned officers and unit com¬ manders of all arms were established. These centers ialso provided special training for the instructors needed at corps schools. Base training centers for replacement troops and special classes of soldiers, such as cooks and mechanics, were designated. The army and corps schools were retained under the direct supervision of the Train¬ ing Section, Genera,! Staff. _ The schools mentioned graduated 21,330 noncommissioned officers land 13,916 officers.

Particular ciare was taken to search the ranks for the most promising soldiers, in order to develop leaders for the command of platoons and companies. There were graduated from these candidate schools in France 10,976 soldiers. It wlas planned to have 22,000 infantry¬ men under instruction by January i, 1919, graduating 5,000 to 6,000 each month. In addition, there were to be graduated monthly 800 artillerymen, 400 engineers, and 200 signalmen, making a total of about 7,000

soldiers each month. Prior to November 14, 1918,

12,732 soldiers were commissioned as officers.

It must not be thought that such a system is ideal, but it represents a compromise between the demand for efficiency and the imperative and immediate neces¬ sity for trained replacement officers.

Every advantage was taken of the experience of our Allies in training officers. It was early recommended to the War Department that French and British officers be asked for to assist in the instruction of troops in the United States. Pending the organization of our own schools, a large number of our officers were sent to centers of instruction of the Allied armies. The training of our earlier divisions was begun in close association with the French divisions, under conditions set forth in the following paragraph on divisional train¬ ing:

Trench warfare naturally gives prominence to the defensive as opposed to the offensive. To guard against this, the basis of instruction should be essentially the offensive both in spirit and in practice. The defensive is accepted only to prepare for future offensive.

For training our Artillery units, special localities such as Vialdahon, Coetquidan, Meucon, and Souge, had to be sought, and the instruction

was usually carried on in conjunction with French artillery followed up later, as far as possible, with field practice in cooperation with our own Infantry.

The long period of trench warfare had so impressed itself upon the French and British that they had almost entirely dispensed with training for open warfare. It was to avoid this result in our Army and to encourage the offensive spirit that the following was published in October 1917.

I… . (a) The above methods to be employed

must remain or become distinctly our own.

(b) All instruction must contemplate the assumption of a vigorous offensive. This purpose will be emphasized in every phase of training until it becomes a settled habit of thought.

(c) The general principles governing combat remain unchanged in their essence. This war has developed special features which involve special phases of training, but the fundamental ideas enunciated in our Drill Regulations, Small Arms Firing Manual, Field Service Regulations, and other service manuals remain the guide for both officers and soldiers and constitute the standard by which their efficiency is to be measured, except as modified in detail by instructions from these head¬ quarters.

id) The rifle and the bayonet are the principal weapons of the infantry soldier. He will be trained to a high degree of skill as a marksman, both on the target range and in field firing. An aggressive spirit must be developed until the soldier feels himself, as a bayonet fighter, invincible in battle.

(e) All officers and soldiers should realize that at no time in our history has discipline been so important ; therefore, discipline of the highest order must be ex¬ acted at all times. The standards for the American Army will be those of West Point. The rigid attention, upright bearing, attention to detail, uncomplaining obedi¬ ence to instructions required of the cadet will be required of every officer and soldier of our armies in France.

• • •

Recommendations were cabled to Washington em¬ phasizing the importance of target practice and musketry training, and recommending that instruction in open warfare be made the mission

of troops in the United States, while the training in trench warfare so far as necessary be conducted in France. Succeeding divisions, whether serving temporarily with the British or French, were trained as thus indicated. The assistance of the French units was limited to demonstrations, and, in the beginning, French instructors taught the use of French arms land assisted in the preparation of element¬ ary trench warfare problems.

Assuming that divisions would arrive with their basic training completed in the United States, one month was allotted for the instruction of small units from battalions down, a second month of experience in quiet sectors by battalions, and a third month for field prac¬ tice in open warfare tactics by division, including artillery.. Unfortunately many divisions did not receive the requisite amount of systematic training before leaving the States and complete preparation of such units for battle was thus often seriously delayed.

The system of training profoundly influenced the combat efficiency of our troops by its determined insist¬ ence upon an offensive doctrine and upon training in warfare of movement. Instruction which had hitherto beeti haphazard, varying with the ideas and conceptions of inexperienced commanding officers and indifferent instructors, was brought under a system based on correct principles. Approved and systematic methods were miaintained and enforced largely by the continual

WAR, EUROPEAN

1 Throwing hand grenades in the trenches

2 An advance through the woods

WAR, EUROPEAN

1 A 37 mm. gun in position

2 American troops practising with liquid fire

presence of members of the Training Section with the troops both during the training period and in campaign.

Intelligence. — Before our entry into the war, Eu¬ ropean experience had shown that military operations can be carried out successfully and without unnecessary loss only in the light of complete and reliable informa¬ tion of the enemy. Warfare with battle lines separated by short distances only, made possible the early acquire-nrient of information, such as that obtained through airplane photography, observation from balloons and planes, sensitive instruments for detecting gun positions and raids to secure prisoners and documents. All such information, together with that from Allied sources, including military, political, and economical, was col¬ lected, classified, and rapidly distributed where needed.

From careful studies of the systems and actual par¬ ticipation by our officers in methods in use at various Allied headquarters, an Intelligence Service wias evolved in our forces which operated successfully from its first organization in August 1917.

With us the simpler methods, such as observation from the air and ground and the exploitation of prison¬ ers and documents, have proved more effective than the less direct means. Every unit from the battalion up had Ian. intelligence detachment, but only in divisions and larger organizations did the intelligence agencies embrace all available means and sources, including radio interception stations and sound and flash-ranging de¬ tachments.

The subjects studied by the Intelligence Section embraced the location of the enemy's front line, his order of battle, the history and fighting value of his divisions, his manpower, his combat activities, circula¬ tion and movement, his defensive organizations, supply, construction

and material, air service, radio service, strategy and tactics, and what he probably knew of our intentions. The political and economic conditions within the enemies' countries were also of extreme irnportance.

To disseminate conclusions, daily publications were necessary, such as a Secret Summary of Intelligence containing information of the broadest scope, which con¬ cerned only General Headquarters; land a Surnmary of Information, distributed down to include the divisions, giving information affecting the western ˆ front. A Press Review and a Summary of Air Intelligence were also published.

Maps showing graphically the disposition and move¬ ment of enemy troops in our front were the best means for distributing information to our troops. At the base printing plant and at General Pleadquarters base maps were prepared while mobile printing plants, mounted on trucks, accompanied corps and army headquarters. Combat troops were thus supplied with excellent maps distributed, just before and during an attack, down to include company and platoon commanders. Between July I and November 11, 1918, over 5,000,000 maps were used.

The secret service, espionage and counter-espionage, was organized in close cooperation with the French and British. To prevent indiscretions in the letters of officers and soldiers, as well as in articles written for the press, the Censorship Division was created. The Base Censor examined individual letters when the writer so desired, censored all mail written in foreign lan¬ guages, of which there were over 50 used, and fre¬ quently checked up letters of entire org'anizations.

The policy of press censorship adopted aimed to accomplish three broad results:

To prevent the enemy from obtaining important in¬ formation of our forces. tt - , 1

To give to the people of the United Mates the maximum information consistent with the limitations imposed by the first object. … 1

To cause to be presented to the American people the facts as they were known at the time.

There were with our forces 3ˆ regularly accredited correspondents, while visiting correspondents reached a

total of 41 1. . „ T j X

Summer of 1917 to Spring: of 1918. — In order to hinder the enemy's conquest of Russia and, if possible, prevent a German attack on Italy, or in the near east, the Allies sought to mlaintain the offensive on the western front as far as their diminished strength and morale would permit. On June 7, I9i7, the British took

Messines, while a succession of operations known as the Third Battle of Ypres began on July 31 and termi¬ nated with the capture of the Passchendaele _ Ridge November 6 — 10. The British attack at (ˆambrai is of special interest, since it was here that American troops (Eleventh Engineers) first participated in active fighting.

The French successfully attacked on a limited front near Verdun, capturing Mort Homme on August 20 and advancing their lines to La Forge Brook._ In an¬ other offensive, begun on October 23, they gained con¬ siderable ground |bn Chemin des Dames Ridge. these

French attacks were characterized by most careful preparation to insure success in order to improve the morale of their troops.

Notwithstanding these Allied attacks on the western front, the immense gains by the German armies in the east, culminating at Riga on September 3, precipitated the collapse of Russia. The following month, the Austrians with German assistance surprised the Italians and broke through the lines at Caporetto, driving the Italian armies back to the Piave River, inflicting a loss of 300,000 men, 600,000 rifles, 3,000 guns, and enormous stores. This serious crisis compelled the withdrawal of 10 French and British divisions from the western front to Italy. The German situation on all other theatres was so favorable that as early as November they began the movement of divisions toward the western front. If needed, her divisions could be withdrawn from the Italian front before the French and British dared re¬ call their divisions.

At first the Allies could hardly hope for a large American Army. Marshal Joft're during his visit to America had made special request that a combat division be sent at once to Europe as visual evidence of our purpose to participate actively in the war, and also asked for Engineer regiments and other special service units.

The arrival of the First Division and the parade of certain of its elements in Paris on July 4 caused great enthusiasm and for the time being French morale was stimulated. Still Allied apprehension was deep-seated and material assistance was imperative. The following extract is quoted from the cabled summary of an yMlied conference held on July 26 with the French and Italian Commanders-in-Chief and the British and French Chiefs of Staff:

General conclusions reached were necessity for adop¬ tion of purely defensive attitude on all secondary fronts and the withdrawing surplus troops for duty on western front. By thus strengthening western front believed Allies could hold imtil American forces arrive in num¬ bers sufficient to gain ascendency.

The conference urged the immediate study of the tonnage situation with a view to accelerating the arrival of American troops. With the approach of winter, depression lamong the Allies over the Russian collapse and the Italian crisis was intensified by the conviction that the Germans would undertake a decisive offensive in the spring.

A review of the situation showed that with Russia out of the war the Central Powers would be able to re¬ lease a large number of divisions for service elsewhere, and that during the spring and summer of 1918, without interfering with the status quo at Salonica, they could concentrate on the western front a force much stronger than that of the Allies. In view of this, it was repre¬ sented to the War Department in December as of the utmost importance that the Allied preparations be expedited.

On December 31, 1917, there were 176,665 American troops in France and but one division had appeared on the front. Disappointment at the delay of the American effort soon began to develop. French and British authorities suggested the more rapid entry _ of our troops into the line and urged the amalgamation of our troops with their own, even insisting upon the curtailment of training to conform to the strict minimum of trench requirements they considered necessary.

My conclusion was that, although the morale of the German people and of the armies was better than it had been for two years, only an untoward combina¬ tion of circumstances could give the enemy a decisive victory before American support as recommended could be made effective, provided the Allies secured^ unity of action. However, a situation might arise which would necessitate the temporary use of all x\merican troops in the units of our Allies for the defensive, but

nothing in the situation justified the relinquishment of our firm purpose to form our own Army under our own flag.

While the Germans were practicing for open warfare land concentrating their most aggressive personnel jn shock divisions, the training of the Allies was still limited to trench warfare. As our troops were being trained for open warfare, there was every reason why we could not allow_ them to be scattered among our Allies, even by divisions, much less as replacements, except by pressure of sheer necessity. Any sort of permanent amalgamation would irrevociably commit America's fortunes to the hands of the Allies. More¬ over it was obvious that the lack of homogeneity would render these mixed divisions difficult to maneuver and almost certain to break up under stress of defeat, witli the consequent mutual recrimination. Again, there was no doubt that the realization by the German people that independent American divisions, corps, or armies were in the field with determined purpose would be a severe blow to German morale and prestige.

It was also certain that an darly appearance of the larger American units on the front would be most beneficial to the morale of the Allies themselves. Accord¬ ingly, the First Division, on January 19, 1918, took over a sector north of Toul; the Twenty-sixth Division went to the Soissons front early in February; the Forty-second Division entered the line near Luneville, February 21, and the Second Division near Verdun, March 18. Meanwhile, the First Army Corps Headquarters, Maj. Gen. Hunter Liggett, commanding, was organized at Neufchateau on January 20, and the plan to create an independent American sector on the Lorraine front was taking shape.

This was the situation when the grdat German offensive was launched on March 21, 1918.

Part II. Operations.

Expediting Shipment of Troops. — The War Depart¬ ment planned as

early as July, 1917, to send to France by June 15, 1918, twenty-one divisions of the then strength of 20,000 men each, together with auxiliary and replacement troops, and those needed for the line of communications, amounting to over 200,000, making a total of some 650,000 men. Beginning with October, six divisions were to be sent during that quarter, seven during the first quarter of 1918, and eight the second quarter. While these numbers fell short of my recommendation of July 6, 19,17, which contemplated at least 1,000,000 men by May, ’1918, it should be borne in mind that the main factor in the problem was the amount of shipping to become available for military purposes, in which must be included tonnage required to supply the Allies with steel, coal, and food.

On December 2, 1917, an estimate of the situation was cabled to the War Department, with the following recommendation:

Paragraph 3. In view of these conditions, it is of the utmost importance to the allied cause that we move swiftly. The minimum number of troops we should plan to have in France by the end of June is four army corps of twenty-four divisions in addition to troops for service at the rear. Have impressed the present urgency upon General Bliss and other American mem¬ bers of the conference. Generals Robertson, Foch and. Bliss agree with me Jthat this is the minimum that should be aimed at. This hgure is given as the lowest we should think of and is placed no higher because the limit of available transportation would not seem to warrant it.

Paragraph 4. A study of transportation facilities shows sufficient American tonnage to bring over this number of troops, but to do so there must be a reduc¬ tion in the tonnage allotted to other than army needs. It is estimated that the shipping needed will have to be rapidly increased, up to 2,000,000 tons by May, in addi¬ tion to the amount already allotted. The use of shipping for commercial purposes must be curtailed as much as possible. The Allies are very weak and we must come to their relief this year, 1918. The year after may be too late. It is very doubtful if they can hold on until 1919 unless we give them a lot of support this year. It is therefore recommended that a complete readjust¬ ment of transportation be made and that the needs of the War Department as set forth above be regarded as immediate. Further details of these requirements will be sent later.

Again on Dec. 20, 1917:

Understood here that a shipping program based on tonnage in sight prepared in War College Division in September contemplated that

entire First Corps with its corps troops and some 32,000 auxiliaries were to have been shipped by end of November, and that an addi¬ tional program for December, January, and February contemplates that the shipment of the Second Corps with its corps troops and other auxiliaries should be practically completed by the end of February. Should such a program be carried out as per schedule and should shipments continue at corresponding rate, it would not succeed in placing even three complete corps, with proper proportion of army troops and auxiliaries, in France by the end of May.ˆ The actual facts are that shipments are not even keeping up to that schedule. It is now the middle of December and the First Corps is still in¬ complete by over two entire divisions {The j-irst, Forty-second, Second, and Twenty-sixth Divisions had arrived but not the Replacement and the Depot Divi¬ sions), and many corps troops. It cannot be too emphatieally declared that we should be prepared to take the Held with at least four corps by June 30. In view of past performances zvith tonnage heretofore available such a project is impossible of fulfillment, but only by most strenuous attempts to attain such a result will we be in a position to take a proper part in operations in 1918. In view of fact that as the number of our troops here increases a correspondingly greater amount of ton¬ nage must be provided for their supply, and also in view

of the slow rate of shipment with tonnage now available, it is of the most urgent importance that more tonnage should be obtained at once as already recommended in my cables and by General Bliss.

During January, 1918, discussions were held with the British authorities that resulted in an agreement which became known as the subdivision plan and which provided for the transportation of six entire divisions in British tonnage, without interference with our own ship¬ ping program. High commanders, staff, infantry, and auxiliary troops were to be given experience with British divisions, beginning with battalions, the artillery to be trained under American direction, using French ma¬ terial. It was agreed that when sumciently trained these battalions were to be united for service under their own officers. It was planned that the period of training with the British should cover about ten weeks. To supervise the administration and training of these divisions the Second Corps Staff was organized Fˆeb.

20, 1918.

In the latter part of January joint note No. 12, presented by the military representatives with the Su¬ preme War Council, was approved by the council. This note concluded that France would be safe during 1918 only under certain conditions, namely:

(c) That the strength of the British and French troops in France be continuously kept up to their pres¬ ent total strength and that they receive the expected reinforcements of not less than two American divisions per month.

The German Offensives of 1918 and Related Allied Agreements.— The first German offensive of 1918, be¬ ginning March 21, overran all resistance during the initial period of the attack. Within eight diays the enemy had completely crossed the old Somme battle¬ field and had swept everything before him to a depth of some fifty-six kilometers. For a few days the loss of the railroad centre of Amiens appeared imminent. The offensive made such inroads upon French and British reserves that defeat stared them in the face unless the new American troops should prove more immediately available than even the most optimistic had dared to hope. On March 27 the military repre¬ sentatives with the Supreme War Council prepared their joint note No. 18. This note repeated the previously quoted statement from joint note No. 12, and continued:

The battle which is developing at the present mo¬ ment in France, and which can extend to the other thea¬ tres of operations, may very quickly place the allied armies in a serious situation from the point of view of effectives, and the military representatives are from this moment of opinion that the above-detailed condition can no longer be maintained, and they consider as a general proposition that the new situation requires new decisions.

The military representatives are of opinion that it is highly desirable that the American Government should assist the allied armies as soon as possible by permitting in principle the temporary service of American units in allied army corps and divisions. Such reinforcements must, however, be obtained from other units than those American divisions which are now operating with the French, and the units so temporarily employed must eventually be returned to the American Army.

The military representatives are of the opinion that from the present time, in execution of the foregoing, and until otherwise directed by the Supreme War Coun¬ cil, only American infantry and machine-gun units, organized as that Government may decide, be brought to

France, and that all agreements or conventions hitherto made in conffict with this decision be modified accordingly.

The Secretary of War, who was in France ht this time; General Bliss, the American military representa¬ tive with the Supreme War Council, and I at once conferred on the terms of this note, with the result that the Secretary recommended to the President that joint note No. 18 be approved in the following sense:

The purpose of the American Government is to render the fullest cooperation and aid, and therefore the recommendation of the military representatives with regard to the preferential transportation of American infantry and maemne-gun units in the present emer¬ gency is approved. Such units, when transported, will be under ˆ the direction of the Commander in Chief of the American Expeditionary Forces, and will be assigned for training and use by him in his discretion. He will use these and all other military forces of the United States under his command in such manner as to render the greatest military assistance, keeping in mind always the determination of this Government to have its various military forces collected , as speedily as their training and the military situation permit, into an independent American army, acting in concert zvith the armies of Greatˆ Britain and France, and all arrangements made by him for their temporary graining and service will be made with that end in view.

While note No. i8 was general in its terms, the priority of shiprnents of infantry more especially per¬ tained to those divisions that were to be trained in the British area, as that Government was to provide the additional shipping according to the six-division plan agreed upon even before the beginning of the March 21 offensive.

On April 2 the War Department cabled that prefer¬ ential transportation would be given to American in¬ fantry and machine-gun units during the existing emer¬ gency. Preliminary arrangements were made for training and early employment with the French of such infantry units as might be sent over by our own transportation.. As for the British agreement, the six-division plan was to be modified to give priority to the infantry of those divisions. However, all the Allies were now urging the indefinite continuation of priority for the shipment of

infantry and its complete incorporation in their units, which fact was cabled to the War Department on April 3, with the specific recom¬ mendation that the total immediate priority of infantry be limited to four divisions, plus 45,500 replacements, and that the necessity for future priority be determined later.

The Secretary of War and I held a conference with British authorities on April 7, during which it de¬ veloped that the British had erroneously assumed that the preferential shipment of infantry was to be con¬ tinuous. It was agreed at this meeting that 60,000 infantry and machine-gun troops, with certain auxiliary units to be brought over by British tonnage during April, should go to the British area as part of the six-division plan, but that there should be a further Agreement as to subsequent troops to be brought over by the British. Consequently, a readjustment of the priority schedule was undertaken on the basis of post¬ poning " shipment of all noncombatant troops to the utmost possible to meet present situation, and at the same time not to make it impossible to build up our own army."

The battleline in the vicinity of Amiens had hardly stabilized when, on April 9, the Germans made another successful attack against the British lines on a front of some forty kilometers in the vicinity of Armentieres and along the Lys River. As result of its being included in a salient formed by the German advance, Passchendaele Ridge, the capture of which had cost so dearly in 1917, was evacuated by the British on April 17.

The losses had been heavy and the British were unable to replace them entirely. They were, there¬ fore, making; extraordinary efforts to increase the shipping available for our troops. On _ April 21 I went to London to clear up certain questions concern¬ ing the rate of shipment and to reach the further agreement provided for in the April 7 conference. The result of this London agreement wias cabled to Wash¬ ington April 24, as follows:

(a) That only the infantry, machine guns, engineers, and signal troops of American divisions and the head¬ quarters of divisions and brigades be sent over in British and American shipping during May for training and service with the British Army in France up to six divisions, and that any shipping in excess of that required for these troops be utilized to transport troops necessary to make these divisions complete. The train¬ ing and service of these troops will be carried out in accordance with plans already agreed upon between Sir Douglas Haig and General Pershing, with a view at an early date of building up American divisions.

(&) That the American personnel of the artillery of these divisions and such corps troops as may be required to build up American corps organizations fol¬ low immediately thereafter, and that American artillery personnel be trained with French material and join its proper divisions as soon as thoroughly trained.

(c) If, when the program outlined in paragraphs

(a) and (b) is completed, the military situation makes advisable the further shipment of infantry, etc., of American divisions, then all the British and American shipping available for transport of troops shall be used for that purpose under such arrangement as will insure immediate aid to the Allies, and at the same time pro¬ vide at the earliest moment for bringing over American artillery and other necessary units to complete the or¬ ganization of American divisions and corps. Provide that the combatant troops mentioned in (o) and (o) be followed by such Service of the Rear and other troops as may be considered necessary by the American Commander in Chief. , , .

(d) That it is contemplated American divisions and

corps, when trained and organized, shallˆ be utilized under the American Commander in Chief in an Amer¬ ican group. .

ie) That the American Commander in Chief shall allot American troops to the French or British for train¬ ing them with American units at his discretion, with

the understanding that troops already transported by British shipping or included in the six divisions men¬ tioned in paragraph (a) are to be trained with the British Army, details as to rations, equipment, and transport to be determined by special agreement.

At a meeting of the Supreme War Council held at Abbeville May i and 2, the entire question of the amalgamation of Americans with the French and British was reopened. An urgent appeal came from both French and Italian representatives for American replacements or units to serve with their armies. After prolonged discussion regarding this question and that of priority generally the following agreement was reached, com¬ mitting the council to an independent American army and providing for the immediate shipment of certain troops:

It is the opinion of the Supreme War Council that, in order to carry the war to a successful conclusion, an American army should be

formed as early as possible under its own commander and under its own dag. In order to meet the present emergency it is agreed that American troops should be brought to France as rapidly as allied transportation facilities will permit, and that, as far as consistent with the necessity of building up an American army, preference will be given to infantry and machine-gun units for training and service with French and British armies; with the understanding that such infantry and machine-gun units are to be with¬ drawn and united with its own artillery and auxiliary troops into divisions and corps at the direction of the American Commander in Chief after consultation with the Commander in Chief of the allied armies in France.

Subparagraph A. It is also agreed that during the month of May preference should be given to the trans¬ portation of infantry and machine-gun units of six divisions, and that any excess tonnage shall be devoted to bringing over such other troops as may be deter¬ mined by the American Commander in Chief.

Subparagraph B. It is further agreed that this pro¬ gram shall be continued during the month of June upon condition that the British Government shall furnish transportation for a minimum of 130,000 men in May and 150,000 men in June, with the understanding that the first six divisions of infantry shall go to the British for training and service, and that troops sent over in June shall be allocated for training and service as the American Commander in Chief may determine.

Subparagraph C. It is also further agreed that if the British Government shall transport an excess of 150,000 men in June that such excess shall be infantry and machine-gun units, and that early in June there shall be a new review of the situation to determine further action.

The gravity of the situation had brought the Allies to a full realization of the necessity of providing all possible tonnage for the transportation of American troops. Although' their views were accepted to the ex¬ tent of giving a considerable priority to infantry and machine gunners, the priority agreed upon as to this class of troops was not as extensive as some of them deemed necessary, and the Abbeville conference was adjourned with the understanding that the question of further priority would be discussed at a conference to be held about the end of May.

The next offensive of the enemy wias made between the Oise and Berry-au-Bac against the French instead of against the British, as was

generally expected, and it came as a complete surprise. The initial Aisne at¬ tack, covering a front of 35 kilometers, met with re-miarkable success, as the German armies advanced no less than 50 kilometers in four days. On reaching the Marne that river was used as a defensive flank and the German advance was directed toward Paris. Dur¬ ing the first days of June something akin to a pianic seized the city and it was estimated that 1,000,000 peo¬ ple left during the spring of 1918.

The further conference which had been agreed upon at Abbeville was held lat Versailles on June i and 2. The opinion of our Allies as to the existing situation and the urgency of their insistence upon further pri¬ ority for infantry and miachine gunners are shown by the following message prepared by the Prime Ministers of Great Britain, France and Italy, and agreed to by General Foch :

THE PRIME MINISTERS OF FRANCE, ITALY AND GREAT BRITAIN, NOW MEETING AT VERSAILLES, DESIRE TO SEND THE FOLLOW¬ ING MESSAGE TO THE PRESIDENT OF THE UNITED STATES:

We desire to express our warmest thanks to Presi¬ dent Wilson for the remarkable promptness with which American aid in excess of what at one time seemed practicable has been rendered to the Allies during the last month to meet a great emergency. The crisis, however, still continues. General Foch has presented

to US a statement of the utmost gravity, which points out that the numerical superiority of the enemy in France, where 162 allied divisions now oppose 200 German divisions, is very heavy, and that, as there is no possibility of the British and French increasing the number of their divisions (on the contrary, they are put to extreme straits to keep them up) there is a great danger of the war being lost tinless the numerical in¬ feriority of the Allies can be remedied as rapidly as possible by the advent of American troops. He, there¬ fore, urges with the utmost insistence that the maxi¬ mum possible number of infantry and machine gun¬ ners, in which respect the shortage of

men on the side of the Allies is most marked, should continue to be shipped from America in the months of June and July to avert the immediate danger of an allied defeat in the present campaign owing to the allied reserves being exhausted before those of the enemy. In addition to this, and looking to the future, he represents that it is impossible to foresee ultimate victory in the war un¬ less America is able to provide such an army as will enable the Allies ultimately to establish numerical su¬ periority. He places the total American force re¬ quired for this at no less than 100 divisions, and urges the continuous raising of fresh American levies, which, in his opinion, should not be less than 300,000 a month, with a view to establishing a total American force of 100 divisions at as early a date as this can possibly be done. • •

IV e are satisfied that General Foch, who is conduct¬ ing the present campaign with consummate ability, and on whose military judgment we continue to place the most absolute reliance, is not overestimating the needs of the case, and we feel confident that the Government of the United States will do everything that can be done, both to meet the needs of the immediate situa¬ tion and to proceed with the continuous raising of fresh levies calculated to provide as soon as possible the numerical superiority which the Commander in Chief of the allied armies regards as essential to ulti¬ mate victory.

A separate telegram contains the arrangements which General Foch, General Pershing and Lord Milner have agreed to recommend to the United States Government with regard to the dispatch of American troops for the months of June and July. (Signed)

D. LLOYD GEORGE,

CLEMENCEAU,

ORLANDO.

Such extensive priority had already been given to the transport of American infantry and machine gun¬ ners that the troops of those categories which had re¬ ceived even partial training in the United States were practically exhausted. Moreover, the strain on our services of supply made it essential that early relief be afforded by increasing its personnel. At the same time, the corresponding services of our Allies had in certain departments been equally overtaxed and their responsible heads were urgent in their representations that their needs must be relieved by bringing over American specialists. The final agreement was cabled to the War Department on June 5, as follows;

The following agreement has been concluded be¬ tween General Foch, Lord Milner and myself with ref¬ erence to the transportation of American troops in the months of June and July:

The following recommendations are made on the assumption that at least 250,000 men can be transported in each of the months of June and July by the employ¬ ment of combined British and American tonnage. We recommend:

(a) For the month of June: (i) Absolute priority shall be given to the transportation of 170,000 combatant troops (viz., six divisions without artillery, ammunition trains, or supply trains, amounting to 126,000 men and 44,000 replacements for combat troops); (2)

25.400 men for the service of the railways, of which

13.400 have been asked for by the French Minister of Transportation ; (3) the balance to be troops of cate¬ gories to be determined by the Commander in Chief, American Expeditionary Forces.

(b) For the month of July: (i) Absolute priority for the shipment of 140,000 combatant troops of the nature defined above (four divisions minus artillery " et cetera," amounting to 84,000 men, plus 56,000 replacement) ; (2) the balance of the 250,000 to con¬ sist of troops to be designated by the Commander in Chief, American Expeditionary Forces.

(c) It is agreed that if the available tonnage in either month allows of the transportation of a larger number of men than 250,000, the excess tonnage will be employed in the transportation of combat troops as de¬ fined above.

(d) We recognize that the ccnnbatant troops to be dispatched in July may have to include troops which have had insufficient training, but we consider the

present emergency is such as to justify a temporary and exceptional departure by the United States from sound principles of training, especially as a similar course is being followed by France and Great Britain.

(Signed) FOCH,

MILNER,

PERSHING.

The various proposals during these conferences re¬ garding priority of shipment, often very insistent, raised questions that were not only most difficult but most delicate. On the one hand, there was a critical situation which must be met by immediate action, while on the other hand, any priority accorded a par¬ ticular arm necessarily postponed the formation of a distinctive American fighting force and the means to supply it. Such a force was, in my opinion, abso¬ lutely necessary to win the war. A few of the allied representatives became convinced that the American services of supply should not be neglected, but should be developed in the common interest. The success of our divisions during May and Jun.e demonstrated fully that it was not necessary to draft Americans under foreign flags in order to utilize American manhood most effectively.

Allied Commander in Chief.— When, on March 21, 1918, the German army on the western front be¬ gan its series of offensives, it was by far the most formidable force the world had ever seen. In fighting men and guns it had a great superiority, but this was of less importance than the advantage in morale, in experience, in training for mobile warfare, and in unity of command. Ever since the collapse of the Russian armies and the crisis on the Italian front in the fall of 1917, German armies were being assembled and trained for the great campaign which was to end the war before America's effort could be brought to bear. Germany's best troops, her most successful gen¬ erals, and all the experience gained in three years of war were mobilized for the supreme effort.

The first blow fell on the right of the British armies, including the junction of the British and French forces. Only the prompt cooperation of the French and British General Headquarters stemmed the tide. The reason for this objective was obvious and strikingly illustrated the necessity for having some one with sufficient authority over all the allied armies to meet such an emergency. The lack of complete co¬ operation (among the Allies on the western front had been appreciated, and the question of preparation to meet a crisis had already received attention by the Supreme War Council. A plan had been adopted by which each of the Allies would furnish a certain num¬ ber of divisions for a general reserve, to be under the direction of the military representatives . of the Su¬ preme War Council, of which General Foch was then the senior member. But when the time came to meet the German offensive in March these reserves were not found available and the plan failed.

This situation resulted in a conference for the im¬ mediate consideration of the question of having an allied commander in chief. After much discussion, during which my view favoring such action was clearly stated, an agreement Was reached and General Foch was selected. His appointment as such was made April 3 and was approved for the United States by the President on April 16, The terms of the agree¬ ment under which General Foch exercised his author¬ ity were as follows:

Beauvais, April 3, 191S.

General Fochˆ is charged by the British, French and American Governments with the coordination of the action of the allied armies on the western front; to this end there is conferred on him all the powers nec¬ essary for its effective realization. To the same end, the British, French and American Governments con¬ fide in General Foch the strategic direction of military operations.

The Commanders in Chief of the British, French and American armies will exercise to the fullest ex¬ tent the tactical direction of their armies. Each Com¬ mander in Chief will have the right to appeal to his Government, if in his opinion his army is placed in danger by the instructions received from General Foch.

(Signed) G. CLEMENCEAU.

RETAIN.

F. FOCH.

LLOYD GEORGE.

D. HAIG. F. M.

HENRY WILSON,

General, 3, 4, 18.

TASKER H. BLISS, General and Chief of Staff. JOHN J. PERSHING, General, U. S. A.

Employment of American Divisions from March to September 1918. — The grave crisis precipitated by the first German offensive caused me to make a hur¬ ried visit to General Foch's headquarters at Bombon, during which all our combatant forces were placed at his disposal. The acceptance of this offer meant the dispersion of our troops along the allied front and a consequent delay in building up a distinctive American force in Lorraine, but the serious situation of the Allies demanded this divergence from our plans.

On March 21 approximately 300,000 American troops had reached France. Four combat divisions, equiva¬ lent in strength to eight French or British divisions, were available — the ist and 2d then in line, and the 26th and 42d just withdrawn from line after one month's trench warfare training. The last two divi¬ sions at once began taking over quiet sectors to re¬ lease divisions for the battle; the 26th relieved the ist Division, which was sent to northwest of Paris in re¬ serve; the 42d relieved two French divisions from quiet sectors. In addition to these troops, one regi¬ ment of the 93d Division was with the French in the Argonne, the 41st Depot Division was in the Services of Supply, and three divisions (3d, 32d and 5th) were

arriving.

On 25 April the 1st Division relieved two French divisions on the front ne!ar Montdidier and on May 28 captured the important observation stations on the heights of Cantigny with splendid dash. French artil¬ lery, aviation, tanks and llame throwers aided in the attack, but most of this French assistance was with¬ drawn before the completion of the operation, in order to meet the enemy's new offensive launched May 27 toward Chateau-Thierry. The enemy reaction against our troops at Cantigny was extremely violent and ap¬ parently he was determined at lall costs to counteract the most excellent effect the American success had pro¬ duced. For three days his guns of all calibres were concentrated on our new position and counterattack succeeded counterattack. The desperate efforts of the Germans gave the fighting at Cantigny a seeming tac¬ tical importance entirely out of proportion to the num¬ bers involved.

Of the three divisions arriving in France when the first German

offensive began, the 32d, intended for replacements, had been temporarily employed in the Services of Supply to meet a shortage of personnel, but the critical situation caused it to be reassembled, and by May 21 it was entering the line in the Vosges. At this time the 5th Division, though still incomplete, was also ordered into the line in the same region. The 3d Division was assembling in its training area and the 3d Corps staff had just been organized to admin¬ ister these three divisions. In addition to the eight di¬ visions already mentioned, the 28th and 77th had ar¬ rived in the British area and the 4th, 27th, 13th, 33d, 35th and 82d were arriving there. Following the agreements as to British shipping, our troops canie so rapidly that by the end of May we had a force of 600,000 in France.

The third German offensive, on May 27, against the French on the Aisne, soon developed a desperate situation for the Allies. The 2d Division, then in re¬ serve northwest of Paris and preparing to relieve the ist Division, was hastily diverted to the vicinity of the Meaux on May 31, and, early on the morning of June I, was deployed across the Chateau-Thierry-Paris road near Montreuil-aux-Lions in a gap in the French line where it stopped the German advance on laris. At ’the same time the partially trained 3d Division was placed at French disposal to hold the crossings of the Marne, and its motorized machine-gun battalion succeeded in reaching Chateau-Thierry in tirne to as¬ sist in successfully defending that river crossiiˆ. ˆ _

The enemy having been halted, the 2d Division commenced a series of vigorous attacks on June 4, which resulted in the capture of Belleau Woods after very severe fighting. The village of Bouresches was taken soon after, and on July i Vaux was captured. In these operations the 2d Division met with most des¬ perate resistance by Germany’s best troops.

To meet the March offensive, the French had ex¬ tended their front from the Oise to Amiens, about bo kilometers, and during the German drive along the Lys had also sent reinforcements to assist the British. The French lines had been further lengthened about 45 kilometers as a result of the Marne pocket made b-the Aisne offensive. This increased frontage and the heavy fighting had reduced French reserves to an ex¬ tremely low point.

Our 2d Corps, under Maj.-Gen. (jeorge W. Rec.d, had been organized for the command of the 10 divisions wkh the iStish, which were held back in training areas or assigned to second-lme defenses. After con-aultation with Field Marshal Ila.g on J, me 3 five American divisions were relieved from the British

area to support the French. The 77th and 82d Divi¬ sions were removed south to release the 42d and 26th for employment on a more active portion of the front; the 35th Division entered the line in the Vosges and the 4th and 28th Divisions were moved to the region of Meaux and Chateau-Thierry as reserves.

On June 9 the Germans attacked the Montdidier—

Noyon front in an effort to widen the Marne pocket

and bring their lines nearer to Paris, but were stub¬ bornly held by the French with comparatively little

loss of ground. In view of the unexpected results of the three preceding attacks by the enemy, this success¬ ful defense proved beneficial to the allied morale, par¬ ticularly as it was believed that the German losses were unusually heavy.

On July 15, the date of the last German offensive, the 1st, 2d, 3d and 26th Divisions were on the Chateau-Thierry front with the 4th and 28th in support, some small units of the last two divisions gaining front-line experience with our troops or with the French; the 42d Division was in support of the French east of Rheims, and four colored regiments were with the French in the Argonne. On the Alsace-Lorraine front we had five divisions in line with the French. Five were with the British army, three having elements in the line. In our training areas four divisions were assembled 4nd four were in the process of arrival.

The Marne salient was inherently weak and offered an opportunity for a counteroffensive that was obvious.

If successful, such an operation would afford im¬ mediate relief to the allied defense, would remove the threat against Paris and free the Paris-Nancy Railroad. But, more important than all else, it would restore the morale of the Allies and remove the profound de¬ pression and fear then existing. Up to this time our units had been put in here and there at critical points as emergency troops to stop the terrific German ad¬ vance. In every trial, whether on the defensive or offensive, they had proved themselves equal to any troops in Europe.

As early as June 23 and again on July 10 at Bombon, I had very strongly urged that our best divisions be concentrated under American com¬ mand, if possible, for use as a striking force against the Marne sialient. Although the prevailing view among the Allies was that American units were suit¬ able only for the defensive, and that at all events they could be used to better advantage under Allied command, the suggestion was accepted in principle, and my estimate of their offensive fighting qualities was soon put to the test.

The enemy had encouraged his soldiers to believe that the July 15 attack would conclude the war with a German peace. Although he made elaborate plans for the operation, he failed to conceal fully his intentions, and the front of attack was suspected at least one week ahead. On the Champagne front the actual hour for the assault was known and the enemy was checked with heavy losses. The qad Division entered the line near .Somme Py immediately, and five of its infantry battalions and all its artillery became engaged. South¬ west of Rheims and along the Marne to the east 0+ Chateau-Thierry the Germans were at first somewhat successful, a penetration of eight kilometers beyond the river being effected against the French immedi¬ ately to the right of our 3d Division. The following quotation from the report of the commanding general, 3d Division, gives the result of the fighting on his front:

“Although the rush of the Gerrnan troops over¬ whelmed some of the front-line positions, causing the infantry and machine-gun companies to suffer, in some cases a 50 per cent loss, no German soldier crossed the road from Fossoy to Crezancy, except as a prisoner of war, and by noon of the following day (July 16) there were no Germans in the foreground of the 3d Division sector except the dead.”

On this occasion a single regiment of the 3d Di¬ vision wrote one of the most brilliant pages in our mili¬ tary annals. It prevented the crossing at certain points on its front, while on either flank the Germans who had gained a footing pressed forward. Our men, firing in three directions, met the German attacks with counterattacks at critical points land succeeded _ in throwing two German divisions into complete confusion, cajituring 600 prisoners.

The selection b” the Germans of the Champagne sector and the eastern and southern faces of the Marne pocket on which to make their offensive was fortunate for the Allies, as it favored tTie launching of their counterattack already planned. There were novv over 1,200.000 American troops in France, which provided a considerable force of reserves. Every American divi¬ sion with any sort of training was

made available for use in a counteroffensive.

General Petain's initial plan for the counterattack involved the entir.-western face of the Marne salient.

The I St and 2d American divisions, with the ist French Moroccan Division between them, were employed as the spearhead of the main attack, driving directly east-wiard, through the most sensitive portion of the Ger¬ man lines, to the heights south of Soissons. The ad¬ vance began on July 18, without the usual brief warning of a preliminary bombardment, and these three divisions at a single bound broke through the enemy's infantry defenses and overran his artillery, cutting or interrupting the German communications leading into the salient. A general withdrawal from the Marne was immediately begun by the enemy, who still fought stubbornly to prevent disaster.

The I St Division, throughout four days of constant fighting, advanced 1 1 kilometers, capturing Berzy-le- Sec and the heights above Soissons and taking some 3,500 prisoners and 68 field guns from the seven Ger¬ man divisions employed against it. It was relieved by a British division. The 2d Division advanced eight kilometers in the first 26 hours, and by the end of the second day was facing Tigny, having captured 3,000 prisoners and 66 field guns. It was relieved the night of the 19th by a French division.

" The result of this counteroffensive was of decisive importance. Due to the magnificent dash and power displayed on the field of Soissons by our ist and 2d Divisions the tide of the wtar was definitely turned in favor of the Allies."

Other American divisions participated in the Marne counteroffensive. A little to the south of the 2d Di¬ vision, the 4th was in line with the French and was engaged until July 22. The ist American Corps, Maj.-Gen. Hunter Liggett commanding, with the 26th Divi¬ sion and a French division, acted as a pivot of the movement toward Soissons, capturing Torcy on the i8th land reaching the Chateau-Thierry-

Soissons roads on the 21 St. At the same time the 3d Division crossed the Marne and took the heights of Mont Saint Peter and the villages of Charteves and Jaulgonne.

In the ist Corps, the 42d Division relieved the 26th on July 25 and extended its front, on the 26th reliev¬ ing the French division. From this time until Au¬ gust 2 it fought its way through the Forest de Fere land across the Ourcq, advancing toward the Vesle until relieved by the 4th Division on August 3. Early in this period elements of the 28th Division participated in the advance.

Further to the east the 3d Division forced the enemy back to Roncheres Wood, where it was re¬ lieved on July 30 by the 32d Division from the Vosges front. The 32d, after relieving the 3d and some ele¬ ments of the 28th on the line of the Ourcq River, ad¬ vanced abreast of the 42d toward the Vesle. On Au¬ gust 3 it passed under control of our 3d Corps, Maj.- Gen. Robert L. Bullard commanding, which made its first appearance in battle at this time, while the 4th Division took up the task of the 42d Division and ad¬ vanced with the 32d to the Vesle River, where, on Au¬ gust 6, the operations for the reduction of the Marne salient terminated.

In the hard fighting from July 18 to August 6 the Germans were not only halted in their advance, but were driven back from the Marne to the Vesle and committed wholly to the defensive. The force of American arms had been brought to bear in time to enable the last offensive of the enemy to be crushed.

The ist and 3d corps now held a continuous front II kilometers along the Vesle. On August 12 the 77th Division relieved the 4th Division on the ist Corps front, and the following day the 28th relieved the 32d Division in the 3d Corps, while from August 6 to Au¬ gust 10 the 6th Infantry Brigade of the 3d Division held a sector on the river line. The transfer of the 1st Corps to the Woevre was ordered at this time, and the control of its front was turned over to the 3d Corps.

On August 13 General Petain began an offensive between Rheims and the Oise. Our 3d Corps partici¬ pated in this operation, crossing the Vesle on Septem¬ ber 4, with the 28th and 77th divisions and overcom¬ ing stubborn opposition on the plateau south of the Aisne, which was reached by the 77th on September 6. The 28th was withdrawn from the line on September 7. Two days later the 3d Corps was transferred to the region of Verdun, the 77th Division remaining in line on the Aisne River until September 17.

The 32d Division, upon its relief from the battle on the Vesle, joined a French corps north of Soissons land attacked from August 29 to 31, capturing Juvigny after some particularly desperate fighting and reach¬ ing the Chauny-Soissons road.

On the British front two regiments of the 33d Di¬ vision participated in an attack on Hamel July 4 and again on August 9 as an incident of an allied offen¬ sive against the Amiens salient. One of these regi¬

ments took Gressaire Wood and Chipilly Bridge, cap¬ turing 700 prisoners and considerable material.

Assembling the First American Army. — In con¬ ference with General Petain at Chantilly on 19 May it had been agreed that the American army would soon take complete charge of the new sector of the Woevre. The 26th Division was already in line in the Woevre north of Toul and was to be followed by other American divisions as they became available, with the understanding that the sector was to pass to our con¬ trol when four divisions were in the line. But de¬ mands of the battle then going on further west re¬ quired the presence of our troops, and the agreement had no immediate result. Due to the presence of a number of our divisions northeast of Paris, the organ¬ ization of an American corps sector in the Chateau-Thierry region was taken up with General Petain, land on July 4 the ist Corps assumed tactical control of a sector in that region. This was an important step, but it was by no means satisfactory, as only one American division at the moment was operating under the con¬ trol of the ist Corps, while we had at this time eight American divisions in the front line serving in French corps.

The counteroffensive against the Marne salient in July and against the Amiens salient in August had gained such an advantage that it Was apparent that the emergency, which justified the dispersion of our divisions, had passed. The moment was propitious for assembling our divisions. Scattered as they were along the allied front, their supply had become very difficult. From every point of view the immediate or¬ ganization of an independent American force Was indi¬ cated. The formation of the army in the Chateau-Thierry region and its early transfer to the sector of the Woevre, which was to extend from Nomeny, east of the Moselle, to north of Saint Mihiel, was, there¬ fore, decided upon by Marshal Foch and myself on August 9, and the details were arranged with General Petain later on the same day.

St. Mihiel Operations. — At Bombon on July 24 there was a conference of all the commanders in chief for the purpose of considering allied operations. Each presented proposals for the employment of the armies under his command, and these formed the basis of fu¬ ture cooperation of the Allies. It was emphatidally determined that the allied attitude should be to main¬ tain the offensive. At the first operation of the Ameri¬ can army the reduction of the salient of St. Mihiel was to be undertaken as soon as the necessary troops and material could be made available. On account of the swampy nature of the country it was especially im¬ portant that the movement be undertaken and finished before the fall rains should begin, which was usually about the middle of September.

Arrangements were concluded for successive re¬ lief of the American divisions, and the organiziation of the First American Army under my personal command ■was announced on August 10, with La Ferte-sous- Jouarre as headquarters. This army nominally as¬ sumed control of a portion of the Vesle front, al¬ though at the siame time directions were given for its secret concentration in the St. Mihiel sector.

The force of American soldiers in France at that moment was sufficient to carry out this offensive, but they were dispersed along the front from Switzerland to the Channel. The three army corps headquarters to participate in the St. Mihiel attack were the ist, 4th and 5th. The ist was on the Vesle, the 4th at Toul and the 5th not yet completely organized. To assemble combat divisions and service troops and un¬ dertake a major operation within this short period aviailable and with staffs so recently organized was an extremely difficult task. Our deficiencies in artillery, aviation and special troops, caused by the shipment of an undue proportion of infantry and machine guns during the summer, were largely met by the French.

The reduction of the St. Mihiel salient was im¬ portant, as it would prevent the enemy from interrupt¬ ing traffic on the Paris-Nancy Railroad by artillery fire and would free the railroad leading north through St. Mihiel to Verdun. It would also provide us with an advantageous base of departure for an attack against the Metz-Sedan railroiad system, which was vital to the German armies west of Verdun, and against the Briey Iron Basin, which was necessary for the production of German armament and munitions.

The general plan -wias to make simultaneous attacks against the flanks of the salient. The ultimate objective was tentatively fixed as the general line Marieulles (east of the Moselle) — heights south of Gorze-Mars in Tour-Etain. The operations contemplated the use of the

western face of three or four American divisions, sup¬ ported by the attack of six divisions of the Second French Army on their left, while seven American divisions would attack on the southern face, and three

French divisions would press the enemy at the tip of the salient. As the part to be taken by the Second ˆ would be closely related to the attack

" First American Army, General Petain placed all the I'rench troops involved under my personal command, j…y -ˆug. 20 the concentration of the scattered

divisions, corps, and army troops, of the quantities of supplies and munitions required, and the necessary con¬ struction of light railways and roads, were well under way.

In accordance with the previous general consideration of operations at Bombon on July 24, an allied offensive extending practically along the entire active front was eventually to be carried out. After the reduction of the St. Mihiel sector the Americans were to co-operate in the concerted effort of the allied armies. It was the sense of the conference of July 24 that the extent to which the different operations already planned might carry us could not be then foreseen, especially if the results expected were achieved before the season was far advanced. It seemed reasonable at that time to look forward to a combined offensive for the Autumn, which would give no respite to the enemy and would increase our advantage for the inauguration of succeeding operations extending into 1919.

On Aug. 30 a further discussion with Marshal Foch was held at my headquarters at Ligny-en-Barrois. In view of the new successes of the French and British near Amiens and the continued favorable results toward the Chemin des Dames on the French front, it was now believed that the limited allied offensive, which was to prepare for the campaign of 1919, might be carried further before the end of the year. At this meeting it was proposed by Marshal Foch that the generous

operations as far as the American Army was concerned should be carried out in detail by :

(a) An attack between the Meuse and the Argonne by the Second French Army, reinforced by from four to six American divisions.

(b) A French-American attack, extending from the Argonne west to the Souain road, to' be executed on the right by tan American Army astride the Aisne and on the left by the Fourth French Army.

To carry out these attacks the ten to eleven Amer¬ ican divisions suggested for the St. Mihiel operation and the four to six for the Second French Army, would have eight to ten divisions for an American Army on the Aisne. It was proposed that the St. Mihiel operation should be initiated on Sept. 10, and the other two on Sept. 15 and 20, respectively.

The. plan suggested for the American participation in these operations was not acceptable to me because it would require the immediate separation of the re¬ cently formed First American Army into several ˆoups, mainly to assist French armies. This was directly contrary to the principle of forming a distinct American Army, for which my contentionˆ had been insistent. An enormous amount of preparation had already been made in construction of roads, railroads, regulating stations, and other installations looking to the use and supply of our armies on a particular front. The in¬ herent disinclination of our troops to serve under allied commanders would have grown and American morale would have suffered. My position was stated quite cleiarly that the strategical employment of the First Army as a unit would be undertaken where desired, but its disruption to carry out these proposals would not be entertained.

A further conference at Marshal Foch's headquarters was held on Sept. 2, at which General Petain was present. After discussion the question of employing the American Army as a unit wias conceded. The essen¬ tials of the strategical decision previously arrived at provided that the advantageous situation of the Allies should be exploited to the utmost by vigorously continu¬ ing the general battle and extending it eastward to the Meuse. All the allied armies were to be employed in la converging action. The British armies, supported by the left of the French armies, were to pursue the attack in the direction of Cambrai; the centre of the French armies, west of Rheims, would continue the actions already begun to drive the enemy beyond the Aisne; and the American Army, supported by the right of-the French armies, would direct its attack on Sedan and Mezieres.

It should be recorded that although this general offensive wias fully outlined at the conference no one present expressed the opinion that the final victory could be won in 1918. In fact, it was believed by the French High Command that the Meuse-Argonne attack could not be pushed much beyond Montfaucon before the arrival of Winter would force a cessation of operations.

The choice between the two sectors, that east of the Aisne, including the Argonne Forest, or the Cham¬ pagne sector, was left to me. In my opinion no other

allied troops had the morale or the offensive spirit to overcome successfully the difficulties to be met in the Meuse-Argonne sector, and our plans and installations had been prepared for an expansion of operations in that direction. So the Meuse-Argonne front was chosen. The entire sector of 150 kilometers of front, extending from Port-sur-Seille, east of the Moselle, west to in¬ clude the Argonne Forest, was accordingly placed under my command, including all French divisions then in that zone. The First American Army was to proceed with the St. Mihiel operation, after which the operation between the Meuse and the western edge of the Argonne Forest was to be prepared and launched not later than Sept. 25.

As a result of these decisions the depth of the St. Mihiel operation was limited to the line Vigneulles-Thiaucourt-Regnieville. The number of divisions to be used was reduced and the time shortened. Eighteen to nineteen divisions were to be in the front line. There were four French and fifteen American divisions avail¬ able, six of which would be in reserve, while the two flank divisions of the front line were not to advance. Furthermore, two Army Corps Headquarters, with their corps troops, practically all the army artillery and aviation, _ and the ist, 2d, and 4th Divisions, the first two destined to take la leading part in the St. Mihiel attack, were all due to be withdrawn and started for the Meuse-Argonne by the fourth day of the battle.

The salient had been held by the Germans since September, 1914. It covered the most sensitive section of the enemy's position on the western front, namely, the Mezieres-Sedan-Metz Railroad land the Briey Iron Basin; it threatened the entire region between Verdun and_ Nancy, and interrupted the main rail line from Paris to the east. Its primary strength lay in the natural defensive features of the terrain itself. The western face of the salient extended along the rugged, heavily wooded eastern heights of the Meuse; the south¬ ern face

followed the heights of the Meuse for eight kilometers to the east and then crossed the plain of the Woevre, including within the German lines the de¬ tached heights of Loupmont and Montsec which dom¬ inated the plain and afforded the enemy unusual facil¬ ities for observation. The enemy had reinforced the positions by every artificial means during a period of four years.

On the night of Sept. 1 1 the troops of the First Army were deployed in position. On the southern face of the salient was the ist Corps, Major Gen. Liggett commanding, with the Sad, 19th, 5th and 2d Divisions in line, extending from the Moselle westward. On its left was the 4th Corps, Major Gen. Joseph T. Dickman comm'anding, with the 89th, 42 d and ist Divisions, the left of this corps being opposite Montsec. These two army corps were to deliver the principal attacl^ the line pivoting on the centre division of the ist Corps. The ist Division, on the left of the 4th Corps, was charged with the double mission of covering its own flank while advancing some twenty kilometers due north toward the heart of the salient, where it was to make contact with the troops of the sth Corps. On the western face of the salient lay the sth Corps, Major Gen. George H. Cameron commanding, with the 26th Division, 15th French Colonial Division and the 4th Division jn line, from Mouilly west to Les Eparges and north to Wa-tronville. Of these three divisions the 26th alone was to make a deep advance directed southeast toward Vigneulles. The French division was to make a short pro¬ gression to the edge of the heights in order to cover the left of the 26th. The 4th Division was not to advance. In the centre, between our 4th and 5th Army Corps, was the 2d French Colonial Corps, Major Gen. E. J. Blondlat commanding, covering a front of forty kilometers with three small French divisions. These troops were to follow up the retirement of the enemy from the tip of the salient.

The French independent air force was at my disposal, which, together with the British bombing squadrons and our own air forces, gave us the largest assemblage of aviation that had ever been engaged in one operation. Our heavy guns were able to reach Metz and to inter¬ fere seriously with German rail movements.

At dawn on Sept. 12, aher four hours of violent artillery fire of preparation, and accompanied by small tanks, the infantry of the ist and 4th Corps advanced. The infantry of the 5th Corps commenced its advance at 8 A. M. The operation was carried out with entire precision. Just after daylight on Sept. 13 elements of the ist and 26th Divisions made a junction near Hat-tonchatel and Vigneulles, eighteen kilometers northeast of St. Mihiel.

The rapidity with which our_ divisions advanced overwhelmed the enemy, and all objectives were reached by the afternoon of Sept. 13. The enemy had appar¬ ently started to withdraw some of his troops from the tip of the salient on the eve of our attack, but had

been unable to carry it through. We captured nearly 16,000 prisoners, 443 guns, and large stores of material and supplies. The energy and swiftness with which the operation was carried out enabled us to smother opposition to such an extent that we suffered less than 7,000 dasualties during the actual period of the advance.

During the next two days the right of our line west of the Moselle River was advanced beyond the objectives laid down in the original orders. This com¬ pleted the operation for the time being and the line was stabilized to be held by the smallest practicable force.

The material results of the victory achieved were very important. An American army was 'an accom¬ plished fact, and the enemy had felt its power. No form of propaganda could overcome the depressing effect on the morale of the enemy of this demonstration of our ability to organize a large American force and drive it successfully through his defenses. It gave our troops implicit confidence in their superiority and raised their morale to the highest pitch. For the first time wire entanglements ceased to be regarded as impass¬ able barriers and open-warfare training, which had been so urgently insisted upon, proved to be the correct doctrine. Our divisions concluded the attack with such small losses and in such high spirits that without the usual rest they were immediately available for employ¬ ment in heavy fighting in a new theatre of operations. The strength of the First Army in this battle totaled approximately 500,000 men, of "Whom about 70,000 were French.

Meuse-Argonne Operation. — The definite decision for the Meuse-Argonne phase of the great allied con¬ vergent attack was agreed to in my conference with Marshal Foch and General Petain on Sept. 2. It was planned to use all available forces of the First Army, including

such divisions and troops as we might be able to withdraw from the St. Mihiel front. The army was to break through the enemy's successive forti¬ fied zones to include the Kriemhilde Stellung, or Hindenburg line, on the front Brieulles-Romagne sous Montfaucon-Grand Pre, and thereafter, by developing pressure toward Mezieres, was to insure the fall of the Hindenburg line along the Aisne River in front of the Fourth French Army, which was to attack to the west of the Argonne Forest. A penetration of some twelve to fifteen kilometers was required to reach the Hindenburg line on our front, and the enemy's defenses were virtually continuous throughout that depth.

The Meuse-Argonne front had been practically stabil¬ ized in September, 1914, and, exeept for minor fluctua¬ tions during the German attacks on Verdun in 1916 and the French counteroffensive in /august, 1917, re¬ mained unchanged until the American advance in 1918. The net result of the four years' struggle on this ground was a German defensive system of unusual depth and strength and a wide zone of utter devastation, itself a serious obstacle to offensive operations.

The strategidal importance of this portion of the line was second to none on the western front. All supplies and evacuations of the German armies in Northern France were dependent upon two great rail¬ way systems — one in the north, passing through Liege, the other in the south, with lines coming from Luxem¬ burg, Thionville, and Metz, had as its vital section the line Carignan-Sedan-Mezieres. No other important lines were available to the enemy, as the mountainous masses of the Ardennes made the construction of east and west lines through that region impracticable. The Carignan-Sedan-Mezieres line was essential to the Ger¬ mans for the' rapid strategical movement of troops. Should this southern system be cut by the Allies before the enem.y could withdraw his forces through the nar¬ row neck between Mezieres and the Duteh frontier, the ruin of his armies in France and Belgium would be complete.

From the Meuse-Argonne front the perpendicular distance to the Carignan-Mezieres railroiad was 50 kilo¬ meters. This region formed the pivot of German operations in Northern France, and the vital necessity of covering the great railroad line into Sedan resulted in the convergence on the Meuse-Argonne front of the successive German defensive positions. The effect of this convergence can be best understood by reference to the map. It will be seen, for example, that the distance between No Man's Land and the third German withdrawal position in the vicinity of the Meuse River was approximately 18 kilometers; the distance between the corresponding

points near the tip of the great salient of the western front was about 65 kilometers, and in the vicinity of Cam'brai was over 30 kilometers. The effect of a penetration of 18 kilometers by the American Army would be equivalent to an advance of 65 kilometers further west; furthermore, such an ad¬ vance on our front was far more dangerous to the enemy than an advance elsewhere. The vital importance

of this portion of his position was fully appreciated by the enemy, who had suffered tremendous Tosses in 1916 in attempting to improve it by the reduction of Verdun. As a consequence it had been elaborately fortified, and consisted of practically a continuous series of positions 20 kilometers or more in depth.

In addition to the artificial defenses, the enemy was greatly aided by the natural features -of the terrain. East of the Meuse the dorninating heights not only protected his left, but gave him positions from which powerful artillery could deliver lan oblique fire on the western bank. Batteries located in the elaborately forti¬ fied Argonne Forest covered his right flank, and could cross their fire with that of the guns on the east bank of the Meuse. Midway between the Meuse and the forest the heights of Montfaucon offered observation and formed a strong natural position which had been heavily fortified. The east and west 'ridges abutting on the Meuse and Air River valleys afforded the enemy excellent machine-gun positions for the desperate defense which the importance of the position would require him to make. North of Montfaucon densely wooded and rugged heights constituted natural features favorable to defensive fighting.

When the First Army became engaged in the simul¬ taneous preparation for two major operations an interval of fourteen days separated the initiation of the two

attacks. During this short period the movement of the immense number of troops and the amount of supplies, and confined entirely to the hours of darkness,

was one of the most delicate and difficult problems

of war. The concentration included fifteen divisions, of which seven were involved in the pending St. Mihiel drive, three were in sector in the Vosges, three in

the neighborhood of Soissons, one in a training area and one near Bar-le-Duc. Practically (all the artillery, aviation and other auxiliaries to

be employed in the new operations were committed to the St. Mihiel attack and, therefore, could not be moved until its success was assured. The concentration of all units not to be used at St. Mihiel was commenced immediately, and on Sept. 13, the second day of St. Mihiel, reserve divisions and artillery units were withdrawn and placed in motion toward the Argonne front.

That part of the American sector from Fresnes-en- Woevre, southeast of Verdun, to the western edge of the Argonne Forest, while nominally under my control, did not actively become a part of my command until Sept. 22, on which date my headquarters were established at Souilly, southwest of Verdun. Of French troops, in addition to the 2d French Colonial Corps, composed of three divisions, there was also the 17th French Corps of three divisions holding the front north and east of Verdun.

At the moment of the opening of the Meuse-Argonne battle the enemy had ten divisions in line and ten in reserve on the front between Fresnes-en-Woevre and the Argonne Forest, inclusive. He had undoubtedly ex¬ pected a continuation of our advance toward Metz. Successful ruses were darried out between the Meuse River and Luneville to deceive him as to our intentions, and French troops were maintained as a screen along our front until the night before the battle, so that the actual attack was a tactical surprise. ‘

The operations in the Meuse-Argonne battle really form a continuous whole, but they extended over such a long period of continuous fighting that they will here be considered in three phases, the first from Sept. 26 to Oct. 3, the second from Oct. 4 to 31, and the third from Nov. i to ii.

On the night of Sept. 25 the nine divisions to lead in the attack were deployed between the Meuse River and the western edge of the Argonne Forest. On the right was the 3d Corps, Major Gen. Bullard command¬ ing, with the 33d, 80th and 4th Divisions in line; next came the 5th Corps, Major Gen. Cameron commanding, with the 79th, 37th and 91st Divisions; on the left was the ist Corps, Major Gen. Liggett commanding, with the 35th,_ 28th and 77th Divisions. Each corps had one division in reserve and the army held three divisions as a general reserve. About 2,700 guns, 189 small tanks, 142 manned by Americans, and 821 airplanes, 604 manned by Americans, were concentrated to support the attack of the infantry. We thus had a superiority in guns and aviation, and the enemy had no tanks.

The axis of the attack was the line Montfaucon-Bomagne-Buzancy, the

purpose being to make the deep¬ est penetration in the centre, which, with the Fourth French Army advancing west of the Argonne, would force the enemy to evacuate that forest without our having to deliver a heavy attack in that difficult region.

Following three hours of violent artillery fire of preparation, the infantry advanced at 5:30 a. m. on Sept. 26, accompanied by tanks. During the fir.st two days of the attack, before the enemy was able to bring up his reserves, our troops made steady progress through

1 The First Engineers of the First Division United States Army on the march near Wirges, 11 miles from Coblenz, Germany

Copyright, Underwood & Underwood, N. Y.

2 German prisoners brought in by a single guard

Copyright, Internati inal Fiim Service

1 Setting off a smoke-pot in the Argonne Forest

2 Battery of searchlights in operation

the network of defenses. Montfaucon was held tena¬ ciously by the

enemy and was not captured until noon of the second day.

By the evening of the 28th a maximum advance of eleven kilometers had been achieved and we had cap¬ tured Baulny, Epinonville, Septsarges, and Dannevoux. The right had made a splendid advance into the woods south of Brieulles-sur-Meuse, but the extreme left was meeting strong resistance in the Argonne. The attack continued without interruption, meeting six new divisions which the enemy threw into the first line before Sept. 29. He developed a powerful machine-gun defense sup¬ ported by heavy artillery fire, and made frequent coun¬ terattacks with fresh troops, particularly on the front of the 28th and 35th Divisions. These divisions had taken Varennes, Cheppy, Baulny, and Charpentry, and the line was within two kilometers of Apremont. We were no longer engaged in a manoeuvre for the pinch¬ ing out of a salient, but w'ere necessarily committed, generally speaking, to a direct frontal attack against strong, hostile positions fully manned by a determined enemy.

By nightfall of the 29th the First Army line was approximately Bois de la Cote. Lemont-Nantillois- Apremont-southwest across the Argonne. Many divi¬ sions, especially those in the centre that were subjected to cross-fire of artillery, had suffered heavily. The severe fighting, the nature of the terrain over which they attacked, and the fog and darkness sorely tried oven our best divisions. On the night of the 29th the 37th and 79th Divisions were relieved by the 32d and 3d Divisions, respectively, and on the following night the I St Division relieved the 35th Division.

The critical problem during the first few days of the battle was the restoration of communications over No Man's Land. There were but four roads available across this deep zone, and the violent artillery fire of the previous period of the war had virtually destroyed them. The spongy soil and the lack of material in¬ creased the difficulty. But the splendid work of our engineers and pioneers soon made possible the move¬ ment of the troops, artillery, and supplies most needed. By the afternoon of the 27th all the divisional lartillery except a few batteries of heavy guns had effected a passage and was supporting the infantry action.

Meuse-Argonne, Second Phase. — At 5 130 a. m. on Oct. 4 the general attack was renewed. The enemy divisions on the front from Fresnes-en-Woevre to the Argonne had increased from ten in the first line to sixteen, and included some of his best divisions. The fighting was desperate, and only small advances were retilizcd, except by the ist Division, on the right of the 1st Corps. By evening of October 5 the

line was ˆproximately Bois de la Cote Lemont-Bois du Fays-Gesnes-Hill 240-Fleville-Chehery-southwest through the Argonne.

It was especially desirable to drive the enemy from his commanding positions on the heights east of the Meuse, but it was even more important that we should force him to use his troops there and weaken his tenacious hold on positions in our immediate front. The further stabilization of the new St. Mihiel line permitted the withdrawal of certain divisions for the extension of the Meuse-Argonne operation to the east bank of the Meuse River.

On the 7th the ist Corps, with the 82d Division added, launched a strong attack northwest toward Cor-nay, to draw attention from the movement east of the Meuse and at the same time outflank the German po¬ sition in the Argonne. The following day the 17th French Corps, Major-Gen. Claudel commanding, initiated its attack east of the Meuse against the ex¬ act point on which the German armies must pivot in order to withdraw from Northern France. The troops encountered elaborate fortifications and stubborn re¬ sistance, but by nightfall had realized lan advance of six kilometers to a line well within the Bois de Consenvoye and including the villages of Beaumont and Haumont. Continuous fighting was maintained along our entire battlefront, with especial success on the ex¬ treme left, where the capture of the greater part of the Argonne Forest was completed. The enemy contested every foot of ground on our front in order to make more rapid retirements further west and withdraw his forces from Northern France before the interruption of his railroad communications through Sedan.

We were confronted at this time by an insuffi¬ ciency of replacements to build up exhausted divisions. Early in October combat units required some 90,000 replacements, and not more than 45,000 would be avail¬ able before November i to fill the existing and pros¬ pective vacancies. We still had two divisions with the British and two with the French. .X review of the situation, .American and allied, especially as to our own resources in men for the next two months, con¬ vinced me that the attack of the First Army and of the

allied armies further west should be pushed to the limit. But if the First Army was to continue its ag¬ gressive tactics our divisions then with the French must be recalled and replacements must be obtained by breaking up newly arrived divisions.

In discussing the withdrawal of our divisions from the French with Marshal Foch and General Retain on October 10 the former expressed his appreciation of the fact that the First Army was striking the pivot of the German withdrawal, and also held the view that the allied attack should continue. General Petain agreed that the American divisions with the French were es¬ sential to us if we were to maintain our battle against the German pivot. The French were, however, strain¬ ing every nerve to keep up their attacks and, before those divisions with the French had been released, it became necessary for us to send the 37tli and 91st di¬ visions from the First Army to assist the Sixth French Army in Flanders.

At this time the First Army was holding a front of more than 120 kilometers; its strength exceeded 1,000,000 men; it was engaged in the most desperate battle of our history, and the burden of command was too heavy for a single commander and staff. There¬ fore, on October 12, that portion of our front extend¬ ing from Port-sur-Seille, east of the Moselle, to Fresnes-en-Woevre, southeast of Verdun, was transferred to the newly constituted Second Army, with Lieut. - Gen. Robert L. Bullard in command, under whom it began preparations for the extension of operations to the east in the direction of Briey and Metz. On Oc¬ tober 16 the command of the First Army was trans¬ ferred to Lieut. -Gen. Hunter Liggett and my advance headquarters was established at Ligny-en-Barrois, from which the command of the group of American armies was exercised.

Local attacks of the First Army were continued in order particularly to adjust positions preparatory to a renewed general assault. The ist and 5th Divisions were relieved by the 42d and i8th Divisions, which were now fresh. An attack along the whole front was made on October ii. The resistance encountered was stubborn, but the stronghold on Cote Dame Marie was captured and the Hindenburg line was broken. Cunel and Romagne-sous-AIontfaucon were taken and the line advanced two kilometers north of Sommerance. A maximum advance of 17 kilo¬ meters had been made since September 26 and the enemy hiad been forced to throw into the fight a total of 15 reserve divisions.

During the remainder of the month important local operations were carried out, which involved desperate fighting. The ist Corps, Major Gen. Dickman com¬ manding, advanced through Grand Pre; the 5th Corps, Major Gen. Charles P. Summerall commanding, cap¬ tured the Bois de Bantheville; the 3d Corps, Ala j or Gen. John L. Hines commanding, completed the occupa¬ tion of Cunel Heights, and the 17th French Corps drove the enemy from the main ridge south of La Grande Alontague. Particularly heavy fighting occurred east of the

Aleuse on October 18, and in the further pene¬ tration of the Kriemhilde-Stellung on October 23 the 26th Division, entering the battle at this time, relieved the 1 8th French Division.

Summarizing the material results which had been

attained by the First Army by the end of October, we had met an increasing number of Germany's best di¬ visions, rising from 20 in line and reserve on Sep¬

tember 26, to 31 on October 31; the enemy's elab¬ orately prepared positions, including the Hindenburg

line, in our front had been broken; the almost im¬ passable Argonne Forest was in our hands; an ad¬ vance of 21 kilometers had been effected; 18,600 pris¬ oners, 370 cannon, 1,000 machine guns and a mass of material captured, and the great railway artery through Carignan to Sedan was now seriously threatened.

The demands of incessant battle which had been

maintained day by day for more than a month had compelled our divisions to fight to the limit of their ca¬ pacity. Combat troops' were held in line and pushed to the attack until deemed incapable of further effort because of casualties or exhaustion; artillery once en¬ gaged was seldom withdrawn, and many batteries fought until practically 'all the animals were casualties and the guns were towed out of line by motor trucks.

The .American soldier had shown unrivaled forti¬ tude in this continuous fighting during most inclement weather and under many disadvantages of position. Through experience, the army had developed into a powerful and smooth-running machine and there was a supreme confidence in our ability to carry through the task successfully.

While the high pressure of these dogged attacks was a great strain on mir troops, it was calamitous to the enemy. His divisions had been thrown into confu¬ sion by our furious assaults land his morale had been

reduced until his will to resist had well-nigh reached the breaking point. Once a German division was en¬ gaged in the fight, it became practically impossible to effect its relief. The enemy was forced to meet the constantly recurring crisis b)ˆ breaking up tactical organiziations and sending hurried detachments to widely separated portions of the field.

Every member of the American Expeditionary Forces, from the front line to the base ports, was straining every nerve. Magnificent efforts were ex¬ erted by the entire Services of Supply to meet the enormous demands made on it. Obstacles which seemed insurmountable were overcome daily in expe¬ diting the movements of replacements, ammunition and supplies to the front, and of sick and wounded to the rear. It was this spirit of determination animating every American soldier that made it impossible for the enemy to maintain the struggle until 1919.

Meuse-Argonne, Third Phase. — The detailed plans for the operations of the allied armies on the western front changed from time to time during the course of this great battle, but the mission of the First American Army to cut the great Carignan-Sedan- Mezieres Railroad remained unchanged. Marshal Foch coordinated the operations along the entire front, continuing persistently and unceasingly the at¬ tacks by all allied armies; the Belgian army, with a French army and two American divisions, advancing eastward; the British armies and two American divi¬ sions, with the First French Army on their right, to¬ ward the region north of Givet; the First American Army and Fourth French Army toward Sedan and Mezieres.

On the 2ist my instructions were issued to start the First Army to prepare thoroughly for a general attack on October 28 that would be decisive, if possi¬ ble. In order that the attack of the First Army and that of the Fourth French Army on its left should be simultaneous, our attack was delayed until November i. The immediate purpose of the First Army was to take Buzancy and the heights of Barricourt, to turn the forest north of Grand Pre, and to establish contact with the Fourth French Army near Boult-aux-Bois. The army was directed to carry the heights of Barri¬ court by nightfall of the first day and then to exploit this success by advancing its left to Boult-aux-Bois in preparation for the drive toward Sedan. By strenuous effort all available artillery had been moved well for¬ ward to the heights previously occupied by the

enemy, from which it could fully cover and support the initial advance of the infantry.

On this occasion, and for the first time, the army prepared for its attack under normal conditions. We held the front of the attack and were not under the necessity of taking over a new front with its manifold installations and services. Our own personnel handled the communications, dumps, telegraph lines and water service; our divisions were either on the line or close in the rear; the French artillery, aviation and technical troops, which had previously made up our deficiencies, had been largely replaced by our own organizations, and now our army, corps and divisional staffs were by actual experience second to none.

On the morning of November i three army corps were in line between the Meuse River and the Bois de Bourgogne. On the right the 3d Corps had the 5th and 90th Divisions; the 5th Corps occupied the centre of the line, with the 89th and 2d Divisions, and was to be the wedge of the attack on the first day, and on the left the I St Corps deployed the 80th, 77th and 78th Divisions.

Preceded by two hours of violent artillery prepara¬ tion, the infantry advanced, closely followed by " ac¬ companying guns." The artillery acquitted itself mag¬ nificently, the barrages being so well coordinated and so dense that the enemy w'as overwhelmed and quickly submerged by the rapid onslaught of the infantry. By nightfall the 5th Corps, in the centre, had realized an advance of almost nine kilometers, to the Bois de la Folie, land had completed the capture of the Heights of Barricourt, while the 3d Corps, on the right, had cap¬ tured Aincreville 'and Andevanne. Our troops had broken through the enemy's last defense, captured his artillery positions and had precipitated a retreat of the German forces about to be isolated in the forest north of Grand Pre. On the 2d and 3d we advanced rapidly against heiavy fighting on the front of the right and centre corps; to the left the troops of the ist Corps hurried forward in pursuit, some by motor trucks, while the artillery pressed along the country roads close behind. Our heavy artillery was skilfully brought into position to fire upon the Carignan-Sedan Railroad and the junctions at Longuyon and Conflans. By the evening of the 4th our troops had reached La Neuville, opposite Stenay, and had swept through the great Foret de Dieulet, reaching the outskirts of Beau¬

mont, while on the left we were eight kilometers north of Boult-aux-

Bois.

The following day the advance continued toward Sedan with increasing swiftness. The 3d Corps, turn¬ ing eastward, crossed the Meuse in a brilliant opera¬ tion by the 5th Division, driving the enemy from the heights of Dun-sur-Meuse land forcing a general with¬ drawal from the strong positions he had so long held on the hills north of Verdun.

By the 7th the right of the 3d Corps had exploited its river crossing to a distance of 10 kilometers east of the Meuse, completely ejecting the enemy from the wooded heights and driving him out into the swampy plain of the Woevre; the stn and ist Corps had reached the line of the Meuse River along their respective fronts and the left of the latter corps held the heights dominating Sedan, the striategical goal of the Meuse-Argonne operation, 41 kilometers from our point of departure on November i. We had cut the enemy's main line of communications. Recognizing that noth¬ ing but a cessation of hostilities could save his armies from complete disaster, he appealed for an immediate armistice on November 6.

Meianwhile general plans had been prepared for fur¬ ther employment of American forces in an advance be¬ tween the Meuse and the Moselle, to be directed to¬ ward Longwy by the First Army, while the Second Army was to assume the offensive toward the Briey Iron Basin. Orders directing the preparatory local operations involved in this enterprise were issued on November 5.

Between the 7th and loth of November the 3d Corps continued its advance eastward to Remoiville, while the 17th French Corps, on its right, with the 79th, 26th land 8 1 St American divisions and two French di¬ visions drove the enemy from his final foothold on the heights east of the Meuse. At 9 p.m. on November 9 appropriate orders were sent to the First and Second armies in accordance with the following telegram from Marshal Foch to the commander of each of the allied armies:

"The enemy, disorganized by our repeated attacks, retreats along the entire front.

" It is important to coordinate and expedite our movements.

"I appeal ˆ to the energy and the initiative of the Commanders in Chief and of their armies to make de¬ cisive the results obtained."

In consequence of the foregoing instructions our Second Army pressed

the enemy along its entire front. On the night of the _ loth-i ith and the morning of the iith the 5th Corps, in the First Army, forced a cross¬ ing of the Meuse east of Beaumont and gained the commanding heights within the re-entrant of the river, thus completing our control of the Meuse River line. At 6 A.M. on the iith notification was received from Marshal Foch's headquarters that the armistice had been signed and that hostilities would cease at ii a.m. Preparatory measures had already been taken to en¬ sure the prompt transmission to the troops of the an¬ nouncement of an armistice. However, the advance east of Beaumont on the morning of the iith had been so rapid and communication across the river was so difficult that there was some fighting on isolated por¬ tions of that front after ii a.m.

Between September 26 and November ii, 22 American and four French divisions, on the front ex- ˆnding from southeast of Verdun to the Argonne r orest, had engaged and decisively beaten 47 different German divisions, representing 25 per cent of the en¬ emy s entire divisional strength on the western front. Of these enemy divisions, 20 had been drawn from the hrench front and one from the British front. Of the 22 American divisions, 12 had at different times dur¬ ing this period, been engaged on fronts other than our First Army suffered a loss of about 117,000 in killed and wounded. It captured 26,000 prisoners, 847 cannon, 3»ooo machine guns and large quantities of material.

The dispositions which the enemy made to meet the Meuse-Argonne offensive, both immediately before the openmg of the lattack and during the battle, demon-r ˆ importance which he ascribed to this section of the front and the extreme measures he was forced to take in Its defense. From the moment the American offensive began until the ˆ armistice his defense was desperate and the flow of his divisions to our front was continuous.

Operations of the Second Army.— Under the in¬ structions issued by me on November 5, for operations by the Second Army in the direction of the Briey Iron Basin, the advance was undertaken along the en¬ tire front of the army and continued during the last three days of hostilities. In the face of the stiff re¬ sistance offered by the enemy, and with the limited number of troops at the disposal of the Second Army,

the gains realized reflected great credit on the divisions concerned. On November 6 Marshal Foch requested that six American divisions be held in readiness to assist in_ an attack which the French were preiiaring to launch in the direction of Chateau-Salins. The plan w'as agreed to, but with the provision that our troops should be employed under the direction of the com¬ manding general. Second Army.

This combined attack was to be launched on No¬ vember 14 and was to consist of 20 French divisions under General Mangin and the six American divisions under General Bullard. Of the divisions designated for this operation the 3d, 4th, 29th and 36th were in army reserve and were starting their march eastward on the morning of November ii, while the 28th and 3Sth were being withdfawn from line on the Second Army front.

American Activities on Other Fronts. — During the first phase of the Meuse-Argonne battle, American divisions were participating in important attacks on other portions of the front. The Second Army Corps, Major Gen. Read commanding, with the 27th and 30th Divisions on the British front, was assigned the task in cooperation with the Australian Corps, of breaking the Hindenburg line at Le Cateau, where the St. Quentin Canal passes through a tunnel under a ridge. In this attack, carried out on September 29 and October i, the 30th Division speedily broke through the main line of defense and captured all of its ob¬ jectives, while the 27th progressed until some of its elements reached Gouy. In this and later actions, from October 6 to 19, our Second Corps captured over 6,000 prisoners land advanced about 24 kilometers.

On October 2—9 our 2d and 36th Divisions assisted the Fourth French Army in its advance between Rheims and the Argonne. The 2d Division completed its advance on this front by the assault of the wooded heights of Mont Blanc, the key point of the German position, which was captured with consummate dash and skill. The division here repulsed violent counter¬ attacks and then carried our lines into the village of St. Etienne, thus forcing the Germans to fall back before Rheims and yield positions which they had held since September, 1914. On October 10 the 36th Divi¬ sion relieved the 2d, exploiting the latter's success, and in two days advanced, with the French, a

distance of 21 kilometers, the enemy retiring behind the Aisne River.

In the middle of October, while we were heavily engaged in the Meuse-Argonne, Marshal Foch requested that two American divisions be sent immediately to as¬ sist the Sixth French Army in Belgium, where slow progress was being made. The 37th and 91st Divisions, the latter being accompanied by the artillery of the 28th Division, were hurriedly dispatched to the Belgian front. On October 30, in continuation of the Flanders offensive, these divisions entered the line and attacked. By November 3 the 37th Division had completed its mission by rapidly driving the enemy across the Es-Caut River and had firmly established itself on the east bank, while the 91st Division, in a spirited ad¬ vance, captured Spitaals Bosschen, reached the Scheldt and entered Audenarde.

American Troops in Italy. — The Italian govern¬ ment early made request for American troops, but the critical situation on the western front made it neces-siary to concentrate our efforts there. When the Secre¬ tary of War was in Italy during April, 1918, he was urged to send American troops to Italy to show Amerida's intrest in the Italian situation and to strengthˆ Italian morale. Similarly a request was made by the Italian Prime Minister at the Abbeville conference. It was finally decided to send one regiment to Italy with the necessary hospital and auxiliary services, and the 332d Infantry was selected, reaching the Italian front in July, 1918. These troops participated in ac¬ tion against the Austrians in the fall of 1918 at the crossing of the Piave River and in the final pursuit ot

the Austrian army… t

American Troops in Russia. — It was the opinion of the Supreme War Council that allied troops should be sent to co-operate with the Russians, either at Mur¬ mansk or Archangel, against the Bolshevist forces, and the British government, through its Ambassador at Washington, urged American participatiˆ in this un¬ dertaking. On July 23, 1918, the War Department di¬ rected the dispatch of three battalions of mjantry and three complanies of engineers to join the allied expedi¬ tion. In compliance with these instructions the 339th Infantry, the ist Battalion, 310th Engineers, 337th Ambulance Company were sent through England, whence they sailed on August 26. j *

The mission of these troops was limited to guard¬ ing the ports and as much of the surrounding country as might develop threatening conditions. The allied force operated under British command, through

whose

orders the small American contingent was spread over a front of about 450 miles. From September, 1918, to May, 1919, a series of minor engagements with the Bolshevist forces occurred, in which 82 Americans were killed and seven died of wounds.

In April, 1919, two companies of American railroad troops were added to our contingent. The withdrawal of the American force commenced in the latter part of May, 1919, and on August 25 there was left only a small detachment of Graves Registration troops.

The Advance into Germany, — In accordance with the terms of the armistice, the Allies were to occupy all German territory west of the Rhine, with bridge¬ heads of 30 kilometer radius at Cologne, Coblenz and the district of Treves. This territory was to be occu¬ pied by an American army, with its reserves held be¬ tween the Moselle-Meuse rivers and the Luxemburg frontier.

The instructions of Marshal Foch, issued on No-vernber i6, contemplated that two French infantry di¬ visions and one French cavalry division would be added to the American forces that occupied the Coblenz bridgehead and that one American division would be added to the French force occupying the Mayence bridgehead. As this arrangement presented possibili¬ ties of misunderstanding due to difference of views regarding the government of occupied territory, it was represented to the marshal that each nation should be given a well-defined territory of occupation, employing within such territory only the troops of the commander responsible for the particular zone. On December 9 Marshal Foch accepted the principle of preserving the entity of command and troops, but reduced the Ameri¬ can bridgehead by adding a portion of the eastern half to the French command at Mayence.

Various reasons made it undesirable to employ either the First or Second Army as the Army of Occu¬ pation. Plans had been made before the armistice to organize a Third Army and on November 14 this army, with Maj.-Gen. Joseph T. Dickman as commander, was designated as the Army of Occupation. The Third and Fourth Army Corps staffs and troops, less artillery, the I St, 2d, 3d, 4th, 32d and 42d Divisions and the 66th Field Artillery Brigade were assigned to the Third Army. This force was later increased by the addition of the 7th Corps, Maj.-Gen. William M. Wright com¬ manding, with the 5th,

89th and 90th Divisions.

The advance toward German territory began on No¬ vember 17 at 5 A.M., six days after signing the armis¬ tice. All of the allied forces from the North Sea to the Swiss border moved forward simultaneously in the wake of the retreating German armies. Upon arrival at the frontier, a halt was made until December i, when the leading elements of all allied armies crossed the line into Germany. The Third Army headquar¬ ters were established at Coblenz and an advance gen¬ eral headquarters located at Treves. Steps were imme¬ diately taken to organize the bridgehead for defense, and dispositions were made to meet a possible renewal of hostilities.

The advance to the Rhine required long arduous mlarches, through cold and inclement weather, with no opportunity for troops to rest, refit and refresh them¬ selves after their participation in the final battle. The Army of Occupation bore itself splendidly and exhibited a fine state of discipline, both during the advance and throughout the period of occupation.

The zone of march of our troops into Germany and the line of communications of the Third Army after reaching the Rhine lay through Luxemburg. After the passage of the Third Army, the occupation of Luxern-burg, for the purpose of guarding our line of communi¬ cations, was intrusted to the 5th and 33d Divisions of the Second Army. The city of Luxemburg, garrisoned by French troops and designated as the headquarters of the allied Commanders-in-Chief, was excluded from our control.

Upon entering the Duchy of Luxemburg in the ad¬ vance, a policy of non-interference in the affairs of the Grand Duchy was announced. Therefore, when the French commander in the city of Luxemburg was given charge of all troops in the duchy, in so far as concerned the " administration of the Grand Duchy of Luxemburg," my instructions were that our troops would not be subject to his control. Later, at my re¬ quest, and in order to avoid possible friction. Marshal Foch placed the entire duchy in the American zˆe.

Return of Troops to the United States. — On the day the armistice was signed, the problem of the re¬ turn of our troops to the United States was taken up with the War Department and, on November 15 a pol¬ icy recommended of sending home certain auxiliaries, so thlat we could begin to utilize all available shipping without delay. On December 21 the War Department announced by cable that it had been decided to begin immediately the return of our forces and

continue as

rapidly as transportation would permit. To carry this out, a schedule for the constant flow of troops to the ports was established, having in mind our international obligations pending the signing of the Treaty of Peace.

While more intimately related to the functions of the Services of Supply than to Operations, it is_ logical to introduce here a brief recital of the organizations created for the return of our troops to America. Prior to the armistice but 15,000 men had been returned liome. Although the existing organization was built for the efficient and rapid handling of the incoming forces, the embarkation of this small number pre¬ sented no difficulties. But the armistice suddenly and completely reversed the problem of the Services of Sup¬ ply at the ports and the handling of troops. It be¬ came necessary immediately to reorganize the rna-chinery of the ports, 'to construct large embarkation camps and to create an extensive service for embarking the homeward-bound troops.

Brest, St. Nazaire and Bordeaux became the principal embarkation ports, Marseilles land Le Havre being added later to utilize Italian and French liners. The construction of the embarkation camps during un¬ seasonable winter weather was the most trying problem. These, with the billeting facilities .available, gave ac¬ commodation for 55,000 at Brest, 44,000 at St. Na¬ zaire and 130,000 at Bordeaux. Unfortunately, the largest ships had to be handlejd at Brest, where the least shelter was available.

To maintain a suitable reservoir of men for Brest and St. Nazaire, an Embarkation Centre was organ¬ ized around Le Mans, which eventually accommodated 230,000 men. Here the troops and the records were prepared for the return voyage and immediate demo¬ bilization. As the troops arrived at the base ports, the embarkation service was charged with feeding, recloth¬ ing and equipping the hundreds of thousands who passed through, which required the

maintenance of a form of hotel service on a scale not hitherto attempted.

On November 16 all combat troops, except 30 di¬ visions and a minimum of corps and army troops, were released for return to the United States. It was early evident that only limited use would be made of the American divisions, and that the retention of 30 divi¬ sions was not necessary. Marshal Foch considered it indispensable to maintain under arms a total, including Italians, of 120 to 140 divisions, and he proposed that we maintain 30 divisions in France until February i, 25 of which should be held in the Zone of the Armies, and that on March i we should have 20 divisions in the Zone of the Armies and five ready to embark. The plan for March i was satisfactory, but the re¬ strictions as to divisions that should be in France on February i could not be accepted, as it would seriously interfere with the flow of troops homeward.

In a communication dated December 24 the mar¬ shal set forth the minimum forces to be furnished by the several allies, requesting the American army to furnish 22 to 25 divisions of infantry. In the same note he estimated the force to be maintained after the signing of the preliminaries of peace at about 32 divi¬ sions, of which the American army was to furnish six.

In reply it was pointed out that our problem of re¬ patriation of troops and their demobilization was quite different from that of France or Great Britain. On account of our long line of communications in France and the time consumed by the ocean voyage and travel in the United States, even with the maximum employ¬ ment of our then available transportation, at least a yelar must elapse before we could complete our demobil¬ ization. Therefore, it was proposed by me that the numxber of American combat divisions to be main¬ tained in the Zone of the Armies should be reduced on April I to 15 divisions and on May i to 10 divisions, and that in the unexpected event that the preliminaries of peace should not be signed by May i we would continue to maintain 10 divisions in the Zone of the Armies until the date of signature.

The allied Commander-in-Chief later revised his esti¬ mate, and, on January 24, stated to the Supreme War Council that the German demobilization would permit the reduction of the allied forces to 100 divisions, of which the Americans were requested to furnish 15. In reply, it was again pointed out that our problem was entirely one of transportation and that such a promise was unnecessary inasmuch as it would prob¬ ably be the summer of 1919 before we could reduce

our forces below the number asked. We were, there¬ fore, able to keep, our av;ailable ships filled, and by May 19 all combat divisions, except five still in the Army of Occupation, were under orders to proceed to ports of embarkation. This provided sufficient troops to utilize all troop transports to include July 15.

The President had informed me that it would be necessary for us to have at least one regiment in oc¬ cupied Germany land left the details to be discussed by

me with Marshal Foch. My cable of July i summarizes the agreement reached:

“ By direction of President, I have discussed with Marshal Foch question of forces to be left on the Rhine. Following agreed upon: The Fourth and Fifth Divisions will be sent to base ports immediately, the Second Division will commence moving to base ports on July 15, and the Third Division on August 15. Date of relief of First Division will be decided later. Agreement contemplates that after compliance by Ger¬ many with military conditions to be completed within first three months after German ratification of treaty, American force will be reduced to one regiment of Infantry and certain auxiliaries. Request President to be informed of agreement.”

As ;a result of a later conference with Marshal Foch, the Third Division was released on August 3 and the First Division on August 15.

Part III. — Supply, Coordination, Munitions AND Administration.

The Services of Supply. — In February, 1918, the Line of Communications was reorganized under the name of the Services of Supply. At that time all staff services and departments, except The Adjutant General’s, the Inspector General’s and the Judge Advocate Gen¬ eral’s Departments, were grouped for supply purposes under one coordinating head, the Commanding General, Services of Supply, with a General Staff paralleling, so far as necessary, the General Staff at General Head¬ quarters.

The principal functions of the Services of Supply were *the procurement, storage, and transportation of supplies. These activities were controlled in a general way by the commanding general Services of Supply, the maximum degree of independence* being permitted to the several services. This great organization was charged with immense projects in connection

wdth roads, docks, railroads, and buildings; the transportation of men, animals, and supplies by sea, rail, and inland waterways; the operation of telegraph and telephone systems; the control and transportation of replacements; the hospitalization necessary for an army of 2,000,000 men; the reclassification of numerous officers and men; the establishment of leave areas and of welfare and entertainment projects; the liquidation of our affairs in France; and the final embarkation of our troops for home.

The growth of the permanent port personnel, the location near the base ports of certain units for training, and_ other considerations led to the appointment of a territorial commander for the section around each port who, while acting as the representative of the com¬ manding general Services of Supply, was given the local authority of a district commander. For similar reasons, an Intermediate Section Commander and an Advance Section Commander were appointed. Eventu¬ ally there were nine base sections, including one in England, one in Italy, and one comprising Rotterdam and Antwerp, also one intermediate and one advance section.

The increasing participation of the American Ex¬ peditionary Forces in active operations necessitated the enlargement of the responsibilities land authority of the commanding general Services of Supply. In August, 1918. he was charged with complete responsibility for all supply matters in the Services of Supply, and was authorized to correspond by cable directly with the War Department on all matters of supply not in¬ volving questions of policy.

In the following discussion of the Services of Supply the subject of coordination of supply at the front, ocean tonnage, land replacements are included for convenience, though they were largely or entirely under the direct control of General-Staff Sections at mv headquarters.

Coordination of Supply at the Front. — Our suc¬ cessful participation in the war required that all differ¬ ent services immediately concerned with the supply of combat troops should work together as a well-regulated niaclnne. In other words, there must be no duplication of efforit, but elach must perform its functions without interference with any other service. The Fourth Section of the General Staff was created to control impartially all these services, and, under broad lines of policy, to determine questions of transportation and supply in France and coordinate our supply services with those of the Allies.

This section did not work out technical details but was chiarged with having a general knowledge of exist¬ ing conditions as to supply, its

transportation, and of construction affecting our operation or the efficiency of our forces. It frequently happened that several of the supply departments desired the same site for the location of installations, so that all plans for such facilities bˆd to be decided in accordance with the best interests of the whole.

WAR, EUROPEAN

1 Loading transports with soldiers going forward into battle

2 British troops crossing the Scarpe

Copyright, Underwood A Underwood, X. Y.

WAR, EUROPEAN

1 United States heavy artillery cutting railroad to Metz

2 United States 14-inch 50-calibre rifle in action at Thierville, France

Copyright, Underwood & Underwood, N. Y.

In front of the advance depots, railroad lines and shipments to troops had to be carefully controlled, be¬ cause mobility demanded that combat units should not be burdened with a single day's stores above the authorized standard reserve. Furthermore, accumula¬ tions at the front were exposed to the danger of destruc¬ tion or capture and

might indicate our intentions. Each combat division required the equivalent of 25 French railway car loads of supplies for its daily consumption to be delivered at a point within reach of motor or horse-drawn transportation. The regular and prompt receipt of supplies by combatant troops is of first im¬ portance in its effect upon the morale of both officers and men. The officer whose mind is preoccupied by the question of food, clothing, or ammunition, is not free to devote his energy to training his men or to fighting the enemy. It is necessary that paper work be reduced to an absolute minimum and that the de¬ livery of supplies to organizations be placed on an automatic basis as far as possible.

The principle of flexibility had to be borne in mind in planning our supply system in order that our forces should be supplied, no matter what their number, or where they might be called upon to enter the line. This high degree of elasticity and adaotability was assured and maintjained through the medium of the regulating station. It was the connecting link between the armies and the services in the rear, and regulated the railroad transportation which tied them together. The regulating officer at each such station was a mem¬ ber of the Fourth Section of my General Staff, acting under instructions from his chief of section.

Upon the regulating officer fell the responsibility that a steady flow of supply was maintained. He must meet emergency shipments of ammunition or engineering material, sudden transfers of troops by rail, the hasten¬ ing forward of replacements, or the unexpected evacua¬ tion of wounded. All the supply services naturally clamored to have their shipments rushed through. The regulating officer, acting under special or secret instruc¬ tions, must declare priorities in the supply of things the Army needed most. Always informed of the con¬ ditions at the front, of the status of supplies, land of military plans and intentions, nothing could be shipped to the regulating station or in front of the advance depots except on his orders. The chiefs of supply services fulfilled their responsibilities when they deliv¬ ered to the regulating officer the supplies called for by him, and he met his obligation when these supplies were delivered at the proper railheads at the time they were needed. The evacuation of the wounded was effected over the same railroad lines as those carrying supplies to the front, therefore, this control had also to be centralized in the regulating officer.

The convenient location of the regulating stations was of prime importance. They had to be close enough to all points in their zones to permit trains leaving after dusk or during the night to arrive at their

destina¬ tions by dawn. They must also be far enough to the rear to be reasonably safe from capture. Only two regulating stations were actually constructed by us in France, Is-sur-Tille land Liffol-le-iGrand, as the existing French facilities were sufficient to meet our require¬ ments beyond the reach of those stations.

As far as the regulating officer was concerned, sup¬ plies were divided into four main classes. The first class constituted food, forage and fuel, needed and consumed every day; the second, uniforms, shoes, blank¬ ets and horse shoes, which wear out with reasonable regularity; the third, articles .of equipment which re¬ quire replacement at irregular ‘intervals, such as rolling kitchens, rifles and escort wagons; the fourth class covered articles, the flow of which depended upon tactical operations, such as ammunition land construction material. Articles in the first class were placed on an automatic basis, but formal requisition was eliminated as far as possible for :all classes.

In order to meet many of the immediate needs of troops coming out of the line and to relieve to some extent the great strain on the railheads during active fighting, a system of army depots was organized. These depots were supplied by bulk shipments from the ad¬ vance depots through the regulating stations during relatively quiet periods. They were under the control of the chiefs of the supply services of the armies and required practically no construction work, the supplies being stored in open places protected only by dunnage and camouflaged tarpaulins.

The Services of Supply can be likened to a great reservoir divided into three main parts — the base depots, the intermediate depots, and the advance depots. The management of this reservoir is in charge of the com¬ manding general. Services of Supply, who administers it with a free hand, controlled only by general policies outlined to him from time to time._ Each of the supply and technical services functions independently in its

own respective sphere; each has its share of storage space in the Ease depots, in the intermediate depots, and in the advance depots. Then comes the distribution system, and here the control passes to the chief of the Fourth Section of the General Staff, who exercises his powers through the regulating stations.

Purchasing Agency. — The consideration of require¬ ments in food and material led to the adoption of an automatic supply system, but,

with the exception of foodstuffs, there was an lactual shortage, especially in the early part of the war, of many things, such as equipment pertaining to land transportation and equip¬ ment and material for combat. The lack of ocean tonnage to carry construction material and animals at the beginning was serious. Although an increasing amount of shipping became available as the war pro¬ gressed, at no time was there sufficient for our require¬ ments. The tonnage from the States reached about seven and one-half million tons to December 31, 1918, which wias a little less than one-half of the total amount obtained.

The supply situation made it imperative that we utilize European resources as far as possible for the purchase of material and supplies. If our Services of Supply departments had entered the market of Europe as purchasers without regulation or coordinlation, they would have been thrown into competition with each other, as well as with buyers from the Allied armies and the civil populations. Such a system would have created an unnatural elevation of prices, and would have actu¬ ally obstructed the procurement of supplies. To meet this problem from the standpoint of economical business management, directions were given in August, 1917, for. the creation of a General Purchasing Board to coordinate and control our purchases both [among our own services and among the Allies as well. The suner-vision and direction of this agency was placed in the hands of an experienced business man, and every supply department in the American Expeditionary Forces was represented on the board. Agents were stationed in Switzerland, Spain, and Holland, besides the Allied countries. The character of supplies included prac¬ tically the entire category of necessities, although the bulk of our purchases consisted of raw materials for construction, ordnance, air equipment, and animals. A total of about 10,000,000 tons was purchased abroad by this agency to December 31, 1918, most of which was obtained in France.

The functions of the Purchasing Agency were gradu¬ ally extended until they included a wide field of ac¬ tivities. In addition to the coordination of purchases, the supply resources of our Allies were reconnoitered and intimate touch was secured with foreign agencies; a Statistical Bureau was created which classified and analyzed our requirements; quarterly forecasts of sup¬ plies were issued; civilian manual labor was procured and organized; a Technical Board undertook the co¬ ordination, development, and utilization of the electric power facilities in France; a Bureau of Reciprocal Sup¬ plies viseed the claims of foreign governments for raw materials from the United States; and a general printing plant was established. Some of

these activities were later transferred to other services as the latter became ready to undertake their control.

The principles upon which the usefulness of this agency ciepended were extended to our Allies, and in the summer of 1918 the General Purchasing Agent be¬ came a member of the Interallied Boiard of Supplies. This Board undertook, with signal success, to coordinate the supply of the Allied armies in all those classes of material necessities that were in common use in all the armies. The possibility of immense savings were fully demonstrated, but the principles had not become of general application before the Armistice.

Ocean Tonnage. — Following a study of tonnage re¬ quirements, an officer was sent to Washington in E>ecember, 1917, with a general statement of the shipping situation in France as understood by the Allied Maritime Council. In March, 1918, tonnage requirements for transport and maintenjance of 900,000 men in France by June 30 were adopted as a basis upon which to calculate supply requisitions and the allocation of ton¬ nage.

In April the Allied Maritime Transport Council showed that requirements for 1918 greatly exceeded the available tonnage. Further revisions of the schedule were required by the Abbeville Agreement in May, under which American infantry and machine-gun units were to be transported in British shipping, and by the Versailles Agreement in June.

In July, a serious crisis developed as the allotment for August made the American Expeditionary Forces by the Shipping Control Committee was only 575,000 dead-weight tons, afterwiards increased to 700,000, whereas 803,000 tons (not including animals) were actually needed. It was strongly urged b”’ me that

more shipping be diverted from trades and that a larger percentage of new shipping be placed in transport service.

Early in 1918, a scheme hiad been proposed which would provide priority for essential supplies only, based upon monthly available tonnage in sight. Although it was the understanding that calls for shipping should be based upon our actual needs, much irregularity was found in tonnage allotments, las shown by the follow¬ ing cables sent September 14, 1918.

” The following variations from cable orders are

noticeable :

Q.M. supplies cabled for, for August delivery,

182,287 short tons.

Q.M. supplies actually received during August,

231,850 short tons.

T.D. supplies {rolling stock, etc.) called for, for August delivery, 113,482 short tons.

T.D. supplies actually received during August,

67,521 short tons.”

” You must prepare to ship supplies we request, instead of shipping excessive amounts of supplies of which we have a due proportion.”

” An increase in the allotment of tonnage must be made, even for September. It is imperative. I can not too strongly urge that the allotment be reconsid¬ ered in the light of the above lowing of our defici¬ encies… . ” At the present time our ability to supply and maneuver our forces depends largely on motor transportation … We are able to carry our present plans due to fact that we have been able to borrow temporarily large numbers of trucks and am¬ bulances from the French … The shortage ‘of

ambulances to move our wounded is critical .

We have reached the point where we can no longer improvise or borrow. The most important plans and operations depend upon certainty that the home Govern¬ ment will deliver at French ports material and equip¬ ment cabled for. It is urged that foregoing be given most serious consideration and that tonnage allotted for supply of Army in France be sufficient to deliver ma¬ terial and equipment

properly proportioned in kinds and amount, to meet the needs of our troops …”

The following is a brief summary of the tonnage asked for and the amount actually received in France during the critical period from July to October, 1918:

MONTH

Cabled for by American Expedi¬ tionary Forces

Received in France from United States

Shortage

July .

* 480,891 700,527 869,438 1,022,135

438,047

511,261

539,018

623,689

42,844

189,266

330,420

398,446

August .

September .

October .

Total .

3,072,991

2,112,015

960,976

* Tons of 2,000 pounds.

Replacements of Personnel. — Under the original organization project there were to be two divisions in each corps of six divisions which were to be used as reservoirs of replacements. One half of the artillery and other auxiliaries of these two divisions were to be utilized as corps and army troops. They were to supply the first demands for replacements from their original strength, after which a minimum of 3,000 men per month for each army corps in France was to be forwarded to them from the United States. It was estimated that this would give a sufficient reservoir of personnel to maintain the fighting strength of combat units, provided the sick and wounded were promptly returned to their own units upon recovery.

The 32d and 41st Divisions were the first to be designated as replacement and depot divisions of the First Army Corps, but the situation soon became such that the 32d Division had to be employed as a combat division. For the same reason all succeeding divisions had to be trained for combat, until June 27, when the need for replacements made it necessary to desig¬ nate the 83d as a depot division.

By the middle of August we faced a serious shortage of replacements. Divisions had arrived in France below strength, and each division diverted from re¬ placement to combat duty increased the number of divisions to be supplied and at the same time decreased the supply.

On August 16 the War Department was cabled, as follows:

” Attention is especially invited to the very great shortage in arrivals of replacements heretofore re¬ quested. Situation with reference to replacements is now very acute. Until sufficient replacements are avail¬ able in France to keep our proven divisions at full strength, replacements should by all means be sent in preference to new divisions.”

At this time it became necessary to transfer 2,000 men from each of three combat divisions (the 7th, 36th, and 8 1 St) to the First Army, in preparation for the St. Mihiel offensive.

By the time the Meuse-Argonne offensive was initi¬ ated the replacement situation had become still more acute. The Infantry and Machine Gun units of the 84th and 86th Divisions then in the vicinity of Bordeaux, were utilized as replacements, leaving only a cadre of two officers and twenty-five men for each company. To provide

immediate replacements during the progress of the battles new replacement organizations were fotmed in the Zone of Operations; at first, as battalions, and later, as regional replacement depots.

On October 3, a Cable was sent the War Depart¬ ment, reading as follows:

” Over 50,000 of the replacements requested for the months of July, August and September have not yet arrived. Due to extreme seriousness of the replace¬ ment situation, it is necessary to utilise personnel of the 84th and 86th Divisions for replacement purposes. Combat divisions are short over 80,000 men. Vitally important that all replacements due, including 55,000 requested for October, be shipped early in October. If necessary, some divisions in United States should be stripped of trained men and such men shipped aj replacements at once.”

Altogether seven divisions had to be skeletonized, leaving only one man per company and one officer per regiment to care for the records. As a further meas¬ ure to meet the situation, the authorized strength of divisions was reduced in October by 4,000 men, thus lowering the strength of each infantry company to approximately 174 men. The 30 combat divisions in France at that time needed 103,513 infantry and ma¬ chine-gun replacements, and only 66,490 were available.

Attention of the War Department was invited on November 2 to the fact that a total of 140,000 replace¬ ments would be due by the end of November, and the cable closed by saying:

” To send over entire divisions, which must be broken up on their arrival in France so we may ob¬ tain replacements that have not been sent as called for, is a wasteful method, and one that makes for ineffi¬ ciency; but as replacements are not otherwise available, there is no other course open to us. New and only partially trained divisions can not take the place of older divisions that have had bat’tle experience. The latter must be kept up numerically to the point of efficiency. …”

Remounts. — The shortage of animals was a serious problem throughout the war. In July, 1917, the French agreed to furnish our forces with 7,000 animals a month, and iaccordingly the War Department was re¬ quested to discontinue shipments. On August 24, however, the French advised us that it would be im¬ possible to furnish the number of animals originally stated, and Washington was again asked to supply ani¬ mals, but none could be sent over until November, and then only a limited number.

Early in 1918, after personial intervention and much delay, the French Government made requisition on the country, and we were able to obtain 50,000 animals. After many difficulties, the Purchasing Board was suc¬ cessful in obtaining permission, in the summer of 1918, to export animals from Spain, but practically no ani¬ mals were received until after the Armistice.

Every effort was made to reduce animal require¬ ments — by increased motorization of artillery and by requiring mounted officers and men to walk — but in spite of all these efforts, the situation as to animals grew steadily worse. The shortage by November ex¬ ceeded 106,000, or almost one-half of all our needs To relieve the crisis in this regard, during the Meuse-Argonne battle. Marshal Foch requisitioned 13,000 ani¬ mals from the French armies and placed them at my disposal.

Reclassification of Personnel. — An important de¬ velopment in the Services of Supply was the reclassifi¬ cation system for officers and men. This involved not only the physical reclassification of those partially fit for duty, but also the reclassification of officers accord¬ ing to fitness for special duties. A number of officers

combat duty and many in noncombatant positions were found unsuited to the duties

on which employed. An effort was made to reassign these officers to the advantage of themselves and the Army. A total of i,ioi officers were reclassified in ad¬ dition to the disabled, and 270 were sent before effi¬ ciency boards for elimination. Nine hundred and sixty-two wounded or otherwise disabled officers were reclassified, their services being utilized to release offi¬ cers on duty with the Services of Supply who were able to serve with combat units.

Construction by Engineer Corps. — Among the most notable achievements of the American Expeditionary Forces was the large program of construction carried out by our engineer troops in the

Services of Supply and elsewhere. The chief projects were port facilities, including docks, railroads, warehouses, hospitals, bar¬ racks and stables. These were planned to provide ulti¬ mately for an larmy of 4,000,000 men, the construc¬ tion being carried on coincident with the growth of the American Expeditionary Forces.

The port plans contemplated 160 new berths, in¬ cluding the necessary facilities for discharge of cargo, approximately one-half of which were completed at the time of the Armistice. Construction of new standard-gauge railroad track amounted to 1,002 miles, consist¬ ing mainly of cut-offs, double tracking at congested points, and yards at ports and depots. Road con¬ struction and repair continued until our troops were withdrawn from the several areas, employing at times upward of 10,000 men, land often using 90,000 tons of stone per week.

Storage requirements necessitated large supply de¬ pots at the ports and in the intermediate and advance sections. Over 2,000,000 square feet of covered stor¬ age was secured from the French, but it was necessary to construct approximately 20,000,000 square feet ad¬ ditional. The base hospital centres at Mars and Mes-ves, each with 4,000-bed convalescent camps, are typi¬ cal of the large scale upon which hospital accommoda¬ tions were provided. The hospital city at Mars, of 700 buildings, covered a ground space of 33 acres and included the usual road, water, sewerage and lighting facilities of a municipality.

Advantages of economy and increased mobility caused the adoption of the system of billeting troops. Billeting areas were chosen near the base ports, along the line of communications, and in the advanced zone as strategical requirements dictated. The system was not altogether satisfactory, but with the number of troops to be accommodated no other plan was practi¬ cable. Demountable barracks were used for shelter to supplement lack of billets, 16,000 barracks of this type being erected, particularly at base ports where large camps were necessary. Stables at remount stations were built for 43,000 animals. Other construction in¬ cluded refrigerating plants, such as the one at Gievres with a capacity of 6,500 tons of meat and 500 tons of ice per day; and mechanical bakeries like that at Is-sur-Tille with capacity of 800,000 pounds of bread per day. If the buildings constructed were consolidated, with the width of a standard barrack, they would reach from St. Nazaire across France to the Elbe River in Germany, a distance of 730 miles. In con¬ nection with construction work, the Engineer Corps en¬ gaged in extensive forestry operations, producing 200,000,000 feet of lumber, 4,000,000 railroad

ties, 300,000 cords of fuel wood, 35,000 pieces of piling and large quantities of miscellaneous products.

Transportation Corps. — The Transportation Corps as a separate organization was new to our army. Its exact relation to the supply departments was con¬ ceived to be that of a system acting as a common car¬ rier operating its own ship and rail terminals. The equipment and operation of port terminals stands out as a most remarkable achievement. The amount of tonnage handled at all French ports grew slowly, reaching about 17,000 tons daily at the end of July, 1918. An emergency then developed as a result of the critical military situation, and the capacity of our terminals was so efficiently increased that, by r November, 145,000 tons were being handled daily.

The French railroads, both in management and ma¬ terial, had dangerously deteriorated during the war. As our system was superimposed upon that of the French it wias necessary to provide them with addi¬ tional personnel and much materiel. Experienced American railroad men brought into our oganization, in various practical capacities, the best talent in the country, who, in addition to the management of our own transportation, materially aided the French. The relation of our Transportation Corps to the French railroads and to our own supply departments pre¬ sented many difficulties, but these were eventually overcome and a high state of efficiency established.

It was early decided, as expedient for our pur¬ poses, to use American rolling stock on the French

railroads, and approximately 20,000 cars and 1,500 standard-gauge locomotives were brought from the United States and assembled by our railroad troops. We assisted the French by repairing with our own personnel 57,385 French cars and 1,947 French loco¬ motives. The lack of rolling stock for Allied use was at all times a serious handicap, so that the number of cars and locomotives built and repaired by us was no small part of our contribution to the Allied cause.

Quartermaster Corps. — The Quartermaster Corps was able to provide a larger tonnage of supplies from the States than any of the great supply departments. T-he operations of this corps were so large and the activities so numerous that they can best be under¬ stood by a study of the report of the commanding general. Services of Supply.-

The Quartermaster Corps in France was called upon to meet conditions never before presented, and it was found advisable to give it relief. Transportation problems by sea transport and by rail were handled by separate corps organized for that purpose, and al¬ ready described. Motor transport was also placed un¬ der an organization of its own. The usual routine supplies furnished by this department reached enor¬ mous proportions. Except for ■ the delay early in 1918 in obtaining clothing and the inferior quality of some that was furnished, and an occasional shortage in for¬ age, _ no army was ever better provided. Special services created under the Quartermaster Corps in¬ cluded a Remount Service, which received, cared for and supplied animals to troops; a Veterinary Service, working in conjunction with the remount organiz;ation ; an Effects Section and Baggage Service; and a Sal¬ vage Service for the recovery and preparation for re¬ issue of every possible article of personal equipment. Due to the activities of the Salvage Service, an esti¬ mated siaving of $85,000,000 was realized, tonnage and raw material were conserved, and what in former wars represented a distinct liability was turned into a valu¬ able asset.

The Graves Registration Service, also under the Quartermaster Corps, wias charged with the acquisition and care of cemeteries, the identification and reburial of our dead and the correspondence with relatives of the deceased. Central cemeteries were organized on the American battle fields, the largest being at Romagne sous-Montfaucon land at Thiaucourt in the Woevre. All territory over which our troops fought was exam¬ ined by this service, and, generally speaking, the re¬ mains of our dead were assembled in American ceme¬ teries and the graves marked with a cross or six-pointed star and photographed. A few bodies were buried where they fell or in neighboring French or British cemeteries. Wherever the soldier was buried, his identification tag, giving his name and army serial number, was fastened to the marker. A careful rec¬ ord was kept of the location of each grave.

Signal Corps. — The Signal Corps supplied, in¬ stalled and operated the general service of telephone and telegraphic communications throughout the Zone of the Armies, and from there to the rear lareas. At the front it handled radio, press and intercept stations; provided a radio network in the Zone of Advance; and also managed the meteorological, pigeon and gen¬ eral photographic services. Our communication sys¬ tem included a clable across the English Channel, the erection of 4,000 kilometers of telephone and telegraph lines on our own poles, and the successful operation of a system with 215,500 kilometers of lines.

Motor Transport Corps. — The quantity and im¬ portance of gasoline-engine transportation in this war necessitated the creation of a new service known as the Motor Transport Corps. It was responsible for setting up motor vehicles received from America, their distribution, repair and maintenance. Within the zone of the Services of Supply, the Motor Transport Corps controlled the use of motor vehicles, and it gave tech¬ nical supervision to their operation in the Zone of the Armies. It was responsible for the training and in¬ struction of chauffeurs and other technical personnel. Due to the shortage of shipments from America, a large number of trucks, lautomobiles and spare parts had to be purchased in France.

Renting, Requisition and Claims Service, — A Renting, Requisition and Claims Service was organ¬ ized in March, 1918, to procure billeting areas, super¬ vise the quartering of troops with an organization of zone and town majors, and to have charge of the renting, leasing land requisitioning of all lands and buildings required by the American Expeditionary Forces. Under the provisions of an act of Congress, approved in April, 1918, the Claims Department was charged with the investigation, assessment and settle¬ ment of all claims " of inhabitants of France or any other European country not an enemy or ally of an

enemy" for injuries to persons or damages to prop¬ erty occasioned by our forces. The procedure followed was in accordance with the law and practice of the country in question. The efficient administration of this service had an excellent effect upon the people of the European countries concerned.

The various activities of the Services of Supply which, at its height on November ii, 1918, reached a numericial strength in personnel of 668,312, including 23,772 civilian employees, can best be summed up by quoting the telegram sent by me to Major Gen. James G. Harbor'd, the commanding general, Services of Sup¬ ply, upon my relinquishing personal command of the First Army:

” I want the S. O. S. to know how much the First Army appreciated the prompt response made to every demand for men, equipment, supplies, and transportation necessary to carry out the recent operations. Hearty congratulations. The S. O. S. shares the success with it.”

Munitions.

Ordnance. — Our entry into the war found us with few of the auxiliaries necessary for its conduct in the modern sense. The task, of the Ordnance Department in supplying artillery was especially difficult. In order to meet our requirements as rapidly as possible, we ac¬ cepted the offer of the French, Government to supply us with the artillery equipment of 75’s, 155 mm. howit¬ zers land 155 G. P. F. guns from their own factories for 30 divisions. The wisdom of this course was fully demonstrated by the fact that, although we soon began the manufacture of these classes of guns at home, there were no guns of American manufacture of the calibres mentioned on our front at the date of the Armistice. The only guns of these types produced at home which reached France before the cessation of hostilities were 109 75 mm. guns. In addition, 24 eight-inch howitzers from the United States reached our front and were in use when the Armistice was signed. Eight 14-inch naval guns of American manu¬ facture were set up on railroad mounts, and most of these were successfully employed on the Meuse-Ar- gonne front under the efficient direction of Admiral Plunkett of the navy.

Aviation. — In aviation we were entirely dependent upon our Allies, land here again the French Govern¬ ment came to our aid until our own program could be set under way. From time to time we obtained from the French such planes for training personnel as they could provide. Without going into a complete discus¬ sion of aviation materiel, it will be sufficient to state that it was with great difficulty that we obtained equip¬ ment even for training. As for up-to-date combat planes, the development at home was slow, and we had to rely upon the French who provided us with a total of 2,676 pursuit, observation and bombing machines. The first aeroplanes received from home arrived in May, and altogether we received 1,379 planes of the De Hlaviland type. The first American squadron com¬ pletely equipped by American production, including aeroplanes, crossed the German lines on August 7, 1918. As to our aviators, many of whom trained with our Allies, it can be said that they had no superiors in daring and in fighting ability. During the battles of St. Mihiel and Meuse-Argonne our aviators excelled all others. They have left a record of courageous deeds that will ever remain a brilliant page in

the an¬ nals of our army.

Tanks. — In the matter of tanks, we were com¬ pelled to rely upon both the French and the English. Here, however, we were less fortunate for the reason that our Allies barely had sufficient tanks to meet their own requirements. While our Tank Corps had limited opportunity, its fine personnel responded gal¬ lantly on every possible occasion and showed courage of the highest order. We had one battalion of heavy tanks engaged on the English front. On our own front we had only the light tanks, and the number Savailable to participate in the last great assault of No¬ vember I was reduced to 16 as a result of the previous hard fighting in the Meuse-Argonne.

Chemical Warfare Service. — The Chemical Warfare Service represented another entirely new departure in this war. It included many specialists from civil life. With personnel of a high order, it developed rabidly into one of our most efficient auxiliary services. While the early employment of gas wlas in the form of clouds launched from special projectors, its use later on in the war was virtually by means of gas shells fired by the light artillery. One of the most important duties of the Chemical Warfare Service was to ensure the equipment of our troops with a safe land comfortable mask, and the instruction of the personnel in the use of this protector. Whether or not gas will be em¬

ployed in future wars is a matter of conjecture, but the effect is so deadly to the unprepared that we can never afford to neglect the question.

Administration.

Medical and Sanitary Conditions. — The general health of our armies under conditions strange and ad¬ verse in many ways to our American experience and mode of life was marvelously good. The proportionate number of men incapacitated from other causes than battle casualties land injuries was low. Of all deaths in the American Expeditionary Forces (to September I, 1919) totaling 81,141, there were killed in action, 35)556; died of wounds received in battle, 15,130; other wounds and injuries, 5,669; and died of disease, 24,786. Therefore, but little over two-sevenths the total loss of life in the American Expeditionary Forces was caused by disease.

Our armies suffered from the communicable dis¬ eases that usually

affect troops. Only two diseases hˆve caused temporarily excessive sick rates, epidemic diarrhoea and influenza, and of these influenza only, due to the fatal complicating pneumonia, caused a seri¬ ous rise in the death rate. Both prevailed in the

armies of our Allies and enemies and in the civilian population of Europe.

Venereal disease has been with us always, but the control was successful to a degree never before at¬

tained in our armies, or in any other army. It has been truly remarkable when the environment in which our men lived is appreciated. The incidence of vene¬ real disease varied between 30 and 60 per thousand

per annum, averaging under 40. Up to September,

1919, all troops sent home were free from venereal disease. The low percentage was due largely to the fine character of men composing our armies.

Hospitalization represented one of the largest and most difficult of the medical problems in the American Expeditionary Forces. That the needs were always met and that there was always a surplus of several thousland beds, were results of great effort and the use of all possible expedients to make the utmost of resources available. The maximum number of patients in hospital on any one day was 193,026, on November 12,

1918.

Evacuation of the sick and wounded was another difficult problem, especially during the battle periods. The total number of men evacuated in the Zone of the Armies was 214,467, of whom 11,281 were sent in hospital trains to base pprts. The number of sick and wounded sent to the United States up to November ii, 1918, was 14,00*0. Since the Armistice, 103,028 patients have been sent to the United States.

The army and the Medical Department were fortu¬ nate in obtaining the services of leading physicians, surgeons and specialists in all branches of medicine from all parts of the United States, who brought the rnost skilful talent of the world to the relief of our sick and

wounded. The Army Nurse Corps deserves more than passing comment. These women, working tirelessly land devotedly, shared the burden of the day to the fullest extent with the men, many of them sub¬ mitting to all the dangers of the battle front.

Records, Personnel and Mail Service. — New problems confronted the Adjutant General's Departrnent in France. Our great distance from home neces¬ sitated records, data and executive machinery to repre¬ sent the War Department las well as our forces in France. Unusually close attention was paid to individ¬ ual records. Never before have accuracy and complete¬ ness of reports been so strictly insisted upon. Expedi¬ ents had to be adopted whereby the above requirements could be met without increasing the record and corre¬ spondence work of combat units. The organization had to be elastic to meet the demands of any force maintained in Europe.

A Statistical Division was organized to collect data • regarding the special qualifications of all officers land to keep an up-to-date record of the location, duties, health and status of every officer and soldier, nurse, field clerk and civilian employee, as well as the location and strength of organizations. The Central Records Office at Bourges received reports from the battle front, evacuation and base hospitals, convalescent-leave areas, reclassification camps and base ports, and pre-plared for transmission to the War Department reports of individual casualties. .Each of the 299,599 casualties was considered as an individual case. A thorough in¬ vestigation of the men classed as " missing in action " reduced the number from 14,000 at the signing of the Armistice to 22 on August 31, 1919.

In addition to printing and distributing all orders from General Headquarters, the Adjutant General's Department had charge of the delivery and collection

of official mail and finally of all mail. The Motor Dispatch Service operated 20 courier routes, over 2,300 miles of road, for the quick dispatch and delivery of official communications. After July i, 1918,

the Mili¬ tary Postal Express Service was organized to handle all mail, official and personal, and operated 169 fixed and mobile post offices and a railway post-office service.

While every effort was exerted to maintain a satis¬ factory mail service, frequent transfers of individuals, especially during the hurried skeletonizing of certain combat divisions, numerous errors in addresses, hasty handling and readdressing of mail by regimental land company clerks in the Zone of Operations, and other conditions incident to the continuous movement of troops in battle, made the distribution of mail an ex¬ ceedingly difficult problem.

Inspection-Discipline. — The Inspector General's De¬ partment, acting as an independent agency net respon¬ sible for the matters under its observation, made in¬ spections and special investigations for the purpose of keeping commanders informed of local conditions. The inspectors worked unceasingly . to determine the man¬ ner in which orders were being carried out, in an ef¬ fort to perfect discipline and team play.

The earnest belief of every member of the Ex¬ peditionary Forces in the justice of our cause was productive of a form of self-imposed discipline among our soldiers which must be regarded as an unusual de¬ velopment of this war, a fast which materially aided us to organize and employ in an incredibly short space of time the extraordinary fighting machine developed in France.

Our troops generally were strongly imbued with an offensive spirit essential to success. The veteran di¬ visions had acquired not only this spirit, but the other elements of fine discipline. In highly-trained divisions, commanders of all grades operate according to a defi¬ nite system calculated to concentrate their efforts where the enemy is weakest. Straggling is practically elimi¬ nated; the infantry, skilful in fire action and the em¬ ployment of cover, gains with a minimum of casualties; the battalion, with all of its accompanying weapons, works smoothly as a team in which the parts automati¬ cally assist each other; the artillery gives the infantry close and continuous support; and unforeseen situa¬ tions are met by prompt and energetic action.

This war has only confirmed the lessons of the past. The less experienced divisions, while aggressive, were lacking in the ready skill of habit. They were capable of powerful blows, but their blows were apt to be awkward — teamwork was often not well under¬ stood. Flexible and resourceful divisions can not be created by a few manoeuvres or by a few months' as¬ sociation of their elements. On

the other hand, with¬ out the keen intelligence, the endurance, the willing¬ ness, and enthusiasm displayed in the training area, as well as on the battle field, the successful results we obtained so quickly would have been utterly impossible.

Military Justice. — The commanders of armies, corps, divisions, separate brigades and certain territorial districts, were empowered to appoint general courts-martial. Each of these commanders had on his staff an officer of the Judge Advocate General's Department, whose duty it was to renderˆ legal advice and to as¬ sist in the prompt trial and just punishment of those guilty of serious infractions of discipline.

Prior to th« signing of the Armistice, serious breaches of discipline were rare, considering the num¬ ber of troops. This was due to the high sense of duty of the soldiers and their appreciation of the seri¬ ousness of the situation. In the period of relaxatiqn following the cessation of hostilities, infractions of dis¬ cipline were naturally more numerous, but not even then was the number of trials as great in proportion to the strength of the force as is usual in our service.

It was early realized that many of the peace-time methods of punishment were not the best for existing conditions. In the early part of 1918 it was decided that the award of dishonorable discharge of soldiers convicted of an offense involving moral turpitude, would not be contemplated, except in the most serious cases. To remove these soldiers temporarily from their organizations, division commanders were authorized to form provisional temporary detachments to which such soldiers could be attached. These detachments were retained with their battalions so that offenders would not escape the dangers and hardships to which their comrades were subjected. Wherever their battalion was engaged, whether in front-line trenches or in back areas, these men were required to perform hard labor. Only in emergency were they permitted to engiage in combat. Soldiers in these disciplinary battalions were made to understand that if they acquitted themselves well, they would be restored to full duty with their organiziations.

All officers exercising disciplinary powers were im¬ bued with the purpose of these instructions and car¬ ried them into effect. So that nearly all men con¬ victed of military offenses in combat divisions re¬ mained with their organizations and continued to per¬ form their duty as soldiers. Many redeemed them¬ selves by rendering valiant service in (action and were released from the further operation of

their sentences.

To have the necessary deterrent effect upon the whole unit, courts-martial for serious offenses usually imposed sentences considerably heavier than would have been awarded in peiace time. Except where the offender earned remission at the front, these sentences stood during hostilities. At the signing of the Armis¬ tice, steps were at once taken to reduce outstanding sentences to the standards of peace time.

Provost Marshal General's Department. — On July 20, 1917, a Provostˆ Marshal General was ap¬ pointed with station in Paris, and later the department was organized as an administrative service with the Provost Marshal General functioning under the First Section, General Staff. The Department _ was devel¬ oped I into four main sections — the Military Police Corps which served with divisions, corps and armies and in the sections of the Services of Supply; the Prisoner of War Escort Companies; the Criminal In¬ vestigation Department; and the Circulation Depart¬ ment. It was not until 1918 that the last-mentioned department became well trained and efficient. On Oc¬ tober 15, 1918, the strength of the corps was increased to I per cent of the strength of the American Expe¬ ditionary Forces, and provost marshals for armies, corps and divisions were provided.

The military police of the American Expeditionary Forces developed into one of the most striking bodies of men in Europe. Wherever the American soldier went, there our military police were on duty. They controlled traffic in the battle zone, in all villages occupied by American troops, and in many cities through which our traffic flowed; they maintained order, so far as the American soldiers were concerned, throughout France and in portions of England, Italy, Belgium, and occu¬ pied Germany. Their smart appearance and military bearing and the intelligent manner in which they dis¬ charged their duties left an excellent impression of the typical American on all with whom they came in contact.

Part IV. — Miscellaneous Subjects.

Prisoners of War. — All prisoners taken by the American troops were kept at least 30 kilometers be¬ hind our lines under guard by the Provost Marshal General's Department, except wounded or sick prisoners who were immediately sent to hospitals for treatment. Arrangements were mlade with the French and British that prisoners taken by our units operating with them should be sent to American enclosures. The Provost Marshal General was instructed to follow the principles of The Hague and the Geneva conventions in the treat¬

ment of prisoners, although these were not recognized by the United States as binding in the present war. Prisoners were organized into labor companies, and were employed on work which had no distinct bearing on military operations. The officer prisoners of war were accorded the same treatment as received by American officers confined in Germany. A Prisoner of War Information Bureau was established in the Central Records Office. Under la mutual understanding with the German Government, payments were made to pris¬ oners in the form of credits, and, subject to censorship, they were allowed to send and receive letters and packages. Religious meetings were held by prisoner chaplains, assisted by our Army chaplains and welfare workers.

From June, 1918, to the end of March, 1919, a total of 48,280 enemy prisoners were handled by the Provost Marshal General's Department, of whom 93 died and 73 escaped and were not recaptured. At the request of the French Government, 516 prisoners, natives of Alsace-Lorraine, were released after examination by la French commission. In accordance with the provisions of the Geneva convention, 59 medical officers and 1,783 men of the sanitary personnel, including 333 members of the German Red Cross, were repatriated. On April 9, 1919, we commenced to repatriate enemy prisoners who were permlanently unfit for further military duty and those who could not perform useful labor.

Through the Berlin Red Cross and the International Red Cross at Geneva, an American Red Cross committee at Berne received lists of all American prisoners taken by the German troops, to each of whom, when located, was sent a package containing food, tobacco, clean underclothing and toilet articles, and thereafter two packages a week. By a system of return post cards, i*^

was determined that 8$ per cent of these packages were received.

As soon as the Armistice was signed the Germans releiased large numbers of Allied prisoners who im¬ mediately started toward the

Allied lines. Four Amer¬ ican regional replacement departments were established, to which all returning Americans were sent until proper records could be made. Those in good physical condi¬ tion were sent to their commands, while the others were sent to hospitals or to leave areas for a rest.

An Allied commission was formed in Berlin early in December, 1918, for the repatriation of Allied prison¬ ers, with representatives from each of the American, British, French, and Italian Armies. American prison¬ ers were evacuated through Switzerland in fully equipped trains, including hospital cars, provided by the Swiss Government and paid for by our Government. These were met by American trains at the Swiss border. It was planned to withdraw all our prisoners by this route, but a number had already been withdrawn tnrough the northern ports and taken to England in British ships.

The Allied Commission obtained a statement of moneys paid Americans while in German prisons; in¬ vestigated complaints concerning treatment of Amer¬ icans; obtained possession of effects of prisoners who had died in captivity, or which had been left behind by those repatriated; and also located the graves of the American dead. , .

On November ii, 1918, there were 248 American officers and 3,302 men in the hands of the Germans, all of whom were evacuated by February 5, 1919. None of our prisoners were condemned to death, al¬ though I officer and 20 men died in captivity.

An InterAllied agreement of January 13, 1919, created a commission for the control of Russian prison¬ ers in Germany. The British and American representa¬ tives, aided by small unarmed detachments, were charged with the administration of the Russion prison camps, and succeeded in discharging their duties despite the civil disorders in Germany.

Early in January, 1919, the Red Cross outlined a plan to send a commission to Germany to assist in caring for and feeding Russian prisoners, and an American officer was detailed to assist and accompany this commission. The Red Cross being financially un¬ able to furnish the necessary food, arrangements were finally made with the French Government to furnish funds for its _ purchase from our Army stores, without any responsibility being assumed by the Army, as was desired by the Allied Food Commission. Such supplies as could be spared by the Army were sold to the French, and American officers were detailed to assist in their distribution. On April 10, 1919, the Supreme Allied War Council decided to give the German Govern¬

ment complete freedom in repatriating Russian prisoners of war, stipulating only that none should be repatriated by force, and that all who left must be provided with sufficient food for the journey.

Civil Administration of Occupied Territory, — To insure law and order, it was necessary that an American civil administration be created in the occupied territory. Different policies were adopted toward Luxemburg and occupied Germany, the former being a disarmed neutral and the latter occupied enemy territory. In both regions we issued proclamations defining our attitude toward the inhabitants.

In accordance with the precedent of our Government under similar circumstances, the local civil government remained in full possession of its former power, and retained j.urisdiction _ over all civil matters. The or¬ ganization of our civil administration in occupied terri¬ tory provided for the control of civil affairs by the Officer in Charge of Civil Affairs in Occupied Territory, under whom Army, corps, and division commanders detailed suitable officers in local charge of civil mlatters. In the Grand Duchy of Luxemburg, civil affairs were regulated by a corresponding representative with an office in the city of Luxemburg.

The principle of requisitioning supplies was exer¬ cised extensively throughout the area, always under central , control and without abuse of the privilege. Under ja board of appraisal payment was made for all property requisitioned, the money being obtained from the German Government under the terms of the Armis¬ tice. Food and forageˆ were not requisitioned, and during most of the period of occupation our officers and men were not allowed to purchase any German food and were forbidden to eat in the restaurants and cafes.

In Luxemburg, billeting arrangements land payment therefor were provided for by an agreement with the Government of Luxemburg.

Under instructions from the State Department, the interests of American citizens found in occupied Ger¬ many were referred to the American Embassy in Paris;

in Luxemburg to the American Legation at The Hague.

We insisted upon the Germans maintaining all public utilities. After being inspected, measures were taken to assure priority of fuel supply in case of coal shortage due to strikes in the Ruhr and Saar districts or

other causes. One of our chief problems was the maintenance and repair of roads and highways, and this at first necessitated the employment of soldier labor. As soon as possible a satisfactory system of road preservation and improvement was inaugurated, utilizing German civil labor.

To control and supervise the movement of funds and securities, all banks and banking houses were re¬ quired to submit monthly reports. Trade and blockade regulations were controlled through the American Sec¬ tion of the InterAllied Economic Committee.

The Civil Administration issued instructions relative to courts. Army, corps and divisional commanders were authorized to convene military commissions and appoint superior provost courts for the respective dis¬ tricts; and commanding officers of each city, town or canton, appointed an inferior provost court. _A11 of these courts were for the trial of offenses agiainst the laws of war or the Military Government. Our legal machinery was simple, and successful results in main¬ taining law and order were due to uniform and strict enforcement of such few regulations as proved necessary.

Strict censorship was maintained over postal, tele¬ phone and telegraphic communications. Passes and cir¬ culation were first handled by the Department of Civil Affairs, but on January 24, 1919, the Third Army took eharge of those matters.

In connection with the reconstruction work in France and Belgium, the Department of Civil Affairs pre-plared a record of all recovered stolen property and measures were taken to protect it against deterioration or unauthorized removal.

The fraternization problem was sharply raised by the sudden transition from the rigors of war conditions in France to the comforts of undisturbed German cities and homes, but a realization by our troops of their position in enemy territory and of their duty to main¬ tain the dignity of their own country reduced infractions of rules on the subject to a minimum.

Execution of Armistice Terms.

The first Armistice agreement provided for super¬ vision by a Permanent International Armistice Commis¬ sion to function under the authority of the Commander-in-Chief of the Allied Armies. The United States, Great Britain, Belgium, France, Italy and Germany were represented on the Permanent Internationial Armistice Commission.

The chairmen of this commission and of the five main committees were French. These com¬ mittees were organized to care specifically for the work in connection with material, transportation, prisoners of war, entretien, and restitution. The United States was represented on each of these main committees.

The Germans unsuccessfully attempted to enter the Permanent International Armistice Commission on the basis of negotiation. Many adjustments were made because of the difficulties under which the German authorities were working, but, in general, they were held strictly to the spirit of the terms of the Armistice agreement. Time of delivery was often extended, but penlalties were imposed for failure to comply with the conditions. All aeroplanes were not obtained until a penalty was imposed of 20 horses for each undelivered plane. Evacuation of occupied territory, and repatria¬ tion of civilian inhabitants and of prisoners of war, were begun immediately and carried out promptly.

In the distribution among the Allied Armies of ordnance and aeroplanes surrendered by the enemy, the Belgian Army received one-tenth, American Army two-tenths, British Army three-tenths, and French Army four-tenths. Our share was 720 field guns, 534 heavy guns, 589 trench mortars, 10,356 machine guns and 340 aeroplanes. Railway rolling stock wlas divided according to the needs of the railway systems serving the different armies.

The question of expense of maintenance of the armies of occupation caused considerable discussion among the Allies and protests from the Germans. This was due to the diversity of opinion as to the items properly chargeable to the expense of an army of occupation. My policy was that, pending final settlement by the Peace Conference, Germany would be liable for all expenses of the American Army of Occupation; that any payments made by Germany for this purpose were to be considered as partial payments on account of the whole sum, and not as a liquidation of any specific expenses. Money was deposited in Coblenz banks to the credit of the United States, in amounts notified as necessary to cover all expenditures made in the

The total expense las calculated by the different Allied Armies, before any of our troops were withdrawn, was based on the effective strength as shown by their Tables of Organization, and appears as follows:

Armies.

Officers

Men

Horses

Cost per month in francs

French .

11,570

1,834

12,000

12,358

35 , 500 39 , 430 240,000 275,617

116,100

11,600

70,000

58,755

175,948,815 00 30,195,142 60 127,935,000 00 269,068,184 10

Belgian .

British .

United States

Total …

603,147,141 70

United States Liquidation Commission. — In Febru¬ ary, 1919, upon my recommendation, the Secretary of War appointed the United States Liquidation Com¬ mission, War Department, which had charge of the liquidation of our affairs in France, the sale of our property and installations and the settlement of claims exclusive of those arising out of torts, which were handled by the Renting, Requisition and Claims Service. While not under my supervision, the Liquidation Com¬ mission played such an important part in the closing chapter of our activities that some mention of it should be made in this report. With the dissolution of the American Expeditionary Forces we were confronted with the problem of disposing of large port and other installations and immense quantities of transportation, mjateriel, supplies and equipment. Much of this was of an immovable nature and the shipping situation forbade the transfer to the United States of most of the movable effects. _ There was little or no demand for many of the articles to be disposed of, and the expense of maintaining a force of caretakers until the mJarket improved would have been prohibitive. The successful negotiations of the Commission led to the liquidation of our affairs with France by the payment of a lump sum to the United States by the French Government.

Relations with the Allies. — ‘ Our troops arrived in Europe after France and Great Britain had been fight¬ ing desperately for nearly three years, and their re¬ ception was remarkable in its cordiality. The resources of our Allies in men and material had been taxed to the limit, but they always stood ready to furnish us with needed supplies, equipment and transportation when at all available. We were given valuable assistance and cooperation in our training program by both the French and British armies, and when the shortage of labor personnel in our forces became acute the French Government rendered material assistance in the solution of this problem.

It wlas our good fortune to have a year in France to organize and train our forces. When our troops entered the battle the veteran soldiers of France and England gave them moral and physical support. The

Artillery of our Allies often supported the advance of American troops; British and French tanks frequently cooperated with our Infantry; and their aviators fought in the air to assist the American soldier.

Throughout France our troops have been intimately associated with the French people, particularly the French peasant, and the relations growing out of these associations assure a permanent friendship between the two peoples. The small force of Americans serving in Italy was accorded a warm welcome and established with the Italian people the most friendly relations. The hospitable reception of those of our forces who passed through England has impressed upon us how closely common langauge and blood have brought to¬ gether the British and ourselves.

The cooperation of our soldiers with the French, British, Belgians and Italians was decisive in bringing the war to a successful conclusion, and will have an equally decisive effect in welding together the bonds of sympathy and good will among the peoples of these nations and ourselves.

Welfare Work.

Allijed Food Commission, — At the request of the Allied Food Commission a selected personnel of 320 officers and 464 men was placed at the disposal of the Commission. There was no other American personnel in Europe or elsewhere available for this necessary work. Our officers were sent to various countries in charge of food distribution, and were everywhere re¬ ceived with the utmost friendliness. These officers

and men, by their executive and administrative ability and their energetic resourcefulness, were in a large measure responsible for the manner in which these food supplies were delivered to the various people in central Europe during a period of civil unrest or com¬ plete disorder. By their disinterested conduct of this charitable work, they won for the American Army the admiration of the populations whom they served.

Societies. — In their respective spheres of activity the Red Cross and Y. M. C. A. undertook the burden of supplying the needs of the entire American Ex¬ peditionary Forces. Their efforts were in many re¬ spects limited by a lack of tonnage. But shortage in tonnage, transportation, or personnel, meant inability to carry out completely

their appointed tasks; whereas with the smaller societies it meant inability to expand. In order to avoid duplication of effort, it was directed in August, i9i7» that the Red Cross confine its activities to relief work, and the Y. M. C. A. to amuse¬ ment and recreation. The Knights of Columbus and the Salvation Army were later given official recognition. The Y. W. C. A., Jewish Welfare Board and American Library Association conducted their activities through one of the established societies.

The American Red Cross maintained within our zones a system of " Line of Communication Canteens," which furnished refreshments and relief to troops in transit and became a valuable feature of the Red Cross work. The statistical work of the searchers attached to statistical sections and to hospitals obtained much information for relatives. This society also aided in locating Ameridan prisoners to whom it sent food from Switzerland.

To avoid depleting our personnel, the Y. M. C. A. agreed to operate our canteens and was at first allotted 208 ship-tons per 25,000 men per month to bring sup¬ plies from the United States, but the requirements of other services later made it necessary to reduce this allotment to 100 tons. This materially reduced the valuable service the Y. M. C. A. might have rendered in this work. _ The termination of hostilities made it possible to relieve the society of this responsibility.

The need of greatly expanded welfare work after hostilities, such as athletics and education was at once recognized, and the cooperation of the welfare societies in all these activities Was of inestimable value. Im¬ mediately after the Armistice steps were taken to pro¬ vide diversion and entertainment for our troops. Enter¬ tainment officers were appointed in all units, and the Y. M. C. A. Entertainment Department furnished pro¬ fessionals and acted as a training land booking agency for soldier talent. Approximately 650 " soldier shows " were developed, which entertained hundreds of thou¬ sands of soldiers, who will remember this as one of the pleasant and unique enterprises of the American Ex¬ peditionary Forces.

The athletic program in the spring of 1919 culmi¬ nated in the InterAllied games in June, held in the concrete stadium erected by our Engineers near Paris, the necessary funds being contributed by the Y. M. C. A. In number of participants and quality of entry, the games probably surpassed any of the past Olympic contests.

Leaves and Leave Areas.-— A leave system an¬ nounced in general orders provided for a leave of seven days every f9ur months, but it

was necessary to suspend the privilege during active operations. In the leave areas freeboard and lodging at first-class hotels were provided for soldiers, and the Y. M. C. A. furnished recreational and amusement facilities. A number of new areas were opened by the Services of Supply immediately after the Armistice, improved trans¬ portation accommodations were eventually secured, and arrangements were made whereby men could visit England, Belgium and Italy.

It was my desire that every man in the American Expeditionary Forces should be given an opportunity to visit Paris before returning to the United States, but the crowded condition of the city during the Peace Conference, transportation difficulties, and other reasons, made it necessary to limit the number of such leaves.

Religious Work. — Religious work in our Army before the war was carried on by chaplains, one to each regiment. To meet the greatly increased size of regiments, legislation was recommended by me to pro¬ vide not less than one chaplain for each 1,200 men. Although such act was passed in June, 1918, there was a continuous shortage of chaplains with the fight¬ ing units and in the hospitals and camps in the rear areas. This was largely met through the ready co¬ operation of the Welfare Societies who sent ministers and priests where most needed. Religious workers in the Y. M. C. A. and Knights of Columbus and Red Cross also aided in the work, the Red Cross sending chaplains to the States with units in many instances.

The religious work was directed and coordinated by a Board of Chaplains at general headquarters, of which Bishop Charles H. Brent was the head. With great devotion to duty this work was maintained despite a lack of transportation and other facilities. Chaplains, as never before, became the moral and spiritual leaders of their organizations, and established a high standard of active usefulness in religious work that made for patriotism, discipline and unselfish devotion to duty.

Educational Work. — Prior to the Armistice, edu¬ cational work was

conducted through the organization of voluntary classes under the Y. M. C. A., the popular subjects studied being French language, French history, and the causes of the war. After the Armistice, measures were taken for ;a systematic organization of non-military educational training.

The formal school work began January 2, with post schools. Then divisional educational centers gave the equivalent of high-school instruction and specialized on vocational training. The American Expeditionary Forces University at Beaune carried on undergraduate and graduate work for the technical professions, while postgraduate work was provided by the entrance of our officers and soldiers into French and British universities. Special schools were organized to meet demands, such as the Practical Agricultural School at Allery and the Art Training Center at Paris, for painting, sculpture, architecture and interior decoration, advanced students being entered in the best atpjiers of Paris. Active instruction was carried on in the base hospitals and convalescent camps.

An important branch of the educational work was the field institute of short courses and educational ex¬ tension lectures, organized to meet conditions due to the rapid repatriation of our soldiers and the constant movement of troops. At least half of our forces were reached by this means with brief intensive courses in business, trades, engineering, agriculture, occupational guidance, and in citizenship.

On April 15 all educational work came under the complete control of the Training Section of the General Staff. The advantage of this change in management was at once apparent in the better coordination of the work of an excellent body of educators. The total attendance in the organized school system of the Amer¬ ican Expeditionary Forces was 230,020, of which num¬ ber 181,475 attended post schools, 27,250 educational centers, 8,528 the American Expeditionary Forces Uni¬ versity at Beaune, 367 Art Training Centers, 4,144 Mechanical Trade Schools, 6,300 French universities and 1,956 British universities. The attendance upon the institute short courses totaled 690,000 more, and at the extension lectures 750,000, giving a grand total of attendance at all educational formations of 1,670,020.

The educational work in the American Expeditionary Forces was of undoubted value, not only in improving morale, but in concrete benefit to the individual officer and soldier. It demonstrated satisfactorily that a com¬ bined military and educational program can be carried out in the Army with little detriment to pure military

training and with decided advantage to the individual.

Stars and Stripes. — The Stars and stripes was a weekly newspaper conceived with the idea of increasing the morale of American troops by providing a common means of voicing the thought of the entire American Expeditionary Forces. Edited and managed by en¬ listed men who declined promotion preferring to re¬ main in the ranks in order to interpret the spirit of the Army, it was la great unifying force and materially aided in the development of an esprit de corps. It lent loyal and enthusiastic support to Army athletics and to the educational program. In leading the men of our Army to laugh at their hardships, it was a distinct force for good and helped to create a healthy viewpoint. The campaign it conducted for the benefit of French orphans resulted in a fund of 2,250,000 francs.

Appreciation. — In this brief summary of the achievements of the American Expeditionary Forces it would be impossible to cite in detail the splendid abil¬ ity, loyalty and efficiency that characterized the service of both combatant and noncombatant individuals and organizations. The most striking quality of both offi¬ cers and men was the resourceful energy and common sense employed, under all circumstances, in handling their problems.

The highest praise is due the commanders of armies, corps and divisions, and their subordinate leaders, who labored loyally and ably toward the accomplishment of our task, suppressing personal opinions and ambitions in the jmrsuit of the common aim; and to their staffs, who developed, with battle experience, into splendid teams without superiors in any army.

To my Chiefs of Staff, Major Gen. James G. Har-bord, who was later placed in command of the Services

of Supply, and Major Gen. James W. McAndrew, I am deeply indebted for highly efficient services in a post of great resiionsibility.

The important work of the staff at General Head¬ quarters in organization and administration was char¬ acterized by exceptional ability and a fine spirit of cooperation. No chief ever had a more loyal and effi¬ cient body of assistants.

The officers and men of the Services of Supply fully reialized the importance of their duties, and the operations of that vast business system were conducted in a manner which won for them the praise of

all. They deserve their full share in the victory.

The American civilians in Europe, both in official and private life, were decidedly patriotic and loyal, and invariably lent encouragement and helpfulness to the armies abroad.

The various societies, especially their women, in¬ cluding those of the theatrical profession, and our army nurses, played a most important part in bright¬ ening the lives of our troops and in giving aid and comfort to our sick and wounded. ,

The nlavy in European waters, under command of Admiral Sims, at all times cordially aided the army. To our sister service we owe the safe arrival of our armies and their supplies. It is most gratifying to record that there has never been such perfect under¬ standing between these two branches of the service.

Our armies were conscious of the support and co¬ operation of all branches of the government. Behind them stood the entire American people, whose ardent patriotism and sympathy inspired our troops with a deep sense of obligation, of loyalty and of devotion to the country's cause never equaled in our history.

Finally, the memory of the unflinching fortitude and heroism of the soldiers of the line fills me with great admiration. To them I again pay the supreme tribute. Their devotion, their valor and their sacri¬ fices will live forever in the hearts of their grateful countrymen.

In closing this report, Mr. Secretary, I desire to record my deep appreciation of the unqualified support accorded me throughout the war by the President and yourself. My task was simplified by your confidence and wise counsel. I am, Mr. Secretary,

Very respectfully,

John J. Pershing,

General, Comniander-in-Chief, American Expeditionary Forces.

17. THE PEACE CONFERENCE OF 1919. Composition and Organization. — That a conference of delegates of the nations at war with Germany and her allies should meet to formulate the terms of peace was a foregone conclusion; and no higher political body was needed to call it into existence. But the time and place of meeting, and the number of dele¬ gates of each nation to be represented were matters that had to be decided by some power that could speak for all.

Such authority was found in the co-operative action of the foreign secretaries of the five great powers opposed to Germany. By cable and telegram, and with the assistance of Col. E. M. House, who acted for President Wilson, they agreed that the confer¬ ence should meet in Paris on 18 Jan. 1919. They also drew up rules of procedure governing the sessions of the conference and decided what states should send delegates and how many could come from each.

Before the conference met much was said in the press about admitting newspaper reporters to the meetings There seems to have existed an impression that the conference would debate matters in a general way, as in an ordinary parliament or congress, and that it would be wed for the peoples of the world to know what their representatives were saying and doing. The reporters won their point formally, but it did them no good ; for the plenary sessions were never characterized by debate and they occurred so rarely and lasted such a brief time that they may be descrilied as the least im¬ portant feature of the Peace Conference.

The first session was held on 18 Jan. 1919. At that time President Wilson had been in Europe more than a month. He had visited England and Italy and had held many con¬ ferences with the men who acted for those countries and for France. By the action of the foreign secretaries an understanding had been reached as to the procedure and the distribu¬ tion of power in the Peace Conference. The result was seen in the easy way in which the conference divided itself into secret committees, each having charge of some vital phase of the proceedings, and the smooth way in which the decision was accepted by the delegates. Many bitter differences of will developed in the con¬ ference, but there was never a protest against the way its decisions were arrived at. It was not a parliamentary but a diplomatic body, and no one ever thought of disputing its procedure.

The following states were represented, ar¬ ranged by the rules of the conference in the following categories: (1) Belligerent powers with general interests (the United States of America, the British Empire,

France, Italy and Japan) ; (2) belligerent powers with particular interests (Belgium, Brazil, the British Domin¬ ions and India, China, Cuba, Greece, Guatemala, Haiti, Hedjaz, Honduras, Liberia, Nicaragua, Panama, Poland. Portugal, Rumania, Serbia, Siam and the Czecho-Slovak Republic) ; and (3) powers in a state of diplomatic rupture with the enemy powers (Bolivia, Ecuador, Peru and Uruguay). The attendance at the conference of neutral nations and nations in process of for¬ mation was recognized at sessions in which their special interests were considered. The powers in class 1 were allowed five delegates each ; Belgium, Brazil and Serbia were allowed three each; China, Greece, Hedjaz, Poland, Portugal, Rumania, Siam and the Czecho-Slovak Republic were allowed two each ; and Cuba, Guatemala, Haiti, Honduras, Liberia, Nicaragua and Panama, as well as the powers of class 3 were alloted one each. The British Dominions w'ere represented as follows: From Aus¬ tralia, Canada, South Africa and India, two each, and from New Zealand one. Each dele¬ gation had the right to avail itself of the panel system. Each delegation was allowed to ap¬ pear at the sessions with technical experts and stenographers, and the experts might speak to give information desired of them. The condi¬ tion of representation of Russia was to be fixed by the conference when Russian matters came up. No general constitution of the Peace Con¬ ference has been announced, beyond such in¬ evitable rules as referred to the numbers of delegates and the functions of the secretariat. By leaving the conference unrestricted its action could be most easily adjusted to the needs of the occasion. As it happened, however, the plenary sessions did little more than register the opinions of the committees.

The work of the conference was early divided into various parts with a commission to investigate and report for each. Thus there were commissions on the formation of a League of Nations, on fixing responsibility for the war, on determining the reparation for damages, on international labor legislation, on international control over ports, waterways and railroads, on economic drafting, and on economic coopera¬ tion among the Allies. But a much more import¬ ant body than any of these commissions was the

central commission of the Peace Conference, which seems to have grown uo out of the sheer prominence of the five great powers. It was composed of President Wilson and Secretary of State Lansing, and of the prime ministers and foreign secretaries of the four other states of class 1. It was sometimes known as the Big Ten, and since each pair was dominated by one man, it eventually came to be the Big Five.

Here was the centre of power of the Peace Con¬ ference. Account should be taken, also, of the Supreme War Council, which sat at Versailles during the second half of the war. Under the presidency of Marshal Foch it sat through the conference period with its eyes on the execution of the armistice and on similar affairs. But even this council did not resist the all-powerful Council of Ten, which superseded it at times or sat with and dominated it at others ; but the Big Ten generally left the Supreme Allied Council to its own will in matters purely military.

Problems of the Peace Congress. — The first session was held in the Salle de la Paix at the Ministry of Foreign Affairs, Quai d'Orsay, Paris, 18 Jan. 1919, at 3 p.m;. Im¬ pressive ceremonies marked the opening of the session. Soldiers saluted the arriving delegates, trumpets sounded shrill notes of honor, digni¬ taries escorted the delegates to their places around a great green table, and the President of the French Republic made a speech of wel¬ come. Then President Wilson rose and nomi¬ nated M. Clemenceau, the French premier, for president of the conference, and Mr. Lloyd George seconded the nomination, which was carried unanimously. In a short speech Clemen¬ ceau pointed out the chief business before the delegates. At the head of the program he placed the proposition for a League of Nations, and after that reparation, responsibility for the war, and the international relations of labor. He invited each nation to submit proposals in regard to each subject.

M. Clemenceau, however, did not allude to the crop of jealousies and local ambitions that were already springing up among the nations represented at the conference. An American editor who was in Paris thus put it: ®The vanities, cupidities and pugnacities which mas¬ querade as ˆnational aspirationsˆ are seething beneath the serenity of the Quai d'Orsay.® He added that the opportunism of politicians, the materialism of business classes and the mili¬ tarism of the professional soldiers operated to make a sinister peace in which should appear all the selfish motives that had characterized the congresses of Vienna and Berlin in whose delib¬ erations were sown the seeds of the World's War. Over against these tendencies, said the same journalist, were three forces that worked for a treaty in which were the elements of permanent peace, and these were : The world's revolt against war, the disgust of liberal-minded people in all nations at the theory of the Balance of Power, and President Wilson's determination to place the project for a League of Nations at the head of any treaty that was made. The diagnosis was correct. In its large relations the conference was a battle royal be¬ tween the forces of international liberalism and those of selfish nationalism. President

Wilson led the first and used freely in support of his cause the immense prestige which the

United States had at the time. The leaders of the other side were morally weak and did not dare fight openly for their views. They did not give them up specifically and did not defend them as principles ; and before President Wilson's at¬ tacks they were mute. But they did not cease to contend for the specific ends they had in mind, and in the conference they were some¬ times strong enough to force Mr. Wilson to a compromise that gave the lie to the Fourteen Points, which they had accepted. It must not be thought that the situation here indicated was solely due to the leaders of the European states. It was as frequently due to the states of mind of the people. There was scarcely a statesman who stood out for a narrow national policy at Paris who did not know it would be politically foolish for him to do otherwise. The peoples of Europe had suffered a great deal and looked for some easing of their burdens at the expense of the defeated, or they had acquired definite convictions that their ˆnational aspirationsˆˆ were justified, and it would havd'been ill for a politi¬ cal leader or party that opposed them.

In this situation the United States and their President were to play a large part. The posi¬ tion of the one among the nations at the con¬ ference and of the other as a champion of international justice were chiefly responsible for this peculiar eminence. So deeply were the doubts and suspicions of European states rooted in past diplomatic history that no European nation at Paris trusted the other European nations to deal fairlyˆ But they all trusted the United States, at first, because it had never become allied with the intrigues of Europe. When they learned the United States would not take up their quarrels, most of their confidence turned into scorn.

President Wilson went to the Peace Confer¬ ence as no other man went there. Received in Europe as a herald of a new world, he had for the moment the plaudits of a suffering con¬ tinent, who looked to him for whatever they thought it needed in its sorrow. He had given the peoples of the belligerent countries a good ideal to fight for when he announced that the war was a war for democracy. The cry heartened the Allies and undermined the authority of the kaisers of Germany and

Austria-Hungary. His suggestion of a League of Nations as a means of reducing future wars to restricted circles made a strong appeal to a world sick of battle horrors. He who had given peoples the hope that an ideal that men had dreamed of since the days of Henry of Navarre might now become a reality was certain to have a devoted follow¬ ing among men who wished well for the future. More than all else, he was in a peculiarly favorable position for taking a great part in the conference. He led the greatest, richest and least damaged nation by the war that was represented at the conference. Every other nation hoped to get aid from this nation in the era of reconstruction, and in the fawning spirit of the diplomacy of 1815 they dared not offend its President. Moreover, President Wilson had taken the earliest stages of the peace negotia¬ tion into his hands when he acted as inter¬ mediary to arrange the terms under which the Germans appealed for peace. His Fourteen Points had been accepted by both groups of Allies as the basis of peace. Although they were to be sadly distorted by his friends, the

assumption when the conference met was that they would be the basis of all deliberations, and who could better guide such discussion and stimulate it than he who wrote them? Thus his personal influence in Europe, the weight he acquired from the position in which his country found itself, and his leadership in the ideals that seemed about to be made the foundation of the treaty all pointed to the high leadership of Presi¬ dent Wilson at the Conference of Versailles in

1919.

Although the mass of business that seemed likely to come up had been parceled out among the eight commissions named, it soon became evident that nothing important was to be done that did not go through the hands of the Council of Ten. Here was the chief power, and here was the chief action. The Big Ten, in fact, decided every important matter before it went to the conference. After a while the habit was established of dropping the for¬ eign secretaries from the meetings, so that the council now became the Big Five. It is said that the reason the body was so reduced was that in its first form the secret business of the sessions seeped out to the French and British press to such an extent that it was thought well to debate the most important affairs in the smallest possible circle. From that time the meetings were generally in President Wilson’s private rooms, and as the Japanese

representa¬ tive rarely attended the body became the Big Four.

The League of Nations. — The first busi¬ ness brought forward was the proposed League of Nations. It was, in fact, the most important thing suggested in the conference; for if such a league could be founded and made to work it would transform the political constitution of the world. If it could not be made to work it was a thing that should not be attempted. President Wilson went to Paris determined to carry it through the conference, if possible. In every European country were some persons of influence who believed it could be made to work, if adopted. But a larger por¬ tion of the men of political ideas looked on the suggestion with some of that good-humored tolerance with which Metternich received the tsar's suggested Holy Alliance. To overcome this lukewarmness was Mr. Wilson's task. Each statesman had some demand to make on the conference, and Wilson's demand was the adop¬ tion of the League of Nations. In the final balancing of demands there was a disposition to make the President pay for his favorite idea by forcing him to give up something in favor of each of the other demands.

President Wilson was chairman of the com¬ mission to which was entrusted the task of preparing a covenant of the League of Na¬ tions ail'd submitted a plan which had the ap¬ proval of the American delegates. Another plan was submitted by General Smuts, of South Africa, and other suggestions were re¬ ceived. After much debate by the commission a tentative covenant was reported to the con¬ ference in plenaiy session on 14 Feb. 1919, and by it made public. It was given out with the hope that the criticism made would give its au¬ thors an opportunity to determine in what re¬ spects it would have to be amended before it was finally accepted. No strong demand for amendment was heard in any nation except the

Copyright, Underwood A Underwood, New York

United States, where a group of Republican senators issued a statement that the covenant would have to be amended before they would accept it. They did not specif}ˆ the exact terms in which the document ought to be modified.

During the long period in which the idea of a league to promote peace had been discussed before 1919 in various societies in the world the suggestions fell in two groups. One series implied the creation of a common organization with no other power than public opinion to enforce its decisions. Such a league was analo¬ gous to the Hague Conferences which did not succeed in arousing much respect before 1914. The other group favored the creation of a league with a central power strong enough to make and enforce international law. When President Wilson went to Paris many persons who desired a league in some form feared that the first type would be all that he could get adopted. Before the discussions at Paris ceased the opinion in the conference shifted in such a way that those wˆho voted at all favored a league strong enough to execute its laws and pledged to enforce them in some important re¬ spects. The covenant as finally announced leaned more to the second than to the first type of a league.

The main features of the covenant as finally incorporated in the treaty were as follows : A bicameral government was provided with a %ody of delegatesˆˆ composed of one member from each constituent state but with very little real power ; and an executive council of nine m.embers, one from each of the five large states and four chosen, one each from the small states in rotation. This council was to have the right to recommend the quota of military and naval forces each state contributed in car¬ rying out the purposes of the league, and it could fix the armaments and numbers of the troops of each state in the league. There was to be a court of arbitration, a permanent secre¬ tariat and a stated place of meeting, and the states pledged themselves not to go to war without first submitting their disputes to arbi¬ tration or to the judgment of the executive council. To disregard this pledge was to com¬ mit an act of war against all the other states of the league and they could take economic or other steps to make the offending state obey the covenant. Each signatory state was to guarantee the territorial and political integrity of the other states against external aggression (Article X) ; a state could be admitted to the league with the approval of two-thirds of the states already in it; colonies taken from a mother state were to become mandatories of the

league under the tutelage of states desig¬ nated by the league; treaties to be valid must be registered with the league; and amendments to the covenant were to be effectiveˆ when ac¬ cepted by all the states represented in the ex¬ ecutive council and by three-fourths of the powers represented in the body of delegates.

This remarkable document was received with equanimity by most of the states of Eu¬ rope. By accepting it they pledged themselves to the erection of a super-state with certain powers in limitation of their freedom of ac¬ tion, and they entered into the arrangement without visible hesitation. The explanation seems to be that the war had brought them to such a state of prostration that they did not be¬

lieve it possible to go on without some such a league to guarantee their safety while they were recovering from existing misfortunes. A league would enable them to reduce armaments, allay the fears of conquest by their ancient enemies, and give them the feeling that their possessions were secure. To the United States, however, the situation seemed other¬ wise. The country had suffered comparatively little through war, and its people were so con¬ fident of the future that they felt no need of the guarantee of other states to enable them to live in security. There was, also, some feeling that the other nations were asking too much of the United States, the one power that had great wealth and undiminished productive ca¬ pacity. Over against this view was the' opin¬ ion that the country ought to throw in its lot with the states of Europe for better or worse, partly because it was the generous thing to do and partly because by doing so it could use its influence in preventing wars which, if they started, would probably involve the United States themselves. The contention that now arose brought up clearly the question of joining or not joining the world movement in behalf of the control of war. The controversy that came up in the Senate of the United States over this question has little relation to this discussion. It was waged chiefly over Article X of the covenant, by which each state guaran¬ teed the integrity of the other states against external aggression. Many Americans did not wish their government to assume such a bur¬ den. The compromises eventually made on this and other points took form in the ®reservation® of certain rights and privileges to the United States, as the interpretation of the Mon¬ roe Doctrine, and the actual calling out of the army by Congress ; but it does not yet appear what strength the ˆˆreservations® when adopted will have in actual use. At the present time the whole subject is unsettled.

The readiness with which the European states at the conference accepted the League of Nations was partly due to the fact that each of them had its own demands on the confer¬ ence and was inclined to play them off against the league project with President Wilson. Great Britain, France, Japan and Italy, to say nothing of the smaller states, as Belgium, Po¬ land, Jugoslavia and Czecho-Slovakia, all had their eyes on some advantage that the confer¬ ence could give. This mass of questions made up the problem of European readjustment. At first it was thought that the European dele¬ gates would settle them among themselves, the delegates from the United States giving them¬ selves to the league and such an academic ques¬ tion as the responsibility for the war. But President Wilson soon showed that he thought otherwise. The meeting was not a two-sided thing, in which the affairs of one continent had nothing to do with the people of the other. The Fourteen Points had definite relations with all the matters connected with readjustments, and President Wilson was their champion. Thus it came about that he took a leading part in settling every point that was before the delegates. It was a new experience for the government of the United States to take such a strong hand in world affairs.

Disposal of the German Colonies. — The first matter of this kind to come up was the

disposition of the German colonies. Late in January it became known that informal plans had been made by which several o£ the British colonies would annex some of the German colonies, that Japan, France, Italy and possibly Belgium had hopes of taking certain others. Against these plans President Wilson protested vigorously. In a long, discussion, the prime ministers of the principal British colonies stood together, with the support of the foreign min¬ ister of France, Mr. Hughes, of Australia, being especially vehement. At last Mr. Lloyd George called the colonial prime ministers into a con¬ sultation and persuaded them to be satisfied with the mandatory system, for which Presi¬ dent Wilson contended. This system was to be administered under the supervision of the League of Nations, and it was in line with

the fifth of the Fourteen Points, accepted in the preceding-autumn by all of the states whose delegates now favored direct annexation of the colonies. The system^ ^was made to apply to dismembered portions of the Turkish Empire as well as to the colonies of Germany.

Attempt to Side-track the League. — Pres¬ ident Wilson's insistence on the creation of the mandatory system was considered one of the crises of the conference. Another was the at¬ tempt of the leaders to side-track the League of Nations during his absence in the United States, between 15 Feb. and 14 March 1919. They seem to have won the consent of Colonel House, who met the President at Brest on his return with a written statement of a plan to separate the league from the treaty, although on 25 January a specific vote of the conference had made it an integral part of that document then in the making. The plan was embodied in a ^Tesolution, fathered by Mr. Balfour,® provid¬ ing for a general settlement of all points and saying nothing about the league. Newspapers and statesmen of the conservative school, who opposed the league, declared that it was a dead project; for it was evident that it would amount to nothing if deferred until the passions of the individual states had an opportunity to rise over the inevitable disappointments at the other fea¬ tures of the treaty. President Wilson felt that he had been deceived and caused his news agency to announce that the vote of 25 Janu¬ ary was ^^of final force® and that reports of contemplated changes were untrue. The news was greeted with derision in many quarters. The world wanted peace and it said that Wilson stood in the way. But the United States was necessary to the world at that time, and it was not to be denied that its demands were un¬ selfish. When, therefore, the other statesmen realized that the President would oppose any aid to Europe if there was an attempt to go on under the old system of concert, they yielded and agreed to abide by the vote of 25 January. They were yet to wring important concessions from him in return for this agreement. This crisis past, the conference proceeded to con¬ sider other matters equally perilous.

The Saar Valley and the Rhine Region. — • One of these matters was the settlement of the claims of the Allied states as to territories and reparation. By this time the Council of Ten had shrunken to the Big Four — Wilson, Lloyd George, Clemenceau and Orlando. Great Brit¬ ain and France had suffered heavily at the hands of Germany and their people demanded heavy

reparation. The prime minister of each nation v/as forced to promise

to collect damages to the uttermost. President Wilson stood by the spirit of the Fourteen Points that ˆffhere shall be no annexations, no contributions, no puni¬ tive damages.® He demanded that the amount to be paid by Germany should be mentioned in the treaty. His associates objected, because they realized that any amount that Germany could pay or that Wilson would accept under the Fourteen Points would be so limited that public wrath in their respective countries would over¬ whelm them.

At the same time territorial claims were pressing for attention. France had definite claims to the Saar coal fields and her military men, headed by General Fbch, wished to have a long period of military control of the entire west bank of the Rhine. By the short-lived treaty of 30 May 1814, the Saar Valley went to France, but it was awarded to Prussia on 20 Nov. 1815. France now demanded its ˆRes¬ toration® by annexation. She has little coal but an abundance of iron and believed that she needed this rich fuel deposit to promote her industrial development. Her demands found some moral support in the heavy and wanton damage the Germans did to the Lens coal mines during the period of occupation. But the Saar Valley is German through and through by race and feeling, and President Wilson felt that to hand it over to France would violate that part of the Fourteen Points which declared that ˆˆpeoples are not to be handed about from one sovereignty to another by an international con¬ ference,® and he opposed the demand. He thus antagonized the French people in two respects and aroused their strong hostility. To his own friends it seemed that he but stood out for the principle of a just peace which would not plant the seed of future wars.

Other peoples had their claims to present, and they all took them straight to the President, who, it was known, occupied a central position in the negotiations. This was not so much because he had more power than Lloyd George and Clemenceau, but because those statesmen, representing the old diplomacy, were, in gen¬ eral, willing to make deals sharing the gains for their own countries, as in the olden times. But they had to get the consent of the American President, and they found it hard to obtain. Not only was this true of Italy, who wished to get Fiume and cut off Jugoslavia from the Adriatic, but there were many small states, as Greece, Poland, Rumania and Czecho-Slovakia who asked his interest in their special claims. It was generally impossible to support them in their extremity, and by refusing the President added to the stream of criticism. There were, also, groups of peoples aspiring to nationality, as the Egyptians and the Irish, who laid their claims before him. If he had seriously taken up their causes he would have broken up the conference ; but

by refusing to play politics with them he aroused their deep resentment. It seemed that his opponents took some satisfac¬ tion in seeing this mass of criticism grow, ex¬ pecting that it would eventually so weaken his influence at Paris that he would no longer be an obstacle to their wishes. Against this menace President Wilson played a vigorous stroke. On_ 7 April, when his opponents were momen¬ tarily expecting him to yield, came the anounce-WAR, EUROPEAN — THE PEACE CONFERENCE OF 1919 (17)

ment that he had ordered the ship George W ashington, then at Brooklyn, to be sent to Brest at once. It was tantamount to saying that he was going to withdraw from the conference if the combinations against him continued to operate. But Clemenceau was too wise to allow such a thing to happen and next day the Paris Temps, by official inspiration, gave it as its opinion that the French government would not demand annexation of the Saar Valley. Other papers taking their cue modified their criticism of the President.

When the treaty was finally published it was seen that the Saar coal fields went to France in fee simple, as reparation for the damages at Lens ; but it was provided that the political ad¬ ministration of the valley should be left to the League of Nations and that a plebiscite at the end of 15 years should settle its ultimate political control. As for the demand that France should have military control over the west bank of the Rhine, the treaty made the entire west bank and a strip 50 kilometers wide on the east bank a demilitarized area under German control. Fort¬ resses must not exist in it, nor manoeuvres be held there, nor any other military steps taken. Thus were met France's contention that her border was exposed; but it was a settlement full of menace.

The Demand for Fiume. — -The fourth crisis was the Italian dispute. Italy entered the war to obtain Italia Irredenta, unredeemed Italy, that is, lands inhabited by Italians but held by Austria. When she threw in her sword in May 1915, she had taken the precaution to obtain the approval of her claims in the agree¬ ment known as the Pact of London. In this document she did not claim Fiume but agreed that it should go to Croatia, which in 1919 was a part of Jugoslavia. The city was the port of commerce for Jugoslavia and Hungary and had long

been so considered ; and that was the reason it was left to Croatia in 1915. Soon after the armistice was signed 11 Nov. 1918, a movement arose in Italy for obtaining Fiume for Italy. Before the war, according to statis¬ tics then accepted the Italian residents were a plurality but not a majority of its population. But agitators in Italy made it appear to the people that one of the jewels of the Italian crown was about to be handed over to foreigners, and the excitable people became aroused on the question. Probably Orlando, the prime min¬ ister, would have resisted the demand if he had felt able to defy popular opinion; but he had many enemies in politics and was in no posi¬ tion to act independently. He arrived in Paris pledged to demand Fiume and let it be known at once. Now neither Great Britain nor France looked favorably on Italy's pretension to be¬ come a great colonial power. They were not willing to take the lead in opposing her, but they encouraged President Wilson to take such a position. The Italians were willing to do anything requested of them if they could have Fiume. Since they could get no intimation that they were to get the city they sought to block progress, threatening to go home, ordering their trains, and forever repeating their arguments. At last President Wilson prepared a statement of the case against their claim, read it over to Lloyd George and Clemenceau, who did not object to it, and finally gave it to the news¬ papers. So much had been said about the

secrecy of the negotiation and the wholesome effects of publicity that President Wilson may have thought that a frank avowal of the matter would clear it up. His statement was gener¬ ally approved outside of Italy. In that country passion rose to white heat. Orlando left Paris and was received with enthusiasm in Rome. The Italians seem to have thought that their departure would break up the conference. When they saw that the treaty with Germany was about to be presented without them, they suddenly announced their return When signs appeared that the Italian wave of passion was beginning to recede the poet, d'Annunzio with a band of followers appeared in Fiume, selected his grave, and announced that he would die in the city before it should pass into the hands of the Jugoslavs. President Wilson was supported by Great Britain and France. He let it be known that he would agree that Fiume might be left under international control, but Italy would have nothing but an Italian Fiume.

The Japanese Demands.— « The fifth crisis occurred over the demands of the Japanese in Shantung. The position of Japan in Asia is different from Italy's in Europe. Over against her lie the rich lands of Russia, China, with colonial possessions of Great Britain and France. Little

wasted by the war she is in a position to do great damage in Asia for the time being, if she feels that it is worth while to incur the hostility of her former friends. When, therefore, she asked Great Britain in February 1917, to agree that she should succeed to Germany's rights at Kiao-chau and in Shan¬ tung Peninsula she obtained a ready assent, and she was able to get France, Italy and Russia to make the same promise. In February 1917, Japan must have believed that the United States would enter the war. She doubtless believed, also, that they would take the side of China, who asked for the restoration of Shantung. By prudently getting the previous assent to her scheme of three great powers, she tied the hands of the United States in the peace con¬ gress. When it is asked why President Wilson did not treat Japan as he treated Italy it is sufficient to point out that he had Great Britain and France behind him on the Fiume incident, and that they, with Italy, were pledged against him on the Shantung incident. He got, how¬ ever, a promise from Japan that she would eventually hand over Shantung to China in sovereignty, but she would not make the prom.- ise in writing, saying that her word was given and that to demand a written statement was to doubt her honor. It was not possible to assert that she was deceiving her associates ; but it was unusual for a power that Jook written as¬ surances from others as a basis of all treaties to refuse to give the same when she was binding herself.

The situation was serious for President Wil¬ son. Without the support of the other powers, with the Italian delegates in Rome in threat¬ ened permanent retirement, it seemed to him necessary to make a compromise. Thus it was agreed in the treaty (sections 156, 157 and 158) that Japan should have all the rights that Ger¬ many had possessed at Kiao-chau and in the Shantung province. Germany, it should be re¬ membered, held Kiao-chau under a 99 years lease, and Japan could not expect to hold it longer, nor more absolutely. At the same time

Japan made an oral supplementary agreement, lOn the surface

voluntary, ®to hand back the Shantung Peninsula in full sovereignty to China, retaining only the economic privileges granted to Germany and the right to establish a settle¬ ment under the usual conditions at Tsingtao.® China protested against this settlement and eventually refused to sign the treaty. To have done otherwise would have been to accept the signing away of rights she was compelled to defend as long as she could.

No other part of the peace treaty was so much criticized in the United States as the Shantung settlement. The opposition arose from a deep-seated suspicion of Japan's integ¬ rity in diplomacy; and it was freely predicted that if Japan did hand back Shantung to China she would find a way to retain vital control under the guise of economic privileges. But the economic privileges she has talked about whenever the subject has been discussed are such as other nations 'have obtained in China, and elsewhere, in establishing spheres of com¬ mercial influence. A feature of the problem not generally taken into account is the supine¬ ness of China, No nation of 400,000,000 per¬ sons has a right to be as weak as she and ex¬ pect the rest of the world to defend her against the greed of a neighbor. It is hers to defend-herself, and it may happen that the Shantung matter will serve to awaken the Chinese to the necessity of protecting their nation. If Japan's policy results in the rise of nationality in China, the situation will take care of itself. If Japan breaks her promises and China challenges her it will be for the other powers, or the League of Nations, to say that she shall not wage war to make good her broken faith.

In some circles it has been claimed that President Wilson had trouble at the Peace Con¬ ference because he tried to get the League of Nations adopted. That is an error. He had little trouble in getting it adopted. It was in trying to carry out the principles in his Fourteen Points, accepted formally by all the powers at war with Germany, that he got into difficulties. If he had been willing to ignore these prin¬ ciples, make a settlement on the basis of the division of the spoils, with the league estab¬ lished to see that the agreements was carried out, he would have had pleasant sailing at Paris. But such a peace would not have had the respect of posterity, nor would the defeated nations have accepted it in good faith. It would have sown seeds of future wars.

Boundaries of Small States. — The adjust¬ ments here described, the disposition of the Ger¬ man colonies, the arrangement with regard to reparations, the Saar Valley, and the demilitar¬ ized region along the Rhine, and the recognition of Japan's claims to succeed Germany in

China, along with the creation of the League of Nations are the achievements of the conference which aroused most feeling. But other adjustments were made, some of them both important and difficult. Of this class one problem was the determination of the boundaries of the new small nations. In reconstituting the Polish state the question of a Polish port came up. Danzig is the natural outlet for Polish trade and it was once a Polish city. There was a demand among the Poles for its cession to the new state. But it was situated in the strongly German province of East Prussia and it was

not wise to assign it to Polish rule. It was finally decided that Danzig should be inter¬ nationalized and that a ˆcorridor® communicat¬ ing with it from Poland should also be inter¬ nationalized. The decision caused great disap¬ pointment to the Poles, but. it satisfied most other people. The boundary was so drawn that the Polish kingdom as it existed before the partition of 1772 was re-established territorially. Within its boundaries lies Upper Silesia rich in coal and iron, whose population is strongly German. To determine the fate of this prov¬ ince it was decided that a plebiscite must be taken in not less than 18 months after the ratification of the treaty to determine whether the province goes to Poland or Germany. East Prussia, lying east of the Vistula, for the most part was left to Germany, since its population is decidedly German.. It was also provided that the province of Schleswig should be divided into two districts, each of which should by vote determine whether it should belong to Germany or to Denmark. Finally, the fortifications of Heligoland were ordered destroyed and by Ger¬ man labor under Allied supervision.

Limitations on German Military Power. — The provisions by which Germany's power to wage war was to be reduced within the safety limits were devised with great care. After 31 March 1920, the army was not to contain more than seven divisions of infantry and three divi¬ sions of cavalry, a total of not more than 100,- 000 men, of whom not more than 4,000 should be officers, and the force was to confine itself strictly to the preservation of internal order. The number of guns that might be kept was specified, and the rest were to be handed over to the Allies. For each gun of 10.5 cm. or less calibre not more than 1,500 rounds of ammuni¬ tion could be kept, and for larger guns not more than 500 rounds each. All surplus stocks of arms and ammunition were to be surren¬ dered, all munitions factories to be closed and only enough maintained to supply the small army now allowed to exist. There was to be no more importation nor exportation of mu¬ nitions of any kind. Universal military serv¬ ice was to be

abolished by law, and the army in the future was to depend on voluntary en¬ listment. The period of enlistment was to be 12 years for officers and privates, and not more than 5 per cent of either class to be discharged in one year. Only one military school was to exist for each arm of the service ; and the uni¬ versities and other educational institutions ^^must not occupy themselves with any military matters.® No ‘^measures of mobilization® were to be taken.

The naval forces in commission were not to exceed 6 battleships of the Deutschland or Lothringen type, 6 light cruisers, 12 destroy¬ ers, 12 torpedo boats, or any equal number constructed to replace them as provided else¬ where in the treaty. The personnel of the navy, induding the reserve corps, coast de¬ fenses, signal stations, and other land forces of the navy, must not exceed 15,000 men, and there must not be more than 1,500 officers and warrant officers. All surface warships above the number specified were to be surrendered, or considered surrendered if they were already in Allied hands ; but 28 auxiliary ships, among them the Mowe, were to be retained and con¬ verted into merchant vessels. All submarines.

with submarine docks and submarine salvage vessels, were to be surrendered or broken up under the supervision of the Allied powers, and the resultant material could only be used for industrial purposes. In replacing the ships herein allowed to Germany armored ships were not to be larger than 10,000, light cruisers 6,000, destroyers 800, and torpedo boats 200 tons each ; .and no submarine was to be constructed or pur¬ chased in the future. Strict provisions were adopted to limit the number of officers and men, who were to be obtained by voluntary enlist¬ ment for long periods of service, as in the army. Germany was forbidden to maintain fortifica¬ tions on her own coast between 54° and 55° 27’ north latitude, and 9° and 16° longitude east of Greenwich. She was also forbidden to keep any military or naval air forces or air¬ crafts of any kind, and all such machines, ex¬ cept 100 seaplanes which were to be retained for locating submarine mines until 1 Oct. 1919, were to be surrendered.

To see that Germany did not find the means of evading these severe military and naval terms provision was made for an InterAllied Commission of Control appointed by the Princi¬ pal Allied and Associated Powers which might take up its residence at Berlin, or elsewhere in Germany, if it saw fit, with full powers of in¬ spection of documents, plants, and other things within its discretion, and the expenses of main¬ taining the Commission were to be borne by Germany. She was required, also, to give every facility for making such investigations as the League of Nations demanded.

The Punishment of Germans. — As the war drew near its close Allied opinion began to cry out for the punishment of the German kaiser and the officers who were responsible for the looting and other harsh measures com¬ mitted by the Germans in violation of the ac¬ cepted usages of war. It was not clear that these persons could be punished under any generally accepted rules ; but once the feeling was abroad it was not wise to ignore it. The victims of the war were not likely to collect out of Germany half reparation for their prop¬ erty damages, to say nothing of the losses of life; and they were in a frame of mind to de¬ mand, as the least that could be done, the full punishment of those who precipitated their sor¬ rows. It was in view of this feeling that the treaty-makers arranged for trials of persons they must have known they would have much diffi¬ culty in getting their hands on. ^^The Allied and Associated Powers,® said article 227, ^^publicly arraign William II of Hohenzollern, for-meirly German Emperor, for a supreme offense against international morality and the sanctity of treaties® and it provided for a special tri¬ bunal to try him and promised to ask Holland to surrender him that he might be given a fair trial. Succeeding articles pledged Germany to hand over for trial by military courts persons accused of ^having committed acts in violation of the laws and customs of war.®

Reparations. — The reparation sections pro¬ vided that Germany assume full responsibility for the damages suffered by the Allied govern¬ ments and people on account of the war. It was admitted, however, that Germany's resources were not sufficient for full reparation. She pledged herself to compensate the civilian pop¬ ulation for the losses she had inflicted upon

them, and in addition to repay to Belgium the sums that government had been forced to bor¬ row during the war. The amount of damages was to be determined by a Reparation Com¬ mission, which must report the assessed dam¬ ages to Germany by I May 1921 and draw

up a schedule of payments by which the debt was to be discharged within 30 years from that time, unless the Commission agreed to extend the time for any deficit. Germany also agreed to hand over in gold by 1 May 1921 the sum of 20,000,000,000 marks or its equivalent out of which the expenses of maintaining the Allied army in Germany should first be met, the bal¬ ance going to the reparation fund. This fund was to be divided among the Allied powers in the proportion already agreed upon among themselves. Germany also promised, in addi¬ tion to the above reparations, to restore all cash and securities taken away and all animals driven off, when they could be identified. The German government undertook to furnish the Reparation Commission all possible facilities in arriving at just decisions and to pay its ex¬ penses. The constitution and powers of the Commission were carefully regulated with an eye to the equal distribution of powers as be¬ tween the states concerned. In anticipation of the reparation payments Germany was to issue: (1) bonds for 20,000,000,000 marks payable with¬ out interest on or before 1 May 1921, an off¬ set against the specific payment of an equal sum already mentioned; (2) bonds for 40,000,- 000,000 marks with interest at 2j4 per cent between 1921 and 1926 and at 5 per cent there¬ after; and (3) bonds with interest at 5 per cent for an additional 40000,000,000 marks if the Commission thought Germany could pay them. Thus money payments might be arranged to a total amount of 100,000,000,000 marks in gold.

The bill presented for submarine damages during the war was exceedingly steep. Recog¬ nizing that Germany could not replace all the sunken vessels, she was required to hand over all the merchant ships under her flag of 1,600 tons or more, half of those between 1,600 and 1,000 tons, and one-fourth of her trawlers and fishing boats. She was to build for the Allied powers, at a price per ton to be agreed upon by the Reparation Commission, ships to the total tonnage of not more than 200,000 tons a year for five years, these ships to be accounted for in the reparation payments. She was also to hand over any boats for inland navigation acquired by her or by her people during the war, and to surrender ships of her river fleet equal to the losses of river craft by the Allies, provided she did not give up more than 20 per cent of her river fleet as it existed 11 Nov. 1918.

Germany was to give up, the values to be credited on her reparation account, various kinds of property, as certain submarine cables, specified quantities of coal for Italy and ben¬ zol and other chemicals for France, and dye¬ stuffs, if they were demanded. She was forced to accept a large number of restrictions on her financial and economic actions, all looking to the execution of the other obligations in the

treaty. She also agreed to restore to the Uni¬ versity of Louvain books and manuscripts equal in number and value to those destroyed by the Germans in the burning of Louvain ; and vari¬ ous other works of artistic or historical interest

taken by Germany from Belgium or France in the past were to be restored, particularly the French flags taken in the Franco-Prussian war. The Kiel Canal was opened free to the vessels of commerce and war of all nations. The Elbe, Oder, Nieman, and the Danube from Ulm were declared international rivers, and arrangements were made for the creation of international commissions to supervise traffic upon them.

International Labor. — Finally, for the establishment of uniform conditions of labor, the treaty authorized the creation of a General Conference of Labor and an International Labor Office to gather and distribute information concerning labor. The Conference was to meet at least once a year. Each nation that belongs to the League of Nations was to send to the Con¬ ference two delegates appointed by the govern¬ ment besides one representing labor and one representing capital. The organization was given little power other than that which looked to the creation of public opinion, and its organiza¬ tion and annual meeting seem to make it some¬ what top-heavy; but it is admittedly a powerful step toward the internationalization of the con¬ ditions under which labor operates.

The Treaty Signed. — The treaty was de¬ livered to the German delegates in Versailles 7 May 1919, the fourth anniversary of the sink¬ ing of the Lusitania. Its publication in Ger¬ many was a black event for her proud people, who had been bred to think themselves invin¬ cible. It took much careful work to keep down an explosion which would sweep the new repub¬ lican government into ruins. After many pro¬ testations that they would never sign, the repre¬ sentatives at last submitted to dire necessity. The new German Parliament approved the treaty, while declaring the country was not able to pay the sums exacted, and sent to Paris delegates who were

willing to sign it. The last ceremony was performed 28 June 1919, in the Hall of Mirrors of the palace at Versailles, the apartment in which the German Empire was proclaimed in 1871. On 10 Jan. 1920 treaty ratifications were exchanged by Great Britian, France and Italy, but in the United States Sen¬ ate attempts were made to modify the league covenant with an eye to weakening the obliga¬ tions the league would impose upon the United States.

The Treaties with Austria and Bulgaria. —

The treaty accepted by Germany furnished the model for the treaties with Austria and Bul¬ garia. The former was submitted to the Aus¬ trian delegates on 2 June 1919 at the old royal castle of Saint Germain-en-Laye, in modern times a museum 13 miles from Paris. It was accepted and signed by the Austrian representa¬ tives on 12 Sept. 1919. In the beginning Aus¬ tria acknowledged responsibility for the war. Terms of reparation were accepted similar to those imposed upon Germany, to be executed under the supervision of the same Reparation Commission Loot, especially artistic and his¬ torical objects, was to be surrendered. The separation of Austria from Hungary was recog¬ nized, as well as the creation of the states known as Czecho-Slovakia and Jugoslavia Aus¬ tria thus gave up her claims to Bohemia, Mo¬ ravia, and Austrian Poland. In the south she surrendered the Trentino, the Tyrol, Istria, and a part of Dalmatia, which with most of the islands in the Adriatic went to Italy. She also

gave up Carniola, Croatia, Bosnia, Herzegovina, and the other part of Dalmatia, which went to the new Jugoslavic states. ˆ The disputed port of Fiume was in the region allotted to the Jugoslavs, but its disposition was not men¬ tioned specifically. A further feature was to require Austria to accord equal civil rights to all her inhabitants without regard to race or religion, and she was forbidden to become a part of the German Empire. Her army was to be reduced to 30,000, and mobilization and com¬ pulsory military service were forbidden. The supplies of munitions were strictly limited and the manufacture of arms was limited to one factory controlled by the state. The navy was not to exceed three patrol boats on the Danube and no military or naval aircraft were to be maintained. Persons accused of violating the laws and usages of war were to be surrendered for trial,

Bulgaria was supposed to have obtained milder terms than her accomplices because she was the first power that submitted. She agreed to pay 2,250,000,000 French francs within a period of 37

years, to reduce her army to 20,000 men and her gendarmerie to 10,000, to surrender her surplus war material, all her war¬ ships and all her military aircraft, to recog¬ nize the Jugoslavic states, to compensate them for stolen coal by delivering 50,000 tons in five years, and to renounce the treaty of Brest-Litovsk. She was also to cede certain small strips of territory to Serbia to rectify bounda¬ ries, the most important being the triangle at Strumitza. The most perplexing matter in con¬ nection with the treaty referred to the disposi¬ tion of Western Thrace. After much debate it was finally decided that Bulgaria was to hand it over to the Allied powers to be disposed of later as they saw fit, but with the provision that Bulgaria's right of free access to the sea should not be denied. The treaty was handed to the Bulgarian delegates 19 Sept. 1919. It was not until 15 November that the Bul¬ garians notified the Conference that it was ac¬ cepted. In making this treaty the delegates from the United States were asked to sit with the delegates from the Allied powers. The United States accepted the invitation, as looking to the future. They had not been at war with Bulgaria.

Bibliography. — ˆThe treaties of peace with Germany and Austria have been issued by the United States government in separate form. The former was published in full in several newspapers in July 1919. Official summaries of each and of the Bulgarian treaty were also-published in most of the large dailies. The treaty with Germany is published in a handy form l)y the American Association for Inter¬ national Conciliation, No. 142 (New York, September 1919). It is also issued as a supple¬ ment by The American Journal of International Law, XHI, No. 3, July 1919 (New York, Ox¬ ford Press), with a good analytical table of con¬ tents. In the same periodical for April 1919, Mr. George A. Finch presents an article ˆˆThe Peace Conference at Paris,ˆˆ a description of the transactions in the plenary sessions in¬ cluding that of 14 Feb. 1919. Similar matter is found in No. 139 of the publications of the American Association for International Con¬ ciliation (New York, June 1919). Much has appeared in the newspapers on the conflicts

that arose in the Conference, most of it colored, no doubt, by the personal views of the editor, reporter, or the person communicating the in-forrnation. The only prominent actor in the affairs of the Conference who has appeared be¬ fore the public is Mr. Ray Stannard Baker, whose small book, ˆWhat Wilson did at Parisˆ (Garden City 1919) is a clear and well-inten¬ tioned description of the main controversies before the Conference. The author was in charge of the American Press Bureau at Paris, and saw President Wilson every day. His book is strongly for Wilson but it seems to be fair and its main positions are not attacked by those who find fault with the temper of it. In Bas¬ sett, John S., ˆOur War with Germanyˆ (New York 1919) may be found a chapter on the Peace Conference, based by admission on the newspaper reports of the day.

John Spencer Bassett,

Professor of History, Smith College.

18. THE PEACE TREATIES. On 7 May

1919 the Treaty of Versailles was handed to Count von Brockdorff-Rantzau, the chief of the German plenipotentiaries. During the weeks of negotiation that followed many minor changes were made in the treaty terms and the Polish section was entirely rewritten. The complete and final text of the treaty as signed by the peace plenipotentiaries of Germany and of 26 Allied and Associated Powers on 28 lune 1919 is given below. This text has been set from one of the printed copies issued by the Peace Conference. The copy which the plenipotenti¬ aries signed was bound in morocco, sealed and deposited in the archives of the French Republic at Paris. A few exceptions must be noted among the delegates named in the preamble. China's delegates refused to sign because of the Shantung award by the Peace Conference to Japan, while the Orlando ministry was over¬ thrown during the deliberations of the Con¬ ference and Italy's signers were led by the Foreign Minister of the new cabinet, Tittoui. On the German side, the Brockdorff delegation withdrew and Dr. Hermann Muller and Dr. Johannes Bell signed for Germany.

The Treaty of Versailles could not become effective until at least three of the principal Allied and Associated Powers had ratified it in addition to Germany. Great Britain ratified the treaty 31 July 1919 and Belgium followed on 8 August. Belgium, however, was not one of ®the Principal Allied and Associated Pow-ersdˆ France ratified the treaty 13 Oct. 1919 and the king of Italy signed a Decree of Rati¬ fication 7 Oct. 1919. The treaty went into im¬ mediate effect in

France and was followed by the removal of all war restrictions in that coun¬ try and in Algeria. Canada ratified the treaty 14 September, and China, although unable to ratify because of her refusal to sign at Versailles, de¬ clared her adherence formally on 24 Sept. 1919, to all the treaty provisions except those concern¬ ing Shantung, and declared the state of war with Germany at an end. New Zealand ratified the treaty 2 Sept. 1919; the Union of South Africa 12 Septerrtber and Australia on 2 Oct. 1919. Japan ratified the treaty 30 Oct. 1919 and Czechoslovakia ratified both the German and Austrian treaties 7 Nov. 1919.

On 10 July 1919 President Wilson laid the Treaty of Versailles before the Senate of the

United States. Four months of bitter debate ensued, during which the Republican majority, led by Senator Lodge of Massachusetts, strove to amend or modify the treaty and the Demo¬ cratic minority tried to have it ratified intact. All amendments were defeated and a real bat¬ tle developed over the adoption of 14 qualify¬ ing reservations reported by the Foreign Rela¬ tions Committee on 7 Nov. 1919. The first test of strength came on the preamble, which re¬ quired the written assent of three of the Allies to the American reservations. This preamble was adopted by a vote of 48 to 40 . On 10 Nov. 1919 began the debate on the principal reservation — that regarding Article X of the treaty. The ratifying resolution offered by Senator Lodge was as follows :

Resolved (two-thirds of the senators present con¬ curring therein), That the Senate advise and consent to the ratification of the Treaty of Peace with Ger¬ many concluded at Versailles on the 28th day of June, 1919, subject to the following reservations and under¬ standings, which are hereby made a part and condi¬ tion of this resolution of ratification, which ratification is not to take effect or bind the United States until the said reservations and understandings adopted by the Senate have been accepted by an exchange of notes as la part and a condition of this resolution of ratification by at least three of the four principal allied and associated powers, to wit, Great Britain, France, Italy and Japan:

1. The United States so understands and construes Article I that in case of notice of withdrawal from the League of Nations, as provided in said article, the United States shall be the sole judge as to whether all its international obligations and all its obligations under the said

covenant have been fulfilled, and notice of withdrawal by the United States may be given by a concurrent resolution of the Congress of the United States.

2. The United States assumes no obligation to pre¬ serve the territorial integrity or political independence of any other country or to interfere in controversies between nations — whether members of the League or not — under the provisions of Article X, or to em¬ ploy the military or nlaval forces of the United States under any article of the treaty for any purpose, unless in any particular case the Congress, which, under the Constitution, has the sole power to declare war or authorize the employment of the military or naval forces of the United States, shall by act or joint reso¬ lution so provide.

3. No mandate shall be accepted by the United States under Article XXII., Part I., or any other pro¬ vision of the treaty of peace with Germany, except by action of the Congress of the United States.

4. The United States reserves to itself exclusively the right to decide what questions are within its do¬ mestic jurisdiction and declares that all domestic and political questions relating wholly or in part to its in¬ ternal affairs, including immigration, labor, coastwise traffic, the tariff, commerce, the suppression of traffic in women and children, and in opium and other dan¬ gerous drugs, and all other domestic questions, are solely within the jurisdiction of the United States and are not under this treaty to be submitted in any way either to arbitration or to the consideration of the Council or of the Assembly of the League of Nations, or any agency thereof, or to the decision or recom¬ mendation of any other power.

5. The United States will not submit to arbitration or to inquiry by the Assembly or by the Council of the League of Nations, provided for in said treaty of peace, any questions which in the judgment of the United States depend upon or relate to its long-estab¬ lished policy, commonly known as the Monroe Doc¬ trine; said doctrine is to be interpreted by the United States alone and is hereby declared to be wholly out¬ side the jurisdiction of said League of Nations and entirely unaffected by any provision contained in the said treaty of peace with Germany.

6. The United States withholds its assent to Arti¬ cles CLVL, CLVIL, and CLVIIL, and reserves full liberty of action with respect to any controversy which may arise under said articles between the Republic of China ;a.nd the Empire of Japan.

7. The Congress of the United States will provide by law for the appointment of the representatives of the United States in the Assembly and the Council of

the League of Nations, and may in its discretion pro¬ vide for the participation of the United States in any commission, committee, tribunal, court, council, or con¬ ference, or in the selection of any members thereof and for the appointment of members of said commis¬ sions, committees, tribunals, courts, councils, or con¬ ferences, or any other representatives under the treaty of peace, or in carrying out its provisions, and until such participation and appointment have been so provided for and the powers and duties of such rep¬ resentatives have been defined by law, no person shall represent the United States under either said League of Nations or the treaty of peace with Germany or be authorized to perform any act for or on behalf of the United States thereunder, and no citizen of the United States shall be selected or appointed ;as a mem¬ ber of said commissions, committees, tribunals, courts, councils, or conferences except with the approval of the Senate of the United States.

8. The United States understands that the Repara¬ tions Commission will regulate or interfere with ex¬ ports from the United “States to Germany, or from Germany to the United States, only when the United States by act or joint resolution of Congress approves such regulation or interference.

9. The United States shall not be obligated to c»ntribute to any expenses of the League of Nations, or of the secretariat, or of any commission, or committee, or conference, or other agency, organized under the League of Nations or under the treaty or for the pur¬ pose of carrying out the treaty provisions, unless and until an appropriation of funds available for such ex¬ penses shall have been made by the Congress of the United States.

10. If the United States shall at any time adopt any plan for the limitation of armaments proposed by the Council of the League of

Nations under the provisions of Article VIII., it reserves the right to increase such armiaments without the consent of the council when¬ ever the United States is threatened with invasion or engaged in war.

11. The United States reserves the right to permit, in its discretion, the nationals of a covenant-breaking State, as defined in Article XVI. of the covenant of the League of Nations, residing within the United States or in countries other than that violating said Article XVI., to continue their commercial, financial, and personal relations with the nationals of the United

12. Nothing in Articles CCXCVI., CCXCVII., or in any of the annexes thereto or in any other article, sec¬ tion, or annex of the treaty of peace with Germany shall, as against citizens of the United States, be taken to mean any confirmation, ratification, or approval of any act otherwise illegal or in contravention of the rights of citizens of the United States.

13. The United States withholds its assent to Part XIII (Articles COCLXXXVII. to CCCCXXVII. in¬ clusive) unless Congress by act or joint resolution shall hereafter make provision for representation in the or¬ ganization established by said Part XIII. and in such event the participation of the United States will be gov¬ erned and conditioned by the provisions of such act or joint resolution.

14. The United States assumes no obligation to be bound by any election, decision, report, or finding of the Council or Assembly in which any member of the League (and its self-governing dominions, colonies, or parts of empire, in the aggregate have cast more than one vote, and assumes no obligation to be bound by any decision, report, or finding of the Council or As¬ sembly arising out of any dispute between the United States and any member of the League if such member, or any self-governing dominion, colony, empire, or part of empire united with it politiGally has voted.

On 19 Nov. 1919 the treaty was rejected by the Senate. It was reintroduced 10 Feb. 1920 but failed of ratification on 19 March 1920.

At the special session of Congress in 1921 a peace resolution was adopted under the terms of which the state of war between Germany and the United States was ended. Signed by Presi¬ dent Harding 2 July 1921. A treaty of peace was negotiated in Berlin during the summer of 1921 and was signed by the United States and German representatives at Berlin 25 Aug. 1921.

After the Senate adjourned on 19 Nov. 1919 without ratifying the Treaty of Versailles, the representatives of England, France and Italy at Paris proceeded to make arrangements for

the final ceremonies that would put the treaty into operation.

The chief steps to be taken were the formal exchange of ratifications and the deposit of the *instruments^^ in the archives of the French Foreign Office, the drawing up of the proces-verbal or formal record of the deposit of these instruments, and the promulgation of the treaty.

On 10 Jan. 1920 ratifications were formally exchanged at Paris between the signatory powers, and the Proces-V erhal was signed by Baron Kurt von Lersner for Germany, Premier Clemenceau for France, Premier Lloyd George for England, Premier Nitti for Italy and Baron Matsui for Japan. These were followed by the delegates of the following nations, who signed in the order named : Belgium, Bolivia, Brazil, Guatemala, Panama, Peru, Poland, Siam, Czechoslovakia and Uruguay. The United States, Greece, Roumania and China, not having ratified the treaty, did not sign.

The treaty went into effect at 4:15 p.m. (Paris time) 10 Jan. 1920. On 16 Jan. 1920 M. Leon Bourgeois became first president of the Council of the League of Nations and Sir Eric Drummond was made secretary.

The Treaty of Peace with Austria, which was handed to the Austrian delegates at Saint Germain on 2 June 1919, is in many respects identical with the peace treaty with Germany. The Austrian treaty consists of a preamble and 14 parts. The Austrian National Assembly ratified this treaty 17 Oct. 1919. The complete text follows the text of the Treaty with Ger¬ many.

The Bulgarian Treaty follows that of Aus¬ tria. Two of the subsidiary treaties are in¬ cluded, that with Poland and the Franco-American Treaty. A summary of the short¬ lived Brest-Litovsk Treaty, so often referred to in the war articles, is also included.

I. Treaty with Germany.

The United States of America, the British Empire, France, Italy, and Japan, these powers being described in the present treaty as the prin¬ cipal Allied and Associated Powers; Belgium, Bolivia, Brazil, China, Cuba, Ecuador, Greece, Guatemala, Haiti, the Hedjaz, Honduras,

Liberia, Nicaragua, Panama, Peru, Poland, Portugal, Rumania, the Serb-Croat-Slovene State; Siam, Czechoslovakia, and Uruguay, these powers con¬ stituting with the principal powers mentioned above the Allied and Associated Powers of the one part; and Germany, of the other part: Bearing in mind that on the request of the Im¬ perial German Government an armistice was granted on Nov. 11, 1918, to Germany by the principal Allied and Associated Powers in order that a treaty of peace might be concluded with her, and the Allied and Associated Powers being equally desirous that the war in which they were successively involved directly or in¬ directly, and which originated in the declaration of war by Austria-Hungary on 28 July 1914, against Serbia ; the declaration of war by Ger¬ many against Russia on 1 Aug. 1914, and against France on 3 Aug. 1914, and in the in¬ vasion of Belgium, should be replaced by a firm, just, and durable peace.

For this purpose the high contracting parties represented as follows:

The President of the United States of America, by:

The Honorable Woodrow Wilson, President of the United States, acting in his own name and by his own proper authority;

The Honorable Robert Lansing, Secretary of State;

The Honorable Henry White, formerly Ambassador Extraordinary and Plenipotentiary of the United States at Rome and Paris;

The Honorable Edward M. House;

General Tasker H. Bliss, Military Representative of the United States on the Supreme War Council;

His Majesty the King of the Belgians, by:

Mr. Hymans, Minister of Foreign Affairs, Minister of State;

Mr. Van Den Heuvel, Envoy Extraordinary and Min¬ ister Plenipotentiary of H. M. the King of the Belgians, Minister of State;

Mr. Vandervelde, Minister of Justice, Minister of State ;

The President of the Republic of Bolivia, by:

Mr. Ismael Montes, Envoy Extraordinary and Min¬ ister Plenipotentiary of Bolivia at Paris;

His Majesty the King of the United King¬ dom OF Great Britain and Ireland and of THE British Dominions Beyond the Seas, Emperor of India, by:

The Right Honorable David Lloyd George, M. P., First Lord of his Treasury and Prime Minister;

The Right Honorable Andrew Bonar Law, M. P., his Lord Privy Seal;

The Right Honorable Viscount Milner, G. C. B., G. C. M. G., his Secretary of State for the Colonies;

The Right Honorable Arthur James Balfour, O. M., M. P., his Secretary of State for Foreign Affairs;

The Right Honorable George Nicoll Barnes, M. P., Minister without portfolio; and

For the Dominion of Canada, by :

The Right Honorable Sir George Eulas Foster, G. C. M. G., Minister of Trade and Commerce;

The Right Honorable Charles Joseph Doherty, Min¬ ister of Justice;

For the Common'wealth of Australia, by:

The Right Honorable William Morris Hughes, At¬ torney General and Prime Minister;

The Right Honorable Sir Joseph Cook, G. C. M. G., Minister for the Navy;

For the Union of South Africa, by:

General the Right Honorable Louis Botha, Prime Minister; .

Lieut. General the Right Honorable Jan Christiaan Smuts, K. C., Minister of Defense;

For the Dominion of New Zealand, by:

The Right Honorable William Ferguson Massey, Minister of Labor and Prime Minister;

For India, by:

The Right Honorable Edwin Samuel Montagu, M. P., his Secretary of State for India;

Major General his Highness Maharaja Sir Ganga Singh Bahadur, Maharaja of Bikaner, G. C. S. 1., G. C. I. E., G. C. V. O., K. C. B., A. D. C.;

The President of the French Republic, by:

Mr Georges Clemenceau, President of the Council,

Minister of War; ,

Mr. Pichon, Minister of Foreign Affairs;

Mr! L. L. Klotz, Minister of Finance;

Mr. Andre Tardieu, Commissary General lor Franco-American Military Affairs;

Mr. Jules Cambon, Ambassador of France,

His Majesty the King of Italy, by:

Mr. V. O. Orlando, President of the Council of Min

Baron S. Sonnino, Minister of Foreign Affairs;

Mr S. Crespi, Deputy, Minister of Supplies; Marquis G. Imperiali, Senator of the Kingdom, Am¬ bassador of his Majesty the King of Italy at Lon—

Mr.°s'. Barzilai, Deputy, formerly Minister;

His Majesty the Emperor of Japan, by:

Marquis Saionzi, formerly President of the Council

of Ministers; , . r t- • ajx •

Baron Makino, formerly Minister of Foreign Affairs, member of the Diplomatic Counml;

Viscount Chinda, Ambassador Extraordinary and Plenipotentiary of H. M. the Emperor of Japan at

ˆ London, Ambassador Extraordinary and

Plenipotentiary of H. M. the Emperor of Japan Psri s *

Mr. H. Ij'uin, Ambassador Extraordinary and Pleni¬ potentiary of H. M, the Emperor of Japan at Rome;

The President of the Republic of Brazil, by:

Mr. Epitacio Pessoa, formerly Minister of State, formerly member of the Supreme Court of Jus¬ tice, Federal Senator;

Mr. Pandia Calogeras, Deputy, formerly Minister of Finance;

Mr. Raul Ferdnandes;

The President of the Chinese Republic, by:

Mr. Lou Tseng-Tsiang, Minister of Foreign Affairs;

Mr. Chengting Thomas Wang, formerly Minister of Agriculture and Commerce ;

The President of the Cuban Republic, by:

Mr. Antonio Sanchez de Bustamante, Dean of the Faculty of Law in the University of Havana, Presi¬ dent of the Cuban Society of International Law;

The President of the Republic of Ecuador, by:

Mr. Enrique Dorn y de Alsua, Envoy Extraordinary and Minister Plenipotentiary of Ecuador at Paris;

His Majesty the King of the Hellenes, by:

Mr. Eleftherios Venizelos, President of the Council of Ministers;

Mr. Nicolas Politis, Minister of Foreign Affairs;

The President of the Republic of Guatemala, by :

Mr. Joaquin Mendez, formerly Minister of State for Public Works and Public Instruction, Envoy Ex¬ traordinary and Minister Plenipotentiary of Guatemala at Washington, Envoy Extraordinary and Minister Plenipotentiary on Special Mission at Paris;

The President of the Republic of Haiti, by:

Mr. Tertullien Guilbaud, Envoy Extraordinary and Minister Plenipotentiary of Haiti at Paris;

His Majesty the King of the Hedjaz, by:

Mr. Rustem Haidar,

Mr. Abdul Hadi Aouni;

The President of the Republic of Honduras, by:

Dr. Policarpe Bonilla, on special mission to Wash¬ ington, formerly President of the Republic of Honduras, Envoy Extraordinary and Minister Plenipotentiary;

The President of the Republic of Liberia, by:

The Honorable C. D. B. King, Secretary of State;

The President of the Republic of Nicaragua, by:

Mr. Salvador Chamorro, President of the Chamber of Deputies;

The President of the Republic of Panama, by:

Mr. Antonio Burgos, Envoy Extraordinary and Min¬ ister Plenipotentiary of Panama at Madrid;

The Presdent of the Republic of Peru, by:

Mr. Carlos G. Candamo, Envoy Extraordinary and Minister Plenipotentiary of Peru at Paris;

The President of the Polish Republic, by:

Mr. Roman Dmowski, President of the Polish Na¬ tional Committee;

Mr. Iˆnace Paderewski, President of the Council of Ministers, Minister of Foreign Affairs;

The President of the Portuguese Republic, by:

Dr. Affonso Costa, formerly President of the Council of Ministers;

Mr. Augusto Soares, formerly Minister of Foreign Affairs;

His Majesty the King of Rumania, by :

Mr. Jean J. C. Bratiano, President of the Council of Ministers, Minister of Foreign Affairs;

General Constantin Coanda, Corps Commander, A. D. C. to the King, formerly President of the Council of Ministers;

His Majesty the King of the Serbs, the Croats, and the Slovenes, by:

Mr. N. P. Pachitch, formerly President of the Coun¬ cil of Ministers;

Mr. Ante Trumbic, Minister of Foreign Affairs;

Mr. Milenko R. Vesnitch, Envoy Extraordinary and Minister Plenipotentiary of H. M. the King of the Serbs, the Croats, and the Slovenes at Paris;

His Majesty the King of Siam, by:

Prince Charoon, Envoy Extraordinary and Minister Plenipotentiary of H. M. thP ‘King of Siam at Paris;

Prince Traidos Prabandhu, Under Secretary of State for Foreign Affairs;

The President of the Czecho-Slovak Re¬ public, by:

Mr. Charles Kramar, President of the Council of

Ministers; , „ . . „ .

Mr. Edouard Benes, Minister of Foreign Affairs;

The President of the Republic of Uruguay, by :

Mr. Juan Antonio Buero, Minister of Industry, for¬ merly Minister of Foreign Affairs;

Minister for Foreign

Germany, by:

Count Brockdorff-Rantzau,

Affairs' of the Empire; , ˆ t:- •

Dr. Landsberg, Minister of Justice of the Empire;

Mr. Giesberts, Minister of Posts of the Empire;

Oberbiirgermeister Leinert, President of the Prussian National Assembly;

Dr. Schiicking;

Dr. Karl Melchior; .

Acting in the name of the German Empire and of each and every component State,

WHO having communicated their full powers tound in good and due form HAVE AGREED AS FOLLOWS:

From the coming into force of the present treaty the state of war will terminate. From that moment and subject to the provisions of this treaty official relations with Germany and with any of the German States will be resumed by the Allied and Associated Powers.

Part I. — The Covenant of the League of

Nations.

The high contracting parties, in order to promote international cooperation and to achieve international peace and security by the acceptance of obligations not to resort to war, by the prescription of open, just, and honorable relations between nations, by the firm estab¬ lishment of the understandings of international law as the actual rule of conduct among Governments, and by the maintenance of justice andˆ'a scrupulous respect for all treaty obligations in the dealings of organized peo¬ ples with one another, agree to this

covenant of the League of Nations.

Article i. — The original members of the League of Nations shall be those of the signatories which are named in the annex to this covenant and also such of those other States named in the annex as shall ac¬ cede without reservation to this covenant. Such acces¬ sion shall be effected by a declaration deposited with the secretariat within two months of the coming into force of the covenant. Notice thereof shall be sent to all other members of the League.

Any fully self-governing State, dominion, or colony not named in the annex may become a member of the League if its admission is agreed to by two-thirds of the assembly, provided that it shall give effective guar¬ antees of its sincere intention to observe its interna¬ tional obligations, and shall accept such regulations as may be prescribed by the League in regard to its mili¬ tary, naval and air forces and armaments.

Any member of the League may, after two years' notice of its intention so to do, withdraw from the League, provided that all its international obligations and all its obligations under this covenant shall have been fulfilled at the time of its withdrawal.

Article 2.- — The action of the League under this covenant shall be effected through the instrumentality of an assembly and of a council, with a permanent secretariat.

Article 3. — The assembly shall consist of represen¬ tatives of the members of the League.

The assembly shall meet at stated intervals and from time to time as occasion may require at the seat of the League or at such other place as may be decided upon.

The assembly may deal at its meetings with any matter within the sphere of action of the League or affecting the peace of the world.

At meetings of the assembly each member of the League shall have one vote, and may have not more than three representatives^.

Article 4. — The council shall consist of representa¬ tives of the principal Allied and Associated Powers, together with the representatives of four other members of the League. These four members of the League shall be selected by the assembly from time to

time in its discretion. Until the appointment of the represen¬ tatives of the four members of the League first selected by the assembly, representatives of Belgium, Brazil, Spain, and Greece shall be members of the council.

With the approval of the majority of the assembly, the council may name additional members of the League whose representatives shall always be members of the council; the council with like approval may increase the number of members of the League to be selected by the assembly for representation on the council.

The council shall meet from time to time as occa¬ sion may require, and at least once a year, at the seat of the League, or at such other place as may be decided upon.

The council may deal at its meetings with any matter within the sphere of action of the League or affecting the peace of the world.

Any member of the League not represented on the council shall be invited to send a representative to sit as a member at any meeting of the council during the consideration of matters specially affecting the interests of that member of the League.

At meetings of the council, each member of the League represented on the council shall have one vote, and may have not more than one representative.

Article 5. — Except where otherwise expressly pro¬ vided in this covenant or by the terms of the present treaty, decisions at any meeting of the assembly or of the council shall require the agreement of all the mem¬ bers of the League represented at the meeting.

All matters of procedure at meetings of the assembly or of the council, including the appointment of com¬ mittees to investigate particular matters, shall be regu¬ lated by the assembly or by the council and may be de¬ cided by a majority of the members of the League rep¬ resented at the meeting.

The first meeting of the assembly and the first meet¬ ing of the council shall be summoned by the President of the United States of America.

Article 6. — The permanent secretariat shall be established at the seat of the League. The secretariat shall comprise a Secretary General and such secretaries and staff as may be required.

The first Secretary General shall be the person named in the annex; thereafter the Secretary General shall be appointed by the council with the approval of the majority of the assembly.

The secretaries and staff of the secretariat shall be appointed by the Secretary General with the approval of the council.

The Secretary General shall act in that capacity at all meetings of the assembly and of the council.

The expenses of the secretariat shall be borne by the members of the League in accordance with the appor¬ tionment of the expenses of the International Bureau of the Universal Postal Union.

Article 7. — The seat of the League is established at Geneva.

The council may at any time decide that the seat of the League shall be established elsewhere.

All positions under or in connection with the League, including the secretariat, shall be open equally to men and women.

Representatives of the members of the League and officials of the League when engaged on the business of the League shall enjoy diplomatic privileges and im¬ munities.

The buildings and other property occupied by the

League or its officials or by representatives attending its meetings shall be inviolable.

Article 8. — The members of the League recognize that the maintenance of peace requires the reduction of national armaments to the lowest point consistent with national safety and the enforcement by common action of international obligations.

The council, taking account of the geographical situ¬ ation and

circumstances of each State, shall formulate plans for such reduction for the consideration and action of the several Governments.

Such plans shall be subject to reconsideration and revision at least every ten years.

After these plans shall have been adopted by the several Governments, the limits of armaments therein fixed shall not be exceeded without the concurrence of the council.

The members of the League agree that the manu¬ facture by private enterprise of munitions and imple¬ ments of war is open to grave objections. The council shall advise how the evil effects attendant upon such manufacture can be prevented, due regard being had to the necessities of those members of the League which are not able to manufacture the munitions and imple¬ ments of war necessary for their safety.

The members of the League undertake to inter¬ change full and frank information as to the scale of their armaments, their military and naval programs and the condition of such of their industries as are adaptable to warlike purposes.

Article 9. — A permanent commission shall be con¬ stituted to advise the council on the execution of the provisions of Articles i and 8 and on military and naval questions generally.

Article 10. — The members of the League undertake to respect and preserve as against external aggression the territorial integrity and existing political independ¬ ence of all members of the League. In case of any such aggression or in case of any threat or danger of such aggression the council shall advise upon the means by which this obligation shall be fulfilled.

Article ii. — ‘Any war or threat of war, whether im¬ mediately affecting any of the members of the League or not, is hereby declared a matter of concern to the whole League, and the League shall take any action that may be deemed wise and effectual to safeguard the peace of nations. In case any such emergency should arise the Secretary General shall on the request of any member of the League forthwith summon a meeting of the council.

It is also declared to be the friendly right of each member of the League to bring to the attention of the assembly or of the council any circumstance whatever affecting international relations which threatens to dis¬ turb international peace or the good understanding

be¬ tween nations upon which peace depends.

Article 12. — The members of the League agree that if there should arise between them any dispute likely to lead to a rupture, they will submit the matter either to arbitration or to inquiry by the council, and they agree in no case to resort to war until three months after the award by the arbitrators or the report by the council.

In any case under this article the award of the arbitrators shall be made within a reasonable time, and the report of the council <6hall be made within six months after the submission of the dispute.

Article 13. — The members of the League agree that whenever any dispute shafl arise between them which they recognize to be suitable for submission to arbitra¬ tion and which cannot be satisfactorily settled by diplomacy, they will submit the whole subject-matter to arbitration.

Disputes as to the interpretation of a treaty, as to any question of international law, as to the existence of any fact which if established would constitute a breach of any international obligation, or as to the extent and nature of the reparation to be made for any such breach, are declared to be among those which are gen¬ erally suitable for submission to arbitration.

For the consideration of any such dispute the Court of Arbitration to which the case is referred shall be the court agreed on by the parties to the dispute or stipu¬ lated in any convention existing between them.

The members of the League agree that they will carry out in full good faith any award that may be rendered, and that they will not resort to war against a member of the League which complies therewith. In the event of any failure to carry out such an award, the council shall propose what steps should be taken to give effect thereto.

Article 14. — The council shall formulate and sub¬ mit to the members of the League for adoption plans for the establishment of a Permanent Court of Interna¬

tional Justice. The court shall be competent to hear and determine any dispute of an international character which the parties thereto submit to it. The court may also give an advisory opinion upon any dispute or ques¬ tion referred to it by the council or by the assembly.

Article 15. — If there should arise between members of the League any dispute likely to lead to a rupture, which is not submitted to arbitration in accordance witli Article 13, the members of the League agree that they will submit the matter to the council. Any party to the dispute may effect such submission by giving notice of the existence of the dispute to the Secretary General, who will make all necessary arrangements for a full investigation and consideration thereof.

For this purpose the parties to the dispute will com¬ municate to the Secretary General, as promptly as possi¬ ble, statements of their case with all the relevant facts and papers, and the council may forthwith direct the publication thereof.

The council shall endeavor to effect a settlement of the dispute, and if such efforts are successful a state¬ ment shall be made public giving such facts and ex¬ planations regarding the dispute and the terms of settle¬ ment thereof as the council may deem appropriate.

If the dispute is not thus settled, the council either unanimously or by a majority vote shall make and pub¬ lish a report containing a statement of the facts of the dispute and the recommendations which are deemed just and proper in regard thereto.

Any member of the League represented on the coun¬ cil may make public a statement of the facts of the dis¬ pute and of its conclusions regarding the same.

If a report by the council is unanimously agreed to by the members thereof other than the representatives of one or more of the parties to the dispute, the mem¬ bers of the League agree that they will not go to war with any party to the dispute which complies with the recommendations of the report.

If the council fails to reach a report which is unani¬ mously agreed to by the members thereof, other than the representatives of one or more of the parties to the dispute, the members of the League reserve to them¬ selves the right to take such action as they shall con¬ sider necessary for the maintenance of right and justice.

If the dispute between the parties is claimed by one of them, and is found by the council to arise out of a matter which by international law is solely within the domestic jurisdiction of that party, the council shall so report, and shall make no recommendation as to its settlement.

The council may in any case under this article re¬ fer the dispute to

the assembly. The dispute shall be so referred at the request of either party to the dis¬ pute, provided that such request be made within four¬ teen days after the submission of the dispute to the council.

In any case referred to the assembly all the pro¬ visions of this article and of article 12 relating to the action and powers of the council shall apply to the action and powers of the assembly, provided that a re¬ port made by the assembly, if concurred in by the representatives of those members of the League repre¬ sented on the council and of a majority of the other members of the League, exclusive in each case of the representatives of the parties to the dispute, shall have the same force as a report by the council concurred in by all the members thereof other than the representa¬ tives of one or more of the parties to the dispute.

Article 16. — Should any member of the League re¬ sort to war in disregard of its covenants under Articles 12, 13, or 15, it shall ipso facto be deemed to have committed an act of war against all other members of the League, which hereby undertake immediately to sub¬ ject it to the severance of all trade or financial rela¬ tions, the prohibition of all intercourse between their nationals and the nationals of the covenant-breaking State, and the prevention of all financial, commercial, or personal intercourse between the nationals of the covenant-breaking State and the nationals of any other State, whether a member of the League or not.

It shall be the duty of the council in such case to recommend to the several Governments concerned what effective military, naval or air force the members of the League shall severally contribute to the armed forces to be used to protect the covenants of the League.

The members of the League agree, further, that thev will mutually support one another in the financial and economic measures which are taken under this article, in order to minimize the loss and inconvenience result¬ ing from the above measures, and that they will mutu¬ ally support one another in resisting any special measures aimed at one of their number by the cove¬ nant-breaking State, and that they will take the neces-

sary steps to afford passage through their territory to the forces of any of the members of the League which are co-operating to protect the covenants of the League.

Any member of the League which has violated any covenant of the League may be declared to be no longer a member of the League by a vote of the council concurred in by the representatives of all the other members of the League represented thereon.

Article 17. — ‘In the event of a dispute between a member of the League and a State which is not a member of the League, or between States not members of the League, the State or States not members of the League shall be invited to accept the obligations of membership in the League for the purposes of such dispute, upon such conditions as the council may deem just. If such invitation is accepted, the provisions of Articles 12 to 16 inclusive shall be applied with such modifications as may be deemed necessary by the council.

Upon such invitation being given the council shall immediately institute an inquiry into the circumstances of the dispute and recommend such action as may seem best and most effectual in the circumstances.

If a State so invited shall refuse to accept the obli¬ gations of membership in the League for the purposes of such dispute, and shall resort to war against a mem¬ ber of the League, the provisions of Article 16 shall be applicable as against the Stat§ taking such action.

If both parties to the dispute when so invited refuse to accept the obligations of membership in the League for the purposes of such dispute, the council may take such measures and make such recommendations as will prevent hostilities and will result in the settlement of the dispute.

Article 18. — Every treaty or international engage¬ ment entered into hereafter by any member of the League shall be forthwith registered with the Secre¬ tariat and shall as soon as possible be published by it. No such treaty or international engagement shall be binding until so registered.

Article 19. — The assembly may from time to time advise the reconsideration by members of the League of treaties which have become inapplicable and the con¬ sideration of international conditions whose continuance might endanger the peace of the world.

Article 20. — The members of the League severally agree that this covenant is accepted as abrogating all obligations or understandings inter se which are incon¬ sistent with the terms thereof, and solemnly under¬ take that they will not hereafter enter into any en¬ gagements inconsistent with the terms thereof.

In case any member of the League shall, before becoming a member of the League, have undertaken any obligations inconsistent with the terms of this covenant, it shall be the duty of such member to take immediate steps to procure its release from such obli¬ gations.

Article 21. — Nothing in this covenant shall be deemed to affect the validity of international engage¬ ments, such as treaties of arbitration or regional under¬ standings like the Monroe Doctrine, for securing the maintenance of peace.

Article 22. — ■ To those colonies and territories which as a consequence of the late war have ceased to be under the sovereignty of the States which formerly governed them and which are inhabited by peoples not yet able to stand by themselves under the strenuous conditions of the modern world, there should be ap¬ plied the principle that the well-being and develop¬ ment of such peoples form a sacred trust of civiliza¬ tion and that securities for the performance of this trust should be embodied in this covenant.

The best method of giving practical effect to this principle is that the tutelage of such peoples should be intrusted to advanced nations who by reason of their resources, their experience or their geographical posi¬ tion can best undertake this responsibility, and who are willing to accept it, and that this tutelage should be exercised by them as mandataries on behalf of the League.

The character of the mandate must differ accord¬ ing to the stage of the development of the people, the geographical situation of the territory, its economic conditions and other similar circumstances.

Certain communities formerly belonging to the Turkish Empire have reached a stage of development where their existence as independent nations can be provisionally recognized subject to the rendering of ad¬ ministrative advice and assistance by a mandatary until such time as they are able to stand alone. The wishes of these communities must be a principal con¬ sideration in the selection of the mandatary.

Other peoples, especially those of Central Africa, are at such a stage that the mandatary must be respon¬

sible for the administration of the territory under con¬ ditions which will guarantee freedom of conscience and religion, subject only to the maintenance of public order and morals, the prohibition of abuses such as the slave trade, the arms traffic and the liquor traffic, and the prevention of the establishment of fortifications or military and naval bases and of militaryˆ training of the natives for other than police purposes and the defense of territory, and will also secure equal oppor¬ tunities for the trade and commerce of other members of the League.

There are territories, such as Southwest Africa and certain of the South Pacific islands, which, owing to the sparseness of their population or their small size, or their remoteness from the centres of civili¬ zation; or their geographical contiguity to the territory of the mandatary, and other circumstances, can be best administered under the laws of the mandatary as in¬ tegral portions of its territory, subject to the safeguards above mentioned in the interests of the indigenous population.

In every case of mandate the mandatary shall render to the council an annual report in reference to the territory committed to its charge.

The degree of authority, control, or administration to be exercised by the mandatary shall, if not previously agreed upon by the members of the League, be ex¬ plicitly defined in each case by the council.

A permanent commission shall be constituted to receive and examine the annual reports of the man¬ dataries and to advise the council on all matters relat¬ ing to the observance of the mandates.

Article 23. — Subject to and in accordance with the provisions of international conventions existing or hereafter to be agreed upon, the members of the League:

(a) will endeavor to secure and maintain fair and

humane conditions of labor for men, women, and children, both in their own countries and in all countries to which their commercial and industrial relations extend, and for that purpose will establish and maintain the necessary international organizations;

(b) undertake to secure just treatment of-the

native inhabitants of territories under their control;

(c) will intrust the League with the general super¬

vision over the execution of agreements with regard to the traffic in women and children and the traffic in opium and other dangerous drugs;

(d) will intrust the League with the general super¬

vision of the trade in arms and ammunition with the countries in which the control of this traffic is necessary in the common in¬ terest;

(e) will make provision to secure and maintain

freedom of communications and of transit and equitable treatment for the commerce of all members of the League. In this con¬ nection the special necessities of the regions devastated during the war of X914-1918 shall be borne in mind;

(f) will endeavor to take steps in matters of in¬

ternational concern for the prevention and control of disease.

Article 24. — There shall be placed under the direc¬ tion of the League all international bureaus already established by general treaties if the parties to such treaties consent. All such international bureaus and all commissions for the regulation of matters of inter¬ national interest hereafter constituted shall be placed under the direction of the League.

In all matters of international interest which are regulated by general conventions but which are not placed under the control of international bureaus or commissions, the secretariat of the League shall, sub¬ ject to the consent of the council and if desired by the parties, collect and distribute all relevant informa¬ tion and shall render any other assistance which may be necessary or desirable.

The council may include as part of the expenses of the secretariat the expenses of any bureau or commis¬ sion which is placed under the direction of the League.

Article 25. — The members of the League agree to encourage and promote the establishment and coopera¬ tion of duly authorized voluntary national Red Cross organizations, having as purposes the improvement of health, the prevention of disease, and the mitigation of suffering throughout the world.

Article 26. — Amendments to this covenant will take effect when ratified by the members of the League

whose representatives compose the council and by a majority of the members of the League whose repre¬ sentatives compose the assembly.

No such amendment shall bind any member of the League which signifies its dissent therefrom, but in that case it shall cease to be a member of the League.

ANNEX.

I. Original members of the League of Nations signatories of the treaty of peace.

United States of America. Belgium.

Bolivia.

Brazil.

British Empire.

Canada.

Australia.

South Africa.

New Zealand.

India.

China.

Cuba.

Czecho-Slovakia.

Ecuador.

France.

Greece.

States invited to accede

Guatemala.

Haiti.

Hedjaz.

Honduras.

Italy.

Japan.

Liberia.

Nicaragua.

Panama.

Peru.

Poland.

Portugal.

Rumania.

Serb-Croat-Slovene State. Siam.

Uruguay.

to the covenant.

Argentine Republic. Chile.

Colombia.

Denmark.

Netherlands.

Norway.

Paraguay.

Persia.

Salvador.

Spain.

Sweden.

Switzerland.

Venezuela.

II. First Secretary General of the League of Nations.

The Honorable Sir James Eric Drummond, K. C. M. G., C. B.

Part II. — Boundaries of Germany.

Article 27. — The boundaries of Germany will be de¬ termined as follows:

1. With Belgium: From the point common to the three frontiers of Belgium, Holland, and Germany, and in a southerly direction; the northeastern boundary of the former territory of neutral Moresnet, then the east¬ ern boundary of the Kreis of Eupen, then the frontier between Belgium and the Kreis of Montj'oie, then the northeastern and eastern boundary of the Kreis of Malmedy to its junction with the frontier of Luxem¬ burg.

2. With Luxemburg: The frontier of the 3d Au¬ gust, 1914, to its junction with the frontier of France of the i8th July, 1870.

3. With France: The frontier of the i8th July, 1870, from Luxemburg to Switzerland, with the reser¬ vations made in Article 48 of Section 4 (Sarre Basin) of Part III.

4. With Switzerland: The present frontier.

5. With Austria: The frontier of the 3d August, 1914, from Switzerland to Czecho-Slovakia is herein¬ after defined.

6. With Czecho-Slovakia: The frontier of the 3d August, 1914, between Germany and Austria from its junction with the old administrative boundary separat¬ ing Bohemia and the Province of Upper Austria to the point north of the salient of the old Province of Austrian Silesia situated at about eight kilometers east of Neustadt.

7. With Poland: From the point defined above to a point to be fixed on the ground about 2 kilometers east of Lorzendorf: the frontier as it will be fixed in ac¬ cordance with Article 88 of the present treaty; thence in a northerly direction to the point where the adminis¬ trative boundary of Posnania crosses the river Bartsch: a line to be fixed on the ground leaving the follow¬ ing places in Poland: Skorischau, Reichthal, Trembat-schau, Kunzendorf, Schleise, Gross Kosel, Schreibers-dorf, Rippin, Furstlich-Niefken, Pawelau, Tscheschen, Konradau, Johannisdorf, Modzenowe, Bogdaj, and in Germany: Lozendorf, Kaulwitz, Glausche, Dalabersdorf, Reesewitz, Stradam, Gross Nartenberg Kraschen, Neu Mittelwalde, Domaslawitz, Wedelsdorf, Tscheschen Hammer; thence the boundary of Posnania northwest¬ ward to the point where it cuts the Rawitsch-Herrn- stadt railway; thence to the point where the administra¬ tive boundary of Posnania cuts the Reisen-Tschirnau road: a line to be fixed on the ground passing west of Triebusch and Gabel and east of Saborwitz; thence the administrative boundary of Posnania to its junction with the eastern boundary of the Kreis of Fraustadt;

Thence in a northwesterly direction to a point to be chosen on the road between the villages of Un-ruhstadt and Kophitz; a line to be fixed on the ground passing west of .Geyersdorf, Brenno, Fehlen, Altkloster, Klebel, and east of Ulbersdorf, Buchwald, Ilgen, Weine, Lupitze, Schwenten; thence in a northerly direction to the northernmost point of Lake Chlop: a line to be fixed on the ground following the median line of the lakes; the town and the station of Bentschen, however, (including the junction of the lines Schwiebus-Bent- schen and Zullichau-Bentschen,) remaining in Polish territory;

Thence in a northeasterly direction to the point of junction of the boundaries of the Kreise of Schwerin, Birbaum, and Meseritz: a line to be fixed on the ground passing east of Betsche; thence in a northerly direc¬ tion the boundary separating the Kreise of Schwerin and Birnbaum, then in an easterly direction the northern boundary of Posnania and to the point where it cuts the river Netze; thence upstream to its confluence with the Kiiddow: the course of the Netze; thence up¬ stream to a point to be chosen about 6 kilometers

southeast of Schneidemuhl; the course of the Ktidow;

Thence northeastward to the most southern point of the re-entrant of the northern boundary of Posnania about 5 kilometers west of Stahren: a line to be fixed on the ground leaving the Schneidemiihl-Konitz rail¬ way in this area entirely in German territory; thence the boundary of Posnania northeastward to the point of the salient it makes about 15 kilometers east of Flatow; thence northeastward to the' point where the river Kamionka meets the southern boundary of the Kreis of Konitz about 3 kilometers northeast of Grunau: a line to be fixed on the ground leaving the following places to Poland: Jasdrowo, Gr. Lutau, Kl. Lutau and Wittkau, and to Germany: Gr. Butzig, Cziskowo, Bat-tow, Bbch, and Grunau;

Thence in a northerly direction the boundary be¬ tween the Kreise of Konitz and Schlochau to the point where this boundary cuts the river Brahe; thence to a point on the boundary of Pomerania 15 kilometers east of Rummelsburg: a line to be fixed on the ground leav¬ ing the following localities in Poland: Konarzin, Kelpin, Adi. Briesen, and in Germany: Sampohl, Neuguth, Steinfort, and Gr. Peterkau; then the boundary of Pomerania in an easterly direction to its junction with the boundary between the Kowo, Battrow, Boch, and Grunau;

Thence northward the boundary between Pome¬ rania and West Prussia to the point on the river Rheda about 3 kilometers northwest of Gohra, where that river is joined by a tributary from the northwest; thence to a point to be selected in the bend of the Piasnitz River about i kilometers northwest of Warschkau: a line to be fixed on the ground; thence this river down¬ stream, then the median line of Lake Zarnowitz, then the old boundary of West Prussia to the Baltic Sea.

8. With Denmark: The frontier as it will be fixed in accordance with Articles 109 and no of Part III, Section XII (Schleswig).

Article 28. — The boundaries of East Prussia, with the reservations made in Section IX (East Prussia) of Part III will be determined as follows:

From a point on the coast of the Baltic Sea about

kilometers north of Probbernau CTiurch ijj a direc¬ tion of about 159 degrees east from true north: A line to be fixed on the ground for about 2 kilometers, thence in a straight line to the light at the bend of the Elbinger Channel in approximately latitude 54.19% north, longitude 19.26 east of Greenwich;

Thence to the easternmost mouth of the Nogat River at a bearing of approximately 209 degrees east from true north;

Thence up the course of the Nogat River to the point where the latter leaves the Vistula (Weichsel) ;

Thence up the principal channel of navigation of the Vistula, then the southern boundary of the Kreis of Marienwerder, then that of the Kreis of Rosenberg, eastward to that point where it meets the old boundary of East Prussia;

Thence the old boundary between East and West Prussia, then the boundary between the Kreise of Osterode and Neidenburg, then the course of the River Skottau down stream, then the course of the Neide up stream to a point situated about 5 kilometers west of Bialutten, being the nearest point to the old frontier of Russia, thence in an easterly direction to a point immediately south of the intersection of the road Neidenburg-Mlava with the old frontier of Russia:

A line to be fixed on the ground passing north oi Bialutten ;

Thence the old frontier of Russia to a point east of Schmalleningken, then the principal channel of navi-

gation of the Niemen (Memel) down stream, then the Skierwieth arm of the delta to the Kurisches Haff:

Thence a straight line to the point where the eastern shore of the Kurische Nehrung meets the administra¬ tive boundary about 4 kilometers southwest of Nidden :

Thence this administrative boundary to the western shore of the Kurische Nehrung.

Article 29. — The boundaries as described above are drawn in red on a one-in-amillion map which is an¬ nexed to the present treaty. (Map No. i.)

In the case of any discrepancies between the text of the treaty and this map or any other map which may be annexed, the text will be final.

Article 30. — In the case of boundaries which are defined by a waterway, the terms “ course ” and “channel” used in the present treaty signify: in the case of non-navigable rivers, the median line of the waterway or of its principal arm, and in the case of navigable rivers the median line of the principal chan¬ nel of navigation. It will rest with the boundary commissions provided by the present treaty to specify in each case whether the frontier line shall follow any changes of the course or channel which may take place or whether it shall be definitely fixed by the position of the course or channel at the time when the present treaty comes into force.

V t

Part III. — Political Clauses for Europe.

SECTION T. — BELGIUM.

Article 31. — ‘Germany, recognizing that the treaties of April 19, 1839, which established the status of Bel¬ gium before the war, no longer conform to the require¬ ments of the situation, consents to the abrogation of the said treaties and undertakes immediately to recog¬ nize and to observe whatever conventions may be entered into by the principal allied and associated powers, or by any of them in concert with the Govern¬ ments of Belgium and of the Netherlands, to replace the said treaties of 1839. If her formal adhesion should be required to such conventions or to any of their stipulations, Germany undertakes immediately to give it.

Article 32. — Germany recognizes the full sovereignty of Belgium over the whole of the contested territory of Moresnet, (called Moresnet Neutre.)

Article 33. — Germany renounces in favor of Bel¬ gium all rights and title over the territory of Prussian Moresnet situated on the west of the road from Liege to Aix-la-Chapelle: the road will belong to Belgium where it bounds this territory.

Article 34. — Germany renounces in favor of Bel¬ gium all rights and title over the territory comprising the whole of the Kreise of Eupen and of Malmedy.

During the six months after the coming into force of this treaty, registers will be opened by the Belgian authorities at Eupen’ and Malmedy in which the inhabit¬ ants of the above territory will be entitled to record in writing a desire to see the whole or part of it remain under Germany sovereignty.

The results of this public expression of opinion will be communicated by the Belgian Government to the League of Nations, and Belgium undertakes to accept the decision of the League.

Article 35. — A commission of seven persons, five of whom will be appointed by the principal allied and associated powers, one by Germany and one by Belgium, will be set up fifteen days after the coming into force of the present treaty to settle on the spot the new frontier line between Belgium and Germany, taking into account the

economic factors and the means of communication.

Decisions will be taken by a majority and will be binding on the parties concerned.

Article 36. — _When the transfer of the sovereignty over the territories referred to above has become defini¬ tive, German nationals habitually resident in the terri¬ tories will definitively acquire Belgian nationality ipso facto, and will lose their German nationality.

Nevertheless German nationals who become resident in the territories after the ist August, 1914, shall not obtain Belgian nationality without a permit from the Belgian Government.

Article 37. — Within the two years following the definitive transfer of the sovereignty over the terri¬ tories assigned to Belgium under the present treaty, German nationals over 18 years of age habitually resi¬ dent' in those territories will be entitled to opt for German nationality.

Option by a husband will cover his wife, and option by parents will cover their children under 18 years

of age.

Persons who have exercised the above right to opt must within the ensuing twelve months transfer their place of residence to Germany.

They will be entitled to retain their immovable property in the territories acquired by Belgium. They may carry with them their movable property of every description. No export or import dutie.s may be im¬ posed upon them in connection with the removal of such property.

Article 38. — The German Government will hand over without delay to the Belgian Government the archives, registers, plans, title deeds and documents of every kind concerning the civil, military, financial, judicial or other administrations in the territory trans¬ ferred to Belgian sovereignty.

The ■ German Government will likewise restore to the Belgian Government the archives and documents of every kind carried off during the war by the German authorities from the Belgian public administra¬ tions, in particular from the Ministry of Foreign Affairs at Brussels.

Article 39. — The proportion and nature of the finan¬ cial liabilities of Germany and of Prussia which Bel¬ gium will have to bear on account of the territories ceded to her shall be fixed in conformity with Articles 254 and 256 of Part IX. (financial clauses) of the present treaty.

SECTION II. — LUXEMBURG.

Article 40. — With regard to the Grand Duchy of Luxemburg, Germany renounces the benefit of all the provisions inserted in her favor in the treaties of Feb. 8, 1842; April 2, 1847; Oct. 20—25, 1865; Aug. 18, 1866; Feb. 21 and May ii, 1867; May 10, 1871; June ii, 1872, and Nov. ii, 1902, and in all conventions conse¬ quent upon such treaties.

Germany recognizes that the Grand Duchy of Lux¬ emburg ceased to form part of the German Zollverein as from Jan. i, 1919; renounces all right to the exploita¬ tion of the railways, adheres to the termination of the regime of neutrality of the Grand Duchy, and accepts in advance all international arrangements which may be concluded by the Allied and Associated Powers relating to the Grand Duchy.

Article 41. — Germany undertakes to grant to the Grand Duchy of Luxemburg, when a demand to that effect is made to her by the principal Allied and Asso¬ ciated Powers, the rights and advantages stipulated in favor of such powers or their nationals in the present treaty, with regard to economic questions, to questions relative to transport and to aerial navigation.

SECTION III. — LEFT BANK OF THE RHINE.

Article 42. — Germany is forbidden to maintain or construct any fortifications either on the left bank of the Rhine or on the right bank to the west of a line drawn fifty kilometers to the east of the Rhine.

Article 43. — In the area defined above the mainte¬ nance and the assembly of armed forces either per¬ manently or temporarily, and military manoeuvres of lany kind,_ as well as the upkeep of all permanent works for mobilization, are in the same way forbidden.

Article 44. — In case Germany violates in any manner the provisions of Articles 42 and 43, she shall be re¬ garded as committing a hostile act against the powers signatory of the present treaty and as calculated to disturb the peace of the world.

SECTION IV. — SARRE BASIN.

Article 45. — As compensation for the destruction of the coal mines in the North of France and as part payment toward the total reparation due from Germany for the damage resulting from the war, Germany cedes to France in full and absolute possession, with exclusive rights of exploitation, unincumbered and free from all debts and charges of any kind, the coal mines situated in the Sarre Basin as defined in Article

48.

Article 46. — In order to assure the rights and wel¬ fare of the population and to guarantee to France com¬ plete freedom in working the mines, Germany agrees to the provisions of Chapters i and 2 of the annex hereto.

Articleˆ 47. — In order to make in due time perma¬ nent provision for the government of the Sarre Basin in accordance with the wishes of the population, France and Germany agree to the provisions of Chapter 3 of the annex hereto.

Article 48. — The boundaries of the territory of the Sarre Basin, as dealt with in the present stipulations, will be fixed as follows:

On the south and southwest: By the frontier of France as fixed by the present treaty.

On the northwest and north: By a line following

the northern administrative boundary of the Kreis of Merzig from the point where it leaves the French trontier to the point where it meets the administrative boundary, separating the commune of Saarholzbach from he commune of Britten; following this communal boundary southwˆd and reaching the administrative Doundary of the Canton of Merzig so as to include in-the territory of the Sarre Basin

the Canton of Mett-lach, with the exception of the commune of Britten; following successively the northern administrative limits of the Cantons of Merzig and Haustadt, which are in¬ corporated in the aforesaid Sarre Basin, then succes¬ sively the administrative boundaries separating the Kreise of Saarelouis, Ottweiler, and Saint Wendel frpm the Kreise of Merzig, Treves, (Trier,) and the principality of Birkenfeld as far as a point situated about 500 meters north of the village of Furschweiler, (viz.: The highest point of tha Metzelberg).

On the northeast and east: From the last point defined above to a point about sYz kilometers east-northeast of Saint Wendel:

A line to be fixed on the ground passing east of Furschweiler, west of Roschberg, east of points 418, 329, (south of Roschberg,) west of Leitersweiler, north¬ east of point 464, and following the line of the crest southward to its junction with the administrative bound¬ ary of the Kreis of Kusel;

Thence in a southerly direction the boundary of the Kreis of Kusel, then the boundary of the Kreis of Homburg toward the south-southeast to a point situated about 1,000 meters west of Dunzweiler;

Thence to a point about one kilometer south of Hornbach: a line to be fixed on the ground passing through point 424, (about 1,000 meters southeast of Dunzweiler,). point 363, (Fuchsberg,) point 322, (southwest of Waldmohr,) then east of Jagersburg and Erbach, then encircling Homburg, passes through the points 361, (about 2Y2 kilometers northeast by east of that town,) 342, (about 2 kilometers southeast of that town,) 347, (Schreinersberg,) 356, 350, (about lYi kilometers southeast of Schwarzenbach,) then pass¬ ing east of Einod, southeast of points 322 and 333, about 2 kilometers east of Webenheim, about 2 kilom¬ eters east of Mimbach, passing east of the plateau which is traversed by the road from Mimbach to Bockweiler, (so as to include this road in the territory of the Sarre Basin,) passing immediately north of the junction of the roads from Bockweiler and Altheim, situated about 2 kilometers north of Altheim, then pass¬ ing south of Ringweilderhof and north of point 322, rejoining the frontier of France at the angle which it makes about i kilometer south of Hornbach, (see map No. 2, scale 1-100,000, annexed to-the present treaty).

A commission composed of five members, one ap¬ pointed by France, one by Germany, and three by the Council of the League of Nations, which will select nationals of other powers, will be constituted within fifteen days from the coming into force of the present treaty, to trace

on the spot the frontier line described above. In those parts of the preceding line which do not coincide with administration boundaries, the commission will endeavor to keep to the line indicated, while taking into consideration, so far as is possible, local economic interests and existing communal boundaries.

The decisions of this commission will be taken by a majority and will be binding on the parties concerned.

Article 49. — Germany renounces in favor of the League of Nations, in the capacity of trustee, the gov¬ ernment of the territory defined above.

At the end of fifteen years from the coming into force of the present treaty the inhabitants of the said territory shall be called upon to indicate the sovereignty under which they desire to be placed.

Article 50. — The stipulations under which the ces¬ sion of the mines in the Sarre Basin shall be carried out, together with the measures intended to guarantee the rights and the well-being of the inhabitants and the government of the territory, as well as the condi¬ tions in accordance with which the plebiscite hereinbe¬ fore provided for is to be made, are laid down in the annex hereto. This annex shall be considered as an integral part of the present treaty, and Germany declares her adherence to it.

ANNEX.

In accordance with the provisions of Articles 45 to 50 of the present treaty, the stii)ulations under which the cession by Germany to France of the mines of the Sarre Basin will be effected, as well as the measures in¬ tended to insure respect for the rights and well-being of the population and the government of the territory, and the conditions in which the inhabitants will be

called upon to indicate the sovereignty under which they may wish to be placed, have been laid down as follows :

Chapter I. — Cession and Exploitation of Mining Property.

1. From the date of the coming into force of the present treaty, all the deposits of coal situated within the Sarre Basin, as defined in Article 48 of the said treaty, become the complete and absolute property of the French State.

The French State will have the right of working or tmt working the said mines or of transferring to a third party the right of working them, without having to obtain any previous authorization or to fulfil any formalities.

The French State may always require that the Ger¬ man mining laws and regulations referred to below shall be applied in order to insure the determination of its rights.

2. The right of ownership of the French State will apply not only to the deposits which are free, and for which concessions have not yet been granted, but also to the deposits for which concessions have already been granted, whoever may be the present proprietors, irre¬ spective of whether they belong to the Prussian State, to the Bavarian State, to other States or bodies, to companies or to individuals, whether they have been worked or not, or whether a right of exploitation dis¬ tinct from the right of the owners of the surface of the soil has or has not been recognized.

3. As far as concerns the mines which are being worked, the transfer of the ownership to the French State will apply to all the accessories and subsidiaries of the said mines, in particular to their plant and equip¬ ment both on and below the surface, to their extracting machinery, their plants for transforming coal into elec¬ tric power, coke ˆ and by-products, their workshops, means of communication, electric lines, plant for catch¬ ing and distributing water, land, buildings, such as offices, managers', employes', and workmen's dwellings, schools, hospitals, and dispensaries, their stocks and supplies of every description, their archives and plans, and in general everything which those who own or exploit the mines possess or enjoy for the purpose of exploiting the mines and their accessories and sub¬ sidiaries.

The transfer will apply also to the debts owing for products delivered before the entry into possession by the French State, and after the signature of the present treaty, and to deposits of money made by customers, whose rights will be guaranteed by the French State.

4. The French State will acquire the property free and clear of all debts and charges. Nevertheless the rights acquired, or in course of

being acquired, by the employees of the mines and their accessories and subsidiaries at the date of the coming into force of the present treaty, in connection with pensions for old age or disability, will not be affected. In return, Germany must pay over to the French State a sum representing the actuarial amounts to which the said employes are entitled.

5. The value of the property thus ceded to the French State will be determined by the Reparation Commission referred to in Article 233 of Part VIII (Reparations) of the present treaty.

This value shall be credited to Germany in part payment of the amount due for reparation.

It will be for Germany to indemnify the proprietors or parties concerned, whoever they may be.

6. No tariff shall be established on the German rail¬ ways and canals which may directly or indirectly di.scriminate to the prejudice of the transport of the per¬ sonnel or product of the mines and their accessories or subsidiaries, or of the material necessary to their exploitation. Such transport shall enjoy all the rights and privileges which any international railway conven¬ tions may guarantee to similar products of French origin.

7. The equipment and personnel necessary to Insure the dispatch and transport of the products of the mines and their accessories and subˆdiaries, as well as the carriage of workmen and employes, will be provided by the local railway administration of the basin.

8. No obstacle shall be placed in the way of such improvements of railways or waterways as the French State may judge necessary to assure the dispatch and transport of the products of the mines and their acces¬ sories and subsidiaries, such-as double trackage, en¬ largement of stations, and construction of yards and appurtenances.

The distribution of expenses will, in the event of disagreement, be submitted to arbitration.

The French State may also establish any new means of communication, such as roads, electric lines, and telephone connections, which it may consider neces¬ sary for the exploitation of the mines.

It may exploit freely and without any restrictions the means of communication of which it may become the owner, particularly those connecting the mines and their accessories and subsidiaries with the means of communication situated in French territory.

9. The French State shall always be entitled to de¬ mand the application of the German mining laws and regulations in force on the nth November, 1918, ex¬ cepting provisions adopted exclusively in view of the state of war, with a view to the acquisition of such land as it may judge necessary for the exploitation of the mines and their accessories and subsidiaries.

The payment for damage caused to immovable prop¬ erty by the working of the said mines and their acces¬ sories and subsidiaries shall be made in accordance with the German mining laws and regulations above referred to.

10. Every person whom the French State may sub¬ stitute for itself as regards the whole or part of its rights to the exploitation of the mines and their acces¬ sories and subsidiaries shall enjoy the benefit of the priviliges provided in this annex.

11. The mines and other immovable property which become the property of the French State may never be made the subject of measutfcs of forfeiture, forced sale, expropriation or requisition, nor of any other measure affecting the right of property.

The personel and the plant connected with the exploitation of these mines or their accessories and subsidiaries, as well as the product extracted from the mines or manufactured in their accessories and sub¬ sidiaries, may not at any time be made the subject of any measures of requisition.

12. The exploitation of the mines and their acces¬ sories and subsidiaries, which become the property of the French State, will continue, subject to the provisions of Paragraph 23 below, to be subject to the regime established by the German laws and regulations in force on the nth November, 1918, excepting provisions adopted exclusively in view of the state of war.

The rights of the workmen shall be similarly main¬ tained, subject to the provisions of the said Paragraph 23, as established on the nth November, 1918, by the German laws and regulations above referred to. No impediment shall be placed in the way of the intro¬ duction or employment in the mines and their acces¬ sories and subsidiaries of workmen from without the basin.

The employes and workmen of French nationality shall have the right to belong to French labor unions.

13. The amount contributed by the mines and their accessories and subsidiaries, either to the local budget of the territory of the Sarre Basin or to the communal funds, shall be fixed with due regard to the ratio of the value of the mines to the total taxable wealth of the basin.

14. The French State shall always have the right of establishing and maintaining, as incidental to the mines, primary or technical schools for its employes and their children, and of causing instruction therein to be given in the French language, in accordance with such curriculum and by such teachers as it may select.

It shall also have the right to establish and main¬ tain hospitals, dispensaries, workmen's houses and gardens, and other charitable and social institutions.

15. The French State shall enjoy complete liberty with respect to the distribution, dispatch, and sale prices of the products of the mines and their accessories and subsidiaries.

Nevertheless, whatever may be the total product of the mines, the French Government undertakes that the requirements of local consumption for industrial and domestic purposes shall always be satisfied in the pro¬ portion existing in 1913 between the amount consumed locally and the total output of the Sarre Basin.

Chapter II. — Government of the Territory of

Sarre Basin.

16. The government of the territory of the Sarre Basin shall be intrusted to a commission representing the League of Nations. This commission shall sit in the territory of the Sarre Basin.

17. The Governing Commission provided for by Paragraph 16 shall consist of five members chosen by the Council of the League of Nations, and will include one citizen of France, one native inhabitant

of the Sarre Basin not a citizen of France, and three members belonging to three countries other than France or Ger¬ many.

The members of the Governing Commission shall be appointed for one year and may be reappointed. They can be removed by the Council of the League of Nations, which will provide for their replacement. The members of the Governing Commission will be entitled to a salary which will be fixed by the Council of the League of Nations, and charged on the local revenues.

18. The Chairman of the Governing Commission shall be appointed for one year from among the mem¬ bers of the commission by the Council of the League of Nations and may be reappointed. The Chairman will act as the executive of the commission.

19. Within the territory of the Sarre Basin the Governing Commission shall have all the powers of government hitherto belonging to the German Empire, Prussia or Bavaria, including the appointment and dis¬ missal of officials, and the creation of such adminis¬ trative and representative bodies at it may deem necessary. It shall have full powers to adminis¬ ter and operate the railways, canals, and the dif¬ ferent public services.

Its decisions shall be taken by a majority.

20. Germany will place at the disposal of the Gov¬ erning Commission all official documents and archives under the control of Germany, of any German State, or of any local authority, which relate to the territory of the Sarre Basin or to the rights of the inhabitants thereof.

21. It will be the duty of the Governing Commission to insure, by such means and under such conditions as it may deem suitable, the protection abroad of the interests of the inhabitants of the territory of the Sarre Basin.

22. The Governing Commission shall have the full right of user of all property, other than mines, be¬ longing, both in public and in private domain, to the Imperial German Government, or the Government of any German State, in the territory of the Sarre Basin.

As regards the railways, an equitable apportion¬ ment of rolling stock shall be made by a mixed com¬ mission on which the government of the territory of the Sarre Basin and the German railways will be rep¬ resented.

Persons, goods, vessels, carriages, wagons, and mails, coming from or going to the Sarre Basin, shall enjoy all the rights and privileges relating to transit and transport which are specified in the provisions of Part XII (ports, waterways, railways) of the present treaty.

23. The laws and regulations in force on November II, 1918, in the territory of the Sarre Basin, (except those enacted in consequence of the state of war,) shall continue to apply. If, for general reasons or to brinˆ these laws and regulations into accord with the provisions of the present treaty, it is necessary to introduce modifications, these shall be decided on, and put into effect by the Governing Commission, after consultation with the elected representatives of the inhabitants in such a manner as the commission may determine. No modification may be made in the legal regime for the exploitation of the mines, provided for in Paragraph 12, without the French State being pre¬ viously consulted, unless such modification results from a general regulation respecting labor adopted by the League of Nations.

In fixing the conditions and hours of labor for men, women, and children, the Governing Commission is to take into consideration the wishes expressed by the local labor organizations, as well as the principles adopted by the League of Nations.

24. Subject to the provisions of Paragraph 4, no

rights of the inhabitants of the Sarre Basin acquired or in process of acquisition at the date of the coming into force of this treaty, in respect of any insurance system of Germany, or in respect of any pension of any kind, are affected by any of the provisions of the present treaty. .

Germany and the Government of the territory of the Sarre Basin will preserve and continue all of the aforesaid rights.

25. The civil and criminal courts existing in the territory of the Sarre Basin shall continue.

A civil and criminal court will be established by the Governing Commission to hear appeals from the decisions of the said courts, and to decide matters for which these courts are not competent.

The Governing Commission will be responsible for settling the organization and jurisdiction of the said court.

Justice will be rendered in the name of the Gov¬ erning Commission.

26. The Governing Commission will alone have the power of levying taxes and dues in the territory of the Sarre Basin.

These taxes and dues will be exclusively applied to the needs of the territory.

The fiscal system existing on November ii, 1918, will be maintained as far as possible, and no new tax except customs duties may be imposed without pre¬ viously consulting the elected representatives of the inhabitants.

27. The present stipulations will not effect the exist¬ ing nationality of the inhabitants of the territory of the Sarre Basin. No hindrance shall be placed in the way of those who wish to acquire a different nationality, but in such case the acquisition of the new nationality will involve the loss of any other.

28. Under the control of the Governing Commission the inhabitants will retain their local assemblies, their religious liberties, their schools, and their language. The right of voting will not be exercised for any assem¬ blies other than the local assemblies, and will belong to every inhabitant over the age of 20 years without distinction of sex.

29. Any of the inhabitants of the Sarre Basin who may desire to leave the territory will have full liberty to retain in it their immovable property or to sell it at fair prices and to remove their movable property free of any charges.

30. There will be no military service, whether com¬ pulsory or voluntary, in the territory of the Sarre Basin, and the construction of fortifications therein is forbidden. Only a local gendarmerie for the mainte¬ nance of order may be established. It will be the duty of the Governing Commission to provide in all cases for the protection of persons and property in the Sarre Basin.

31. The territory of the Sarre Basin as defined by Article 48 of the

present treaty shall be subjected to the French customs regime. The receipts from the customs duties on goods intended for local consumption shall be included in the budget of the said territory after deduction of all costs of col¬ lection. No export tax shall be imposed upon metal¬ lurgical products of coal exported from the said territory to Germany, nor upon German exports for the use of the industries of the territory of the Sarre Basin. Natural or manufactured . products originating in the basin in transit over German territory and similarly German products in transit over the territory of the basin shall be free of all customs duties.

Products which both originate in and pass from the basin into Germany shall be free of import duties for a period of five years from the date of the coming into force of the present treaty, and during the same period articles imported from Germany into the ter¬ ritory of the basin for local consumption shall likewise be free of import duties.

During these five years the French Government reserves to itself the right of limiting to the annual average of the quantities imported into Alsace-Lorraine and France in the years 1911 to 1913 the quantities which may be sent into France of all articles coming from the basis, which include raw materials and semi¬ manufactured goods imported duty free from Germany. Such average shall be determined after reference to all available official information and statistics.

32. No prohibition or restriction shall be imposed upon the circulation of French money in the territory of the Sarre Basin. The French State shall have the right to use French money in all purchases, payments, and contracts connected with the exploitation of the mines or their accessories and subsidiaries.

33. The Governing Commission shall have power to decide all questions arising from the interpretation of the preceding provisions. France and Germariy agree that any dispute involving a difference of opinion as to the interpretation of the said provisions shall in the same way be submitted to the Governing Comrnission, and the decision of a majority of the commission shall be binding on both countries.

Chapter III. — Plebiscite.

34. At the termination of a period of fifteen years from the coming into force of >ˆhe present treaty, the population of the territory of the Sarre Basin will be called upon to indicate their desires in the following manner:

A vote will take place, by communes or districts, on the three following alternatives: (a) Maintenance of the regime established by the present treaty and by this annex; (b) union with France; (c) union with

Germany… ˆ

All persons without distinction of sex, more than 20 years old at the date of the voting, resident in the territory at the date of the signature of the present treaty, will have the right to vote.

The other conditions, methods, and the date of the voting shall be fixed by the Council of the League of Nations in such a way as to secure the liberty, secrecy, and trustworthiness of the voting.

35. The League of Nations shall decide on the sov¬ ereignty under which the territory is to be placed, taking into account the wishes of the inhabitants as expressed by the voting.

(a) If, for the whole or part of the territory, the League of Nations decides in favor of the maintenance of the regime established by the present treaty and this annex, Germany hereby agrees to make such renuncia¬ tion of her sovereignty in favor of the League of Na¬ tions as the latter shall deem necessary. It will be the duty of the League of Nations to take appropriate steps to adapt the regime definitely adopted to the per¬ manent welfare of the territory and the general interests.

(b) If for the whole or part of the territory the League of Nations decides in favor of union with France, Germany hereby agrees to cede to France in accordance with the decision of the League of Nations all rights and title over the territory specified by the League.

(c) If for the whole or part of the territory the League of Nations decides in favor of union with Germany, it will be the duty of the League of Nations to cause the German Government to be re-established in the government of the territory specified by the League.

36. If the League of Nations decides in favor of the union of the whole or part of the territory of the Sarre Basin with Germany, France's rights of owner¬ ship in the mines situated in such part of the territory will be repurchased by Germany in their entirety at a price payable in gold. The price to be paid will be fixed by three experts, one nominated by Germany, one by France, and one, who shall be

neither a Frenchman nor a German, by the Council of the League of Nations. The decision of the experts will be given by a majority.

The obligation of Germany to make such payment shall be taken into account by the Reparation Com¬ mission, and for the purpose of this payment Ger¬ many may create a prior charge upon her assets or revenues upon such detailed terms as shall be agreed to by the Reparation Commission.

If, nevertheless, Germany after a period of one year from the date on which the payment becomes due shall not have effected the said payment, the Repara¬ tion Commission shall do so in accordance with such instructions as may be given by the League of Nations, and, if necessary, by liquidating that part of the mines which is in question.

37. If, in consequence of the repurchase provided for in Paragraph 36, the ownership of the mines or any part of them is transferred to Germany, the French State and French nationals shall have the right to pur¬ chase such amount of coal of the Sarre Basin as their industrial and domestic needs are found at that time to require. An equitable arrangement regarding amounts of coal, duration of contract, and prices will be fixed in due time by the Council of the League of Nations.

38. It is understood that France and Germany may, by special agreements concluded before the time fixed for the payment of the price for the repurchase of the mines, modify the provisions of Paragraphs 36 and 37-39. The Council of the League of Nations shall make such provisions as may be necessary for the estab¬ lishment of the regime which is to talce effect after the decisions of the League of Nations mentioned in Paragraph 35 have become operative, including an equi¬ table apportionment of any obligations of the Govern¬ ment of the territory of the Sarre Basin arising from loans raised by the commission or from other causes.

From the coming into force of the new regime, the powers of the Governing Commission will terminate, except in the case provided for in Paragraph 35. (a)

40. In all mattprs dealt with in the present annex, the decisions of the Council of the League of Nations will be taken by a majority.

SECTION V. — ˆALSACE-LORRAINE.

The high contracting powers, recognizing the moral obligation to redress the wrong done by Germany in 1871, both to the rights of

France and to the wishes of the population of Alsace and Lorraine, which were sepa¬ rated from their country in spite of solemn protests of their representatives at the Assembly of Bordeaux, agree upon the following articles:

Article 51. — The territories which were ceded to Ger¬ many in accordance with the preliminaries of peace

signed at Versailles on the 26th February, 1871, and the treaty of Frankfort on the loth May, 1871, are restored to French sovereignty as from the date of the armistice of the iith November, 1918.

The provisions of the treaties establishing the delimination of the frontiers before 1871 shall be re¬ stored.

Article 52. — The German Government shall hand over without delay to the French Government all archives, registers, plans, titles, and documents of every kind concerning the civil, military, financial, judicial, or other administrations of the territories restored to French sovereignty. If any of these documents, archives, registers, titles, or plans have been misplaced, they will be restored by the German Government on the demand of the French Government.

Article 53. — Separate agreements shall be made be¬ tween France and Germany dealing with the interests of the inhabitants of the territories referred to in Article 51, particularly as regards their civil rights, their business and the exercise of their professions, it being understood that Germany undertakes as from the present date to recognize and accept the regulations laid down in the annex hereto regarding the nationality of the inhabitants or natives of the said territories, not to claim at any time or in any place whatsoever as German nationals those who shall have been declared on any ground to be French, to receive all others in her territory, and to conform, as regards the property of German nationals in the territories indicated in Article 51, with the provisions of Article 297, and the Annex to Section 4 of Part X (economic clauses) of the present treaty.

Those German nationals ˆ who without acquiring French nationality shall receive permission from the French Government to reside in the said territories shall not be subjected to the provisions of the said article.

Article 54. — Those persons who have regained French nationality in virtue of Paragraph i of the annex hereto, will be held to be Alsace-Lorrainers for the purposes of the present section.

The persons referred to in Paragraph 2 of the said annex will, from the day on which they have claimed French nationality, be held to be Alsace-Lorrainers with retroactive effect as from the nth November, 1918. From those whose application is rejected, the privilege will terminate at the date of the refusal.

Such juridical persons will also have the status of Alsace-Lorrainers as have been recognized as possessing this quality, whether by the French administrative authorities or by a judicial decision.

Article 55. — The territories referred to in Article 51 shall return to France, free and quit of all public debts under the conditions laid down in Article 255 of Part IX (financial clauses) of the present treaty.

Article 56. — In conformity with the provisions of Article 256 of Part IX (financial clauses) of the present treaty, France shall enter into possession of all property and estate within the territories referred to in Article 51, which belong to the German Empire or German States, without any payment or credit on this account to any of the States ceding the territories.

This provision applies to all movable or immovable property of public or private domain, together with all rights whatsoever belonging to the Glerman Empire or the German States or to their administrative areas.

Crown property and the property of the former Emperor or other German sovereigns shall be assimi¬ lated to property of the public domain.

Article 57- — ’Germany shall not take any action either by means of stamping or by any other legal or administrative measures not applying equally to the rest of her territory, which may be to the detriment of the legal value or redeemability of German monetary instruments or moneys which at the date of the signa¬ ture of the present treaty are legally current, and at that date are in the possession of the French Govern¬ ment.

Article 58. — A special convention will determine the conditions for repayment in » marks of the exceptional war expenditure advanced during the course of the war by Alsace-Lorraine or by public bodies in Alsace-Lorraine on account of the empire in accordance with German law, such as payment to the families of persons mobilized, requisitions, billeting of troops, and assist¬ ance to persons who have been expelled. In fixing the amount of these sums Germany shall be credited with that portion which Alsace-Lorraine would have con¬ tributed to the empire to meet the expenses resulting from these payments, this contribution being calculated according to the proportion of the imperial revenues de¬ rived from Alsace-Lorraine in 1913.

Article 59. — The French Government will collect for

its own account the imperial taxes, duties, and dues of every kind leviable in the territories referred to in Arti¬ cle 51 and not collected at the time of the armistice of the iith November, 1918.

Article 60. — The German Government shall without delay restore to Alsace-Lorrainers, (individuals, juridical persons, and public institutions,) all property, rights, and interests belonging to them on the iith November, 1918, in so far as these are situated in German terri¬ tory.

Article 61.— The German Government undertakes to continue and complete without delay the execution of the financial clauses regarding Alsace-Lorraine contained in the armistice conventions.

Article 62. — The German Government undertakes to bear the expense of all civil and military pensions which had been earned in Alsace-Lorraine on the date of the Iith November, 1918, and the maintenance of which was a charge on the budget of the German Empire.

The German Government shall furnish each year the funds necessary for the payment in francs, at the aver¬ age rate of exchange for that year, of the sums in marks to which persons resident in Alsace-Lorraine would have been entitled if Alsace-Lorraine had re¬ mained under German jurisdiction.

Article 63. — For the purposes of the obligation as¬ sumed by Germany in Part VIII (reparations) of the present treaty to give compensation for damages caused to the civil populations of the Allied

and Associated countries in the form of fines, the inhabitants of the territories referred to in Article 51 shall be assimilated to the above mentioned populations.

Article 64. — The regulations concerning the control of the Rhine and of the Moselle are laid down in Part XII (ports, waterways, and railways) of the present treaty.

Article 65. — Within a period of three weeks after the coming into force of the present treaty the Port of Strasbourg and the Port of Kehl shall be constituted, for a period of seven years, a single unit from the point of view of exploitation.

The administration of this single unit will be carried on by a manager named by the Central Rhine Commis¬ sion, which shall also have power to remove him. He shall be of French nationality. He will reside in Stras¬ bourg and will be subject to the supervision of the Central Rhine Commission.

There will be established in the two ports free zones in conformity with Part XII (ports, waterways, and railways) of the present treaty.

A special convention between France and Germany, which shall be submitted to the approval of the Cen¬ tral Rhine Comrnission, will fix the details of this organization, particularly as regards finance.

It is understood that for the purpose of the present article the Port of Kehl includes the whole of the area necessary for the movements of the port and the trains which serve it, including the harbor, quays and rail¬ roads, platforms, cranes, sheds and warehouses, silos, elevators and hydro-electric plants, which make up the equipment of the port.

The German Government undertakes to carry out all measures which shall be required of it in order to as¬ sure that all the making up and switching of trains arriving at or departing from Kehl, whether for the right bank or the left bank of the Rhine, shall be car¬ ried on in the best conditions possible.

All property rights shall be safeguarded. In par¬ ticular, the administration of the ports shall not preju¬ dice any property rights of the French or Baden rail¬ roads.

Equality of treatment as respects traffic shall be as¬ sured in both ports to the nationals, vessels, and goods of every country.

In case at the end of the sixth year France shall consider that the

progress made in the improvement of the Port of Strasbourg still requires a prolongation of this temporary regime, she _ may ask for such prolonga¬ tion from the Central Rhine Commission, which may grant an extension for a period not exceeding three years.

Throughout the whole period of any such extension the free zones above provided for shall be maintained.

Pending appointment of the first manager by the Central Rhine Commission, a provisional manager, who shall be of French nationality, may be appointed by the principal Allied and Associated Powers, subject to the foregoing provisions.

For all purposes of the present article the Central Rhine Commission will decide by a majority of votes.

Article 66. — The railway and other bridges across the Rhine now existing within the limits of Alsace-Lorraine shall, as to all their parts and their whole

length, be the property of the French State, which shall insure their upkeep.

Article 67. — The French Government is substituted in all the rights of the German Empire over all the railways which were administered by the Imperial Rail¬ way Administration, and which are actually working or under construction.

The same shall apply to the rights of the empire with regard to railway and tramway concessions within the territories referred to in Article 51.

This substitution shall not entail any payment on the part of the French State.

The frontier railway stations shall be established by a subsequent agreement, it being stipulated in advance that on the Rhine frontier

they shall be situated on the right bank.

Article 6B. — In accordance with the provisions of Article 268 of Chapter I of Section I of Part X (eco¬ nomic clauses) of the present treaty, for a period of five years from the coming into force of the present treaty, natural or manufactured products originating in and coming from the territories referred to in Article 51 shall, on importation into German customs territory, be exempt from all customs duty. The French Govern¬ ment shall fix each year, by decree communicated to the German Government, the nature and amount of the products which shall enjoy this exemption.

The amount of each product which may be thus sent annually into Germany shall not exceed the average of the amount sent annually in the years 1911— 1913.

Further, during the period of five years above men¬ tioned, the German Government shall allow the free export from Germany and the free reimportation into Germany, exempt from all customs duties and other charges, (including internal charges,) of yarns, tissues, and other textile materials or textile products of any kind, and in any condition, sent from Germany into the territories referred to in Article 51, to be subjected there to any finishing process, such as bleaching, dye¬ ing, printing, mercerization, gassing, twisting, or dress¬ ing.

Article 69. — During a period of ten years from the coming into force of the present treaty, central electric supply works situated in German territory, and for¬ merly furnishing electric power to the territories re¬ ferred to in Article 51, or to any establishment the working of which passes permanently or temporarily from Germany to France, shall be required to continue such supply up to the amount of consumption corre¬ sponding to the undertakings and contracts current on the nth November, 1918.

Such supply shall be furnished according to the con¬ tracts in force and at a rate which shall not be higher than that paid to the said works by German nationals.

Article 70. — It is understood that the French Goy-ernment preserves its right to prohibit in the future in the territories referred to in Article 51 new German participation: …

1. In the management or exploitation of the public

domain and of public services, such as railways, navi¬ gable waterways, water works, gas works, electric power, *etc.* .

2. In the ownership of mines and quarries of every kind and in enterprises connected therewith;

3. In metallurgical establishments, even though their working may not be connected with that of any mine.

Article 71. — As regards the territories referred to in Article 51, Germany renounces on behalf of herself and her nationals as from nth November, 1918, all rights under the law of the 25th May, 1910, regarding the trade in potash salts and generally under any stipu¬ lations for the intervention of German organizations in the working of the potash mines. Similarly she re¬ nounces on behalf of herself and her nationals all rights under any agreements, stipulations or laws, which may exist to her benefit with regard to othep products of the jiforesaid territories. , .

Article 72. — The settlement of the questions relating to debts contracted before the nth November, 1918, be¬ tween the German Empire and the German States or their nationals residing in Germany on the one part, and Alsace-Lorrainers residing in Alsace-Lorraine on the other part, shall be effected in accordance with the provisions of Section III of Part X (economic clauses) of the present treaty, the expression “ before the war ” therein being replaced by the expression “ before the nth November, 1918.” The rate of exchange applicable in the case of such settlement shall be the average rate quoted on the Geneva Exchange during the month pre¬ ceding the nth November, 1918. There may be estab¬ lished in the territories referred to in Article 51, for the settlement of the aforesaid debts under the condi¬ tions laid down in Section III of Part X (economic clauses) of the present treaty, a special clearing office, it being understood that this office shall be regarded as

a “ central office ” under the provisions of Paragraph i of the annex to the said section.

Article 7Z- — The private property rights and inter¬ ests of Alsace-Lorrainers in (Germany will be regulated by the stipulations of Section IV of Part X (economic clauses) of the present treaty.

Article 74. — ‘The French Government reserves the right to retain and liquidate all the property, rights and interests which German nationals or societies controlled by Germany possessed in the territories referred to in Article 51 on Nov. ii, 1918, subject to the conditions laid down

in the last paragraph of Article 53 above.

Germany will directly compensate its nationals who may have been dispossessed by the aforesaid liquida¬ tions.

The product of these liquidations shall be applied in accordance with the stipulations of Sections III and IV of Part X (economic clauses) of the present treaty.

Article 75. — Notwithstanding the stipulations of Sec¬ tion V of Part X (economic clauses) of the present treaty, all contracts made before the date of the pro¬ mulgation in Alsace-Lorraine of the French decree of 30th November, 1918, between Alsace-Lorrainers (whether _ individuals or juridical persons) or others resident in Alsace-Lorraine on the one part, and the German Empire or German States and their nationals resident in Germany on the other part, the execution of which has been suspended by the armistice or by subse¬ quent French legislation, shall be maintained.

Nevertheless, any contract of which the French Gov¬ ernment shall notify the cancellation to Germany in the general interest within a period of six months from the date of the coming into force of the present treaty shall be annulled except in respect of any debt or other pecuniary obligation arising out of any act done or money paid thereunder before the nth November, 1918. If this dissolution would cause one of the parties sub¬ stantial prejudice, equitable compensation, calculated solely on the capital employed without taking account of loss of profits, shall be accorded to the prejudiced party.

With regard to prescriptions, limitations, and for¬ feitures in Alsace-Lorraine, the provisions of Articles 300 and 301 of Section V, Part X (economic clauses) shall be applied, with the substitution for the expression " outbreak of war" of the expression " nth November, 1918," and for the expression "duration of the war" of the expression "period from the nth November, 1918, to date of the coming into force of the present treaty."

Article 76. — Questions concerning rights in indus¬ trial, literary, or artistic property of Alsace-Lorrainers shall be regulated in accordance with the general stipulatio-ns of Section VII of Part X (economic clauses) of the present treaty, it being understood that Alsace-Lorrainers holding rights of this nature under German legislation will preserve full and entire enjoyment of those rights on (German territory.

Article 77. — The German Government undertakes to pay over to the French Government such proportion of all reserves accumulated by the empire or by public or private bodies dependent upon it, for the purposes of disability and old age insurance, as would fall to the disability and old age insurance fund at Strasbourg.

The same shall apply in respect of the capital and reserves accumulated in Germany falling legitimately to other serial insurance funds, to miners' superannua¬ tion funds, to the fund of the railways of Alsace-Lor¬ raine, to other superannuation organizations established for the benefit of the personnel of public administra¬ tions and institutions operating in Alsace-Lorraine, and also in respect of the capital and reserves due by the insurance fund of private employes at Berlin by reason of engagements entered into for the benefit of insured persons of that category resident in Alsace-Lorraine.

A special convention shall determine the conditions and procedure of these transfers.

Article 78. — With regard to the execution of judg¬ ments, orders, and prosecutions, the following rules shall be applied:

1. All civil and commercial judgments which shall have been given since Aug. 3, 1914, by the courts of Alsace-Lorraine between Alsace-Lorrainers, or between Alsace-Lorrainers and foreigners, or between foreigners, and which shall not have been appealed from before the nth November, 1918, shall be regarded as final and capable of being fully executed.

When the judgment has been given between Alsace-Lorrainers and Germans, or between Alsace-Lorrainers and subjects of the allies of Germany, it shall only be capable of execution after the issue of an exequatur by the corresponding new tribunal in the restored territory referred to in Article 51.

2. All judgments given by German courts since the 3d August, 1914, against Alsace-Lorrainers for political

crimes or misdemeanors shall be regarded as null and void.

3. All sentences passed since the nth November,

1918, by the Imperial Court of Leipzig on Appeals

against the decisions of the courts of Alsace-Lorraine shall be regarded as null and void and shall be so pro¬ nounced. The papers in regard to the cases in which such sentences have been given shall be returned to the courts of Alsace-Lorraine concerned.

All appeals to the Imperial Court against decisions of the courts of Alsace-Lorraine shall be suspended.

In the cases referred to above, the papers shall be

returned under the aforesaid conditions for transfer without delay to the French Cour de Cassation which shall be competent to decide them.

4. All prosecutions of Alsace-Lorraine for offenses committed during the period between the iith Novem¬ ber,- 1918, and the coming into force of the present treaty will be conducted under German law except in so far as this has been modified by decrees duly published on the spot by the French authorities.

All other questions as to competence, procedure or administration of justice, shall be determined by a special convention between France and Germany.

Article 79. — The stipulations as to nationality con¬ tained in the annex hereto shall be considered as of equal force with the provisions of the present section.

All other questions concerning Alsace-Lorraine which are not regulated by the present section and the annex thereto, or by the general provisions of the present treaty, will form the subject of further conventions be¬ tween France and Germany,

ANNEX.

1. As from the nth November, 1918, the following persons are ipso facto reinstated in French nationality:

First. — Persons who lost French nationality by the application of the

Franco-German treaty of the :oth May, 1871, and who have not since that date acquired any nationality other than German;

Second. — The legitimate or natural descendants of the persons referred to in the immediate preceding para¬ graph, with the exception of those whose descendants in the paternal line include a German who migrated into Alsace-Lorraine after the 15th July, 1870;

Third. — All persons born in Alsace-Lorraine of un¬ known parents or whose nationality is unknown.

2. Within the period of one year from the coming into force of the present treaty, persons included in any of the following categories may claim French nation¬ ality:

First. — All persons not restored to French national¬ ity under Paragraph 1, above, whose ascendants include a Frenchman or French woman who lost French nation¬ ality under the conditions referred to in the said para¬ graph :

Second. — All foreigners not nationals of a German State who acquired the status of a citizen of Alsace-Lorraine before the 3d August, 1914; •

Third. — All Germans domiciled in Alsace-Lorr'aine, if they have been so domiciled since a date previous to 15th July, 1870, or if one of their ascendants was at that date domiciled in Alsace-Lorraine;

Fourth. — All Germans born or domiciled in Alsace-Lorraine who have served in the allied or associated armies during the present war and their descendants;

Fifth. — All persons born in Alsace-Lorraine before loth May, 1871, of foreign parents, and the descendants of such persons;

Sixth. — The husband or wife of any person whose French nationality may have been restored under Para¬ graph I or who may have claimed and obtained French nationality in accordance with the preceding provisions.

The legal representatives of a minor may exercise on behalf of that minor _ the right to claim French nationality; and if that right has not been exercised, the minor «iay claim French nationality within the year following hKs majority.

Except in the case provided in No. 6 of the present paragraph, the

French authorities reserve to themselves the right in individual cases to reject the claim to French nationality.

3. Subject to the provisions of Paragraph 2, Ger¬ mans born or domiciled in Alsace-Lorraine shall not acquire French nationality by reason of the restoration of Alsace-Lorraine to France, even though they may have the status of citizens of Alsace-Lorraine.

They may acquire French nationality only by natu¬ ralization, on condition of having been domiciled in Alsace-Lorraine from a date previous to the 3d August, 1914, and of submitting proof of unbroken residence within the restored territory for a period of three years from the iith November, 1918.

France will be solely responsible for their diplomatic

and consular protection from the date of their applica¬ tion for French naturalization.

4. The French Government shall determine the pro¬ cedure by which reinstatement in French nationality as of right shall be effected, and the conditions under which decisions shall be given upon claims to such nationality and applications for naturalization, as pro¬ vided by the present annex.

SECTION VI. — AUSTRIA.

Article 80. — Germany acknowledges and will respect strictly the independence of Austria. Within the fron¬ tiers which may be fixed by a treaty between that State and the principal Allied and Associated Powers she agrees that the independence shall be inalienable, ex¬ cept with the consent of the Council of the League of Nations.

SECTION VII. — CZECHOSLOVAK STATE.

Article 81. — Germany, in conformity with the action already taken by the Allied and Associated Powers, recognizes the complete independence of the Czecho¬ slovak State, which will include the autonomous terri¬ tory of the Ruthenians to the south of the Carpathians. Germany hereby recognizes the frontier of this State as determined by the principal Allied and Associated Powers and the other interested States.

Article 82. — > The old frontier as it existed on Aug, 3, 1914,

between Austria-Hungary and the German Em¬ pire will constitute the frontier between Germany and the Czechoslovak State.

Article 83. — Germany renounces in favor of the Czechoslovak State all rights and title over the portion of Silesian territory defined as follows:

Starting from a point about 2 kilometers southeast of Katscher, on the boundary between the Circles (Kreise) of Loebschtitz and Ratibor: the boundary be¬ tween the two Kreise; then, the former boundary be¬ tween Germany and Austria-Hungary up to a point on the Oder immediately to the south of the Ratibor-Oder- berg railway; thence, toward the northwest and up to a point about 2 kilometers to the southeast of Katscher: a line to be fixed on the spot passing to the west of Kranowitz.

A commission composed of seven members, five nom¬ inated by the Principal Allied and Associated Powers, one by Poland, and one by the Czechoslovak State, will be appointed fifteen days after the coming into force of the present treaty to trace on the spot the frontier line between Poland and the Czechoslovak State.

The decisions of this commission will be taken by a majority and shall be binding on the parties con¬ cerned.

Germany hereby agrees to renounce in favor of the Czechoslovak State all rights and title over the part of the Kreis of Loebschiitz comprised within the follow¬ ing boundaries in case after the determination of the frontier between Germany and Poland the said part of that circle should become isolated from Germany: from the southeastern extremity of the salient of the former Austrian frontier at about 5 kilometers to the west of Loebschiitz southward and up to a point of junction with the boundary between the Kreise of Loebschiitz and Ratibor: the former frontier between Germany and Austria-Hungary; then, northward, the administrative boundary between the Kreise of Loebschutz and Ratibor up to a point situated about 2 kilometers to the south¬ east of Katscher; thence, northwestward and up to the starting point of this definition: a line to be fixed on the spot passing to the east of Katscher.

Article 84.— German nationals habitually resident in any of the territories recognized as forming part of the Czechoslovak State will obtain Czechoslovak nationality ipso facto and lose their German nationality.

Article 85. — Within a period of two years from the coming into force of the present treaty German nationals over 18 years of age habitually resident in any of the territories recognized as forming part of the Czecho¬ slovak State will be entitled to opt for German national¬ ity. Czechoslovaks who are habitually resident in Ger¬ many will have a similar right to opt for Czechoslovak nationality.

Option by a husband will cover his wife, and option by parents will cover their children under 18 years of age. Persons who have exercised the above right to opt must within the succeeding twelve months transfer their place of residence to the State for which they have opted. They will be entitled to retain their landed property in the territory of the other State where they had their place of residence before exercising the right to opt. They may carry with them their movable prop¬ erty of every description. No export or import duties may be imposed upon them in connection with the re-

moval of such property. Within the same period Czecho¬ slovaks who are German nationals and are in a foreign country will be entitled, in the absence of any provi¬ sions to the contrary in the foreign law, and if they have not acquired the foreign nationality, to obtain Czechoslovak nationality and lose their German nation¬ ality by complying with the requirements laid down by the Czechoslovak State.

Article 86. — ■ The Czechoslovak State accepts and agrees to embody in a treaty with the principal Allied and Associated Powers such provisions as may be deemed necessary by the said powers to protect the in¬ terests of inhabitants of that State who differ from the majority of the population in race, language or religion.

The Czechoslovak State further accepts and agrees to embody in a treaty with the said powers such pro¬ visions as they may deem necessary to protect freedom of transit and equitable treatment of the commerce of other nations.

The proportion and nature of the financial obliga¬ tions of Germany and Prussia which the Czechoslovak State will have to assume on account of the Silesian territory placed under its sovereignty will be deter¬ mined in accordance with Article 254 of Part IX (financial clauses) of the present treaty.

Subsequent agreements will decide all questions not decided by the present treaty which may arise in conse¬ quence of the cession of the said territory.

SECTION VIII. — POLAND.

Article 87. — Germany, in conformity with the action already taken by the Allied and Associated Powers, recognizes the complete independence of Poland and renounces in her favor all rights and title over the ter¬ ritory bounded by the Baltic Sea; the eastern frontier of Germany as laid down in Article 27 of Part II (boundaries of Germany) of the present treaty, up to a point situated about two kilometers to the east of Lorzendorf, then a line to the acute angle which the northern boundary of Upper Silesia makes about three kilometers northwest of Simmenau, then to where the boundary of Upper Silesia has its meeting point with the old frontier between Germany and Russia, then this frontier to the point where it crosses the course of the Niemen, and then the northern frontier of East Prussia, as laid down in Article 28, Part II, aforesaid.

The terms of this article do not, however, apply to the territories of East Prussia and the free city of Danzig, as defined in Article 28, of Part II (boundaries of Germany,) and in Article 100 of Section XI (Dan¬ zig) of this part.

The boundaries of Poland not laid down in the present treaty will be subsequently determined by the principal Allied and Associated Powers. A commission consisting of seven members, five of whom shall be nominated by the principal Allied and Associated Powers, one by Germany, and one by Poland, shall be constituted fifteen days after the coming into force of the present treaty to delimit on the spot the frontier line between Poland and Germany. The decision of the commission will be taken by a majority of votes and shall be binding upon the parties concerned.

Article 88. — In the portion of Upper Silesia in¬ cluded within the boundaries described below the in¬ habitants will be called upon to indicate by a vote whether they wish to be attached to Germany or to Poland:

Starting from the northern point of the salient of the old province of Austrian Silesia, situated about eight kilometers east of Neustadt, the former frontier between (Germany and Austria, to its junction with the boundary between the Kreise of Loebschiitz and Ratibor; thence in a northerly direction to a point about two kilometers southeast of Katscher; the boundary be¬ tween the Kreise of Loebschiitz and Ratibor; thence in a southeasterly direction to a point on the course of the Oder immediately south of the Ratibor-Oderberg railway: a line to be fixed on the ground passing south of Karanowitz;

Thence the old boundary between Germany and Austria, thence the old boundary between Germany and Russia to its junction with the administrative boundary between Posnania and Upper Silesia; thence this ad¬ ministrative boundary to its junction with the admin¬ istrative boundary between Upper and Middle Silesia; thence westward to the point where the administrative boundary turns in an acute angle to the southwest about three kilometers northwest of Simmenau;

The boundary between Upper and Middle Silesia; thence in a westerly direction to a point to be fixed on the ground about two kilometers east of Orzendorf; a line to be fixed on the ground passing north of Kein Hennersdorf; thence southward to the point where the

boundary between Upper and Middle Silesia cuts the Stadtel-Karlsruhe road: a line to be fixed on the ground passing west of Hennersdorf, Polkowitz, Noldau, Steam-ersdorf and Dammer, and east of Strehlitz, Nassadel, Eckersdorf, Schwirz, and Stadtel; thence the boundary between Upper and Middle Silesia to its junction with the eastern boundary of the Kreis of Falkenberg; thence the eastern boundary of the Kreis of Falkenberg to the point of the salient which is three kilometers east of Puschine; thence to the northern point of the salient of the old province of Austrian Silesia, situated about eight kilometers east of Neustadt: a line to be fixed on the ground, passing east of Zulls.

The regime under which this plebiscite will be taken and given effect to is laid down in the annex hereto.

The Polish and German Governments hereby re¬ spectively bind themselves to conduct no prosecutions on any part of their territory and to take no excep¬ tional proceedings for any political action performed in Upper Silesia during the perio.d of the regime laid down in the annex hereto, and up to the settlement of the final status of the

country Germany hereby re¬ nounces in favor of Poland all rights and title over the portion of Upper Silesia lying beyond the frontier line fixed by the principal Allied and Associated Powers as this result of the plebiscite.

ANNEX.

1. Within fifteen days from the coming into force of the present treaty the German troops and such officials as may be designated by the commission set up under the provisions of Paragraph 2 shall evacuate the plebiscite area. Up to the moment of the comple¬ tion of the evacuation they shall refrain from any form of requisitioning in money or in kind and from all acts likely to prejudice the material interest of the country.

Within the same period the workmen's and soldiers' councils which have been constituted in this area shall be dissolved. Members of such councils who are na¬ tives of another region and are exercising their func¬ tions at the date of the coming into force of the present treaty, or who have gone out of office since the ist March, 1919, shall be evacuated.

All military and semi-military unions formed in the said area by the inhabitants of the district shall be immediately disbanded. All members of such military organizations who are not domiciled in the said area shall be required to leave it.

2. The plebiscite area shall be immediately placed under the authority of an international commission of four members to be designated by the following powers: The United States of America, France, the British Empire, and Italy. It shall be occupied by troops belonging to the Allied and Associated Powers, and the German Government undertakes to give facili¬ ties for the transference of troops to Upper Silesia.

3. The commission shall enjoy all the powers exer¬ cised by the German or by the Prussian Government; except those of legislation or taxation. It shall also be substituted for the Government of the Province and the Regierungbezirk.

It shall be within the competence of the commission to interpret the powers hereby conferred upon it, and to determine to what extent it shall exercise them and to what extent they shall be left in the hands of the existing authorities.

Changes in the existing laws and the existing taxa¬ tion shall only be

brought into force with the consent of the commission.

The commission will maintain order with the help of the troops which will be at its disposal and to the extent which it may deem necessary by means of gendarmerie recruited among the inhabitants of the country. The commission shall provide immediately for the replacement of the evacuated German officials, and, if occasion arises, shall itself order the evacuation of such authorities and proceed to the replacement of such local authorities as may be required. It shall take all steps which it thinks proper to insure the freedom, fairness, and secrecy of the vote. In par¬ ticular, it shall have the right to order the expulsion of any person who may in any way have attempted to distort the result of the plebiscite by methods of cor¬ ruption or intimidation.

The commission shall have full power to settle all questions arising from the execution of the present clauses. It shall be assisted by technical advisers, chosen by it from among the local populations. The decision of the commission shall be taken by a majority vote.

4. The vote shall take place at such date as may be determined by the principal Allied and Associated

Powers, but not sooner than six months or later than eighteen months after the establishment of the com¬ mission in the area.

The right to vote shall be given to all persons, with¬ out distinction of sex, who:

(a) Have completed their twentieth year on the ist of January of the year in which the plebiscite takes place;

(b) Were born in the plebiscite area or have been domiciled there since a date to be determined by the commission, which shall not be subsequent to Jan. i, 1919, or who have been expelled by the German au¬ thorities and have not retained their domicile there.

Persons convicted of political offenses shall not ex¬ ercise their right of voting. Every person will vote in the commune where he is domiciled, or in which he was born, if he has not retained his domicile in the area.

The result of the vote will be determined by the communes according to the majority of votes in each commune.

5. On the conclusion of the voting the number of votes cast in each commune will be communicated by the commission to the principal Allied and Associated Powers with a full report as to the taking of the vote and a recommendation as to the line which ought to be adopted as the frontier of Germany in Upper Silesia. In this recommendation regard will be paid to the wishes of the inhabitants, as shown by the vote, and to the geographical and economic conditions of the locality.

6. As soon as the frontier has been fixed by the prinicipal Allied and Associated Powers the German authorities will be notified by the International Com¬ mission that they are free to take over the administra¬ tion of the territory which it is recognized should be German; the said authorities must proceed to do so within one month of such notification and in the man¬ ner prescribed by the commission. Within the same period and in the manner prescribed by the commission, the Polish Government must proceed to take over the administration of the territory which it is recognized should be Polish.

When the administration of the territory has been provided for by the German and Polish authorities re¬ spectively the powers of the commission will terminate.

The cost of the Army of Occupation and expendi¬ ture by the commission, whether in discharge of its own functions or in the administration of the territory, will be a charge on the area.

Article 89. — Poland undertakes to accord freedom of transit to persons, goods, vessels, carriages, wagons, and mails in transit between East Prussia and the rest of Germany over Polish territory, including territorial waters, and to treat them at least as favorably as the persons, goods, vessels, carriages, wagons, and mails, respectively, of Polish or of any other most-favored nationality, origin^ importation starting point, or own¬ ership, as regards facilities, restrictions, and all other matters.

Goods in transit shall be exempt from all customs or other similar duties.

Freedom of transit will extend to telegraphic and telephonic services under the conditions laid down by the conventions referred to in Article 98.

Article 90. — Poland undertakes to permit, for a period of fifteen years, the exportation to Germany of the products of the mines in any part of Poland in ac¬ cordance with the present treaty. Such export shall be subject Jo duties or other changes or restrictions on exportation.

Poland agrees to take such steps as may be neces¬ sary to secure that such products shall be available for sale to purchasers in Germany on terms as favorable as are applicable to like products sold under similar conditions to purchasers in Poland or in any other country.

Article 91. — German nationals habitually resident in territories recognized as_ forming part of Poland will acquire Polish nationality ipso facto and will lose their German nationality. German nationals, however, or their descendants who became resident in these terri¬ tories after Jan. i, 1908, will not acquire Polish na¬ tionality without a special authorization from the Polish State.

Within a period of two years after the coming Into force of the present treaty, German nationals over 18 years of age, habitually resident in any of the terri¬ tories recognized as forming part of Poland, will be entitled to opt for German nationality. Poles who are German nationals over 18 years of age, and habitually re.”ˆident in Germany, will have a similar right to opt for Polish nationality. Option by a husband will cover his wife and option by parents will cover their children

under 18 years of age. Persons who have exercised the above right to opt must within the succeeding twelve months transfer their place of residence to the State for which they have opted. They will be entitled to retain their immovable property in the territory of the other State, where they had their place of residence before exercising the right to opt. They may carry with them their immovable property of every descrip¬ tion. No export or import duties or charges may be imposed upon them in connection with the removal of such property.

Within the same period Poles who are German na¬ tionals and are in a foreign country will be entitled, in the absence of any provisions to the contrary in the foreign law, and if they have not acquired foreign

nationality, to obtain Polish nationality and to lose their German nationality by complying with the requirements laid down by the Polish State.

In this portion of Upper Silesia submitted to a plebiscite the provisions of this article should only come into force as from the definite attribution of the territory.

Article 92. — The proportion and the nature of the financial liabilities of Germany and Prussia to be borne by Poland will be determined in accordance with Article 254 of Part IX (financial clauses) of the present treaty. There shall be excluded from the share of such financial liabilities assumed by Poland that por¬ tion of the debt which, according to the finding of the Reparation Commission referred to in the above mentioned article, arises from measures adopted by the German and Prussian Governments with a view to German colonization in Poland. In fixing under Article 256 of the present treaty the value of the property and possessions belonging to the-German Empire and to the German States which pass to Poland, with the territory transferred above, the Reparation Commission shall exclude from the valuation buildings, forests, and other State property which belonged to the former kingdom of Poland; Poland shall acquire these proper¬ ties free of all costs and charges.

In all the German territory transferred in accord¬ ance with the present treaty and recognized as forming definitely a part of Poland, the property rights and in¬ terests of_ German nationals shall not be liquidated under Article 297 by the Polish Government except in accordance with the following provisions:

1. The proceeds of the liquidation shall be paid di¬ rect to the owner;

2. If, on his application, the mixed arbitral tri¬ bunal provided for by the Section 6 of Part X (eco¬ nomic clauses) of the present treaty, or an arbitrator appointed by that tribunal, is satisfied that the condi¬ tions of the sale or measures taken by the Polish (Gov¬ ernment outside of its general legislation were un¬ fairly prejudicial to the price obtained, they shall have discretion to award to the owner equitable compensa¬ tion to be paid by the Polish Government.

Further agreements will regulate all questions arising out of the cession of the above territory, which are not regulated by the present treaty.

Article 93- — Poland accepts and agrees to embody in a treaty with

the principal Allied and Associated Powers such provisions as may be deemed necessary by the said powers to protect the interests of inhabitants of Poland who differ from the majority of the popula¬ tion in race, language or religion.

Poland further accepts and agrees to embody in a treaty with the said powers such provisions as they may deem necessary to protect freedom of transit and equitable treatment of the commerce of other nations.

SECTION IX. — ■ EAST PRUSSIA.

Article 94. In the area between the southern frontier of East Prussia, as described in Article 28 of Part II (frontiers of Germany) of the present treaty, and the line described below, the inhabitants will be called upon to indicate by a vote the State to which they wish to belong:

The western and northern boundary of Regierungs-bezirk Allenstein to its junction with the boundary be¬ tween the Kreise of Oletsko and Angerburg, thence, the northern boundary of the Kreis of Oletsko to its junction with the old frontier of East Prussia.

Article 95. — The German troops and authorities will be withdrawn from the area defined above within a period not exceeding fifteen days after the coming into force of the present treaty. Until the evacuation is completed they will abstain from all requisitions in money or in kind and from all measures injurious to the economic interests of the country.

On the expiration of the above-mentioned period the said area will be placed under the authority of an

International Commission of five members appointed by the principal Allied and Associated Powers. This Com¬ mission will have general powers of administration and, in particular, will be charged with the

duty of arranging for the vote, and of taking such measures as it may deem necessary to insure its freedom, fairness, and secrecy. The commission will have all necessary authority to decide any questions to which the execu¬ tion of these provisions may give rise. The commis¬ sion will make such arrangements as may be necessary for assistance in the exercise of its functions by officials chosen by itself from the local population; its decisions will be taken by a majority.

Every person, irrespective of sex, will be entitled to vote who:

(a) Is 20 years of age at the date of the coming into force of the present treaty, and

(b) Was born within the area where the vote will take place, or has been habitually resident there from a date to be fixed by the commission.

Every person will vote in the commune where he is habitually resident or, if not habitually resident in the area, in the commune where he was born.

The result of the vote will be determined by com¬ mune, (Gemeinde,) according to the majority of the votes in each commune.

On the conclusion of the voting the number of votes cast in each commune will be communicated by the commission to the principal Allied and Associated Powers with a full report as to the taking of the vote and a recommendation as to the line which ought to be adopted as the boundary of East Prussia in this region.

In this recommendation, regard will be paid to the wishes of the inhabitants as shown by the vote, and to the geographical and economic conditions of the locality. The principal Allied and Associated Powers will then fix the frontier between East Prussia and Poland in this region. If the line fixed by the principal Allied and Associated Powers is such as to exclude from East Prussia any part of the territory defined in Article 94, the renunciation of its rights by Germany in favor of Poland, as provided in Article 87, above, will extend to the territories so excluded. As soon as the line has been fixed by the principal Allied and Associated Powers, the authorities administering East Prussia will be notified by the International Commission that they are free to take over the administration of the terri¬ tory to the north of the line so fixed, which they shall proceed to do within one month of such notification and in the manner prescribed by the commission. Within the same period, and as

prescribed by the commission, the Polish Government must proceed to take over the administration of the territory to the south of the line. When the administration of the territory by the East Prussian and Polish authorities, respectively, has been provided for, the powers of the commission will terminate.

Expenditure by the commission, whether in the dis¬ charge of its own functions or in the administration of the territory, will be borne by the local revenues. East Prussia will be required to bear such proportion of any deficit as may be fixed by the principal Allied and Associated Powers.

Article 96. — In the area comprising the Kreise of Stuhm and Rosenberg, and the portion of the Kreis of Marienburg which is situated east of the Nogat, and that of Marienwerder east of the Vistula, the inhabit¬ ants will be called upon to indicate by a vote, to be taken in each commune, (Gemeidde,) whether they de¬ sire the various communes situated in this territory to belong to Poland or to East Prussia.

Article 97- — The German troops and authorities will be withdrawn from the area defined in Article 96 within a period not exceeding fifteen days after the coming into force of the present treaty. Until the evacuation is completed they will abstain from all requisitions in money or in kind and from all measures injurious to the economic interests of the country. On the expiration of the above mentioned period the said area will be placed under the authority of an Interna¬ tional Commission of five members appointed by the principal Allied and Associated Powers. This com¬ mission, supported, if occasion arises, by the necessary forces, will have general powers of administration, and, in particular, will be charged with the duty of arrang¬ ing for the vote and of taking such measures as it may deem necessary to insure its freedom, fairness, and secrecy. The commission will conform as far as possi¬ ble to the provisions of the present treaty relating to the plebiscite in the Allenstein area. Its decision will be taken by a majority. Expenditure by the commis¬ sion, whether in the discharge of its own functions or in the administration of the territory, will be borne by the local revenues.

On the conclusion of the voting, the number of votes cast in each commune will be communicated by the commission to the principal Allied and Associated Powers, with a full report as to the taking of the vote and a recommendation as to the line which ought to be adopted

as the boundary of East Prussia in this region. In this recommendation regard will be paid to the wishes of the inhabitants as shown by the vote and to the geographical and economic conditions of the locality. The principal Allied and Associated Powers will then fix the frontier between East Prussia and Poland in this region, leaving in any case to Poland for the whole of the section bordering on the Vistula full and complete control of the river, including the east bank as far east of the river as may be necessary for its regulation and improvement. Germany agrees that in any portion of the said territory which remains German no fortifications shall at any time be erected.

The principal Allied and Associated Powers will at the same time draw up regulations for assuring to the population of East Prussia to the fullest extent, and under equitable conditions, access to the Vistula, and the use of it for themselves, their commerce, and their boats.

The determination of the frontier and the foregoing regulations shall be binding upon all the parties con¬ cerned. When the administration of the territory has been taken over by the East Prussian and Polish au¬ thorities, respectively, the powers of the commission will terminate.

Article 98. — Germany and Poland undertakes, within one year of the coming into force of this treaty, to enter into conventions of which the terms, in case of difference, shall be settled by the Council of the League of Nations, with the object of securing on the one hand to Germany full and adequate railroad, tele¬ graphic, and telephonic facilities for communication be¬ tween the rest of Germany and East Prussia over the intervening Polish territory, and on the other hand to Poland full and adequate railroad, telegraphic, and telephonic facilities for communication between Poland and the free city of Danzig over any German territory that may, on the right bank of the Vistula, intervene between Poland and the free city of Danzig.

SECTION X. — MEMEL.

Article 99. — Germany renounces in favor of the principal Allied and Associated Powers all rights and title over the territories included between the Baltic, the northeastern frontier of East Prussia as defined in Article 28 of Part II (frontiers of Germany) of the present treaty and the former frontier between Ger¬ many and Russia.

Germany undertakes to accept the settlement made by the principal Allied and Associated Powers in re¬ gard to these territories, particularly in so far as con¬ cerns the nationality of the inhabitants,

SECTION XI. — FREE CITY OF DANZIG.

Article 100. — Germany renounces in favor of the principal Allied and Associated Powers all rights and title over the territory comprised within the following limits:

From the Baltic Sea southward to the point where the principalˆ channels of navigation of the Nogat and Vistula (Weichsel) meet;

The boundary of East Prussia as described in Arti¬ cle 28 of Part II (boundaries of Germany) of the present treaty;

Thence the principal channel of navigation of the Vistula downstream to a point about 6ˆ4 kilometers north of the bridge of Dirschau;

Thence northwest to point, 5, kilometers south¬ east of the Church of Giittland, a line to be fixed on the ground;

Thence in a general westerly direction to the salient of the Kreis of Berent, 8Vˆ kilometers northeast of Schoneck;

A line to be fixed on the ground passing between Miihlbanz on the south and Rambeltsch on the north;

Thence the boundary of the Kreis of Berent, west¬ ward to the re-entrant which it forms six kilometers north-northwest of Schoneck;

Thence to a point on the median line of Lonkener See; a line to be fixed on the ground passing north of Neu Fietz and Schatarpi and south of Barenhiitte and Lonken; thence the median line of the Lonkener See to its northernmost point; thence to the southern end of Pollenziner See; a line to be fixed on the ground;

Thence the median line of Pollenziner See to its northernmost point;

Thence in a northeasterly direction to a point about

one kilometer south of Koliebken Church, where the Danzig-Neustadt Railway crosses a stream;

A line to be fixed on the ground passing southeast of Kamehlen, Krissau, Fidlin, Sulmin, (Richthof,) Mat-tern, Schaferei, and to the northwest of Neuendorf, Marschau, Czapielken, Hoch and Klein Kelpin, Pulver-miihl, Renneberg, and the towns of Oliva and Zoppot;

Thence the course of this stream to the Baltic Sea.

The boundaries described above are drawn on a German map, scale 1 —100,000, attached to the present treaty (Map No. 4).

Article loi. — A commission composed of three mem¬ bers appointed by the principal Allied and Associated Powers, including a High Commissioner as President, one member appointed by Germany, and one member appointed by Poland, shall be constituted within fifteen days of the coming into force of the present treaty for the purpose of delimiting on the spot the frontier of the territory as described above, taking into account as far as possible the existing communal boundaries.

Article 102. — The principal Allied and Associated Powers undertake to establish the town of Danzig, to¬ gether with the rest of the territory described in Article 100, as a free city. It will be placed under the pro¬ tection of the League of Nations.

Article 103. — A constitution for the free city of Danzig shall be drawn up by the duly appointed repre¬ sentatives of the free city in agreement with a High Commissioner to be appointed by the League of Na¬ tions. The constitution shall be placed under the guar¬ antee of the League of Nations.

The High Commissioner will also be intrusted with the duty of dealing in the first instance with all differ¬ ences arising between Poland and the free city of Danzig in regard to this treaty or any arrangements or agreements made thereunder.

The High Commissioner shall reside at Danzig.

Article 104. — The principal Allied and Associated Powers undertake to negotiate a treaty between the Polish Government and the free city of Danzig which shall come into force at the same time as the establish¬ ment of said free city, with the following objects:

1. To effect the inclusion of the free city of Danzig within the Polish

customs frontiers and to establish a free area in the port.

2. To insure to Poland without any restriction the free use and service of all waterways, docks, basins, wharves, and other works within the territory of the free city necessary for Polish imports and exports.

3. To insure to Poland the control and administra¬ tion of the Vistula and of the whole railway system within the free city; except such street and other rail¬ ways as serve primarily the needs of the free city and of postal, telegraphic, and telephonic communication between Poland and the Port of Danzig.

4. To insure to Poland the right to develop and im¬ prove the waterways, docks, basins, wharves, railways, and other works and means of communication men¬ tioned in this article, as well as to lease or purchase through appropriate processes such land and other prop¬ erty as may be necessary for these purposes.

5. To provide against any discrimination within the free city of Danzig to the detriment of citizens of Poland and other persons of Polish origin or speech.

6. To provide that the Polish Government shall un¬ dertake the conduct of the foreign relations of the free city of Danzig as well as the diplomatic protection of citizens of that city when abroad.

Article 105. — On the coming into force of the present treaty German nationals ordinarily resident in the territory described in Article 100 will ipso facto lose their German nationality, in order to become na¬ tionals of the free city of Danzig.

Article 106. — Within a period of two years from the coming into force of the present treaty German nationals over 18 years of age ordinarily resident in the territory described in Article 100 will have the right to opt for German nationality.

Option by a husband will cover his wife and option by parents will cover their children less than 18 years of age.

All persons who exercise the right of option referred to above must during the ensuing twelve months trans¬ fer their place of residence to Germany.

These persons will be entitled to preserve the im¬ movable property possessed by them in the territory of the free city of Danzig. They may carry with them their movable property of every description. No

export or import duties shall be imposed upon them in this connection.

Article 107. — All property situated within the terri¬ tory of the free city of Danzig belonging to the German Empire or any German State shall pass to the principal Allied and Associated Powers for transfer to the free

city of Danzig or to the Polish State as they may consider equitable.

Article 108. — - The proportion and nature of the financial liabilities of Germany and of Prussia to be borne by the free city of Danzig shall be fixed in ac¬ cordance with Article 254 of Part IX (financial clauses) of the present treaty.

All other questions which may arise from the ces¬ sion of the territory referred to in Article 100 shall be settled by further agreements.

SECTION XII. — SCHLESWIG.

Article 109. — The frontier between Germany and Denmark shall be fixed in conformity with the wishes of the population.

For this purpose the population inhabiting the ter¬ ritories of the former German Empire situated to the north of a line from east to west, (shown by a brown line on the Map No. 3 annexed to the present treaty);

Leaving the Baltic coast about thirteen kilometers east-northeast of Flensburg, running southwest so as to pass southeast of Sygum, Ringsberg, Munkbrarup, Adelby, Tastrup, Jarplund, Oversee, and northwest of Langballigholz, Langballig, Bonstrup, Riillschau, Weseby, Kleinwolstrup, Gross-Solt; thence westward passing south of Frorup and north of Wanderup; thence in a southwesterly direction passing southeast of Oxlund, Stieglund, and Ostenau and northwest of the villages on the Wanderup-Kollund road; thence in a northwesterly direction passing southwest of Lowen-stedt, Joldelund, Goldelund and northeast of Kalker-heide and Hogel to the bend of the Soholmer Au, about one kilometer east of Soholm, where it meets the south¬ ern boundary of the Kreis of Tondern; thence following this boundary to the North Sea; thence passing south of the islands of Fohr and Amrum and north of the islands of Oland and Langeness shall be called upon to pronounce by a vote which will be taken under the following conditions:

I. Within a period not exceeding ten days from the coming into force of the present treaty, the German ˆoops and authorities (including the Oberprasidenten, Regierungs-Prasidenten, Landrathe, Amtsvorsther, Oberbiirgermeister) shall evacuate the zone lying to the north of the line above fixed.

Within the same period the Workmen's and Soldiers' Councils which have been constituted in this zone shall be dissolved; members of such councils who are natives of another region and are exercising their functions at the date of the coming into force of the present treaty, or who have gone out of office since the 1st March, 1919, shall also be evacuated.

The said zone shall immediately be placed under the authority of an international commission, com¬ posed of five members, of whom three will be desig¬ nated by the principal Allied and Associated Powers; the Norwegian and Swedish Governments will each be requested to designate a member. In the event of their failing to do so, these two members will be chosen by the principal Allied and Associated Powers.

The commission, assisted in case of need by the necessary force, shall have general powers of ad¬ ministration. In particular, it shall at once provide filling the places of the evacuated German au¬ thorities, and, if necessary, shall itself give orders for their evacuation and proceed to fill the places of such local authorities as ma,y be required. It shall take all steps which it thinks proper to insure the freedom, fairness, and secrecy of the vote. It shall be assisted by German and Danish technical advisers chosen by it from among the local population. Its decisions will be taken by a majority.

ˆ Clnchalf of the expenses of the International Com¬ mission and of the expenditure occasioned by the plebis¬ cite shall be paid by Germany.

. p* The right to vote shall be given all persons, without distinction of sex, who:

(a) Have completed their twentieth year at the date of the coming into force of the present treaty; and ˆ (b) Were born in the zone in which the plebisCite IS taken, or had been domiciled there since a date before the ist January, 1900, or had been expelled by ˆ the German authorities without having retained their domicile there.

Every person will vote in the commune (Gemeinde) where he is

domiciled or of which he is a native.

Military persons, officers, noncommissioned officers and soldiers of the German Army, who are natives of the zone of _ Schleswig, in which the plebiscite is taken, shall be given the opportunity to return to their native place in order to take part in the voting there.

3. In the section of the evacuated zone lying to the north of a line from east to west (shown by a

red line on Map No. 3, which is annexed to the present treaty) :

Passing south of the Island of Alsen and follow¬ ing the median line of Flensburg Fjord;

Thence leaving the fjord about six kilometers north of Flensburg, and following the course of the stream flowing past Kupfermiihle upstream to a point north of Niehuus;

Thence passing north of Pattburg and Ellund and south of Frosless to meet the eastern boundary of the Kreis of Tondern at its junction with the boundary between the old jurisdiction of Slogs and Kjaer, (Slogs Herred and Kjaer Herred) ;

Thence the latter boundary to where it meets the Scheidebek;

Thence the course of the Scheidebek, (Alte Au, Slider Au, and Wied Au downstream successively to the point where the latter bends northward, about 1,500 meters west of Ruttebiill;

Thence in a west-northwesterly direction to meet the Aˆorth Sea north of Sieltoft;

Thence passing north of the Island of Sylt.

The vote above provided for shall be taken within a period not exceeding three weeks after the evacuation of the country by the

German troops and authorities.

The result will be determined by the majority of votes cast in the whole of this section. This result will be immediately communicated by the commission to the principal Allied and Associated Governments and proclaimed.

If the vote results in favor of the reincorporation of this territory in the Kingdom of Denmark, the Danish Government, in agreement with the commission, will be entitled to effect its occupation with their mili¬ tary and administrative authorities immediately after the proclamation.

4. In the section of the evacuated zone situated to the south of the preceding section and to the north of the line which starts from the Baltic Sea thirteen kilometers from Flensburg and ends north of the islands of Oland and Langeness, the vote will be taken within a period not exceeding five weeks after the plebiscite shall have been held in the first section.

The result will be determined by communes (Ge-meinden) in accordance with the majority of the votes cast in each commune, (Gemeinde).

Article no. — Pending a delimination on the spot, a frontier line will be fixed by the principal Allied and Associated I'ower3 according to a line based on the result of the voting, and proposed by the Interna¬ tional Commission, and taking into account the par¬ ticular geographical and econornic conditions of the localities in question.

From that time the Danish Government may effect the occupation of these territories which the Danish civil and military authorities, and the German Govern¬ ment may reinstate up to the said _ frontier line the German civil and military authorities whom it has evacuated.

Germany hereby renounced definitely in favor of the principal Allied and Associated Powers all rights of sovereignty over the territories situated to the north of the frontier line fixed in accordance with the above provisions. The principal Allied and Associated Pow¬ ers will hand over the said territories to Denmark.

Article iii. — A commissionˆ composed of seven members, five of whom shall be nominated by the prin¬ cipal Allied and Associated Powers, one by Denmark, and one by Germany, shall be constituted within fifteen days from the date when the final result of the vote is known, to trace the frontier line on the spot.

The decisions of the commission will be taken by a majority of votes, and shall be binding on the parties concerned.

Article 112. — All the inhabitants of the territory which is returned to Denmark will acquire Danish na¬ tionality ipso facto, and will lose their German na¬ tionality. Persons, however, who had become habitually resident in this territory after the ist October, 1918, will not be able to acquire Danish nationality without permission from the Danish Government.

Article 113. — Within two years from the date on which the sovereignty over the whole or part of the territory of Schleswig subjected to the plebiscite is restored to Denmark:

Any person over 18 years of age, born in the ter¬ ritory restored to Denmark, not habitually resident in this region and possessing German nationality, will be entitled to opt for Denmark.

Any person over 18 years of age habitually resi¬ dent in the territory restored to Denmark will be entitled to opt for Germany.

Option by a husband will cover his wife and option

by parents will cover their children less than 18 years of age.

Persons who have exercised the above right to opt must within the ensuing twelve months transfer their place of residence to the State in favor of which they have opted.

They will be entitled to retain the immovable prop¬ erty which they own in the territory of the other State in which they were habitually resident before opting. They may carry with them their movable property of every description. No export or import duties may be imposed upon them in connection with the removal of such property.

Article 114. — The proportion and nature of the financial or other obligations of Germany and Prussia which are to be assumed by Denmark will be fixed in accordance with Article 254 of Part IX (financial clauses) of the present treaty.

Further stipulations will determine any other ques¬ tions arising out of the transfer to Denmark of the whole or part of the territory of which she was de¬ prived by the treaty of Oct. 30, 1864.

SECTION XIII. — HELIGOLAND.

Article 115. — The fortifications, military establish¬ ments, and harbors of the islands of Heligoland and Dune shall be destroyed under the supervision of the principal Allied Governments by German labor and at the expense of Germany within a period to be deter¬ mined by the said Governments.

The term “ harbors ” shall include the Northeast Mole, the West Wall, the outeˆ and inner breakwaters and reclaimed land within them, and all naval and mili¬ tary works, fortifications, and buildings, constructed or under construction, between lines connecting the fol¬ lowing positions taken from the British Admiralty Chart No. 126 of 19 April 1918:

(A) Lat. 54 degrees 10 minutes 49 seconds N. ;

long. 7 degrees 53 minutes 39 seconds E. ;

(B) Lat. 54 degrees 10 minutes 35 seconds N.;

long. 7 degrees 54 minutes 18 seconds E.;

(C) Lat. 54 degrees 10 minutes 14 seconds N. ;

long. 7 degrees 54 minutes o seconds E. ;

(D) Lat. 54 degrees 10 minutes 17 seconds N.;

long. 7 degrees 53 minutes 37 seconds E. ;

(E) Lat. 54 degrees 10 minutes 44 seconds N. ;

long. 7 degrees 53 minutes 26 seconds E.

These fortifications, military establishments, and harbors shall not be reconstructed, nor shall any similar works be constructed in future.

SECTION XIV. — RUSSIA AND RUSSIAN STATES.

Article 116. — Germany acknowledges and agrees to respect as permanent and inalienable the independence of all the territories which were part of the former Russian Empire on August i, 1914.

In accordance with the provisions of Article 259 of Part IX (financial clauses) and Article 292 of Part X, (economic clauses), Germany accepts definitely the abrogation of the Brest-Litovsk Treaties and of

all treaties, conventions, and agreements entered into by her with the Maximalist Government in Russia.

The Allied and Associated Powers ‘formally reserve the rights of Russia to obtain from Germany restitution and reparation based on the principles of the present treaty.

Article 117. — Germany undertakes to recognize the full force of all treaties or agreements which may be entered into by the Allied and Associated Powers with States now existing or coming into existence in future in the whole or part of the former Empire of Russia as existed on Aug. i, 1914, and to recognize the frontiers of any such States as determined therein.

Part IV. — ■ German Rights and Interests Outside Germany.

Article 118. — In territory outside her European frontiers as fixed by the present treaty, Germany re¬ nounces all rights, titles, and privileges whatever in or over territory which belonged to her or to her allies, and all rights, titles, and privileges, whatever their origin, which she held as against the Allied and Asso¬ ciated Powers.

Germany undertakes immediately to recognize and to conform to the measures which may be taken now or in the future by the principal Allied and Associated Powers, in agreement where necessary with third powers, in order to carry the above stipulation into effect.

In particular, Germany declares her acceptance of the following articles relating to certain special sub¬ jects:

SECTION I. — GERMAN COLONIES

Article 119- — Germany renounces in favor of the principal Allied and Associated Powers all her rights and titles over her overseas possessions.

Article 120. — All movable and immovable property in such

territories belonging to the German Empire or to any German State shall pass to the Government exer¬ cising authority over such territories on the terms laid down in Article 257 of Part IX (financial clauses) of the present treaty. The decision of the local courts in any dispute as to the nature of such property shall be final.

Article 121. — The provisions of Section I (com¬ mercial relations) and Section IV (property, rights, and interests) of Part X (economic clauses) of the present treaty shall apply in the case of these territories what¬ ever be the form of government adopted for them.

Article 122.- — The Government exercising authority over such territories may make such provisions as it thinks fit with reference to the repatriation from them of German nationals, and to the conditions upon which German subjects of European origin shall, or shall not, be allowed to reside, hold property, trade, or exercise a profession in them.

Article 123. — The provisions of Article 260 of Part IX (financial clauses) of the present treaty shall apply in the case of all agreements concluded with German nationals for the construction *9r exploitation of public works in the German overseas possessions, as well as any sub-concessions or contracts resulting therefrom which may have been made to or with such nationals.

Article 124. — Germany hereby undertakes to pay In accordance with the e'stimate to be presented by the French Government, and approved by the Reparation Commission, reparation for damage suffered by French nationals in the Cameroons or the frontier zone by reason of the acts of the German civil and military authorities and of German private individuals during the period from Jan. i, 1900, to Aug. i, 1914.

Article 125. — Germany renounces all rights under the conventions and agreements with France of Nov. 4, 1911, and Sept. 28, 1912, relating to equatorial Africa. She undertakes to pay to the French Government, in accordance with the estimate to be presented by the Government and approved by the Reparation Com¬ mission, all the deposits, credits, advances, &c., effected by virtue of these instruments in favor of Germany.

Article 126. — Germany undertakes to accept and observe the agreements made or to be made by the Allied and Associated Powers or some of them with any other power with regard to the trade in arms and spirits, and to the matters dealt with in the general act of

Berlin of Feb. 26, 1885, the general act of Brussels of July 2, 1890, and the conventions completing or modifying the same.

Article 127. — The native inhabitants of the former German overseas possessions shall be entitled to the diplomatic protection of the Governments exercising authority over those territories.

SECTION II. — CHINA.

Article 128. — Germany renounces in favor of China all benefits and privileges resulting from the provisions of the final protocol signed at Peking on Sept. 7, 1901, and from all annexes, notes, and docu¬ ments supplementary thereto. She likewise renounces in favor of China any claim to indemnities accruing thereunder subsequent to March 14, 1917.

Article 129. — -From the coming into force of the present treaty the high contracting parties shall apply in so far as concerns them respectively:

1. The arrangement of Aug. 29, 1902, regarding the new Chinese customs tariff.

2. The arrangement of Sept. 27, 1905, regarding Whang-Poo, and the provisional supplementary ar¬ rangement of April 4, 1912. China, however, will no longer be bound to grant to Germany the advantages or privileges which she allowed Germany under these arrangements.

Article 130. — Subject to thfe provisions of Section VIII of this part, Germany cedes to China all the buildings, wharves and pontoons, barracks, forts, arms and munitions of war, vessels of all kinds, wireless telegraphy installations and other public property belonging to the German Government, which are situated or may be in the German concessions at Tientsin and Hankow or elsewhere in Chinese terri¬ tory.

It is understood, however, that premises used as diplomatic or consular residences or offices are not included in the above cession, and, furthermore, that no steps shall be taken by the Chinese Government to dispose of the German public and private property

situated within the so-called legation quarter at Peking without the consent of the diplomatic representatives of the powers which, on the coming into force of the present treaty, remain parties to the final

protocol of Sept. 7, 1901.

Article 131. — Germany undertakes to restore to China within twelve months from the coming into force of the present treaty all the astronomical instruments which her troops in 1900-1901 carried away from China, and to defray all expenses which may be incurred in effecting such restoration, including the expenses of dismounting, packing, transporting, insurance, and installation in Peking.

Article 132. — Germany agrees to the abrogation of the leases from the Chinese Government under which the German concessions at Hankow and Tientsin are now held.

China, restored to the full exercise of her sovereign rights in the above areas, declares her intention of opening them to international residence and trade. She further declares that the abrogation of the leases under which these concessions are now held shall not affect the property rights of nationals or Allied and Associated Powers who are holders of lots in these concessions.

Article 133. — Germany waives all claims against the Chinese Government or against any Allied or Asso¬ ciated Government arising out of the internment of German nationals in China and their repatriation. She equally renounces all claims arising out of the capture and condemnation of German ships in China or the liquidation, sequestration or control of German prop¬ erties, rights, and interests in that country since Aug. 14, 1917. This provision, however, shall not effect the rights of the parties interested in the proceeds of any such liquidation, which shall be governed by the provisions of Part X (economic clauses) of the present treaty.

Article 134. — Germany renounces, in favor of the Government of his Britannic Majesty, the German State property in the British concessions at Shameen at Canton. She renounces, in favor of the French and Chinese Governments conjointly, the property of the German school situated in the French concession at Shanghai.

SECTION III. — SIAM.

Article 135. — Germany recognizes that all treaties, conventions, and agreements between her and Siam, and all rights, titles, and privileges derived therefrom, including all rights of extraterritorial jurisdiction, terminated as from July 22, 1917.

Article 136. — All goods and property in Siam belong¬ ing to the German Empire or to any German State, with the exception of

premises used as diplomatic or consular residences or offices, pass ipso facto and with¬ out compensation to the Siamese Government.

The goods, property, and private rights of German nationals in Siam shall be dealt with in accordance with the provisions of Part X (economic clauses) of the present treaty.

Article i37- — Germany waives all claims against the Siamese Government on behalf of herself or her nationals arising out of the seizure or condemnation of German ships, the liquidation of German property, or the internment of German nationals in Siam. This provision shall not affect the rights of the parties interested in the proceeds of any such liquidation, which shall be governed by the provisions of Part X (economic clauses) of the present treaty.

SECTION IV. — LIBERIA.

Article 138. — Germany renounces all rights and privileges arising from the arrangements of 1911 and 1912 regarding Liberia, and particularly the right to imminate a German receiver of customs in Liberia. She further renounces all claim to participate in any measures whatsoever which may be adopted for the rehabilitation of Liberia.

Article 139. — Germany recognizes that all treaties and arrangements between her and Liberia terminated as from Aug. 4, 1917.

Article 140. — The property, rights, and interests of Germans inˆ Liberia shall be dealt with in accordance with Part X (economic clauses) of the present treaty.

SECTION V. — MOROCCO.

Article 141. — Germany renounces all rights, titles, and privileges conferred on her by the general act of Algeciras of April 7, 1906, and by the Franco-German agreements of Feb. 9, 1909, and Nov. 4, 1911. All treaties, agreements, arrangements, and contracts con-

eluded by her with the Sherifian Empire are regarded as abrogated as from Aug. 3, 1914.

In no case can Germany take advantage of these instruments, and she undertakes not to intervene in any way in negotiations relating to Morocco which may take place between France and the other powers.

Article 142. — Germany having recognized the French Protectorate in Morocco, hereby accepts all the con¬ sequences of its establishment, and she renounces the regime of the capitulations therein.

This renunciation shall take effect as from Aug. 3,

1914-

Article 143. — The Sherifian Government shall have complete liberty of action in regulating the status of German nationals in Morocco and the conditions in which they may establish themselves there.

German-protected persons, sensars, and “ associes agricoles ” shall be considered as having ceased, as from Aug. 3, 1914, to enjoy the privileges attached to their status and shall be subject to the ordinary law.

Article 144. — All property and possessions in the Sherifian Empire of the German Empire and the Ger¬ man States pass to the Maghzen without payment.

For the purposes of this clause, the property and possessions of the German Empire and States shall be deemed to include all the property of the crown, the empire, or States, and the private property of the former German Emperor and other royal personages.

All movable and immovable property in the Sherifian Empire belonging to German nationals shall be dealt with in accordance with Sections III and IV of Part X (economic clauses) of the present treaty.

Mining rights which may be recognized as be¬ longing to German nationals by the Court of Arbitra¬ tion set up under the Moroccan mining regulations shall form the subject of a valuation, which the arbi¬ trators shall be requested to make, and these rights shall then be treated in the same way as property in Morocco belonging to German

nationals.

Article 145. — The German Government shall insure the transfer to a person nominated by the French Gov¬ ernment of the shares representing Germany's portion of the capital of the State Bank of Morocco. The value of these shares, as assessed by the Reparation Commis¬ sion, shall be paid to the Reparation Commission for the credit of Germany on account of the sums due for reparation. The German Government shall be re¬ sponsible for indemnifying its nationals so dispossessed.

This transfer will take place without prejudice to the repayment of debts which German nationals may have contracted toward the State Bank of Morocco.

Article 146. — Moroccan goods entering Germany shall enjoy the treatment accorded to French goods.

SECTION VI. — EGYPT.

Article 147. — Germany declares that she recognizes the protectorate proclaimed over Egypt by Great Britain on Dec. 18, 1914, and that she renounces the regime of the capitulations in Egypt. This renunciation shall take effect as from Aug. 4, 1914—

Article 148. — All treaties, agreements, arrangements, and contracts concluded by Germany with Egypt are regarded as abrogated as from Aug. 4, 1914—

In no case can Germany avail herself of these in¬ struments, and she undertakes not to intervene in any way in negotiations relating to Egypt which may take place between Great Britain and the other powers.

Article 149. — Until an Egyptian law of judicial organization establishing courts with universal jurisdic¬ tion comes into force, provision shall be made, by means of decrees issued by his Highness the Sultan for the exercise of jurisdiction over German nationals and property by the British consular tribunals.

Article 150. — The Egyptian Government shall have complete liberty of action in regulating the status of German nationals and the conditions under which they may establish themselves in Egypt.

Article 151.ˆ — Germany consents to the abrogation of the decree issued by his Highness the Khedive on Nov. 28, 1904, relating to the

commission of the Egyptian public debt or to such changes as the Egyptian (Government may think it desirable to make therein.

Article 152. — Germany consents, in so far as she is concerned, to the transfer to his Britannic Majesty's Government of the powers conferred on his Imperial Majesty the Sultan, by the convention signed at Con¬ stantinople on Oct. 29, 1888, relating to the free navi¬ gation of the Suez Canal.

She renounces all participation in the Sanitary, Maritime, and Quarantine Board of Egypt, and con¬ sents, in so far as she is concerned, to the transfer to the Egyptian authorities of the powers of that board.

Article 153. — All property and possessions in Egypt of the German Empire and the German States pass to the Egyptian Government without payment.

For this purpose the property and possessions of the German Empire and States shall be deemed to include all the property of the crown, the empire or the States, and the private property of the former German Emperor and other royal personages.

All movable and immovable property in Egypt be¬ longing to German nationals shall be dealt with in accordance with Sections III and IV of Part X (economic clauses) of the present treaty.

Article 154. — Egyptian goods entering Germany shall enjoy the treatment accorded to British goods.

SECTION VII. — TURKEY AND BULGARIA.

Article 155. — Germany undertakes to recognize and accept all arrangements which the Allied and Asso¬ ciated Powers may make with Turkey and Bulgaria, with reference to any rights, interests, and privileges whatever which might be claimed by Germany or her nationals in Turkey and Bulgaria and which are not dealt with in the provisions of the present treaty.

SECTION VIII. — SHANTUNG.

Article 156. — Germany renounces, in favor of Japan, all her rights, titles, and privileges — particularly those concerning the territory of Kiao-Chau, railways, mines, and submarine cables, which she acquired

in virtue of the treaty concluded by her with China on 6th March, 1898, and of all other arrangements relative to the Province of Shantung.

All German rights in the Tsingtao-Tsinan-Fu rail¬ way, including its branch lines, together with its sub¬ sidiary property of all kinds, stations, shops, fixed and rolling stock, mines, plant, and material for the ex¬ ploitation of the mines are and remain acquired by Japan, together with all rights and privileges attaching thereto.

The German State submarine cables from Tsingtao to Shanghai and from Tsingtao to Che Foo, with all the rights, privileges, and properties attaching thereto, are similarly acquired by Japan, free and clear of all charges and incumbrances.

Article 157. — The movable and immovable property owned by the German State in the territory of Kiao-Chau, as well as all the rights which Germany might claim in consequence of the works or improvements made or of the expenses incurred by her, directly or indirectly, in connection with this territory, are and remain acquired by Japan, free and clear of all charges and incumbrances.

Article 158. — ‘Germany shall hand over to Japan within thrqe months from the coming into force of the present treaty the archives, registers, plans, title deeds, and documents of every kind, wherever they may be, relating toˆ the_ administration, whether civil, military, financial, judicial or other, of the territory of Kiao-Chau.

Within the same period Germany shall give par¬ ticulars to Japan of all treaties, arrangements or agreements relating to the rights, title or privileges referred to in the two preceding articles.

Part V. — Military, Naval, and Aerial

Clauses.

In order to render possible the initiation of a gen¬ eral limitation of the armaments of all nations, Ger¬ many undertakes strictly to observe the military, naval, and air clauses which follow:

SECTION I. — MILITARY CLAUSES.

Chapter /. — Effectives and Cadres of the German Army.

Article 159. — The German military forces shall be demobilized and reduced as prescribed hereinafter.

Article 160. — i. By a date which must not be later than March 31, 1920, the German Army must not comprise more than seven divisions of infantry and three divisions of cavalry. After that date the total number of effectives in the army of the States con¬ stituting Germany must not exceed 100,000 men, in¬ cluding officers and establishments of depots. The army shall be devoted exclusively to the maintenance of order within the territory and to the control of the frontiers.

The total effective strength of officers, including the personnel of staffs, whatever their composition, must not exceed 4,000.

2. Divisions and army corps headquarters staffs shall be organized in accordance with Table No. i annexed to this section.

The number and strength of the units of infantry, artillery, engineers, technical services, and troops laid down in the aforesaid table constitute maxima which must not be exceeded.

The following units may each have their own depot:

An infantry regiment; a cavalry regiment; a regi¬ ment of field artillery; a battalion of pioneers.

3. The divisions must not be grouped under more than two army corps headquarters staffs.

The maintenance of formation of forces differently grouped or of other organizations for the command of troops or for preparation for war is forbidden.

The Great German General Staff and all similar organizations shall be dissolved and may not be recon¬ stituted in any form.

The officers, or persons in the position of officers, in the Ministries of War in the different States in Germany and in the administrations attached to them, must not exceed three hundred in number and are in¬ cluded in the maximum strength of four thousand laid down in

the third sub-paragraph of the first paragraph of this article.

Article i6i. — Army administrative services consist¬ ing of civilian personnel not included in the number of effectives prescribed by the present treaty will have such personnel reduced in each class to one-tenth of that laid down in the budget of 1913.

Article 162. — The number of employes or officials of the German States, such as customs officers, forest guards, and coast guards shall not exceed that of the employes or officials functioning in these capacities in

1913-

The number of gendarmes and employes or officials of the local or municipal police may only be increased to an extent corresponding to the increase of popula¬ tion since 1913 in the districts or municipalities in which they are employed.

These employes and officials may not be assembled for military training.

Article 163. — The reduction of the strength of the German military forces as provided for in Article 160 may be effected gradually in the following manner:

Within three months from the coming into force of the present treaty the total number of effectives must be reduced to 200,000 and the number of units must not exceed twice the number of those laid down in Article 160.

At the expiration of this period, and at the end of each subsequent period of three months, a conference of military experts of the principal Allied and Asso¬ ciated Powers will fix the reductions to be made in the ensuing three months, so that by the 31st of March, 1920, at the latest, the total number of Gˆman effec¬ tives does not exceed the maximum number of 100,000 men laid down in Article 160. In these successive re¬ ductions the same ratio between the number of officers and of men, and between the various kinds of units shall be maintained as is laid down in that article.

Chapter II. — Armament, Munitions, and Material.

Article 164.— Up till the time at which Germany is admitted as a member of the League of Nations the German Army must not possess an armament greater than the amounts fixed in Table No. 2, annexed to this section, with the exception of an optional increase not exceeding one-twenty-fifth part for small arms and one-fiftieth part for guns, which shall be exclusively used to provide for such eventual replacements as may be necessary.

Germany agrees that after she has become a member of the League of Nations the armaments fixed in the. said table shall remain in force until they are modified* by the Council of the League. Furthermore she hereby agrees strictly to observe the decisions of the Council of the League on this subject.

Article 165. — The maximum number of guns, ma¬ chine guns, trench mortars, rifles, and the amount of ammunition and equipment which Germany is allowed to maintain during the period between the coming into force of the present treaty and the date of March 31, 1920, referred to in Article 160, shall bear the same proportion to the amount authorized in Table No. 3 an¬ nexed to this section as the strength of the German Army as reduced from time to time in accordance with Article 163 bears to the strength permitted under Arti¬ cle 160.

Article 166. — At the date of March 31, 1920, the stock of munitions which the German Army may have

at its disposal shall not exceed the amounts fixed in Table No. 3 annexed to this section.

Within the same period the German Government will store these stocks at points to be notified to the Governments of the principal Allied and Associated Powers. The German Government is forbidden to estab¬ lish any other stocks, depots, or reserves of munitions.

Article 167. — The number and calibre of the guns constituting at the date of the coming into force of the present treaty the armament of the fortified works, fortresses, and any land or coast forts which Germany is allowed to retain, must be notified immediately by the German Government to the Governments of the principal Allied and Associated Powers, and will con¬ stitute maximum amounts which may not be exceeded.

Within two months from the coming into force of the present treaty

the maximum stock of ammunition for these guns will be reduced to, and maintained at, the following uniform rates: Fifteen hundred rounds per piece for those the calibre of which is 10.5 cm. and under; 500 rounds per piece for those of higher calibre.

Article 168. — The manufacture of arms, munitions, or any war material shall only be carried out in fac¬ tories or works the locations of which shall be commu¬ nicated to and approved by the Governments of the principal Allied and Associated Powers, and the num¬ ber of which they retain the right to restrict.

Within three months from the coming into force of the present treaty all other establishments for the manufacture, preparation, storage, or design of arms, munitions, or any war material whatever shall be closed down. The same applies to all arsenals except those used as depots for the authorized stocks of munitions. Within the same period the personnel of these arsenals will be dismissed.

Article 169. — -Within two months from the coming into force of the present treaty, German arms, muni¬ tions, and war materials, including anti-aircraft mate¬ rial, existing in Germany in excess of the quantities allowed must be surrendered to the Governments of the principal Allied and Associated Powers, to be de¬ stroyed or rendered useless. This will also apply to any special plant intended for the manufacture of military material, except such as may be recognized as necessary for equipping the authorized strength of the German Army.

The surrender in question will be effected at such points in German territory as may be selected by the said Governments.

Within the same period, arms, munitions, and war material, including anti-aircraft material, of origin other than German, in whatever state they may be, will be delivered to the said Governments, who will decide as to their disposal.

Arms and munitions which on account of the suc¬ cessive reductions in the strength of the German Army become in excess of the amounts authorized by Tables 2 and 3 of the annex must be handed over in the manner laid down above within such periods as may be decided by the conferences referred to in Article 163.

Article 170. — Importation into Germany of arms, munitions, and war material of every kind shall be strictly prohibited.

The same applies to the manufacture for and ex¬ port to foreign countries of arms, munitions, and war material of every kind.

Article 171. — The use of asphyxiating, poisonous or other gases and all analogous liquids, materials or devices being prohibited, their manufacture and impor¬ tation are strictly forbidden in Germany.

The same applies to materials specially intended for the manufacture, storage, and use of the said products or devices.

The manufacture and the importation into Germany of_ armored cars, tanks, and all similar constructions suitable for use in war are also prohibited.

Article 172. — Within a period of three months from the coming into force of the present treaty the Ger¬ man Government will disclose to the Governments of the principal Allied and Associated Powers the nature and mode of manufacture of all explosives, toxic sub¬ stances or other like chemical preparations used by them in the war or prepared by them for the purpose of being so used.

Chapter III. — Recruiting and Military Train¬ ing.

Article 173. — Universal compulsory military service shall be abolished in Germany.

The German Army may only be constituted and recruited by means of voluntary enlistment.

Article 174. — The period of enlistment for non¬ commissioned officers and privates must be twelve con¬ secutive years.

The number of men discharged for any reason be¬ fore the expiration of their term of enlistment must not exceed in any year 5 per cent, of the total effec¬ tives as fixed by the second sub-paragraph of Paragraph I of Article 160 of the present treaty.

Article 175. — The officers who are retained in the army must undertake the obligation to serve in it up to the age of forty-five years, at least.

Officers newly appointed must undertake to serve on the active list for twenty-five consecutive years, at least.

Officers who have previously belonged to any forma¬ tion whatever of the army and who are not retained in the units allowed to be maintained must not take part in any military exercise, whether theoretical or practical, and will not be under any military obliga¬ tions whatever.

The number of officers discharged for any reason before the expiration of their term of service must not exceed in any year 5 per cent, of the total effectives of officers provided for in the third sub-paragraph of Paragraph i of Article 100 of the present treaty.

Article 176. — -On the expiration of two months from the coming into force of the present treaty there must only exist in Germany the number of military schools which is absolutely indispensable for the recruitment of the officers of the units allowed. These schools will be exclusively intended, for the recruitment of officers of each arm, in the proportion of one school per arm.

The number of students admitted to attend the courses of the said schools will be strictly in propor¬ tion to the vacancies to be filled in the cadres of officers. The students and the cadres will be reckoned in the effectives fixed by the second and third sub-paragraphs of Paragraph i of Article 160 of the present treaty.

Consequently, and during the period fixed above, all military academies or similar institutions in Germany, as well as the different military schools for officers, student officers, (aspiranten,) cadets, noncommissioned officers, or student noncommissioned officers, (aspiran¬ ten,) other than the schools above provided for, will be abolished.

Article 177. — Educational establishments, the uni¬ versities, societies of discharged soldiers, shooting or touring clubs, and, generally speaking, associations of every description, whatever be the age of their mem¬ bers, must not occupy themselves with any military matters. In particular they will be forbidden to in¬ struct or exercise their members, or to allow them to be instructed or exercised, in the profession or use of arms.

These societies, associations, educational establish¬ ments, and universities must have no connection with the Ministries of War or any other military authority.

Article 178. — All measures of mobilization or ap¬ pertaining to mobilization are forbidden.

In no case must formations, administrative services, or general staffs include supplementary cadres.

Article 179. — Germany agrees, from the coming into force of the present treaty, not to accredit nor to send to any foreign country any military, naval, or air mission, nor to allow any such missions to leave her territory, and Germany further agrees to take appro¬ priate measures to prevent German nationals from leaving her territory to become, enrolled in the army, navy, or air service of any foreign power, or to be attached to such army, navy, or air service for the purpose of assisting in the military, naval, or air train¬ ing thereof, or otherwise for the purpose of giving mili¬ tary, naval, or air instruction in any foreign country.

The Allied and Associated Powers agree, so far as they are concerned, from the coming into force of the present treaty, not to enroll in nor to attach to their armies or naval or air forces any German national for the purpose of assisting in the military training of such armies or naval or air forces, or otherwise to employ any such German national as military, naval, or aero¬ nautic instructor.

The present provision, however, does not affect the right of France to recruit for the Foreign Legion in accordance with French military laws and regulations.

Chapter IV. — Fortifications,

Article 180. — All fortified works, fortresses, and field works situated in German territory to the west of a line drawn fifty kilometers to the east of the Rhine shall be disarmed and dismantled.

Within a period of two months from the coming into force of the present treaty such of the above fortified works, fortresses, and field works as are situ¬

ated in territory not occupied by Allied and Associated troops shall be disarmed, and within a further period of four months they shall be dismantled. Those which are situated in territory occupied by Allied and Asso¬ ciated troops shall be disarmed and dismantled within such periods as may be fixed by the Allied High Com¬ mand.

The construction of any new fortification, whatever its nature and importance, is forbidden in the ione re¬ ferred to in the first paragraph above.

The system of fortified works of the southern and eastern frontiers of Germany shall be maintained in its existing state.

TABLE No. I.

State and Establishment of Army Corps Headquarters Staffs and of Infantry and Cavalry Divisions.

These tabular statements do not form a fixed estab-ment to be imposed on Germany, but the figures con¬ tained in them (number of units and strengths) repre¬ sent maximum figures, which should not in any case be exceeded.

1. Army Corps Headquarters Staffs.

UNITS

Maxi¬

mum

number

author¬

ized

Maximum strength of each unit

Officers

/

N.C.O.’s

and

men

Army corps hdq. staffs .

2

30

150

Total for hdq. staffs .

60

300

2. Establishment of an Infantry Division.

UNITS

Maximum number of such

Maximum strength of each unit

units in a single division

Officers

N.C.O.’s

and

men

Hdqrs. of inf. div .

1

25

70

Hdqrs. of divisional inf .

1

4

30

Hdqrs. of divisional art .

1

4

30

Regiment of inf .

3

70

2,300

(Each regiment comprises 3 battalions of infantry. Each battalion comprises 3 com¬ panies of infantry and 1 ma¬ chine-gun company.)

Trench mortar company ….

3

6

150

Divisional squadron .

1

6

150

Field artillery regiment .

1

85

1,300

(Each regiment comprises 3 groups of artillery. Each group comprises 3 batteries.) Pioneer battalion .

1

12

400

(This battalion comprises 2 companies of pioneers, 1 pon¬ toon detachment, 1 search¬ light section.)

Signal detachment .

1

12

300

(This detachment com¬ prises 1 telephone detach¬ ment, 1 listening section, 1 carrier pigeon section.) Divisional Med. Service .

1

20

400

Parks and convoys .

Total for infantry div .

14

410

800

10,830

3. Establishment of a Cavalry Division.

UNITS

Maximum number of such

Maximum strength of each unit

units in a single division

Officers

N.C.O.‘s

and

men

Headquarters of a cavalry division .

1

15

50

Cavalry regiment .

6

40

800

(Each regiment comprises four squadrons.)

Horse artillery (three bat¬ teries) .

1

20

400

Total for cavalry division ….

275

5,250

TABLE No. 2.

Tabular statement of armament established for a maximum of seven infantry divisions, three cavalry di¬ visions, and two army corps headquarters staffs.

MATERIAL

Inf.

Div.

For 7 Inf. Divs.

Cav,

Div.

For 3 Cav. Divs.

Total

col¬

umns

2 & 4

Rifles .

12.000

84,000

84,000

18,000

Carbines .

6,000

18,000

Heavy machine

guns .

108

756

12

36

792

Light machine

guns .

162

1,134

1,134

Medium trench

mortars .

9

63

63

Light trench mortars .

27

189

189

7.7 cm. guns .

1C. 5 cm. howit-

24

168

12

36

204

zers .

12

84

84

Army corps headquarters staff establishment must be drawn from the increased armaments of the divisional infantry.

TABLE No. 3.

Maximum Stocky Authorized.

MATERIAL

Maximum number of arms author¬ ized

Estab¬ lishment per unit. Rounds

Maximum

totals.

Rounds

Rifles .

84,000

400

40,800,000

Carbines .

18,000

Heavy machine guns .

792

8,000

15,408,000

T>ight TTU^^rhinp. guns .

1,134

Medium trench mortars…

63

400

25,000

Light trench mortars .

189

800

151,200

Field artillery —

7.7 cm. guns .

204

1,000

204,000

10.5 cm. howitzers .

84

800

67,200

SECTION II. — NAVAL CLAUSES.

Article i8i. — After the expiration of a period of two months from the coming into force of the present treaty the German naval forces in

commission must not exceed: Six battleships of the Deutschland or Lothringen type, six light cruisers, twelve destroyers, twelve torpedo boats, or an equal number of ships con¬ structed to replace them as provided in Article 190.

No submarines are to be included. All other war¬ ships except where there is provision to the contrary in the present treaty, must be placed in reserve or de¬ voted to commercial purposes.

Article 182. — 'Until the completion of the mine¬ sweeping prescribed by Article 193, Germany will keep in commission such number of minesweeping vessels as may be fixed by the Governments of the principal Allied and Associated Powers.

Article 183. — After the expiration of a period of two months from the coming into force of the present treaty the total personnel of the German Navy, in¬ cluding the manning of the fleet, coast defenses, signal stations, administration, and other land services, must not exceed 15,000, including officers and men of all grades and corps. The total strength of officers and warrant officers must not exceed 1,500. Within two months from the coming into force of the present treaty the personnel in excess of the above strength shall be demobilized. No naval or military corps or reserve force in connection with the navy may be organized in Germany without being included in the above strength.

Article 184. — From the date of the coming into force of the present treaty all the German surface war¬ ships which are not in German ports cease to belong to Germany, who renounces all rights over them. Ves¬ sels which, in compliance with the armistice of Nov. II, 1918, are now interned in the ports of the Allied and Associated Powers, are declared to be finally sur¬ rendered. Vessels which are now interned in neutral ports will be there surrendered to the Governments of the principal Allied and Associated Powers. The Ger¬ man Government must address a notification to that effect to the neutral powers on the coming into force of the present treaty.

Article 185. — Within a period of two months from the coming into force of the present treaty the German surface warships enumerated below will be surrendered to the Governments of the principal Allied and Asso¬ ciated Powers in such allied ports as the said powers may direct. These warships will have been disarmed as provided in Article 23 of the armistice, dated Nov.

II, 1918. Nevertheless, they must have all their guns on board.

Battleships — Oldenburg, Thuringen, Ostfriesland, Helgoland, Posen, Westfalen, Rheinland, and Nassau.

Light Cruisers — Stettin, Danzig, Miinchen, Lii-beck, Stralsund, Augsburg, Kolberg, and Stuttgart.

And in addition forty-two modern .destroyers and fifty modern torpedo boats, as chosen by the Govern¬ ments of the principal Allied and Associated Powers.

Article 186. — On the coming into force of the pres¬ ent treaty the German Government must undertake, under the supervision of the Governments of the prin¬ cipal Allied and Associated Powers, the breaking up of all the German surface warships now under construc¬ tion.

Article 187. — The German auxiliary cruisers and fleet auxiliaries enumerated below will be disarmed and treated as merchant ships.

Ships interned in neutral countries: Berlin, Santa Fe, Seydlitz, Yorck.

Ships interned in Germany: Ammon, Fiirst Billow, Answald, Gertrud, Bosnia, Kigoitia, Cordoba, Rugia, Cassel, Santa Elena, Dania, Schleswig, Rio Negro, Mdwe, Rio Pardo, Sierra Ventana, Santa Cruz, Chem¬ nitz, Schwaben, Emil Georg von Strauss, Solingen, Hapsburg, Steigerwald, Meteor, Franken, Waltraute Gundomar, Scharnhorst.

Article 188. — On the expiration of one month from the coming into force of the present treaty all Gerrtian submarines, salvage vessels, and docks for submarines, including the tubular dock, must have been handed over to the Governments of the principal Allied and Associated Powers. Such of these submarines, vessels, and docks as are considered by said Government to be fit to proceed under their own power or to be towed shall be taken by the German Government into such allied ports as have been indicated. The remainder, and also those in course of construction, shall be broken up entirely by the German Government under the supervision of the said Governments. The breaking up must be completed within three months at the most after the coming into force of the present treaty.

Article 189. — Articles, machinery, and material arising from the breaking up of German warships of all kinds, whether surface vessels or submarines, may not be used except for purely industrial or commercial purposes. They may not be sold or disposed of to foreign

countries.

Article 190. — ‘Germany is forbidden to construct or acquire any warships other than those intended to re¬ place the units in commission provided for in Article 1 81 of the present treaty. The warships intended for replacement purposes as above shall not exceed the following displacement: Armored ships, 10,000 tons; light cruisers, 6,000 tons; destroyers, 800 tons; torpedo boats, 200 tons. Except where a ship has been lost, units of the different classes shall only be replaced at the end of a period of twenty years in the case of battleships and cruisers, and fifteen years in the case of destroyers and torpedo boats, counting from the launching of the ship.

Article 191. — The construction or acquisition of any submarine, even for commercial purposes, shall be for¬ bidden in Germany.

Article 192. — The warships in commission of the German fleet must only have on board or in reserve the allowance of arms, munitions, and war material fixed by the principal Allied and Associated Powers. Within a month from the fixing of the quantities as above, arms, munitions and war material of all kinds, including mines and torpedoes, now in the hands of the German Government and in excess of the said quantities, shall be surrendered to the Governments of the said powers at places to be indicated by them. Such arms, munitions and war material will be de¬ stroyed or rendered useless. All other stocks, depots or reserves of arms, munitions or naval war material of all kinds are forbidden. The manufacture of these articles in German territory for, and their export to foreign countries shall be forbidden.

Article 193. — On the coming into force of the present treaty Germany will forthwith sweep up the mines in the following areas in the North Sea to the eastward of longitude 4 degrees 00 minutes east of Greenwich: (i) Between parallels of latitude 53 de¬

grees 00 minutes N. and 59 degrees 00 minutes N. ; (2) to the northward of latitude 60 degrees 30 minutes N. Germany must keep these areas free from mines. Germany must also sweep and keep free from mines such areas in the Baltic as may ultimately be notified by the Governments of the principal Allied and Asso¬ ciated Powers.

Article 194. — The personnel of the German Navy shall be recruited entirely by voluntary engagements entered into for a minimum period of twenty-five con-

secutive years for officers and warrant officers, and twelve consecutive years for petty officers and men. The number engaged to replace those discharged for any reason before the expiration of their term of service must not exceed 5 per cent, per annum of the totals laid down in this section. (Article 183.)

The personnel discharged from the navy must not receive any kind of naval or military training or under¬ take any further service in the navy or army. Officers belonging to the German Navy and not demobilized must engage to serve till the age -of 45 unless dis¬ charged for sufficient reasons. No officer or man of the German mercantile marine shall receive any train¬ ing in the navy.

Article 195. — In order to insure free passage into the Baltic to all nations, Germany shall not erect any fortifications in the area comprised between latitudes 55.27 north and 54.00 north and longitudes 9.00 east and 16.00 east of the meridian of Greenwich, nor install any guns commanding the maritime routes between the North Sea and the Baltic. The fortifications now ex¬ isting in this area shall be demolished and the guns re¬ moved under the supervision of the allied Govern¬ ments and in periods to be fixed by them. The German Government shall place at the disposal of the Govern¬ ments of the principal Allied and Associated Powers all hydrographical information now in its possession con¬ cerning the channels and adjoining waters between the Baltic and the North Sea.

Article 196. — All fortified works and fortifications other than those mentioned in Article 195 and in Part III (political clauses for Europe), Section XIII, (Heligoland,) now established within fifty kilometers of the German coast or on German islands off that coast, shall be considered of a defensive nature and may remain in their existing condition. No new forti¬ fications shall be constructed within these limits. The armament of these defenses shall not exceed, as re¬ gards the number and calibre of guns, those in posi¬ tion at the date of the coming into force of the present treaty. The German Government shall communicate forthwith particulars thereof to all the European Gov¬ ernments. On the expiration of a period of two months from the

coming into force of the present treaty the stocks of ammunition for these guns shall be reduced to and maintained at a maximum figure of fifteen hun¬ dred rounds per piece for calibres of 4.1 inch and under, and five hundred rounds per piece for higher calibres.

Article 197. — During the three months following the coming into force of the present treaty the German high-power wireless telegraphy stations at Nauen, Han¬ over, and Berlin shall not be used for the transmission of messages concerning naval, military, or political questions of interest to Germany or any State which has been allied to Germany in the war, without the assent of the Governments of the principal Allied and Associated Powers. These stations may be used for commercial purposes, but only under the supervision of the said Governments, who will decide the wave length to be used. During the same period Germany shall not build any more high-power wireless telegraphy stations in her own territory or that of Austria, Hun¬ gary, Bulgaria, or Turkey.

SECTION III. — AIR CLAUSES.

Article 198. — The armed forces of Germany must not include any military or naval air forces. Ger¬ many may, during a period not extending beyond Oct. I, 1919, maintain a maximum number of 100 seaplanes or flying boats, which shall be exclusively employed in searching for submarine mines, shall be furnished with the necessary equipment for this purpose, and shall in no case carry arms, munitions, or bombs of any nature whatever. In addition to the engines installed in the seaplanes or flying boats above mentioned, one spare engine may be provided for each engine of each of these craft. No dirigible shall be kept.

Article 199. — Within two months from the coming into force of the present treaty the personnel of the air forces on the rolls of the German land and sea forces shall be demobilized. Up to the ist of October, 1919, however, Germany may keep and maintain a total number of 1,000 men, including officers, for the whole of the cadres and personnel, flying and non¬ flying, of all formations and establishments.

Article 200. — Until the complete evacuation of Ger¬ man territory by the Allied and Associated troops, the aircraft of the Allied and Associated Powers shall en¬ joy in Germany freedom of passage through the air, freedom of transit and of landing.

Article 201. — During the six months following the coming into force

of the present treaty the manufacture and importation of aircraft, parts of aircraft, engines

for aircraft, and parts of engines for aircraft shall be forbidden in all German territory.

Article 202. — On the coming into force of the present treaty all military and naval aeronautical ma¬ terial, except the machines mentioned in the second and third paragraphs of Article 198, must be delivered to the Governments of the principal Allied and Asso¬ ciated Powers. Delivery must be effected at such places as the said Governments may select, and must be completed within three months. In particular, this ma¬ terial will include all items under the following heads, which .are or have been in use or were designed for warlike purposes:

Complete airplanes and seaplanes, as well as those being manufactured, repaired, or assembled.

Dirigibles able to take the air being manufactured, repaired, or assembled.

Plant for the manufacture of hydrogen.

Dirigible sheds and shelters of every kind for air¬ craft.

Pending their delivery, dirigibles will, at the ex¬ pense of Germany, be maintained inflated with hydro¬ gen; the plant for the manufacture of hydrogen, as well as the sheds for dirigibles, may, at the discretion of said powers, be left to Germany until the time when the dirigibles are handed over.

Engines for aircraft.

Nacelles and fuselages.

Armament, (guns, machine guns, light machine guns, bomb-droppirig apparatus, torpedo-dropping apparatus, synchronization apparatus, aiming apparatus).

Munitions, (cartridges, shells, bombs, loaded or un¬ loaded, stocks of explosives or of material for their manufacture).

Instruments for use on aircraft.

Wireless apparatus and photographic or cinemat¬ ograph apparatus for use on aircraft.

Component parts of any of the items under the preceding heads.

The material referred to above shall not be removed without special permission from the said Governments.

SECTION IV. — interallied COMMISSIONS OF

CONTROL.

Article 203. — All the military, naval, and air clauses contained in the present treaty, for the execu¬ tion of which a time limit is prescribed, shall be ex¬ ecuted by Germany under the control of interallied commissions specially appointed for this purpose by the principal Allied and Associated Powers.

Article 204. — The Interallied Commissions of Con¬ trol will be specially charged with the duty of seeing to the complete execution of the delivery, destruction, demolition, and rendering things useless to be carried out at the expense of the German Government in ac¬ cordance with the present treaty. They will communi¬ cate to the German authorities the decisions which the principal Allied and Associated Powers have reserved the right to take, or which the execution of the military, naval, and air clauses may necessitate.

Article 205.— The Interallied Commissions of Con¬ trol may establish their organizations at the seat of the Central German Government. They shall be enti¬ tled as often as they think desirable to proceed to any point whatever in German territory, or to send sub¬ commissions, or to authorize one or more of their mem¬ bers to go, to any such point.

Article 206. — The German Government must give all necessary facilities for the accomplishment of their missions to the Interallied Commissions of Control and to their members. It shall attach a qualified represen¬ tative to each Interallied Commission of Control for the purpose of receiving the communications which the commission may have to address to the German Gov¬ ernment, and of supplying or procuring for the com¬ mission all information or documents which may be re¬ quired. The German Government must in all cases furnish at its own cost all labor and material required to effect the deliveries and the work of destruction, dismantling,

demolition, and of rendering things use¬ less, provided for in the present treaty.

Article 207. — ■ The upkeep and cost of the Commis¬ sions of Control and the expenses involved by their work shall be borne by Germany.

Article 208. — The Military Interallied Commission of Control will represent the Governments of the prin¬ cipal Allied and Associated Powers in dealing with the German Government in all matters concerning the exe¬ cution of the military clauses. In particular it will be its duty to receive from the German Government the notifications relating to the location of the stocks and depots of munitions, the armaments of the fortified works, fortresses and forts which Germany is allowed to retain, and the location of the works or factories

for the production of arms, munitions and war material and their operations. It will take delivery of the arms, munitions, and war material, will select the points where such delivery is to be effected, and will super¬ vise the works of destruction and demolition and of rendering things useless which are to be cjarried out in accordance with the present treaty. The German Gov¬ ernment must furnish to the Military Interallied Com¬ mission of Control all such information and documents as the latter may deem necessary to insure the complete execution of the military clauses, and in particular all legislative and administrative documents and regula¬ tions.

Article 209. — The Naval Interallied Commission of Control will represent the Governments of the principal Allied and Associated Powers in dealing with the Ger¬ man Government in all matters concerning the execu¬ tion of the naval clauses. In particular it will be its duty to proceed to the building yards and to supervise the breaking up of the ships which are under construc¬ tion there, to take delivery of all surface ships or sub¬ marines, salvage ships, docks and the tubular dock, and to supervise the destruction and breaking up provided for. The German Government must furnish to the Naval

Interallied Commission of Control all such in¬ formation and documents as the commission may deem necessary to insure the complete execution of the naval clauses, in particular the designs of the warships, the composition of their armaments, the details and models of the guns, munitions, torpedoes, mines, explosives, wireless telegraphic apparatus and in general everything relating to naval war material, as well as all legislative or administrative documents or regulations.

Article 210. — The Aeronautical Interallied Commis¬ sion of Control will represent the Governments of the principal Allied and Associated Powers in dealing with the German Government in all matters concerning the execution of the air clauses. In particular it will be its duty to make an inventory of the aeronautical ma¬ terial existing in German territory, to inspect airplane, balloon, and motor manufactories, and factories pro¬ ducing arms, munitions, and explosives capable of being used by aircraft, to visit all aerodromes, sheds, landing grounds, parks, and depots, to authorize, where neces¬ sary, a removal of material, and to take delivery of such material. The German Government must furnish to the Aeronautical Interallied Commission of Control all such information and legislative, administrative or other documents which the commission may consider necessary to insure the complete execution of the air clauses, and, in particular, a list of the personnel be¬ longing to all the German air services, and of the ex¬ isting material as well as of that in process of manu¬ facture or on order, and a list of all establishments working for aviation, of their positions, and of all sheds and landing grounds.

SECTION V. — GENERAL ARTICLES.

Article 21 1. — ‘After the expiration of a period of three months from the coming into force of the present treaty, the German laws must have been modified and shall be maintained in conformity with this part of the present treaty. Within the same period all the admin¬ istrative or other measures relating to the execution of this part of the treaty must have been taken.

Article 212. — The following portions of the armis¬ tice of Nov. II, 1918: Article VI, the first two and the sixth and seventh paragraphs of Article VII, Article IX, Clauses I, II, and V of Annex No. 2 and the protocol, dated April 4, 1919. supplementing the armis¬ tice of Nov. II, 1918, remain in force so far as they are not inconsistent with the above stipulations.

Article 213. — So long as the present treaty remains in force, Germany undertakes to give every facility for any investigation which the Council of the League of Nations, acting if need be by a majority vote, may consider necessary.

Part VI. — Prisoners of War and Graves.

SECTION I. — prisoners OF WAR.

Article 214. — The repatriation of prisoners of war and interned civilians shall take place as soon as possi¬ ble after the coming into force of the present treaty and shall be carried out with the greatest rapidity.

Article 215. — The repatriation of German prisoners of war and interned civilians shall, in accordance with Article 214, be carried out by a commission composed of representatives of the Allied and Associated Powers on the one part, and of the German Government on the other part.

For each of the Allied and Associated Powers a sub¬ commission composed exclusively of representatives of

the interested powers and of delegates of the German Government shall regulate the details of carrying into effect the repatriation of the prisoners of war.

Article 216. — From the time of their delivery into the hands of the German authorities the prisoners of war and interned civilians are to be returned without delay to their homes by the said authorities. Those among them who before the war were habitually resi¬ dent in territory occupied by the troops of the Allied and Associated Powers are likewise to be sent to their homes, subject to the consent and control of the mili¬ tary authorities of the Allied and Associated Armies of Occupation.

Article 217. — The whole cost of repatriation from the moment of starting shall be borne by the German Government, who shall also provide the land and sea transport and staff considered necessary by the com¬ mission referred to in Article 215.

Article 218. — Prisoners of war and interned civil¬ ians awaiting disposal or undergoing sentences for offenses against discipline shall be repatriated irrespec¬ tive of the completion of their sentence or of

the pro¬ ceedings pending against them.

• This stipulation shall not apply to prisoners of war and interned civilians punished for offenses committed subsequent to May i, 1919.

During the period pending their repatriation all prisoners of war and interned civilians shall remain subject to the existing regulations, more especially as regards work and discipline.

Article 219.-ˆ— Prisoners of war and interned civilians who are awaiting disposal or undergoing sentence for offenses other than those against discipline may be de¬ tained.

Article 220. — The German Government undertakes to admit to its territory without distinction all persons liable to repatriation.

Prisoners of war or other German nationals who do not desire to be repatriated may be excluded from repatriation; but the Allied and Associated Govern¬ ments reserve to themselves the right either to repatriate them or to take them to a neutral country or to allow them to reside in their own territories.

The German Government undertakes not to institute any exceptional proceedings against these persons or their families nor to take any repressive or vexatious measures of any kind whatsoever against them on this account.

Article 221. — The Allied and Associated Govern¬ ments reserve the right to make the repatriation of German prisoners of war or German nationals in their hands conditional upon the immediate notification and release by the German Government of any prisoners of war who are nationals of the Allied and Associated Powers and may still be in Germany.

Article 222. — Germany undertakes:

1. To give every facility to the commissions to in¬ quire into the cases of those who cannot be traced; to furnish such commissions with all necessary means of transport; to allow them access to camps, prisons, hos¬ pitals, and all other places; and to place at their dis¬ posal all documents, whether public or private, which would facilitate their inquiries.

2. To impose penalties upon any German officials or private persons who have concealed the presence of any nationals of any of the Allied and Associated Powers, or have neglected to reveal the presence of

any such after it had come to their knowledge.

Article 223. — Germany undertakes to restore with¬ out delay from the date of the coming into force of the present treaty all articles, money, securities, and docu¬ ments which have belonged to nationals of the Allied and Associated Powers and which have been retained by the German authorities.

Article 224. — The high contracting parties waive reciprocally all repayment of sums due for the mainte¬ nance of prisoners of war in their respective territories.

SECTION II. — GRAVES.

Article 225. — The Allied and Associated Govern¬ ments and the German Government will cause to be re¬ spected and maintained the graves of the soldiers and sailors buried in their respective territories.

They agree to recognize any commission appointed by an Allied or Associated Government for the pur¬ pose of identifying, registering, caring for, or erecting suitable memorials over the said graves and to facilitate the discharge of its duties.

Furthermore, they agree to afford, so far as the pro¬ visions of the laws and the requirements of public health allow, every facility for giving effect to requests that the bodies of their soldiers and sailors may be trans¬ ferred to their own countries.

Article 226. — The graves of prisoners of war and

interned civilians who are nationals of the different belligerent States and have died in captivity shall be properly maintained in accordance with Article 225 of the present treaty.

The Allied and Associated Governments on the one part, and the German Government on the other part, reciprocally undertake also to furnish to each other:

1. A complete list of those who have died, together with all information useful for identification.

2. All information as to the number and position of the graves of all those who have been buried without identification.

Part VII. — Penalties.

Article 227. — The Allied and Associated Powers publicly arraign William II of Hohenzollern, formerly German Emperor, for a supreme offense against inter¬ national morality and the sanctity of treaties.

A special tribunal will be constituted to try the accused, thereby assuring him the guarantees essential to the right of defense. It will be composed of five judges, one appointed by each of the following powers: The United States of America, Great Britain, France, Italy, and Japan.

In its decision, the tribunal will be guided by the highest motives of international policy with a view to vindicating the solemn obligations of international undertakings and the validity of international morality. It will be its duty to fix the punishment which it con¬ siders should be imposed.

The Allied and Associated Powers will address a request to the Government of the Netherlands for the surrender to them of the ex-Emperor in order that he may be put on trial.

Article 228. — The German Government recognizes the right of the Allied and Associated Powers to bring before military tribunals persons accused of having committed acts in violation of the laws .and customs of war. Such persons shall, if found guilty, be sentenced to punishments laid down by law. This provision will apply, - notwithstanding any proceedings or prosecution before a tribunal in Germany or in the territory of her allies.

The German Government shall hand over to the Allied and Associated Powers or to such one of them as shall so request, all persons accused of having com¬ mitted an act in violation of the law and customs of war who are specified either by name or by the rank, office, or employment which they held under the Ger¬ man authorities.

Article 229. — ■ Persons guilty of criminal acts against the nationals of one of the Allied and Asso¬ ciated Powers will be brought before the military tri¬ bunals of that»power.

Persons guilty of criminal acts against the nationals of more than one of the Allied and Associated Powers will be brought before military tribunals composed of members of the military tribunals of the powers con¬ cerned.

In every case the accused will be entitled to name his own counsel.

Article 230. — The German Government undertakes to furnish all documents and information of every kind, the production of which may be considered necessary to insure the full knowledge of the incriminating acts, the discovery of offenders, and the just appreciation of responsibility.

Part VIII. — Reparation.

SECTION I. — GENERAL PROVISIONS.

Article 231. — The Allied and Associated Govern¬

ments affirm, and Germany accepts, the responsibility of Germany and her allies for causing all the loss and damage to which the Allied and Associated Govern¬

ments and their nationals have been subjected as a con¬ sequence of the war imposed upon them by the aggres¬ sion of Germany and her allies.

Article 232. — The Allied and Associated Govern¬

ments recognize that the resources of Germany are not adequate, after taking into account permanent diminu¬ tions of such resources which will result from other provisions of the present treaty, to make complete

reparation for all such loss and damage.

The Allied and Associated Governments, however, require, and Germany undertakes, that she will make compensation for all-damage done to the civilian popu¬ lation of the Allied and Associated Powers and to their property during the period of the belligerency of each as an Allied or Associated Power against Germany by such aggression by land, by sea, and from the air, and in general all damage as defined in Annex I hereto.

In accordance with Germany’s pledges, already

given as to complete restoration for Belgium, Germany undertakes, in addition to the compensation for dam¬ age elsewhere in this chapter provided for, as a conse¬ quence of the violation of the treaty of 1839, to make reimbursement of all sums which Belgium has borrowed from the Allied and Associated Governments up to Nov. II, 1918, together with interest at the rate of 5 per cent, per annum on such sums. This amount shall be determined by the Reparation Commission, and the German Government undertakes thereupon forthwith to make a special issue of bearer bonds to an equivalent amount payable in marks gold, on May i, 1926, or, at the option of the German Government, on the I St of May in any year up to 1926. Subject to the foregoing, the form of such bonds shall be deter¬ mined by the Reparation Commission. Such bonds shall be handed over to the Reparation Commission, which has authority to take and acknowledge receipt thereof on behalf of Belgium.

Article 233. — The amount of the above damage for which compensation is to be made by Germany shall be determined by an interallied commission, to be called the Reparation Commission, and constituted in the form and with the power set forth hereunder and in Annexes II to VII inclusive hereto.

This commission shall consider the claims and give to the German Government a just opportunity to be heard.

The findings of the commission as to the amount of damage defined as above shall be concluded and notified to the German Government on or before the I St May, 1921, as representing the extent of that Gov¬ ernment's obligations.

The commission shall concurrently draw up a schedule of payments prescribing the time and manner for securing and discharging the entire obligation within a period of thirty years from the ist May, 1921. If, however, within the period mentioned," Germany fails to discharge her obligations, any balance remaining unpaid may, within the discretion of the commission, be postponed for settlement in subsequent years, or may be handled otherwise in such manner as the Allied and Associated Governments, acting in Accord¬ ance with the procedure laid down in this part of the present treaty, shall determine.

Article 234. — The Reparation Commission shall after the ist May, 1921, from time to time, consider the resources and capacity of Germany and, after giving her representatives a just opportunity to be

heard, shall have discretion to extend the date and to modify the form of payments, such as are to be pro¬ vided for in accordance with Article 233; but not to cancel any part, except with the specific authority of the several Governments represented upon the com¬ mission.

Article 235. — In order to enable the Allied and Associated Powers to proceed at once to the restora¬ tion of their industrial and economic life, pending the full determination of their claims, Germany shall pay in such installments and in such manner (whether in gold, commodities, ships, securities, or otherwise) as the Reparation Commission may fix, during 1919, 1920, and the first four months of 1921, the equivalent of 20,000,000,000 gold marks.

Out of this sum the expenses of the armies of occu¬ pation subsequent to the armistice of the nth Novem¬ ber, 1918, shall first be met, and such supplies of food and raw materials as may be judged by the Govern¬ ments of the principal Allied and Associated Powers to be essential to enable Germany to meet her obliga¬ tions for reparation may also, with the approval of the said Governments, be paid for out of the above sum. The balance shall be reckoned toward liquidation of the amounts due for reparation.

Germany shall further deposit bonds as prescribed in Paragraph 12 (c) of Annex II hereto.

Article 236. — Germany further agrees to the direct application of her economic resources to reparation as specified in Annexes III, IV, V, and VI, relating re¬ spectively to merchant shipping, to physical restora¬ tion, and to coal and derivatives of coal, and to dye¬ stuffs and other chemical products; provided always that the value of the property transferred and any services rendered by her under these annexes, assessed in the manner therein prescribed, shall be credited to her toward liquidation of her obligations under the above articles. .

Article 237. — The successive installments, including the above sum, paid over by Germany in satisfaction of the above claims, will be divided by the Allied and Associated Governments in proportions which have been determined upon by them in advance on a basis of general equity and of the rights of each.

For the purposes of this division the value of

property transferred and services rendered under Article 243 and under Annexes III, IV, V, VI, and VII shall be reckoned in the same manner as cash payments effected in that year.

Article 238. — In addition to the payments men¬ tioned above, Germany shall effect, in accordance with the procedure laid down by the Reparation Commission, restitution in cash of cash taken away, seized, or sequestrated, and also restitution of animals, objects of every nature, and securities taken away, seized, or sequestrated, in the cases in which it proves possible to identify them in territory belonging to Germany or her allies.

Until this procedure is laid down restitution will continue in accordance with the provisions of the armistice of nth of November, 1918, and its renewals and the protocols thereto.

Article 239. — Germany undertakes to make forth¬ with the restitution contemplated by Article 238 and to make the payments and deliveries contemplated by Articles 233, 234, 235, and 236.

Article 240. — Germany recognizes the commission providing for by Article 233 as the same may be con¬ stituted by the Allied and Associated Governments in accordance with Annex II and agrees irrevocably to the possession and exercise by such commission of the power and authority given to it under the present treaty. The German Government will supply to the commission all the information which the commission may require relative to the financial situation and operations and to the property, productive capacity, and stocks and current production of raw materials and (manufactured articles of Germany and her nationals, and, further, any information relative to military operations which in the judgment of the com¬ mission may be necessary for the assessment of Ger¬ many's liability for reparation as defined in Annex I.

The German Government will accord to the members of the commission and its authorized agents the same rights and immunities as are enjoyed in Germany by duly accredited diplomatic agents of friendly powers. Germany further agrees to provide for the salaries and expenses of the commission, and of such staff as it may employ. *

Article 241. — Germany undertakes to pass, issue, and maintain in force any legislation, orders, and decrees that may be necessary to give complete effect to these presents.

Article 242. — The provisions of this part of the present treaty do not apply to the property, rights, and interests referred to in Sections III and IV of Part X (economic clauses) of the present treaty, nor to the product of their liquidation, except so far as concerns any final balance in favor of Germany under Article 243 (a).

Article 243. — The following shall be reckoned as credits to Germany in respect of her reparation obli¬ gations:

(a) Any final balance in favor of Germany under Sections III and IV of Part X (economic clauses) and Section V (Alsace-Lorraine) of Part III, (political clauses for Europe).

(b) Amounts due to Germany in respect of trans¬ fers under Part IX, (financial clauses). Part XII, (ports, waterways, and railways), and Section IV (Sarre Basin) of Part III, (political clauses for Europe).

(c) Amounts which in the judgment of the Repa¬ ration Commission should be credited to Germany on account of any other transfers under the present treaty of property, rights, concessions, or other interests.

In no case, however, shall credit be given for property restored in accordance with Article 238.

Article 244. — The transfer of the German submarine cables which do not form the subject of particular pro¬ visions of the present treaty is regulated by Annex VII hereto.

annex I.

Compensation may be claimed from Germany under Article 232 above in respect of the total damage under the following categories:

1. Damage to injured persons and to surviving de¬ pendents by personal injury to or death of civilians caused by acts of war, including bombardments or other attacks on land, on sea, or from the air, and all the direct consequences thereof, and of all operations of war by the two groups of belligerents wherever arising.

2. Damage caused by Germany or her allies to civilian victims of acts of cruelty, violence, or mal¬ treatment, (including injuries to life or

health as a consequence of imprisonment, deportation, internment, or evacuation, of exposure at sea, or of being forced to labor by Germany or her allies), wherever arising, and to the surviving dependents of such victims.

3. Damage caused by Germany or her allies in their own territory or in occupied or invaded territory to civilian victims of all acts injurious to health or capacity to work, or to honor, as well as to the sur¬ viving dependents of such victims.

4. Damage caused by any kind of maltreatment of prisoners of war.

5. As damage caused to the peoples of the Allied and Associated Powers, all pensions and compensations in the nature of pensions to naval and military victims of war, (including members of the air forces), whether mutilated, wounded, sick, or invalided, and to the dependents of such victims, the amount due to the Allied and Associated Governments being calculated for each of them as being the capitalized cost of such pensions and compensations at the date of the com¬ ing into force of the present treaty, on the basis of the scales in force in France at such date.

6. The cost of assistance by the Governments of the Allied and Associated Powers to prisoners of war and to their families and dependents.

7. Allowances by the Governments of the Allied and Associated Powers to the families and dependents of mobilized persons or persons serving with the forces, the amount due to them for each calendar year in which hostilities occurred being calculated for each Government on the basis of the average scale for such payments in force in France during that year.

8. Damage caused to civilians by being forced by Germany or her allies to labor without just remunera¬ tion.

9. Damage in respect of all property, wherever situated, belonging to any of the Allied or Associated States or their nationals, with the exception of naval and military works or materials, which have been carried off, seized, injured, or destroyed by the acts of Germany or her allies on land, on sea, or from the air, or damage directly in consequence of hostilities or of any operations of war.

10. Damage in the form of levies, fines and other similar exactions

imposed by Germany or her allies upon the civilian population.

ANNEX II.

1. The commission referred to in Article 233 shall be called “ The Reparation Commission,” and is herein¬ after referred to as “ the commission.”

2. Delegates to the commission shall be nominated by the United States of America, Great Britain, France, Italy, Japan, Belgium, and the Serb-Croat-Slovene State. Each of these powers will appoint one delegate and also one assistant delegate, who will take his place in case of illness or necessary absence, but at other times will only have the right to be present at pro¬ ceedings without taking any part therein. On no occasion shall the delegates of more than five of the above powers have the right to take part in the pro¬ ceedings of the commission and to record their votes. The delegates of the United States, Great Britain, France, and Italy shall have this right on all occasions. The delegate of Belgium shall have this right on all occasions other than those referred to below. The delegate of Japan shall have this right on occasions when questions relating to damage at sea and ques¬ tions arising under Article 260 of Part IX (financial clauses) in which Japanese interests are concerned are under consideration. The delegate of the Serb-Croat- Slovene State shall have this right when questions relating to Austria, Hungary, or Bulgaria are under consideration.

Each Government represented on the commission shall have the right to withdraw therefrom upon twelve months notice, filed with the commission and confirmed in the course of the sixth month after the date of the original notice.

3. Such of the other Allied and Associated Powers as may be interested shall have the right to appoint a delegate to be present and act as assessor only while their respective claims and interests are under examina¬ tion or discussion, but without the right to vote.

4. In case of the death, resignation or recall of any delegate, assistant delegate, or assessor, a successor to him shall be nominated as soon as possible.

5. The commission will • have its principal par-manent bureau in Paris and will hold its first meeting in Paris as soon as practicable , after the coming into force of the present treaty, and thereafter will meet in such place or places and at such time as it may deem convenient and

as may be necessary for the most expeditious discharge of its duties.

6. At its first meeting the commission shall elect from among the delegates referred to above a Chair¬ man and a Vice Chairman, who shall hold office fo*- one year and shall be eligible for re-election. If »

vacancy in the Chairmanship or Vice Chairmanship should occur during the annual period the commis¬ sion shall proceed to a new election for the remainder of the said period.

7. The commission is authorized to appoint all neces¬ sary officers, agents, and employes who may be required for the execution of its functions, and to fix their re¬ muneration; to constitute committees, whose members need not necessarily be members of the commission, and to take all executive steps necessary for the pur¬ pose of discharging its duties, and to delegate authority and discretion to officers, agents, and committees.

ˆ 8. All proceedings of the commission shall be private unless, on particular occasions, the commission shall otherwise determine for special reasons.

9. The commission shall be required, if the Ger¬ man Government so desire, to hear, within a period which it will fix from time to time, evidence and arguments on the part of Germany on any question connected with her capacity to pay.

10. The commission shall consider the claims and give to the German Government a just opportunity to be heard, but not to take any part whatever in the decisions of the commission. The commission shall afford a similar opportunity to the allies of Germany when it shall consider that their interests are in question.

11. The commission shall not be bound by any par¬ ticular code or _ rules of law or by any par¬ ticular rule of evidence or of procedure, but shall be guided by justice, equity, and good faith. Its decisions

must follow the same principles and jules in all cases where they are applicable. It will establish rules relat¬ ing to methods of proof of claims. It may act on any trustworthy modes of computation.

12. The commission shall have all the powers con¬ ferred upon it, and shall exercise all the functions as¬ signed to it by the present treaty.

The commission shall in general have wide latitude as to its control and handling of the whole reparation problem as dealt with in this part of the present treaty, and shall have authority _ to interpret its pro¬ visions. Subject to the provisions of the present treaty, the commission is constituted by theˆ several Allied and Associated Governments referred to in Para¬ graphs 2 and 3 above as the exclusive agency of the said Governments respectively for receiving, selling, holding, and distributing the reparation payments to be made by Germany under this part of the present treaty. The commission must comply with the ‘ following con¬ ditions and provisions:

U) Whatever part of the full amount of the proved claims is not paid in gold, or in ships, securities, and commodities or otherwise, Germany shall be required, under such conditions as the commission may deter¬ mine, to cover by way of guarantee by an equivalent issue of bonds, obligations, or otherwise, in order to constitute an acknowledgment of the said part of the

debt: . . ˆ ,

(b) In periodically estimating Germany s capacity to pay, the commission shall examine the German system of taxation first to the end that the sums for reparation which Cermany is required to pay shall be-come a charge upon all her revenues prior to that for the service or discharge of any domestic loan, and, secondly, so as to satisfy itself that, in general, the German scheme of taxation is fully as heavy propor¬ tionately as that of any of the powers represented on

the commission. .

(c) In order to facilitate and continue the immediate restoration of the economic life of the Allied and As¬ sociated countries, the commission will, as provided in Article 235, take from Germany by way of security for and acknowledgment of her debt a first installment of gold bearer bonds free of all taxes or charges of every description established or to be established by the Government of the German Empire or of the German States, or by any authority subject to them; these bonds ’will be delivered on account and in three por¬ tions the marks gold being

payable in conformity with Article 262 of Part IX (financial clauses) of the present

treaty, as follows; , , , . , ,

First. To be issued forthwith, 20,000,000,000 marks gold bearer bonds, payable not later than Alay i, 1921, without interest. There shall be specially applied to¬ ward the amortization of these bonds the payments which Germany is pledged to make in conformity with Article 235, after deduction of the sums used for the reimbursement of expenses of the armies of occupa¬ tion and for payment of foodstuffs and raw materials. Such bonds as have not been redeemed by May i, 1921, shall then be exchanged for new bonds of the same type as those provided for below, (Paragraph 12, c.

second)… . ,

Second. To be issued forthwith, further 40,000,000,000

marks gold bearer bonds, bearing interest at 2ˆ per cent, per annum between 1921 and 1926, and thereafter at 5 per cent, per annum, with an additional 1 per cent, for amortization beginning in 1926 on the whole amount of the issue.

Third. To be delivered forthwith a covering under¬ taking in writing, to issue when, but not until, the commission is satisfied that Germany can meet such interest and sinking fund obligations, a further in¬ stallment of 40,000,000,000 marks gold 5 per cent, bearer bonds, the time and mode of payment of prin¬ cipal and interest to be determined by the commission.

The dates for payment of interest, the manner of applying the amortization fund, and all other questions relating to the issue, management, and regulation of the bond issue shall be determined by the commission from time to time.

Further issues by way of acknowledgment and security may be required as the commission subsequently determines from time to time.

ˆ (d) In the event of bonds, obligations, or other evidence of indebtedness issued by Germany by way of security for or

acknowledgment of her reparation debt being disposed of outright, not by way of pledge, to persons other than the several Governments in whose favor Germany's original reparation indebted¬ ness was created, an amount of such reparation in¬ debtedness shall be deemed to be extinguished corre¬ sponding to the nominal value of the bonds, etc., so disposed of outright, and the obligation of Germany in respect of such bonds shall be confined td her lia¬ bilities to the holders of the bonds, as expressed upon their face.

(e) The damage for repairing, reconstructing, and rebuilding property in the invaded and devastated dis¬ tricts, including reinstallation of furniture, machinery and other equipment, will be calculated according to the cost at the dates when the work is done.

(f) Decisions of the commission relating to the total or partial cancellation of the capital or interest of any verified debt of Germany must be accompanied by a statement of its reasons.

13. As to voting, the commission will observe the following rules: _

When a decision of the commission is taken, the votes of all the delegates entitled to vote, or in the absence of any of them, of their assistant delegates, shall be recorded. Abstention from voting is to be treated as a vote against the proposal under discussion. Assessors have no vote.

On the following questions unanimity is necessary:

(a) Questions involving the sovereignty of any of the Allied and Associated Powers, or the cancella¬ tion of the whole or any part of the debt or obliga¬ tions of Germany.

(lb) Questions of determining the amount and conditions of bonds or other obligations to be issued by the German Government and of fixing the time and manner for selling, negotiating, or distributing such bonds.

(c) Any postponement, total or partial, beyond the end of 1930, of the payment of installments falling due between the ist May, 1921, and the end of 1926 inclusive.

(d) Any postponement, total or partial, of any in¬ stallment falling due after 1926 for a period exceeding three years.

(e) Questions of applying in any particular case a method of measuring damages different from that which has been previously

applied in a similar case.

(f) Questions of the interpretation of the provisions of this part of the present treaty.

All other questions shall be decided by the vote of a majority.

In case of any difference of opinion among the delegates, which cannot be solved by reference to their Governments, upon the question whether a given case is one which requires a unanimous vote for its deci¬ sion or not, such difference shall be referred to the immediate arbitration of some impartial person to be agreed upon by the Governments, whose award the Allied and Associated Governments agree to accept.

14. Decisions of the commission, in accordance with the powers conferred upon it, shall forthwith fecome binding and may be put into immediate execu¬ tion without further proceedings.

15. The commission will issue to each of the in¬ terested powers, in such form as the commission shall fix:

First. A certificate stating that it holds for the account of the said power bonds of the issues men¬ tioned above, the said certificate, on the demand of the power concerned, being divisible in a number of parts not exceeding five:

Second. From time to time certificiates stating the

goods delivered by Germany on account of her repara¬ tion debt which it holds for the account of the said power.

The said certificates shall be registered, and, upon notice to the commission, may be transferred by in¬ dorsement.

When bonds are issued for sale or negotiation, and when goods are delivered by the commission, certifi¬ cates to aii equivalent value

must be withdrawn.

1 6. Interest shall be debited to Germany as from ist May, 1921, in respect of her debt as determined by the commission, after allowing for sums already cov¬ ered by cash payments or their equivalent, or by bonds issued to the commission, or under Article 243. The rate of interest shall be 5 per cent., unless the com¬ mission shall determine at some future time that cir¬ cumstances justify a variation of this rate.

The commission, in fixing on ist May, 1921, the total amount of the debt of Germany, may take ac¬ count of interest due on sums arising out of the reparation of material damage as from iith November, 1918, up to ist May, 1921.

17. In case of default by Germany in the perform¬

ance of any obligation under this part of the present treaty, the commission will forthwith give notice of such default to each of the interested powers and may make such recommendations as to the action to be taken in consequence of such default as it may think necessary. ' *

18. The measures which the Allied and Associated Powers shall have the right to take, in case of volun¬ tary default by Germany, and which Germany agrees not to regard as acts of war, may include economic and financial prohibitions and reprisals and in general such other measures as the respective Governments may determine to be necessary in the circumstances.

19. Payments required to be made in gold or its equivalent on account of the proved claims of the Allied and Associated Powers may at any time be accepted by the commission in the form of chattels, properties, commodities, businesses, rights, concessions, within or without German territories, ships, bonds, shares or securities of any kind, or currencies of Germany or other States, the value of such substitutes for gold being fixed at a fair and just amount by the commis¬ sion itself.

20. The commission, in fixing or accepting payment in specified properties or rights, shall have due regard for any legal or equitable interests of the Allied and Associated Powers or of neutral powers or of their nationals therein.

21. No member of the commission shall be re¬ sponsible, except to the Government appointing him, for any action or omission as such

member. No one of the Allied or Associated Governments assumes any responsibility in respect of any other Government.

22. Subject to the provisions of the present treaty this annex may be amended by the unanimous decision of the Governments represented from time to time upon the commission.

23. When all the amounts due from Germany and her allies under the present treaty or the decisions of the commission have been discharged and all sums received, or their equivalents, shall have been dis¬ tributed to the powers interested, the commission shall be dissolved.

ANNEX III.

1. Germany recognizes the right of the Allied and Associated Powers to the replacement, ton for ton (gross tonnage) and class for class, of all merchant ships and fishing boats lost or damaged owing to the war.

Nevertheless, and in spite of the fact that the tonnage of German shipping at present in existence is much less than that lost by the Allied and Asso¬ ciated Powers in consequence of the German aggres¬ sion, the right thus recognized will be enforced on German ships and boats under the following condi¬ tions :

The German Government on behalf of themselves and so as to bind all other persons interested, cede to the Allied and Associated Governments the property in all the German merchant ships which are of 1,600 tons gross and upward; in one-half, reckoned in ton¬ nage, of the ships which are between 1,000 tons and 1,600 tons gross; in one-quarter, reckoned in tonnage, of the steam trawlers, and in one-quarter, reckoned in tonnage, of the other fishing boats.

2. The German Government will, within two months of the coming into force of the present treaty, deliver to the Reparation Commission all the ships and boats mentioned in Paragraph i.

3. The ships and boats mentioned in Paragraph i include all ships and boats which (a) fly, or may be

entitled to fly, the German merchant flag; or (b) are owned by any German national, company, or corpora¬ tion or by any company or corporation belonging to a country other than an Allied or Associated

country and under the control or direction of German na¬ tionals; or (c) which are now under construction (i) in Germany, (2) in other than Allied, or Associated countries for the account of any German national, company,, or corporation.

4. For the purpose of providing documents of title for the ships and boats to be handed over as above mentioned the German Government will:

(a) Deliver to the Reparation Commission in re¬ spect of each vessel a bill of sale or other document of title evidencing the transfer to the commission of the entire property in the vessel free from all incum¬ brances, charges, and" liens of all kinds, as the com¬ mission may require;

(b) Take all measures that may be indicated by the Reparation Commission for insuring that the ships themselves shall be placed at its disposal.

5. As an additional part of reparation, Germany agrees to cause merchant ships to be built in Ger¬ man yards for the account of the Allied and Asso¬ ciated Governments as follows:

(a) Within three months of the coming into force of the present treaty, the Reparation Commission will notify to the German Government the amount of ton¬ nage to be laid down in German shipyards in each of the two years next succeeding the three months mentioned above:.

(b) Within twenty-four months of the coming into

force of the present treaty, the Reparation Commission will notify to the German Government the amount of tonnage to be laid down in each of the three years following the two years mentioned above: •

(c) The amount of tonnage to be laid down in each year shall not exceed 200,000 tons, gross tonnage:

(d) The specifications of the ships to be built, the conditions under which they are to be built and de¬ livered, the price per ton at which they are to be accounted for by the Reparation Commission, and all other questions relating to the accounting, ordering, building and delivery of the ships, shall be determined by the commission.

6. Germany undertakes to restore in kind and in normal .condition _ of upkeep to the Allied and Asso¬ ciated Powers, within two months of the coming into force of the present treaty, in accordance with pro¬

cedure to be laid down by the Reparation Commission, any boats and other movable appliances belonging to inland navigation which since the ist August, 1914, have by any means whatever come into her possession or into the possession of her nationals, and which can be identified.

With a view to make good the loss in inland navi¬ gation tonnage, from whatever cause arising, which has been incurred during the war by the Allied and Associated Powers, and which cannot be made good by means of the restitution prescribed above, Germany agrees to cede to the Reparation (Commission a por¬ tion of the German river fleet up to the amount of the loss mentioned above, provided that such cession shall not exceed 20 per cent, of the river fleet as it existed on the nth November, 1918.

The condition of this session shall be settled by the arbitrators referred to in Article 339 of Part XII (ports, waterways and railways) of the present treaty, who are charged with the settlement of difficulties relating to the apportionment of river tonnage result¬ ing from the new international regime applicable to certain river systems or from the territorial changes affecting those systems.

7. (Germany agrees to take any measures that may be indicated to her by the Reparation Commission for obtaining the full title to the property in all ships which have been during the war transferred, or are in process of transfer, to neutral flags, without the consent of the Allied and Associated Governments.

_8. Germanyˆ waives all claims of any description against the Allied and Associated Governments and their nationals in respect of the detention, employment, loss or damage of any German ships or boats, except when being made of payments due in respect of the employ¬ ment of ships in conformity with the armistice agree¬ ment of the 13th January, 1919, and subsequent agree¬ ments.

The handing over of the ships of the German mer¬ cantile marine must be continued without interruption in accordance with the said agreement.

9. Germany waives all claims to vessels or cargoes sunk by or in consequence of naval action and sub¬ sequently salved, in which any of the Allied or asso¬ ciated Governments or their nationals may have any interest, either as owners, charterers, insurers or other-

wise, notwithstanding any decree of condemnation which may have been made by a prize court of Ger¬ many or of her allies.

ANNEX IV.

1. The Allied and Associated Powers require, and Germany undertakes, that, in part satisfaction of her obligations expressed in this part of the present treaty, she will, as hereinafter provided, devote her economic resources directly to the physical restoration of the invaded areas of the Allied and Associated Powers, to the extent that these powers may determine.

2. The Allied and Associated Governments may file with the Reparation Commission lists showing:

(a) Animals, machinery, equipment, tools, and like articles of commercial character, which have been seized, consumed, or destroyed by Germany or destroyed in direct consequence of military operations, and which such Governments, for the purpose of meeting immedi¬ ate and urgent needs, desire to have replaced by animals and articles of the same nature which are in being in German territory at the date of the coming into force of the present treaty:

(b) Reconstruction materials, (stones, bricks, re¬ fractory bricks, tiles, wood, window glass, steel, lime, cement, etc.,) machinery, heating apparatus, furniture, and like articles of a commercial character which the said Governments desire to have produced and manu¬ factured in Germany and delivered to them to permit of the restoration of the invaded areas.

3. The lists relating to the articles mentioned in 2 (a), above, shall be filed within sixty days after the date of the coming into force of the present treaty. The lists relating to the articles in 2 (b), above, shall be filed on or before Dec. 31, 1919. The lists shall contain all such details as are customary in commercial contracts dealing with the subject matter, including specifications, dates of delivery, (but not extending

over more than four years,) and places of delivery, but not price or value, which shall be fixed as hereinafter provided by the commission.

4. Immediately upon the filing of such lists with the commission, the commission shall consider the amount and number of the materials and animals men¬ tioned in the list provided for above which are to be required of Germany. In reaching a decision on this matter the commission shall take into account such domestic requirements of Germany as it deems essential for the maintenance of Germany's social and economic life, and the prices and dates at which similar articles can be obtained in the Allied and Associated countries as compared with those to be fixed for German articles, and the general interest of the Allied and Associated Governments that the industrial life of Germany be not so disorganized as to affect adversely the ability of Germany to perform the other acts of reparation stipu¬ lated for. Machinery, equipment, tools, and like articles of a commercial character in actual industrial use are not, however, to be demanded of Germany unless there is no free stock of such articles respectively which is not in use and is available, and then not in excess of 30 per cent, of the quantity of such articles in use in any one establishment or undertaking.

The commission shall give representatives of the German Government an opportunity and a time to be heard as to their capacity to furnish the said ma¬ terials, articles, and animals. The decision of the commission shall thereupon and at the earliest possible moment be communicated to the German Government and to the several interested Allied and Associated Gov¬ ernments. The German Government _ undertakes to deliver the materials, articles, and animals as speci¬ fied in the said communication, and the interested Allied and Associated Governments severally agree to accept the same, provided they conform to the specifi¬ cation given, or are not, in the judgment of the com¬ mission, unfit to be utilized in the work of reparation.

5. The commission shall determine the value to be attributed to the materials, articles, and animals to be delivered in accordance with the foregoing, and the Allied or Associated Power receiving the same agrees to be charged with such value, and the amount thereof shall be treated as a payment by Germany to be divided in accordance with Article 237 of this part of the present treaty.

In cases where the right to require physical res¬ toration as above provided is exercised the commis¬ sion shall insure that the amount to be credited against the reparation obligation of Germany shall be the

fair value of work done or materials supplied by Germany and that the claim made by the interested power in respect of the damage so repaired by physical restoration shall be discharged to the extent of the

proportion which the damage thus repaired bears to the whole of the damage thus claimed for.

6. As an immediate advance on account of the animals referred to in Paragraph 2 (a) above, Germany undertakes to deliver in equal monthly installments in the three months following the coming into force of the present treaty the following quantities of live stock:

First. To the French Government, 500 stallions, (3 to 7 years,) 30,000 fillies and mares, (18 months to 7 years,) type; Ardenias, Boulonnais, or Belgian; 2,000 bulls, (18 months to 3 years,) 90,000 milch cows, (2 to 6 years,) 1,000 rams, 100,000 sheep, 10,000 goats.

Second. To the Belgian Government, 200 stal¬ lions, (3 to 7 years,) large Belgian type; 5,000 mares, (3 to 7 years,) large Belgian type, 5,000 fillies, (18 months to 3 years,) large Belgian type; 2,000 bulls, (18 months to 3 years,) 50,000 milch cows, (2 to 6 years,) 40,000 heifers, 200 rams, 20,000 sheep, 15,000 sows.

The animals delivered shall be of average health and condition. To the extent that animals so de¬ livered cannot be identified as animals taken away or seized, the value of such animals shall be credited against the reparation obligations of Germany in ac¬ cordance with Paragraph 5 of this annex.

7. Without waiting for the decisions of the com¬ mission, referred to in Paragraph 4 of this annex, to be taken, (Germany must continue the delivery to France of the agricultural material referred to in Article 3 of the renewal of the armistice of i6th January, 1919.

ANNEX V.

1. Germany accords the following options for the* delivery of coal and derivatives of coal to the under¬ mentioned signatories of the present treaty.

2. Germany undertakes to deliver to France 7,000,- 000 tons of coal per year for ten years. In addition, Germany undertakes to deliver to France annually for a period not exceeding ten years an amount of

coal equal to the difference between the annual production before the war of the coal mines of the Nord and Pas de Calais, destroyed as a result of the war, and the production of the mines of the same area during the years in question; such delivery not to exceed 20,- 000,000 tons in any one year of the first five years, and 8,000,000 tons in any one year of the succeeding five years.

It is understood due diligence will be exercised in the restoration of the destroyed mines in the Nord and Pas de Calais.

3. Germany undertakes to deliver to Belgium 8,- 000,000 tons of coal annually for ten years.

4. Germany undertakes to deliver to Italy, up to the following quantities of coal:

July, 1919, to June, 1920, 4,500,000 tons,

July, 1920, to June, 1921, 6,000,000 tons.

July, 1921, to June, 1922, 7,500,000 tons.

July, 1922, to June, 1923, 8,000,000 tons.

July, 1923. to June, 1924, 8,500,000 tons,

and each of the following five years, 8,500,000 tons.

At least two-thirds of the actual deliveries to be land borne.

5. Germany further undertakes to deliver annually to Luxemburg, if directed by the Reparation Commi.s-sion, a quantity of coal equal to the pre-war annual consumption of German coal in Luxemburg.

6. The prices to be paid for coal delivered under these options shall be as follows:

(a) For overland delivery, including delivery by barge, the German pithead price to German nationals, plus the freight to French, Belgian, Italian, or Luxemburg frontiers, provided the pithead price does not exceed the pithead price of British coal for export. In case of Belgian bunker coal, the price shall not ex¬ ceed the Dutch bunker price. Railroad and barge tariffs shall not be higher than the lowest similar rates paid in Germany.

(b) For sea delivery, the German export price f. o. b. the German ports, or the British export price f. o. b. British ports, whichever may

be lower.

7. The Allied and Associated Governments inter¬ ested may demand the delivery in place of coal of metallurgical coke in the proportion of three tons of coke to four tons of coal.

8. Germany undertakes to deliver to France and to transport to the French frontier by rail or by water the following products during each of the three years following the coming into force of this treaty:

Benzol — 35,000 tons.

Coal tar — 50,000 tons.

Sulphate of ammonia — 30,000 tons.

All or part of the coal tar may, at the option of

the French Government, be replaced by corresponding quantities of products of distillation, such as light oils, heavy oils, anthracine, naphthaline, or pitch.

9. The price paid for coke and for the articles re¬ ferred to in the preceding paragraphs shall be the same as the price paid by German nationals under the same conditions of shipment to the French frontier or to the German ports, and shall be subject to any advantages which may be accorded similar products furnished to German nationals.

10. The foregoing options shall be exercised through the intervention of the Reparation Commission, which, subject to the specific provisions hereof, shall have power to determine all questions relative to procedure and the qualities and quantities of products, the quantity of coke which may be substituted for coal, and the times and modes of delivery and payment. In ˆv-ing notice to the German Government of the foregoing options the commission shall give at least 120 days' notice of deliveries to be made after the ist January, 1920, and at least thirty days' notice of deliveries to be made between the coming into

force of this treaty and the ist January, 1920. Until Germany has re¬ ceived the demands referred to in this paragraph the provisions of the protocol of the 25th December, 1918, (execution of Article 6 of the armistice of the nth November, 1918,) remain in force.

The notice to be given to the German Government of the exercise of the right of 'Substitution accorded by Paragraphs 7 and 8 shall be such as the Reparation Commission may consider sufficient.

If the commission shall determine that the full exercise of the foregoing options would interfere un¬ duly with the industri|al requirements of Germany,

' the commission is authorized to postpone or to cancel deliveries, and in so doing to settle all questions "of priority, but the coal to replace coal from destroyed mines shall receive priority over other deliveries.

ANNEX VI.

1. Germany accords to the Reparation Commission an option to require as part of reparation the delivery by Germany of such quantities and kinds of dyestuffs and chemical drugs as the commission may designate, not exceeding 50 per cent, of the total stock of each and every kind of dyestuff and chemical drug in Ger¬ many or under German control at the date of the com¬ ing into force of the present treaty.

This option shall be exercised within sixty days of the receipt by the commission of such particulars as to stocks as may be considered necessary by the com¬ mission.

2. Germany further accords to the Reparation Com¬ mission an option to require delivery during the pe¬ riod from the date of the coming into force of the present treaty until Jan. i, 1920, and during each period of six months thereafter until Jan. i, 1925, of any specified kind of dyestuff and chemical drug up to an amount not exceeding 25 per cent, of the Ger¬ man production of such dyestuffs and chemical drugs during the previous six months' period. _ If in any case the production during such previous six months was, in the opinion of the commission, less than normal, the amount required may be 25 per cent, of the nor¬ mal production.

Such option shall be exercised within four weeks after the receipt of such particulars as to production and in such form as may be considered necessary by the commission; these particulars shall be furnished by the German Government immediately after the expira¬

tion of each six months' period.

3. For dyestuffs and chemical drugs delivered under Paragraph i the price shall be fixed by the commission, having regard to pre-war net export prices and to sub¬ sequent increases of cost.

For dyestuffs and chemical drugs delivered under Paragraph 2 the price shall be fixed by the commission, having regard to pre-war net export prices and subse¬ quent variations of cost or the lowest net selling price of similar dyestuffs and chemical drugs to any other purchaser.

4. All details, including mode and times of exer¬ cising the options and making delivery, and all other questions arising under this arrangement shall be de¬ termined by the Reparation Commission; the German Government will furnish to the commission all neces¬ sary information and other assistance which it may reauire.

5. The above expression " dyestuffs and chemical drugs includes all synthetic dyes and drugs and in¬ termediate or other products used in connection with dyeing, so far as they are manufactured for sale. The present arrangement shall also apply to cinchona bark and salts of quinine.

ANNEX VII.

Germany renounces on her own behalf and on be¬ half of her nationals in favor of the principal Allied and Associated Powers all rights, titles or privileges of whatever nature in the submarine cables set out be¬ low, or in any portions thereof:

Emden-Vigo: from the Straits of Dover to off Vigo;

Emden-Brest: from off Cherbourg to Brest;

Emden-Teneriffe: from off Dunkirk to off Teneriffe;

Emden-Azores (i): from the Straits of Dover to Fayal;

Emden-Azores (2) : from the Straits of Dover to Fayal;

Azores-New York (i): from Fayal to New York;

Azores-New York (2) : from Fayal to the longitude of Halifax;

Teneriff e-Monrovia: from off Teneriffe to off Mon¬ rovia;

Monrovia-Lome: from about latitude 2 degrees 30 minutes north, and longitude 7 degrees 40 minutes west of Greenwich,

to about latitude 2 degrees 20 minutes north, and longitude s degrees 30 minutes west of Green¬ wich,

and from about latitude 3 degrees 48 minutes north, and longitude 0 degrees o minutes to Lome;

Lome-Duala: from Lome to Duala;

Monrovia-Pernambuco: from off Monrovia to off Pernambuco;

Constantinople-CTonstanza: from Constantipole to Constanza;

Yap-Shanghai, Yap-Guam, and Yap-Menado (Ce¬ lebes): from Yap Island to Shanghai, from Yap Island to Guam Island, and from Yap Island to Manado.

The value of the above-mentioned cables or por¬ tions thereof in so far as they are privately owned, calculated on the basis of the original cost less a suit¬ able allowance for depreciation, shall be credited to Germany in the reparation account.

SECTION II. — SPECIAL PROVISIONS.

Article 245. — ■ Within six months after coming into force of the present treaty the German Government must restore to the French Government the trophies, archives, historical souvenirs, or works of art carried away from France by the German authorities in the course of the war of 1870-1871 and during this last war, in accordance with a list which will be commu¬ nicated to it by the French Government; particularly the French flags taken in the course of the war of 1870-1871, and all the political papers taken by the German authorities on Oct. 10, 1870, at the Chateau of Cercay, near Brunoy, (Seine-et-Oise,) belonging at the time to M. Rouher, formerly Minister of State.

Article 246. — Within six months of the coming into force of the present treaty Germany will restore to his Majesty the King of the Hedjaz the original Koran of the Caliph (Dthman, which was removed from Medina by the Turkish authorities and is stated to have been

presented to the ex-Emperor William II.

Within the same period Germany will hand over to his Britannic' Majesty's Government the skull of the Sultan Mkwawa, which was removed from the pro¬ tectorate of German East Africa and taken to Ger¬ many.

The delivery of the articles above referred to will be effected in such place and in such conditions as may be laid down by the Governments to which they are to be restored.

Article 247. — Germany undertakes to furnish to the University of Louvain, within three months after a request made by it and transmitted through the inter¬ vention of the Reparation Commission, manuscripts, in¬ cunabula, printed books, maps, and objects of collec¬ tion corresponding in number and value to those de¬ stroyed in the burning by Germany of the library of Louvain. All details regarding such replacement will be determined by the Reparation Commission.

Germany undertakes to deliver to Belgium, through the Reparation Commission, within six months of the coming into force of the present treaty, in order to enable Belgium to reconstitute her two great artistic works:

(a) The leaves of the triptych of the Mystic Lamb painted by the Van Eyck Brothers, formerly in the Church of St. Bavon at Ghent, now in the Berlin Museum.

(b) The leaves of the triptych of the Last Supper, painted by Dierick Bouts, formerly in the Church of St. Peter at Louvain, two of which are now in the Berlin Museum and two in the old Pinakothek at Munich.

Part IX. — Financial Clauses.

Article 248. — Subject to such exceptions as the Reparation

Commission may approve, a first charge upon all the assets and revenues of the German Em¬ pire and its constituent States shall be the cost of reparation and all other costs arising under the present treaty or any treaties or agreements supplementary thereto or under arrangements concluded between Ger¬ many and the Allied and Associated Powers during the armistice or its extensions.

Up to May i, 1921, the German Government shall not export or dispose of, and shall forbid the export or disposal of, gold without the previous approval of the Allied and Associated Powers acting through the Reparation Commission.

Article 249. — There shall be paid by the German Government the total cost of all armies of the Allied and Associated Governments in occupied German terri¬ tory from the date of the signature of the armistice of the nth November, 1918, including the keep of men and beasts, lodging and billeting, pay and allowances, salaries and wages, bedding, heating, lighting, clothing, equipment, harness and saddlery, armament and roll¬ ing stock, air services, treatment of sick and wounded, veterinary and remount services, transport service of all sorts, (such as by rail, sea, river, or motor lorries,) communications and correspondence, and in general the cost of all administrative or technical services, the working of which is necessary for the training of troops and for keeping their numbers up to strength and preserving their military efficiency.

The cost of such liabilities under the above heads, so far as they relate to purchases or requisitions by the Allied and Associated Governments in the occupied territories, shall be paid by the German Government to the Allied and Associated Governments in marks at the current or agreed rate of exchange. All other of the above costs shall be paid in gold marks.

Article 250. — Germany confirms the surrender of all material handed over to the Allied and Associated Powers in accordance with the armistice agreement of the nth November, 1918, and subsequent armistice agreements, and recognizes the title of the Allied andˆ Associated Powers to such material.

There shall be credited to the German Government against the sums due from it to the Allied and Asso¬ ciated Powers for reparation, the value, as assessed by the Reparation Commission referred to in Article 233 of Part VIII (reparation) of the present treaty, of the material handed over in accordance with Article 7 of the armistice agreement of the nth November, 1918, Article 3 of the armistice agreement of the

i6th Janu¬ ary, 1919, as well as of any other material handed over in accordance with the armistice agreement of the nth November, 1918, and of subsequent armistice agree¬ ments, for which, as having non-military value, credit should, in the judgment of the Reparation Commission, be allowed to the German Government.

Property belonging to the Allied and Associated Governments or their nationals restored or surrendered under the armistice agreements in specie shall not be credited to the German Government.

Article 251. — The priority of the charges estab¬ lished by Article 248 shall, subject to the qualifications mads below, be as follows:

(a) The cost of the armies of occupation as de¬ fined under Article 249 during the armistice and its extensions;

(b) The cost of any armies of occupation as de¬ fined under Article 249 after the coming into force of the present treaty;

(c) The cost of reparation arising out of the present treaty or any treaties or conventions supplementary

thereto; … ,

(d) The cost of lall other obligations incumbent on Germany under the armistice conventions or under this treaty or any treaties or conventions supplementary

The payment for such supplies of food and raw material for Germany and such other payments as may be judged by the Allied and Associated Powers to be essential to enable Germany to meet her obligations in respect of reparation will have priority to the extent and upon the conditions which have been or may be determined by the Governments of the said powers.

Article 252. — The right of each of the Allied and Associated Powers to dispose of enemy assets and prop¬ erty within its jurisdiction at the date of the coming into force of the present treaty is not affected by the foregoing provisions. .

Article 253.— Nothing in the foregoing provisions shall prejudice in any manner charges or mortgages lawfully effected in favor of the Allied and Associated Powers or their nationals respectively, before the date

at which a state of war existed between German}' and the Allied and Associated Powers concerned, by the German Empire or its constituent States, or by Ger¬ man nationals on assets in their ownership at that date.

Article 254. — The powers to which German terri¬ tory is ceded shall, subject to the qualifications made in Article 255, undertake to pay:

1. A portion of the debt of the German Empire as it stood on the ist August, 1914, calculated on the basis of the ratio between the average for the three financial years 1911, 1912, 19135 of such revenues of the ceded territory and the average for the same years of such revenues of the whole &rman Empire as in the judgment of the Reparation Commission are best calculated to represent the relative ability of the re¬ spective territories to make payments.

2. A portion of the debt as it stood on the ist August, 1914. of the German State to which the ceded territory belonged, to be determined in accordance with the principle stated above.

Such portions shall be determined by the Repara¬ tion Commission.

The method of discharging the obligation both in respect of capital and of interest, so assumed, shall be fixed by the Reparation Commission. Such method may take the form, inter alia, of the assumption by the power to which the territory is ceded of Germany's lia¬ bility for the German debt held by her nationals. But in the event of the method adopted involving any pay¬ ments to the German Government, such payments shall be transferred to the Reparation Commission on account of the sums due for reparation so long as any balance in respect of such sums remains unpaid.

Article 255. — (i) As an exception to the above pro¬ vision and inasmuch as in 1871 Germany refused to undertake any portion of the burden of the French debt, France shall be, in respect of Alsace-Lorraine, exempt from any payment under Article 254.

2. In the case of Poland that portion of the debt which, in the opinion of the Reparation Commission is attributable to the measures taken by the German and Prussian Governments for the German colonization of Poland shall be excluded from the apportionment to be made under Article 254.

3. In the case of all ceded territories other than Alsace-Lorraine that portion of the debt of the German Empire or German States which in the opinion of the Reparation Commission represents expenditure by

the (jovernments of the German Empire or States upon the Government properties referred to in Article 256 shall be excluded from the apportionment to be made under Article 254.

Article 256. — Powers to which “Germanˆ territory is ceded shall acquire all property and possessions situated therein belonging to the German Empire or to the German States, and the value of such acquisitions shall be fixed by the Reparation Commission, and paid by the State acquiring the territory to the Reparation Com¬ mission for the credit of the German Government on account of the sums due for reparation.

For the purposes of this article the property and possessions of the German Empire and States shall be deemed to include all the property of the Crown, the Empire or the States, and the private property of the former German Emperor and other royal personages.

In view of the terms on which Alsace-Lorraine was ceded to Germany in 1871 France shall be exempt in respect thereof from making any payment or credit under this article for any property or possessions of the German Empire or States situated therein. Bel¬ gium also shall be exempt from making any payment or any credit under this article for any property or pos¬ sessions of the German Empire or States situated in German territory ceded to Belgium under the present treaty.

Article 257. — In the case of the former German territories, including colonies, protectorates, or depend¬ encies, administered by a mandatory under Article 22 of Part I (League of Nations) of the present treaty, neither the territory nor the mandatory power shall be charged with any portion of the debt of the German Empire or States.

All property and possessions belonging to the Ger¬ man Empire or to the German States situated in such territory shall be transferred with the territories to the Mandatory Power in its capacity as such, and no pay¬ ment shall be made nor any credit given to those Gov¬ ernments in consideration of this transfer.

For the purpose of this article the property and possessions of the German Empire and of the German States shall be deemed to include all the property of the crown, the empire or the States and the private property of the former German Emperor and other royal personages.

Article 258. — Germany renounces all rights ac-

corded to her or her nationals by treaties, conventions or agreements, of whatsoever kind, to representation upon or participation in the control or administration of commissions, state banks, agencies or other financial or economic organizations of an international charac¬ ter, exercising powers of control or administration, and operating in any of the Allied or Associated States, or in Austria, Hungary, Bulgaria or Turkey, or in the dependencies of these States, or in the former Russian Empire.

Article 259. — ■ i. Germany agrees to deliver within one month from the date of the coming into force of the present treaty, to such authority as the principal Allied and Associated Powers may designate, the sum in gold which was to be deposited in the Reichsbank in the name of the Council of the Administration of the Ottoman Public Debt as security for the first issue of Turkish Government currency notes.

2. Germany recognizes her obligation to make an¬ nually for the period of twelve years the payments in gold for which provision is made in the German Treas¬ ury bonds deposited by her from time to time in the name of the Council of the Administration of the Ottoman Public Debt as security for the second and subsequent issue of Turkish Government currency notes.

3. Germany undertakes to deliver, within one month from the coming into force of the present treaty, to such authority as the principal. Allied and Associated Powers may designate, the deposit gold constituted in the Reichsbank or elsewhere, representing the residue of the advance in gold agreed to on the 5th of May, 1915. by the Council of the Administration of the Ottoman Public Debt to the Imperial Ottoman Gov¬ ernment.

4. Germany agrees to transfer to the principal Al¬ lied and Associated Powers any title that she may have to the sum in gold and silver transmitted by her to the Turkish Ministry of Finance in November, 1918, in anticipation of the payment to be made in May, 1919, for the service of the Turkish internal loan.

5. Germany undertakes to transfer to the principal Allied and Associated Powers within a period of one month from the coming into force of the present treaty, any sums in gold transferred as pledge or as collateral security to the German Government or its nationals in connection with loans made by them to the Austro-Hungarian Government.

6. Without prejudice to Article 292 of Part X (economic clauses) of the present treaty, Germany con¬ firms the renunciation provided for in Article XV of the armistice convention of the nth November, 1918, of any benefit disclosed by the treaties of Bucharest and of Brest-Litovsk, and by the treaties supplementary thereto.

Germany undertakes to transfer, either to Rumania or to the principal Allied and Associated Powers, as the case may be, all monetary instruments, specie, securities and negotiable instruments or goods which she has received under the aforesaid treaties.

7. The sums of money and all securities, instru¬ ments and goods of whatever nature, to be delivered, paid and transferred under the provisions of this article, shall be disposed of by the principal Allied and Asso¬ ciated Powers in a manner hereafter to be determined by these powers.

Article 260. — Without prejudice to the renunciation of any rights by Germany on behalf of herself or of her nationals in the other provisions of the present treaty, the Reparation Commission may, within one year from the coming into force of the present treaty, de¬ mand that the German Government become possessed of any rights and interests of the German nationals in any public utility undertaking or in any concession operating in Russia, China, Turkey, Austria, Hungary, and Bulgaria, or in the possessions or dependencies of these States or in any territory formerly belonging to Germany or her allies, to be ceded by Germany or her allies to any power, or to be administered by a manda¬ tary under the present treaty, and may require that the German Government transfer, within six months of the date of demand, all such rights and interests and any similar rights and interests the German Government may itself possess, to the Reparation Commission.

Germany shall be responsible for indemnifying her nationals so dispossessed and the Reparation Commis¬ sion shall credit Germany on account of sums due for reparation with such sums in respect of the value of the transferred rights and interests as may be assessed by the Reparation Commission, and the German Gov¬ ernment shall, within

six months from the coming into force of the present treaty, communicate to the Repara¬ tion Commission all such rights and interests, whether already granted, contingent, or not yet exercised, and shall renounce on behalf of itself and its nationals in favor of the Allied and Associated Powers all such

rights and interests which have not been so commu¬ nicated.

Article 261. — Germany undertakes to transfer to the Allied and Associated Powers any claims she may have to payment or repayment by the Governments of Austria, Hungary, Bulgaria, Turkey, and, in particular any claims which may arise, now or hereafter, from the fulfillment of undertakings made by Germany during the war to those Governments.

Article 262. — Any monetary obligation due by Ger¬ many arising out of the present treaty and expressed in terms of gold marks shall be payable at the option of the creditors in pounds sterling payable in London; gold dollars of the United States of America payable in New York; gold francs payable in Paris, or gold lire payable in Rome.

For the purpose of this article, the gold coins men¬ tioned above shall be defined as being of the weight and fineness of gold as enacted by law on the ist Jan¬ uary, 1914.

Article 263. — Germany gives a guarantee to the Brazilian Government that all sums representing the sale of coffee belonging to the State of Sao Paolo in the Ports of Hamburg, Bremen, Antwerp, and Trieste, which were deposited with the Bank of Bleichroder at Berlin, shall be reimbursed, together with interest at the rate or rates agreed upon.

Germany, having prevented the transfer of the sums in question to the State of Sao Paolo at the proper time, guarantees also that the reimbursements shall be effected at the rate of exchange of the day of the de¬ posit.

Part X. — • Economic Clauses.

SECTION I. — COMMERCIAL RELATIONS.

Chapter /. — Customs Regtdations, Duties, and

Restrictions.

Article 264. — Germany undertakes that goods, the produce or manufacture of any one of the Allied or Asssociated States imported into German territory, from whatsoever place arriving, shall not be subjected to other or higher duties or charges (including internal charges) than those to which the like goods, the produce or manufacture of any other such State or of any other foreign country are subject.

Germany will not maintain or impose any prohibi¬ tion or restriction on the importation into German terri¬ tory of any goods the produce or manufacture of the territories of any one of the Allied or Associated States, from whatsoever place arriving, which shall not equally extend to the importation of the like goods the produce or manufacture of any other such State or of any other foreign country.

Article 265. — Germany further undertakes that, in the matter of the regime applicable on importation, no discrimination against the commerce of any of the Allied and Associated States as compared with any other of the said States or any other foreign country shall be made, even by indirect means, such as cus¬ toms regulations or procedure, methods of verification or analysis, conditions of payment of duties, tariff classification or interpretation, or the operation of monopolies.

Article 266. — In all that concerns exportation Ger¬ many undertakes that goods, natural products or manu¬ factured articles, exported from German territory to the territories of any one of the Allied or Associated States shall not be subjected to other or higher duties or charges (including internal charges) than those paid on the like goods exported to any other such State or to any other foreign country.

Germany will not maintain or impose any prohibition or restriction on the exportation of any goods sent from her territory to any one of the Allied or A.sso-oiated States which shall not equally extend to the ex¬ portation of the like goods, natural products or manu¬ factured articles, sent to any other such State or to any other foreign country.

Article 267. — Every favor, immunity, or privilege in regard to the importation, exportation, or transit of

foods granted by Germany to any Allied or Associated tate or to any other foreign country whatever shall simultaneously and unconditionally, without request and without compensation, be extended to all the Allied and Associated States.

Article 268.— The provisions of Articles 264 to 267 inclusive of this chapter and of Article 323 of Part XII (ports, waterways, and railways) of the present treaty are subject to the following exceptions:

(a) For a period of five years from the coming into force ot the present treaty, natural or manufactured products which both originate in and come from the territories of Alsace and Lorraine reunited to France

shall, on importation into German customs territory, be exempt from all customs duty.

The French Government shall fix each year, by de¬ cree communicated to the German Government, the nature and amount of the products which shall enjoy this exemption.

The amount of each product which may be thus sent annually into Germany shall not exceed the aver¬ age of the amounts sent annually in the years 1911-1913.

, Further, during the period above mentioned the German Government shall allow the free export from Germany, and the free reimportation into Germany, exempt from all customs duties and other charges, (including internal charges,) of yarns, tissues, and other textile materials or textile products of any kind and in any condition, sent from Germany into the territories of Alsace or Lorraine, to be subjected there to any finishing process, such as bleaching, dyeing, printing, mercerization, gassing, twisting, or dressing.

(b) During a period of three years from the coming into force of the present treaty natural or manufac¬ tured products which both originate in and come from Polish territories which before the war were part of Germany shall, on importation into German customs territory, be exempt from all customs duty.

The Polish Government shall fix each year, by de¬ cree communicated to the German Government, the nature and amount of the products which shall enjoy this exemption.

The amount of each product which may be thus sent annually into Germany shall not exceed the aver¬ age of the amounts sent annually in the years 1911 —

1913.

(c) The Allied and Associated Powers reserve the right to require Germany to accord freedom from cus¬ toms duty, on importation into German customs terri¬ tory, to natural products and manufactured articles which both originate in and come from the Grand Duchy of Luxemburg, for a period of five years from the coming into force of the present treaty.

The nature and amount of the products which shall enjoy the benefits' of this regime shall be communicated each year to the German Government.

The amPunt of each product which may be thus sent annually into Germany shall not exceed the average of the amounts sent annually in the years 1911-1913.

Article 269. — During the first six months after the coming into force of the present treaty, the duties im¬ posed by Germany on imports from Allied and Asso¬ ciated States shall not be higher than the most favor¬ able duties which were applied to imports into Ger¬ many on the 31st July, 1914*

During a further period of thirty months after the expiration of the first six months, this provision shall continue to be applied exclusively with regard to prod¬ ucts which, being comprised in Section A of the First-Category of the German Customs Tariff of the 25th December, 1902, enjoyed at the above-mentioned date (31st July, 1914) rates conventionalized by treaties with the Allied and Associated Powers, with the addi¬ tion of all kinds of wine and vegetable oils, of artificial silk and of washed or scoured wool, whether or not they were the subject of special conventions before the 31st July, 1914.

Article 270. — The Allied and Associated Powers re¬ serve the right

to apply to German territory occupied by their troops a special customs regime as regards im¬ ports and exports, in the event of such a measure be¬ ing necessary in their opinion in order to safeguard the economic interests of the population of these terri¬ tories.

Chapter 11. — Shipping.

Article 271. — As regards sea fishing, maritime coasting trade, and maritime towage, vessels of the Allied and Associated Powers shall enjoy, in German territorial waters, the treatment accorded to vessels of the most-favored nation.

Article 272. — Germany agrees that, notwithstanding any stipulation to “the contrary contained in the con¬ ventions relating to the North Sea fisheries and liquor traffic, all rights of inspection and police shall, in the case of fishing boats of the Allied Powers, be exer¬ cised solely by ships belonging to those powers.

Article 273. — In the case of vessels of the Allied or Associated Powers, all classes of certificates or docu¬ ments relating to the vessel, which were recognized as valid by Germany before the war, or which may here¬ after be recognized as valid by the principal maritime States, shall be recognized by Germany as valid and as equivalent to the corresponding certificates issued to German vessels.

A similar recognition shall be accorded to the cer¬ tificates and documents issued to their vessels by the Governments of new States, whether they have a sea-

coast or not, provided that such certificates and docu¬ ments shall be issued in conformity with the general practice observed in the principal maritime States.

The high contracting parties agree to recognize the flag flown by the vessels of an Allied or Associated Power having no seacoast which are registered at some one specified place situated in its territory; such place shall serve as the port of registry of such vessels.

Chapter III. — Unfair Competition.

Article 274. — Germany undertakes to adopt all the necessary legislative and administrative measures to protect goods the produce

or manufacture of any one of the Allied and Associated Powers from all forms of unfair competition in commercial transactions.

Germany undertakes to prohibit and repress by seizure and by other appropriate remedies the impojta-exportation,ˆ manufacture, distribution, sale or offering for sale in its territory of all goods bearing upon themselves or their usual get-up or wrappings any marks, names, devices, or descriptions whatsoever which are calculated to convey directly or indirectly a false indication of the origin, type, nature, or special charac¬ teristics of such goods.

Article 275.— Germany undertakes on condition that reciprocity is accorded in these matters to respect any law, or any administrative or judicial decision given in conformity with such law, in force in any Allied or Associated State and duly communicated to her by the proper authorities, defining or regulating the right to any regional appellation in respect of wine or spirits produced in the State to which the region belongs or the conditions under which the use of any such ap¬ pellation may be permitted; and the importation, ex¬ portation, manufacture, distribution, sale or offering for sale of products or articles bearing regional appellations inconsistent with such law or order shall be prohibited by the German Government and repressed by the meas¬ ures prescribed in the preceding article.

Chapter IV. — Treatment of Nationals of Allied and Associated Powers.

Article 276. — -Germany undertakes:

(a) not to subject the nationals of the Allied and Associated Powers to any prohibition in regard to the exercise of occupations, professions, trade, and indus¬ try, which shall not be equally applicable to all aliens without exception;

(b) not to subject the nationals of the Allied and Associated Powers in regard to the rights referred to in Paragraph (a) to any regulation or restriction which might contravene directly or indirectly the stipulations of the said paragraph, or which shall be other or more disadvantageous than those which are applicable to nationals of the most-favored nation;

(c) not to subject the nationals of the Allied and Associated Powers, their property, rights, or interests, including companies and associations in which they are interested, to any charge, tax, or impost, direct or in¬ direct, other or higher than those which are or

may be imposed on her own nationals or their property, rights, or interests;

(d) not to subject the nationals of any one of the Allied and Associated Powers to any restriction which was not applicable on July i, 1914, to the nationals of such powers unless such restriction is likewise imposed on her own nationals.

Article 277. — The nationals of the Allied and Asso¬ ciated Powers shall enjoy in German territory a con¬ stant protection for their persons and for their prop¬ erty, rights, and interests, and shall have free access to the courts of law.

Article 27%. — Germany undertakes to recognize any new nationality which has been or may be acquired by her nationals under the laws of the Allied and Asso¬ ciated Powers, and in accordance with the decisions of the competent authorities of these powers pursuant to naturalization laws or under treaty stipulations, and to regard such persons as having, in consequence of the acquisition of such new nationality, in all respects severed their allegiance to their country of origin.

Article 279. — The Allied and Associated Powers may ˆpoint Consuls General, Consuls, Vice Consuls, and Cfonsular Agents in German towns and ports. Germany undertakes to approve the designation of the Consuls General, Consuls, Vice Consuls, and Consular Agents, whose names shall be notified to her, and to admit them to the exercise of their functions in con¬ formity with the usual rules and customs.

Chapter V. — General Articles.

Article 280. — The obligations imposed on Germany by Chapter I and by Articles 271 and 272 of (Chapter

II above shall cease to have effect five years from the date of the

coming into force of the present treaty, unless otherwise provided in the text, or unless the Council of the League of Nations shall, at least twelve months before the expiration of that period, decide that these obligations shall be maintained for a further pe¬ riod with or without amendment.

Article 276 of Chapter IV shall remain in opera¬ tion, with or without amendment, after the period of five years for such further period, if any, not exceed¬ ing five years, as may be determined by a majority of the Council of the League of Nations,

Article 281. — If the German Government engages in international trade, it shall not in respect thereof have or be deemed to have any rights, privileges, or immu¬ nities of sovereignty.

SECTION II. — TREATIES.

Article 282. — From the coming into force of the present treaty and subject to the provisions thereof the multilateral treaties, conventions, and agreements of an economic or technical character enumerated be¬ low and in the subsequent articles shall alone be ap¬ plied as between Germany and those of the Allied and Associated Powers party thereto; ,

1. Conventions of March 14, 1884; Dec. i, 1886, and

March 23, 1887, and final protocol of July 7, re¬

garding the protection of submarine cables.

2. Convention of Oct. ii, 1909, regarding the inter¬ national circulation of motor car.s

3. Agreement of May 15, 1886, regarding the sealing

of railway trucks subject to customs inspection, and protocol of May 18, i907' , ,

4. Agreement of May 15, 1886, regarding the tech¬ nical standardization of railways.

5. Convention of July 5, 1890, regarding the publi¬ cation of customs tariffs and the organization of an international union for the publication of customs

^^^^6.*’Convention of Dec. 31, 1913, regarding the uni¬ fication of commercial statistics.

7. Convention of April 25, 1907, regarding the

raising of the Turkish customs tariff.

8. Convention of March 14, 1857, for the redemp¬ tion of toll dues on the sound and belts.

9. Convention of June 22, 1861, for the redemption

of the stade toll on the Elbe, .

10. Convention of July 16, 1863, for the redemption of toll dues on the Scheldt.

11. Convention of Oct. 29, 1888, regarding the

establishment of a definite arrangement guaranteeing the free use of the Suez Canal.

12. Convention of Sept. 23, 1910, respecting the

unification of certain regulations regarding collisions and salvage at sea.

13. Convention of Dec. 21, 1904, regarding the ex¬ emption of hospital ships from dues and charges in

^°^i4. Convention of Feb. 4, 1898, regarding the ton¬ nage measurement of vessels for inland navigation.

15. Convention of Sept. 26, 1906, for the suppres¬ sion of nightwork for women.

16. Convention of Sept. 26, 1906, for the suppression of the use of white phosphorus in the manufacture of matches.

17. Conventions of May 18, 1904,. and May 4. 1910, regarding the suppression of the white slave traffic.

18. Convention of May 4, 1910, regarding the sup¬ pression of obscene publications. « »

19. Sanitary conventions of January, 1892; April 15, 1893; April 3, 1894; April 19, 1897, and Dec. 3,

^^°20. Convention of May 20, 1875, regarding the

unification and improvement of the metric system.

21. Convention of Nov. 29, 1906, regarding the

unification of pharmacopoeial formulae for potent drugs.

22. Convention of Nov. 16 and 19, 1885, regarding the establishment of a concert pitch.

23. Convention of June 7, 1905, regarding the crea¬ tion of an International Agricultural Institute at Rome.

24. Conventions of Nov. 3, 1881, and April 15, 1889, regarding precautionary measures against phyl¬ loxera.

25. Convention of March 19, 1902, regarding the protection of birds useful to agriculture.

26. Convention of June 12, 1902, as to the protec¬ tion of minors.

Article 283. — From the coming into force of the present treaty the high contracting parties shall apply the conventions and agreements hereinafter mentioned, in so far as concerns them, on condition that the special stipulations contained m this article are ful¬ filled by Germany.

Postal Coitventions.

Conventions and agreements of the Universal Postal Union concluded at Vienna, July 4, 1891.

Conventions and agreements of the Postal Union signed at Washington, June 15, 1897.

Conventions and agreements of the Postal Union signed at Rome, May 26, 1906.

Telegraphic Conventions:

International Telegraphic Conventions signed at St. , Petersburg July 10, (22) 1875.

Regulations and tariffs drawn up by the Interna¬ tional Telegraphic

Conference, Lisbon, June ii, 1908.

Germany undertakes not to refuse her assent to the conclusion by the new States of the special arrange¬ ments referred to in the conventions and agreements relating to the Universal Postal Union and to the Inter¬ national Telegraphic Union, to which the said new States have adhered or may adhere.

Article 284. — From the coming into force of the present treaty the high contracting parties shall apply, in so far as concerns them, the International Radio-Telegraphic Convention of July 5, 1912, on condition that Germany fulfills the provisional regulations which will be indicated to her by the Allied and Associated Powers.

If within five years after the coming into force of the present treaty a new convention regulating interna¬ tional radio-telegraphic communications should have been concluded to take the place of the convention of July 5, 1912, this new convention shall bind Germany even if Germany should refuse either to take part in drawing up the convention or to subscribe thereto.

This new convention will likewise replace the pro¬ visional regulations in force.

Article 285. — From the coming into force of the present treaty the high contracting parties shall apply in so far as concerns them and under the conditions stipulated in Article 272 the conventions hereinafter mentioned:

1. The conventions of May 6, 1882, and Feb. i, 1889, regulating the fisheries in the North Sea outside territorial waters.

2. The conventions and protocols of Nov. 16, 1887, Feb. 14, 1893, and April ii, 1894, regarding the North Sea liquor traffic.

Article 286. — The International Convention of Paris of March 20, 1883, for the protection of indus¬ trial property, revised at Washington on June 2, 1911; the International Convention of Berne of Sept. 9, 1886, for the protection of literary and artistic works, revised at Berlin on Nov. 13, 1908, and completed by the additional protocol signed at Berne on March 20, 1914, will again come into effect as from the coming into force of the present treaty, in so far as they are not affected or modified by the exceptions and restric¬ tions resulting therefrom.

Article 287. — From the coming into force of the present treaty the

high contracting parties shall apply, in so far as concerns them, the Convention of The Hague of July 17, 1905, relating to civil procedure. This renewal, however, will not apply to France, Portu¬ gal, and Rumania.

Article 288. — The special rights and privileges

{ranted to Germany by Article 3 of the convention of)ec. 2, 1899, relating to Samoa shall be considered to have terminated on Aug. 4, 1914—

Article 289. — ■ Each of the Allied or Associated Pow¬ ers, being guided by the general principles or special provisions of the present treaty, shall notify to Ger¬ many the bilateral treaties or conventions which such Allied or Associated Power wishes to revive with Ger¬ many.

The notification referred to in the present article shall be made either directly or through the inter¬ mediary of another power. Receipt thereof shall be acknowledged in writing by Germany. The date of the revival shall be that of the notification.

The Allied and Associated Powers undertake among themselves not to revive with Germany any conven¬ tions or treaties which are not in accordance with the terms of the present treaty.

The notification shall mention any provisions of the said conventions and treaties which, not being in ac¬ cordance with the terms of the present treaty, shall not be considered as revived. In case of any differ¬ ence of opiniqn, the League of Nations will be called on to decide.

A period of six months from the coming into force of the present treaty is allowed to the Allied and Associated Powers within which to make the notifica¬ tion.

Only those bilateral treaties and conventions which

have been the subject of such a notification shall be revived between the Allied and Associated Powers and Germany; all the others are and shall remain abrogated.

The above regulations apply to all bilateral treaties or conventions existing between all the Allied and Associated Powers, signatories to the present treaty and Germany, even if the said Allied and Associated Powers have not been in a state of war with Germany.

Article 290. — Germany recognizes that all the treaties, conventions, or agreements which she has con¬ cluded with Austria, Hungary, Bulgaria, or Turkey since Aug. i, 1914, until the coming into force of the present treaty are and remain abrogated by the present treaty.

Article 291. — Germany undertakes to secure to the Allied and Associated Powers, and to the officials and nationals of the said powers, the enjoyment of all the rights and advantages of any kind which she may have granted to Austria, Hungary, Bulgaria, or Turkey, or to the officials and nationals of these States by treaties, conventions, or arrangements concluded before Aug. i, 1914, so long as those treaties, conventions, or arrange¬ ments remain in force.

The Allied and Associated Powers reserve the right to accept or not the enjoyment of these rights and advantages.

Article 292. — Germany recognizes that all treaties, conventions, or arrangements which she concluded with Russia or with any State or Government of which the territory previously formed a part of Russia, or with Rumania before Aug. i, 1914, or after that date until the coming into force of the present treaty, are and remain abrogated.

Article 293. — Should an Allied or Associated Power, Russia, or a State or Government of which the territory formerly constituted a part of Russia have been forced since Aug. i, 1914, by reason of mili¬ tary occupation or by any other means or for any other cause, to grant or to allow to be granted by the act of any public authority, concessions, privileges, and favors of any kind to Germany or to a German national, such concessions, privileges, and favors are ipso facto annulled by the present treaty.

No claims or indemnities which may result from this annulment shall be charged against the Allied or As¬ sociated Powers or the powers. States, Governments, or public authorities which are released from their en¬ gagements by the present article.

Article 294. — From the coming into force of the present treaty Germany undertakes to give the Allied and Associated Powers and their nationals the benefit ipso facto of the rights and advantages of any kind which she has granted by treaties, conventions, or ar¬ rangements to non-belligerent States or their nationals since Aug. i, 1914, until the coming into force of the present treaty so long as those treaties, conventions, or arrangements remain in force.

Article 295. — Those of the high contracting parties who have not yet signed, or who have signed but not yet ratified, the Opium Convention signed at The Hague on Jan. 23, 1912, agree to bring the said con¬ vention into force, and for this purpose to enact the necessary legislation without delay and in any case within a period of twelve months from the coming into force of the present treaty.

Furthermore, they agree that ratification of the present treaty should in the case of powers which have not yet ratified the Opium Convention be deemed in all respects equivalent to the ratification of that conven¬ tion and to the signature of the special protocol which was opened at The Hague in accordance with the reso¬ lutions adopted by the Third Opiurn Conference in 1914 for bringing the said convention into force.

For this purpose the Government of the French Re¬ public will communicate to the Government of the Netherlands a certified copy of the protocol of the deposit of ratifications of the present treaty, and will invite the Government of the Netherlands to accept and deposit the said certified copy as if it were a de¬ posit of ratifications of the Opium Convention and a signature of the additional protocol of I9i4'

SECTION III. — DEBTS.

Article 296. — There shall be settled through the intervention of clearing offices to be established by each of the high contracting parties within three months of the notification referred to in paragraph (e) hereaHer the following classes of pecuniary obligations:

1. Debts payable before the war and due by a national of one of the contracting powers, residing within its territory, to a national of an opposing power, residing within its territory.

2. Debts which became payable during the war to

nationals of one contracting power residing within its territory and

arose out of transactions or contracts with the nationals of an opposing power, resident within its territory, of which the total or partial execution was suspended on account of the declaration of war.

3. Interest which has accrued due before and dur¬ ing the war to a national of one of the contracting powers in respect of securities issued by an opposing power, provided thJat the payment of such securities to the nationals of that power or to neutrals has not been suspended during the war.

4. Capital sums which have become payable before and during the war to nationals of one of the contract¬ ing powers in respect of securities issued by one of the opposite powers, provided that the payment of such capital sums to nationals of that power or to neutrals has not been suspended during the war.

The proceeds of liquidation of enemy property, rights, and interests mentioned in Section IV and in the annex thereto will be accounted for through the clearing offices, in the currency and at the rate of ex¬ change hereinafter provided in Paragraph (d), and dis¬ posed of by them under the conditions provided by the said section and annex.

The settlements provided for in this article shall be effected according to the following principles and in accordance with the annex to this section:

(a) Each of the high contracting parties shall prohibit, as from the coming into force of the present treaty, both the payment and the acceptance of pay¬ ment of such debts, and also all communications be¬ tween the interested parties with regard to the settle¬ ment of the said debts otherwise than through fhe clearing offices.

(b) Each of the high contracting parties shall be respectively responsible for the payment of such debts due by its nationals, except in the cases where before the war the debtor was in a state of bankruptcy or failure, or had given formal indication of insolvency or where the debt was due by a company whose busi¬ ness has been liquidated under emergency legislation during the war. Nevertheless, debts due by the in¬ habitants of territory invaded or occupied by the enemy before the armistice will not be guaranteed by the States of which those territories form part.

(c) The sums due to the nationals of one of the high contracting parties by the nationals of an oppos¬ ing State will be debited to the clearing office of the country of the debtor, and paid to the creditor by

the clearing office of the country of the creditor.

(d) Debts shall be paid or credited in the cur¬ rency of such one of the Allied and Associated Powers, their colonies or protectorates, or the British Do¬ minions or India, as may be concerned. If the debts are payable in some other currency they shall be paid or credited in the currency of the country concerned, whether an Allied or Associated Power, colony, pro¬ tectorate, British Dominion, or India, at the pre-war rate of exchange.

For the purpose of this provision the pre-war rate of exchange shall be defined as the average cable trans¬ fer rate prevailing in the Allied or Associated country concerned during the month immediately preceding the outbreak of war between the said country concerned and Germany.

If a contract provides for a fixed rate of exchange governing the conversion of the currency in which the debt is stated into the currency of the Allied or As¬ sociated country concerned, then the above provisions concerning the rate of exchange shall not apply.

In the case of new States the currency in which and the rate of exchange at which debts shall be paid or credited shall be determined by the Reparation Commission provided for in Part VIII, (Reparation).

(e) The provisions of this article and of the annex hereto shall not apply as between Germany on the one hand and any one of the Allied and Associated Powers, their colonies or protectorates, or any one of the British Dominions or India on the other hand, unless within a period of one month from the deposit of the ratifica¬ tions of the present treaty by the power in question, or of the ratification on behalf of such Dominion or of India, notice to that effect is given to Germany by the Government of such Allied or Associated Power or of such Dominiop or of India as the case may be.

(f) The Allied and Associated Powers who have adopted this article and the annex hereto may agree between themselves to apply them to their respective nationals established in their territory so far as re¬ gards matters between their nationals and German nationals. In this case the payments made by appli¬ cation of this provision will be subject to arrangements between the allied and associated clearing offices con¬ cerned.

Annex.

1. Each of the high contracting parties will, within three months from the notification provided for in Article 296, Paragraph (e), establish a clearing office for the collection and payment of enemy debts.

Local clearing offices may be established for any par¬ ticular portion of the territories of the high contract¬ ing parties. Such local clearing offices may perform all the functions of a central clearing office in their respective districts, except that all transactions with the clearing office in the opposing State must be ef¬ fected through the central clearing office.

2. In this annex the pecuniary obligations referred to in the first paragraph of Article 296 are described as “ enemy debts,” the persons from whom the same are due as ” enemy debtors,” the persons to whom they are due as “ enemy creditors,” the clearing office in the country of the creditor is called the ” Creditor Clearing Office,” and the clearing office in the country of the debtor is called the ” Debtor Clearing Office.”

3. The high contracting parties will subject con¬

traventions of Paragraph (a) of Article 296 to the same penalties as are at present provided by their legisla¬ tion for trading with the enemy. They will similarly prohibit within their territory all legal process relating to payment of enemy debts, except in accordance with the provisions of this annex. _

4. The Government guarantee specified in Para¬ graph (b) of Article 296 shall take effect whenever for any reason, a debt shall not be.fecoverable, except in a case where at the date of the outbreak of war the debt was barred by the laws of prescription in force in the country of the debtor, or where the debtor was at that time ‘ in a state of bankruptcy or failure or had given formal indication of insolvency, or where the debt was due by a company whose business has been liquidated under emergency legislation during the war. In such case the procedure specified by this annex shall apply to payment of the dividends.

The terms “bankruptcy” and “failure” refer to the application of legislation providing for such jundi-c!al conditions. The expression “ formalˆ indication of insolvency ” bears the same meaning as it has in Eng¬ lish law… , ˆ /-I

5. Creditors shall give notice to the Creditor Clear¬ ing Office within six months of its establishment of debts due to them, and shall furnish the Clearing Office with any documents and information required of

The high contracting parties will take all suitable measures to trace and punish collusion between enemy creditors and debtors. The clearing offices will com¬ municate to one another any evidence and information which might help the discovery and punishment of

such collusion. ˆ

The high contracting parties will facilitate as much as possible postal and telegraphic communication at the expense of the parties concerned and through the intervention of the clearing offices between debtors and creditors desirous of coming to an agreement as to the amount of their debt.

The Creditor Clearing Office will notify the Debtor Clearing Office of all debts declared to it. The Debtor Clearing Office will, in due course, inform the Creditor Clearing Office which debts are admitted and which debts are contested. In the latter case the Debtor Clearing Office will give the grounds for the non-ad¬ mission of debt… , ,

6. When a debt has been admitted, in whole or in part, the Debtor Clearing Office will at once credit the Creditor Clearing Office with the amount admitted, and at the same time notify it of such credit.

7. The debt shall be deemed to be admitted in full and shall be credited forthwith to the Creditor Clear¬ ing Office unless within three months from the receipt of the notification or such longer time as may be agreed to by the Creditor Clearing Office notice has been given by the Debtor Clearing Office that it is not admitted.

8. When the whole or part of a debt is not admitted the two clearing offices will examine into the matter jointly, and will endeavor to bring the parties to an agreement.

9. The Creditor Clearing Office will pay to the in¬ dividual creditor the sums credited to it out of the funds placed at its disposal by the Government of its country and in accordance with the conditions fixed by the said Government, retaining any sums considered necessary to

cover risks, expenses, or commissions.

10. Any person having cjaimed payment of an enemy debt which is not admitted in whole or in part shall pay to the clearing office by way of fine interest at 5 per cent, on the part not admitted. Any person having unduly refused to admit the whole or part of a

debt claimed from him shall pay by way of fine intereˆ at 5 per cent, on the amount with regard to which his refusal shall be disallowed.

Such interest shall run from the date of expira¬ tion of the period provided for in Paragraph 7 until the date on which the claim shall have been disallowed or the debt paid.

Each clearing office shall in so far as it is concerned take steps to collect the fines above provided for, and will be responsible if such fines cannot be collected.

The fines will be credited to the other clearing office, which shall retain them as a contribution toward the cost of carrying out the present provisions.

11. The balance between the clearing offices shall be struck monthly, and the credit balance paid in cash by the debtor State within a week.

Nevertheless, any credit balances which may be due by one or more of the Allied and Associated Powers shall be retained until complete payment shall have been effected of the sums due to the Allied or Asso¬ ciated Powers or their nationals or laccoun't of the war.

12. To facilitate discussion between the clearing offices each of them shall have a representative at the place where the other is established.

13. Except for special reasons all discussions in re¬ gard to claims will, so far as possible, take place at the Debtor Clearing Office.

14. In conformity with Article 296, Paragraph (b), the high contracting parties are responsible for the payment of the enemy debts owing by their nationals.

The Debtor Clearing Office will therefore credit the Creditor Clearing Office with all debts admitted, even in case of inability to collect them from the in¬ dividual debtor. The Governments concerned will, nevertheless, invest their respective clearing offices with all necessary

powers for the recovery of debts which have been admitted.

As an exception the admitted debts owing by per¬ sons having suffered injury from acts of war shall only be credited to the Creditor Clearing Office when the compensation due to the person concerned in re¬ spect of such injury shall have been paid.

15. Each Government will defray the expenses of the clearing office set up in its territory, including the salaries of the staff.

16. Where the two clearing offices are unable to agree whether a debt claimed is due, or in case of a difference between an enemy debtor and an enemy creditor, or between the clearing offices, the dispute shall either be referred to arbitration if the parties so agree under conditions fixed by agreement between them, or referred to the mixed arbitral tribunal pro¬ vided for in Section VI hereafter.

At the request of the Creditor Qearing Office the dispute may, however, be submitted to the jurisdic¬ tion of the courts of the place of domicile of the debtor.

17. Recovery of sums found by the mixed arbitral tribunlal, the court, or the arbitration tribunal to be due shall be effected through the clearing offices as if these sums were debts admitted by the Debtor Clearing Office.

18. Each of the Governments concerned shall appoint an agent who will be responsible for the presentation to the mixed arbitral tribunal of the cases conducted on behalf of its clearing office. This agent will exercise a genei^al control over the representatives or counsel employed by its nationals.

Decisions will be arrived at on documentary evi¬ dence, but it will be open to the tribunal to hear the parties in person, or, according to their preference, by their representatives approved by the two Govern¬ ments, or by the agent referred to above, who shall be competent to intervene along with the party or to reopen and maintain a claim abandoned by the same.

19. The clearing offices concerned will lay before the mixed arbitral tribunal all the information and documents in their possession, so as to enable the tri¬ bunal to decide rapidly on the cases which are brought before it.

20. Where one of the parties concerned appeals against the joint decision of the two clearing offices he ^hall make a deposit against the

cost, which deposits shall only be refunded when the first judgment is modified in favor of the appellant and in proportion to the success he may attain, his opponent in case of such a refund being required to pay an equivalent proportion of the cost and expenses. Security accepted by the tribunal may be substituted for a deposit.

A fee of 5 per cent, of the amount in dispute shall be charged in respect of all cases brought before the tribunal. This fee shall, unless the tribunal directs otherwise, be borne by the unsuccessful party. Such fee shall be added to the deposit referred to. It is also independent of the security.

The tribunal may award to one of the parties a stini in respect of the expenses of the proceedings.

Any sum payable under this paragraph shall be credited to the clearing office of the successful party as a separate item.

21. With a view to the rapid settlement of claims, due regard shall be paid in the appointment of all persons connected with the clearing offices or with the Mixed Arbitral Tribunal to their knowledge of the language of the other country concerned. Each of the clearing offices will be at liberty to correspond with the other, and to forward documents in its own Ian* guage.

22. Subject to any special agreement to the con¬ trary between the Governments concerned, debts shall carry interest in accordance with the following pro¬ visions:

Interest shall not be payable on sums of money due by way of dividend, interest, or other periodical pay¬ ments which themselves represent interest on capital.

The rate of interest shall be 5 per cent, per annum except in cases where, by contract, law, or custom, the creditor is entitled to payment of interest at a dif¬ ferent rate. In such cases the rate to which he is

en¬ titled shall prevail.

Interest shall run from the date of commencement of hostilities (or, if the sum of money to be recovered fell due during the war, from the date at which it fell due) until the sum is credited to the clearing office of the creditor.

Sums due by way of interest shall be treated as debts admitted by the clearing offices and shall be credited to the Creditor Clearing Office in the same way as such debts.

23. Where by decision of the clearing offices or the Mixed Arbitral Tribunal a claim is held not to fall within Article 296, the creditor shall be at liberty to prosecute the claim before the courts or to take such other proceeclings as may be open to him.

The presentation of a claim to the clearing office suspends the operation of any period of prescription.

24. The high contracting parties agree to regard the decisions of the Mixed Arbitral Tribunal as final and conclusive, and to render them binding upon their nationals.

25. In any case where a Creditor Clearing Office de¬ clines to notify a claim to the Debtor Clearing Office, or to take any step provided for in this annex, intended to make effective in whole or in part a request of which it has received due notice, the enemy creditor shall be entitled to receive from the clearing office a certificate setting out the amount of the claim, and shall then be entitled to prosecute the claim before the courts or to take such other proceedings as may be open to him.

SECTION IV. — PROPERTY, RIGHTS, AND INTERESTS.

Article 2ˆ7. — The question of private property, rights, and interests in an enemy country, shall be settled according to the principles laid down in this section and to the provisions of the annex hereto:

(a) The exceptional war measures and measures of transfer (defined in paragraph 3 of the annex hereto) taken by Germany with respect to the property, rights, and interests of nationals of Allied or Associated Powers, including companies and associations in which they are intere.sted, when liquidation has not been com¬ pleted, shall be immediately discontinued or stayed and the property, rights, and interests concerned re¬ stored to their owners, who shall enjoy full rights therein in accordance with the provisions of Article 298.

(b) Subject to any contrary stipulations which may be provided for in the present treaty, the Allied and Associated Powers reserve the right to retain and liqui¬ date all property, rights, and interests belonging at the date of the coming into force of the present treaty to German nationals, or companies controlled by them, within their territories, colonies, possessions, and pro¬ tectorates including territories ceded to them by the present treaty.

The liquidation shall be carried out in accordance with the laws of the Allied or Associated State con¬ cerned, and the German owner shall not be able to dis¬ pose of such property, rights, or interests nor to sub¬ ject them to any charge without the consent of that State.

German nationals who acquire ipso facto the nation¬ ality of an Allied or Associated Power in accordance with the provisions of the present treaty will not be considered as German nationals within the meaning of this paragraph.

(c) The price or the amount of compensation in re¬ spect of the exercise of the right referred to in the preceding paragraph (b) will be fixed in accordance with the methods of sale or valuation adopted by the

laws of the country in which the property has been re¬ tained or liquidated.

(d) As between the Allied and Associated Powers or their nationals on the one hand and Germany or her nationals on the other hand, all the exceptional war measures, or measures of transfer, or acts done or to be done in execution of such measures as defined in Paragrpahs i and 3 of the annex hereto shall be con¬ sidered as final and binding upon all persons except as regards the reservations laid down in the present treaty.

(e) The nationals of Allied and Associated Powers shall be entitled to compensation in respect of damage or injury inflicted upon their property, rights, or inter¬ ests, including any company or association in which they are interested, in German territory as it existed on Aug. I, 1914, by the application either .of the ex¬ ceptional war measures or measures of transfer men¬ tioned in Paragraphs i and 3 of the annex hereto. The claims made in this respect by such nationals shall be investigated, and the total of the compensation shall be determined by the Mixed Arbitral Tribunal provided for in Section VI or by an

arbitrator appointed by that tribunal. This compensation shall be borne by Ger-mlany, and may be charged upon the property of Ger¬ man nationals, within the territory or under the con¬ trol of the claimant's State. This property may be constituted as a pledge for enemy liabilities under the conditions fixed by Paragraph 4 of the annex hereto. The payment of this compensation may be made by the Allied or Associated State, and the amount will be debited to Germany.

(f) Whenever a national of an Allied or Associated Power is entitled to property which has been su,bjected to a measure of transfer in German territory and expresses a desire for its restitution, his claim for compensation in accordance with Paragraph (e) shall be satisfied by the restitution of the said property if it still exists in specie.

In such case (Germany shall take all necessary steps to restore the evicted owner to the possession of his property, free from all incumbrances or burdens with which it may have been charged after the liquidation, and to indemnify all third parties injured by the restitu¬ tion.

If the restitution provided for in this paragraph cannot be effected, private agreements arranged by the intermediation of the powers concerned or the clear¬ ing offices provided for in the Annex to Section III may be made, in order to secure that the national of the Allied or Associated Power may secure compensa¬ tion for the injury referred to in Paragraph (e) by the grant of advantages or equivalents which he agrees to accept in place of the property, rights or interests of which he was deprived.

Through the restitution in accordance with this article, the price or the amount of compensation fixed by the application of Paragraph (e) will be reduced by the actual value of the property restored, account being taken of compensation in respect of loss ot use or de¬ terioration.

(g) The rights conferred by Paragraph (f) are re¬ served to owners who are nationals of Allied or Asso¬ ciated Powers within whose territory legislative meas¬ ures prescribing the general liquidation of enemy prop¬ erty, rights or interests were not applied before the signature of the armistice.

(h) Except in cases where, by application of Para¬ graph (f), restitutions in specie have been made, the net proceeds of sales of enemy property, rights or in¬ terests w'herever situated carried out

either by virtue of war legislation, or by application of this article, and in general all cash assets of enemies, shall be dealt with as follows:

(i) As regards powers adopting Section III and the annex thereto, the said proceeds and cash assets shall be credited to the power of which the owner is a national, through the clearing office established there¬ under; any credit balance in favor , of Germany result¬ ing therefrom shall be dealt with as provided in Article

243.

(2) As regards powers not adopting Section III and the annex thereto, the proceeds of the property, rights and interests, and the cash assets, of the nation¬ als of Allied or Associated Powers held by Germany shall be paid immediately to the person entitled thereto or to his Government; the proceeds of the property, rights and interests, and the cash assets, of German nationals received by an Allied or Associated Power shall be subject to disposal by such power in accord¬ ance with its laws and regulations and may be applied in payment of the claims and debts defined by this article or Paragraph 4 of the annex hereto. Any proj)- erty, rights and interests or proceeds thereof or cash assets not used as above provided may be retained by the said Allied or Associated Power and if retained

the cash value thereof shall be dealt with as provided in Article 243.

In the case of liquidations effected in new States, which are signatories of the present treaty as Allied and Associated Powers, or in States which are not entitled to share in the reparation payments to be made by Germany, the proceeds of liquidations effected by such States shall, subject to the rights of the Reparation Commission under the present treaty, particularly under Articles 235 and 260, be paid direct to the owner. If on the application of that owner, the Mixed Arbitral Tribunal, provided for by Section VI of this part or an arbitrator appointed by that tribunal, is satisfied that the conditions of the sale or measures taken by the Government of the State in question outside its gen¬ eral legislation were unfairly prejudicial to the price obtained, they shall have discretion to award to the owner equitable compensation to be paid by that State.

(i) Germany undertakes to compensate its nationals in respect of the sale or retention of their property, rights or interests in Allied or Associated States.

(j) The amount of all taxes and imposts upon capi¬ tal levied or to be levied by Germany on the property, rights, and interests of the nationals of the Allied or Associated Powers from the iith of November, 1918, until three months from the coming into force of the present treaty, or, in the case of property, rigfits or interests which have been subjected to exceptional measures of war, until restitution in accordance with the present treaty, shall be restored to the owners.

Article 298. — Germany undertakes, with regard to the property, rights and interests, including companies and associations in which they were interested, re¬ stored to nationals of Aflied and Associated Powers in accordance with the provisions of Article 297, Para¬ graph (a) or (f) :

(a) to restore and maintain, except as expressly pro¬ vided in the present treaty, the property, rights, and interests of the nationals of Allied or Associated Pow¬ ers in the legal position obtaining in respect

of the property, rights, and interests of German nationals under the laws in force before the war.

(b) not to subject the property, rights, or interests of the nationals of the Allied or Associated Powers to any measures in derogation of property rights which are not applied equally to the property, rights, and in¬ terests of German nationals, and to pay adequate com¬ pensation in the event of the application of these measures.

ANNEX.

1. In accordance with the provisions of Article 297, Paragraph (d), the validity of vesting orders and of orders for the winding up of businesses or companies, and of any other orders, directions, decisions, or in¬ structions of any court or any department of the Governrnent of any of the high contracting parties made or given, or purporting to be made or given, in pur¬ suance of war legislation with regard to enemy prop¬ erty, rights, and interests is confirmed. The interests of all persons shall be regarded as having been effec¬ tively dealt with by any order, direction, decision, or instruction dealing with property in which they may be interested, whether or not such interests are specifically mentioned in the order, direction, decision, or instruc¬ tion. No question shall be raised as to the regularity of a transfer of any property, rights, or interests dealt with in pursuance of any such order, direction, de¬ cision, or instruction. Every action taken with regard to any property, business, or company, whether as re¬ gards its investigation, sequestration, compulsory ad¬ ministration, use, requisition, supervision, or winding up, the sale or management of property, rights, or in¬ terests, the collection or discharge of debts, the pay¬ ment of costs, charges or expenses, or any other matter whatsoever, in pursuance of orders, directions, decisions, or instructions of any court or of any department of the Government of any of the high contracting parties, made or given, or purporting to be made or given, in pursuance of war legislation with regard to enemy property, rights, or interests, is confirmed. Provided that the provisions of this paragraph shall not be held to prejudice the titles to property heretofore acquired in good faith and for value and in accordance with the laws of the country in which the property is situated by nationals of the Allied and Associated Powers.

The provisions of this paragraph do not apply to such of the above-mentioned measures as have been taken by the German authorities in invaded or occu¬ pied territory, nor to such of the above mentioned measures as have been taken by Germany or the Ger¬ man authorities since Nov. ii, 1918, all of which shall be void.

2. No claim or action shall be made or brought against any Allied or Associated Power or against any person acting on behalf of or under the direction of any

legal authority or department of the Government of such a power by Germany or by any German national wherever resident in respect of any act or omission with regard to his property, rights, or interests during the war or in preparation for the war. Similarly no claim or action shall be made or brought lagainst any person in respect of any act or omission under or in accordance with the exceptional war measures, laws, or regulations of any Allied or Associated Power.

3. In Article 297 and this Annex .the expression " exceptional war measures " includes measures of all kinds, legislative, administrative, judicial, or others, that have been taken or will be taken hereafter with regard to enemy property, and which have had or will have the effect of removing from the proprietors the power of disposition over their property, though with¬ out affecting the ownership, such as measures of super¬ vision, of compulsory administration, and of sequestra¬ tion; or measures which have had or will have as an object the seizure of, the use of, or the interference with enemy assets, for whatsoever motive, under what¬ soever form or in whatsoever place. Acts in the execu¬ tion of these measures include all detentions, instruc¬ tions, orders or decrees of Government departments or courts applying these measures to enemy property, as well as acts performed by any person connected with the administration or the supervision of enemy prop¬ erty, such as the payment of debts, the collecting of credits, the payment of any costs, charges, or expenses, or the collecting of fees.

Measures of transfer are those which have affected or will affect the ownership of enemy property by transferring it in whole or in part to a person other than the enemy owner, and without his consent, such as measures directing the sale, liquidation, or devolu¬ tion of ownership in enemy property, or the canceling of titles or securities.

4. All property, rights, and interests of German nationals within the territory of any Allied or Asso¬ ciated Power and the net proceeds of their sale, liquida¬ tion or other dealing therewith may be charged by that Allied or Associated Power in the first place with pay¬ ment of amounts due in respect of claims by the na¬ tionals of that Allied or Associated Power with regard to their property, rights, and interests, including com¬ panies and associations in which they are interested in

German territory, or debts owing to them by German nationals, and with payment of claims growing out of acts committed by the German Government or by any German authorities since July 31, 1914, and before that Allied or Associated Power entered into the war. The amount of such claims may be assessed by an arbitrator appointed by Gustave Ador, if he is willing, or if no such appointment is made by him by an arbitrator ap¬ pointed by the Mixed Arbitral Tribunal provided for in Section VI. They may be charged in the second place with payment of the amounts due in respect of claims bjr the nationals of such Allied or Associated Power with regjard to their property, rights, and interests in the territory of other ‘enemy powers, or debts owing to them by nationals of such powers in so far as those claims or debts are otherwise unsatisfied.

5. Notwithstanding the provisions of Article 297, where immediately before the outbreak of war a com¬ pany incorporated in an Allied or Associated State had rights in common with a company controlled by it and incorporated in Germany to the use of trademarks in third countries, or enjoyed the use in common with such company of unique means of /reproduction of goods or articles for sale in third countries, the former company shall alone have the right to use these trade¬ marks in third countries to the exclusion of the German company, and these unique means of reproduction shall be handed over to the former company, notwithstanding « any action taken under German war legislation with regard to the latter company or its business, industrial property or shares. Nevertheless, the former company, if requested, shall deliver to the latter company deriva¬ tive copies permitting the continuation of reproduction of articles for use within German territory.

6. Up to the time when restitution is carried out in accordance with Article 297, Germany is responsible for the conservation of property, rights, and interests of the nationals of Allied or Associated Powers, including companies and associations in which they are interested, that have been subjected by her to exceptional war measures.

7. Within one year from the coming into force of the present treaty the Allied or Associated Powers will specify the property, rights and interests over which they intend to exercise the right provided in Article 297, Paragraph (f).

8. The restitution provided in Article 297 will be carried out by order of the German Government or of the authorities which have been substituted for it. De¬ tailed accounts of the action of administrators shall be

furmshed to the interested persons by the German au-thontiˆ uponˆ request, which may be made at any time after the coming into force of the present treaty, r completion of the liquidation provided

for by Article 297, Paragraph (b), the property, rights and interests of German nationals will continue to be exceptional war measures that have been or will be taken with regard to them.

ˆ 10. Germany will, within six months from the com—

into force of the present treaty, deliver to each Allied or Associated Power all securities, certificates, deeds, or other documents of title held by its nationals and relating to property, rights or interests situated in the territory of that Allied or Associated Power, in¬ cluding iany shares, stock, debentures, debenture stocks, or other obligations of any company incorporated in accordance with the laws of that power.

Germany will at any time on demand of any Allied or Associated Power furnish such information as may be required with regard to the property, rights, and in¬ terests of German nationals within the territory of such Allied or Associated Power, or with regard to any transactions concerning such property, rights or inter- , ests effected since July i, 1914.

11. The expression “cash assets” includes all de¬ posits or funds established before or after the declara¬ tion of war, as well as all assets coming from deposits, revenues, or profits collected by administrators, seques¬ trators, or others from funds placed on deposit or other¬ wise, but does not include sums belonging to the Allied or Associated Powers or to their component States, provinces, or municipalities.

12. All investments wheresoever effected with the cash assets of nationals of the high contracting parties, including companies and associations in which such nationals were interested, by persons

responsible for the administration of enemy properties or having con¬ trol over such administration, or by order of sucn per¬ sons or of any authority whatsoever shall be annulled. These cash assets shall be accounted for irrespective of any such investment.

13. Within one month from the coming into force of the present treaty, or on demand at any time, Ger¬ many will deliver to the Allied and Associated Powers all accounts, vouchers, records, documents, and in¬ formation of any kind which may be within German territory, and which concern the property, rights and interests of the nationals of those powers, including companies and associations in which they are interested, that have been subjected to an exceptional war measure, or to a measure of transfer either in German territory or in territory occupied by Germany or her allies.

The controllers, supervisors, managers, administra¬ tors, sequestrators, liquidators, and receivers shall be personally responsible under guarantee of the German Government for the immediate delivery in full of these accounts and documents, and for their accuracy.

14. The provisions of Article 297 and this annex relating to property, rights and interests in an enemy country, and the proceeds of the liquidation thereof, apply to debts, credits and accounts. Section III regu¬ lating only the method of payment.

In the settlement of matters provided for in Article 297 between Germany and the Allied or Associated States, their colonies or protectorates, or any one of the British Dominions or India, in respect of any of which a declaration shall not have been made that they adopt Section III, and between their respective nation¬ als, the provisions of Section III respecting the cur¬ rency in which payment is to be made and the rate of exchange and of interest shall apply unless the Gov¬ ernment of the Allied or Associated Power concerned shall within six months of the coming into force of the present treaty notify Germany that the said pro¬ visions are not to be applied.

15. The provisions of Article 297 and this annex apply to industrial, literary, and artistic property which has been or will be dealt with in the liquidation of property, rights, interests, companies, or businesses uncfer war legislation by the Allied or Associated Powers, or in accordance with the stipulations of Article 297, Paragraph (b).

SECTION V. — CONTRACTS, PRESCRIPTIONS, JUDGMENTS.

Article 299. — (a) Any contract concluded between enemies shall be regarded as having been dissolved as from the time when any two of the parties become enemies, except in respect of any debt or other pecu¬ niary obligation arising out of any act done or money paid thereunder, and subject to the exceptions and special rules with regard to particular contracts or classes of contracts contained herein or in the annex

hereto. , . , „ .

(b) Any contract of which the execution shall be

required in the general interest, within six months from the date of the coming into force of the present treaty, by the Allied or Associated Governments of which one of the parties is a national, shall be excepted from dis¬ solution under this article.

When the execution of the contract thus kept alive would, owing to the alteration of trade conditions, cause one of the parties substantial prejudice the mixed arbitral tribunal provided for by Section VI shall be empowered to grant to the prejudiced party equitable compensation.

(c) Having regard to the provisions of the Consti¬ tution and law of the United States of America, of Brazil, and of Japan, neither the present Article, nor Article 300, nor the Annex hereto shall apply to con¬ tracts made between nationals of these States and Ger¬ man nationals; nor shall Article 305 apply to the United States of America or its nationals.

(d) The present Article and the Annex hereto shall not apply to contracts the parties to which became enemies by reason of one of them being an inhabitant of territory of which the sovereignty has been trans¬ ferred, if such party shall acquire under the present Treaty the nationality of an allied or associated power, nor shall they apply to contracts between nationals of the Allied and Associated Powders between whom trading has been prohibited by reason of one of the parties be¬ ing in allied or associated territory in the occupation of the enemy.

(e) Nothing in the present Article or the Annex hereto shall be deemed to invalidate a transaction law¬ fully carried out in accordance with a

contract between enemies if it has been carried out with the authority of one of the belligerent Powers.

Article 300. — (a) All periods of prescription, or lim¬ itation of right of action, whether they began to run before or after the outbreak of war, shall be treated in the territory of the High Contracting Parties, so far as regards relations between enemies, as having been suspended for the duration of the war. They shall begin to run again at earliest three months after the coming into force of the present Treaty. This pro¬ vision shall apply to the period prescribed for the pres¬ entation of interest or dividend coupons or for the presentation for repayment of securities drawn for re¬ payment or repayable on any other ground.

(b) Where, on account of failure to perform any act or comply with any formality during the war, meas¬ ures of execution have been taken in German territory to the prejudice of a national of an Allied or Associated Power, the claim of such national shall, if the matter does not fall within the competence of the courts of an Allied or Associated Power, be heard by the mixed arbitral tribunal provided for by Section VI.

(c) Upon the application of any interested person who is a national of an Allied or Associated Power, the mixed arbitral tribunal shall order the restoration of the rights which have been prejudiced by the meas¬ ures of execution referred to in paragraph (b), wher¬ ever, having regard to the particular circumstances of the case, such restoration is equitable and possible.

If such restoration is inequitable or impossible the mixed arbitral tribunal may grant compensation to the prejudiced party to be paid by the German Govern¬ ment.

(d) Where a contract between enemies has been dis¬ solved by reason either of failure on the part of either party to carry out its provisions or of the exercise of a right stipulated in the contract itself the party preju¬ diced may apply to the Mixed Arbitral Tribunal for relief. The tribunal will have the powers provided for in paragraph (c).

(e) The provisions of the preceding paragraphs of this article shall apply to the nationals of Allied and Associated Powers who have been prejudiced by reason of measures referred to above taken by Germany in invaded or occupied territory, if they have not been otherwise compensated.

(f) Germany shall compensate any third party who may be prejudiced

by any restitution or restoration ordered by the Mixed Arbitral Tribunal under the pro¬ visions of the preceding paragraphs of this Article.

(g) As regards negotiable instruments, the period of three months provided under paragraph (a) shall commence as from the date on which any exceptional regulations applied in the territories of the interested power with regard to negotiable instruments shall have definitely ceased to have force.

Article 301. — As between enemies no negotiable in¬ strument made before the war shall be deemed to have become invalid by reason only of failure within the re¬ quired time to present the instrument for acceptance or payment or to give notice of non-acceptance or non¬ payment to drawers or indorsers or to protest the in¬ strument, nor by reason of failure to complete any formality during the war.

Where the period within which a negotiable instru¬ ment should have been presented for acceptance or for payment, or within which notice of non-acceptance or non-payment should have been given to the drawer or indorser, or within which the instrument should have been protested, has elapsed during the war, and the party who should have presented or protested the in¬ strument or have given notice of non-acceptance or non¬ payment has failed to do so during the war, a period of not less than three months from the coming into force of the present treaty shall be allowed within which presentation, notice of non-acceptance or non-payment or protest may be made.

Article 302. — Judgments given by the courts of an Allied or Associated Power in all cases which, under the present treaty, they are competent to decide, shall be recognized in Germany as hnal, and shall be enforced without it being necessary to have them declared ex¬ ecutory.

If a judgment in respect of any dispute which may have arisen has been given during the war by a Gerrnan court against a national of an

Allied or Associated State in a case in which he was not able to make his defense, the allied and associated national who has suffered prejudice thereby shall be entitled to recover compensation, to be fixed by the Mixed Arbitral Tri¬ bunal provided for in Section VI.

At the instance of the national of the Allied or Associated Power the compensation above mentioned may, upon order to that effect of the Mixed Arbitral Tribunal, be effected where it.js possible by replacing the parties in the situation which they occupied before the judgment was given by the German court.

The above compensation may likewise be obtained before the Mixed Arbitral Tribunal by the nationals of Allied or Associated Powers who have suffered preju¬ dice by judicial measures taken in invaded or occupied territories, if they have not been otherwise compen¬ sated.

Article 303. — For the purpose of Sections III, IV, V, and VTI, the expression “ during the war ” means for each Allied or Associated Power the period between the commencement of the state of war between that power and Germany and the coming into force of the present treaty.

ANNEX.

I. General Provisions.

1. Within the meaning of Articles 299, 300 and 301, the parties to a contract shall be regarded as enemies when trading between them shall have been prohibited by or otherwise became unlawful under laws, orders or regulations to which one of those parties was subject. They shall be deemed to have become enemies from the date when such trading was prohibited or otherwise became unlawful.

2. The following classes of contracts are excepted from dissolution by Article 299 and, without preju¬ dice to the rights contained in Article 297 (b) of Sec¬ tion IV, remain in force subject to the application of domestic laws, orders or regulations made during the war by the Allied and Associated Powers and subject to the terms of the contracts:

(a) Contracts having for their object the transfer of estates or of real or personal property where the property therein had passed or the object had been delivered before the parties became enemies;

(b) Leases and agreements for leases of land and houses;

(c) Contracts of mortgage, pledge, or lien;

(d) Concessions concerning mines, quarries or de¬ posits;

(e) Contracts between individuals or companies and States, provinces, municipalities, or other similar ju¬ ridical persons charged with administrative functions, and concessions granted by States, provinces, munici¬ palities, or other similar juridical persons charged with administrative functions.

3. If the provisions of a contract are in part dis¬ solved under Article 299, the remaining provisions of that contract shall, subject to the same application of domestic laws as is provided for in Paragraph 2, con¬ tinue in force if they are severable, but where they are not severable the contract shall be deemed to have been dissolved in its entirety.

II. Provisions Relating to Certain Classes of

Contracts.

Stock Exchange and Commercial Exchange Contracts.

4. (a) Rules made during the war by any recog¬ nized exchange or commercial association providing for the closure of contracts entered into before the war by

an enemy are confirmed by the high contracting parties, as also any action taken thereunder, provided:

(i) That the contract was expressed to be made subject to the rules of the exchange or association in question ;

(ii) That the rules applied to all persons concerned;

Oii) That the conditions attaching to the closure

were fair and reasonable.

(b) The preceding paragraph shall not apply to

rules made during the occupation by exchange or com¬ mercial associations in the districts occupied by the enemy, ,

(c) The closure of contracts relating to cotton “ futures,” which were closed as on the 3i£t July, 1914, under the decision of the Liverpool Cotton Asso¬ ciation, is also confirmed.

Security.

(5) The sale of a security held for an unpaid debt owing by an enemy shall be deemed to have been valid irrespective of notice to the owner if the creditor acted in good faith and with reasonable care and prudence, and no claim by the debtor on the ground of such sale shall be admitted.

This stipulation shall not apply to any sale of secu¬ rities effected by lan enemy during the occupation in regions invaded or occupied by the enemy.

•

Negotiable Instruments.

6. As regards powers which adopt Section III and the Annex thereto the pecuniary obligations existing between enemies and resulting from the issue of nego¬ tiable instruments shall be adjusted in conformity with the said Annex by the instrumentality of the Clearing Offices, which shall assume the rights of the holder as regards the various remedies open to him.

7. If a person has either before or during the war become liable upon a negotiable instrument in accord¬ ance with an undertaking given to him by a person who has subsequently become an enemy, the latter shall remain liable to indemnify the former in respect of his liability, notwithstanding the outbreak of war.

III. Contracts of Insurance.

8. Contracts of insurance entered into by any per¬ son with another person who subsequently became an enemy will be dealt with in accordance with the follow¬ ing paragraphs:

Fire Insurance.

9. Contracts for the insurance of property against fire entered into by a person interested in such prop¬ erty with another person who subsequently became an enemy shall not be deemed to have been dissolved by the outbreak of war, or by the fact of the person be¬ coming an enemy, or on account of the failure during the war and for a period of three months thereafter to perform his obligations under the contract, but they shall be dissolved at the date when the annual premium becomes payable for the first time after the expiration of a period of three months after the coming into force of the present

treaty.

A settlement shall be effected of unpaid premiums which became due during the war, or of claims for losses which occurred during the war,

10. Where by administrative or legislative action an insurance against fire effected before the war has been transferred during the war from the original to an¬ other insurer, the transfer will be recognized and the liability of the original insurer will be deemed to have ceased as from the date of the transfer. The original insurer will', however, be entitled to receive on demand full information as to the terms of the transfer, and if it should appear that these terms were not equitable they shall be amended so far as may be necessary to render them equitable.

Furthermore, the insured shall, subject to the con¬ currence of the original insurer, be entitled to re¬ transfer the contract to the original insurer as from the date of the demand.

Life Insurance.

11. Contracts of life insurance entered into between an insurer and a person who subsequently became an enemy shall not be deemed to have been dissolved by the outbreak of war, or by the fact of the person be¬ coming an enemy.

Any sum which during the war became due upon a contract deemed not to have been dissolved under the preceding provision shall be recoverable after the war with the laddition of interest at five per cent, per annum from the date of its becoming due up to the day of payment.

Where the contract has lapsed during the war owing to non-payment of premiums, or has become void from breach of the conditions of the contract, the assured or his representatives pr the persons entitled shall have the right at any time within twelve months of the coming

into force of the present treaty to claim from the insurer thp surrender value of the policy at the date of its lapse or avoidance.

Where the contract has lapsed during the war owing to non-payment of premiums the payment of which has been prevented by the enforcement of measures of war, the assured or his representative or the persons entitled shall have the right to restore the contract on payment of the premiums with interest at five per cent, per annum within three months from the coming into effect of the present treaty.

12. Any Allied or Associated Power may within three months of the coming into force of the present treaty cancel all the contracts of insurance running be¬ tween a German insurance company and its nationals under conditions which shall protect its nationals from any prejudice.

To this end the German insurance company will hand over to the allied or associated Government con¬ cerned, the proportion of its assets attributable to the policies so canceled and will be relieved from all lia¬ bility in respect of such policies. The assets to be handed over shall be determined by an actuary ap¬ pointed by the Mixed Arbitral Tribunal.

13. Where contracts of life insurance have been entered into by a local branch of an insurance com¬ pany established in a country which subsequently be¬ came an enemy country, the contract shall, in the ab¬ sence of any stipulation to the contrary in the contract Itself, be governed by the local law, but the insurer shall be entitled tb demand from the insured or his representatives the refund of sums paid on claims made or enforced under measures taken during the war, if the making or enforcement of such claims was not in accordance with the terms of the contract itself or was not consistent with the laws or treaties existing at the time when it was entered into.

14. In any case where by the law applicable to the contract the insurer remains bound by the contract notwithstanding the non-payment of premiums until notice is given to the insured of the termination of the contract, he shall be entitled where the giving of such notice was prevented by the war to recover the unpaid premiums with interest at five per cent, per annum from the insured.

15. Insurance contracts shall be considered as con¬ tracts of life assurance for the purpose of Paragraphs II to 14 when they depend on the probabilities of human life combined with the rate of interest for the calculation of the reciprocal engagements between the two parties.

Marine Insurance.

16. Contracts of marine insurance including time policies and voyage policies entered into between an insurer and a person who subsequently became an enemy, shall be deemed to have been dissolved on his becoming an enemy, except in cases where the risk undertaken in the contract had attached before he be¬ came an enemy.

Where the risk had not attached, money paid by way of premium or otherwise shall be recoverable from

the insurer. . , i_

Where the risk had attached effect shall be given to the contract notwithstanding the party becoming an enemy, and sums due under the contract either by way of premiums or in respect of losses shall be recoverable after the coming into force of the present treaty.

In the event of any agreement being come to for the payment of interest on sums due before the war to or by the nationals of States which have been at war and recovered after the war, such interest shall in the case of losses recoverable under contracts of marine insurance run from the expiration of a period of one year from the date of the loss.

17. No contract of marine insurance with an in¬ sured person who subsequently became an enemy shall be deemed to cover losses due J.o belligerent action by the power of which the insurer was a national or by the allies or associates of such power. , , , r

18 Where it is shown that a person who had before the war entered into a contract of marine insurance with an insurer who subsequently became an enemy entered after the outbreak of war into a new contract covering the same risk with an insurer who was not an enemy, the new contract shall be deemed to be sub¬ stituted for the original contract as from the date when it was entered into, and the premiums payable shall be adjusted on the basis of the original insurer having remained liable on the contract only up till the time when the new contract was entered into,

Other Insurance.

19. Contracts of insurance entered into before the war between an

insurer and a person who subsequently became an enemy other than contracts dealt with in Paragraphs 9 to i8 shall be treated in all respects on the same footing as contracts of fire insurance between the same persons would be dealt with under the said paragraphs.

Reinsurance.

20. All treaties of reinsurance with a person who became an enemy shall be regarded as having been abrogated by the person becoming an enemy, but with¬ out prejudice in the case of life or marine risks which had attached before the war to the right to recover payment after the war for sums due in respect of such risks.

Nevertheless, if, owing to invasion, it has been im¬ possible for the reinsured to find another reinsurer, the treaty shall remain in force until three months after the coming into force of the present treaty.

Where a reinsurance treaty becomes void under this paragraph, there shall be an adjustment of ac¬ counts between the parties in respect both of premiums paid and payable and of liabilities for losses in respect of life or marine risk which had attached before the war. In the case of risks other than those mentioned in Paragraphs ii to 18 the ladjustment of accounts shall be made as at the date of the parties becoming enemies without regard to claims for losses which may have occurred since that date.

21. The provisions of the preceding paragraph will extend equally to reinsurances existing at the date of the parties becoming enemies of particular risks under¬ taken by the insurer in a contract of insurance against any risks other than life or marine risks.

22. Reinsurance of life risks effected by particular contracts and not under any general treaty remain in force.

The provisions of paragraph 12 apply to treaties of reinsurance of life insurance contracts in which enemy companies are the re-insurers.

23. In case of a reinsurance effected before the war of a contract of marine insurance the cession of a risk which had been ceded to the reinsurer ‘shall, if it had attached before the outbreak of war, remain valid and effect be given to the contract notwithstanding the outbreak of war; sums due under the contract of re¬ insurance in respect either of premiums or of losses shall be recoverable after the war.

24. The provisions of paragraphs 17 and 18 and the last part of paragraph 16 shall apply to contracts for the reinsurance of marine

risks.

SECTION VI. — MIXED ARBITRAL TRIBUNAL.

Article 304. — (a) Within three months from the date of the coming into force of the present treaty, a Mixed Arbitral Tribunal shall be established between each of the Allied and Associated Powers on the one hand and Germany on the other hand. Each such tri¬ bunal shall consist of three members. Each of the Governments concerned shall appoint one of these mem¬ bers. The President shall be chosen by agreement be¬ tween the two Governments concerned.

In case of failure to reach agreement, the President of the tribunal and two other persons either of whom may in case of need take his place, shall be chosen by the Council of the League of Nations, or, until this is set up, by M. Gustave Ador if he is willing. These persons shall be nationals of Powers that have re¬ mained neutral during the war.

If any Government does not proceed within a period of one month in case there is a vacancy to appoint a member of the tribunal, such member shall be chosen by the other Government from the two persons men¬ tioned above other than the President.

The decision of the majority of the members of the tribunal shall be the decision of the tribunal.

(b) The Mixed Arbitral Tribunals established pur¬ suant to paragraph (a) shall decide all questions within their competence under Sections III, IV, V, and VII.

In addition, all questions, whatsoever their nature, relating to contracts concluded before the coming into force of the present treaty between nationals of the Allied and Associated Powers and German nationals shall be decided by the Mixed Arbitral Tribunal, always excepting questions which, under the laws of the Allied, Associated or neutral powers, are within the jurisdiction of the national courts of those powers. Such questions shall be decided by the national courts in question, to the exclusion of the Mixed Arbitral Tribunal. The party who is a national of an Allied or Associated Power may nevertheless bring the case before the Mixed Arbitral Tribunal if this is not prohibited by the laws of his country.

(c) If the number of cases justifies it, additional members shall be appointed and each Mixed Arbitral Tribunal shall sit in divisions. Each of these divisions will be constituted as above.

(d) Each Mixed Arbitral Tribunal will settle its own procedure except in so far as it is provided m the following Annex, and is empowered to award the sums to be paid by the loser in respect of the costs and expenses of the proceedings.

(e) Each Government will pay the remuneration of the member of the Mixed Arbitral Tribunal appointed by it and of any agent whom it may appoint to repre¬ sent it before the Tribunal. The remuneration of the President will be determined by special agreement be¬ tween the Governments concerned, and this remunera¬ tion and the joint expenses of each tribunal will be paid by the two Governments in equal moieties.

(f) The high contracting parties agree that their courts and authorities shall render to the Mixed Arbitral Tribunal direct all the assistance in their power, par¬ ticularly as regards transmitting notices and collecting evidence.

(g) The high contracting parties agree to regard the decisions of the Mixed Arbitral Tribunal as final and conclusive, and to render them binding upon their nationals.

ANNEX. *

1. Should one of the members of the Tribunal either die, retire, or be unable for any reason whatever to discharge his functions, the same procedure will be fol¬ lowed for filling the vacancy' 'as was followed for ap¬ pointing him.

2. The tribunal may adopt such rules of procedure as shall be in accordance with justice and equity and decide the order and time at which each party must conclude its arguments, and may arrange all formalities required for dealing with the evidence.

3. The agent and counsel of the parties on each side are authorized to present orally and in writing to the tribunal arguments in support or

in defense of each case.

4. The tribunal shall keep record of the questions and cases submitted and the proceedings thereon, with the dates of such proceedings.

5. Each of the Powers concerned may appoint a secretary. These secretaries shall act together as joint secretaries of the tribunal and shall be subject to its direction. The tribunal may appoint and employ any other necessary officer or officers to assist in the per¬ formance of its duties.

6. The tribunal shall decide all questions and mat¬ ters submitted upon such evidence and information as may be furnished by the parties concerned.

7. Germany agrees to give the tribunal all facilities and information required by it for carrying out its in¬ vestigations.

8. The language in which the proceedings shall be conducted shall, unless otherwise agreed, be English, French, Italian, or Japanese, as may be determined by the Allied or Associated Power concerned,

9. The place and time for the meetings of each tribunal shall be determined by the President of the tribunal.

Article 30$. — Whenever a competent court has given or gives a decision in a case covered by Sections III, IV, V or VII, and such decision is inconsistent with the provisions of such sections, the party who is prejudiced by the decision shall be entitled to obtain redress which shall be fixed by the Mixed Arbitral Tri¬ bunal. At the request of the national of (an Allied or Associated Power, the redress may, whenever possible, be effected by the Mixed Arbitral Tribunal directing the replacement of the parties in the position occupied by them before the judgment was given by the German Court.

SECTION VII. — INDUSTRIAL PROPERTY.

Article 306. — ■ Subject to the stipulations of the present treaty, rights of industrial, literary, and artistic property, as such property is defined by the Interna¬ tional Conventions of Paris and of Berne, mentioned in Article 286, shall be re-established or restored, as from the coming into force of the present treaty in the territories of the high contracting parties, in favor of the persons entitled to the benefit of them at the moment when the state of war commenced, or their legal representatives. Equally, rights which, except for the war, would have been acquired during the war in consequence of an application

made for the protection of industrial property, or the publication of a literary or artistic work, shall be recognized and established in favor of those persons who would have been entitled thereto, from the coming into force of the present treaty.

Nevertheless, all acts done by virtue of the special measures taken during the war under legislative, execu¬ tive or administrative authority of any Allied or Asso¬ ciated Power in regard to the rights of German na¬ tionals in industrial, literary or artistic property shall remain in force and shall continue to maintain their full effect.

No claim shall be made or action brought by Ger¬ many or German nationals in respect of the use during the war by the Government of any Allied or Associated Power, or by any persons acting on behalf or with the assent of such Government of any rights in industrial, literary or artistic property, nor in respect of the sale, offering for sale, or use of any products, articles, or apparatus whatsoever to which such rights applied.

Unless the legislation of any one of the Allied or Associated Powers in force at the moment of the signa¬ ture of the present treaty otherwise directs, sums due or paid in virtue of any act or operation resulting from the execution of the special measures mentioned in Paragraph i of this article shall be dealt with in the same way as other sums due to German nationals are directed to be dealt with by the present treaty; and sums produced by any special measures taken by the German Government in respect of rights in industrial, literary or artistic property belonging to the nationals of the Allied or Associated Powers shall be considered and treated in the same way as other debts due from German nationals.

Each of the Allied and Associated Powers reserves to itself the right to impose such limitations, conditions or restrictions on rights of industrial, literary or artistic property (with the exception of trademarks) acquired before or during the war, or which may be subse¬ quently acquired in accordance with its legislation, by German nationals, whether by granting licenses, or by the working, or by preserving control over their ex¬ ploitation, or in any other way as may be considered necessary for national defense or in the public interest, or for assuring the fair treatment by Germany of the rights of industrial, literary, and artistic property held in German territory by its nationals, or for securing the due fulfillment of all the obligations undertaken by Germany in the present treaty.

As regards rights of industrial, literary and artistic property acquired after the coming into force of the present treaty, the right so reserved by the Allied and Associated Powers shall only be exercised in cases where these limitations, conditions or restrictions may be considered necessary for national defense or in the public interest.

In the event of the application of the provisions of the preceding paragraph by any of the Allied or Asso¬ ciated Powers, there shall be paid reasonable indemni¬ ties or royalties which shall be dealt with in the same way as other sums due to Germian nationals are directed to be dealt with by the present treaty.

Each of the Allied or Associated Powers reserves the right to treat as void and of no effect any transfer in whole or in part of or other dealing with rights of or in respect of industrial, literary or artistic property effected after Aug. 1, 1914, or in the future, which would have the result of defeating the objects of the provisions of this article.

The provisions of this article shall not apply to rights in industrial, literary or artistic property which have been dealt with in the liquidation of businesses or companies under war legislation by the Allied or Associated Powers, or which may be so dealt with by virtue of Article 297, paragraph (b).

Article 307. — A minimum of one year after the com¬ ing into force of the present treaty shall be accorded to the nationals of the high contracting parties, without extension fees or other penalty, in order to enable such persons to accomplish any act, fulfill lany formality, pay any fees, and generally satisfy any obligation pre¬ scribed by the laws or regulations of the respective States relating to the obtaining, preserving, or op¬ posing rights to, or in respect of, industrial property either acquired before the ist of August, 1914, or which, except for the war, might have been acquired since that date as a result of an application made be¬ fore the war or during its continuance, but nothing in this article shall give any right to reopen interference proceedings in the United States of America where a final hearing has taken place.

All rights in, or in respect of, such property which may have lapsed by reason of any failure to accomplish any act, fulfill any formality, or make any payment, shall revive, but subject in the case of patents and designs to the imposition of such conditions as each Allied or Associated Power may deem reasonably neces¬ sary for the protection of persons who have manufac¬ tured or made use of the subject matter of such prop¬ erty while the rights had lapsed. Further, where

to patents or designs belonging to German nationals are revived under this article, they shall be subject in respect of the grant of licenses to the same provisions as would have been applicable to them during the war, as well as to all the provisions of the present treaty.

The period from the ist August, 1914, until the force of the present treaty shall be excluded in considering the time within which a patent should be worked or a trademark or design used, and It is further agreed that no patent, registered trade¬ mark or design in force on the ist of August, 1914, shall be subject to revocation or cancellation by reason only of the failure to work such patent or use such trademark or design for two years after the coming into force of the present treaty.

Article 308.— The rights of priority, provided by Article IV of the International Convention for the Protection of Industrial Property of Paris, of the 20th March, 1883, revised at Washington in 1911, or by any other convention or statute, for the filing or registra¬ tion of applications for patents or models of utility, and for the registration of trademarks, designs, and models which had not expired on the ist August, 1914, and those which have arisen during the war, or would have arisen but for the war, shall be extended by each of the high contracting parties in favor of all nationals of the other high contracting parties for a period of six months after the coming into force of the present treaty.

Nevertheless, such extension shall in no way affect the right of any of the high contracting parties or of any person who before the coming into force of the present treaty was bona fide in possession of any rights of industrial property conflicting with rights applied for by another who claims rights of priority in respect of them, to exercise such rights by itself or himself personally, or by such agents or licensees as derived their rights from it or him before the coming into force of the present treaty; and such persons shall not be amenable to

any action or other process of law in re¬ spect of infringement.

Article 309. — No action shall be brought and no claim made by persons residing or carrying on business within the territories of Germany on the one part and of the Allied or Associated Powers on the other, or persons who are nationals of such powers, respectively, or by any one deriving title during the war from such persons, by reason of any action which has taken place within the territory of the other party between the date of the declaration of war and that of the coming into force of the present treaty, which might constitute an infringement of the rights of industrial property or rights of literary and artistic property, either existing at any time during the war or revived under the pro¬ visions of Articles 307 and 308.

Equally, no action for infringement of industrial, literary or artistic property rights by such persons shall at any time be permissible in respect of the sale or offering for sale for a period of one year after the signature of the present treaty in the territories of the Allied or Associated Powers on the one hand or Ger¬ many on the other, of products or articles manufac¬ tured, or of literary or artistic works published, during the period between the declaration of war and the signa¬ ture of the present treaty, or against those who have acquired and continue to use them. It is understood, nevertheless, that this provision shall not apply when the possessor of the rights was domiciled or had an industrial or commercial establishment in the districts occupied by Germany during the war.

This article shall not apply as between the United States of America on the one hand and Germany on the other.

Article 310. — Licenses in respect of industrial, liter¬ ary, or artistic property concluded before the war be¬ tween nationals of the Allied or Associated Powers or persons residing in their territory or carrying on busi¬ ness therein, on the one part, and German nationals, on the other part, shall be considered as canceled as from the date of the declaration of war between Ger¬ many and the Allied or Associated Powers. But, in any case, the former beneficiary of a contract of this kind shall have the right, within a period of six months aher the coming into force of the present treaty, to demand from the proprietor of the rights the grant of a new license, tire conditions of which, in default of agreement between the parties, shall be fixed by the duly qualified tribunal in the country under whose legis¬ lation the rights had been acquired, except in the case of licenses held in respect of rights acquired under Ger¬ man law. In such cases the conditions shall be fixed by the Mixed Arbitral Tribunal referred to in Section VI of

this Part. The tribunal may, if necessary, fix also the amount which it may deem just should be paid by reason of the use of the rights during the war.

No license in respect of industrial, literary, or artistic property, granted under the special war legisla¬ tion of any Allied or Associated Power, shall be affected by the continued existence of any license entered into before the war, but shall remain valid and of full effect, and a license so granted to the former bene¬ ficiary of a license entered into before the war shall be considered as substituted for such license.

Where sums have been paid during the war by virtue of a license or agreement concluded before the war in respect of rights of industrial property or for the reproduction or the representation of literary, dra¬ matic, or artistic works, these sums shall be dealt with in the same manner as other debts or credits of German nationals, as provided by the present treaty.

This Article shall not apply as between the United States of America on the one hand and Germany on the other.

Article 311. — The inhabitants of territories sepa¬ rated from Germany by virtue of the present treaty shall, notwithstanding this separation and the change of nationality consequent thereon, continue to enjoy in Germany all the rights in industrial, literary, and artistic property to which they were entitled under German legislation at the time of the separation.

Rights of industrial, literary and artistic property which are in force in the territories separated from Germany under the present treaty at the moment of the separation of these territories from Germany, or which will be re-established or restored in accordance with the provisions of Article 306 of the present treaty, shall be recognized by the State to which the said territory is transferred and shall remain in force in that terri¬ tory for the same period of time given them under the German law.

SECTION VIII. — ˆSOCIAL AND STATE INSURANCE IN CEDED TERRITORY.

Article 312. — Without prejudice to the provisions contained in other articles of the present treaty, the German Government undertakes to transfer to any power to which German territory in Europe is ceded,

and to any power administering former German terri¬ tory as a mandatary under Article 22 of Part I (League of Nations,) such portion of the reserves accumulated by the Government of the German Empire or of Ger¬ man States, or by public or private organizations under their control, as is attributable to the carrying on of social or State insurance in such territory.

The powers to which these funds are transferred must apply them to the performance of the obligations arising from such insurances.

The conditions of the transfer will be determined by special conventions to be concluded between the Ger¬ man Government and the Governments concerned.

In case these special conventions are not concluded in accordance with the above paragraph within three months after the coming into force of the present treaty, the conditions of transfer shall in each case be referred to a commission of five members, one of whom shall be appointed by the German Government, one by the other interested Government, and three by the governing body of the International Labor Office from the nationals of other States. This commission shall by majority vote within three months after appoint¬ ment adopt recommendations for submission to the Council of the League of Nations, and the decisions of the council shall forthwith be accepted as final by Ger¬ many and the other Government concerned.

Part XI. — Aerial Navigation.

Article 313. — The aircraft of the Allied and Asso¬ ciated Powers shall have full liberty of passage and landing over and in the territory and territorial waters of Germany, and shall enjoy the same privileges as German aircraft, particularly in case of distress by land or sea.

Article 314. — The aircraft of the Allied and Asso¬ ciated Powers shall, while in transit to any foreign country whatever, enjoy the right of flying over the territory and territorial waters of Germany without landing, subject always to any regulations which may be made by Germany, and which shall be applicable equally to the aircraft of Germany and those of the Allied and Associated Countries.

Article 315. — -All aerodromes in Germany open to national public traffic shall be open for the aircraft of the Allied and Associated Powers, and in any such aerodrome such aircraft shall be treated on a footing of equality with German aircraft as regards charges of every description, including charges for landing and accommodation.

Article 316. — Subject to the present provisions, the

rights of passage, transit and landing, provided for in Articles 313, 314 and 315, are subject to the observance of such regulations as Germany may consider it neces¬ sary to enact, but such regulations shall be applied without distinction to German aircraft and to those of Allied and Associated Countries.

Article 317. — Certificates of nationality, airworth¬ iness, or competency, and licenses, issued or recognized as valid by any of the Allied or Associated Powers, shall be recognized in Germany as valid and as equiva¬ lent to the certificates and licenses issued by Germany.

Article 318. — As regards internal commercial air traffic, the aircraft of the Allied and Associated Powers shall enjoy in Germany most favored nation treatment.

Article 319. — Germany undertakes to enforce the necessary measures to insure that all German aircraft flying over her territory shall comply with the rules as to lights and signals, rules of the air and rules for air traffic on and in the neighborhood of areodromes, which have been laid down in the convention relative to aerial navigation concluded between the Allied and Associated Powers.

Article 320. — The obligations imposed by the pre¬ ceding provisions shall remain in force until the ist January, 1923, unless before that date Germany shall have been admitted into the League of Nations or shall have been authorized, by consent of the Allied and Associated Powers, to adhere to the convention relative to aerial navigation concluded between those powers.

Part XII. — Ports, Waterways and Railways.

SECTION I. — general PROVISIONS.

Article 321. — Germany undertakes to grant freedom of transit

through her territories on the routes most convenient for international transit, either by rail, nav¬ igable waterway, or canal, to persons, goods, vessels, carriages, wagons, and mails coming from or going to the territories of any of the Allied and Associated Powers, (whether continguous or not;) for this pur¬ pose the crossing of territorial waters shall be allowed. Such persons, goods, vessels, carriages, wagons, and mails shall not be subjected to any transit duty or to any undue delays or restrictions, and shall be entitled in Germany to national treatment as regards charges, facilities, and all other matters.

Goods in transit shall be exempt from all customs or other similar duties.

All charges imposed on transport in transit shall be reasonable, having regard to the conditions of the traffic. No charge, facility, or restriction shall depend directly or indirectly on the ownership or on the na¬ tionality of the ship or other means of transport on which any part of the through journey has been, or is to be, accomplished.

Article 322. — Germany undertakes neither to im¬ pose nor to maintain any control over transmigration traffic through her territories beyond measures neces¬ sary to insure that passengers are bona Ude in transit; nor to allow any shipping company or any _ other private body, corporation, or person interested in the traffic to take any part whatever in, or to exercise any direct or indirect influence over, any adminis¬ trative service that may be necessary for this purpose.

Article 323. — Germany undertakes to make no dis¬ crimination or preference, direct or indirect,ˆ in the duties, charges, and prohibitions relating to importa¬ tions into or exportations from her territories, or, subject to the special engagements conUained in the present treaty, in the charges and conditions of transport of goods or persons entering or leaving her territories, based on the frontier crossed; or on the kind, ownership, or flag of the means of transport (including aircraft) em¬ ployed; or on the original or immediate place of de¬ parture of the vessel, wagon, or aircraft or other means of transport employed, or its ultimate or intermediate destination; or on the route of or places of trans¬ shipment on the journey; or on whether any port through which the goods are imported or exported is a German port or a port belonging to any foreign country or on whether the goods are imported or ex¬ ported by sea, by land, or by air.

Germany particularly undertakes not to establish against the ports and vessels of any of the Allied and .Associated Powers any surtax or any

direct or indirect bounty for export or import by German ports of ves¬ sels, or by those of another power, for example by means of combined tariffs. She further undertakes that persons or goods passing through a port or using a vessel of any of the Allied and Associated Powers shall not be subjected to any formality or delay what¬ ever to which such persons or goods would not be sub¬ jected if they passed through a German port or a port

of any other power, or used a German vessel or a vessel of any other power.

Article 324. — All necessary administrative and tech¬ nical measures shall be taken to shorten, as much as possible, the transmission of goods across the German frontiers and to insure their forwarding and transport from such frontiers, irrespective of whether such goods are coming from or going to the territories of the Allied and Associated Powers or are in transit from or to those territories, under the .same material conditions in such matters as rapidity of carriage and care en route as are enjoyed by other goods of the same kind carried on German territory under similar conditions of transport.

In particular, the transport of perishable goods shall be promptly and regularly carried out, and the customs formalities shall be effected in such a way as to allow the goods to be carried straight through by trains which make connection.

Article 325. — The seaports of the Allied and Asso¬ ciated Powers are entitled to all favors and to all re¬ duced tariffs granted on German railways or navi¬ gable water\(ays for the benefit of German ports or of any port of another power.

Article 326. — ■ Germany may not refuse to partici¬ pate in the tariffs or combinations of tariffs intended to secure for ports of any of the Allied or Associated Powers advantages similar to those granted by Ger¬ many to her own ports or the ports of any other power.

SECTION II. — NAVIGATION.

Chapter I. — Freedom of Navigation.

Article 327. — The nationals of any of the Allied and Associated Powers as well as their vessels and property shall enjoy in all German ports and in the in¬ land navigation routes of Germany, the same treatment in all respects as German nationals, vessels and property.

In particular the vessels of any one of the Allied or Associated Powers shall be entitled to transport goods of any description, and passengers, to or from any ports or places in German territory to which Ger¬ man vessels may have access, under conditions which shall not be more onerous than those applied in the case of national vessels; they shall be treated on a footing or equality with national vessels as regards port and harobr facilities and charges of every description, including facilities for stationing, loading and unloading, and duties and charges of tonnage, harbor, pilotage, lighthouse, quarantine, and all analagous duties and charges of whatsoever nature, levied in the name of or for the profit of the Government, public functionaries, private individuals, corporations or establishments of any kind.

In the event of Germany granting a preferential regime to any of the Allied or Associated Powers or to any other foreign power, this regime shall be ex¬ tended immediately and unconditionally to all the Allied and Associated Powers.

There shall be no impediment to the movement of persons or vessels other ‘than those arising from pre¬ scriptions concerning customs, police, sanitation, emi¬ gration and immigration and those relating to the im¬ port and export of prohibited goods. Such regula¬ tions must be reasonable and uniform and must not impede traffic unnecessarily.

Chapter II. — Free Zones in Ports.

Article 328. — The free zones existing in German ports on the 1st August, 1914. shall be maintained. These free zones and any other free zones which may be established in German territory by the present treaty, shall be subject to the regime provided for in the following articles.

Goods entering or leaving a free zone shall not be subjected to any import or export duty, other than those provided for in Article 330.

Vessels and goods entering a free zone mlay be subjected to the charges established to cover expenses of administration, upkeep and improvement of the port, as well as to the charges for the use of various instal¬ lations, provided that these charges shall be reasonable having reg’ard to the expenditure incurred, and shall be levied in the conditions of equality provided for in Article 327.

Goods shall not be subjected to any other charge except a statistical duty which shall not exceed i per mille ad valorem, and which shall be devoted exclu¬ sively to defraying the expenses of compiling

statements of the traffic in the port.

Article 329. — • The facilities granted for the erection of warehouses, for packing and for unpacking goods, sh)all be in accordance with trade requirements for the time being. All goods allowed to be consumed in

the free zone shall be exempt from duty, whether of excise or of any other description, apart from the statistical duty provided for in Article 328 above.

There shall be no discrimination in regard to any of the provisions of the present article between persons belonging to different nationalities or between goods of different origin or destination.

Article 330. — Import duties may be levied on goods leaving the free zone for consumption in the country on the territory of which the port is situated. Conversely, export duties mˆay be levied on goods coming from such country and brought into the free zone. These import and export duties shall be levied on the same basis and at the same rates as similar duties levied at the other customs frontiers of the country concerned. On the other hand, Germany shall not levy, under any denomination, any import, export, or transit duty on goods darried by land or water across her territory to or from the free zone from or to any other State.

Germany shall draw up the necessary regulations to secure and guarantee such freedom of transit over such railways and waterways in her territory as nor¬ mally give access to the free zone.

Chapter III. — Clauses Relating to the Elbe, the Oder, the Niemen (Russtrom-Memel- Niemen), and the Danube.

(1) General Clauses.

Article 331. — The following rivers are declared in¬ ternational:

The Elbe (Labe) from its confluence with the Vltava (Moldau) and the Vltava (Moldau) from Prague;

the Oder (Odra) from its confluence with the Oppa;

the Niemen (Russtrom-Memel-Niemen) from Grodno;

the Danube from Ulm;

and all navigable parts of these river systems which naturally provide more than one State with access to the sea, with or without transshipment from one vessel to another; together with lateral canials and channels constructed either to duplicate or to improve naturally navigable sections of the specified river system, or to connect two naturally navigable sections of the same river.

The same shall apply to the Rhine-Danube navi¬ gable waterway, should such a waterway be constructed under the conditions laid down in Article 353.

Article 332. — On the waterways declared to be in¬ ternational in the preceding article, the nationals, property and flags of all powers shall be treated on a footing of perfect equality, no distinction being made to the detriment of the nationals, property or flag of any power between them and the nationals, property or flag of the riparian State itself or of the most favored nation.

Nevertheless, German vessels shall not be entitled to carry passengers or goods by regular services be¬ tween the ports of any Allied or Associated Power, with¬ out special authority from such power.

Article 333. — Where such charges are not precluded by any existing conventions, charges varying on dif¬ ferent sections of a river may be levied on vessels using the navigable channels or their approaches, provided that they are intended solely to cover equitably the cost of maintaining in a navigable condition, or of improving, the river and its approaches, or to meet ex¬ penditure incurred in the interests of navigation. The schedule of such charges shall be calculated on the basis of such expenditure and shall be posted up in the ports. These charges shall be levied in such a manner as to render any detailed examination of cargoes unnecessary, except in cases of suspected fraud or con¬ travention.

Article 334. — The transit of vessels, passengers, and goods on these waterways shall be effected in accord¬ ance with the general conditions prescribed for transit in Section I, above.

When the two banks of an international river are within the same State goods in transit may be placed under seal or in the custody of customs agents. When the river forms a frontier goods and passengers in transit shall be exempt from all customs formalities; the loading and unloading of goods, and the embarka¬ tion and disembarkation of passengers, shall only take place in the ports specified by the riparian State.

Article 335. — No dues of any kind other than those provided for in the present part shall be levied along the course or at the mouth of these rivers.

This provision shall not prevent the fixing by the riparian States of customs, local octroi, or consumption duties, or the creation of reason,able and uniform charges levied in the ports, in accordance with public

tariffs, for the use of cranes, elevators, quays, ware¬ houses, *etc.*

Article 336. — In default of any special organiza¬ tion for carrying out the works connected with the up¬ keep and improvement of the international portion of navigable system, each riparian State shall be bound to take suitable measures to remove any obstacle or danger to navigation and to insure the maintenance of good conditions of navigation.

If a State neglects to comply with this obligation any riparian State, or any State represented on the International Commission, if there is one, may appeal to the tribunal instituted for this purpose by the League of Nations.

Article 337. — The same procedure shall be followed in the case of a riparian State undertaking ‘any works of a nature to impede navigation in the international section. The tribunal mentioned in the preceding article shall be entitled to enforce the suspension or suppres¬ sion of such works, making due allowance in its de¬ cisions for all rights in connection with irrigation, water power, fisheries, and other national interests, which with the consent of all the riparian States or of all the States represented on the International Com¬ mission, if there be one, shall be given priority over the requirements of navigation.

Appeal to the tribunal of the League of Nations does not require the suspension of the works.

Article 338. — The regime set out in Articles 332 to 337 above shall be superseded by one to be laid down in a General Convention drawn up by the Allied and Associated Powers, and approved by the League of Nations, relating to the w'aterways recognized in such Convention as having an international character. This Convention shall apply in particular to the whole or part of the above-mentioned river systems of the Elbe, (Labe,) the Oder, (Odra,) the Niemen, (Russtrom-Memel-Niemen,) and the Danube, land such other parts of these river systems as may be covered by a general definition.

Germany undertakes in accordance with the pro¬ visions of Article 379, to adhere to the said General Convention as well as to all projects prepared in ac¬ cordance with Article 343 below for the revision of existing internlational agreements and regulations.

Article 339. — Germany shall cede to the Allied and Associated Powers concerned, within a maximum period of three months from the date on wliich notification shall be given her, a proportion of the tugs and vessels remaining registered in the ports of the river systems referred to in Article 331 after the deduction of those surrendered by way of restitution or reparation. Ger¬ many shall in the same wiay cede material of all kinds necessary to the Allied and Associated Powers con¬ cerned for the utilization of those river systems.

The number of the tugs and boats and the amount of the material so ceded, and their distribution, shall be determined by an arbitrator or arbitrators nominated by the United States of America, due regard being had to the legitimate needs of the parties concerned, and particularly to the shipping traffic during the five years preceding the war.

All craft so ceded shall be provided with their fittings and gear, shall be in a good state of repair and in con¬ dition to carry goods, and shall be selected from among those most recently built.

The cessions provided for in the present article shall entail a credit of which the total amount, settled in a lump sum by the arbitrator or arbitrators, shall not in any case exceed the value of the capital ex¬ pended in the initial establishment of the material ceded, and shall be set off against the total sums due from Germany; in consequence, the indemnification of the proprietors shall be a matter for Germany to deal with.

(2) Special Clauses Relating to the Elbe, the Oder, and the Niemen (Russtrom-Memel-Niemen).

Article 340. — The Elbe (Labe) shall be placed under the administration of an International Commission which shall comprise:

4 representatives of the German States bordering on the river;

2 representatives of the Czechoslovak Stlate;

I representative of Great Britain;

I representative of France;

I representative of Italy;

I representative of Belgium.

Whatever be the number of members present, each delegation shall have the right to record a number of votes equal to the number of representatives allotted to it.

If certain of these representatives cannot be ap¬ pointed at the time of the coming into force of the present treaty, the decisions of the commission shall nevertheless be valid.

Article 341. — The Oder (Odra) shall be placed under the administration of an International Commis¬ sion, which shall comprise:

I representative of Poland;

3 representatives of Prussia;

I representative of the Czechoslovak Stiate;

I representative of Great Britain;

I representative of France;

I representative of Denmark;

1 representative of Sweden.

If certain of these representatives cannot be ap¬ pointed at the time of the coming into force of the present treaty, the decision of the commission shall nevertheless be valid.

Article 342. — On a request being mlade to the League of Nations by any riparian State, the Niemen (Russtrom-Memel-Niemen) shall be placed under the administration of an International Commission, v/ hich shall comprise one representative of each riparian State, and three representatives of other States speci¬ fied by the League of Nations.

Article 343. — The International Commissions re¬ ferred to in Articles 340 and 341 shall meet within three months of the date of the coming into force of the present treaty. The International Commission re¬ ferred to in Article 342 shall meet within three months from the date of the request made by a riparian State. Each of these commissions shall proceed immediately to prepare a project for the revision of the existing internationjal agreements and regulations, drawn up in conformity with the General Convention referred to in Article 338, should such convention have been already concluded. In the absence of such convention, the project for revision shall be in conformity with the principles of Articles 332 to 337, above.

Article 344. — The projects referred to in the pre¬ ceding article shall, inter alia:

(a) Designate the headquarters of the International Commission, and prescribe the mianner in which its President is to be nominated;

(b) Specify the extent of the commission's powers, particularly in regard to the execution of works of maintenance, control, and improvement on the river system, the financial regime, the fixing and collection of charges, and regulations for navigation;

(c) Define the sections of the river or its tribu¬ taries to which the international regime shall be applied.

Article 345. — The international agreements and regulations at present governing the navigation of the Elbe, (Labe,) the Oder, (Odra,) and the Niemen (Russtrom-Memel-Niemen) shall be provisionally main¬ tained in force until the ratification of the above-men¬ tioned projects. Nevertheless, in all cases where such agreements and regulations in force are in conflict with the provisions of Articles 332 to 337 above, or of the General Convention to be concluded, the latter

pro¬ visions shall' prevail.

(3) Special Clauses Relating to the Danube.,

Article 346. — The European Commission of the Danube reassumes the powers it possessed before the war. Nevertheless, as a provisional measure, only rep¬ resentatives of (jreat Britain, France, Italy, land Rumania shall constitute this commission.

Article 347. — From the point where the competence of the European Commission ceases, the Danube system referred to in Article 331 shall be placed under the ad¬ ministration of an international commission composed las follows:

2 representatives of German riparian States;

I representative of each other riparian State;

I representative of each non-riparian State rep¬ resented in the future on the European Com¬ mission of the Danube.

If certlain of these representatives cannot be ap¬ pointed at the time of the coming into force of the present treaty, the decisions of the commission shall nevertheless be valid.

Article 348. — The International Commission pro¬ vided for in the preceding article shall meet as soon as possible after the coming into force of the present treaty, and shall undertake provisionally the administra¬ tion of the river in conformity with the provisions of Articles 332 to 337, until such time as a definite statute regarding the Danube is concluded by the powers nominated by the Allied and Associated Powers.

Article 349. — Germany agrees to accept the regime which shall be laid down for the Danube by a conference of the powers nominated by the Allied and Associated Powers, which shall meet within one year after the coming into force of the present treaty, and at which German representatives may be present.

Article 350. — The mandate given by Article 57 of

the Treaty of Berlin of the 13th July, 1878, to Austria-Hungary, and transferred by her to Hungary, to carry out works at the Iron Gates, is abrogated. The com¬ mission intrusted with the administration of this

part of the river shall lay down provisions for the settle¬ ment of accounts subject to the financial provisions of the present treaty, Charges which may be necessary shall in no case be levied by Hungary.

Article 351. — Should the Czechoslovak State, the Serb-Croat-Slovene State, or Rumania, with the au¬ thorization of or under mandate from the International Commission, undertake maintenance, improvement, weir, or other works on a part of the river system which forms a frontier, these States shall enjoy on the op¬ posite bank, and also on the part of the bed which is outside their territory, all necessary facilities for the survey, execution, and maintenance of such works.

Article 352. — Germany shall be obliged to make to the European Commission of the Danube all restitu¬ tions, reparations, and indemnities for damages inflicted on the commission during the war.

Article 353. — Should a deep-draught Rhine-Danube navigable waterway be constructed, Germany under¬ takes to apply thereto the regime prescribed in Articles 332 to 338.

Chapter IV. — Clauses Relating to the Rhine and the Moselle.

Article 354. — As from the coming into force of the present treaty, the Convention of Mannheim of 17th October, 1868, together with the Final Protocol thereof, shall continue to govern navigation on the Rhine, sub¬ ject to the conditions hereinafter laid down.

In the event of any provisions of the said Con¬ vention being in conflict with those laid down by the General Convention referred to in Article 338, (which shall apply to the Rhine,) the provisions of the Gen¬ eral Convention shall prevail.

Within a maximum period of six months from the coming into force of the present treaty, the Central Commission referred to in Article 355 shall meet to draw up a project of revision of the Convention of Mannheim. This project shall be drawn up in har¬ mony with the provisions of the General Convention referred to above, should this have been concluded by that time, and shall be submitted to the powers rep¬ resented on the Central Commission. Germany hereby agrees to adhere to the project so drawn up.

Further, the modifications set out in the following articles shall immediately be made in the Convention of Mannheim.

The Allied and Associated Powers reserve to them¬ selves the right to

arrive at an understanding in this connection with Holland, and Germany hereby agrees to accede if required to any such understanding.

Article 355. — The Central Commission provided for in the Convention of Mannheim shall consist of nine¬ teen members, *viz.* :

Two representatives of the Netherlands;

Two representatives of Switzerland;

Four representatives of German riparian States;

Four representatives of France, which in addition shall appoint the President of the Commission;

Two representatives of Great Britain;

Two representatives of Italy;

Two representatives of Belgium.

The headquarters of the Central Commission shall be at Strasbourg.

Whatever be the number of members present, each delegation shall have the right to record a number of votes equal to the number of representatives allotted

to it.

If certain of these representatives cannot be ap¬ pointed at the time of the coming into forcˆ of the present treaty, the decisions of the Commission shall nevertheless be valid.

Article 356. — “Vessels of all nations, and their dargoes shall have the same rights and privileges as those which are granted to vessels belonging to the Rhine navigation, and to .their cargoes.

None of the provisions contained in Articles 15 to 20 and 26 of the above-mentioned Convention of Mann¬ heim, in Article 4 of the Final Protocol thereof, or in later Conventions, shall impede the free navigation of vessels and crews of all nations on the Rhine and on waterways to which such Conventions apply, subject to compliance with the regulations concerning pilotage and other police measures drawn up by the Central Commis¬ sion.

The provisions of Article 22 of the Convention of Mannheim and of

Article 5 of the Final Protocol thereof shall be applied only to vessels registered on the Rhine. The Central Commission shall decide on the steps to be taken to insure that other vessels satisfy the con-

ditions of the general regulations applying to naviga¬ tion on the Rhine.

Article 357- — Within a maximum period of three months from the date on which notifeation shall be given Germany shall cede to France tugs and vessels, from among those remaining registered in German Rhine ports after the deduction of those surrendered by way of restitution or reparation, or shares in German Rhine navigation companies.

When vessels and tugs are ceded, such vessels and tugs, together with their fittings and gear, shall be in good state of repair, shall be in condition to carry on commercial traffic on the Rhine, and shall be selected from among those most recently built.

The same procedure shall be followed in the matter of the cession by Germany to France of —

(1) the installations, berthing, and anchorage ac-cornmodation, platforms, docks, warehouses, plant, etc., which German subjects or German companies owned on the I St August, 1914, in the port of Rotterdam, and

(2) the shares or interests which Germany or Ger¬ man nationals possessed in such installations at the same date.

The amount and specifications of such cessions shall be determined within one year of the coming into force of the present treaty by ian arbitrator or arbitrators ap¬ pointed by the United States of America, due regard being had to the legitimate needs of the parties con¬ cerned.

The cessions provided for in the present article shall entail a credit of which the total amount, settled in a lump sum by the arbitrator or arbitrators mentioned above, shall not in any case exceed the value of the capital expended in the initial establishment of the ceded material and installations, and shall be set off against the total sums due from Germany; in consequence, the indemnification of the proprietors shall be a matter for Germany to deal with.

Article 358. — Subject to the obligation to comply with the provisions of the Convention of Mannheim or of the convention which may be substituted therefor, and to the stipulations of the present treaty, France shall have on the whole course of the Rhine included be¬ tween the two extreme points of the French frontiers —

(a) the right to take water from the Rhine to feed navigation land irrigation canals (constructed or to be constructed) or for any other purpose, and to execute on the German bank all works neces¬ sary for the exercise of this right;

(b) the exclusive right to the power derived from works of regulation on the river, subject to the payment to Germany of the value of half the power actually produced, this payment, which will take into account the cost of the works neces¬ sary for producing the power, being made either in money or in power and in default of agreement being determined by arbitration. For this pur¬ pose France alone shall have the right to carry out in this part of the river all works of regula¬ tion (weirs or other works) which she may con¬ sider necessary for the production of power. Similarly, the right of taking water from the Rhine is accorded to Belgium to feed the Rhine-Meuse navigable waterway provided for below.

The exercise of the rights mentioned under (a) and (b) of the present article shall not interfere with navi¬ gability nor reduce the facilities for navigation, either in the bed of the Rhine or in the derivations which may be substituted therefor, nor shall it involve any increase in the tolls formerly levied under the convention in force. All proposed schemes shall be laid before the Central Commission in order that that commission may assure itself that these conditions are complied with.

To insure the proper and faithful execution of the provisions contained in (a) and (b) above, Germany;

(i) binds herself not to undertake or to allow the

construction of any lateral canal or any derivation on the right bank of

the river opposite the French frontiers; . , „ , ,

(ii) recognizes the possession by France of the right of support on and the right of way over all lands situated on the right bank which may be required in order to survey, to build, and to operate weirs which France, with the consent of the Central Commission, may subsequently decide to establish. In accordance with such consent, FPance shall be entitled to decide upon and fix the limits of the necessary sites, and she shall be permitted to occupy such lands after a period of two months after simple notification, subject to the payment by her to Germany of indemnities of which the total amount shall be fixed by the Central Comrnission. Germany shall make it her business to indemnify the proprietors whose property will be burdened with such servitudes or permanently occupied by the works.

Should Switzerland so demand, and if the Central

Commission approves, the same rights shall be accor'ded to Switzerland for the part of the river forming her frontier with other riparian States;

(iii) shall hand over to the French Government, during the month following the coming into force of the present treaty, all projects, designs, drafts of con¬ cessions and of specifications concerning the regula¬ tion of the Rhine for any purpose whatever which have been drawn up or received by the Governments of Alsace-Lorraine or of the Grand Duchy of Baden.

Article 359. — Subject to the preceding provisions, no works shall be carried out in the bed or on either bank of the Rhine where it forms the boundary of France and Germany without the previous approval of the Central Commission or of its agents.

Article 360. — France reserves the option of sub¬ resulting from agreements arrived at between the stituting herself as regards the rights and obligations Government of Alsace-Lorraine and the Grand Duchy of Baden concerning the works to be carried out on the Rhine; she may also denounce such agreements within a term of five years dating from the coming into force of the present treaty.

France shall also have the option of causing works to be carried out which may be recognized as necessary by the Central Commission for the upkeep or improve¬ ment of the navigability of the Rhine above Mann¬ heim.

Article 361. — Should Belgium, within a period of 25 years from the coming into force of the present treaty decide to create a deep-draught Rhine-Meuse navigable waterway, in the region of Ruhrort, Germany shall be bound to construct, in accordance with plans to be communicated to her by the Belgian Government,' after agreement with the Central Commission, the por¬ tion of this navigable waterway situated within her territory.

The Belgian Government shall, for this purpose, have the right to carry out on the ground all necessary surveys.

Should Germany fail to carry out all or part of these works, the Central Commission shall be entitled to carry them out instead; and, for this purpose, the commission may decide upon and fix the limits of the necessary sites and occupy the ground after a period of two months after simple notification, subject to the payment of indemnities to be fixed by it and paid by Germany.

This navigable waterway shall be placed under the same administrative regime as the Rhine itself, and the division of the cost of initial construction, including the above indemnities, among the States crossed there¬ by shall be made by the Central Commission.

Article 362. — Germany hereby agrees to offer no objection to any proposals of the Central Rhine Com¬ mission for extending its jurisdiction:

(1) to the Moselle below the Franco-Luxemburg frontier down to the Rhine, subject to the consent of Luxemburg;

(2) to the Rhine above Basle up to the Lake of Constance, subject to the consent of Switzerland;

(3) to the lateral canals and channels which may be established either to duplicate or to improve naturally navigable sections of the Rhine or the Moselle, or to connect two naturally navigable sections of these rivers, and also any other parts of the Rhine River system which may be covered by the General Convention pro¬ vided for in Article 338 above.

Chapter V. — Clauses giving to the Czecho¬ slovak State the Use of Northern Ports.

Article 363. — In the ports of Hamburg and Stettin, Germany shiall lease to the Czechoslovak State, for a period of ninety-nine years, areas which shall be placed under the general regime of free zones

and shall be used for the direct tflansit of goods coming from or going to that State.

Article 364. — The delimitation of these areas, and their equipment, their exploitation, and in general all conditions for their utilization, including the amount of the rental, shall be decided by a commission con¬ sisting of one delegate of Germany, one delegate of the Czechoslovak State and one delegate of Great Britain. These conditions shall be susceptible of revision every ten years in the same manner.

Germany declares in advance that she will adhere to the decisions so taken.

SECTION III. — R.MLWAYS.

Chapter I. — Clauses Relating to International

Transport.

Article 365. — Goods coming from the territories of the Allied and Associated Powers, and going to

Germany, or in transit through Germany from or to the territories of the Allied and Associated Po^vers, shall enjoy on the German railways as regards charges to be collected (rebates and drawbacks being taken into account) facilities, and all other matters, the most favorable treatment applied to goods of the same kind carried on any German lines, either in internal traffic, or for export, import or in transit, under similar con¬ ditions of transport, for example as regards length of route. The same rule shall be applied, on the request of one or more of the Allied and Associated Powers, to goods specially designated by such power or powers coming from Germany and going to their territories.

International tariffs established in accordance with the rates referred

to in the preceding paragraph and involving through waybills shall be established when one of the Allied and Associated Powers shall require it from Germany.

Article 366. — From the coming into force of the present treaty the high contracting parties shall renew, in so far as concerns them and under the reserves in¬ dicated in the second paragraph of the present Article, the conventions and arrangements signed at Berne on the 14th of October, 1890, the 20th September, 1893, the i6th July, 1895, the i6th June, 1898, and the 19th September, 1906, regarding the transportation of goods by rail.

If within five years from the date of the coming into force of the present treaty a new convention for the thansportation of passengers, luggage and goods by rail shall have been concluded to replace the Berne convention of the 14th October, 1890 and the subse-guent additions referred to above, this new convention and the supplementary provisions for international transport by rail which may be based on it shall bind Germany even if she shall have refused to take part in the preparation of the convention or to subscribe to it. Until a new convention shall have been concluded, Germany shall conform to the provisions of the Berne Convention and the subsequent additions referred to above, and to the current supplementary provisions.

Article 367. — Germany shall be bound to co¬ operate in the establishment of through ticket services (for passengers and their luggage) which shall be required by any of the Allied and Associated Powers to insure their communication by rail with each other and with all other countries by transit across the terri¬ tories of Germany; in particular Germany shall, for this purpose, accept trains and carriages coming from the territories of the Allied and Associated Powers and shall forward them with a speed at least equal to that of her best long-distance trains on the same lines. The rates applicable to such through services shall not in any case be higher than the rates collected on Ger¬ man internal services for the same distance, under the same conditions of speed and comfort.

The tariffs applicable under the same conditions of speed and comfort to the transportation of emignants going to or coming from ports of the Allied and Asso¬ ciated Powers and using the German railways, shall not be at a higher kilometric rate than the most tavoiiable tariffs (drawbacks land rebates being taken into account) enjoyed on the said railways by emigrants going to or coming from any other ports.

Article 368. — Germany shall not apply specially to such through services or to the transportation of emi-gˆrants going to or coming from the ports of the Allied and Associated Powers, any technical, fiscal or ad¬ ministrative measures such as measures of customs examination, general police, sanitary police, and con¬ trol, the result of which would be to impede or delay such services.

Article 369. — In case of transport partly by rail and partly by internal navigation, with or without through waybill, the preceding Articles shall apply to the part of the journey performed by rail.

Chapter 11. — Rolling Stock.

Article 370. — Germany undertakes that German wagons shall be fitted with ‘apparatus allowing;

(1) of their inclusion in goods trains on the lines such of the Allied and Associated Powers as are parties to the Berne Convention of May 15, 1886, as modified on May 18, 1907, without hampering the action of the continuous brake which may be adopted in such coun¬ tries within ten years of the coming into force of the present treaty, and

(2) of the acceptance of wagons of such countries in all goods trains on the German lines.

The rolling stock of the Allied and Associated Powers shall enjoy on the German lines the same treat¬ ment as German rolling stock as regards movement, upkeep and repairs.

Chapter III. — Cessions of Railway Lines.

Article 371. — Subject to any special provisions con¬ cerning the cession of ports, waterways and railways situated in the territories over which Germany abandons her sovereignty, and to the financial condi¬ tions relating to the concessionaries and the pension¬ ing of the personnel, the cession of railways will take place under the following conditions:

1. The works and installations of all the railroads shall be handed over complete and in good condition.

2. When a railway system possessing its own rolling-stock is handed over in its entirety by Germany to one of the Allied and Associated Powers, such stock shall be handed over complete, in accordance with

the last inventory before November iith, 1918, and in a nor¬ mal state of upkeep.

3. As regards lines without any special rolling-stock, commissions of experts designated by the Allied and Associated Powers, on which Germany shall be reppresented, shall fix the proportion of the stock existing on the system to which those lines belong to be handed over. These commissions shall have regard to the amount of material registered on these lines in the last inventory before November iith, 1918, the length of track (sidings included), and the nature and amount of traffic. These commissions shall also specify the locomotives, carriages and wagons to be handed over in each case; they shall decide upon the conditions of their acceptance, and shall make the pro¬ visional arrangements necessary to insure their repair in German workshops.

4. Stocks of stores, fittings and plant shall be handed over under the same conditions as the rolling-stock.

The provisions of paragraphs 3 and 4 above shall be applied to the lines of former Russian Poland con¬ verted by Germany to the German gauge, such lines being regarded as detached from the Prussian State System.

Chapter IV. — Provisions Relating to Certain Railway Lines.

Article 372. — When (as a result of the fixing of new frontiers a railway connection between two parts of the same country crosses another country, or a branch line from one country has its terminus in another, the conditions of working, if not specifically provided for in the present treaty, shall be laid down in a convention between the railway administrations concerned. If the administration cannot come to an agreement as to the terms of such convention, the points of difference shall be decided by commissions of experts composed as provided in the preceding Article.

Article 373. — Within a period of five years from the coming into force of the present treaty the Czecho¬ slovak State may require the construction of a railway line in German territory between the stations of Schlauney and Nachod. The cost of construction shall be borne by the Czechoslovak State.

Article 374. — Germany undertakes to accept, within ten years of the coming into force of the present treaty, on request being made by the Swiss Govern¬ ment after agreement with the Italian Government, the

denunciation of the International Convention of the 13th October, 1909, relative to the St. Gothard rail-wiay. In the absence of agreement as to the condi¬ tions of such denunciation, Germany hereby agrees to accept the decision of an arbitrator designated by the United States of America.

Chapter V. — Transitory Provisions.

Article 375. — Germany shall carry out the instruc¬ tions given her, in regard to transport, by an author¬ ized body acting on behalf of the Allied and Asso¬ ciated Powers:

1. For the carriage of troops under the provisions of the present treaty, and of material, ammunition and supplies for army use.

2. As a temporary measure, for the transportation of supplies for certain regions, as well as for the res¬ toration, as rapidly as possible, of the normal condi¬ tions of transport, and for the organization of postal and telegraphic services.

SECTION IV. — DISPUTES AND REVISION OF PERMANENT CLAUSES.

Article 376. — Disputes which may arise between interested powers with regard to the interpretation and application of the preceding articles shall be settled as provided by the League of Nations.

Article 377.-— At any time the League of Nations may recommend the revision of such of these Articles as ˆlate to a permanent administrative regime.

Article 378. The stipulations in Articles 321 to 33O) 332, 365. and 367 to 369 shall be subject to re¬ vision by the Council of the Le;ague of Nations at any time after five years from the coming into force of the present treaty.

hailing such revision, no Allied or Associated Fower can claim after the expiration of the above period of five years the benefit of any of the stipula¬ tions in the Articles enumerated above on behalf of any portion of its territories in which reciprocity is not accorded in respect of such stipulations. The period of five yelars during which reciprocity cannot be de¬ manded may be prolonged by the Council of the League of Nations.

SECTION V. — ■ SPECIAL PROVISION.

Article 379. — Without prejudice to the special obli¬ gations imposed on her by the present treaty for the benefit of the Allied and Associated Powers, Germany undertakes to adhere to any general conventions re-g'arding the international regime of transit, wiater-ways, ports or railways which may be concluded by the Allied and Associated Powers, with the approval of the League of Nations, within five years of the coming into force of the present treaty.

SECTION VI. — CLAUSES RELATING TO THE KIEL

CANAL.

Article 380.— The Kiel Canal and its approaches shall be maintained free and open to the vessels of commerce and of war of all nations at peace with Germany on terms of entire equality.

Article 381. — The nationals, property, and vessels of all powers shall, in respect to charges, facilities, and in all other respects, be treated on a footing of per¬ fect equality in the use of the canal, no distinction being made to the detriment of nationals, property, and vessels of any power between them and the na¬ tionals, property, land vessels of Germany or of the most favored nations.

No impediment shall be placed on the movement of persons or vessels other than those arising out of police, customs, sanitary, emigration or immigration regulations, and those relating to the import or export of prohibited goods. Such regulations must be rea¬ sonable and uniform and must not unnecessiarily im¬ pede traffic.

Article 3S2. — Only such charges may be levied on vessels using the canal or its approaches as are in¬ tended to cover in an equitable manner the cost of maintaining in a navigable condition, or if improving, the canal or its approaches, or to meet expenses in¬ curred in the interests of navigation. The schedule of such charges shall be calculated on the basis of such expenses, and shall be posted up in the ports.

These charges shall be levied in such a manner as to render any detailed examination of cargoes un¬ necessary, except in the case of suspected fraud or contravention.

Article 383. — Goods in transit may be placed under seal or in the custody of customs agents; the leading land unloading of goods, and the embarkation and dis¬ embarkation of passengers, shall only take place in the ports specified by Germany.

Article 384. — No charge of any kind other than those provided for in the present treaty shall be levied along the course or at the approiaches of the Kiel Canal.

Article 385. — Germany shall be bound to take suit¬ able measures to remove any obstacle or danger to navigation, and to insure the maintenance of good conditions of navigiation. She shall not undertake any works of a nature to impede navigation on the canal or its approaches.

Article 386. — In the event of violation of any of the conditions of Articles 380 to 386, or of disputes as to the interpretation of these articles, any interested power can appeal to the jurisdiction instituted for the purpose by the Ldague of Nations.

In order to avoid reference of small questions to the League of Nations, Germany will establish a local authority at Kiel qualified to deal with disputes in the first instance, and to give satisfaction so far as possible to complaints which may be presented through the consular representatives of the interested powers.

Part XIII. — Labor.

SECTION I. — organization OF LABOR.

Whereas the League of Nations has for its object the establishment of universal peace and such a peace

can be established only if it is based upon social justice :

And whereas conditions of labor exist involving such injustice, hardship, and privation to large num¬ bers of people as to produce unrest so great that the peace and harmony of the world are imperiled; and an improvement of those conditions is urgently re¬ quired: as, for example, by the regulations of the hours of work,

including the establishment of a maxi¬ mum working day and week, the regulation of the labor supply, the prevention of unemployment, the pro¬ vision of an adequate living wage, the protection of the worker against sickness, disease, and injury arising out of his employment, the protection of the children, young persons, and women, provision for old age land injury, protection of the interests of workers when employed in countries other than their own, recognition of the principle of freedom of association, the organization of vocational and technical education, and other measures:

Whereas also the failure of any natfPn to adopt humane conditions of labor is an obstacle in the way of other nations which desire to improve the con¬ ditions in their own countries:

The high contracting parties, moved by sentiments of justice and humanity as well as by the desire to secure the permanent peiace of the world, agree to the following:

Chapter I. — Organization.

Article 387. — A permanent organization is hereby established for the promotion of the objects set forth in the preamble. 1

The original members of the League of Nations shall be the original members of this organization, and hereafter membership of the League of Nations shall carry with it membership of the said organization.

Article 388. — The permanent organization shall consist of:

(i) a General Conference of Representatives of the Members, and,

(ii) an International Labor Office controlled by the governing body described in Article 393.

Article 389. — The meetings of the General Con¬ ference of Representlatives of the Members shall be held from time to time as occasion may require, and at least once in every year. It shall be composed of four representatives of each of the members, of whom two shall be Government delegates and the two others shall be delegates representing respectively the em¬ ployers and the workpeople of each of the members.

Each delegate may be accompanied by advisers, who shall not exceed two in number for each item on the agenda of the meeting. When questions specially af¬ fecting women are to be considered by the

con¬ ference, one at least of the advisers should be a woman.

The members undertake to nominate non-Govern- ment delegates and advisers chosen in agreement with the industrial organizations, if such organizations exist, which are most representative of employers or workpeople, as the case may-be, in their respective countries.

Advisers shall not speak except on a request made by the delegate whom they accompany and by special authorization of the President of the conference, and may not vote.

A delegate may by notice in writing addressed to the President appoint one of his advisers to act as his deputy, and the adviser, while so acting, shall be allowed to speak and vote.

The names of the delegates and their advisers will be communicated to the International Labor Office by the Government of each of the members.

The credentials of delegates and their advisers shall be subject to scrutiny by the conference, which may, by two-thirds of the votes cast by the delegates present, refuse to admit any delegate or adviser whom it deems not to have been nominated in accordance with this article.

Article 390. — Every delegate shall be entitled to vote individually on all matters which are taken into consideration by the conference.

If one of the members fails to nominate one of the non-Government delegates whom it is entitled to nominate, the other non-Government delegates shall be allowed to sit and speak at the conference, but not to vote.

If, in accordance with Article 389, the conference refuses admission to la delegate of one of the members, the provisions of the present article shall apply as if that delegate had not been nominated.

Article 391. — The meetings of the conference shall be held at the seat of the League of Nations, or at such other place as may be decided by the conference at

a previous meeting by two-thirds of the votes cast by the delegates present.

Article 392. — The International Labor Office shall be established at the seat of the League of Nations as part of the organization of the League.

Article 393. — ■ The International Labor Office shall be under the control of a governing body consisting of twenty-four persons, appointed in accordance with the following provisions:

The governing body of the International Labor Office shall be constituted as follows:

Twelve persons representing the Governments;

Six persons elected by the delegates to the con* frence representing the employers;

Six persons elected by the delegates to the con¬ ference representing the workers.

Of the twelve persons representing the G@vernments, eight shall be nominated by the members which are of the chief industrial importance, and four shall be nominated by the members selected for the purpose by the Government delegates to the conference ex¬ cluding the delegates of the eight members mentioned above.

Any question as to which are the members of the chief industrial importance shall be decided by the council of the League of Nations.

The period of office of the members of the governing body will be three years. The method of filling va¬ cancies and other similar questions may be determined by the governing body subject to the approval of the conference.

The governing bpdy shall, ’from time to time, elect one of its members to act as its Chairman, shall regulate its own procedure, and shall fix its own times of meeting. A special meeting shall be held if a writtten request to that effect is made by at least ten members of the governing body.

Article 394. — - There shall be a Director of the In¬ ternational Labor Office, who shall be appointed by the governing body, and, subject to the instructions of the Governing body, shall be responsible for the efficient conduct of the International Labor Office land for such other duties as may be assigned to him.

The Director or his deputy shall ‘ attend all meet¬ ings of the governing body.

Article 395. — The staff of the International Labor Office shall be appointed by the Director, who shlall, as far as is possible with due regard to the efficiency of the work of the Office, select persons of different nationalities. A certain number of these persons shall be women.

Article 396. — The functions of the International Labor Office shall include the collection and distribu¬ tion of information on all subjects relating to the in¬ ternational adjustment of conditions of industrial life and labor, and particularly the examination of sub¬ jects which it is proposed to bring before the conference with a view to the conclusion of international con¬ ventions, and the conduct of such special investiga¬ tions as may be ordered by the conference.

It will prepare the agenda for the meetings of the conference.

It will carry out the duties required of it by the pro¬ visions of this part of the present treaty in connection with international disputes. ,

It will edit and publish in French and English, and in such -other languages as the governing body may think desirable, a periodical paper dealing with problems of industry and employment of international interest.

Generally, in addition to the functions set out in this Article, it shlall have such other powers and duties as may be assigned to it by the conference.

Article 397. — The Government departments of any of the’ members which deal with questions of industry and employment may communicate directly with the Director through the representative of their Govern¬ ment on the governing body of the International Labor Office, or, failing any such representative, through such other qualified official as the Government naay nominate for the purpose.

Article 398. — The International Labor Office shall be entitled to the assistance of the Secretary-General of the League of Nations in any

matter in which it can be given.

Article 399. — Each of the members will pay the traveling land subsistence expenses of its delegates and their advisers and of its representatives attending the meetings of the conference or governing body, as the case may be.

All the other expenses of the International Labor Office and of the meetings of the conference or gov¬ erning body shall be paid to the Director by the Secretary-General of the League of Nations out of the general funds of the League.

The Director shall be responsible to the Secretary-Generlal of the League for the proper ex¬ penditure of all moneys paid to him in pursuance of this Article.

Chapter II. — Procedure.

Article 400. — The agenda of all meetings of the conference will be settled by the governing body, who shall consider any sugggestion as to the agenda that may be made by the Government of any of the members or by any representative organization re¬ cognized for the purpose of Article 389.

Article 401. — The Director shall act as the Secre tary of the Conference, land shall transmit the agenda so as to reach the members four months before the meeting of the conference, and, through them, the non-Government delegates when appointed.

Article 402. — Any of the Governments of the mem¬ bers may formally object to the inclusion of any item or items in the agenda. The grounds for such objec¬ tion shall be set forth in a reasoned statement ad¬ dressed to the Director, who shall circulate it to all the members of the permianent organization.

Items to which such objection has been made shall not, however, be excluded from the agenda if at the conference a majority of two-thirds of the votes cast by delegates present is in favor of considering them.

If the conference decides (otherwise than under the preceding paragraph) by two-thirds of the votes cast by the delegates present that lany subject shall be considered by the conference, that subject shall be included in the agenda for the following meeting.

Article 403. — • The conference shall regulate its own procedure, shall elect its own President, and may ap¬ point committees to consider and report on any matter.

Except as otherwise expressly provided in this part of the present treiaty, all matters shall be decided by a simple majority of the votes cast by the delegates present.

The voting is void unless the total number of votes cast is equal to half the number of the delegates attending the conference.

_ Article 404. — The conference may add to any com¬ mittees which it appoints technical experts, who shall be assessors without power to vote.

Article 405. — When the conference has decided on the ladoption of proposals with regard to an item in the agenda, it will rest with the conference to determine whether these proposals should take the form: (a) of a recommendation to be submitted to the members for consideration with a view to effect being given to it by national legislation or otherwise, or (b) of a draft international convention for ratificiation by the members.

In either case a majority of two-thirds of the votes cast by the delegates present shall be necessary on the final vote for the adoption of the recommendation or draft convention, as the case may be, by the con¬ ference.

In friaming any recommendation or draft conven¬ tion of general application the conference shall have due regard to those countries in which climatic condi¬ tions, the imperfect development of industrial organi¬ zation or other special cidcumstances make the industrial conditions substantially different and shall suggest the modifications, if lany, which it considers may be required to meet the case of such countries.

A copy of the recommendation or draft convention shall be authenticated by the signature of the President of the conference and of the Director and shall be de¬ posited with the Secretary-General of the Leiague of Nations. The Secretary-General will communicate a certified copy of the recommendation or draft conven¬ tion to each of the members.

Each of the members undertakes that it will, within the period of one year at most from the closing of the session of the conference, or if it is impossible owing to exceptional circumstances to do so within the

period of one year, then iat the earliest practicable moment and in no case later than eighteen months rrom the closing of the session of the conference, bring the recommendation or draft convention before the authority or authorities within whose competence the matter lies, for the enactment of legislation or other action.

In the case of a recommendation the members will inform the Secretary-General of the action taken.

In the case of a draft convention, the member will, if it obtains the consent of the authority or authorities within whose competence the matter lies, communicate the formal ratification of the convention to' the Secre¬ tary-General and will take such action las may be neces¬ sary to make effective the provisions of such conven¬ tion.

If on a recommendation no legislative or other action is taken to make a recommendation effective, or

if the draft convention fails to obtain the consent of the iauthoritjr or authorities within whose competence the matter lies, no further obligation shall rest upon the member.

In the case of a federal state, the power of which to enter into conventions on labor matters is subject to limitations, it shall be in the discretion of that Gov¬ ernment to treat a draft convention to which such lim¬ itations apply as a recommendation only, and the pro¬ visions of this article with respect to recommendations shall apply in such case.

The above Article shall be interpreted in accord¬ ance with the following principle:

In no case shall any member be asked or required, as a result of the adoption of any recommendation or draft convention by the conference to lessen the pro¬ tection afforded by its existing legislation to the work¬ ers concerned.

Article 406. — Any convention so ratified shall be registered by the Secretary-General of the League of Nations, but shall only be binding upon the members which ratify it.

Article 407. — If any convention coming before the conference for final consideration fails to secure the support of two-thirds of the votes cast by the dele¬ gates present, it shall nevertheless be within the right of any of the members of the permanent organization to agree to such convention among themselves.

Any convention so agreed to shall be communicated by the Governments concerned to the Secretary-General of the League of Nations, who shall register it.

Article 408. — Each of the members agrees to make an annual report to the International Labor Office on the measures which it has taken to give effect to the provisions of conventions to which it is a party. These reports shall be made in such form and shall contain such particulars as the governing body may request. The Director shall lay a summary of these reports be¬ fore the next meeting of the conference.

Article 409. — In the event of iany representation being made to the International Labor Office by an industrial association of employers or of workers that any of the members has failed to secure in any re¬ spect the effective observance within its jurisdiction of any convention to which it is a party, the Governing Body may communicate this representation to the Gov¬ ernment against which it is made and may invite that Government to make such statement on the subject as it may think fit.

Article 410. — If no statement is received within a reasonable time from the Government in question, or if the statement when received is not deemed to be satisfactory by the Governing Body, the latter shall have the right to publish the representation and the statement, if any, made in reply to it.

Article 41 1. — Any of the members shall have the right to file a complaint with the International Labor Office if it is not satisfied that any other member is securing the effective observance of lany convention which both have ratified in accordance with the fore¬ going articles.

The Governing Body may, if it thinks fit, before referring such a complaint to a Commission of Inquiry, as hereinafter provided for,

communicate with the Government in question in the manner described in Article 409.

If the Governing Body does not think it ncessary to communicate the complaint to the Government in question, or if, when they have made such communica¬ tion, no statement in reply has been received within a reasonable time which the Governing Body considers to be satisfactory, the Governing Body may apply for the appointment of a Commission of Inquiry to consider the complaint and to report thereon.

The Governing Body may adopt the same procedure either of its own motion or on receipt of a com¬ plaint from a Delegate to the Conference.

When any matter arising out of Articles 410 or 41 1 is being considered by the Governing Body, the Government in question shall, if not already repre¬ sented thereon, be entitled to send a representative to take part in the proceedings of the Governing Body while the matter is under consideration. Adequate notice of the date on which the matter will be considered shall be given to the Government in question.

Article 412. — The Commission of Inquiry shall be constituted in accordance with the following provi¬ sions:

Each of the members agrees to nominate within six months of the date on which the present Treaty comes into force three persons of industrial experience, of whom one shall be a representative of employers, one a representative of workers, and one a person of independent standing, who shall together form a panel

from which the members of the Commission of In¬ quiry shiall be drawn.

The qualifications of the persons so nominated shall be subject to scrutiny by the Governing Body, which may by two-thirds of the votes cast by the represen¬ tatives present refuse to accept the nomination of any person whose qualifications do not in its opinion com¬ ply with the requirements of the present article.

Upon the application of the Governing Body, the Secretary-General of the League of Nations shiall norn-inate three persons, one from each section of this panel, to constitute the Commission of Inquiry, and

shall designate one of them as the President of the commission. None of these three persons shall be a person nominated to the panel by any member directly concerned in the complaint.

Article 413. — The members iagree that, in the event of the reference of a complaint to a commission of inquiry under Article 41 1, they will each, whether di¬ rectly concerned in the complaint or not, place at the disposal of the commission all the information in their possession which bears upon the subject-matter of the complaint.

Article — ‘When the Commission of Inquiry has

fully considered the complaint, it shall prepare a re¬ port embodying its findings on all questions of fact relevant to determining the issue between the parties and containing such recommendations as it may think proper as to the steips which should be taken to meet the complaint and the time within which they should be taken.

It shall also indicate in this report the measures, if any, of an economic character against a defaulting Government which it considers to be appropriate, and which it considers other Governments would be justi¬ fied in adopting.

Article 415. — The, Secretary-General of the League of Nations shall communicate the report of the Com¬ mission of Inquiry to each of the Governments con¬ cerned in the complaint, and shall cause it to be pub¬ lished.

Each of these Governments shall within one month inform the Secretary-General of the League of Nations whether or not it accepts the recommendations con¬ tained in the report of the Commission; and if not, whether it proposes to refer the complaint to the Per¬ manent Court of International Justice of the League of Nations.

Article 416. — In the event of any member failing to take the action required by Article 405, with re¬ gard to a recommendation or draft convention, any other member shall be entitled to refer the matter to the Permanent Court of Interruational Justice.

Article 417. — The decision of the Permanent Court of International Justice in regard to a complaint or matter which has been referred to it in pursuance of Article 415 or Article 416 shall be final.

Article 418. — The Permanent Court of Interna¬ tional Justice may affirm, viary or reverse any of the findings or recommendations of the Commission of In¬ quiry, if any, and shall in its decision indicate the

measures, if any, of an economic character which it considers to be appropriate, and which other Govern¬ ments would be justified in adopting (against a default¬ ing Government.

Article 419. — In the event of any member failing to carry out within the time specified the recommenda¬ tions, if any, contained in the report of the Commis¬ sion of Inquiry, or in the decision of the Permanent Court of International Justice, as the case may be, any other member may take against that member the measures ot an economic cnaracter indicated in the report of the Commission or in the decision of the Court as appropriate to the case.

Article 420. — The defaulting Government may at any time inform the Governing Body thiat it has taken the steps necessary to comply with the recommenda¬ tions of the Commission of Inquiry or with those in the decision of the Permanent Court of International Justice, as the case may be, and may request it to apply to the Secretary-General of the League to con¬ stitute a commission of Inquiry to verify its conten¬ tion. In this case the provisions of Articles 412, 413, 414, 415, 417 (and 418 shall apply, and if the report of the Commission of Inquiry or the decision of the Permanent Court of International Justice is in favor of the defaulting Government, the other Governments shall forthwith discontinue the measures of an economic character that they have taken against the defaulting Government.

Chapter III. — General.

Article 421. — The members engage to apply con¬ ventions which they have ratified in accordance with

the provisions of this part of the present treaty to their colonies, protectorates, and possessions which are not fully self-governing.

1. Except where owing to the local conditions the convention is inapplicable, or

2. Subject to such modifications as miay be neces¬ sary to adapt the convention to local conditions.

And each of the members shall notify to the Inter¬ national Labor Office the action taken in respect of each of its colonies, protectorates, and possessions which are not fully self-governing.

Article 422. — Amendments to this piart of the present treaty which are adopted by the Conference by a majority of two-thirds of the votes cast by the delegates present shall take effect when ratified by the States whose representatives compose the Council of the League of Nations and by three-fourths of the members.

Article 423. — Any question or dispute relating to the interpretation of this piart of the present treaty or of any subsequent convention concluded by the mem¬ bers in pursuance of the provisions of this part of the present treaty shall be referred for decision to the Permanent Court of International Justice.

Chapter IV. — Transitory Provisions.

Article 424. — The first meeting of the Conference shall take place in October, 1919. The place and agenda for this meeting shall be as specified in the Annex hereto.

Arrangements for the convening and the organiza¬ tion of the first meeting of the Conference will be made by the Government designated for the purpose in the said Annex. That Government shall be assisted in the preparation of the documents for submission to the Conference by an International Committee con¬ stituted as provided in the siaid, Annex.

The expenses of the first meeting and of all subse¬ quent meetings held before the League of Nations has been able to establish a general fund, other than the expenses of delegates and their advisers, will be borne by the members in accordance with the apportionment of the expenses of the International Bureau of the Universal Postal Union.

Article 425. — Until the League of Nations has been constituted all communications which under the pro¬ visions of the foregoing articles should be addressed to the Secretary-General of the League will be pre¬ served by the Director of the International Labor Office, who will transmit them to the Secretary-General of the League.

Article 426. — Pending the creation of a Permanent Court of International Justice, disputes which in ac¬ cordance with this part of

the present treaty would be submitted to it for decision will be referred to a tri¬ bunal of three persons appointed by the Council of the League of Nations.

ANNEX.

First Meeting of Annual Labor Conference,

1919.

The place of meeting will be Washington.

The Government of the United States of America is requested to convene the conference.

The International Organizing Committee will con¬ sist of seven members, appointed by the United States of America, Great Britain, France, Italy, Japan, Bel¬ gium, and Switzerland. The committee may, if it thinks necessary, invite other members to appoint representa¬ tives.

Agenda:

1. Application of principle of the 8-hours day or of the 48-hours week.

2. Question of preventing or providing against un¬ employment.

3. Women's employment:

(a) Before and after childbirth, including the

question of maternity benefit.

(b) During the night.

(c) In unhealthy processes.

4. Employment of children:

(a) Minimum age of employment.

(b) During the night.

(c) In unhealthy processes.

5. Extension and application of the Internationial Conventions adopted at Berne in 1906 on the pro¬ hibition of night work for women employed in industry and the prohibition of the use of white phosphorus in the manufacture of matches.

SECTION II. — GENERAL PRINCIPLES.

Article 427.— The High Contracting Parties, recog¬ nizing that the well-being, physical, moral, and intel¬

lectual, of industrial wage earners is of supreme inter¬ national importance, have framed, in order to further this great end, the permanent machinery provided for in Section I and associated with that of the League of Nations.

They recognize that differences of climate, habits, and customs, of economic opportunity and industrial tradition, make strict uniformity in the conditions of labor difficult of immediate attainment. But, holding as they do, that labor should not be regarded merely as an article of commerce, they think that there are methods and principles for regulating labor conditions which all industrial communities should endeavor to apply, so far as their special circumstances will permit.

Among these methods and principles, the following seem to the High Contracting Parties to be of special and urgent importance:

First — The guiding principle above enunciated that labor should not be regarded merely as a commodity or iarticle of commerce.

Second — The right of association for all lawful purposes by the employed as well as by the employers.

Third — The payment to the employed of a wage adequate to maintain a reasonable-standard of life as this is understood in their time land country.

Fourth — The adoption of an eight hours day or a forty-eight hours week as the standard to be aimed at where it has not already been attained.

Fifth — The adoption of a weekly rest of at least twenty-four hours, which should include Sunday wher¬ ever practicable.

Sixth — The abolition of child labor and the im¬ position of such limitations on the labor of young per¬ sons as shall permit the continuation of their educa¬ tion and assure their proper physical development.

Seventh — The principle that men and women should receive an equal remuneration for work of equal value.

Eighth — The standard set by law in each country with respect to the conditions of labor should have due regard to the equitable economic treatment of all workers lawfully resident therein.

Ninth — Each State should make provision for a system of inspection in which women should take part in order to insure the enforcement of the laws and regulations for the protection of the employed.

Without claiming that these methods and principles are either complete or final, the High Contracting Par¬ ties are of opinion that they are well fitted to guide the policy of the League of Nations; and that, if adopted by the industrial communities who are mem¬ bers of the League, and safeguarded in practice by an adequate system of such inspection, they will confer lasting benefits upon the wiage earners of the world.

Part XIV. — Guarantees.

SECTION I. — western EUROPE.

Article 428. — As a guarantee for the execution of the present treaty by Germany, the German territory situated to the west of the Rhine, together with the bridgeheads, will be occupied by Allied and Associated troops for a period of fifteen years from the coming into force of the present treaty.

Article 429. — If the conditions of the present treaty are faithfully carried out by Germany, the occupation referred to in Article 428 will be successively restricted as follows:

(i) At the expiration of five years there will be evacuated: — the bridgehead of Cologne and the terri¬ tories north of a line running along the Ruhr, then along the railway Jiilich, Duren, Euskirchen, Rheinbach, thence along the road Rheinbach to Sinzig, and reaching the Rhine iat the confluence with the Ahr; the roads, railways and places mentioned above being ex¬ cluded from the area evacuated.

(ii) At the expiration of ten years, there will be evacuated: — the

bridgehead of Coblenz and the terri¬ tories north of a line to be drawn from the intersection between the frontiers of Belgium, Germany and Hol¬ land, running about 4 kilometers south of Aix-la- Chapelle, then to and following the crest of Forst Gemiind, then east of the railway of the Urft Valley then along Blankenheim, Valdorf, Dreis, Ulmen to and following the Moselle from Bremm to Nehren, then passing by Kappel and Simmern, then following the ridge of the heights between Simmern and the Rhine and reaching this river iat Bacharach; all the places, valleys, roads and railways mentioned above being ex¬ cluded from the area evacuated.

(iii) At the expiration of fifteen years there will be evacuated: — the bridgehead of Mainz, the bridge¬ head of Kehl land the remainder of the German terri¬ tory under occupation.

If at that date the guarantees against unprovoked

aggression by Germany are not considered sufficient by the Allied and Associated Governments the evacuation of the occujiying troops may be delayed to the extent regarded fas necessary for the purpose of obtaining the required guarantees.

Article 430. — - In case either during the occupation or after the expiration of the fifteen years referred to above, the Reparation Commission finds that Germany refuses to observe the whole or part of her obligations under the present treaty with regard to reparation, the whole or part of the areas specified in Article 429 will be reoccupied immediately by the Allied and Asso¬ ciated forces.

Article 431. — If before the expiration of the period of fifteen years Germany complies with all the under¬ takings resulting from the present treaty, the occupy¬ ing forces will be withdrawn immediately.

Article 432. — All matters relating to the occupation and not provided for by the present treaty shall be regulated by subsequent agreements, which Germany hereby undertakes to observe.

SECTION II. — ‘EASTERN EUROPE.

Article 433. — As a guarantee for the execution of the provisions of the present treaty, by which Germany accepts definitely the abrogation of the Brest-Litovsk Treaty, and of all treaties, conventions and agreements entered into by her with the Maxinnalist Government in Russia, and in order to insure the restoration of peace and good government in the Baltic Provinces and Lithuania, all German troops at present in the said territories shall return to within the frontiers of Ger¬ many as soon as the Governments of the principal Allied and Associated Powers shall think the moment suitable, having regard to the internal situation of these territories. These troops shall abstain from all requisitions and seizures and from any other coercive measures, with a view to obtaining supplies intended for Germany, and shall in no way interfere with such measures for national defense as may be adopted by the provisional Governments of Esthonia, Letvia, and Lithuania.

No other German troops shall, pending the evacua¬ tion or after the evacuation is complete, be admitted to the said territories.

Part XV. — Miscellaneous Provisions.

Article 434. — ■ Germany undertakes to recognize the full force of the treaties of peace and additional con¬ ventions which may be concluded by the Allied and Associated Powers with the powers who fought on the side of Germany, and to recognize whatever disposition may be made concernirtg the territories of the former Austro-Hungarian Monarchy, of the fCingdom of Bul¬ garia, and of the Ottoman Empire, and to recognize the new States within their fontiers as there laid down.

Article 435. — The high contracting parties, while they recognize the guarantees stipulated by the treaties of 1815, and especially by the Act of 20th November, 1815, in favor of Switzerland, the said guarantees con¬ stituting international obligations for the maintenance of peace, declare nevertheless that the provisions of these treaties, conventions, declarations and other sup¬ plementary acts concerning the neutralized zone of Savoy, as laid down in paragraph i of Article 92 of the Final Act of the Congress of Vienna, and in para¬ graph 2 of Article 3 of the Treaty of Paris of 20th November, 1815, are no longer consistent with present conditions. For this reason the high contnacting par¬ ties take note of the agreement reached between the French Government and the Swiss Government for the abrogation of the stipulations relating to this zone which are

and remain abrogated.

The high contracting parties also agree that the stipulations of the treaties of 1815 and of the other supplementary acts concerning the free zones of Upper Savoy and the Gex district are no longer consistent with present conditions, and that it is for France and Switzerland to come to an a,greement together with a view to settling between themselves the status of these territories under such conditions as shall be considered suitable by both countries.

ANNEX.

i; The Swiss Federal Council has informed the French Government on the 5th Miay, i9i9» that after examining the provisions of Article 435 in a like spirit of sincere friendship it has happily reached the conclu¬ sion that it was possible to acquiesce in it under the following conditions and reservations:

Pirst — The neutralized zone of Haute-Savoie :

(a) It will be understood that as long as the Fed¬

eral Chambers have not ratified the agreement come to between the two-Governments concerning the abroga¬ tion of the stipulations in respect of the neutralized zone of Savoy nothing will be definitely settled, on one side or the other, in regard to this subject.

(b) The assent given by the Swiss Government to the abrogation of the above-mentioned stipulations pre¬ supposes, in conformity with the text adopted, the recognition of the guarantees formulated in favor of Switzerland by the treiaties of 1815 and particularly by the declaration of 20th November, 1815.

(c) The agreement between the Governments of Trance and Switzerland for the abrogation of the above-mentioned stipulations will only be considered as valid if the treaty of peace contains this article in its present wording. In addition, the parties to the treaty of peace should endeavor to obtain the assent of the signatory powers of the treaties of 1815 and of the declaration of 20th November, 1815, which are not signatories of the present treaty of peace.

Second ■ — Free zone of Haute-Savoie and the dis¬ trict of Gex.

(a) The Federal Council miakes the most express reservations to the

interpretation to be given to the statement mentioned in the last paragraph of the above article for insertion in the treaty of peace, which pro¬ vides that “the stipulations of the treaties of 1815 and other supplementary acts concerning the free zones of Haute-Savoie and the Gex district are no longer con¬ sistent with the present conditions.” The Federal Council would not wish that its acceptance of the above wording should lead to the conclusion that it would agree to the suppression of a system intended to givˆ neighboring territory the benefit of a special regime which is appropriate to the geographical and economical situation and which hias been well tested.

In the opinion of the Federal Council the question is not the modification of the customs system of the zones as set up by the treaties mentioned above, but only the regulation in a manner more appropriate to the economic conditions of the present day of the terms of the exchange of goods between the regions in question. The Federal Council has been led to

make the preceding observations by the perusal of the dnaft convention concerning the future constitution of the zones, which was annexed to the note of April 26 from the French Government. While making the above reservations the Federal Council declares its readiness to examine in the most friendly spirit any proposals which the French Government may deem it convenient to make on the subject.

(b) It is conceded that the stipulations of the

treaties of 1815 and other supplementary acts relative to the free zones will remain in force until a new

arrangement is come to between France and Switzer¬ land to regulate matters in this territory.

2. The French Government have addressed to the Swiss Government, on May 18, 1919, the following note in reply to the communication set out in the pre¬ ceding paragraph:

In a note dated May s the Swiss Legation in Paris was good enough to inform the Government of the

French Republic that the Federal Government adhered to the proposed article to be inserted in the Treaty of Peace between the Allied and Associated Governments and Germany.

The French Government have taken note with much pleasure of the agreement thus reached, and, at their request, the proposed article, which had been accepted by the Allied and Associated Governments, has been inserted under No. 435 in the peace conditions pre¬ sented to the German plenipotentiaries.

The Swiss Government, in their note of May 5, on this subject, have expresed various views and reserva¬ tions.

Concerning the observations relating to the free zones of Haute-Savoie and the Gex district, the French Government have the honor to observe that the provi¬ sions of the last paragraph of Article 435 are so clear that their purport cannot be misapprehended, especially where it implies that no other power but France and Switzerland will in future be interested in that ques¬ tion.

The French Government, on their part, are anxious to protect the interests of the French territories con¬ cerned, and, with that object, having their special situ-tion in view, they bear in mind the desirability of assuring them la suitable customs regime and deter¬ mining, in a manner better suited to present conditions, the methods of exchanges between these territories and the adjacent Swiss territories, while taking into ac¬ count the reciprocal interests of both regions.

It is understood that this must in no way prejudice the right of France to adjust her customs fine in this region in conformity with her political frontier, as is

done on the other portions of her territorial boundaries, and as was done by Switzerland long ago on her own boundaries in this region.

The French Government are pleased to note on this subject in what a friendly disposition the Swiss Government take this opportunity of declaring their willingness to consider any French proposal dealing with the system to be substituted for the present regime of the said

free zones, which the French Gov¬ ernment intend to formulate in the same friendly spirit.

Moreover, the French Government have no doubt that the provisional maintenance of the regime of 1815 as to the free zones referred to in the above-mentioned paragraph of the note from the Swiss Legation of May 5, whose object is to provide for the passage from the present regime to the conventional regime, will cause no delay whatsoever in the establishment of the new situation which has been found necessary by the two Governments. This remark applies also to the ratifica-tioh by the Federal Chambers, dealt with in Paragraph I (a), of the Swiss note of May 5, under the heading " Neutralized Zone of Haute-Savoie."

Article 436. — The high contracting parties declare and place on record that they have taken note of the treaty signed by the Government of the French Re¬ public on July 17th, 1918, with His Serene Highness the Prince of Monaco defining the relations between France /and the Principality.

Article 437. — The high contracting parties agree that, in the absence of a subsequent agreement to the contrary, the Chairman of any commission established by the present treaty shall, in the event of an equality of votes, be entitled to a second vote.

Article 438. — The Allied and Associated Powers agree that where Christian religious missions were be¬ ing maintained by German societies or persons in terri¬ tory belonging to them, or of which the government is intrusted to them in accordance with the present treaty, the property which these missions or missionary societies possessed, including that of trading societies whose profits were devoted to the support of missions, shall continue to be devoted to missionary purposes. In order to insure the due execution of this under¬ taking the Allied and Associated Governments will hand over such property to boards of trustees appointed by or approved by the Governments and composed of persons holding the faith of the mission whose property is involved.

The Allied and Associated Governments, while con¬ tinuing to maintain full control as to the individuals by whom the missions are conducted, will safeguard the interests of such missions.

Germany, taking note of the labove undertaking, agrees to accept all arrangements made or to be made by the Allied or Associated Government concerned for carrying on the work of the said missions

or trading societies and waives all claims on their beh/alf.

Article 439. — ■ Without prejudice to the provisions of the present treaty, Germany undertakes not to put forward directly or indirectly against any Allied or Associated Power, signatory of the present treaty, in¬ cluding those which without having declared war, hiave broken off diplomatic relations with the German Empire, any pecuniary claim based on events which occurred at any time before the coming into force of the present treaty.

The present stipulation will bar completely and finally /all claims of this nature, which will be thence¬ forward extinguished, whoever may be the parties in interest.

Article 440. — Germany accepts and recognizes as valid and binding all decrees and orders concerning German ships and goods and all orders relating to the payment of costs made by any prize court of any of the Allied or Associated Powers, and undertakes not to put forward any claim arising out of such decrees or orders on behalf of any German national.

The Allied and Associated Powers reserve the right to examine in such manner as they may determine all decisions and orders of German Prize Courts, whether affecting the property rights of nationals of those powers or of neutral powers. Germany agrees to fur¬ nish copies of all the documents constituting the record of the cases, including the decisions and orders made, and to accept /and give effect to the recommenda¬ tions made after such examination of the cases.

The present treaty, of which the French and Eng¬ lish texts are both authentic, shall be ratified.

The deposit of ratifications shall be made at Paris as soon as possible.

Powers of which the seat of the Goverment is out¬ side Europe will be entitled merely to inform the Gov¬ ernment of the French Republic through their diplo¬ matic representative at Paris that their ratification has

been given; in that case they must transmit the instru¬ ment of ratification as soon as possible.

A first proces-verbal of the deposit of ratifications will be drawn up as soon as the treaty has been rati¬ fied by Germany on the one hand,

and by three of the principal Allied and Associated Powers on the other hand.

From the date of the first proces-verbal the treaty will come into force between the high contracting par¬ ties who have ratified it. For the determination of all periods of time provided for in the present treaty this date will be the date of the coming into force of the treaty.

In all other respects the treaty will enter into force for each power at the date of the deposit of its ratifica¬ tion.

The French Government will transmit to all the signatory powers a certified copy of the proces-verbaux of the deposit of ratifications.

IN FAITH WHEREOF the above-named plenipo¬ tentiaries have signed the present treaty.

DONE AT VERSAILLES, in a single copy which will rem/ain deposited in the archives of the French Republic, and of which authenticated copies will be transmitted to each of the signatory powers.

(2) Treaty of Peace Between the Principi Allied and Associated Powers and Austria.

N. B. — There are many references to the German Treaty in the Austrian Trelaty as printed below. It is, of course, to be borne in mind that in such clauses stated to be identical the words “ Austria ”, “ Austro-Hungary ”, “ Austrian ”, etc., are substituted for the words “ Germany ”, “ German ”, *etc.* Where the dates of Germany’s entering on a state of war and ceasing to be a belligerent lare inserted as affecting the coming into operation of or marking a cessation of the operation of a clause, these dates in the Austrian treaty are as of 28 July 1914 and 3 Nov. 1918 respectively.

The United States of America, the Brit¬ ish Empire, France, Italy and Japan,

These Powers being described in the present Treaty as the Principal Allied and Associated Powers;

Belgium, Bolivia, Brazil, China, Cuba, Ecuador, Greece, Guatemala, Haiti, The Hedjaz, Honduras, Liberia, Nicaragua, Pan¬ ama, Peru, Poland, Portugal, Roumania, The Serb-Croat-Slovene State, Siam, Czecho¬ slovakia and Uruguay,

These Powers constituting, with the Principal Powers mentioned

above, the Allied and Associated Powers,

of the one part;

And Austria,

of the other part;

Whereas on the request of the former Imperial and Royal Austro-Hungarian Government an Armistice was granted to Austria-Hungary on November 3, 1918, by the Principal Allied and Associated Powers in order that a Treaty of Peace might be concluded, and

Whereas the Allied land Associated Powers are equally desirous that the war in which certain among them were successively involved, directly or indirectly, against Austria-Hungary, and which originated in the declara¬ tion of war against Serbia on July 28, 1914, by the former Imperial and Royal Austro-Hungarian Govern¬ ment, and in the hostilities conducted by Germany in alliance with Austria-Hungary, should be replaced by a firm, just and durable Peace, and

Whereas the former Austro-Hungarian Monarchy has now ceiased to exist, and has been replaced in Austria by a republican government, and

Whereas the Principal Allied and Associated Powers have already recognized that the Czecho-Slovak State, in which are incorporated certain portions of the said Monarchy, is a free, independent and Allied State, and

Whereas the said Powers have also recognized the union of certain portions of the said Monarchy with the territory of the Kingdom of Serbia as a free, independent and Allied State, under the name of tlie Serb-Croat-Slovene State, and

W'hereas it is necessary, while restoring peace, to regulate the situation which has arisen from the dis¬ solution of the said Monarchy and the formation of the said States, and to establish the government of these countries on a firm foundation of justice and equity;

For this purpose the HIGH CONTRACTING PARTIES represented as follows:

The President of the United States of America, by:

The Honourable Frank Lyon Polk, Under Secretary of State;

The Honourable Henry White, formerly Ambassador Extraordinary land Plenipotentiary of the United States at Rome and Paris;

General Tasker H. Bliss, Military Representative of the United States on the Supreme War Council;

His Majesty the King of the United King¬ dom OF Great Britain and Ireland and OF the British Dominions beyond the Seas, Emperor of India, by:

The Right Honourable David Lloyd George, M. P., First Lord of His Treasury and Prime Minister;

The Right Honourable Arthur James Balfour, O. M., M. P., His Secretary of State for Foreign Affairs;

The Right Honourable Andrew Bonar Law, M. P., His Lord Privy Seal;

The Right Honourable Viscount Milner, G. C. B., G. C. M, G., His Secretary of State for the Colonies;

The Right Honourable George Nicoll Barnes, M. P., Minister without portfolio;

And

for the Dominion of Canada, by:

for the Commonwealth of Australia, by:

fpr the Union of South Africa, by:’

for the Dominion of New Zealand, by:

for India, by:

The President of the French Republic, by;

Mr. Georges Clemenceau, President of the Council, Minister of War;

Mr. Stephen Pichon, Minister for Foreign Affairs; Mr. Louis-Lucien Klotz, Minister of Finance;

Mr. Andre Tardieu, Commissary General for Franco-American Military Affairs;

Mr. Jules Cambon, Ambassador of France.

His Majesty the King of Italy, by:

Mr. S. Crespi, Deputy;

His Majesty the Emperor of Japan, by:

Viscount Chinda, Ambassador Extraordinary and Plenipotentiary of H. M. the Emperor of Japan at London;

Mr. K. Matsui, Ambassador Extraordinary and Plenipotentiary of H. M. the Emperor of Japan Psns *

Mr. H. IjuiN, Ambassador Extraordinary and Pleni¬ potentiary of H. M. the Emperor of Japan at Rome;

His Majesty the King of the Belgians, by:

Mr. Paul Hymans, Minister for Foreign Affairs, Min¬ ister of State; _ ,

Mr. Jules vtan den Heuvel, Envoy Extraordinary and Minister Plenipotentiary, Minister of State; ˆ

Mr. Emile Vandervelde, Minister of Justice, Minister of State;

The President of the Republic of Bolivia, by :

Mr. Ismael Montes, Envoy Extraordinary and Min¬ ister Plenipotentiary of Bolivia at Paris;

The President of the Republic of Brazil, by :

Mr. Pandia Calogeras, Deputy, formerly Minister of Finance;

The President of the Chinese Republic, by:

Mr. lou Tseng-Tsiang, Minister for Foreign Affairs;

Mr. Chengting Thomas Wang, formerlv Minister of Agriculture and Commerce;

The President of the Cuban Republic, by:

Mr. Antonio Sanchez de Bustamante, Dean of the Faculty of Law in the University of Havana, President of the Cuban Society of International Law;

The President of the Republic of Ecuador, by:

Mr. Dorn y de Alsua, Envoy Extraordinary and Minister Plenipotentiary of Ecuador at Paris;

His Majesty the King of the Hellenes, by:

Mr. Eleftherios Veniselos, President of the Council of Ministers;

Mr. Nicolas Politis, Minister for Foreign Affairs;

The President of the Republic of Guate¬ mala, by:

Mr. Joaquim Mendez, formerly Minister of State for Public Works and Public Instruction; Envoy Extraordinary and Minister Plenipotentiary of Guate¬ mala at Washington, Envoy Extraordinary and Minister Plenipotentiary on special mission at Paris;

The President of the Republic of Haiti, by:'

Mr. Tertullien Guilbaud, Envoy Extraordinary and Minister Plenipotentiary of Haiti at Paris;

His Majesty the King of the Hedjaz, by:

Mr. Rustem Haidar;

M. Abdul Hadi Aouni;

The President of the Republic of Hondu¬ ras, by:

The President of the Republic of Liberia, by:

The Honourable Charles Dunbar Burgess King, Secretary of State ;

The President of the Republic of Nicaragua, by :

Mr. Salvador Chamorro, President of the Chamber of Deputies;

The President of the Republic of Panama,

by: .

Mr. Antonio Burgos, Envoy Extraordinary and Min¬ ister Plenipotentiary of Panama at Madrid;

The President of the Republic of Peru, by:

Mr. Carlos G. Candamo, Envoy Extraordinary and Minister Plenipotentiary of Peru at Paris;

The President of the Polish Republic, by:

Mr. Ignace Paderewski, President of the Council of Ministers, Minister for Foreign Affairs,

Mr. Roman Dmowski, President of the Polish National Committee;

The President of the Portuguese Republic, by :

Dr. Affonso Costa, formerly President of the Council of Ministers;

Mr. Augusto Soares, formerly Minister for Foreign Affairs;

His Majesty the King of Roumania, by:

Mr. Ion I. C. Bratiano, President of the Council of Ministers, Minister for Foreign Affairs;

Generlal Constantin Coanda, Corps Commander, A. D. C. to the King, formerly President of the Council of Ministers;

His Majesty the King of the Serbs, the Croats and the Slovenes, by:

Mr. Nicolas P. Pachitch, formerly President of the Council of Mini.sters;

Mr. Ante Trumbic, Minister for Foreign Affairs;

Mr. Milenko Vesnitch, Envoy Extraordinary and Minister Plenipotentiary of 11. M. the King of the Serbs, the Croats and the Slovenes at Paris;

His Majesty the King of Siam, by :

Prince Charoon, Envoy Extraordinary and Minister Plenipotentiary of H. M. the King of Siam at Paris; Prince Traidos Prabandhu, Under Secretary of State for Foreign Affairs;

The President of the Czecho-Slovak Repub¬ lic, by:

Mr. Karel Kramar, President of the Council of Min¬ isters;

Mr. Edouard Benes, Minister for Foreign Affairs;

The President of the Republic of Uruguay, by:

Mr. Juan Antonio Buero, Minister for Foreign Af¬ fairs, formerly Minister of Industry;

Austria, by:

Mr. Charles Renner, Chancellor of the Austrian Republic.

WHO, having communicated their full powers, found in good and due form, have AGREED AS FOLLOWS:

From the coming into force of the present Treaty the state of war will terminate.

Austria is recognized under the name of the “ Republic of Austria.”

From that moment, and subject to the provisions of this Treaty, official relations will exist between the Allied and Associated Powei’S land the Republic of Austria.

Part I. — The Covenant of the League of

Nations.

(Articles 1—26 with Annex)

r

For text of the League of Nations Covenant see Part I, German Treaty, supra, p. 524.

Part II. — Frontiers of Austria.

Article 27. — The frontiers of Austria shall be fixed as follows (see Map) :

1. IVith Switzerland and Lichtenstein: the present frontier.

2. With Italy:

From the point 2645 (Gruben J.) eastwards to point 2915 (Klopaier Spitz),

a line to be fixed on the ground plassing through point 1483 on the Reschen-Nauders road;

thence eastwards to the summit of Dreiherrn Spitz (point 3505),

the watershed between the basins of the Inn to the north and the Adige to the south;

thence south-south-eastwards to point 2545 (March-kinkele),

the watershed between the basins of the Drave to the east and the Adige to the west;

thence southeastwards to point 2483 (Helm Spitz) a line to be fixed on the ground crossing the Drave between Winnbaoh and Arnbach;

thence east-south-eastwards to point 2050 (Osternig) about 9 kilometres northwest of Tarvis,

the watershed between the basins of the Drave on the north and successively the basins of the Sextenbach, the Piave and the Tagliamento on the south;

thence east-south-eastwards to point 1492 (about 2 kilometres west of Thorl),

the wiate’rshed between the Gail and the Gailitz; thence eastwards to point 1509 (Pec), a line to be fixed on the ground cutting the Gailitz south of the town and station of Thorl and passing by point 1270

(Cabin Berg).

3. On the South, and then with the Klagenfurt area, subject to the provisions of Section II of Part III (Political Clauses for Europe) :

from point 1509 (Pec) eastwards to point 1817 (Malestiger),

the crest of the Karavanken;

from point 1817 (Malestiger) and in a northeasterly direction as far as the Drave at a point situated about

1 kilometre southeast of the railway bridge on the eastern branch of the bend made by that river about 6 kilometres east of Villach,

a line to be fixed on the ground cutting the railwav between Mallestig and Faak and passing through point 666 M'olana);

thence in a southeasterly direction to a point about

2 kilometres above St. Martin,

the course of the Drave;

thence in a northerly direction as far as point 871, about 10 kilometres to the east-north-east of Villach, a line running approximately from south to north to be fixed on the ground;

thence east-north-eastwards to a point to be chosen

near point 725 about 10 kilometres northwest c' Klagenfurt on the administrative boundary between the districts of St. Veit and Klagenfurt,

la line to be fixed on the ground passing through points 1069 (Taubenbiihel), 1045 ((jallinberg) and 815 (Freudenberg) ;

thence eastwards to a point to be chosen on the ground west of point 1075 (Steinbruch Kogel),

the administrative boundary between the districts of St. Veit and Klagenfurt;

thence northeastwards to the point on the Gurk where the administrative boundary of the district of Volkermarkt leaves this

river,

a line to be fixed on the ground passing through point 1076;

thence northeastwards to point 1899 (Speikkogl), the (administrative boundary between the districts of St. Veit and Volkerrriarkt;

thence southeastwards to point 842 (i kilometre west of Kasparstein),

the northeastern boundary of the district of Volkermarkt;

thence eastwards to point 1522 (Hiihner Kogel), a line to be fixed on the ground passing north of Lavamiind.

4. With the iSerb-Croat-Slovene State, subject to the provisions of Section II of Part III (Political Clauses for Europe) :

From point 1522 (Hiihner Kogel) eastwards to point 917 (St. Lorenzen),

a line to be fixed on the ground passing through point 1330;

thence eastwards to the point where it meets the administrative boundary between the districts of Mar¬ burg and Leibnitz,

the watershed between the basins of the Drave to the south and the Saggau to the north;

thence northeastwards to the point where this admin¬ istrative boundary meets the Mur,

the above-mentioned administnative boundary; thence to the point where it meets the old frontiers of 1867 between Austria and Hungary 5 kilometres southeast of Radkersburg,

the principal course of the Mur downstream; thence northwards to a point to be fixed east of point 400 about 16 kilometres north of Radkersburg, the old frontier of 1867 ‘between Austria and Hungary;

thence northeastwards to a point to be fixed on the ■wiatershed between the basins of the Raab and the Mur about 2 kilometres eaˆt of Toka,

a line to be fixed on the ground, passing between the villages of Bonisfalva and Gedoudvar.

THis point is the point common to the three frontiers of Austria,

Hungary and the Serb-Croat-Slovene State.

5. With Hungary:

From the point above defined northeastwards to point 353 about 6 kilometres north-north-eiast of Srentgotthard,

a line to be fixed on the ground passing through point 353 (Janke B.), then west of the Radkersburg-Szentgotthard road and east of the villages of Nagyfalva, Nemetlak and Rabakersztur ;

thence in a general north-elasterly direction to point 234 about 7 kilometres north-north-east of Pinka-Mindszent,

a line to be fixed on the ground passing through point 323 (Hochkogel), then south of the villages of Zsamand, Nemetbiikkos and Karacsfa, and between Nagysaroslak and Pinka-Mindszent;

thence northwiards to point 883 (Trott K6) about 9 kilometres southwest of Koszeg,

a line to be fixed on the ground passing througn points 241, 260 and 273, then east of Nagynarda and Rohoncz and west of Dozmat and Butsching;

thence northeastwards to point 265 (Kamenje) about 2 kilometres southeast of Nikitsch,

a line to be fixed on the ground, passing southeast of Liebing, Olmod and Locsmiand, and northwest of Koszeg and the road from Koszeg to Salamonfa;

thence northwards to a point to be selected on the southern shore of Neusiedler See between Holling and Hidesgseg,

a line to be fixed on the ground, passing east of Nikitsch and Zinkendorf and west of Kovesd and Nemet-Pereszteg;

thence eastwards to point 1 1 5 situated about 8 kilometres southwest of St. Johann,

la line to be fixed on the ground, crossing the Neusiedler See, passing south of the island containing point 1 1 7, leaving in Hungary the branch railway running northwestwards from the station of Mexiko as well as the entire Einser canal, and passing soutn of Pamhagen ;

thence northwards to a point to be selected about i kilometre west of

Antonienhof (east of Kittsee), this

point being the poirtt common to the three frontiers of Austria, Hungary, and the Czecho-Slovak State,

a line to be iixed on the ground, leaving entirely in Hungarian territory the Csorua-Karlburg railway and passing west of Wiist-Sommerein and Kr. Jahrndorf, and east of Andau, Nikelsdorf, D. Jahrndorf and Kittsee.

6. IVitli the Czecho-Slovak State:

F rom the point above defined northwestwards to the bend of the old frontier of 1867 between Austria and Hungary about 2% kilometres northeast of Berg, a line to be fixed on the ground, cutting the Kittsee-Pressburg road about 2 kilometres north of Kittsee;

thence northwards to a point to be selected on the principal channel of navigation of the Danube about 4^^ kilometres upstream from the Pressburg bridge, a line to be fixed on the ground following as much as possible the old frontier of 1867 between Austria and Hungary ;

thence westwards to the confluence of the Moravia (March) with the Danube,

the principal channel of navigation of the Danube; thence the course of the Morava upstream, then the course of the Thaya upstrelam to a point to be selected about 2 kilometres southeast of the intersection of the Rabensburg-Themenau road with the Rabensburg-Lundenburg railway;

thence west-nortli-westwards the above-mentioned administrative boundary between Lower Austria and Moravia situated about 400 metres south of the point where this boundary cuts the Nikolsburg-Feldsberg rail way,

a line to be fixed on the ground passing through points 187

(Dlouhyvrch), 221 (Rosenbergen) , 223

(Wolfsberg), 291 (Raistenberg), 249 and 279 (Kaller-haide) ;

thence west-northwestwards the above-mentioned administrative boundary;

thence westwards to a point to be selected about 3 kilometres east of the village of Franzensthal,

the old administrative boundary between Lower Austria and Bohemia;

thence southwards to point 498 (Gelsenberg) about 5 kilometres north-northwest of Gmund,

a line to be fixed on the ground passing east of the Rottenschachen-Zuggers road and through points 537 and 522 (G. Nagel B.);

thence southwards and then west-north-westwards to a point on the old administrative boundary between Lower Austria and Bohemia situated about 200 metres north of the point where it cuts the Gratzen-Weitra road,

a line to be fixed on the ground passing between Zuggers and Breitensee, then through the most south¬ easterly point of the railway bridge over the Lainsitz while leaving to Austria the town of Gmiind and to the Czecho-Slovak Stete the station and railway works of Gmiind (Wolfshof) and the junction of the Gmiind-Budweis and Gmiind-Wittingau railways, then passing through points 524 (Grundbuhel), 577 (north of Hohenberg) and 681 (Lagerberg);

thence southwestwards the above mentioned adminis¬ trative boundary, then northwestwards the old adminis¬ trative boundary between Upper Austria and Bohemia to its point of junction with the frontier of Germany.

7. With Germany:

The frontier of August 3, 1914-.

Article 28. — The frontiers described by the present Treaty are traced, for such parts as are defined, on the one in a million map attached to the present Treaty. In case of differences between the text and the maps, the text will prevail.

Article 29.— Boundary Commissions, whose composi¬ tion is fixed by

the present Treaty, or will be fixed by a Treaty between the Principal Allied and Associated Powers and the, or any, interested States, will have to trace these frontiers on the ground.

They shall have the power, not only of fixing those portions which are defined as “ a line to be fixed on the ground,” but also, where a request to that effect is mlade by one of the States concerned, and the Com¬ mission is satisfied that it is desirable to do so, of revising portions defined by administrative boundaries; this shall not however apply in the case of international boundaries existing in August, 1914. where the task of the Commission will confine itself to the re-estabhsh- ment of sign-nosts and boundary-marks.

They shiall endeavour in both cases to follow as nearly as possible the descriptions given in the Treaties, taking into account as far as possible administrative boundaries and local ecnomic interests.

The decisions of the Commissions will be taken by a majority, and shall be binding on the parties con—

ceriˆL Boundary Commissions will be

borne in equal shares by the two States concerned.

Article 30. — In so far as frontiers defined by a waterway are concerned, the phrases “ course ” or “ channel ” used in the descriptions of the present Treaty signify, as regards non-navigable rivers, the median line of the waterway or of its principal branch, and, as regards navigable rivers, the median line of the principal channel of navigation. It will rest with the Boundary Commissions provided for by the present Treaty to specify whether the frontier line shall follow any changes of the course or channel which may take place, or whether it shall be definitely fixed by the position of the course or channel at the time when the present Treaty comes into force.

Article 31. — The various States interested undertake to furnish to the Commissions all documents necessary for their tasks, especially authentic copies of agree¬ ments fixing existing or old frontiers, all large scale miaps in existence, geodetic data, surveys completed but unpublished, and information concerning the changes of frontier watercourses.

They also undertake to instruct the local authorities to communicate to the Commissions all documents, especially plans, cadastral and land

books, and to fur¬ nish on demand all derails regarding property, existing economic conditions, and other necessary information.

Article 32. — The various States interested under¬ take to give every assistance to the Boundary Commis¬ sions, whether directly or through local authorities, in everything that concerns transport, accommodation, labour, material (signposts, boundary pillars) neces¬ sary for the accomplishment of their mission.

Article 33. — The various States interested under¬ take to safeguard the trigonometrical points, signals, posts or frontier marks erected by the Commission.

Article 34. — The pillars will be placed so as to be intervisible; they will be numbered, and their position and their number will be noted on a cartographic docu¬ ment.

Article 35. — The protocols defining the boundary and the maps and documents attached thereto will be made out in triplicate, of which two copies will be forwarded to the Governments of the limitrophe States and the third to the Government of the French Republic, which will deliver authentic copies to the Powers who sign the present Treaty.

Part III. — Political Clauses for Europe.

SECTION I. ITALY.

Article 36. — Austria renounces, so far as she is concerned, in favour of Italy all rights and title over the territory of the former Austro-Hungarian Monarchy situated beyond the frontier laid down in Article 27 (2) and lying between that frontier, the former Austro-Hungarian frontier, the Adriatic Sea, and the eastern frontier of Italy as subsequently determined.

Austria similarly renounces so far as she is con¬ cerned in favour of Italy all rights and title over other territory of the former Austro-Hungarian Monarchy which may be recognized as forming part of Italy by any treaties which may be concluded for the purpose of completing the present settlement.

A Commission composed of five members, one nomi¬ nated by Italy, three by the other Principal Allied and Associated Powers, (and one by Austria, shall be con¬ stituted within fifteen days from the coming into force of the present Treaty to trace on the spot the frontier line between Italy and Austria. The decisions of the Commission will be

taken by a majority and shall be binding on the parties concerned.

Article 37. — Notwithstanding the provisions of Article 269 of Part X (Economic Clauses), persons having their usual residence in the territories of the former Austro-Hungarian Monarchy transferred to Italy who, during the war, have been outside the territories of the former Austro-Hungarian Monarchy or have been imprisoned, interned or evacuated, shall enjoy the full benefit of the provisions of Articles 252 and 253 of Part X (Economic Causes).

Article 38. — A special Convention will determine the terms of repayment in Austrian currency of the special war expenditure advianced during the war by territory of the former Austro-Hungarian Monarchy transferred to Italy or by public associations in that territory on account of the Austro-Hungarian Monarchy under its legislation, such as allowances to the families of persons mobilised, requisitions, billeting of troops, and relief to persons who have been evacuated.

In fixing the amount of these sums Austria shall be credited with the amount which the territory would have contributed to Austria-Hungary to meet the expenses resulting from these payments, this contribution being calculated according to the proportion of the revenues of the former Austro-Hungarian Monarchy derived from the territory in 1913.

Article 39. — The Italian Government will collect

for its own account the taxes, dues and charges of every kind leviable in the territories transferred to Italy and not collected on November 3, 1918.

Article 40. — No sum shall be due by Italy on the ground of her entry into possession of the Palazzo Venezia at Rome.

Article 41. — Subject to the provisions of Article 204 of Part IX

(Financial Clauses) relative to the acquisition of, and payment for. State property and possessions, the Italian Government is substituted in all the rights which the Austrian State possessed over tail the railways in the territories transferred to Italy •ˆhich were administered by the Railway Administration of the said State and which are actually working or under construction.

The same shall apply to the rights of the former Austro-Hungarian Monarchy with regard to railway and tramway concessions within the above-mentioned territories.

The frontier railway stations shall be determined by a subsequent agreement.

Article 42. — Austria shall restore to Italy within a period of three months all the wagons belonging to the Italian railways which before the outbreak of war had passed into Austria and have not returned to Italy.

Article 43. — Austria renounces as from November 3, 1918, on behalf of herself and her nationals in regard to territories transferred to Italy all rights to which she may be entitled with regard to the products of the aforsaid territories under any agreements, stipulations or laws establishing trusts, ’cartels or other similar organiziaitions.

Article 44. — For a period of ten years from the coming into force of the present Treaty central electric power stations situated in Austrian territory and formerly furnishing electric power to the territories transferred to Italy or to any other establishment the exploitation of which passes to Italy shall be required to continue furnishing this supply up to an amount corre¬ sponding to the undertakings and contracts in force on November 3, 1918.

Austria further admits the right of Italy to the free use of the waters of Lake Raibl and its derivative watercourse and to divert the said waters to the basin of the Korinitza.

Article 45. — (i) Judgments rendered since August 4, 1914, by the courts in the territory transferred to Italy in civil and commercial cases between the inhabit¬ ants of such territory and other nationals of the former Austrian Empire, or between such inhabitants and the subjects of the allies of the Austro-Hungarian Monarchy, shall not be darried into effect until after endorsement by the corresponding new court in such territory.

(2) All decisions rendered for political crimes or offences since August

4, 1914, by the judicial authorities of the former Austro-Hungariian Monarchy against Italian nationals, including persons who obtain Italian nationality under the -ˆresent Treaty, shall be annulled.

(3) In all matters relating to proceedings initiated before the coming into force of the present Treaty before the competent authorities of the territory trans¬ ferred to Italy, the Italian and Austrian judicial authorities respectively shall until the coming into force of a special convention on this subject be authorized to correspond with each other direct. Requests thus presented shall be given effect to so far as the laws of a public character allow in the country to the authorities of which the request is addressed.

(4) All appeals to the higher Austrian judicial and administrative authorities beyond the limits of the territory transferred to Italy against decisions of the administrative or judicial authorities of this territory shall be suspended. The records shall be submitted to the authorities against whose decision the appeal was entered. They must be transmitted to the competent Italian authorities without delay.

(5) All other questions as to jurisdiction, procedure or the administration of justice will be determined by a special convention between Italy and Austria.

SECTION II. SERB-CROAT-SLOVENE STATE.

Article 46. — Austria, in conformity with the action already taken by the Allied and Associated Powers recognizes the complete independence of the Serb-Croat-Slovene State.

Article 47. — Austria renounces so far as she is con¬ cerned in favour of the Serb-Croat-Slovene State all rights and title over the territories of the former Austro-Hungarian Monarchy situated outside the frontiers of Austria as laid down in Article 27 of Part II (Frontiers of Austria) and recognised by the present Treaty, or by any Treaties concluded for the purpose of Completing the present settlement, as forming part of the Serb-Croat-Slovene State.

Article 48. — A Commission consisting of seven members, five nominated by the Principal Allied and Associated Powers, one by the Serb-Croat-Slovene State, and one by Austria, shall be constituted within fifteen days from the coming into force of the present Treaty to trace on the spot the frontier line described in Article 27 (4) of Part II (Frontiers of Austria).

The decisions of the Commission will be taken by a miajority and shall be binding on the parties concerned.

Article 49.- — ■ The inhabitants of the Klagenfurt area will be called upon, to the extent stated below, to indicate by a vote the State to which they wish the territory to belong.

The boundaries of the Klagenfurt area are as follows:

From point 871, about 10 kilometres to the east-north-east of Villach, southwards to a point on the Drave about 2 kilometres above St. Martin,

a line running approximately from north to south to be fixed on the ground;

thence in a northwesterly direction as far as a point about i kilometre southeast of the pailway bridge on the eastern branch of the bend formed by the Drave about 6 kilometres to the east of Villach, the course of the Drave;

thence in a southwesterly direction to point 1817 (Malestiger),

a line to be fixed on the ground passing through point 666 (Polana) and cutting the railway between Mallestig and Faak;

thence in an east-south-easterly direction, then north¬ west to point 1929 (Gushowa),

the watershed between the basins of the Drave to the north and the Save to the south;

thence northeast to point 1054 (Strojna), a line to be fixed on the ground following in a general manner the western boundary of the basin of the Miess, passing through points 1558, 2124 and 1185; thence northeast to point 1522 (Hiihner Kogel), a line to be fixed on the ground, crossing the Drave to the south of Lavamiind;

from the Hiihner ˆ Kogel westwards to point 842, I kilometre west of Kasparstein,

a line to be fixed on the ground passing to the north of Lavamiind;

thence as far as point 1899 (Speikkogl), the northeastern administrative boundary of the

district of Volkermarkt;

thence in a southwesterly direction and as far as the river Gurk,

the northwestern administrative boundary of the

district of Volkermarkt;

thence in a southwesterly direction as far as a point on the administrative boundary to the west of point

1075 (Steinbruch Kogel),

a line to be fixed on the ground, passing through point 1076;

thence in a westerly direction and as far as a point to be fixed near point 725, about 10 kilometres north¬ west of Klagenfurt,

the administrative boundary between the districts

of St. Veit and Klagenfurt;

thence as far as point 871, which was the starting point of this description,

a line to be fixed on the ground, passing through points 815 (Freudenberg), 1045 (Gallinberg) and 1069 (Taubenbiihcl).

Article 50. — With a view to the organisation of a plebiscite, the Klagenfurt area will be divided into two zones, the first to the south and the second to the north of a transversal line of which the following is a description :

From the point where the western boundary of the area leaves the Drave in a northerly direction as far as the point about i kilometre to the east of Rosegg (Saint-Michael),

the course of the Drave downstream; thence in a northeasterly direction and as far as the western extremity of the Worther See, south of Velden, a line to be fixed on the ground;

thence in an easterly direction to the outlet of the Glanfurt from the lake,

the median line of that lake;

thence eastwards to its confluence with the river Gian,

the course of the Glanfurt downstream; thence eastward to its

confluence with the river Gurk,

the course of the Gian downstream; thence in a northeasterly direction, to the point where the northern boundary of the Klagenfurt area crosses the river Gurk, the course of the Gurk.

The Klagenfurt area will be placed under the control of a Commission entrusted with the dutv of preparing the plebiscite in that area and assuring the impartial

administration thereof. This Commission will be com¬ posed as follows: four members nominated respectively by the United States, Great Britain, France and Italy, one by Austria, one by the Serb-Croat-Slovene State, the Austrian member only taking part in the delibera¬ tions of the Commission in regard to the second zone, and the Serb-Croat-Slovene member only taking part therein with regard to the first zone. The decisions of the Commission will be taken by a majority.

The second zone will be occupied by the Austrian troops and administered in accordance with the general regulations of the Austrian legislation.

The first zone will be occupied by the troops of the Serb-Croat-Slovene State and administered in accordance with the general regulations of the legislation of that State.

In both zones the troops, whether Austrian or Serb-Croat-Slovene, shall be reduced to the numbers which the Commission may consider necessary for the preserva¬ tion of order, and shall carry out their mission under the control of the Commission. These troops shall be replaced as speedily jas possible by a police force re¬ cruited on the spot.

The Commission will be charged with the duty of arranging for the vote and of taking such measures as it may deem necessary to ensure its freedom, fair¬ ness and secrecy.

In the first zone the plebiscite will be held within three months from the coming into force of the present Treaty, at a date fixed by the Commission.

If the vote is in favour of the Serb-Croat-Slovene State, a plebiscite will be held in the secon'd zone within three weeks from the proclamation of the result of the plebiscite in the first zone, at a date to be fixed by the Commission.

If on the other hand the vote in the first zone is in favour of Austria, no plebiscite will be held in the second zone, and the whole of the area will remain definitely under Austrian sovereignty.

The* right of voting will be granted to every person without distinction of sex who:

(a) Has attained the age of 20 years on or before January i, 1919;

(b) Has on January i, 1919, his or her habitual residence within the zone subjected to the plebiscite; and,

(c) Was born within the said zone, or has had his or her habitual residence or rights of citizenship ipertinenza) there from a date previous to January i,

1912.

The result of the vote will be determined by the majority of votes in the whole of each zone.

On the conclusion of each vote the result will be communi0ated by the Commission to the Principal Allied and Associated Powers; with a full report as to the taking of the vote, and will be proclaimed.

If the vote is in favour of the incorporation either of the first zone or of both zones in the Serb-Croat- Slovene State, Austria hereby renounces, so far as she is concerned and to the extent corresponding to the result of the vote, in favour of the Serb-Croat- Slovene State all rights land title over these territories.

After agreement with the Commission the Serb-Croat- Slovene Government may definitely establish its authority over the said territories.

If the vote in the first or second zone is in favour of Austria, the Austrian Government, after agreement with the Commission, will be entitled definitively to re¬ establish its authority over the whole of the Klagenfurt area, or in the second zone, as the case may be.

When the administration of the country, either by the Serb-Croat-Slovene State, or by Austria, as the case may be, has been thus assured, the powers of the Commission will terminate.

Expenditure by the Commission will be borne by Austria and the Serb-Croat-Slovene State in equal moieties.

Article 51. — The Serb-Croat-Slovene State accepts and agrees to embody in a Treaty with the Principal Allied and Associated Powers such provisions as may be deemed necessary by these Powers to protect the interests of inhabitants of that State who differ from the majority of the population in race, language, or religion.

The Serb-Croat'Slovene State further accepts and agrees to embody in a Treaty with the Principal Allied and Associated Powers such provisions as these Powers may deem necessary to protect freedom of transit and equitable treatment of the commerce of other nations.

Article 52. — The proportion and nature of the finan¬ cial obligations of the former Austrian Empire which the Serb-Croat-Slovene State will have to assume on account of the territory placed under its sovereignty will be determined in accordance with Article 20.3 of Part IX (Financial Clauses) of the present Treaty.

Subsequent agreements will decide all questions

which are not decided by the present Treaty and which may arise in consequence of the cession of the said territory.

SECTION III. — CZECHOSLOVAK STATE.

Article 53. — Austria, in conformity with the action already taken by the Allied and Associated Powers, recognizes the complete independence of the Czecho¬ slovak State, which will include the autonomous terri¬ tory of the Ruthenians to the south of the Carpathians.

Article 54. — Austria renounces so far as she is concerned in favour of the Czecho-Slovak State all rights and title over the territories of the

former Austro-Hungarian Monarchy situated outside the frontiers of Austria as laid down in Article 27 of Part II (Frontiers of Austria) (and recognized in accordance with the present Treaty as forming part of the Czecho-Slovak State.

Article 55. — A Commission composed of seven mem¬ bers, five nominated by the Principal Allied and Asso¬ ciated Powers, one by the Czecho-Slovak State, and one by Austria, will be appointed fifteen days after the coming into force of the present Treaty to trace on the spot the frontier line laid down in Article 27 (6) of Part II (Frontiers of Austria) of the present Treaty.

The decisions of this Commission will be taken by a majority and shall be binding on the parties con¬ cerned.

Article 56. — The Czecho-Slovak State undertakes not to erect any military works in that portion of its territory which lies on the right bank of the Danube to the south of Bratislava (Pressburg).

Article 57. — The Czecho-Slovak State accepts and agrees to embody in a Treaty with the Principal Allied and Associated Powers such provisions as may be deemed necessary by these Powers to protect the in¬ terests of inhabitants of that State who differ from the miajority of the population in race, language or religion.

The Czecho-Slovak State further accepts and agrees to embody in a Treaty with the Principal Allied and Associated Powers such provisions as these Powers may deem necessary to protect freedom of transit and equitable treatment for the commerce of other nations.

Article 58. — The proportion and nature of the financial obligations of the former Austrian Empire which the Czecho-Slovak State will have to assume on account of the territory placed under its sovereignty will be determined in accordance with Article 203 of Part IX (Financial Clauses) of the present Treaty.

Subsequent (agreements will decide all questions which are not decided by the present Treaty and which may arise in consequence of the cession of the said territory.

SECTION IV. — ROUMANIA.

Article 59. — Austria renounces, so far as she is concerned, in favour of Romania all rights and title over such portion of the former Duchy of Bukovina as lies within the frontiers of Roumania which may ultimately be fixed by the Principal Allied and Asso¬ ciated Powers.

Article 60. — Roumania accepts and agrees to em¬ body in a Treaty with the Principal Allied and Asso¬ ciated Powers such provisions as may be deemed neces¬ sary by these Powers to protect the interests of in¬ habitants of that State who differ from the majority of the population in race, language or religion.

Roumania further accepts and agrees to embody in a Treaty with the Principal Allied land Associated Powers such provisions as these Powers may deem necessary to protect freedom of transit and equitable treatment for the commerce of other nations.

Article 61. — The proportion and nature of the finan¬ cial obligations of the former Austrian Empire which Roumania will have to assume on account of the terri¬ tory placed under her sovereignty will be determined in accordance with Article 203 of Part IX (Financial Clauses) of the present Treaty.

Subsequent agreements will decide all questions which are not decided by the present Treaty and which may arise in consequence of the cession of the said territory.

SECTION V. — PROTECTION OF MINORITIES.

Article 62. — Austria undertakes that the stipulations contained in this Section shall be recognised as funda¬ mental laws, and that no law, regulation or official action shall conflict or interfere with these stipulations, nor shall any law, regulation or official action prevtail over them.

Article 63. — Austria undertakes to assure full and complete protection of life and liberty to all inhabitants of Austria without distinction of birth, nationality, language, race or religion.

All inhabitants of Austria shall be entitled to the free exercise, whether public or private, of any creed, religion or belief, whose practices are not inconsistent with public order or public morals.

Article 64. — Austria admits and declares to be Austrian nationals ipso facto and without the require¬ ment of any formality all persons possessing at the date of the coming into force of the present Treaty rights of citizenship (pertinenza) within Austrian ter¬ ritory who are not nationals of any other State.

Article 65. — All persons born in Austrian territory who are not born nationals of another State shall ipso facto become Austrian nationals.

Article 66. — All Austrian nationals shall be equal before the law and shall enjoy the same civil and political rights without distinction as to race, language or religion.

Differences of religion, creed or confession shall not prejudice any Austrian national in matters relating to the enjoyment of civil or political rights, as for instance admission to public employments, functions and honours, or the exercise of professions and industries.

No restriction shall be imf>osed on the free use by any Austrian national of any language in private inter¬ course, in commerce, in religion, in the press or in publications of any kind, or at public meetings.

Notwithstanding any establishment by the Austrian Government of an official language, adequate facilities shall be given to Austrian nationals of non-German speech for the use of their language, either orally or in writing, before the courts.

Article 67. — Austrian nationals who belong to racial, religious or linguistic minorities shall enjoy the same treatment and security in law and in fact as the other Austrian nationals. In particular they shall have an equal right to establish, manage and control at their own expense charitable, religious and social institutions, schools and other educational establishments, with the right to use their own language and to exercise their religion freely therein.

Article 68. — Austria will provide in the public educa¬ tional system in towns and districts in which a con¬ siderable proportion of Austrian nationals of other than German speech are residents ladequate facilities for ensuring that in the primary schools the instruction shall be given to the children of such Austrian nationals through the medium of their own language. This pro¬ vision shall not prevent the Austrian Government from making the teaching of the German language obligatory in the said schools.

In towns and districts where there is la considerable proportion of

Austrian nationals belonging to racial, religious or linguistic minorities, these minorities shall be assured an equitable share in the enjoyment and application of the sums which may be provided out of public funds under the State, municipal or other budgets for educational, religious or charitable purposes.

Article 69. — Austria agrees that the stipulations in the foregoing Articles of this Section, so far as they affect persons belonging to racial, religious or linguistic minorities, constitute obligations of international concern and shall be placed under the guarantee of the League of Nations. They shall not be modified without the assent of a majority of the Council of the League of Nations. The Allied land Associated Powers represented on the council severally agree not to withold their assent from any modification in these Articles which is in due form assented to by a majority of the Council of the League of Nations.

Austria agrees that any Member of the Council of the League of Nations shall have the right to bring to the lattention of the Council any infraction, or any danger of infraction, of any of these obligations, and that the Council may thereupon take such action and give such direction as it may deem proper and effective in the circumstances.

Austria further agrees that any difference of opinion as to questions of law or fact arising out of these Articles between the Austrian Government and any one of the Principal Allied and Associated Powers or any other Power, a Member of the Council of the League of Nations, shall be held to be a dispute of an inter¬ national character under Article 14 of the Covenant of the League of Nations. The Austrian Government hereby consents that any such dispute shall, if the other party thereto demands, be referred to the Perma¬ nent Court of International Justice. The decision of the Permanent Court shall be final and shall have the same force and effect as an awiard under Article 13 of the Covenant.

SECTION VI. — CLAUSES RELATING TO NATIONALITY.

Article 70. — Every person possessing rights of citi¬ zenship {pertinenza) in territory which formed part of the territories of the former Austro-Hungarian Mon¬ archy shall obtain ipso facto to the exclusion of

Austrian nationality the nationality of the State exer¬ cising

sovereignty over such territory.

Article 71. — -Notwithstanding the provisions of Article 70, Italian nationality shall not, iji the case of territory transferred to Italy, be acquired ipso facto;

(1) by persons possessing rights of citizenship in such territory who were not born there;

(2) by persons who acquired their rights of citizen¬ ship in such territory after May 24, 1915, or who acquired them only by reason of their official position.

Article 72. — The persons referred to in Article 71, as well as those who (a) formerly possessed rights of citizenship in the territories transferred to Italy, or whose father, or mother if the father is unknown, pos¬ sessed rights of citizenship in such territories, or (b) have served in the Italian Army during the present war, and their descendants, may claim Italian nationality subject to the conditions prescribed in Article 78 for the right of option.

Article 73.- — The claim to Italian nationality by the persons referred to in Article 72 may in individual cases be refused by the competent Italian authority.

Article 74. — Where the claim to Italian nationality under Article 72 is not made, or is refused, the persons concerned will obtain ipso facto the natiomality of the State exercising sovereignty over the territory in which they possessed rights of citizenship before ‘acquiring such rights in the territory transferred to Italy.

Article 75. — Juridical persons established in the territories transferred to Italy shall be considered Italian if they are recognized as such either by the Italian administrative authorities or by an Italian judicial decision.

Article 76. — Notwithstanding the provisions of Ar¬ ticle 70, persons who acquired rights of citizenship after January i, 1910, in territory transferred under the present Treaty to the Serb-Croat-Slovene State, or to the Czecho-Slovak State, will not acquire Serb-Croat- Slovene or Czecho-Slovak nationality without a permit from the Serb-Croat-Slovene State or the Czecho-Slovak State respectively.

Article 77. — If the permit referred to in Article 76 is not applied for, or is refused, the persons concerned will obtain ipso facto the nationality of the State exer¬ cising sovereignty over the territory in

which they previously possessed rights of citizenship.

Article 78. — Persons over 18 years of age losing their Austrian nationality and obtaining ipso facto a new nationality under Article 70 shall be entitled within a period of one year from the coming into force of the present Treaty to opt for the nationality of the State in whirh they possessed rights of citizenship be¬ fore acquiring such rights in the territory transferred.

Option by a husband will cover his wife and option by parents will cover their children under 18 years of age.

Persons who have exercised the above right to opt must within the succeeding twelve months transfer their place of residence to the State for which they have opted.

They will be entitled to retain their immovable prop¬ erty in the territory of the other State where they had their place of residence before exercising their right to opt.

They may carry with them their movable property of every description. No export or import duties may be imfMDsed upon them in connection with the removal of • such property.

Article 79. — Persons entitled to vote in plebiscites provided for in the present Treaty shall within a period of six months after the definitive attribution of the area in which the plebiscite has taken place be entitled to opt for the nationality of the State to which the area is not assigned.

The provisions of Article 78 relating to the right of option shall apply equally to the exercise of the right under this Article.

Article 80. — Persons possessing rights of citizenship in territory forming part of the former Austro-Hungarian Monarchy, and differing in race and lan¬ guage from the majority of the population of such territory, shall within six months of the coming into force of the present Treaty severally be entitled to opt for Austria, Italy, Poland, Roumania, the Serb-Croat-Slovene State, or the Czecho-Slovak State, if the majority of the population of the State selected is of the same race and language as the person exer¬ cising the right to opt. The provisions of Article 78 as to the exercise of the right of option shall apply to the right of option given by this Article.

Article 81. — The High Contracting Parties under¬ take to put no hindrance in the way of the exercise of the right which the persons

concerned have under the present Treaty, or under treaties concluded by the Allied and Associated Powers with German v, Hungary or Russia, or between any of the Allied and Associated

Powers themselves, to choose any other nationality which may be open to them.

Article 82. — hor the purposes of the provisions of this Section, the status of a married woman will be governed by that of her husband, and the status of children under 18 years of age by that of their parents.

SECTION VII. — POLITICAL CLAUSES RELATING TO CERTAIN EUROPEAN STATES.

1. Belgium.

Article 83. — Austria, recognizing that the Treaties of April 19, 1839, which established the status of

Belgium before the war, no longer conform to the requirements of the situation, consents so far as she is concerned to the abrogation of the said treaties and undertakes immediately to recognize and to observe whatever conventions may be entered into by the Principal Allied and Associated Powers, or by any of them, in concert with the Governments of Belgium and of the Netherlands, to replace the said Treaties of 1839. If her formal adhesion should be required to such conventions or to any of their stipulations, Austria undertakes immediately to give it.

2. Luxemburg.

Article 84. — Austria agrees, so far as she is con¬ cerned, to the termination of the regime of neutrality of the Grand Duchy of Luxemburg, and accepts in advance all international arrangements which may be concluded by the Allied and Associated Powers relating

to the Grand Duchy,

3. Schleswig.

Article 85. — Austria hereby accepts so far as she is concerned all arrangements mlade by the Allied and Associated Powers with Germany concerning the terri¬ tories whose abandonment was imposed upon Denmark by the Treaty of October 30, 1864.

4. Turkey and Bulgaria.

Article 86. — Austria undertakes to recognize and accept as far as she is concerned all arrangements which the Allied and Associated Powers may make with Turkey and with Bulgaria with reference to any rights, interests and privileges whatever which might be claimed by Austria or her nationals in Turkey or Bulgaria and which are not dealt with in the provisions of the present Treaty.

5. Russia and Russian States.

Article 87. — i. Austria acknowledges and agrees to respect as permanent and inalienable the independence of all the territories which were part of the former Russian Empire on August i, 1914.

In accordance with the provisions of Article 210 of Part IX (Financial Clauses) and Article 244 of Part X (Economic Clauses) of the present Treaty, Austria accepts definitely so far as she is concerned the abroga-gation of the Brest-Litovsk Treaties and of all treaties, conventions and agreements entered into by the former Austro-Hungarian Government with the Miaximalist Government in Russia.

The Allied and Associated Powers formally reserve the rights of Russia to obtain from Austria restitution and reparation based on the principles of the present Treaty.

2. Austria undertakes to recognize the full force of all treaties or agreements which nuay be entered into by the Allied and Associated Powers with States now existing or coming into existence in future in the whole or part of the former Empire of Russia as it existed on August I, 1914, and to recognize the frontiers of any such States as determined therein.

SECTION VIII. — GENERAL PROVISIONS.

Article 88. — The independence of Austria is in¬ alienable otherwise than with the consent of the Council of the League of Nations.

Consequently Austria under¬ takes in the absence of the consent of the said Council to abstain from any act which might directly or in¬ directly or by any means whatever comprornise her independence, particularly, and until her admission to membership of the League of Nations, by participation in the affairs of another Power.

Article 89. — Austria hereby recognises and accepts the frontiers of Bulgaria, Greece, Hungary, Polana, Roumanila, the Serb-Croat-Slovene State and the Czecho¬ slovak State as these frontiers may be determined by the Principal Allied and Associated Powers.

Article 90. — Austria undertakes to recognise the full force of the Treaties of Peace and Additional Con¬

ventions which have been or may be concluded by the Allied and Associated Powers with the Powers who fought on the side of the former Austro-Hungarian Monarchy, and to recognise whatever dispositions have been or may be made concerning the territories of the former German Empire, of Hungary, of the Kingdom of Bulgaria and of the Ottoman Empire, and to recognize the new States within their frontiers as there laid down.

Article 91. — Austria renounces so far as she is con¬ cerned ill favour of the Principal Allied and Associated Powers all rights and title over the territories which previously belonged to the former Austro-Hungarian Monarchy and which, being situated outside the new frontiers of Austria as described in Article 27 of Part II (Frontiers of Austria), have not at present been assigned to any State.

Austria undertakes to accept the settlement made by the Principal Allied and Associated Powers in regard to those territories, particularly in so far las concerns the nationality of the inhabitants.

Article 92. — No inhabitant of the territories of the former Austro-Hungarian Monarchy shall be disturbed or molested on account either of his political attitude be¬ tween July 28, 1914, and the definitive settlement of the sovereignty over these territories, or of the determination of his nationiality effected by the present Treaty.

Article 93. — Austria will hand without delay to the Allied and Associated Governments concerned archives, registers, plans, title-deeds and documents of every kind belonging to the civil, military, financial, judicial or other forms of administration in the ceded territories. If any one of these documents, archives, registers, title-

deeds or plans is missing, it shall be restored by Austria upon the demand of the Allied or Associated Govern¬ ment concerned.

In case the archives, registers, plans, title-deeds or documents referred to in the preceding paragraphs, ex¬ clusive of those of a military character, concern equally the administrations in Austria, and cannot therefore be handed over without inconvenience to such ladministra-tions, Austria undertakes, subject to reciprocity, to give access thereto to the Allied and Associated Governments concerned.

Article 94. — Separate conventions between Austria and each of the States to which territory of the former Austrian Empire is transferred, and each of the States arising from the dismemberment of the former Austro-Hungarian Monarchy, will provide for the interests of the inhabitants, especially in connection with their civil rights, their commerce and the exercise of their pro¬ fessions.

Part IV. — Austrian Interests Outside

Europe.

Article 95. — In territory outside her frontiers as fixed by the present Treaty Austria renounces so far as she is concerned all rights, titles and privileges what¬ ever in or over territory outside Europe which belonged to the former Austro-Hungarian Monarchy, or to its allies, and all rights, titles land privileges whatever their origin which it held as against the Allied and Associated Powers.

Austria undertakes immediately to recognise and to conform to the measures which may be taken now or in the future by the Principal Allied and Associated Powers, in agreement where necessary with third Powers, in order to carry the above stipulation into effect.

SECTION I. — MOROCCO.

Articles 96-101 identical with Articles 141—146 in¬ clusive of (jerman Treaty, with the exception of the substitution of the words Austria, Austrian, etc., for Germany, German, *etc.*

SECTION II. — ’EGYPT.

Articles 102— 109 identical with Articles 147— 154 of German Treaty with the exception of the substitution of the words Austria, Austrian, etc., for Germany, German, *etc.*

SECTION III. — SIAM.

Articles no, in, 112 identical with Articles 135, 136 land 137 of the German Treaty with the exception of the substitution of the words Austria, Austria-Hungary, Austrian, etc., for Germany, German Govern¬ ment, *etc.*

SECTION IV. — CHINA.

Article 113. — Austria renounces, so far as she is concerned, in favour of China all benefits and privileges resulting from the provisions of the final Protocol signed at Peking on September 7, 1901, and from all annexes,

notes land documents supplementary thereto. She like¬ wise renounces in favour of China any claim to in¬ demnities accruing thereunder subsequent to August 14,

1917.

Article 114. — From the coming into force of the present Treaty the High Contracting Parties shall apply, in so far as concerns them respectively:

(1) The Arrangement of August 29, 1902, regarding the new Chinese customs tariff;

(2) The Arrangement of September 27, 1905, regard¬ ing Whang-Poo, and the provisional supplementary Arrangement of April 4, 1912.

China, however, will not he bound to grant to Aus¬ tria the advantages or privileges which she allowed to the former Austro-Hungarian Monarchy under these Arrangements.

Article 115. — Austria, so far as she is concerned, cedes to China all her rights over the buildings, wharves and pontoons, barracks, forts, arms and munitions of war, vessels of all kinds, wireless telegraphy

installations and other public property which belonged to the former Austro-Hungarian Monarchy, and which are situated or miay be in the Austro-Hungarian Concession at Tientsin or elsewhere in Chinese territory.

It is understood, however, that premises used as diplomatic or consular residences or offices, as well as the effects and furniture contained therein, are not included in the above cession, and, furthermore, that no steps shall be taken by the Chinese Government to dis¬ pose of the public and private property belonging to the former Austro-Hunˆrian .Monarchy situated within the so-called Legation Quarter at Peking without the consent of the Diplomatic Representatives of the Powers which, on the coming into force of the present Treatv. remain parties to the Final Protocol of September 7,

1901.

Article 116. — Austria agrees so far as she is con¬ cerned to the abrogation of the leases from the Chinese Government under which the Austro-Hungarian Con¬ cession at Tientsin is now held.

China, restored to the full exercise of her sovereign rights in the above area, declares her intention of open¬ ing it to international residence and trade. She further declares that the (abrogation of the leases under which the said concession is now held shall not affect the property rights of nationals of Allied and Associated Powers who are holders of lots in this concession.

Article 117. — Austria waives all claims against the Chinese Government or against any Allied or Associated Government arising out of the internment of Austrian nationals in China and their repatriation. She equally renounces, so far as she is concerned, all claims arising out of the capture and condemnation of Austro-Hungarian ships in China, or the liquidation, sequestrla-ti'on or control of Austrian properties, rights and inter¬ ests in that country since August 14, 1917. This provision, however, shall not affect the rights of the parties interested in the proceeds of any such liquida¬ tion, which shall be governed by the provisions of Part X (Economic Qauses) of the present Treaty.

Part V. — Military, Naval and Air Clauses.

In order to render .possible the initiation of a general limitation of the armaments of all nations, Aus¬ tria undertakes strictly to observe the

military, naval and air clauses which follow.

SECTION I. — MILITARY CLAUSES.

Chapter I. — General.

Article 118. — -Within three months of the coming into force of the present Treaty, the military forces of Austria shall be demobilised to the extent' prescribed hereinafter.

Article 119. — Universal compulsory military service shall be (abolished in Austria. The Austrian Army shall in future only be constituted and recruited by means of voluntary enlistment.

Chapter II. — Effectives and Cadres of the Austrian Army.

Article 120. — The total number of military forces in the Austrian Army shall not exceed 30,000 men, includ¬ ing officers and depot troops.

Subject to the following limitations, the formations composing the Austrian Army shall be fixed in accord¬ ance with the wishes of Austria:

(1) The effectives of units must be fixed between the maximum and minimum figures shown in Table IV annexed to this Section.

(2) The proportion of officers, including the personnel of staffs and special services, shall not exceed one twentieth of the total effectives with the colours, and

that of noncommissioned officers shall not exceed one fifteenth of the total effectives with the colours.

(3) The number of machine guns, guns and howitzers shall not exceed per thousand men of the total effectives with the colours those fixed in Table V annexed to this Section.

The Austrian Army shall be devoted exclusively to the maintenance of order within the territory of Aus¬ tria, and to the control of her frontiers..

Article 121. — The maximum strength of the Staffs and of all formations which Austria may be permitted to raise lare given in the Tables annexed to this Section; these figures need not be exactly

followed, but must not be exceeded.

All other organisations for the command of troops or for preparation for war are forbidden.

Article 122. — All measures of mobilisation, or ap¬ pertaining to mobilisation, are forbidden.

In no case must formations, administrative services or staffs include supplementary cadres.

The carrying out of any preparatory measures with a view to requisitioning animals or other means of military transport is forbidden.

Article 123. — The number of gendarmes, customs officers, foresters, members of the local or municipal police or other like officials may not exceed the number of men employed in a similar capacity in 1913 within the boundaries of Austria as fixed by the present Treaty.

The number of these officials shall not be increased in the future except as may be necessary to maintain the same proportion between the number of officials and the total population in the localities or municipalities which employ them.

These officials, as well as officials employed in the railway service, must not be assembled for the purpose of taking part in any military exercises.

Artide 124. — Every formation of troops npt included in the Tables annexed to this Section is forbidden. Such other formations as may exist in excess of the 30,000 effectives authorised shall be suppressed within the period laid down by Article 118.

Chapter III. — Recruiting and Military Training.

Article 125. — All officers must be regulars (officers de carriere) . Officers now serving who are retained in the Army must undertake the obligation to serve in it up to the age of 40 years at least. Offiders now serving who do not join the new army will be released from all military obligations; they must not take part in any military exercises, whether theoretical or practical.

Officers newly appointed must undertake to serve on the active list for 20 consecutive years at least.

The number of officers discharged for any reason before the expiration of their term of service must not exceed in any year one twentieth of the total of officers provided for in Article 120. If this proportion is un¬ avoidably exceeded the resulting shortage must not be made good by fresh appointments.

Article 126. — The period of enlistment for non¬ commissioned officers and privates must be for a total period of not less than 12 consecutive years, including at least 6 years with the colours.

The proportion of men discharged before the expira¬ tion of the period of their enlistment for reasons of hdalth or as a result of disciplinary measures or for any other reasons must not in any year exceed one twentieth of the total strength fixed by Article 120. If this proportion is unavoidably exceeded, the resulting shortage must not be made good by fresh enlistments.

Chapter IV. — Schools. Educational Establish¬

ments, Military Clubs and Societies.

Article 127. — The number of students admitted to attend the courses in military schools shall be strictly in proportion to the vacancies to be filled in the cadres of officers. The students and the cadres shall be in¬ cluded in the effectives fixed by Article 120 of the present Section.

Consequently all military schools not required for this purpose shall be abolished.

Article 128. — Educational establishments, other than those referred to in Article 127, as well as all sporting and other clubs, must not occupy themselves with any military matters.

Chapter V. — Armament, Munitions and Material,

Fortifications.

Article 129. — On the expiration of three months from the coming into force of the present Trdaty, the armament of the Austrian Army shall not exceed the figures fixed per thousand men in Table V annexed to

this Section. Any excess in relation to effectives shall only be used-for such replacements as may eventually be necessary.

Article 130. — The stock of munitions at the disposal of the Austrian Army shall not exceed the iamounts fixed in Table V annexed to this Section.

Within three months from the coming into force of the present Treaty the Austrian Government shall deposit any existing sumlus of armament and munitions in suah places as shall be notified to it by the Principal Allied and Associated Powers.

No other stock, depot or reserve of munitions shall be formed.

Article 131. — The number and calibre of guns con¬ stituting the fixed normal armament of fortified places existing at the present moment in Austria shall be immediately notified to the Principal Allied and Asso¬ ciated Powers, and will constitute maximum amounts which must not be exceeded.

Within three months of the coming into force of the present Treaty the maximum stock of ammunition for these guns shall be reduced to land maintained at the following uniform rates:

1500 rounds per gun for those the calibre of which is 105 mm. and under;

500 rounds per gun for those of higher calibre.

Article 132. — The manufacture of arms, munitions and war material shall only be carried on in one single factory, which shall be controlled by and belong to the State, land whose output shall be strictly limited to the manufacture of such arms, munitions and war material as is necessary for the military forces and armaments referred to in Articles 120, 123, 129, 130 and 131.

The manufacture of sporting weapons is not for¬ bidden, provided thiat sporting' weapons manufactured in Austria taking ball cartridge are not of the same calibre as that of military weapons used in any European army.

Within three months from the coming into force of the present Treaty all other establishments for the manufacture, preparation, storage or design of arms, munitions or any other war material shall be closed down or converted to purely commercial uses.

Within the same length of time, all arsenals shall also be closed down, except those to be used as depots for the authorised stocks of munitions, and their staffs discharged.

The plant of any establishments or arsenals in ex¬ cess of the amoun-t required for the manufacture author¬ ised shall be rendered useless or converted to purely commercial purposes in accordance with the decisions

Table I. — Composition and Maximum Effec¬ tives OF AN Infantry Division.

of the Military InterAllied Commission of Control referred to in Article 153.

Article 133. — Within three months from the coming into force of the present Treaty, all arms, munitions and war material, including any kind of ariti-iaircraft material, of whatever origin, existing in Austria in excess of the quantity authorised shall be handed over to the Principal Allied and Associated Powers.

Delivery shall take place at such points in Austrian territory as may be appointed by the said Powers, who shall also decide on the disposal of such material.

Article 134. — The importation into Austria of arms, munitions and war material of all kinds is strictly forbidden.

The manufacture for foreign countries and the ex¬ portation of arms, munitions and war material shall also be forbidden.

Article 135. — The use of flame throwers, asphyxiat¬ ing, poisonous or other gases, and all similar liquids, materials or devices being prohibited, their manufacture and importation are strictly forbidden in Austria.

Material specially intended for the manufacture, storage or use of the said products or devices is equally forbidden.

The manufacture and importation into Austria of armoured cars, tanks or any similar machines suitable for use in war are equally forbidden.

Table II. — Composition and Maximum Ef¬ fectives FOR a Cavalry Division.

UNITS

Maxi¬

mum

number

author¬

ised

Maximum effectives of each unit

Officers

Men

Headquarters of a Cavalry Di¬ vision .

1

15

50

Regiment of Cavalry 1 .

6

30

720

Group of Field Artillery (3 Bat¬ teries) .

1

30

430

Group of motor machine-guns and armoured cars ˆ .

1

4

80

Miscellaneous services .

30

500

Total for a Cavalry Divi¬ sion .

259

5,380

UNITS

Maximum effectives of each unit

Officers

Men

Headquarters of an Infantry Division …

25

70

Headquarters of Divisional Infantry ….

5

50

Headquarters of Divisional Artillery… . 3 Regiments of Infantry ‘ (on the basis of 65 officers and 2,000 men per regiment)

4

30

195

6,000

1 Squadron .

6

160

1 Battalion of Trench Artillery (3 Companies) .

14

500

1 Battalion of Pioneers * (3 Companies) . .

14

500

Regiment Field Artillery * .

80

1,200

1 Battalion Cyclists (comprising 3 Com-

18

450

1 Signal Detachment * .

11

330

Divisional medical corps .

28

550

Divisional parks and trains .

14

940

Total for an Infantry Division .

414

10,780

1 Each Regiment comprises 3 Battalions of infantry. Each Battalion comprises 3 Companies of infantry and 1 Machine-gun Company.

* Each Battalion comprises 1 Headqˆuarters, 2 Pioneer Com¬ panies, 1 Bridging Section, 1 Searchlight Section.

s Each Regiment comprises 1 Headquarters, 3 Groups of Field or Mountain Artillery, comprising 8 Batteries; each Battery comprising 4 guns or howitzers (field or mountain).

♦This Detachment comprises: telephone detachment, 1 listening section, 1 carrier pigeon section.

* Each Regiment comprises 4 Squadrons.

2 Each group comprises 9 fighting cars, each carrying one gun, 1 machine gun, and 1 spare machine gun, 4 communica¬ tion cars, 2 small lorries for stores, 7 lorries, including 1 repair lorry, 4 motor cars.

Note. — The large Cavalry Units may include a variable number of regiments and be divided into independent brigades within the limit of the effectives laid down above.

Table III. — Composition and Maximum Ef¬ fectives FOR A Mixed Brigade.

Maximum effectives of each unit

UNITS

Headquarters of a Brigade. . 2 Regiments of Infantry 1…

1 Cyclist Battalion . .

1 Cavalry Squadron .

1 Group Field Artillery .

1 Trench Mortar Company . . Miscellaneous services .

Total for Mixed Brigade

Officers

Men

10

50

130

4,000

18

450

5

100

20

400

5

150

10

200

198

5 , 350

1 Each Regiment comprises 3 Battalions of Infantry. Each Battalion comprises 3 Companies of Infantry and 1 Machine-gun Company.

&86

Table IV. — Minimum Effectives of Units Whatever Organisation is Adopted in THE Army.

(Divisions, mixed brigades, etc.)

*

UNITS

Maximum effectives (for reference)

Minimum

effectives

Officers

Men

Officers

Men

Infantry Division .

414

10,780

300

8,000

Cavalry Division .

259

5,380

180

3,650

Mixed Brigade .

198

5,350

140

4,250

Regiment of Infantry ….

65

2,000

52

1,600

Battalion of Infantry .

Company of Infantry or

16

650

12

500

Machine-guns .

3

160

2

120

Cyclist Group .

18

450

12

300

Regiment of Cavalry .

30

720

20

450

Squadron of Cavalry .

6

160

3

100

Regiment of Field Artillery

80

1,200

60

1,000

Battery of Field Artillery. Company of Trench Mor-

4

150

2

120

tars .

3

150

2

100

Battalion of Pioneers .

Battery of Mountain Ar-

14

» •

500

8

300

tillery .

5

320

3

200

Table V. — Maximum Authorized Armaments and Munition Supplies.

material

Quantity for 1,000 men

Amount of munitions per arm (rifles, guns, etc.).

Rifles or Carbines .

1,500

Rounds

500

Machine guns, heavy or light .

15

10,000

Trench Mortars, light .

ˆ 2

/ 1,000

Trench Mortars, medium .

\ 500

Guns or howitzers (field or moun¬ tain) …

3

1,000

(D Automatic rifles or carbines are counted as light machine guns.

Note. — No heavy gun, *i.e.* of a calibre greater than 105 mm. is authori-ed, with the exception of the normal arma¬ ment of fortified places.

SECTION II. — NAVAL CLAUSES.

Article 136. — From the date of the coming into force of the present Treaty all Austro-Hungarian war¬ ships, submarines included, are declared to be finally surrendered to the Principal Allied and Associated Powers.

All the monitors, torpedo boats and armed vessels of the Danube Flotilla will be surrendered to the Principal Allied and Associated Powers.

Austria will, however, have the right to maintain on the Danube for-the use of the river police three patrol boats to be selected by the Commission referred to in Article 154 of the present Treaty.

Article 137. — -The Austro-Hungarian auxiliary cruisers and fleet auxiliaries enumerated below will be disarmed and treated as merchant ships:

Bosnia.

Gabions.

Carolina.

Africa.

T irol.

Argentina.

Lussin.

Teodo.

Pelikan.

Herkules.

Pola.

Najade.

Pluto.

, President Wilson (ex-Kaiser Frans Joseph).

Trieste.

Baron Bruck.

Nixe.

Gigante.

Dalmat.

Persia.

Prince Hohenlohe. Gastein.

Helouan.

Graf Wurmbrand.

Elisabet.

Melcavich.

Baron Call.

Gaea.

Cyclop.

Vesta.

Ny'mphe.

Buffet,

Article 138. — All warships, including submarines, now under construction in Austrian ports, or in ports which previously belonged to the Austro-Hungarian Monarchy, shall be broken up.

The work of breaking up these vessels will be com¬ menced as soon as possible lafter the coming into force of the present Treaty.

Article 139. — Articles, machinery and material arising from the breaking up of Austro-Hungarian war¬ ships of all kinds, whether surface vessels or sub¬ marines, may not be used except for purely industrial or commercial purposes.

They may not be sold or disposed of to foreign countries.

Article 140. — The construction or acquisition of any submarine, even for commercial purposes, shall be for¬ bidden in Austria.

Article 141. — All arms, ammunition and other naval war material, including mines and torpedoes, which be¬ longed to Austria-Hungary at tne date of the signature of the Armistice of November 3, 19.18, are declared to be finally surrendered to the Principal Allied and Associated Powers.

Article 142. — Austria is held responsible for the delivery (Articles 136 and 141), the disarmament (Article 137), the demolition (Article 138), as well as the disposal (Article 137) and the use (Article 139) of the objects mentioned in the preceding Articles only so far as these remain in her own territory.

Article 143. — During the three months following the coming into force of the present Treaty, the Austrian high -power wireless telegraphy station at Vienna shall not be used for the transmission of messages concern¬ ing naval, military or political questions of interest to Austria, or any State which has been allied to Austria-Hungary in the war, without the assent of Principal Allied and Associated Powers. This station may be used for commercial purposes, but only under the supervision of the said Powers, who will decide the wave-length to be used.

During the same period Austria shall not build any more high-power wireless telegraphy stations in her own territory or that of Hungary, Germany. Bulgaria or Turkey.

SECTION III. — AIR CLAUSES.

Article 144. — The armed forces of Austria must not include any military or naval air forces.

No dirigible shall be kept.

Article 145. — Within two months from the coming into force of the present Treaty, the personnel of the air forces on the rolls of the Austrian land and sea forces shall be demobilised.

Article 146. — Until the complete evacuation of Aus¬ trian territory by the Allied (and Associated troops the aircraft of the Allied and Associated Powers shall enjoy in Austria freedom of passage through the lair, freedom of transit and of landing.

Article 147. — During the six months following the coming into force of the present Treaty, the manu¬ facture, importation and exportation of aircraft, parts of aircraft, engines for aircraft, and parts of engines for aircraft shall be forbidden in all Austrian territory.

Article 148. — On the coming into force of the present Treaty, all military and niaval aeronautical material must be delivered by Austria and at her ex¬ pense to the Principal Allied and Associated Powers.

Delivery must be effected at such places as the Gov¬ ernments of the said Powers may select, and must be completed within three months.

In particular, this material will include alt items under the following heads which are or have been in use or were designed for warlike purposes.

Complete aeroplanes and seaplanes, as well as those being manufactured, repaired or assembled.

Dirigibles able to take the air, being manufactured, repaired or assembled.

Plant for the manufacture of hydrogen.

Dirigible sheds and shelters of every kind for air¬ craft.

Pending their delivery, dirigibles will at the expense of Austria, be maintained infliated with hydrogen; the plant for the rnanufacture of hydrogen, as well as the sheds for dirigibles, may, at the discretion of the said Powers, be left to Austria until the time when the dirigibles are handed over.

Engines for aircraft.

Nacelles and fuselages.

Armiament (guns, machine guns, light machine guns, bomb-dropping apparatus, torpedo apparatus, synchronisa¬ tion apparatus, aiming apparatus).

Munitions (cartridges, shell, bombs loaded or un¬ loaded, stocks of

explosives or of material for their mianufacture).

Instruments for use on aircraft.

Wireless apparatus and photographic or cinemato¬ graph apparatus for use on aircraft.

Component parts of any of the items under the preceding heads.

The material referred to labove shall not be removed without special permission from the said Governments.

SECTION IV. — INTERALLIED COMMISSIONS OF .

CONTROL.

Article 149. — All the Military, Naval and Air Clauses contained in the present Treaty for the execu¬ tion of which a time limit is prescribed shall be executed by Austria under the control of InterAllied Commissions specially appointed for this purpose by the Principal Allied and Associated Powers.

Tire above-mentioned Commissions will represent the Governments of the Principal Allied and Associated Powers in dealing with the Austrian Government in all matters concerning the execution of the Military, Naval and Air Clauses. They will communicate to the Aus¬ trian authorities the decisions which the Principal Allied and Associated Powers have reserved the right to take or which the execution of the said Qauses may necessitate.

Article 150. — The InterAllied Commissions of Con¬ trol may establish their organisations at Vienna and shall be entitled, as often as they think desirable, to proceed to any point whatever in Austrian territory, or to send a subcommission, or to authorise one or more of their members to go, to any such point.

Article 151. — ’The Austrian Government must fur¬ nish to the

InterAllied Commissions of Control all such information and documents as the latter may deem necessary to insure the execution of their mission, and all means (both in personnel and in material) which the above-mentioned Commissions may need to ensure the complete execution of the Military, Naval or Air Clauses.

The Austrian Government must attach a qualified representative to each InterAllied Commission of Con¬ trol with the duty of receiving from the latter any communications which it may have to address to the Austrian Government, and furnishing it with, or pro¬ curing, all information or documents demanded.

Article 152. — The upkeep and cost of the Commis¬ sions of Control and the expense involved by their work shall be borne ‘by Austria.

Article 153.— It will be the special duty of the Military InterAllied Commission of Control to receive from the Austrian Government the notifications relating to the location of the stocks and depots of munitions, the armiament of the fortified works, fortresses and forts, and the location of the works or factories for the production of arms, munitions, and war material and their operations.

It will take delivery of the larms, munitions, war material and plant intended for war construction, will select the points where such delivery is to be effected, and will supervise the works of destruction, and render¬ ing things useless, or of transformation of rnaterial which are to be carried out in accordance with the present Treaty.

Article 154. — It will be the special duty of the Naval InterAllied Commission of Control to proceed to the building yards and to supervise the breaking-up of the ships which are under construction there, to take delivery of arms, munitions and naval war material, and to supervise the destruction and breaking-up pro¬ vided for.

The Austrian Government must furnish to the Naval InterAllied Commission of Control all such information’ and documents as the Commission may deem necessary to ensure the complete execution of the Naval Clauses, in particular the designs of the warships, the com¬ position of their armaments, the details and models of the guns, munitions, torpedoes, mines, explosives, wire¬ less telegraphic apparatus, and in general everything relating to naval war material, as well as all legislative or administrative documents or regulations.

Article 155. — It will be the special duty of the Aeronautical InterAllied Commission of Control to miake an inventory of the

aeronautical material which is actually in the possession of the Austrian Government, to inspect aeroplane, balloon and motor manufactories, and factories producing arms, munitions and explosives capable of being used by aircraft, to visit all aerodromes, sheds, landing grounds, parks and depots which are now in Austrian territory, and to authorise where necessary a removal of material and to take delivery of such material.

The Austrian Government must furnish to the Aeronautical InterAllied Commission of Control all such information and legislative, administrative or other docu¬ ments which the Commission may consider necessary

to ensure the complete execution of the Air Clauses, .and, in particular, a list of the personnel belonging to all the air services of Austria and of the existing ma¬ terial, as well as of that in process of manufacture or on order, and a list of all establishments working for aviation, of their positions, land of all sheds and landing grounds.

SECTION V. — GENERAL ARTICLES.

Article 156. — After the expiration of a period of three months from the coming into force of the present Treaty, the Austrian laws must have been modified and shall be maintained by the Austrian Government in conformity with this Part of the present Treatv.

Within the same period all the administrative or other measures relating to the execution of this Part must have been taken by the Austrian Government.

Article 157. — The following portions of the Armistice of November 3, 1918: paragraphs 2 and 3 of Chapter I (Military (Clauses), paragraphs 2, 3, 6 of Chapter I of the annexed Protocol (Military Clauses), remain in force so far as they are not inconsistent with the above stipulations.

Article 158. — Austria undertakes, from the coming into force of the present Treaty, not to accredit nor to send to any foreign country any military, naval or air mission, nor to allow any such mission to leave her territory; Austria further agrees to take the necessary measures to prevent Austrian nationals from leaving her iterritory to enlist in the Army, Navy or Air serv¬ ice of any foreign Power, or to be attached to such Army, Navy or Air service for the purpose of assist¬ ing in the military, naval or air training thereof, or generally for the purpose of giving military, naval or air instruction in any foreign country.

The Allied and Associated Powers undertake, so far as they are concerned, that from the coming into force of the present Treaty they will not enrol in nor attach to their armies or naval or air forces any Aus¬ trian national for the purpose of assisting in the military thaining of such armies or naval or air forces, or other¬ wise employ any such Austrian national as military, naval or aeronautic instructor.

The present provision does not, however, affect the right of France to recruit for the Foi'eign Legion in accordance with French military laws and regulations.

Article 159. — So long as the present Treaty remains in force, Austria undertakes to submit to any investiga¬ tion which the Council of the League of Nations, acting if need be by a majority vote, may consider necessary.

Part VI. — Prisoners of War and Graves.

SECTION l. — PRISONERS OF WAR.

Articles 160—170 are identical with Articles 214-224 of the German Treaty, with the exception of the sub¬ stitution of the words Austria, Austrian, etc., for Germany, German, *etc.*

SECTION II. — GRAVES.

Articles 171 and 172 are identical with Articles 225 and 226 of the German Treaty with the exception of the substitution of the words Austria, Austrian Govern¬ ment, etc., for Germany, German Government, *etc.*

Part VII. — Penalties.

Article 173. — The Austrian Government recognises the right of the Allied and Associated Powers to bring before military tribunals persons accused of having committed acts in violation of the laws and customs of war. Such persons shall, if found guilty, be sentenced to punishments laid down by law. This provision will apply notwithstanding any proceedings or prosecutions before a tribunal in Austria or in the territory of her allies.

The Austrian Government shall hand over to the Allied and Associated Powers, or to such one of them as shall so request, lall persons accused of having com¬ mitted an act in violation of the laws and customs of war, who are specified either by name or by the rank, office or employment which they held under the Austrian authorities.

Article 174. — Persons guilty of criminal acts against the nationals of one of the Allied and Asso¬ ciated Powers will be brought before the military tribunals of that Power. _

Persons guilty of criminal acts against the nationals of more than one of the Allied and Associated Powers will ‘be brought before military tribunals composed of members of the militery tribunals of the Powers con¬ cerned.

In every case the accused will be entitled to name his own counsel.

Article 175. — The Austrian Government undertakes to furnish all documents and information of every kind, the production of which may be considered necessary to ensure the full knowledge of the in¬ criminating acts, the discovery of offenders and the just appreciation of responsibility.

Article 176. — The provisions of Articles 173 to 175 apply similarly to the Governments of the States to which territory belonging to the former Austro-Hun¬ garian Monarchy has been assigned, in so far as con¬ cerns persons accused of having committed acts con¬ trary to the laws and customs of war who are in the territory or at the disposal of the said States.

If the persons in question have acquired the na¬ tionality of one of the said States, the Government of such State undertakes to take, at the request of the Powˆr concerned and in agreement with it, all the measures necessary to ensure the prosecution .and punishment of such persons.

Article 177. — The Allied and Associated Govern¬ ments affirm and Austria accepts the responsibility of Austria and her allies for causing the loss and damage to which the Allied land Associated Governments and their nationals have been subjected as a consequence of the war imposed upon them by the aggression of Austria-Hungary and her allies.

Article 178. — The Allied and Associated Govern¬ ments recognise that the resources of Austria are not adequate, after flaking into account the permanent diminutions of such resources which will result from other provisions of the present, .Treaty, to make com¬ plete reparation for such loss and damage.

The Allied and Associated Governments however require, and Austria undertakes, that she will make compensation as hereinafter determined for damage done to the civilian population of the Allied and Asso¬ ciated Powers and to their property during the period of the belligerency of each as an Allied and Asso¬ ciated Power against Austria by the said aggression by land, by sea and from the air, and in general dam¬ age as defined in Annex I hereto.

Article lyg. — The amount of such damage for which compensation is to be made by Austria shall be deter¬ mined by an InterAllied Commission to be called the Reparation Commission and constituted in the form and with the powers set forth hereunder and in An¬ nexes Nos. II— V inclusive hereto. The Commission •is the same as that provided for under Article 233 of the Treaty with Germany, subject to any modifica¬ tions resulting from the present Treaty. The Com¬ mission shall constitute a Section to consider the special questions raised by the application of the present Treaty: this Section shall have consultative power only, except in cases in which the Commission shall delegate to it such powers as miay be deemed convenient.

The Reparation Commission shall consider the claims and give to the Austrian Government a just opportunity to be heard.

The Commission shall concurrently draw up a schedule of payments prescribing the time and manner for securing and discharging by Austria, within thirty years dating from May i, 1921, that part of the debt which shall have been assigned to her after the Com¬ mission has decided whether Germany is in a position to pay the balance of the total amount of claims pre¬ sented against Germany and her allies land approved by the Commission. If, however, within the period mentioned, Austria fails to discharge her obligations, any_ balance remaining unpaid may, within the dis¬ cretion of the Commission, be postponed for settlement in subsequent years or may be handled otherwise in such manner las the Allied and Associated Governments acting in accordance with the procedure laid down in this Part of the present Treaty shall determine.

Article 180. — The Reparation Commission shall, after May I, 1921, from time to time consider the resources and capacity of Austria, and,

after giving her repre¬ sentatives a just opportunity to be heard, shall have discretion to extend the date and to modify the form of payments such as are to be provided for in accord¬ ance with Article 179, but not to cancel any part except with the specific authority of the several Gov¬ ernments represented on the Commission.

Article 181. — Austria shall pay in the course of the years 1919, 1920 and the first four months of 1921, in such instalments and in such manner (whether in gold, commodities, ships, securities or otherwise) as the Reparation Commission may lay down, a reasonable sum which shall be determined by the Commission.

Out of this sum the expenses of the armies of occupation subsequent to the Armistice of November 3, 1918, shall first be met, and such supplies of food and raw materials las may be judged by the Governments of the Principal Allied and Associated Powers essential to enable Austria to meet her obligations for repara¬ tion may also, with the approval of the said Govern¬

ments, be paid for out of the above sum. The balance , shall be reckoned towards the liquidation of the amount ' due for reparation.

» «

ANNEX I.

Annex I (i— 10) is similar to Annex I of Part VIII of the (lerman Treaty except that the word Austria is substituted for Germany throughout.

annex II.

1. The Commission referred to in Article 179 shall be called the " Reparation Commission " and is here¬ after referred to as the " Commission."

2. The Delegates to this Commission shall be ap¬ pointed by the United States of America, Great Britain, France, Italy, Japan, Belgium, Greece, Poland, Roumania, the Serb-Craat-Slovene State and Czecho-Slovakia. The United States of America, Great Britain, France, Italy, Japan and Belgium shall each appoint a Delegate. The other five Powers shall appoint a Delegate to represent them all under the conditions indicated in the third sub-paragraph of paragraph 3

hereafter. At the time when each Delegate is appointed there shall also be appointed an Assistant Delegate, who will take his place in case of illness or necessary absence, but at other times will only have the right to be present at the proceedings without taking any part therein.

On no occasion shall Delegates of more than five of the above Powers have the right to take part in the proceedings of the Commission and to record their votes. The Delegates of the United States, Great Britain, France and Italy shall have this right on all occasions other than those referred to below. The Delegate of Belgium shall have this right on all occasions other than those referred to below. The Delegate of Japan will have this right when questions relating to damage at sea are under consideration. The Delegate repre¬ senting the five remaining Powers mentioned above shall bave this right when questions relating to Austria, Hungary or Bulgaria are under consideration.

Each of the Governments represented on the Com¬ mission shall have the right to withdraw after giving twelve months' notice to the Commission and confirm¬ ing it six months after the date of the original notifica¬ tion.

3. Such of the Allied and Associated Powers as nuay be interested shall have the right to name a Delegate to be present and act as assessor only while their respective claims and interests are under examination or discussion, but without the right to vote.

The Section to be established by the Commission under Article 179 of the present Part shall include representatives of the following Powers: the United States of America, Great Britain, France, Italy, Greece, Poland, Roumania, the Serb-Croat-Slovene State and Czecho-Slovakia. This composition of the Section shall in no way puejudge the admissibility of any claims. In voting, the representatives of the United States of America, Great Britain, France and Italy shall each have two votes.

The representatives of the five remaining Powers mentioned above shall appoint a Delegate to represent them all, who shall sit upon the Reparation Commission in the circumstances described in paragraph 2 of the present Annex. This delegate, who shall be appointed for one year, shall be chosen successively from the nationals of each of the said five Powers.

4. In the case of death, resignation, or recall of any Delegate, Assistant Delegate or Assessor, a successor to him shall be nominated as soon as possible.

5. The Commission shall have its principal perma¬ nent bureau in Paris, and shall hold its first meeting in Paris as soon as practicable after the coming into force of the present Treaty, and thereafter will meet in such place or places and at such time as may be deemed conyenient and as may be necessary for the most expeditious discluarge of its duties.

6. At its first meeting the Commission shall elect from among the Delegates referred to above a Chair¬ man and a Vice-Chairman, who shall hold office for a year and shall be eligible for re-election. If a vacancy in the chairmanship or vice-chairmanship should occur during the annual period, the Commission shiall proceed to a new election for the remainder of the said period.

7. The Commission is authorised to appoint all necessary officers, agents and employees who may be required for the execution of its functions, and to fix their remuneration; to constitute Sections or Com¬ mittees, whose members need not necessarily be mem¬ bers of the Commission, and to take all executive steps necessary for the purpose of discharging its duties; and to delegate authority and discretion to officers, agents. Sections and Committees.

8. All the proceedings of the Commission shall be private unless on particular occasions the Commission shall otherwise determine for special reasons.

9. The Commission shall be required, if the Austrian Government so desire, to hear within a period which it will fix from time to time evidence and arguments on the part of Austria on any questions connected with her capacity to pay.

10. The Commission shall consider the claims and give to the Austrian Government a just opportunity to be heard, but not to take any part whatever in the deqisions of the Commission. The Commission shall afford a similar opportunity to the allies of Austria when it shall consider that their interests are in question.

11. The Commission shall not be bound by any particular code or rules of law or by any particular rule of evidence or of procedure, but shall be guided by justice, equity and good faith. Its decisions must follow the same principles and rules in all cases where they axe applicable. It will establish rules relating to methods of proof of claims. It may act on any trustworthy modes of computation.

12. The Commission shall have all the powers con¬ ferred upon it and shall exercise all the functions as¬ signed to it by the present Treaty.

The Commission shall, in general, have wide latitude as to its control and handling of the whole reparation problem as dealt with in this Part, and shall have authority to interpret its provisions. Subject to the provisions of the Present Treaty, the Commission is constituted by the several Allied and Associated Governments referred to in paragraphs 2 and 3 above as the exclusive agency of the said Governments re¬ spectively for receiving, selling, holding and distribut¬ ing the reparation payments to be made by Austria. The Commission must comply with the following condi¬ tions and provisions:

(a) Whatever part of the full amount of the proved claims is not paid in gold or in ships, securities, com¬ modities or otherwise, Austria shall be required, under such conditions as the Commission may determine, to cover by way of guarantee, by an equivalent issue of bonds, obligations or otherwise, in order to constitute an acknowledgment of the said part of the debt.

(б) In periodically estimating Austria's capacity to pay the Commission shall examine the Austrian system of taxation; first, to the end that the sums for repara¬ tion which Austria is required to pay shall become a charge upon all her revenues prior to that for the service or discharge of any domestic loan, and, secondly, so as to satisfy itself that in general the Austrian scheme of taxation is fully as heavy proportionately as that of any of the Powers represented on the Commission.

The Reparation Commission shall receive instruc¬ tions to take account of:

(1) The actual economic and financial position of Austrian territory as delimited by the present Treaty; and

(2) The diminution of its resources and of its capacity for payment resulting from the clauses of the present Treaty.

As long as the position of Austria is not modified the Commission shall

take account of these considera¬ tions in fixing the final amount of the obligations to be imposed on Austria, the payments by which these are to be discharged, and any postponement of pay¬ ment of interest which may be asked for by Austria.

(c) The Commission shall, as provided in Article 1 81, take from Austria, by way of security for and acknowledgment of her debt, gold bearer bonds free of all taxes or charges of every description established or to be established by the Austrian Government qr by any authorities subject to them. These bonds will be delivered at any time that may be judged expedient by the Commission, and in three portions, of which the respective amounts will be also fixed by the Com¬ mission, the crowns gold being payable in conformity with Article 213 of Part X (Financial Clauses) of the present treaty:

(1) A first issue in bearer bonds payable not later than May i, 1921, without interest. There shall be specially applied to the amortisation of these bonds the payments which Austria is pledged to make in con¬ formity with Article 181 of this Part, after deduction of the sums used for the reimbursement of the expenses of the armies of occupation and other payments for foodstuffs and raw materials. Such bonds as may not have been redeemed by Mav i, 1921, shall then be exchanged for new bonds of the same type as those provided for below (paragraph 12, (c) 2).

(2) A second issue in bearer bonds bearing interest at 2ˆ per cent, between 1921 and 1926, and there¬ after at 5 per cent, with an additional i per cent.

for amortisation beginning in 1926 on the whole amount of the issue.

(3) An undertaking in writing to issue, when, but not until, the Commission is satisfied that Austria can meet the interest and sinking fund obligations, a further instalment of bearer bonds bearing interest at 5 per cent., the time and mode of payment of principal and interest to be determined by the Commission.

The dates for the payment of interest, the manner of employing the amortisation fund and all other ques¬ tions relating to the issue, management and regulation of the bond issue shall be determined by the Com¬ mission from time to time.

Further issues by way of acknowledgment and security may be required as the Commission subse¬ quently determines from time to

time.

In case the Reparation Commission should proceed to fix definitely and no longer provisionally the sum of the common charges to be borne by Austria as a result of the claims of the Allied and Associated Powers, the Commission shall immediately annul all bonds which have been issued in excess of this sum.

(d) In the event of bonds, obligations or other evidence of indebtedness issued by Austria by way of security for or acknowledgment of her reparation debt being disposed of outright, not by way of pledge, to persons other than the several Governments in whose favour Austria's original reparation indebtedness was created, an amount of such reparation indebtedness shall be deemed to be extinguished corresponding to the nominal value of the bonds, etc., so disposed of out¬ right, and the obligation of Austria in respect of such bonds shall be confined to her liabilities to the holders of the bonds, as expressed upon their face.

(e) The damage for repairing, reconstructing and rebuilding property situated in the invaded and de¬ vastated districts, including reinstallation of furniture, machinery and other equipment, will be calculated ac¬ cording to the cost at the date when the work is done.

(/) Decisions of the Commission relating to the total or partial cancellation of the capital or interest of any of the verified debt of Austria must be accompanied by a statement of its reasons.

13. As to voting the Commission will observe the following rules:

When a decision of the Commission is taken, the votes of all the Delegates entitled to vote, or in the absence of any of them, of their assistant Delegates, shall be recorded. Abstention from voting is to be treated as a vote against the proposal under discussion. Assessors shall have no vote.

On the following questions unanimity is necessary:

(a) Questions involving the sovereignty of any of the Allied and Associated Powers or the cancellation of the whole or any part of the debt or obligations of Austria;

(b) Questions of determining the amount and con¬ ditions of bonds or other obligations to be issued by the Austrian Government and of fixing the time and manner for selling, negotiating or distributing such bonds;

(c) Any postponement, total or partial, beyond the end of 1930, of the payment of instalments falling due between May i, 1921, and the end of 1926 inclusive.

(d) Any postponement, total or partial, or any instal¬ ments falling due after 1926 for a period exceeding three years.

(e) Questions of applying in any particular case a method of measuring damages different from that which has been previously applied in a similar case.

(/) Questions of the interpretation of the provisions of this Part of the present Treaty.

All other questions shall be decided by the vote of the majority.

In the case of any difference of opinion ‘among the Delegates, which cannot be solved by reference to their Governments, upon the question whether a given case is one which requires a unanimous vote for its decision or not, such difference shall be referred to the immediate arbitration of some impartial person to be agreed upon by their Governments, whose award the Allied and Associated Governments agree to accept.

14. Decisions of the Commission, in accordance with the powers conferred upon it, shall forthwith become binding and may be put into immediate execution with¬ out further proceedings.

15. The Commission shall issue to each of the inter¬ ested Powers in such form as the Commission shall fix:

(1) A certificate stating that it holds for the account of the said Power bonds of the issues mentioned above, the said certificate on the demand of the Powers con¬ cerned being divisible into a number of parts not ex¬ ceeding five;

(2) From time to time certificates stating the goods delivered by Austria on account of her reparation debt which it holds for the account of the said Power.

Such certificates shall be registered and, upon notice to the Commission, may be transferred by endorsement.

When bonds are issued for sale or negotiation, and when goods are delivered by the Commission, certificates to an equivalent value must be withdrawn.

1 6. Interest shall be debited to Austria as from May I, 1921, in respect of her debt as determined by the Commission after allowing for sums already covered by cash payments or their equivalent by bonds issued to the Commission or under Article 189. The rate of interest shall be 5 per cent, unless the Commission shall determine at some future time that circumstances justify a variation of this rate.

The Commission, in fixing on May i, 1921, the total amount of the debt of Austria, may take account of interest due on sums arising out of reparation and of material damage as from November 3, 1918, up to

May I, 1921.

17. In case of default by Austria in the performance of any obligation under this part of the present Treaty the Commission will forthwith give notice of such default to each of the interested Powers and may make such recommendations as to the action to be taken in consequence of such default as it may think necessary.

18. The measures which the Allied and Associated Powers shall have the right to take, in the case of voluntary default by Austria, and which Austria agrees not to regard as acts of war, may include economic and financial prohibitions and reprisals and in general such other measures as the respective Governments may determine to be necessary in, the circumstances.

19. Payments required to oe made in gold or its equivalent on account of the proved claims of the Allied and Associated Powers may at any time be ac¬ cepted by the Commission in the form of chattels, properties, commodities, businesses, rights, concessions within or without Austrian territory, ships, bonds, shares or securities of any kind or currencies of Aus¬ tria or other States, the value of such substitutes for gold being fixed at a fair and just amount by the Com¬ mission itself.

20. The Commission in fixing or accepting payment in specified properties or rights shall have due regard for any legal or equitable interests of the Allied and Associated Powers or of their nationals therein.

21. No member of the Commission shall be responsible, except to the Government appointing him, for any action or omission as such member. No one of the Allied <and Associated Governments assumes any responsibility in respect of any other Government.

22. Subject to the provisions of the present Treaty this Annex may be amended by the unanimous decision of the Governments represented from time to time upon the Commission.

23. When all the amounts due from Austria and her allies under the present Treaty or the decisions of the Commission have been discharged, and all sums received, or their equivalents, have been distributed to the Powers interested, the Commission shall be dissolved.

ANNEX III.

1. Austria recognises the right of the Allied and Associated Powers to the replacement ton for ton (gross tonnage) and class for class of all merchant ships and fishing boats lost or damaged owing to the war.

Nevertheless and in spite of the fact that the tonnage of Austrian shipping at present in existence is much less than that lost by the Allied and Associated Powers in consequence of the aggression of Austria and her allies, the right thus recognised will be enforced on the Austrian ships and boats under the following conditions:

The Austrian Government on behalf of themselves, and so as to bind all other persons interested, cede to the Allied and Associated Governments the property in all merchant ships and fishing boats belonging to na¬ tionals of the former Austrian Empire.

2. The Austrian Government will, within two months of the coming into force of the present Treaty, deliver to the Reparation Commission all the ships and boats mentioned in paragraph i.

3. The ships and boats in paragraph i include all ships and boats which (a) fly or may be entitled to fly the Austro-Hungarian merchant flag and are registered in a port of the former Austrian Empire, or (b) lare owned by any national, company or corporation of the former Austrian Empire or by any company or corpora¬ tion belonging ta a

country other than an Allied or Associated country and under the control or direction of nationals of the former Austrian Empire: or (c) which are now under construction (i) in the former Austrian Empire (2) in other than Allied or Associated countries for the account of any national company or corporation of the former Austrian Empire.

4. For the purpose of providing documents of title

for the ships and boats to be handed over as above mentioned, the Austrian Government will:

(a) Deliver to the Reparation Commission in respect of eiach vessel a bill of sale or other document of title evidencing the transfer to the Commission of the entire property in the vessel, free from all encumbrances, charges and liens of all kinds as the Commission may require;

(6) Take all measures that may be indicated by the Reparation Commission for ensuring that the ships themselves shall be placed at its disposal.

5. Austria undertakes to restore in kind and in normal condition of upkeep to the Allied and Associated Powers within two months of the coming into force of the present Treaty in accordance with procedure to be laid down by the Reparation Commission any boats and other movable appliances belonging to inland navigation which, since July 28, 1914, have by any means what¬ ever come into her possession or into the possession of her nationals and which can be identified.

With a view to make good the loss_ in inland navigation tonnage from whatever cause arising which has been incurred during the war by the Allied and Associated Powers, and which cannot be made good by means of the restitution prescribed above, Austria agrees to cede to the Reparation Commission a portion of the Austrian river fleet up to the amount of the loss mentioned above, provided such cession shall not exceed 20 per cent, of the river fleet as it existed on November 3, 1918.

The conditions of this cession shall be settled by the arbitrators referred to in Article 300 of Part XII (Ports, Waterways and Railways) of the present Treaty, who are charged with the settlement of difficulties relat¬ ing to the apportionment of river tonnage resulting from the new international regime applicable to certain river systems or from the territorial changes affecting those systems.

6. Austria agrees to take any measures that may be indicated to her by the Reparation Commission for obtaining a full title to the property in all ships which have, during the war, been transferred or are in process of transfer to neutral flags without the consent of the Allied and Associated Governments.

7. Austria waives all claims of any description against the Allied and Associated Governments and their nationals in respect of the detention, employment, loss or damage of any Austrian ships or boiats.

8. Austria renounces all claims to vessels or cargoes sunk by or in consequence of naval action and sub¬ sequently salved in which any of the Allied or Associated Governments or their nationals may have any interest either as owners, charterers, insurers, or otherwise, not¬ withstanding any decree of condemnation which may have been made by a Prize Court of the former Austro-Hungarian Monarchy or of its allies.

ANNEX IV.

1. The Allied and Associated Powers require and Austria undertakes that in part satisfaction of her obligations expressed in this Part she will, as herein¬ after provided, devote her economic resources directly to the physical restoration of the invaded areas of the Allied and Associated Powers to the extent that these Powers may determine.

2. The Allied and Associated Governments may file with the Reparation Commission lists showing:

(o) Animals, machinery, equipment, tools and like articles of a commercial character which have been seized, consumed or destroyed by Austria, or destroyed in direct consequence of military operations, and which such Governments, for the purpose of meeting immediate and urgent needs, desire to have replaced by animials and articles of the same nature which are in being in Austrian territory at the date of the coming into force of the present Treaty;

(b) Reconstruction materials (stones, bricks, re¬ fractory bricks, tiles, wood, window glass, steel, lime, cement, etc.), machinery, heating apparatus, furniture and like articles of a commercial character, which the said Governments desire to have produced and manu¬ factured in Austria and delivered to them to permit of the restoration of the invaded areas.

3. The lists relasJng to the articles mentioned in 2 (o) above shall be

filed within sixty days after the date of the coming into force of the present Treaty.

The lists relating to the articles in 2 lb) shall be filed on or before December 31, 1919.

The lists shall contain all such details as are customiary in commercial contracts dealing with the subject-matter, including specifications, dates of delivery (but not extending over more than four years) and places of delivery, but not prices or value, which shall be fixed as hereinafter provided by the Commission.

4. Immediately upon the filing of such lists with

tht“ Commission, the Commission shall consider the amount and number of the materials and animals nientioned in the lists provided for above which are to be required of Austria. In reaching a decision on this matter the Commission shall take into account such domestic requirements of Austria las it deems essential for the maintenance of Austrian social and economic life, the prices and dates at which similar articles can be obtained in the Allied and Associated countries as compared with those to be fixed for Austrian articles, •and the general interest of the Allied and Associated Governments that the industrial life of Austria be not so diˆrganised as to affect adversely the ability of Austria to perform the other acts of reparation stipulated for.

Machinery, equipment, tools and like articles of-a commercial character in tactual industrial use are not, however, to be demanded of Austria unless there is no free stock of such articles respectively which is not in use and is available, and then not in excess of 30 per cent, of the quantity of such articles in use in any one establishment or undertaking.

The Commission shall give representatives of the Austrian Government tan opportunity and a time to be heard as to their

capacity to furnish the said materials, articles and animals.

The decision of the Commission shall thereupon and at the earliest possible moment be communicated to the Austrian Government and to the several interested Allied and Associated Governments.

The Austrian Government undertakes to deliver the materials, articles and animals as specified in the said communication, and the interested Allied and Associated Governments severally agree to accept the same, pro¬ vided they conform to the specification given or are not, in the judgment of the Commission, unfit to be utilised in the work of reparation.

5. The Commission shall determine the value to be attached to the materials, articles and animals to be delivered in accordance with the foregoing, and the Allied or Associated Power receiving the siame agrees to be charged with such value, and the amount thereof shall be treated as a payment by Austria to be divided in accordance with Article 183 of this Part of the present Treaty.

In case where the right to require physical restora¬ tion as labove provided is exercised, the Commission shall ensure that the amount to be credited against the reparation obligation of Austria shall be fair value for work done or material supplied by Austria, and that the claim miade by the interested Power in re¬ spect of the damage so repaired by physical restoration shall be discharged to the extent of the proportion which the damage thus repaired bears to the whole of the damage thus claimed for.

6. As an immediate adviance on account of the animals referred to in paragraph 2 above, Austria undertakes to deliver in equal monthly instalments in the three months following the coming into force of the present Treaty the following quantities of live stock:

TO THE ITALIAN GOVERNMENT.

4,000 milch cows of from 3 to 5 years;

1,000 heifers;

50 bulls from 18 months to 3 years;

1,000 calves;

1,000 working bullocks;

2,000 sows.

TO THE SERB-CROAT-SLOVENE GOVERNMENT.

1,000 milch cows of from 3 to 5 yelars;

300 heifers;

25 bulls from 18 months to 3 years;

1,000 calves;

500 working bullocks;

1,000 draught horses;

1,000 sheep.

TO THE ROUMANIAN GOVERNMENT.

1,000 milch cows of from 3 to s yelars;

500 heifers;

25 bulls from 18 months to 3 years;

1,000 calves;

500 working bullocks;

1,000 draught horses;

1,000 sheep.

The animals delivered shall be of average health and condition.

If the animals so delivered cannot be identified as animals taken tiway or seized, the value of such animals shall be credited against the reparation obligations of Austria in accordance with paragraph 5 of this Annex.

7. As an immediate adv^ance on account of the articles referred to in paragraph 2 above, Austria

undertakes to deliver during the six months following the coming into force of the present Treaty in equal monthly instalments such supplies

of furniture in hard and soft wood intended for sale in Austria as the Allied land Associated Powers shall ask for month by month through the Reparation Commission and which the Commission shall consider justified on the one hand by the seizures and destruction carried out in the course of the war on the territory of the said Powers and on the other hand proportionate to the supplies at the disposal of Austria. The price of the articles so supplied shall be carried to the credit of Austria under the conditions provided for in paragraph S of this Annex,

• ANNEX V.

1. Austria shall give, as partial reparation, to the Allied and Associated Governments severally an option during the five years following the coming into force of the present Treaty for the annual delivery of the raw materials hereinafter enumerated : the amounts de¬ livered to bear the same relation to their annual importations of these materials before the war from Austria-Hungary as the resources of Austria as now delimited by the present Treaty bear to the resources before the war of the former Austro-Hungarian Mon¬ archy.

Timber and timber manufactures;

Iron and iron alloys;

Magnesite.

2. The price paid for the products referred to in the preceding paragraph shall be the same as the price paid by Austrian nationals under the siame conditions of shipment to the Austrian frontier and shall be subject to ‘any advantages which may be accorded similar products furnished to Austrian nationals.

3. The foregoing options shall be exercised through the intervention of the Repiaration Commission, which subject to the specific provisions hereof shall have power to determine all questions relative to procedure and qualities and quantities of products and the times and modes of delivery and payment. In giving notice to the Austrian Government of the foregoing options, the Commission shall give at least 120 days’ notice of deliveries to be miade after January i, 1920, and at least 30 days’ notice of deliveries to be made be¬ tween the coming into force of the present Treaty and January i, 1920. If the Commission shall determine that the full exercise of the foregoing options would interfere unduly with the industrial requirements of Austria, the Commission is authorised to postpone or to cancel

deliveries and in so doing to settle all questions of priority.

ANNEX VI.

Austria renounces on her own behialf and on behalf of her nationals in favour of Italy all rights, titles or privileges of whatever nature in any submarine cables or portions of cables connecting Italian territory, in¬ cluding the territories which are assigned to Italy under the present Treaty.

Austria also renounces on her own behalf and on behalf of her nationals in favour of the Principal Allied and Associated Powers all rights, titles and privileges of whatever nature in the submarine cables, or portions thereof, connecting the territories ceded by Austria under the terms of the present Treaty to the various Allied and Associated Powers.

The States concerned shall provide for the upkeep of the installations and the proper working of the said cables.

As regards the cable from Trieste to Corfu, the Italian Government shall enjoy in its relations with the company owning this cable the same position as that held by the Austro-Hungarian Government.

The value of the cables or portions of cables re¬ ferred to in the two first paragraphs of the present Annex, calculated on the basis of the original cost, less a suitable allowance for depreciation, shall be credited to Austria in the repariation account.

SECTION II. — SPECIAL PROVISIONS.

Article 191. — In carrying out the provisions of Article 184 of this Part Austria undertakes to surrender to each of the Allied and Associated Powers respectively all records, documents, objects of lantiquity and of art, and all scientific and bibliographical material taken away from the invaded territories, whether they belong to the State or to provincial, communal, charitable or ecclesiastical administrations or other public or private institutions.

Article 192. — Austria shall in the . same manner restore objects of the same nature as those referred to in the preceding Article which may Ivave been taken away since June i, 1914, from the ceded territories,

with the exception of objects bought from private owners.

The Repiaration Commission will apply to these objects the provisions of Article 208 of Part IX (Financial Clauses) of the present Treaty, if these are appropriate.

Article 193. — Austria will give up to each of the Allied and Associated Governments respectively all the records, documents and historical material possessed by public institutions which may hiave a direct bearing on the history of the ceded territories and which have been removed during the last ten years. This last-mentioned period as far as concerns Italy, shall be extended to the date of the proclamation of the King¬ dom (1861).

The new States arising out of the former Austro-Hungarian Monarchy land the States which receive part of the territory of that Monarchy undertake on their part to hand over to Austria the records, docu¬ ments and material dating from a period not exceed¬ ing twenty years which have a direct bearing on the history or administration of the territory of Austria and which may be found in the territories transferred.

Article 194. — Austria acknowledges that she re¬ mains bound, as regards Italy, to execute the obligations referred to in Article 15 of the Treaty of Zurich of November 10, 1859, in Article 18 of the Treaty of Vienna of October 3, 1866, and in the Convention of Florence of July 14, i868, concluded between Italy

and' Austria-Hungary, in so far as the Articles referred to have not in fact been ^^ecuted in their entirety and in so far as the documents and objects in question are situated in the territory of Austria or her allies.

Article 195. — Within a period of twelve months after the coming into force of the present Treaty a Com¬ mittee of three jurists appointed by the Reparation Commission shall examine the conditions under which the objects or manuscripts in possession of Austria, enumerated in Annex I hereto, were carried off by the House of Hapsburg and by the other Houses which have reigned in Italy. If it is found that the said

objects or manuscripts were carried off in violation of the rights of the Italian provinces the Reparation Commission, on the report of the Committee referred to, shall order their restitution. Italy and Austria agree to accept the decisions of the Commission.

Belgium, Poland and Czecho-Slovakia may also sub¬ mit claims for restitution, to be examined by the same Committee of three jurists, relating to the objects and documents enumerated in Annexes II, III and IV hereto. Belgium, Poland, Czecho-Slovakia and Austria undertake to accept the decisions taken by the Repara¬ tion Commission as the result of the report of the said Committee.

Article 196. — ˆ With regard to all objects of artistic, archaeological, scientific, or historic character forming part of collections which formerly belonged to the Government or the Crown of the Austro-Hungarian Monarchy and are not otherwise provided for in this present Treaty, Austria undertakes:

(a) To negotiate, when required, with the States concerned for an amicable arrangement whereby any portion thereof or any objects belonging thereto which ought to form part of the intellectual patrimony of the ceded districts may be returned to their districts of origin on terms of reciprocity, and

(b) For twenty years, unless a special arrangement is previously arrived at, not to alienate or disperse any of the said collections or to dispose of any of the above objects but at all times to ensure their safety and good condition and to make them available, together with inventories, catalogues and administrative documents relating to the said collection, at all reasonable times to students who are natioUals of any of the Allied and Associated Powers.

ANNEX I.

Tuscany.

The Crown jewels (such part as remains after their dispersion) ; the private jewels of the Princess Electress of Medici; the medals which form part of the Medici heirlooms and other precious objects — all being do¬ manial property according to contractual agreements and testamentary dispositions — removed to Vienna dur¬ ing the eighteenth century.

Furniture and salver plate belonging to the House of Medici and the “

jewel of Aspasios ” in payment of debts owed by the House of Austria to the Crown of Tuscany.

The ancient instruments of astronomy and physics belonging to the Academy of Cimento removed by the House of Lorfaine and sent as a present to the cousins of the Imperial House of Vienna.

Modena.

A “ Virgin ” by Andrea del Sarto and four drawings by Correggio belonging to the Pinacothek of Modena and removed in 1859 by Duke Francis V.

The three following MSS. belonging to the library of Modena:

Biblia vulgata (Cod. Lat. 422/23),

Brevarium Romanum (Cod. Lat. 424) and Officium Beats Virginis (Cod. Lat. 262),

carried off by Duke Francis V in 1859.

The bronzes carried off under the same circumstances in 1859.

Certain objects (among others two pictures by Sal¬ vator Rosa and a portrait by Dosso Dossi) claimed by the Duke of Modena in 1868 as a condition of the execution of the Convention of June 20, 1868, and other objects given up in 1872 in the same circum¬ stances.

Palermo.

Objects made in Palermo in the twelfth century for the Norman kings and employed in the coronation of the Emperors, which were carried off from Palermo land are now in Vienna.

Naples.

Ninety-eight MSS. carried off from the Library of S. Giovanni a Carbonara and other libraries at Naples in 1718 under the orders of Austria and sent to Vienna.

Various documents carried off at different times from the State Archives of Milan, Mlantua, Vienna, Modena and Florence.

ANNEX II.

I. The Triptyeh of S. Ildephonse, by Rubens, from the Abbey of Saint-Jacques sur Cowdenberg at Brussels, bought in 1777 and removed to Vienna.

II. Objects and documents removed for safety from Belgium to Austria in 1794:

(o) Arms, armour and other objects from the old Arsenal of Brussels.

(&) The Treasure of the “ Toison d’or ” preserved in previous times in the “ (Thapelle de la Cour ” lat Brussels.

(c) Coinage, stamps, medals, and counters by Theo¬ dore van Berckel which were an essential feature in the archives of the “ Chambre des Comptes ” at Brussels.

(d) The original manuscript copies of the “ carte chorographique ” of the Austrian Low Countries drawn up by Lieut. -General Comte Jas de Ferraris between 1770 and 1777, and the documents relating thereto.

ANNEX III.

Object removed from the territory forming part of Poland subsequent to the first partition in 1772:

The gold cup of King Ladislas IV, No. 1,114 of the Court Museum at Vienna.

ANNEX IV.

(1) Documents, historical memoirs, manuscripts, maps, etc., claimed by the present State of Czecho¬ slovakia, which Thaulaw von Rosenthal removed by order of Maria Theresa.

(2) The documents originally belonging to the Royal Aulic Chancellory of Bohemia and the Aulic Chamber of Accounts of Bohemia, and the works of art which formed part of the installation of the Roylal Cˆiateau of Prague and other royal castles in Bohemia, which were removed by the Emperors Mathias, Ferdinand II, Charles VI (about 1718, 1723 and 1737) and Francis Joseph I; all of which are now in the archives. Im¬ perial castles, museums and other central public institu¬ tions at Vienna.

Part IX. — ■ Financial Clauses.

Article 197. — Subject to such exceptions as the Reparation

Commission may make, the first charge upon all the assets and revenues of Austria shall be the cost of reparation and all other costs arising under the present TrOaty or any treaties or agreements sup¬ plementary thereto, or under arrangements concluded between Austria and the Allied and Associated Powers during the Armistice signed on November 3, 1918.

Up to May i, 1921, the Austrian Government shall not export or dispose of, and shall forbid the export or disposal of, gold without the previous approval of the Allied and Associated Powers acting through the Reparation Commission.

Article 198. — There shall be paid by the Govern¬ ment of Austria the total cost of all armies of the Allied and Associated Governments occupying territory

within the boundaries of Austria as defined by the present Treaty from the date of the signature of the Armistice of November 3, 1918, including the keep

of men and beasts, lodging and billeting, pay and allow¬ ances, salaries and wages, bedding, heating, lighting, clothing, equipment, harness and saddlery, armament and rolling-stock, air services, treatment of sick and wounded, veterinary and remount services, transport services of all sorts (such as by rail, sea, or river, motor-lorries), communications and correspondence, and, in general, the cost of all administrative or tech¬ nical services the working of which is necessary for the training of troops and for keeping their numbers up to strength and preserving their military efficiency.

The cost of such liabilities under the above heads, so far as they relate to purchases or requisitions by the Allied and Associated Governments in the occupied territory, shall be paid by the Austrian Government to the Allied and Associated Governments in crowns or any legal currency of Austria which may be sub¬ stituted for crowns at the current or agreed Hate of exchange.

All other of the above costs shall be paid in the currency of the country to which the payment is due.

Article 199. — Austria confirms the surrender of all material handed over or to be handed over to the Allied and Associated Powers in accordance with the Armistice of November 3, 1918, and subsequent Arm¬ istice Agreements, land recognises the title of the Allied and Associated Powers to such material.

There shall be credited to the Government of Aus¬ tria, against the sums due from it to the Allied and Associated Powers for reparation, the value, as assessed by the Reparation Commission, of such of the above material for which, as having non-military value, credit should, in the judgment of the Reparation Commission, be allowed to the Government of Austria.

Property belonging to the Allied and Associated Governments or their nationals restored or surrendered under the Armistice agreements in specie shall not be credited to the Government of Austria.

Article 200. — The priority of the charges established by Article 197 shall, subject to the qualifications made in the last paragraph of this Article, be as follow's:

(a) The cost of the armies of occupation, as defined under Article 198, during the armistice;

(b) The cost of any armies of occupation, as de¬ fined under Article 198, after the coming into force of the present Treaty;

(c) The cost of reparation arising out of the present Treaty or any treaties or conventions supplementary thereto;

(d) The cost of all other obligations incumbent on Austria under the Armistice Conventions or under this Treaty or any treaties or conventions supplementary thereto.

The payment for such supplies of food and raw ma¬ terial for Austria and such other payments as may be judged by the Principal Allied and Associated Powers to be essential to ePable Austria to meet her obliga¬ tions in respect of reparation shall have priority to the extent and upon the conditions which have been or may be determined by the Governments of the said Powers.

Article 201. — The right of each of the Allied and Associated Powers to dispose of enemy assets and property within its jurisdiction at the

date of tue com¬ ing into force of the present Treaty is not affected by the foregoing provisions.

Article 202. — Nothing in the foregoing provisions shall prejudice in lany manner charges or mortgages lawfully effected in favour of the Allied and Associated Powers or their nationals respectively before the date at which a state of war existed between Austria-Hungary and the Allied or Associated Power concerned by the former Austrian Government or by nationals of the former Austriian Empire on assets in their ownership at that date, except in so far as variations of such charges or mortgages are specifically provided for under the terms of the present Treaty or conventions supple¬ mentary thereto.

Article 203. — i. Each of the States to which terri¬ tory of the former Austro-Hungarian Monarchy is trans¬ ferred, land each of the States arising from the dis¬

memberment of that Monarchy, including Austria, shall assume responsibility for a portion of the debt of the former Austrian Government which is specifically se¬ cured on railways, salt mines or other property, and

which was in existence on July 28, 1914-The portion to be so assumed by each State shall be such portion as in the opinion of the Reparation Commission repre¬ sents the secured debt in respect of the railways, salt mines, and other properties transferred to that State

under the terms of this Treaty or conventions sup¬

plementary thereto.

The amount of the liability in respect of secured VOL. 28 — 38

debt so assumed by each State, other than Austria,

shall be valued by the Reparation Commission, on such basis as the Commission may consider equitable, and the value so ascertained shall be deducted from the amount payable by the State in question to Austria in respect of property of the former or existing Austrian Govern¬ ment which the State acquires with the territory.

Each State shall be solely responsible in respect of

that portion of the secured debt for which it assumes responsibility

under the terms of this Article, and holders of the debt for which responsibility is assumed by States other than Austria shall have no recourse against the Government of any other State.

Any property which was specifically pledged to se¬ cure any debt referred to in this Article shall remain specifically pledged to secure the new debt. But in

case the p»operty so pledged is situated as the result of the present Treaty in more than one State, that portion of the property which is situated in a par¬ ticular State shall constitute the security only for that part of the debt which is apportioned to that State, and not for lany other part of the debt.

For the purposes of the present Article there shall be regarded as secured debt i)ayments due by the former Austrian Government in connection with the purchase of railways or similar property; the distribution of the liability for such payments will be determined by the Reparation Commission in the same manner as in the case of secured debt.

Debts for which the responsibility is transferred under the terms of this Article shall be expressed in terms of the currency of the State assuming the re¬ sponsibility, if the original debt was expressed in terms of Austro-Hungarian paper currency. For the pur¬ poses of this conversion the currency of the assuming State shall be valued in terms of Austro-Hungarian paper kronen at the rate at which those kronen were exchanged into the currency of the lassuming State by that State when it first substituted its own currency for Austro-Hungarian kronen. The basis of this con¬ version of the currency unit in which the bonds are expressed shall be subject to the approval of the Repara¬ tion Commission, which shall, if it thinks fit, require the State effecting the conversion to modify the terms thereof. Such modification shall only be required if, in the opinion of the Commission, the foreign exchange value of the currency unit or units substituted for the currency unit in which the old bonds are expressed is substantially less at the date of the conversion than the foreign exchange value of the original currency unit.

If the original Austrian debt was expressed in terms of a foreign currency or foreign currencies, the new debt shall be expressed in terms of the same currency or currencies.

If the original Austrian debt was expressed in terms of Austro-Hungarian gold coin, the new debt shall be expressed in terms of

equivalent amounts of pounds sterling and gold dollars of the United States of America, the equivalents being calculated on the basis of the weight and the fineness of gold of the three coins as enacted by law on January i, 1914.

Any foreign exchange options, whether at fixed rates or otherwise, embodied explicitly or implicitly in the old bonds shall be embodied in the new bonds also.

2. Each of the States to which territory of the former Austro-Hungiarian Monarchy is transferred, and each of the States arising from the dismemberment of that Monarchy, including Austria, shall assume re¬ sponsibility for a portion of the unsecured bonded debt of the former Austrian Government which was in existence on July 28, 1914, calculated on the basis

of the ratio between the average for the three financial yeiars 1911, 1912, 1913, of such revenues of the dis¬ tributed territory and the average for the same years of such revenues of the whole of the former Austrian territories as in the judgment of the Reparation Com¬ mission are best calculated to represent the financial capacity of the respective territories. In making the above calculation, the revenues of Bosnia and Herze-govinla shall not be included.

The responsibilities in respect of bonded debt to be assumed under the terms of this Article shall be discharged in the manner laid down in the Annex hereto.

The Austrian Government shall be solely responsible for all the liabilities of the former Austrian Govern¬ ment incurred prior to July 28, 1914, other than those evidenced by the bonds, bills, securities and currency notes which are specifically provided for under the terms of the present Treaty.

Neither the provisions of this Article nor the pro¬ visions of the Annex hereto shiall apply to securities of the former Austrian Government deposited with the Austro-Hungarian Bank as security for the currency notes issued by that bank.

ANNEX,

The amount of the former unsecured Austrian Gov¬ ernment Bonded Debt, the responsibility for which is to be distributed under the provisions of Article 203, shall be the amount of that debt as it stood on July 28, 1914, after deducting that portion which represents of the liability of the former Hungarian Government for that debt las provided by the additional Convention relating to the contribution of the countries of the

Sacred Hungarian Crown to the charges of the general debt of the Austro-Hungarian State approved by the

Austro-Hungarian Law of December 30, 1907, B. L. I. No. 278.

Each State assuming responsibility for the old un¬ secured Austrian Government debt shall, within three months of the coming into force of the present Trefaty, if it has not already done so, stamp with the stamp of its own Government all the Bonds of that debt existing in its own territory. The distinguishing num¬ bers of the Bonds so stamped shall be recorded and

shall be furnished, together with the other records of

the stamping, to the Reparation Commission.

Holders of Bonds within the territory of a State which is required to stamp old Austrian Bonds under the terms of this Annex shall, from the date of the coming into force of the present Treaty, be creditors in respect of these Bonds of that State only, and they shall have no recourse against the Government of any other State.

Each State which, under the terms of Article 203, is required to assume respon.ˆbility for a portion of the old unsecured Austrian Government Debt, and which has ascertained by means of stamping the old Austrian Bonds that the Bonds of any particular issue of such old Austrian Bonds held within its territory were smaller in amount than the amount of that issue for which, in accordance with the assessment of the Reparation Commission, it is held responsible, shall deliver to the Reparation Commission new Bonds equal in amount to the difference between the amount of the issue for which it is responsible and the amount of the same issue recorded as held within its own territory. Such new Bonds shall be of such denominations as the Reparation Commission may require. They shall carry the same

rights as regards interest and amortisiation as the old Bonds for which they are substituted, and in all other respects the conditions of the new Bonds shall be fixed subject to the approval of the Repara¬ tion Commission.

If the original Bond was expressed in terms of Austro-Hungarian paper currency, the new Bond by which it is replaced shall be expressed in terms of the currency of the State issuing the new Bond, and for the purpose of this currency conversion, the cur¬ rency of the new State shall be valued in terms of Austro-Hungarian paper kronen at the rate at which those kronen were exchanged for the currency of the new State by that State when it first substituted its own currency for Austro-Hungarian paper kronen. The basis of this conversion of the currency unit in which the Bonds are expressed shall be subject to the ap¬ proval of the Reparation Commission, which shall, if It thinks fit, require the State effecting the conversion to modify the terms thereof. Such modification shall only be required if, in the opinion of the Commission, the foreign exchange value of the currency unit or units substituted for the currency unit in which the old Bonds are expressed is substantially less at the date of the conversion than the foreign exchange value of the original currency unit.

If the original Bond wias expressed in terms of a foreign currency or foreign currencies, the new Bond shall be expressed in terms of the same currency or currencies. If the ori^^inal Bond was expressed in terms of Austro-Hungarian gold coin, the new Bond shall be expressed in terms of equivalent amounts of pounds sterling and gold dollars of the United States of America, the equivalents being calculated on the basis of the weight and fineness of gold of the three coins las enacted by law on January i, 1914,

Any foreign exchange options, whether at fixed rates or otherwise, embodied explicitly or implicitly in the old Bonds shall be embodied in the new Bonds also.

Each State which under the terms of Article 203 is required to assume responsibility for a portion of the old unsecured Austrian Government Debt, which has ascertained by means of stamping the old Austrian Bonds that the Bonds of any particular issue of such old Austrian Bonds held within its territory were larger in amount than the arnount of that issue for which it is held responsible in accordance with the assessment qf the Reparation Commission, shall receive from the Reparation Commission its due proportionate share of eiach of the new issues of Bonds issued in accordance with the provisions of this Annex.

Holders of unsecured Bonds of the old Austrian Government Debt held outside the boundaries of the States to which territory of the former Austro-Hun—

farian Monarchy is transferred, or of States arising rom the dismemberment of that Monarchy, including Austria, shall deliver through the agency of their re¬ spective Governments to the Reparation Commission the Bonds which they hold, land in exchange therefor the Reparation Commission shall deliver to them certifi¬ cates entitling them to their due proportionate share of each of the new issues of Bonds corresponding to and issued in exchange for their surrendered Bonds under the provisions of this Annex.

The share of each State or private holder entitled to a share in any new issue of Bonds issued in accord¬ ance with the provisions of this Annex shall beiar such proportion to the total amount of Bonds of that new issue as the holding of the State or private owner in question of the old issue of Bonds bears to the total amount of the old issue presented to the Reparation Commission for exchange into new Bonds in accord¬ ance with the provisions of this Annex. Each such participating State or private holder will also be en¬ titled to its or his due proportionate share of the new Bonds issued under the terms of the Treaty with Hungary in exchange for that portion of the former Austrian Government Debt for which Hungary accepted liability under the Agreement of 1907.

The Reparation Commission shall, if it think fit, arrange with the holders of the new Bonds provided for by this Annex a consolidation loian of each debtor State, the Bonds of which loan shall be substituted for the various different issues of new Bonds on such terms as may be agreed upon by the Commission and the bondholders.

The State assuming liability for any Bond of the former Austrian Government shall assume any liability •attaching to the Bond in respect of unpaid coupons or sinking fund instalments accrued since the date of the coming into force of the present Treaty.

Article 204. — i. In case the new boundaries of any States, as laid down by the present Treaty, shall divide any local area which was a single unit for borrowing purposes and which had a legally constituted public debt, such debt shall be divided between the new divisions of the area in a proportion to be deter¬ mined by the Reparation Commission in accordance with the principles laid down for the

reapportionment of Government Debts under Article 203, and the re¬ sponsibility so assumed shall be discharged in such a manner as the Reparation Commission shall determine.

2. The public debt of Bosnia and Herzegovina shall be regarded as the debt of a local area and not as part of the public debt of the former Austro-Hun¬ garian Monarchy.

Article 205. — Within two months of the coming into force of the present Treaty, each one of the States to which territory of the former Austro-Hungarian Monarchy is transferred and each one of the States arising from the dismemberment of that Monarchy, including Austria, shall, if it has not already done so, stamp with the stamp of its own Government the securities of various kinds which are sepiarately pro¬ vided for, representing the bonded war debt of the former Austrian Government as legally constituted prior to October 27, 1918, and existing in their respective territories.

The securities thus stamped shall be withdrawn and replaced by certificates, their distinguishing numbers shall be recorded, and any securities withdrawn, together with the documents recording the transaction, shiall be sent to the Reparation Commission.

The stamping and replacement of a security by a certificate under the provisions of this Article shall not imply that the State so stamping and replacing a security thereby assumes or recognises any obligation in respect of it, unless the State in question desires that the stamping and replacement should have this implica¬ tion.

The aforementioned States, with the exception of Austria, shall be free from any obligation in respect of the war debt of the former Austrian Government, wherever that debt may be held, but neither the Gov¬ ernments of those States nor their nationals shall have recourse under any circumstances whatever against any other States including Austria in respect of the war debt bonds of which they or their nationals are the beneficial owners.

The war debt of the former Austrian Government which was prior to the signature of the present Treaty in the beneficial ownership of nationals or Governments or States other than ˆ those to which territory of the former Austro-Hungarian Monarchy is assigned shall be a charge upon the Government of Austria only, and no one of the other States aforementioned shall be held responsible for any part thereof.

The provisions of this Article shall not apply to the securities of the former Austrian Government deposited by that Government with the Austro-Hungarian Bank as security for the currency notes of the said bank.

The existing Austrian Government shall be solely responsible fcjr all the liabilities of the former Austrian Government incurred during the war, other than those evidenced by the bonds, bills, securities and currency notes which are specifically provided for under the terms of the present Treaty.

Article 206. — i. Within two months of the coming into force of the present Trelaty, each one of the States to which territory of the former Austro-Hungarian Monarchy is transferred, and each one of the States arising from the dismemberment of that Monarchy, in¬ cluding Austria and the present Hungary, shall, if it has not already done so, stamp with the stamp of its own Government the currency notes of the Austro-Hungarian Bank existing in its territory.

2. Within twelve months of the coming into force of the present Treaty, each one of the States to which territory of the former Austro-Hungarian Monarchy is transferred, and each one of the States arising from the dismemberment of that Monarchy, including Austria and the present Hungary, shall replace, as it may think fit, the stamped notes referred to above by its own or a new currency.

3. The Governments of such States as have already converted the currency notes of the Austro-Hungarian Bank by stomping or by the issue of their own or a new currency, and in carrying out this operation have withdrawn, without stamping them, a portion or all of the currency notes circulating in their territory, shall either stamp the notes so withdrawn or hold them at the disposal of the Reparation Commission.

4. Within fourteen months of the coming into force of the present Treaty, those Governments which hiave replaced notes of the bank by

their own or new currency, in accordance with the provisions of this Article, shall transfer to the Reparation Commission all the notes, stamped or unstamped, of the bank which have been withdrawn in the course of this replacement.

5. All notes transferred to the Reparation Commis¬ sion under the provisions of this Article shall be dealt with by that Commission in accordance with the pro¬ visions of the Annex hereto.

6. The Austro-Hungarian Bank shall be liquidated as from the day succeeding the day of the signature of this Treaty.

7. The liquidation shall be conducted by receivers specially anpointed for that purpose by the Reparation Commission. In conducting the liquidation of the bank, the receivers shall follow the rules laid down in the Statutes or other valid instruments regulating the consti¬ tution of the bank, subject however to the special pro¬ visions of this Article. In the case of lany doubt arising las to the interpretation of the rules concerning the liquidation of the bank, whether laid down in these Articles and Annexes or in the Statutes of the bank, the decision of the Reparation Commission or any arbitrator appointed by it for that purpose shall be final.

8. The currency notes issued by the bank subsequent to October 2y, 1918, shall have la claim on the securi¬ ties issued by the Austrian and Hungarian Governments, both former and existing, and deposited with the bank by those Governments as security for these notes, but they shall not have a claim on any other assets of the bank.

9. The currency notes issued by the bank on or prior to October 27, 1918, (in so tor as they are en-vitled to rank at all in conformity with these Articles), shall all rank equally as claims against all the assets of the bank, other than the Austrian and Hungarian Government securities deposited as security for the various note issues.

10. The securities deposited by the Austrian and Hungarian Governments, both former and existing, with the bank as security for the currency notes issued on or prior to October 27, 1918, shall be cancelled in so far as they represent the notes converted in the territory of the former Austro-Hungarian Monarchy as it existed on July 28, 1914, by States to which territory of that Monarchy is transferred or by States^ arising from the dismemberment of that Monarchy, including Austria and the present Hungary.

11. The remainder of the securities deposited by the Austrian and

Hungarian Governments, both former and existing, with the bank ‘as security for the currency notes issued on or prior to October 27, 1918, shall be retained in force as security for, and in so far as they represent, the notes issued on or prior to October 27, 1918, whch on June 15, i9’9. were outside the limits of the former Austro-Hungarian Monarchy as it existed on July 28, 1914, that is to say, firstly, all notes _ of this description which are presented to the Reparation Commission in laccordance with paragraph 4 of this

Article, and secondly all notes of this descriotion which may be held elsewhere and are presented to the receivers of the bank in accordance with the Annex hereto.

12. No claims on account of any currency notes issued on or prior to October 27, 1918, shall rank either against^ the general assets of the bank or against the securities deposited by the Austrian and Hungarian Governments, both former and existing, as security for the notes, and any balance of such securities remaining after the amount of securities mentioned in paragraphs 10 and II has been calculated and deducted shall be cancelled.

13. All securities deposited by the Austrian and Hungarian Governments, both former and existing, with the bank as security for currency note issues and which lare maintained in force shall be the obligations respectively of the Governments of Austria and the present Hungary only and not of any other States.

14. The holders of currency notes of the Austro-Hungarian Bank shall have no recourse against the Governments of Austria or the present Hungary or any other Goverment in respect of any loss which they may suffer as the result of the liquidation of the bank.

ANNEX.

1. The respective Governments, when transmitting to the Reparation Commission all the currency notes of the Austro-Hungarian Bank withdrawn by them from circulation in accordance with the terms of Article 206, shall also deliver to the Commission all the records showing the nature and amounts of the conversions which they have effected.

2. The Repanation Commission, after examining the records, shall deliver to the said Governments separate certificates stating the total amount of currency notes which the Government has converted:

(a) within the limits of the former Austro-Hungarian Monarchy as they existed on July 28, 1914;

(b) elsewhere.

These certificates will entitle the bearer to lodge a claim with the receivers of the bank for currency notes * thus converted which are entitled to share in the assets of the bank.

3. After the liquidation of the bank is completed, the Reparation Commission shall destroy the notes thus withdrawn.

4. No notes issued on or prior to October 27, 1918, wherever they may be held, will rank as claims against the bank unless they are presented through the Govern¬ ment of the country in which they lare held.

Article 207. — Each one of the States to which territory of the former Austro-Hungarian Monarchy is transferred, and each one of the States arising from the dismemberment of that Monarchy, including Aus¬ tria, shall deal as it thinks fit with the petty or token coinage of the former Austro-Hungarian Moniarchy existing in its territory.

No such State shall have any recourse under any circumstances, on behalf either of itself or of its nationals, against any other State with regard to such petty or token coinage.

Article 208. — States to which territory of the former Austro-Hungarian Monarchy is transferred and States arising from the dismemberment of that Monarchy shall acquire all property land possessions situated within their territories belonging to the former or existing Austrian Government.

For the purposes of this Article, the property and possessions of the former or existing Austrian Govern¬ ment shall be deemed to include the property of the former Austrian Empire and the interests of that Empire in the joint property of the Austro-Hungarian Monarchy, as well as all the property of the Crown, and the private property of members of the former Royal Family of Austria-Hungary.

These States shall, however, have no claim to any property of the former or existing Government of Aus¬ tria situated outside their own respective territories.

The value of such property and possessions acquired by States other than Austria shall be fixed by the Reparation Commission and pliaced

by that Commission to the credit of Austria and to the debit of the State acquiring such property on account of the sums due for reparation. The Reparation Commission shall de¬ duct from the value of the public property thus ac¬ quired an amount proportionate to the contribution in money, land or miaterial made directly by any province or commune or other autonomous local authority to¬ wards the cost of such property.

Without prejudice to Article 203 relating to secured Debt, in the case of each State acquiring property under the provisions of this Article, the amount nlaced to the credit of Austria and to the debit of the said State in accordance with the preceding paragraph shall be

reduced by the value of the amount of tlie liability in respect of the unsecured Debt of the former Aus¬ trian Government assumed by that State under the provisions of Article 203 which, in the opinion of the Reparation Commission, represents expenditure upon the property so acquired. The value shall be fixed by the Reparation Commission on such basis as the Commission may consider equitable.

Property of the former and existing Austrian Gov¬ ernments shall be deemed to include a share of the real property in Bosnia-Herzegovina of all descriptions for which, under Article 5 of the Convention of February 26, 1909, the Government of the former Austro-Hun¬ garian Monarchy paid £ T. 2,500,000 to the Ottoman Government, Such share shall be proportionate to the share which the former Austrian Empire contributed to the above payment, and the value of this share, as assessed by the Reparation Commission, shall be credited to Austria on account of reparation.

As exception to the above there shiall be transferred without payment:

(1) The property and possessions of provinces, communes and other local autonomous institutions of the former Austro-Hungarian Monarchy, including those in Bosnia-Herzegovina which did not belong to the former Austro-Hungarian Monarchy;

(2) Schools and hospitals the property of the former Austro-Hungarian Monarchy;

(3) Forests which belonged to the former Kingdom of Poland.

Further, any building or other property situated in the respective territories transferred to the States re¬ ferred to in the first paragraph whose principal value lies in its historic interest and associations, and which formerly belonged to the Kingdom of Bohemia, the Kingdom of Poland, the Kingdom of Croatia-Slavonia- Dalmatia, Bosnia-Herzegovina, the Republic of Ragusa, the Venetian Republic or the Episcopal Principalities of Trient and Bressanone, may, subject to the approval of the Reparation Commission, be transferred to the Government entitled thereto without payment.

Article 209. — Austria renounces, so far as she is concerned, all rights accorded to her or her nationals by Treaties, Conventions or Agreements, of whatsoever kind, to representation upon or participation in the con¬ trol or administration of Commissions, State Banks, Agencies or other financial or economic oreranisations of an international character exercising powers of con¬ trol or administration and operating in any of the Allied or Associated States, or in Germany, Hungary, Bulgaria or Turkey, or in the dependencies of these States, or in the former Russian Empire.

Article 210. — i. The Austrian Government agrees to deliver within one month from the coming into force of the present Treaty to such authority as the Principal Allied and Associated Powers miay designate the sum in gold deposited in the Austro-PIungarian Bank in the name of the Council of the Administration of the Otto¬ man Public Debt as security for the first issue of Turkish Government currency notes.

2. Without prejudice to Article 244 of Part X of the present Treaty, Austria renounces so far as she is concerned any benefit disclosed by the Treaties of Bucharest and Brest-Litovsk and by the Treaties supple¬ mentary thereto.

Austria undertakes to transfer either to Roumania or to the Principal Allied and Associated Powers, as the case may be, all monetary instruments, specie, securi¬ ties and negotiable instruments or goods which she has received under the aforesaid Treaties.

3. The sums of money and all securities, instruments and goods, of whatsoever nature, to be delivered, paid or transferred under the

provisions of this Article, shall be disposed of by the Principal Allied and Associated Powers in a manner hereafter to be determined by those Powers.

4. Austria recognises any transfer of gold provided for by Article 259 (5) of the Treaty of Peace concluded at Versailles on June 28, 1919, between the Allied and Associated Powers and Germany, and any transfer of claims provided for by Article 261 of that Treaty,

Article 211. — Without prejudice to the renunciation of any rights by Austria on behalf of herself or of her nationals in the other provisions of the present Treaty, the Reparation Commission may, within one year from the coming into force of the present Treaty, demand that Austria become possessed of any rights and interests of her nationals in any public utility undertaking or in any concession operating in Russia, Turkey, Germany, Hungary or Bulgaria, or in the possessions or dependen¬ cies of these States, or in any territory formerly belong¬ ing to Austria or her allies to be transferred by Aus¬ tria or her allies to any State, or to be administered by a mandatory under any Treaty entered into with the Allied and Associated Powers, and may require that the Austrian Government transfer, within six months of

the date of demand, to the Reparation Commission all such rights and interests and any similar rights and interests owned by the former or existing Austrian Government.

Austria shall be responsible for indemnifying her nationals so dispossessed, and the Reparation Commis¬ sion shall credit Austria on account of sums due for reparation with such sums in respect of the value of the transferred rights and interests as may be assessed by the Reparation Commission, and the' Austrian Gov¬ ernment shall, within six months from the coming into force of the present Treaty, communicate to the Rep¬ aration Commission all such rights and interests, whether already granted, contingent or not yet ex¬ ercised, and shall renounce on behalf of itself and its nationals in favour of the Allied and Associated Powers all such rights and interests which have not been so communicated.

Article 212. — The Austrian Government undertakes to refrain from preventing or impeding such acquisition by the German, Hungarian, Bulgarian or Turkish Gov¬ ernments of any rights and interests of German, Hun¬ garian, Bulgarian or Turkish nationals in public utility undertakings or concessions operating in Austria as may be required

by the Reparation Commission under the terms of the Treaties of Peace or supplementary Treaties or Conventions concluded between the Allied and Associated Powers and the German, Hungarian, Bulgarian or Turkish Governments respectively.

Article 213. — Austria undertakes to transfer to the Allied and Associated Powers all claims in favour of the former or existing Austrian Governments to pay¬ ment or reparation by the Governments of Germany. Hungary, Bulgaria or Turkey, and in particular all claims which may arise now or hereafter in the fulfill¬ ment of undertakings made after July 28, 1914, until the coming into force of the present Treaty.

The value of such claims shall be assessed by the Reparation Commission, and shall be transferred to the Reparation Commission for the credit of Austria on account of the sums due for reparation.

Article 214. — Any monetary obligation arising out of the present Treaty and expressed in terms of gold kronen shall, unless some other arrangement is specific¬ ally provided for in any particular case under the terms of this Treaty or conventions supplementary thereto, be payable at the option of the creditors in pounds sterling payable in London, gold dollars of the United States of America payable in New 1ˆork, gold francs payable in Paris, or gold lire payable in Rome.

For the purposes of this Article, the gold coins mentioned above shall be defined as being of the weight and fineness of gold ias enacted by law on January i,

1914.

Article 21 s. — Any financial adjustments, such as those relating to any banking and insurance companies, savings banks, postal savings banks, land banks, mortgage compianies or other similar institutions, operating within the territory of the former Austro-Hungarian Monarchy, necessitated by the partition of that Monarchy and the resettlement of public debts and currency provided for by these Articles, shall be regulated by agreement be¬ tween the various Governments concerned in such a manner as shall best secure equitable treatment to lall the parties interested. In case the Governments con¬ cerned are unable to come to an agreement on any ques¬ tion arising out of this financial adjustment, or in case any Government is of opinion that its nationals have not received

equitable treatment, the Reparation Com¬ mission shall, on the application of any one of the Governments concerned, appoint an arbitrator or arbitra¬ tors, whose decision shall be final.

Article 216. — The Government of Austria shall be under no liability in respect of civil or militarv pensions granted to niationals of the former Austrian Empire who have been recognised as nationals or other States or who become so under the provisions of the present Treaty.

Part X. — Economic Clauses.

SECTION I. — COMMERCIAL REIJVTIONS.

Chapter I. — Customs, Regulations, Duties and

Restrictions.

Article 217. — Austria undertakes that goods the produce or manufacture of any one of the Allied or Associated States imported into Austrian territory, from whatsoever _ place arriving, shall not be subjected to other or higher duties or charges (including internal charges) than those to which the like goods the produce or manufacture of any other such State or of any other foreign country are subject.

Austria will not maintain or impose lany prohibition or restriction on the importation into Austrian territory

of any goods the produce or manufacture of the territories of any one of the Allied or Associated States, from whatsoever place arriving, which shall not equally extend to the importation of the like goods the produce or manufacture of any other such State or of any foreign country.

Article 218.— Austria further undertakes that, in the matter of the regime applicable on importation, no dis¬ crimination against the

commerce of any of the Allied and Associated States as compared with any other of the said States or any other foreign country shall be made, even by indirect means, such as customs regu¬ lations or procedure, methods of verification or analysis conditions of payment of duties, tariff classification or interpretation, or the operation of monopolies.

Article 219. — In all that concerns exportation, Aus¬ tria undertakes that goods, natural products or manu¬ factured articles, exported from Austrian territory to the territories of any one of the Allied or Associated States, shall not be subjected to other or higher duties or charges (including internal charges) than those paid on the like goods exported to any other State or to any other foreign country.

Austria will not miaintain or impose any prohibition or restriction on the exportation of any goods sent from her territory to any one of the Allied or Associated States which shall not equally extend to the exportation of the like goods, natural products or manufactured articles, sent to any other such State or to any other foreign country.

Article 220. — Every favour, immunity, or privilege in regard to the importation, exportation or transit of goods granted by Austria to any Allied or Associated States or to any other foreign country whatever shall simultaneously and unconditionally, without request and without compensation, be extended to all the Allied and Associated States.

Article 221. — By way of exception to the provisions of Article 286 of Piart XII (Ports, Waterways and Rail¬ ways), products in transit by the ports which before the war were situated in territory of the former Austro-Hungarian Monarchy shall, for a period of three years from the coming into force of the present Treaty, enjoy on importation into Austria reductions of duty corre¬ sponding with and in proportion of those applied to such products under the Austro-Hungarian Customs Tariff of February 13, 1906, when imported by such ports.

Article 222. — Notwithstanding the provisions of Articles 217 and 220, the Allied and Associated Powers agree that they will not invoke these provisions to secure the advantage of any arrangements which may be made by the Austrian Government with the Gov¬ ernments of Hungary or of the Czecho-Slovak State for the accord of a special customs regime to certain natural or manufactured products which both originate in and come from those countries, and which shall be speci¬ fied in the arrangements, provided that the duration of these arrangements does not exceed a period of five years from the coming into force of the present Treaty.

Article 223.— During the first six months after the coming into force of the present Treaty, the duties im¬ posed by Austria on imports from Allied and Associated States shall not be higher than the most favourable duties which were applied to imports into the former Austro-Hungarian Monarchy on July 28, 1914.

During a further period of thirty months^ after the expiration of the first six months this provision shall continue to be applied exclusively with regard to the importation of fruits (fresh and dried), fresh vegetables, olive oil, eggs, pigs and pork products, land live poultry, in so far as such products enjoyed at the above mentioned date (July 28, 1914) rates conventionalised by Treaties with the Allied or Associated Powers.

Article 224. — (i) The Czecho-Slovak State and Po¬ land undertake that for a period of fifteen years from the coming into force of tne present Treaty they will not impose on the exportation to Austria of the products of coal mines in their territories any export duties or other charges or restrictions on exportation different from or more onerous than those imposed on such exportation to any other country.

(2) Special agreements shall be made between Po¬ land and the Czecho-Slovak State and Austria as to the supply of coal land of raw materials reciprocally.

(3) Pending the conclusion of such agreements, but in no case during more than three years from the com¬ ing into force of the present Treaty, the Czecho¬ slovak State and Poland undertake that no export duty or other restrictions of any kind shall be imposed on the export to Austria of coal or lignite up to a reason¬ able quantity to be fixed, failing agreement between the States concerned, by the Reparation Commission. In fixing this quantity the Reparation Commission shall take into account all the circumstances, including the quantities both of coal and of lignite supplied before

the war to present Austrian territory from Upper Silesia and from the territory of the former Austrian Empire transferred to the Czecho-Slovak State and Poland in accordance with the present Treaty, and the quantities now available for export from those countries. Austria shall in return furnish to the Czecho-Slovak State and Poland supplies of the raw materials referred to in paragraph (2) in accordance with the decisions of the Reparation Commission.

(4) The Czecho-Slovak State land Poland further undertake during the same period to take such steps as may be necessary to ensure that any such products shall be available for siale to purchasers in Austria on terms as favourable as are applicable to like products sold under similar conditions to purchasers in the Czecho¬ slovak State or Poland respectively or in any other country.

(5) In case of disagreement in the execution or interpretation of iany of the above provisions the Reparation Commission shall decide.

Chapter II. — Shipping.

Article 225. — The High Contracting Parties agree to recognise the flag flown by the vessels of any Con¬ tracting Party having no seacoast, which are registered at some one specified place situated in its territory; such place shjall serve as the port of registry of such vessels.

Chapter III. — Unfair Competition.

Article 226. — Austria undertakes to adopt all the necessary legislative and administrative measures to protect goods the produce or manufacture of any one of the Allied and Associated Powers from all forms of unfair competition in commercial transactions.

Austria undertakes to prohibit and repress by seizure and by other appropriate remedies the importa¬ tion, exportation, manufacture, distribution, sale or offer¬ ing for sale in her territory of all goods bearing upon themselves or their usual get-up or wrappings any nuarks, names, devices, or descriptions whatsoever which are calculated to convey directly or indirectly a false indication of the origin, type, nature or special charac¬ teristics of such goods.

Article 227. — Austria undertakes, on condition that reciprocity is accorded in these matters, to respect any law, or any administnative or judicial decision given in conformity with such law, in foroe in any Allied or Associated State and duly communicated to her by the proper authorities, defining or regulating the right to any regional appellation in respect of wine or spirits produced in the State to which the region belongs or the conditions under which the use of any such appella¬ tion may be permitted; and the importation, exportation, manufacture, distribution, sale or offering for sale of products or articles bearing regional appellations in¬ consistent with such law or order shall be prohibited by the Austrian Government and repressed by the mea¬ sures prescribed in the preceding Article.

Chapter IV. — Treatment of Nationals of Allied and Associated Powers.

Article 228. — Austria undertakes: —

(o) not to subject the nationals of the Allied land Associated Powers to any prohibition in regard to the exercise of occupations, professions, trade and industry, which shall not be equally applicable to all aliens with¬ out exception;

(b) not to subject the nationals of the Allied and Associated Powers in regard to the rights referred to in paragraph (o) to any regulation or restriction which might contravene directly or indirectly the stipulations of the said paragraph, or which shall be other or more disadvantageous than those which are applicable to nationals of the most favoured nation;

(c) not to subject the nationals of the Allied and Associated Powers, their property, rights pr interests, including companies and associations in which they are interested, to any charge, tax or impost, direct or in¬ direct, other or higher than those which are or may be imposed on her own nationals or their property, rights or interests;

(d) not to subject the nationals of any_ ope of the Allied or Associated Powers to any restriction which was not applicable on July i, 1914, to the nationals of such Powers unless such restriction is likewise im¬ posed on her own nationals.

Article 229. — The nationals of the Allied and Associated Powers shall enjoy in Austrian territory a constant protection for their persons and for their property, rights and interests, and shall have free access to the courts of law.

Article 230. — Austria undertakes to recognise any new nationality which has been or may be acquired by

her nationals under the laws of the Allied and Asso¬ ciated Powers, and in accordance with the decisions of the competent authorities of these Powers pursuant to naturalisation laws or under treaty stipuktions, and to regard such persons as having, in consequence of the acquisition of such new nationality, in all respects severed their allegiance to their country of origin.

Article 231. — The Allied and Associated Powers may appoint consuls-general, consuls, vice-consuls and con¬ sular agents in Austrian towns and ports, Austria undertakes to approve the designation of the consuls-general, consuls, vice-consuls and consular agents, whose names shall be notified to her, and to admit them to the exercise of their functions in conformity with the usual rules and customs.

Chapter V. — General Articles.

Article 232. — The obligations imposed by Austria by Chapter I above shall cease to have effect five years from the date of the coming into force of the present Treaty, unless otherwise provided in the text, or unless the Council of the League of Nations shall, at least twelve months before the expiration of that period, decide that these obligations shall be maintained for a further period with or without amendment.

Nevertheless it is agreed that unless the League of Nations decides otherwise an Allied or Associated Power shall not after the expiration of three years from the coming into force of the present Treaty be entitled to require the fulfilment by Austria of the provisions of Article 217, 218,' *219 or 220 unless that Power accords correlative treatment to Austria.

Article 228 of Chapter IV shall remain in operation, with or without amendment, after the period of five years for such further period, if any, not exceeding five years, as may be determined by a majority of the Council of the League of Nations.

Article 233. — If the Austrian Government engages in international trade, it shall not in respect thereof have or be deemed to have any rights, privileges or immunities of sovereignty.

SECTION II. — TREATIES.

Article 234. — From the coming into force of the present Treaty and subject to the provisions thereof the multilateral Treaties, Conventions and Agreements of an economic or technical character concluded by

the former Austro-Hungarian Monarchy and enumerated below and in the subsequent Articles shall alone be applied as between Austria and those of the Allied and Associated Powers party thereto;

(1) Conventions of March 14, 1884, December i,

1886, and March 23, 1887, and Final Protocol of July 7,

1887, regarding the protection of submarine cables.

(2) Convention of October ii, 1909, regarding the international circulation of motor-cars.

(3) Agreement of May 15, 1886, regarding the seal¬ ing of railway trucks subject to customs inspection, and Protocol of May 18, 1907.

(4) Agreement of May 15, 1886, regarding the technical standardisation of railways.

(5) Convention of July 5, 1890, regiarding the publica¬ tion of customs tariffs and the organisation of an inter¬ national Union for the publication of customs tariffs.

(6) Convention of April 25, 1907, regarding the raising of the Turkish customs tariff.

(7) Convention of March 14, 1857, for the redemp¬ tion of toll dues on the Sound and Belts.

(8) Convention of June 22, 1861, for the redemp¬ tion of the Stade Toll on the Elbe.

(9) Convention of July 16, 1863, for the redemption of the Toll dues on the Scheldt.

(10) Convention of October 29, 1888, regarding the establishment of a definite arrangement guaranteeing the free use of the Suez Canal.

(11) Conventions of September 23, 1910, respecting the unification of certain regulations regarding collisions and salvage at sea.

(12) Convention of December 21, 1904, regarding the exemption of hospital ships from dues and charges in ports.

(13) Convention of September 26, 1906, for the sup¬ pression of nightwork for women.

(14) Conventions of May 18, 1904, land May 4,

1910, regarding the suppression of the White Slave Traffic.

(15) Convention of May 4, 1910, regarding the sup¬ pression of obscene publications.

(16) Sanitary Convention of December 3, 1903, and the preceding Conventions signed on January 30, 1892, April 15, 1893, April 3, 1894, and March 19, 1897.

(17) Convention of May 20, 1875, regarding the uni¬ fication and improvement of the metric system.

(18) Convention of November 29, 1906, regarding the unifiaation of pharmacopoeial formulae for potent drugs.

(19) Convention of November 16 and 19, 1885, re¬ garding the establishment of a concert pitch.

(20) Convention of June 7, 1905, regarding the creation of an International Agricultural Institute at Rome.

(21) Conventions of November 3, 1881, and April IS, 1889, regarding precautionary measures against phylloxera.

(22) Convention of Miarch 19, 1902, regarding the protection of birds useful to agriculture. ‘

(23) Convention of June 12, 1902, regarding the guardianship of minors.

Article 235. — From the coming into force of the present Treaty the High Contracting Parties shall apply the conventions and agreements hereinafter mentioned, in so far as concerns them, Austria undertaking to comply with the special stipulations contained in this Article.

Postal Conventions.

Conventions and agreements of the Universal Postal Union concluded at Vienna, July 4, 1891.

Conventions and Agreements of the Postal Union

signed at Washington, June 15, 1897.

Conventions and Agreements of the Postal Union

signed at Rome, May 26, 1906.

Telegraphic Conventions.

International Telegraphic Conventions signed at St. Petersburg July 10/22, 1875.

Regulations and Tariffs drawn up by the Inter¬ national Telegraphic Conference, Lisbon, Tune ii, 1908.

Austria undertakes not to refuse her assent to the conclusion by the new States, of the special arrange¬ ments referred to in the Conventions and Agreements relating to the Universal Postal Union and to the Inter¬ national Telegnaphic Union, to which the said new States have adhered or may adhere.

Articles 236—247 are identical with Articles 284-295 inclusive of the German Treaty with the exception that the words Austria, Austro-Hungarian Monarchy are substituted for the words Germany, etc., in the

latter treaty.

SECTION III. — DEBTS.

Article 248 with Annex is the same as Article 296 and Annex of German Treaty with the exception that me words Austria, Austrian, are substituted for Germiany, German, etc., of the latter.

SECTION IV. — ‘ PROPERTY, RIGHTS AND INTERESTS.

Articles 249-250 with Annex are identical with Articles 297 and 298 and Annex to the latter of Ger¬ man Treaty with the exception that the words Austria, Austrian are substituted for Germany, German, *etc.*

SECTION V. — CONTRACTS, PRESCRIPTIONS, JUDG¬ MENTS.

Articles 251—255 inclusive are identical with Articles ■2.99~303 with Annex of German Treaty with the excep¬ tion of the substitution of the word Austria for Ger¬ many, *etc.*

SECTION VI. — MIXED ARBITRAL TRIBUNAL.

Articles 256-257 inclusive are identical with Articles 304—305 of the German Treaty with the exception of the usual substitution of the

word Austria for Germany.

SECTION VII.— INDUSTRIAL PROPERTY.

Articles 258-262 of this Treaty are identical with Articles 306-310 inclusive of the German Treaty with the exception that the words Austria, Austrian, etc., are substituted for the words Germany, German, *etc.*

SECTION VIII. — SPECIAL PROVISIONS RELATING TO TRANSFERRED TERRITORY.

Article 263. — Of the individuals and juridical per¬ sons previously nationals of the former Austrian Empire, including Bosnia-Herzegovinians, those who acquire ipso facto under the present Treaty the nationality of an Allied or Associated Pow'er are designated in the pro¬ visions which follow by the expression " nationals of the former Austrian Empire the remainder are designated by the expression "Austrian nationals."

Article 264. — The inhabitants of territories transferred by virture of the present Treaty sball, notwithstanding this transfer and the change of nationality consequent thereon, continue to enjoy in Austria all the rights in industrial, literary an.' artistic property to which they were entitled under the legislation in force at the time of the transfer.

Article 265. — The questions concerning the nationals of the former Austrian Empire, as well as Austrian nationals, their rights, privileges and property, which are not dealt with in the present Treaty, or in the Treaty prepared for the purpose of regulating certain immediate relations between the States to which territory of the former Austro-Hungarian Monarchy has been transferred, or arising from the dismemberment of that Monarchy, shall form the subject of special con¬ ventions between the States concerned, including Aus¬ tria; such conventions shall not in any way conflict with the provisions of the present Treaty. For this purpose it is agreed that three months from

the coming into force of the present Treaty a Conference of delegates of the States in question shall take place.

Article 266. — The Austrian Government shall with¬ out delay restore to nationals of the former Austrian Empire their property, rights and interests situated in Austrian territory.

The amount of taxes land imposts on capital which have been levied or increased on the property, rights and interests of nationals of the former Austrian Empire since November 3, 1918, or which shall be levied or in¬ creased until restitution in accordance with the pro¬ visions of the present Treaty, or, in the case of prop¬ erty, rights and interests which have not been sub¬ jected to exceptional measures of war, until three months from the coming into force of the present Treaty, shall be returned to the owners.

The property, rights, and interests restored shall not be subject to any tax levied in respect of any other property or any other business owned by the same person after such property had been removed from Austria, or such business ha'd ceased to be carried on therein. If taxes of any kind have been paid in (an¬ ticipation in respect of property, rights and interests removed from Austria, the proportion of such taxes paid for any period subsequent to the removal of the property, rights and interests in question shall be returned to the owners.

Cash assets shall be paid in the currency and at the rate of exchange provided for the case of debts under Articles 248 (d) and 271.

Legacies, donations and funds given or established in the former Austro-Hungarian Monarchy for the benefit of nationals of the former Austrian Empire shall be placed by Austria, so far as the funds in question are in her territory, at the disposition of the Allied or Associated Power of which the persons in question lare now nationals, in the condition in which these funds were on July 28, 1914, taking account of pay¬ ments properly made for the purpose of the Trust.

Article 267. — Notwithstanding the provisions of Article 249 and the Annex to Section IV the property, rights and interests of Austrian nationals or companies controlled by them situated in the territories which formed part of the former Austro-Hungarian Monarchy shall not be subject to retention or liquidation in accord¬ ance with these provisions. Such property, rights and interests shall be restored to their owners freed from any measure of this kind, or from any other measure of transfer, compulsory administration or sequestration, taken since November 3, 1918, until the coming into force of the

present Treaty, in the condition in which they were before the application of the measures in question.

The property, rights and interests here referred to do not include property which is the subject of Article 208 of Part IX (Financial Clauses).

Nothing in this Article shall affect the provisions laid down in Part VIII (Reparation), Section I, Annex III, as the property of Austrian nationals in ships

and boats.

Article 268. — All contracts for the sale of goods for delivery by sea concluded before January i, i9i7 >

between nationals of the former Austrian Empire on the one part and the administrations of the former Austro-Hungarian Monarchy, Austria, or Boznia-Her- zegovina, or Austrian nationals of the other part shall be annulled, except in respect of any debt or other pecuniary obligation arising out of any act done or money paid thereunder. All other contracts between such parties which were made before November i, 1918, and were in force at that date shall be main¬ tained.

Article 269. — With regard to prescriptions, limita¬ tions, and forfeitures in the transferred territories, the provisions of Articles 252 and 253 shall be applied with sub.stitution for the expression " outbreak of war " of the expression " date, which shall be fixed by ad¬ ministrative deci.sion of each Allied or Associated Power, at which relations between the parties became impossible in fact or in law," and for the expression " duration of the war " of the expression " period be¬ tween the date above indicated and that of the coming into force of the present Treaty."

Article 270. — Austria undertakes not to impede in any way the transfer of property, rights or interests belonging to a company incorporated in accordance with the laws of the former Austro-Hungarian Monarchy, in which Allied or Associated nationals are interested, to a company incorporated in accordance with the Laws of any other power, to facilitate all measures necessary for giving effect to such transfer, and to render any assistance which may be required for effecting the restoration to Allied or Associated nationals, or to companies in which they are interested, of their prop¬ erty, rights or

interests whether in Austria or in transferred territoˆ.

Article 271. — Section III, except Article 248 (d) shall not apply to debts contracted between Austrian nationals and nationals of the former Austrian Empire.

Subject to the special provisions laid down in Article 248 (d) for the case of the new States, these debts shall be paid in the legal currency at the time of payment of the State of which the national of the former Austrian Empire has become a national, and the rate of exchange applicable shall be the average rate quoted on the Geneva Exchange during the two months preceding November i, 1918.

Article 272. — ■ Insurance companies whose principal place of business was in territory which previously formed part of the former Austro-Hungarian Mon¬ archy shall have the right to carry on their business in Austrian territory for la period of ten years from the coming into force of the present Treaty, without the rights which they previously enjoyed being affected in any way by the change of nationality.

During the above period the operations of such companies shall not be subjected by Austria to any higher tax or charge than shall be imposed on the operations of national companies. No measure in dero¬ gation of their rights of property shall be imposed upon them which is not equally applied to the prop¬ erty, rights or interests of Austrian insurance com¬ panies; adequate compensation shall be paid in the event of the application of any such measures.

These provisions shall only apply so long as Aus¬ trian insurance companies previously carrying on busi¬ ness in the transferred territories, even if their prin¬ cipal place of business was outside such territories, are reciprocally accorded a similar right to carry on their business therein.

After the period of ten years above referred to, the provisions of Article 228 of this Part of the present Treaty shall apply in regard to the Allied ‘and Asso¬ ciated companies dn question.

Article 273. — Special agreements will determine the division of the property of associations or public cor-ponations carrying on their functions irij territory which is divided in consequence of the present Treaty.

Article 274. — A special convention shall determine all questions relative to the records, registers and copies in connection with the

protection of industrial, literary or artistic property, and fix their eventual transmission or communication by the Offices of the former Austro-Hungarian Monarchy to the Offices of the States to which are transferred territory of the said Monarchy and to the Offices of new States.

States to which territory of the former Austro-Hungarian Monarchy is transferred, and States arising from the dismemberment of that Monarchy, shall recog¬ nize and give effect to rights of industrial, literary and artistic property in force in the territory at the time when it passes to the State in question, or re-estab¬ lished or restored in accordance with the provisions of Article 258. These rights shall remain in force in that territory for the same period as that for which they would have remained in force under the law of the former Austro-Hungarian Monarchy.

Article 275. — Without prejudice to other provisions of the present Treaty, the Austrian Government under¬ takes so far as it is concerned to hand over to any Power to which territory of the former Austro-Hun¬ garian Monarchy is transferred, or which arises from the dismemberment of that Monarchy, such portion of the reserves accumulated by the Governments or the administrations of the former Austro-Hungarian Mon¬ archy, or by public or private organisations under their control, as is attributable to the carrying on of Social or State Insurance in such territory.

The Powers to which these funds are handed over must apply them to the performance of the obligations arising from such insurances.

The conditions of the delivery will be determined by special conventions to be concluded between the Austrian Government and the Governments concerned.

In case these special conventions are not concluded in accordance with the above paragraph within three months after the coming into force of the present Treaty, the conditions of transfer shall in each case be referred to a Commission of five members, one of

whom shall be appointed by the Austrian Government, one by the other interested Government and three by the Governing Body of the International Labour Office from the nationals of other States. This Commission shall by majority vote within three months after ap¬ pointment adopt recommendations for submission to the Council of the League of Nations, and the decisions of the Council shall forthwith be accepted as final by Austria and the other Government concerned.

Part XI. — ˆAerial Navigation.

Articles 276— 283 inclusive of this Treaty are identical with Articles 313—320 inclusive of the German Treaty, with the exception that the words Austria, Austrian, etc., take the place of the words Germany, German, *etc.*

Part XII. — Ports, Waterways and Railways.

SECTION I. — ‘GENERAL PROVISIONS.

Articles 284—289 inclusive are identical with Articles 321—326 of the German Treaty, with the exception that the word Austria is substituted for Germany, *etc.*

SECTION II. — NAVIGATION.

Chapter I. — Freedom of Navigation.

Article 290. — The nationals of any of the Allied and Associated Powers las w,ˆll as their vessels and property shall enjoy in all Austrian ports and on the inland navigation routes of Austria the same treatment in all respects as Austrian nationals, vessels and prop¬ erty.

In plarticular the vessels of any one of the Allied or Associated Powers shall be entitled to transport goods of any description, and passengers, to or from any ports or places in Austrian territory to wnich Austrian vessels may have access, under conditions which shall not be more onerous than those applied in the case of nationlal vessels; they shall be treated on a footing of equality with national vessels as regards port and harbour facilities and chlarges of every description, in¬ cluding facilities for stationing, loading and unloading, and duties and charges of tonniage, harbour, pilotage, lighthouse, quarantine, and all analogous duties and charges of whatsoever nature, levied in the name of or for the profit of the Government; public functionaries, private individuals, corporations or establishments of any kind.

In the event of Austria granting a preferential regime to any of the Allied or Associated Powers or to any other foreign Power, this regime shall be extended immediately and unconditionally to all the Allied and Associated Powers.

There shiall be no impediment to the movement of persons or vessels other than those arising from pre¬ scriptions concerning customs, police, sanitation, emigra¬ tion and immigration, and those relating to the import and export of prohibited goods. Such regulations must be reasonable and uniform and must not impede traffic unnecessarily.

Chapter II. — Clauses Relating to the Danube.

1. General Clauses Relating to River Systems Declared International.

Article 291. — The following river is declared inter¬ national: the Danube from Ulm; together with all navigable parts of this river system which naturally provide more than one State with access to the sea, with or without transhipment from one vessel to an¬ other, as well bs the portion of the course of the Morava (March) and the Thaya (Theiss) forrning the frontier between Czecho-Slovakia and Austria, and lateral canals and channels constructed either to dupli¬ cate or to improve naturally navigable sections of the specified river system or to connect two naturally navigable sections of the same river.

The same shall apply to the Rhine-Danube navigable waterway, should such a waterway be constructed, under the conditions laid down in Article 308.

Any part of the labove-mentioned river system which is not included in the general definition may be de¬ clared international by an agreement between the riparian States.

Article 292. — On the waterways declared to be international in the preceding Article, the nationals, property !and flags of all Powers shall be treated on a footing of perfect equality, no distinction being made to the detriment of the nationals, property or flag of any Power between them and the nationals, property or flag of the riparian State itself or of the most favoured nation.

Article 293. — Austrian vessels shall not be entitled to carry plassengers or goods by regular services be¬ tween the ports of any Allied or Associated Power, without special authority from such Power.

Article 294. — Where such charges are not precluded by any existing convention, charges varying on differ¬ ent sections of a river may be levied on vessels using the navigable channels or their approaches, provided that they iare intended solely to cover equitably the cost of maintaining in a navigable condition, or of improving, the river and its approaches, or to rneet expenditure incurred in the interests of navigation. The schedule of such charges shall be calculated on the basis of such expenditure and shall be posted up in the ports. These charges shall be levied in such a manner as to render any detailed examination of cargoes unnecessary, except in cases of suspected fraud or contravention.

Article 295. — • The transit of vessels, passengers and goods on these waterways shall be effected in accordance with the general conditions prescribed for transit in Section I above.

When the two banks of an international river are wiithin the same State goods in transit may be placed under seal or in the custody of customs agents. When the river forms ia frontier goods and passengers in transit shall be exempt from all customs formalities, the loading and unloading of goods, and the embarka¬ tion and disembarkation of passengers, shall only take place in the ports specified by the riparian State.

Article 296. — No dues of any kind other than those provided for in this Part shall be levied along the course or at the mouth of these waterways.

This provision shall not prevent the fixing by the riparian States of customs, local octroi or consumption duties, or the creation of reasonable iand uniform charges levied in the ports, in accordance with public tariffs, for the use of cranes, elevators, quays, ware¬ houses, and other similar constructions.

Article 297. — In default of any special organisation for darrying out the works connected with the upkeep and improvement of the international portion of a navigable system, each riparian State shall be bound to take the necessary measures to remove any obstacle or danger to navigation and to ensure the maintenance of good conditions of navigation.

If a State neglects to comply with this obligation any riparian State, or any State represented on the Inter¬ national Commission, may appeal to the tribunlal insti¬ tuted for this purpose by the League of Nations.

Article 298. — • The same procedure shall be followed in the case of a riparian State undertaking any works of a nature to impede navigation in the international section. The tribunal mentioned in the preceding Article shall be entitled to enforce the suspension or suppression of such works, making due allowance in its decisions for all rights in connection with irrigation, water-power, fisheries, and other national interests, which, with the consent of all the riparian States or of all the Stiates represented on the International Com¬ mission, shall be given priority over the requirements of navigation.

Appeal to the tribunal of the League of Nations does not require the suspension of the works.

Article 299. — The regime set out in Articles 292 and 294 to 298 above shall be superseded by one to be laid down in a General Convention drawn up by the Allied and Associated Powers, and approved by the League of Nations, relating to the waterways recognised in such Convention as Laving an international char¬ acter. This Convention shall apply in particular to the whole or part of the above-mentioned river system of the Danube, and such other parts of that river system as may be covered by a general definition.

Austria undertakes, in laccordance with the provisions of Article 331, to adhere to the said General Con¬ vention.

Article 300. — Austria shall cede to the Allied and Associated Powers concerned, within a maximum period of three months from the date on which notification shall be given her, a proportion of the tugs and vessels remaining registered in the ports of the river system referred to in Article 291 after the deduction of those surrendered by wiay of restitution or reparation. Austria shall dn the same way cede material of all kinds necessary to the Allied and Associated Powers concerned for the utilisation of that river system.

The number of the tugs and boats, and the amount of the material so ceded, and their distribution, shall be determined by an arbitrator or arbitrators nominated by the United States of America, due regard being had to the legitimate needs of the parties concerned, and particularly to the shipping trtaffic during the five years preceding the war.

All craft so ceded shall be provided with their fittings and gear, shall be in a good state of repair

and in condition to carry goods, and shall be selected from among those most recently built.

Wherever the cessions made under the pre¬ sent Article involve a change of ownership, the arbitrator or arbitrators shall determine the rights of the former owners as they stood on October

i5» 1918, and the amount of the compensation

to be paid to them, and shall also direct

the manner in which such payment is to be effected in each case. If the arbitrator or arbitrators find that the whole or part of this sum will revert directly or indirectly to States from whom reparation is due, they shall decide the sum to be placed under this head to the credit of the said States.

As regards the Danube the arbitrator or arbitrators referred to in this Article will also decide all questions as to the permanent allocation and the conditions thereof of the vessels whose ownership or nationiality is in dispute between States. Pending final allocation the control of these vessels shall be vested in a Commission consisting of Representatives of the United States of America, the British Empire, France and Italy, who will be empowered to make provisional arrangements for the working of these vessels in the general interest by any local organisation, or failing such arrangements by themselves, without prejudice to the final allocation.

As far as possible these provisional arrangements will be on a commercial basis, the net receipts by the Commission for the hire of these vessels being disposed of as directed by the Reparation Commission.

2. Special Clauses Relating to the Danube.

Article 30J . — The European Commission of the Danube reassumes the powers it possessed before the war. Nevertheless, as a provisional measure, only representatives of Great Britain, France, Italy and

Roumania shall constitute this Commission.

Article 302. — From the point where the competence of the European Commission ceases, the Danube system referred to in Article 291 shall be placed under the administration of an International Commission com¬ posed as follows:

2 representatives of German riparian States;

I representative of each other riparian State;

I representative of each non-riparian State repre¬ sented in the future on the European Commission of the Danube.

If certain of these representatives cannot be ap¬ pointed at the time of the coming into force of the present Treaty, the decisions of the Commission shall nevertheless be valid.

Article 303. — The InternationJal Commission provided for in the preceding Article shall meet as soon as possible after the coming into force of the present Treaty, and shall undertake provisionally the adminis¬ tration of the river in conformity with the provisions of Articles 292 and 294 to 298, until such time as a definitive statute regarding the Danube is concluded by the Powers nominated by the Allied land Associated Powers.

The decisions of this International Commission shall be taken by a majority vote. The salaries of the Commissioners shall be fixed and paid by their respective countries.

As a provisional measure any deficit in the ad¬ ministrative expense of this Internationlal Commission shall be borne equally by the States represented on the Commission.

In particular this Commission shall regulate the licensing of pilots, charges for pilotage and the ad¬ ministration of the pilot service.

Article 304. — Austria agrees to accept the regime which shall be laid down for the Danube by a Con¬ ference of the Powers nominated by the Allied and Associated Powers, which shall meet within one year after the coming into force of the present Treaty, and at which Austrian representatives may be present.

Article 305. — The mandate given bv Article 57 of the Treaty of Berlin of July 13, 1878, to Austria-Hungary, .and transferred by her to Hungary, to carry out works at the Iron Gates, is abrogated. The Com¬

mission entrusted with the administration of this part of the river shall lay down provisions for the settle¬ ment of accounts subject to the financial provisions of the present Treaty. Charges which may be necessary shall in no case be levied by Hungary.

Article 306. — Should the Czecho-Slovak State, the Serb-Croat-Slovene Satte, or Roumania, with the au¬ thorisation of or under mandate from the International Commission, undertake maintenance, improvement, weir, or other works on a part of the river system which forms la frontier, these States shall enjoy on the opposite bank, and also on the part of the bed which is outside their territory, all necessary facilities

for the survey, execution and maintenance of such works.

Article 307. — Austria shall be obliged to make to the European Commission of the Danube all restitutions, reparations and indemnities for damages inflicted on the Commission during the war.

Article 308. — Should a deep-draught Rhine-Danube navigable waterway be constructed, Austria hereby undertakes to accept the application to the said navigable wlaterway of the same regime as that prescribed in Articles 292 and 294 to 299 of the present Treaty.

Chapter III. — Hydraulic System.

Article 309. — In default of any provisions to the contrary, when as the result of the fixing of a new frontier the hydraulic system (canalisation, inundations, irrigation, drainage, or similar matters) in (a State is dependent on works executed within the territory of another State, or when use is made on the territory of a State, in virtue of pre-war usage, of water or hydraulic power, the source of which is on the terri¬ tory of another State, an agreement shall be made between the States concerned to safeguard the interests and rights acquired by each of them.

Failing an agreetnent, the matter shall be regulated by an arbitrator appointed by the Council of the League of Nations.

Article 310. — Unless otherwise provided, when use is made for municipal or domestic purposes in one State of electricity or water, the source of which as the result of the fixing of a new frontier is on the territory of another State, an agreement shall be made between the States concerned to safeguard the interests and rights acquired by

each of them.

Pending an agreement, central electric stations and waterworks shall be required to continue the supply up to an amount corresponding to the undertakings and contracts in force on November 3, 1918.

Failing an agreement, the matter shall be regulated by an Arbitrator appointed by the Council of the League of Nations.

SECTION III. — RAILWAYS.

Chapter I. — Freedom of Transit to the Adriatic

for Austria.

Article 31 1. — Free access to the Adriatic Sea is accorded to Austria, who with this object will enjoy freedom of transit over the territories and in the ports severed from the former Austro-Hungarian Monarchy.

Freedom of transit is the freedom defined in Article 284ˆ until such time as a General Convention on the subject shall have been concluded between the Allied and Associated Powers, whereupon _ the dispositions of the new Convention shall be substituted therefor.

Special Conventions between the Stlates or Ad¬ ministrations concerned will lay down the conditions of the exercise of the right accorded above, and will settle in particular the method of using the ports and the free zones existing in them, the establishment of international (joint) services and tariffs including through tickets and waybills, and the maintenance of the Convention of Berne of Otcober 14, 1890, and its supplementary provisions until its replacement by a new Convention.

Freedom of transit will extend to postal, telegraphic, and telephonic services.

Chapter II. — Clauses Relating to International

Transport.

Article 312. — Goods coming from the territories of the Allied and Associated Powers, and going to Austria, or in transit through Austria from or to the territories of the Allied and Associated Powers, shall enjoy on the Austrian railways as regards charges to be collected (rebates and drawbacks being taken into account), facilities, and all other matters, the most favourable treatment applied to goods of the

same kind carried on any Austrian linesj either in internal traffic, or ˆ for export, import or in transit, under similar conditions of transport, for example as regards length of route. The same rule shall be applied, on the request of one or more of the Allied and Associated Powers, to goods specially designated by such Power or Powers coming from Austria land going to their territories.

International tariffs established in accordance with the rates referred to in the preceding paragraph and involving through waybills shall be established when one of the Allied and Associated Powers shall require it from Austria.

However, without prejudice to the provisions of Articles 288 and 289, Austria undertakes to maintain on her own lines the regime of tariffs existing before the war as regards traffic to Adriatic and Black Sea

ports, from the point of view of competition with North German ports.

Article 313. — From the coming into force of the present Treaty the High Contracting Parties shall re¬ new, in so far as concerns them and under the reserves indicated in. the second paragraph of the present Article, the Conventions and Arrangements signed at Berne on October 14, 1890, September 20, 1893, July 16, 1895, June 16, 1898, and September 19, 1906, regarding the transportation of goods by rail.

If within five years from the date of the coming into force of the present Treaty a new Convention for the transportation of passengers, luggage and goods by rail shall have been concluded to replace the Berne Convention of October 14, 1890, and the subsequent additions referred to above, this new Convention and the supplementary provisions for international transport by rail which may be based on it shall bind Austria, even if she shall have refused to take part in the

E reparation of the Convention or to subscribe to it.

fntil a new Convention shall have been concluded, Austria shall conform to the provisions of the Berne Convention and the subsequent additions referred to above, and to the current supplementary provisions.

Article 314. — Austria shall be bound to co-operate in the establishment of through ticket services (for passengers and their luggage) which shall be required by any of the Allied and Associated Powers to ensure their communication by rail with each other and with all other countries by transit across the territories of Austria; in particular Austria' «hall, for this purpose, accept trains and carriages coming from the territories of the Allied and Associated Powers and shall for¬ ward them with a speed at least equal to that of her best long-distance trains on the same lines. The rates applicable to such through services shall not in any case be higher than the rates collected on Austrian internal services for the same distance, under the same conditions of speed and comfort.

The tariffs applicable under the same conditions of speed and comfort to the transportation of emigrants going to or coming from ports of the Allied and Asso¬ ciated Powers and using the Austrian railways, shall not be at a higher kilometric rate than the most favour¬ able tariffs (drawbacks and rebates being taken into account) enjoyed on the said railways by emigrants going to or coming from any other ports.

Article 315. — Austria shall not apply specially to such through services, or to the transportation of emi¬ grants going to or coming from the ports of the Allied and Associated Powers, any technical, fiscal or ad¬ ministrative measures, such as measures of customs examination, general police, sanitary police, and con¬ trol, the result of which would be to impede or delˆy such services.

Article 316. — - In case of _ transport partly by rail land partly by internal navigation, with or without through waybill, the preceding Articles shall apply to the part of the journey performed by rail.

Chapter III. — Rolling-Stock.

Article 317. — Austriaˆ undertakes that Austrian wagons shall be fitted with apparatus allowing:

(i) of their inclusion in goods trains on the lines of such of the Allied and Associated Powers as are parties to the Berne Convention of May 15, 1886, as modified on May 18, 1907, without hampering the

action of the continuous brake which may be adopted in such countries within ten years of the coming into force of the present Treaty, and

(2) of the inclusion of wagons of such countries in all goods trains on Austrian lines.

The rolling-stock of the Allied and Associated Pow¬ ers shall enjoy on the Austrian lines the same treat¬ ment as Austrian rolling stock as regards movement, upkeep and repairs.

Chapter IV. — Transfers of Railway Lines.

Article 318. — Subject to any special provisions con¬ cerning the transfer of ports, waterways and railways situated in the territories transferred under the present Treaty, and to the financial conditions relating to the concessionnaires and the pensioning of the personnel, the transfer of railways will take place under the following conditions;

(i) The works and installations of all the railroads shall be handed over complete and inˆ good condition.

(2) When a railway system possessing its own roll¬ ing stock is handed over in its entirety by Austria to one of the Allied and Associated Powers, such stock shall be handed over complete, in accordance with the last inventory before November 3,, 1918, and in a normal state of upkeep.

(3) As regards lines without any special rolling Stock, the distribution of the stock existing on the

system to which these lines belong shall be made by Commissions of experts designated by the Allied and Associated Powers, on which Austria shall be repre¬ sented. These Commissions shall have regard to the amount of the material registered on these lines in the last inventory before November 3, 1918, the length of track (sidings included), and the nature and amount of the traffic. These Commissions shall also specify the locomotives, carriages and wagons to be handed over in each case; they shall decide upon the condi¬ tions of their acceptance, and shall make the pro¬ visional arrangements necessary to insure their repair in Austrian workshops.

(4) Stocks of stores, fittings and plant shall be handed over under the same conditions as the rolling-stock.

The provisions of paragraphs 3 and 4 labove shall be applied to the lines of former Russian Poland converted by the Austro-Hungarian authorities to the normal gauge, such lines being regarded as detached from the Austrian and Hungarian State systems.

Chapter V. — Promsions Relating to Certain Raihvay Lines.

Article 319. — When as a result of the fixing of new frontiers a railway connection between two parts of the same country crosses another country, or a branch line from one country has its terminus in another, the conditions of working, if not specifically provided for in the present Treaty, shall be laid down in a con¬ vention between the railway administrations concerned. If the administrations cannot come to an agreement as to the terms of such convention, the points of difference shall be decided by commissions of experts composed as provided in the preceding Article.

The establishment of all the new frontier stations between Austria and the contiguous Allied and Asso¬ ciated States, as well as the working of the lines be¬ tween those stations, shall be settled by agreements similarly concluded.

Article 320. — With the object of insuring regular utilization of the railroads of the former Austro-Hun¬ garian Monarchy owned by private companies which, as a result of the stipulations of the present Treaty, will be situated in the territory of several States, the administrative and technical reorganization of the said lines shall be regulated in each instance by an agree¬ ment between the owning Company and the States territorially concerned.

Any differences on which agreement is not reached, including questions relating to the interpretation of con¬ tracts concerning the expropriation of the lines, shall be submitted to arbitrators designated by the (Council of the League of Nations.

This arbitration may, as regards the South Aus¬ trian Railway Company, be required either by the Board of Management or by the Committee represent¬ ing the bondholders.

Article 321. — Within a period of five years from the coming into force of the present Treaty, Italy may require the construction or improvement on Austrian territory of the new transalpine lines of the Col de Reschen and the Pas de Predil. Unless Austria decides to pay for the works herself, the cost of con¬ struction or improvement shall be paid by Italy. An arbitrator appointed by the Council of the League

of Nations shall, after the lapse of such period as may be fixed by the Council, determine the portion of the cost of construction or improvement which must be repaid by Austria to Italy on account of the increase of revenue on the Austrian railway system resulting from these works.

Austriaˆ shall hand over to Italy gratuitously the surveys, with their Annexes, for the construction of the following railway lines:

The line from Tarvis toˆ Trieste by Raibl, Plezzo, Caporetto, Canale and Gorizia;

The local line from S. Lucia de Tolmino to Caporetto;

The line from Tarvis to Plezzo (new scheme) ;

The Reschen line connecting Landeck and Mals.

Article 322. — In view of the importance to the Czecho-Slovak State of free communications between that State and the Adriatic, Austria recognises the right of the Czecho-Slovak State to run its own trains over the sections included within her territory of the following lines:

(1) from Bratislava (Pressburg) towards Fiume via Sopron, Szembathely and Mura Keresztur, and a bnanch from Mura Keresztur to Pragerhof;

(2) from Budejovic (Budweiss) towards Trieste via Linz, S. Michael, Klagenfurt, and Assling, and the branch from Klagenfurt towards Tarvisio.

On the application of either party, the route to be followed by the Czecho-Slovak trains may be modified either permanently or temporarily by mutual agreement

between the Czecho-SIovak Railway Administration and those or the railways over which the running powers are exercised.

Article 323* The trains for which the running powers are used shlall not engage in local traffic, except by agreement between Austria and the Czecho-SIovak State.

■ running powers will include, in particular, the

right to establish running sheds with small shops for minor repairs to locomotives and rolling-stock, and to appoint representatives where necessary to supervise the working of Czecho-SIovak trains.

Article 324. — The technical, administrative and financial conditions under which the rights of the CzechojSlovak State shall be exercised shall be laid down in a Convention between the Railway Adminis¬ tration of the Czecho-SIovak State and the Railway Administrations of the Austrian systems concerned. If the Administrations cannot come to an agreement on the terms of this Convention, the points of difference shall be decided by an arbitrator nominated by Great Britain, and his decisions shall be binding on all parties.

In the event of disagreement as to the interpretation of the Convention or of difficulties arising unprovided for in the Convention, the same form of arbitration will be adopted until such time as the League of Nations may lay down some other procedure.

Chapter VI. — Transitory Provision.

Article 325. — Austria shall carry out the instructions given her, in regard to transport, by an authorised body acting on behalf of the Allied and Associated Powers:

(1) For the carriage of troops under the provisions of the present Treaty, and of material, ammunition and supplies for army use;

(2) As a temporary measure, for the transportation of supplies for certain regions, as well as for the restora¬ tion, as rapidly as possible, of the normal conditions of transport, and for the organisation of postal and tele¬ graphic services.

Chapter VII. — Telegraphs and Telephones.

Article 326. — Notwithstanding any contrary stipula¬ tions in existing treaties, Austria undertakes to grant freedom of transit for telegraphic correspondence and telephonic communications coming from or going to any one of the Allied and Associated Powers, whether neighbours or not, over such lines as may be most suitable for international transit and in accordance with the tariffs in force. This correspondence

and these communications shall be subjected to no unnecessary delay or restriction; they shall enjoy in Austria national treatment in regard to every kind of facility and especially in regard to rapidity of transmission. No payment, facility or restriction shall depend directly or indirectly on the. nationality of the transmitter or the addressee.

Article 327. — In view of the geographical situation of the Czecho-SIovak State Austria agrees to the follow¬ ing modifications in the International Telegraph and Telephone Conventions referred to in Article 235 of Part X (Economic Clauses) of the present Treaty.

(1) On the demand of the Czecho-SIovak State Aus¬ tria shall provide and maintain trunk telegraph lines across Austrian territory.

(2) The annual rent to be paid bv the Czecho¬ slovak State for each of such lines will be calculated in accordance with the provisions of the above-mentioned Conventions, but unless otherwise agreed shall not be less than the sum that would be payable under those Conventions for the number of messages laid down in those Conventions as conferring the right to demand a new trunk line, taking as a basis the reduced tariff provided for in Article 23, paragraph 5, of the Inter¬ national Telegraph Convention as revised at Lisbon.

(3) So long as the Czecho-SIovak State shall pay the above minimum annual rent of a trunk line;

(a) The line shall be reserved exclusively for transit traffic to and from the Czecho-SIovak State;

(б) The faculty given to Austria by Article 8 of the International Telegraph Convention of July 22, 1875, to suspend international telegraph services shall not apply to that line.

(4) Similar provisions will apply to the provision and maintenance of trunk telephone circuits, but the rent payable by the Czecho-SIovak State for a trunk telephone circuit shall, unless otherwise agreed, be douljle the rent payable for a trunk telegraph line.

(5) The particular lines to be provided together v/ith any necessary administrative, techriical, and financial conditions not provided for in existing International Conventions or in this Article shall be fixed by a further Convention between the States concerned. In default of agreement on such Convention they will be fixed by an arbitrator appointed by the Council of the League of Nations.

(6) The stipulations of the present Article may be varied at lany time by agreement between Austria and the Czecho-SIovak State. After the expiration of ten years from the coming into force of this Treaty the conditions under which the Czecho-SIovak State shall enjoy the rights conferred by this Article may, in default of agreement by the parties, be modified at the request of either party by an arbitrlator designated by the Council of the League of Nations.

(7) In case of any dispute between the parties as to the interpretation either of this Article or of the Convention referred to in paragraph 5, this dispute shall be submitted for decision to the Permanent Court of International Justice to be established by the League of Nations.

SECTION IV. — ■ DISPUTES AND REVISION OF PERMANENT CLAUSES.

Article 328. — Disputes which may arise between interested Powers with regard to the interpretation and application of this Part of the present Treaty shall be settled as provided by the League of Nations.

Article 329. — At any time the League of Nations may recommend the revision of such of the above Arti¬ cles as relate to a permanent administrative regime.

Article 330. — The stipulations in Articles 284 to 290, 293. .312, 314 to 316, and 326 shall be subject to revision by the Council of the League of Nations at any time after three years from the coming into force of the present Treaty.

Failing such revision, no Allied or Associated Power can claim after the expiration of the above period of three years the benefit of any of the stipulations in the Articles enumerated above on behalf of any portion of its territories in which reciprocity is not accorded in respect of such stipulations. The period of three years during which reciprocity cannot be demanded may be prolonged by the Council of the League of Nations.

The benefit of the stipulations mentioned above can¬ not be claimed by States to which territory of the former Austro-Hungarian Monarchy has been trans¬ ferred, or which have arisen out of the dismemberment of that Monarchy, except upon the footing of giving in the territory passing under their sovereignty recip¬ rocal treatment to Austria.

SECTION V. — SPECIAL PROVISION.

Article 331. — Without prejudice to the special obligations imposed on her by the present Treaty for the benefit of the Allied land Associated Powers, Aus¬ tria undertakes to adhere to any General Conventions regarding the international regime of transit, waterways, ports or railways which may be concluded by the Allied and Associated Powers, with the approval of the League of Nations, within five years of the coming into force of the present Treaty.

Part XIII. — Labor.

(Labor Clauses are similar to those of Part XIII of German Treaty.)

Part XIV. — Miscellaneous Provisions.

Article 373. — Austria undertakes to recognise and to accept the conventions made or to be made by the Allied and Associated Powers or any of them with any other Power as to the traffic in arms and in spirit¬ uous liquors, and also as to the other subjects dealt with in the General Acts of Berlin of February 26, 1885, and of Brussels of July 2, 1890, and the con¬ ventions completing or modifying the same.

Article 374. — The High (Contracting Parties declare and place on record that they have taken note of the Treaty signed by the Government of the French Re¬ public on July 17, 1918, with His Serene Highness the Prince of Moruaco defining the relations between France and the Principality.

Article 375. — The High Contracting Parties, while they recognise the guarantees stipulated by the Treaties of 1815, and especially by the Act of November 20, 1815, in favour of Switzerland, the said guarantees constituting international obligations for the mainte¬ nance of peace, declare nevertheless that the provisions of these treaties, conventions, declarations and other supplementary Acts concerning the neutralised zone of Savoy, as laid down in paragraph i of Article 92 of the Final Act of the Congress of Vienna and in para¬ graph 2 of Article 3 of the Treaty of Paris of November 20, 1815, are no longer consistent with present con¬ ditions. For this reason the High Contracting Parties take note of the agreement reached between the French Government and the Swiss Government for the abroga¬ tion of the stipulations relating to this zone which are and remain abrogated.

The High Contracting Parties also agree that the stipulations of the

Treaties of 1815 and of the other supplementary Acts concerning the free zones of Upper Savoy and the Gex district are no longer consistent with present conditions, and that it is for France and Switzerland to come to an agreement together with a view to settling between themselves the status of these territories under such conditions as shall be considered suitable by both countries.

ANNEX.

I. .The Swiss Federal Council has informed the French Government on May 5, 1919, that after examin¬ ing the provisions of Article 435 of the .Peace con¬ ditions presented to Germany by the Allied and Asso¬ ciated Powers in a like spirit of sincere friendship it has happily reached the conclusion that it was possible to acquiesce in it under the following conditions and reservations;

(1) The neutralized zone of Haute-Savoie.

(a) It will be understood that as long as the Federal Chambers have not ratified the agreement come to be¬ tween the two Governments concerning the abrogation of the stipulations in respect of the neutralized zone of Savoy, nothing will be definitively settled, on one side or the other, in regard to this subjet.

(b) The assent given by the Swiss Government to the abrogation of the above-mentioned stipulations pre¬ supposes, in conformity with the text adopted, the recognition of the guarantees , formulated in favour of Switzerland by the Treaties of 1815 and particularly by the Declaration of November 20, 1815.

(c) The agreement between the Governments of

France and Switzerland for the abrogation of the above-mentioned stipulations will only be considered as_ valid if the Treaty of Peace contains this Article in its present wording. In addition the Parties to the Treaty of Peace should endeavour to obtain the assent of the signatory Powers of the Treaties of 1815 and of the Declaration of November 20, 1815, which are not

signatories of the present Treaty of Peace.

(2) Free zone of H'aute-Savoie and the district of Gex:

(a) The Federal Council makes the most express reservatiops to the interpretation to be given to the statement mentioned in the last paragraph of the above Article for insertion in the Treaty of Peace,

which provides that “the stipulations of the Treaties of 1815 and other supplementary acts concerning the free zones of Haute-Savoie and the Gex district are no longer con¬ sistent with present conditions.” The Federal Council would not wish that its acceptance of the above word¬ ing should lead to the conclusion that it would agree to the suppression of a system intended to give neighbouring territory the benefit of a special regime which is appropriate to the geographical and economical situation and which hias been well tested.

In the opinion of the Federal Council the question is not the modification of the customs system of the zones as set up by the Treaties mentioned above, but only the regulation in a manner more appropriate to the economic conditions of the present day of the terms of the exchange of goods between the regions in ques¬ tion. The Federal Council has been led to make the preceding observations by the perusal of the draft Con¬ vention concerning the future constitution of the zones which was annexed to the note of April 26 from the French Government. While making the above reserva¬ tions the Federal Council declares its readiness to examine in the most friendly spirit any proposals which the French Government may deem it convenient to make on the subject.

(b) It is conceded that the stipulations of the Treaties of 1815 and other supplementary acts relative to the free zones will remain in force until a new arrangement is come to between France and Switzer¬ land to regulate matters in this territory.

II. The French Government have addressed to the Swiss Government, on May 18, 1919, the following note in reply to the communication set out in the preceding paragraph :

In a note dated May 5 the Swiss Legation in Paris was good enough to inform the Government of the French Republic that the Federal Government adhered to the proposed Article to be inserted in the Treaty of Peace between the Allied and Associated Governments and Germany.

The French Government have taken note with much pleasure of the agreement thus reached, and, at their request, the proposed Article, which had been accepted by the Allied land Associated Governments, has been inserted under No. 435 in the Peace conditions pre¬ sented to the German Plenipotentiaries.

The Swiss Government, in their note of May 5 on

this subject, have expressed various views and reserva¬ tions.

Concerning the observations relating to the free zones of Haute-Savoie and the Gex district, the French Gov¬ ernment have the honour to observe that the provisions of the last paragraph of Article 435 are so clear that their purport cannot be misapprehended, especially where it implies that no other Power but France and Switzer¬ land will in future be interested in that question.

The French Government, on their part, are anxious to protect the interests of the French territories con¬ cerned, and, with that object, having their special situa¬ tion in view, they bear in mind the desirability of assuring them a suitable customs regime and determin¬ ing, in a manner better suited to present conditions, the methods of exchanges between these territories and the adjacent Swiss territories, while taking into account the reciprocal interests of both regions.

It is understood thiat this must in no way prejudice the right of France to adjust her customs line in this region in conformity with her political frontier, as is done on the other portions of her territorial boundaries, and as was done by Switzerland long ago on her own boundaries in this region.

The French Government are pleased to note on this subject in what a friendly disposition the Swiss Govern¬ ment take this opportunity of declaring their willingness to consider any French proposlal dealing with the sys¬ tem to be substituted for the present regime of the said free zones, which the French Government intend to formulate in the same friendly spirit.

Moreover, the French Government have no doubt that the provisional maintenance of the regime of 1815 as to the free zones referred to in the above mentioned paragraph of the note from the Swiss Legation of May 5, whose object is to provide for the passage from the present regime to the conventional regime, will clause no delay whatsoever in the establishment of the new situation which has been found necessary by the two Governments. This remark applies also to the ratification by the Federal Chambers, dealt with in paragraph i (o), of the Swiss note of May 5, under the heading “ Neutralized zone of Haute-Savoie.”

Article 376. — The Allied and Associated Powers agree that where Christian religious missions were being maintained by Austrian

societies or persons in territory belonging to them, or of which the government is en¬ trusted to them in accordance with the present Treaty, the property which these missions or missionary so¬ cieties possessed, including that of trading societies whose profits were devoted to the support of missions, shall continue to be devoted to missionary purposes. In order to ensure the due execution of this underbaking the Allied and Associated Governments will hand over such property to boards of trustees appointed by or approved by the Governments and composed of persons holding the faith of the Mission whose property is in¬ volved.

The Allied and Associated Governments, while con¬ tinuing to maintain full control as to the individuals by whom the Missions are conducted, will safeguard the interests of such Missions.

Austria, taking note of the labove undertaking, agrees to accept all arrangements made or to be made by the Allied or Associated Governments concerned for carry¬ ing on the work of the said missions or trading societies and waives all claims on their behalf.

Article 377. — ˆWithout prejudice to the provisions of the present Treaty, Austria undertakes not to put for¬ ward directly or indirectly against any Allied or Asso¬ ciated Power, signatory of the present Treaty, any pecuniary claim based on events which occurred at any time before the coming into force of the present Treaty.

The present stipulation will bar completely and finlally all claims of this nature, which will be thence¬ forward extinguished, whoever may be the parties in interest.

Article 378. — ‘ Austria accepts and recognises as valid and binding all decrees and orders concerning Austro-Hungarian ships and Austrian goods and all orders relating to the payment of costs made by any Prize Court of anv of the Allied or Associated Powers, and undertakes not to put forward any claim arising out of such decrees or orders on behalf of any Aus¬ trian national.

The Allied and Associated Powers reserve the right to examine in such manner as they may determine all decisions and orders of Austro-Hungarian Prize Courts, whether affecting the property rights of nationals of those Powers or of neutral Powers. Austria agrees to furnish copies of all the documents constituting the record of the cases, including the decisions and orders made, and to accept and give effect to the recommenda¬ tions made after such examination of the cases.

Article 379. — The High Contracting Parties agree that, in the absence of a subsequent agreement to the contrary, the Chairman of any Commission established by the present Treaty shall in the event of an equality of votes be entitled to a second vote.

Article 380. — Except where otherwise provided in the present Treaty, in all dases where the Treaty provides for the settlement of a question affecting particularly certain States by means of a special Con¬ vention to be concluded between the States concerned, it is understood by the High Contracting Parties that difficulties arising in this connection shall, until Aus¬ tria is admitted to membership of the League of Nations, be settled by the Principal Allied and Asso¬ ciated Powers.

Article 381. — ˆ In the present Treaty the expression “ former Austrian Empire ” includes Bosnia and Herzegovina except where the text implies the contrary. This provision shall not prejudice the rights and obligations of Hungary in such territory.

The present Treaty, in French, in English, and in Italian, shall be ratified. In case of divergence the Freneh text shall prevail, except in Parts I (Covenant of the League of Nations) and XIII (Labour), where the French and English texts shall be of equal force.

The deposit of ratifications shall be made at Paris las soon as possible.

Powers of which the seat of the Government is out¬ side Europe will be entitled merely to inform the Gov¬ ernment of the French Republic through their diplomatic representative at Paris that their ratification has been given; in that case they must transmit the instrument of ratification as soon as possible.

A first proces-verbal of the deposit of ratifications will be drawn up as soon as the Treaty has been ratified by Austria on the one hand, and by three of the Principal Allied and Associated Powers on the other hand.

From the date of this first proces-verbal the Treaty will come into force between the High Contracting Parties who have ratified it. For the determination of all periods of time provided for in the nresent Treaty this date will be the date of the coming into force the Treaty.

In all other respects the Treaty will enter into force for each Power at the date of the deposit of its ratification.

The French Government will transmit to all the signatory Powers a certified copy of the proces-verbaux of the deposit of ratifications.

In faith whereof the above-named Plenipotentiaries have signed the present Treaty.

Done at St. Germain-en-Laye, the loth day of Sept, one thousand nine hundred and nineteen, in a single copy which will remain deposited in the archives of the P'rench Republic, and of which authenticated copies will be transmitted to each of the Signatory Powers.

(3) Bulgarian Treaty, The. The Allied and Associated Powers handed the text of a treaty to the Bulgarian Peace Delegates at Paris, 19 Sept. 1919. This Treaty is arranged on the same plan as the Austrian Treaty. The following parts are identical with the Austrian Treaty :

Preamble.

Part I. — Covenant of the League of Nations.

Part VI. — Penalties.

Part X. — Aerial Navigation.

Part XII. — Labor Convention.

Part II. — The Future Frontiers of Bulgaria.

On the North, the frontier with Roumania remains unchanged.

(Dn the West, the frontier with the Serb-Croat-Slovene State for the most part follows the line of the old frontier with Serbia. Small portions of territory are ceded to the Serb-Croat-Slovene State, of which the most important is the town-of Strumnitzia and the surrounding district.

A modification is introduced into the southern frontier with territories to be subsequently attributed by the Principal Allied and Associated Powers and the new boundary follows a line which may be drawn

roughly from a point about eight miles southwest of Bashmakli to Kilkik, passing close to Ardabashi and Daridere, which remain in Bulgarian territory and crossing the Kartal Dagh and the Tokatjik Dagh. .

On the SouthEast line a slight modification taking in a smtall piece of Turkish territory northwest of Mustafa Pasha is introduced. The Black Sea forms as before the Eastern frontier.

Part III. — Political Clauses.

SECTION I. — SERB-CROAT-SLOVENE STATE.

Bulgaria recognizes the Serb-Croat-Slovene State and renounces in favour of that State all rights and title over the territories of the Bulgarian Monarchy situated outside the frontiers of Bulgaria, as defined by the present Treaty or by any Treaties concluded for the purpose of completing the present settlement. A Com¬ mission, consisting of seven members, five of whom shall be nominated by the principal Allied and Associated Powers, one by the Serb-Croat-Slovene State, and one by Bulgaria, shall be constituted within 15 days of the coming into force of the present Treaty to trace on the spot the frontier line. Bulgarian nationals who became resident in the territories assigned to the Serb-Croat-Slovene State after i Jan. 1910, will require a permit from the Serb-Croat-Slovene State to acquire Serb-Croat-Slovene nationality. All other Bulgarian nationa,ls resident in those territories will acquire Serb-Croat-Slovene nationality ipso facto and lose their Bulgarian nationality.

SECTION II. — GREECE.

Bulgaria renounces in favour of Greece all rights and titles over the territories of the Bulgarian Monarchy situated outside the frontiers of Bulgaria as laid down in the sections dealing with frontiers and recognized by the present Treaty as forming part of Greece. Bulgarian nationals habitually resident in the territories assigned to Greece in accordance with *he present Treaty will obtain Greek nationality ipso facto and will lose their Bulgarian nationality. They will, however, be entitled within a period of two years from the coming into force of the present Treaty, if over 18 years of age, to opt for Bulgarian nationality, a similar privilege being accorded to Greeks over 18 years of age who are Bulgarian nationals habitually resident in Bulgaria who may wish to opt for Greek nationality. The proportion and nature of

the financial obligations of Bulgaria which Greece will assume on account of the territory placed under her sovereignty will be determined in accordance with the financial clauses of the present Treaty.

SECTION III. — THRACE.

Bulgaria renounces in favour of the Principal Allied and Associated Powers all rights and title over the territories in Thrace which used to belong to the Bul¬ garian Monarchy and which being situated outside the new frontiers of Bulgaria have not at present been assigned to any State. Bulgaria undertakes to accept whatever settlement may be made by the Principal Allied and Associated Powers in regard to these terri¬ tories and the Principal Allied and Associated Powers undertake, on the other hand, to ensure economic outlets for Bulgaria to the Aegean Sea under the conditions which will be fixed at a later date.

SECTION IV. — PROTECTION OF MINORITIES.

The provisions for the protection of minorities repro¬ duce exactly those laid down in the Austrian Treaty, adding the proviso that all persons not nationals of any other State habitually resident in Bulgaria at the date of the coming into force of the present Treaty, as well as all' persons born in Bulgaria who are not born nationals of another State, ipso facto become Bulgarian nationals.

SECTION V. — GENERAL PROVISIONS.

Bulgaria undertakes to recognize all Treaties or rgree-ments which may be entered into by the Allied and Associated Powers with States now existing or coming into existence in future in the whole or part of the former Empire of Russia as it existed on i Aug. 1914, and to recognize the frontiers of any such States as determined therein.

Bulgaria accepts definitely the abrogation of the Brest-Litovsk Treaties and of all Treaties, Conventions, and Agreements entered into by her with the Maximalist Government in Russia.

The Allied and Associated Powers formally reserve the rights of Russia to obtain from Bulgaria restitution and reparation based on the principles of the present Treaty. Bulgaria undertakes to recognize the Treaties of Peace and additional Conventions which have been or may be concluded by the Allied and Associated Powers with the Powers who fought on the side of Bulgaria.

Bulgaria declares that she recognizes the Protectorate proclaimed over

Egypt by Great Britain on 18 Dec. 1914. and that she will make no claim on behalf of herself

or her nationals to the benefits or immunities deriyed from the regime of the capitulations in Egypt regarding all Treaties, agreements, and contracts concluded by Bulgaria with Egypt as abrogated as from ii Oct. 1915.

Bulgaria declares that she recognizes the French protectorate in Morocco, and that she will make no claim on behalf of herself or her nationals to the bene¬ fits or immunities derived from the regime of the capitulations in Morocco regarding all Treaties, agree¬ ments, arrangements, and contracts concluded by Bul¬ garia with Morocco as abrogated as from ii Oct. 1915.

Part IV. — Military, Naval, and Air Clauses.

SECTION I. — MILITARY CLAUSES.

The military terms fix the total number of effectives of the Bulgarian Army, the sole function of which shall be to maintain internal order and control frontiers, at 20,000, including officers, and it is provided that there will be no other military forces raised outside this figure. This army shall be recruited both as regards officers land men on a voluntary basis; in the case of officers (who shall not be retired before the age of 40), for not less than 20 years' service, and in the case of noncommissioned officers and men. for not less than 12 years' service. The number of customs, forestry, or police officials shall be fixed by a military InterAllied Commission of Control, and in no case shall the number of these officials who are armed with rifles exceed 10,000, so that the total number of rifles in use in Bulgaria shall not e'xceed 30,000.

The proportion of officers, including personnel, staffs, and special services, shall not exceed one-twentieth of the total effectives with the colours, and that of non¬ commissioned officers shall not exceed one-

fifteenth of the total effectives with the colours. The effectives of units shall be compulsorily fixed between the maximum and minimum figures laid down in the Treaty.

On the expiration of three months of the coming into force of the present Treaty, there must only exist in Bulgaria one military school for the sole purpose of the recruitment of officers for the authorized units. The number of students admitted to instruction in the school shall be strictly in proportion to the vacancies to be filled in the officer cadres, and both cadres and students shall be reckoned as part of the effectives of the Bulgarian Army.

Within three months of the coming into force of the present Treaty, the Bulgarian Government shall deposit in places notified by the Allied and Associated Powers any surplus of armament and munitions exceed¬ ing the figures fixed per thousand men in the present Treaty, and no other stock, depot, or reserve of munF tions shall be formed. The number and calibre of guns constituting the fixed normal armament of fortified places existing at present in Bulgaria shall constitute the maximum amount which may not be exceeded. Within three months of the coming into force of the present Treaty, the maximum stock of ammunition for these guns will be reduced to and maintained at the rates of 1,500 rounds per gun of the calibre of 105 mm. and under, and 500 rounds per gun of higher calibre.

No new fortifications shall be constructed in Bulgaria. No poisonous gas or liquid fire shall be manufactured or imported, nor any tanks nor armoured cars, and within three months of the coming into force of the present Treaty, all arms, munitions, land war material of whatever origin or kind existing in Bulgaria in excess of the authorized quantity shall be handed over to the principal Allied and Associated Powers at such point in Bulgarian territory as they may appoint. The Allied land Associated Powers shall also decide on the disposal of such material.

The manufacture of arms, munitions, and of war material shall only be carried on in one single factory, controlled by and belonging to the State, whose output shall be strictly limited to such manufacture as is sanctioned above.

SECTION II. — NAVAL CLAUSES.

The naval terms provide that from the date of the coming into force of

the Treaty, all Bulgarian war¬ ships, including submarines existing or under construc¬ tion, are finally to be surrendered to the principal Allied and Associated Powers or broken up. Submarines miay not be constructed or acquired even for commercial pur¬ poses. All naval arms, munitions, and other war ma¬ terial belonging to Bulgaria at the date of the Armistice must be surrendered to the Allies. The Bulgarian wire¬ less station lat Sofia will be under Allied supervision and may only be used for commercial messages during the three months after the coming into force of the present Treaty. Nor during the same period May Bulgaria build lany more high-power wireless stations.

SECTION III. — AIR CLAUSES.

The air clauses provide that the armed forces of Bulgaria must not include any military or naval air forces. The entire personnel of the air forces in Bulgaria is to be demobilized within two months.

The aircraft of the Allied land Associated Powers is to enjoy full liberty of passage and landing over and in Bulgarian territory until the complete evacuation of that territory by the Allied and Associated troops. The manufacture of aircraft and piarts of aircraft is for¬ bidden for six months. All military and naval air¬ craft, including dirigible and aeronautical material, are to be delivered on the ratification of the present Treaty.

SECTION IV. — INTERALLIED COMMISSIONS OF

CONTROL.

All Military, Naval, and Air Clauses contained in the present Treaty for the execution of which a time limit is prescribed shall be executed by Bulgaria under the control of InterAllied Commissions appointed for this purpose by the Principal Allied and Associated Powers.

The InterAllied Commissions of Control may estab¬ lish their organiziations at Sofia and shall be entitled to proceed as often as they think fit to any point in Bulgarian territory or to send subcommissions to any such point. The Bulgarian Government must furnish to the InterAllied Commissions of Control all such information and documents as the latter may think necessary to ensure the execution of their mission, and all means (both in personnel land material) which said Commissions may need to ensure complete execution of the Military, Naval, or Air Clauses. The Bulgarian Government must

also attach a qualified representative to each InterAllied Commission of Control with the duty of receiving the communications which the Com¬ mission may have to address to the Bulgarian Govern¬ ment and of furnishing it with or procuring all informa¬ tion or documents demanded.

The upkeep and cost of the InterAllied Commissions of Control and the expense involved by their work shall be borne by Bulgaria.

Part V. — Reparation and Financial Clauses.

This section follows the similar one in the Austrian Treaty, except for one article, which in the case of Bulgaria, provides for an InterAllied Commission of Inquiry into offences lagainst the laws of war com¬ mitted by the Bulgarian authorities and to search for non-repatriated Allied and Associated nationals.

Parts VII and VIII. — Reparation and Fi¬ nancial Clauses.

REPARATION.

The Allied and Associated Governments, while recog¬ nizing that the resources of Bulgaria are insufficient to enable adequate reparation to be made, agree to accept from Bulgaria such reparation as she can make, and fix the sum of 2,250,000,000 (two-and-a-quarter milliards) of francs, in gold, which amount (except as hereinafter provided) shall be discharged by a series of half-yearly payments on i January and i July in each year, beginning on i July 1920. The payments on I July 1920, and i Jan. 1921, shall represent interest at the rate of 2 percent per annum on the total sum from i Jan. 1920. Thereafter elach half-yearly payment shall include payment of interest at 5 percent per annum on the amount of the capital sum out¬ standing and the provision of a sinking fund sufficient to extinguish the total amount on i Jan. 1958.

The sums shall be remitted through the InterAllied Commission referred to in this Treaty to the Reparation Commission created by the Treaty of Peace with Germany on 28 June 1919 (hereinafter referred to as the Reparation Commission), in accordance with the arrangements lalready made. The Reparation Com¬ mission shall have power at any time to dispose, either by sale or otherwise, of gold bonds based on the payments to be made by Bulgaria, the nominal amount of which bonds shall be fixed by it in con¬ sultation with the InterAllied Commission, but shall in no case exceed the total capital sums then out¬ standing. In such case Bulgaria undertakes to deliver

to the Reparation Commission through the InterAllied Commission the necessary bonds in such form, number, and denominations and terms as the Reparation Com¬ mission may determine. Bonds so delivered shall be direct obligations of the Bulgarian Government, but all arrangements for the service of the bonds shall be made by the InterAllied Commission. The InterAllied Commission shall pay all interest, sinking fund,

and other charges connected with the bonds out of the half-yearly payments to be made by Bulgaria in accordance with this Treaty. Any surplus shall con¬ tinue to be paid to the order of the Reparation Com¬ mission.

The InterAllied Commission shall have discretion to recommend to the Reparation Commission either the reduction of any particular payment due or a reduc¬ tion of the total capital sum to be paid by Bulgaria, and the Reparation Commission shall have power by a majority of votes to make any such reduction or postponement up to the extent recommended by the InterAllied Commission. Bulgaria, on the other hand, shall have power lat any time to make immediate pay¬ ments in reduction of the total capital sum due over and above the half-yearly payments.

While Bulgaria recognizes the transfer to the Allied and Associated Powers of any financial claims which her late allies may have against her, particularly those derived from the execution of undertakings entered into during the war, the Allied and Associated Powers • agree not to require any payment in respect of those claims which have been taken into account in fixing the ■amount of the financial reparation to be paid by Bulgaria.

Bulgaria undertakes to return to Greece, Roumania, and the Serb-Croat-Slovene State respectively all rec¬ ords, archives, and articles of archaeological, historic, or artistic interest which have been taken away from the territories of these countries during the present war, and live stock of the descriptions and in the numbers set out in the

Treaty, in restitution for the animals taken away by her during the war from the territories of the countries named. Bulgaria under¬ takes by way of special compensation for the destruc¬ tion caused to the coal mines situated on Serbian terri¬ tory by the Bulgarian armies to deliver to the Serb-Croat-Slovene State during five yelars from the coming into force of the present Treaty 50,000 (fifty thousand) tons of coal a year from the output of the State mines at Pernik, provided these deliveries are sanctioned by the InterAllied Commission, which will require to be satisfied that such deliveries of coal will not unduly interfere with the economic life of Bulgaria.

The InterAllied Commission above referred to shall be esta'blished at Sofia as soon as possible after the coming into force of the present Treaty. It shall consist of three members, to be nominated respectively by .the Governments of the British Empire, France, and Italy. Bulgaria shall be represented at the Commis¬ sion by a Commissioner who shall take part in the sittings whenever invited by the Commission to do so, but shall not have the right to vote.

In the law relating to the Commission there shall' be laid down a list of the taxes and revenues (now existing or hereafter to be created) estimated to be sufficient to produce the sums above referred to. This list shall include all revenues or receipts arising from concessions made ot to be made for the working of mines or quarries, or fcrr. the carrying on of any works of public utility, or of any monopolies for the mianufacture or sale of any articles in Bulgaria. This list may be altered from time to time with the unani mous consent of the Commission.

In case of default by Bulgaria in the performance of her obligations the Commission shall be entitled to the extent, and for the period it may determine, to assume the full control of and undertake the collection of such taxes and sources of revenue, and to hold and disburse the proceeds thereof, land to apply any net proceeds after meeting the cost of administration and collection to the satisfaction of reparation obligations of Bulgaria, subject to any priorities laid down in this Treaty.

FINANCIAL.

Bulgaria is required to make the following payments in the following order of priority —

1. Cost of military occupiation.

2. The service of such part of the external Ottoman Public Debt as a Comrnission appointed for the purpose may attribute to Bulgaria.

3. The cost of reparation as prescribed by the present Treaty.

Part IX. — Economic Clauses.

The Economic Clauses are virtually identical with those in the Austrian Treaty.

In the section on property, rights, and interests, a modification has been introduced. The Bulgarian Gov¬ ernment is required to revoke all the exceptional war measures affecting the propertyˆ of Allied nationals, whereas similar measures put into operation by the Allied and Associated Powers lare declared final and binding. Bulgaria, in a series of new provisions, is

made responsible for certain obligations incurred by her owing to her acquisition of certain property after the Balkan Wars.

Part XI. — Ports, Waterways and Railways.

The section dealing with Ports, Waterways, and Railwiays follows almost exactly the lines of the Austrian Treaty.

Part XIII. — ˆMiscellaneous Provisions.

This section follows the similar one in the Austrian Treaty, except for a few minor points.

(4) The Polish Treaty. The treaty with Poland was the first of the formal agree¬ ments through which the Entente and Associ¬ ated Powers bound the new states of eastern Europe to maintain institutions of modem polit¬ ical freedom under the general supervision of the League of Nations. By this treaty Poland was bound to protect minorities against dis¬ crimination, and to assume payment of part of the Russian debt.

M. Clemenceau, President of the Peace Con¬ ference, transmitted the treaty to the Polish government on 24 June 1919 accompanied by a long letter to Paderewski, the Polish premier, in which were set forth the reasons for the various conditions, unusual to such a document, expressed in the treaty. The salient features of this letter are given below, followed by the text of the treaty as signed by the Allied and

Associated Powers on 28 June 1919:

On behalf of the Supreme Council of the principal allied and associated powers, I have the honor of com¬ municating to you herewith, in its final form, the text of the treaty which, in accordance with Article 93 of the treaty of peace with Germany, Poland will be asked to sign on the occasion of the confirmation of her recognition as an independent State and of the trans¬ ference to her of the territories included in the former German Empire which are assigned to her by the said treaty.

The principal provisions were communicated to the Polish delegation in Paris in May last and were subse¬ quently communicated direct to the Polish Government through the French Minister at Warsaw. The council since has had the advantage of the suggestions which you were good enough to convey in the memorandum of June 16, and as the result of a study of the sugges¬ tion modifications have been introduced in the text of the treaty. The council believes that it will be found that, by the modification, the principal points to which attention was drawn in your memorandum have, in so far as they relate to specific provisions of the treaty, been adequately covered.

In formally communicating to you the final decision of the principal allied and associated powers in this matter I should desire to take this opportunity of ex¬ plaining in a more formal manner than has hitherto been employed the conditions by which the principal allied and associated powers have been guided in deal¬ ing with the question.

Guiding Principles.

One. — In the first place, I would point out that the treaty does not constitute any fresh departure. It has for long been the established procedure of the public law of Europe that when a State is created, or even when large accessions of territory are made to an established State, the joint and formal recognition by the great powers should be accompanied by the require¬ ment that such State should, in the form of a binding international convention, undertake to comply with cer¬ tain principles of government. This principle, for which there are numerous other precedents, received the explicit sanction when, at the last great assembly of European powers — the Congress of Berlin — the sovereignty and independence of Serbia, Montenegro, and Rumania were recognized. It is desirable to re¬ call the words used on this occasion by the British, French, Italian and German plenipotentiaries, as re¬ corded in the protocol of June 28, 1878… .

Two.— The principal allied and associated powers are of the opinion that they would be false to the responsibility which rests upon them if on this occasion they departed from what has become an established tradition. In this connection I must also recall to your

consideration the fact that it is through the endeavors and sacrifices of the powers in whose name I am addressing you that the Polish Nation owes the recov¬ ery of its independence. It is by their decision that sovereignty is being re-established over the territories in question, and that the inhabitants of these territories are being incorporated in the Polish Nation. It is on the support which these powers will afford to the League of Nations that the future Poland will, to a large extent, depend for the secure possession of these territories.

There rests, therefore, upon these powers an obliga¬ tion which they cannot evade to secure in the most permanent and solemn form guarantees for certain essential rights which will afford to the inhabitants the necessary protection, whatever changes may take place in the internal constitution of the Polish State.

It is in accordance with this obligation that Clause 93 was inserted in the treaty of peace with Germany. This clause relates only to Poland, but a similar clause applies the same principles to Czechoslovakia, and other clauses have been inserted in the treaty of peace with Austria, and will be inserted in those with Hungary and Bulgaria, under which similar obligations will be undertaken by other States which, under those treaties, receive large accessions of territory.

The consideration of these facts would be sufficient to show that by the requirement addressed to Poland at the time when it is receiving in the most solemn manner the joint recognition of the re-establishment of its sovereignty and independence, and when large acces¬ sions of territory are being assigned to it, no doubt is thrown upon the sincerity of the desire of the Polish Government and the Polish Nation to maintain the general principles of justice and liberty. Any such doubt would be far from the intention of the principal allied

and associated powers.

Three. — It is indeed true that the new treaty differs in form from earlier conventions dealing with similar matters. The change of form is a necessary conse¬ quence and an essential part of the new system of international relations which is now being built up by the establishment of the, League of Nations. Under the older system the guarantee for the execution of similar provisions was vested in the great powers. Ex¬ perience has shown that this was in practice ineffective, and it was also open to the criticism that it might give to the great powers, either individually or in combina¬ tion, a right to interfere in the internal constitution of the States affected, which could be used for political purposes.

Under the new system the guarantee is intrusted to the League of Nations. The clauses dealing with this guarantee have been carefully drafted, so as to make it clear that Poland will not be in any way under the tutelage of those powers who are signatory to the treaty.

I should desire, mtoreover, to point out to you that provision has been inserted in the treaty by which dis¬ putes arising out of its provisions may be brought before the court of the League of Nations. In this way differences which might arise will be removed from the political sphere and placed in the hands of a judicial court, and it is hoped that thereby an impartial de¬ cision will be facilitated, while at the same time any danger of political interferences by the powers in the internal affairs of Poland will be avoided.

Four. — The particular provisions to which Poland and the other States will be asked to adhere differ to some extent from those which were imposed on the new States at the Congress of Berlin. But the obliga¬ tions imposed upon new States seeking recognition have at all times varied with the particular circum¬ stances.

The situation with which the powers have now to deal is new, and experience has shown that new pro¬ visions are necessary. The territories now being trans¬ ferred both to Poland and to other States inevitably include a large population speaking languages and be¬ longing to races different from that of the people with whom they will be incorporated. Unfortunately, the races have been estranged by long years of bitter hos¬ tilities. It is believed that these populations will be more easily reconciled to their new position if they know that from the very beginning they have assured protection and adequate guarantees against any danger of unjust treatment or oppression. The very knowledge that these guarantees exist will, it is hoped, materially

help the reconciliation which all desire, and will, in¬ deed, do much to prevent the necessity of its enforce¬ ment.

Five. — ■ To turn to the individual clauses of the present treaty. Article 2 guarantees to all inhabitants those elenientary rights which are, as a matter of fact, secured in every civilized State. Clauses 3 to 6 are designed to insure that all the genuine residents in the

territories now transferred to Polish sovereignty shall in fact be assured of the full privileges of citizenship. Articles 7 and 8, which are in accordance with prece¬ dent, provide against any discrimination against those Polish citizens who by their religion, their language, or by their race differ from the large mass of the Polish population. It is understood that, far from raising any objection to the manner of the articles, the Polish Government have already, ,of their own accord, de¬ clared their firm intention of basing their institutions on .the cardinal principles enunciated therein. .

Six. — Clauses 10 and 12 deal specifically with the Jewish citizens of Poland. The information at the dis¬ posal of the principal allied and associated powers as to the existing relations between the Jews and the other Polish citizens has led them to the conclusion that, in view of the historical development of the Jew¬ ish question and the great animosity aroused by it, special protection is necessary for the Jews of Poland. These clauses have been limited to the minimum which seems necessary under the circumstances of the present day, viz., the maintenance of Jewish schools and the protection of the Jews in the religious observance of their Sabbath.

It is believed that these stipulations will not create any obstacle to the political unity of Poland. They do not constitute any recognition of the Jews as a sepa¬ rate political community within the Polish State. The educational provisions contain nothing beyond what is in fact provided in the educational institutions of many highly organized modern States. There is nothing inconsistent with the sovereignty of the State in recognizing and supporting schools in which chil¬ dren shall be brought up in the religious influences to which they are accustomed in their home. Ample safe¬ guards against any use of non-Polish language to en¬ courage a spirit of national separation have been pro¬ vided in the express acknowledgment that the provi¬ sions of this treaty do not prevent the Polish State from making the Polish language obligatory in all its schools and educational institutions… .

In conclusion, I desire to express to you on behalf of the allied and associated powers the very sincere satisfaction which they feel at the re-establishment of Poland as an important State. They cordially welcome the Polish Nation on its re-entry into the family of nations. They recall the great services which the ancient Kingdom of Poland rendered to Europe both in public affairs and by its contributions to the progress of mankind, which is the common work of all civilized nations. They believe that the voice of Poland will add to the wisdom of their common deliberations in the cause of peace and harmony, that its influence will be used to further the spirit of liberty and justice, both in internal and external affairs, and that thereby it will help in the work of reconciliation between the nations which, with the conclusion of peace, will be the common task of humanity.

TEXT OF THE POLISH TREATY.

The United States of America, the British Em¬ pire, France, Italy, and Japan, the Principal Allied AND Associated Powers, on the One Hand; and Poland, on the Other Hand:

Whereas, The allied and associated powers have, by the success of their arms, restored to the Polish Nation the independence of which it had been un¬ justly deprived; and

Whereas, By the proclamation df March 30, 1917, the Government of Russia assented to the re-establish¬ ment of an independent Polish State; and

Whereas, The Polish State, which now, in fact, ex¬ ercises sovereignty over those portions of the former Russian Emoire which are inhabited by a majoritv of Poles has already been recognized as a sovereign and important State by the principal allied and associated powers; and

Whereas, Under the treaty of peace concluded with Germany by the allied and associated powers, a treaty of which Poland is a signatory, certain portions of the former German Empire will be incorporated in the territory of Poland; and

Whereas, Under the terms of the said treaty of peace, the boundaries of Poland not already laid down are to be subsequently determined by the prin¬ cipal allied and associated powers;

The United States of America, the British Empire, France, Italy, and Japan, on the one hand, confirming their recognition of the Polish State, constituted within the said limits as a sovereign and independent mem¬ ber of the family of nations and being anxious to

in¬ sure the execution of the provisions of Article 93 of the said treaty of peace with Germany;

Poland, on the other hand, desiring to conform her institutions to the principles of liberty and justice, and

to give a sure guarantee to the inhabitants of the terri¬ tory over which she assumed sovereignty; for this pur¬ pose the following representatives of the high con¬ tracting parties:

The President of the United States of America; his Majesty the King of the United Kingdom of Great Britain and Ireland and of the British dominions beyond the seas, Emperor of India; the President of the French Republic; his Majesty the King of Italy; his Majesty the Emperor of Japan, and the President of the Polish Republic, after having exchanged their full powers, found in good and due form, have agreed as follows:

Chapter I. *

Article i. — Poland undertakes that the' stipulations contained in Articles 2 and 8 of this chapter shall be recognized as fundamental law, and that no law, regu¬ lation, or official action shall conflict or interfere with these stipulations, nor shall any law, regulation, or official action prevail over them.

Article 2. — Poland undertakes to assure full and-complete protection to life and liberty to all inhabitants of Poland, without distinction of birth, nationality, language, race, or religion.

All inhabitants of Poland shall be entitled to the free exercise, whether public or private, of any creed, religion, or belief whose practices are not inconsistent with public order or public morals.

Article 3. — Poland admits and declares to be Polish nationals ipso facto Hungarian or Russian nationals habitually resident, at the date

of the coming into force of the present treaty, in territory which is or may be recognized as forming part of Poland under the treaties with Germany, Austria, Hungary, or Russia, respectively, but subject to any provisions in the said treaties relating to persons who became resident in such territory after a specified date.

Nevertheless, the persons referred to above who are over 12 years of age will be entitled under the con¬ ditions contained in the said treaties to opt for any other nationality which may be open to them. Option by a husband will cover his wife and option by parents will cover their children under 18 years of age.

Persons who have exercised the above right to option must, except where it is otherwise provided in the treaty of peace with Gerrnany, transfer within the succeeding twelve months their place of residence to the State for which they have opted. They will be entitled to retain their immovable property in Polish territory. They may carry with them their movable property of every description. No export duties may be imposed upon them in connection with the removal of such property.

Article 4. — Poland admits and declares to be Polish nationals, ipso facto and without the requirement of any formality, persons of German, Austrian, Hun¬ garian, or Russian nationality who were born in the said territory of parents habitually resident there, even if at the date of the coming into force of the present treaty they are not themselves habitually residerit there.

Nevertheless, within two years after the coming into force of the present treaty, these persons may make a declaration before the competent Polish authorities in the country in which they are resident, stating that they abandon Polish nationality, and they will then cease to be considered as Polish nationals. In this connection a declaration by a husband will cover his wife, and a declaration by parents will cover their children under 18 years of age.

Article 5.ˆ — Poland undertakes to put no hindrance in the way of the exercise of the right which the per¬ sons concerned have, under the treaties concluded or to be concluded by the allied and associated powers with Germany, Austria, Hungary, or Russia, to choose whether or not they will acquire Polish nationality.

Article 6. — All persons born in Polish territory who are born nationals of another State shall ipso facto become Polish nationals.

Article 7. — All Polish nationals shall be equal be¬ fore the law and shall enjoy the same civil and political rights without distinction as to race, language, or religion.

Differences of religion, creed, or confession shall not prejudice any Polish national in_ matters relating to the enjoyment of civil or political rights, as for admis¬ sion to public employments, functions, and honors, or the exercise of professions and industries.

No restriction shall be imposed on the free use by any Polish national of any language in private inter¬ course, in commerce, in religion, m the press, or in publications of any kind, or at public meetings.

Notwithstanding any establishment by the Polish Government of an official language, adequate facilities shall be given to Polish nationals of non-Polish speech for the use of their language, either orally or in writing, before the courts.

Article 8. — Polish nationals who belong to racial, religious, or linguistic minorities shall enjoy the same treatment and security in law and in fact as the Polish nationals. In particular they shall have an equal right to establish, manage, and control at their own expense charitable, religious, and social institutions, schools and other educational establishments, with the right to use their own language and to exercise their religion freely therein.

Article 9. — Poland will provide, in the public edu¬ cational system in towns and districts in which a con¬ siderable proportion of Polish nationals of other than Polish speech are residents, adequate facilities for in¬ suring that in the primary schools instruction shall be given to the children of such Polish nationals through the medium of their own language. This provision shall not prevent the Polish Government from making the teaching of the Polish language obligatory in the said schools.

In towns and districts where there is a considerable proportion of Polish nationals belonging to racial, re¬ ligious, or linguistic minorities, these minorities shall be assured an equitable share in the enjoyment and application of the sums which may be provided out of public funds under the State, municipal, or other budgets, for educational, religious, or charitable pur¬ poses.

The provisions of this article shall apply to Polish citizens of German speech only in that part of Poland which was German territory on Aug. i, 1914.

Article 10. — • Educational committees appointed locally by the Jewish communities of Poland will, sub¬ ject to the general control of the State, provide for the distribution of the proportional share of public funds allocated to Jewish schools in accordance with Article 9, and for the organization and management of these schools.

The provision of Article 9 concerning the use of language in schools shall apply to these schools.

Article ii. — Jews shall not be compelled to per¬ form any act which constitutes a violation of their Sabbath, nor shall they be placed under any disability by reason of their refusal to attend courts of law or to perform any legal business on their Sabbath. This provision, however, shall not exempt Jews from such obligations as shall be imposed upon all other Polish citizens for the necessary purposes of military service, national defense, or the preservation of public order.

Poland declares her intention to refrain from order¬ ing or permitting elections, whether general or local, to be held on a Saturday, nor will registration for electoral or other purposes be compelled to be per¬ formed on a Saturday.

Article 12. — Poland agrees that the stipulations in the foregoing articles, so far as they affect persons belonging to racial, religious, or linguistic minorities, constitute obligations of international concern, and shall be placed under the guarantee of the League of Na¬ tions. They shall not be modified without the assent of a majority of the Council of the League of Nations. The United States, the British Empire, France, Italy, and Japan hereby agree not to withhold their assent from any modification in these articles which is in due form assented to by a majority of the Council of the League of Nations.

Poland agrees that any member of the Council of the League of Nations shall have the right to bring to the attention of the Council any infraction, or any danger of infraction, of any of these obligations, and that the Council may thereupon take such action and give such direction as it may deem proper and effective in the circumstances.

Poland further agrees that any difference of opinion as to question of law or fact arising out of these arti¬ cles, between the Polish Government and any of the principal allied and associated powers, or

any other power a member of the Council of the League of Nations, shall be held to be a dispute of an interna¬ tional character under Article 14 of the Covenant of the League of Nations. The Polish Government hereby consents that any such dispute shall, if the other party thereof demands, be referred to the Per¬ manent Court of International Justice. The decision of the Permanent Court shall be final and shall have the same force and effect as an award under Article 13 of the covenant.

Chapter II.

Article 13. — Each of the principal allied and asso¬ ciated powers, on the one part, and Poland on the other shall be at liberty to appoint diplomatic represen¬ tatives to reside in their respective capitals, as well as Consul Generals. Consuls, Vice-Consuls, and Consular Agents, to reside in the towns and ports of their respective territories.

Consul Generals, Consuls, Vice Consuls, and Consular Agents, however, shall not enter upon their duties until they have been admitted in the usual manner by the Government in the territory of which they are stationed.

Consul Generals, Consuls, Vice Consuls, and Con¬ sular Agents shall enjoy all the facilities, privileges, exemptions, and immunities of every kind which are or shall be granted to Consular officers of the most favored nation.

Article 14. — Pending the establishment of a per¬ manent tariff by the Polish Government, goods originat¬ ing in the allied and associated States shall not be subject to any higher duties on importation into Poland than the most favorable rates of duty appli¬ cable to goods of the same kind under either the Ger¬ man, Austro-Hungarian, or Russian customs tariffs on July I, 1914.

Article 15. — Poland undertakes to make no treaty, convention, or arrangement, and to take no other ac¬ tion, which will prevent her

from joining in any gen¬ eral agreement for the equitable treatment of the com¬ merce of other States that may be concluded under the auspices of the League of Nations within five years from the coming into force of the present treaty.

Poland also undertakes to extend to all the allied and associated States any favors or privileges in cus¬ toms matters which they may grant during the same period of five years to any State with which, since August, 1914, the Allies have been at war, or to any State which may have concluded with Austria special customs arrangements as provided for in the treaty of peace to be concluded with Austria.

Article 16. — Pending the conclusion of the general agreement referred to above, Poland undertakes to treat on the same footing as national vessels, or vessels of the most favored nation, the vessels of all the allied and associated States which accord similar treat¬ ment to Polish vessels.

By way of exception from this provision, the right of Poland or any other allied or associated State to confine her maritime coasting trade to national vessels is expressly reserved.

Article 17. — ˆPending the conclusion, under the auspices of the League of Nations, of a general con¬ vention to secure and maintain freedom of communica¬ tions and of transit, Poland undertakes to accord free¬ dom of transit of persons, goods, vessels, carriages, wagons, and mails in transit to or from any allied or associated State over Polish territory, including terri¬ torial waters, and to treat them at least as favorably as the persons, goods, vessels, carriages, wagons, and mails respectively of Polish or of any other more favored nationality, origin, importation, or ownership, as regards facilities, charges, restrictions, and all other matters.

All charges imposed in Poland on such traffic in transit shall be reasonable having regard to the con¬ ditions of the traffic. Goods inˆ transit shall be exempt from all customs or other duties. Tariffs for transit traffic across Poland and tariffs between Poland and any allied or associated power, involving through tickets or waybills, shall be established at the request of that allied or associated power.

Freedom of transit will extend to postal, telegraphic, and telephonic services.

It is agreed that no allied or associated power can claim the benefit of these provisions on behalf of any part of its territory in which

reciprocal treatment is not accorded with respect to the same subject matter.

If within a period of five years from the coming into force of the present treaty no general convention as aforesaid shall have been concluded under the auspices of the League of Nations, Poland shall be at liberty at any time thereafter to give twelve months' notice to the Secretary General of the League of Na¬ tions to terminate obligations of this article.

Article 18. — Pending the conclusion of a general convention on the international regime of waterways, Poland undertakes to apply to the river system of the Vistula (including the Bug and the Narest) the regime applicable to international waterways set out in Articles 332 to 337 of the treaty of peace with Germany.

Article 19. — ■ Poland undertakes to adhere, within twelve months of the coming into force of the present treaty, to the international conventions specified in Annex I.

Poland undertakes to adhere to any new conven¬ tion, concluded with the approval of the Council of the League of Nations within five years of the coming into force of the present treaty, to replace any of the international instruments specified in Annex I.

The Polish Government undertakes within twelve months to notify the Secretary General of the League

of Nations whether or not Poland desires to adhere to either or both of the international conventions specified in Annex II.

Until Poland has adhered to the two conventions last specified in Annex I she agrees, on condition of reciprocity, to protect by effective measures the indus¬ trial, literary, and artistic property of nationals of the allied and associated States. In the case of any allied or associated State not adhering to the said conventions, Poland agrees to continue to afford such effective pro¬ tection on the same conditions until the conclusion of a special bilateral treaty or agreement for that purpose with §uch allied or associated State.

Pending her adhesion to the other conventions speci¬ fied in Annex I, Poland will secure to the nationals of the allied and associated powers the advantages to which they would be entitled under the said conven¬ tions.

Poland further agrees, on condition of reciprocity, to recognize and protect all rights in any industrial, literary, or artistic property belonging to the nationals of the allied and associated States now in force or which, but for the war, would have been in force in any part of her territories before their transfer to Poland. For such purposes they will accord the extensions of time agreed to in Articles 307 and 308 of the treaty with Germany.

ANNEX .1.

Telegraphic and Radio-Telegraphic Conventions.

International Telegraphic Convention signed at St. Petersburg July 10-22, 1875.

Regulations and tariffs drawn up by the Interna¬ tional Telegraph Conference signed at Lisbon June ii,

1908.

International Radio-Telegraphic Convention, July 5,

1912.

Railway Conventions.

Conventions and arrangements signed at Berne on Oct. 14, 1890, Sept. 20, 1893, July 16, 1895, and Sept. 19, 1906, and the current supplementary provisions made under those conventions.

Agreement on May 15, 1886, regarding the sealing of railway trucks subject to custom inspections, and protocol of May 18, 1907.

Agreement of May 15, 1886, regarding the technical standardization of railways, as modified on May 18,

1907.

Sanitary Convention.

Convention of Dec. 3, 1903.

Other Conventions.

Convention of Sept. 26, 1906, for the suppression of night work for women.

Convention of Sept. 26, 1906, for the suppression of the use of white phosphorus in the manufacture of matches.

Conventions of May 18, 1904, and May 4, 1910, re¬ garding the suppression of the white slave traffic.

Convention of May 4, 1910, regarding the suppres¬ sion of obscene publications.

International conventions of Paris of March 20, 1883, as revised at Washington in 1911, for the protec¬ tion of industrial property.

International convention of Sept. 9, 1886, revised at Berlin on Nov. 13, 1908, and completed by the addi¬ tional prqtocol signed at Berne on March 20, 1914, for the protection of literary and artistic works.

ANNEX II.

Agreement of Madrid of April 14, 1891, for the prevention of false indications of origin on goods, re¬ vised at Washington in 1911, and agreement of Mad¬ rid of April 14, i89i,_ for the international registra¬ tion of trademarks, revised at Washington in 1911.

Article 20. — All rights and privileges accorded by the foregoing articles to the allied and associated States shall be accorded equally to all States members of the League of Nations.

The present treaty, of which the French and Eng¬ lish texts are both authentic, shall be ratified. It shall come into force at the same time as the treaty of peace with Germany.

The deposit of ratifications shall be made at Paris.

Powers of which the seat of Government is outside Europe will be entitled merely to inform the Govern¬ ment of the French Republic through their diplomatic representative at Paris that their ratification has been given. In that case they must transmit the instrument of ratification as soon as possible.

A proces-verbal of the deposit of ratifications will be drawn up.

The French Government will transmit to all the signatory powers a certified copy of the proces-verbal ot the deposit of ratifications.

Article 21. — Poland agrees to assume responsibility for such proportion of the Russian public debt and other Russian public liabilities of any kind as may be assigned to her under a special convention between the principal allied and associated powers on the one hand and Poland on the other, to be prepared by a commis¬ sion appointed by the above States. In the event of the commission not arriving at an agreement, the point at issue shall be referred for immediate arbitration to the League of Nations.

In faith whereof the above-named plenipotentiaries have signed the present treaty.

Done at Versailles, [June 28, 1919,] in a single copy which will remain deposited in the archives of the French Republic, and of which authenticated copies will be transmitted to each of the signatory powers.

(5) Franco-American-British Treaty. On 28 June 1919 treaties were concluded at Versailles between Great Britain and France, and between the United States and France, by the terms of which the two great powers pledge immediate aid to France in the event of an unprovoked act of aggression by Germany. The treaties were signed at the same time as the German treaty and were pub¬ lished to the world on 2 July. ˆ The treaties are to be submitted to the Council of the League of Nations, which will decide if they are in conformity with the Covenant of the League. Italy was resentful because she was not in¬ cluded and hints were given out that one effect would be to drive Italy into alliance with Ger¬ many. In the United States those who opposed the League of Nations pointed to these treaties as proof of their contention that the proposed League of Nations was ineffective. The text of the treaty between France and the United States is as follows:

Considering that the United States of America and the Government of the French Republic are equa ly animated by a desire to maintain the peace of the world, so hˆappily restored by the treaty signed at Versailles on June 28, which put an end to the war begun by the aggression of the German Empire and terminated by the

defeat of that power, and •

Considering that the United States of America and the Government of the French Republic, fullˆy con¬ vinced that an unprovoked aggression directed by Ger¬ many against France would not only violate at the same time the letter and spirit of the Versailles Treaty, to which the United States and France are parties, thus exposing France anew to the intolerable burden of un¬ provoked war, but that such aggression on the act re¬ puted by the Treaty of Versailles as being agamst all the powers signatory to the treaty and _ calculated to trouble the peace of the world, involving inevitably and directly the States of Europe and

world, as experience has amply and unhappily demon

ˆˆˆˆConsidering that the United States of America and the Government of the French Republic apprehend that the stipulations concerning the left bank of the Rhine cannot assure immediately to France, on the one hand, and to the United States, on the other, as signatory powers to the Treaty of Versailles, appropriate security

ˆ”“ˆC?n°s?(iuemiy, the United States of America and the Government of the French Republic, having de¬ cided to conclude a treaty to realize these necessary ends, Woodrow Wilson, President of the United States of America, and Robert Lansing, Secˆtary of ˆta e, specially authorized to that end by the Presˆent of the United States of America, and Georges Clemenceau, President of the Council of Ministers ˆd Minister of War and Stephen Pichon, Minister of Foreign Affairs, specially authorized to that end by Raymond Poincare, President of the French Republic, have agreed upon the

I — The following stipulations concerning the left bank of the Rhine are contained in the Peace Treaty signed with Germany at Versailles, June 28,

1919, by the United States of America, by the Govern¬ ment of the

French Republic, and by the Pritish Em¬ pire, among other powers;

Article 42. — Germany is forbidden to maintain or construct any fortifications either on the left bank of the Rhine or on the right bank to the west of a line drawn fifty kilometers to the east of the Rhine.

Article 43. — In the area defined above' the mainte¬ nance and the assembly of armed forces, either perma¬ nently or temporarily, and military manoeuvres of any kind, as well as the upkeep of all permanent works for mobilization, are in the same way forbidden.

Article 44. — In case Germany violates in any man¬ ner whatever the provisions of Articles 42 and 43 she shall be regarded as committing a hostile act against the powers signatory of the present treaty and as cal¬ culated to disturb the peace of the world.

In case these stipulations should not assure imme¬ diately to France appropriate security and protection, the United States of America shall be bound to come immediately to her aid in case of any unprovoked act of aggression directed against her by Germany.

Article 2. — ■ The present treaty, couched in terms analogous to those of a treaty concluded on the same date and to the same end between Great Britain and the French Republic, a copy of which is hereto an¬ nexed, will not enter into force until the moment when the latter is ratified.

Article 3.— The present treaty must be submitted to the Council of the Society of Nations and must be recognized by the council, deciding if occasion arise by majority, as an engagement in conformity with the cove¬ nant of the society. It will remain in force until, upon dernand of one of the parties to the treaty, the council deciding if occasion arise by a majority, finds that the society itself assures sufficient protection.

Article 4 ~ The present treaty shall before ratifica¬ tion be submitted to the Chambers of the French Par¬ liament for approval and it shall be submitted to the Senate of the United States of America at the same time as the treaty of Versailles shall be submitted for assent t() ratification. _ Ratifications shall be exchanged at the time of deposit in Paris of the ratifications of the Treaty of Versailles, or as soon afterward as possible.

Then follow the signatures of M. Clemen¬ ceau, M. Pichon, Mr. Wilson and Mr. Lansing.

(6) The Brest-Litovsk Treaty. Soon after the coup dˆeiat in Russia which resulted in the overthrow of the Kerensky government and the rise to power of the Maximalists (Bolsheviki), the German government took the initiative in peace pourparlers with the new government. On 15 Dec. 1917 an armistice was signed by Germany, Austria-Hungary and the Bolsheviki, which was to last until 17 Feb. 1918, during which period of two months the terms of peace could be discussed and embodied in a treaty. The demands of the Central Powers were such that the. Russian Soviet government refused to grant them. On 10 Feb. 1918 the Russians announced that they had withdrawn from the war without signing a peace and Russian troops on all fronts were ordered to demobilize at once. To this unprecedented attitude of a nation negotiating peace the Central Powers answered that Russia's abrupt withdrawal from the dis¬ cussions at Brest-Litovsk constituted a breach of the armistice conditions and consequently a state of war existed. On 17 February Germany began a new invasion of Russia, and Turkey invaded the Caucasus on the 23d. Trotsky, the People's Commissioner (Bolshevik Minister of War) urged the peasants and workers to resist, but Lenin, the Russian Premier, was able to induce the Central Soviet Committee to accept the terms offered by Germany. The Germans ended their advance on 3 March 1918 and on the same day the Treaty of Brest-Litovsk was signed. The Entente obliged Germany to re¬ nounce this treaty under the drastic terms of the Treaty of Versailles signed 28 June 1919.

It is of more than passing interest in view of the fact that it was the only treaty resulting from the Great War that was based on the formula of ˆˆno annexations, no indemnities, and self-determination.® The formula as in¬ terpreted by Germany during 1918 proved de¬ ceptive.

The chief provisions of the treaty are as follows :

I. The state of war between the Bolshevik! and the Central Powers is terminated.

II. The high contracting parties agree to refrain from all agitation against the other signatory governments.

III. Russia cedes all claim to Esthonia, Finland, Livonia Courland, Lithuania, Russian Poland, and Ukrainia. Fur¬ thermore Russia promises not to interfere in the internal affairs of these districts. Germany and Austria is to decide, their status agreeable to the wishes of their respective populations.

IV. After the conclusion of a general peace the Central Powers agree to evacuate all other Russian territory occupied by them. Russia agrees to evacuate aˆl Anatolian provinces and return them to Turkey. Russian Armenia is also to be evacuated and allov/ed self-determination in agreement wiih Turkey.

V. Russia will without delay carry out the complete demobilization of her army. Russia will further transfer her warships to Russian harbors and leave them there until a general peace or immediately disarm. Warships of states continuing in a state of war with the Quadruple Alliance will be treated as Russian warships in so far as they are within Russian control. Shipping routes are to be kept permanently free from floating mines.

VI. Russia undertakes immediately to conclude peace with the. Ukrainian People's Republic and to recognize the peace treaty between this state and the powers of the Quadruple Alliance. Ukrainian territory will be immediately evacuated by Russia. The Aland Islands fortifications are to be removed with all possible dispatch.

VII. The political and economic independence and ter¬ ritorial integrity of Persia and Afghanistan are to be respected by the contracting parties.

VIII. Prisoners of war of both sides will be repatriated.

IX. The contracting parties mutually renounce indem¬ nification of their war costs.

X. Diplomatic and consular relations will be resumed immediately.

XI. The prescriptions contained in Appendices 2 to 5 shall govern the economic relations between the powers of the Quadruple Alliance and Russia.

XII. The restoration of public and private relations, interned civilians,

etc., will be regulated by separate treaties with Russia.

XIII. This article is in regard to the authoritative texts, in German, Russian, Hungarian, Bulgarian and Turkish, specifying the relations in which each shall govern.

XIV. The present treaty will be ratified and ratifications exchanged as soon as possible in Berlin. The treaty enters into force on its ratification.

The sianatures of the plenipotentiaries are attached.

For the results of the operation of this treaty see The Eastern Front (p. 381) this section. For its renunciation by Germany see (1). Treaty with Germany in this article.

19. AMERICAN NEUTRALITY. When the European War broke out in August 1914, it immediately drew into the circle of its opera¬ tions and influences all the civilized nations of the world. Eventually three powers were allied with Germany and 27 states declared war upon her. Italy remained neutral for a year and China for four years: otherwise the only coun¬ try significant in a military sense that kept out of the war was the United States ; and that power at once found itself entangled in the net of European diplomacy, because it was not to the interest of the great belligerents to foster neutral rights, and because the intensity of the war made real neutrality almost im¬ possible.

Attitude of the American People. — Some German-Americans would have liked to see the United States at least apply a brand of neutral¬

ity favoring Germany. A small but eminent group of Americans from the first believed and urged that the United States should go to the rescue of Great Britain, and incidentally of France, as the belligerents who were closest to us in history and policy. By far the greater part of the American people, however, insisted upon maintaining the neutrality traditional in all European conflicts. Neutrality was observed by the American government with little difficulty or friction in the 11 wars, — ‘eight European, one Asiatic and two African, to which one or more European powers were parties after 1854.

The United States was further committed to stiff principles of non-interference by its policy during the Civil War from 1861 to 1865. The nation then went to an extreme in resent¬ ment at w’hat was thought

to be a premature recognition by Great Britain of the belligerent status of the Southern Confederacy. In the effort to check the trade of neutrals with the enemy it insisted on restrictions, especially as to ^^continuous voyages,® which proved incon¬ venient when it became a neutral in 1914. On the other hand, the United States during the Civil War insisted on standards of strict ac¬ countability for the building and dispatch of vessels of war by neutral nations, and subse¬ quently claimed and received an indemnity for the slackness of Great Britain in that particular (see International Claims and Disputes),

As a nation with a vast and expanding import and export trade it was the interest and policy of the United States, when the Great War broke out, to preserve the broad privileges to which was given the general term ˆTreedom of the seas.® In every considerable war for many years fighting populations had drawn food and other supplies from the United States : hence commercial reasons combined with the traditions of the nation to make the government and people stand by the policy of impartial trade with all belligerents, and to insist on strict con¬ struction of the limitations on naval warfare.

Principles of Neutrality. — A hard struggle, lasting for centuries, gradually built up among nations the idea that neutrality is an inter¬ national right, and not simply a privilege. The slow gains made were swept away by the Napoleonic Wars, in which all the nations of Europe, as well as the United States of Amer¬ ica, were at one time or another drawn into active warfare. When large-scale wars were renewed, beginning with the Crimean War in 1854, strong neutral powers, some of them with considerable ocean trade, insisted on rights which were enlarged by international agree¬ ments. The general congresses of Paris in 1856, and of Berlin in 1878, and particularly The Hague Conferences of 1899 and 1907, made new definitions of the rights and duties of neutrals ; so that in 1914 there was a body of inter¬ national law upon this subject recognized throughout the world. The most important of these principles are as follows:

A. General Principles. — (1) Every sovereign nation has a right to abstain from war, even though its closest neighbors are in combat. No previous friendship or trade relations or com¬ mercial treaties require any power to join in a war in which it was not otherwise involved. To remain neutral is unfriendly to nobody.

B. Neutral Trade. — (2) Citizens of neutrals

who happen to be in belligerent countries arc entitled to protection and to the advantage of commercial and other treaties with those bellig¬ erents.

(3) Neutrals on the other hand are bound to refrain from ˆunneiitral actsˆˆ which might give aid and comfort to any of the belligerenis. No military expeditions are to he prepared on their soil; no ships of war to be built or fitted up; no passage is permitted to belligerent troops across neutral territory; no hostilities al¬ lowed by land or sea within the territorial re¬ strictions of the neutrals,

(4) Hospitals and Red Cross services are exempt from capture ; and neutrals engaged in such service are to be respected.

(5) The neutral preserves the right of con¬ tinuing intercourse in goods or persons, by land or sea, by railroad or by ship, with all the belligerents, subject to the limitations on sea commerce described below.

(6) Neutral vessels capturable at all are entitled to an adjudication by a prize court. The vessel is to be preserved if possible, and the passengers and crews must be taken off in safety.

ˆ(7) By the Declaration of Paris (16 April 1856), the signatory powers (not including the United States) agreed mot to use privateers for the capture of merchant vessels.

(8) Enemy’s vessels and enemy’s property in such vessels are liable to capture anywhere on the high seas. The efforts to prohibit capture of private property at sea were unsuccessful.

(9) Enemy’s property (except contraband) is safe from capture in neutral ships.

(10) Neutral goods (except contraband) are safe from capture in enemy ships.

C. Freedojn of the Seas. — Neutral com¬ merce is subject to three

very important limita¬ tions as follows :

(11) Contraband, that is, commodities and persons directly intended or adapted for mili¬ tary purposes, are capturable even if owned by a neutral or in a neutral ship.

(12) A blockade of any port or coast by a belligerent is considered directly a military operation so that neutral vessels bound in or out are subject to capture anywhere on the high seas. Blockades in order to be binding must be effective.

(13) Neutral goods, if contraband in nature, may by the doctrine of continuous voyages be captured if bound from one neutral port to another, where the ultimate destination is a belligerent port.

(14) The definition of contraband was un¬ certain in 1914. In the Conference of London in 1911, an international Declaration was drawn under the leadership of Great Britain, which made careful distinction between ^^contraband,® ^'conditional contraband® and *non-contraband® ; but this document was subsequently withdrawn hy the British government before ratification. The progress of the art of war has added many commodities to the group of materials plainly intended for war; and it has always been a debatable question whether food is necessarily contraband.

Not all of these principles were admitted by all nations ; but, with the exception of privateer¬ ing, which played no part in the Great War, they were substantially held hy the American government in 1914, and had been applied Ijy

it ill the Spanish War of 1898 and claimed in other wars to which the United States was not a party. The statute books contained a series of provisions for enforcing the neutrality of the United States by penalties bn those who might aid the belligerents. Unfortunately the neutrality statutes of the United States, as pointed out early in the war by the Attorney-General, were defective and inadequate. They date back to 1794 with a revision in 1797 and additions in 1818. This body of law was sub¬ stantially incorporated into the revised laws of 1878 and was in force in 1914. In spite of the advice of the Department of Justice, the only new statute enacted during the period of the neutrality was that of 4 March 1915, authorizing the withholding of clearances where ^ffhere was reasonable cause to believe® that the cargo was intended to supply belligerent vessels of war at sea.

Diplomatic Intercourse. — At the outbreak of the war Great Britain, Austria and Germany requested the United States to represent them in enemy countries, and Turkey, Serbia and other countries made like requests. This threw upon the United States a large responsibility with reference to individuals and property of citizens of one state in the territory of an enemy, and also made the United States min¬ isters intermediaries in questions relating to the status and treatment of prisoners of war and of civilians arrested and interned. In addition the American ministers in all the belligerent countries represented the general interests of the United States as a neutral, and were the channel for claims of the owners of ships and cargoes which were seized or captured.

An early duty thrown upon the officials and the government was that of aiding American travelers stranded in Europe, particularly in Germany and Austria, at the outbreak of hos¬ tilities. Congress appropriated $2,750,000, and the government chartered ships to bring home those who could not obtain passage on the regu¬ lar lines. By these m.eans all stranded trav¬ elers and others who wished to come to Amer¬ ica were brought across the Atlantic.

Another unexpected service of American diplomatic and consular officials was in the territories, especially in western Europe, oc¬ cupied by the Central Powers. Minister Brand Whitlock was ordered to remain at his post in Brussels even when all but a fraction of the kingdom of Belgium was occupied by the Ger¬ mans, Germany could not refuse to recognize him without admitting that Belgium was con¬ sidered a conquered and extinguished nation. Official and unofficial agents of the vast system of relief organized for the people of Belgium and northern France were also unwillingly re¬ ceived by the Germans, who permitted both belligerent England and neutral United States to feed the population which was deprived of its means of life by the German invasion. Upon Ambassador James W. Gerard \vas thrown the heavy responsibility of representing the United States in Berlin. Efforts were made to cajole him and also to brow-beat him. On one oc¬ casion the emperor suddenly approached him with the remark: ^^America had better look out after this war. 1 shall stand no nonsense from America after ffiis war.® Upon the Amer¬ ican ministers in Holland, Russia, Serbia, Bui-614

garia, Rumania, fell very difficult duties. Am¬ bassador Morgenthau in Turkey was toward the Armenians as a protector of oppressed peoples in their country. Besides these official represen¬ tatives, Colonel House, the personal friend and representative of President Wilson, several times visited England, Germany and other countries upon special and private missions.

The representatives of the belligerent nations in the United States made every effort to ad¬ vance the cause of their respective countries. They addressed themselves first of all to the raising of loans. President Wilson at one time used his influence to prevent the placing of foreign loans, but no principle of international law forbids neutrals to lend money to bellig¬ erents, and the Allied loans were very popular, because the proceeds were at once invested in the purchase of military supplies and food in the United States. The rising tide'bf feeling against Germany greatly interfered with the German loans. The diplomatic representation of the Central Powers was able. Count von Bernstorff, the German ambassador, made his lega¬ tion the centre of legal propaganda, but sev¬ eral of his subordinates were dismissed from the country by the United States government. Dr. Dumba, the Austrian ambassador, was likewise dismissed. Several consuls of both countries were convicted of breaches of the neu¬ trality laws and sent to prison. Toward the end of the neutral period (19 Jan. 1917) Count Bernstorff forwarded to the German minister in Mexico an official order from the German foreign office to make an alliance with Mexico and if possible with Japan, for war on the United States, adding: ®it is understood that Mexico is to reconquer the lost territory in New Mexico, Texas, and Arizona.® The Turk¬ ish Ambassador, Rustem Bey, was dismissed in 1914 for a criticism on the conduct of the State Department here. Various unofiicial agents of the German government were sent over to work upon public opinion in the United States, particularly Bernhard Dernburg, who formerly lived in the United States. Several prominent unnaturalized Germans who made their homes in America, and a few who were naturalized, were open or secret agents of the German government.

Public Announcements of Neutrality. —

The general European War practically began when Germany declared war on Russia, 1 Aug. 1914. On 4 August, without waiting for the announcement of the final decision by the Brit¬ ish government. President Wilson issued the first of a series of Proclamations of Neutral¬ ity. In them he set forth the friendship of the United States for the contending powers, the status of citizens of the United States in territories of the belligerents, and of belligerent subjects within the

jurisdiction of the United States and the need of ˆfimpartial neutrality.® He then laid down a series of injunctions upon persons within the United States. They were warned not to accept a commission or to enlist in the service of either belligerent or induce other persons so to do ; or to fit out vessels for the service of the belligerents, or to in¬ crease the force of any belligerent publicship en¬ tering the United States; or to prepare a military enterprise to be carried On from the United States. In addition, belligerent vessels of war

were warned not to use the waters of the United States for hostile purposes. All citizens of the United States and all other persons within its limits were enjoined to commit no acts in contravention of treaties of the United States and the national statutes against unneutral acts. All persons were warned that they would have no ˆˆprotection from the Government of the United States® against the consequences of their misconduct. Two important limitations on these requirements were stated. In the opening sen¬ tences of the proclamation appears the reserva¬ tion, ˆ(without interfering with the free expres¬ sion of sympathy or with commercial manu¬ facture or sale of arms or munitions of war.® Toward the end the President reiterated the right to sell and ship contraband of war and to break a blockade, at the risk of capture and the resultant penalties.

Similar proclamations were issued from time to time as additional countries entered the war. In addition the President on 5 August began a series of special proclamations, the first pro¬ hibiting the radio stations from ˆffiandling messages of an unneutral nature.® On 14 August a circular was issued in rather uncer¬ tain terms on the liability of former citizens of the belligerent powers to render military service. On the I7th -instructions were sent out to diplomatic and consular officers in the belligerent countries. On the 18th an act was approved by the President permitting the registry of foreign-built ships in the United States, thus allowing the acquirement of an American status.

On 15 October the Department defined the attitude of the government on the shipment of contraband, reaffirming the doctrine that there was no duty under international law to prevent such traffic. Many additional proclamations set forth the position and the decrees of the government, and the President in public ad¬ dresses insisted on the neutral policy of the country. He even went so far as to issue a proclamation (18 Aug. 1914), in which he urged his fellow

countrymen to avoid that ˆdeepest, most subtle, most essential breach of neutrality which may spring out of partisanship or out of passionately taking sides, — we must deal impartially in thought as well as in action.® So far as precept could go, the United States did everything that was correct and traditional.

Difficulties of Neutrality. — ˆ Little heed was paid to the President's injunction to preserve a neutrality of thought. Most Americans from the beginning had a strong preference on one side or the other, and two positive causes created a strong current of public feeling against Germany. These were the occupation of Bel¬ gium in the early days of August; and the treatment of noncombatants in the portions of Belgium and France occupied by the German army.

The invasion of Belgium was contrary to the general principle of the right of a nation to remain neutral if it were not concernecl in the outbreak of the war; and it was also a gross violation of the obligation of treaties. The contemptuous phrase of the German chan¬ cellor that treaties were ˆˆonly a scrap of paper® was a blow at the sanctity of all obligations of nations.

The United States, however, was not a signa¬ tory of the Treaty of 1839 by which both

Germany and Great Britain guaranteed the neutrality of Belgium. The Hague Conventions on the rights of neutral powers, though signed by the United States, could not be reasonably construed to require this country to make war on Germany. (Otherwise the Germans had the legal power to compel the United States to go to war by interfering with a third power. The general right of belligerents to keep up com¬ merce with neutral powers is of course subject to and conditioned by their physical ability to protect direct trade in their merchant ships. A few days after the beginning of the war the allied British and French navies showed such an overwhelming superiority at sea that the German shipping which could not reach home ports took refuge in any neutral waters that offered. Except on the Baltic and a little coast¬ ing

trade in the German Ocean to Holland and the Scandinavian countries, the movement of Germ-an merchant ships ceased all over the world. A few German commerce destroyers were let loose, but all of them were eventually captured or driven to port. No transoceanic or Mediterranean commerce could be kept up by the ships of Germany and her allies. This change in the conditions put a strain on Amer¬ ican neutrality. Goods could still be shipped to Germany in neutral vessels, but contraband cargoes were liable to capture by the Allied cruisers. This introduced a complication in the trade in arms and military supplies which quickly sprang up from the United States. Shippers had the same legal right to ship to Germany or to England, but none of the Ger¬ man cargoes could reach their destination if contraband; while practically all the English cargoes went safely.

Without altering a syllable of the proclama¬ tions, without any deviation from the received principles of international law, this state of things was very advantageous to the Allies as against the Central Powers. As a great ex¬ porter it was clearly the interest of the United States to claim a liberal construction of contra¬ band. Cargoes of food not earmarked for military consumption were considered in the United States to be free from capture; and, if sent in American bottoms, also free from search or detention, even if paid for. The Allied powers at once began to create difficulties for shipments of all kinds from the United States even to other neutral powers. The result was confusion in the treatment of Am.erican car¬ goes and vessels, and controversy over the right to ship munitions of war.

Another and very serious difficulty was the conduct of the -German and Austrian diplomatic and consular officials and secret agents, who entered on a propaganda intended to rouse the German-Americans, both aliens and citizens, and to put a pressure on the government in Wash¬ ington to take ground with regard to neutrality which would be favorable to Germany.

A further complication was bringing forward the Haw of necessity.”^ Both groups of bellig¬ erents argued that their victory was so neces¬ sary for the welfare of mankind that they were justified in cutting down the privileges of neu¬ trals; and that it was no time to stand on the niceties of international law, when the keep¬

ing up of the German army or the British navy was at stake.

Above all, the contest in Europe speedily became so terrible that it

was impossible for the people of the United States to ignore the plain fact that the interests of their country were involved and that the success of either side would mean a great change in interna¬ tional relations. The war soon ceased to be European. It aroused every thinking man and woman. It revived influences of race and birth. Nobody was really neutral, nobody felt in¬ different as to the outcome of the struggle, and, therefore, no voter and no statesman could be vitally neutral.

Freedom of the Seas. — During the Civil War, from 1861 to 1865, the United States, as a belligerent, set precedents of restricting the movement of neutral commerce. In 1914 the American foreign trade amounted to nearly $2,500,000,000 in exports and nearly $2,000,000,- 000 in imports. Hence the natural tendency of the administration was to insist on the ®freedom of the seas.® This phrase in times of peace means simply that by the common con¬ sent of all nations, the open sea, outside a line of territorial jurisdiction, usually stated as three marine miles beyond the low-water mark, was free to everybody for fisheries and for passage.

So far did this principle go that certain nar¬ rows, as for example the straits leading from the North Sea into the Baltic, though less than six miles wide, were part of the universal seas. Associated with this idea was the right of ap¬ proach to the coast of every country for pur¬ poses of trade, and the right of vessels to be re¬ ceived in foreign harbors. Attempts of nations like China and Japan to forbid the approach of foreign vessels were repelled by threats and even by war.

In time of war the freedom of the seas was much more significant, for it included the right of a neutral to use the high seas as a free waterway to the ports of other neutrals or bel¬ ligerents, and also to navigate in areas where belligerent vessels were moving about.

As soon as the war began, a series of limi¬ tations was placed by both belligerents on this free use of the world's waterway. In the first place, all the vulnerable coasts of the belliger¬ ents were protected by mine fields extending far beyond the three-mile limit, thus reserving long belts of water from commerce. Gaps and lanes were left in these belts, however, through which vessels could pass in and out under pilot¬ age. The next disturbance was due to the pres¬ ence of vessels of war in the North Sea and Mediterranean. Where fighting was going on, it was plain that merchant vessels must move at their own risk. Great Britain (13 Oct. and 4 Nov. 1914) announced that ˆffiwing to the dis¬ covery of mines in the North Sea, the whole of that sea must be considered a military area. Merchant shipping of all kinds will be

exposed to the gravest dangers.® All ships were warned not to pass a line drawn from the Hebrides to Iceland. There was no threat of capture for vessels ihat ignored the notice; they were sim¬ ply warned that (jreat Britain would take no responsibility if they were destroyed accidentally.

The Germans made this an excuse for a

proclamation (4 Feb. 1915) to the effect that ®the waters surrounding Great Britain and Ire¬ land including the whole English Channel are hereby declared to be a war zone.® Enemy merchant vessels in the war zone could be destroyed without rescuing passengers and crews. An accompanying ˆmemorial® held that Great Britain had in various ways violated the international law of naval warfare, the neutral powers had not insisted on their own rights, and the German government would not be re¬ sponsible if one of them should become ®the victim of an attack intended to be directed against the vessels of the enemy.®

One highly important stretch of water, the Straits of Dover and the English Channel, was throughout the war treated by the British gov¬ ernment as in their sole military possession. Commerce was first restricted, and then com¬ pelled to find its way around the north of Scotland, which was a serious detriment to the trade of and with Holland.

The German assertion of sole control of broad areas of the sea was combined with ag¬ gressions on the right of neutral vessels to humane treatment if captured. The British zone did not seriously interfere with American commerce, and no protest was ever lodged against it by the United States government. Vigorous protests, however, were made against the German theory of the war zone by several European neutrals and (10 Feb. 1915) by the United States. The matter was somewhat com¬ plicated by the attempt of Germany to prevent the use of false flags, particularly the Ameri¬ can, by the British. It appeared that this ruse, which had for centuries been frequent and

was generally considered by international law to be innocent, gave offense to the United States which (22 February) asked both parties to dis¬ continue the practice. No further trouble arose upon that question. The real grievance of German}? was that cargoes of American-made munitions were freely passing into Eng¬ lish and French ports. Since it was not pos¬ sible to stop them by capturing the vessels, they demanded the cessation of the shipments. In the correspondence on the war zone the Ger¬ man government warmly complained (1 March 1915) of the export of munitions of war to anybody; a long controversy followed as to the munition trade. The manufacture of powder, rifles, great guns, military equipment and ma¬ chinery was an industry active in most of the great nations of the world. It had been a prac¬ tice for many years that neutrals could supply belligerents with arms. In the wars of 1912 and 1913 in the Balkans the German Krupp firm sold cannon to the Turks and the French Creusot works sold to the Serbians.

International law was absolutely clear that there was no responsibility resting upon any government to forbid the manufacture and sale of munitions to any belligerent. Nevertheless, during the Mexican difficulties, under an act of Congress (14 March 1912) President Taft is¬ sued a proclamation ˆprohibiting the export of both arms and munitions from any port in the United States to Mexico.® This was held by the State Department, however, not to apply to shipments consigned to the Mexican govern¬ ment, Subsequently (4 Feb. 1914) the order was rescinded by President Wilson.

The German government seized this prece¬

dent as proof that it was entirely within the dis¬ cretion of the United States to prohibit the trade, which ran up the total exports of the United States to Europe in one year from $1,486,000,000 to $1,971,000,000, and in the next year (1915) to $3,547,000,000. To many Ameri¬ cans the traffic was unwelcome. The United States government refused to sell to the Allies 350,000 obsolete rifles, but the President re¬ peatedly and officially stated that no such obli¬ gation lay on private parties. The Germans (4 April 1915) complained that ˆˆthis industry is actually delivering goods only to the enemies of Germany® and suggested ®an embargo on the exportation of arms.® On 12 Aug. 1915 the State Department declined to accept as a gen¬ eral principle a theory which would preclude war except by countries which could supply themselves with military material. This an¬ swer was supported by a decision (Pearson vs. Allis-Chalmers Company et

al.) in the Circuit Court of the United States for Wisconsin (May 1915), when the court declined to inter¬ fere with the shipment of shrapnel shells to the Allies.

The only approach to restriction that was reached by Congress was the act of 18 Sept. 1916 which authorized the President to retali¬ ate against any country that prohibited the im¬ portation of American products by preventing the ˆimportation of similar or other articles from the offending country.® Otherwise, throughout the period of her neutrality the United States insisted on the freedom , of the seas for shipments of munitions, subject to capture on grounds of genuine contraband or blockade or continuous voyage.

Personal Status. — One reason why the United States was so deeply concerned in the war was the presence within its boundaries of thousands of citizens of Germany, Austria, Bul¬ garia and Turkey, of whom a large proportion were unnaturalized and, therefore, remained alien subjects of the belligerent countries. A smaller number of English, French, Belgian, Russian, Serbian and Greek nationals presented the same problem of their rights and responsibil¬ ities in a neutral country. So far as the natural¬ ized citizens and their minor children were con¬ cerned, the United States recognized no differ¬ ence in their legal status from that of na¬ tive-born citizens, with the exception that it declined to interfere in cases in Italy where the American-born son of a naturalized citizen who visited Italy was held for military service.

The serious question was that of the aliens, most of whom were men of military age, and large numbers of whom were borne on the rolls of their own countries as liable to military serv¬ ice. In the Balkan wars of 1912 and 1913 scores of thousands of subjects of the Balkan nations \yent home to fight; and the United States paid no attention to that movement. It was considered the right of an alien to return to his native country, whenever he felt like it, even though he thereby furnished material for armies in the field.

As soon as the Great War began and actu¬ ally some time in advance, the German and Austrian authorities made preparations to send their men home. Formal notice was served upon those whom they could reach to report for that service. This was nearly a breach of neutrality; for it was in effect the enlistment

of soldiers for foreign service within the terri¬ tory of the United States. The collapse of the German sea power at once put a stop to the wholesale transfer of these men ; and the few who got out and tried to reach their home countries in disguise or by roundabout routes were nearly all picked up by Allied cruisers, Nvho took the ground (accepted by the United States) that ^^reservists^^ were rightfully consid¬ ered as in the military service of their own country and were, therefore, contraband of war. Large numbers of British subjects be¬ took themselves undisturbed to England or crossed the border into Canada and enlisted there.

With them went thousands of American citizens who paid no attention to the Presi¬ dent's proclamation against entering the mili¬ tary service of one 9f the belligerents. Some of them accepted corhmissions in the Canadian or British service, and thereby, under the terms of the United States statutes, forfeited their citizenship. This penalty was not applied at the time; and after the United States joined in the war, an act of Congress was obtained per¬ mitting such men to retain or resume their citi¬ zenship. In a few cases overzealous cruisers seized men who claimed to be American citizens as German or Austrian subjects. In the case of Piepenbrink (April 1915) the United States successfully maintained the right of protection, even though the man had only filed his first papers of naturalization, and was not yet ad¬ mitted to citizenship. Several thousand Ger¬ mans were employed as seamen or otherwise on board German ships that were in American ports when the war broke out or entered for refuge. Practically all these men were liable for naval service in Germany; but they were allowed to remain on board their^ ships or to stray off into the general population. A few of them found their way home and entered the German service.

Five German ships of war took refuge in American ports and their crews were interned to the end of the war. These were the Geier and Locksun (Hawaii, October 1914), the Cor-moran (Guam, December 1914), the Prinz Eitel Friedrich (Newport News, March 1915) and the Kronprinz Wilhelm (Newport News, April 1915). A considerable

number of the officers and some of the men broke the parole that they had given and escaped. The German embassy and the German government approved this breach of faith and excused it on the ground that the wording of the parole did not make the pledge equivalent , to the German ^^Ehrenwort.®

Several thousand Americans took part ac¬ tively on the side of the Allies, and a few on the other side, by joining ambulance, medical and relief corps which were organized in Amer¬ ica by individuals and societies, including the magnificent Red-Cross Society. While not en¬ rolled in the active armies, many of them served close up to the lines and under fire, and some were killed or wounded. Many entered the similar services and put on the uniforms of the belligerents. Others formally enlisted in the fighting branches.

Allied Restrictions on Neutral Trade. —

The United Stales government as a neutral power found itself called upon to prevent cer¬ tain forms of American trade, such as the send¬ ing out of provisions or other supplies to

cruisers near the American coast. Several Ger¬ mans were prosecuted and one of them (Buenz, agent of the Hamburg-American line) was con¬ victed, for swearing to false manifests of the cargoes of ships expecting to leave the port of New York. Steps were also taken to prevent the dispatch of submarines as completed ships; although the shipment of fabricated parts to Canada, there to be assembled into submarines, was permitted. By an order of 14 Sept. 1914, the United States refused to give clearances to any merchant ships armed for self-defense, although such arming had been usual in earlier wars. Vessels, however, were allowed to carry a few small guns which could be used against a stern chase. Warships of all the powers were free to enter and leave port without augment¬ ing their force ; but the only German ship of war that was able to make use of this privilege was the fighting submarine U. 53, which put into Newport for a few hours in 1916. The mer¬ chant submarine Deutschland entered and cleared from Baltimore and from New London. The German merchant ship Odenwald attempted to put to sea from San Juan, Porto Rico (March 1915), but was compelled to return by the American batteries.

Nominally both the Central and Allied powers admitted the ships and commerce of the United States to their ports ; actually, after the first few months of the war, very few ships reached German or Austrian

ports ; and it proved diffi¬ cult to send cargoes to neutral ports, if of such a nature that they were likely to be re-exported to Germany or Austria.

The first serious controversy between the United States and Great Britain arose out of the detention of steamers in Gibraltar, and else¬ where, on the theory that it took time to go through the cargoes and select the contraband. Another grievance was that the British gov- enment seized neutral vessels and ˆillegally brought them within its territorial jurisdiction, compelling them to submit to the laws and regulations of that nation.®

In a dispatch of 25 Oct. 1915, the United States assumed a championship for general neu¬ tral rights, in accordance with ˆ“iestablished rules of international conduct upon which Great Britain in the past has held the United States to account.® The State Department further declined to yield to the plea that ®the exceptional geographical position of the ene¬ mies of Great Britain require or justify op¬ pressive and illegal practice.® The British government was referred to the policy of the United States upon this subject during the Civil War. There was further complaint that the British prize courts did not make their decisions upon the general principles of inter¬ national law, but were guided by the Orders in Council of the British government from time to time.

On the question of unreasonable delays, the British government gave way, by directing more expedition and discrimination in the search of cargoes. The same result was reached, after some effort, with regard to interference with parcels and letter mail. The British govern¬ ment set up a regular practice of taking off the mails in either direction between the United States and Dutch and Scandinavian ports. This led to a formal protest by Secretary Lansing

(4 Jan, 1916) insisting that ˆ‘ˆmails are not to he censored, confiscated or destroyed on the high seas, even when carried hy belligerent mail ships.ˆˆ The British government (4 April 1916) replied with the not

very convincing argument that as much as 800 pounds of rubber had been sent in a single parcel post ; they in¬ sisted on a right to open any sealed package which appeared to contain goods ; but promised no longer to seize ^^real correspondenie.^^ Simi¬ lar protests were made against the censorship of telegrams transmitted by cable and wireless, including money transfers. This whole question was complicated with the seizure of dispatches and private papers of unofficial agents who in many cases were spies of the German govern¬ ment. The documents of accepted ambassadors and agents were not thus restricted ; though when the German Ambassador, von Bernstorff, returned to Germany in April 1917, under safe conduct, his baggage was searched at Halifax and correspondence which, in the judgment of the British authorities, was unofficial was seized.

Another difficulty arose from the seizure of certain subjects of the Allies on board Ameri¬ can ships. The most serious case was that of a party of German and Austrian subjects bound from the Orient to the United States on board the United States merchant ship China (1916). They were not military officials, and on the protest of the United States, they were eventu¬ ally released.

Controversies ‘ over Contraband. — The

failure of Great Britain to give sanction to the report of the London Conference of 1911 on contraband left that subject in a state of con¬ fusion at the outbreak of the war; for there was no clear understanding as to the status either of military material or of food. As the war progressed it became evident that many articles in common use in time of peace were also essential to the conduct of the war, such as automobiles, copper, flying machines, rubber and iron; and also that where all the available male population was enlisted in the army the distinction between food intended for the civil population and that intended for the army or navy no longer existed.

With the Central Powers there was little op¬ portunity to test new theories of contraband. The only significant case was that of the sailing vessel William P. Frye, an American ship which, 27 Jan. 1915, was captured by the Ger¬ mans loaded with wheat from Portland, Ore., the property of an American citizen, bound to English ports ®for orders.® The German offi¬ cers at first decided that the food cargo was contraband, and began to throw it overboard. They then changed their minds and sunk the ship with most of the cargo. The American gov¬ ernment forthwith protested (31 March 1915) and demanded full damages for the value of the ship and, the destruction of the cargo. The German government (5 April) held that the cargo was

ˆconditional contraband® according to the Declaration of London. It then took up the Prussian-American treaty of 1828, under which it admitted that it was not authorized to capture the property of Americans even though contraband, although the United States had made no claim under the treaty. A tedious correspondence followed. The German prize court justified the seizure of the cargo and the

destruction of the ship under international law, but admitted responsibility under the treaty. Arbitration was proposed, but no settlement was reached prior to the declaration of war by the United States in April 1917, which super¬ seded any other proceedings.

Much more serious were the difficulties over contraband with the Allies, and especially with Great Britain, which became the recognized agent for the Allied Powers. On 7 Aug. 1914, the American government proposed to both groups of belligerents to adopt the definitions of contraband in the Declaration of London ; with its classification into ˆabsolute contraband® —arms, military equipment and warships ; *conditional contraband® — food, clothing and materials for transportation by land and sea ; and ®non-contraband® — raw cotton and other textiles, rubber, hide, ores, paper, soap, etc., and also articles to aid the sick and wounded. The Germans accepted this proposition and that is why they tried to apply the Declaration of London to the Frye case.

The British reserved the right to make ®additions and modifications® to the list in the Declaration. By an Order in Council of 24 Oct. 1914 much more stringent rules were laid down as to the effect of the destination of neutral vessels. From time to time thereafter, the British altered the lists to the growing dis¬ advantage of Germany. Oil, being the fuel for motors and air ships, was early made con¬ traband, raw cotton (21 Aug. 1915), wool, tin, castor oil, paraffin wax, lubricants, hides and ammonia (11 March 1915), and many other arti¬ cles. France, Russia and Italy followed in the same path. The Germans abandoned the Decla¬ ration of London, and made up lists closely resembling the British (18 April 1915).

Had the British lost control of the sea, it would have gone hard with the American ex¬ port trade under this severe doctrine of con¬ traband; but England and France offered good cash markets for almost anything the Ameri¬ cans had to sell, irrespective of contraband. The pinch came when the British began to use nominal principles of contraband to cut off non-contraband trade to neutrals. On 28 Dec.

1914 the American State Depart¬ ment lodged a protest against the extension of contraband, which, however, carefully refrained from discussing increases in the number of articles held contraband; it confined itself to the stoppage of ships bound on what Ameri¬ cans claimed were innocent voyages to neutrals. The British argument was that it was neces¬ sary to retaliate against and undercut the Ger¬ man practices; and that the statistics of ex¬ port from the United States to Holland, Scan¬ dinavian powers and Italy showed vast in¬ creases, which could only be available for re¬ export to Germany. They also justified the stoppage of food shipments, when applied to a nation in arms like Germany, as necessary for the success of the policy of starving out Ger¬ many.

The prohibition of cotton was a heavy blow to the American producer, though the argu¬ ment that cotton was raw material for explo¬ sives proved to be justified. The United States continued to insist that ordinary food ship¬ ments were not contraband ; that to seize ship¬ ments and then reimburse the owners did not

relieve Great Britain from responsibility to our government ; and that there was no right to seize cargoes simply because they might even¬ tually reach the enemy. Later on Great Britain treated money and securities as contraband, which, up to this time, had not been definitely looked on as subject to capture in neutral ves¬ sels and was a striking addition to the ordinary principles of international law. There was, however, no redress from any of these seizures during the period of neutrality; and when the United States asisociated itself in 1917 with the Allied Powers, any claim for later adjustment or indemnity on the ground that the British system was contrary to international law and the righ{s of the United States became exceed¬ ingly unlikely.

The Submarine Question. — The question of blockade did not stand by itself ; in its extensions and applications it was adopted by Great Britain as a practical means of meeting a new and dangerous system of maritime war¬ fare. For many years American inventors followed

by Europeans had been working on a practicable form of submarine boat, which could discharge a self-propelling torpedo under water. When the war broke out, Great Britain had a fleet of submarines, but her regular war¬ ships disposed of the German commerce and it was found impracticable to use the sub¬ marines in attacks on the German coast, chiefly because of mines. Since the Germans were unable to keep commerce destroyers at sea, except in a few cases and for a brief period, they sought to employ their submarines against Allied commerce. The German war-zone order of 4 Feb. 1915 was a prelude to a systematic policy of hunting out belligerent merchantmen with submarines. The British held this to be an unauthorized and illegal form of warfare, and President Wilson later laid down the rule that any use of submarines as commerce de¬ stroyers was contrary to international law. To this the German reply was that it was lawful to use a new maritime weapon, and that it was justified further as a retaliation for the illegal action ‘by the British.

The British Order in Council (11 March 1915) on that subject professed to be founded on a German order of 26 January, by which a government agency was created to take en¬ tire charge of and distribute corn, wheat and flour. The British declared that this system nationalized the German food supply and made legal a policy of intercepting all food cargoes.

Both the German and the English practices seriously affected the export trade of the United States, and the controversy was further ag¬ gravated by the seizure by the British govern¬ ment of the ship Wilhelmina (9 Feb. 1915) on a voyage from New York to Hamburg. Much later it was proved that thf Wilhehnina was not entitled to American register, but that question did not enter into the early proceed¬ ings. To the principle of the right to stop all food supplies going to Germany by any cap¬ tures necessary to that end, the British gov¬ ernment adhered to the last. Other important cases of American vessels seized or detained, which became the subject of diplomatic con¬ troversy, were the Neches (Jtily 1915) bound from Rotterdam, to the United States; the Seguranca (April 1915) bound to Holland but

not consigned to the Netherland Trust, and the Wico (March 1915) with oil for Sweden. In all these cases the United States lodged a protest.

The submarine controversy quickly took on a new form through official orders from the German government to destroy belligerent

mer¬ chant ships without the safeguards of capture at sea required by international law. No hail nor demand for surrender was thought neces¬ sary by the Germans ; no chase was required ; no examination of the papers to ascertain the character or cargo of the ship; no attempt to put a prize crew on board and send the capture into a German port for the action of a prize court; no opportunity to the crew and passen¬ gers to save their lives was obligatory on the (German commanders. These bold deviations from the accepted law of nations could not fail to involve neutral vessels, for no proper precautions were taken to distinguish between neutrals and belligerents. The Entente Allies at once protested that these methods were illegal and barbarous. The United States was speedily drawn in by the sinking of the British ship Falaba in Saint George's Channel (28 March 1915), causing the loss of 111 lives, in¬ cluding an American citizen. On 28 April, the American ship Cushing was a'ttacked by a Ger¬ man airship. On 1 May the American steamer Gulflight was torpedoed without notice. On 2 and 10 April the steamer Greenbriar was de¬ stroyed by a mine near the German Coast. On 10 April the Harpalyce, a British ship bearing relief to the Belgians from the United States, was sunk on her return voyage, apparently by a submarine.

Protests were at once lodged and the Ger¬ mans appeared disposed to make some repara¬ tion, when (7 May 1915) the British steamer Lusitania was torpedoed without notice off the Irish Coast, and sank in a few minutes with a loss of 1,195 lives, of whom 114 are believed to have been American citizens. As soon as the facts were established the United States gov¬ ernment protested. President Wilson in a pub¬ lic address (11 May) tried to calm the excite¬ ment, saying ®There is such a thing as a man being too proud to fight® ; but on the same day he completed a note (issued 13 May), abso¬ lutely denying the right to destroy either bellig¬ erent or merchant ships without notice, and calling on Germany to disavow the sinking. The President added, ®The Imperial German Government will not expect the Government of the United States to omit any word or any act necessary to the performance of its sacred duty of maintaining the rights of the United States and its citizens and of safeguarding their free exercise and enjoyment.®

This was the 'beginning of a long diplomatic controversy. (The principal American dis¬ patches are dated 13 May, 9 June and 21 July). To each of these the Germans replied, begin¬ ning with a defense of the sinking of the Lusitania on the general ground of the right to destroy an enemy vessel in the only way that was safe lor the crew of the submarine, and insisting that the Lusitania was a public armed vessel, carrying contraband. The Germans laid down the

doctrine that neutrals who traveled on belligerent ships took their chance of de¬ struction and particularly insisted that Ger¬ many had no responsibility to the United States,

for a printed notice had been sent out by the German Embassy warning Americans not to take passage on that particular ship.

Secretary Bryan soon found himself out of agreement with the President's strong remon¬ strances and repeated suggestion that such acts would lead to war; and he resigned (9 June 1915). Mr. Robert M. Lansing was appointed Secretary of State, but from this time it was understood that the vital dispatches on inter¬ national questions were drawn by President Wilson. A decision by the Federal District Court of New York {In re Ctinard Steamship Company 15 Aug. 1915) held that in fact and law the Lusitania was an unarmed mer¬ chant vessel.

The main point at issue in the controversy was the insistence by the United States that submarines must submit to the usual processes of boarding a prize, and must send the capture in for adjudication, unless (as was usually the case in captures by submarines) circumstances made it impossible. Destruction of the ship was only allowable after the crew and passen¬ gers were given a reasonable opportunity of escape. The United States also stood by the principle that, as in times past, neutrals were entitled to avail themselves of belligerent mer¬ chant ships for employment or for passage.

In the face of this persistent assertion of rights the Germans slowly gave way, although the negotiations were interrupted (19 Aug. 1915) bˆy the torpedoing without warning of the British ship Arabic, causing the loss of three American lives ; for this act the German government made an apology. On 1 Sept. 1915 the German ambassador filed a memorandum in Washington in the following words : ˆLiners will not be sunk by our submarines without warning and without safety of the lives of noncombatants, provided that the liners do not try to escape or offer resistance.ˆˆ This was ac¬ cepted as a German withdrawal from the sub¬ marine policy. On 8 Nov. 1915 the ship Ancona was

sunk by an Austrian submarine, and Austria in like manner eventually apologized. During the next few months there were some minor cases, in which the facts were less clear. The controversy blazed up again on the torpedoing without notice of the British packet Sussex in the English Channel (24 March 1916) with loss of American lives. With great reluctance the German government at last admitted that a German subm.arine was responsible and prom¬ ised amends.

Doctrine of Continuous Voyages. — More than a century ago the United States was en¬ gaged in a controversy with Great Britain over the question whether carrying a cargo from a belligerent port to a port of the United States (then a neutral) and thence to another belligerent port was a ^^continuous voyage® which would justify the capture of an American carrier. The United States stood for the prin¬ ciple that ^ffree ships make free goods® ; and insisted that if the cargo was actually unloaded and reloaded in the American port it was the object of two voyages, both of which were pre¬ sumably innocent.

In the Civil War a similar question came up and the United States now took the ground that a cargo carried from luirope to a European colony and thence shipped, either in the same

vessel or in another bottom, to a port of the Southern Confederacy, was engaged in an un¬ neutral voyage and was subject to capture. The courts of the United States upheld such cap¬ tures in the test cases of the Dolphin and Pearl, the Stephen Hart, the Volant, the Springbok, the Peterhoff and others. The Supreme Court of the United States confirmed the principle of these captures.

Most of these decisions justified the cap¬ tures on two grounds : the nature of the cargo if contraband, and the ultimate de.^‘tination whether the cargo was contraband or innocent, if on the way to a blockaded port. All the captures of vessels not actually proceeding to or from a blockaded port which were ap¬ proved finally by the Supreme Court, were for transfers in which both legs of the travel were on the sea, and the ultimate destination was an enemy belligerent (Confederate) port. _ In the Volant and Peterhoff cases the destination was Matamoros, Mexico, whence the goods w’ere to be carried over land to the Confederacy. In both these cases only the capture of the absolute contraband part of the cargo was justified; the ship and remainder of the cargo were released.

A very different system was inaugurated by Great Britain by a

succession of Orders in Council and diplomatic notes beginning 1 March 1915. It was put forth first as ˆˆan embargo® and at no time was there a formal proclamation of a ˆblockade® although Sir Edward Grey (13 March 1915) asserted that ˆffhe British fleet has instituted a blockade effectively con¬ trolling by cruiser ˆcordon ˆ all passage to and from .Germany by sea.® This process, however, could not properly be called a blockade be¬ cause it included restrictions on the entry of vessels into Scandinavian and Dutch ports, which being neutral could not possibly be sub¬ ject to technical blockade. Furthermore, the policy included the assignment of a passage around the north of the British Islands to all vessels bound to Northern Europe and the stop¬ page and detention for examination of all com¬ merce.

The real purpose of this policy was to shut off all neutral cargoes which in the judgment of the British government might be transported into Germany or might set free other com¬ modities from the neutral countries which could then be carried into Germany. The United States replied (30 March 1915) declaring that ˆffhe Order in Council would constitute a practical assertion of unlimited belligerent rights over neutral commerce within the whole Euro¬ pean area and an almost unqualified denial of the sovereign rights of the nations now at peace.® Nevertheless, this remonstrance was not pushed home upon England, even when a list was drawn up by the American government, showing that from 50 to 55 American vessels had been compelled to interrupt their voyage at the British observation port of Kirkwall in the Orkney Islands. The controversy with Gerrnany over the Lusitania turned public atten¬ tion in another direction ; and the United States practically submitted to the British interpreta¬ tion of international law.

The policy of embargo, for it was not en¬ titled to be called or applied as blockade, was vigorously followed. The British government refused to allow American vessels to coal unless

they would enter arrangement as to the nature of their cargo.ˆ It unloaded cargoes at its will and contented itself with paying the

owners for them. It refused to permit shipments to neu¬ trals unless they would enter into agreements against re-exportation. As a military measure the English policy was completely successful. It cut off practically all neutral trade from over¬ seas to Germany and Austria, not only in mu¬ nitions and in food, but in all commodities from the outside world, and thus prepared the way for the eventual defeat of the German nation and army. When the United States entered the war in April 1917 it forbore to press questions of injury or damages against its associates.

Breaches of Neutrality by the Belliger¬ ents. — At the beginning of the war, the British and French made little effort to influence public sentiment in the United States, and carefully retrained from raising international questions by using the United States Coast as a base ; but when complaint was made that provisions were being sent from the port of New York to Allied cruisers at sea, the practice was at once stopped. On the other hand the Germans and Austrians from the very beginning united in systematic attempts to create public sentiment in their favor, and thence proceeded to engage in acts hostile, not only to their public enemies, but to the people and government of the United States. Before the war broke out a group of ^^spell¬ binders® was sent over under the command of Dr. Heinrich Albert, a German official. He en¬ gaged in secret propaganda, many of the details of whigh were later discovered and spent about $35,000,000 in hiring agitators, furnishing mate¬ rial for the press, buying newspapers, and so far as he could, organizing the German-Ameri- cans.

Albert and his agents were in constant com¬ munication with the diplomatic and consular officials of the Central Powers; but they were careful not to give any evidence of connection with the official propaganda for breaking up the munitions trade and setting on foot military and semi-military enterprises. They worked through a German University League, a Krieger Verein, a German-American Alliance, and other socie¬ ties. In some States they attempted to set up a German-American party and to defeat candi¬ dates not favorable to the Germans, and they did their best to marshal the German voters and aliens in the United States in a movement for urging Congress to put an embargo on the export of munitions.

An official cohort for propaganda and more active measures was managed primarily by Count von Bernstorff and Dr. Dumba, the Aus¬ trian ambassador and included also Captain von Papen and Captain Boy-Ed, military attaches. Many consuls-general and other consular officers were in constant touch with this organization. The first effort was to buy up the munitions factories or their products, and thus

make them useless to the Allies. Next they attempted to send secret expeditions or aid to German cruis¬ ers at sea. They also made a systematic effort , to get German and Austrian workmen out of the munitions factories and egged on some of them to destroy those factories. They planned several expeditions to destroy means of com¬ munication in Canada. They furnished aid and comfort to East Indians who were plotting

on American soil against the British govern¬ ment in India. They subsidized secret factories of bombs intended to destroy ships leaving American ports. They ordered the sabotage of the German vessels in port, just as the United States entered the war.

The United States government made every effortˆ to penetrate and break up these criminal conspiracies, and secured convictions in a con¬ siderable number of cases, especially the follow¬ ing: Captain Fritzen, a German reservist, for an attempt to blow up the Welland Canal; Carl A. Luederitz, German Consul at Baltimore, for aid m securing a fraudulent passport; Captain Kleist, a naturalized_ American citizen, and Carl Schmidt, chief engineer of the German ship Friedrich der Grosse, making bombs on board that ship for the purpose of destroying vessels. Major von der Goltz, a German spy, gave evi¬ dence of another attempt to blow up the Wel¬ land Canal. Werner Horn, who claimed to be a German officer, received money from von Papen which enabled him to blow up a bridge connecting Maine with New Brunswick on the Canadian Pacific road. Paul Koenig, an official of the Hamburg-American line, was convicted of swearing to false affidavits that he had seen cannon on board the Lusitania. Wolf von Igel was an active agent in corrupting the journalists and buying up agitators ; his papers were seized, and the German Embassy claimed them as offi¬ cial documents but declined to identify any of the papers. Franz von Rintelen, who had been active in founding an anti-munition organization called Labor's National Peace Council, was con¬ victed of illegal attempts to prevent the shipping of munitions.

The United States government demanded and secured the recall of Captain von Papen and Captain Boy-Ed because of illegal acts for which they could not be tried on account of their diplomatic immunity. Dumba, the Aus¬ trian Ambassador, was dismissed (8 Sept. 1915) for conniving to get a false passport for one of his spies, and also for attempting to organize a strike to break up the munition manufacture. In addition to these offenses, which were proved in open court, the German agents, official and unofficial, were engaged in a

tissue of plots which were subsequently revealed through docu¬ ments of Albert, von Papen and others which were unearthed by the Department of Justice.

The Crisis of 1917. — The various phases of American neutrality here discussed were in¬ terwoven with each other. The war zone, sub¬ marine warfare, extension of contraband, block¬ ade, continuous voyages, and control of neutral vessels in British waters were all different phases of the determination of the two groups of belligerents to destroy each other's commerce without reference to the previous restrictions of international law. In that process the commer¬ cial rights of all neutrals were certain to be re¬ stricted, and both parties were willing to push captures and condemnations to the farthest point that neutral governments would permit.

The British, however, were heavy and sol¬ vent buyers of American products; they are not chargeable with the sacrifice of a single life of an American citizen (noncombatant) as against 320 destroyed by German submarines. In addi¬ tion the British government paid for seized cargoes and in some cases for vessels or dam-

ages for detention, thus relieving the pressure of owners for action by the United States gov¬ ernment. Even when from February 1916 to February 1917 the Germans restrained their sub¬ marines from sinking vessels without notice, they were sinking great quantities of Allied shipping. Occasionally, as inˆ the Stissex case, they failed to give due warning. Their treat¬ ment of noncombatants, in Belgium, France, Poland, Serbia, Rumania, and their responsibil¬ ity for the massacres of Armenians by the Turks created a rising animosity against them in the United States. The pressure was to some degree relieved by the efforts of the American government to facilitate peace, particularly the proposals of 8 Dec. 1916, formulated by Presi¬ dent Wilson. This was followed (22 Jan. 1917) by President Wilson's address on ˆˆPeace with¬ out Victory.® The Germans, however, had de¬ cided to return to submarine warfare in its most merciless form. On 31 Jan. 1917, the Ger¬ man government gave notice at

Washington that any sliips found in a ®zone® which included the seas adjacent to Britain, France and Italy, ®will he stopped with every available weapon, and without further notice.® By an added presump¬ tion, lanes were described upon the Atlantic, over which one American steamer would be per¬ mitted to pass every week.

It has sometimes been charged that this re¬ newal of warfare was a violation of a promise made by the Germans in 1915. Reference to the discussion on this point above will show that the pledge was conditioned on the withdrawal of the embargo by Great Britain, which was never secured. Renewal of extreme submarine warfare was not, therefore, a breach of faith, but it was a clear breach of humanity and a denial of the accrued rights of neutral com¬ merce. The argument that it was a retaliation for illegal British behavior had no force as against the United States. Retaliation by one belligerent against another cannot be . invoked to destroy a third and neutral power. The ground of the United States was that the free¬ dom of the seas was not granted by or depend¬ ent upon the will of particular nations either in peace or war, and could not be denied upon any ®law of necessity.®

The revival of a form of warfare which to the American government, and most of the American people, seemed murderous, was destined to lead to war. A suggestion had been made earlier that the difficulty might be avoided by forbidding Americans to accept employment or take passage on a belligerent ship liable to destruction by a submarine. In February 1916 McLemore, a member of the House of Repre¬ sentatives from Texas, introduced a resolution to the effect that Americans ought not to travel on any armed merchant ship. This resolution was laid on the table by a vote of 276 to 142. When, in February 1917, the difficulty returned in a startling form, the President came forward with a plan for turning the tables by arming American merchantmen. A bill was proposed by the President (26 Feb. 1917) ®to supply our merchant ships with defensive arms …

and to employ any other measures or instru¬ mentalities that may be necessary or adequate to protect our ships and people in their legiti¬ mate and peaceful pursuits on the sea.® The bill was defeated by a filibuster in the Senate;

but on 12 March the State Department gave notice that ®The Government of the United States has determined to place upon all Ameri¬ can merchant vessels sailing through barred areas an armed guard for the protection of the vessels and the lives of the persons on

board.®

This armed neutrality was powerless to stop the progress of the war, and in any case could only have resulted in a sea fight which would be the prelude to war. The German government made a frantic attempt (February 1917) to in¬ duce Ambassador Gerard to agree to a ®protocol® for enlarging the guarantees of the treaty of 1828, which could operate only if there were war between the countries. On 3 Feb. 1917 the President informed Congress that he had broken off diplomatic relations and dismissed the Ger¬ man ambassador, a broad intimation to the Ger¬ mans that the United States was not too pacific to accept its challenge.

The President's second inaugural address (5 March 1917) indirectly suggested war. The next step was to call Congress in extra session (9 March 1917). The Germans were already beginning to sink vessels on which Americans were passengers or members of the crew. On 2 April the President officially advised Congress to declare war; and on 6 April 1917 Congress passed a joint resolution to the effect that ®the slate of war between the United States and the Imperial German government which has thus])een thrust upon the United States is hereby formally declared.® The President thereupon issued a proclamation of war, and the long period of neutrality terminated. On *7 Dec. 1917, a formal act of war was passed against Austria-Hungary, but no such action was ever authorized against Bulgaria or Turkey, the Allies of the two Central Powers.

Bibliography. — List of Books and Articles : Dutcher, G. M., ˆSelected Critical Bibliography of Publications in English relative to the World War> (Philadelphia) ; Hart, A. B., ˆAmerica at Warˆ (New York 1918) ; Hart, A. B., and Love joy, A. O., ˆHandbook of the War for Public Speakersˆ (ib. 1917) ; Meyer, H. H. B., ˆ Check list of Materials in the Library of Congress on the European Warˆ (Washington 1918) ; Prothero, G. W., ˆList of Publications bearing on the Warˆ (London 1914, et seq.). Documents : American Association for Inter¬ national Conciliation, ˆDocuments regarding the European War> (New York 1914-17) ; Amer¬ ican Journal of International Law, Supplements (ib. 1914—17) ; ˆAmerican Year Bookˆ (ib. 1914, et seq.) ; Fenwick, C. G., <The Neu¬ trality Laws of the United Statesˆ (Washing¬ ton 1917) ; New York Times ˆCurrent Historyˆ (New York 1914-17) ; Stowell, E. C., and Munro, W. B., Hnternational Casesˆ ; United States, Department of State, < Diplomatic Corre¬ spondence with Belligerent Governmentsˆ (Washington 1914-). Narratives; Bullard, A., ˆDiplomacy of the Great Warˆ (New York

1917) ; Clapp, E. J., < Aspects of the War: Neu¬ tral Rights, etc.ˆ (ib. 1916) ; Gauss, Christian, ˆWhy We Went to Warˆ (ib. 1918) ; McMaster, J. B., ˆThe United States in the World Warˆ (ib. 1919) ; Ogg, F. A., ˆNatural Progressˆ (ib.

1918) ; Rogers, Lindsay, ˆAmerica's Case Against Germanyˆ ˆ (ib. 1917) ; Scott, J. B., ˆSurvey of International Relations between the United States and Germanyˆ (ib. 1917) ;

Smith, Munroe, ˆAmerican Diplomacy in the European Warˆ (ib. 1916). Discussions; American Journal of International Law, es¬ pecially ˆAmerican Neutralityˆ (April 1915, pp. 443-456) ; ˆContinuous Voyage Doctrineˆ (October 1915, pp. 793 et seq.) ; Baldwin, J. M., ˆAmerican Neutrality, its Cause and Cureˆ (New York 1914) ; Brewer, D. C., ˆRights and Duties of Neutralsˆ (ib. 1916) ; Raiom, P. M., international Realitiesˆ (ib. 1917) ; Hale, VV. B., ˆAmerican Rights and British Pretensesˆ (ib. 1915) ; Pyke, R. H., ˆThe Law of Contra¬ band of Warˆ (Oxford 1918) ; Roosevelt, T., ˆAmerica and the World Warˆ (New York

1915).

Albert Bushnell Hart, Professor of Government, Harvard University.

20. NEUTRALS AND THE WORLD WAR. The nations of the modern world are bound together so closely by political, social, economic and intellectual ties that any great war is inevitably felt everywhere. To a lesser de¬ gree this has been the case in the past, and much of international law is concerned with the rights and duties of neutrals. The interests of neutrals and belligerents constantly conflict. Neutrals wish to maintain as nearly as possible their ordinary relations with both sides; belligerents wish to prevent their enemies from receiving help from outside. Hence the discussions over blockades, contraband, the ˆfreedom of the seasˆˆ and violations of neutrality.

From the first day of the war each neutral nation faced the following problems: (1) that of keeping out of the war; (2) of avoiding un¬ neutral acts by the government or its citizens ; (3) of preventing any belligerent frorn violat¬ ing its neutrality, and of securing satisfaction for unlawful acts; (4) of upholding its rights under international law of carrying on certain kinds of commerce with either belligerent; (5) of readjusting the whole economic life of ordi¬ nary times, meeting deficits, getting raw mate¬ rials, providing for unemployment, etc.; (6) of keeping the people fed, clothed and warmed; (7) finally, of mediation, of helping to end the war, and in the meanwhile of mitigating its severity .by relief measures.

In particular the neutrals have been affected by the use of mines on the high seas, the crea¬ tion of war zones, the increasingly ruthless use of submarines by Germany, the lengthening lists of contraband, blacklists, interference with mails, use of neutral flags by belligerents, the forcing of concessions by the withholding of imports and compelling neutral ships to enter belligerent ports. The Allies through their command of the sea could control a large part of the imports and exports of the neutrals, par¬ ticularly the Scandinavian countries and Hol¬ land. Germany through open land frontiers and across the Baltic had access to these north¬ ern neutral markets. Both belligerents tried to prevent supplies from reaching their enemies indirectly through neutrals, and demanded con¬ cessions or threatened reprisals whenever the other side seemed to be profiting.

The Netherlands. — At the outbreak of war Holland mobilized to defend the frontiers. The Dutch knew that German expansionists had long desired to control the month of the Rhine, the Dutch seacoast and their colonies in the East Indies. For years Pan-German

propagandists had been urging the Dutch to join a greater Germany. German capital had secured a tremendous economic hold in Hol¬ land. In court, army and business circles there were numerous Germans and German sympa¬ thizers. The nation as a whole, however, was firmly resolved to maintain its neutrality and independence. To join Germany meant the loss of the colonies to the Allies; to join the Allies meant to risk the fate of Belgium and Serbia. The spectacle of martyred Belgium made a deep impression on Holland, exciting sympathy, indignation and alarm. While many were pro-Ally, Dutch patience was sorely tried by British restrictions on trade, interference with mail and cables and use of coaling privileges to control the movements of Dutch shipping. German methods of

search and seizure were also re¬ garded as illegal. Protests were made to both sides on these matters, and also as to mines in the North Sea. Specific violations of Dutch territorial neutrality by warships, aircraft or troops were resisted, or apologies were secured. Early in the hostilities the government forbade all belligerent warships to. enter Dutch waters. This was extended to cover armed merchant¬ men. Soldiers who crossed the border were interned.

The government refused to publish its spe¬ cific reasons for keeping a considerable force mobilized. Obviously by conquering Holland, Germany would have gained additional sub¬ marine bases and valuable rail lines to northern France; on the other hand a neutral Holland protected the vital Rhine industrial districts. On several occasions the Dutch suspected that Germany was trying to force a quarrel. At times, as in March 1916, it was rumored that the Allies planned to attack Germany through Flolland. The most serious controversies were those with the German government over its submarine policy. Losses from mines and sub¬ marines began in 1914 and became steadily worse. Particularly critical were the sinking of the Katwyk April 1915, the Tuhantia and the Palembang, March 1916, and of six grain ships, February 1917. In some cases Germany apolo¬ gized and offered damages, in others responsi¬ bility was disclaimed, or the sinkings justified. Finally Holland, with Germany's assent, took over German shipping in the East Indies to re¬ place some of the lost tonnage. On 20 March 1918 all Dutch ships in American and Allied ports were taken over, after German threats had pre¬ vented an agreement as to chartering them. Holland was to be paid and any losses made good. The Dutch government protested, but the measure though unusual was legal. Ger¬ many protested Holland's final acquiescence as an unneutral act, and brought on a crisis by de¬ manding the right to ship gravel and other supplies through Holland to Belgium. The previous autumn Britain had brought pressure on Holland to stop such shipments. Holland yielded to Germany only in part.

The heavy expenses of mobilization and re¬ lief work necessitated emergency loans and in¬ creased taxes. At first business was disorgan¬ ized. Stock exchanges closed, and a limited moratorium was declared. Many industries, like the diamond-cutting of Amsterdam, were paralyzed. Later readjustments resulted in some war prosperity, but the profits were not

widely distributed. It was especially difficult to secure raw materials, food and fuel, to control re-exports to belligerents and to maintain trade relations with the Dutch East Indies. The government at different times took action to prevent the export of necessities, to fix prices and to ration the food supply. Poor, crops (1915) and floods (1916) increased the food difficulties. Much discontent was caused by the government's failure to solve all these problems satisfactorily. The question of im¬ ports was largely solved by the formation in November 1914 of the Netherlands Overseas Trust, an organization of Dutch importers who were allowed by the Allies to receive goods on their guarantee that they would not be re¬ exported to Germany, or used to replace Dutch goods so exported. While some smuggling continued, the great flow of goods to Germany was checked. In spite of food shortage at home the Dutch managed to export some meat, fish and dairy products to bQth Germany and England in return for coal and other necessi¬ ties.

Holland was naturally keenly interested in peace, and through Dutch intermediaries occa¬ sional informal attempts were made to initiate discussions. Pacifist groups, like the Inter¬ national Congress of Women (April 1915) convened in Holland to denounce the war and to demand peace. Holland did much to relieve suffering. Besides caring for her own poor and unemployed, and the families of her sol¬ diers, Holland supported over a million Belgian refugees, though many of them returned home later. Through Holland there went great quantities of mail and food packages for pris¬ oners, particularly English prisoners in Ger¬ many. English-German exchanges and repa¬ triations took place largely through Holland.

Switzerland. — Of the Swiss population of nearly 3,800,000, about 2,600,000 speak German, 800,000 French and 300,000 Italian. While the Swiss were patriotically united in their de¬ termination to resist attacks from whatever quarter, their sympathies were divided roughly along the lines of language. Some German¬ speaking Swiss, however, were alienated by the invasion of Belgium and by the whole German conduct of the war.

Although the neutrality of Switzerland had been guaranteed, the Swiss citizen army was promptly mobilized, and the larger part of it kept on

guard throughout the war, in spite of increasing protests from the radical labor lead¬ ers. Occasionally alarming rumors were cur¬ rent that one side or the other planned a flank¬ ing movement through Swiss territory; but if such a plan was ever seriously considered the prospect of determined resistance, the moun¬ tainous character of the . country, the moral disadvantage of an unprovoked attack and the doubtful military value of the step prevented its being undertaken. On several occasions when Allied or German aviators flew over Swiss ter¬ ritory apologies were made. The government tried to maintain a strict neutrality, censoring press expressions that might cause trouble. In 1916 anti-German riots at Lausanne were sup¬ pressed and an apology tendered. In January 1916, much excitement was caused by the trial of two Swiss officers accused of betraying

Swiss and Allied military information to the Central Powers, but they were acquitted.

The government early (1914) protested against Allied interference with Swiss imports, particularly grain. Protests were also made against the German submarine blockade, though at first it purported to allow shipments to Switzerland through a French port, Cette. Switzerland keenly felt the loss of the profit¬ able tourist trade. Industry also suffered. Un¬ employment was for a time serious, calling for government action. Normally Switzerland im¬ ported chiefly foodstuffs, silk, coal and cotton, and exported manufactures of cotton and silk, watches and clocks, cheese and chocolate. The chief trade was with Germany. Much difficulty was encountered in securing these imports and in keeping industry going, neither group being willing to help Switzerland to help its ene¬ mies. In October 1915, the Swiss Surveillance Society was formed, corresponding to the Netherlands Overseas Trust, and in general agreements were concluded guaranteeing that manufactured goods should not be sold to the enemies of the country furnishing the coal, raw materials and machinery that produced them. In spite of an increased use of electricity pro¬ duced by water power, and the use of low-grade Swiss peat, Switzerland had to depend on Germany for coal, and in September 1916 ob¬ tained a supply in return for cattle, cheese and aluminum. In May 1918 Switzerland offered timber to the Allies in return for food conces¬ sions. Soon afterward cattle were again ex¬ changed with Germany for coal. France objected. ˆ The food question became increas¬ ingly serious. At the outset the government forbade food exports, and later there devel¬ oped constant negotiation for supplies from out¬ side, regulating prices and controlling distribu¬

tion. By 1917 the Swiss were on compulsoiy rations. The Swiss were almost entirely de¬ pendent on the United States for grain, which was allotted to them and sent through in spite of submarines which sank it when possible, even in Spanish ships.

As a neutral adjacent to both groups of bel¬ ligerents Switzerland offered opportunities for espionage and intrigue, and also for infor¬ mal peace negotiations. Swiss charitable and relief efforts were most remarkable. Doctors and nurses served in the, Red Cross on both sides. Belgian and Serbian refugees were cared for. Exchanges of seriously wounded prisoners were arranged for (1915) and carried out. Swiss societies located missing prisoners and reunited scattered refugee families. The Post Office forwarded great quantities of mail and food packages for prisoners. Through Swiss intermediaries went money for relief in Turkey. Invalid prisoners, especially those suffering from tuberculosis, were certified by Swiss doctors and interned in Swiss sanitoria. Through Switzerland civilians-and occupants of invaded territories were repatriated.

Denmark. — In Denmark the memory of Prussia's seizure of Schleswig-Holstein and the fear of German conquest made most of the people suspicious of and unfriendly to the Cen¬ tral Powers. Long continued Pan-German propaganda, however, had made some impres¬ sion. In spite of the hopelessness of single-handed resistance, Denmark mobilized part of

the army, and strengthened the frontier de¬ fenses. A few violations of Danish neutrality were apologized for, the most flagrant being me destruction by Germany of the stranded British submarine E13 in 1916. Danish ship¬ ping early began to suffer from mines and sub¬ marines. Early sales of food and supplies to the belligerents soon brought a shortage. The government began regulating prices, rationing scarce articles, and arranging for necessary im¬ ports, especially coal, fodder, fertilizer, copper, oils, fats, hides and steel. Two Danish Mer¬ chant Guilds were formed which the Allies al¬ lowed to receive imports on a guarantee against re-export to Germany. In 1918 a similar agree¬ ment was made with the United States. From England and Germany combined only about two-thirds of the normal coal supply could be obtained, crippling railways, factories and

lighting. Some electric power was later ob¬ tained from Sweden. Many, however, were thrown out of employment. In 1915 Denmark agreed with Great Britain to dispose of meat in the pre-war ratio, half to Great Britain, 14 per cent to Germany, the rest for home use. Export butter was divided evenly; England re¬ ceived five-eighths of the fish and Germany three-eighths. Under government supervision a considerable number of swine have been slaughtered because of the scarcity of fodder. On the whole Denmark fared much better as to food supply than most other European nations. During the war (1915) a more demo¬ cratic constitution was adopted, granting woman suffrage. In 1916 the Danish West Indies were sold to the United States. Added expenses called for extra taxes and loans. In 1917 Denmark agreed to care for 1,200 invalid prisoners (Russian, German, Austrian).

Norway. — Through common liberal institu¬ tions, economic ties and intermarriage of the royal families, Norway has been bound to Eng¬ land. Though sometimes the Allied blockade aroused resentment, the chief anger of the nation — at times bringing it to the verge of war — was directed against Germany because of the losses of shipping and life caused by sub¬ marines. Some of the earlier losses were apologized and paid for. By June 1915 34 vessels had been sunk. In March 1917 66 ships were lost, 75 in April and 49 in May. By the summer of 1918, 769 ships had been sunk, with a loss of 1,008 lives, and 53 were missing with 704 on board, two-thirds of them probably ^^purlos versenkt® by Germany. In 1916 all submarines were forbidden to enter Norwegian waters. The carrying power of the large Norwegian merchant marine proved directly and indirectly of great service to the Allies. Shipbuilding was greatly stimulated, and shipping stocks earned large profits. By 1916 Norwegian merchants were signing con¬ tracts against re-exporting articles allowed to pass by the Allies. In 1917 England cut off Norway's supply of coal, because of the ex¬ port of pyrites to Germany, and only furnished it again on condition that Norwegian ships should make trips to France as well as to Nor¬ way. Efforts were made to develop Norwe¬ gian water power and coal. In 1916 the British government contracted for 85 per cent of the Norwegian fish catch. In 1918 the contract was taken over by the Norwegian government.

With less than 4 per cent of its area under cultivation Norway has always imported a large part of the necessary cereals. Since 1914, by

the use of tractors, the home produc¬ tion has been considerably increased. Govern¬ ment control of food, and ultimately strict rationing, were found necessary. Whale oil was refined and used to make oleomargarine. In May 1918 a treaty with the United States allowed Norway to import, for home consump¬ tion ˆ only, foodstuffs, coal and farming machinery. In return timber, wood-pulp, fish, metals for munitions and nitrates were to go to France. While the bulk of Norwegian exports went to the Allies, some were permitted to go to Germany. Norway feared German resent¬ ment, and as a matter of fact the German Cen¬ tral Trade Board attempted to retaliate for the American agreement. Internally, Norway has seen further liberalization of the constitution. In 1916 there were serious labor disturbances.

Sweden. — Of the Scandinavian countries, Sweden has shown the strongest pro-German sentiment. Long and close cultural and eco¬ nomic associations made most members of the court (the queen is German), of army and business circles, of the universities and of the Conservative party generally, sympathetic to the Central Powers. For years the fear of a Russian advance across Sweden and Norway to warm -vvater, and apprehension of Russian aggression in the Baltic, had made Sweden look to Germany for protection. This feeling was carefully stimulated from Germany. In the war,_ however, Sweden decided for neutrality, mobilized part of the army and made common cause with Norway and Denmark in defending their neutrality and their rights. A small but aggressive ^^activist® party advocated interven¬ tion on the side of the seemingly victorious Central Powers, with the hope of securing the Aaland Islands and Finland from Russia. The Socialists and Liberals were strongly for peace. Most of the people, even the Conservatives, whatever their sympathies, favored neutrality, if possible. In January 1915 export of muni¬ tions was forbidden. In 1916 submarines were forbidden to enter Swedish waters. Apologies were secured for several violations of neutral¬ ity, as in 1915, when Russian ships destroyed a German warship inside the three-mile limit, and in 1916 when a German cruiser fired on a Swedish submarine. In July 1916 Sweden closed the exit from the Baltic through Swed¬ ish waters, but reopened it after a strong Eng¬ lish protest. Perhaps by way of compensation, 10,000 horses were sold to Germany. The action of Swedish diplomats in transmit¬ ting German correspondence, notably the Luxburg dispatches from Argentina, aroused much unfavorable comment, and was not approved by Swedish opinion. Swedish-Russian relations improved somewhat in the course of the war. Trade was brisk. Railroad connections, long delayed for strategic reasons, were made. Through

Sweden thousands of German and Russian invalided prisoners were' exchanged, and much relief work was done. A crisis was caused (1916) when Russia fortified the Aaland Islands, but it passed when Russia and England guaranteed that the fortifications would be re¬ moved after the war. The collapse of Russia removed the fear of that power. Sweden was

particularly interested m Finland, where an im¬ portant minority is Swedish. Beyond assisting refugees to escape, however, the Swedish gov¬ ernment did not intervene. To preserve order, the Aaland Islands were occupied 19 Feb. 1918, and the action of Germany in displacing the Swedish forces 3 March increased the dislike and fear of Germany which had been growing since the submarine campaign grew more ruth¬ less. To have the Baltic made a German lake, as for a time seemed inevitable, would have seriously threatened Swedish security.

Sweden also objected to British interference with imports and the mails, and by stopping mail for Russia (1915) became involved in a serious controversy. An arrangement was finally made reserving Sweden's right to claim damages later. Until 1916 Sweden refused to permit merchants to make the usual contracts with the Allies as to re-exports, and finally agreed only on condition that the Swedish gov¬ ernment should supervise tl;\e working of the scheme in Sweden. In 1915 a limited amount of cotton and coal was allowed to pass by England. England and Germany both wanted Swedish iron ore. By treaty Sweden was bound to furnish a certain amount to Germany, and the government refused to stop this export. England however took an increasing share of the output. To England Sweden exported tim¬ ber for mine-props, in spite of the fact that Germany declared this contraband and seized it whenever possible.

The food shortage was serious. Ordinarily over 12,000,000 bushels of cereals were imported, chiefly from Russia and Germany. Now four-fifths of this had to come from the United States, the rest from Argentina. Prices rose enormously. The government took control, for¬ bidding exports, arranging for imports, selling food to_ the public at

less than market prices, attempting to fix prices, requisitioning stores, rationing various articles, and finally adopting bread and sugar cards. The rye crop of 1916 was poor, partly because of lack of fertilizer. Fodder was scarce, dairy products fell olf and many cattle had to be killed. A little food (butter and pork) was exchanged with Ger¬ many for coal. When England cut off the sup¬ ply of oleomargarine, butter had to be kept for home use. At home increased use of wood and development of water power helped the fuel shortage. Some coal was produced by the Spitzbergen mines. Coal imports for the first six months of 1916 were 2,859,750 tons ; in the same period in 1917 they fell to 634,138 tons. In 1916-17 England cut off the supply of tan-bark, thus crippling factories which had been making army shoes for the Central Powers. While many individuals made money out of war trade, and while bank deposits, imports and exports all showed an increase, the country as a whole suffered in many ways more than England. Part of the war profits were used to buy out foreign owners of Swedish securities.

Some Swedish Socialists were active in try¬ ing to bring the working classes of all the belligerents together, particularly after the Russian Revolution. Stockholm was proposed as a place for the meeting, but Allied opposi¬ tion prevented it. An internal controversy, which had begun before the war, raged around the question of national preparedness and over

the degree to which the king might act inde¬ pendently of the Ministry. Taxes and loans were needed to meet deficits. The elections of September 1917 gave a strong Socialist-Liberal majority and led to somewhat better relations with the Allies. In May 1918 by a trade agree¬ ment with the Allies and the United States, Sweden allowed 400,000 tons of shipping to be chartered to the Allies, and promised to facili¬ tate the export of wood-pulp, steel and iron ore. In return imports of food, leather, oil, cotton, etc., principally from Argentina and Australia, were permitted. Re-export of course was forbidden.

The war strengthened the ties between the Scandinavian countries. At several conferences of the three kings and their advisers questions of common interest were discussed, and pro¬ grams of action decided upon. On several occasions identical notes were issued by the three governments (protesting against blockades and submarines, agreeing to Wilson's peace-terms note), thus emphasizing Scandinavian solidarit}ˆ By interchange of products (e.g., Swedish sugar to Norway, Danish butter to Sweden) the economic distress was somewhat

relieved.

Spain. — Spain was more fortunate than the northern neutrals in being farther removed from actual fighting. Nevertheless there was some danger of being drawn into the war, par¬ ticularly through the German submarine cam¬ paign. Spain had interests and sympathies with both groups. A common Latin culture and an interest in Mediterranean questions binds her to France and Italy. Colonial interests in North Africa make it imperative to keep on good terms with the Entente naval powers. (The queen is English). A larger proportion of Spanish trade has been with the United King¬ dom and France than with any other country. On the outbreak of war, Spain took over French interests in Germany and Austria-Hungary. In 1916 Spain gave assurance to France as to the Pyrenees boundary and Morocco, and withdrew some garrisons from the boundary of Portugal, then fighting as England's ally. On the other hand, trade relations with Germany had been getting closer. More German capital was being invested in Spanish enterprises. During the war it was thought that Germany was planning to make Spain a base from which to recover lost trade after the war. Thousands of Ger¬ mans in Spain, directed from the embassy, carried on an energetic propaganda with con¬ siderable success. England's hold on Gibraltar and the French advance in Morocco were em¬ phasized. German victory was spoken of as certain. A number of newspapers were sus¬ pected of receiving German money.

The mass of the people were strongly in favor of neutrality. The war affected them chiefly through higher prices, unemployment and scarcity of food, against which they expressed resentment by occasional riots and strikes. Though the sympathies of the better educated classes were strong on one side or the other, relatively few advocated joining in the war. The Liberals, Republicans and Socialists, through their sympathies with radical and anti-clerical France, were pro-ally, as were part of the pro¬ fessional classes. Partly through dislike of French anti-clericalism, the Church leaders, the

Clericals and the Conservatives, together with most of the army officers, were pro-German. Some Catholics however protested against the outrages in Belgium. The king personally ap¬ peared to favor the Allies, but he maintained a correctly neutral official attitude. He individu¬ ally established a bureau to locate missing per¬ sons in the war area. The government tried to be neutral and curbed violent outbreaks of sympathy for either side. It was repeatedly charged that German submarines were getting supplies at unfrequented places along the coast, which it was hard to guard properly. Several damaged submarines were interned in Spain, but one or two later escaped, apparently through the connivance of local officials. The Allied re¬ strictions seemed to the Spanish irksome and illegal, but still greater resentment was aroused by the German submarine campaign, particu¬ larly after February 1917. By August 1918, one-fifth of the Spanish tonnage had been sunkˆ much of it outside the area covered by Ger¬ man decrees, some of it even in Spanish waters, with considerable loss of life. The Cabinet finally announced that future losses would be made good temporarily by using equivalent German tonnage interned in Spanish ports. Ger¬ many would not agree to this. In October 1918 preliminary steps were taken for carrying out the Spanish plan, but hostilities ended before much was done. During the war there were a number of Cabinet changes, due largely to dif¬ ferences over internal questions. In foreign affairs. Liberal and Conservative and coalition governments alike held to a policy of neutrality, though Romanones rather favored intervention on the side of the Allies. The government was forced to resort to extra taxes and to loans, the latter being floated with difficulty. In 1916 Spain refused to join President Wilson in sug¬ gesting to the belligerents that they state their war aims, suggesting however the formation of an entente among neutrals to uphold their rights.

Internal problems had to do with the de¬ velopment of a more genuinely democratic gov¬ ernment, administrative decentralization, the in¬ auguration of a program of social and economic reform, the development of Spanish resources, the strengthening and reform of the army and the control of the committees of army officers, and the formulation of a more satis¬ factory Moroccan policy. These difficulties were of course intensified by war condi¬ tions. Internal economic problems caused much anxiety. At times embargoes on food¬ stuffs and raw materials were laid, and then relaxed. Scarcity of coal crippled factories and railroads. In March 1918 coal was selling at $45 a ton. The food shortage, though at times serious, was less so than in most other European countries. “Part of the difficulty was caused by extensive exports of foodstuffs, in¬ cluding grain, sugar and

wine, amounting in 1916 to $106,000,000 and in 1917 to $101,000,000. Imports of food were from one-third to one-half of these amounts. Part of the food scar¬ city at home was attributed to food specula¬ tion. Some Spanish manufacturers were helped by the increased demands from the belligerents, particularly France and England. After falling off in 1914, imports and particularly exports rose considerably above the figures for 1913.

Large orders for the American army (mules, blankets, food) were placed in Spain. When there were delays in delivery — possibly not unconnected with German activities — the United States brought pressure to bear by hold¬ ing up the export of much-needed raw materials. In March 1918 an agreement was reached by which Spain was to send supplies to Pershing, and was to give France a credit for supplies, receiving in return permission to import oil and cotton from the United States.

South America. — The economic effects of the war were immediately felt in South Amer¬ ica. As a continent. South America exports foodstuffs and raw materials, and imports coal, oil, foodstuffs and manufactured goods from Europe and the United States. South American countries are largely in debt and continue to rely on outside capital for further economic de¬ velopment of their resources. For some months the interruption of normal trade and the dis¬ arrangement of international credit caused de¬ pression and distress. Nearly everywhere a moratorium was declared. Customs revenues fell off, and retrenchment, new taxes and addi¬ tional loans were needed to meet governmental deficits. In Chile the export of nitrates was crippled, and with it the finances of the gov¬ ernment. In Brazil, already suffering from a fall in price of rubber and coffee, disorders broke out among unemployed rubber collectors. By 1915 conditions began to improve somewhat. A determined effort was made by the United States and Great Britain to capture the large trade formerly done by the Central Powers. The increasing demands of the Allies for food, sugar, hides, copper, tin, rubber and nitrates caused a revival of exporting. By 1916 the Chile nitrate industry was more prosperous than ever. The Argentine had a market for all the grain for which transportation could be secured. The chief difficulty was with shipping, owing to the increased losses by submarines and the diversion of ships to more pressing uses. Freight rates rose very high. South American imports fell from $1,033,000,000 in 1913 to $536,-000,000 in 1915, rising to $646,000,000 in 1916. Before the war between 13 per cent and 16 per cent of these imports came from the

United States. In 1916 the percentage rose to 36, and later to nearly 50. South American exports fell from nearly $1,160,000,000 in 1913, to $889,840,000 in 1914, rising to $1,233,000,000 in

1916.

Some questions of South American neutrality were raised. German cruisers in the early days attempted — sometimes with success — to obtain supplies and wireless information from South America. Britain protested. Chile, Ecuador and Colombia denied any unneutral activities. The German cruiser Dresden was sunk (14 March 1915) by the British in Chilean waters. England explained and apologized.

South American shipping was not large, but it suffered its share of losses. The German submarine campaign of 1917 led to protests from most of the South American republics, a number of which followed the United States in breaking relations with Germany (Brazil, Peru, Ecuador, Bolivar, Paraguay, Uruguay). The action of Brazil, the Argentine and Chile was watched with particular interest. In both the Argentine and Brazil there were hundreds

of thousands of German settlers among whom an active Pan-German propaganda had long been carried on. Germany's hope of extending political control over parts of these two states was well known. There were also hundreds of thousands of Italian settlers, many of whom — perhaps 50,000 — had been called back to fight in 1915. Their loss, and the stoppage of immi¬ gration, increased the labor shortage. In Chile the German trained army was said to be Teutonic in sympathy, but public opinion was divided. After breaking relations with Germany, 11 April 1917, Brazil a few weeks later ^'revoked her neutrality^^ in order to show Pan-American solidarity, and seized German shipping. On 26 October, following the sinking of the Macau, Brazil declared war. The Brazilian navy as¬ sisted in hunting for raiders and submarines. The Germans in southern Brazil made some

trouble, but it did not prove serious. In the course of the negotiations between Argentina and Germany as to the safety of Argentine shipping, the German Ambas's'ador, Count Luxburg, advised his government that two small ships then at sea should either be spared or ®sunk without leaving any trace.^^ The publi¬ cation of this dispatch by the United States led Argentina to dismiss Luxburg. In September Congress voted to break relations with Ger¬ many, but on the repudiation of Luxburg by Berlin, President Irogoyen refused to take further action. A reference in another of the count's dispatches to ˆreorganizing® southern Brazil aroused anger in that country. By the end of the war South America had not recov¬ ered entirely from the initial depression. On the whole,' however, the governments came through financially in better shape than might have been expected. Home manufacturing and the use of home resources were stimulated. The need of greater diversity of home products was realized. Germany's commercial hold was for the time broken, and the menace of political aggression ended. Pan-American cooperation and solidarity were increased, and closer politi¬ cal and economic ties with the United States established.

Arthur P. Scott,

Assistant Professor of History, University of Chicago.

21. THE WAR AND THE SMALL NA¬ TIONS OF CENTRAL AND EASTERN EUROPE.

I. Introductory.

One of the most important results of the World War is the political emergence and independence of several small national states which had previously been suppressed and denied a separate political existence or the full realization of their national aspirations. These new or greatly augumented national states include the Finnish peoples of Fin¬ land, Esthonia and northern Livonia; the Letts and Lithuanians of the Baltic provinces of southern Livonia, Courland and their hinter¬ land; the Poles of Russia, Prussia and Austria; the Ruthenians of the Ukraine; the Czecho¬ slovaks of Bohemia and Moravia ; the Magyars of Hungary; the Rumanians of Transylvania, Moldavia and Wallachia; the Bulgars of the southeastern Balkan regions; the Jugo or south¬ ern Slavs, including the Slovenes, Croats and Serbs ; the Albanians on the coast of the lower

eastern Adriatic; and the Greeks in the extreme south of the Balkan districts and about the islands and shores of the .ˆEgean Sea. It must be understood at the outset, of course, that the above-mentioned peoples were not all equally suppressed during the period before the war. Some had enjoyed at least partial political emancipation, while others remained entirely submerged in a political sense. But as a group they do constitute the ˆˆsmall nations® that figure prominently in current international problems. The general historical and psychological back¬ ground of the emergence of the national aspira¬ tions of these peoples is discussed in the article on Nationalism, the Historical Development, in this Encyclopedia.

II. The Historical and Ethnographic Back¬ ground OF THE Problems of the Small Nations in the World War and at THE Peace Conference.

1. The Finnish Peoples. — The northern¬ most of these suppressed nations are the Finnish peoples of Finland, Esthonia and northern Livonia. Originally constituting a portion of that early Nordic stock which in¬ habited most of the great plain of Russia, and from which the Teutonic and Scandinavian peoples, as well as the Finns, Letts and Lithu¬ anians, have subsequently been differentiated, they have been forced north against the Lapps by the successive invasions of the Russian Slavs from the south They were converted to Chris¬ tianity by Bishop Henry, an English missionary, in the middle of the 12th century. In the 14th century Finland was annexed to Sweden and about 1350 Denmark, which had controlled Es¬ thonia, surrendered it to the Teutonic Knights. At the beginning of the 17th century, the vigor¬ ous Swedish monarch, Gustavus Adolphus, ob¬ tained for Sweden both Esthonia and Livonia. \Vhile the Swedes were able to control the Finns politically for a considerable period, they were never able to impose their culture upon their Finnish subjects beyond inducing them to accept Swedish Protestantism. In 1721, by the Treaty of Nystad, Peter the Great obtained for Russia Esthonia, Livonia and part of Finland, and by 1809 Russia had secured complete politi¬ cal control of all the Finnish peoples. For some 90 years thereafter the Finns enjoyed practical cultural autonomy, but in 1899 the advocates of the Russification policy of Pan-Slavisrn induced Nicholas II to extend these measures to Fin¬ land. The Finns, however, took advantage of the weakness of the tsar in the revolution of 1905 and compelled him to restore the Finnish constitution and to consent to the many liberal political reforms proposed by the Finns. A revival of Russification policy by the Russian bureaucracy in 1913-14 was partially termi¬ nated by the outbreak of the World War, but was probably instrumental in inducing the Finns to declare their independence from Rus¬ sia in December 1915. From the racial

stand¬ point Ripley, the leading authority on the racial distribution of Europe, holds that the Finns are a branch of that primordial Nordic stock which inhabited the region now known as Russia and from which have been differentiated the Teu¬ tonic, Letto-Lithuanian and Finnish types. The Nordics were pressed north by the invasions of the Alpine Slavs from the southwest. The Finns, having been massed against the extremely

broadheaded Lapps in the north and intermar¬ ried with them, have acquired a tendency to¬ ward broadheadedness which was quite un¬ known in the original stock and is practically absent among the Finns of the Baltic provinces of Esthonia and Livonia who have not been brought into proximity with the Lapps. In re¬ cent times three languages have been used in Finland, the Swedish in commercial and inter¬ national relations, and to a considerable degree in culture and religion ; the Russian as the offi¬ cial speech, and the Finnish as the national lan¬ guage. The Finns number about 3,500,000, of whom about 2,500,000 live in Finland. In 1910 an authoritative estimate put the proportion of Finnish-speaking peoples at 88 per cent and at least that proportion are of a definite Finnish stock. In religion the Finns are overwhelm¬ ingly Lutheran. The strength of the national bond between the Finns of Finland and their kinsmen in the Baltic provinces can only be determined when the confusion and conflicting claims growing out of the present war have subsided.

2. The Letts and Lithuanians. — Living next to the Finns of Esthonia are the Letts and the Lithuanians who inhabit the Baltic provinces of southern Livonia and Courland and their hin¬ terland. The Letts dwell in the Baltic Coast region and the Lithuanians in the adjacent in¬ land districts. While the Letts and Lithu¬ anians are physically identical and linguisti¬ cally and culturally closely allied, their history has been at least slightly different. That this variation began only after they had been pushed up toward the Baltic by the oncoming Slavs can¬ not be doubted. The conquest and colonization of the Letts by the Teutonic Knights was begun in the 13th and 14th centuries. The Letts fol¬

lowed the order into an acceptance of Luther¬ anism, but after the order was dissolved in 1526 the Letts were later partitioned between Poland and Sweden. It was not long, however, until the Letts were united with the Lithuaniams in a common subjection to Russia. By the Treaty of Nystad, in 1721, Livonia was ceded by Sweden to Russia, and Courland was^ obtained by the third partition of Poland. Lithuania has had a much more distinguished history. At the opening of the 14th century it was a great non-Christian duchy stretching from the Baltic provinces on the north to the Black Sea on the south. In 1386 its grand duke, Jagello, married Jadwiga, daughter of the king of Poland, ac¬ cepted Roman Catholicism for himself and his subjects and became king of Poland as Wladys-law II. This purely personal union was changed into a constitutional one by the Union of Lublin in 1569. The merger with Poland was never popular, however, with the Lithuanians, and in accordance with the principle of national self-determination this historical union could in no way be used as a 'basis for a claim to Lith¬ uania on the part of the restored Polish state. Lithuania constituted the majority of that part of Poland which went to Russia in the parti¬ tions from 1772 to 1795. Until 1876 it was al¬ lowed a large amount of cultural autonomy, but after that date the Russification policy was pur¬ sued with the usual result of only increasing the national sentiment of the Lithuanians. Racially the Letts and Lithuanians are identical, both being branches of the same primordial Nordic race from which the Teutons and binns were

also differentiated. The Lithuanian language is one of the most interesting in Europe, being the best preserved representative of the so-called *Aryaifl^ type. It is said that the intelli¬ gent Lithuanian peasant has little difficulty in reading Sanskrit. The Lettish language dif¬ fers but slightly from the Lithuanian. Religion is the chief point of division between the Letts and Lithuanians. While some Letts belong to the Greek Church and some Lithuanians are Protestants, the vast majority of the Letts are ardent Lutherans and the Lithuanians are over¬ whelmingly Roman Catholic. Their Roman Catholicism is the only thing which the Lithu¬ anians have in common with the Poles. It is generally estimated that there are something over 2,500,000 Lithuanians and 1,250,000 Letts, though in the official Russian censuses they are all lumped together as Lithuanians.

3. The Poles. — Of all the nations freed by the war Poland can, perhaps, claim the most notable and romantic past. Aside from non-Polish elements, it once included Russian Po¬ land, Posen, East and West Prussia, Silesia and Galicia. Little is known of the origins of the

Poles — a Slavic people — before the founda¬ tion of the vast Polish kingdom embracing most of central Europe by Boleslaw the Brave (992-1025). This abortive domain was divided in 1139 and not reunited until 1320. In the middle of the 13th century the Teutonic Knights began their missionary work and colonization among the Poles and succeeded in converting them to Roman Catholicism. The military success of the Knights was not as marked as their theo¬ logical progress; 24 years after the personal union with Lithuania under Jagello, the Poles and Lithuanians utterly defeated the Knights in the battle of Tannenberg. In 1683 John So-bieski, king of Poland, relieved Vienna and saved central Europe from the Mohammedans. The complete union with Lithuania at Lublin, in 1569, gave Poland assurance of an ample ter¬ ritory, but the state was so beset with fatal weaknesses that decline was inevitable and ulti¬ mate extinction invited. The kingdom was ex¬ tensive but lacked distinct or defensible bound¬ aries ; there were serious religious and racial diversities ; gross political, social and economic inequalities existed; the constitutional arrange¬ ments invited anarchy; and the control by for¬ eign kings resulted in the exploitation of Polish interests. The first partition between Prussia, Austria and Russia in 1772, while unjustified on the part of the partitioning powers, can stir tit¬ tle sympathy, but not so with the second and third partitions in 1793 and 1795. In the 21 years that had intervened the Poles had elimi¬ nated many of the fatal economic and political weaknesses that had previously endangered their national existence and had given promising evi¬ dence of being on the eve of a far-reaching political renaissance, but the avaricious empress, Catherine II, would tolerate no strong Slavic state obstructing Russian contact with the west and she arranged the outrageous partitions of 1793 and 1795 which terminated the political in¬ dependence of Poland. The national hopes of the Poles were temporarily revived by Napo¬ leon's creation of the grand duchy of Warsaw, in 1807. Still more promising was the establish¬ ment, in November of 1815, of a kingdom of Poland by the then liberal tsar, Alexander I. This embraced much of the old kingdom of

Poland and was favored with the most liberal political constitution then in existence in Eu¬ rope, but the Poles desired complete political independence and could not resist the contagion of the revolutionary movement that swept over Europe in 1830. Their revolt was speedily sup¬ pressed and the short-lived kingdom was united with Russia. Encouraged by the growth of na¬ tionalism in Germany and Italy and by the benevolent but treacherous attitude of Napo¬ leon III, the Poles made one last desperate at¬ tempt in 1863 to obtain their freedom. This rebellion was crushed with even greater ease than the revolt of 33 years earlier and a most brutal and thorough-going punishment was meted out to the gallant rebels. That policy of Russification then began, by means of which the Russians have since tried without avail to crush the national aspirations of their Polish subjects. The one extenuating compensation which the Poles have enjoyed since 1863 has been the fact that the coming of the industrial revolution to Russia made P>oland the centre of Russian economic life. That part of the Polish nation which was included within the kingdom of Prussia — a part of upper Silesia, Posen, West Prussia and the Masurian district of East Prussia — has met with oppression only less severe than that which their kinsmen received from Russia. But the rigorous religious, edu¬ cational and agrarian policy of Bismarck and Billow only served to stir the resentment of the Poles and to reanimate their national spirit. Only in Austrian Galicia were the Poles ac¬ corded that degree of autonomy and liberal treatment which has made them partially satis¬ fied to dwell in political subjection to another state. The Poles are a branch of the Slavic di¬ vision of the Alpine race, but are much less broadheaded than their Czech and Slovak neighbors on the south, or even the Russians to the east. Their contact with so many different peoples has caused a considerable prevalence of racial intermixture Their language is a dis¬ tinct western Slavic dialect. In religion over three-fourths of the Poles are Roman Catho¬ lic. The only notable exception is to be found in the 300,000 Protestants in the Masurian Lakes district of East Prussia. The estimates of the number of Poles in Europe at the out¬ break of the war vary from about 15,000,000 to 20,000,000, of whom some 3,500,000 lived in Ger¬ many, about the same number in Austria and the remainder in Russia.

4. The Rutkenians. — Stretching from south¬ eastern Poland to the sea of Azov is the dis¬ trict of the Ukraine, eastern Galicia, and part of Bukowina, the home of the Little Russians or Ruthenians. Roughly this is the region in¬ cluded between the Dniester and Dnieper riv¬ ers and coincides with the fertile ˆTlack-earth® district of Russia, the most productive cereal growing region in Europe. The Little Russians or Ruthenians of the Ukraine have had a most varied history. Settling

in southern Russia in one of the most recent waves of Slav immigra¬ tion, they were first welded into something like a southern Russian state, with Kiev as their capital by Yarosiaff in the first half of the 11th century. An attempt was made to introduce at least a veneer of Byzantine civilization. The kingdom lasted little more than a generation and the eastern part of the region was overrun by the Tatar invasion of the 13th century. In the

14th century the majority of the Ukraine was conquered by the expanding Lithuanian princi¬ pality and was later included in the joint king¬ dom of Poland and Lithuania. In the middle of the I7th century an unsuccessful rebellion of the Ukraine led to the placing of the east¬ ern portion under the suzerainty of Russia, but most of it remained with the Polish-Lithuanian kingdom until the partitions. Austria obtained the Ruthenians of eastern Galicia by the first partition in 1772, and Russia secured the re¬ maining portion by the partitions of 1793 and 1795. Within the last 40 years there has devel¬ oped a determined Ukrainian movement for in¬ dependence from Russia which has been greatly stimulated by the same Russification policy that has been applied to the Finns. Letts, Lithuanians and Poles. The ruthless repression of Ruthenian national sentiment and activities by Russia in the early part of the war was prob¬ ably responsible for the immediate growth of the independence movement in the Ukraine after the Russian Revolution of March 1917. Ra¬ cially the Ruthenians are the purest of the Rus¬ sian Slavs and the best Russian representatives of the Alpine race. They speak the truest of the Slavic dialects. Most of the inhabitants of the western Ukraine adhere to the curious Uni-ate Church. This was created in 1595 by the union of Brest-Litovsk, according to the terms of which the Ukrainians of the Polish-Lithu¬ anian kingdom were made to accept the suprem¬ acy of the Roman pontiff, while at the same time they were allowed to retain their Greek orthodox liturgy, ritual, ceremonial and organ¬ ization. Farther east the Ruthenians are divided between the Uniate and the Orthodox churches. Liberal estimates place the total number of Ruthenians at about 30,000,000, of whom some 3,500,000 reside in Galicia, 700,000 in the Carpathian district of Hungary and about 50,000 in Bukowina. The others are, of course, found in southern Russia.

5. The Czecho-Slovaks. — South and west of the home of the Poles and Ruthenians is found the land of the Czechs of Bohemia and Mora¬ via and of the Slovaks of northwestern Hun¬ gary. Like the Poles, these peoples have had a distinguished past. Their Slavic ancestors

came into this district during the 6th century and were organized into the first Bohemian state during the second quarter of the 7th cen¬ tury. Absorbed by the transitory Great Mora¬ vian empire in the 9th century, Bohemia re¬ gained its independence in the 10th after the Magyars had overthrown the Moravians and ab¬ sorbed the Slovaks. In 1086 it became an inde¬ pendent kingdom and during most of the 14th century its dynasty headed the Holy Roman empire. The height of its prosperity was prob¬ ably attained under Charles IV (1347-78). The Hussite wars of the I5th century were not only of a religious nature, but were also a great na¬ tional movement. In 1526, to gain the strength of unity against the Turks, the Bohemians ac¬ cepted the personal leadership of the house of Hapsburg. Almost exactly a century later, as a result of the first episode of the Thirty Years' War, Bohemia lost its independence and there began a period of ruthless Germanization and forcible conversion to Catholicism, which for nearly two centuries seemed to have crushed out the national life of the Czechs. In the first half of the 19th century, however, this was reWAR, EUROPEAN — THE WAR AND THE SMALL NATIONS (21)

kindled by the reaction of the nationalistic aspects of the Napoleonic period upon Bohemia and by the arousing of Czechish interest in their national culture and history by a number of brilliant scholars, among them the linguist and philologist, Dobrovsky; the philosopher, Kol-lar; the archaeologist, Safarik, and, above all, the historian, Palacky. The national movement in the spring and early summer of 1848 was brought to a speedy and tragic end, but since 1868 the Czechs have maintained a steady cam¬ paign for the recognition of their national rights and aspirations by Vienna, the old Czech party demanding that Emperor Franz Joseph be formally crowned king of Bohemia at Prague, and the young Czech party looking forward to the more aggressive and ambitious program of uniting with the Slovaks, Ruthenians and Jugo-Slavs in the attempt to make ilie dual-monarchy a Slavic state. Racially the Czechs are, of course, Slavs, being much taller and more broadheaded than the Poles and, to a lesser degree, than the Ruthenians. In Bohe¬ mia and Moravia, however, there are large mi¬ norities of Germans which constitute about 36 per cent of the total population in Bohemia and 29 per cent in Moravia. Czechs and Slovaks use the Slavonic dialect of the Czechs as their national literary language. In religion the great majority of the Czechs are

Roman Catholic, while the Slovaks are fairly evenly divided be¬ tween Catholics and Protestants, but religion plays little part in the present national com¬ plex of the Czecho-Slovaks. In 1910 it was es¬ timated that there were about 6,500,000 Czechs in Bohemia and Moravia and slightly more than 2,000,000 Slovaks in the Tatar districts of north¬ western Hungary.

6. The Magyars. — Though the Magyars of Hungary and Transylvania are normally and quite correctly regarded as a dominating or gov¬ erning nation, it is at the same time true that since 1526 they have been in varying degrees subject to the House of Hapsburg. The Hun¬ garians, presumably an offshoot of the Finns, came into the great plain of Hungary in the 9th century. They tried to push farther westward into Germany, but were decisively defeated by Otto the Great in 955. Receding into Hungary, the Magyars remained as a wedge separating the northern and southern Slavs of central Eu¬ rope and were organized into a stable state by their first king. Saint Stephen (997-1038). In the 12th century they began their expansion southward through Croatia to the Adriatic. By 1200 they had been converted to Ronian Catholicism and had very generally adopted Eu¬ ropean customs and institutions. In 1222 King Andreas H issued the famous Golden Bull which served as the constitution of Hungary until the revolution of 1848. In the 13th cen¬ tury Hungary was overrun by the great Mon¬ gol invasion from Asia; the Hungarian army was crushed in 1241 and the country devastated. Recovering from this disaster, the Hungarians met a similar fate at the hands of Suleiman the Magnificent, the leader of the Turks, some three centuries later at the battle of the Mohacs, 1526. The Turks occupied the most of Hungary and turned the remainder over to the Hapsburgs. After the tragedy of Mohacs the Hungarians never regained their complete independence until the end of the present World War. In 16ˆ, by the terms of the Treaty of Karlowitz,

that part of Hungary taken by the Turks was returned to Austria and until 1848 the Hun¬ garians enjoyed a large degree of autonomy under the Hapsburg emperors who reigned as kings of Hungary. The promising revolution of 1848 failed primarily because the Magyars were unwilling to grant to the other nations of Hungary the same concessions from Budapest that the Magyars had succeeded in extorting from Vienna. After the creation of a tempo¬ rarily independent Hungarian republic in the spring of 1849 the Magyars were overwhelm¬ ingly defeated by the Austrians and their Rus¬ sian allies and were severely punished for their uprising. When the

Hapsburgs were humbled by the double defeat of 1866, they found it nec¬ essary to placate the Hungarians by the ar¬ rangements of the Ausgleich of 1867, which created the dual-monarchy and raised Hun¬ gary nearly to a plane of equality with Austria. This important concession did not, however, give Hungary independence and it was most un¬ just to the non-Magyar majority in Hungary. The Ausgleich was framed to make possible the German-Magyar repression of the Slavs, and the rule of the Magyars over their subject Slavs and Rumanians in the attempt to Magyarize all of Hungary has been more brutal and se¬ vere than that of any other state except Russia. The exact nature of the racial derivation of the present Magyar population of Hungary is unknown. Ripley holds that they are the prod¬ ucts of the intermixture of an original Slavic population with a Finnish minority which en¬ tered the plain of Hungary in the 9th century, conquered the Slavs and imposed their Finnish language and culture. .He believes that in the mixture of the two races the Slavs were much the more numerous and that the modern Magyar is about one-eighth Finnish and seven-eighths Slav, a fact which accounts for the present broadheadedness of the Magyars. The Hun¬ garian language is a Finnish dialect with con¬ siderable evidence of borrowing from the Turks. In religion the Magyars have since their con¬ version to Roman Catholicism been overwhelm¬ ingly adherents to this cult though there are a few Protestants. In 1910 there were about 10,- 000,000 Magyars in Hungary, a number which was over 40 per cent of the total population. This number includes some 800,000 Makars in Transylvania, which is chiefly inhabited by Rumanians. The most important repressed races were something over 3,000,000 Ru¬ manians, 2,000,000 Germans, about 5,000,000 Slovaks, Croats, Slovenes and Serbs, 1,0(X),(XX) Jews, and over 500,0(X) Ruthenians. The re¬ adjustment of central Europe according to the principle of nationality at the Paris Peace Con¬ ference leaves Hungary one of the ^^small na¬ tions® of the future.

7. The Rumanians. — To the east of the Mag¬ yars and occupying the northern half of the great plain of the lower Danube are the Ru¬ manians of Moldavia, Wallachia, Transylvania, eastern Bukowina, and part of Bessarabia and the Banat of Temesvar. The product of a considerable mixture of races, these people were gathered under a political organization in the Danubian principalities of Moldavia and Wallachia after the retirement of the Mongols who invaded this district in the 13th century. Under the leadership of Stephen the Great of Moldavia (1457-1504) they had become a power-

ful military state and for a time fought off the Turks with success, but were later overcome by these Asiatic invaders. According to the terms of the Treaty of Kuchuk Kainarji (1774) between Russia and the Turks, the latter were ordered to improve their rule in this region and further progress was made by the Treaty of Adrianople in 1829 which secured for these two principalities practical autonomy from Tur¬ key. In 1859 the inhabitants of Moldavia and Wallachia defied the Great Powers and united themselves in the joint Rumanian principality, which attained complete independence in 1878 by the Treaty of Berlin and declared itself a kingdom in 1881. In recent years Rumanian nationalism has been greatly stimulated by the study of the Roman colonization of Dacia and the attempt of Xenopol and the Rumanian his¬ torians to trace the relationship between the ancient Romans and the modern Rumanians. The racial composition of the Rumanians is a complicated question. Ripley believes that the original substratum of the Rumanian people was an ancient Eurafrican population like that which originally settled Russia and constituted the progenitors of the Nordic race. Among these there settled a considerable number of Roman colonists in the 2d century. In the west the Slavs came in very large numbers following the 6th century. In the 13th century the Mongols swept over this district, and in the 16th the Turks conquered it. As a conse¬ quence, Rumania is not homogeneous racially, but shows the predominant influence of the Slavs in the west and of the primordial long¬ headed Eurafrican stock in the east. The Ru¬ manians vary from very broadheaded in the Transylvanian district of Hungary to relatively longheaded in the region of the delta of the Danube, and are uniformly short and stocky in stature. The language of modern Rumania is a Romance dialect resembling classical Latin al¬ most as much as some of the variations of medi¬ eval Latin. This is in well-nigh universal use to-day among Rumanians. Perpetuated in parts of this region from classical times, this language has become a vital element of recent Rumaniaq, nationalism and has been systematically ex¬ tended and adopted since 1860, to the general exclusion of the previous Slavic and Turkish dialects. In religion the Rumanians are chiefly Greek Orthodox. There are about 10,500,000 Rumanians, some 6,250,000 living in Rumania proper, 3,000,000 in Transylvania, a little over 1,000,000 in Bessarabia, 275,000 in the eastern Bukowina and about 40,, 000 in northeastern Serbia. Added to these there are about 1,250,- 000 non-Rumanians living in what constituted the pre-war Rumanian state.

8. The Bulgarians. — Across the Danube to the south of Rumania are to be found the Bul¬ garians of the pre-war Bulgaria, and of south¬ ern Macedonia, southern Dobrudja, and eastern Thrace. Populated originally by the same longheaded Eurafrican race that had settled the Rumanian portion of the lower Danubian plain, this district was invaded in the latter part of the 7th century by the Bulgars, an offshoot of the Finns. They founded, in 679, the first Bul¬ garian kingdom, which endured until the con¬ quest of Bulgaria by the Byzantine empire in 1018. Under Tsar Simeon (893-927) the Bul¬ garian kingdom developed to considerable proportions and became the strongest of the

Balkan states. Recovering from the Byzantine conquest the Bulgars estaWished a second king¬ dom in 1186 which reached the height of its power under Ivan Asen II (121&-41). In the middle of the 13th century Bulgaria was ravaged by the Mongols and was finally conquered by the incoming Turks between 1340 and 1396. The beginning of the Bulgarian national revival dates from about 1830. The brutality of the Turks in Bulgaria in 1876 precipitated the momentous Russo-Turkish War of 1877-78. By the Treaty of Berlin of 1878 Bulgaria was granted autonomy from the Turk, but was un¬ naturally separated into two principalities, Bul¬ garia and East Rumelia. In 1885, the Bulgars broke down this artificial division and formed the united principality of Bulgaria. Twenty-three years later the Bulgars took advantage of the embarrassment of the Turks during the civil war of 1908 and declared their independence of Turkey and proclaimed Bulgaria as a kingdom. By the unfortunate Second Balkan War of 1913 Bulgaria was estranged from the other Balkan states. Racially the Bulgarians are highly com¬ posite. In the west the contact with the Slavs has made the Alpine racial characteristics most prominent, while in the east the traits of the primordial Eurafrican or proto-Nordic race prevail. The Finnish or Bulgar invaders of the 7th century have had almost no significance for Bulgaria other than political. Racially they have long been assimilated in the original popu¬ lation and in the neighboring and invading Slavs. Turkish occupation has left traces of the Asiatic racial traits. Swarthy in complexion and short in stature, the Bulgars vary from extreme broadheadedness in the west to long¬ headedness in the east. The Bulgarian language is now a definite Slavonic dialect, the original Finnish language having definitely disappeared centuries ago. In religion the Bulgarians are solidly Greek Orthodox, but the Bulgarian church is independent of the organization of the Greek Church. The best estimates put the truly Bulgar population of Bulgaria at about

4,000,000 at the outbreak of the World War, which number constituted over 75 per cent of the total population, the largest non-Bulgar group being Turks. In addition to these there were about 1,250,000 Bulgarians in southern Macedonia under Serbian rule and a very con¬ siderable number in the hinterland of the northern ˆEgean, in the Dobrudja district and in the portion of Turkey adjoining Bulgaria.

9. The Jugo-Slavs. — Extending eastward from the western boundary of Bulgaria to the head of the Adriatic Sea is found the home of the Jugo-Slavs (i.e. the Southern Slavs), the Slovenes of Carniola, Carinthia, Styria and Kiistenland; the Croats of Croatia; the Serbo-Croats of Slavonia, Bosnia and Herze¬ govina ; and the Serbs of Serbia, Montenegro and a portion of the Banat of Temesvar. The Jugo-Slavs are the southern contingent of that general Slav incursion into central Europe in the 6th and 7th centuries. They were separated from their northern kinsmen in the 9th cen¬ tury by the Magyar invasion which drove a wedge between the two branches of the western vanguard of the Slavs. The Slovenes have never created an independent state, but have alternated between German and Italian control and are to-day primarily Germanic in most phases of their culture other than their language.

Croatia was the first of the Jiigo-Slav districts to develop a strong and coherent political or-gciiiization. From 800 to about 1100 Croatia enjoyed a distinguished existence as an in¬ dependent duchy and then as a kingdom, but from the beginning of the 12th century to the present most of it has been controlled by Hungary. Serbia became a powerful kingdom in the 13th century and under Stephen Dushan (1331-55) developed into the most extensive Balkan power that has existed since the decline of the Macedonian empire. The independent Serbian kingdom was overthrown by the Turks at the Battle of Kossovo in 1389, and by 1459 the southern Slavs were completely conquered by the invading Turk. Serbia remained in a condition of subjection until the beginning of the national revolt in 1804. The right

of self-government was obtained in 1830 and complete independence recognized in 1878. In 1903 the corrupt and Austrophile Obrenovitch dynasty was eliminated by the brutal assassination of the royal family. The rival Karageorgevitch dynasty which succeeded to the throne, in spite of its disgraceful mode of regaining power, brought to Serbia a more liberal and efficient political system and encouraged a revival of Serbian national sentiment, which has been in¬ tensified by Austrian aggression in the finnexa-tion of Bosnia and Herzegovina in 1908 and the creation of Albania in 1913. The little mountain kingdom of Montenegro can boast of having been the only Slavic state of the Balkan Peninsula to defy Turkish conquest. After three centuries of ineffectual attempts to conquer these warlike Serbs the Turks recognized their auton¬ omy in 1799 and their complete independence in 1878. From the standpoint of race the Jugo¬ slavs are the purest and finest type of Alpine Slavs. This is probably due to their more isolated habitat which has prevented as much intermixture of races as in central and eastern Europe. They are very tall and broadheaded brunettes, of so fine a physical type that Deniker has designated them as a separate race — the Dinaric, but, as there is no doubt that they are true Alpines, this attempt to classify them as a distinct sub-type seems butˆ a needless further complication of an already highly confusing sub¬ ject. The Slovene language differs from the Serbo-Croat, but is an allied dialect. The Ser¬ bian language is the purest Slav dialect of the Balkan Peninsula and the Croatian language is merely Serb written in Latin characters. In religion the Slovenes and the Croatians are Roman Catholic, while the Serbs are Greek Orthodox. The total population of the terri¬ tory inhabited by the Jugo-Slavs is estimated at about 14,000,000, of whom about 12,000, 0(X) are Jugo-Slavs. Of the Jugo-Slavs a little over 8,000,000 are Serbs and Serbo-Croats and the remainder mainly Slovenes. A recent estimate has summarized the distribution of the Jugo-Slavs as follows: Serbia, 4,500,000; Croatia and Slavonia combined, 2,650,000; Bosnia and Herzegovina, 1,900,000; Slovenia, 1,600,000; Dalmatia, 650,000; Istria, 403,000; and Mon¬ tenegro, 440,000.

10. The Albanians. — To the southwest of Serbia lies the little mountain state of Albania, inhabited by a group of hardy, primitive and warlike mountaineers. Albania, by a fiat of the Austrian government, was advanced in 1913 from a tribal condition to independent state¬

hood, in the effort of Vienna to shut off Ser¬ bia from an outlet to the Adriatic. Albania has had no distinct history but has existed as a group

of warring tribes since classical days. Racially the Albanians are regarded by Rip¬ ley as identical with the Serbo-Croats, but other authorities hold that they are descended from the older pre-Slavic Mediterranean or Eurafrican race. In culture the Albanians are a strange mixture of Greek, Slav, Turk and Italian. In religion the Albanians are divided between the Mohammedans, Greek Orthodox and Roman Catholics, the Moslems being the most numer¬ ous. Certainly southern Albania or northern Epirus belongs to the Greeks on the basis of both culture and national feeling. It is esti¬ mated that there are about 1,000,000 Albanians living in the Albanian state, though there are many Albanians scattered about in adjacent districts.

11. The Greeks. — The southernmost exten¬ sion of the Balkan Peninsula and its adjacent territory and islands is the habitat of the Greeks of Greece, Epirus, western Thrace, Cyprus, the islands of the JEgtan and the west¬ ern coast of Asia Minor, who, whatever the actuality, regard themselves as the descendants of the Greeks of the age of Pericles and Aris¬ totle. The Greeks were conquered by the Ro¬ mans in 146 B.C., but retained most phases of their culture and imposed it upon the Byzan¬ tine empire, founded by Constantine in 330 a.d. The Greeks remained under the control of the Eastern empire until the occupation of Hellas by the Turks between 1423 and 1460, except for a short period following the fourth crusade (1204-61), when a Latin empire was estab¬ lished, and the later temporary conquest of a part of Greece by Stephen Dushan in the mid¬ dle of the 14th century. By their own gallant efforts and through the aid of Russia, France and England the Greeks were awarded their independence in the Treaty of Adrianople (1829) and established as a kingdom in 1832. Re¬ ceiving some territory by the Treaty of Berlin (1878) the Greeks have since made great strides in advance, especially after 1909 under the lead¬ ership of their exceedingly able and statesman¬ like premier, Eleutherios Venizelos, who reor¬ ganized the Greek state and prepared it for the victorious war against the Turks in 1912-13, by which Greece was greatly increased in popula¬ tion, territory and prestige. The modern Greek prides himself not only upon his cul¬ tural heritage from classical Greece, but also maintains his direct physical descent from the Attic Greeks. In spite of many_ invasions of the Greek Peninsula between classical times and to-day by non-Greek, peoples, such^ as Avars and Slavs, it is true that, in some districts, es¬ pecially in Thessaly, Attica and the Pelopon¬ nesus, the modern Greek has retained the char¬ acteristics of the original Mediterranean race to a remarkable degree. The ®Greeks^^ of Asia can scarcely be regarded as Greek in race, but rather in their national feeling and in some su¬ perficial aspects of their culture. The

Greeks speak a language which is a debased form of the ancient Attic Greek, but since the Hellenic revival of the last century it has been systemati¬ cally improved and brought back closer to the classical form. In religion the Greeks belong almost without exception to the Greek Ortho¬ dox Church. There are about 4,500,000 Greeks

in the Greek state, about 2,000,000 in the .Egean Islands and along the coast of Asia Minor, some 150,000 in Epirus, nearly 200,000 in Macedonia, about 350,000 in the city of Constantinople and about 400,000 in western Thrace, where they constitute a majority of the population.

III. The Small Nations in the Period of THE European War.

Only the briefest summary of the salient facts involved in the participation of the small nations in the hostilities of the World War can be attempted here. For a more detailed ac¬ count the reader must be referred to the sec¬ tions dealing with the military operations in the war.

While there were many signs of the old national separatism among the Finns from the outbreak of the war, they participated in the military operations to a greater or less degree along with the other portions of the Russian empire, though the traditional enmity of the Finns toward Russia early .led them into nego¬ tiations with Sweden and intrigues with Ger¬ many. The outbreak of the active revolt against Russian domination, which followed the March Revolution of 1917 in Russia, began in August of that year. In December 1917 the Finns declared their independence of Russia, and by the forced Treaty of Brest-Litovsk, 3 March 1918, Russia was obliged to recognize the full independence of Finland and to agree to evacuate Esthonia and Livonia. Great Brit¬ ain and the United States recognized the inde¬ pendence of Finland on 5 May 1919 and on 25 July of that year the Finns elected as their president the liberal statesman and publicist, Professor Stalberg. Down to the period of the German conquest the state of affairs in the districts inhabited by the Letts and Lithuanians

was not widely different from that which ob¬ tained in Finland, as far as their relations with the Russian empire were concerned. Most of Lithuania was conquered hy the Germans in 1915, and the Letto-Lithuanians were not in¬ disposed to accept the change of masters. The Teutonic conquerors stimulated the desire for independence, which was declared by the Lith¬ uanians at Vilna in January 1918. They elected a president and received recognition from some of the European states during 1919. The Letts have also established a provisional government following a declaration of inde¬ pendence from Russia. This new state, Letvia, was seriously threatened by a German occupa¬ tion in 1919, but the Allies intervened. From the outbreak of the war it seemed evident that at its close the Poles would realize a greater amount of autonomy than they had enjoyed since the Revolution of 1830, if not since the period of partition. On 15 Aug. 1914 the tsar gave out a proclamation promising autonomy to Russian Poland after the war, and also to German and Austrian Poland, in case Russia should conquer and hold them in the course of the conflict. However, the tsar's anticipations as to conquest were not realized and the Ger¬ mans began to occupy portions of Poland very soon after the outbreak of hostilities. Hindenburg's severe defeat of the Russians at Tannenberg in September 1914 opened the way for the German advance and Poland was occupied in the summer of 1915, following the famous re¬ treat of Grand Duke Nicholas in August of

that year. By the Treaty of Brest-Litovsk Rus¬ sia was forced to abandon Russian Poland. At the close of the war Poland declared its in¬ dependence and elected a constitutional con¬ vention, which met on 9 Feb. 1919. The new state was soon recognized by several powers and a general recognition of the independence of Poland was included and implied in the Treaty of Peace submitted by the Allied Pow¬ ers to Poland on 28 June 1919. Following the Russian Revolution of 1917 the Ruthenians of the Ukraine showed signs of restlessness, pro¬ moted by the severity of the Russification pol¬ icy during the early years of the war, and later in the year began a definite movement for in¬ dependence. The Treaty of Brest-Litovsk pro¬ vided for the Russian recognition of the inde¬ pendence of the Ukraine, but the Ruthenians suffered severely as a result of the accompany¬ ing Teutonic invasion. The Czecho-Slovaks fought in the early years of the war on the side of the Austrians, though without great enthusi¬ asm. The nucleus of the Bohemian revolt was the group of Czecho-Slovak prisoners of war captured by the Russians during General Brussi-Icv's great drive into Galicia and detained in Siberia. They refused to abide by the terms of the Treaty of Brest-Litovsk and rebelled and conquered

the city of Vladivostok when the Bolshevik government refused them transit across Siberia to join the Allies. On 18 Oct. 1918 the Czecho-Slovak National Council, sit¬ ting at Paris, drafted a declaration of independ¬ ence. On 28 October a republic w'as declared, and on 14 November Thomas G. Masaryk, the distinguished statesman, publicist and Slavonic scholar, was elected the first president. The Poles, Ukrainians and Czecho-Slovaks entered into an armed conflict over disputed boundaries, and the Czecho-Slovaks were also involved in a disastrous conflict with the Soviet government of Hungary during the summer of 1919. The Magy'ars fought loyally with the Austrians dur¬ ing the greater part of the period of hostilities, but the development of signs of ultimate defeat for the Central Powers produced a separatist spirit in Hungary*. On 17 Oct. 1918 the Hun¬ garian Diet declared itself independent of all bonds of union with Austria, save only the per¬ sonal union created by the fact that Emperor Charles of Austria was also the king of Hun¬ gary. On 3 November the Hungarians declared their complete independence of Austria and on 16 November a republic was formally proclaimed. The liberal regime established under Count Karolyi was overturned by the failure of the Allies to protect Hungary from invasion and by what the patriotic Hungarians regarded as the severe terms likely to be imposed upon Hun¬ gary at the Peace Conference, and a Soviet government was formed by Bela Kun and his associates. The refusal of the Allied Powers to deal with this government did much to retard the final settlement of territorial prob¬ lems in central and southern Europe.

Rumania, after much vacillation, due in part to changes in the personnel of rulers and party leaders with somewhat different sym¬ pathies, and also to the failure of the Allies to create a favorable diplomatic and military situation to aid the pro-Ally group in Ru¬ mania, came into the war on the Allied side on 28 Aug. 1916, when it looked as though an earl}-' defeat of the Central Powers was assured.

Rumania's action was also hastened by a practical ultimatum from France demanding her entry into the war on the Allied side. Poorly

equipped and not taking sufficient care to guard their communications, the Rumanian forces rapidly invaded Transylvania as they had been directed by France in the military agreement, hut their very speed, combined with the failure of the Allies to co-operate as they agreed, proved their undoing. They were attacked on their flanks and rear by Generals Falkenhayn and Mackensen with the armies of the Ger¬ mans, Austrians and Bulgarians. So swift was the reversal of the Rumanian fortunes that by January the enemy had driven the Rumanians out of Transylvania and had captured the most fertile portion of Rumania, its valuable oil-wells, and the capital, Bucharest. A separate peace was forced upon Rumania, compelling the cession of the Dohrudja to Austria and Bulgaria, though Rumania was in part com¬ pensated by the addition of Bessarabia. With the triumph of the Allies at the close of 1918 the German forces were withdrawn and the pro-German party ousted fromˆ power.

After a long period of higgling with the contending groups over the most favorable terms, Bulgaria went into the war on the side of the Central Powers in October 1915. The loss of Bulgaria was one of the most stupid and tragic blunders of Allied diplomacy, as about all that Bulgaria asked in return for aid to the Allies was the undoing of the injustices of the second Balkan War. Another serious error on the part of the Allies was the failure to carry through the only sane alternative pol¬ icy, namely, to allow the Serbian army to an¬ ticipate the Bulgarian attack by a Serbian inva¬ sion of Bulgaria and the capture of Sofia, the key to the Balkans. The aid of the Bul¬ garian army helped materially to alter the whole military situation in the Balkans. Ser¬ bia and Albania were overrun, the Pro-German party in Greece was strengthened and a year later the Bulgarians gave important assistance in the conquest of Rumania. The collapse of the Bulgarian military power, however, was rapid at the end. By a vigorous attack of the Allied forces which had been long in training at Salonica, the Bulgarian armies were divided and defeated in detail. The attack began on 15 Sept. 1918 and on the last day of the month Bulgaria surrendered unconditionally to the Al¬ lied forces.

Serbia, was the first of the Balkan states to enter the war, the Austrian ultimatum of 23 July 1914 being the immediate occasion of the outbreak of hostilities. Austria declared war on Serbia on 28 July. Montenegro joined Ser¬ bia in the war against Austria on 8 August. The success of the Serbians varied in the open¬ ing campaigns. At first the Serbians success¬ fully resisted Austrian invasion and themselves invaded Bosnia. In November the Austrians were able to capture Belgrade, but were driven out of Serbia in the following month. _ No im¬ portant further developments came until the en¬ try of the

Bulgarians in the fall of 1915. Austro-German-Bulgarian forces invaded Ser¬ bia on 6 Oct. 1915. The Serbs fought gal¬ lantly, but were forced to retire before supe¬ rior numbers, and by 12 December the Serbian army had been forced to flee into Albania and Montenegro, from which a nucleus of about

125,000 made their way to Salonica and became the most active element in the Allied forces operating . from that base. The Serbian disas¬ ter was due to the failure of the Allied military authorities to land a sufficiently large force at Salonica to intimidate the Bulgarians, win over the Greeks and save Serbia, and to the failure of the Allies to allow an aggressive campaign by Serbia at the moment of the discovery of the evident intention of Bulgaria to join the Central Powers. The fall of Serbia cleared the way from Germany to Turkey. Serbia was overrun by the Bulgarians, the royal fam¬ ily fled to France and the government was re-established, first at Corfu and later at Salon¬ ica. The Serbian army was reorganized and re-equipped at Salonica and participated with great distinction in the defeat of the Bulga¬ rians in September 1918, and subsequently cleared the enemy out of Serbia and Albania. On 1 Dec. 1918 a union of all the Jugo-SIavs, including Montenegro, was proclaimed, though there has been some subsequent indication of restlessness over Serbian domination. A considerable period before Italy's entry into the war she landed forces in Albania, 25 Dec. 1914. After the Serbian debacle the Bulgarians and Austrians overran Albania in January and Feb¬ ruary 1916. In the winter of 1916-17 the Ital¬ ians began to recover Albania, and by July 1918 they had joined with the Allied forces op¬ erating from Salonica. At the close of the war the Allied army was rapidly clearing Al¬ bania of the armies of the Central Powers. There has been as yet little evidence among the Albanians of any unified sentiment as to the type of government or mode of political union which shall prevail after the war.

Premier Venizelos of Greece made vigorous efforts to get Greece into the war on the side of the Allies, but King Constantine was notori¬ ously pro-German in his sympathies and Veni¬ zelos was compelled to resign with his cabinet on 7 Oct. 1915. Venizelos continued to criticize the inactivity of the king and his party and on 28 Sept. 1916 he fled to Salonica and established a provisional government, which he regarded as in a state of war with Bulgaria and Turkey. His government was recognized by the Allies on 16 Oct. 1916 and it formally declared war on Turkey and Bulgaria, 25 Nov. 1916. The pro-Ally sentiment grew in Greece and on 12 June 1917 King

Constantine abdicated, along with the pro-German crown prince, leaving the throne to his second son, Alexander. On 27 June Venizelos returned as premier of the new government. In the final Balkan campaign of September-October 1918 the Greek army took an honorable part. It will, of course, be under¬ stood that all occupied territory in the region of the small nations was treated with a vary¬ ing degree of savagery and existed in a state of utmost physical suffering and economic deple¬ tion, especially in the cases of Poland, Serbia and Rumania.

IV. The Peace Conference and the Attempt AT A Reconstruction of the Small Na¬ tions According to the Principle of National Self-Determination.

1. The Difficulties in Applying the Princi¬ ple of Nationality to the Reconstruction of Europe. — • The principle of national self-

determination as applied to the reconstruc¬ tion of Europe meant, in its most fundamen¬ tal and general sense, the redrawing of the map of Europe, so that state lines would coincide with the ethnographic boundaries of the distinct national units which had been here¬ tofore either thwarted in obtaining complete political unity or had been denied any political independence and existence whatever. This guiding tenet of nationality had, however, to be accepted by the Peace Conference with reser¬ vations and had to be governed by good judg¬ ment and common sense, or its enforcement would have resulted merely in a return to some¬ thing near complete political anarchy. As Mr. Zimmern has pointed out :

“If the sentiment of nationality were admitted as a sole and sufficient claim for a change of government French Canada would pass to Prance, Wisconsin to Germany, and part of Minnesota to Norway, while the New York police would become servants of the new Home Rule govern¬ ment in Ireland. The theory which makes national feeling the criterion of Statehood can easily be reduced to an absurdity.” >.

Were there available space it would be most instructive to summarize what is known about the claims presented by the small nations at the Peace Conference. It is perfectly obvious that in many, if not most cases, the claims have em¬ braced all the territory to which the most shad¬ owy pretensions could be advanced, apparently in the hope that after extensive reductions in the original claims the territory assigned would be somewhat more than what each nation could hope to receive on the basis of the facts in the case. Such representative conflicting claims as those of Italy and Jugo-Slavia to Dalmatia, Is-tria, Fiume and Trieste; of Albania and Greece to Epirus; of Greece and Bulgaria to Mace¬ donia and Thrace ; of Greece and Italy to the Dodecanese Islands; of Rumania and Bulgaria to the Dobrudja; of Serbia and Bulgaria to western Macedonia ; of Rumania and Serbia to the Banat ; of Rumania and the Ruthenians of Galicia to Bukowina ; of Poland, Czecho-Slo- vakia and the Ukraine to eastern Galicia ; of Poland and the Ukraine over their boundary line; of Poland to Lithuania; of Czecho-Slova- kia and Poland to upper Silesia ; and of the Poles and Germans to Posen and West Prussia afford overwhelming proof that the principle of strict fairness and a conciliatory and com¬ promising policy have not guided these states or potential states in their negotiations at Paris. They have apparently decided to stake the fu¬ ture of their nations upon the success which might attend their higgling in the boundary market of Paris.® While these extreme claims put forth by the small nations have created po¬ litical and diplomatic problems of the first mag¬ nitude, they are so obviously out of accord with a true application of the national principle in the contested regions that they may be passed over without further mention. Attention may be given to a brief survey of what has so far been achieved by the Peace Conference in redis¬ tributing the territory inhabited by the peoples of the lesser states and in granting political in¬ dependence to the suppressed nations.

2. The Achievements of the Peace Con¬ ference. — Any summary at the present time of the reconstruction of boundaries in central and eastern Europe must necessarily be unsatisfac¬ tory on account of the absence of a final and

definite settlement of the problem by the Peace Conference in many of the largest areas where some sort of a redistribution of territory was rendered inevitable by the war. In particular does this statement apply to regions formerly a part of Russia or Hungary, for the Allies have steadily refused to enter into formal peace negotiations with the Soviet government of Russia or the late Soviet government of Hun¬

gary. In addition to this cause for delay in the settlement, there have been many others, es¬ pecially the above-mentioned comiicting claims of the small nations, and the secret agreements made among the Allied states during the prog¬ ress of the war, which have been most difficult of fulfilment in harmony with the principle of national self-determination. Finally, the neces¬ sity of taking many plebiscites to determine ex¬ act boundary demarcation, and the difficulties inherent in this process through racial and national complications have operated further to obstruct progress.

As was stated in a previous paragraph the Finnish peoples have declared their independ¬ ence from Russia and their statehood has been recognized by leading Allied powers. The exact details of the Russo-Finnish boundary cannot be determined, however, until the final settle¬ ment is arranged with Russia, and the Allies manifest an unwillingness to treat with the ex¬ isting Soviet government. The final arrange¬ ment of relations between Finland and Esthonia is still unsettled, though it seems certain that ultimately a single Finnish state will be estab¬ lished of a unitary or a federal character, though from the declaration of 1918 up to the present time Esthonia has asserted independ¬ ence of both Russia and Finland. The Finns in both provinces have been involved in a serious difficulty in defending themselves against invasion by the Soviet government of Russia, which has shown as ardent a spirit of Russification and Pan-Slavism as was ex¬ hibited by Pobiedonostseff and Nicholas II. The Letts of Courland and Livonia declared their independence of Russia in 1918 as the new state of Letvia. While the final disposition of the Lettish question must await the settle¬ ment with Russia, Mr. Balfour, speaking for the Allies, declared that until the ultimate set¬ tlement the Allies were willing to ^^grant pro¬ visional recognition to the Lettish National Council as a de facto independent body.® The Letts, like the Finns, were attacked by the Bolshevik forces, and later their territory was occupied by the Germans under von der Goltz. He was compelled to begin withdrawal by an Allied ultimatum of 28 Sept. 1919, but the Letts have been obliged to resort to force of arms to insure and expedite the evacuation. Lithuania declared her independence in January 1918 and on 4 April 1919 proclaimed herself a republic and elected M. Smatona as the first president. The Peace Conference, however, failed to recog¬ nize Lithuanian independence. The aggressive Pan-Polish party, supported by the French at the Conference, have urged the incorporation of Lithuania within the new Polish state on the ground of the historic union of the two nations before the partitions. The final ad¬ justment will doubtless wait upon the Russian settlement, but whatever the

outcome, it has been clearly shown above that neither the facts

of ethnography nor the principle of self-deter¬ mination would warrant the inclusion of Lithu¬ ania within the new Poland. In spite of no formal final action by the Peace Conference all of the Allied powers have recognized the in¬ dependence of Finland, all but the United States the independence of Esthonia and Letvia, and some lesser powers and Great Britain have recognized the independence of Lithuania. The action of the United States in delaying the ad¬ justment of the Baltic situation is hard to de¬ fend; the only excuse stated being that it means a dismemberment of Russia, a process which has not acutely depressed the representatives of the United States when it has taken place in other parts of the former Russian empire.

Of all the new states created or recognized by the Peace Conference Poland has advanced the most ambitious claims and has succeeded best in getting them recognized by the Confer¬ ence. From Germany Poland has received about 28,000 square miles of territory, including most of Posen and West Prussia and some of southeastern Silesia. A plebiscite is to decide the redistribution in East Prussia. Danzig has been internationalized as a free city open to Polish trade. The delimitation of the bound¬ aries between Poland and Lithuania, Russia, Hungary and Rumania must await the Russian and Hungarian treaties, though it is already evident that only vigorous opposition on the part of Lithuania and the Ukraine has pre¬ vented the Conference from agreeing to Polish annexation of Lithuania and absorption of east¬ ern, or Ruthenian, Galicia. In spite of such opposition it seems likely that the Allies will allow a far greater Polish occupation of Lithuanian, Russian and Galician territory than ethnographic facts would justify. Confirma¬ tion of this opinion is to be found in the action of the Peace Conference on 21 Nov. 1919, when it turned over eastern Galicia to Poland for 25 years, in spite of the fact that the district is overwhelmingly Ruthenian in population. Poland, Germany and Czecho-Slovakia have engaged in a struggle of arms over the disposition of south¬ eastern Silesia, prized by the contending par¬ ties on account of its mines and factories. The general treaty of peace submitted to the Poles by the Allies on 28 June 1919 was opposed by the former on account of the guarantees to subject nationalities living

within Poland. The ultimate fate of the Ukraine was not definitely decided by the Peace Conference, but will be included in the Russian settlement. The Allied treaty with Germany abrogated the terms of the Treaty of Brest-Litovsk, and the Poles and Pan-Slavists have thus far prevented the Con¬ ference from recognizing the independence of the Ukraine by representing the Ukrainians as in sympathy with Bolshevism. It would seem, however, that the independence of the Ukraine will be sooner or later confirmed by the Allies, though there will be difficult boundarv problems to settle, particularly the Galician boundary with Poland and the agreement with Russia over ihe disposition of Odessa. The Russian situa¬ tion is still further complicated by affairs in White Russia. Poland desires to annex much of this area, and there has also developed a distinct movement for independence.

The solution of the Czecho-Slovak problem has been in part reached by the Peace Confer¬

ence. Its independence has been confirmed and some of its boundaries settled. The German treaty provided that the boundary with Ger¬ many should be the old Austro-German bound¬ ary with some slight cessions in Silesia* to Czecho-Slovakia. The Austrian treaty, signed on 10 Sept. 1919, included the Austrian recogni¬ tion of the independence of Czecho-Slovakia and the delimitation of the boundary with Aus¬ tria, which followed, in general, the old bound¬ ary of Bohemia and Moravia, with some slight gains for the Czecho-Slovaks, especially on the east. It was also stipulated that Czecho¬ slovakia should have access to the sea through Austrian and Hungarian territory. The bound¬ aries with Poland and Hungary are still to be fixed. The nature of the union with Slovakia is unsettled. The Czechs desire the incorpora¬ tion of Slovakia with Bohemia and Moravia; the Slovak extremists desire independence, and the Magyars urge autonomy under Hungarian oversight. It is probable that the outcome will be some sort of a union with the Czechs. The settlement with Hungary has been greatly de¬ layed by the effects of the deplorable and in¬ defensible treatment of Count Karolyi and his government by the Allies, which resulted in the establishment of a Soviet government with which the Allies would not deal. The Austrian treaty gave to Austria certain of the German districts of western Hungary. The remaining boundaries awaited final determination until the Hungarian treaty was presented. It seemed generally admitted, however, that Hungary would have to surrender the Jugo-Slav districts, Transylvania, Bukowina, the Banat and Slova¬ kia, and was

certain to become one of the lesser of the ^^small nations.^^

The reconstruction of the boundaries of Rumania has not as yet advanced to the final stage, owing to the failure of the Allies to ad¬ just matters with Russia and Hungary, from which states Rumania hopes to receive her chief cessions of territory. At a very early period it was generally conceded that the Conference would grant to Rumania the Rumanian portions of the Banat and Bukowina, Transylvania and a part of Bessarabia. Rumania has occupied both Transylvania and Bessarabia and has treated the latter with considerable severity. The pro-Russian party in Bessarabia protested against Rumanian methods to the Peace Con¬ ference on 23 Sept. 1919. The Rumanians in Transylvania have expressed a desire for union with Rumania and were annexed on 11 Jan. 1919, It is doubtful, however, if Russia will leave to Rumania any more of Bessarabia than can be shown to be predominantly Rumanian in nationality, and for many months the Con¬ ference refused to grant any of Bessarabia to Rumania. On 1 Nov. 1919, however, Rumania formally announced to the Peace Conference the annexation of Bessarabia. The relations between the Allies and Rumania were some¬ what altered on account of the bold Rumanian occupation of Hungary and the refusal of the Rumanians to evacuate it after Allied requests for such action. Among all the small nations Bulgaria has, with the possible exception of Hungary, received the most severe treatment at the hands of the Peace Conference. Instead of attempting to undo the injustices to Bulgaria which were included in the treaty following the

second Balkan War of 1913, the treaty handed by the Allies to Bulgaria on 19 Sept. 1919 actually intensified and increased the unfair¬ ness, While application of the principle of nationality to the readjustment of Bulgarian boundaries would require the cession to Bul¬ garia of Macedonia south of the Shar Moun¬ tains, of much of the hinterland of the north¬ western coast of the Aegean, of Dobrudja south of Constanza and of eastern Thrace and Adrianople, the peace terms provide for no significant extension of Bulgarian territory

whatever, but rather for some considerable con¬ traction of Bulgarian boundaries. At four places on the Bulgarian-Serbian boundary slight ˆRectifications® are made in favor of Serbia, and Bulgaria is forced to give up to the Allies for subsequent allotment a large portion of Thrac¬ ian territory on the northern coast of the vEgean. This temporary postponement of a final award of Thrace led to a vigorous Greek propaganda directed toward proving the recti¬ tude and justice of the claims of Greece to this area. The Rumanian boundary re¬ mains unchanged, though there have existed some hints to the effect that Rumania will be urged to return to Bulgaria the strictly Bul¬ garian Dobrudja. In addition to territorial ces¬ sions, heavy economic burdens are imposed on Bulgaria by the peace terms and her army is reduced to an insignificant force of 20,000 men. An indefinite promise of commercial access to the ˆgean is included in the treaty. It is the opinion of the most alert and critical authori¬ ties that the peace treaty with Bulgaria was designed to make her continued independence so difficult, if not so . intolerable, that she will seek union with the new Jugo-Slav state.

While the situation remained .uncertain until the signing of the treaty with Hun¬ gary it was felt that the Jugo-Slavs would attain unto complete political independence. The Austrian treaty recognizes the independ¬ ence of the ˆˆSerbo-‘Croat-Slovene State.® Montenegro was merged with Serbia and the emancipated provinces in the new state. While the Serbian hegemony in the Jugo-Slav state seems likely to endure, there has developed much opposition to Serbian methods, particu¬ larly on the part of the royal party in Monte¬ negro and on the part of the Croats. Jugo¬ slavia and Rumania seem destined to become the two great powers of southeastern Europe and they have already begun to quarrel over the disposition of the Banat, The fate of Al¬ bania has not been decided upon, but it would seem that the intense Albanian hatred for all of her neighbors will by a sufficient barrier to annexation by any of them and will require autonomy under the mandate of some great power other than Italy.

While Greece presented to the Peace Con¬ ference an ambitious and not reasonable aspira¬ tion to annex northern Epirus, Thrace, Con¬ stantinople, the eastern coast of Asia Minor and a number of Mgean islands, including the Dodecanese islands held by Italy, she has not as yet been able to realize her aims. She seems destined to obtain something over half of Thrace, the Asia Minor coast and most of the islands claimed. She appears to be blocked in the desire to obtain all of Thrace and Constan¬ tinople by the present Allied plan to constitute out of the remainder of Thrace a free state

with Constantinople as its capital under a man¬ datory power. A sinister Italian intrigue in regard to Albania has prevented Greece from receiving her wholly just allotment in northern Epirus. But if Greece fails on account of Italian jealousy to obtain all the territory she set out to secure there is no doubt that she will issue from the war stronger and more populous than at any other time since the fall of the old Byzantine empire.

If space were available one might carry this discussion into a consideration of the disputed territory in the extreme southeastern Europe and in western Asia, such as Kouban, North Caucasia, Azerbaidjan, Georgia, Armenia, Syria, Mesopotamia, Persia, Arabia and the new proposed Jewish colony in Palestine, but this territory involves problems of so widely different a character and such relative ease of solution that they may be passed over with this mere allusion. The principle of nationality might in justice be applied to the reconstruction of western Asia, which has at last been freed from the rule of the intolerable Turk. While the Turk can claim, under cover of the national principle, a more or less independent state in Asia Minor, national independence should cer¬ tainly be extended to Georgia, Armenia, Syria, Palestine, Arabia and Persia, and, if a sufficient demand exists, to the Zionist settlement in Palestine. The internal peace and order of these new states and their security against for¬ eign aggression should, and doubtless will, be guaranteed through their supervision by a more advanced and powerful state according to the mandatory system. From the Anglo-Persian Agreement of 9 Aug. 1919 and the Anglo-French Agreement of 16 Sept. 1919 over Syria, it would appear clear that France and England plan to take over the districts of western Asia which were dominated before the war by Tur¬ key, Germany and Russia. It is difficult at prpent to predict how far they will respect the principle of national self-determination in this area. The candid analyst of political recon¬ struction on the basis of nationality will also be likely to be skeptical of any reasons brought forward to deny the application of the principle to Eg^^pt and Korea, though it might readily be conceded that the mandatory power in these cases should be exercised by Great Britain and Japan, respectively. As the Monroe Doctrine is recognized in the Covenant of the League of Nations, it will devolve upon the United States to compel the respect of the principle of nation¬ ality in the western hemisphere and to require the ˆRmall nations® of this half of the world lo abide by the dictates of international law and morality.

V. The League of Nations and the Small

Nations.

In view of the fact that the League of Nations has not begun to function completely, it is obvious that its relation to the small nations can only be inferred from the sections of the Covenant which relate directly to this matter and from the interpretative discussions of the subject by leading publicists. It will readily be apparent that the most fundamental relation of the League to the problem of the small na¬ tional states which have been recently created or extensively increased in territory is its con¬ tributions to the lessening of the probability of

more wars resulting from the emergence of a greater number of national states. To bring into being rnore politically independent nations than have hitherto existed, without at the same tirne making provision for reducing the prob¬ ability of war arising out of their mutual dis-I'lites, would be but an invitation to a recurrence of the interminable warfare which accompanied the rise of the national dynastic states of the 16th and 17th centuries. The probable causes of an increase of warfare arising from the addition to the number of independent states are chiefly disputes of a general nature between states, and quarrels among them or with greater states over matters connected with their boundaries. The League end.eavors to re¬ duce the probability of wars among all states, including the smaller states, which would arise out of general causes for open conflict by the provisions of Article VIII of the Covenant, providing for the reduction of armaments, and by Articles XI-XVII which endeavor to substi¬ tute the arbitration of disputes for the cruder method of adjustment through armed conflict. The reduction of friction which would inevi¬ tably arise over boundary disputes is met by the provisions of the much discussed and equally misunderstood and misinterpreted ˆArticle X,ˆˆ to the effect that ®the members of the League undertake to respect and preserve as against ex¬ ternal aggression the territorial integrity and existing political independence of all members of the League.ˆˆ If this article is enforced, as it must be if the League possesses any vitality whatever, the small states will be protected from

the aggression of the larger states and of combinations of smaller states which desire to acquire their territory or terminate their polit¬ ical independence. No such policy as that con¬ templated by the Central Powers toward Serbia in 1914 would be possible if Article X were ef¬ fectively enforced. It has been frequently argued that the obvious injustices in the redis¬ tribution of territory among the small states at the Peace Conference make it undesirable that the existing boundaries be maintained and that the perpetuation of the settlement arranged at Paris would be unwise and unjust. In view of the fact that the present adjustment was the best that could be had under the circumstances and that its immediate disruption would bring a vastly greater disaster than is involved in the existing minor injustices, it would seem that the guaranteeing of the present arrangement against forcible violation is one of the most indis¬ pensable policies which could be devised in the interests of the advancement of peace. It is generally agreed by the authori¬ tative interpreters of Article X that it does not mean that the present arrangement must remain permanent and inflexible, even in the face of voluntary desire to readjust bound¬ aries. Some even maintain that it would be possible for the League to alter the boundaries at any time it seemed desirable, but it would also appear that the large majority required for effective action in any such procedure would protect any small state against arbitrary inter¬ ference with its existing and desired boundaries. One of the obviously desirable modes of future peaceable readjustment of boundaries by the League is the encouragement of voluntary and mutually beneficial unions among the small states which would increase their economic

power and resources and harmonize with the admitted tendency of political evolution to pro¬ duce large political entities, though care should be taken not to promote the formation of larger states of a distinctly antagonistic character. Again, in light of the consideration that these small states existed as a whole or in part as oppressed minorities within greater states be¬ fore the war, it is plain that they should not be allowed after their own emancipation to pro¬ ceed to a similar oppression of lesser national minorities within their boundaries. While there is no specific guaranty of the rights of minori¬ ties included in the Covenant of the League, this important matter is provided for in the various treaties of peace arranged by the Paris Conference, which specifically and often in gTeat detail stipulate the protection of minori¬ ties, and which will be enforced by the League if it becomes operative.

In regard to the organization and adminis¬ tration of the duties of the

League, there is one aspect which particularly relates to the small states, namely, the representation of the states in the various organs of the League. It has in the past invariably proved true that one of the chief obstacles to the efficient functioning of international bodies has been the desire of small states to possess an equality of voting power and their equally evident aim to avoid assum¬ ing the impossible equality of duties and respon¬ sibility. That this weakness has not been wholly avoided in the present arrangement of the League of Nations is certain from the pro¬ vision that ®at meetings of the Assembly each member of the League shall have one vote,ˆˆ while at the same time it declares that ˆffhe ex¬ penses of the Secretariat shall be borne by the members of the League in accordance with the apportionment of the expenses of the Interna¬ tional Bureau of the Universal Postal Union.® Ii will be evident, further, that the small states will not contribute an equal number of soldiers or a similar amount of money to the cause of enforcing the actions of the League. It can be said, however, that this weakness is to some extent offset by the preponderance of the greater states on the Council of the League.

It will be apparent, therefore, in conclusion, that through the instrumentality of the League of Nations, and in that way only, can the lesser national states be emancipated and elevated to statehood with a very considerable benefit to the totality of civilization and with no serious or dangerous drawbacks resulting therefrom.

Bibliography.— In view of the fact that the rise of nationality and its problems was the most important political development in the 19th century, the literature bearing upon the subject of national problems and dis¬ putes leading to and growing out of the World War embraces nearly all the political histories, general and special, dealing with the events and movements of the last cen¬ tury. The most serviceable guides which have yet appeared in English indicating the more important books in this whole field are E. B. Krehbiel's ˆNationalism, War and Societyˆ (1916) ; George Matthew Butcher's ˆA Selected Critical Bibliography of Publications in Eng¬ lish Relating to the Great War,ˆ published as Part V of Albert E. McKinley's ˆCollected Materials for a Study of the Great Warˆ (1918) ; and ˆThe Causes of the War: What to

Rcad,ˆ published by the Council for the Study of International Relations (London 1918). Professor Butcher's bibliography contains much more critical comment on the books enumer¬ ated, but his list is limited to English and American publications or translations in Eng¬ lish and to books or pamphlets. The English bibliography contains little critical discussion of the volumes enumerated, but is much more com¬ prehensive, including the more important for¬ eign books and the most significant pamphlets and magazine articles. Each pamphlet covers the whole field of the modern history of both the great and small nations. See also Nation¬ alism.

The meaning of the term Nationality and its allied concepts is dealt with in a number of books and pamphlets. A very clear discussion of its nature and relationships is contained in Ramsay Muir's ˆNationalism and International¬ ismˆ (1917), pp. 37ff., and in Theodore Ruys-sen's ˆWhat is a Nationality?ˆ translated by John Mez as Bulletin No. Il2 of the ˆPub-cations of the American Association of Inter¬ national Conciliation,ˆ March, 1917. The best scientific demonstration of the lack of any cor¬ relation of race and language with nationality is contained in William Z. Ripley's ˆ Races of Europeˆ (1899), Chapter ii. The whole sub¬ ject of nationality is analyzed by Israel Zang-v/ill in his little book, ˆThe Principle of Nationalitiesˆ (1917), a work of real literary merit and considerable critical acumen. A very clear demonstration that nationality in its es¬ sence is a psychological and cultural fact rather than political is to be found in A. E. Zimmern's ˆNationality and Governmentˆ (1918), pp. 32-60. The principle of nationality is analyzed with great power, if in an unfavorable light, by Lord Acton in his essay on ®Nationality,ˆˆ re¬ printed in his ˆHistory of Freedom and Other Essaysˆ (1909). An admirable syllabus indi¬ cating the most significant problems connected with nationality and giving the more important literature dealing with each field is to be found in Edward Krehbiel's ˆNationalism, War and Societyˆ (Part I).

On the history of the development of the national principle and system, see Nationalism, The Historical Development of. The most extended general discussions of the history of nationalism are to be found in Ramsay Muir's ˆNationalism and Internationalismˆ (1917), and J. Holland Rose's ˆNationality in Modern His¬ toryˆ (1916), which admirably supplement each other. A good review of the development of na¬ tional unity and national spirit in modern Eu¬ rope since 1815 is provided in the brilliant vol¬ ume on ˆThe War and Democracyˆ (1918), by R. W. Seton-Watson and others. While, most of these writers are not unfair in their arraignment of the development of Ger¬ man nationalism, they create a very inac¬ curate impression by

ignoring the exuber¬ ant development of an ardent national spirit in France and England in the last genera¬ tion, and by dealing softly with the brutal and aggressive Pan-Slavism of Pobiedonostseff and his associates. The authoritative, comprehen¬ sive and impartial history of nationalism is yet to be produced, but there are three brilliant and incisive critical discussions: the above-men¬ tioned work of Zangwill ; ®What is National Spirit?® by James Harvey Robinson (Century

Magazine, 1916); and ®The War of the Na¬ tions,® by Carlton J. H. Hayes (Political Science Quarterly, 1914). For the details of the political history of Europe, in which the development of nationalism plays so large a part, the reader may be referred to the ˆCambridge Modern His¬ toryˆ and to the standard manuals of Lynn Thorndike, J. H. Robinson, C. M. Andrews, C. D. Hazen, Ch. Seignobos, Robinson and Beard, C. J. H. Hayes and J. S. Schapiro. An¬ drews and Hazen are relatively sympathetic with national aspirations, while Robinson and Beard, Hayes and Schapiro have produced works which are especially valuable for their synthesis of the economic and political factors producing the world of to-day. The recent period is covered more fully in Holt and Chilton's ˆEuropean History, 1862-1914ˆ (1917), and H. A. Gibbons' ˆNew Map of Europeˆ (1915). Extensive treatments of the whole field are to be found in the volumes of the Cambridge and Oxford Historical Series.

The best general introduction to the problem of the small nations in its territorial and inter¬ national aspects is, perhaps, the temperate and comprehensive essay by James Bryce ®The Prin¬ ciple of Nationality and Its Applications,® in his ˆEssays and Addresses in Wartimeˆ (1918), chapter vii. A moderate and well-reasoned plea for the political emancipation of the more ad¬ vanced ®small nations® is embodied in Thomas G. Masaryk's ˆThe Problem of the Small Nations in the European Crisisˆ (1916). An excellent brief survey of the obstacles to the realization of this program is contained in chapters iv-v and vii of ˆWar and Democracy.ˆ The best com¬ pendium of information in the English language relating to the formerly repressed and recently emancipated European nationalities, as well as those in western Asia, is Lothrop Stoddard and Glenn Frank's ˆThe Stakes of the War: a Sum¬ mary of the Various Problems, Claims and Interests of the Nations at the Peace Tableˆ (1918). This work takes up in succession the various national and boundary problems in Europe and the Near East, gives a brief survey of the historical, economic, racial and territorial factors involved and then presents the several possible solutions which have been proposed, indicating in each case the

elements of strength and weakness in the proposal. It is not a read¬ able narrative, but frankly a semi-encyclopedic compilation, generally accurate and relatively impartial. A more detailed analysis of the same field, with the author's own solution of the problems involved in the reconstruction of the map of Europe, according to the principle of nationality, is set forth in Arnold J. Toynbee's ˆNationality and the Warˆ (1915). While not always recognizing the standards of impartial¬ ity, this is probably the most satisfactory work yet contributed in English to the analysis of the problems of national reconstruction in Europe. A work which purports to deal mainly with the linguistic basis of national units in Europe, but which in reality is a general survey, though not well proportioned, of the territorial, economic and political factors involved is Leon Dominian's ˆThe Frontiers of Language and National¬ ity in Europeˆ (1917). While not always accu¬ rate in the refinement of detail this is a most valuable work, giving a thorough analysis of the language problems involved in the question of the small nations, and supplying a large

amount of historical data. The National Geo¬ graphic Magazine for December 1918, is wholly devoted to a long and interesting article on ''ˆThe Races of Europeˆˆ by Edwin A. Grosvenor. While inaccurate in many matters of statistical detail and hopelessly confusing the terms ˆbiation® and ˆˆrace,® this is a very interesting and valuable survey with the admirable illus¬ trations for which this publication is so justly famed.

.ˆmong the most valuable works of the detailed treatments of specific areas are the chapters devoted to the small nations in the ap¬ propriate volumes of the ˆCambridge Modern Historyˆ ; Reade, A., "Finland and the Finnsˆ (1915); Lewinski-Corwin, E. H., ˆPolitical His¬ tory of Poland> (1917) ; Hill, N., ˆPoland and the Polish Questionˆ (1915) ; Phillips, W. A., 'Polandˆ (1915) ; Gibbons, H. A., ˆPoland and the Reconstruction of the Near Eastˆ (1917) ; Sands, B., 'ˆThe Ukraineˆ (1914) ; Steed, H. W., ˆThe Hapsburg Monarchyˆ (1913) ; Von Schier-brand, W., ˆAustria-Hungaryˆ (1917) ; Maurice, C., ˆ Bohemiaˆ (1896) ; Benes, E., ˆBohemia's Case for Independenceˆ (1917) ; Seton-Watson, R. W., ˆRacial Problems in Hungaryˆ (1908) ; id., ˆRumania and the Great Warˆ (1915) ; id., ˆThe Rise of Nationality in the Balkansˆ

(1917) ; id., ˆThe Balkans, Italy and the Adriaticˆ (1915) ; Mariott, J. A. R., ˆThe Eastern Ques¬ tionˆ (1917) ; Miller, W., ˆThe Ottoman Em¬ pireˆ (1913) ; Taylor, A. H. E., ˆThe Future of the Southern Slavsˆ (1917) ; Peacock, W., ˆ Al¬ baniaˆ (1914) ; Savic, V. R., ˆSoutheastern Europeˆ (1918) ; Monroe, W. S., ˆBulgaria and Her Peopleˆ (1914); Petrovich, W. M., ˆSer-biaˆ (1915) ; Forbes, Toynbee, et al., ‘ˆThe Bal¬ kansˆ (1915) ; ˆ‘Polybius, ˆ(Sreece before the Conferenceˆ (1918) ; Cassavetti, D. J., ˆHellas and the Balkan Warsˆ (1914) ; Brailsford, H. N., ˆ Macedoniaˆ (1906) ; and Lupu, N., ˆRumania and the Warˆ (1919). The only scientific comprehensive analysis of the races of Europe and the Near East is contained in Ripley’s ˆ Races of Europeˆ (1899), which needs a revision bringing it down to date and including the valuable ethnographic investiga¬ tions conducted in the last 20 years. The problem of the disputed boundaries and the matter of establishing boundaries of different types is discussed by Holdich, Sir Thomas, in his ˆBoundaries in Europe and the Near Eastˆ (1917) ; and by Lyde, L. W., ˆSome Frontiers of To-Morrowˆ (1915). G. De Greef’s im¬ portant discussion of the futility and danger of purely political frontiers in his ˆLa Structure generale des Societesˆ (1908) is not available in English, but a general summary of his position is presented by A. A. Tenney in the Political Science Quarterly, September 1910, pp. 502-08. The geographical problems complicating the settlement of national claims are fairly well dis¬ cussed by Dominian, but a detailed treatment of the geography of the Balkans in its nationalistic bearings is provided in N’ewbigin, Marion I., ˆThe Geographical Aspects of the Balkan Prob¬ lems in their Relation to the Great European Warˆ (1915), and in Hogarth, D. G., ‘The Nearer Eastˆ (1902).

The periodical literature dealing with these problems is very large in volume, especially since the Balkan Wars of 1912“— 13 and the World War. First and foremost in the list of periodicals discussing national problems in

Europe must be put the recently founded New Europe, edited by a group of the ablest and nriost liberal of the English and other European historians. Its articles have given evidence of the best scholarship and a generally liberal and impartial spirit. The Journal of Race Development (now The Journal of International Relations), edited by Prof. George H. Blakes-lee, has given special attention to these problems during the progress of the European War. The National

Geographic Magazine has published a large number of elaborately illustrated articles on the chief repressed nations of Europe during the last few years. Many of these have been of a high order. Most of them are referred to in the footnotes of Dr. Grosvenor's above-mentioned article in the issue of December 1918. The Geographical Review, published by the American Geographical Society, has recently printed several valuable articles dealing with European boundary problems. The New York Times Current History Magazine has devoted many pages to the discussion of the various national and boundary problems involved in the European settlement. The numbers since the signing of the armistice in November 1918 have been especially valuable in this connection. A new semi-monthly periodical devoted entirely to the area under discussion in this article and entitled Eastern Europe was founded in Sep¬ tember 1919. The New Republic and The New York Nation have also given much space to these questions, which have been discussed in a uniformly liberal and constructive manner.

Space does not allow a summary of the more important books dealing with the general problem of a League of Nations and its organ¬ ization and functions. A good annotated bibli¬ ography on this subject by Frederick C. Hicks is to be found in Bulletin 134 of the 'Publications of the American Association for International Conciliation,ˆ January 1919. The standard treat¬ ment of the subject to date is the composite work edited by Stephen P. Duggan, 'The League of Nations: The Principle and the Practiceˆ (1919), with ample bibliography. For a list of references on the history of inter¬ nationalism consult the bibliographies in Krehbiel, part HI.

Harry Elmer Barnes,

Professor of History, Clark University, Worces¬ ter, Massachusetts.

22. POST-WAR PROBLEMS AND RE¬ CONSTRUCTION IN THE BALKANS.

One of the greatest problems or series of problems which claim the attention of the statesmen of both the Old World and the New is to arrive at an equitable adjustment of the numerous and often conflicting claims of the Balkan states. These lands of southeastern Europe, so far from having reached a solution of their peculiar racial and territorial problems through the military operations in that theatre from 1914 to 1918, have emerged from the throes of the conflict with greater and rnone puzzling complexities than ever before, with the possible exception of the new Serbo-Croat-Slovene State (Jugoslavia), formed from the king¬ doms of Serbia and

Montenegro, and the for¬ mer Austrian crownlands of Bosnia, Herzego¬ vina, Croatia, Dalmatia and Slavonia.

After the adjustment of the boundary and territorial claims of the several nationalities.

a most difnciilt problem in itself due to the fact that the populations of these states are more or less intermixed racially and linguistically, there remain for settlement the problems of providing adequate means for the transportation to tide¬ water of the agricultural and other products of these states and of affording to each an outlet for its commerce through a national seaport. Other problems of the period under discussion will be referred to in the course of the article.

The one great Balkan problem, past and present, is transportation. The elaborate sys¬ tem of Roman roads, improved and extended by the mediaeval republics of Venice and Ra-gusa, has well nigh disappeared. The Balkan lands differ to-day from the rest of central Europe chiefly because in the period during which the latter reached its most rapid develop¬ ment they lay prone under the heel of the Turk. As these Balkan peoples gradually freed them¬ selves of the Turkish yoke, they found them¬ selves economically strangled, partially because the most favorable trade outlets were in the hands of their powerful neighbors, Austria-Hungary and Russia, partially also because they were denied an outlet to the sea through the natural obstacle in the shape of a mountain wall which separates the heart of the Balkan Penin¬ sula from the Adriatic, This barrier (the Dinaric Alps) offers peculiar engineering diffi¬ culties to railroad and road construction from the interior to the coast, and such construction is also rendered impracticable by the fact that no amount of expenditure of labor and money can construct a good port along that coast. Fiume is the logical outlet to the sea for Jugoslavia and is the only good port on that side of the penin¬ sula. It is also the terminus of the one good railway to the interior which reaches Belgrade through Agram. A railroad has been projected from Spalato to Serajcvo and thence inland to the heart of Old Serbia, but the capital needed is excessive in view of the probable returns, and the special construction problems it offers will require much time, hence this line does not promise a speedy solution

of the Serbian trans¬ portation problem. A narrow-gauge road ex¬ tends from Ragusa to Serajevo, which renders valiant service subject to its limitations. To make this road of standard gauge is impracti¬ cable for the reasons already given. Another railway project is the route from Prizren along the old Roman road to the gulf of San Giovanni di Medua. The objection to this from a Jugo¬ slav viewpoint is that the latter port is Albanian territory. These routes practically exhaust the possibilities for a Jugoslav national seaport in Dalmatia, which is literally the lungs through which commercial Jugoslavia must breathe un¬ less Salonica on the ˆgean be opened to it through some arrangement after the manner of the German Customs Union or Zollvercin. Such arrangement would naturally include Greece, within whose national territory the port of Salonica lies. Salonica is the only Jugoslav outlet to the sea apart from those on the Adri¬ atic described at length above. A Balkan Cus¬ toms Union would immediately make Salonica one of the most important ports in the Mediter¬ ranean system, since it is the national outlet to the south for Thrace, Macedonia, Bulgaria and Jugoslavia. There has beˆn proposed an in¬

land waterway by canalizing the Vardar to the Morava and the latter to its junction with the Danube below Belgrade. Were such a water¬ way well developed it would become at once a large factor furthering the commercial devel¬ opment of the countries concerned.' A great extension must take place in the railway system of Serbia — ˆ even the Belgrade-Salonica main line is not a first-class road — to render it ade¬ quate for the heavy traffic of a modern state would entail a larger expenditure than the re¬ gion concerned could well meet.

Bulgaria is in an equally bad position in re¬ gard to transportation facilities. The natural outlets for its overseas commerce are the ports of Salonica and Constantinople, neither of which lies within its borders. A trunk railway to Varna on the Black Sea affords considerable relief but the fact of its being located in the extreme eastern end of the country and on the Black instead of the ˆgean Sea makes it in¬ convenient and expensive to use.

Salonica is the port of export for the new Greek territories acquired as a result of the Balkan Wars. It is not the logical port for most of the trade of Old Greece, in fact, it is only since 1914 that it has had rail connection with Athens. There is a railway line from Salonica to Monastir through Ostrovo and it has been proposed to run a branch line from the last-named city to Avlona via Argyrokastro and Kastoria.

Railroad and road building have progressed further in Rumania than in the other Balkan states (if we may classify Rumania as a Balkan state), and does not present the same difficulties. During the war, the great bridge near Tchernavoda, the only one on the lower Danube, was partially destroyed and for many winter months most of the country was cut off from the one port, Constanza (Kustendje), which is open the year round. During the war Rumanian and Serbian territor}'- being the scene ot actual cam¬ paigns, a large proportion of the bridges were destroyed. These were repaired temporarily but the transportation for a long time was greatly handicapped; floods and storms often carried down the temporary wooden structures and tied up traffic for days at a time. Further¬ more, about three-fourths of the rolling stock was either destroyed, wˆorn out or carried away. The coming of peace did not secure the replace¬ ment of this stock from Germany and Austria-Hungary.

The Commerce Problem. — So much for the transportation problem ; it now behooves us to inquire with whom are the Balkan countries to trade? These states cannot be expected to trade much with each other, since they produce for the most part similar commodities and their requirements are also somewhat similar. For the same reason there is no prospect of their developing a large volume of trade with Russia. Before the World War Germany and Austria-Hungary furnished the bulk of the imports, especially the manufactured goods, but they took no such proportionate part of the exports. Balkan merchants had become accustomed to the flexibility of the German credit system through their having transacted business with German wholesalers for generations. Conse¬ quently at the end of the war they were unpre¬ pared to buy for cash in Allied countries, and

at the same time assume the burdens of an un¬ favorable exchange rate, shipping costs, risks and delays incident to commerce in countries prostrated by years of war. The Germans are beginningˆ to recapture this business. Their opportunity was rendered all the more easy because of the stiff and antiquated credit systems and foreign trade methods of the principal Allied countries and also because of the existing trade routes and a network of rail¬ roads to central Europe over which trade merely had to be resumed. In 1919 whatever part of

the Balkan trade was going to the Allies through the port of Fiume was suddenly with¬ drawn and thrown open to central Europe over the old trade routes, when Italian soldiers occupied Fiume.

We might characterize as ˆhndustrial para¬ sitism® the condition which already existed in the Balkans and was merely aggravated and brought into sharp relief by the war. The pop¬ ulation had been rapidly increasing and life, ex¬ ternally at least, assumed a certain modernity through the use and on the basis of imported goods. Whole cities look in nearly all respects like those of western Europe — similar public buildings, hotels, streets, electric cars, lights, *etc.* This is of an ephemeral character because it is not a natural growth and these countries are unable to produce the goods on which it is based. Stop foreign trade for a consider¬ able period and the railway cars and locomo¬ tives wear out and get out of repair. Not only is replacement, even of parts, impossible, but the mechanics themselves who do the work in normal times are very largeˆ foreigners and their shop tools entirely so. The few shipyards get their engines and other machined parts from abroad. Dock machinery, cranes, all sorts of steel bridge materials, even railroad iron, must be imported, and these are only illustrative items out of myriads. This industrial depend¬ ency upon foreign nations causes the ruling classes in the Balkans to entertain perennial fears for the national existence and predisposes them toward diplomatic intrigue and militarism. Moreover, because of their lack of any consid¬ erable industrial development, these states also lack the steadying and democratizing influence of a large, intelligent middle class.

Reconstruction. — Reconstruction is much simpler in the Balkans than in countries highly developed industrially like Belgium, France or Austria, because the population is still small enough to maintain itself without a very compli¬ cated organization. In the Balkans there ex¬ isted neither a great aggregation of factory machinery to be carried off or destroyed as was the case in Belgium and in France, nor any highly articulated organization to derange by stopping production and killing large numbers of specially trained men. The total prostration of Austria following the war illustrates the point under discussion as does also the condi¬ tion of the Balkan states during the same pe¬ riod. Austria needed food and raw materials from abroad to rehabilitate her industries while the chief wealth of the Balkans consists to-day as formerly in agricultural products raised from year to year. Rumania and Serbia at the close of the war were about thoroughly stripped of the necessaries of life. In the towns people went without the most ordinary comforts — soap, thread, leather-goods, cloth and particu¬

larly everything manufactured out of metal. In the villages life apparently had not been changed to any great extent mostly because its simplicity did not admit of change.

In the months following the close of the fighting many persons starved to death and more would have perished had it not been for the relief afforded by the American Food Commis¬ sion and Red Cross. This must not lead us to suppose that these organizations saved the countries in question from complete starvation and Bolshevism. When there is a shortage of food, they reduce their already simple civiliza¬ tions to still lower terms.

In the year following tfle close of the war the remarkable thing to note was that although many communities had lost practically all their draft animals and such rude farm implements as they possessed, in spite of mobilization and a pinching shortage of seed, both Rumania and Serbia managed to plant and harvest fairly large crops. In the months just preceding the harvest season the most extreme want existed all over Rumania, Serbia, Montenegro and Al¬ bania. Plenty of grain was harvested and much of it was available for export. A short¬ age of fats was pronounced but in these coun¬ tries the poorer people always lack fats. Ru¬ mania, for example, has more pellagra than any other country in Europe. Americans have a tendency to overlook this superior resiliency of simple civilizations which are not mechanized to the extent that they are.

By the time Europe shall have resumed its full productive capacity industrially the Balkans will also have practically recovered their pre¬ war appearance (in fact none of them but Jugo¬ slavia and Rumania really lost it). The great problem of European reconstruction here in¬ volved particularly affects the Balkan states be¬ cause their population, while it has outgrown its primitive peasant stage, has not become in¬ dustrially self-supporting. However, while Europe remains more or less crippled industri¬ ally, it is safe to say that the Balkans suffer less than the former great industrial centres of Europe.

The Race Problem. — Balkan race problems can be settled only by a general and naturally slow growth of tolerance. Redrawing the boundaries in Macedonia and Thrace has not solved the race problem because, as in most of the other disputed regions, the different races are settled by communities or villages and these hopelessly mixed up. In the lands allotted to Serbia from the former kingdom of Hungary are many communities of Magyars, Germans, Rumanians, and Jews as

well as Serbs. In the new Rumanian lands are not only the same mix¬ tures in different proportions, but in Bukowina are found Ruthenes as well, and in southern Bessarabia exists as variegated an assortment as in Macedonia itself. For territory to change hands is generally bad in itself, especially when it has remained a long time in the possession of one state. An official language is adopted ; pos¬ tal, railroad and other officials of the new gov¬ ernment assume their posts and schools get under way. In the Balkans, therefore, a change of allegiance means a change of language, and this in turn involves the dismissal of a great part of the trained personnel, a serious matter in countries where illiteracy is general. The race problem of the Balkans can best be met by

a reasonable set of boundaries with a fair de¬ gree of permanency, and sufficient governmen¬ tal liberality in dealing with alien communities to make those boundaries tolerable. It must not be supposed, however, that such a course will put an end to the race problem although it would do much to lessen friction arising there¬ from.

Economic and Military Problems. — The

race problem does not stand alone in the way of a peaceable settlement of Balkan ills ; there are other elements, especially those of a mili¬ tary and economic nature, which enter into the problem and add to its complexity. With Tur¬ key to the south, Hungary to the north and a mountain wall between them and the Adriatic, there was before 1913 little incentive or occa¬ sion for the Balkan governments to further the economic and commercial status of their coun¬ tries, and they busied themselves chiefly with military affairs, politics and intrigue. In 1919 the jealousies between the states were particu¬ larly keen because the settlements ordered from Paris pretended to a certain finality and each state was anxious not to get the worst of an irrevocable judgment.

During the sessions of the Peace Conference in 1919-20 these rivalries were exemplified by the numerous claims laid before that body by the Balkan states. For instance, Macedonia and Thrace, with their seaport

Salonica, were sought to be internationalized. These regions constitute one of the chief economic keys to the whole central Balkan region, of an interest at least equal to Constantinople itself to this par¬ ticular section. A fertile strip of South Dobrudja of prime military importance was claimed by both Bulgaria and Rumania. The former claimed that if awarded to Rumania the latter would threaten the Rustchuk-Varna Rail¬ way and the chief Bulgarian port; while Ru¬ mania claimed that with this strip in the hands of Bulgaria the latter nation would be within easy striking distance of the Tchornavoda-Constanza Railway to the only port of Rumania which is ice-free. Both sides argued with his¬ torical phrases and presented more or less jug¬ gled race statistics, but the real reasons were chiefly military. A treaty of 1916 with the Allies gave Rumania the advantage here as also in the Banat to which the Jugoslavs laid claim. Here too economic and military reasons were of almost equal importance with the racial.

The chief objection of both Rumania and Jugoslavia was to the proposal of the Peace Conference to limit their sovereignty over racial groups within their borders.

Hungary's attack on Rumania in July 1919 furnished the test case for the Balkans of the Paris Conference's ability and determination to enforce its decisions. After a brief but ver}'' bloody struggle, the Rumanians defeated the Soviet troops. Paris forbade the completion of this victorv by the occupation of the Hungarian capital. This proscription the Rumanian army ignored, placed Budapest and eastern Hungary under martial law and requisitioned some 60,000 tons of materials. (This figure is not large, relatively — it is less than 5 per cent of what the Hungarians removed from Rumania during their two years' occupation). The big powers in charge of the Paris Conference apparently did not have the hundred thousand or so of available soldiers required to make a

serious demonstration in Hungary; so the Bal¬ kans witnessed their failure to coerce either their enemies or their Allies. The Rumanians offered to withdraw if the Conference could send enough troops for police. It became mor¬ ally impossible to use Italian troops in the Balkans, when D'Annunzio took possession of Fiume in defiance of the Conference, and the Italian government was evidently not able to make them obey that body. The United States Senate failed to ratify the peace treaty, Japan was too distant to be considered, and French diplomats showed no great hostility to the claims of either sister Latin power. Territorial am¬ bitions being satisfied or laid aside as

impossible, chauvinism will inevitably weaken for lack of focussed attention and the Balkan governments can and must at last turn their attention to the development and modernization of their re¬ spective countries.

Greece. — Greece was tranquil for the most part during 1919, perhaps because she had not the same immediate cause for concern over the settlement as had other Balkan states. Very little of her territory was devastated in the war. She is a maritime power, and hence was the first to be opened up to foreign trade after the armistice. She entered the war late, so that her human losses were small compared with those of Serbia or Rumania. The most im¬ portant fact of all was that she remained financially solvent — Greek money being ex¬ changed at uniformly higher rates than either French or Italian, at least during 1919.

Albania. — Albania lacks wholly a govern¬ mental system and its probable fate for a decade or more will be to remain under a mandate to one of the great powers. In this country there is a woful lack of communications and while the population is rather homogeneous as to race, it is divided among three religious faiths — Greek-Orthodox, Mohammedan and Roman Catholic — a potent source of friction in a back¬ ward state.

Bulgaria. — Bulgaria's payment of 2,250,- 000,(X)0 francs under the provisions of the peace treaty does not seriously menace her financial solvency. The country was not devastated, and still contains incredible amounts of goods and livestock — a good deal of this of Rumanian and Serbian origin. It is a country of small proprietors. The people are of sturdy stock, in¬ dustrious and frugal, more favorably situated than were the French in 1870. Both the recent war and the most unfortunate one of 1913 are charged to the late King Ferdinand, who was a large factor in making the surprisingly liberal constitution, on paper, less so in practice. Both Bulgaria and Serbia have for years had single¬ chamber legislatures, elected by proportional representation. After Greece, Bulgaria probably will be the first Balkan country to recover from the war.

Serbia. — Serbia lost over half of her men in the war — about a fourth of the entire popula¬ tion. For all of Jugoslavia as at present con¬ stituted, about one-tenth of the population per¬ ished. To the Serbian national debt of $40,000,- 000 in the fall of 1915 have been added about $600,000,000 more by borrowings during the exile, while the country was being laid waste. Besides this $500,000,000 and more in debts, the Jueoslavs formerly belonging to the Dual Monarchy must

assume their proportion of

the Austro-Hungarian obligations. This is a crushing burden for the new state, and one bitterly complained of. The new Democratic party (led bv MM. Pribitchevitch and David-ovitch), which stood for radical agrarian re¬ form and a thorough amalgamation of all the elements of the nation, resigned in 1919 over the claim of the Peace Conference and League of Nations for partial sovereignty over national minorities within Jugoslavia. After two fail¬ ures, the Old Radicals (led by M. Protitch), managed to form a government; but Jugoslav politics may be regarded as very unstable. The Croatian Radical party is separate from the Old or Serbian Radicals. There is a Slovene Catholic party (Old Serbia is Greek Catholic in leligion). There are many socialists in the ex-Hungarian lands, and in Croatia the National Club or Party of the Right stands for autonomy.

Rumania. — Rumania's internal affairs are perhaps the most incalculable of all. She had 220,000,000 lei ($44,0(ˆ,000) in gold in the Ger¬ man Reichsbank, which sum was held by Ger¬ many to guarantee compliance with the Treaty of Bucharest (May 1918). During the occu¬ pation, the Central Powers emitted through a private bank in Bucharest {Batxca Genera! a Ronian-a) over two billion francs (lei) in paper. With these they made purchases in the' country, and even abroad, leaving the notes to the Rumanian government to redeem according to the peace of Bucharest. About three hundred and fifty million francs in gold and some securities, privately and publicly-owned jewels, *etc.* (including the crown jewels), were sent to Moscow for safekeeping during the war. Nothing is known of the fate of this deposit. Presumably the Central Powers will eventually repay something of the stupendous sums they took from Rumania in money and goods, but the indemnities and reparations imposed upon them by the victorious Allies are so large in the aggregate as to make this a doubtful asset. Like Serbia, the occupied part of Rumania was stripped practically bare — the German official records, left behind, account for nearly four million tons, and livestock to a value of over six billion francs (pre-war valuation) have disappeared.

To cover over four billion francs in paper money alone (laying aside

the question of a fairly large national debt and the financing of the reconstruction), there is in gold and securi¬ ties a little over eight million francs, something like half of it in Russia — if it has not been stolen.

The Rumanian National Liberal party, led by Ian C. Bratianu, has divided all the crown and institutional lands among the peasants and also expropriated 2,000,600 hectares (nearly 5,000,000 acres) from the large pro])rictors, to be turned over to the peasants who actually work it. No proprietor can now hold over 500 hectares, and the only remaining estates even as large as this are those previously containing 10,000 hectares or more. The terms of the Bessarabian expropriation act were fixed by the local assem¬ bly, and are still more severe. Universal man¬ hood suffrage was decreed for Old Rumania and Bessarabia in 1918; also a decree authoriz¬ ing Jews who were actual residents to secure citizenship papers from the justice courts.

The chief opposition to the National Liberals conics from Take Joncscu. M. Joncscu began

his career with the Liberals, seceded to the Conservatives in 1892, left that party to found a new one in 1908, returned to form a Con¬ servative ministry in 1912, and is now leading a new split-off from the Conservatives known as the Conservative-Democratic party. He was strongly and consistently pro-French through¬ out the war. The old Conservatives are in bad odor because their leader, Marghiloman, formed a ministry under the Germans. General Ave-rescu's ^^People's League^^ has some following, especially among the peasants. It stands for mild reforms. The Social Democrats have been persecuted and prevented from maintaining any strong organization since the beginning of the war. There are many socialists in the cities of Transylvania and Bukowina, and communistic doctrines flourish in the village communities all over the eastern part of what was Austria-Hungary. The Rumanian government has been handicapped in the persecution of radicals in these newly-acquired territories by the fear of making too many enemies. In Old Rumania there is less visible evidence of ®Bolshevism^^ than in any country visited by the writer. In general, the Balkans are free from this, pre¬ sumably because there are comparatively few town laborers, and the holdings in the country are generally small. For the moment, the main political issues in Rumania are the constitu¬ tionality of the Bratianu reforms and the ques¬ tion of whether foreign corporations shall be encouraged through large concessions to develop the country's resources. This is

favored by Jonescu and opposed by the Bratianu govern¬ ment.

All the Balkan monarchies are decidedly limited, since the death of Carol of Rumania and the abdications of Constantine of Greece and Ferdinand of Bulgaria. King Ferdinand of Rumania is popular. He has maintained a scrupulously constitutional position since his accession in 1914. Prince Carol, who re¬ nounced the throne, had a number of escapades, and was regarded by many as erratic. Repub¬ lican sentiment is strong in the lands taken from Austria-Hungary and Russia. This applies also to the ex-Hungarian parts of Jugoslavia. The Serbian king has had little real power in the government since the assassination of King Alexander and Queen Draga in 1903, after an attempt at arbitrary rule. King Peter is popular in Serbia.

Reorganized Serbia and Rumania, the two great southeastern European states arising from the war, now have their political and economic centres of gravity on the fringe of the Balkan Peninsula, if not actually outside. The long established trade habits and routes, political and economic machinery, centre in Budapest, Vienna and Berlin. They do not fit the new order; hence the future largclv depends upon their necessarily slow reconstruction by the South Slavs and Rumanians. It is a stupendous task. If successfully accomplished, what we have called Balkan problems will be absorbed and integrated in the general European problem, and we shall hear no more of the ®crude, raw races.®

Bibliography. — The file of The New pAirope for 1919 is the best written source: Consult especially ‘ˆVak® Primovac, Gˆxonomic Future of Jugoslaviaˆ (19 June) ; Jovan, Jovanovic, ˆThe Jugoslavs in the New Europe’ (14 Au-

gust) ; ®P,® ˆThe Union of Montenegroˆ (4 September) ; Seton-Watson, R. W., ˆBulgaria Before the Conferenceˆ (28 August) ; also G, Clenton Logic’s article (7 August) ; Lady Ellinor F, B. Grogan’s (26 August) and a series by Constantine Stephanove — these three for the Bulgarian point of view.

In The Balkan Review, beginning February 1919, the following are of interest: (1) On Serbia: The Adriatic, under ˆProblems of Peace® (March) ; Vesnitch, Mil. R., ‘ˆThe As¬ pirations of Serbiaˆ (May) ; Yedlowski, Dr. Yosep, ˆThoughts on the Adriatic Disputeˆ and Price, Crawfurd, ‘Serbia’s Financial Dilemmaˆ (June). (2) (Dn Bulgaria: Thrace, under “Problems of Peace® (April) ; Venizelos, M. E. K., ‘Bulgaria and Thraceˆ (August). The August issue is called the ‘Bulgarian Peace Number,ˆ and contains much matter on that state, largely hostile, e.g.. Price, Crawfurd, ‘The Bulgarian Memorandaˆ ; “Vardarius® answers J. D. Bourchier’s ‘The Fateˆpf Macedonia,ˆ in the July 1919, InternaiionaC ‘Review. (3) On Greece : The two articles cited above under Bulgaria, on Thrace; Politis, M. Nicholas, ‘The Standpoint of Hellasˆ (May) ; Michalocopoulos, M. A., ‘The Economic Future of Greeceˆ (June) .

Nicolas Basilesco’s ‘La Roumanie dans la guerre et dans la paixˆ (Vol. II, Paris 1919), is an exceedingly exhaustive discussion of the Rumanian point of view (see also YYl. I, ch. on political parties). G. Clenton Login’s ‘Bul¬ gariaˆ (London 1919), is a detailed, sympa¬ thetic analysis of the Bulgarian situation and viewpoint. Vladislav R. Savic’s ‘SouthEastern Europeˆ (New York 1918), does the same thing for Jugoslavia (written before the Peace Conference) ; consult also his article, “The Passing of the Balkans,® Yale Review (1919, Vol. VIII, pp. 500-12).

For recent economic information consult Eco¬ nomic Supplement to Review of Foreign Press, published fortnightly in London by the General Staff, War Office, especially 1919 numbers for 29 January, 12 February, 12 March, 29 April, 11 June, 25 June, 9 and 23 July The issue for 24 Nov. 1918, contains a detailed exposition of the Bulgarian land situation. Current History, October 1919, summarizes United States Com¬ mercial Reports of 30 August on Rumania and 6 September on Serbia, under “Among the Nations.® Under this heading will be found a monthly digest of Balkan events.

Marion Newbigin’s ‘Geographical Aspects of Balkan Problemsˆ (London 1915) gives a good general analysis of the transportation and other fundamentally geographical questions (does not include Rumania). For this and other Rumanian economic information, consult ‘Die Rumanische Volkswirtschaft,ˆ a very fine, accurate little handbook published in Berlin, (1917), for the use of the German army in Rumania. The larger Austrian Army hand¬ book, ‘Rumanienˆ (Vienna 1917, 785 pp.), is the most systematic statistical treatise on Ru-m.ania, but hastily compiled and not always accurate. The only way now to get up-to-date statistical information on the Balkans is to

write or visit the appropriate ministry in the country concerned. The statistical annals of the Balkan countries are surprisingly good, but are always out of date even when issued —

especially true now. The reports of the Amer¬ ican Red Cross Commissions to the Balkans (Serbia, Montenegro, Greece, Albania, Ru¬ mania) contain valuable sections on economic and social conditions (so far available only in manuscripts). Dominian's 'Frontiers of Lan¬ guage and Nationalityˆ (New York 1917) is a valuable and fairly accurate race handbook. Consult also Seton-Watson's 'The Rise of Nationality in The Balkansˆ (London 1917).

Out of the flood of propagandist books and pamphlets incident to the Peace Conference, the following seem to have special merit:

Albania : "Memorandum to the Peace Con¬ ference® (International Conciliation, No. 128, New York, May 1919). In same issue, Mehmed Bey Konitza's article, "The Albanian Question.®

Bulgaria: laranoff, Athanase, 'La Bulgarie economique,ˆ (Lausanne 1919) ; Mishew, D., 'The Bulgarians in the Pastˆ (Lausanne 1919); 'America and Bulgaria and Their Moral Bonds,ˆ (Berne 1918) ; and 'Public Instruc¬ tion in Switzerland and in the Balkan Statesˆ (Lausanne 1919), statistical treatment; Stephan¬ ove, Constantine, 'We; The Macedoniansˆ (Berne 1919) and 'The Bulgarians and Anglo-Saxondomˆ (Berne 1919).

Greece: "Polybius,® 'Greece before the Conferenceˆ (London 1919) ; Venizelos, Eleutherios, 'Greece before the Peace Conference of 1919ˆ (New York 1919) ; Phocas-Cosmetatos, S.-P., 'La Macedoine, son Passe et son Presentˆ (Paris 1919), fine maps; Cassavetes, N. J., "North Epirus and the Principle of Nationality® (International Conciliation, No. 141, August 1919) ; also the debate in Congressional Record, 3 Sept. 1919, Vol. LVIII, No. 86, pp. 5017-21, especially speeches of Wm. S. Felton and Prof. George M. Bolling.

Jugoslavia: Jovan, Cvijic, has two very fine articles in the Geographical Review: "The Geographic Distribution of the Balkan Peoples® (Vol. V, No. 5, May 1918) and "The Zones of Civilization in the Balkan Peninsula® (Vol. V, No. 6, June 1918). The Hungarian case against both Jugoslavia and Rumania is ably discussed by Pivany, Eugene, 'Some Facts about the Pro¬ posed Dismemberment of Hungaryˆ (Cleveland, Ohio, 1919).

Rumania: Lupu, Nicholas, ‘Roumania and the Warˆ (Boston 1919), contains a good dis¬ cussion of peasant co-operatives and popular banks. Otherwise, it is rather trite, and the m.anuscript is evidently old.

M. M. Knight,

Lecturer on Political Science, Hunter College of the City of New York.

23. COSTS OF THE WORLD V/AR.—

War costs are of two kinds — direct and in¬ direct. Direct costs embrace all expenditures made by belligerents in carrying on hostilities ; indirect costs include the economic losses result¬ ing from deaths attributable directly or in¬ directly to the war, the value of property dam¬ aged or destroyed, the loss in production grow¬ ing out of the transfer of men from civil to military pursuits, expenditures for war relief work, the costs of the war to neutral nations and the like. The direct costs of the European War, based on the most reliable statistics, were $186,333,637,097 ; the indirect costs have been estimated at $151,646,942,560, making the total

war bill $337,980,579,657.* It has been possible to appraise the direct costs fairly accurately. Of necessity the indirect costs can only be estimated for there is no unit of measurement by which they may be definitely fixed ; no method where¬ by they may be reduced to a dollar and cents basis. Even in trying to determine the direct costs of the conflict one encounters many ob¬ stacles. Some of the countries which declared war participated therein so slightly that they have not seen fit to segregate their war ex¬ penditures from their general expenditures. Again, the figures given out by certain of the principal belligerents lack definiteness, and a tendency to exaggerate has been mani¬ fested in some of the statements. Furthermore, some of the big powers made expenditures which, for military reasons, have not been dis¬ closed or with reference to which misleading information was given out. Nevertheless, the total of $186,333,637,097, mentioned

above, is believed to be very nearly correct. The esti¬ mates of some statisticians, however, are higher. One authority has estimated that the seven major belligerents alone spent $194,000,000,000. An¬ other, Edgar Crammond, in an address before the Institute of Bankers in London on 26 March 1919 asserted that the total direct costs of the war amounted to $210,175,000,000. Secretary of War, Newton D. Baker, has placed them at

$197,000,000,000.

But notwithstanding all of these figures pur¬ porting to show how much money was spent to carry on the war, the fact is that it was fought mainly on credit, for the gold coin avail¬ able at the outbreak of hostilities was not suffici¬ ent to have kept it going for more than 40 or 50 days. During the first three years of the war the average daily cost was $123,000,000. In 1918 it rose to $224,000,000. As will be shown by the following table, the amount of gold coin available in July 1914 was but slightly in excess of four and three-quarter billion dollars, or only a little over one-fiftieth of the sum that W'as spent for war purposes during the slightly more than four years of fighting.

Gold Reserves as of July 1914.

Great Britain. .

France .

Russia .

Germany .

Austria-Hungary -

United States .

United States banks

Argentina .

Brazil .

Other reserves .

$190,000,000

830,000,000

800,000,000

390,000,000

255,000,000

1,184,000,000

168,000,000

200,000,000

50,000,000

700,000,000

Total

$4,767,000,000

These are but approximate figures. It is probable that the gold supply was considerably in excess of the total as shown above. In Great Britain, for example, there is supposed to have been about $615,000,000 in gold coin in excess of the reserve in the issue departrnent of the Bank of England. France's supply, like¬ wise, appears to have been much greater than the table indicates. It is probable also that Ger¬

* These are the figures of Prof. Ernest L. Bogart of the University of Illinois, whose volume, ' Direct and In¬ direct Costs of the Great World War ' published by the Carnegie Endowment for International Peace , is recognized as perhaps the most authoritative work yet issued upon this subject.

many had more gold at the outbreak of the war than she is credited with. Still, the war bill is so great as to make the fact apparent that had the nations been required to conduct the fighting on a cash basis it would have lasted but a very short time. In order, therefore, to carry on the conflict for the more than four years it lasted, all of the belligerents had to resort to the issuance of notes, paper money and promises to pay. Considerable sums were raised for war purposes in some of the coun¬ tries by taxation, but it has been estimated that almost nine-tenths of the money expended was raised by loans, that is, by the sale of gov¬ ernment notes, bonds and other evidences of debt upon which, in certain cases, interest will have to be paid for more than 50 years.

Taking into consideration only net expendi¬ tures (determined by deducting from gross ex¬ penditures all advances to Allies) Germany's war bill, exclusive of any indemnities she may be required to pay, exceeded that of any other belligerent. England's bill was the next largest France's was third; that of the United States, fourth ; Russia's, fifth ; Austria-Hungary's, sixth; and Italy's, seventh. These countries spent a combined total of $172,000,000,000, which when deducted from $1ˆ,000,000,000, the net costs of the war to all countries, leaves

$14,000,- 000,000 to represent the combined expenditures of the minor belligerents. Below will be shown the war expenditures of each of the countries taking part therein.

I. Direct Costs of the War by Countries.

Allied and Associated Powers.

United States. — Although the last great power to enter the conflict, the net war ex¬ penditures of the United States amounted to $22,625,252,843. This was almost 20 times as much as the pre-war debt of the country and, as has been said, almost enough to have naid, the entire costs of the government from 1791 to the outbreak of the great European struggle. It represented an expenditure of over $1,000,000 an hour from the moment America became a belligerent down to April 1919, and was sufficient to have carried on the Revolutionary War for a thousand years at the rate of expenditure during that struggle. England, a participant from the beginning of the war, spent but a little over $12,0(X),000,0(X) more than did America; France, not quite $2,000,000,000 more, and Russia, about $30,000,000 less. These figures suggest that had the war lasted another year the expenditures of the United States would have equaled those of Great Britain and Germany. As it was, her gross expenditures (her net plus her advances to the Allies) totaled $32,080,266,968 and ex¬ ceeded the gross expenditures of France by ap¬ proximately $6,000,000,000. Her advances to the Allies amounted to $9,455,0(X),000 in round fig¬ ures, and exceeded the advances made by Great Britain to other belligerents by about $1,000,- 000,000. About two-thirds of the gross amount expended by America was raised by loans ; the remainder by taxation, the plan from the be¬ ginning having been to pay one-third of the war bill out of revenues. This policy necessitated tremendous increases in taxes. Very few things ”vere omitted from the taxable list, but incomes and war and excess profits were made to carry ffie greater part ‘of the burden. Among other

increases the tax on distilled spirits was raised to $6.40 a gallon. Between the time America entered the war and May 1919 five government loans were issued. The first four were known as Liberty Loans and the fifth as the Victory Loan. The yield from these, to which will be added the approximate yield from the sale of War Savings Certificates, was as follows:

United States Liberty Loans.

First . $2,000,000,000

Second . 3,808,766,150

Third . 4,176,576,850

Fourth . 6,993,073,250

Fifth (Victory) . 4,500,000,000

W ar savings stamps (estimated) . 1 , 000 , 000 , 000

Total . ■. . $22,478,416,250

Professor Bogart adds that these expenditures v/ere met by revenues totaling $8,708,741,310 and borrowings amounting to $35,055,123,155. Of the $8,695,000,000 loaned by Great Britain to her Allies, $855,000,000 was advanced to her own dominions. The following table shows the advancements made by her :

Great Britain's Advances to Allies.

France . $2,170, 000 , 000

Italy . 2,065,000,000

Russia . 2,840,000,000

Belgium . 435,000,000

Serbi a . 90, 000 ,000

Other Allies . .’ . 240 , 000 , 000

Dominions . 855,000,000

Total . $8,695,000,000

Subscriptions to the first loan amounted to $3,035,226,850, an over-subscription of $1,035,- 226,850. The second loan also was over-sub¬ scribed, the subscriptions totaling $808,766,150 more than was accepted. All subscriptions to the third and fourth loans were accepted, but the fifth (Victory) loan was over-subscribed to the extent of $749,908,300, the total subscriptions amounting to $5,249,908,300.

The United States began advancing money to the Allies very soon after she entered the conflict. The following is a list of the advances made by her together with the names of the countries to which such advances were made :

Great Britain’s Colonies. — Despite the be¬ lief in German circles that Great Britain’s en¬ trance into the war would be the signal for a revolt upon the part of some, if not most, of her colonies, the facts are that every one of those colonies sprang to the aid of the mother country with both men and means. The direct war expenditures of these colonies totaled $4,493,813,072, as follows :

Canada . $1,665,576,032

Australia . 1,423,208,040

U nion of South Africa . 300 , 000 , 000

New Zealand . 378,750,000

India . 601,279.000

Other British colonies . 125,000,000

Advances to Allies by the United States.

Great Britain…	$4,316,000,000
France .	2,852,000,000
Italy .	1,591,000,000
Russia .	187,000,000
Belgium .	341,000,000
Serbia .	27,000,000
Czecho-Slovakia	50,000,000
Greece .	43,000,000
Rumania .	30,000,000
Cuba .	10,000,000
Liberia .	5,000,000

Total

$9,452,000,000

Great Britain. — Among the Entente Allies the war bill of Great Britain was the heaviest. Her expenditures totaled $44,029,011,868, but from this amount should be deducted advances to co-belligerents amounting to $8,695,000,000 leaving $35,334,011,868 to represent her net ex¬ penditures. About one-fourth of the money spent by her was raised by increased taxation. The greater portion of the remainder was raised by internal and foreign loans and by the sale of War Savings Certificates. Professor Bogart determines England's war costs by deducting from her total governmental expenditures for the years 1914-15 to 1918-19, inclusive, an amount equal to five times her normal expendi¬ tures for the year preceding the war, thus :

Great Britain's War Expenditures.

1914-15 . $2,802,367,665

1915-16 . 7,795,791.888

1916-17 . 10.990,563,550

1917-18 . 13,481,107,025

1918-19 . 13.896,505,940

$48,966,336,068

Less five years normal . 4,937,324, 200

$14,029,011,868

Advances to Allies . 8 , 695 , 000 , 000

Net war costs

$35,334,011,868

Total

$4,493,813,072

India’s expenditures included a gift of $500,- 000,000 to the British government, a gift from the Maharajah of Nabha of $100,000, another from the Gaikwar of Baroda of $33,000 and still another from the Maharajah of Mysore of

$330,000.

France. — Estimates as to the financial bur¬ den the war imposed upon France vary widely. -A report made to the Chamber of Deputies in February 1919 fixes her expenditures at $36,- 400,000,000. Professor Bogart places them at $25,812,782,800 less advances to ‘her Allies of $1,547,2ˆ,000, making her net expenditures $24,265,582,800. In determining the war costs of France, Professor Bogart adopts a method similar to that emplo3ˆed by him in determin¬ ing the war costs of Great Britain, that is, he deducts from her governmental expenditures, ordinary and extraordinary, for the years 1914 to 1918, inclusive, five times the amount of her normal expenditures in 1913, as follows :

France’s War Expenditures.

1914 . $2,817,900,000

1915 . 4,560,800,000

1916 . 6,589,029,000

1917 . 8,374,185.000

1918 . 8,537,800.000

$30,879,714,000

Less normal for five years . 5,066,931 , 200

Gross cost of war . $25 , 812 , 782 , 800

Advances to Allies . 1,547, 200 , 000

Net costs of war

$24,265,582,800

France resorted to various methods to raise the funds needed by her to carry on the fighting. She issued four loans which brought her in a total of $11,012,200,000. Advances made to her

by the Bank of France and the Bank of Al¬ geria amounted to $3,430,000,000. Great Brit¬ ain advanced her $2,170,000,000 and the United States advanced her $2,852,000,000. Her reve¬ nues for the years 1914-18 amounted to $5,000,000,000, and yet when the end of the struggle came she had a floating indebtedness of almost $5,000,000,000 more.

Russia. — Broadly speaking, Russia may be said to have dropped out of the war in Septem¬ ber 1917 when the Provisional Government, which supplanted the old Imperial Government, had to make way for the Bolsehviki regime. Up to that time the country's war expenditures had reached a total of $22,593,950,000. She raised the money by various methods — by bond issues, by foreign borrowings, by issuing treas¬ ury bonds and short-term treasury notes, by in¬ creased taxation and by enormous issues of paper money. Seven internal loans yielded her $6,176,000,000, as follows:

Russian War Loans.

First . $257,500,000

Second . 257,500,000

Third . 515,000,000

Fourth . 515,000,000

Fifth . 1,029,000,000

Sixth . 1,544,000,000

Seventh . 2,058,000,000

Total . . $6,176,000,000

From Great Britain Russia borrowed $2,840,- 000,000; from the United States $187,000,000; and from Japan $333,000,000, Her issues of paper money exceeded $8,000,000,000.

Italy. — The direct cost of the war to Italy was $12,413,998,000. Of this sum $607,840,000 represents her expenditures for mobilization and other military purposes between the out¬ break of the war and 24 May 1915, the day she became a belligerent. Like all other belligerents, she increased taxes in order to raise war funds. She also borrowed large amounts from Great Britain and the United States. Five internal loans yielded as follows :

Italian War Loans.

Mobilization loan

First .

Second .

Third .

Fourth .

$200,000,000

229,200,000

602,800,000

797,100,000

1,224,600,000

Total

$3,053,700,000

Belgium. — Statisticians have experienced great difficulty in trying to determine the direct costs of the war to Belgium. With most of her territory under hostile control she was not in a position cither to raise revenues or issue loans. Perhaps her borrowings afford the best index of her expenditures. These totaled $1,210,125,090. England loaned her for war purposes, $435,000,000; France, $434,125,090; the United States, $341,000,000. On 21 March 1919 the Belgium Minister of Finance asserted that Germany owed Belgium $1,930,000,000 for cash requisitioned during the war. However, as the Treaty of Versailles provides that Germany must restore to Belgium the amounts com¬ mandeered, these sums have not been in¬ cluded in Belgium's war costs.

Other Entente Allies. — The war expendi¬ tures of the other Entente Allies were as fol¬ lows :

Rumania. . ,

Japan .

Serbia .

Greece .

Brazil .

China .

Cuba .

Guatemala.

Haiti .

Honduras. . , Liberia …. Montenegro Nicaragua. . Panama… Portugal … San Marino, Siam .

$1,600,000,000

40,000,000

399,400,000

270,000,000

500,000,000

Total

$2,809,400,000

Central Powers.

Germany. — Whether or not Germany was primarily responsible for starting the war, one cannot survey her pre-war plans without arriv¬ ing at the conclusion that, in the opinion of her statesmen, war was inevitable and that she ■was preparing for it financially as well as militarily. As far back as the days of Fred¬ erick the Great she created a fund known as the ^^War Chest.® Into it she placed $30,000,- 000 taken from the indemnity squeezed out of France at the close of the Franco-Prussian War. In July 1914 the funds in the *War Chest® totaled $51,000,000. In 1913, after France adopted compulsory military service, Germany enacted a law designed to raise $250,- 000,000 to be used in defraying the expenses of her own enlarged army. Soon after the outbreak of the war she enacted much legisla¬ tion of a financial nature that undoubtedly was prepared in advance and for the purpose of meeting just such a contingency. Her gross war expenditures have been placed at $40,150,- 000,000 by her Minister of Finance. Her ad¬ vances to co-belligerents totaled $2,375,000,000, leaving her net war costs $37,775,000,000. At first she did not materially increase taxation but raised most of the money expended by her through loans similar in many respects to the American Liberty loans. Before the war ended, however, necessity had driven her to the taxing of almost everything taxable. In the meantime she kept up her policy of issuing periodical loans, issuing nine all together. These yielded as follows :

German War Loans

First . $1,220,250,000

Second . 2,276,500,000

Third . 3.040,000,000

Fourth . 2,692,000,000

Fifth . 2.674.750,000

Sixth . 3,280,515.000

Seventh . 3.156,415,000

Eighth . 3,691.500,000

Ninth . 2,608,489,925

Total . $24,640,419,925

Austria-Hungary. — The war cost Austria-Hungary $20,622,960,000, all of which she bor¬ rowed Its outbreak found her in very bad financial conditions. Her debt in 1914 was ex¬ tremely burdensome, and her credit was more or less impaired. During the preceding decade she had borrowed large sums of money, prac-

tically all of which had been used to increase her armaments. This suggests that she too ex¬ pected war and was doing her best to prepare for it. In financing the war Austria and Hun¬ gary issued

separate loans and made separate borrowings from the Austro-Hungarian and other banks. The following table shows the borrowings of the dual monarchy during the war :

Austro-Hungarian War Loans

Austrian loans Hungarian loans

First . $440,149,400 $235,067,400

Second . 535,664,400 226,507,000

Third . 840,520,000 396,972,000

Fourth . 904,058,400 386,000,000

Fifth . 892,922,000 405,000,000

Sixth . 1,075,000,000 506,000.000

Seventh . 1,117,000,000 738,000,000

Eighth . 1,152,600,000 772,000,000

Totals . . $6,957,914,200 $3,665,546,400

Austro-Hungarian Bank

advances . 3,560,000,000 2,156,000.000

Advances by other banks 2,000,000,000 512,000,000

Treasury notes dis¬ counted . 280,0017,000 1,134,000,000

Foreign loans . ‘ 8,500,000 348,000,000

Totals . $12,806,414,200 $7,815,546,400

Grand total . ; . $20,622,960,600

Turkey and Bulgaria. — The war is said to have cost Turkey $1,430,000,000. Bulgaria spent $815,200,000. Its close found each country in a bad financial way.

The following table shows in condensed form the net costs of the war to the different belligerents :

Net Direct Costs of the War.

Allied and Associated Powers.

United States .

Great Britain .

British colonies:

Canada .

Australia .

New Zealand .

India . • …

Union of South Africa

Other colonies .

France .

Russia .

Italy .

Belgium .

Rumania .

Japan .

Serbia .

Greece …

Other Entente Allies…

$22,625,252,843

35,334,011,868

1,665,576,032

1,423,208,040

378,750,000

601,279,000

300,000,000

125,000,000

24,265,582,800

22,593,950,000

12,413,998,000

1,210,125,090

1,600,000,000

40,000,000

399,400,000

270,000,000

500,000,000

Total

$125,746,133,673

Central Powers.

Germany .

Austria-Hungary

Turkey .

Bulgaria .

$37,775,000,000

20,622,960,600

1,430,000,000

815,200,000

Total

$60,643, 160,600

Grand total . $186,333,637,097

The increases during the war in the national debts of the various belligerents afford another means of approximating the costs of the war. The table at the bottom of page shows these increases.

H. Indirect War Costs.

Loss of Human Life. — Since, as Professor Bogart so truthfully says, ®the loss of human life and the race deterioration resulting from war are the most appalling and permanent costs of the war, for they affect not merely the pres¬ ent, but are traceable through future genera¬ tions,® the deaths resulting from the European War deserve first consideration in any attempted tabulation of the indirect costs of that great struggle. Professor Bogart cites official reports by the major belligerents and semi-official re¬ ports by most of the minor belligerents to prove that of the soldiers who took part in the Euro¬ pean War, 9,998,771 made the supreme sacrifice. These appalling figures become even more ap¬ palling when it is remembered that the death toll of all of the wars fought during the pre¬ ceding 125 years, beginning with the Na¬ poleonic War of 1790 and ending with the Balkan War of 1912-13, was only about one-half as great. The tragic story of the deaths resulting from the European War, how¬ ever, does not stop with the known dead. To that painfully long list must be added, accord¬ ing to various statisticians, 50 per cent of the soldiers reported as ^^prisoners or missing® to account for those who were so mutilated that they could not be identified or who were so blown to pieces that not even a trace of them was left. The ˆprisoners or missing® list, at the time the reports above referred to were given out, embraced 5,980,600 names. Fifty per cent of that number would add 2,991,800 to the fatal casualty lists and bring the known and presumed dead among the soldiers up to 12,990,570. Before one can recover from the shock occasioned by the contemplation of so many deaths among the very flower of the world’s manhood, one learns from Professor

National Debts Before and After the European War.*

COUNTRIES

United States… . Great Britain… . British colonies:

Canada .

Australia… .

India .

New Zealand South Africa.

France .

Russia .

Italy .

Belgium .

Germany .

Austria-Hungary .

T urkey .

Bulgaria .

Totals .

Before

After

Increase

$1,103,000,000

3,444,000,000

$26,116,000,000

37,985,000,000

$25,013,000,000

34,541,000,000

544,000,000

182,000,000

1,470,000,000

487,000,000

614,000,000

6,346,000,000

4,537,000,000

2,921,000,000

156,000,000

1,194,000,000

1,044,000,000

843,000,000

223,000,000

1.796,000,000

1,420,000,000

2,225,000,000

756,000,000

774,000,000

34,842,000,000

125,750,000,000

15,600,000,000

4,000,000,000

37,150,000,000

25,799,000,000

1,485,000,000

486,000,000

1.252,000,000

1,238,000,000

755,000,000

269,000,000

160,000,000

28,496,000,000

21,213,000,000

12,679,000,000

3,844,000,000

35,956,000,000

24,755,000,000

642,000,000

263,000,000

$25,108,000. 000

1 $216,184,000,000

$191,076,000,000

* These figures relating to the national debts of the different belligerents were supplied by O. P. Austin, statistician

of the National City Bank of New York, t October, 1917.

Bogart that to the deaths among the soldiers must be added 10,000,000 more to cover the deaths among civilians resulting from causes attributable directly or indirectly to the war. All wars have been accompanied by an increase in the civilian death-rate, but, as Professor Bogart says, ®it remained for the Great World War to establish a new record in this, as in so many other aspects.® Various causes were re¬ sponsible. Famine and cold cost hundreds of thousands of lives. Epidemics took their toll — the Spanish influenza, responsibility for which has been laid at the war's door — is said to have caused 6,000,000 deaths, 1,200,000 of which occurred in the United States. More ' than 4,000,000 Armenians, Syrians, Jews and Greeks are said to have been massacred while the war raged. One-third of the population of Poland is said to have been wiped out ; 2,000,000 Russians are said to have perished ; deaths among the Rumanians numbered 800,000. Ger¬ many also lost 800,000 civilians, while deaths from famine in Austria and Serbia numbered nearly 1,000,000. In the occupied areas of France there was a tremendous increase in the death-rate ; in Belgium, strange as it may seem, the increase was nothing like so pronounced. Approximately 100,000 fishermen and sailors lost their lives in mined waters or from other causes for which the war was directly respon¬ sible.

In determining the value of the human lives lost during the war Professor Bogart has adopted the figures of M. Barriol, the noted French actuary, who, 10 years ago, estimated the average social value

of an individual in the six leading countries to be as follows :

U nited States . $4,720

England . 4,140

Germany . 3,380

France . 2,900

Austria-Hungary . 2,750

Russia . 2,020

After saying that these valuations probably err on the side of underestimation, Professor Bogart extends their application by affixing the French valuation to Belgium and the Russian valuation to Italy and the minor belligerents. Using these valuations in conjunction with the casualty lists, he gives the following table to show the costs of the war resulting from deaths among the soldiers :

Capitalized Value of Loss of Life.

Known dead . 9,998,771

Presumed dead . 2,991,800

COUNTRY

Lives lost Value

United States . 109,740

England . 839 , 904

Germany . 1,997,365

France . 1,654,550

Austria-Hungary… . 1,132,500

Russia . 4,012,064

Belgium … 272,000

Italy . 1,180,660

Serbia . 757,343

Rumania . 397,117

Greece . 37,500

Portugal . 4,100

Japan . 301

Turkey . 488,789

Bulgaria . 106,637

$517,972,800

3,477,202,560

6,751,093,700

4.798,195,000

3,114,375,000

8,104,369,280

788,800.000

2,397,053,200

1,529,832,860

802,176,340

75.750,000

8,282,000

608,020

987,353,780

215,406,740

12,990.570 $33,568,471,280

Estimated loss resulting from deaths among civilians (the number of such deaths being supposed to equal the number of deaths in the armies) .

33.568,471.280

Total valuation of lives lost . $67 , 136,942.560

Property Losses. — Estimating the losses of the European War growing out of the de¬ struction of and damage to property is an ex¬ ceedingly difficult task. Very few of the au¬ thorities agree upon the subject. Professor Bogart estimates the total property losses at $36,760,000,000, placing the losses on land at $29,960,000,000 and the maritime losses at $6,800,000,000. The vessels sunk, totaling 15,398,392 gross tons, represent a loss of $3,000,- 000,000 and the cargoes sunk with the vessels a loss of $3,800,000,000. The land losses are di¬ vided among the different countries as follows :

Property Losses on Land.

Belgium . $7,000,000,000

France . 10,000,000,000

Russia . 1,250,000,000

Poland … 1,500,000,000

Serbia, Albania and Montenegro . 2,000,000,000

East Prussia, Austria and Ukraine . 1 , 000 , 000 , 000

Italy . 2,710,000,000

Rumania . 1,000,000,000

British Empire . 1,750,000,000

Germany . 1,750,000,000

Total . $29,960,000,000

The following table compiled by Professor Bogart from various sources shows the gross tonnage of seagoing merchant vessels lost be¬ tween 1 Aug. 1914 and 11 Nov. 1918:

Gross Tonnage of Seagoing Merchant Vessels Lost.

Enemy

Marine

COUNTRY OF REGISTRY

action

risk

United States .

394,658

430,759

Great Britain .

7,756,659

1,143,000

Norway .

1,177,001’

Italy .

846,333

France .

888 , 783

Denmark .

240,860

Sweden .

200,829

Greece .

345,516

Russia .

182,933

Holland .

203,190

Spain .

167,865

710,285

Portugal .

93,136

Belgium .

83,819

Japan .

120,176

Brazil .

25,464

Argentina .

4,275

Uruguay .

6,027

Peru .

1,419

Rumania .

3,973

Persia .

758

Allies and neutrals .

. 12,743,674

2,284,044

Germany .

187,340

86,265

Austria .

15,166

20,433

Turkey .

61,470

Total all countries .

. 13,007,650

2,390,742

Grand total of all sinkings . 15,398,392

Loss in Production. — One of the big indi¬ rect costs of the war was the loss in production growing out of the withdrawal of millions of men from commercial pursuits for service in the armies and navies. In 1917 there were 38,000,000 men under arms. Professor Bogart believes that an average of 20,000,000 served in the armed forces during each of the four and a half years of the war. Ascribing to these men an average earning capacity of $500 a year, he estimates the loss in production re¬ sulting from their withdrawal from civil pur¬ suits at $45,000,000,000.

War Relief Costs. — The relief work made necessary by the war is estimated to have cost

$1,000,000,000, all of which was raised by vol¬ untary subscriptions. Statistics are available only for the English-speaking nations. The ex¬ penditures of the United States far exceeded those of all other countries. Canada, consid¬ ering her population, made exceedingly liberal contributions. England also spent large sums for war relief, as did each of her various colo¬ nies in addition to Canada.

United States. — The contributions of the United States toward war relief totaled $625,- 015,028 and were distributed through the vari¬ ous organizations as follows :

American War Relief Expenditures.

American Red Cross .	$250,000,000
Young Men's Christian Association .	55,000,000
Young Women's Christian Association .	5,000,000
Knights of Columbus .	11,249,529
Jewish Welfare Board .	20,000,000
American Library Association .	1,014,076
War Camp Community Service .	15,000,000
Salvation Army .	2,485,000
United drive of 1918 . »• .	203,179,038
Rockefeller Foundation .	3,087,385
Belgian relief (private contributions) .	9 , 000 , 000
Other contributions (estimated) .	50,000,000
Total .	$625,015,028

According to Professor Bogart the actual expenditures of the Rockefeller Foundation to¬ taled $22,444,814, but of this amount $8,000,000 was contributed to the American Red Cross and appears in its figures. About $4,000,000 was contributed to different philanthropies and $5,100,000 to the United War Work Fund.

In addition to the expenditures mentioned above. Congress appropriated for the relief of starving Europeans $100,000,000, only $11,250,- 000 of which, however, was disbursed for free charity. The remainder, according to the re¬ port of Mr. Herbert C. Hoover, head of the American Relief Administration, was loaned to various European governments, each of which executed notes for the amount loaned it. These notes have been turned over to the United States Treasury. The loans w'err-as follows :

Loans by American Relief Association.

Poland …	$57,000,000
Czecho-Slovakia	6,750,000
Armenia .	10,000,000
Russia .	5,000,000
Esthonia .	
Let via .	
Lithuania .	
Finland .	

2,300,000

3,000,000

700,000

4,000,000

Total

$88,750,000

Great Britain and Colonies. — The contri¬ butions of Great Britain and her colonics to w''ar relief totaled, according to available statis¬ tics, $249,047,000, as follows :

United Kingdom War Relief Expenditures.

England (Red Cross fund) . $72,112, 000

Prince of Wales relief fund . 15,000,000

$87,112,000

Canada . 91,750,000

New Zealand . 17,585,000

Australia . 36,000,000

South Africa . 10,000,000

Newfoundland . 3,000,000

India . 3,600,000

Total . $249,047,000

While, as stated above, no figures for other countries are available, it is believed that their expenditures, coupled with certain unre¬ ported expenditures of Great Britain, were suf¬ ficient to bring the total costs

of war relief up to the estimated figure of $1,000,000,000.

Cost of War to Neutral Nations. — Accord¬ ing to Professor Bogart's estimate, the war cost the neutral nations $1,750,000,000. This represents the sums expended by them in guard¬ ing their frontiers and otherwise maintaining their neutrality, and are reflected in their in¬ creased public expenditures. The following table shows the cost of the war to each of the neutrals :

Cost of War to Neutral Nations.

Holland .

Switzerland … ,

Sweden .

Norway .

Denmark .

Other countries

$672,000,000

250,000,000

429,800,000

130,000,000

90,000,000

178,200,000

Total

$1,750,000,000

Conclusion. — The total costs of the war, direct and indirect, may be summarized as fol¬ lows :

Direct and Indirect Costs of the War.

Direct costs . . $186,333,637,097

Indirect costs:

Value of human lives lost:

Soldiers . $33,568,471,280

Civilians . 33,568,471,280

Value of property lost:

On land . 29,960, 000 , 000

On sea . 6,800,000,000

Loss in production. . 45,000,000,000

War relief . 1,000,000,000

Loss to neutrals .... 1,750, 000 , 000

- 151,646,942,560

Grand total . $337,980,579,657

The writer acknowledges his indebtedness to Professor Bogart for much of the information in this article and for his kind permission to

make free use of his ˆDirect and Indirect Costs of the Great World War.ˆ

A. H. McDannald,

Managing Editor, Encyclopedia Americana.

24. WAR CASUALTIES. The official re¬ ports and estimates of dead, wounded and miss¬ ing, in the Great War of 1914-18, show that it was far the bloodiest in history, from every point of view. The battle deaths alone form the amazing total of 7,553,600, a larger number than the total of slain in all wars between 1793 and 1914, although this period included the Napoleonic wars. These figures include those dying of wounds, probably a fourth of the total. Ill previous wars the deaths from disease far ex¬ ceeded the deaths on the battlefields, frequently as four to one, while in this war the deaths from disease were inconsiderable in comparison, being high only during the ®flffiˆ period in Octo¬ ber and November 1918. The total of armed men in the war being about 56,000,000, of whom probably 30,000,000 were actually engaged, it follows that one in four of the totals at the front perished. The losses fell most heavily on Rus¬ sia, (Germany, France, Great Britain and Aus¬ tria, in the order named, 6,385,000 dead being credited to these five nations. The official esti¬ mates, as made by Col. Leonard P. Ayres, in his

report to the War Department of the United to 6,589, 6,019 and 5,151 per week. During the States, 31 May 1919, follow; remaining month of hard fighting they fell to

Armies Mobilized and Casualties in the World War.

ENTENTE ALLIES

Total armies

Battle deaths

Wounded

Missing or prisoners

Total

Russia .

France .

Great Britain .

Italy .

United States .

Serbia .

Rumania .

Belgium .

Japan .

Greece .

Portugal .

Montenegro .

Total .

CENTRAL POWERS

Germany .

Austria-Hungary .

Turkey .

Bulgaria .

Total .

Grand total .

11,500,000

7,500,000

7,500,000

5,500,000

4,000,000

700,000

750,000

267,000

800,000

230,000

100,000

50,000

1,700,000

1,385,300

900,000

330,000

49,000

125,000

2O0,OOO

102,000

300

7,000

2,000

3,000

3,000,000

2,675,000

2,200,000

947,000

237,000

100,000

120,000

60,000

907

40,000

15,000

10,000

2,000,000

446,300

400,000

1,393,000

3,000

228,000

80,000

10,000

3

40,000

200

7,000

6,700,000

4,506,600

3,500,000

2,800,000

289,000

550,000

400,000

110,000

1,210

87,000

17,200

20,000

38,897,000

4,803,600

9,404,907

4,607,503

18,981,010

10,000,000

6,500,000

1,600,000

400,000

1,600,000

800,000

250,000

100,000

3,683,000

3,200,000

500,000

150,000

770,000

1,211,000

130,000

11,000

6,053,000

5,211,000

880,000

261,000

17,500,000

2,750,000

7,533,000

2,122,000

12,405,000

56,397,000

7,553,600

16,937,907

6,729,000

31,386,010

Later reports have constantly added to these figures. The totals computed by the United States War Department in January 1920 show the losses to the American army and the Marine Corps on all fronts as follows :

Killed in action . 35 , 585

Died of wounds . 14,742

Died of disease . 58,073

Died of accidents and other causes . 8,092

Total dead … 116,492

Total wounded . 230,074

Total casualties . 346 , 566

A review of the casualty lists collected dur¬ ing the war, published by

a Majority Socialist, in January 1920, shows that the German army lost in killed 1,718,246 men, including 62,693 officers ; in wounded 4,234,000 men, including 116,015 officers; in prisoners or missing 1,073,- 619 men, including 23,104 officers. The total losses of the army, therefore, amounted to 7,025,972 men.

The losses of the navy are estimated at 78,342, including 24,112 killed and 29,830 wounded. Germany's army casualties have hitherto been estimated at 1,600,000.

Appalling as are the above totals they do not show the entire mortality. It should be remem¬ bered that at least 100,000 civilians among the Allies perished through brutality 'in Belgium and Northern France, U-boat warfare and bombing excursions. The massacres of the Ar¬ menians, Syrians, Jews and Greeks by the Turks were probably close to 1,000,000, and a moderate estimate of deaths among civilians in war areas from influenza, pneumonia, starvation and ex¬ posure is 4,000,000; or at least 5,000,000 deaths, a grand total of 12,618,000 deaths chargeable to the Great War.

The principal reason why American losses were so comparatively light is that they were engaged in heavy fighting only 200 days. The American losses never reached 500 a week until the third week in July 1918 at Chateau-Thierry ; in the following three weeks they were 2,239, 2,362 and 2,232, respectively. Thereafter they fell to about 1,000 per week until October, when the Meuse-Argonne struggle brought them up

about 2,500 a week. In percentages the Ameri¬ can infantry and machine-gun men suffered - most heavily, the air service next, followed by the tank, engineer and artillery corps.

American War Casualties by States.

State Casualties Dead

New York . 40,222

Pennsylvania . 35 , 042

Illinois . 18,264

Ohio . 16,007

Massachusetts . 13 , 505

Missouri . 10,385

Michigan . 10,369

New Jersey . 10,166

Texas . 10,133

Wisconsin . 9,813

Minnesota . 7,323

Iowa . 7,311

California . 6,650

Connecticut . 6,625

Oklahoma . 6,358

Tennessee . 6,190

Virginia . 6,130

North Carolina . 5 , 799

Indiana . 5,766

Kentucky . 5,380

Kansas . •• . 5,182

Alabama . 5,160

Georgia . 4,425

West Virginia . . 4,018

South Carolina . 3,919

Maryland . 3,812

Montana . 3,443

W ashington . 3,070

Nebraska . 3,041

Arkansas . 2 , 658

North Dakota . 2,560

Mississippi . 2 , 303

Maine . 2,090

Louisiana . 2,160

South Dakota . 1 . 867

Colorado . 1,759

Oregon . 1,577

Rhode Island . . 1 . 562

New Hampshire . 1 . 535

Idaho . 1,351

Florida . 1,171

Vermont . 1,170

Utah….. . 1,006

New Mexico . 860

District of Columbia . 773

Wyoming . 676

Arizona . 557

Delaware . 303

Nevada . 250

Alaska . 15

Hawaii . 13

Porto Rico . 11

Philippine Islands . 7

Canal Zone . 3

9,196

7,898

4,260

4,082

2,955

2,562

2,751

2,367

2,722

2,649

2,133

2,161

1,747

1,265

1,471

1,836

1,635

1,610

1,510

1,436

1,270

1,251

1,530

1,063

1,138

975

934

877

855

883

700

904

518

823

554

537

512

355

358

409

467

300

302

228

202

233

150

87

71

6

4

1

3

2

654

WAR, EUROPEAN — REPATRIATION OF PRISONERS (25)

The loss by disease among the American Ex¬ peditionary Forces was about 27,000, but there were also 35,500 deaths in the home army dur¬ ing the war period, so that the total number of deaths in the army from the declaration of war to 1 May 1919 was 112,432, or including the

every man killed in battle seven were wounded. Five out of every six sent to the hospitals re¬ turned to duty cured. In the expeditionary forces the battle losses were twice as great as the losses from disease. The American hospital facilities were always equal to or in excess of

Casualties Compared with Other Wars.

WAH

Armies

Killed

Died of wounds (Estimated)

Died of disease (Estimated)

Totals

The Great War, 1914-1918 .

American Civil War, 1861-1865 .

Franco-Prussian War, 1870-1871 .

British-South African War .

Russo-Japanese War, 1904-1905 .

* •

56,000,000

(U.) 2,000,000

(C.) 750,000

(P.) 750,000

(F.) 300,000

(B.) 410,000

100,000

(J.) 650,000

(R.) 2,000,000

7,553,600

} 67,000

j 17,500

6,000

4,000

48,000

43,000

11,000

2,000

11,500

2,550,000

225,000

12,000

14,000

1,000

27,000

10,103,600

f 335,000

(200,000

(40,500

(50,000

22,000 5,000 86,500 120,000

navy, 122,500. For 86.3 per cent of these deaths, the epidemic popularly known as the *flu® was responsible. The physicians generally credited these to ˆinfluenza pneumonia.ˆˆ Most of these deaths occurred between 14 Sept, and 8 Nov. 1918 and the number of soldiers and sailors stricken with the disease during that period was 370,000. Of these cases more than 11 per cent were fatal. Notwithstanding this calamity, the disease record of the American troops was bet¬ ter than ever before when in combat. The best comparison is afforded by the Civil War, in which 65 per cent of the

360,000 deaths were from disease.

It is very difficult to draw a parallel between the casualties in the battles of the Civil War and the American casualties in the great World War. The number of slain at Gettysburg in three days was 3,067, and in the battle of the Wilderness, 2,246 perished in two days of fight¬ ing, while at Antietam, 2,108 deaths were re¬ corded in a single day's battle. In three weeks' fighting at Meuse-Argonne the battle-deaths of Americans numbered 18,000, or a daily aver¬ age of 1,000. Thus in destructiveness the Meuse-Argonne battle was the equivalent of seven Gettysburgs. At Gettysburg there were about 100,000 Union troops. More than 1,000,000 American troops participated on the Meuse, however, so the percentage loss was much lower than at Gettysburg.

Far more were probably killed, died of wounds and disease than will ever get into any record. On the other hand there is always a tendency of writers to exaggerate the figures. American newspapers about the second year of the war credited Germany with having lost about twice as many men as appear at the close to have perished. These conditions render com¬ parison of casualties of different nations and different wars very uncertain.

However, American statistics were , kept with great accuracy, and it is remarkable that the statisticians in charge were able to clear up the records of over 2,500,000 troops so com¬ pletely, that less than 3,000 were finally unac¬ counted for. Of the total American forces in the war, 2 per cent were killed or died, and for

the army's needs. War was declared with 200,- 000 men in the army, and the total of dead and wounded at the close was nearly 300,000.

Charles H. Cochrane. 25. REPATRIATION OF PRISONERS. When the great European War ended on 11 Nov. 1918, one of the big problems confront¬ ing the nations which had participated therein was that of repatriating hundreds of thousands of prisoners. At that time, according to in¬ formation supplied by the statistics branch of the War Department of the United States, Ger¬ many held, exclusive of Russians for whom, it is asserted, no information is available, a total of 886,116 prisoners, as follows:

Prisoners Held by Germany at Close of War.

French … Belgian… English … Serbian… Italian …. Portuguese Japanese. . American .

499,210

36,829

171,536

21,854

141,483

10,636

98

4,470

Total

886,116

The German prisoners held by the United States and the Allies, exclusive of Russia, at the close of the war numbered 615,922, as fol¬ lows :

German Prisoners Held by the United States AND Allied Powers at Close of War.

United States in France . 49,966

United States in United States . 5 1888

Allies, exclusive of Russia . 560 i 065

Total . 615,922

Estimates of the Russian prisoners held by Germany at the close of the war place the num¬ ber at more than 1,200,000. She is supposed also to have held at that time 90,000 Rumanians. On 1 July 1919 it was estimated by the United States War Department that there were 163,-308 German, Austrian and Turkish prisoners still in Siberia. Another estimate which in¬ cludes Hungarians and Bulgarians, in addition to Germans, Austrians and Turks, places the number at 212,000.

Liuler the terms of the armistice, Germany was required immediately to begin the repatria¬ tion of the prisoners held by her, including any that might then be under trial or who had been previously convicted. Repatriation of the Ger¬ man prisoners held by the United States and the Allies, however, the armistice stated, should be regulated at the conclusion of the preliminaries of peace. On 8 Jan. 1920, Col A. Gibson, of the General Staff of the United States Army, acting chief of the Statistics Branch of the War De¬ partment, asserted that practically all of the prisoners held by Germany, exclusive of Rus¬ sians, had been repatriated by 30 April 1919, and that repatriation of the German prisoners held by the United States and England had been practically completed some time before his letter w'as written. He added that large numbers of German prisoners still were being held by France ^pending final acceptance by Germany of the Peace Treaty and attendant stipulations.® Ger¬ many simply by turning them loose experienced but little trouble in getting rid of all of her prisoners except the Russians. The latter, how¬ ever, presented an exceedingly difficult problem. When they were dumped by Germany at the Russian frontier they soon encountered the Bolshevists who gave them their choice between death and service in the Red armies. Some joined the Reds; thousands were massacred. The situation finally became so bad that the Allies took cognizance of it. Germany was for¬ bidden to send any more Russians to the fron¬ tier, and the United States and the Allies sent a commission to Berlin to direct the repatriation. This commission also had its troubles. It rounded up about 250,000 of the Russians and placed them in concentration camps in East Prussia, but the Reds balked practically every attempt to get them to their homes. Several thousand were eventually gotten through but as late as 11 Oct. 1919 it was said that there were still 150,000 Russians in Germany who could be located. Late in the fall of 1919 it was stated that 50,000 of the Rumanians who were supposed to have been in Germany at the close of the war had never been accounted for. The theory was that they had perished without any records being left.

The first of the unwounded German pris¬ oners sent home by England reached Cologne, 2 Sept. 1919. England thereafter delivered about 3,000 Germans at Cologne daily and also sent back 3,000 each week by way of Rotterdam, until repatriation had been completed. The first German prisoners held in the United States to be sent home sailed from New York on 26 Oct. 1919. There were 1,600 in the party. Of these about 1,200 had been interned in Georgia. Ap¬ proximately 150. of the Germans Avho were in¬ terned in America applied for naturalization papers. Of these, probationary citizenship was granted

to 73. On 9 Aug. 1919 the Chilean government set free the crews of the German cruiser Dresden and the German raider Seeadler who had been interned in Chile for a long period — the crew of the Dresden since 1915. See Prisoners of War.

A. H. McDannald,

Managing Editor, Encyclopedia Americana.

26. PSYCHOLOGY OF THE WAR. (1) American.— The war psychosis of all countries is declared by authorities to fall

into a pattern typical of group behavior any¬ where under stress or during crisis. This pat¬ tern has been clearest in the United States of America for the reasons that it was physically remote from the scene of the conflict and that its component groupings are both more specific and more fluid than those of countries with greater ˆ ethnic homogeneity and more stable economic and social castes. In August 1914, the United States of America was a country nearing the end of the first half of a liberal po¬ litical administration. Events and legislation had both exhibited tendencies toward liberalism in industry and interaccommodation in society. On the surface America ethnically was held to be a ˆˆmelting pot,® politically and economically a land of equal opportunities. Immigrants and newcomers were declared automatically to ˆˆAmericanize® and to find their status in the economic system according to their talents. The tradition and foreign policy of the land had been republican and pacific. Life had on the whole been secure from famine within and assault from without. Individuals and groups, consequently, were preoccupied with the fate of their own precarious cultural, vocational, politi¬ cal and religious organizations. They were patriotic when they thought of it, but nothing bad arisen to make them think of it often. Labor unions, financial and industrial corpora¬ tions, ethnic and religious societies, political parties and such, absorbed their attention, held their active allegiance and involved them in reciprocal conflicts. Beneath the unity imposed by the ˆTerd-dogmas® of ˆmelting pot® and ˆˆdemocracy® there was the strain of uncon¬ scious ethnic antipathies and conscious eco¬ nomic rivalries, pressing for free expression and inhibited by the ˆˆherd-dogma.® The war supplied the liberating opportunities. During its first period in Europe the inhabitants of the United States were in the position of spectators. They took sides according to their European affiliations, their intellectual and moral inter¬ ests, their economic or political advantage. Thus, New England and the Atlantic Coast line

generally sympathized with Old England and her allies ; the Middle West sympathized with Central Europe; so did groups of intel¬ lectuals, college professors and such, who had studied in Germany; Socialists again denounced both sides, regardless of extraction; and Re¬ publicans and Democrats took attitudes deter¬ mined entirely by their relations to the policy of the administration. The administration, on the other hand, demanded neutrality even ®in deed and thought.® Responsible for the whole country, it could ask for nothing less, and for nothing more impossible. It was subjected, therefore, to accusations of the partisan groups of both sides — ^^pro-German,® according to one; ^^pro-English® to another, and ^capitalist® to a third.

These accusations accompanied activities which turned ^^Americanism® — i.e., the interest of the totality of the inhabitants of the coun¬ try — into a social and political issue. The President made his famous speech on the ®hy-phenated American.® At the same time Ameri¬ can financiers who had been making extensive loans to the Entente grew somewhat disquieted by the character of the campaign, and the ef¬ fects of the enormous profits made by American manufacturers and others on the sale of war

materials to the Entente showed themselves in a strong desire to maintain the source of sup¬ ply and in a corresponding antagonism to any¬ thing that might hurt it. Wages rose, more¬ over, and the demand for labor grew. And all the while German agents were plotting against the property of American citizens and the neu¬ trality of the American government. These events together served to alter the pattern of the American group-arrangement. They brought into being a new and forceful align¬ ment deriving from the attitude of groups to¬ ward the parties at war. The change became quite manifest in 1916 when Mr. Wilson was reelected on the slogan *he kept us out of war® on a vote contrary to all the precedents of American presidential elections, the result remaining in doubt until the very last returns were in.

The program of neutrality was, however, itself being destroyed by events. There ap¬ peared on the field interes,ted military propa¬ ganda organizations, like the National Security League, the Navy League and the American Defense Society. German naval policy came smack against international law and American interests. To continue keeping America out of war it became necessary to get speedy peace — from the ®peace without victory® to all the other varieties. When war finally was de¬ clared, it was declared on two grounds, to avenge the wrongs suffered by the United States at the hands of Germany and *to keep the world safe for democracy.® The Council of National Defense, the Espionage Law, the Draft Law, the War Industries Board, the War Labor Policies Board, the Food Administra¬ tion, the Fuel Administration, the Bureau of Public Information, came into rapid existence. Loyalty leagues and other spy-hunting organi¬ zations appeared all over the country, headed usually by ˆTusiness® men. The interest of all America had at last been fused with the partic¬ ular interest of one group of the belligerents and one social class.

This identification does not appear to have been the result of the active will of the great mass of American citizens. The malfeasance of the Germans appears to have had less influ¬ ence in creating it than the effective will of two organized and interested minorities, busi¬ ness men and intellectuals. The mass required to be argued, sung and whipped into enthusi¬ asm. Instruments of propaganda for this pur¬ pose were both official and voluntary, and they used all the methods known to the advertising agent and a good many new ones. They played upon fear, vanity, the blood-lust, greed and hatred, certainly not less than on the nobler emotions. But the new waves of feeling thus aroused and integrated acquired a reliable base only with the application of the draft laws, the operations of the food and fuel regulations and the reports of the casualties. With these a defi¬ nite change in the American mood was to be observed — an intensity of sentiment in which all the emotional elements mentioned above were active. This sentiment was still in cres¬ cendo when the armistice came. For over a year feeling was far from normal.ˆ It was, however, without the object on which, under a state of war, it would have spent itself. Its manifestations, consequently, are taking the

form of what is called ˆunrest® for one group, and *law and order® for another.

*War psychology® began to develop with the appearance of ˆAmericanism® as an issue. Up to that time, social life in the United

States had been determined by the usual motives of the peace-time routine. Its overruling psycho¬ logical factors are the instincts involved in the individual's activities of self-preservation and self-expression. These instincts operate the functions of food-getting, rnating, self-asser¬ tion, play, and so on. Their inhibition and re¬ pression involve unpleasantness, pain, anger, fear, and the other emotions of repression and disintegration. The milieu in which they work is a society or herd whose solidarity is ex¬ pressed in a like-mindedness established and maintained upon either or both of two condi¬ tions — the internal one of a common specific heredity and common social organization and tradition from infancy, and the external one of a natural and man-made environment im¬ posing common vocational, religious, political, military or other purposes. This like-minded¬ ness has been attributed in recent literature to an ˆinstinct of the herd.® It establishes and defines the background and limitations against which and within which the competitive indi¬ vidualities of the members of the group oper¬ ate. Its force varies inversely with its extent and it is most overruling in the family and the tribe. It is a distinguishing mark of primitive societies in which the individual's struggle for survival and expression is limited to any one type of association under the conditions of con¬ flict which are normal to such groups; his vir¬ tue or his wickedness becomes that of the group, and his responsibility the group's re¬ sponsibility: blood-guilt and blood-vengeance are the social inheritances passed on by the generations. The state of war between one group and another compels and reinforces the state of harmony and solidarity within each group. When the pressure of such a state re¬ laxes, the individualities within each group ex¬ pand. In times of peace, no matter what the society, individualism is maximal.

The maximum, nevertheless, is not an ab¬ solute one. Individuality is required to con¬ form to the ˆˆherd-dogma® which is the overt expression of like-mindedness, and keeps the irreducible rivalries of individuals within the group in a state of perpetual compromise and repression — sex, prestige and power conflicts never get quite fought out to a decision. An indefinite number of impulses, instincts and ap¬ petites may be added to these three, to fill out the psychological picture of a normal peace¬ time society. Such a society was the United States in 1914. The groupings in which indi¬ viduals formed themselves were primarily eth¬ nic and economic, and these to a large extent reinforced each other. The prestige and posi¬ tion of the British strain was opposed and threatened by the growing importance and self-assertion of other strains, and reinforced again bv the law of imitation whereby ®lower® social types get assimilated to the

standard of the ˆhigher® ones. The war in Europe served to release the emotional and ideational systems in¬ volved in the situation. Groups that could not fight each other as Americans, might as pro-English and pro-German. The war of words that was carried on between 1914 and 1917 inWAR, EUROPEAN— PSYCHOLOGY OF THE WAR (26)

tensified the oppugnances of each group and accelerated the emotional fission within the land. As feeling grew, two processes became apparent. On the one hand, each opposing group belittled the other; on the other, it con¬ verted the enemy into an all-powerful mon¬ ster of evil. The chief subjects of the proc¬ esses were the Germans and the English : the other peoples in the war being mere back¬ ground, of significance only in their relation to the protagonists, who again symbolized the chief division in America. There was no evil too improbable or impossible for either to be¬ lieve of the other. Since the country's official neutrality functioned as an inhibition upon the release of the emotional tensions involved in this condition, the government, particularly the President, became the object of ill-feeling. This feeling was, among the pro-English, however, not prirnarily a response to the nation's neu¬ trality; it was a resentment against the liberal domestic policies which the President had spon¬ sored and a wish to continue and to increase the gains which the war had brought. Not be¬ ing expressible directly, it found its release in¬ directly through a denunciation of neutrality.

American entry into the war shut off this channel of expression. In recompense, how¬ ever, it released and gratified all the other lusts, impulses, appetites and resentments which in normal times are held in leash within the group. It released them by appearing to give them an objective beyond the group, in its enemy: to¬ ward the Germans no attitude and no expres¬ sion could be too immoral or too inhuman. It gratified them by enabling the business classes and associations involved to identify the inter¬ ests of their own opponents within the group with the interests of the whole group's enemy outside. Thus, notably, although the President's popularity became enormous and the solidarity of the country unprecedented, the opposition of the business classes grew intenser and took the form of a criticism of the conduct of the war, particularly with reference to the admin¬ istration's

attitude toward labor. Violence be¬ gan to appear in many forms, from pacifist and radical baiting to race riots, and a patriotic terrorism, engineered and led by members of the business class, became manifest part of the war psychosis. Examples are the Mooney case, the Bisbee outrage, theˆ I.W.W. prosecutions, the Liberty Loan intimidations in Wisconsin and elsewhere, the assault on the Non-Partisan League in Minnesota. Incitements to violence became recurrent in the newspapers and were later chronic. Any appearance of free spirit or independent judgment in industry or politics was declared ˆˆpro-Germaffiˆ and proscribed. Particularly did the Russian revolution and sympathy with it come in for hysterical denun¬ ciation. The underlying cause of this phe¬ nomenon was the functioning of the War Labor Policies Board upon the basis of collective bar¬ gaining and of a wage-scale determined by the standard of living. The repression of pacifists, liberals and other minorities, the persecution of the merely foreign, the suspension of the civil liberties of the common man, of which much is usually made in war psychology were only in¬ cidental to this more basic transference of the combative and aggressive emotions.

This was possible because the ˆffierd-instincBˆ usually acting as a check upon the various con-vol.28— 42

flicting personal and group wishes, impulses and feelings had under the conditions of war released them, and had integrated them into its own processes. Inasmuch as the execution of the national purpose fell naturally into the hands of the business class, the ®herd-dogmaˆˆ was identified with the interests and prefer¬ ences of this class. ˆˆAmericanismˆˆ thus ac¬ quired a meaning not at all intended by the President nor implicated in the institutions and principles of American polity. The meaning was reinforced by two novel phenomena in the conduct of war: one was the necessary integra¬ tion of the industrial basis of modern war, the other was propaganda usually called ˆpublic in¬ formation.® From April 1917 to November 1919 and longer, the feeling evoked by these conditions and agencies exhibits a steady ac¬ celeration in mass and intensity. The armis¬ tice came long before the height of this move¬ ment had been reached, long before the ˆdierd-feeling® had been used up by enchannelment in the standardized types of behavior apparent in the warring countries of Europe, long before war-weariness could set in. The armistice abolished the foe whose existence had been the initiating occasion of war-behavior and the war-psychosis. The country became like a charged wire with a loose end; a menace to almost anything that might draw its feeling.

The premature removal of the external occa¬ sion and the lack of a new one meant a re¬ version of this feeling inward, bringing ®un-rest® and ˆdaw and order® into play. Bolshe¬ vism replaced Germany as an object of hatred, and was used as a synonym for any attitude other than one favoring the perpetuation of the dominance of the business class. ˆˆAmerican¬ ism® became synonymous with the suppression of labor activities, liberalism in politics, liberal¬ ism of any kind. All these were extruded from the body politic by the epithet ˆToreign® or by being attributed to ® foreign® agitators.

The same relation of emotion and condition obtained among the drafted men returning to civilian life. By propaganda and training their minds had been set to military activity covering a larger period than was actually required of them. While at the same time, the discipline of military life had repressed all the appetitions which the purpose of that life aroused. They came back, thus, ripe for violence. Organized in the American Legion, and led by persons of the business class, they also seek objects by which the emotional tension might be released. They function violently against anything ˆToreign® or ˆˆBolshevist.®

Because of the discrepancy between the in¬ tensity of the war feeling and the length of the war the whole country is, in fact, in a con¬ dition of intellectual confusion and emotional instability. The war having from the point of view of the emotional change in society stopped too soon, the emotions accompanying it disin¬ tegrate on all sides the unity they had estab¬ lished. The pre-war rivalries are more explicit and more intense; the conflict between the eco¬ nomic groups is now avowed and final. This state will endure at least until the surplusage of emotion is consumed. It may endure rntich longer if the appropriation of ˆˆAmericanism® by one class is not repudiated and common purposes of construction posited effectively enough to create a new national morale.

Broadly speaking, the same things are true for all other countries. See Psychiatry and War.

Bibliography. — Ellis, Havelock, ˆThe Psy¬ chology of Conflictˆ ; Freud, Sigmund, ˆZeit-gemasses ueber Krieg und Todtˆ ; Jones, Ernest, WVar and Individual Psychologyˆ ; Trotter, instincts of the Herd in Peace and Warˆ ; James, William, Moral Equivalent for

Warˆ ; MacCurdy, J. T., ˆThe Psychology of Warˆ ; Kallen, H. M., ˆThe Psychology of War.ˆ

Horace Meyer Kallen, New School for Social Research, New York.

(2) European. — ˆThe catastrophe of 1914 and the psychic reactions to it present the student a distinctive problem. The readjust¬ ments demanded by the World War appear psychologically as contributions to the genesis of conviction. When we attempt to view the World War as occasioned by psychic condi¬ tions, this implies a look below and beyond outward manifestations, to ’the underlying phe¬ nomena, and then to see these reflected in the convictions of men under the coercion of a vio¬ lent reconstruction of their already adjusted outlooks, outlooks upon the world formed dur¬ ing a period of peace.

It is only by confining oneself to generalities that one can discuss group mentality and senti¬ mental states. For though all groups doubtless possess a certain number of common character¬ istics, many partial differences divide them, and even various provinces possess strongly marked similarities, which distinctions, however, do not in the least preclude the existence of many com¬ mon characteristics.

In former wars as in the late struggle it was not each nation’s desire for national expression which made the continuance of peace impossible. It is the fact that thus far in the world’s his¬ tory such desire has been bound up with naval-ism and militarism. Any national group whose frontier bristles with engines of war is not un¬ like the individual with a magazine pistol ready for instant action. Both make for murder ; and in their hearts, both really mean murder. This war was occasioned by too many nations with a desire for self-expression under military and naval conditions and only one planet upon which they might expand. Psychologically, war is mere instinctive action. The Great War cannot have been dependent upon the will of any one man. It was brought about by deep-seated, re¬ mote and varied causes, which had been accumu¬ lating until now when their effects emerge suddenly, as it were, into our ken. We have been surprised, and our mental peace has been taken from us by the revelations of, say, a preparedness, so far surpassing ours, that we do not see ourselves so much of a world power as we had imagined ourselves. The Great War revealed the souls of men. The leading European

representatives of Western civilization — Germans, Englishmen and French — are op¬ pressed by a paralyzing astonishment in regard to each other's real nature. They did not know each other — and yet considered themselves as members of a single ancestral stem.

Ever since the olden days, the world has been seething with suppressed but none the less destructive activities that have at last laid it low with the worst case of universal nervous prostration ever known. This state is called

war. The world could not avoid war as long as it remained on the level of warfare. Ours was not a Christian world. And while the national pulpit preached Christianity, nations eyed each other, ready for blood. The powers that move one mass of humanity ' against its brethren are deep and subtle ; so deep and subtle that we are constantly substituting surface and relatively unimportant causes for the real ones.

One of the plainest lessons taught by history, and one of those substantially verified by the late conflict, is that nations are not ruled by realities, but by more or less illusory ideas which they have, intellectually, misformed of realities. The truth about an historical event is seldom, very seldom, known at the time of its occurrence.

Wars are not the expression of reason but of instinct. And there is in consequence no such thing as ®culture^^ or ^civilization® on the level of reasonless instinct. The instinct of parti.sanship which on one side is devotion and loyalty, on the other side hate and bigotry; the instinct of dominance which makes the strong love to assert their power over rivals, and the instinct of pugnacity urge men to fight and nations to war. Most great wars are fratricidal. The worst wars and the worst misunderstandings, prejudices and hatreds bred by war are be¬ tween strong nations closely akin. War has the zest of action at terrific intensity. It is the very intoxication of instinctive life and is as tempting as strong drink.

As a result of the war the attitude of the human mind toward many things has changed radically. The relations of life and death — life's value and death's meaning — are con¬ sidered to-day much as primitive men con¬ sidered them. The world as a whole felt a sense of disappointment as the war progressed. Our disappointment was not, however, justified, for the reason that it was based on the destruc¬ tion of an illusion. Before the war began, illusions as to the nations

soon to be at war, commended themselves to the world at large because an illusion saves us pain and allows us to enjoy pleasure which a true appreciation of our position would tend to destroy. The sense of disappointment brought about by the war came into existence with the shock which fol¬ lowed when our illusions collided with reality — the reality, namely, that civilized nations are still capable of reverting to what we have been wont to regard as savagery.

Many phases of the mystical spirit glided into our ken as the war progressed. We be¬ held the odd behavior of sovereigns appealing to their gods and rendering them thanks for victories put down to their credit. A tsar held up an ikon to be gazed at by his kneeling squadrons, as they worshipped. A kaiser made speeches and issued proclamations about the motives and purposes of the god of the Fatherland and of his royal house. And even George V we find to have retained some of his sacred war functions. He vowed not to touch a drop of liquor during the war; and this vow is an act of religion.

A few considerations will help to state the relations which such behavior bears to piety. Piety is unconcerned about human relations themselves But, as the sense of union wKK deity is immeasurably strengthened by the sense

of community in worship, the pious are in fact concerned about the body of the faithful as well. Consider Christianity. It arose lonely in a lonely land. It developed the dogma of the ˆbrotherhood® of man, quite as mystical a dogrna as ˆˆnationality® or any other principle of kinship or union. But after two or three centuries, when Christianity was adopted as a religion, the Christian's gregarious in¬ stinct was satisfied in another way. His sense of participation with mankind became super¬ fluous. It began to atrophy. One with his ˆˆstate-church P the Christian rose up against the ˆheretic® and the ˆinfidel® — his pristine breth¬ ren ! Warfare with the enemies of the Chris¬ tian Church but intensified his sense of the participation with the Father of Mankind.

With the Crusades came the movements his¬ torians call ^^nationalistic® — a series of move¬ ments which subordinates church to state, the faithful to the patriotic ; a movement, in short, which made of God at most a National hero. A nation's god grows with a nation. ^National® groups came into existence with common triumphs and common sufferings — in a word, by sharing a common experience. A nation's god is thus the synthetic personality of a whole peo¬ ple, taken from its beginning to its end. This god is thus the attribute of a specific nationality ; and thus a people is the body of a god. With such information one can easily enough under¬ stand the anachronism in the behavior of the aforementioned sovereigns.

®This war is queer,® wrote Wells the Eng¬ lish sociologist on his return from the front. All have remarked the silence of many returned men who experienced some of the most awful things witnessed in the war. In France one beheld an impressionable, volatile and undis¬ ciplined nation suddenly transformed into a resolute and tenacious body of men, exposed for months together to an underground existence in cruel trenches and to the constant menace of an obscure and awful death. From English shores men saw boys go off blithely to experience the storm for themselves ; these came back sobered, which is intelligible; and silent, which is unin¬ telligible. That they and their French and Bel¬ gian brethren spoke modestly of their deeds was not unnatural. But that they should be so strangely reticent in speaking of the grim total fact and of their minor reactions was unnatural. They had been willing to communicate a few items of their adventures; but of their total experience they would not and could not speak.

Wells saw them in the trenches; and found them ®weary, rather sullen, inturned^^ with shoulders drooped. Their very outline was, as it were, a mark of interrogation ; on their faces they wore the expression of puzzled men — thoughtful. How strangely they inhibited thought and speech, these men of the Front! Puzzled, thoughtful, speculative inturned: a mind as yet unable to grapple with the domi¬ nance of an ineffable fact. Such men feel them¬ selves conscious of some new spiritual fact.

When one meets one of these returned men, mud, shrapnel, rats, gas and the like will no doubt figure prominently in the story he tells. Beyond that — he can only intimate by silence that life at the Front has qualities which may not be told. Such an one is a transformed personality: he has lost his original self. Wil¬

liam James notes ˆdneffability® as the handiest of marks to classify a state of mind, which as mystical, is negative. The subject of it im¬ mediately says that it defies expression ; no ade¬ quate report of its contents can be communi¬ cated in words. It follows from all this that its quality must be directly experienced to be understood. It cannot be imparted ; not trans¬ ferred to others. And thus we are to explain the strange thoughtful silence of returned men by supposing that a touch of the Hneffable'^^ seemed to have entered into the fabric of their lives with their experience at the Front, how¬ ever brief, or humble, that experience may have been.

In the trenches the instinct of emulation, so closely allied to imitation, found ample ex¬ pression. In its earliest forms this instinct is closely allied to envy and jealousy. Among the other things that found expression was ardent race hatred ; the instinct to revenge ; the mega¬ lomania that ®it is all right for us to fight but never right for our enemy to fight® ; and with all the instinct of excitement, to adven¬ ture, and to insatiable achievement, were not wanting in so far as their expression was concerned. Vengeance is one of the most per¬ manent of all feelings; but the most remarkable thing about its expression on all sides during the war was the extent to which vengeance passed for justice.

The proximity of hostile armies was a pow¬ erful spur to invention ; attention being of course chiefly turned to the production of the means of offense and defense. Success in war depended upon the mechanical superiority as well as the morale of the armies, — indeed, it counted far more upon mechanism than upon any kind of personal prowess. Hence the many •new ®gases® and ^^aeroplanes® and long-range ˆcannon® ; as well as the manifold ways of concealing one's position in relation to one's enemy.

Collective opinion has a great deal of strength, which is seldom spontaneous, how¬ ever, for the crowd is really an amorphous or¬ ganism that is incapable of acting unless it has a leader, who influences it by affirmation, repetition, prestige and contagion. Now Ger¬ many was a nation with a military rather than a civic spirit. We are told of policies of ®Schrecklichkeit® and of ^^Hymn of Hate,® and wonder whether these are symptoms of madness or the contrary. The facts as to the psychosis of the composer of this ^^Hymn® are not forth¬ coming. But what appears to be the truth is this, rather that the power of song was fully realized by the military powers of Germany, than that Germans hated — actually hated — England. We are in America, all familiar with the political device in which a few venture an assertion and urge it upon the crowd wˆh un¬ observed

compulsion, proclaiming as arready existent an agreement in feeling which they are only seeking to inoculate. We believe this to be the meaning of the existence of the ®Hymn of Hate.®

®Der Tag® was no doubt the symptom of megalomania. It is often said that the Ger¬ mans were ^^firmly convinced® that the conflict was due to a conspiracy secretly plotted by Eng¬ land. How far this is true a census would tell better than a guess. Fear, to be sure, is the in-

stinctive stamp of a coward, and a coward that fears to-day may fight to-morrow because continued fear is the worse of two evils. When fear is once turned loose it is cruel beyond measure. When the great poet Schiller was analyzing the human heart to find the most un¬ governable, the most ®don't care^^ emotion of man, he pointed out terror as that emotion. Terror is fear gone mad. With these thoughts in mind, it is not impossible that the reitera¬ tion of German politicians had ^^convinced® the German mind of ' something. Was that some¬ thing to make them fight the better? From such a mood of fear arose the majority reso¬ lutions of 19 July 1917, on peace, without an¬ nexations or indemnities, and the peace offer, with its fateful consequence, of 5 Oct. 1918.

As the war progressed we saw the morale of the German nation torn asunder by different political parties — no morale could endure so much disunity. The politician has succeeded also in sowing a mistrust of a .League of Nations ^invented by Germany's enemies to vanquish the Germans by votes.^^ When active hostilities ceased, influence from beyond its borders ac¬ quired terrifying powers; and as one of its manifestations the world has seen a transfor¬ mation of the Germanic form of government.

This brings us to the Englishman, or rather to the Entente. At the outset we see Entente diplomats operating with concepts of an older period. They appeared to favor, within cer¬ tain undefined limits, the military power to seize conferred by the right to keep ; and they operated with ^annexations,® ^^strategic fron¬ tiers,® apolitical

guarantees® ˆeconomic barri¬ ers,® ˆConstantinople,® ˆGerman colonies,® a ˆprovince of Prussia,® and many more ideas. Later they appeared with the more respectable principle of ˆnationality,® and the ˆrights® of - the weaker peoples to rough hew their own destinies without molestation from the outside. But in consequence of the special strategic, imperialistic and sentimental aspirations of in¬ dividual units of the coalition, the principle of ˆnationality® had to be so twisted, limited, and interpreted in the final considerations of the Big Four, before it received adhesion of all, that when it emerged from this process the idea of nationality was of course a curious hybrid.

In 1871 the world beheld England, Italy, Austria and Russia occupied with internal prob¬ lems, as well as the sultan's dominions in proc¬ ess of dissolution. Then followed the birth of new nations — Greece, Albania, Montenegro, Serbia, Bulgaria and Rumania, — from the ruins of the Turkish Empire. From all this one can readily understand why the concept of ˆˆnation¬ ality® needed modification. For with the birth of these nations arose also many hopes, and many fears, as well as jealousies, even among greater continental powers.

No one could have foreseen the marvelous efflorescence of qualities in men who come from the most widely sundered classes of society and ethnic stations. All nations possess an aggre¬ gate of inherited feelings which are deteiTnina-tive of their mental orientation, causing in¬ dividuals of unlike ancestral equilibria to take different views of the same questions, and which occasion those inextinguishable race-hatreds that were among the chief causes of the Euro¬ pean War.

It is a general psychological rule that inter¬ nal dissension and civil dangers cease as foreign danger begins to threaten. England and Ire¬ land are thus seen united in the hour of dan¬ ger. The sight of Belgium's burning cities did not make her hesitate a moment to defend her ®honor.® Here the Belgian resembles the Frenchman. Invariably when an idea becomes too ethereally abstract (as "honor®) the Eng¬ lishman begins to regard it as humor. In his most exalted moments during the war the Frenchman seemed to the Englishman like an idealistic ghost. An Englishman thinks in quan¬ tities ; only an American outdoes him in this respect. We see him demand all ships; let him dictate all news, and allow him to control all credit. Here we behold the English world-idea. During the war the English mind de¬ veloped for the first time, and without insu¬ larity, an extension of national consciousness into one of imperial magnitude. A new experi¬ ence brought the islander to feel a deepened intimacy with the

dominions overseas, a feel¬ ing reflected in his daily press, in the pulpit, and on the platform, in conversation of phi¬ losophers and working men. When the war began there was an insular, national conscious¬ ness, now there is an imperial consciousness in the Briton.

The experience of rationing has begotten for England a respect for the idea of equality over that formerly exercised by inequality in the same country. Many other transformations in the English habit of thought could be men¬ tioned ; space forbids.

It could be shown that Italy entered the war through fear, as did China. Japan's policy is perhaps the most consistent expression of an intelligible purpose of any nation who partici¬ pated in the war ; it may be formulated as the consideration of her own influence in the Far Eastern waters to the exclusion of all others.

Ever since Peter the Great's time Russia had been consciously reaching forth for an outlet upon the warmer waters of the sea. A Russian traces his religion and very largely his civiliza¬ tion to the Christian Empire of Constantinople (Byzantium), and this was destroyed by the Turks in 1453.

No thoughtful person underestimates the great moral powers latent in the Russian people. The Slavic world, whether north or south, is one full of deep melancholy beauty, of devoted loyalty, of religious democracy, of sincere ideal¬ ism. The harshness of its upper classes under the autocratic regime and widespread corrup¬ tion of its upper classes are unimportant com¬ pared with the sterling virtues of the Russian people of Slavic descent.

Even a German soul is full of sunshine. The Russian at its best reveals something som¬ bre, gloomy, oppressive. The aspiration of a Russian aims at democracy, but history reveals that this aim brings high and low to one level, by lowering the better, and thus bringing all to a state of simple humanity. The result is lack of education, complete submission to the church, and a pathetic mixture of ignorance and superstition.

Such is the soul which the Russian exposed to the awful experiences of the Front. No one can wonder that in its various transformations the horrible state of his land as it now exists has

resulted. For is it not a state expressinpr child¬ like ignorance of the un-Paradisiacal inno¬ cence of the empirical than?

P. W. Hausmann, Editorial Staff of The Americana.

27. WAR AND ITS RELATION TO WORLD COMMERCE, The. To dis¬ cuss the relation of the World War to world commerce implies (1) a consideration of politi¬ cal and commercial conditions at the beginning of the war; (2) the political, commercial and industrial conditions developed during the war ; (3) the conditions at its close, and (4) the probable effect of the many changes which it made in the political, industrial, economic and commercial power of the areas which ordinarily produce or participate in commerce.

International commerce of the world at the beginning' of the war consisted of annual ex¬ change between nations of about $20,000,0000,000 worth of merchandise, but as the value of mer¬ chandise was counted twice, once when exported from the country of production and again when imported into the country of consumption, we are accustomed to say that the pre-war com¬ merce was about $40,000,000,000 per annum. About one-third of this, speaking in very round terms, was foodstuffs, another third was manu¬ facturing material and another third was manu¬ factures. Most of the food and manufacturing material entering international trade was pro¬ duced in the Americas and Australasia and was taken by Europe and paid for in her chief product for exportation, manufactures, to which she added the services of her merchant marine and the earnings of her in¬ vested capital in the producing countries. Of the $7,000,000,000 of manufactures entering in¬ ternational trade in 1913 about $6,000,000,000 was supplied by Europe and $1,000,000,000 by the United States, and they took manufacturing materials and foodstuffs in exchange. Much of this manufacturing material and food came from the Americas and Australasia, though Rus¬ sia supplied a part of the food, and tropical Asia and Africa a part of the manufacturing material.

Of the manufactures which were exchanged for the food and raw material a very large pro¬ portion was produced in those European coun¬ tries which actively participated in the war, and they were large purchasers of manufacturing material and food. Much of their power of production in manufactures for export was sus¬ pended, while in the case of the other great manufacturers, the United States, production and exportation were stimulated. The European

manufacturers thus lost to a considerable de¬ gree their hold upon the world's markets and the United States gained largely in those areas formerly supplied by Europe, our own exporta¬ tion of manufactures in the year following the close of the war having been over $3,000,000,000, against $1,000,000,000 in the year preceding the war.

Great Britain, France, Belgium, Italy, Ger¬ many and Austria-Hungary supplied about $6,000,000,000 worth of manufactures for in¬ ternational trade prior to the war, and while they bought a part of their food from Russia, the bulk of their purchases of this character came from the parts of the world in which there was during the war no suspension of pro¬

ducing power but rather an increase in produc¬ tion, and, therefore, of purchasing power. With the inflation of world currency and increased prices which followed, the nominal value of commerce increased. The belligerent countries of Europe necessarily increased their imports, buying largely on credit and with money bor¬ rowed from their own people, and the valuation of world commerce, measured in the high prices which followed world inflation, was in the clos¬ ing years of the war over $60,000,000,000, as against $40,000,000,000 in 1913, despite the fact that Germany, Austria-Hungary, Turkey, Bul¬ garia, Belgium and Russia were cut off from participation in international trade.

The effect of the war upon world commerce in the years to follow will depend chiefly upon the recuperative power in production, and, therefore in consumption, of the areas in which the war was waged. The other parts of the world find themselves with increased producing power, higher prices for their products and, therefore, higher purchasing power, and while they must pay to labor a higher wage for its services and to shipping a higher charge for transportation, their exchanges with each other will be larger, at least when measured in the inflated currency, and their power to supply food and raw material to manufacturing Europe will exceed that of the pre-war period. The proper relation of wages to the high prices which have followed the quadrupling of world currency will be slowly adjusted, the purchasing power of the masses measured in larger figures, and world interchanges, except as to the war-torn sections, will move on at a new level of stated values, for it cannot be expected that prices will materially decrease unless the in¬ flated currency is deflated, and that will not be easy in view of the fact that the countries hav¬ ing this

inflated currency must now demand from their people three times as much in taxes as before the war.

The chief subject to be considered in an attempt to look into the future of world com¬ merce, as affected by the war, is the con¬ dition present and prospective of the area in which the war was waged. Practically all of Europe, except that part immediately fronting upon the Atlantic, has been radically changed in political organization, the grouping of peoples and the facilities of production, transportation, finance and, therefore, of commerce. Four great countries with an area of 10,000,000 square miles and a population of 325,000,000 have been trans¬ formed into 40 new and comparatively small political divisions, and if we include their ^^overseas^^ areas the number of new political units is 50, with an aggregate area of 11,000,- 000 square miles and '350,000,000 popula¬ tion. In Russian territory alone no less than 20 groups of people have declared themselves as new political organizations, republics in most cases, despite their inexperience in the conduct of that form of government. From Austro-Hungarian territory a half dozen new political divisions have sprung into existence. Ger¬ many, after losing 15 per cent of her European area, 10 per cent of her population, all of her colonies and an important part of her industrial resources, re-enters the industrial and economic world with a new form of government, a much depreciated currency and greatly diminished

transportation facilities, especially on the ocean. From the territory in Asia formerly adminis¬ tered by the Turkish government, a dozen politi¬ cal divisions are being created, maii}^ of them to be governed at long distance as ^mandates® or colonies, protectorates and dependencies, while in others the administration will be left to the chieftains of the scattered and nomadic popu¬ lations. The German colonial possessions in Africa, Asia and Oceania are also to pass under new political control and commercial influences.

Thus all of interior Europe with its great manufacturing and agricultural resources has been thrown into the melting pot, and the new political units made therefrom have been

grouped chiefly upon ethnic relationship and

with forms of government new to the people and to be conducted by comparatively inex¬ perienced minds, leaving to the future the re¬ adjustment of their industrial, commercial,

financial and transportation facilities. This

great area of interior Europe with its 325,000,- 000 people was, prior to the .war, an extremely important factor in world industries and com¬ merce. Its annual production of wheat aver¬ aged 1,250,000,000 bushels or nearly one-third of the entire world crop ; it produced practically all of the beet sugar of the world and thus fur¬ nished about one-half of the world's sugar sup¬ ply; its coal and iron production exceeded the requirements of the local population, and its factories distributed their chemicals, textiles and iron and steel manufactures to the entire world and took in exchange food and manufacturing material of other countries. The pre-war ex¬ ports of the four countries which have now been subdivided into 40 new political divisions totaled in 1913 nearly $4,000,000,000 and their combined imports exceeded $4,000,000,000, mak¬ ing a grand aggregate of $8,000,000,000 or one-fifth of the entire international commerce of the world; while their railways were 115,000 miles in length or one-sixth those of the entire world.

It is quite apparent that the effect of the war upon prospective world industries and com¬ merce depends to a large extent upon the indus¬ trial, financial and commercial future of the 40 political units into which these four great areas — Russia, Germany, Austria-Hungary and Tur¬ key — have been subdivided.

While it may be assumed that the 325,000,000 industrious people of this area who have created in the past an international trade of $8,000,000,- 000 are still of the same industrious disposition, it is important to consider the new grouping which has been made, in the matter of ethnic stocks, form of government, experience or oth¬ erwise as lawmakers, transportation facilities, finances, industrial power and, therefore, com¬ mercial prospects. One of the most distin¬ guished American authorities on world political and ethnic history. Prof. Edwin A. Grosvenor, formerly professor of modern government and international law in Amherst College, and for 20 years professor of history in the Robert College, at Constantinople, discussing the new groupings of people in the area in question, says : ^^For the first time in human experience, an effort is being made by the victors after a great war to trace the new frontiers in accordance with the racial

aspirations and affinities of the peoples in¬ volved. Because of the impossibility of defining exactly the limits of a race, many heart burnings

are inevitable in the new adjustment of Euro¬ pean boundaries… . The Old Order has

passed away. A new Europe is in the making. Neither a year nor a generation will suffice to make it… . Europe, though so old, is for

the greater part young and inexperienced in self-government and political duty and oppor¬ tunity. The gait of more than one newly en¬ franchised people will resemble the uncertain walk of a just-awakened child.^^

Before entering upon a consideration of the 40 new political divisions created from the four great interior countries, it is not improper to give a moment to the effect of the war upon the population, area and industrial and commer¬ cial power of the Allied group.

Great Britain. — Great Britain made no at¬ tempt to gain European territory as a result of her participation in the war, but in the distribu¬ tion of the overseas possessions of th6 defeated countries, she has added materially to the area of her ˆAolonies, protectorates and dependencies.® Immediately following the announcement that Turkey had aligned herself with the Central Powers, Great Britain on 8 Dec. 1914 declared a British protectorate over Egypt, in the gov¬ ernment of which she had for a long time largely participated, and this new British gov¬ ernment over Egypt was promptly recognized by the French, Russian and Belgian governments, and in at least a limited form by the United States. At the same moment attention was given by Great Britain and France to the Cierman territories in Africa, which aggregated about 930,000 square miles with a population of approximately 11,000,000. Togo, lying on the west coast between the British colony of Gold Coast and the French colony of Dahomey, was jointly taken by the British and French troops in August 1914 and the administration divided between the governments of the British and French colonies adjacent and is now governed by a commission appointed by the Allied com¬ manders. German Southwest Africa was promptly invaded by troops from the adjoining colony of British South Africa and was con¬ quered in July 1915 and placed under the con¬ trol of the government of the South African Union, a British colony. Kamerun, also on the west coast, between British Nigeria and French

Kongo, was conquered by British and French troops in cooperation, and in February 1916 a part of its area was placed under the govern¬ ment of British Nigeria and the remainder under that of French Equatorial Africa. Ger¬ man East Africa, the most important of the German possessions in that continent, was in¬ vaded by Great Britain in the early part of the war and its conquest completed in 1918, and the Peace Conference at Paris decided that the ˆmandate® for its government should be held by Great Britain. The control of British East Africa and Egypt by Great Britain gives to that country a continuous stretch of British terri¬ tory from the Mediterranean at the North to Cape Town at the South. In the Pacific, the German possessions of Kaiser Wilhelm Land, the Bismarck Archipelago, the German Solomon Islands and Nauru were occupied by Australian troops and the German Samoan Islands by British forces, and all remain under British m.ilitary occupation. In Asia Minor, Great Britain, by her occupation of Bagdad and the

Valley of the Euphrates in the early part of 1917, obtained control over the Mesopotamia Valley with an estimated area of 143,000 square miles and a population of 2,000,000, and by her occupation of Jerusalem in the latter part of 1917 she obtained control of Palestine with an area of about 16,000 square miles and a popula¬ tion of approximately 500,000.

France. — France gained important addi¬ tions to her territory and producing power by the return to her of the Alsace-Lorraine area and with it a permanent control of the German coal mines of the adjacent territory of the Saar Valley. Alsace-Lorraine has an area of 5,600 square miles and a population, by the 1910 cen¬ sus, of 1,874,000. The chief cities are Strassburg, the capital, with a population of 179,000; Alulhausen, in Alsace, 95,000, and Metz, in Lorraine, 69,000. The chief agricultural prod¬ ucts are wheat, rye, oats and wine; the mineral products in 1913 were 21,000,000 tons of iron ore and 3,800,000 tons of coal. The cotton manufactures were considered the most im¬ portant in Germany and the woolen manufac¬ tures also of considerable importance. Ger¬ many, by the Peace Treaty, cedes to France the full ownership of the coal mines of the Saar Basin, which extends from the frontier of Lorraine as far north as Saint Wendel,

includ¬ ing on the west the Valley of the Saar as far as Saarholzbach and on the east the town of Homberg. This coal area is to be governed by a commission appointed by the League of Na¬ tions and at the end of 15 years a plebiscite is to be taken to determine the wishes of the people as to union with France or Germany or continued control by the League of Nations. France also gains in Africa about 100,000 square miles of area and about 1,500,000 people.

Italy. — The chief changes in Italian terri¬ tory consist of the addition of certain territory, formerly the southwest part of Austria and in¬ cluding the important port of Trieste; also a fringe of islands and mainland coast on the eastern frontage of the Adriatic, formerly a part of Hungary but having a large Italian population. The details as to the area or popu¬ lation gained by Italy are not yet sufficiently determined to render possible an exact state¬ ment, though apparently the territory added approximately 18,000 square miles with a popu¬ lation of 2,000,000. Late in 1919, the former Hungarian port of Fiume, claimed by Jugo¬ slavia, was occupied by a military force com¬ posed of Italians, but the Italian government stated that the action was not by its authority. Later, however, the government announced its intention to occupy the city and adjacent area, pending a settlement of permanent control by plebiscite or otherwise. The importance to Italy of the newly-added territory from Aus¬ tria and Hungary lies largely in the control which it gives her of the Adriatic frontage at the head of that gulf and the fringe of islands and mainland along its eastern shore.

Belgium. — The changes in Belgian territory are extremely small and consist chiefly of the settlement in her favor of the long-pending question of the control of the town of Moresnet, a tiny territory of about one and one-half square miles on the borders of Belgium and Prussia, four miles southwest of Aix-la- Chapelle. The three townlets of Moresnet lie

close to Aix-la-Chapelle, one being Prussian Moresnet, the second Belgian, and the third neutral. The last named, which has a popu¬ lation of some 2,800, owes its origin to the European settlement of 1815. Between 1816 and 1841 it was administered by Prussia and Belgium jointly. But since 1841 neutral Mores¬ net has been independent, being governed by a council of 10 members with a burgomaster at its head. The control of this disputed area now passes absolutely to Belgium.

Greece. — Greece gains a considerable area of Turkish territory in Anatolia, in Asia Minor, just across the .ˆgean from her eastern border, including Smyrna and the adjacent sec¬ tion in which there are many representatives of her own population. No definite announce¬ ment has yet been made as to the boundaries of the area which will be assigned to her or its population. Whether the territory at the head of the .ˆgean will be attached to Greece is not yet determined.

Rumania. — Rumania gains largely in area and population through the absorption of the eastern section of Hungary, which was occu¬ pied by people speaking the Rumanian language, including the important section of Hungary known as Transylvania, also the Russian terri¬ tory of Bessarabia on the Black Sea, also a considerable area of interior Hungary. No definite figures can be given as to her increase in either area or population, though from latest indications the present area of Rumania is about double that prior to the war, and absorbed chiefly from Hungary.

Japan. — Japan took forcible possession in the early part of the war of the Marshall, Ladrone and Caroline Islands and the German colony of Kiao-chau, on the coast of China, and still retains control thereof. The peace treaty gives her a ˆmandate® over the islands in question and also passes to her all rights re¬ garding railways, mines and cables which had been granted by China to Germany. This, while protested by the Chinese government, will if it becomes effective give to Japan extremely valuable exclusive privileges in the important Chinese province of Shantung and probably in other provinces of China.

The losses by the Central Powers may be outlined as follows :

Germany. — Germany's losses on the West, as outlined by the Peace Treaty, consist of the Alsace-Lorraine territory and the Saar coal mines, already described. She must also give full recognition to the Belgian claim of Mores¬ net. To Poland on the East, Germany is re¬ quired to cede the greater part of Upper Silesia, Posen and the province of West Prussia on the left bank of the Vistula, while in regard to East Prussia, which becomes a German island surrounded by Polish territory, a plebiscite is to determine the ultimate frontier. Danzig and the district adjacent thereto is to be constituted the ®Free State of Danzig® under the guar¬ anty of the League of Nations, but to be included within the Polish customs frontier, and Poland is to have the use of the city's docks and waterways. Germany must also con¬ cede to Poland the privilege of railroad com¬ munication across German territory to Danzig, and Poland must in turn grant similar privi¬ leges to Germany across the Polish territory

between East Prussia and Germany. On the Northwest the people of North Schleswig and those of a part of Central Schleswig are to be given the privilege of determining the return of their territory to Denmark or the retention of German control, and the fortifications of Heligoland are to be destroyed. Parts of the Elbe, Danube, Oder and Niemen rivers are to be internationalized, and the Kiel Canal is to be opened to the merchant shipping of all nations at peace with Germany. She is also required to lease to the Republic of Czecho¬ slovakia for a period of 99 years certain areas in the harbors of Hamburg and Stettin as free zones. As a guaranty for the execution of the treaty, the German territory west of the Rhine, together with the bridgeheads, is to be occu¬ pied by the Allied and associated troops for 15 years. Germany's losses of area are in gen¬ eral terms: to France, about 6,000 square miles and 2,000,000 people; to Poland, 30,000 square miles and 6,000,000 people. She loses about 15 per cent of her former' "area and about 10 per cent of her population, to say nothing of the loss of the Saar coal mines or of her colonies and dependencies in Africa, Asia and the Pacific with an area of about 1,000,000 square miles and a population of about 12,()00,- 000. The new form of government is a repub¬ lic with a president to be elected by the whole German people for a term of seven years. _ Its operations in the first year were characterized by the adoption of socialistic laws and regula¬ tions, especially in control of basic industries.

Austria-Hungary. — Austria-Hungary's losses of territory and population are much greater than those of Germany. The area of the Austro-Hungarian monarchy at the beginning of the war was 260,000 square miles and the population 51,000,000. The Austrian territory was stated at 116,000 square miles and the popu¬ lation in 1910 28,325,000; the Hungarian terri¬ tory 126,000 square miles and the population 21,000,000, and in addition to this, Hungary had the administration of Bosnia and Herzegovina wdth an area of about 19,000 square miles and a population of about 2,000,000. In October 1918 a part of the territory formerly known as Austria established itself as a republic under the title of German Austria, the area which it claimed amounting to about 40,000 square miles or approximately 15 per cent of the former Austro-Hungarian Empire, the population about 9,000,000 or about 19 per cent of the former empire. In the same

month, the Austrian prov¬ inces of Bohemia, Moravia and Silesia and cer¬ tain Hungarian area designated as Slovakia organized themselves as the Republic of Czecho¬ slovakia. The Austrian territory passing into this new republic was about 30,000 square miles and the population about 9,000,000; that of Hungary passing into the Czecho-Slovakian Republic was estim.ated at approximately 30,000 square miles and the population about 4,000,000. At the same time, the southern part of Hungary established itself as an independent nation with the title of Jugo-Slavia or Yugo-Slavia and including Bosnia-Herzegovina, Dalmatia, Croa¬ tia, Slavonia, Carniola, Carinthia, Styria, Istria, Gorizia-Gradisca, and certain adjacent islands. Some of these islands and smaller provinces have, however, passed to the control of Italy. A small section at the southeast of Austria was

transferred to Italy and this included the for¬ mer Austrian port of Trieste, leaving Austria without direct access to tidewater over her owm territory. The fragment of former Austria which now retains the title of German Aus¬ tria is about 40,000 square miles -in area as against 107,000 in the former Austria and with a population of about 9,000,000 as against 28,000,000 in Austria in 1913.

Hungary established itself as an independent republic (the Hungarian Peoples Republic) in November 1918 w/ith an area much less than that of the Hungarian Kingdom as it existed as a part of Austria-Hungary. A considerable sec¬ tion at the south was incorporated into the new state of Jugo-Slavia, and a large section at the east including Transylvania passed under the control of Rumania. Subsequently (in the lat¬ ter half of 1919) Rumanian troops occupied a considerable part of the eastern section of the territory which had been designated as the Hun¬ garian Peoples Republic, and still later an at¬ tempt was made to transform this republic into a limited monarchy. No definite statement can at this time be given as to the exact area or population of the Hungarian state. The best estimate available is an area of about 35,000 square miles or 30 per cent of the area formerly the Kingdom of Hungary, and the population about 8,000,000 or a little over one-third that of the kingdom in 1913. Her principal port of Fiume passed under control of the new state of Jugo-Slavia but its control was late in 1919 taken over by a military organization originating in Italy, and finally occupied hy the Italian gov¬ ernment pending a final settlement. Hungary, by these incidents, loses her entire frontage on the Adriatic as does also German Austria, though it is expected that both the new repub¬ lics will be given access to the Adriatic through the internationalization of certain railway lines connecting their trade

centres with certain of the Adriatic ports.

Bulgaria. — Bulgaria, by the terms of the treaty submitted by the Peace Conference late in 1919 and accepted by Bulgaria, loses sundry small areas in adjustment of her boundaries wdth the new state of Jugo-Slavia; also western Thrace which formed her outlet to the yEgean, though she still retains her frontage upon the Black Sea and is promised traffic routes to the .(Egean by some plan not yet announced.

Russia. — The changes in Russian territory as relates to political divisions and government are even more striking than those of Germ.any or Austria-Hungary. While the various groups of Russian political agitators attempted one by one to include all of the former Russian terri¬ tory in their proppsed governments, they were opposed by various groups of people in the dif¬ ferent sections of that great area, who desired to establish themselves respectively as new and independent states composed of distinct ethnic or racial stocks. The abdication of the Em¬ peror Nicholas II in March 1917 was followed by a provisional government which continued until 16 May 1917, when it was reorganized with Alexander Kerensky as the head of the new Cabinet, but this was in turn reorganized in October 1917, maintaining itself until 7 Novem¬ ber 1917, when the Military Revolutionary Com¬ mittee seized the government authority and handed it over to the All-Russian Congress of

the Councils of Workmen's, Soldiers' and Peas¬ ants' Deputies. A Constituent Assembly was created and a form of government established controlled by the Executive Committee of the Congress of the Councils of Workmen's, Sol¬ diers' and Peasants' Deputies. On 31 Jan. 1918, a decree was issued establishing the permanent character of the Workmen's and Peasants' (Bolshevik) government. On 14 March, 1918, the People's Commissioners left Petrograd for Moscow, which thus became the centre of the government. The title of the government thus established is the ^^Russian Federated Repub¬ lics^ ; its flag is red with the legend, ^Federal Republic of the Soviets. ss Its

control over Rus¬ sian territory cannot be definitely stated, how¬ ever, as to the area in which it exercises juris¬ diction and administers government or the number of people under its immediate control or administration. In every part of the area formerly known as Russia groups of people have established themselves by proclamation and organization as independent governments, ill nearly all cases republics.

One of the largest and earliest of the groups establishing themselves as independent govern¬ ments was the republic of Ukrainia, occupying the southwestern section of Russia and fronting upon the Black Sea with Odessa as its principal port. It declared its independence in Novem¬ ber 1917 under the title of the ^^Ukraine Peoples Republic, but its boundaries are still somewhat in dispute, especially with the neighboring re¬ public of Poland, which was formed in part from Russian and in part from German and Austrian territory. The Ukrainian Republic has, so far as can be determined, an area of about 215,000 square miles and a population of approximately 30,000,000. It has a large part of the area known as the ®Black Soil District^^ and its agricultural and mineral possibilites are imiportant. Immediately north of the Ukrainian Republic is a group of people known as the White Russians who established themselves in May 1919 as the Republic of White Russia, with an area estim.ated at 140,000 snuare miles and a population of approximately 5,000,000. Imme¬ diately west of the Republic of White Russia and extending to the Baltic, another new repub¬ lic was established in April 1918 under the title of the Republic of Lithuania, with an area of approximately 90,000 square miles and a popu¬ lation estimated at about 10,000,000. Imme¬ diately north of Lithuania and also fronting upon the Baltic, the little Republic of Courland with an area of 10,000 square miles and a popu¬ lation of 800,000 was declared an independent government in April 1918. Next north of Courland and fronting upon the Gulf of Riga, a part of the Baltic, the Republic of Livonia was declared in April 1918, with an area of about 17,000 square miles and a population of approximately 1,600,000. The Lettish popula¬ tion occupying the peninsula between the Gulf of Riga and the Baltic established themselves as a republic under the title of Letvia (also sometimes written Latvia). The territory imme¬ diately north of Livonia declared itself in April 1918 as the independent Republic^ of Esthonia. It fronts not only upon the Baltic but on the Gulf of Finland, the entrance to the harbor of Petrograd. Its area is stated at about 7,300 square miles and its population at 1,750,000. Still further north, the people of the area long

known as Finland declared themselves in De¬ cember 1917 an independent republic, with a population of about 3,500,000 and an area of 125,000 square miles, extending northward to within a short distance of the Arctic Ocean. The Arctic frontage of Russia lying immediately east of the northern part of Finland was estab¬ lished as a militaˆ district by the Allied Powers on 7 July 1918 with a military government, and has an area of approximately 35,000 square miles and a population estimated at about 100,000. Further east on the Arctic frontage the greater part of the former Russian Province of Archangel was established under the title of the Republic of North Russia with Nicholas Tchaikovsky as its head and its existence as a separate government recognized by certain of the powers, especially Great Britain. Its area is es¬ timated at 275,000 square miles and its population at about 400,000. The popula¬ tions of both North Russia and the Mur-man Region are composed largely of Lapps, Finns and Samoyedes. Immediately south of the White Sea and on the eastern border of Finland, the Republic of Eastern Karelia was established in May 1919 and authorized to create a Constituent Assembly to determine whether the area shall form an alliance with Finland or Russia. The area of this republic is about 68,000 square miles and the population approxi¬ mately 250,000.

■ In the southeastern section of Russia with its considerable sprinkling of Tatar stock inter¬ mingled with Slavic blood, a half dozen small republics sprang into existence; the Tauride Republic, including the Crimean Peninsula, with an area of approximately 23,000 square miles and a population of 1,800,000, declared itself independent of Russia in March 1918; the Kuban Republic just east of the Sea of Azov, with an area of 36,000 square miles and a popu¬ lation of 3,000,000, declared itself independent in November 1919; the Terek Republic at the southeast of Kuban and extending north across to the Caspian Sea, with an area of 28,000 square miles and a population of 1,300,000, de¬ clared itself independent in September 1918; the Republic of Georgia, at the extreme eastern end of the Black Sea, with an area of 40,000 square miles and a population of 2,500,000, was declared an independent state in January 1918; the Don Republic lying at the northeast of the Sea of Azov and fronting upon that sea, with an area of 63,000 square miles and a population of 4,000,000, declared itself independent in Janu¬ ary 1918. East of the Caspian, the Turkestan area, consisting of about 400,000 square miles and with a population of 6,500,000, was in Jan¬ uary 1918 established as an independent govern¬ ment under military control ; north of the Cas¬ pian, the Tatar-Bashkir Republic was estab¬ lished in October 1918, its area being estimated at 175,000 square miles and

its population at 9,000,000; the government is under military control.

Passing across the Urals into Siberia, the independent Republic of Siberia was proclaimed in December 1917, with its capital at Tomsk, and a Siberian Duma of 30 members was opened. Later, however, it was decided for the time being to concentrate all power in the hands of a single individual. Admiral Kolchak. No statement is made as to the actual area claimed by the Republic of Siberia, though presumably

it would include a large part of the area of Siberia stated at 4,832,000 square miles and a population of 10,378,000. At the extreme north¬ east of the Siberian area, a separate government designated as the Yakutsk Republic was estab¬ lished in May 1918 with a military government and an area estimated at about 1,()00,(X)0 square miles and a population of 400,000.

The above 20 new political divisions created from Russian territory and chiefly of Slavic stock are in many cases shadowy in the matter of boundary lines and details of governmental operations. Some of them were established for military reasons and others through a sincere desire on the part of the people to establish in¬ dependent governments which will group closely their respective ethnic or racial stocks. No predictions can be made as to their perma¬ nency or future activities in view of the con¬ stant turmoil and military activities still pre¬ vailing in a large part of the area in question. The fact, however, that the area has been sepa¬ rated into these numerous independent organi¬ zations reduces to a minimum for the near future the possibilities of Russia in industry and commerce, and adds gravity to the remark of Professor Grosvenor, above quoted, that ˆflack of self-reliance or of initiative capacity, an¬ ciently as now, appeared to be a characteristic almost inseparable from the Slav. Dependence upon some helping or guiding hand has often resulted in his own undoing, while he himself has seemed unable to retain what his industry or courage had won.®

Turkey. — While no definite action has yet been taken looking toward a final judgment in the readjustment of Turkish territory, the plans outlined include the creation of a half dozen new organizations, some

to be governed by ^^mandate® through representatives by cer¬ tain of the Allied Powers, while other sections have broken off from the. central government and established themselves under local leader¬ ships.

The first section of Turkish territory to vol¬ untarily separate itself as a separate govern¬ ment was the Kingdom of Hejaz, with an area of about 96,000 square miles, extending along the eastern coast of the Red Sea and including the Mohammedan sacred cities of Mecca and Medina. It declared its independence as the Kingdom of Hejaz in June 1916 and was recog¬ nized by the British government as an inde¬ pendent political entity, and later by the Peace Conference which accepted its representative as a member of that body. Its population is estimated at about 300,000. Lying to the east of Hejaz is the great desert area of Arabia, composed in large degree of shifting sands and a nomadic population, though in the vicinity of the oases the population is more permanent in character. In half a dozen of these local groups of people, the native chieftains have es¬ tablished their own rule. The Emirate of Nejd and Hasa, the more powerful of the two Cen¬ tral Arabian principalities, has its capital at Riyadh; the Emirate of Jebel Shammar, lying immediately north of the Nejd, with its capital at Hail, is ruled by an emir; the Imamate of Yemen, with its political centre at Sana; the Principate of Asir on the west coast, between Hejaz and Yemen, with its capital at Sabivah ; the Sultanate of Koweit on the Persian Culf ; and the Sultanate of Oman in the extreme south¬

east at the entrance of the Persian Gulf, with an area of 82,000 square miles and an estimated population of 5(X),000. Lying north of these areas governed by native rulers is Palestine fronting upon the Mediterranean which, it is assumed, will be considered British territory by reason in part of her capture of Jerusalem and, further east, the Mesopotamia Valley which was successfully invaded by British troops dur¬ ing the war. Immediately north of Palestine is Syria over which France is expected to be given control. The area of Palestine is small, about 16,000 square miles and a population of 500,000; Mesopotamia, 143,000 square miles and a population of 2,000,000; Syria, 37,000 square miles, and a population of 1,000,000. North of Syria lie the important provinces of Armenia with an area of 75,000 square miles and a popu¬ lation of 2,500,000; Anatolia, 145,000 square miles and a population of 5,()00,000, of which Greece is to have a part of the .^gean frontage; and the small European area remaining under the Turkish flag, 10,000 square miles and a popu¬ lation of 1,900,0(X), the future government and governing power in

each of these being yet un¬ determined, though sufficient has developed to justify the statement that the Turkish territory i.s, like that of Russia and Austria-Hungary, to be transformed into comparatively small po¬ litical divisions independent of each other and thus not likely in the immediate future at least rapidly to develop industrial or commercial power. Nothing has yet been determined as to the future government of Constantinople and the small European Turkish territory by which ii is surrounded.

While only a comparatively small proportion of the newly established states have progressed to a point at which it is practicable to state in any detail their physical, industrial, financial or commercial condition and possibilities, it seems proper to state the new facts now available with reference to those for which such material can be presented.

Poland. — While no exact figures are avail¬ able at present as to the area or population of Poland, an estim.ate by Polish authorities puts the total area at 135,000 square miles and a population of 36, (X)0,0()0. To the area formerly known as Polish Russia is now added those territories ethnographically Polish but which were long ago detached and annexed by other states. This would include a large part of Upper Silesia, East Prussia, Galicia, Posen, and perhaps a part of Lithuania. Coal, iron ore, zinc, lead, potassium salt and rock oil are among the minerals; the agricultural products include wheat, rye, oats, barley, potatoes and sugar beets ; and in the industries, those of tex¬ tiles and iron and steel are the most important. Danzig on the Baltic, formerly in German ter¬ ritory, is to be by order of the Peace Confer¬ ence constituted the ^^Free State of Danzig® under the ˆaranty of the League of Nations but to be included within the Polish customs frontier and Poland is to have the use of the city's docks and waterways. Germany must also concede to Poland the privilege of railroad com.munication across German territory to Dan¬ zig, thus assuring Poland of a permanent port.

Ukrainia. — The Ukrainian Peoples Republic, proclaimed on 21 Nov. 1917, lies imme¬ diately north of the Black Sea v/ith Odessa as its principal port. Its area is estimated at

Area, Population, Date of Declaration of Independence, Proposed Form of Government, Countries from which Formed and Ethnic or Racial Stock of Newly Established Political Units Resulting from the War— So Far as Can be Stated.

Poland .

Czecho-Slovakia . Jugo-Slavia .

Ukrainia .

Esthonia ….

Livonia .

Courland ….

Letvia .

Lithuania …. White Russia . North Russia.

Don Republic …. Kuban Republic . . Tauride Republic. Terek Republic…

Y akutsk Republic . . Republic of Siberia… . Republic of Georgia… Republic of T urkestan . . Eastern Karelia ….

Finland .

Murman Region… . German Republic …

Hungarian Republic! . Rumania t .

Turkey in Europe .

Anatolia, Asia-Minor. . Armenia, Asia-Minor. . Mesopotamia, Asia-Minor .

Syria, Asia Minor .

Palestine, Asia-Minor. .

Kingdom of Hejaz .

Nejd & Hasa, Arabia. . Jebel Shammar, Arabia.

Asir, Arabia .

Yemen, Arabia .

Koweit, Arabia .

Oman, Arabia .

Egypt . .

German East Africa… German S. W. Africa. .

Kamerun .

Togo .

Kaiser Wilhelm Land . . German Samoan Islands

Nauru Island .

Ger. S. Pacific Islands . . Ger. N. Pacific Islands. Kiao-Chau .

*Area

*Population

Date

established

Form of government

Countries from which formed

135,000

36,000,000

Nov., 1916

Republic .

Russia, Germany, Aus¬ tria-Hungary .

60,00C

13,000,000

Oct., 1918

Republic .

Austria-Hungary, Ger-

85,000

10,500,000

Oct., 1918

Kingdom .

many .

Hung., Serbia, Bos., Herzegovina, Mon¬ tenegro .

Russia, Austria-Hun¬ gary .

Russia .

215,000

30,000,000

Nov., 1917

Republic .

7,300

1,750,000

April, 1918

Republic .

17,000

1,650,000

April, 1918

Republic .

Russia .

10,000

800,000

April, 1918

Republic .

Russia .

10,000

60,000

1917

Republic .

Russia .

90,000

10,000,000

April, 1918

Republic .

Russia .

140,000

5,000,000

May, 1918

Republic .

Russia .

275,000

400,000

Nov., 1918

Military gov… Soviet Rep ….

Russia .

undet’d

undet’d

Nov., 1917

Russia .

63 , 000

4,000,000

Jan., 1918

Military gov… Republic .

Russia .

36,000

3.000,000

Nov., 1918

Russia .

23,000

1,800,000

Mar., 1918

Republic .

Russia .

28,000

1,300,000

Sept., 1918

Republic .

Russia .

175,000

9,000,000

Oct., 1918

Military .

Russia .

1,000,000

400,000

May, 1918

Military .

Siberian Russia…

undet’d

undet’d

Dec., 1917

Military .

Siberian Russia .

40,000

2,500,000

Jan., 1918

Republic .

Russia, Turkey .

400,000

6,500,000

Jan., 1918

Military .

Russia .

68,000

250,000

May. 1919

Military .

Russia .

125,000

3,500,000

Dec.. 1917

Republic .

Russia .

35,000

100,000

July, 1918

Military .

Russia .

175,000

60,000,000

Nov., 1918

Republic .

Germany .

28,000

10,000,000

Oct., 1918

Republic .

Austria .

32,000

9,000,000

Nov., 1918

Soviet Rep ….

Hungary .

110,000

12,500,000

- , 1919

Kingdom .

Rumania, Hungary, Bessarabia .

10,000

1,900,000

5,000,000

2,500,000

undetermined

Turkev .

145,000 75 , 000

undetermined

Turkey. .

Aug., 1918

undetermined

Turkey .

143,000

2,000,000

1917

British admin. .

Turkey .

37,000

1,000,000

1919

undetermined

Turkey .

16,000

500,000

1917

British admin. .

Turkey .

96,500

300,000

no data

June, 1916

1913

Kingdom .

Turkey .

no data

Emirate .

Turkey .

no data

no data

1918

Emirate .

Turkey .

no data

no data

1918

Principate .

Turkev .

no data

no data

1918

Imamate .

Turkey .

no data

no data

1918

Sultanate .

T urkey .

82,000

500,000

1913

G. Br. & France

Turkey .

350,000

12,000,000

1914

Gt. Britain… .

Turkey .

384,000

8,000,000

1918

Gt. Britain… .

German Colony .

322,000

200,000

1915

Brit. S. Africa. .

German Colony .

191,000

2,500,000

1916

Brit. & French.

German Colony .

33,000

1,000,000

1914

Allied Military.

German Colony .

70,000

1,200

t

250,000

40,000

t

1918

Australia .

German Colony .

1918

Australia .

German Colony .

1918

Mandate, Brit.

German Colony .

15,000

5,000

350,000

600,000

1918

Australia .

German Colony .

1918

Mandate, Japan

German Colony .

200

200,000

1918

Japan .

German Colony .

Ethnic or racial stock

Slavic; Semitic Slavic

Slavic, Serbs, Croats

Slavic

Slavic

Slavic

Slavic

Lettish

Slavic; Germanic Slavic

Slavic; Finns Slavic

Slavic; Cossack Slavic

Slavic; Tatar

Turko-Tatar

Turko-Tatar

Yakuts: Cossack

Slav; Mongol; Tatar

Georgian; Armenian

Turko-Tatar

Balto-Slavic

Finns

Finns

Germanic

Germanic

Magyar

Rumanians, Magyars

Turkisk

Turkish

Armenians

Turks, Arabs, Persian

Syrian, Turkish

Turks, Arabs, Jews

Arabs, Turks

Arabs

Bedouin

Arabs

Arabs

Arabs

Arabs

Egyptians

Bantu

Hottentots

Sudanese

Hamitic

Malay

Samoan

Samoan

Malay

Malay

* Latest available estimate,

tEnlarged by absorption of Hungarian territory,

j A small island in the Marshall group occupied as a wireless station; also known as Pleasant Island. § Limited monarchy proposed 1919.

about 216,000 square miles and with a popula¬ tion of approximately 30,000,000. A consider¬ able part of Ukrainia belongs to the Black Soil Region of Russia and its agricultural products, wheat and other cereals, sugar beets, potatoes and food animals, are thus important, while the fact that the deposits of iron ore were looked upon as the most important in all of Russia and with rich coal deposits in the Donetz Basin gives promise of industrial and commercial ac¬ tivity for the Republic of Ukrainia.

Chechoslovakia. — The Czecho-Slovak Re¬ public was declared on 28 Oct. 1918. It com¬ prises two branches of the same nation, the 7,0(X), {X)0 Czechs of Bohemia, Moravia and Si¬

lesia, and the 3,000,000 Slovaks in Upper Hun¬ gary who speak a dialect of Czech. It includes Bohemia, Moravia, Silesia and Slovakia with an estimated area of 60,000 square miles and a population estimated at about 13,000,000, About 5,000,000 are Bohemians, 3,000,000 Slovaks, 2,000,000 Moravians, and 2,500,000 Germans, Its principal city and capital, Prague, has a population of about 500,000. The agricultural area is looked upon as one of the most impor¬ tant in interior Europe, supplying large quanti¬ ties of sugar beets, potatoes and other impor¬ tant crops. The coal mines are considered exceptionally valuable and the manufacturing industries were highly developed prior to

the war, the number of factories in operation have been upward of 5,000. Czecho-Slovakia has no ocean frontage, though it is expected that an agreement will be made for its per¬ manent use of a harbor on the Adriatic with railroad facilities guaranteed through inter¬ vening territory and similar privileges are pro¬ vided at Hamburg and Stettin.

Jugo-Slavia. — Jugo-Slavia, which includes within its borders the Slavic peoples of Croatia, Slavonia and Dalmatia, and certain parts of the former Adriatic frontage of Hungary com¬ bined with Serbia and Montenegro, will have an area of approximately 85,000 square miles and a population of about 10,000,000, with frontage upon the Adriatic. Its producing pow¬ ers agriculturally are little more than sufficient to meet the requirements of the population and manufacturing has not yet been actively de¬ veloped.

Of the numerous other groups which have been declared independent political units, little can at present be said other than to state the estimated area, population, ethnic stock of the people, date of establishment, form of govern¬ ment, and countries which contributed the area, and these facts are presented in the table on the preceding page, though it is proper to add that in many instances the figures of area and popu¬ lation are necessarily estimated.

O. P. Austin,

Statistician, National City Bank of New York.

28. EFFECT OF THE WAR ON CUR¬ RENCY. The World War made great changes in world currency, and especially in the countries participating in that conflict. The paper currency of 30 principal countries of the world at the beginning of the war aggre¬ gated a little over $7,000,000,000; at the end of the war, November 1918, it was about $40,- 000,000,000; and in December 1919 it totaled $51,000,000,000, these figures being of course in very round terms, and exclusive of the currency issues of the Bolshevik government, which alone are estimated at $34,000,000,000. The gold re¬ serve of the 30 countries in question was in 1914 a little less than $5,000,000,000; in 1918 a little over $7,000,000,000; and in 1919 slightly below the $7,000,000,000 line. The ratio of gold reserve to outstanding notes in the 30 countries in question was in 1914, 70 per cent; by 1918 it had dropped to 18.4 per cent ; and in Decem¬ ber

1919 was 13.7 per cent.

The world paper currency at the date of the Armistice was more than five times as great as at the beginning of the war, and one year later, December 1919, was seven times as much as at the beginning of the war. The actual in¬ crease during the year succeeding the Armistice was over $10,000,000,000 or a 25 per cent in¬ crease over that existing at the end of hos¬ tilities. These figures of the currencies of the countries named are based upon the normal pre-war value of the respective currencies as expressed in United States gold coin.

Most of this increase both during and sub¬ sequent to the war occurred of course in the countries participating in that great conflict. Taking the 23 countries and colonies which were in a greater or lesser degree, participants in the war, their paper currency in July 1914 aggregated in round terms $6,000,000,000; in

November 1918, $37,000,000,000; and in December 1919, $48,000,000,000; these figures being again in extremely round terms. Meantime their stock of gold when taken in the aggregate showed but a small increase, from $4,360,000,000 in 1914 to $6,050,000,000 in 1918, and $5,640,000,000 in 1919. Their ratio, as a group, of gold to circulating notes, was in 1914, 71.3 per cent; in November 1918 15.8 per cent; and in December 1919 11.2 per cent. In certain coun¬ tries, notably those of interior Europe, includ¬ ing the Central Powers and Russia, the ratio of gold to notes fell with a much greater rapidity than that above noted ; that of Austria-Hungary from 54.8 per cent to about 0.5 per cent ; Russia from 98 per cent in 1914 to ap¬ proximately 7 per cent at the date of the advent of the Bolshevik! ; Germany from practically 70 per cent in 1914 to 3.5 per cent in 1919. Among the European Allies, the reduction in ratio of gold to notes was also notable but less dramatic than that of the Central Powers, the drop in ratio of gold to notes being in the case of France from 62 per cent in 1914 to

11.2 per cent at the close of the war, and 9.6 per cent in 1919; Italy from 70 per cent in 1914 to 7.5 per cent in 1919; while in our own case the ratio of gold to notes dropped from 99.6 per cent in 1914 to 63.2 per cent in 1918, and

52.3 per cent in 1919. The Central Powers as a group show a ratio of gold to notes in 1914 49.7 per cent; in 1918 5.5 per cent; and in De¬ cember 1919 but 1.7 per cent. The Allies as a group show a gold ratio

in 1914 of 76.6 per cent, in 1918 20.8 per cent and in 1919 17.1 per cent.

The neutrals of course fared better in the matter of their currency than did those partic¬ ipating in the war, though the total of their paper figures did increase from $1,166,000,000 in the eight countries for which figures are avail¬ able to $2,421,000,000 in 1919, though the in¬ crease of gold was still larger proportionately, from $516,000,000 in 1914 to $1,451,000,000 in 1919, bringing the ratio of gold to notes in this group of eight neutrals from 44.3 per cent in 1914 to 59.9 per cent in 1919. (See accompany¬ ing table for details for each of the 30 coun¬ tries included in the study).

The most astonishing, not to say alarming, feature of this growth of world paper currency and reduction in the ratio of gold reserve thereto, occurs in the development of the year following the war. It was, of course, necessary that the governments while participating in the war should largely increase their quantities of currency, and they did, as is shown from the fact that the paper currency of the 23 countries in question jumped from ˆ109,000,000 in July 1914 to $37,284,000,000 at the end of the war, November 1918; though why it should have been necessary to add another $11,000,000,- 000 in the year following the close of the war and bring the grand total of December 1919 up to $48,362,000,000 is difficult to understand, especially when we realize that none of this in¬ crease of $11,000,000,000 in the 13 months following the Armistice included any of the $34,000,000,000 of paper issued by the Bol¬ shevik! government from its establishment late in 1917 to the end of 1919, and which is described by persons familiar with conditions in Bolshevik Russia as ˆhaving no gold backing and therefore absolutely valueless,®

WAR, EUROPEAN — CONGRESSIONAL MEDAL OF HONOR AWARDS

66ˆ

The table which follows shows the currency usually termed ®State Banks, such as those conditions as to circulating notes and gold re- above cited. The value, in United States dollars,

Paper Currency and Gold Reserve of Principal Countries, Prior to the War, at the

Date of the Armistice and December 1919*

(In millions of United States dollars).

July, 1914

November, 1918

December, 1919

Bellicbrents

Gold

Notes

Ratio of gold to notes: %

Gold

Notes

Ratio of gold to notes: %

Gold

Notes

Ratio of gold to notes: %

Austria-Hungary .

255

464

54.8

54

7,207

255

No data

7

53

86

t69

44

9

10,001

260

909

582

476

300

5

Australia .

29

48

60.1

85

33.2

33.9 7 5

Belgium .

65

180

36.7

Brazil .

125

175

71.5

38

560

6.7

3 6

8.0 2 1

Bulgaria .

27

32

83.3

12

342

Canada .

94

162

58.1

145

287

50.1

123

41 0

Egypt .

8

13

60.1

No data

17

301

5 8

Finland .

7

24

28. 1

8

213

3.9

8

205

4 0

France .

806

1,301

692

62.1

665

5,951

4,127

2,049

221

11.2

709

7,286

7,561

2,132

266

9.6

Germany .

298

43.2

621

15.0

266

3.5

Great Britain .

195

140

134.6

521

25.6

584

22 9

Greece .

47

39

120.0

277

125.5

347

130 3

India .

124

220

56.2

174

330

52.7

183

336

54.3

Italy .

236

337

70.1

160

1,621

401

9.8

157

2,085

532

7.5

Japan .

106

159

66.8

330

82.3

389

73.1

112.1

New Zealand .

30

10

300.0

40

30

130.0

39

36

Portugal .

6

83

7.3

9

264

3.5

10

400

2.6

Rumania .

43

147

28.9

34

457

7.3

34

721

4.8

Russia .

777

795

98.3

628

8,936

24

7.0

336

9,456

t3.5

29.9

Siam .

4

12

33.7

6

27.3

7

27

South Africa (British) . .

38

11

340.1

43

23

188.9

43

24

182. 1

Turkey .

16

9

177.1

No data

70

704

3.1

United States .

1,023

1,056

99.6

2,199

3,643

63.2

2,107

4,001

52.3

Total belligerents .

4,359

6,109

85.4

6,049

36,941

16.2

5,640

48,601

11.5

Principal Neutrals Argentina .

235

428

55.1

379

494

76.6

394

513

76.8

Denmark .

20

42

47.2

51

115

44.4

52

130

39.8

Holland .

66

125

52.1

282

439

64.2

256

420

61.1

Java .

12

47

25.8

43

80

55.3

65

116

55.7

Norway .

14

33

43.8

33

110

29.7

40

115

34.5

Sweden .

28

60

46.2

75

211

35.5

81

194

41.8

Spain .

106

378

28.1

434

627

68.6

471

749

62.9

Switzerland .

35

52

67.2’

74

185

39.7

92

183

50.5

Total of neutrals .

516

1,165

44.3

1,371

2,261

60.7

1,451

2,420

60.0

Grand total of belligerents and principal neutrals .

4,875

7,274

70.8

7,420

39,202

18.4

7,091

51,021

13.7

* The figures of gold and notes are in most cases those of the State Banks of the countries named (Bank of France, Bank of England, Imperial Bank of Germany, Austro-Hungarian Bank, National Bank of Belgium, Swiss National Bank, etc.) and do not include notes of other banks of issue. In the case of the United States the figures as supplied by the Treasury Department are exclusive of gold and silver certificates which are considered as warehouse certificates for an equivalent amount of metal deposited with the Treasury. British figures include Bank of England and the " Currency Notes Account." Russian figures are exclusive of Bolsheviki notes, estimated in 1919 at a face value of about $34,000,000,000 but with practically no gold reserve. All currency figures are in millions of United States dollars, calculated at the normal (pre¬ war) value of the currency of the respective countries, t Includes silver.

i Exclusive of Bolsheviki notes estimated at a face value of $34,000,000,000, but without gold reserve.

serve in the 30 principal countries of the world in 1914, 1918 and 1919. These figures include in most cases only the currency issues and gold reserve of the great State Banks, such as the Bank of France, the Bank of Italy, the Imperial Bank of Germany, the Austro-Hungarian Bank, the National Bank of Belgium and the Swiss National Bank; though the figures with refer¬ ence to Great Britain include not only those of the Bank of England but the ˆCurrency Notes Account® which was separately stated by the government from the early part of the war period downward. The figures presented in this table are, therefore, exclusive in most instances of the comparatively small amounts of paper currency represented by other banks of issue, though this statement applies only to those coun¬ tries having the great banking organization

of the paper currency in each country is based upon the pre-war value of the currencies of the respective countries.

O. P. Austin,

Statistician, National City Bank of New York.

WAR, European — Congressional Medal of Honor Awards. — The Congressional Medal of Honor was the most highly prized as it was the most difficult to obtain of all military decorations. See Medal of Honor, United States Military. There were only 78 awards of this medal and of the 78 men on the honor roll 24 lost their lives, most of them in the action for which they were cited. Below is the honor roll of those who merited the highest symbol of appreciation in the gift of the United States. The names are in order of the

dates of the action for which the awards were made from 6 June 1918 to 9 Nov. 1918.

Charles F. Hoffman, Gunnery Sergeant, 5th Marines, Chateau-Thierry, 6 June 1918.

Thomas A. Pope, Corporal, Co. E., 131st Infantry, Hamel, 4 July.

George Price Hays, First Lieutenant, 10th Field Artil¬ lery, Villers Cotterets, 14-15 July.

Louis Cukela, Sergeant, 5th Marines, Villers Cotterets, 18 July.

*George Dilboy, Private, Co. H, 103rd Infantry, Belleau, 18 July.

*Matej Kocak, Sergeant, 5th Marines, Soissons, 18 July.

Sidney E. Manning, Corporal, Co. C, 167th Infantry, Breuvannes, 28 July.

Jake Allen, Corporal, Co. H, 131st Infantry, Chippilly Ridge, 9 August.

*James I. Mestrovitch, Sergeant, Co. C, 111th Infantry, Fismette, 10 August.

*J. Hunter Wickersham, Second Lieutenant, 353rd Infantry, Limey, 12 September.

L. Wardlaw Miles, Captain, 308th Infantry, Revillon, 14 September.

*Emory J. Pike, Lieutenant-Colonel, Machine Gun Bat¬ talion, Vandieres, 15 September.

Donald Call, Corporal, Tank Corps, Varennes, 26 September.

Sydney G. Gumpertz, First Sergeant, Co. E, 132nd Infantry, Bois de Forges, 26 September.

Philip C. Katz, Sergeant, Co. C., 363rd Infantry, Eclisfontaine, 26 September.

George H. Mallon, Captain, 132nd Infantry, Bois de Forges, 26 September.

Willie Sandlin, Private, Co. A, 132nd Infantry, Bois de Forges, 26 September.

Lloyd M. Seibert, Sergeant, Co. F, 364th Infantry, Epinonville, 26 September.

* Alexander R. Skinker, Captain, 138 th Infantry, Cheppy, 26 September.

Chester H. West, First Sergeant, Co. D, 363rd Infantry, Bois de Cheppy, 26 September.

*Nels Wold, Private, Co. I, 138th Infantry, Cheppy, 26 September.

*WiLLiAM B. Turner, First Lieutenant, 105th Infantry, Ronssoy, 27 September.

Reider Waalker, Sergeant, Co. A, 105th Infantry, Ronssoy, 27 September.

*Oscar F. Miller, Major, 361st Infantry, Gesnes, 28 September.

*Fred E. Smith, Lieutenant-Colonel, 308th Infantry, Binarville, 28

September.

Alan Louis Eggers, Sergeant, M. G. Co., 107th Infantry, Le C4telet, 29 September.

John Cridland Latham, Sergeant, M. G. Co., 107th Infantry, Le C4telet, 29 September.

*Thomas E. O'Shea, Corporal, M. G. Co., 107th Infantry, Le C4telet, 29 September.

Joseph B. Adkinson, Sergeant, Co. C, 119th Infantry, Bellicourt, 29 September.

Frank Gaffney, Private, 108th Infantry, Ronssoy, 29 September.

*Milo Lemert, First Sergeant, Co. H, 119th Infantry, Bellicourt, 29 September.

*Frank Luke, First Lieutenant, Aviation, Murvaux, 29 September.

George S. Robb, First Lieutenant, 369th Infantry, Sechault, 29 September.

Frank J. Bart, Private, Co. C, 9th Infantry, Medeah Farm, 3 October.

John Joseph Kelly, Private, 6th Marines, Blanc Mont Ridge, 3 October.

*JoHN H. Pruitt, Corporal, 6th Marines, Blanc Mont Ridge, 3 October.

Benjamin Kauffman, First Sergeant, Co. K, 308th Infantry, Argonne Forest, 4 October.

*Harold W. Roberts, Corporal, Tank Corps, Montbrehain Woods, 4 October.

Michael B. Ellis, Sergeant, Co. C, 28th Infantry, Exer-mont, 5 October.

Archie A. Peck, Private, Co. A, 307th Infantry, Argonne Forest, 6 October.

John L. Barkley, Private, Co. K, 4th Infantry, Cunel, 7 October.

Edward R. Talley, Sergeant, Co. L, 117th Infantry, Ponchaux, 7 October.

Ralyn Hill, Corporal, Co. H, 129th Infantry, Dannevoux, 7 October.

Johannes S. Anderson, Sergeant, Co. B, 132nd Infantry, Clery-le-Petit, 8 October.

*Henry G. Costin, Private, Co. H, 115th Infantry, Bois de Consenvoye, 8 October.

James C. Dozier, First Lieutenant, 118th Infantry, Montbrehain, 8 October.

Gary Evans Foster, Sergeant, Co. F, 118th Infantry, Montbrehain, 8 October.

* Made the supreme sacrifice.

Earl D. Gregory, Sergeant, Hdqrs. Co., 116th Infantry, Bois de Consenvoye, 8 October.

♦Thomas Lee Hall, Sergeant, Co. G, 118th Infantry, Montbrehain, 8 October.

James E. Karnes, Sergeant, Co. D, 117th Infantry, Estrees, 8 October.

Patrick Regan, Second Lieutenant, ll-5th Infantry, Bois de Consenvoye, 8 October.

Samuel H. Sampler, Sergeant, Co. M, 142nd Infantry, St. Etienne, 8 October.

Clayton K. Slack, Private, Co. E, 124th Infantry, Consenvoye, 8 October.

Harold L. Turner, Corporal, Co. F, 142nd Infantry, St. Etienne, 8 October.

Calvin Ward, Private, Co. D, 117th Infantry, Estrees, 8 October.

Alvin C. York, Corporal, Co. G, 328th Infantry, Chatel-Chehery, 8 October.

Charles W. Whittlesley, Major, 308th Infantry, Argonne Forest, 2-8 October.

George G. McMurtry, Captain, 308th Infantry, Argonne, 2-8 October.

♦Wilbur E. Colyer, Sergeant, Co. A, 1st Engineers, Verdun, 9 October.

Berger Loman, Private, Co. H, 132nd Infantry, Consen¬ voye, 9 October.

Richmond H. Hilton, Sergeant, Co. H, 118th Infantry. Brancourt, 11 October.

♦Robert L. Blackwell, Private, 119th Infantry, Saint Souplet, 11 October.

♦James D. Heriot, Corporal, Co. I, 118th Infantry, Vaux-Andigny, 12 October.

Samuel Woodfill, First Lieutenant, 60th Infantry, Cunel, 12 October.

John C. Villepigue, Corporal, Co. M, 118th Infantry, Grand-Pre, 15 October.

Thomas C. Neibaur, Private, Co. M, 167th Infantry, Landres-et-St.-Georges, 16 October.

♦William Sawelson, Sergeant, 312th Infantry, Grand-Pr6, 26 October.

♦Michael J. Perkins, Private, Co. D, 101st Infantry, Belleau Wood, 27 October.

Jesse N. Funk, Private, 354th Infantry, Bois de Bantheville, 31 October.

Charles D. Barger, Private, Co. L, 354th Infantry, Bois de Southeville, 31 October.

Arthur J. Forrest, Sergeant, Co. D, 354th Infantry, Remonville, 1 November.

Richard A. Furlong, First Lieutenant, 353rd Infantry, Bantheville, 1 November.

♦Marcellus H. Chiles, Captain, 356th Infantry, Le Champy Bas, 3 November.

Edward S. Allworth, Captain, 60th Infantry, Clery-le- Petit, 5 November.

M. Waldo Hatler, Sergeant, Co. B, 356th Infantry, Exer-mont, 8 November.

♦David B. Barkeley, Private, Co. A, 356th Infantry, Pouilly, 9 November.

Harold I. Johnston, Sergeant, Co. A, 156th Infantry, Pouilly, 9 November.

Louis Van Iersal, Sergeant, Co. M, 9th Infantry, Mouzon, 9 November.

WAR, Instrumentalities and Methods of.

The Hague Convention respecting the laws and customs of war on land (Article 23) declares that the means which a belligerent may adopt for the purpose of overcoming his enemy are not unlimited, and among the instrumentalities and methods which it expressly forbids are the use of poison and poisoned weapons ; arms, projectiles and materials calculated to cause unnecessary suffering; the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases; the use of expanding or explosive bullets ; the employ¬ ment of uncivilized races as troops ; the com¬ pelling of the inhabitants of occupied territory to take part in the military operations against their own country, or to furnish the enemy with information regarding the location or strength of their own forces; the killing of prisoners of war ; the assassination of persons belonging to the enemy forces or his civil offi¬ cials; the resort to treachery or perfidy; the bombardment of undefended towns, villages or habitations ; the resort to devastation except in case of military necessity; the destruction of property except when imperatively demanded by the necessities of the war, *etc.* These pro-WAR, INSTRUMENTALITIES A.ND METHODS OF

hibitions are all expressly incorporated in the war manuals of the United States, Great Britain and France. In addition to these in¬ strumentalities and methods forbidden by The Hague Convention there are others still which are prohibited by the established customs and usages of civilized warfare. The Declaration of Saint Petersburg of 1868 affirmed the prin¬ ciple that war is a contest between only the armed forces of states and not a contest be¬ tween their peoples as such, and that conse¬ quently the ˆffinly legitimate object which states should endeavor to accomplish during war is to weaken the military forces of the enemy; that for this purpose it is sufficient to disable the greatest number of men and that the em¬ ployment of arms which

needlessly aggravate the sufferings of disabled men or render their death inevitable is not permissible.® There is a difference of opinion among the authorities as to whether the principle laid down in the Declara¬ tion of Saint Petersburg that war is merely a contest between the armed forces does not go too far and the late war seems to have dem¬ onstrated that belligerents will nofact upon it. But there is little or no difference of opinion among writers outside Germany that there are limits beyond which considerations of humanity must take precedence over the necessities of war. As Spaight, a high English authority, has aptly remarked, ®the civilized world has signed and sealed its approval of two great principles — the first, that the sole end of war is the overcoming of the military forces of the enemy ; second, that as regards the means which may be adopted to secure this end certain restrictive laws apply.®

German militarists and text writers, how¬ ever, have long maintained a different view as to the nature and objects of war and of the instrumentalities and methods that may be em¬ ployed in prosecuting it. The German manual (ˆKriegsbrauch im Landkriegeˆ) asserts that ®a war conducted with energy cannot be di¬ rected merely against the armed forces of the enemy state and the positions they occupy, but it will and must in like manner seek to destroy the total moral and material resources of the latter.® The rights of individuals, it adds, and their property can only be taken into considera¬ tion in so far as the nature and objects of war permit. This means or seems to mean that it is permissible to direct the war not only against the armed forces of the enemy but against his education, art, science, finance, rail¬ roads, industry, everything in fact that goes to make up his Kultur. This view was as¬ serted by von Moltke in a letter to Professor Bluntschli in 1880 where, criticizing Bluntschli's proposed code in general and the Decla¬ ration of Saint Petersburg in particular, he said : cannot agree with the Declaration of

Saint Petersburg that the weakening of the armed forces of the enemy is the only legitimate object which states should endeavor to accom¬ plish during war; no, all auxiliary resources of the hostile government must be destroyed: its finances, railroads, necessaries of life and even its prestige.® This view of the nature and objects of war was that affirmed by Ger¬ many's first and greatest military writer, von Clausewitz, who advocated terrorism and vio¬ lence as a means of overcoming the enemy,

who declared that an invader has the right to live on the country, that

war must support war and that the resource of requisition and con¬ tribution ˆffias no limits except those of ex¬ haustion, impoverishment and devastation.® Views less extreme, although sufficiently so to be condemned by practically all writers out¬ side Germany, have more recently been asserted by Generals von Hartmann, von der Goltz, von Hindenburg, von Bissing, Bernhardi and other German militarists. General von Hindenburg in an interview published in the Vienna Neue Freie Presse in November 1914, said: *One can¬ not make war in a sentimental fashion. The more pitiless the conduct of the war the more humane it is in reality, for it will run its course all the sooner. The war which of all wars is and must be the most humane is that which leads to peace with as little delay as possible.® Speak¬ ing on 29 Aug. 1915, at Munster, of the extreme measures which the Germans had felt obliged to take against the civil population of Belgium, General von Bissing said : ®The innocent must suffer with the guilty. In the repression of infamy, human lives cannot be spared and if isolated houses, flourishing villages and even entire towns are annihilated, that is regretable but it must not excite ill-timed sentimentality. All this must not in our eyes weigh as much as the life of a single one of our brave soldiers. The rigorous accomplishment of duty is the emanation of a high Kultur, and in that, the population of the enemy country can learn a lesson from our army.®

Regarding the limitations imposed upon the conduct of belligerents by the laws of human¬ ity, German military writers have long held to the view that war is by its very nature incon¬ sistent with humanity and cannot be prose¬ cuted humanely if success is to be achieved. The German manual of war, prepared by the General Staff, shows a disposition to belittle the efforts which have had as their purpose the humanizing of war and more than once it re¬ fers to those who have taken the leadership in such movements as misguided sentimentalists and theorists whose humanitarianism has ˆTrequently degenerated into sentimentality and flabby emotion® {S entimentalitdt unci Gefuhls-schwdrmerei) which are in ˆfundamental con¬ tradiction with the nature of war and its ob¬ ject.® Often the only true humanity, it as¬ serts, ®lies in a ruthless application of them® and soldiers would do well to guard against ex¬ aggerated humanitarian notions regarding the object and purpose of war. This note of warning had already been sounded years before by von Moltke in the letter to Bluntschli, referred to above, where the great marshal said ˆffhe great kindness in war is to bring it to a speedy con¬ clusion.® German text writers and militarists frankly admit that there are limits in respect to the methods and instrumentalities which may be employed by a belligerent but the theory of military necessity which they uphold un¬

fortunately reduces the limitations to a nullity in many cases. The Hague Conventions inferentially, and nearly all text writers expressly, recognize that there are circumstances under which a belligerent may disregard the limita¬ tions set by the established rules of inter¬ national law but they are all, at least outside Germany, in substantial agreement that the

plea of necessity is no excuse for overriding the limitations of the law unless its observance would actually imperil the existence of the bel¬ ligerent. In short, it must be a case of self-preservation and the injury or danger must be such as will not admit of the delay which the normal course of action would involve. Mere considerations of convenience or stra¬ tegical interest such as led Germany to send her army through Belgium are not sufficient to justify a belligerent in overriding the law. The German manual, as well as many German text writers, draws a distinction between what they call Kriegsraison and Kriegsmanier. The for¬ mer, which may be translated as ®the reason of war,^^ allows a belligerent to employ any means or methods which are necessary to the attain¬ ment of the object of the war even though they are forbidden by the customs and usages of war (Kriegsmanier). In short, the limita¬ tions set to belligerent conduct by the laws of war may be disregarded whenever their ob¬ servance would hinder or defeat the attainment of the object of the war. Such a distinction is condemned by The Hague Conventions, by the war manuals of the United States, Great Britain and France and by practically all writers outside of Germany.

The German war manual affirms that ®every means may be employed to overcome the enemy, without which the object of the war cannot be attained … all means which modern inventions afford, including the most perfect, the most dangerous and those which destroy most quickly the adversary en masse; and since these latter result most promptly in the attain¬ ment of the object of the war they must be considered, as indispensable, and, all things con¬ sidered, they are the most humane.® Neverthe¬ less, it admits that ^^chivalrous and

Christian spirit, the progress of civilization and espe¬ cially the knowledge of one's own interest have led to voluntary relaxations the necessity of which has received the tacit assent of all states and of all armies.® Von Moltke from whom the General Staff draws so many of its ideas, laid down the inadmissible principle that ®the great benefit in war is that it should be termi¬ nated as soon as possible.® For this purpose it is permissible to ^^employ all means except those which are positively condemned® (dazu miissen alle, nicht geradezu verwerfliche mittel frei-stehen). In short, the test of the legitimacy of an instrument or measure is not so much its humanity but its effectiveness in enabling a belligerent to bring the war to a speedy and successful termination. This view has recently found advocates in Generals Bernhardi, von Hindenburg, von Bissing and other German militarists and it is apparently the view on which the German government proceeded during the late war. Thus the Imperial Chancellor said in the Reichstag in March 1916 : ®Every means that is calculated to shorten the war constitutes the most humane policy to follow. When the most ruthless methods are considered best calculated to lead us to victory and a swift victory, then they must be employed.® Again in a note of 31 Jan. 1917, handed to the Secre¬ tary of State of the United States, the German Ambassador at Washington justifying Ger¬ many's repudiation of the pledges given to the American government regarding the sink¬

ing of merchant vessels (see Submarine War¬ fare) and defending the resumption of unre¬ stricted submarine warfare, said : ®The Ger¬ man government is now compelled to continue the fight for existence, forced upon it, with the full employment of all the weapons which are at its disposal.^^

The employment of new and powerful agencies of destruction or of new methods of attack is, of course, not to be condemned merely because they are new or because they are more effective than those formerly used. The true test of their lawfulness is whether they are humane, whether they can be em¬ ployed without inflicting superfluous injury upon those against whom they are used, whether in the language of the Declaration of Saint Petersburg the effect is to ^ffiselessly aggravate the sufferings of disabled men.® The doctrine of the German militarists that the test is effectiveness, that is, it is permissible to employ any instrument the use of which will contribute to the attainment of the object of the war and especially the shortening of its duration, cannot be accepted. It is in fact re¬ jected by nearly all military codes and is con¬ demned by The Hague

Conventions, and by practically all text writers outside Germany. Turning now to the practice during the late war, we find that nearly every instrument, agency or method of destruction forbidden by The Hague Conventions and the customs of war was employed by one or the other of the belligerents, and that Germany has the un¬ enviable distinction of having made use of them all. Each belligerent accused the other during the early months of the war of making use of both dumdum and explosive bullets and each vigorously denied the charge. Each claims to have captured on the field of battle large quantities especially of dumdum ammunition, and the French admitted that the Germans may have found such ammunition at Longwy, but asserted that it had been stored there be¬ fore the war for target practice and that none of it was ever used against the Germans. The German emperor addressed a protest to the President of the United States against the alleged use by the English and French of bul¬ lets forbidden by The Hague Convention, and the President of France in a telegram to Mr. Wilson denied the charge and stated that the emperor's protest was designed to deceive the people of the United States. The French gov¬ ernment also stigmatized as ®the grossest for¬ geries® what purported to be facsimiles of labels found on French ammunition boxes showing the presence of dumdum bullets. Count von Bernstorff, German Ambassador at Washington, filed a complaint with the De¬ partment of State, charging that bullets for¬ bidden by The Hague Convention were being manufactured in the United States for ship¬ ment to England for use by the British forces. The department made an investigation of the charge and informed Count von Bernstorff that no evidence could be found in support of his charge. Nevertheless, it added, that if evidence could be furnished that any firm or individual in the United States was engaged in the manu¬ facture of such ammunition for shipment to England or France, it would be glad to have the proof. None was ever furnished. While prac-WAR, INSTRUMENTALITIES AND METHODS OF

tically every belligerent accused the other of using forbidden bullets the evidence at hand does not indicate that any general use was made by any belligerent of the particular type of bullet prohibited by The Hague Convention, although there may have been occasional uses of it with or without the authority of the government whose troops were guilty of it.

A substance which, however, was used by all belligerents on an extensive scale and tbe law¬ fulness of which was questioned in many quarters was asphyxiating and even poisonous gases. This new agency of attack appears to have keen first employed by the Germans on 22 April 1915, at the second battle of Ypres. T-he Germans charged that it had already been used by the British troops but there is no evi¬ dence in support of th'c charge. Several methods were employed in generating the gases thus used, the most common of which was to ignite the substance in the first line trenches and permit the wind to blow the fumes toward the enemy. The opinions of chemists regard¬ ing the composition ot the gases first us'ed dif¬ fered but there was a general agreement that one of the ingredients was chlorine. During the sam-e month what was described in the press dispatches as ^'poisonous'^ gases was used by the Germans against the Russians on the Eastern front, the gases being generated, as on the West'ern front, by means of steel cylinders placed in the trenches. The British, French and Russian troops naturally considered that retaliation in kind was legitimate and accord¬ ingly they very early organized ^^gas detachm-ents^^ and before the end of the year 1915 ap¬ parently all belligerents were resorting to this new mode of attack. Whether such mode of warfare is a violation of The Hague Conven¬ tion would seem to depend mainly on the character of the gases employed and the effect which they produced on the men against whom they were launched. According to the reports of British and French military commanders, medical experts and newspaper correspondents who saw the victims of these attacks the effect was to produce agonizing and prolonged suffer¬ ing; that the result was not merely to disable the men who inhaled it but to inflict permanent injury upon thos'e who did not succumb on the field or cause them to die a painful and linger¬ ing death. Alexander Powell, an American newspaper correspondent who saw many of the victims on the Western front, stated that the inhalation of the gases produced painful and agonizing strangulation accompanied by black¬ ened and distorted features. Stanley Wash¬ burn, a London newspaper correspondent who saw hundreds of tffe victims in the hospitals on the Eastern front, stated that the gas caused blood congestion and the formation of clots not only in the lungs but in the blood vessels and arteries and that those who lingered on and finally succumbed suff*ered a torture which the days of the Inquisition could hardly parallel.

The Germans, however, at first denied that such effects were produced by the use of gas and asserted that th*e suffocation of the enemy in this method was no more cruel or inhuman than the bombardment of trenches or the flood¬ ing of the enemy's camps with water as the

Belgians had done at Nieuport. The evidence, however, was so strongly to the contrary that

the Germans later preferred to rest their de¬ fense on the ground of reprisal against the enemy for having first resorted to this method of attack. As stated above, however, no evi¬ dence has been produced in support of their charge that the English were the first to make use of this agency of attack. The Germans might have argued that what The Hague Con¬ vention prohibited was projectiles and not gen¬ erating tanks or cylinders ; and that it pro¬ hibited only poisoned weapons and not the use of noxious or poisonous fumes generated by apparatus in the trenches and which reach the enemy by being blown against him by means of the wind. But to this argument it might be replied that The Hague Convention forbids the use of poison in any form and it also for¬ bids not only the employment of arms and pro¬ jectiles but also of material calculated to cause unnecessary suffering. At the time, the Con¬ ference did not foresee the invention of other agencies than bombs or projectiles for the dif¬ fusion of asphyxiating or deleterious gases and consequently the language employed in the Convention was directed only against the in¬ struments then in use. It is hardly probable that had the Conference foreseen the inven¬ tion of other instruments than bombs or pro¬ jectiles for diffusing such gases it would have fail'ed to formulate its prohibition in such lan¬ guage as to embrace the methods of attack devised by the Germans and subsequently adopted by the other belligerents as a measure ot reprisal and defense.

Not only did the Germans first make use of asphyxiating and poisonous gases in the man¬ ner described above, but at the same time, ac¬ cording to the report of Sir John French, on the battle of Ypres, they employed explosive shells charged with deadly asphyxiating gases. Later shells charged even with poisonous gases were employed on an extensive scale by the Germans. Whatever may be the opinion re¬ garding the legitimacy of the method of attack by means of gas generated from tanks or cylinders and wafted against the enemy by the wind, there can be no difference of opinion in regard to th-e use of explosive shells which emit such gases. The Hague Convention ex¬ pressly forbids the use of such weapons.

Still another instrumentality invented by the Germans and first used by th-em in their opera¬ tions against Verdun ip March 1916, and

against which there was more or less protest, was the ˆdiquid fire projectoLˆ or ˆTame thrower® {riammenwerfer) — a small tank filled with a highly flammable composition liquid under high pressure and strapped to the back of the soldier using it. Connected by a swivel joint with the bottom of the tank was a hose pipe with a valve and a nozzle to which was attached an igniting apparatus. By open¬ ing the valve and igniting the composition a stream of fire with intense heat could be pro¬ jected a distance of 20 or 30 yards. The effect against those upon whom it was directed was deadly, the victims sometimes being burnt to a crisp. The French government denounced it as an ˆabominable method® of attack, in con¬ travention of all the undertakings solemnly given by the German government to the other powers and in ˆcontempt of all the sentiments of humanity.® No government, it added, could

remain defenseless against such refinements of barbarity without endangering the safety of its own troops and accordingly it was announced that the French government would adopt re¬ taliatory measures. The employment of such an instrument is not expressly forbidden by The Hague Convention unless it belongs to the category of ˆmaterial calculated to produce superfluous suffering,® which may be seriously doubted. Owing to its very limited radius of action and the visibility of the flarne it is al¬ ways possible for the enemy to avoid the effect, which is not the case where the instru¬ ments employed are explosive projectiles or shells charged with gases.

A serious charge made by General Botha against Lieutenant-Colonel Franke, Com¬ mander of the German forces in Southwest Africa, was that he had given orders to poison the wells of Swakopmund in January 1915, be¬ fore evacuating the town. This was done by placing bags of arsenical cattle dip in the wells. General Botha protested on the ground that the use of poison was forbidden by The Hague Convention and he threatened that if the prac¬ tice were persisted in he would hold the officers concerned responsible and would be compelled to resort to such measures of reprisal as might

seem advisable. Colonel Franke admitted that cattle dip had been put into the wells by his orders but asserted that they had been care¬ fully marked by warning notices, so that it was not a case of poisoning, since poisoning implies the secret adding of matter injurious to the health of human beings. It was, in short, nothing more than the ˆeffecting a change in the natural condition of the water in order to deprive the enemy of the use of this means of existence.® It is admitted by all the authorities that the cutting off of the water supply upon which the armed forces of the enemy are dependent is entirely legitimate and the diversion of streams which supply a be¬ sieged place is not an unusual m'ethod of com¬ pelling the place to surrender. It is also ad¬ mitted by some authorities that it is legitimate to pollute the water supply of the enemy as by throwing the carcasses of dead animals into it. This was done by General Johnston during the Civil War and by General Cronje during the Boer War. Such a measure would seem to differ little in principle from introducing poisonous substances iw wells provided they are carefully marked as Colonel Franke claims to have been the case with the wells at Swakop¬ mund. It should be remarked, however, that the effect if not the purpose of the German measure was not to deprive the armed forces of the enemy of his water supply but to cut off the supply of the civil population which was left behind after the Germans had evacuated the place. It is very doubtful whether a belligerent has a lawful right to punish in this way the peaceable civil population ot the terri¬ tory evacuated by him. The American ˆRifles of Land Warfareˆ (Art. 177) go to ih-e length of interpreting the prohibition of The Hague Convention in respect to the use ol poison to include ˆ4he deliberate contamination of sources of water by throwing into the same dead animals and all poisonous substances of any kind.®

A somewhat similar case was the action of

the Germans in poisoning certain wells in the Somme region of France, during their retreat in the spring of 1917 and with having filled others with dung and creosote soda. Charges were also made against German aviators for having dropped poison candy in certain towns of France over which they flew and the mayor of Vadelaincourt felt obliged to issue a proclamation warning the inhabitants against eating candy thus dropped.

Falling within th'e category of forbidden instrumentalities is the employment of savage troops. In July 1915 the German Foreign Office issued a white book in which it pro¬ tested against the employment in

Europe, con¬ trary to international law, by England and France of large numbers of colored troops from Africa and Asia: Gurkhas, Sikhs, Pathans. Sepoys, Turcos, Moroccans, Sengalese, *etc.* These p-eople having, it was said, grown up in countries where war was still conducted in its most savage forms, had brought to Europe the custom of their countries and had in fact committed atrocities which set at de¬ fiance not only the recognized usages of war¬ fare, but of civilization and humanity. Among the evidence submitted in proof of the charge were depositions of witnesses, facsimile repro¬ ductions of extracts from diaries of French and Belgian soldiers and photographs of muti¬ lated bodies, amputated ears, and the like. In some cases, it was alleged, war trophies con¬ sisting of th*e severed heads, ears and fingers of German soldiers were found in the pockets of captured Turcos or strung around their necks like beads. The Hague Convention does not for'bid tbe employment of colored troops but it lays down the requirement that militia and volunteer forces to be entitled to treatment as lawful belligerents must conduct tbeir opera¬ tions in accordance with the laws and customs of war. Manifestly this condition is none the less essential in the case of regular troops. There is a general agreement among writers on international law that it is not permissible to employ savages or semi-barbarous peoples as soldiers, but there is no agreement as to what particular races fall within this category. In¬ dians were employed by the English and French in the colonial wars of North America, thus calling out the famous protest of Lord Chat¬ ham ; Bashi-Bazouks and Circassians were used by the Turks during the Russo-Turkish War of 1877-78; Kaffirs were armed for defense by the British and later were regularly employed as soldiers during the Boer War and certain Manchurian bands known as Chunchuses were made us'e of by the Japanese during their war with Russia in 1904-ˆ5. African troops were used in Europe by the French in 1859 and again in 1870-71 and in both cases the govern¬ ments against whose troops they were us*ed protested. Regarding the conduct of African troops in the late war it is probably safe to say that there were individual instances of atrocities but from the best information avail¬ able it does not appear that such cruelties were common. Concerning the conduct of the Indian troops there appears to have been no ground for complaint. Valentine Williams, correspondent of the London Daily Mail, savs in his book ˆWith Our Army in Flandersˆ : ˆˆThey have proved themselves to be a smart

and soldierly body of men, cfean, well-man¬ nered, and like all good troops, most punctual about saluting,®ˆ Again he says-: ˆˆThey are fierce and terrible in their charge but are rn'erciful to their prisoners and there is none of that slaying of prisoners that has eternally be¬ smirched the German escutcheon.®

Turning now from instrumentalities and weapons to methods and practices forbidden either by The Hague Conventions or the cus¬ tomary rules of warfare we find many ex¬ amples during the present war of non-con¬ formity to the law and custom. One of the most common and reprehensible of such prac¬ tices was the conduct of German military com¬ manders in using their civilian captives as screens or shields to protect their own troops against attack by the forces of the enemy or by the civil population. In many towns and villages occupied by the Germans large num¬ bers of the inhabitants, men, women and chil¬ dren, were seized and placed in front of the German firing lines and sometimes were com¬ pelled to march long distances at the head of columns of German troops. The evidence in proof of this charge is so abundant in quantity and so reliable in character as to leave no doubt whatever in the mind of the investigator that this barbarous practice was resorted to on numerous occasions particularly in Belgium and France and to a less extent on th-e Rus¬ sian and Italian fronts and in Serbia. In some cases the Germans approached their ob¬ jects of attack and even attacked th-e forces of the enemy from behind columns of civilians or military prisoners. Such a cruel and barbarous expedient is not only contrary to the customs and usages of civilized warfare but it is ex¬ pressly forbidden by The Hague Convention itself, which declares that the inhabitants of occupied territory may not be compelled to take part in the military operations against the troops of their own country.

Another practice frequently resorted to by German commanders was the taking of hostages from among the inhabitants of occupied ter¬ ritory and in some instances even the putting of them to death. They appear to have been taken for a variety of purposes, the most com¬ mon of which was to insure the good behavior of tke civil population. Generally their seizure was accompanied by a threat to shoot all or a certain number of them in case acts of hos¬ tility were committed and in some cases the threats were actually carrred out. The per¬ sons taken as hostages were usually the leading citizens of the community: the mayor, mem¬ bers of the city council, senators or deputies,

sometimes the schoolmaster and frequently the parish priest. Sometimes they were shut up in buildings as prisoners, sometimes they were led through the streets and compelled to warn their fellow citizens of the consequences which would result from hostile acts and considerable numbers were deported to Germany where they were confined as prisoners or held to forced labor.

The practice of taking hostages is an old one and in early times was resorted to as a means of insuring the execution of treaties, armistices and other agreements. During the Franco-German War of 1870-71 it was resorted to on a large scale by the Germans for the

purpose of securing their troops against at¬ tack by those whom the Germans considered to be francs-tireurs, for insuring the obedience of the inhabitants and to compel the payment of community fines and the raising of contri¬ butions. It was also during this war that hostages for the first time were placed on rail¬ way trains for the purpose of protecting them against derailment either by. the troops of the enemy or the ciyil population. This latter ex¬ pedient was also resorted to for similar pur¬ poses by the British during the Boer War. Mr. Bryce in the House of Commons criticized the action of Lord Roberts and Earl Kitchener as being ˆcontrary to The Hague Convention and the general usages of civilized warfare,® but it was defended by Mr. Broderick. Secretary of State for War, as a legitimate war measure. Writers on international law have generally condemned the practice as being analogous to the placing of iimocent civilians in the front of battle in order to induce the enemy's troops to withhold their fire. The German war man¬ ual, as might be expected, defends the conduct of German commanders in resorting to this practice in 1870-71, because it was effective, although it frankly admits that "every writer outside Germany has stigmatized it as con¬ trary to the law of nations, and that it was a harsh and cruel measure.®

Regarding the legitimacy of the taking of hostages for the general purpose of insuring the good behavior of the civil population there is a difference of opinion among the authorities on international law. The Hague Conventions do not deal with the matter further than to declare that "the lives of private individuals mmst be respected® and that "belligerents are forbidden to compel the nationals of the ad¬ verse party to take part in the operations of war directed against the enemy.® Whatever may be one's opinion regarding the lawfulness of the practice there is no difference of opinion among the authorities as to the treatment to which hostages are entitled. All are agreed that

hostages are both “private persons® and “prisoners,® not combatants. The Hague Con¬ vention, as stated above, declares that the lives of private persons must be respected, and as to prisoners it declares that they shall be “hu¬ manely treated.® They cannot, therefore, be put to death ‘except for crime. Nevertheless, as stated above, the Germans in a number of instances put to death hostages on account of acts of hostility alleged to have been com¬ mitted by the civil population. The most fla¬ grant instance of the kind was the shooting of more than 90 hostages at Les Rivages, a suburb of Dinant, for the act of certain civilians in firing upon a detachment of German troops who were engaged in constructing a pontoon bridge. The German white book, ˆThe Belgian Peoples’ War,ˆ admits that hostages were shot there and elsewhere but undertakes to justify this extreme measure on the ground that the taking of hostages would often be without effect if the belligerent taking them were not allowed to inflict the death penalty for viola¬ tion of the conditions for which they are taken. In early times the right to put hostages to death was asserted, but no modern writer outside Germany can be found to defend this cruel practice, and it does not appear that in fact it

has been resorted to in any war of modern times, until the ancient practice was revived by the Germans during the late war.

Another practice forbidden by the laws of war is the devastation of the enemy’s country except when absolutely required as a measure of military necessity. This long-established rule of civilized warfare, like so many others, was flagrantly violated by the Germans during the late war. The most notable instance of the kind was the frightful devastation of a region on the Somme front in France in March 1917 before the Germans retreated from it. The territory evacuated was, according to German accounts themselves, ˆTonverted into a veritable waste and left an empire of death. Not only were the roads, bridges, culverts and other objects of military value destroyed, but hun¬ dreds of private houses were burned, fences destroyed, shade trees cut down, orchards leveled, vineyards uprooted, dwellings pillaged and

their contents destroyed or carried away, wells polluted and poisoned, banks robbed, churches desecrated and despoiled of their relics, and even the tombs of the dead broken open. ®Never before in the history of the world,® said the American Ambassador who visited the devastated region and made a report to the Department of State, ˆTad there been such a thorough destruction wrought by either a vanquished or a victorious army.® Mr. Pen-field, American Ambassador to Vienna, made a similar report.

The German military authorities attempted to justify the act as a measure of military necessity; the territory in question was to be a military zone and it was, therefore, necessary to destroy trees, houses, vineyards, etc., to prevent the enemy from using them for pur¬ poses of concealment. As stated above, all authorities on war law are agreed that a bel¬ ligerent may destroy objects likely to be of mili¬ tary value to the enemy into whose hands they may fall and he may level houses and trees for the purpose of bombardment to prevent the enemy from concealing himself behind them. He may even destroy mills, granaries and growing crops for the purpose of depriving the enemy of the means of subsistence which they afford. It was on this theory that Sheridan's devastation of the Shenandoah Valley during the Civil War has been defended by some writers on international law. But it is clear that the German devastation of the Somme region went much further than this, including as it did the cutting down of orchards and vineyards which lay not within a probable zone of attack but in a region from which the Ger¬ mans were retreating. In any case, the whole¬ sale pillage of private houses, desecration of the churches, deportation of the inhabitants, etc., could have subserved no immediate mili¬ tary end. Much of it appears to have been done in the spirit of wantonness and revenge and was entirely unjustified. *The measure of permissible devastation,® say the American ˆ Rules of Land Warfare,ˆ ®is found in the strict necessities of war. As an end in itself, as a separate measure of war, devastation is not sanctioned by the law of war. There must be some reasonably close connection between the destruction and the overcoming of the enemy's army.® (Art. 334). The British and

French manuals lay down essentially the sanie rule and this is the view of the great majority of the text writers on international law.

Numerous charges and countercharges have been made by each belligerent against the other of misusing the white flag, and as in other cases the Germans appear to have been the most frequent

offenders. The abuse consisted in hoisting the flag as the token of a desire to surrender and of firing upon the enemy when he advanced to take them as prisoners or to confer with the commander. In some cases the white flag was raised by the enemy for the purpose of enabling him to bring up his reserves. The Germans were many times charged with this offense. The employment of the white flag and the flag of truce for such purposes has long been forbidden by custom and it is expressly condemned by The Hague Convention respecting the laws and customs of war on land. (Arts. 23j and 32-34). Thˆ use of either flag for the purposes mentioned above is not regarded as a legitimate ruse of war but an act of gross perfidy and treachery. A ruse of war to be legitimate must be one which does not involve perfidy or breach of faith, such, for example, as the allowing of bogus dispatches to fall into the hands of the enemy, deceiving the enemy by means of false signals, sham works, dummy artillery and the like.

In several instances charges and counter¬ charges were made by belligerents on one side against the enemy for attacking in his adver¬ sary's uniform. International law does not for¬ bid the use of the enemy's uniform or his military insignia as a ruse of war, but The Hague Convention prohibits their improper use without indicating what is and what is not a proper use. Many writers on international law hold that it is legitimate to wear the enemy's uniform for the purpose of approach, but that before attacking he must put on his own uni¬ form and reveal his true identity. Other au¬ thorities, however, take the position that it is not allowable for any purpose, not even for the purpose of approach, on the theory that the distinction between the use of the enemy's in¬ signia prior to beginning the attack and after beginning it is arbitrary. Most military manu¬ als now condemn the use of the enemy's uni¬ form for purposes of deceit, but allow it in case of necessity, as, for example, where on account of lack of a sufficient supply of cloth¬ ing the soldiers are dependent upon uniforms captured from the enemy. In that case if the uniforms are altered or distinctly marked so as to disclose the true character of-the wearers there is no treachery and the practice is un¬ objectionable.

A somewhat similar question was many times raised during the late war by the action of merchant vessels or warships in flying the enemy's flag or the flag of a neutral power. The action of the master of the illfated Lusi¬ tania and other British merchantmen in hoisting the American flag in order to deceive German submarines evoked a protest from the American government. As is well known, the German cruiser Emden flew the Japanese flag on the high seas for many weeks, and even entered neutral ports and obtained supplies under false colors. The use by a warship of the enemy's

flag for the purpose of deception has .generally been regarded as a legitimate ruse, subject to the condition that before beginning the attack the ship must display its true colors. That is to say, a warship may sail and chase under false colors but it cannot make an attack until its own flag has been raised. The prize regula¬ tions of many countries lay down this rule, but as in the case of the use of the enemy's uni¬ form, the distinction between approaching and attacking is more or less arbitrary, and writers are not lacking who condemn the use of the enerny's flag for any and all purposes. The Institute of International Law in 1913 adopted a rule forbidding the use of false flags, uni¬ forms or insignia of whatever character.

As regards the use of neutral flags by war¬ ships, opinion is still more divided, although the practice has often been resorted to, e.g., by the cornmanders of the Alabama and the Florida during the Civil War. It has also been stated that the American warship Charleston was fly¬ ing the Japanese flag at the time it captured Guam during the Spanish-American War. As to the use of neutral flags by merchant vessels of belligerent nationality for the purpose of deceiving the enemy and escaping attack there appears to have been no instance prior to the present war of such use, doubtless because mer¬ chant vessels have not heretofore been re¬ garded as liable to attack and destruction and hence the necessity of resorting to ruses of this kind rarely existed. In the course of the controversy between the American and British governments on account of the action of the Lusitania in hoisting the American flag to escape destruction by a German submarine, the British Foreign Offlce contended that the use of neutral flags as a ruse of war was a well-established practice and it pointed out that British law allowed British merchantmen to use neutral flags for the purpose of escaping capture. The American government contended that there was a distinction between the oc¬ casional use of a neutral or enemy flag under the stress of immediate pursuit or with a view to deceiving an approaching enemy, on the one hand, and a general authorization of a belliger¬ ent of its merchant vessels to fly the flag of a neutral power within certain positions of the high seas which are presumed to

be frequented by hostile warships. In short, it did not deny the right of a British merchant vessel to use the American flag in particular instances to escape destruction but it did contest the right of the British .government to authorize its merchant vessels generally to fly the American flag since such general use would expose American ves¬ sels and their passengers to danger.

Such are some of the methods and practices of war which are either forbidden by interna¬ tional law or • concerning the legitimacy of which there is doubt or difference of opinion among the authorities. The list is by no means exhaustive.- Many others were resorted to dur¬ ing the late war, especially by German military and naval commanders, but the limits of this article do not permit a consideration of them.

Bibliography. — Hershey, ˆEssentials of In¬ ternational Public Lawˆ (ch. 26) ; Lawrence,

< Principles of International Lawˆ (secs. 195-209) ; Morgan, ˆWar Book of the German Gen¬ eral Staffs (pp. 84-110) ; Phillipson, ˆInterna¬ tional Law and the Great Warˆ (chs. 10-12) ;

Spaight, ˆWar Rights on Landˆ (chs. 4, 7) ; ˆAmerican Rules of Land Warfareˆ (ch. 6).

James W. (Earner,

Professor of Political Science, University of

Illinois.

WAR, Laws of. See Laws of War.

WAR, Prisoners of. See Prisoners of War.

WAR, Prize of. See Admiralty and Maritime Jurisdiction; Contraband; Neu¬ trality; Prize; Prize Courts and Prize Juris¬ diction ; Prize Money.

WAR, Rules of. See International Law.

WAR COLLEGE. See Army War Colˆ lege.

WAR DANCE, a dance formerly common among the American Indians, engaged in by the warriors of a tribe before a warlike expe¬ dition.

The men put on their head-dress and war paint, flourished their weapons and circled about to the noise of crude drums.

WAR DEMOCRATS, those members of the Democratic party who during the Civil War of 1861-65 supported President Lincoln and the Union cause. The chief figure of the group was Stephen A. Douglas, who pledged his support to Lincoln in person on 14 April 1861. Douglas died 3 June 1861 and the War Democrats were bereft of a national leader. In the 37th Congress the Democrats nomi¬ nated no candidate for Speaker and joined the Republicans in voting war supplies of men and treasure. In the elections of 1861 it was evident that there was a lack of harmony in the party, some like Dickinson, in New York, and Tod, in Ohio, heading a coalition move¬ ment, others nominating their own candidates and while approving the war in their plat¬ forms, severely criticized several of Lincoln's policies, especially the suspension of habeas corpus. In 1862 the effect of the Emancipa¬ tion proclamation was to estrange the War Democrats from the Republicans. In 18ˆ An¬ drew Johnson was nominated' for vice-presi¬ dent by the Republicans, and at Chicago the regular Convention nominated McClellan and Pendleton, thus the War Democrats were di¬ vided in two factions. The election of Lin¬ coln saw the party without influence and its numbers reduced to impotence. Consult Rhodes, James F., ˆHistory of the United Statesˆ (New York 1905) ; and Stanwood, E., ˆHistory of the Presidencyˆ (1898).

WAR-EAGLE, any eagle connected with war or the idea or war in symbolism or other¬ wise, as the imperial eagle (Aquila mogolnik) adopted as a standard first by a favorite legion and later by Roman troops generally; whence the symbol spread to the national insignia of many European countries. The war-eagle of the North American Indians, whose feathers ornamented their war-bonnets and other ac¬ coutrements, was the golden eagle {A. chry-scetns). See Eagle.

WAR GAME. Sec Kriegspiel.

WAR GARDENS. Among the problems wFich faced the world at the outbreak of the World War there w'as none more vital than that of food supply. Substitutes wˆere found for many of the articles needed to carry on the war. Inventive chemists discovered alloys or compositions which could be made to serve in

place of metals which were indispensable. In some countries they began to make clothing from materials which had never before been used for that purpose. But for food there could be no substitutes and it became neces¬ sary not only to keep up the usual supplies but if possible to increase the output. On this ac¬ count efforts were made to discover hitherto undeveloped sources of food production. While every aid was given to the established farmer to speed up and add to the nation's food re¬ sources, there was a limit to what he could do, due particularly to his increasing difficulties as the war progressed in getting help. Here then was the opportunity, in fact it amounted practi¬ cally to a necessity, for the development of a new branch of agriculture. T.he result was the ^^city farmer,^^ Starting in 1917 when the entry of the United States into the war made the food situation acute, the war gardeners of the United States had increased by the following year into a grand total of 5,285,000, which was an increase of 1,785,000, or. 51 per cent over the number who went into the home food pro¬ duction work in the first year of the National War Garden Commission's nation-wide cam¬ paign. Before 1918, too, the message of ®Food F.O.B. the Kitchen Door® had spread beyond the bounds of the United States, and other countries were coming here for information as to how much universal interest had been aroused in home gardening and what methods of instruction and assistance were given to the workers. The National War Garden Commis¬ sion was organized early in the spring of 1917 for the purpose of stimulating and encourag¬ ing the cultivation of all that land which was lying idle in the form of backyards and vacant lots by the millions in cities, towns and vil¬ lages all over the country. Those who started the movement realized that here was a great untapped source of food wealth ; and that if all this ^^slacker land,® or even a large percentage of it, could be put to work there would be opened up an unlimited addition to the fight¬ ing resources of America and her Allies. The results were remarkable and have far out¬ stripped the early anticipations of the founders of the scheme. Like the forces of Roderick Dhu which rose unseen from the heather all over the mountain side at his whistle shrill, so the vast army of war gardeners all over the United States from coast to coast rose at the call to them to ^^Sow the Seeds of Victory.® They formed a mighty force and added about $350,000,000 to the food wealth of the nation in 1917. In the following year they had in¬ creased vastly in numbers and the product they raised was valued at more than $500,000,000.

Cooperation was the means which made the war garden compaign a success. Patriotic and unselfish assistance was given to the commis¬ sion in spreading widecast its call to the back yard and vacant lot farmer. Organizations of all kinds, committees and women's clubs ; State, city and county officials ; industrial and manu¬ facturing concerns, big and small ; banks and business houses ; chambers of commerce and other trade bodies ; railroads and mining com¬ panies ; school and college superintendents and instructors ; city park departments, bureaus of municipal research, city improvement associa¬ tions, even tenement-house inspection services in some cases : these and many others co¬

operated loyally in getting the message home to the people, and through their local commit¬ tees organized and started the good work. The war gardens of the United States proved their worth in many ways. They added a vast total to the food wealth of the nation. But they accomplished much more. They resulted in the saving of transportation facilities, and by making the consumer also a producer released thousands of freight cars for more essential war work. At the same time this also freed many workers for other service.

Another important benefit has been the lesson of thrift which the war garden has inculcated in the minds of millions of Ameri¬ can people. This has had its effect and made easier the work of the government in urging •the purchase of Liberty Bonds and thrift stamps. Not only was the lesson there, but the war gardener had been able to save a considerable amount of money which he would have spent at the market. When the call came, therefore, to buy government certificates the home food producer found that he was able to pay a larger monthly instalment than other¬ wise would have been the case, because he was growing $10 to $20 worth of vegetables in his little back yard or vacant lot plot every month. The war garden has come to stay — that is the testimony which has come from many sources; and it is one of the ways in which the work proves its value.

Employers of labor have found the war garden one of the best means of helping to keep their men contented and of stabilizing labor. Through their mutual interest or similar departments they have furnished tracts of land for their workers, in many cases also prepar¬ ing it for them and providing the fertilizer and seed or selling it to the men at cost and on easy instalments. This has worked to the benefit of both employer and employee. The satisfied worker is a better worker. He is not so likely to leave if he happens to hear of what he believes a

better opportunity elsewhere. He realizes that his employer takes an added inter¬ est in his welfare and he appreciates this human touch. While the workers at hundreds of plants have thus been helping themselves and adding to their incomes, they also have been assisting their country, for frequently they are at con¬ gested industrial centres where every saving of freight space is doubly valuable. The wives and children have gone out into the gardens and helped to care for them. In addition the women have been encouraged to conserve as much of the garden product as possible; and this move the manufacturers have stimulated by fairs and contests at which prizes were given for the best display of vegetables and for the finest canned goods. The National War Garden Commission in 1917 and again in 1918 added national recognition to those contests, as well as to many held at county fairs and other war garden exhibits,ˆ by its National Capitol Prize Certificate which went to blue ribbon winners.

Plans for the big new cities which have gone up almost as if by magic around new shipyards and munition plants include as one of their features little gardens for the workers. ˆ“Every Garden a Munition Plant,® one of the slogans which the Commission sounded through¬ out the country, has an added significance when

I

Im^‘ ‘ ■“.■ ‘?•* i*

‘^•ri.^’-r-. ,*5; r-M. *-”’

^ <v

■m

‘ 34>-

». ■ ■ ■ *> •.

> ‘t*.. MA * ‘

./ 5^»“ ‘•

, : ,. •■ ‘i-o j#J’,’Vii . is;;

.’- ■’ • ‘■ ■ ■ ■ 41 j.* V”’ -•.-

le.4r‘ ‘

. ‘.‘ . :.^’4. * \^- ^ .

■¥*^«a’>i.»desr^:^ I’* ■ . . j

■»i. -■-*•

•• , *»’^ ‘

1 War Gardens of the American Rolling Mills Company’s Employees, Middletown, Ohio

2 War Garden of Employees of the Oliver Chilled Plow Co., South Bend, Ind.

1 Demonstration War Garden on Boston Common

2 War Gardens alongside the Pennsylvania Railroad at East Liberty, Ohio

applied to conditions like these. While the guns and the ammunition, the shells and the ships are being turned out in the nearby fac¬ tories and yards, the men are growing ®ammunition^^ in their home plots.

Charles Lathrop Pack, President of the National War Garden Com¬ mission.

WAR GOD. Most ancient religions had their war gods, and in America, before the Spanish conquest, the Mexican war god was specially worshipped, with human sacrificial rites. Ares and Mars were the war gods of Greece and Rome respectively. The Tews evi¬ dently regarded Jehovah as presiding over their battles, and David is represented in 1 Samuel xvii, 45, as telling the Philistine that he comes ^fin the name of the Lord of hosts, the God of the armies of Israel.® The same con¬ ception exists in some degree among Christian nations, and in the Great World War the kaiser and other prominent Prussians were fond of evoking the approval of their deity.

WAR INDEMNITY, the sum of money paid by the defeated country in an interna¬ tional war to the victorious government. The largest amount demanded in this way previous to 1919 was $1,000,000,000, which France was compelled to pay Germany after the war of 1870-71. In the war of 1866 Prussia took from Austria and her allies a war indemnity of $41,750,000, besides $3,750,000 requisitioned dur¬ ing the campaign. The war between Japan and China covered about nine months and the amount paid by the latter nation was $185,000,-

000. For the Turko-Russian War of 1877, Russia demanded $701,000,000, but her claim was reduced to $160,000,000. Great Britain has received two indemnities from China, the first, in 1840, being $25,000,000, and the second, in 1860, about $10,000,000. The sultan of Turkey was forced by the powers to reduce his claims of $50,000,000 on Greece at the close of the war of 1897 to $10,000,000. The settlement of war claims betw'een the United States and Spain at the end of the war of 1898 was unique. The Spanish-American War lasted four months, and cost the United States $150,000,000. The Spaniards were defeated in every battle on sea and land, and finally sued for peace. A treaty was signed by President McKinley and by the queen regent of Spain in 1899 by the terms of which the United States relinquished all claims for indemnity of any kind, and agreed to send back to Spain, at its own cost, all Spanish soldiers taken prisoners, with their arms. The United States further agreed to pay to Spam the sum of $20,000,000. On her part, Spain was to Relinquish all claim of sovereignty over Cuba; to cede to the United States the island of Porto Rico and other islands then under Spanish sovereignty In the West Indies; the island of Guam, in the Ladrqnes ; and the archi¬ pelago known as the Philippin'S Islands. In this case it would appear that the victors paid for their success. At the close of the trouble be¬ tween China and the powers, growing out of the Boxer uprising in 1900, it was agreed that China pay the powers 450,000,000 taels as an indemnity. These settlements are petty com¬ pared with that exacted from Germany under Section VIII of the Treaty of Versailles signed

28 June 1919 according to which ˆGermany undertakes to make compensation for all dam¬ age caused to civilians, the total obligation to be determined by an InterAllied Reparation Com¬ mission. As an immediate step toward restora¬ tion, Germany shall pay within two years 20,000,000,000 marks in either gold, goods, ships or other specific forms of payment. The Commission may require Germany to give from time to time by way of guarantee issues of bonds or other obligations to cover such claims as are not otherwise satisfied. In this connection and on account of the total amount of claims, bond issues are presently to be re¬ quired of Germany in acknowledgment of its debt as follows ; 20,000,000,000 marks gold, payable not later than 1 May 1921, without in¬ terest; 40,000,000,000 marks gold, bearing 2ˆ4 per cent interest between 1921 and 1926, and thereafter 5 per cent with a 1 per cent sinking fund, payment beginning in 1926, and an under¬ taking to deliver 40,000,000,000 marks gold, bearing interest at 5 per cent under terms to be fixed by the Commission.®

Germany was also obliged to undertake ®to replace ton for ton, and class for class, all merchant ships or fishing boats lost or dam¬ aged owing to the war, and to cede to the Allies all German merchant ships of 1,600 tons gross and upwards, one-half of her ships be¬ tween 1,600 and 1,000 tons gross, and one-quarter of her steam trawlers and other fishing boats. As an additional part of reparation, the German government further agrees to build merchant ships for the account of the Allies to the amount of not exceeding 200,000 tons gross annually during the next five years.®

WAR INDUSTRIES BOARD. One of a

number of boards organized for the purpose of enabling the United States to meet the tre¬ mendous demands for men and materials spring¬ ing from her entrance into the World War as a combatant. While it functioned, it controlled and regulated industry in all of its direct and in¬ direct relations to the war and to the nation. Especially was it charged with the duty of pro¬ curing an adequate flow of materials for the two great war-making agencies of the government — the War and Navy departments — and for the two agencies immediately affiliated with those departments, namely, the Emergency Fleet Cor¬ poration and the Railroad Administration. Originally the War Industries Board was organ¬ ized as a branch of the Council of National Defense, which was created by Act of Congress of 29 Aug. 1916, ^^to increase and develop do¬ mestic production and to concentrate, mobilize and coordinate the country's resources, both in men and supplies, in time of need.® President Wilson, however, in effect, reorganized the board 4 March 1918, and on 28 May, following, made it a separate administrative agency. As it was finally made up the board consisted of the following members : Bernard M. Baruch, chair-m.an ; Alexander Legge, vice-chairman ; Robert S. Brookings, chairman of the Price-Fixing Committee ; Rear Admiral F. F. Fletcher, repre¬ senting the Navy Department; Hugh Frayne, head of the Labor Division; Major-General George W. Goethals, representing the War De¬ partment; Judge Edwin B. Parker, Priorities Commissioner; George N. Peek, Commissioner of Finished Products; J. Leonard Replogle,

Steel Administrator; L. L. Summers, Technical Adviser ; Albert C. Ritchie, General Counsel, and H. P. Ingels, Secretary. Herbert Bayard Swope, C. Dillon and Harold T. Clark were named as assistants to the chairman. In a letter asking Mr. Baruch to accept the chairmanship of the board, the President declared its functions should be :

(1) The creation of new facilities and the disclosing — if necessary, the opening up — of additional sources of supply.

(2) The conversion of existing facilities, where necessary, to new uses.

(3) The studious conservation of resources and facilities by scientific, comfnercial and in¬ dustrial economies.

(4) Advice to the several purchasing agen¬ cies of the government with regard to the prices to be paid.

(5) The determination, wherever necessary, of priorities of production and of delivery and of the proportions of any given articles to be made immediately accessible»to the several pur¬ chasing agencies when the supply of that article is insufficient, either temporarily or permanently.

(6) The making of purchases for the Allies.

The President further stated that the ulti¬ mate decision of all questions, save those relat¬ ing to the determination of prices, should rest with the chairman, the other members simply acting in a co-operative and advisory capacity.

Keeping in mind the President's outline of what its functions should be, the board organ¬ ized for work by creating the following divisions ;

Requirements Division.

Priorities Division.

Price-Fixing Division.

Controlled Industries Division.

Purchasing for the Allies Division.

Labor Division.

Conservation Division.

The duties of these divisions were appor¬ tioned as follows:

Requirements Division. — The principal task of this division was that of distributing materials and supplies to industries that were essential to the war before the less essential industries were taken care of. Such distribu¬ tion was necessary because the demands made by the war upon the industries of the country were so great and so varied that in most cases the production of materials and supplies for direct and indirect war needs fell far short of meeting those demands and the demands of the civilian population as well. In many cases, the production was not ' suf¬ ficient even for war purposes. The first thing this division did was to make a sur¬ vey of the industries of the country as a result of which numerous plants engaged in the pro¬ duction of non-essentials were converted into plants supplying the needs of the war. For in¬ stance, plants for making gas-holders were con¬ verted into munitions plants, carpet plants were converted into blanket and duck plants, auto¬ mobile factories were converted into plants for the manufacture of air planes, refrigerator plants were converted into plants for making filing cases for the navy, furniture plants were changed into plants for making ammunition boxes, horseshoe plants were changed into plants for making trench picks, toy plants were

changed into plants for the manufacture of packing-boxes, factories turning out women's waists were converted into plants for making signal flags, electric-vacuum plants were changed into plants for making Liberty motors, rubber and canvas factories were changed into gas¬ mask plants, stove plants were changed into hand grenade and trench-bomb factories, corset factories were put to work making supplies for the Medical Corps and gear plants were changed to plants for making gun-sights. The list of conversions might be continued almost indefi¬ nitely, but those referred to indicate how varied and extensive that list grew to be.

Priorities Division. — The functions of this division were to determine, whenever necessary, priorities of production and <ielivery and the proportions of any given article which were to be made accessible to

the various and varying demands for it. The division formulated gen¬ eral plans for the coordination of the military program, as presented by the military authori¬ ties, and the industrial program, in so far as such programs called for priorities. It deter¬ mined policies and designated agencies to carry such policies out. It defined those activities which are accorded preferential treatment be¬ cause of their war or civilian importance and certified its classifications to the Fuel Adminis¬ tration, the Railroad Administration, the United States Employment Service and the Industrial Advisers of the District Draft Boards for their respective uses and guidance in distributing fuel, furnishing transportation and labor and passing upon cases of industrial and occupa¬ tional deferment. All government and other agencies were governed by its decisions and rulings in all matters pertaining to priorities.

Price-fixing Division. — Statutory authority to fix prices was extended to the government with reference only to food, wheat and fuel — coal and coke. However, it had authority to commandeer, and this power, coupled with its power to determine priorities, enabled it in many cases to fix prices by agreement with producers. The prices fixed by it were of two kinds — prices which the government only paid and prices which were paid by the government, the Allies and the public. Prices for the govern¬ ment alone were fixed whenever such price¬ fixing was necessary to prevent it from being charged more than a reasonable and fair price for its needs and when the government pur¬ chases were not such as to disturb market con¬ ditions. When the needs of the government ab¬ sorbed so large a portion of a product as to change normal economic conditions, then prices for the public also were fixed. Among the commodities, the prices of which were fixed, were aluminum, cement, copper, cotton fabrics, cotton linters, hides and leather, hemp, lumber, platinum, rags, sand, gravel, crushed stone, steel, wool and zinc. In each case, maximum prices only were fixed.

Controlled Industries Division. — Governm.ent control of an industry, in so far as dis¬ tribution is concerned, results when its entire output is allocated. That control becomes abso¬ lute when, in addition to allocating the indus¬ try's output, the government also fixes the price therefor. The principal commodities for which prices were fixed by the War Indus¬ tries Board already have been named. In some cases the entire supply of the commodities was

allocated also. With respect to certain other commodities the output was allocated though the prices were not fixed. The principal com¬ modities with respect to which the entire out¬ put was allocated were chlorine, copper, cotton-duck goods, cotton linters, felts, hides and skins, manganese and chrome, military optical glasses, nitrate of soda, platinum, steel and pig iron, sulphur, toluol (the essential ingredient of T.N.T.), turbines, wood chemicals and wool.

Purchasing for the Allies Division. — Un¬ der an agreement between the United States and the Allies all purchases of supplies made by the latter had to be submitted to and ap¬ proved by the Allied Purchasing Commission of the War Industries Commission It was the duty of that commission to secure the best prices and the best terms of delivery possible and submit them to the Allied governments. In practice the purchase of food and feed was made by the Food Administrator. The Allied governments had to agree among themselves as to their several requirements and as to the pri¬ orities of delivery. In cases where prices had been fixed by the Price-fixing Commission, such prices applied to purchases made by the Allies. In other cases, the prices were approved by the Allied Purchasing Commission. However, the purchases actually were made by representatives of the Allied governments within limitations im¬ posed by the Allied Purchasing Commission.

Labor Division. — The activities of this di¬ vision were devoted to : .

(1) Securing cooperation of the govern¬ ment and organizations in reclaiming man power and waste materials.

(2) Utilization of prison labor — war, civil and disciplinary.

(3) Re-education by vocational training of crippled soldiers, sailors and persons injured in industry so as to make them self-sustaining.

(4) National waste reclamation system.

(5) Standardization of industries and oc¬ cupations in penal

institutions for producing materials.

(6) National road work system for pris¬ oners.

(7) Development of war prisoners' divi¬ sion in the army.

(8) Induction into industry and agricul¬ ture of discharged or paroled prisoners.

(9) Army and navy waste reclamation.

(10) Development of camp gardens.

(11) Aiding in work of securing legislation to make this work permanent.

Conservation Division. — This division took over the work of the Commercial Economy Board of the Council of National Defense. Its functions were the studious conservation of re¬ sources and facilities by means of scientific, commercial and industrial economies. It de¬ termined in the case of each industry what labor, materials, equipment and capital could be dispensed with in order that these facilities might be put to more essential uses. In other w'ords, its primary object was to eliminate waste and unnecessary uses of all kinds and to put the labor, materials or capital thus saved into businesses essential to war needs. The results of its efforts to conserve the wool supply of the country afford an excellent example of what it accomplished. Soon after taking up its duties it ascertained that substantial economies could be effected by reducing the number of designs

of wool fabrics the manufacturers were putting out, and also by reducing the number of models of garments, eliminating the use of cloth for needless adornments and by reducing the size of samples. It was learned, for instance, that a fabric manufacturer would get out, say 1,000 designs for a season, of which perhaps not more than 200 would be sold in commercial quantities. The labor and material used in making the other 800 designs were wasted. Fabric manufacturers, therefore, were requested to reduce the number of their designs and thereby large savings were effected. Wholesale tailors were persuaded to reduce the size of the samples sent out by them, and as a result, 450,- 000 yards of cloth were saved in this wˆay in the spring season of 1918 alone. The matter was taken up with other branches of the industry and a total saving of between 3,000,000 and 4,000,- 000

yards of cloth w'as the result. Even larger savings were effected by persuading clothing manufacturers to eliminate useless adornments such as belts, plaits, cuffs on sleeves and the like. Extensive savings in leather were brought about by getting shoe manufacturers to eliminate styles involving excessive and wasteful uses of material. Manufacturers of pneumatic tires for automobiles were induced to reduce the num¬ ber of types and sizes they were putting out from 287 to 33 with a promise of a further re¬ duction to nine types and sizes in two years. Similar economies were effected with reference to agricultural implements, paints and varnishes, stoves and furnaces, davenports and metal beds, tinware and sample trunks, buggies and spring wagons. Considerable labor was saved by per¬ suading department stores to reduce their de¬ livery services, this labor being released for more essential occupations. Taking all of these things into consideration the probabilities are that none of the various boards created for the purpose of helping the United States and the Allies to win the war rendered more efficient service.

Albert C. Ritchie,

Attorney-General of Maryland, 1915-19; Gen¬ eral Counsel, War Industries Board, 1918-19; and Governor of Maryland, 1920 — .

WAR LABOR BOARDS. As the United States speeded up its industries for the success¬ ful prosecution of the war it appeared early that much depended on the attitude and effi¬ ciency of labor. The United States Labor De¬ partment was called upon to adjust problems of employment, wages and hours, mediation and the maintenance of a labor morale. A pro¬ gram of labor administration was formulated at a conference between the Department of Labor and the Council of National Defense in January 1918 and in approving the program President Wilson also appointed Secretary of Labor Wilson, Labor Administrator. The pro¬ gram called specifically for six agencies as fol¬ lows : (1) an agency to establish Federal Labor Exchanges which would advise as to the meth¬ ods of training workers and secure a staple labor supply; (2) an agency to deal with ques¬ tions arising in regard to hours, wages, etc.; (3) an agency to secure proper wmrking condi¬ tions; (4) an agency to secure adequate housing and living conditions; (5) an agency to collect and digest labor information ; and (6) an agency to keep the public well informed. An advisory

commission was appointed by Secretary Wilson and on 28 Jan. 1918 this commission reported in favor of extending the program above outlined to include agencies for women in industry, train¬ ing and dilution, etc., and also recommended the formation of a War Policies Board. From these suggestions there developed the War Labor Policies Board and the National War Labor Board, also known as the War Labor Conference Board and the Taft-Walsh Board. Directors were then appointed to administer the several agencies. On 13 May 1918 Mr. Felix Frankfurter was made chairman of the War Labor Policies Board; with him served repre¬ sentatives of the Labor, War, Navy and Agri¬ culture departments, the War Industries Board, the Fuel Administration, Shipping Board, Emer¬ gency Fleet Corporation, Food Administration, Railroad Administration and the Committee on Public Information. Its chief function was to coordinate the industrial services of the de¬ partments and boards represented. It aimed to standardize employment conditions and thus to stabilize industry.

The National War Labor Board, formed 29 March 1918 was empowered to settle labor dis¬ putes by mediation and conciliation in all in¬ dustries classed as essential to the successful prosecution of the war; to establish means to bring about such conciliation, and in the case of failure of local mediation to bring the par¬ ties in question for a hearing before the Board itself. In case the decision of the Board was not unanimous the case was carried before an umpire appointed by the President of the United States. The Board consisted of Messrs. W. H. Taft and F. Walsh as representatives of the public, Messrs. L. A. Osborne, W. H. Vander-voort, L. F. Loree, C. E. Michael and B. L. Worden as representatives of the employers, and Messrs. F. S. Hays, W. H. Johnston, V. A. Olander, T. A. Rickert and W. L. Hutcheson as representatives of the employees. The basis of the relations between employers and em¬ ployees in war industries which the Board rec¬ ognized, included the right of workers to or¬ ganize trade unions, collective bargaining, main¬ tenance of satisfactory health and safety meas¬ ures, equal pay for women, the eight-hour day as basic in certain industries, mobilization of labor by every available means, the fixing of wages, hours, etc., in accord with local stand¬ ards, the recognition of the principle of a liv¬ ing wage. Among the important decisions of the Board were those in the cases of the tele¬ graph companies, the Bethlehem Steel workers, the street railways, the

Smith and Wesson munition workers and the Bridgeport strike.

WAR OFFICE, in Great Britain, the de¬ partment of government which controls all matters connected with the army. The head of the department has long been the Secretary of State for War, with a seat in the cabinet, and a salary of $25,000 a year attached to his office. During th-e World War a War Cabinet was formed, with D. Lloyd George (q.v.) as Prime Minister and First Lord of the Treasury, he having been Minister of Munitions from May to July 1916 and Secretary of State for War until December 1916, when he was made Prime Minister. Earl Curzon at the same time was made Lord President of the Council, A. Bonar Law Chancellor of the Exchequer, and

Viscount Milner and Arthur Henderson min¬ isters without portfolio.

WAR OF THE PACIFIC, a name given to the war between Chile and Bolivia and Peru in 1879-83. See Bolivia; Chile; Peru.

WAR PAINT, among the American In¬ dians, paint put on the face and other parts of the body on going to war, with the obj*ect of making their appearance more terrible to their enemies.

WAR PATH, among the American Indians, the route or path taken on going to war ; a warlike expedition or excursion. On the war¬ path means on a hostile or warlike expedition; hence, colloquially, about to make an attack on an adversary or measure. .

WAR AND PEACE (<Voma i Mir>). In the early sixties Count Tolstoy was engaged in gathering material for a novel that should introduce some of the surviving participants in the famous ®Dekabrist,^^ or December Con¬ spiracy of 1825, and portray their relationship to the changed conditions in Russia, after the accession of the liberal Emperor Alexander II, who permitted these surviving exiles to re¬ turn from Siberia to their former homes. He wrote several chapters and parts of chapters, but was irresistibly drawn back to the primal causes of the Conspiracy in the fateful period of Napoleon and of mystical-minded Alexander 1. He laid aside his project of producing a contemporary romance and energetically went to work on a historical novel which should depict the epoch ending with Napoleon's in¬ vasion of Russia, the burning of Moscow by Count Rostopchin and the disastrous retreat of the French. He had three chief objects in view. One was to give living pictures of the great events not only in Russia

but also in Europ-e that brought about the downfall of Napoleon. The second was to evolve a theory of Chance or Fate as overruling the apparently free actions of even th*e greatest of men. The third was to expound and illustrate a phi¬ losophy of life. His dramatis personae com¬ prise emperors, famous statesmen and gen¬ erals, gentlemen and ladies of the court, and a host of landed proprietors, princes and other titled personages, soldiers, peasants, each care¬ fully individualized and, however insignificant, yet introduced so as to become an integral part of the whole. The conversations also, even when trivial, are so managed as to help create the general ‘effect of reality.

The flow of the narrative is occasionally in¬ terrupted by philosophical disquisitions in them¬ selves forming a complete treatise which has been translated and published in both French and English. Its English title is ˆNapoleon and the Russian Campaign,ˆ and its main argument tries to prove that great leaders, like Napoleon and the Emperor Alexander I, were not, as they th’emselves believed and as historians have taken for granted, the prin¬ cipal factors in the great movements of man¬ kind, but were merely like the kings, castles, knights and bishops on a gigantic chessboard directed by a higher power which Tolstoy calls Chance or Fate. He argues that even their mistakes and blunders were vital links in the woven chain of circumstance leading to their successes, and actions which viewed from the

standpoint of ordinary common sense would seem to have been to the last degree fatuous were turned to their advantage; while, on the other ˆ hand, lofty intentions and admirable qualities were made the instruments of mis¬ fortune. He shows how mighty preparations were brought to naught and petty circum¬ stances led to imm’ense consequences. There is, therefore, deep meaning attached to slight episodes and to snatches of idle dialogue : they are like the chips floating on a broad current, rnaking evident to the eye in which direction the river flows. The epilogue also has been pub¬ lished by

itself under the title of ˆPower and Liberty,ˆ in which Tolstoy scouts the theory of Free Will. Three characters, Prince Andrei Bolkonsky,ˆ Count Nikolai Rostof and Pierre Bezukhof m a very distinctive way illustrate the author's own mental and religious develop¬ ment. They are members of families from which — the names being only slightly changed — - Count Tolstoy himself was descended, and their careers follow rather closely the records and traditions that had come down to him, modifi'ed by an infusion of his personal ex¬ periences in a somewhat similar environment abroad, in Moscow and Petrograd, in the army and in the activities of country life. In the character and theories of the philosophic muzhik, Platon Karatayef, may be seen ex¬ emplified the religious ideals which Count Tolstoy later developed as the guide of his life and which came to be the culmination of his teachings, in accordance with which he re¬ nounced his wealth, his title, his home, his family, everything usually beld dear by men of his station. These three characters are swept into the great maelstrom of the Napoleonic Wars; their individual actions are contrasted with the historic figures that appear and re¬ appear — 'Napoleon, Alexander, General Ku-tuzof. Prince Adam Czartoryski, Speransky, General B'ennigsen, the Countess Potocka and many other famous men and women of that day. There is a kaleidoscopic succession of de¬ scriptions of scenes in palaces and in peasants' izbas, in camps and in battles. There are horse-races and balls, quarrels and duels, flirtations and elopements, proposals of mar¬ riage, realistic descriptions of births and of deaths, drinking bouts and gambling, country idyls and workingmen's riots, councils and con¬ ferences, the orgies during the conflagration of Moscow, the horrors of the French invasion, hunting and harvest scenes — all depicted with perfect realism, so that the whole s'eems like a transcript from life, while the element of fiction is fused into a vast transcript of history.

As a novel ˆWar and Peaceˆ has serious faults, but its greater merits place it in the front rank not only of Russian but also of world literature. It is of remarkable length. The original covers more than 2,000 pages, aggre¬ gating not far from 650,000 words. It appeared between 1864 and 1869 in the Russian Messen¬ ger (Russky Vyestnik) . It was enthusiastically received, and when published in six volumes went through many editions. In the later and less expensive popular editions the dialogue, which, in order to represent the fashion of the last century, was given with a considerable ad¬ mixture of French, is all put into Russian. The sixth edition is dated 1886, and in this year the

first English edition made by Clara Bell from the French version was reprinted in New York. In 1898 the first translation from the original Russian, by Nathan Haskell Dole, ap¬ peared in six volumes. It is also comprised in the later versions of Tolstoy's complete works made by Leo Wiener and by Constance Garnett.

Nathan Haskell Dole.

WAR PENSIONS. During the fiscal year 1918-19 the United States Government paid to 624,427 persons pensions totaling $222,129,292.70. This was the largest sum ever disbursed by the government since the pension S3'Stem was adopted notwithstanding the fact that the num¬ ber of names on the pension roll was the small¬ est since 1890. Payments on account of pensions during the preceding fiscal year amounted to $179,835,328.75. There were at that time 646,895 names on the pension rolls. The greatest num¬ ber of names ever on the United States pension rolls was 999,446 in the year 1902. Payments to them totaled $137,502,267.99. According to the 1919 report of the Pension Commissioner the total pensions paid on account of the Civil War up to that year amounted to $5,299,859,509.39 and the total on account of all wars was $5,617,520,- 402.30, including $65,211,665.71 paid on account of the Spanish-American War. The net reduc¬ tion in the pension roll during 1919 was 22,468 names, 32,149 names having been stricken from the roll while 9,681 names were added to it. Of the pensioners on the rolls in 1919, 3,747 were scattered through 63 foreign countries, one being on the Island of Saint Helena, famous in history as the place of Napoleon Bonaparte's last exile and death. These pensioners in for¬ eign countries received a total of $1,188,188.45. Ohio led the States with the greatest number of persons on the Federal pension rolls in 1919, there having been 60,002 residents of that State who drew pensions totaling $21,582,330.04 in that year. Pennsylvania was second with 59,072 who received $20,630,813.44; New York came third on the list with 53,736 pensioners who drew $19,631,090.72; Illinois was fourth with 43,976 pensioners who received $15,956,335.52 and Indiana was fifth with 37,647 pensioners who drew $13,703,084.94. See Pensions.

WAR POWER, The United States Con¬ stitutional, dates back to Federal Convention of 1787 ; and it provides for the national de¬ fense through Congress which alone has the right to declare war and of making rules rel¬ ative to the conduct of the war and of cap¬ tures on land and sea. Congress is also em¬ powered to raise and maintain armies and the navy and to make rules for the government of both and to provide for their organization, training and discipline. This

power is ex¬ ercised through the President of the United States, as the commander-in-chief of the militia and the land and naval forces in the service of the nation. It is the duty of Congress to provide the necessary military forces in case of need; and it is the business of the President as the chief executive officer of the nation, the army and the navy, to see that these are made use of in accordance with the will of the nation as expressed through Congress, which must de¬ cide all questions relative to the strength and composition of the land and naval forces and

prescribe the Articles of War and the Rules for the Government of the Navy. The declara¬ tion of war by Congress does not, however, become law until it has received the sanction of the President of the nation. The President is also empowered to use the national forces on land and sea to repel foreign aggression or invasion and to suppress insurrection until Congress is able to declare its will in the matter. In fact the powers of the President in case of war, invasion or insurrection are plenary over the forces placed at his dis¬ position by Congress, or by the Constitution. This applies even to the property of the enemy which he may take for the use of the army, the navy and the needs of the nation in time of war. In the case of newly-acquired territory the President also exercises very extensive powers until it has been assimilated legally by act of Congress. Consult Black, H, C., ˆCon¬ stitutional Lawˆ (1895) ; Clode, C. M., ˆMilitary Forces of the Crownˆ (1869) ; Coolidge, A. C., ˆUnited States As a World Powerˆ (1908) ; Moore, J. B., ˆAmerican Diplomacyˆ (1905) ; Pomeroy, J. N., ˆConstitutional Lawˆ (1907).

WAR RELIEF. See War Costs.

WAR RISK INSURANCE. The Bureau of War Risk Insurance (U. S. A.) traces its origin back to 1914 in the days when the world was stunned by the European cataclysm, and found its prototype in the action taken by the British government in assuming the war time risk on vessels flying the British flag. The British government had all it could do to pro¬ vide for its own commerce. That left neutrals to look after

themselves. It was necessary for America to cover the risks on American vessels and cargoes. William G. McAdoo*, then Secre¬ tary of the Treasury, asked of Congress the au¬ thority to establish a Bureau of War Risk In¬ surance as an adjunct to the Treasury Depart¬ ment. Congress passed a bill at once to provide government insurance for American hulls and cargoes. William C. DeLanoy, a prominent in¬ surance broker of New York, was appointed to establish and direct the new government bureau.

Mr. DeLanoy continued in office as Director of the Bureau of War Risk Insurance until October 1918 and was succeeded by Col. Henry D. Lindsley who took office in December 1918, resigning in the spring of 1919 to be in turn succeeded by Col. R. G. Cholmeley-Jones, the present Director of the Bureau.

Mr. DeLanoy began business on 2 Sept. 1914 with an office force of four persons, yet on the first day of his incumbency Mr. DeLanoy wrote several hundred thousand dollars worth of in¬ surance on American ships and cargoes. This marine insurance remained the only form of war risk insurance until June 1917 when Con¬ gress amended the original war risk bill to es¬ tablish a Seamen's Division to insure the lives of officers and crews of American mer¬ chant vessels in sums ranging from $1,500 to $5,000 according to their scale of pay. On 12 June 1917 President Wilson approved the amend¬ ment to the Act of 1914 under which the War Risk Insurance Bureau was authorized to insure the masters and crews of American merchant vessels against loss of life or disability on ac¬ count of risks of war and to provide for com¬ pensation to United States prisoners of war

while detained in enemy countries. Under the amendment compensation was authorized in case of death, permanent or total disability, or loss of both hands, both arms, both legs, both feet, both eyes, or any two of these, amounting to one year's earnings or 12 times the monthly earnings, not less than $1,500 nor more than $5,000. There were also specified certain com¬ pensations : 50 per cent of one year's earnings for the loss of one hand; 65 per cent for one arm ; 50 per cent for one foot ; 65 per cent for one leg; 45 per cent for one eye and 50 per cent for total loss of hearing. There was estab¬ lished a department of the bureau for issu¬ ing policies on the lives of masters and crews.

Captain John J. Cro.wley of the Traveler's Insurance Company with headquarters in Hart¬ ford, Conn., was put in charge of this Sea¬

men's Division. Captain Crowley was a man within the draft age and had just completed arrangements for entering an officers' training camp when he was commandeered to serve his country in the capacity of insurance organizer, a task for which he was almost uniquely equipped by training, experience and tempera¬ ment, and the success of this Division of Marine and Seamen's Insurance was due in no small part to the very fine work x)i Captain Crowley and his assistants.

The writing of marine and seamen's insur¬ ance was suspended on 4 Jan. 1919. While in existence a total business of $2,389,952,996.54 was accomplished with the premiums on 33,381 policies amounting to $47,593,122.26, and claims paid to the extent of $28,ˆ2,789.73.

This left a surplus of approximately $18,- 000,000 which, together with the $50,000,000 fund voted by Congress, reverted to the United States Treasury.

Meanwhile in the months following the en¬ trance of the United States in the World War there arose a public demand for some desirable method of compensating soldiers and sailors for injuries and their dependents for deaths in the military and naval services. It was generally agreed that the evils of the pension system of the Civil War period should not be repeated. On 2 July 1917 Secretary of the Treasury Mc¬ Adoo conferred with representatives of insur¬ ance companies in regard to an insurance scheme to cover the war risk of those serving in the military and naval forces of the nation. The Committee on Labor of the Advisory Com¬ mission of the Council of National Defense also cooperated ; a plan of government insurance providing for both compensation and insurance was drawn up, presented to Congress and en¬ acted into law 6 Oct. 1917. The War Risk In¬ surance Bureau was empowered to administer the act and for this purpose the bureau was re¬ organized into four divisions: (1) Marine and Seamen's Insurance Division; (2) The Allot¬ ment and Allowance Division for compulsory and voluntary allotments of funds and family allowances to be paid by the government; (3) The Compensation and Insurance Claims Division for the consideration of cases of dis¬ ability or death due to injuries or diseases con¬ tracted during actual service; (4) and the In¬ surance Division.

The War Risk Insurance Act entitled all officers and enlisted men in the service at that time to obtain insurance for any sum up to $10,000 if they made application within 120 days

after the date of passage of the act, and pro¬ vided that all men enlisting thereafter must miake application for it within 120 days after their enlistment. For men already in the serv¬ ice the insurance might date back to the time they entered the service.

Another feature of this act was the provision whereby a soldier or sailor might make allot¬ ment of his pay to any one dependent upon him, and the government would supplement this with an allowance.

Organization. — Immediately upon the pas¬ sage of the act voluntary applications for in¬ surance began to pour in. The first came from Lieut. Coke Flannagan of the army, for the maximum $10,000. By cablegram on 12 Nov. 1917, General Pershing applied for the maxi¬ mum insurance for himself, at the same time thanking the government in the name of the army in France for giving to the soldiers a privilege which no other country had ever ex¬ tended to its fighting men.

The Military and Naval Division of insur¬ ance was thus added to the Marine and Sea¬ men's Division and the two divisions were still presided over by the original director, Mr. DeLanoy. To the general direction of the work Hon. Thomas B. Love of Texas was called as Assistant Secretary of the Treasury in charge of War Risk Insurance and Internal Revenue. At this time the late Maj. Willard D. Straight of New York was summoned to Washington to command the War Risk Section for duty over¬ seas. If the insurance plan was to be the broad, beneficent plan intended, every man in the serv¬ ice should be insured. To get the 1,500,000 men already in the army and the navy and sign up the thousands and tens of thousands being added daily and weekly to the war force was a Herculean task even if a big organization had been devised for this work. But there was no organization. The War Risk Bureau had two rooms in the basement of the Treasury building. It had to get thousands of clerks to handle the colossal volume of papers. It had to spread its canvassers in camps in America and camps in Europe, in navy stations in America, in England and in France, and elsewhere. It had to jump in a few weeks from a bureau with 20 clerks to one with thousands of clerks. The housing of the bureau presented extreme difficulties. Seemingly every available

foot of office space had already been taken over by one or another branches of the government. Various old de¬ partments and not a few new ones were having structures built for them hastily and mean¬ while were ˆcamping out® wherever they cou}d find space. There was a great scarcity of labor, particularly skilled labor. There was _ still a greater scarcity of office workers, particularly trained office workers.

The life insuance division which was known in the beginning merely as the ˆUnderwriters Section® was under the immediate direction of Mr. Fred O'Neil, who accomplished the pioneer work and was later succeeded by Mr. John M. Gaines, a member of the Actuarial Society of America, who contributed distinguished service in systematizing the records of War Risk.

Within five days of the passage of the act in October 1917 the bureau sent insurance ap¬ plications to every military and naval station. At the same time the adjutant general tele¬ graphed every department commander, explain¬

ing the opportunities and privileges the new law extended to the men — how for an average cost of $8 per $1,000 per year for policies up to $10,000, any and every officer and man in army and navy could insure his life, make provision for wife, child, mother or dependent in case of his death or disability.

A few days later representatives of the rank and file of every military unit in the United States met in Washington, summoned by tele¬ graph by the government to receive first hand information concerning the construction and operation of the Insurance Act. The Secretary of War, Newton D. Baker, and the Secretary of the Navy, Josephus Daniels, took an active part in forming this organization to co-ordi¬ nate in the field.

In the beginning the Allotment and Allow¬ ance Division was under the direction of Mr. F. C. Brown ; later the leadership passed to Mr. Dudley Cates; and the activity of these officials is reflected by the fact that before the armis¬ tice was signed there were on file in the bureau in Washington the applications for allotment and allowance of more than 4,000,000 men.

The whirlwind campaign in the United States that went forward immediately on the passage of the act could not exceed the con¬ certed, whole-hearted effort to reach the men so much nearer the risk

of supreme sacrifice in France. At the time the act was passed there were a quarter million soldiers already in Eng¬ land and France and hundreds of thousands on the point of embarking for duty overseas. Col. S. Herbert Wolfe, of the Quartermaster's Corps, who was in Paris on special detail, was ordered by cable to form an organization, and at the same time a special section of the Adjutant General's Department was organized by Maj. Willard Straight in America for service over¬ seas. After three weeks of intensive training to familiarize themselves with the law and its interpretation a War Risk company of 35 officers and 65 men left Washington for New York whence they sailed overseas on Christmas Day, 1917. This contingent carried through the campaign for War Risk Insurance in France.

From 5 o'clock in the morning until 9 o'clock at night field squads were at it. Speeches were made in the Y. M. C. A. huts and at mess and everywhere that the men could be gotten together. After the speechmaking there was personal work. Every man was approached directly. If the proposition was not quite clear to him it was explained in detail ; if his attitude remained indifferent all the ingenu¬ ity of the insurance snuad was bent toward his conversion. They wrote insurance all the way from the farthest western training camp to the most easterly port of debarkation and the re¬ ceiving ports in France. They wrote insurance as near the front-line trenches as any non-com¬ batant was permitted to go, and when they could proceed no farther they sent blank insur¬ ance applications into the front trenches on the very eve of battle.

In the Insurance Division of the Bureau of War Risk, locked up in a steel cabinet, is now treasured the original paper, grimy with the soil of the trenches, but bearing the names of boys who ^^signed uˆ on it for insurance of varying amounts the night before they went out at day¬ break Into No Man's Land, some never to re¬ turn. Across the names of these is written

simply the word ®Dead.^^ But these applica¬ tions collected by insurance officers who had gone into the trench during a stiff German offensive, have been treated as the last will and testament of those soldiers and the beneficiaries mentioned are receiving government insurance upon as valid a contract as if it had been for¬ mally made and taken in triplicate as was the custom.

These insurance officers wrote insurance in hospitals ; went into wards and among the desperately wounded and wrote insurance for dying men ; policies, the validity of which was established by a ruling of the Secretary of the Treasury and on which payments are being made.

When the campaign ended by statutory lim¬ itations on 12 February, more than $900,000,000 worth of insurance had been written for the quarter million men then in foreign service. Capt. G. H. Rennick who was also a member of this unit, on his return to^^the United States was assigned as assistant director of War Risk in charge of personnel, and Capt. John W. Bar¬ ton, who later was appointed assistant director in charge of Compensation and Claims, was a leader in the work of insuring the men in hos¬ pitals and camps abroad. The writer of this article, the present director of the Bureau of War Risk Insurance, was privileged to have a part in this insurance campaign among overseas troops.

All in all, the Bureau of War Risk Insur¬ ance, in America and. abroad, has written $40,000,000,000 of insurance on the lives of 4,539,045 men and women in the military service.

After the signing of the armistice Secretary Love resigned on account of ill health, and was succeeded as Assistant Secretary of the Treas¬ ury in charge of War Risk, by the Hon. Jouett Shouse, of Kansas.

In the early spring of 1919 the bureau moved into its new home, a building started as a hotel but taken over by the government in the course of construction and finished so that the Bureau of War Risk Insurance might at last be housed under one roof. It is 11 stories above ground, has three sub-basements and a total floor space of 608,000 square feet. It has 12 high-speed elevators, its own telephone ex¬ change and every comfort and convenience for its 16,000 employees, over 90 per cent of whom are women. In this new home the bureau will continue its service to service men.

Allotments and Allowances. — Under the law every enlisted man with a wife or with a child under 18, or with a divorced wife in re¬ ceipt of alimony was required to set aside a por¬ tion of his pay as an allotment for these de¬ pendents, who were known as class A. For par¬ ents, brothers, sisters and grandchildren, known as class B dependents, the enlisted man might make voluntary allotments. In the original law the compulsory allotment for class A depend¬ ents was at least $15 per month from a man's pay and as much more up to 50 per cent of his monthly pay to equal the allowance in the gov¬ ernment schedule. Women in the service were placed on the same basis as men. Allotments in class B were subject to the same rule. Gov¬ ernment allowances were given only on request and after payment of the compulsory allotment. The schedule of p-overnment allotments was at first as follows: Wife alone, $15; wife and one

child, $25 ; wife and two children, $32.50 and $5 additional for each additional child up to $50, the maximum ; for one child alone, $5 ; for two children, $12.50; for three, $20; for four, $30; and $5 for each additional child. Changes in pay of enlisted men involved a corresponding change in allowances and allotments, which in turn necessitated a vast amount of clerical work. To obviate this an amendment was in¬ troduced in the law providing for a flat com¬ pulsory allotment to dependents of class A of $15 per month and a flat allotment to depend¬ ents of class B of $5 per month.

Compensations and Insurance Claims. — The compensation and claims division was in the nature of an employer's liability company. This division, as the name indicates, paid com¬ pensation and indemnities in cases of disability or death due to injuries suffered or diseases contracted while in actual service. These two branches, however, were almost insignificant compared with the insurance division. The insurance provisions of the Act of 6 Oct. 1917 enabled any person, male or female, in active military or naval service to take out insurance in mutiples of $500 for any sum from $1,000 to $10,000. Premium rates on an annual term basis were moderate and a list of beneficiaries was specified. There were made certain modifications of the act in 1918, when Congress extended the time for applying for the insurance, changed the rates of allowance to dependents, allowed changes in beneficiaries when attested in writ¬ ing, limited the fees of attorneys to $3 in pre¬ paring and executing papers for claimants and provided fine and imprisonment for soliciting or receiving any other fees. Other amendments were requested by the Treasury Department in 1919 especially in the schedule of

compensation payable to disabled ex-service men. Under the law as it stood a man totally disabled was paid $30 a month if single. The Treasury Depart¬ ment requested that this be increased $80; it asked also that the allowance of $45 for a man with a wife but no child be increased to $90; and $55 paid a man with wife and one child be increased to $95. The man with a wife and two or more children received ˆ5; it was recommended that this be increased to $100. The amendment incorporating these changes was known while pending before Con¬ gress as the Sweet Bill and became a law on 24 Dec. 1919.

ˆ The stupendous scope of the Bureau of War Risk Insurance is shown by the following facts and figures, which demonstrate that within its organiption are four of the largest businesses of their kind in the world.

I. Marine and Seamen's Insurance Division:

Total business tol Dec. 1919 . $2,389,962,663.54

With premiums collected . 47,586 491 45

33,384 policies issued and paid claims. 28 [751 [628 72

Surplus over expenses and refunds … 1 7 [1 29 [994 . 46

2. Allotments and Allowance Division:

Payments of allotments to dependents of men in the service . $283 , 538 , 383 . 77

Payments of allowances . 255,922 779.12

Total up to 1 Dec. 1919 . $539,461,162.89

J. Compensation and Claims Division:

37,053 claims approved for Compen¬ sation on account of deaths in the service and now making payments thereon each month . $976,590.27

100,974 claims approved for Compen¬ sation on account of disabilities through service and now making payments thereon each month… . $2,654,927.30

27,806 burial awards and burial

expenses . $1,956,119.08

4. Insurance Division:

Individual policies numbering 4,586,- 535 written between 6 Oct. 1917, and 1 Dec. 1919, representing a

total amount of insurance . $39,987,020,500.00

Premiums between 6 Oct. 1917, and

1 Dec. 1919, approximately . 325,000,000.00

Claims payable, approximately . 1,100, 000 , 000 . 00

Compensation (Figures as of 1 Dec. 1919):

Number

Claims received . 323,340

Claims approved . 138,000

Claims pending . 90,615

Payments made each month to disabled men

and to dependent relatives of those who died. 113 , 131 Payments discontinued due to death of payee or

recovery from disability . 23 , 249

Disability claims disallowed . 22,000

Death cases considered as compensation cases, wherein it has been established there are no dependent relatives entitled to receive compensation . 72 , 000

Insurance (Figures as of 1 Dec. 1919):

Claims received . 128,952

Claims approved . 121, 000

Claims disallowed . 1 , 400

Claimspending . 6,526

The War and Navy departments notify the Bureau of War Risk Insurance of all deaths and disabilities occurring while men are in the service. These notifications are treated as po¬ tential claims, and every effort is made by the bureau to ascertain whether an award should be made in each case. Sometimes relatives cannot be found and in other cases communi¬ cations are frequently received by the bureau to the effect that no claims will be made.

Up to 1 Dec. 1919 the bureau had received for consideration 323,340 claims for compen¬ sation, and 128,952 claims for insurance.

Of the compensation claims approximately 138,000 have been approved. Approximately 22,000 disability claims have been disallowed be¬ cause, after thorough investigation, it was found the claimants were not entitled to compensa¬ tion benefits. In more than 72,000 death cases considered as compensation cases it has been definitely established that there are no depend¬ ent relatives entitled at the present time to re¬ ceive compensation benefits. On 30 Nov. 1919 90,615 compensation claims were pending. Of the insurance claims the bureau has ap¬ proved 121,000 claims and disallowed 1,400 claims, and on 30 Nov. 1919 there were pending 6,526 insurance claims.

Under the compensation feature of the War Risk Insurance Act the bureau is making 113,- 131 payments each month to men who were dis¬ abled while in active service, in the line of duty, and to the dependent relatives of those who die. Payments have been discontinued on 23,249 cases, due to the death of the payee or the recovery from disability. During the war more than four and one-half million of our soldiers, sail¬ ors and marines were insured by a government contract, known as yearly renewable term in¬ surance, and the total amount of insurance un¬ derwritten was nearly $40,000,000,000. The fig¬ ures are astounding. On 1 Jan. 1919 the 19 largest American life insurance companies had about $20,000,000,000 insurance outstanding;

furthermore, the business of the American life insurance companies, which it had taken many of them over 50 years to establish, was obtained by agency forces operating in all the cities and large towns of the United States, while, on the other hand, the Insurance of the War Risk Bureau had no qualified agents and had to rely in many instances upon the services of those without insurance experiences.

During the war the bureau depended upon the army, the navy and the marine corps for all contact with service men, contact manifestly upon a wholesale basis. Men entering a service had their insurance written up for them and the applications for family allowance were made out by the officers in charge of the work, and all papers were forwarded to the bureau by the officers. The bureau had no direct contact with men in the service, its province being merely to carry out the instructions contained in the service men's papers sent in by camp officers. The bureau, however, had direct contact with the families of service men, to which insurance or allotment and allowance were paid ; the bu¬ reau in this work becoming in effect a gigantic banking concern

through which were cleared service men's checks against the United States Treasury and payable to their dependents. With demobilization and the return to civil life organized processes ceased and there existed no means by which the bureau could appeal di¬ rectly to service men and urge upon them the very great value of their War Risk Insurance and the importance of retaining it and ulti¬ mately converting it into permanent United States Government Insurance. A large per¬ centage of the men when released from the service failed to make premium payments and their insurance thus lapsed. It was found that many elements entered into the failure to keep up this insurance. Many men, just out of mili¬ tary service, and not yet placed industrially, were unable to pay their War Risk Insurance premiums, small as those premiums were. This constituted a large class, but not so large, it was believed, as the class made up of those who were apathetic on the subject of life insurance and those not fully alive to the value of life in¬ surance and the tremendous asset which they have in a government insurance contract.

To meet this situation the United States Treasury Department, under whose general supervision is the Bureau of War Risk Insur¬ ance, issued a very generous reinstatement rul¬ ing. The reinstatement provision allows a serv¬ ice man 18 months after discharge from the service within which to reinstate his policy. He is required to pay only two months' pre¬ miums, one for the month of grace, during which he had full insurance protection, and the other for the month in which reinstatement is made.

As originally announced this ruling stipu¬ lated that the application for reinstatement be accompanied by a declaration on the part of the applicant that his health is as good as at the date of discharge. This ruling has since been liberalized by an amendment providing that men out of the service shall be perrnitted to reinstate merely by paying* two months' pre¬ miums, without a formal application for rein¬ statement or a statement as to health, at any time within three calendar months following the month of their discharge from the service.

Later a special blanket ruling was made which permitted any former service man to reinstate his lapsed or canceled insurance before 31 Dec. 1919, provided the applicant was in as good health as at the date of discharge, or at the ex¬ piration of the grace period of his insurance, whichever was the later date, and he so stated in his application.

Another decision is of interest to former service men who paid back premiums on their insurance reinstatement. Those who paid back premiums in excess of two may have the ex¬ cess applied toward the payment of future pre¬ miums.

The Sweet bill, passed by the 66th Congress, provides for a change in the manner of paying converted policies, and the Wason bill, answer¬ ing the wishes voiced by the American Legion, proposes similar changes in the payment of War Risk term policies issued to men while in active service. The Wason bill contains pro¬ visions not included in the Sweet hill, which latter bill had passed the House before the American Legion meeting. The Wason bill in¬ corporates the additional recommendations of the Legion and embodies additional amendments to the act not touched by the Sweet bill.

There had been an insistent demand for a change from the present method of paying poli¬ cies in monthly instalments covering a period of 20 years. And to be sure it is not a perfect system for small policies. A thousand dollar policy paid in that manner means a monthly payment of $5.75 continuing over 20 years. On the other hand the possibility for the misinvest-ment of a lump sum payment by inexperienced beneficiaries always exists.

To arrive at a conclusion as to the best method of policy payment, the bureau communi¬ cated with numerous philanthropic and charity organizations asking, ®Of those adults who come to you for aid, whether or not they or any member of their family had insurance, how many of them get on their feet financially in the first, the second, the third, or the fourth year?^^ The records furnished by these organ¬ izations proved that 85 per cent of all the adults who need financial aid because of stress get on their feet within the first year; more than 90 per cent the second year, and all but the disabled the third year. By these records, we were able to determine that three years is

approximately the period of stress. So, upon recommendation of the bureau, the Sweet bill provides that the policyholder shall have the right to say whether the policy shall be paid in a lump sum or in 36 or more monthly pay¬ ments.

The Wason bill has a like provision for the present term insurance, and provides also that if the policyholder has not designated how the policy shall be paid, the beneficiary shall have the right to elect to take the proceeds in not less than 36 monthly intalments. If the in¬ sured specifies that the policy shall he paid in 36 monthly instalments, the beneficiary cannot reduce the number of payments, but can in¬ crease the number. The beneficiary can say, ®I want this paid in 50 instalments,^^ or any other number; buf by making it impossible for the beneficiai*y to reduce the number of pay¬ ments he is protected against unnecessary loss or danger of loss.

The Wason bill further provides that the full

face of the policy shall be paid to beneficiaries irrespective of what sums may have been paid on the policy to the insured in his lifetime on account of total and permanent disability; and it exempts from premium payments those re¬ ceiving hospital care from the bureau, those receiving training under the Vocational Re¬ habilitation Act and those who are temporarily totally disabled.

The Sweet bill increases the class of bene¬ ficiaries to include uncles, aunts, nephews, nieces, brothers-in-law, sisters-in-law and per¬ sons who may have stood in loco parentis to the insured for a period of one year preceding the issuance of the policy.

The Wason bill goes even further; it abso¬ lutely abolishes any limitation as to beneficiary and makes a United States Government Insur¬ ance policy negotiable in exactly the same way that commercial policies are negotiable.

The class of persons privileged to carry government insurance is comparatively small, and once that privilege is finally lost it is lost for all time. If a man seeks counsel on his insurance and it is suggested' to him to allow his government contract to lapse and take out some other insurance contract, that man has suffered a gross injustice.

Under the Sweet bill single men would re¬ ceive $80 a month, instead of $30 as provided by the original act; those with a wife, $90 in¬ stead of $45; those with a wife and one child, $95 instead of $5; those

with a wife and two or more children $100 instead of $65 ; those with¬ out a wife, but having one child, $90 instead of $40, with $5 additional allowed for each of two additional children. Partial disability is to be rated by a percentage of the foregoing, and it shall equal ˆffhe degree of reduction in earning capacity.®

The compensation provisions of the Wason bill are even more generous. For a disabled man without wife or child $80 a month is al¬ lowed; if he has a wife and no child, $95; a wife and one child $105 ; a wife and two chil¬ dren, $112.50; and $5 additional for each child above two; if there is no wife, but one child, $85; no wife, but two children, $92.50; no wife, but three children, $100; no wife, but four children, $110, and $5 additional for each addi¬ tional child.

Closely related to the Compensation Divi¬ sion, though distinct in its own province, and certainly very near to the hearts of all who are interested in service men, is the Medical Divi¬ sion. Properly speaking, though the Bureau of War Risk Insurance is charged with the physi¬ cal aid and relief of all men discharged by the army, navy and marine corps as physically un¬ fit, the bureau has no hospitals. There are, however, numerous hospitals owned by the Treasury Department and operated by the United States Public Health Service. In these hospitals as well as in various private hospitals disabled service men are receiving treatment. Just before the 66th Congress adjourned its special session in 1919 an appropriation of $9,000,000 was made for the purchase or build¬ ing and equipment of hospitals to be owned by the Treasury, and operated by the United States Public Health Service, especially for War Risk patients The program outlined at that time seemed ample for all possible needs. As time has gone on, however, it has been made evident

that vastly greater preparation for the treat¬ ment of men discharged •because of disability will have to be made. It is not unlikely that Congress will be asked to make a considerably larger appropriation for this purpose.

Probably it will be necessary in time to add to the hospital facilities now available, on ac-

which must be deducted the profit of $17,124,- 903.84 made in the marine insurance division, which reduces the net cost of administration up to 30 June 1919 to less than $2,000,000.

The following table gives the monthly premium rates on each $1,000 of war risk insurance.

Government Insurance Rates.

Age

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

Ordinary life .

$1.06

$1.08

$1.10

$1.12

$1.15

$1.17

$1.20

$1.23

$1.26

$1.29

$1.32

$1.35

$1.39

$1.43

$1.47

$1.51

$1.55

20-payment life .

1.66

1.68

1.71

1.73

1.76

1.79

1.82

1.85

1.88

1.91

1 95

1.98

1.59

2.02

1.62

2.06

1.66

2.10 1 69

2.14

2.19

30-payment life .

1.32

1.34

1.36

1.38

1.40

1.43

1.45

1.48

1.51

1.53

1.56

1.73

1.77

20-year endowment .

3.29

3.30

3.30

3.30

3.31

3.31

3.31

3.32

3.32

3.33

3.33

3.34

3.34

3.35

3.36

3.37

3.38

30-year endowment .

2.04

2.04

2.0.S

2.05

2.06

2.06

2.07

2.07

2.08

2.09

2.10

2.11

2.12

2.13

2.15

2.16

2.18

Endowment age 62 .

Term (temporary or war-

1.29

1.32

1.36

1.40

1.44

1.48

1.53

1.58

1.63

1.68

1.74

1.80

1.87

1.94

2.01

2.09

2.18

time) .

.63

.63

.64

.64

.64

.65

.65

.65

.66

.66

.67

.67

.68

.69

.69

.70

.71

Age

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

Ordinary life .

$1.60

$1.65

$1.70

$1.76

$1.81

$1.88

$1.94

$2.01

$2.09

$2.16

$2.25

$2.34

$2.43

$2.53

$2.64

$2.76

20-payment life .

2.23

2.28

2.33

2.38

2.44

2.50

2.56

2.62

2.69

2.76

2.83

2.91

2.99

3.08

3.18

3.28

30-payment life .

1.81

1.85

1.90

1.95

2.00

2.05

2.11

2.17

2.23

2.30

2.38

2.46

2.54

2.64

2.73

ˆ.84

20-year endowment…

3.39

3.40

3.41

3.43

3.44

3.46

3.48

3.51

3.53

3.56

3.60

3.63

3.68

3.72

3.78

3.84

30-year endowment…

2.20

2.22

2.24

2.27

2.30

2.33

2.36

2.41

2.45

2.50

2.55

2.62

2.68

2.76

2.84

2.93

Endowment age 62 …

2.27

2.37

2.48

2.60

2.72

2.86

3.01

3. 18

3.30

3.56

3.79

4.04

4.31

4.63

4.98

5.39

Term (temporary or wartime) .

.72

.73

.74

.75

.76

.77

.79

.81

.82

.84

.87

.89

.92

.95

.99

1.03

count of the fact that several thousand disabled men will shortly be discharged from army hos¬ pitals and turned over to the Bureau of War Risk Insurance as compensation and hospital cases. Months of treatment to effect a cure will be required in a large number of those cases in whicli cure may be possible. Unfortu¬ nately there is a distressingly large number of these cases for which institutional care must be considered as permanently necessary. Besides, there are those men who were discharged from the service as physically unfit before being as¬ signed to permanent units.

Early in the summer of 1918, with the idea of standardizing the physical fitness of the army, there was a general weeding out process in the training camps all over the country. As a result of this, more than 170,000 men who had not completed their work in the training camps were sent back to civil life. Of this number more than 25,000 were tubercular cases. Sorne of these cases had developed from pneumonia and but so many of them had developed

without any exact cause to which the malady might be assigned, that the assumption .among army medical men was that a large number of them had been latent or incipient at the time the men were accepted by their local boards. There were approximately 3,500 cases of dis¬ charge because of epilepsy, and the list of causes for discharge on account of physical dis¬ ability runs the whole gamut of human ills. In time, all of these cases will be submitted to the Bureau of War Risk Insuranceˆ for hospital treatment to which every man discharged be¬ cause of physical disability is entitled :

The cost of administering the bureau to 30 June 1919 was approximately $19,000,000, from

The Bureau of War Risk Insurance was established and is conducted for the benefit of our soldiers, sailors and marines. It exists for and because of them, and its sole concern is to serve them promptly, efficiently and with under¬ standing of the needs of each particular case,

R. G. Cholmeley-Jones, Director, War Risk Insurance Bureau, Wash¬ ington, D. C.

WAR OF THE ROSES. See England.

WAR SONG.S. See National Songs.

WAR TARIFF. See United States — Tariff.

WAR TOKENS. See Token Money.

WAR WOUNDS. The wounds described will be those peculiar to the war of 1914-18. Indeed, they have special characteristics, ac¬ cording to the objects producing them, and cannot be compared with the wounds of pre¬ ceding wars. In the wars of the last cen-tuiy, 80 per cent were produced by bullets. In the war of 1914-18 80 per cent were caused by pieces of shell, grenades, bombs and torpe¬ does. We are also confronted with injuries resulting from new chemical compounds, like gas and burns from liquid flame. Wounds by knife, bayonet, sword or lance are rare, while the two most common types of injury-inflicting agents are the bullet and pieces of shell. But besides these, we find other foreign bodies in the wounds. For instance, the projectile may carry a fragment of wood which was in the vicinity of the soldier into the body, or a shell may explode in a group of men, the bones of one man entering the body of another. These projectiles often carry with them pieces of

clothing covered with mud and containing many bacteria. The presence of such foreign bodies is characteristic of shell wounds.

It sometimes happens that a bullet takes along with it a button, or a coin or a metallic piece of a suspender, but this is exceptional. It may happen, also, when the form of the bullet has become changed, by ricochetting, that it will carry with it bits of clothing. But where it strikes directly, it perforates the cloth, piercing its way between the fibres of the tissue, and in this way does not carry along any of the clothing. On the contrary, a piece of shell, always irregular and jagged, cuts the cloth into pieces, which it carries to the bottom of the wound. This cloth is the conveyor of the bacteria into the wound. It can thus readily be seen why a bullet wound is generally unin¬ fected, while that produced by shell is usually infected.

Aside from the element of foreign bodies carried into the wound, there, is a big difference between the injury produced by a bullet and that resulting from a piece of shell. The bul¬ let causes only slight damage to the soft tis¬ sues, because it advances insinuatingly, pushing the fibres aside without tearing them. The piece of shell tunnels its way through the body, its ragged edges cutting and tearing, pro¬ ducing in this way a kind of pulp out of the contused muscles and cellular tissues torn and detached from the walls of the track. This pulp proves a very good culture medium for the bacteria. The jhell fragments are thus not only sources of infection, but are also the purveyors of food for the bacteria which they carry into the wound along with clothing and other foreign bodies.

Upon the bony structure of the body, the bullet inflicts generally more serious injury than does the piece of shell. This is due to the greater velocity of the bullet, which pro¬ duces considerable pressure in the bone into which it is penetrating, this pressure causing bursting of the bone. The lesser speed with which a piece of shell enters usually prevents bursting of the bone, but it increases the seriousness of the compound fracture by carry¬ ing more bacteria.

In present-day warfare every kind of in¬ jury can be seen, from a tiny scratch to com¬ plete tissue disintegration, but the variety of wounds is less characteristic than their number. The plentiful supply of artillery, with its greater precision, multiplies the injuries. The wounded are numerous and each usually has several wounds : generally not less than two or three, often 10 or 15, sometimes as many as 40 to 70, and even 90. The number of the wounded emphasizes the fact that the injured can no longer be considered by the general staff as a negligible waste, of which little care need be

taken, but that it is important to treat them quickly in order to preserve them for a continuance of the struggle.

The characteristic of the clinical evolution of shell wounds is the element of infection. Every disease-producing bacterium may be the agent of this infection. The most dangerous are the tetanus bacillus, gas or Welch bacillus, and the streptococcus. Tetanus was very fre¬ quent at the beginning of the late war because of the lack of antitoxin. Later every wounded

man was injected with antitoxin and no more tetanus was observed. Gas gangrene is a very serious complication, which manifests itself by the necrosis of the walls of a wound, spreading quickly into the rest of the limb; by the pro¬ duction of gas which distends the tissues and by general poisoning of the injured. Treat¬ ment for it is wide opening of the wound, to expose the bacteria to the oxygen of the air, which prevents their development, and the in¬ jection of an antitoxin prepared by Bull and Pritchett of the Rockefdller Institute, or by Weinberg in France. Streptococcus, is the bacterium of erysipelas. It is one of the most resistant bacteria, and causes serious local and general infection. We have not as yet any specific treatment against it.

But whatever may be the infection, it is possible to subdue it by accurate surgical and antiseptic treatment. This should be done as early as possible, preferably before the first eight hours after the injury. An X-ray pic¬ ture indicates the bone lesion and also the location of foreign bodies. The operation which follows consists of wide opening of the wound; of the complete excision of the walls of the wound; of the removal of foreign bodies, and of the resection of bone splinters. This mechanical cleansing permits the removal at the same time of any necrotic tissue and bacteria. After this operation it is in many cases possible to close the wound immediately. But if there remains a doubt as to the pres¬ ence of dangerous bacteria within the injured part, it is preferable to keep the wound open, to make bacteriological examinations and to close it only after knowledge has been ob¬ tained of the result of these bacteriological examinations. If a wound is infected, it is best to keep it open and to sterilize it by an antiseptic method, which permits secondary closure after several days.

The old antiseptic methods have proved themselves insufficient. Carrel and Dakin thought that the main reason for the failure of these methods was their inadequate applica¬ tion. Indeed, contact of an antiseptic sub¬ stance with a wound only once a day produces

sterilization for only a few minutes, because the secretions quickly combine with the anti¬ septic, thereby destroying its efficacy. The Carrel-Dakin method consists of the applica¬ tion, renewed every two hours, of a strong antiseptic, non-toxic and non-caustic, but hav¬ ing the property of dissolving necrotic tissue. This substance must reach every part of the wound, for which purpose tubes especially pre¬ pared are placed in all the interstices of the injury,ˆ as carriers of the antiseptic fluid.

Experience has shown that with the use of hypochlorite of sodium, in the way described, it is possible quickly to sterilize every kind of wound, and Dehelly and Dumas have shown the feasibility and necessity of closing these wounds after sterilization, instead of allowing them to cicatrize spontaneously.

Dakin and Dunham, endeavoring to simplify the technique, prepared another antiseptic, dichloramine-T dissolved in a chlorinated paraffin oil. This preparation permits the slow decomposition of the antiseptic in contact with the secretions of the wound, thus diminishing the necessity for renewal of the antiseptic on

the surface of the wound. Good results have been leported from the application of this com¬ pound.

To resume : Considerable progress was made from the beginning of the war until its close in the treatment of the wounded. This was due, first, to the early treatment of the injured; second, to the conquest of the infec¬ tion by the Carrel-Dakin method; third, to the perfected surgical cleansing of the wounds; fourth, to the secondary closure proved neces¬ sary by Dehelly and Dumas, and, fifth, to the work of Gaudier, showing the possibility of cleansing a wound thoroughly by surgical means and closing it immediately after the first operation. The result of this progress was that 80 per cent of the wounded were returned without disability and after short period of treatment to the active military forces.

WAR ZONES. Among the many circum¬ stances which distinguished the late war from all others of the past was the practice of belligerents in treating certain areas of the ocean as ®war zones^^ and asserting belligerent rights within such waters which are incon¬ sistent with the long-recognized principle of the freedom of the seas. At the very out¬ break of the war, between Great Britain and Germany the German Admiralty was guilty of planting submarine mines in open waters of the North Sea in consequence of which a goodly number of merchant and fishing vessels were destroyed. The British Admiralty at first refrained from this procedure, but on 2 Oct, 1914, in consequence of the policy of the Ger¬ man admiralty, it announced that it had as a counter measure authorized ®a mine laying policy in certain areas,^^ and that a ^^system of mine fields had been established and is being developed on a considerable scale.® Notice was, therefore, given that within certain areas of the North Sea it would be dangerous for ships to navigate. In the following month the British Admiralty announced that in conse¬ quence of Germany's having scattered mines indiscriminately on the trade routes from America to Liverpool, the whole of the North Sea must be considered as a ^^military area® within which shipping of all kinds would be exposed to the gravest danger from mines which it had been necessary to lay as a counter

measure. Lanes of safety, however, were pro¬ vided and directions were issued to enable neutral vessels to navigate the North Sea with¬ out exposure to destruction. The British mine field was extended or contracted by successive notices issued by the Admiralty from time to time throughout the succeeding years of the war.

By a memorandum of 4 Feb. 1915 the Ger¬ man government charging Great Britain with various violations of international law and declaring that it had in vain called the atten¬ tion of neutral governments to these violations, proclaimed that the waters around Great Bri¬ tain, including the whole of the English Chan¬ nel, were a ˆ %ar zone® within which after 18 February all enemy merchant vessels would be destroyed, even if it were not always possible to save their crews and passengers. It was also added that in consequence of the misuse of neutral Hags by British masters, neutral ves¬

sels navigating such waters would be exposed to the danger of destruction. The principal difference between the so-called ˆdanger area® proclaimed by Great Britain and the German ®war zone® was that nothing was said in the British proclamation regarding the possible sinking of neutral vessels ; on the contrary, it left certain routes open and undertook to guarantee neutral vessels against destruction from English mines by furnishing their masters with sailing directions which if followed would insure their safety. In fact, it does not appear that any neutral vessel was ever destroyed or injured by a British mine while navigating the dangerous area. Aside, therefore, from the delays and inconveniences to which neutrals were subjected in the exercise of the right to navigate the high seas, the British measure was unobjectionable. The German proclamation in¬ volved a much more serious encroachment upon neutral rights since it not only exposed neutral vessels navigating the war zone to destruction, but it similarly exposed neutral persons in¬ nocently traveling on belligerent merchant ves¬ sels within the zone, since it was the avowed intention of the German government to sink such vessels, even when it was not possible to provide for the safety of their crews and passengers. It is one thing for a belligerent to plant mines in the open seas for the sole pur¬ pose of preventing the approach to its coasts of enemy war ships, when precautions are taken to protect neutral vessels against de¬ struction therein; it is a very different thing for a belligerent to proclaim a portion of the sea to be a war zone and announce that all enemy merchant vessels encountered within such zone shall be destroyed, even when provision cannot be made for the safety of crews and passengers and without taking steps

to pre¬ vent the destruction of neutral vessels therein b}ˆ providing them with sailing directions en¬ abling them to make their way safely enough through the forbidden zone.

In January 1917, the German government went still further, and after abrogating its Xˆrevious pledges to the United States in regard to the sinking of merchant vessels (see Sub¬ marine Warfare) proclaimed a new war zone embracing the whole North Sea, including the waters around the British Isles, extending north to the Faroe Islands, westward from France and England about 500 miles and southward to within a few miles of the coast of Spain. A large portion of the Mediterranean Sea was also included within the area. This vast ex-Iianse of ocean embracing more than a million square miles was declared to be a ‘Tarred® or “blockaded® zone within which after 1 Felj-ruary all sea traffic would if possible be pre¬ vented by means of mines and submarine tor¬ pedo boats. As a special concession to the United States a narrow lane extending west¬ ward from Falmouth through the zone was to be left open for the passage of one American steamer per week, provided it arrived at Fal¬ mouth on Sunday and departed on Wednesday, and provided it had vertical stripes three metres broad painted on its sides and carried a large flag of checkered red and white at the mast end and the American flag at the stern. Within this zone all other merchant vessels, belligerent and neutral alike, were to be sunk

without warning and without provision for the safety of the crews and passengers. This ex¬ traordinary measure was avowedly adopted as an act of reprisal against Great Britain for various acts, the chief of which was the alleged attempt of the British government to starve the German nation hy means of an unlawful blockade. It was also justified on the ground that the governments of the Entente powers had “bluntly refused® to consider Germany’s peace offer. Finally, it was added that the measure would result in “a speedy termination of the war and the restoration of peace which the United States had so much at heart.® The assertion of the right to close a vast area of the open

seas to neutral navigation and the threat to destroy neutral vessels which dared to traverse it was so manifestly contrary to the long-established doctrine of the freedom of the seas for which the Gerrrian government pre¬ tended to be fighting that it would be a w'aste of time to argue the quesfjon. It was, as the President of the United States aptly declared, a declaration of war against the world and against humanity itself. Various neutral gov¬ ernments vigorously protested and the action of the German government in proceeding to put the decree into effect was one of the chief causes which led the United States to declare war against Germany in April 1917.

Aside from the action of the Japanese gov¬ ernment in proclaiming in January 1904 certain "strategic areas® in and adjacent to its own territorial waters there is nothing analogous in the slightest degree to the war zone de¬ cree of either Great Britain or Germany in any previous war. It has long been a recognized rule of the law of nations that a belligerent has no right to close any portion of the high seas to neutral navigation or to interfere with neutral vessels traversing them further than such as is incidental to the right .of search, visit or blockade, or in pursuance of the right of a belligerent to intercept the carriage of con¬ traband to the enem3ˆ

A. belligerent may, of course, engage the enemy in battle and prey upon his commerce anywhere on the high seas. He may even warn neutrals that within a certain area of the sea which is likely to become an immediate theatre of naval operations their vessels will be exposed to destruction in the same way that a noncombatant individual who in land warfare strays into the military lines will be exposed to danger, and if they disregard the warning and are unavoidably destroyed or injured in consequence of their presence in such theatre of operations it is doubtful whether the bellig¬ erent from whom they suffer can justly be held responsible. But it is a very different thing for a belligerent to proclaim an immense area of the ocean which by reason of the ex¬ tent of such area cannot be made a theatre of immediate hostilities to be a barred or closed zone and to destroy neutral vessels en¬ gaged in peacefully navigating such waters. The action of the British government in pro¬ claiming the North Sea to be a military area in which mines were planted on an extensive scale was itself an infringement upon the principle of freedom of the seas, but for the reasons mentioned above it was far less ob¬ jectionable than the German war zone decree

of January •1917. It is difficult to see how the German measure can be

defended on grounds of international law.

Bibliography. — Burgess, ˆAmerican Rela¬ tions to the VVarˆ (pp. 7ff.) ; Garner, ˆWar Zones and Submarine Warfareˆ • {American Journal of International Law, Vol. IX, pp. 594ff) ; Rogers, ˆAmerica's Case Against Ger¬ manyˆ (Ch. 2) ; Scott, ˆSurvey of Inter¬ national Relations Between the United States and Germanyˆ (Ch. 12) ; Westlake, Hnternational Lawˆ (Vol. II, pp. 222ff) ; inter¬ national Law Situationsˆ (Publications of the United States Naval War College for 1912, pp. 126ff).

James W. Garner,

Professor of Political Science, University of Illinois.

WAR OF 1812, General Society of, a pa¬ triotic society founded in 1894, its member¬ ship being open to the male descendants over 21 years of age of any one who fought in the army or navy in the War of 1812. In case of there being no lineal male descendant one representative of a collateral line may be ad¬ mitted to membership. The society was or¬ ganized by members of the Association of the Defenders of Baltimore in 1814, and by the Pennsylvania Association of the Defenders of the Country in the War of 1812, and has now State branches in Massachusetts, Connecticut, the District of Columbia, New York, New Jersey and Delaware. Its president in 1918 was John Cadwalader. Its headquarters are at Boston, and its membership in 1918 was 575.

WAR OF 1812, Military Society of, a pa¬ triotic society founded in New York, 3 Jan. 1826. It admitted to membership officers of the regular army, navy and volunteer services who had served in the War of 1812. It was consolidated 8 Jan. 1848 with the Veteran Corps of Artillery, a society of the Revolutionary War which was organized in New York 25 Nov. 1790. At that time it adopted the name as well as the ruling of the Veteran Corps of Artillery concerning membership, extending it to male descendants of the officers of both the Revolutionary War and the War of 1812. Its last survivor of the Revolution was Daniel Spencer, d. 4 March 1854; its last survivor of the War of 1812 was Hiram Cronk, d. 13 Mav

1905.

WARBECK, war'bek, Perkin, pretender to the throne of England in the reign of Henry VH: b. Tournay, about 1475; d. London, 28 Nov. 1499.

He was the son of a Jew of Tournay, and appears in history in 1490, when he was attached to the court of Margaret, dowager Duchess of Burgundy. At the court he was taught to represent Richard, Duke of York, younger brother of Edward V, one or the princes generally supposed to have been murdered by their uncle, Richard of Gloster, in the tower. In 1492, when there was prospect of a war between France and England, War-beck landed at Cork, and was joined by numer¬ ous partisans. At the invitation of Charles VHI he went to the court of France, where he was acknowledged as Duke of York, re¬ ceived a pension and was attended by a body guard. At the Peace of Estaples he was dis¬ missed from France and went to Flanders,

where he was received by the Duchess of Burgundy as her nephew. The belief in the truth of his claim was shared by the populace of England, and certain of the nobility, and some of them openly declared for him. He was, however, taken prisoner after an invasion of Cornwall 1497, tried for high treason and hanged at Tyburn.

WARBLERS, a popular name applied in different countries to a variety of small in¬ sectivorous birds belonging to quite distinct families, but resembling one another in habits and appearance. The American warblers, to which the book name ˆ%ood-warblers® is often given, belong to the extensive family Mniotil-tidcB and include a varied assemblage of generic types somewhat closely related to the tanagers (Tanagridce) . They are small birds, with one or two exceptions about five inches in length. Their colors are bright and varied, yellow often predominating, with patches of red, blue, brown, black or white in conspicuous places; but the females are often plain and often closely re¬ semble one another in the different species. The bill varies, but is generally rather slender, pointed, slightly curved and without a hooked tip, a tooth or a deep notch ; the feet are rather small with scutellate tarsi and present no posi¬ tive characters ; the primary wing-quills are nine, the secondaries are not elongated and the tail-quills are 12 in number. Owing to the great diversity of the genera it is practically impos¬ sible to give any brief definition covering all. Various groupings of the genera into sub¬ families have been proposed, but with the ex¬ ception of the well-marked Icteriina, which are decidedly aberrant, they all intergrade more or less easily. A division such as follows is con¬ venient and fairly natural. The typical warblers {Sylvie olincB) have the wings nearly always longer than the tail, the bill slender and coni¬ cal, with the commissure slightly curved and the rictal bristles short or wanting. The flycatching warblers {Setophagince) have sim¬ ilar wings and tail, with the bill broad and flattened at the base, the commissure slightly curved and the rictal bristles numerous and very long. The chats (Icteriince) have the wings shorter than the tail, the bill high, compressed and stout, with strongly curved commissure and no rictal bristles. They are much larger than any of the members of the other subfamilies. There are, in

round numbers, about 130 species of known warblers, strictly confined to Amer¬ ica ; the flycatching warblers being found in greatest variety and abundance in northern South America, Central America and the West Indies, while the Sylvicolince are pre-eminently characteristic of North America.

Warblers are all insectivorous and migra¬ tory, chiefly inhabitants of the woods and thick¬ ets and because of their varied habits and great abundance among the most interesting of our birds. They build on the ground, in bushes, in crevices or high up in tall trees, nests exhibit¬ ing a great diversity in material and archi¬ tecture. The name warbler probably alludes to their constancy rather than to their ability as musicians, for their songs, though attractive and interesting, are, with a few exceptions, not highly melodious. The varied role played by warblers in nature has been well expressed by

Dr. Coues in the following poetic passage ; ˆHdic warblers have we always with us, all in their own good time; they come out of the South, pass on, return and are away again ; their appearance and withdrawal scarcely less than a mystery ; many stay with us all summer long, and some brave the winters in our midst. Some of these slight creatures, guided by un¬ erring instinct, travel true to the meridian in the hours of darkness, slipping past 4ike a thief in the night, ˆ stopping at daybreak from their lofty flights to rest and recruit for the next stage of the journey. Others pass more leisurely from tree to tree, in a ceaseless tide of migration, gleaning as they go; the hardier males, in full song and plumage, lead the way for the weaker females and yearlings. With tireless industry do the warblers befriend the human race; their unconscious zeal plays due part in the nice adjustment of Nature's forces, helping to bring about that balance of vegetable and insect life without which agriculture would be in vain. They visit the orchard when the apple and pear, the peach, plum and cherry are in bloom, seeming to revel carelessly amid the sweet-scented and deliciously tinted blos¬ soms, but never faltering in their good work. They peer into the crevices of the bark, scruti¬ nize each leaf, and explore the very heart of the buds, to detect, drag forth and destroy those tiny creatures, singly insignificant, collectively a scourge, which prey upon the hopes of the fruit-grower, and which, if undisturbed, would bring his care to naught. Some warblers flit incessantly in the terminal foliage of the tallest trees ; others hug close to the scored trunks and gnarled boughs of the forest kings ; some peep from the thicket, the coppice, the impene¬ trable mantle of shrubbery that decks tiny water courses, playing hide-and-seek with

all comers ; others, more humble still, descend to the ground, where they glide with pretty minc¬ ing steps and affected turning of the head this way and that, their delicate flesh-tinted feet just stirring the layer of withered leaves with which a past season carpeted the ground. We seek warblers everywhere in their season ; we shall find them a continual surprise.®

Of the Sylvicolinae nine genera and 46 spe¬ cies are North American, the principal genera ‘ being Dendroica, the largest by far, Hehnintho-phila and Geothlypis. The diagnostic colors of many are sufficiently indicated by their vernacu¬ lar names, which, however, are generally de¬ scriptive of the full-plumaged males only. The black and white creeping warbler (Mniotilta varia) has the sexes similarly colored and is a common migratory woodland species through¬ out eastern North America, breeding from Vir¬ ginia northward and wintering from the Gulf Coast into South America. In feeding habits it resembles the brown creeper rather than the other warblers, climbing the tree trunks and larger branches by clinging to the bark, search¬ ing the crevices for insects and their eggs, but not using the tail as a prop. The song is a feeble unmusical trill, but the call notes are varied. A simple nest on the ground of bark, moss, grass, etc., contains four or five eggs, white with profuse reddish-brown spots. Pro-tonotaria includes only P. ciirea, the prothonotary warbler, a beautiful species whose pre¬ vailing color in both sexes is golden with

olivaceous and bluish above and the tail-quills largely white; the bill is unusually long, acute and black. It breeds in most of the United States east of Nebraska, but is rare in the East north of Virginia. It haunts swampy woods and thickets and nests in holes of trees. An interesting species of striking aspect is the worm-eating warbler {Helmintheriis vermi-vorus), with a stout acute bill without bristles, a very short tail and strong feet. In both sexes the back is olivaceous, the under parts buff and the head conspicuously marked with four longi¬ tudinal black stripes. A common bird of the eastern United States west to Nebraska and north to southern New England, breeding over this range and wintering in the Antilles and northern South America. It is a bird of the woodland undergrowths and nests on the ground, the four or five eggs being brilliant white with fine dots of reddish brown. The popular name is a misnomer as it does not feed on worms but chiefly on caterpillars and spiders. The best known of -the Helminthophilce is the blue-winged yellow warbler (H. pinus) having about the limits of range of the last and much resembling it in habits though they are more active and arboreal and often frequent the shrubbery of parks and well-kept grounds. The Nashville warbler {H. ruficapilla) is a plain species; the males in breeding-dress olive above, yellow below, the latter remaining even in the duller autumn colors. Except in the extreme Northern States this species is a migrant only, but very common in the United States, breeds in the British provinces and winters in Mexico and Central America. This genus also includes the golden-winged, Tennessee and orange-crowned warblers of the eastern United States and several western spe¬ cies, besides some rarities which are supposed to be hybrids. No warbler is better known than the little gaily-dressed parula or blue-yel- low-backed warbler (Compsothlypis americana) which breeds in the United States and lower Canada west to the great plains and winters in the West Indies and Central America. They are very common in open woods during the migrations and distributed more locally in swampy districts and river valleys during the breeding period, probably attracted by the abundance of the long-stemmed Usnea or ˆSpanish moss,® of which their beautiful, usually globular hanging nests, are in chief part con¬ structed. Like the Dendroicas they are true tree-warblers, incessantly flitting about the outermost twigs, turning and hanging in every conceivable attitude and often taking short flights in pursuit of flying insects.

Dendroica comprises 24 species of the warblers found within our limits. Most of them glean for their food in the terminal twigs of trees much as does the parula and like it their songs are simple feeble trills. They come in troops when the forest trees are bursting into leaf in May and most of them pass to the British provinces or at least to the northern woods and high mountain ridges to breed, but a few, like the yellow warbler, remain through the summer. With few exceptions they never nest on the ground. The males in breeding plumageˆ are handsomely and variously colored, but nearly always have much white on the tail quills, the female, young and male autumn

plumage is generally very different. One of the best known but hardly a good representa¬ tive example is the yellow or summer warbler {D. (estiva), one of the few species which has an extensive breeding range in the United States. It is abundant almost everywhere in North America and its warm glowing yellow color and the absence of white from the tail are diagnostic. It is less of a woodland bird than many of the others and frequents orchards, parks and roadside thickets, building a pretty nest, compactly felted of soft vegetable fibres, bits of wool, paper, etc., securely wedged in the upright fork of a bush or low tree. More than one brood of four or five young is some¬ times raised and th'ese birds often outwit the cowbird which drops an egg in their nests by covering the intruder with a false floor and hatching their own brood above it. The spring song of the yellow warbler is very sprightly. Other species which breed over considerable areas in the United States are the cerulean warbler (D. ccoriilea), chestnut-sided warbler {D, pennsylvanica) , yellowthroated warbler {D. dominica) , pine warbler {D. vigorsii), and prairie warbler {D. discolor) in the East and the black-throated gray warbler {D. nigrescens) , Townsend's warbler {D. townsendi), hermit warbler (D. accidentalis) and golden-cheeked warbler {D. chrysoparia) in the West. Well-known migrant species, which breed in Canada and more or less in our northern border States and along the high mountain ridge south¬ ward even to North Carolina and Georgia, are the Cape May warbler {D. tigrina), black-throated blue warbler (D. ccerulescens), yel-low-rumped or myrtle warbler {D. coronata) , which lingers into the winter even in the lati¬ tude of Philadelphia, magnolia warbler (D. maculosa), bay-breasted warbler (D. cas-tanca), the beautiful black and orange Black¬ burn's warbler {D. blackbuniicc) , black throated green warbler (D. virens) and the Eastern palm warbler {D. palmarum hypochrysea) .

Very distinct in appearance from all of the above are the members of the genus Seiurus, of ground-loving habits and thrush-like plu¬ mage,

brownish above and streaked or spotted below. We have three species. The golden-crowned thrush or oven-bird (5*. aurocapillus) slightly exceeds six inches in length, and both sexes are of a rather bright olive color above, with a golden crown-streak bounded by black. It inhabits the greater part of North America and breeds from Virginia and Kansas north¬ ward, building its over-arched nest of leaves and grasses on the ground and laying therein four to six white eggs thickly speckled with brown and lilac. The oven-bird is very com¬ mon in the summer in the New England and Middle States, inhabiting low damp woods and living mostly on or near the ground, searching for its chiefly insect food among the fallen leaves. Besides its ordinary loud clear whistled song, it has an exquisitely sweet nuptial song seldom heard. The common water-thrush or water-wagtail (S', novcboracensis) is slightly smaller and of a nearly uniform rich olive-brown above, pale yellow, streaked with brown below. Its breeding range is northerly in the eastern United States to Illinois and to the Arctic, and it winters in middle America. The water-thrush inhabits woodlands in the vicinity

ot sUcams and swamps and, resembles the wapˆ- tails in its habit of wading and raising the tail to balance the body on its insecure footing. The nest of leaves, grasses and fine roots is built on the ground in the shelter of a log and the crystalline white eggs profusely speckled with brown number four to six. A related spe¬ cies of similar habits, the large-billed or Louisiana water-thrush (.S', niotacilla), is more southern in range but very similar in appear¬ ance. Both are exquisite songsters.

Geothlypis contains a group of ground-war¬ blers with the feet stout and the wings generally very short and exceeded in length by the tail. A typical, very common and wide-ranging spe¬ cies is the Maryland yellowthroat (G. trichas) which breeds from Georgia to Labrador. The male is a handsome bird, olive above, chiefly clear yellow below, the face with a broad rich black mask which the female lacks. It lives in thickets and shrubbery, especially where the ground is low and wet. The nest is skilfully concealed in tufts of herbage on the ground and is constructed of leaves, twigs, grass, rootlets, *etc.* The four to six eggs are white and rather sparingly spotted about the large end with brown. The song is a loud, clear, lively whistle sung vvith great energy. A related species is the Kentucky warbler (G. fornwsa), which dif¬ fers in having in place of the black mask a black crown and a black bar running obliquely downward and backward from the eye and be¬ tween them a yellow superciliary stripe. It is more southern than the yellowthroat, but breeds throughout the eastern United States. Much less common than the yellowthroat its habits are essentially similar, but it is a bird more of the woodland borders and underbrush than of the swampy thickets. Other species are the mourning warbler (U. Philadelphia) , the Connecticut warbler (G. agilis) and several southern and western species closely similar to the Maryland yellowthroat.

Coming now to the Setophagin<ˆ, we find five genera and 10 species recorded as North American, six of which are Mexican and scarcely or not at all cross the borders of the United States. The remaining four are gener¬ ally common eastern birds. Typical of the sub¬ family is

the redstart (Setophaga ruticilla), not at all related to the redstart of Europe. The male is a handsome bird of lustrous black plumage, the belly white, and the wing lining, a patch on the primaries and one on each side of the tail quills of rich orange which appears and disappears as the bird opens and closes these parts in its never-ceasing activity in the pursuit of insects among the outer foliage of trees and the surrounding air. As a catcher of flying insects the redstart is very skilful ; its song is lively and pleasing and its nest a neatly felted cup of soft vegetable fibres in an upright fork of a small tree. It is found throughout most of North America and breeds in the north¬ ern half of the United States and in Canada. The Canadian flycatching warbler (Sylvania canadensis) is bluish ash above, rich yellow l)clow, with numerous small black streaks on the crown and more distinct ones on the throat, and a bjack band running backward from the eye. This handsome species is found from the - base of the Rocky Mountains eastward and breeds from southern New England and New York to Newfoundland. It is abundant during

the migrations and spends much of its time making short flights to secure passing insects, from which it immediately returns to its un¬ ending activity in the higher branches of the trees. The nest is on the ground and the eggs of the usual warbler type. Two related species are the hooded warbler {S. mitrata) and the black-capped warbler (S. pusilla), both chiefly yellow, the first with a black cap and throat and a rich yellow face mask, the last smaller and with the black confined to the crown. The hooded warbler is chiefly southerly and hardly reaches the northern limits of the United States, but breeds southward to the Gulf Coast, build¬ ing its nest in low bushes. The black-cap, on the other hand, is even more northerly and has a wider western range than the Canadian warbler, but like it nests on the ground.

Of the Icteriince our fauna contains but a single genus and species, the yellow-breasted chat (Icteria virens), isolated in structure and standing quite apart from the other warblers; and in manners equally unique. The length is about seven and one-half inches, the color clear olive-green above; the throat, breast and sides bright rich yellow; the belly, superciliary and maxillary stripes and a spot below the eye, white; the cheeks and lores black and the bill blue-black. The form is stout and the wings much shorter than the tail. In two subspecies the yellow-breasted chat inhabits the entire United States except the northern tier. It is locally abundant, living in tangled thickets on warm hillsides and sheltered valleys, and build¬ ing a loose but pretty nest of leaves, plant stems, strips of bark and grass in the thickest patches of briers,

often in association with many of its fellows. The eggs, which are about an inch long by four-fifths of an inch in diam¬ eter, are usually three or four in number, vari¬ ously spotted and blotched with brown and lilac. The chats are among the most remarkable of cur songsters, but have no definite song, pro¬ ducing a constant succession of extraordinary sounds with much force and expression. Some are clear whistles endlessly modulated and com¬ bined, some are hoarse guttural notes, some sharp, coughing sounds, some cat-like mews, some are original, others imitated, but all are uttered with a vehemence and abandon that is quite inimitable. Few birds surpass the chat in imitative or ventriloquistic powers and few combine their nuptial song, which is heard both by night and day, with such a series of gro¬ tesque aerial antics.

The warblers of Europe belong to the family SylviidcB, related to the thrushes and by many ornithologists combined with these and other birds in the family Turdidee used in a wide sense. The Syhiidee have the bill of moderate length and slender form, broad at the base and tapering toward the extremity. The tip of the upper mandible is curved downwards, and is slightly notched. The wings are elongated with 10 primaries and the tail has often only 10 quills, the tarsi long and slender. The family includes a variety of subfamilies and a large number of genera, presenting quite as varied an array of structures and habits as do the Mniotiltidce and quite as difficult to classify. All are small insectivorous and mostly plain-colored birds. They are especially characteris¬ tic of Eurasia, though some breed in Australia, New Zealand and the Polynesian Islands,

Regiihis and Phyllopneusies inhabit North America. To this group belongs the genus Sylvia, represented by such forms as the white-throat {Sylvia undata), garden warbler (S. hortensis), chiff-chaff {S. rufa), and other equally notable species elsewhere described.

Besides an Asiatic species {Phyllopneustes borealis) which extends its breeding range into Alaska the only North American representa¬ tives of this very extensive family are four spe¬ cies of Regulus, diminutive

little birds known as kinglets (q.v.). The dainty little gnatcatch-ers (q.v.), of which three species are North American, and which with their allies form the family Polioptilidce, are very closely related to the Sylviidce. Some of the flycatching Musci-capidce are called warblers in Australia.

Consult Baird, Brewer and Ridgway, ˆNorth American Birds-* (1874) ; Coues, ˆKey to North American Birds ˆ (Boston 1903) ; Ridgw'ay, ˆBirds of North and Middle Americaˆ (Wash¬ ington 1902) ; Wilson, ˆAmerican Ornithologyˆ (Philadelphia 1814) ; Jones, *ˆSongs of the Warblersˆ (Oberlin 1900) ; Dresser, ˆBirds of Europe* (London 1881) ; Chapman, ˆWarblers of North America* (New York 1907).

J. Percy Moore, University of Pennsylvania.

WARBLES, in cattle. See Ox-bot.

WARBURG, Paul Moritz, American banker : b. Hamburg, Germany, 10 Aug. 1868. He was educated at the Realgymnasium, Ham¬ burg, later studied in France and England and traveled widely. He entered his father's bank¬ ing business at Hamburg in 1894; and for sev¬ eral years after 1902 he was a member of the banking firm of Kuhn, Loeb and Compan}', New York, as well as serving as director for various banks, trust companies, railroads and other organizations. He was an earnest advo¬ cate of a central banking system in the United States, and in 1914 he was appointed by Presi¬ dent Wilson a member of the newly-formed Federal Reserve Board, whereupon he resigned his directorships and similar connections. Upon the expiration of his term in 1918 he insisted upon retiring, owing to criticism directed at his German birth. He was active on various committees in connection with the European War. A..uthor of ˆEssays on Banking Reform in the United States* (1914).

WARBURTON, Alexander Bannerman, Canadian statesman : b. Charlottetown, Prince Edward Island, 5 April 1852. He was gradu¬ ated at King's College, Windsor, Nova Scotia, in 1874, and later studied at the University of Edinburgh He was called to the bar in 1879 and engaged in practice at Charlottetown. He was elected to the legislature of Nova Scotia in 1891; served as premier in 1897-98; and in 1898-1904 was judge of Queen's County Court. He was elected to the Dominion Parliament in 1908. He is a governor of King's College, Windsor, and is known as a writer on political subjects, and on the history of Prince Edward Island, forestry, education and other subjects.

WARBURTON, Bartholomew Elliott George (Eliot Warburton), Irish author: 1). near Tullamore, King's County, 1810; d. a.t sea, 4 Jan. 1852. He was educated at Trinity Col¬ lege, (Cambridge, and was called to the bar of Ire¬ land in 1837. Later, however, he abandoned law for travel and literary pursuits. He achieved a

great success with his first book, <The Crescent and the Cross* (1844; dated 1845), a narrative of his travels in 1843 through Turkey, Syria, Palestine and Egypt. It passed rapidly through many editions, sharing honors with Kinglake's 'Eoihen* of the same year. He w.as an ear¬ nest advocate of annexation of Egypt by Eng¬ land, and his writings on the East possessed a great popular appeal. In 1851 the Atlantic and Pacific Junction Company appointed him its spe¬ cial representative to secure friendly relations with the natives of the Isthmus of the Penin¬ sula of Darien, but he perished at sea when the steamship Amazon burned and sank 4 Jan. 1852. He was also author of ˆThe Memoir of Prince Rupert and the Cavaliers* (1849) ; the novels 'Reginald Hastings* (1850) ; ˆDarien, or the Merchant Prince* (1851), *etc.*

WARBURTON, William, English prelate : b. Newark-upon-Trent, Nottinghamshire, 24 Dec. 1698; d. Gloucester, 7 Jan. 1779. He studied law and practised in Newark, but soon gave up his profession and in 1723 took orders in the English Church, becoming rector of Brant Broughton, Lincolnshire, in 1728. In 1726 he formed an aquaintance with Theobald, to whose edition of Shakespeare he contributed. In 1727 he began to dis¬ tinguish himself as an original writer by his inquiry into the ˆCauses of Prodigies and Mira¬ cles,* and in 1736 appeared his 'Alliance be¬ tween Church and State, or the Necessity and Equity of an Established Religion and Test Law.* The first volume of his chief work was published in 1737, entitled 'The Divine Lega¬ tion of Moses demonstrated on the Principles of a Religious Deist from the Omission of the Doctrine of a Future State of Rewards and Punishments in the Jewnsh Dispensation.* This paradoxical performance met with adversaries among all parties, who concurred in criticising and censuring the theory on which it is founded, and he replied to his critics in a vindication of his opinions. Having published in the journal called the Works of the Learned, in 1739 and 1740, a defense of the 'Essay on Man* against the remarks of De Crousaz of Geneva, Pope ac¬ knowledged his obligations to Warburton, and an intimacy was established. On his death in 1744 Pope bequeathed to Warburton half his library and the copyright of such of his works already printed as were not otherwise disposed of. In 1747 Warburton

appeared as the editor of Shakespeare and proved himself to be but a poor commentator. In 1750 appeared ‘Julian, or a Discourse concerning the Earthquake and Fiery Eruption which defeated that Emperor’s Attempt to rebuild the Temple, elicited by Mid¬ dleton’s Inquiry concerning the Miraculous Powers of the Christian Church.* In 1757 he became dean of Bristol, and two years after bishop of Gloucester. In 1768 he established a lecture at Lincoln’s Inn on the evidence in favor of Christianity from the prophecies of the Old and New Testaments. His collected works were published by Hurd in 1788. Consult the biography of Watson (1863) ; and Mark Patti-son, ‘Essays* (1889).

WARD, ward. Sir Adolphus William, English historian : b. Hampstead, 2 Dec. 1837. lie was graduated from Peterhouse College, Cambridge, and became a Fellow of his col¬ lege. In 1866 he was appointed professor of

t

history and English literature in Owens Col¬ lege, Manchester, an institution of which he was principal from 1888 until his resignation in 1897. He took a leading part in the movement for the foundation of Victoria University, and in 1900 became master of Peterhouse. He was knighted in 1913, after serving two years as president of the British Academy. He published a transla¬ tion of Curtins' ˆHistory of Greeceˆ (1868-73), and in 1875 his valuable ˆHistory of English Dramatic Literature to the Death of Queen Anneˆ appeared (new ed., 1899). Among his other works are ˆThe House of Austria in the Thirty Years' War> 0869) ; ˆChaucerˆ (1880) and ˆDickensˆ (1882) in ˆEnglish Men of Let¬ tersˆ series; ˆThe Counter-Reformationˆ (1ˆ8) ; ˆSir Henry Wottonˆ (1897) ; ˆGreat Britain and Hanoverˆ (1899) ; ˆThe Electress Sophia and the Hanoverian Successionˆ (1903; 2d ed., 1909) ; ˆLillo's London Merchant and Fatal Curiosityˆ (1906) ; ˆGermanyˆ (Vol. I, 1916; Vol. H, 1917) and numerous contribu¬ tions to the ˆEncyclopaedia Britannica,ˆ the ˆDictionary of National Biography, > ˆCam¬ bridge Modern Historyˆ and ˆCambridge His¬ tory of English Literature.ˆ

WARD, Artemas, American general: b. Shrewsbury, Mass., 1727; d. there, 28 Oct. 1800. He was graduated at Harvard College in 1748; early entered public life as a representative to the General Court ; became a member of the executive council and a justice of the Court of Common Pleas of Worcester County. In the French and Indian War he served as lieutenant-colonel under Abercrombie and at the opening of the Revolutionary War was in command of the besieging forces at Boston till the arrival of Washington, after which he wˆas stationed with the right wing on Roxbtiry Heights. He re¬ signed his commission of major-general, in April 1776, but at the request of Washington continued to serve till the end of May. He was president of the Massachusetts executive coun¬ cil in 1777, a member of the legislature for 16 years and sat in Congress 178(>-81 and 1791-95.

WARD, Artemus. See Browne, Charles Farrar.

WARD, Bernard (Nicolas), English Ro¬ man Catholic bishop: b. Old Hall, Hertford¬ shire, 4 Feb. 1857. He was educated at Saint Edmund's College, Old Hall, and at Oscott Col¬ lege, Birmingham, and was ordained priest in 1882. He served as a master at both Saint Edmond's and Oscott colleges, and in 1893-1916 was president of Oscott. He was rector of Holy Trinity, Brook Green, in 1916-17. He was appointed domestic prelate to the Pope in 1895; Roman Catholic

canon of Westminster in 1903; and since 1917 he has been bishop of Brent¬ wood. Author of ˆHistory of Saint Edmund's Collegeˆ (1893) ; ˆLife of Saint Edmund of Canterbury > (1903) ; ˆCatholic London a Cen¬ tury Agoˆ (1905) ; ˆThe Eve of Catholic Eman¬ cipationˆ (3 vols., 1911-12); ˆThe Sequel to Catholic Emancipationˆ (2 vols., 1915), *etc.*

WARD, Edgar Melville: b. Urbana, Ohio, 24 Feb. 1839; d. 1915. He was graduated at Miami University; proceeded to study art at the National Academy of New York 1870-71 and subsequently spent six years in France (1872-78). He was a favorite genre painter and among his pictures are <The Sabot Maker> ; ˆBrittany Washwoman' ; ˆThe Quilting Party' ;

and ˆThe Coppersmith,' the latter being in the Metropolitan Museum, New York. He was made a National Academician in 1883 and sub¬ sequently was elected professor in the National Academy.

WARD, Edward Matthew, English painter: b. Pimlico, London, 14 July 1816; d. Slough, 15 Jan. 1879. His first studies were pursued in the studio of John Cawse, London, and in 1835 he entered the Royal Academy schools. During the three years 1836-39 he was in Paris, Venice and Rome, and studied fresco-painting wdth Cornelius at Munich. His first noteworthy pic¬ ture was ˆCimabue and Giotto,' exhibited at the Royal Academy (1839)-. From that time he was a regular contributor to the Academy's annual exhibition, and in 1855 was elected academician. In 1853 he was commissioned to paint eight pic¬ tures for the corridor of the House of Com¬ mons. He died from the effects of a self-in¬ flicted wound. Llis numerous oil paintings were historical and genre, and among the best of them are ˆDr. Johnson reading the Manu¬ script of the Vicar of Wakefield' (1843) ; ˆA Scene from the Early Life of Goldsmith' • (1844) ; ˆA Scene in Lord Chesterfield's Ante¬ room in 1748' (1845), now in the Tate Gallery; ˆCharles H and Nell Gwyn' (1848), in the South Kensington Museum; ˆThe Royal Family •of France in the Temple' (1851) ; ˆCharlotte Cor day going to Execution' (1852) ; the ˆAnte¬ chamber at Whitehall during the Dying Mo¬ ments of Charles H' (1861) ; ˆHogarth's Stu¬ dio, 1739' (1863) ; ˆLuther's First Study of the Bible' (1869), now owned by the British and Foreign Bible Society; ˆThe Eve of Saint Bar¬ tholomew' (1873); ˆMarie Antoinette in the Conciergerie' (1874), *etc.* Many of these are well known in engravings. Consult Dafforne, ˆLife and Works of E. W. Ward' (1879).

WARD, Elizabeth Stuart Phelps, Ameri¬ can novelist and poet,

daughter of Austin Phelps (q.v.) : b. Andover, Mass., 31 Aug. 1844; d. Newton, Mass., 28 Jan. 1910. In 1888 she was married to H. D. Ward (q.v.), with whom she sometimes collaborated. Her first work to attract attention was ˆThe Gates Ajar' (1868), which had a very wide reading and was instrumental in substituting reasonable healthy views concerning a future existence in place of the vague and conventional ideas on the subject then prevalent in religious circles. Among her later works were ˆMen, Women and Ghosts' (1869) ; ˆThe Silent Partner' (1870) ; ˆHedged in' (1870) ; ˆThe Story of Avis' (1877) ; '˜Beyond the Gates' (1ˆ3) ; ˆDr. Zay' (1884) ; ˆThe Gates Between' (1887) ; ˆPoetic Studies,' verse (1875) ; ˆSongs of the Silent World' (1884) ; ˆThe Struggle for Im¬ mortality' (1889), a volume of essays; ˆA Singular Life' (1895) ; ˆThe Story of Jesus Christ' (1897)

WARD, Frederick Townsend, American military leader in China: b. Salem, Mass., 29 Nov. 1831 ; d. Ningpo, China, 21 Sept. 1862. He served in the French army in the Crimean War and later was for a time a ship broker in New York. The Taiping Rebellion in China enlisted his interest in 1860 and he went to Shanghai. There he gathered a band of ad¬ venturous spirits of various nationalities and approached the local Chinese authorities with, an offer to capture the city of Sungkiang in

return for a large sum of money. The city was held by about 10,000 rebels, but Ward made good his offer to take it and not only re¬ ceived his monetary reward but was made a mandarin of the fourth class. He cleared the country about Shanghai of rebels, receiving a monetary reward for each victory and later organized and drilled three regiments of native troops. With this force he met and defeated a superior force of rebels, saving Shanghai from capture and later clearing a 30-mile belt around the city. From this time he was taken into the confidence and esteem of the French and English officers on duty there and who had hitherto considered him merely an adventurer. He was made a mandarin of the highest rank, married a Chinese woman and was appointed admiral-general by the emperor. He was killed in a skirmish at Ningpo at a time when he was making arrangements to return to the United States to take part in the Civil War. His ad¬ mirably trained and disciplined military force afterward became the micleus of Gordon's famous ^^Ever Victorious Army® and he was generally regarded as a military genius. He was honored by the Chinese with burial in the Confucian Cemetery at Ningpo, where a great mausoleum was erected to him ; and monuments also were erected at the scenes of his important victories.

WARD, Henry Augustus, American natu¬ ralist : b. Rochester, N. Y., 9 March 1834; d. Buffalo, N. Y., 4 July 1906. He was educated at Williams College and at the Lawrence Scien¬ tific School at Harvard, where he was assistant to Professor Agassiz. He studied in Paris and traveled through Europe and the Orient in 1855-59 ; occupied the chair of natural sciences at Rochester University in 1860-65 ; and in 1866-69 was manager of gold mines in Montana and South Carolina. He traveled in various coun¬ tries between 1870 and 1900 collecting cabinets of mineralogy and geology, which he distributed among the colleges and universities of the United States. He founded at Rochester Ward's Natural Science Establishment, was naturalist to the United States expedition to Santo Domingo in 1871 and published ˆNotices of the Megatherium Cuvieriˆ and ˆDescription of the Most Celebrated Fossil Animals in the Royal Museums of Europe.ˆ

WARD, Herbert Dickinson, American au¬ thor, son of W. H. Ward (q.v.) : b. Waltham, Mass., 30 June 1861. He was graduated fri)m Amherst and in 1888 was married to Elizabeth Stuart Phelps (q.v.) with whom he wrote 'The Master of the Magicians^ (1890) ; and 'Coine Forth^ (1890). Among works of which he is sole author are ^The New Senior at Andover^ ; ^The Burglar who Moved Paradise^ (1897) ; ^The White Crown and Other Stories' (1894); ^The Light of the World' (1900; ^A Dart to the Pole' ; ^Love Letters of an American Girl.'

WARD, Mrs. Humphry. See Ward, Mary Augusta Arnold.

WARD, James, English artist; b. London, 23 Oct. 1769; d. Cheshunt, Hertfordshire, 23 Nov. 1859. He studied the engraver's art in his boyhood and also early turned his attention to painting, in which he was a pupil of Morland, who married his sister. He was elected R.A. in 1811. His first painting was exhibited in

1790, and from that time to his death he pro¬ duced numerous pictures of different types, though his best work was done in the painting of animals. His most important works are <^Bull-baiting' (1797); the ^Alderney Bull, Cow, and Calf in a Meadow' (1820-22), his masterpiece, now in the National Gallery, painted in rivalry with Paul Potter's celebrated picture; ^Allegory of Waterloo' (1817), a sketch for the British Institution which he afterward painted larger with less success ; ^Gordale Scar, Yorkshire,' in the National Gallery (this great picture with its noble group of cattle which was presented by Lord Ribber-dale to the British Museum with a view to its transference to the British Museum was rolled up and consigned to a cellar until 1858, though it eventually reached its destination in 1878) ; ^Harlech Castle,' also in the National Gallery; ^Regent's Park in 1807' ; ^A Cattle Piece,' also in the National Gallery; ^Bulls Fighting in a Landscape,' a work of great merit, now in the South Kensington Museum; ^Donkey and Pigs,' also in the museum at South Kensing¬ ton; ^Pigs,' and ^A Chinese Sow,' in the same collection; ^The Council of Horses,' in the Manchester Gallery, and ^De Tabley Park,' in the Oldham Gallery. Among his engravigs the most noteworthy are after Rembrandt, Hoppner, Rubens, Northcote, Morland and Reynolds. As an engraver he was not less successful than as a painter and a complete set of impressions of all his plates, in their different states, 300 in all, was presented by him to the British Museum before his death.

WARD, James, English psychologist and metaphysician: b. Hull, 27

Jan. 1843. He was educated at the Liverpool^ Institute, the uni¬ versities of Berlin and Gottingen and at Trinity College, Cambridge.^ He was ordained in the Congregationalist ministry and was for a year in charge of Emmanuel Church, Cambridge, but later engaged in psychological research. He became a Fellow of Trinity College in 1875, lecturer there in 1881 and in 1897 he was called to the chair of mental philosophy at Cambridge University. He was Gifford lecturer in psy¬ chology at Aberdeen University in 1895-97 and lecturer at Saint Andrew's in 1908-10. He has accomplished notable work in both psychology and metaphysics ; has received honorary de¬ grees from the universities of Cambridge, Edin¬ burgh and Oxford; and in 1913 was elected to the French Institute. He has contributed extensively to the Journal of Physiology, Mind, and British Journal of Psychology. He is author of ^Naturalism and Agnosticism' (1899; 4th ed., 1915) ; ^Heredity and Memory' (1913) ; ^Psjxhological Principles' (1918), *etc.*

WARD, John Henry Hobart, American soldier: b. New York, 17 June 1823; d. Monroe, N. Y., 25 July 1903. He entered the United States army in 1841, was appointed sergeant-major in 1845, served through the Mexican War, and was afterward successively assistant commissary-general and commissary-general of New York. He organized a regiment of volun¬ teers at the outbreak of the Civil War, was appointed colonel and was engaged at the first battle of Bull Run. He later participated in the Peninsular campaign, in the second battle of Bull Run and on 4 Oct. 1862 was promoted brigadier-general of volunteers. He was subse-

qncntly engaged with the Army of the Potomac and vvas in command of a brigade at Fred-Chancellorsville, Gettysburg, the Wilderness, Spottsylvania and other important oattles. He was honorably mustered out of service 21 July 1864 and from 1870 until his death was clerk of the Superior Court of New York City.

WARD, John Quincy Adams, American sculptor: b. Urbana, Ohio, 29 June 1830; d. 1 May 1910. In 1850 he entered the studio of Henry K. Browne, where he studied six years. In 1861 he opened a studio in New York, where as the fruits of his residence in the Indian country, he modeled his Hndian Hunter.> This was followed by ˆThe Good Samaritan,ˆ ˆCom-rnodore M. C. Perry, ˆ with reliefs and ˆThe Freedman.ˆ Among his best-known work in later years he produced the ˆCitizen Soldier,> and statues of ˆShakespeare,ˆ ˆGeneral Rey¬ nolds,ˆ ˆGeneral Washington,ˆ ˆGeneral Israel Putnam,> ˆGeneral Thomas,ˆ ˆGeneral Daniel Morganˆ and ˆLafayette.ˆ He subsequently modeled the colossal statue of ˆWashingtonˆ for the New York sub-treasury building, a colossal statue of ˆPresident Garfieldˆ and ˆThe Pilgrim.ˆ The crowning group of Wictoryˆ in the arch for the Dewey reception in New York in 1899 was also his work. For three years he was vice-president and for one terrn president of the National Academy of Design, and wˆas trustee of the Metropolitan Museum of Art.

WARD, Lester Frank, American geologist: b. Joliet, Ill., 18 June 1841 ; d. 1913. Graduated from the Columbian University in 1869, he was assistant geologist in the United States Geo¬ logical Survey in 1ˆ1-88, and geologist in 1888. He made especial investigations in the field of palseobotany. Among his publications are ˆ Guide to the Flora of Washington and Vicin¬ ityˆ (1881); ˆSketch of Palaeobotanyˆ (1885); ˆTypes of the Laramie Floraˆ (1887) ; ˆGeo¬ graphical Distribution of Fossil Plantsˆ (1888) ; ˆOutlines of Sociologyˆ (1898) ; ˆPure Sociol¬ ogyˆ (1903), and ˆPsychic Factors of Civiliza¬ tionˆ (2d ed., 1906).

WARD, Lydia Avery Coonley, American writer: b. Lynchburg, Va., 31 Jan. 1845. She was married in 1867 to J. E. Coonley (d. 1882) and in 1897 to H. A. Ward, and was president of the Chicago Woman's Club

1895-96. She has published ˆUnder the Pines and Other Versesˆ (1895); ˆOur Flag,ˆ a cantata, with music by G. F. Root (1896) ; ˆSinging Verses for Childrenˆ (1897) ; ˆLove Songs ˆ (1898).

WARD, Mary Augusta Arnold, English novelist: b. Hobart, Tasmania, 11 June 1851; d. London, 24 March 1920. She was a daughter of Thomas Arnold (q.v.), son of Arnold of Rugby, and in 1872 was married to Thomas Humphry Ward. Her father, having become a Roman Catholic, gave up his educational post in Tasmania and returned to England in 1856 and there his daughter was educated. The father held appointments at Dublin and Bir¬ mingham, and after 1885 resided at Oxford, where she also lived with her husband until they removed to London in 1880. Her long residence in Oxford and consequent familiarity with the intellectual atmosphere of the university no doubt gave her that inclination toward ethical

discussion which so rnarkedly influenced the character of her writing. In 1890 she was one of the principal founders of University Hall, a settlement among the poor in the Saint Fancras district of London, and since 1897 oc¬ cupying a spacious building near Tavistock square, erected for that purpose by Passmore Edwards. In the work of this settlement Mrs. Ward put a vast amount of personal en¬ deavor and thought, and its influence has been commensurate with the pains that have been taken in its behalf. Mrs. Ward's first impor¬ tant literary work was a translation of ˆAmiel's JournaP (1885), but prior to this she had pub¬ lished ˆMilly and Olly,ˆ a child's story. These were followed by ˆMiss Bretherton,ˆ a story (1886), and ˆRobert Elsmereˆ (1ˆ8), which brought her almost imrnediately a world-wide fame, being translated into several languages, and having an immense sale. Later works of hers are <The History of David Grieve> (1892) ; ˆMarcellaˆ (1894); ˆSir George Tressadayˆ (1896); <Helbeck of Bannisdale> (1898); ˆEleanor> (1900); ˆLady Rose's Daughter> (1902) ; <The Marriage of William Asheˆ (1905) ; < Fenwick's Career > (1906) ; ˆUnitarianismˆ and the'Future> (1894). All of Mrs. Ward's novels display much intellectual power and intensity of moral purpose, and her in¬ fluence upon the social and ethical thought of England and the United States has not been inconsiderable. Her novels are of varying de¬ grees of excellence, ˆHelbeck of Bannisdaleˆ being perhaps the most powerfully conceived since ˆRobert Elsmere.ˆ She was a founder of the Women's National Anti-Suffrage League in 1908, and took the platform in defense of their views on several occasions.

WARD, Nathaniel, English Puritan divine: b. Haverhill, Suffolk, 1578;

d. Shenfield, Essex, 1652. He was educated at Emmanuel College, Cambridge, traveled widely on the Continent, took orders in 1618 and from 1620 to 1624 ap¬ pears to have been chaplain to the colony of British merchants at Elbing, Prussia. On his return to England, he was curate of Saint James', Piccadilly (1626-28), and subsequently rector of Stondon Massey, Essex. On account of his Puritan views he was frequently cited before Laud, who finally (1633) deprived him of the living. He emigrated in 1634 to Massa¬ chusetts, and became minister to a settlement at Agawam,ˆ later called Ipswich. This post, because of ill-health, he resigned in 1636. In 1639 he was appointed, with the Rev. John Cotton (q.v.), to frame the first code of laws for the colony, — the ˆBody of Liberties,ˆ passed by the General Court in 1641. This compilation is in many respects a remarkable one, and displays wide knowledge of law. Ward was influential in the colonial govern¬ ment; in 1645 he became a member of the com¬ mittee for the revision of the Massachusetts laws. But he is chiefly known as the author of the ˆˆmost eccentric and amusingˆˆ work written in colonial America. This book, ˆThe Simple Cobbler of Agawam,ˆ was printed at London in 1647, and passed through four editions in that year. It appeared under the pseudonym of Theodore de la Guard — Theodore being the Greek equivalent of the Hebrew Nathaniel, de-la Guard the French for Ward — who turns from his humble last to satirize England old

and new. Amid some curious syntax, there is in it an abundance of eloquence and wit, mak¬ ing it still very readable. There is, too, rnuch of the intolerance of the place and time. Ward went back to England in 1646. His ˆ Cob¬ blerˆ had gained some notice, and he preached before the Commons in 1647 and received the living of Shenfield, Essex, in 1648. Among his further publications were ˆA Religious Re¬ treat Sounded to a Religious Armyˆ (1647) ; ˆTo the High and Honorable Parliament, Humble Petitions, Serious Suggestions and Dutiful Expostulationsˆ (1650) ; and probably, ˆMercurius Anitmechanicusˆ (1648), denounc¬ ing the execution of Charles. Consult Dean, ˆMemoir of Nathaniel Wardˆ (1868) ; Tyler, ˆA History of American Literatureˆ (1878) ; the ˆCollection of the Massachusetts Historical Society,ˆ 3d ser., I, VIII; 4th ser., VII.

WARD, Nathaniel Bagshaw, English bot¬ anist: b. London, 1791; d. Saint Leonard's Sussex, 4 June 1868. He was apprenticed to his father, a medical man, »studied at the Lon¬ don Hospital and attended the lectures of Thomas Wheeler at the Society of Apothe¬ caries. He succeeded to his father's practice but devoted his leisure to collecting and culti¬ vating plants. In 1836 he observed a seedling which had sprouted and was growing in a bottle, which suggested to him the possibility of growing plants under adverse atmospheric conditions, and resulted in his construction of the Wardian Case. The high value of the case was demonstrated by the successful con¬ veyance of 20,000 tea plants from Shanghai to the Himalayas; and later cinchona plants were introduced into India through the same means. He collected a herbarium of 25,000 specimens ; was one of the founders of the Microscopical (now the Royal Microscopical) Society, and was elected to the Royal Society in 1852. Author of ˆOn the Growth of Plants in Closely Glazed Casesˆ (1842).

WARD, Susan Hayes, American author, sister of W. H. Ward (q.v.) : b. Abington, Mass., 26 Nov. 1838. She was educated at Wheaton Seminary, Mass., under Lucy Larcom (q.v.),. studied art in New York, Boston, Dres¬ den and Paris, and later studied at the Woman's Medical College in Boston. She afterward engaged in lecturing on art; was art-critic on the New York Independent in 1883-93, and office editor in 1892-98. Her writings include ˆChrist at the Doorˆ (1872) ; ˆSabrina Hackettˆ ; ˆHistory of the Broadway Taber¬ nacleˆ (1901); ˆGeorge Hepworth,ˆ a biography (1903), *etc.*

WARD, Thomas Humphry, English au¬ thor and journalist: b. Hull, 9 Nov. 1845. He was educated at Oxford, and was married to Mary Augusta Arnold, since widely known as Mrs. Humphry Ward, in 1872. He editea ˆWard's English Poetsˆ (1881-82) ; ˆEnglish Art in the Public Galleries of Londonˆ (1888) , ˆThe Reign of Queen Victoriaˆ (1887) ; ˆMen of the Reignˆ (1885) ; ˆMen of the Time,ˆ 12th ed.

WARD, Wilfrid Philip, English author, son of W. G. Ward (q.v.) : b. Ware, Hertford¬ shire, 2 Jan. 1856; d. 9 April 1916. He was edu¬ cated at Ushaw College, Durham, and the Gregorian University at Rome, and was lecturer at the former in 1890. He has been a member

of the Council of the Catholic Union of Great Britain since 1886, and has published ˆThe Wish to Believeˆ (1884); ˆThe Clothes of Religionˆ (1886) ; ˆWilliam George Ward and the Oxford Movementˆ (1889) ; ˆWilliam George Ward and the Catholic RevivaP Q893) ; ˆWit¬ nesses to the Unseenˆ (1894) ; ˆLife and Times of Cardinal Wisemanˆ (1897) ; <Life of Cardi¬ nal Newmanˆ (1908) ; ˆMan and Mattersˆ

(1914).

WARD, William, English Baptist mission¬ ary: b. Derby, 20 Oct. 1769; d. Serampore, India, 7 March 1823. He was a printer who was licensed as a preacher and going to India in 1799 settled at Serampore. Besides printing various religious works in the Bengali language, he wrote ˆAn account of the Writings, Religion and Manners of the Hindoos including Trans¬ lation from their Principal Worksˆ (1811, 5th ed., 1863), which was long the principal author¬ ity upon Indian affairs.

WARD, William George, English Tractarian leader and Roman Catholic theologian : b. London, 21 March 1812; d. Hampstead, London, 6 July 1882. Educated at Winchester College, he entered Christ Church, Oxford, in 1830, ob¬ tained a scholarship at Lincoln College in 1833, was graduated in 1834 and about the same time secured election to a Fellowship at Balliol. He then took orders, and was a lecturer in mathe¬ matics and logic. He soon became a powerful influence in Oxford life, especially on its re¬ ligious side, among those more or less affected by him being Archbishop Tait, Benjamin Jowett, Dean Stanley and the poet Clough. He in turn was profoundly influenced by John Henry Newman, whose famous ˆ Tract 90ˆ he de¬

fended in two pamphlets. The publication, in 1843, of William Palmer's ‘ˆNarrative of Events connected with the Publication of Tracts for the Timesˆ produced from Ward in reply his famous work ˆThe Ideal of a Christian Church considered in comparison with existing Prac¬ ticeˆ (1844), and the formal condemnation of this book by the university authorities precipi¬ tated Ward's reception into the Roman Catholic Church (1845), where he was soon followed by Newman and other Tractarians. In 1851 he became lecturer in moral philosophy in Saint Edmund's College Ware, and in 1854 the Pope gave him the diploma of Ph.D. He resigned his lectureship in 1858, and in the Dublin Re¬ view, which he edited 1863-78, contended vigorously on behalf of ultramontane principles. He was founder and leading member of the Metaphysical Society (1869), which included such opposites as Huxley and Martineau. In addition to the works already mentioned Ward wrote ˆOn Nature and Graceˆ (1860) ; ˆEssays on the Philosophy of Theismˆ (1884), a work of great ability; and many smaller works. Consult ˆWilliam George Ward and the Oxford Movementˆ (1889), and ˆW. G. Ward and the Catholic RevivaP (1893), both by his son Wil¬ frid. See Oxford Movement.

WARD, William Hayes, American Congre¬ gational clergyman and Orientalist : b. Abing¬ ton, Mass., 25 June 1835; d. 28 Aug. 1916. He was graduated from Amherst in 1856, from the Theological Seminary there in 1859 and was ordained to the ministry in the last-named year. He engaged in pastoral work and in teaching and in 1860-68 he was pastor of the Congre-

gational Church and professor of Latin at Ri-pon College. He joined the editorial staff of the New York Independent in 1868 and was chief editor from 1896 until a few years before his death. He was in charge of the Wolfe explor¬ ing expedition to Babylonia in 1884, concerning which he published a ˆ Reportˆ (1885) ; and has also written ˆWorld's Christmas Hymnˆ with his sister, S. H. Ward (1883) ; ˆBiography of Sidney Lanier> (1885), *etc.*

WARDE, ward, Frederick, American ac¬ tor: b. Wardington,

Oxfordshire, England, 23 Feb. 1851. He made his first stage appearance in 1867, acted in English cities until 1874, then came to the United States and for three years was leading man at Booth's Theatre, New York. He afterward supported Edwin Booth arid John McCullough and since 1881 has starred as a tragedian, also lecturing often on Shakes¬ pearean and other subjects. He published ˆThe Fools of Shakespeareˆ (1913).

WARDEN, David Baillie, American scholar: b. Ireland, 1788; d. Paris, France, 8 Oct. 1845. He came to the United States when young, received a classical education, was grad¬ uated from the New York Medical College and in 1804 he was appointed secretary of the United States legation at Paris. He subse¬ quently became consul and continued in that office until his death. His ˆStatistical, Political and Historical Account of the United States of North Americaˆ (3 vols., 1819) was later pub¬ lished in both French and German and his other writings include Hnquiry Concerning the In¬ tellectual and Moral Faculties and Literature of the Negroesˆ (1810) ; ˆRecherches sur les antiquites de I'Amerique septentrionaleHI827) ; ˆL'Art de verifier les dates, chronologie historique de I'Amerique ˆ (10 vols., 1826-44) ; ˆBibliotheca Americanaˆ (1831), *etc.*

WARDEN, Florence. See James, Flor¬ ence.

WARDEN, the title in the United States of certain public officers, such as game-wardens, who enforce the game laws, port-wardens, who are harbor officers, and the wardens of prisons.

In the Protestant Episcopal Church the church-wardens are two parochial officers, chosen a'.inually at the Easter vestries, one by the minister and one by the parishioners. Their duties are to protect the church-building apd its appurtenances, to superintend the ceremoiiies of divine worship and generally to act as the legal representatives of the parish.

In England the heads of All Souls, Keble, Alerton, Wadham and New colleges at Oxford are known as wardens. The Lord Warden of the Cinque Ports is an official with merely nominal duties now, though he was formerly of much importance. Lord Wardens of the Marches were formerly appointed to keep the disturbed border counties of England in a state of defense against the Scotch.

WARDHA, wur'da, or WURDHA, India, (1) the chief town of the district of the same name. Central Provinces, on the left bank of the Wardha River, 40 miles southwest of Nagpur and 471 east of Bombay.

It was founded in 1866; as a junction station on the railway it has become a centre of the cotton trade. Pop. about 10,000. (2) The district, which was

formed out of Nagpur in 1862, has an area of 2,401 square miles and about 300,000 population.

The staple crops are millet, cotton, wheat and rice. Here is produced the well-known Hinganghat cotton, which is exported to the amount of 25,000 bales a year. The breed of cattle is good, especially the trotting bullocks. A railway crosses the centre of the district. (3) The Wardha River rises in the Satpura hills and flows southeast for 254 miles to join the Weingunga; the united stream, under the name of the Pranhita, ultimately falls into the Godavery at Sironcha.

WARDLAW, Elizabeth, Lady, Scottish poet: b. 1677; d. 1727. She was the daughter of Sir Charles Halkett of Pitfirrane and in 1696 married Sir Henry Wardlaw of Pitreavie, near Dunfermline. Her ballad, ˆHardyknute, a Fragment,ˆ was first published in 1719 as an antique and after enlargement from 216 to 336 lines, had been several times reprinted, when Percy in the second edition of his ˆReliquesˆ revealed its authorship. To Lady Wardlaw has also been ascribed ˆSir Patrick Spens,ˆ *ˆThe Douglas Tragedyˆ and many more traditonal Scotch ballads. This is highly improbable. ®Hardyknute,® says Sir Walter Scott, ˆˆwas the first poem I ever learnt, the last I shall ever forget.®

WARDLAW, Ralph, Scottish Congrega¬ tional clergyman: b. Dalkeith, 22 Dec. 1779; d. near Glasgow, 17 Dec. 1853. He at first studied divinity with the view of becoming a minister of the Associate Secession Church, but having been led to change his views on the subject of ecclestiastical polity, he was settled in charge of a congregation in Glasgow, where he continued to officiate to the close of his life. In 1811 he was appointed professor of syste¬ matic theology in the Congregational seminary in Glasgow. Both as a lecturer and as a preacher his abilities were of the first order. Of his numerous publications may be cited ˆDiscourses on the Socinian Controversyˆ (1814); ˆEssays on Assurance of Faith and Extent of the Atonemicnt and Universal Pardonˆ (1830) ; ˆChristian Ethicsˆ (1832) ; ˆNational Church Establishments Examinedˆ (1839) ; U.ectures on Female Prostitutionˆ (1842) ; ˆCongregational Independencyˆ (1847).

WARD'S ISLAND, an island in the East River, lying northeast of the borough of Man¬ hattan, New York City, and forming the west¬ ern

boundary of Hell Gate. It is roughly rec¬ tangular in shape and includes about 200 acres. It is the property of the city of New York and contains a State insane asylum, a home for invalid soldiers, a home for children and the State Emigrant Hospital.

WARE, war, Henry, American Unitarian divine: b. Sherburne, Mass., 1 April 1764; d. Cambridge, Mass., 12 July 1845. He was grad¬ uated at Harvard in 1785, for two years studied theology, and in 1787 became pastor of the First (Jhurch at Hingham, Mass., where he remained until 1805 and then accepted the Hollis professorship of divinity at Harvard. At this time Unitarian views were beginning to cause dissension in the New England churches, and the appointment of Ware, a leader of Uni¬ tarian thought, to this position in the college brought on a memorable controversy, in which he took a prominent part, particularly in his ˆLetters Addressed to Trinitarians and Cal¬ vinistsˆ (1820), in answer to the ˆLetters to

Unitarianˆ by Leonard Woods, a professor at the Andover Theological Seminary. Ware also published ˆAn Answer to Dr. Woods' Replyˆ (1822); ˆA Postscript to an Answer,ˆ *etc.* (1823) ; < Foundation, Evidences, and Truth of Religionˆ (1842), and other writings. He re¬ signed his professorship in 1840, but was at the head of the Harvard Divinity School from its establishment in 1826 until his death.

WARE, Henry, Jr., American Unitarian divine and author, son of Henry Ware (q.v.) : b. at Hingham, Mass., 21 April 1794; d. Fram¬ ingham, Mass., 22 Sept. 1ˆ3. He was grad¬ uated at Harvard in 1812; was instructor at Phillips Exeter Academy, 1812-14; studied the¬ ology at Harvard under his father and in 1817 became minister of the Second Church, Boston. From 1830 to 1842 he was professor of pulpit eloquence and pastoral care in the Harvard Divinity School, and in 1819-22 was one of the editors of the Christian Disciple, afterward the Christian Examiner , an organ of Unitarian thought. He took an active part in the or¬ ganization of the Unitarian movement. Among his writings are ˆHints on Extemporaneous Preachingˆ (1824) ; ˆOn the Formation of the Christian 'Characterˆ (1831) ; ˆLife of the Saviourˆ

(1832) ; ˆScenes and Characters Illus¬ trating Christian Truthˆ (1837) ; various memoirs, and compositions in verse.

WARE, William, American Unitarian cler¬ gyman and author : b. Hingham, Mass., 3 Aug. 1797; d. Cambridge, Mass., 19 Feb. 1852. He was graduated at Harvard in 1816, studied the¬ ology under his father, Henry Ware (q.v.) at Cambridge, held pastorates at Northboro, Mass., Brooklyn, Conn., and Burlington, Vf., and from 1821 to 1836 was minister of the First Uni¬ tarian Church, New York. He afterward preached for short periods at several other places, all near Boston, was proprietor and editor of the Christian Examiner (1839-44), and published ˆLetters from Palmyraˆ (1837), first published in the Knickerbocker Magazine, subsequently republished as ˆZenobia, or the Fall of Palmyraˆ (new ed., 1868) ; ˆ Probus, or Rome in the 3d Centuryˆ (1838), republished as ˆAurelianˆ (new ed., 1868) ; ˆJulian, or Scenes in Judeaˆ (1841) ; ˆSketches of Euro¬ pean Capitalsˆ (1851) ; ˆLectures on the Works and Genius of Washington Allstonˆ (1852), and a ˆLife of Nathaniel Bacon, ˆ in Sparks' series. He edited ˆAmerican Unitarian Biog¬ raphyˆ (1850).

WARE, William Robert, American archi¬ tect, son of Henry Ware, Jr. (q.v.) : b. Cam¬ bridge, Mass., 27 May 1832; d. Milton, Mass., 9 June 1915. He was graduated at Harvard (1852) and at the Lawrence Scientific School (1856). He practised architecture at Bo.ston (1860ˆ1). In 1865 he wˆas appointed professor of architecture in the Massachusetts Institute of Technology and filled the same chair in Columbia University from 1881-1903, when he retired with title of professor emeritus. Among his writings are ˆModern Perspectiveˆ ; ˆThe American Vignolaˆ ; ˆShades and Shadows.ˆ

WARE, Mass., town in Hampshire County, on the Ware River and on the Boston and Maine and the Boston and Albany railroads, nearly in the centre of the State, al)OUt 25 miles northeast of Springfield and about the same

distance west of Worcester. It was settled in 1673 by Jabez Olmstead, and on 25 Nov. 1761 was incorporated as a precinct and in 1775 was made a town. The town has a general eleva¬ tion of about 550 feet above sea-level. The waterworks are owned and operated by the town. The chief manufacturing establishments are cotton, woolen and hosiery factories, shoe factories, paper manufactures and machine shops. There are more than 100 factories in the town with nearly 3,500 employees. The surrounding farms and the nearby manufactur¬

ing villages contribute to Ware's industrial prosperity. .There are seven churches, a pub¬ lic high school, established in 1850, public and parish graded schools and a public library which contains about 15,000 volumes. There is one national and one savings bank, the latter un¬ usually prosperous for a town of the size. The government is administered by means of town meetings, at which, by popular vote, the town officers are elected. Nearly one-third the popu¬ lation are of foreign birth, chiefly French Canadians and Poles. Pop. 8,525. Consult Gay, ˆGazetteer of Hampshire County.ˆ

WAREHAM, war'am. Mass., town in Plymouth County, on Buzzard's Bay, and on the New York, New Haven and Hartford Rail¬ road, about 50 miles southeast of Boston and 15 miles northeast of New Bedford. It has steamer connections with many of the coast cities and towns. The town contains the vil¬ lages of Wareham, East Wareham, West Wareham, South Wareham and Onset. The chief industries are iron manufacturing and the culti¬ vation of cranberries. The town has five churches, one high school, elementary schools, public and private, and a public library. There are two banks and two newspapers. Pop. 5,176.

WAREHOUSE ACT, an act of Congress which became a law 11 Aug. 1916, its purpose being *to establish a form of warehouse re¬ ceipt for cotton, grain, wool, tobacco and flax¬ seed, which will make these receipts easily and widely negotiable as delivery orders or as col¬ lateral for loans, and, therefore, of definite assistance in financing crops. This purpose the act aims to attain by licensing and bonding Vvarehouses under conditions which will insure the integrity of their receipts and make these receipts reliable evidence of the condition, qual¬ ity, quantity and ownership of the products named which may be stored with them.® The general authority of supervision and investiga¬ tion and classification of warehouses and their methods is vested in the Secretary of Agricul¬ ture. Licenses may then be granted to ware¬ housemen who fulfil the proper conditions mentioned in the license and who supply suffi¬ cient bond and sureties for their responsibility. Licenses may also be granted to persons not warehousemen to accept custody of and store agricultural products in warehouses owned by the State, provided they fulfill certain specified conditions. A nominal fee is charged for such license and for its renewal. Consult ˆUnited States Compiled Statutesˆ (chap. E, sec. 8747jd,

1916).

ˆ WˆAREHOUSEMAN, in law, one who re¬ ceives goods of any kind for the mere purpose of storage. He is a bailee, and, his contract with the owner being one for their mutual

benefit, is held only to ordinary care and dili¬ gence, and if loss or injury happen to the goods, he is not responsible without the absence of this care or diligence on his part, unless he expressly assumes a greater responsibility. There is nothing, however, to prevent ware¬ housemen receiving goods on whatever terms or contract they see fit to make with the owner. Persons may become warehousemen and subject only to the law of that relation, whose general position is quite different. Forwarding mer¬ chants in the United States are generally re¬ garded as warehousemen, unless they take upon themselves the duty and the responsibility of cornmon carriers, whieh they do when they begin to act in that character. On the other hand, common carriers, as railroad companies or expressmen, lie only under the less responsi¬ bility of warehousemen when they cease to be carriers of the goods they have transported, or have not yet begun to carry those they have taken for future transport. It is sometimes difficult to draw the line in particular cases arid say whether a person or company is liable without fault because the goods were then in his or its possession as carrier, or liable only for fault because the transit had not begun, or had terminated. The general principle is quite certain, although the authorities are far from uniform in their application of it. If the carrier receives them to carry at once or as soon as he can, he holds them as carrier; if he is to keep them until a distant period of transit, until then he is only a warehouseman. If the actual transit has ceased, some courts hold that his liability ceases at once, and it un¬ doubtedly does so when, after he is ready to deliver them, they are left on his hands and he awaits the call of the owner or consignee. A warehouseman has a lien on goods in his care for the storage of them. He may deliver a part and retain his lien on the residue for all his charge for all the goods, if all were de¬ livered to him as one bailment. But he has no general lien on any goods for all demands against the owner, or for the storage of othei goods. During recent

years the larger cities of the United States have increased the string¬ ency of storage warehouse regulations, which vary with localities.

WAREHOUSING SYSTEM, the system b}" which goods liable to excise or customs duty are kept in warehouses without the duty being paid on them till they pass to the con¬ sumer or the retail dealer. Goods liable to duty are warehoused in a bonded warehouse, and are called goods in bond. The ports at which particular kinds of goods may be warehoused are determined ; but the system has been gradu¬ ally relaxed so as to admit of every important port being used for warehousing and even im¬ portant inland towns are admitted as warehous¬ ing centres. The warehouse is kept by a bonded storekeeper, who gives a bond of sufficient \alue and with satisfactory security to the gov¬ ernment for the performance of his duties. When goods are warehoused by an importer in a bonded store they may be transferred by an order, addressed by the importer to the store¬ keeper, to any other persons, the new owner assuming the responsibilities of the importer. Goods in a bonded store are always open to the inspection of the officers of customs and can

only be inspected by the owner in the presence of the proper officer. Any importer who fraud¬ ulently gains access to goods stored by him \yithout the presence of the proper officer is liable to a fine. Goods must be stored and re¬ main in store in their original packages, unless when permission is given before or after stor¬ ing to sort or repack them. Any infringement of this regulation or of the regulations for storing or removing goods subjects to heavy penalties, commonly to the forfeiture of the goods. Goods under bond may on application be removed at the expense of the owner as often as required from one warehouse to an¬ other, . or by coast or inland carriage, from one port to another, being stored on the same terms in the new port or warehouse as in the old. The warehouse-keeper is bound to store the goods so that easy access can be had to each package. The keeper of the warehouse is liable for the duty on any goods taken out of the warehouse without proper authority; but if goods are improperly removed by a customs-officer no duty is exigible. Goods which have been in warehouse for five years must be re¬ warehoused or they are liable to be sold.

WARFARE, Submarine. See Submarine Warfare.

WARFIELD, Benjamin Breckinridge,

American educator: b. Lexington, Ky., 5 Nov. 1851 ; d. Princeton, N. J., 16 Feb. 1921. He was graduated from Princeton in 1871, from the Princeton Theological Seminary in 1876 and studied at Leipzig in 1877. The next year he be¬ came instructor in New Testament literature and exegesis at the Western Theological Seminary, Allegheny, Pa. He was appointed professor of those branches in 1879, and in 1887 he resigned to accept the chair of didactic and polemical the¬ ology at Princeton, which he occupied till his death. He twice served as president of Prince¬ ton Theological Seminary (1902-03 and 1913-14). He was for a time coeditor of the Pres¬ byterian Reviezv (1890-1902), and he published ˆThe Divine Origin of the Bibleˆ (1882) ; Hntroduction to the Textual Criticism of the New Testamentˆ (1886 and 11 subsequent editions); ˆAugustine's Anti-Pelagian Treatisesˆ (1887) ; ˆThe Right of Systematic Theologyˆ (1897) ; ˆTwo Studies in the History of Doctrine* (1897) ; ˆThe Significance of the Westminster Standards as a Creedˆ (1897); ˆActs and Pas¬ toral Epistles* (1902) ; ˆThe Power of God Unto Salvation* (1903) ; ˆThe Lady Story* (1907); ˆThe Saviour of the World* (1913); 'The Plan of Salvation* (1915). He contrib¬ uted frequently to the Quarterly Review, and wrote many articles for the leading encyclopedias and dictionaries of the Bible.

WARFIELD, David, American actor : b. San Francisco, Cal., 1866. He first appeared on the stage in 1888 in 'The Ticket-of-Leave Man,* and from 1890 he was seen in New York at the Casino and at Weber and Field's Music Hall. He came under the management of David Belasco in 1901 and from that time starred in a series of phenomenal successes. 'The Auc¬ tioneer,* in which he starred, was staged in 1901 and had a run of 1,400 performances. This was followed in 1904 by 'The Music Master,* which ran for more than 1,000 per¬ formances and was repeatedly successfully re-

vived. He played in <The Grand Army Manˆ in 1907; in ˆThe Return of Peter Grimmˆ in 1911, and in ˆVan der Decken,ˆ written for him by Belasco, in 1916. ˆThe Music Masterˆ was again revived in 1917-18 and ˆThe Auc¬ tioneerˆ in 1918-19. Under Belasco's manage¬ ment he

has appeared only in roles portraying a lovable old gentleman, and his mastery of the art of making the role by turns pathetic, amusing and always appealing has placed him in the foremost ranks of American actors.

WARFIELD, Ethelbert Dudley, Ameri¬ can college president, brother of B. B. War-field (q.v.) : b. Lexington, Ky., 16 March 1861. He was graduated from Princeton in 1882 and from the Columbia Law School in 1885. In 1886-88 he was engaged in law practice at Lex¬ ington, but in 1888 accepted the chair of his¬ tory and the presidency of Miami University, Oxford, Ohio, resigning in 1891 to accept a like position at Lafayette College, Easton, Pa. He became president of Wilson College, Cham-bersburg. Pa., in 1915. He published ˆThe Kentucky Resolutions of 1798ˆ (1887); ˆAt the Evening Hourˆ (1898) ; ˆMemoir of Joseph Cabell Breckenridge, U. S. N.ˆ (1898), *etc.*

WARHAM, war'am, William, English prelate, archbishop of Canterbury: b. Hamp¬ shire, about 1450; d. 22 Aug. 1532. He was educated at New College, Oxford, of which he became a Fellow in 1475. He acted for a time as advocate in the Court of Arches and mod¬ erator of the Civil Law School at Oxford, and in 1493 was ordained subdeacon. He was granted the living of Barley, Herts, in 1495, and that of Cottenham, near Cambridge, in 1500, and held both till 1502 when he was conse¬ crated bishop of London. He was formally in¬ stalled as archbishop of Canterbury in 1504 and about the same time he was appointed lord-chancellor after 17 months' service as keeper of the great seal. From 1506 until his death he was chancellor of Oxford University. He performed the ceremony of coronation in 1509, after the accession of Henry VHI, and in 1515 was suc¬ ceeded by Wolsey in the lord-chancellorship. When Wolsey had been raised to the dignity of papal legate there was much friction be¬ tween him and Warham in their official capaci¬ ties. Warham's action in regard to the divorce question was weak and subservient, but shortly before his death he made a protest against the acts of the Parliament undermining the papal authority. In his earlier years he was much employed on foreign embassies. Consult Camp¬ bell, ˆLives of the Lord-Chancellorsˆ (1ˆ5ˆ46) ; Hook, ˆLives of the Archbishops of Canter¬ bury,ˆ new series, Vol. I (1868).

WARING, war'Tng, George Edwin, Amer¬ ican sanitary engineer: b. Poundridge, N. Y., 4 July 1833; d. New York, 29 Oct. 1898. He was a pupil in agriculture of James J. Mapes, in 1853-55 lectured in Vermont and Maine on improved farming methods and in 1855 was made by Horace Greeley manager of the lat¬ ter's well-known experimental farm at Chap-paqua, N. Y. In 1857-61 he was

agricultural and drainage engineer of Central Park, New York, whose drainage system he planned. Hav¬ ing entered tke Federal army in 1861 as major of the 39th New York Volunteers (Garibaldi Hussars), he fought at the first Bull Run, was

transferred to the Department of the South¬ west, recruited a battalion of cavalry (Fre¬ mont Hussars) at Saint Louis, and when these were consolidated with other troops to form the Fourth Missouri Cavalry, he was made colonel of that regiment. He S'eryed as such until mustered out of the service in 1865. In 1867-77 he was manager of the Ogden Farm, Newport, R. L, writing during that tim-e the 'Ogden Farm Papersˆ for the American Agri¬ culturist. At the time of the yellow-fever epidemic in Memphis, T-enn., in 1878, he was appointed to alter the drainage system there ; and subsequently he devoted himself to sani¬ tary engineering. In 1882 he was appointed a member of the National Board of Health, with which he remained connected for several years; and in 1894 he became assistant engi¬ neer of New Orleans. From 1895 to 1898 he was street-cleaning commissioner of New York; during his administration he thoroughly reorganized his department and brought it to a high state of efficiency. In 1898 he was selected to be head of a commission for the improvement of sanitary conditions in Havana, Cuba, with the purpose of eradicating yellow fever. He prepared a detailed report of great value, but died of the fever not long after his return to the United States. He was a mem¬ ber of the Institution of Civil Engineers, Great Britain ; Fellow of the Sanitary Institute of Great Britain; honorary member of the Royal Institute of Engineers, Holland, and corre¬ sponding member of the American Institute of Architects. Among his published works are 'The Elements of Agricultureˆ (1854) ; 'Whip and Spurˆ (1875) ; 'A Farmer's Vacationˆ (1876) ; 'Village Improvements and Farm Vil¬ lagesˆ (1877) ; 'Sewerage and Land Drainageˆ (1889) and 'Modern Methods of Sewage Dis-posaP (1894).

WARK, David, Canadian legislator: b. near Londonderry, Ireland, 19 Feb. 1804; d. Fred¬ ericton, New Brunswick, 20 Aug. 1905. In 1825 he emigrated to New Brunswick, there took up shipbuilding, bookkeeping and teach¬ ing until 1836, turned to mercantile life at Richibucto, later adding to his interests milling and the lumber-trade. He held office as a county magistrate and judge of the Court of Common Pleas, in 1842 was elected from the county (Kent) to the provincial legislature and in 1846 reelected. From 1851 to 1867 he was a representative of the county in th-e legislative council, being in 1858-62 in the executive coun¬ cil, and for a time holding the post of

receiver-general. In 1867 he was one of the original senators appointed to the Senate of Canada under the British North America Act. Through¬ out his political career he was identified with the Liberal party. In the development of agri¬ culture, the ext'ension of trade and the pro¬ motion of education, he was prominently con¬ cerned. He undertook in 1847 the furtherance of legislation favoring reciprocal trade between the provinces, and such legislation eventualy proved of influence in connection with the reciprocity treaty of 1854 between Canada and the United States. The perfected system of the New Brunswick savings bank was largely due to his initiative; and he was chiefly instru¬ mental in bringing about the movement which in 1847 resulted in the constitution of the pro-WARKAMOO WEE — WARNER

vincial board of education of New Brunswick, with the attendant changes, and in the reor¬ ganization of King's College as the Univer¬ sity of New Brunswick (1859). His centenary \yas formally observed in 1904 by the presenta¬ tion of addresses, it being claimed for him that he was the world's oldest legislator; and on 28 April a portrait of 'him by W. Forbes, A.R.CA., was unveiled in tbe Senate. Consult an article by Crockett in the Westminster Magazine (Toronto), June 1903.

WARKAMOOWEE, in Ceylon, a catama¬ ran type of canoe, carrying a sail with out¬ riggers. It is generally manned by lascars, who sit grouped together for hours at the end of the lever that balances the sail, adding or tak¬ ing away a man according to the strength of the wind. These canoes often sail 10 miles an hour.

WARM-BLOODED ANIMALS, mam¬ mals and birds, in contradistinction to fishes, amphibians and reptiles and to all invertebrate animals with slow circulation. See Animal Heat.

WARMAN, Cy G., American journalist: b. Greenup, 111., 22 June 1855; d. Chicago, Ill., 7 April 1914. He engaged as a farmer and wheat broker in Illinois until 1880 when he removed to Colorado. He became editor of the Western Railway, Denver, Colo., in 1888; cf the Creede, Colo., Chronicle in 1892 ; and in 1892 was introduced to the public as the ®Po*et of the Rockies^^ by the New York Sun. He went

to New York in 1893 and has since been engaged in literary work. He wrote the words of the popular song ˆ Sweet Marieˆ and has published ˆTales of an Engineerˆ (1895) ; ˆSnow on the Headlightˆ (1899) ; ˆShortRailsˆ (1900) ; ˆ Songs of Cy WarmaiC (1911), *etc.*

WARMING AND VENTILATION. See

Heating and Ventilation.

WARMOUTH, Henry Clay, American politician and soldier : b. McLeansboro, Ill., 9 May 1842. He was admitted to the bar in Itˆl and became district attorney of the 18th judi¬ cial district of Missouri in 1862, but resigned to enter the Union army. He was appointed lieutenant-colonel, was engaged in the assaults on Vicksburg of 19-22 May 1862 and was present at the battles of Lookout Mountain and Missionary Ridge. He served in the Texan campaign and was afterward judge of the mili¬ tary court of the Department of the Gulf until the close of the war. He became rnilitary gov¬ ernor of Louisiana in 1868 and was inaugurated civil governor upon tbe adoption of ijs new constitution, an office he occupied until 1873. He was a member of the Louisiana legislature in 1876-77 and collector of customs at New Orleans in 1889-93. He was one of the builders of the New Orleans, Fort Jackson and (Jrand Isle Railroad, of which he was long president.

WARNER, war'ner, Anna Bartlett (®Amy Lothrop'O, American novelist, sister of Susan Warner (q.v.) : b. New York, 1820; d. 1915. Sh*e collaborated with her sister in writing the novels ˆSay and SeaP (1860) ; ˆWych HazeP (1876) and ˆThe Gold of Chickareeˆ (1876). Her own publications include ˆDollars and Centsˆ (2 vols., 1853) ; <My Brother's Keeper > (1855); ˆStories of Vinegar HilP (1871);

ˆThe Fourth Watchˆ (1874) ; ˆThe Light of the Morningˆ (1882) ; ˆCross Cornersˆ (1887) ; ˆWest Point Colorsˆ (1903), *etc.*

WARNER, Anne (Anne Warner French), American novelist: b. Saint Paul, Minn., 1869; d. 1913. In 1888 she became the wife of Charles Ellis French. She wrote a number of books of travel and fiction in popular style. They include ˆA Woman's WilP (1904) ; ˆThe Rejuvenation of Aunt Maryˆ (1905) ; ˆSeeing France with Uncle Johnˆ (1906) ; ˆS'eeing England with Uncle Johnˆ (1908; ; ˆThe Pantherˆ (1908) ; ˆYour Child and Mineˆ (1909) ; ˆJust between Themselvesˆ

(1910) ; ˆWhen Woman Proposesˆ (1911) ; ˆThe (jay and Festive Claverhous'eˆ (1914) ; ˆTaming of Amoretteˆ (1915).

WARNER, Charles Dudley, American edi¬ tor and author : b. Plainfield, Hampshire County, Mass., 12 Sept. 1829; d. Hartford, Conn., 20 Oct. 1900. He graduated from Hamil¬ ton College in 1851 and from the law school of the University of Pennsylvania in 1856; he was admitted to the bar in the latter year at Phila¬ delphia and practised his profession at Chicago in 1856-60. In 1860 he became assistant edi¬ tor of the Hartford (Conn.) Evening Press and in 1861 its editor-in-chief. This news¬ paper was consolidated in 1867 with the Courant, a morning journal, and Warner was a part owner and long assistant 'editor of the latter, though eventuallv his connection with the paper was largely that of a literary con¬ tributor. Some letters of travel in America and Europe in 1868-69, printed in the Courant, were widely copied and his articles published in book form in 1870 as ˆMy Summ-er in a Garden,ˆ placed him high in the list of Ameri¬ can humorists. From 1884 to 1891 he was in charge of the ˆEditor's Drawer® department of Harper's Magazine and in 1892 was trans¬ ferred to that of the ˆEditor's Study® in the same magazine. H.e was particularly success¬ ful in the 'essay, in which he combined shrewd observation and cultured humor in a manner in many ways resembling that of Washington Irving. He was a discerning critic as well ; and in addition to his literary activities was identified with various philanthropic work. His further publications include ˆA Book of Eloquenceˆ (1853) ; ˆSaunteringsˆ (1872) ; ˆBacklog Studiesˆ (1872) ; *ˆThe Gilded Ageˆ (with S. L. Clemens, 1873) ; ˆBaddeck and That Sort of Thingˆ (1874) ; ˆMummies and Moslemsˆ (1876 — reissued as ˆMv Winter on the Nileˆ) ; Hn the Levantˆ (1877); ˆBeing a Boyˆ (1877) ; Hn the Wildernessˆ (1878) ; ˆThe American Newspaperˆ (1879) ; ˆStudies of Irvingˆ (with W. C. Bryant and George P. Putnam, 1880) ; ˆLife of Washington Irvingˆ (1881); ˆCaptain John Smith, Sometim'e Gov¬ ernor of Virginia and Admiral of New Eng¬ landˆ (1881): ˆA Roundabout Journeyˆ (1883); ˆPapers on Penologyˆ (with others, 1886) ; ˆTheir Pilgrimageˆ (1886); ˆOn Horseback: a Tour in Virginia, Etc.ˆ (1888) ; ˆStudies in the South and West, with Comments on Canadaˆ (1889) ; ˆA Little Journey in the World: a NoveP (1889); ˆLooking Forward: The Dual Government Realizedˆ (1890) ; ˆOur Italy, Southern Californiaˆ (1890) ; ˆAs We Were Sayingˆ (1891); ˆWashington Irvingˆ (1892) ; ˆAs We Goˆ (1893) ; ˆThe Golden

House; a NoveP (1894); ˆThe Relation of Literature to Lifeˆ (1896) ; ˆThe People for Whom Shakespeare Wroteˆ (1897). He also edited the ˆAmerican Men of Lettersˆ series and Library of the World's Best Litera¬ tureˆ (1896-98).

WARNER, Everett Longley, American artist: b. Vinton, Iowa, 16 July 1877. He studied at the Art Students' League, New York, and at the Julien Academy, Paris, after¬ ward settling in New York, which city has furnished subjects for many of his paintings. He has specialized in landscapes and in etch¬ ings and his work is well represented in Ameri¬ can art galleries. He engaged in painting ship camouflage in 1917 and originated one of the five designs accepted by the War Risk Bureau. He received medals at the Phila¬ delphia Academy of Fine Arts in 1908; at Buenos Aires in 1910; the First Hallgarten Prize from the National Academy of Design in 1912; and a medal at"the San Francisco Exposition in 1915. Among his paintings are ˆBroadway on a Rainy Eveningˆ (Corcoran Art Gallery, Washington) ; ˆ Quebecˆ (P- enn- sylvania Academy of Fine Art, Philadelphia) ; ˆAlong the River Front, New Yorkˆ (Toledo Art Museum) ; ˆA Mountain Village TyroP (Saint Louis Museum). Author and illustrator of ˆThe Clan of Muiresˆ (1916).

WARNER, Olin Levi, American sculptor: b. Suffied, Conn., 9 April 1844; d. New York, 14 Aug. 1896. He studied in the Ecole des Beaux Arts in Paris and subsequently entered Carp'eaux's studio. In 1872 he opened a studio in New York, where his work came under the eye of several critics whose commendation secured his success. In 1877-78 he modeled ˆ Twilight,ˆ which established his reputation. Among other well-known works of his may be mentioned ˆThe Dancing Nymphˆ ; ˆ Cupid and Psycheˆ ; reliefs of. Joseph and other Indian chiefs; statues of Governor Bucking¬ ham of Connecticut, William Lloyd Garrison, General Devens, *etc.*

WARNER, Seth, American soldier: b. Roxbury. Conn., 17 May 1743; d. there, 26 Dec. 1784. Having removed in 1763 to Bennington, he was prominent in the dispute between New York and the ®N'ew Hampshire Grants® (after¬ ward Vermont), and was outlawed (1771) with Ethan Allen (q.v.) and others. He took part in the capture of Ticonderoga and 12 May 1775 effected the surrender of Crown Point

with its garrison and 113 cannon. On 16 Sept. 1775 he was made by Montgomery, in whose Canadian expedition he participated, colonel of a regiment of Green Mountain rangers, though the provincial congress of New York withheld his commission. On 5 July 1776 he was commission-ed by Congress the colonel of a regi¬ ment formed in pursuance of a resolution passed on that day; and on 7 July 1777 was defeated by Fraser at the battle of Hubbardton (q.v.). At the battle of Bennington, 16 Aug. 1777, h-e arrived with his regiment in time to meet the enemy's reinforcement and secure a victory. In 1782 he withdrew from the serv¬ ice. Consult Chipman, ˆThe Life of Col. Seth Warner, with an Account of the Controversy between New York and Vermont from 1763 to 1775ˆ (1858) ; and ˆ Green Mountain Boys.ˆ

WARNER, Susan, American author: b. New York, 11 July 1819; d. Highland Falls, Orange County, N. Y., 17 March 1885. For a number of years sh*e resided on Constitution Island in the Hudson River, opposite West Point. Her first essay in •literature was a novel entitled ˆThe Wid-e, Wide World, ˆ pub¬ lished in 1850 un'der the pseudonym of Elizabeth W-etherell. This book was in its day next to ˆUncle Tom's Cabinˆ the most successful work of fiction in America in point of sales and was popular also in Europe. In cheaper-editions it still finds readers. It was mediocre in style and unduly pietistic in its manner; and, says Richardson, ˆˆall literature cannot show so lachrymose a book.® It was succeeded by ˆQueechyˆ (1852), which had also a large circulation and ˆThe Hills of the Shatemucˆ (1856), containing many glimpses of American scenery. She was also the author of 'ˆThe Law and the Testimonyˆ (1853), in which the texts proving the great doctrines of Christianity are brought together under their appropriate heads; ˆTh-e Old Helmetˆ (1863) ; ˆMelbourne Houseˆ (1864), and other works.

WARNING COLORATION, in zoology.

See Coloration, Protective.

WARP. See Weaving.

WARPING, in agriculture, a mode of fer¬ tilizing poor or barren land by means of artifi¬ cial inundation from rivers which hold large quantities of earthy matter, or warp, in sus¬ pension. The operation, which consists in en¬ closing a body or sheet of water till the warp has deposited, can only be carried out on flat lowlying tracts which may be readily sub¬ merged.

WARRANT, a writ issued by a competent official authorizing some minor official, as a marshal or policeman, to make an arrest, seiz¬ ure or the like. The power of issuing a war¬ rant is conferred upon justices of the peace, judges of certain courts and sometimes cor¬ poration officers who are clothed with powers of justice of the peace. A warrant for arrest is addressed to a sheriff, constable or other officer, commanding him to arrest the body of the person named and bring him before the magistrate or court to answer or be examined regarding some offense which he is charged with having committed ; it is not issued with¬ out probable cause, and is secured on the com¬ plaint of a person who thinks that a public offense has been committed and who appears before the justice and requests that a warrant be issued. A warrant must give the name of the accused or sufficient data to establish his identity. It must state the offense in respect to which the magistrate has authority to issue the warrant. A return must be made by the officer of his doing under it, but as there is no set time for a return, a warrant remains in force until it is executed or canceled. There are various other forms of warrants, such as a search warrant of commitment, death war¬ rant, extradition warrant, dividend or interest warrant, land warrants, landlord's warrant, tax warrant, warrant in bankruptcy and municipal warrants.

WARRANT OFFICER, a rank in the navy, divided into three classes — gunners.

boatswains and carpenters, the gunners taking precedence of the other two. Formerly, before ironclads superseded wo'oden ships, there was only one officer of this rank of each class, even on the largest ships. Now, in addition to the officer of each class appointed to carry out the special duties of gunner, boatswain and carpenter on board every ship, there are usually three or four junior gunners or boat¬ swains appointed to battleships and some of the larger of other classes of ships to perform what are called quarter-deck duties, in addition to which in many of the larger ships an extra gunner or boatswain is appointed for torpedo duties. See United States — Navy.

WARRANTY, a guarantee, promise or covenant, or an undertaking on the part of one person to. answer for the statements made of the thing warranted to be as represented, and to indemnify against loss, in case of failure. There are two general classes, express and implied. An express warranty is one made ex¬ pressly in given terms, such as, in insurance, to indicate that an undertaking on the part of the insured that certain alleged facts are as he represents them to be; in real estate, that the grantor has a legal title to the lands con¬ veyed ; in sales, that the seller assures the quality, or the title to the property sold. A warranty in a sale of personal property is a statement made at the time oi and as part of, the sale, that the goods or articles sold are as represented. A warranty is implied when the law derives it by implication or inference from the nature of the transaction. No particular form of words is necessary to create a war¬ ranty. It is the subject matter of a statement and the circumstances under which it is made that are considered rather than the form. A warranty is not valid unless supported by a consideration. In case of a breach of war¬ ranty the vendee may sue for the purchase price or may claim damages, and is not bound to return the goods. Proof of a warranty in a written contract must be shown in writing. Oral warranty cannot be admitted as evidence to vary the terms of a written contract except where the warranty is an independent agree¬ ment and where the writing does not embrace the whole contract.

WARREN, wor'en. Sir Charles, British general: b. Bangor, 7 Feb. 1840. He received a military education at Sandhurst and Wool¬ wich, joined the Royal Engineers in 1857 and in 1ˆ1-65 was engaged in a survey of Gibraltar. During the three years following 1867 he car¬ ried out exploring work in Palestine for the Palestine Exploration Fund, and in 1876 was a commissioner for settling the western bound¬ ary of the Orange Free State. He commanded the Diamond Fields Horse in the Kaffir War of 1878, and during the immediately succeeding Griqua and Bechuana campaigns was com¬ mander of the field forces. He returned to England in 1880 and during the next four years was attached to the Chatham School of Military Engineering as instructor in surveying. He commanded the Bechuanaland expedition of 1884ˆ5, and was in command at Suakim. From 1886 till his resignation in 1888 he was chief commissioner of the metropolitan police of Lon¬ don, and for five years from 1889 was in com¬

mand of the troops in the Straits Settlements, with the temporary rank of major-general. He was commander of the Thames district 1895-98; commanded a division in the South African War of 1899-1902, and

cooperated with Sir Redvers Buller in that attempt to relieve Lady¬ smith with which the occupation of Spion Kop is prominently associated. He was afterward appointed military governor of Griqualand West. He has published ˆUnderground Je¬ rusalemˆ (1876) ; ˆThe Temple or the Tombˆ (1880), and with C. R. Conder, ˆJerusalem ˆ

(1884).

WARREN, Francis Emory, American legislator: b. Hinsdale, Mass., 20 June 1844. He served in the Civil War as a noncommis¬ sioned officer in 1862-65 and received a Con¬ gressional medal for gallant conduct at Fort Hudson. He removed to Wyoming in 1868, became active in politics, was a member and president of the council, mayor of Cheyenne, treasurer of the Territory, and in 1885-ˆ was governor. In 1889 he again became governor and upon Wyoming's admission to Statehood in 1890 was elected first governor of the State ; before the expiration of his term, however, he was elected to the United States Senate and has served almost continuously since in that body.

WARREN, Frederick Morris, American philologist: b. Durham, Me., 9 July 1859. He was graduated from Amherst in 1880 and en¬ gaged as instructor in modern languages at Johns Hopkins in 1886-91. In 1891-1901 he was professor of Romance languages at the Western Reserve University, and since 1901 has been professor of modern languages at Yale. He has published ˆA Primer of French Litera¬ tureˆ (1889) ; ˆHistory of the Novel Previous to the Seventeenth Centuryˆ (1895), etc., and has also edited ˆSelections from Victor Hugoˆ (1893) ; ˆFrench Prose of the Seventeenth Cen¬ turyˆ (1899) ; Lamartine's ˆGraziellaˆ (1900), and ˆRacineˆ (1903) ; ˆTen Frenchmen of the 19th Centuryˆ (1904), *etc.*

WARREN, Gouverneur Kemble, Ameri¬ can military officer : b. Cold Spring, N. Y., 8 Jan. 1830; d. Newport, R. I., 8 Aug. 1882. He was graduated from West Point in 1850, was assigned to the engineering corps and until 1859 was engaged in making river and railway sur¬ veys between the Mississippi River and the Pacific Ocean. He was assistant professor of mathematics at West Point from 1859-61, when he became lieutenant-colonel and later colonel and captain of volunteers. For service at Gaines' Mills in 1862 he was promoted briga¬ dier-general, and he became chief of topographi¬ cal engineers in 1863, rising to chief of engi¬ neers in the Army of the Potomac in that year. He was on the staff of General Meade at the battle of

Gettysburg, where on 2 July he seized and held Little Round Top, the key to the Federal position. He was promoted major-gen¬ eral of volunteers in May 1863 and in 1864 as¬ sumed command of the Fifth corps in the Army of the Potomac. He was subsequently placed in command of the Department of the Mississippi and in 1865 was mustered out of the volunteer service as brevet brigadier-general of regulars. He continued in the arm}”, engaged in various surveys, and in 1879 was promoted lieutenant-708

colonel. A statue was unveiled to his memory on Little Round Top, Gettysburg, 8 Aug. 1888. He published various reports and ˆAn Account of the 5th Army Corps at Five Forksˆ (1866).

WARREN, Henry Kimball, American coL lege president: b. Cresco, Iowa, 31 May 1858. He was graduated from Olivet College in 1882, was principal of the public schools of Mount Pleasant, Mich., 1882-83 and of those of Hanni¬ bal, Mo., 1883-89. He wa5 president of Gates College, Nebraska, 1889-94, of Salt Lake Col¬ lege, Utah, 1894-95 and in the latter year be¬ came president of Yankton College, South Dakota.

WARREN, Henry White, American Methodist bishop : b. Williamsburg, Mass., 4 Jan. 1831 ; d. 1912. He was graduated from Wesleyan University in 1853 and in 1855 was admitted into the Methodist Conference. He was engaged for 15 years in various pastorates in Massachusetts ; served in the Massachusetts house of representatives in* 1861-62 ; was pastor of the Arch Street Church in Philadelphia in 1871-74, and in 1877-80; and in 1880 was elected bishop. He traveled in almost all parts of the United States in the performance of his episcopal duties and visited Japan for inspect¬ ing the Methodist Church missions in 1888. He edited The Study in 1896-1900, and pub¬ lished ˆSights and Insightsˆ (1874) ; ˆRecrea¬ tions in Astronomyˆ (1879) ; ˆThe Bible in the World's Educationˆ (1892) ; ˆ Among the Forcesˆ (1898) ; ˆFifty-two Memory Hymnsˆ (1908), *etc.*

WARREN, James, American Revolution¬ ary leader: b. Plymouth, Mass., 28 Sept. 1726; d. there, 27 Nov. 1808. He was graduated at Harvard in 1745, and for several years was en¬ gaged in mercantile pursuits at Plymouth. He was elected a member of the General Court from Plymouth in 1766, was uniform in his support of the rights of the colonists and re¬ mained in that assembly until it was dissolved in 1774. In 1772 he took a leading part in the establishment of committees of correspondence for the different colonies, a measure generally adopted. He became president of the Massa¬ chusetts provincial congress in 1775, was pay¬ master to the Continental army while it was at Cambridge, after the adoption of the Massachu¬ setts State constitution was for several years speaker of the House and held also a seat in the navy board.

WARREN, Sir John Borlase, English naval officer: b. Stapleford, Nottinghamshire, 1754; d. Greenwich, 27 Feb. 1822. He entered the navy as midshipman and after serving in that capacity for some time studied at Emanuel College, Cambridge, and took his degree in 1776. In 1774 he entered Parliament as member for Marlow, and in 1775 was created a baronet. In 1793, on the commencement of the war with France, he was appointed to the Flora frigate, and in 1795 commanded the expedition to Quiberon Bay to assist the insurrectionists of La Vendee, which was unsuccessful. On 11 Oct. 1798 he fell in with a French squadron off the coast of Ireland destined for the invasion of that country, and captured the Hoche line-of-battle ship and three frigates. For this he was subsequently made rear-admiral of the blue. He continued in the navy until the Peace of

Amiens, when he was made privy councillor and sent to Russia as Ambassador Extraordinary and Minister Plenipotentiary, and there man¬ aged some delicate negotiations with regard to the retention of Malta with great ability. On his return he again entered into service, sub¬ sequently became vice-admiral, and in 1812 re¬ ceived the chief command in North America and the West Indies. He is the supposed au¬ thor of an anonymous work entitled ˆA View of the Naval Force of Great Britainˆ (8 vols.,

1791).

WARREN, John Byrne Leicester, 3d

Baron De Tabley, English poet : b. Tabley House, Cheshire, 26 April 1835 ; d. Ryde, Isle of Wight, 22 Nov. 1895. He was educated at Eton and Oxford, was called to the bar and after a short diplomatic experience devoted himself to literature. His life was passed in retirement, although he was the personal friend of Tennyson, Browning, Gladstone and other eminent men of his day. His poetry, which re¬ veals many excellencies of style as well as depth of thought, appeals to the cultivated few, but not to the general public. His earliest work appeared with the signature ˆˆG. F. Preston® (1858ˆ2), and later he used the pseudonym ˆˆWilliam Lancaster.® After 1873 his work ap¬ peared with his own name, John I.eicester War¬ ren. In 1893 he published ˆPoems Dramatic and Lyrical by Lord De Tabley,ˆ which met with qualified success, and in 1895 a second series appeared. Among his other volumes of verse are ˆPraeteritaˆ (1870) ;

ˆPhiloctetesˆ (1867); ˆOrestesˆ (1868); ˆRehearsalsˆ (1870); and ˆSearching the Net> 1873). He also wrote two novels, ˆA Screw Looseˆ (1868); ˆRopes of Sand> (1869).

WARREN, John Collins, American sur¬ geon, son of John Warren : b. Boston, Mass., 1 Aug. 1778; d. there, 4 May 1856. He was graduated at Harvard University in 1797 and later studied medicine in London, at Edin¬ burgh University and in Paris. He returned to Boston in 1802, and finding his father in greatly impaired health he took over a considerable part of his practice. He became joint editor of the Monthly Anthology in 1803; was adjunct professor of anatomy and surgery at Harvard in 1806-15, and professor in those branches in 1815ˆ7, succeeding his father. He was one of the founders of the Massachusetts General Hospital and was its chief surgeon the re¬ mainder cf his life. He performed the first public operation in which ether was used as an anaesthesia in October 1846; he also performed the first operation for strangulated hernia in this country; and introduced Hunter's opera¬ tion for aneurism. He was a voluminous writer, drawing upon a vast fund of personal experi¬ ence as a surgeon. He was greatly interested in palaeontoloˆ and owned a fine collection, se¬ curing for it in 1845 the most perfect specimen of a mastodon skeleton in existence. His col¬ lection of anatomical specimens formed the nu¬ cleus of the ®Warren Museum® of the Har¬ vard Medical School. He was one of the foun¬ ders of the American Medical Association. Au¬ thor of ˆ Cases of Organic Diseases of the Heartˆ (1809) ; ˆA Comparative View of the Sensorial and Nervous Systems in Men and Animalsˆ (1822) ; ˆSurgical Operations on Tumorsˆ (1837) ; Hnhalation of Etheral Vapor

for the Prevention of Pain in Surgical Operations> (1846), *etc.*

WARREN, John Collins, American sur¬ geon, son of John C. Warren (q.v.) : b. Boston, Mass., 4 May 1842. He was gradu¬ ated at Harvard University in 1863 and took his M.D. there in 1866, later studying in Vienna, Berlin, Paris and London. He engaged in prac¬ tice at Boston in 1869 ; became a surgeon at the Massachusetts General Hospital ; was associate professor of surgery at the Harvard Medical School in 1887-93, professor in 1893-1907 and has since been professor emeritus. He attained a high reputation as a surgeon both at home and abroad. In 1873-81 he edited the Boston Medical and Surgical Journal. Author of ˆAnatomy and Development of Rodent Ulcer ˆ (1872) ; ˆHealing of Arteries after Ligature in Men and Animalsˆ (1886) ; ˆSurgical Pathol¬ ogy and Therapeuticsˆ (1895), *etc.* He was also editor and part author of ˆInternational Textbook of Surgeryˆ (2 vols,, 1900).

WARREN, Joseph, American patriot : b. Roxbury, Mass., 11 June 1741; d. Charlestown, Mass., 17 June 1775. He was graduated from Harvard in 1759, studied medicine with Dr. James Lloyd of Boston, entered the practice of his profession in 1764, and from the time of the Stamp Act (q.v.) (1765) contributed to the press. On the occasion of the Townshend reve¬ nue acts (see Townshend, Charles, 1725-67), imposing duties on paper, glass and tea, legaliz¬ ing writs of assistance and forming a board of customs, Warren printed in the Boston Gazette over the signature *A True Patriot a letter which caused Governor Francis Bernard to at¬ tempt the prosecution of the publishers on the ground that the article tended to bring the royal government into contempt. The attorney-gen¬ eral began proceedings, but the grand jury re¬ fused to find a bill. In 1770 Warren was one of the committee of safety appointed after the ˆˆBoston Massacre® of 5 March, and in 1772 he pronounced the memorial oration at the anni¬ versary of that event. With Samuel Adams (q.v.) and James Otis (q.v.) he was recorded in November 1772 as a member of the first committee of correspondence, and during the next two years busily cooperated with Adams. When the latter left Boston, 10 Aug. 1774, to

attend the meeting of the Continental Congress at Philadelphia, Warren became the leading figure in Massachusetts political movements. When the towns of Suffolk County assembled in convention at Milton, 9 Sept. 1774, Warren read a set of resolutions, drawn up by himself and since known as the ^^Suffolk resolves,® which declared that a king who has violated the chartered rights of subjects forfeits their allegiance ; that the ^^Regulating act,® which had deprived Massachusetts without a previous no¬ tice and without a hearing of most important rights and liberties, was null and void; and directed tax-collectors to refuse to pay the moneys collected to Gates' treasurer, warned Gates that if patriots were arrested for political reasons royal officers would be held as hostages and counseled the towns to choose their own officers of militia. After the meeting of the Provincial Congress in October 1774, Warren was chairman of the committee of safety for collecting military stores and organizing a mili¬ tia, and on 5 March 1775 delivered his second

oration on the anniversary of the ^^assacre.® He was unanimously elected president of the Provincial Congress at its Watertown meeting, 31 May, being thus made chief executive under the provisional government. On 14 June he was chosen second major-general of Massachusetts forces, and on 17 June went to Bunker (Breed's) Hill, where he told Putnam and Prescott that he had come to serve as a volunteer aide. At the final conflict near Prescott's redoubt he was shot and killed. Webster's apostrophe to him in the ^Bunker Hill Oration^ as ®the first great rnartyr in this great cause® is well known. The biography by Everett in Sparks' ^American Biography,^ Vol. X (1838), has been super¬ seded by that of Frothingham, ^Life and Times of Joseph Warren^ (1865).

WARREN, Josiah, American social re¬ former: b. near Boston, Mass., 1799; d. Boston, 14 April 1874. He was an enthusiastic sup¬ porter of Robert Owen's communistic settle¬ ment at New Harmony, Ind., in 1825-26, and upon its failure he for a time abandoned the idea of communal living. He then formulated a theory of a time valuation of labor, placing all grades, skilled and unskilled, upon an equal basis. He established a time store at Cincinnati, Ohio, in 1826 and conducted it for two years on a plan of his own invention. His merchan¬ dise was sold at cost, plus a charge of 7 per cent to cover store maintenance, the customer paying in addition for the time of the salesman. In this experiment he also made use of labor notes with success. He later returned to the idea of communistic living, and his theories are still held in high esteem by the philosophical anarchists.

Some of his opinions received favorable notice from John Stuart Mill. Au¬ thor of ˆTrue Civilizationˆ (1846) ; ˆEquitable Commerceˆ (1852).

WARREN, Mercy Otis, American patriot : b. Barnstable, Mass., 25 Sept. 1728; d. Ply¬ mouth, Mass., 19 Oct. 1814. She was Mrs. James Warren (see Warren, James), sister of James Otis (q.v.). An ardent patriot she corresponded with the leaders of the Revolution, among them Samuel and John Adams and Thomas Jefferson. She wrote some dramatic works which were included in her volume of ˆPoems, Dramatic and Miscellaneousˆ (1790). Of these attempts in drama the best is the metrical ˆGroiip,ˆ satirizing British and Tory leaders. The chief of her writings, how¬ ever, is the three-volume ˆHistory of the Rise, Progress and Termination of the American Revolution, Interspersed with Biographical, Po¬ litical and Moral Observationsˆ (1805). Tyler admits the ˆffone of undisguised partisanship ringing through the book,® but calls it a ®powerful delineation of a great period,® and says its character-sketches may still be found of interest.

WARREN, Minton, American philologist and educator: b. Providence, R. I., 29 Jan. 1850; d. 26 Nov. 1907. He was graduated at Tufts College in 1870, and took his Ph.D. at Strassburg University in 1879. He was professor of Latin at Johns Hopkins University until 1899, and held that chair at Harvard University from 1899 until he died. In 1896-97 he was director of the American School for Classical Studies at Rome, Italy; and in 1897 he was president of the American Philological Association. He con-

tribiited many papers on epigraphy and Latin comedy to the learned journals.

WARREN, Samuel, English novelist: b. Denbighshire, Wales, 23 May 1807 ; d. London, 29 July 1877. He studied medicine at Edin¬ burgh and law at the Inner Temple, was called to the bar in 1837 and was made queen's coun¬ sel in 1851. He was recorder of Hull (1854-74), represented Midhurst in Parliament (1856-59) and was appointed master in lunacy in 1859. His earliest work, ˆPassages from the Diary of a Late Physicianˆ (1832), appeared in several editions in both England and the United States, but his most popular work was ˆTen Thousand a Yearˆ (1841), which has passed through many editions. It appeared in an abridged form in 1903. He published various other works, including ˆNow andThenˆ (1847) ; ˆThe Lily and the Beeˆ (1851) ; and several law books.

WARREN, Whitney, American architect : b. New York. He studied architecture in New York and under Daumet and Girault at the Ecole des Beaux Arts, Paris. In 1894 he established himself as an architect in New York, and in 1899 he designed the New York Yacht Club building. He afterward became a member of the firm of Warren and Wet-more, and was codesigner of the Grand Central Station, New York, completed in 1913; the Grand Trunk Station, Winnipeg, Canada; the Ritz-Carlton and Belmont hotels. New York; many fine private residences ; the bronze gates at the cathedral of Saint John the Divine; and many other notable works. He received a silver medal at the Paris Exposition in 1900; became a member of the Academie des Beaux Arts of the French Institute in 1905; and was elected to the National Institute of Arts and Letters.

WARREN, William Fairfield, American educator : b. Williamsburg, Mass., 13 March 1833. He was graduated from Wesleyan Uni¬ versity in 1853, ordained in the Methodist min¬ istry in 1855 and for several years was pro¬ fessor of systematic theology at Frankfort, Ger¬ many. In 1866 he became acting president of the Boston Theological Seminary, and from 1873-1903 he was president of Boston Univer¬ sity, occupying, also, during that time, the chair of philosophy of religion and comparative theol¬ ogy. His writings include ˆThe True Key to Ancient Cosmologyˆ (1882) ; *ˆParadise Found,ˆ published also in Japanese, Chinese, Spanish and German (1885) ; ˆThe Story of

Gottlieb,ˆ translated into German and Arabic (1890) ; Constitutional Law Questions in the Metho¬ dist Episcopal Churchˆ (1894) ; ˆThe Religion of the World and the World's Religinˆ (1900), *etc.*

WARREN, Ark., city and county-seat of Bradley County, situated in the north central part of the county, on the Missouri Pacific, Warren and Ouachita Valley and also the War-ren-Johnsville and Saline River railroads, about 100 miles south of Little Rock. It contains sev¬ eral cottonseed-oil-, saw-, hardwood and stave mills. It has a high school, a junior high school, ♦two ward schools, a negro public school, also a negro industrial school (Walters Institute), a courthouse and two banks with resources over $1,000,000; taxable property, $440,000. Pop.

(including mill sections outside of corporation on account of taxes) about 5,000.

WARREN, Ill., village in Jo Daviess County, on the Illinois Central and the Chicago, Milwaukee and Saint Paul railroads, about 26 miles east by north of Galena and 25 miles northwest of Freeport. It is in an agricultural and stock-raising region, and near the lead mines of the Galena district. A good quality of tobacco is grown in the vicinity. The chief industrial establishments are flour mills, cream¬ eries .and tobacco factories. The village has a high school, graded schools, a public library and a State bank. Pop. 1,330.

WARREN, Ind., town in Huntington County, on the Salomonie River, and on the Toledo, Saint Louis and Kansas City Railroad, about 75 miles north by west of Indianapolis and 15 miles south of Huntington, the county-seat. It is in a region of good farm lands and in a natural-gas and petroleum belt. The chief manufacturing establishments are flour and lumber mills, cooperage and machine shops. There are large shipments of hay, grain and live stock. Pop. (1920) 1,520.

WARREN, Me., town in Knox County, on Saint George's River, and on the Maine Central Railroad, GO miles northeast of Portland. It was first permanently settled in 1736, though it was known as a trading post as early as 1631 ; it was incorporated as a town in 1776. There are large deposits of limestone in the town; and the river affords power for manufacturing; the town contains cotton and shoe factories, and a powder mill. There is a public high school. Pop. about 1,812.

WARREN, Mass., town in Worcester County, on the Chicopee River,

and on the Bos¬ ton and Albany Railroad, 18 miles west of Worcester. It includes the villages of Warren and West Warren. It was first settled in 1731, and in 1741 was incorporated as a town under the name of Western. In 1834 the name was changed to Warren. It contains cheese fac¬ tories, cotton and woolen mills and manufac¬ tories of steam pumps and engines. It has a public high school established in 1870, and a public library of about 15,000 volumes, founded in 1876 by a library association. Pop. about

4,188.

WARREN, Ohio, city, county-seat of Trumbull County, on the Mahoning River, and on the Pennsylvania, the Erie and the Pittsburgh and Western railroads, about 50 miles southeast of Cleveland and 15 miles northwest of Youngs¬ town. It is a region where much of the land is good for farming, but the chief industries of the city are connected with manufacturing iron products. Some of the principal manufactures are rolling mill products, flour, lumber products, automobiles, tubing, bath tubs, electric lamps, foundry and machine-shop products. It has about 75 factories, giving employment to 3,500 people, the annual value of products being about $7,000,000. The principal public buildings are the county courthouse, the municipal build¬ ings, churches and schools. There are a high school, public graded schools and a public li¬ brary containing about 10,000 volumes. There are five banks and two daily newspapers. War¬ ren was founded in 1799; incorporated in 1834,

and has grown very rapidly in recent years. Pop. about 27,050.

WARREN, Pa., borough, county-seat of Warren County, on the Allegheny River, and on the Pennsylvania and the Western New York and Pennsylvania railroads, about 120 miles northeast of Pittsburgh and 20 miles south of Chautauqua Lake, N. Y. Warren was settled in 1795 by Daniel McQuay and was incorporated in 1832. The village of

Gade was annexed in 1895. There are a large number of foreign-born inhabitants, chiefly Germans and Scandi¬ navians. It is in an agricultural and oil region', but the chief industries are connected with oil products and manufacturing. The principal manufacturing establishments are iron and steel works, machinery, lumber mills, oil and gas en¬ gine factories, boiler works, piano and fur¬ niture factories. Other manufactures are wood alcohol, oil and the by-products, glue, bar¬ rels, machinery used with oil wells and for manufactories. In 1910 (government census) there were 72 manufacturing establishments. These give employment to about 2,000 persons, and produce about $6,000,000 annually. The principal public institutions are the county court¬ house, the State Hospital for Insane, the churches and educational institutions. There are 15 churches representing seven different denomi¬ nations. There are seven public schools, one Roman Catholic parish school, four private schools and a public library containing* about 12,000 volumes. There are five banks and three daily newspapers. The government is adminis¬ tered according to the Pennsylvania statutes for boroughs, which provides for a burgess and a council of 14 members who hold office three years. Pop. 15,000.

WARREN, R. I., town in Bristol County, on the Warren River and Narragansett Bay, and on the New York, New Haven and Hartford Railroad, 10 miles southeast of Providence. It was the old Indian town of Sowamset ; a trad¬ ing post was established there by white men as early as 1632, but permanent settlement came later. It was in the territory in dispute be¬ tween Rhode Island and Massachusetts, and originally formed a part of the town of Swan¬ sea, Mass. ; after the boujidary was settled and Warren came under the jurisdiction of Rhode Island it was incorporated as a town (1747) ; in 1770 the town of Barrington was separated from it. From 1764-70 it was the seat of the College of Rhode Island (now Brown University). During the Revolutionary War the town was pillaged by the British, and a number of houses burned. It is now largely a manufacturing town, its products including cotton goods, braid and twine. It has a public high school, and the George Hall Free Library, several banks and a newspaper. Pop. 7,841. Consult Fessen¬ den, ˆHistory of Warren.ˆ

WARREN, (1) a tract of ground appro¬ priated to the breeding and preservation of game or rabbits ; also, a preserve for fish in a river. (2) In English law, a franchise or place privileged by prescription or grant from the Crown for keeping beasts and fowls of warren, which are hares, rabbits, partridges and pheas¬ ants, though some add quail, woodcock and water fowl. The warren is the next franchise in degree to the park, and g forest, which is the

highest in dignity, comprehends a chase, a park, and a free warren.

WARRENSBURG, wpr'enz-burg. Mo., city, county-seat of Johnson County, on the Black River, and on the Missouri Pacific Railroad, about 65 miles southeast of Kansas City. It is in a f'ertile agricultural region and in the vicinity are large sandstone quarries. It has several mineral springs, noted for their medic¬ inal properties. The springs and climate have much to do with making the city a favorite pleasure and health resort. The chief manu¬ facturing establishments are flour mills, foun¬ dries and machine shops, wagon and carriage factories and woolen mills. It has grain eleva¬ tors, coal and stock yards. The city has the State Normal School for the Second district, a high school and graded elementary schools. There are three banks and four newspapers. Pop. (1920) 4,811.

WARRENTON, Va., town, county-seat of Fauquier County, on the Southern Railroad, about 42 miles southwest of Washington, D. C. It is in the region of tire foothills of the Blue Ridge and its picturesque scenery and cool climate in summer have made it a favorite sum¬ mer resort. It has seven churches, a high school, Fauquier Institute, private select schools, a national bank and a private bank, and two newspapers. The town has gravity waterworks. Pop. (1920) 1,545.

WARRINGTON, wor'mg-ton, England, a manufacturing town in Lancashire, on the river Mersey and the Manchester Ship Canal, near the Sankey and Bridgewater canals, 15 miles east of Liverpool. The Latchford locks are notable features of the ship canal at Warrington. The public buildings and institu¬ tions include the restored parish church of Saint Elphin, in decorated style ; other modern parish churches; Nonconformist and Roman Catholic churches ; the town-hall, in classical style; the museum, containing a free library and municipal art-gallery; the grammar school, blue-coat school, clergy orphan daughters' school, Saint Elphin's schools, a training col¬ lege for school mistresses, a municipal school of art, technical schools and other educational institutions ; post office ; public baths ; the mar¬ ket-hall ; municipal gas works, waterworks, tramways, electric light works ; hospitals and an infirmary ; a gymnasium ; public parks and gardens ; and military barracks. Of the numer¬ ous industries of the town the most important are the manufacture of iron and iron goods, wire, leather, soap and beer. Warrington is an ancient town and had at one time a house of Augustinian friars. The famous academy, which existed here from 1757 till 1783, had among its teachers Dr. Joseph Priestley, Dr.. William Enfield, Dr. Aikin, Dr. John Taylor, the Rev.

Gilbert Wakefield and other eminent men; it is now represented by Manchester Col¬ lege, Oxford. Pop. 74,157.

WARRNAMBOOL, war'nambool, Aus¬ tralia, a seaport town in Victoria, on Warr-nambool or Lady Bay, 166 miles southwest of Melbourne. The principal public buildings are the Episcopal, Roman Catholic and other churches, various banking and insurance offices, mechanics' institute, the Odd Fellows' and the volunteer ˆrtjllery halls, a hospital and benevo*-

lent asylum, *etc.* Steamers ply several times a week to Melbourne and a good trade is done from the port in wool and other agri¬ cultural produce. The town contains a flour mill, biscuit factories, boot factories, tanneries, breweries, *etc.* Pop. about 7,500.

WARS OF THE WORLD. The story of the wars of the world, if told in anything like its entirety, would be practically a history of the human race, for wherever nations have risen to greatness and have bred men capable of performing great deeds th-e records of these acts of heroism have almost invariably been made on those fields of battle upon which the supremacy of tbe nation itself has been accom¬ plished. In the record of the wars of the world the student may read the tale of human progress — the story of the advance of civiliza¬ tion — for it cannot be denied that man's high place in the world to-day is largely a reward bestowed upon him in return for the brutality and bloodshed of the battlefields upon which his ancestors fought. That there have been wars that have been unnecessary is a fact that cannot be questioned, any more than one would deny that warfare has often been unnecessarily brutal, and yet, trom a logical point of view, these are merely incidents which reflect upon but do not detract from the integrity of the original propositions : that war is the means by which superior nations have attained their superiority; that most wars have brought about some good to humanity as a whole; that by war civilization was extended and that in the winnowing prpeess afforded by such interna¬ tional conflicts the fittest alone have survived and all that which was opposed to human progress or contrary to the best interests of civilization has been cast aside, to be lost and, eventually, forgotten by all save the historian who does not deign to record the most ignobl'S things in the life and customs of the earth's peoples.

Early History. — Unfortunately it is im¬ possible to state, even approximately, when the first battle of the world was fought. In the early ages, of course, primitive man had all he could do to maintain a bare 'existence and preserve himself against the fury of the wild beasts so eager to attack him; out even tradition furnishes no clue to enable the student to discover at what period men first turned against other men to do battle with the crude instruments that had been devised only as a means of protecting themselves from the savage animals in the forests. Probably th'ere were wars many thousands of years be¬ fore recorded history. All we know is that Osymandyas of Egypt,

supposed by some to be the Osiris of the priests, is the first warlike king mentioned by history. He passed into Asia and conquered Bactria, about the year 2100 B.c. If Osymandyas was the first warlike king, however, he was not the last, for in 1900 it was estimated that since his time no less than 6,860,000,000 men have lost their lives on fields of battle and the millions slain in the Great World War are yet uncounted; but, in spite of this grewsome record, men have fought and will probably continue to conduct wars against each other, while all nations will be compelled to arm themselves with the latest fighting inventions, for, with the history of

the past to guide them, they realize only too well the Power that is not always prepared to protect its rights and properties with the sword may not unlikely find itself with very little except its honor to defend. Probably the first wars originated in nomad life and these con¬ flicts were undoubtedly occasioned by the disputes which arose between the various tribes in regard to their rights of possession in favorable pasturage. When all tribes devoted themselves to the flocks and herds there was little to discriminate between them, but, grad¬ ually, certain tribes began to assume different characteristics. On-e became attached to the art of agriculture ; another devoted its time to hunting and fishing, while a third class still remained shepherds of the flocks. It was this difference of occupation* which finally became the natural source of hostilities, for it estab¬ lished a series of classes, the stronger of which began to prey upon tbe weaker. Naturally, those who devoted themselves to the hunt be¬ came the victors in war, and, by reducing their victims to a condition of slavery, threw the manual labor, which they despised, upon the shoulders of others. In fact, there is a tradi¬ tion in western Asia, that Nimrod, who is mentioned in the Bible as ®a mighty hunter before the Lord,® was the first person to en¬ gage upon an extensive system of warfare for the express purpose of obtaining slaves and that it was he who introduced the practice of requiring conquered nations to pay an annual tribute, or, in other words, a ransom for their release. However true this may be we find that the ancient Old Testament days were full of such warfare, in which the outcome was either tribute or slavery. History began on the banks of the Nile and along the Tigris and the Euphrates; for these valleys, like two great oases, were practically the only habitabl'e spots in the great desert. Fitted with all known conveniences for travel, with roads suitable for the passage of vast armies, these two centres of habitation finally became great rivals. In fact, whenever any particularly energetic ruler appeared in either spot he at once set out, as if moved by an irresistible impulse, to conquer his rival and so

control western Asia. It may truthfully be said, there¬ fore, that the history of this time is little more than one continuous record of struggles be¬ tween Eˆpt and Mesopotamia, a condition which existed until Europe entered the lists and became the conqueror. In Egypt, - during this age, the military class held such a prominent position in society that fully one-third' of the land was in the possession of the 410,000 men who composed the army.

As the Persians trusted for success mainly to numbers, war to them was little more than an exhibition of brute force. Sometimes as many as 1,000,000 men were brought into serv¬ ice for one campaign. In battle the troops were massed in deep ranks, thos-e which were supposed to be the bravest being in front, but, if the line of battle was once broken, defeat appears to have been inevitable, for the army lost heart, even if the commander himself did not set the example of flight and the general stampede that followed usually cleared the battlefield. Rawlinson's description of the appearance of the Persian forces in time of

war is one of the most vivid word pictures painted by any historian :

The troops were drawn from the entire empire, and were marshaled in the field according to nations, each tribe accoutred in its own fashion. Here were seen the gilded breastplates and scarlet kilts of the Persians and Medes; there the woolen skirt of the Arab, the leathern jerkin of the Berber, or the cotton dress of the native of Hindustan. Swart savage Ethiops from the Upper Nile, adorned with a war paint of white and red, and scantily clad with the skins of leopards and lions, fought in one place with huge clubs, arrows tipped with stone, and spears terminating in the horn of an antelope. In another, Scyths, with their loose spangled trousers and their tall pointed caps, dealt death around from their unerring blows; while near them Assyrians, helmeted, and wearing corselets of quilted linen, wielded the tough spear or the still more formidable iron mace. Rude weapons, like cane bows, unfeathered arrows, and stakes hardened at one end in the fire, were seen side by side with keen swords and daggers of the best steel, the finished productions of the work¬ shops of Phoenicia and Greece. Here the bronze helmet was surmounted wdth the ears and horns of an ox; there it was superseded by a fox-skin, a leathern or wooden skull cap, or a head dress fashioned out of a horse's scalp. Besides horses and mules, elephants, camels and wild asses diversified the scene, and rendered it still more strange and wonderful.

Wars of the Romans. — Although the Per¬ sians fought and won battles in spite of their crude methods of fighting, Greece was the mother of the art of warfare. It must not be imagined, however, that the splendid body of perfectly trained soldiery comprising the armies of Athens, Sparta, Thebes or Macedon was the product of a day, or of the genius of a single man, for nothing less than centuries were re¬ quired for the perfection of this wonderful force. In the heroic days, the days of the Homeric battles, the Greek soldrers were no more to be commended than their^ Persian rivals. Loosely organized, poorly drilled and badly -equipped, the mass of the army was capable of doing little more than give the in¬ spiration of numerical strength to the small bodies of heroes who did all the fighting. At length,

however, the idea of the phalanx evolved itself, and, in a remarkably brief period of time, the history of the world was changed. At no time prior to the invention of the modern instruments of war has man conceived such a formidable weapon as the attack of a charging phalanx. It was this powerful engine of war that accomplished the downfall of the Persian force at Marathon. It was a still more perfect phalanx that resulted in the defeat of Thebes and the victory of Macedon on the fields of Chaeronea. It was clearly the Greek phalanx — solid, erect and terrible in its -effect — that enabled Alexander to inaugurate the campaign that had for its purpose the conquering of the entire known world. It was with the aid of the phalanx that Athens was preserved; that the Peloponnesian war was won by Sparta, and it was this same maneuver that saved the day for the Greek forces, until, at last, the Roman legions sw-ept down upon a degenerate Macedon to declare the end of the Grecian Empire. The story of Rome's supremacy is not dissimilar to that of the rise and fall of the Grecian power. She scorned to make us-e of the phalanx, her legions fighting in such open formation that those in the front rank could fall back, when weary, and allow those in the second file to advance and take their places and yet the discipline and generalship of the great army was so per¬ fect that it succeeded in establishing a wider empire than that of Alexander's, an empire which, in 133 B.C., included all of Southern

Europe from the Atlantic to the Bosporus, as well as a part of Northern Africa. Syria, Egypt and Asia Minor were then Roman de¬ pendencies. H-er army had made her prac¬ tically mistress of the civilized world. Sev¬ eral centuries elapsed before Rome's glori-es be¬ gan to fade. During this time her power was still further extended, civil wars had been sup¬ pressed and revolutions crushed, tor when the Roman army could fight according to the scien¬ tific rules of warfare it was practically an invincible force. Wh-en the destroyers of the great empire came, however, they brought with them no knowledge of the science of war which Rom-e knew so well. To Alaric the Goth, Attila the Hun, and Genseric the Vandal, war was simply a question of mere numerical hu¬ man strength. They had no more idea of the advancement in military art than had the Saracen horde that swept across the country and that might have planted the standard of Islam in every nook and corner of Europe if Charles Martel had not won his great victory on the plain of Tours. Against these three great barbaric leaders Rome was almost power¬ less -and as they swept down upon her, as one wave of the sea follows another, Rome fell, never to rise again. City after city was spoiled and burned; Rom-e, even, opened her gates without a blow. The tiara and purple robes of the empire

were sent to Constantinople and Zeno appointed Odoacer to be Patrician ot Italy.

The Middle Ages. — From the fall of Rome and up to the close of the 15th century, wars were less frequent between nation and nation than among the various nations themselves. French fought French; Germans, Germans, and Spaniards, Spaniards and even the war be¬ tween the English and the French, the war that desolated France for more than a century, was no exception to this rule, for the enmity that was the cause of all the strife was not that of two rival nations, but was due entirely to the fact that th-e rulers of England were French princes, themselves hereditary sover¬ eigns of French provinces, like Normandy or Poitou. Similar conditions existed in other parts of Europe so that the student who reads of the wars of the Middle Ages is struck by the absence of the well-planned and carefully executed campaigns that distinguished the warfare of both previous and later periods. Th-ere were civil wars, it is true ; local insur¬ rections, or single battles of more or less im¬ portance, but, with the exception of the in¬ vasion of the Saracens, the expeditions of Charlemagne, and the conquests of England by the Danes and the Normans, there is little to remind one of the well-organized systems of warfare which distinguished the days of Greece and Rome and which have since been revived by nations of modern times. It was not until almost the close of the Middle Ages that anything was done to improve the art of war as it was known to the ancients. Then th-e invention of gunpowder and the abandonment of armor revolutionized the science of fighting. Strange as it may seem, however, gunpowder was known for more than two centuries before the French, at the clos-e of the 16tlT century, armed their soldiers with matchlock muskets, while conservative England, fearing that archery would be superseded, forbade the use

of the new weapon as late as the time of

Henry VIII.

Modern Warfare. — By Gustavus Adolphus, ^^the father of the modern art of war,® as be is called by Colonel Dodge, his biographer, the new weapon was accepted at its true worth, and, arming his corps with thern, he evolved the then original plan of preparing an attack with artillery. The adoption of the musket, however, was not the only development in warfare that may be traced to this great strategist, for it was he who first substituted the line for the mass formation, one of the greatest innovations in modern tactics. It was not until the close of the Middle Ages, there¬ fore, that military science, having slept for centuries, awoke to the possibilities of greater perfection in armament as well as in discipline. From the time of Gustavus Adolphus and Frederick the Great up to and after the close of the Civil War in America, military methods were undergoing such a change that the period may be regarded as that. of the rehabilitation of the science of warfare, for nearly every kind of arm or maneuver that was in use dur¬ ing the Middle Ages has now become obsolete. In the accomplishment of all this improvement in armament and tactics credit is due to all tbe great generals, including Napoleon, who hired the best mechanics to make experiments for him and who gave to Europe its first breech¬ loader. To-day, however, everything but the small calibre rifle, and possibly the bayonet, has been relegated to the scrap heap, just as the antique fighting tactics, like the various variations of the phalanx and mass forma¬ tions, have given place to a more and more open formation, as the perfection in the fight¬ ing arms has required such alterations in the fighting methods of the world's armies.

Decisive Battles. — Creasy, the historian of warfare, who treats of incidental battles rather than of connected wars, selects the following as the ^^Fifteen Decisive Battles of the World® :

1. Marathon, at which, on 28 Sept. 490 B.C., 11,000 Greeks defeated a Persian force numbering more than 110,000 men. The Grecian army was commanded by such generals of genius as Miltiades, Aristides and Themistocles. The Persian'army was forced to retreat to Asia.

2. Syracuse, 419 B.C., when the besieged Syracusans turned upon the invading Athenians, almost completely de¬ stroying their forces, driving them, “ with heavy slaughter, over the cliffs, which an hour or two before they had scaled full of hopes and confident of success.”

3. Arbela, the battle between Alexander the Great and Darius Codomanus which decided the fate of the Persians;

1 Oct. 331 B.c,

4. Metaurus, at which Hasdrubal, the brother of Han¬ nibal, was defeated and slain by the Roman army under the command of Livius and Claudius Nero; 207 b.c.

5. Teutoburg, 9 a.d., the battle at which Varus and the Romans were defeated by the Germans, and which was regarded at Rome as such a national calamity that Augustus is said to have cried aloud in agony, “ Varus, give me my legions! **

6. Chalons, at which, in 451 a.d., Actius defeated Attila the Hun, compelling him to retire into Pannonia.

7. Tours, at which Charles Martel saved Europe by his great victory over the invading hosts of the Saracens. _ This conflict is also •sometimes known as the battle of Poitiers:

732 A.D.

8. Hastings, at which, on 14 Oct. 1066, Harold II of

England lost his life and kingdom in battle against William, Duke of Normandy… ˆ

9. Orleans, besieged by the English during October 1428; it was bravely defended by Goucour, who realized that its fall would bring ruin to the cause of Charles IV of France. On 8 May 1429, the siege was raised as the result of the heroism of Joan of Arc.

10. The Spanish Armada, ‘the naval battle at which the Spanish fleet was almost completely destroyed by the British.

11. Blenheim, at which the French and Bavarians were

defeated by the English under the Duke of Marlborough, 2 Aug. 1704.

12. Pultowa, where Charles XII of Sweden was completely defeated by the Saxons; 1 May 1703.

13. Saratoga, the engagement regarded as the greatest check suffered by the British forces during the Revolutionary War in America.' At this battle, fought on 17 Oct. 1777, the British general, Burgoyne, still flushed by his victory at Ger¬ mantown, was obliged to surrender his entire force of 5,791 men to the American commander. General Gates.

14. Valmy, where the French, commanded by Kellerman, defeated the Prussians, commanded by the Duke of Bruns¬ wick, 20 Sept. 1792.

15. Waterloo, at which the great Napoleon was C9m-pelled to accept defeat at the hands of the Duke of Welling¬ ton's forces; 18 June 1815.

And to them we now add the prolonged battle of the Meuse in 1918 when the Allies under Foch turned back the German tide.

Wars of the World. — Irrespective of the character of the individual battles the follow¬ ing list of the most important wars that have been waged between the various nations since the Middle Ages is generally regarded as reasonably complete and thoroughly repre¬ sentative :

1455-1485. The War of the Roses, which ended with the defeat and death of Richard HI at Bosworth, 22 Aug. 1485. The war was between the Lancastrians and the Yorkists and obtained its name from the fact that the former wore the red rose as their emblem, and the latter, the white. The union of the roses was consummated in 1486, when Henry VII was married to Princess Elizabeth, daughter of Edward IV.

1587-1588. War of the Armada. In 1587 Philip H, king of Spain, collected and equipped what he believed to be an invincible fleet, for the purpose of effecting the subju¬ gation of England, Although it consisted of more than 130 ships and was manned by picked men, it was practically de¬ stroyed by the British fleet, commanded by Sir Francis Drake, Sir John Hawkins and Lord Charles Howard, 29 July 1588.

1618-1648. The Thirty Years' War between the Cath¬ olics and Protestants of Germany. Beginning in Bohemia, in 1618, it ended with the Peace of Westphalia, 30 years later.

1648-1652. The Civil War of the Fronde may not be one of the great wars of the world, but it is so thoroughly repre¬ sentative of the conditions of the times that it is usually included in such lists. It originated in the minority of Louis XIV, and during the reign of Queen Anne of Austria and Cardinal Mazarin, and was strictly a war of classes. On one side were ranged the supporters of the court and the nobility, while the citizens, supported by the Parliament, were arrayed against them. It ended with the ignoble defeat of Conde at the battle of Saint Antoine.

1702-1713. War of the Spanish Succession, a conflict which arose over the question whether an Austrian or a French prince should succeed to the throne of Spain. From the beginning the British court was opposed to Louis and the successes of the Duke of Marlborough would have delivered the throne to the Austrians if the allies, by withdrawing one after another, had not left the Bourbons free to succeed.

1741-1748. War of the Austrian Succession. At the death of Emperor Charles VI, his daughter, Maria Theresa, attempted to assume control of the throne which the great powers of Europe had guaranteed to her under the law known as the Pragmatic Sanction. Contrary to their agreement, however, all the powers except England determined to rob her of her inheritance. The plot failed and the peace of Aix-la-Chapelle was signed, Frederick the Great being the only monarch to profit by the conflict. He was bought off by the cession of Silesia.

1756-1763. The Seven Years' War was the result of Maria Theresa's determination to recover the Silesian terri¬ tory which she had ceded to Prussia. By careful diplomacy an alliance was formed between Austria and France, Russia, Saxony, Sweden and Poland, leaving England as the only power to which Prussia could look for support. Although it was believed that Frederick would be unable to stand against such odds he was so generally victorious that he was not only able to retain his control over Silesia, but his successes in battle established the position of Prussia as one of the five great nations of the world.

1775-1782. War of the American Revolution. The revolt oi the American colonists as a protest against English oppres¬ sion is one of the most serious conflicts in which England has been engaged, costing, as it did, the greater part of her American possessions. The war culminated with the signing of the treatv of Paris, 30 Nov. 1782.

1789-1794. War of the French Revolution. The uprising in France was distinctly a class awakening, but it resulted in the abolition of the

monarchy and the establishment of the first republic. During this period of internal agitation, however, _ other nations took advantage of the supposed opportunity to meet France with less danger to themselves and yet, during the very days when the Terrorists were

sending their victims to the guillotine the republican army was enjoying such continued success that several threatened frontiers were pacified; Belgium was overrun; Holland conquered, and peace was signed with Prussia and Spain.

1796-1797. In the Italian Campaign, Bonaparte, the new military figure in European affairs, was given his first oppor¬ tunity to exhibit his great genius for generalship, for with a fOTce of 38,000 men destitute of everything but courage, he advanced upon three well-equipped bodies of the flower of Italian and Austrian soldiery, vanquished them and was already in the act of advancing upon Vienna when the Aus¬ trian government, in consternation, asked for a suspension of hostilities. The treaty of Campo Forniio, signed in 1797, was the result. By this France took Belgium and the long-coveted boundary of the Rhine, while Venice and its depend¬ encies were apportioned to Austria.

1803—1815. The Wars with Bonaparte, which may be said to have commenced with Austerlitz and to have ended only with Waterloo, occupied the attention of Europe for more than 12 years. The third coalition, which was formed to resist Napoleon's projects of advancement, consisted of England, Austria and Russia, but the " Sun of Austerlitz " went down upon a defeat so crushing that the conquered were glad to accept the terms of the treaty of Presburg, even at the cost of the very existence of the Holy Roman Empire which had continued for more than 1,000 years. In 1806 a fourth coalition, composed of Prussia, Russia and England, was formed, but_ in one_ day Napoleon annihilated their armies, and, entering Berlin, rifled even the tomb of Frederick the Great. A year later, 1807, saw the humiliation of Russia made complete, for while the battle of Eylau may be said to have been indecisive, there could be no question about the victory of Friedland, and Alexander, forced to sue for peace, signed the treaty of Tilsit. _ The Peninsula Campaign in 1808; the war with Austria in 1809, and the war in Spain, 1809-12, were continuous exhibitions of the power of the French bayonets, and it was not until the Russian campaign, 1812, when the French army retreated from

Moscow like a mass of straggling fugitives, that the powers of Europe saw an opportunity to shake off the yoke which the bold usurper had forced them to bear. Again there was a coalition formed, a gigantic confederation of power which included the forces of England, Russia, Prussia and Sweden, and while Napoleon's new army succeeded in defeating the allies at Lutzen, Bautzen and Dresden, his own fall at the terrible battle of Leipzig sent him back to Paris to prepare for the inevitable fate which Fortune had in store for him, the fate of Waterloo and his own abdication,

1812-1814. The War of 1812 between Great Britain and the United States, which was caused by the aggressions of the British and their refusal to recognize the rights of the American republic on the high seas, resulted in the defeat of the English invaders. It concluded with the treaty of Ghent, signed 14 Dec. 1814.

1821-1829. The Greek War of Independence was the culmination of four centuries of Turkish bondage. Prior •to this there had been several uprisings, all of which had been crushed with relentless cruelty, but the revolt that broke out in 1821 was of a different character, as many Europeans contributed both their money and their services to aid the Greek insurgents. During the_ contest which followed fully one-half of the population is said to have perishedˆ and the Turks, who had called the Egyptians to their assistance, seemed likely to overwhelm the revo¬ lutionists when England, Russia and France formed a league to help the Hellenes. As the result the fleets of the combined forces defeated the Turks and the Egyptians in the bay of Navarino; the French troops drove the Egyptians from the Peloponnesus, and freedom for Greece was at last attained.

1831-1839. The Belgian War of Independence was inspired by practically no other cause than that of a desire for freedom. The revolutions in America, in France and in Greece were a means of inspiration, and as Belgium had never been in sympathy with Holland it required but a spark to kindle the flame of insurrection. In 1839, therefore, the independence of Belgium was declared.

1845-1848. The Mexican War with the United States resulted from the annexation of Texas, the independence of which had never been recognized by the Mexican govern¬ ment, and from Mexico's refusal to treat with the United States regarding the adjustment of the boundary. After several sharp engagements, in nearly all of which the United States forces were overwhelmingly victorious, Mexico City was taken and peace was proclaimed, 4 July 1848.

1853-1855. The Crimean War grew out of a dispute between the Greek and Latin churches as to the right of exclusive possession of the Holy Places in Palestine. France and Russia took opposite sides upon the question, but when a mixed commission decided in favor of the Greeks and against France, the French acceded. Russia, on the other hand, continued to make demands upon the sultan, com¬ manding, among other things, that the tsar be recognized by treaty as the official protector of Christians within the limits of the Turkish domain. In 1853 the tsar also proposed that England should join with him in partitioning the sultan's empire, a proposition which was immediately refused. In

view of the strained relations, however, it was but natural that Turkey should declare war against Russia. In 1854 both England and France came to the sultan's aid, and, an expedition against the Crimea having been decided upon, the allied forces, numbering nearly 60,000 men, attacked the Russians, who, under the command of Prince Menschikoff, had intrenched themselves, 50,000 strong, on the heights of Alma, a position which was supposed to be unassailable. In spite of this, after one sharp contest, the Russians were routed. Peace was proclaimed in April 1856.

1856-1857. The Persian War. The taking of Herat by the Persians, 25 Oct. 1856, was considered such a viola¬ tion of the treaty of 1853 by the British that war ensued between Great Britain and Persia. Several sharp battles followed, in which the Persian forces suffered defeat, and final peace was proclaimed in April 1857.

1857-1859. The Indian Mutiny, which continued for nearly two years, grew out of a revolt of the sepoys, or native soldiers in India. The original cause of the trouble was that the cartridges given to them were said to be greased with tallow or lard, •ivhich was regarded as an insult to their religion, a Hindu being forbidden to touch cow's fat; and a Mohammedan, lard. It was late in 1859, before the re¬ bellion was finally crushed, while, in the meantime, the white residents at Delhi, Cawnpore, and many other places were massacred with terrible brutality. Those at Lucknow were just able to hold the city until relief ar¬ rived.

1861-ˆ1865. The Civil War in the United States, which resulted in the defeat of the Southern forces, the re-establish¬ ment of the Union, and the emancipation of the slaves.

1868-1899. Cuban War for Independence. Although the first attempt to wrest the island of Cuba from the hands of Spain was made as early as 1850, the first insurrection, or formal revolution, did not occur until the fall of 1868. From that time, however, revolutions were of frequent occurrence, but all were suppressed by the Spanish forces until 1898, when the United States formed an alliance with the revolutionists, thus enabling Cuba to obtain the freedom that had so long been denied.

1870-1871. The actual cause of the Franco-Prussian War was the jealousy of Emperor Napoleon, who had been an impotent witness of the success of Bismarck's negotia¬ tions, which had resulted in the greatly increased power of Prussia. More definite excuses were found, of course: the refusal of Prussia to permit the French to purchase Luxemburg from the king of Holland, and the effort of Bismarck to place Prince Leopold of Hohenzollern-Sigmarin- gen on the throne of Spain being two of them; but it is the consensus of opinion among historians that the war was both premeditated and unjust, and that as the emperor had been misinformed both as to the numerical strength of his army and to its state of preparation, his surrender was practically a foregone conclusion from the beginning of the conflict.

1876-1903. The Anglo-Boer War. Although separated by; lapses of several years the hard feeling which always existed between Great Britain and the small South African republics resulted in many serious disturbances which culminated, in 1900, in the Anglo-Boer War, the complete victory of the English arms and the subjection of the South African farmers.

1877-1878. The Russo-Turkish War. The spirit of revolution which spread through nearly all the Turkish possessions during 1875 and 1876 and which resulted in the revolt of Bosnia and Herzegovina and Bulgaria, and the declarations of war by Servia and Montenegro, was the immediate cause of the Russo-Turkish war, which ended with Russian victory, 3 March 1878.

1894-1895. Chinese-Japanese War. A revolt in Corea and a call upon China for assistance was the direct cause of the conflict between China and Japan. When the latter power, uninvited, sent troops with a proposal of joint action against the revolutionists, China protested - vigorously, and, after much dispute, the war began. It resulted in Japanese victory and the cession of much territory on the part of China, considerable of which Japan was compelled to relinquish because of the protests of Russia, France and Germany.

1898-1899. The Spanish-American War was the natural outcome of the interference of the United States in the war between Spain and her revolutionary colony, Cuba. Having fought with great bravery and against almost overwhelming odds for years the state of insurrection had degenerated into such barbarous cruelty on the part of those who were striving to suppress it that the American people decided that it had passed the bounds of humane warfare. For this, and several other reasons. Congress determined to give assistance to Cuba, upon which war was promptly declared. It resulted in overwhelming defeat for the Spanish forces, independence for Cuba, and the accession of considerable colonial territory by the United States.

1904. Russo-Japanese War. Russia's eagerness to extend her territory to such an extent as to secure ports that should be open at all seasons of the year — a desire which made her seize upon Manchuria with a firm hand and tempted her to cast covetous eyes upon Korea — was

the cause of such strenuous objection upon the part of Japan that the Russo-Japanese war resulted.

1914-18. The European War. Germany's rampant imperialism and her insidious commercial propaganda turned the Europe of the opening 20th century into an armed camp, driving republican France into the arms of Tsaristic Russia, and obliging Great Britain to relinquish her cherished policy of " splendid isolation." Austria was urged on by Germany to repress the growing Slav sentiment in the Balkans although such a course involved the active participation of Russia and the other members of the Entente. The viola¬ tion of Belgian neutrality by Germany made Great Britain a belligerent, and in the later developments all the leading countries of the world became involved in the conflict, either because of their political or economic alliances, or, as in the case of the United States, because of the violation of the rights of their citizens.

John R. Meader.

WARSAW, war'sa, Ill., town in Hancock County, on the Mississippi River and on the Toledo, Peoria and Western Railroad, 100 miles southwest of Peoria and five miles from Keokuk, Iowa. Fort Edwards was established within the limits of the town in the War of 1812. 'The largest river steamers can ascend the Mississippi to the town; and it is a shipping point for the agricultural produce of the region. It also has several manufacturing industries, including cooperage works, flour and woolen mills, pickle works, shoe, button and incubator factories and manufactories of agricultural implements. It contains a pub¬ lic high school, banks and a newspaper. Pop.

2,254.

WARSAW, Ind., city, county-seat of Kos¬ ciusko County, on the Tippecanoe River and on the Pittsburgh, Fort Wayne and Chicago and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, 40 miles west by north of Fort Wayne and 125 miles north of Indianapolis. It was settled in 1836 and chosen as the county-seat in 1837 ; it was incorporated as a town in 1854 and as a city in 1867. It is in a lake region, and is popular as a summer resort. It is also an agricultural

region and is the chief trade centreˆ of the county. It has large canning and pickling works, flour mills, creameries and manufactories of agri¬ cultural implements and vacuum cleaners. A large park and the county courthouse are among its notable features. There is also a public high school established in 1872, a pub¬ lic library, banks and two daily newspapers. Pop. (1920) 5,478.

WARSAW, N. Y., village, county-seat of Wyoming County, in the valley of the Oatka Creek, on the Erie, and the Buffalo, Rochester and Pittsburgh railroads, 37 miles southwest of Rochester. It was first settled in 1804, and was incorporated as a village in 1816. It is in an agricultural region ; and there are important salt deposits in the vicinity. The village con¬ tains salt works, broom factories, manufac¬ tories of knit goods, a button factory, foundry, carriage factories, lumber and saw mills. It has a public high school, established in 1897, with a large library of about 20,000 volumes, two newspapers and several banks. The water¬ works are owned and operated by the village. Pop. (1920) 3,622.

WARSAW, Poland, the capital and largest city .of the Republic, situated partly on a flat, and partly on a height rising gradually from the left bank of the Vistula, here crossed by an iron bridge 1,660 feet long, and by a railway bridge, communicating with the suburb of Praga, 325

miles east of Berlin. It consists of the city proper and several suburbs, enclosed for the most part along with it by a rampart and fosse, and dominated by a vast citadel erected by the Russians. In the older parts the streets are narrow, and the houses, generally of indifferent appearance, are huddled together without any order; in the newer part, and more especially in some of the suburbs, the streets are often spacious and many ranges of handsome build¬ ings are seen. There are several large public squares, among which that of Sigismund, adorned with a bronze colossal statue of the third king of that name, is particularly deserv¬ ing of notice ; and the vicinity is well provided with beautiful promenades. The more remark¬ able public buildings are the Roman Catholic cathedral, the Russian cathedral, the Church of the Holy Cross, the Church of the Carmelites, the Lutheran Church, the Zamek or ancient castle of the Polish kings, a huge pile on a height overhanging the Vistula; the palace of Casimir, occupied by the university and adorned in front with a statue of Copernicus ; the Saxon palace, with fine gardens attached to it; the Krasinslˆ palace, occupied partly by the superior courts of law and partly by govern¬

ment offices ; several other palaces similarly occupied; tfie town-house, arsenal, mint, cus¬ tom-house, exchange, barracks, several theatres, and the bazaar of Marieville, consisting of a large square lined with arcades. The principal educational establishments are the university, suppressed after the rebellion of 1830, reopened in 1864, and having 2,500 students before the outbreak of the World War; a lyceum, techni¬ cal, commercial, and many other schools. Among the benevolent institutions are a town and a military hospital, a foundling hospital, a deaf and dumb and two lunatic asylums. The manufactures consist of metals, beer, tobacco, textiles, chemical products, furniture, artificial flowers, musical instruments, *etc.* There are a vast number of small industries and factories, giving employment to over one-third of the population. The trade is very extensive, War¬ saw being by far the most important com¬ mercial emporium of Poland, and carrying on a _ large traffic both with the interior and with Thorn and Dantzig, by means of the Vistula. Warsaw, though very ancient, did not become the capital of Poland till about the middle of the 16th century, when it superseded Cracow. It has witnessed much warfare, the suburb Praga generally being the field of ac¬ tion. Here in 1656 the Poles were defeated by Charles Gustavus of Sweden. The chief in¬ terest belonging to the city is connected with the insurrection of 1794, when after the capture of Kosciusko at Maciejowice, the dispirited and disorganized remnants of the Polish army de¬ fended the ramparts of Praga against the vic¬ torious Russian forces under Suwaroff. On 3 Nov. 1794, the Russ'an general ordered an as¬ sault, and after a fierce struggle the ramparts were carried, more than 15,000 Polish soldiers being slain, drowned in the Vistula or taken prisoners, and an almost equal number of un¬ armed inhabitants of every age and sex bru¬ tally massacred. In the evening a great fire arose, vhich destroyed a large part of the city. In 1807 it was the capital of the Duchy of Warsaw, and in 1813 was acquired by Russia.

(See Poland). The vicinity of Warsaw was also the principal seat of the Polish War in 1831, and the Germans occupied it in 1915. In No¬ vember 1918 Polish troops occupied Warsaw which again had become

the capital of an inde¬ pendent Poland. The population of the city is about 900,000, of whom about a fourth are Jews.

WARSAW, University of, a Polish uni¬ versity founded in 1816 and opened in 1818. It was suppressed in 1830 as a result of the insurrection of that year but was reopened in 1869. After 1884 it was completely Russianized. There are extensive laboratories, an observa¬ tory, botanical gardens and a library of nearly 600,000 volumes, including a splendid collection of Polish works, despite the fact that after the suppression of 1830 the university's library was removed to Petrograd. At the outbreak of the European War there were four faculties, those of history and philology, law, medicine and physics, and mathematics. There were about 100 instructors and 1,600 students. After the occupation by the Germans in 1915 a Polish faculty was installed.

WARSHIPS, Ancient. The first warships of recorded history were the great rowboats of the Mediterranean, with two and three oar-decks, where galley-slaves were chained to their tasks. These vessels were far superior to sail¬ ing craft for fighting purposes, as they could force their way at any time, whereas the sailing ships had to wait for the wind. The fighting naval weapons of those days were bows and arrows, javelins-and spears and burning balls flung at the enemy to destroy -their ships. It was important to protect the rowers or galley-slaves as well as the fighting men and hence some sort of protective armor was sought from the earliest times. The ships of the Greeks and Romans were often fortified with a thick fence of hides which served to repel the missiles of their enemies and afforded protection to their own crews. Thick timbers and hides entered into the construction of the turrets and towers with which the fighting ships of ancient and mediaeval times were fitted, especially when used for_ har¬ bor defense, as in the Venetian turret ship of the 9th century. Felt made an early appearance as a defensive armor on shipboard and in a sea fight off Palermo in 1071, between the Nor¬ mans and Saracens, the former hung their galleys with this material by way of a defensive cuirass. The Norman knights had probably adopted this device from their enemies, for felt had been used for some time for this purpose on board the huge ˆdromons® of the Saracens. These, the battleships of those days in the Mediterranean, usually rowed 50 oars a side, each oar being manned by two men, so that the size of the ships was evidently large. When the soldiers, sail trimmers and artificers who worked the war engines and siphons for Greek fire are added, it is evident that the crew must have been very large and have required a ship of considerable dimensions. These great war¬ ships were armored with woolen cloth soaked in vinegar to render it fireproof and hung

with, mantlets of red and yellow felt, so that their cuirass was not only useful, ibut ornamental as well. At this period and for many hundreds of years later additional protection was af¬ forded to those on deck by the ranging of the bucklers and shields of the warriors on board

along the gunwales. Later, in the I5th and 16th centuries, special ®pavesades® or bulwarks, were provided in lieu, composed of large oblong shields, supplied for the purpose. In addition to felt, the time-honored leather armor also entered into the defensive panoply of the ˆMromons® and in the war of the Sicilian Ves¬ pers, Pedro III of Aragon covered two of the largest ships of his fleet with leather before sending it against Charles of Anjou. Conrad of Montferrat, at the siege of Tyre in 1187, either invented, or at all events, caused a spe¬ cial class of leather-protected vessels to be built, which were called barboats or duckbacks. They would now probably be called turtle-•backs. They would appear to have been small craft covered with a strong leather-protected domed roof through portholes or openings in which the archers ‘and crossbowmen could fire without ‘exposing themselves. They proved very effective against the Saracens and in 1218 the entrance of the Nile was forced by 70 of these little armorclads.

It is said that the Great Dromon — whose capture by Richard Lion-Heart is still com¬ memorated — was equipped with leaden armor. This was in 1191 and probably lead was occa¬ sionally used for protective purposes through¬ out the next two or three centuries, although there is no record of any ship so protected until 1530. In this year the Knights of Saint John, those sworn opponents of the Turk, built one or perhaps two leadclads. At any rate, one account says that they built such a ship in this year at Malta, while another describes a ship of this kind called the Santa Anna, launched at Nice in the same year. The Santa Anna’s leaden armor plates were attached to her sides •by bolts of brass and it was said for her that she could ˆresist the artillery of a whole army® and at the same time could sail or row as fast as any of her unarmored contemporaries. She was a big ship, with six decks, a reception sa¬ loon, a chapel, a specially constructed po-wder magazine and a bakery. She was present at the taking of Tunis in 1535 and played an important part in its capture. Lead was not infrequently used at ‘this period for sheathing ships under water, in the same way that copper is still found so useful. Thus the French ship Grande-Frangoise, launched in 1527, one of the largest and most famous ships of her day, was sheathed with lead from her keel to the first wale above her waterline.

The Spaniards attempted to protect their galleons of the Invincible Armada by building their exposed sides of exceeding thickness, but the heavy English guns ®lashed them through and through.® The first real ironclad ship was constructed in Antwerp in 1585, with a view of breaking through the lines of the Spanish army under Alexander of Parma, which was at that time closely investing the city. It was a large flat-bottomed craft, with a central casemate or battery built of thick balks of timber and plated with iron. It was intended to be and very likely was impenetrable to any artillery that the Spaniards could bring against it ; and in hopeful anticipation that their ironclad ship would raise the siege and put an end to hos¬ tilities, the men of Antwerp christened her the Finis Belli. In addition to a heavy bat¬ tery of guns, the Finis Belli carried a large body of musketeers, some of whom were stationed

aloft in her four fighting tops, while the rest were well protected by the loopholed bulwarks on the upper deck. Unluckily for the besieged Dutchmen, she ran aground before she reached her objective and fell into the hands of the Spaniards, who nicknamed her the Caran-jamula or Bogey. They' contrived to get her afloat and brought her down to the camp of Alexander of Parma, where she became a great attraction to the sightseers of the period. As for the Dutchmen in the doomed city, they henceforward only referred to their experiment as the Perdita Expenses or Wasted Money. Ten years previous to this, others of the Dutch patriots had built a somewhat similar contri¬ vance, which very possibly was also armored. This was the Ark of Delft, a twin-hulled vessel supporting a floating fortress, which was pro¬ pelled by three hand-worked paddle-wheels placed between the two hulls.

It is interesting to note that if we go to the Far East we can find a parallel to almost any Western invention. It is, tKerefore, not aston¬ ishing to find that the Japanese possessed a paddle-propelled armorclad in the year 1600. This quaint craft, like the old leather-clad ®barbotes^^ of the 12th century, was turtle-backed, with ports for the gunners. She was covered with iron and copper plates fitted together like the cells of a honeycomb, mounted 10 guns, and, like the Ark of Delft, was moved by a central paddle wheel. The British navy used various devices to protect its ships in the 18th century. According to a French writer the sailors of his country were astonished at the perfection to which the English had attained in this direction. ^^Old cables,^^ he writes, ®held in place by pieces of iron, barricaded the whole length of the bulwarks ; mantlets of old rope hung over the ship's sides to diminish the shock of our cannon balls, and, beneath, a thick rope netting stretched from poop to bowsprit. The English fought under shelter, maneuvering with¬ out ceasing, out of musket range, so as to riddle our detachments of fusileers, with their can¬ non shot. So we lost 200 men for every 30 of the English put out of action.®

This system of armoring was soon adopted by the French. The Spaniards endeavored to improve on this and in 1782 hoped great things from the celebrated floating batteries employed at the great siege of Gibraltar by the Duke de Crillon. The floating batteries were mounted on ships of the line, cut down to a uniform size. On the top

they were defended by a covering made of cordage and wet hides. This was not the complete protection that was origi¬ nally intended by the Chevalier d'Arcon, their constructor, according to another account of the same date as the above, which states that ^the covering was to have been laid over with strong sheets of copper and by this means the redhot balls, the bombs and other destructive implements would have slid off.®

The fate of these experimental armorclads offered no inducement to the naval constructors of the day to make further efforts in the di¬ rection of protection, so that till comparatively recent times we find sailors depending only on their ^Vooden walls® to resist the projectiles of the enemy. The oaken sides of the British ships, we may note in passing, were often ex¬ ceptionally stout and difficult to penetrate. In the fight between the Glatton, 56-gun ship, and

four French frigates, a brig and a cutter, mount¬ ing 220 guns between them, their 12-and 24-pounders failed to penetrate her sides and she beat them all off with great loss at the cost of one officer and one man wounded.

Americans, from the very commencement of their existence as a nation, set themselves to make improvements in naval warfare. David Bushnell constructed a practical submarine boat in 1773. Torpedoes were used by him and others in the war with England and for the purpose of towing these contrivances alongside the British ships, they invented and built in 1814 a paddle-propelled turtle-backed boat lying very low in the water and covered with ®half-inch iron plates, not to be injured by shot.® About the same period Robert Fulton (q.v.), who had already constructed one or two sub¬ marine boats and various classes of torpedoes, built a steam frigate which he called the De-mologos, or Voice of the People, but which is sometimes known as the Fulton I. This, the first steam warship ever constructed, had her sides no less than 13 feet thick of alternate layers of oak and ash wood, a thickness im¬ penetrable by shot from any gun then afloat. In 1829 this vessel was blown up by accident and was succeeded in the American navy by the Fulton II, a ship which appears to have been protected by some kind of iron armor.

yarious proposals were made to use iron plating to protect the sides of ships of war from this time forward, but until the French con¬ structed a number of armor-plated batteries for use in the Crimean War, nothing practical came of the suggestions of inventors. Their

success at the bombardment of Kinburn demonstrated the value of armor plating. England at once followed wnth others of the same kind, some of which are still preserved as relics. Then came the French La Gloire, the British Warrior, the iron clads and monitors of the American war and henceforward the steady evolution of the armored fighting ship, which has provided us with the majestic battleships of the present day.

WARSHIPS, Modern. The consideration of so comprehensive a subject as Modern War¬ ships must necessarily be confined to the salient features of the principal classes of such vessels. These features are best illustrated by tables giving the principal particulars of the most im¬ portant individual designs, with supplemental information in the form of outline plans, giv¬ ing profiles and battery arrangement; also, in seme cases, supplemented by photographs of the completed vessel. Before giving and comment¬ ing on such definite Klata, however, it may be well to give general consideration to the devel¬ opment of fhe principal types of war vessels in two of the most important navies. In an article of this character, consideration must necessarily be confined to fighting vessels, since the article would extend to quiˆe an undue length if more than allusion ■were made to auxiliary naval ves¬ sels. This, in no sense, implies lack of appre¬ ciation of the very important service performed by auxiliary vessels. In fact, the mere enumera¬ tion of the names of the principal types of vessels employed as fleet auxiliaries tells its own story. Supply vessels, fuel ships, hospital ships, ammunition ships, repair ships, distilling ships, destroyer tenders, submarine tenders, trans-WARSHIPS

ports, etc., are vital to the efficiency of the ac¬ tive fleet, and their names indicate clearly the very tremendous part necessarily played by ves¬ sels of this character in all naval operations. Moreover, in order to reduce the article to rea¬ sonable proportions, consideration will be largely confined to battleships, battle cruisers, light or scout cruisers, destroyers, submarines, submarine chasers and monitors. While the World War did not afford an opportunity to try out satisfactorily all of the types of vessels above enumerated, some of them were afforded unusual opportunities for demonstrating their offensive and defensive qualities.

of warships in many phases of naval warfare. It cannot be said that the views which pre¬ vailed prior to the Great War with respect to the general type and characteristics of modern warships and the special advantages of each type have undergone any radical change. The battleship still remains the backbone of an of¬ fensive navy, and a navy capable of effective offense is the only navy worthy of consideration by any great power whose maritime interests are of commanding importance. The battleship, however, for its most effective employment, re¬ quires Other types of war vessel in close co¬ operation. The experience of the Great War

UNITED STATES BATTLESHIPS.

Connecticut Class — Length 450 ft.; 16,000 tons; speed 18.1 to 18.8 knots; armament 4—12 in., 8-8 in., secondary armament changed and AA. guns added. Connecticut and Louisiana have 1 1-inch belt tapering to 9 inches instead of uniform 9-inch and have only 2-3-inch guns at the stem. New Hampshire has two military masts in place of the towers. ’Minnesota has one mast and one tower._ New Hampshire has 11-inch barbetts for 12-inch turrets instead of 10-inch as in rest of class.

Nevada Class — Length 575 ft.; 27,500 tons; speed 20.5 knots; armament 10-14 in., there are now; 12-5 in., and 2-3 in. AA. Completed 1915.

Georgia Class — Length 435 ft.; 14,948 tons; speed 19 to 19.4 knots; armament 4-12 in., 8-8 in., secondary armament changed and AA. guns added. Completed

1906-1907.

It is not the province of an article of this character to go into the subject of the vital im¬ portance of a navy for countries with exten¬

sive coast lines, and especially where such countries are necessarily dependent upon im¬ ports for their vital necessities, Mahan and many other able naval strategists and historians have dealt with this subject in a most complete and adequate manner. Were further exposi¬ tion of the vital necessity of a navy required, however, the history of the Great War would, in itself, furnish all the argument necessary. While engagements between capital vessels were not frequent and the technical information which might have been obtained from such ac¬ tions is not as complete as might be desired, rich experience was obtained from the behavior

Pennsylvania Class. — Length 600 ft.; 31,400 tons; speed 21 knots; armament 12-14 in., 14—5 in., are now mounted with 4-3 in. AA. Completed 1916-1919.

has ’proved this most conclusively, even if such additional proof were desired. To refer to one instance only, the great development in design and use of the submarine has necessitated a correspondingly effective development in battle cruisers, scout cruisers and destroyers. In the presence of submarines or with a possibility of encountering submarines, no battleship fleet would be reasonably secure without an envel¬ oping screen of destroyers. To meet the devel¬ opment of submarine vessels and to counteract the mining of large areas of the open sea, mine sweepers and mine layers had to be provided in large numbers. To obtain suitable information concerning enemy movements and to meet all the requirements of such exacting duty, not only light cruisers and scout cruisers, but the great-

1 U. S. S. Oregon representing Indiana, Massachusetts and Oregon 2 U. S. S. Iowa ‘

3 U. S. S. Kentucky representing Kearsarge and Kentucky

MODERN WARSHIPS

1 U S. S. Alabama representing Alabama, Illinois and Wisconsin

2 U. S. S. Maine representing Maine, Missouri and Ohio

3 U. S. S. Virginia representing Virginia, Georgia, Nebraska, New Jersey and Rhode Island

1 U. S. S. Louisiana representing Connecticut, Louisiana, Kansas, Minnesota, New Hampshire and Vermont

2 U. S, S. Michigan representing South Carolina and Michigan

3 U. S. S. North Dakota representing Delaware and North Dakota

U. S. S. Florida representing Florida and Utah 2 U S. S. New York representing New York and

3 U. S. S. Arkansas representing Arkansas and Wyoming

Texi

721

No. 40. New Mexico

41. Mississippi

42. Idaho

! Length, 600 feet; breadth, 97 feet 4i inches; draft, 30 feet; displacement, 32,000; speed, 21 knots. Armament, 12-14’, 14r-5’, 4—3’ AA,

Muzzle energy of one 14 inch gun = 76,087 ft. tons Muzzle energy of one 5 inch gun = 3,439 ft. tons

No. 43. Tennessee

44. California

45. Colorado

46. Maryland

47. Washington

48. West Virginia

Length,ˆ600 feet; breadth, 97 feet 3i inches; draft, 30 feet 3 inches; displacement, 32,300; speed, 21 knots. Armament 12-14’, 14-5”, 4-3’ AA.

Tennessee and California have three 14 inch guns per turret.

Length, 600 feet; breadth, 97 feet 3ˆ inches; draft, 30 feet 6 inches; displacement, 32,600; speed, 21 knots.

Armament 8-16’, 14-5’, 4-3” AA.

Muzzle energy of one 16 inch gun = 98,406 ft. tons Muzzle energy of

one 14 inch gun = 76,087 ft. tons Muzzle energy of one 5 inch gun = 3,439 ft. tons

Length, 660 feet; breadth, 104 feet 9 inches; draft, 33 feet; displacement, 43,200; speed, 23 knots. Armament, 12-16'; 16-6'; 4-3" AA.

Muzzle energy of one 16 inch gun = 114,130 ft. tons Muzzle energy of one 6 inch gun = 6,550 ft. tons

No. 49. South Dakota

50. Indiana

51. Montana

52. North Carolina

53. Iowa

54. Massachusetts

VOl . 28 — 46

cst development of this type — battle cruisers — must be provided.. In this connection, it is of interest to note that, in an earlier stage of naval development, scout cruisers and light cruisers were intended to prey upon enemy commerce. This resulted gradually in the development of the armored cruiser type which, in its turn, gave way to the battle cruiser type, which now has possibilities far in excess of those involved in the original idea of preying upon enemy commerce. This type has, in fact, duties of the highest importance in cooperation with the bat¬ tleship fleet, and is even capalble of doing its full share when in actual contact with enemy battleships. The high speeds desired for battle-

been considered an immense battery even for a battleship, namely, four 15-inch guns. These vessels were designed especially for action against less heavily armed enemy craft, and yet their great battery power and high speed per¬ mitted them to run the risk of an encounter with battleships less heavily armed, with a good chance of inflicting heavy damage at ranges which would enable them to escape serious pun¬ ishment themselves. In the event of meeting vessels of equal battery power, their great speed permitted them to avoid action.

The very important part taken by aircraft in the Great War in scouting, bombing and range finding necessitated the provision of a special

From paper by Sir E. H. T. d'Eyncourt, ' Transactions' Institution of Naval Architects, Volume LXI, 1919. British Battle Cruisers " Repulse " (1916) and '\Renown " (1916).

From paper by Sir E. H. T. d'Eyncourt, 'Transactions' Institution of Naval Architects, Volume LXI, 1919. British Battle Cruisers " Courageous " and " Glorius." Both completed 1916.

ships and the high degree of armored protec¬ tion required for battle cruisers tended, toward the close of the Great War, to cause some au¬ thorities to recommend merging these two types into one. It is still the opinion of eminent naval authorities, however, that, for highest efficiency, the battleship and the battle cruiser must be kept distinct.

The exigencies of the Great War developed two other types of cruiser which had not here¬ tofore existed. These were the high speed, heavily armed light cruiser of the British Glori¬ ous type, and the aircraft carrier, of the Furi¬ ous type. The Glorious class carried as main armament what, a few years ago, would have

type of vessel to carry such craft in large quantities, with special deck arrangements which would permit their taking flight from and alighting on board ship at sea under all nor¬ mal conditions of weather. To provide such facilities, a considerable number of large, high speed merchant vessels were converted into air¬ craft carriers, and the Furious and other high speed cruisers and one large battleship were re¬ arranged prior to completion and fitted with long, upper, flush decks and other arrangements necessitated by their service as aircraft carri¬ ers. The provision of upper decks of great area and without obstructions necessitated very unusual arrangements of smoke pipes, ventila-

tors and other features which, in ships of ordi¬ nary design are carried well above deck. In these vessels they are carried long distances .the upper deck and out to the sides of me ship The exigencies of naval operations during the Great War also necessitated a great development in destroyers, submarines, sub-niarine chasers and monitors, all of which will be commented upon at greater length under their appropriate headings.

for new naval construction to an extent repre¬ sented by a total of more than $1,200,000,000.

Distribution of Weights.— One of the most important ˆ and controlling elements in warship design is the proportion of the total displacement of the vessel which may be de¬ voted to the vital offensive and defensive char¬ acteristics. It goes without saying that the size and form of the hull is largely controlled by the battery and protection to be provided, the

tiiu.

0*

U»»t* fti«»

-

-yL..

£2

03 □

From paper by Sir E. H. T. d'Eyncourt, 'Transactions' Institution of Naval Architects, Volume LXI, 1919.

Monitors " Erebus " and " Terror " (15ˆ' guns)

ˆ In a word, the development of modern war¬ ships received an unparalleled stimulus during the Great War, and perhaps nothing could em¬ phasize this development in more effective terms than the mere recital of the fact that au¬ thoritative reports indicate that the British government appropriated, in the development of the British navy, between £250,000,000 and £300,000,000 sterling for warship construction during the period subsequent to August 1914, while the Congress of the United States, sub¬ sequent to February 1917, made authorization

speed to be attained and the radius of action at maximum speed and most economical speed. Adequate strength of hull structure and good seagoing characteristics must, in the nature of things, be given priority over all other ele¬ ments. The development of the other vital characteristics is, therefore, subordinate to ade¬ quate strength of structure and seaworthiness. The attainment of high speed is especially de¬ pendent upon form of hull. With given di¬ mensions, large radius of action necessarily re¬ duces the amount of space which can be

devoted to armor, armament, propelling machinery and other important elements. The converse is also true. All warship design is,, therefore, in the nature of a compromise. If any given design produces an unusual develop¬ ment in any one of the major characteristics above enumerated, it may be taken for granted that others must suffer a corresponding dimi¬ nution. These conclusions are, in fact, the direct result of immutable physical laws, and no designer, however skilful, can run counter to these laws. The element in which efficiency of manufacture and design can be shown most clearly is dependent upon material and necessi¬ tates specifying and obtaining a very high grade and so distributing it as to produce the best results with the least expenditure of v'eight. Reduction in weight is, therefore, pos-

have steadily been made in this direction. Given, however, the same skill in design in all the elements of a warship, the proposition enunciated in the beginning of this section is practically axiomatic; namely, oyer-develop- m.ent of any vital element of warship design can only be effected at the expense of other elements of the design. As indicating the gen¬ eral distribution of displacement required for the principal elements of modern vessels of war, there are given below two tables. The first gives a tabulation of approximate weights for various recent type vessels of the United States navy. The second gives the approximate weight and percentage of displacement ab-sorbˆed by the various principal elements em¬ bodied in recent type vessels of the British navy:

UNITED /STATES NAVAL VESSELS.

Tabulation of Weights.

Percentage of Weight to Normal Displacement. (Based on Estimated Weights).

Items

Hull complete .

Hull fittings .

Protection … .

Steam engineering …. Reserve feed water …

Battery …

Ammunition .

Equipment .

Outfit .

Stores .

Coal …

Oil fuel .

Margin .

Displacement (normal)

Battle cruisers

Scout cruisers

Destroyers

49-54

1-6

Nos. 4 to 13

(186 class)

Wt.

Per

Wt.

Per

Wt.

Per

Wt.

Per

(tons)

cent

(tons)

cent

(tons)

cent

(tons)

cent

19,580

45.32

21,288

48.94

3,459

48.71

405 . 89

33.42

1,698

3.93

2,061

4. 74

352

4.98

60.6

5.02

10,325

23.90

6,159

5,738

14. 15

2,878

6.66

13.19

1,612

22.7

430.8

35.47

400

.93

500

1.15

100

1.41

14.0

1.15

2,767

6.41

2,029

4.66

159

2.25

40.11

3.29

2,034

4.71

1,551

3.56

163

2.30

t37.82

3. 13

624

1.44

837

1.92

165

2.32

t32.94

2.72

347

.80

371

.85

*217

3.06

t42.61

3.54

444

1.03

440

1.01

1,400

3.24

2,000

4.71

800

11.27

150.0

12. 35

702

43,200

1.63

526

43,500

1.21

73

7,100

1.03

.23

1,215.00

.02

* Stores. t Two-thirds stores.

Approximate Percentage of Displacement Absorbed by the Various Items of Weight

ON Type Vessels of the British Navy.*

Ite.ms

Queen

Eliza¬

beth

Iron Duke and Royal Sovereign

Tiger

Renown

Coura¬

geous

Light

cruisers

T.B.D.

“ P” boats

Sloops

and

sweepers

Erebus

(monitor)

Equipment .

3.0

3.0

3.0

2.5

3.5

6.0

4.5

6.0

8 0

4 5

Armament .

16.5

18.0

12.5

12.5

12.0

5.5

4.0

2.5

2.0

14.5 9 0

Machinery .

14.5

10.0

21.0

21.0

16.0

22.0

35.0

35.0

25 0

Fuelt _ ‘ .

2.5

3.5

3.0

3.5

4.0

7.5

15.0

9.0

15.0

3 0

Armor and protection!… Hull .

31.0

32.0

27.0

21.5

18.5

8.5

26 0

32.5

33.5

34.5

39.0

46.0

51.0

41.5

48.0

50.0

43.0

* From paper by Sir E. H. T. d'Eyncourt, published in ' Transactions' of Institution of Naval Architects (Vol. LXI, 1919). tThe percentage of fuel is much greater and all other percentages correspondingly less for the vessels in their fully loaded or deep condition.

t A considerable portion of the structure forming the hull is required to be of such thickness for strength in the large vessels given above, that it is useful for protection, in which it might reasonably be included.

sible in both hull and machinery designs, par¬ ticularly through skilful distribution of the highest class of material. In machinery de¬ sign, reduction of weight is also possible by improvement in the design of propelling ma¬ chinery and auxiliaries. In armor and arma¬ ment, the possibilities of reduction in weight are rather more limited, although improvements

The foregoing tables are obviously not di¬ rectly comparable, since the grouping of the weights for British vessels is not the same as that for United States vessels. It will be noted that, in the ta'ble of British weights, all weights are grouped under six headings, while, in the table for United States vessels, they are given under 13 headings. It may be noted also that.

in the table for United States vessels, the hull weights include protective deck, while, in the British table, the protective deck is apparently included under the heading ˆarmor and pro¬ tection.® In the same manner, it will be ob¬ served that armament in the British table un¬ doubtedly includes ammunition. Moreover, the types of armored vessels, _ while of the same general description, vary in many particulars. The tables must, therefore, be taken as appli¬ cable only to the particular types of vessels noted, but_ they have special interests as indicat¬ ing theˆ distribution of the weights allotted to the major elements of design in the most re¬ cently designed vessels of the two largest

much opposition was expressed by the propo¬ nentsˆ of reciprocating machinery. With the in¬ creasing efficiency of turbine propulsion, how¬ ever, this opposition has practically disap¬ peared, and the manifold advantages due to turbine installations in warships are such that, for that class of vessels, turbine machinery has largely superseded the reciprocating engine. The introduction of the gear drive instead of direct-acting turbines has had much to do with the increasing favor with which turbine pro¬ pulsion has ibeen regarded. The introduction of the gearˆ drive has permitted a reduction in the revolutions of the ˆ screw and the use of greater blade areas with smaller number of

500 jces’ X 25** Tot4s .

21 Knot* 24-,6oo

iMCRfit’ or OHX 12*60ˆ rˆToMR.

- - -*O-T** •• .

navies, and they indicate in the most convincing way how over-development of one element must necessarily be reflected in a reduction of some other element or elements.

Propelling Machinery. — The developments in propelling machinery are treated elsewhere in articles dealing with that and allied sub¬ jects, so that little more than allusion thereto would seem appropriate at this time. To those who are responsible for the designs of mod¬ ern warships, however, it is well known that improvements in propelling machinery make possible great improvements in the general ef¬ ficiency of design of all warships. It is of in¬ terest to note, at the outset, that it is only in comparatively recent years that the transition from reciprocating engines to turbine-driven propelling machinery has had full acceptance. In the earlier stages of turbine development,

revolutions of propellers. This has contrib¬ uted greatly to the efficiency of this type of propulsive mechanism,. There is also now being steadily developed the internal combustion engine. This type of propelling machinery has not, however, had extensive use in naval ves¬ sels, other than submarines. On the other hand, the use of electrically-driven propelling machinery has made rapid advances, even for installation on capital ships. This advance has been so notable that it seems appropriate to re¬ fer in greater detail to the results obtained through the installation of this type of pro¬ pelling machinery on one of the most recently built battleships of the United States navy and its prospective installation on the very latest battleships and battle cruisers designed for that navy. So far as known, practical use of the electric drive for the main propelling machinery

of capital ships has not been made in navies other than that of the United States up to the present time, although this type of ma¬ chinery is, of course, under consideration. In the United States navy, however, its installa¬ tion has been attended with conspicuous suc¬ cess. It was first tried on a large scale on the naval collier Jupiter. After most exhaustive tests on this vessel, this type of propelling ma¬ chinery was further developed and, after the most thorough consideration, was finally adopted for the battleship New Mexico. The New Mexico is one of the most recently con¬ structed battleships of the United States navy, and is one of a group of three vessels of about 32,000 tons designed load displacement. The other two vessels of the class, the Idaho and the Mississippi, are fitted with turbine machin-700 tons. The actual weight as installed v.ˆas only 600 tons. Moreover, the actual weight of the main propelling machinery, exclusive of auxiliaries and spares, was nearly 215 tons less than the weight of corresponding machinery of the turbine-driven sister ship Mississippi.

The New Mexico was designed for a speed of 21 knots, with 26,400 shaft horsepower. The electric motors not only met the contract re¬ quirements, but, on the four-hour full speed run, permitted an average speed of 21.08 knots per hour to be maintained on a total shaft horse power of 31,200. This result was ac¬ complished in spite of the fact that the vessel had extra fuel, stores, etc., on board, making her displacement 800 tons in excess of the de¬ signed trial load displacement. In this case, moreover, the speed was adversely affected by

MoIXLC OMC l’£ 9 fl

• m », n • •» 4,550 « •

- • , 4-‘ - - 1,545 . -

ARGENTINE REPUBLIC BATTLESHIPS Rivadavia and Moreno

ery. The structural arrangements adopted for the two sister vessels remain practically unal¬ tered on the New Mexico, so that one of the particular advantages of the electric drive did not show to its fullest extent in this particular installation. The New Mexico had her dock trials 18 and 19 July 1918, and on 15 August put. to sea for her official trials. This trial was conducted under decided disadvantages. The crew was new to the ship, and the ship was only a short time out of the hands of the build¬ ers. Nevertheless, the machinerj'- soon devel¬ oped its maximum power with ease and with¬ out accident of any character to the electric part of the machinery, in spite of the fact that the crew was inexperienced and that none of them, with the exception of a few officers and men, had ever before been associated with this type of machinery. It should be noted that the penalty contract weight for the propelling ma¬ chinery, including all necessary auxiliaries, was

the paravanes, which were* not contemplated in the original design and allowance for which was not made in determining the original de¬ signed speed of 21 knots. Many advantages are claimed for the electric type of propulsion from the point of view of economy of opera¬ tion, flexibility of control and adaptability of installation. This last-named quality is of par¬ ticular advantage in permitting increased pro¬ tection to be given to all vital portions of the machinery spaces of battleships. In this re¬ spect, it has apparently great advantages over any other type of propelling machinery. While, as already stated, the space actually occupied by the machinery on the New Mexico is prac¬ tically the same as that occupied by the turbine machinery on the sister ships Mississippi and Idaho, this fact is due rather to a similar arrangement of machinery spaces having been adopted in the original design of all these vessels. It is, however, a fact that the installa-MODERN WARSHIPS

1 U. S. S. Bridge — Supply Ship No. 1

2 U. S. S. Vestal — Repair Ship No. 1

#■

1 U. S. S. Huntington of the Frederick Class. Formerly U. S. S. West Virginia of Maryland Class 2 U. S. S. Montana

1 U. S. S. Oklahoma representing Nevada and Oklahoma

2 U. S. S. Arizona representing Arizona and Pennsylvania

3 U. S. S. New Mexico representing New Mexico, Mississippi and Idaho

. Tennessee representing Tennessee and California 2 U. S. S. Colorado representing Colorado, Maryland, Washington and West Virginia

tion of the electric ˆ drive has permitted, in later designs, an entire rearrangement of the machinery spaces, with consequent great im¬ provement of the protective features of the ship. In actual service the manoeuvring power of the vessel due to the electric drive has proved itself quite satisfactory. In its backing power it appears to be superior to the turbine machinery drive on account of the ease and simplicity of reversing operations, and also by reason of the fact that when operating at speeds not exceeding 17 knots only one turbo-generator

had happened far out at sea, as was the case on the New Mexico, the speed of the ship would have had to be reduced and steadiness on her course could only have been obtained by put¬ ting the helm over to counteract the effect of the dead screw. This would also have resulted in a very definite reduction of speed. In the case of this accident on the New Mexico, how¬ ever, it was not necessary to stop the vessel. The trial trip was completed with all four propellers revolving at the fullest speed advis¬ able under the conditions of weather and sea

From paper by Sir E. H. T. d'Eyncourt, ' Transactions' Institution of Naval Architects, Volume LXI, 1919.

BRITISH BATTLESHIPS (1) Royal Sovereign. (2) Agincourt.

is used, all driving motors being then capable of being operated at equal speeds without any special action on the part of the operator. This is true whether the engines are going ahead or backing, a result highly desirable in manoeuvr¬ ing in confined waters. An accident to one of the turbines of the New Mexico demonstrated quite fully the advantage of the electric type of machinery installation. Had a similar

acci¬ dent happened to the turbine of a turbine-driven vessel, the propeller actuated by that turbine would have been put out of action entirely until the damage had been repaired. If the accident

then prevailing. This gratifying result was due to the practicability of using the current gener¬ ated by the operating turbines for the rotation of all the propeller shafts, thus demonstrating clearly that all shafts could be operated at a uni¬ form speed even though a substantial portion of the turbine power was, through accident or otherwise, out of action. The good perform¬ ance of the Nem Mexico on trial has been maintained during the 18 months of her subse¬ quent service, and electric drive for the main propelling machinery of the six battle cruisers of the U. S. S. Lexington class and the six

battleships of the U. S. S. South Dakota class has since been authorized.*

Battleships and Battle Cruisers. — The de¬ velopment of the battleship in size, offensive and defensive qualities, has been rapid in recent years. The necessity for increasing the power of the armament, providing greater armor pro¬ tection increase of speed, increase of fuel en¬ durance, increase of ammunition supply, etc., has resulted in a steady and, at the present time, almost prohibitive increase in size. In order that battleship development may be traced, for the last quarter century, in a concrete way,

ago, while the displacement has increased four¬ fold.

In considering the military features of battleship design, the war between guns and armor is ever present. The quality of armor has steadily improved, and this ordinarily would permit reducing the relative weight of this de¬ fensive element But concurrently with the im¬ provement in quality of armor has come great increase in the power of ordnance. So that instead of the thickness of armor and percentage of total weight allotted to that element under¬ going a reduction there has been a tendency

From paper by Sir E. H. T. d'E5Ticourt, ' Transactions ' Institution of Naval Architects, Volume LXI, 1919.

BRITISH BATTLESHIPS (3) Erin. (4) Canada.

Table I of this article has been prepared. This table gives for vessels of that class constructed for the United States navy the principal char¬ acteristics, including dimensions, battery power, speed, *etc.* The armor protection is shown on the profile and battery plans. Although specific data as to cost is not given, it may be stated that the development in

this respect has also been extraordinary, the cost of a completed first-class battleship of the present day being more than six times the cost of the battleship of 25 years

* Data upon which statements of the machinery per¬ formance of the New Mexico are based were obtained through courtesy of Rear-Admiral Niffin, Chief of Bureau of Steam Engineering, United States navy.

toward increase. Moreover, this increase in protective features is by no means confined to side armor. Possible underwater damage from torpedo and mine and the new dangers arising from overhead aerial attack, in addition to the greater vulnerability of deck armor to damage from gun fire due to increased angles of fall of projectiles fired from^ great ranges, have necessitated a very great increase in deck and internal bulkhead armor. The necessity for providing against vessels being put out of action or sunk through damage due to attack by tor¬ pedoes and mines has also necessitated the pro¬ vision of large side compartments throughout the vital portions of the length of the ship in

COHIitCTfCUT

U S S north DAKOTA

U S s, SOUTH CAROLINA

HCV HflKPJKIHt

VERMONT

U S.S. DELAWARE

(

Battleships

CFor dimensions and characteristics of vessels see Table I)

U5 5. Illinois

U5 5 ALRBAMft

U a ‘j K£AH.“ARGi_

U S.G. KElNTUCK’r

Battleships

<For dimensions and characteristics of vessels see Table I)

; 3 S MISSISSIPPI

IDAHO

0 3, ertTite SMifj

MM** RM*!! ««II»K»» t«PtAB4 Wh,

n*4«Tiuwk m < owM < r«

Battleships

(For dimensions and characteristics of vessels see Table I)

U S S OKLAHOMA

U S S Nt VADA

U S S wyOMINO

U S S ARKANSAS

U S.S, MEIVV YORK

U S.S TCVAS

ft.

Battleships

(For dimensions and characteristics of vessels see Table I)

wake of magazine and machinery spaces. These compartments are so arranged as to permit of a very considerable absorption of the explosive effect due to shells which explode in the interior after penetrating the side of the vessel. In some ships already built or whose construction was^ considerably advanced, the provision of additional explosive compartments for protec¬ tion against submarine and mine attack took the form of ^bulges.® There are those, however, who contend that the damage arising from such mine and torpedo attacks can best be guarded against by protecting the vital portions of the vessel (by increased wing compartmental sub¬ divisions provided for in the original design of the vessel. This, of course, necessitates increase of beam, but no greater increase than is neces¬ sary through the addition of extraneous com¬ partments, as in the case of vessels with ^^bulges.® As indicating the serious increase in beam necessitated by the provision of such special explosive compartments, it may be noted that battleships of recent design have been given a beam only limited by the capacity to pass such a vessel through the Panama Canal locks ; so that, in the United States navy, from the Oregon of 1890, with a beam of little more than 69 feet, there has now been developed the South Dakota class of 1919, whose beam is 106 feet. There are several serious physical limita¬ tions which have to be recognized in battleship development. Among the most important of these is the comparatively shallow depth of many important harbors, both naval and com¬ mercial. There is also the limitation imposed by the sizes of existing dry docks and the locks of great interoceanic canals. It is essential, therefore, to limit the draft to as small an amount as practicable, not only with respect to entry into such harbors under normal conditions, but also to permit entry under damaged con¬ ditions and to permit utilization of existing docks and interoceanic canal locks. In de¬ veloping the designs of battleships and other exceptionally large war vessels, the ship de¬ signer is confronted with many conflicting requirements. If he permits himself to over¬ develop any one of the most important char¬ acteristics, he invariably does so at the expense of some other characteristic which may be con¬ sidered of less importance by some and yet by others may be considered as of equal or greater importance.

In no particular has the development of battleship design advanced to a greater degree than in the element of offensive power. Thus, it will be seen that the main battery of the Oregon class, which was considered a very heavy primary battery for that date, was four 13-inch guns of 35 calibres. ‘Subsequently the 12-inch guns of greater length was adopted for the main battery of United States battleships and up to and including the Arkansas class, the heaviest gun of the main battery for United States battleships was the 12-inch, 50-calibre gun. The primary battery of the South Dakota class, however, consists of twelve 16-inch, 50-calibre guns, mounted in four centre-line turrets, thus making three guns in each turret. It is interest¬ ing to note that the general features of turret location and relative heights of barbettes of the South Dakota class are identical with those of the South Carolina class — the first of the mod¬

ern all-big-gun ships of the United States navy. There is a very important difference in the battery power, however, in that the South Carolina class have only two 12-inch guns in each turret, while, in the South Dakota class, there are three 16-inch guns in each turret. As the muzzle energy of the 12-inch, 45-calibre gun of the South Carolina is approximately 49,(W0 foot-tons and the muzzle energy of the 16-inch, 50-calibre gun of the South Dakota is approximately 114,000 foot-tons, it will be ob¬ served that the energy of broadside of the main battery of the South Dakota class is three and one-half times that of the main battery of the South Carolina class.

In referring to great developments in ord¬ nance, it is well to bear in mind that not only has the power of guns been greatly increased but the accuracy of fire has been vastly im¬ proved due to greater training of .personnel and greater precision of instruments and methods of obtaining ranges. It is interesting to note, in this connection, that not very many years ago four and five thousand yards was considered a considerable battle range, and just prior to the outbreak of the Great War 10,000 yards was considered a long battle range. The Battle of Jutland, however, was begun at a range of 20,000 yards,_ and the range was maintained at that approximate figure for a considerable period. The numlber of losses of vessels and great damage to vessels through long-range gun fire during this battle give convincing proof of the great strides which have been made in the development and operation of ordnance material.

The South Carolina class, at the time of their design, represented a definite departure from previous practice in the main battery arrange¬

ments of battleships. The idea of the all-big- ˆn ship is not new. It was not new at the time of the building of the Dreadnaught of the British navy, which was, however, the first all-big-gun modern battleship actually built. Outline designs for an all-big-gun ship for the American navy had been prepared prior to the date of the building gf the Dreadnaught, and a British all-)big-gun battleship had been suggested in outline designs as early as 1885. This earlier British all-big-gun ship is thus alluded to in a recent paper published in the ˆTransactionsˆ of the British Institution of Naval Architects:

I left the Inflexible shortly before the bombardment of Alexandria. I brought away with me an outline design which had been evolved during the cruise and which was described as a combination of the Devastation and Inflexible designs. The armament was an “ all big-gun ” armament of four pairs of 16-inch 80-ton guns mounted in turrets, all placed on the upper deck; one pair at each extremity of the vessel on the middle line as in the Devastation, and one pair placed on each broadside en echelon as in the Inflexible. Thus one pair of guns had direct ahead fire with an arc of training from well abaft the beam on the starboard side to well abaft the beam on the port side; one pair of guns had a direct astern fire with an arc of training from well before the beam on the starboard side to well before the beam on the portside; the pair of guns mounted in the starboard en echelon turret had an arc of training on the starboard beam from nearly right ahead to nearly right astern, and a considerable arc of train¬ ing on the port beam, one gun of this turret also being capable of firing directly ahead and the other directly astern; the fourth pair of guns, in the port en echelon turret, had an arc of training on the port beam from nearly right ahead to nearly right astern and a considerable arc of training on the starboard beam, one gun of this turret also being capable of firing directly ahead and the other directly astern. Four big guns could always be brought to bear on any target right ahead or right astern or on either bow or on either quarter; and on the beam six big guns could always be brought to

Great Britain. Battleship of the Queen Elizabeth Class

Length 600 ft.; 27,500 tons; speed 25 knots; armament S-‘IS in, 12-6 in., 2-3 in. A A. Completed 1915-1916.

Great Britain. Battleship of the Dreadnaught Class

Dreadnaught — Length 490 ft.; 17,900 tons; speed 21.8 knots; armament 10-12 in., 24—12 pr., ,5 small. Completed

1906.

Bellerophon 1 Temeraire > Superb j

St. Vincent] Collingwood

N.B. The

Length 490 ft., 18,600 tons; speed 21.6-22 knots; armament 10-12 in., 16-4 in., 4-3 pr., 5 small. Completed 1909.

Length 500 ft.; 19,250 tons; speed 21.5-22.1 • knots; armament 10-12 in., 18-4 in., 4-3 pr., 5 small.

masts are differently arranged in the later ships.

Length 580 ft.; 25,000 tons; speed 21-22 knots; armament 10-13.5 in., 12-6 in., 2-3 in., 4-3pr.

Great Britain. Battleship, Lord Nelson Class

(Length 410 ft.; 16,500 tons; speed 18.75-18.9 knots; armament 4-12 in.. 10-9.2 in., 24-12 pr., 2-3 pt., 5 small. Completed 1908.’ i

Great

Orion Conqueror Monarch Thunderer . Ajax

Centurion King George V.

Britain. Battleship of the Orion Class

Length 545 ft.; 22,500 tons; speed 21-22 knots; armament 10-13.5 in., 16-4 in., 4-3 pr,, 5 small. Completed 1911-12.

I Length 555 ft.; 23,000 tons; speed 22 knots; 1 armament 10-13.5 in., 16-4 in., 4-3 pr. Completed 1912-13.

Great Britain. Battleship of the Neptune Class

Length 510 ft.; 19,900-20,000 tons; speed 21.5-21.78 knots; armament 10-12 in,, 16-4 in., 4—3 pr., 5 small. Com¬ pleted 1911.

Great Britain. Battle-Cruiser Tiger Length 660 ft.; 28,500 tons; speed 30 knots; armament -13.5 in., 12-6 in. Completed 1914.

Great Britain. Battleship, Africa Class ‘

Length 425 ft.; 16,350 tons; speed 18.5-19.5 knots; armament 4-12 in., 4-9.2 in., 10-6 in., 12-12 pr,, 12-3 pr. Completed 1905-1906.

bear, and subject to certain limitations eight could be brought to bear on any target.

The scheme involved a displacement of 16,000 tons, and on this account was considered inadmissible by Sir Nathaniel Barnaby. ”*

Even prior to this all-big-gun ship proposed in 1885, however, the same principle had been carried out on vessels built or begun for the United States navy during the Civil War. This was notably the case with the large, double-turreted monitors of the Miantonoinoh type, \dth four heavy guns in turrets on the middle line of the ship, and the line of battleship New Ironsides, with its heavy, broadside battery arrangernent. Although, therefore, this par¬ ticular idea has been developed in various countries at different times — in some instances this development taking place quite independ¬ ently of conclusive knowledge of what had been done in other countries — several navies, in turn, have taken the lead in the development of certain important features of the all-big-gun battery arrangement. The United States, in this connection, was the first to adopt the con¬ centration of all big guns in turrets on the centre-line, the turrets being so arranged as to permit all guns to fire on each broadside or half the battery to fire dead ahead and the other half dead astern, with large angles of bow and quarter fire in intermediate positions of train¬ ing. This great increase in efficiency of primary battery fire was obtained by elevating the after turret of the two forward-turrets and the for¬ ward turret of the two after turrets, as is in¬ dicated on the profiles of the Michigan class and all subsequent designs for battleships of the United States navy. It was some time before this particular arrangement was adopted by other navies. It is now, however, practically universally employed. It is also of interest to note, in this connection, that one of the severest criticisms made upon the design of the Michigan and South Carolina class, particularly by foreign critics, was the danger due to firing over the lower turret. In all probability, it was not gen¬ erally known at that time, that before adopting this design the most exhaustive experiments were made by the United States Navy Depart¬ ment by installing a 12-inch gun on one of the United States monitors

in the exact relative location that such a gun would occupy on the

Great Britain Battle Cruisers, Lion Class

Length 660 ft.; 26,350 tons; speed 28-28.5 knots: armament 8-13.5 in., 16-4 in., 4-3 pr., 4 small. Completed

1912-1913.

South Carolina class and firing over the lower turret in exactly the same way as would occur with the battery of the South Carolina in action under war conditions. This experiment had, moreover, been preceded by other experiments on shore to determine the effect when animals were placed in an improvised lower turret and then firing took place directly over that turret.

* From paper by Sir Philip Watts, published in ‘Transac¬ tions,’ of Institution of Naval Architects (Vol. LXI).

In the final experiments, naval officers occupied the most exposed positions in the turret being fired over, and the net result was that the effect of the blast of the guns upon those actually in the turret being fired over was not so great as upon those stationed on the bridge of the vessel in the immediate vicinity of the gun being fired. In fact, in the most important developments in design of warships for the United States navy, theory has been supplemented wherever prac¬ ticable by extensive practical experiments prior to making final decision.

There are many who contend that the advan¬ tage attained by high-speed battleships is not commensurate with the great additional weight

Great Britain Battle Cruisers, Indomitable Class’

Indomitable Inflexible j

New Zealand Australia

Length 530 ft.; 17,250 tons; speed 26 knots; armament 8-12 in., 16-4 in., 5 small. Completed 1908-9.

I Length 555 ft.; 18,800 tons; speed 25 knots; > armament 8-12 in., 16-4 in., 4-3 pr., I 5 small.

* The centre turrets are more en Echelon than in the two earlier ships.

which must be allotted to the longer hull and the more powerful propelling machinery re¬ quired for such high speeds. This additional weight can only be obtained by reducing the amount allowed for guns, armor, ammunition or other essential elements b.f offense or defense. Conservative naval opinion holds that armor and armament still take precedence on the battleship and that the more moderate speeds necessary to allow for this heavier armor and armament are preferable for battleships; also, that for vessels in which unsually high speed is particularly desirable a special type of the battle cruiser order should be adopted. In fact, the battle cruiser is neither more nor less than a battleship in which speed has been given very great prominence at the expense of armor pro¬ tection and, toˆ a more limited extent, at the expense of battery, the calibre of the guns on battle cruisers, though not the number, being the same as that provided for battleships of the same period of design. In order to obtain the high speeds required, the length of battle cruisers is necessarily very much greater than that of battleships. ‘ The weight assigned to propelling machinery is also very much greater. The degree of armor protection is, on the other hand, less. It is, therefore, obvious that the considerable increase in speed provided for the battle cruiser must be obtained at the expense of other very important qualities.

In the beginning, the British navy took the lead in the development of battle cruisers, the first group being the Indomitable class. They were closely followed by the German navy with the Von der Tann and subsequent classes. From these type vessels have been developed subsequent battle cruisers, the greatest present development being embodied in the powerful

vessels of the Lexington class in the United State navy, the Hood and Renown classes of the British navy, and the Hindenburg and Fon Spee classes formerly of the German navy. The British battle cruiser Hood, of which it was intended originally to build four, could prob¬ ably be more properly styled a high-speed (battleship, since the reported armored protection and armament are those of the battleship.

Only a few years ago, the employment of such extreme dimensions for vessels of war would have been considered highly improbable. Today such dimensions are accomplished facts.

Without repeating here the dimensions and characteristics of many of the latest vessels of the battleship and battle-cruiser types — par¬ ticulars of which, for the principal navies, are fully set forth in the tables and plans accom¬ panying this article — the extensive development of these classes of vessels is sufficiently indicated by the enumeration of the principal particulars of the largest of these vessels so far put under construction, namely. United States battleships Nos. 49 to 54 — South Dakota class — and United States battle cruisers Nos. 1 to 6 — the Lexington class. The design of these two classes of vessels represents practically the latest word in vessels of their type, and while it is not prac¬ ticable to go into the details of their design, it is only just to the responsible authorities of the United States Navy Department to state that they appear to have availed themselves, in the highest degree, of the information obtained during the recent war, and to have produced designs of vessels which will probably hold the record for some years to come.

Principal Characteristics of United States Battleships Nos. 49-54.

South Dakota Class.

Length between perpendiculars . 660 feet.

Length over all . 684 feet.

Breadth, extreme . 106 feet.

Mean draft, about… 33 feet.

Displacement, about.. . 43,200 tons.

Main propelling machinery . 60,000 S. H. P.

Speed . 23 knots.

Armament:

Twelve 16-inch guns in four turrets.

Sixteen 6-inch guns.

Pour 3-inch anti-aircraft guns.

Two 21-inch submerged torpedo tubes.

Principal Characteristics of Battle Cruisers Nos. 1-6, After Modification of Original Plans.

Lexington Class.

Length between perpendiculars . 850 feet.

Length over all . 874 feet.

Breadth, extreme . 105 feet 5J inches.

Mean draft, about . 31 feet.

Displacement, about . 43,500 tons.

Main propelling machinery . 180,000 S. H. P.

Speed, about . 33.25 knots.

Armament:

Eight 16-inch guns in four turrets. Sixteen 6-inch guns.

Four 3-inch anti-air craft guns.

Four 21-inch submerged torpedo tubes. Four 21-inch deck torpedo tubes.

The modifications of the plans for battle cruisers of the Lexington class were based, in large part, upon knowledge obtained during the

United States Armored Cruiser of the Montana Class

Length 502 ft.; 14,500 tons; speed 22-22.5 knots; arma¬ ment 4-10 in., 4—6 in., 12-3 in., 2-3 in. AA. 17 small (new armament). Completed 1906-1908.

Great War. This involved a considerable ex¬ pansion of armored protection for reasons al¬ ready referred to ; also a more elaborate pro-

No. 1. Lexington

2. Constellation

3. Saratoga

4. Ranger

5. Constitution

6. United States

UNITED STATES BATTLE CRUISERS Nos. 1 to 6

Length 850 feet; breadth 105 feet 4 inches; draft 31 feet; displacement 43,500; speed 33J knots. Armament 8-16”, 16-6”, 4-3” AA.

Muzzle energy of one 16 inch gun = 114,130 ft. tons. Muzzle energy of one 6 inch gun = 6,550 ft. tons.

MODERN WARSHIPS

1 Battle Cruiser

2 and 3 Armored Cruisers

4 Battleship

(For dimensions and characteristics of vessels see Table I)

1 and 4 Scout Cruisers

2 and 3 Armored Cruisers

(For dimensions and characteristics of vessels see Table I)

vision for the protection of underwater portions of the vessel from damage due to explosive action of torpedoes and mines, especially in the wake of magazine and machinery spaces. The modifications involved a reduction of nearly two knots in the original designed speed but this sacrifice in speed was considered to be amply compensated for.

It is well, in any consideration of battle cruisers, to bear in mind the causes which underlie the development of this type of vessel. Originally, unarmored cruisers with light bat¬ teries were attached to battle fleets to act as screens and to obtain authoritative information concerning enemy movements. These light cruisers were found to be ineffective in view of the growing tendency to provide more heavily armed and armored scout vessels ; hence the gradual development of the armored cruiser. In course of time, developments of similar craft in various navies rendered the armored cruiser incapable of performing the highly im¬ portant service of keeping in contact with the enemy, menacing his lines of supply in overseas transportation, and being able to meet on equal or superior terms vessels which could be em¬ ployed for this purpose by a possible enemy. While the latest developments in battle-cruiser design indicate a tendency to attempt to combine the powerful battery and armor protection of the battleship with the very high speeds here¬ tofore associated only with battle cruisers, actual experience in the Great War has indicated that

United States Armored Cruiser of the Frederick Class

Length 502 ft.; 13,680 tons; speed 22-22.4 knots; arma¬ ment 4-8 in., 4-6 in., 10-3 in., 28 small and AA. (new armament). Completed 1905-1907.

the logical working out of such a development would result in sizes of warships which would be practically prohibitive, not only as regards cost, but as regards ability to utilize the largest existing dock facilities, interoceanic canal locks and a large number of the most important

harbors.

It is worthy of note that recent experience in actual battle has demonstrated the efficiency of the latest type of armored protection as well as the latest type of underwater protection against damage from torpedoes and mines. A very late type of British battleship, the Marlboro, ˆ and one of the later types of German battle cruisers, the Seydlitz, received serious damage through torpedo attack during the Battle of Jutland, but remained in battle line and gave an excellent account of themselves for a considerable time thereafter.

It is quite impossible, in the limited space available, to even touch upon many questions involved in the efficient development of battle¬ ship and battle cruiser design. It may not be out of place, however, to state that actual results under battle conditions have very largely con¬

firmed the conservative expectations concerning these vessels held by those who design warships and those who ultimately command such vessels singly or in fleet action. Moreover, it seems more than probable that the battleship and battle cruiser type will continue to be regarded as vital elements in the strength of great navies.

Large Light Cruisers. — The only navy which has so far developed to so great an extent this class of vessel is the British navy. The original group comprised three vessels, the Courageous, the Glorious, and the Furious. The Furious, however, was subsequently transformed into an aircraft carrier. As these vessels repre¬ sent a distinct departure in cruiser design, no better description can be given than that pre¬ sented by their designer in a recent paper read before the British Institution of Naval Architects :*

Whilst the designs of Renown and Repulse were in progress, I received instructions to design some very high-speed ships carrying powerful guns of a size sufficient to keep their speed in moderate weather, but to have a draught lighter than any existing British or enemy ship of the same class, so as to be able to navigate shallow waters, if required.

As sanction was not likely to be obtained for building more capital ships taking two years or longer to complete, while additional light cruisers had been already approved, it was decided to build Courageous and Glorious on the lines of very large light cruisers mounting a few guns of heaviest calibre, so as to be able to annihilate any enemy light cruisers or raiders. They were to have thin protection,

similar to our light cruisers, and a speed of not less than 32 knots, the draught being restricted to about 22 ft., or 5 ft. to 6 ft. less than any existing battleship or battle cruiser carrying such heavy guns, the main armament of four 15-in. guns in two turrets, one forward and one aft, making them a match for any raider or light cruiser that might be encountered. At this time it should also.be remembered that the armaments of ships, especially as regards heavy guns, had to be regulated by the guns and gun-mountings which would be available or could be manufactured in the time at our disposal, and this condition applied to the 15-in. mountings which were adopted for these ships. The secondary armament consisted of eighteen 4-in. guns in six triple mountings, similar to the triple mountings of the Renown and Repulse. The side armor consisted of 2-in. protected plating on top of the 1-in. shell plating, as in our light cruisers, and a thin protective deck was worked all fore and aft, but this was considerably thickened over the magazines after Jutland. A modified bulge was arranged for, as in Renown and Repulse.

The machinery adopted for these ships was of the type fitted in the light cruiser Champion. It consisted of a 4-shaft arrangement of geared turbines, the power being transmitted to the propeller shafts by double helical gearing. The eighteen boilers of Yarrow small tube type were also similar to those of the light cruisers, and with all-oil firing a power of 90,000 S, H. P. at about 340 revolutions was aimed at. Such trials as it was possible to make showed that 32 knots could easily be obtained at the designed displacement, and reports show that on Service this is actually exceeded. _

The design of these vessels was begun late in January 1915, and the order for one ship {Courageous) was placed with Messrs. Armstrong and the other {Glorious) with Messrs. Harland & Wolff, the latter making their own machinery and Messrs. Parsons supplying the machinery for Messrs. Armstrong's ship.

It was intended that these vessels should be built in a year, or as near that as possible, but this was not realized, and the ships were both commissioned in October 1916.

On her commissioning trials, the Courageous worked up to full power, and while steaming during the trials at full speed she met very heavy weather. Some signs of weakness were shown at the fore side of the forw;ard turret where there is an inevitable discontinuity of longitudinal strength, and some doubling plates were accordingly added to the Coura¬ geous. Her sister vessel Glorious was in commission for over a year before similar additions were made to her,

although no signs of weakness were shown. This incident shows that the very high speed obtained on trial, reacning 32 knots, should hardly be maintained against head seas in heavy weather.

The Furious was similar to, but a modification of, the Courageous and Glorious, having about the same length and the same machinery, but the form of midship section was somewhat different, having a more pronounced bulge and a

* Sir E. H. T. d'Eyncourt " Nayal Construction During the War," ' Transactions ' Institution of Naval Architects (Vol. LXI; 1919).

WARSHIPS

Fu < «ioua

Furious

(Ordered April 1916) "'Ceres," " Curacoa," " Curlew," " CardiflF," " Coventry."

(Ordered June-July 1917) ",C)airo," " Capetown," " Carlisle," " Colombo," ".Calcutta." i

Light Cruisers ordered December, 1915

" Raleigh," " Effingham," " Hawkins," " Frobisher," " Cavendish," (" Cavendish," rearranged to carry ˆair craft and renamed " Vindictive.")

From paper by Sir E. H. T. d'Eyncourt, 'Transactions' Institution of Naval Architects, Volume LXI, 1919

\ South Dakota Class representing the battery arrangement of the South Dakota, Indiana, Iowa, Massachusetts, Montana and North Carolina

2 Model of the Lexington Class representing the battery arrangement of the Constellation, Constitution, Lexington, Ranger, Saratoga and United States

1 U. S. S. Babbitt — Destroyer No. 128 2 U. S. S. Burns — Destroyer No. 171

3 U. S. S. Stewart — Coast Torpedo Vessel No. 13

simpler form of main framing and structure of the hull. The armarnent also was different, each turret, instead of having two 15-in. guns, was arranged to carj-y one big gun of 18-in. bore, although arrangements were made to substitute pairs of 15-in. guns, if thought desirable later.

The order for this ship was placed with Messrs. Armstrong about two months after that of Courageous, and she was to be finished in the shortest possible time. Early in the spring of 1917, however, the necessity for having fast aeroplane-carriers became very obvious, and it was approved to fit turious for this purpose. This entailed doing away alto¬ gether with the fore turret and making other considerable alterations. A large hangar was built on the forecastle deck, and a flying-off platform 160 ft. long was arranged on the roof of the hangar, which was designed to house about ten machines. Later it was decided to remove the after turret as well, and a flying-on deck 300 ft. long, extending from the funnel aft, was constructed.

The secondary armament, which had consisted originally of eleven Sˆ-in. guns, was retained, with the exception of one gun; the remaining ten guns being rearranged. Four sets of triple 21-in. torpedo tubes were fitted on the upper deck aft, and one pair each side on the upper deck forward.

After these alterations were completed, the ship was tried and commissioned in July 1917, a speed of 31} knots being obtained with 94,000 S. H. P. at 330 revolutions.

From the speed point of view the great advantage of size and length is clearly shown in these ships compared to T. B. D.'s. In Repulse, with 4 times the horsepower we can drive at the same speed as a destroyer a vessel of about 24 times the displacement, and in Courageous, with about 3} times the horsepower of a destroyer, we can drive one of nearly 18 times the displacement at the same speed. This in smooth water: in anything of a head sea, the T. B. D.'s are left behind altogether by these great ships.

Light Cruisers. — Another type of vessel whose design was developed

to meet the re¬ quirements of naval operations is represented by the Raleigh class of the British navy and scout cruisers 4 to 13 of_ the United States navy. In the case of the light cruisers of the Raleigh type, a two-inch armor belt was pro¬ vided for the whole extent of the machinery and magazine spaces. This, with the hull plat¬ ing, made an effective protection of three inches of steel. The main battery consisted of seven 7j4-inch guns. Great prominence was given to the element of speed, these vessels hav¬ ing a designed speed of 30 knots an hour. The attainment of such high speeds for a vessel of this class is only obtainable, however, by a great increase in displacement and length. The principal characteristics of the Raleigh class and United States scout cruisers Nos. 4 to 13 are given below :

in effect, greatly amplified destroyers of a size capable of keeping the sea and maintaining con¬ siderable speed under all conditions of weather. They also have a battery which permits them to give a good account of themselves, except as against heavily armed cruisers and battleships. The Raleigh class, on the other hand, were in¬ tended as a development of a preceding type of light cruiser which had found much favor in the British navy, thoup'h the propelling machin¬ ery was based upon the destroyer type. The Raleigh class, in the words of the designer, rep¬ resented ^^a considerably heavier class of light cruisers, more especially designed for ocean work in any part of the world.^^ These vessels were also provided with modified bulges as pro¬ tection against underwater mine or torpedo at¬ tack, Therefore, in their size, speed and battery power they are more nearly high speed devel¬ opments of previous light cruisers than an ex¬ treme development of the destroyer type, as is the case with the United States scout cruisers.

Destroyers. — No one class of war vessel has demonstrated its usefulness in actual war to a greater degree than the destroyer class. This type of vessel has proved itself indispensable as

U. S. S. Preble — Latest'type destroyer.

For dimensions and characteristics of vessel, see Table I,

a screen for protection of the battleship fleet against destroyer or submarine attack. It has also ibeen invaluable in convoy work in warding off' submarine and other hostile attacks. It has also proved

itself the most efficient weapon of offense against the submarine in general, whether the submarines were acting singly or in groups

Length between perpendiculars .

Length overall .

Breadth, extreme .

Load draught, mean .

Displacement in tons . .

Shaft horsepower of engines .

Speed at load draught (knots) .

Armament, British Raleigh Class:

Seven 7.5-inch guns

Twelve 3-inch (4 H. A.) guns.

Six 21-inch twin tubes.

Armament, U. S. Scout Cruisers 4 to 13:

Eight 6-inch, 53 cal. guns.

Two 3-inch anti-aircraft guns.

Two 21-inch twin tubes.

It is well to note that the Raleigh class is considerably larger than the United States scout cruiser class, and carries a much heavier main battery, and has, as with the United States scout cruisers, a light armor protection. There is, however, very great inferioritv in speed as compared with the scout cruiser class. These differences in characteristics are due to the dif¬ ferent purposes for which these vessels were intended. The United States scout cruisers are,

British

Raleigh Class

565 ft. 0 in. 605 ft. 0 in. 65 ft. 0 in. 17 ft. 3 in.

9,750 60,000 30

U. S. Scout Cruisers 4 to 13

550 ft. 0 in. 555 ft. 6 in. 55 ft. 0 in. 13 ft. 6 in.

7,100 90,000 34.5

as commerce destroyers or were engaged in fleet action. The high speed developed by these vessels, their fine manoeuvring power, the effi¬ ciency of their armament, both gun and tor¬ pedo, combined with the use of depth charges, caused them to be a veritable terror to enemy submarines. Not only did they give an excel¬ lent account of themselves in individual action, but they bore a magnificent part in some of the major actions of the war, taking an unusual amount of punishment when in action against vessels of greatly superior power. So great was the development of this class of vessel during the period of the war that nearly 300 were added to the effective forces of the Brit¬ ish navy or were in course of construction ; also nearly 300 have been built or placed under

ruM or urrca • aoMf CAtna oux

“ M ” Class Destroyer. Admiralty Design 1914

rmftr

UPPCH < FOHtCASTLl DCChS.

H. M. S. “ Vectis ” (“- V ” Class). Admiralty design

H. M. S. ” Scott ” Class. (Flotilla Leaders.) Admiralty Design 1916
From paper by Sir E. H .T d’Eyncourt, ‘ Transactions ’ Institution of Naval Architects, Volume LXI, 1919.

construction for the United States navy subse¬ quent to April 1917. The maximum speed de¬ veloped by some of the latter types of these vessels in the British navy was within a frac¬ tion of 40 knots an hour, while all of the later vessels of this type contracted for on account of the United States navy had a designed speed of 35 knots an hour and have made con¬ siderably rnore than this speed on their trials. Not only did these vessels undergo a great de¬ velopment in speed but their oft'ensive arma-

U. S. S. Paulding — Earlier type destroyer.

For dimensions and characteristics of vessel, see Table I.

ment was greatly increased, being, for the latest vessels of the United States navy, four four-inch, 50-calibre guns and four triple deck tubes carrying 12 torpedoes. In addition, there is one three-inch anti-aircraft gun and a large supply of depth charges, with suitable fir¬ ing apparatus.

For the British navy there has been devel¬ oped a type of vessel called flotilla leader. These vessels are enlarged destroyers and carry a main battery of five 4.7-inch guns. There are also six 21-inch torpedo tubes. The speed and endurance of these latest flotilla leaders are also superior to those of preceding destroyers. They are, in effect, light, high-speed cruisers. Par¬ ticulars of destroyers recently designed for the various principal navies are given in Tables I to VIII. There are given below the principal characteristics of the latest American and Brit¬ ish destroyers :

Length between perpendiculars

Length overall .

Breadth, extreme .

Load draught, mean .

Displacement in tons .

Shaft horsepower of engines . . Speed at load draught (knots) .

navy in the American Civil War and were espe¬ cially favored after the combat between the original monitor and the Confederate ironclad Merrimac, their development subsequent to that war was comparatively limited. Only a few such vessels have been designed and built for the United States navy subsequent to 1870. In the recent World War, however, the long reaches of shoal water off the Belgian coast made the development of this class of vessel im¬ perative in order to make possible the most ef¬ fective cooperation of the navy with the land forces. On the_ Belgian coast they were espe¬ cially valuable in attacking the powerful land defenses installed by the Germans on that coast and in combatting the efforts of the enemy to thoroughly protect their submarine bases in that vicinity. This resulted in the development of several types of shallow draft monitors. The peculiar conditions in the English Channel and the North Sea and in the eastern Mediterranean thus gave great stimulus to the development of the monitor type. While the building of this type of vessel during the American Civil War may be regarded as the beginning of the moni¬ tor development, subsequent improvements in ordnance permitted the offensive power of this class of vessels to be enormously increased over that existing in the earlier types designed for the United States navy. Moreover, the low freeboard deemed essential in the earlier de¬ signs was practically abandoned in the very heavily armed vessels of the British navy de¬ signed primarily for operations against the Belgian coast. Here again local conditions and the special service to be performed had a con¬ trolling influence on the design.

Of course, any type of vessel designed under the great pressure existing during the World War — where rapid completion and entry into active service were of vital consequence — em¬ bodied in its design and equipment some make¬ shifts. This was particularly the

case in pro¬ viding the battery and propelling machinery for the British monitors, the selection of these es¬ sential elements being based largely upon avail-

British

** V ” and “ W ” U. S. Destroyers Classes 345 to 347

300 ft. 0 in. 312 ft. 0 in. 29 ft. 6 in. 9 ft. 0 in.

1,300 27,000

34 knots

310 ft. 0 in 314 ft. 4i in 31 ft. 8J in. 9 ft. 3i in.

1,200 27,000

35 knots.

Armament, British “ V ” and “ W ” Classes:

Four flinch or 4.7-inch guns.

One 3-inch.

Four or six 21-inch torpedo tubes.

Armament, U. S. Destroyers 345 to 347:

Four 4-inch guns. j

1 (One 3-inch anti-aircraft gun.

‘ Four 21-inch torpedo tubes.

The Monitors. — The monitor is a special type of vessel, the development of which was first undertaken in the United States during the Civil War in 1861. The essential features of this type were, in the beginning, the carrying of a very heavy battery, having an extensive arc of fire, on a hull of comparatively shallow draft and with a minimum of freeboard. This permitted operation in shallow waters and of¬ fered the minimum target. While monitors were used extensively by the United States

able supplies of ordnance and propelling ma¬ chinery. As a matter of fact, the equipment of older vessels or those in a less advanced state of completion was heavily drawn upon for this purpose. Moreover, provision had to be made in these later monitor designs for satisfactory protection against recent great developments in torpedo attack, as well as making effective pro¬ vision against damage resulting from attack with mines in mine-strewn areas. The most ef¬ fective provision against serious damage by mine and torpedo attack proved to be through the addition of substantial bulges for a consid¬ erable portion of the length, or else the provision of large wing compartments in the hull structure itself. The first method found greatest favor in these monitor designs, and this defense against torpedo and mine attack was found to

WARSHIPS

United States Battleship of the. Michigan Class

Length 450 ft.;. 16,000 tons; speed 18.8 knots; armament 8-12 in., 14-3 in., ‘2-3 in., A.A., 6 small. Completed 1909.

German Battleship of the Konig Class

Length on W. L. 573i ft.; 25,390 tons; speed 21 knots; armament 10-12 in., 14-5.9 in., 4-3.4 in. Completed 1914-15.

United States Battleship of the Delaware Class nAlQWQrA 1 Length 510 ft.; 20,000 tons; speed 21 knots;

German Battleship of the Kaiser Class

Length on W. L. 564 ft.; 24,310 tons; speed 21 knots; armament 10-12 in., 14-5.9 in., 2-3.4 in. Completed 1912-13.

Japanese Battle Cruiser, Kongo Class Length 704 ft.; 27,500 tons; speed 27 knots; armament 8-14 in., 16-6 in., 18 small. Completed 1913-1916.

German Battleship of the Ostfriesland Class

Length on W. L., 546 ft.; 22,440 tons; speed 20.5 knots; armament 12-12 in., 14-5.9 in., 2 or 4-3.4 in. Comoleted

1911-1912.

German Battleship, Bayern Class

Length (L. W. L.) 623 J ft.; 28,000 tons; speed 22 knots armament 8-15 in., 16-5.9 in., 4-3.4 in., A.A.

German Battleship of the Deutschland Class

Length (B. P.) 398J ft.; 13,040 tons; speed 19 knots; armament 4-11 in., 14-6.7 in., 2-3.4 in., 2 M.

739

Length (L. W. L.) 452 ft.; 18,600 tons; speed 20 knots; armament 12-11 in., 12-5.9 in., 2 or 4-3.4 in. Completed

1909-1910.

German Battle Cruiser of the Moltke Class

[‘*’ Length W. L. 610 ft., 22,640 tons; speed 27.25 knots; armament 10-11 in., 12-5.9 in., 2-3.4 in. ˆCompleted 1911-12.

7 JL

German Battle Cruiser, Graf von Spee Class

Length (L. W. L.) 715i ft.; 27,000 tons; armament 6-15 in., 14-5.9 in., 8-3.4 in. A.A.

1 Length on W. L. 563 ft.; 19,100 tons: speed 26 knots; armament 8-11 in., 10-5.9 in., 4-3.4 in. A. A., 2 M. Com¬ pleted 1911.

German Battle Cruiser, Hindenburg Class|

Length (L. W. L) 689 ft.; 26,200 tons; speed 28 knots; armament 8-12 in.. 16-5.9 in., ˆ3.4 in. A.A. Completed

1917-18.1

Former Austrian Battleship of the Prinz Eugen Class * Length 495 ft.; 20,000 tons; speed 20.7 knots; armament 12-12 in., 12-5.9 in., 18-12 or.. 6 small. Completed 1913 and building. JT

German Battle Cruiser Seydlitz

Length on W. L. 656 ft.; 24,610 tons; speed 26.75 knots; armament 10-11 in., 12-5.9 in., 2-3.4 in. Completed 1913.

Former Austrian Battleship of the Erzherzog Franz . Ferdinand Class

Length 451 ft.; 14,226 tons; speed 20.5 knots; armament' -12 in., 8-9.4 in., 20-3.9 in., 6-12 pr., 2 small. Completed

910-1911.

be most effective in actual service. Two of the largest monitors, the Erebus and Terror, were torpedoed during off-shore operations. The T er¬ ror received three torpedo wounds in the for¬ ward portion of the vessel, two being forward of the bulge and occasioning serious damage. The third hit was on the bulge itself and did very little damage. The Erebus was struck squarely on the bulge by a distance-controlled vessel carrying a very heavy explosive charge, but the bulge prevented the loss of the vessel, and the vessel itself was repaired in less than two weeks.

Table IX, which appears in another portion of this article, gives the principal characteristics of the various monitor classes designed for the British navy during the Great War. It will be noted that the two largest classes, represented by the Erebus and Marshall Soult, carried two 15-inch guns each in the main battery and had very considerable armor protection for the hull, with much more extensive protection for the guns. The Erebus, morfebver, had a speed quite beyond that associated ordinarily with this type of vessel, and, while designed for 12 knots, was actually capable of a service speed of 14 knots. Speed, however, has never been considered a vital characteristic in vessels of this class, their development being rather that of powerful, well protected, floating batteries. One of the notable features in connection with the design and building of the original monitor in 1861-62 was speed of construction. Rapidity of design and construction was also notable in connection with the construction of these later shallow-draft monitors, some of the largest of which were designed and completed in less than six months. In connection with the development of the monitor type of vessels and the special provision for resisting torpedo attack, it may be noted that, about 12 years ago, extensive ex¬ periments were conducted by the United States Navy Department to determine the best method of providing protection for battleships and other large vessels against torpedo attack. The ves¬ sel selected for this experimental purpose was the shallow-draft monitor Florida (subsequently renamed Tallahassee). Special underwater compartmental subdivision was installed in wake of the magazine spaces, and this vessel, under actual experimental conditions, was an¬ chored in shallow water and subjected to many attacks by torpedoes at close range. Various conditions of compartmental filling were adopted for the various protective compart¬ ments, namely, inner compartment filled with coal or water, next outer compartment and

wdng compartment being empty. Variations were then made as to the compartments filled or empty in order to furnish complete experi¬ mental data. As observers were on board the vessel and fairly close to the point of impact of these torpedoes, the most complete informa¬ tion was obtained, not only as to the local effect upon the hull of the vessel, but as to the dy¬ namic effect upon the vessel as a whole. These experiments showed conclusively the practica¬ bility of limiting the damage created by the ex¬ plosion against the underwater hull of a vessel of a torpedo or mine with large, bursting charge. Later on, additional experiments of this general character were conducted on another United States naval vessel, and an elaborate series of experiments was conducted with a full-size

model of the section of a modern battleship. Still later, an exhaustive series of experiments was made with small-scale models to deter¬ mine the results of bursting of high explosive charges against the hulls of naval vessels. As a result of these various experiments, there had been decided upon, prior to the Great War, a method of compartmental subdivision for United States battleships and other large war vessels which actual experience under war con¬ ditions has subsequently demonstrated as en¬ tirely correct in principle. There are advan¬ tages and disadvantages connected with the bulge form of protection as compared with ex¬ tensive wing compartments incorporated in the actual form of the ship. It is worthy of note, however, that while the bulge involves a greater decrease in speed than would be the case with wing compartments in the ship itself, it has the advantage of largely confining the action of gases from an exploding shell to spaces external to the main hull of the vessel.

Submarines. — Considered from the point of view of damage done to merchant shipping and its indirect effect upon the conduct of the war, the submarihe occupies a position of espe¬ cial prominence. The method of its use by the Germans against unarmed vessels was, in no sense, sanctioned by the rules of civilized war¬ fare, but the effect upon military and naval op¬ erations in general was, for a considerable pe¬ riod of the war, most important. The develop-rnent of this type of vessel is, therefore, espe¬ cially interesting. As the submarines of the British and German navies bore the most con¬ spicuous part in submarine warfare, comment will be largely confined to brief allusion to the development of this type of vessel in those two navies. In Tables II and IX, already referred to, are given particulars of British submarines, and there is given in Table VIII the general particulars of the principal classes of German submarines. The British

types underwent ex¬ traordinary development, reaching, in the K class, their greatest advance. The K class were really submarine cruisers, having a surface dis¬ placement of 1,880 tons and a submerged dis¬ placement of 2,650 tons. They developed a surface speed of 24 knots and, under sub¬ merged conditions, a speed of nine knots. The armament consisted of one four-inch high-powered gun and one three-inch high angle gun. They were also equipped with eight 18-inch torpedo tubes.

The development of the cruiser type of sub¬ marine, represented by the K class of the Brit¬ ish navy, made advisable the use of three sepa¬ rate types of propelling machinery. The high power required for the surface speed of 24 knots indicated the advisability of a steam drive Therefore, after thorough consideration, steam turbines developing 10,(XX) horse power were installed for this purpose. This necessi¬ tated, under submerged conditions, special pro¬ vision for making watertight the openings for smokestacks and other apertures in the hull due to this type of machinery. This was satisfac¬ torily accomplished. There was also installed a Diesel engine to accelerate the operation of diving and to give greater power during the in¬ termediate stage between the submerged condi¬ tion and the surface condition. The main reli¬ ance for submerged propulsion was the usual storage batterly electric drive. The success of

2 Earliest type United States Submarine B-3, formerly the Tarantula 3 German Submarine U-H7

1 United States Submarine R-1

1 U. S. S. Kanawha — Fuel Ship No. 13

3 U. S. S. Melville — Destroyer Tender No. 2

2 U. S. S. Jason — Fuel Ship No. 12

xn — rrr

French Battleship of the Normandie Class

Length 574 ft.; 25,230 tons; speed 21 knots; armament 12-13.4 m., 24-5.5 in., 4-3 pr.

Italian Battleship of the Conte di Cavour Class

Length 557 ft.; 22,340 tons; speed 22.5-23 knots; arma¬ ment 13-12 in., 18-4.7 in., 14-12 pr. Completed 1914-1915.

Length 546 ft.; 23,177 tons; speed 20 knots: armament 10-13.4 in., 22-5.5 in., 8 small, jja.

Length 546 ft.; 23,100 tons; speed 20 knots; armament 12-12 in., 22-5.5 in., 4-3 pr. Completed 1913-1914.

Italian Battleship of the Andrea Doria Class

Length 570 ft.; 23,025 tons; speed 23 knots; armament 13-12 in., 16-6 in., 14-12 pr., 6 small. Completed 1915.

N. B, In the next succeeding class, Francesco Morosini, Cwac-ciolo, Cristoforo Colombo and Marcantonio Colonna, eight 15 inch guns are mounted in four turrets on the middle line, as in the Queen Elisabeth.

Japanese Battleship of the Fuso Class

Length 658 ft.; 31,000 tons; speed 22.5 knots; armament 12-14 in., 16-6 in., 4-12 pr. Completed 1915-1918.

Length 400 ft.; 19,800 tons; speed 20.5 knots; armament 4-12 in., 12-10 in., 8-6 in., 8-12 pr.,*8 small. Completed

1911.

Japanese Battleship Settsu

Length 500 ft., 20,800 tons; speed 20.5 knots; armament 12-12 in., 10-6 in.,i8-4.7 in., 16 small. Completed 1912.

this unusual comlbination of propelling ma¬ chinery was reported to have been complete.

The J class, which immediately preceded the K class of British submarines, had a surface speed of 19 knots, a surface displacement of 1,210 tons, a submerged displacement of 1,820 tons, and a battery generally-similar to the K's. These developments in submarine construction represent an extraordinary advance over the earlier classes and a very marked improvement over even the E class of British submarines. These last-named vessels had a length of 180 feet, a submerged displacement of 800 tons, a surface speed of 15 knots, and a submerged speed of 10 knots. They carried one three-inch gun and five 18-inch torpedo tubes. One other class of submarine which was developed as a result of the Great War is represented by the M class of British submarines. These vessels, only one of which has been reported as actually built up to the present time, had a designed sub¬ merged displacement of approximately 2,000 tons and carried one 12-iilth, 35 calibre gun. The mounting of this gun was necessarily of a special t > T)e and the training of the gun was necessarily dependent on the manoeuvring of the vessel. This type of vessel is somewhat of an experimental character and has never, so far as reported, been in actual service, so that it is impossible to make positive statement concern¬ ing 'its probable success in actual service. There is little doubt, however, that, under certain con¬ ditions, it would have proved a valuable ad¬ junct to the fighting fleet.

In the German navy the development of the submarine, both in types and numbers, was very great, but with results not altogether satisfac¬ tory from the point of view of speed and habi¬ tability. The Germans, ho\yever, developed the offensive powers of the submarine to a very great extent, especially with a view to operating against merchantmen, both armed and unarmed. They also developed to a high degree the mine¬ laying type of submarine ; also the cruising cargo submarine. This last type was not put to any great practical use and was subsequently converted into a mine layer. The great damage to merchant shipping accomplished by the Ger¬ man submarine has created an impression in some quarters of unusual superiority for the type developed by them. ˆ That this is not sup¬ ported by the facts is evident from the follow¬ ing quotation from a statement recently issued b}' the United States Navy Department, com¬ paring one of the

latest types of German sub¬ marines with one of the latest types of United States submarines which had then completed its official trials :

New and interesting light is thrown on the efficiency of the German submarines by recent tests conducted by officers in the Bureau of Construction and Repair. An opportunity recently developed in this country which permitted a direct comparison between a late design of German submarine and a late design of American submarine. While details of the comparative tests cannot be given, sufficient information is available to destroy the much-advertised superiority of the German submarine. As is well known, five German sub¬ marines of the latest design were brought to the United States for use in the Victory Loan campaign. Four of these boats came over under their own power, manned by officers and men of the United States navy. The propulsive machinery of the fifth was partially destroyed or removed so that it was necessary to tow this vessel across. The best of these German boats was “tuned up ” foˆ special trials. When reported ready for these trials a special trial board was designated to conduct the trials, following the established

Eractice in carrying out contract trials for submarines of the United States navy. The boats compared were ex-German

submarine U-111 built at the Germania Yard, Kiel, Germany (completed in 1918) and S-3 a submarine designed by the Navy Department; S-3 was built at the Portsmouth Navy Yard and was commissioned in 1918.

These boats both belong to the “ 8(X) ton class ” — U-111 having a surface displacement of 830 tons and S-3 a surface displacement of 854 tons.

Dimensions.

U-111 S-3

Length . 235 ft. 231 ft.

Beam . 21 ft. 21.5 ft.

Draft . . 12.5 ft. 12.5 ft.

In the trials the maxim)Lim surface speed of the U-1 1 1 was 13.8 knots while the S-3 ffiade 14.7 knots. The submerged speed of U-111

was 7.8 knots while S-3 made 12.4— ˆ a remarkable difference in favor of S-3. The radius of action of the two boats is also in favor of ˆ3, despite all the furor that was created by the advent of the German U-boat on American coasts during the war.

U-111 can cruise 8,500 miles at 8 knots, while S-3 can cover 10,000 miles at 11 knots. The submerged cruising radius shows an equal preponderance in favor of S-3. Both boats can carry 12 torpedoes. U-111 mounts two 4 in. guns, one forward and one aft, while S-3 mounts one 4 in. gun forward, this practice of one gun on a submarine being standard practice in the United States navy. So much for the ordinary military characteristics of the vessels. It is necessary to really live in these vessels to appreciate the radical difference in their habitability, a vital military characteristic, for a submarine is no better than its crew. U-111 is congested to the last degree; she is complicated in the extreme by the installation of many “ gadgets some of which are of doubtful utility and more doubtful necessity. Accessibility to her equipment is very difficult; frequently it is necessary to take down three installations to overhaul one. On the contrary S-3 is a habitable, livable proposition; comparatively “ roomy ” with reasonable accommodation for officers and crew. Her equipment is accessible and her general habitability is vastly superior to U-111. Much has been written of the seaworthiness of the German U-boat. An opportunity to compare the seagoing capabilities of the two vessels occuˆed during these trials and the general consensus of opinion among the officers conducting the test is that S-3 is the more seaworthy vessel. Her decks are drier, her bridge less subject to green seas, and her general behavior in a seaway superior. Referring to the comparative diving capabilities of the two vessels and general handling there are few differences and those few appear to favor S-3. In their reports of the outcome of the comparative tests the Bureau officers point out that there should be no idea that “ we have nothing to learn from the Germans. ” There are a number of interesting details in design, construction and in operation that are well worth while studying. A few features are worthy of adoption for the U-111 is the” mittcl U-boat,” which type is considered by the Germans as, by far, their best submarine.

Nothing so clearly indicates the rapid and extensive development of the submarine during the recent World War period than the simple statement that, at the beginning of the war, Germany had less than 40 submarines, while during the period of hostilities it actually built or had in process of construction at the time of signing the armistice more than 600 additional vessels of this class. Although the Germans lostˆ rather more than 200 of these submarines during the war, they

succeeded in destroying approximately 15,000,000 tons of shipping, in¬ volving the loss of more than 16;000 lives. The development of the submarine in Germany was accompanied, however, by rapid development by the Allies of suitable vessels and other means of combatting the submarine menace, but it was only in the autumn of 1918 that the construc¬ tion of new tonnage and the development of anti-submarine measures showed clearly that this menaceˆ had been brought under control. That the existence and operation in large num¬ bers of enemy submarines had a most material bearing upon the manoeuvres of the Allied fleet is amply evidenced by reports of fleet com¬ manders during the war period. They also ex¬ ercised an important influence on the design of capital ships so far as related to the provision of protection against underwater torpedo at-WARSHIPS

tack. As is well known, during a great part of the war, German naval energy was concentrated on providing and operating submarines, thus making this particular type of naval vessel of predominant consequence to them in the prose¬ cution of the naval side of the war. In view of the important part recently played by the German submarine, the following quotation is rnade from a paper contributed to the transac¬ tions of an American scientific society by an of ficer who had unusual opportunities for ob¬ servation and whose comments upon this sub¬ ject have authoritative value:

All modern German submarines are of the double hull type. The war produced three standard types of German submarines which are known as the UC type, the UB type and the U boat or “ mittel U-boat.” In addition to the standard types, there were two special types, as follows: — UE type, mine-laying cruisers; UA type, large cruiser class. The large cruiser class consists of two designs, the ordinary design being a vessel of about 2,000 tons surface displacement, while there were a few of the special cruiser design of about 1,200 tons surface displacement. There were apparently only two vessels in this class completed, and they were especially designed for surface speed.

The UC class is made up of small, coastal, mine-laying submarines. This class has a surface displacement of about 500 tons and a submsrged displacement of about 575 tons. These vessels in their latest development are about 185 feet long, 18 feet beam, and 12 feet

draught. They made about Hi to 12 knots on the surface and 6 to knots submerged. The mines were carried in the forward part of the vessel in non-watertight compartments or mine wells, 18 mines being usually carried, although some of the designs carried only 12. A torpedo tube was fitted in the stern and two torpedo tubes were fitted externally in the superstructure, sometimes for¬ ward and sometimes abaft the conning-tower. They usually carried one 10.5 or one 8.8-cm. gun. There were about 100 of these boats completed and a great many more in the course of construction.

The UB class of vessels formed the coastal submarines and were vessels of about 520 tons surface displacement and 650 tons submerged. They were 183 feet long, 19 feet beam and 12 feet draught. They had a surface speed of about 13i knots and a submerged speed of 7 i to 8 knots. Four torpedo tubes were installed in the bow and one in the stern. They usually carried one 10.5-cm. gun; no mines were carried on the UB class.

It is of particular interest to note that the UB class and the UC class in the final analysis were very similar in size and displacement. An examination of the boats of these classes in Germany in December,1918, showed very completely the progressive steps made in the design and construction of these types of vessels. The earlier UB boats and UC boats only displaced about 125 to 150 tons each. It was very soon demonstrated that these boats were too small for the purpose intended, and when standardization took place it resulted in boats as indicated above. There were about 140 UB boats completed and many more under construction at the time the armistice was signed.

U-boat — ”Mittel U-boats.” — The first boat of this class was completed in 1906 and had a surface displacement of 238 tons. The increase in the size of this type of sub¬ marine continued through various progressive stages until 1914, when the displacement had reached about 760 tons. The “ mittel U-boats ” subsequent to this date were generally similar in design except that the displacernent increased slightly so that the latest type had a surface displacement of about 830 tons. The standard design of ” mittel U-boats ” has about the following characteristics*:

Surface displacement . 830 tons.

Submerged displacement . 1 ,030 tons.

Length . 235 feet.

Beam . 20 J feet.

Draft . 12i feet.

Designed surface speed, about 16 knots.

Actual surface speed, about 15 knots.

Designed submerged speed, about 8ˆ knots.

Actual submerged speed, about 8 knots or less.

Most of the ” mittel U-boats ” were fitted with four bow torpedo tubes and two stern torpedo tubes. They carried either one or two 4.1-inch guns. This type of boat was considered the most successful of the German submarines, and many of the German service consider that, if they had adhered to this type of vessel, they would have been more successful in their submarine warfare. The Germans had

* From paper by Commander E. S. Laut, Construction Corps, United States Navy, published in ‘Transactions ’ of Society of Naval Architectural and Marine Engineers (Vol. XXV).

completed at the time of the armistice about 110 of these vessels; a large number were also under construction in various parts of Germany.

UE Class. — These were large ocean-going, mine-laying cruisers of:

Surface displacement, about . 1 , 200 tons.

Submerged displacement . 1,520 tons.

Length . 275 feet.

Beam . 24 feet.

Draft . 13 feet.

Designed surface speed, 14.7 knots.

Designed submerged speed, 7.2 knots.

Armament, 4 bow torpedo tubes; 2 stern mine tubes, 39 inches in diameter.

Stowage space was available for 42 mines and 24 tor¬ pedoes. It is doubtful whether these vessels carried this nurnber of spares. Their gun armament - consisted of one 5.9-inch gun and one 4.1-inch, although in some cases they may have carried two 5.9-inch guns. Usually only one gun was carried.

There were about 10 of this class completed and a large number building. U-71-80 were small mine-laying sub¬ marines of this general type but of an earlier design, and only displaced about 760 tons. They were not a successful design.

Cruiser Class — UA Type. — Of the special cruiser class there appear to have been completed only two boats — U-135 and 136. Their displacement is similar to the mine-laying cruiser class, that is:

Surface displacement . 1 ,200 tons.

Submerged displacement . 1,535 tons.

Length . 275 feet.

Beam . 24ˆ feet.

Draft . 13 feet.

Designed surface speed . 18 knots.

Designed submerged speed . 8.2 knots.

The>r had four bow tubes and two stern tubes and carried one 5.9-inch gun.

The large cruiser class consisted of vessels of the following characteristics: —

Surface displacement, about . 2,000 tons.

Submerged displacement . 2,500 tons.

Length . 302 feet.

Beam . 29ˆ feet.

Draft . 17 feet.

They carried four bow tubes, two stern tubes and 19 torpedoes. They had a designed surface speed of 15.8 knots and a designed submerged speed of 7.7 knots. Only four of these boats were actually completed at the time of the armistice, but there were a large number under construction in various parts of Germany.

It is impossible to predict the future of sub¬ marines ; their development and operation in the Great War indicated their tremendous possibili¬ ties. The future alone can determine whether or not it will be possible to restrict the activities of submarines so that in their operation nations at war will fully comply with the laws of na¬ tions governing civilized warfare and the spe¬ cial regulations established in times of peace to provide for such compliance. It may be re¬ marked, in this connection, that the operations of enemy submarines in the Great War were largely those of action against unarmed or lightly armed merchant vessels and their use in strictly naval operations was rather restricted. In the earlier stages, their operations were emi¬ nently successful, because of their ability to cruise on the surface, to lie in traffic routes and to attack with comparative impunity vessels unarmed or only lightly armed. As soon as it was possible to conduct a rigorous offensive against this type of vessel, their surface opera¬ tions were greatly limited. The development of mine barrages and, more particularly, the in¬ crease in the number of torpedo-boat destroyers carrying large quantities of depth charges and the employment of large numbers of submarine chasers soon rendered the surface operations of this type of vessel, in the vicinity of high-speed, well-armed surface craft exceedingly hazardous. In fact, it may be stated without fear of serious contradiction that the submarine menace at the

time of the armistice in. November 1918 was fairly well under control, and the increasing number of destroyers being -put into service at that time would have soon rendered the danger from this class of vessel comparatively small. In conclusion, it is worthy of note that more than 200 German submarines were sunk, cap¬ tured on driven ashore during the course of the war, this numiber representing more than 50 per cent of the total number which had been in op¬ eration. It is also a fact that the extremely hazardous character of duty in enemy subma¬ rines shortly before and at the time of the con¬ clusion of the armistice, due to the increasing efficiency of the offensive operations conducted against them, had produced a marked decline in the morale of the crews of such enemy vessels. This, in itself, became a potent factor in reduc¬ ing the menace from this type of vessel, and may possibly result in a closer observance of such laws as may hereafter be established for the control of suWarine warfare in any future operations of war in which such vessels may be engaged.

Submarine Chasers. — A type of vessel for which submarine operations were distinctly re¬ sponsible was the submarine chaser class. These were small, moderate-speed, lightly-armed ves¬ sels whose main object was to act as scout patrols and to locate and attack enemy subma¬ rines. Their speed, while not great, was supe¬ rior to that of the large majority of submarines. This special type in the United States navy was represented by a class of nearly 450 ves¬ sels. They had an armament of one three-inch gun, two machine guns and a Y-gun for depth charges. This permitted them to operate ef¬ fectively against enemy submarines. Their principal dimensions were as follows ;

Length (between perpendicular) . 105 feet.

Length, overall . 110 feet.

Breadth (W.L.) . 14 feet 8J inches.

Draft . 5 feet 5J inches.

Displacement (normal) . 77 tons.

Displacement (full load) . 85 tons.

Speed . 18 knots.

More than 100 of another type of submarine chaser and scout patrol were under construc¬ tion for the United States navy at the time of the signing of the armistice, and extensive ar¬ rangements had been made to build this type in very large quantities if the continuance of the war and the effectiveness of enemy submarine operations had justified such an extension of the building program. These vessels, called the ®Eagle® class, were very much larger than the type of submarine chaser just mentioned, their principal characteristics being as follows :

Length (between perpendicular) . 200 feet.

Length, overall . 200 feet, 9 inches.

Breadth (W.L.) . 25 feet, 6 inches.

Mean drˆt . 7 feet, 3 inches.

Displacement (normal) . 500 tons.

Displacement (full load) . 615 tons.

Speed . 18 knots.

Battery:

Two 4-inch, 50 cal, R. F. guns.

One three-inch, 50 cal. anti-aircraft gun.

• Two machine guns.

One Y-gun for firing depth charges.

Being much larger and more effectively armed than the first type of sulbmarine chaser, they would undoubtedly have proved themselves effective vessels for the class of work for which designed, and their

simple type of construction

would have permitted prompt and extensive ad¬ ditions to the fleet originally contracted for, had the exigencies of war necessitated such ad¬ ditions.

Mine Sweepers and Mine Layers. — Ves¬ sels of this class may not be regarded ordi¬ narily as warships. As a matter of fact, how¬ ever, a large number of specially designed mine sweepers were employed during the Great War, although the vast majority of such vessels were improvised from seagoing tugs, trawlers and other vessels of that general character. They were, however, lightly armed and performed such notable service in strictly naval operations that they are at least entitled to mention in an article on warships. The type of vessel of this class specially designed for the United States navy was of the enlarged seagoing tug order, having a length of 180 feet, a beam of 35 feet 6 inches, a mean draft of 9 feet 9j4 inches, and a normal displacement of 950 tons. They were single-screw vessels, with vertical triple ex¬ pansion engines having a horse power of 1,400 and had a designed speed of 14 knots. They had a battery of two three-inch, 50 calibre anti-air¬ craft guns and two machine guns.

The mine layers, in almost all cases, con¬ sisted of merchant vessels transformed to meet the requirements of the particular service in¬ volved. They were also lightly armed in order to permit them to make reasonable resistance against attacks from aircraft and submarines. In view of the improvisation of this type, no attempt will be made to describe the features of any particular vessel.

Tables. — In the tables which appear at the end of this article (Tables I to VIII, inclus¬ ive), are shown in condensed form the major characteristics of the principal types of vessels in ˆ the navies of the United States, Great Britain, France, Italy, Japan, Russia, Germany and Austria. The vessels for which data are given, with the exception of the United States navy, are those which have been completed or designed in the past 10 years.

There are given in Table IX particulars of British warships constructed during the war. This table is taken from a papes prepared by Sir Eustace Tennysou d'Eyncourt, Director of Naval_ Construction, British Admiralty, for pre¬ sentation to the British Institution of Naval Architects in April, 1919, and since published.* It is complete and authoritative and shows in graphic form the tremendous development

in the strength of the British navy during the World War. There was also taken from this same paper the plans appearing on Plates 38, 39, 40 and 50, 51 and 52. These plans give a good general idea of the compartmental subdi¬ vision, battery deck plans, interior arrange¬ ments, armor and armament of the following classes of vessels :

Battleships . Royal Sovereign Class, Agincourt,

Erin and Canada.

Battle Cruisers … Repulse and Renown.

Large Light Cruisers . Courageous and Glorious.

Aircraft Carrier . Furious.

Light Cruisers . Raleigh Class and Ceres Class.

Monitors . Erebus, and Terror (31ass, and

M-15 to 28, and M-29 to 39.

Also M Class of Destroyers, V Class of Destroyers, and Scott Class of Flotilla Leaders.

♦‘Transactions’ of Institution of Naval Architects (Vol. LXI„ 1919).

1 U. S. S. Tallahassee, formerly the Florida 2 United States Monitor Miantonomoh

3 United States Submarine Chaser No, 27

1 United States Submarine Chaser (Eagle Class) 2 U. S. S. Bittern. Mine Sweeper No. 36

3 United States Submarine AA-1. Latest (Fleet) type

While the ˆTransactionsˆ of the British Insti¬ tution of Naval Architects are especially rich iˆ data concerning the development of warship building, the two papers published in the 1919 ˆTransactionsˆ of that society, one by Sir Philip Watts, late Director of Naval Construction in the British Admiralty, and the other by Sir Eustace Tennyson d'Eyncourt, the present Di¬ rector of Naval Construction, are particularly replete in data covering the development of the British navy up to the close of the year 1918. In addition, Sir Philip Watts incorporated in his paper very complete statistical data concerning the principal foreign navies, which gives it un¬ usual historical value.

There is given in Table X a summary state¬ ment of effective fighting ships built and build¬ ing, for the countries just enumerated. This table is taken from the 1919 edition of Brassey's Annual.

There are given in Tables XI, XII, XIII, Xiy and XV summaries of vessels in the United States navy ˆˆfit for service® and ®under construction,® covering the period from 1 July 1906 to 1 Oct. 1919. These tables have been prepared for an official publication of the United States Navy Department, soon to be is¬ sued, and are reproduced by kind permission of the secretary.

Photographs, Silhouettes and Battery Plans. — Photographs represent the complete series of United States battleships, battle cruisers and representative vessels of the de¬ stroyer, submarine, monitor, submarine chaser and minesweeper classes.

The Silhouettes give correct profile illustra¬ tions of the various types of fighting vessels in the United States navy.

The Profiles and Deck Plans of United States and foreign vessels give the battery arrangements and armor distribution of the complete series of United States battleships and battle cruisers and the latest battleships and battle cruisers of the navies of Great Britain, France, Italy, Russia, Jaipan, Germany, Austria. There also have been added profiles and battery plans of the latest and most im¬ portant

battleship additions in the Brazilian and Argentine navies, namely, the Minas Geraes and the Rivadavia. The first of these battleships was constructed in England for the Brazilian government, while the last-named

vessel was constructed in the United States. It may also be noted, in this connection, that the present battleship Canada of the British navy and the aircraft Eagle of the same navy were originally under construction in England for the Chilean navy, but were taken over by the British admiralty during the Great War.

The thanks of the author are due to the Sec¬ retary of the United States Navy for his kind permission to use hitherto unpublished data concerning naval vessels; also to the chiefs of technical bureaus of the United States Navy Department for certain authoritative data ob¬ tained from them concerning United States naval vessels, and especially to the chief of the Bureau of Construction and Repair for his most helpful cooperation in obtaining data and suit¬ able illustrative photographs and sketch draw¬ ings ; also to the technical staff of the Bureau of Construction and Repair, especially the head of the design drawing office and his assistants for the compilation of tabular matter and prep¬ aration of sketch plans illustrating the types and characteristics of naval vessels.

The author is also indebted to various for¬ eign admiralties for inforntation derived from their official publications, and also to various scientific and technical societies and technical publications for naval data contained in their latest editions. The principal publications con¬ sulted are indicated in the bibliography given below, the author being under special obligations to the British Institution of Naval Architects and Brassey's Annual for the use of some of their plans in illustrating this article.

Bibliography. — ■ Official publications relat¬ ing to naval vessels published by the United States Navy Department; similar publications of foreign admiralties; Transactions of the American Society of Naval Architects and Marine Engineers, New York; Transactions of the British Institution of Naval Architects, London; Transactions of the Society of Naval Engineers (Washington, D. C.) ; Proceedings of the United States Naval Institute (Annapolis, Md.) ; Brassey's Naval Annual (London) ; Jane's ˆFighting Shipsˆ (London) ; Scientific American (New York) ; Engineering (Lon¬ don) ; Engineer (London).

W. L. Capps,

Chief Constructor, United States Navy.

TABLE I

Table Giving Particulars of all United States Battleships Including and Subsequent to Oregon Class

WARSHIPS

747

‘O 1

to

40

O’ 1

‘O

‘C

40

to

ˆ 1

to

40

‘O

‘O

■o

00

00

X ˆ

O’

•d o\

o\

o

•^3 . §®

‘^2’

13 o*

d’d

lx o xT

XJ XJ CS

C d

>1

d

S

<3

i3 >»

W d

S

Co:

d

July

2 4)

x2 4 >

.2 4 >

sub—

ed

>« bo

«> 60

“ M

V 00

ft ˆ

ft Vh

ft In

V

ˆ 0)

ˆ 4)

xX 0)

r3 o

7 a

a

a

ˆ d xJ. C2

ts

(N

*

*

*

d d

d d

d d

o d

Q Q

o o

o o

to

to O

xˆO

-H O

-H O

lom

40 40

«0 lO

X.40

ft ft

ft ft

ft ft

t V

to to

lO to

lO to

‘?tO

44

4 4

x}x 4

‘O 4

1

0

o

o

o

o

40

o

o

40

40

40

•

ft

ft

ft

>0

o

♦N

<s

a

<N

u

o

u

O

l-l

wi

“C

TI

H

•-•

•<-> t-i

a d

y d

y rt

ˆ d

© s

0} bo

.2 <u

13 00

a> a

13 00

<u S

13 00

G

flj

G

G

. o

o

C)

o

4)-5

XX- ˆ

.x-4-»

x.1-ˆ

9 o

lU o

<U o

4) y

^ 3

.9 G

9 3

G 3

M-d :j 4)

J^TD

S’d

lx «>

jd’G

W ‘W

H ^

3 ^

3

3 ^

«•

H

H

H

o

o

o

o

o

o

o

o

40

40

O’

o

00

00

o*

cs

<s

CS

‘O

p

o

o

o

o

o

o

o

CO

«s

CS

CS

o

o

o

o

o

o

o

o

o

to

‘O

<N

»

«•

•

•

<s

CS

CO

?o

fO

CO

o

to

‘O

o

o

o

o

CO

to

CO

to

CO

arifM

Hm

ˆ\e%

CO

to

O’

“t

O’

O’

O’

o

o

o

o

o

o

o

o

o

o

o

o

‘O

‘O

vO

VO

o

E :

^ \

4)

i d

“OxG •

2t3 :

2 :

12 :

-9 G .

‘^•a

.. lx

4 > .

c .

•

lO •

^ ;

a *

4 > •

00*^

Tj«r >

rsT d

T3 !

H ;

4J

d ;

C •

G

ˆ d

＜d .

Tt＜ • ˆ •

lo o :

‘＝*’ 2

40 . 4J

. 0

ˆ c\S •d

c *

O

. d S2

ci ;

•

:g| >

O’ C 3

‘^.2’g

to-* o .

2a

..&

w to

x2’S

o_to

oS

o ˆ

class. Nos. 4. a .

!3 “

ˆ d to P»

o .

G

to*,9

＜0 bx

.iS H

CO ˆ d

O ˆ sg

2ˆ.3

tniˆS « o .

xSxM d

o d te dQ o

0x3 .

o*

lU

IS

ennessee

Californi

u d

oS

Tl - d o

Ix^O

O d o

*^gS

Qc8-‘3

^ .. *3

,9

d 4oU o

2

H

U

cn

•o

a

rt

M

o

••

o.

K

t, M

V (3

＞’3

t’Tj

•* ^

tn

U

t/5

hH

D

o

H

H

<

PQ

«s

t3

C

ˆ u PO cl «S 1)

. M ‘Z-°

r-i to u

a _g

•aT3

»G Q1 ＜U

•*■＞ G rt’S m-g

o

.e-x)

3

to d (U u O. >

.StJ

a H

•M Jj

a H

fS

\ri

00

CSTJ l-> «uˆ

＋J ＋J *0

C d(N

Ot3:ˆ

t-c

a

＜J

■ V

^ C«

cd cl u u

f00 l0 l0

VO fO

s

o

lo

ft * ‘C

00

o

• «H

Ih

ˆ ilM

ˆ q5 V bo

G

«‘l

2 = > ˆT > U

3 ˆ

f-

o

00

o

fO

to

o

o

»o

＜o

■＜t

fO

to

«o

o

o

＞o

00

O G o

3.2

lo d

0)

to gc/l w 0)

■•-stoˆ

• Gt

o ° -

►So

00

o

x->

G

♦

cn

C4

U

CO

IH

t3

u

Q

W

oi

o

s

<

to

u

H

<

H

CO

Q

a

H

2

P

b

o

cn

-i:

hJ

D

O

►H

H

Cli

<

•d

u

to

a >

Clt‘

•d

G

d

-d

m

ID

O.

cn

CS

tn

40

d*

00

CO

o

40

o

o

O’

40

O’

o

Ov

d <

40

CO

o

40

‘O

O’

O’

o

o

00

00

O’

O’

pN

ˆN

*

•

•

*

O’

a

In

$>x$

3

c

4)

Q

d

p-ˆ

d

•

2 4)

’3’^

^ (D

to oO

<« 60

ft In

00 «

ˆ 4 >

ˆ fi

cs G

1 ˆ

CN

4 ^

«•

*

*

*

_ I

_ ■

d d

d d

Cd CQ oS

cd d d

o o

O (J

o o y

o o

ooo

»o m

•d < UD

iO 40 40

40 40 40

ft ft

ft ft

ft ft ft

>x £. Sx

40 CO

40 CO

‘O CO CO

‘C CO CO

a <N

1 1

00 CN

t j 1

••tOCN

4 <N tS

pˆ !

pH

*

»

d

d

“5

q

o

o

o

O

40

40

«o

o

tn

d”

d”

•

ft

ft

ft

ft

00

00

00

O

4

!

00

4*

4

d.

d.

d.

d.

H

X

4 >

4) -

o

CO

CO

CO

CO

•M

4 < >

l-i

Im

ˆd

a >

4J

4)

o

>

>

>

>

00

‘O

o

CO

o

CN

o

lO

vo’

00

00*

‘O*

CN

CN

o

o

O’

vO

-
-
-

pH

CN

CN

CN

CN

CN

Cl

o

40

o

o

40

00

o

CN

‘O

40

00

O’*

CO

d <

CO

o

o

CO

tl <

d’

»o

fS

CN

CN

CN

-IW

mKp

o

00

‘O

o

•‘1*

d*

O’

CN

‘O

>0

‘O

‘O

‘O

o

o

o

o

CN

CN

00

•CO

o

o

o

d*

40

to

ˆ ?» •

• • 1 • fo q .

00 .

pH O .

-0.2 • 9Q •

•

d •

3 . :

d d .

00 ;

3 .

. G d

CN •

rx. d xj

ˆ O •

cn o

U •

-o

^ d

. d .

^ o •

pH

.,3 :

J o JcJ

o •

V 4J

Ofi 3

O *

O +xˆ

toˆ :

O

3,i<l

2 « •

CN

6

CO

4« U

•2 *d

XJ •

,XJ •

(/) d .

1/1 <u . dcn .

2

d

2

o . o

.G-Sfe

o

10 !

(V

•M

(/)

G*

00 lx

3ˆ0

tO’3 .

13*0. •

4)

JD tOJD

Memp

Mem

tana

,G

o

o

o

Ih

uj x-> 4)

S.tJ 3 jJˆPxClx

Pd

n

M

m

.!4

O

(U

2

Ss

;|

*n

o

o

u

d

G

<

*

0)

•a

(U

G

O

<u

00

G

o

o

G

’d

G

d

‘O

to

O

2

6, 4

to

<u

O,

>.

o

•xx

G

(U

>

•a

d

x->

d

Q

cn

U

cn

►-«

D

a

o

H

D

o

U

C/2

cn

u

H

<J

H

C/3

Q

U

H

2

P

o

cn

pi$

o

o

►X

H

Oi

<

fu

o

00

CO

CO

CO

CO

00

00

o

O’

Ov

-3 .

40

y < > »

CN

9ˆ

3

Td

a

d y

M 4)

<

Q

a >

>

3

o

ˆ 4) l-l

!;3

.2 > <u

d «

5 d

ˆ i 3

pHpR I>

s &

CN

CN d l>

I

CN

r-5 *

*

d •-N

u d

go

« lx—

OTl

m ft

>

ˆ ft

ft

CO fO

to fo

CN pH

CN CN

P-d

d

3

o

CO

40

ft

V

‘O

40

a

d->

G

o

o

4)

Id

• Pd

■g

•3

3

d)

_C

‘O

4)

Id

•3

lx <u

4)

c2—

(N ^

• S In n q

Id

g 00

eo

o

o

o

o

40

o*

CN

O’

n

CN

o

40

o

‘d

40

CN

CO

«

o

o

40

o

pH

CO

O’

VO

P

‘O

CO

o

40

40

o

o

o

o

CN

40

■d

»o

1

bo .

G .

• *d

d *

p •*

_jd •

pQ :

1-^

4)

•M

(A •

03 .

Xi ■

^ :

^ !

T) •

G •

d •

CN *

4)

>

» pd

(A

(A *

_3

o •

o

Z :

p d

c

- Pd

a S

CO

.9’d

ucn

o

W p

-♦- >

a

d <

to fll

•

4)2

(A

o

u

2

T)

d

a

</)

4>

w

T)

G

d

‘d

0)

(U

O.

cn

m

d

(U

00

c

o

o

3

Tl

0)

oT

G

to*

CD

2

o,

to

* >

lx

<u

>

fS*

6

2

d

o

G

<1

*

c

o

x->

d<

to

O

2

748

w

«

u

o

P6

H

c/5

u

•rsQ

« H

O ˆ Q U H

NH

m

<

H

b<

o

cn

c <

o

1^

H

Citf

c

PLh

■n I G

il

OiJ

O.

G

OO

0\000<N(N <N<N

< >4

<s

O «« ‘/5

i (N <s

.A •« S 4>

O u

oo’O’O’Ooooe ‘O’O

00

00 ‘O

00

G

O

iJ52i

rt«G »

Q i

o

a

o

fS

f < 5

to

o

o

00

a

o

^4

a

a

a

a

a

a

a

a

a

a

o

a

a

PO

a‘

fS

<s

<s

CM

CM

CM

>

z,

o

a

4)

f/i

u

G

3

4)

C

d

Aug.

.Q

>.

c4

a

<

4)

c

d

Dec.

•—>

6

4)

Q

0)

c«

n

o

•d w

H**

fl G G G G G

‘r^

^ ^ ^ ^ ^

G • ^

G

- p <

%

00

00

00

00

1

1

I

4>

%

GC

00

i 4*

<s <s

4 4.

•2

.&

*c

<s

4.

0)

a

Jj)

*3i

• *4

＜s r4

^ 4.

’a • »« U

＜s

4.

bi

•SI

G

81

rt

3

(4

^<5

I

CN

3

(4

n

- fS

e4

U

< <j

< < ?0 ** < ^

I

(S

G

‘rt

t >

a

>«

■♦-»

>t

u

C

JS

£ § G ˆ G ˆ P* 3

4j « y

J « Si3

— a’o

“cfl

*(4

“rt

1

c4

“eS

o

o

u

o

u

o

o

o

o

o

o

o

»o

lO

»o

*o

lO

%

CO

CO

Tj*

‘f

4

4

4

4

4

4

s s

s

S3 3

o

o

o

o

o

o

\n

to

•o

CO

»o

k

4 4

4 4

O . O

2 : 2

iQ .‘-O

:-S-E-

• o W O W

. 8 y s «

‘ .2 .S

I’d’S’d’S) . G G G G . c4 V G .45

« nl 1＞ 4＞ « ni M’S 4^*3

g¥gS?gS?gS^gggc

.3 ＞.G ＞.G ＞.a ＞.a a-s 3

h-d b’O 2*5 fa’s t? o.a o.

0S;3h G’n

•d’S)

G G c4 V

IJ

8-»§

4＞ ’i-H

t3ˆ

.3 c ti

-d 45 8

•dl

•dl

C u

U ih

c4

c4

c «

.2 >

• G

• O

•

. ♦> o

: 3

.•d

. 4)

• G

• O

• **4

. ■•J

o

; 3

.•d . 4 >

3

H

3

H

H H H H

”1J > kIs -1-1—

5_Q*rˆ OOC4 rt*rˆ tO c4 ˆ c4 o c4 i-0»“Ciy«”“C55’y“4cr4) ˆ aˆ’d.2 Clos’d. 2 ooˆ ooˆ oo

°’|‘d.2 Sbˆ‘d.E M H H H H H

c

o

**

u

3

•d

V

45 .

2

IS ««

•S 4) ˆ 00

3

H

M V C 1

CO

o

o

«o

s:

<0

o

o

o

a

o

o

a

o

o

a§.a|

a

a*

CO

CM

o

CM

CO

»o

“I*

>0

CM

to

‘O

NO

o^

o*

o

^ f

CM

CM

CM

•d ^

to CO

CO

§:

■ < 4«

t > .

‘O

VO

CM

o

00

‘t

o

»o

to

o

2-2

CM

d

a

d

a

a

a’

a*

to

to

CO **

CS

to

CM

CO

CS

CM

CM

CM

to

to

to

Dis¬

place¬

ment

normal

, o

CM

CM

CM

o

CS

o

o

to

to

to

«o

•«i’

■»!•

CM

»o

a

CM

00

!>%

o

o

o

o

CM

Mean

draft

,

•IK

«o

‘t

CO

»o

VO

o

^•oo

00

00

00

a

a

a

a

a

00

a

a

:S u

*-c«

c®

-t

00

•-M

ˆi4

♦H

Q＞ O O ?*Jm

ˆ o

＞0

vO

o

o

o

a

a

o

O /

o

m

tt. < N

CM

CM

CM

tt)

to

to

CM

«

CM

«

to

CO

CO

o

o

o

o

o

o

o

o

o

o

o

o

On

a

a

a

o

o

o

o

o

o

o

o

w

00

00

00

o

o

o

CM

CM

CM

CM

to

CO

to

to

to

to

CO

CO

to

o

to

V©

to

o

to

＞©

“O

V©

V©

•H

to

5

00

o

•o

00

o

o

CO

o

si

CO

On

4ˆ

00

>0

NO

to

•H

to

<A

r>*

to

o

Z

O

Iz:

QO

o

o

z

•d

•2

a

a

<9

U

o

n

o

CO

o

fO

«

o

00

c

‘I

*<4

8

<s

o

M

o

3

4)

2

0)

u

^•d*

W «

* ^

a

a

o

o

o

, G

a M •a a

Is

feo

a

c-<

V .

>o

•a*”

Ml ˆ

q2

45

TABLE! I — Concluded

Characteristics of United States Submarines

WARSHIPS

749

. 0

•a ‘«.2

o.

6

< o

^ e ^ Mbflbfl&o bobe

9 fs ‘7 <s to I “iiivoooooot^oo-SooooV^‘S-S.S^oo.S.S

Wi

i)

Xi w

il

V O 4) 4) O O 4)

c a c a a c c

o o o o o o o

<4 <d

u u o o

4)4} 4) _

a G c Qttjtotoo o o o

ScdcC < 4 < 4cdcdciSc9 n3o3 ooooooooˆcJy

4J 4J 4)

rt cOfOtOOOOOOO dOO wwwwwwwwwwuu .
.g5io < SPmO > O«O’OiO«O0’O‘O

«?*%*» * » “t % *55 1 *fc*

to to to •< # to tt) f*5 to ‘ < 1’ ‘I* ˆ ˆ

I I I I I I I I I I I t I II

•H 4i

t0’ˆTt < < 4 < ˆ‘4”O00O 00 90 00 Q000e0’t00 90 < sa0 00
a0a0(Scsr4rˆs0c4ˆ

ˆ « > 4 ˆ

I’ss

ie-a

•2

o

c/3

•a

u

U)

Wi

V

J3

a

c/3

4/

U

C«

‘t

a

(/ >

OOOOQQOOOOOQOOOOOOOOOOOOOi0 > 0 > 0OO

CSeSˆO’Cˆ» < i0»0‘0‘0« > 0 > 0‘0«0OO‘0‘0O‘0OOOCˆfS«SOO

r’ > 00O > O\t-«*HOO0»O’OOOOO»ˆˆ*HˆO»-«O«Hˆ»HtscsO»H» <

ppoopoooooooooooooooooooppopiooo

~l p ˆ <~

»0fSO(S«0«0O‘00(

■ ooooooooo>oo>ooo>otˆ>oao

ooa»ˆtototO’«”^^’***^^’^’<#‘ptotoO’^’ˆto«ˆi’»f’OiotofS’<i”i’

a

2

a

CQ

Wi

Q

^

l!t > i»^O00«eS‘0l > .O < S«O*Ht > .f0O»H»o^^ioO’O-HO(S»i^^O > O

■ > *000«-
< ^CS(StOc4«H«stOtOtO*H«4i(S(S‘4 > ^tO‘4’tOiO’OtOtO(S’OtO

^ irt ^ ^ ^ ^ ^

jQ «

I 6

•o 4)

(4 tH

V ‘4- > Wi M

« 4 >

^ > w Iw iw > im«?i!^i I Ii M tmamam •** WW «■»« . < «■ < «■ < tf
»♦*

KOiOOO’O^POO’O0tWU)9 > PO9 > t’OOt0Ot‘00t^OO9’a0O

,‘U*HOlfOtO*4‘iOt0tOtOt»M3’Or’ > ^O’ < S«O’^tS00’O00’OOO”^^«OO*H

to

s

hJ

jgoMotoo«st»poo»otop»oPtoaifOOP‘4‘0*ˆOfooppfOfOP

.fOtStO’ˆlOtSˆˆˆtˆPtOOOtoOPtˆtOPtSiO’ClOOktˆ’.HˆOiOO

Sˆ‘O00Ot0tt5’4 < ‘O’O’O»0iOl0’O’O©”O’ < i»’»O’O«’-r”00«’»-
ˆOt0t0i0«STl’

•H •H ˆ ˆ •iN ˆ ˆ CS < S ˆ cs cs cs ts ˆ cs cs

c

v

0)

u

c«

a

M

TJ

4)

bfi

a

ja

a

c/3

V

n:

a

c/3

lOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO

lOOOOt^’^OOOtSOOOOOOCSOOtoOOOOOOOOOO

<SOtot’I<sO‘0»-<od«s
\j<^OOt^‘Ot^’*4’‘Ot^O>OOoO(Sr»fS(S’<J<‘00

<sr^t^tt)^0^00’c»0t*5p^”<l*«sr^00^ 00 00<s‘0000>‘0»^0‘0>t0fstt)

»H^{sjtOtO’i|’«O^^^^W>«/>l«‘0^^tO^>0»OOiOOO’OOt<’-^CS

lOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO »0000<sf4
000‘00000000>0000000000t^00

‘OlOO00»^OO«OtoO00P4O»H00’Ot~<^‘OOiOO’»O’^O’O’Ot^‘OfO

O’^^ooootopt^o>»’»«ooiviiioooo^toot^o0‘0c>»oot^r^‘ooa’

»-i^«S«S<St0^fOtOtOtOtO’^^’«4’»-<tOt0^vO’<4‘iO’^OOOOOOOOtOO
\Ov

H

55

SSSSSS

•2 ® 5 2

Ov

*0

I I boo

to

tOtˆ < J

cA

00

ˆ 1 <N I I

o o-a

I ˆ ˆ

fO ˆ ˆ

ˆcijfijcicˆ

o 2 2 ®

I ˆ ˆ M

pq 1ˆ Q fi li 6 ci 6 ci W W Jj Jj 2 <; SS 55 <; 6 O Pi »5 c/) cA ci ci) W cˆ

Table II

Particulars of British Ships Completed or Designed Since 1910

750 ’

o B a

ooooo

OOOOOOO

t-» 00

00

CO

CO

O

<N

CN

vH

W e» *1

CO

00

Oi

e?\

.

ft

O’ ˆ

o\

«NO‘0OOOO»ˆOrˆt’

0ˆ(Nˆ‘0ˆ00ˆ‘0000000

11 T) P 9)

o “£

O-a

o -ft ˆ ＜N •’!’

Tjieo ftje

CO

< 0

(S es ftf

‘O •

»H ˆ tH ˆ

ˆ

ˆ ˆ4

9’ ˆ 9’

o o o

o

Oi

^ ^ O

0\ •

^ ^ ^

^ ^ ^

»H ^

^ •

^ ^ ^ ^ ^ ^

I ^ ^ ^ O’ ^ O’ O’ O’ O O’

o ^ ^ ^ ^ ^ ^ ^ ^ ^

CO

… . !

. <D 0)

-d

4)

•d

4)

<u

. , . . •

* bo bo

bO

bO

• u u

tH

Wl

….

-d y y

o

4)

< 4ˆ

… . ˆ …. tiO

§,fi B

B

B

o

… . (h

uXi ^

x >

• … a >

V ^ :3

0

3

a >

• . » . d

H CO CO

CO

CO

A

O

• • • -^

• • • - 2

CO

fO fO CO CO ^

n % ^

•b ^ ^

,::44

cs

<s

H

4

4

fs <s ˆ es

. .

CS CS <S CS <S CS ˆ ˆ *00 00ˆ

>s

(h

a>

-«->

<d

PQ

ˆ •

’2 S 2

S

o»ˆ

4) 2 cd

c/3 rt

ti ti l-i Vi

Ih

0 tJ 0 73 *0 < <« “3 a a a a aˆ ft

rOfCfOfO’O*** — -

li

•o

o,

•o -d <3f«<d

4* 4* 4< 4< ‘I ˆ.o 4* ˆ 4- <

- - - - -<SI .tKt

% S ft

ci4>ˆ4.4.”ˆ24.rJ9

O

r4 ˆ

Ih »-i ˆ

‘d’di

ftft’H.

4* 4 4 < j

ftft-ft**ˆ

‘t > ©

I

I cs

4 4 <

ft 7 < j

?4. < j

•^ft’ft

.U3

T’?’^

<

<

ft “

.

Vi Wi Vi Vi U I

’O’d ‘d’d’d-^ a C3.^ A ft ft ^ t < 5 fO ro fO ft

44 < 444”4’^oo

< i < j < 3

• < • < < 3

ft ft ft

ro ro <*>

I I I

«S <S <N

0

• ^ eg

-ft % •

^ ^ lo i/> U)

k ^ …

<s r«i fO

iO

^ ^ • CN ^ fO

»o

»o

00 00

io»o cs fO

00

Lot

lO 40

44,

%

•^^‘C’O’C’O’COiO’P’CO

III I iTi liTii

OOCNOOOOO«SCSOM7W70

0)

a ^

‘S Oi

*3 ^

c« **

lA M CO (0 (0 4> O 4> O 4)

a a a a a

jujuxtjaxi Vi Vl h h >-■ d 9 3 3 3 HHHHH

(0 (/] M

0, 0, 0,

COG

Wi Ih Ih

3 :3

HHH

o

•O

o

l-i

cd

a >

00

CO

a >

a

10

o

a

ˆ 5Po

Vi C Vi

3— 3

H H

CA CO CO

4> 4) 4>

c a a

ˆXiXi

l-t u l-l

:J o 3

HHH

0)

Ih

cd

a >

bo

w ??

O) 4)

G

COO 0.5

- -

^ b

HH

. *0 ••O’O’O

. 4).4 > 4 > 4 >

. u , u u u

. . cd.cdcdcd

. 4 > .V4)a)

W . bO 00 CO

COCOCOCOCOMCOCOCOCOCOCO

4)^4)4)4)Q4^4^4>^4}^

ccaaaaccccca

333030003030

M

o

w

CO

O -ft 00 lO Q

OOO

o

o

O es O O O

o

o

rt’C,

lib -ft o >o

o

o

B ^

ftJ’t’.OiOO’O

0\

eo

o*

y

C9 eN <S <S <S

ro f<J ts

ftie

OOO’tˆ-ˆOOOOOi tˆOCS’OOOPOOOi ˆ-■O‘0ftˆ•0’l0OOOO(

0000ˆ＜ˆU3’OOO«i3OOQ

Speed

on

trial

,

(o oo cs ‘^d’t^OOco i; .

. ^ ^ ^ ftH ^

<N CS CS <S <S

«22.0

«23.0

<21.0

o

CO

o

CO

CS

< 25.0 28.5 *30.0

* 32.0 31.0

ftj o ftt

tg’OOOAubi/bOOOOOO

c/^‘C’OcOCOi/70d’COO’d’dc

CSCNCNCSCSeSfOCNCSCNCSCS

c

4 >

a

4)

O

-52

Tons

19,250

19,900

22,500

23,000

22,940

27,500

28,000

25,000

27,500

25,750

.

18,800

26,350

28,500

26,500

41,200

OOOOOOOOOOOO

ubftl’OubO’^OububesO’Ub

to-j’exftsfti’ftg’ubt^es-ft-ftt’.

fOf^^vococ/>f<)cOco^^^

a

(0

Q

Mean

draft

jjOO’O’O’O

O’OO

A

‘O

‘OO’O

o o

so t*iOOˆ O O

A -ft so sO O to

. t > . 00

cs cs cs cs cs

00 00

<S CS CN

00

CN

00

fS

>C 00 00 <S CN CS

erj 00

cs <s

f^fOcococococ^^c/)^*^^

VH ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^

jO y

jjOO’OO’C

»

o,

ooo

oo

‘O’OO’OAOOOO O

OO

eg c y 5

PQ y

-j< lO e» A -ft ,—* W 00 00 00 Oe be

©1 es O

00 9i 9i

o

0\

00

00

O 00 o oooool

90

104

^^rftftOOˆd’d’ˆOOCSfOO

«•

JS

g-o o o o o

OOO

o

’o

OOOOOOOOOOOO

M

0

y

i-J

*-1

.oo > o > o»o -* O -ft Ub cs k, > 0 Ub to Ub Ub

es ub O to ts 00 ‘O’Oeo

009

580

Uboo

Ub O O Ub O O

750

810

ubioOOOOOOOubi/biO

OOOOnbtOtOroˆCSttbtStNftl’

rott,egi’ < tftti’«r”g’ftj’ftg’fti”ˆft|e

No.

of

ships

fO ^ ^

•4 *4

^ ^

CO

CO

etj

(N fo tH

C* C4

CStOs

■4fff5coˆrOfOOOˆCSˆOˆ

C4 M ˆ ˆ ˆ ˆ

(A

0.

(A M

w 2—

co ,,

ij

H

H

<

4)

0 « M g

8 8

.s§:iˆ ‘ˆ&-2 ˆ.s

w;5o3w

a >

0

•ail

< 30A

CO

CO

Cd

a >

-Q

cd

N » ˆ

w

o

lU

<u

o

o

eg

0

bo

<u

>

o

CO

cd

o

Oi

eg

-v >

o

H

(A

«

Cd

lA

»

a

o

Cd

H

H

<

m

eA

lA

eg

•d

o

eg

ˆ (A

2

4, eg

N “o

v <

& o Si S.2-2? izjijH

eA

(A

“y

O

ˆ >o

©•d

ˆ S

y O

eg

ftj

o

H

(A

ts

Cd

eA

P

a

o

H

s

o

eA

eA

eg

V* •

eg eA “o . 7) <A f/i e/i C eA 2

2 “ 2*^ u 5 2J3

o y 2 B’Si^

^ ^ O 0tO*O ^

S -H .S2 ^ r ^

-2 y V. 0^.5

0 P ‘5 y y o 5 bo y X 0 2 0 eg a c

n^.« Vi O 01

S‘P3.‘2’S d fi S‘;S.^<2J fc; P

^ y Vi 0 eg.b eg eg eg

m<mQopq<opQooQ

‘0,

eg

eA ‘o eA

eA u)

2 tA y j! yˆ eg

-

0 old 4) ydo: eg

0

1918 I 340

Raleigh class 10 . | 5 I 565 0 l 65 0 i 17.3 l 9,750 i ‘30.0 i 60,000 1 Turbines geared cruis-l 7-7.5’ i 8-3’, 4-3’ A. A. | 6 . i . I 480

751

lO

00

o

> o

cs cs

<■5

<

fO I <1

lO 00

‘ CN

•a

a>

u

cl

0ˆ

00

03

QJ

a

SP2

C u

3

H

oo

o’o*

Ov 0\

o >o

<S

fO ro

o o oo ■o

00* O’*

‘O

fS

cs (S

oo

»H 00

00 00

oo

t*) fO

fS ‘

cl

CO

;3 ,

o,

(1 >

00

a

(0

o ^ u

CS CS

*H cs CO fO

I I I I

ˆ CS tH ˆ

ˆ ˆ t Tt< ˆ

si 4ˆ 4ˆ

lO

<U 0) w «-l

cd cd

(D <D

bo bo

CO CO CO (O c; 03 03 03

C G a C

JD J3.Q JD

IH IH IH W

3 3 3 3

HHHH

o o o o o o o o o o o »/ >

O O «s

PO fO CS ■‘4’

o o o

Tj < 00 vO PO ^ ^

I I I o

O O O 00 O ^ cs ^ o po

VO O’ O O’

fS O’ ’-I po po cs po

ed

o

H

o

Ph

Ih

0)

3

(/} (U cd

3 „

4) u

ft >.+J cd o

>ai

d

Tf ‘O 00

O’ O’

O’ 1 O’ 1

ˆ 1/5 d-H

O’ O’

ud 0 0 >0

ˆ rjl ‘O

PO d PO d

000

‘O

ˆ 0 OvO

0000

0 10 0 0

PS -H 0 PS

f< > PO fO

O’

r# < f<5 ˆ iO

« e< ˆ

73

• • • •

• « • •

• • • •

• • • *

«

. • . •

u

Q

■9;

. •

U

ftl

•52 : :

* cd • .

<

CO f/*

2 52 •

•3

.2 ＋J cd -•

tJ

M

4* “S “o !2

<d

■u

o

H

•o

3

cd

cd

3

‘3

m

tn

<u

‘d

“o

3

tn

03

cd

. lU e ˆ .3 cd a o t” ft h

43 43

3j3

cd^^

td

A 43

Qd)

v» 3

“o

3

•d

43

Cd .

a

.3 3

to d

W’-a

o

CO ^

M i

3 t-T

O 43

d 5

03 o

Qd

Pi Cd

55 ‘3d

fe ˆ

ˆ CO C) CO

03

4-a

03

*“d

ft 3 O

52 a cdO ‘o2

03

n “ O c

“is > ˆ

3

Is

S3—

w

d

cd 43

w 43

*3 3

0.2

CO & 43 Cd

73 *

a

Ih

03

CO

- ^4

. 3

ft ti

s ˆ

“x:

43 00

ft33

43

ˆ £?

<2 2

c::’

43

>

oo

3 ˆ

4,) Cd

q.2

cd

o

PQ

O

O’

a

o

S5

i-(

CO

Q

W

Z

O

C/3

Q

o

Q

W

H

.J

ft

3

o

o

cn

U

z

I— I

ft

<!

a

n

&

CO

M

73

l-H

H

1^

ft

PQ

ft

o

73

ft

«J

P)

u

l-H

H

ft

Ph

0000

PSH*

tn

‘O

OO

•O’ I

•

ˆuauiaˆduioO

PSPSPO

PS ‘I’

10

PD

‘OPS

• dH 1

•

VO

‘O

00 00

•91’ ID

82

dˆ dˆ ˆ

dH

H ˆ

H dH

1 1 O’

O’ 1

O’

0

O’ (O’

1 1

0 43

CS 10 ˆ

ˆ 10

dH

dH

H pH

CS

H ˆ

ˆ Od

O’ O’

O’

O’ O’

tH dH

H dH

0

cs % -2

ft

ft

ft ft

d 03

00 00 C3fc

dH 00

00

00

00 00

»H d-H cd ˆ CN wH

H H

ftX3

Wi 3

0 2

1

＞OPOoo 1

-H

4”i

1

00

vi

•‘i

•g

1 1

CS cs

H

4.

.Tt

ft

$>>1$

,

tH

03

cd d’*-!

•

< :

<1

<: :

:<i

4J

4ˆ

Cd

d 2 2

ˆ cd vh

Od y

43 C cd

: :ft < < :

: :ps < iˆ :

• • 1 1 •

PD

1

<i :

ft

PD •

1 •

‘ <

•ft

•PD • 1

C/3 tfl

dH •

*dH

Ih

Ih

3

•

•

0

ft 0

• •

ft

ft ft

PS ft ft

• •

PO •(* >

1 • 1

:t

•91’

1

fO Tf ^ fO ^

1 1 1

• •

^ ^

• ^

dH

d

• • •

; •

•

•

• •

• ;

X ^

^ bO

000

cJ «•

0

0

0 0

0 6

c

“I

03 03 03

03 03

03

03

03 03

03 03

03

.s

www

ww

w

w

ww

ww

id

03

0

• • _ *

n «H

:a

cd

1

w

Diese

Diese

Diese

Diese

Diese

Gear.

Turl

Diese

Elec.

Diese

Diese

Semi—

Dies

Diese

Diese

*0 bo

QOO

0 0

0

0

• 0

• 0

1-1

CS 0

0

0

■ 0

• 00

03

^ Ih

00 00

PP5 •91’

•’!’

0

•0

&

73 2

0

8

• ^

•

ft

03

Ih

0)

0

000

00

0

0

• 0

00

0

000

000

0

0

.10

0 ‘O

a

‘O O’ 0

Tf ‘O

CJ

•91’

•CS

Ovtˆ

3

dH ˆ

PPJ*

0

PS

73

d

«o

X ˆ

Xi bO

0 «

»OiO

lo

lOlO*

^8

S 0 OOO

©O’

O’

d

O’ >0

oo‘ od

•-H r-{

dH

03

03

ft

03

03

73

lO >0

•

10

Cd

g UO tJ« Tl <

pp > 0’

Tl’

ID 0

PDPD

Ih

PS

dH H

3

73

d

to 1/) 10

00

0

0

00

00

4< >

1 03

S 0 PS Pˆ

0 PS

10

ID 0

‘O 0

a

X bO

0 00 70 O’

lid «

‘O

0

O’ CD

it ID

03

s

3 Ih

73 «

h

CS

H

03

P

0

cd

03

0

cd

’ft

. PS PO 0

0 0

0

0

00

•0

2 >0 10 0

Tl< \0

00

O’

0 CS

• •91’

s 0 PO t>.

•^f PS

00

00

‘O 91’

•PD

Q

1

73

JJ-VO 0”0

0\0

0

O’

00

•‘O

03 P’S

IS’O

PS 0 PO

ID tJ’

＞0

PD

0 PS

•O’

VH hH dH

vH

ˆ H

tf’OO

0

VO

•o

00

PDO

d

cd

*-9 >0

O’

03

Ih

PS ‘O PS

ID PD

‘O

PD

$0 > D$

VO

«

fed <s ˆ cs

ˆ CS

CS

CS

CS ^

dH H

XI

•OOO

00

0

0

00

‘O O’

“& 43:i

•—1

3 > cd

ˆ ˆ »«d

ˆ ir >

00

00

0\

(V 0

00 to 00

CO

PD

0 ‘O

‘* •9}’

I-)

ft ^ ^ -.4

^ cs

PD

CS

cs H

H H

0 CO

10 ^

CS

to

dH

< 0

•91’ PS

ˆH

•9ˆ •91’

cs

J3:j.si33J

CS CO ‘O cs

32

CO

dH

37

ˆ CS

dH

• •

Ov

CS

:).uas3jd uq

•

• •

J3ˆSI33J

. rj’

VO

«‹

35

• •

‘I’ PD

uiojj paAouia-g

•

• ’•

j^uns JO :;soq

• Tt <

cs •

fO

PD

; •

• dH

40

…

. •

•

.

73

rS, “

5 ˆ

w’wcD

w

••*

W

> >

1/3 to c/3

c/3 C/3

t/3

C/3

CA C/3

CA CA

73 «

CO CO c/i

C/3 (/3

C/3

CO

CO CA

(A CA

<

cd cd cd

cd cd

Cd

cd

cd cd

cd cd

s

QUO

DO

0

0

do

Particulars uncertain. ‘ Six H-boats presented to Chile and two to Canada. * J class presented to Australia. • Many variations in L type. ‘ Submarine monitors.

* Submarine destroyers. • W class presented to Italy during war.

o

o^

u

u

HH

C/2

Q

U

o

1—1

Crt

U

Q

pij

o

w

a ˆ

e

w

PQ

<

H

w

ij

Cu,

S

o

O

c/2

p:i

W

> <

o

oi

H

c/2

u

Q

»

c/2

i-«

H

2

m

to

o

c/2

to

<5

P

o

H

to

<

Ph

<u

‘o.‘g

a §

o S

O

0) <1>

o

Co a

c g

J O

1-1 o

(O

CSOOOOvOfN^N

(S O

o

1ˆ

0\

t > *OO00tˆtˆ0000

O .-1

< N

1

tH •h

cs

•rH ro Tt

00

1916

917

00

c

1

o

1 1 1 1 1

2

• ˆ

< > v

O’ O’ Oˆ O ˆ ˆ

tH

PQ

>»

Wi

0)

＞4ˆ

•4-＞

0)

i-Ss

nil

ca ‘d’O

(3

o

o

<u

CO

S’?

-»- >

a

cd

<N

cs cs

. ‘t ■‘t

Tjc Tdt

r)i

‘O

U

*0

Q <

u

• •

« • • •

• • V4 tH W

<

cs

P <

• • T?

• ■ a a o. a

‘d < !

0 < ˆ

<

< 3

1

CO

IN

• • CS N CN ＜S

1 1 1 i

＜S CO

1 1

CO

CO

1-1

O

1

cs

• • ˆ vH ˆ

1

1

CS

c

‘S

Q >

a 2

I ^‘swas

u

O

cs ciaJa CO cJ2cJ, (J) Jj lO

rf

4< 4.

!>«

Tj<

4.

UCOMtacAMVlC/] (/](/) U) c/3

02 (U 0) U (13 <u 42 (U,rl V v-rt ˆt1 “’•rl

.a.a.a.a.a.E.a.a «.a.a «.a «.E «

=l33=l3)333S)33g)3S)3S)

HHHHHHHH “hH H H

(/)

o

C

0 000000000

o

o

0 000000000

o o

o

o

lo ˆloioioioooouooo

o o

o

o

bb

o

C

o

T-t 1-H -.-H cs es cs N cs cs cs

CN fS

CO

cs

Data given for type ship. * About 100 ships of various classes not completed April, 1919.

TABLE III

Particulars of French Ships Completed or Designed Since 1910

753

Com¬

plement

690

998

1,167

1,204

‘ «

738

‘O’OO’OOCOOOOO

1 *d

Ov

tH vH

hH CO lO’O

OOh-hh-h 1 CS I 1

G H*J

^ <-H -*-H <D

O 0)

O’ O’ O’ 1^

o

OnOnOn^^On^^

-1 n — 1 CJ

c

3

rt

J ■

u

0)

4-»

o

*0 {/) (X) 0)

ax)

in 3

S_^ ^ 8’c-s

4} 2 t’l CO ^

o;

to

u

<D

S

3

(/)

fS

nd

0)

to

u

<D

a

3

ui

13 T) 0) (U &0 CiO 1-. l-i

O) <u

a a

3 3

Ul Ui

rr o

t-c , .

13 1-1 1-, iH

ai3 5: 13 5 6 13

ˆ 0,10 0.10 lo Q,

»-i to lo ˆ lO lo <o

‘i 00 (N 41 <N 4 4

ˆ tN CM cs

13

(U

60

li

<u

a

3

(A

CN

: : : : ;

U U U ^

OiQiQi O’ On O’

4< 4<

u u u ‘d xJ ‘d

Q* p4 Q« O’ O’ O’

444

hJI h:}<

. Wi (-1 .

fTl CO

jh *d ˆd ’d

CIS

CS

. CS

13 Q, Q, 0.13 5 6 5

ˆ O’ vH

1 1 1

1 1

*ˆiO 1/) to • • •

CS CS

O CN

OnCSCSCSOnCOCOCO

tH

4

1 1 > 1 I 1 1 1

^^CSCSOCSCSCS

ifH

> >

u

t/i

t/5

Oi 0)

0,

o

0

0

0 0

ai (1) fli fl) (13 <u (D 0)

3 0)

_a

_a

q c

1

, caccaccc

_S

3

3

33

CO

33333333

o rv

Lh

tH

(h U

♦

u\ˆuuuuyˆu

cfl

3

3

3 3

t

33333333

H

H

HH

0

>

HHE-‘HHa-‘E-‘d’

I-. ˆ

Sag

12 -a

o

o

o o

CO

OOOOOOOO

!

O

(/3

Ih

o

o

o

o o

o

OOOOOOOO

lo

CS

o

00

O 00

ClHt

00

oT

O-HfOlOlOnHOO

Ov-cfcocot.HiJ’iOO

W g

CS

CS

CS CO

CO

^^^^

00

o

O CO

o

O’ CO to

•

•

CO(3\CO,^»0000

■S O’

CS

d h-h

CO

55 C.2

CS

CS CS

CS

0ˆtO»ˆ00ˆ»ˆˆ

CO

«4

C4

cococococscococo

1

0)

u ˆ

G G

o

o

CNOO-cJHioOOO

O’

‘O

to

o

OvCNO’ONriOOOoO

s’”

Tt <

ˆ CS

HtoocˆoOHiftˆoooo

0. y

[2 00

CO

CO lO

■Cl < *

2 B

hi

CS

CS CS

Q

s®

o

O CO

‘O

oo o ooo

C 4J

cci’tJ

. hS a

1ˆ13

1, If to

a

O 00

ooaodooo

•

It, CN

CS

CS CS

CS

^ ^ ^ ^

s®

‘O

‘O VO

CO

0

0

4ˆ

13

Cˆ

0

CO 0\t.’ ‘O o.

u

CQ

r”**

00

00 00

o

-hiOiJ’OOh-hiO’O’O

fc, 00

00

00 00

CSCSCSCSCSCSvNCS

43

4ˆ

In.

0

o

o o

o

c.

0

0

0

0

to

Tf Ht <5 tJ’

0

‘O

‘O Ov

CSNCfˆcOˆHtOCSˆ

HI 00

-t

rf

CS

CSTt < fOtOCStOtˆtˆ

b, •’! <

lO

lO IT)

lo

cscscscscscscscs

C/J

‘O

CO >0

00

CS

CS

fo^^^cstotoco

O’*-, w

a: °’.S

M

CS

(A

w

0,

x

(/)

u

hJ

H

H

<

m

tn

CD

lU

o

O

13

C

o

o

w

UJ

rt

r~ <

o

ti

a

CQ

U)

■i (/)

d ˆ

0.2J

D X)

S) §

ˆ rt

ci

•«- >

o

H

o

C • ^

3

O

T)

li

C3

60

13

w

(fl

■tJ

o

H

(/)

Ph

u

>•

o

pH

H

(/)

u

Q

(A

(A

CIS

(A <2 CO

55 0)

CA 3. ”’

nS o

’ Vi Vi

‘ 4ˆ ˆ c3

rtwrJGCviSgG

J3 CIS o.a « 0.2 q

oopQOKmwoˆ

o

H

5

oS

Q

t’

VOL. 28 — 48

given for type ship. * Not completed. * Estimated. • One of class sunk.

TABLE IV

Particulars of Italian Ships Completed or Designed Since 1910

Data given for type ship. * Three ships of these two classes have been dismantled; the remaining ship, the Caracciolo is being finished as a battle cruiser. *Estimated.* Marco has turbines. ˆ One lost. ® Three lost.

TABLE V

Particulars of Japanese Ships Completed or Designed Since 1910

Com¬

plement

940

940

1,000

1,243

!

o

o

o

845

413

138

92

109

145

61

Data given for type ship. Speed and horsepower estimated. i Particulars uncertain. * Building. • Hyuga and Ise slightly larger and have 600 tons more displacement;

have 20-5.5” guns instead of 16-6”. * Two additional proposed. ‘ One lost. * Ikoma and Tsukaba, slightly smaller completed before 1910. ’ Dimensions vary somewhat in

different groups of class.

Com¬

pleted

1910

1911

1912

1915-18

Launched

1919

1913-15

5

c

o

4

s

>

s

4

1912

1909-15

1912-14

1918

1918

Building

Battery

Torpedo

tubes

5 submerged

5 submerged

5 submerged

6 submerged

1

8 submerged

3 submerged

3 submerged

3 or 4

4

6

6

2

Secondary and anti¬ aircraft

‘d j •

* ft * ft < •

ˆ O ˆ o •

‘ A 1 1 1 i >

CN 00 00 O 00 ˆ6 ˆ

16-6”

8-12 pdr.

4

4

4

4

4.

5-3”

4-12 pdr.

Main

^ ^ ^ ^ ^ «

^ O cs o <N vO

^ ^

_L > _L 1 * I *

^ ^ CN <S 00

Jo

ˆ 00 4.0ˆ

1

00

2-4.7”

1-4.7”

3-4.7”

4-4.7”

6-12 pdr.

type

Vert. 3 exp.

Turbines

Turbines

Turbines

Turbines

geared

Turbines

Turbines

Turbines

Turbines

Vert. 3 exp.

Turbines

Turbines

Horse¬

power

main

engines

18,507

24,000

25,000

45,000

78,000

27,000

22,500

9,500

to 27,000

19,500

16,000

28,000

6,000

Speed

on

trial

Knots

18.95

20.0

20.5

22.5

27.5

21

26

31.5

34

30

31.5

34

29

Displace¬

ment

Tons

19,350

19.800

20.800

30,600

32,000

27,500

14,600

4,950

1150-1227

665

835

1,300

374

Mean

draft

ˆ o O O O

;

OO •

CN <S CS

27 6

26 8

16 6

O -H ©.VO o

0\ Ov o

Breadth

O >0 o o

■“I I

•U ro PO

ft, 00 OO 00 oˆ

92 0

75 6

46 6

a o Tt<o o

to

fS «S CS CN

Length

between

perpen¬

diculars

Ft. In.

450 0

460 0

500 0

630 0

Overall

704 0

Between perpen¬ diculars

450 6

440 0

310 0

260 0

260 0

320 0

220.3

No.

of

ships

1

1

2

*4

* 2

05

es

<S ˆ fS cs

ˆ €S ˆ

53

Battleships

Satsuma .

Aki .

Settsu .

Fuse class 1 .

Mutsu class * .

Total .

Battle Cruisers Kongo class .

Total .

Armored Cruisers

Ibuki r1a. < 5s* .

Total .

Light Cruisers Hirado class .

Total .

Destroyers

Umikaze class .

Kaba class ˆ .

Momo class ˆ .

Tanikase class ” .

Kikutsuki and Minatsuki <*f old Hatsushima class

T otal .

TABLE VI

Particulars of Russian Ships Completed or Designed Since 1910

WARSHIPS

0

CO

»o

CS

CO

cs 0 0

0

to

<s

to

1*^

cl S’ S’

•H

a P

Ot

Ot

«s

10

^ ^ ^

0 a

0.5i

ft

•a

Qj

»o

“0

(U

‘S X

44

0)

Xo

‘S‘^

0

^ T*

vH ^

ft

a

0

^4

Ov

ft

4’

ft

4 <

•H

a

9’-‘

a®’

3 r-t

rt

c ˆ

§2

cd”ˆ’

ft

d ˆ d ˆ

cs

ft ft 0

1—1 ˆ 1ˆ

ft

4<

Ov

0

0

CS

U

rt

n

o

TJ la (U u

h””

<u

bO

Vh

(U

6

3

ui

•3

0)

bO

ki

(U

a

3

(O

$< s$

0)

u

a >

a

Xi

3

’TJ

a >

00

Wi

a >

a

3

(A

0)

U)

0)

a

XI

3

(A

0)

bo

Vh

0)

a

■3

(0

SO

o

bo

0)

a

XI

3

cs

t3

o

bo

u

o

a

X

3

v

.2*

‘C

^ ^ ‘ ■«- >

rf 10 10 f(5

c c c

>s

u

cS

‘C’O

c c

O c4 u

0)

W

%

‘OfOˆ I

(S ‘

u

ft

» t S <3<

ˆ »0 i-H

I 4. cl.

0» 10 <S >0 Tf

00 4*i4<

ˆ CS

Tl 10 to cs

4*4ˆ

cs

w. u •TZJ’d Pi Q4

ˆ VO

Sa

ft ft

4.4.

<3

<3

k3

T!

ft

CS

I

<3

<3

•a

ft

CS

I

a

■3

*; % fc

(St CS 00 CS

1 00 <

fc

cs cs

4.^^4.cl, 4. cl,

ft

ft ft 00 >0 I I fO cs

10

4>

» t t

S< ‘t I I I S’ CCJ CO

•‘t

I

CO

•S 4)

-s bg;

OJ 4 > ˆ

CO

o

c

« <U ˆ

ˆ H

M

o

a

- *4

X

.-•

3

H

to

a >

a

< ^

Wi

3

H

to

lU

a

Wi

3

H

CO

4-> ft CJ 4> >

CO

C

Vi

3

H

CO to CO CO

U (U <u <u

C C 3 3

• «4 • ^ • *4 • ^

XXX X

Vi ki Vi

3 3 3 3

HHH H

0

0

0

0

p

p

p

p

POP

p

0

0

0

0

p

p

p

p

POP

p

a s>.a <s

‘O

0

0

10

p

to

p

00 to to

p

KaEg >

0*

CS

ft*

00*

>0*

p*

cs to to

p*

S’

CS

cs

•o

to

S’ CN (N

CO

0

0

0

0

p

to

p

to

COP P

435

^ r < ^

S.o-2

•h’d

06

CO

‘O

ft

X S’ S’

CS

CS

CS

CS

CS

CS

CO CO CO

CO

C/3 4J

.

CO

0

p

p

p

p

to

p

CO

0

S’

0

0

0

»o

0

0

to

0

00

P P oL CO

ip

S »

P 1-1 00 C5 P to

O-a

c?

CO*

CS

CS

to*

cs »-4 0 CO cs CO

.2 a

ri ˆ

ˆ4

CS

CS

CS

CO

Q

♦■4 ^4 ^4

s°

0

CO

> 0

ft

CO

‘OftP

ft

s-s

r > *

ft

00

00

^^^

Ov

li, CS

CS

CS

CS

CS

CS

CS

vH

•d

4ˆ

K®

0

0

‘O

p

CO

to

S’

S’tox

p

•o

0

Wi

>*■ S’

0

ft

to

00

p

m p ft

p

PQ

ftiC-.

00

00

00

ft

ft

to

to

CO CO cs

CO

•a: = 3

S®

0

0

CO

p

0

p

p

P‘0 00

ft

r o>

H >

- t>*

0

Tt*

00

ft

CO

i-J 0

0

ft

ft

cs

4:

p

CO CN P

s-/

S’

»o

»o

to

to

CO CO CO

CO

No.

of

hips

CS

CS

S’

S’

00

00

ˆ to CN

30

00

CO

(0

(A

b.

M

H

H

•<

PQ

c4

(3

<d

-*->

to

>

to

to

ccl

>.

3

3

«]

>

s

o

>

u

4)

ft

•o

3

<

to

CO

Cl)

g,

§

o

Wi

o

4ˆ

CQ

Ih

0)

Oi

a

4) HH

ˆ Vi 4 > CC)TJ >t3

•o ««

>

o

u

K

4)

c4

rt

id

o

a

4 >

Q

cd

o

H

UI

O to to W cd

Pi

H O

< 3

o

Wi

o

m

o

H

cd

-«- >

o

H

Cfl”

«-.*

« « O bo

ˆ (U

H-C

BO

O

ˆ 2 • p4

a

•o

<

V)

»

(d >

O

3

H , w to

to to rt w ˆ

0)

iS

o

H

o.B

9

＞^3 O 1°8’ lcB＜S

_cd

“o

>

o

•d

4 >

t >

o

Ih

ft

a

o

H

Data given for type ship. * Building. *Estimated.* Slight differences in dimensions of vessels of above class. * Black Sea fleet. * Slight differences in particulars.

TABLE VII

Particulars of Austrian Ships Completed or Designed Since 1910

757

- d

ii

o,

- o o

O

ˆ 00 o

o

fN

O’©

t ‘d O 4 >

o-a.

o

•H

Wi

4->

a

PQ

o

•o «

&•§

o

H

•d

V

00

a

d

(0

T3

u

00

a

J3

d

w

d Jj

o c d 4) g ca

CO “

a

‘3

0)

d a >

‘IS

< 0

i|.es

‘oi’s

ip-Sg

•d ˆ d

ao h

CO

I

y

J2 d &d

.2 s

Q

_!3 ˆ

• «s . CS fO ˆ lO

M ot)

CS 1-H ˆ

o

♦H

<s

OvOv

<s cs

Ih

T3 U Oa’d

Oa CS ˆ a-H CO

4..i

%

<S • CS ˆ O’ ˆ

4.01

k

fO

I

t-»

. <0

K.a

ˆ CO t3 4) ˆ d

> H

VO O

o «o

«S CM

vO »o

0 ® s

U-

. ^

xt . © ^

^ cs

O)

0)

d

XI

t-i

d

H

•d

a

k CM

I I

CS T-«

M

4 >

d

• ^

W

d

H

o

o

o

00

00

0^0

VO

CS

f*) O »0 C»5

o

o

>0

CO

t-»

00 Ov t’* CO

Mean

draft

Ft. In.

26 6

27 0

15 6

00

00 00

•

•4-»

‘d

In.

6

6

0

VO CCJ

4)

0 Ov

r^i

100

PQ

b, w 00

rj <

bo

In.

9

0

0

0 00

d

a >

. 0 »c

lOO

10 0

VC ^

t, -i’ ‘i’

CS «s

No.

of

ships

CC

‘t kf

00

CA

cu

x

(/)

td

H

H

<

PQ

•d

d

rt

.d

Ih

s

d

rt

u

a.

00

S

« S

J3 d

H

ca

d

V

00

d

W

s

d

C

ai

o

H

!/)

d

« O

O c

O S

M O’ Wco

CLa

§2

•d

<

ca

■*■ >

o

H

(/)

»

H >

O d

d

«;5

＜a 2

ˆ ca

•fJ Cl

ca «a H＞

ca

■kj

o

H

d

d

CO

C/l

CO

ca

I

V)

o

g

»4

o

d

4 >

>

‘S)

ca

Q

TABLE VIII

Particulars of German Ships Completed or Designed Since 1910

to

o

o

o

f'l 00

d fo td fs o o

.. ‘O

o

CS

o

o

O 00

s §

o

CS

d

C

v-4

fo t#! fO fd 1/1 d*

o B

4-4

US

o,

o

CS

o

CM

CO

O H” d* X X

. .

^ ^ ^ ^4 ^ vH

o <u

o.

©

0\

o >

©

d

d

d

d

d

9ˆ

03.

tH

4H

^ ^ ^ ^ ^

T)

TJ

*rt

•d

•d

Tl

TJ

•d

‘d’d’d ‘d

0)

a;

0)

0)

o

0)

0/

03

0

03

<U 4) <u <l>

bo

bfi

00

w

bo

bo

bo bo

bo bo

bo bo bo bo

V V

0.-Q

tv :3

Ih

Ih

Ih

Ih

Ih

Ih

Ih

Ih

IH

Ih

W Ih Ih Ih

a

a

<D

a

03

a

<1>

a

03

a

03

a

0)

a

03

a

03

a

03 0) 0) 03

a a a a

o

.O

XXX X

H

3

3

3

3

3

3

3

3

=

3

3 3 3 3

1/3

U)

CO

C/3

t/i

C/)

C/3

C^

CA

t/l to Ul C/l

>0

<0

lo

lo

H*

H’

lo

X

<S CS fS lO d* <N

>s

U

a >

^ 1

4J

C rt

A.A.

A.A.

A.A.

<jj < <i <j <lj «li

4ˆ

C S

^ ^

» ^ &

i

« « « k. « «

Cl]

0*rt Ih

4) 2

CO ˆ

d’tdˆd’ˆd’tdˆ

Tj< H< H< tJI Tf tJi

m

lococococococoiococococo

fo ro fO ro

1 1

4.r!.

4* 4^ o 4*

<^4.

III!

CM CM CM fS

00 ot

1 1 1 1 1 1

(S CS cs (S fO <S|

« •

% ^ ^ ^

fS

CN

CO

CM

lO

O* Ov O’ O’ Ov Ov

1

1

1

1

ˆH

1

1

1

1

1

1

U-, lo »0 VJ »0 ID

c

CS

o

o

00

00

o

o

OC

X

A t— 00 1— 4*

• ˆ cd

＞%

Ih

d

cS.

c/3

cn

C/3

c/3

C/3

c/3 C/) C/)*C/3 c/3 c/3

0)

w

o;

o

03

03

03

03

Qi

03

03 03 03 03 0 > 03

C (U

3

3

3

3

3

3

3

3

c a 3 3 C 3

s

XXXXXX

o rv

•

Ih

Ih

U

Ih

Ih

Ih

Ih

Ih

ˆ V4 Ih Wt Ih Ih

cfl

3

3

3

3

3

3

3

3

3 3 3 3 3 3

s

0)

>

a;

>

H

H

H

H

H

H

H

1 “

©

o

o

o

o

o

CM

00

o

O (S o o o o

Tj* rt o O O O

o

o

o

o

o

00

CO

o

o 1 g’Sb

00

to

lO

\r)

o

▼H

o

X

00

oT

XT)

oT

o

ro O tt O O

-H PO X r~ lO X

IS§.Hg

CS

lO

00

00

00

rO fO <S (S tt tj<

**

M ‘

«o

«••••••••

f<3

X)

lO

-Hoo

,

U)

o

o

CM

o

o

O ts lo to X O

•

pee

on

ria

CS

00

d

00

00

00 P-00 H*

•

V rsi

CS

cs

(M

<S

CS

CM

CM

CM

CM

CM CM CM CM CM CO

•

CO

M

••

m

•O M M M

•

FS!

*

1

0)

o

o

o

o

o

o

o

o

o

o

O O fS o o o

,

,,©

©

o

o

o

o

00 00 tt P4 o o

•

o 4- >

S’®.

fO o

CM

o

<s Tt 00 fO «s O

L 00

00

d*

CM

it

X

tt tt H* tt Tt tt

.

S B

hi ˆ

CS

fS

CN

CS

CM

CM

CM

CM

Q

•

S’®

o

CO

o

o

o

fO

o

X d O X O X

« 2

‘O

00

X X d X X

tt, <N

cs

(N

CS

<N

CM

CM

CM

CM

ˆH ˆ ˆ ˆ v4

4ˆ

PO

o >

d.

CO

d

CO

o

0X0000

T)

c4

V

00

o

d

>0

CO

CO

X <tl X X t/b tt

CQ

k, 00

o

a

CN

d

00

d

d

d

d

it it it it ˆ it

J3

8®

fO

to

CO

CO

d

CO

CO

o

o

O fd o o o o

4ˆ

c

‘O

CO

CO

CM

o

VO

d

XT)

ts X X o o

CN

lO

00

o it *0 it CO CO

k-)

lo

lo

X

tt tt tt Tt tt tt

«4

C4

04

C4 ^ ^ ^

No.

of

ships

1

lo

CM

CO

CO

o

cs cs rd tH o tN

o

CN

oe

0»

o

•* ^

CM

(/)

• •

• •

• •

P4

•

S •

X

1/5

w

ij

40*

(/)

U)

0)

o

U9

a

ˆH

o

• •

U

(/)

NH

D

3

o

le

c:

t0

c/

C/l

c

t/i

t/i

s

b3 »•*••• •

B ; : : ;

Q t/3 c8 c/3 * 03 c/3

cn oj CA • 03 CA

H uj

H M

•< s

PQ o

•d

3

cd

ˆH

(/)

” 01

0) OT

to cd

42 T)

CJ

*c3

u

u

H

H

<

c

03

H

Ih

C/3

C/3

73 •

M

bo ˆ

u Ui

i s

03

4J

tHJ3T;j2 ■ d rt

X 00® •’® ®

r-H

c«

4ˆ

3

3

o

PQ

03

03 ˆ

c

o

iJ 3x 01 4) 3

o

‘Z

‘C

4ˆ

W3

O

(U

(/)

s

M

OO Ih

« ai

C ^

•o cd

M PQ

H

TP

3

O

>

4-

*0

IS

•X

•d

>.

cn

03

*0 MH

C 03

S (5

H

Augsb Strassl Graud Pillau , Niimb Brumi

H

Data given for type ship. i Two of class not completed, other two interned Scapa Flow, one sunk. *Length on water line.* • *Estimated.* Length between perpendiculars *Scuttled by crew at Scapa Flow. « Surrendered.* ˆ *Dismantled in Germany.* ® *One of class transferred to Turkey, Moltke scuttled at Scapa Flow. » One of class not com¬ pleted, other two scuttled at Scapa Flow. Not completed. “ Mining Cruiser. Four of class not completed, rest scuttled at Scapa Flow. i* Frankfurt included, scuttled at

Scapa Flow.

TABLE VIII — Concluded

Particulars of German Ships Completed or Designed Since 1910 — Concluded

759

I G

a s o a

OiJ

fOQ O O ‘O

Ov

>s

kl

<U

c9

m

o

T3 ui

0) 4 >

O 4-»

H

a

1 °

’O 0 2

c |3

O r* !2 0) 3 Cl CO ^

a

rt

^ ^ % ^ ^

fo’

* » _L

CS fO ˆ

＞.

t-l

a＞

G a＞ *G Q*

•g S

M (/) 03

03 ＜13 4)

G G G

IS IS 2

U Wi w*

G G G

HHH

1 I g’Ss

!o.S§

o o o o o o

*r > fO

•-H (S

*d

4 >

4 >

S—

o*

O Ih

tn

«4- >

< o »0 2 < S

fO

ag

.2 a

p

ooo , rˆO© i2 lo 00 fo

I

G

rt*tj 0) G

o © o

oo

•o

rt

Ih

m

ooo

•>» >o CN It, cs es po

X!

♦J

(30

c

0)

p

lOOO

. P‘30 00 ••^ P‘3 <s te, <s PS PO

O’

O’

CO

a

CO

P‘3 O PO PO

»H PN

Q.

CN 00

•

O’ ^

a

tH sO •

O 93

•«-t VC O’ •

^‘S.

^ ^ • 9^ ^ •

CO

■Ct

a

cc

. -CJ

ti CO

O O

••H \0 O O’ ^ fO ^

■o

■o

(/)

PS

u

jo

e

Q.

CO

<u

a

>»

O CO O 3 »-i O

ftg’l >>mS

o

H

T)

CO

G

G

G

G

JO

•o

0)

o

<1>

o

Ih

a

*T3

03

G

(A

CA

Ih

03

•G

o

lo

G

<

&

03

>.

X

•o

03

8

(A

03

Ih

03

&

&

CQ

O.

S

CO

•o

o

e

03

03

＞s

o

Wi

C0

a

- WH

K

o

w

a

Q.

rt

(A

03

Ih

i

03

＞s

o

CA

03

•d

Ih

o

4ˆ

cO

Q

03

&

o

a

03

(A

Ih

o

w

•o

03

03

a

CO

a

03

a

03

o

rt

“0.

CO

5

0”S

°a

u

•o

o >

o

C

3

c«

P

fs

w >

03

-*- >

c«

cq

I ˆ Ih’O O 03’

(r > ft.

03

B

•fl C

U 3

a

s

B

- fH

cO

03

Q*

> >

Ih

03

G

03

o

ecJ

V

3

CO

•d i ‘w XI bo 3 ‘-‘ CO «

a

03

o

cfl

V

3

CO

I

XI

3

CO

•d

03

bfi

tH

03

a

03

o

CCJ

V

3

CO

C

ccj’ti

03 d

. < ’d

•d

Cfl

03

PQ

pxppjoO’O’OO’O

•-cPSPOPOPOPO’^Tf

o

CO

OcOCOlO

‘OX’O’O

PS •>0”ti0>0 ‘O VO 00

^ ^ tH ^ ^

VO 00 ^ O’d’voO’

O ^ ^ ^ ^ ‘ •H ^ ^

V I 11^1

2 2 22®2’^^‘i”^ V3 covi^pi.

^ ^ ^ ^

rn.

^ « t>*

Ov

^ ^

•ri) ^ cs fo 4’ 4* 4^ 4< ‘4< ‘i of^ oL

^ c^c^cscs

to

lO lO to t/o to tr> CO ir> ˆ lo ˆ cs ˆ dv dv to

lOfc

^^fOfOcoCSf0^tOtO < StOtotOtO»^

I 1 i I i ^ I I I t I I I I t I

‘d

JL 43

X (30

3 lx

d

d d d y 43 d 43 C3

d

d d d d

c;

93 43 43 43 43 43 43 43

a;

<i> a> a> o

CO 2

a

W

3

wSwwwwSw

3

3333

_ Q > ˆa)aˆa)030)03

s;.(a > .(A(A(A(acaca(aca(a ??rtoG0303030303030303

- “qqqqqqpq

03 03 03 a3 0)

CA CA CA (A CA

03 0) 03 ˆ 03

P QQQQ

O O OOQOOOPO

•Cf PS PSOOOOOOO

PS PO PO «0 lo >0 oo 0\ O’ O

o oooo o oooo

PS •‘t vO O O

xH ,1 *H xH PS

o

o

OOOOOOOO

o

0000

o

o

oooooooo

5

0000

o

OO’CSPOtˆOOOcO

ˆ ˆ ˆ CS

to

cs

O ˆ CSO

fO ˆ to

Co O’

Si*

o

O’ O’ O’ O’ O O’ PS PS PS P‘3 PO ˆ « CO

t, PS

o’ˆ

8

PS PO ˆ wb 00 oo 00 00

O’ O ˆ PS ˆ PS PS

lo U3

O’OˆPSPSPOˆCO

IT) \r>

t” PS “ct Pˆ

>0 >0

5!®’

fe.

PStˆO’»- < 0‘0-HPS

T-I»-Iˆ PS»-IPSPSPS

to

PS

O’cl’OOO P‘3 P‘3 rf P‘3

Sub-j merged

Tons

236

280

OOtoOOQOO

OtOtˆtOtOOtOCN

foto’Otˆood’O*-‘

1,200

toooo o o

^ Tf

»H ^ ^ CN

0)

o

OOOOOOOO

o

O to O to

u

2 O’

cs

•Pl<l0t/3‘01000‘0

o px O CO

G

cs

ps”l’to‘0‘0r～oooo

O’

＜S cˆ fO O’

“C

o

* •> m «

G

^^^

tn

Length

r

Feet

128

130

PSOOOOOOO

pc’oooopspsp‘3’a’

X-IXX-IPSPSPSPSPS

250

‘O O to o

O’ PO O’ 00

PS P‘3 PS P‘3

. ˆ

PSTl’OO’tOOPSPSOO

00

ˆ t>.

cs

OcXX.Ot

^ cs ^

(N

‘O

° x

CA

(/)

t/)

<

O

• OOOOPSO . ‘O PS PS ‘t cO 00

■ < t oo-‘ I I I II

I I I t)tibt > t >

I

p

PS

I

p

1 1

^ ^ fO

cvjioOvˆfNrsˆ‘O

• ‘III’ J, J—

fpppppppp

00

o

I

p

00

I

p

*d

B cS

• S

p’* rj< PJ PS -H to <2 ‘O

ˆ TI »-i

I I S I

f:3pnt3

I PI

O’ 00 to o o to to

^ *H ^

till

pppp

o

H

o

CO

43

lx

43

&

43

x:

H

•d

43

O,

a

•o

u

lx

43

>

43

B

43

lx

43

X)

43

lx

43

‘d

B

43

t

3

133

43

lx

43

&

“t

C3)

lx

43

>»

ca

C 43

ˆ.a c*3 a

-1 OT

.. d

43

tf CO

43 ˆ

:« S

d

.a «

•So

> > .

q; O

•d m

fei

1“

d 43

1/3 (30

00 ˆ •ˆ•d

• X rj

gS

d 43

a s

feciJ

ˆ43

O. O

3V-I

B’O

I «

P

lx C/I ˆ Ui d

93 xx lx <->

fepq

<0 .

a > «4-(

XI o

eg

43ˆ

＞xX

.Q g

d a

43

•eS

P‘3

3

o

x >

oS

760

WARSHIPS

04

<

s

o

u

m

H

O

s;

l-H

04

D

Q

H

d

pq

04

o

Q

U

Z,

O

►H

PS td

tf)

<

H

W

hJ

PQ M

c/5 cn U >

04

n (/}

H

S

pq

u <

o

cn

04

C >-]

u

H

04 <

O

2;

>

O

(0

TJ

ca

a

c4

o

W

3

o

u

.c

‘Ei

S >

(U

ti

05

>

o

c/2

’cS

＞%

o

04

05

X >

Cl)

N

- wM

w

c

05

05

3

o

05

3

Q

c

o

3 3 3 3

ooo’o2Sˆ®2®

OOCNioOes

Hi

to

3.

.-a-o

4J

＞4-1

CO

3

>

fS

d’S

OO ’Hfoi/ˆCˆCCC H)« c

4 ˆ 4 % 4 ˆ 4 *4 • _ a CZ

loˆˆsoofsfo T-tocN *

cˆˆ‘OCˆcs ˆ ˆ S 4J S C C

ˆ ˆ i-i

0) > Orr < Z >

CS ˆ ˆ ˆ

…. H-S -S

.s.s.a.s ˆ Soo ˆ .

w .w ‘H’ Q Q Q fvj rS ri ri r! ˆ ˆ

Olo jH.S.S.S.S’ˆ.S.S

(0

A • ˆ

M

0}

T)

a

rt

4J4J4J4JX 1 - - ‘3’

＞*., VM ＞4.1 ＞4-1 ˆ CS PO 4-1 Ov tJi 10 o ˆ csi

10 ©1 »H 00 es es .-i ＞0 cs » . .‘H’.

CSlOOvCS ˆ j

10*0 0’OTf3333

4H 4H .-4*-4«-4.-4 -.10— ((4— 1*4 .4(44 ■”

CS ＞0 00 O 4-4 4.H 4-4 4H fp)

‘ 3 3 3 3 .“

ˆ .a

ˆ.a.e.a*; 8

; ＋4 ＋4 ˆ.Jo© ”Cocso.S jj.a’® Ooo.s.B:g

4＞4H＞M＞4-4ˆˆ pHCCJ CS”ˆ4-lˆ.ˆ.rtvj—|B

ˆ o cs,2.2.S.S.S ˆ

a a a a

• *w* • *w* ^

O ‘O o o ® ® cv© o o

^ OOCSOQCS

CO

a

■

43

CO

CO

•O

3

05

＋j

rt

3 3 3

CS 4-1 o > p-CS CO CO P-00 CS

O© T(< ocs©©©o > cs 3 3 3 3 3 3

ˆCS . 4H •-4.-4.,-.-l.rt.-4

,.ˆ|« Htw

»- < ˆ vH CS

3 3

• «H • ˆ

O to

O Tf< 00 CS 10 ‘O

3 3

o ss

＞4-1 ＞4-4

00 00

00 CS

oococ

to O CS (

©

to©

CS4j >

^ 3

o , ^.ia.a'^ ..a « '^.a fj.a .2.a ^ ^ J J -I -3 -T .

4-4 © cs.c.a.a.a '^.a e

00 ■4!)' ■4^4 ^f5 \o CO o

3-h

• *14

-.a'

O.^

C-S g

^ ^ ^ CS

jOJ

ˆ . r2 p! 6’;: o -

c

3”^

＜U.S

o＜

^ CS

w

d d

■ «4 • ^

CS ^

c c a a

• ˆ • p4 • ˆ ♦ *i4

©OtOOv®®ˆ®

O O CS 10

• • • • 10 o o

4ˆ 4ˆ 4ˆ

VM <4ˆ <4ˆ ˆ - -

I/)

© CO © 00 cstˆ

© .ˆ 0\ CS

VO VO

H c . . c

rJ-« 3 3—

o • • Tit rli …

‘ = f.a *3. a ri” - -.2 a ^^.a

CO to”’ .-t’”” 3 3 . ^ ^ th 4-4 VO CS CO”^ 3 t-4 -H .

4H VO

00 CS Ti4 Q

CO

. CO. ft

•S’H.c

3 CO

-PC 05 cO *3

O 3 3ˆ

•*j . rt

* . . 3 . r

8 3 3— 3 3

• ˆ ˆ ˆ •H • W

CS 4-4 CS 4-1 4-1 CO

H.S .-2 d

Hoo.aˆr

: ‘t

.CO

3 3 3 3

• W . *H • •

©©©©oo4-io©©a

©©CS©toiO”’

4i4J4-:4.-®®

«4-| «4 < (CM *4-1 _ ^ ^

10

O CS o 00 CS CN

00 CS 0\ CS ” Tv^ .

»0’C OCSri < C30o

CS 00

to

Oa • 5/)

j.a-S’OˆS.s.p

•ˆOio S.S ..£5 c g*ˆJ2ˆ

• .£ r4

ˆOvPJ’C Sow

ˆocs • * r

• \rˆ .’ˆ C ,. C d a

8 . . 3 3 3

-ˆ 3 a—* — —

CM

^ tH CS CS CS

0) ^ 4J X -O ^ >^0

°j3 S § A

f.vtlv’O— ,.2 +jt3 ™ 3

33053(0*1)05 05 3

(U0)i-.O;:;.c;aB o-‘^ hJhJCQhjQc/JWPiiOO

4J

. >4-1

• 3

i-O ■ 3

3

3

“d

aS

il

-d

- &

a ˆ

-d

Vh

3

&

V-I

o

V4-I

CO

Sf3«)

3 o

05 Oi

& -4 ^

■4-4 o 3

CO W -Ht O g 3 ,2 3 Wj'-P 05

3

05 05

-d-d

o S o 0 Ht ^4

33-5 V O

■^5 c 3^^^

3 3 3 O I

M j'o3i) 05 o 4) o Trt o.>

(D <t>

a*^T3 ^ Ot^S O p3 S S hj

G

d >

a

1

1-4

3

0

4^

(J

0

0

G

G

4->

G

Vh

M

u

0

Vi*

<

<

A

*3

Ij

w

M

t/i

t/i

ct

w

.2

*0

o

w

3 3 3 3

.Sh

.^’*4

©©©©0©©©l^©‘0 Vt

• • • • ^ o O ^ ^ O ri

*ifii££oo©4t’o

CS »H ro ^ CS ^ CS CO CS ^

CS CS

.a 00

co’^

3 3 3 3

<

Wh

s-SH

©©’©©©©©©TjlO,©-

. - . -ooio©©cs © CO ˆ

roˆ.a

Tt 00 O ＞0 *1 (N O -H .00

CO CO CS 4-1 4H ˆ ˆ

.3«)

3333

•2h

©©©©o©©©©©-ˆ «-

© o

CS © to ‘

.tJ.iivS.ii”ˆioovoco

CS ˆ

CS CS

H

3’

.a 00

CO’^

3 3 3 3

‘0©©c0o©©©co0©

; ; ; ; Tf © 00 CS .H »-i 4-1

4-* 4^ 44* 4^ ^4 l/^ ^

＜4-1 iM *4-1 «4-« ^ ^

^ ^ I/) ^

VO ^ ^

H

.H

! 3

CS

•4

H

3 3 3 3 d

©©‘OcoQuoo©Tii©Tit 8_

• • •

A©oo

10 CS CO ˆ »H •

00 00 CS ˆ ˆ

-H,-. ,g

00

3 3 3 3

H

©©©‘Ooo©©tO©ioS’“^ ££££©00000 “

© 4-1 CS CS

00 00 CS

f^.a

to

u

r2

3

o

• ^

-d

3

05

A

A

-d

-d . aj,

• Pf S v

rti W y z;

o V rt g

•>5

-r! 1h -A 3 3 ^ g-g CO CO

61O CO CO . .

o V CO CO 4S -Jj CS S 2 2 O O •C^.a.e 3 3 3 bo SodS dS - 3 3-^^^

_ „ 4.) d) 4J .M W W!u-.u-.^43 G

G ^

(A

3 3 “o bc 00 b

3

cs b b

05 -l-t -4J

3 3

.v-.-T-Ht’-‘^td’- <D (-< ^ Qi TO 03

g G G G ^ ^

^ *00

I . -4^ -tJ> _>_^ 7 ^ /c %

O - flt ^ ^ P* ®_c2<i>a)00’^T^ s*/

trt *7? ^ ‘O G rt

2P 9. c3 ^ Q, CLvm *4-4 d) d> *4^ c GGd>c3a3c/5c3rtd)<u_«.H

d) d) Vh 0*jr*jr’j3j3 Q4 Qc’G G

4-3 H-J CQ J Q Q M M c/2 CA c5 <

/

From paper by Sir Eustace Tennyson d ’Eyncourt published in Transactions ’ of Institution of Naval Architects, Vol. LXI.

TABLE IX — Continued

WARSHIPS

761

C/l

«

w

»

o

H

a

o

(/)

os

(d

w

»

o

o

%

(A

OS

H

(A

h-i

D

«

o

(d

C

n

J3

‘S

13

<d

o

V

o.

o

13

O

3

ja

4->

V

<

M

3

o

tH

3

Ph

CO

3

Od

cd

ii

3

o

o

a

o

3

lU

Pli

tH

(U

&0

C C 3 C

ooo < ^®2®ooo

coOrCOOO^^

• • . .t’.O OOO’OG^ -cs

VM VM < M CM “ -! H

o^ O

lo to lo ‘O

O O > 0 T-(

lo o

ct

^ ^ 3—’ r 3 .

^ 3— 3

ro cs •’”-(«•’

(>. CS VO

to cs ‘

CO

O.

• id

(0

T3

•

a

cd

a a c a

• W

ooofo®2ˆ® ˆ lO© (NO …. NO O

4> 4ˆ 4> 4J

N+H SH VM VM ˆ

ˆ o

ˆ vO

rˆ< t>* ˆ ˆ

ˆ ˆ wˆ.a G

to -o ˆ ˆ j

ˆ‘3 d-sˆ:::-s

VO to tN vo cs cs

3

*

(N

(A

a

IS

(A

TJ

• 9^

a

cQ

a a o c

• ^ • .H • ^

OO’O’O®®®’®

lOQcSO

＋i

ViH ＜44 ＜44 ＜44

to O

O vO -4 ro ■‘t

CM T)(4ˆ1 44 r# < Tt

•O

• CS

• 3v

3

F.|«d

H

H .

. . 3-S-

•S-S’::^ d

O vd* fv»

＜N

fS 00 Tf

CO

.&

,3

CO

X)

a

3

3 3 3 3

• ^ ^ • pd

ooo’o52®’®

^ OQCSVO

… . lO O CS

4^ 4-*

＜44 ＜44 ＜*-,＜44^* (5*

O vO Ov to Tj＜

•H CO to

Tt Tj.

• d

o •-

3 d’^ d

»3 • ^ ^

VO •＜#’ CS

CS

3

- ^

VO

tn

a

« M

ja

CO

T)

♦ Pd

a

3

CS 00

3 3 3 3

.pd tPd .Pd HlCˆ

O’OO’oQS’ˆ® ˆ ˆ OOtOiO

• . • • 44 O

4-> 44 4. 4…

V44 tW <44 <44 ˆ ˆ

to vO 00 »H 44 Ov

to 00 00 CS

t’. {>«

o

o

■ < t

to*

to CS

O 00

CS tot^

3 3 3 3

Pd Pd *Pd* pd

otootogS^J® o o to to … . o O

44 44 4> 4> . .

<44 <44 <44 <44 ^

to VO •H CS 44 Ov to 00 00 CS

t4.

H

H 3 .•” . . 3 3

> 3to 3 3”^ .

>.4, — — ˆ c 3..I4I

*3

u

aj

O

CS 3 • 3 3 Ch .•« 3-”-’” O CS Ec-o .■

to to’” 44 to . .44 •<

d d G 3 -2

dt 00 ■<J< •‘4’«””>4 ˆ

44 44 CS to t-4 Ov 44

3 3 3 3

t4

3

O

3

OOOOˆOCSO

4J4i4J44-S§ˆ§

MH *4-1 <♦-< <d-4 ˆ ˆ ˆ

O O © CS *-(

‘lo © © CS CS *-(

H-2 d d

c a

Pd • ^

.S.StjtC’

a ^

»pd .pd

^^Pd-p

CS © ^ ^ ^

NO ^ ^

H*’

‘ lO

d d d Cd

.d..d.Pd.SQOoooo ^ .i:c^

r-s^-NN/^NrtOOfCOCSOOC

I

Pd ˆ

r.a.a 3

3 d.a-<44 “

41” * - 3

M

73

CS ® O d” O OO »H vO O Ov CS O C»

:oo*2S C C®’°

to VO ‘

44 CS r

3

00 44 di.s

3v

3 3®‘2’” c 3 .

”4— .—H.— f3

ˆ On d

CS

(A

U

ji

3

o

- Pd

ta

3

lU

a

t4

<u

a

w

a b

a 0

ob-is

3’-^

<D 44

ja

<0

to < **4 44 44* 14

c 3 o 60ja 1? P 3 op ce¬ ss 3 O

Co V

Vd

d R d o

> *

w-H a ˆ ˆ‘3 i:.w4j

fe 1.+S.3 d i34-(4J 3

& t4 ti ■£. 3 I

2 4J K 00 4) OJ

<U>4>3C”

ja o * 3 g

4343ˆ-3 y

44 44’C •

COˆ

(4

- O

yja

*4 *3

2’3-‘d ix 3 o S’ O 3 g

44 44 (i VJ

3 44 3-3

3 o a

•T3

• d

O, ˆ

‘.S’H

a

3

3

•3

3

« 3

3

|4

cC

|4

o

3 U

r? 4.\

cd

. T? •

pH pd

, . ” . Vd . wN*

.d.GOcsOddddC .

..d p4.pd < d-l .pd ..d .pd .pd •

. d d d

d

CO

d

. Pd

He*

CS

y

•3 S

O flj

L. ‘■y p3j 4 • o psq

« « Si

- ＞-4 -K-S yˆ-a g 3ˆ”ˆ « V4

w .a y (u c‘3 y

3 60*4 4J Q,.3,n ＞ o d h b S 3ˆ 5

y y

＜3-3

•K＋iTiˆda 44*3 ˆ

bo 60 rt ” a”** y 44

33y3-ˆ3yy_„

0) y i4 O’X xi a3 o-ˆ

jjpQkJQwc/j&sOO

＜d

o:

d

a >

a

3

a

u

<

3*3 3

Pd »pd _Tr

ww

I

Id

o

a

Id

H

j-> o d ^ ?r cd ^ ‘ o 1

Vd

pd cd — w

pqmoo

3

o

. Pd

44

o

y

o

Wi

Ps

(A

H

<

o

PQ

4)

o

3

H

C

a

CA

«

«

3

4)

＞-d

H

O

4)

a

Q

«

H

(A

3

3

> <

O

3

S5

3

Q

<!

o

m

I

o

a

3

3

3

o

H

(/)

CO

3

a

3 3

• W • pd

O VO

44 44 <44 <44

O 3< CO ■’!< CS CS

3 3

• Pd » pd

Ov t-4

coo eso O CS to too

CO Cˆ

CS

‘-■a

y C”

•’^a

”’.a §

o 3

-fpd »

csZ

0)

to d

‘g rt 3

3-7« CO

12 ” y

33-3

.i* y 3

y o, d

44 <o.a

£ y ˆ y 3

wa a

CO a

3

o

3 3

• Pd • pd

o o

O CS CS to to to

3 3

♦ Pd • pd

O VO

44 44

<44 <44

44 O to 44

o

o

o

O O to to

00 + 4 CS

a®

ˆO

o

PPK ˆ

in ˆ rtj

o

(A

(A

cd

(1 >

a-d

d

u

a

a

0)

M

•

(A

0)

‘d

CA

d

d

(A

pS

‘o

>

C/D

* (A Tl ^ d CA Cd ^

: ^

Pi

(A

(A

Cd

d d d d

■ Pd • pd • Pd • pd

OOOnO(ˆq.(ˆu.ˆ

• … O CO 10

dJ ,*J 4U C> CS

td_d td-m-i “d-d ˆ ˆ

10 O ˆ nO

ˆ CS CO *H CO

CO CO

CA ^ •

^ H

< u ^

10. s ^

*H * G (4

10 0.5

a

dt I ˆ

CS CS CS *t

d d d d

• Pd • Pd * Pd « pd

OOOOoO*t 10

… . o O CO CO

4.5 4.9 4.9 ˆ

VM *dM* 4-1 *4-» ‘

O CS Ov Ov 44 (4.

O 4* CS CS

toco

• o

•to OfO

.3-2

.a-o

tf

•3’

V4

O

3 3

• Pd • Pd

00

4J 4ˆ 4.> 4.)

VM Vm <4ˆ <4-d

d d

* Pd . Pd

000

to vO

VO (4.

CS CS

VO Ov CS

to O VO O vO O to to

00 44

44 t4,

CS

®.a ® ˆ to 3 <

to

5H

•Sh

O 3

a’”

CS

d d

• Pd • Pd

O

4J 4”S

*d-< *4d

10 CO O

CS CS

d d

• Pd • Pd

00 CO

4i 4-»

＜4-1 *4-1

NO 00 ’ fS

100 rt(0 CN O CO ^

00 ^

1 10

CS

y H

.TJa

®.a § . CS §.a

a*

CO

CS

CS

lA

c3

1

♦ Pd

d

$<D$

a

0)

a

p#t w

CA 4ˆ

d 4ˆ

(D ˆ w

CAˆ. 4ˆ

60X1? O . 3 60 3 “ O

3 3

4, y ＋4 V4

a _’ 2 ■ . 3 o ‘o u

ˆ 3 “S ‘S, a 1 3 ＜0 .ti

■3 2f I o 3 y

0 y 2 3

ˆ.a ˆ-o 2’

＞‘a

44 3

4-* y Qtj y y Q m’o a

y ＞ y 3 3 O 3 ‘S .3 j3‘5‘0 a.3 -3 rt-Tj

33y3tfl3yy3

aawaQwcoaOo

3

y

a

d

a

u

<

TABLE IX — Concluded

762

OD

o

H

ta

o

S

c

3

00

I

o

I

«N

M

3

tH

U

3

o

OJ

13

JS

m

2

V)

J2

*0

a

g >

I

CN

IS

cd

u

C

3

to

3

• ^

4*

w

o

s

3

w

a a a a

o o o o i/^OO

... . O «-i

4-> m ^

Mm MH <4-«

O ^ ^

(3 a c a o

OOOOqOO^h

... . ^ o o

^ 4-> lO 4^

MM MM

Ot^-^‘O

lo

(H

＜D

•3

c

3

o

‘t.i: a

\0 VO (S

O tS.S

r*5 .

0 > fO

C C 3 3

ooooggˆo

o >o oo coo 00ˆ

r*i Tf

‘COO

•o C *

•^*”.S

• to

• 4 •

• CN 00

. o

- o

U)

3.S

o

_B_B-S 3.S_0 tj’t Tj’OOˆ‘O’ˆ’ˆrJv.S

3

• «i4

a • ˆ

＜s

3 3 3 3

o«’ˆ’ˆo§*’§

… . vO »0 fi ˆ

4-＞ 4V＞ 4V＞ .

O lO O o

t1 < lO Ov >

ro

o o

»o.S

fO o

<N lO

tJV «S 00

0)

a

o

•

3 “

3

■ + • O .

^ C

* _B’ < -‘ 3 3 3 3 3 B ‘^’^ t} < 00-hvOˆt- < ° ci

• 3 H«

.3 fs

fo r

3 3 3 3

o

O

»o

3

• ^

fS

ovooog < NVgo … . Os o O fO

4^ ^ ^

MM Mm Mm Mm

o >o«ˆ o S’®

tS fO 00 »H ˆ tOr*i

«S

3

3’® 2 O

ˆ 4J

CS

o a

13

c S

M >5 C^*^*^.2

o ^

.2-2

. CS

rj ‘

.S’O 00 r a

a

- w«

cs

.S.2.S.S

ovSoooo.-oo

• • • • -H o S fS

4- >

OtJioo

fN ro Oi ro tf)

■ O CS O

— 3

rji’’*

VO

«S <-H

3

• *^ 3 Tj.

a

lo . 3 C

cs •“ c!

.2 o-S.c-3 c .

3 r ˆ

00—

2 C

CS

(A

Im

J2

3

o

• »4

TJ

G

<u

a

o

a

G

<u

&

«4->

a>

•Q

• • * •

. . • •

• •

« •

‘ X ^ *

• V? 4J •

. G c3 w)

• •

.

• ’S)^ g

•

•

• to

: a

. <U 4^

* to

• !jg

52 Mm

5 o bpj:3

• 3

^5

• to

. 73

• * ^

‘ • 4) ^

-• a 2.S

/i\ «.

4) .r

ol

w, -Hˆ

> 3 3

O - rt 2

2 “ C’-‘ <5230ˆ

a’o’® ˆ y

S’®- a

£ ° § ˆ «

£ o O’

0

Ob (u o

cu

t3

3

a

Mm

G

G

G

(0

Ih

0)

G G G G »G •G *5

^^’^’^‘Oioˆioooas.S o

MM MM M-4 M-» •

o o ˆ *

(S cs

cs

(/)

gwM to to o

*5 3

3 u

ˆ aˆ £ Orrt 55

o cij ;2 ˆTJ o ˆ

4) CJ-a 4)

a,*®:- ˆ

9.

4j 4)*0b-Q

j3ˆˆ‘o y*® ‘”■y S’S

OO 00 Clj ˆ Q|MM 4) MM

GG4)GtoG4)Si < 3ˆ

►ji-jpqjQcflwfeOO

3

a >

2

G

2

.’23‘3 rt 3 o I WWPQPQOU ‘

O’vSS o

o

a

Wi

<

3

o

•*■»

o

«

■* >

o

t1

1ˆ

(A

H

<

o

a

%

t3

o

<

►M

a

o

CA

3

H

3

H

I

H

%

a

z

<

CA

3

o

o

U

C/3

M

U)

3

U

4)

u

3

IS

13

>»

Ph

to

Wi

(V

a

4) 4)

S

to

I

4)

^1

&

4>

Wi

u

to

I

G

e

4 >

- 9

•o g

•O P rt w di V

3

a

O)

O IS

O rt lo “o

p V, t-i 4)

ˆ & i o ‘3) < ˆ

2-

w

3 3 3

OvOO

O vO

(S cs

® lO O . Tf O ijvoo

＜s

ˆ.2.2

fcio

vof^

«S CM

3 3 3

• *4 • p4 • vM

o SCO fS CN

OooloO Os ˆ

4M

«*-i

CS

Wi

T)

a

I

. «

> ˆo.Sˆ

,.H

po

3 3 3

•^•^^

OOO

O •-« 00

fs po cs

pvj fS

® OOVO

. I/) o ˆ

♦itˆOO

o

TJ

a

.Sˆ

J

^•o

a

m

a >

• • -2 •

3 3 3*0 3

OOsO ˆOvo <

• to

• o

»to

lO to Os o sC ˆ CO ˆ CN .

CN CN

00

to

fs

*»> r

Wi

-•Si

‘A

3 3 3

fO O’ >0

4ˆ pM Mm ˆ Mm

.2

Ooo

• to Q

i2CN_^

t^OO »H PO VO ^ «S

:°l

to fO to O CO

CN CN

^ ^ CN

‘»’ < s

CN

to

V4

G

3

o

g

&

4 >

O* • 0)

4) ˆ §

4 >

•O

°.3

.3 JSlS

3 3 V

4 > 4 > Wi

h-JhJCQ

763

TABLE X

* Effective Fighting Ships Built and Building

The rˆidly diminishing value of the older battleships and first-class or armored cruisers makes them no longer enective. The United States and other Powers retain ships long on their lists, and therefore British ships are kept here for purposes of comparison.

Great

Britain

United

States

France

Italy

Japan

Germany

Austria

Russia

Class

&0

bo

00

00

00

00

00

4->

ra

2

•4ˆ

H

’3

2

2

13

4ˆ

2

13

G

2

13

c • ^

T)

13

2

13

3

3

o

3

3

o

3

3

O

3

3

“o

3

3

O

3

3

o

“3

~3

o

3

3

b

CQ

CQ

CQ

m

H

CQ

m

H

m

m

PO

m

m

H

CQ

CO

CQ

m

H

Battleships:

Modem .

35

35

17

6

23

12

5

17

6

4

10

7

2

9

19

*2

21

2

2

8

Battle-cruisers .

9

1

10

6

6

4

4

5

1

6

4

4

Older battleships ….

6

6

13

13

5

. .

5

4

. .

4

6

• •

6

9

9

• •

• •

• •

4

4

Cruisers:

1st class .

19

19

12

12

15

15

5

5

12

12

3

3

Light .

77

13

90

3

10

13

3

3

6

6

8

8

24

4

28

3

8

11

Destroyers .

‘282

108

390

95

231

*326

76

20

96

48

10

58

89

122

122

Submarines .

59

63

122

88

73

8

81

26

32

32

♦Brassey’s Naval Annual, 1919 edition.

* Excluding 97 destroyers of classes A to F. A nurnber of destroyers have been completed since this table was made up early in April, 1919. * The Mackensen battle-cruiser is the only German ship that may be completed. The other vessels

indicated in this column will not be proceeded with. * Twelve destroyers projected.

The destroyer and submarine figures given fpr Russia represent the situation before the war, except that vessels known to have been lost have been removed from the lists.

TABLE XI

Summary of Vessels Fit for Service and Under Construction in the United States Navy,

1 July 1906 to 1911*

Fit for service, including those under repair f

Type

1906

1907

1908

1909

1910

1911

•Q

6

3

Iz:

Dis¬

place¬

ment

Ih

0)

B

3

Dis¬

place¬

ment

Ih’

v

43

B

‘Z

Dis¬

place¬

ment

u

(U

43

B

Dis¬

place¬

ment

u

a >

•c

B

3

Dis¬

place¬

ment

(U

B

3

Dis¬

place¬

ment

Tons

Tons

Tons

Tons

Tons

Tons

First-class battleships .

16

198,250

22

292,146

25

334,146

25

334,146

29

406,146

29

406,146

1

6,315

1

6,315

1

6,315

1

6,315

1

6,315

Armored cruisers .

4

54,720

6

83,720

9

125,580

10

140,080

10

140,080

10

140,080

First-class cruisers .

3

27,065

5

46,465

5

46,465

5

46,465

5

46,465

5

46,465

ArmnrpH ram

1

2,183

1

2,183

1

2,183

1

2,183

Single-turret monitors .

4

12,900

4

12,900

4

12,900

4

12,900

4

12,900

4

12,900

Double-turret monitors .

6

26,104

6

26,104

6

26,104

6

26,104

6

26,104

Protected cruisers .

19

76,070

19

76,070

19

76,070

18

71,987

18

71,987

17

67,574

Unprotected cruisers .

3

6,216

3

6,216

3

6,216

3

6,216

3

6,216

2

4,144

.Smut, rrnisRrs .

2

7,500

3

11,250

3

11,250

3

11,250

Gunboats .

9

11,564

9

11,564

9

11,564

9

11,564

8

10,387

7

8,677

Light-draft gunboats .

3

4,155

3

4,155

3

4,155

3

4,155

3

4,155

3

4,155

‘Composite gunboats .

8

8,190

8

8,190

8

8,190

8

8,190

8

8,190

8

8,190

1

1,175

1

1 , 175

1

1,175

1

1,175

Training ships, steel…

2

3,600

2

3,600

2

3,600

‘2

3,600

2

3,600

Training brigantine .

i

346

1

346

1

346

1

346

1

346

1

346

fecial class .

2

2,416

2

2,416

2

2,416

2

2,416

2

2,416

2

2,416

(junboats under 500 tons… .

15

3,603

13

3,265

12

3,095

12

3,095

12

3,095

9

2,439

Torpedo-boat destroyers ….

16

6,695

16

6,695

16

6,695

16

6,695

21

10,195

33

19,099

Steel torpedo boats .

35

5,737

35

5,737

35 .

5,737

33

5,299

33

5,299

31

5,111

1

31

1

31

1

31

1

31

1

31

Submarine torpedo boats… .

8

935

8

935

12

1,719

12

1,719

18

3,485

18

3,748

Iron steam vessels .

5

5,861

4

3,606

3

3,056

3

3,056

3

3,056

3

3,056

Wooden steam vessels .

5

8,840

5

8,840

5

8,840

5

8,840

3

5,565

3

5,565

Wooden sailing vessels .

8

10,045

8

10,045

5

5,895

5

5,895

5

5,895

4

5,620

Tugs .

41

13,060

40

12,703

41

13,606

42

14,361

43

15,133

44

15,833

Auxiliary cruisers .

5

28,339

5

28,339

4

24,959

4

24,959

4

24,959

4

24,959

CnfivpTtfid yachts .

23

11,881

23

11,872

22

11,750

21

11,453

19

10,421

18

10,106

CnlHprs .

15

79,504

15

79,504

15

79,504

15

79,504

20

140,067

20

155,112

Submarine tenders .

1

357

2

807

2

807

4

4,702

5

6,771

1

4,083

1

4,083

1

4,083

1

3,380

1

3,380

1

3,380

1

3,380

Transports and supply ships .

11

53,247

io

50, SH

9

50,084

8

44,384

8

44,384

8

44,384

Hospital ships .

1

3,300

1

3,300

1

3,300

2

9,000

2

9,000

2

9,000

Receiving ships .

4

18,995

5

21,250

5

21,250

4

18,995

4

18,995

5

23,408

Prison ships .

2

4,850

2

4,850

2

4,850

3

7,105

3

7,105

3

7,105

Total .

276

692,592

285

835,465

292

923,483

292

941,753

308

1,075,407

311

1,090,826

* Data from official publication. United States Navy Department, t
Taken from the 1911 edition; classification changes in the 1912 edition.

TABLE XII

Summary of Vessels Fit for Service and Under Construction in the United States Navy,

1 July 1906 to 1911 *

Under construction

Type

1906

1907

1908

1909

1910

1911

Number

Dis¬

place¬

ment

Number

Dis¬

place¬

ment

Number

Dis¬

place¬

ment

Number

Dis¬

place¬

ment

Number

Dis¬

place¬

ment

Number

Dis¬

place¬

ment

Tons

Tons

Tons

Tons

Tons

Tons

First-class battleships .

9

135,896

5

74,000

4

72,000

6

115,650

4

95,650

6

149,650

Armored cruisers .

6

85,360

4

56,360

1

14,500

First-class cruisers .

2

19 , 400

Scout cruisers .

3

11 1250

3

11,250

T

3,750

Training ships, steel .

2

3ˆ600

Torpedo-boat destroyers ….

5

3,500

20

14,630

15

11,130

9

6,678

Submarine torpedo boats… .

4

784

4

784

7

2,103

16

5,890

10

4,124

17

7,732

Tugs .

2

1,510

2

1,510

1

755

Colliers .

•

2

25;i70

2

25,170

6

78,220

2

38,735

2

38,735

Total .

26

> i

256,290

20

169,074

22

122,533

49

215,145

31

149,639

0

34

202,795

* Taken from the 1911 edition; classification changes in the 1912 edition. Data from official publication. United States Navy Department.

TABLE XIII

Summary of Vessels Fit for Service and Under Construction in the United States Navy,

1 July 1912 to 1916 *

Fit for Service, Including Those Under Repair

1912

1913

1914

1915

1916

Type

Number

Displace¬

ment

Number

Displace¬

ment

Number

Displace¬

ment

Number

Displace¬

ment

Number

Displace¬

ment

Battleships, single calibre .

6

Tons

115,650

8

Tons

167,650

10

Tons

221,650

10

Tons

221,650

13

Tons

308,050

Battleships, mixed calibre .

25

334,146

25

334,146

25

334,146

23

308,146

23

308,146

Armored cruisers .

10

140,080

10

140,080

10

140,080

10

140,080

10

140,080

Cruisers, first class .

5

46,465

5

46,465

5

46,465

5

46,465

5

46,465

Cruisers, second class .

6

33,561

4

25,065

4

25,065

4

25,065

4

25,065

Cruisers, third class .

15

48,748

15

48 , 748

15

48,748

15

48,748

16

50,820

Monitors .

10

39,004

9

32,944

9

32,944

9

32,944

7

24,964

Destroyers .

23

16,856

26

19,082

34

27,300

37

30,472

47

41,403

Coast torpedo vessels .

16

6,695

16

6,695

16

6,695

16

6,695

16

6,695

Torpedo boats .

28

4,821

26

4,446

19

3,365

19

3,365

18

3,300

Submarines .

22

5,229

24

6,421

30

9,322

36

12,338

38

13,580

Tenders to torpedo vessels .

7

20,661

7

20,661

6

19,484

7

20,892

8

31,927

Gunboats .

27

25,078

27

25,078

30

27,890

30

27,890

28

25,937-

Transports .

5

26,595

5

26,595

5

26,595

5

26,595

4

22,235

Supply ships .

4

25,400

4

25,400

4*

25 , 400

4

25,400

4

25 , 400

Hospital ships .

2

9,000

2

9,000

2

9,000

2

9,000

1

5,700

Fuel ships .

19

160,313

21

205,352

22

237,051

23

251,581

20

239,430

Converted yachts .

17

9,634

17

9,634

16

9,476

16

9,476

14

8,957

Tugs .

44

15,884

45

18,024

45

18,024

45

18,024

47

19,431

Special type .

Unserviceable for war purposes .

6

26,335

8

48,333

8

43,333

8

43 , 333

8

45,904

26

59,421

22

50,771

21

47,501

19

43,976

21

46,291

f-Total .

y

323

1,169,576

326

1,270,590

336

1,359,534

343

1,352,135

352

1,439,780

Under Construction

Battleships, first line .

Destroyers .

Submarines .

Tenders to torpedo vessels .

Transports .

6

11

17

1

161,000

10,496

8,268

1,408

5

14

22

1

140,400

14,580

11,555

1,408

4

12

20

3

1

1

117,800

12,992

10,673

12,138

10,000

8,500

7

15

22

2

1

1

213,800

16,442

11,839

10,730

10,000

8,500

6

11

35

1

1

192,000

12,093

20,311

10,000

8,500

Supply ship .

Gunboats .

3

4

1,805

67,000

Fuel ships .

Tugs .

5

2

95,624

2,240

2

29,000

2

29,000

2

2

29,000

1,150

Total .

42

279,036

49

236,748

43

201 , 103

50

300,311

58

273,054

♦ Battleship and destroyer figures adjusted to conform with the 1916 classification. Data from official publications United States Navy Department.

765

TABLE XIV

Summary of Vessels Fit for Service and Under Construction in the United States Navy *

Type

Fit for service, including those under repair ˆ

Under construction

1 July 1917

1 July 1918

1 July 1919 2

1 July 1917

1 July 1918

1 July 1919 «

u

a

Displace¬

ment

Ih

<u

a

3

iz;

Displace¬

ment

U

0)

un

a

3

Displace¬

ment

U

0)

a

3

iz;

Displace¬

ment

Wi

0)

a

3

iz;

Displace¬

ment

i-i

a >

.Q

a

3

Displace¬

ment

Tons

Tons

Tons

Tons

Tons

Tons

Battleships, single calibre .

14

339,450

16

403,450

17

435,450

9

291,000

7

227,000

10

367,800

Battleships, mixed calibre .

23

308,146

23

308,146

23

308,146

Battle cruisers .

5

176,500

5

176,500

6

5 261,000

Armored cruisers .

9

125,580

9

125,580

8

111,900

Monitors .

7

24,964

7

24ˆ964

7

24ˆ964

Cruisers, first class .

5

46,465

4

36 ’,765

4

36,765

Subtotal, armored .

58

844,605

59

898,905

59

917,225

14

467,500

12

403,500

16

628 , 800

Cruisers, second class .

4

25,065

4

25,065

4

25,065

1

7,100

4

28,400

10

71,000

Cruisers, third class .

15

47,820

15

47,820

15

47,820

Destroyers . .

52

46,886

65

61 ,528

159

172,986

62

73,128

263

316,086

166

201,600

Coast torpedo vessels .

16

6,695

15

6i275

15

6,275

Torpedo boats .

17

3,146

17

3,146

12

2ˆ041

Submarines .

44

13,602

57

19,231

93

40,554

71

42,041

91

61,340

65

52,476

Gunboats .

37

34,410

37

34,410

37

34,410

1

1,575

2

3,150

2

3,150

Patrol vessels .

15

7,500

100

50,000

45

22,500

Submarine chasers .

304

23,408

321

241717

305

23,485

42

31234

Subtotal, unarmored fighting

ships .

185

177,624

514

220,883

671

361,368

440

147,329

502

462,210

288

350,726

Tenders .

6

24,717

16

93,990

17

99,960

Mine sweepers .

4

3,800

40

38,000

3

2,850

50

47,500

9

8,550

Converted yachts .

14

8,957

12

8,711

10

8,711

Transports ˆ .

5

57,295

5

57,295

3

19i615

Supply ships . .*

5

33,900

5

33,900

6

43,500

Hospital ships .

1

5; 700

7

37,497

6

36,297

1

9,800

1

9,800

1

9,800

Fuel ships .

22

268,349

21

248,989

21

248,989

1

14,800

1

14,800

15

236,650

Special service .

8

45,904

13

83,891

6

29,611

1

10,600

1

10,600

3

31,200

Tugs .

49

20,758

50

22,572

57

24,922

2

2,000

65

33 , 600

18

18,000

Unserviceable for war puriˆoses…

20

45,116

15

43,356

14

41,101

Subtotal, nonfighting ships . .

130

510,696

148

634,001

180

590,706

8

40,050

118

116,300

46

304,200

Total .

1,532,925

721

1,753,789

910

1,869,299

462

654,879

632

982,010

350

1,283,726

* Data from official publications, United States Navy Department.

‘ Does not include vessels in temporary war service.

* Includes purchased vessels added to navy list.

* Exclusive of 2 battleships, 12 destroyers, 9 fleet submarines, 1 transport, 1 destroyer tender, and 1 submarine tender, in three-jrear program for which contracts have not yet been placed.

* Estimated.

* Design modified, with increased displacement.

TABLE XV

Summary of Vessels in the United States Navy, 1 October 1919 *

Type

Battleships, single calibre. Battleships, mixed calibre

Battle cruisers .

Armored cruisers .

Monitors .

Cruisers, first class .

Subtotal, armored …

Fit for service including those under repair

Under con¬ struction

Authorized but not yet placed

Total

Number

Displace¬

ment

u

<u

JO

a

3

Displace¬

ment

U

0)

a

3

iz;

Displace¬

ment

Wl

0)

JO

a

3

Displace¬

ment

17

23

Tons

435,450

308,146

12

Tons

454,200

Tons

29

23

6

8

6

4

Tons

889,650

308,146

261,000

111,900

20,974

36,765

6

261,000

8

6

4

111,900

20,974

36,765

58

913,235

18

715,200

76

1,628,435

* Data from official publications United States Navy Department.

TABLE XV— Concluded

Fit for service including those under repair

Under con¬ struction

Authorized but not yet placed

Total

Type

U

0)

G

Displace¬

ment

l-i

<U

G

p

Z

Displace¬

ment

t-i

.B

3

Displace¬

ment

IG

3

12:

Displace¬

ment

Cruisers, second class .

4

Tons

25,065 45 , 748 205,865 49,953

10

Tons

71,000

Tons

14

Tons

96,065

Cruisers, third class .

14

14

45,748

Destroyers .

184

136

164,684

49,641

3,150

4,000

12

14,580

332

385,129

Submarines .

99

58

9

U)

166

2 99,594

Gunboats .

30

30,110

26,000

13,552

2

32

33,260

Patrol vessels .

52

8

6 60

30,000

Submarine chasers * .

176

176

13,552

Subtotal, unarmored fighting ships .

559

396,293

214

292,475

21

14,580

794

703,348

Tugs and mine sweepers .

105

68,520

5,398

227,560

283,505

23,615

34,605

20

19,700

125

88,220

Converted yachts .

5

5

5,398

Auxiliaries — fuel ships …

20

15

236,600

51,600

35

464,160

356,305

33,615

34,605

Auxiliaries — special type .

44

5

* 2

21,200

10,000

51

Miscellaneous — transports, etc .

4

4 1

5

Unserviceable for war purposes .

16

16

Subtotal, nonfighting ships .

194

643 , 203

40

307,900

3

31,200

237

982,303

T otal .

811

1,952,731

272

1,315,575

24

45 , 780

1,107

3,314,086

1 Does not include chasers scheduled for sale or other disposition.

’ Does not include displacement of 9 fleet submarines.

• One destroyer tender and 1 submarine tender.

• Transport.

• Includes 5 vessels turned over to Coast Guard Service since 1 Oct. 1919.

WARSHIPS, War Losses in.— In the Great War the principle belligerents lost the following tonnage in war vessels :

United States

Ships

Jacob Jones.. Westover… . Buena Ven¬ tura .

Minnesota…

Mohawk… .

Chauncey …

S. C. No. 141

F. 1 .

Zaanland… . Schurz .

S. C. No. 187 S. C. No. 60 S. C. No. 397 Shaw .

Tarantula… Rehoboth … S. C. No. 117

No. 3429 _

Montauk… . S. C. No. 209 S. C. No. 219 Lake Borgne.

Class

Destroyer… Army supply

Tonnage 1,265 gross.. 8,800 gross..

Army cargo .

Battleship .

Revenue cutter…

Destroyer .

Submarine chaser.

Submarine .

Cargo .

Cruiser .

Submarine chaser. Submarine chaser. Submarine chaser. Destroyer .

4,881 gross..

16,000 dis¬ placement 1,148 dis¬ placement 592 dis¬ placement 75 gross. ,

5,417 gross.. 1,630 dis¬ placement 75 gross.. 75 gross.. 75 gross.. 1,100 dis¬ placement

Special patrol …. Armed trawler… Submarine chaser.

Motor patrol .

Patrol boat .

Submarine chaser. Submarine chaser. Army account… .

254 gross.. 75 gross..

641 gross.. 75 gross.. 75 gross.. 2,100 gross,.

6

11

16

29

1

19

13

17

13

21

4 1

5

9

28

8

22

10

21

27

9

22

Date

Dec. 1917 July 1918

Sept. 1918

Sept. 1918

Oct. 1917

Nov. 1917 Dec. 1917 Dec. 1917 May 1918

June 1918 Aug. 1918 Oct. 1918 Oct. 1918

Oct. 1918 Oct. 1918 Oct. 1917 Dec. 1917 July 1918 Aug. 1918 Aug. 1918 Oct. 1918 Oct. 1918

England

Tonnage

Date

Audacious .

. 24,000

29 Oct. 1914

‘Bulwark .

. 15,000

25 Nov. 1914

Formidable .

. 15,000

1 Jan. 1915

Irresistible .

. 15,000

18 Mar. 1915

Ocean .

. 12,950

18 Mar. 1915

Goliath .

. 12,950

12 May 1915

Triumph .

. 11,800

25 May 1915

Majestic .

. 14,900

27 May 1915

King Edward VII .

. 16,350

2 Jan. 1916

Russell .

. 14,000

27 April 1916

England — Continued

Battleships Tonnage

Britannia . .

Cornwallis . .

Vanguard . .

Battle Cruisers

Queen ˆry . 27,000

I ndef atigable . 18,750

Invincible . 17,250

Cruisers

Hogue . 12,000

Cressy. . 12,000

Aboukir . 12,000

Hawke . 7 , 350

Good Hope . 14,100

Monmouth . 9,800

Argyll . 10,850

Natal . 13,660

Defence . 14,600

Warrior . 13,660

Black Prince . 13,660

Hampshire . 10,850

Cochrane . .

Drake . .

Light Cruisers

Amphion . 3,360

Pathfinder . 2 , 940

Pegasus . 2,135

Hermes . 5,600

Arethusa . 3,600

F almouth . 5,250

N ottingham . 5,440

Brilliant . .

Intrepid .

Iphigenia . .

Sirius . .

Thetis . .

Vindictive . …..

France

Battleships Tonnage

Bouvet . 12,000

Suffren . .

Gaulois . .

Danton . .

Armored Cruisers

Leon Gambetta . 12,352

Admiral Charner . 4,680

Date

9 Nov. 1918 11 Jan. 1917 9 July 1917

31 May 1916 31 May 1916 31 May 1916

22 Sept. 1914 22 Sept. 1914 22 Sept. 1914 15 Oct. 1914 1 Nov. 1914

1 Nov. 1914 28 Oct. 1915

30 Dec. 1915

31 May 1916 31 May 1916 31 May 1916

6 June 1916 4 Nov. 1918

2 Oct. 1917

6 Aug. 1914 5 Sept. 1914 20 Sept. 1914 31 Oct. 1914 14 Feb. 1916 19 Aug. 1916 19 Aug. 1916 23 April 1918 23 April 1918 23 April 1918 23 April 1918 23 April 1918 10 M.ay 1918

Date

18 Mar. 1915

26 Nov. 1916

27 Dec. 1916

19 Mhr. 1917

26 April 1915 8 Feb. 1916

France — Continued.

Germany — Continued.

Cruisers Tonnage Date

Kleber . 27 June 1917

Chateaurenault . 14 Dec. 1917

Dupetit Thouars . 7 Aug. 1918

Tbe French navy lost also among lesser craft the following: 2 gunboats; 1 torpedo gunboat; 1 sloop; 11 destroyers; 10 torpedo boats; 15 submarinesj 2 mine layers; 3 auxiliary cruisers; 2 armed merchant cruisers; 1 special vessel. Grand total — 48.

Russia.

Battleships Tonnage Date

Syobodnaya Rossiyu . 18 June 1918

Imperatritza Mariya . 20 Oct. 1916

Peresvyet . 4 Jan. 1917

Ilava . 17 Oct. 1917

Armored Cruiser

Pallada . 7,775 11 Oct. 1914

Cruiser

Chemtchug . 3,130 28 Oct. 1914

And in addition: 3 gunboats; 1 armed auxiliary; 2 mine layers; 23 destroyers; 10 submarines; 3 hospital ships; 1 auxiliary cruiser.

Battleship Kawachi .

Japan.

Date

12 July 1918

Battle Cruiser

Tsukuba . 1 Jan. 1917

Light Cruisers

Kasagi . July 1916

Otowa . July 1917

Takashiho . July 1917

And in addition 2 destroyers; 1 torpedo boat; 1 training ship; 4 special service ships. Grand total — 8.

Italy.

Tonnage

Date

Benedetto Brin .

13,215

28 Sept. 1915

Leonardo da Vinci* .

_ 22,022

Aug.’ 1916

Regina Margherita .

%

11 Dec. 1916

Armored Cruisers

Amalfi .

9,958

7 July 1915

Garibaldi .

7,234

18 July 1915

Among lesser craft Italy lost: 1 mine vessel; 1 monitor; 1 flotilla leader; 8 destroyers; 4 torpedo boats; 8 submarines; 1 gunboat; 1 transport; 2 auxiliary cruisers. Grand total — 27. Portugal: One river gunboat.

Rumania: One torpedo boat,

Greece: One destroyer.

* Afterward raised and restored.

Germany.

Tonnage

Date

Pommern .

12,997

31 May 1916

Battle Cruisers

Lutzow .

28,000

31 Mky 1916

Goeben (sold to Turkey)… .

22,635

13 Aug. 1914

Armored Cruisers

Yorck .

9,350

3 Nov. 1914

Scharnborst .

11,420

8 Dec. 1914

Gneisenau .

11,420

8 Dec. 1914

Friedrich Karl .

8,858

Dec. 1914

Bluecher . .

15,550

25 Jan. 1915

Prinz Adalbert .

8,858

23 Oct. 1915

Smaller Cruisers

Magdeburg .

27 Aug. 1914

28 Aug. 1914

Koln .

28 Aug. 1914

28 Aug. 1914

Hela .

13 Sept. 1914

orlQrnViP . - . .

4 Nov. 1914

P’.mHpn .

9 Nov. 1914

8 Dec. 1914

8 Dec. 1914

14 Mar. 1915

Konigsberg .

11 July 1915

7 Nov. 1915

17 Dec. 1915

31 May 1916

Weisbaden .

31 May 1916

Smaller Cruisers Tonnage Date

Rostock . 31 May 1916

Frauenlob . 31 May 1916

Light Cruiser

Elbing . 31 May 1916

Among lesser craft Germany lost: 28 mining vessels; 11 gunboats; 60 destroyers; 29 torpedo boats; 197 sub¬ marines; 6 mine layers; 20 auxiliary cruisers; including the Cap Trafalgar (18,710), 14 Sept. 1914; and the Kaiser Wilhelm der Crosse (13,952), 26 Aug. 1914* 2 survey ships; 16 armed auxiliaries; including some of those interned by the United States and other powers.

The ships sent to Scapa Flow, where the scuttling by their crews occurred, were: von der Tann, Moltke, Kaiser Friedrich der Crosse, Kaiserin, Koenig Albert, Print Regent Luitpold, Seidlitz, Koenig, Crosser Kurjurst, Markgraf, Kronprint Wilhelm, Derfflinger, Hindenburg, Baden, Bayern, Strassburg, Dresden, Emden, Frankfurt, Koln, Number g, Brummer and Bremser.

Austria-Hungary.

Battleships Tonnage Date

Srent Istvan . . 10 June 1918

Wien . 10 Dec. 1917

Viribus Unitis . . 1 Nov. 1918

Cruisers

Zenta . 2,264 16 Aug. 1914

Kaiserin Elizabeth . 3,937 7 Nov. 1914

Lesser craft lost by Austria included: 1 river monitor: 1 training ship; 5 destroyers; and 12 submarines. Grand total — 19 ‘

Turkey.

Battleships Tonnage Date

Mussudyeh . 10,000 14 Dec. 1914

Barbarossa . 9,900 8 Aug. 1915

Cruiser

Medjidieh . 3,330 3 April 1915

Minor losses were: 1 light cruiser; 1 armed auxiliary; 13 gunboats: 3 destroyers; 6 torpedo boats; 2 submarines; and 2 mine layers. Grand total — 28.

WART, an elevation on the skin, usually a collection of lengthened papillae, closely adher¬ ent and ensheathed by a thick covering of hard dry cuticle. From friction and exposure to the air the surface presents a horny texture and is rounded off into a small button-like shape. Simple warts are commonly seen on the hands and fingers (rarely on the face or elsewhere) of persons of all ages, but especially of chil¬ dren. Among other varieties of warts are (1) the verruca digitata, more elongated in shape and less protected by cuticle than the common wart and which is apt to occur on the scalp, especially in persons of adult age and sometimes occasions great annoyance in brushing and comb¬ ing the hair; (2) subungual warts, generally of syphilitic origin, growing, as their specific name implies, beneath or at the side of the finger or toe nail and which originate beneath the nail, as they increase crop out either at the free extremity or the side of the nail and are usually troublesome, often very painful; (3) venereal warts, caused by the direct irritation of the discharges of gonorrhoea or syphilis and occurring about the parts which are liable to be polluted with such discharges. These last at¬ tain a larger size and are more fleshy and vas¬ cular than other warts. It is supposed that warts are always due to some local_ irritation. Venereal warts are certainly contagious ; with regard to others, nothing can be said positively on this point. In consequence of the capricious way in which v/arts often undergo spontaneous cure, there are numerous popular *charms® for their removal. Common warts are so apt to

disappear that they may be often left to them¬ selves. If it is desired to remove them, glacial acetic acid mav be applied with a camel's hair pencil till the wart is pretty well sodden, care being taken not to blister the neighboring skin. One or at most two applications will usually be sufficient. Nitrate of silver and tincture of iron are popular and general applications. Salicylic acid in collodion is also very effective and so is common concentrated lye. Small warts hang¬ ing by a neck may often be very simply removed by the tight application of an elastic ligature to the base. The wart usually shrivels up and falls off within a week. Electrocautery is sometimes successfully employed. The other varieties must be left to the surgeon.

WART-HOG, an extraordinary African swine, several species of which form the genus Phacochcerus, and are so named from the pres¬ ence of a large warty protuberance on each cheek. The P. celiani of Northern Africa is familiar in Abyssinia under the names of halluf or haroja. Another specie'^ is the vlakte vark (F. cethiopicus) of Dutch South Africa, which, like the preceding form, has formidable tusk-like canines and a large wart under each eye. The animal attains a length of three or four feet and is reddish-gray with a stiff blackish mane and spinal stripe. It is fierce and courageous and fights desperately when brought to bay.

WARTA, var'ta. See Warthe.

WARTBURG, War of the, a great poetic contest which took place in 1206 or 1207, when the minnesingers assembled at the Wartburg, Germany, for a trial of their skill before Her¬ mann I, landgrave of Thuringia. The poem descriptive of the contest was entitled Kriec von Wartburg, and appeared about 1300. It is a singular, wild and inharmonious composi¬ tion, divided into two parts, and its authorship is unknown. The Wartburg festival was a cele¬ bration held at the castle by German students on 18 Oct. 1817, in the third centenary year of the Reformation. Several hundred students from 12 universities were present, and here the colors of the student societies were displayed for the first time. The participators in the festi¬ val were suspected of an intention of introduc¬ ing republicanism into Germany, and after the assassination of Kotzebue a large number of them were arrested and imprisoned, and not long afterward all participation in the student societies was forbidden by the authorities.

WARTBURG (vart'boorg) CASTLE, an ancient mountain castle of Germany, not far from Eisenach, belonging to the Grand Duke of Saxe-

Weimar. It was built between 1069 and 1072, and was the residence of the landgraves of Thuringia. The elector Frederick the Wise of Saxony caused Luther, who had been outlawed by the Diet of Worms, to be carried thither, where he lived from 4 May 1521 to 6 March 1522, engaged in the translation of the Bible. See Luther, Martin.

WARTHE, var'te, or WARTA, a European river, the principal tributary of the Oder River. It rises near Kromolov, Russian Poland, and after a northern and western course, enters Prussia at the confluence of the Prosna. It flows westerly and empties into the Oder at Kiistrin. Its total length is slightly over 500 miles.

WARTON, Joseph, English poet and critic : b. Dunsfold, Surrey, 1722 (baptized 22 April) ; d. Wickham, 23 Feb. 1800. He was the son of Thomas Warton the elder and brother of Thomas Warton the younger (q.v.). He studied at his father's grammar school at Basingstoke; then at Winchester, and finally at Oriel Col¬ lege, Oxford, where he was graduated B.A., 13 March 1743-44. During the next 10 years he served successively as curate at Basingstoke, rector of Winslade and rector of Tunworth. Then, in 1755, he became usher, or second mas¬ ter, and in 1766 headmaster of Winchester College. In 1759 he had received from Oxford the degree of M.A. ; in 1768 he received those of B.D., and D.D. He remained at Winchester 38 years, but, after suffering three student in¬ surrections, he resigned in 1793 and withdrew to a living at Wickham. There he died, 23 Feb.

1800.

Among English writers of the 18th century, Joseph Warton is significant for being probably the earliest consciously romantic poet. The romanticism evident in his hostility to the cold correctness of the school of Pope, and in his enthusiasm for Spenser, Shakespeare and Mil-ton, appears consistently throughout his works. It appears in ˆThe Enthusiast; or the Lover of Nature,ˆ 'written in 1740 when Warton was 18 and included in his first volume ˆOde on reading West's Pindarˆ (1744).

" What are the lays of artful Addison,

Coldly correct, to Shakespeare's warblings wild?

Whom on the winding Avon's willow'd banks Pair Fancy found, and

bore the smiling babe To a close cavern.”

His romanticism he again avows in the adver¬ tisement to his second volume ˆOdes on Various Subjectsˆ (1746). ®The Public has been so much accustomed of late to didactic poetry alone, and essays on moral subjects, that any work where the imagination is much indulged, will perhaps not be relished or regarded. The author therefore of these pieces is in some pain lest certain austere critics should think them too fanciful or descriptive. But as he is con¬ vinced that the fashion of moralizing in verse has been carried too far, and as he looks upon invention and imagination to be the chief facul¬ ties of a poet, so he will be happy if the follow¬ ing Odes may be looked upon as an attempt to bring back Poetry into its right channel.® This romantic creed he states even more completely in his ˆEssays on the Genius and Writings of Popeˆ (1757). This book has been called the ®most important of all the critical works that aided the Romantic movement … one of the most significant books of the whole century.® In it, Warton .openly attacked the poetry of Pope; demolished the ideals of the pseudo-classical school, and in their place set up the romantic standards that have since been ac¬ cepted. It makes Warton, despite the compara¬ tive inconsequence of his poetry, one of the most important forerunners of English Roman¬ ticism.

His chief works are ˆOde on Reading West’s Pindarˆ (1744) ; ˆOdes on Various Sub¬ jectsˆ (1746) ; an edition of Virgil in Latin and English, to which he contributed translations of the Eclo^es and the Georgies (1753) ; 24 essays, chiefly in literary criticism, contributed to ˆThe Adventurerˆ (1753-56) ; ˆEssays

on the Genius and Writings of Popeˆ (Vol. I, 1757; Vol. II, 1782), and an edition of Pope’s works in nine volumes (1797),

Arthur H. Nason,

Professor of English, New York University.

WARTON, Thomas, English writer: b. Basingstoke, 9 Jan. 1727 or 28; d. Oxford, 21 May 1790. He was the younger son of Thomas Warton, and brother of Joseph Warton (q.v.). He studied under his father until, at the age of 16,_ he matriculated, 16 March 1743-44, at Trinity College, Oxford, With this university he was associated for life. Here he received his B.A., in 1747; took orders; became a tutor; re¬ ceived the degree of M.A., in 1750, a fellowship in 1751, and the degree of B.D. in 1767. For two terms of five years each, beginning in 1757, he was professor of Poetry; and in 1785 he was appointed Camden Professor of History of Ox¬ ford, and Poet Laureate. In 1771, he was made a Fellow of the London Society of Antiquaries*, and from 1782 he was, like his brother Joseph, a member of Dr. Johnson's Literary Club.

Warton's significance in English literature consists in the influence that he exerted in favor of the romantic revival in the 18th century. In his ˆObservations on the Faerie Queen of Spen¬ serˆ (1754), in his critical edition of Milton's early poems, and especially in his great ˆHistory of English Poetryˆ (1774-81), he demonstrated to all who could understand, that English poetry did not begin with Dryden, and that it might rightfully deal with subjects other than those chosen by the Queen Anne wflts. His ˆObserva¬ tions on the Faerie Queenˆ is a strong plea for romanticism and for a study of Spenser, of chivalry, and of mediaeval life. His ˆHistory of English Poetryˆ embodies, in the clear prose style of Warton's day, a knowledge, rare even in our own, of English poetry from the close of the 11th century to the end of the Eliza¬ bethan period. Later scholarship has discovered in Warton's ˆHistoryˆ some errors of detail; but it remains, nevertheless, a monument of wide reading and profound research. In addi¬ tion to these historical and critical works. War-ton promoted the romantic movement by his experiments in the verse-forms and subject matter of Spenser and Milton. Notable among his imitations of the latter are his sonnets, his ode on the ˆApproach of Summer, > and his ˆPleasures of Melancholy.ˆ

His chief works are ˆThe Triumph of Isisˆ (1749) ; ˆNewmarket, a Satireˆ (1751) ; a humorous ˆGuideˆ to Oxford (1760) ; an anthol¬ ogy of university wit entitled ˆThe Oxford Sausageˆ (1764) ; ˆObservations on the Faerie Queen of Spenserˆ (1754) ; ˆHistory of English Poetry from the Close of the 11th to the com¬ mencement of the 18th Centuryˆ (Vol. I, 1774; Vol. H, 1778; Vol. Ill, 1781; Vol. IV, never published) ; ˆ Poems … by John Milton … wdth Notes Critical and Explanatory . . P (1785) ; a collection of his own poems (1777) ; fourth edition (1789); and another edition, corrected by himself before his death (1791). Consult his ˆLife> by C. Rinaker (Urbana,

Ill.,

1916).

Arthur H. Nason,

Professor of English, New York University.

WARWICK, wor'ik, Guy. See Guy of Warwick.

VO I-28 — 49

WARWICK, Richard Neville, Earl of, English soldier and statesman, known as the ˆKingmaker® : b. about 1428 ; d. Barnet, Hert¬ fordshire, 14 April 1471. In the battle of Saint Albans (1455), the opening action of the Wars of the Roses, he fought on the Yorkist, the winning side, and three years later as lord-deputy of Calais and admiral of the fleet gained a splendid success over the Spaniards, but a quarrel between his followers and those of the king led to charges against him which resulted in his taking the field of Ludlow with his cousin, the Duke of York 0459). On being defeated, he withdrew to Calais, and thence in the follow¬ ing summer recrossed to Kent, anjd mastering London, brought about the compromise by which Henry VI was to reign for life, but York was to be recognized as his successor. There¬ upon Margaret of Anjou, routing and slaying York and Salisbury at Wakefield, advanced to Saint Albans, where a second battle ended in Warwick's defeat. Warwick, however, joined the young Earl of March (now Duke of York), and boldly placed him on the throne as Edward IV, then chasing the Lancastrians back to York¬ shire, cut them to pieces on the field of Towton 29 March 1461. Warwick, however, bestowed his daughter on the Duke of Clarence, and after seizing on Edward's person, executing the queen's father and brother, entered upon a scheme for making Clarence king.

Failure drove him once more to France, where, through the mediation of Louis XI, he engaged to restore the crown to Henry VI, with the understanding that Margaret wed her son to Warwick's daughter Anne. His landing in Devonshire came like a clap of thunder to Ed¬ ward IV, who from the North, where he was busy quelling a revolt, escaped to Burgundy, leaving Warwick master of the kingdom. Ed¬ ward returned in six months' time, and War¬ wick with his brother was routed and slain at Barnet.

WARWICK, England, a market-town, capi¬ tal of Warwickshire, on the right bank of the Avon, nine miles northwest of London. The principal buildings are the church of Saint Mary, the Earl of Leicester's hospital for aged breth¬ ren, the shire-hall, jail, museum, endowed gram¬ mar school, east and west gates, *etc.* The chief manufacture is gelatine ; and the trade in cattle, corn and provisions is considerable. On the opposite bank of the river, crowning a solid rock, is the ancient and magnificent castle, the residence of the earls of Warwick. The date of the original erection is unknown. Caesar's Tower, the most ancient part of the structure, is 147 feet high ; Guy's Tower, 128 feet high, was erected in 1394. The approach to the grand front exhibits three stupendous towers, and the entrance is flanked with embattled walls covered with ivy. It was partially destroyed by fire in 1871 ; but the most ancient portion re¬ mains uninjured. Pop. 12,500.

WARWICK, N. Y., village in Orange County, on the Wawayanda Creek, and on the Lehigh and Hudson River Railroad, about 30 miles southwest of Newburgh and 10 miles south of Goshen. It is in an agricultural re¬ gion and near by are iron mines and granite quarries. In the vicinity are -the beautiful lakes Glennere, Greenwood, Clark's and Wawayanda. The manufacturing establishments are railroad

shops, a foundry, creameries and fabric-hose works. It has six churches, Warwick Institute, .graded schools and a school library. There are two banks. The village is a favorite summer resort. Pop. (1920) 2,420.

WARWICK, R. I., town in Kent County, on the Pawtuxet and the Providence rivers, the Cowsett and Narragansett bays and on the New York, New Haven and Hartford Railroad. It is five miles south of Providence. The town includes several villages, in each one of which there are graded schools, and in some, libraries. The largest of these villages is West War¬ wick, which in 1915 had 15,782 population, and Warwick 13,302. The manufacturing interests, which are large, centre chiefly in West War¬ wick, which has large cotton mills, machine shops, grist mills, a thread mill and a bleachery. Warwick

was settled in 1642 by a colony of 12 Englishmen, under the leadership of Samuel Gorton. The place was first called Shawomet, but in 1848 the name was changed by admirers of the Earl of Warwick. Massachusetts claimed control of the colony and in 1643 one result of the contentions was that the place was nearly destroyed. Indians attacked the place several times, and in 1676 burned a number of houses and wounded many of the defenders of the town. Nathanael Greene (q.v.) was born in Warwick.

WASATCH (wa'sach) MOUNTAINS, a

range in Utah, the eastern boundary of the Great Basin, extending from the northern boundary of the State south to the southern edge of the State, approaching the Grand Canon of the Colorado. Several peaks are nearly 12,000 feet high ; at the base and among the foothills are deep canyons. Silver in large quantities is found in these mountains, also coal. See also Rocky Mountains; Utah.

WASCO (was'ko) INDIANS («grass» or ^^grass people^U, a tribe of the Chinookan stock of North American Indians, also known as Dal¬ les Indians and as Wascopums. They formerly claimed the country about The Dalles, on the south bank of Columbia River, in Wasco County, Ore., therefore forming, with the Wushgum or Tlagluit, the easternmost exten¬ sion of the Chinookan stock. They were par¬ ticipants in the Wasco treaty of 1855 and are now on Warmspring Reservation, Oregon, num¬ bering about 250.

WASECA, wa-se'kaj Minn., city, county-seat of Waseca County, on Clear Lake, and on the Minneapolis and Saint Louis and the Chi¬ cago and Northwestern railroads, about 60 miles south by west of Minneapolis and 25 miles south by east of Mankato. It is in an agricultural and stock-raising region. It has a large roller mill, railroad shops, flour mills, creameries and machine shops. The Minnesota Chautauqua holds its sessions on their grounds bordering on the lake and adjoining the city. There are 12 churches, the Holy Child Jesus Academy, graded public schools, a school library and two newspapers. Pop. (1920) 3,908.

WASH, England, a wide estuary on the east coast, between the counties of Lincoln and Norfolk, 22 miles in length and 15 miles in average breadth. -It is surrounded by low and marshy shores and receives the Witham, Wel¬ land, Ouse and Nen rivers. The estuary for

the most part is occupied by sandbanks, dry at low water and intersected by channels through which the rivers flow into the North Sea. On both sides of the channel by which the Ouse falls into the sea considerable tracts of land have been reclaimed. Anchorage is afforded to vessels by two wide spaces or pools of water, called respectively Lynn Deeps, oppo¬ site the Norfolk, and Boston Deeps, off the Lincoln coast.

WASH BOTTLE, in analytical chemistry, an apparatus used for delivering a fine jet or stream of liquid on to a precipitate for the pur¬ pose of washing it, or for removing any residue of a solution or solid particles from one vessel to another. It consists of a flask of hard glass, fitted with a cork or india-rubber stopper per¬ forated in two places. Through each perfora¬ tion is passed a piece of bent glass tubing, one being carried to within half an inch of the bot-' tom of the flask, and the portion of tubing out¬ side drawn to a fine open point. The other tube is carried just within the bottle, and it is to the outer end of this that the lips are applied in blowing into the apparatus in order to expel the liquid contained in it.

WASHBURN, wosh'bern, Cadwallader Golden, American soldier, son of Israel Wash¬ burn (q.v.) : b. Livermore, Me., 22 April 1818; d. Eureka Springs, Ark., 14 May 1882. He studied law, was admitted to the bar in 1842 and engaged in practice at Mineral Point, Wis. He founded a bank there in 1852, dealt extensively in real estate and in 1855-61 was a member of Congress. At the outbreak of the Civil War he organized a cavalry regiment, of which he was appointed colonel. He was engaged in the Arkansas campaign, received his commission as major-general of volunteers in 1862, participated in the movements around Vicksburg and later was assigned to command the 13th corps in the Department of the Gulf. He was transferred to Texas with a portion of his command in 1863, captured Fort Esperanza, 29 Nov. 1863, and in 1864 was placed in com¬ mand of the district of West Tennessee. He was again member of Congress in 1867-71, was governor of Wisconsin in 1871-73 and subse¬ quently engaged in lumber and flour manufac¬ turing. He founded the Washburn Observa¬ tory at the University of Wisconsin.

WASHBURN, Charles Ames, son of Is¬ rael Washburn (q.v.), American editor and diplomat : b. Livermore, Me., 16 March 1822 ; d. New York, 26 Jan. 1ˆ9. He was graduated at Bowdoin in 1848, went to California in 1850, entered journalism in San Francisco and be¬ came editor and proprietor of the Alta Califor¬ nia, the first newspaper on the Pacific Coast to advocate the principles of the Republican party, of which he was one of the organizers in that State. From 1858 to 1861

he was editor and proprietor of the San Francisco Daily Times. In 1860 was chosen elector-at-large, and in the following year was appointed by President Lin¬ coln Minister to Paraguay, a post which he occupied for seven years, covering most of the period of the war between that country and Brazil and her allies. In 1868, under the tyranny of Francisco Solano Lopez (q.v.), many foreigners, as well as Paraguayans, were put to death on an unfounded charge of conspiracy

against the government, and Washburn, on ac¬ count of his efforts to save the lives of his associates, was accused of complicity in the plot. His life was preserved through the interven¬ tion of a United States naval force, the gun¬ boat Wasp taking him away from the country. Disagreement with certain naval officers grew out of these incidents, and the circumstances were investigated by the House Committee on Foreign Affairs. The result was Washburn's complete vindication. He published a ˆHistory of Paraguay, with Notes of Personal Observa¬ tions and Reminiscences of Diplomacy under Difficulties^ (1871), giving a graphic account of these events; ˆFrorh Poverty to Compe¬ tence^ ; ˆGraduated Taxation^ ; 'ˆPolitical Evo¬ lution^ ; and several novels. He was the in¬ ventor of a typograph and other mechanical devices.

WASHBURN, Elihu Benjamin, Ameri¬ can diplomat, son of Israel Washburn (q.v) ; b. Livermore, Me., 23 Sept. 1816; d. Chicago, Ill., 22 Oct. 1887. He was educated at Har¬ vard, admitted to the bar in 1840 and engaged in practice at Galena, Ill. He was a member of Congress from 1852-69, when he was ap¬ pointed Secretary of State by President Grant, an office he soon afterward resigned in order to become Minister Plenipotentiary to France. He was the only Foreign Minister to remain at his post in Paris throughout the Franco-Prussian War, and the American legation be¬ came a refuge for Germans and other foreign¬ ers unable to leave the city during the siege of the, city and the period of the Commune. His firmness in his course won the gratitude of the European governments and he was granted special honors by the German emperor and Bismarck, as well as by the French leaders, Gambetta and Thiers. He returned home in 1880. He published ˆRecollections of a Minister to France^ (1887).

WASHBURN, Emory, American jurist: b. Leicester, Mass., 14 Feb. 1800; d. Cambridge, Mass., 17 March 1877. He entered Dartmouth College, and from there went to Williams, where he was graduated in 1817. Admitted to the bar in 1821, he practised in Leicester until 1828, and for the next 30 years in Worcester. Having served in both branches of the Massa¬ chusetts legislature, in 1844 he became a

justice of the Court of Common Pleas, a position which he held three years. In 1854-55 he was governor of the State. From 1856 to 1876 he served as Bussey professor in the Harvard Law School. Besides lectures, pamphlets, etc., his legal publications include ˆAmerican Law of Real Propertyˆ (1860) and < American Law of Easements and Servitudesˆ (1863).

WASHBURN, George, American educator: b. Middleboro, Mass., 1 March 1833; d. 1915. He was graduated from Amherst in 1855 and from Andover Theological Seminary in 1859. He was appointed professor of philosophy at Robert College, Constantinople, Turkey, in 1868; served as acting president there in 1870-77 and then president to 1903. He was an authority on the politics of southeastern Europe and in recognition of his services in behalf of Bulgarian liberty and the general elevation of the people he received from the first Bulgarian Parliament a vote of thanks, and in 1884 from the Prince of Bulgaria the Order of Saint

Alexander. He delivered an address on Mo¬ hammedanism at the World's Parliament on Re¬ ligions at Chicago in 1893, and in 1908 returned to the United States, publishing the following year his ˆFifty Years in Constantinople,ˆ which required several editions.

WASHBURN, Israel, American shipbuilder and trader; b. Raynham, Mass., 18 Nov. 1784; d. Livermore, Me., 1 Sept. 1876. In 1806 he removed to Maine, then a part of Massa¬ chusetts, and having a population of about 200,000. Two years later at a place th'en called White's Landing .(now Richmond), on the Kennebec River, he began shipbuilding in part¬ nership with Barzillai White, and in 1809 es¬ tablished a trading-post at Livermore (now in Androscoggin County), where he soon after settled. He reared many children and several of his sons rose to positions of distinction, mak¬ ing the family name conspicuous in American history.

WASHBURN, Israel, Jr., American lawyer and ˆW'ar Governor,® son of the preceding; b. Livermore, Me., 6 June 1813; d. Philadelphia, 12 May 1883. He studied law, was admitted to the bar in 1834, and in the same year settled at Orono, Me., where he practised his profession continuously until 1850, when he was elected to Congress. • He was four times reelected and became prominent among the anti-slavery mem¬ bers of the House in the critical period just before the Civil War. In 1860 he was elected governor of Maine. Reelected in 1861, he de¬ clined a third election, and in 1863 accepted an appointment as

collector of customs for the port of Portland, an office which he continued to hold until 1877. During his terms as gover¬ nor he energetically supported the Federal gov¬ ernment by raising, equipping and forwarding troops with a promptness which ensured to Maine an honorable position among the States that upheld the Union cause, and placed his own name in the list of great ^^War Governors® of the period. In 1875 he was elected to the presi¬ dency of Tufts College, but declined the office. He published ^ Notes, Historical, Descriptive, and Personal, of Livermore, Maine^ (1874), and also contributed frequently to periodicals.

WASHBURN, Margaret Floy, American psychologist; b. New York, 25 July 1871. She was graduated at Vassar College in 1891, and took her Ph.D., at Cornell University in 1894. She was professor of psychology and ethics at Wells College in 1894—1900; warden of Sage College, Cornell, in 1900-02; and assistant pro¬ fessor of psychology at the University of Cin¬ cinnati in 1902-03. In 1903-08 she was asso¬ ciate professor of philosophy at Vassar; and since 1908 she has been professor of psychology there. She is author of many contributions to philosophical journals and of ^Animal Mind: Textbook of Comparative Psychology^ (1908) ; ^Movement and Menial Imagery^ (1916).

WASHBURN, Samuel Benjamin, Arnerican naval officer, son of Israel Washburn (1784— 1876) (q.v.) ; b. Livermore, Me., 1 Jan. 1824. He became a shipmaster in the merchant ma¬ rine, and later engaged in the lumber trade in Wisconsin. During the Civil War he entered the United States naval service as a volunteer and at the battle of Fort Darling won special commendation for skill and gallantry. Later

he commanded a squadron and performed many valuable services for the government.

WASHBURN, William Drew, American legislator and manufacturer, son of Israel Washburn (q.v.) : b. Livermore, Me., 14 July 1831. He was graduated at Bowdoin in 1854, admitted to the bar in 1857, and in that year engaged in law practice in Minnesota. He was a member

of the Minnesota legislature in 1859 and in 1871 ; was surveyor-general in 1861-65 ; served in Congress in 1879-85 ; and in 188W95 was a United States senator. He engaged extensively in the lumber and flour industries, was one of the builders of the Minneapolis, and Saint Louis Railroad, of which he was president until 1889. He later became president of the Bismarck, Washburn and Great Falls Railroad Company.

WASHBURN, Me., town in Aroostook County, on the Aroostook River, 50 miles north by west of Houlton. It is a distributing centre of considerable importance, although it is eight miles from a railroad station. It is a favorite summer resort. It has three churches, a high school, graded school and public library. Pop. 1,582.

WASHBURN, Wis., city, county-seat of Bayfield County, on Lake Superior and on the Northern Pacific and the Chicago and North¬ western railroads, about 50 miles east of Su¬ perior and 200 miles northeast of Minneapolis, Minn. In 1665 a Jesuit mission was estab¬ lished in the place now occupied by the city. Washburn's first permanent settlement was made in 1883, and in 1884 it was incorporated. In the vicinity are large manufactories of ex¬ plosives, brownstone quarries and in the forests there is considerable lumbering. There are nearly 2,000 employees in the industrial estab¬ lishments. Washburn ships large quantities of stone, lumber and grain ; and distributes to the lumber camps and the towns and hamlets of the vicinity general merchandise. There are several church buildings, the county court¬ house, which cost $50,000, and several good business blocks. The educational institutions are the Walker High School, founded in 1889 (building cost $40,000), three graded schools, one large Roman Catholic parish school and a school library. There are two banks and two newspapers. The majority of the inhabitants are Scandinavians. Pop. 3,830.

WASHBURN COLLEGE, located at To¬ peka, Kan. It was founded in 1865 by the General Association of the Congregationalists of Kansas, but is non-sectarian in policy and government. It was first called Lincoln College and the name changed in honor of Ichabod Washburn of Worcester, Mass., who gave the college $25,000. The college is coeducational. The course of study was at first not above the academic grade, but was soon expanded to a full college course and other departments added until the college now includes four depart¬ ments: (1) the College; (2) the School of Law, opened in 1903; (3) the School of Fine Arts; (4) the Summer School. The college confers the degrees of B.A., and B.S., for the completion of a four years' course and the degrees of M.A., and M.S., for graduate work. For the bachelor degrees

the course in the first two years is partially prescribed and

partially elective, for the last two years, entirely elective. The electives must include a major and a minor taken in courses not open to fresh¬ men and totaling 28 hours. Candidates for the B.S., degree must elect the mathematic and science for their major and minor requirements. Biblical literature, Hebrew and pedagogical courses are included in the curriculum. The School of Law offers a three years' course and confers the degree of LL.B. The School of Fine Arts was organized a's a separate school in 1903, music and art departments having been established some years before. This school in¬ cludes the departments of music, drawing, painting and expression. The music depart¬ ment offers four years' collegiate courses in pianoforte, organ, violin and vocal culture, leading to the degree of bachelor of music ; and a two-year normal course for public school teachers. The students maintain five literary societies, two for men and three for women, an oratorical association, Christian associations, and an athletic association. In addition to the intercollegiate sports in which the college par¬ ticipates, an annual college field-day has been inaugurated. The college occupies a campus of 160 acres just outside the city on elevated ground; the buildings include Rice Hall (origi¬ nally Science Hall, the name having been changed in 1902), Whitin Hall, the observatory building (erected in 1903 for the departments of physics and astronomy), the MacVicar chapel, the Library, Hartford Cottage and Hol¬ brook Hall (women's dormitories), Carnegie library and Thomas gymnasium. The library contains 26,000 volumes ; in addition the school of law has a separate library. The Topeka Public, the Kansas State, the Kansas State His¬ torical Society and the Academy of Science libraries are open to students. The enrolment averages 700 students, of whom about two-thirds are in the college department.

WASHING OF FEET. See Feet Wash¬ ing.

WASHING MACHINE, a machine for washing clothes. A great number of machines have been contrived, the most general feature of them being that the clothes are agitated by artifical means in a vessel or trough containing the cleansing agents. One of the great advan¬ tages of the washing machine as compared with the hands is that the water can be used when boiling hot. In some, provision is made for retaining the steam which effectually bleaches the clothes, and they generally have also roller attachments for wringing and mangling. See Laundry Machinery.

WASHINGTON, w6sh’mg-t6n, Booker Taliaferro, American negro educator : b. near Hale’s Ford, Franklin County, Va., about 1858; d. 14 Nov. 1915. After the Civil War he went to Malden, W. Va., where he worked first in a salt-furnace and afterward in a coal-mine, obtained some rudiments of education in a night-school there, and finally after many diffi¬ culties, recounted in the autobiography <Up from Slavery^ (1901), got to the Hampton Normal and Agricultural Institute (Va.) (q.v.), where he studied in 1872-75. After a two-years’ interval of teaching at Malden, he ob¬ tained further training at the Wayland Semi¬ nary (Washington D. C.), and in 1879 was

made an instructor at Hampton. He had charge of the work of the Indian pupils then being experimentally introduced into the insti¬ tution and established the night-school as a regular and successful feature of the institute. In 1881 he was selected by Gen. S. C. Armstrong of Hampton on the application of citizens of Tuskegee, Ala., to start in that place in insti¬ tution on the plan of Hampton. The State legislature granted an appropriation of $2,000 annually for the salaries of the teaching force, but the Tuskegee Normal and Industrial Insti¬ tute (q.v.) then existed in name only, without land, buildings or credit. Washington, with himself as the only instructor, opened the school with an enrolment of 30 in an old church and a shanty. Later he purchased a plantation about a mile from Tuskegee, and re¬ moved the school thither to its present site. In 1918 the institution had 191 officers and in¬ structors, 1,451 students and over 2,500 gradu¬ ates. Its development was due chiefly to the activity of Washington in bringing the nature and merits of the work to public attention, and the originality and effectiveness of his methods. He has aimed to give the blacks a practical education along lines of trade and indus¬ try, leading to an ultimate position of eco¬ nomic independence in the South. If this were attained he asserted, political rights now de¬ nied would not long be withheld. He became well known as a forceful public speaker, his most noteworthy address probably being that given in 1895 at the opening of the Cotton States and International Exposition in Atlanta, Ga. He organized the National Negro Busi¬ ness League , at Boston in 1900. Among his writings are ‘ˆThe Future of the American Ne¬ groˆ (1899); ˆUp from Slaveryˆ (1901), the interesting autobiographical narrative referred to above; ˆCharacter-Buildingˆ (1902), col¬ lected addresses to pupils of Tuskegee; and ˆThe Story of the Negroˆ (1909) ; ˆThe Man Farthest Downˆ (1912). Consult Thrasher, M. B., ˆTuskegeeˆ (1900), to which Washing¬ ton contributed an introduction; an article by W. D. Howells (in the North American Re¬ view, Vol. 173, pp. 280-288, 1901) ; his ‘Life> by Stone and Scott (Garden City 1916) ; and Riley, D. F., ˆThe Life and Times of Booker T. Washingtonˆ (New York 1916).

WASHINGTON, Bushrod, American ju¬ rist: b. Westmoreland County,

Va., 5 June 1762; d. Philadelphia, 26 Nov. 1829. He was nephew of George Washington. He was grad¬ uated in 1778 from the College of William and Mary; studied law with James Wilson (1742-98) at Philadelphia and practised in Westmore¬ land County with much success. From 1780 until the surrender at Yorktown, he served in Colonel Mercer's cavalry troops, in 1787 became a member of the Virginia house of delegates; and in 1788 of the Virginia con¬ vention for ratification of the Constitution of the United States. In December 1798 he was appointed an associate justice of the United States Supreme Court. He was the first presi¬ dent of the American Colonization Society (See Colonization Society of America, The Isˆational). Among his publications are < Re¬ ports of Cases in the Court of Appeals of Vir¬ giniaˆ (1793-99) ; ˆReports of Cases Deter¬ mined in the Circuit Court of the United States

for the 3d Circuit, 1803-27ˆ (edited by R. Pe¬ ters, 1826-29). Consult Binney, ˆLifeˆ (1858).

WASHINGTON, George, American sol¬ dier-statesman, and first President of the United States : b. in the family homestead at Bridges Creek, in Westmoreland County, Va., 22 Feb. 1732; d. Mount Vernon, 14 Dec. 1799. He was the fifth child of Augustine Washing¬ ton, who belonged to the third generation of Washingtons who had lived in America. Au¬ gustine was a well-to-do planter who might have afforded every school advantage to his son had he not died before George was 12 years of age. The father's death left the son in his mother's care, with a farm on the Rappa¬ hannock as his sole inheritance. This pre¬ cluded any hope of an education in England such as his elder brothers had enjoyed, and he, therefore, received the practical and elementary instruction afforded in colonial Virginia. He learned something in books but more about the forest life, and manly sports, and the habits of a Virginia gentleman. Formal schooling he quit altogether at the age of 16, and began surveying in the employment of Lord Fairfax, an Englishman who came to Virginia to look after his inherited lands, and whose companion¬ ship taught Washington some of the conduct and breeding of a man of the world. Though Washington was a mere boy and almost self-taught in surveying, yet he was a good woods¬ man, and he did his work so well on Lord Fairfax's forest lands that for three years he was kept busy at the profession, which in that day approached nearer to woodcraft than ex¬ pert mathematics. Meanwhile he did not neg¬ lect to give considerable time to the study of military tactics and the manual of arms, for which a Virginian of his standing might have use.

This life came to an end in 1751, when the failng health of his elder brother Lawrence caused him to seek recuperation in the Baha¬ mas. Thither George went with him, only to bring him back to die. As executor of his brother's will, he assumed so many cares that his surveying profession had to be abandoned altogether.

Before Lawrence's death he had given George his place in the Virginia militia, and in 1752 Lieutenant-Governor Dinwiddie gave the popular young soldier a commission as major and adjutant-general in charge of one of the four military districts of the State. Hardly was he in charge of his new office when a movement of the French to insure their control of the region between the Mississippi and the Alleghanies made war between the French and Eng¬ lish in America almost inevitable. From Canada the French had sent 1,500 men to Presque Isle on Lake Erie to erect a fort, intending thence to push through the forest to the Allegheny River and down it to the Ohio. There they would drive out the English, who were beginning to push into that region.

Governor Dinwiddie saw the danger and, after getting authorization from England, he selected Major Washington for a dangerous midwinter journey through the forest to the French fort to command them to depart and not to trespass upon England's claims. The hardy young surveyor made the terrible journey only to be given the hint that the French had come to stay. Upon his return, the Virginia assembly was persuaded to furnish funds for

a force to be sent against the invaders. Wash¬ ington was made lieutenant-colonel, and under Colonel Fry set out to resist the French ad¬ vance. Fry died on the march, and Washington bore the brunt of the enterprise. A rough and ready fort built by an advance party of back¬ woodsmen near the junction of the Ohio and the Allegheny was taken by the French, who thereupon built Fort Duquesne and awaited the Virginians. In that neighborhood, at , Great Meadows, Washington camped. A skirmish took place in which a small body of French under Jumonville were defeated, and then the defenses, which Washington had built and called Fort Necessity, were attacked, 3 July 1754, by superior French forces. A wretched day of fighting in the rain was followed by a parley, at which Washington sensibly agreed to withdraw from a hopeless conflict. Upon his return to Virginia he was unfairly reduced in rank, and indignantly resigned his commission.

The war for the possession of America was now taken up by the home? ‘government. Eng¬ land sent the headstrong General Braddock to help the English colonists to drive out the French. Upon his arrival in Virginia he made the acquaintance of Washington and offered to make him a member of his staff — an offer which was eagerly accepted. Braddock did not realize the difficulties of forest warfare, and wdthout heeding some of the wise counsel given him by Americans, he pushed toward Fort Duquesne with 2,000 regulars brought from England and some provincial recruits. Eight miles from the French fort, he was attacked by an unseen enemy, and the terrified regulars were held in solid ranks to be shot down until sheer fright made them break into retreat. Braddock was mortally wounded, and it was left to Washington to conduct the retreat. After he had led the shattered forces back to Virginia, he became for a time the chief stay of his province in guarding her frontiers against the savages, until, in 175ˆ8, he was sent with the British General Forbes again to attempt the capture of Fort Duquesne, and this time success crowned the effort. Then Quebec fell, and England’s power in America was firmly established.

When England and her colonies quarreled, Washington took an early and decided part in asserting and defending the colonial rights, though with other American leaders he long looked and hoped for conciliation. To him the Stamp Act was *a direful attack on the liber¬ ties of the colonists.® In 1769 he thought some¬ thing must be done

ˆffo maintain the liberty which we have derived from our ancestors.® He approved of awakening English attention to American rights ˆˆby starving their trade and manufactures,® and as a mernber of the Vir¬ ginia assembly he presented a non-importation agreement, and secured its passage. He was present and gave his support, in 1773, to the resolves instituting a committee of correspond¬ ence, and in 1774 he favored the proposed gen¬ eral congress at Philadelphia. On 1 Aug. 1774 the convention met which elected him, with six others, delegates to the first Continental Con¬ gress, where he was in the opinion of Patrick Henry ˆunquestionably the greatest man on the floor,® as far as solid formation and sound judgment was concerned. When the second Continental Congress met, 10 May 1775, he

was again a member, but he was not long to remain there.

After 10 long years of growing irritation be¬ tween England and America the first blow had been struck. The enraged farmers had fol¬ lowed the intruding British from Concord and Lexington to the very defenses of Boston, and then with their numbers ever-increasing they settled down in a great half-circle around the town with the purpose of driving Gage, the British commander, into his ships. Everything was in confusion and men came and went much as they chose, kept to their task only by the efforts of a few natural leaders. When the men of New Hampshire and Rhode Island and Connecticut came, not even the fanatic zeal of the siege could banish the provincial jealousies. It was plain to all that there could be no great thing accomplished without a strong leader, one who would make men forget, for a time at least, the most prominent fact in colonial life — the jealous love that every man had for his own colony.

The Continental Congress was forced after a month of hesitation to assume the army be¬ fore Boston as the ˆContinental Army.® As a commander-in-chief they needed a man who could by his personal influence draw the south¬ ern and middle colonies into the struggle which New England had thus far made alone. In this critical moment John Adams saw the wisdom of binding the South to New England's for¬ tunes by choosing a Virginian to lead her army. Local prejudice would have chosen John Han¬ cock, who was bitterly chagrined that he missed the office. At Adams' suggestion the choice fell upon Col. George Washington, who every day since the session began had sat in Congress in his uniform.

The new commander-in-chief was a physical giant, over six feet, and

of wˆell-proportioned weight. His composed and dignified manner, and his majestic walk marked him an aristo¬ crat and a masterful man. This character was heightened by a well-shaped, though not large head set on a superb neck. His blue-gray eyes, though penetrating, were heavy-browed and widely separated, suggesting a slow and sure mind rather than wit, and brilliant imagination. Passion and patience, nicely balanced, appeared in the regular, placid features, with the face muscles under perfect control. A resolutely closed mouth and a firm chin told of the perfect moral and physical courage. His clear, pale, and colorless skin never flushed in the greatest emoti'on, though his face then became flexible and expressive. Mentally, the directive facul¬ ties were the more marked. He had been but half-educated, with no culture except that com¬ ing of good companionship. From that he had learned rather the tastes of a country gentle¬ man, courtesy, hospitality and a love of sport. The soundness of his judgment and the solidity of his information were the notable qualities. He had little legal learning and was too shy and diffident for effective speech. His elo¬ quence was the eloquence of battle. It had the note of challenge, and the gesture of chivalry when it threw down the gage of mortal combat.

will raise one thousand men,® he said in 1775, ˆˆat my own expense, and march myself at their head for the relief of Boston.® Of origi¬ nal statesmanship he had little, but he had ˆcommon sense lifted to the level of genius.®

Believing in a course, he followed it, single-minded, just, firm and patient. No rash action or personal caprice was ever charged to him. He was able to bear great responsibility, and courageously to meet unpopularity and mis¬ representation. There was no flaw in his de¬ votion. He was ®often anxious, but never despondent.® ˆDefeat is only a reason for exertion,® he wrote. «We shall do better next time.® This spirit, and his gift for military ad¬ ministration, were the winning traits in the years to come.

On the day before the Continental army fought at Bunker Hill, 16 June 1775, Wash¬ ington accepted the command in his modest way, refusing to accept any pay for his services, except his actual expenses. To his wife, the one person to whom he could lay bare his heart, he wrote : «I assure you in the most solernn manner that so far from seeking this appointment, I have used every endeavor in my power to avoid it … from a conscious¬

ness of its being a trust too great for my capacity.® kind of destiny® had thrown

him into this service, and he could not refuse.

Upon his arrival at Boston, 2 July, Wash¬ ington found his army an armed mob. They had done creditable things, but in a blundering, unmilitary way. Rude lines of fortifications extended around Boston, but they were exe¬ cuted with crude tools and without competent engineers. A few officers were looking after the commissary department, but there was no head. No able officer looked after the recruit¬ ing and mustering service, or the barracks or hospital, and there was only a haphazard method of paying the soldiers. There was no uniform, and the very differences in costume augmented the colonial jealousies and self-consciousness. All that distinguishes a well-drilled and equipped army from a mob was wanting; yet here was the weapon with which Washington was expected to defeat the armies of the most powerful nation of the world. Only by the exercise of all his gifts as an administrator did he get even the semblance of an army. His own great care for details, his method and punctuality had their

effect upon others, and, though there was malingering, desertion and petty mutinies, the enemy never knew that the army before Boston was often on the point of dissolution. When, in Decem¬ ber, the terms of enlistment ran out, Wash¬ ington even succeeded, as he said, in disband¬ ing one army and raising another within cannon shot of the enemy. Then early in March 1776 he made an adroit move, seized Dorchester Heights, and left the British nothing to do but evacuate Boston in the utmost haste.

The American leader had scored his first triumph, and, that assured, he hastened with his army to New York, where, it was shrewdly judged, the British would strike next. Con¬ gress urged him to hold the city at all hazards, and contrary to his better sense, he attempted the impossible. Without the control of the sea. New York, on its narrow strip of land thrust far down between two navigable waters, was a deadly trap. A military genius would have refused the risk, but Washington ventured it, half believing for a time that he might succeed. He placed his army in a position where every probability pointed to defeat, followed by almost certain capture or destruction. Had

Howe not taken such tender care of his enemy's safety, all might have ended there. Washing¬ ton was able to withdraw from Brooklyn, 30 Aug. 1776, after the defeat on Long Island, and then to evacuate New York and get behind the Haarlem, because, as an English critic said, Howe calculated with the greatest accuracy the exact time necessary to allow his enemy to escape. The unbounded confidence of Wash¬ ington's countrymen had proved too much on this occasion for even his steady judgment, and in response to their enthusiasm he had tried to hold a position and defend a place for which his resources were inadequate. He had become for the moment a source of danger to the Americans because they did not understand his real greatness.

Washington realized keenly his own lack of military experience on a large scale — he had no heaven-born genius, and he knew it. The skill that he finally attained was that which a strong-brained, sensible man would get in any vocation which he plied industriously, and to which he gave his heart. Washington learned as he fought, and his early errors with the con¬ sequent disaster grew steadily less, until, as a master of his profession he issued from the war without a peer and almost beyond th6 reach of envy. Yet not even his ultimate mili¬ tary greatness explains his real service to his countrymen. It was the confidence that Wash¬ ington inspired as a man, rather than his great

genius as a soldier, which made him the only man in America who could carry the Revolu¬ tion to a successful issue.

After losing New York Washington fought step by step, as he retreated, repulsing the British at Haarlem Heights and holding his own at White Plains, 28 Oct. 1776, but the med¬ dling of Congress cost him some 3,000 men cap¬ tured in Fort Washington, and then there was nothing for him but a retreat from the Hudson •through New Jersey. This was not the only time that the democratic faction in Congress forced their military plans upon their com¬ mander-in-chief. He was much hampered at first by Congressional interference in his mili¬ tary plans, but he soon won the limitless faith of these democratic enthusiasts, conquering all their fear of military despotism and gaining in the disposal of his own army the supremacy of a Frederick or a Gustavus Adolphus.

As the American army fell back mile after mile the character of the leader was tested to its utmost. His generals grew insubordinate, his men deserted by whole companies, through¬ out the Jerseys thousands took oath of allegiance to George HI, and everywhere there were mur¬ murs of. discontent with this sort of a campaign. Then it was seen that Washington's courage was not mere disregard of danger, but the sort that long endures uncertainty and never shrinks responsibility, bearing in silence temporary unpopularity or exasperating misrepresentation.

When the army at last crossed the Delaware the roll-call would muster but 3,000 men. Straining his powers to the furthest bounds, Washington kept this force together, and added as many more. Concerning some of his ex¬ traordinary measures, Washington wrote Con¬ gress : ^^A character to lose, an estate to for¬

feit, the inestimable blessing of liberty at stake, and a life devoted must be my excuse.® Be¬ fore the holidays he was ready to strike a blow

for liberty, and to sustain his character. Cross¬ ing the Delaware, 25 Dec. 1776, in spite of pitchy darkness and grinding ice, he marched through a sleeting storm nine miles to Trenton. The Hessians there were surprised and driven to surrender. Some 900 prisoners were taken to the other side of the river, and then Wash¬ ington crossed again to win another victory at Princeton. The whole situation was changed. The wretched retreat was forgotten or regarded as only the prelude to the startling and brilliant victories. In England, Walpole declared that Washington was both a Fabius and a Ca-millus. His whole campaign got a new color because of its issue. In the Russian court, in Frederick's cabinet, and in the aristocratic cir¬ cles of Paris, Madrid and Vienna the campaign was praised as if the end had been in Washing¬ ton's view from the first. The victories made Washington's military reputation rest on some¬ thing tangible, to which men might point. Mere faith such as the Americans had shown hereto¬ fore had little effect on foreign critics. The European soldiers grew more interested, and their favorable opinion had vast influence in winning foreign aid. Washington had been so consistently patient and brave in adversity, so silent under unjust criticism, never talking down his mistakes, or glossing his errors, that the hour of victory brought its ten-fold reward in sympathy and confidence. He had quietly as¬ sumed so much obloquy that any stint of his praise seemed unjust and ungenerous. The vic¬ tories renewed American confidence in their leader, and from that time on whatever there was of unity for political or military purposes among the 13 States came of the common faith in Washington.

Congress now put its whole trust in him — until a temporary reverse put him again in the shadow of its distrust. It provided for long enlistments to take the place of the evanescent three months' levies that had ruined Washing¬ ton's army heretofore, just as he had it drilled. He was made a veritable dictator as to all that might affect the success of the army, its disci¬ pline and its supplies. It was well that the commander-in-chief had made this brilliant stroke, which appealed to all those who saw only the surface of the Revolution. For 18 months thereafter nothing but reverse and mis¬ fortune and terrible trial fell to the leader's lot. While Gates was gathering unearned laurels at Saratoga, and the American cause was vastly, advanced by Burgoyfie's defeat and the conse¬ quent French alliance — while others were get¬ ting glory and significant victories,

Washington was manoeuvring with Howe, always refusing battle, or, as at Brandywine Creek, 11 Sept. 1777, and Germantown, 4 Oct. 1777, meeting de¬ feat. To the superficial observer there was only failure for Washington and success for his rivals. There seemed no great work in merely keeping an army together, delaying Howe and keeping him from going north to Burgoyne's rescue. When, at last, the British settled down cosily in the ®rebel capital® — when PhiladeF phia had taken Howe, as Franklin so cleverly expressed it — Washington encamped at Valley Forge, 19 Dec. 1777, his popularity waning at the very moment when he began ,to render his greatest service to his country. There, in the most trying hour, he continued to do what had been his greatest task from the first. In spite

of jealous States and a wrangling Congress, and while deprived of all that source of power which a strong government gives to a com¬ mander, Washington kept together a starved and suffering army by his personal firmness, patience and judicious handling of men.

While the burden of his trial was greatest there grew up in Congress an ugly scheme to put Gates in Washington's place. From the first there had been intrigue among the officers.

am wearied to death,® John Adams wrote, after a visit to the army, ^^with the wrangles between military officers high and low. They quarrel like cats and dogs. They worry one an¬ other like mastiffs, scrambling for rank and pay like apes for nuts.® Amid this Washington had lived disturbed, but not concerned for him¬ self. Now Congress was implicated in the plotting. Some were impatient with the Fabian policy, and, like Adams, wanted ^^a short and violent war.® A conceited or vain man would have resigned and let the whole cause go to per¬ dition as a vindication of himself, but Washing¬ ton was nobler than that. Throughout the Revolution he kept the same spirit that ani¬ mated him in the earlier years of border fight¬ ing. Then he had declared : could offer

myself a willing sacrifice to the butchering enemy, provided that would contribute to the people's ease.® He could ^Mie by inches to save a people.® During the Revolution he risked reputation, sacrificed popularity, suffered in mind and heart all that he had been willing to suffer in body to ^^save a people.® Now he silently watched the plot ripen, and at the right moment exposed it with a royal contempt that quite crushed the plotters.

When the winter was gone there came the news of the French alliance. A fleet from France was menacing the British army in Phil¬ adelphia, and orders came for the evacuation of the city. They began a march toward New York across New Jersey. At Monmouth, 28 June 1778, the American army fell upon them, and, but for the cowardly or traitorous conduct of General Lee, nothing but the fragments of the English army would hav'e reached its destination. In that moment men saw what a tempestuous nature Washington habitually held in check. He stopped the retreat that Lee had unaccountably ordered, and in ungoverned rage cursed him for a coward. The troops were ral¬ lied, and they successfully engaged the enemy, but the moment for victory had been lost. The British reached New York in safety and Wash¬ ington took a post on the Hudson.

Now came the supreme test that proved the American leader's unrivaled fitness for the work that he had to do. For three years, while Congress was helpless, unable to tax or get aid from the States, while it paid theˆ soldiers in paper, so valueless that the pay of a colonel would not purchase oats for his horse, while nothing but a forced levy would secure food for the army, when a hundred men a month went over to the enemy in sheer desperation with suffering for food and clothing, while the great country that had so much at stake seemed absolutely indifferent — in the midst of blank despair Washington kept his he;art and his pur¬ pose. Again and again he was disappointed by the failure of the promised aid from France — the naval aid that would prevent the British escape by sea if they were worsted on land.

GEORGE WASHINGTON

From the Painting by Stuart

MARTHA WASHINGTON

*?»■»>

♦At last, however, the moment came when De Grasse with a French fleet held a temporary control of the sea, and Lafa3'ette had pushed Cornwallis out on the peninsula at Yorktown. A few days' hesitation would have lost the op¬ portunity, but the man who had waited three years knew the moment for action when he saw it. Making a feint that deceived the enemy at New York, he got well on the way before his aim was guessed. For 400 miles he urged his eager arm}-, and brought 6,000 men to Lafay¬ ette's aid at just the hour to render Cornwallis' escape impossible. The siege that then began could have but one end as long as De Grasse ˆ controlled the sea. The British surrendered, 19 Oct. 1781, and the war was ended.

As men looked back over the years of strife, they saw clearly that the greatest factor in the final success of the Revolution was the per¬ sonal leadership of Washington, If we seek an explanation, it was not his great mind, for Franklin's was greater; not his force, energ}-, or ingenuity, for Benedict Arnold surpassed him in these qualities ; not his military experi¬ ence, for Charles Lee's was far more extensive; but it was the strength of character which day by day won the love of his soldiers and the perfect confidence of his countrymen. The ab¬ sence of a mean ambition, the one desire of serving well his countr}' and his fellow men, the faithfulness that could not be driven from its task through jealousy or resentment — these were the traits that gave him an unique and solitary place among the world's heroes.

Washington's service to his country was not to end with Yorktown. As he had been ˆ'first in war,® because he was most fitted, so his unique character and pre-eminent place in American hearts fated him to become ®first in peace.® His last success had still more firmly fixed his power among the people. Their thoughts and imaginations were filled with him. But they had not even yet seen the sub¬ limity of his character. With a discontented and insubordinate army still in arms and with no real government in existence, Washington was the only source of authority and law that had anything more than a local influence. The weak Union might have at once lost all cohe¬ sion, and America might have degenerated into a number of petty, feeble and

hostile States. Worse than that, the hopes for an American republic might have been indefinitely delayed, for, in the despair which settled upon many,

‘ /there seemed but one escape from the political storm that threatened — they would make Washington king. In the army this plan was gravely considered, but when broached to Washington, he expressed himself as pained that such ideas existed in the army. am much at a loss to conceive what part of my conduct could have given encouragement to an address which to me seems big with the greatest mischief that can befall my country.® To nobody could such a thought be more dis¬ agreeable, he declared earnestly. ®Let me con¬ jure you, if you have any regard for your country, concern for yourself or posterity, or respect for me, to banish these thoughts from your mind.®

W’hen the countr}’ seemed indifferent to the deserts of the army, when there was talk of disbanding it without provision for the future or even pay for what it had done, and when

as a natural result there was mutiny and threat that the army would take government into its own hands — then it was Washington who tirelessly urged upon Congress and upon the States the justice of the soldiers’ claims. Though he longed to go back to his home and to have his work done, yet he w’aited through months of wˆeariness until the British really left the country, and until the proper laws at least had been made to insure the soldiers’ rights. Then at last he stood among his officers at Fraunce’s Tavern, bidding them to take him by the hand, while he gave them each and all the warm-hearted farewell that so fittingly ended their long years of trial and companion¬ ship.

For a brief time Washington now became ˆˆa private citizen on the banks of the Potomac . . , free from the bustle of a camp and the

busy scenes of public life,® planning as he said to ®move gently down the stream of time until I sleep with my fathers.® He did not see in this happ3ˆ hour that his past services had but devoted him to further duties, and that he had become *the focus of political intelligence for the New World.® Even before resigning his leadership he had urged the States to put fac¬ tion and jealousy away and make ®an indis¬ soluble union under one federal head.® As the affairs of the confederation became more and , more deranged, and America, ˆflike a young heir,® as Washington wrote, wantoned and ran riot

until its reputation was iDrought to the brink of ruin, their great leader warned them that it was in the choice of the States and depended upon their conduct, whether they would be re¬ spectable and prosperous, or contemptible and miserable as a nation.

The politically starved Congress grew daily weaker. It could not even persuade the States to carry out the terms of the treaty of peace or pay their debts to foreign countries. Con¬ gress was despised at home, and America was disgraced abroad. The world looked on to see the confederation go to pieces. Within the in¬ dividual States the mob seemed to have gained control and the law-giving bodies abandoned themselves to paper money and other economic vagaries. There was quarreling over State boundaries and commercial restrictions, one State against another, until thoughtful men like Washington urged that, if they were not a united people, they should no longer act the farce of pretending it. At last, however, his own endeavors united with others brought about a convention of the States, and that led to an¬ other which met at last in May of 1787, at Philadelphia, destined, if not purposed, to give America a new and stronger form of govern¬ ment. To that convention Washington reluc¬ tantly came. He thought himself a soldier but no statesman. When at last he was ‘persuaded that the chief hope for success must come from his approval, and that his mere presence would lend dignity and power to the convention, he yielded. As the delegates slowly assembled, he grew-eager for the success of the wˆork, and would listen to no half-way measures. ®Let us raise a standard to which the wise and the honest can repair,® he said to those who talked of a weak plan. When the wˆork began he was chosen president of the convention, and, though he was no parliamentarian, his prominent place lent gravity and steadiness to the business.

After the Constitution was completed, and when it was before the country for approval, Washington had never been seen so eager for anything as for the adoption of the new scheme of government. It was only by active letter¬ writing that he used his influence, however, for the work of the politicians was out of charac¬ ter for him. The final success was very grate¬ ful to him, but, when the new government was being set up, and the whole country turned to him as their choice for President, he held back, diffident and reluctant. He yielded at last be¬ cause, as Hamilton represented to him, ˆTn a matter so essential to the well-being of society as the prosperity of a newly instituted govern¬ ment, a citizen of so much consequence as your¬ self to its success has no option but to lend his services.®

His was a noble figure to stand in the fore¬ front of a nation's history. His simple manner well graced a republic, and yet there was a gravity and a lofty courtesy that lent dignity to democratic forms. His own self-m.astery was a living lesson to democracy with its ill-repute for turbulence. No more fitting ideal of manhood could have been chosen for a new republic. It is, indeed, creditable to the men of that day that they were won by a character so unpretentious.

The political leadership was very unattrac¬ tive to Washington. When the formality of election was over, he went to the seat of gov¬ ernment with ˆfeelings not unlike those of a culprit who is going to the place of execution.® He bade adieu to private life and to domestic felicity, going to his new duties with resolution, but anticipating no joy in them. On his way the demonstrations of the people only filled him with forebodings. ®The decorations of the ships, the roar of the cannon, and the loud acclamations of the people which rent the skies as I walked along the streets, filled m.y mind with sensations as painful as they are pleasant.® After he had sworn, 30 April 1789, in the open balcony of the Federal Hall, that he would faithfully execute the office of President of the United States, he read his address in the Senate Chamber. ˆˆThe magnitude and difficulty of the trust,® he protested once more, ˆˆcould not but overwhelm with despondence one who, inherit¬ ing inferior endowments from nature, and un¬ practised in the duties of civil administration, ought to be peculiarly conscious of his own deficiencies.®

He realized keenly from the first that he walked ˆˆon untrodden

ground.® Scarcely any part of his conduct might not thereafter be drawn into precedent. There must not be a government only, but a body of public opinion that would uphold it. Governmental action must be mixed of firmness, prudence and con¬ ciliation, said Washington, if it would win lik¬ ing and loyalty as well as respect. He resolved to give it every proper form of dignity, cere¬ mony and prestige that would appeal to the imagination of the people. Men must see that it was a real government, supreme in the land. To this end he adopted forms that some thought stiff, some unrepublican, but which all were soon taught to respect. ®If there are rules of proceeding,® he wisely concluded, *which have originated from the wisdom, of statesmen, and are sanctioned by the common assent of

nations, it would not be prudent for a young State to dispense with them altogether.®

It was not by this conservatism alone that he gave strength to the new government, but by that unerring judgment which led him to choose men like Hamilton, Knox, Jefferson and Randolph, and then to take for his guide Ham¬ ilton, the greatest of these for the present needs of the government. Natural leader as Wash¬ ington was, he recognized the gifts and talents of others, and gave to each the task for which he was fitted. Hamilton's genius in affairs had not been in just the lines along which he was now to act, but his bold and original m.ind Washington saw to be a fit instrument to set the new government on a strong foundation. Hamilton quickly demonstrated the wisdom of the President's choice. He funded the public debt and established confidence in the nation's honesty. He prevailed upon Congress to as¬ sume the State debts and thus transferred the interest of creditors to the central government. A bank of the United States was created at his call, the ˆimplied powers® of the Constitution being thus brought to the support of a strong government, and the commercial classes won by this attention to their interests. He was ena¬ bled to do these things successfully because he had the strong will of Washington with hirn. The fiscal measures had been m.ade the Presi¬ dent's own, because he was convinced that they were right, not merely that they were expe¬ dient. The end that was sought was the pur¬ pose that Washington held from the first, a strong and righteous government.

Hardly had things been set aright in the new nation's household than there came disturbing forces from abroad. The French people had gone upon a wild quest for liberty that threat¬ ened to turn the world upside down. The mad¬ ness spread even to America — or rather

seemed to leap by a strong attraction straight to Amer¬ ica's democratic shores. France was soon fight¬ ing the conservative world, and what was more fitting than that liberal America should come to her aid? A French agent hastened to America to ask the people that very question. Washing¬ ton determined that America, herself but ®in a convalescent state,® should not be drawn into the European struggle. She was too provincial at the best, too interested in European opinion and politics, and too oblivious of her own na¬ tionality. want an American character,® the wise President declared, ^^that the powers of Europe may be convinced we act for ourselves, and not for others.® He would avoid their dis¬ putes and their politics, and he purposed ˆfff they will harass one another, to avail ourselves of the neutral conduct we have adopted.® Washington, with a few others, stood almost alone in the advocacy of statesmanship rather than sentiment. In a few months, however, the public eyes were able to see more clearly, and the administration got the support that it deserved. The demands of the French revolu¬ tionary governm.ent were refused, and the Pres¬ ident issued a proclamation of neutrality.

Meanwhile the country had learned that the new central government proposed to enforce its laws even within State boundaries. The rebel¬ lion in the back counties of Pennsylvania was quelled by the strong action of the central power. There could be no return to the time

when there was no power but that of an indi¬ vidual State. The national government was expected thereafter to make itself felt directly upon the individual, and men began to look to it therefore in awe and reverence.

A second time Washington consented to hold the reins of power, and again, as in the Revolu¬ tion, he felt the bitterness of unpopularity. All the honor that he had gained could not protect him from the hasty wrath of a people dissatis¬ fied with his policy toward England. Because he strove for peace he was roundly abused in terms scarcely suited ^^to a Nero, a notorious defaulter, or even a common pickpocket.® It saddened but did not change him. He was only the more unwilling to serve another term, and, when his eight years of civil service ended, he said farewell to the people he had served through a generation. He gave them the sim¬ ple advice that they most needed. Tears coursed down his cheeks as he turned for the last time from the throng that had listened to him in love and sorrow. Three years he lingered in retire¬ ment at Mount Vernon, and then died, as he had wished to live, ®amid the mild concerns of ordi¬ nary life.®

Bibliography. — Baker, W. S., itinerary of Washingtonˆ (Philadelphia 1892) ; Carrington, H. B., ˆWashington the Soldierˆ ; Ford, P. L., ˆThe True George Washingtonˆ (Philadelphia 1896) ; Harrison, J. A., < Washingtonˆ (1906) ; Haworth, P. L., ˆGeorge Washington; Farmerˆ (Indianapolis 1915) ; Rush, R., ˆWashington in Domestic Lifeˆ (Philadelphia 1857) ; Schauf-fler, R. H., ˆWashington's Birthdayˆ (New York 1910) ; Trevelyan. G. O., ˆThe Am.erican Revo¬ lutionˆ (ib. 1905-12) ; Whipple, ˆStory Life of Washingtonˆ (1911) ; lives and studies by E. E. Hale (New York 1888), Washington Irving (ib. 1855-59) ; H. C. Lodge (in the ˆAmerican Statesman Series,ˆ Boston 1898), John Marshall (Philadelphia 1804-07), B. T. Thayer (New York 1894), Woodrow Wilson (ib. 1897). Con¬ sult also ˆThe Writings of George Washing¬ tonˆ (edited by W. C. Ford, 14 vols.. New York 1889-93) ; ˆLetters to Washingtonˆ (ed¬ ited by S. M. Hamilton, 5 vols., Boston 1898-1902) ; ˆLife and Writings of George Wash¬ ingtonˆ

(edited by Jared Sparks, ib. 1834-37) ; and standard histories of the United States.

Claude Halstead Van Tyne, Head of Department of History ˆ University of Michigan.

WASHINGTON, Henry Stephens, Ameri¬ can geologist: b. Newark, N. J., 15 Jan. 1867. He was graduated at Yale University in 1886, and took his Ph.D. at the University of Leip¬ zig in 1893, studying also at the American School for Classical Studies at Athens, Greece. He has conducted an extended series of geologi¬ cal investigations in Greece, Asia Minor, Italy, Spain, Brazil and in the United States, and is a consulting mining geologist of high reputa¬ tion. Author of ˆChemical Analyses of Igneous Rocksˆ (1903) ; ˆManual of the Chemical Analy¬ sis of Rocksˆ (1904 ; 2d ed., 1910) ; ˆThe Ro¬ man Cogmatic Regionˆ (1907), *etc.*

WASHINGTON, Martha, wife of George Washington, first President of the United States: b. New Kent County, Va., May 1732; d. Mount Vernon, Va., 22 May 1802. She was the daughter of (Tol. John Dandridge, and was

educated by tutors at home. The daughter of one of the first families of Virginia, possessed of both beauty and charm, a skilful performer on the spinnet, she became a famous belle, and was a frequent guest at the British gov¬ ernor's residence at Williamsburg, Va. In June 1749 she was married to Daniel Parke Custis, a wealthy Virginia planter. The mar¬ riage was a happy one and they lived at the ˆWhite House® on Custis's plantation on the Pamunkey River. Four children were born to them, of whom two died in infancy. Custis himself died in 1757, leaving his widow one of the wealthiest women in Virginia and with no restrictions upon her use of the property, a confidence which she proved amply justified. In May 1758 the Widow Custis became engaged to Colonel Washington and she was married to him in January 1759, the wedding being one of the most brilliant ever solemnized in Virginia. With Mrs. Washington's two children, Martha Parke Custis and John Parke Custis, they set¬ tled at Mount Vernon, the estate left to Wash¬ ington by his elder brother Lawrence. The marriage was without issue, but was one of ideal happiness. Washington had resigned from the army, and except for winter so¬ journs in Williamsburg, where he was a dele¬ gate to the House of Burgesses, their life wˆs the pleasant and busy one of the Virginia planters. Mrs. Washington's daughter, Martha, died in 1774 at the' age

of 16, and Washington was afterward absent in attendance at the Con¬ tinental Congress. The separation was con¬ tinued by his appointment as commander-in¬ chief of the Continental Army, but throughout the Revolutionary War, Mrs. Washington spent the winters at camp with the General, in¬ cluding the one of terrible privation at Valley Forge. During the campaigns she remained at Mount Vernon, superintending the plantation, and throughout the Revolution she adopted the simplest manner of living and dressed in fabrics spun and woven at Mount Vernon. In Novem¬ ber 1781 her only remaining child, John Parke Custis, died, leaving four children, of whom Washington adopted the two youngest, Eleanor Parke Custis and George Washington Parke Custis, as his own. After Washington's in¬ auguration as President of the United States, at New York 30 April 1789, Mrs. Washington left Mount Vernon with her two grandchildren and traveled in state to New York. Bred to high social position, with every advantage of wealth and association, she presided over the Executive Mansion in New York and in Phila¬ delphia with great grace and dignity, an in¬ comparable ®First Lady® and often called ^^Lady Washington.® However, notwithstand¬ ing her great social gifts, the quiet of Mount Vernon was to her, as to her husband, the life most desired. There, after Washington's re¬ tirement from the Presidency, she continued to offer unlimited hospitality to the many vis¬ itors attracted by her distinguished husband. She never recovered from his death in 1799 and was deeply depressed until just prior to her own death two and a half years later. Her remains were placed at rest with those of Washington in the vault at Mount Vernon. Consult Conklin, M. C., ^Memoirs of the Lives of the Mother and Wife of WashingtoiP (1851); Lossing, B. J., ^Mary and Martha^

(1887) ; Holloway, L. C, ˆLadies of the White Houseˆ (1886).

WASHINGTON, Mary, American woman, mother of George Washington: b. Lancaster (bounty, Va., 1706; d. near Fredericksburg, Va., 25 Aug. 1789. She was the youngest daughter of Joseph Ball, and was educated chiefly by parish ministers. No authentic portrait of her exists, but she was beautiful and popular socially, and developed into a woman of re¬ markable force of character. She was married to Augustine Washington, 6 March 1730, Wash¬ ington's first wife having died in 1728. They settled in Westmoreland County, where their first child, George, was born 22 Feb. 1732. Later they removed to another farm owned by Washington on the Rappahannock River, near Fredericksburg. Three other children were born of the marriage, John Augustine, Charles and Mildred. Mrs. Washington was widowed 12 April 1743, and became the sole guardian of her children. She managed her business affairs with marked success and reared her children in simple piety and under strict dis¬ cipline, stamping her high principles indelibly upon them. She continued her customary habit of life after her son George rose to the heights of fame, personally managed her farm, and rarely appeared at public functions. She attended, however, with General Washington, the ball at Fredericksburg, given in honor of Cornwallis's surrender. Washington rode from her house to his inauguration as Presi¬ dent, a few months before her death. Consult Conkling, M, C., ˆMemoirs of the Mother and Wife of Washingtonˆ (1851); Lossing, B. J., ˆMary and Marthaˆ (1887).

WASHINGTON, a western State of the United States, popularly known as the ˆˆEver¬ green State, admitted to the Union, 22 Feb. 1889, is bounded on the north by the Strait of Juan de Fuca and British Columbia, on the east b}ˆ Idaho, on the south by Oregon, and on the Mˆest by the Pacific Ocean. It lies between 45° 32' and 49° N., lat. and 116° 57' and 124° 48' W. long. Capital, Olympia. Area, 69,127 square miles (land 66,836, water, 2,291).

Topography. — Washington is divided into two distinct sections by the continuous range of the Cascade Mountains, extending clear across the State from north to south. These sections are known as eastern and western Washington. The eastern section contains about three-fifths of the land area of the State and the western section about two-fifths. In

its physical features the State is characterized by a great diversity of topography, ranging from low plains, a few feet above the sea-level, to snow-covered mountains, several of which ex¬ ceed 10,000 feet in height, together with broad, rolling prairies, elevated plateaus, deep canons and fertile valleys. This great diversity of topography presents ever-changing scenery and gives rise to a great variety of climate, rainfall, vegetation and occupations of the people.ˆ

Topographically, the State may be divided roughly into seven sections: First: The penin¬ sula lying between Puget Sound and the Pacific Ocean. The greater part of this peninsula is occupied by the Olympic Mountains, which form a segment of the general coast range. The highest of these mountains reach elevations of from 7,000 to 8,000 feet. The whole section,

with the exception of a strip a few' miles in width along the coast, presents a very rugged surface, broken into high peaks, steep slopes, deep canons and sharp serrated divides, which are almost inaccessible in many places, and as a consequence, these mountains form the least known section of the United States. The high¬ est peaks of the Olympics are Mount Olympus, 8,131 feet; Fitzhenry, 8,098 feet, and Constance, 7,777 feet. Second : The Puget Sound Basin, a wide valley lying between the Olympic Moun¬ tains on the west and the Cascade Mountains on the east, extending in a north and south direc¬ tion from the British Columbia line nearly to the southern part of the State. This basin con¬ sists largely of rolling land with many quite extensive level tracts. The soil consists prin¬ cipally of glacial deposits covered in the lower portions by alluvium. Third : The Cascade Mountains, which form the most prominent feature of the topography of the State. The general height of these mountains is about 8,000 feet above the sea-level with a number of peaks rising much higher, the highest being Mount Rainier, 14,408 feet; Adams, 12,307 feet; Baker, 10,730 feet; Saint Helens, 9,697 feet, and Stuart, 9,470 feet. Fourth: The Okanogan Highlands, extending eastward from the Cascade Moun¬ tains to Idaho and lying north of the Columbia and Spokane rivers. This section is character¬ ized by a beautiful rolling surface, with long, gentle slopes reaching down from the water¬ sheds to the wide stream basins. The divides, although attaining heights of 5,000 feet and more, are generally rounding and not sharp or abrupt. Fifth : The Columbia Plain, which in¬ cludes nearly all that part of Washington lying south of the Okanogan Highlands and east of the Cascade Mountains. From the Columbia at a height of 500 or 600 feet above the sea, the plain rises gradually to the westward and east¬ ward,

reaching a general elevation of about 2,000 feet in the higher parts, with some hills and ridges rising from 1,000 to 2,000 feet above the surrounding plain. Much of this plain is in the form of an elevated plateau with a rolling sur¬ face. Several sharp ridges of a mountainous character run down from the Cascade Mountains in an easterly direction toward the Columbia River, ˆixth : The Blue Mountain Range on the border line of Washington and Oregon rep¬ resents a local mountainous section in the Co¬ lumbia Plain. These mountains are located in the extreme southeastern portion of the State, the highest points rising 7,000 feet above the sea and about 5,000 feet above the surrounding plain. Seventh : The lower Columbia and Pacific Coast section includes that part of the State lying west of the Cascade Mountains and south of Puget Sound and the Olympic Moun¬ tains. This section consists largely of ranges of low mountains or hills, with broad valleys in¬ tervening, nearly all of which are covered with a dense growth of forest. In this section there are also a few rich prairies of limited extent.

Rivers, Lakes and Harbors. — The principal river of Washington is the Columbia, which enters the State from British Columbia, at about 117° 30’ W. long., from which point it pursues a southerly course for about 110 miles, flowing thence westerly for about 100 miles, thence south and southeasterly for 225 miles where it unites with its greatest tributary, the Snake River; from this point it pursues a westerly

WASHINGTON. Estimated population, 1,534,221 . COUNTIES

Pop.

10,920 Adamt, . E 14

5,831 Asotin . F 17

7,937 Benton . F 12

15,104 Chelan . C 9

6,755 Clallam . B 3

26,115 Clarke . G 5

7,042 Columbia . F 15

12.561 Cowlitz . F 5

9,227 Douglas . C 11

4,800 Ferry . B 13

5,153 Franklin . E 13

4,199 Garfield . F 15

8,698 Grant . Dll

35,590 Grays Harbor… .D 3

4,704 Island . B 5

8,337 Jefferson . C3

284,638 King . D 7

17,647 Kitsap . C 5

18.561 Kittitas . D9

10,180 Klickitat . G9

Incorporated Cities,

20,334 Aberdeen . D 2

276 Albion . E 16

368 Almira . C 13

4,168 Anacortes . A 5

1,476 Arlington . B 6

820 Asotin . F 16

957 Auburn . D 6

32,985 Bellingham . A 6

2,289 Blaine . A 5

599 Bothell . C6

2,993 Bremerton . C 5

296 Brewster . B 11

431 Bridgeport . C 11

1,272 Buckley . D 6

1,302 Burlington . B 6

1,125 Camas . G 6

625 Cashmere . C 9

998 Castle Rock . F 5

352 Cathlamet . . T”… . . F 3

7,311 Centralia . E5

1,062 Charleston . C 5

4,507 Chehalis . E 5

682 Chelan . CIO

1,207 Cheney . D15

823 Chewelah . B 15

1,257 Clarkston . F 16

2,749 Cle Elum . D 9

2,783 Colfax . E 16

393 Colton . E 16

1,533 Colville . R15

357 Conconully . B 10

945 Concrete . B 6

1,132 Cosmopolis . E 3

276 Coulee City . C 12

310 Coupeville . B 5

308 Creston . C14

153 Cunningham … .E 12

1,229 Davenport . C 4

2,389 Dayton . F 15

875 Deer Park . C 16

754 Eatonville . E 6

1,114 Edmonds . C6

330 Elberton.. . E 16

4,209 Ellensburg . D 10

1,532 Elma . D 4

474 Endicott . E 15

323 Ephrata . D 12

35,486 Everett . C 6

308 Fairfield . D 16

489 Farmington . D 16

169 Ferndale . A 5

400 Friday Harbor… .B 4

932 Garfield . E 16

1,203 Goldendale . G 9

320 Grandview . F 11

453 Granger . F 10

714 Granite Falls . B 7

405 Hamilton . B 7

661 Harrington . D 14

237 Hartline . C 12

161 Hatton . E13

3,276 Hillyard . C 16

11,666 Hoquiam . E 3

664 Ilwaco . F 2

417 Index J . C 7

634 lone . A 16

628 Issaquiah . D 7

132 Kahlotus . E 13

816 Kalama . . G 5

2,039 Kelso . F 5

1,219 Kennewick . F 12

1,908 Kent . D 6

377 Kettle Falls . A 14

532 Kirkland . C6

288 La Center . G 5

603 La Conner . B 5

222 Lakeside . C 10

339 Latah . D16

1,551 Leavenworth . C9

831 Lind . E 13

631 Little Falls . F 4

1,148 Lynden . A 5

377 McMurray, . B 6

666 Mabton . .F 10

1,239 Marysville . B 6

1,730 Medical Lake … .C 15 448 Milton . D 6

Pop.

32,127 Lewis . E 5

17,539 Lincoln . C 13

5,156 Mason . D 4

12,887 Okanogan . A 11

12,532 Pacific . E3

…. Pend Oreille . A 1 6

(Pop.incl.inStevensCo. ‘

120,812 Pierce . E 6

3,603 San Juan . A 5

29,241 Skagit . B 7

2,887 Skamania . G 7

59,209 Snohomish . B 7

139,404 Spokane . C 16

25,297 Stevens . B 15

17,581 Thurston . E 5

3.285 Wahkiakum . F3

31,931 Walla Walla . F 14

49,511 Whatcom . A 7

33 280 Whitman . E 15

41,709 Yakima . F f)

Towns. Villages, *Etc.*

1,552 Monroe . B 7

2,488 Montesano . D 3

2,381 Mt. Vernon . B 6

299 North Bend . C 7

1,199 Northport . A 15

476 Northport . B 16

20,951 North Yakima…E 10

882 Oakesdale . D 16

465 Oakville . E 4

127 Ocosta . E 2

885 Odessa . D 13

611 Okanogan . B 11

6,996 Olympia . D4

495 Oroville . A 12

799 Orting . E 6

413 Pacific . D 6

1,549 Palouse . . E 16

2,083 Pasco . F12

176 Pataha City . F 15

838 Pe Ell . E 4

1.605 Pomeroy . E 16

2.286 Port Angeles . B 3

682 Port Orchard . D 5

4,181 Port Townsend .. .B 5

364 Poulsbo . C 5

502 Prescott . F 14

1,298 Prosser …■ . F 11

2,602 Pullman . E 16

4,554 Puyallup . D 6

264 Quincy . D 11

2,450 Raymond . F 3

527 Rearden . C 15

2,740 Renton . D 6

999 Republic . A 13

1.859 Ritzville . D 3

663 Rockford . D 16

767 Rosalia . D 16

3,126 Roslyn . D 9

315 Roy . E 5

780 Ruston . D 5

348,639 Seattle . C6

2,129 Sedro Woolley … .A 6

1,163 Shelton . D 4

238 Skykomish . C 8

3,244 Snohomish . C 6

279 Snoqualmie . D 7

3,023 South Bend . E 3

264 South Prairie . D 6

299 Spangle . D 16

150,323 Spokane . C 16

1,110 Sprague . D 14

251 Springdale . B 15

421 St. John . D 15

544 Stanwood . B 6

761 Starbuck . F 15

430 Steilacoom . D 7

387 Stevenson . G4

576 Sultan . C 7

902 Sumas . A 6

892 Sumner . D 6

1,379 Sunnyside . F 11

112,770 Tacoma . D 5

1,694 Tekoa . D16

1,038 Tenino . E 5

375 Toledo . F 5

1,598 Toppenish . F 9

361 Tukwila . D 7

490 Tumwater . E 4

227 Twisp . B 10

426 Uniontown . E 6

13.180 Vancouver . G 5

1,237 Waitsburg . F 14

25,1.36 Wallawalla . G 14

400 Wapato . E 10

456 Washougal . G6

300 Washtucna . E 14

950 Waterville . C 11

318 Waverly . D 16

4,050 Wenatchee . D 9

682 White Salmon …. G 7

757 Wilbur . C 13

899 Wilkeson . D 7

405 Wilson Creek… .D 12

1 140 Winlock . F4

384 Woodland . G5

435 Yacolt . G 6

263 Yakima . E 10

Lont;itude West ‘from Greenwich

> slfftid

Osoffoos

Abbotsford

ˆBoundai

‘ftdpoin|

Velvetˆ

＞rthi»’＞r1

lUiurier

ˆUaiiviUc

Cltˆarbowk

rt,’.3ftj»‘ert8

i

ˆ”’”“’’pilistord

in Uureu% luokfackpˆ lawretrc®

Cli !saw

7 Rockcutˆ Orientˆ ＞Malo ■＞\V.

Napoleon

Boyd»*i

Metallic ˆ

l/4anˆi

^^’^larbioˆ Williams ‘ˆjBosabiirK

fvaus Echo

, Everson ‘

Goshen’

iSiirress

W Mfe A TˆJ ;i” Baker f

It Creek;

‘snxcnˆ i .SullivˆT)ˆ-

0 Antwyne

Tonaskct

Waucoxit

o

b.eˆ

‘Twin Sisters

.Crc»(‘‘.ur

fNO#

Middleportl: « 5i lirce’-jˆorksl

Lxist Cl’

Iville Bldˆt Crystal U

,pidt p„i_ '

/ EˆS h

Addy

ˆue Creek *

＞ˆChewelnH

LAKE

HatSenO

Republic MeyerrSp

j Kottle

? E R R Y /

.FrsTsl

I? Bow ;

ConconuUya .

Riversidw Hudson® ˆ EI’I’S’d

i,,, Onmkˆ

,* OkanoganAo

Mazama

Aenee

Lariiloniount

‘I’t

—Bostoi

TPeaC

°Synarep

rdevlei

Harvey c-Rice I

“Tatoosh

[l.\ f’l’itom

V’Bil: Lake I \iMuQtUornS

ˆlEbrlUb I

;ˆtcMnrrS3

Winthropˆ

VICTOR

Miss’iOtx.

Jnehellum

jstchekidv

Peak

fiper.

Suyes

dispell ˆ Dalkena

V Qlema* ‘Car ton

Wakefield’ \Ki owltouo Metliowˆ

Schmid

Alien. Qviarrj v Waits.

•» i VII

Meteor o Covada

Malott

/)mak Lake

Bissell

‘CoiipoviuJ

\l

■”’’Codoni t

Hunters

Bjl ewster

\ˆG lacier 5\Sbasln’ VˆBedal ‘gSilvci ton

[cspelem

Luceino

‘Beaˆr

Pledmr.

Spring’lali

FruitI;

USk—coi

HMilan

if Mt.ilijI 7*Carlton fChatiaroyˆ

— QˆOllVCX lX»tl ‘*■

^^nleoristcˆ’^^ .

Ir im.

Gerome.

.Xeller

:iaylonS5\

UeexptrSˆ

Gemsoniirvˆ/

i i

^ ^ Biuckeyifl jSi-r-dT Colbert

6 I oCuvbyX—L Ulie Mile Fslis^^jArz.’^A

Pearl

® Forks’

V ˆ JviacliUs

Ivei^tt

P^Pori [CeriUrOj- ˆ

r ˆ Sbinso PArl

Sanderson® .

V I— r

Leahy pi

iTUrcc 1.AkeS

Bonita

Tvii itum

Uncoil

iMeadowdˆ

Seattle . ,fleightaˆ

Telma

, ˆ Dsl ˆullcene <

Ihelau Falls oMansfiold.

It. 0{ympu1

III 0 Edwo

.ing8toncA(/

LakesidV

»J > ruce ˆ

iplecrecl

‘ronkey “Moldo IJS WiHiraw o«i i

D 0 xy G la s ,

ˆjSˆˆFarmer Baird (Douglas Spencer \ BrightoJˆˆ

t’uvall G rotSb elUuKfeinˆPplj

\ˆo •*

Telfordˆˆ

Rocklyu

‘ N CˆOJ

‘Wa’trhagtctM

ndrews

AhniUL

tline

ˆrtnn f

yChiˆanlrafn;

sN Rediii’.lud’ˆ r’l®’ AˆTolt;

|C«rri«toBe ˆ

ˆllobkrt T»vlor

[usballj

Oroiiiu

＞Vatei’

’• Eepi Medl＜ Wauko^

Lca’venworl

‘eshastin

•vjPrydeu

‘Eldon LiUIwanp i

yC!heney\ Mean leib- \Hapi Spangle Y *’ n^ :»\

W^erl^

plaza j

Sdring YalleViV

Btrcnori

QUIN AULT

■ IND..,ˆ

Cor

A’euatchee

ˆjjˆIipledaje!

‘Palisades

BmUtu 1 : WjiUOB jlfLi]

cBlewett

Detroit!

ˆadnU

\tuO»4

Mohrwets

‘nton

Hodna

JCphrata >

Columbia River

incord

Vy-cils Effle’ fˆauiont A

wˆ-Marcelh

lonald

«Cˆoslyi

Uuiiicy

,, , dio.vpjrˆy

Morrison o

Burke Mae ® ‘w \

»^^’^^&PineiCii Vhta Oik«i TliorntonJ *

ˆ Aslilij’ hitzvllle EnwienY I

f rnarllle «

H A RˆB 0 R

＞L * WUhkab)

Shelton^’;

New Eamilˆ ^^‘^^oStlmsoTL

foteklej ˆiroett ˆ

TVyrukeson

Whe^r

VnillhurBt

tfSKevero jC Lancaster,

Ktpptr.iˆGarˆ

o Bailey

Illenaburg

a Q;/*lbcrtom \y P.alovisc] AColfax /

ˆ■svJaUonA ilbion\ :®i

Lone Trai; Gra

Wesitpd

‘ Cohasb’^’

IPuyelhip

f’oBcnat’itf £j,

TA ^”’■’■’^..^^^^Boylston’:

tˆWhrail

lona

ardepj

MT.

B^^.NIER

^j;^^Ramier

national

‘ PARK

Diamond

pˆswoV”

yiarkhem S<)ˆ o y\

Western

iClay City V,

yohop ■ >

(iBntonTnie

kOrende

.eima

/ Providence. MaeV

/ -Pa;

,J»/Cunningham ‘^9o

^^Hattoii Waslilux*na~

/^7 **^McInto&h.v . —

“riino

Lacrosse

jˆOthbll’ Taunton t\

Wilcox° ˆ

Penawawa

PACx.^^-.

Mayview o

PmlAiairvo^^^ llrnoiaX^ Tr J ^NYawawai i

BlylSSS C

Lrˆ ˆCi%lton^^_’

ˆUafcutowul

Eoiuproy

U3fii.-da _.

Noiih Cl

Moftfow

i i MenUota .

(-Xopiah

Chehalis , jT

ˆ D’ˆ < ˆˆˆQˆaloBka ˆ Eveline)o7iˆ 3av*r Ctwk kJ

1 VeneBBjj ˆ,.ˆ«.Mbyoˆr|d _

bvvoff

Vadeˆ J jKxab®

Gt*o® ‘Cenˆ ,Eagleton o y

iner

VHˆjˆPoniona

*-/i ii ton oVˆs..® P

Cowiclieo r-SN- rˆelah ‘ W I’ikfl N-K’ˆ‘Vˆviche Jc.

North

Haiwoodo

uein^-S^

is^'^ulphur

.K^dotus

bite Bluffs

lay Center’^Menlo R

P A C I C :

I _ LebamBV v

p’CT”— — . GIol)?*N > -^

Chetlo Harbor

Genesee

Oyslervil

Lindber

Bremer , Harmony^

Hanford

^^*coTAjTr* ‘ Pleasant pstlarbuci > View/ *

Ranitle _ Vance

N’alicol Ocean Pu Klipsan Beat I’.ri’nkc

Loii.‘itcfl. \ v:7.l

■RLugold j

Parke

Wapato

‘ Lj*- p. .-ˆX

ˆ♦ˆSToppenislP

*C«ldof»c

{JJraTW’Rirfr |

WAHKIAKUM

®Ri > abiiir _ j

o ^^^Skamokawj

Olem

SilvJ

Casllerl

!oww

fftvde /f\s ˆ

1 rand V 1 c n tbnˆ

s = sˆˆ5— ‘ˆ(iibbonBadgenv /r

■;rˆ Prosser Kricˆ/ 1

tland

Alfalfa

COLUMBTA EIVElill

L’/.f4

LL A\W/ALL A(lC_P L

trr ?l t

Ts V A Dixleˆ/ |<,(

X ‘\ ‘ 1

•?’ˆ.-ˆ5ZiˆTracˆ

Waˆhi

“Allege PU(»’ I 11 ,

/W L i, Ostrander iingtou Kelso ˆCarrolls

ilaiiiotˆ

•<v—oSteni

Burliank

AnatonCo

Craigei

Rogersbttrgl

Mablon.

■Attalia

|Uson|PerT3^

Cougaro

Uorse Heaven

»CLATSOP

Holladay /

Kalnnia

ˆGlenNVood oLucaj/

oBickletiin

Martian BIuˆ

Troutv Laurel \

Uke’l o >

Paijakanicˆˆ K iS

.Gilmer (

Snowden ® ˆTimber

Apphton

Cleveland o

Milton

Smeltz

ˆmatilla

pinkie

j\u Ceoto oA”;!’«y

I V riaccil

L — Jj/Heibsorr

Itle OroundPCrawford

Pc L AJR K I il. Prairio/^.iver

.. I

Doto Bixprungo

Blorkhhiiso

ioitlendali

Heppner Jc.

CMterdlle

-G ibbon

Riner

|N. cdSˆ Gmnd Pall

Dalles

IB O Olˆ D d’arkdale

L\ V E R

WASH!

Euterprl le

Hillsboro

Tillamook

Hfppuet

,Joccpll

Xo Griimle

Erlcnd

Oregon Cl ty

124’

WASHINGTON

SCALE ®

Statute Miles, 33 = 1 Inch.

0 5 ”10 20 .10 40 ftO

Rand MoNally’a New II x 14 Alap of W’aabingtun. yiˆlll Copyright by Rand-MoNally j

Pacific Bcoj

-Railroads -Electric Lines

2124ˆ

11

”913

15”9

17 ’”3150

course, flowing between the States of Wash¬ ington and Oregon, breaking through the Cas¬ cade Mountains and entering the Pacific Ocean in lat. 46° 15'. Its principal tributaries in east¬ ern Washington are the Pend d'Oreille, or Clark's Fork, which is the outlet of Lake Pend d'Oreille in northern Idaho ; the Spokane, one of the largest tributaries, the outlet of Lake Coeur d'Alene, also in Idaho ; the Okanogan, flowing from the north through Lake Okanogan in British Columbia ; the Methow ; Lake Chelan and its outlet; the Wenatchee and the Yakima, flowing down from the Cascade Mountains, and the Snake River, its largest tributary, which rises in the western part of Wyoming and flows through the southern part of Idaho. In western Washington its principal tributaries are the Lewis and the Cowlitz rivers. The other rivers of the State of any considerable size are the Nooksack, Skagit, Stillaguamish, Snohomish, Skykomish, Snoqualmie, Cedar, White, Duwamish, Puyallup and Nisqually, which flow into Puget Sound from the Cascade Mountains and the Chehalis, which flows into Gray's Har¬ bor. The Columbia is navigable for ocean¬ going vessels to Vancouver and for steamboats over the greater part of its course. The Snake is navigable for more than 150 miles. The Oka¬ nogan, Lewis, Cowlitz, Nooksack, Skagit, Sno¬ homish, Duwamish, Puyallup and Chehalis riv¬ ers are also navigable for considerable dis¬ tances.

There are many fresh-water lakes in the State, the largest is Lake Chelan, lying between the eastern ridges of the Cascade Mountains. This lake is 55 miles long, from one to three miles wide and more than 1,500 feet deep in many places. It extends from a point near the Columbia River into the very heart of the moun¬ tains, and the tourist can here enjoy the novel experience of sailing for more than 30 miles between high ranges of mountains, rising from the water's edge, whose snow-crowned peaks reach elevations of from 7,000 to 10,000 feet above the sea. This part of the State has some of the grandest scenery in the world. Lake Washington, lying in the western part of King County, bounding Seattle on the east, is a beau¬ tiful lake 22 miles long, and from two to four miles wide. The surface of this lake is about 20 feet higher than the mean high tide in Puget Sound, and a

government canal has been con¬ structed, at Seattle, to connect it with the sound through Lake Union. Lakes Crescent and Cushman are the largest lakes in the Olympic Mountains and Lakes Wenatchee, Kachhess, Keechelus, Moses and Cle Elum, are the largest in eastern Washington.

Willapa Bay and Gray's Harbor are the only good ports on the Pacific Coast of Wash¬ ington. Neah Bay, Clallam Bay, Port Angeles and Dungeness are excellent ports on the Strait of Juan de Fuca. Puget Sound, as it is now known, includes all the waters of the great in¬ land sea, which extends easterly from the Strait of Juan de Fuca, and southerly from the national boundary line to Olympia, a distance of about 200 miles. The waters of the Sound are from 60 to 1,000 feet in depth. The rise and fall of the tide ranges from nine to 18 feet. There are no sunken reefs or other dangerous obstruc¬ tions to navigation. The coast line aggregates about 1,600 miles in length. The principal har¬ bors along the sound are Bellingham Bay, Ever¬

ett Harbor, Port Townsend, Seattle Harbor or Elliott Bay, Commencement Bay or Tacoma Harbor and Port Orchard. Owing to the fact that Puget Sound is protected on all sides by high mountain ranges, it may be considered as one great harbor, in which vessels can land at almost any point along the whole coast line.

Climate. — The State of Washington is di¬ vided as to climatic conditions into two distinct sections — the eastern and western. The Cas¬ cade Mountains extending from the north .to the south form the line of demarkation. West¬ ern Washington has a mild, moist climate, while east of the Cascades the climate is characterized by short hot summers and comparatively cold winters. Western Washington seldom has snow and is free from oppressive heat in the summer. The mean annual maximum temperature at Se¬ attle, a typical point in western Washington, is 58.2°, while the mean annual minimum is 44.6°. The mean annual maximum temperature in Ya¬ kima County, eastern Washington, is 64° and the mean annual minimum 35.5°.

Rainfall. — The rainfall in western Wash¬ ington varies greatly in different localities ov/- ing to the mountain ranges and prevailing winds. The heaviest precipitation occurs on the coast of the Pacific Ocean and gradually decreases as it proceeds inland around the south side of the Olympic Mountains and down the Puget Sound Basin. The annual rainfall aver¬ ages 88.13 inches on the coast at South Bend; 54.96 inches at Olympia; 42.27 inches at Ta¬ coma; 33.9 inches at

Seattle and 29.81 inches at Port Townsend. While winter is called the rainy season and summer the dry season, it should be understood that every month in sum¬ mer has some rainy days and that there is con¬ siderable clear weather during the winter months. For a period of 10 years, during the months of December, January and February, the average number of days per month with precipitation to the amount of .01 of an inch has been from 15 to 19, and the average precipi¬ tation per month about five inches ; the average number of rainy days in July and August for the same period has been five, the average pre¬ cipitation has been about one inch each month and the average number of rainy days has been 162 per year. Thunder andˆ lightning are of rare occurrence and violent wind storms are en¬ tirely unknown.

Geology. — ■ Metamorphic rocks occupy a large portion of the State, being of very fre¬ quent occurrence throughout the region of the Cascade Mountains and the Okanogan High¬ lands. The most important varieties of these rocks are gneiss, schist, marble, slate and quartz¬ ite. Granite is found in many localities in very large quantities. Crystalline limestone also oc¬ curs in a number of places, particularly in the Puget Sound Basin. The most important vol¬ canic rock in the State is the basaltic rock of the Columbia Plain, which not only extends over a large portion of Washington, but also covers all of southern Idaho, eastern Oregon and northeastern California. Sedimentary rocks cover a large portion of the State. The rocks of the Tertiary period are the best known and are of great economic importance on ac¬ count of the large deposits of coal and building stone which they contain. The Eocene rocks are nearly all coal-bearing. Pleistocene sedi¬ ments, in the nature of glacial deposits, occur

in the western and northern parts of the State. In all of the mountainous districts, except the Blue Mountains, glacial deposits are found, and the valleys are largely occupied by deep terraces and moraines. The glacial deposits of the Pu¬ get Sound Basin consist of till, with stratified sand, clay and gravel, in all averaging not less than 500 feet in thickness.

Soil, Agriculture and Irrigation. — There are about 40,000 square miles of forested land in the State, the trees being mostly conifers, with some oak, maple, cottonwood and other deciduous varieties. Nearly all of the western section of the State was originally covered with forests, while in the eastern section the forest areas are confined principally to the slopes of the mountains and the highlands. The soil in western Washington consists largely of glacial drift, being a mixture of sand, gravel and clay upon the uplands, which is very productive when properly handled. In the lower lands there are large areas of sandy loam and semi-peat lands, rich in organic matter, which are very fertile and grow all kinds of crops that thrive in a porous soil.

In eastern Washington the soil has been formed by the disintegration of basaltic or lava rocks. It is of a dark color, of fine texture and contains no gravel and very little sand. It is what might be termed a clay loam. It has been stated by eminent authorities that this is the best wheat land in the world, a statement which is proved by the enormous crops produced each year. The higher lands of the Columbia plain are devoted principally to the cultivation of wheat, which is the most important agricultural product of the State. The annual crop of wheat averages about 40,000,000 bushels, and the aver¬ age yield per acre is about 25 bushels.

In the lower lands of the eastern section the rainfall is insufficient to bring crops to maturity and irrigation is carried on to a considerable extent with great success. There are now about 547,000 acres of irrigated lands under cultiva¬ tion, and about 130,000 acres more under ditch and ready for cultivation. Numerous irrigation projects are in progress or in contemplation which will probably result in the reclamation of thousands of acres more within the next few years. The irrigated lands produce wonderful crops of fruits, vegetables, hay, hops and grain. The climate is very favorable and a great variety of apples, peaches, plums and kindred fruits are raised in great

abundance, together with grapes, strawberries, blackberries, raspberries and other small fruits of every kind. The fruits raised in eastern Washington are beautifully colored and of most excellent flavor. The soil of the irrigated section is admirably adapted to the cul¬ tivation of all kinds of vegetables, and especi¬ ally to the cultivation of potatoes, of which large quantities are produced each year. Al¬ falfa is one of the chief forage plants, producing three or four crops during the season and yield¬ ing from five to eight tons of hay per acre. Timothy, clover and other grasses are also raised quite extensively. Hop raising is an im¬ portant industry, the average crop being 40,000 bales per year. All kinds of cereals are also cultivated to some extent. The Okanogan Highlands and the slopes of the Cascade Moun¬ tains furnish extensive ranges for cattle and sheep, which are raised in large numbers. With the settling up of the country, however, the

ranges are becoming more restricted year by year, and, as a consequence, domestic methods of stock raising are being adopted with a result¬ ing yearly increase in production.

In western Washington diversified farming, dairying and fruit raising are the principal agri¬ cultural pursuits. This section of the State is admirably adapted to the dairying industry, owing to the rich soil and the moist, warm cli¬ mate, which combine to produce an abundance of nutritious grasses, hay and other stock food, and excellent water. The home market is one of the best in the world, on account of the large population engaged in manufacturing, lumber¬ ing, fishing and mining, and the trade with Alaska. There are 186 creameries and 13 con¬ densed milk factories in the State. All kinds of stock do well in this section and large num¬ bers of horses and hogs are raised. The breed¬ ing of Angora goats has also been undertaken with marked success and is becoming an im¬ portant industry. Hop raising is carried on quite extensively in the river valleys, the average crop being about the same as in eastern Wash¬ ington; considerable small grain is raised in this section, especially upon the flat lands along the shores of Puget Sound. About 27 per cent of the total land area of the State is included in farms. Of this (11,712,238 acres) about 55 per cent is improved farm land. The average size of farms in the State is 209 acres and there are 56,192 farms in the State. Farm land in 1910 had an average value of $44.18, but has since increased about 50 per cent. About five-sixths of all farms are operated by owners. About two-thirds of all farmers are native-born, the remainder coming from Germany, Sweden, Norway, Canada and England. At the time of the

last census there were 673 Indian farmers, 316 Japanese, 59 Chinese and 77 negroes.

The wheat yield in 1918 was 26,429,000 bush¬ els, valued at $51,801,000; barley yielded 2,630,- 000 bushels, valued at $3,024,000 ; oats yielded 8,370,000 bushels, valued at $8,203,000; corn, 1,634,000 bushels, valued at $2,778,000; potatoes, planted to 65,000 acres, yielded 8,580,000 bush¬ els, valued at $8,666,000. The hay crop was 1,429,000 tons, valued at $36,297,000. The fol¬ lowing was the acreage in the year above named: Corn, 43,000; barley, 173,000; wheat, 2,191,000; oats, 310,000; and hay, 794,000 acres. On 1 Jan. 1919 the domestic animals were 303,- 000 horses, 20,(X)0 mules, 216,000 milch cows, 307,000 other cattle, 780,000 sheep and 317,000 swine. The wool clip in 1917 totaled 4,988,000 pounds of wool. The fruit-growing area has increased over 100 per cent in the last two years.

Lumbering. — The greatest industry of the State is the manufacture of lumber and shingles. There are in the State 500 lumber mills, which cut 4,500,000,000 feet annually, and 292 shingle mills, with an output of 7,000,000,000 shingles. There are also more than 300 logging-camps and a number of planing mills and woodenware fac¬ tories. These mills, factories and camps em¬ ploy more than 65,000 men ; the annual payroll amounts to $89,500,000 and the value of the product is about $112,500,000 annually. The most valuable tree of the State is yellow, or Douglas fir {Pseudotsuga Douglasii) , which comprises almost one-half of the merchantable timber. The next most valuable is the red cedar {Thuya gigantea) , used extensively in the manufacture of shingles. Western hemlock

WASHINGTON

Photo, by Asbabel Curtis

1 Mount Rainier and a Washington Forest 2 Irrigation in the Yakima Valley

WASHINGTON

Courtesy of Washington State Bureau

2 A Western Logging Scene

1 A Lumber Shipping Port

WASHINGTON

State Capitol at Olympia

(Tsuga mertensiana) , yellow pine {Pinus pon-tierosa), sugar pine {Piniis lambertiana), spruce (Picea sitcJiensis) and western larch (Larix occidentals) , are also valuable commercial va¬ rieties. At the present rate of consumption, the amount of standing timber will supply the mills of the State for at least 100 years. Al¬ most 400,000,000,000 feet of timber is untouched in this State.

Mining. — Coal is first in importance in the mining resources of the State. The greatest deposits are found in the Puget Sound Basin and on the eastern slopes of the Cascade Moun¬ tains in Kittitas County. The coal fields are ex¬ tensive and practically inexhaustible. The veins var>' from five to 25 feet in thickness. The quality ranges from a rich bituminous coking coal to brown lignites. Deposits of anthracite have also been discovered in the vicinity of Mount Rainier and Mount Baker. In 1919 there were 70 mines in operation, emplojdng 5,847 workmen. The aggregate output during the year 1919 was 4,000,000 tons of coal and 96,000 tons of coke. The mines of Washington and British Columbia practically supply the Pacific Coast States and Alaska with coal.

There are large deposits of iron ore in the Cascade Range and in the Puget Sound Basin. Brown hematite ore is found along the Skagit River. Magnetic ore is found in Kang County and bog ore occurs in several localities. Cop¬ per and lead are found in the Cascade Moun¬ tains and the Okanogan Highlands. Lead, zinc, arsenic, molybdenum, tungsten and platinum also are found.

The precious metals are found in several localities and sufficient development work has been done to prove the existence of mines of great value. In the northeastern part of the Slate the mines have been worked on an ex¬ tensive scale. The prevailing country-rock in that district is limestone and the prinicipal min¬ eral is argentiferous galena. Gold and silver have been discovered in many places throughout the whole extent of the Cascade Range and in the Okanogan Highlands. The yearly output of metal mines is about $3,000,000. Clay prod¬ ucts are valued at $1,500,000 yearly. The total mineral output, exclusive of coal, is valued at $18,000,000

yearly.

Fisheries. — Salmon fishing is one of the im¬ portant industries of the State, and her brands of canned salmon are known in ever > * market in the civilized world. The capital invested in the fishing industry' exceeds $15,000,000; the num¬ ber of persons directly dependent on the fish¬ eries is 50,000 to 60,000, while the number actu¬ ally employed is about 15,000, and the wages paid amount to more than $4,000,000 annu¬ ally. The value of the yearly product of the canneries ranges from $12,000,000 to $30,000,000, according to the run of fish, and the value of the fresh, salted and smoked product will amount to about $3,000,000 more each year. There are about 71 salmon canneries operated in. the State. The propagation of salmon was undertaken by the State in 1895, and since that time 38 hatcheries have been established with a capacity of from 5,000,000 to 10,000,000 fish each per season. This work had been very suc¬ cessful and has resulted in an increase of the supply of salmon. In addition to the salmon industry, the cod, halibut, mackerel and herring fisheries on the banks off the coast of Wash¬

ington and Alaska give emploNinent to a large number of men. Large quantities of halibut are shipped to the Atlantic Coast cities in re¬ frigerator cars and that line of fishing has been developed into an important industry*. Chster culture is also carried on to quite an extent in the shallow waters of Puget Sound and Willapa Harbor. Clams, crabs and shrimp are abundant, and many kinds of game fish are found in the streams and fresh-water lakes.

Game. — There is a great abundance of large and small game in Washington. Deer are found in all sections, elk abound in large numbers in the Olympic Mountains and to some extent in the Cascades. Mountain goats are numerous on the higher ranges of the Cascades. There are a few mountain sheep on the loft > ' moun¬ tains. Black bears, panthers and wildcats are common in the mountains. Waterfowl, pheas¬ ants, quail, prairie chickens and several kinds of grouse are plentiful.

Washington exceeds eveiy-other State in its ˆme fishing. In 1918 20,000,000 trout fr > - were liberated from its hatcheries.

Manufacturing. — \ hen the census of 1914 was taken, there were 3,289 manufacturing es¬ tablishments reported in this State. There are at present probably 5,000 such establishments. The number of

wage-earners employed is about 100,000; the amount of wages and sala¬ ries paid is $150,000,000 and the value of the products $5,0(X),000,0W. The largest manufac¬ turing industries consist of lumber mills, air¬ plane factories, flour and grist mills, shipyards, iron and steel works, paper mills, smelters, beet-sugar plants, fruit and vegetable canneries, fruit juice factories, furniture factories, pot¬ tery' and terra-cotta works, creameries and con¬ densed milk factories, fireworks and fertihzer plants. Since 1914, manufacturing has increased very rapidly. Many new industries have been established and old ones have been greatly ex¬ tended in order to keep pace with the grotHng markets. There are about 150 flour mills in the State producing more than $50,000,000 worth of flour per annum, which is marketed largely in the Orient, South America and Eu¬ rope. Shipbuilding is carried on at a number of localities on Puget Sound and at Grab 's Har¬ bor. The Puget Sound Xa\y' Yard is equipped for the construction and repair of all kinds of ships and boats. The Pacific fleet is based on this station. The battleship Nebraska was built in 1904 in Seattle. Washington produced more than 30 per cent of the vessels constructed during the war. Both steel and wooden ves-esls of various 01)05 are builL The superiority of Washington fir for use in ship construction is recognized in all parts of the world, on ac¬ count of its great strength and the length of clear timber obtainable. The manufacture of iron and steel is also carried on extensively. Several open-hearth furnaces are operating at Seattle and producing a high grade of steel. W ith an abundance of raw materials, easily as¬ sembled at low prices, and with a large mar¬ ket for the product, the manufacture of iron and steel promises to become one of the leading industries.

Nˆearly all the rivers of the State are moun¬ tain streams, with a large flow of water at all seasons of the year, and many rapids and falls, which, under modem methods of transmission are capable of supplying power for indu.strial

purposes at a low cost and in almost unlimited quantities. Large power plants have already been installed on the Snoqualmie and Puyallup, Cedar and other rivers. The city of Seattle has constructed a plant upon the Cedar River and is building another on the Skagit River to sup¬ ply the municipality with light and power for both public and private purposes. Several other plants are in the course of construction in the vicinity of the larger cities. The State is cred¬ ited with having 4,930,000 horse power or 18 per cent of the total potential hydro-electric power of the country.

Transportation. — Washington is well pro¬ vided with transportation facilities, both by water and by railroad. The rivers, lakes, Puget Sound, with its numerous arms, bays and inlets; the strait of Juan de Fuca and the Pacific Ocean make all parts of the western section, and many parts of the eastern section of the State easily accessible by boats. There are 1,200 miles of navigable streams in the State, about 8,000 miles of railroad and 1,500 miles of electric roads. The chief steam railroad sys¬ tems are the Northern 'Pacific, Great Northern, 'Oregon-Washington Railway and Navigation Company, Chicago, Milwaukee and Saint Paul, Pacific Coast Railroad, Spokane Falls and Northern, and Seattle, Portland and Spokane. The Burlington system, the Canadian Pacific and Grand Trunk Pacific also reach Puget Sound under traffic arrangements with the other roads. Electric railways are now in operation between most of the important cities. A number of other lines are projected. A large fleet of steamers is operated upon the waters of Puget Sound carrying freight and passengers in the local traffic. Steamship lines are oper¬ ated between Seattle, Puget Sound and Alaska, British Columbia, California, Europe, the Orient and the Atlantic Coast, and between Gray's Harbor and San Francisco. In addition to the regular lines, a large commerce is • carried on by sailing vessels and itinerant steamships.

Commerce. — During the calendar year of 1918, vessels aggregating 3,329,294 tons entered, and vessels aggregating 3,423,541 tons cleared in the foreign trade of the Washington Cus¬ toms District, which includes all the ports of Washington except the Columbia River. The value of the foreign imports was $300,990,136, and the value of the foreign exports was $296,- 190,778 in the Washington district. In 1893 the imports amounted to only $839,709 and the ex¬ ports to $5,093,436. A very large commerce is carried on between Washington

and the other Pacific Coast States, Alaska, Hawaii and the Philippine Islands. Alaska's commerce alone in 1918 was valued at $127,049,132. In addition about $195,000,000 in foreign imports were landed on Puget Sound in bond to other cities.

Education. — There are 2,554 school dis¬ tricts in the State, in 793 of which schools of more than one room are maintained. In 1919 the total number of children of school age was 348,771 and the enrolment at the schools was 272,325. The reports of the State superintend¬ ent of public instruction show that 9,770 teach¬ ers were employed in 1917 and 1918. Total dis¬ bursements were .'^14,058,211 in 1918. The value of school property, exclusive of school lands, was $36,596,668. The average length of the school sessions in the country districts is approxi¬

mately eight months. In the towns and cities the sessions are usually nine months. Nearly every town of* from 1,500 upward has a high school with a three or four year course. In a number of places several country districts have combined to form a junior high school district. The number of students in attendance at high schools in 1918 exceeded 37,000. For higher education the State maintains the University of Washington at Seattle with 300 instructors and enrolment of over 2,400 students ; the Agricul; tural College and School of Science at Pullman, 1,900 students; and normal schools at Cheney, 2,524 students ; Ellensburg, 600 students, and Bellingham with 2,313 students.

In addition there are 133 private educational institutions. The leading private colleges are Whitman College at Walla Walla; Whitworth College, Spokane ; Gonzaga College, Spokane ; College of Puget Sound, Tacoma Vashon Col¬ lege, Burton and Colfax College, Colfax.

Charitable, Reformatory and Penal Insti¬ tutions. — The State maintains separate insti¬ tutions for the care and education of the blind, deaf and feeble-minded; a penitentiary, three hospitals for the insane and two soldiers' homes. The boys' training school is located at Chehalis, and the girls' training school at Grand Mound. Each of these institutions has a large farm and is well provided with shops and the necessary equipment for educating the youth in useful trades. The penitentiary is located at Walla Walla. In this institution there is a jute mill which gives employment to a large number of the inmates. The Western Washington Hospital for the Insane is located near Steilacoom, the Northern Hospital for the Insane is at Sedro-Wooley

and the Eastern Washington Hospital at Medical Lake. The Soldiers' Home is located at Orting and the Washington Veterans' Home at Port Orchard. All of these State institutions are under the general super¬ vision and management of a board consisting of three members appointed by the governor, known as the State Board of Control.

Banks and Finance. — There were in 1919, 386 banks ; of these, 84 were national, 293 State and 5 foreign. The total resources of all banks in 1919 was $469,644,256. The assessed valuation of real and personal property in the State in 1919 was $1,060,620,838 and the State tax levy, $10.44 per 1,000. The assessed valua¬ tion of real property in 1917 amounted to $702,944,238, and of personal property to $136,- 238,708. In 1917 the valuation of railways was, $341,371,132; electric lines, $44,498,275; tele¬ graphs, $889,147. The outstanding bonded debt was paid off in 1911. For the year ending 30 Sept. 1918 the revenue of the State was $15,643,321, which was increased to $20,251,757 by the balance over of $4,608,436 from the year previous. The disbursements during the year named amounted to $14,878,937, leaving a bal¬ ance on hand on 30 Oct. 1918 of $5,372,820.

Government. — The State officers are as follows : Governor, lieutenant-governor, secre¬ tary of state, treasurer, auditor, attorney-gen¬ eral, superintendent of public instruction, com¬ missioner of public lands and insurance com¬ missioner, who are elected for terms of four years. The legislature of the State has biennial sessions and consists of a senate and house of representatives. There are 42 members of the senate, one-half of whom are elected every two

years to hold office for terms of four years. The house of representatives consists of 97 members, elected biennially for terms of two years. The judicial department is divided into a Supreme Court and Superior Courts. There are nine judges of the Supreme Court whose terms are six years, and 60 judges of the Su¬ perior Courts, elected for terms of four years. The whole State is under county organization, the affairs of each county being administered by a board of county commissioners consisting of three members. The State is represented in Congress by two senators and five representa¬ tives.

Population and Divisions. — As shown by the United States census reports, the population of Washington was 11,594 in 1860 ; 23,955 in 1870; 75,116 in 1880; 349,390 in 1890. The United States census of 1910 reported the pop¬ ulation as 1,141,990. The same authority re¬ ported 1,356,621 in 1920.

There are 39 counties in the State, which, with their county-seats, are named as follows :

Adams, Ritzville.

Asotin, Asotin.

Benton, Prosser.

Grays Harbor, Montesano.

Chelan, Wenatchee.

Clallam, Port Angeles.

Clarke, Vancouver.

Columbia, Dayton.

Cowlitz, Kalama.

Douglas, Waterville.

Ferry, Republic.

Franklin, Pasco.

Garfield, Pomeroy.

Grant, Ephrata.

Island, Coupeville.

Jefferson, Port Townsend.

King, Seattle.

Kitsap, Port Orchard.

Kittitas, Ellensburg.

Klickitat, Goldendale.

There are 99 places in the State of over

I, 000 population; 52 of over 2,000 and eight of over, 20,000. The metropolis is Seattle, on Puget Sound, with 315,312 inhabitants, reported in 1920, Tacoma 96,965, Spokane 104,437, Bel¬ lingham 25,585, Everett 27,644, Walla Walla 15,503, Yakima 18,539 and Aberdeen 15,337. All of the cities named are important commercial and manufacturing centres.

Indians. — According to the annual report of the Commission of Indian Affairs there are

II, 083 Indians living upon the 12 reservations in the State. The reservations contain 1,699,807 acres of land. The largest reservations are the Makaw and Quinault reservations on the, Paci¬ fic Coast; the Tulalip and Puyallup reservations on Puget Sound and Yakima, Colville and Spo¬ kane reservations in eastern Washington. There is also a large number of Indians who do not live upon the reservations. Many of them are engaged in agriculture and a considerable num¬ ber work in the logging-camps and fisheries.

History. — The first record in history of the region which is now the State of Washington, was the discovery in 1592 of the Strait of Juan de Fuca by a Greek pilot of that name in the service of the viceroy of Mexico. In 1775 a Spanish navigator, Capt. Bruno Heceta, sailed along the coast and discovered the mouth of the Columbia, and was unable to enter the river. In 1792 Capt. Robert Gray, a New England navi¬

gator, sailed up the North Pacific Coast on a voyage of exploration and on 11 May he discov¬ ered the mouth of the Columbia, sailed into the

river, explored it for about 15 miles and gave it the name of his ship. It was this discovery and the exploration that gave the United States their strongest claim to the territory drained by the Columbia, which was known as the ^^Oregon Country 9ˆ In the same year Capt. George Van¬ couver of the British navy, explored the waters of Puget Sound. During the next few years a number of other navigators visited the coast and it soon became quite well known. The first overland exploration was the expedition of Lewis and Clark of the United States army in 1805-06. This expedition, sent out by Presi¬ dent Jefferson, traversed the Mississippi Val¬ ley, crossed the Rocky Mountains and followed the Columbia River to its mouth, where they spent one winter. The next military expedition was that of 1843 under Capt. John C. Fremont, which reached Vancouver on the Columbia. The first United States naval expedition was the exploration of Puget Sound by Capt. Charles Wilkes in 1841. The first white people to settle in Washington were the traders of the Northwest Fur Company, who established posts in eastern Washington in 181 L The next white settlement _ was established by Dr. Marcus Whitman in 1836 near the site of the present city of Walla Walla. The first settlement in western Washington was at Tumwater on Puget Sound in 1845. The ownership of the country north of the Columbia River was claimed by both Great Britain and the United States until 1846, when, under the Buchanan-Pakingham treaty. Great Britain took all the territory north of the 49th parallel, and the United States all of the territory south of that parallel, except the south end of Vancouver Island. The Amer¬ ican territory was organized as the Territory of Oregon, 14 Aug. 1848. On 2 March 1853 that portion lying north of the Columbia River and the 46th parallel was organized as the Ter¬ ritory of Washington. With the discovery of gold in eastern Washington, a great increase of population followed, and the Indians becom¬ ing alarmed for their hunting grounds, resolved to exterminate the whites. This led to the In¬ dian War of 1855-56, and there were still fur¬ ther troubles with the Indians in 1857, at the time of the rush to the gold fields of British Columbia, but the greatest rush was after the discovery of gold at Salmon River in 1860. At the time of the treaty between Great Britain and the United States in 1846, the 49th parallel had been accepted as the boundary to the chan¬ nel between Vancouver Island and the main¬ land, and thence down that channel to the sea. In 1859 a

dispute arose as to which channel was meant, and this was not settled untij 1872, when the claims were referred to arbitration and de¬ cided by the German emperor in favor of the United States. On 22 Feb. 1889, Congress passed an enabling act providing for the ad¬ mission of the State of Washington into the Union. The State constitution was adopted and ratified by the people at an election held 1 Oct. 1889, and on 11 Nov. 1889, in accordance with the provisions of the enabling act, the Presi¬ dent of the United States proclaimed the admis¬ sion of the State of Washington into the Union.

The growth of the population of Washington was very slow until the advent of the first rail¬ road in 1884, on account of its remoteness and the difficulty of reaching it from the Eastern Stales. Since that time the development of the

Lewis, Chehalis.

Lincoln, Davenport. Mason, Shelton.

Okanogan, Okanogan. Pacific, South Bend.

Pend Oreille, Newport. Pierce, Tacoma.

San Juan, Friday Harbor. Skagit, Mt, Vernon. Skamanis, Stevenson. Snohomish, Everett. Spokane, Spokane.

Stevens, Colville. Thurston, Olympia. Wahkiakum, Cathlamet. Walla Walla, Walla Walla. Whatcom, Bellingham. Whitman, Colfa.x.

Yakima, North Yakima.

country has been phenomenally rapid. The es¬ tablishment of regular steamship lines between Puget Sound and the countries of the Orient, the trade which has grown up as a result of the great discoveries of gold in Alaska and the Yukon territory in 1897, and the development of commerce between this State and the new island possessions in the Pacific Ocean, are some of the leading factors which have caused the wonderful progress of the past few years.

Anti-Chinese riots occurred in 1885-86 and many lives were lost and much property de¬ stroyed by mobs. At the Federal elections of 1892 the State selected Republican electors ; four years later a fusion ticket of Democrats and Populists captured a majority of its votes; in 1900, 1904 and 1908 the State chose Republi¬ can electors. Woman suffrage was granted in November 1910 by a large majority. In the fol¬ lowing year the chief executives of Tacoma and Seattle were recalled from office by popular vote. Roosevelt received 111,179 votes in 1912 to 87,674 cast for Wilson and 71,252 for Taft. V\ ilson received 183,388 votes in 1916 to 167,208 for Hughes. In 1920 Plarding received 223,137 to 84,298 for Cox.

The war with Germany caused a sudden ex¬ pansion of the State's industrial activities, espe-ˆ cially in shipbuilding. After the war consider¬ able labor disturbances marked the State's in¬ dustrial life. Radical agitators, mostly of the I. W. W. stripe, endeavored to fan the flame of discontent caused by high prices and an in¬ flated currency, and seized every opportunity to make recruits to their ranks Their activities reached their climax at Centralia on 11 Nov. 1919, when, during a celebration of the anni¬ versary of Armistice Day, a band of the I. W. W. fired several shots into a passing pa¬ rade of members of the American Legion, kill¬ ing four and seriously wounding many others. This outrage caused the law-abiding citizens, not alone of Washington, but of every other State, dishonored by the presence of this law¬ less foreign element, to take prompt measures against these revolutionaries. One leader of the band was lynched at Centralia and after a few days order was restored.

Governors of Washington.

TERRITORY.

Isaac I. Stevens… 1853-57

C. H. Mason, acting . 1857

Fayette McMullen . 1857-58

C. H. Ma-son, acting . ! … . 1858-59

Richard D. Gholson . 1859-60

Henry M. McGill, acting . 1860-61

William H. Wallace . 1861

L. J. S. Turner, acting . 1861-62

WiUiam Pickering . 1862-66

George E. Cole . 1866—67

E. L. Smith, acting . j . 1867

Marshall F. Moore . 1867-69

Alvin Flanders . 1869-70

Edward S. Salomon . 1870-72

Elisha P. Ferry . 1872-80

William A. Newell . 1880-84

Watson C. Squire . 1884-87

Eugene Semple … 1887-89

Miles C. Moore . 1889

STATE.

Elisha P. Ferry . Republican . 1889-93

John H. McGraw. … “ . 1893-97

J. R. Rogers . Democrat-Populist . 1897-1901

Henry G. McBride, acting . 1901-05

.‘Mbert E. Mead . Republican . 1905-09

Samuel C. Cosgrove.. “ . 1909

M. E. Hay . “ . 1900-13

Ernest Lister . Democrat . 1913-1919

Louis F. Hart, acting. Republican . 1919-21

Louis F. Hart . “ . 1921-25

Bibliography. — Bancroft, ˆHistory of Washington, Idaho and Montanaˆ (San Fran¬ cisco 1890) ; ˆAnnual Reports of the Washing¬ ton Geological Surveyˆ (1902 et seq.) ; Bagley, Hn the Beginning: Sketch of Early Events of Washingtonˆ (Seattle 1906) ; Ballinger, R. A., and Remington, A., ˆ Codes and Statutes of Washingtonˆ (Seattle 1910) ; Davis, W. L., and Bowles, J. H., ˆBirds of Washingtonˆ (2 vols., Seattle 1909) ; Evans, ˆHistory of the Pacific Northwestˆ (Portland 1889) ; id., ˆWashing¬ tonˆ (Tacoma 1893) ; Hawthorne, Julian, ˆHis¬ tory of Washingtonˆ (New York 1893) ; Hines, H. K., Hllustrated History of Washingtonˆ (Chicago 1893) ; Meany, Edmond S., ˆHistory of the State of Washington-* (New York 1909) ; Schafer, J., ˆHistory of the Pacific Northwestˆ (New York 1905) ; Stevens, Haz¬ ard, ˆLife of Isaac Ingalls-Stevensˆ (Boston 1900) ; Hllustrated History of Klickitat, Ya¬ kima, and Kittitas Counties: with Early History of the Stateˆ (Spokane 1905) ; ˆBulletin 214ˆ of the United States Department of Agricul¬ ture, and HVater Supply and Irrigation Papers 55 and 118 of the United States Geological Sur¬ veyˆ (Washington 1901; 1905); Vancouver, George, ˆVoyage of Discovery to the North Pacific Oceanˆ (3 vols., London 1797). Con¬ sult also ˆManufacturing Opportunities in the State of Washingtonˆ (Olympia 1918) ; ˆThe Beauties of the State of Washingtonˆ (id. 1915) ; ˆHome Seekers Guide to the State of Washington: Its Resources, etc.ˆ (Olympia 1915) ; Biennial Reports of the Executive De¬ partments of the State; ˆHistory of the Expedi¬ tion under Lewis and Clarkˆ (New York 1893).

Frank C. Doig,

Director of Publicity, Seattle Chamber of Com¬ merce and Commercial Club.

WASHINGTON, Ark., town, county-seat of Hempstead County, on the Arkansas and Louisiana Railroad, about 110 miles southwest of Little

Rock. It is in an agricultural region, and its industries are connected chiefly with farm products. It has considerable trade, es¬ pecially in the shipments of grain, vegetables, cotton and tobacco. Pop. (1ˆ0) 556.

WASHINGTON, Conn., township in Litchfield County, on the Shepatig River, about 90 miles northeast of New York and 38 miles north of Bridgeport. It contains the villages of Marbledale, New Preston, Woodville, Wash¬ ington, Washington Depot and Romford. Its industries are connected with farm products and caring for guests in summer, as it is a favorite stimm-er resort. Pop. about 1,747.

WASHINGTON, D. C, the capital of the United States, coterminous with the District and, therefore, occupying a territory of 69J4 square miles. The city is under the exclusive jurisdiction of the Congress; it is situated on the Potomac River, 100 miles above its mouth, 40 miles south by west of Baltimore, 136 miles from Philadelphia, 226 miles from New York, 1,109 miles from New Orleans and 3,118 miles from San Francisco.

The exact location of Washington is, long. 76° 58’ W. ; lat. 38° 53’ N. The climate of this locality is mild and even, the mean average annual temperature for the past quarter-cen¬ tury being 55° ; average summer temperature for this p’eriod, 75° ; average winter tempera¬ ture, 35.

1

2

3

4

5

6

7

8

9

500

Washington is approached by both railway and waterway, as well as by an admirable sys¬ tem of highways constructed to meet the re¬ quirements of the recent enormous increase in motor travel. Steamboat lines connect it with Baltimore to the north, and with Norfolk to the south. From the north and west both the Pennsylvania and th*e Baltimore and Ohio rail¬ ways lead into the city, from the west the Chesapeake and Ohio and from the south the Southern, the Seaboard Air Line and the At¬ lantic Coast Line.

A bird's-eye, or airship, view of Wash¬ ington discloses a forest-like area, banded from north to south, from east to west, and from certain radiating centres, by broad thoroughtares. At trequent intervals the wealth of greenery grows compact in park formation. Dome, and spire, and turret, lift through the verdure. And within it there is the glow of gilded roof, the gleam of marble wall and the massed grays and reds of every city's usual architecture. From this high point the northern bank of the Potomac is seen to form a border of urban landscape, bending to the river's way, from the eastern to the western limits of the city, in a picturesque sweep of green. This effect of living green is the dominant note of the whole. With its 600 miles of street trees, exclusive of those be¬ longing to the parks, Washington challenges the world in this respect, Buenos Aires alone standing as its only possible rival. This up¬ lifted field of observation makes disclosure, also, of the spread ot the city and the direction of its most vigorous growth. It reveals, be¬ sides, the number and location of attractive suburbs that are so rapidly gathering upon its outskirts to the north and northwest. And, above all, it brings into a distinct and related view those points that mark Washington as the seat of government. On a commanding height in the eastern part or the city rises its most notable and magnificent structure, the Capitol. A block away from this, to both north and south, are two commodious and impressive buildings of white marble, devoted to the office use of senators and representatives respect¬ ively. A block to the east of it is the Library of Congress. A mile to the west of the Capitol is the White House, flanked on the east by the Treasury of the United States, and on the west by the State, War and Navy build¬ ing. This outline sketch

summarizes the es¬ sentials of the city as the heart of the Federal territory. A line flung westward across the Mall, from the Capitol to Arlington National Cemetery on the Virginia side of the Potomac, includes, besides these two points, Washington Monument and Lincoln Memorial.

Streets and Avenues. — The projectors of Washington possessed the vision of a city that was, eventually, to fill the District of Columbia to its borders. Therefore, it was to this scale that they planned. The Capitol was selected as the keynote of the scheme. Through the cen¬ tre of its site a line was drawn from north to south, and another from east to west. Both extended to the limits of the District. The four sections laid off by these lines were, ac¬ cording to relative position, named, northeast, northwest, southeast and southwest, Washing¬ ton. This device was calculated to reduce to a

clear and simple system the complex problem of street naming that great cities encounter. These initial lines became streets, the one ex¬ tending north and south from the Capitol, North and South Capitol streets respectively. The one running east from the Capitol was named East Capitol street. Toward the west, the Mall was set off for a great city park. This, to the width of four city blocks, ex¬ tends straight west from the Capitol to the Potomac River. Lines drawn parallel to the two original ones served as the plan by which the entire District might, as need arose, be transformed into a huge area of rectangular city blocks, bounded-by a regular system of numbered and lettered streets, the former ex¬ tending north and south, the latter east and west. Since the street naming started from the two initial lines that divided the city into four sections, each lettered and numbered street be¬ came one of a four-fold duplicate. Identifica¬ tion would be rendered simple and complete, however, by virtue of the section to which each belonged. Superimposed upon this rectangular system of streets were the avenues radiating from the Capitol and certain other centres. These as they developed were to be given the names of the States of the Union. The original plan of city growth has been adhered to with fidelity. The distinction of Washington's streets lies in their width, their finish and their luxuriant tree borders. The narrowest street is 60 feet wide. They range from this figure to 160 feet in width. Pennsylvania avenue, extending from the Capitol, east to the Eastern branch and west to Rock Creek, paved with asphalt its entire length, is the broadest of the avenues. Sixteenth street is the widest and most beautiful of the streets. The city report of 1916 shows 513.69 miles of paved streets, its mileage of asphalt paving ex¬ ceeding that of all

other kinds combined. Scientific street-tree culture is vigorously pur¬ sued. Already 600 miles of street trees con¬ tribute markedly to the beauty of the city.

Parks. — The park system of Washington is an imposing one of certain unique and indi¬ vidual features. The parks of the city separate, roughly, into large and small parks. In the first group are Rock Creek Park of 1,609 acres, a tract of great natural beauty lying to the west of the city. Adjoining it on the southwest is Zoological Park with 166 acres. Potomac Park of 723 acres borders the river from Georgetown to the Eastern branch. The Mall, containing 306 acres, issues, so to speak, out of the beautiful 50-acre park surrounding the Capitol and, running west in a narrow line, meets the Potomac River a mile and a half away, where it joins Potomac Park. Between this point of juncture and the southern bound¬ ary of Rock Creek Park are 162 acres which will, finally, serve to bring into complete exist¬ ence a splendid continuous parkway that will sweep the entire western and southern borders of the city. The Mall connects the Capitol with this great parkway. In process of con¬ struction is a beautiful plaza connecting the Capitol with the new and imposing Union Station, a symbolic connection, also, with the federated States of which the capitol itself is the focal point. To the north of Washington is the Soldiers' Home in the midst of 600 acres

of beautifully planned and matured grounds. Adjoining Soldiers' Home to the south is a parklike area of 29 acres. This contains, in picturesque arrangement, the city filtration plant. At a point about 15 miles above the city, its water supply is drawn from the Poto¬ mac through aqueducts into large storage reser¬ voirs from which it passes into the filtration plant. The water supply with everything _ re¬ lating to it is under the charge of the United States government, a sufficient water rent be¬ ing charged consumers.

In the second group of parks are the scores of smaller reservations that are scattered throughout the city. In their source these go back to the original city plan of imposing a system of radiating avenues upon a system of parallel streets. Intersections between these two systems cut out and left over, as it were, many areas ranging in size from mere plots to the equivalent of several city blocks. These triangles, squares and circles were taken over by the general government and converted into parks and park spaces. Among the most familiar of these are the White Lot, lying di¬ rectly south of the White House and toudiing the Mall; Lafayette square, facing the White House to the north; Lincoln Park at 11th and East Capitol streets; Washington Circle at 22d and Pennsylvania avenue ; and Meridian Hill Park, facing upon 16th street in the northern section of the city. A park commission, ap¬ pointed by Congress in 1902, has, through the services of landscape architects and experts in city planning, converted this multitude of separate parks into a system that functions in many recreative ways as an organic part of the civic life. Meridian Hill Park stands as a model of the modern conception of an urban reservation, in its combination of beauty and utility. Washington possesses 392 parks and reservations.

Buildings. — Of all the city buildings, those belonging to the general government stand pre¬ eminent in interest. The Capitol, the Library of Congress, the White House, the Treasury and the State, War and Navy Building lead this group. South of these, occupying points upon the Mall, are Lincoln Memorial, Wash¬ ington Monument, Bureau of Engraving and Printing, Bureaus of Agriculture, Smithsonian Institution and National Museum. North of Pennsylvania avenue and quite within the busi¬ ness section of the city are the government post office, patent office, pension office and the government printing office, which is the largest and most complete printing establishment in the world. The Capitol is the crown of the city's architecture. Seated upon

a plateau 88 feet above the river it commands the city and its environs. The dome of the Capitol is from every outlying quarter the first intimation of one's approach to the Federal city. Expressed in figures this building covers 153,112 square feet, with a length of 751 feet, a depth of 350 feet and a height from base to summit of 288 feet. Its cost was $14,000,000. Architecturally it consists of an-original central structure crowned by a lofty dome, with long extensions or wings stretching to north and south. Its position, its approaches, the material and design of its architecture make this one of the most magnificent of the public buildings of the

world. The lawmaking centre of the federated States, it possesses two grand legislative halls, that to the north devoted to the use of the Senate, the one to the south to the House of Representatives. The United States Supreme Court also has its council chambers in the Capitol. In September 1793 George Washing¬ ton laid the cornerstone of the original central building. This is of sandstone quarried on Aquia Creek, Va., a few miles below the capital. In 1814 this building was practically destroyed by the British. By 1827 the Capitol had cost $2,433,844. On Independence Day, 1851, President Fillmore laid the cornerstone of the two extensions, Daniel Webster officiate ing as orator. Next to the Capitol itself the Library of Congress is the most notably beauti¬ ful and impressive structure in Washington. This, at a cost of $6,347,000, was completed in 1897. It contains the great national library; 45 miles of shelving furnish a capacity of 2,200,000 octavo volumes. In addition to the 1,625,318 books, pamphlets and prints that it contains the library has 218,324 other articles deposited for copyright purposes. The White House, so called by reason of the white surface applied to its freestone foundation, is a simple and dignified structure whose historic associa¬ tions give it a general personal interest sur¬ passing that attached to any other of the public buildings save the Capitol alone. The Treasury, a freestone and granite building erected at a cost of $7,000,000, the oldest of the departmental buildings, is the one example of pure Greek architecture in the city. The State, War and Navy Building, a commodious structure occupy¬ ing four and a half acres of land, erected at a cost of $11,000,000, is a composite Greek and Roman architecture. The Lincoln Memorial is as truly one of the world's architectural gems as is the Eastern Taj Mahal. For this Con¬ gress appropriated $2,595,000. To the east it is joined with Washington Monument by the high¬ est art of landscape architecture. Washington Monument, a shaft 555 feet in height, is built of marble to which almost every country on the face of the earth contributed a stone. An ele¬ vator leads to the top of this

shaft where a wide view of the city and its environs may be obtained. Since its completion in 1888, 4,479,745 have made this ascent. The new Bureau of Engraving and Printing, situated on the river front to the east of the monument, is counted by experts as a model of industrial archi¬ tecture. A group of commodious and hand¬ some buildings for the use of the Agricultural Department is in process of construction, two of them having been already completed. The Smithsonian Institution, an impressive building of red sandstone, was built with funds be¬ queathed for this purpose by an English scien¬ tist, James Smithson. The new National Museum, situated on the edge of the Mall to the north of the old museum, was built in 1905 at a cost of $4,000,000. Other important Federal structures are the Naval Observatory and the Bureau of Standards, the latter a very complete plant to the northwest of the city. Notable buildings outside of this government group are the Municipal Building, erected in 1905 at a cost of $1,500,000, as the administrative centre of the District government; Washington Public Library, the $300,000 gift of Andrew Carnegie;

Corcoran Art Gallery; the new building of the American National Red Cross; Continental Hall, erected by the Daughters of the American Revolution, and the Pan-American Union. The last four are situated on the stretch of 17th street lying between Pennsylvania avenue, N. W., and the Mall. The Union Station be¬ longs to this group, as does the new City Post Office, situated beside it. The former was built at a cost of $5,000,000, with an additional $11,000,000 for the construction of its ap¬ proaches. The buildings of The Evening Star, The Washington Times, The Washington Post; that of the Southern Railway; the New Wil¬ lard, Raleigh and Shoreham hotels ; the Masonic Temple and Scottish Rite Supreme Council ; Carnegie Institution, and the new Central High School command attention.

Churches. — Washington has some of the finest church buildings in the country. Its places of worship number 358, representing 17 sects, 4 non-sectarian bodies and an unclassified group of 20 miscellaneous congregations. Like the government holdings the vast church properties of the city are exempt from taxation.

Education. — For the direct purpose of co¬ ordinating the educational forces of the capital, the Congress, by specific act, has opened its vast sources of information to the use of the higher institutions of learning situated in Washington. More than this, the leading universities of the country have completed a plan for creating a common university centre at Washington in order ‘to take advantage of its unexcelled facil¬ ities for advanced studies of history, political science and economics. Certain institutions, special in purpose and unique in character, are located in Washington. The Carnegie Institu¬ tion of Washington is one of these.

A considerable part of the adult population of Washington is engaged in study of one sort or another. Hundreds of men and women, clerks in the government bureaus, seek by this means to increase their efficiency and further their prospects of advancement. Not only have new institutions risen to meet this condition, but those already established have recast curric¬ ula and adjusted school hours to suit the situa¬ tion. Washington is the seat of five univer¬ sities. The

oldest of these, as well as the oldest institution of learning in the District, is Georgetown University, situated on the heights of the west of Georgetown. Founded in 1789 by Archbishop Carroll of. Baltimore, it was de¬ veloped under the direction of the Jesuit Order of the Catholic Church. George Washington University goes back for its beginnings to 1821. In that year, through the activity of the Bap¬ tist Church, it was organized as Columbian Col¬ lege. Reorganized upon a non-sectarian basis, refortified by a more hopeful financial outlook, projected in strict accord with the aims of the modern university and planned to meet the peculiar need of the capital's large body of a'dult students, this university, with its student force of 3,436 and a faculty of 280, is forging rapidly to the front as an important institution. Howard University was established in 1867 by act of Congress to furnish oppor¬ tunities for the education of the negro. It pos¬ sesses both preparatory and collegiate depart¬ ments. The latter, in addition to its academic foundation, includes schools of theology, law.

medicine, dentistry and pharmacy. The Catholic University of America was organized in 1885 under the direction of the Catholic hierarchy of America, though its actual establishment was deferred until the autumn of 1889. It occupies a spacious tract in a northeast suburb of the capital. Here beautiful and dignified buildings are rising with a rapidity that points to the substantial growth of this university. It is one of the leading institutions for the higher study of letters and metaphysics. The American Uni¬ versity was organized under the inspiration and, in the main, under-the support of the Methodist Church for postgraduate research. In a north¬ west suburb of the capital, upon the 90 acres owned byˆ the university, two of the two' score buildings, projected in its plan, are already serving the purposes of postgraduate work. Near the Catholic University of America is Trinity College, a Roman Catholic institution established in 1900 for the higher education of women, under the direction of the Sisters of Notre Dame de Namur. Beautifully situated in the northeast section of the city is The Columbian Institution for the Deaf and Dumb, or Gallaudet College, incorporated in 1857 by Congress, this body making annual appropria¬ tions for its maintenance.

Below these higher 'and special institutions are the primary and secondary schools of the District. These are private and public, sec¬ tarian and non-sectarian. The mild winter climate of Washington ; the beauty, the cleanli¬ ness and the healthfulness of the city; the bril¬ liant drama of its political and social life; its public facilities for reference and research; all these combine to make the capital fruitful

soil for the development of private schools. There are literally hundred of these, many of them conspicuous in excellence, ranging from kinder¬ garten to seminary on the one hand and prepara¬ tory school on the other. Washington has a finely progressive public school system. The public school population for 1919 was 62,239. Of this number about two-thirds were white pupils and one-third negroes. This racial fact separates the school population into two parallel systems united at the top by the superintendent of public schools. These two parts are practically identical in aim and opportunity. Each consists of kindergarten, primary and grammar grades, each is supplied with both academic and vocational high schools and each supports a normal school for the training of teachers. The teaching force of the system for 1919 was, officers and teachers, 1,965. A new high school, modern in design and equip¬ ment, erected at a cost of $1,600,000. was dedi¬ cated in February 1917. Another, built at a cost of $700,000 for the use of negroes, was opened at about the same time. A $400,000 normal school for white pupils and one costing $250,000 for the training of colored teachers indicate further the scale to which the new school build¬ ings are being constructed.

Commerce. — By virtue of its fundamental character, Washington's commercial interests are, generally speaking, limited to local needs. The latest census report for the District of Columbia on this subject shows 514 manu¬ facturing establishments whose total capital is $40,810,200. The number of persons en¬ gaged in these is 11*,323, of whom 435 are pro-

prietors and firm partners, 2,011 salaried em-idoyecs and 8,877 wage-earners. The salaries and wages reported from these establishments are $8,068,692. The cost of material is shown to be $12,976,241. The value of the product is $28,978,241. This, less the cost of material, is $16,739,118. Between the reports of 1909 and 1914 a slight falling off appears in the number of these establishments. Within this period, however, there was a gain of 33.6 in capital, of 37.5 in salaries, of 21.6 in wages and of 11.3 in the net value of products. In addition to its manufacturing interests, Washington supports a vast mercantile business. Its department stores are models of this modern industrial ex¬ pedient. The heart of business Washington is in the northwest section of the city, though the complete business district extends from 6th to 15th streets, east and west, and from Penn¬ sylvania avenue to K street, north and south. The real estate interests of the city are enor¬ mous. Out of town investors control large blocks of property and speculation has at times been a conspicuous feature of this business. To the active speculation in real estate Wash¬ ington owes the development of its handsome suburbs both in the District and in the States immediately surrounding. Over 50 per cent of the property is controlled hy the United States government, whose holdings are increased from time to time as the demand for public building sites increases.

Banks. — The banking interests of the city are important. Reports made to the Comp¬ troller of the Currency, 12 Sept. 1919, by the banks and trust companies of the District show that Washington has 14 national banks whose deposits at that date were, in aggregate, $84,437,000 ; 24 savings banks with a total deposit of $21,722,000 and six trust companies whose deposits amounted to $55,578,000. The grand total of deposits stood at $161,737,000.

Transportation. — Washington has two street railway companies operating about 220 miles of track within the District. The larger of these companies is the Washington Railway and Electric Company, the other is the Capital Traction Company. The former is a syndicate of eight companies, with eight lines operating within the city and six in the suburbs. The lat¬ ter controls three important lines. The track¬ age is, for the most part, double track under¬ ground conduit electric. The slight percentage of overhead trolley lines is operated outside the city, connecting in several instances with re¬ lated lines of Maryland

and Virginia. The street railways of Washington have played a conspicuous part in developing the suburbs and outlying sections generally.

Charitable Institutions. — The peculiar con¬ ditions governing Washington politically have their effect on its moral government. The humane institutions of the capital are divided into three classes. First, those supported en¬ tirely by the combined general and local gov¬ ernment ; next, those supported partially by the same government combination, and third, those maintained solely by private means. In the first class are Soldiers and Sailors' Tempo¬ rary Home ; the Board of Children's Guard¬ ians; Freedman's Hospital for Negroes; Municipal Lodging House; Washington Asy¬ lum, including the workhouse, an institution for

correction, and also the almshouse, to which the sick of both these institutions are sent, and the Government Hospital for the Insane. In the second class are the Columbia Hospital for Women; Children's Hospital, Providence Hospital, Garfield Hospital and Emergency Hospital ; Woman's Clinic ; Washington Home for the Incurables; Washington Hospital for Foundlings; Saint Ann's Infant Asylum, and many other organizations of similar aim. The third class includes many institutions and asso¬ ciations which have for their object the caring for sick and incapacitated persons. Washing¬ ton has numerous private charities and institu¬ tions for charitable purposes in connection with the various churches and religious organizations. The charities of the District are superintended by a board of prominent citizens known as the board of charities ; appointments to this board are made by the President of the United States.

Government. — The government of Wash¬ ington is unique. The population is a disfran¬ chised one, therefore the citizens have, prac¬ tically, no part in its direction and control. On the contrary, it is the voters of the country at large who, through the Congress of the United Sates, control their Federal city. Congress enacts the laws for the government of the Dis¬ trict. It also appropriates all sums required to meet both the current administrative expenses and those involved, as well, in measures for the further development and improvement of Wash¬ ington. This body, moreover, names in specific detail the purposes for which its annual ap¬ propriations are made and dictates to the least item the several uses to which these appropria¬ tions are to be put. The source of revenue for such maintenance and improvement is twofold. One-half of the amount required annually is

dra.wn from the Treasury of the United States. This represents the federal obligation toward the support of the Federal territory. The other half is derived from taxes levied on the real and personal holdings of the citizens of the District and from the proceeds of licenses of various sorts. The vast property values within this area belonging to the general government are exempt from taxation. Three commis¬ sioners are appointed by the President, ®with the advice and consent of the Senate,® to ad¬ minister the District government. Two of these represent the two dominant political parties. _ The third one is an officer drawn from the engineer corps of the army. A commis¬ sioner's term of office is three years. The salary is $5,000. In addition to the District laws enacted by Congress, corresponding to the State laws of other localities, there are munici¬ pal regulations taking the place of municipal laws of other cities, formulated by the board of commissioners. For the purpose of admin¬ istrative convenience, the government business of the District is divided into three groups, over each of which a commissioner has charge. The department of the engineer commissioner is, as a matter of course, a technical one. The remaining two are grouped according to cer¬ tain convenient lines of agreement. Questions that may arise over carrying out the enactments of Congress are decided by a majority vote of this administrative board. All subordinate officers required to execute the government business of the District are appointed by the

WASHINGTON, D. C.

1 The Capitol

2 The White House

WASHINGTON, D. C.

Photographed by Frances Benjamin Johnson

The Washington Monument

WASHINGTON, D. C,

■iv.Sfc

HHKn

rrrˆ

1 House of Representatives

2 Senate Chamber

WASHINGTON, D. C

1 Congressional Library

2 State, War and Navy Building

commissioners themselves. Fiscal affairs are in the hands of an assessor, a tax collector and an auditor. These stand as the heads of a compactly coordinated fiscal department. Ac¬ counts are scrutinized, also, by the auditors of certain Federal departments. Appointed by the commissioners is an officer, not connected with the fiscal department itself, who disburses the funds allotted to the District.

The general safey and welfare of Wash¬ ington is vested in police and fire departments, in a board of health and sanitation and in the courts. The police department consists of 854 men. Eighty-eight of these are officers, ranking from a major and superintendent of police to sergeant. Police jurisdiction, covering an area of 69.7 square miles, is divided into 13 pre¬ cincts, each in charge of a lieutenant of police. The fire department consists of 650 men. The head of this organization is a chief engineer, supported by two deputies, eight assistants, a machinist and a fire marshal. The force is divided into 27 steam-engine companies, 12 truck companies, one chemical company and a fire-boat company. In both police and fire departments a conspicuous feature of the training is a well-organized study of methods of prevention as the fundamental idea of municipal protection. Sanitation in its wide range of application to city life is in charge of a health officer, assisted by numerous inspectors, a chemist and a bacteriologist. The commonly recognized functions of this depart¬ ment are now increased by medical and dental inspection of public school pupils and the direc¬ tion of school nurses, as well as by an over¬ sight of the operations of the Child Labor Law and the Eight-hour Law for women workers. The District of Columbia, though unique in character and limited in area, is, in its human nature, neither unique nor limited. It is neces¬ sary, therefore, to maintain a judiciary of com¬ prehensive purpose and applicability. This judiciary consists of five branches. These are the Court of Appeals, the Suprerne Court of the District, the Police, Municipal and Juvenile courts. The Court of Appeals considers appeals from the Supreme Court of the District and also from the commissioner of patents. It is pre¬ sided over by a chief justice and two associates. The Supreme Court, presided over by a chief justice and five associates, is so divided into

criminal, equity, circuit and probate courts as to include within its jurisdiction such matters as are generally covered by the Federal, State and municipal courts of other localities. The Police Court consists of two branches, each in charge of a police justice. One branch takes cognizance of minor infractions of United States laws and the other of major violations of municipal regulations. The Municipal Court deals with the multitude of lesser violations of city ordinances. The Juvenile Court, as its name implies, takes cognizance of the offensive of minors against municipal regulations.

History. — In order to secure a permanent capital of the United States, Congress, in July 1790, created a commission with President George Washington at its head, to select a site, not to exceed 10 miles square, within specified points on the banks of the Potomac River. That commission chose the present site of the capital. Several experimental namings of the

city and the tract of which it is a part resulted finally in the names Washington and the Dis¬ trict of Colurnbia. Major L'Enfant, a French engineer, serving in the Continental army, su¬ perintended the laying out of the city according to a plan outlined by Washington, a plan said to have been derived from the outlines of Ver¬ sailles, France. Lack of sympathy and support brought about the resignation of the disheart¬ ened L'Enfant. Andrew Ellicott, a Pennsylvania engineer, took up the work abandoned by the former. The seat of government was removed from Philadelphia to Washington in 1800. In November of that year the national legislature met for the first time at the new capital. At outset Congress placed the administrative affairs of the city in the hands of three com¬ missioners ; but, dissatisfied with the results of this experiment, in 1802 the city of Washington was made a corporate town with a mayor, board of aldermen and_ a common council. The first mayor was appointed by the President, but the later incumbents of the mayoralty were elected by the people. Georgetown and Alexandria were included within the Federal district. These, existing as towns prior to the Revolu¬ tion, remained corporate towns with independ¬ ent municipal governments. In 1814 the city was captured by an expeditionary force of British soldiers. The Capitol, the White House and other government buildings were destroyed by fire. For the first 70 years of its existence as the capital of the United States, Washington was nothing more than the most forlorn of villages. No serious move toward municipal development and improvement was made. The United States government then, as now, paid no taxesˆ on its property holdings within the District. Appropriations for city

maintenance were lamentably meagre and insufficient. This lack of public spirit lost to the District that part of it originally belonging to Virginia, for in 1846, on petition of the citizens of Alex¬ andria, the Virginia section of the Federal ter¬ ritory was receded to that State. In 1871 the creation of a territorial form of government brought the District once more under Federal control. This event marks the beginning of the era of pro.gress which, at the present time, is reaching a ripe maturity. The board of public works, created by Congress at that time, projected, in the face of parsimony and preju¬ dice, a substantial and permanent plan of pub¬ lic improvements. The city was cleared of the most objectionable of the results of a haphazard and makeship expediency. The obliterated lines of city planning set by Washington _ and L'Enfant were reset. The constructive vision, under which the present city is moving so vig¬ orously forward, began to be apparent. Certain dissatisfactions with the territorial form of government developed, however, and in June 1878 Congress established the commission form oUgovernment under which the city is now administered.

Population. — The essential function of the Federal city is that of transacting the enormous bulk of business that the operations of the government impose. This singular municipal functioning determines, to a great extent, not only the fundamental character of the popu¬ lation as a whole, but that of the city itself as well. The government business is, in contrast

to that of huge traffic and manufacturing cen¬ tres, a physically clean and smokeless business ; one, too, that does not exact unsightly con¬ gested sections. Washington is, therefore, a city of clear atmosphere, of wide spaces throughout and of general cleanliness of ap¬ pearance. The core of the population consists of those engaged in the business of the gov¬ ernment. The government officials and clerks, alone, constitute a city of about 110,000. The Executive and his Cabinet, members of Con¬ gress and of the judiciary, representatives of foreign powers and representatives of the United States army and navy in official ad¬ ministrative capacity greatly increase this num¬ ber. Each class is materially augmented by official and domestic families. To this basic population are added thousands of unclassified residents on the one hand and on the other hand thousands more who are engaged in such occupations and professions as are required to meet the needs of the whole. In 1920 the pop¬ ulation of Washington was 437,571 ; in 1917, 395,947; in 1916, 437,414; inT913, 353,297; and in 1910, 331,069. In but a slightly varying relation, two-thirds of these are shown to be of the white race. The remaining one-third are negroes. In 1919 the total assessment of real and personal property was $785,539,666. The budget for the same year amounted to

$22,865,676.

The New Washington, 1917-19. — President Wilson's Declaration of War against the Cen¬ tral Powers of Europe in April, 1917, speedily transformed the capital from a city of leisurely government procedures to a highly electrified national centre of war activities. To aid in the enormous speeding up of government machinery imposed by the fact of war itself, men* and women from all parts of the country hastened weekly by hundreds and thousands to the capi¬ tal. By far the larger part of these were absorbed by the urgent clerical demands of the government departments. The smaller part — men and women of exceptional training and experience — were grouped in special bureaus whose common purpose was to accelerate, to coordinate, and to control the mobilization of the vast material resources required to support in full efficiency the man power of actual mili¬ tary service. Conspicuous among these bureaus were those taking charge of food, fuel, trans¬ portation, and housing. Bolling Field, Camps Meigs,

Meade, Humphreys, Leach, instruction and concentration camps, in the immediate vi¬ cinity of Washington, stressed the tax upon the city's resources. In less than a year the popula¬ tion was increased by 59,480. This sudden and excessive increase presented promptly the acute problem of house and office accommodations. Every available building, or any part thereof, was commandeered to meet the situation. Be¬ sides, there were erected, chiefl}'- along the Mall, temporary office buildings that cover acres of this area. Upon the Plaza between Union Stti-tion and the Capitol, the United States Housing Corporation built, also, a series of government hotels for the use of women war workers. Supplementing the activity of these government agencies was the equally enthusiastic and effici¬ ent war service of the municipality itself. Twenty thousand men from the District entered military service. Emulative service banners

adorned business house and home. The District quotas of Liberty and Victory loans were more than met in a rush of patriotic fervor. The local Red Cross, community centres, the District Council of Defence, the Boy Scouts, welfare organizations of every creed and pur¬ pose, joined full-heartedly in the supreme busi¬ ness of ˆcarrying on.ˆˆ Women released men from civil service in a competent substitution. Then the war. Then the armistice. Gradually the tide of transient residents moved away from Washington and slowly a Washington of new outlook and aim was shaping under the inspiration of its patriotic shareholding in the vicissitudes of a world at war.

Bibliography. — Brown, Glenn, ˆHistory of the United States CapitoP (2 vols., Washing¬ ton 1900-03) ; Bryan, W. B.,_ ˆBibliography of the District of Columbiaˆ (in ˆSenate Docu¬ ments, Fifty-sixth Congress, 1st Session, No. 61,ˆ ib. 1900) ; id., ˆHistory of the National CapitaP (Vol. I, New York 1914) ; Cox, W. V., ˆCelebration of the One Hundredth Anniver¬ sary of Washington, 1800-1900ˆ (in ˆ House Documents, Fifty-sixth Congress, 2d Session, No. 552,ˆ Washington 1901) ; Crew, H. W. (ed.), ˆCentennial History of the City of Wash¬ ingtonˆ (ib. 1892) ; Crook, W. H., ˆThrough Five Administrationsˆ (New York 1910) ; Dodd, W. F., ˆThe Government of the District of Columbiaˆ (Washington 1909) ; Forbes-Lindsay, C. H. A., ˆWashington : The City and Seat of Governmentˆ (Philadelphia 1908) ; Leupp, F. E., ˆ Walks About Washingtonˆ (Bos¬ ton 1915) ; Taft and Bryce, ˆWashington, the Nation's CapitaP (Washington 1915) ; Tindall, W., ˆOrigin and Government of the District of Columbiaˆ (Washington 1909) ; Todd, C. B.,

ˆ Story of Washingtonˆ (New York 1889) ; Varnum, J. B., ‘ˆThe Seat of Government of the United Statesˆ (Washington 1854) ; Whar¬ ton, A. PL, ˆSocial Life in .the Early Repub¬ licˆ (Philadelphia 1902) ; Wilson, R. R., ˆWash¬ ington ; The Capital Cityˆ (2 vols., Philadel¬ phia 1902).

WASHINGTON, Ga., village, county-seat of Wilkes County, on the Georgia Railroad, about 55 miles northwest of Augusta. It is the northern terminus of the Washington Branch Railroad (Georgia Railroad), which connects at Barnet with the main line. Mineral springs noted for their medicinal properties at¬ tract here many health-seekers. The surround¬ ing country is devoted mainly to agriculture. The manufactures are flour and lumber prod¬ ucts. The principal buildings are the county courthouse, six churches and the schools. It has a high school, opened in 1893, Saint Jo¬ seph’s Academy (Roman Catholic), public and parish schools and Saint Joseph’s (Drphanage. There are two banks and two newspapers. Pop. (1920) 3,321.

WASHINGTON, Ill., city in Tazewell County, on the Chicago and Alton, the Toledo, Peoria and Western, the Atchison, Topeka and Santa Fe railroads, about 11 miles east of Peoria and 65 miles north of Springfield. It is in an agricultural region and supports a canning factory. It has wagon and carriage works, a furniture factory, flour mill and grain elevators. There are a public high school, es¬ tablished in 1876, a public library, a newspaper and two private banks. Pop. 1,590

WASHINGTON, Ind., city, county seat of Daviess County, on the Evansville and Indiana and the Baltimore and Ohio Southwestern rail¬ roads, about 100 miles southwest of Indian¬ apolis and 20 miles east of Vincennes. It is in an agricultural and coal-mining region, and in the near vicinity there are nine large coal mines. The chief manufacturing establishments are railroad shops, flour mills, foundry and machine shops. There are extensive shipments of coal, grain, livestock, flour and vegetables. The city has four banks, two daily and two weekly news¬ papers. ˆ It has a high school established in 1874, Saint Simon's Academy, public and parish schools and a school library. Pop. (1920) 8,745.

WASHINGTON, Iowa, city, county-seat of Washington County, on the Chicago, Burling¬ ton and Quincy and the Chicago, Rock Island and Pacific railroads, about 70 miles southwest of Davennort and 50 miles northv/est of Bur¬ lington. It is in an agricultural and stock-raising region, with a large horse market. The chief manufacturing establishments are brick and tile works, button factory, marble works, machine shops and creameries. The principal public buildings are the county courthouse, 12 churches, the schools, banks and business blocks. It has a high school, opened in 1867, an acad¬ emy, public and parish schools and two libraries. There are five banks, two national and three State, and a daily and two weekly newspapers. Pop. (1920) 4,697.

WASHINGTON, Kan., city, county-seat of Washington County, on Mill Creek, and on the Chicago, Burlington and Quincy and the Mis¬ souri Pacific railroads, about 90 miles north¬ west of Topeka. It is in an agricultural region, in which the principal products are wheat and corn. Stock-raising is given considerable atten¬ tion. The industries are connected chiefly with the farm products and the shipment of live¬ stock. There are a high school, a Friends' Academy, two newspapers, two national banks, two private banks and a private business school. Pop. 1,405.

WASHINGTON, La., town in Saint Lan¬ dry Parish on the Bayou Courtableau, and on the Southern Pacific Railroad, about 168 miles

northwest of New Orleans. It is at the head of navigation on the bayou, and has opportuni¬ ties for shipping freight by water that makes it a commercial centre for a large part of the parish. There are brick and tile works, a cotton twine and yarn factory, cotton mills and a machine shop. The principal shipments are rice, cotton, sugarcane and corn. The State bank has a capital of $50,000. Pop. 1,405.

WASHINGTON, Me., town in Knox County, about 25 miles east by south of Au¬ gusta. It was incorporated in 1811 and called Putnam; in 1823 the name was changed to Washington. The town contains several vil¬ lages, in all of which there are manufacturing interests ; the principal manufactures are bar¬ rels, staves, headings, undertakers' supplies, cab¬ inet work and lumber. There are five churches, a high school and district schools. Pop. 814.

WASHINGTON, Mo., city in Franklin County, on the Missouri River and on the Mis¬ souri Pacific Railroad, about 55 miles west of Saint Louis. It is in a fertile agricultural re¬ gion. It has manufactures of lumber, brick.

flour, shoes, cob-pipes, leather, musical instru¬ ments, agricultural implements and furniture. There are made extensive shipments of packed beef and pork, wheat and corn, and lumber products. There are six churches, public schools, Roman Catholic and Lutheran schools. The city has two banks and two newspapers. Pop. 3,670.

WASHINGTON, N. J., borough in War¬ ren County, on the Morris Canal, and on the Lackawanna Railroad, about 61 miles west of Newark, and 12 miles northeast of Easton, Pa. It is near the base of Scott Mountain, on the south side, and is in an agricultural region. The chief manufacturing establishments are piano and organ factories, silk mills, machine shops and furniture factory. There are six churches, a high school, founded in 1882, public elementary schools and a school library. There are two banks and a newspaper. Pop. 3,341.

WASHINGTON, N. C., town, county-seat of Beaufort County, on the Pamlico River, and on the Atlantic Coast Line Railway, 103 miles northeast of Wilmington, N. C. It is at the head of navigation on the river, has freight con¬ nections by water with the Atlantic Coast ports and the West Indies. There are grain elevators and large wareho.uses ; the principal exports are fish, vegetables, flour and fruit. The town also contains barrel and sash factories, lumber and planing mills and steam cotton gins ; oyster fishing is an important industry. There are

two banks, a daily and two weekly newspapers. The town has a high school, founded in 1899, with a school library. Pop. 7,500.

WASHINGTON, Ohio, county-seat of Fay¬ ette County, on Paint Creek, and on the Balti¬ more and Ohio, the Ohio Southern, the Cincin¬ nati and Muskingum Valley and the Cincinnati, Hamilton and Dayton railroads, about 75 miles northeast of Cincinnati and 30 miles southeast of Springfield. It is in an agricultural region. The principal industrial establishments are boot and shoe factories, soap factory, woolen mills, iron works, machine shop, planing mill and flour mill. There are four banks and five news¬ papers, including a daily and semi-weekly. There are a public high school, graded elemen¬ tary schools, a library and nrivate business schools. Pop. (1920) 7,962.

WASHINGTON, Pa., borough, county-seat of Washington County, on Chartiers Creek and on the Pennsylvania, the Baltimore and Ohio, the Waynesburg and Washington railroads, about 32 miles southwest of Pitts¬ burgh. It is in an agricultural and coal region. The chief industrial establishments are tube and pipe works, steel works, tin plate and iron works, glass factories, petroleum works, ma¬ chine shops and foundries. According to 1919 estimate there are over 150 factories, producing annually about $8,500,000 of goods. The prin¬ cipal public buildings are the county court¬ house, erected in IWl, and which cost about $1,250,000; the Washington Hospital and the churches and schools. There are 27 churches, representing 13 different denominations. The educational institutions are Washington and Jefferson College (q.v.), Washington and Jefferson Academy, Trinity Hall Military School, Washington Ladies' Seminary, Wash¬ ington Business College, Practical Commercial

College, 10 public schools, one Roman Catholic parish school and the Citizens' Library. The six banks have a combined capital of $2,000,000. There are three daily, two weekly and a monthly (college) newspaper. The govern¬ ment is administered by a burgess and council of 21 members.

Washington was first settled in 1768 by peo¬ ple from the northern part of Ireland. The place was incorporated as a borough in 1810; in 1901 the boroughs of North and South Washington consolidated with the borough of Washington. Pop. (1920) 21,480.

WASHINGTON (D. C.), Campaign Against and Burning of, in the War of 1812. In the early summer of 1814 the British determined to make a diversion somewhere on the southern coast in favor of the army on the Canadian frontier. Having decided in favor of Chesa¬ peake Bay, Admiral Sir Alexander Cochrane conducted thither the troops under command of Maj.-Gen. Robert Ross, the landing at the mouth of the Potomac being made on 15 Aug. 1814. At this time Washington was absolutely unprotected save by old Fort Washington and the little flotilla under Joshua Barney (q.v.). Despite Madison's insistence that defensive measures be taken and the appointment 2 July of Brig.-Gen. William H. Winder (q.v.) to command the district, by the time the British began their march inland practically nothing had been done save to gather together about 1,000 regulars and to enroll about 4,000 militia, of which the larger portion was yet to be col¬ lected. On reaching Benedict on the Patuxent River, the British army of 4,500 troops was divided into three brigades. On the 20th Coch¬ rane went up the river in search of Barney's flotilla (which was blown up by order of the Secretary of War to prevent capture) while Ross marched by land toward Washington; Capt. John A. Gordon was sent up the Potomac to attack Fort Washington (which was blown up by its commander) and Sir Peter Parker was dispatched to make a demonstration in the Patapsco (Parker being killed on the night of 30-31 August at Mooresfield). Probably never in history has such a march been made. With¬ out cavalry, with hardly a piece of cannon, Ross was allowed to advance unmolested through a well-settled country, abounding in defiles, ravines, streams and the like, whereas 100 men with axes and spades could have de¬ layed him for days ; but Ross encountered noth¬ ing more serious than a thunderstorm on the road to Upper Marlboro, where he arrived 22 August. The next

day he met and dispersed a small American force and that night en¬ camped within nine miles of the capital. On the night of 22 August a brigade of Maryland militia under Gen. Tobias E. Stansbury arrived at Bladensburg, followed the next day by the Fifth Baltimore regiment under Col. Joseph Sterett and a rifle battalion under Maj. Wil¬ liam Pinkney (q.v.). Winder had 3,200 men at Old Fields, but instead of sending them to oppose the British at Bladensburg, whither he knew the latter was marching, he ordered them back to Washington, thus leaving the road to Bladensburg open to the British, at which place they arrived about noon of the 24th.

The eastern branch of the Potomac was narrow and shallow at Bladensburg and was

spanned by a bridge over which passed the road to Washington. In a ravine near the eastern bank was the village but the western bank was hilly, and in these hills Stansbury had drawn up his troops, flanked on one side by a battery of six guns. Winder then arrived and posted more troops and two batteries in the rear of Stansbury about a mile from the Bladensburg bridge. Shortly after noon the British light brigade, 1,5(X) strong, crossed the bridge and, clearing the thickets of skirmishers, quickly put the first American line to flight but was checked by the second line. A second brigade of British then charged and turned the left flank of the Americans, who, with the exception of several strong corps, broke and rushed in disorderly flight from the field. Meanwhile Barney, having destroyed his fleet, took his 400 sailors and two 18 pounders toward Bla¬ densburg and on beholding the rout of the Americans established his men and guns on a hillside about a mile from Bladensburg. His first discharge completely cleared the road of the enemy who made several attempts to crush the little band. Finally they divided their forces, attacked Barney on both flanks and the rear, and through sheer weight of numbers soon compelled the sailors to flee, leaving Barney a prisoner in British hands. By 4 o'clock not a vestige of the American army was in sight; it had lost 26 killed and 51 wounded, while Ross officially reported his loss at 64 killed and 18 wounded, though probably he lost nearer 500. About dark the British entered Washington and in retaliation for real and alleged American depredations in Upper Can¬ ada, set afire and destroyed the Capitol building, which then contained the library of Congress. Ross then fired the President's house and the Treasury building, and the next day continued the work, so that by noon the departments of State and War, the printing office of the National Intelligencer, the bridge over the Po¬ tomac, several ships in the navy

yard and a few small houses were in ruins. A terrific tornado passed over the city shortly after noon, whereupon, leaving the other buildings marked out for destruction and abandoning his wounded, Ross withdrew from the scene of devastation and marched to Upper Marlboro, where he re¬ embarked his troops to make the attack on Baltimore (q.v.).

Bibliography. — Adams, Henry, ˆThe United Statesˆ (Vol. VHI, pp. 12(4ˆ5); ˆAmer¬ ican State Papers, Military Affairsˆ (Vol. I, pp. 52'-l-99) ; Armstrong, John, < Notices of the War of 1812ˆ (Vol. H, pp. 124-54, 225-26) ; Mrs. Barney, ˆMemoir of Commodore Barneyˆ ; Brackenridge, H. M., ˆHistory of the Late Warˆ (pp. 254-63) ; Cooper, J. F., '^Naval His¬ toryˆ (Vol, H, pp. 136-38) ; Cullum, G. W., ˆCampaigns of the War of 1812 to 1815ˆ (Chaps. VH-VHI) ; Gleig, G. R., ˆCampaigns of the British Army at VVashington and New Orleansˆ (pp. 94-146) ; Gilman, D. C., ˆLife of Monroeˆ ; Hunt, Gaillard, ˆLife of Madisonˆ ; Ingraham, Edward D., ˆSketch of the Events which preceded the Capture of Washingtonˆ ; Ingersoll, C, J., ˆHistory of the Second Warˆ (Vol. H) ; James, William, ˆMilitary Occur¬ rences (Vol. H, pp. 277-93) ; Lossing, ˆWar of 1812> (pp. 91S-46) ; William.s, J. S., <The Invasion and Capture of Washingtonˆ ; Wiley

and Rines, ˆThe United Statesˆ (Vol. VI, pp. 22-33).

WASHINGTON (D. C.), Early's Attempt

on. On 13 June 1864 General Early marched from Gaines' Mills, under orders from General Lee, to attack and drive General Hunter from the Shenandoah Valley and then cross into Maryland near Leesburg, or at or above Har¬ per's Ferry, and threaten Washington, thus hoping to draw troops from Grant's army. Hunter's failure at Lynchburg (q.v.) and his retreat toward the Kanawha left the Shenan¬ doah Valley open to the movement into Mary¬ land, and 27 June Early concentrated his army at Staunton, moving next day down the valley and reaching Winchester 2 July. He broke the railroad west of Martinsburg, drove Gen¬ eral Sigel from that place 3 July and across the Potomac to Maryland Heights (q.v.), crossed the Potomac at Shepherdstown Ford, demonstrated on Sigel, then crossed South Mountain by Turner's, Fox's and Crampton's Gaps and attacked and defeated Gen. Lew Wallace on the Monocacy (q.v.), 9 July, Wal¬ lace retiring on the Baltimore road, leaving open to Early the road to Washington. Early had under his command the four infantry di¬ visions of Rodes, Ramseur, Gordon and Echols, Ransom's division of cavalry and Long's three battalions of artillery, in all about 15,000 men and 50 guns. On the morn¬ ing of 10 July Early marched on the direct road to Washington and bivouacked at night four miles north of Rockville. McCausland's cavalry brigade, which had preceded him, drove from and beyond Rockville, about 600 Union cavalry, under command of Major Fry, of the 16th Pennsylvania cavalry. During these movernents, from the time of entering Mary¬ land, the Confederate cavalry was industri¬ ously engaged in gathering up horses, sheep, hogs and cattle of all kinds, grain, bacon and subsistence of every kind, and shoes and cloth¬ ing. The livestock was driven across the Potomac. Bradley T. Johnson's cavalry brigade, moving from Frederick toward Balti¬ more, occupied several towns on the _way and destroyed the Northern Central Railroad at Cockeysville.

Another cavalry detachment ˆ stopped a train of cars at Magnolia Station, on the Baltimore and Ohio Railroad, and burned the train and

Gunpowder River bridge. Wires were cut and communication with the north severed. At dawn, 11 July, Early marched through Rockville, McCausland, who had the advance, took the Georgetown road and by 9 o'clock was stopped by Colonel Lowell, with a small cavalry force, in advance of Fort Reno. He formed Early's right. The main force, pre¬ ceded by Imboden's cavalry brigade, marched for the Seventh Street road, running past Sil¬ ver Spring, while Jackson's cavalry brigade moved on the left flank. Imboden's cavalry drove a small body of Union cavalry into the works on the Seventh Street road and, dis¬ mounting, deployed as skirmishers. Early rode ahead of his infantry and arriving in front of Fort Stevens at noon, discovered that the works were but feebly manned. The northern defenses of Washington consisted of a series of detached works, at intervals of 800 to 1,000 yards, generally connected by rifle-pits, and

mounting 400 heavy guns with a large range of fire. The one in Early's front, west of Seventh Street road, was Fort Stevens, with Fort De Russy on its left, from which it was separated by a deep ravine, through which ran Rock Creek; the one on the right was Fort Slocum. Fort Stevens had been furnished with a powerful armament, mostly of siege guns, well protected by embrasures and traverses. It had an extensive bomb-proof ; and a hollow in the rear was capable of sheltering large bodies of men from artillery fire. General Augur, commanding the defenses, had col¬ lected some heavy artillerymen and a miscel¬ laneous force of militia, convalescents, invalid corps, marines and sailors, department clerks and other employees of the government, and placed them under command of Gen. A. McD. McCook. The whole force, prior to the ar¬ rival of the Sixth corps, numbered about 8,000 men. The line immediately north of the city was garrisoned chiefly by the 150th and 151st Ohio regiments of 100 days' men, two or three companies in each fort, and by detach-placed them under command of Gen. A. McD. Hardin's division of the 22d corps, whose two brigades held the entire line of 16 forts from the Potomac, above Chain Bridge, to the Eastern branch.

The cavalry, under command of Colonel Lowell, consisted of detachments of the Second Massachusetts, Eighth Illinois and 16th Penn¬ sylvania, in all about 1,000 men, and was in advance of the works from the Potomac to Fort Stevens, When Early, who was within sight of the dome of the Capitol, had seen the works, thought to be feebly manned, he or¬ dered Rodes' division into line, in front of Fort Stevens, and, about 1.30 p.m. when the skirmishers were within range, the Union ar¬ tillery in Fort Stevens, under Captain Dupont,

opened a rapid fire, clouds of dust appeared ris¬ ing behind the fort, and soon a Union column was seen — a body of quartermasters' em¬ ployees and 600 dismounted cavalry, under Maj. G. G. Briggs of the Seventh Michigan, filing into the works on the right and left of the fort, whose skirmishers advanced to the front, before whom those of Rodes fell back, after approaching within musketry range of Fort Stevens and wounding men on its parapet. This dashed Early's hope of getting possession of the works by surprise and he consumed the rest of the day in reconnoitering. Meanwhile a substantial and timely reinforcement had ar¬ rived to strengthen the Union defense. Gen¬ eral Grant had doubted whether Early had any¬ thing more than cavalry in Maryland, but had sent Ricketts' division to Baltimore, and, on the night of the 9th, a few hours after Wal¬ lace's defeat on the Monocacy, ordered General Wright, commanding the Sixth corps, to march his other two divisions from the lines before Petersburg to City Point, 14 miles, where he arrived at daylight of the 10th, took transports and by 2 p.m. of the 11th arrived at Washington, where, just arrived, was a steamer with 800 men of the 19th corps, who, having reached Hampton Roads from New Orleans, had been sent directly to Washington. President Lincoln was on the wharf to greet the troops on their arrival. Wright quickly landed his troops and marched them to near

Fort Stevens, where he bivouacked, sending 900 men to relieve those that had been thrown out in front of Fort Stevens; being old sol¬ diers, they immediately intrenched. Late in the evening 1,500 quartermasters' employees and 2,800 convalescents, under Col. Frank Price, from nearly every regiment in the Army of the Potomac, took position in rear of Fort Slocum and in the rifle-pits on either side of it.

After nightfall Early called a council of his division commanders and a conclusion was ar¬ rived at to assault the Union lines at daybreak next morning, the 12th, but during the night a dispatch was received from Bradley T. John¬ son, near Baltimore, that two corps had ar¬ rived from Grant's army, and this caused Early to delay the attack until he could again ex¬ amine the works. As soon as it was light enough to see he rode to the front and saw that the works were lined with troops, and gave up the idea of capturing Washington, but decided to remain in front of the works during the day and retire at night.

At dawn of the 12th Early was* seen in posi¬ tion, with part of his command, at the Rives House, on the right of Silver Spring road, on rising ground, surrounded by shade trees, with an orchard near, giving cover to sharpshooters, who commanded the Union skirmish line from this point and also from McLay's House on the left of the road. Wheaton's brigade of the Sixth corps was thrown out on the skirmish line in front of Fort Stevens and instantly the Confederate sharpshooters began their work. Skirmishing continued until the middle of the afternoon, when Wright pushed out Bidwell's brigade of the Sixth corps, formed in two lines with orders to join Wheaton in an attack upon the Confederates at the Rives House. The guns of Fort Stevens and Fort Slocum opened a rapid fire and at a signal from Wright, who stood on the parapet of Fort Stevens, Presi¬ dent Lincoln at his side, Bidwell moved for¬ ward, and with Wheaton's brigade, which formed an advance line, drove the Con¬ federates from the Rives House and, after a sharp fight, from rising ground beyond, and back for a mile upon Rode's main line, where farther advance was stayed, but the skirmish¬ ing was kept up until late in the night, and the ground gained intrenched. The engagement was witnesses by Cabinet officers, other officials and some ladies from behind the parapet of Fort Stevens, where also the President was ordered by General Wright, when the engage¬ ment opened and men were being

wounded on the parapet. The Union loss was ovˆr 200, of whom 150 were of Bidwell's brigade, including two regimental commanders of the brigade killed and others wounded.

On the left, near Fort Reno, Lovell's 900 cavalry had heavy skirmishing with McCausland's cavalry brigade, and drove it back on the Georgetown road until infantry came to McCausland's support. That night Early fell back through Rockville, marched all night and halted near Darnestown. Lovell's cavalry pushed after Early on the morning of the 13th as far as Rockville, where it was attacked and driven back by McCausland, with a loss of 30 killed and wounded, after taking 38 prisoners. At noon Wright marched after Early with two

divisions of the Sixth corps, followed by Emory's division of the 19th corps. Earl3ˆ re¬ sumed his march from Darnestown and crossed the Potomac at White's Ford, near Leesburg, on the morning of the 14th, heavily laden with the spoils of war. The Union loss during the three days was between 350 and 450. Early left 30 dead and 70 wounded on the field and lost over 200 prisoners, not including his wounded. The loss on both sides was com¬ paratively small, but the event is memorable in that it was the only occasion in the history of the country where hostile armies met so near the seat of government, and men fell in battle within the boundaries of the District of Columbia. Consult ˆOfficial Recordsˆ (Vol. XXXVII) ; Early, ˆThe Last Year of the War for Independenceˆ ; The Century Com¬ pany, ˆBattles and Leaders of the Civil Warˆ (Vol. IV).

E. A. Carman.

WASHINGTON, Fort. See Fort Wash¬ ington.

WASHINGTON, Mount, in New Hamp¬ shire, the highest peak of the White Moun¬ tains, and the highest point in the northeastern part of the United States. Its altitude is 6,293 feet; it is east of Crawford Notch. Granite is the chief rock formation of the whole mass. On the east side there are many deep gorges and several on the north ; on the west the slope is steep. The summit is rocky, with scanty vegetation compared with the lower slopes and base, where large trees are numer¬ ous. For many years a carriage road has ex¬ tended to the top and since 1869 a rack-and- pinion railroad has enabled tourists to ascend to the summit with ease. A United States meteorological station and a large hotel are on the summit.

WASHINGTON, State College of, a co¬ educational State institution situated at Pull¬ man, Wash., founded in 1890 under the National Land Grant Act as the Washington State Agri¬ cultural and Mechanical College, and opened in 1902. TLe institution now offers courses in economics, civil, mechanical and mining engi¬ neering, mathematics, chemistry, botany, zoolo'g > % agriculture, horticulture, forestry, physics, geology mineralogy and education, and offers special cours'es in agriculture, phar¬ macy, veterinary science and .business. The college nas a Federal grant of 180,000 acres of land, an income of $90,000 annually from trust funds and receives State appropriations of about $400,000 annually. There are about l70 members in the faculty and 2,500 students enrolled.

WA.SHINGTON, Treaty of, a treaty be¬ tween Great Britain and the United States, signed 8 May 1871. Under its terms the Ala¬ bama claims, the San Juan boundaries and cer¬ tain fisheries disputes were settled by arbitra¬ tion. See Treaties.

WASHINGTON, University of, the State university located at Seattle, Wash. The first steps toward the establishing of the uni¬ versity were taken by the first territorial legis¬ lature in 1854, which petitioned Congress for a grant of land; an appropriation of two town¬ ships was shortly afterward made by Congress. In 1855 the legislature organized the Territorial

University of Washington in two .equal insti¬ tutions, one located at Seattle, the other on Boisfort Plains, Lewis County; but as no further steps were taken toward the establish¬ ing of the university, the legislature united the two institutions, and fixed the location in Cow¬ litz Farm Prairie, Lewis County. This shifting policy led the people of Puget Sound region to incorporate another university, and the fear of thus duplicating institutions led the legisla¬ ture to definitely fix the location of the Uni¬ versity of Washington at Seattle, and to ap¬ point a board of commissioners to select and sell the granted lands and establish the univer¬ sity, The main building was completed in 1861 and the university opened to students in the same year. In its earlier years the university met with many difficulties, chiefly financial, as the_ Territory appropriated no money for its maintenance until 1879 ;

its progress was slow until 1893, when the legislature provided a new site and appropriation for building purposes. Since that time the growth of the university has been both continuous and rapid, and it has taken its place as the real head of the educational system of the State. The Board of Regents con¬ sists of seven members appointed by the gov¬ ernor, with the approval of the senate, for a term of six years. The university includes the following divisions: (1) The College of Liberal Arts; (2) the College of Science; (3) the College of Education ; (4) the College of Business Administration; (5) the College of Engineering; (6) the College of Fine Arts; (7) the College of Forestry; (8) the College of Mines; (9) the College of Naval, Military and Aeronautical Science; (10) the College of Pharmacy; (11) the Library School; (12) the School of Journalism; (13) the School of Law; (14) the Graduate School; (15) the University Extension Service'. Beginning with the year 1917-18 the university adopted the four-quarter plan, in accordance with which the academic year is divided into four quarters of approxi¬ mately 12 weeks each. The university is in session practically continuously, except for the month of September. The requirement for entrance to the university is graduation from a standard four-year high school course, ex¬ cept in the case of special students who must be 21 years of age and show evidence of ability to profit by the special work desired. The total university enrolment in the pre-war year of 1916-17 was 4,828; in 1917-18 the en¬ rolment was 3,871, _ During the first 18 months of the war the university sent forth from its student body, alumni and faculty 2,069 men for active military service. The enrolment of the university by schools and colleges in 1916-17 was as follows (the numbers in parentheses are the enrolments for 1917-18) ; Graduate School, 202 (116); College of Liberal Arts, 1,629 (1,311); College of Science, 452 (358); College of. Education, 247 (201) ; College of Engineering, 521 (377) ; College of Fine Arts, 200 (193); College of Forestry, 80 (47); School of Law, 173 (54) ; College of Mines, 119 (53) ; College of Pharmacy, 77 (53) ; Sum¬ mer Session 1916, 1,386 (1,245). The As¬ sociated Students of the University of Wash¬ ington have charge of all athletics, the Co¬ operative Book-store, the University Daily, the Glee Club and the Dramatic Association. The

student members of the board of control of the associated students act as a committee on the student government. The university has 19 fraternities and 17 sororities, and many local clubs. The campus comprises 450 acres, lying between lakes Union and Washington. The plan for the arrangement of the buildings is a modification of the quadrangle, the buildings devoted to liberal arts being arranged in one

quadrangle and those devoted to the applied sciences in another. Scientific laboratories are well equipped with modern apparatus, and the library in 1918 contained 87,542 volumes.

WASHINGTON ACADEMY OF SCI¬ ENCES, a society for the promotion of scientific learning, organized in 1898. It is an organiza¬ tion uniting a number of learned societies of the city, including the Anthropological Society, the Biological Society, the Geological Society, the National Geographic Society, the Medical Society of the District of Columbia and the Philosophical Society. The last-mentioned, or¬ ganized in 1871, is the oldest of the societies composing the academy. The academy and the majority of the separate societies publish ˆProceedings.ˆ

WASHINGTON BARRACKS (formerly

Washington Arsenal), a military post at Washington, D. -C., established as an arsenal in 1803 at Greenleaf Point, a peninsula at the con¬ fluence of the Potomac and Anacostia rivers. It originally occupied 28jˆ acres of ground, later increased to the present 69 acres, which are beautifully laid out. The buildings were destroyed by the British in 1814, and were re¬ built in 1815. In the Civil War it was still an arsenal and was the depot of stores for the Army of the Potomac; and in 1865 the execu¬ tion of the conspirators in the assassination of President Lincoln took place at the United States Penitentiary here. Afterward the peni¬ tentiary was removed, its site being added to the ornamental grounds. The arsenal was abolished in 1881 and the former storehouses were converted into barracks occupied as an artillery post and subsequently known as the Washington Barracks. Since 1901 the bar¬ racks have been occupied by engineering troops. The United States Army War College and the engineering school are located here. Large quantities of bridge equipment, together with engineering tools and scientific instruments, are stored at the barracks.

WASHINGTON COLLEGE, located at Chestertown, Md. It was chartered as a col¬ lege in 1782, being the oldest institution of col¬ legiate grade in the State. _ It was the direct successor of an academy with which the Free School of Chestertown (founded in 1723) had been merged and was established as a part of the proposed University of Maryland. General Washington gave his consent to the naming of the institution for him and ‘became one of the board of visitors. The college is noi>-sectarian and receives an appropriation from the State. It is open to women. The college offers two collegiate courses, classical and scientific, lead¬ ing to the degrees of A.B., and B.S., and

two years of preparatory work. There is a wide range of electives. By means of gymnasium work, athletics and setting-up exercises special emphasis is laid upon physical health and vigor.

There are a number of scholarships established by the State. The plant includes a large campus of unusual beauty, a new main building, a g3ˆmnasium, a dormitory for women, three dor¬ mitories for men, a heating plant and a fine athletic field.

WASHINGTON COLLEGE, located in Washington County, Tenn. It was chartered as an academy in 1783, and as a college in 1795, and was the first institution of higher learning west of the Alleghany Mountains. During the Civil War, and for a short time after the war, the resources of the college were seriously crippled, and only a course of academic grade was offered. Two-thirds of the board of trustees must -be Presbyterians, but the college is not otherwise under denominational control. Two college courses are offered, the classical, leading to the degree of A.B., and the scientific, leading to the degree of B.S. There are also courses in music and oratory, a preparatory de¬ partment with an auxiliary department giving instruction in domestic science and an industrial department (established in. .1892-93) affording opportunity for students to pay a portion of their expenses by manual labor. The campus, consisting of 16 acres, occupies an elevated site, commanding a view of the surrounding moun¬ tains ; the buildings are the recitation hall, the boys' dormitory and the girls' dormitory. Salem Church is used as the college chapel. The students average 100 and the instruct¬ ors 10.

WASHINGTON COURT HOUSE, Ohio,

city and county-seat of Fayette County, 38 miles southwest of Columbus, on the Cincin¬ nati, Hamilton and Dayton, the Pennsylvania, the Baltimore and Ohio Southwestern, and the Detroit, Toledo and fronton railroads. It is an important livestock market, has a can¬ ning industry and manufactures boots, shoes, flour, soap, stoves, furniture and fertilizers. Pop. 7,277.

WASHINGTON ELM, an elm tree at Cambridge, Mass., situated northwest of the common, under which General Washington took

command of the American army 3 July

1775.

WASHINGTON AND JEFFERSON COLLEGE, located at Washington, Pa. Three classical schools were conducted by three min¬ isters near Washington, the earliest opened in 1780, and out of these schools grew the acade¬ mies and colleges from which came the present institution. In 1787 an academy was founded at Washington under the leadership of three Presbyterian ministers; in 1790 the courthouse where the academy held its sessions was burned, and academy suspended, some of its patrons In 1794 chartered a new academy at Canonsburg, and the opening of this school stimulated the reopening of the Washington Academy; the Canonsburg school was chartered as Jefferson College in 1802 and the Washington school as Washington College in 1806. Many attempts were made to unite the two institutions, but all failed until 1865, when the union was accom¬ plished under the present name. Even then rivalry existed as to the location of the col¬ lege and a compromise was effected by having a part of the faculty and students at Canons¬ burg and the rest at Washington ; in 1869, how¬

ever, the college was definitely located at Wash¬ ington. The control is vested in a self-perpetuat¬ ing board of trustees of 31 members. The col¬ lege offers three courses leading to degrees, the classical (with the degree of A.B.), the Latin scientific (degree of B.S.), and the French scientific (degree of B.S.). There is also a course in civil engineering. To aid stu¬ dents preparing for the professions courses are suggested preparatory to the study of theology, law and medicine; Hebrew is included in the curriculum for the benefit of those studying for the ministry. There is also a preparatory department. There are a number of scholar¬ ships endowed and a large loan fund for stu¬ dents. The college occupies 16 acres within the limits of the town. The property and en¬ dowment of the college, including amounts pledged at the-centennial celebration of 1902, amounts to considerably more than $1,500,000. The average attendance is about 400 and the faculty numbers 21. Of the alumni about 1,650 have entered the ministry, 950 the law and 460 the medical profession. Of those who have ob¬ tained some distinction there have been four members of the Cabinet, 11 governors of States, 10 United States senators, 70 presi¬ dents of colleges and universities, 20 State Supreme Court judges, 2 bishops of

the Pro¬ testant Episcopal Church and 28 moderators of general assemblies.

WASHINGTON AND LEE UNIVER¬ SITY, an institution of higher learning, located at Lexington, Va., midway between the Blue Ridge and the Alleghany Mountains, which are here about 15 miles apart. Founded in 1749 as Augusta Academy, about 15 miles north of its present site, its name was enthusiastically changed to Liberty Hall Academy in the spring of 1776. The institution was moved to Lex¬ ington in 1780 and formally chartered in 1782, under an independent and self-perpetuating board of trustees. Liberty Hall Academy was endowed by George Washington with a gift of $50,000, and by him authorized to change its name to Washington Academy, which was again changed in 1813 to Washington College. During the Civil War, the work of the college was dis¬ continued, the student body enlisting in the Confederate army under name Liberty Hall Vˆolunteers. The college property was much injured during Hunter's raid in the Valley of Virginia in June 1864, for which Congress granted remuneration 30 years later.

On 4 Aug. 1865 Gen, Robert E. Lee was elected president, and was formally installed on 2 October. During his devoted and efficient administration of five years, the growth of the college in numbers, curriculum, financial re¬ sources, equipment and influence was phe¬ nomenal. In 1866 the Lexington Law School, founded by Judge Brockenbrough in 1849, be¬ came ˆˆThe School of Law and Equity of Washington College.® In 1871, soon after Gen¬ eral Lee's death, the name of Washington Col¬ lege was changed to the present corporate title — ˆThe Washington and Lee University.® The university property consists of about 140 acres of land and 25 buildings. The Lee Mausoleum, in the rear of the Lee Memorial Chapel, contains Valentine's recumbent statue of Lee, and in the crypt below are the remains of the whole Lee family, including ®Light

Horse Harryˆˆ Lee, the father of Robert Ed¬ ward. The Bradford Art Gallery bequeathed to the university by Vincent L. Bradford of

Philadelphia and the Lee collection of por¬ traits of the Lee and Washington families are housed in the library and the Lee Chapel. The latter contains Peale's portraits of Washing¬ ton and Lafayette, with other memorial por¬ traits, busts and tablets. The principal bene¬ factors of the university have been George Washington, its practical founder, his friend and follower, John Robinson, the Society of the Cincinnati, Cyrus H. McCormick, W. W. Corcoran, Thos. S. Scott, Andrew Carnegie, Vincent L. Bradford, Robert H. Bayley, Wm. H. Reid, Mrs. S. P. Lees, Mrs. Sophie New¬ comb, Judge Thos. H. Harvey, George Pea¬ body and Mr. and Mrs. Robert Parker Doremus.

The university organization includes (1) the School of Arts, (2) the School of Applied Science, (3) the School of Commerce, (4) the School of Law. The courses in the School of Arts are divided into three groups; (1) Lan¬ guages, (2) humanitarian studies, (3) mathe¬ matics and science For the A.B. or B.S. degree, a prescribed amount of study must be done in each group. Otherwise, the courses are entirely elective and modern languages may be substituted for classical. Although distinctively Christian in its traditions and ideals, the uni¬ versity is entirely independent, having no offi¬ cial connection with Church or State. Its patronage is distinctly national, as its support has been, more than two-thirds of its 625 stu¬ dents coming from other States than Virginia. Its methods of discipline and self-government have been known for generations as the ^^Southern Honor System.®

In recent years, the university has adopted a universal and compulsory system of training in hygiene and physical education lasting during a student's whole course and a necessary re¬ quirement for any degree. The United States maintains at the university a reserve officers training corps in charge of a professor of mili¬ tary science and tactics. Military training, how¬ ever, is optional, no student being required to take it. '

The library of the university contains 55,000 volumes and its present endowment, including the Doremus residuary legacy, .amounts to about $3,000,000.

WASHINGTON UNIVERSITY, Saint Louis, Mo., founded 1853, is a non-sectarian in¬ stitution, under the control of a self-perpetu¬ ating board of directors of 17 members. Be¬ sides the college there are schools of engineer¬ ing, architecture, commerce and finance, botany, law, medicine, dentistry and fine arts. The course in the college is largely elective, par¬ ticularly the work of the 'junior and senior years. The school of engineering offers courses in civil, mechanical, electrical and chemical engineering. The university confers the fol¬

lowing first degrees : A.B., B.S., B.Arch.,

B.S.C. ; for graduate work the following de¬ grees : A.M., M.S., M.Arch., M.S.C., and Ph.D.; in the professional schools : LL.B., M.D., D.D.S. ; and after not less than three years of successful active practice, the degrees of civil, mechanical, electrical and chemical engi¬ neer. The productive funds of the university amount to nearly $12,000,000; the library con¬

tains 165,000 volumes; the students' annual en¬ rolment is over 3,000 and the faculty numbers 228. See also Saint Louis — Education.

WASHITA, wosh'i-ta, or OUACHITA, a river which rises in Polk County, Ark, and flows east, then south into Louisiana, entering the Red River in the east central part of the State. The chief tributaries are Saline, La Fourche. Tensas and Little Missouri. The part of the river below the point where the Tensas enters is often called the Black River. The Washita is navigable throughout the year as far as Camden, Ark., and for about eight months to Arkadelphia, Ark. The total length is about 600 miles.

WASHITA, Battle of, an engagement fought on the banks of the river of that name in Indian Territory on 27 Nov. 1868, in which Gen. George A. Custer, in command of the Seventh cavalry inflicted a crushing defeat upon the Indians, 103 of their warriors being killed. The immediate result was the return of the en¬ tire tribe of Cheyennes to their reservation. The chief Black Kettle (q.v.) was killed in the encounter.

WASHO-INDIANS, a linguistic stock of North American Indians, consisting of the Washo tribe, whose original range extended from Reno, on the line of the Central Pacific Railroad in western Nevada, to the lower end of Carson Valley. The vicinity of Carson is now the chief seat of the tribe and here and in the neighboring valleys there are about 200 living a parasitic life about the ranches and towns.

WASMANN, vas-man, Erich, Austrian biologist: b. Meran, Tyrol, 29 May 1859. He was educated in the g3'^mnasia at Meran Hall and Feldikirch, at Jesuit scholasticates and the University of Prague. In 1875 he entered the Society of Jesus and was ordained to the priest¬ hood in 1888. He has spent many years in biological study and research, and has taken part in many zoological and entomological con¬ gresses. His works are ^Der Trichterwickler^ (1884) ; ^Atemeles

und Fomechusaˆ (1888) ; Wergleichende studicn fiber Ameisengasteˆ (1889) ; ˆZusammengesetzte Nester und gem-ischte Kolonien der Ameisenˆ (1891); ˆKritisches Verzeichnis der myrmekophilen und termitophilen Arthopodenˆ (1894) ; ˆZur neueren Entwicklungstheorie in Deutschlandˆ (1896) ; Hnstinkt und Intelligenz im Tierreichˆ (3d ed., 1905) ; Wergleichende Studien fiber das Seelen leben der Ameisen und der hoheren Tiereˆ (2 ed., 1900) ; ˆDie psychischen Fahigh-keiten der Ameisenˆ (2d ed., 1909); ˆNeue Dorylinengasteˆ (1900); ˆTermiten von* Ceylonˆ (1902) ; ˆZur naheren Kenntnis des echten Gasverhaltnissˆ (1903) ; ˆDorylinengaste vom Kongo ˆ (1904) ; ˆDie moderne Biologie und die Entwicklungstheorieˆ (3d ed., 1906) ; ˆMenschen und Tierseeleˆ (5th ed., 1910) ; ˆUrsprung der Sklaverei bei Ameisenˆ (1905-10) ; ˆAmeisen und Ameisengaste von Lux¬ emburgˆ (1906-09) ; ˆKampf urn das Entwick-lungsproblemˆ (1907) ; ˆDer biologische Un-terrichtˆ (1908) ; ˆEntwicklungstheorie und Monismusˆ (1910) ; Ameisen und ihre Gasteˆ (1911) ; ˆBeitrage zur Kenntnis der Termitophilenˆ (1912), and contributions to scientific reviews.

II \ \

rltHS

SnjsJb!

aim ; '. ' , ?'(•> • ' r.l . ,! s" ', .j •, /

. n> ••• .1

'"W" • , ,>* .•* ;'v f

1^1 J & % Jjj

?r ■

liWJ m

• ' ,{-, !. - ' %

si' « w\

n .v»raj

mm&mgssm

1

! 1

I

I

II \ \

rltHS

SnjsJb!

aim ; ‘. ‘ , ?’(•> • ‘ r.l . ,! s” ’, .j •, /

. n> ••• .1

“‘W” • , , > * .•* ;‘v f

1^1 J & % Jjj

?r ■

liWJ m

• ‘ ,{-, !. - ‘ %

si’ « w\

n .v»raj

mm&mgssm

1

! 1

I

I

4 1

I

1

1

|

1

I

I

I

1

I

I

%

I

THE

ENCYCLOPEDIA

AMERICANA

JT

IlBlˆtV

UNIVERSAL

MoWLEDGEj

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK. CHICAGO

d

Copyright, 1920

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY ALBANY NEW YORK

I 8 1922

vOW.A654317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXIX

BARNES, HARRY ELMER, Ph.D.

Pr?£essor of Hist°ry. Clark University, Worcester Mass. ’

WEALTH OF NATIONS WORLD POLITICS AND THE EXPAN¬ SION OF EUROPEAN CIVILIZATION

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and oemitic Languajjes, Colgate University

ZECHARIAH ZEPHANIAH, BOOK OF

BOURNE, FRANK A.

Architect, Boston, Mass.

WOOD

BREWSTER, WILLIAM T., A. M.

Professor of English, Columbia University

WATER feABIES, THE WESTWARD HO

BRYCE, GEORGE, LL.D.

Author of “Short History of the Canadian People”

WINNIPEG, CANADA

BUCHANAN, MILTON A., Ph.D.

Professor of Italian and Spanish, University of Toronto

WONDER-WORKING MAGICIAN, THE

CALLAHAN, JAMES MORTON. Ph.D.

Professor of History and Political Science, West Virginia University

WEST (THE) AS A FACTOR IN AMERI¬ CAN POLITICS

WEST VIRGINIA AND MARYLAND BOUNDARY DISPUTE WEST VIRGINIA UNIVERSITY WEST VIRGINIA AND VIRGINIA DEBT QUESTION, THE

CARMAN, E. A.*

General, United States Army

WAYNESBORO (VA.), BATTLE OF WEST VIRGINIA CAMPAIGN OF 1861 WILDERNESS, THE BATTLE OF THE WILMINGTON, CAPTURE OF WILSON'S RAID FROM CHICKASAW TO SELMA, ALA., AND MACON, GA. WINCHESTER, MILITARY OPERA¬ TIONS AT AND NEAR YAZOO CITY, MILITARY OPERATIONS AT AND NEAR

YORKTOWN, SIEGE OF, IN THE CIVIL WAR

CARMAN, HARRY JAMES, Ph.D.

Instructor in History, Columbia University

YOUNG'S TRAVELS

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Political Economy, Harvard University

WEALTH

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

WILD DUCK, THE

COCHRANE, CHARLES H.

Editorial Staff of The Americana

WILLIAM II (FRIEDRICH WILHELM VICTOR ALBERT)

CORCORAN, H. P.

Assistant Manager, Wheeling Chamber ot Com¬ merce

WHEELING, W. VA.

COUMBE, CLEMENT W.

Technical Art Expert /

WATER-COLOR PAINTING WEDGEWOOD WARE WOOD ENGRAVING WORCESTER PORCELAIN

COWAN, JAMES H.

Secretary, Wilmington (N. C.) Chamber of Com¬ merce

WILMINGTON, N. C.

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell University

WILL

DALE, HARRISON C.

Professor of Political Science, University of Wyoming

WYOMING

DICKINSON, THOMAS H., Ph.B., Ph.D.

Associate Professor of English, University of Wisconsin

WAY OF THE WORLD, THE

DODD, WILLIAM E., B.S., M.S., Ph.D.

Professor of American History, University of Chicago

WEBSTER, DANIEL WILSON, WOODROW

DOGGETT, LAURENCE L., Ph.D.

President, International Young Men's Christian Association College, Springfield, Mass.

YOUNG MEN'S CHRISTIAN ASSOCIA¬ TION

DONOVAN, EDWARD F.

Formerly Editor " Unabridged Standard Diction¬ ary," " Standard Bible Dictionary "

WOMEN, LEGAL RIGHTS OF

DRUM, WALTER, S.J.

Professor of Scripture, Woodstock College, Woodstock, Maryland

WORSHIP

* Deceased

Contributors to Volume XXIX — Continued

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

WILHELM MEISTER

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

WAVES OP ASSAULT WIRE ENTANGLEMENTS

FERRIS, RICHARD, C.E., D.Sc.

Editorial Staff of The Americana

WEAVING

FOULK, WILSON M.

Late State Historian and Archivist

WEST VIRGINIA

HAERTEL, M. H.

Secretary of the Faculty, University of Wisconsin, Madison, Wis.

WISCONSIN, UNIVERSITY OF

HANFORD, JAMES IL, Ph.D.

Associate Professor of English, University of North Carolina

WUTHERING HEIGHTS

HARDY, J. I.

Associate Wool Specialist, The University of Wyoming Agricultural College and Experiment Station

WOOL

HARPER, IDA HUSTED

Biographer of Susan B. Anthony, and author with Miss Anthony, Elizabeth Cady Stanton, and Matilda Joslyn Gage of the “ History of Woman Suffrage

WOMAN SUFFRAGE

HARRISON, HUBERT M.

Secretary, Wichita Falls Chamber of Commerce

WICHITA FALLS, TEX.

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Literature, The College of the City of New York

WASSERMANN, JAKOB WEDEKIND, FRANK WOLFRAM VON ESCHENBACH ZAHN, ERNST

HUGHES, JOHN D.

Secretary of Mercantile Bureau, Worcester Chamber of Commerce

WORCESTER, MASS.

INGERSOLL, ERNEST

Naturalist and Author

WILD LIFE, CONSERVATION OF, IN AMERICA ZOOGEOGRAPHY

KOYL, C. HERSCHEL, A.B.

Consulting Engineer, New York City

WATER SOFTENING

LAMON, FRANCIS H.

Secretary, Watertown Chamber of Commerce

WATERTOWN, N. Y.

McConnell, r. g.

Geological Survey of Canada

YUKON

MARSH, E. A.

General Superintendent, American Waltham Watch Company

WATCHMAKING, MODERN

MITCHELL, SAMUEL C., Ph.D., LL.D.

President of Delaware College

WYTHE, GEORGE

MOORE, WILLIS L., LL.D. D.Sc.

Professor _ of Meteorology, George Washington University

WEATHER BUREAU

NEWELL, FREDERICK H.

Professor of Civil Engineering, University of Illinois

WATER LAWS

OBENAUER, MARIE L.

Director of Industrial Survey and Information Service, Washington, D. C.

WOMEN IN INDUSTRY

QUAIFE, M. M.

Superintendent of the State Historical Society of Wisconsin

HILL, HENRY WAYLAND, LL.D.

President of the New York State Waterways Association, Author of " Waterways and Canal Construction in New York "

WATER SUPPLY

WATERWAYS OF THE UNITED STATES

HORTON, ROBERT E.

Consulting Hydraulic Engineer

WATER POWER

HOUSE, HOMER D., B.S., M.A., Ph.D.

State Botanist, The University of the State of New York

WILD FLOWERS

HOWARD, WILLIAM G., A.M.

Professor of German, Harvard University

WEAVERS, THE

WISCONSIN

RISTEEN, A.D., Ph.D.

Director of Technical Research, The Travelers .. Insurance Company, Hartford, Conn.

ZEEMAN EFFECT

ROWELL, GEORGE W., Jr.

The Lloyd Manufacturing Company, Menominee, Mich.

WICKER WEAVING AND PRODUCTS

RUBINOW, ISAAC M., Ph.D.

Director, Bureau of Social Statistics, Department of Public Charities, New York City

WORKMEN'S COMPENSATION

SIEBENTHAL, C. E.

Geologist, United States Geological Survey

ZINC

Contributors to Volume XXIX — Concluded

SINGLETON, ESTHER

Author of " Social New York Under the Georges," Furniture of Our Forefathers," "Guide to Modern Opera," " A Daughter of the Revolution," *etc.*

WOMEN'S CLUBS

SNYDER, HARRY, B.S.

Chemist, Russell Miller Milling Co.

WHEAT

TOUSEY, SINCLAIR, M.D.

New York City

X-RAY

TRUE, F. W.

United States National Museum

WHALE

TUCKER, MARION, Ph.D.

Professor of English, Polytechnic Institute of Brooklyn

WHEN LILACS LAST IN THE DOOR-YARD BLOOMED

VANCE, LEE J.

Publisher “ The Beverage News,” New York City

WINE AND WINE-MAKING

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia University

YEMASSEE, THE

WALSH, JAMES J., M.D., Ph.D., LL.D., Litt.D., Sc.D.

Author of “ Catholic Churchmen in Science,” “ The Popes and Sciences,” *etc.*

WINDTHORST

WELD, HARRY P., Ph.D.

Assistant Professor of Psychology, Cornell Univer¬ sity

WUNDT, WILHELM (MAX)

WEST, BIN A M.

Supreme Commander

WOMAN’S BENEFIT ASSOCIATION OF THE MACCABEES, THE

WHEELER, JOSEPH L.

Librarian, Youngstown Public Library

YOUNGSTOWN, OHIO

WIENER, LEO

Professor of Slavic Languages and Literature, Harvard University

. YIDDISH LANGUAGE

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Columbia University

WINTER’S TALE, THE

a

a

a or a

a

a

A

a

ch

e

e or e

e

?

e

ff

g

gw

h

h or h

hw

I

• ¥ i or 1

A

1

j

kw

h

KEY TO PRONUNCIATION.

.0 i . 1 A. K.u’ xH.il/Jd (CXJiIN

far, father

fate, hate at, fat air, care ado, sofa all, fall choose, church eel, we bed, end

her, over : also Fr. e, as in de ; eu, as in neuf ; and oeu, as in boeuf, coeur; Ger. d (or oe), as in okonomie.

befall, elope

agent, trident

off, trough

gas, get

anguish, guava

hat, hot

Ger. ch, as in nicht, wacht

what

file, ice

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

gem, genius

quaint, quite

Fr. nasal ni or n, as in embon¬ point , Jean, temps

n

ng

nk

6

o or 6

A

o

Span, h, as in canon (can’ydn), pihon (pen’yon)

mingle, singing

bank, ink

no, open not, on corn, nor

6

o

oi

o or oo

ou or ow

s

sh

th

fh

u

u or u

u

ii

v

y

z

zh

‘(prime),

atom, symbol book, look

oil, soil ; also Ger. eu, as in beutel

fool, rule

allow, bowsprit

satisfy, sauce

show, sure

thick, thin

father, thither

mute, use

but, us

pull, put

between u and e, as in Fr. sur, Ger. Muller

of, very

(consonantal) yes, young pleasant, rose azure, pleasure

“(secondary) accents, to indicate syllabic stress

WASPS, hymenopterous insects, typic¬ ally belonging to the family Vespidce, in Which the head-shield is square and the mandibles or greater jaws short and toothed at their tips. The wings are folded once longitudinally when at rest. The antennae of the males are 13-jointed, those of the females and neuters or workers 12-jointed. The abdomen is egg-shaped and often borne on the thorax by a slender stalk.

The true wasps differ considerably in ap¬ pearance and greatly in habits. Some of them live in pairs and construct simple cells of mud which are attached to twigs, beneath stones, etc., and stored with paralyzed spiders and in¬ sects upon which the larvae feed; others

burrow into the stems of plants or the ground and pro¬ vide for the young in a similar manner. All such are known as solitary wasps, to distinguish them from the social or colonial wasps, and are sometimes separated as a distinct family (Eli - menidce). The true social wasps are all paper-makers and their nests are sometimes of large size and shelter a great many individuals. Un¬ like the solitary wasps which are of perfect males and females only, the social wasps pro¬ duce in addition a caste of ˆworkers® or in¬ fertile females.

Eumenes fraterna is a well-known solitary wasp, easily recognizable by the long and slender pedicle formed by the basal segment of the abdomen, the short square thorax, and long jaws. Its nests are dainty spheres about half an inch in diameter constructed of mud pellets and attached, often several in a row, to twigs or walls, and sealed after being provided with a fertilized egg and a supply of caterpillars. Odynerus and several related genera having very similar habits have the abdomen sessile. They are often gaily colored and some of them place their mud cells within hollow galls or the deserted nests of other insects. Kaphiglossa forms burrows in the pithy stems of briers and stores its cells with the larvae of weevils.

Of the social paper-wasps the species of Polistes somewhat resemble Eumenes in the slender more or less petiolate abdomen. All of the numerous species build a single tier of cells supported by a central pedicle and unenclosed in a covering. Several of these species are very common and well known. The nests, which begin with a single cell, around which others are added with a large disc two or three inches in diameter, hang from a support by the stem of the original cell, so that the nest, resembles an

inverted short-stemmed wineglass. The grubs hatch from the egg laid in each cell as soon as it is finished, and the cells are lengthened some¬ what as they grow. They are fed by the mother, and mature and fly in about three weeks. Those first born are females, and these daughters at once begin to assist the mother-wasp in caring for the young hatched later. In the winter nearly all the wasps die, but a few fertilized females hide in shelter-crevices and survive to found new colonies in the spring.

In Vespa, the hornets, the abdomen is broad, robust and sessile, and most of the species, which include the hornets and yellow jackets, are brightly striped with yellow on a black or brown-ground color. The members of this genus exhibit the largest and most highly de¬ veloped

wasp communities. A common large species is Vespa maculata, the white-faced hornet which builds the large oval grayish paper-nests so well known. Externally they consist of several loose covering layers pierced by an aperture at the lower end. The interior is occupied by horizontal tiers of combs, like floors in a house, supported by columns, and with passages between. Each cell is hexagonal, as in the combs of bees, but the material is paper. These tiers of cells are built in succes¬ sion, the upper ones first. Sexually wasps are of three kinds, males, females and neuters, the two latter armed with an exceedingly venomous sting. The last are the workers in the hive; they also go out to bring in provisions for the community. Wasps are nearly omnivorous, feeding on honey, jam, fruit, butcher's meat, and any insects which they can overpower. A share of these viands is given to the males and females, whose work lies in the vespiary and in providing for the future progeny of the colony. The cells of a large nest may amount to more than 15,000. In these the females, which are few in number, deposit eggs, hatched in eight days into larva;. These go into the chrysalis state in 1 Z or 14 days more, and in' 10 more are perfect insects. The males do not work. Most of the workers, all the males and the old females, die at the approach of winter, and in the spring each surviving female, hav¬ ing been impregnated in autumn, looks out for a suitable place to form a new vespiary, and builds a few cells in which are deposited eggs destined to produce workers. The latter then assume the duties of nest-building, and the number of cells is rapidly-increased to provide places for the eggs which the female continues

to lay throughout the summer. V. arenaria is a smaller species of a richer yellow color and similar habits. The yellow jacket (V. vulgaris) builds similar nests in an underground chamber reached by a tunnel, and the large European hornet (V. crabro), naturalized in portions of the United Statesfi nests in hollow trees.

The mud-dauber wasps belong to a distinct family (Sphecidce). These have the greater part of the abdomen in the form of a bulb borne on a

very long and narrow stalk and the head is supported on a distinct neck. The black and yellow species of Pelop-ceus make the famil¬ iar rough mud-cells which are so commonly plastered to the ceilings of barns, outhouses and garrets, and which are packed with spiders at once paralyzed and preserved by a thrust of the sting through the nerve ganglia. Many of the numerous other genera of this family bur¬ row into banks or along paths, but all have the habit of provisioning the nest with spiders or caterpillars. Some of them are very large and handsome wasps. A related family of burrow¬ ing or “sand® wasps is the P ompilidce , which have long, non-angulated antennae, and rather small eyes. A very fine large species (Pcpsis - formosus) , found in the Southern States, is known as the tarantula-killer from its habit of attacking that huge spider, with which its cells are stored. Not infrequently in the North a very large wasp, with a stout, heavy body about one and one-half inches long, is seen half flying, half walking, burdeneed by a cicada which it has captured and is bearing off to its burrow. This is Sphecius speciosus, a repre¬ sentative of the family Bembecidce, which, like the last two, has the wings unfolded when at rest. Still another interesting family of fosso-rial wasps is the Mutilidce, or wingless wasps. Most of them are richly colored and hairy; and are seen running in sandy pathways. They are commonly mistaken for ants, and are popularly known as “velvet ants,® but sting severely. There are numerous other wasps which cannot be even mentioned. Suffice it to state that the North American fauna includes about 1,500 known species, arranged in 17 families.

Bibliography. — Cresson, ‘Hymenoptera of North America) (Philadelphia 1887) ; Lubbock, (Ants, Bees, and Wasps) (New York 1876) ; Ormerod, British Social Wasps) (London 1868) ; Packard, (Guide to the Study of Insects) (New York 1880) ; Comstock, (Manual for the Study of Insects) (Ithaca 1895) ; Sharp, ‘Cambridge Natural History) (Vols. V and VI, New York 1895) : Morley, (Wasps and Their Ways* (New York 1900) ; Lutz, ‘Field-book of Insects) (New York 1918).

WASSERMANN, August von, German scientist : b. Bamberg,. 1866. He studied at the universities ..of Berlin and Strassbu.fg and was appointed assistant at-the Koch Institute, Ber¬ lin. In 1902 he was made assistant professor of therapeutics, becoming full professor in 1911 at Berlin University. He became known internationally in 1906 through his discovery of the reaction in syphilis known universally as the “Wassermann test.®

WASSERMANN, vas’er-man, Jacob, Ger¬ man novelist: b. Furth. Bavaria, 10 March 1873. He attended the Realschule in his native

city, and first went into business, later going into writing at Vienna, where he has been liv¬ ing for more than 20 years. He has great versatility both in the choice of his materials and in the manner of treatment, and has passed successively under the influence of most of the important tendencies and writers of the present day. His most famous novels are (Die JJuden von ZirndorP (1897) ; (Die Geschichte der jungen Renate Fuchs* (1900; 11th ed., 1908) ; (Der Moloch) (1902) ; (Caspar Hauser oder die Tragheit des Herzens) (1908). He has also written an interesting, rather mystical essay on the art of the narrator, 'Die.Kunst der Erzahlung* (1904).

Jacob Wittmer Hartmann.

WASSON, wos'on, David Atwood, Ameri¬ can clergyman and author: b. Brooksville, Me., 14 May 1832; d. West Medford, Mass., 21 Jan. 1887. He entered Bowdoin College in 1845, but remained only one year ; went to sea in search of health ; studied law and for a short time practised; and in 1848 entered the Ban¬ gor Theological Seminars In 1851 he became minister of a Congregational church at Grove-land, Mass., took charge there of an independ¬ ent society with which he remained until 1857, with an interval of six months at Worcester, Mass. In 1865 he was called to the 28th Congregational Society (Theodore Parker's), Boston, but soon retired on account of illness. Afterward he resided for several years in Germany, and finally settled at West Medford. A profound thinker and writer, of striking originality, and with a style equally powerful and brilliant, Wasson contributed in prose and verse to various periodicals — the North Ameri¬ can Review, Atlantic Monthly, Christian Ex¬ aminer, Radical, *etc.* — his subjects including political philosophy and government, economics and religion, eithics and social reform The principal collection of his verse is the vol¬ ume of Poems* (1888), edited by Ednah D. Cheney, including (All's Well,* a classic of faith; 'Babes of God,* a paean of Wasson's op¬ timistic philosophy; 'Seen and Unseen) ; <Ideals) ; 'Opheus* ; 'Scipio to the Senate,* and others equally striking in thought and ex¬ pression.

WASTE, in law, the result of any act or omission by the tenant of any particular estate by which it is rendered of less permanent value. Waste is of two sorts, voluntary and permissive; the former being that caused by active procedure on the part of the tenant, such as the destruction or alteration of build¬ ings, the removal of fixtures, the cutting down of fruit or shade trees or ornamental shrubs, or in the case of a wood lot, the removal of timber trees and cordwood and

their sale for the benefit of the tenant. The latter may, how¬ ever, cut such timber as is needed and used in the repair of the buildings on the estate. Per¬ missive waste is that caused by negligence, such as the allowing of buildings to fall out of re¬ pair. Under the law of waste a tenant may work any mine or quarry alreadv in existence on the leased property unless specifically for¬ bidden in the lease. But he is not permitted to open and operate for his own gain either mine or quarry. In some States the tenant is per¬ mitted to clear up wild land for agricultural

purposes ; but he must not sell the product of such clearing in cordwood or lumber for his own emolument. On the theory of permissive waste as developed at common law is based the rule which throws upon the tenant the responsi¬ bility of making all ordinary repairs in the premises which he occupies. Though he can¬ not strictly be required to make repairs, and is not liable in damages for any failure so to do, yet in case of an action for waste against him his only defense is a demonstration that he has repaired the waste, and he, therefore, prefers to maintain the premises in repair.

WASTE, or BY-PRODUCTS. Waste is that portion of raw material used in any specific manufacture which is in the process rendered useless for that particular line. However, the name is sometimes retained long after a sub¬ stance, at one time of little or no value, has been utilized as raw material in some other industry. In every manufacturing process, me¬ chanical or chemical, there is more or less left over material which becomes waste. The ex¬ amples given below relate to new waste, but nearly everything we use wears or corrodes, or gets broken or unshapely, and so rags and rust and scraps arise. On the other hand, the rust which arises from corroding iron is utter waste, since it can never be profitably collected at all. There is a kind of waste, for the most part difficult to prevent, which goes on in the con¬ sumption of fuel, apd in certain processes of roasting or calcination in the smelting of metals. Roundly speaking, the best designed steam-engines and boilers require only half as much coal per

horse power per hour as those less skilfully constructed, and the fuel unnecessarily consumed by bad boiler furnaces is largely wasted as smoke through imperfect combustion. The utilization of blast furnaces gases for heat¬ ing purposes, and the recovery of tar and am¬ monia also produced at the same time from the coal consumed in these furnaces, form an in¬ stance of a double saving from the same source. In the report of the chief inspector of alkali works for 1891, it is stated that the plant put up in recent years for collecting tar, ammonia, etc., at 57 Scotch blast furnaces cost $2,223,000, a sum fully equal to the cost of building the furnaces themselves. The condensing Hues, miles in length, connected with some lead-smelt¬ ing furnaces are modern examples for appli¬ ances to condense lead fumes or vapor which formerly was allowed to escape, causing much loss of the metal.

Some instances of how waste in a solid form arises in working rock and other mineral sub¬ stances may now be given. In shaping and dressing granite paving stones as much as three-fourths of the rock quarried is, in some in¬ stances at least, wasted. This waste is as yet only in very small part utilized for road metal, and for ˆgranolithic® pavements. Blast-furnace slag is now utilized in several ways, notably in the manufacture of Portland cement. In a number of cases the accumulations of other kinds of slag on the sites of ancient smelting works have, in modern times, been again put through the furnace to extract the metals left in them, with profitable results. Some of the refuse from the old silver mines of Laurium has been bought up by capitalists for this pur¬ pose. One instance, though not of very recent

date, may be given where, by the salvaging of a by-product, a fortune was very quickly amassed. About 1840 Mr. Askin of Birmingham dis¬ covered a method of separating cobalt, in the form of oxide, from nickel, two metals which were very difficult to separate. This oxide of cobalt was at first a waste product, but before very long it was put into the hands of potters, who readily bought it up to produce a blue color on their ware, at the rate of two guineas per pound Among comparatively recent instances of utilization of by-products and waste products in the chemical industries, we may refer to the importance of the substances now developed from coal tar (q.v.), and the great value of some of them in the manufacture of dyes. Another example is the recovery of binoxide of manganese in the production of chlorine for the manufacture of bleaching powder by Weldon's beautiful process. Formerly for every 100 pounds of bleaching powder made about 100 pounds of the native oxide of manganese were required. Now this manganese is recov¬ ered and used again and again in the process,

with only a loss of about 5 per cent to make up each time it is returned to the chlorine still. The earlier methods of recovering manganese were not nearly so perfect, and, therefore, were not much used. A process for the utilization of chemical waste on a great scale is Chance's method, patented in 1888, of recovering sulphur from alkali makers' black-ash refuse. A British automobile manufacturing concern sal- - vages 1,200 gallons of cutting oil a week from scrap metal, this oil being used again with the addition of 10 per cent of new oil, the latter being the actual amount of unrecoverable waste. Another establishment treated in one year 83,400 pounds of lathe waste, recovering 2,292 gallons of cutting oil. Large quantities of machine oil are recoverable from rags and cotton waste used for wiping machinery. The process of oil recovery so cleanses the wipers that they are useful again. The year's report shows 350,000 wipers treated, and an annual replacement of only 15,000 new cloths required; and a recovery of more than 5,000 gallons of oil — the total cost of the operation being less than $1,000.

Passing to vegetable substances, the various materials besides rags used in the manufacture of paper may be first noticed. Straw, wood, and esparto fibre, if not exactly waste products, were at least undeveloped substances before they became, as they now are, so largely used in paper making. Old ropes, flex and jute-mill waste, old or torn pieces of paper of every kind, are all serviceable in paper-mills or in the manufacture of millboard. In the pulp of the latter old newspapers bulk largely. Cotton waste is much used by mechanical engineers for cleaning purposes. Sawdust is employed in several ways : in the manufacture of artificial wood, which is pressed into many architec¬ tural forms; as a source of oxalic acid, and of pyroligneous acid ; and, when compounded with magnesium chloride, as a durable, warm and resilient coating for the cement floors of fireproof buildings. Chips of yellow pine from Southern shipyards yield turpentine and rosin to the waste industry. One of the most in¬ teresting developments of all is the manufac¬ ture of artificial silk from the wood waste of sawmills and carpenter shops. The timber

wastes of the United States are prodigious ; the estimate for 1913 placing the total at 150,- 000,000 tons. One of the most effective activi¬ ties of the Forest Service is directing the sal¬ vaging of this waste and its delivery into the hands of establishments which will utilize it. The waste liquors of the wood-pulp industry yield alcohol, adhesives, tanning agents and thymol; and a recently discovered Norwegian process for separating the lignin makes that substance available for fuel — in amount nearly or quite enough to furnish all the heat required in making the pulp. Molasses, a waste product of sugar making, besides being a food, yields large quantities of industrial alcohol at low cost; and, as a by-product to this manufacture, yields valuable potash salts. Corkcutter's waste has become of high importance in the manu¬ facture of linoleum and cork carpet. Cork mattresses and life-preservers, compressed with shellac into new bottle corks, for lining re¬ frigerators and as a substitute for shavings in vinegar making. From the bark stripped from osier wands the useful medicine salicin is now made. In days not so long past the spent mad¬ der of our large dyeworks was suddenly raised from a useless to a valuable material by treat¬ ment with sulphuric acid, which converted it into the dye called garancin. One of the most interesting examples of what has been done in converting a waste animal product into a highly useful material is seen in the case of waste silk. Cocoons do not yield half their weight of reeled silk, but the remaining ˆwaste® por¬ tion has, through the ingenuity of an English inventor, become the raw material for a large spun silk industry. In Venice artificial flowers for ladies' headdresses are made of imperfect cocoons. The various kinds of waste from woolen mills and from the cutting up of woolen fabrics are either worked up again, the short fibre into mungo and the long fibre into shoddy, or it is used for felt or ground into flock for paper hangings. Glue (q.v.) is made from par¬ ings of hide and bone, which also yield glycerine. The turnings and dust of the ivory and bone turner have various useful applications. From almost any wasjte animal matter, such as par¬ ings of horns and hoofs, hair, blood, leather cuttings and even field mice, is made the whole list of the invaluable cyanides. The waste of leather cutting is compounded with waste or scrap rubber in the production of a water¬ proof artificial sole leather. Clippings of fur skins are made into hats and fish scales into artificial pearls. The waste of mother-of-pearl left by button cutters is converted into a fine powder of peculiarly beautiful silky lustre, and used in making artificial flowers and fine wall-papcrs.ˆ The skim-milk residue of butter fac¬ tories is made into a grade of condensed milk or treated as a source of commercial casein, the whey being worked for its content of milk sugar. The waste bone-charcoal of the sugar refineries is treated with

sulphuric acid to make the valued bone phosphate fertilizer. Other materials regularly dealt in by the dealers in waste include old twine, old oilcloth and car¬ pets, books and magazines, old hats, broken glass and old bottles, moss, hair, fur, bones and many olhers.

The enormously increased prices following [he entrance of the United States into the

World War gave a market stimulus to the waste industry, owing to the increased values which waste assumed. The larger establish¬

ments found it profitable to organize individual salvage departments, in some cases costing into the millions ; equipped with complete outfits for treating all sorts of waste. A salient ex¬ ample is the General Electric Company's great plant at Schenectady. The report for 1916

showed that the waste department had handled in that year 80,000,000 pounds of waste, of which 15,000,000 pounds was of scrap metal. Other materials brought to the salvaging shop com¬ prised fibre, rubber, rope, rags, burlap bags and wrappings, remnants of leather belting, as¬ bestos boards and paper, trimmings of cloth, excelsior, box shooks, barrels and barrel staves, *etc.* Such material as was useless for any

other purpose was used as fuel under the

boilers, and supplied 53,000,000 pounds of steam in the year.

Smaller establishments disposed of their waste at good prices to one of a large and com¬ petitive throng of dealers. The waste trade has its own directory which lists more than 25,000' concerns who either deal in wastes or who use these wastes as raw material in their own industries. Some 1,200 of these dealers are in foreign countries, and not only sell their own domestic waste, but buy at good prices the wastes of American industries.

The trade supports a monthly periodical de¬ voted to its interests. Consult Koller, T., (The Utilization of Waste Products) (London 1918).

WASTE LANDS, uncultivated and un¬ profitable tracts in populous and cultivated countries. The term waste lands is not employed with reference to land not reduced to cultiva¬ tion in countries only partially settled. There is a large extent of waste lands even in the

British Islands. Of the 77,800000 acres which they contain, only about 47,000,000 are arable land and improved pasture; 2,000,000 acres are occupied with woods and plantations ; 7, 000,000 acres in Scotland consist of sheep-pasture, gen¬ erally at considerable elevation, and little im¬ proved by art; 8,000,000 acres in Ireland are uninclosed pasture, generally quite unimproved; 3,000,000 acres are mountain and bog; and the remainder is unimproved and unproductive.

In the United States, much of the land now practically waste is in this condition merely be¬ cause the lime has not yet come for profitable development of its capacities. A large portion of the area which 40 years ago was known as the (Great American Desert > has been brought under cultivation and is remarkably productive. With increase of population and multiplication of railroads, much of the land in the west now lying idle will be converted into fertile fields. Many of the ˆabandoned farms® in the eastern States, some of which have been injured by a bad system of tillage, also will be reclaimed. While there are no authentic figures giving area of waste land in the United States, the follow¬ ing items as reported by the last census are of value in considering the subject:

Totals for the United States.

Total land area . 1 , 903 , 289 , 600

Total area in farms . 878 , 798 , 325

Improved land in farms . 478,451, 750

Unimproved land in farms … … 400. 346. 575

Hence of the total land area in the United States only 46 per cent is in farms and only 25 per cent was classed as ˆimproved® land. Consult Hall, A. D., Reclamation of Waste Lands) (in Popular Science Monthly,

Vol. LXXXV, p. 377, 1914).

WASTES, City, Disposal of. The public wastes of a city may be grouped into three classes: (1) sewage; (2) city refuse; (3) trade refuse. The first class is specifically treated under the title Sewerage. The third class con¬ sists of such material as earth from excavations, refuse from building operations, manure from livery stables, slaughter-house offal, etc., and the packing litter from stores. This is usually and properly cared for under the law by private contractors. The second class, which must be cared for by one of the municipal departments, commonly the department of street cleaning, is divisible into: (1) household refuse; and (2) street refuse. The first includes garbage, ashes, rubbish (paper, rags, broken glass and crockery, bottles, tin cans, leather and rubber. scrap) , and general sweepings. The second consists of horse droppings, pavement wear, fallen leaves, dead animals, material falling from carts, and snow. When these have been collected, it is neces¬ sary for the department of street cleaning to make the most economical and least obnoxious final disposition of the various products of its activity. Many, and indeed most, of the ma¬ terials collected have a definite and considerable value when separate from material of other classes, but a mixture of the various kinds of refuse has no value except the little which can be produced by separating the materials by hand picking.

In any large city the proper treatment of these materials calls for their collection in five separate classes: (1) Street sweepings; (2) dead animals; (3) household garbage and mar¬ ket waste; (4) ashes; (5) household rubbish — cans, bottles, paper, rags, bits of metal — and trade waste. When a city population exceeds say 100,000, the amount of waste is sufficient to warrant this classification, because the re¬ sulting economies will counterbalance . the at¬ tendant trouble and expense of keeping and collecting the materials separately.

(1) Street sweepings consist of about two-thirds horse droppings and one-third dust and scrap of one kind and another. These sweep¬ ings are not satisfactory as a lowland filling be¬ cause of the large proportion of organic matter ; and on the other hand the material has small value for fertilizing purposes because even well-kept stable manure has a value of only about $2 per ton, wholesale, on the basis of the price of manufactured fertilizers; and street sweepings, from their admixture with other dirt, have a fertilizing value of only about $1.35 per ton. It is evident that such material cannot be shipped far, because its value would soon be equaled by charges for handling and transportation; and the best disposition that can be made of it is to send it out as a farm and garden dressing as far as its fertilizing value

will pay the freight. Before the days of high-grade fertil¬ izers, such material had a relatively higher value; but nowadays, only in small cities where market gardens and farms are not greatly distant from the centre of population, have street sweepings any commercial value at the

point of collection. In 1840 New York City sold its street sweepings and manure for $38,711; in 1850 the amount received was $30,898; in 1860 the amount was $17,928; and all recepits from this source ceased not many years later. The increasing use of automobiles has reduced the percentage of manure in the sweepings to less than 50 per cent. In smaller cities, however, while the cost of sweeping the streets will apparently always be a charge on the citizen, the value of the sweepings collected from paved streets ought to pay for their final disposition.

(2) In the matter of dead animals, it is customary to contract with some individual or firm for their prompt collection and removal ; and though this is considered a service and is nearly always paid for by the city, yet the value recovered by the contractor from the hides, bones, grease and fertilizer-material goes a long way toward equaling the expense of col¬ lection and disposal; and there is good reason to believe that the value of this material when scientifically treated is sufficient to meet the total expense.

(3) The third class, household garbage and market waste, is the division which causes most trouble and expense in any city, large or small. In seaport towns it has usually been cheapest and easiest to tow the mixed wastes to sea and to dump them so far from shore as to be practically unobjectionable. In¬ land cities and towns, however, have found, great difficulty in disposing of organic waste, because the method of disposition adopted must be satisfactory at once to the community and to its neighbors. These municipalities have usually endeavored to sell their edible waste, even if not very fresh, for use as food in large piggeries. Many, too, until within recent years, have used it as food for milch cows. The city of Worcester, Mass., feeds upward of 2,000 hogs a year at the municipal piggeries. Colorado Springs, Denver, Kansas City, Omaha and Providence make a similar disposition of city garbage. At Grand Rapids a contractor pays the city 45 cents per ton and feeds 10,000 hogs ; his sales reaching $135,000 a year in pork besides 2,400 tons of highly valued fertilizer.

When mechanical methods were sought, the first impulse naturally

was to destroy an article which had been the source of so much danger and trouble; the second impulse was to save a substance which was known to be valuable. The development of these two ideas has led to the invention of incinerating and utilization meth¬ ods, respectively. The term garbage is used here to signify only table, kitchen and market refuse, consisting of animal and vegetable scrap, always wet and putrescible. The composition of this material varies with the season and with the city, but the average in America is approxi¬ mately : Water, 70 per cent ; grease, 3 per cent ; - solid fibre, 27 per cent. Such material cannot be burned until its 70 per cent of closely-held water has been freed and evaporated; and, on the other hand, its grease and fibre have com¬ mercial value if they can be separated from the water and from each other.

Every housekeeper knows that small amounts of garbage can be quickly disposed of by a good fire; but when the endeavor is made to destroy a large amount of garbage by a poor fire, the

trouble begins. In all cases noxious fumes are produced and escape unless the temperature is 2,000° F. or more, and freedom from offensive odors is gained only at the expense of fuel. The organic fumes must be decomposed and destroyed within the furnace itself and, there¬ fore, the process must be one of complete com¬ bustion and not mere evaporation or distilla¬ tion. When a small amount of garbage is mixed with a large amount of paper, excelsior, shop sweepings and waste coal and clinker the in¬ cineration process is neither difficult nor costly; and is permissible in the outskirts of a town or city where there are no neighbors within a mile to be troubled by the fumes which in practice always escape with the chimney smoke and come to the ground at a greater or lesser distance ac¬ cording to the force of the wind. Many city in¬ cinerators for this kind of waste destruction are in use in the United States and Canada; many of practically the same class have been in use in England for a long time, and from there the practice has extended to Hamburg and some other places ; but none of these incinerators en¬ deavor to burn

pure garbage, but always the mixture above mentioned. As a matter of fact, there is enough heating power in a pound of dry garbage to evaporate the water from the next pound, and, therefore, there is no reason why a furnace cannot be so constructed that each pound of garbage may dry the next succeeding pound, and garbage thus be made to burn itself, with only enough added fuel to insure the destruction of fumes. The practice in cities which use in¬ cinerators is to collect household ashes with the garbage. These ashes average 20 to 25 per cent of unburned coal, and this is ample for the complete destruction of the garbage at a suitable temperature.

Garbage utilization processes all aim to ex¬ tract the grease by cooking in steam or solution in naphtha, after which the solid material or fibre is dried and ground to form a fertilizer base. The recoverable grease amounts to about 60 pounds per ton of raw garbage, and is salable at about three cents per pound. The dry fibre averages 540 pounds per ton of winter garbage and derives its value from the presence of am¬ monia— 18 pounds @ 8c. =$1.44; phosphoric acid — 18 pounds @ lc. = 18c.; potash — 6 pounds @ 3j4c. = 21c., or a total recoverable value of $3.63 from a ton of raw winter garbage. Summer garbage is less valuable because it contains more water and less grease and fibre. The cost of treatment, when the quantity is large, is less than the value of the material re¬ covered. In American cities the amount of garbage collected averages about a half pound per citizen per day; in Europe it averages less than a quarter pound. Many people object to keeping separate garbage cans because of the odors which arise unless the water is absorbed by a mixture of ashes, paper and other waste ; but in a large city where garbage is collected daily, it is evident that material which has come from the table within 24 hours must be odorless and unobjectionable, and that the odors arise solely from the cans, and from them only be¬ cause they are not regularly washed and kept clean. Some cities require the wrapping of garbage in substantial paper parcels. This not only makes for cleanliness but renders incinera¬ tion very much easier. The per capita produc¬ tion of garbage in the United States varies

from 80 pounds (Buffalo, N. Y.) to 260 pounds (Rochester, N. Y.) per annum. In nine of the larger American cities the daily output of gar¬ bage varies from 331 pounds to 875 pounds per 1,000 of population. In 1914 the city of New York entered into a contract by which it was to receive $62,500 for its garbage the first year; $87,500 the second year; and $112,500 annually for three years thereafter.

The cost of incinerating garbage in the United States ranges from $250 to $1,000 per annum per 1,000 of population, the average cost being about $600. At Minneapolis the city's wastes are used to produce steam, which lights and heats the charities and corrections build¬ ings, and in addition lights 31 miles of streets.

(4) Ashes are always available for lowland filling and steam ashes are particularly sought by builders for use in fireproof floors, as a foundation for the cement floors of cellars and as a substratum for sidewalks and flagging. The ash output amounts in the northern parts of America to nearly three-quarters of a cubic yard per citizen per year and many efforts have been made to utilize its various constituents so as to save the cost of carting or boating it away for filling purposes. Ordinary household ash from anthracite coal consists of : Fine ash, 50 per cent; coarse ash, stone and clinker, 30 per cent; coal, 20 per cent. Such recovered coal has a ready cash sale, and while the daily value of the ash from a single building is probably too small to pay for its separation, yet the process may be profitable when conducted on a large scale, in proper buildings and aided by mechan¬ ical means of separation. This recovered coal has an average heating value of about 75 per cent of that of new coal and has many advan¬ tages as household fuel because of its ease of ignition and its freedom from dust, clinker and slate. In the borough of Manhattan, New York, the annual output of ash is per capita, 1,162 pounds, or 3,17a pounds per 1,000 inhabitants daily. This amounts to an average of 12,999 cubic yards in summer and 18,558 cubic yards in winter. The total amount to be handled annually is not far from 5,500,000 cubic yards, or 4,200,000 tons, and the amount of recover¬ able coal contained therein is not far from 1,050,000 tons. The cost of handling, on the basis of an average haul of three-fourths of a mile, is 96 cents per cubic yard. If the ash collections are kept free from street sweepings and garbage, the recovery may be made by "a machine capable of separating coal from clin¬ ker; and the value of the recovered coal will be nearly sufficient to meet the expense of ash collection and disposal.

(5) The class of waste including general rubbish — cans, bottles, old rubber, paper, rags, bits of metal, *etc.* — is a perennial delight to scavengers,, who withstand dust and smells in order to pick out these things from a mixed mass of animal and vegetable refuse. But

since city authorities have learned to keep the different classes of waste separate, this rub¬ bish has become a source of revenue to the city even after paying the cost of collection and sorting. Old cans are sold at $5 per ton for

their solder, tin and value as material for

cheap castings. Bottles are of two classes,

<(registered® goods — bottles which have the proprietor's name blown in the glass — and plain bottles without names. The average

price, at the place of collection, for ˆregistered® bottles, which by law may be sold only to their original owners, is one cent each. Plain bot¬ tles are put into barrels and sold to dealers at $1.50 per barrel. Broken glass, too, has a mar¬ ket value of 10 cents per bag. Rubber scrap is worth 15 cents per pound at the rubber re¬ claiming factories. Waste paper, when clean, is worth from $4 per ton for newspapers to $40 per ton for fine white paper, the average price for the paper collections of a city being about $9 per ton. Rags vary in price, as do papers, many of the rags being used for paper stock. These materials have such value that only a small proportion reaches the carts of the de¬ partment of street cleaning. The large propor¬ tion is collected by house-to-house visitation by junk-cart men, of whom there are in the bor¬ ough of Manhattan, for instance, some 400, whose purchases amount to about $1,000 per day; and only the balance is collected by the department carts. In many cities the privilege of picking over the Mump® is sold to the high¬ est bidder. In smaller places the pickers are free to exercise their trade for what they can make. An idea of the extent of the trade in these waste materials may be gained from the statement that the yearly collection of old rub¬ bers in the United States amounts to about 17,000 tons, of which some 600 tons per year, worth $50,000, are collected in the borough of Manhattan. Some of the other yearly collec¬ tions in Manhattan are as follows : <(Registered® bottles — principally syphon bottles, milk bottles and those used tor carbonated waters, soda and beer — '2,000,000, worth $20,000; plain bottles, 30,000 barrels, worth $45,000 ; waste paper, $2,000,000 worth ; rags, $75,000 worth ; bits of carpet, string, iron, brass, etc., to the amount of several thousand dollars more. Though, as said above, only a small proportion of these things goes to the waste heap, yet, since the department has pro¬ vided separate carts for dry

rubbish, the city has received annually nearly $100,000 for the delivery of these collections to contractors at the docks. The various materials are delivered mixed from each cart, and some $150,000 is paid annually by the contractors to laborers who sort the waste into separate piles, after which it is sold to various dealers. Allowing a reasonable profit to the contractors, it is prob¬ able that the amount received by them is not less than $300,000. Therefore, these bits * of scrap thrown away by the housekeeper have become worth $100,000 by their collection at the receiving station, and have become worth $300,- 000 by separation into their component parts. The city of New York now employs large motor carts with eight compartments for ashes along the sides and a V-shaped ((story® above for rubbish. A crew of eight men operate the car. The garbage is collected separately by, a smaller car, with a crew of three. Of the 50 largest cities in the United States, 37 require the separation by the household of garbage, ashes and rubbish. All the cities in New York follow this plan. Of the 158 cities listed in the last census of municipalities, 72 per cent col¬ lect their wastes by a municipal force, and 28 per cent let contracts for waste removal to private parties.

The problem of the general separation of wrastc materials is simple in the household, but

difficult in the community. It is all a mattei of education in ethics and community economy and requires strict rules with sure penalties for infraction. If each member of the population would increase the salable value of his house¬ hold wastes one-half cent per day by keeping these wastes separate, the total amount would be sufficient to defray all the expenses of the department of street cleaning in any city in the United States. (See Street Cleaning). Con¬ sult Branch, J. G., (Heat and Light from Munic¬ ipal Waste) (Saint Louis 1906) ; Capes, W. P., and Carpenter, J. D., (Municipal Houseclean-ing) (New York 1918) ; Matthews, E. R., Ref¬ use Disposal* (London 1915) ; Morse, W. F., <The Collection and Disposal of Municipal Waste) (New York 1908) ; Venable, W. M., (Garbage Crematories in America) (New York 1906).

WATAUGA ASSOCIATION, in Ameri¬ can history a name adopted by a party of set¬ tlers who established the first independent civil government in North America. In 1768, the Six Nations (q.v.) agreed to surrender all the lands between the Ohio and Tennessee rivers. The first settlers were largely from Virginia and the first settlement was made on the banks of ‘ the Watauga River in 1769. The Watauga

Association, established in 1772 by John Sevier, James Robertson and others, subsequently grew to be the State of Tennessee. Under the title ((Articles of the Watauga Association,® a writ¬ ten constitution was drafted, the first ever adopted by a community of American-born freemen. See Sevier, John.

WATCH HILL, post-village in Westerly Township, Washington County, R. I., on the Atlantic Ocean, and about three miles southeast of Stonington, Conn. It is near Watch Hill Point, a promonotory forming the extreme southwest point of Rhode Island. The place has a fine beach and ranks next to Newport and Narragansett Pier, in Rhode Island, as a popu¬ lar summer resort.

WATCHMAKING, Modern. It is an ac¬ cepted fact of horological history that the port¬ able mechanism from which has been evolved the modern pocket watch had its origin in Ger¬ many. And until the last half of the 19th cen¬ tury the watchmaking industry was confined to a few European countries, particularly to Switz¬ erland and England.

The methods employed by all European watchmakers involve a great degree of indi¬ vidual skill on the part of the various work¬ men, a skill which can be acquired only by years of application and experience. But as it is the custom in the watchmaking districts of Europe for the children of a family to adopt the line of work pursued by the parents, the acquisition of superior manual dexterity would tend to be both natural and easy. Such skill would, however, lie within narrow limits. For instance, the members of a certain family would for succeeding generations be engaged in the making of a given piece or portion of the watch, one family making wheels, another reg¬ ulators, another dials, *etc.* The several parts produced by these various families being brought together by still others, who fitted them to each other and sold them in the form of completed watches. Practically the same methods were in use in the watchmaking dis-8

tricts of England. But while watchmaking in England has to a great extent declined, the Swiss are still largely engaged in the business, but their methods have been materially modi¬ fied through the introduction of American machines.

It may be properly said that Europeans made watches by long-used methods, while Ameri¬ cans made a radical departure from established ways and originated a system, the foundation of which may be briefly stated as the substitu¬ tion of impersonal machines for the acquired skill of the individual workman. A half cen¬ tury of continued growth has given practical demonstration of the correctness of the theory on which this system was founded. It is con¬ ceded to have had its theoretical origin in the mind of Aaron L. Dennison, a young Boston watchmaker, who in 1849, after months of planning and endeavor, succeeded in enlisting the cooperation of Edward Howard and his partner, makers of accurate instruments of various forms. Having secured capital to the amount of $20,000, they built a small factory in Roxbury, where about four years was spent in preliminary work and in the production of a few hundred watches. In 1854 a new factory was built in Waltham, Mass., about 10 miles from Boston. This factory, after numerous changes and additions, now exists as the oldest watch factory in America and the largest in the world. Here really began the manufacture of watches on what is now known as the American system, so that it may fairly be said that modern watchmaking belongs peculiarly, if not exclusively, to America. We have said that the American system of watch manufacture em¬ ployed machines as a substitute for the ac¬ quired skill of the individual workmen. The foundation of the system is that of practical uniformity in the form and dimensions of large numbers of any given parts of watch move¬ ments, so as to permit of interchangeability.

Manufacturing on the basis of interchangeability may be said to have been in its infancy at the middle of the last century. Doubtless that system had its finest exponent at the time in the United States armory at Springfield, Mass., where were manufactured muskets for the use of the army. Mr. Dennison believed that, notwithstanding the diminutive character of watch parts, as compared with muskets, it would be possible, by the employment of suit¬ able machines, to manufacture large numbers of such parts of such exact uniformity as to be readily interchangeable. The original American watch factory was therefore planned on that theory. But to fully equip a watch factory with tools and machines capable of producing work in that systematic way, would involve the em¬ ployment of very large capital. The original factory was not fortunate enough to command sufficient confidence of capitalists to enable it to do more than make a beginning, but accom¬ plished enough to demonstrate the practicability of the system. Its development has, however, been continuous, until at the present time machine watchmaking has to a limited extent been adopted in Switzerland, while the old methods of manufacture in England have

de¬ clined to such an extent that there now remains but a small per cent of the former business.

A watch is really quite a simple machine,

containing an average of about 150 distinct parts. By actual count it has been found that the production of all these parts requires over 3,700 distinct operations. It will, therefore, be readily understood that the manufacture of watches on an extensive scale is one of the most complex and exacting manufacturing problems ever undertaken. It calls for high grade talent in almost every direction, and involves an intricacy of detail which can be mastered only by years of study and ex¬ perience.

This being the fact, it will be hopeless to attempt more than a brief and fragmentary description of a few of the manufacturing proc¬ esses involved; and it should be understood that the methods employed and the means used are not identical in all American watch fac¬ tories, but doubtless they are as diverse as the factories themselves. It will, therefore, be best to indicate the most advanced methods only, which in the nature of the case can be found only in a large factory, possessing the absolute requisite of plenty of capital; for high grade automatic machinery is of necessity quite ex¬ pensive, while at the same time its productive capacity exceeds the requirements of a small factory.

Beginning then with the foundation of the watch movement — the “pillar plate® — it should be said that these larger parts (which in the cheaper grades of watches are of brass, and in the better grades are of nickel alloy) are made at brass mills, from dies furnished by the watch factories, and are received in the form of blank “punchings .® After these blanks have been carefully cleaned they are placed in a tubular magazine located at one extreme of a “facing machine® directly beneath a <(carrier ,» which is attached to the extremity of a swing¬ ing arm. When the machine is put in motion the carrier descends and grasps one of the plate blanks and lifts it clear of the magazine and swings around to a point directly in front of a suitable chuck or holder on a running spindle of the machine, which at that instant is not in motion. The carrier then descends until the blank is in exact line with the axial centre of the spindle. When in this position the chuck is opened to receive the blank, which is pushed into the waiting chuck, which imme¬ diately closes tightly upon it. The empty car¬ rier then rises and swings to a position mid¬ way of its excursions. The spindle

then begins to revolve at a suitable speed, and at the same time moves forward so as to bring the revolving blank into the path of a suitable cut¬ ting tool which at once commences to move toward the axial centre, cutting away a definite portion of the blank and leaving it with a per¬ fectly flat and smooth surface. As soon as the cutting tool reaches the centre of the blank, it is withdrawn from contact and returns to its former position. At the same time a second carrier swings around from the opposite side and places itself directly in front of the chuck containing the faced blank; the grasp of the chuck is relaxed and the blank is. pushed out of it and into the second carrier which at once swings around and deposits it in the chuck of a second running spindle — a duplicate of the first. In this second position the other side of the blank is faced; then a third carrier takes

the now double-faced blank and deposits it in a receptacle at one end of the machine.

As the movements of the three carriers are simultaneous, and the cutting tools move in unison also, it will be seen that notwithstanding the numerous operations which succeed each other, a completed blank is deposited at one end of the machine at practically the same instant that another one is taken at the other end. Slight modifications in parts of the machine provide for desired recesses on either one or both sides of the blanks. These ma¬ chines do their work on plates at the rate of 1,800 per day, so that it will be seen that they are far too productive for any watch factory which is not organized for a large output.

Succeeding the facing operations, just de¬ scribed, comes that of drilling most of the numerous holes in the plate needful to receive the screws, pins, etc., for attaching the (<top plate,® ((balance cock, pallet bridge,® *etc.* The ordinary method or drilling has been to clamp the blank watch plate to a master plate or <(drill jig,® in which were the required holes of proper size and accurately located, which holes served as guides to the various drills required. But inasmuch as the number and location of holes in such a jig were necessarily quite

limited there was involved the use of several jigs to complete the drilling on each and every watch plate. Of course also an operative was re¬ quired to insert and remove the plates and to manipulate the drills. Following the opera¬ tions of drilling there is required the ((threading® or tapping of certain holes for the recep¬ tion of screws. This operation involved the repeated handling of the plates.

D. H. Church, the mechanical superintend¬ ent of the American Waltham Watch Factory, in addition to other machines in great variety, invented an automatic plate-drilling machine capable of both drilling and tapping practically all of the holes in the watch plate, in which the only work of the attendant is to fill with blank plates the magazine at one end of the machine and remove them from a similar magazine at the other end, where they are automatically deposited, completely drilled and tapped. In some instances the operations per¬ formed on each plate number 135, and the plates are delivered at the rate of one in 90 seconds.

Following the drilling of the plates comes the turning of the required recesses in both sides to make room for some of the mov¬ ing parts of the watch, such as the main¬ spring barrel and some of the wheels of the ((train.®

The automatic recessing machines are also provided with delivering and receiving maga¬ zines located at the extreme ends of the ma¬ chines, and between them are a number of parallel heads each provided with a running spindle and ((chuck,® and in suitable relation to each a compound slide rest carrying a special cutting tool adapted to the work to be done. Carrying arms automatically take the plates from the magazine and the successive chucks and transfer them to the next in order. But this transfer must be done with the ut¬ most exactness, for the plates must be so held in the various chucks that the axis of revolu¬ tion shall in each successive operation be in a

new but definite part of the plate. Moreover, the plates are located and kept with utmost precision in their proper position by guide pins in each of the clamping chucks, which pins correspond in relative position with certain of the drilled holes in the plates. It is needful, therefore, that as the plate is presented to each succeeding chuck, its guide pins shall be ex¬ actly in the proper position to enter the hole in the plate. The attempt to attain the re¬ quired exactness of movement was regarded at first as a bold one, but complete success justified the hopes and expectations of the in¬ ventor.

The other supporting plates of the watch are treated in the same manner as the pillar plates above described, their differing forms, of course, demanding correspondingly differing chucks and holders.

For numerous succeeding operations of bor¬ ing, turning, milling, etc., special machines are provided, many of them being exceedingly in¬ teresting in their intricate movements, but im¬ possible of any brief description.

The American system includes the produc¬ tion of every portion of the watch in one estab¬ lishment, but in very few even of the American watch factories has this ideal been attained. The fact that certain components of the watch, such as dials, hands, mainsprings, etc., which do not demand extreme exactness in fitting, can be imported from Europe, or produced in special factories, has enabled a number of in¬ complete factories to turn out watch move¬ ments in considerable numbers, without the investment of large capital. But the original American watch factory is equipped for the uniform production of every part of the watch movement, down to the delicate little taper pins used to confine the ends of the hairsprings. By means of special automatic machines these little pins are made at a rate exceeding 50 per minute. Even the fragile enamel for coating the dials is manufactured from the raw ma¬ terials ; as also the pure gold ornaments used to embellish (<fancy dials.® These things, how¬ ever, do not demand the extreme accuracy which makes watch manufacturing so extremely trying.

It may be proper at this point to speak of one feature of watch manufacturing which might seem to show incompleteness in the <(sys-tem.® For many years the original American watch company manufactured watch cases as well as movements. But as their watches grew in favor, new watch companies were created, and as those new companies did not attempt the making of complete watches, other factories were organized for the exclusive manufacture of watch cases. As movement making has in¬ creased, case factories also have been multiplied to an extent hardly warranted by the produc¬ tion of movements. All case factories, how¬ ever, of necessity conform to the standards of measurement furnished by the movement mak¬ ers, and those standards are so practically uni¬ form that regular cases of all makers, will fit corresponding movements produced by any of the regular watch companies.

This systematic method of manufacturing to standard dimensions is of exceeding importance to watch dealers, and the purchasing public also, as the customer is thereby enabled to

select a watch movement of any desired size or grade, and also to select from a variety of cases one of such style or weight as best suits his taste. The ability to make independent selections of movement and case is one of the advantages of modern watchmaking made pos¬ sible by the American system.

The use of special machines was applied to the manufacture of the smaller portions of the watch much earlier than to the production of the plates, as above described; indeed, it may be said that some of the earliest machines employed were semi-automatic. But so radical have been the changes and improvements insti¬ tuted within the last 15, and especially during the last eight years, that methods previously used can hardly be considered as modern watchmaking.

One of the most interesting of those which are strictly modern is one of the turning of the delicate arbor on which is mounted the most swiftly moving wheel of the entire watch, the (<balance.® The fact that this wheel moves with such rapidity, together with the fact of its location at the farthest point from the reservoir of power, in the mainspring, makes it abso¬ lutely essential that it should be subject to the least possible amount of running friction. Consequently the pivots of this <(balance staff® are exceedingly minute. It is, of course, an ab¬ solute necessity that every portion of the staff, including the delicate pivots, should run abso¬ lutely true. Exact truth was a difficult attain¬ ment under the methods ordinarily used, al¬ though great care was used to avoid any stress or distortion of the staff, by a very gradual reduction of the blank, so that 10 to 14 separate turnings were required to complete a staff. By the most approved modern methods and ma¬ chines, all of the required turnings, including the pivots, are performed before the completed staff is severed from the rod of wire from which it is made. So complete is the machine, and so accurate and rapid is its operation, that a staff is delivered from the machine each 90 seconds.

The pinions of various sizes, which com¬ pose so large a portion of the time train of the watch, are formed from the best quality of steel

rods and, as this wire must of course have a diameter as great as the largest part of the pinion, it follows that a large proportion of the material must be removed to bring the pinion to its finish dimensions. An early method consisted in first cutting the wire into blanks of sufficient length, then to insert those blanks in a suitable chuck in the running spindle of a lathe and with a suitable tool to remove the metal from the projecting end so as to bring it to an accurate point or centre. The blank was then reversed in the chuck and the opposite end pointed in like manner. In some instances a portion of the excess metal was removed in connection with the operation of pointing.

Following this somewhat crude method of pointing and initial turning, came the inven¬ tion and adoption of so-called <(roughing out machines,® in which a rod of wire is inserted in the machine which automatically cuts off, points and turns the blanks on both ends and delivers them uniform in dimensions and re¬ quiring only the slight finish turnings and the

cutting of the teeth when they will be ready for hardening and tempering.

A later form of machine has been devised, which takes a rod of wire at one end and de¬ livers the pieces ((finish turned® at the other end.

The finished blanks are then placed in a magazine or ((feeder® in a cutting machine which automatically takes them one at a time and forms the teeth of the required number and shape, the work of the attendant being to keep the magazine supplied with blanks, and to examine the pinions occasionally in order to detect any imperfections; so that a single per¬ son can easily attend six cutting machines. For the greater convenience and comfort oi the operator a chair is fitted to run on rollers on an iron track on the floor. These rolling chairs are also provided in connection with numerous other machines where a single person attends to a number of machines.

Within two or three years D. H. Church of the Waltham factory has created machines in which pinions are completely turned and the required teeth are cut. All the work being automatically performed, so that completed pinions are made, the last operation being to sever the finished pinion from the rod of wire from which it was formed. The exactness with which these machines operate makes pos¬ sible the production of pinions which could not have been produced with tools and ma¬ chines in previous use.

As each watch movement required from 30 to 50 screws it will be evident that for a daily product of more than 2,500 watches more than 100,000 screws would be required. By the earlier methods employed in American watch factories an active man could make from 800 to 1,200 screws per day so that more than 80 men would be required for the production of this large number. But within a few years screw-making machines have been devised which are capable of making from 4,000 to 10,000 screws each per day, and being entirely automatic in action, a single attendant is able to attend six or more machines.

The almost absolute uniformity in the op¬ eration of the most improved modern watch¬ making machinery insures a resulting product so uniform in quality and dimensions as to make needless the minute ((fitting® operations which are indispensable in work" produced by even the earlier American methods. So ac¬ curately is the work performed that many of the most delicate portions of the watch, whose exact performance is absolutely essential, do not come together until all the finished parts meet for the final assembling.

It may appear strange, but it is neverthe¬ less a fact that, by modern methods, wˆatches are not made by watchmakers, as that term is generally understood, but by machines, by which it is to be understood that the component parts of the watch are all fabricated by ma¬ chines designed for that special use and pur¬ pose. When those individual parts are finished and collected so as to suffice for complete watches they are assembled for the first time and when each part is in its proper place and the watch is (<wound® it is run for a period of one hour, which is sufficient to determine whether it is inclined to run faster or slower

WATCHMAKING

A PARIS

■

HU Marti-

Dials of French Watches of 16th and 19th Centuries

WATCHMAKING

MODERN WATCHMAKING MACHINERY

Woerd-Marsh Automatic Roughing Machine The Marsh Automatic Screw Making Machine Automatic Watch Plate Facing Machine

2 A Row of Remodelled Woerd Pinion Cutters, Self-feeding 4 Automatic Pillar Plate Recessing Machine 6 Automatic Pinion Staff Turning Machine

than the standard rate. But when the numer¬ ous portions of the mechanism are made and assembled, the work of the skilled watchmaker begins ; for he it is who by means of the skill and judgment, which are acquired by experi¬ ence, is able to discover the individualities and peccadillos of each movement, and so remove any ‘((crankiness)> that its performance shall be satisfactory.

It has already been said that the manufac¬ ture of watches by modern, that is, by Ameri¬ can methods, is a very complex business, in¬ volving the employment of large capital and demanding the highest executive and me¬ chanical talent.

The enormous growth of the railroad busi¬ ness in the United States and the greatly in¬ creased speed at which trains are now run has

made absolutely necessary a standard of time and a high degree of accuracy in the running of all time pieces which are in any way con¬ nected with the running, of trains. These new and exacting requirements are met by high grade watches with special adjustments to position as well as temperature. The natural effect of the requirements of the railroad time service has been to establish a higher standard of accuracy in rate for watches for the general public.

It will be readily comprehended that the product of a well-designed and properly made automatic machine will be much more uniform in its measurements than could be possible with an individual workman, even one of the highest skill. But the most delicate parts of a watch demand a degree of exactness that is impossible of attainment by even the most delicate measurement of mere size. These delicate parts are those which constitute the ˆescapement® whose combined function is to control the speed of the entire mechanism. The demand for exactness in the vibrations of the watch balance wheel which govern its time rate allows of no variation whatever — it is positive. To obtain the required number of 18,000 vibrations of the balance per hour two factors are required to operate in proper co-ordination, viz., the balance wheel and its accompanying hairspring, the requisite being the proper adaptation of the weight . of the balance to the elastic force of the spring. But there are other factors which cannot be ignored in the attempt to secure the precise rate of balance vibration. The first of these is tem¬ perature. It is one of the laws of nature that metals expand under the influence of heat, and it is evident that with a given amount of driving power a large wheel cannot be moved as rapidly as a smaller one. This being the case it must follow that the speed of oscillation of a watch balance wheel must vary in rapidity as the size of the wheel is modified by the temperature changes which affect it. so that if nothing could be devised to counteract the normal effect of temperature changes, the speed of the mechanism would be constantly changing in conformity to varying tempera¬ tures. Fortunately a most ingenious form of construction of the balance wheel has made possible a means of self-correction, by which the form of the balance is made changeable, so that the expansion or contraction of the metals which compose the balance is so utilized

as to maintain the effective diameter practically constant.

The method by which this result is achieved will readily be understood by the help of the accompanying illustrations, in which Figure 1 shows two bars of metal of equal

STEEL.

BRASS.

Fig. 1.

lengths, when at normal temperature. The dotted lines indicate the relative amount of ex¬ pansion of the two metals — steel and brass. Figure 2 shows the two metals joined by fusion. Figure 3 shows the effect of heat upon this bi-metallic bar — the greater amount of

STEEL

BRASS

expansion of the brass portion causing the bar to curve upward. If cold was applied instead of heat the bar would be deflected in the op¬ posite direction (as shown in Figure 4) . Figure 5 shows a watch balance, in which the arms

STEEL.

BRASS.

Fig. 3.

and the inner portion of the rim are of steel, the outer portion of the rim being of brass fused to the steel rim, the rim being severed at two points, near the arms, thus allowing freedom for the movement of the rim under

Fig. 4.

the changes of temperature. Figure 6 shows this balance when under the influence of heat. Figure 7 shows a complete balance, having a number of screws with relatively heavy heads located at varying distances around the rim of the balance. Figure 8 shows the finished

balance under influence of heat. The effect of heat is to curve the rim inward, thus reducing the size of the balance — the endeavor, of course, being to maintain the effective dia¬ meter unchanged. But the quantities involved are so extremely minute that additional and

more delicate adjustments must-be provided. It will be observed that on Figure 8 the loca¬ tions of the balance rim screws are numbered from 1 to 12 on each half of the balance. Also note that screws numbered 1 and 6 have shorter

heads and longer bodies than the others. Also note that while these four screws are screwed in only part way, the others are screwed down to the head. These four screws are desig¬ nated as (<meantime screws,® since by screwing

Fig. 7.

them in further the active diameter of the balance is reduced, that is, while the actual weight of the balance remains unchanged, a very minute portion of the weight is carried nearer to the centre of the balance, with the

g s

3 a

Fig. 8.

result of very slightly increasing the rapidity of its vibration. A watch balance vibrating precisely 18,000 times each hour will keep per¬ fect time. But if it should vibrate 18,001 times an hour the watch would gain two and

two-fifths minutes in a month. Suppose that owing to a change in temperature the self compensation of the balance, as before de¬ scribed, should be insufficient, and the watch should lose, because of the increase in heat it would show that it was (<under compen¬ sated.® In such case it might suffice to simply change the location of some of the rim screws, for instance, to move screws number 4 to locations number 11. Such a change of location would not at all affect the actual weight of the balance, but would modify the vibrational weight, because when the screws were in location 11 they would be near the free end of the rim, and the distortion of the balance rim would carry more weight toward the balance centre and in effect maintain the effective diameter of balance and keep its speed of vibration unchanged. It must be realized that these changes are real, though so infinitesimal.

A second factor is that of position, as it affects the running friction through the influ¬ ence of gravity, inertia and friction. These two factors of temperature and position are real, though somewhat intangible, and call for the exercise of the highest skill of the watch¬ maker and constitute what is called <(Adjusting.® The means for ˆtemperature adjusting® have already been described, and as the proc¬ esses of (<position adjustment involve such a variety of delicate manipulations of the balance and its pivots and also of the accompanying hairspring, any attempted description of the process would be useless. It should be said that the obtaining of correct adjustment involves a series of 24-hour trials in the established ex¬ treme variations of 50°, i.e., between 40° and 90° Fahrenheit, and also in not less than three <(positions® while the highest grades require to be adjusted to five positions.

A watch has been generally understood to mean a small timepiece in portable form, usually to be carried in the pocket. In later years,

however, watches have been made in sizes and forms suitable for use as articles of convenience and ornament especially adapted for ladies' wear. One of the triumphs of au¬ tomatic machinery has been the production of watch parts so extremely delicate as to make possible the construction of watch movements so small as to be covered by a dime. On the other extreme of size portable timepieces are made to run eight days. Movements of this size have come into extensive use on motor cars and as desk watches, *etc.* Movements of this size are also made of special grade and cased in the form of ship chronometers and are coming into extensive use for navigation, the United States government having hundreds of them in use.

A person who has not given careful thought or study to the matter of timekeeping can have but little conception of the extreme minuteness of the deviations from absolute perfection of rate which have been attained by modern timekeepers. On the other hand, to one who has given the subject careful con¬ sideration, it seems almost marvelous that mechanism can be created which makes pos¬ sible the marking or determination of such almost infinitesmal time intervals as are taken into account in ascertaining the longitude of

any location for purposes of navigation, or even of securing safety in the daily movement of trains on our modern railway systems.

For these reasons it may be well to briefly mention some of the agencies which are em¬ ployed in the complete modern watch factory, first for obtaining and indicating the exact standard time rate. It may perhaps be needless to state that the ultimate standard for the entire world is the unvarying movement of fixed stars across any given meridian. Nearly 40 years ago the Waltham Watch Company established an observatory equipped with a transit instrument and chronograph and also constructed two elaborate mean time clocks, which were most carefully mounted on special piers. In telegraphic connection with the ob¬ servatory is the chronograph which is placed in the clock room, which is isolated from dis¬ turbing influences of vibration and noise and is also so arranged as to maintain

automatically a temperature whose variation at all seasons of the year does not exceed one-half degree Fah¬ renheit. In taking the stellar observations the observer is able to record the exact in¬ stant of the passage of a given star across the local meridian upon a sheet of record paper which also records the vibrations of the stand¬ ard clock, at one second intervals. So accu¬ rate do these clocks run that in a period of over two months their variation is less than three-tenths of a second. By means of an electric telegraph circuit the beats of the standard clock are given on telegraph sounders in all parts of the extensive factory. This method of time distribution is practically identical with that employed by the United States government in the naval observatory at Washington, D. C. In cooperation with the government wireless station at Arlington time signals were distributed throughout the entire country so that the standard time could be obtained by anyone who had a wireless outfit. On the orders of the government that all private wireless stations be dismantled because of the state of war existing with Germany, the Waltham Watch Company was compelled to resume the taking of its own observations for time, which had been discontinued when the government had organized its distribution of time signals by wireless means.

This feature of providing accurate timing standards is peculiar to modern watch manu¬ facturing and so far as is known no watch factory in the Old World is equipped in this manner. But, on the other hand, the Royal Observatory at Kew, England, and the gov¬ ernment observatory at Neuchatel, Switzer¬ land, undertake the testing of the limited num¬ bers of watches submitted by the manufactur¬ ers of those two countries.

In conclusion, it may be said that notwith¬ standing the two or more centuries of priority and experience enjoyed by European watch¬ makers, their extreme conservatism has al¬ lowed them to be outstripped by the more pro¬ gressive manufacturers of America, so that wmodern watchmaking® is at the present time, and in its most advanced form, an exclusively American achievement.

E. A. Marsh,

General Superintendent American Waltham Watch Company.

WATCHUNG, or ORANGE MOUN¬ TAINS, in New Jersey; a range of hills west of Paterson, Plainfield, and Orange, extending north and south, but curving westward at each end. Length, about 40 miles.

There are three divisions of the range, each composed of trap-rock, which was a lava flow about the time other portions of New Jersey were in a more ad¬ vanced stage of formation. The mud and sand covering followed and now the ranges are mostly shale and sandstone. The trap-rock, in places, forms elevations from 300 to 400 feet high, the soft sedimentary beds once enclosing it, yielded more rapidly to erosion. There is. a similarity in the material composition of the Watchung Mountains and the Palisades, the difference being more in the direction of the original lava flow. The Palisades sheet was not a surface flow, but was forced between the sedimentary beds.

WATER, a universally diffused liquid, the true nature of which was not discovered till toward the close of the 18th century. In 1781 Cavendish carried out a series of experiments by detonating mixtures of common air and hydrogen or dephlogisticated air, as it was termed. He showed that by regulating the rela¬ tive quantities ((almost the whole of the inflam¬ mable and dephlogisticated air is converted into pure water.® Although Cavendish showed ex¬ perimentally that water is produced by bringing together oxygen and hydrogen, yet to Lavoisier, who received information regarding Cavendish's experiments, must be assigned the merit of in¬ terpreting aright the experimental results, and of proving that water was a compound sub¬ stance — a compound of hydrogen and of oxy¬ gen.

Water may be produced by exploding a mixture of two volumes of hydrogen with one volume of oxygen at a temperature above 1190° F. Below that temperature the gases will not unite. It may also be produced, by passing hydrogen over the heated oxides of several of the metals — and in various other ways. It exists, although never in a perfectly pure state, in immense quantities in nature. The com¬ position of water has been determined by two distinct methods: (1) by volumetric synthesis; (2) by gravimetric synthesis. In volumetric synthesis of water measured volumes of pure dry hydrogen and of pure dry oxygen are mixed and the mixture is exploded by the elec¬ tric spark while standing over mercury; the residual volume of gas is then measured ; it is found that two volumes of hydrogen invariably unite with one volume of oxygen. In the sec¬ ond method a weighed quantity of a metallic oxide (usually cupric oxide) is decomposed by means of pure dry hydrogen at a high tem¬ perature and the water which is produced is weighed. The decrease in weight of the oxide gives the quantity of oxygen in the water formed ; while the difference between the total weight of water and the weight of the oxygen gives the weight of hydrogen used. It is found that 16 parts by weight of oxygen are always united with two parts by weight of hydrogen to form 18 parts by weight of water. In the scale in which 16 is adopted

as the atomic weight of oxygen the formula of water is H2O. The molecular weight of water has been variously

decided upon; first as 18, later as 36, and it is now accepted as probably 72.

Water is a tasteless, inodorous liquid, under usual conditions, colorless ; but when a great thickness of it is examined, as in looking end¬ wise through a pipe filled with it, it is found to have a distinctly blue tint. At all tempera¬ tures below 32° F. it is a solid and at all tem¬ peratures above 212° F. it is a gas. When water at 32° is heated it contracts until it reaches the temperature of 39.2°, after which it expands ; conversely, when water at 21 2° is cooled it contracts until it reaches the temperature of 39..2°, after which it expands ; 39.2° F. is called the point of maximum density of water; the specific gravity of water is greater at this than at any other temperature. The fact that water expands on cooling from 39.2° to 32° is a most important one. If a sheet of fresh water be cooled, the upper layers become more and more dense ; they, therefore, tend to sink, and so fresh surfaces are exposed to the cooling influences. But when the temperature of the mass of water has reached 39.2° further cool¬ ing of the surface causes an expansion of the upper layers, which continues until these solidify into ice; these layers of cold water consequently float upon the warmer water underneath ; hence it is impossible for the mass of water to sud¬ denly freeze throughout. When water passes from the liquid to the solid state it expands to the amount of about 1-1 lh of its volume; that is, one volume of water forms 1.0908 vol¬ ume of ice. This expansion is sufficient to bring about a _ large quantity of mechanical work, and to . it the bursting of water-pipes during frost is to be largely traced. When solid water becomes liquid, or when liquid water becomes gaseous, a considerable quantity of heat is absorbed and disappears, or, as the expression is, is rendered ((latent» Steam is¬ suing from boiling water is no hotter than the water itself ; water formed when ice is melting is no hotter than the ice itself; yet heat is being communicated to the ice and to the water. The latent heat of

water is 79 thermal units; the latent heat of steam is 536 thermal units, although by the thermometer the tem¬ perature remains unchanged. In other words, in order to convert unit weight of ice at 32° into water at 32° a quantity of heat must be communicated to the ice, which, if communi¬ cated to unit weight of water at 32°, would raise its temperature to 79° C. In order to con¬ vert unit weight of water at 21 2° into steam at 212° such a quantity of heat must be com¬ municated to the water as would suffice to raise the temperature of that weight of water through 536° C., or 536 times that weight of water through 1° C. Before water can become steam the upward pressure of its vapor must overcome the downward pressure of the at¬ mosphere; hence it follows that the boiling point of water is conditioned by the atmospheric pressure. Water boils at a much lower tem¬ perature on mountain tops, where the pressure is comparatively small, than in the valleys. Water is almost incompressible. At 32° it is diminished in volume only by the fraction .0000462 for each atmosphere (15.7 pounds) of pressure added.

The solvent power of water is very large. As a rule hot water dissolves larger quantities

of solid matter than cold. Water is found in nature in many forms — vapor, dew, hoar-frost, rain, hail, snow ; besides the several distinct variations of spring water, well water, river water, surface water, sea water, *etc.* As has been mentioned it is never found in a state of purity. Analyses of dew and hoar frost show from 2.64 to 8.00 parts of solid impurities in 100,000 parts of water. These are organic car¬ bon, organic nitrogen, ammonia, nitrates and nitrites, chlorine, lime and magnesia. These substances have been held in solution in the vapor of water in the air. Snow will gain in ammonia content the longer it lies on the ground.

Rain water, when collected before it touches the earth, contains only such impurities as may be derived from the atmosphere, chiefly con¬ sisting of oxygen, nitrogen and carbon dioxide, with more or less nitric acid and ammonia in the case of thunder showers. The rain water of towns contains comparatively large quantities of sulphurous and sulphuric acids and of soluble salts. The amount of these substances may be taken as an estimate of the comparative purities of the atmospheres of different towns. Rain water collected near the sea is rich in chlorides. Samples of rain water taken in a farming country near the sea have shown 42.8 parts of solid impurities per -100,000.

River water varies greatly in so far as the nature and quantity of the substances held in solution by it are concerned. The soluble con¬ stituents of river water are chiefly such as may be derived from the rocks through which the water of the springs which have fed the river has percolated and the amount of surface water it has received owing to storms. The dilution of the original spring water by the continual influx of tributaries reduces the relative quan¬ tity of solid matter held in solution, while the escape of carbon dioxide during the ex¬ posure of the surface water to the air causes the precipitation of those salts which were held in solution by the aid of the carbonic acid. River water is often largely contaminated by the drainage of towns or of manufactories situated on the river banks.

Spring Waters. — The soluble constituents of spring waters are various. In some springs the quantity of dissolved _ solid matter is but trifling, while in others it amounts to 2,000 grains per gallon. Spring waters are usually di¬ vided into classes in accordance as one or other dissolved constituent predominates. See Mineral Waters.

Sea water is essentially an alkaline chlori¬ nated water. The quantity of solid matter held in solution varies in the waters of different seas. Inland seas, as a rule, contain less solid matter than the ocean; thus the solid content of the water of the Black Sea amounts to about 1,760 parts per million, while that of the Baltic averages 17,700, and that of the Atlantic Ocean 36,000 parts per million. The substances held in solution in sea water are chiefly chlorides and sulphates of sodium, magnesium and potassium, together with iodides, bromides and carbonates, chiefly of potassium and calcium.

Use of Water. — In considering the suitable¬ ness of a water for domestic use attention should be principally paid to (1) the source of the supply, (2) the total solid matter held

in solution by the water, (3) the organic mat¬ ter held in solution and (4) the action which is likely to be exercised on the water by the means of supply. In examining the source of a water supply attention

should be paid espe¬ cially to the proximity of drains or sewers of any description, and to the likelihood of con¬ tamination-from these sources. The nature of the soil through which the water percolates should also be inquired into. The solid sub¬ stances held in solution by a sample of water may be estimated by evaporating a measured quantity of the water to dryness in a platinum basin heated by steam and weighing the resi¬ due. From a knowledge of the total solids in a water, unaccompanied by any further infor¬ mation, no reliable conclusion as to the suit¬ ability of such a water for potable purposes can be deduced. In seeking to determine whether a sample of water has undergone contamina¬ tion with hurtful organic matter the following points are to be more particularly attended to : (1) Estimation of the amount of chlorine, whether existing as hydrochloric acid or as a chloride; (2) estimation of ammonia; (3) es¬ timation of nitrates, and (4) detection and estimation, if necessary, of poisonous metals. The presence of an undue amount of chlorine generally points to contamination with animal matter. Pure waters do not as a rule contain more than three to four grains of chlorine per gallon. It must, however, be borne in mind that such waters as flow through a soil rich in chlorides — such, for instance, as the waters found in the neighborhood of salt-beds — al¬ ways contain large quantities of chlorine. The sudden appearance of chlorides in a water previously free or nearly free from these sub¬ stances points to animal contamination.

Ammonia may be obtained from most waters by distillation after the addition of a little sodium carbonate; when the whole of this am¬ monia has been driven off it not unfrequently happens that the addition of an alkaline solu¬ tion of permanganate of potassium and heating results in the production of a further quantity of ammonia. The ammonia obtained by the first distillation is usually spoken of as (<free am¬ monia,® while to that obtained by the second distillation the name of (<albumenoid ammonia® is given. The presence of even small quanti¬ ties of albumenoid ammonia points unmistak¬ ably to organic contamination. Such ammonia is derived from the decomposition, by the agency of the alkaline permanganate liquid, of nitrogenous matter of animal or vegetable ori¬ gin. Pure water should not contain more than 0.10 parts of <(free® ammonia per million, nor more than 0.08 parts of <(albumenoid® per mil¬ lion.

If nitrogenous matter has become thoroughly oxidized it gives rise to the formation of nitric and nitrous acids. The presence of these acids or of their salts, therefore, generally points to previous contamination of some organic nature. As, however, these things are the harmless — that is, in the quantities in which they occur in waters — products of

the decomposition, and, therefore, of the removal, of hurtful substances, their presence, even when in comparatively large quantities, ought not of itself to condemn a water. The poisonous metals which are most likely to occur in drinking waters are lead and

copper. These may be easily detected and esti¬ mated even when present in exceedingly minute quantities. For details of the analytical methods of water analysis reference must be made to manuals of applied chemistry. It is evident that in a water analysis we look for symptoms of a disease; not for substances which are in them¬ selves hurtful, but for substances whose pres¬ ence is associated more or less invariably with others, the action of which upon the system cannot but be pernicious.

In storing water for domestic purposes the water may undergo contamination from the vessels containing it or from proximity to drains or other places emitting noxious gases. It is certain that water exercises a solvent action upon lead; but our ordinary leaden water pipes and tanks become coated with a comparatively insoluble compound of lead, so that the danger of contamination from this source is not great. Hot water should never be stored in leaden tanks ; it very quickly corrodes and dissolves the metal. Aerated waters act rapidly on lead; for this reason they should never be prepared pr stored in leaden vessels. The solvent action of water on copper is very small. The system of storing water for drinking or cooking in cisterns close to, or even communicating with, the house drainage system, is a very bad one. (See Sanitary Science; Public Health). In some circumstances, as in the case of swim¬ ming-bath's, large quantities of water have to be heated to a certain temperature and kept at the same for a considerable time while the water has to be maintained in a due condition of purity. For industrial purposes also most waters require purification of a kind, depending upon the processes of manufacture in which they are employed. The most common treat¬ ment is that known as <(softening,® for the re¬ moval of lime and magnesia carbonates, chlorine and other lesser impurities. See Water Soften¬ ing; Water Supply.

WATER, ITS RELATION TO DIS¬ EASE. See Water Supply.

WATER BABIES, The. This story, by Charles Kingsley, written originally for the amusement of his youngest son (<and all other good little boys,® and published in 1863, re¬ mains perhaps the most popular of the author's works, with the possible exception of the his¬

torical novel (Westward Ho.* It is on the face of it a fairy story. Tom, a little friend¬ less chimney sweep, falls asleep in a fine house where he is working and is transformed into a water baby, being in most respects like a land baby, except for the presence of gills and other necessities of aqueous life. As a water baby he has many charming and attractive adventures of the kind since made more popular as well as more fantastic through Lewis Carroll's (Alice in Wonderland.* In addition to these merely odd happenings, the book is, character¬ istically, a treatise on belief and education. As in (Alton Locked (Yeast,* (Westward Ho,* (Hypatia* and other Kingsley novels, there is a fundamental moral thesis. In this book it is that one must not be too prone to dispute the existence of this or that simply because he has not seen it. This idea comes out most clearly in the clever argument of Kingsley's to demon¬ strate the existence of water babies. From this

point of view the book is a vivacious argument for faith, designed on the one hand to make readers less assertive and dogmatic and also to render them more receptive of the under¬ lying, if undemonstrable, mysteries of the Christian religion.

William T. Brewster.

WATER BALANCE, an oscillating pendu¬ lous frame, having a series of troughs in verti¬ cal series and inclined in alternate directions, so that, as the frame oscillates, the water dipped by the lower one shall be poured into the next above, which, on the return motion, shall pour it into the next, and so on.

WATER BAROMETER. See Barome¬ ter.

WATER-BEARS. See Tardigrada.

WATER BED, a watertight mattress or bed for relieving any partial pressure of the body of a patient long confined to bed and so preventing the formation of ulcers which arise from such local pressure. One form is that of a trough half-filled with water, covered

by a loose lining of india-rubber sheeting attached all around to the upper edge of the trough so as to be watertight, a mattress being laid be¬ tween the invalid and the lining. Another form is that of a large waterproof bag which is laid upon an ordinary mattress and half-filled with water, the weight of the body resting upon this directly or with bed clothes between.

WATER-BEETLES, the numerous species of beetles which inhabit water. A common mode of life does not indicate blood relation¬ ship, and the various aquatic beetles belong to a number of quite distinct families. Besides those which are aquatic throughout their lives quite a large number of beetles live in or near the water only during the larval period. The strictly and permanently aquatic beetles belong chiefly to three families. The diving beetles (Dytiscidce) are predaceous throughout life and represent in the water the Carabidce, to which they are somewhat closely related, on land. The legs in these insects are adapted for swim¬ ming, the two hinder pairs being flattened and fringed with hairs. The body is oval and flat¬ tened. The mandibles are short and strong and the thorax is broad. The front legs are short and the antennae long and filiform. In the genus Dytiscus the tarsi of the males are wide, flat and provided with sucking discs, while those of the females are unmodified. The females are of two forms, the one having the wing-covers smooth, the other grooved. The head is short and received into the thorax. D. fasciventris is the common water-beetle of our ponds. These insects carry a supply of air for breathing beneath the elytra or wing-covers. At evening they fly in the air. They are emi¬ nently carnivorous in habits and feed on other insects. The larvae are active creatures and are also aquatic; their noteworthy rapacity has gained for them the name of water-tigers, which they well merit, for they will not hesitate to seize in their sharp sickle-like jaws any insect-larvae, small fish or tadpole that comes within reach, and after draining its juices discard the dead body. The tail is terminated by a pair of respiratory tubes which are raised above the surface of the water to effect respiration. Be-

sides this large species the family includes numerous small ones having similar habits. The other two families have ciub-shape instead of filiform antennae.

The Gyrinidce, or whirligig beetles, have the antennae short, the front legs long, clawed, and in the males provided with a spongy disc, the

second and third pairs of legs very short, broad and paddle-shaped, and the elytra do not cover the tip of the oval body. They derive their familiar name from their peculiar habit of de¬ scribing circles on the surface of the pools they inhabit. When alarmed these insects dive to the bottom and anchor themselves for a time by means of the strong front legs, carrying with them a small bubble of air on the tip of the abdomen. Owing to their smooth, polished and oily surface they are unaffected by the water. The facets of the compound eyes are divided into two groups on each side, one adapted for vision in the water, and looking downward, the other for looking upward in the air — an im¬ portant adaptation to the peculiar mode of life of these insects on the surface. When handled, the whirligigs emit from the joints a peculiar strong-smelling milky fluid. Although, like the Pytiscus larvae, the young of the whirligigs are predaceous, their appearance is totally differ¬ ent; they are of slender form and, instead of a single pair of caudal respiratory tubes or gills, they bear 10 pairs of fringed lateral gills on the sides of as many abdominal segments. Several other genera and species are common in ponds.

The largest of the common water-beetles belong to the family Hydro philidce, which also includes numerous small and inconspicuous spe¬ cies. In the form of the body and the fringed oar-like middle and hind legs they resemble the Dytiscidce , from which all the members of this family are distinguished by their short strongly-clubbed antennae. The eggs are deposited in silken cocoons attached to water-plants or car¬ ried by the female. In general resembling the water-tigers in form, the larvae have shorter, thicker, solid jaws, much less prominent respira¬ tory tubes and are less active, although, like them, carnivorous. They pupate in burrows in the banks of the ponds which they inhabit. The great water-beetle (Hydro philips triangu¬ laris) is a pitchy black polished beetle an inch and a half long, often seen flying at night or during the day rising to the surface of clear weed-grown ponds for air and, unlike the Dytiscidce , usually resting head upward. In adult life they forsake the predaceous habits and animal diet of their larvae and become scavengers, finding their food chiefly in the vegetable debris at the bottom of ponds. Few inhabitants of freshwater ponds and ditches are better suited to life in an .aquarium than these beetles and few present a greater variety or more interesting habits. Consult standard works, especially Miall, <The Natural History of Aquatic Insects) (New York 1895) and Kellogg's (American Insects } (New York 1909). See Freshwater Insects.

WATER-BOA, the anaconda snake. See Boa.

WATER-BOATMAN. See Boat-fly; Water-bug.

WATER BRASH. See Pyrosis.

WATER-BUG, an aquatic bug of the hemipterous family Notoncctidcu. The hind legs are long and adapted for swimming by being provided with a fringe of stiff hairs. The body is prismatic in form, convex above and flat beneath, and the head' is as large and as wide as , the body. Notonecta is the typical genus of the family and N. irrorata and undulata are two of the common species. These and others abound in ponds and streams, where they rest on their backs at the surface, oc¬ casionally striking out with a vigorous oar¬ like movement of the hind legs, or dive to the bottom and cling to plants or stones. They are constantly buoyed up by' a film of air which surrounds the abdomen, partly entangled in a coat of close fine hairs, partly held between the wings and the abdomen in a space into which the spiracles open and partly between the joints of the abdominal and thoracic segments. On land the water boatman are at a disadvantage and progress by a series of spasmodic leaps ; but they are agile fliers. As larvae, nymphs and imagoes they are predaceous and, besides strictly aquatic insects, young fishes, etc., they attack and suck the juices of flying insects which happen to fall into the water or approach its margin to drink. Various other hemipterous insects, such as the water-scorpions (q.v.), are aquatic. The croton bug is not truly aquatic, but is called a water-bug because it frequents water-pipes in cities.

WATER-CLOCK. See Clepsydra.

WATER-COLOR. See Painting, Tech¬ nique OF.

WATER-COLOR PAINTING, in contra¬ distinction to oil painting, the use of water gen¬ erally interfused with gum arabic as a vehicle for applying colors, very often transparently, to a white surface. Anciently, there were three distinct methods of water-color painting, and these were known as tempera, encaustic and fresco. Tempera, or as it was sometimes called, distemper painting, was common in early Ital¬ ian art. (See Painting). The colors were ground and mixed with the beaten-up white and yolk of an egg, or with the white juice of the

fig tree, and sometimes with ox-gall. Encaustic painting was a process in which the colors were mixed with wax and laid in a thin coating, then fixed by the application of hot irons. The early Flemish and Dutch painters attained considerable success by the use of water colors in the medium of tempera, long previous to the invention of oil painting by the Van Eyck brothers. The Italian frescoes are painted in water color, on damp plaster and have retained their colors scarcely impaired for centuries. See Fresco Painting.

But when we speak of water-color painting in a modern sense we refer to the aquarelle. The ancient Egyptians used water-color to decorate their papyrus rolls, and the monks of the Middle Ages employed it to adorn vellum manuscripts; but this was all impasto, not the transparent washes, as in modern English work. This process and manipulation was the outgrowth of the methods worked out by Paul Sandby (1725-1809) and advanced by Alexan¬ der Cozens, creating an entirely new type of fine art productions known as aquarelles. The former treatment of the water-color work on vol. 29—2

white paper was really a species of sketching in outline certain scenes then filling in the spaces with water-color (color printing). In the aquarelles the brush supersedes the pen (or pencil). Thomas Girtin (1775-1802) perfected the method and produced pictures disclosing consummate genius, and the novel charm of light and shade in nature as a fine art with transparent washes was revealed to admiring connoisseurs. These were the precursors of a talented English school. In the English school there has been no exclusive use made of what is known as body color. The lightness and darkness of each tint have generally been de¬ termined by the degree of their dilution with pure water, not by their modification through an admixture of Chinese white.

In early painting the pigments employed were generally mineral earths or juices pressed from plants. The colors found in antique fres¬ coes were few but permanent in value. In the Middle Ages chemistry came to the aid of the fresco painter and supplied him with many brilliant and permanent tints, which is some in¬ stances vied with the lustre with which the church window maker stained his glass. The modern water-color painter has gained innu¬ merable additions to the color range of his palette, and the freshness, crispness and uner¬ ring certainty of his touch have been largely due to the beauty, clearness and permanency of the colors in which he has worked. Manufacturers have, indeed, vied with each other in providing him with pigments

which shall flow smoothly from his brush and stand projected with na¬ ture's beauty upon his paper. While the mod¬ ern water-color painter aims at producing his effects by means of transparent washes, artists have not always considered it illegitimate to re¬ sort to the use of body color in their efforts to impart to their work the depth and solidity of oil painting.

Technique. — The necessary apparatus of a water-color artist's studio is simple and con¬ sists of paper, drawing-board and drawing-pins (push pins), palette, pigments and brushes. Many use an easel, but a number rest the draw¬ ing-board on their knees or on an adjacent piece of furniture (table, etc.). To avoid the paper from crinkling or cockling when the water washes are applied it is necessary to stretch the paper, by wetting it with water and fastening it firmly to the board by pins or mu¬ cilage around the border. While there are dif¬ ferences of opinion as to what paper to select, there is a limit to the number of makes accept¬ able to any artist. All used surfaces, grains, textures, etc., are comprised in the following list: Whitman, Allenje, Michallet, David Cox, Creswick, Varley, cartridge, Van Gelder, white Canson and Burlington.

Pigments. — The colors used by the early aquarelle masters were made up into little hard bricks (cakes) and were rubbed out in water on a porcelain surface, but a more recent, perhaps more convenient, form of pigment preparation consists of moist colors, requiring less manipu¬ lation before being ready for the brush. Light-red, yellow ochre, cyanine blue, ivory black and burnt sienna are the colors which are the main¬ stay of artists. From these basic pigments can be produced every ordinary color effect in na¬ ture directly or by blending. But, in these days of rapid action, many or most artists add an

array of other paints to the color-box, care being taken that they are not such as fade quickly in the light, as do Prussian blue, antwerp blue, *etc.* French ultramarine (pure ultramarine being al¬ together too expensive), Indian ink, rose mad¬ der, sepia, oxide of chromium,

vermilion and naples yellow are considered safe for use. Brushes are peculiarly a matter of choice of in¬ dividual artists, their sense of touch differing greatly. The number selected is not so much a matter of importance as their being kept ab¬ solutely clean and carefully dried after use.

But the full capacity of the water-color me¬ dium was not known before the pictures of Joseph Mallard William Turner (1775-1851) (an early student of John Cozens' works and a con¬ stant coworker with Girtin till the latter's pre¬ mature death), were exhibited to the world. His early water-colors were, indeed, low in tone and gloomy, though forcible and convincing. What he came to do in the way of color is shown best in his Venetian studies, originally made on the spot in water-colors. Turner, however, did not confine himself to the water wash ; when he thought it necessary he employed body color in parts of his work, and even, on occasion pastels ; or it may be pencil or pen. But he never revealed to anyone the secrets of a tech¬ nique which made him the greatest landscape painter in water-colors which the world has ever seen. The foundation of the Old Water-Color Society, in 1800, and of the new society, in 1863, gave a great impulse to the art, among whose representatives may be mentioned Cop¬ ley Fielding (d. 1855) ; Peter de Wint (d. 1849) ; Samuel Prout (d. 1852), the master of archi¬ tectural painting; David Cox (d. 1859) and the brilliant executer of Oriental genre, Lewis (d. 1876). Taylor and Landseer, as animal painters, found this a successful and pliant me¬ dium, and among the Pre-Raphaelites who were eminent aquarellists may be mentioned Rosetti, Madox Brown, Burne-Jones, Holman Hunt and Millais.

Prominent Aquarellists. — A partial list of the aquarelle artists of the English school whose works are appreciated by connoisseurs at sales must include the following; there are, of course, a number of noted artists who use the water-color medium as a side issue for ˆstudies® but do not specialize on aquarelles. Earliest masters: Alexander Cozens and his son John Robert, Girtin, Turner, De. Wint, David Cox, J. S. Cotman, Copley Fielding, S. Prout, Devis, Hearne, Bonington, Rooker, the two Cleveleys, W. Payne and N. Pocock. Be¬ longing to the latter half of the 19th century we have F. Walker, G. J. Pinwell, Sir John Gil¬ bert, G. Cattermole, E. J. Gregory, M. Birket Foster, J. M. Swan. Recent artists : R. W. Allen, Mrs. Allingham, Wilfrid Ball, F. Brangwyn, Sir Alfred East, G. S. Elgood, W. R. Flint, A. Goodwin, A. Ingram, F. E. James, H. Marshall, E. Noble, A. Powell, A. Rackham, A. Wardle, Sir E. Waterlow, J. R. Weguelin, J. W. West, M. Fisher, M. Hale, Hughes-Stanton, Lamorna Birch, A. W. Rich, C. M. Gere, C. J. Holmes, *etc.*

In France, among able landscape painters in water colors, were conspicuous I. B. Isabey (1767-1855) ; Hubert, J. Ouvrie, Sue and Fort. They pretty generally employed body color (gouache) in their composition, the transparent wash being much less frequently employed in

France. In portraits, Olivier Grand; in flower painting and still life, Redonte (1759-1840), the best painter of this class France has ever pro¬ duced. But the art was not tried to its full capacity untiMhe oriental sketches of Eugene Delacroix (1798-1863) proved to the French art world that there was something to be sought for fresher and more inspiring than the frigid classicalism of David. His lead was fol¬ lowed by Descamps (1803-60), one of the best colorists and most original painters of the mod¬ ern French school, who taught his countrymen that it was possible to represent in water-colors the broad blaze of open sunlight in an African sand-plain; or in the streets of Smyrna and Constantinople. The powerful genres of Gavarni (1804-66) made a sensation even in Eng¬ land, the native home of water colors.

The German school of water-color painting began with the illuminating or tinting by hand of copper plate engravings. An independent and distinct department of aquarelle came late in the history of German art. The first notable aquarellists in that country were Karl Werner of Leipzig and Edward Hildebrandt of Berlin — Viermann, Otto, Grael of Berlin, Heindrich, Stockles, R. Stieles of Munich and a circle in Diisseldorf, including Scheuren and Mintrop, kept up the traditions of German water-color painting. A new path was struck out by Menzel, who obtained a great following. He adopted a broad, frank and dashing style which was much admired. The Berlin painters, such as Franz Skarbina and Paul Mayerheim, vied with him in this method of handling. But German aquarelle has never been distinguished for the lightness of touch, the brilliant and transparent coloring, the powerful and vivid landscape ef¬ fects which we find in the productions of Eng¬ lish and French artists. Italy and Russia on the other hand have many skilful adepts in this art. The vivid coloring of such masters as Corelli, Zezzos and Mainella has a light and vividness all its own and the creations of these painters are worthy of comparison with many of the most eminent workers in their own de¬ partment of art in other parts of Europe. The same may be said of the Russians, Benken¬ dorf, Bergholz, Karafin, Heftier, Jegornow, Pissemski and Ehrenon.

Water-color painting has always formed a very living section of American art life. When Vassili Verestchagin, the great Russian war painter, was in America, he was astonished, according to his own account, that native artists were not more alive to the possibilities of American scenery and American life as subjects for. the pencil. He was not sufficiently ac¬ quainted with the history of art in the country to which he had come a stranger, to be aware of the fact that local art had long flourished there. The Hudson River School of painters produced many noble transcripts from the scenery of that river, mostly in large canvases, and by employing oil as a favorite medium, but several of them have also executed gems of art in water-colors after the style of the best masters. Among those who have done some good water-color sketching among the sublime scenery of the West may be named Albert Bierstadt, some of whose views are cor¬ rect in drawing and rich in coloring, albeit they owed their original impressiveness to the novelty of the effects in atmosphere and moun-

tain contour or coloring which they reproduced. The same in a less degree may be said of the drawings of F. E. Church. Neither of these painters was, however, as triumphant in water as in oil. The New York Water Color Club has done much to foster a revived interest in this most difficult yet most effective and de¬ lightful department of the painter's art and among the most successful of those who culti¬ vate it may be enumerated James McNeill Whistler, John Singer Sargent, Childe Hassam, Abbey, Moran, Parton, Murphy, Parsons, Shurt-leef, Tryon, *etc.* Louis C. Tiffany is a colorist of rare gifts and although his natural predilec¬ tion leads him to the representation of still life, yet his water-color landscapes have a value of their own. Charles Sanderson is well known for his lovely water-color studies of the shores of Lake Michigan. At the end of the 19th cen¬ tury there was suddenly a new movement de¬ veloped in this department, principally through the influence of John H. Twachtman, whose early death was a sad blow to the cause he had most at heart in his native country. In 1898 the Ten American Artists crystallized into a new school of painting in New York. As far as this movement was represented by Twachtman it stood for a distinct advance in water-color art. There can be no doubt that he re¬ flected in the practice of his art the very best features of that style which in Europe was embodied in the work

of Girtin, Cozens and Turner. Water-color painting in the United States numbers among its devotees many other great names. Homer D. Martin's few water-colors are of the highest value. Frederic Crown-inshield shows in his water-colors a noble sense of the form of hills and cliffs and the greater forms of the landscape, as well as of tree-form. Winslow Homer's many water-colors are about as important a contribution to American art as any other group of works. They are extremely vigorous and impressive, they sell at high prices and among lovers of modern painting there are certainly none more esteemed. Winslow Homer is essentially a <(painter's painter" and no single artist in the whole group is more ad¬ mired by his fellow-artists. John La Farge's water-colors are what have chiefly made his great reputation. There are hundreds of them in private collections in Boston, New York and neighboring towns and the show of the South Sea Island collection at the Paris Salon in 1898 or 1899 occupied a hall especially set aside for it and made a great sensation. There is nothing in modern art more rich in color than these La Farge drawings, which were produced during the years 1865 to 1895 chiefly; for from that time he became thoroughly absorbed in decorating work, glass and the like. The work of Robert F. Blum and that of Irving R. Wiles commands the admiration of their brother artists. Francis Hopkinson Smith was a master of loaded color, that which is mixed with white (the French gouache). There are women artists Who excel in water-color work of each kind.

Bibliography. — Baldry, Alfred L., <The Practice of Water Colour Painting) (London 1911) ; Bellows, Albert F., (Water-color Paint¬ ing; Some Facts and Authorities in Relation to Its Durability* (New York 1868; New York American Society of Painting in Water Colors) ; Constant-Viguier, F., and Langlois-Longue- ville, F. R., (Nouveau manuel complet de mini¬

ature et de gouache ; suivi du Manuel du lavis a la sepia, et de l'aquarelle* (Paris 1845) ; Fed-den, Romilly, 'Modern Water-Colour; includ¬ ing some chapters on current day art* (Bos¬ ton 1917) ; Gallatin, A. E., (Notes on some Masters of the Water-Color* (in Arts and Dec¬ oration, New York 1916) ; Herrick, H., 'Wa¬ ter color Painting; description of materials with direction for their use) (New York 1880) ; Holme, Charles, and Finberg, A. J., and Taylor, E. A., (The Development of British Landscape Painting in Water Colours* (New York 1918) ; MacWhirter, John, landscape Painting in Wa¬ ter Colour) (London 1911) ; Prang Educational Company, (A Course in Water-color for the first eight years in schooP (Boston 1900) ; Rich,

Alfred William, (Water-colour Painting* (Phil¬ adelphia 1918).

Clement W. Coumbe.

WATER CRESS, WINTER CRESS,

See Cress.

WATER CURE. See Hydrotherapy.

WATER DISTRICT. See District.

WATER-DOG, a salamander. See Mud ‘ Puppy.

WATER-FLEA. See Cypris; Daphnia.

WATER GAPS. See Delaware Water Gap; Stream Piracy; Trellised Drainage.

WATER-GAS, a mixture of gases produced by the action of steam on incandescent carbon. The carbon first decomposes the steam, formings hydrogen and carbon dioxide, and the latter gas then combines with more carbon to form the inflammable carbon monoxide. Thus water-gas may be considered economically a mixture of hydrogen and carbon monoxide with certain impurities. Its especial value as a fuel lies in the fact that 90 per cent of its volume is com¬ bustible, while the ordinary producer-gas is but 30 per cent combustion. Pure water-gas is non-luminous, but it is rendered luminous by mix¬ ing with it various gases obtained from pe¬ troleum, the luminous mixture being known as carbureted water-gas. Two chief methods are employed for the manufacture of water-gas for illuminating purposes. In the first of these, the Lowe process, the preparation of the pure gas and the carbureting are performed in one operation. The apparatus consists essentially of a generator, filled with anthracite or coke, in which the non-carbureted gas is produced ; a carbureter, a circular chamber lined with fire¬ brick and filled with a checkerwork of the same material ; and a superheater, a taller circular chamber similarly filled. By means of air-blasts and the producer-gas from the anthracite of the generator, the firebricks of the car¬ bureter and the superheater are raised to a red heat, and then superheated steam is passed through the incandescent carbon. The product at this stage is known as <(blue water-gas” and burns with a very hot, non-luminous flame. It is useful for many manufacturing purposes. To make it available for illuminating the water-gas formed is carried over into the carbureter, where it becomes mixed with the highly car¬ bureted gases formed by the action of the heated bricks on mineral oil, which is intro¬ duced

from above. This process is completed in the superheater, and the carbureted gas is then ready for purification process in which the

sulphuretcd hydrogen and carbon dioxide com¬ ponents are removed. In the Wilkinson proc¬ ess the operations of making the gas and car¬ bureting are separate. In the United States carbureted water-gas has largely replaced coal-gas as an illuminant, partly because of its brighter light and partly because it can be more cheaply manufactured. Illuminating gas made from coal is often mixed with carbureted water-gas in order to increase its illuminating power. The chief objection to the use of water-gas as an illuminant is the highly poisonous nature of one of its largest constituents, carbon monoxide. By keeping the percentage of this constituent down to 16 per cent of the total volume, the mixture is not more dangerous to inhale than ordinary coal-gas. See Gas, Nat¬ ural.

WATER GLASS, a substance which, when solid, resembles glass, but is slowly soluble in boiling water, although it remains unaffected by ordinary atmospheric changes. It consists of soluble silicates of potash or soda, or a mixture of both. The soda glass has the formula, Na20.3Si02. A substance of this kind was first discovered, so far as is known, by Van Helmont in 1640. In the 19th century Dr. Johann Fuchs of Munich did much to improve the mode of preparing and applying it. Water glass may be prepared in two ways, called wet and dry. The former method is used where the proportion of alkali may be so large as 50 per cent, in which case the sand and alkali may be simply boiled together. Where a water glass richer in silica is required the mode of prepara¬ tion consists in breaking down and calcining flint nodules, the fragments or particles of which are then added to a solution of caustic potash or soda, whereupon the whole is ex¬ posed for a time to intense heat at 60 pounds pressure. Sand may be used instead of the flint. According to the product when prepared in this way is viscid, and may be used in this state or further diluted. In this method of manufacture the caustic soda or potash may be replaced by the carbonate or the sulphate. Potash water glass is more soluble than

soda water glass, and if both metals be present a still more soluble glass, called double soluble glass, is obtained. Among the purposes to which water glass is applied are painting on glass, coating stone, wood and other materials to render them waterproof or fireproof, glazing scenery and paintings, *etc.* It is also used mixed with sand to make an artificial stone, and it forms an ingredient indispensable in the manufacture of fireproof cements, such as are used in joining firebricks in furnace construc¬ tion. For this purpose it is commonly mixed with lime. One of the most valuable of its applications is in the fixing of wall-paintings, by spraying with the water glass. They are thus rendered more durable than in the or¬ dinary process of fresco-painting.

WATER HAMMER, the name applied in the laboratory to a vessel partly filled with water, exhausted of air and hermetically sealed. When reversed or shaken, the water being un¬ impeded by air, strikes the sides with a sound like that of a metal striking against glass. In hydraulics the term is used to designate the sudden rise of pressure in a pipeline due to the

check of flow of the liquid running in it — as by the sudden closing of a valve. The strain on the pipe and any motor connected openly with it is often very serious. The formulas which are used to calculate this strain are

py

— = the circumferential stress in the pipe

/

py

walls; and ~ the longitudinal stress — where

p represents the increase in pressure in pounds per square foot; r the radius of the pipe in feet; and t the thickness of the pipe in feet. The hydraulic ram (q.v.) operates by water hammer. The technics of water hammer is ex¬ haustively discussed in Gibson, A. H., (Water Hammer in Hydraulic Pipe Lines) (Man¬ chester, England, 1908).

WATER-HEMLOCK, deadly poisonous plants (Cicuta) of the carrot family, known also by many other names, such as beaver-poison, spotted parsley, muskrat-weed and musquash-root, the latter names

being borrowed from the muskrat, which inhabits such swamps as the Cicuta affects; and the odor of the roots of certain species of the latter also re¬ calls the musk-scented rodent. Cicuta maculata is a tall biennial, reaching eight feet in height, with a rigid, hollow stem marked with purple lines, that grows in swamps and wet lands throughout the northeastern United States.. The leaves are decompound, even three-pinnate, having coarsely serrate leaflets, with veins apparently ending in notches instead of at the points of the teeth, as in ordinary foliage. The flowers are very tiny and white, in decompound, terminal umbels, with unequal pedicels. The fruits are ovate-oblong, glabrous and slightly flattened laterally. The ribs are corky, the lateral ones being strongest. Spindle-shaped, tuberous roots cluster about the base of the stem, and are the cause of many deaths. They have an aromatic flavor and fleshy sub¬ stance, and are frequently mistaken, especially by children, for the roots of sweet cicely, par¬ snips, artichokes, or even horse-radish, and are sometimes eaten for no particular reason except that they are fleshy and exposed by washouts, freezing or digging-operations. Even livestock are killed, not only by feeding on the tubers themselves but by drinking water poisoned by roots which have been crushed under the cattle's hoofs. The poisonous element in this Cicuta is an aromatic oily fluid, which permeates the whole plant, but is found chiefly in the roots, and probably contains the alkaloid conine and the bitter principle cicutoxin. When eaten Cicuta produces vomiting, colic, staggering and unconsciousness, and finally frightful convul¬ sions which end in death. No chemical anti¬ dote being known, the only treatment possible is to cleanse thoroughly the digestive system, and treat each stage of the attack with such medicines as seem necessary. Cattle may some¬ times be saved by timely and repeated doses of melted lard. The elongated spindling-roots of the Wyoming water-hemlock, Cicuta occi-dentalis, which in Montana is known as the wild parsnip, has a characteristic musky odor, and stock are poisoned either by the young plants or by the roots. Other species of Cicuta have a similar appearance above ground and are equally poisonous.

WATER-HBN, or MOOR-HEN, a rail

(G alhnula chloropus) , generally distributed throughout Europe, Asia and Africa. Its length is about 13 inches ; back, wings, rump and tail rich dark olive-brown; head, neck, breast and sides dark slate gray; thighs and flanks streaked with white, belly and vent gray¬ ish white ; beak yellowish, becoming red ; naked patch on forehead red ; legs and toes greenish-yellow, claws dark-brown. The female is rather larger and more vividly colored than the male. They frequent ponds covered with aquatic herbage, overgrown watercourses and the banks of slow rivers, swimming and diving with facility, assisted by an expansion of the mem¬ brane along the sides of the toes. The water-hen is representative of the subfamily Gallinu-lince of the rail family (Rallidce) which com¬ prises 30 or 40 species found in all parts of the world. In the United States they are generally known as gallinules or mud-hens, and are represented by the purple gallinule (Ionornis martinica) and the Florida, or common galli¬ nule (Gallinula galeata). The American coot (Fulica americana) is. also frequently called a water-hen.

WATER-HICKORY. See Hickory.

WATER INCH, in hydraulics, a measure of water equal to the quantity discharged in the 24 hours through a circular opening of one inch diameter leading from a reservoir under the least pressure, that is, when the water is only so high as to cover the orifice. This quantity is about 500 cubic feet. In irrigation, the term is used synonymously with ˆminer's inch,® which is the volume of water which flows in one hour through an aperture one inch square, the sides being horizontal and vertical, under a head of six inches measured from the upper edge of the aperture. The flow amounts to 673.2 gallons per hour.

WATER LAWS, the body of legislative enactment and legal decisions governing the rights to the use of water. In comparison with the laws concerning ownership of land and of other property the water laws, par¬ ticularly in the United States, are extremely complicated. There is a great amount of law with apparent lack of consistency in the pre¬ vailing legislation and decisions. The cause of this lies largely in the physical fact that water as a substance varies in quantity from day to day and until recent years the principles gov¬ erning its occurrence and the methods of measurements have not been well understood. In fact they are still more or less of a mystery to many members of law-making bodies. More than this there has been an attempt to apply rules of law which while suitable for per¬ manent or fixed objects are hardly applicable to a substance the component particles of which are

ever flowing away and are ever renewed, but in fluctuating quantity. To illustrate some of the different conditions and viewpoints take first the case of a natural spring or pond on a certain tract of land. It is generally conceded that ownership of the land carries with it the full right to the use of this small body of water. If, however, the spring or pond discharges onto a piece of land be¬ longing to another proprietor, it is obvious that the second owner has certain rights due to the

fact that the stream flows along or across his land. Under ordinary conditions the upper owner may not deprive the lower of his fair share of the water, at least for drinking pur¬ poses f<pr man and beast. The stream flows on continually, joins with others and becomes a boundary line between proprietors. Each through his ownership of the land claims cer¬ tain riparian rights in the flowing water. The stream finally becomes of such size as to be of importance to the whole community or State and the latter sometimes claims proprietorship in the bed and banks, these being held by the State for the benefit of the public. It finally becomes of navigable capacity, and, under the terms of the prevailing interpretation of the Constitution of the United States regarding commerce, the control is vested in Congress. In the older part of the country where, under humid conditions, there is usually ample water and to spare, the rule is that each riparian proprietor shall permit the stream to flow through or along his land undisturbed in quantity and unchanged or unpolluted as to quality — his rights being bounded by those of all his neighbors above and below, each having a fair share in the use of the water provided he does not interfere with rights of others. He may utilize the water for power if in so doing he does not overflow the lands of others nor interfere with established usages nor with the enjoyment of similar opportunities by others. If, however, a municipality finds it necessary to take water from a stream, it must be prepared to make compensation for any possible rights which may be interfered with. As a rule it cannot exercise the right of eminent domain outside of the borders of the State in which the city is located. It may be thus narrowly circum¬ scribed and hindered from its best growth because of artificial restrictions imposed by State lines.

In the arid and semi-arid regions in the western part of the United States the common law of England, which has been followed in the humid East, is not in accord with the common necessities of the people. There it is possible to cultivate the ground successfully only through the artificial application of water. The lands will remain

unproductive and popu¬ lation cannot increase unless the waters are taken from their natural channels to be spread over the ground and the stream channels left practically dry. The rights of riparian proprietors can be no longer observed, as in Eastern States, where under ordinary-circumstances there is enough water for all. Out of the necessity of the people has thus grown an entirely different theory, namely, that of appropriation — this being limited to beneficial use, each appropriator being per¬ mitted to take usually only so much water as is needed for the irrigation of his land; even in this he may be required to show an economic use. In the case of two or more appropriators not finding enough water to satisfy their needs, the rule is usually en¬ forced to the effect that first in time is first in right, although this rule is being modified in practice in accordance with larger equity, for example, if the first in time is at a place where there results great waste in getting

the water to him, consideration may be taken of the fact that to irrigate one acre thus situated many acres better located must be left dry.

The common law of riparian rights such as prevails in the eastern or humid part, of the United States, but modified to a considerable extent, is recognized in California, Kansas, Montana and Washington. The civil-law doctrine declaring that the waters are the property of the State is contained in the constitution of Wyoming; similar declarations are made in the laws of Idaho, Nevada and Texas. By the constitution of Colorado the water of every natural stream is declared to be the property of the public and dedicated to the use of the people of the State. Similar declarations are contained in the water laws of Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota and Utah. Under the so-called Wyoming system the water rights are in theory acquired by grant from the State. There is great difference among the Western States with reference to the control of appropriation. In some States this control is vested in a State board with right of appeal, however, to the courts. In others adjudication

proceedings are initiated in the courts. Because of the difficulty of ascertaining the ordinary supply of water and because of the exagger¬ ated claims which are made to its use there have arisen innumerable controversies so that in some parts of the arid region more money is being expended in litigation than in actual irrigation. In most States in which water rights are adjudicated by courts the law provides that all parties claiming rights to ‘ water from the same source shall be made parties to the action so that all rights may be determined in a single action. Without such provision, there may be an interminable suc¬ cession of suits, A bringing B into court to determine their respective rights, then C com¬ ing in and upsetting the arrangements and so on through the entire alphabet. The interest of the public or of the State is not necessarily taken into consideration at any time.

There are conflicting theories which arise from a difference of opinion as to the origin of rights to water. Throughout a greater part of the East there is insistence upon the conception that all rights to the use of water abide in and are derived from private or personal proprietorship of land and that any attempt at the invasion of the sanctity of prop¬ erty will result disastrously. Nevertheless attempts have been made and are continually being made to preserve the rights of the pub¬ lic and by asserting the theory of State owner¬ ship and control of water, to set a limit to the broad claims of riparian owners. Farther than this there is still a third class who claim that the Federal government has the right and duty on behalf of all the people and for the general welfare to extend its authority be¬ yond the narrow limitations of preventing interference with navigation and to legislate in such a way as to prevent this great natural resource from being exploited wholly for private gain, especially as to those waters which have not already been appropriated or put to beneficial use. There is continual attempt of riparian owners and of large

moneyed interests to extend and strengthen their control of water rights. At the same time efforts are being made by the State legislatures and by the Federal Congress to enact legislation protecting the general public in the proper enjoyment of water, which, like air, is essential to all life whether human, animal or vegetable. The conflict between these opposing theories and views is resulting in innumerable statutes and court decisions, many of them apparently irreconcilable. The unfortunate feature is that, besides provoking litigation, the largest and best uses of the waters of the country are not being given full consideration.

F. H. Newell.

WATERLILY, a plant of the aquatic family Nymphceacece , especially of the genera Castalia and Nymphcea. These are found in fresh, still waters throughout the warm and temperate regions, and are often cultivated. Some can be easily raised from seed, and those which are hardy in the North will stand a very low temperature without damage, even to be encased in ice. They may be grown in tanks, or even in half-barrels, as well as in ponds; but the tropical species, such as Victoria regia, require the warmth of a greenhouse, or heated tanks, in our northern latitudes. The water-lilies are handsome plants, having more or less orbicular, generally peltrate leaves, either floating or, more rarely, immersed, and solitary flowers, of similar varying habit. These blos¬ soms have several sepals and many petals, stamens and carpels, the latter distinct, united or immersed in a thickened receptacle ; in color they may be white, pink, yellow or blue, and are sometimes very fragrant. The fruit is in-dehiscent, semewhat fleshy, and like a giant berry filled with nuts, or, in the case of Nelumbo, the nuts are half sunk in pits in the flat-topped, enlarged torus. The seeds are large with fleshy cotyledons and are naked or enclosely in pulpy arils. Water-lilies, even in the time of Pliny, were considered to be an antidote to love-philtres. The most famous of them is perhaps the giant or royal lily, Victoria regia (q.v.) Another which is very large is the Austrian waterlily (Castalia gigantea), which is one of the finest of its genus. Its flowers are sometimes a foot across, with hundreds of stamens, and the color is blue, or even other tints. They do not close so completely at night as do other water-lilies. The Egyptian lotus (Castalia lotus) that was a favorite plant of the ancient Egyptians is often confounded with the Indian lotus (Nelumbo), but is really a blue flowered waterlily. It was a valuable plant to the decorators of that country, who copied it, and conventionalized its form in many of their architectural ornaments, and also in¬ troduced it constantly into their painted pictures of life and customs. Its rootstock and seeds served as a food. (See Lotus). The European waterlily (Castalia alba) is similar, but has white flowers that are apt to open a little above the surface of the water, being supported on a stiff petiole. The flowers are not fragrant, as are those of the American pond-lily (Cas¬ talia odorata) , The latter lovely lily rides upon the water, with creamy-white petals radiating in circles, the inner gradually narrowing, and passing by various stages into golden stamens

in the centre. They expand in sunshine and . close in the early afternoon. The fruit is ovate and baccate and ripens under water. The leaves, or lily-pads, a favorite food of deer, are ovate-orbicular, with a deep sinus, and have very long cylindrical stems of unvarying thickness, great flexibility and toughness. The thick, fleshy creeping rootstock furnished a brown dye for the early settlers, and was also used as a styptic and tonic. A variety of this lily is smaller and has rose-colored flowers. There are several other species of Castalia in the United States, including the handsome golden-flowered lily (C . flava) of Florida.

One of the most common water-lilies is the yellow pond-lily {Nymphcca advena) which blooms all through the summer, but is not very beautiful. The leaves are ovate, or orbicular, with a deep sinus at the cordate base. They may be either floating or erect, especially when the plant grows in tidal streams, and is likely to be left standing nearly out of water, upon the ebbing of the tide. These pond-lilies also are known as spatter-docks and frequently join with pickerel-weeds in obstructing a boat's passage to the shore, along which they stand in an extended ribbon. The flowers are flattened globes, made up of half a dozen thick, golden sepals, arching over the stamen-like sepals. The fruit is ovoid, somewhat constricted at the neck and contains edible seeds. The strong¬ growing Pacific Coast representative of the spatter-dock is the Nymphce polysepala, known to the Klamath Indians as wokas. It is very like the Eastern species. When fully mature, the large pods burst open irregularly at the base, and the entering water, when it reaches the white, mealy interior in which the seeds are imbedded, at once starts a mucilaginous dissolu¬ tion of it, which frees the seeds and allows them to sink into, the water. These seeds were once a staple farinaceous food of the Klamath Indians, and are still a favorite delicacy among them. The squaws betake themselves in canoes to the lily-patches and pluck the full-grown pods while still hard, or scoop out those al¬ ready dissolving with a wicker spoon. The latter are the more prized, and are deposited in holes in the ground, where the pods fer¬ ment and turn into a mucilaginous mass from which the seeds may be freed by washing. Or the seeds may be extracted by other methods. They are then prepared in various ways for eating, either as mush or meal, or merely parched; they are delicious cooked in this manner.

Nelumbo nelumbo is the Indian lotus ; Ne¬ lumbo lutea is the American or yellow lotus of the Mfiddle West. It is also called water-chinquapin, on account of its edible seeds. Consult standard authorities, especially Bailey,

(Standard Cyclopedia of Horticulture) (New York 1916).

WATER-LOCUST, or SWAMP LO¬ CUST (Gleditschia aquatic a) , a variety of honey-locust indigenous to the Southern States. See Locust.

WATER MARK, (1) The mark or limit of the rise of a flood or the mark indicating the rise and fall of the tide. (2) In paper-making, any distinguishing device or devices appearing in translucent lines in the substance of a sheet of paper. It is produced by a pattern of wire

built upon the web and receiving heavy pres—

St.ire ˆrom r°fl.s as the film of pulp passes through them while yet in a damp or pulpy condition. The water marks used by the earlier paper-makers have given names to several of the present standard sizes of paper, as fools¬ cap, crown, elephant.

WATER METER, a mechanism by which the quantity of water or any other liquid flow¬ ing through pipes is measured and recorded automatically. They are of three general types — the “positive,® the “inferential® and the “pro¬ portional® meters.

Positive meters measure the actual volume of the water, by the action of a piston working in a cylinder which is successively emptied and filled at the completion of each stroke. The cylinder being of known dimensions affords a measure of the quantity of water introduced. The pistons are either reciprocating or rotary, or of the oscillating or gyrating disc patterns and they may be single or double. When single, a weight or spring produces the return stroke, but in the case of the double arrange¬ ment, the reciprocal action of the two pistons is controlled by the action of each other, as in the case of a duplex pump. In rotary piston meters, which may also be of the single or double type, the pistons have interlocking faces and rotate in an airtight chamber. Upon the outer surfaces of the pistons are a series of projections and recesses which correspond to similar shapes on the inner walls of the cylin¬ der. The pressure of the flowing water causes the piston to turn so that a series of recesses or chambers in the cylinder are successively filled and discharged from the inlet to the out¬ let of the meter. When oscillating or gyrating discs are employed

in the place of pistons, the wabbling motion of the discs alternately empties and fills the cylinder. Inferential meters meas¬ ure the velocity of the flowing water by record¬ ing the revolutions of a turbine or other water¬ wheel attachment, and the quantity is deduced by computation from that record. Proportional meters measure a fractional part of the full flow and are, therefore, capable of being set on a small by-pass pipe which branches from and subsequently rejoins the main pipe, but being only approximately accurate their use is limited.

The registering mechanisms consist of a series of gear-wheels and dials. The flow of the water actuates the gear-wheels, and the num¬ ber of revolutions are recorded on the dials. The arrangement of the mechanism converts the number of revolutions into any desired unit of volume, so that the reading of the dials is termed straight and gives the quantity direct, in cubic feet, the unit generally adopted, par¬ ticularly in the United States.

The working parts of meters are made light and durable. Serviceability and accuracy are the qualities required, and in their design the support of the water pressure is employed to reduce to a minipium the loss of head, and the wear and tear of the working parts, and al¬ though a high degree of accuracy is not gener¬ ally required, the meters are made sufficiently sensitive to measure the small flows incident to leakage. Hard rubber is generally used for the discs, and also for the rotary pistons of some meters, but where the liquids are hot, or consist of chemical solutions, brass is generally

employed. Possible damage due to clogging by the introduction of fish or gravel is prevented by various forms of strainers and sieves, while effect of frost is guarded against by frost cases.

There are several forms of meters which do not come under the general classes already described. Of these the ® Venturi,® constructed by Clemens Herschel of New York, in 1886, is the superior and most useful on account of its simplicity and durability. Its basic

principles — the relation between the reduction of pressure and the increase of velocity of water flowing through a contracted pipe, was discovered by Venturi in 1796. In construction it consists of two conical shaped pipes with their smaller ends joined together by a collar or throat-piece, re¬ sulting in a shape similar to a pipe contracted at one point of its length. By gauging the pres¬ sure of the water at a point just before, and also directly at the point of contraction, and the relation of these pressures to the diameter of the pipe, the volume of the flow is computed. The tubes are usually constructed of cast iron or riveted steel, but they may also be con¬ structed of masonry or wood. The length of the meter varies from 8 to 16 times the diameter of the uncontracted portion, while the diameter of the contraction ranges from one-fourth to one-half of the full diameter of the tube. They are made in sizes varying from two to about 100 inches, with practically no limit to the possible maximum size, but for practical use where meters of diameters less than six inches are re¬ quired those with moving parts are cheaper. Waste-water meters are employed in connection with waterworks to measure the rate of con¬ sumption per unit of time, instead of the total volume. They consist usually of a disc placed horizontally in a cone-shaped chamber. The disc is lifted or lowered according to the greater or lesser volume of water passing through the pipe in which it is set, and being connected by a wire with counterweight and pencil which follow the movements of the disc, records the nature and amount of those movements on a paper carried by a drum which is revolved by clockwork. The vertical rulings of the record sheet indicate the time intervals, while the hori¬ zontal lines represents the units of volume. Since all the water consumed in a given district must pass through such a meter, by comparing the rates of consumption of the various dis¬ tricts, the causes of abnormal waste are readily determined and localized.

Another form of water meters, more par¬ ticularly known as current meters, are em¬ ployed in hydraulic engineering to measure the velocity and volume of flow of the waters in rivers, large aqueducts and sewers. See Cur¬ rent Meter.

WATER-MOCCASIN, a snake. See Moc¬ casin.

WATER-MOLDS. See Fungi.

WATER MOTOR. In its broadest sense

the term is applicable to all forms of machines or systems of machinery operated by water un¬ der the force of gravity, or in other

words, by which the energy inherent in a natural water¬ fall is utilized to perform mechanical work. There are three types of such motors, classified as (1) gravity motors; (2) pressure motors, and (3) impulse motors. Of these machines, the waterwheel (q.v.), the turbine (q.v.) and

the pump (q.v.) have been treated under their respective titles, but in this article the term will be considered as designating those machines which are operated by the element of pressure only, such as hydraulic lifts and water pressure engines.

The Hydraulic Lift, used in elevator serv¬ ice, is the simplest of all water motors. The direct-acting lift consists of a cylinder in which a ram or piston of equal length, with a cage attached to its upper end, works up and down. The level of the water supply must be necessarily above that of the maximum height through which the cage may be lifted, .so that when the water is admitted to the cylinder at its lower end, the pressure forces the ram upward and thus lifts the cage. The descent of the ram is accomplished by closing the sup¬ ply valve and opening the discharge valve, the ram descending by its own weight. As the weight of the ram is greater than necessary to lining down the cage, a part of that weight is balanced by a counterweight attached to the end of a chain that works over a pulley at the top of the lift and is connected to the cage. The most familiar examples are the high¬ speed hydraulic passenger elevators. They are operated by the pressure of water Dumped into tanks situated on the roofs of the buildings in which they are installed, while the operating machinery is located in the basement. (See Elevators). The hydraulic press and the hydrau¬ lic ram are devices operated practically under similar principles. In the former, the action depends upon the principle of hydrostatics that a pressure applied to any part of the surface of a liquid is transmitted in all directions and throughout the mass without diminution. For example, if a cylinder filled with water has a plunger one inch square working through one end and another 10 inches square working through the other end, and a pressure of one pound is exerted on the smaller plunger, this pressure will be transmitted to the larger plunger and be delivered by the latter in a multiplied amount equal to the square of its face area expressed in pounds. In this example that pressure would be 100 pounds. Such presses consist essentially of two cylinders connected by piping. The pressure is applied to the plunger of the smaller cylinder and the multiplied pres¬ sure is transmitted by that of the larger to the object to be raised or pressed. In construction they vary greatly with the purpose for which

they are employed. Those used as hay, cot¬ ton and oil presses consist of four strong iron pillars arranged in the form of a square, which carry a cast-iron plate solidly attached to their tops. A similar casting is situated at the bottom of the pillars. Through a circular hole in the centre of the lower plate, a plunger carrying a square platen on its head works with an up¬ ward motion and presses the material placed between the platen and the under face of the top plate. In presses used for hydraulic forg¬ ing, the cylinder and plunger are carried by the top plate, while the bottom plate carries the anvil. The plungers work downward in the act of pressing or hammering. They are made of various sizes and are generally provided with two pressure plungers and cylinders and they are adapted for purposes varying from the manufacture of revolver cartridge cases to the

xorging of armor plate, guns and steamship shafts. Armor plate presses capable of exerting a pressure of 14,000 tons are in use, while 7,000-ton fluid compressors are employed in many of the larger steel manufacturing plants. A brief description of the construction and work¬ ing-of one of the last-named capacity will serve to illustrate the mammoth proportions and enormous power -of these machines. It consists of an upper head weighing 120 tons carrying the plunger and a 135-ton base plate containing the hydraulic cylinder. These are supported and held in place by four vertical connecting columns each 50 feet long, and 19 inches in diameter. In operation, the molten metal is poured into a mold built up in sec¬ tions and the mold is raised under a hydraulic pressure of 7,000 tons, while a plunger at¬ tached to the upper head bears down upon the fluid metal and compresses it.

Hydraulic Ram. — In the hydraulic ram the force of water flowing by gravity is utilized to raise a portion of its volume to a height above that of the source of supply. Two pipes are employed. The water in flowing through the main or drive pipe acquires sufficient mo¬ mentum to close a valve at the foot of the pipe, and the water thus confined automatically opens another valve, partially fills an air

chamber situated over the foot of the main pipe and compresses the air in it until the pressure within balances the column of water in the main pipe. Then the foot valve of the main pipe opens again and the action described is repeated. In the meantime, the pressure in the air chamber forces the water through a small service pipe leading out of its bottom, to the required height. See Hydrostatic Press ; Hydraulic Ram ; Power Transmission; Pumps and Pumping Ma¬ chinery.

Hydraulic Engines. — In the hydraulic lifts or elevators, the admission and discharge valves are worked by hand at the will of the operator, but in the engines the mechanism actuates the valves automatically and period¬ ically, thus converting the lift into a machine with a continuous action. Unlike the vertical water wheels and turbines, the efficiency of which depends upon the weight of a large body of water falling from a comparatively small height, the water engines work under the pressure of a small column of water descending from a considerable elevation. They are of three types — • the (<single action,® in which a piston working in a cylinder is moved upward by the pressure of the water, and downward by the weight of the piston it¬ self ; the ((double action,® in which the cylinder is closed at the top as well as at the bottom, and the water admitted to it by supply pipes at those points, acts reciprocally on the piston from above and below ; and the ((rotary,® in which the water pressure acts on a revolving piston similar to that of a rotary steam-en¬ gine. Rotary engines may be of the single-acting or double-acting type, the advantage being with the former, since the pressure of the piston is always exerted on the crank pin in one direction and the dead centres are passed without knocking. Generally three single-acting cylinders formed in one casting are used in connection with a disc valve with segmental posts which pass over correspond¬

ing apertures in the valve seating, during rotation and the engine will readily start in all positions. The first engine of this kind was constructed by Sir William Armstrong, who also subsequently designed one of the re¬ ciprocating pattern. Since then a great variety of hydraulic engines have been invented, the greater number of them being of the last-named type. (See Hydraulic Engine). They have a wide field of usefulness, especially as auxiliary motors for driving small machinery such as hoists, swing-bridges, capstans, cranes, winches, *etc.* The employ¬ ment of superheated water motors is one of the latest developments in the methods for railroad traction. In the earlier forms of engines operated by superheated water, the storage tank being charged with water at a temperature corresponding to

several hundred pounds of pressure, only the steam from the water was utilized in the cylinders of the motor, in a manner similar to the utilization of steam from the boiler of a locomotive engine by expansion in its cylinders. Their opera¬ tion was based upon the relation of tempera¬ ture and pressure to the vaporization of liquids and the steam was drawn off from its point of formation at the top of the storage tank to the cylinders. Under these conditions, with each revolution the new steam was supplied by water which boiled at continually lower and lower pressures and reduced tempera¬ tures, until the pressure fell to a point at which it was not available for use in the motor; and only about one-ninth of the energy of the heated water was actually used in the cylinders. W. E. Prall of Washington, D. C., suggested the utilization of the power in the storage tank by withdrawing the superheated water directly from the bottom of the tank instead of steam from the top and allowing the water thus withdrawn to expand into steam within the cvlinders of the engine it¬ self. In the latest motors, this is accomplished by a generator composed of a nest of tubes coupled into manifolds at the top and bottom. The working pressure is about 700 pounds to the square inch and the water is drawn off from the generator into three insulated storage tanks with a total capacity of 7,000 pounds, carried beneath the car. From the bottom of the tanks the water is delivered through three Tappet valves provided with screw and nut adjustment to regulate the amount of feed. In operation, under the decreasing pressure caused by the movement of the piston through its stroke, the water resolves into steam in a continuous series of flashes, the steam and the unevaporated portion of the water from the high-pressure cylinders passing out through the ports in its bottom and draining off through valves in the lower face of the valve chest. The exhaust steam from the high-pressure cylinder passes in the usual way to the low-pressure cylinder and is eventually exhausted into the atmosphere. A car equipped with two compound engines and three tanks charged with water at a pressure of 700 pounds to the square inch and a corresponding temperature of 500° is capable of running 40 miles at a speed of from 30 to 40 miles an hour.

Bibliography. — Church, I. P., (Hydraulic Motors) (New York 1911) ; Gibson, A. H.,

(Hydraulics and Its Applications } (New York 1915); Innes, C. H., (Centrifugal Pumps,

Turbines and Water Motors) (Manchester, England, 1904).

WATER-OUZEL. See Ouzel.

WATER-PLANE. See Waters, Under¬ ground.

WATER-PLANTAIN, an aquatic or marsh herb of the genus Aiisma, family Alismacece, of which Sagittaria (q.v.) is also a member. The plant most commonly known as water-plantain is that found also in Europe and Asia (Aiisma plantago aqnatica), which grows in mud or shallow water. It has a circle of radical long-petioled leaves, ribbed ovate and strongly resembling those of the common plantain. The scape, which is usually solitary, branches verticillately, and forms a large, open pyramidal, flowing panicle; the blossoms are very small, white or rose-colored and have their parts in threes.

WATER POWER. Water power is de¬ rived from the conversion of the energy of fall¬ ing water into mechanical work. If a volume of water having a weight w in pounds is situ¬ ated at a height h in feet above a plane of reference, it possesses a potential energy w X h in foot pounds, all of which can be converted into kinetic energy by allowing the water to fall through the height h. If the water in fall¬ ing passes through a suitable hydraulic motor, most of its potential energy can be converted into useful mechanical work, in which case the water will reach the bottom of the fall with little or no energy remaining, instead of having its full energy remaining in kinetic form, as it would do if it fell freely and unrestricted. In practice, water power is usually derived from running streams, and the amount of power is expressed in terms of the rate at which energy is supplied to or derived from the hydraulic motor. The ratio of the rate at which energy is derived from an hydraulic motor to that at which it is supplied to the motor is called the ˆefficiency® of the motor. The amount of power may be expressed in terms of the rate at which energy is supplied, or the rate at which mechanical work can be performed by the motor. The former is called the ˆtheoretical power® of the water or stream supplying the motor.

One horse power, as defined by Watt, repre¬ sents energy sufficient to raise a weight of 33,- 000 pounds one foot high per minute, or in other words, 33,000 foot-pounds per minute, or 550 foot-pounds per second. Fresh water weighs 62.42 pounds per cubic foot, hence the theoreti¬ cal horse power of a constant stream of water, flowing in a volume of q cubic feet per second, and falling through a height of h feet, is equiva¬ lent to

62.42 X q X h

550

horse power.

This reduces to the simple rule — Theoretical horse power of water =

0.1135 Xq X h.

The output or derived power of an hydraulic motor, or of a water power, is the product of the theoretical power multiplied • by the effi¬ ciency expressed as a decimal, or if the effi¬

ciency is E, then the mechanical or brake horse power is equal to

0.1135 X q X h X E.

Efficiency may be considered with reference to the hydraulic motor alone, or with reference to the entire power plant, including allowances for losses of power in electric generators and other equipment in the case of hydro-electric plants. If used in the latter sense it is termed <(overall efficiency,® and the theoretical horse power, multiplied by the overall efficiency, represents the net rate of power output by the plant or power development.

Water power ranks with mines and the soil as one of the ereatest natural sources of wealth. Coal and oil supply at present the greater por¬ tion of the fuel and energy used in the world, but this supply is

exhaustible. The soil fosters organic growth, which is capable of supplying energy resources chiefly in the forms of wood and of alcoholic fuels. These sources of energy, like water power, are perpetual, but are at pres¬ ent relatively much less important.

Machines or organisms through the operation of which useful mechanical work is derived from natural sources of energy are called “prime movers.® There are organic or living prime movers which derive useful mechanical work from* the latent energy contained in the food they eat. Men and horses are found to be relatively inefficient as prime movers. The human body is capable of yielding back through muscular work only about one-fifth of the avail¬ able energy supplied to it as food. Another class of prime movers consumes fuel and con¬ verts its potential energy into kinetic energy by means of steam, gas and oil engines. Both the preceding classes may be considered as fuel en¬ gines. They derive energy from highly organ¬ ized compounds which have originated in life processes. These are broken down into simpler compounds by the processes of digestion or com¬ bustion, and in accordance with a rule of nature, they give up a supply of stored energy as they are disintegrated. The supply of (power from chemical reduction being dependent upon life processes, can be renewed by a perpetuation of life, but unfortunately fuel consumption at the present time greatly exceeds the rate of re¬ newal, and we are mainly dependent on the great storehouse of latent energy given us as a legacy from past ages in the form of coal, oil and gas. The power consumption at the present day, if derived from wood alone, would exhaust our timber supply in a few years. In the early days of railroads, wood was used as fuel in locomo¬ tives. Few of us realize the extent to which the forests were devastated to supply that need.

Prime movers of another or third general class derive their energy more directly from the sun and operate by means of the winds, waves and tides. This class includes solar engines that concentrate and utilize the sun’s heat directly. It also includes wind mills. Water wheels of all kinds belong to this general class. The source of their power is the sun’s heat, operat¬ ing through the hydrologic cycle of precipita¬ tion, evaporation and run off. Vapor evaporat¬ ing from the seas and lands is condensed in the upper air, and falls again on the uplands as rain, running in streams and rivers down the hillsides and valleys to the lakes and seas, and again evaporated, is kept in a perpetual cycle of

change by the opposing forces of the energy of the sun's heat and the earth's gravity. It is the sun which supplies the power to overcome gravi¬ tation and lift the water to a height from which in falling it drives the water wheel.

runner. The hydraulic turbine is usually encased or submerged in a flume, and is often (<out of sight, and out of mind,® to the extent that it lubricates itself, and frequently does not receive or require direct attention for years of operation.

Percan+aje Thermo I £ ff icicncy to 2o Jo Ac 5o Co ~7o So

9 o

Jt eom Po *v e r-Plants (3cn ler Efficiency &S per cent) Simple fion-c o ncJenˆ B?/ t c/e Va/s/e E-nytnc

Compound High - 5pcec/ ffon-r.ondensm<y Engine Compound Cor/ iss f/on - c onc/e ns / ng Engine

Compound H'gh-5 peed Condens/ng JT n<y > ne Compound Corliss Condensing Engine.

Triple Expansion Corliss Condensing E n g / n a ■5+e.om Turbine.

Produ car Go <5 P/on'f'

0/7 Engine

So 7o G>o So Vo «3o 2o ic Thermal iTa si e Per Cenh.

j

Fig. 1. — Comparative Efficiencies of Fuel Motors.

The usual efficiencies of different types of fuel engines are shown graphically by Fig. 1. The average efficiency of fuel engines in use at the present time, of all kinds, including gasoline and steam engines, steam turbines and locomo¬ tives, is probably about 10 per cent.

A water-power development consists essen¬ tially of a turbine or water wheel with ade¬ quate means of supplying the water and regulat¬ ing the supply. Types and methods of water¬ power development are so closely related to types of water wheels that it is necessary to give

£ ffi c / ency , Te.r Ce.nl-. o io lo Jo J > o So to To 0o

S/mp/e Current *Ytiee*

Primitive Vert tea *T! u tier tYbee*

Some rY/fb CurSec/ Var.es lYocx/en (Vnc/ersbot *Yhee.*

Ponce.le.f- * ”

Breas t //free/

Crersbot *Wee*

Scro// Centra/ T/achar < yc one/ Tub tYbeefa eTonva/ Type Curb m C . T bo c tj Patterns Tour ney ron J urb/ne T or ty (/me r i con Type Turbines Be/fer C/aiS C?rnencon Type Turbines Trane ij Type Hiy tr t- Ye o ct Turbin e 6 Pp-!ton Type J m r > u / Sc lurhtnes ,

Fig. 2. — Comparative Efficiencies of Water Motors.

Fig. 2 shows the average efficiency (solid black) and the best efficiency (shaded) ordi¬ narily obtained from various types of hydraulic motors. This diagram shows, for purposes of comparison, the efficiency of various early and obsolete types of water wheels, such as current, flutter and central discharge wheels. Even these were more efficient than the best fuel engines. At the present time practically all water wheels in use are of one or the other of the last three types shown on Fig. 2. These have efficiencies ranging from 70 to 93 per cent. The great effi¬ ciency of hydraulic turbines as compared with other prime movers is strikingly illustrated by the fact that if it were possible to replace all fuel engines now in use by some improved type, having an efficiency equal to that of the hydraulic turbine, the effect would be the same as if the existing supply of coal in the world was. in¬ creased at least seven times. Not only is a developed water power the most efficient means of converting natural energy into mechanical work, but the hydraulic turbine is the simplest of all prime movers. Such a water wheel usually contains only one continuously moving part — the

here some description of the latter. A water wheel is a hydraulic motor that operates con¬ tinuously by rotation in the same direction. A canal lock lifting a boat is a water motor but is not a water wheel. A water wheel usually con¬ sists of various parts, of which the most im¬ portant is the runner, or moving part. A run¬ ner is usually divided into various compartments into, or through which, the water flows. These compartments are properly called buckets. The word bucket is often used incorrectly to describe the vanes or partition walls which form part of the boundary of the bucket. It is better to de- , scribe the partition wall's between adjacent buck¬ ets as vanes. It is often convenient to speak of the passage through or into which the water flows, and these passages are sometimes them¬ selves called buckets, but mav be more properly referred to as bucket passages. As stated above, the buckets are separated by vanes, which form the boundary walls on two sides of each bucket. The boundary walls on the remaining two sides are usually formed by the crowns. The com¬ partments through which the water flows into the buckets are properly termed chutes, or guide

chutes. The passage through a chute may be conveniently called a guide passage, and the partition walls between adjacent chutes are properly termed guide vanes. Usually a water wheel of the turbine type is enclosed in a case, of which the guide chutes form a part, and

l?omne.\r

prof/-

Ivhee / Cose.

Fig. 3. — 'Turbine Type of Water Wheel. Phantom view of wheel-case.

within which the runner is placed. As a rule, the case also contains gates for regulating the water supply. These may be classified as cylinder gates, register gates and wicket or pivot gates. Turbines are set in compartments called penstocks to which the water is led by means of a flume. The words penstock and flume are often used with the meanings here given trans-posted. A penstock of sheet iron or steel is often

spoken of as a case, but inasmuch as the wheel proper has a case which is placed inside the penstock, it is better to make the distinction of meaning given above.

Fig. 3 shows a phantom view of a modern hydraulic turbine, giving the names and relative locations of different parts. The accompanying table contains a classification of water wheels. Further descriptions of water wheels herein wifl be limited to the hydraulic turbine, which is practically the only type of hydraulic motor now in extensive use, excepting a limited number of impulse water wheels of the Pelton type.

The word turbine, meaning primarily a <(wheel that revolves® does not of itself dis¬ tinguish the class of water motors to which it is commonly applied. The word turbine appears to have been first applied to a water wheel by Burdin in 1825. Fourneyron, a pupil of Burdin, perfected the outward-flow wheel, and his use of the term turbine as describing such wheels led to its general adoption to distinguish water wheels operating by combined action and receiv¬ ing their water supply to all the buckets simul¬ taneously. We find the word turbine variously defined by different authors. Weisbach includes impulse wheels in the class of turbines. Bjorling distinguishes a turbine from a water wheel in that it takes its water supply at the centre or bot¬ tom of the fall, while a water wheel takes water from the top of the fall. Bodner says a turbine may be defined as a water wheel in which a mo¬ tion of the water relative to the buckets is

essen¬ tial. We also find a turbine defined as a water wheel having buckets which the water flows through instead of in and out at the same open¬ ing, as in the case of an overshot or impulse wheel. Again a turbine is defined as a water wheel in which the buckets are entirely filled instead of being partially filled as in the case of a. water wheel or impulse wheel. The hydraulic turbine in all its vari¬ ous forms is practically a development of the 19th century, and the modern high speed large capacity hydraulic turbine has been

Classification of Rotary Hydraulic Motors

MODE OF RECEIVING WA1ER ON RUNNER

Place of receiving water on runner

Action of water at full capacity

General

direction of flow in wheel

relative to runner

Usual designation of water wheel

Near summit of runner on

Gravity . .

Circumferential! y

Overshot and pitchback

horizontal axis.

downward.

About mid-height of run—

Mainly

Circumferentially

Breast and

“ Ten O’clock ”

ner on horizontal axis.

gravity.

downward.

Below mid-height of run—

M ainly

Circumferentially

Low breast

At one or more points

ner on horizontal axis.

impulse.

downward.

Poncelet

on circumference but

Near bottom of runner on

Tangential .

Undershot

not usually on entire

horizontal axis.

Impulse . .

Hurdy-gurdy

circumference.

Current wheel

Tangential to runner on

Impulse . .

Tangential .

Flutter wheel

vertical axis.

Partially revers—

Pouet volante

ing.

Rouet curves

Tangential to runner on

Impulse . .

T angential com—

Modern j

vertical axis.

pletely revers—

Impulse j

Pelton, Hug, Doble, *etc.*

ing.

Wheels J

Inner end of buckets .

Combined

Outward .

Barker Mill

action.

Inner circumference of

Combined

Outward .

Fourneyron

Usually on entire cir—

runner.

action.

cumference of inlet

Upper surface of runner.

Combined

Downward .

T urbines

Jonval

surface of runner,

action.

which may be on ver—

Outer circumference of

Combined

Circumferential

Scroll central discharge

tical or horizontal

runner.

action.

and inward.

axis.

Inward.

Howd, Francis

Inward and down—

American type

ward.

WATER POWER

Fig. 4 The 10,500 Horse Power Turbine of the Shawinigan Water and Power Company, Quebec, Canada

WATER POWER

Fig. 9 Hydro-Electric Plant of the Mengemor Company, Spain

WATER POWER

evolved from a somewhat crude prototype, mainly within the last 40 years. In the early part of the 19th century, parallel flow or Jonval turbines, and outward flow, or Fourneyron tur¬ bines, both French inventions, were largely used. In the former the water flowed through the -turbine runner in a direction generally parallel with the axis. In the latter the water flowed outward more or less radially through the runner. These simple types of hydraulic turbines were capable of application only to relatively small capacities and low speeds. Then came the development in America of the inward flow type of turbine. This was the work of no one inventor, although Samuel B. Howd of Geneva, N. Y., patented such a turbine in 1836, which closely resembles the most modern types in its principle of operation. While

more compact and giving a higher speed than the French turbine, it was still a wheel of small capacity. James B. Francis of Lowell improved the mechanical construction and efficiency of the Howd wheel, and further developments were made by Swain and others. Even before the advent of hydro-electric power developments and transmission, there came a demand for water wheels of higher speed and greater capac¬ ity than could then be supplied. Probably the greatest achievement of any one man in advanc¬ ing the development of the hydraulic turbine was that of John B. McCormick of Indiana County, Pa. About 1870 he found that by extending the bucket vanes of an inward flow turbine down¬ ward and outward, making them ladle or spoon shaped, he was able to greatly increase the outlet openings of a turbine of a given diameter. At the same time the length or the depth of the inlet openings was proportionately increased, thus greatly increasing the capacity without in¬ creasing the diameter of the runner. Since the speed of a turbine decreases as the diameter in¬ creases, he thus produced a turbine of much greater capacity than any heretofore available without reducing the speed. It was also found that the use of curved vanes, providing for downward and outward flow, as well as inward flow, through the runner, increased the efficiency, since the water left the wheel in a direction op¬ posite to that of the motion of the runner, and so dropped away from the runner with very little absolute velocity.

McCormick's designs were, however, arbi¬ trary, and each size or pattern was worked out by long and* costly experimentation. While the theory of the hydraulic turbine had been de¬ veloped mathematically many years before, it had never been successfully applied in practice to the design of turbines to meet specific con¬ ditions until after the advent of hydro-electric power transmission. The next step in advance consisted in the modification of the combined flow or McCormick turbine, largely by means of theoretical deductions so as to adapt it to speeds, capacities and other conditions somewhat different from those for which the experi&nental designs were made. This process started in Europe, especially in Switzerland, where it was first applied to outward flow or Fourneyron tur¬ bines, exemplified by the Swiss turbines installed in the Niagara power development of 1895. Scientific methods of design were soon extended to inward and combined flow turbines, chiefly in the United States until at the present time,

combined inflow, or so-called Francis type tur¬ bines are produced, not only of enormous capacity, high efficiency and speed, but of de¬

sign so nicely adjusted as to give in practice almost precisely the required or predetermined speed, power and efficiency to meet any desired condition, yet the form of runner and principle of its operation are almost precisely as McCor¬ mick left it.

The essentials of a modern hydraulic turbine as illustrated by Fig. 3, include: (a) The run¬ ner; (b) the guide vanes, which are usually pivoted, so the openings between them can be opened or shut, thus forming gates; (c) the case, which supports the guides and gates, and has bearings which support the runner.

In Fig. 4 the case includes a spiral channel surrounding the gates and runner, for the pur¬ pose of conducting water to all parts of the cir¬ cumference of the wheel at •uniform velocity. The spiral chute is often omitted from the case, especially where the turbines operate under relatively low heads. In such cases, it is fre¬ quently replaced by a spirally formed compart¬ ment of concrete, forming a wheel pit, in which the turbine is set. The pivoted, or as they are called, “Fincke” gates, are an adaptation of a similar contrivance which was used on some of the earlier American stock pattern turbines. The spiral chute is an adaptation of a similar form of case, used on primitive wooden or iron central discharge turbines. The principal de¬ siderata of an hydraulic turbine are: (1) High efficiency; (2) good efficiency when operating at part gate or partial capacity; (3) compactness; (4) high speed; (5) adaptability to speed regu¬ lation. These results are all attained in a re¬ markable degree in the type of turbine illus¬ trated in Fig. 4.

Power developments are generally classified as low medium and high head installations. The type of the turbine and the mode in which it is set in the flume depend largely upon the head, and this governs in a general way the entire layout of the power development.

The essential features of a modern water¬ power development comprise: (1) A dam to impound the water. The dam may be of logs, sawn timbers, stone or concrete, and sometimes of steel or a combination of one or more of these with earth embankments It is usually provided with a spillway or gates. (2) Head gates to control the water to be diverted, and trash racks, the latter to exclude ice and de¬ bris. (3) A conduit which may be either an open canal, an open timber or metal flume or head race, or a closed pipe of wood or steel. A long closed flume is usually connected to a surge tank near its downstream end. (4) A wheel pit (if open) or a penstock (if closed) containing the turbine or turbines. (5) The tur¬ bine itself with its runner, guides, gates and casing. (6) A d*raft tube to convey the water

from the wheel to the tail race. (7) A tail race, which is usually an open channel, to convey the water back to the natural stream. (8) A speed governor.

Power developments may be classified ac¬ cording .to the manner in which a sufficiently concentrated fall or head is obtained, as (1) “cascade” developments, and (2) “canal” deˆ velopments.

Fig. 5 illustrates various modes of setting hydraulic turbines in power plants. Fig. 5 -a shows a vertical turbine in an open concrete flume. This mode of setting is most generally used for relatively low head developments. The wheel compartment is often spiral in form. Fig. 5 -b shows horizontal turbines in an open rec¬ tangular flume. In Fig. 5 -b there are two tur¬ bines or runners combined in a single unit, dis¬ charging into a common compartment between them, called the draft chest. The size of a tur-

a

bine of a given capacity generally varies some¬ what inversely as the speed of the turbine. By the use of two runners forming a single unit, as in Fig. S-b, the capacity of the power unit is doubled without decreasing the speed, or in other words, a given power is obtained at a much higher speed than would result from the use of the single turbine runner of equal capacity. Fig. 5 -c shows a vertical turbine with a closed spiral concrete penstock. This type is often used for medium heads. Fig. 5 -d shows a horizontal tur¬ bine, with a spiral supply chute combined with

the stream instead of wasting its energy in eddies and swirls and

friction on the rough stream bed, flows smoothly and slowly through the pond to the dam with very little loss of power by fric¬ tion. In a cascade development, the power plant is located immediately downstream from the dam or natural fall. Where a canal is used to concentrate the fall it is usually made uni-

Fig. 5. — Usual Arrangements of Power Houses and Hydraulic Turbines.

the turbine case. This type is most commonly used for high head power developments.

A sufficiently concentrated fall for power de¬ velopment may occur in a stream naturally, or it may be created artificially. Fall is obtained artificially by (1) a dam or (2) a canal or con¬ duit, or (3) by both combined. Where a dam is built the fall which naturally occurred in the stream from the dam up to the head of the pond which it forms is concentrated at the dam, and

form and smooth as possible with just enough grade to convey the required volume of water to the power house slowly and smoothly. The stream having a much steeper grade than the canal, the difference of level in the canal and stream, or, in other words the head, pro¬ gressively increases proceeding downstream. Where the water is conveyed from the dam to the power house through a closed conduit, the principle is the same as where a canal is used,

for although the conduit may lie down near stream level, the water would rise in a vertical open pipe, connected to the conduit at any point, to a height nearly equal to the level at the entrance to the

conduit. The difference between the height of the water at the source and the height to which it would rise in such a pipe is the head lost by friction in the conduit. In the earlier days of water-power development in the United States it was considered impracticable to utilize a head of more than about 30 feet on a single turbine. Accordingly, where the fall in a stream was greater than this at a given location, the total fall was subdivided between different canals, and the water drawn from the uppermost level supplied turbines which dis¬ charged into the second or next lower level, *etc.* This type of canal development was success¬ fully utilized at Holyoke, Mass., Cohoes, N. Y., and elsewhere, but it often happened that mills on lower levels did not require the full quantity of water discharged from the upper levels, and a large waste would occur. One of the results which is being brought about by modern ad¬ vanced methods of power development is the substitution of single hydro-electric stations for such canal systems, thus conserving a consider¬ able portion of the available power.

Turbines are usually set at some height, never more than 25 feet, above the bottom of the fall from which they derive their power. The utilization of the power of the water in falling through a height equal to the distance from the centre of the turbine down to the level of the tailrace is effected by means of the draft tube. The water in falling, through the draft tube creates a suction head, which in¬ creases the pressure or power of the water operating the turbine exactly as if the turbine were placed at the foot of the fall, thus render¬ ing the full use of the head practicable. Plac¬ ing the turbine above the tail water has many advantages; among others electrical generators can be directly connected to horizontal turbines so placed without danger of being flooded dur¬ ing high water. Theory requires that in order to utilize the power of a stream of water to the fullest degree, the water must be discharged back into the stream after its use, with the least possible velocity. It is never possible to dis¬ charge the water from a turbine wholly without velocity. The velocity of discharge can be much further reduced by passing the water through a gradually expanding draft tube after it leaves the turbine. The velocity of the water enter¬ ing the draft tube is mostly converted back into draft head, which in turn increases the effec¬ tive head and power of the turbine.

One of the most difficult and at the same time the most important factors in successful water power development for the purpose of generating electricity is the matter of speed regulation.

In many hydro-electric plants, sudden and large changes in load on

the hydraulic turbine, or in the amount of power required, take place. To generate electricity for commercial use, the voltage of the current must remain practically constant. In order that this shall be the case, the speed at which the generator is driven by the hydraulic turbine must be regulated and maintained as nearly constant as possible. If the gates regulating the supply of water to the turbine were set at a constant or fixed position,

then each time that a change in load to the turbine occurs, there would be a corresponding change in the speed of the turbine and the gen¬ erator which it drives. The problem of regu¬ lating the speed of an hydro-electric power unit is much more difficult than that of regu¬ lating a steam-engine or steam-turbine driven electric generator, for a variety of reasons.

Steam is a highly expansive elastic fluid. In order to regulate the speed of the steam engine, it is only necessary to partially open or close the ports or valves admitting steam to the engine cylinder. This is accomplished in plain slide valve engines by the familiar fly-ball governor, and in more advanced types of steam engines by closely related mechanisms. In order to regulate the speed of an hydraulic turbine with changing load, it is necessary to open or close the turbine gates. The weight of these gates and other connected parts which must be moved is enormously greater than the weight of the valves to be moved in regulating a steam engine. Thus the problem of quickly over¬ coming the inertia of heavy weights is in¬ volved. In the case of the steam engine, the steam pressure at the boiler is usually nearly constant. In the case of an hydraulic turbine, the head operating the turbine may vary within relatively wide limits at different seasons of the year. Thus when the head is reduced by back¬ water or otherwise, the gate openings must be wider to maintain a given load and speed than at other times. In hydro-electric plants supplied with water by means of closed conduits or flumes, especially if the head is high, sudden reduction in the gate opening of the turbine produces a pressure wave in the penstock simi¬ lar to the water hammer effect produced when house faucets under considerable pressure are suddenly closed. This pressure wave tends to produce a sudden large increase in the head and pressure, and consequent overspeeding of the turbine at the instant when the gates are closed, or shortly after. This difficulty does not exist in the case of steam engine regula¬ tion. These problems have been solved by the use of modern governors for water wheels, to such an extent that the degree of speed regulation obtainable in hydro-electric plants closely approximates that attained

in the best of steam driven power stations. The principle of operation of a water wheel governor is es¬ sentially the same as that of a steam governor. An incipient change of speed operating on a pair of fly-balls similar to those of a steam engine governor operates what is known as a pilot valve. This is a small valve, easily moved, and consequently sensitive to changes of speed, which admits oil under high pressure to a valve or system of valves known as the ˆrelay.® Oil under high pressure, flowing through the secondary valves, actuates an hydraulic piston, which is articulated to. the water wheel gates. Thus the work of opening or closing the gates is accomplished by oil under high pressure from an accumulator, which is kept constantly supplied by means of an auxiliary pump. An¬ other important feature of a water wheel governor is the compensator. If controlled by the fly-balls alone, the opening or closing of gates could take place only as rapidly as the speed changes. In that event, speed regulation for hydraulic turbines would be relatively slow and inefficient, furthermore its value might be

largely vitiated by the effect of surges. The purpose of the compensator is to immediately set the governor in operation approximately to the full change of gate opening which will be required for a given change of speed or load without waiting until the full change of load or speed occurs. Governors with compensators have been developed to such a degree of perfec¬ tion that they will anticipate with but small error the total effect of a sudden change in load on the generator almost the instant that the change in load and resulting change in speed begins to take place. Slight errors in the first adjustment are quickly corrected by successive smaller movements of the governor mechanism, as the gate openings become adjusted to the new load conditions.

Pondage and storage may be distinguished in that the former is derived directly from a pond formed by the dam supplying the power plant. It is usually used only for the purpose of sup¬ plying a quantity

of water greater than the average flow of the stream for the day, dur¬ ing hours when the load or demand for power is maximum. The pond is then allowed to re¬ fill during hours of the day when the supply , exceeds the demand. When such a pond is drawn down to any degree to supply power, the available head is accordingly reduced and there is generally an economic limit of the amount of the draft from pondage, since the drawing down of the pond to a greater extent reduces the head to such a degree that the power output is not increased by any further

Pump and Accumulator Actuator

Fig. 6. — Modern Water Wheel Governor.

Fig. 6 illustrates a typical water wheel gov¬ ernor or actuator of the oil pressure relay com¬ pensating type. Such an apparatus is almost human in its operation, in apparently antici¬ pating pending load changes, the moment they begin, and correcting the gate opening in ad¬ vance of the complete load change so as to maintain a constant speed.

Water power which is available continuously, or nearly so, is called primary or firm power. The amount of primary power which a given water power plant can produce is measured by the minimum flow of the stream, either natural or as regulated by storage. Power which can be supplied only part of the year, when the flow of the stream is sufficient to produce it, is called secondary or surplus power. Primary power brings the higher price of the two in the market per horsepower year, often about double that of surplus power. The amount of power available at a given location from a natural variable stream may be increased by the use of pondage, or storage, or both.

use of pondage. Storage, on the other hand, is a term usually applied where water which is not otherwise usable, — that is, waters mainly derived from floods or stream flows in excess of the power plant capacities, are stored and held in reserve by natural lakes or artificial reservoirs. Such stored waters are used to make good part of the deficiency in supply of a natural stream during the low water periods. Storage thus increases the average available output of the plant, regardless of the mode of operation, whereas pondage only increases

the available output when the demand for power varies from hour to hour during the day.

In the early days of water power develop¬ ment, water power plant capacities were usually made a little greater than the dry weather ca¬ pacities of the streams supplying them. For example, a common practice was to make a plant capacity equal to the flow of the stream during the third driest month, in other words, the stream would supply the full capacity of the water power plant during nine months of the

The information in regard to water-power resources Is based on estimates compiled by the United States Geological Surrey In 190S and revised by the Department of Agriculture in 1916 (Klee trie power development in the United States, 1916: 64th Cong., 1st seas., S. Doc. 316). The figures show the maximum horsepower, which is defined as the power available for six months of the year

11 /•VWr

Ennv

Js-O

■

10.4

2 7. 6

\fc/ Ji V. o\ p|k

.ansint

£*rirurj|

\ \(\ririT*i

\StJo4

(Yj 1’

! JeAtrsofl t

| M J S

‘ar,UL,

Au;J I***4’

Horsepower per square mile

Less than 10

o . 2 - —v

ao to 30

30 to 40

| Over 50

Figures indicate average for each State

DEPT. OF INTERIOR, U. S. GEOLOGICAL SURVEY U S GEOLOGICAL SURVEY

GEORGE OTIS SMITH., DIRECTOR

Prepared by W B Heroy

WATER-POWER RESOURCE OF THE UNITED STATES

Distribution in horsepower per square mile

Edition of June. .1919

DEPARTMENT OF THE INTERIOR FRANKLIN K LaANE SECRETARY

Sr.»W; n

MU—

loo ˆ _ WO — 3y > __4ˆ° too _ «oo Kilometers

year, on an average When the use of auxiliary steam power became more general, and manu¬ facturing demands increased, the plant capaci¬ ties of newer power developments were often made equal to the sixth or seventh month's flow in order of dryness, so that the stream would supply the full capacities of the plants during five 'or six months of the year only, the defi¬ ciency during the remaining six or seven months being usually made up by the use of auxiliary steam where a constant power output was required.

Modern large capacity turbines, hydro-elec¬ tric developments, inter-connected transmission lines, and large demands for power at times for peak loads or breakdown service, have brought about an increase in the economic ca¬ pacity of hydro-electric power developments, until such plants are sometimes installed hav¬ ing capacities equal to the flow of the stream in the ninth driest month, or even greater, especially where there is extensive pondage or storage in connection with the plant, so that power in large quantities can be developed for short time use from impounded water quite in¬ dependent of the volume of the natural flow at the time. It is seldom commercially feasible, even on the steadiest natural stream, to install a water-power plant having a capacity adequate to utilize the full flow of the stream at all times. As a rule, a large portion of the natural flow during floods goes to waste; furthermore, few hydro-electric plants can utilize all the water which is actually available, but are re¬ stricted in their output at times by low demand for power or by varying loads. The ratio of the average to the maximum or peak load out¬ put of an hydro-electric power plant is called the load factor. If power is used mainly dur¬ ing certain hours of the day only, as for elec¬ tric lighting purposes, the load factor is usually relatively low. If power can be used 24 hours per day, the load factor is increased. The re¬ duction of the operating hours from 10 to eight hours in a manufacturing plant, for ex¬ ample, operated by water power without pond¬ age, may reduce the load factor by about 20 per cent, and

bring about a corresponding economic loss of water power.

Some of the advantages of water as com¬ pared with steam power have been described. Its chief advantage is the saving in coal. This is so significant that in France and Switzerland water power is designated as *((white coal.® Some of the disadvantages of water power are: (1) A larger investment is generally re¬ quired per horse power of plant capacity than for steam power; (2) The power must be de¬ veloped near the place where it naturally occurs, and if desired for distant use beyond a range of a few hundred feet, it must be transmitted by electricity, whereas steam power can be devel¬ oped at the place where it is to be used; (3) In northern climates the use of water power in winter is sometimes seriously hampered1 by the occurrence of ice, especially those varieties known as «needle,® <(slush,» or “anchor ice®; (4) Low head water-power developments are often hampered by variations in head, especially as a result of backwater during floods; (5) Water power can only be generated from the water as it comes to the power plant, and since most streams are variable in the amount of their flow, the power output also is variable,

unless the stream is regulated by natural or artificial storage. Steam power can be gen¬ erated at any rate required, up to the limit of the plant capacity.

The Great Lakes afford an example of nearly complete natural stream flow regulation. Small streams are usually more variable than larger streams, and mountain streams, in which the most rapid fall usually occurs, are fre¬ quently the most variable. Such streams, how¬ ever, most often contain available reservoir sites. As a rule, larger streams are not capable of complete equalization of flow by storage for lack of suitable reservoir sites, or if such sites exist their use for this purpose may be inhibited by the economic value for agricultural or other uses of the land which would be flooded. The potential water power of a stream is propor¬ tional to the product of its total fall in feet multiplied by the average volume of flow. Often a large portion of the natural fall in a stream, especially a large stream, occurs so gradually that its utilization for water-power purposes would entail the construction of long raceways or conduits at prohibitive cost. In view of the fact that much of the natural flow of streams is unavoidably wasted, and that much of their natural fall cannot be commercially utilized, it is evident that efforts for complete conservation and utilization of natural water resources must be futile. Fortunately, there

are many instances where partial conservation of water power which would otherwise waste can be accomplished by storage. Instances where it is physically possible to accomplish these results are more numerous than those where it is commercially feasible.

In order to justify the construction of a stor¬ age reservoir for water-power purposes, the cost of the total power produced, including the cost of storage, should generally not be ma¬ terially greater than the cost per horse power of the power which could be produced without storage. This rule may be modified somewhat by betterment of the grade of power produced by a regulated stream. Sometimes storage reservoirs can be built which will not only serve to equalize stream flow for power purposes, but will perform other important functions, such as the reduction in flood volumes and flood damages at points along the course of the stream below the reservoir. The construction of a storage reservoir useful for both purposes may be justified where its development for power or flood control alone would not be desirable.

A storage reservoir may benefit a water power in two ways: (1) By increasing the average available output; (2) By increasing the pro¬ portion of firm or primary power which the water-power plant can produce. In investiga¬ tions of water-power sites on variable streams, what are known as stream flow or power dura¬ tion diagrams are commonly used to determine the amount and character of the available power output and the economical size of the power development. Such diagrams also serve to illustrate the benefits to water power which may be derived from storage.

On Fig. 7 the line ab shows a power dura¬ tion curve for a natural unregulated stream. In preparing such a curve, the quantities of flow in the stream day by day or month by month are arranged in their order of magnitude from the greatest “o the least, and the corresponding

quantities of power which could be produced by the entire flow of the

stream are determined. In Fig. 7 these quantities are plotted as ordi¬ nates in terms of percentages of time during which the flow of the stream or power available

££SfC£A/T/?G£ or 77 pt££ G/VEfV pOW£P IJ EXCEEDED

Fig. 7. — Water Power Duration Diagram for an Unregulated Stream.

exceeds a given quantity. These time percent¬ ages are shown by the scale at the bottom of the diagram. The total area of the diagram o-a-b-g represents the aggregate volume of power available during the year. If a plant having a capacity of say 2,000 horse power is contemplated, then the area of the diagram o-c-d-b-g lying below the line c-d, corresponding to 2,000 horse power, represents the aggregate average yearly volume of power which would be produced by such a plant, while the area a-c-d lying above the plant capacity line repre¬ sents the volume of power which would be wasted in excess flow or floods. The quantity of firm or primary power which could be pro¬ duced is represented by the rectangular area h-b-g-o lying below the lowest point b on the power, duration curve, while the area h-c-d-b represents the aggregate amount of secondary

PEPCEfi/TASE 0£ T/EJE fl G/VEP POWER IS EXCEEDED

Fig. 8. — Water Power Duration Diagram with Partial Stream Regulation by Storage.

power which could be produced by the given plant. The area d-l-b represents the deficiency which must be made up by steam or other auxiliary power in order to produce a constant output of 2,000 horse power of firm power. If the plant capacity was increased to say 3,000

horse power, as indicated by the line j-k, the quantity of firm power would remain the same as before, and only the secondary power would be increased. This in turn would not be in¬ creased by so great a proportion as the size and consequent cost of the power plant.

These conditions go to fix and determine the most economical size of water-power installa¬ tion which can be installed in a given case. Fig. 8 illustrates the effect of a partial regula¬ tion of the same stream at

the same power site by means of storage. The power duration curve as regulated by storage is represented by the line a-d-m. The average power output is in¬ creased by an amount represented by the shaded area d-b-m for a plant of 2,000 horsepower capacity. The firm power is increased to a greater degree, being represented in this instance by the area m-n-o-g.

One of the apparent advantages of storage is that the stored water can be utilized over and over again by successive plants located on the stream below the storage reservoir. There are, however, certain disadvantages attendant on the utilization of storage which reduce its efficiency for power purposes. As a rule where a storage reservoir is located at some distance upstream from a water-power development, it is not feasible to discharge the stored water in such a manner as to regulate the stream during only the working hours, so that if a power plant below the reservoir operates during certain hours of the day only, and does not have sufficient pondage to regulate the flow for a 24-hour period, then the storage which is let out of a reservoir at some point upstream con¬ tinuously during the dry period, will partially go to waste, . the waste in extreme cases, for plants operating 10 hours a day without pond¬ age, being as much as seven-twelfths of the entire volume of stored water released. A storage reservoir, therefore, effects the greatest benefit on streams where power plants are lo¬ cated which operate uniformly and continu¬ ously or have extensive pondage in immediate connection with the power developments. The quantity of water reaching a power plant located at some distance downstream from a storage reservoir is the sum of the quantity of water discharged at the reservoir and the natural in¬ flow to the stream channel between the reservoir and the power plant. As the distance from the storage reservoir to the power plant increases, the ratio of the latter to the former also in¬ creases, with the result that proceeding down¬ stream from the storage reservoir the degree of regulation afforded thereby progressively de¬ creases.

The first hydro-electric central station in the United States was installed at Appleton, Wis., in 1882. The use of hydro-electric power for lighting advanced rapidly during the 80's, this advance following quickly the invention of the incandescent lamp by Edison in 1879. While there were some previous experiments carried out, the first large scale successful long distance power transmission was that from Lauffen to Frankfort, completed in 1891, by which 110 horse power was transmitted a distance of 112 miles at 12,000 volts. This provided the initial stimulus for extensive hydro-electric power de¬ velopment. Prior to that date, water power was not much used for the generation of electric

Fig. 10 Hydro-Electric Station of the City of Tokio, Japan (a) Complete view of the Generating Station (b) Generator Turbines

Fig. 11 Turbines i”stalled in the High Head Hydro-Electric Station of the City of Bellinzona, Switzerland Fig. 12 Estacada Plant of the Portland (Oregon) Railway Light and Power Company with tnree 6 000 Horse Power Francis Turbines

current unless the water power happened to be located very near the site where the current was to be used.

The growth of hydro-electric power devel¬ opment has taken place mainly along natural economic lines. In general water powers near large .industrial centres were developed first, and of these, those involving the lowest primary investment have been given preference; further¬ more, the first water power developed in a local¬ ity has generally been that having a size suited to the demands of the immediate future. Thus it happens that some of the very largest water powers, as well as numerous smaller ones, have thus far remained undeveloped. The necessity of developing powers of a size suited to the existing market conditions at the time of de¬ velopment is emphasized by the fact that many of the larger hydro-electric developments in the eastern United States passed through bank¬ ruptcy, but are now operating successfully. The cause of the financial difficulties was in general that it took too much time to build up an

adequate market for the output of a power larger than the immediate demand, and during this time the revenue was insufficient to meet interest payments and other fixed charges on the large investment.

There has been a progressive advance both in the modes and extent of utilization of elec¬ tric power, especially hydro-electric power. Originally, its principal uses were for street lighting and street railway traction. In east¬ ern United States good roads and automobiles have lessened the latter demand, although in the Pacific Coast States electric railroads afford the principal means of transport between im¬ portant commercial centres, — coal is more costly — and a large proportion of the hydro¬ electric power produced is used for traction purposes. In the meantime electric lighting has been greatly increased in efficiency. The amount of current required per candle power is much less than formerly. This has stimulated the use of electricity for lighting purposes, and the demand for electric current for ornamental pub¬ lic lighting, and for domestic and commercial lighting and advertising, is rapidly increasing, especially where current produced by water power can be supplied cheaply.

The introduction of hydro-electric power for manufacturing purposes took place more slowly than its use for lighting and traction. At the start almost every manufactory had its own steam or water-power plant, with a complicated system of shafting and belting to drive indi¬ vidual machines. To replace this system by the use of motor drives for individual ma¬ chines, equipment representing a large invest¬ ment must be discarded. The development -of highly efficient variable speed motors, with large initial capacity for starting, combined with the many advantages of direct electric drives for each machine, and the increasing cost of coal and labor, have brought about within the past decade a gradual introduction of the use of hydro-electric current for power in manufacturing. This gives promise of rapid ex¬ tension in the immediate future. Not infre¬ quently manufacturing plants owning water powers have installed electric generators, and have also connected their plants with the trans¬ mission lines of commercial electric companies. If, as usually happens on variable streams, the

water power alone is insufficient to supply all the power required by the manufactory during low water periods, the current is then purchased from the distributing company to make good the deficiency, instead of generating auxiliary power by steam.

When the stream supplies more current than is required, or at night or

other times when the manufacturing plant is shut down, the water power which would otherwise go to waste is con*erted into electric current, and this is turned on to the commercial distributing lines, thus effecting an interchange of power advan¬ tageous to both parties. The use of inter-con¬ necting distribution lines, or of a common disv tribution system, supplied by several hydro¬ electric power plants owned by different com¬ panies or individuals, with an agreement for interchange of surplus power, is now being ac¬ complished in several instances. This procedure bids fair to stimulate the electrical development or re-development of numerous smaller water powers going to waste through non-use or aban¬ donment, or which are now inefficiently used mechanically for manufacturing purposes.

Fixed charges on initial investments form a large item — amounting often to about one-half the total cost — of hydro-electric power pro¬ duction. As a rule the initial cost of hydro¬ electric power development of small water powers is relatively high, often prohibitively so. This is especially likely to be the case where the investment includes the cost of transmission lines to market the output. Where a common distribution system is used, a small water power located near a transmission line may sometimes be developed, and its output turned upon the existing transmission line at the requisite phase, voltage and frequency. By thus operating ((in parallel,® as it is called, the construction of costly transmission lines for small water powers may be avoided in such cases, and a market found for their output. A further stimulus to the use of hydro-electric power in manufactur¬ ing is afforded by the increased cost of coal subsequent to the Great World War.

In certain lines of manufacture, non-constant power can be used to advantage, as for ex¬ ample in the grinding of wood pulp for printing paper, a process which consumes relatively large quantities of power, commonly about 75 to 100 horse power per ton of product per day. Such industries afford a market for a large quantity of secondary power from hydro-electri • stations.

Electrochemical industries require large and constantly increasing quantities of electric cur¬ rent, which because of its cheapness compared with steam-generated current, is almost wholly produced by water power. Recently practicable methods of fixation of nitrogen from the at¬ mosphere have been developed. The product is used in the manufacture of explosives, in other chemical industries, and especially as a means of the nitrification and consequent fertili¬ zation or otherwise weak, worn-out or sterile soils. The demand for nitrogen compounds for agricultural fertilizers is enormous. Their production

from the atmosphere requires the use of lage quantities of electric current. Under present conditions the fixation of nitrogen on a commercial basis for agricultural use can only be accomplished where hydro-electric power is available in large quantities at extremely low cost. This is obtained in some instances, in

Scandinavia in particular, and affords a pros¬ pective means of utilization of large water powers remote from commercial manufacturing centres.

At the present time, hydro-electric power de¬ velopments range in size from those of a few horse power, supplying individual farms or small industries, to plants of 100,000 horse power or more, as at Keokuk, Cedar Rapids and Niagara Falls. The number of existing small water powers of 1,000 horsepower capac¬ ity or less which are undeveloped greatly ex¬ ceeds the number of large water powers, but by far the larger proportion of the total out¬ put of hydro-electric current is produced by medium-sized plants of 1,000 to 20,000 horse¬ power capacity, owing to the fact that these have been found to meet more generally the requirements of commercial feasibility for ex¬ isting market conditions.

Hydro-electric power plants include so wide a variety of natural conditions, types of equip¬ ment and methods of development as to be difficult of typical illustration. They range in heads or falls utilized from a few feet to sev¬ eral thousand feet — in voltage the current ranges from a few hundred volts to 150,000 volts — and in distance of transmission of the output the range is from zero to several hun¬ dred miles. Certain features are, however, more or less common to nearly all hydro-electric power developments, and these are illustrated by the following examples : Fig. 9 gives an ex¬ ternal view, and also a view of the interior, of an hydro-electric power station of the Mengemor Company, Spain. This is a typical cas¬ cade development, in that the fall is created by a dam which also provides pondage, and the power station is located immediately adjacent to the dam; Fig. 10 -shows an external view, and also a view of one of the turbines and generators,

of the hydro-electric power station of the city of Tokio, Japan. This is a high head development of the canal type. Water is brought to the top of the bluff from the Kat-sura River, which has its source in Mount Fugi, by means of a canal, from which it is conveyed to the power station through steel pipe con¬ duits. The turbines are of phosphor bronze, of 4,500 horse power each, and operate under a head of 315 feet.

Fig. 11 shows the power station and pipe lines supplying it used to generate electricity for the city of Bellinzona, Switzerland. This is a very high head development, in which water wheels of the impulse, or Pelton type, are used, as shown in Fig. \-b. The head or fall operat¬ ing the water wheels is 1,132 feet. The water is brought down from the source of supply above the crest of the mountain through the small pipe line shown in the background in Fig. 11 -a.

Fig. 12 is a view of the interior of the Estacada plant of the Portland, Ore., Rail¬ way Light and Power Company. Here a pair of spiral case Francis type turbines is connected to each of the generators.

The total mechanical power used in the United States is estimated at about 180.000,000 horse power. The larger proportion of this is used by railroad locomotives, and for a wide variety of miscellaneous purposes. The amount of power used directly in manufacturing was estimated in 1909 as 18,680,776 horse power. Of this only 1,882,573 horse power was produced

directly by water power, and about an equal amount of hydro-electric power was purchased for manufacturing use. Central electric light and power stations produced at the same date about 7,500,000 horse power.

The developed water power of the United State was estimated at 6,000,000 horse power in 1909. While the total water power of the streams of the United States exceeds 100,000,000 horse power, the larger proportion of this is not capable of profitable development at ithe present time.

Thus while it appears probable that there may be a material increase in the use of w;ater power in the near future, and consequent reduction in the annual coal consumption, it must be expected that an enormous consumption of coal for power purposes will continue for many years. The total water-power resources of the world have been

estimated at about 700,000,000 horse power. See Hydraulics.

Bibliography. — Ball, Sir R. S., <Natural Sources of Power) (London 1915) ; Lof, E. A., and Rushmore, D. B., (Hydro-electric Power Stations) (New York 1917) ; Lyndon, L., c Hydro-electric Power) (2 vols., New York 1916) ; Mead, D. W., (Water Power Engineering> (New York 1915) ; Taylor, W. T., and Braymer, D. H., (American Hydro-electric Practice) (New York 1917) ; (Report of the United States Commissioner of Corporations on Water Power Development in the United States> (Washington 1912).

Robert E. Horton, Consulting Hydraulic Engineer.

WATER PURIFICATION. See Water Supply; Waterworks.

WAXER-RABBIT, or SWAMP-HARE.

See Hares.

WATER-RAIL, a species of rail (Radius aquaticus) widely distributed over Europe, Asia and North Africa and generally common, but, on account of its retiring habits and shyness, not often seen. It is about 11 inches long, olive brown above streaked with black, the under parts gray and the sides streaked. It frequents marshes and bogs, dives and swims well, but is a poor flyer. It is a delicious table-bird. In North America its nearest representative is the king rail (R . elegans). The name is applied generally' to other species of aquatic rails (q.v.) in distinction from the land-rails and crakes (q.v.).

WATER RAT, or VOLE. See Vole.

WATER RIGHTS. See Rivers ; Riparian

Rights.

WATER-SCORPION, a bug of the fam¬ ily Nepidce, whose species inhabit ponds and take their popular name from the scorpion¬ like form of the forelegs, with which they seize their prey. The remaining two pairs are slender and locomotory, and the abdomen terminates in a long, slender breathing tube. Some of the species carry eggs in a layer on the under side of the abdomen. Belostoma includes the largest species with flattened bodies and four-jointed antennae; Nepa is much flattened and oval and the antennae are three-jointed and lamellate; while Ranatra includes species of linear form. The larvae and nymphs of the water-scorpions resemble the imagoes in general aspect, but lack the

wings of the latter. In all stages they are sluggish in movements and secure their prey by hiding and stealth. These insects are very interesting in habits and structure. See Fresh¬ water Insects.

WATER SHELL. See Ordnance.

WATER-SNAKE, a harmless colubrine American snake (Natrix fasciata), closely allied to the garter-snakes (q.v.), but of aquatic hab¬ its, swimming and diving with great ease and skill and spending its life largely in streams, ponds and marshes. It lives largely upon fish, either alive or dead, frogs, tadpoles, newts and aquatic . insects and other small creatures. It is mottled in variable dull tints and is lively and pugnacious. Its eggs are laid in holes in stream banks and similar places. The common grass-snake (q.v.) of Europe, the only British serpent except the viper, is. a near relative. The wart-snake of East India (Acrocordus javanicus) and the sea-snake, a venomous fish-eating hydrophoid of the Indian Ocean, also bear the name of sea-snake.

WATER SOFTENING, specifically the process of eliminating from water the calcium (lime) and magnesium compounds which com¬ bine with soap, forming insoluble curds and prevent the formation of lather, thus making the water ˆhard.® In general the term em¬ braces all forms of removal from water of any substance, lime, magnesia, acid, silt or other material which renders the water unsuitable for industrial use. The process has usually three phases: (1) the removal of scale-forming sub¬ stances; (2) the neutralization or removal of corroding substances; (3) the separation of suspended matters. The first two are chemical; the third, mechanical. Rain water contains only the soluble gases of the air, carbonic acid gas, oxygen, ammonia and sulphurous acid and such dust and dirt as it may have washed out of the air in its fall. The water falling at the last end of a long rainstorm is nearly pure. Such water mixes readily with soap to form a slippery lather and the water is said to be soft. If rain water runs down a clean, grassy slope to a stream, it is still nearly pure soft water. If it runs over limestone or ground containing particles of limestone, it dissolves a

small amount, perhaps two grains per gallon (of 58,391 grains) or one part of limestone to about 29,000 parts of water; but for practical purposes this is still called soft water. If, however, the rain water sinks into the ground to remain a long time in contact with lime¬ stone, it dissolves greater amounts, frequently 20 grains per gallon of water and sometimes more than 100 grains per gallon. Water is commonly said to be hard if it contains more than five grains per gallon. Deep well waters are nearly always of this nature. In the arid plains of the western part of the United States where the soil contains large quantities of common salt (chloride of sodium) and the other salts of sodium and potassium which are all readily soluble in water, the w.ell waters are usually heavily charged not only with the salts of cal¬ cium and magnesium but also with the salts of sodium and potassium and such water is called alkali water. The water which is found near the coal fields frequently contains sulphuric acid to the amount of two or three grains per gallon.

Lakes contain the waters of many creeks and rivers and are usually soft water; but the cur¬ rent is slow or absent altogether and the evapo¬ ration from the broad surface has the effect of concentrating the volume of dissolved salts so that lake water contains rather more min¬ eral matter than river water and is frequently on the border line between soft and hard. Lake Erie water, the softest of all the lakes, con¬ tains about five grains per gallon of the salts of calcium and magnesium. The oceans are the final receptacles for the waters of the rivers and lakes and are subject to continuous evaporation, so that in the course of years the mineral matter has become concentrated and ocean water contains about 2,100 grains per gallon of mineral matter, made up of calcium carbonate, eight grains ; calcium sulphate, 75 grains; magnesium sulphate, 99 grains; mag- . nesium chloride, 230 grains ; potassium sulphate, 55 grains; and sodium chloride, 1,6 33 grains; the great amount of sodium chloride and the relative scarcity of calcium and magnesium compounds being due to reactions which have taken place in the water,, precipitating the salts last mentioned. .Great Salt Lake in Utah and the Dead Sea in Palestine (q.v.) are small bodies of water, like oceans, without known outlets, and since the rivers feeding them are heavily charged with common salt, these lakes contain much more of it in proportion than the oceans. Ocean water contains about 3.5 per cent mineral matter, the Dead Sea 26 per cent and Great Salt Lake averages about 20 per cent.

When hard waters are evaporated the min¬ eral matter is left in a solid mass, interesting examples, being found in the stalactites and

stal¬ agmites in caves and in the deposit in the bot¬ toms of tea kettles. The most serious damage produced by hard water in industrial opera¬ tions is the scale deposited in steam boilers and the waste of soap in washing. Scale in boilers is a deposit of the mineral content of the water evaporated, due in large part to the fact that some of the dissolved salts are more soluble in cold water than in hot and as the temperature rises, the overplus is precipitated as a crust on the inside of the boiler plates. This condition prevents the easy passage of heat from the fire to the water and shortens the life of the boiler because of the excessive temperature to which the steel must be raised in order to force the heat through the scale to the water. The average heat conductivity of boiler scale is one-thirty-seventh of that of the iron of which the boiler is made when the scale is thin. If thick this figure is much too large. The amount of extra fuel required to evaporate water in a boiler which is coated with scale varies with the thickness and character of the scale and with the rate at which the boiler is worked. When the boiler is being driven to nearly its full capacity, the amount of additional fuel re¬ quired by a one-quarter-inch layer of scale is frequently as much as 50 per cent; but if the boiler is being worked at only half its capacity the difference may not be more than 10 per cent. Nearly all tables of such data are based on measurements of the additional amount of fuel required in a scale-covered boiler to heat the water at the same rate as in a clean boiler worked at normal capacity. It is estimated that the railroads of the United States are spending at least $15,000,000 annually in additional fuel

and boiler repairs due to the hard and muddy water used in some parts of the country. Us¬ ing hard water in boilers is much more expen¬ sive than softening it, since on the average 1,000 gallons of hard water will do 50 cents worth of damage in fuel and repairs, while 1,000 gallons of hard water may almost always be softened for less than 3 cents. The value of the soap wasted by hard water is enormous, amounting to 1.7 pounds per 1,000 gallons of water for each grain of hardness, or 17 pounds per 1,000 gallons of water 10 grains hard per gallon, a value of at least 70 cents, when it would cost perhaps two

cents per 1,000 gallons on the average to sufficiently soften such water.

The chlorides and sulphates of calcium and magnesium are readily soluble in water, but the carbonate of lime or magnesium (marble or ordinary limestone) is soluble only in water which contains carbonic acid gas (C02). The greatest difficulty with the magnesium salts is that they prevent or delay the removal of the calcium salts and by their presence raise the point of solubility for calcium carbonate. An increased addition of lime in this case results in the formation of magnesium hydroxide which forms very slowly and is very likely to assume a colloidal form, absorb carbonic oxide from the air and return to its first form. Calcium carbonate will remain in solution in ordinary samples of water to the extent of 2.04 grains per gallon. This amount, how¬ ever, is not large enough to rate the water as (<hard.® If all the carbon dioxide is re¬ moved from the water the limit of solubility will be only 1.08 grains per gallon. And this remnant cannot be dislodged by the addition of caustic lime. Magnesium carbonate is much more soluble where carbon dioxide is present and while it rarely exceeds five or six grains per gallon, it is sometimes in much larger quantity. Even though all the carbon dioxide be removed the content of magnesium car¬ bonate may remain at 12 grains per gallon. The higher the pressure in a boiler the more of this salt will be held in solution. Magnesium chloride, although highly soluble, is very ob¬ jectionable in boiler water because of its tend¬ ency to decompose and produce hydrochloric acid, which is extremely corrosive. Calcium chloride is more stable, but under high pres¬ sure is believed also to break down into hydro¬ chloric acid. It is a simple matter to soften water which contains only the bicarbonate of calcium, because it is necessary only to steal away the extra molecule of C02 by adding a little fresh-slaked lime which has a great af¬ finity for carbonic acid gas and combines with it to form a molecule of mono-carbonate of calcium, which is insoluble, and, like the remain¬ ing molecule of mono-carbonate, settles to the bottom as precipitate. The chemical reaction is stated thus :

Calcium Slaked Calcium mono¬ bicarbonate lime carbonate Water

CaC03(C02) + Ca(OH)2 = 2CaC03 + H20 and thus there is precipitated to the bottom not only the original dissolved limestone but also the slaked lime which has become limestone by uniting with the molecule of carbonic acid gas which held the original limestone in solution. This discovery or invention was made in Eng¬ land by Dr. Clark about 1840 and no better or

cheaper method has since been found for re¬ moving carbonate of lime from water. Cal¬ cium carbonate alone does not form a hard scale in boilers but produces a soft, slimy silt. In combination with other salts, however, it makes the hardest of scale.

In the case of the sulphate of calcium heavy crystals are deposited whenever the boiler pressure reaches or exceeds 50 pounds. The sulphate of calcium scale is regarded as worst of all. The solubility of calcium sulphate is increased by the presence of magnesium chloride and decreased by the presence of cal¬ cium chloride. At high boiler pressure very much less of calcium sulphate is held in solu¬ tion, the excess being precipitated. At ordi¬ nary temperatures water will hold in solution 150 grains per gallon. At a temperature of 356° F., equivalent to a pressure of 132 pounds per square inch, the solubility per gallon is but 16 grains, the remaining 134 grains per gal¬ lon having been deposited as scale. The ordinary method of taking out sulphate or chloride of calcium is to add to the water the proper amount of sodium carbonate (soda ash or washing soda), when the sodium and calcium exchange acids as follows :

Calcium Sodium Calcium Sodium

sulphate carbonate carbonate sulphate CaSCh + Na2C03 = CaC03 + Na2S04

The calcium carbonate settles as a precipitate while the sodium sulphate remains dissolved in the water, and, for boiler or washing purposes, is harmless in any ordinary amount. In water softening operations the treatment for the mag¬ nesium salts is practically identical with that for calcium salts. Mud in suspension is taken out of soft water by introducing a coagulant, as alum, or the combination of two substances which will form a precipitate — such as sulphate of iron and caustic soda, so that the precipitate in settling will carry down with it the fine particles of mud. The oil taken up by steam in engine cylinders is extracted from the con¬ densed water in the same way, so that the water may be used again in the boilers. For boiler purposes it is most important that the softened water should be freed from precipitate and made perfectly clear, because the .presence of particles of solid matter suspended in the water is the most potent cause of boiler foaming. When the reactions take place and the young and fine precipitates are formed, in the presence of old precipitate, an agglomerating action re¬ sults which gathers the small particles together in balls so that they settle readily. The best machines in use

for carrying out these proc¬ esses are automatic in their action and require only to be supplied with chemicals and to have the settled precipitates discharged by opening a valve at the bottom of the settling tank, each once in 24 hours.

The most recent and apparently the most successful of all water softening processes is the use of zeolites, natural or artificial. These substances are silicates containing water, and which, in contradistinction to other silicates, decompose and are soluble in dilute acids. The artificial form is produced by fusing together feldspar, kaolin, pearlash and soda in certain fixed proportions ; and goes by the commercial name of (<permutit.® Two forms are in use — sodium permutit and manganese permutit.

When water is made to flow through a layer ot sodium permutit, the latter exchanges its soda for the calcium and magnesium salts of the water and the degree of hardness in the latter is reduced to zero. The permutit has to be regenerated as it grows lax in action. This is easily accomplished by washing it for a few hours with a solution of common salt. Man¬ ganese permutit in connection with marble dust removes all iron and acids from waters thus affected.

The practice of softening the entire water supply of a municipality has grown steadily and in not a few large manufacturing cities the municipal softening plant is saving the citi¬ zens hundreds of thousands of tons of coal per annum and adding years of life to the community's boilers. The principal require¬ ments are (1) mixing chambers, in which the softening chemicals are thoroughly mixed with the water ; (2) capacious settling basins suffi¬ cient to give the necessary time for the slower i eactions when the temperature is low, as in winter; (3) a device for adding a coagulant (alum or ferrous sulphate) at both the en¬ trance port and the exit port of the water into and from the settling basins; (4) substantial mechanical filters. In addition, as one of the requisites should be a special apparatus to slake the lime, reduce it to a proper emulsion and feed it in proper quantity automatically into the flowing water.

At the municipal water softening plant at Cleveland, Ohio, 150,000,000 gallons of water per day require the daily application of 40 tons of quicklime. This is slaked with hot water, mixed into an emulsion in an agitator, taken to tanks where it is cooled and diluted to the proper consistency and finally pumped at a uniform rate into the flowing water.

In a recent report (1916) upon a water sup¬ ply for the city of Sacramento, Cal., the rel¬ ative hardness of the available waters was con¬ sidered in estimating the cost of the project. The engineers showed that while a supply of water from ground wells would be cheapest in initial outlay, that the water of the Sacra¬ mento River would be more economical for the consumers because of its lower degree of hardness ; the ultimate figures being $38.40 per 1,000,000 gallons for the river water as against $42.40 per 1,000,000 gallons for well water. On the basis of the city's daily consumption of 30,000,000 gallons the saving in soap alone to the consumers amounted to $120 per day. Consult Booth, W. H., (Water Softening and Treatment (London 1906) ; Christie, W. W.,

(Water: Its Purification and Use in the Industries) (New York 1912) ; Whipple, G. C., (The Value of Pure Water* (New York 1907).

C. Herschel Koyl, Consulting Engineer, New York.

WATER SUPPLY: For Municipal, Do¬ mestic and Potable Purposes, Including Its Sources, Conservation, Purification and Dis¬ tribution. Introduction. — This article does not treat of water supply for navigation, irrigation or power development, but is confined princi¬ pally to the consideration of the sources, collec¬ tion, conservation, purification and distribution of water for municipal, domestic and potable purposes. This is becoming an increasingly en¬ grossing subject for all progressive communi¬

ties, since scientific research has shown that many natural waters are the media for the prop¬ agation and dissemination of countless colonies of micro-organisms of vegetative and animal growths, including bacteria, some of which are pathogenic. Some water bacteria have been localized and classified as shown by Prescott and Winslow in their (Elements of Water Bacteri¬ ology. J Many other micro-organisms have also been localized and classified as shown by George C. Whipple in his (Microscopy of Drinking Water.) The nature and characteris¬ tics of some of these organisms must be

studied in all water supply problems and therefore will be considered to some extent under some of the subtitles to follow.

In 1857 Nagel suggested the name <(schizo-mycetes® for all micro-organisms and that des¬ ignation is used by some bacteriologists for all such organisms. Botanists use that designation for vegetative organisms. ((Bacteria,® however, is the name usually applied to living organisms in water. Many of these infest surface and ground waters. Neither lakes, rivers, ponds, nor wells are free from such micro-organisms. Not infrequently thousands of bacteria are found in a cubic centimeter of natural, which is usually denominated <(raw® water. Dr. A. H. Hassall of London (1850) is reported to be the first to identify living organisms in drinking water. He was followed by E. N. Horsford, L. Radlkofer, Ferdinand J. Cohn, James Bell, L. Hirt, W. G. Farlow, Ira Remsen, H. C. Sorby, J. D. Hyatt, George W. Rafter, George C. Whipple and others. Dr. A. C. Houston of the London Metropolitan Board in 1912 reported 10,315 microbes per centimeter of raw Thames water, although says Prof. William P. Mason ((it is now generally admitted that such a medium is not favorable to their growth.® Dr. Houston found that they lived longer in deep Loch Katrine water, one of the sources of supply for Glasgow, than they did in the Thames.

Dr. Robert Koch traced the cholera epidemic of 1892, in Hamburg, which did not prevail in Altona across the Elbe, to the contamination of its unfiltered raw river water supply by the cholera germ, spirillum cholerce Asiatics, or comma bacillus, discovered by Koch in 1884. ‘Altona used filtered water from the Elbe and largely escaped that cholera epidemic. Since the discovery of the specific cholera germ by Dr.* Koch, greater caution is exercised by munic¬ ipalities to prevent the contamination of their water supplies by the spirilla cholerce Asiaticce, and cholera epidemics are less frequent. In 1887 Messina, Sicily, had an epidemic of cholera due to polluted water. Typhoid epidemics have occurred more frequently than Asiatic cholera, for the typhoid bacilli (B . typhosi) are more generally distributed and the contamination of water supplies thereby has been not uncommon. George C. Whipple in (The Microscopy of Drinking Water,* p. 80, says, ((A11 quiescent sur¬ face-waters are liable to contain microscopic organisms in considerable numbers. The water that is entirely free from them is very rare.® From the ˆWaterworks Handbook of Flinn-Weston and Bogert and other publications are excerpted the following data as to bacterial con¬ tents of a few river waters per cubic centimeter.

Bacteria in the Niagara vary from 10,000 to 300,000 per cubic centimeter; in the Seine from 300 per cubic centimeter above Paris to 200,000 per cubic centimeter below Paris; in the Spree from 82,000 per cubic centimeter above Koepe-nick to 10,000,000 per cubic centimeter at Charlottenburg; in the Ohio they averaged 16,500 per cubic centimeter; in the Delaware 7,680 per cubic centimeter; in Crystal Lake, Mass., 185 per cubic centimeter ; in Lake Ontario 7,040 per cubic centimeter; in the Mississippi upwards of 2,000 per cubic centimeter; in the Potomac up¬ wards of 4,000 ‘ per cubic centimeter and in the Merrimac upwards of 11,000 per cubic centimeter; in raw Thames water 10,315 microbes per cubic centimeter; and in the Isar at Munich opposite an effluent of sewage 121,861 per cubic centimeter. In some waters bac¬ teria have exceeded 200,000 per cubic centimeter. Nearly all surface waters have some bacterial content and in many cases the bacteria are pathogenic. Neither are all springs nor well waters entirely free from bacterial in¬ fusion. This may not be sufficient nor of the kind to pollute such waters for some genera are not pathogenic. However, it has been con¬ tended that some non-pathogenic bacteria may become pathogenic under favorable conditions. That is notably so in the case of bacillus coli communis (B . coli), when nourished on sewage and on other typhoid waste.

Ground waters, including wells, in some lo¬ calities are infested with crenothrix at the num¬ ber of 20,000 per cubic centimeter and with sim¬ ilar organisms, where iron and manganese are found. The crenothrix flourisnes in waters impregnated with iron and crenothrix itself se¬ cretes iron and clogs water pipes. Many other species have been found in ground waters, though they may not all be pathogenic. Some time ago the Massachusetts Board of Health tabulated those found in ground waters. In re¬ cent years, possibly from China, there have been imported with livestock, or by means of their hides, the dread anthrax spores (B . anthracis) discovered by Robert Koch in 1876, which have been discharged from tanneries into rivers. They are immune to the ordinary agencies used for the sterilization or purifi¬ cation of water supplies. Turneaure and Russell reported in their (Public Water Supˆ plies) that in Medford, Wis., a well was con¬ taminated by surface water draining into it from a field, where cattle

had died of anthrax or splenic fever.

The bacilli tetani (B . tetani) and many other species have been discovered in raw river water. In 1900, George C. Whipple compiled data showing the relative abundance of diatomacece, chorophycece, cyanophycece and Protozoa in 57 lakes, ponds and storage reservoirs of Massa¬ chusetts. Consult Whipple's < Microscopy of Drinking Water* pp. 139-141. None of such waters were entirely free from some one or more genera of such organisms. They may be considered as fairly representative of all surface waters.

As a result of the prevalence of pathogenic bacteria in water supplies, waterborne diseases are many and include those already mentioned and many other intestinal, tubercular and other disturbances. It is the aim of modern research to prevent all such diseases and to that end

new processes for the purification of water sup¬ plies have been perfected. New standards of purity and wholesomeness have'been established to which water supplies must conform before they are considered safe for potable uses. Some of these will be considered in this article, which will comprise several subtitles.

Primitive Conditions. — In the primitive con¬ ditions of society the water supply of a terri¬ tory received but little attention. The early in¬ habitants of the world were more interested in its availability and abundance than they were in its quality. Accordingly the most populous settlements were those along oceans, seas, gulfs, bays, lakes, rivers and watercourses generally. Early palaeolithic remains have been found along the Thames. In the Stone and Bronze ages dwellings for human habitation were built on poles in the lakes of Switzerland, the British Islands and elsewhere and mounds were con¬ structed along the coasts in Scandinavia. Their occupants were thus abundantly supplied with water as well as protected from the ferocity of wild animals. Primitive peoples, however, knew little or nothing about the animal and vegetative organisms, in surface, running or stored-up water. At first there was little, if any pollution of watercourses by human agen¬ cies. The early inhabitants supplied their needs from nature's inexhaustible reservoirs without fear or even the knowledge that water in any of its manifold forms might be unsafe for do¬ mestic or for general potable uses. That is a matter of recent deduction from the slow dis¬ covery of species of pathogenic bacteria, in sur¬ face and other polluted waters. Some of these develop and propagate readily when taken into the human system as do bacilli coli com~ m

unis.

Prior to the 19th century of our era there are few extant records of the ravages of dis¬ eases and the destruction of human life, attrib¬ uted to the potable uses of unwholesome water. Many wasting fevers, pestilences and plagues are recorded in history prior to the discovery of the deadly species of microscopic organisms in con¬ taminated water, but their causes were unknown. As the population increased and extended from watercourses inland, tanks, storage reservoirs and canals were constructed as they were in As¬ syria, Babylonia, Egypt and China. The sources of the Tigris and Euphrates and the waters of those rivers themselves were con¬ veyed through a network of canals to water the many cities of Mesopotamia whose water jars have been found at Nippur and elsewhere. Khammunabi provided for the protection of some of such canals in his Code of Laws, pro¬ mulgated 2250 b.c. Egypt was watered by the Nile, whose constant flow was maintained by drawing upon the impounded waters of Lake Moeris. Asia Minor had many springs, notably those in the valley of the Msenander. The Ara¬ bians utilized extinct volcanic craters as reser¬ voirs for the accumulation of waters. Greece had its rivers, springs and infiltration galleries. Rome had its lakes, springs, aqueducts, reser¬ voirs and rivers. Carthage and ‘Palestine had their wells, cisterns and pools, supplied by mountain streams. India had its rivers, canals and reservoirs. All those ancient peoples and also the Chinese had their deeply driven wells, which supplied their best waters. Herod-WATER SUPPLY

otus, Hippocrates, Strabo, Pliny and others wrote on the water supply of various countries.

2Eschylus in his (Eumenides) speaking through Athena said:

Ka/ca<c evrippoaior fiopfiopo 6’vdup

’kap.Tcpbv piaivuv ovnod’ evprjaei f tcot6v.

which has been translated as follows :

“ But if with streams defiled and tainted soil Clear river thou pollute, no drink thou ’It find,”

thus warning the Athenians of the dangers in polluted water.

Hippocrates recommended that drinking water be filtered and boiled before using it. That is some proof that he realized that raw water ought to be sterilized before it was drunk. The Romans knew that some waters were un¬ suitable for drinking purposes and used their poorer qualities for irrigation, municipal foun¬ tains and other public non-potable purposes. Not until the advancement of science in the 19th century had revealed waterborne diseases, did the quality of the water supplies of com¬ munities arouse public attention.

The Germ Theory of Disease. — The mod¬ ern sciences of bacteriology and biology re¬ vealed the nature and activities of myriads of microscopic organisms in impure water herein¬ before partially described and how they become the media of infection and the agencies for spreading diseases. After the discoveries of Theodor Schwann, Louis Pasteur, Robert Koch, Ferdinand J. Cohn, Joseph Lister and others during the last century <(the germ theory of disease® was generally accepted. Those pathologists turned their attention to the discovery of means of combating the active agencies that were destructive of human life. They made several important discoveries of antitoxins, serums and lymphs of inesti¬ mable pathological utility to the race. These, however, were insufficient to check the ravages of all infectious diseases, some of which, as was stated, are ‘transmitted through living organisms in potable waters. That led to the study of the water supplies of communities, one of the most engrossing subjects of the last and present century. Municipalities and communities generally for their own welfare must consider and solve this problem regard¬ less of the expense thereby entailed upon tax¬ payers, for it is growing in importance in many habitable parts of the globe with the ever-increasing density of population. Before entering upon the study of the processes for the purification of water supplies, it may be well to consider some of the physical conditions that contribute to the production of the abund¬ ant waters, found in the habitable portions of the earth.

Earth’s Water Supply. — Three-fourths of

its surface is covered with salt water and from those inexhaustible fountains of the deep the heat of the sun is continually drawing invisible vapor up into the strata of the atmosphere, where the aqueous vapor is cooled and becomes visible and is wafted landward over continents. It comes in contact with hills and mountain ranges and is precipitated in rain and snow and so replenishes the infinite watersources of the uplands of the earth. Whether in some one of its

varied forms, it accumulate in in¬ surmountable masses of snow, giving mountain

ranges their names as it did the Himalayas, or in another form it become rivers of ice, like Alpine glaciers to form such commerce-bear¬ ing rivers as the Rhone, or in another form it roll in ceaseless tidal billows encircling the globe, or still in another form it float in vaporous clouds landward to fall in refreshing rains over vast areas of territory to percolate the soil and be stored in an infinite number of natural reservoirs, whence it flows in countless streams to nourish the fruits of the earth and supply the wants of man, it conditions and largely controls the activities of every genera¬ tion and will continue so to do for all time.

Next to the free air we breathe, water is man's greatest earthly possession. Water is freely showered upon the earth in abundance and is stored up in countless pools, ponds, ground waters, subterranean springs and other natural reservoirs and is accumulated in brooks, creeks, streams, rivers, lakes, sounds, bays, seas and the oceans, covering three-fourths of the earth's surface and making habitable a large part of the remaining fourth. Its dis¬ tribution is affected by the uplift and physical configuration of continents and their relation to oceans, the rotation of the earth upon its axis, the temperature, humidity, succession and varying seasons, climate and trade and other prevailing winds. All of these and other natural phenomena more or less condition the amount of precipitation over different areas. Some lofty mountain ranges, continually inter- - cepting vaporous clouds swept inland from the oceans and seas, are capped with permanent masses of snow, which are unfailing sources of water supply for great rivers like the Amazon, the Yukon, the Rhone, the Ganges and others. Other mountain ranges cause al¬ most daily precipitation in the form of rain, which collects in innumerable natural basins on the surface and below it, but high above the sea-level. These are the source of mountain streams and of the occasional underground flow found in some mountain regions. The amount of precipitation varies over different areas. In the polar regions there is no ram and all precipitation there is congealed in the form of snow and icy particles. Rainfall or precipitation is quite fully treated in the special article under the title, Rainfall, in Volume 23 of this Encyclopedia, to which reference is herein made for the amount thereof over various areas of the habitable globe.

Under the operation of natural laws only a part of rainfall can be

collected, conserved and made available for human needs. As an¬ nounced under the article on Rainfall com¬ munities must also consider its disposal. That will appear from what follows.

Disposal of Precipitation. — Water from rain or melting snows disappears from the catchment areas, (1) by evaporation, (2) by transpiration, (3) by runoff and (4) by perco¬ lation. These methods dispose of varying amounts dependent somewhat upon the sur¬ faces, whether land, or water, the seasons, climate, temperature, locality, altitude, vegeta¬ tion, character of the soil and other physical conditions. They may be briefly stated as follows :

(1) Evaporation to some extent already considered under the article on Rainfall may

dispose of any part or all of the rainfall over a limited area and in some instances evapora¬ tion may exceed rainfall, as it did in Massachu¬ setts in 1883. Evaporation goes on from ice and snow less rapidly than from land or water surfaces. Vegetation and trees intercept precipitation and also retard evaporation. They tend to increase percolation for the moisture penetrates the soil in and about the roots and is held there until it percolates into the deep strata of the earth. Various formulae have been deduced to determine evaporation, as stated in the article on Rainfall. These, how¬ ever, are not conclusive.

Capillary attraction acts upon water 30 or more inches below the surface and occasionally lifts a film of water 6 to 30 inches above the ground-water level and so aids evaporation. Wilton Whitney, in 1897, reported (Agri¬ culture Year Book)) that capillarity drew moisture up 20 feet or more to nourish crops in the soils of California. Prof. J. B. Stew¬ art of the Agricultural College of Michi¬ gan reported that capillarity operated upon water from 45 to 70 inches below the surface. The depth of the water-table below the surface is not uniform and varies in different localities. In the Central States it was found by W. J. McGee to be about 22 inches below the surface. Charles H. Lee

of the Geological Survey was of the opinion that the capillarity lift is limited to four feet in coarse sandy soil and to eight feet in fine sandy and clay soils. Thus by the operation of natural laws is the verdure of the earth nourished and sustained from the waters below, though there be insufficient pre¬ cipitation from above. Warm sunshine and gentle winds increase evaporation.

From some soils evaporation averages 16.68 inches annually, where the rainfall is 30.29 inches and the percolation 13.61 inches. Over the Ohio River watersheds, where the rainfall averages 41.1 inches, the evaporation averaged 14.8 inches; over the James River watersheds, where the rainfall averaged 42.1 inches, the evaporation averaged 16.3 inches ; and over the Sacramento River watershed, where the rain¬ fall averaged 32.2 inches, the evaporation averaged 8.5 inches. Evaporation from the Croton watershed was computed by John R. Freeman for a period of 32 years at 24.74 inches. Evaporation has been computed over the Sudbury watershed at 23.63 inches and at Nashua at 23.76 inches. From water surfaces evaporation is much greater than from land surfaces. From the Chestnut Hill reservoir near Boston for a period of years it averaged 39.2 inches and from a water surface at Croton, N. Y., it averaged 39.68 inches. From Mount Hope reservoir at Rochester for 10 years, it averaged 44.45 inches, trom the Muskingum River 40 inches, from Owens Lake, California, 80 inches, from Yakima River, Washington, 32.8 inches, from East Lake, Birmingham, Ala., it ranged from 52.1 inches to 69.4 inches.

The United States Weather Bureau and United States Department of Agriculture for some years have compiled a record of evaporation from the principal watersheds of the United States. These show that about two-thirds of rainfall or precipitation over the United States is disposed of by evaporation.

In Massachusetts in 1883, evaporation was 39.12 inches and rainfall was only 32.78 inches.

From a water surface at Lea Bridge, Eng¬ land, it averaged 20.6 inches, whereas for 14 years it averaged 18.14 inches from land sur¬ faces, where the rainfall was 25.72 inches. At Rothamsted, England, evaporation averaged 16.68 inches, where rainfall averaged 30.29 inches. From Talla reservoir, Edinburgh, it averaged 15 inches. The characteristics of land areas and their general physical condi¬ tions, together with atmospheric influences, affect evaporation.

(2) Transpiration also disposes of an ap¬ preciable amount of rainfall in some localities through grasses, grains, other vegetation, shrub¬ bery and trees and by them returned to the at¬ mosphere. Bulletin No. 285 of the Bureau of Plant Industry of the United States De¬ partment of Agriculture shows the water re¬ quirements of various cereals and plants. Prof. Adolph T. Meyer states that ((For grasses and grains the ratio of pounds of water used to pounds of dry substance pro¬ duced varies from 300.1 to 600. l.w B. E. Livingston has undertaken to show (40 Botanical Gazette 31) that there is a direct re¬ lationship between transpiration and the weight of vegetables produced. The Depart¬ ment of Agriculture of the United States has also undertaken to show that the yield of grain of an area is approximately proportionate to the water consumed. It will thus be seen that large quantities of water are taken up by the growing vegetation and forests of the earth and returned to the atmosphere. Growing crops absorb from 9 to 10 inches of rainfall and brush and trees from 4 to 12 inches of rain¬ fall according to estimates made by Professor Meyer. Nearly all such water escapes from the stomata of leaves into the air, for the amount retained is very slight. Raphael Zon of the United States Forestry Bureau re¬ ported in 1913, that one acre of oak forest in Austria absorbed upwards of 2,227 gallons of water daily, which was equivalent to a rainfall of 1 2*4 inches in a period of five months. These figures indicate the enormous quantities of water given off by forests into the air.

The United States Department of Agricul¬ ture collected data in Central Europe showing the transpiration from forests to equal one-fourth the rainfall there. From deductions oi M. W. Harrington it appears that much of the rainfall is transpired into the atmosphere by green crops and three-fourths of it from some forests and less than one-third from bare soil. During the growing season plants and trees draw moisture and water from the subsoils and thence it escapes into the atmosphere. The amount of water so taken from the ground by the capillary attraction in vegetation, plants and trees and by them transpired into the at¬ mosphere varies greatly under different phys¬ ical conditions, but enough has been stated to indicate that an appreciable part of the pre¬ cipitation is thus disposed of and under some conditions that amounts to 20 inches.

(3) The runoff from different watersheds also varies greatly, depending upon their physical characteristics, including their geologi¬ cal structures and configuration. Sandy sur¬ faces freely absorb water and from them there

is little runoff, whereas clay and rocky soils absorb but little rainfall and from such sur¬ faces the runoff is large. Steep slopes also shed water freely, whereas forest-clad areas retard, absorb and retain a large part of the rainfall. The following data will illustrate the amount of water disposed of in the localities mentioned by runoff. The runoff waters from catchment areas or watersheds accumulate in pools, ponds, lakes and rivers and become one of the two available sources of water supply, the other being ground-waters. From the Genesee River at Mount Morris, N. Y., from 1892 to 1898, the runoff ranged from 6.67 to 19.38 inches, averaging about 12 inches.

Prof. Adolph F. Meyer in his work on (Elements of Hydrology > says that evapora¬ tion and transpiration dispose of 15 to 25 inches of rainfall and the remainder represents runoff which includes seepage and percolation. The latter will be considered under the next subtitle. From the map of the Geological Survey prepared by Henry Gannett, it appears that the surface runoff over different water¬ sheds ranges from three inches in the States east of the Rocky Mountains to 60 or 80 inches in the northern Pacific States. In the Central and Eastern States, it approximates 20 inches. Each watershed, however, must be independ¬ ently studied to determine its runoff. This varies greatly in the. different months and necessarily averages much less than the rain¬ fall. Where the mean precipitation over the upper Mississippi reservoirs was 24.62 inches, the mean runoff was only 3.61 inches and the percolation averaged 14.7 inches. Over the Mississippi watershed it averaged 5.31 inches, or nearly 25 per cent of the rainfall. The rate of runoff to rainfall ranged from 15 per cent in the Missouri Basin to 24 per cent in the Ohio Basin. In Ohio it amounted to 22 inches. At Saint Croix, Wis., it was 9.6 inches, at Roanoke, Va., it was 17.7 inches. In the Yazoo and Saint Francis basins, the runoff was 90 per cent of the rainfall. Over the Connecticut River where the precipitation for nine years averaged 36 inches, the runoff averaged 21.9 inches. From the James River watershed tor seven years, it averaged 18 inches. At Tohickon Creek for 24 years, it averaged 26.10 inches. At Tombigbee, Miss., it averaged 17.10 inches, at Sacramento, Cal., it averaged 20.4 inches. Over the Sudbury River, where the precipitation for 25 years averaged 45.4 inches, the runoff was 21.5 inches. In the State of New York it averaged about 45 per cent of the rainfall.

John C. Hoyt and Robert Anderson in their * Hydrography of the

Susquehanna River Drainage Basing reported that the runoff in that part of the basin above Harrisburg from 1891 to 1904, averaged from 49 to 55 per cent of the rainfall and at other places in the basin from 49 to 63 per cent of the rainfall. Over the Nashua River where the precipitation for 13 years averaged 47.3 inches, the runoff averaged 23.9 inches. The runoff averages nearly 50 per cent of the rainfall in New England. Over the Croton River, where the precipitation for 43 years averaged 48.9 inches, the runoff averaged 23.3 inches. Over the Mil-burn-Massapequa watershed, Long Island, N. Y., where the mean precipitation was 46.41

inches the runoff was about 30 per cent thereof. Over the Susquehanna River, where the pre¬ cipitation for 10 years averaged 38.4 inches, the runoff averaged 21.3 inches. Over the James River in Virginia, where the precipita¬ tion for 14 years averaged 42.3 inches, the run¬ off averaged 17.9 inches. Over the Potomac River, where the precipitation for 14 years averaged 37.4 inches, the runoff averaged 14.4 inches. Over the Muskingum, where for seven years precipitation averaged 41.21 inches, the runoff averaged 14.20 inches. Over the Rock River, Illinois, where the precipitation for five years averaged 33.88 inches, the runoff averaged 10.03 inches. George W. Rafter in (Water Supply and Irrigation Papers No. 80 United States Geological Survey) gives the runoff for various years over 12 watersheds, and it averaged from one-third to one-half the rainfall.

Over Saale River, in Germany, where for 14 years precipitation averaged 23.78 inches, the runoff averaged 7.17 inches. Over Remsched Dam in Germany, where for nine years pre¬ cipitation averaged 45.62 inches, the runoff aver¬ aged 30.78 inches. Over the Woodburn River in Ireland, where precipitation was 36.29 inches, the runoff was 23.04 inches. Over the Buffalo River in South Africa, where precipitation was 29.52 inches, the runoff was 5.30 inches.

The mean runoff from 20 watersheds in France is nearly 50 per cent of the precipi¬ tation, while in Germany the mean runoff from nine watersheds does not, excepting in three in¬ stances, exceed one-third the precipitation.

The mean runoff from the watersheds of Great Britain ranges from 50

per cent to 75 per cent of the precipitation. The foregoing data, largely from approved reports, indicate observed runoffs. They are not merely esti¬ mates from curves which are fraught with more or less error, owing to the failure in some instances to take into consideration all the necessary physical elements of a given water¬ shed to determine its actual runoff.

The French physicist, G. Lidy, proposed the equation of P -f-E + R = R", wherein P stands for percolation, E for evaporation, R for runoff and R" for rainfall, but that does not always accord with actual measurements. Atmospheric and material conditions may so affect the fac¬ tors of the equation as to make an un¬ balanced equation.

T. U. Taylor, of the Society of Civil Engi¬ neers, well says : <(Runoff is a complex factor depending on rainfall topography, vegetation, kinds and condition of the soil at the time of the rains.® (Proceedings of the Society of Civil Engineers, Vol. XL, p. 166).

(4) Percolation is the descent of water from rain or snow, or from other sources into the porous strata of the earth due to gravity. Water thus descends to the saturated horizon usually a little above the water-bearing level of the ground water. As the latter is drawn upon by capillarity and ceaselessly flows away between the strata of the earth, it is depleted and the percolating waters replenish the losses. Such <(gravity waters® descend, where the soils do not admit of capillarity. Ground waters fill the subterranean channels, supply springs and wells and descend

"Through caverns measureless to man Down to a sunless sea."

The subterranean Rubicon in Belgium is a river of ground waters.

Ground waters are well nigh unfailing sources of water supplies as we shall see from what follows. As already stated, percolation disposes of what is left after evaporation, transpiration and runoff have eliminated a large part of the rainfall. It is conditioned some¬ what

upon the physical formation of the ter¬ ritory and also upon climate, temperature, eleva¬ tion and slope of watershed. On mountain slopes and hillsides, where the surface and strata are tilted, there is little percolation, but excessive runoff. Permeability of the strata determines their storage capacity. Soils, un¬ consolidated deposits, sands, gravels, sand¬ stones, porous limestones, slate, till, conglom¬ erate quartzite and other rocks absorb quan¬ tities of water dependent upon their porosity. The denser rocks, such as granites, gneisses and schists are relatively impervious to satur¬ ation and in such geological formations only in joints, faults, bedding planes, caverns and sub¬ surface basins and channels is water collected. The porosity of all these different strata and the physical conditions of the earth s crust largely control the amount and depth of per¬ colation, which ranges in different locations from 10 per cent to 50 per cent of the pre¬ cipitation.

Into some soils over which the rainfall is 30.29 inches the percolation averages 13.61 inches thereof. On Long Island it was esti¬ mated by the Burr-Hering-Freeman Commis¬ sion to be from 30 per cent to 50 per cent of the rainfall and to range from 15 to 25 inches, conditioned upon the dry and wet years. In Muhlthal, Germany, where the rainfall was

47.1 inches, the percolation was found by Walter E. Spear to equal 30.42 inches. He estimated the percolation in Germany to equal 50 per cent of the rainfall, in Holland to range from

11.1 inches to 15.3 inches of the rainfall and in Belgium to range from 6 to 9.7 inches of the rainfall. Herbert E. Gregory estimated that 25 per cent of the 46.89 inches of rainfall over Connecticut is absorbed in the ground, while in some sections of the United States such absorption is greatest during the period of heaviest rainfall and then it ranges from 80 per cent to 95 per cent of the precipitation. In this manner water enters the strata of the earth and forms underground streams or is collected in springs and in subsurface basins. Such waters are known as ground waters and supply wells and also flow toward river beds and to adjacent waters, such as lakes, seas and oceans. Ground waters are also supplied from streams flowing over the surface. Large habitable areas are supplied from underground flow by means of innumerable wells, tapping that flow, or by means of springs or by means of conduits, as on Long Island, or by means of infiltration gal¬ leries, as in some parts of Belgium, Holland and Germany.

I. M. de Varona found that the amount of ground water recovered from Ridgewood drain¬ age area of 65.4 square miles in 1890, when

the rainfall was 52.15 inches, was 17.68 inches, which was 33.9 per cent of the former. For several years in that area such amount ranged from 28 per cent to 33 per cent of the pre¬ cipitation. The Board of Water Supply esti¬ mated that, if the Ridgewood watershed were

completely developed, the yield of ground waters in normal rainfall years would be nearly 1,000,000 gallons a day for each square mile of area They reported that the old watershed was ’yielding 900,000 gallons a day per square mile and the new one was yielding 700,000 gal¬ lons a day per square mile. The Burr-Henng- Freeman Commission from its investigations concluded that, in addition to the water being pumped in 1903 for Brooklyn, there might be obtained 200,000,000 gallons per day from the southern watersheds of Long Island.

The underground reservoirs of California are structural basins filled with the alluvial debris, due to the weathering of the adjacent mountain ranges. Through such alluvial de¬ posits precipitation percolates to the impervious rock below. The ground waters are thus col¬ lected and their only escape is through some possible subterranean or known surface channel, evaporation or springing or seeping through the overlaying deposits at the lower side of the tilted, but elevated, basin. Such ground waters may be used and in some mountain localities are being drawn and conducted to irrigate des¬ ert areas and to supply needy communities with wholesome waters.

The report of the State Water Conference of California in 1916 shows that many of Cali¬ fornia’s water problems were considered and recommendations made for drawing upon the ground waters in the San Joaquin and Sacra¬ mento valleys and elsewhere to irrigate the arid lands where there is insufficient precipitation to make such lands productive and also to supply waters for municipal purposes.

The extent and quality of some ground waters are shown in the Water Supply Papers of the United States Geological Survey as fol¬ lows : for Connecticut in Paper 232, for Kan¬ sas in Paper 273, for Iowa in Paper 293 and for Owen Valley, California, in Paper 294.

Some of the legal principles applicable to ground waters in Europe and America are stated in Bradford Corporation v. Ferrand, 2 Ch. 655; also fully reported in two British Rul¬ ing Cases, 980; The People v. New York Car¬ bonic Acid Gas Co., 196 N. Y. 421 ; Lindsley v. National Carbonic Acid Gas Co., 220 U. S. 61 ; and in the annotations

to the first of said cases and in the other cases referred to in said cases. Consult (Water Supply and Irrigation Paper No. 122, } United States Geological Survey.

The Board of Water Supply of New York reported in 1912 that the Brussels watershed of 4.6 square miles yielded 2,100,000 gallons a day; that The Hague sand dune catchment area of 7 square miles yielded 5,100,000 gallons a day; that the Amsterdam sand dune catchment area of 11.6 square miles yielded 6,100,000 gallons a day, and that the Muhlthal watershed of 14.7 square miles yielded 21,300,000 gallons a day.

These few records indicate the large quan¬ tities of ground waters obtainable from the watersheds mentioned for water supply pur¬ poses. They also indicate the quantities of per¬ colation into the strata of the areas described. They also indicate the amount of water stored in the earth's strata for water supply purposes. Some of the ground waters, however, find their way to the surface by seepage through sands and gravels, emerging in ponds, streams and springs. Such seepage is the outflow through

WATER SUPPLY

1 Titicus Reservoir and Dam, New York Water Supply

2 Chain of Rock Filters, Saint Louis System

WATER SUPPLY

: - ‘ -

‘ . ˆ,“ > 1 - * j

1*7ˆ

iMLt-wri zst -

, ■ ˆ | |

jjjs

1 High Pressure Fire Service Pumping Station, New York

2 Water Laboratory, New York

WATER SUPPLY

1 Coagulating Basins with Filter House on Left, Cincinnati, O

2 Filter House Interior, Cincinnati, O

WATER SUPPLY

■

1 ‘.‘4

1 Toronto Drifting Sand Filters (view from south west)

2 Toronto Drifting Sand Filters — Filter Gallery and Filters (looking north)

WATER SUPPLY

45

ihc surficial layers of ground waters flowing downward from the water-tables above. Wher¬ ever the ground water level is higher than the surface or depressions in the surface, the water “seeps5* through

the sands and gravels and ap¬ pears as already stated. This is noticeable in marshy areas in the period of heavy rainfall and also in the many mineral and other seepage springs found in mountainous districts as well as in such streams as those on Long Island. The amount of ground water thus returned to the surface is but a small percentage of the volume of underflow, the amount and rate of which in some localities have been determined and reported by Charles S. Slichter of the Geological Survey. The winter flow of Minne¬ sota streams is largely seepage waters.

Ground waters are being continuously replen¬ ished by percolating waters coming from pre¬ cipitation, the amount of which the world over must be known to ascertain the volume of sur¬ face and ground waters available for the water supplies of the inhabitants of the earth. They are also replenished to some extent from sur¬ face waters in some regions.

Percolating waters descend to the surface of the saturated strata and become part of the permanent ground waters of the region. The saturated strata known as “water-bearing for¬ mations** are several hundred feet in thickness and overlie the strata that are impervious to water. The surface of saturation is known as “the ground-water level** and may be within a few feet of the surface. Above this saturation is not constant. Hence, to insure a continuous supply, wells must be deep enough to reach the ground water level, and as that fluctuates in different regions and in the wet and dry seasons, it is necessary to drive wells some distance below the level. From the several water hori¬ zons, comprising strata, consisting of differ¬ ent geological formations, various qualities and quantities of water are obtainable. Geological and water supplies reports of this and other countries may be consulted for specific informa¬ tion in relation to the nature of the ground waters of any region covered in such reports. Myton H. Fuller and others of the United States Geological Survey have compiled much valuable data on the ground waters of the United States of America. From their reports as well as from others it appears that the water-bearing horizons are not always hori¬ zontal, but incline either up or down in most watersheds, and the force of gravity causes a flow of ground waters between the layers of such horizons, “mainly,** says Herbert E. Greg¬ ory, “in the same direction as the slope of the surface.** Such flow is very slow, being from a few feet to a mile or more a year, depending on several conditions, such as character of the water-bearing formations, temperature, slope, percolation and other physical elements. The flow, however, is continuous and replenishes wells, springs and streams, as they are drawn upon, or otherwise discharge their waters. Springs and flowing wells exist in Connecticut,

Michigan, Iowa, California and elsewhere. These and thousands of other wells in all lands are fed from the inexhaustible ground waters of the earth to supply human needs. Copen¬ hagen draws its entire supply from wells down through glacial drift to chalk deposits.

Some of these may be hereinafter mentioned,

as they are the principal sources of the water supply of most rural populations.

Water supplies are obtained from waters that run off from catchment areas and from waters that percolate the strata of the earth. Before considering any particular water sup¬ ply and a few only need be considered as they are necessarily local and special in their char¬ acteristics, may be considered the important matter of the purification of water supplies. That subject is of general interest to all com¬ munities.

Purification of Water Supplies.

Introduction.— This is so important that it must be considered at some length and under several subheadings. Enough has al¬ ready been said to show that nearly all waters in their natural or raw state are unsuitable for potable uses, but most unpolluted surface waters may be rendered wholesome. Under this subtitle some of the processes in use for that purpose will be described.

Purification of water supplies is no longer effected by the lyre of Empedocles as stated by Matthew Arnold, whose music did

“ Cleanse to sweet airs the breath of poisonous streams.”

Absolute self-purification of running waters has not been conclusively demonstrated, though partial purification is undoubtedly effected. (Consult Phelps, Earle B., (Studies on the Self-Purification of Streams,* United States Public Health Service). Where oxygen from the air is dissolved in water oxidation of organic matter takes place and bacteria in time are destroyed provided such running water be not further pol¬ luted by sewage and other contaminating refuse. Where waters are covered with ice and oxygen is excluded therefrom, there may be an increase-in their bacterial content. Prof. H. Marshall Ward has reported that the blue and violet rays of sunlight destroy bacteria near the sur¬ face but have little or no effect upon the germs a few feet below the surface. In darkness some genera are propagated. The

B. coli com¬ munis, B. typhosus and others will live several days in running water and multiply therein, if there be waste material thrown into it.

To aid natural purification, “filter wells, ** “filter galleries** and “filter cribs** have been installed at some places in West Virginia, Penn¬ sylvania, Indiana, Ohio, Massachusetts and else¬ where, which are of doubtful utility for they merely clear the water of visible pollution, while they may concentrate the bacteria and promote their propagation.

Polluted waters percolating into some soil’s are subjected to nitrification, which William P. Mason describes, as the tearing asunder of the objectionable nitrogenous organic materials, securing their union with the oxygen of the air and thus converting them into harmless inor¬ ganic forms. The action of nitrifying bacilli is mainly confined to upper layers of soil. Mason on (Water Supply,* p. 221.

George A. Johnson of the United States Geological Survey says in his valuable Water Supply paper that “a majority of the cities and towns of the United States take their water supply from ground sources …

and as a rule they are pure, clear and color¬ less, although they are very hard and others

contain much iron in solution.® Recent bac¬ teriological and microscopic examinations, how¬ ever, show many ground waters and conse¬ quently wells and springs are not wholly free of pathogenic bacteria. All waters collected for potable purposes ought to be tested before they are used. Most of them in their natural state contain micro-organisms, some of which are pathogenic and others are harmless as stated by Dr. Maximilian Marsson of Berlin in his lectures on <(The Significance of Flora and Fauna in Maintaining the Purity of Nat¬ ural Waters.® Each water supply from what¬ ever source ought to be tested before use. Iron is found in the ground waters of Ger¬ many, Holland, the Netherlands, Britain, the United States and

elsewhere.

In his valuable work entitled (The Purifica¬ tion of Public Water Supplies, > John W. Hill, at page 278, says ((the dimensions of the bacteria (B . typhosi) are stated in microns, designated by the Greek letter g, which is 1/1000 milli¬ meter, equal to 1/25000 of an inch. Thus the typical dimensions of B. typhosus are .5 to .8 p-wide, by 1.5 to 2.5 p long, or about 1/50000 to 1/31250 of an inch wide or thick and 1/16666 to 1/10000 of an inch long. Tak¬ ing the average length of the typhoid bacillus as two microns (g) it would require 12,500 of these placed end on end to make an inch.®

All such bacteria are invisible and may be de¬ tected only by some one of the modern scien¬ tific tests. (Consult Hasseltine, H. E., (The Bacteriological Examination of Water/ United States Public Health Service). Some bacteria are non-pathogenic and, with such knowledge as we now have of their characteristics, are con¬ sidered harmless, while others are themselves destructive of lower bacteria, as are the Rotifera. Bacteriologists are studying these lower forms of life to determine their nature and activities in relation to other forms of animal life and are making new discoveries from time to time of vital importance to the welfare of the race.

Bacteria and Other Micro-organisms in Water. — Migula undertook to classify all bac¬ teria into five families, namely, (1) Coccaceae, (2) Bacteriaceae, (3) Spirillaceae, (4) Chlamydo-bacteriaceae and (5) Beggiatoaceae.

That grouping is still maintained by some bacteriologists. Other and additional families have also been suggested. Some species are pathogenic. Some bacteria already localized are B. acrophilum, -B. alcaligenes, B. anthracis, also known as the microspira comma bacillus, the cause of anthrax, or splenic fever, B. clocce, , B. coscorobce, B. coli communis , under certain conditions pathogenic, one of the widely disseminated microbes, B. communion, B. cul-ticularis sporogenes, B. diphtherias, B. enteritidis sporogenes in sewage, B. influenzce, B. leprce, B. pestis, causing Bubonic plague, B. prodiglo-sus, B. ruminatus, B. salmoni, causing hog-cholera, B. shigce, found in cases of diarrhea, dysentery and cholera infantum, B. simplex, B. streptococci, B. subtilis, B. tuberculosis, B. tumesceus, B. typhosus, B. welchii, M. agilis, P. miribilis, B. vesiculosi and others.

Nearly all of these subsist in natural and polluted waters and, increase rapidly under favorable conditions. Thousands of some of them have been found in a single cubic centi¬ meter of raw water. They are

found in

natural, unpolluted pools, brooks and ponds in rural and even in mountain regions. From official reports it may be seen how prevalent they are in nearly all waters and the processes that are being adopted to eliminate or destroy them. Some of these will be considered in this article. In 1906, S. D. Gage concluded that they propagate more rapidly in warm weather than they do in cold weather. Millions of some species have been found in a cubic centimeter of sewage, thus showing the danger of pollution therefrom.

In addition to the bacteria proper are the in¬ numerable micro-organisms, comprising both animal and vegetative growths in drinking water. Prof. George C. Whipple has de¬ scribed and enumerated in his (Microscopy of Drinking Water) 200 or more of such species. He has classified vegetative organisms into such groups as (1) Diatomaceae, (2) Schiz-ophyceae, comprising Schizomycetes and Cy-anophyceae, (3) Algae, (4) Fungi and (5) vari¬ ous higher plants. Under Diatomaceae is the species Asterionella, which infested Mount Prospect reservoir in Brooklyn in 1897 and ne¬ cessitated its non-use until they could be re¬ moved.

He has classified the animal micro-organ¬ isms into (1) Protozoa, comprising rhizopoda, mastigophora (flagellata), and infusoria; (2) Rotifera; (3) Crustacea, comprising entomo-straca; (4) Bryozoa; (5) Spongidae, and (6) various higher animals.

Other sanitary engineers, biologists and bac¬ teriologists have localized and classified other species, of which these may be legion. Some of these have been studied and subjected to various tests to determine their characteristics and their effect upon water and water supplies. Some live but a short time, while others live for days, weeks and even months. Some after brief existence die and impart a disagreeable taste or an offensive odor to water. Some genera are pathogenic, that is they produce disease in human beings and other genera are harmless, so far as known at the present time.

Prescott and Winslow in their (Elements of Water Bacteriology) describe still other char¬ acteristics of some of the countless colonies of animalcula infesting the surface and ground waters of the earth. Bacteria are found in shallow wells and even in deep well waters. Prescott and Winslow found them in deep wells and springs in Worcester, Waltham, Hyde Park, Mass., in Newport, R. I., and at

Saranac Lake, N. Y. They have been found in well waters at Mainz, Leitmeritz and Kiel in Germany and elsewhere. Quantitative bac¬ teriological examinations and the microscope are now revealing bacteria in many waters not detected by any of the tests formerly applied, and that may account for the failure to discover them. Consequently bacteria in ground waters escape detection and such waters were formerly considered pure and wholesome. <(Even rain and snow,® say Prescott and Win¬ slow in their (Elements of Water Bacteriology/ <(are by no means free from germs, but con¬ tain them according to the amount of dust present in the air at the time of the precipita¬ tion… . Janowski, in 1888, found in freshly fallen snow from 34 to 463 bacteria per cubic centimeter of snow water… . It is

difficult to find a river in inhabited regions, which does not contain several hundred or thousands of bacteria to the cubic centimeter.®

In ground waters are found such micro¬ scopic organisms as crenothrix, cladothrox, lepo-throx, astenonella, ancerobia and typhoid bac¬ teria. , The latter were reported as occurring in some ground waters in Germany, probably due to surface pollution. Still many communities obtain their supply from surface waters such as springs, streams, rivers, ponds and lakes, all of which are fed primarily by the waters and snows, precipitated over the earth's surface to the extent already shown. Most of said waters are consumed in their natural state without purification by filtration, sterilization or other¬ wise. As already stated, it is a well-known fact that most surface waters are unsafe for potable uses. Such waters are frequently pol¬ luted by the inflow of sewage and become the purveyors of deadly organisms.

The investigation of the pollution and sani¬ tary conditions of the Potomac watershed under the supervision of the United States Hygienic Laboratory reported in Bulletin No. 104 dis¬ closed 20 or more genera of living organisms, including bacilli coli communes in great quan¬ tities. Spore-forming ancerobia, gas producing organisms, were found in parts of the river unpolluted by sewage, thus proving that those living organisms may be found in any surface waters. The

biology of rivers has been treated by Dr. S. A. Forbes, Prof. R. E. Richardson and others-in this country and by Dr. A. C. Houston-in his (Report on Research for The Metropolitan Water Board of London) and by W. G. Savage of England. The American Pub¬ lic Health Association in its report on Stand¬ ard Methods of Water Analysis) in 1912, sug¬ gested tests to discover bacteria in water. Typhoid fever and other deadly diseases may have their inception from the bacteria in such unwholesome waters. It is, therefore, of vital importance to all communities, that they be provided with pure water supplies. This may be accomplished by treating such waters in a manner to rid them of bacteria and all other foreign organisms. Other bacteria will be mentioned under the several processes for their elimination.

The general acceptance of ((the germ theory of disease® led to investigation into the media of transmission of pathogenic microbes. Pot¬ able water was found not only to be a pur¬ veyor of such bacteria but a medium for their propagation. The epidemic of Asiatic cholera in Europe in 1847 and in 1850 has since been attributed largely to contaminated water sup¬ plies. The British Parliament, suspecting that such might be the case, in 1852 passed its first act requiring the filtration of the Metropolitan Water Supply. Later Dr. Robert Koch actually discovered the cholera bacillus (B . choleras Asiaticce or comma bacillus) and found that it would exist for some time in water. He thereby demonstrated that cholera might be spread through water supply of communities, as it ap¬ peared to have been spread during the epidemic of 1847 and 1850. Upon the surface of an open sand filter at Boston six genera and four and one-third million organisms were found in one square centimeter of sand. All were not patho¬ genic but some are an aid to filtration. How¬

ever when the decomposition of such organisms in water sets in, it may impart offensive odors. These have been grouped as aromatic, grassy and fishy, thereby indicating the genus under¬ going decomposition and disclosing the char¬ acter of pollution.

The most numerous and prevalent patho¬ genic microbes found in American and foreign surface waters are the typhoid bacilli, which caused a death rate of 23.3 per 100,000 popula¬ tion in 48 cities of the United States in 1910. That is four times the death rate per 100,000 population in Berlin, Vienna and London from typhoid fever per annum. But the death rate from typhoid in America is being lowere'd, as greater efforts are being made to secure pure waters for municipal and general potable pur¬ poses. Fortunately for rural

populations most of their supplies are from ground waters, which are free or largely so from bacteria, except where such ground waters are near enough the surface to be polluted.

Dr. Koch discovered a method of eliminat¬ ing bacteria from surface waters, which was to allow the water to percolate through slow filters. Those were found to remove most of the microbes from the water as it percolated through such layers of sand and gravel. A single filter, however, did not always arrest all the living organisms in the water, so that two or three sand filters came into use. The filter beds at first are not wholly impervious to the transmission of bacteria. It was learned from experiments that the surface must first be coated with a film of mud and microbes before the latter were entirely arrested. When such a film is completely formed over the surface of the layer of sand, then the filter is efficient and may be kept in operation as long as water continues to percolate through it. Then its layers may be washed by drawing off the water standing in the basin and by forcing filtered water up through the layers of sand and of coagulated matter. While the filtered water is being so forced up through the layers, they and the coagulated matter thereon may be agitated by raking as is done in the works of Pittsburgh, or they may be agitated by mechanical devices. In this manner the coagulated matter is lifted and freed from the surface of the sand. Filtra¬ tion may then be resumed. This may be repeated once or twice before it is necessary to scrape off the coagulated matter and the upper layer of sand to the depth of one or two inches, which is all that is necessary to remove, in order to dispose of the pathogenic microbes and other foreign bodies and the mud and silt. The layers of sand so removed may then be cleansed, dried and replaced in the filter basin and filtration may be resumed. There are various methods of renovating sedimentary and infiltration basins, but the foregoing methods illustrate some of the processes in general use. It is a well-known fact that bacteria propagate rapidly and there is always a possibility that some may pass through a filter and con¬ taminate the water that has passed through such filter.

The processes in general use for the purifi¬ cation of water include: (1) Sedimentation with or without chemicals; (2) preliminary treatment for slow sand filters; (3) slow sand filtration; (4) rapid sand filtration ; (5) the dis-

infection of water supplies by various chemi¬ cals; (6) the application of (a) ozone, or (b) ultra-violet rays of light, and (7) by sterilization. Two or more of these processes may be used in succession in the same plant, or they may form parts of a single system though operating independently of each other.

In the application of these processes many subsidiary details are involved and the com¬ pleted waterworks of a city are often its most costly, complex and elaborate public works.

A brief description of each of these several processes for the purification of water may show something of their value and adaptability to the services which they are required to per¬ form in rendering water suitable for domestic and potable purposes.

1. Sedimentation is the clarification of tur¬ bid or of other waters holding particles of for¬ eign matter in suspension. This may be aided

at Cincinnati and Covington ; Dr. A. C. Houston reported to the London Metropolitan Board that <(thirty days' storage of river-water is tan¬ tamount to sterilization" as to pathogenic mi¬ crobes. William P. Mason, however, states that ((bacteria sink but slowly in water." If that be so, a long period of subsidence is neces¬ sary to make sedimentation an efficient process for their removal from water supplies.

2. The preliminary treatment of water for slow sand filters may be affected by the use of sulphate of lime to coagulate the clav particles in suspension as in the Potomac, or by the use of concrete sedimentation basins with roughing filters of coarse stone, called baffles, to strain out the coarser materials in some waters coagulated by the introduction of chemicals and removed therefrom before the water passes into the sedi¬ mentation basins, as in the filtration plant at Pittsburgh, or still by the use of such prelimi-

Fig. 1. — -General Plan of Filtration Plant, Washington, D. C.

by the introduction of such chemicals as tend to promote coagulation of the particles in sus¬ pension in the water. Sedimentation is the process used in the removal of such large parˆ tides as are found in the waters of the Hudson above Poughkeepsie, in those of the Potomac above Washington, in the Ohio above Cincinnati and Louisville and in the Mississippi above New Orleans, in all of which cities sedimentation reservoirs and coagulation basins are in use. The process removes most of the colloidal mate¬ rial in suspension. Percy Frankland found that sedimentation removed 82 per cent of the bac¬ teria in the Grand Junction Company's reservoir and about 87 per cent of the bacteria from the water that had passed through to storage res¬ ervoirs of the West Middlesex Company. Offi¬ cial reports show that from 87 per cent to 97 per cent of the bacteria were removed from the waters after 32 days subsidence in the reservoirs

nary filters without coagulation, as those of the Torresdale type in use at Philadelphia, where since their installation it has been found necessary to install a sedimentation basin for the use of coagulants on account of the large quantity of turbid waters to be treated, or still by the use of such prefilters as those described by William F. Johnson, in the Puech-Chabal system extensively used in Europe. That sys¬ tem consists of a series of decreasing in size roughing filters, a subsiding basin and a coagu¬ lating basin.

3. The slow sand filtration process is in use in Washington, D. C. A large area of sand is required and many watertight basins of sand are necessary, where a large volume of water is to be clarified. The Belmont and Queen Lane filters of Philadelphia are of this type and comprise many shallow sand beds underlain with layers of gravel. Such filters

have masonry or concrete walls and are cov¬ ered over where necessary to prevent freezing. Philadelphia has five slow sand filtration plants, known as the Upper and Lower Rox-borough,

Belmont, Torresdale and Queen Lane plants, with an aggregate daily capacity of 405,- 000,00.0 gallons, the largest in the world. Some of these have settling basins, sedimentation basins, covered preliminary filters, filtered water reservoirs, the Torresdale plant of 240,000,000 gallons daily capacity having 120 covered me¬ chanical preliminary filters. Philadelphia ob¬ tains its supply from the Schuylkill and Dela¬ ware rivers and the latter is becoming so pol¬ luted, that other sources may be required. The arrangements there for treating water with chemicals were elaborate and it was necessary to use chlorine, for the Torresdale filters did not remove all the bacteria.

From Hugh S. Cumming's (Investigation of the Potomac Watershed,* it appears that the District of Columbia obtains its supply of water from the Potomac River at Great Falls 150ˆ feet above tidewater. The water is conducted through a circular conduit nine feet in diameter most of the 15 miles distance by gravity to the Dalecarlia, Georgetown and McMillan Park res¬ ervoirs, from the latter of which the water is pumped up 21 feet to the slow sand filtration plant, one of the best in the country, compris¬ ing 29 filters, each having an area of an acre, altogether having a daily capacity of upwards of 100, 000 , 000 gallons. In the Georgetown reser¬ voir the water is sometimes treated with sulphate of aluminum, used as a coagulant to assist sedimentation before slow sand filtra¬ tion and in some cases it is used where no fil¬ tration is employed.

Plants for supplying such preparation of alum as a coagulant have recently been installed at Trenton, N. J., Springfield, Mass., Columbus, Ohio, and at Omaha, Neb. Slow sand filters were used by the Chelsea Water Company of London in 1829 to remove turbidity from water. As now constructed their daily capacity is from 2,000,000 to 3,000,000, and in some exceptional cases as high as from 6,000,000 to 8,000,000 gal¬ lons per acre. When they become clogged, as they necessarily do, then the coagulated deposit is removed. Then the superficial layers of sand from one-half to one and one-half inches in depth are scraped off, then washed and dried and replaced. There are several means for sand washing, including the Nichols separator, the Blaisdell filter sand-washing machine and surface raking, which increases the efficiency of the process of slow sand filtration. In all such plants at least 12 inches of sand must be main¬ tained and from two to three feet of sand is much more efficient. Many cities and villages are using the slow sand filtration process for the filtration of water, including New Orleans, Pittsburgh, Superior, Zurich, Yokohama and Osaka, where in 1905, the bacteria were reduced from 200 to 25 per cubic centimeter, while at Lawrence, Mass., the bacteria in the Merrimac River water were reduced from 12,700 to 70 per cubic centimeter as a

result of the installa¬ tion of the slow sand filtration plant there in 1893. The chlorine disinfection of that water was reported on by Clark and Gage in 1909, showing the reduction of bacteria at different temperatures of the water. Such plants are at VOI.. 29 — 4

Albany, N. Y., and at Wilmington, Del., and many are in use in Europe. Some of them are equipped with automatic controllers. The rate of filtration is slow and the filter must be cleaned and that is done by scraping off the superficial layers of sand and then washing, drying and replacing them. Allen Hazen says that <(sand filtration alone, without preliminary treatment, is able to remove nearly all of the objectionable bacteria, as well as other organ¬ isms, from many waters, at the same time puri¬ fying them in other ways.** The bacterial con¬ tent of the filtered water is very low, but not entirely free from organisms. It was on the re¬ port of James P. Kirkwood of his investigations in Europe in 1866, that Slow Sand Filtration plants were subsequently constructed at Poughkeepsie, Lowell, Columbus and Toledo.

4. Rapid sand filters, by some also denomi¬ nated mechanical filters, require less area than do the former type, but they are more elaborate and somewhat complex in construction. Typical plants comprise pumping stations, preliminary settling basins, coagulation basins for the treat¬ ment of the waters by chemicals, chemical rooms and mixers, filter tanks -with connecting pipes, cleaning apparatus, controlling mechan¬ ism, covered reservoirs for the filtered water, a drainage system and other equipment to meet existing conditions, as to locality, characteristics of raw water and amount of filtered water de¬ sired. Filters of this type will clarify 125,000,- 000 gallons of water a day per acre of its tur¬ bidity and of 90 per cent to 99 per cent of its bacteria. Strictly modern rapid sand filter plants under skilful management with the proper use of germicidal chemicals are nearly 100 per cent efficient in the elimination of all bacteria from ordinary running surface waters. Some waters, however, carry in solution an abnormal amount of foreign substances and those may partially neutralize the germicidal agents of the usual dosage and in such cases the bacterial content may not be entirely negli¬ gible. In such cases the foreign matter may partially consume the disinfectant, so that some of the bacteria may escape and appear in the effluent. Such effluents may then be treated with chlorine, which will destroy the remaining bacteria, unless they be of a class immune to such treatment.

Rapid sand filters of the improved type are in use in Little Falls, N. J., Cincinnati, Colum¬ bus, Cleveland, Youngstown and Toledo in Ohio, Louisville, Ky., Saint Louis, New Orleans, Harrisburg, Minneapolis, Baltimore and else¬ where. The Cincinnati, Louisville, New Orleans and some others also have preliminary settling basins, where the suspended colloidal matter in the water settles. The water is then drawn off into the coagulation basins and therein coagu¬ lation is effected by the introduction of com¬ mon alum, or aluminum sulphate alone or with caustic lime or ferrous sulphate (copperas) or other chemical coagulant. When brine is used in some cases caustic alkali is also needed.

Joseph W. Ellms, author of (Water Puri¬ fication states that <(such electrolytes as acid basis and salts will coagulate colloidal suspen¬ sions and so will hydrochloric acid, caustic soda, caustic lime or ordinary salt solutions.** In that manner all organic matter including bacteria and inorganic matter suspended in the

water are entangled and deposited on the layer of sand at the bottom of the basin. The bac* teria and colloidal matter so deposited form a coating, or film over the surface of sand im¬ pervious to bacteria and other suspended mat¬ ter but not so to water, which flows rapidly through it. Many devices serve to facilitate the operation of that process of the purification of the raw river waters, which are the source of supplies for such cities.

Rapid sand filtration operates rapidly, owing in part to the reverse flow of water through the sand, which flow washes away the accumulation of coagulated matter and bacteria into the drainage pipes. Several hundred cities are using this process for the purification of their waters, including many foreign cities. The bacteria in the Polar River water at Bethman-galia, India, were reduced from 4,350 to 13 per cubic centimeter.

The construction and operation of the rapid sand filtration plant at Baltimore will suffice to illustrate that process of purification of water

supplies.

Baltimore formerly obtained its water supply from Gunpowder River, collected into Loch-Raven and from Jones Falls collected into Loch Roland. Both sources were polluted by patho¬ genic bacteria, including B. typhosi and B. coli communes in great quantities.

Baltimore still obtains its principal water supply from the new impounding reservoir at Loch Raven, which has been enlarged by a new dam 48 feet above the bedrock. The water is drawn through a tunnel 12 feet in diameter into Lake Montebello and from that lake it is pumped through a venturi meter, an aerator gate house, headi house with tower 80 feet high containing chemical storage bins, a mixing basin, coagulating basins and thence to the filters. The design involves the handling of wash waters in the settling res¬ ervoirs, a drainage system, effluent pipe details, a head house, a pumping station, a baffle mixing chamber, two coagulating basins, covered fil¬ tered water reservoirs and other equipments.

A nine-foot conduit, recently built, connects the Montebello reservoirs with the distributing system at Lake Clifton. Altogether the Bal¬ timore new mechanical filtration plant, also known as the rapid sand filter, at Lake Mon¬ tebello, has 32 units, each with a capacity of 4,000,000 gallons daily.

5. The disinfection of water supplies by various chemicals. In 1774 the Swedish chem¬ ist, Karl Wilhelm Schecle, made an analysis of manganese dioxide and from that he was led to the discovery of chlorine. Hydrochloric acid, consisting of chlorine and hydrogen, was isolated by J. Priestly in 1772. Chlorine de¬ pends upon the oxidation of that acid, whose salts are known as chlorides. In 1800 chlorine was used as a disinfectant in France and in England. In 1854 it was used in London to deodorize sewage. Another chlorine disinfect¬ ant was Eau de Javelle made by Percy, near Paris in 1792, also known as Labarraque solu¬ tion, chloros and chlorozone, according to Joseph Race. The germicidal nature of chlo¬ rine, however, was not understood until after the discovery of living organisms in water. Experiments were made with chlorine in

France, England, Germany and in the United States. In 1890 a plant was erected for its manufacture at Bradford, England, and in 1893 one was erected at Brewster, N. Y., and (<elec-trozone® was applied to the sewage then pol¬ luting the Croton water supply. Dr. A. C.

Houston of London is said to be the first to apply chlorine to the purification of water. The history of disinfectants now very widely and generally used is given to show the slow prog¬ ress made in the evolution of such agencies for the purification of water supplies. Had chlorine been in general use within half a century after its discovery, the appalling mortality in London in 1854, due to cholera, and in Germany in 1892-93, also due to cholera, might have been avoided.

The chemicals now in use as such disin¬ fectants are liquefied chlorine gas, calcium hypochlorite or bleaching powder, sodium hypochlorite, copper sulphate in minute quanti¬ ties, sulphate of ammonia, sulphate of iron, caustic and hydrated lime, carbonate of soda, chloramine and possibly others or compounds of some of these. Most of these germicides are of recent discovery and their application to water supplies has necessitated the renova¬ tion of most of the water plants of this and other countries. Since the proposal of Webster in 1889 to use electrolyzed seawater as a dis¬ infectant, several processes have been utilized for the transmission of a current of electricity through some of the foregoing and other sub¬ stances to produce coagulants and disinfectants.

In 1859 James Watt discovered that hypochlorites were produced by the electrolysis of the chlorides of alkalies and alkaline earths.

Joseph Race, in his (Chlorination of Water, > p. 106, maintains that in the electrolysis ((of the solution of sodium chloride, the chlorine may combine with the sodium hydrate formed by the action of the sodium on the water to form sodium hypochlorite, one-fialf of the chlorine produced is found as hypochlorite and the other half reforming sodium chloride… .

The electrolytic hypochlorite method offers some advantages, but in the great majority of plants it cannot economically compete with bleach.®

Commercial bleaching powder is formed by passing chlorine gas over slacked lime. It is also known as calcium hypochlorite and as stated by Joseph W. Ellms in his <Water Purification, } p. 369, consists of several chemi¬ cals formed by the reaction of chlorine and calcium, such as calcium oxychloride, calcium chloride, calcium chlorate, calcium hydroxide, calcium carbonate, calcium sulphate, oxides of Na.K.Mg.Fe and Si. and moisture. These un¬ dergo reactions resulting in the evolution of oxygen which is set free and is destructive of micro-organisms. Oxygen is the potential en¬ ergy that destroys them.

Calcium hypochlorite was first used effec¬ tively in this country to purify the waters of the Benton reservoir at Jersey City of bac¬ teria. Since that it has been and is still ex¬ tensively used as a disinfectant. Its germicidal energy is said to equal ozone as an oxydizing and sterilizing agent, and is much cheaper than ozone.

Hypochlorite of sodium, obtained by the

electrolysis of salt, has some advantages over hypochlorite of calcium, which produces sludge, that clogs orifices and is dangerous to fish, when dumped into running waters.

Joseph Race, in his (Chlorination of Water, > p. 17, says that l(on dissolving bleach in water the first action is the decomposition of calcium oxychloride into an equal number of molecules of calcium hypochlorite and calcium chloride.® At page 20 he says : <(The addition of small quantities of sodium chloride (0.1 per cent) in¬ creases the hydrolysis of bleach solutions but much larger quantities tend to the opposite di¬ rection .... Sodium chloride in the absence of hypochlorites was found to have no influ¬ ence upon the viability of B. coli in water.®

Bleaching powder is one of the most effi¬ cient germicidal agents. The neutralizing chem¬ ical for an overdose of bleaching solution is sodium thiosulphate at one-half the amount of the former.

F. Raschig, Samuel Rideal and Joseph Race have developed the new germicide, known as chloramine (NH2C1), formed by adding am¬ monia to bleaching solution, which increases the germicidal action of the latter. Joseph Race has stated that from numerous experiments he concluded that the most efficient proportion of the compound was two parts by weight of chlo¬ rine to one part by weight of ammonia. Consult Race, J., Chlorination of Water* (p. 118).

On a recent inspection of the operation of the chloramine process at Ottawa, the author learned that the after-growth noted after the use of

hypochlorite in some plants amounting to 20,- 000 bacteria per cubic centimeter has been elimi¬ nated and that the B. coli communes had been nearly all destroyed. Race reported that similar results followed the application of chloramine at the Capitol Hill reservoir in Denver, where bacteria dropped from 15,000 to 10 per cubic centimeter. It is important to the health of a community that some process be adopted that will eliminate or destroy pathogenic bacteria, so that less than 100 bacteria per cubic centi¬ meter survive whatever process of purification that community may adopt. Otherwise, its water supply is not of that degree of purity which hygienic standards require for potable uses. Such standards have been greatly raised in the last half century, and no enlightened community would be suffered to use such water supplies as were in general use before the nature and characteristics of the micro-organ¬ isms in such waters were discovered and par¬ tially understood. Therefore the modern proc¬ esses for the purification must be efficient, and to be so they must conform to scientific stand¬ ards. Communities will not be permitted longer to provide water laden with pathogenic mi¬ crobes, and if any one of the foregoing processes of purification fail to eliminate or destroy such organisms, then it ought to be superseded by the installation of a more efficient process, as was done at Ottawa by the substitution of the chloramine in place of liquid chlorine.

Lieutenant Nesfield of the Indian Medical Service is said to have used liquid chlorine gas as a disinfectant of water in 1903. Sifice 1910 liquified chlorine gas has been used in several cantonments of the United States army and at Wilmington, Philadelphia, Brooklyn, New York and in many other places. On the Western Front during the Great World War

it was successfully applied by means of liquid chlorine machines. The Dunwoodie chlorinating plant for New York City has a daily capacity of 400,000,000 gallons. The chlorine gas is introduced into the water in the aqueduct as it leaves the Kensico reservoir to ensure practical sterilization of the water before it reaches the city of New York. This process has some advantages over the hypochlorite or ozone process, though there is danger of injury to operators from leakages of the gas, which is injurious to the lungs and deadly if inhaled in concentrations of .06 per cent. The rela¬ tive efficiency and cost of installation of these several processes are usually considered be¬ fore any one is installed. Recently halazone (ChN-CbS C&HˆCOOH) has been found to be an efficient chemical for sterilizing heavily polluted waters.

6. The Application of (a) Ozone, or (b) Ultra Violet Rays of Light. — (a) ((Ozone is produced,® says Allen Hazen in his (Clean Water and How to Get It,> p. 101, «by the discharge of high-tension electricity through air under certain conditions. The air is afterward pumped through the water to be treated or otherwise the water is showered downward through towers in which the ozonized air is circulated.® Ozone, being a modification of oxygen, is a. more active oxidizing agent than oxygen and is a powerful disinfectant. There are many devices for the application of ozoned air to the purification of water, but the process is equally efficient but more expensive than the application of the chemicals hereinbefore de¬ scribed. The De Frise system at Saint Maur gives satisfaction in sterilizing the Marne water after sedimentation and filtration. Sanitary commissions, health authorities and specialists have extensively experimented with it in Europe and found ozonized air, when properly applied, was. destructive of bacteria in water. The application of the ozonized air produced by the ozonizers, of which there are several in use, such as the large plant of 128 Siemens and Halske ozonizers at Petrograd, with five sterilizing towers, is as follows :

The ozonized air enters the bottom of water towers and is absorbed by the water as it de¬ scends through the layers of gravel in some and sieves in other towers after the water has first passed through sedimentation and pre¬ liminary sand-filter basins. Such water as it enters the sterilizer may still contain several hundred bacteria per cubic centimeter. The pathogenic bacteria, such as typhoid and cholera microbes, are destroyed by ozonized air, though the more hardy and harmless ones may escape destruction. In the higher towers, the steriliz¬ ing ozonized air is injected at several levels, as at Ginnekin, Holland, where all pathogenic bacteria are destroyed. The process is more costly than the hypochlorite process, but it has been pronounced by an English expert as (<ideal.® It is in use in Brussels, Ginnekin, Paris, London, Berlin, Petrograd, Florence, Chartres, Nice, Saint Maur, Wiesbaden, Paderborn and in many other European cities, and at one plant in Philadelphia and in Ann Arbor, Herring Run, Md., and a few other places, but it is not at present extensively used in America. It has some advantages over the chlorine processes. The Otto process in use in Nice purifies 5,000,000 gallons daily. Its general

use in Europe, after most thorough tests as to its efficiency, may result in its more general use in America.

(b) Ultra-violet rays of light. One of the recently discovered processes for the destruc¬ tion of pathogenic bacteria is the application of ultra-violet light to the flow of water through flumes, so that the organisms are exposed to the concentration of its rays. Several ultra¬ violet ray sterilizers have been devised and suc¬ cessfully used in the rapid destruction of bacteria. It was demonstrated, by experiments made by Henri Helbronner and others at Sorbonne University in Paris, that bacteria can¬ not long endure the direct ultra-violet rays of three ten-thousandths of a millimeter in length. American tests have shown that it required only one-twentieth of a second to kill bacteria with such rays, but they must not be inter¬ cepted by suspended organic matter in the water. It is, therefore, necessary that the water be rid of turbidity before applying the ultra¬ violet ray process to its sterilization, for Dr. Von Reckling-Hausen declared that it is the light and not chemical reaction that produces the germicidal results. Ultra-violet ray tests made at Luneville, France, on water containing 60,000 germs per cubic centimeter reduced the number to 10 germs per cubic centimeter and destroyed all B. coli. The death rate of 70 to 160 of typhoid fever also became negligible. Since devastations of the Great World War began, the water supply of northern France has been contaminated at the rate of 4,600 putrescent bacteria and 1,000 B. coli per cubic centimeter and they may go on for years in an increasing ratio, in consequence of the count¬ less burials and pollution of the underground waters of the war zone. The Quartz-Mercury lamp is sometimes used to produce ultra-violet rays for the sterilization of water. That process eliminated nearly all the bacteria from the raw Durance river water at Marseilles.

7. By Sterilization. — Purification is also gen¬ erally effected by sterilization, which is used in conjunction with several of the processes al¬ ready mentioned. By reason of the various chemicals used and their germicidal action on micro-organisms, irrespective of the other agencies employed, too much attention cannot be given to the process of sterilization.

In recent years some public water supplies have been purified by sterilization, where sewage bacteria now known as ancerobic spore¬ forming bacilli, including B. cerogenes capsul-atus, B. cnteritidis, or B.

sporogenes and B. streptococci were present. Active agents were necessary to destroy them. The basins or reser¬ voirs where the process of sterilization is in operation must be cleansed two or more times a day.

In 1892, the English employed calcium hypo¬ chlorite to disinfect sewage. In the following year the American Public Health Association recommended its use as a disinfectant. It was known in 1892 that hypochlorites were efficient water sterilizers. In 1897 they were first used at Maidstone, England, to purify its water sup¬ ply, after a typhoid epidemic. In 1904 they were applied to disinfect the water pipes in London. Thereafter they came into quite gen¬ eral use in this and other countries. Hypo¬ chlorite of lime and hypochlorite of soda are

the principal chemicals used. Where hypo¬ chlorite of lime is used its solutions are thoroughly mixed with the raw water in the proportion of 5 to 10 pounds of the powder to 1,000,000 gallons of water, which is destruc¬ tive of such pathogenic germs as typhoid, cholera and other bacilli. The objection to this chemical is that a sludge is formed, which interrupts the flow through the orifices and is also injurious to aquatic life, when deposited in fresh waters. Hypochlorite of soda, electrolytically produced, is somewhat more de¬ structive of pathogenic bacteria than hypo¬ chlorite of lime. It is not difficult to produce and does not form sludge. The hypochlorites, however, are not a substitute for filtration, but rather additional agencies, that may be used to ensure complete destruction of pathogenic germs. Some spore-forming bacteria in water are not pathogenic and not all of these are destroyed, because they are hardy and not af¬ fected by any of these chemicals, when in such small proportions as not to affect the water deleteriously, but made sufficiently active to destroy pathogenic germs, which are less hardy. Many cities in this and in other countries use the hypochlorite processes in connection with sedimentation and filtration.

Francis F. Langley reported (American Journal Public Health, 4 Dec. 1914) that two billion gallons of water per day were being treated with bleaching powder, or chlorine gas. As already stated, liquid chlorine being the liquification of chlorine gas, produced by the electrolysis of sodium chloride in the manufac¬ ture of caustic soda, is also used to sterilize water supplies. There are several devices for applying the gas, which is eliminated from the liquid by heat, to the tanks of water to be treated. The gaseous vapor is diffused through the

water and destroys the pathogenic germs. Some of the chlorinated water so sterilized in the tower of Wilmington contained only from 6 to 50 bacteria per cubic centimeter. Liquid chlorine is one of the sterilizing agencies used in Chicago Stock Yards, at Philadelphia, Pa., Saint Louis, Mo., Trenton and Newark, N. J., Cincinnati, Ohio, Niagara Falls and Ossining,

N. Y., Hartford and Stamford, Conn., Saint Catherines and other places in Canada and at Honolulu, Hawaii, and elsewhere.

The ferrochlorine process of sterilization has been tested in Paris and found to be an effi¬ cient bactericide, though on account of its cost it is not in general use. Another sterilizing chemical was proposed in the form of copper sulphates, but that has not been generally adopted. It was proposed as a sterilizing . process to dispose of microscopic organisms. The research work of the Bureau of Plant Industry of the United States Department of Agriculture, D. D. Jackson in his work on (Odors and Tastes of Surface Waters, } and especially George C. Whipple, department engi¬ neer under the Burr-Hering-Freeman Commis¬ sion, on the Additional Water Supply of New York City, and others have called attention to algae, and spore-forming diatomacece (diatoms), or bacillariece , now classified as vegetative or¬ ganisms, varying in diameter from one thou¬ sandth of a millimeter to one millimeter. Several species of these microscopic organ¬ isms are found in fresh waters. Several species

of Anopheles have been localized in the waters of Alabama, South Carolina and North Caro¬ lina by Dr. H. R. Carter and others of the United States Public Health Service. Anopheles are the cause of malaria. Mosquito-eating fish are being introduced to rid such waters of the Anopheles larvae.

Dr. Zacharias has identified the animalcula known as flagellata, which multiply rapidly and discolor surface waters. Rhizopods, including amoebce, diffhigia and other genera ; and in¬ fusoria which are the highest type of Protozoa , are also microscopic. Some are free-swim¬

ming and others attached animalcula. They exist in countless colonies and some of them are in¬ ternal parasites. These infest reservoirs and other potable waters. The larvae of chirono-mus are found in. upper layers of sand of water¬ works in great colonies. Green and blue algoe known in Germany as ((water ‘blossoms, w zooglcea, bcggiatoa and innumerable other micro-organisms infest waterworks, form slimy organic patches and undergo putrefactive changes. These decompose and produce odors and give water an unpleasant taste. George T. Moore and Dr. Karl F. Kellerman of the United States Department of Agriculture recommended the use of copper sulphate, but that does not always destroy all the typhoid bacilli and is a dangerous chemical to use, ex¬ cept in the smallest quantities, and when so used it is less efficient than the chlorides. Therefore it has not come into general use.

Nearly all the processes of sterilization are of recent discovery and those in general use are ridding potable waters of most of their pathogenic bacteria. Prior to their discovery half a century ago, they were the causes of epidemics that wasted away communities and historians referred to them as pestilences and plagues. It may be assumed that polluted water has destroyed as many human lives as the wars of all the ages.

Progressive nations are fast coming to realize that impure water is one of the greatest known menaces to health and to life itself. In this modern era the researches of scientists and experiments by health authorities have demon¬ strated that most pathogenic bacteria and nearly all living organisms in surface and other waters may be eliminated therefrom and all such waters may be made safe for potable and all other uses.

Communities are no longer limited to lakes, mountain streams, springs and other ground sources for their water supply, ‘but may draw raw water from rivers, streams, lakes and ponds provided such waters be treated by some of the processes heretofore mentioned, that will render such waters pure and wholesome, as is being done by scores of cities in this and other countries. The water supply of a community is now largely a matter of purification, and while turbid or bacteria-laden waters are not desirable on account of the expense involved in carrying on the processes of purification, still if other adequate sources be not avail¬ able, river and other surface waters may be made safe for potable purposes. Thus it is possible for communities to obtain their supply from nearby surface waters.

The Hudson, the Ohio, the Mississippi, the Niagara, the Saint

Lawrence, the Thames, the

Seine, the Rhine, the Rhone, the Elbe, the Danube, the Volga, the Nile, the Ganges, the Irrawaddy, the Yangtse-Kiang and scores of other rivers, as well as the Great Lakes in North America, the British, Swiss, Italian, African and innumerable other lakes are the sources of the water supply for millions of population. When such waters are scientifically treated by some of the processes hereinbefore described, they are safe and palatable. The importance of preserving all such surface waters from artificial contamination has led to the enactment of many laws to prevent such contamination.. In America and Europe water supply authorities are usually empowered to acquire catchment areas and in some instances large parts of watersheds to prevent artificial contamination as well as to procure additional sources as has been done by New York City in acquiring the Catskill watershed and certain British cities in acquiring large additional areas to ensure wholesome water supplies. Rather slowly the public conscience is being enlightened and awakening to the dangers of the contami¬ nation of water supply sources, in permitting the inflow of sewage, effluents 'from industrial plants, gas refuse, chemical works and other artificial wastes, all of which pollute and render waters noxious in their natural state. Most of these, however, are susceptible of such treat¬ ment as to ensure their wholesomeness for potable purposes.

The introduction and general adoption of scientific processes for the purification of water • for municipal and domestic purposes herein¬ before described and others have necessitated the discontinuance of the use, or the demolition of many old and the installation of many new waterworks in this and other countries. The needs of each community and the physical con¬ ditions of the territory of each whence its supply must come, as well as the water sources them¬ selves, become matters of public investigation and of scientific study. This was demonstrated in the undertaking on the part of the city of New York to obtain its additional water sup¬ ply, commencing in 1896 and continuing for 20 years or longer. Such progress has been made in the scientific treatment of water for mu¬ nicipal purposes, that, in addition to a score or more of processes for its purification in most any state, its acidity may be neutralized, as at Mossley, England, it may be softened by any one of several processes, or it may be hardened and it may be deferrized as in Germany to get rid of the microscopic crenothrix and other bacteria absorbing iron into their tissues and closing water mains.

In all these matters conditions differ and it is necessary to specialize in the treatment of each municipal water supply. No two are identical, unless they form parts of the same system, as now does the supply for several boroughs of New York City, when the same general principles may apply, as to the collec¬ tion, purification and distribution of water for such boroughs. But in most cases, each supply must be studied independently of all others and provided for, with special reference to its peculiar characteristics, which are as variable as earth's watersheds.

Removal of the Salts of Calcium, Magne¬ sium, Iron and Manganese. — In some well

and other ground waters such minerals as salts of calcium, magnesium, iron and manganese are found in solution. An ar¬ tificial zeolite, known as (<Permutit,® was pro¬ duced by Dr. Richard Gans and is used to rid water of its calcium and magnesium. Caustic soda, the silica of sodium, barium carbonate and other chemicals are also used for that pur¬ pose. The Reisert zeolite and other water softeners are in use in this and other coun¬ tries. C. P. Hoover and R. D. Scott in Ohio, R. N. Kimmard, Dr. Edward Bartow, Samuel A. Greeley, Francis G. Wickware and others have written on the subject of water softening by the <(Permutit® or other processes. There is a large plant for softening at Winnepeg, Canada, and smaller ones at Oberlin, Ohio, and elsewhere in the United States.

The extraction of iron and manganese has also been studied by Dr. Gans, M. S. Applebaum, Dr. H. Luhrig, Frank E. Hale, R. S. Weston, F. C. Amsbary and others. Plants for deferrization of water have been installed at Middleboro, Mass., at Rotterdam, at Dresden, Breslau and Hamburg in Germany and else¬ where. The process is described in the reports of those specialists and is generally effective in eliminating those minerals from such waters, though there may remain in water pipes the crenothrix, cladothrix, clonothrix, chlamydothrix and gallionella organisms that flourish in such solutions. Karl Kraepelin found 60 species of animalcula, infesting the water pipes of Ham¬

burg and known as ((pipe moss® comprising sponges, spongilla fluviatilis and lacustris, tno-lusca, snails, <(water lice,® asellus aquaticus, <(water crabs® (Gammarus pulex) and other species. Rotterdam, Boston and Brooklyn have encountered troublesome growths in their water pipes.

Minor Processes. — Some of the minor processes of purification involve the use of the small mechanical filters, consisting of small basins of layers of sand, over which gelatinous films of aluminum hydrate are found. Water passes through these rapidly and the bacteria are caught in gelatinous material and removed. Such filters are used to clarify muddy waters during freshets and in limited areas, where suffi¬ cient land cannot be economically obtained for sedimentary and the slow sand filter beds. There are several hundred in use in America. Where properly constructed and operated, satis¬ factory results are obtained, but they must be cleansed twice or more times a day and the chemicals used in sterilization are expensive. Several such filters, including the Candy and Reisert types, are in successful operation.

The Lawrence filter first installed in the United States was the forerunner of other mechanical filters, that have proved quite effi¬ cient in purifying municipal water supplies.

Porcelain Filters. — Prof. Louis Pasteur and others have suggested porcelain and baked infusorial earth, as additional safeguards, but the necessity of their frequent sterilization and the cost of such filters render them im¬ practicable for general water-supply purposes. Bacteriologists now contend that microbes are propagated in and are not eliminated by porce¬ lain filters. There are other minor processes for the purification of water, such as granular bed filters, charcoal filters, porous wall filters Berke-

feld system, Maignen method and the boiling of water. None of these processes are efficient in disposing of all the pathogenic bacteria. Some of these, such as B. anthracis and its spores, B. typhosus and others, are very per¬ sistent and live a long time in water. H. D. Fisher, Prof. John Tyndall and French and German bacteriologists have insisted that the boiling of water at 21 2° F. does not destroy the spore-bearing bacteria, though it may and does destroy many other species.

Collection, Impounding and Distribution of Water Supplies.

In the collection, impounding and distribu¬ tion of water for water-supply purposes, a few systems will suffice to illustrate how many operate. As already stated, many communities obtain their supply from ground waters by means of wells and springs.

Batavia in the East Indies, notorious for its unhealthfulness, supplies its 240,000 inhabitants from ordinary wells. Many ground waters are polluted by surface waters.

Amsterdam derives its supply from open canals containing the waters collected from sand dunes and also from the river Vecht. Such waters are filtered. Antwerp derives its sup¬ ply from polluted river water, which is treated and also filtered.

Rotterdam obtains its supply from Maas (Rhine), which is then filtered.

Magdeburg and Altona obtain their sup¬ plies from the Elbe, which are treated and filtered. Breslau obtains its supply from the Oder, Budapest from the Danube, Petrograd from the Neva, and Warsaw from the Weich-sel River. All such raw waters are filtered and some, or all of them, treated with germi¬ cidal disinfectants.

Constantinople obtains its supply from streams, springs and forest catchment areas, where the waters are collected in impounding reservoirs and conducted in aqueducts to the city.

Damascus obtains its supply from the Abana River through conduits, which also convey water for power purposes. See Syria in article on Rainfall.

Jerusalem obtains its water from springs, cisterns and pools, fed by conduits bringing water from Ain Saleh and other distant springs. Water from the Virgin Fountain flows through a tunnel to the Pool of Siloam.

In Phoenicia near Tyre were waterworks, consisting of towers, into which the artesian well waters flowed upward to a height of 20 feet or more above ground. Those waters were then conducted into reservoirs for the supply of that ancient port.

Berlin, Germany, obtains most of its water from deep boreholes near the shores of Lake Tegel, an expansion of the Havel River, and from Lake Muggel, one of the expansions of the Spree. These contain some iron in solu¬ tion, as do most ground waters of Germany. It also obtains part of its supply from wells, since it has succeeded in

eliminating iron from its ground waters.

The Spree was said to contain 2,500,000 more bacteria per cubic centimeter below Berlin than it contained above Berlin.

In 1878 crenothrix was found in the raw

water of the Spree and in wells at Charlottenburg. Dr. Richard Gans' new method and Herr Piefke's process were used to eliminate the iron and the bacteria, such as crenothrix and other micro-organisms dependent thereon. There are 60 or more sand filters with an aggregate area of 35 or more acres and other processes used to purify daily 66,000,000 gallons of water which is pumped into the city. The bacterial reduction in 1900 was from 896 to 27 per cubic centimeter in Muggelsee Works and from 345 to 22 per cubic centimeter in the Tegeler Works. There the death rate from typhoid feve-r and other diseases traceable to pathogenic bacteria is low. A new testing station of its water supply and sewage disposal is maintained in Berlin. In 1911 Berlin daily consumed 22 gallons for each of its 2,200,000 inhabitants. One of the most extensive plants in (Germany for removing iron from ground water is that at Erlenstegen for removing the iron from the ground water supply of Nuremberg. Munich obtains its water supply chiefly from spring and infiltration gal¬ leries constructed in the layers of sand and gravel in the western slopes of the Alps. Those galleries of concrete in some parts intercept the flow of ground waters. The water so col¬ lected is conducted to the city, which in 1911 consumed daily 57 gallons for each of its 571,- 000 inhabitants.

Hamburg obtained its water from the river Elbe and prior to the epidemic of Asiatic cholera in 1892, that water was unfiltered. In 1893 a municipal filtering plant was installed. Later a deferrization plant was also installed there. In 1913 Hamburg daily consumed 37 gallons for each of its 977,000 inhabitants. Double filtration is employed in Altona, Bremen and Schiedam.

Vienna obtains its supply of pure water through masonry-arched aqueducts, whose in¬ terior measurements are 0.84 by 0.93 meters from springs 913 feet and 1,196 feet, respec¬ tively, above sea-level and about 400 feet to 600 feet above distributing reservoirs in the city and from ground waters in the Schneeberg region 59 miles distant in the Alps, and from other springs and the Salza River, 114 miles distant. These are gravity systems, but in the city some pumping is necessary to fill the high¬ est service reservoirs about 550 feet above sea-level. Since its introduction and the use of sterilizing agencies typhoid has nearly disap¬ peared. Such Alpine sources, however, are quite devoid of pathogenic bacteria. In 1914 Vienna consumed 25 gallons per day for each of its 2,066,000 inhabitants.

Rome for centuries has obtained its water supply from the Tiber and springs along its left bank and later from such Apennine sources as the Appia, the Anio Vetus, Aqua Tepula and Lacus Alsietinus and from such springs as fed the Aqua Virgo, Aqua Marcia and Aqua Claudia and from the Rivus Herculaneus. The Aquia Trajana drew its waters from springs west of Lacus Sabatinus, whose polluted waters con¬ taminated those of the aqueduct. Aqua Alex¬ andria drew its waters from springs that now supply Aqua Felice. The Aqua Marcia drew its waters from numberless springs, discovered by Marcius in 145 b.c. Most of the longer aqueducts were partially subterranean and some have entirely disappeared.

From (The Aqueducts of Ancient Romeˆ by John Henry Parker, the following important facts are derived as to the water supply of Rome, one of the problems for engineers to solve.

In the time of Nerva and Trajan from 94 to 107 a.d. Sextus Julius Frontinus was water commissioner of Rome and has left a report of some of its remarkable works. At that time he says nine aqueducts entered the city, namely, (i) Aqua Appia; (n) Aqua Vetus; (hi) Aqua Marcia; (iv) Aqua Tepula; (v) Aqua Julia; (vi) Aqua Virgo; (vn) Aqua Alsietina; (viii) Aqua Claudia, and (ix) Aqua Novus. Seven were constructed later, namely, (x) Aqua Sabbatina, a.d. 110; (xi) Aqua Trajana, a.d. 120; (xii) Aqua Aurelia, a.d. 185; (xm) Aqua Severiana, a.d. 190; (xiv) Aqua Antoniniana, a.d. 215; (xv) Aqua Alexandriana, a.d. 225; (xvi) Aqua Algentiana, a.d. 300. In the Middle Ages two more were constructed, namely, (xvn) Aqua Carbra and Marrana, a.d. 1124, and (xvin) Aqua Felice. Some of these are also known by other names, namely (vn) Aqua Claudia as Cerulea; (ix) Aqua Novus as Attica; (xvn) Aqua Crabra and Marrana as Herculea; (i) Aqua Appia as

Augustea; (ix) Aqua Claudia, or (x) Sabbatina as Ciminia and Cloaca Maxima as Damnata, which forms the lake of Curtius.

The Roman engineers so constructed con¬ duits that they had frequent openings and angular turns with possible intercepting bars or baffles to check the flow of matter in sus¬ pension and thereby rid the water of some of its impurities, which, except those brought by the Paola (or ancient Sabatina) aqueduct, were few on account of its Apennine and other sources. There were many piscina or castclla aqua or reservoirs, where sedimentation and some filtration took place and visible foreign matter was removed. The Romans had many thermae and fully understood the importance of pure water. The Piscina Mirabilis at Baiae, is well preserved. The Domitian reservoir was remarkable for its utility and beauty.

William P. Mason in his <Water Supply* quotes a passage from Pliny's (Natural History> which has been translated as follows : <(Among the blessings conferred on the city by the bounty of the gods is the water of the Marcia, the cleanest of all the waters in the world, distinguished for coolness and salubrity.® The Romans had such baths as those of Cara-calla, Diocletian and Titus where they repaired for hot and cold baths, for hygienic exercises and where they engaged in the discussion of political, philosophical and other topics. They gave much consideration to their water supply. They built aqueducts to bring water from dis¬ tant mountain sources, that have been the ad¬ miration of later ages. Modern Rome has a daily supply of 65,000,000 gallons obtained largely through the Vergine, Felice, Paolo and Pia (or ancient Marcia) aqueducts and from springs. The Vergine aqueduct is 11.8 miles long and daily conveys its 14.08 million gallons of spring water 79 feet above sea-level, dis¬ charging it in Rome 66 feet above sea level. The Felice aqueduct daily conveys its 4.4 mil¬ lion gallons of spring water, the intake being 217 feet above sea-level, 22 miles from Rome, the aqueduct running over arches 6.25 miles and

the remainder of the distance underground and delivers its waters 202

feet above sea-level. The Paolo aqueduct daily draws 17.6 million gallons from Lake Bracciano, 538 feet above sea-level and from springs in Manziano, Brac¬ ciano and Ficarello 32.33 miles from Rome and delivers its supply partly in Rome at an eleva¬ tion of 246 feet above sea-level to supply the fountains of the Piazza Saint Pietro and partly to supply the town of Leonina. The Pia or Marcia aqueduct, 33 miles long, is fed by a number of springs near Subiaco 1,000 feet above sea-level. It follows that valley of the Anio to Tivoli. and conveys 27 or more million gallons daily into the ancient Varo reservoir, having a capacity of 214,000 gallons and being 578 feet above sea-level, and thence to Rome. The water is conducted through three cast-iron pipes 24 inches in diameter into different parts of Rome. It also derives some of its waters from springs nearer Rome than the above sources. Its nu¬ merous fountains are supplied with waters con¬ ducted through some of the old aqueducts, whose names have undergone some change, as above stated, in consequence of the discovery of additional sources by various emperors and the connection thereof with the old aqueducts. The poorer qualities of water were used for fountains, public baths and other non-potable municipal purposes.

In 1900 some of the waters in their natural state carried too large a number of bacteria for safety, but since that time it is possible that some of the recent processes of purification may have been utilized. The ozone process is adequate to rid such waters of their pathogenic germs. In 1911 modern Rome daily consumed 120 gallons of water for each of its 542,000 inhabitants. During the Roman era it consumed approximately 32,000,000 gallons daily. The remains of Roman aqueducts still exist in Asia Minor, Algeria, France, Spain and else¬ where, showing that the Romans took great pains and went to great expense to provide their cities with the best natural waters obtainable. Some, of the aqueducts were of superb con¬ struction, as were the Pont-du-Gard, the aque¬ duct at Segovia and the Aqua Claudia, extend¬ ing along the Roman Campagna.

Naples obtains its supply in part from ground waters collected in filtration galleries 2,000 feet or more in length, constructed in a stratum of gravel 30 feet below the surface, wherein are daily collected 38,000,000 gallons. Five parallel tunnels have been formed in the old quarries of Capodimonte for impounding such waters. The Apulian aqueduct in the southeastern part of Italy is of masonry con¬ struction for 151 miles. Its main trunk line and lateral branches altogether are 1,690 miles in length. Its waters supply 152 service reser¬ voirs and nearly 2,000,000 of people. Italy has both the Alps and the Apennines to intercept the vapor-laden clouds, whose waters

supply its many streams and its dense population.

Paris has two general systems for supplying water under different pressures, namely, (1) a high-pressure system for its domestic or potable supply, (2) a low-pressure system for industrial, street-cleaning and general municipal, other than potable purposes.

1. Paris obtains its high-pressure supply for

domestic purposes from four sources, namely, (a) from the springs that are tributaries of the Vanne River 108 miles distant, conducted through the Vanne aqueduct into the two-story reservoir at Montrouge 262 feet above sea-level; (b) from springs that are tributaries to the Loing and Lunain rivers, whose waters are conducted through the Loing and Lunain aque¬ duct into the Monsouris reservoir (that sup¬ ply and the Syphon aqueduct are described and illustrated in (La Derivation du Sources du Loing et du Lunnain) par Bechmann et Babinet, published at Paris 1905) ; (c) from the Dhuis springs 82 miles distant, flowing from the east through the Dhuis aqueduct into reservoirs at Menilmontant having an elevation of 354 feet above the sea, and (d) an additional supply for domestic purposes from the springs of the Avre, 63 miles west of the city, flowing through an aqueduct into Saint Cloud reservoir. Dur¬ ing the World War the Dhuis supply was cut off and the demands on the other sources were greatly increased.

2. Paris obtains its low-pressure supply for industrial and general municipal, other than potable, purposes from the Seine pumped at Ivry and at other places on that river and from the Marne at Saint Maur and from the Ourcq Canal and from artesian wells, and water is also obtained through the Arcueil aqueduct from Rungis.

The works at Saint Maur include sedimenta¬ tion basins, sand filters, ozone sterilizers and a bacteriological laboratory. In pre-war 1914 conditions, the raw Marne water carried 12,000 B. coli per cubic centimeter. After passing the sand filters these were reduced to 300, which disappeared as the water passed through the ozone sterilizers. An additional supply for domestic purposes was found neces¬ sary and river water was thoroughly treated, purified and used. The entire supply for do¬ mestic and potable purposes before the World War was about 40 gallons per day for each resident of the city. The supply for other mu¬ nicipal purposes is three times per capita the amount used for domestic and potable pur¬ poses. Since the World War, the Marne

and other rivers in northeastern France, in which are countless human remains, have carried a great increase of pathogenic and other bacteria. The water supply of the entire war zone has been polluted.

The ozone treatment was so successful at Saint Maur that it was adopted by the mu¬ nicipality of Paris to purify the water of the Seine, taken to supplement its general mu¬ nicipal water supply. Miquel in 1896 found 300 bacteria per cubic centimeter in the Seine above Paris and Clichy found 200,000 bacteria per cubic centimeter in the Seine below Paris.

The Belleville reservoir has two stories. The upper receives water from the Dhuis aque¬ duct and the lower from the river. The Mont¬ rouge receives water from the Vanne aqueduct into its upper stories and water from the river into its lower story. The Montmartre reservoir receives spring water into its three upper stories and river water into its lower story.

The water supply of the city of London is obtained from the yield of the watersheds of the Thames, the Lea and the New River, com¬ prising an area of 620 square miles and from

springs and many wells in those watersheds and in the chalk deposits of Kent. Formerly eight or more companies pumped the water from the Thames, the Lea and the New rivers and from springs and wells into 65 or more reservoirs. Some of the principal ones were included in the works of the New River Com¬ pany, the East London Waterworks Company, The Southwark and Vauxhall Water Company, the Company of the West Middlesex Works, the Company of Proprietors of Lambeth Water¬ works, The Governor and Company of Chelsea Waterworks, The Grand Junction Waterworks Company, The Company and Proprietors of the Kent Waterworks and The Staines Reser¬ voirs Joint Committee, supplying Kempton Park reservoir. In the literature on the subject these legal titles are omitted and the popular names of the particular companies are used.

From the Thames above its tidal flow and above Teddington lock, 185ˆ2 million gallons were available, from the Lea all its flow except 5,400,000 gallons left for navigation and from the New River 22ˆ million gallons were pumped. Upward of 33,000,000 gallons were obtained from springs and wells. In 1900 Lon¬ don consumed 226.000,000 gallons of water daily, which was distributed through 3,500 miles of pipes. The Thames, the Lea and the New rivers 20 years ago were subject to pollution from the inflowing surface waters, and their filtered waters as well as waters obtained from wells contained from 15 to 100 bacteria per cubic centimeter. In 1902 an act was passed creating the Metropolis Water Board. It was authorized to acquire the properties of the eight or more water companies above named and to enforce rigid regulations for the protection from pollution of the sources of London's water supply. Royal commissions investigated and reported on the purity of the supply, and out of the 294 experiments made by Dr. A. C. Houston in 1907-08, not a bacillus typhosus was isolated, though millions of bacteria were dis¬ covered, the Lea being most heavily laden with them.

The Metropolitan Water Board was created by the act of 1907. That board took over the properties and facilities of the Metropolis Water Board. The New Works Act of 1911, author¬ ized the Metropolitan Water Board to construct large storage reservoirs at Staines, Laleham and Shepperton. New service reservoirs were constructed on Horseendon Hill, Greenford and on Barn Hill.

In January 1913 the Metropolitan Water Board, through the various intakes, drew daily from the Thames 132,859,184 gallons and from the Lea 55,300,700 gallons and from springs and wells 36,712,390 gallons and from ponds 203,600 gallons. The aggregate of that supply was 225,075,874 gallons, which was at the rate of 33.44 gallons per person. New reservoirs are being constructed to provide additional waters and the daily consumption in 1918 was reported at 39 gallons per capita for a total population of 6,783,897.

Parliament has passed several acts for the conservancy of the waters of the Thames, Lea, New and other rivers and has empowered boards and commissions to take such action as may be necessary to protect the waters of said rivers from pollution by regulating the uses

of their watersheds and otherwise by enforcing sanitary ordinances on the part of cities, towns and villages.

Most thorough and exhaustive investigations have been made in both London and Paris to ascertain the quality and the bacteria in the raw waters, which are the sources of supply for those cities and every precaution is taken to rid all such potable waters of their pathogenic species.

The official reports of Dr. A. C. Houston, director of the Metropolitan Water Board, over a series of years and of his skilled staff of experts at London are exhaustive. They show all phases of the water supply of London, in¬ cluding its sources, amount, quality, bacteriolog¬ ical and chemical tests, the processes for its purification, the results obtained, its distribu¬ tion and all other conditions incidental thereto. In his official report for 1913 Dr. Houston said that ((about eighty percent of the London Water Supply is derived from rivers polluted directly or indirectly with sewage, … that the three factors of sedimentation, devitalization and equalization are indeed of supreme importance in connection with the storage of impure water antecedent to its filtration… . The practice of occasionally dragging' or Haking5 the sur¬ face of the filter beds to increase the yield of water or to prolong their working periods should be discontinued altogether, or only re¬ sorted to under quite exceptional circumstances… . Over eight years' work on the London water question has convinced me that to a progressively increasing extent the Water Board are securing the reasonable if not absolute (safety 5 of the Metropolitan Water Supply. This opinion will carry the more weight since I have been, and still remain, a somewhat merci¬ less critic of any imperfections in processes of water purification. … As a counsel of per¬ fection, I still feel bound to advocate the choice of an initially pure source of water supply; but my own results and experiments do seem to indicate clearly that the evil effects even of an impure source can be largely, if not entirely, annulled by adequate storage and efficient filtra¬ tion. … In conclusion, my opinion is that the Equality policy5 of the Metropolitan Water Board should be directed towards securing an (epidemiologically sterile5 water (i.e., a water containing none of the microbes associated with waterborne epidemic disease) antecedent to fil¬ tration by means of storage (sedimentation, devitalization and equalization) aided, if need be, by the occasional employment of supple¬ mentary processes of water purification.55

For the years 1906-13 the average number of microbes per cubic centimeter as reported by Dr. Houston in raw Thames water were 4,894, in the raw Lea water were 13,293 and in the raw New River water were 2,081.

He also reported that by the processes of subsidence and filtrations the

number in raw Thames water was reduced from 5,250 to 16.1 per cubic centimeter, in raw Lea water from 9,263 to 30.9 per cubic centimeter and in the raw New River water from 2,172 to 14.1 per cubic centimeter. In all these cases the reduction was upward of 99 per cent. The filtered waters from Kent had but 7 microbes per cubic centi¬ meter and there were in the Chelsea filtered supply only 7.3 microbes per cubic centimeter.

Dr. Houston in his report for 1913 also stated that (<The striking fact has been shown in my last reports that London is not really drinking merely filtered raw river water but raw river water, which by storage processes has been purified bacteriologically antecedent to filtration to a reasonable extent… . When it is remembered 90.5 per cent of the samples of raw Thames contain typical B. coli in each cubic centimetre and that . 84.8 per cent of the samples of raw Lea water also contains typical B. coli in each cubic centimetre, the transformation which the river water has undergone previous to filtration becomes strikingly apparent.® Dr. Houston strongly advises storage preliminary to filtration and storage he says means sedi¬ mentation, devitalisation and equalization. Nearly the entire supply for London is stored antecedent to filtration. Dr. Houston also stated that <(99.9 per cent of the typhoid bacilli could not be recovered after one week.®

Down to 1913 storage and sand filters had efficiently purified the waters used for potable purposes in London. Dr. Houston, however, in his report for the year recommended sup¬ plementary processes of purification. Since 1917 the entire water supply of London has been treated with chlorine. Before filtration, it re¬ ceives a dose of calcium hypochlorite. Slow-sand filters are now used at the various works.

The twelfth annual report of Director Hous¬ ton for the year 191 7—18, contains an exhaustive report of chlorination, super-chlorination and de-chlorination experiments with 224 micro¬ photographs.

The thirteenth annual report of the director for the year ending 31

March 1919, discusses the scientific results of the chlorination of the Thames and New River raw river waters and chlorination in relation to filtration and the condition of the raw and filtered waters. On 31 March 1919, the equipment of the London water supply under the Metropolitan Water Board comprised 48 storage reservoirs with a total capacity of 1,981,500,000 gallons and 86 service reservoirs for filtered water with a capacity of 310,900,000 gallons and its 172 filter beds had a total area of 170.7 acres.

Liverpool obtains its supply from wells, from eight impounding reservoirs in the water¬ shed, Ravington having a capacity of 4.1 billion gallons and from the impounding reservoir, the largest in Europe, 825 feet above sea-level, formed by a dam 1,172 feet long and 84 feet high across the valley of the Vyrnwy River, formerly a glacial lake in north Wales, having a capacity of 12 1/7 billion gallons. The im¬ pounded waters from the Ravington reservoirs are delivered through a 44-inch cast-iron pipe 24*4 miles long to Liverpool and from Vyrnwy reservoir through a 39-inch cast-iron pipe 63 miles long and a tunnel 4 miles long to Pres¬ cott reservoir at Liverpool. The water is filtered through sand filters and otherwise treated. Upward of 38,000,000 gallons are con¬ sumed daily in Liverpool, which is at the rate of 40 gallons per capita per day. An additional reservoir has been constructed near Malpas and a high-level tank has been built at Woolton Hill.

Manchester obtains its water supply from the elevated Longdendale watershed with seven or more impounding reservoirs along the

Elherow River and from Lake Thirlmere 2ˆ4 miles long and 533 above sea-level in the north¬ western part of England. The outlet of the lake is closed by a masonry structure 857-feet long and 104*4 feet high from the low¬ est part of the gorge outlet. That enlarges the lake to three and one-fourth miles in length and gives it a capacity of eight and one-seventh billion gallons. The aqueduct leading to the city is 95 miles long and carries 50,000,000 gallons per day. The storage reservoirs of Manchester have a capacity of upward of 41,000,000 gallons. Its daily consumption is 40 gallons per capita and aggregates 50,000,000 gallons. A third con¬ duit has recently been constructed from the lake to the city.

Birmingham, England, formerly obtained its water supply from five local streams and eight wells. From these the water was pumped into six service reservoirs at different elevations and into a standpipe. All such waters were filtered. In 1900 there were 12 sand filter beds with a total area of eight and one-fourth acres. In 1892 Parliament authorized Birmingham to draw an additional supply from Elan and Claerwen rivers in Wales. It constructed six long reser¬ voirs by building masonry dams across the narrow valleys of those rivers, one of which dams was 600 feet long and some were more than 100 feet in height above the bed of the gorges so closed. They had a combined ca¬ pacity of 18,000,000,000 gallons. There were also constructed 30

filter beds for the filtration of all such waters. This improvement contem¬ plated a supply of 75,000,000 gallons a day for service in addition to 27,000,000 gallons to com¬ pensate for losses to riparian operators along the Wye.

The water flows by gravity through the Elan aqueduct 73.3 miles to Birmingham. From the elevated sources to the high service reservoirs in Birmingham there is a fall of 170 feet.

In 1913 there were consumed 27,47 1 ,991 gallons daily, which was an average of 32.24 gallons for each resident.

Glasgow obtains its water supply from Brock Burn six miles from the city through its Gorbals works into four impounding reservoirs, having a combined capacity of 1.000,000,000 gallons or more and also from Loch Katrine 364 feet above sea-level, having a storage capacity of five and two-thirds billion gallons. The water was conducted by gravity through aqueducts and tunnels 27 miles to Mugdock and Craig-maddie reservoirs, having a combined capacity of one and one-fifth billion gallons. Reservoirs have been constructed in the valley of the Teith to compensate for waters drawn by the city. In 1895 it was decided to connect by' the tunnei Loch Arklet 455 feet above sea-level with Loch Katrine and raise the outlet of the latter five feet and thereby secure a storage capacity of 2.05 billion gallons in the two lochs. An ad¬ ditional reservoir with a capacity of 694,000,- 000 gallons has been constructed. In 1913-14 Glasgow daily consumed 75 gallons per capita or an aggregate of 85,000,000 gallons.

Edinburgh obtains its water supply from the Esk, the water of Leith and from the streams fed by the Pentlands, the Moorfoot Hills and from Talla Water reservoir. Talla Water is an affluent of the River Tweed.

In 1913 the daily consumption of water in

WATER SUPPLY

The great waterwheel at Hama, Syria, used for pumping the water out of the Orontes River

J’l

%

1»ˆ. 1

. .

m

; ” §

,1ˆ —

llfg

1 Filter Pipe Gallery, Montebello Filters, Baltimore, Md,

2 Lime Mixers and Lime Tanks, Montebello Filters

Edinburgh and Leith was 56 gallons per capita.

The Derwent Valley Water Supply under an Act of Parliament, is distributed to Derby, Leicester, Nottingham and Sheffield, the ex¬ pense of which is borne by said several cor¬ porations in proportion to their several allotments or percentages of water consumed, all drawing from the same source, made avail¬ able by their joint effort. That plan might be carried out in other countries where a common

supply may be available for several munici¬ palities.

In 1907 the Earl of Cromer reported that the Assouan reservoir would supply one-fourth of all the water needed in Egypt. That water flowed from the upper Nile 1,800 miles to reach Egypt. The evaporation in those torrid and tropical regions was 103,000,000 cubic meters out of 2,300,000,000 cubic meters of sup¬ ply and the loss by absorption and filling the Nile trough was 260,000,000 cubic meters, and the consumption in middle Egypt was 850,- 000,000 cubic meters, which left only 1,087,000,- 000 cubic meters for use in Lower Egypt at Cairo. That statement shows the great losses of river or canal waters due to evaporation and percolation or absorption. Under all conditions they are factors to be considered in determin¬ ing the amount of water supply for a com¬ munity. Long before the Assouan reservoir was constructed, Jacob had dug a well near the site of Cairo and still earlier the Fayum depres¬ sion was embanked and Lake Moeris was formed, around whose shores were settlements from the Neolithic age down through many centuries.

In 1914 Cairo used for all purposes an amount equivalent to 25 gallons for each of its 700,000 residents. Its water is clarified by passing it through rapid sand filters. Alex¬ andria has a similar plant of 12,000,000 gallons daily capacity, where sulphate of aluminum is used as a coagulant.

The importance of wholesale water supplies to communities cannot be too emphatically stated, when we recall the ravages of diseases due to the contaminated water supplies in India. Prior to the British sovereignty of that Peninsula nearly all well, river and surface waters were unfit for potable purposes. ‘ Con¬ ditions there were appalling. The waters of the Indus, the sacred Ganges, the Brahmaputra and of all other rivers were laden with putrescent matter and some with decomposing human remains. Even the wells were con¬ taminated and the thousands of reservoirs and tanks were used as bathing pools by thousands of dust begrimed and filthy pilgrims in their annual tours of parts of India. They were ignorant of the laws of health and oblivious of all hygienic and sanitary regulations. That was the commencement of water purification in central India. There are now many sand filtration plants in India.

The Plindus were enjoined to drink the water of the Ganges, as a sacred duty. Cholera and other deadly epidemics depopulated whole districts. When the British officials began to exercise authority, they undertook to remedy conditions wherever they were, able so to do, but the superstition and prejudices of the

natives were such under their Indian cults, that progress was slow.

In 1893, the Balram Dass Waterworks were constructed at Raipur in the central provinces. Those consisted of an infiltration gallery 100 feet from and paralleling the Karoun River whose level was raised at that point six feet by a dam and its waters percolated the intervening sand layers and weeped through holes into the gallery. Thence they were pumped up through a conduit of masonry and cut through the rock into tanks for distribu¬ tion. The supply was six and one-half gallons a day per capita. Consult Vol. 143 of Pro¬ ceedings of Institution of Civil Engineers, pp. 262 et seq., London.

In 1901 the British favored the construction of works for the extension of irrigation from 47,000,000 to 53,500,000 acres.

In 1905 to 1912, they aided in the con¬ struction of the Punjab Triple Canal system, which had an excellent effect upon the quality of flowing water for the thousands dependent thereon for drinking purposes. Consult Vol. 201 of Proceedings of Institution of Civil Engineers, pp. 24 et seq.

Prior thereto the inhabitants in that part of India obtained their supply from polluted ponds and other unwholesome sources. The irrigation works of India are extensive and have done something to relieve the deplorable conditions of the millions untutored in hygienic science. All such Indian watercourses as the extensive Punjab Triple Canal system, the Bengal system, the Madras canals, the Ganges and the Indus systems supplied waters for ir¬ rigation and formerly to some extent waters for navigation. In a land of such intense heat and extensive barren areas, most of such water¬ courses supplied all the water obtainable for potable as well as for all other purposes. Slowly the people of the peninsula are begin¬ ning to understand some of the causes of the cholera, typhoid and other fatal epidemics that have swept over India from the Buddhist period, commencing 520 b.c. down to recent years. Who can estimate India's mortality directly attributable to its pathogenic-bacteria- polluted water supplies? What costly sacri¬ fices the race has made to its ignorance of and failure to observe the laws of health ! Polluted waters are disease producers, as unfailing as the forces of gravity on falling bodies. India with its dense population and appalling pesti¬ lential epidemics is an inimitable example of the dreadful results of the use of unwhole¬ some waters for domestic and potable pur¬ poses. Modern modification processes have been installed in its principal cities and ports, so the danger of

infection in those towns is constantly lessening. In 1914 Bombay consumed 27 gallons, and Calcutta 62 gallons daily per capita. In the waterworks of Calcutta alumino-ferric is used as a purifier, which is an impure sulphate of aluminum. That is gen¬ erally used as a coagulant elsewhere in India. Mechanical filters at Betmangula, India, re¬ duced the bacteria in Palar River water from 4,350 to 13 per cubic centimeter. The train¬ ing of some of the river courses, such as the Rangoon, has resulted in the improvement of their waters for domestic uses. Gradually the people are beginning to realize the importance

of preserving their streams and watercourses, including reservoirs, tanks, etc., from pollution.

China and Japan in the past centuries were hardly less oblivious of hygienic and sanitary laws, though less frequently swept by epidemics attributable to waterborne diseases. The Chinese obtain their water supplies from wells, springs and their rivers. There appears to be some natural purification of their waters and less human pollution of them. They are ac¬ customed to boil their drinking water and that disposes of many bacteria.

Japan is abundantly supplied with lakes, rivers and waterfalls and is fast advancing in sanitary science. It has already commenced to adopt some western methods for the purifica¬ tion of its water supplies. George A. Johnson of the United State Geological Survey says : That <(the water purification works at Osaka, Japan, having a daily capacity of 25,000,000 gallons, include open sedimentation basins and also sand filters.® One was completed in 1903. Bacteria in Yodo River water were reduced from 200 to 25 per cubic centimeter. There is also a slow sand filtration plant at Yokohama, whose water supply is taken from the Sagami-gawa. Water purification is also effected to some extent in Tokio, where were consumed in 1914, daily 32 gallons by each of its 1,500,000 residents. It takes its water from the river Tama into the city reservoir at Yodobashi, located high enough to afford nearly 100 feet pressure. There potash alum was used as a purifier. At Kyoto there is a large rapid sand filtration plant.

Melbourne in Australia derives its water supply from the Yan Yean system, consisting of Silver Creek, Wallaby Creek and the Plenty watershed yielding 33,000,000 gallons daily and from the Maroondah or Watts River system yielding 25,000,000 gallons daily, and from Survey Hills yielding 9,000,000 gallons daily. There are six service reservoirs with a combined capacity of 45,000,000 gallons. The daily supply in 1905 was 63 gallons per capita. In 1899 the waters in the service reservoirs and mains carried from 146 to 398 bacteria per cubic centimeter. B. coli were found in some reservoirs fed from drainage areas, where there was no sewage and other micro-organisms were also found. That shows how prevalent they may be when least expected. The presence of such bacteria is usually attributable to pol¬ lution by sewage. The obtaining of pure and wholesome water is not the least of municipal problems nor of rural communities.

In New South Wales a dozen or more nar-now gorges have been dammed and their waters impounded for domestic purposes. So in all inhabited parts of the world, the problem of water supply is of first importance, and is be¬ coming increasingly so as the population in¬ creases in density.

Some American City Supplies. — In ad¬ dition to the municipal supplies already men¬ tioned, the following illustrate the methods adopted in the United States for obtaining wholesome water supplies.

Boston, Mass., is in the Metropolitan Water District, which obtains its supply from lakes and rivers, whose waters are impounded in reservoirs. Cochituate Lake, Sudbury River and the south branch of the Nashua River are

its principal sources. The first of these com¬ prises a series of ponds three and one-half miles long, and their waters flow through an aque¬ duct into Chestnut Hill reservoir, having a capacity of 23,000,000 gallons a day. On the Sudbury River four storage reservoirs, an aqueduct and a conduit were built. They carry 108,000,000 gallons a day, 15.9 miles to the Chestnut Hill reservoir. The waters of the south branch of the Nashua are impounded in the large Wachusett reservoir, at Clinton, hav¬ ing a capacity of 64,500,000,000 gallons in its 6.46 square miles of area. It is 12 miles from the Sudbury reservoir, into which its waters are conducted by the Wachusett aqueduct, and from one of the Sudbury reservoirs by the Western aqueduct built in 1904, to the westerly part of the metropolitan district. The daily capacity of the Wachusett aqueduct is 300,000,000 gallons. The site and shores of

the Wachusett reservoir were stripped and that proved satis¬ factory, for algae and other plant organisms do not thrive where rock constitutes the bottom and sides of such reservoirs. The water in the reservoirs is not. polluted and is remarkably free of organisms, due to the stripping of the sites and the freedom of the catchment areas from pollution, except such as are within the towns of Marlborough and South Borough. Diatomacea have been found in Lake Cochit¬ uate and occasionally small numbers of harm¬ less bacteria in the tap water.

In the Metropolitan Water District of Bos¬ ton are several other corporations and the sup¬ ply is metred for different uses.

New York City obtains its water supply from six different sources. Those are with their respective available daily yields: (1) The Croton watersheds with 336,000,000 gallons ; (2) The Bronx and Bryan watershed with 18,000,000 gallons; (3) the Esopus watershed with 250,000,000 gallons to be augmented by the Schoharie Creek addition of 250,000,000 gal¬ lons ; (4) the Long Island watersheds com¬ prising the Ridgewood and other systems, and including Queens (in reserve) with 150,000,000 gallons; (5) the Staten Island watershed, in reserve, with 12,000,000 gallons, and (6) private water companies with 34,000,000 gallons. The foregoing amounts, except that from Schoharie Creek, soon to be added, are given in the in¬ structive paper of Dr. Frank E. Hale, chief chemist of the Department of Water Supply, Gas and Electricity. No other modern system has involved a greater expenditure, except pos¬ sibly that of London, and none is delivering a greater quantity unless it be that of Chicago. Certainly its quality is as pure and wholesome as that of any city in the world. All its catch¬ ment areas are under the supervision of sani¬ tary inspectors and its Catskill supply is largely from lands owned and cleared by the city. Every precaution has been taken to avoid pol¬ lution of the sources, and some of which are in the foothills and slopes of mountains. Physical, chemical, bacterial and microscopical examinations are periodically made of the various sources.

Several modern processes of purification in¬ cluding liquid chlorine at several plants are in use. They comprise an aerator at the Ashokan reservoir, a coagulation plant above the Kensico

reservoir on the Catskill aqueduct, a Dunwoodie chlorination plant on the new Croton aqueduct, a chlorination plant on the Catskill supply below Kensico reservoir, following aeration, a slow sand filter plant below Oak¬ land Lake in Queens County, whose bacterial ef¬ ficiency is supplemented by liquid chlorine and several slow and several rapid sand filter plants located on various conduits of the minor sources of supply. One of the latter is at Baisley Pond. Micro-organisms which are destroyed by treatment with copper sulphate, and iron, have been found in some of the waters. The processes used have been efficient in purifying any waters that have been so in¬ fested.

and other supplies, including about 96,000,000 gallons of ground waters from Long Island.

In 1918 there were daily distributed for all purposes in all the boroughs of Greater New York approximately 600,000,000 gallons, that be¬ ing a little more than the rate of 100 gallons per capita.

The waters of the Schoharie Creek or water¬ shed are to be impounded in a reservoir at Gil-boa dam, and carried in a tunnel 18 miles long under the Shandaken Mountains into the upper reaches of the Esopus Creek and thence into the Ashokan reservoir to double the present (1919) supply. When that improvement is completed there will be 500 million gallons available a day for New York city, from the Catskill and Scho-

fat’s! - ■ ‘ 7 ma

SOUtt ■ and

fUkdJtrs

Grave!

4ˆT~!’-7Ls!oe!

‘ -<i . v . rfeadn.

Breakneck fait.

BuH Hi!!

west Posm-

Stor m Kmg vrt

Crows Nest

…

B.W 5. 1 44 6

Fig. 2.

Bacteria in the waters of the several Croton and Catskill aqueducts varied from 17 to 68 per cubic centimeter, but chlorination reduced the number from 46 to 91 per cent. In 1918 storage in the Ashokan reservoir reduced B. coli 99.8 per cent and other bacteria 69 per cent. Several species of Diatomacec ? Cyanophycece, Protozoa and Crenothrix have been localized in the waters of the New York supply.

The Esopus supply is from several streams, whose waters are

conducted into the Ashokan reservoir 91 miles northwest of the city and thence are conducted in an aqueduct having a daily capacity of 500,000,000 gallons down the west side and under the Hudson 1,100 feet below its surface (Fig. 2) and up to the Kensico reservoir, thence to the Hill View reseryoir with an elevation of 295 feet, which determines the <(head)} of the Catskill supply and. thence in a tunnel extending down through New York City to the distributing reservoirs in the sev¬ eral boroughs. These receive also the Croton

harie watersheds, having an area of 571 square miles. The Ashokan reservoir has an eleva¬ tion of 587 feet above tidewater and its outlet is 495.5 feet above tidewater. Its capacity is 128 billion gallons. The Gilboa reservoir will have a capacity of 20 billion gallons, and has an elevation of upwards of 1,100 feet above tide water and is 125 miles from New York City.

Albany takes its supply from the raw Hudson River water through screened intakes and passes it through two 18-inch inlets and one 36-inch inlet into a sedimentation basin. After sedi¬ mentation, it passes roughing filters into the slow sand filters where the daily rate of filtra¬ tion is 3,000,000 gallons per acre. It then passes into the covered filtered water reservoirs. Its capacity is 21,000,000 gallons per day and its bacterial efficiency is 99 per cent. The usual bac¬ terial efficiency of slow sand filters ranges from 98 to 99 per cent.

Chicago obtains its daily supply of 1,000,000,- 000 gallons from Lake Michigan, through nine

intake tunnels, reaching seven intake cribs two or more miles from shore.

In 1915 the Chicago Board of Experts re¬ ported that its water from Lake Michigan was turbid, polluted and unsafe for drinking pur¬ poses. The opening of the Drainage Canal in 1901 to send the flow of

sewage down the Illi¬ nois River lessened the pollution of near shore lake waters, but did not wholly remedy the diffi¬ culty. City sewage still flows to a limited ex¬ tent into the lake and pollution continues. The problem is a serious one for Chicago as it is for all other cities similarly situated. The in¬ takes of other Great Lake cities, however, are not so near the effluents of their sewage and there is less direct pollution therefrom. Chlori¬ nation was tried in one of the districts in Chicago in 1912, and was attended with good results, except that during the winter months the plant was affected by the severe cold. Un¬ doubtedly Chicago will adopt some modern process for the sterilization of its water supply.

In Milwaukee hypochlorite has been used to eliminate gas-forming bacteria from its Lake Michigan supply, but such large dosages were necessary, that the taste was affected and odors were produced. The water before treatment contained 2,590 microbes per cubic centimeter. Milwaukee's consumption in 1915 was 48,000,000 gallons a day, which was equivalent to 111 gal¬ lons per capita.

Cleveland in 1911 completed its new intake and a marked improvement followed. It in¬ stalled a rapid sand filtration plant and also used calcium hypochlorite as a germicidal dis¬ infectant. Its supply in 1912 was at the rate of 133 gallons per capita a day.

Superior, Wis., has a slow sand filtration plant comprising three units with a total capac¬ ity of 300,000 gallons a day.

Kansas City, Missouri, obtains its supply from the Missouri River at Quindaro above the inflowing polluted Kansas River. The raw Mis¬ souri River water is pumped into a reservoir of 90,000,000 gallons capacity at Quindaro where there is preliminary sedimentation. The water is thereafter treated with alum and lime. The clear water then returns to the pumping station and is treated in its passage with calcium hypo¬ chlorite and aerated. It is then pumped into Turkey Creek reservoir, where a high pressure service is maintained and thence it is let into the mains. The raw river water in 191 1 contained as high as 30,000 B. coli per cubic centimeter and they were reduced by such treatment as stated to less than 100 per cubic centimeter, which is the standard of purity established in 1914 by the Treasury Department of the United States Gov¬ ernment. The purification at Kansas City, Mo., whereby large colonies of pathogenic bacteria in its raw river water supply were eliminated, well illustrates how Missouri River water may be purified and made safe for potable uses.

Buffalo obtains its supply from Lake Erie and it is purified by

chlorination at the intake pier in Lake Erie. The daily consumption is approximately 125,000,000 gallons.

New Orleans obtains its supply from the Mississippi River. A Sewerage and Water Board was created in 1899 and aerial cisterns were ordered closed. They were breeding places of the stegomytce which cause yellow fever. In 1909 a new rapid sand filtration plant was in¬

stalled having a daily capacity of 40,000,000 gallons and the water was first put through sedi¬ mentation aided by sulphate of aluminum and ferrous sulphate as coagulants. In 1910 the rate was 5.99 million gallons per acre per day. New Orleans has two filter plants, namely the Car¬ rollton Filters and the Algiers Filters. From an official report it appears that the rate of filtration through the former in 1914, was five¬ fold that of the latter. In 1915 the daily con¬ sumption was 20,000,000 gallons, which was at the rate of 57 gallons per capita,

Omaha, Neb., obtains its supply from the Missouri River which requires purification. Ac¬ cordingly a series of basins were constructed for sedimentation of much of the suspended matter. That was accompanied by coagulation produced by the use of alum. There is also used hypochlorite without filtration. Since the installation of the foregoing processes of puri¬ fication, there has been a great reduction in typhoid and other diseases produced by patho¬ genic bacteria.

Pittsburgh obtains its supply from the Alle¬ gheny River, which has several inflowing tribu¬ taries. One of these is the Kiskiminetas which receives waste products from oil refineries, tan¬ neries and other plants. The water carries much colloidal matter. Its waterworks plant com¬ prises concrete sedimentation basins, holding 120,000,000 gallons with 24 roughing filters of coarse stone and two hollow frame baffles, ex¬ tending the full length of the sedimentation basins. These rid the water of much of the matter in suspension. It also comprises slow sand filters and a covered filtered water reser¬ voir. The plant is unique and illustrates an¬ other type of construction to overcome condi¬ tions quite extraordinary. Its service reservoir is at Highland Park 367 feet above the river. It has several reservoirs for service in different parts of the city.

Los Angeles formerly obtained its supply from ground waters by means of infiltration galleries. Its daily consumption was 26,000,000 gallons. It is soon to obtain its supply from Owens Valley where the

city owns a large catchment area. Long Valley and Tincmaha reservoirs are to be constructed with a com¬ bined capacity of 150,500,000,000 gallons. The aqueduct consists of open canal sections, ma¬ sonry sections and tunnels and several inter¬ cepting reservoirs, each of many million gallons capacity which regulate the flow and develop power. It is so constructed that ground water near the surface may be pumped into it and augment its volume. It has 23 inverted siphons and serves both for water supply and power purposes and is one of the large water supply projects on the Pacific Coast.

San Diego has a municipal pressure filter of 5,000,000 gallons capacity.

San Francisco is supplied by five independent systems owned by a private corporation. The waters are drawn from artesian wells.

In June 1919, Sacramento decided to install a modern filtration and pumping plant with fil¬ ter beds of 30,000,000 gallons daily capacity and is to use sulphate of aluminum as a coagulant. Its water supply is from river water, mountain sources and from wells.

In addition to those already mentioned, puri¬ fication plants have been constructed at Wil-

mington, Cincinnati, Cleveland, Columbus, To¬ ledo, Lorain, Youngstown, Louisville, Saint Louis, Des Moines, Minneapolis, Grand Rapids, Mich., Little Falls, N. J., Harrisburg and

fected by chlorination and an electrolyser of the Allen-Moore cell, adopted by the Montreal Water and Power Company. The equipment comprises four cells, each having a capacity of

Bethlehem, Pa., Middleboro, Mass., and at many other places in the

United States and other countries.

The water supply in Canada is illustrated in the following few cases :

The Victoria aqueduct conveys waters from mountain reservoirs 37 miles away.

At the present time Winnipeg obtains waters that require softening and that involves large expense annually. It has recently decided to obtain soft water from Shoal Lake, some dis¬ tance away.

Toronto obtains its supply from Lake On¬ tario. Its filter beds of its slow sand system have a capacity of 5,000,000 gallons per acre per day. It has recently installed drifting sand fil¬ ters. These consist of 10 units, each having a capacity of 6,000,000 gallons daily. In them there is a constant vertical circulation of water through the filters, so that a part of the bed of sand is kept in suspension in the water, while some of the sand is being constantly re¬ moved and washed in transit and replaced in filters. A coagulant apparatus is attached and the coagulant goes directly to the filters. The bacteria are caught up and carried along out with the drifting sand. The process is rapid and may be expensive. The average amount of chlorine applied was .2 parts per million in 1918. In 1911 Toronto daily consumed 118,- 000,000 gallons.

Montreal obtains its supply from the Saint Lawrence and Ottawa rivers. The waters are conducted into the main reservoir 200 feet above the Saint Lawrence River. That reservoir has a capacity of 36,500,000 gallons. There is an¬ other high service reservoir still higher. Puri¬ fication of the water supply of Montreal is ef-

32 pounds of chlorine per day. The process has been credited with 93 per cent efficiency. In 1914 Montreal supplied an amount equivalent

to 153 gallons for each of its 600,000 inhab¬ itants.

The republics of South America are likewise appreciating the necessity of providing pure water for their inhabitants. In 1867-68, there was an epidemic of cholera in Buenos Aires, Argentina, which had 1,500 victims, and in 1871 yellow fever followed, which had 2,600 victims, both due to unsanitary water supply. Aroused by this condition the city employed eminent engi¬ neers and constructed a system of modern waterworks. The city obtains its water from the Estuary at Belgrano. It is then conducted three and one-half miles to Recoleta, where there are settling basins of 12,000,000 gallons capacity and six acres of covered filters. The filtered water is then pumped to great distrib-

may understand what is involved in obtaining such supplies and the menace to health and to life in drinking impure water.

There is always the possibility that the purification of municipal water supplies may be incomplete or that contamination may ensue from private wells or other auxiliary supplies into water mains forbidden in New York ex¬ cept with the aporoval of the Board of Health or may be contamination mav ensue from sewage or other subterranean pollution in cities, so that pathogenic bacteria may still exist in public water supplies, as they may exist in well waters and in all other kinds of raw waters. Such menace to health may be avoided, however, by the installation of ap¬ proved purification processes in private dwell-

Fig. 5. — Toronto Filtration Plant — General Arrangement of Pipes in Filter House.

uting reservoirs at Colles Cordoba and Via-monte, which cover an area of four acres and have a capacity of 13,500,000 gallons. Buenos Aires now has a good water supply. Argentina is enforcing hygienic regulations in all of its coast cities.

Rio de Janeiro obtains its waters from mountain sources. The waters are conducted into receiving reservoirs and then are carried 33 miles from their sources through conduits to distributing reservoirs, in the course of which there is some purification.

The foregoing will suffice to show the world¬ wide interest now - being taken in water supplies and the researches of scientists and efforts that; have been made and are being put forth by all progressive communities to secure for them¬ selves pure and wholesome water for potable and other domestic purposes.

Enough has already been said to demonstrate the vital importance of water supplies to com¬ munities and to individuals. In this article the problems involved in the construction of water¬ works have not been discussed for they are engineering problems and do not come within its scope. The larger and more important problems of water supplies, however, have been presented at some length in order that readers of the Encyclopedia Americana

ings, hotels, hospitals, schools, offices, factories, *etc.*

The matter is of such transcendent import¬ ance that the Treasury Department of the United States Government called together a corps of distinguished specialists in 1914, and they formulated standards of purity for water to be consumed by the public, which was being supplied by common carriers in interstate com¬ merce.

The article is contributed in the hope that it may awaken a deeper interest in the subject than that taken by individuals and communi¬ ties which have suffered most seriously from unwholesome water supplies in the past.

Bibliography. — Applebaum, S. B., (Man¬ ganese in Ground Waters and Its Removal } ; Binnie, Alexander R., Warious Articles on Hydrology, Rainfall and Water Supply ' (Rochester, N. Y.) ; Cincinnati, Report on Water Purification aD ; De Frise, M., (La Sterilization de beau par l'ozone> ; Don and Chisholm, (Modern Methods of Water Puri¬ fication* (London 1911); Ellms, Joseph W., Purification of Water) (New York 1917) ; Engineering Record (1907; 1913 et seq.) ; Flinn, Weston and Bogert, (Waterworks Hand¬ book (New York 1916) ; Fuller, Myron W., Contributions to Hydrology of the Eastern

United States5 (in (Water-Supply and Irriga¬ tion Papers 102, 110, and 146,) of the United States Geological Survey) ; Fuller, George W., (Report of Commissioner of Waterworks of Cincinnati) ; Frankland, Percy, (Micro-Organ¬ isms in Water5 (London) ; Grover, Nathan C., Contributions to Hydrology of the United States) (United States Water Supply Paper 375); Hasseltine, H. E., (The Bacteriological Examination of Water) (United States Health Reports No. 45, Washington 1917) ; Hall, Ed¬ ward Hagaman, (The Catskill Aqueduct) (in 23d Annual Report of the American Scenic and Historic Preservation Society) ; Hale, Frank E., (Iron Removal by Rapid Sand Filters5 ; Hill, Nicholas S., Jr., (Modern Filter Prac¬ tice5 ; Houston, A. C., (Reports5 as Director of the Metropolitan Board of Water Supply for London; Johnson, George A., (The Purification of Public Water Supplies5 (Paper 315, United States Geological Survey) ; Jvurnal of the American Waterworks Association; Journal of the New England Waterworks Association (Vols. XIII, XIV, March and June 1915); Kunz, George F., (The Catskill Aqueduct Publications5 (New York) ; (Annual Reports of the Water Board of London5 (London, annually) ; Mason, William P., (Water Supply5 (New York 1916) ; (Mass. Board of Health, Reports of5 ; Meyer, Adolph F., dements of Hydrology5 (New York) ; dew York City, Water Supply of5 (pamphlet issued ‘by the Merchants’ Association, ib.) ; Parker, John Henry, (The Aqueducts of Ancient’ Rome5 ; Phelps, Earle B., (Chemical Disinfection of Water5 (United States Public Health Report 41, Washington, October 1914) ; Prescott and Wins¬ low, (Elements of Water Bacteriology5 (Lon¬ don) ; Proceedings of the American Waterways Association and of the Institution of Civil En¬ gineers of London; Race, Joseph, (Chlorina¬ tion of Water5 (New York 1918) ; Rafter, George W., (Various Articles on Hydrology, Rainfall, and Water-Suppjy5 (Rochester, N. Y.) ; Rideal, Samuel, (Water and Its Purifi¬ cation5 (London) ; Reports of the Massachusetts State Board of Health, of the Public Health Service and Hygiene Laboratory of the United States, and of the New York City Board of Water Supply, Gas and Electricity; Slichter, Charles S., (The Rate of Movement of Under¬ ground Waters5 (Paper 140, United States Geo¬ logical Survey) ; Transactions of the American Microscopical Society (Vols. XXIII, XXIV and XXX), and of the London Institution of Mechanical Engineers ; Turneaure and Rus¬ sell, (Public Water Supplies5. (New York) ; Technology Quarterly (various volumes) ; Underground Water Resources of Iowa5 (Water Supply Paper 293 of the United States Geological Survey) ; United States Geological Survey Reports on Underground Waters, Hydrology and Water Supply; Whipple, George C., (Microscopy of Drinking Water’

(New York) ; id., (The Value of Pure Water5 (New York 1907) ; Zeitschrift fiir Hygiene (Berlin 1894 et seq).

Henry Wayland Hill,

President of the New York State Waterways Association. Author of ((Waterways and Canal Construction in New York 55 and of the Articles on ˆRainfall? and v" 'Waterways 55 in this Encyclopedia.

WATER TABLE, in architecture, a pro¬ jecting stone sloped on the roof to throw off water. It occurs in buttresses and other parts of Gothic architecture.

WATER THERMOMETER. See Ther¬ mometer.

WATER-THRUSH, an American warbler

of the genus Seiurus, brownish to yellowish in color, having terrestrial habits and frequenting preferably the borders of streams; its domed nest in the woods gives the name oven-bird to the common resident species (X. auric apillus) . The Louisiana variety (S. motacilla) is distin¬ guished by a white superciliary line. See War¬ blers ; Wagtail.

WATER TURBINE. See Turbine;

Water Wheel.

WATER-TURKEY. See Darter.

WATER VALLEY, Miss., city, one of the county-seats of Yalobusha County, on the Illinois Central Railroad, about 140 miles north by east of Jackson, the State capital, and 15 miles north of Coffeeville, the other county-seat. It was settled in 1855 by William Carr; incor¬ porated in 1867, and chartered as a city in 1890. It is in an agricultural region, in which cotton is one of the principal products. It has consid¬ erable lumbering interests. The chief manufac¬ turing establishments are cotton mills, railroad repair and construction shops, in which there are 500 men employed, a lumber mill, foundry and machine shops, and woodworking factory. The city owns and operates the electric-light plant and the waterworks. There are seven church denominations, the Methodist State Or¬ phans' Home, the McIntosh Training School, and public Schools for both races. There

are two banks and two newspapers. The govern¬ ment is vested in a mayor and board of aider-men consisting of seven members elected every two years. Pop. (1920) 4,064.

WATER WHEEL, a machine by which

the energy in falling water is utilized to per¬ form mechanical work. Water, through its tend¬ ency to seek the lowest level — the point near¬ est to the centre of the earth — ‘acts as a motive power by its weight. When the water is con¬ fined, as in a vertical pipe, this weight becomes pressure. When the water has acquired a ve¬ locity in flow its motive power is called impulse. Water wheels adapted to these various condi¬ tions may be divided into two .general classes — the (<vertical,55 consisting of the <(overshot,)5 ((breast55 and ((undershot55 wheels ; and the ((horizontal,)5 which includes a great variety of turbine or reaction wheels. The impact or im¬ pulse wheels are represented in both classes. The term water wheel is correctly applicable to all forms of water motors that rotate, but in this article it will be restricted to those of the vertical class. For those belonging to the hori¬ zontal class, see Turbine.

The overshot wheel is so called because the actuating water is fed to it from the top. It is provided with a number of buckets fixed to its periphery in such a way that as the wheel re¬ volves the buckets on the descending side have their tops upward, and being filled with water at or near the top of the wheel, the weight of the water exerts a downward pull and the axle of the wheel being free to turn in its bearings, a rotary motion is imparted to the axle from

which it is transmitted by belts or gearing to the mechanism to be operated. The water is admitted to the wheel by various methods, such as the overfall sluice, the penstock and the guide bucket, in all of which the water is guided in a course tangential to the perimeter of the wheel. If the water is in motion, that is, has a certain velocity, when it enters the wheel buck¬ ets, it acts partly by impact, but in usual condi¬ tions the motive power of the wheel is simply the weight

of water in its descending buckets, which may be roughly estimated as the cubic content in feet of two-thirds of the number of buckets, multiplied by 62ˆ2 pounds. To obtain the greatest efficiency, the number of buckets, ought to be as large as possible and so arranged as to hold the water as long as practicable. The buckets vary in form, but the greatest effect is obtained from curved buckets, the “radial® giving only about 75 per cent of the power obtainable by the use of “elbow® buckets. Overshot wheels may be constructed of wood or iron in any size. The earlier forms were mas¬ sive structures built of wood; the modern wheels are generally built of iron and are prac¬ tically limited by construction problems to falls less than 60 feet in height. The average sizes range from 8 to 40 feet in diameter.

In the breast wheel the water is received by the buckets on a level with or but slightly above the axle of the wheel. It is most effectively employed in connection with falls ranging from 5 to 20 feet, and where the flow ranges from 5 to 90 cubic feet per second. The buckets are generally held in a curb, and, not being re¬ quired to hold water, are set radially. Their number is made as large as possible, and they are set at such an angle that they leave the water vertically so as not to carry up water from the tailrace. The breast wheel is more effective than the overshot where the fall is low, since it can be made of nearly double the diameter and affords an increased facility for the reception and discharge of the water by the buckets, besides gaining some power from impulse.

The undershot wheel receives the water be¬ low its horizontal centre line. Instead of buck¬ ets it is equipped with a series of paddles or vanes fixed to the periphery in such a way that the flowing water passing under the wheel pushes against the paddles, causing rotation. It is usually set in a curb with a minimum amount of clearance for the escape of the water. The most effective curbs are concentric to the wheel, those set straight or tangential allowing too much waste. The paddles are set radially and inclined upward in order to be readily emptied of water upon the return side.

For falls not exceeding six feet, the most effective wheel is the Poncelet. In it the water acts in a manner very similar to its action in a turbine, and although not quite as efficient as turbines working under normal conditions, it is superior when working under a reduced water supply. The buckets are curved, and the water flowing along their concave sides presses upon them without impact and with greater effect than that of water impinging at right angles -against buckets with plane surfaces. The effect of the wheels increases with the depth of the water, and the velocity of rotation is equal to about one-half the

velocit}ˆ of the flowing water. The simplest form of the “impact® wheel con¬

sists of a series of rectangular buckets fixed upon a wheel at an angle varying from 50 to 70 degrees to the horizontal. The water is con¬ ducted to it through a pyramidal flume set at an angle varying from 20 to 40 degrees, so that it strikes the blades nearly at right angles. The normal effect is about 5 per cent of the total mechanical power of the flow, but this may be increased somewhat by increasing the length of the paddles, so that the water exerts a combined impinging and pressing force.

In another form, known as the “impulse® wheel, a series of cup-shaped buckets attached to the periphery of the wheel are acted upon by a jet of water conducted by a pipe and delivered through a nozzle tangentially against the cups. More power is obtained by increasing the num¬ ber of nozzles to two, or even four. Of this form the most notable are those of the Pelton type, which are extensively employed to work air compressors in mining operations. At first limited in usefulness to the locality of the power, the development of electric power trans¬ mission brought them into a greatly enlarged field of service. Such wheels are now operating under heads up to nearly 2,000 feet. A Pelton wheel in the service of the South California Edison Company, working under 1,900 feet head at 430 revolutions per minute, develops 1,600 horse power. This wheel has been running con¬ tinuously since 17 March 1903. At a plant re¬ cently erected in Europe, a jet of water one and one-half inches in diameter under a head of 5,250 feet develops 3,000 horse power. The Rio Janeiro Traction, Light and Power Company operates a Pelton wheel with four nozzles under 900 feet of head. The power developed is equivalent to 20,000 horse power.

The efficiency of the turbine being so much greater than that of any type of vertical water wheel they are universally preferred except in the smallest water power developments. This statement, however, does not apply to the Pelton wheel whose efficiency is equal to the turbine, and is available where the head is too great for economical use in turbines. The largest vertical water wheel ever built in America was the Burden wheel, located on the bank of Wyn-ant’s Kill, which enters the Hudson River near Troy, N. Y. This wheel was of tension con¬ struction, the 264 spokes being one and one-half inch rods bolted to rosettes on the 12 inch shaft. Its diameter was 60 feet, and its face width was 20 feet. The water was brought to the wheel

through a steel penstock which crossed the wheel transversely at its summit. Four gates at intervals in this penstock were in the constant charge of the wheelman who opened or closed them so as to keep the supply such that it would turn the wheel at a constant speed of two and one-half revolutions per minute. On the outer sides of the rim were circular cogged racks which engaged with pinions seven feet in diameter and nine inches face keyed to the shaft, which projected 31 feet into the mill. This wheel was in constant operation 45 years, much of the time running night and day for long periods. It was abandoned in 1898 as of insufficient power for the needs of the business, but remained intact for 15 years thereafter be¬ fore it began to fall into decay. The largest water wheel in the world is that which supplies the ancient city of Hama with water for drink¬ ing and irrigation from the river Orontes —

about 120 miles north of Damascus. This wheel is of the undershot type, 70 feet in diameter and of comparatively narrow face. It is built of wood upon an iron axle.

Bibliography. — Good descriptions of water wheels are scattered through the various en¬ gineering periodicals. Especially valuable data may be obtained from transactions of the In¬ ternational Engineering Congress) (San Fran¬ cisco 1916). See also Turbine; Water Power; Water Motor.

WATER AND WHITE ALDERS. See

Clethra.

WATER WORSHIP, a feature of nature worship, and one of the primitive superstitions of mankind. Water was not worshipped as an element, but in its various forms of well and spring, river and ocean. Every spring and river was supposed to have an animating deity, who could be propitiated or offended, and the worship of these divinities was a prominent part of Greek and Roman cult, especially in the rural districts.

WATERBORO, wa’ter-bur-o, Me., town in York County, on the Portland and Rochester Railroad, about 25 miles southwest of Portland. It contains the villages of Waterboro, East Waterboro, South Waterboro, North Water¬ boro, Waterboro Centre and Ossippee Mills. It was settled in 1787, and in 1789 was incorpor¬ ated. The town has flour and lumber mills, an apiary for breeding bees and considerable dairy interests. Pop. 997.

WATERBURY, a city of Connecticut, in New Haven County, the fourth in population in the State, and one of the most important manu¬ facturing centres in New England. It is situated on both sides of the Naugatuck River, 21 miles above its junction with the Housatonic, 22 miles northwest of New Haven and 32 southwest of Hartford. In January 1902, by an amendment to the charter, the city became coterminous with the town, so that it now covers an area seven or eight miles square. Its physical fea¬ tures are greatly diversified. Its streams and wet lands probably suggested its name, given to ihe town at the time of its incorporation. Its earliest designation, (<Matetacoke® (shortened to Mattatuck), means a place or land without trees, and had reference probably to the primaeval meadows on the Naugatuck.

History. — The first attempt at a settlement was made in 1674, by men of Farmington, on the high land west of the river, known ever since as the Town Plot. The breaking out of King Philip’s War led to the abandonment of this site and the planters, when they returned, settled on the east side of the river, nearer to Farmington, calling the place the Town Spot. The settlement was formed under the order of the General Court, upon the payment of about £2,500. The men numbered 31, and for 26 years no outsider was admitted as a proprietor. Mat¬ tatuck-was incorporated as a town (of Hartford County), with a change of the name to Waterbury, in 1686, occupying then a territory about eight miles wide and 18 miles from north to south.

For more than a century its growth was slow. In addition to the natural disadvantages of the situation, there were such disasters as the “great flood® of 1691 and the “great sickness® of 1712. The organization of a church — always

an important event in a New England plantation

did not take place until 1691. The town and parish were identical

until 1738, when Westbury (now Watertown) was set apart as an ecclesi¬ astical society. Northbury (now Plymouth and Thomaston) secured similar rights in 1739, and thenceforth the original parish became known as the First Society. The church belonged, of course, to the Congregational denomination. No other existed in the territory until 1737, when Episcopal services were introduced. The town was represented in the Revolutionary War by about 800 men, an extraordinary number.

Throughout its history, Waterbury has suf¬ fered seriously from fires. The losses in 1880-81 and in 1892-94 were exceptionally large, but were far surpassed by those of the great fire of 1902, which amounted to more than $2,000,000. A fire company was organized in 1828 and sev¬ eral others later, and a fire department was es¬ tablished under the first city charter in 1854. This has developed, much after the fashion of other cities, into a paid department, with a chief engineer, and equipped with a modern auto¬ mobile apparatus.

Manufactures, *etc.* — The conditions that surrounded the settlement of the town and limited its agricultural prosperity became an im¬ portant factor in its subsequent development. Under the discipline of poverty and hardship, a group of men grew up who possessed inven¬ tive genius, and, in addition, patience, economy and pluck. When the manufacturing era opened, these men were at the front, ready to make use of their opportunities, while the rapid streams of the region furnished the necessary water power. The farmers' sons became manufac¬ turers — makers of clocks and buttons — and along the several streams little factories and mills grew up, whose products met the growing demand of the time. It was in response to this demand, emphasized by the War of 1812-15. that the brass industry of Waterbury received, its early impetus — ■ an impetus which was en¬ hanced anew, and very greatly, by the War for the Union. By 1840 the manufacture of sheet metal and wire had taken the lead of all others. But there were many uses to which sheet brass could be applied beside button-making, and Waterbury manufacturers were quick to dis¬ cover them. The great manufactories are still known locally as <(rolling mills,® but the articles produced in them are of endless variety. Through the latter half of the 19th century the bulk of the brass manufacture was carried on by six concerns, one of which came into exist¬ ence in 1802, and another a few years later. These six manufactories still hold their prominent position, but meanwhile others have sprung up and attained to great import¬ ance, some devoted to one specialty and some to another, and several of them rivaling in the ex¬ tent of their product the older establishments. Buttons, buckles, pins, hooks and eyes, suspen¬ ders, harness

trimmings, rivets, wire, tubing, gas fixtures, lamps, brass kettles, boilers, clocks, watches, spoons, forks, flasks, percussion caps, photographic materials, coins for South Ameri¬ can republics — things of all kinds made wholly or in part of brass — are sent forth from their packing rooms by hundreds of thousands, and shipped to all parts of the world. The chief seat of the brass industry in America is the Nauga¬ tuck Valley, and Waterbury is its dominant

centre. There are also many important estab¬ lishments quite outside of the brass industry — machine shops of national reputation, foundries, manufactories of cutlery, of hinges, of traps, of aluminum goods, paper-box factories and vari¬ ous others. The number of Waterbury con¬ cerns which organized under the (<Joint Stock Law® of Connecticut between 1843 and 1911 was about 300. One hundred of these were companies working in metals; the rest were' corporations manufacturing other materials, or mercantile and miscellaneous concerns. Many of these have ceased to exist, but the surviving corporations number over 150. The fame of the Waterbury watch was worldwide, yet few people know that one of the largest clock fac¬ tories on the globe is here. In 1845 the capital employed in manufactures amounted to $653,- 825; in 1890 the amount of the capital was $17,- 682,500, and the value of the product, $17,712,- 829; and, in 1910, the amount of the capital was $35,000,000, the value of the product $50,350,000, and the total wages paid $12,000,000. In 1914 the capital was $49,000,000 and the gross prod¬ ucts almost $51,000,000. Waterbury, having manufactured munitions during the War of 1812, and during the Civil War, again turned to the manufacture of war materials in 1914, and continuously during the World War has turned out munitions to the extent of tens of millions of dollars.

Through all this period Waterbury men were busy as inventors. The first United States patent was granted to a descendant of a Water¬ bury miller; the second was granted to a resi¬ dent of Waterbury — in 1796. The number of patents issued to residents of Waterbury con¬

tinues to be about double what might be ex¬ pected from the population; or one annually for every 500 inhabitants. The city has six com¬ mercial and seven savings banks.

Railroads and Transportation. — Electric cars run through the main streets and beyond the city limits in every direction to the neigh¬ boring towns. The headquarters of the western division of the New York, New Haven and Hartford Railroad are in Waterbury and ex¬ press train service is given both to New York and Boston with local service on branches ex¬ tending to Middletown, to New Haven and to Watertown. The electric trolley railway sys¬ tem centring here serves 42 towns within a radius of 35 miles. The product of the Water¬ bury manufacturers in the line of mailable goods is so immense that the business of the post office is exceptionally large. The mone}ˆ order business amounts to nearly a million dollars annually.

Water Supply, Lighting, *etc.* — The water supply is abundant and good. A reservoir was established on East Mountain in 1868, another on Cooke street in 1880, the Wigwam Reservoir in 1901, and in 1909 the building t>f the Morris Reservoir on the west branch of the Naugatuck, 11 miles north of the city, was begun. These reservoirs have a total capacity of over 5,000,000 gallons of water. There are 95 miles of water pipe. A sewerage system was introduced in 1883, but the discharge of sewage into the river was strongly objected to by persons and estab¬ lishments located below the outfalls. In August 1904 the city began the building of a trunk sewer, and a sewage disposal plant some miles down the valley. The city has been lighted by

gas since 1854. Electric lights were introduced in 1884, and were substituted for gas lights on the public streets not long after. Since 1904 the current which supplies the lights and also furnishes the motive power of the trolley sys¬ tem is brought across the country from the Housatonic River.

Streets, Parks, Buildings, *etc.* — The city is divided into four sections, as the town has been from its settlement, by two main streets, one running east and west, the other nearly north and south. There is also an informal di¬ vision into districts, some of which represent the school districts of the earlier time. The most important of these are Brooklyn, Waterville, Hopeville and Bunker Hill. At the inter¬ section of the main streets there is a central park or green, adorned with stately elms, at one end of which stands an elaborate soldiers' monu¬

ment (erected in 1885, by popular subscription), and at the other end a handsome drinking fountain. The development of Hamilton and Chase Parks — valuable gifts to the city — was begun in 1903. Centre square and Union square are attractively laid out. The public buildings worthy of mention are the courthouse, the post office, the Bronson Library, Second Con¬ gregational Church, Saint John's Church (Epis¬ copal), Saint Patrick's Church (R.C.), the building of the Young Men's Christian Associa¬ tion, the Girls' Industrial School, the Lilley building, the Citizens' Bank, the Elton Hotel and the Buckingham building, Saint Anne's Church (R.C.). The municipal building adjoin¬ ing Library Park cost $600,000. There are 23 theatres. The union railway station is modern and commodious. The Chase Interests, Inc., have just built an edifice costing approximately $1,000,000, to be used for office purposes.

Education, *etc.* — School affairs were at first conducted by the town, and afterward by a ((school society,® which divided the town into 14 districts. In 1849, chiefly with a view to establishing a high school (the old academy having suffered a decline), five of the districts were incorporated as a centre district, under the management of a board of education, a finance committee and a superintendent of schools, — leaving a circle of outlying districts under the old management (a board of school visitors). In 1899 the bounds of the city were extended and made coterminous with those of the centre district, and the earlier and somewhat cumbrous organization was superseded by a department cf education, consisting of the mayor and a board of seven members. In 1917 the board consisted of the mayor and nine members, three members being elected for terms of six years each. When, in 1902, the city was finally made coterminous with the town, the traditional status of the outlying districts was preserved. The districts have since practically been abolished. The investment in public schools exceeds

$3,000,000.

Kindergartens, domestic science, -manual training and sewing departments have been es¬ tablished in all of the schools, and the evening schools have been conducted since 1856. A con¬ tinuation school for machine shop apprentices has been established. An open-air school was established in 1912. The first high-school build¬ ing was destroyed by fire in 1870 ; the third was erected in 1895-1911 at a cost of $225,000. Two new high schools have been erected at a cost

of about $1,000,000 each and a third has been begun to cost the same. Pupils enrolled in the public schools for 1918 number 14,748 and in schools other than public 6,184. These other schools include Saint Margarets School for Curls (the diocesan school of the Episcopal Church,), the Academy of the Convent of Notre Dame, five large parochial schools and various smaller schools. The Bronson Library, founded in 1868 by a bequest of $200,000 from a native of the town, contains more than 100,000 vol¬ umes, and has a very wide circulation every month. The present building was erected in 1893-94, at a cost of $63,500.

There are three daily newspapers — the Waterbury American , established in 1844; the Waterbury Democrat and the Waterbury Re¬ publican, both dating from 1881. The town has made a very respectable record in pictorial art, sculpture, music and literature.

.Societies.— Various literary, musical and scientific societies and social clubs have been organized, the most active of which are the Waterbury Club, incorporated in 1881 ; the Women's Club, established in 1889; the Daughters of the American Revolution, 1893, the Naturalists' Club, 1897, the Mattatuck His¬ torical Society, organized in 1877 and incor¬ porated in 1902 and the Country Club, incor¬ porated in 1908. The various Masonic bodies and mutual benefit fraternities number about 175. The Young Men's Christian Association, organized in 1858, occupies a building which cost $40,000. Other philanthropic organizations are the Industrial School (for girls), the Boys' Club, the Young Women's Friendly League, two day nurseries, a free kindergarten, Protestant and Roman Catholic temperance societies and the Southmayd Home (for aged persons). Waterbury has three large modern hospitals, the Waterbury Hospital and the Saint Mary's Hospital, costing considerably over one-half a million dollars. The present almshouse was built in 1893 at a cost of

$80,000. Of the sev¬ eral cemeteries of the town, Riverside (opened in 1853) is noteworthy for its picturesqueness and for its monuments. A memorial chapel stands at its main entrance.

Religion. — Waterbury contains 38 churches and three Union chapels. Probably two-thirds of the population are Roman Catholics and the Catholic churches number 10. Five of the Protestant churches are Congregational, three Episcopalian, four Baptist, five Methodist, three Lutheran and one Adventist. There is also a corps of the Salvation Army, a society of; Christian Scientists and two Jewish syna¬ gogues.

Government. — In 1825 the population lying around the centre of the town was organized into a borough. The incorporation of the city took place in 1853, with a population of about 4,000. A new charter, obtained in 1871, was su¬ perseded by another in 1896, to which important amendments were made in 1899 and 1902. Under this third charter the city is divided into five wards and the government is conducted by a mayor and 15 aldermen, through a number of boards, each having charge of one of the follow¬ ing departments: Of public works, of public safety, including the police and fire depart¬ ments, of public health, of charities, of educa¬ tion, of finance; also a board of assessors, a board of relief and a board of agents of the

Bronson Library. There are also superintend¬ ents of streets, of the waterworks and of sewers and a city engineer. Besides the police court, there is a district court, which has juris¬ diction beyond the limits of the city and ses¬ sions of the Superior Court are held in Water¬ bury.

Population. — The successful conduct of man¬ ufactures so extensive and varied in an inland Connecticut valley has involved a large and steadily increasing immigration. The growth of the city since 1850 has been greatly aug¬ mented by the steady inflow of foreigners. The population in 1790 numbered 2,937; in 1850, 5,137; in 1860, 10,004; in 1880, 17,806; in 1890, 28,646; in 1900, 51,139. The United States census of 1910 reported the population at 73,141, the percentage of increase being 59.5. By 1920 the population had grown to 91,410, an increase of 25 per cent over the population of 1910. The percentage of residents of foreign birth or pa¬ rentage is, with one exception, the largest of any Connecticut town and the number of nationali¬ ties represented is remarkable. At the same time, the condition of the community, socially and morally, is exceptionally good. Waterbury is noted for the superior grade of the homes of its working people.

Wealth is more uniformly distributed than in most cities, the question fre¬ quently arising whether there are any million¬ aires in the community. The valuation of property, real and personal, in 1918 was $110,-

000,000.

Bibliography. — Bronson, < History of Water¬ bury } (1858) ; Bassett, (Waterbury and Her In-du-stries) (1888) ; Anderson, (The Town and City of Waterbury from the Aboriginal Period to the Year 1895 } (1896) ; also Wharter and Ordinances of the City of Waterbury) (1902) and the annual (Municipal Register.*

Leroy M. Gibbs,

Secretary, Waterbury Chamber of Commerce.

WATERBURY, Vt, town in Washington County, on the Waterbury River and on the Central Vermont Railroad, about 11 miles north¬ west of Montpelier. It contains the villages of Waterbury and Waterbury Center. The loca¬ tion, in a beautiful valley, is most picturesque. The principal manufacturing establishments are grist and lumber mills, brick works, tannery, boot and shoe factory, sleigh and carriage works. There are six churches, Green Mountain Semi¬ nary, a State Insane Hospital and graded schools. Pop. (1920) 1,515.

WATERCOURSES, in law, streams of water usually following a well-defined channel and emptying into some other body of water. A watercourse need not maintain* a constant current, but it must be more than an occasional stream, the result of unusual rains or the melt¬ ing of snow and following a channel cus¬ tomarily dry-See Riparian Rights.

WATEREE, a river of South Carolina, formed by the junction of the Catawba River and Fishing Creek, and is called the Catawba in the upper part of its course. It is about 315 miles long and runs nearly southward, forms the east boundary of Chester, Fairfield and Richland counties, and unites with the Congaree River at the southwest extremity of Sum¬ ter County to form the Santee River.

WATERFALL, a sudden descent in the water of a river or stream from a higher to a

lower level. When the water falls over a precipice it is called a cataract, and when sev¬ eral cataracts occur in succession it is called a cascade. Where the incline is less steep and there is merely a stretch of very swift and tumbling water, the term rapid is commonly used. Some of the mountain waterfalls are remarkable for their height, while others are noted for the fall of immense quantities of water. The most remarkable waterfall in the world is Niagara Falls on the Niagara River, between lakes Erie and Ontario, and thousands of visitors from all parts of the world have admired the sublimity of these falls. Water¬ falls are now being utilized to furnish both electric and water power for commercial pur¬ poses. The falls discovered by Dr. Livingston in Africa and named by him Victoria Falls, the falls of the Ruikanfoss in Norway, the Cascade of Gavarnie in the Pyrenees and the falls of the Rhine are among the most beauti¬ ful in the world, and justly celebrated. Falls are characteristic of a youthful stage of river erosion, and are usually caused by unequal hardness of the rock, the softer being worn down the faster, and giving rise to inequalities in the river bed. After the softer beds are cut down as low as they can be eroded, the rivers more slowly cut away the harder layers, and the fall gradually disappears. For a fuller description see Cataracts.

WATERFORD, Conn., village and town¬ ship in New London County, three miles south¬ west of New London, on the New York, New Haven and Hartford Railroad. There are granite quarries and manufactures of paper. Pop. 3,097.

WATERFORD, Ireland, capital of County Waterford and a county city, about 100 miles southwest of Dublin, on the right bank of the Suir, connected with its north suburb of Ferry-bank by a bridge. Of six Catholic places of worship, including a cathedral, the finest is the Dominican Church of Saint Savior, erected (1878) in the Italian style; the Protestant Epis¬ copalians have also a cathedral and two churches. Other buildings are the Protestant Episcopal palace, the Catholic College of Saint John, Saint Dominic's Industrial School, four convents, a town hall, market house, *etc.* Con¬ siderable sums have been expended in deepening the channel of the Suir, whose south bank is fringed for a mile by a spacious quay, while on the Kilkenny

side is a shipbuilding yard, with a patent slip, graving bank and dock. Besides two immense bacon-curing establishments, Wa¬ terford has iron foundries, flour mills, brewer¬ ies, *etc.* A memorial of Waterford's founda¬ tion by the Danes in the 9th century is Regi¬ nald's Tower® (1003), which has witnessed the city's capture by Strongbow (1170), the repulse of Cromwell and surrender of Ireton (1649-50) and the embarkation of James II after the bat¬ tle of the Boyne (1690). Pop. 27,000.

WATERFORD, N. Y., village in Saratoga County, on the Hudson River at the mouth of the Mohawk River and on the Champlain Canal and the Delaware and Hudson Railroad, two miles above Cohoes and 10 miles north of Albany. It has extensive water power and is a manufacturing village. The chief manu¬ factories are knitting mills, foundry and machine shops, fire-engine shops, paper and

flour mills, boiler works, shirt and collar factories and a furniture factory. The value of the finished products exceeds $3,000,000 annually. It has a union free school, public and parish elementary schools, free library, two newspapers and one private bank. Pop.

(1920) 2,637.

WATERHOUSE, Alfred, English archi¬ tect: b. Liverpool, 19 July 1830; d. London, 22 Aug. 1905. He studied architecture under Richard Lane in Manchester and afterward in France and Italy. He began practice in Manchester in 1853 and first made his name known by the Assize Courts of that city. For the same city he afterward designed the county jail, Owens College, the town-hall, Saint Mary's Hospital and other buildings. In other parts of England he was responsible for the following among other buildings, in Liver¬ pool, Seaman's Orphanage, Turner Memorial Home, Royal Infirmary and University Col¬ lege; in London, Natural History Museum, New Saint Paul's School, City and Guilds Central Institution, King's Weigh House Chapel and University College Hospital ; in Oxford, Balliol College (partly rebuilt) ; in Cambridge, Caius and Pembroke colleges (partly rebuilt); in Leeds, Yorkshire College; the mansions of Eaton Hall (Cheshire), Hey-throp (Oxford), and Iwerne Minster (Dorset). He was elected A.R.A., in 1878 and R.A., in 1885, and in 1898 became treasurer of the academy. He received a Grand Prix from the Paris exhibition of 1867 and was a mem¬ ber of various foreign academies. In 1878 he was awarded the

gold medal of the Royal In¬ stitute of British Architects, of which he was president 1888-90.

WATERHOUSE, John William, English

painter: b. Rome, Italy, 1849. He studied at the Royal Academy and his paintings are noted for the richness of their coloring. His paintings include (The Oracle) (1884) ; (The Magic Circle,) (The Lady of Shalott,* (La Belle Dame sans Merci,* (The Soul of the Rose> and <Thisbe.)

WATERLAND, Daniel, English clergy¬ man: b. Lincolnshire, 14 Feb. 1683; d. 23 Dec. 1740. He studied at Cambridge, became master of Magdalen College, chaplain to George I and canon of Windsor. Waterland was an able defender of the Orthodox faith against the Deists. His chief writings are (A Vindication of Christ's Divinity, being a Defense of some Queries relating to Dr. Clarke's Scheme of the Holy Trinity) (1719), followed by a second (1723) and third (1725) Vindication* ; a (Critical History of the Athanasian Creed* (1724), also directed against Clarke; (Christianity Vindicated Against Infidelity,* a reply to Tindal's (Christianity as old as the Creation1* ; and a Review of the Doctrine of the Eucharist* (1737), di¬ rected against Hoadley's rationalistic theory of that ordinance. Consult Van Mildert, Rife of Daniel Waterland) prefixed to Waterland's (Works,* in 6 vols. (1843).

WATERLOO, Stanley, American author and journalist: b. Saint Clair County, Mich., 21 May 1846. He was graduated from the University of Michigan in 1869, engaged in journalism, was one of the owners of the

Saint Louis Journal in 1872, was subsequently editor of the Saint Louis Republic, Chronicle , and Globe-Democrat, and in 1884 established the. Saint Paul Day. He was later editor-in- chief of the Chicago Mail, and has been en¬ gaged on various other journals. He has written (A Man and a Woman1 (1892) ; (Honest Money1 (1895) ;

(These are My Jewels1 (1902) ; (The Cassowary1 (1906), *etc.*

WATERLOO, Canada, (1) a town of Waterloo County, Ontario, two miles north¬ west of the capital, Berlin, on a tributary of the Grand River, and on a branch line of the Grand Trunk Railway to Elmira. It is an in¬ dustrial centre, with iron foundries, manu¬ factures of agricultural implements, boots and shoes, brooms, textiles and tobacco and a newspaper. Pop. 4,800. (2) The capital of

Shefford County, Quebec, and a railway junc¬ tion, on the Stanstead, Shefford and Chambly Railway, 70 miles east by south of Montreal. It has lumber and flour mills, a brewery, tan¬ neries and manufactures of mill-machinery, agricultural implements, iron-castings and furniture. There are two newspapers and two banks. Lumber and farm produce are shipped. Pop. about 2,000.

WATERLOO, England, a town and water¬ ing-place; of England, on the Lancashire Coast, four miles north-northwest of Liverpool, forming with Seaforth one urban district. Pop. 27,000.

WATERLOO, Ill., city, county-seat of Mon¬ roe County, on-the Mobile and Ohio Railroad, 24 miles south of Saint Louis, Mo. It is in a fertile agricultural region, in which the chief products are wheat and corn. In the vicinity are quarries of fine building stone, known in the trade as Waterloo marble. The chief manufacturing establishments are flour mills, marble works, a large brewery, an ice factory and bottling works. There are large stock yards and coal and lumber yards. The educa¬ tional institutions are a high school, founded in 1891, Saint Joseph's School (Roman Cath¬ olic), public and parish elementary schools and a school library. There are two banks and two newspapers. Pop. (1920) 1,930.

WATERLOO, Ind., town in De Kalb County, on the Cedar Creek, and on the Lake Shore and Michigan Southern Railroad, 28 miles north by east of Fort Wayne. It is the commercial centre of an extensive agricultural section, in which wheat, corn and vegetables are the chief products. It has seven churches, a high school, founded in 1872, graded ele¬ mentary schools, two banks and a newspaper. It was founded in 1857, and in 1864 was in¬ corporated. Pop. 1,167.

WATERLOO, Iowa, city, county-seat of Blackhawk County, on the Cedar River, and on the Illinois Central, the Chicago, Rock Island and Pacific and the Chicago, Great Western railroads, about 95 miles west of Dubuque. It is in an agricultural and stock-raising region, and has considerable manu¬ facturing interests, partly due to abundant and

cheap water power. The chief manufactur¬ ing establishments are foundries, machine shops, gas-engine works, threshing-machine factories and automobile works, manufac¬ tories of refrigerators, farm implements and

the Illinois Central Railway repair shops. Their annual gross products are valued at about $4,000,000. The principal public buildings are the government building, the county court¬ house, municipal buildings and the Presbyte¬ rian Hospital. There are 31 church buildings. The educational institutions are two public high schools — the East High School, founded in 1872, and the West High School, in 1870; Our Lady of Victory Academy (Roman Catholic), public and parish elementary schools, Waterloo Business College and school libraries. There are seven banks and two daily newspapers, besides monthly and semi¬ monthly periodicals. The government is vested in a mayor and a council of eight members elected biennially. The ma¬ jority of the inhabitants are American born; of the foreign born the Germans predominate, then the Irish and the Scandinavians. Water¬ loo was settled in 1845-46 by G. W. Hanna and Charles Mullan. It was incorporated as a town in 1868. Pop. (1920) 36,230.

WATERLOO, N. Y., village, one of the

county-seats of Seneca County, on the Seneca River, the Cayuga and Seneca Canal and on the New York Central and Hudson River Railroad, about 18 miles west of Auburn and 55 miles east of Rochester. It is in an agricul¬ tural region, but the village has several manu¬ factories, chief of which are large woolen mills, lumber mills, piano factories, wagon and carriage works. It has a high school founded in 1843, public elementary school and a public library. There are two banks and three news¬ papers. Pop. (1920) 3,809.

WATERLOO, Battle of, the culminating engagement of the shortest and most de¬ cisive of all of the Napoleonic campaigns, was fought 18 June 1815, near the village of Water¬ loo, in Belgium, situated about 12 miles south of Brussels. From 11 April 1814, when Napoleon signed the first abdication and re¬ tired in exile to Elba, until 20 March, when he terminated the period of that retirement and returned to Paris, the political and domes¬ tic affairs of France had been bordering on revolution. Although the administration of affairs by the government established by the Comte du Provence, who, under the title of Louis XVIII, had taken unopposed possession of the country, restored political liberty, the changes inaugurated were so sudden,

that it unsettled all domestic affairs, the title of es¬ tates, the position of public men, and the prospects of the army to an intolerable extent. A general sense of alarm and humiliation pre¬ vailed among all classes, and even a Napoleonic period seemed preferable to the existing con¬ ditions. To add to the general turmoil, about 300,000 troops who had been held as prisoners in the various German fortresses were released under treaty stipulations and returned to France. Their apparent availability for fur¬ ther operations soon formed the basis for in¬ numerable military plots of which that de¬ signed by Fouche, with the ultimate object of placing either the Duke of Orleans or the king of Rome upon the throne, was the most important.

Napoleon was fully conscious of the exist¬ ing state of affairs. France was down, grovel¬ ing at the feet of the Allies. Here was the

opportunity for a truly patriotic action. He would give popular liberty to imperial France, and henceforth devote all his energies to strengthen that liberty and increase that pros¬ perity. He counted upon the enthusiastic sup¬ port of the army which was fretting under the command of emigres who had once fought against France, but were then being appointed to important commands, and felt sure of the effect o± his tremendous military fame upon the general military feeling of the country. He thought of Marengo ; how in three short months he had lifted France and himself from

army amounted to about 500,000 men, on paper, but only about 200,000 men were available for actual field service. In planning the campaign, Napoleon had the choice of confining himself to purely defensive operations and allowing the Allies to invade France, or of assuming the offensive, and relieve her of the conse¬ quences of a second invasion. He chose the latter, and laid the scene of the campaign in Belgium where the English under the Duke of Wellington had their headquarters at Brus¬ sels, and the Prussians under the

command of Marshal Bliicher, at Namur.

the lowest ebb of fortune up to the highest pinnacle of military glory and power. He judged correctly in all these things. He left Elba 20 February, and landed on the coast of France 1 March, and entered Paris triumph¬ antly 20 days later.

While Napoleon was inaugurating the Hun¬ dred Days with professions of peace and liberty, the Allied Powers suspended negotia¬ tions at the Congress at Vienna, issued a declaration branding him as ((an enemy and disturber of the peace of the world,® and formed a new Coalition to renew the struggle against him. By the beginning of June they had more than 700,000 men in the field, and he was compelled to take active measures to de¬ fend his newly recovered empire. The French

The general plan of operations was based upon his favorite form of strategy — action on interior lines® against the two armies opposed to him. He assumed that Wellington and Bliicher would endeavor to form a junction at Charleroi, and determined to concentrate the bulk of his own army at that point and defeat them separatelv before they could effect that junction, and then turn his attention to the force of Austrians and Russians gathering on the eastern border under the command of Prince Schwarzenberg.

At the beginning of the campaign the French army numbered 124,588 men — 89,415 infantry, 23,595 cavalry, 11,578 artillery with 344 guns. Wellington commanded 93,717 men — 69,829 infantry, 11,879 cavalry, 9,406 artillery and

engineers, with 196 guns. The Prussian forces under Blucher amounted to 120,954 men — 99,- 715 infantry, 11,897 cavalry and

9,360 artillery, with 312 guns. Wellington's forces, composed of Englishmen, Dutch, Belgians, Nassauers, Germans and Brunswickers, were stationed in numerous cantonments scattered over a large area around Brussels, and to the westward of the Brussels-Charleroi pike leading to the south, with the coast as their base. Of Bliicher's force the First corps, under Ziethen, was at Charleroi, the Second, under Pirch, at Namur, the Third, under Thielmann, at Ciney

and the Fourth, under Bulow, at Liege, with the Rhine as their base.

The movement began on 13 June. The French army advanced rapidly northward, crossed the Sambre on the afternoon of tne 15th, attacked Ziethen's position, drove him back upon Fleurus, and occupied Charleroi. A portion of the army then continued the ad¬ vance through Gossilies to Quatre-Bras where they met a force of 25,000 men under Welling¬ ton, on the afternoon of the 16th, and after several hours of hard fighting were driven back upon Frasnes. In the meantime, with the intention of blocking the road between Quatre-Bras and Sombreffe so as to separate the forces under Wellington and Blucher, the troops commanded by Napoleon himself at¬

tacked the Prussians at Ligny, and after three hours of severe fighting, defeated them and captured 21 guns. The battle was desperate and bloody; about 12,000 Prussians fell, and in the final charge of the Guard, Blucher himself was wounded. This was Napoleon's last vic¬ tory. As the result of the battle, he assumed that the Prussians had been routed and were retreating to their base by way of Namur and Liege, when, as a matter of fact, under the direction of Gneisenau, Bliicher's chief of staff, they were moving northward and con¬ verging on Wavre, with the intention of Join¬

ing Wellington, with whom they were in con¬ stant communication. About noon of the 17th, Napoleon detached Grouchy with 3d, 000 men to pursue and complete the defeat of the Prus¬ sians driven back at Ligny, while he himself wZith the main body of dhe army joined Ney and followed Wellington, who, although vic¬ torious at Quatre-Bras, had been forced to fall back northward toward Brussels on ac¬ count of the defeat of the Prussians at Ligny. Wellington's retrograde movement was con¬ tinued during the whole of the 17th, until he had

reached the heights of Mont Saint Jean, about four miles south of the village of Water¬ loo, where the Prussians could join him by way of Ohain and Wavre. Here he selected his position, and confident of their assured

Field of Waterloo. (Showing positions of the three armies at 7.30 p. m., 18 June 1815).

support, he awaited the advance of the em¬ peror.

On the afternoon of the 17th, when Na¬ poleon reached Marbain, he received the in¬ formation that the Prussians defeated at Ligny had not retreated to Namur and Liege, and he sent a message to Grouchy informing him of that fact, and instructing him to find out if the Prussians were moving to a junction with Wellington. When Grouchy received this mes¬ sage he was actually farther from the Prus¬ sians than the Prussians were from Welling¬ ton, and about the time he reached Gembloux, about 10 o'clock on the night of the 17th, only

rear of Wellington's position, and thus cut off his retreat in the direction of Brussels and his base of supplies. The best authorities con¬ cede that the plan was admirably conceived.

About 8 o'clock on the morning of the 18th, Wellington drew up his forces in line of battle, but although the rain which had been falling all night ceased about that time, the attack by the French was postponed so that the ground might be in better condition for artillery move¬ ments. A little before 9 o'clock Napoleon re¬ viewed his lines, and about 10 o'clock he sent instructions to Grouchy to advance upon the Prussians at Wavre. The battle commenced

to learn that the Prussians had reallv marched to Wavre, the main French army had reached the field of Waterloo and bivouacked opposite the forces of Wellington. It was past mid¬ night when Napoleon inspected the position of both armies. The main line of Wellington's forces occupied an advantageous position along the highway that runs from Braine la Leud to Wavre by way of Oham, with the centre resting on the Brussels-C'harleroi pike, while strong outposts held the' farm house of La Haye Sainte directly in advance of the centre, the hamlets of La Haye, Papellotte, and Smohain on the extreme left, and the chateau of Hougomont on the right. His force consisted of 67,661 men — 49,608 infantry, 12,- 408 cavalry and 5,645 artillery with 156 guns. Of these the British troops numbered only about 24,000. Napoleon had 71,947 men — 48,- 950 infantry, 15,765 cavalry and 7,232 artillery with 246 guns. He arranged his troops in two lines diagonally across the Brussels-Charleroi pike, the right resting on Frischermont, and the left across the road to Nivelles, with a strong force of infantry, cavalry and artillery stationed in the rear on both sides of the Charleroi pike near Rossomme.

Early on the morning of the 18th, he dic¬ tated his plan of battle, the direct object of which was to capture the village of Mont Saint Jean lying on the Charleroi pike directly in the

at 11.30. As a diversion, a division of Reille's corps assaulted the British position at Hougo¬ mont, were repulsed, and were supported by division after division until the entire Second corps were in action against Wellington's left, and therefore did not take any part in the main attack on the British centre by D'Erlon about 1.30. In this attack, the advanced troops of. the British right, composed of Bylandt's brigade, were easily routed, but the advancing French received a terrific fire from Picton's brigade, and being charged by the British cavalry, fell back in great disorder. Here General Picton who probably commanded the British right was killed. In the meantime, as¬ sault upon assault was made by the French on La Haye Sainte, which occupied the greater part of the afternoon, while for two hours, from 4 to 6 o'clock, under the personal direc¬ tion of Ney, the splendid cavalry divisions of the French were hurled against the British right-centre, but failed to break the formation of a single British square. The cavalry at¬ tack being unsupported by infantry, Ney was compelled to withdraw for lack of troops, about 6.30, just as La Haye Sainte was taken, too late to he of any advantage. About the middle of the afternoon Napoleon discovered the advance guard of the re-enforcing Prus¬ sians on the hills of Saint Lambert about three miles away upon

his right, and realized for the

first time that the entire Prussian torce had succeeded in concentrating at Wavre. and were now on hand to aid Wellington. He im¬ mediately detached Lobau with the Sixth corps, to intercept the new enemy, and sent a message to Grouchy, ordering him to return. Grouchy in the meantime, having moved off to Wavre in search of the Prussians, did not get this message until evening.

Lobau being unable to check the advance of the Prussians, the Young Guard was sent to re-enforce him, and then, believing that his right was secure, Napoleon massed the eight remaining battalions of the Imperial Guard for a final attack upon Wellington's centre. Sup¬ ported by a terrific artillery fire, and led by Friant, the Guard advanced, while D'Erlon hurled the First corps against the British right. D'Erlon's assault was effective, but the Guard, decimated by a heavy fire from Maitland's brigade, supported by those of Halkett and Elphinstone, were repulsed with terrific loss and fell back in complete disorder before the impetuous charge of the 52d regi¬ ment. Just then, about 7.30, the main body of the Prussians arrived, and going right into action, attacked the French right and threw it into confusion. At that moment, Welling¬ ton, seeing that victory was assured, ordered a general advance of his lines and decided the contest. His troops, however, were too far gone to engage in the pursuit, which was taken up by the Prussians with vigor, and the retreat soon became a rout. Napoleon left the field in the centre of a square of the Imperial Guard. He left this at Genappe, and arrived at Charleroi at daybreak with a small escort of horsemen. He reached Paris 21 June, and signed the second abdication on the 22d. The entire campaign had lasted but three days, and the battle itself, one of the most re¬ markable and terrible of modern times, was decided in eight and a half hours. The French lost in killed, wounded and missing, about 31,000 men, and the Allies, about 23,000.

Bibliography. — The literature upon the subject is very extensive, but for the most reliable and exhaustive information consult Ropes, J. C.,

(The Campaign of Waterloo) (New York 1892) ; Chesney, (Waterloo Lectures) (London 1874), and Gardner, (Quatre-Bras, Ligny and Waterloo> (London 1882).

WATERMAN, Nixon, American author: b. Newark, Ill., 12 Nov. 1859. He was con¬ nected with the Omaha World-Herald and Bee 1887-90; with the Chicago Herald and Post 1890-93, and since 1895 has been engaged in lit¬ erary work. He is the author of (A Book of Verses> (1900); (In Merry Mood: a Book of Cheerful Rhymes1* (1902) ; (The Whistling Girl,* a comedy (1902) ; (Cap and Bells> (1903) ; (Io from Iowa* (1911).

WATERMELON. See Melons.

WATERPROOFING, the art of rendering various substances impervious to the penetrating action of water. The purposes to which water¬ proofing is now applied are very numerous and the methods range from the early use of lead for sheathing building foundations, of tar for tarpaulin, oil for oilskin, rubber for clothing, to various painting processes which claim for bases, substances capable of resisting the natural

action of the elements, and which, invisible, im¬ penetrable, insoluble and imperishable, effectually render brick, stone, marble, terracotta, stucco, concrete, etc., impermeable to water. These processes are used to waterproof and insulate exterior and interior walls of buildings, for cold storage plants, for the lining of reservoirs, for monuments, *etc.*

Among the numerous methods of water¬ proofing, many of which are protected by pat¬ ents, the greater number in general relate to a surface application of some composition, usu¬ ally somewhat thicker than an ordinary liquid solution. The more widely known methods of waterproofing are those used in connection with paper and paperboard, textile fabrics, cloth, with cordage, leather, *etc.*

Paper. — The commonest process for water¬ proofing paper and manufactures of paper is their saturation with wax or paraffine; either by the use of heat, or in solution, as with benzol. Flexible papers (and woven fabrics also) of an absorbent nature may be made waterproof by a half-and-half mixture of a vegetable oil — such as China wood oil, linseed oil, poppy seed oil or soya bean oil — with polymerized cuma-rone. The mixture is heated for a time, and after, being allowed to cool, is dissolved in a volatile solvent, which is applied with a

brush, or by dipping the material into the solution and draining off the surplus. This treatment does not affect the folding qualities of papers, prac¬ tically doubles the tensile strength, and renders the sheet transparent. One of the newest methods, recently patented, consists in saturat¬ ing th'e paper with an ammonia soap of stearic acid emulsified with paraffine and diluted with water. The paper is passed through a tank containing the emulsion, and thence is taken over a series of drying rolls to evaporate the water. A French process recently introduced consists in coating the paper with a vegetable mucilage, and, after this is dry, applying a coat of agar-agar. The paper thus prepared is then subjected to the steam arising from a bath made by adding four pounds of formol and five pounds of potassium bichromate to six quarts of water. This process renders the paper some¬ what brittle, and to restore flexibility it is sponged with a weak dilution of glycerine. The so-called Japanese waterproof paper is made by pasting two sheets of paper together, the fibres crossing, with a secret waterproof cement.

Textiles. — Water-repellent textiles may be grouped into two classes according to their nature, first, the coarser tissues used for awn¬ ings, tents, oilskins, tarpaulins or canvas cover¬ ings for exposed merchandise, *etc.* ; secondly, the finer tissues employed for the manufacture of waterproof clothing. The processes em¬ ployed are of two classes, mechanical and chem¬ ical. In the first, a solid layer of some im¬ permeable substance is laid upon the material. The substances usually applied are india rub¬ ber, varnish, resin, pitch, tar, paints, *etc.* These are also impervious to air. The agents in use for chemical waterproofing are aluminum sul¬ phate, common alum, lead acetate, copper sul¬ phate, zinc sulphate, iron sulphate, ammonium cuprate, potassium chromate, paraffin, ceresine, wax, soap, *etc.* In waterproofing loosely woven fabrics it becomes necessary to fill up the inter¬ stices between the threads with imperviable

material as well as to waterproof the threads themselves. It follows that a textile which is to be waterproofed should be very tightly

woven so that when the individual threads are made impervious to water the cohesion of water falling upon it will prevent its separation into particles so small as to be able to pass between the threads. The earliest process -consisted in covering the tissue with tar, a method still em¬ ployed for marine supplies, ropes, cordage and coverings, and which has the advantage of giv¬ ing solidity to the fibre, and at the same time preserving it. Drying oils, and particularly boiled linseed oil, are still largely used to water¬ proof coarse tissues, and particularly for the oilskin overalls worn in rough weather by sail¬ ors and fishermen. Oiled tissues, however, are heavy and lack comfortable suppleness, while their color and appearance militate against their extended use. One of the more widely employed processes for waterproofing the coarser tissues consists in impregnating the material with an insoluble soap such as those formed with copper, iron, zinc and alumina. Copper soap is most universally used. The material to be waterproofed is first scoured by boiling with soda lye and then washed, after which it is passed through a 20 per cent am¬ monia soap bath, then immersed in an 8 per cent solution of sulphate of copper. Ac¬ cording to its nature, the fibre absorbs a certain quantity, large or small, of copper soap. In the ashes produced by the burning of a square yard of canvas or linen tissue so treated, as much as S7l/2 grammes of copper is found, and nearly 29 grammes of copper is to be found in the cinders of the same quantity of cotton tis¬ sue. Copper-soap waterproofed materials pre¬ sent a characteristic greenish tint.

The manufacture of waterproofed materials for clothing has attained considerable import¬ ance. The fact, however, must be recognized that the results generally obtained are not alto¬ gether satisfactory, especially from a hygienic point of view. Absolute waterproofing cannot be obtained without wholly closing the pores of the tissue; thus prepared it is an efficacious protection from rain and from contact with water, in certain cases is of real service, but inconveniently prevents ventilation. While the garments are made watertight they are at the same time made airtight. The perspiration and natural moisture of the body are not allowed to escape, but are held in saturation in the cloth¬ ing, rendering it impure, damp and uncomfort¬ able. The body is kept damp, and upon remov¬ ing the outer garments the wearer is liable to chills and colds, hence, such waterproofing is unsuitable for prolonged personal wear.

The most diverse substances can be used for waterproofing textiles, if they are soluble in a liquid other than water, and can be spread over the surface of the material, — if they possess a certain suppleness, and neither alter the fibre nor the color of the tissue. Wax, balsamic gums, isinglass, spermaceti, metallic soaps dis¬ solved in essential oils, a

solution of shellac with borax are employed in waterproofing tis¬ sues. The cloth, whether of silk, cotton, flax or wool, is usually rendered waterproof by the application of some solution of any of these substances to one or both surfaces. In many of the earlier processes, the cloth was im¬

mersed in a liquid, so as to become saturated with the waterproofing agent. An early pat¬ ent was obtained for a method of rendering cloth waterproof without concealing its textile surface; the cloth in the first place is satu¬ rated with a waterproof composition; it is then dried on one side to form a hard film, while the other side is kept moist, and is afterward deprived of its composition by means of spirits of turpentine.

Frequently silk tissues are waterproofed by the use of gelatine rendered insoluble by an alumina soap. The material is impregnated by passing it through cylinders covered with swan¬ skin, afterward being steam dried. Woolen tis¬ sues are passed through a solution of acetate of alumina obtained by treating ordinary alum with acetate of lead. The process most exten¬ sively in use at the present day is the acetate of alumina treatment. The fabric is steeped in the acetate solution for 12 hours, the tem¬ perature being kept at about 95 degrees, special care being taken that it shall not reach 100 de¬ grees. Much difficulty in securing an even dis¬ tribution of the acetate throughout the fabric is avoided by the use of the ® jigger,® a machine which takes the cloth on a reel and passes it continuously through a vat containing the chemi¬ cal, winding it upon another reel. When it has all passed the machine reverses and rewinds the cloth on the first reel ; repeating this alter¬ nation again and again.' By this process the time of saturation is reduced to five hours. A still more effective method of saturation is by the vacuum process. The reel of cloth is placed in an airtight drum and the air is exhausted. The acetate liquor is then allowed to flow in, filling the cylinder. Air pressure to the ex¬ tent of two and one-half to three atmospheres is applied, and allowed to remain for 45 min¬ utes, when the operation is complete. The cloth then goes to the drying room where the temperature is kept well above 100 degrees, in order that the acetate may be changed by the heat to the insoluble basic acetate of alumina. In this condition the fabric is sufficiently water¬ proof for most purposes of wearing apparel. If it is required that it be absolutely water¬ proof, it may be made so by immersion in a 5 per cent solution of soap. An insoluble aluminum soap is formed on the fibre of the textile and adheres firmly. The fabric will now have a slippery feel,

and this is quite ob¬ jectionable. It is readily removed, however, by passing the goods through a solution of common alum of the strength of 1 degree or one and one-half degrees Beaume. With some manufacturers it is a practice to add india rub¬ ber or paraffin to fortify the protection given by the insoluble aluminum soap. This is readily accomplished, as the soap solution easily forms an emulsion with melted paraffine or with a solu¬ tion of rubber in a mixture of linseed and palm oils. A highly recommended formula directs that chopped-up india rubber be dis¬ solved in twice its weight of a hot mixture of petroleum and linseed oil; and that to this be added three times its weight of Japan wax. When well mixed, a small quantity of liver of sulphur is to be worked in. This mass is then to be stirred into a boiling mixture of olein, linseed oil and resin. Finally the whole is to be saponified to a neutral soap with caustic

potash lye. The completed mixture should show a 10 per cent content of rubber and from 6 to 10 per cent of palm oil. After immer¬ sion, the fabric is calendered by polished steel rolls under heavy pressure. Linen, hemp and cotton require heavier pressure than wool or silk. In this calendering operation care is needed to avoid such extreme pressure that the textile fibres are crushed. Casein is sometimes used in waterproofing certain textiles and col¬ lodion also, but rarely.

Absolute waterproofing of textile materials is obtained by applying to their surface a thin layer of rubber. The first experiments were made in France by Besson in 1793; they were improved upon and perfected successively by Mackintosh and Hancock of Glasgow, Scotland, by Buttire and Guibal in France and by Good¬ year in the United States. As in the case of Macadam with road surfaces, the successful efforts of Mackintosh perpetuated his name in connection with india rubber waterproof gar¬ ments. The material is prepared by spreading on .the surface a semi-liquid layer of rubber dissolved in benzol then submitting it to the action of heat to evaporate the solvent. Car¬ bon disulphide first employed to dissolve the rubber, was replaced by a mixture of benzol or coal naphtha and essence of turpentine and later

by benzol which alone is now used. In the treatment of cotton and linen cloth a small proportion of sulphur is generally added. A thin layer of this rubber solution is spread on the fabric by special machinery, after which the cloth is doubled, pressed and finished in calendars, the waterproof layer being thus in the centre of the finished material. (See Rub¬ ber Manufactures.) The offensive odor of waterproofed rubber garments may be remedied by treating them with aromatized vapors or by dipping them in concentrated infusions of ver¬ vain root, of orris root, of lavender, of camo¬ mile, *etc.* Ammoniacal vapor and sulphurous acid can also be successfully utilized to relieve rubbered materials of their penetrating odor. The application of rubber is made on dyed ma¬ terial in thread or in piece. The use of paraffine as an impervious agent allows the tissue to be dyed after being waterproofed. Paraffined tis¬ sues do not absorb water, which assumes a spheroidal shape and slides off the surface. The chief objection to paraffine lies in the fact that it is exceedingly brittle at low tempera¬ tures and melts readily with ordinary summer heat. Woolen tissues-well cleaned by passing through a light and tepid bath of carbonate of soda and soap, are dried, then steeped in a solution of paraffine in petroleum ether, 60 or 100 grammes to the quart. They are afterward passed through roller pressers, dried in the open air, and sent to the dyeing vats.

As already pointed out waterproof rub¬ bered textiles are not only impervious to water, but also to air and numerous other methods and processes have been introduced to pro¬ duce fabrics which, while resisting rain, do not altogether obstruct ventilation. The con¬ secutive dipping of cloths, as already explained, in soap and alum solutions or in gelatine and gall solutions or in a solution of acetate of lead and then in a solution of alumina, are re¬ sorted to with more or less success. Algin, ob¬ tained from seaweed, has been strongly recom¬

mended for the same purpose. One of the most modern processes consists in treating the fibres in the solution before they are manufac¬ tured into textiles and the fabric thus pro¬ duced, while rain-resisting, offers the same ventilation as ordinary materials. ˆFibre-mail/* as it is called commercially, is described as a clear, colorless substance held in solution for the purpose of treating silks, woolens, cottons, feathers, paper and other materials, so as to render them water-repellent and proof against dampness, mildew and moths. The value of the process is further stated to be by no means limited to the water-repellent qualities given to the goods treated. The application of the solution

leaves a coating upon each separate fibre which, by the action of heat, is cured or vulcanized upon and into the fibre, strength¬ ening it and leaving it impervious and elastic. Among other advantages cited are the prop¬ erties of giving weight and body to the finer textile fabrics, and by this means, where de¬ sirable, economizing material, the quality of the goods being greatly improved and never deteriorated; the process also gives lustre and finish to fabrics, being especially valuable for silks, alpacas, etc.; gives elasticity and tough¬ ness to the fibres, preventing cracking and breaking qualities valuable for felt hats, silks, etc.; deepens and fastens the colors in dyed goods; resists stains and spots in the lighter and more delicate goods; prevents w<Dods from swelling and warping; preserves painted sur¬ faces ; and prevents polished* or metal surfaces from rusting.

Leather. — ˆFibre-mail® is also successfully applied to leather and leather goods. Many compositions, some of them patented, have been long employed, for rendering leather water¬ proof by filling up the minute pores. Four or five may be briefly described as examples of the whole. Boiled linseed oil, mutton-suet, yellow-beeswax, and common resin are melted to¬ gether over a slow fire and applied while hot to the leather, which is itself to be made warm. • Linseed oil, resin, white vitriol, spirit of turpen¬ tine and white oak sawdust are the materials of another composition. Yellow beeswax, Bur¬ gundy pitch, turpentine and linseed oil consti¬ tute a third. A fourth plan consists in apply¬ ing to the leather a hot mixture of two parts tallow with one part resin. Another is to first apply a coating of tallow to the leather with a second coating of one part copaiba balsam with two of naphtha. Caoutchouc, boiled for two hours in linseed or neat's-foot oil is also said to be effective.

Structures. — Paint and silica compounds, oils, varnishes and gums have long been ex¬ perimented with for the preservation of build¬ ings by waterproofing. The Sylvester process has long been in vogue for stone, brick and cement surfaces. It consists of alternately applying hot washes of soap and alum. Coat¬ ing buildings with linseed oil has been a favor¬ ite method as affording some degree of pro¬ tection against the deteriorating action of the elements. But linseed oil alone or mixed with colors, varnishes and gums has never proved wholly efficient to prevent the disintegration of stone, the weather staining of brickwork, the crumbling of mortar joints and the efflorescence of soluble salts, contained to a greater or less

degree in all bricks, cement and some varieties of stone; this is owing to the protective ma¬ terials in themselves being subject both to chemical changes when exposed for a compara¬ tively short time to the weather. When lin¬ seed oil alone is used, should there be any lime or alkaline salt9 in the wall, these immediately saponify the oil and render it useless as water¬ proofing. The oil soon dries out and leaves a spotted or mottled surface. Paint is often seen peeling off from the mortar joints of a building and from the brick work as well, owing to the same cause, the caustic alkaline properties of the salts of lime saponifying the linseed oil in the paint. Among scores of pro¬ prietary secret formulas there are some that are indisputably good and are thoroughly guaranteed by their makers. It is the custom of some architects' to call for these applications in specifications.

Dry foundations are necessary in order to prevent moisture from rising by capillary at¬ traction from the damp earth into the bases of walls or stoops. One or more perfectly water¬ proof courses near the foundations and reach¬ ing above the level of the ground, -should be introduced as a <(sine qua non® to a good build¬ ing. Otherwise, a constant state of dampness, affecting that part of the structure, is apt to produce staining and disintegration beyond re¬ demption. Cement or slate will not effectu¬ ally answer this purpose owing to their ab¬ sorbent qualities. Asphalt, sheet lead, copper or some other non-absorbent material should be used. The modern practice of builders of valu¬ able structures is to construct a waterproof ˆmembrane® completely enclosing the founda¬ tion. This is commonly a succession of layers of burlaps cemented together with asphalt and united to the foundation material by the same impervious substance. An elastic felt recently introduced is claimed to be superior to the burlaps. Sheet lead as foundation waterproof¬ ing is found in the ruins of Roman buildings * 2,000 years old. One of the best processes hitherto employed for waterproofing the ex¬ terior and interior surfaces of the walls, is the paraffine compound process. The base of this compound is paraffine wax of special manu¬ facture with refined creosote oil and other sub¬ stances not disclosed. The method of appli¬ cation is to warm the wall to be treated, to the depth of about one-quarter of an inch, thereby evaporating all moisture and rendering it absorbent of the waxy material. The melted waterproofing is then applied to the warm sur¬ face until absorbed into the pores. It there re¬ mains for a

brief time in a liquid state, pene¬ trating as deeply as the surface is heated and dry and gradually hardens as the surface cools. The pores are thus permanently filled and ren¬ dered solid without altering the appearance of the stone, etc., treated. This waterproofing compound thus forced in by heat and becom¬ ing solid when cold, is far more durable and effective than superficial applications of cold solutions, oils or paints, applied in the usual manner, which do not penetrate into the ma¬ terial, which soon perish, if they are not pre¬ viously chipped or rubbed off.

As a preservative of stone and marble, of monuments and statuary, vaults, etc., from the destructive effects of the weather so often ob¬

served in cemeteries, the process has proved of great value.

A material successfully used in Europe is a fluo-silicate of magnesia, commercially known as (<fluate.® Its application both hardens and rainproofs stone, but the effect is not instan¬ taneous, as it takes a year to demonstrate it¬ self. Consult Mierzinski, S., (The Water¬ proofing of Fabrics.

WATERS, wa'terz, Clara Erskine Clem¬ ent, American writer : b. Saint Louis, Mo., 28 Aug. 1834; d. 20 Feb. 1916. She was well known as a writer and lecturer upon art. Her writings include (Legendary and Mythological Art) (1870); (Eleanor Maitland* (1881); (Life of Charlotte Cushman *(1882) ; (Stories of Art and Artists) (1887) ; (Women Artists in Eu¬ rope and America) (1903) ; (Women in the Fine Arts* (1906), *etc.*

WATERS, Territorial. See International Law.

WATERS, Underground. A certain

amount of the water that falls on the earth's surface passes underground, the percentage varying with the porosity of the surface ma¬ terials. This absorption of water is due to the fact that all rocks are somewhat porous and considerably fissured. Sand and gravel deposits are very porous and can store from 15 to 35 per cent of their bulk of water. Sand¬ stones have space between their sand grains, but their porosity varies greatly with size of grain and especially with the amount of ce¬ menting material filling the interspaces which, in the case of quartzite and some highly calcareous sandstone, fill these spaces entirely. Most sand¬ stones, however, are porous and many hold from 5 to 10 per cent of their bulk of water. Limestones are only

slightly porous, but they are always traversed ‘by joint planes and usu¬ ally, toward the surface, by channels and caverns. Clays, shales and slates have but little capacity for water and the crystalline rocks, such as granite, have very slight porosity. Crystalline rocks, however, are usually traversed by many joint planes and often by zones of de¬ composition along which surface waters descend for a greater or less distance. In many dis¬ tricts, also, the crystalline rocks are deeply de¬ composed by the solution of some of their components, and the resulting ((rotten rock® is usually as porous as many sandstones. Man}*- lavas are porous and they usually are exten¬ sively fissured. Water passes underground in various ways, of which the following are the most prominent: direct inhibition of rainfall; the sinking of surface flows in passing over zones of porous rock; the spreading of streams laterally into the porous deposits of their val¬ leys; and the percolation of water laterally from the ocean or lakes into the materials of the shore. In all regions it is found that the surface run-off and evaporation do not equal the rainfall, which is evidence of the general in¬ hibition of water. Many streams are observed to diminish in volume and even to disappear entirely in running over areas of porous sand¬ stones, cavernous limestones or especially per¬ meable portions of their beds. In many arid re¬ gions waters flow out of the mountains in rocky beds and at once sink in the sands of the valleys. In nearly all river valleys there are

travel of underground water is slow, averaging about one mile a year in moderately porous sandstone.

In the accompanying figures are shown some conditions of underground waters, which have

Fig. 1.

Waters present various conditions under¬ ground, in some cases flowing to lower levels, through permeable rocks, caverns in limestone or crevices in the harder rocks, to emerge as springs in hillsides, valley bottoms or even out under the ocean, as off the east coast of Florida. Usually the water supply fills an underground reservoir of sand, gravel, porous sandstone, de¬ composed crystalline rock or fissures. Water under this condition is usually designated (<ground water® and its surface level is known as the ((water plane.® In some cases ground water may occupy strata or follow down crev¬ ices for a depth of several hundred feet. Waters which extend far underground are mainly contained in sandstones, and some of these water-bearers are of vast extent and often descend to great depths. Two conditions frequently existing are shown in accompanying cuts. Fig. 1. Cross-sections showing conditions of underground water in permeable rocks. In the first of these sections a bed of sandstones reaches the surface at A A where it receives water from rainfall or sinking of streams. This water passes underground below relatively impermeable clay or shale, and an artesian basin is formed which would yield a flowing well at B and at other points where the land is less elevated than at A and A. In the second sec¬ tion the conditions are somewhat similar, the water entering at C but escaping in springs at D, so there is a constant flow from C toward D. On account of this flow to a lower level there is gradual diminution of <(head® of the water from C to D, known as the “hydraulic grade.® This condition is found in the Central Great Plains of the United States, where there is a bed of porous sandstone with an average thick¬ ness of 200 feet, underlying more than 500,000 square miles and in places lying 5,000 feet deep, and apparently filled with water throughout. Many wells draw artesian supplies from this sandstone and in some areas the flows have a surface pressure of over 200 pounds to the square inch. Hundreds of billions of gallons are contained in this stratum. The rate of

been referred to above. Fig. 2. Sections of a river valley, showing the relations of under¬ ground waters. This valley is cut in rock but partly filled with sand and gravel, as shown by

Fig. 2.

the stipple. The river flows on the surface at A but the waters also

flow slowly underground in an “underflow® and pass laterally into the sands, filling them to the “water plane® B B at the level of the river. Fig. 3. Fissured and de-

Fig. 3.

composed crystalline rock. Surface waters often sink deeply and occur in considerable volume under the conditions shown in this figure. A is the zone of decomposition and disintegration of the rock. B B are fissures down which the decomposition has progressed still deeper. This condition is found over wide areas in the Piedmont region of the eastern United States.

N. H. Darton,

United States Geological Survey.

WATERSHED. See Rivers.

WATERSPOUT, a meteorological phe¬ nomenon frequently observed at sea, and an¬ alogous to the whirlwinds experienced on land. It occurs when opposite winds of different tem¬ peratures meet in the upper atmosphere, whereby a great amount of vapor is condensed into a thick black cloud, to which a vortical motion is given. This vortical motion causes it to take the form of a vast funnel, which appears to descend near the surface of the sea. creates

alluvial deposits in which the water extends lateially from the main stream and some water¬ courses have water only in the sands and gravels of their beds for the greater part of the year.

a partial vacuum at the centre and draws up the water in its vortex, which joins in its whirling motion. The dark cloud above does not in

fact descend, as is usually stated by observers, the column being formed by the visible condensation of the moisture in specially ascending air-currents. The whole column, which after the junction extends from the sea to the clouds, assumes a magnificent appear¬ ance, being of a light color near its axis, but dark along the sides. When acted on by the wind the column assumes a position oblique to the horizon, but in calm weather it maintains its vertical position and is carried along the surface of the sea. Waterspouts seldom last more than a few moments and are not as a rule dangerous to passing vessels. Firing a projectile into one has not been observed to give any appreciable results. Compare Cloud¬ burst; Tornado. Consult the publications of the United States Weather Bureau.

WATERTON, Charles, English naturalist: b. Walton Hall, Wakefield, 3 June 1782; d. 27 May 1865. He was educated at the Roman Catholic College at Stonyhurst, where he showed a great taste for natural history. He spent many years in travel, and in 1825 published (Wanderings in South America, the Northwest of the United States, and the Antilles in the years 1812, 1816, 1820, and 1824, > a book which has had great popularity. An illustrated and slightly altered edition was published under the direction of J. G. Wood in 1879. His only other publication is Assays in Natural History, with an Autobiography. 5 These appeared orig¬ inally in three series (1838, 1844, 1857). In 1870 Norman Moore produced a new edition of them, together with some of his letters and a life. He lived a secluded life for many years at Walton Hall, where he formed a curious col¬ lection of animals.

WATERTOWN, Conn., town in Litchfield County, on a branch of the Naugatuck River, 27 miles southwest of Hartford, and on the New York, New Haven and Hartford Railroad. It was settled in 1677. There are manufactures of silks, hardware, wire goods and novelties. Pop. (1920) 6,050.

WATERTOWN, Mass., town in Middle¬ sex County, on the Charles River, and on the Boston and Maine Railroad, eight miles west of Boston. It contains the villages of Bemis, Watertown and Mount Auburn. It is connected with Boston and many of the suburban towns by electric railways. It was first incorporated in 1630. It has a number of manufacturing establishments, chief of which are woolen mills, hosiery works, starch and needle factories. At the United States arsenal located here a large amount of modern ordnance work is produced. The famous Mount Auburn (q.v.) Cemetery is in the town of Watertown. There are two banks, one national and one State, and two weekly newspapers. Pop. (1920) 21,057.

WATERTOWN, N. Y., city, county-seat of Jefferson County, on the Black River, about 10 miles from its entrance to Black River Bay, an arm of Lake Ontario, and on the New York Central Railroad (Saint Lawrence and Ontario divisions), about 80 miles northwest of Utica and 73 miles north of Syracuse.

Industries. — The city lies on both sides of the river, which has a fall of 112 feet inside

the city limits. From Carthage, a village 16 miles above the city, to Dexter, eight miles below the city, the river is lined with busy manufacturing villages, all of which contribute to a considerable extent to the prosperity of Watertown. Along this 24 miles of river val¬ ley the investment in paper mills alone exceeds $15,000,000. More than 2,200 persons are en¬ gaged in the paper industry. Watertown in addition to its paper mills has a widely-diver¬ sified manufacturing life, the largest industry being the New York Air Brake Company, with nearly 3,000 persons regularly employed in the production of air-brake equipment. Other large manufacturing establishments include the Kops Brothers' corset factory, one of the largest in the country. The Bagley and Sewall Com¬ pany, producers of paper and pulp mill ma¬ chinery and vises and J. B. Wise, Inc., op¬ erating a large brass rolling mill and foun¬ dry and producing a complete line of bathroom fixtures and plumbers' supplies. Two large flouring mills, one of which manufactures health and dietetic foods that are consumed throughout the United States and in many foreign markets ; two silk mills, a glove fac¬ tory, a plant producing clinical thermome¬ ters, a large knit underwear mill, several ma¬ chine shops producing special machinery, wood¬ working plants and printing establishments are included in the list of manufacturing institu¬ tions of Watertown. Over 8,000 employees are engaged in the operation of these industries, which have gross annual products of more than

$20,000,000.

Trade and Finance. — Watertown is the financial and commercial centre of a rich agri¬ cultural region and is the trading town for the people of the rural section and the numerous communities within a radius of 35 miles. The county of which Watertown is the seat is one of the largest in the United States in the num¬ ber of dairy cows and in the production of hay and forage crops. The Watertown Prod¬ uce

Exchange, made up of the manufacturers of American cheese, is the largest inland cheese board in the world. The annual sales of this commodity on the local exchange exceed $2,500,- 000. Watertown has one trust company, three national banks, two savings banks and a large building, savings and loan association. The trust company and national banks have deposits in excess of $15,000,000; the savings banks, de¬ posits of more than $13,000,000.

Buildings and Municipal Improvements. — The retail business of the city is located in Public square, an imposing plaza situated in the geographical centre of the community. In recent years, as a result of continued increase in population, retailing interests have invaded six of the thoroughfares that radiate from the common centre. The public buildings include the government post office, a State armory, four county buildings, the city hall and the Roswell P. Flower Memorial Library, a classic marble structure costing nearly $300,000 — the gift to the city of Mrs. Emma Flower Taylor, as a memorial to her father, who was a governor of the State of New York. The city also has two orphanages, three hospitals, the City Hos¬ pital and Saint Joachim's, the latter being con¬ ducted by the Sisters of Mercy. The Henry Keep Home, established and endowed by Mrs. Emma Keep Schley, is a refuge for the

aged The new Kamargo Hotel, a modern fireproof structure, cost $550,000. The pub¬ lic schools, 11 graded and one high school, are notˆ surpassed by any in the State of New Lork. A full-paid fire department, housed in four modern buildings and equipped with rpotor-driven apparatus, is a model of efficiency. The city has 23 churches, the largest and most attractive being Trinity Episcopal, erected by the late Roswell P. Flower and his brother, the late Anson R. Flower; the Sacred Heart and Holy Family (Catholic), the Emmanuel Congregational and the Asbury Methodist. The Young Men's Christian Asso¬ ciation, with a modern six-story building con¬ taining gymnasium, swimming pool, bowling alleys and other accessories and equipment, oc¬ cupies one of the most valuable sites

in Public square. The Young Women's Christian Asso¬ ciation, occupying its own building, which is also located in Public square, is another important institution in the religious life of the city. The Black River Valley Club, with a modern club¬ house in lower Washington street; the Elks' Club ; the Masonic Club, housed in a beautiful marble temple ; the Knights of Columbus, with a spacious club home in Stone street, close to the business centre, and the Lincoln League, with 2,000 members, are the principal social organizations of the city. Watertown is over¬ looked on the east and south by a beautiful pub¬ lic park, purchased, developed and presented to the city by an unknown donor. It embraces more than 600 acres, a considerable portion of which has been improved with drives, walks, storm water sewers, its own water-supply sys¬ tem and a most attractive landscape scheme, with shrubs and flowering plants in great pro¬ fusion. Two daily and one weekly newspapers are published in the city.

Government. — On i Jan. 1920 the city of Watertown went under the commission-man¬ ager plan of municipal government. Pop.

(1920) 31,285.

Francis H. Lamon,

Secretary, Watertown Chamber of Commerce.

WATERTOWN, S. D., city, county-seat of Codington County, on the Big .Sioux River, and on the Chicago and Northwestern, the Minne¬ apolis and Saint Louis, Chicago, Rock Island and Pacific, and the Great Northern Railway, with branch lines, about 100 miles north by west of Sioux Falls.

It is in a fertile agricultural region, eleva¬ tion 1,750 feet, in which the chief products are wheat, rye, flax, barley, corn, potatoes and sugar beets; stock raising is also given considerable attention. The city has flour mills, machine shops, foundries, large grain elevators, meat packing house and stock yards; besides a tow mill; sash and door, farm implement and tractor and wagon factories. It has an ex* tensive trade in grain and livestock; and is a large distributing centre for agricultural implements, automobiles, groceries, fruits and produce. There are 10 churches, a public high school, six graded elementary schools, a Carnegie public library and the Barton and Luther hospitals. There are five national and State banks, and five newspapers, two of

which are issued daily. The city government from 1913-15 under commission form returned to the aldermanic form in 1916. The city owns water

and light and power plants. About three miles from the city is Lake Kampeska, one of the most beautiful bodies of water in the State, a favorite summer resort, with casino, club houses, municipal golf links and parks. Watertown was founded in 1881 and incorporated 26 March 1885. Pop. (1920) 9,400.

WATERTOWN, Wis., city in Jefferson and Dodge counties on the Rocke River, and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 44 miles west of Milwaukee and 38 miles east of Madison, the capital of the State. It is on both sides of the river, and has considerable water power which is utilized by various manu¬ facturing plants, chief of which are two large shoe factories, flour mills, a foundry, machine shops, a brewery; cigar, box, furniture, paper box, tractor and money changing device fac¬ tories and creameries. Watertown has several educational institutions, chief of which are the College of Our Lady of the Sacred Heart (Roman Catholic), the Northwestern College (Lutheran), a high school and a free public library. The four banks carry deposits of over $3,200,000 and one of the three newspapers is a daily. The government is vested in a mayor and a council of 14 members, elected biennially. Watertown was first settled by Timothy John¬ son in 1836, and wa9 incorporated in 1837. In 1853 it was chartered as a city. Pop. 9,299.

WATERVILLE, Me., city in Kennebec County, on the Kennebec River, and on the Maine Central Railroad, about 17 miles north by east of Augusta and 78 miles northeast of Portland. It was settled about 1760 by emi¬ grants from Cape Cod, and was part of Wins¬ low until 1802, when it was set off as a town and incorporated. In 1873 West Waterville was set off from Waterville, and in 1888 the city charter was granted. Waterville, Fairfield4 and Oakland electric railways connect the city with all the nearby places. The Ticonic Falls fur¬ nishes a great water power used by the manu¬ factories. The chief industrial establishments are the cotton mills, which have 1,500 em¬ ployees ; railroad shops, 350 employees ; woolen factories, 500; paper and pulp mills, machine shops, *etc.* There are nine churches, Colby College (Baptist), founded in 1818; Coburn Classical Institute,

Ursuline Academy (R.C.), a public high school, public and parish elemen¬ tary schools and school libraries. There are four banks and one newspaper, a daily, and an up-to-date chamber of commerce with 325 members and a paid secretary-manager. The government is vested in a mayor, seven aider-men and 14 councilmen, elected annually. There are a number of French Canadians, but the majority of the inhabitants are native born. Pop. (1920) 13,351.

WATERVILLE, N. Y, village in Oneida

County, on the Lackawanna Railroad, about 22 miles southwest of Utica. It is in an agricultural region in which hops and vegetables are the chief products. It has steam grist mills, a woodworking and a shoe factory. The prin¬ cipal public buildings are the Granger and Masonic halls, the Young Men's Christian Association building, and the churches and schools. There are six churches, a high school established in 1872, public graded schools and a

public library. There are two banks. Pop.

(1920) 1,255.

WATERVLIET, wa-ter-vlet', N. Y., city in Albany County, on the Hudson River and on the Delaware and Hudson Railroad, opposite Troy and six miles north of Albany. Electric railways connect the city with Albany, Troy, Schenectady and Cohoes. A steel bridge over which pass electric cars for both passengers and freight spans the river at this point. It is at the head of river navigation and has by means of the Hudson River water connections with New York and intermediate points. Watervliet is a factory city having plants making woolen goods, shirtwaists, collars, bells, iron products, sashes, doors and blinds, metal harness parts, street cars, car-journal bearings, machine-

shop products and boats. In 1807 the United States government established here the Watervliet Arsenal for the construc¬ tion of siege ordnance and field and coast de¬ fenses ; in 1919 negotiations were opened for the purchase of some 35 acres of land com¬ prising many city blocks, the plan being to en¬ large the original reservation of 109 acres with its wharfage of 1,000 feet, and to make the plant the largest of its kind in the country. The construction works have been constantly in operation and some of the largest guns in the United States' service have been made here. The place was the scene of great activity during the World War; at an expenditure of between 12 and 14 million dollars the normal output was tripled, the maximum number of employees reaching 5,125. Within the arsenal reservation are quarters for officers and bar¬ racks for soldiers. There is also a large stone magazine. The city has 12 churches repre¬ senting six denominations; a high school estab¬ lished in 1899, Saint Patrick's Academy and public and parish schools. There is a graded school in connection with Saint Colman's Orphanage, and also with Fairview Home. Watervliet was settled about the time the first settlements were made at Albany and other places on the Hudson. It was incorporated as a village, and called West Troy in 1836. In August 1897 it was chartered as a city under its present name. Its industrial growth has been closely connected with the work of the government arsenal. It has many of the social and educational advantages of Troy and Albany. The waterworks are owned by the city, and on 10 Tune 1919 the commission form of government was adopted. Pop. (1920) 16,073.

WATERWAYS OF THE UNITED STATES, The. The atlas of the world shows that three-fourths of its surface is covered with water. The waters of the earth comprise oceans, seas, straits, gulfs, bays, lakes and rivers. In the main these are navigable, but where not navigable, much has been done to make them so. In addition thereto, extensive systems of inter¬ secting canals have been constructed, so that natural and artificial waters of the world, known as "waterways,® comprise all its oceans, seas, gulfs, sounds, bays, many of its lakes and rivers, and all navigable canals.

In the United States the ebb and flow of the tide is not the test of navigability as it was in England before it was abolished by 24 Viet., ch. 10. The Supreme Court of the United States held in the Daniel Ball, 10 Wall.

557, that a different test than tidal variations must be applied here to determine navigability. The courts say that those rivers must be re¬

garded as public navigable rivers in law, which are navigable in fact ; and they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the custom¬ ary modes of trade and travel on water. The commercial power of Congress authorizes such legislation as will insure the convenient and safe navigation of all navigable waters of the United States, whether that consists in requiring the removal of obstructions to their use, in prescribing the form and size of the vessels employed upon them, or in subjecting the ves¬ sels to inspection and license. The power to regulate commerce comprehends the control for that purpose and to the extent necessary, of all navigable waters of the United States which are accessible from a State other than those in which they lie. For this purpose they are the public property of the nation, and sub¬ ject to all the requisite legislation of Con¬ gress. In the case of Perry v. Haines, 191 U. S. 17, the same court decided that admiralty jurisdiction extends to cases of maritime liens upon vessels navigating the Erie Canal, as that formed part of a navigable highway for inter¬ state commerce between Lake Erie and the ocean. Thus artificial as well as natural navi¬ gable waters are being recognized as public waters in the sense in which Bracton used that term, in the rule that publica vero sunt omnia flumina et portus. Years ago the English courts decided that the river .Severn was a public highway, and the courts of the United States have followed the decisions of the Supreme Court of the United States heretofore stated in regard to public navigable waterways. An interior nation has a servitude along natural watercourses to reach the highway of nations, known as jus transitus, which is recognized by the law of nations. The right of transit over the Danube below the Iron Gates is secured by agreement. In the United States and in Canada, the rivers do not generally flow in foreign territory,, so that it is not necessary to invoke the doctrine of jus transitus, except in a few cases, as along the Richelieu and lower Saint Lawrence.

The Atlantic Coast. Maine. — The water¬ ways of Maine include 240 miles of seacoast, with many bays indenting it and scores of islands strewn along it. The Saint Croix River on the east is the outlet of Grand Lakes. It forms , part of the . international boundary and is navigable from its mouth up to Calais. Its tonnage in 1917 was 61,896 tons. The Penobscot is 275 miles long and navigable to Bangor by large vessels. It is the outlet of several lakes in central Maine and flows into Penobscot Bay, 30 miles long and 15 miles wide. Its tonnage in 1917 was 340,198 tons. The Kennebec is 160 miles long and navigable to Augusta. It is the outlet of Moosehead Lake, which is

36 miles long and from 8 to 12 miles wide, and navigated by pleasure steamers.

The Kennebec has a channel 150 feet wide and from 18 to 16 feet deep up to Gardiner and thence a channel 125 feet wide and 11 feet deep up to Augusta. The tonnage on that river in 1917 was 123,855 tons. The Androscoggin

I

l ll|i ■

*

‘■ •

-

River drains the famous Rangeley lakes and other lakes, and flows 200 miles into the Kenne¬ bec near its mouth. It is navigable only in part and by river craft. Sebago Lake is 12 miles long and 10 miles wide and navigable by small steamers.

Its principal seaport is Portland, but it also has other improved harbors, among which are Bar Harbor, Stockton, Camden, Rockport, Rockland, Matinicus, South Bristol, Boothbay, Sasanoa and others.

Portland has a developed waterfront of four miles in extent. It has 47 wharves, 12 of which are used for transportation terminals. Its tonnage in 1917 was 2,905,428 tons.

The tonnage of Bar Harbor in 1917 was 27,723 tons.

Saco River, 105 miles long, has a channel seven feet deep and from 100 to 200 feet in width for six miles upstream. In 1917 its ton¬ nage

was 53,216 tons.

New Hampshire and Massachusetts. — New Hampshire has Portsmouth as its principal for¬ tified harbor. Its rivers are few. Cochero and Exeter rivers are navigable a few miles for light draft vessels and the channel of the Merrimac has been improved to Haverhill, W/2 miles, to a depth of seven feet. Fourteen wharves extend along the Merrimac. Its ton¬ nage in 1917 was 18,031 tons. Portsmouth and other harbors have been improved.

Pepperells Cove is a part of Portsmouth Harbor and has been improved for anchorage purposes, the controlling depth being 11 feet. Its tonnage in 1917 was 109,781 tons.

The inland lakes of New Hampshire are navigable by small pleasure boats. The same is true of the rivers of Massachusetts. It has, however, Boston Harbor, Massachusetts Bay, Cape Cod Bay, which is connected with Buz¬ zard's Bay by a canal across Cape Cod, Nan¬ tucket Sound, Vineyard Sound, Buzzard's Bay and several other small bays, all in communica¬ tion with the ocean. Boston has a landlocked harbor of 47 square miles in area. It has sev¬ eral improved channels from 23 to 40 feet deep and from 100 to 1,200 feet wide. Its inflowing tributaries, Chelsea Creek, Fort Point Channel, Charles River and Mystic River have all been made navigable. In 1917 the tonnage on Chel¬ sea Creek was 532,200 tons; on Fort Point Channel 1,116,204 tons; on Mystic River 5,082,- 250 tons. It has four or more miles of fully-developed waterfront with wharves of various types devoted to ocean commerce. Gloucester, Beverly, Salem and Lynn harbors have all been improved. In 1917 the tonnage of Gloucester Harbor was 239,272 tons; of Beverly Harbor, 444,695 tons; of Salem, 58,158 tons and of Lynn Harbor, 338,783 tons.

Taunton River is navigable to Taunton, 15 miles from its outlet, which empties into Mount Hope Bay. The Malden, Weymouth Fore and Weymouth Back rivers are navigable at their mouths only. Salem, as a commercial port, has a reputation far more enviable than that for witchcraft.

Vermont. — Vermont has part of Lake Mem-phremagog, which is navigable by lake steam¬ ers, and part of Lake Champlain, 120 miles long and 15 miles wide in its extreme width, which has been, since its discovery on 4 July 1609, a highway of commerce for the aborigines, for

the colonists and for Americans generally. It is navigated by large lake steamers, bv scores of other steamers and by many yachts and sail¬ ing vessels. It is one of the most picturesque lakes in America and forms an important por¬ tion of the 467 miles of waterway between the Saint Lawrence on the north and New York Bay on the south. It contains several beautiful islands, such as Isle La Motte, North Hero and South Hero. Lake Champlain is connected with the waters of the Hudson River at Fort Ed¬ ward by the Champlain Barge Canal, having a depth of 12 feet of water, so that vessels draw¬ ing 11 feet may pass from Lake Champlain through into the Hudson River.

Whitehall, Port Henry, Burlington, Platts¬ burgh and Rouses Point are

the principal im¬ proved ports of Lake Champlain. Its principal tributaries are the historic Otter Creek, where Commodore Macdonough built his fleet in 1814, the Missisquoi River and the Champlain or Big Chazy River. Its outlet is the Richelieu River, a tributary of the Saint Lawrence.

Rhode Island. — Rhode Island has Narragansett Bay, Mount Hope Bay, Providence and Seekonk rivers. These are navigable by large passenger and other vessels. Narragansett Bay, about 20 miles long and 12 miles wide, has channels through it to Providence and Fall River. Along its eastern margin is Sakonnet River with Portsmouth Harbor at the head of it. The Pawtucket River, 50 miles long, is im¬ proved in its lower section for a distance of five and two-tenths miles. Its tonnage. in 1917 was 490,594 tons. Providence River and Har¬ bor has been dredged to a depth of 30 feet over an area one and six-tenths miles in length and one-quarter mile in width. Its tonnage in 1917 was 3,406,224 tons. Fall River Harbor, at the mouth of Taunton River, has a channel 300 feet wide and 25 feet deep, extending out to Narragansett Bay. The steamers of the Fall River Line enter that harbor. In 1917 its ton¬ nage was 1,469,750 tons. Newport Harbor, R. I., is an improved waterway with a channel 750 feet wide and 18 feet deep at low water. Its tonnage in 1917 was 204,701 tons.

Connecticut. — Connecticut has part of Long Island Sound, the Thames River, navi¬ gable to Norwich, the Connecticut River, the Naugatuck River, navigable by small craft for a few miles and the Housatonic, 150 miles long and navigable to Shelton. It has several towns along its waterways, such as Stonington, Nor¬ wich, N»ew London, New Haven and Bridge¬ port.

The tonnage of the Connecticut River be¬ low Hartford in 1917 was 602,008 tons. That river has been improved as far as Holyoke, a distance of 85.9 miles from its mouth.

There are numerous harbors along the north shore of Long Island Sound with inflowing tributaries, many of which have been improved sufficiently to be navigable by coastwise vessels.

New London has an entrance channel 600 feet wide and 33 feet deep and is well equipped with wharves and other terminal facilities. In 1917 its tonnage was 690,977 tons.

The channel at New Haven is 400 feet wide and 20 feet deep, three miles up ‘from Long Island Sound, and it has been somewhat ex¬ tended at lesser depths and widths upstream. In 1917 the tonnage at

that port was 1,868,649

tons. Thames River, Connecticut, is a tidal es¬ tuary from 400 to 4,000 feet wide, extending from Long Island Sound to Norwich, a dis¬ tance of 15 miles. Its channel is 200 feet wide and from 20 feet deep to Allyn Point and 14 feet deep from there to Norwich, with wharves at New London and Norwich. The tonnage on that river in 1917 was 328,188 tons. The Housatonic River has an improved channel from 100 to 200 feet wide and seven feet deep to Derby ami Shelton, a distance of 13 miles from its out¬ let. Its tonnage in 1917 was 300,047 tons.

Bridgeport has several improved channels from Long Island Sound leading up to the port to accommodate coastwise vessels. Its tonnage in 1917 was 1,588,056 tons.

There are several other harbors along the south coast of Connecticut that have been im¬ proved, all of which show the increasing inter¬ est in waterways improvement.

Long Island Sound is 75 miles long and 20 miles wide. It is a great waterway for several superb steamboat lines plying between New York and towns and cities on its northern shore. The Connecticut River at one time was navigated by a number of river boats and had considerable commerce. A line of boats ran between Wells River, Vt., and Hartford. The boats were flat boats and did not draw much water. The Barnet was the first steamer for Connecticut River service. It drew 22 inches of water. On its first trip from Hartford to Vermont it had in tow a barge filled with peo¬ ple. Other steamers were built for river serv¬ ice, in which they were engaged for many years. This river was a great natural highway for the transportation of produce to market. The rapids in the river were overcome by canals at South Hadley Falls, at Turner Falls and at Bellows Falls.

New York. — The waterways of New York comprise that portion of the Atlantic Ocean washing Long Island on the south, and that part of

Long Island Sound washing Long Island on the north, and also the upper and lower New York and Jamaica bays, and a portion of Staten Island Sound and all of the East, Harlem and Hudson rivers. They also include the Mohawk, Seneca, Chemung, Black, Oswego and parts of the Delaware, Susquehanna, Genesee, Alle¬ gheny, Niagara, Saint Lawrence and other riv¬ ers, interior lakes and parts of Lakes Erie, On¬ tario and Champlain and others.

In and about the port of New York are many inflowing streams and contiguous har¬ bors. Some of these are Port Chester, Mama-roneck, Echo Bay, Westchester, Bronx River, Flushing Bay, Hempstead, Huntington, Port Jefferson, Mattituck, Great South Bay, Brown's Creek, Jamaica Bay, Sheepshead Bay, East River, Wallabout Channel, Newtown Creek, Harlem River, Hudson River, New York Bay and the various improved channels therein. All such waterways have been improved and are navigable by coastwise vessels, and many of them by the ocean-going vessels.

New York is the largest commercial port in the world, having wrested first place from Lon¬ don recently. The total tonnage of the port of New York' for the year 1917 was 65,176,983 short tons. That was during the World War, when war supplies were being shipped in great quantities. Its unique position at the conflu¬

ence of the East and Hudson rivers overlook¬ ing one of the finest harbors in the world, has added to its other commercial advantages and is destined to continue it as the emporium of the western hemisphere. On the north flows the picturesque Hudson, discovered in Septem¬ ber 1609, and navigable by steam vessels 150 miles to the city of Troy, and by canal barges to Waterford. It has been improved, its many harbors also improved and the river has been canalized from Waterford to Fort Edward. It receives on the west the waters of the Mo¬ hawk, formerly navigable about 95 miles, to Little Falls, which is also canalized from the Hudson nearly to the city of Rome. The ca¬ nalized Hudson and Mohawk form a part of the improved canal system of the State of New York, constructed pursuant to the provi¬ sions of the Canal Referendum Law, which law provided for the issue and sale of the bonds of the State, amounting to $101,000,000, for the construction of a system of barge canals, hav¬ ing a bottom width of 75 feet and a depth of 12 feet, from the waters of the Hudson to those of Lake Champlain, Lake Ontario and Lake Erie, adequate for barges carrying 2,000 or more tons. That was followed by the Cayuga and Seneca canal referendum of 1909, authorizing a bond issue of

$7,000,000 to improve the Cayuga and Seneca Canal, which was approved. That was also followed by the Barge Canal Terminal referendum measure of 1911, authorizing a fur¬ ther bond issue of $19,800,000 to construct Barge Canal terminals and was approved, and that was followed by the canal referen¬ dum of 1915, authorizing a further bond issue of $27,000,000, thus making aggregate bond is¬ sues for canals and terminals of $154,800,000. An additional bond issue of $25,000,000 will be required to complete the system.

The Cayuga and Seneca Canal has been en¬ larged to Barge Canal dimensions and connects Cayuga and Seneca lakes with the Erie Barge Canal. The New York Barge canals have standard locks 328 feet long, 45 feet wide with 12 feet of water over mitre sills. These will admit of the passage of barges carrying 2,000 or more tons. See Barge Canal.

These are the largest canal improvement projects ever undertaken by one of the Ameri¬ can States. West of the city of Rome is Oneida Lake, into which flows Wood Creek, which is canalized and connected with the Mohawk. Oneida Lake, Oneida River and Oswego River are all canalized, as well as the Seneca River from the Three River point to the outlet of Onondaga Lake, and thence southwesterly nearly to Seneca Lake. New York contains several beautiful bodies of water, such as Lake George, part of Lake Champlain, part of Lake Ontario, part of Lake Erie, Onondaga, Skane-ateles, Cayuga, Seneca, Keuka, Canandaigua and Chautauqua lakes. All of these lakes are navi¬ gated by passenger steamers during the summer.

New Jersey. — The waterways of New Jersey comprise a portion of the lower Hudson, upper New York Bay, Newark Bay, Staten Island Sound, Raritan Bay, the Atlantic Ocean and several arms of the ocean indenting the east¬ ern coast of New Jersey, and Delaware Bay on the south and the Delaware River on the west, and other rivers intersecting it.

New Jersey and Pennsylvania. — Newark Bay is navigable for six miles and Passaic

•d

c

3

o

hi

M

4 >

4)

J3

a

•O

4 >

J3

O

c

o

S 05

tfl M

M O

C O

« 2

I s

<a

t n

o 3 u

a .2

hi

4)

J3

.st;«

ca 4> g

J_|Vh, O

-S’13

M O 4) t> o

»q o a

gs

cS OJ

h, >

•2 ˆ 3

C u —

°JB*

* fl

„ o

4 >

O

o

»-*

i M co

WATERWAYS

1 Steel barges built for Federal Governmental use on the New York State Barge Canal and nut in service in 1919

2 Fleet of concrete barges on Barge Canal — built and used by Federal Government

WATERWAYS OF THE UNITED STATES

85

River in New Jersey for 16 miles. Hackensack River has been made navigable for 15 miles from its mouth. Staten Island Sound, 17 miles

long, connects New York and Raritan bays.

Commerce on Raritan Bay, Arthur Kill and Passaic River in 1906 amounted to 25,584,273 tons.

The Raritan Bay, seven miles long, and Raritan River to New Brunswick, a distance of 12 miles, are being improved. The Raritan River is navigable from Raritan Bay to New Brunswick, and from that point along the bed of the Raritan and Millstone rivers to Tren¬ ton is a canal, thus joining the waters of lower New York Bay with those of the Delaware. The total length of the Susquehanna River, includ¬ ing tributaries, is over 400 miles, and it is only partially navigable.

In some portions of its course the Susque¬ hanna has been canalized to overcome rocks and vegetable matter, which obstructed its naviga¬ tion. It flows into the Chesapeake Bay, which is 120 miles long and 50 miles wide. It has been improved to a depth of 15 feet with a width of 200 feet from Chesapeake Bay to Havre de Grace. It is proposed to render it navigable to Harrisburg. A bill authorizing an appropriation for this work was passed in 1919.

Pennsylvania has suffered its extensive canal system to pass fromi its control.

The Schuylkill River is being improved for six and one-half miles up from the Delaware River to a depth of 22 feet and 200 feet wide.

Delaware River is about 315 miles long and empties into Delaware Bay, which is 50 miles long. The river has been improved as far as Trenton, N. J., to a depth of 12 feet and to a width of 200 feet which is to be increased to 400 feet. Its channel from Delaware Bay to Philadelphia is 35 feet deep at low water and has a width of 800 feet, and in the city of Phila¬ delphia it is 1,000 to 1,200 feet wide. The ton¬ nage at Trenton in 1917 was 2,439,044 tons.

Philadelphia has extensive modern terminal facilities and its waterborne tonnage, coast¬ wise and foreign, for the year 1917 was 26,282,- 734 short tons. The total arrival of vessels for the year was 51,206 and the departures were 58,838. This shows the enormous waterway ac¬ tivities of that port. Other ocean ports were more or less active.

Middle Atlantic States. — ‘Wilmington Har¬ bor on the Delaware River, at the mouth of Christiana River, includes sections of those two rivers and is well provided with wharves and terminals. Its tonnage in 1917 was 414,987 tons.

Several rivers, creeks and harbors in New Jersey, Delaware and Maryland have been im¬ proved. The Wilmington district includes 26 rivers, creeks and harbors that are being im¬ proved, the largest being Wilmington Harbor, including the Christiana River, navigable for 15 miles, and a tidal canal between Rehoboth and Delaware bays.

The Appoquinemink, the Smyrna, the Leip-sic, Little Saint Johns, Murderkill, Mispillion and Broadkill rivers, all in Delaware, are small streams that have been improved in their lower reaches. A waterway six feet deep and 50 feet wide extends from Rehoboth Bay and Delaware Bay whose tonnage in 1917 was 15,275 tons.

The inland waterway from Delaware Bay to Chincoteague Bay, Virginia, which is six feet

deep and 70 feet wide, had a tonnage in 1917 of 22,520 tons.

The Chesapeake and Delaware Canal has been purchased by the United States govern¬ ment and is to be enlarged and made a sea-level canal, 12 feet deep at mean low water with 90 feet bottom width. It extends from the Dela¬ ware River to Black Creek at Elk River, a dis¬ tance of 18.9 miles and becomes a part of the Intercoastal Waterway from Maine to Key West.

The Baltimore district includes 26 rivers and harbors undergoing improvement. The principal harbor is Baltimore. That includes Curtis Bay and Patapsco River and tributaries and is 11 miles above Chesapeake Bay. It has several channels of 35-feet depth and of vari¬ able widths from 400 to 1,000 feet with wharves, terminal facilities and a belt line railway con¬ necting the waterfront terminals with the trunk line railways. Its tonnage in 1917 was 14,055,885 tons.

The Washington district comprises 11 rivers and harbors, including a part of the Chesa¬ peake Bay and the streams emptying into it.

The harbor of Washington is on the Poto¬ mac River, 110 miles from its outlet into Chesa¬ peake Bay. The average depth of water in its channel is 20 feet.

The Washington Harbor is two miles in length and 950 feet in width. It has 44 wharves, eight of which are municipal and eight are open to the public on equal terms. Vessels of 30 feet draft may moor at the docks extending 11,000 feet along the waterfront. In 1917, the tonnage was 837,221 tons. Above Washington is the Chesapeake and

Ohio Canal of six feet depth of orism paralleling the Potomac for 175 miles to Cumberland, Md.

In 1906 its tonnage was 225,142 tons. The Anacosta River is 20 miles long, flowing into the Potomac at Washington. It has been im¬ proved and has 15 terminals. Its tonnage in 1917 was 226,911 tons. Several ports have been improved on the Potomac, such as George¬ town, Alexandria and Lower Cedar Point. The Potomac River is about 400 miles long and navi¬ gable 110 miles for large vessels. It flows into Chesapeake Bay from the northwest. It re¬ ceives from the south the waters of the Shen¬ andoah. The Rappahannock River is over 200 miles long and navigable by vessels of 10-feet draft to Fredericksburg, a distance of 110 miles.

The James River is 320 miles long and is being improved to Richmond, a distance of 103.8 miles. Its channel will be 22 feet deep at mean low water and have a width of 200 to 400 feet. The river is equipped with terminals at various points connecting with railroads. It lias extensive wharves and docks at Richmond, some of which are free for public use. In 1917 the tonnage was 715,255 tons.

Norfolk Harbor, Va., has a channel 40 feet deep at mean low water and 750 feet wide from Hampton Roads to the mouth of the southern branch of the Elizabeth River, and thence 450 feet wide up that branch, a distance of 11ˆ4 miles, except in front of the navy yard where the channel is 35 feet and from 600 to 800 feet wide. There are other channels in the harbor of various dimensions. Its wharves, piers and terminals number 165. In 1917 its tonnage was 31,870,321 tons.

The harbor at Newport News, 10 miles west of Norfolk, has a channel 600 feet wide, 35 feet draft and three and one-quarter miles long. It has extensive shipbuilding, railway and other facilities. Its tonnage in 1917 was 6,259,- 774 tons. The lower reaches of the Appomat¬ tox, 137 miles long, a tributary of the James River, are being improved to a depth of 12 feet and with a diversion channel two and one-half miles long, and from 200 to 400 feet wide below Petersburg. Its

tonnage in 1917 was 335,- 947 tons. The Pagan and Nansemond rivers and Cape Charles City Harbor, Va., are being improved. The Congress of the United States has made appropriations in part for the con¬ struction of an intracoastal waterway with a prism having a bottom width of 90 to 300 feet and a depth of 12 feet at mean low water, paral¬ leling the Atlantic Coast from Norfolk, Va., to Beaufort, N. C., a distance of 186 miles. It will comprise natural watercourses except through four land cuts to connect such watercourses.

The tidal waterway along the coast of Vir¬ ginia, including Cat River and Bogues Bay, with a channel four feet deep and 25 feet wide, had a tonnage in 1917 of 109,024 tons.

Four routes were surveyed for that intra¬ coastal canal and the route via the Albemarle and Chesapeake Canal was recommended. It follows the existing waterway, via Neuse River, Adams Creek, Adams Creek Canal, Core Creek and Newport River. Several rivers which flow into the Atlantic Ocean and into the bays con¬ nected by this intracoastal canal are being im¬ proved for some distance up from their outlets and wharves and terminal facilities are being installed along their navigable waters. Roanoke River is 198 miles long, and from Weldon to its mouth, a distance of 129 miles, it is being im¬ proved to secure a channel 50 feet in width and six feet in depth. In 1917 its commerce was 78,736 tons. The Roanoke flows into Albe¬ marle Sound, which is about 50-miles long and from five to eight miles wide, and it communi¬ cates through Croaton Sound with Pamlico Sound, which is 75 miles long and about 20 miles wide. These sounds will be connected with the Chesapeake by the intracoastal canal, having a depth of 12 feet and destined to do an active business.

The Wilmington, N. C., district comprises 25 rivers and harbors, including Beaufort Harbor, N. C, and several inland waterways and Cape Fear River. Most of the sounds are shallow and communicate with the Atlantic Ocean. Into Pamlico Sound flows the Pamlico and the River Neuse. The Cape Fear, Black and East Cape Fear rivers have been improved. Most of the other rivers and harbors of the Wilmington, N. C., district will be improved and brought into navigable communication with the coastal canal.

South Atlantic States. — The Charleston, S. C., district includes 11 rivers and harbors. The Waccamaw River is to be improved its entire length of 147 miles. The Little Peedee, South Carolina, is to be improved 113 miles above its outlet into the Great Peedee River, so as to have a four-foot channel. The Santee River is to be improved and a canal constructed between Estherville and Minim Creek, six feet deep

and 70 feet wide for river steamers. Wateree River is to have a four-foot navigable

channel from Camden to its mouth, a distance of 67 miles.

The Congaree River is to have a four-foot navigable channel for 49 miles above its mouth. The creeks, sounds, rivers and bays between Charleston Harbor and Alligator Creek for a distance of 4 7j4 miles are being connected by a channel 100 feet wide and six feet deep at mean low water, and another channel seven feet deep has been recommended from Win-yah Bay to Charleston, via Estherville-Minim Creek Canal. Charleston Harbor has an area of six square miles and is to be im¬ proved by the construction of a channel 30 feet deep and 500 feet wide from the sea up to the navy yard, and 1,000 feet wide out to seaward. The North Jetty is 15,443 feet long and the South Jetty is 19,104 feet long and the passage¬ way between them is 2,900 feet wide. The east¬ ern waterfront of Charleston Harbor has three-quarters of a mile of piers and the same length of marginal wharves. On the western front there is one small public wharf. The ton¬ nage of the port in 1917 was 766,026 tons. The harbor is formed at the confluence of the Ash¬ ley and Cooper rivers. The Ashley River is being improved by constructing a channel 24 feet deep at mean low water and 300 feet wide from the mouth of the river up to the Standard wharf, a distance of seven and one-half miles and of eight feet depth above that to Lambs. Ashley River also has 12 phosphate wharves. Cooper River has been improved to a depth of 32 feet for six miles and a marginal wharf and warehouses have been built along it.

Savannah, Ga., district comprises 16 rivers and harbors. Savannah Harbor is being im¬ proved by a channel 30 feet deep and 500 feet wide to Quarantine, thence 26 feet deep and from 400 to 500 feet wide to the city water¬ works, a distance of 16 miles, and thence 21 feet deep and 300 feet wide, one and one-half miles to King's Island, making the entire length of the improvement 27ˆ2 miles. The turning basin at West Broad and Barnard streets is 26 feet deep and 600 feet wide with a basin at Fort Oglethorp 26 feet deep and 900 feet wide. It has a wharf frontage of five miles, comprising municipal, private and railway terminals. Its tonnage in 1917 was 2,429,288 tons. From Sa¬ vannah, 17 miles from the sea to Augusta, 218 miles from the sea, the Savannah River has a navigable channel of five feet depth, and along its course on many landings and at Augusta are private wharves with a total frontage of 1,450 feet. It also has a municipal wharf and ware¬ house with an electrically equipped elevator and locomotive crane.

From Augusta to Petersburg, a distance of 53 miles, a channel is being main¬ tained from 12 to 25 feet wide for vessels with a draft of one and three-tenths feet. A waterway 53 miles long with a depth of seven feet is being constructed along Ramshorn Creek, Wright and Mud rivers from Savannah to Beaufort, S. C. Another waterway is being constructed from Beaufort, S. C., to Saint John's River, Florida. Still another project provides for a channel seven feet deep and 150 feet wide from Savan¬ nah, Ga., to Fernandina, Fla., through Skidway and Creighton Narrows, Little Mud River, Frederica and Jekyl creeks and Cumberland, River, a distance of 147 miles. Auxiliary chan¬ nels through Three Mile Cut, near Darien,

around Saint Simon's and Saint Andrew's Sound and along Club and Plantation Creek with supplemental routes, altogether measuring 183 miles. These improved natural channels made navigation safer and reduced freight rates. An improved waterway, 29 miles long, seven feet deep and 100 feet wide, connects Saint John's River, Florida, six miles from its mouth, with Cumberland Sound, Georgia. Other water¬ ways and harbors in that region are being im¬ proved.

Satilla River, Georgia, 350 miles long, is being improved so as to afford steamboat navi¬ gation 93 miles upstream. The channel of Saint Maˆ's River for 12ˆ2 miles above its mouth is 17 feet deep and 200 feet wide and for 24ˆ2 miles still further upstream the channel is being cleared.

The Altamaha River is being improved its entire length of 137 miles. It will have a chan¬ nel 60 to 100 feet wide and four feet deep. Its tonnage in 1917 was 37,625 tons. The River Oconee for 145 miles and Ocmulgee for 205 miles, whose confluence forms the Altamaha, are being improved in the same manner as the last-named river. The inner and outer har¬ bors of Brunswick, Ga., are to be dredged to a depth of 30 feet at mean low water and equip¬ ped with terminal facilities. Fernandina Har¬ bor, Florida, and Cumberland Sound, Georgia and Florida, are also being improved.

The Jacksonville, Fla., district includes 26 rivers and harbors undergoing improvement to various navigable depths.

Saint John's River is to have a channel from 300 to 600 feet wide and a depth of 24 to 30 feet from Jacksonville to the ocean, a distance of 28 miles, and a channel 200 feet wide and 13 feet deep from Jacksonville to Palatka, a distance of 55 miles, and a channel 100 feet wide and eight feet deep from Palatka to San¬ ford and five feet deep from Sanford to Lake Harney, the two last improvements extending up the river 115 miles above Palatka. Lake Crescent, 14 miles long and one to three miles wide, is in touch with Saint John's River through Dunn's Creek, eight and one-half miles long, with a channel 100 feet wide and eight feet deep.

In 1917, the total number of arrivals and de¬ parture of steamers, motor boats, sail boats, lighters and rafts on the Saint John's River was 10,098. The freight traffic was 174,609 tons. A waterway, known as the East Coast Canal, extends from Saint John's River to Key West, Fla.

The channel of the Oklamaha River, Florida, a tributary of Saint John's River, is being cleared to a depth of six feet from its mouth to Silver Springs Run, a distance of 62 miles. Indian River has a channel 75 feet wide and five feet deep for 77 miles; Lucie Inlet with a channel 200 feet wide and 18 feet deep connects Indian River with the ocean, 235 miles south of Saint John's River. The Miami Harbor has an entrance channel 300 feet wide and 20 feet deep. It embraces artificial basins and dredged channels through to the ocean with parallel pro¬ jecting stone jetties. It has wharves and piers, some of which are public. Its waterborne tonnage in 1917 was 244,380 tons.

The harbor at Key West has a channel 300 feet wide and 30 feet deep. The channel oppo¬

site the wharves is 26 feet deep and 800 feet wide. It is an important harbor affording shelter for vessels exposed to hurricanes. It had a tonnage in 1917 of 745,056 tons.

Gulf Coast. — The Kissimmee River is being cleared and is to have a channel 30 feet wide and three feet deep for 99 miles, connecting scveial interior lakes, including Kissimmee, I ohopekaliga and Okeechobee, connected many years ago by canals with Lake Hicpochee. The lowering of the water in Lake Okeechobee for

drainage purposes has interfered with the navi¬ gation of the upper Kissimmee River, which was navigable for 137 miles. The Caloosa-hatchee River has a channel 200 feet wide and 12 feet deep to Puntarasa and thence a channel 100 feet wide and 10 feet deep to Fort Myers, where there is a turning basin and a channel from two to four feet deep to Fort Thompson. Fort Myers is 20 miles from Charlotte Bay and Fort Thompson is 43 miles from Fort Myers. A drainage canal connects Fort Thompson through Lake Hicpochee with Lake Okeechobee. That is to be improved and made navigable so there will be a navigable channel through from Charlotte Harbor to Lake Tohopekaliga. The Orange River, a tributary of the Caloosa-hatchee, is also being dredged so as to have a navigable depth of four feet for a distance of six miles. Charlotte Harbor is from five to 11 miles wide and 11 miles long and is to have a channel 300 feet wide and 24 feet deep to Boca Grande, and 10 feet deep to Punta Gorda and six. or seven feet in Pine Island Sound. There is now a channel 12 feet deep up Peace River to Punta Gorda, 200 feet wide in the bay and 120 feet wide in Peace River. In 1917 the tonnage was 304,095 tons.

Sarasota Bay is to be brought into navigable communication with Tampa Bay on the north by a proposed channel 100 feet wide and five feet deep. Little Sarasota Bay has a channel 75 feet wide and three feet deep to Venice. Tampa Bay is a large body of water 25 miles long to Gadsend Peninsula where it divides into Hillsboro Bay and Old Western Tampa Bay. It is from seven to ten miles wide. It has a channel from its entrance to Port Tampa 200 feet wide and 26 feet deep. Its tonnage in 1917 was 1,181,076 tons.

The connecting bays and inflowing rivers are being provided with navigable channels of 200, 300 and 500 feet in width. Hillsboro Bay and river and Manatee River are navigable for several miles. Saint Petersburg is on the west shore of Tampa Bay eight and three-quarters miles from Port Tampa. That part of the bay is called Bayboro Harbor connected by a channel 200 feet wide and 10 feet deep with the wide waters of Tampa Bay. Its tonnage in 1917 Avas 22,151 tons. Clearwater Harbor eight miles long and from one-half to one and three-quarters miles wide and Boca Ceiga Bay are shallow sounds but navigated by small vessels. The lower reaches of Anclote crystal, Withlocoochee and Suwannee rivers are navigable for small vessels. The latter has been improved up to Ellaville, 135 miles above its mouth, and has a channel 150 feet wide and five feet deep for the first 75 miles, and one 60 feet wide and four feet deep for the remaining 60 miles.

Alabama. — ‘The Montgomery, Ala., dis¬ trict includes 18 rivers and

harbors. Carra-

belle Harbor, Apalachicola Bay and river, the lower and upper Chipola, Flint and Chatta¬ hoochee rivers, the canal 36ˆ4 miles long con¬ necting Apalachicola River, which is a large stream, and Saint Andrew's Bay and the en¬ trance to Saint Joseph's Bay are all navigable waterways with channels of different widths and depths. They are being improved. Choctawhatchee Bay, 20 or more miles long, is navi¬ gable. Choctawhatchee River has a navigable channel from its mouth up to Geneva, Ala., a distance of 96 miles. Its tributary, the Holmes River, is to be made navigable from its mouth up to Vernon, a distance of 25 miles. Blackwater River will have a channel 100 feet wide and nine feet deep up to Milton, a distance of 10 miles. Escambia River, 65ˆ4 miles long in Florida, and Conecuh, 235 miles long in Ala¬ bama, is the same river and is to have a navi¬ gable channel from its mouth to Patsaliga Creek, a distance of 147 miles, unless the pres¬ ent project be modified.

Pensacola Harbor is 13 miles long and is five miles wide. It joins Escambia, East and Blackwater bays and Santo Rosa Sound on the southeast. Pensacola Harbor has a channel 500 feet wide from the Gulf of Mexico and 28 feet deep. It is equipped with several wharves, a terminal railway and warehouses. Its tonnage in 1917 was 524,058 tons. The AJabama River formed by the confluence of the Coosa and Tallapoosa rivers, 22ˆ2 miles above Montgomery, unites with the Tombigbee River, 44 miles above Mobile, to form the Mobile River. The Alabama, whose width is from 400 to 700 feet, and Coosa rivers are being improved so as to have a continuous channel four feet deep up to Wetumpa on the Coosa, a distance of 321.6 miles. Vessels of three feet draft may now navigate the river all the year as far as Montgomery where there are some terminal facilities and whose port tonnage in 1917 was 94,356 tons. The Coosa River, formed by the Oostanaula and Etowah rivers, is being im¬ proved by the construction of a channel 100 feet wide and four feet deep and of seven dams and seven locks 40 to 52 feet wide and 176 to 280 feet

long at various points, rendering the river navigable for 165ˆ4 miles above its mouth, 22*4 miles above Montgomery. Its tonnage in 1917 was 15,744 tons.

The Mobile, Ala., district includes 14 rivers and harbors. Into Mobile Harbor flows Mobile River. A channel 300 feet wide and 27 feet deep has been constructed from the ocean up Mobile Bay for 33j 4 miles to the river and thence up Mobile River in front of the city of Mobile for five miles to Chickasaw Creek. In the bay it is 200 feet wide and in the river 300 feet wide. Wharves and piers line the west shore of Mobile River for two and one-fourth miles. The city owns a wharf and pier in the upper end of the bay 8,300 feet long and 300 feet wide. Mobile tonnage in 1917 was 1,816,284 tons. Black Warrior River, a tributary of the Alabama River, has been dredged, and 17 dams and 18 locks have been constructed to afford slackwater navigation for 332ˆ2 miles from its mouth to Sanders Ferry on the Mulberry Fork of the Black Warrior River and to Nichols Shoals on the Locust Fork of the same river. The entire length of the section to be improved is 443ˆ4 miles to

Sanders Ferry and 42314 miles to Nichols Shoals. The channel is 100 feet wide and six feet deep. The locks are 52 feet wide, about 282 feet long with a depth of six and one-half feet of water over mitre sills. The tonnage on that part of the improved waterway in use in 1917 was 580,728 tons. The Tombigbee River is shallow, having a channel two feet in depth, though in some sections it is six feet deep and all the way 100 feet wide from Demopolis to its mouth, a distance of 185 miles. In 1917 the tonnage thereon was 445,458 tons. From Demopolis, Ala., to Columbus, 149 miles, which is 230 miles from its mouth, the Tombigbee is to have a channel six feet deep by dredging and by the construction of dams and locks. From Columbus to Walkers Bridge, 169 miles, it is to have a high-water channel, which is more or less hazardous.

Mississippi and Louisiana. — Pascagoula Harbor and Gulfport Harbor have both been improved, the former having a channel 300 decreasing to 153 feet in width and a depth of 25, decreasing to 22 feet in depth four miles up Dog River. It had a tonnage in 1917 of 199,817 tons and the latter (Gulfport Harbor) has a channel 26 feet deep and 300 feet wide made through Slip Island Pass and one 19 feet deep and 1,320 feet wide for an anchorage basin one-half mile long. It had a tonnage in 1917 of 345,688 tons. Both ports have limited terminal facilities. Leaf and Chickasahay rivers have been cleared of obstructions and are navigable, the former for low water navigation 78 miles above its

mouth and the latter for rafts 75 miles above the outlet. Those two rivers unite to form the Pascagoula River flowing into Mississippi Sound. That river has a channel of seven feet depth from the mouth of Dog River to Dead Lake, 32 miles, and of three feet depth above that point for 50 miles. Biloxi Harbor, Saint Louis Bay, Wolf, Jordan, East Pearl, including Lake Borgne, and Pearl rivers near the Gulf of Mexico have been dredged and are navigable for vessels of small, but different draft for limited distances. Pearl River is to have a navigable depth of two feet from its mouth to Rockport, a distance of 246 miles.

The New Orleans district includes 25 rivers, harbors and lakes. . These include the South and Southwest Passes up into the Mississippi River. The latter is 1,000 feet wide between bulkheads and in the ideal area 2,400 feet wide and 35 feet deep, completed for seven miles with protecting jetties, the east one four and one-half miles and the west three and one-half miles long. Through the South Pass the chan¬ nel is at least 39 feet deep between parallel dikes 700 feet apart. It is 14 miles via the South Pass from the gulf to the head of passes, 91 miles below New Orle.ans. The improve¬ ment of the several mouth's of the Mississippi is the work of years and has involved all the skill of the Engineers of the United States army. Dikes, submerged sills with mattresses placed on the sills at the head of Pass a Loutre, through which 45.7 per cent of the waters of the river flow, and levees have been constructed at various places below New Orleans. The harbor at that city, which is about 104 miles from the Gulf, possesses the advantages of a seaport. It is from 1,500 to 3,000 feet wide

and 40 feet deep and has extensive wharves and other modern terminal facilities. It ac¬ commodates ocean-going vessels. Its domestic and foreign commerce in 1917 totaled 8,026,283 tons. Its river commerce is increasing.

Lake Pontchartrain, 40 miles long and 24 miles wide, has a central depth of 16 feet. The principal channel is seven feet deep except through the dredged channel of eight feet in depth to Lake Borgne, which is in navigable communication with Mississippi Sound. The new

Basin Canal, seven miles long, brings it into communication with New Orleans. The chan¬ nels of Chefuncte, which flows into the lake, and Bogue Falia, its tributary, 10*4 miles above Lake Pontchartrain, are improved to Covington, a distance of 14ˆ4 miles. The ton¬ nage of those waterways in 1917 was 288,630 tons. Pass Manchac, rising in Lake Maurepas and flowing into Lake Pontchartrain, seven miles long, is to have a channel seven feet deep and 100. feet wide and will pass vessels plying the Amite River, Bayou Manchac and Tickfaw River to and from New Orleans.

Tickfaw River flows into Lake Maurepas. It receives the Natalbany River two miles above its mouth and the Blood River seven miles above its mouth. Its channel is dredged to seven feet for 10 miles and to six feet from the 10th to the 26th mile above its mouth. Blood River is to be similarly dredged for four miles and Natalbany River and its tributar> Ponchatoula, together, are improved for 15ˆ4 miles. The Amite River is to be cleared of obstructions for 110 miles above its mouth and its channel deepened and widened for 44 miles. Bayou Manchac is to be improved for 1114 miles above its mouth. Other bayous in Louisi¬ ana are being improved. An intercoastal water¬ way of five feet depth and of 40 feet wide on the bottom is being constructed from Bayou Teche near Franklin to the Mermenteau River, a distance of 45 miles. It extends through several lakes and through the Hanson Canal, purchased by the United States, for a distance of 4.2 miles. A dam across Schooner Bayou and a lock are to be constructed. It also in¬ cludes Schooner Bayou Canal 12 miles long, crosses White Lake 13*4 miles and includes the canals, connecting Turtle, Alligator and Collicon lakes and extends to Grand Lake 12 miles wide. That waterway is navigable throughout the year. Another connecting inter¬ coastal waterway extends from Mermenteau River, Louisiana, to Sabine River, a distance of 62 miles. It includes the Lake Misere Canal and passes south of Sweet Lake and then to Calcasieu River. It has a prism five feet deep and 40 feet wide and is to be seven feet deep and 75 feet wide from Mermenteau to Calcasieu River. It is open throughout the year. Bayou Lafourche, once one of the outlets of the Mississippi, has a lock at its head and a channel five feet deep and a bottom width of 75 feet through its entire length of 107 miles. Its tonnage in 1917 was 766,203 tons. Bayou Terrebonne is 53 miles long and empties into a bay of the same narrie. It has a channel six feet deep from its mouth to Houma, a dis¬ tance of 24.11 miles. In 1917 its tonnage was 188,411 tons. Bayou Plaquemine is 112 miles from New Orleans via Mississippi, with which river it is connected by Plaquemine lock. Ves¬

sels passing through that lock in 1917 varied in draft from three and one-half to seven feet and the tonnage was 205,741 tons. It forms 10.6 miles of the waterway to Morgan City, La. That waterway also includes 19.4 miles of the Grand River, Bayou Natchez for six miles, Little and Big Goddel for six miles, Belle River for nine miles, Bayou Long for seven and three-tenths miles. Flat Lake and Drews Pass to Berwick Bay three and two-tenths miles and thence by Atchafalaya River three and two-tenths miles to Morgan City. Pigeon bayou connects Grand River with Grand Lake. The entire waterway is 64 miles long. The lock is 298 feet 7 inches long and 55 feet wide with 10 feet of water over the mitre sills. The tonnage over that waterway in 1917 was 776,781 tons. The boats were of four to seven feet draft. Bayou Grossetete, a tributary of the Bayou Plaquemine, is being improved from its mouth eight miles below Plauqemine lock to above Maringouin, La., a distance of 29 miles. It will have a channel five feet deep and 60 feet wide. Its tonnage in 1917 was 237,947 tons. Bayou Teche is 125 miles long and joins the Atchafalaya River 10*4 miles above Mor¬ gan City. It is to have a channel six feet deep and 50 feet wide from its mouth to Arnaud-ville, La., a distance of 106*4 miles. It is to have a dam and lock at Keystone Plantation 72ˆ4 miles above its mouth and other regulat¬ ing works. In 1917 its tonnage was 693,622 tons, but that passing Keystone lock was only 10,172 tons. The Atchafalaya River, an outlet of both the Mississippi and the Red River, was provided with a channel from a point 17ˆ4 miles below Morgan City to its mouth in Atchafalaya Bay, from 1,500 to 3,000 feet in width and from 20 to 140 feet in depth. The last improvement was from the 20-foot contour four miles below its mouth to the 20-foot contour in the Gulf of Mexico, a distance of 15$4 miles to give it a ship channel 20 feet deep and 200 feet wide The channel from Morgan City down will have a minimum' depth of 14 feet and a width of 200 feet. The ton¬ nage at Morgan City in 1917 was 814,713 tons and was carried in vessels of not exceeding 11 feet draft. Vermillion River is to have a channel five feet in depth and 40 feet on the bottom from Vermillion Bay to Lafayette, La., a distance of 51 miles. Its tonnage in 1917 was 32,810 tons. Mermenteau River is 71 }4 miles long and is being improved its entire length and through Lake Arthur six miles, as also are 25 miles of Bayou Nezpique, its tributary, and Mud Lake, all in Louisiana, which has a score of navigable waterways. The lower reaches of the Bayou Queue de Tortue, also a tributary of the Mermenteau, is being improved for a distance of 14 miles above its mouth. The lower section of the Bayou Plauqemine Brule, another tributary of the Mermenteau, is being improved for a distance of 19 miles so as to have a channel six feet deep and 60 feet wide. Calcasieu River widens out and forms a lake of the same name 25 miles north of

the Gulf of Mexico. The lake is 18 miles long and shallow. The river, including the lake, is pro¬ vided with a channel for 72 miles, which is the head of boat navigation of not less than six feet in depth. This improvement is carried through Lake Charles and West Lake, where

there are several wharves and boathouses. The mouth of the bayou is also protected by two converging jetties one and one-half miles long projecting out into the Gulf and there is a channel between them 200 feet wide and 12 feet deep up to the entrance into the river. The channel from that point to a point above Calcasieu Lake is 80 feet wide and eight feet deep. The tonnage over that waterway in 1917 was 763,619 tons.

Texas. — The Galveston, Tex., district in¬ cludes 25 rivers and harbors. The entrance to Galveston Harbor is protected by two rubble-stone jetties extending from Galveston Island, which is 28 miles long, and Bolivar Peninsula out into the Gulf. The former is six and three-fourths miles and the latter is four and three-fourths miles long, their outer ends being 1,000 feet apart. The channel is 30 feet deep and 800 feet wide. Galveston channel is 30 feet deep and 1,200 feet wide from the outer end more than four miles westward to 51st street in Galveston, which is to be extended, but at the reduced width of 1,000 feet to 57th street. The seawall five miles long protecting the en¬ trance to the harbor is to be extended. The terminal facilities include a wharf system adequate to accommodate 63 or more ocean vessels, several miles of piers, grain elevators, transfer carriers and warehouses. * The ton¬ nage of the port of Galveston in 1917 was 2,965,937 tons and the number of vessels enter¬ ing and departing from the port during the year was 1,539. A channel 200 feet wide and 30 feet deep and four miles long connects Galveston Harbor with Port Bolivar at the end of the Bolivar Peninsula, where there is a turn¬ ing basin 1,000 feet square. The port is equipped with slips, piers, wharves and ware¬ houses. Its tonnage in 1917 was 109,227 tons. The Houston Ship Canal, 25 feet deep and 150 feet wide on the bottom, extends from Gal¬ veston Harbor across Galveston Bay, with a bottom

width, up the Jacinto River and Buffalo Bayou to a turning basin 600 feet in diameter at Long Beach and thence by a channel eight feet deep and 40 feet wide through Buffalo Bayou to Houston, Tex. The entire length of the improved waterway is 50 miles. It is pro¬ tected through upper Galveston Bay by a dike nearly five miles long. There are docks, ware¬ houses, terminals, railway tracks and other terminal facilities at Houston and a regular line of steamships between Houston and New York City. The tonnage of Houston in 1917 was 1,161,424 tons. Some other bayous and streams entering Galveston Bay have been im¬ proved for short distances under various river and harbor acts of Congress, authorizing the improvement of West Galveston Bav channel, Double Bayou and the mouths of adjacent streams. In 1851-53 the West Galveston Bay and Brazos River Canal was constructed paralleling the coast but from one to four miles therefrom. It was 10 miles long and had a depth of six feet and a width of 100 feet. It was purchased by the United States govern¬ ment in 1892 at a cost of $30,000. A new water¬ way with a channel five feet deep and 40 feet wide on the bottom is being constructed from West Galveston Bay, through Oyster Bay and along the route of the Galveston and Brazos River Canal to Brazos River. Chocolate and

Bastrop bayous and Oyster Creek are com¬ mercially tributary to that waterway. The channel between Brazos River and Matagorda Bay, a distance of 32 miles, is to be five feet deep and 40 feet wide on the bottom. At the mouth of Brazos River and at Matagorda are wharves, docks and fish and oyster houses. That forms a part of the 202 miles of inland waterway extending from Galveston to Corpus Christi. The Guadalupe River is to have a channel five feet deep and 40 feet wide on the bottom for 52 miles to Victoria from San An¬ tonio Bay, which is 16 miles across, also to be dredged to similar dimensions to the main line of the inland waterway.

The channel from Pass Cavallo to Port Lavaca, Tex., a distance of eight miles, is to have a depth of seven feet and a width of 80 feet. The channel from Pass Cavallo, the west end of Matagorda Bay, to Aransas Pass, extends through Espiritu Santo, San Antonio Mesquite and Aransas bays and is 63 miles long. It is also to have a depth of five feet and a width of 40 feet. It is equipped with wharves on Aransas Bay and at some other places. From Aransas Pass it follows Turtle Cove and passes through Corpus Christi Bay. That section of the inland waterway is 21ˆ2 miles long. Free¬ port Harbor is at the mouth of Brazos River and is protected by parallel north and south jetties a mile more or less in length, and is being improved for six and one-half

miles to Velasco, the channel being 18 feet deep and 150 feet wide. There are some wharves there open to the public and regular sailings of ves¬ sels therefrom to New York. The tonnage of the port in 1917 was 334,693 tons.

The Brazos River is 950 miles long and is navigable to Bolivar Landing. It had a depth of four to 20 feet above that point to Old Washington, 254 miles from its mouth, and that section is to be cleared. There is but little traffic on that river. It has been proposed to improve its channel to a depth of four feet as far as Waco by the construction of locks and dams and by dredging the open channel for 103 miles. Aransas is to be protected by two rubble-stone jetties, the north two and three-fourths and the south one and three-fourths miles long, and by a dike on Saint Joseph Island, three and three-fourths miles long, connecting with the north jetty.

The channel up to the town of Port Aransas is 100 feet wide and 17 feet deep, but down toward the Gulf it is 400 feet wide and 25 feet deep and still farther out it is 1,200 feet wide and 25 feet deep out between the jetties, where the dredged channel is to be 600 feet wide. The Harbor Island Basin will be thus extended. Other channels have been dredged leading from Harbor Island Basin.

The Dallas district includes 11 rivers and harbors. Port Arthur Canal, seven miles long, extends from Sabine Pass to Port Arthur docks near Taylors Bayou. Sabine Pass, seven miles in length with a width varying from 1,700 to 5,000 feet, connects Sabine Lake with the Gulf of Mexico. Its entrance is protected by jetties extending out four miles, between which is a channel 26 feet deep and 200 feet wide. The channel through Port Arthur Canal is to be 26 feet deep and 150 feet wide to Fort Arthur, where there are two turning basins 25 feet

deep, one 600 feet by 1,700 feet and the other 420 feet by 1,800 feet. At Sabine are wharves and other facilities. In 1917 the tonnage on the Port Arthur Canal was 6,984,286 tons.

That canal cost $1,029,982 and was trans¬ ferred to the United States government without charge.. The Sabine River, 550 miles long and 700 feet wide, enters Sabine Lake through three passes. Neches River, .300 miles long and 650 feet wide, flows into the same lake. A new waterway starting from Port Arthur Canal has a channel 25 feet deep and 90 feet wide through the land and 115 feet wide in the open lake and 150 feet wide in the open rivers and ex¬ tends through the Sabine-Neches Canal and Neches River to Orange on the Sabine River and from the mouth of Neches River to Beau¬ mont on that river, terminating in a turning basin 500 feet by 1,500 feet on each stream. There are some terminal facilities at Beaumont in touch with ocean-going vessels. The ton¬ nage over the Sabine-Neches Canal in 1917 was 1,437,489 tons and on the Sabine River 215,605 tons and on the Neches River was 1,066,- 310 tons. Trinity River, Texas, 760 miles long and discharging into Galveston Bay, is being improved by the construction of dams and locks and by dredging. Thirty-seven locks and dams were recommended by the Engineers of the United States army. Those locks have chambers 140 feet long, 50 feet wide and a navi¬ gable depth of six feet over the mitre sills. In 1917 only nine locks were completed and navi¬ gation was practicable as far as Liberty, 41 >4 miles above the mouth of Trinity River. To completely canalize the river to Dallas Tex., 512 miles above its mouth and 370 feet above the tide water, is the present project partially com¬ pleted. The city of Dallas is bearing part of the expense.

Other Gulf-State Waterways Development. — Red River is 1,275 miles long and from its mouth in Louisiana to Fulton, Ark., the distance is 482 miles. It is under improvement. From Fulton to Shreveport, La., there is a minimum depth of five feet and from Shreveport to its mouth there is a minimum depth of seven feet from December to June when the water is high and the river within its improved sections may be navigated, but not at other times. At high stages of water light draft vessels have and may still ascend as far as Denison, 763 miles above its mouth and 11 miles below the outlet of the Washita. At Denison there is in some months a depth of five feet in the channel. Lanesport, 75 miles above Fulton, formerly was at the head of navigation, though boats occasionally ascended to the mouth of the Kiamichi, 158 miles above Fulton, Ark. Some clearings of the channel and dredging has been done in the lower 51 miles of the Sulphur River, and dur¬ ing high water in the Red River there is a back¬ water flow into Sulphur River for 50 miles which render the lower reaches of the latter navigable for light draft steamboats for a dis¬ tance of 17 miles for rather irregular and short periods of time. The channel of the lower part of Cypress Bayou for 66 miles is being dredged and straightened

from Red River at Shreveport, La., to Jefferson, Tex. A dam has been con¬ structed without a lock at the foot of Caddo Lake, which is 17 miles across. That dam cre¬ ates a pool extending 43 miles to Jefferson City,

Tex., which insures a navigable waterway four feet deep.

The Vicksburg, Miss., district comprises 16 rivers and harbors, some of which have al¬ ready been described. The Ouachita River, Ar¬ kansas, is being improved by the construction of eight locks and dams and by clearing the channel so as to afford a navigable depth of six and one-half feet of water from the mouth of Black River, Louisiana, to a point 10 miles above Camden, Ark., a distance of 360 miles. The lock chambers are 55 feet wide and 268 feet long and have lifts of five and one-half to 14J4 feet. In 1917 the tonnage over that waterway was 178,136 tons. The Tensas, which has its source in Lake Providence and is 235 miles long, joins the Ouachita and Little rivers to form the Black River, Louisiana. The Tensas receives, as a tributary, Bayou Mason, which is 270 miles long. The channels of both of those streams are being cleared and improved to make the Tensas navi¬ gable from Westwood Place, 81 miles above its mouth, and Bayou Macon from Floyd, 112 miles above its mouth, so as to afford a navigable depth of six feet from January until June. At high stages those channels are 150 feet wide and eight feet deep. The traffic on the two streams in 1917 was 8,344 tons on the sections improved. Boeuf River, Bayou Bartholomew, Saline River, Bayous D'Arbonne and Coney are navigable for light draft vessels in their lower reaches during the months of high water. The \azoo River, a tributary of the Mississippi, has a channel four feet deep and 500 feet wide its entire length of 178 miles. Loaded boats thereon draw four feet of water. The tonnage of that river in 1917 was 102,418 tons. The lower 115 miles of the Tallahatchie and the lower 40 miles of the Coldwater rivers have been made navi¬ gable for vessels of three feet draft. Big Sun¬ flower River, a tributary of the Yazoo River, is 216 miles long and is to have a navigable depth of four and one-half feet and a navigable width of 100 feet for 171 miles above its mouth. In 1917 its tonnage was 61,017 tons. Several other smaller streams in that district have been improved.

The mouth of the Yazoo River is opened up through Lake Centennial to the Mississippi for a distance of nine and three-tenths miles with a bottom width of 98j4 feet and a depth of six and one-half feet. The canal is navigable all the year. In 1917 its traffic was 61,657 tons.

The lock and dam in the Big Sunflower River at Little Callao Landing, Miss., create a pool of varying depth of one to 22 feet for 61.8 miles up stream and render the river navi¬ gable to Pentecost, Miss., 124 J4 miles above its mouth. The Little Rock, Ark., district com¬ prises five rivers and the locks and dams on the upper White River. The Arkansas River, 1,460 miles long, a tributary of the Mississippi, is to be improved from its mouth to Neosho (Grand) River, 461 miles. The Grand is navi¬ gable to Fort Gibson two miles from its mouth. Under ordinary conditions from February to July the Arkansas has a navigable depth of four feet from its mouth to Little Rock, 174 miles, and some years it has a navigable depth of three feet as far as Fort Smith, 369 miles above the mouth. In 1917 steamboats ascended the river to Littles, 202 miles above its mouth, and gasolene boats ascended to Dardanelle, 261

miles above its mouth. Steamboats with barges of three to four feet draft operated as far as Little Rock for four and one-half months in 1917. The tonnage on that river in 1917 was 38,659 tons. The White River, 690 miles long, a tributary of the Mississippi, is being improved from its mouth to Batesville, a distance of 301 miles, by the construction of works, dredging, *etc.* A lock and dam has been constructed one mile below Batesville, a second lock and dam seven and eight-tenths miles above Batesville and a third lock and dam nine and seven-tenths miles above Batesville, thereby affording all-3ˆear slackwater navigation for vessels of three feet draft from the first dam to Guion, a dis¬ tance of 33 miles farther up stream. The locks are 147 feet long, 35 feet wide, and have six feet of water over the mitre sills. At low water in 1917, its controlling channel depth was three and one-half feet from its mouth to Grand Glaize, a distance of 241 miles, and three feet from Grand Glaize to Jacksonport, a distance of 123 miles, and 14 to 16 inches from the latter port to Bates¬ ville. Forsyth, Mo., 505 miles above the mouth of the White River, was at the head of steam¬ boat navigation. For seven and one-half months in 1917 a channel depth of six feet obtained from the mouth to Devall Bluff, a distance of 124 miles. In 1917 the tonnage on the White River was

205,198 tons and that through the three locks was 16,014 tons.

The Arkansas and White rivers enter the Mississippi River through a common inlet. The Black River in Kansas and Missouri is 300 miles long and flows into the White River at Jacksonport. It is being dredged and being made navigable from its mouth to Poplar Bluff, Mo., a distance of 239 miles, by boats of 18 inches draft and by boats of two and one-half feet to the mouth of Current River, a distance of 116 miles. In 1917 boats of three and one-half to five feet draft operated below Current River and boats of two feet draft 'above Current River two months. The Black River tonnage in 1917 was 154,281 tons. The Current River is 200 miles long and is being cleared of snags from its mouth to Van Buren, Mo., a distance of 94 miles, so that flatboats may ascend that far and have ascended 33 miles farther up the river to Jack's Fork. In high water steamboats ascend from the Black River as far as Pitman's Landing, 41 miles above the mouth of Current River. In 1917 the con¬ trolling channel depths were to Duff's Ferry, 32 miles above the mouth, three and one-half feet; to Doniphan, 53 miles up stream, 14 inches, and to Van Buren, from 10 to 12 inches. The ton¬ nage in 1917 was 16,762 tons.

Some work has been done toward clearing the lower reaches of the Saint Francis River, 460 miles long, the L'Anguille River and the Blackfish Bayou to render the same navigable for boats of four-foot draft at medium and high stages of water from January until August, but the controlling depths in L'Anguille River and in Blackfish Bayou are due to the backwater stages of the Mississippi River. In 1917 a steamboat of three-foot draft operated as a weekly packet in the Helena- (on the Missis¬ sippi) Marianna- (on the Saint Francis) Black¬ fish commerce. The Saint Francis R.iver to Marked Tree, the Blackfish Bayou to Fifteen Mile Bayou and the L'Anguille to Marianna are

navigable by boats of four-foot draft at medium or high water. The aggregate tonnage on the three streams in 1917 was 344,278 tons.

The Mississippi System. — The Mississippi River has a total length of 2,471 miles. Its channel has a depth of 35 feet from the Head of Passes to New Orleans about 104 miles from the Gulf of Mexico and a depth of 30 feet up to a point 227 miles above the Head of Passes, which is 13 miles from the mouth of the South Pass. It has a width of 250 feet. Thence for 833 miles to the mouth of the Ohio River its channel has a depth of nine feet and a width of 250 feet and thence to Saint Louis, a distance of 188 miles, its channel has a minimum depth of eight feet

and a width of 250 feet, and thence to the mouth of the Missouri, a distance of 17 miles, its channel has a depth of six feet at low water and a width of 250 feet. From the mouth of the Missouri River to the Twin City Lock and Dam, it is 664 miles and to Washington Avenue Bridge at Minneapolis, the head of navigation, it is 669 miles, that being 1,955 miles from the mouth of the Mississippi. In that section of the Mississippi River the channel is to have a depth of six feet and a width of 300 to 1,400 feet, to be obtained by means of contracting works consisting of wing and spur dams for narrowing the main channel of the river. In 1918 the depth of water at Rock Island Rapids at the lowest stages was only four feet. From Cape Girardeau, Mo., to Rock Island, Ill., a distance of 452 miles, the Mississippi for most of the way is protected by levees as it is for 1,503 miles below Cape Girardeau. The channel has been improved at various places below Cairo. At Keokuk, Iowa, 496 miles below the head of navigation and 173 miles above the outlet of the Missouri River, is a power dam of 41 feet crest with a lock 400 feet long, 110 feet wide with six feet of water over mitre sills. There is also a dry dock there 380 feet long, 140 feet wide with entrance gates 110 feet wide. During the 252 days of naviga¬ tion in 1917, steamboats to the number of 489 and launches to the number of 233 passed through that lock. That replaces the old Des Moines Rapids Canal.

The Moline Lock and Dam at the foot of Rock Island Rapids, 366 miles below the head of navigation, has a length of 350 feet, a width of 80 feet and a depth of six feet of water over the mitre sills. One hundred and fifty-four steam¬ boats, 74 barges and 270 launches passed through it during the 265 days of navigation in 1918. That lock overcomes the swiftest part of the Rock Island Rapids. Le Claire Canal has been proposed 360 miles below the head of navigation of the same dimensions as those of the Moline Canal.

_ Provision has been made for the construction of a power dam with a lock 350 feet long, 298 feet wide and having a lift at low water of 33ˆ4 feet between Minneapolis and Saint Paul. That will make it possible for vessels to transport grain from the elevators and flour from the mills at Minneapolis to the Gulf of Mexico or to ocean carriers without transshipment. The depth of water over the mitre sills varies from seven to lO1/ˆ feet. The upper Mississippi, from Saint Paul to Brainard, a distance of 170 miles, is navigable for light draft vessels, and from Brainard to Grand Rapids, a distance of 180

miles, it is to have a channel 60 feet wide and three and one-half feet deep at mean low water. A similar improvement has been made in the river between Aitkin and Grand Rapids, a distance of 125 miles and three and one-half feet depth has been secured. The large natural reservoirs at the headwaters of the Mississippi River, in addition to Itasca Lake, its source, and Cass Lake, 283 miles above Brainard, the head of navigation, include Winnibigoshish Lake, Leech Lake, Pokegama Lake, Sandy Lake, Pine River and Gull Lake, having an aggregate capacity of 97*4 billions cubic feet. Their discharge is regulated by dams and controlling works at their several outlets and their waters keep up a uniform flow in the Mississippi as far down as Lake Pepin, 52 miles below Saint Paul. The waters of Winnibigoshish and Leech Lakes reservoirs flow into Pokegama reservoir and thence into the Mississippi. The Leech River has been dredged and improved for 27 miles and has a channel 100 feet wide and eight feet deep and the channel of the Mississippi was made eight feet deep and 100 feet wide above the Leech River and 125 feet wide below that river, that entire section of the Mississippi improved being 65 miles in length. New Orleans has five miles of wharves, of which three and one-half miles are covered with steel sheds. Natchez has some wharves and old landings. The harbor at Memphis is subject to thick deposits and requires much dredging as do many other harbors along the Mississippi.

The Saint Croix River flowing through Lake Saint Croix, which is 25*4 miles long, and into the Mississippi, 26.9 miles below Saint Paul, is being improved to obtain a channel three feet in depth from its mouth to Taylor's Falls, a dis¬ tance of 52.3 miles.

The Minnesota River, 450 miles long, is to have an open. channel to accommodate vessels of four-foot draft from its mouth at Saint Paul to Shakopee, a distance of 25.6 miles.

Lake Traverse, one of the sources of the Red River of the North, is 25 miles long and through its narrows is to have a channel 50 feet wide and four feet deep.

The Red River of the North flows northerly between Minnesota and North Dakota about 350 miles and thence along the International

bound¬ ary and thence into Lake Winnipeg. From Breckenridge to Moorhead, a distance of 97 miles, it is to have a navigable channel during high and medium stages of water; from Moor¬ head to Grand Forks, a distance of 155 miles, it is to have a channel 50 feet wide and three feet deep, and from Grand Forks to the Inter¬ national Boundary, a distance of 143ˆ2 miles, it is to have a channel 60 feet wide and four feet deep at low water. Red Lake River be¬ tween Thief River Falls and Red Lake, a dis¬ tance of 71 miles, is to have a channel of three feet depth. Regulating works are being con¬ structed at the outlet of that lake to control its discharge and the flow of the river in the in¬ terest of navigation. Warroad Harbor and Warroad River are southwest of the Lake of the Woods. The harbor has a wharf open to the public and the river, 26 miles long, con¬ necting the harbor with the lake, has a depth of eight feet. In 1917 the tonnage of the harbor was 8,500 tons. A harbor of refuge has been constructed in Zippel Bay on the south shore of the Lake of the Woods.

The Missouri River from its mouth to Kansas City, a distance of 398 miles, is to have a permanent channel six feet deep and 1,200 feet wide, though in 1917 the draft of steamers was three and one-half feet and that of barges from four to four and one-half feet, but in low water it was from three to three and one-half feet. From Kansas City to Sioux City, Iowa, a dis¬ tance of 409 miles, in 1917, it had a channel four feet deep, though the loaded draft of boats did not exceed two and one-half feet. From Sioux City to Fort Benton, Mont., the head of navigation, a distance of 671 miles, loaded vessels had an average draft of two feet in the upper reaches of that section of the river. The lower reaches of the Osage River from its out¬ let into the Missouri up to Linn Creek, a dis¬ tance of 109 miles, are to have an open channel 80 feet wide and three feet deep. A lock 220 feet long and 42 feet wide with an available depth of nine feet of water over the mitre sills and with a lift of 16 feet has been constructed seven miles above its mouth. That has made the lower 109-mile section navigable for light draft vessels. In 1917 its commerce was 28,171 tons. The Gasconade River is being cleared of ob¬ structions from its mouth to Gascondy, a dis¬ tance of 61.4 miies. It had in 1917 a channel of only nine inches navigable depth in some sections and two feet in others. It had a score of small warehouses in the lower 39ˆ2 miles of its course and a tonnage in 1917 of 24,523 tons.

The Cumberland River in Tennessee and Kentucky has been improved from Burnside, the head of navigation, to its mouth, a distance of 418.7 miles. That has been done by dredging and by the construction

of locks and dams in its several sections. The average width be¬ tween Burnside and Nashville, 326.1 miles below, is 300 feet and from Nashville to its outlet into the Ohio River, a distance of 192.6 miles, it has a width of 400 to 500 feet. The channel between Burnside and Nashville is 150 feet wide and six feet deep at low water. There are six locks and dams in that section of the river below Nash¬ ville. Locks A, B and C are 280 feet long by 52 feet wide, with six feet of water over the mitre sills, and have lifts of 12 feet. Locks D, E and F are 310 feet long and 52 feet wide with six and one-half feet of water over the mitre sills and have lifts of 10 to 13.3 feet. These have made the lower Cumberland navigable to Nash¬ ville and its tonnage in 1917 was 131,325 tons. In the section above Nashville, the river is navigable for light draft vessels for four or five months in the year during high water. Above Nashville are locks 1, 2, 3, 4, 5 6, 7 and 21 (locks 8 to 20 and 22 proposed in the original plans having been eliminated), each 280 feet long and 52 feet wide with six and one-half feet of water over the mitre sills and with lifts of six to 14 feet. These struc¬ tures set the water back so that a navigable depth of six feet will be provided within four miles of Burnside and over that distance a navigable channel of four feet depth will be obtained. The total waterborne commerce at Nashville in 1917 was 267,091 tons. That will undoubtedly materially increase after the im¬ provement has been completed and boat lines are established. The Board of Engineers of the United States army have recommended the con¬ struction of 10 additional locks, namely eight to 17 as originally planned, provided that the

States, counties and local agencies will save the United States harmless from claims for dam¬ ages due to overflowing lands along that sec¬ tion of the river. The total commerce passing through all the locks in 1917 was 683,529 tons.

Tennessee. — The Tennessee, 652 miles long and formed by the junction of the French Broad and Holston rivers, four and one-half miles above Knoxville, Tenn., flows south¬ westerly into Alabama and

westerly across the northern part of that State and thence northerly into and across Tennessee and north¬ westerly into and across Kentucky into the Ohio River about 36 miles above the outlet of the latter, into the Mississippi. Above Chatta¬ nooga it is 700 feet wide, but below it is 1,000 feet wide and at Muscle and Colbert Shoals it is more than 1,000 feet wide. From its head to Chattanooga, a distance of 188 miles, it is to have a channel 150 feet wide and three feet deep. A concrete dam and lock 265 feet long and 60 feet wide with six and one-half feet of water over mitre sills and with a lift of 25.7 feet is at the foot of Caney Creek Shoals, which sets the water back for 24.6 miles, making a navigable depth of six feet. That 188-mile sec¬ tion is navigable for boats of . three-feet draft, however, only when the water is at high stages from January to June. For short periods boats of four-feet draft may navigate parts of that section, but boats of only one foot draft can navigate that section all the year. Both Knox¬ ville and Chattanooga have a wharf with a warehouse equipment with conveyors. The shoals in the upper reaches of the Tennessee are being dredged. The total river tonnage above Chattanooga for the year 1917 was 613,- 243 tons. Chattanooga is 464 miles above the mouth of the Tennessee. At Hale's Bar, 33 miles below Chattanooga and 431 miles above the mouth of the Tennessee, is another concrete dam and lock, 267 feet long and 60 feet wide, with six and one-half feet of water over the mi¬ tre sills and with a lift of 37*4 feet. That sets the water in the river back and affords a navigable depth of six feet as far as Chattanooga. The tonnage through that lock in 1917 was 15,681 tons. Concrete dams and locks are to be con¬ structed at Widow's Bar, 56.1 miles below Chattanooga and Bellefonte Island, 72.1 miles below Chattanooga, or one concrete dam 17.9 feet high and a lock at the latter place to pro¬ vide a navigable channel of six feet depth. The locks are to be 265 feet long and 60 feet wide with six feet of water over the mitre sills. The project announced by the War Department in 1917 provides for an open channel, 150 feet wide and five feet deep at extreme low water be¬ tween Hale's Bar and Brown's Island, that sec¬ tion being 138 miles long, except in those parts of that section that may be canalized. The Muscle Shoals Canal opened in 1890 and com¬ prises two sections, aggregating about 18 miles in length. It had 11 locks from 275 to 283 feet in length and all 57 feet in width with different lifts, ranging from three and nine-tenths to 13.1 feet and having from two and two-tenths to seven and five-tenths feet of water over the mitre sills. The locks in the 36.6 miles of rapids above Florence overcome 134 feet of fall in the river. The existing project provides for the construc¬ tion by the United States government of new locks, dams and a power-house, securing nine and one-half feet of water for 14.7 miles and a

depth of five feet of water in the canals at ex¬ treme low water. The construction of dam No. 2 was approved in 1918. It is two and seven-tenths miles above Florence with locks 300 feet long, 60 feet wide and total lift of 90 feet. When the new project is completed, old locks Nos. 3 to 9, inclusive, will be submerged, but old locks Nos. 1 and 2 and locks A and B on the Elk River Shoals section will remain in service. This improvement not only provided for the navigation of the Muscle Shoals sec¬ tion of the Tennessee, but also for the genera¬ tion of electric power for the production of some of the nitrates used during the World War. A bill is now pending in Congress for the nationalization of that nitrate plant.

From Florence, 208 miles below Chattanooga and 256.5 above the mouth of the river to Col¬ bert Shoals, the available depth of channel at extreme low water is five feet throughout the year. In that section is the Colbert Shoals Canal on the left bank of the river and nearly eight miles long with a depth of six feet over mitre sills. Its width is 140 feet. Its single lock is 350 feet long and 80 feet wide with a lift of 26 feet. The river tonnage between Chattanooga and Florence in 1917, was 170,968 tons and through that canal was 38,286 tons.

The Tennessee from Riverton to its mouth, a distance of 226.5 miles, is to have a channel 150 feet wide and six feet deep at ordinary stages of water and at five feet deep at extreme low stages. The draft of boats in that section of the river varies from two to six feet. The tonnage below Florence in 1917 was 416,304 tons. The French Broad River has been made navigable for steamboats of two-feet draft up to Dandridge, 46ˆ4 miles above its mouth, and at stages of high water as far as Leadvale, 69ˆ4 miles above its mouth. The tonnage thereon in 1917 was 129,201 tons.

Clinch River, a tributary of the Tennessee 10314 miles above Chattanooga, is being pro¬ vided with a navigable channel two feet deep from its mouth to Clinton, Tenn., a distance of 60 miles, and a channel one and one-half feet deep from Clinton to Walker's Ferry, a dis¬ tance of 66 miles. The usual draft of boats varies from 15 inches to three feet, but during periods of low water there is little or no navi¬ gation of parts of the river. Its tonnage in 1917 was 8,983 tons. The United States Engineers have recommended that no further moneys be expended in its improvement. The Hiawassee River rises in northern Georgia and empties into the Tennessee, 36ˆ4 miles above Chatta¬ nooga. Its channel is being improved for 35 miles above its mouth and is to have a width of 154 feet and a depth of three feet in

the cen¬ tre and two and one-half feet the entire width of the channel. It has been navigated as far as Savannah Ford, though its present steamboat traffic does not extend above Charleston, Tenn., 19 miles above its mouth. Its tonnage in 1917 was 2,152 tons.

N orth Middle States. — The next great water¬ way of the United States is the Ohio River, which is formed by the junction of the Alle¬ gheny and Monongahela rivers at Pittsburgh, Pa. Thence it flows southwesterly 968J4 miles into the Mississippi River at Cairo. The sec¬ tion between Pittsburgh and Steubenville, Ohio, a distance of 65.7 miles, has dams Nos. 1 to 10, the section from Steubenville to a point two

miles below Huntington, W. Va., a distance of 245.2 miles, has dams Nos. 11 to 28 and the section from the last-named place to a point two miles above Madison, Ind., a distance of 242.7 miles, has dams Nos. 29 to 40 and the section extends from the last-named place to Mound City, Ill., a distance of 408 miles, and has dams Nos. 41 to 54, inclusive. The Louisville and Portland Canal was completed in 1830 by a Kentucky corporation to overcome the falls in that part of the river. It had three combined lift locks, each of eight and two-thirds feet lift, a width of 50 feet and a length of 200 feet. That has been enlarged and under the existing project it is to be again enlarged. The im¬ provement of the Ohio involves the construc¬ tion of locks and movable dams so as to pro¬ vide a minimum channel of nine feet of water in the pools formed thereby and the widening of the Louisville-Portland Canal from 90 to 200 feet. Shoals form in the river and annual dredging is necessary to keep the channel cleared of obstruction and deposits. There are to be 53 locks which are to have usable dimen¬ sions of 600 feet in length and 110 feet in width, and having varying lifts from three and one-tenth to 29 feet, most of them having seven and three-tenths to nine feet lifts. Down to 30 June 1918 the total expenditures under the ex¬ isting adopted project aggregated $28,578,032.38 on new work and the amount expended on all projects in the improvement of the Ohio for new work aggregated

$46,235,306.16. The ton¬ nage on the Ohio River including that over fer¬ ries for 1916 was 7,917,112.61 short tons, and for 1917 was 6,149,21 3.32 short tons.

Pennsylvania. — The Monongahela River is to be made navigable for 130 miles above its mouth by the construction of 15 locks and dams to afford slackwater navigation from Pittsburgh, Pa., to a point four miles above Fairmont, W. Va. The locks have a width of 50 to 56 feet and lengths of 159 to 360 feet, and lifts of four and four-tenths to 12.8 feet and with five to nine and four-tenths feet of water over the mitre sills. The tonnage on the Monon¬ gahela in 1917, was 16,000,153 tons.

The Allegheny River is 325 miles long and joins the Monongahela to form the Ohio at Pittsburgh, Pa. It is designed that it have an open channel from its mouth to the New York State line, a distance of 214 miles. Formerly it was the route for the pioneer and traders pass¬ ing between New York and southern Ohio. Locks 286 to 360 feet long and 55 to 56 feet wide with seven to 11 feet of water over their mitre sills and having lifts of seven to 12 feet are being constructed above Pittsburgh and three have been completed affording slackwater navigation up to Natrona, Pa., a distance of 24 miles with a controlling depth of six and one-half feet. Slackwater navigation is to be ex¬ tended to Riverton, Pa., a distance of 37 miles. Its tonnage in 1917 was 2,3 00,143 tons. The har¬ bor at Pittsburgh comprises sections of the Ohio, Monongahela and Allegheny rivers and these are 27.2 miles in length. The channels are from 300 to 800 feet wide and seven to 10 feet deep. Terminal facilities include wharves, docks, hoists of various types and other equip¬ ment. The commerce of Pittsburgh for the year 1917 was 14,639,496 tons.

The Youghiogheny River, Pennsylvania, a tributary of the Monongahela, is being improved

by dredging and the construction of three locks, 360 feet long and 56 feet wide, with eight feet of water over the mitre sills and dams between its mouth and West Newton, 19ˆ4 miles upstream, which will afford slackwater navi¬ gation to West Newton. The tonnage on that river in 1917 was 85,585 tons.

Virginia, ll est Virginia, Ohio and Indiana. — The Little Kanawha, a tributary of the Ohio, has been improved for a distance of 48 miles from its mouth to Creston by the construction of locks and dams,

thereby affording a navi¬ gable depth of four feet to Creston. The locks are 125 feet long, 23 feet wide and have a depth of four to 10.2 feet over the mitre sills and lifts of six and four-tenths to 12.4 feet. The ton¬ nage over that river in 1917 was 40,849 tons. The States of Virginia and West Virginia, im¬ proved sections of the Kanawha River, also a tributary of the Ohio, and packets and barges ascended the river for a distance of 90 miles at high-water stages. It is 97 miles long. Ten locks, 271 to 313 feet long, 50 to 55 feet wide, with six and five-tenths to 11.35 feet of water over the mitre sills and having five and sixty-five hundreths to 13.67 feet lifts, are being constructed at various sections of the river. All the dams are of the movable type except two. That will afford a navigable channel of six feet depth for 90 miles above its mouth. The tonnage on that river in 1917 was 1,605,495 tons. Sixteen steamboats and 265 other craft navigated the river in 1917. The Wabash River, 517 miles long, flows northwesterly from Ohio across Indiana and southerly between that State and Illinois into the Ohio, 121 miles above the mouth of the latter river. The Wabash in its original condition was 450 to 1,300 feet wide and was navigable at periods of high water, when boats ascended as far as Peru, Ind., 366 miles above its mouth. It has been made navigable in separate sections and at different periods. A lock, 214 feet long and 52 feet wide, and dam at Grand Rapids, 97.1 miles above the mouth, provide slackwater navigation for 12 miles. Through navi¬ gation is impracticable on account of the rapids and shallows in some parts of the river. The New Harmony Cutoff, 41 F2 miles above the mouth, where there is a fall of six and one-half feet, is to be closed and the river dredged to afford a navigable channel of three and one-half feet at low water from the mouth of the river to Terre Haute, 214 miles from the mouth, but boats drawing three feet can make that dis¬ tance for less than four months of the year. Boats of 20-inches draft can pass from Mount Carmel, 96 miles above the mouth, to Vincennes, 32 miles farther upstream, at all stages of water, but cannot pass downstream to the mouth of the river only at very high water. In 1917 about 800 boats passed through the locks at Grand Rapids. One of the principal tributaries of the Wabash River is the White River, formed by the confluence of the East and West Forks about 50 miles above its en¬ trance into the Wabash. It is navigable in its lower reaches for light-draft boats. The Scioto, Maumee and Miami rivers formerly were nav¬ igable and the latter two are in the route of the projected Miami and Erie Canal across Ohio.

Kentucky and Ohio. — The Green and Bar¬ ren rivers in Kentucky are being improved by

the construction of six locks and fixed dams in the former, a tributary of the Ohio, and one lock and dam in the latter, a tributary of the Green River. The locks are 138 to 142 feet long and 35 to 35.6 feet wide, with six to eight feet of water over the mitre sills and having lifts of 11 to 20 feet. That improvement renders the Green River navigable for boats of five-feet draft all the year from lock No. 1 at Spotts-ville to Mammoth Cave, Kentucky, a distance of 187ˆ4 miles, or to Bowling Green, Ky., on Bar¬ ren River, a distance of 171 miles from lock No. 1 on the Green River. The tonnage in 1917 was 252,841 tons. Rough River, Kentucky, 125 miles long, another tributary of the Green River at Livermore, has been cleared of ob¬ structions and a lock and dam have been built near Livermore, Ky. The lock is 125 feet long and 27 feet wide, with four and nine-tenths feet of water over the lower mitre sills, and having a lift of nine and four-tenths feet. That struc¬ ture sets the water back and affords slackwater navigation to Hartford, Ky., 29ˆ/2 miles from the mouth for boats of four-feet draft. Its tonnage in 1917 was 12,701 tons.

The Muskingum River is being improved from its outlet into the Ohio River at Mari¬ etta up to Dresden, a distance of 91 miles, by the construction of 11 locks and dams and four short lateral canals, affording a minimum depth of five and one-half feet. All the locks are 3Sl/2 feet wide and 160 feet in length with the exception of lock No. 10 which is 159 feet long, and lock No. 1 which is 55ˆ feet wide and 360 feet long. The depth of water over the mitre sills is six feet or more and the lifts vary from four and eight-tenths feet to 15.1 feet. There are several warehouses along the river and its tonnage in 1917 was 92,426 tons. The improvement may be extended through the val¬ ley of the Cuyahoga to form the Ohio and Erie Canal. The Big Sandy River, on the boundary between Kentucky and West Vir¬ ginia, formed by the junction of the Levisa and Tug Forks, flows north 27 miles and emp¬ ties into the Ohio 10 miles below Huntington. Its improvement involves the construction of three locks and dams. Two locks and dams are being constructed on each of the Levisa and Tug forks. The locks are about 158 feet long and 54ˆ2 feet wide. The improvement has ren¬ dered the Big Sandy River navigable by vessels of six-feet draft 27 miles to Levisa and the Levisa Fork navigable for

18 miles, and the Tug Fork navigable for 12 miles by vessels of six-feet draft. The tonnage on those rivers in 1917 was 88,344 tons.

Kentucky. — The Kentucky River, formed by the North, Middle and South forks, is 255 miles long and empties into the Ohio at Carrollton, Ky. It is being improved by the construction of 14 locks and fixed dams.

That affords slackwater navigation for ves¬ sels of six-feet draft to points on the three forks above Beattyville, Ky., a distance of 280 miles. The lower five locks are 145 feet long and 37 to 38 feet wide, with six and one-tenth to six and eight-tenths feet of water over the mitre sills and having lifts of 12ˆ2 to 17 feet; these afford slackwater navigation for 88 miles. The remaining nine locks are 146 feet long and 52 feet wide, with six to seven feet of water over the mitre sills, and lifts from 14.4 to 18 feet.

Slackwater depth of five feet has been obtained for 260 miles up from the mouth of the river and the additional foot will be obtained as soon as the dredging is completed. In 1917 the ton¬ nage was 148,981 tons. Some years ago, the Licking River was improved from its mouth into the Ohio 125 miles up to West Liberty.

Great Lakes System. — The Fox River, 176 miles long, in Wisconsin, is divided into the upper and lower Fox by Winnebago Lake. It has a depth of six feet from Depere to Montello, a distance of 125 miles, and a depth of four feet from Montello to Portage, a distance of 31 miles, and a width from Lake Winnebago to Montello of 100 feet. The lower Fox is from 300 to 3,000 feet wide and 39 miles long. In its course it has 27 locks and 16 dams. The locks are from 136.4 to 148.6 feet long and from 34.3 to 40 feet wide, the water over the mitre sills varies from one and two-tenths to 14 feet. The Wolf River, which flows into it 10 miles above Oshkosh, is being improved from its mouth to New London, a distance of 47 miles, to afford navigation for vessels of four-feet draft.

The head of navigation on the Upper Fox is Portage, except that during high water in the Wisconsin River, boats can proceed from Port¬ age into Wisconsin River and thence down into the Mississippi. The tonnage on the river in 1917 was 161,060 tons. The further improve¬ ment of the Wisconsin River has been chiefly that of clearing the channel of obstructions. Formerly the Wisconsin River, a tributary of the Mississippi, 600 miles long, and the Fox River, 200

miles long, with a connecting canal, formed a continuous waterway from the Mis¬ sissippi to Lake Michigan. It was declared by the courts a public highway. Grand River, Michigan, has also been declared a public high¬ way. It has an improved channel, 100 feet wide and six feet deep, from Grand Haven, Mich., to Grand Rapids, a distance of 38 miles,

A ship canal connects Sturgeon Bay with Lake Michigan. It is 7,200 feet long, varying from 160 to 250 feet wide, and the channel is being continued into Sturgeon Bay, a distance of four miles, having a width of 200 feet and a depth of 19 feet at low water datum. In 1917 the tonnage through that canal was 720,803 tons and the harbor afforded shelter for more than 100 vessels.

The Chicago River, formed by the junction of the North and South branches, discharges into the Sanitary Canal and is only seven-tenths of a mile long. It has a channel 21 feet below low water datum in Lake Michigan. The head of navigation is Belmont avenue, five and five-fourteenths miles on the North Branch, and Ashland, four and eight-hundredths miles on the South Branch. In the Chicago River are nu¬ merous slips, docks and other terminal facili¬ ties. The Calumet River is seven and eighty-three-hundredths miles long and empties into Lake Michigan 12ˆ4 miles south of Chicago. It is formed by Little Calumet River, 60 miles long, and Grand Calumet River, which is a lagoon 18 miles long. The entrance to Calumet River is to be 200 feet wide and 21 feet deep, and the improvement is to be extended up¬ stream five and forty-seven-hundredths miles to ((The Forks, » with turning basins located at intermediate points.

The river is navigable by vessels of four-feet draft from The Forks to Indiana Harbor

WATERWAYS

1 Saint Marys Falls Canal. Upper approach to locks

2 Saint Marys Falls Canal. Lower entrance Weitzel and Poe Locks

WATERWAYS

1 Steam trawler, built at a Great Lakes shipyard, passing through the New York State Barge Canal for use on the nrean

2 Great Lakes vessel, partially dismantled, passing through the Barge Canal for ocean use during war emergency

WATERWAYS

1 Gatun Locks (Panama Canal). Looking south from west-wall Lighthouse

2 U. S. S. Arkansas (left) and U. S. S. Texas (right) in middle chambers of Gatun Locks (Panama Canal), 25 July 1919

WATERWAYS

1 Miraflores Locks (Panama Canal) (Sea-level section in distance)

2 Pedro Miguel Locks (Panama Canal) (Gaillard Cut in distance)

Canal, and by vessels of six-feet draft to River-dale on the Little Calumet, a distance of 12 miles from the mouth of the river. The en¬ trance to the harbor is protected by parallel breakwaters. The tonnage of the river and harbor in 1917 was 10,269,304 tons. The Illi¬ nois River, formed by the junction of the Kan¬ kakee and Des Plaines rivers, empties into the Mississippi 36 miles above Saint Louis. It is 273 miles long. Years ago it was navigable by Mississippi boats from

its mouth as far as Utica, a distance of 230 miles. It is now being im¬ proved to secure a seven-foot depth at low water from La Salle, the head of navigation, to its mouth, a distance of 223 miles, by lock and dam construction and dredging. The locks are 325 feet long and 73 feet wide, with seven and seven-tenths feet of water over the mitre sills and with seven-feet lifts. The State of Illinois is co-operating with the Unite 1 States government in that improvement. The tonnage over the improved sections of the river in 1917 was 284,970 tons and the number of passengers transported was 32,574. When improved, the Illinois River will form a part' of a continuous waterway from the Mississippi to Lake Michigan, the other con¬ necting sections being the Illinois and Michigan Canal, 63 miles long, extending from La Salle to Joliet and the Chicago Sanitary or Drainage Canal extending from Joliet to Lake Michigan. The Illinois and Michigan Canal, when con¬ structed was 96 miles long and extended to the South Branch of the Chicago River at Chicago. It had a bottom width of 40 feet, a surface width of 60 feet and a depth of six feet, and 11 locks, which were 103 feet long and 17 feet wide, and had five to six feet of water over the mitre sills. That canal has been repaired and restored to a navigable condition. Another waterway connecting Lake Michigan and the Mississippi River is the Illinois and the Missis¬ sippi Canal, proceeding from the Illinois River at a point one and three-quarters miles above Hennepin, via the Bureau Creek Valley and over the summit to Rock River, and down that river to the Mississippi. It has a surface width of 80 feet, a depth of seven feet and 33 locks 150 feet long and 35 feet wide. The main canal is 75 miles long and has a navigable feeder ex¬ tending from Rock Falls on Rock River to the summit level. Some improvements have been made in that canal, which were completed in 1918. Its tonnage in 1917 was 15,662 tons and 32,377 passengers were transported. The Ke¬ weenaw waterway, partly natural and partly ar¬ tificial, 25 miles in length, extends across Ke¬ weenaw Point in Michigan. It is a navigable channel 20 feet deep with a bottom width of 120 feet, along which there are 32 privately owned docks. It affords access to a harbor of refuge for Lake Superior vessels. The tonnage passing through it in 1917 was 558,456 tons.

Saint Joseph River in Michigan and Indiana was at one time navigable as far as South Bend, a distance of 50 miles. It now has a channel from 30 to 50 feet wide and from two to three feet deep, at low water, from its mouth into Lake Michigan at Saint Joseph up to Berrien, a distance of 22 miles. The harbor at the outlet including the outlet of the Pawpaw River and the Benton Harbor Canal is two and one-tenth miles long, with a channel 18 feet deep and 150 feet wide, two -thirds of a mile vol. 29—7

long, a turning basin and a canal 15 feet deep and 100 feet wide to Benton Harbor. The tonnage of that port in 1917 was 115,138 tons. Saginaw River in Michigan has been improved and has a channel, 200 feet wide and 18ˆ4 feet deep, from Saginaw Bay to the mouth of the river three and one-quarter miles and thence 16J4 feet deep to its source, a distance of 22 miles. There are several thousand feet in length of docks in and between Bay City and Saginaw, which are situated on that waterway. The lower three and one-quarter miles of the channel of Black River ini Michigan has been dredged to a depth of 17 feet and the width of 160 decreasing to 75 feet. Boats of small draft ascend the river five miles beyond the improve¬ ment. There are docks on both sides of the river for a thousand feet or more, all of wdfich are privately owned. In 1917 the tonnage was 80,006 tons.

The Clinton River in Michigan, 60 miles long, has a channel eight feet deep and 60 feet wide at its mouth, which narrows down to 50 feet up the stream. The improvement extends for about eight miles up the river and vessels of light draft ascend two miles farther. The lower portion of the Rouge River in Michigan has been widened and deepened for three miles or more from its outlet into the Detroit River up to Wabash Bridge or farther. Its tonnage in 1917 was 1,954,470 tons.

The Great Lakes and Connecting Water¬ ways. — • Saint Mary's River is the outlet of Lake Superior and flows from Point Iroquois, 63 miles southeasterly, to the Detour Passage into the northern end of Lake Huron. It has a total fall of 18 to 21 feet. Its improved one¬ way channels are 300 feet wide and 21 feet deep and its bothway or upbound amd downbound single channel is 600 feet wide and 21 feet deep. There are four large locks in the Saint Mary's River located at Sault Sainte Marie, Michigan. The Weitzel Lock is 515 feet long and 80 feet wide with a lift of 20R> feet. The Poe Lock is 800 feet long and 100 feet wide with a lift of 20ˆ4 feet. The third lock is 1,350 feet long and 80 feet wide with a lift of 2014 feet. A fourth lock is 1,350 feet long and 80 feet wide with a lift of 20*4 feet, nearing completion. The Weitzel Lock has a depth of 12 6/10 feet of water on the lower breast wall, the Poe Lock has a depth of water of 18 feet on the lower breast wall, and the third and fourth locks have each a depth of water of 24ˆ4 feet on the lower breast walls.

The Saint Clair River connects Lake Huron and Lake Saint Clair. It is 40 miles long. Its channel is from 20 to 22 feet deep and has a width of 400 to 2,400 feet. A channel has been dredged through the Saint

Clair Flats, 300 feet wide and 20 feet deep. The distance through Lake Saint Clair traversed by Great Lake vessels is 18 miles, although the lake is 30 miles wide. The outlet of Lake Saint Clair is the Detroit River which is 28 miles long and flows into Lake Erie. It has several channels. Its Fighting Island Channel, four anid one-half miles long, is 800 feet wide and 22 feet deep. Its Amherstburg Channel is 12 miles long, 600 feet wide and from 20 to 22 feet deep. Its Livingstone Channel is nine and one-half miles long and has a width of from 300 to 800 feet, and a depth of 22 feet. These are connecting waterways between the Great Lakes. Both the

United States and Canadian canals are open to the vessels of either country.

The Great Lakes with their spacious bays and inflowing tributaries are partly within the jurisdiction of the United States and partly within the Dominion of Canada. Such parts of them as are within the United States com¬ prise some of its most important waterways. Their waters wash the shores of Minnesota, Wisconsin, Michigan, Indiana, Illinois, Ohio, Pennsylvania and New York. Other States also are brought in touch with their manifold and extensive commerce. Their score or more spacious and improved harbors with the chan¬ nels of 19 to 23 feet in depth are frequented by the largest grain, ore and lumber fleets in the world, and the volume of their aggregate tonnage approaches, if it does not exceed, 100,000,000 tons annually. They are equipped with all modern appliances for loading and unloading the large lake vessels, some of whose cargo capacities exceed 14,000 gross tons. In 1917, the tonnage at the port of Duluth was 52,411,824 tons, that being the largest tonnage of any inland port in the world.

In 1917 there passed through the United States canals at Saint Mary's Falls, 10,469 lockages of vessels carrying 74,361,850 tons of freight, and 11,990 passengers, and there passed through the Canadian Saint Mary's Falls Canal 5,349 vessels carrying 15,452,048 tons of freight and 26,349 passengers, making an aggregate tonnage passing through the two Saint Mary's Falls canals of 89,813,898 tons of freight and

38,339 passengers. In addition to these were the vessels with their cargoes and pas¬ sengers passing through other Great Lake ports, but not through Sault Sainte Marie canals. The lake tonnage of the port of Buffalo in 1917 was 18,925,179 tons. Such other lake ports as Superior, Chicago, Milwaukee. Detroit, To¬ ledo, Cleveland, Ashtabula, Contneaut, Erie, Tonawanda, Oswego and Ogdensburg had in the aggregate millions of tons of waterborne freights and in addition thousands of passengers. The commerce of the Great Lakes and connect¬ ing waters justifies the expenditure of millions of dollars annually to keep their harbors ade¬ quate to accommodate the several hundred lake vessels in the service. The Niagara River along its eastern margin has a ship channel 200 feet wide and 23 feet deep from Buffalo Harbor down five miles through the ship lock 650 feet long and 68 feet wide with 22 feet of water over the mitre sills into the deep waters of the river. The navigable channel at Tonawanda has been improved. Tonawanda Creek is also improved to make it navigable for lake vessels. The harbors and connecting channels of the Great Lakes are from 19 to 23 feet deep at mean lake levels.

Lake Ontario ports include Charlotte Harbor, with a channel, 200 feet wide and 20 feet deep up to the mouth of the Genesee River; Great Sodus Bay and Little Sodus Bay, which have been improved, each having an entrance channel 150 feet wide and 15*4 feet deep, protected by lengthy parallel piers ; Oswego Harbor with an entrance channel 16 feet deep and 600 feet wide up to the mouth of the Oswego River and Cape Vincent Harbor and the harbor at Og¬ densburg. The latter is provided with an upper entrance channel 19 feet deep and from 300

to 450 feet wide, and also for a channel 19 feet deep and from 200 to 350 feet wide along the city water front, and also for a lower entrance channel and basin 19 feet deep and from 1,600 to 2,100 feet wide along the lower wharf frontage. Ogdensburg is the principal Saint Lawrence River Harbor in the United States, and its tonnage in 1917 was 1,029,427 tons. The Saint Lawrence is the outlet of the Great Lakes and flows wholly through Canadian territory below its Long Sault Rapids a few miles north of Ogdensburg.

Pacific Coast. California. — The Colorado River is navigable between the Laguna Dam and Fort Mohawk, a distance of 280 miles, by boats of 20 to 22 inches draft nearly all the year, provided channels be maintained through shift¬ ing bars of sand. San Diego and Los Angeles harbors have each been dredged and have en¬ trance channels 35 feet

deep and from 400 to 500 feet in width, which channels increase in width landward to turning basins. The ton¬ nage in San Diego Harbor in 1917 was 33,092 tons, and that for 1917 in Los Angeles Harbor was 288,917 tons.

San Francisco has the largest harbor on the Pacific Coast. It is 40 miles long and from three to 10 miles wide and its depths of water vary from 40 to 90 feet. It is a land¬ locked harbor. It has 50 or more piers averag¬ ing 700 feet in length. Its piers for handling bulk freight are equipped with freight-handling devices. The State of California owns the entire water front of San Francisco and its terminal facilities are publicly owned and are open to the public upon reasonable terms. Its tcnnage in 1917 was 9,294,366 tons. Into San Francisco Bay flows Redwood Creek which has a channel 150 feet wide and five feet deep for three and one-quarter miles up stream. Along it are several wharves. The commerce of that waterway in 1917 was 24,271 tons. Oakland Harbor is but a part of San Francisco Bay and has a channel 500 feet wide and 30 feet deep at low water through Oakland Estuary to Brooklyn Basin, a distance of four and three-quarters miles and thence it is but 300 feet wide and 25 feet deep around the basin, and 18 feet deep through Oakland Tidal Canal to San Leandro Bay, a further distance of four and three-eighths miles, making a total length of nine and one-eighth miles. Its tonnage in 1917 was 3,026,279 tons.

San Pablo Bay in California is a waterway 12 miles long and six miles wide, with a channel five miles long, 500 feet wide and 30 feet deep. It is provided with 20 privately owned wharves equipped with warehouses and other facilities. Its tonnage in 1917 was 11,531,- 518 tons. Suisun Channel, California, is a waterway 17 miles long with a channel 80 feet wide and six feet deep. In 1917 its tonnage was 62,842 tons. Napa River, California, is provided with a channel 75 feet wide and four feet deep, for a distance of 18 miles. It is a tidal estuary with a range of 6.92 feet at high water, giving it 11 feet of water at high tide. Steamers of five-feet draft, carrying fast freight, and sailing vessels of six-feet draft, carrying bulky freight navigate that river, whose tonnage in 1917 was 130,093 tons. Petaluma Creek, Cali¬ fornia, a stream 20 miles long emptying into San Pablo Bay, has a channel 600 feet wide

in its lower section and 80 feet wide in its upper section, having a depth of eight feet of water and is navigable for 16 miles. In 1917 its tonnage was 284,423 tons. Montgomery Harbor ii California in 1917 had a tonnage of 248,398 tons.

Humboldt Harbor and Bay, whose entrance is provided with protecting jetties, has a channel 300 feet wide and 18 feet deep. Its tonnage in 1917 was 463,901 ton/s. The San Joaquin River, California, has a channel nine feet deep and 200 feet wide from its outlet in Suisun Bay to Stockton Channel and through Stockton Channel to Stockton, a distance of 45 miles. That chanmel is to be extended at the same depth through Freemont Channel and McLeod Lake, which form part of the harbor of Stockton. Another channel, one and seven-tenths miles long, four feet deep and 80 feet wide, is being constructed from Stockton Channel to Centre street in the city of Stockton, knowni as Mor¬ mon Channel. There are several improvements along the river and some terminal facilities. Loaded vessels on that river do not ordinarily draw more than seven feet. The existing project for the improvement of that river pro¬ vides for the diversion of the waters of Mor¬ mon Slough, through a canal, 150 feet wide, to the San Joaquin River. Its tonnage for 1917 was 1,890,856 tons. Mokelumne River, Califor¬ nia, is 140 miles long and empties into the San Joaquin River, 20 miles above the mouth of latter. It has a navigable channel 50 feet wide and six feet deep from its mouth to Galt, New Hope Landing, a distance of 35 miles. Its ton¬ nage in 1917 was 78,954 tons. Sacramento River, California, is to have a channel seven feet deep from its mouth at Collinsville in Sui¬ sun Bay up to Sacramento, a distance of 60.7 miles, thence a channel of four feet deep up to Colusa, a distance of 90 miles, and thence a channel three feet deep up to Chico Landing, a distance of 51.3 miles, and of such depths as are practicable up to Red Bluff, a distance of 52.4 miles. The latter place is at the head of navi¬ gation and 254.4 miles from the mouth of the river. The river points are provided with wharves, warehouses and other terminal facili¬ ties. Its tonnage in 1917 was 947,690 tons. Feather River, California, a tributary of the Sacramento, 20 miles above the city of Sacra¬ mento, has a cleared navigable depth of two and one-half feet from its mouth at Vernon up to Marysville, a distance of 28.3 miles.

Oregon, Washington and Montana. — The Coquille River, 100 miles long, has a controlling depth of five feet and a width of 100 feet from

its mouth at Bandon to Coquille, a distance of 25 miles. There are wharves at Bandon and at various points upstream. The outlet has a depth of 12 feet and the depth of channel de¬ creases upstream. In 1917 its tonnage was 40,050 tons. Coos Bay has an. improved chan¬ nel 18 feet deep and 200 feet wide up to Marsh¬ field, a distance of 13 miles. Its tonnage in 1917 was 446,062 tons. The Coos River, Ore¬ gon, flowing into the bay, has a navigable length of 23 miles. Its tonnage in 1917 was 97,047 tons. Yaquina River, Oregon, has a channiel 100 feet wide and 10 feet deep from its mouth to Toledo, eight and one-half miles, and above that town to the head of navigation, 22 miles from the mouth, the channel is 100 feet

wide and two feet deep. Tillamook Bay, which is six miles long and three miles wide, has a navigable channel 16 feet deep and 200 feet wide, and at its entrance it is 22 feet deep. It is protected by a jetty a mile long on the north side. The channel from Bay City up to Tilla¬ mook City, 12 miles from the sea, is nine feet deep. The Columbia River is 1,200 miles long. Only 748 miles of its course is in the United States. It flows southwesterly through the State of Washington into the Pacific Ocean between that State and Oregon. It has such large tributaries as the Spokane, the Snake and the Willamette rivers. It has an entrance chan¬ nel 42 feet deep and one-half mile in width, protected by jetties, the north one being two and one-half miles long and the southern one being seven miles long. The largest Pacific steamships may enter the harbor. The tonnage at the mouth of the Columbia River in 1917 was 2,357,863 tons. A channel 30 feet deep and 300 feet wide is maintained from its mouth up to the mouth of the Willamette River, a dis¬ tance of 99 miles, and thence up the latter river to Portland, a distance of 14 miles. From the mouth of the Willamette River to Vancou¬ ver, Wash., a distance of four and one-half miles, it has an improved channel 150 feet wide and 20 feet deep. It also has a channel 10 feet deep and 300 feet wide in the vicinity of Cath-lamet. At Portland onf the Willamette are mu¬ nicipal and private docks, which include grain, lumber and other types. At Astoria on the Columbia River is a large municipal terminal and there are many private docks. In 1917 the tonnage was 2,357,863 tons carried on ocean¬ going vessels and 4,326,681 tons carried on in¬ land river boats. The Cascade Rapids in the Columbia River, 140 miles above its mouth, are overcome by a canal 3,000 feet long with one lock consisting of two chambers, the lower be¬ ing 469 feet long and the upper one 462 feet long, both of which and the canal have a width of 90 feet and lifts of from 18 to 24 feet, with eight feet of water over the mitre sills. The Dalles Rapids and the Celilo Falls, in a distance of nine

and one-half miles, with a total fall of 81 feet, are overcome by the Dalles-Celilo Canal, 190 miles from the ocean, which canal has a depth of eight feet and a width of 65 feet at the bottom and five locks, each 265 feet long and 45 feet wide, with lifts of six and one-half to 70 feet. The canal is eight and one-half miles long. These canals render the Columbia River navigable as far as Priest Rapids, a dis¬ tance of 397 miles, and also render navigation possible on Snake River to Pittsburgh Landing, which is 540 miles from the mouth of Columbia River. The maximum draft of boats on those sections of the Columbia River is four and one-half feet. The Columbia is to have a channel seven feet deep between Watchee and Kettle Falls, a distance of 242 miles. Pittsburgh Land¬ ing, Idaho, on the Snake River, is 216 miles from its mouth and is being improved to se¬ cure a channel five feet deep to Riparia, 68 miles above its outlet, and between Riparia and Lewiston, a distance of 72 miles, to secure a channel five feet deep and 60 feet wide, though for much of the distance the channel is from 240 to 700 feet wide. The tonnage through the Dalles-Celilo Canal in 1917 was 57,718 tons. The Willamette, a tributary of the Columbia,

100 miles from the sea, is to have an improved channel six feet deep and 150 to 200 feet wide „ from Portland to Clackamas Rapids, 11*4 miles, and thence a channel six feet deep and 100 feet wide to Oregon City, one and one-half miles, and thence a channel two and one-half to three and one-half feet deep to Corvallis, a distance of 106 miles. The Willamette Falls near Oregon City are overcome by a canal, four locks and a dam. The locks are 210 feet long and 40 feet wide, with six feet of water over mitre sills and having lifts of 10J4 feet. The tonnage through it in 1917 was 113,954 tons. The mouth of the Yamhill River, a tributary of the Willamette, 42 miles above Portland, was formerly the head of navigation, but loaded boats now ascend as far as Harrisburg on; the Willamette, 33 miles above Corvallis. The Yamhill, eight miles above its mouth, has a lock 210 feet long and 40 feet wide, with four feet of water over the mitre sills and has a lift of 16 feet. That renders that river navigable to McMinnville, 18 miles above its

mouth. Its tonnage in 1917 was 2,032 tons. Loaded boats below Oregon City are of five-feet draft and above that city they are of two-feet draft. The total traffic transported by 31 river boats in 1917 was 491,901 tons. The Lewis River, Washington, a tributary of the Columbia, 26 miles below Portland, divides three and three-quarters miles above its mouth into the North Fork, 106 miles long, and the East Fork, 36 miles long. It has a channel six feet deep and 50 feet wide to the forks. The East Fork has a channel four feet deep and 50 feet wide to La Centre, a distance of three miles, and the North Fork has a similar channel from its mouth to Woodland, a distance of three and one-half miles. Both La Centre and Woodland have terminals publicly owned. In 1917 the traffic on both forks was 25,262 tons, about orue-half that of 1916.

The Cowlitz and Gray rivers, Washington, both tributaries of the Columbia River, have been improved in their lower reaches, the for¬ mer as far as Toledo and the latter for eight miles above its mouth. In 1917 the tonnage on the former was 310,992 tons and on the lat¬ ter 31,092 tons. Willapa Harbor is at the mouth of Willapa River, which is 30 miles long and is from 200 to 2,000 feet wide at the outlet of the harbor into the ocean. A channel 24 feet deep and 200 feet wide has been constructed from Willapa Bay to the forks of the river at Raymond, and thence up the South Fork, 150 feet wide, to the Cram lumber mill, and also from Raymond up the North Fork, 250 to 350 feet wide, to 12th street. The entire improve¬ ment extends 13j4 miles. The harbor is equip¬ ped with city and railway wharves open to the public use. In 1917 its tonnage was 567,510 tons. Gray's Harbor at the mouth of the Chehalis River is 17 miles long and 14 miles wide and has a channel into it 500 feet wide and 24 feet deep, with projecting jetties, on the south three and one-half miles long and oni the north three miles long. The tonnage at that port in 1917 was 455,957 tons. The Chehalis River has a channel 18 feet deep at low water and 200 feet wide from the bay to Cosmopolis, a dis¬ tance of 15 miles, and thence a channel six feet deep and 150 feet wide to Montesano, a dis¬ tance of eight and one-half miles. The traffic

on that river in 1917 was 771,480 tons. Into Gray's Harbor also empties the Hoquiam River, whose channel is 100 feet wide and 18 feet deep for a distance of two miles. The commerce on that river is principally lumber.

Puget Sound is a large bay in the western part of the State of Washington opening out into the Strait of Juan de Fuca. It has many

connecting arms and extensions, principally to the south and southwest deep waters. Into it flows the Skagit, Snohomish, Snoqualmie, Sky-komish, Stilaguamish, Nooksak, Puyallup and Duwamish rivers and connecting navigable sloughs. The conditions are such that perma¬ nent results are not obtainable and continuous dredging is necessary. Large vessels may navi¬ gate the sound proper, but only vessels of six-feet draft can navigate its inflowing streams.

At the south end of the sound is Budd Inlet. Upon this is Olympia Harbor, which has a chan¬ nel 250 feet wide and 12 feet deep, with turn¬ ing basins at the end of the improvement 20 feet deep. One of these is 400 feet wide and 800 feet long. The draft of vessels is limited to 10 feet. The tonnage of that port in 1917 was 283,472 tons. Another arm of Puget Sound is Commencement Bay, four miles long and two and one-half miles wide, constituting Tacoma Harbor. That has one channel 500 feet wide and 25 feet deep to 11th street bridge, and thence 18 feet deep to 14th street bridge, and thence from 500 to 200 feet wide and 15 feet deep to a point 8,500 feet from the en¬ trance. The Puyallup waterway has a channel 500 feet wide and 28 feet deep for two-thirds of a mile. That is at the outlet of Puyallup River. The tonnage at Tacoma in 1917 was 2,912,530 tons. Lake Washington Canal ex¬ tends from the lake through several bays, in¬ cluding Shilshole, Salmon, Lake Union and Union Bays to Puget Sound and is wholly within the city of Seattle. That canal has a double lock 760 feet long and 80 feet wide with 26 feet of water over the mitre sills and a fixed dam. Below the locks to deep water in Puget Sound, a distance of eight miles, the channel is 300 feet wide and 30 feet -deep. Wharves and terminals are located on Salmon Bay, Union Bay and Lake Washington. The tonnage at Seattle in 1917 was 4,850,627 tons. Snoho¬ mish River has a channel 75 feet wide and eight feet deep for five and one-half miles above its mouth into the Puget Sound and its tonnage in 1917 was 1,038,477 tons. The chan¬ nel of Skagit River, 150 miles long in the United States, is being improved nine and one-half miles above its mouth across Saratoga Passage. The draft of loaded boats is limited to three feet. Its tonnage in 1917 was 554,797 tons. Swinomish Slough, 11 miles long be¬ tween Saratoga Passage and Padilla Bay, has a channel 100 feet wide and four feet deep. Its tonnage in 1917 was 54,347 tons. Bellingham Harbor, Washington, is an arm of Puget Sound. It is four miles long and two miles wide. Through its outlet is the Whatcom Creek waterway, 363 feet wide, two-thirds of a mile long and 26 feet deep at the outer end and 18 feet deep for the inner one-quarter mile of the improvement. The draft of loaded vessels was 10 feet. The tonnage of Bellingham Harbor in 1917 was 434,340 tons. The channel in Flat-head Lake, Montana, is to have

a channel 100

- T»i + r_ Y er y SOCMW

WATERWAYS OF THE UNITED STATES

101

feet wide and six feet deep. Poison Bay at its southern end is a harbor six miles long and five miles wide. Loaded boats there were lim¬ ited to six-feet draft.

Alaska. — Apoon Mouth is the most east¬ erly outlet of the Yukon River and empties into Pastol Bay, 115 miles south of Nome Harbor. The Yukon is navigable for river boats of five and one-quarter-feet draft to the international boundary, a distance of 1,500 miles. Apoon Mouth has been improved for seven miles, having a channel from 150 feet wide and six feet deep through the bars at the mouth. Saint Michael Canal, Alaska, is a salt-water channel 18 miles long, 100 feet wide and six feet deep at the entrance of Saint Michael Harbor. That canal provides a shel¬ tered passage for river boats plying between the port of Saint Michael and the mouth of the Yukon River. The tonnage thereon for the year 1910 was 24,622 tons. Nome Harbor on Norton Sound is the outlet of Snake River, a stream 20 miles long. The harbor is pro¬ tected by concrete jetties 400 feet long. It has a basin 200 feet wide, 250 feet long and eight feet deep. Its tonnage in 1917 was 17,981 tons.

Hawaii and Porto Rico. — Hawaii has Hono¬ lulu Harbor, with an entrance channel 400 feet wide, 3,000 feet long* and 35 feet deep at mean low water. Since the opening of the Panama Canal Honolulu has become a port of call for coal and fuel oil. It has 22 wharves and piers. Its tonnage in 1917 was 2,037,424 tons. Hawaii also has Kahului Harbor and Hilo Harbor, both improved to a depth of 35 feet. The tonnage of the former in 1917 was 228,853 tons, and that of the latter was 357,406 tons. San Juan Harbor in Porto Rico has an improved chan¬ nel 600 feet wide and 30 feet deep with terminal facilities. Its tonnage in 1917 was 756,350 tons.

Cape Cod and Panama Canals. — The water¬ ways of the United States also include many channels already described and also the Cape Cod and Panama canals. The former extends from Buzzard's Bay to Cape Cod Bay. It is from 100 to 300 feet wide on the bottom and was originally built by private parties, and may become a part of the Intercoastal Waterway from Maine to Key West. It is to be acquired by the United States and be given a prism 30 feet deep, with a minimum width of 200 feet. The largest of the government owned and oper¬ ated canals is the Panama Ship Canal, approxi¬ mately 40 miles long, extending from Limon Bay in the Atlantic to La Boca Bay in the Paci¬ fic. Its regulated summit level is between 82 and 87 feet above sea-level. The difference is due to the variation in the level of the Chagres River. That level is reached by a double lock, each lift being 45 feet, making a total lift of 90 feet at the Atlantic end of the canal and at the Pacific end there are double lift locks in the Pedro-Miguel section and a single lift lock be¬ low Lake Miraflores. Approximately one-half of its length is through Gatun Lake and Lake Miraflores, natural bodies of water, thereby ma¬ terially reducing the original cost of that waterway. Its locks are 1,000 feet long and 110 feet wide. The canal has a minimum bottom width of 300 feet, but an average width of 649 feet, and it has a minimum depth of 41 feet.

The JVaterzvays. — There are other water¬

ways not mentioned in this article compris¬ ing interior lakes and unimproved rivers. The foregoing enumeration, however, of waterways and the description of their channels are sufficient to indicate their extensiveness the country over as well as their importance to the commerce of the na¬ tion. Those hereinbefore mentioned comprise thousands of miles of navigable channels. In their construction and maintenance, the govern¬ ment of the United States has expended hun¬ dreds of millions of dollars. Furthermore, some States and many communities have con¬ tributed large sums toward waterway improve¬ ments. The policy of cooperation between the general government and the States and com¬ munities may become a settled policy and that governmental aid may be extended only when localities advance some part of the expense of making waterway improvements. That policy has been adopted in some European countries and has been recommended by one or more commissions of the United States.

The data as to waterborne tonnage given in this article are chiefly from the official records for the year 1917. Over most waterways, it

was not as voluminous as it was during the preceding four years, owing to the abnormal conditions prevailing the country over, in conse¬ quence of the Great War. Much of the com¬ merce of the country was diverted from water¬ ways to railways, which were under Federal control. The conditions in the year 1918 were still more unfavorable for water carriers and the waterborne tonnage, except ocean traffic, the greatest in the history of the country, was less over inland waterways than it was in 1917.

The end of the war and the return to normal industrial life will awaken an ever-increasing demand for greater facilities of transportation. The waterways of the coun¬ try will furnish those facilities. The entire Atlantic, Gulf and Pacific coasts, the Great Lakes and the interior waterways of the coun¬ try are equipped as shown in this article to do a volume of transportation unparalleled at any other period in the history of the world.

Bibliography. — Various United States Coast and Geodetic Survey charts; various reports of the Committee on Rivers and Harbors of the House of Representatives of the United States; many Acts of Congress of the United States; the Reports of the Chief of Engineers of the United States army for the years 1900-19 ; Re¬ port of Gen. William H. Bixby, Chief of Engi¬ neers, on the Intercoastal Waterway from Maine to Key West; various documents of the House of Representatives of the United States on Waterway Improvement Projects; Reports of the United States Commissioner of Corpora¬ tions on Transportation by Water m the United States in 1909; Reports of the Mississippi River Commission; Reports of the Ohio River Com¬ mission; Reports of the New York State Waterways Association; Reports of the At¬ lantic Deeper Waterways Association; Reports of the National Rivers and Harbors Congress; Reports of the Tennessee River Improvement Association; Proceedings of the International Joint Commission on Boundary Waters; Report for 1912 of the International Congress of Nav¬ igation ; Reports of State Engineers of various

States; maps and charts of various sections of the United States;

reports of Municipal Harbor Improvement Commissions, and many-other records.

Henry Wayland Hill, President of the New York State Waterways Association, author of the articles on ((Rain¬ fallˆ and ((Water Supply }) in this Encyclopedia and of ((Waterways and Canal Construction in New York

WATERWORKS, systems of machinery and engineering structures, employed to supply water to individual manufacturing, mining and milling plants, and to municipalities, for domes¬ tic and industrial uses and for irrigation. Such systems existed during very early periods of history, and the waterworks of ancient Greece, Carthage and Rome may be readily traced and studied by the ruins of their reservoirs and masonry aqueducts. In these earlier systems, gravity was depended upon for the delivery of the water, but force pumps were introduced about the middle of the 16th century, and ex¬ tended greatly the general installation and use ‘of waterworks systems. The waterworks built at London Bridge by Peter Maurice 1562 appear to be the first on record. The plant consisted of 16 force pumps, each 17 inches in diameter, and 30 inches long, which were driven by a cur¬ rent wheel, and raised 311,000 gallons of water per day to a reservoir at an elevation of 120 feet above the pumps, and from which the water was delivered by gravity, through lead pipes to buildings in the immediate vicinity.

In the United States, the first pumping plant installed to provide water for municipal pur¬ poses was that at Bethlehem, Pa., about 1760. It consisted of a five-inch wooden force pump, which raised water to a height of 70 feet through pipes’ of bored hemlock logs. This was replaced in 1761 by three single-acting iron pumps, each four inches in diameter, and of 18-inch stroke, operated by an undershot waterwheel. The first municipal water-supply system built in America, however, was that of Boston, in 1652. It was built by the WaterWorks Company, and consisted of a reservoir about 12 feet square, to which the water from springs in the vicinity was conveyed through wooden pipes. From 1652 up to the close of the year 1800, the waterworks plants in the United States numbered 16, and had been located and 1 uilt at the following named cities : Boston, Mass., 1652; Bethlehem, Pa., 1754-61; Provi¬ dence, R. I., 1772; Geneva, N. Y., 1787; Ply¬ mouth, Mass., 1796; Salem, Mass., 1795; Hart¬ ford, Conn., 1797; Portsmouth, N. H., 1798; Worcester, Mass., 1798; Albany, N. Y., 1798 — 99; Peabody, Mass., 1799; New York City, 1799; Morristown, N. J., 1799; Lynchburg, Va., 1799; Winchester, Va., 1799-1800; and Newark, N. J., 1800. With the exception of the plants at Win¬ chester

and Morristown, they were all built by private concerns, but passed into the ownership of the respective municipalities from time to time up to 1860. The works at Winchester were built by the municipality, and those at Morristown were built by a private concern and still remain in private ownership. Up to the present time (1919) the number of plants in¬ stalled throughout the country amounts to nearjy 4,000, of which four-fifths are under municipal control.

A clear and concise consideration of the sub¬

ject of waterworks may be facilitated by ar¬ ranging the various requirements under the four general headings — quality of the water; sources of supply; modes of distribution, and public policy.

Quality expresses the fitness of the water for the special purposes for which it may be re¬ quired. A good quality of water is character¬ ized by freedom from turbidity and color, un¬ pleasant taste and odor, and undue sewage con¬ tamination.

Taste is the first quality to be satisfied in drinking water. Even a perfectly safe water may be rejected because of nauseating flavor. This may often be remedied by dosing with chlorine and then removing the chlorine taste with sodium sulphite.

Turbidity is a condition caused by clay and silt suspended in the water. When the source of supply is a river, this condition is liable to great variation according to the amount and character of the rainfall over the watershed. Heavy rains of short duration are drained off with great erosive effect, and introduce into the flowing rivers vast quantities of finely divided inorganic matter. Such impurity, however, is more offensive than harmful, unless taken into the system frequently or in large quantities. It is removed by the use of settling reservoirs where the water is allowed to rest and deposit the heavier particles, before it is passed through the filter-beds by which the smaller particles are removed. (See Water Supply). Color is a condition more offensive to the eye than harm¬ ful to the health. The apparent color due to turbidity disappears under the processes of sed¬ imentation and filtration, but true color, gen¬ erally due to infusion of vegetable organic matter, such as leaves, grass, etc., is much more difficult to remove.

Odor is a condition which, although less fre¬ quent, is much more objectionable than turbidity or color. As a rule it is due to the life

proc¬ esses of minute organisms, and is removable to a considerable degree by filtration. It may, however, persist at certain times in the year and has been known to produce, or be followed by bowel disturbances among small children.

Sewage contamination is the most harmful of all the various forms of impurities natural or artificial that a water supply may be sub¬ jected to, and is the direct cause of epidemics of typhoid fever and various troubles of the intestines, which by undermining the constitu¬ tion reduces its power of resistance to other dis¬ eases. The water may be somewhat purified by filtration, but the proper remedy is to remove' the source of pollution. Failing this, even a much polluted water may be made reasonably safe for drinking by sterilization with chlorine.

The quality of water is ascertained by vari¬ ous kinds of analyses, physical, chemical and bacteriological. Physical analyses consist merely of comparisons of the given samples with standard solutions, and afford data relative to temperature, turbidity, color and odor. Chem¬ ical analyses indicate the time of past contami¬ nation and the nature of its origin — animal or vegetable, and the content of mineral salts. Bacteriological analyses are principally used to ascertain the absence or presence of the growths which cause bad taste and odor. Such analyses are capable of showing the number and prob¬ able origin of the bacteria present, but in mafi

ters of differentiation, as in the case of the typhoid germ from the harmless water bacteria, their operation is quite uncertain.

The results obtained by any set of analyses are generally interpreted by chemists and engi¬ neers by comparing them with other known facts, without attempting to establish a system of arbitrary standards. A minimum limit of impurity, however, may be stated, as follows :

(1) The best authorities consider water as unfit for drinking purposes when 100,000 parts of the liquid contain more than three parts by weight of mineral matter or one part by weight of dry organic matter,

before it has been sub¬ mitted to precipitation, or when it holds in sus¬ pension more than one part by weight of dry organic matter after six hours of perfect repose in a reservoir.

(2) When the same amount of liquid con¬ tains in solution more than two parts by weight of organic carbon, or three parts of nitrates.

(3) If it exhibits a distinct color under day¬ light when placed in a white porcelain dish, to the depth of one inch.

(4) When 100,000 parts of the liquid con¬ tain more than two parts by weight of a salt of any metal except calcium, magnesium, potas¬ sium and sodium.

(5) When 100,000 parts of the liquid contain in solution, suspension, or chemical combina¬ tion, more than 0.5 part of arsenic.

(6) When 100,000 parts of the liquid, after the addition of sulphuric acid, contain more than one part by weight of free chlorine.

(7) When 100,000 parts contain more than one part by weight of sulphur in the form of sulphuretted hydrogen, or a soluble sulphuret.

(8) When 100,000 parts of the liquid holds in suspension more than 0.5 part of petroleum or hydrocarbon, or exhibits a film of the same upon its surface.

(9) When the acidity is greater than that produced by two parts by weight of hydrochlo¬ ric acid to 1,000 parts of distilled water.

(10) When the alkalinity is greater than that produced by adding one part by weight of caustic soda to 1,000 parts of distilled water.

(11) When 10 cubic centimeters of water contain more than 100 harmless bacteria. This is the requirement of the government for water served on railroad trains in interstate com¬ merce, and is adopted by all bottlers of table waters.

In general, a large percentage of chlorine and nitrates, together with the presence of Bacillus coli communis, an organism originating in large quantities in the human intestines, indi¬ cate sewage contamination.

A very simple but reliable test for sewage contamination was suggested by Heisch. To half a pint of the suspected water placed in a clear errorless glass-stoppered bottle, add a few grains of the best

white lump-sugar, and expose the bottle freely to daylight in the window of a warm room for a week or 10 days. If the water remains clear it may be considered safe, but if it become turbid, it is open to grave sus¬ picion of sewage contamination.

Turbidity or a precipitate which follows upon the addition of baryta water indicates the presence of carbonic acid;- chloride of barium is used in the same way as a test for sulphates; nitrate of silver for chlorides; oxalate of

ammonia for lime* salts; sulphide of hydrogen, slightly acid, for salts of antimony, arsenic, bismuth, calcium, copper, gold, lead, mercury, platinum, silver and tin; an alkaline (by ammo¬ nia) solution of sulphide of ammonium, for salts of aluminum, chromium, cobalt, iron, manganese, nickel and zinc. Chloride of gold or mercury and the sulphate of zinc are the reagents for organic matter.

Hardness of water is a quality that bears chiefly upon its use for boilers and for laundry purposes. The hardening impurities are prin¬ cipally the salts of lime and magnesia. Their carbonates produce temporary hardness which may be removed by boiling, when the carbonic acid is dissipated and the insoluble bases are deposited as incrustations on the bottoms of the kettles and boilers. The carbonates are less troublesome to the human constitution than to steam users, but the sulphates, chlorides and nitrates of lime cannot be dissipated by ordinary boiling and are productive of what is known as permanent hardness. Ordinarily pure water can take up only about two grains of carbonate of lime per imperial gallon of 70,000 grains, but when carbonic acid is present, that amount of water will dissolve as much as 20 grains of the carbonate. The degree of hardness is esti¬ mated according to the number of grains of soap the solution is capable of neutralizing. Thus, one, two and three degrees of hardness represent the neutralization of 10, 20 and 30 grains of soap, respectively. The amount of waste, in the wear of clothes and soap, and the destruction of many valuable food properties by the use of hard water is not fully appreciated by the general public. It is safe to state that the money value of that waste far exceeds the cost that would supply an abundance of water for domestic purposes from a source free from impurities.

Systematic processes for softening water have been employed in the United States, prin¬ cipally in connection with manufacturing plants. The first process was invented by Prof. Thomas Clark, of Aberdeen,

Scotland, in 1841, and consists of mixing the water supply with lime water or milk of lime, and allowing it to subside for a period ranging from 12 to 24 hours, when the water is drawn off while the precipitate is left behind. The first softening plant in connection with a municipal water sup¬ ply in America is that connected with the water¬ works of the city of Winnipeg, Monitoba. The source of supply is a number of artesian wells, and the water obtained is very hard. The softening process employed is a modification of that of Clark, and includes a variety of set¬ tling and filtering devices, into which the water is pumped and mixed with the lime solutions and then drawn off and distributed by direct pressure pumping into the mains. Its working provides a water more beneficial to the health, and better for domestic purposes, than that of the Red River, which formed the original water supply of the city. (See Water Softening).

While boiling is a very cheap and thoroughly effective process of purifying water, and may be used by householders in general, distillation, owing to its expense, may be employed only in special cases, in connection with artificial ice plants, the conversion of salt water into fresh water at sea, and in the various industrial prts.

It will be noted, however, that both boiled and distilled water are unpalatable unless aerated before used for drinking.

Sources of water supply will be found exten¬ sively treated under that title. In a general way, the origin of all sources is the atmosphere. It is a simple matter to trace the course of the water from the clouds in the form of rain to the rivu¬ lets which form the feeders to the lakes and rivers, and which, percolating through the porous rocks and earth, issue as sparkling springs along the valleys. Some special sug¬ gestions, however, relative to the selection of a potable water is advisable in this connection. In the open country water reaches the ground in a fairly pure condition and by selecting a site isolated from the drainage of barnyards, house sewerage and fertilized gardens, an ex¬ cellent quality of water may be obtained from a well. *Extending the application to where the supply is for the use of a community, town or*

small city, subterranean reservoirs in which the great rain percolations are stored up, may be tapped by artesian wells and furnish an in¬ exhaustible supply of pure water. In boring these wells, however, a thorough knowledge of the geological structure of the region is im¬ portant (see Artesian Wells), in order to avoid unsuccessful and costly boring operations, as well as to obtain a sufficient quantity of water free from subsurface impurities. Waters percolating through or over the crevices of granite, gneiss, serpentine, trappean, mica-slate or silicious sandstone and drift formations, are usually quite pure, since the disintegrations of such formations are not soluble in pure water. On the other hand, limestones and chalks im¬ part objectionable qualities. Carboniferous rocks are often composed largely of mineral salts and the water penetrating such strata are of a briny nature and are wholly unfit for do¬ mestic use. This is the case in the Kanawha Valley and in some parts of Ohio, West Vir¬ ginia and the State of New York. In the bituminous limestones of the oil regions of Pennsylvania, the waters passing through those strata are saturated with petroleum compounds, while the dark waters issuing from the sulphur¬ ous rocks of the Niagara group of the Ontario geological division carfy a high percentage of sulphuretted hydrogen.

As the municipality requiring the water in¬ creases in size, the quantity obtainable from a source of supply becomes more and more im¬ portant. The per capita consumption varies greatly and very often quite unexplainably. See Water Supply.

In the ancient cities of Jerusalem, Rome, Byzantium and Alexandria, the consumption amounted to 300 gallons per capita, daily.

In 1870, the water consumed by the principal European cities, in gallons per capita, was as follows : London 29, Liverpool 27, Glasgow 40, Paris 30, Marseilles 40, Genoa 30, Geneva 16, Madrid 16, and Berlin 18. On the other hand, it is not an unusual thing to find American cities consuming all the way up to 300 gallons per capita, the largest consumption being in the irrigation districts and in manufacturing towns. Without doubt, a great amount of the water in such cases is really wasted, but American hydraulic engineers in planning for a water supply under the present conditions, calculate

upon the basis of a consumption, of 100 gallons per capita, with provisions to meet an increased demand in the near future.

A fair average daily consumption may be ap¬ proximately estimated as follows, in gallons per capita, on a basis of total population : For

or¬ dinary domestic purposes, 20 gallons; for pri¬ vate stables, including carriage washing, 3 gal¬ lons; commercial and manufacturing purposes, 16 gallons; fountains, drinking and ornamental, 10 gallons; fire protection, 0.2 gallon; private hose and sprinkling of streets and public grounds, during the four or five driest months of the year, 10 gallons; waste to prevent the freezing of water in the service pipes and house fixtures in northern cities, during the three coldest months of the years, 10 gallons; and waste by leakage, and for flushing purposes, 10 gallons; a total of about 80 gallons. The actual domestic consumption has been proved by meters to range from eight gallons per capita in a one-family apartment with one bath and one toilet, to 46 gallons per capita in a crowded boarding . house.

Thus for the larger cities, the selection of a source of supply passes from wells and springs to the large ponds and lakes. Important ex¬ amples of such are found in the cities of Chicago and Milwaukee, ‘which draw their supply from Lake Michigan, and Cleveland and Buffalo, from Lake Erie. In the majority of cases the principal cities of the world obtain their water from rivers, although a great many, as in the case of New York, which draws its supply from Croton Lake and the Esopus watershed of the Catskills, have adopted cer¬ tain natural basins and converted them by arti¬ ficial means, such as dams, etc., into immense reservoirs, fed solely by the rainfall over the drainage area. In such cases the principal mode of delivering the supply at the point of con¬ sumption is by gravity, through aqueducts (q.v.), connecting the source of supply with the distributing mains. Intermediate storage set¬ tling filtering reservoirs may be employed in connection with the source of supply to neutral¬ ize the conditions of turbidity, color, etc., inherent to surface waters, while auxiliary pumping stations may be built and operated in connection with standpipes if any part of the area using the water happens to be higher than the level of the source of supply. See Dams.

On the other hand, when a river is the source of supply, its natural position in the lowest part of the valleys compels the elevating of its waters before delivery to the consumers. This is accomplished by pumping plants which raise the water into reservoirs or standpipes from which it is distributed by gravity, or it may be pumped direct into the distributing mains and thence into the service pipes. In either case, in planning a system of water¬ works, it is essential that proper provisions be made to insure a pressure of delivery that is constant and adequate to supply the consump¬ tion per capita for all domestic and industrial purposes, and of sufficient power to throw fire streams over the tops of ordinary buildings. A combination of the gravity and pumping sys¬ tems is employed by the city of Washington From the

Great Falls of the Potomac, situated several miles west of. the city, the water is con¬ veyed through a conduit to receiving reservoirs on the heights adjacent to the city and after a

period of subsidence, is passed into the distrib¬ uting reservoirs and thence to the service mains. Certain portions in the northwestern and northeastern parts of the city being higher than the receiving reservoir, pumping stations connecting with the distributing mains pump the water into standpipes in the elevated sections, from which it is delivered to the consumers by gravity. As a rule, the cost of establishing pumping systems to lift the water from the river from a point near at hand to the stand¬ pipes, is far less than that of building the neces¬ sary aqueducts to conduct the water from a point on the river a sufficient distance beyond to insure the required head or pressure. In the case of Washington, however, the arrangement is practically necessary since the sewage of the city flows into the river in the immediate vicin¬ ity, and the current of the river itself is af¬ fected by the ebb and flow of the tide to some distance above the city, so that the water imme¬ diately at hand is in a polluted condition. In this connection it may be mentioned that but a very small numlber of American cities are for¬ tunate enough to obtain an abundant supply of water directly from natural sources sufficiently transparent and limpid for domestic purposes. The great majority are compelled to resort to artificial means of various kinds, such as storage and settling reservoirs, filter beds, sterilizing basins, and pumping plants, to insure the purity and quantity required. In the light of the pres¬ ent knowledge of the ease with which water of a considerable degree of pollution may be steril¬ ized with chlorine, no water-supply plant is complete without this cheap safeguard.

The character of ˆpumping plants® varies ac¬ cording to the source and mode of supply, the motive power employed and the working pres¬ sure on the pumps. In connection with the source and mode of supply, such plants are ar¬ ranged for direct pumping, or for pumping into a reservoir. Direct pumping plants are liable to be affected by

great and sudden changes in working pressure and, therefore, require ma¬ chinery capable of responding quickly to such changes, with strong and simple working parts automatically regulated under variable speeds. On the other hand, since the machinery em¬ ployed to pump into a reservoir works against an almost constant head or pressure, at a prac¬ tically uniform' rate of speed, a much greater latitude is presented in the economy of design and operation.

As a general rule, when the source of supply is more than 25 feet below the surface of the earth, economy in the matter of excavations and foundations compels the use of some form of a vertical rather than a horizontal pump. If the well is very deep two sets of pumps, one at the bottom and one at the surface, may be employed, or by the use of the air lift, the motive power may be kept at the surface of the ground. On the other hand, when the water has to be pumped from a river to a settling reservoir for purification, and then repumped into the dis¬ tributing mains, under conditions involving a comparatively low lift, some form of horizontal or centrifugal pump is the most suitable. See Pumps and Pumping Machinery.

Relative to motive power for the pumping plant, it is evident that water power, when it can be obtained in a sufficient amount, is the

ideal source of energy, since it is generally in¬ exhaustible and always cheap. If, however, it cannot be obtained during the whole year, it may be supplemented by steam or electric power, or by a system of storage reservoirs arranged to equalize the flow of the stream under the varying conditions of wet and dry seasons. The employment of steam, electric and compressed air power to operate pumping plants depends to a great extent upon the cost of fuel used. When the pumping plants are situated at points far from the fuel supply, they may be op¬ erated frugally, within the limits of eco¬ nomical electric power transmission, by power derived from dynamos driven by steam-engines or the energy of waterfalls. The high-pressure hydraulic pumps are exceptionally economical and efficient where suf¬ ficient head is available. Compressed air may be used to operate small plants located at a distance from the main plant, and also to oper¬ ate air lifts where deep wells are the source of supply, while oil and gas engines are the most economical for operating isolated secondary pumping plants in large cities, or the main pumps of small towns and villages. It is a fact, however, that in a majority of the waterworks throughout the world, steam is the motive power employed, the pumping engine usually combining the motive power and pump

action in one ma¬ chine. They are of several different types, and the adoption of any particular one depends prac¬ tically on the cost of the fuel used. When that cost is great, high duty engines, although more expensive in design and construction, but capa¬ ble of performing a relatively larger amount of work with a small amount of fuel, are adopted. See Pumps and Pumping Machinery.

For specific information on the construction of reservoirs, filter beds, tanks and standpipes see Water Supply.

Standpipes placed upon the force mains are employed by several American cities, whose reservoirs are distant from their pumping sta¬ tions to equalize the resistance against the pumps. Those at Louisville, Milwaukee and Saint Louis are examples. Other cities, such as Chicago and Toledo, where proper reservoir sites are unattainable, use open-topped stand¬ pipes of considerable height, ranging from 150 to 27 5 feet. They serve as partial substitutes for relief valves acting in conjunction with tall air chambers. In the standpipes the surface of the water rises and falls according to the rate of delivery into them by the pumps and the rate of draft when the main over which they are place is connected with the distributing system. In northern cities they have to be housed to pre¬ vent the water from freezing during the winter.

The water obtained by any of the methods already described is supplied to the consumers by distributing systems comprising the various kinds of mains, service pipes, house fixtures, valves and hydrants which control the flow and the delivery of the water, while various kinds of meters record the amount consumed and af¬ ford a basis for taxation. See Water Meters.

Such systems usually consist of one or more trunk mains from which numerous branch pipes, continually diminishing in size, lead under the surface of the streets and connect v/ith the various buildings. The mains are usually of cast iron, although wooden pipes have

been and are even at the present time used under certain conditions.

Under a direct pressure sys¬ tem, when the water is pumped through such a pipe it is called a force main. Originally they were of wrought iron, ‘but proving unreliable were superseded by cast iron and finally by those of riveted steel. See Pipe, Manufacture of.

The size of trunk mains depends upon the required volume and velocity of the water con¬ veyed and vary from 48 to 72 inches in diame¬ ter. Pipes leading to fire hydrants should not be less than four inches in diameter, and when of that size should be restricted to lengths not exceeding three or four hundred feet and lead¬ ing to a single hydrant. Service pipes are usually of lead or wrought iron. Lead pipes, although more expensive, are preferable on account of their flexibility, smooth interior sur¬ face, great durability and relative non-corrosive¬ ness. Plain wrought-iron and galvanized-iron pipe corrodes so rapidly that it is unfit for use unless coated both inside and outside by asphaltum or varnish of some kind. Various sub¬ stances have been applied for that purpose from time to time, while interior linings of cement have been used extensively; but the present practice is confined’ to the application of an asphaltum bath, with perhaps the most satisfac¬ tory results obtainable. It consists simply of a mixture of coal tar and asphaltum in propor¬ tions that will give a coating non-brittle at the freezing point.

Valves are employed to control the water as it flows into the mains and from them into the service pipes. Pipes are always liable to accident through excavations for buildings, sewers, electric conduits, overflows and quick¬ sand and clay slides. It is also very often necessary to shut off the water when new hy¬ drants arc attached, or when large pipe con¬ nections or repairs are made. Under such cir¬ cumstances means to maintain a constant supply at and beyond the points involved are best ob¬ tained by a duplicate arrangement of sub-mains in parallel lines at several squares distance, joined across by a system of smaller service mains, so that there are always at least two lines of sub-mains around any given point. Under such conditions stop-valves may be used with advantage to shut off the water from a particular point without cutting off the supply from what may be a large territory lying be¬ yond. Stop-valves are made in a great variety of forms, but the best have double self-adjusting discs, with the seats slightly divergent, so that the pressure of the screws sets the valve-discs snug upon the seats. They are usually located on the mains under some unvarying system as, on the property line of the block and five feet from the curb, on the southwest corners of street intersections. Thus they may be readily found in case of accident when hid¬ den by a cover of frozen earth, snow, or other debris. Blow-off and waste valves are attached to pipes laid upon undulating ground, and are

used to flush out the sediment deposited by the water, in the principal depressions of mains and sub-mains. Their diameters are usually about one-half that of the mains from which they branch and they may be led into sewers or wherever the waste water may be disposed of. Valves commonly known as cor¬ poration cocks regulate the flow into the houses and are usually set in the sidewalk near the

curb. Check-valves act against a backward flow of water and are useful on force mains to pro¬ tect the meters against back pressure, while reducing-valves are employed to relieve de¬ pressed areas of a city from excessive pressure where an effective division into high and low service is impracticable. They operate auto¬ matically, under the hydraulic pressure in the mains in which they are located, while the other forms are operated by hand or may be operated by electrical connections. Valves are expensive contrivances, and the cost of the larger sizes may be often reduced by the application of the Venturi principle, the larger pipes being grad¬ ually contracted to the size of a small valve, and then gradually increased to the original size without much loss of pressure.

Hydrants are valves used for fire-fighting and flushing purposes. In post or fire-hydrants, a vertical tube extends from the valve to a cer¬ tain height above the ground. They are usually set on a branch pipe, at or near the curb line, and may be provided with from one to four nozzles, according to the capacity of the service mains, for the attachment of fire-hose. They are made in an innumerable variety of patterns ; a first-class hydrant, however, consists of a frost case that is free to move up and down as the ground expands and contracts under vary¬ ing temperatures, without straining the hydrant base; a waste-valve that will drain the hydrant effectually as soon as the main valve is closed, and which will close automatically as soon as the main-valve begins to open ; a main-valve that is positively tight, which if it closes ˆwith® the pressure will be free of any slack motion of its stem and thus prevent a severe water-ram at the moment it is closed ; a screw motion of the valves requiring at least 10 complete revolutions before the valves are seated, thus insuring a slow closing and pre¬ venting the excessive shock and strain on the valves of an entire system that may result from a water-ram caused by the simultaneous closing of several hydrants. A stop-valve is usually placed between the main and the hy¬ drant, so that the latter may be repaired with¬ out shutting off the flow through the mains.. Hydrants should not be placed more than 500 feet apart, while in a closely built business district they may be placed at very near in¬ tervals.

Waste by leakage from the mains and poorly constructed flushing devices varies from five gallons upward per capita, and its reduction to a minimum is essential to the economical opera¬ tion of any system of waterworks, but it is especially important when the service is by pumping, for the cost of pumping the waste is proportionally equal to that which is actually used. This is true also when the source of supply is distant and the purity of the water depends upon the conservation of its quantity. This can only be accomplished by careful work¬ manship in the construction of the plant; care¬ ful pipe laying; the use of high-grade, self-closing plumbing fixtures, especially those de¬ vices used for flushing water-closets and the installation of meters not only to detect leaks and other causes of waste in the houses, but to form the basis for charges against the con¬ sumer and compel carefulness on his part. This, however, brings the matter to a point where it is necessary to harmonize good practice with

public policy. The details of district meter sys¬ tems and the inspection of service pipes are minor problems as compared with the equitable adjustment of water rates according to the various classes of consumers. In general, al¬ though the district plan is ‘but a poor com¬ petitor of the house meter system, it has pro¬ duced good results in controlling waste and detecting leaks whenever it has been employed. See Hydraulics ; Hydrostatics.

Bibliography. — Flinn, A. D., (Waterworks Handbook (New York 1916) ; Folwell, A. P., ‘Water-Supply Engineering) (New York 1917) ; Rideal, S., and E. K., (Water Supplies: their Purification, Filtration and Sterilization (London 1914) ; Turneaure, F. E., and Russell, H. L., (Public Water Supples: Requirements, Resources, and the Construction of Works) (New York 1913) ; Uren, F. C., (Waterworks Engineering* (Bristol 1914) ; Wegmann, E., ‘Conveyance and Distribution of Water for Water Supply) (New York 1918).

WATIE, Stand, Cherokee Indian leader and soldier : b. Oo-yoo-ge-lo-gi, near the present town of Rome, Ga., about 1806; d. 2 Sept. 1871. His father, Oo-wa-tie, was a Cherokee of pure Indian blood and his mother

was the child of a white father and a Cherokee mother. His given name was Degataga, which, rendered into English, signified <(standing together,® whence came his English given name, Stand. His surname was a contraction of his father's given name. Elias Boudinot, known also as Buck Watie, was an elder brother of Stand Watie. Major Ridge was his uncle. In com¬ mon with his immediate kinsmen, Stand W'atie was active in his support of the removal treaty and was marked for assassination at the same time they were but was warned in time to save himself. He was thenceforth regarded as the head of the Ridge, or Treaty Party in the Cherokee Nation. At the outbreak of the Civil War, he espoused the cause of the seceding States, raised a regiment for the Confederate service, commanding it with the rank of colonel until May 1864, when he was promoted to the grade of brigadier-general. The end of the war found him homeless and penniless. His brave struggle with adversity was ended by his death.

WATKIN, wot'kin, Sir Edward William,

English railway manager: b. Northenden, Che¬ shire, 1819; d. London, 14 April 1901. He was engaged in the warehouse of his father, a Lon¬ don merchant, from 1829-45 when he became secretary to the Trent Valley Railroad Com¬ pany, and thenceforward continued in the rail¬ way business, becoming general manager and director in various leading companies. He was chairman of the Southeastern in 1867 and of the Metropolitan in 1872, extricating each from financial difficulties. While president of the Canadian Grand Trunk he prosecuted negotia¬ tions which resulted in the confederation of the five British North American provinces. He was elected to Parliament for Great Yarmouth in 1857, but was unseated by petition. In 1864-68 he was a member for Stockport and for Hythe in 1874-95. He was knighted in 1868, and created a baronet in 1880. He was the chief promoter of the Channel tunnel project.

WATKINS, wot'kinz, John Elfreth, Ameri¬ can scientist: b. Ben Lomond, Va., 17 May

1852 ; d. 1903. He was graduated from Lafayette College in 1871, and until 1872 was mining en¬ gineer for the Delaware and Hudson Canal Company. He was appointed curator of the United States National Museum in 1877, an office he occupied until 1892, and in 1895 be¬ came superintendent and curator of its tech¬ nological collections. He wrote much concern¬ ing the development of railroad and telegraph

systems, including (The Evolution of the Rail¬ way Passenger Car* (1888) ; (History of the Pennsylvania Railroad, 1846-96* (1896), *etc.*

WATKINS, N. Y., village, county-seat of Schuyler County, on Seneca Lake, and on the New York Central and Hudson River (Fall Brook) and the North Central railroads, about 20 miles north of Elmira. It is in an agri¬ cultural region in which are large vineyards. The Glen Springs Sanitarium is a famous salt plant, but the chief attraction is the glen. The principal manufactories are flour and lumber mills, wagon and carriage factories and iron foundries. Several mineral springs are nearby. Large quantities of grapes are shipped in the season. The village has a high school, founded in 1863, graded schools, two libraries, two pri¬ vate banks and three newspapers. Pop. 2,785.

WATKINS GLEN, N. Y., near the village of Watkins, in Schuyler County, a ravine noted for its picturesque scenery and its great beauty. The rocks are Devonian shale, which, during the Pleistocene period, were cut into narrow gorges by the glacial ice. The gorge here is, in places, 300 feet deep, and a narrow stream flows through, forming a succession of beautiful cascades and rapids. On the slope from the crest of the elevation overlooking a most charming part of the gorge, to the village of Watkins, is a cemetery, which for natural beauty is rarely equaled. The artist, Hope, made Watkins his home for many years, and he was laid to rest in the cemetery he so much admired. Many tourists visit the glen each year.

WATKINSON, wot'kin-son, Davil, Amer¬ ican philanthropist: b. Lavenham, Suffolk, 17 Jan. 1778; d. Hartford, Conn., 13 Dec. 1857. He came with his parents to the United States in 1795 and was for a time engaged in a New York counting-house. He established a busi¬ ness in Hartford with his brother William in 1800, and retired in 1841 with an immense fortune. His will bequeathed large sums to various charitable institutions and he also gave $100,000 to the Connecticut Historical Society for a reference library.

WATLALA INDIANS, a tribe of the Chinookan stock of North American Indians, who call themselves Kwikwulit, and who have also been known as Upper Chinook, Wahclellah, <(Dog River, or Cascade Indians,® *etc.* They formerly occupied the Cascades and about the Dog River, which discharges into the Columbia about midway between the Cascades and The Dalles, in Wasco County, Oregon. They num¬ bered but 80 souls in 1854; in the next year they entered into the Wasco treaty, by which they agreed to move to the Warmspring Reser¬ vation, where a few of them now are, while the others are still about the Cascades. Their language is almost identical with that of the

Wasco Indians (q.v.).

WATLING (wot'ling) STREET, England, one of the great Roman roads, beginning at Dover, passing through Canterbury and Roch¬ ester to London and thence to Chester and York, and north in two branches to Carlisle and the Wall in the neighborhood of New¬ castle. Traces of the ancient road are still found in many parts of its course, and in some it is still an important highway; a street in Lon¬ don retains its name. It was the line of divi¬ sion in the treaty between Alfred and Guthrum the Dane, and it is still the boundary between Warwickshire and Leicestershire. Of the origin of Watling nothing is now remembered; it was formerly written Waeclinga Straet. and is sup¬ posed to be a corruption of Stratum Vitellianum ; a trace of the title survives in the name Wat-tlesborough, a place on Watling street near Wroxeter (Uriconium).

WATLINGS (wot'lingz) ISLAND, one of the Bahamas, British West Indies, lying 220 miles northeast of Cuba. It is 18 miles long and has a lagoon near the centre. It is fertile, but sparsely inhabited. It is now generally ad¬ mitted to be the first landing place of Colum¬ bus called by him San Salvador. Pop. about

617.

WATMOUGH, James, United States naval officer: b. Whitemarsh, Pa., 30 July 1822; d. Washington, D. C., 18 Jan. 1917. He was edu¬ cated at the University of Pennsylvania, and from 1843-44 was acting midshipman. He served in the Mexican War, and participated in the capture of California. In the Civil War he commanded the South Atlantic Squadron and took an active part in the operations on Stone River and James and John Islands. Later he became general pay inspector of the navy, and from 1873-77 was paymaster-general. In 1884 he was retired and in 1906 was created rear-admiral.

WATROUS, Harry Wilson, American artist: b. San Francisco, Cal., 17 Sept. 1857. He studied at Atelier Bonnat and at Julien Academy, Paris, and later established himself in New York. He specializes in studies of city life, his paintings being usually of a small size, exquisitely finished and occasionally of some¬ what daring conception. He was married to Elizabeth Nichols, also an artist, in 1887. Among his works are 'Passing of Summer) (Metropolitan Museum, New York) ; 'An Auto Suggestion (Buffalo Fine Arts Academy) ; <A Study in Black) (Saint Louis Museum), and many works in private collections.

WAT.SEKA, wot-se'ka, Ill., city, county-seat of Iroquois County, on the Iroquois River, and on the Chicago and Eastern Illinois and the Toledo, Peoria and Western railroads, about 75 miles south of Chicago and 100 miles east of Peoria. It is in an agricultural and stock-rais¬ ing region. The chief manufacturing establish¬ ments are flour and grist mills, planing mills, knitting mills, brick and tile works and machine shops. There are seven churches, public ele¬ mentary schools, two banks and two news¬ papers. Pop. (1920) 2,817.

WATSON, Alfred Augustus, American Protestant Episcopal bishop: b. New York, 21 Aug. 1818; d. 21 April 1905. He was graduated from the University of New York in 1837, studied law and in 1841 was licensed to practise in the New York Supreme Court. He then

turned his attention ro theology, and in 1845 took priest's orders in the Episcopal Church. During the Civil War he served as chaplain in the Confederate army, and in 1884 was con¬ secrated bishop of East Carolina.

WATSON, Clarence Wayland, American legislator: b. Fairmont, W. Va., 8 May 1864. He was educated in the public schools of Marion County and since his youth has been engaged in coal mining in West Virginia. He organized several companies which were later consolidated as the Consolidation Coal Com¬ pany, with mines in West Virginia, Maryland, Pennsylvania and Kentucky, of which he was president until 1911, and since served as chair¬ man of the board. He is interested in many other industrial and financial establishments. Mr. Watson was delegate to the Democratic National Convention at Denver in 1908 and on 25 Jan. 1911 was elected United States senator from West Virginia, for the unexpired term of the late S. B. Elkins. Senator Watson has served on the Democratic National Committee since 1916. On 25 March 1918 he was com¬ missioned lieutenant-colonel and was detailed to the Ordnance Department.

WATSON, David T., American lawyer:

b. Washington County, Pa., 2 Jan. 1844; d. 1916. He was graduated from Washington and Jefferson College in 1864, studied law at Har¬ vard for two years, was admitted to the bar and successfully engaged in law practice in Pennsylvania. In 1903 he was chosen one of the three counsel for the United States before the Alaskan Boundary Commission. He wrote an important brief for the government in the cases against the Standard Oil corporation about 1909.

WATSON, Elkanah, American agricultur¬ ist: b. Plymouth, Mass., 22 Jan. 1758; d. Port Kent, N. Y., 5 Dec. 1842. He was apprenticed at 15 to John Brown of Providence, founder of the famous mercantile firm, and when 19 was intrusted by him with $50,000 to be invested in cargoes for the markets of Europe. He made the journey to Charleston successfully and his journal, subsequently published, is the best existing account of the principal towns of the colonies at the time of the Revolution. He opened a branch house in Nantes, France, in 1779, meeting with much success for three years, when he lost his property through the crash of French finances. He returned to America in 1784, engaged in trade between South Carolina and Haiti until 1788, and in 1789 removed to Albany, where he was an active promoter of public enterprises. He projected an internal canal for New York State, founded the Albany Bank, organized the first agricultural society in New York, aided the establishment of west¬ ern stage routes, and was an earnest worker for improved educational advantages. He removed to Port Kent on Lake Champlain in 1828. He published ‘Tour in Holland) (1790) ; ‘History of Western Canals in the State of New York) (1820) ; ‘History of Agricultural Societies) (1820). Consult Watson, Winslow, C., ‘Men and Times of the Revolution, or Memoirs of Elkanah Watson) (1855).

WATSON, George Lennox, English naval architect: b. Glasgow, 30 Oct. 1851; d. 12 Nov. 1904. After a five-years’ connection (1867-71) with shipbuilding firms he established himself

m Glasgow in 1872 as a naval architect. His first success was made in 1873 with the racing vacht Llotildc. Subsequently he designed more than 400 vessels, including, besides racing yachts, passenger, mail and cargo steamers, and some of the largest steam yachts afloat. Among his racing yachts were V anduara (for John Clark of Paisley) ; the cutter Britannia (for the Prince of Wales, later Edward VII), and the Thistle, Valkyrie II, and Valkyrie III, compe¬ titor's for the America's cup.

WATSON, Henry Brereton Marriott,

English novelist : b. Caulfield, Melbourne, Aus¬ tralia, 20 Dec. 1863. Graduated from Canter¬ bury College (Christchurch) in 1883, he went in 1885 to England, where he took up journal¬ ism in 1887. He wrote much for the National Observer and was assistant editor of Black and White and the Pall-Mall Gazette. Among his works are (Marahuna > (1888); (The Web of the Spider5 (1891) ; (The Adventurers5 (1898) ; (The Skirts of Happy Chance5 (1901); (The House Divided) (1901) ; (Godfrey Merivale) (1902) ; (Alarms and Excursions) (1903) ; (The Block House by Bull's Ferry5 (1904) ; (At a Venture) (1911), and (Chapman's Wares5 (1915). With J. M. Barrie he was joint-author of the drama (Richard Savage.5

WATSON, James Craig, American as¬ tronomer: b. Fingal, Ontario, 28 Jan. 1838; d. Madison, Wis., 23 Nov. 1880. He was gradu¬ ated from the University of Michigan in 1857, was appointed professor of astronomy there in 1859, and in 1879 accepted the chair of astron¬ omy at the University of Wisconsin. He ac¬ companied the eclipse expeditions to Iowa in 1869 and to Sicily in 1870, and was in charge of the expedition to Peking, China, for the obser¬ vation of the transit of Venus in 1874. He was the discoverer of 23 asteroids, and of several comets, receiving the Lanlade medal from the Paris Academy in 1870 for the discovery of six asteroids in one year. In 1867 he was elected to the National Academy of Sciences, an institution to which he bequeathed $16,000 for a research fund and the <(Watson medal.55 He published 'Popular Treatise on Comets5 (1860) ; (Theoretical Astronomy5 (1868) ; (Tables for Calculation of Simple and Com¬ pound Interest and Discount5 (1879), *etc.*

WATSON, John, Canadian philosopher: b. Glasgow, Scotland, 25 Feb. 1847. He was graduated from Glasgow University in 1872 and in the same year was called to the chair of men¬ tal and moral philosophy at Queen's University, Kingston, Ontario. He has published 'Kant and His English Critics5 (1881); 'Schelling's Transcendental Idealism: a Critical Exposition5 (1882) ; (The Philosophy of Kant as Con¬ tained in

Extracts from His Own W’ritings5 (1888) ; ‘Comte, Mill and Spencer, an Out¬ line of Philosophy5 (1895) ; ‘Hedonistic Theo¬ ries, from Aristippus to Spencer5 (1895) ; Christianity and Idealism5 (1896) ; (An Out¬ line of Philosophy with Notes Historical and Critical5 (1898) ; ‘Philosophy of Kant Ex¬ plained5 (1908) ; Unterpretation of Religious Experience5 (1913).

WATSON, John (<(Ian Maclaren55), Eng¬ lish Presbyterian clergyman and author : b. Manningtree, Essex, 3 Nov. 1850; d. Mount Pleasant, Iowa, 6 May 1907. He was educated at Edinburgh University, New College (Edin¬

burgh), and the LTniversity of Tubingen, was licensed to preach by the Free Church of Scot¬ land in 1874 and appointed assistant minister of the Barclay Church, Edinburgh. In 1875 he was ordained minister of Logiealmond (Pert-shire) Free Church, whence he went in 1877 to Free Saint Matthew's, Glasgow, and in 1880 to the Sefton Park Presbyterian Church of Liver¬ pool. He was Lyman Beecher lecturer at Yale in 1896, and in 1900 Moderator of the Synod of the Presbyterian Church of England. Among his religious works are (The Upper Room5 (1895); (The Mind of the Master5 (1896); (The Potter's Wheel5 (1897) ; Companions of the Sorrowful Way5 (1898); (Doctrines of Grace5 (1900) ; and 'The Life of the Master5 (1901). He also published several works of fiction, beginning with (Beside the Bonnie Brier Bush5 (1894), a very successful collec¬ tion of sketches of life and character in High¬ land and semi-Highland parishes, and including further (The Days of Auld Lang Syne5 (1895), (Kate Carnegie5 (1896), 'A Doctor of the Old School5 (1897), (Afterwards5 (1898) and

'Rabbi Saunderson5 (1898) ; 'Life of the Mas¬ ter5 (1901) ; Unspiration of Our Faith5 (1905) ; Children of the Resurrection5 (1908).

WATSON, John Broadus, American psychologist: b. Greenville, S. C., 9 Jan. 1878. He was graduated at Furman University in 1900, and took his Ph.D. at the University of Chicago in 1903. He was assistant and in¬ structor in psychology at Chicago in 1903-08; and from 1908 occupied the chair of experi¬ mental and comparative psychology at Johns Hopkins University and was also director of the psychological laboratory there. He was com¬ missioned major in the aviation section of the Signal Corps of the United States Reserves in 1917. He was editor of the Psychological Re¬ view in 1908-15, and is joint editor of the Journal of Animal Behavior. Author of (Ani¬ mal Education5 (1903); (Behavior — An In¬ troduction to Comparative Psychology5 (1914) ; 'Homing and Related Activities of Birds5 (1915) ; Suggestions of Modern Scientists Concerning Education5 (1917), *etc.*

WATSON, John Crittenden, American naval officer: b. Frankfort, Ky., 24 Aug. 1842. He was graduated from the United States Naval Academy in 1860, was promoted master in 1861 and assigned to the Sabine. He was transferred to the Hartford, flagship of Admiral Farragut, in 1862 and served under him throughout the war. He participated in the battles of Fort Jackson and Saint Philip, served in the passage of the Vicksburg batteries in 1862, of Fort Hud¬ son in 1863 and was engaged at Mobile Bay in 1864. He received rank as

lieutenant-com¬ mander in 1866, as commander in 1874 and in 1877-80 was in command of the Wyoming. He was lighthouse inspector in 1880-86, pro¬ moted captain in 1887 and commodore in 1897. In the Spanish-American War of 1898 he com¬ manded the blockading squadron on the north¬ ern coast of Cuba, was transferred to the com¬ mand of the Oregon later in that year and in 1899 succeeded Admiral Dewey in charge of the Asiatic squadron at Manila, with rank of rear-admiral. In 1900-02 he was president of the naval examining board and since then has been president of the examining and retiring board. He retired in 1904.

no

WATSON

WATSON, John Fanning, American anti¬ quary: b. Batsto, N. J., 1780; d. Germantown, Pa., 23 Dec. 1860. He was a bookseller in Phil¬ adelphia for many years and made a careful study of early and Revolutionary history. His publications include <Annals of Philadelphia) (1830) ; (Historic Tales of the Olden Times in New York5 (1832) ; (Annals of New York City and State5 (1846) ; (History of the United States> (1856).

WATSON, Musgrave Lewthwaite, Eng¬ lish sculptor: b. Hawkdale, Cumberland, near Carlisle, 1804; d. London, 28 Oct. 1847. Meet¬ ing Flaxman in London in 1823 he gained the friendship of that sculptor, through whose in¬ fluence he was admitted to the schools of the Royal Academy. He subsequently visited Rome, working under Chantrey (q.v.) and Behnes.

• His productions include a terra cotta relief, (Suffer Little Children to Come Unto Me} ; and, statues of Flaxman, Nelson, Chaucer and Queen Elizabeth.

WATSON, Paul Barron, American author: b. Morristown, N. J., 25 March 1861. He was graduated from Harvard in 1881, subsequently studied law and was admitted to the bar and has practised in Boston. His published writings are a (Bibliography of the Pre-Columbian Dis¬ coveries of America,5 privately printed in 1881, and included, in the fourth (enlarged) edition of (America Not Discovered by Columbus,5

by R. B. Anderson (q.v.) ; (Marcus Aurelius An-toninus) (1884), the first extended biography of the subject in English; and <The Swedish Revolution under Gustavus Vasa) (1889).

WATSON, Richard, English Anglican prel¬ ate : b. Heversham, Westmoreland, August 1737 ; d. Calgarth Park, Westmoreland, 4 June 1816. He was graduated from Trinity College, Cambridge, in 1759, became professor of chem¬ istry there in 1764 and in 1771 was appointed regius professor of divinity. He became arch-deachon of Ely in 1780 and in 1782 was conse¬ crated bishop of Llandaff. His writings include (An Apology for Christianity) (1776) ; Chem¬ ical Essays5 (5 vojs., 1781—88) ; <An Apology for the Bible5 (1796), *etc.* Consult his son Richard, (Anecdotes of the Life of Richard Watson) (1817).

WATSON, Richard, English Methodist clergyman : b. Barton-upon-Humber, Lincoln¬ shire, 22 Feb. 1781 ; d. London, 8 Jan. 1833. He joined the Wesleyan Methodists at 15 and be¬ gan preaching. He was ordained in 1800 and shortly afterward joined the Methodists of the New Connection, returning to the Wesleyans in 1812. He was appointed secretary of the Wes¬ leyan Missionary Society in 1817 and in 1826 was president of the conference. He was for a time editor of the Liverpool Courier and wrote (Apology for the People Called Methodists) (1800) ; (Life of the Rev. John Wesley5 (1831) ; (A Biblical and Theological Dictionary5 (1831) ; (An Exposition of the Gospels of Matthew and Mark5 (1833), *etc.* His collected works were edited by Thomas Jackson, in 13 vols., 1834-37, with (Memoir. 5

WATSON, Robert Spence, English pub¬ licist and lawyer: b. Gateshead, 8 June 1837; d. 1911. He was educated at University Col¬ lege, London, and established a law practice in Gateshead and Newcastle. He was president

of the National Liberal Federation in 1890-1902 and has taken an active part in educational movements in Newcastle. He is also known for his writings on economic subjects, particularly the labor question. His publications include Undustrial Schools5 (1867) ; (Higher Education in Boroughs5 (1868) ; (The History of English Rule and Policy in South Africa5 (1879) ; (Irish Land Law Reform5 (1881) ; (The Re¬ lations of Labor to Higher Education5 (1884) ; (Boards of Conciliation and Arbitration and Sliding Scales5 (1886) ; (The Peaceable Settle¬ ment of Labor Disputes5 (1889) ; <Labor, Past, Present and Future5 (1889) ; <The Recent His¬ tory of Industrial

Progress5 (1891); (The Duties of Citizenship5 (1895) ; (Reform of the Land Laws5 (1906), *etc.*

WATSON, Sereno, American botanist: b. East Windsor Hill, Conn., 1 Dec. 1826; d. Cambridge, Mass., 9 March 1892. He was graduated from Yale in 1847, studied medicine at the University of New York and in 1867-69 was botanist to the government exploration of the 40th parallel under Clarence King (q.v.). In 1871 he became assistant curator at the Gray Herbarium at Harvard and from 1874 until his death was curator there. He was elected Fellow of the National Academy of Sciences in 1889. Among his publications are (Botany5 ; Yol. V of (Reports on the Geological Explora¬ tion of the 40th Parallel5 (1871) ; bibliograph¬ ical Index to North American Botany, Part I, Polypetalae5 (1878); with W. H. Brewster and Asa Gray, botany of California5 (2 vols., 1876-80), *etc.*

WATSON, Thomas, English poet: b. Lon¬ don, about 1557 ; d. 1592. While his fame may seem to have been eclipsed by that of Spenser and Sidney, among his contemporaries he was equally popular for his pastoral and love poetry. He lived in a learned age and translated the (Antigone 5 of Sophocles into very elegant Latin. His ˆelibceus, Thomae Watsoni ; seu, Ecloga in Obitum Domini Francisci Walsing-hami, Equitis Aurati5 (1590) was a graceful Virgilian tribute to the memoiy of the states¬ man and diplomat Francis Walsingham (q.v.). His sonnets, ‘Tears of Fancie; or Love Dis¬ dained,5 evidently gave suggestions to Shakes¬ peare in the composition of his bonnets.5 Consult Arber, bnglish Reprints5 (1892).

WATSON, Thomas Edward, American lawyer and politician : b. Columbia County, Ga., 5 Sept. 1856. He entered Mercer University but did not complete the course there and then took up the study of law and was admitted to the bar in 1875. He began the practice of his pro¬ fession at Thompson, Ga., and rapidly attained a reputation as one of the leading lawyers of the State. In politics he was at first a Democrat; was elected to the State legislature in 1882 and served as Democratic electorat-large in 1888. He was active in the Farmers’ Alliance move¬ ment and finally affiliated himself with the Peo¬ ple’s Party; in 1890 he was elected to Congress on the Populist ticket and for some time edited a Populist paper at Atlanta. While in Con¬ gress he obtained the first appropriation for the rural free delivery of mail. He was the Pop¬ ulist Party’s candidate for Vice-President in 1896 and the Presidential candidate of the People’s Party in 1904 and 1908. He was elected to the United States Senate as a Democrat in

1920 for the term 1921-27. His publications in¬ clude (The Story of France) (1898) ; (Life of Napoleon5 (1902) ; (Life and Times of Thomas Jefferson5 (1903) ; (Handbook of Politics and Economics5 (1908); <The Story of the South and West) (1911) ; (The House of Hapsburg.5

WATSON, William, American scientist, b. Nantucket, Mass., 19 Jan. 1834; d. 30 Sept. 1915. tie was graduated from the Lawrence Scientific School of Harvard in 1857 ; was an instructor there in 1857-59; in 1859-63 was in Europe collecting information on technical edu¬ cation, which, when communicated to W. B. Rogers, was made the basis of the organization of the Massachusetts Institute of Technology; and from 1865 to 1873 was professor of me¬ chanical engineering and descriptive geometry in that institution. In 1884 he was elected sec¬ retary of the American Academy of Arts and Sciences. In addition to numerous technical papers he published (Technical Education) (1872) ; (Courses in Shades and Shadows 5

(1889) ; (The Civil Engineering, Architecture and Public Works of the Paris Exposition of 18895 (1891) ; and (The International Water Transportation Congress, Chicago, 1893'* (1894).

WATSON, Sir William, English poet: b. Burlej'-in-Wharfedale, Yorkshire, 2 Aug. 1859. He was privately educated and in 1880 published his first volume of verse, (The Prince's Quest and Other Poems,5 which showed the influence of Keats and William Morris and found favor with Rosetti.. In 1884 he issued his Epigrams of Art, Life and Nature,5 containing much highly-finished work, but it was not till the publication of (Wordsworth's Grave and Other Poems5 in 1890 that he gained adequate recog¬ nition. The volume of his Eoems5 published in 1892 was a reprint of the 1890 volume with the addition of 26 new pieces. Of Eachrymae Musarum and Other Poems) (1892), the title-poem is a fine eulogy of Lord Tennyson. (The Eloping Angels) followed in 1893, (Odes and Other Poems) in 1894 and (The Father of the Forest and Other Poems) in 1895. To 1896 be¬ long two volumes of sonnets on the Armen¬ ian atrocities, with the titles (The Year of Shame5 and (The Purple East5 ; to 1897, (The Hope of the World and

Other Poems.5 His (Collected Poems5 (1898) ought rather to be called Selected Poems,5 since from them are excluded all of the 1880 and 1893 volumes, more than half of the (Epigrams, 5 most of (The Year of Shame5 and portions of the other vol¬ umes. He wrote in 1902 one of .the more prominent odes on the coronation of Edward VII and in 1903 (For England.5 He has written in prose a volume of literary essays, Excur¬ sions in Criticism5 (1893). In 1909 he brought out (New Poems,5 in 1913 (The Muse in Exile,5 in 1916 (Retrogression and Other Poems,5 in 1917 (The Man Who Saw.5 Watson's work is carefully wrought, reflective in tone and marked by an air of distinction. It has been sometimes criticized as occasionally too closely an echo of greater poets. He was prominently mentioned among the possible successors to Tennyson and Alfred Austin in the laureateship but the honor went elsewhere. In 1917 he received the honor of knighthood.

WATSONVILLE, wot'sdn-vil, Cal., city in Santa Cruz County, on the Pajaro River and

on the Southern Pacific Railroad, about five miles from Monterey Bay, an arm of the Pacific Ocean and 18 miles southeast of Santa Cruz. It is in an agricultural and fruit-growing region. Sugar beets are one of the chief products grown in the vicinity. The principal manufacturing establishment is the sugar beet factory; which has a beet-crushing capacity of over 1,000 tons and a sugar manufacturing capacity of over 200 tons each day. There are four banks and two daily newspapers. Pop. (1920) 5,013.

WATT, wot, James, Scottish engineer : b. Greenock, Renfrewshire, 19 Jan. 1736; d. Heathfield, near Birmingham, Staffordshire, 25 Aug. 1819. Having determined to adopt the trade of mathematical instrument maker, he spent a year in London learning the art, in which he attained great dexterity and after his return endeavored to set himself up in business in Glasgow. In this he might not have suc¬ ceeded owing to the opposition of other work¬ ers in the trade, had he not been appointed (1757) mathematical instrument maker to the university, which was outside of the jurisdic¬ tion of the Glasgow municipality. While thus employed he was also active in preparing sur¬ veys and reports in connection with canal, river and harbor work. It was during this period that he thought of and completed most of his improvements of the steam-engine. The idea of a separate condenser first occurred to him in 1764 and in January 1769 he took out the patent for the improvements of the steam-engine in which this

idea was applied. Previous to Watt's time the cylinder itself had been used as a condenser and the jet of cold water intro¬ duced into the cylinder to condense the steam so reduced the temperature of the cylinder that three times as large a supply of steam (so Watt estimated) was demanded as was really needed. Watt set to work to condense the steam in a separate receptacle. The change was so im¬ portant as to make him almost the inventor of the modern engine. But it was not until the year 1774 that he united with Matthew Boulton (q.v.), a manufacturer at Birmingham, in order to carry his improvements into execution. In consequence of this he removed to Soho, near Birmingham, where the establishment in which his steam-engines were manufactured soon acquired a European fame. He retired from the business in 1800, when his patent, which had been renewed in 1775 for 25 years, expired. Watt was a Fellow of the Royal Societies both of London and Edinburgh and one of the few natives of Great Britain who have been elected members of the National Institute of France. Besides the expedient of the condenser, Watt made also other improvements in the steam-engine. He devised the sun-and-planet gear¬ wheel, made use of the expansion principle to obtain the double engine, applied the governor to the regulation of the speed of steam-engines and invented the throttle-valve. He built the first indicator for drawing a diagram of steam pressure and also patented a fuel-saving fur¬ nace, invented copying ink and independently discovered the chemical composition of water. .He had a retentive memory and the range of his reading was very wide. Chemistry, archi¬ tecture, music, law, metaphysics and language were the principal subjects which, in addition to physical science and its practical applications,

engaged his attention and in all of them his knowledge was wonderfully extensive, minute and accurate. (For an account of the improve¬ ments that Watt effected in the steam-engine see Steam; Steam-engine). The significance of his work places him among the fore¬ most of inventors. Consult Muirhead, (Origin and Progress of the Mechanical Inven¬ tions of James Watt' (1854) ; a <Life> abridged

from the preceding (1858) ; Smiles, (Lives of Boulton and Watt' (1865) ; Thurston, (The Growth of the Steam-Engine ' (1879) and an article by Cowper in the transactions' of the Institution of Mechanical Engineers for

1883.

WATT, in elecricity, the unit of activity or rate of doing work, named after James Watt, (q.v.). See Electrical Terms, Vol. 10, p. 167; Electrical Units, Vol. 10, p. 168.

WATT-HOUR. See Electrical Terms.

WATTEAU, va-to, Jean Antoine, French painter: b. Valenciennes, 10 Oct. 1684; d. Nogent-sur-Marne, 18 July 1721. His parents, whose situation in life was humble, with diffi¬ culty contrived to give him the instructions of a very inferior master in the country. In 1702 he went to Paris, in company with a scene-painter, with whom he continued to work for a few months. Soon afterward he found employment with one Claude Gillot, who, although only a painter of decorations for ballet and a designer of costumes and of patterns for tapestry, was a true artist. With him he found an opportunity of practising in all these branches of art and when he left him he found another master in Claude Audran, a very able man, keeper of the Luxembourg, who was of great service to him in opening to him the famous gallery of the palace in which Rubens had painted in allegory the history of Marie de Medicis. From the study of the great Flemish master he improved his coloring and when he left Audran in 1709 he was a consummate master of his art and a painter of ((Fetes Galantes." He now began to paint on his own account, but met at first with little encouragement. He failed to secure the ((Prix de Rome,® which would have enabled him to visit Italy, but soon afterward scored a tri¬ umph by his (Un Depart de Troupes.' He was admitted to the Academie in 1717 as a painter of ((Fetes Galantes" and produced many pic¬ tures whose power and grace in drawing and coloring his rivals strove in vain to emulate. His subjects were all genre, military and civil. He excelled in reproducing the costumes, airs and graces of the fashionable world of his time. His ^'occupation selon l'Age) sold in 1891 for $27,300. The finest collection of Wat¬ teau paintings is in Berlin, others are to be seen in the Wallace collection, London, in the Louvre, Paris, and in the Petrograd, Vienna, Edinburgh and Glasgow galleries. Consult Goncourt, E., Catalogue raisonne de l'ceuvre peint, dessine et grave d'Antoine Watteau' (Paris 1875) ; Pater, W., CA

Prince of Court Painters' (in imaginary Portraits) London 1887) ; Foster, J. J., (French Art from Watteau to Trud'hon> (London 1905); Mauclaire, C., * (De Watteau a Whistler' (Paris 1905) ; Pilon, E., (Watteau et son ecole' (Brussels 1912) ; Staley, E., (Watteau and his school' (London

1902).

WATTERSON, wot'er-son, Henry, Ameri¬ can journalist: b. Washington, D. C., 16 Feb. 1840. He was privately educated, and began journalistic work as editorial writer for the Washington Star. In 1861 he joined the Con¬ federate army as a private, and later was aide-de-camp to Generals Forrest and Polk. In 1862 he withdrew from the army to edit the Rebel at Chattanooga, a daily paper, recognized as an organ of the Confederate government, but in 1864 returned to the army, and had part in General Johnston's campaign, and the siege of Atlanta. After the war he revived the pub¬ lication of the Nashville Republican Banner: and in 1867 became editor of the Louisville Journal. This paper he united with the Courier, under the name of the Courier-J ournal, of which he became editor-in-chief and which he has made one of the leading Southern news¬ papers. He has been active in politics as a member of the Democratic party, although a leader in the Liberal Republican program of 1872 ; was delegate-at-large to every Democratic National Convention from 1872-92, and was permanent chairman of that of 1876. He was a member of Congress in 1876-78, and hotly op¬ posed all greenback ideas. Though a staunch supporter of Tilden for the Presidency, yet in Congress he was one of the leaders in obtaining a peaceable adjustment of the election dispute, and approved the appointment of the Electoral Commission, 1877 (q.v.). In 1896 he refused to support the Chicago platform of the Demo¬ cratic party, and was affiliated with the Gold Democrats. As a defender of the tariff, he was not over strenuous, believing that its main pur¬ pose was to raise revenue. He was ever antag¬ onistic to trust policies and the dominance of industry by great capital. As speaker and editor he has been a consistent advocate of free trade, and particularly of a policy of conciliation be¬ tween the North and the South. He retained his vigor of utterance and influence in politics in his latter days. He has published (Oddities of Southern Life and Character' (1882) ; <History of the Spanish-American War' (1899) ; and (Abraham Lincoln' (1899). In 1911 he was conspicuous as being among the first to urge the fitness of Woodrow Wilson for the Presidency. His famous slogan (<To hell with the Hapsburgs and Hohenzollerns" in 1917 was largely instru¬ mental in arousing the

United States to war against the German atrocities and brutal dis¬ regard of the rights of neutral nations. On 2 March 1919 a worldwide tribute was paid him in the special <Marse Henry edition' of the Louisville Courier-J ournal in which over 200 thinkers and statesmen of the world voiced their esteem of the veteran editor.

WATTLE-BIRD, or WATTLE-CROW,

an Australian honey eater (Antliochcera carun-culata), so named from the large reddish wattles on its neck. It is about the size of a magpie, and is of bold, active habits.

WATTLES, arborescent shrubs (Acacia) of Australia and Tasmania, in some places grow¬ ing to. good-sized trees. They have foliage which is compound or reduced to phyllodia, and pretty, crowded flowers, in globose or cylin¬ drical heads. The wattles furnish a gum, used as an adhesive in cotton-printing; the stems make poles, which are serviceable for many

<cbush° purposes. The bark is a valuable tan¬ ning material, known as mimosa-or wattle-bark, and many of the acacia forests have been killed by the stripping of their cortex for this pur¬ pose.' A good quality of tan-bark is obtained from A. decurrens and A. mollis sima, the black, green or feathered wattle found also in South Africa. It is one of the most graceful of the acacias and least destruct ve of this thorny race to person and clothing. The silver wattle (A. dealbata) is a taller tree than the black wattle, with ashen-tinted young foliage. The African wattle is A. natalitia; the Alpine, A. pravissima, from the Victorian Alps. A. juni-perina, the prickly wattle, is an evergreen shrub of Australasia. The raspberry-jam wattle (A. acuminata) of the same region, yields a cabinet wood, having the odor of that sweetmeat. The wallaby- (A. rigens) and varnish-wattle (A. verniciflua), are also Australian shrubs. The soap-pod wattle is the same as the soap-nut of India. Savannah wattles are West Indian trees (Citharexylum quadrangulare and C. cinerea) of the verbena family.

WATTMETER. See Electrical Terms.

WATTS, wots, George Frederick, English painter: b. London, 23 Feb. 1817; d. there, 1 July 1904. He studied in the Royal Academy and in 1837 exhibited there two portraits of young ladies and a subject-picture entitled (The Wounded Heron,) and afterward contributed to various art exhibitions, notably the Royal Academy, the. Grosvenor Gallery and the New Gallery, about 300 pictures of various kinds. Some of these are landscapes and seascapes; a few, such as (The Sempstress) and (Under the Arch,5 portray contemporary life; but the finest and most characteristic are portraits and allegorical or ideal subjects. His portraits in¬ clude those of the most eminent men and women of his age and perhaps form his chief claim to renown, as they were the basis of his repu¬ tation as an artist, and yet many of his idealistic pictures will continue to be copied after all the portraits are forgotten. Of his other pictures the following may be mentioned: Hsabella Find¬ ing Lorenzo Dead5 (1840) ; (Paolo and Francesca) (1848); (Life's Illusions) (1849); (Sir Galahad) (1862); (The Wife of Pygmalion) (1868); (Daphne) (1870); (The Curse of Cain5 (1872) ; (Dedicated to all the Churches) (1875); (Love and Death) (1877); (Time and Death5 (1878), like the preceding one of his most notable pictures; (Orpheus and Eurydice5 (1879); (Psyche) (1880); (The Rider on the Pale Horsed (The Rider on the Black Horse, 5 (The Rider on the White Horse5 and (The Rider on the Red Horsed all apocalyptic pic¬ tures of 1883; (Love and Life> (1884); (Rain Passing Away5 (1884) ; (The Angel of Death > (1888); (The Wife of Plutus5 (1889); <She Shall be Called Woman5 (1892), a large pic¬ ture of Eve; (For He Had Great Possessions5 (1894); (The Outcast5 (1895); (Jonah5 (1895); (Love Triumphant-' (1898); (Court of 'Death5 (1902). He was in Italy during 1843-47, and was powerfully influenced by Titian and Tin¬ toretto. In 1847 his colossal oil-pictures of (Echo5 and (Alfred inciting the Saxons to prevent the Landing of the Danes5 were awarded a prize of £500 in another Westminster Hall competition. The latter of these now vol. 29 — 8

adorns a committe room of the Houses of Parliament. He completed a fresco, (Saint George Overcomes the Dragon,5 in 1853, for the Houses of Parliament and at a later date painted in fresco the west end of the new hall at Lincoln's Inn. After 1896 he was on the list of retired academicians. A large number of his portraits, presented by him to the nation, are now in the National Portrait Gallery, and some of his best allegorical paintings were presented to the National Gallery of British Art (Tate Gallery). To use his own words, he painted ideas rather than

objects and the poetic idealism to which he was faithful throughout all his long career stood in the way of extensive popularity. His drawing was of the utmost correctness and his coloring often extremely fine, but while his allegorical sub¬ jects were often great in conception and treat¬ ment they sometimes required too much literary exposition to appeal to the ordinary picture lover in a clear and direct manner. His (Life5 has been written by his wife, Mary S. Watts, and appeared in London in 1912 in three vol¬ umes. Consult also Monkhouse, (British Con¬ temporary Artists5 (1889) ; Bateman, (G. F. Watts5 (1901) ; Chesterton, (G. F. Watts5 (1904) ; Chesterton, G. IC, (G. F. Watts5 (New York 1909).

WATTS, Isaac, English Congregational divine: b. Southampton, 17 July 1674; d. Stoke, Newington, London, 25 Nov. 1748. He was educated for the ministry at an academy in Stoke-Newington. In 1696-1702 he was a pri¬ vate tutor, in 1699-1702 was assistant to Isaac Chauncy, minister of the Congregational chapel in Mark Lane, London, and in 1702 succeeded to the pastorate. The congregation here was a distinguished one. Watts remained nominally pastor until his death, though from 1713 ill-health frequently interrupted his ministry, and Samuel Price was made co-pastor. Watts had in his own time great popularity as a writer, his manuals of religious instruction and his works of popular divinity having large circulation ; while his (Horse Lyricse5 (1706) admitted him to Johnson's (Lives of the Poets5 and was re¬ printed in 1834 in a series of (Sacred Classics5 with a memoir by Southey, and his hymns, num¬ bering in all about 600, were the chief part of the psalmody of English Nonconformist con¬ gregations. At the beginning of the 18th cen¬ tury only a few unimportant hymns had been written for Dissenters' use, the rule of Calvin having permitted only canticles and metrical Psalms. The dearth of suitable tunes and the custom of <(lining out55 hampered Watts' work; he had, too, many defects in rhyme and dic¬ tion, was at times rhetorical and at others pro¬ saic. But a number of his hymns are among the finest and most popular in English. Many are found in all hymn-books, and about a dozen remain in very general use. A collection was made in 1707, a second edition appearingˆ in 1709. He published in 1722-24 doctrinal treat¬ ises of an Arian tendency, but grounds are wanting for believing that he finally passed to that position. His (Works5 were edited by Jennings and Doddridge in 1753; the (Posthumous Works5 were published in 1779. The former were reprinted with additions, and a memoir by Burder, in 1810. Consult Gibbons, (Memoirs5 (1780); Milner, (Life5 (1834);

Hood, <Life) (1875); Julian, dictionary of Hv mnology 5 (1 892) .

WATTS, Mary Stanbery (Mrs. Miles Taylor Watts), American author: b. Dela¬ ware County, Ohio, 4 Nov. 1868. She was educated at the Convent of the Sacred Heart, Cincinnati, and early engaged in literary work. She is well known as a writer of short magazine fiction and of novels dealing with American life. Author of (The Tenants) (1908) ; (Nathan Burke5 (1910) ; (The Legacy) (1911); Wan Cleve5 (1913); (The Rise of Jennie Cushing5 1915) ; (The Rudder5 (1916) ; (The Boardman Family5 (1918), *etc.*

WATTS, Thomas Hill, American politi¬ cian: b. Butler County, Ala., 3 Jan. 1819; d. Montgomery, Ala., 16 Sept. 1892. He was grad¬ uated from the University of Virginia in 1840, established a law practice in Greenville, Ala., was elected to the State legislature in 1842, 1844-45, and to the State senate in 1853. He opposed the secession movement, but upon the secession of Alabama accepted the situation. He was appointed colonel in the Confederate army and fought at Shilo, but resigned shortly afterward to become attorney-general in the Confederate Cabinet. He was elected governor of Alabama in 1863, but was unseated by the Federal government at the close of the war. He was thereafter engaged in law practice at Montgomery, and with the exception of 1880-81, when he served in the legislature, held no further public office.

WATT'S DYKE. See Offa's Dyke.

WATTS-DUNTON, Theodore, English poet, critic and novelist : b. Saint Ives, Hunting¬ donshire, 12 Oct. 1832; d. 17 June 1914. He was educated privately at Cambridge and for a time studied law, but had already gained a rep¬ utation as a writer of sonnets when he joined the staff of the Examiner as literary and art critic. Later he joined the Atlienceum staff, and for many years was one of the chief contributors to that review, his criticisms of poetry being of the most illuminating character. In 1897 he pub¬ lished a poem entitled (Jubilee Greeting at Spithead to the Men of Greater Britain,5 which met with wide appreciation ; and in the same year collected in (The Comine of Love, and Other Poems,5 some of the more important of his poetical

contributions. (Aylwin,5 a novel or romance published in 1898 (privately printed in 1883), forms a striking prose counterpart to the (Coming of Love,5 and contains excellent pictures of gypsy life. Watts-Dunton has also contributed largely to the Nineteenth Century and other periodicals. Several of the notices in Ward's (English Poets5 are from his pen, and the valuable critical article on poetry in the Ency¬ clopaedia Britannica5 was written by him. He and Swinburne (q.v.) were intimate friends. Later publications are (The Christmas Dream5 (1901), and (The Renaissance of Wonder5 (1902). On occasion Watts-Dunton makes free use of the Romany dialect, which he has care¬ fully studied. His best work is probably the critical, especially that dealing with the prin¬ ciples of verse. Consult Miles, (Poets and Poetry of the Century,5 (Vol. IV, 1901) ; also

an article in the Idler (Vol. V), and one by Nicoll in the Contemporary (Vol. LXXIV).

WAUGH, wa, Arthur, English author: b. Midsomer Norton, Somerset, 24 Aug. 1866. He was graduated from Oxford in 1889, became a journalist in London in 1890, was London cor¬ respondent of the New York Critic in 1893-97, and in 1894 was sub-editor of the London New Review. He acted as literary adviser to Kegan Paul and Company in 1895-1902, and ;s now managing director of the London publishing firm of Chapman and Hall. He has written (Gordon in Africa5 (1888) ; (Alfred, Lord

Tennyson, a Study5 (1892) ; (Legends of the Wheel5 (1898), etc.; and has edited Johnson's (Lives of the Poets5 (6 vols., 1896) ; Biograph¬ ical edition of Dickens (19 vols., 1902-03), and other works.

WAUGH, Frederick Judd, American artist : b. Bordentown, N. J., 13 Sept. 1861. He studied at Pennsylvania Academy, Philadelphia, and in Paris, and lived and worked abroad in 1892— 1907. He exhibited at the Paris Salon and at the Royal Academy, London, and also worked as a newspaper illustrator in London. He lived at Montclair, N. J., after his return from Eu¬ rope, and gained a considerable reputation as a painter of marines. His work is well repre¬ sented in both public and private collections. He was elected to the National Academy of Design in 1911. Among his works are (The Roaring Forties5 (The Metropolitan Museum, New York) ; (Surf and Fog, Monhegan5 (Art Institute, Chicago) ; (After a Northeaster5 (National Gallery, Washington) ; (The Blue Gulf Stream5 (Pennsylvania Academy, Phila¬ delphia), *etc.*

WAUKEGAN, wa-ke'gan, Ill., city, county-seat of Lake County, on Lake Michigan, and on the Chicago and Northwestern, the El¬ gin, Joliet and Eastern (Belt Line) railroads, 30 miles north of Chicago and 50 miles south of Milwaukee. There are two electric lines which connect the city with the lake ports and nearby villages and towns. The city is on a bluff about 80 feet above the lake. There is a fine beach and a good harbor, which has been improved, thus giving Waukegan the advan¬ tages of the lake traffic. It is in an agricultural region, but the city is best known for its manu¬ facturing industries. The chief industrial estab¬ lishments are steel and wire works, which have about 2,500 employees ; sugar refineries, 2,000 employees ; brass and iron works, a tannery, woodworking factory, wrapper factory, roofing material works, electric scale works and organ-stop factory. The city ships large amounts of lumber, coal, salt, iron, grain and manufactured products. The principal public buildings are the county courthouse, the municipal buildings, the Jane McAlister Hospital, the library, the churches and the schools. There are 15 churches, a high school, public and parish ele¬ mentary schools, and the Carnegie public li¬ brary. A United States naval training station is close by. There are three banks and two daily newspapers. The government is con¬ ducted on the commission plan. The place was settled in 1835 by Thomas Jenkins; was incorporated in 1849, and chartered as a city in 1859. Pop. (1920) 19,226.

WAUKESHA, wa'ke-sha, Wis., city, county-seat of Waukesha County, on the Fox River, and on the Chicago Milwaukee and Saint Paul, the Chicago and North¬ western, and the Wisconsin Central rail¬ roads, about 16 miles west of Milwaukee. It was settled in 1834 by Morris D. Cutter. It was incorporated in 1855 and in 1896 was chartered as a city. There are elec¬ tric railways connecting the city with Milwau¬ kee and with Pewoukee Lake. The city is in an agricultural region, and nearby are quarries of dolomite stone much used in buildings. There are here magnesian springs which are noted for their medicinal properties. The waters are bottled for several markets. The chief manufactures are steel and iron products, bottles, beer, flour and

lumber. There are railroad and machine shops. There are nine churches. The educational institutions are Carroll College (Presbyterian), the State In¬ dustrial School, a high school established in 1890, graded public schools, Roman Catholic and Lutheran parish schools, and the Carnegie , public library. There are two banks and four newspapers. The government is vested in a mayor and a council of 10 members. Pop. 12,558.

WAUKON, wa-kon', Iowa, town, county-seat of Allamakee County, on the Chicago, Mil¬ waukee and Saint Paul Railroad, about 80 miles north by west, in direct line, from Dubuque. It is in an agricultural, fruit-growing, and stock-raising region. It has flour mills, cream¬ eries, wagon factories, a canning factory, a ma¬ chine shop, grain elevator, and stockyards. There are seven churches, a high school, public and parish elementary schools, a business col¬ lege and a public library. There are three banks and three newspapers. Pop. (1920) 2,359.

WAUL, wal, Thomas Neville, American lawyer: b. Sumter District, S. C., 3 Jan. 1813; d. 1903. Lie was educated at Columbia College, was licensed to practise law in 1834, and engaged in that profession in Mississippi until 1850, when he removed to Gonzales County, Tex. He served in the Provisional Congress of the Confederate States in 1861-62, recruited in the first year of the war 2,000 troops known as (<Waul's Legion,® received commission as their colonel, and served through the war. He was a member of the Texas Reconstruction, Conven¬ tion in 1865, and afterward engaged in law practice at Galveston, Tex., until 1896, when he retired.

WAUPACA, wa-pa'ka, Wis., city, county-seat of Waupaca County, on the Waupaca River, and on the Wisconsin Central Railroad, about 133 miles northwest of Milwaukee and 38 miles northwest of Oshkosh. It is in an agricultural and stock-raising region. It has excellent water power and many attractions which make it a favorite summer resort. The climate is cool in summer and in the vicinity are a number of small picturesque lakes. The chief manufac¬ turing establishments are flour mills, lumber and woolen mills, machine shops and potato starch factories. It has the State Soldiers' Home, public graded schools and four churches. There are two banks and a newspaper. Pop.

(1920) 2,839.

WAUPUN, wapun', Wis., city in Fond du Lac and Dodge counties, on

the Chicago, Mil¬

waukee and Saint Paul Railroad, about 70 miles northwest of Milwaukee and 17 miles south¬ west of Fond du Lac. It is in an agricul¬ tural region. The chief manufacturing estab¬ lishments are pump and windmill factories, cane goods works, an umbrella factory, flour and lumber mills and creameries. The principal buildings are the State prison, the city hall, Carnegie library, churches and schools. There are nine churches, a high school, graded schools, a school library and two newspapers. Pop.

(1920) 4,440.

WAURXKA, Okla., city in Jefferson County, 92 miles southwest of Oklahoma City, on the Chicago, Rock Island and Pacific Railroad. There are railroad repair shops and cotton gins. Pop. 2,928.

WAUSAU, wa'sa, Wis., city, county-seat of Marathon County, on the Wisconsin River, and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 175 miles northwest of Milwaukee and 130 miles north of Madison, the State capital. The city lies on both sides of the river, and the slope is gradual, but sufficient to give good surface drainage. There are parks, broad paved streets, well shaded ; and an excellent water system. The reservoir has a capacity of 3,000,- 000 gallons per day, and the water is obtained from Big Bull Falls. Wausau is in a region of extensive lumbering interests. The chief manufacturing establishments are saw mills, which employ over 1,000 men; a sash and door factory, box factories, granite works, a sand¬ paper factory, machine shops, excelsior fac¬ tories, novelty works, veneering factories, can¬ neries, paper mills and flour mills. Large granite quarries are nearby. The county court¬ house (cost $60,000), the government building, the municipal buildings, the County Asylum for the Insane, the churches and schools, the li¬ brary and several fine business blocks are among the principal public buildings of the city. There are 20 churches, representing 15 different denominations. The educational institutions are a fine public high school ; graded elementary public .schools, 10; Roman Catholic and Lutheran parish schools, 5; and a public library. It has also the County Training School for Teachers and a County Agricultural College. There are two national banks and one State bank, and a daily and two weekly newspapers. The govern¬ ment is administered under a

revised charter of 1892, which provides for a mayor and a council of 18 members, who are elected biennially.

Wausau was settled in 1845 by lumbermen. It was platted in 1852 and existed under a town organization until 1861, when it was in¬ corporated as a village. On 18 March 1872 it was chartered as a city. Fop. (1920) 18,661.

WAUSEON, wa'se-un, Ohio, village, county-seat of Fulton County, on the Lake Shore and Michigan Southern Railroad, about 31 miles west by south of Toledo. It is in an agricul¬ tural region, in which are cultivated grain and vegetables. It has flour mills, a creamery, a machine shop and wagon works. There are two banks and four newspapers. The educa¬ tional institutions are a public high school, graded school and a public library. Pop. 3,000.

WAUTERS, vo-tar, Emile, Belgian painter: b. Brussels, 29 Nov. 1846. He was for four

vears the pupil of Portaels and of Gerome at Paris. His picture, (Fair Edith finding the Body of Harold on the Field of Hastings,* at¬ tracted wide attention and he was sent by his government to attend in a professional capacity the opening of the Suez Canal. He returned from the East with many sketches and genre pictures and materials, out of which he after¬ ward painted his panorama, (Cairo and the Banks of the Nile.* His historical pictures are characterized by strong drawing and beauty of coloring; the most famous of these is (Mary of Burgundy before the Magistrates at Ghent. *

WAUWATOSA, Wis., city in Milwaukee County, on the northern outskirts of Milwau¬ kee, and on the Chicago, Milwaukee and Saint Paul Railroad. The Lutheran Theological Seminary is located here, as are several sanataria, the northwestern branch of the National Soldiers' Home, and the county hospital. There are extensive building stone quarries in the vicinity, and the manufactures include machin¬ ery, woodwork, bricks, chemicals and lime. Pop. (1920) 5,818.

WAVE MOTOR, a mechanism for obtain¬ ing power from the force of ocean waves. Very many forms have been devised, but none has come into general use. There is immense power exhibited in wave action, but it is so irregular, and usually so distant from the locations where it is desired to use power, that nothing com¬ mercially satisfactory has been produced. The United States Patent Office contains records of literally thousands of these interesting yet un¬ successful inventions, and occasionally some magazine or technical journal describes some of them. They differ from tidal motors in that these seek to employ the force or motion of the tide water in a river or bay, whereas the wave motor is designed to be placed on a beach where the waves roll in ; or to be anchored a little way off shore where its floats will bob up and down with the wave motion ; or to utilize a shore structure, as a well in a sea-cliff. One of the best of these devices, which operated on a California beach for many months, consisted of a series of horizontal round logs, supported on their sides about three feet above the beach slope. Little paddles were so hinged to the logs that they continually rotated the logs in one direction, so that power could be sent to the shore from each log by a rope or belt. In the course of months the shifting sands of the shore threw many of the logs out of action, and the winter storms finished the destruction of the equipment. The history of all other de¬ vices that have been tried is more or less sim¬ ilar, and educated engineers have come to regard the wave motors as akin to the perpetual motion delusion.

WAVE OFFERING (in Hebrew, tenuphah, from nuph, to wave), a sacrificial ceremony mentioned in the Old Testament, in Leviticus xiv, 24, in the rites to be followed in cleansing a leper, and in Numbers vi, 20, in the descrip¬ tion of ceremonies attending the separation of a Nazarite, and in other places. The offering is believed by the rabbis to have been waved to the four points of the compass, as an acknowledgment of God's sovereignty over the earth, while the <(heave offering,® mentioned in connection with the <(wave offering,® is sup¬

posed to have been lifted upward as a tribute to God's rule in heaven.

WAVELLITE, an attractive, radiated min¬ eral essentially a hydrous basic phosphate of aluminum, 4AlPCX.2Al(OH)3 + 9H20. It rarely occurs in distinct orthorhombic crystals ; usu¬ ally it is in more or less complete spherical ag¬ gregates, externally showing crystal termina¬ tions and with radiated structure. Its hardness is 3.25 to 4, and its specific gravity about 2.32. In the many European localities its color is

usually white or pale green; at its most impor¬ tant American locality in Arkansas it is light to dark green, while the curious stalactitic wavellite of White Horse, Pa., is white.

WAVERLEY, wa'ver-lT, or 'TIS SIXTY YEARS SINCE, a novel by Sir Walter Scott. It was the earliest of the world-famous series of romances to which it gives its title, and was published in 1814. The author withheld his name at first, from doubt as to the success of the venture. The continuance of the conceal¬ ment with subsequent issues followed perhaps naturally; Scott himself could give no better reason afterward than that <(such was his * humor.® Although the authorship of the series was generally credited to him, it was never for¬ mally acknowledged until the avowal was made in 1827 at a dinner for the benefit of the Edin¬ burgh theatrical fund. <Waverley) is a tale of the rebellion of the Chevalier Prince Charles Edward, in Scotland in 1745.

WAVERLY, Ill., village in Morgan County, on the Jacksonville and Saint Louis, and the Saint Louis, Chicago and Saint Paul railroads, about 26 miles southwest of Springfield and 20 miles southeast of Jacksonville. It is in an agricultural and stock-raising region, and has flour mills, grain elevators, brick and tile works, a creamery and stockyards. There are eight churches, graded schools, two banks and a news¬ paper. Pop. about 1,538.

WAVERLY, Iowa, city, county-seat of Bremer County, on the Cedar River, and on the Chicago, Rock Island and Pacific, the Illinois Central and the Chicago Great Western rail¬ roads, about 18 miles northwest of Waterloo. It is in an agricultural and stock-raising re¬ gion. It has a large number of butter and cheese factories, condensed milk factories, can¬ neries, a furniture factory, a creamery-supply factory, a flour mill and agricultural implement works. There are four banks and five news¬ papers, of which three are monthlies devoted to poultry raising. It has six churches. The educational institutions are the Wartburg Teachers' Seminary and Academy, graded pub¬ lic schools, and a public library. The city owns and operates the waterworks. Pop. 3,561.

WAVERLY, N. Y., village in Tioga County, on the Chemung River, and on the Erie and the Lackawanna railroads, about 17 miles south¬ east of Elmira and 20 miles southwest of Owcgo. It is in a region largely devoted to farming and stock-raising and is a shipping point for large quantities of butter, cheese, milk, eggs, poultry and farm products. There are flour mills, cigar and furniture factories, an iron foundry, *etc.* Waverly is near the coal and oil fields of Pennsylvania, and has

connection by electric cars with Athens and Sayre, Pa. There are two barks, a newspaper, six churches, a

high school established in 1871, grammar and primary schools, an opera house and a town hall. Pop. (1920) 5,270.

WAVERLY, Ohio, village, county-seat of Pjke County, on the Scioto River, and on the Norfolk and Western, and Ohio Southern rail¬ roads, 57 miles south of Columbus. It is in an agricultural and' stock-raising region, and con¬ tains flour and saw mills, tanneries and furni¬ ture factories. There is a high school with a school library of over 1,000 volumes; two banks and two newspapers. Pop. 1,625.

WAVES OF ASSAULT. In modern war¬ fare the intense effort demanded of assault¬ ing troops, and the successive attacks which they must make, necessitate a deep formation. The several echelons thus constituted have been given the name of waves. But this term does not signify a uniform formation. The fore¬ most waves, generally the first and the second, advance in line ; those following are in various formations, for example, in lines of small columns. Moreover, to facilitate the leading of the echelons, the waves are formed by the simultaneous advance of tactical units not de¬ ployed in single line but themselves extended in the direction of depth, from which it re¬ sults that a company or battalion will form a part of several successive waves. Formation for the assault does not consist of the deploy¬ ment of rigid lines capable only of a movement straight to the front, but, on the contrary, of placing side by side tactical units which are capable of being led and even manoeuvred.

The waves are crowded into the first-line trench and the parallels in the immediate rear, sometimes in double rank. They dash forward, following each other at short distances so as to rapidly cross the zone of hostile barrage fire. Theoretically an assaulting battalion leaves a single block of its parallels of departure and then while marching takes the distances pre¬ scribed between waves. In no event should these waves close up automatically on the lead¬ ing wave, as its only

effect would be in thicken¬ ing the skirmish line, increasing the losses, and mixing the units. To avoid such effects, when the first wave has crossed the advanced hostile trench it continues its advance toward the ob¬ jective assigned to it. The other waves follow in good order. They engage successively ac¬ cording to the necessities of the situation under orders from the commanders of the several units. The assault is now followed by a com¬ bat in the interior of the position. At certain points the enemy yields, at others he resists stubbornly. The assailants, rallying about the officers that remain, rush into the opening and surround the nuclei of resistance. As soon as the trench is carried the attack pauses only long enough to reform, and the groups of assailants then dash into every opening that offers. Their audacity constitutes their strength. These scattered combats bring the assailants in contact with a new line of defense. If it is occupied, they dig themselves in, in order to form a line of departure for an assault by the reinforce¬ ments.

Edward S. Farrow,

Consulting Military and Civil Engineer.

WAVES AND WAVE-MOTION. Wave is the name commonly given to a disturbance of the surface of a body in the form of a ridge

and trough, propagated by forces tending to restore the surface to its figure of equilibrium, the particles not advancing with the wave. A more complete and scientific definition of a wave is that particular form of aggregation assumed by the molecules between the nearest two consecutive surfaces in which similar phases simultaneously exist throughout. The theory of wave-motion is of the utmost im¬ portance in all physical science, and the general investigation of the form and rate of propaga¬ tion of waves demands the application of the highest resources of mathematics. The theory of even such comparatively simple cases as the wind-waves in deep water (the Atlantic roll, for instance) though easily enough treated to a first, and even to a second and third approxima¬ tion, has not been thoroughly worked out, as fluid friction has not been fully taken into ac¬ count. To find the rate at which an undulation runs along a stretched cord, as for instance, when a harp-string is sharply struck or plucked near one end, a very simple investigation suf¬ fices. Suppose a uniform cord to be stretched with a given tension in a smooth tube of any form whatever, we may easily show that there is a velocity with which the cord must be drawn through the tube in order to cease to press on it at any point ,

that is, to move inde¬ pendently of the tube altogether. For the press¬ ure on the tube is due to the tension of the cord; and is relieved by the centrifugal force when the cord is in motion. If T be the tension of the cord, r the radius of curvature of the tube at any point, the pressure on the tube per

T

unit of length is — . If m be the mass of unit

r

length of the cord, v its velocity, the centrifugal

force is . These are equal in magnitude,

r

and so destroy each other, if T = mv2. Hence, if the cord be pulled through the tube with the velocity thus determined, these will be no more pressure on the tube, and it may therefore be dispensed with. If we suppose the tube to have a form such as that in Fig. 1, where the extreme

Fig. 1.

portions are in one straight line, the cord will appear to be drawn with velocity v, along this, the curved part being occupied by each por¬ tion of the cord in succession ; presenting some¬ thing like the appearance of a row of sheep in Indian file, jumping over a hedge. To a specta¬ tor moving in the direction of the arrow with velocity v, the straight parts of the cord will appear to be at rest, while an undulation of any definite form and size whatever runs along it with velocity v, in the opposite direction. This is a very singular case, and illustrates in a very clear manner the possibility of the propa¬ gation of a solitary wave. * Thus we prove that the velocity with which an undulation runs along such a cord is the square root of T divided by m.

If / be the length of the cord in feet, w its whole weight, W the appended weight by which it is stretched, g — 32.2 feet, the measure of

the earth's gravity, this becomes

This

formula is found to agree almost exactly with the results of experiment. We can easily see why it should be to some small extent incor¬ rect, because we have supposed the cord to be inextensible and perfectly flexible, which it can¬ not be; and we have neglected the effects of ex¬ traneous forces, such as gravity, the resistance of the air, *etc.*

A

Fig. 2. — Ammeter in Circuit to Indicate Resonances.

In gometrical investigations it has been proved that the velocity with which a sound

wave travels is proportional to

where p

is the pressure, and d the density of the air. The easiest mode of doing this is to express, in terms of these and other quantities, the equa¬ tion given by the laws of motion, Mass X Ac¬ celeration = Difference of Pressures, and to assume that Hooke's law holds, even dur¬ ing the sudden compression of air. The fore¬ going formula _ shows that the velocity of sound is not affected by the pressure of the air (the height of the barometer) since, in still air, /> is proportional to d. The velocity does depend on the temperature, being, in fact, proportional to the square root of the tempera¬ ture measured from absolute zero. We also see from the formula that the velocity is inversely as the square root of the density of the gas — • the pressure being the same. Thus a sound wave travels about four times faster in hydro¬ gen than in air. Also, within the limits of ap¬ proximation we have used, the velocity does not depend upon the intensity, pitch, or quality of the sound.

WAVEY, the common name in the Hudson Bay region for the smaller wild geese, espe¬ cially the snow-goose. See Geese.

WAX, fatty solid animal substance, of which the typical sort is .called beeswax. Various similar substances of vegetable and animal origin bear the name. Beeswax is secreted by bees in constructing their hives, and a very similar

vegetable product enters into the composition of the pollen of flowers, covering the envelope of the plum and of other fruits, especially of the berry of the Myrica cerifera, and in many in¬ stances forming a kind of varnish to the sur¬ face of leaves. It is distinguished from fat and resinous bodies by its not readily forming soaps when treated with alkaline solutions. Common beeswax is always more or less colored, and has a distinct, peculiar odor, of both of which it may be deprived by exposure in thin slices to air, light and moisture, or more speedily by the action of chlorine. At ordinary temperatures wax is solid and somewhat brittle ; but it may be easily cut with a knife, and the fresh surface presents a characteristic appearance, to which the name of waxy lustre is applied. Its specific gravity is 0.96. At 155° F. it enters into fusion, and boils at a high temperature. Heated to redness in a closed vessel it suffers decompo¬ sition, yielding products very similar to those which are procured under the same circum¬ stances from oil. It is insoluble in water, and is only dissolved in small quantities by alcohol or ether.

In bleaching wax the wax must be melted, with a degree of heat not sufficient to alter its quality, in a caldron so disposed that the melted wax may flow gradually through a pipe at the bottom of the caldron into a large wooden cylin¬ der that turns continually round its axis, and upon which the melted wax falls. As the sur¬ face of this cylinder is always moistened with water, the wax falling upon it does not adhere but quickly becomes solid and flat, and acquires the form of ribbons. The continual rotation of the cylinder carries off these ribbons as fast as they are formed, and distributes them through the tub. When all the wax ribbons to be whitened is thus formed, it is to be put upon large frames covered with linen cloth, which are supported about a foot and a half above the ground in a situation exposed to the air, the dew and the sun. If the weather be favor¬ able, the color will be nearly discharged in a few days. It is then to be remelted and formed into ribbons and exposed to the action of the air as before. These operations are to be re¬ peated till the wax is rendered perfectly white, when it is cast into cakes or other commercial form.

The principal applications of wax are to make candles and medicinal cerates ; to give a polish to furniture or floors, for which pur¬ pose it is largely used in the United States ; to form a lute or cement, for which it is used by chemists; and to serve as a vehicle for colors. By modern painters colors previously prepared in oil are sometimes diluted just before being laid on in a mixture of wax and oil of turpen¬ tine. This practice is much resorted to by French artists, especially in mural paintings. The object is to keep the painting free from that lustrous appearance which often renders it difficult to be seen properly in consequence of reflection. Wax also forms a principal in¬ gredient in modelers' wax and gilders' wax. In the former the other ingredients are drug¬ gists' lead-plaster, olive oil, yellow resin, and whiting; and in the latter verdigris and sul¬ phate of copper. Sealing-wax is not properly a wax at all, but is composed of resin lac and some less brittle resin. The largest consump-119

tion of wax takes place in Roman Catholic countries, where large quantities are required for the candles used in religious ceremonials.

t Chinese wax comes from the ash-tree where it is secreted by an

insect. It resembles sperma-cetic. Cork wax or cerin is extracted from cork by an alcoholic process. Mineral wax or ozocerite is a waxy paraffine sometimes found in coal measures. Shoemakers' wax is a mixture of pitch and tallow. Wool wax is the solid greasy product obtained from sheep washing, is used as a dressing for leather, and is an adulterant or base for ointments. See also Wax, Vegetable.

Wax Figures. — The employment of wax in imitative art dates from a period anterior to historical times, although, according to Pliny, the art of casting it in molds was not practised previous to the time of Lysistratus, its reputed inventor, who flourished about 300 b.c., and whose productions were chiefly portraits cast in plaster molds taken from the face. Wax por¬ traits eventually became common, and among the Romans, who placed them in the vestibules of their houses, were regarded as an evidence of ancient nobility, as none were allowed to ossess such images whose families had not orne some curule magistracy. In the Middle Ages, wax was employed in the construction of images of saints and of votive images, and those who practised sorcery melted before a slow fire wax figures of the persons against whom their incantations were directed. In the latter half of the 15th century Andrea del Ver¬ rocchio and Orsin-o gained considerable reputa¬ tion by some figures of Lorenzo de' Medici, their joint production, which consisted of frameworks of wood or skeletons for the bodies and limbs, while the heads, hands and feet were cast in wax, painted in oil colors to counterfeit life. They were furnished with glass eyes and natural hair, and were habited in the costume usually worn by Lorenzo. The manufacture of wax figures of the size of life is still carried on to a considerable extent, but has long ceased to be considered a branch of the fine arts, no imitative skill or taste on the part of the artist being sufficient to overcome the ghastly fixed¬ ness' which such images must always present, and which is the more disagreeable as the re¬ semblance to life is closer. In the preparation of anatomical models and pathological exam¬ ples, however, wax has been very advantage¬ ously employed, the invention being due to Gaetano Giulio Zummo, a famous modeler in colored wax, who flourished in the latter half of the 17th century. In the succeeding century the celebrated collection of anatomical models in the Institute of Bologna was begun under the direction of Ercole Lelli, the finest speci¬ mens being by Giovanni Manzoli and his wife, Anna Morandi Manzoli. In the Museum of Natural History at Florence are 15 chambers devoted to preparations by Fontana, Susini and other celebrated modelers ; the Musee Dupuv-tren at Paris is famous for its morbid speci¬ mens ; and almost every considerable city of Europe now has its collection.

The collection of wax figures at the Eden Musee in New York was for about 50 years prior to 1910 one of the show features of the city.

WAX, Mineral. See Hatchettite.

WAX, Vegetable, a solid, fatty substance, resembling animal wax, which is secreted by many plants, sometimes in large enough quan¬ tities to be of commercial importance. It forms, on foliage, a varnish or coating, which prevents excessive transpiration or wetting of the cells; and, on twigs and flower-pedicels, by its slippery surface keeps unwelcome insects from reaching the flowers and robbing them of their honey. The whitened under surfaces of some willow leaves and the bloom of fruit are composed of wax either in granules or rods or spread over the cuticle. The most familiar example in America of the hard fat or wax in quantity is on the bony nutlets of the wax-myrtles or bay-berries (Myrica). The gray-coated drupes of M. carolinensis clustering on the bare twigs are conspicuous in seashore regions, after the leaves are fallen ; the wax clinging to their rough, granular surfaces when melted is a greenish, hard substance, sharing the balsamic odor of the plant. It was used in colonial times as a basis for candles and for scap. Other species, of other countries, furnish a similar wax and are known as candle-berries or tallow-trees. Carnauba wax is exported from Brazil for candles and as a substitute for beeswax. It is the coating on the young leaves of Corypha cerifera, indigenous to tropical South America. The young leaves are removed and dried. The wax-granules may then he shaken off, in the form of a fine dust, melted and caked. A varnish-like exudation of wax, on the stems of two other South American palms, Klopstockia cerifera and Ceroxylon andicola, the wax-palm, the latter being a tall tree, slightly thickened at the centre of the trunk and crowned by a tuft of pinnate leaves*. This wax is scraped off and melted. A mixture of resin and wax results, from which the latter is extracted by hot alcohol, and is then utilizable for candles. It is, however, seldom seen in commerce. Japan wax is a wax-like, hard fat, which is largely exported from Japan to Europe, in yellowish hard cakes, with a resinous, rancid odor, and often covered with a powdery efflorescence. It is mixed with or substituted for beeswax, where its rancid odor is not preventive and is extracted by several methods, such as heating under pressure or boiling from the crushed drupes of an oriental species of sumac (q.v.).

WAX-BILL, or SENEGAL FINCH, an African weaver-bird (Estrilda astrilda), one of the section of the family called blood-finches on account of the prevalence of red in the plumage. This has long been a

favorite among cage-birds and is sold by dealers all over the world. It is nearly five inches long. The beak is bright red and somewhat swollen. A bright red stripe passes between the eyes and the middle of the breast and belly is a beautiful reddish-brown. The upper surface of the body is brownish-gray, the lower sur¬ faces lighter, everywhere traversed by very fine blackish wavy lines ; wings and tail brown. They are varied much in color by breeders, bright blue tints, even, having been developed in some. Their song is not very musical, but they are pretty and affectionate to a high degree. Their food and care should be similar to those given to a canary.

WAX-FLOWER, or MADAGASCAR JASMINE. See Stephanotis.

WAX INSECT. See Scale Insects.

WAXWING, a woodland bird of the fam¬ ily Ampelidce, a small isolated group of birds of the northern hemisphere, characterized by their shrike-like beaks, silky brown plumage, tall erectile crests and especially by the tips of the wing and tail-quills terminating in flattened scales closely resembling red sealing-wax. There are but three species, the northern or Bohemian waxwing (A. garrulus) ; the Si¬ berian waxwing (A. phoenicoptera) , and the common North American cedar-bird (q.v.). The northern waxwings make their home near the Arctic coasts of both continents and breed there, in trees, long before the snpw has dis¬ appeared in spring. Sometimes they are not seen in the United States or Central Europe for years together ; then will appear in large numbers locally. These erratic movements are doubtless due to presence or absence of food, which consists of both insects and berries (the latter mainly, of course, in winter), but were regarded by the superstitious peasantry of Europe as signs of some visitation of war or pestilence to follow. All the waxwings are cinnamon-brown, relieved by handsome mark¬ ings of black, gray and yellow.

WAXAHACHIE, waks-a-hach’e, Tex., town, county-seat of Ellis County, on the Missouri, Kansas and Texas and the Houston and Texes Central

railroads, about 178 miles northeast of Austin, the State capital, and 31 miles south of Dallas. It was founded in 1847. It is in an agricultural and stock-raising region, in which are produced large crops of wheat and a good quality of cotton. The manufactories are cottonseed-oil- mills, cotton compresses and flour mills. It is a cotton centre for an extensive region. The principal public buildings are the county courthouse (original cost $150,000), Trinity University, three banks, six churches, schools and a library. There are besides a daily, weekly and monthly (college) newspapers. Pop. 8,000.

WAXWORKS, the representation in wax of figures, ornaments or other articles, but in popular usage confined to that of figures of real persons. For the history and development of modeling in wax see article on Wax Figures under Wax. In modern public exhibitions of waxworks only the heads and hands of the figures are modeled in wax, the figures being clothed as in life ; and in some cases a mech¬ anism is added to make ihem capable of move¬ ment. The figures reproduced are usually those of notable personages of different periods. There is also usually a department in which startling happenings are represented, as in the (<Chamber of Horrorsˆ at the Eden Musee, New York, where notorious criminals were shown in wax. The Eden Musee was long a famous showplace of New York, but waning public interest resulted in its closing its doors in 1915. Other noted exhibits of the sort are those of Madame Tussaud (q.v.), in London, and the figures of the sovereigns of England formerly in the Tower of London.

WAXY or AMYLOID DEGENERA¬ TION. See Degen eration ; Pathology.

WAY, Arthur S., English classical scholar : b. Dorking, 13 Feb. 18-17. lie was Fellow of Queen's College, Melbourne, Australia; was

classical lecturer in Queen's College, Taunton, in 1870-76 and was the head of the Wesley Col¬ lege of Melbourne in 1882-92. In 1897 he be¬ came examiner in Latin to the Central Welsh board of secondary education. His publications include English verse-renderings of the (Odyssey) (1880) and (Uiad) (i-xii, 1886;

xiii-xxiv, 1889) ; of the tragedies of Euripides (1894-98) ; of Horace's ˆpodes* (1898) ; and of Apollonius Rhodius' (Tale of the Argo-nauts} ; he has also published (Letters cf Saint Paul to Seven Churches and Three Friends) (1901); (David the Captain (1904); (Epistle to the

Hebrews) (1906) ; <Orestcia) (1908) ; (The Cyclops of Euripides) (1912) ; (Virgil's Georgies in English Verse* (1912); (Virgil's .TEneid in English Verse) (I— III, 1916).

WAY, Right of. See Realty.

WAY OF ALL FLESH, The, the title of a novel by Samuel Butler (q.v.) published posthumously in 1903. It is the history of three generations of the author's family and is a brilliant satire on the church, family relation¬ ships and the education of children. Not only are hundreds of facts in the author's own life minutely recorded ; it is a spiritual auto¬ biography as well. Bernard Shaw in the pref¬ ace to Major Barbara, says that he learned more from Butler than anyone else in the perfection of paradoxical style and the trick of reversing moral dynamics.

V/AY OF THE WORLD, The. William

Congreve was already the leading playwright and one of the most elegant gentlemen of London when in 1700 in his 30th year, he brought out at Lincoln's Inn Fields <The Way of the World) with his friend Mrs. Bracegirdle in the principle role of Millamant. The play was written with a conscious aspiration <(to write only to the few refined. ** It was the author's purpose ((to design some characters which should appear ridiculous, not so much through a natural folly (which is incorrigible and therefore not proper to the stage) as through an affected wit, a wit which at the same time that it is affected is also false.** The venture was not entirely a success and Congreve's career as a playwright was at an end.

It may profit • us to inquire why the play failed and why in spite of its failure it is hailed as one of the greatest of the world's comedies. By the time of Congreve there had been added to the over-emphasis and gro-tesquencss of Jonson's comedy the refining touch of Moliere. Comedy now becomes an art of manners, a pattern of human ingenuity at its wittiest and best. It was Congreve's distinction that he best adapted the technique of town living to the technique of the stage. Interested in character he is even more inter¬ ested in social groups :

"poets oft in one piece expose

whole belles — assemblees of coquettes and beaux."

The play is rendered caviare to the general by its superabundance of dazzle, a radiance that conceals, as by principle, the real humanity of

some at least of the characters. Moreover, the characters quite run away with the author in their good spirits and lavish life, leaving his plot unclear and a matter of raveled ends and hasty explanations. But these things can¬ not be counted faults by one who” loves

Congreve. He only among English writers has raised the artifices of character to universality. In language, observation, wit he presents a fine texture of grace that provokes and satisfies thoughtful laughter. Millamant is one of the rarest creations in literature, the woman en¬ trancing as distinguished from the woman emotional or the woman instinctive. Though he is dealing with a conventionalized society Congreve’s characters are thoroughly indi¬ vidualized in their several relationships with that society. As is natural for such a society, most of the characters are women, but the characters that stand out, with one exception, are men. Written after Jeremy Collier’s blast against the immorality of the stage, the play shows some of the restraining influence of this divine’s charges. It was often presented dur¬ ing the 18th century, but has been the particular delight of the study. Editions : Ewald, A. C., ed., Mermaid Series, 1887 ; Street, G. S., Comedies of William Congreve, 1895 ; Archer, W., Masterpieces of English Drama, 1912. Consult Gosse, E., <Life of Congreve) (1888) ; Meredith, G., (An Essay on Comedy* (1879) ; Lamb, C., (On the Artificial Comedy of the Last Century) ; Thackeray, W. M., (English Humorists \

Thomas H. Dickinson.

WAYCROSS, wa’kross, Ga., city and the county-seat of Ware County, on the Waycross and Western, the Atlanta, Birmingham and Atlantic, the Waycross and Southern, and the Atlantic Coast Line railroads, about 95 miles southwest of Savannah and approximately 60 miles west of Brunswick. Large meat-packing establishments are located here, also railroad construction and repair shops. The city is a commercial centre for lumber, naval stores and cotton. Four periodicals, including one news¬ paper of daily issue, are published here. There are two banks in the city. Waycross was set¬ tled in 1870, incorporated in 1874 and became a city in 1909. The waterworks are

municipally owned. Before State-wide prohibition went into effect in Georgia, Waycross secured virtual pro¬ hibition by the imposition in 1883 of a license fee of $20,000 upon dealers in intoxicating liquors and by increasing this fee to $30,000 in 1892. The educational institutions include a high school for whites, established in 1890, a high school for negroes, and public and private schools. Pop. (1900) 5,919; (1910) 14,485;

(1920 18,068.

WAYLAND, wa'land, Francis, American college president: b. New York, 11 March 1796; d. Providence, R. I., 30 Sept. 1865. He was graduated from Union College in 1813, studied in the Andover Theological Seminary, was a tutor at Union College 1817-21 ; in 1821 became pastor of the First Baptist Church of Boston and took a leading place in the ranks of American preachers, his sermon on (The Moral Dignity of the Missionary Enterprise) (1823) being particularly well known. After holding a professorship at Union (1826-27), he became president of Brown University. Dur¬ ing the 28 years of his administration he greatly developed the institution and was one of the pioneers of the elective systqm in Ameri¬ can universities. Subsequent to his resig¬ nation (1855) lie was for a year and a half

pastor of the First Baptist Church of Provi¬ dence, after which he devoted himself to various kinds of religious and humanitarian effort. He was the author of many valuable works, in¬ cluding (Elements of Moral Science) (1835) ; (Elements of Political Economy> (1837) ; limitations of Human Responsibility* (1838);

(Domestic Slavery Considered as a Scriptural Institution? (1845) ; (Elements of Intellectual Philosophy) (1854) ; and (Sermons to the Churches * (1858). Consult Murray, S. O.,

(Francis Wayland* (Boston 1891) ; Wayland, F. and H. L., (his sons), (Life and Labors of Francis Wayland* (New York 1867).

WAYLAND, Francis, American legal scholar, son of the preceding: b. Boston, 23 Aug. 1826; d. New Haven, Conn., 9 Jan. 1904. He was graduated from Brown University in 1846, took his M.A. degree from Yale in 1872, and began law practice in Worcester, Mass., in 1850, removing in 1858 to New Haven. He was judge of probate in 1864-65, and lieuten¬ ant-governor of Connecticut in 1869. In 1872 he became

professor in the law school of Yale, and in 1873 dean of the school. In 1903 he resigned the deanship. The development of the school from a minor local institution to its present condition, with adequate financial basis and wide curriculum, is due chiefly to him. He was president of several organizations, in¬ cluding the American Social Science Associa¬ tion, the board of directors of the Connecticut State Prison, the Prison Aid Association from 1872, and the Organized Charities Association of New Haven from 1878. He was promi¬ nent as a writer and speaker on sociological and charitable topics and criminology, and was joint author, with his brother, H. L. Wayland, of the (Memoir) of President Wayland (1867).

WAYLAND THE SMITH (Gen Wieland, ve' lant; Norse, Volundr; A. S. Weland), a hero of old Teutonic saga. His myth as¬ sumes numerous forms. It appears in Scandi¬ navian, Anglo-Saxon and German poems. The name probably signifies the ˆskilful® or ((art-ful® one. Wayland seems to be a deification of the smith, whose calling was considered among the highest. Episodes in the story nar¬ rate that Wayland was, like Vulcan, lame, and, like Daedalus, manufactured wings and could fly. These are thought, however, to have been late introductions from the classic mythology. In France, too, Galans the Smith was known. Simrock employed the various legends in his epic (Wieland der Schmied) (1835). The megalithic monument in Berkshire called ((Way-iand Smith's cave,® with the character Wayland, empiric farrier, and pedlar, is familiar through Scott's (Kenilworth. } Consult Mau-rus (Die Wielandsage in der Litteratur*

(1902).

WAYNE, wan, Anthony, American soldier : b. Easton, Pa., 1 Jan. 1745; d. Presque Isle (Erie), Pa., 15 Dec. 1796. At 18 he became a land-surveyor. He was an intimate friend of Franklin, and early took an active interest in public affairs. Having married and settled to farming (1767), he was elected to the Penn¬ sylvania convention and legislature in 1774, served on the committee of safety, and in 1775 laised a regiment, with which he took part in the campaign against Canada. He fought with

distinction and was wounded at the battle of Three Rivers 3 Jan. 1776, held Ticonderoga till May 1777 and after receiving the commis¬ sion of brigadier-general joined Washington in New Jersey; led a division at Brandywine 11 September and commanded the right wing and led the attack at Germantown 4 October. He made a dashing raid on the British lines in the winter of 1777-78, carrying off a great quantity of supplies, and on the night of 15 July 1779 achieved the most brilliant of the American victories in the storming of Stony Point, for which he received a gold medal and the thanks of Congress. He became a popular hero, and his nickname of (<Mad Anthony® was as much a tribute to his energy and valor as it was a denotation of his recklessness in action. By a bayonet charge he rescued La¬ fayette in Virginia in 1782; made a daring attack on the whole British army at Green Spring (6 July), and defeated the British and Indians in Georgia. On the surrender of Char¬ leston, S. C., by the British it was occupied by Wayne, 14 Dec. 1782. He was made brevet major-general 10 Oct. 1783, retired from the army in 1784 and became a member of the Pennsylvania legislature. He was a member of the convention of that State which ratified the Federal Consti¬ tution in 1787. Later he settled on a Georgia plantation presented to him by the State in return for his military services; and from Georgia, in 1791, he was sent to Congress, but in a contest during the next year his seat was declared vacant. In April 1792, he was made commander-in-chief of the Ameri¬ can army, with the rank of major-general. In 1793 he took the field against the Indians in Ohio, whom he finally defeated at Maumee Rapids or Fallen Timbers and he forced them to conclude the treaty of Greenville (1795), which gave a large tract of territory to the United States. His death occurred while he was engaged in completing this service. A monument was erected to him at Waynesboro, Pa., 1809. Consult the <Lives) by Armstrong (1834) and Moore (1845) ; Wayne's (Regimen¬ tal Orderly Book) on the northern campaign, edited by J. Munsell (1859); Stifle, c Wayne and the Pennsylvania Line) (1893) ; Roosevelt,

(Winning of the West,* Vol. IV (1889-94) ; and Spears, (Anthony Wayne* (1903).

WAYNE, James Moore, American jurist: b. Savannah, Ga., 1790; d. Washington, D. C.,

5 July 1867. He was graduated at Princeton University in 1808, was

admitted to the bar in 1810, and engaged in practice at Savannah. He served for two years in the Georgia legisla¬ ture, was mayor of Savannah in 1823, and was judge of the Superior Court in 1824-29. He was a member of Congress in 1829-35 ; and was appointed by President Jackson an associate justice of the Supreme Court of the United States 9 Jan. 1835. He was a recognized au¬ thority on admiralty jurisprudence. He op¬ posed the re-chartering of the United States Bank.

WAYNE, Neb., city, county-seat of Wayne County, on the Chicago, Saint Paul, Minneapo¬ lis and Omaha Railroad, about 95 miles north by west of Lincoln and 85 miles northwest of Omaha. It is in an agricultural region, in

which the principal productions are wheat, corn, sugarbeets and potatoes. Wayne makes ex¬ tensive shipments of grain, hogs, cattle, hay and vegetables. It has the Nebraska Normal Col¬ lege (private), a high school and public graded schools. There are four banks and two news¬ papers. Pop. about 2,140.

WAYNESBORO, wanz'bur-d, Ga., city, county-seat of Burke County, on the Central Railroad of Georgia, about 100 miles northwest of Savannah and 30 miles south of Augusta. It was laid out as a town in 1783, and in 1888 was incorporated as a city. The chief manu¬ factories are cottonseed-oil mills, a wagon fac¬ tory, agricultural implement works, a meat¬ packing plant and a cotton compress. It has seven churches, one public high school or academy, and Waynesboro Academy (a private high school), elementary public schools, two banks and a newspaper. A battle was fought here during the Revolutionary War, and one during the Civil War. Pop. (1920) 3,311.

WAYNESBORO, Pa., borough in Frank¬ lin County, on the Mont Alto and West Mary¬ land railroads, about 48 miles southwest of Flarrisburg. It is the commercial and indus¬ trial centre of quite an extent of territory. The chief manufacturing establishments are four large machine factories, employing a total of 2,500 men, also foundries, tool works, cream¬ eries, ice-machine and engine works, and a plow factory. There are four banks, two daily and two weekly newspapers. The borough is near South Mountain and Antietam Creek. The Confederate army passed through Waynes¬ boro on the way to and from Gettysburg. Pop. about 9,720.

WAYNESBORO (Va.), Battle of. On 27

Feb. 1865 General Sheridan started from Win¬ chester, Va., on his final campaign up the Shen¬ andoah Valley, under instructions from General Grant to destroy the Virginia Central Railroad, the James River canal, capture Lynchburg, if practicable and join General Sherman, where-ever he might be found in North Carolina, or return to Winchester. He had Custer's and Devin's divisions of cavalry and two sections of artillery, about 10,000 officers and men, the whole commanded by General Merritt, his chief of cavalry. At Mount Crawford, 1 March, he was met by Rosser's cavalry which was promptly dispersed, and 2 March he reached Staunton, which had been abandoned by Gen¬ eral Early, who had fallen back eastward to a ridge west of and near Waynesboro, where he could muster only Wharton's two small brigades of infantry, Nelson's battery of six guns and Rosser's cavalry, in all not over 1,800 men. Merritt followed from Staunton, and late in the afternoon, after some artillery-firing, three of Custer's dismounted regiments moved around Early's left flank, between it and South River, while two of his brigades charged his front. Early's men made but a feeble resist¬ ance and broke in a disorderly rout, hotly pursued by the Union cavalry through Waynes¬ boro and as far as the South Fork of the Shenandoah and to Greenwood Station, where five guns were captured and several loaded cars burned.- Merritt took as prisoners 1,450 officers and men and captured 11 guns with horses and caissons complete, 200 loaded

wagons and several battle-flags. Generals Early, Long, Wharton, Lilley and Rosser, with a few men, escaped. From Waynesboro the prisoners and captured artillery were sent back to Winchester, under guard of 1,600 men. Early's army had disappeared and Sheridan moved unmolested to the Virginia Central Rail¬ road, which was destroyed for several miles. The swollen conditions of the rivers made it impossible to join Sherman and Sheridan de¬ termined to destroy still more thorougly the railroad and James River canal and then join Grant in front of Petersburg. He divided his command, sending one part to the James River canal, which it destroyed as effectually as the other part destroyed the railroad. This done, he moved to White

House on the Pamunkey River, where he arrived on 19 March 1865, and thence to the army in front of Petersburg. Con¬ sult (Official Records, > (Vol. XLVI) ; Pond, (The Shenandoah Valley in 1864) ; Sheridan, (Personal Memoirs) (Vol. II) ; Early, (Last Year of the War for Independence > ; The Cen¬ tury Company's (Battles and Leaders of the Civil War> (Vol. IV).

E. A. Carman,

WAYNESBURG, wanz'berg, Pa., borough, county-seat of Greene County, on Ten Mile Creek and on the Waynesburg and Washington Railroad, about 44 miles south of Pittsburgh. It is in an agricultural and stock-raising region, and in the natural-gas and oil belt. It has flour mills, a foundry, a planing mill, a carriage fac¬ tory, a machine shop and creameries. It is the seat of Waynesburg College (Cumberland Presbyterian). There are five banks and two newspapers. Pop. (1920) 3,332.

WAYNESBURG COLLEGE, located at Waynesburg, Pa. It was chartered in 1850 and first opened to students in 1851. It was estab¬ lished by and is under the control of the Penn¬ sylvania Synod of the Cumberland Presbyterian Church, and the trustees are elected by this synod. In 1902 the board of trustees was in¬ creased from 11 to 21 members, and the Alumni Association empowered to submit 12 nomina¬ tions, from which six trustees shall be elected. The college for many years labored under seri¬ ous financial difficulties, and it was not until 1898 that an adequate endowment was obtained, which was increased in 1900. Since that time the curriculum has been extended, especially in the study of sciences, and the equipment greatly improved. The college offers three regular courses, classical, literary and scientific, which lead to the degrees of A.B., B.L. and B.S. Greek is required for the A.B. degree. These courses all include some electives in the work of the last two years, the list of electives from which the student may choose differing in each course. The degree of A.M. is conferred for graduate work; courses leading to the Ph.D. degree have been discontinued. In addition, the college maintains a preparatory department, _ a normal department, a conservatory of music, and a school of oratory. The college adopted the system of coeducation at the first, and has found it most successful. The students main¬ tain two literarv societies and a Young Men's and a Young Women's Christian Association. The buildings include the main building and Hanna hall, a dormitory. There are well-equipped chemical and biological and physical laboratories, recently established. The library in 1918 contained 10,000 volumes, and the pro¬ ductive funds amounted to $90,000. The stu¬ dents numbered

270 and the faculty 23.

WAYS AND MEANS COMMITTEE.

See United States — Finances; Senate, United States.

WAZAN, or WEZZAN, wa-zan', Morocco, an inland town, picturesquely situated on the steep northern slope of a two-peaked mountain, in the hill country 90 miles southeast of Tan¬ gier. It is a sacred city of refuge, and a place of pilgrimage, the headquarters of the grand sheriff, the spiritual ruler of Morocco. The principal buildings are the great mosque and the tombs of a long line of sheriffs. The trade is, as elsewhere in Morocco, mainly in the hands of the Jews. Pop. about 16,000. Con¬ sult Watson, (A Visit to Wazan* (1880).

WAZIRISTAN, wa-ze-ri-stan' the coun¬ try of the Waziris, Northwestern India, a moun¬ tainous region situated west of the Suliman range, north of British Baluchistan, and east of Afghanistan. It is now partly included in Brit¬ ish India, and has at various times been the scene of military operations owing to the depre¬ dations and raids of the Waziris on the cara¬ vans traversing the Gomul Pass. The British government maintains political agencies in both Northern and Southern Waziristan. The prin¬ cipal town is Kanigoram. It is a mountainous country, with much fine scenery, and a delight¬ ful climate except in some of the valleys. The Waziris, a portion of whom are known as Mahsuds, are a hardy race of Afghans. Some of them have settled peaceably within British territory, where they cultivate the land. Their crops are wheat, maize and barley; they raise horses and sheep, and iron and wood are ex¬ ported.

WEA (contraction of Wayatonuki, ((Eddy people®), a tribe of the Algonquin stock of North American Indians, belonging to the Miami confederacy. When first known to the whites, in 1672-1703, they were in Wisconsin, but they seem to have gradually drifted south¬ ward, and in 1701 one of their villages was on the site of the present Chicago, Ill., and in 1719 their chief village was on the Wabash below the mouth of Wea Creek, in Indiana. They were hostile against the whites in western Vir¬ ginia, in which their country was situated, but they finally signed the celebrated treaty of Greenville in 1795, and in 1820 sold their last lands in Indiana and moved with the Piankashaws to Illinois and Missouri. In 1832 they again sold their lands and the main body moved to Kansas, whither a few of their number had already migrated. In 1S54 the rapidly decreas¬ ing Weas and Piankashaws united with the Peorias and Kaskaskias of the Illinois

confed¬ eracy; at this time, their population aggregated 259, largely mixed-bloods. In 1868 they moved to the Neosho Indian Territory, now Oklahoma, where the small remnant has been absorbed.

WEAKFISH, or SQUETEAGUE, a

spiny-rayed fish of the genus Cynoscion and family Scicenida. It has no teeth on the vomer or palate bones, but numerous ones in the jaws, which are weakly in structure; the air-bladder

has a horn on each side projecting forward. The genus is chiefly American, with about 15 North American species. The common weakfish (C. regalis) is one to two and one-half feet long, brownish blue above, with irregular brownish spots, and tinged with greenish and banded in the young; the sides silvery, abdomen white, and iris yellow; lower fins orange; a single row of very small teeth in the upper jaw and a double series in the lower; dorsals separated, and the second, with the caudal and anal, mostly covered with scales. This is one of the most abundant fishes along the entire Atlantic Coast from Cape Cod to Florida, but there have been times when the invasions of bluefish have driven them from parts of the coast. The name originated from the little re¬ sistance it makes when taken, and from the ease with which the delicate structure of the mouth enables it to break away. This is the name most employed on the New Jersey Coast, while in New England the Indian name “squeteague® is usual, and in the South sea-trout is applied to this and to the spotted Cynoscion. On the New Jersey Coast it appears early in the spring, being most abundant toward the end of July, and dis¬ appears late in the autumn ; it is a greedy biter, and is easily taken by any soft white bait, af¬ fording great sport for about an hour on the flood tide; it swims in shoals near the surface and requires a line slightly if at all leaded. In summer it is abundant about the mouths of rivers, where the water is brackish, and some¬ times ascends far up, having been taken in the Hudson 50 miles above New York; it is taken by seines and poundnets in large quantities ; when caught it makes a croaking sound, also heard when the fish is at the bottom. The flesh is wholesome and well

flavored, but so quickly gets soft that it does not rank high in the market. The air-bladder makes excellent isinglass for culinary purposes. The spotted weakfish (C. nebulosns) is conspicuously marked with round black spots above and the soft-dorsal fin is not scaly. It is more southern than the squeteague, and is sometimes called spotted trout. Other related species occur in West Indian waters and on the Pacific Coast.

WEALDEN, wel'den, certain delta-depos¬ its of the Cretaceous (or Chalk system, from their great development in the weald of Sussex, England. Weald means in Old English a wood or forest, and the name is applied to a tract of country lying between the north and south downs of Kent and Sussex. The recognized geological name of this subdivision of the Cre¬ taceous system is the Ncocomian, from the old Latin name of Neuchatel in Switzerland. This stage in the south of England, and thence east¬ ward across Hanover, consists of a mass of sand and clay, sometimes 1,800 feet thick, rep¬ resenting the delta of a river. Only a portion of this delta remains, but as it extends in an eastern and western direction for a distance of at least 200, and from north to south less than 100 miles, its total area may have been 20,000 square miles, indicating a very large river flow¬ ing from a continent. The stream not improb¬ ably descended from the north or northwest. It carried down the drifted vegetation of the land, with occasional carcases of the iguanodons and other terrestrial or amphibious creatures of the time. Beyond the area overspread by the

sand and mud of the delta, the ordinary marine sediments accumulated, with their characteristic organic remains. From Yorkshire, England, they stretch eastward through northwestern Germany, and are found at the base of the Cre¬ taceous system through France into Switzer¬ land. See Geology.

WEALTH. Wealth may be defined either as a state of being or as a category of goods. A state of wealth is practically identical with a state of well-being. It is a condition under which men possess most of the things they need. It is the opposite of a state of poverty. Wealth, however, is generally conceived as a category of goods. As a category of goods it includes all those material things which possess value or, which means the same thing, all those material things of which the community pos¬ sesses less than it would like to have. Or again it consists of all those material things which the community thinks it worth while to strive to get in larger quantities than it already has.

From this point of view it will be seen that there is a very close connection between wealth aˆa category of goods and wealth as a state of being, though there is an apparent paradox here. Wealth is contrasted with free goods, — such as air, sunlight, beautiful scenery, abundant water and so forth. It is obvious that the more free goods the community possesses, the greater its well-being. If an object which is now consid¬ ered as wealth could be made sufficiently abund¬ ant to satisfy all possible needs, the community would undoubtedly be better off, but that ob¬ ject would have ceased to be wealth. There would be one less article to include in the cate¬ gory of wealth.

This paradox, however, is only an apparent one. The object of wealth which, under the above illustration, has become a free good, has become such by reason of its abundance. Well-being is clearly improved by increasing its abundance. Now any material thing is wealth of which you can say that by increasing its abundance you would increase the well-being of the community. After it has become suffi¬ ciently abundant, you can no longer say that. If we have enough air, you cannot say that we would be better off if we had more. It is only when we have not enough that we can say that. Well-being, therefore, depends upon wealth in a very direct, immediate and practical sense. Anything of which we need more than we have is wealth. Anything of which you can say, — more of it, more well-being, less of it, less well-being, — is wealth. Anything of which you can say that it is worth our while to try to get more of it, is wealth ; whereas anything of which you cannot say that, either because it is useless in itself or because we have already as much as we can possibly use, is not wealth.

Wealth as thus defined become an essential factor in the greatest and most practical of all the problems of man on earth: namely, that of adaptation. In some respects there is already perfect adaptation between man and his envi¬ ronment. In such cases there is no particular reason why he should think about or exercise his mind or body over the situation. There are many other cases, however, in which he does not find himself perfectly adapted. If the cli¬ mate is too cold, he needs fuel, clothing and shelter. There is the best possible reason why

he should exercise his mind and body over ques¬ tions of this kind. If he lives in a climate where food is not spontaneously produced by nature he will find a scarcity of food. There is, therefore, the best possible reason why he should exercise his mind and body over the food question. So with respect to every¬ thing of which there is a scarcity or of which he feels the need of more than he has, he will wrork at his great problem of adaptation in proportion as he gives effective attention to these things and ignores those phases of . the situation which are not susceptible of improve¬ ment. From this point of view one might al¬ most say that wealth consists of those material things which it is worth our while to concern ourselves about.

Some difference of opinion has arisen as to whether the term wealth should include only material things. Are not intelligence and skill wealth? They are undoubtedly absolutely es¬ sential to the production of wealth, but it is not customary to call them wealth. It seems on the whole better to restrict the use of the term to those material things which are the objects of the exercise of the intelligence and skill rather than to include intelligence and skill themselves. If we begin to enlarge the defini¬ tion of wealth, it would be very difficult to know where to stop. Should we include the physical texture of the human muscles and the chemical and biological processes which go on inside the human body in our category of wealth? These undoubtedly have a great deal to do with the production of wealth and with our general well¬ being, just as do air and sunlight, but these are not generally the objects of human endeavor and certainly are not consciously thought of in what we call the pursuit of wealth. All defini¬ tions are of course more or less arbitrary. It seems that we must draw the line somewhere between the things which are wealth, and the things which are not wealth. It seems better to include under wealth only those things of which it is worth our while to try to increase our supply.

T. N. Carver.

WEALTH OF NATIONS. Writers on economics distinguish capital from wealth by including in capital only those commodities which are susceptible to reproduction or are employed as agents in reproduction, as land, timber, fisheries, rivers, roads, canals, ships, carriages, money, telegraphs, *etc.* The distinc¬ tion might be useful if it were generally adopted; for a vast amount of capital is sunk in objects which are apparently non-productive, as temples, monuments, statues, pictures,

musi¬ cal instruments, and generally all artistic prod¬ ucts. But as a matter of fact the distinction is not generally adopted, so that its utility is far from being convincing. No tax assessors, census canvassers nor lenders of money have adopted it. For this reason national capital and national wealth will, in the present article, be treated as synonymous.

Before the opening of the 17th century, a date which corresponds with the colonization of America, but few attempts were made to estimate the wealth of a nation, the rate of its growth, its relation to population, to the cur¬ rent rate of interest or to the local and variable character of the measure (money) which was

necessarily employed to compute it. The prac¬ tical importance of these relations were left to the researches of a later age. Yet at the very opening of the century arose a genius who, suspecting the significance of these relations, laid the foundations for every economical work which in treating these subjects has commanded the respect of science. This was Giovanni (John) Botero, a Jesuit, and the author of (Ragione di Stato,> or <The Wealth of Na¬ tionsˆ of which an English translation by Rob¬ ert Paterson appeared in 1606. Botero was followed by Mariana in Spain, Sully in France and Sir Charles D'Avenant in England, to the last of whom we are indebted for the earliest computations concerning the wealth of England, France and Holland; all of which computa¬ tions relate proleptically to the quarter of a century preceding the accession of Charles I in

1625.

England — Great Britain — United King¬ dom. — At a later period Sir Charles D'Avenant estimated the population, value of real estate and current ˆspecie" of England, whether in the treasury or in circulation, for the year 1600, as follows: For the real estate, £72,000,000; specie, £4,000,000; conservative figures. From these data a comprehensive estimate has been compiled, as follows: Year 1600, population, 5,000,000; wealth, real and personal, £200,000,- 000; money (coins and exchequer tallies), £5,000,000. Upon the scattered but useful data of Sir Charles, strengthened by the almost con¬ temporaneous estimates of Sir William Petty and others, Gregory King compiled the first contemporaneous estimate of the wealth of England in 1688, which he fixed at about £600,- 000,000, equal to about 3,000,000,000

Spanish dollars of that period ; population, 7,700,000. From that time onward the progress of wealth in the United Kingdom has been computed as follows :

YEAR

Authority

•

Population,

millions

Wealth,

million

dollars

1700

Gregory King (1712) .

8.0

3,500

1800

Sir W. Pulteney .

16.0

8,753

1850

McKean and Elder .

27.3

22,564

1875

Sir R. Giffen .

32.0

42 , 740

1900

Based on Giffen .

42.0

70,000

1903

Sir R. Giffen .

42.4

72,998

1915

Based on Giffen .

47.0

100,000

Note. — Government property and unproductive lands were not included in the estimates of wealth until 1875. In addition to his computation of wealth for the United Kingdom in 1903, Sir. R. Giffen estimated the wealth of the British Colonies and Dependencies as follows: Canada, $6,750,000,- 000; Australasia, $5,500,000,000; India, $15,000,000,000; South Africa, $3,000,000,000; and the rest of the Empire, $6,000,000,000; total for Colonies and Dependencies, $36,250,- 000,000. Because this addition to British cadastres was a novelty, and because a large part of this wealth was repre¬ sented by Indian and Colonial securities held in the United Kingdom and already included in its cadastres, it has not been included in the above table.

Out of 50 known cadastres relating to the wealth of the British isles, those above have been selected on account of their dates as illus¬ trating the progress of wealth in equal periods of time and because they are practically from the same source: a political economist and statistician of the British Board of Trade. The advance during the century, from 1700 to

1800, appears to have been about two and one-half times; from 1800 to 1850 two and one-half times in 50 years ; from 1850 to 1875 nearly twice in 25 years; and from 1875 to 1900 only 14 per cent in 25 years. The remarkable de¬ crease in the progress of wealth and

therefore of profits marked by the declining rate of in¬ terest on investments which prevailed from 1875 to 1900 has been attributed by British econo¬ mists to the loss of profits in trade occasioned by German rivalry, especially in the woolens and iron and steel trades.

France. — Turning from Great Britain to France, although scattered data may be gleaned from the memoirs of Sully, Colbert, Turgot and Necker, no comprehensive cadastre of the wealth of France appears to have been made before Arthur Young and the other economists of the Revolutionary period; from which time to the present there exist some twenty-odd com¬ putations. From, these have been selected the following ones, as illustrative of the progress of wealth in about equal divisions of time :

YEAR

Authority

Population,

millions

Wealth,

million

dollars

1789

Arthur Young and others…

25.0

7,600

1815

Moniteur Industriel .

29.5

14,200

1840

Deduced from income and other data .

33.0

22,900

1865

Deduced from M. Vacher

(1878) .

36.0

38,800

1890

Deduced from M. DeFoville

(1888) .

37.0

53,600

1915

Deduced from Leroy Beau¬ lieu and De Lavergne .

41.0

64,300

Note. — De Foville's cadastre includes securities. De Beaulieu's cadastre (of 1908) includes certain lands, roads, canals and personal property, for the first time. These have been deducted, to render it uniform with previous computations. Mr. James E. Dunning (North American Review, 1911) computed the annual savings of France at $400,000,000; a substantial agreement with the growth of wealth shown in the table.

The progress of national wealth in France exhibits a rise, from 1789 to 1815, of about 50 per cent; 1815-40, about 60 per cent; and 1840-65, about 50 per cent; 1865-90 (period of the Franco-Prussian War), a fall to about 37 per cent; and 1890-1914, a fall to 20 per cent; for which there has appeared no adequate ex¬ planation except a decrease in the profits of trade.

Germany. — The German republic as now constituted was formed on the ruins of the empire of 1871 at the close of the Great War of 1914 —18, hence the cadastral data relating to previous periods is more or less proleptical and inharmonious, not only as to computations of wealth, but even as to population. After a careful comparison of numerous conflicting au¬ thorities, the following statistics have been adopted as apparently the most authentic. The data since 1870 are based on official returns.

German national wealth appears to have in¬ creased during the decade 1850-60 to the extent of 15 per cent; 1860-70, 10 per cent; 1870-80, 18 per cent ; 1880-90, 10 per cent ; and during the four years following, 7 per cent. After¬ ward, in the five years ending 1914 the increase rose to 31 per cent. The figures are very in¬ structive, and taken in connection with those relating to Great Britain and France, they

throw no little light upon the great events through which the world is now passing.

YEAR

Authority

Popula¬

tion,

millions

Wealth,

million

dollars

1850

International Review, 1875 .

33.5

30,000

1860

Monthly Consular Reports, 1868.

37.5

34,500

1870

Daily Consular Reports, April 29,

1911 .

43.0

38,000

1880

Deduced from same .

45.2

45,000

1890

Deduced from data of Prof. Ballod

49.4

49,500

1894

Deduced from Dr. J. Riesser .

•52.0

53,000

1909

Sir Francis Oppenheimer .

63.0

63,500

1911

Dr. Karl Helfferich .

65.0

72,500

1914

Deduced from official data .

70.0

83 . 300

Note. — Sir Francis reported to the British government a German computation of national wealth showing a gain of 58 per cent in 15 years. This percentage was attained by adding “ personal property ” to the extent of $40,000,000,000; an inadmissible proportion. It has been reduced in the table to the usual proportion of personal to real property. Dr. Helfferich’s computation relates to 1910-11 and estimates the German national wealth from “ 69 to 76 ” billion dollars. The table gives the mean of these two sums.

The United States. — This is the one coun¬ try in which contemporaneous computations have been made at regular intervals

concern¬ ing the progress of national wealth. As such they afford a means of measuring that progress with some degree of exactitude and of observ¬ ing its correspondence with the profits derived from the discovery and utilization of natural resources, agriculture, cattle-raising, fisheries, mining, manufactures, shipping, the extension and profits of trade and the rate of interest which capital commands for its employment in these industries. Computations of the national wealth began with Adam Seybert in 1791 and extend at intervals of 10 years down to the present time. Until 1850 they were made by various unconnected authorities, most of them, however, by officers of the government, and one at least by formal order and under the supervision of the Treasury. In 1850 and de¬ cennially since that date they have been made officially by the Census Bureau; while taken together they are all deserving of the highest credit.

Wealth o? the United States.

YEAR

Authority

Popula¬

tion,

millions

Wealth,

million

dollars

1791

Adam Seybert, ‘ Statistics ’ .

4.0

750

1800

Pitkins' ' Statistics ' .

5.3

1,072 1,500 1,882 2,653 3,764 7,136 11,318 16,160 30,068 43 , 642 65,037 88,517 107,104 187,739

1810

Pitkins' ' Statistics ' .

7 1

1820

Pitkins' ' Statistics ' .

9 4

1830

Pitkins' ' Statistics ' .

12 8

1840

Tucker's ' Statistics ' .

17 1

1850

United States Census .

23.2

27.0

31.5

38 6

1855

1860

Report Secretary Treasury, 1856.. United States Census .

1870

United States Census .

1880

United States Census .

50 2

1890

United States Census .

63.1

77 3

1900

United States Census .

1904

United States Census .

83 8

1912

United States Census .

96.9

Note. — The later censuses include the populations of Porto Rico, Alaska and Hawaii, but not the Philippines. The censuses from 1880 and onward include from four to 12 billions of property exempt from taxation. The census of 1912 includes the cost of the United States navy ships and valuation of the privately owned water supply systems not embraced in previous computations; together about $700,000,000.

WEALTH OF NATIONS

127

Resume of Wealth of World.— The fol¬ lowing table of national capital embraces the latest computations available before the break¬ ing out of the Great War. It was coupled with an estimate of national and corporate indebt¬ edness, represented by consols, rents, bonds and other ˆsecurities® amounting to $150,000,000, equal to 25 per cent compared with the aggre¬ gate capital of the countries represented.

Capital of the Commercial Wprld, 1912.

COUNTRY

Popu¬

lation,

millions

Wealth,

millions

dollars

United States, 1912, U. S. Census… .

96.9

187,000

Great Britain, 1909, computed .

45.0

88,725

France, 1909, computed .

40. 1

83,000

Germany, 1909, computed .

64.0

63,500

Russia, 1910, computed .

146.8

60 , 000 46,170

Austria-Hungary, 1910, estimated… .

51.3

Italy, 1908, estimated .

34.0

30,600

Spain, 1912, estimated .

20.0

14,000

Turkey, 1910, estimated (Egypt and Tripoli excluded) …

24.0

9,600

Belgium, 1907, estimated .

7.3

10,950

Holland, 1909, estimated .

6.0

9,000

Balkan States, 1910, estimated .

14.0

7,000

Switzerland, 1910, estimated .

3.5

3,030

Sweden, 1‘908, computed .

5.4

2,197

Portugal, 1910, estimated .

5.4

2,700

Denmark, 1906, estimated .

2.6

2,340

Norway, 1910, estimated .

2.4

1,440

Greece, 1907, estimated .

2.6

1,300

North and South America, excluding the United States of America, est'd.

70.3

34,448

Grand total .

640.0

600,000

After the declaration of war, when new loans demanded more recent and thorough esti¬ mates of national resources, the wealth of Great Britain and her colonies and dependencies was computed at $110,000,000,000; France and her colonies, $90,000,000,000; Russia and her de¬ pendencies, $90,000,000,000; Italy and her colo¬ nies, $40,000,000,000; and the two German em¬ pires together, $150,000,000,000. This brought the .grand total of national wealth in the states tabulated to about $707,000,000,000.

As a rule the computations which have been made of the wealth of nations are based upon tax returns. Taxes being usually levied upon productive resources, such computations, whether estimates of economists or returns of census marshals, embrace not the entire wealth, but rather the more effective capital or repro¬ ductive wealth

of nations. Its rate of growth from time to time, therefore, affords inductions of a highly important and valuable character; such as the relation of money to capital, the dependable bases of taxation, the safe limits of debt, the financial significance of an impartial administration of justice and the probable fu¬ ture net rate of interest on permanent in¬ vestments.

Relation of Wealth to Population.— Al¬ though this table is in effect the balance sheet of a nation, one that covers over a century of discovery, conquest, industry and savings, it does not on its face disclose the progress of indi¬ vidual wealth. Because, for example, it shows that in 1800 the wealth per capita was $200 and in 1912 $1,938, it does not follow that the average wealth has increased nine or 10 times. The dollar of 1800 and the dollar of 1912, though they may have contained substantially the same quantity of metal, were of widely different purchasing power; so different that it has even been doubted whether the average per

capita wealth of to-day is much greater than it was a century ago. Not only has the number of dollars in circulation been enormously in¬ creased, their efficiency (velocity) in effecting exchanges has been enhanced by means of the check system, the transportation system and the post office.

In the year 1800, dollars, in order to effect distant exchanges, had to be transported by mounted messengers, mail-coaches or sailing vessels ; now they are transmitted by railways, steamboats and telegraphs ; formerly, even as to nearby exchanges, they were sent by hand; now they are paid by checks. For the most part only purchases over the counter are now settled with money. Another and opposite con¬ sideration must also be held in view. Formerly every family was obliged to keep a stock of provisions, raiment, arms and implements ; and the valuation of these commodities helped to swell the returns of wealth made to the as¬ sessors. Such is now the superior organization of industry and trade that similar precautions are no longer necessary. The official returns now include little beyond real properties, their improvements and the stocks of producers, manufacturers and merchants; in short, taxable commodities. Any comparison of per capita wealth in dollars at one time with another which omits these considerations must, there¬ fore, be fallacious.

But while the average individual wealth in tangible things may not have greatly increased, another sort of wealth has taken its place,

which, though it cannot be computed in money, has enormously multiplied the national wealth and diffused it among individuals. This is the wealth of education, knowledge and skill.

Relation of Capital to Profit. — The earlier cadastres of the United States embrace con¬ tinual accessions of territory, either by con¬ quest from the Indians or purchase from France and Spain. For this and other reasons the summations of wealth do not afford a re¬ liable guide to the average annual rate of profit in trade or investment. The doubling of na¬ tional wealth from 1820 to 1840 is equal to about 3J/2 per cent compounded annually. The doubling from 1850 to 1860 is influenced by the accession of California and other territory in consequence of the war with Mexico; while that from 1860 to 1870 is complicated by the Civil War and an inflated currency. From 1870 to 1890 the returns indicate a profit on capital of about 4 per cent compounded annually; from 1880 to 1900 about 3ˆ4 per cent; and from 1890 to 1910 again about 3]/2 per cent, compounded annually. Even before the frequent repetition of 31/ 2 per cent annual net profit at all normal periods, its identity with the net rate of in¬ terest for capital was gleaned from an analysis of the market rate of interest made in 1864. It is now widely recognized by economists, and as such it confers an additional value on the census returns and affords a useful guide 1o merchants, bankers and investors.

Relation of Capital to the Rate of Interest. — Temporarily and in any given market the rate of interest depends upon the local supply of money and credit ; but in the long run and throughout any extensive country it depends upon the profits of production in agriculture, fisheries, mining, manufactures and the means of transportation ; while these again depend

upon the rate at which the animals and plants increase and the minerals are produced under the hand of man. Other things being equal, were this rate to double, the net rate of in¬ terest (that is, the rate, divested of risk, taxes and the cost of superintending loans of capital) would tend to double ; and contrariwise, were the rate of

growth of the means of subsistence to diminish one-half, the rate of interest would tend to diminish one-half ; for that would be all that capital could earn when invested in production. ((The Science of Money, > Chap. xm).

Such being the case, it follows that the rate at which in the long run the capital of a nation increases (leaving out of view adventitious gains by discovery, invention or conquest, or, on the other hand, losses by war or other na¬ tional calamity) affords a reliable indication of the prevailing rate of interest. Indeed, when stripped of all adventitious circumstances, the two things are seen to be essentially the same thing; the net rate of interest is itself the measure of national growth and vice-versa, the rate of national growth marks the net rate of interest.

International Comparison. — When the

growth of capital in the United States is com¬ pared with that in other leading countries, the practical results of a liberal constitution, a common school system and the popular diffu¬ sion of education will be readily recognized. At the beginning of the 19th century Great Britain had a capital of $8,753,000,000; in the course of a century it increased eight times. France had a capital of about $11,000,000,000; in 100 years it increased about five times. Ac¬ cording to an estimate from the data in Zimmermann's Purvey5 (London 1787), Germany, as now constituted, had a capital of about $10,000,000,000; in 100 years it increased about four and one-half times. The United States had a capital of about $1,000,000,000; and in the course of a century it has increased 88 times.

Population and Capital in the Year 1800.

COUNTRY

Population

Wealth

Wealth, per capita

Great Britain..

16,000,000

$8,753,000,000

$547

France .

27,000,000

11,000,000,000

409

Germany .

20,000,000

10,000,000,000

500

United States..

5,300,000

1,072,000,000

202

Before the events which, preceding the European War of 1914, began to disturb the normal rate of progress in each country, Great Britain

annually added to her national capital about iy2 per cent; France, 2ˆ4 per cent; and Germany less than 2 per cent. Meanwhile the United States was increasing (is still increas¬ ing) her national wealth to the extent of about 3*4 per cent per annum. Were it regarded as a fair reward of superior industry, skill and invention, this rapid rate of progress in wealth would stand in no jeopardy of arrest. But in the fierce rivalry of international interests the palm of victory has not only to be won; it has to be defended.

National wealth cannot be deduced solely from either population, income, taxation, wages, the prices of commodities or the stock of money. In attempting to do this, many of the computations cited in Mulhall's (Statisticˆ

Putnam's edition of Hayden's dictionary of Dates) and other works of reference, have ended in the wildest misapprehension and con¬ fusion. In the absence of an official cadastre, the only reliable guide is the net rate of inter¬ est for capital, and even this must be employed with judgment. When either is ignored, the results can only be regarded as misleading.

Bibliography. — Bastiat, F., (Harmonies of Political Economy > ; Blanqui, (History of Po¬ litical Economy } ; Bohm-Bawerk, (Capital and Interest (London 1890) ; id., (Positive Theory of CapitaP (i'b. 1891); Buchanan, <Taxation) ; Buchner, dorms of Force) ; Clark, J. B., (The Distribution of Wealth) (New York 1899) ; D'Avenant, (Political Economy) ; Fetter, (The Principles of Economics) (New York 1904) ; Fisher, Irving, (The Nature of Capital and Income* (ib. 1906) ; Giffen, Sir R., (Essays in Political Economy* ; Hobson, (The Evolution of Modern CapitalisnP (London 1896) ; Mc¬ Culloch, (Political Economy) ; Madox, (History of the Exchequer) ; Marshall, (Principles of Economics* (3d ed., London 1895) ; Marx, Carl, (Das Kapital* (1867-95; Eng. trans., Chicago 1909) ; Mill, J. S., Principles of Political Economy) (London 1848) ; Necker, dinances of France* ; Ostwald, Wilhelm, (Natur Philosophie) ; Pitkin, T., Statistical View) ; Ricardo, dolitical Economy* ; Say, J. B., Political Economy* ; Sinclair, (History of British Revenue) ; Sombart, (Der moderne Kapitalismus) (Leipzig 1902) ; Taussig, <Wages and CapitaP (New York 1899) ; Tucker, G., Progress of the United States* ; Turgot, dormation and Distribution of Wealth* ; Youmans, E. L., dor-relation and Conservation of Forces) ; Young, Arthur, <Travels in France* ; Zimmermann, Survey of Europe.*

WEALTH OF NATIONS. «In the year

1776, Adam Smith published his (Wealth of Nations) ; which, looking at its ultimate results, is probably the most important book which has ever been written, and is certainly the most valuable contribution ever made by a single man toward establishing the principles on which government should be based.® Henry Thomas Buckle thus described the significance of the work of the eminent leader of the English school of ˆClassical Economists.® While the exponents of the now popular theory of ex¬ tensive state activity would be inclined sharply to differ with Buckle's estimate of the import¬ ance of the (Wealth of Nations) as an expres¬ sion of political and economic philosophy, there can be no doubt that this work was more effect¬ ive than any other in producing the generally accepted political theory which dominated the mid-Victorian England in which Buckle wrote his (History of Civilization in England.* What¬ ever may be the opinion of the modern social reformer with respect to the validity of Smith's individualistic and laissez-faire political theory, it is undeniable that a work which was able to shape the political and economic thought of a great European country, as well as of a con¬ siderable portion of continental Europe, for more than half a century is worthy of serious consideration by any student of the evolution of economic and political theory. Inasmuch as Smith's major work involved a treatment of both political philosophy and economic theory, it may increase the clarity of this summary

analysis to treat these two phases of his doc¬ trines separately, though always remaining con¬ scious that in Smith's mind they formed a single unified and coherent -body of thought.

In ,his political theory Smith followed the teachings of Locke, Montesquieu and Hume, combined with the doctrines of the Physiocrats regarding the proper scope of state activity. It is his concern with the latter which is of the greatest importance in this analysis, as he here exerted his greatest influence. Accepting the doctrine which the Physiocrats had taken over from contemporary

scientists and philosophes, namely, that there is a natural and beneficent order which pervades the universe and of necessity extends to the domain of social, eco¬ nomic and political phenomena — an order which man cannot and therefore should not attempt to alter — Smith launched a violent at¬ tack upon the restrictive state activity which had been advocated by the Mercantilist writers who had dominated political and economic theory and practice for more than a century prior to 1776. It was his fundamental thesis that human happiness and the "wealth of na¬ tions" can be most rapidly and effectively in¬ creased by bringing about complete industrial and commercial liberty, and it was at this point that his political philosophy merged with his economic theory and made possible a unified and coherent body of doctrine, though it pre¬ vented Smith from separating politics from economics as effectively as he had divorced ethics from economics. Smith enumerates the three classes of duties which it falls to a state to perform, or to guarantee the execution thereof and beyond which it should not pro¬ ceed. These are (1) the protection of the citi¬ zens against foreign states; (2) the adminis¬ tration of law and justice; (3) the establishment and maintenance of public works and the pro¬ vision Qf education, academic and religious. But he would have even the last two types of functions exercised as far as possible by the citizens acting voluntarily according to self-interest, and the state should only intervene in these fields when voluntary activity fails to function in an effective manner. It is needless to add that he vigorously urged the immediate abolition of all restrictive state regulation of industry and commerce and the immediate in¬ itiation of that regime of unhindered compe¬ tition which would allow economic affairs to harmonize with the beneficent order of nature and bring the full measure of happiness and prosperity to the human race. These laissez-faire theories were adopted and re-emphasized by Smith's disciples and were the leading factor in securing that abolition, of industrial and commercial restrictions which constituted that era of (<economic liberalism" and "political in¬ dividualism," which was the most fundamental characteristic of the economic and political his¬ tory of Europe during the first half of the 19th century, and which still prevailed a century after the publication of the (Wealth of Nations.5

In his strictly economic doctrines Adam Smith has had as wide an influence as through his political theories. Though not the founder of modern political economy, he was its. first great systcmatizer, and the (Wealth of Nations> stands toward modern economics in much the

same way that Comte's (Positive Philosophy5 does to present day sociology.

The most conspicuous element in Smith's system of economic doctrines was his emphasis on the factor of labor , which he conceived to be the ultimate source of all wealth and the true measure of value. In his theory regarding the production of wealth his emphasis upon the importance of the division of labor has been most influential in the history of economic thought. Smith's treatment of this subject was the first extensive analysis it had received since the appearance of the (Republic 5 of Plato, and in many respects it has never , been improved upon. Smith's analysis of value and exchange centred about the well-known labor theory of value, and he maintained that the actual meas¬ ure of value was the quantity of labor which a given commodity would command in exchange. His theory of distribution initiated the conven¬ tional discussion of wages, profits, interest and rent. Wages are the return to labor and are determined iby the demand for, and the supply of, labor. Profits are the return to capital and are determined by the amount of capital stock invested, varying inversely in proportion to the amount of the stock. Interest is that part of profits which is derived from the lending of capital. Finally, rent, and here in part he an¬ ticipated Ricardo, is the return to the land¬ owner and may exist as soon as all free land is occupied. It normally equals the residue from the gross income of the renter after he has deducted profits and wages. Though these specific phases of economic analysis in the (Wealth of Nations1* were of great importance for the subsequent development of economic theory, they have scarcely stood the test of more refined and scientific analysis, and they have done far less than his more general con¬ tributions to secure for Adam Smith the pon¬ tifical position which he still occupies in the history of economic thought. This position has been attained by his epoch-making attack upon Mercantilism ; the accompanying advo¬ cacy of the initiation of the regime of laissez-faire and unhampered industrial competition ; and his production of the first great systematic treatise on political economy. The significance of the (Wealth of Nations5 for posterity has been thus expressed by Walter Bagehot, "The life of almost every one in England — perhaps of every one — is different and better in con¬ sequence of it. No other form of political phi¬ losophy has ever had one-thousandth part of the influence on us." Consult Gide and Rist, (History of Economic Doctrines5 (Chap. II) ; Haney, L. H., (History of Economic Thought5 (Chap. X) ; Bonar, (Philosophy and Po¬ litical Economy5 (pp. 146-183). The relation of the 'Wealth of Nations5 to sociology is presented in A. W. Small's (Adam Smith and Modern Sociology.5

Harry Elmer Barnes,

Professor of History, New School for Social Research.

WEANING, the accustoming of an infant to food other than its mother's milk, or the disengaging of a child from the habit of nurs¬ ing. In normal cases it is now deemed desir¬ able to continue nursing for nine or 10 months after birth. Very careful mothers extend the period to cover the second summer. With

children who are healthy, and cut their teeth early, weaning may begin earlier than with weak, sickly children. It should never be at¬ tempted during sickness, nor, unless absolutely necessary, in hot weather. It is best for both mother and child to bring it about gradually. By so doing the secretion of milk in the former is slowly diminished, and those complaints which arise from sudden weaning are pre¬ vented ; while the child is gradually accustomed to other kinds of sustenance, and the restless¬ ness and want of sleep, which are so trouble¬ some in sudden weaning, are avoided. Both during the weaning and for some time after it no food should be given to the child except what is very easy of digestion, and more fluid than solid, and in particular what has no stimulating qualities, nor any that will tend to create acid¬ ity, or produce other marked changes in the organic function. See Infancy.

WEARE, war, Meshech, American colo¬ nial leader: b. Hampton Falls, N. H., 16 June 1713; d. there, 14 Jan. 1786. He was graduated at Harvard in 1735; studied theology and en¬ tered the ministry, which he gave up for the practice of law ; was repeatedly sent to the leg¬ islature, and in 1782 was speaker. His later appointments included that of commissioner to the Albany Congress (q.v.) in 1774, justice and (1777) chief justice of the Superior Court of Judicature. He was also colonel of a militia regiment, and when the Revolution opened was appointed chairman of the Committee of Public Safety. Upon the reorganization of the State judiciary he was placed at its head. He raised troops for defense against Burgoyne, whose in¬ vasion he

materially aided in repelling. In 1776, under the temporary constitution, he was elected president of the State, and was annually re¬ elected until 1784. Under the new constitution he was again elected president, but resigned before the expiration of his term.

WEASEL (Putorius novcboracensis) , a fur¬ bearing mammal (q.v.), typical of the family Mustelidce. The body is elongated and slender, the head long, the legs short, the muzzle rounded and the tail short and slender. The feet have each five toes and are digitigrade and unwebbed. There are 34 teeth and the sectorial or flesh-tooth lacks an internal tubercle. The anal glands are developed and secrete a strong¬ smelling substance. The weasel attains a length of from 12 to 15 inches, of which the tail makes nearly one-third. The male is larger than the female. Above, the color is brown ; below, white or pale yellow, the terminal one-third of the tail black. In winter the fur becomes more or less white, but this change is complete only in the north and does not affect the black of the tail ; in this white phase the animal is called an ermine (q.v.). The common weasel, in one or other of its varieties, inhabits the entire eastern United States, westward to Minnesota, south to North Carolina and north to Canada; and is replaced in most other parts of North America by more or less closely related species and in Eurasia by others, of which the Siberian ermine is its nearest ally. Owing to its retiring and nocturnal habits it is unknown to most people. It is plentiful even in the vicinity of large cities, where it renders efficient service in the destruc¬ tion of vermin.

The European weasel (P. vulgaris) is slightly smaller than its American relative, red¬ dish brown in color, but whitish underneath. (See Polecat). The weasel is a highly courage¬ ous animal, and makes war on rats, mice, hares and rabbits, birds and many other small animals. During the summer it devours insects, but ap¬ pears never to partake of a vegetable diet. In¬ stances are on record in which these animals have attacked horses and cows, and they some¬ times exhibit an utter indifference to the prox¬ imity of man. They are especially fond of eggs, and rob hen-roosts and the nest of every wild bird which they find. Their mode of killing their prey is characteristic — since they usually fasten on to the neck of their victim, and hold firmly on while they suck the blood ; next they eat the brains and only then the flesh. Like most of their near relatives they often kill much more than they require for food. They hunt by scent and are tireless in pursuit. Few ani¬ mals are so active, and the slimness of their bodies enables them to explore every hole and hiding-place of their prey. Weasels live in holes under stone walls, rocks and trees, in bur¬ rows captured by

force from ground-squirrels and woodchucks, in hollow stumps, *etc.* A nest of dried leaves and grasses is constructed and about five young are born in a litter. Consult Coues, (Fur-bearing Animals) (Washington 1877) ; Merriam, (Synopsis of the Weasels of North America > (Washington 1896).

WEATHER, the condition of the atmos¬ phere, at any time in respect to heat, moisture, wind, ram, cloud and electricity; a change of weather implies a change in one or more of these elements. For the possibility and mode of making real predictions of the weather, see Storm ; for the system of weather forecast, see Meteorology.

The great changes of solar heating attend¬ ing the alteration of day and night, and the annual march of the seasons, produce well-marked and predictable changes of weather in all parts of the world. There are indeed many tropical and sub-tropical regions of the earth where there is so much of regularity in several or all of the weather elements that the experi¬ ence of preceding years forms a trustworthy guide by means of which the weather may usu¬ ally be closely forecasted for a considerable time in advance. For example, the daily march of the barometric pressure at many tropical stations is so regular that the time of day can be told pretty closely by reading the barometer. But on the other hand, large irregular fluctuations of barometric pressure, rainfall and temper¬ ature prevail over a great portion of the earth, and in these regions there is as yet no sound system of local weather prediction for more than two days in advance.

The proximity of western Europe to the Atlantic makes it impossible in that region to predict the weather beyond a day or two at the utmost, except in the case of considerable storms leaving the American coast and likely, if not certain, to strike widely on the coast of Europe. In Norway and the Baltic, and places toward eastern Europe, the weather may be predicted for a longer time, owing to the more easterly situation. In America also, where storms advance chiefly from west to east, gales and unsettled weather are predicted for

places on the seaboard in the east some days before; though the course that a storm may take, whether more to the north or to the south, cannot be certainly foretold.

A .forecast, conjectural indeed, yet often useful, may be made by observing the barome¬ ter, the winds and the face of the sky — espe¬ cially the cirrus cloud, most elevated and deli¬ cate of the clouds; but some previous knowl¬ edge of the general features of storms (q.v.) is indispensable: these specially — (1) Storms have a circular area, and (2) advance in an easterly direction, bearing a low barometric pressure with them. (3) Winds blow from a high to a low barometer — the observer, stand¬ ing with his back to the wind, having always the low barometer to his left in the northern hemisphere — and (4) with a force propor¬ tioned to the difference of the pressure, or to the steepness of the barometric gradient. (5) Storms are noticed first in the upper regions of the atmosphere, or in the region of the cirrus cloud. (6) In front of the storm the air is warm and humid; in the rear of it, cold, or cool and dry. With such observations, requir¬ ing only a barometer intelligently interpreted, particularly if hills form part of the landscape, the character of the weather may be foreseen for one day, or even on occasions longer. In general a falling barometer is not followed certainly by storm ; but a rising barometer in bad weather indicates the passing away of the storm, though, in the colder season, possibly not without a change to higher winds and snow. > .

To the agriculturist and horticulturist, not high winds but hails, heavy rains, frosts and fine weather are what are required to be known. Such forecasts were begun in the United States by General Albert J. Myer; also in France by Leverrier shortly before his death; and they are gradually being introduced over the continent of Europe.

The weather prognostics of every language embrace much that is shrewd and of consider¬ able value, but more that is vague and absurd. The changes of the moon long were, and in many minds sti.ll are, regarded as supplying the elements of prediction; but when brought to the test of accurate examination and figures, the supposed influence of the moon's changes on the coming weather is found to be a delu¬ sion. This was shown especially by an exami¬ nation of 50 years' observations at Greenwich, and similar old records of the weather. For some years Thomas du Boulay predicted the general character of the weather of each summer from the weather conditions which prevailed during the week of the spring equinox preced¬ ing, supposing that the general character of the weather of the next six months is then settled, requiring only skillful reading. For a few years he speculated in grain on the faith of these predictions, which turned

out correct on the whole; but later his predictions did not come true. Many persons forget that a great number of indiscriminately chosen instances are required for the verification of any theoiy of weather forecasting; and that more than half of these, when impartially considered, must be favorable to the soundness of the theory, else the result is attributable to chance

alone. .

Within the past few years progress has

been made in two branches of experimental work, which may soon lead to marked advance in the line of forecasting. In the first place, the exploration of the upper air by means of kites and captive balloons carrying registering meteorological apparatus is yielding much knowledge of the distribution of atmospheric temperatures, currents and electrical conditions, which can hardly fail to promote the accuracy of storm forecasts.

In the second place, the work of the Smith¬ sonian Astrophysical Observatory, begun under the direction of the late Secretary S. P. Lang¬ ley, has tended strongly to show that the radia¬ tion of the sun (on which, directly or indirectly, all weather elements depend) is not constant, but varies often through a range of 10 or even 15 per cent in a few months. The connection between the temperature of the earth and the radiation it absorbs from the sun is such that a permanent decrease of 10 per cent in the latter would produce about 7° Centigrade (12ˆ2° F.) fall of the earth's mean temperature. But owing to the short period of the observed solar changes, and to the great capacity for heat of the oceans, the actual effect of the changes of solar radiation would generally be much less than this. Stations near the oceans will be only slightly affected, while stations in the interior of the great continents are apt to feel more nearly the full effect above estimated. On account of the secondary effects of changes of solar radiation upon cloudiness, and the reaction of cloudiness on temperature, the tem¬ peratures of different stations will be differently influenced. Owing to the immense size of the sun a considerable time must elapse before con¬ ditions affecting its radiation can reverse, and thus it seems highly probable that when the exact connection between the changes of solar radiation and the weather has been determined, it will be possible to predict the prevailing char¬ acteristics of a season, whether cold or hot, wet or dry, for some weeks, and perhaps one or two months in advance. See

Climate; Meteorology ; Rainfall.

WEATHER BUREAU. The invention of the electric telegraph made it possible to apply the developing science of meteorology to the art of weather forecasting. While American scientists were pioneers in the development of the knowledge of the atmosphere, the United States was not the first government to organize a weather reporting service, but it was the first to do so on a large scale. Its broad expanse of territory permits it, with the aid of simultane¬ ously taken observations at over 200 stations, to chart and study the operations often of several different storms at the same time, and to fore¬ cast their movements through two or three thousand miles of their progress eastward. Warnings of frosts, cold waves, floods, rain and snow storms, and of winds, dangerous to mariners, are worth many millions annually, and the saving of human life is large. Fore¬ casts cannot be made with mathematical accu¬ racy, for they are practically all empirical de¬ ductions, but they do have such a high degree of verification that no one whose life or prop¬ erty is affected by the coming of severe storms would to-day consider for a moment doing without the benefit to be derived from them.

For many years the Smithsonian Institution

was the custodian of meteorological observa¬ tions collected from government officials and others by mail, and Prof. Joseph Henry, Sec¬ retary of the Institution, in 1858, was the first person in this country (probably in the world) to collect by telegraph simultaneously taken weather observations and daily plot them on a publicly displayed map. Except in a ten¬ tative way, it does not appear that forecasts were made from these maps. He demonstrated, however, the feasibility of a national weather bureau, such as Dr. Increase A. Lapham, of Wisconsin, had diligently advocated for many years preceding, and such as Maury had sug¬ gested as the result of his studies of the storms of the oceans, and as Redfield had recommended in 1846.

Henry's map was discontinued with the breaking out of the Civil War, after having been in operation but a short time, as was a weather report issued by Prof. Cleveland Abbe, at Cincinnati, in the fall of 1869, with the aid of the Western Union Telegraph Company and the Cincinnati Board of Trade.

The persistent study of Lapham in taking comparative observations with Dr. Asa Horr, of Dubuque, Iowa, in 1853 and in 1860; the publishing of results in the Milwaukee Sentinel in 1861, showing, as Jefferson and Madison had done for Virginia many year before, that weather changes also progress from the west in the Mississippi Valley; his work in collect¬ ing and compiling records of the loss of life and property on the Great Lakes due to storms, and his petitions to scientific, commercial and legis¬ lative bodies, was mainly and immediately re¬ sponsible for the resolution introduced in Con¬ gress by Gen. Halbert E. Paine, of Wisconsin, in 1870. This finally initiated a government weather forecasting system in the United States that has grown to be the largest of its kind in the world and more intimately to serve the peo¬ ple than does any other.

Gen. Albert J. Meyer, U. S. A., the first chief, a man of splendid executive attainments, so wisely laid the foundations of the new and unique service and so successfully demonstrated its value to the industries of the nation, that Congress readily gave the appropriations neces¬ sary for its growth and development. General Meyer at once called to his aid Dr. Lapham and Professor Abbe. Lapham did not wish to leave Wisconsin permanently, where he was considered one of the most useful citizens of the State, but he did service for a time at Chi¬ cago, where he made the first government weather map and issued to the public the first government forecasts, then called probabili¬ ties. J Professor Abbe accepted service and be¬ came a scientific aid to the chief in Washington, which position he held continuously until the day of his death in 1916.

Until 1891 the weather service was a part of the Signal Corps of the Army, and the chiefs were, in the order of service, Gen. Albert J. Meyer, Gen. Wm. B. Hazen and Gen. A. W. Greely. It then became a bureau in the Agri¬ cultural Department, with Prof. Mark W. Har¬ rington chief. Harrington served four years, and was succeeded by Prof. Willis L. Moore, who directed its affairs for 18 years. The latter was followed by Prof. Charles F. Marvin, the present chief.

How a Weather Map is Made. — Each morn¬ ing at eight o'clock,

75th meridian time — which, by the way, is about seven o'clock at Chi¬ cago, six o'clock at Denver, and five o'clock at San Francisco — the observers at 200 sta¬ tions distributed throughout the United States and the West Indies take their observations, and, with the aid of carefully tested instru¬ ments, note the pressure of the air, the tem¬ perature, the humidity, the rainfall or snowfall, and the cloudiness. During the next 40 minutes these observations are speeding to their destina¬ tions, each station contributing its own observa¬ tion, and important stations receiving in return such observations from other stations as they may require in the making of maps and fore¬ casts.

At the Central Office in Washington as fast as the reports come from the wires they are passed to the Forecast Division, where a force of clerks is engaged in making represen¬ tations of the geographical distribution of the different meteorological elements. One clerk constructs a chart showing changes in temper¬ ature during the past 24 hours. Broad red lines separate the colder from the warmer regions, and narrow red lines enclose the areas showing changes in temperature of more than 10°.

A second chart shows the changes that have occurred in the barometer during the past 24 hours. As in the construction of the temper¬ ature-change chart, broad lines of red separate the regions of rising barometer from the regions of falling barometer. Narrow lines enclose the regions where the change has been greater than one-tenth of an inch ; inside of these lines other lines enclose the areas where the fall has been two-tenths, and so on. Here, for instance, throughout a great expanse of territory, all the barometers are rising — that is to say, that throughout this region the air is cooling and contracting, and therefore allowing that of ad¬ jacent warmer regions to flow in at high levels. Thus the total quantity of air resting on any given area at the ground is increased, and hence the barometers stand correspondingly higher. Over another considerable area the barometers are falling, as a result of the air above them flowing away to cooler regions. This chari indicates whether or not the storm centres are increasing or decreasing in intensity, and it gives, in a great measure, the first indications of the formation of storms.

A third chart shows the cloud areas, with the kind, amount and direction of clouds at each station.

A fourth chart, called the general weather chart, shows for each station the air temper¬ ature and pressure, the velocity and direction of the wind, the rain or snowfall since last re¬ port, and the amount of cloudiness. This is the principal chart from which the forecaster makes

predictions. The readings of the barometer on this chart are reduced to sea-level, so that vari¬ ations in pressure due to local altitudes may not mask and obscure those due to storm for¬ mation. Then lines, called isobars, are drawn through places having the same pressure. By drawing isobars for each difference of pressure of one-tenth of an inch the high-and the low-pressure areas are soon enclosed in their proper circles. The word ˆhigh® is written at the centre of the region of greatest air pressure,

and the word ˆlow® at the centre of the region of least pressure. The air flows from a region of great pressure toward one of less, the veloc¬ ity depending upon the difference in pressure in a given distance.

The arrows fly with the wind, and, as will be seen by reference to any weather map, are almost without exception moving indirectly to¬ ward the low or storm centre, and outward from the high.

A new weather map is made every 12 hours, and when severe cold waves, dangerous marine storms, heavy snows or floods are threatened, special reports are ordered to be sent to the Cen¬ tral Office every four hours from the danger region and some distance to the east of it. Through the frequent use of the telegraph and the telephone, and by maps and bulletins, the wireless and other agencies, every community in the United States is warned of impending weather changes that may be dangerous to it or harmful to its interests.

The work of the Central Office of the Weather Bureau is divided between several ap¬ propriate divisions, the chiefs of which direct their various branches under the supervision of the head of the whole service. The Forecast Division receives and charts the telegraphic re¬ ports that are sent in twice daily, and several times a day from restricted areas when danger¬ ous conditions are imminent. It issues all the more important warnings for the whole coun¬ try. To facilitate getting to the public the forecasts in the shortest possible time, dis¬ trict forecasters receive full sets of reports at Boston, Chicago, New Orleans, Denver, San Francisco and Portland, Ore., and simulta¬

neously with the Central Office, make and dis¬ tribute forecasts for definite districts, but these district centres are instructed from Washington with regard to each of the important warnings disseminated. Certain river centres issue fore¬ casts of the daily stages of the rivers in their respective regions independent of the Central Office. Local forecasters at all of the import¬ ant cities issue forecasts for their vicinities and have freedom of expression, provided they first receive from Washington forecast each for his State. In addition to the 200 regular observa¬ tion stations of the bureau there are some 200 substations at lake and sea ports that display flags during the day and lights at night to warn mariners of storms. Special means of distribu¬ tion are provided so that warnings of frosts, cold waves, floods and marine storms may in each case reach all of those who may profit by them.

The River and Flood Division has charge of the work of that part of each local station that collects information as to precipitation and the amount of snow and ice on the ground throughout the watersheds of the principal rivers, and the measuring of the height of streams. For this purpose, in addition to 48 full stations, where gauge readings are made, there are over 250 special stations that measure only the height of rivers and 74 that measure rainfall.

The duties of the Division of Agricultural Meteorology is to supervise the work of 3,000 voluntary or co-operating observers, who serve without pay and render reports of temperature, precipitation and other miscellaneous meteoro¬

logical and climatic data, which are published in the Monthly Weather Review. There is thus being collected a large amount of data that is available for the discussion of climate in its relation to man from either a hygienic or a commercial viewpoint. During the seasons of planting, cultivating and harvesting, weekly re¬ ports of weather conditions and their effects upon various crops and farming operations are included in both the national Weekly Crop Bul¬ letins and in 42 section bulletins. This divi¬ sion controls the distribution of the forecasts and warnings issued by the Forecast Division.

The Instrument Division is charged with the examination, testing, comparison, installa¬ tion and maintenance of the instrumental equip¬ ment of the bureau.

The Division of Meteorological Records has charge of the compilation

of meteorological and climatic statistics and their application to the various needs of commerce, courts of law and individuals.

The Division of Barometry and Aerial Ex¬ ploration has charge of the exploration of the upper air by means of kites, balloons, theodo¬ lites and nephoscopes. It studies the technical problems of air pressure and vapor-tension.

There are also the Publications, Telegraph and Supplies divisions, the duties of which are indicated by their respective titles.

The observation instruments consist of standard wet, dry, maximum and minimum thermometers and the mercurial barometer, for measuring temperature and pressure, with wind vane and anemometer for wind direction and velocity. Most stations are also equipped with self-registering instruments that record con¬ tinuously the fluctuations in pressure and tem¬ perature, velocity and direction of the wind and the number of hours of sunshine. An automatic raingauge also registers the time of beginning and ending of precipitation, together with the amounts that occur.

The telegraphic circuits are so arranged that at any station those reports are taken off that are used in making charts and forecasts at that station. The observation messages take pre¬ cedence over all others and the efficiency of the telegraph companies is such that within an hour after the observations are taken they all have been received at Washington and other stations.

The press associations receive the forecasts as soon as made and immediately furnish them to the papers to whom they render service. They are also telegraphed to Chambers of Commerce, or delivered by messenger from the local office of the bureau to the commercial associations and marine agencies, where they are posted on bulletin boards. Before the more important commercial exchanges an observer of the bureau each morning draws the weather chart in different colored chalks, on a glass map of the United States of about 8 by 12 feet. The principal stations of the bureau are equipped with plants for the printing of the daily weather map and forecast cards, which are distributed by messenger and post. The fore¬ casts are also telegraphed to a large number of postmasters, who stamp them on cards that are mailed to surrounding towns.

For a number of years the bureau main¬ tained at Mount Weather, Va.f a research

station, through the work of which the United States cooperated with other nations in the gaining of useful information of the great ocean of air above us. Up to 1912 the records of the world were broken at this institution, altitudes of four and one-half miles being at¬ tained with kites carrying self-recording in¬ struments and balloons ascending to over 19 miles. The latter was accomplished by send¬ ing instruments and balloons to the far west, where they were liberated, the instruments descending to the earth farther east under para¬ chutes after the balloons had burst. The ex¬ ploration of the upper air made by this in¬ stitution has proved of inestimable value to our aviators during the World War, an elaborate series of observations, or deductions thereupon, covering a period of five years, having been pub¬ lished by the National Advisory Committee for Aeronautics.

Further Development in Forecasting. — We

reasonably may expect that it is but a matter of time and not far in the future, when enough of the observation stations of the bureau will be equipped with kites for windy days and aviators for days of moderate wind, so that there may be secured such a system of simul¬ taneous observations as will enable the fore¬ caster at Washington to construct a weather chart on say the three-mile level, which is about in the centre of storms, so far as their vertical dimensions are concerned. By com¬ paring such a chart with the sea-level chart a much more accurate forecast surely can be made. At the close of the war many thousand air men were free for the development of mail, passenger and light freight transporta¬ tion through the air. Then forecasts of the stability of the air for flight became imperative. The proposed high-level chart will render such forecasts possible. The time may be near at hand when Weather Bureau stations will dis¬ play more warning signals from the tops of their office building and elsewhere for the bene¬ fit of air sailors than are now displayed to aid the sailors of the sea.

Ignorance of weather conditions on the oceans costs the world hundreds of millions of property annually and the toll of human life is

appalling when expressed in figures. To aid in preventing this enormous loss, much of which is unneccessary if the full measure of the methods that science within recent time has put at our disposal is utilized, the writer, as chief of the Weather Bureau, organized a sys¬ tem of wireless observations from moving ships along the Atlantic and Gulf coasts that has enabled the forecaster to detect many hurri¬ canes when they were entirely out of the range of our land stations and give full and timely warning of their approach. In 1912 he formulated and published a plan for the con¬ struction of a daily weather map of the Atlan¬ tic Ocean by the relay from ship to ship of si¬ multaneous observations and their charting at the Central Office of the Weather Bureau in Washington. With only two-words in the mes¬ sage the location of the ship and the reading of the barometer can be conveyed. When the pressure of the air is plotted the direction and force of the wind will be known. The storm regions can be shown, and when hurricanes appear no ship carrying a receiving instrument

need be unadvised of its location, for a high-power message can be flashed from some coast wireless station which will, at the same instant, reach every vessel on the great ocean.

The first thing necessary to the inaugura¬ tion of the proposed great ocean service is the right of way for messages, so that they may be quickly accumulated at some central point. With the object of overcoming this difficulty the writer was made a member of the Inter¬ national Radio Congress that met in London in 1912, where, with the aid of the United States delegates, he secured the adoption of regulations that give to the observations needed in such a service the right of way over all messages except distress calls. The logic of events must eventually compel the cre¬ ation of something so necessary to the needs of humanity, both on the Atlantic and the Pacific oceans. The return of our flag to the peaceful ways of ocean commerce and the pro¬ tection of our fleet in time of war, would seem to require the proposed extension of the do¬ main of the Weather Bureau.

Seasonal forecasts also seem to be one of the possibilities of the future. Abbot, Kim¬ ball and other able men are studying the varia¬ tions in solar radiation, the recurrence and fre¬ quency of sun-spots and solar prominences, hoping by a comparison of data to trace some relation between them and the ever-varying seasons of the earth. Recent results are encouraging.

Willis L. Moore,

Professor of Meteorology , George Washington

U niversity.

WEATHER MAPS. See Meteorology.

WEATHER SIGNALS. See Signals and Signaling.

WEATHERFORD, William, American

half-breed Indian chief : b. Creek Settlement, Ala., about 1770; d. Monroe County, Ala., 1826. He was the son of a white trader and of a Seminole Indian woman. He was a warrior of great bravery and force of character ; led the attack upon Fort Mims, 30 Aug. 1813; was defeated by Claiborne at the battle of Holy Ground, December 1813; and again suffered de¬ feat at Horseshoe Bend, 27 March 1814, after¬ ward surrendering to General Jackson. He subsequently retired to his plantation, where he lived peaceably the remainder of his life, respected and honored by both Indians and whites. Consult Parton, J., (Life of Andrew Jackson* (Vol. I, 1860).

WEATHERFORD, wefh'er-ford, Tex., city, county-seat of Parker County, on a branch of Trinity River, and on the Gulf, Colorado and Santa Fe, the Weatherford, Mineral Wells and Northwestern and the Texas and Pacific railroads, 30 miles west of Fort Worth. It was settled in 1850 by persons from east Texas and the older States. In 1856 it was incor¬ porated, and in 1858 chartered as a city. It is in an agricultural and stock-raising region ; wheat, cotton and corn are among the principal productions. The chief manufactories are oil mills, cotton mills, a cotton compress, an ice factory, machine shops and the light plant. There are 10 churches. The educational in¬ stitutions are the Texas Female Seminary (Cumberland Presbyterian), the Weatherford

WEAVER BIRDS (Ploceus franciscanus)

College (Methodist Episcopal South), a high school established in 1885, Saint Joseph's Acad¬ emy, Hughey and Turner School, public and parish graded schools. There are three banks and three newspapers, one a daily. The government is vested in a mayor and a board of aldermen consisting of eight members. The majority of the inhabitants are American born ; about 7 per cent are of Mexican and French descent and 3 per cent are colored. Pop. (1920) 6,203.

WEATHERING, the process, either me¬ chanical or chemical, by which rock material is made fine and ready for removal by wind or running water. See Metamorphic Rocks, and especially the section on the Work of the Atmosphere in the article on Geology.

WEATHERLY, wet'h'er-li, Frederic Ed¬ ward, English song writer and barrister : b. Portshead, Somerset, 4 Oct. 1848. He was graduated from Oxford in 1871 and was called to the bar of the Inner Temple in 18S7. He is widely known as the writer of popular songs, many of which have been given musical settings. Among them are (Nancy Lee5 ; <Polly) ; (Three Old Maids of Lee5 ; (Darby and Joan.5 Of his published volumes mention may be made of (Muriel and Other Poems) (1870) ; (Wilton SchooP (1872) ; (Oxford Days> (1879) ; Ru¬ diments of Logic) (1879) ; (Questions in Logic, Progressive and General5 (1883) ; (Two Chil¬ dren5 (1884) ; (Lays for Little Ones5 (1898).

WEATHERLY, Pa., borough in Carbon County, 18 miles southeast of Scranton, on the Lehigh Valley Railroad. There are manufac¬ tures of silks, machinery, woodwork, cigars and candy. Pop. (1920) 2,356.

WEAVER, we'ver, Aaron Ward, American naval officer: b. District of Columbia, 1 July 1832; d. 2 Oct. 1919. Graduated United States Naval Academy in 1854; became lieutenant in 1855 and in 1858-59 cruised along the African Coast in the sloop Marion, and returned in command of the prize slaver Ardennes. He served in the Union army with distinction through the Civil War, was made commander in 1866, captain in 1876 and rear-Admiral in 1893 ; and was retired in September of the year last named.

WEAVER, Emily Poynton, Canadian au¬ thor: b. near Manchester, England, 1865. She removed to Canada with her parents in 1880 and subsequently lived in Oxford County, Ontario, and in Halifax and Toronto. She is known as a writer of short fiction and his¬ torical essays for magazines, and is also author of (My Lady Nell5 (1890) ;

(The Rainproof Invention5 (1896) ; (Builders of the Dominion5 (1907); (The Trouble Man5 (1910); ‘Canada and the British Immigrant5 (1914), *etc.*

V/EAVER, James Baird, American po¬ litical leader: b. Dayton, Ohio, 12 June 1833; d. Des Moines, Iowa, 6 Feb. 1912. He was graduated from Ohio. University Law School, 1854, and began practice in Iowa. In 1861 he entered the Union army, was promoted colonel in 1862 and brevetted brigadier-general in 1865. In 1866-70 he was district attorney, second ju¬ dicial district of Iowa, and in 1867-73 assessor of internal revenue first Iowa district. For some time he was editor of the Iowa Tribune, published at Des Moines. He took an active part in the organization of the Greenback party

and was elected to Congress on its ticket in 1879, serving one term; in 1880 he was the Greenback candidate for President, receiving over 300,000 popular votes. Later he was affili¬ ated with the People’s Party, was a delegate to the National Convention in 1892, and was again nominated for the presidency, receiving over .1,000,000 popular votes. Since 1895 he has lived in Colfax, Iowa, and was mayor of that city from 1903-06. He wrote ‘A Call to Action5 (1892) and (Past and Present of Jasper County, Iowa5 (1912).

WEAVER, Jonathan, American clergyman, bishop of the United Brethren in Christ: b. 23 Feb. 1824; d. 6 Feb. 1901, at Dayton, Ohio. His education was limited to the common schools and the Hagerston, Ohio, Academy. He first began to preach in 1845 but did not join a conference until 1847. After serving several appointments he became presiding elder in 1852 and then was agent for Ottenbein Uni¬ versity from 1857 to 1865 when he was elected bishop. In 1893 he became bishop emeritus. He was one of the greatest leaders of his church. He was the author of discourses on the Resurrection5 (1871) ; Ministerial Salary5 (1873); divine Providence5 (1873); ‘The Doctrine of Universal Restoration Carefully Examined5 (1878) ; dractical Comment on the Confession of Faith of the United Brethren in Christ5 (1894) ; ‘Heaven, that Better Country5 (1899) ; ‘Christian Theology5 (1900) ; Edited ‘A Comprehensive View of Doctrinal and Prac¬ tical Theology by thirty-seven different writers5 (1889). Consult ‘Biography of Jonathan Weaver,5 by H. A. Thompson (Dayton, Ohio,

1902).

WEAVER-BIRD, a bird of the family Ploccdice remarkable for their nests. The fam¬ ily is a large one and is confined to the warmer parts of the Old World, Africa being particu¬ larly rich in species. Weaver-birds closely re¬ semble large finches, with somewhat elongated bodies, moderate wings, which have the outer primary quill better developed than in the Fringillidcu, long tails, and very bright plumage, the latter often varied in the breeding season. Yellow and yellowish red . are the prevailing tints, but species occur in which black, red, white or gray predominates. The weaver-birds are extremely social, and many of the species live in large colonies during the period of in¬ cubation.

The nests of the various species differ con¬ siderably in shape and general structure, some (as the genus Oriolinus), building a separate nest for the male, while the female sits in an¬ other on her eggs, till relieved by her mate ; others again contain more than one chamber, as that of the golden weaver-bird (Ploccus gal-bula) ; while the social weaver-birds (Philceterus socius) construct an umbrella-like roof, under which from 800 to 1,000 separate nests have been found. But in all cases fibres, slender twigs or blades of grass are the materials em¬ ployed, the whole being tightly woven, after having been rendered more flexible and ad¬ hesive by the application of saliva. In some cases the birds of a pair take positions on op¬ posite sides of the structure and the fibres are passed through and through from one to the other. The nests themselves consist of a more or less globular portion, elongated into a tube.

below, with the entrance at the bottom or at the side. They are very generally suspended at the extremities of branches, and often over water, probably as affording security against monkeys, snakes and other enemies. The Mahali weaver (P. taka) is said to insert thorns into its nest, as a further protection against marauders. A Philippine species (P. Philip-pinns) builds flask-shaped nests of fine roots suspended mouth downward by long ropes of similar construction from the boughs of trees. Consult Bartlett, (Monograph of the

Weaver-birds) (Maidstone 1888).

WEAVERS, The. The misery of the Sile¬ sian weavers of the second quarter of the 19th century inspired Heine to one of his most mov¬ ing ballads and is a matter of common histori¬ cal knowledge. Gerhart Hauptmann derived his intimate feeling for it chiefly from the lips of his grandfather, one of the actual sufferers; and in his work (Die Weber) ((<The Weavers®) (1892) he has given to industrial revolution a stronger sanction than can be found in any other dramatic work whatever. (Die Weber) is rather a series of five one-act dramas than a drama in five acts. Different groups of per¬ sons appear in five different places. But the persons belong to the same community, they pass to and fro, and the five acts, each a unit, with skilful exposition and a theatrical con¬ clusion, constitute a greater whole, in which rebellion is carried to temporary success, but which is mainly impressive for the presentation of conditions that cry out for a remedy. There is no hero; every person is an integral char¬ acter, every one a reality, and to the tragedy of starvation as the only reward for toil is added the pathos of vicarious atonement: an old weaver who refuses to leave his loom in order to join his fellows in rebellion is shot by a stray bullet. Hauptmann's method is unquali¬ fiedly naturalistic. The play was first written in the harsh Silesian dialect, and the revised form in general circulation is only approxi¬ mated to the literary language. It smacks of the soil. Its power resides in its apparent art¬ lessness, in the impressiveness of truth naked and unadorned. There is, however, in a treat¬ ment of squalor which arouses unmixed sym¬ pathy a high degree of art, as there is also a preachment the more eloquent for being left to be inferred. Its text is the simple precept, give them their daily bread. Consult (The Dramatic Works of Gerhart Hauptmann) (tr. by Ludwig Lewisohn and others, New York

1913-15).

William G. Howard.

WEAVING, a process in which a series of longitudinal strands of fibre of one kind or another are united into a web or fabric by in¬ terlacing with cross threads. The two sets of threads employed traverse the web at right angles to each other. The first set extends from, end to end of the web in parallel lines, and is commonly called the warp ; while the other set of threads crosses and interlaces with the warp from side to side of the web, and is generally called the weft or woof. In all forms

of weaving the warp threads are first set up in a device known as a loom, and then the weft threads are worked into the warp, to and fro, by means of a shuttle.

The art of weaving is of such extreme an¬

tiquity that its beginnings cannot be traced ; and, indeed, the idea seems to have had a well-nigh universal origin in the human mind, as the essential methods are found in well-devel¬ oped form among savage tribes which have never been in touch with civilization. The primitive loom may have been no more than a simple beam suspended from the branch of a tree and sustaining the warp fibres or threads, the weft being worked in by hand with a sort of needle. But from the earliest days down to the present it has been by this fundamental process of interlacing two sets of thread in looms of simple mechanism that all known tex¬ tile fabrics have been produced — the mummy cloths of Egypt, the fine damasks and tapes¬ tries of the Greeks and Romans, the Indian muslins, the shawls of Cashmere, and the world-famed weaves of Italy and the Netherlands.

Four classes of woven cloths are recog¬ nized by weavers: (1) Single, or simple cloths, in which there is but one warp and one weft in¬ terlaced at right angles to one another ; (2) Compound cloths, in which there are two or more warps or wefts interlaced at right angles;

(3) Cloths in which the warp threads either singly or in groups are interwoven with each other during the weaving, with a knitting stitch ;

(4) The pile fabrics of all degrees. The first class includes all ordinary cloths of single thick¬ ness. The second class includes what are known as “backed® cloths, two-ply, three-ply and four-ply fabrics, tapestries and padded fabrics. The third class includes all fabrics of the gauze type, or which are partly in the “leno® or knitting stitch. The fourth group in¬ cludes such fabrics as Turkish towels, Brussels carpets, velvet carpets, plushes and velvets of all descriptions.

The instrument or mechanism by which the operations of weaving are accomplished is known as the loom (q.v.). Looms are classi¬ fied as Hand Looms and Power Looms, accord¬ ing to the motive power employed. In the hand loom the operator throws the shuttle with his hand, and works the treadles with his feet. The power loom is automatic, all necessary motions being carried out by ingenious and

often intri¬ cate mechanisms, so that once started it contin¬ ues weaving until all the warp has been made into cloth. An attendant stands by in case of accident, and usually one operator can attend to several running looms.

Hand Looms. — Until comparatively modern times all weaving was effected by means of the hand loom. This loom, in its usual form, con¬ sists of a frame of four upright posts braced together by cross-beams, a centre horizontal beam at the back being the warp beam, the beam in front being that upon which the web is wound, while just below this, in front, is the breast-beam for the support of the weaver at his work. At the top of the loom is an apparatus by which the heddles are lifted or lowered by means of treadles under the foot of the weaver. These heddles consist of vertical frames, set with cords, each with an eyelet at the centre. In “setting® the loom the mass of threads con¬ stituting the warp is wound upon the warp-beam as upon a spool. They are then led one by one to the heddles. If there are but two heddles on the loom, as in plain weaving, the

Chinese Silk Fabric

threads are passed alternately through the eye¬ lets; that is, the first, third, fifth — and all the other odd-numbered threads through one hed-dle, and the even-numbered threads through the other. A loom may have many heddles, as in pattern weaving and in that case the threading of the warp through the heddles requires much

skill, to be gained onlv by experience. After passing the heddles the

threads are brought forward through the reed, a sort of comb-like structure with long teeth, lying upon its back, the teeth extending vertically upward. Two ad¬ joining warp threads pass in the space between each two teeth of the ˆcomb.® The ends of the warp are finally fastened to the cloth-beam in front. Care is needed in order that all the threads shall have equal tension, so that the cloth when woven shall be smooth, and not pucker. Attached to the lower edge of the reed is the <(ley® or (<sley® which serves to weight the reed and thus give force to its blow in the weaving process, and also provides . a shelf along which the shuttle travels. See Fig. 1.

In the operation of the loom, when one hcddle is raised every second thread in the warp is also raised, while the remaining threads are depressed; and this is called shedding the warp. When the warp threads are thus parted there is left a small opening or shed between the threads directly in front of the reed, and it is through this opening that the weaver drives his shuttle to and fro, from side to side. The shuttle, which is hollow in the middle, con¬ tains the weft-thread wound around a bobbin or pirn, and as the shuttle is shot across the web this weft-thread unwinds itself. When the thread is thus introduced it is necessary to bring it to its place in the fabric. This is accom¬ plished by means of the ley or batten, sus¬ pended from a pivot at the top of the loom, swinging backward and forward like a pendu¬ lum by an attachment of vertical rods at each side called the swords. The teeth of the reed are thus swung forcibly against the newly laid weft thread, driving it solidly to its place in the cloth. The other treadle is then pressed

down, raising the other heddle and, with it, the alternate warp threads, thus forming another shed, in which the threads which were the floor of the first shed are the roof of the second. Through this new shed the shuttle is thrown on its return journey. This throwing of the shuttle is termed ((picking® and each traverse of the web is called a ((pick.® The travel of the shuttle is accomplished by means of a Y-shaped handle, to the arms of which are attached two strings which lead one to each of the shuttle boxes at the ends of the ley. A quick jerk upon the string sends the shuttle flying out of its box through the shed of warp threads and into the shuttle box at the opposite end of the ley. Thus the weaving proceeds, the ley being swung forward, driving up the new weft thread, after each pick of the shuttle. Occasionally, as the web of finished cloth increases, the loom is stopped,, and the cloth is wound up around the cloth-beam, another stretch of warp being unwound from the warp-beam; and this suc¬

cession of operations continues until the entire length of the warp has been woven into cloth.

Weaves. — ‘There are three fundamental methods or plans of interlacing the warp and weft threads in weaving; (1) plain weave; (2) twill weave; and (3) sateen, or satin weave. All woven cloths may be referred to one or another of these three primary plans or of a combination of two or more of them — in which case the texture is called ˆcombination weave.® By far the larger part of all woven fabrics is produced by the plain weave method, but these cloths are varied in many ways — by modifica¬ tions of the relative sizes of the warp and weft threads, by manipulations of the heddles, and to an unlimited degree as to the color and design by the use of self-colored and parti¬ colored threads in both weft and warp.

Plain Weave. — In plain weave the threads are made to interlace alternately; and, if the warp and weft threads are of the same diameter, and there are an equal number of each to the inch, they bend around one another to about the same degree, and thus form a plain flat uniform cloth, in which the warp and weft threads

Fig. 2. — Simple Weave, showing the interlacing of the warp threads A, A, with the weft thread B, B. At right the weaver’s pattern for simple weave with the tie-up of the two heddles employed (above).

appear equally on the surface. With this weave are produced the finest cambrics and muslins, and the heaviest woolen blankets — and the numberless other fabrics of similar texture lying between these two extremes.

A diagram of the interlacing of plain weave fabrics is shown in Fig. 2, the threads A,

A representing a section of the warp, and the continuous cross-thread

B, B representing the weft. In actual weaving the warp threads would lie close together, usually from 16 to 64 to the inch, and each pick of the weft would be driven up snugly to the one preceding by a blow of the reed. In order that the weaver may know what style of cloth he is to produce, a plan or pattern is drawn for him by the de¬ signer on paper ruled in squares ; the latter being marked in some way to indicate the position the thread represented will occupy in the finished cloth. The rows of squares running vertically indicate the warp, and those horizon¬ tally the weft. As only the warp threads are raised and lowered by the heddles, the pattern is made to indicate these movements by coloring the squares.

Ordinarily (though the exact reverse is sometimes encountered), a blackened square shows that that section of the warp is de¬ pressed below the weft thread on that pick. It is also customary to show the threading of the heddles above (or below) the pattern — as shown in the figure. The two heavy horizontal lines indicate the bars of the two heddles used in plain weaving; the upright lines leading to the heddle bars from the pattern indicate the method of threading each strand of the warp.

Fig. 3 shows a diagram of the arrangement

Fig. 3. — Diagram of Attachment of Heddles to Treadles for Double Shed Motion.

of levers where both the rising and sinking of the warp threads are employed in producing the shed. The short horizontal levers are so tied to the long ones that when one of the latter is depressed by stepping upon a treadle, thus rais¬ ing one of the heddles, all of the other heddles (three in this case) are pulled down, producing the double movement shed shown in profile in Fig. 1.

Modifications of the plain weave may be

made in several ways ; for example, by taking in two or more threads of the warp with each pick of the weft, thus extending the ex¬ posure of the weft from side to side, or as this form of pattern is designated, in the <(horizontal® form. Or two or more threads of the warp may be passed under by the weft in con¬ secutive picks without change of

the heddles, thus exposing more of the warp than is usual in simple plain weave, thus forming a (<vertical® pattern. Plans for both these patterns are shown in Fig. 4. Such modifications may be

Fig. 4. — Plain Weaves. A, Vertical pattern; B, Hori¬ zontal pattern; C, Horizontal l-and-3 pattern; D, Basket Weave.

uniform, or they may be uneven in design; that is, the same number of threads may be taken in at each stitch, or there may be a con¬ stant variation, as l-and-3, l-and-3, and so on. If the same number (more than one) are taken both vertically and horizontally the (<basket-weave® is produced. Plans for these also are shown in Fig. 4.

Twill Weave. — In the weaving of twills the interlacing is quite different from plain weave. Considering the shuttle as starting from the left hand, and the threads numbered consecu¬ tively from left to right, the operation may be described thus : for the first pick the first thread of the warp is raised, allowing the shuttle to pass under it, the second and third threads being depressed so that the weft lies above them ; the fourth thread is raised and the fifth and sixth are depressed — and so on. On the second pick, that is, as the shuttle comes back to its first position, the heddles are operated so that the second thread of the warp is raised, the third and fourth being depressed ; the fifth raised, and the sixth and seventh depressed — and so on. As the shuttle starts away again from the left, the first and second threads are depressed and the third raised ; the fourth and fifth depressed and the sixth raised — and so on ; this completing the cycle. By this method of manipulating the heddles is produced the diagonally ribbed appearance of the surface of the cloth characteristic of twills. These rib-WEAVING

bings appear on both sides of the cloth. They may trend either to the right or to the left (from the weaver). On the three-thread pat¬ tern, as described above, only one variety of twill can be produced — that with the apparent ribbing on the diagonal of a square, that is, at 45°. But by using a four-thread pattern — that is, by depressing three threads of warp

Fig. 5. — Cross Sections of Single Weave Cloths: A, the common weave with weft and warp of equal size; B, corded or repp cloth with two sizes of warp; C, l-and-3 cloth.

for each one raised, a modified twill is pro¬ duced with a ˆflatter® diagonal, that is at about 30° — away from the weaver. The cloth thus produced is called a ˆhorizontal twill.® On the other hand the manipulation of the heddles may be such that three vertical meas¬ ures of the warp may be left on the surface to each one covered by the weft, thus producing

Fig. 6. — Pattern for Plain Weave on two heddles; show¬ ing tie-up above, and treadle movement at the right.

a (<vertical twill,® with the angle of the ribbing running away (from the weaver) at about 60°.

Where four threads (of warp) and four picks (of weft) enter a design a much wider variety in texture is gained. In fact, next to the plain weave the 2-and -2 twills are the most extensively used in weaving; constituting the serges, cassimeres, most linen goods and a

great variety of silk, wool and cotton dress cloths. Patterns of the three fundamental straight twills on four threads are shown in the upper tier of Fig. 8, the 2-and-2 twill in the centre; the tier of pattern blocks just below them showing the reverse sides of the upper

|-i

R

T

5S

Fig. 7. — A, Regular twill; B, Vertical twill; C, Horizontal twill.

blocks. Besides these straight twill weaves three other arrangements are possible through the manipulation of the heddles in an irregular fashion, thus producing what are called <(broken twills® — used very largely in the weaving of the coarser lines of <(dice® pattern; in many

C3 W Fig. 8. — Group of Four-thread Twill Patterns. F

woolen cloths ; in double-faced cloths ; and ex¬ tensively as a base for various fancy weaves and for dotted fabrics. Patterns for these broken twills are shown in the lowest tier of Fig. 8. The twill weave can also be carried into five-thread patterns, and even greater skips,

Fig. 9. — Patterns of Herring-bone Twills.

but with five threads the sateen weave becomes available, and is more commonly used. It is obvious that the direction of the ribbing in a twill may be changed at will from a right-hand trend to a left-hand trend during the process of weaving, and thus produce a zigzag pattern

known as ˆherring-bone® or diaper — as shown in Fig. 9. In Fig. 10 is shown an elabo¬ rate pattern of twill which may be worked on 10 heddles and with 10 treadles. One of the chief advantages of the twill pattern is that a firm and substantial cloth may be thus woven from comparatively light yarns.

Sateen Weave. — In sateen weaving at least five heddles are used. Supposing the shuttle to start from the left side of the warp, and the

sateens: 3-and-5 and 5-and-3. In an 11-thread design eight different sateens are pos¬ sible : 2-and-9, 3-and-8, 4-and-7, 5-and-6,

6-and-5, 7-and-4, 8-and-3, 9-and-2. As a prac¬ tical limit in designing it may be mentioned that 24-thread patterns are in use for fine silks, though rarely for other materials.

Damasks. — In damask weaving the pattern is produced by arranging that the warp in some parts of the fabric and the weft in others

Pig. 10. — Pattern of Twill Weave on ten heddles; showing tie-up above, and treadle movement

at the right.

warp threads to be numbered consecutively from that side, the operation may be described as follows: the first, sixth, 11th, etc., threads are stitched on the first pick; the third, eighth, 13th, etc., on the second pick; the fifth, 10th, 15th, etc., on the third pick; the second, seventh, 12th, etc., on the fourth pick; and the fourth, ninth, 14th, etc., on the fifth pick — thus completing the sateen cycle. The resulting fabric is of peculiarly pleasing texture, display¬ ing comparatively long stretches of parallel fibres, affording a smooth and silky texture.

On five threads and five picks only two pat¬ terns of regular sateens are possible. These are indicated at A and B in Fig. 11. Variations are produced by increasing the number of threads or picks in each stitch ; thus producing patterns C and D in the same figure. Further variations give patterns E, F and G. It is readily seen that no regular sateen pattern can be worked out on six threads (each way). With seven threads, however, there are four; expressible by the leaps in the stitches, thus : 2-and-5, 3-and-4, 4-and-3, and 5-and-2. In an eight-thread design there can be only two

shall be exposed in more or less solid masses. This form of weaving is employed more gen¬ erally in textiles of cotton, linen and silk, though sometimes in woolen dress goods. Well-known examples are table

linen and up¬ holstery. The stitch is usually of five-thread or eight-thread sateen. In some of the finer napery the ground work is in five-thread sateen and the figure in eight-thread sateen. These fine fabrics may show up to 140 threads of warp and 200 picks of weft to the square inch. An illustration of damask texture is shown in Fig. 12.

The possibility of combining the fundamen¬ tal weaves in the production of ((combination-weave® textures has been referred to already. The necessary limits of an article such as this preclude a discussioin of these numberless varia¬ tions, and the student must be referred to the technical works cited in the bibliography at the close of the article.

Jacquard Loom. — A most important im¬ provement was made on the handloom by Joseph Jacquard of Lyons, who. in 1801, invented an apparatus by which the most intricate patterns

could be woven as readily as plain cloth. This is accomplished by an ingenious arrangement of hooks and wires, by means of which the warp threads are lifted in any order necessary to make the shedding required by the pattern. The order in which these hooks and wires are suc¬

cessively lifted and lowered is determined by means of a series of pasteboard cards punctured with holes, the holes corresponding to a certain pattern and the cards passing successively over a so-called ˆcylinder,® of square cross-section, over which the chain of cards is carried. With

Fig. 12. — Pattern showing method of weaving damask.

each pick of the shuttle this ˆcylinder’* swings outward and makes a

quarter-revolution pre¬ senting a new card face on the return swing. The wire rods which fail to strike a hole in the card are driven back thus unhooking the hooked rods from the rising and falling (<knife

beamˆ which operates the heddles. The hooks which remain on the pins of the knife beam lift the warp threads to which they are attached ta the ((roof» of the shed. The unhooked threads remain on its ˆfloor.® The operation will be more readily understood by referring to Fig. 13. When the pattern is extensive the machine may be provided with as many as 1,000 wires.

Power Looms. — A great development in the art of weaving followed upon the invention of the power loom by the Rev. E. Cartwright in 1784. In the power loom, which has been gradually improved and adapted to steam and electric power, the principal motions of the old method of weaving, such as shedding the warp threads, throwing the shuttle, and beating up the thread, are still retained. The frame of the power loom is of cast iron, and motion is com-

Fig. 13. — Diagram of Heddle-operating Mechanism of the Jacquard Loom. A, A, the chain of perforated cards; C, " cylinder " in normal position holding card against needle-plate P — the dotted lines show the position of C when swung outward and revolving; N, N, the needles as held by the spring-box 5 except when pushed back by the unper¬ forated parts of the card; H, H, hooks actuated by needles; K, knife-beam for lifting the engaged hooks; W, W, wires to heddles, of which E, E, represent the eyelets each carrying a warp thread.

municated to the loom by means of a shaft, the stroke of the ley being made by cranks attached to the driving shaft, while the shuttle is thrown by means of a lever at the centre of the loom. Although the principle of the loom is the same in all kinds of weaving, yet there are number¬ less modifications for the production of special fabrics. The lappet loom may be employed for weaving either plain or gauze cloths, also for putting in representations of flowers, birds or the like, with the effect of embroidery.

Cross Weaving is a term applied to that process in which, as in gauze weaving, the warp-threads, instead of lying constantly parallel, cross over or twist around one another, thus forming a plexus or interlacing independent of that produced by the weft. It is a combination of

knitting and weaving.

Double Weaving consists in weaving two webs simultaneously one above the other, using

/

two sets of wanp threads from two warp beams, and interweaving the two at intervals so as to form a double cloth. Kidderminster or Scotch carpeting is the chief example of this process. Three-ply and four-ply cloths are similarly made. The plan of make-up of these fabrics is illustrated in Fig. 14.

Fig. 14. — Sectional Diagram of one of the many methods of weaving double cloth on two sets of warp.

Pile Weaving is the process by which fabrics like that of velvets, velveteens, corduroy and Brussels carpets are produced. In the weaving of these fabrics', besides the ordinary warp and weft, there is what is called the pile-warp, the threads of which are left standing in loops above the general surface until cut, and the cut¬ ting of which produces the pile. In such fab¬ rics as Brussels carpet the loops are left uncut. The manner in which the pile-warp is woven into the fabrics is illustrated in Fig. 15. See Loom ; Velvet.

Fig. 15. — Sectional diagrams of two of the principal methods employed in the weaving of pile fabrics; showing both cut and uncut loops. W, W, wires on which the loops are formed.

Bibliography. — Beaumont, R., (Woollens and Worsteds) (London 1915) ; Fox, T. W., (The Mechanism of Weaving 5 (London 1900) ; Hooper, L., (HandLoom Weaving) (London 1910) ; International Library of Technology, Vol. 81, (Glossary of Weaves) (Scranton, Pa., 1906) ; Kissell, M. L., Warn and Cloth Mak-ing) (New York 1918) ;

Murphy, W. S., tex¬ tile Industries, Vols. IV and V5 (London 1912) ; Oelsner, G. H., (Handbook of Weaves5 (New York 1915) ; ‘Posselt, E. A., dictionary of Weaves — from Four to Nine Harness) (London 1914) ; Woodhouse, T., and Milne, T., (Jute and Linen Weaving) (London 1914) ; Worst, E. F., (Foot-power Loom Weaving5 (Milwaukee, Wis. 1918).

Richard Ferris.

WEBB, Alexander Stewart, American sol¬ dier and educator: b. New York, 15 Feb. 1835; d. 12 Feb. 1911. He was graduated from West Point in 1855, was assistant professor of mathe¬ matics there in 1857-61, and at the outbreak of the Civil War became maior of the First Rhode Island infantry. He participated in the defense

of Fort Pickens, was at the first battle of Bull Run, served in the Peninsular campaign and in 1863 became brigadier-general of volunteers. At Gettysburg he assisted in repulsing Pickett’s charge and received a Congressional medal of honor in recognition of his gallantry. He was engaged in the Rapidan and the Wilderness campaigns, was wounded at Spottsylvania and upon his return to duty was appointed chief-of-staff to General Meade. He received brevet rank as major-general of volunteers in 1864 and was brevetted brigadier-general of regulars in 1865. In 1866 he was promoted lieutenant-colonel, was brevetted major-general in the reg¬ ular army in 1869 and in 1870 at his own re¬ quest received an honorable discharge. He was president of the College of the City of New York in 1869-1903 and wrote (The Penin¬ sula: McClellan’s Campaign of 1862 5 (1882).

WEBB, Aston, English architect: b. Lon¬ don, 22 May 1849. He was educated in private schools, was articled to Banks and Barry, architects, and began practice in 1873. He was the architect for the completion of the Victoria and Albert Museum and the Royal College of Science, South Kensington ; the Britannia Naval College, Dartmouth, and the achitectural accessories for the Victoria Me¬ morial before Buckingham Palace. He has de¬ signed many churches, commercial structures and mansions, and, with E. I. Bell, the Victoria Courts, Birmingham; the Birmingham Univer¬ sity and the new schools of Christ’s Hospital. He was president of the Architectural Asso¬ ciation in 1884 and vice-president of the Royal Institute of British Architects 1893-97. He was knighted in 1904 and given the K. C. V. O. in 1914.

WEBB, Beatrice Potter, English econ¬ omist: b. England, 22 Jan. 1858. She was educated privately and later engaged in investi¬ gation of social conditions. In 1892 she was married to Sidney Webb (q.v.), with whom she has collaborated in the preparation of sev¬ eral works on economics. She served on the Royal Commission on Poor Law and Unem¬ ployment in 1905-09 and was joint author of the minority report. From 1909 she was hon¬ orary secretary of the National Committee for the Prevention of Destitution. She is prominent in the Fabian Society. She edited (The Case for the Factory Acts5 (1901), and is author of (The Co-operative Movement in England5 (1891; new ed., 1904).

WEBB, Charles Henry (pen name (<John Paul55), American journalist and humorist: b. Rouse's Point, N. Y., 24 Jan. 1834; d. New York City, 24 May 1905. He was on the staff of the New York Times (1860-63), and going to California in 1863 founded the Californian, San Francisco, which he edited till 1866. Sub¬ sequently he contributed to the New York Tribune humorous articles signed (<Jean Paul.55 He invented an adding machine, but was better known by his burlesque dramas, among which are (Liffith Lank5 (1867) and (Saint Twel' Mo5 (1868). Other works by him are (John Paul's Book5 (1874); (Parodies, Prose and Verse5 (1876) ; (Vagrom Verse5 (1889) ; (More Vagrom Verse5 (1901).

WEBB, James Watson, American journal¬ ist and author: b. Claverack, N. Y., 8 Feb. 1802;

d. New York, 7 June 1884. He entered the United States army as second lieutenant and be¬ came adjutant in 1825; served in the West un¬ der General Scott, and resigned from the army in 1827. In that year he became editor of the Morning Courier in New York; this was united with the Enquirer as the Courier and Enquirer, which he edited until 1861, when it was merged in the New York World. At first he supported Jackson but later as vigorously opposed Jack¬ son's measures, and made the Courier and En¬ quirer one of the leading Whig papers. In 1851 he was appointed engineerin-chief of New \ork State and given the rank of major-gen¬ eral. After refusing an appointment as Minister to Turkey, he was appointed Minister to Brazil in 1861, which office he held until 1869. In 1865 when he was

in France for a time, he negotiated a secret treaty with the emperor providing for the removal of the French troops from Mexico. He wrote (Altowan, or Incidents of Life and Adventure in the Rocky Mountains' (1846) ; ˆSlavery and its Tendencies) (1856), and Na¬ tional Currency' (1875).

WEBB, Samuel Blatchley, American sol¬ dier: b. Wethersfield, Conn., 15 Dec. 1753; d. Claverack, N. Y., 3 Dec. 1807. He joined the Revolutionary army immediately after the battle of Lexington, was engaged at Bunker Hill, be¬ came aide to General Putnam and in June 1776 was appointed private secretary and aide-de- camp to Washington, receiving rank as lieuten¬ ant-colonel. He was engaged at the battles of Long Island, White Plains, Trenton and Prince¬ ton, and in 1777 took command of the Third Connecticut regiment which he had organized, equipping it almost entirely from his own funds. He accompanied General Parsons' expedition to Long Island in 1777 and on 10 December was captured with his command. He remained a prisoner until 1780, when he was appointed to succeed Baron Steuben in command of the light infantry, with brevet rank of brigadier-general. He was one of the 16 founders of the Society of the Cincinnati in 1783, and in 1789 held the Bible, on which Washington took the oath as first President of the United States.

WEBB, Sidney, English political econo¬ mist and Fabian socialist: b. London, 13 July 1859. He was educated in Switzerland and at the City of London College, and in 1878 entered the civil service, holding several different posi¬ tions, chiefly in the colonial office, and resign¬ ing from the service in 1891. He was admitted to the bar in 1885. He was one of the founders of the Fabian Society (q.v.), and in 1891 was elected to the London County Council as a can¬ didate endorsed by the Fabian Socialists. He is lecturer on political economy at the London School of Economics and Political Science and is a member of the Economic Faculty of Lon¬ don University. He has written Socialism in England' (1890) ; <The Eight Hours' Day' (1891, with Harold Cox); (The London Programme' (1892); (Labor in the Longest Reign' (1897), and in collaboration with his wife, Beatrice Potter Webb, (The History of Trade Unionism ' (1894); Hndustrial Democracy) (1897) ; Problems of Modern Industry' (1898); (English Local Government' (1906); (English Poor Law Policy' (1910) ; cThe Pre¬ vention of Destitution' (1911), *etc.* (The History

of Trade Unionism' is an exhaustive account of the origin and progress of the English labor unions; Hndustrial Democracy' shows the or¬

ganization and ideals of the modern British trades unions. These two works form perhaps the most valuable contribution to the history of English labor, and written with sympathy and forcible directness, well express the power and vitality of the labor movement.

WEBB, Thomas, British soldier and Metho¬ dist pioneer in America: b. England, 1724; d. Bristol, England, 20 Dec. 1796. He was an offi¬ cer of the Royal American army and saw serv¬ ice at Braddock's Defeat in 1755; at the storm¬ ing of Louisburg, Nova Scotia, in 1758 and with Wolfe at the battle of the Heights of Abraham in 1759. He was converted to Methodism by the preaching of John Wesley at Bristol, Eng¬ land, and was afterward licensed to preach. He returned to America on military duty and after 1767 preached in New York in alterna¬ tion with Philip Embury. He was the largest contributor to the fund for the erection of the John Street Church, New York. After his re¬ tirement from the army with rank of captain he devoted himself to the preaching of Meth¬ odism. He founded the first Methodist society at Philadelphia and also established societies in New Jersey, Delaware and Maryland, as well as holding services at his home in Jamaica, L. I. He twice revisited England to solicit funds and preachers for the Church in Amer¬ ica. After the outbreak of the Revolution he returned to England and spent the remainder of his life as a preacher at Bristol.

WEBB, William Henry, American ship¬ builder: b. New York, 19 June 1816; d. 30 Oct. 1890. He was educated in the grammar school of Columbia College, New York; learned the trade of shipbuilding in his father's yard; be¬ came manager of his father's business in 1843. Under Webb's management were built many ships of war for the United States and foreign governments, as the General Admiral, steam-frigate for Russia, two steam-frigates for Italy, the Dunderberg, iron-clacl ram for the United States government. In 1890 were erected build¬ ings at Fordham, N. Y., for an <(academy and home for shipbuilders," founded by Webb. The objects of the academy and home are: 1. Relief of ((aged, indigent and unfortunate men" who have been engaged in any department of shipbuilding in the United States; relief also of their widows. 2. Providing for American young men of good character gratuitous educa¬ tion in the profession of shipbuilding and machine-engine building, together with free maintenance.

WEBB CITY, Mo., city in Jasper County, on the Kansas City Southern, the Saint Louis and San Francisco and the Missouri Pacific railroads, about eight miles east of Joplin, and known with its neighbor, Cartersville, as one of the (<Twin Cities." It was first incorporated in

1876, three years after the discovery of ex¬ tensive deposits of lead ore, zinc being discov¬ ered several years later, and in 1890 became a city, its government being administered by a mayor and a council of 10 members. It is im¬ portant as a mining town, the Webb City-Cartersville mining district having very ex¬ tensive deposits. It is the centre of a rich agri

cultural and fruit-growing section. The Webb City Iron Works are the second largest in southwestern Missouri, and the city has also lumber and flour mills. It has 12 churches, five graded elementary schools and a high school. Webb City is the seat of the Great West¬ ern Normal School and Business College. The waterworks system cost originally $100,000. It has two banks and a daily newspaper. Pop.

(1920) 7,807.

WEBB-KENYON LAW, a regulation in regard to liquor traffic, declared constitutional by the United States Supreme Court 8 Jan. 1917. By this law, shipment of liquor from <(wet55 to ((dry55 States is prohibited. This decision also rendered constitutional the West Virginia law prohibiting the importation of intoxicants for personal use. By this means, a long con¬ troversy on the subject was ended and the en¬ forcement of prohibition in dry States greatly enhanced.

WEBB-PEPLOE, Hanmer William,

clergyman of the Church of England : b. 1 Oct. 1837 at Weobley. He was educated at Marl¬ borough College, Cheltenham College and Pem¬ broke College, Cambridge. In 1863 he was or¬ dained deacon and priest; became curate of Weobley and served for four years. At the same time he was chaplain of Weobley Union until 1876, vicar of Kings Pym Cum Birley 1866-76 and of Saint Paul's, Onslow Square since 1876, prebendary of Saint Paul's Cathedral since 1893. In college he was a champion athlete and was seriously injured. As a

result he was confined to his bed for three years and con¬ tinued his college work on his back. He was Cambridge University preacher in 1896. Has been much interested in missions and connected with several missionary organizations. He is the author of (I Follow After> (1894) ; (A11 One: Sermons5 (1896); (Life of Privilege5 (1896); Victorious Life5 (1896); (Calls to Holiness5 (1900) ; (Within and Without5

(1900) ; <Titles of Jehovah5 (1901) ; (Four Re¬ markable Letters of Saint Paul5 (1903) ; (He Cometh5 (1905); ˆConsider Him; or, Sketches of the Four Gospels5 (1906) ; (The Beautiful Name5 (1910).

WEBBER, web'er, Charles Wilkins,

American author : b. Russellville, Ky., 29 May 1819; d. Nicaragua, 11 April 1856. In early youth he passed several years of adventurous life on the Texan frontier and later settled in New York where he was for a short time as¬ sistant editor of the American Review and a prolific contributor to that and the Democratic Review and other periodicals, in which ap¬ peared in a serial form his (01d Hicks the Guide5 and other tales of backwoods life and adventure. In 1849 he published the (Gold Mines of the Gila.5 His remaining works com¬ prise the (Hunter Naturalist5 (1851) ; Spiritual Vampirism5 (1853) ; Vales of the Southern Border5 (1853), and (Wild Scenes and Song Birds5 (1854), forming a second volume of the (Hunter Naturalist.5 In 1856 he joined an expedition to Nicaragua in aid of William Walker (q.v.) and was killed in a skirmish.

WEBBER, Herbert John, American plant physiologist: b. Lawton, Mich., 27 Dec. 1865. He was graduated at the University of Ne¬ braska in 1889 and took his Ph.D. at the Uni¬

versity of Washington in 1901. He was in charge of the United States Department of Agriculture's plant-breeding investigations in 1889-1907, and investigated orange diseases in Florida in 1893-97. He served as professor of experimental plant biology at Cornell Univer¬ sity in 1907-08; was acting director of plant breeding there in 1909-10, and was professor of plant breeding at the New York College of Agriculture in 1910-12. Since 1912 he has been director of the Citrus Experiment Station, dean of the Graduate School of Tropical Culture and professor of plant breeding at the Uni¬ versity of California.

WEBBER, Samuel, American college presi¬ dent: b. Byfield, Mass., 1759; d. Cambridge, Mass., 17 July 1810. He was graduated at Har¬ vard in 1784, subsequently entered the ministry, and in 1787 was appointed university tutor of mathematics. In 1789 he was appointed to the chair of mathematics and natural philosophy, which he retained until the death of President Joseph Willard in 1804, when he became his successor. He died while holding this office. He was one of the commissioners appointed to determine the boundary between the United States and the British provinces. He published (A System of Mathematics5 (1801).

WEBER, va'ber, Ernst Heinrich, German physiologist: b. Wittenberg, Germany, 24 June 1795; d. Leipzig, Germany, 26 Jan. 1878. He was educated at Leipzig, was appointed pro¬ fessor of comparative anatomy there in 1818, and of physiology in 1840. He originated the formula known as Weber's Law (q.v.) and wrote (Anatomia Comparativa Nervi Sympa¬ thies (1817) ; (Lehre vom Bau und von der Verrichtung der Geschlechtsorgane5 (1846) ; (Annotationes Anatomicse et Physioligicae5 (1851), *etc.*

WEBER, Georg, German historian : b. Bergzabern, Rhenish Bavaria, 10 Feb. 1808; d. Heidelberg, 10 Aug. 1888. He was educated at Erlangen, traveled extensively, and was di¬ rector of the normal school at Heidelberg in 1848-72. His writings, which include (Lehrbuch der Weltgeschichte5 (1847) ; (Geschichte der Deutschen Litteratur5 (1847); Allgemeine Weltgeschichte fur die Gebildeten Stande5 (15 vols, 1857-80), *etc.*

WEBER, Karl Maria (Friedrich Ernst),

Baron von, German composer : b. Eutin, Grand Duchy of Oldenburg, 18 Dec. 1786; d. London, 5 June 1826. He was a pupil of J. P. Heuschkel of Hildburghausen, attaining great skill as a pianoforte virtuoso and much proficiency in the technique of composition ; and continued his studies with Michael Haydn at Salzburg, and at Munich with Ivalcher (harmony and compo¬ sition) and Valesi (singing). His opera, (Das Waldmadchen,5 was produced with but mod¬ erate success at Freiberg, though more fortu¬ nate at Chemnitz and (in 1805) at Vienna, A second opera, (Peter Schmoll und seine Nach-barn,5 first presented at Augsburg (1803) met with no particular approval. Early in 1803 he went to Vienna, and there that curious genius the Abbe Vogler was for a year his instructor. By Vogler's aid, he secured the post of kapell¬ meister of the opera at Breslau (1894). He displayed great ability as an organizer and di¬ rector, but resigned in 1806, and became musical

director to Prince Eugene of Wiirtemberg at Karlsruhe, Silesia. In 1807 he entered the service of Duke Louis of Wiirtemberg at Stuttgart as private secretary, and in 1808-10 was working on his first large opera, (Silvana,) the libretto of which was to a large extent based on that of his earlier <Waldmadchen.) He was falsely charged with fraud, and despite all lack of evidence against him, was perpetually banished from Wiirtemberg 26 Feb 1810. Then he went to Mannheim, where his first symphony was most favorably received, and his piano¬ playing was also very successful; and thence to Darmstadt, where he once more became a pupil of Volger. His comic operetta, (Abu Hassan,* was completed in 1810 and given at Munich, and ˆilvanaP with additions, gained adequate recognition at Berlin in 1812. It was not, how¬ ever, until 1813 that Weber held an important appointment ; in that year he was made kapell¬ meister of the Prague opera, and there proved himself the first of the Great German mu¬ sicians to be conspicuous also as a conductor. His administration of marked success was brought to a close by his giving it up in 1816. His chief compositions of this period were set¬ tings of Korner's songs, and the cantata (Kampf und SiegE founded on the battle of Waterloo. In 1816 he went to Dresden, where previously Italian opera had held undisputed sway, to or¬ ganize the new venture of German opera; and soon he had attained, except among a few par¬ tisans, an unqualified victory. The appointment was confirmed for life, and he was frequently summoned to direct the music of the chapel loyal. He became widely known with the presentation of his opera, (Der Freischiitz,* at Berlin, 18 June 1821, which was quickly echoed elsewhere, being simultaneously given in Lon¬ don in three different places. Few operatic works, it is said, have equaled it in immediate triumph. <Euryanthe> did not meet similar approval at Vienna (1823), though appreciation was duly encountered in Dresden, Leipzig and Berlin. On the commission of Charles Kemble of Covent Garden, London, he wrote <Oberon) to an English libretto by J. R. Planche, himself learning English to be able to work to better effect. He conducted the first 12 performances, and after a reception which almost surpassed that of the ˆreischiitzP played at numerous concerts.

With the (Freischiitz,* which struck a distinctively national note, Weber became the founder of what is known as the romantic school of German opera. He has heen claimed as a predecessor of Wagner in adapting his music to the dramatic requirements, and the use of leading motives. In his operatic works he apparently preferred legendary and super¬ natural elements, which he could make musically effective. Though his operas are the best known of his writings, he did musicianly and even brilliant work in the direction of Lieder and pianoforte compositions. Consult Jahns, <C. M. von Weber: Eine Lebensskizze* (1873) ; the biographies by Rau (1865) ; Benedict (1881) ; Reissmann (1882) ; Gehrmann (1899), and his son Max Maria von Weber (Leipzig, new ed., 1912) ; also Benedict, (Musiciens du Temps Passe* (1893), and the article by Spitta in Grove's <Dictionary) (Vol. IV, 1889).

WEBER, Wilhelm Eduard, German physi¬ cist, brother of E. H. Weber (q.v.) : b. Witten-vol 29—10

berg, 24 Oct. 1804; d. Gottingen, 23 June 1891. He was educated at Halle, was professor of physics at Gottingen in 1831-37 and occupied that chair at Leipzig in 1842-49, after which he resumed his chair at Gottingen. He was asso¬ ciated with his brothers and with Gauss in vari¬ ous publications concerning physics, and made valuable researches in the fields of electricity and magnetism. He also published a series of essays, (Elektrodynamische Massbestimmungen> (1846-67). Consult Heinrich Weber, (Wil¬ helm Weber) (1893).

WEBER, we'ber, a river of Utah, whose headwaters are on the west slope of the Uinta Mountains. It flows northwest through fertile lands and through a series of canons ; and after a course of nearly 200 miles it enters Great Salt Lake. The famous Weber Canon is the gorge made by this river where it breaks through the Wasatch Mountains. The Union Pacific Rail¬ road passes through this gorge. The descent in places is most rapid, and the consequent water¬ power is extensive. At Ogden, the mean vol¬ ume of water is about 2,000 cubic feet a second. The Weber is much used for irrigation. The river has built up at Ogden a large delta which extends into ancient Lake Bonneville.

WEBER'S LAW. In the 30's of the last century E. H. Weber (q.v.) made the dis¬ covery that a subject who could barely distin¬ guish between lifted weights of 29 and of 30 ounces could also barely distinguish between weights of 29 and 30 drachms. Similar results were obtained in the case of cutaneous pressure and in the visual measurement of

short lines. That is, it appeared in each case that the just noticeable increment of a stimulus was not a constant, but bore instead a constant ratio to the strength of the stimulus itself. This gen¬ eralization, which is Weber's law, is a precise statement of the fact which is familiar to us in such cases as that of the ticking of a watch, quite inaudible on the noisy street though it may be very loud in the silence of the bedroom. The ratio of the barely observable increment or dif¬ ference limen to the stimulus is dependent on the kind of stimulus used. For pressures on the tip of the finger it is nearly 0.05, for noise loud¬ nesses it is about 0.33, for lifted weights, 0.033, and for brightness, 0.01. Weber's law is only an approximation at best. It is badly in error for very great or very small stimuli ; even for those of moderate intensity it presupposes a complete adaptation of the percipient organ. It is not in general valid for other attributes of sense than intensity, although it seems to hold good for visual extension. In the pitch of tones, for instance, the just noticeable increment is about .75 vibrations per second for a consider¬ able range of the scale. In so far as we are able to equate easily noticeable intervals in dif¬ ferent parts of an intensity scale, it appears that these obey the same law as just noticeable intervals ; that equal-appearing intervals between stimuli are proportional to the intensity of the stimuli evoking the lower terms of the intervals, and are made up of an equal number of just noticeable intervals. This assemblage of facts was raised by G. T. Fechner (q.v.) to the dig¬ nity of a necessary law expressing the relation¬ ship of mind and matter. He represented the fact that a constant increment of a sensation is

produced by a fixed proportional change in the

stimulus by the formula sx — Si = f

, where

k is the stimulus inducing the sensation sv We obtain from this at once

(glog i &?2)=0, (i0g {x —

As i\ depends only on Si, and it depends only on $2 in the same way, we get Si — <P, (log k — c), and s2 =k(l> (log k — c) , where c is the value of log ik for Si = 0. Therefore <p (log k — c) — <p (log it — c)~ (log i\ — log k), so that <p satisfies the functional equation <p (x) — ˆ (y) = <p (x — y).

Differentiating with respect to x, 01 (x) = 01 (x — - y) , which is only possible for all values of x and y if p (x) is some constant such as Ki, or if (f> (x) is of the form Ki x + K2. It is easily seen that K2 = 0. We thus get sx — s2 = Ki (log i 1 — log k) . By the proper choice of units this becomes S\ = K log i. Fechner's law is, then, that the sensa¬ tion varies as the logarithm of the stimulus.

There are several serious objections to Fechner's. treatment of the law. In the first place, it is more than probable that the basis of the phenomena observed lies rather in the make-up of the nervous system than in the transition from the physical phenomena of the nervous system to the percipient mind. Even Wundt's explanation of the facts by appercep¬ tion is vitiated by the appearance of the same logarithmic formula in the reactions of the nervous system of a decerebrized frog. Sec¬ ondly, what is being determined in the mind of the subject of an experiment on discrimination is not the difference between two mental states, but the awareness of that difference, which is altogether another thing. The existence of limina is in itself enough to refute Fechner's opinion that it is actually the difference between two mental states which is reported, for things identical with the same thing are identical with one another, wThereas a weight of 61 drachms is sensibly equal to the discriminable weights of 60 and 62 drachms. In the third place, while measurement of sensations is a conceivable thing, it is most assuredly not done directly, so that 'the whole interpretation of Fechner's law remains indeterminate until a thorough logical analysis is made of the processes involved in our actual measurement of the intensity of sen¬ sation.

The general types of method used in experi¬ ments and investigations on Weber's law are that of just noticeable differences, where two stimuli are gradually separated or approximated until their difference appears or disappears; that of average error, in which the average error of the observer in selecting a variable stimulus equal to a given fixed stimulus is taken as the index of the just noticeable difference or limen ; that of equivalents, which differs from that of average error only in that the stimuli are applied sim¬ ultaneously to different parts of the body rather than successively to the same part ; that of mean gradations, in which a supraliminal interval is bisected; and that of right and wrong cases, in which the mean position of the initial stimulus limen or the difference limen is determined by ascertaining throughout a series of trials for each intensity of stimulus or magnitude of stimulus difference the proportion of cases in

which its presence or absence is rightly judged. (See Limina; Psychophysics). Consult Del-boeuf, J. R. L., (Examen critique de la loi psy¬ chophysique* (Paris 1883) ; Fechner, G. T., (Elemente der Psychophysik* (Leipzig 1889) ; Fullertan and Cattell, (On the Perception of Small Differences *(Philadelphia 1892) ; Kiilpe, O., (Outlines of Psychology* (tr. New York 1909) ; Meinong, A. (in Zeitschrift fur Psychol¬ ogy, Vol. XI, 1896) ; Muller, (Grundlegung der Psychophysik> (Berlin 1878) ; Myers, C. S., (TextBook of Experimental Psychology* (2d ed., Cambridge 1911) ; Titchener, Experi¬ mental Psychology) (New York 1905) ; Wundt, W., (Grundzuge der physiologischen Psycholo¬ gic * (Leipzig 1908-11) ; Ziehen, T., (Leitfaden der physiologischen Psychology (10th ed., Jena 1914).

WEBSTER, Arthur Gordon, American physicist: b. Brookline, Mass., 28 Nov. 1863. He was graduated at Harvard University in 1885, later studied at the universities of Paris and Stockholm, and in 1890 took his Ph.D., at the University of Berlin. He received in 1895 the Thompson prize, Paris, of 5,000 francs for experimental research on the period of electri¬ cal oscillation. He was assistant professor of physics at Harvard in 1892-1900; and from 1900 he was professor and director of physics at Clark University. He was appointed to the Naval Consulting Board in 1915; and to the Na¬ tional Research Council in 1917. He is an au¬ thority on sound and the inventor of several in¬ struments of value in this connection. Author of < A Mathematical Treatise on the Theory of Electricity and Magnetism* (1897) ; < Dynamics of Particles of Rigid, Elastic and Fluid Bodies) (1903) ;

(Harrison Lectures on Sound, Univer¬ sity of Pennsylvania) (1911), *etc.*

WEBSTER, Daniel, American statesman : b. Salisbury (now Franklin), N. H., 18 Jan. 1782; d. Marshfield, Mass., 24 Oct. 1852. He was the son of a New Hampshire judge and farmer and brother to a large family of boys and girls, all of whom worked and sacrificed in favor of Daniel whose health was apparently not robust. After rather meagre preparation he attended Exeter Academy a year. Thence he went to Dartmouth College where he was grad¬ uated in 1801 with good if not distinguished standing. He loved to study English and clas¬ sical literature; he liked self-indulgence; and he was already an orator for Fourth of July occasions. More than once he had shown a disregard to that rigid honesty in little money matters which was later to become such a dis¬ tressing trait of his character.

From Dartmouth to the farm of the hard-pressed father was not a congenial move for a young man so filled with ambition to play a role in the great world outside ; but the road to the goal he vaguely set himself was not easy to find. He studied law a while in the office of a friendly lawyer nearby but inclined rather to general reading and to fishing than to rigid self-discipline. Next he turned to teaching school in the town of Fryeburg, Me., in the hope of winning ready money, so much needed in the Webster family, now that another son was sent to Dartmouth. After one session at Fryeburg, he returned to his native town of Salisbury and resumed the study of law in earnest. Ezekiel,

the brother who had been at Dartmouth, now took a school in Boston and Daniel followed him to the New England metropolis. Here he studied law under the distinguished Christopher Gore, a little later governor of Massachusetts, and always a prince of the old New England culture. Gore was certainly not of the type of Ezekiel Webster, the farmer judge of New Hampshire, but he was the bitter enemy of that ftMr. Jefferson, the atheist Virginian® who had broken the power forever of the Federalists of New England. Webster absorbed the politics of localism and provincial superiority which a

little later threatened to ruin a great career.

Admitted to the Boston bar on the recom¬ mendation of Gore himself in March 1805, Webster, a little past his 23d birthday, returned to his native State and there, in the town of Boscawen, began the practice of his profession. He was quickly successful; but realizing that a larger sphere for the display of his talents was necessary, he removed to the important com¬ mercial town of Portsmouth in the year 1807.

Here he came into touch with real New Eng¬ land, with men who went down to the sea in ships and brought back rich harvests from the banks of Newfoundland, from the marts of Europe and even from the strange cities of China. He met and competed with great law¬ yers, like Jeremiah Mason and William Plumer, and he learned to think in generous figures, not in the niggardly shillings and pence of his boy¬ hood. For five years he learned from these men and from renewed study of the great Brit¬ ish law authorities. Webster received or gave himself a broad and deep training, whereas his great rival in life, Henry Clay, had little or no training. Moreover he earned large fees in those exasperating years of non-importation acts and embargoes, procured for himself a good town house and went back to his native countryside and married Miss Grace Fletcher, the daughter of the minister at Hopkinton.. He spoke against the government on every suitable occasion ; learned to write great orations and to move large audiences ; and shaped barbed reso¬ lutions against James Madison and his inconsid¬ erate Virginians who monopolized all the great offices of the nation. He learned rather better than history has recorded the language of re¬ sistance and secession. How could he do other¬ wise in a community whose people were de¬ lighted with young William Cullen Bryant's first poem, ((The Embargo.® Thus trained, deeply resentful at the policy of the national government in going to war with England a second time and ambitious to meet the enemy face to face, he became a candidate for a seat in the National House of Representatives, was elected on a most flattering vote and took his seat in May 1813.

From 1813 to 1817 Webster served New Hampshire in the House of Representatives. He opposed the Madison administration at every turn as every good New Englander must do. His protests against the conduct of the war, against Federal interference with New England trade and against the conscription of soldiers to fight the war were all animated by a warm and even impassioned sectionalism that, reminded one of the Massachusetts secessionist, Josiah Quincy, just retired in disgust from a govern¬ ment which seemed destined to remain in the hands of slave-holding Southerners and igno¬

rant frontiersmen. If Webster was more dis¬ creet, it was probably because the exasperation of Southern leadership was not quite so dis¬ turbing to him. But Webster was already a great lawyer and very much of his time, as well as the best of his talent, was during these four years spent in the Federal courts, both at Bos¬ ton and in Washington where Chief Justice Marshall took pains to express his hearty ad¬ miration of a fellow partisan who could distress Mr. Madison. When the second term in the house was about to expire, Webster declined to offer himself in New Hampshire for re-election and removed to Boston, having first thought of making New York his home — for there, he said, the great decisions of the near future would be made.

In Boston, he quickly received that recogni¬ tion and adulation which seems to have become necessary to his happiness and success. From 1816 to 1823, he again practised his profession with eminent success. His income from fees increased, in spite of the lean years that followed the close of the war with England, from $2,000 to $20,000 a year. The wealthy and the distin¬ guished yielded to the son of the New Hamp¬ shire frontiersman who lived in the handsome house on Somerset street and deported himself with all the dignity of a Cabot or a Dana. With wealth abounding and social distinction undis¬ puted, even in Boston, Webster now gave him¬ self to the delivery of a series of commemora¬ tive orations that made his name known wher¬ ever New Englanders dwelt or New England newspapers were read. The Plymouth (1820) and the Bunker Hill (1826) addresses were the best of these, although others, like that on the Character of Washington and on the Landing at Plymouth, were reprinted in every important eastern paper. It was the day of oratory. There were few scholars and the clergy were fast losing their former mastery of the popular imagination. Public men must be learned, or appear to be so, and they must on occasion dis¬ play their learning and their fine phrases in well-rounded periods. Of all Americans who essayed the role of classic oratory on the fron¬ tier soil of America Webster was the foremost. He had a remarkable personality; his voice and manner were both imposing and winning; and he had a memory that always served him ad¬ mirably. When Webster spoke men laid down their tools or stopped their plows in the field and went to hear him. They would gladly stand in great outdoor audiences or crowd themselves into Faneuil Hall for hours at a time on hot days in order to look upon his majestic form or follow his moving imagery. Thus, before the great struggle in the country about the tariff and the powers of the Federal government, Webster was prepared as few men ever had been

prepared for attack or defense..

It was an easy matter, then, in 1822 for him to procure once more a seat in the national House of Representatives. He. represented Boston. He was a strict sectionalist. In 1814, when he spoke for a New Hampshire constitu¬ ency, he had threatened to resist the national authority and he sympathized fully with those recalcitrant governors and judges of New Eng¬ land who refused to furnish troops to the na¬ tional administration or who declared Federal laws inoperative in States that did not approve Federal policy. In 1820 Webster was so much

opposed to the tariff laws of the Union that he threatened secession in a notable speech. When he appeared in his place in the national legisla¬ ture late in 1823 he was ready for a great struggle.

Henry Clay was the leader of the House of Representatives at that time and he was press¬ ing with all his energies the tariff and internal improvement bills which together he christened the ((American System.® Webster opposed Clay in the best speech that had ever been made in Congress on the subject of the tariff. It is known as his free trade speech. It was deliv¬ ered in 1824. The arguments which he then arranged and massed in consummate style have never been answered. But New England was changing. He was a New Englander. In 1825 a New Englander, John Quincy Adams, became President and half of New England changed its investments from shipping to manufactures. Before 1828 Webster was himself in a quandary. He must change his attitude or cease to play a part in public life. His position was exactly parallel to that of Calhoun who had been a strenuous protectionist but whose constituents now became free traders. Calhoun abandoned protection which South Carolina would no longer endure; and Webster abandoned free trade which Massachusetts then and henceforth condemned. Calhoun was the Vice-President and very ambitious to be President. Webster was elected to the Senate in 1827 and he too soon became possessed with the ambition to rise to the presidency.

When Webster took his seat in the Senate, Henry Clay was the Secretary of State and the director of the policy of the party with which Webster must work, the incipient Whig party, the party of protection to American industries, of wide-flung schemes of internal improvements and of expanding the powers of the national government. The New Englander quickly fell into line. In 1828 he made his first important speech in favor of the ((American System,® so ably condemned four years before, and Calhoun prepared to thwart that very tariff policy which he had done so much to set up in 1816. Nulli¬ fication was about to be tried and Webster from opposing the national power, as he had done all his life, now prepared to champion that cause. The greatest speech of his life was delivered in February of 1830 when western influences in Congress opposed to the leadership of Henry Clay were being aligned with the southern in¬ fluences and interests voiced by Calhoun and Robert Young Hayne. These leaders of the three great sections of the country were com¬ pelled to work out a national policy which it was hoped that a majority of the people might support.

Thomas H. Benton had pressed for six years his bill for a freer distribution of the public lands in the hope of building up the West at the expense of the East. Webster opposed the Benton plan. The Southerners were di¬ vided ; but, after long and doubtful negotiations, they had made up their minds to support the western claims in exchange for support of their free trade policy. Jackson was made President upon this combination. Webster did not like the combination. It meant disaster for New England. But Jackson did not like the power and influence of Calhoun in the combination which lay behind his own presidency. When,

therefore, Calhoun prepared to launch his nulli¬ fication program, expecting that Jackson would remain quiescent, there were signs that the President would revolt. It was the primary interest of New England that Jackson and Cal¬ houn should break, that the West and the South should not continue their coalition, or alliance.

Soloman Foot of Connecticut made the first move in his resolutions of early January 1830, in which it was proposed to withdraw the public lands from sale. Benton was quick to denounce the resolution as indicative of the selfish and provincial policy of New England. The South¬ erners came to the support of Benton. The great debate was begun. Hayne of South Caro¬ lina made an elaborate attack upon New Eng¬ land, which roused Webster's ire; but Hayne also publicly

announced that the South would support the West in its land program which made him uneasy. To this Hayne also added a long and thoughtful argument against the growing powers of the Federal government. The nation was only a confederation. It was only what the Constitution provided, but not a power of original jurisdiction over the people. Webster replied. He defended New England; said nothing about the subject of the public lands; and closed in a magnificent appeal to the people of the country on behalf of the govern¬ ment as a government of real powers. (<The Union, one and inseparable, now and forever.® It was strange doctrine from New England. But New England had changed its interest and" its attitude. Chief Justice Marshall and the Federal courts had long been w'orking to the same end with New England and the East as a whole. Webster stirred in men a devotion, as yet but half-aroused anywhere, to the ideal of a great national government supreme over all States, all sections and all American citizens. It was to be one of the classics of American oratory. There can be no doubt that it proved to -be a powerful influence during the next 30 years. No President, duly cognizant of the meaning of his own office, could remain deaf to an appeal like Webster's. Jackson made it known in April following that he agreed with his New England opponent. When Calhoun's friends would have had him talk of States' rights at a Jefferson dinner, he boldly an¬ nounced that he drank to the Union, <(it shall be preserved.® If that were so the alliance of South and West was dissolved and Daniel Webster had done much to dissolve it.

From 1830 to 1850 Webster remained almost uninterruptedly in the Senate. He supported the United States Bank in the long war it made upon the President and the nation he talked of in the great oration. He played a great part in the campaign of 1840 which resulted in the election of William Henry Harrison to the pres¬ idency and was under Secretary of State. When Vice-President Tyler succeeded in May 1841 to the office made vacant by the death of Harrison and when Henry Clay under¬ took to manage Tyler as a modern boss gener¬ ally manages a governor of his own nomination, Webster revolted against the counsels of his chief, Clay, and retained his seat in the Tyler Cabinet. As Secretary of State under Tyler, Webster negotiated a treaty with the British Minister, Lord Ashburton, which was long known bv tho names of the two negotiators.

But Webster retired in May 1843. Already

the nomination and election of Henry Clay seemed to be foregone conclusions. Webster, in spite of Clay's dislike of his insubordination, gave earnest support to the Clay ambition. Clay was again defeated and Webster himself now expected that his turn for the leadership of the Whig party had come. He returned to the Senate in 1845 where he renewed his opposition to the annexation of Texas in its final stages. When the war with Mexico began he was, as usual, in full sympathy with the heated and unalterable opposition of his section. But he was too much of a candidate for the presidency to voice his views very strongly. Yet he failed of the Whig nomination in 1848. A successful general and a great slave-holder, Zachary Tay¬ lor, received the nomination as a result of Abolitionist opposition to Webster and Clay. Webster declared that it was an improper and unworthy nomination; and both Webster and Clay declined to give public support. Yet Tay¬ lor was elected.

Taylor, the slave-holder, urged the ad¬ mission of California as a free State. As a result civil war between the North and the South seemed imminent. Webster was still in the Senate. Calhoun was again a member in 1845, after a retirement that had been designed to be final. Clay was returned to the Senate at this critical juncture to aid in reconciling the hostile sections of the country, reconcile inter¬ ests that were in violent conflict. Since Web¬ ster, Calhoun and Clay so well represented the three sections — the East, the South and the West — any agreement satisfactory to them was likely to be satisfactory to the country. Clay took the lead, as he had done all his life. Calhoun placed himself in direct and bitter op¬ position. The South would never consent to the admission of another free State south of the line of 36° 30', extended to the Pacific.

Unexpectedly President Taylor maintained the position that California must be admitted as a free State. A deadlock ensued. From the opening of Congress in December 1849 till the first of March 1850 it seemed that a disruption of the Union must be the out¬ come. Under these circumstances Clay ar¬ ranged his last great compromise. It was

prepared early in January. Private meetings of senators and representatives were arranged. Old enemies sat down to dinners together and with Clay. Newspaper editors were consulted and combinations made. When Clay at last made his appeal to Congress and the country, he had Webster's consent to follow him with a similar appeal. But President Taylor would have nothing to do with the compromise. Web¬ ster and Clay had both said he was an unfit man to be President. Moreover the Southern leaders challenged Taylor, and a challenge of the Presi¬ dent as to his powers and his independence has almost invariably been fatal to the challenging party. Taylor would send the United States army into any territory where the Southerners refused to recognize the authority of the United States. That meant immediate war.

Webster had been a nationalist since 1830. He was not in sympathy with the Administra¬ tion of his own party, which was supported by the Abolitionists. He was by nature a conser¬ vative, one who liked to have great social changes made slowly or not at all. He repre¬

sented the manufacturers and the stable busi¬ ness element of New England and not what would be called the democracy of the North.

He made the only decision that he could have made. It was given to the world on 7 March 1850 in a great and eloquent appeal to the pub¬ lic sentiment of the country, North and South, against the disruption of the Union. This de¬ cision of Webster broke the deadlock; it ranged his great followers alongside that of Clay. The country rallied to the two old chieftains. The President resisted till 9 July, when death re¬ moved him from the scene. Vice-President Fillmore, a friend of Webster and Clay, suc¬ ceeded and the country breathed freely. In every large town there was a holiday, and big guns announced the passage of the compromise.

It had been Webster's decision in March that produced the result. Not even Taylor's mili¬ tary stubbornness could long have withstood the tide of'popular demand for a settlement.

Webster entered President Fillmore's Cabinet as Secretary of State and served the ideals of the country well, particularly in the publication of the Hulsemann letter, in which American sympathy for democratic uprisings everywhere was vigorously expressed. But he was de¬ nounced for his 7th of March speech most un¬ mercifully. His name was .anathematized in Hchabod,* one of the widely read poems of

Whittier. But the country as a whole did not think less of him, only the people did not de¬ mand him for President. When the Whig na¬ tional convention met in Baltimore, June 1852, to nominate a candidate for the presidency,

Webster was the logical candidate. According to all the rules of regular political procedure, the great New England statesman should have received the nomination. But the convention, under the influence of Thurlow Weed and Wil¬ liam H. Seward, preferred another military <(hero.® General Scott was nominated. Web¬ ster, broken hearted at the way the North had treated his 7th of March speech and deeply s wounded by the conduct of the Whig leaders r i. b- ˆ

in Baltimore, went home to Nostiifield. There he made known his wish that his friends would vote for the Democratic candidate, Franklin Pierce. It was a trying ordeal, the public abandonment of his party. He died before the election. Like so many other great leaders, he died despairing of the republic.

Bibliography. — Curtis, George T., (The Life of Daniel Webster* (2 vols., New York 1870) ; Lodge, Henry Cabot, (Daniel Webster*

(Boston 1883) ; Hale, Edward Everett, (The Works of Daniel Webster) (6 vols., Boston 1851); McMaster, J. B., (Daniel Webster *

(New Yqrk 1902) ; Rhodes, Tames Ford, his¬ tory of the United States) (Vol. I, New York 1906) ; Van Tyne, C. H., (The Letters of Daniel Webster) (New York 1902) ; Webster, Fletcher,

(The Private Correspondence of Daniel Web¬ ster * (2 Vols., Boston 1857).

William E. Dodd,

Professor of American History, University of Chicago.

WEBSTER, Ebenezer, American patriot, father of Daniel Webster (q.v.) : b. Kingston,

N. H., 1739; d. Franklin, N. H., 1806. In his youth he served under General Amherst in the (‘old French war,® and in 1761 was one of the original settlers of that part of the town of

Salisbury now known as Franklin. He united, as was common at the time, the occupations of farmer and innkeeper, took an active part in public matters, and at the outbreak of the Rev¬ olution led the Salisbury militia to Cambridge. Subsequently he fought at White Plains and Bennington, and served in other campaigns until the close of the war, when he had attained the rank of colonel of militia. He was at various times a member of both branches of the legis¬ lature, and in 1791 was appointed judge of the Court of Common Pleas, which office he held till his death. In personal appearance he re¬ sembled his son Daniel, being of large frame, with a swarthy complexion and dark piercing eyes.

WEBSTER, Henry Kitchell, American au¬ thor: b. Evanston, Ill., 7 Sept. 1875. He was graduated from Hamilton College, Clinton, N-Y., in 1897, and in the following year was instructor in rhetoric at Union College. With Samuel Merwin, he has written (The Short Line War5 (1899) ; and (Calumet ((K55 5 (1901). His own work includes (The Banker and the Bear) (1900) ; (Rogers Drake, Captain of Industrv) (1903) ; (The Whispering Man5 (1908) ; (The Girl in the Other Seat5 (1911), *etc.*

WEBSTER,* Herbert Tracy, American eclectic . physician and author : b. Portland Township, Chautauqua County, N. Y., 14 Oct. 1847. He was graduated at the Eclectic Medi¬ cal Institute of Cincinnati in 1869, and in 1882 was appointed professor of materia medica in the California Medical College (now located at San Francisco), and now fills the chair of principles and practice of medicine in the same institution. He has written Principles of Medicine) ; (Dynamical Therapeutics) and (The New Eclectic Practice of Medicine.5

WEBSTER, Herman Armour, American

artist: b. New York, 6 April 1878. He was graduated at Yale University in 1900 and later studied art under Laurens in Paris. He subse¬ quently lived chiefly abroad. He is known as a painter and is particularly prominent as an etcher. His usual subjects in this field are quaint scenes in out-of-the-way French towns. He has exhibited at the Paris Salon ; the Royal Academy, London ; the Western Society of Artists, Chicago; Rouen, France; and at the American Art Association,

Paris. He is a member of the Royal Society of Painter-Etch¬ ers and of the Societe Nationale des Beaux Arts, Paris. He was awarded a gold medal at the Panama Exposition in 1915. His work is represented in the Luxembourg, Paris ; the South Kensington Museum, London ; the Con¬ gressional Library, Washington; the Boston Museum; the Art Institute, Chicago; and in other important collections.

WEBSTER, Jean, American authoress : b. Fredonia, N. Y., 24 July 1876; d. New York City, 11 June 1916. She was educated at the Lady Jane Grey School in Binghamton, N. Y., and at Vassar College. After spending a few years in Italy and traveling around the world, Miss Webster returned to New York, and in 1915 married Glenn Ford McKinney, a New Vork lawyer. She was a grand-niece of Mark Twain. Her most popular production was the novel (Daddy Long-Legs) which in its dramatic form was most successful. She wrote also

(When Patty Went to College) (1903) ; (The Wheat Princess) (1905) ; (Jerry Junior5 (1907); <The Four Pools Mystery5 (1908); (Much Ado About Peter) (1909) ; (Just Patty5 (1911); and Pear Enemy) (1913).

WEBSTER, John, English dramatist: b. about 1580; d. about 1625. He appears to have followed the occupation of his father, a tailor, and in 1604 was a freeman of the Merchant Taylors' Company. In 1602 he began to write plays in collaboration with other playwrights, but attained to his full power only when, be¬ tween 1607 and 1612, he adopted independent authorship. He added to (The Malcontent, 5 a play by John Marston, and was associated with Dekker in writing two vigorous prose com¬ edies, (Westward Hoe) (acted 1604) and (Northward Hoe) (acted 1605). (The White Devil,5 or (Vittoria Corombona,5 a tragedy pub¬ lished in 1612, was his first independent work, and is now recognized as one of the best trage¬ dies of its age. (Appius and Virginia,5 pub¬ lished in 1654, followed soon afterward and in 1616 his masterpiece, (The Duchess of Malfi,5 was first produced at the Blackfriars Theatre. It was first published in 1623. This great trag¬ edy, which has won enthusiastic praise from Charles Lamb and many subsequent critics of eminence, is based on a Neapolitan story found in Bandello. (The Devil's Law Case) was pub¬ lished in 1623 and appears to have been Web¬ ster's last play. Of other plays sometimes ascribed in part to Webster, only (A Cure for a Cuckold 5 (published 1661) seems to contain any of his work. Webster wrote in 1624 a pageant for the Lord Mayor of London and in 1612 was associated with Heywood and Tour¬ neur in producing (Three Elegies to the Memory of Prince Henryk He also contributed verses to

other works. There are editions of Web¬ ster's works by Dyce (1830; new eds., 1857 and 1886) and Hazlitt (1856). J. A. Svmonds edited a selection in the (Mermaid Series5 in 1888 and there is an edition of (The Duchess of Malfi, in the (Templc Dramatists5 by C. E. Vaughan (1896). Consult Hazlitt, (Dramatic Literature of the Age of Elizabeth5 (ed., 1840) ; Vopel, (John Webster: Researches on his Life and Plays5 (1887) ; Gosse, c 17th Century Stud¬ ies5 (1883) ; Swinburne, (Studies in Prose and Poetry5 (1894). Lamb was the earliest among 19th century critics to give due praise to Web¬ ster and Swinburne enthusiastically places him next to Shakespeare among English dramatists.

WEBSTER, Joseph Dana, American sol¬ dier: b. Old Hampton, N. H., 25 Aug. 1811; d. 12 March 1876; son of Josiah W., minister at Hampton 1808-37. After graduation at Dart¬ mouth in 1832, he studied law; became clerk in the war department, Washington, and was made United States civil engineer in 1835 ; was commissioned second lieutenant of topographi¬ cal engineers in 1838; served in the Mexican War; resigned from the army, with rank of captain, 1854, to practice in Chicago as civil engineer. He perfected a system of sewerage for Chicago, the execution of which necessi¬ tated raising the grade of a large part of the city and involved many great and novel engi¬ neering feats. At the beginning of the Civil War he was charged with the construction of fortifications at Cairo, Ill., and Paducah, Ky.; became colonel of an Illinois artillery regiment

in 1862; as chief of General Grant's staff was present at Fort Henry and Fort Donelspn; at Shiloh he was chief of artillery. He was com¬ missioned brigadier-general 29 Nov. 1862, and served as military governor of Memphis and as military superintendent of railroads; he was again General Grant's chief of staff at Vicksburg, and held a like post under General Sherman from 1864 till the end of the war. Having been brevetted major-general of volun¬ teers March 1865, he retired from the army and went back to Chicago ; there he was assessor of internal revenue 1869-72, afterward assistant United States treasurer,

and finally collector of revenue.

WEBSTER, (Julia) Augusta Davies, Eng¬ lish poet and dramatist: b. Poole, Dorsetshire, 30 Jan. 1837 ; d. Kew, Surrey, 5 Sept. 1894. She was a daughter of Admiral George Davies and was married to Thomas Webster, a Fellow of Trinity College, in 1863. In 1879 she was elected to the London School Board. Her first work was published under a pseudonym, which she soon discarded, and her early inclinations led her to make translations from the Greek in which field she did admirable work. As a dra¬ matic poet she takes high rank, but her verse appeals most nearly to highly cultured readers. Her works include (Dramatic Studies) (1866) ; <Portraits) (1870); the dramas (Disguises) (1879) ; (In a Day5 (1882) and (The Sentence) (1887); (The Medea of Euripides, 5 translation (1868) ; (A Housewife's Opinions) (1878) ; Gaffodil and the Croaxaxicans) (1884), *etc.*

WEBSTER, Noah, American lexicographer: b. Hartford, Conn., 16 Oct. 1758; d. New Haven, Conn., 28 May 1843. In 1774 he entered Yale College but his studies were interrupted by the outbreak of the Revolutionary War, in which he served under his father as a volunteer. He was graduated in 1778 and was admitted to practise law in 1781, but the unsettled state of the country prevented his obtaining a suitable opening in his profession and in 1782 he re¬ moved to Goshen, N. Y., where he taught a clas¬ sical school. Soon after he published his Gram¬ matical Institute of the English Language,5 in three parts, Part 1 (1783) containing (A New and Accurate Standard of Pronunciation5 ; Part 2 (1784), (A Plain and Compre¬

hensive Grammar5 ; Part 3 (1785), (An Ameri¬ can Selection of Lessons in Reading and Speak¬ ing.5 The first part of this work afterward became popularly known as (Webster's Spelling-book.5 In 1889 it was stated that 62,000,000 copies of the work had then been published. His literary activity was henceforth very great and among works issued by him during the next few years are (Sketches of American Policy5 (1784-85), an argument for the formation of a national constitution. In 1787, after the ad¬ journment of the Constitutional Convention, he published the pamphlet, Examination of the Leading Principles of the Federal Constitution5 ; and dissertations on the English Language5 (1789). He began the practice of law at Hart¬ ford in 1789, but removed in 1793 to New York, where he established a daily paper, the Minerva (later The Commercial Advertiser) , for the pur¬ pose of supporting the government. Fie pub¬ lished in 1794 a pamphlet on the (Revolution in France5 and wrote 10 essays under the

signature of ((Curtius55 in favor of the Jay Treaty with Great Britain. These publications had a powerful influence in stemming the tide of feeling in favor of a French alliance. In con¬ nection with the visitation of yellow fever he made a special study of the history of pestilential diseases and wrote a work on contagious dis¬ eases which was published in England and America in 1799. In the previous year he had removed to New Haven. In 1802 he published historical Notices of the Origin and State of Banking Institutions and Insurance Offices.5 His great work was the (American Dictionary of the English Language.5 He devoted many years to the collection of new words and prepa¬ ration of more free and exact definitions. In 1824, when the book was nearly finished, he vis¬ ited Europe to procure such information as he had been unable to obtain in America. After a short stay in Paris he went to England, where he finished his dictionary during an eight months' residence in Cambridge. In June 1825, he returned to America. An edition of 2,500 copies of his dictionary was published in 1828, followed by an edition of 3,000 in England under the superintendence of E. H. Barker. The work contained 12,000 words and 40,000 definitions not to be found in any similar publication. In 1840-41 he published a second edition in two vol¬ umes, with extensive additions to the vocabulary and corrections of definitions.

Noah Webster properly takes rank as the greatest of lexicographers, his work being largely original and of vastly greater scope than that of earlier dictionary makers. He originated most of the accepted dictionary forms and laid the groundwork for the modern comprehensive lexicons. (See Dictionary). His (Collection of Papers on Political, Literary and Moral Subjects5 was a reprint of some of his earlier writings. Webster was through¬ out life associated with many of the most emi¬ nent men of the country and always took an active share in public life, supporting his party chiefly by his pen. Several enlarged and im¬ proved editions of his dictionary have been pub¬ lished since his death, both in America and in England, and it has always held its place as a standard work. Among his further writings are Getters to Dr. Priestly5 (1800) ; (Origin,- History and the Connection of the Languages of Western Asia and of Europe5 (1807) ; and a (History of the United States5 (rev. ed., 1838). Consult the (Life5 by Scudder (1882) in the (American Men of Letters5 series; and Ford's (Notes on the Life of Noah Webster5 (2 vols., New York 1912).

WEBSTER, Pelatiah, American political economist: b. Lebanon, Conn., 1725; d. Phil¬ adelphia, Pa., September 1795. He was grad¬ uated at

Yale University in 1746, studied theol¬ ogy and in 1748-49 was engaged as a preacher. Afterward he entered upon a business career in Philadelphia and gained a considerable fortune. He was a lifelong student of the problems of currency, finance and national resources and during the Revolutionary War aided the cause with both his purse and his pen. He was im¬ prisoned by the British at Philadelphia for more than four months in 1778 and had property to ihe value of £500 confiscated. Author of Es¬ says on Free Trade and Finance5 (1779-85) ; (Dissertation Upon the Political Union and Con-

stitution of the Thirteen United States of North America) (1783); (Essay on Credit) ; (Politi¬ cal Essays on the Nature and Operation of Money, Public Finances and Other Subjects y (1791), *etc.*

WEBSTER, Sir Richard Everard, 1st Vis¬ count Alverstone, English jurist: b. 22 Dec. 1842; d. 1915. He was educated at Cambridge, was called to the bar in 1868, became queen's counsel in 1878 and was Attorney-General in Lord Salisbury's Cabinet in 1885-86, 1886-92 and 1895-1900. He was returned to Parliament for Launceston in 1885 and in 1885-1900 was mem¬ ber for the Isle of Wight. He was knighted in 1885, created a baronet in 1900 and in that year was raised to the peerage; in 1913 he was made a viscount. In 1893 he was one of the British representatives before the Bering Sea arbitration tribunal. He was Master of the Rolls, May-October 1900 and was then appointed chief justice. He served as a member of the Alaskan boundary tribunal in 1903. Shortly before his death he published (Recollections of Bench and Bar.*

WEBSTER, Mass., town in Worcester County, on the French River and on the New York, New Haven and Hartford and the Bos¬ ton and Albany railroads, 15 miles south of Worcester. It is in an agricultural region and has considerable industrial interests connected with farm products. A lake (1,225 acres) is one of the attractions of the town. It has cotton and wroolen mills, shoe factories and machine shops. It has a good water system. There are 11 churches, a high school, 13 graded public schools, three graded parish schools, a public library, two

banks and tw?o newspapers. The government is administered by annual town meetings. Webster was set off from Dudley and Oxford and in 1832 was incorporated. Pop. (1ˆ20) 13,258.

WEBSTER-ASHBURTON TREATY,

The, in American history, a treaty between the United States and Great Britain, negotiated by Daniel Webster and Lord Alexander Baring Ashburton in August 1842. By this treaty the frontier line between the State of Maine and -Canada was definitely agreed to. By this agree¬ ment seven-twelfths of the disputed ground, and the British settlement of Madawaska, were given to the United States, and only five-twelfths of the ground to Great Britain; but it secured a better military frontier to England, and included heights commanding the Saint Lawrence, which the award of the king of Hol¬ land, who had been chosen arbiter, had assigned to the Americans. By the 8th and 9th articles, provisions are made for putting an end to the African slave-trade; and the 10th article pro¬ vides for the mutual extradition of suspected criminals. See Treaties; United States — LIistory of Arbitration.

WEBSTER CITY, Iowa, county-seat of Hamilton County, on the Boone River, and on the Webster City and Southern, the Chicago and Northwestern and the Illinois Central rail¬ roads, about 70 miles north of Des Moines. It js in an agricultural region, in which there are a number of coal mines. It has a shoe factory, foundry, machine shops, iron furnaces, flour mill, grain elevators and large coal yards.

Nearby are mineral springs of some import¬ ance. It has a high school, graded public and parish schools, four banks and a daily and four weekly newspapers. The city employs a busi¬ ness manager to operate its affairs. Pop.

(1920) 5,657.

WEBSTER GROVES, Mo., city in Saint Louis County, on the southwestern outskirts of Saint Louis, and on the Missouri Pacific and the Saint Louis and San Francisco railroads. It is chiefly a residential suburb of Saint Louis. The Loretto Academy, the Kendrick Seminary and a Masonic Home are located here. Pop. (1920) 9,474.

WEBWORMS, various species of cater¬ pillars or lepidopterous larvae,

so named be¬ cause of their habit of spinning webs of silk, enclosing leaves upon which they feed, and also serving as a shelter. As a rule neither the web-spinning nor the social habit is so highly developed as in the tent-caterpillars (q.v.), but there is no sharp distinction in the application of the two names. The species of caterpillars exhibiting such habits are quite numerous and belong to a number of genera and families of moths (q.v.). Some of them are of consider¬ able economic importance. The fall webworm is the larva of the small white moth (H 31-phantria cunea). As soon as they leave the egg all of the larvae hatching from a mass spin a common web enclosing several leaves. After these are eaten the caterpillars wander farther and farther in search of food, sometimes de¬ stroying the entire foliage of a tree, but always returning to the shelter of the nest to rest when not feeding. The web may be extended to include whole branches. The caterpillars are covered with long hairs, and there are two broods, one in the spring and one in the fall, the latter being unusual among species of similar habit, wherefore the name. All kinds of shade and ornamental trees suffer from their attacks. Typical of a large and quite distinct group of caterpillars is the garden webworm (Loxostcgc similalis), which is a small, nearly naked caterpillar, that feeds in company on all kinds of garden vegetables, the leaves of which are drawn together in small webs. Some of the related species form large colonies, and one small form is often very destructive to dried clover hay. The root webworms are cater¬ pillars of the little roll-wing moths. Crambus vulvivagellus is a common species, which spins a web about the stalks and roots of grass to which, as well as to corn, it is sometimes very destructive. The true tent-caterpillars (q.v.) belong to the genus Clisiocampa and family Bombycidcc or silk-spinning moths. A quite unrelated species is Cacozria cerasivorana, which forms veritable silken tents, sometimes cover¬ ing small trees entirely. The general method of combating webworms is to destroy their eggs in winter, to burn the newly-formed tents and to spray the foliage about the tents with arsenical solutions. The ground-webs may be checked by fall plowing. Consult Llarris and Flint, (Insects Injurious to Vegetation (New York 1884), and publications of the United States Department of Agriculture.

WEDDERBURN, wed’er-bern, Alexander,

Baron Loughborough, 1st Earl of Rosslyn,

British politician': b. Edinburgh, 13 Feb. 1733; d. near Windsor, England, 2 Jan. 1803. He was educated at the University of Edinburgh, was called to the English bar in 1757, entered Parliament in 1761 as member for Ayr and subsequently represented various constituencies. He pleaded the great Douglas case in 1768-89, and in 1771 left the ranks of the opposition to become a firm supporter of Lord North, who had appointed him solicitor-general. He strenu¬ ously opposed the claims of the American colonists, defending the policy of Lord North throughout the American war. He was made chief justice of the Court of Common Pleas in 1780, at the same time being raised to the peerage as Baron Loughborough, and in 1783 assisted in forming the coalition ministry, but in 1784 he joined the forces of Fox. He sub¬ sequently made friends with Pitt and gained from him the place of lord chancellor, after which he joined the supporters of George III. Upon his retirement from the chancellorship in 1801 he was created Earl of Rosslyn.

WEDDERBURN, James, Scottish psalmo-dist: b. Dundee, Scotland, about 1500; d. Eng¬ land, about 1564. He studied at the University of Saint Andrew, became interested in the Scottish Reformation and fled to France to escape prosecution as a heretic. He edited, with his brothers Robert and John, the principal song book used in Scotland, (Ane Compendius Buike of Godly and Spirituall Sangs, Collectit Out of Sundrie Partes of the Scripture, wyth Sundrie of Uther Ballates Changed Oot of . Prophane Sangs, for Avoyding of Sinne and PIarlotrie) (about 1548). Later editions of this work have been edited by David Laing (1868) and Mitchell (1897). He is also credited with the author¬ ship of (The Complaynt of Scotland1 (1548), ((the only classic work in old Scottish prose.11 Consult Mitchell, <rThe Wedderburns and Their Work1 (1898).

WEDDING ANNIVERSARIES, or cele¬ brations, bear many familiar names from the sort of articles considered appropriate gifts on such occasions. They are as follows : Cotton wedding one year; paper wedding, two years; leather wedding, three years ; wooden wedding, five years ; woolen wedding, seven years ; tin wedding, 10 years ; silk and fine linen wedding, 12 years; crystal, (glass) wedding, 15 years; china wedding, 20 years; silver wedding, 25 years ; golden wedding, 50 years ; diamond wed¬ ding, 75 years.

WEDDING CEREMONIES. See Mar¬

riage, History of.

WEDEKIND, Frank, German dramatist and pamphleteer: b. Hanover, 24 July 1864; d. Munich, May 1918. He early became a journal¬ ist, but drifted for a time into the employ of Maggi's soups, for whom he conducted their advertising department (1886), traveled as a performer in Herzog's Circus (1888) and set¬ tled in Munich in 1890, where he spent the rest of his life in literary and artistic work of vari¬ ous kinds. Wedekind's plays, of which many may be obtained in English translations, are a savage exposure of the sexual hypocrisy of our times, which imposes upon all classes a degree of restraint and concealment of this fundamental passion inevitably resulting in the most dangerous repressions and perversions.

His first play treats this situation in a more pathetic and impressive manner than Wedekind has since succeeded in reaching in any of his more ambitious works, for he presents in it ((Fruhlings Erwachen,1 1891, Spring's Awaken¬ ing') the early sex interest of the child and the cowardice of parents in informing them on matters so vital to their future development. The terrible results of the misunderstood pas¬ sion on the lives of the boys and girls in the play are perhaps more typical of Germany than of most other countries, owing to the more rigid course of German family life, but they are, in large measure, of universal application. Like several other plays of Wedekind, Friih-lings Erwachen1 has been played in New York, in English, ˆrdgeist,1 also dealing with sex phenomena (1895), is more colossal in its scope almost crushing in the fury of its obsessions ; its sequel (Die Buchse der Pandora1 (Pandora's Box, 1904) goes further in depicting the un¬ savory side of sex relations — Schnitzler's ˆeigen1 is probably the extreme in the more aphrodisiac, more tempting direction' — than any other play in literature, ˆrdgeist1 and (Die Buchse der Pandora1 are more generally known under the collective title of ˆulu,1 the name of the man-consuming heroine. Other important plays are (Die junge Welt1 (1897), (Der Liebestrank1 (1899), (Der Kammersanger1 (played in New York in English, as (The Tenor,1 by the Washington Square Players, 1900). (Hidalla1 (1904), <Die Zensur1 (1908).

The last named is a short but humorous dra¬ matic attack on the censorship, with which Wedekind had come in contact because of out¬ spoken utterances in a previous play. In fact, he once fled from Germany from persecution for lese majeste (Majestatsbeleidigung),

re¬ mained for a short time in Paris, returned voluntarily for trial, and served a short sen¬ tence in the fortress of Konigstein (1900). After the outbreak of the European War in 1914, Wedekind seems, like many other German writers, to have been attracted to a more sympathetic view of German his¬ tory and the German government, and wrote (1915) a rather over-patriotic historical play, Bismarck,1 glorifying the events leading up to the foundation of the modern German Empire. He is one of the most vigorous and original satirists of our time ; his ironic, cynical estimate and rejection of the universe is apparent behind all his ingenious puns, his grotesque humor, his eccentric caricatures, his burlesque distortions. As an artist he considers restrictions of form to be not binding, and produces not infrequently results that are refreshing or even childlessly grotesque. His works (7 vols.) appeared at Munich in 1913, and include short stories as well as plays. Biographical works on Wede¬ kind have appeared from the pens of Pissin, Raimund (1905); Kapp, Julius (1909); and Eisner, Richard (1909).

Jacob Wittmer Hartmann.

WEDGE, something made of hard sub¬ stance in the form of a V or double inclined plane, for splitting or pushing apart by being thrust between two surfaces. It is often re¬ garded as one of the mechanical powers, but is really an amplification of the inclined plane. The blade of an axe, the head of a chisel and the woodman's wedge are familiar illustrations

of common wedges. A very thin wedge driven with a comparatively light hammer may be made to exert a high degree of splitting force, owing to the mechanical advantage obtained. See Mechanical Movements, Powers and Appliances.

WEDGWOOD, wej'wud, Josiah, English potter: b. Burslem, Staffordshire, 12 July 1730; d. Etruria, Staffordshire, 3 Jan. 1795. He was the son of a potter in the district and on the death of his father was employed in the pottery at nine. An incurable lameness later

compelled him to give up the wheel and he removed for a time to Stoke, where he entered into partner¬ ship with other potters and where his talent for ornamental pottery was first displayed. In 1759 he returned to Burslem, and set up a small manufactory of his own, in which he made white stoneware, and developed the cream-colored ware for which he became so famous. He presently succeeded in producing a ware so hard and durable as to render works of art produced in it almost indestructible ; and he also produced paintings on pottery without the arti¬ ficial gloss so detrimental to the effect of superior work. In 1771 he erected potteries at Etruria, a village which he founded for his workmen. His improvements in pottery, which included form, substance and decoration, in all of which he attained an excellence rarely equaled, created the great trade of the Stafford¬ shire potteries, which even during his lifetime acquired a remarkable expansion. He made 50 copies of the Portland vase, which were sold for 50 guineas each, a sum which it is said did not cover his expenditure in their production. (See Pottery; Wedgwood Ware). Consult Jewett, ‘The Wedgewoods5 (1865) ; Meteyard, Eliza, (Life) (1860) ; Rathbone, ‘The Master¬ pieces of Old Wedgwood Ware5 (1892-93) ; ‘Life,5 by Smiles (1894).

WEDGWOOD PYROMETER, in physics,

a pyrometer in which temperature is ascertained by the contraction of baked cla}7, measured be¬ fore and after its subjection to the action of heat.

WEDGWOOD WARE. England’s most noted art potter was Josiah Wedgwood, born at Burslem, Staffordshire, in 1730. In 1754 he became Whieldon’s partner, but started his Ivy House works in 1759, making “cream-color55 ware. By 1773 Wedgwood’s products were all being made at the newly-erected magnificent works called Etruria. “Jasper55 ware (made first in 1775) was Wedgwood’s most noted achieve¬ ment. It was of colored body and decorated with Flaxman’s reliefs in white. The texture of the paste was very beautiful and the ware was left unglazed (biscuit). It was used, not only in vases and table services, but also as cameos in medallions, plaques, brooches, shoe-buckles, earrings, snuff-boxes, *etc.* Jasper ground colors were dark and light blues, lav¬ ender, pink, two tones of green, black, so-called ‘lilac55 and yellow — the rarest and most cov¬ eted of all pieces. First it consisted of a sblid colored body of a most beautiful grain, but was later made in a white body and dipped to give a surface of color upon which the delicate white reliefs were laid. A few pieces (made since 1790) are “tricolored.55 The medallions (Hackvvood, a§ well as Flaxman, did many of

the best) contained mythological subjects and beautifully executed portraits of Benjamin Franklin, Robert Boyle, Sir Isaac Newton, Priestly, Hamilton, *etc.* A fine white ware, named “pearl,55 was made from a variation of Wedgwood’s “Queen’s ware55 paste (this was his cream-color patronized by Queen Charlotte) used on “shell55 patterns and coated with pearl-shell lustre enamel washes. Gold, purple, yel¬ low and silver (platinum) lustre pieces were made from 1792 to 1810 in tea-pots, coffee pots, cream jugs, candlesticks, trays, *etc.* The black stoneware that Wedgwood called “basalts of Egypt55 was used on “Etruscan55 (as Greek vases were then called) vase styles, medallions, panels, seals, plaques, busts, tea and coffee sets, etc., with reliefs of mythological scenes, trees, horses, flowers. Noted are the busts in this ware of Zeno, Cicero, Plato, Chaucer, Milton, Spencer, Bacon, Lord Chatham of the larger sizes and the smaller Voltaire, Rousseau, *etc.* Most famous of Wedgwood’s productions is the glass Barberini or Portland vase (see Portland Vase) in black-polished earthenware background with applied white jasper bas-reliefs. Wares of mottled bodies and glazes were made in both Burslem and Etruria, Wedgwood learned this style through Whieldon’s “tortoiseshell,55 gran¬ ite, agate and other marbled wares. Another variety was the “rosso antico55 or unglazed red stoneware, after the Elers brothers’ style, used on cream jugs, milk jugs, *etc.* The so-called Greek “Etruscan55 antique pieces were imitated by a method Wedgwood termed “encaustic55 painting; they used an enamel paint process that produced a dull (mat) surface. As the pieces copied were of the Greek “Decadent55 period they are not much admired ; such ware is found in teacups, jugs, bowls, *etc.* Wedg¬ wood’s “bronze encaustics55 still exist but the bronze (precipitated gold), adhering only through japanners’ size is mostly worn off. Wedgwood produced scarcely any porcelain ware, but his nephew, Byerly (10 years after the great Josiah’s death), made a real fine porcelain in small quantities, in unrefined dec¬ oration, mostly. Since 1872 porcelain has been produced again in Etruria. This great factory has been continued under the descendants of Josiah to this day.

Characteristics and Marks. — True pieces

having the “Wedgwood® mark and word “Eng¬ land55 date from 1791, then the country of origin was added. “Old55 Wedgwood body has been compared with a “baby’s skin55 ; Church de¬ scribes it as “ivory, neither dry and chalky-looking on the one hand, nor of waxy smooth¬ ness on the other; Yoxall says it “feels like a clay-pipe which has a film of soap-bubble over it.55 In Josiah’s day the body had a

perfect homogeneity and the workmanship showed “no ripples or stringiness55 as appeared later. Marks are “Wedgwood & Bentley,55 “WEDGWOOD & BENTLEY,55 “WEDGWOOD & BENTLEY, ETRURIA,55 in a circle; also “W. & B.55 These were during the Bentley partnership, otherwise “WEDGWOOD55 alone was used. The mark is always impressed. Much has been said of the Wedgwood forgeries, but they are so rare as to be almost considered negligible. Neither the ware nor the impressed mark are easy to closely imitate. Voyez, when dismissed by Wedgwood, made cameos in Wedgwood style and he was

a “perfect master of the antique style,55 few are known of. William Adams (worked under Josiah) made fine jasper cameos, but gave them the mark “Adams® impressed. Gamier says a Herr ‘ Schmidt, at a Bayreuth factory (19th century), imitated Wedgwood’s stoneware, using his mark.

Bibliography. — Burton, W., < English Earthenware and Stoneware5 (New York 1904) ; Church, A. H., (Josiah Wedgwood, Master Potter5 (London 1903) ; Jewitt, LI., Wife of Josiah Wedgwood5 (London 1865) ; Meteyard, E., (The Life of Josiah Wedgwood5 (London 1865-66) ; id., (Wedgwood and his Works) (London 1873) ; Rathbone, F., (01d Wedgwood5 (London 1893).

Clement W. Coumbe, Technical Art Expert.

WEDMORE, Frederick, English author: b. Richmond Hill, Clifton, England, 9 July 1844. He was educated in France, has been art critic on the London Standard since 1878 and has published an edition of Michel’s (Rembrandt5 ; (Poems of the Love and Pride of England5 with his daughter Millicent. Among works of his own are (Pastorals of France5 (1877); Wife of Balzac5 (1890) ; (Studies in English Art5 (1876; 1880) ; (On Books and Art5 (1899) ; (The Collapse of the Penitents,5 a novel; (Turner and Ruskin5 (1900), *etc.* .

WEDNESBURY, wenz’bu-ri, England, a manufacturing town in

Staffordshire, 19 miles south-southeast of Stafford and 120 miles north¬ west of London. The Gothic parish church stands on the summit of a hill at the northern extremity of the town ; there are several other churches and chapels, a town hall, free library, a mechanics' institute, public baths, a benevolent society, an almshouse and several schools. The principal manufactures are railway carriages, patent axles and general ironwork for railways; steel tubing for gas and water and steam pipes; gun locks and barrels, springs for coaches, hinges, nails, screws, spades, shovels, edge tools and wrought-iron work of every description. Pop. about 30,000.

WEDNESDAY, the fourth day of the week. The Germans call it Mittwoch (mid¬ week). The English name is derived from the old Scandinavian deity Odin or Woden. In Anglo-Saxon it is Wodnesdceg ; in Swedish, Odensdag; in Dutch, Wocnsdag. See also Ash-Wednesday.

WEED, Clarence Moore, American nat¬ uralist : b. Toledo, Ohio, 1864. He was gradu¬ ated from the Michigan Agricultural College in 1883 and is at present teacher of nature study at the Massachusetts State Normal School at Lowell. He has written (Insects and In¬ secticides5 (1893) ; (Ten New England Blos¬ soms and Their Insect Visitors5 (1895) ; (Seed Travelers5 (1898) ; Hnsect World5 (1899) ; (Th-e Flower Beautiful5 (1903) ; (The Nature Calendar Series5 (1902-4)3) ; <Bird Life Stories5 (1904); (Our Trees, How to Know Them5 (1908) ; <Wild Flower Families5 <1908) ; Warm Friends and Farm Foes5 (1910) ; Weeing Nature First5 (1913).

WEED, Edwin Gardner, American Protes-ant Episcopal bishop : b. Savannah, Ga., 23 July 1837. He was educated at the University

of Georgia and studied theology at the General Theological Seminary whence he was graduated in 1870. He took priest's orders in the Episcopal Church in 1871 and was rector of the church of the Good Shepherd, Summerville, Ga., 1871-86. In the year last named he was consecrated bishop of Florida.

WEED, Stephen Hinsdale, American sol¬ dier: b. New York, 1834; d. near Gettysburg, Pa., 2 July 1863. He was graduated from West Point in 1854, served on the Texan frontier and in Florida wars of 1855-57, receiving rank as lieutenant in 1856, and in 1858-61 he was on duty in Kansas and Utah. In 1861 he was pro¬ moted captain and assigned to the command of a battery in the Army of the Potomac. He was engaged in the Maryland, Peninsular and North¬ ern Virginia

campaigns and fought at Manas¬ sas, Antietam and Chancellorsville, receiving promotion to brigadier-general of volunteers for gallantry at the latter. He commanded a brigade of artillery at Gettysburg 2 July 1862 and was killed while holding Little Round Top against the terrific onslaught of the Confed¬ erates. The place where he fell is now called “Weed’s Hill.55

WEED, Thurlow, American journalist and political leader : b. Cairo, Greene County, N. Y., 15 Nov. 1797; d. New York, 22 Nov. 1882. He entered a printing office at 14, but left his trade for a time to serve in the army during the War of 1812; in 1815-19 he worked as a printer in New York, and in 1819 went to central New York State, where he established and edited successively The Agriculturist at Norwich, and the Onondaga County Republican at Manlius. In 1822 he became editor of the Rochester Tele¬ graph, a daily paper, and later its proprietor. During the Anti-Masonic excitement he stopped the publication of the Telegraph and issued the Anti-Masonic Enquirer. He was twice elected to the State legislature on the Anti-Masonic ticket, and while in Albany became noted as a shrewd political manager. In 1830 he moved to Albany and established the Albany Evening Journal, which he edited till 1865. This paper was first used as a means of attacking the Albany “Regency,55 a body of politicians under the leadership of Martin Van Buren, and it soon became the leading journal of the Whig party in the State. Through the influence of this paper and his political skill, Weed became the dominant State manager of the Whig, and later of the Republican, party. He held no public office himself, but for many years practically controlled the nominations for State officers; his control being used as a rule for the public good; some of the most efficient governors of the State were elected under his management. He also took a leading part in national politics as early as 1824, and when J. Q. Adams was nominated for the Presidency was instrumental in uniting the Clay and Adams factions ; was particularly influential in securing the nomina¬ tion of Harrison in 1840, Clay in 1844 and Tay¬ lor in 1848, and materially aided in the nomina¬ tion of Scott in 1852 and Fremont in 1856. In 1860 his first choice for the Presidency was Seward, but he loyally supported Lincoln after his nomination and urged his renomination in 1864. Weed had long been a personal friend of Seward and was for some time closely

associated with Seward and Greeley in what was known as “the political firm of Seward, Weed and Greeley.® In 1861 he went to Europe on a diplomatic mission to place the North in a favorable light before foreign governments and to prevent their intervention in behalf of the South. After 1865 he was for a time a member of the editorial staff of the New York Times; in 1867-68 was editor of the Commercial Ad¬ vertiser in New York. His health then forced him to resign continuous journalistic work, but he continued to write occasionally for news¬ papers and periodicals, and though he took no active part in politics, his advice was sought by Republican leaders and had no small influence m shaping the policy of the party. He published (Letters from Europe and the West Indies) (1866), and prepared his ‘Autobiography,* which was published after his death (1884). Consult Barnes, (Memoir of Thurlow Weed) (1884); Alexander, Political History of New York* (New York 1906).

WEED, Walter Harvey, American geolo¬ gist : b. Saint Louis, Mo., 1 May 1862. He was graduated as mining engineer from Columbia University, School of Mines (1883) and ap¬ pointed assistant geologist, United States Geo¬ logical Survey in that year. In 1883-89 he was engaged in Yellowstone Park investigating hot springs and geysers, and glacial and sedimen¬ tary formation. To him is due the discovery that the brilliant coloring about hot springs and geysers are not mineral but due to living algae; and he also found and described Death Gulch. He also made the discovery that Death Gulch gave out carbon dioxide gas from an extinct hot spring, and it was this that killed wild ani¬ mals that strayed there. He was occupied in general geologic exploration work in Mon¬ tana, 1889-98. His most notable contribu¬ tion to science was the theory of second¬ ary enrichment of mineral deposits published in 1899, now generally accepted. This was followed by the theory of enrichment by as¬ cending alkaline waters. He was one of the first to describe contact metamorphic ore de¬ posits, and to interpret replacement deposits correctly. He is a member of practically all important scientific societies and was appointed special expert and commissioner on copper for Louisiana purchase exposition, 1904. In 1906 he resigned from United States Geological Survey to become chief geologist and examining engi¬ neer

for General Development Company, and in 1910 went into private practice as consulting engineer and mine valuer. In recent years he has been expert witness in many important mining lawsuits. His publications include ‘Copper Mines of the World* ; ‘Nature of Mineral Deposits) (a textbook, a revision and translation of Beck’s German treatise) ; ‘Geol¬ ogy of Butte, Montana) ; ‘Geysers) ; ‘Second¬ ary Enrichment *; and many papers of the United States Geological Survey and in ‘Trans¬ actions* of the American Institute Mining En¬ gineers, and the technical journals.

WEEDEN, William Babcock, American manufacturer and economic and historical writer: b Bristol, R. I., 1 Sept. 1834; d. 1912. He studied at Brown University, and then en¬ gaged in the manufacture of woolen goods in Providence. In 1861 he joined the Union army

as first lieutenant of artillery; was promoted captain after the first battle of Bull Run ; was present during the siege of Yorktown, and took part in the engagements at Hanover Court House, Mechanicsville, Gaines’ Mill and Mal¬ vern Hill. In August 1862 he resigned and resumed business in Providence. His publica¬ tions include ‘Mortality of Prohibitory Liquor Laws* (1875) ; ‘Social Law of Labor) (1882) ; ‘Economic and Social History of New Eng¬ land, 1620-1789> (1890) ; ‘War Government (1906) ; ‘Early Rhode Island* (1911).

WEEDS are plants growing where they are not desired. There are no plants which are weeds, per se, since in nature each plant has its place, and since in cultivated areas any plant, useless or useful, may become a w’eed. Thus grass would be considered a weed in a bed of garlic, and vice-versa. Many plants, however, are popularly dubbed weeds because they are troublesome in fields and gardens, but even among these are not a few which are culti¬ vated; for instance, purslane, lamb’s quarters and sorrel. Far from being the useless and obnoxious things that they have long been re¬ puted to be, weeds have performed a distinct service, which they still continue, in agricul¬ ture ; they have compelled the husbandman to practise clean cultivation, upon which the suc¬ cess of his crops very largely depends.

Weeds often must be eradicated upon land that has become foul under neglect. Upon pastures and lawns that commence to fail the two principal wˆays of management are to make more grass grow or to plow the land and grow some other crop upon it for a year or more. The former is usually more feasible with lawns; the latter with

meadows and pastures. Often a reseeding to grass will be sufficient. The plantain, dandelion and similar weeds trouble¬ some in lawns may be cut out individually, but to keep them out the growth of grass must be encouraged by sowing extra seed and by fertil¬ izing. In land that has lain fallow the annual weeds may be destroyed by frequent cultivation ; biennial and perennial weeds, by short rota¬ tions of crops, especially such as include inter¬ tillage crops, like potatoes, beans and turnips. The one necessity to observe in combating per¬ ennial weeds is to prevent their forming leaves and thus elaborating food. In low grounds where sedges, rushes and bracken often abound, the land may be rid of these weeds by draining. In gardens many weeds may be "smothered® by growing leafy crops which will shade the ground. Ground which is kept free from weeds in the early months may become choked with weeds toward autumn and these may reseed the ground for the following year. Mowing be¬ fore the plants blossom, or plowing the ground are often practised. In some cases, however, the plants may be allowed to remain as a cover crop to prevent the washing of the soil during winter. This practice is most common in • or¬ chards. A cover crop sown by the orchardist is preferable.

Besides the usual means of seed dispersal, such as wind and water, weeds are frequently distributed by means of baled hay, manure, and imperfectly cleaned seeds of the crops sown.

I his last is particularly prevalent with such difficulty cleaned seeds as grass and clover. Hence the advisability of purchasing only the

best seeds. It is not remarkable that many of the most troublesome weeds are imported from foreign countries, because being removed from their natural controls they find less resistance and spread accordingly.

Weeds are often of service in aiding the farmer to judge the needs of his land, since many kinds grow only where the conditions are peculiarly adapted to them. The character of their growth also

indicates the quality of the soil. Wild carrot and the ox-eye daisy grow only upon poor soils, or soils that have been robbed of their fertility. Sheep sorrel indicates acid land and the necessity of applying lime to ˆsweeten® the soil. Bracken, sedge and moss show that the land needs drainage. Dark green foliage and large size of plant and leaf are good indications of abundant nitrogenous plant food in the soil ; and yellowish foliage and sparse, stringy growth shows lack of this material.

WEEHAWKEN, we-ha'ken, N. J., town in Hudson County, on the Hudson River, and on the New York, Ontario and Western and the West Shore railroads, opposite New York. It is one of the largest coal depots in the United States. It has the coal docks and freight sheds of the Erie Railroad Company and the coal docks of the Delaware and Hudson Canal Com¬ pany and the Pennsylvania Company. It has several manufacturing establishments. Two of the Hackensack Water Company reservoirs are located here. Weehawken is known as the dueling place of Alexander Hamilton and Aaron Burr. The post office of Weehawken is in the town of Union adjoining. Pop* (1920) 14,485.

WEEK, a period of seven days, one of the common divisions of time. The week is an arbitrary division of time, and the question when, why and by whom it was first adopted necessarily arises in connection with its actual prevalence. One explanation is that the num¬ ber seven occurs so conspicuously in mythical and occult lore. It was also early used as an indefinite unit, and things were counted by sevens, where later they were enumerated by dozens or hundreds. Another natural explana¬ tion offered is that it has been adopted as a quarter lunation ; but as there is no absolute necessity for dividing the month into four, and a large fraction is needed to make the weekly square with the lunar periods, this explanation is not satisfactory. The week is, in fact, a much closer division of a year than of a month; but the division of the year into 52 portions is so purely arbitrary that this can hardly suggest the origin of the week. The convenience of some short recurring period or cycle of days is obvious, and it is the prevalence alone, and not the occurrence of a particular cycle, that has to be accounted for. The practice of antiquity on the subject does not seem to have been so uni¬ form as is sometimes supposed. Among the nations who adopted the week as a division of time, the Chinese, Hindus, Egyptians, Chaldseans, Jews, Persians and Peruvians have been mentioned, but in some cases the antiquity of the practice is doubtful, and in others the name has been applied to other cycles than that of seven days. The nations with whom the weekly cycle has been traced with certainty to the greatest antiquity are the Egyptians and the Hebrews. With the former we only know of its existence, but with

the latter it had a much

more important character. Their earliest rec¬ ords speak of its existence, and refer it to a period previous to that of the nation itself. Laban, the uncle of Jacob, alludes to the week as an established measure of time in Gen. xxix, 27. The origin of the week is further ascribed in the Jewish Scriptures to the creation of the world, and is wrought into the institutions of the nation in a variety of ways, but particularly by the consecration of the seventh day to the worship of the Creator. The Hebrew word for week is of a general signification, and applies equally to a period of seven days, seven months, and seven years, each of which had a particular celebration attached to it in the Hebrew ritual, hence the use of days to represent years in the prophetic writings is according to the natural genius of the language. The number seven had a mystic significance attached to it in the sym¬ bolism of the Jewish religion in a variety of other ways. The Romans and Greeks each di¬ vided the month into three periods (see Cal¬ endar), and were not acquainted with the week till a late period. The Romans, however, had for civil uses, as the arrangement of market-days, a cycle of eight days, the ninth day being the recurring one, instead of the eighth, as with us. The use of the week was introduced into the Roman Empire about the first or second century of the Christian era from Egypt, and had been recognized independently of Chris¬ tianity before the Emperor Constantine con¬ firmed it by enjoining the observance of the Christian Sabbath. The names given by the Romans to the days of the week, and which have pervaded Europe, were derived from the planetary system, which was supposed to con¬ sist of the sun, moon and five planets, Mars, Mercury, Jupiter, Venus and Saturn. With the Mohammedans the week has also a religious character, Friday being observed by them as a Sabbath. The Chinese week is said to consist of five days, named after the five elements, iron, wood, water, feathers and earth. See articles on the different days of the week.

WEEKES, weks, Henry, English sculp¬ tor: b. Canterbury, 1807; d. 29 May 1877. He was for many years the principal assistant of the sculptor Chantrey, was elected to the Acad¬ emy in 1863 and became professor of sculpture there in 1873. Besides the earliest bust of Queen Victoria (1837) he executed statues of Latimer, Cranmer, Bacon, Charles II and others.

WEEKS, Edwin Lord, American artist: b. Boston, 1849; d. Paris, 17 Nov. 1903. He was a pupil of the Beaux-Arts (Paris), of Gerome, and

Bonnat, and sketched and painted in Cairo, Jerusalem, Damascus, Tangier and other parts of the Orient, obtaining there ma¬ terial for the genre-scenes from Eastern life with which he won his reputation. A frequent exhibitor at the Salon, he obtained honorable mention there in 1885. Among the other dis¬ tinctions which he received were the diploma of honor at the Berlin international exhibition in 1891, and a special medal and prize in 1896 at the empire of India exhibition (London). Specimens of his work are in the Pennsylvania Academy of Fine Arts, Philadelphia, the gal¬ leries of Greater New York, and the Corcoran Gallery of Washington. Among his paintings are (Cup of Coffee in the Desert) ; Jerusalem

from the Bethany Road) ; (Pilgrimage to the Jordan* ; (Scene in Tangier > ; (Arab .Story-Teller* (exhibited at the Centennial Exhibition, Philadelphia, 1876) ; (Departure for the Hunt — India) ; (Moorish Camel-Driver. * He also wrote (From the Black Sea Through Persia and India) (1895), and (Episodes of Mountaineering) (1897).

WEEKS, John Wingate, American legis¬ lator: b. Lancaster, N. H., 11 April 1860. He was reared on a farm and in 1881 was gradu¬ ated at the United States Naval Academy and in 1881-83 served as midshipman in the United States navy. In 1886-88 Mr. Weeks was assist¬ ant land commissioner of the Florida Southern Railroad and from 1888 to 1912 was member of Hornblower and Weeks, bankers and brokers, of Boston. He was alderman 1900-02, and mayor in 1903-04 of Newton, Mass., was chair¬ man of the Republican State convention in 1905 and a member of Congress from 1905 to 1913 from the 12th Massachusetts district. He was a member of the United States Senate from 1913 to 1919; received 105 votes for the Presi¬ dential nomination in the Republican National convention, Chicago, in 1916 and in 1898 com¬ manded a division of the Massachusetts Naval Brigade with rank of captain. In 1918 Mr. Weeks was defeated for re-election to the Senate. He was made Secretary of War in 1921.

WEEKS, Raymond, American philologist

and phonetician: b. Tabor, Iowa, 2 Jan.ˆ 1863. He was graduated at Harvard University in 1890 and later studied at the universities of Paris and Berlin, taking his Ph.D. at Harvard in 1897. He was professor of the Romance languages at the University of Missouri in 1895-1908; held that chair at the University of Illinois in 1908-09, and at Columbia University since 1909. He wras in the ambulance service in France in 1917-18. In 1910 he was one of the founders of the Romanic Review. He was an assistant editor of the (New Standard Dictionary) (1913) ; and is general editor of the Oxford French Series. He was joint author of (The N. E. A. Phonetic Alphabet (1912) ; has contributed verse and short fiction to the maga¬ zines ; and is author of Origin of the Cove¬ nant Vivien* (1902) ; (La Chivalerie Vivien) (1909), *etc.*

WEEKS, Feast of (Heb. Shabuoth) , the second of the great Hebraic religious festival, it is thus called from the fact that it forms the culmination of the seven weeks succeeding the Passover feast. Primarily it appears to have been connected with the celebration of the end of the harvest, but later also with the giving of the Law on the 50th day after the departure from Egypt. In the New Testament it is called Pentecost (q.v.), the Greek word (7r evTTjKocTv) signifying 50th (from day).

WEEMS, wemz, Mason Locke, American Protestant Episcopal clergyman : b. Maryland, about 1760; d. Beaufort, S. C., 23 May 1825. He began the study of medicine, but gave it up and went to London, where he was educated for the clerical profession, but found no bishop in Eng¬ land to admit him to holy orders. There was then no Anglican bishop in America, and the professional plans of Weems were obstructed by peculiar difficulties. (For an account of them consult McMaster's ˆHistory of the People of the United States,* Vol. I). Returning to this

country, he preached at different places, appar¬ ently never having a regular charge, although it has been said that the rectorship of Mount Ver¬ non parish (there was no such parish) was held by him before the Revolution, as claimed by himself; also that he officiated in the old Pohick Church, of which Washington was an attendant, which indeed he may have done, but not until long after Washington's attendance there had ceased. About 1790 he became a book agent for Mathew Carey (q.v.), and traveled through the South selling works, some of which were his own. He made himself popular by exercising his talents for comedy and his skill with the violin, probably diverting and

(through his ser¬ mons) exhorting the people by turns. A book of his own writing which he offered for sale was (The Drunkard's Looking Glass) (6th ed., 1818). His (Life of Washington,* by which he is best known, first appeared in 1800, and dur¬ ing the 19th century the number of its editions exceeded 70. The traditional conception of Washington rests mainly upon this work, as do the story of the cherry-tree and other anec¬ dotes which historians reject, most of which first appeared in the 5th edition (1806). His other publications, all more or less tawdry and inaccurate, include (Life of General Francis Marion* (1805) ; (The Philanthropist (10th ed., 1809) ; (God's Revenge Against Gambling) (3d ed., 1816) ; (Life of Benjamin Franklin, with Essays) (1817) ; (Life of William Penn* (1819) ; (Hymen's Recruiting Sergeant (7th ed., 1821 and (The Bad Wife's Looking Glass) (2d ed., 1823).

WEENDIGO, wind-ego (meaning <(cannibal**) mythical tribe of Indians believed in by the Algonquin and other eastern races. The Chippewa and the Ottawa thought they in¬ habited an island in Hudson Bay; while certain other tribes placed them indefinitely in the far north country. Indian stories tell of a terrible Weendigo with two faces and monstrous ears, who could see and hear everything. The ((great weendigo® was a monster so huge that his step shook the earth. So terrible was his gaze that no one looked upon him and continued to live. For this reason no one could accurately describe him. He lived far within the forest; but, for the same reason, no one knew exactly where. Like the forest Indians, he was much of a wanderer, and consequently was found, now in one place, now in another. For this reason he was the more to be feared, as one was liable to come upon him suddenly when least expected. But though no one had lived to describe him, there were many who had heard his tramp as it shook the forest and his terrible voice as he roared in rage. Sometimes the Great Ween¬ digo makes himself small and induces the un¬ wary warrior or hunter to follow him ; but he who does so never returns. He is much taller than the tallest wigwam ever built, and his ears stick out like those of a mountain cat. These he uses for hunting bags; and in them he stores, for the time being, all he does not care to eat. The Great Weendigo is supposed to be espe¬ cially fond of children and to keep a supply of them constantly in his great ears. Sometimes children thus imprisoned have escaped from the Weendigo, when the proper magic has been brought to bear upon the giant. A customary way of frightening Algonquin children into be¬ ing good was to tell them the Weendigo would

c itcn them and put them in his ears, or roast them and eat them. Numerous mythical folk¬ tales have grown up about the Weendigo, many ot which are imaginative and dramatic. The tireat \ eendigo had the power of self-trans¬ formation ; and he frequently changed his form to gain his ends. Ihe Weendigo was firmly believed in from the Hudson Bay to the head of Lake Superior and throughout all the Al¬ gonquin country from this line eastward.

WEENIX, Jan, yan va'niks, the Younger, Dutch painter, son of Jan Baptist: b. Amster¬ dam, 1644; d. there, 20 Sept. 1719. He painted landscapes, animals, flowers and fruit, but ex¬ celled in the representation of dead game and hunting scenes. His pictures of this class are unrivaled by any productions of the Dutch schools, and command large prices. He finished with extreme neatness, and exhibited a clear and brilliant coloring and a wonderful knowl¬ edge of chiaroscuro.

WEENIX, Jan Baptist, Dutch painter: b. Amsterdam, 1621; d. Ter May, near Utrecht, 1660. He was instructed by Abraham Bloemart and Nicolas Mojert, and at 22 visited Rome, where he acquired a reputation by his Italian seaports and landscapes with architectural ac¬ cessories. The last 12 years of his life were passed in Holland. He was a rapid painter, having been known to finish three half-length portraits with accessories in a single day, and excelled in history, portrait, animal, landscape and marine painting, being on the whole most distinguished in the last-named department.

WEEPING CROSS, a cross of stone or wood, erected at the side of a road, at which penitents prayed and wept for their sins. Hence the old English saying, ((To return by weeping cross,® that is, to return in sorrow from some message or undertaking. These crosses were removed in England when that country became Protestant, and the saying is now obsolete.

WEEVER (variant of weaver, or of the obs. wiver, from Lat. vipera, viper), a fish of the genus Trachinus, two species of which are rec¬ ognized : T. vipera, five to six inches in length, and T. draco, 10 to 12 inches. They possess sharp opercular and dorsal spines, with which

they can inflict a painful wound. The sting is believed not to be poisonous, but it is very similar to that of the sting-ray (q.v.). The name weever is hence applied to any of the T rachinidce.

WEEVIL, a general name applied not only to various genera of adult beetles but also to their larvae. They form a group Rhyncho-phora, or snout-beetles, so called from the char¬ acteristic production of the head in the form of a prominent snout, bearing the elbowed antennae at the sides and the small mouth at its tip. There are several families, but most of these beetles belong to the Curculionidae, which is said to include upward of 600 genera and 20,000 species. All of them are vegetarians and the larvae are little white or yellow, fat footless grubs which mostly live within the tissues of plants, and are especially destructive to nuts, seeds and fruits. One of the most conspicuous and harmful is cotton-boll weevil (Anthono - inns grandis). It is about one-fifth of an inch long and may be differentiated from related species by the fact that the tibiae of the first

pair of legs are provided with two small spines. Immediately after transforming from the pupal state the color is reddish but some time after emergence the color becomes consiierable darker. The grub-like larvae are considerably longer than the adults, strongly curved, white with pale yellowish heads. The eggs are depos¬ ited in punctures made by means of the beak of the female weevil in the buds (called squares) and bolls. The larvae devour the interior. In¬ fested squares practically invariably fall to the ground but bolls always remain attached to the plant. In the case of the squares, of course, the fruit is ruined. In case of bolls only the infested like or apartment is destroyed. The life-cycle is completed in about 20 days and there is an inextricable confusion of genera¬ tions. The winter is passed in the adult stage, the individuals flying to the woods or seeking shelter in debris around or inside of the cotton fields.

This insect probably originated in Central America. It was introduced into the United States near Brownsville, Tex., about 1892. By 1895 it became established as a serious pest and has continued to spread northward and eastward. It has now extended about 585 miles northward from Brownsville and to a point within 10 miles of the Mississippi River in Louisiana. Five counties in southwestern Ar¬ kansas have also become invaded. Efforts to stay the progress of the weevil have been un¬ availing, but an effective method of mitigating its damage has been perfected. The methods of destroying or controlling recommended by the Department of Agriculture, which

has pub¬ lished several valuable pamphlets on the nat¬ ural history and injurious work of this insect, are the removal of the plants from the fields in the fall when there is no prospect of any more fruit being allowed to mature; early planting, the use of early maturing varieties, the application of fertilizers and intensive culti¬ vation.

The grain-weevil (Sitophilus granarius) is a little dark red beetle about an eighth of an inch long. The eggs-are deposited on wheat after it is stored, and the larvae burrow therein, each larva inhabiting a single grain. The rice-weevil (S . oryzce) destroys rice and Indian-corn in a like fashion ; this species has four red spots on the elytra or wing-covers. An¬ other species (Calandra palmarum) infests palm-trees, is common in Guiana and attains a length of two inches, the larvae burrowing in the pith of the trees. C. sacchari inhabits sugar-canes. The genus Rhynchites, of which the grape-weevil (R. bacchus) is an example, has the head broad behind; it devastates the growing vines, and strips them of their leaves. The plum curculio (Conatrachelus nenuphor) causes great damage to plums, cherries and other stone fruits. The eggs are laid one at a place in the young, forming fruit, upon the flesh of which the larva feeds, causing it to drop prematurely or to become “wormy.® The beetle is less than one-fifth of an inch long and dark brown spotted with black and yellow. The familiar chestnut-worm is the larva of Balaninus rectus , remarkable for the great length of the snout, which ex¬ ceeds the short robust body and which is adapted for piercing the thick burrs of the

young chestnuts, permitting the deposition of an egg in the kernel. Related species of the genus infest other nuts. Equally troublesome to fruit-growers are the species of Anthonomus, of which one pretty little weevil (A. signatus) causes great damage to the Sharpless and other staminate varieties of strawberry. This species attacks the flowers, and the larvae feed upon the pollen. Quite different in its habits is the potato weevil or potato-stalk borer (Tricho - baris trinotata) , the larva of which bores pas¬ sages in the stems of potatoes and wild

plants of the same family. The clover-weevil (Phyto - nonius punctatus) has green larvae, which differ from all of the foregoing in living exposed to the air and light, though they feed chiefly at night. They eat the leaves, and as they hiber¬ nate in the ground and begin to feed almost as soon as the clover sprouts in the spring they become most serious pests. The adults are nearly a third of an inch long, thick-bodied and short-snouted, with strongly knobbed antennae.

To the family Bruchidtz belong the ex¬ tremely destructive pea and bean weevils, which have the proboscis short and curved down on the breast and the antennae not elbowed. They are small beetles with stout bodies and the swollen abdomen often projecting beyond the tips of the wing-covers. Unlike the Curculionid.tr, which become quiescent and assume an appearance of death, these beetles are ex¬ tremely active and fly when disturbed. The larva of the pea-w'eevil (Bruchus pisi) damages peas, the eggs being laid when the peas are ripening. They destroy much of the substance of the grain, lessen its germinating power and pupate in its interior. The mature insect is black marked with white spots, and about an eighth of an inch long. The B. pisi was at one time so destructive in North America that its ravages threatened to wholly exterminate the pea crops. Several species are named corn-weevils, from their destructive effects in granaries. B. granarius also attacks peas, and one species infests the cocoanut. The bean-weevil (B . fabtz) is plain brown in color but otherwise similar.

Weevils are very difficult to control on ac¬ count of their small size, inconspicuousness and the fact that the destructive larvae are gen¬ erally beyond the effective reach of insecticides. The best measures consist in the total destruc¬ tion by burning of all infested fruits, nuts or stems, the digging or plowing in the late fall of the ground in which the pupae hibernate, and in the case of the pea and bean weevils the fumigation with carbon bisulphide of all infested seed. Consult Harris and Flint, Un¬ sects Injurious to VegetatioiP (New York 1884) ; Saunders, Unsects Injurious to Fruits) (Philadelphia 1883) ; Smith, (Economic Entomology) (Philadelphia 1896) ; and special papers published numerously by the United States Department of Agriculture and by the experiment stations of various States.

WEEYOT. See Wishoskan.

WEIDNER, wid'ner, Revere Franklin,

American Lutheran theologian : b. Centre Val¬ ley, Pa., 22 Nov. 1851 ; d. Tangerine, Fla., 5 Jan. 1915. He was graduated from Muhlenberg

Col¬ lege, Allentown, Pa., in 1869, from the Lu¬

theran Theological Seminary, Philadelphia, in 1873, and after being ordained to the ministry was pastor at Phillipsburg, N. J., 1873-78, and at Philadelphia 1878-82. He was professor of English, history and logic at Muhlenberg in 1875—77, and in 1882-91 was professor of dogmatics and exegesis at Augustana Theo¬ logical Seminary, Rock Island, Ill. In the last-named year he accepted the presidency and the chair of dogmatic theology at the Chicago Lu¬ theran Theological Seminary. He published (Commentary on the Gospel of Mark) (1881) ; (Biblical Theology of the Old Testament) (1886) ; Annotations on the General Epistles) (1897); (Theologia; or the Doctrine of God} (1903); (Studies in Exodus) (1903), *etc.*

W E I G A L L , Arthur Edward Pearse Brome, English Egyptologist: b. 20 Nov. 1880. He studied at Wellington College and at New College, Oxford, but from the age of 18 was engaged in archaeological investigation. He was assistant to Petrie at Abydos in 1901-02 ; was engaged in excavations at Sakkarah in 1902-04; and excavated the mortuary temple of Thothmes III at Thebes in 1905. He was ap¬ pointed inspector of antiquities under the Egyptian government in 1905, and held that office until 1914, when he retired. He investi¬ gated the antiquites of Nubia in 1906-07; later explored the eastern desert, the Imperial Porphry quarries, Wady Hammanat and Kassair; and in 1907-12hewas associated with the excavation and preservation of the tombs of the nobles of Thebes. Upon his return to London after his retirement in 1914 he became interested in designing stage scenery and costumes, in which vocation he has had con¬ siderable success; and he was part author of the play (See-Saw) (1916). Author of <A Report on the Antiquities of Lower Nubia) (1907); (A Catalogue of the Weights and Balances of the Cairo Museum J (1908) ; (A Guide to the Antiquities of Upper Egypt y (1910); (The Treasury of Ancient Egypt) (1910) ; (History of Events in Egypt from 1798 to 1914> (1915), *etc.*

WEIGAND, vi'gant, August, Belgian mu¬ sician: b. Belgium; d. Oswego, N. Y., 26 May 1904. He began his musical career as organist of Saint Giles' Church, Liege, and subsequently long presided at the organ of the Sydney, New South Wales, town-hall, then the largest instrument in the world. His achievements as organist and composer won for him a professorship in the Royal Conservatoire at Liege. He came to the United States in 1903, gave numerous concerts, opened the large organ at Brown University and was appointed to open the

grand organ at the Louisiana Purchase Exposition, Saint Louis, in June 1904. In a dozen years he gave throughout Europe more than L800 concerts. He was the recipient of various distinctions, and was generally known as Chevalier Weigand.

WEIGHING MACHINES, mechanical de¬ vices for ascertaining the weight of objects. It is to be understood, however, that the ele¬ ment thus determined is a relative value, and is entirely independent of the magnitude of the force of gravity or the tendency of a body to fall. It is measured at sea-level and at the

1 Uninjured cotton bolls about to open 2 Cotton boll practically destroyed by boll weevil

3 Larva of boll weevil in square 4 Side view adult boll weevil 5 Adult boll weevil, wings spread

mean diameter of the earth. For example, the force of gravity decreases with elevation, but a commercial unit of weight such as a bpound® is the same at the top as it is at the foot of a mountain. In the usual method of determining weights of this character, a ((unit of weight® is first adopted, and then a <(set of weights'® procured, each of which represents a certain predetermined number of the units. With these, by the aid of a machine so constructed as to be capable of establishing an equilibrium between any number of the weights and the article being weighed, the ratio of the weight of the article to that of the adopted unit is determined. Such machines may be conven¬ iently arranged in three general classes — vequal armed® balances, ((unequal armed® bal¬ ances, and ˆspring® balances.

Equal armed balances are represented by the various forms of <(scale-‘beams,® in which the scale-pans hang below the beam, and the <(counter-scales® in which the scale-pans are above the beam, both forms operating by ad¬ justment of equilibrium between a known and an unknown weight. Unequal armed balances are represented by those consisting of a single steelyard, and those formed by combinations of unequal armed levers and steelyards, such as platform scales and weighbridges, in which a small known weight at one end of a beam counterbalances a heavy unknown weight at the other end. Spring balances operate on the prin¬ ciple that, when a helix is ‘subjected to a ten¬ sion, the amount of elongation increases pro¬ portionally with the increase in the force of tension. In the simplest form, it consists of a helical spring of hard steel of a high elastic limit. As commonly used it is suspended from a fixed point by a hook at its upper end, while its lower end is bent into a hook, which is crossed by another hook to which the article to be weighed is attached. An index attached to the spring and moving along the face of a graduated plate indicates the amount of ten¬ sion in terms of the adopted unit of weight. The contrivance is so arranged that the axis of the spiral is always a plumb line, under tension or at rest, and is capable of weighing only an amount within the elastic limit of the spring. The capacity of such balances is gen¬ erally small, and they are extensively used in shops, and for other purposes where a high degree of accuracy such as may be obtained by lever balances is not required. On the other hand, the various forms of dynamometers em¬ ployed for registering the pull of locomotives are made with enormous capacities. In this connection the ˆtorsion balance® may be con¬ veniently mentioned, although in reality it is a machine generally used for the purpose of measuring horizontal forces, rather than weights as here understood. In its simplestform it con¬ sists of a beam, supported by a wire stretched horizontally which passes through its centre of gravity. When twisted by the application of a weight to the beam, the elasticity of the wire acts the part played by the weight of the beam in an ordinary balance. For measuring hori¬ zontal deflections* caused by electric, magnetic, and other forces, the wire is stretched verti¬ cally. ,

For all forms of weighing machines of the equal armed type with small capacities, such as VOL. 29 — 11

counter-scales, chemical and assay balances, etc., see Balance.

The majority of the machines of large ca¬ pacity known as ((platform-

scales,® used for weighing heavy loads such as carts loaded with grain, hay, coal, building materials, etc., oper¬ ate on the principle of the lever, and belong to the class designated as unequal-armed balances. They are sometimes arranged as (<decimal bal¬ ances,® the ratio between the small known weight on the weighing beam and the unknown weight on the platform or bridge being indi¬ cated in multiples of 10. Such a balance con¬ sists of a lever (ab), suspended at (h), and connected by the rod (o), with two levers (r) and (s), hinged at (t) and (u), respectively. A platform (p), resting by means of standards upon the levers (r) and (s), accommodates the load which is counterbalanced on the long arm of the weighing beam or lever (ab), by a sliding weight — (w). When a load is placed upon the platform (p),* the levers (r) and

ah b

the rod (o), with a consequent lifting of the long arm. This pull is counterbalanced by sliding the weight (w) along the long arm until it is brought into a horizontal position. The weighing beam being graduated with an adopted unit of weight and fractions thereof (usually pounds), the-weight of the load on the platform is ascertained by a simple direct read¬ ing of the graduated scale. In the smaller scales, the weight (w) equals one pound, and counterbalances a load of 100 pounds upon the platform, but it is evident, that by varying the number of levers and the relative lengths of their arms, any desired ratio between the load and the counter weight may be readily obtained. In scales used for weighing loaded wagons and cars, the ratio varies from one to 500, or one to 1,000. Cattle scales are capable of weighing from 10 to 200 head of cattle at a single opera¬ tion, and the capacity of grain scales ranges upward of 500 bushels, while the large iron and steel manufacturing plants and gun shops employ machines with capacities exceeding 100,- 000 pounds. The machine at Watervliet Ar¬ senal, Watervliet, _ N. Y., used for weighing guns, has a capacity of 300,000 pounds.

With the advent of the automobile and its far greater capacity of burden the platform-scales formerly used to weigh loads drawn by horses have become obsolete, and with the re¬ building of such weighing machines automatic recording devices have been added, so that a modern scales of this class will weigh a load of coal approximating five tons within the

limit of error of three ounces, and print the correct weight upon a tape without the services of any attendant.

Self-discharging gcales are also much in use for measuring units of weight; as for instance the filling of packages of commodities, as coffee, suger, flour, cereals, *etc.* The same idea is em¬ bodied in receiving scales in large establish¬ ments, where coal, feed-water, sand, cement, ore, crushed stone, etc., are weighed as de¬ livered, the receiving hopper discharging when the weight enuals one ton, 100 pounds, or any other desired amount.

Railroad or track-scales are of prodigious size and capacity. The largest of this type in the world is a ˆsuspended-platform® scales in the West Albany yard of the New York Cen¬ tral Railroad. The weighing rail is 90 feet long, and the capacity is 825 tons.

A new idea in heavy-work scale construction is known as the flexure-plate scale. In this type thin plate fulcrurtis of chrome-vanadium- steel take the place of the usual knife-edge pivots. They operate by bending instead of frictional movement on bearings. They have been found of most dependable accuracy and unequalcd endurance, being unaffected by dampness or changes of temperature, and thus entirely free from the variations common to the ordinary track-scales.

The conveyor scale weighs material as it passes on a conveyor belt making use of elec¬ tricity instead of weights for the recording. The belt is so arranged in reference to the weighing apparatus that the full belt is weighed against the empty return belt. A vertical plun¬ ger in a tube partly filled with mercury rises and falls in the tube according to the weight of material passing. The moving mercury brings more contact points into action the greater the thrust of the plunger, and the varying cur¬ rent makes its record automatically on a travel-iilg tape. A standard comparison of amperes per hour and tons per hour gives the figure by which the weight is readily computed.

The computing scale is a machine which carries an attachment for

indicating a certain limited range of prices. Usually it carries a cylinder covered with a paper roll ruled in many different proportions, each ruling indic¬ ative of a certain price unit. The cylinder turns with the weight, thus showing the cost at several different prices per pound.

The difficulty of exactitude in weighing is recognized and a legal ((tolerance,® as it is called, is permitted, within which no one can be accused of dishonesty or fraud. These tol¬ erances are as follows : On counterpoise scales, one grain on one-fourth ounce ; two grains on one ounce; 10 grains on .10 ounces; 10 grains on one pound; 40 grains on 10 pounds; 100 grains on 50 pounds. On platform scales one ounce is allowed on 50 pounds ; one pound on 800 pounds; two pounds on one ton. On railroad or track-scales the permissible error is four pounds per ton.

WEIGHT THERMOMETER. See

Thermometer.

WEIGHTS AND MEASURES. Weights and measures are fundamental necessities of commerce, industry and science. Measurement is required in the exploration of lands and waterways, in their location and transfer, in the

work of construction of buildings, bridges, railroads and other engineering works, in the manufacture of foods, in the preparation of compounds and in the purchase, shaping and sale of materials,. Weights and measures are essential to all barter of goods. Here, the ac¬ curacy may range from the <(heap® or ((pile® of ancient times to the one one-hundredth of a cent used in cotton and spelter quotations won change,® estimates of value which we call prices being based on a specified weight of gold. Weights and measures are essential in all construction whether the precision be the (<rule of thumb,® or the millionth of an inch in optical work, or the one-ten-thousandth of an inch in the manufacture of fine machinery. The pharmacist with his weights compounds the prescriptions which mean health and life to the sick. In the extractive and compounding in¬ dustries, weights and measures are used to de¬ termine the essential proportions in analyses and compounds, and precision is the main con¬ dition of reproducibility of results. Likewise the manufacturer must accurately weigh, meas¬ ure and test his materials to secure perfect construction. Surveying and navigation would be very

primitive were it not for the rigorous measurements of base lines, accurate triangu¬ lation, precise leveling, including even such delicate measurements as the variation of lati¬ tude. Weights and measurements will in fact be found necessary in the discovery and in the statement of industrial and scientific facts of all kinds. The birth of the exact sciences was coincident with the development and application of quantitative measurements to the phenomena of nature, and the rapid growth of modern science has since been parallel with that of pre¬ cision. James Watt was one of the earliest to suggest international standards which would enable scientific results when published in terms of such standards to be intelligible and repro¬ ducible the world over. Precise and uniform standards made possible the interchangeability of parts in machinery, first practically applied by Eli Whitney and to-day one of the most im¬ portant principles in manufacturing.

Classification. — Weights and measures or¬ dinarily include those defining length, area, vol¬ ume, capacity and weight. These are relatively the most important measures used by man. However, within the last half century when such products as power, electric current, heat, light, refrigeration and services or other kinds have entered the world's markets as commodi¬ ties for manufacture, purchase and sale • — the scope of weights and measures has widened to inchfde units used in the measurement of ve¬ locity, pressure, energy, electricity, tempera¬ ture and illumination. Technical requirements also resulted in a series of compound units such as the knot, a unit of speed for vessels of one minute of the earth's circumference per hour; the ton-mile used in transportation rates and statistics; the foot-pound, a unit of energy; the dyne, the international unit of force and other units of the centimetre-gram-second system of scientific units in use throughout the world. Such compound units are multiplying apace with the technical needs, and have proven of in¬ estimable value and economy by the facility and precision which they afford in conveying exact quantitative results of experiment and observa¬ tion. With advancing needs the units of weight

and measure have extended to microscopic and to telescopic dimensions. The millimicron of the physicist and the still smaller Angstroem unit of which it requires 254,000,500 to make one inch, are used in spectrum analysis for measur¬ ing the dimensions of light waves, while on the other hand the (<earth's orbit® (meaning the mean radius of the orbit) is used by astron¬ omers in measuring stellar distances. In addi¬ tion, the ˆlight-year® is used for the greatest distances, this unit being the distance which light traverses in one year, or about 6,000,000,- 000,000 miles. With the extension and divi¬ sion in size of units, the kinds of instruments utilized and methods of application of the units themselves have multiplied. Almost every oc¬ cupation has its particular units, its methods of making measurements and its special measuring instruments.. A few of the thousands of the latter may be cited, such as the common desk rulers, carpenter's folding rules, draughtsman's scales, surveyor's chains, engineer's tapes and level rods, lumberman's log rules and board measures, the merchant's yard stick, the tailor's tope, the shoe, glove and hat-measures, machin¬ ist's scales, measuring bars, micrometers, mi¬ crometer calipers, limit gauges of ring and plug types, end and line standards of precision. In measuring volume we have the standard ca¬ pacity measures, milk measures, beer measures, wooden dry measures, a vast variety of stand¬ ard flasks, glass graduates such as burettes, pipettes and other volumetric apparatus of the druggist, physicist and chemist, the gauging rods for casks and cargoes, gasometers reading in cubic feet, tanks and reservoirs with gradu¬ ated scales reading volumes directly. For weighing, we have even-balance scales, steel¬ yards, platform scales, spring balances, all ranging from the most delicate analytical bal¬ ances to the master scales for weighing canal boats and railway trains. Scales are especially designed for every particular need, and the countless varieties attest the high state of the art of weighing and its great importance in in¬ dustrial and scientific work. Such instruments have multiplied in form and number and the demand for them has grown so rapidly that the manufacture of weights, measures and meas¬ uring instruments forms in itself a whole group of industries.

With the development of units of measure of the order of inter-molecular distances on the one hand and of almost interstellar distances on the other, and the multiplication of kinds of in¬ struments used in measurement has come the invention of a large variety of measuring ap¬ pliances which automatically indicate the result upon a scale. Of this class are thermometers, spring balances, aneroid barometers, pressure gauges, speedometers and indicating meters of all kinds. Computing scales not only indicate the weight but

show the computed total price of the article at several prices per pound. Many of this class of instruments also make continuous record of the measurements show¬ ing by a curve the values at successive moments of time. Of this type are the automatic record¬ ing instruments used to record temperature, air pressure, sunshine, rainfall, electrical quanti¬ ties as well as tide recorders, anemometers and many others. Equally interesting are those measuring instruments like dividing engines, trip scales or trip measures which besides meas¬

uring definite lengths, weights or quantities au¬ tomatically perform certain operations, such as graduating a scale, delivering or tipping a cer¬ tain weight of grain, or delivering certain vol¬ umes of liquids. Closely related are those de¬ vices which integrate quantities delivered or magnitudes measured, such as the small map wheels which measure distances on maps, or the planimeters which measure areas within irregu¬ lar contours, and all forms of gas and water meters, integrating rain gauges, integrating watt meters for measuring electric power con¬ sumed. These instruments usually indicate on a dial the total number of units measured since the last zero setting.

Metrology. — Many sciences and industries have given the science of metrology their best thought and labors. Chemistry opened up new chapters in the science of the refractory metals, developing iridium and platinum of purity requisite for the world's fundamental standards of mass and length, producing in conjunction with metallurgy the remarkable nickel-steel alloy <(invar® (q.v.), having practically a zero temperature coefficient of expansion ; the alloy manganin free from temperature coefficient for electrical resistance; Jena glass, a material for measuring flasks and thermometer bulbs which practically eliminates temperature disturbances. To optics and the glass industry we are in¬ debted for the microscopes, telescopes, polari-scopes and other optical instruments which form essential parts of modern measuring ap¬ paratus. Optical methods based upon the in¬ terference of light waves have made possible the detection of changes of dimension far beyond the power of the microscope to detect. By such methods plane glass surfaces are produced hav¬ ing errors of less than a millionth of an inch, and in the interferometer is provided the most delicate and senstive length-measuring instru¬ ment known to man. Metallurgy and engineer¬ ing have developed methods of fusing, casting and tempering materials to be used in measur¬ ing apparatus, and have developed the accurate machining of such instruments. Astronomy has given the precision measurements of time, the ((second® being the unit of time in the interna¬ tional C. G.

S. system of units. Mathematics has devoted a large section of its science to the theory of observations and added rigor in their adjustment, and in the elimination of accidental errors, and by developing the theoretical side of precision measurements has rendered the great¬ est service to metrology.

Unit Standards. — The standards of length and mass are fundamental. From these and the unit of time practically all other standards are derived, either directly or indirectly. The derived standards include those used in the measurement of volume, density, capacity, ve¬ locity, pressure, energy, electricity, tempera¬ ture, illumination and the like. The production of copies, multiples and subdivisions of the fun¬ damental standards, the construction of the de¬ rived standards, and the comparison of the standards used in scientific work, manu¬ facturing and commerce with the fundamental or derived standards of the government are functions of the Bureau of Standards in the United States and of similar bureaus in other countries. In the United States the standard of the weights and measures of trade is main¬ tained through the State, county and city sealers

of weights and measures with an efficiency de¬ pendent upon local administration. For more precise purposes, however, uniformity and pre¬ cision are attained and maintained only by reg¬ ular reference of the local standards to the fun¬ damental standards of the government, at the Bureau of Standards in Washington.

The units of weight and measure in the United States are practically those used in the colonies prior to the formation of our govern¬ ment. While Congress has never definitely authorized the weights and measures in com¬ mon use, it has sanctioned their use by its act of 14 June 1836, providing that accurate copies of the yard, pound, etc., be furnished as stand¬ ards to each State of the Union. The consti¬ tutional power ((to fix the standard of weights and measures,® vested in Congress (I. 3, 5,

United States Constitution) has rarely been ex¬ ercised, so that

legislation on weights and measures has been confined to the individual States, and in this manner numerous differ¬ ences in usage have grown up in the several States, although the same general system of weights and measures prevails throughout the country. The customary units of length are de¬ fined by reference to the yard. The yard itself was formerly defined as the length of a certain brass bar, the standard yard, kept at the Office of Standard Weights and Measures in Wash¬ ington. Since 1893 the yard is defined in terms of the international metre. The yard appears to have been a unit of length in England since very early times. The name signified in Old English and in Anglo-Saxon (gyrd) a rod or stick. A standard bronze yard of 1496 still ex¬ ists in England, having been used for the veri¬ fication of other yards until 1588, when a new standard was made which is also in existence to-day. This yard, known as the Winchester standard, was the legal standard in England until 1824, when new standards, the imperial standards, were authorized.

When the Coast Survey was organized it was found necessary to have a definite standard of length, and an 82-inch bar was secured from the instrument maker, Troughton, of London. This bar was nearly a copy of Troughton's scale, and had not been compared with the Brit¬ ish standard yard, but the distance between the 27th and 63d inch marks on the bar was taken as representing the standard yard, and was made the 'basis of the standards sent out in ac¬ cordance with the act of Congress of 1836. In 1834 the British imperial yard was destroyed by fire and when a new standard had been pre¬ pared, copies of it were made, two of which were presented to the United States in 1856. These copies were compared with the Troughton scale, and the latter was found to be 0.00083 inch longer than the new imperial yard at the standard temperature of 62° F. One of the copies was then accepted as standard by the United States Office of Standard Weights and Measures in place of the Troughton scale. This copy of the imperial yard was the stand¬ ard on which all measurements of length in the United States were thereafter based until 1893, when the yard was defined in terms of the international prototype metre. The matter had been left entirely to the Treasury Department, which had adopted different yards from time to time, assumed to be equal to the British im¬ perial yard.

The copies of the imperial yard had shown noticeable changes relative to the standard when subsequently compared, and this led to the belief that the imperial yard itself was not con¬ stant. Shortly after the arrival of the na¬ tional prototype metre, a careful determination of

the relation of the imperial yard to the in¬ ternational metre at the Office of Standard Weights and Measures showed that the rela¬ tion differed from that legalized in 1866 by less than the uncertainty of the comparison, and it was decided to adopt the metre as the funda¬ mental standard of length and to define the yard in terms of it. Not only is the constancy of the length of the imperial yard suspected, but in addition the lines, which are about 1-1000 of an inch wide, are much too broad for present requirements. On the other hand, the international metre and its copies satisfy the rigorous requirements of modern metrology. The kilogram was also declared to be the fun¬ damental standard of weight. The present standards of the United States are, therefore, independent of the British standards and in part differ from them. The prevalent idea that the weights and measures in common use are identical with the British imperial system is, therefore, erroneous. The United States yard is slightly longer than the imperial yard and this inequality extends to all of its subdivisions and multiples. The present material standards of the United States are the national prototype metre No. 27 and the national prototype kilo¬ gram No. 20, received by the President of the United States on 2 Jan. 1890. These are ac¬ curate copies of the international prototype metre and kilogram which are the fundamental standards of length and weight designed for the entire world. The latter standards are pre¬ served at the International Bureau of Weights and Measures in accordance with the Interna¬ tional Metric Convention of 1875, now signed by the leading countries of the world. These countries jointly maintain and direct the work of this bureau through official representatives forming an international committee, composed of eminent scientific men.

The units of length and the derived units of area, volume and capacity are derived from the international metre in the ratio of 1 metre = 39.37 inches (Law of 28 July 1866). Since 1893 the Office of Standard Weights and Measures and the Bureau of Standards which superseded that office have .used the equivalent 1 yard = 3600/3937 metre (by order approved 5 April 1893). This action fixed the values, in¬ asmuch as the reference standards are as per¬ fect and unalterable as human skill could make them. Besides the yard, the units of length most universally employed in the United States at the present time are the inch, foot and mile.

The <(inch® is the 1-36 part of the yard and like it has been in use since ancient times. The name (derived from the Latin uncia, meaning the 12th part) occurs in Anglo-Saxon in the form of ynce. It probably originated only as a convenient subdivision for the foot. Lengths shorter than one inch are commonly expressed in fractions of an inch.

Two meth¬ ods of subdivision are in common use ; among builders and wood-workers it is customary to use the binary subdivisions, half quarter, eighth, etc., but machinists also divide the inch into

tenths, hundredths and thousandths. The inch is usually denoted by the symbol but bot¬ anists use the symbol ‘ for the inch. The ((miner’s inch® is a rather vague unit for the flow of water varying from 1.36 to 1.73 cubic feet per minute, and is the flow of water through a single square inch of orifice under varying heads of water. The ((inch or gauge of cream® is fixed by Iowa statute as equal to one-half gallon.

The (<foot® is legally defined as one-third of the yard or 12 inches. As its name implies it was probably based on the length of the human foot. Almost every nation, ancient and modern, has had a unit called the (<foot,® its value differ¬ ing somewhat, as might be expected with a unit of so crude an origin. Most countries, how¬ ever, have now adopted the metric system, the foot being discarded as an official measure, though universally used in English countries. Lengths shorter than one foot are usually ex¬ pressed in inches and fractions of an inch, but among surveyors and civil engineers it is quite common to use decimal fractions of the foot. The foot is generally denoted by the symbol ‘, but botanists use the symbol ° to denote feet. Some artisans use the foot and the inch but not the yard, others the yard and its binary di¬ visions, but not the foot or inch. Thus the foot and inch are used to the exclusion of the yard in building, while the yard and its binary sub¬ divisions to the exclusion of the foot and inch in measuring cloth.

The (<statute® or Hand mile® is the unit most commonly used for longer distances and is equal to 5,280 feet. The name is from the Latin mille passman, 1,000 paces, the Roman pace being a double step and consequently about five feet in length. This mile was used by the Anglo-Saxons. Almost every European nation has had a unit called the <(mile® but widely at variance with one another, ranging from about two-thirds of the United States mile (Holland) up to seven United

States miles (Norway). The old British statute mile was about 300 feet shorter than the United States mile but now is the same.

The following units of length are used in special work and are arranged in the order of their magnitude. Metric units are not included, as they are for the most part official only, and not generally in use in commercial and indus¬ trial life. See Metric System.

Mil (.001 inch) is used in electrical work, especially in indicating the cross section of wires.

The point (1-72 inch) is used in designating the sizes of type, the point system designating the sizes of type by the number of seventy-sec¬ onds of an inch height of the type face. The em is a unit of measure used in composition and varies with the size of the type, usually being considered as the square of the face height.

The line (1-12 inch) is little used, mechanics preferring to divide the inch into tenths, hun¬ dredths and thousandths. It is used by printers and by botanists, the latter denoting the line by the symbol ". The line "button measure® is 1-40 inch as defined in the tariff act.

The barleycorn (one-third inch) is an . old unit still surviving in shoemakers* shoe sizes, these being graded by thirds of an inch or bar¬ leycorns, in a system of 13s,

Four units based upon the "hand® are some¬ times used. These are the nail (two and one-fourth inches) for measuring cloth,, originally the distance from the end of the thumb nail to the joint at the base of the thumb, and later fixed as 1-16 yard; the palm (three inches) includes the breadth of the hand exclusive of the thumb; the hand (four inches), originally the breadth, of the palm, is used in measuring horses and is almost exactly one decimetre ; the finger (four and one-half inches) is about the length of the middle finger and is only used as a rough unit in cloth measure. This should not be confused with the finger breadth used in measuring charges of powder.

The surveyor's link (7.92 inches) is the length of one link or 1—100 part of a surveyor's chain, and is used in the survey of lands.

Quarter (nine inches) is sometimes used in measuring cloth (more frequently in Great Britain) to designate a quarter of a yard. A unit of the same length called the span was originally half a cubit, but probably has not been used in modern times as an officially recog¬

nized unit.

The engineers' link (12 inches) used as a unit in engineering is the hundredth part of the engineers' chain and is decimally divided. The 10th of the engineers' link is 1.2 inches.

The pace is a conventional unit for measur¬ ing distances and is the length of a stride meas¬ ured from the heel of one foot to that of the other; a full pace measures about one yard. This is the value of the United States military pace, double time, with a cadence of three steps a second. The regulation military pace quick time is 30 inches with a cadence of two steps per second. The Roman pace was a dou¬ ble step of about five feet.

The English ell, a unit still referred to but seldom used, having a value of 45 inches, vary¬ ing, however, in different places. The Flemish ell of 27 inches is still in use commercially in the Low Countries.

The fathom (six feet) is used in measuring depths of water or mines. The name comes from an Anglo-Saxon word faethm, signifying <(embrace,® and originally meant the length of rope between the two hands when the arms were held outstretched.

The rod, perch or pole is equal to five and one-half yards and is used in measuring land. It has varied in different places from five to eight yards and is supposed to have been the length of the ancient goad used to measure the width of the first furrow.

The surveyors' or Gunter's chain (22 yards) was so chosen that 10 chains square might ex¬ actly equal one acre. This chain is the official unit prescribed formerly for the use of sur¬ veyors surveying public lands under the super¬ vision of the surveyor-general and now often used in relocating old surveys.

The engineers' chain (100 feet) is used in engineering, and is decimally divided into feet, tenths and hundredths of a foot. The use of the two chains in many cases for the same land for different purposes requires reduction tables. On account of the direct relation to the foot, the engineers' chain is becoming very widely used.

The bolt for measuring cloth is generally given as 40 yards, though the name means sim¬ ply a roll of definite length. The customary

length of the bolt varies with different fabrics and manufacturers.

The skein for yarn is often defined as 120 yards. Its length varies, however, according to the material and the locality. Consult the United States Conditioning and Testing Com¬ pany's (Textile Tables) (New York 1914).

The United States cable's length (720 feet), used by mariners, is 120 fathoms as recognized by the United States navy.

The furlong (220 yards) originally meant ˆlength of a furrow,® supposed to be the dis¬ tance oxen could plow without stopping to rest.

The hank is a unit of length for yarn. In the United States the length of a hank of cot¬ ton is usually 840 yards, while that of linen is 3,000 yards; different lengths, however, are also in use under that title.

The nautical mile or geographical mile has been defined as 1-60 part of the length of a degree of a great circle of the earth. Since the earth is not a perfect sphere, however, the de¬ gree varies in length and this has led to much confusion in usage regarding the nautical mile. The definition accepted by the United Stated Coast and Geodetic Survey (consult Report of 1881, Appendix 12) is as follows: The 1-60 part of the length of a degree on the great cir¬ cle of a sphere whose surface is equal to the surface of the earth. This makes the length of the nautical mile 6,080.20 feet or 1,853.248 metres. The uncertainty in the dimensions of the earth affects the last decimal place given. The nautical mile is often miscalled ((knot.® The latter term, however, is not a measure of length, but a measure of speed, equal to one nautical mile per hour. The admiralty <(knot® of Great Britain is 6,080 feet.

The league is equal to three miles, the land league being equal to three United States statute miles (15,840 feet) and the United States ma¬ rine league to three nautical miles (18,240.6 feet). Its value varies in different countries. The marine league is the distance from shore over which a country has jurisdiction under in¬ ternational law.

The degree is equal to about 60 nautical miles.

The astronomical unit, equal to the mean radius of the earth's orbit or nearly 93,000,000 miles, is sometimes used in stating astronomical distances.

In stating interstellar distances it is some¬ times found convenient by astronomers to use the light year, being the distance traversed by light in one year, or 65,700 astronomical units.

Besides the measures of length given above, there are numerous very special methods of denoting length in case of special commodities. The thickness of sheet iron and steel is denoted by a system of arbitrary gauge numbers. The numbers in use differ for different products. On 3 March 1893 Congress passed an act estab¬ lishing a standard gauge for sheet and plate iron and steel for use in the customs service. In this system the gauge numbers indicate thick¬ ness, or the weight per unit area. Sizes of wire are also denoted by a special system of ar¬ bitrary gauge numbers. The number of differ¬ ent systems which have been used is quite large. Pfeilschmidt's (Wire and Sheet Gauges of the World* gives comparative tables for 11 systems of wire gauges. At present the most common

gauges in use in this country are the Brown and Sharp gauge and the Birmingham wire gauge. (See Wire). The fineness or coarseness of yarn is denoted by a system of numbers, called ftcounts® which indicate usually the number of hanks of the yarn in question which will weigh one pound. Thus No. 10 yarn (English cotton yarn and spun silk count) is a yarn of such fine¬ ness that 10 hanks (of 84,000 yards) are re¬ quired to make a weight of one pound, or again No. 1 wool (Aberdeen count) is such that one spindle (of 14,400 yards) shall weigh a pound. There are about 24 different systems of counts in use, and in order to introduce uniformity in counting textile yarn throughout the world, the international metric count was approved by the International Paris Conference of 1900. Ac¬ cording to this count, No. 1 means that a length of 1 metre will weigh 1 gram, and 100 metres of No. 100 yarn will weigh 1 gram.

In addition to the above there are a large number of special systems of numbering-par¬ ticular commodities such as hats, shoes, gloves, nails, cordage, books and other articles, too numerous for description.

The units of superficial measure or area are usually the squares of the linear units and as such need but little comment. The circular mil (.7854 square mil) is the area of a circle .001 inch in diameter. One

circular inch contains 1,000,000 circular mils, and one square inch con¬ tains 1,273,240 circular mils. The square inch is the most common small unit of area, being used in measuring pressures, strength and other properties of materials, and in engraving, cloth analysis and many other purposes. The square foot (144 square inches) is also largely used. It is the basis of the board foot which is 144 cubic inches of undressed lumber, being reck¬ oned as one square foot of one inch board, or its equivalent. The <(square® is a unit used in carpentry for flooring, ceiling and shingling, and contains 100 square feet, architects' and builders' measure.

In surveyors' measure 1 acre = 10 square chains = 160 square poles = 100,000 square Gun¬ ter's or surveyors' links. The acre (43,560 square feet) was probably as much land as could be tilled in a day and therefore of rather indefi¬ nite extent until later times. It is a unit of the same order as the French journee and the Ger¬ man Morgen. The acres of various countries differ in size, for example, the Irish acre of 7,840 square yards; the Scottish acre of 6,104 square yards ; the Cheshire acre of 10,240 square yards; Cunningham acre and the Imperial acre.

In subdividing public lands in the United States, the lands are laid out in townships. One township = 36 sections or square miles =144 quarter sections = 23,040 acres. The (<homestead® is a free grant of public land having a maximum area of one-quarter section or 160 acres. In the Philippine Islands, the <(homestead® is 64 hectares, which is almost identical with the homestead as defined above.

Among the more important units of volume are the cubic inch, the cubic foot, the cubic yard, and the cubic mile. The cubic inch is prac¬ tically the smallest unit of volume based directly on linear units. It is very largely used. The cubic foot (1,728 cubic inches) is used in engineering to express volumes of gas, water, or other solids. In some States, such as Wash-

ington and Colorado, the cubic foot is estab¬ lished by statute as the

legal unit for measur¬ ing the volume of water. A special system of units is used in the measurement of wood; 144 cubic-inches or one foot square of one inch board is expressed as one board foot. A timber foot, however, is 1,728 cubic inches or one cubic foot. A cord foot is a pile of wood 1 by 4 by 4 feet. A cord of wood is 8 cord feet. In the lum¬ ber business boards are usually bought and sold by the 1,000 board feet to simplify computa¬ tion. In New Hampshire, a measure for lum¬ ber was adopted in 1866 based upon an ((imaginary cubic foot® equal to about 1.4 cubic feet. This unit is also used in parts of Maine and Vermont. Round timber is measured as-fol¬ lows : ((A stick of timber 16 inches in diameter

and 12 inches in length shall constitute one cubic foot, and the same ratio shall apply to any other size and quantity. Each cubic foot shall constitute 10 feet of 1,000 board feet.® In the practical use of this rule it is customary to consider 115 cubic feet equivalent to 1.000 board feet, instead of 100 cubic feet, according to the wording of the statute. In this case the diame¬ ter is taken at the middle of the log inside the bark. If the diameter is measured at the small end of the log, 106 cubic feet are allowed for 1,000 board feet. The New Hampshire rule is called the Blodgett Rule. The Doyle is the standard of log measurement in Arkansas for logs cut and sold or hauled. A large variety of log rules is in use throughout the country. These are locally accepted as standards, but they differ among themselves in so confusing a man¬ ner as to make it impossible to give an ac¬ curate and complete statement concerning them. The cubic yard is used largely in engineering and in computing grading, cuts and fills, a cubic yard being equal to about one load.

The perch, in addition to being a unit of length and a unit of area, is also widely used as a unit of volume of brickwork and masonry. The perch of brickwork, however, is a widely varying unit, ranging from 16f4 cubic feet to 25 cubic feet. In Colorado it is 16*4 cubic feet, in Philadelphia 22 cubic feet, 25 cubic feet in North and South Dakota, 24ˆ4 cubic feet in other places. The latter perch is equal to a section of brickwork 1 by feet by 16ˆ4 feet or one perch in length.

A cord of masonry is usually reckoned at 100 cubic feet, although in some cases it is 96 cubic feet.

The cubic mile is used in expressing very large volumes, such as the silt carried by rivers.

Liquid Measure. — ‘The fundamental unit of liquid measures in the United States is the wine gallon of 231 cubic inches — a unit

abandoned by England in 1824, but now generally adopted by the various States of the Union. The Brit¬ ish Imperial gallon measures 277.274 cubic inches, and is the volume of 10 pounds of water at 62° F. The liquid measures of the United States unfortunately bear no relation to those of England. Much confusion is occasioned by the use of the ambiguous term gallon, as there are in the United States the wine gallon (231 cubic inches), the ale, beer or milk gallon (282 cubic inches), and the dry gallon, besides the <(proof gallon,® the unit for internal revenue taxation. The ((proof gallon® is a wine gal¬ lon of spirits containing one-half its volume

of nearly pure alcohol at 60° F. and is the basis for computing the United States internal revenue tax. For example, a gallon of spirits containing 40 per cent alcohol would be 80 per cent proof and the number of proof gal¬ lons is computed by multiplying the per cent of proof by the number of wine gallons. Wiscon¬ sin and Connecticut still retain the dry gallon of 282 cubic inches as a legal standard. New Hampshire and Minnesota definitely retain the ale, beer or milk gallon of 282 cubic inches, and Maine definitely mentions the same unit among its list of State standards. A Minnesota statute provides that the <(Beer and milk mea¬ sures shall contain the following capacities : The gallon shall contain 282 cubic inches. The half gallon shall contain 141 cubic inches, and the quart one-half as much, and the pint one-half as much as the quart.® The milk gallon thus established is 51 cubic inches larger than the standard gallon used more generally throughout the country. There are thus three different quarts, the dry quart derived from the Winchester bushel, the liquid quart derived from the wine gallon, and the liquid quart de¬ rived from the beer or milk gallon. The differ¬ ences, of course, extend proportionately to all the multiples and subdivisions of these units. The ordinary liquid measures are usually 1 gallon = 4 quarts = 8 pints = 32 gills. In ad¬ dition to the capacity measurement bv volume, the legal weight of a gallon of certain commodi¬ ties have been fixed by statute in some States1, and in several cases by Congress for certain pur¬ poses. Thus 12 pounds of strained honey is a legal gallon in Nebraska, 6*4 pounds of kero¬ sene (Kansas), and 7*4 pounds of kerosene in Ohio, 11 pounds of sorghum molasses (In¬ diana), 11 pounds of maple syrup (New York), 8 pounds of castor oil (Kansas) are all legal gallons of the products named. These legal weights differ among themselves, and do not accord with the true volume of one gallon of 231 cubic inches.

The subdivisions of the gallon, the quart, pint and gill are largely used in trade. In ad¬ dition to the general liquid measures enumerated

above, apothecaries have a special system of capacity measures based on the volume of the United States liquid pint of 28.875 cubic inches. One pint = 16 United States fluid ounces = 128 United States fluid drams = 7,680 United States minims.

The minim is the smallest of the United States units of volume and is about 0.003,76 cubic inches. A minim of pure water weighs about 0.95 grains and corresponds to the <(drop,® which it approximates in size. The United States minim is about 4 per cent larger than the British Imperial minim. It is denoted by the symbol H .

The drop varies from 0.02 to 0.1 cubic centi¬ metre and is not a fixed unit, but is convenient for use in dispensing very small quantities of liquids. It is not subdivided and its size de¬ pends upon the liquid and the method of drop¬ ping. The ordinary form of drop pipette of the ophthalmologist delivers drops of about a half United States minim.

The United States fluid dram (60 minims) is equal to one-eighth United States fluid ounce, its volume differing from the volume of one avoirdupois dram of water, from the volume of

one apothecaries' dram of water (by weight), and is about 4 per cent larger than the fluid dram in use in Great Britain. It is about 4 cubic centimetres, or an average teaspoonful, and is denoted by the symbol /3.

The United States fluid ounce (480 United States minims) is the 1-16 part of the wine pint and has a volume of about 1.8 cubic inches. It differs from the British unit of the same name as well as from the volume of the avoir¬ dupois ounce of water and the troy or apothe¬ caries' ounce of water. Other measures of less definite character are often found convenient, such as the teaspoonful, dessertspoonful, table¬ spoonful, wineglassful and teacupful. They do not contain exactly the quantities usually given arbitrarily, but more exactly the common spoon¬ fuls contain the following quantities : A table¬ spoonful, 5 fluid drams or 20 cc. ; a dessert¬ spoonful, 2 fluid drams

or 10 cc. ; a teaspoonful, 60 minims or 5 cc.

Dry Measures. — The dry measures in gen¬ eral use in the United States bear no direct relation to the liquid measures of this country or Great Britain. The following are the ordinary units of dry measures : One bushel = 4 pecks = 32 dry quarts = 64 dry pints. The fundamental unit is the Winchester bushel, a unit abandoned by England in 1824. The Winchester bushel had a' capacity of 2,178 cubic inches. In the United States the name Winchester has been attached to the London bushel with a volume of 2,150.42 cubic inches and is about 69 cubic inches or 3 per cent smaller than the Imperial bushel of Great Britain — a proportionate difference exist¬ ing in the subdivisions of the bushel. Conflict¬ ing State laws render difficult an adequate state¬ ment of the status of the <(bushel® in this coun¬ try. Although the standard Winchester bushel contains 2,150.42 cubic inches, Nebraska has established 2,150 cubic inches as the volume of a legal bushed for that State, and other States have made similar changes. Several States adopted the old ale or milk gallon as the capacity of the dry gallon, this being about 5 per cent larger than the corresponding unit derived from the Winchester bushel. Moreover, special bushels have been legallv established in many States for particular products, such as the char¬ coal bushel, which in Connecticut is 2,748 cubic inches, in Colorado 2,500 cubic inches, in Kansas 2 564 cubic inches, in Pennsylvania 2,571 cubic inches and in Minnesota 2,419.5 cubic inches (or Yz basket). In Vermont (<one bushel and three-quarters of a peck® are ((deemed a bushel of charcoal, lime, or ashes.® In some places five pecks constitute a bushel of <(screened lump coal.® A lime bushel in Minnesota is 2,688 cubic inches. In Pennsylvania, however, it is equal to the Winchester bushel, although the coke bushel is 2,648 cubic inches. In the adjoining State of Ohio the coke bushel is 2,688 cubic inches. In Idaho, the bushel of fruit is defined as 2,564 cubic inches and in Missouri as 2,680 cubic inches. Some States require, furthermore, <(heaped measure,® others ((struck measure,® the heap sometimes being required to be (<as high as the article will admit,® and elsewhere <(as high as may be without special effort or de¬ sign,® and in still other cases, as in Connecticut, the heaped bushel is definitely fixed as 2,564 cubic inches. The many objections to buying and selling agricultural products by volume, such as the difficulty of detecting error or

fraud, the variation in the size of the heap, the ease of packing short quantity in a given volume, the effects of expansion, moisture, or'

shaking and the general uncertainty of estimates of quantity based upon volume early led to the practice now quite general, of defining the bushels as definite weights for the different com¬ modities. Unfortunately the matter was left to the several States with the result that the lack of uniformity in legislation and custom has introduced considerable confusion. Not only do the weights fail to equal the true volume of one Winchester bushel, but even for the same com¬ modity and in adjoining States the values are widely at variance. In at least two cases the size of the bushel varies with the time of the year. For a few commodities like wheat and hard coal, the standard weight is fairly general — but for such commodities as fruits and vege¬ tables there is but little uniformity. The values of the various bushels of apples vary by about 10 per cent and for beans and charcoal about the same proportion, the legal weights of the bushel of gooseberries or beets by about 20 per cent and for cranberries 17 per cent, for sweet potatoes and buckwheat the variation is about 28 per cent in range. The ((bushel® has in fact become merely a name for a miscellaneous group of units varying from State to State and differ¬ ing for the various commodities, sometimes as in at least two cases, changing with the time of the year. The uncertainty is confusing to trade and precludes the compilation of accurate statis¬ tics based upon so variable and ambiguous a term.

The barrel is a convenient receptacle for packing, transporting and storing commodities.

It varies in size, sometimes being defined in terms of units of volume, 6,25344 cubic inches struck measure in Massachusetts. In other cases it is fixed as a definite number of units of dry measure, 100 dry quarts in New York, five bushels in Tennessee; or in some States as a definite number of liquid gallons, 36 gallons in Arkansas, 42 gallons in Tennessee, or more commonly 31ˆ4 gallons. Besides this method of definition the barrel, like the bushel and the gallon, is legally defined for certain commodi¬ ties in terms of a definite number of pounds. The barrel of flour, for example, is commonly fixed at 196 pounds. Apart from this, but few States have used this method of defining the barrel and that only for a few products. One hundred and eighty pounds of shelled corn con¬ stitute a legal barrel in Connecticut, 200 pounds of pork in Indiana, North Carolina and Ten¬ nessee, 200 pounds of fish in Maine, 150 pounds of sweet potatoes in Massachusetts and 3ˆ4 bushels dry measure in Louisiana. In New York and some other States the several dimen¬ sions of the standard barrel are specified, al¬ though other forms containing the same volume may be used. The dimensions specified in New York are head diameter 17ˆ2 inches, stave length 28t/4 inches, bulge not to exceed 64 inches

outside measure. A barrel of crude oil is usually 31ˆ4 United States wine gallons and the barrel of refined oil 42 gallons.

The hogshead (two barrels), the pipe (four • barrels), and the tun (eight barrels) are more commonly not intended as definite measures but merely convenient receptacles for liquids in bulk.

The smaller units of dry measure, such as

the peck, dry quart and dry pint, are largely used in retail trade, the pint and quart being used for smaller products like berries.

Avoirdupois System. — The avoirdupois system of weights is used for almost all com¬ modities except the precious metals, chemicals and jewels. The avoirdupois dram differs from the apothecaries' dram, and the avoirdupois ounce and pound differ from the troy units of the same name. . Ambiguity is avoided only by properly qualifying the terms. The use of such unqualified terms as ounce, pound or ton causes great confusion owing to the uncertainty and ambiguity of the terms. The "avoirdupois pounds or "troy ounce,® however, are definite units. The avoirdupois units are as follows:

One long ton = 20 long hundredweights = 80 long quarters =2,240 pounds = 35,840 ounces = 573,440 drams = 15,680,000 grains.

One short ton = 20 short hundredweights = 80 short quarters =2 000 pounds = 32,000 ounces = 512,000 drams = 14,000,000 grains.

The fundamental unit of the avoidupois sys¬ tem is the avoirdupois pound now derived from the International kilogram, in accordance with the law of 1866 and the executive order of 1893, the value being 453.5924277 grams, on the basis of 2.204621 pounds to the kilogram,. The avoirdupois pound was probably derived from the Attic mina of 6845.3 grains troy, the 1-60 part of the large Attic talent, divided by the Romans into 16 ounces-of nearly the same weight as the modern ounce. Congress has never directly legalized any standard

of weight except the troy pound and that only for pur¬ poses of coinage. To avoid confusion in com¬ parisons of mass, the ratio of the avoirdupois pound to the troy pound was fixed at 7,000 to 5,760, measured in grains.

The United States avoirdupois ram (or drachm) is the 1-16 part of the avoirdupois ounce (28.3495 gram9). This unit must not be confused with the apothecaries' dram (weight) which is the one-eighth part of the apothecaries' ounce or 60 grains. The avoir¬ dupois dram is largely used in the textile in¬ dustries. The avoirdupois ounce is the 1/16 part of the pound and contains 16 drams. The avoirdupois stone is a denomination often used, especially in England, and varies with different commodities, the mqst common value being fixed in England as 14 pounds.

The hundredweight (cwt.) is the 1/20 part of the ton. The round hundredweight contains 100 pounds and is sometimes called the "cental,® while the long hundredweight con¬ tains 112 pounds. This unit is used very largely in fixing transportation rates.

The commercial ton of 2,000 pounds is in very general use throughout the United States, but 112 pounds is the legal hundredweight in many places, and 2,240 pounds the legal ton, as in England. The gross ore ton contains 2 688 pounds. Some confusion exists in the use of the word "ton,® as the unqualified term may mean the short ton, long ton, gross ore ton, miner's ton, varying from 2,500 to 3,000 pounds, displacement ton of 35 cubic feet, shipping ton of 40 cubic feet, timber ton of 42 cubic feet, or register ton of 100 cubic feet. The register ton varies in different countries. . Accurate sta¬ tistics covering more than a single State or industry are difficult to obtain, owing to the difference in the values of these units and

methods of measurement. The tariff act de¬ fines the ton of coal as "28 bushels of 80 pounds each® equal to the long or United States ton, but the statutory ton of coal in Montana is de¬ fined as 26J bushels of 76 pounds each. In some cases the ton is defined as a definite num¬ ber of cubic feet, for example, 343 cubic feet is a legal ton of hay in North Dakota and Okla¬ homa, and in New Mexico the ton is defined as 380, 422, or 512 cubic feet, according to the time the hay has been stacked.

Troy Weights. — The troy weights are as follows: One pound = 12 ounces = 240 penny¬ weights = 5,760 grains. The troy pound was

legalized in 1828 as the standard unit to be used by the Mint of the United States in the regulation of the coinage. In view of the con¬ fusion in the weights and measures of trade, Congress found it important to legalize some particular weight for the use of the Mint, and by the act of 19 May 1828 legalized the copy of the Imperial Standard troy pound. This copy was procured .by Albert Gallatin in England in the preceding year and was received by Presi¬ dent Adams 13 Oct. 1827. It was based upon the old Imperial Standard troy pound of 1758, legalized in 1825. This troy pound has not been recognized as a legal standard in England since 1855, and was declared illegal, with pen¬ alty attached, in 1878.

The grain is the 1—5760 part of the troy pound, and is the only unit which connects the troy system with the avoirdupois. A very old English statute (51 Henry III, 1266) provided that the. English penny should weigh “thirty-two grains of wheat well dried and gathered out of the middle of the ear.® Fifteen differ¬ ent values of the grain in different countries are cited, varying from 0.68 to 1.54 United States troy grains. The troy grain, as used in the United .States, is 0.0648 gram. . The diamond grain is 0.8 troy grain. The troy grain is practically obsolete in the avoirdupois measures. Fractions of the grain are usually indicated decimally.

The pennyweight is the 1-240 part of the troy pound. Some 18 different values are recorded, varying from 7.42 grams to 24 United States grains.

The troy ounce is the highest troy de¬ nomination permitted in England, and is used in stating quantities of silver and other precious metals. In assaying the troy ounce is fre¬ quently divided decimally. The silk troy ounce according to Troemner is the 1/16 of the troy pound and contains 360 grains. One hun¬ dred and seventy-five troy ounces equal about 192 avoirdupois ounces.

The units of apothecaries’ weights are as follows: One apothecaries’ pound =12 ounces = 96 drams = 288 scruples = 5,760 grains. The apothecaries’ pound is equivalent to the troy pound in the United States, but in Eng¬ land the apothecaries’ weights based on the troy pound were discontinued in 1858 under authority of the medical act, and avoirdupois weights substituted in dispensing medicines. In the United States, the avoirdupois system is largely used in buying and selling drugs, al¬ though the metric system is rapidly coming into use and displacing the apothecaries’ weights on account of its great convenience. The apothe¬ caries’ grain is used in compounding prescrip¬ tions of the more powerful drugs. The United

States apothecaries' scruple (20 grains) and the. United States apothecaries' dram (60 grains) are still used in compounding prescrip¬ tions. The United States apothecaries' ounce (480 grains) is equal to the troy ounce. The apothecaries' pound (equal to the troy pound) is rarely used.

The units used in the weighing of diamonds are as follows: One diamond carat — 4 dia¬ mond grains = 64 parts. The carat is the jew¬ elers' unit for weighing diamonds, the name referring to a small hard bean formerly used for that purpose. In view of the variation in the value of the carat in different countries, its weight was fixed by agreement of London, Paris and Amsterdam jewelers, in 1878, at ex¬ actly 205 milligrams. The following varieties of carats should be carefully distinguished : The international diamond carat of 205 milli¬ grams, a definite unit free from ambiguity; the English diamond carat (3.2 troy grains or four diamond grains) differing, however, in different countries; the old carat (1-24 troy ounce); the gold carat (about 150 troy grains) ; and the gold carat, a ratio equal to 1-24 part by weight used in designating the purity of gold alloys. See also Balance; Tonnage; Weigh¬ ing Machines.

Table Showing the Principal Weights and Measures of Foreign Countries in Use in Commercial Transactions, and Their Equivalents in the Weights and Meas¬ ures of the United States.

Name

Country

U. S. Equivalent

Almude .

Portugal (Lisbon).

4.3695 gallons

U

“ (Oporto) .

6.6256

Anna .

Bengal .

14.04 grains

Ardeb .

Egypt .

5.6187 bushels

Are .

France .

0.0247 acre

25 . 3583 pounds

Arroba* .

Argentina .

U

Bolivia .

25.3536 “

a

Brazil .

32 3792 “

u

Chile .

25.365 “

25.365 “

25.366 “

25.3645

25 . 365

25 . 365 “

u

Costa Rica .

a

Cuba .

a

Mexico .

u

Peru .

u

Philippines .

u

Portugal .

32.3795 “

u

Spain .

25.4024 “

a

Venezuela .

25 . 3595 “

4 . 1 gallons

Arroba* (liquid) Arroba* (liquid)

Cuba .

(oil) .

Arroba* (liquid)

Spain .

3.3185

(wine) .

a

4.263 “

Arroba* (liquid)

Venezuela .

4.263

Arshine .

Russia .

28 inches

29.5281

U

Turkey .

“ (square)

U

5 . 44 square feet

Barll* .

Argentina .

20.077 gallons

“ (raisins) . .

Spain (Malaga).. .

50.6 pounds

Berkovetz .

Russia .

360 6764 “

Bushel .

Great Britain ….

1.0315 bushels

Caffiso .

Italy (Messina).. .

3.091 gallons

•“ (oil) .

Malta .

5 . 499 “

Candy .

Bombay .

560 pounds

Ceylon .

500

U

Madras .

500 “

a

Malacca .

405 “

Can taro .

Egypt .

98.190 “

112 “

U

Greece .

a

Malta .

175 “

u

Morocco

119 “

123.992 “

u

Rumania .

* While the metric system is official and its use even compulsory in most Latin-American States these measures derived from Old Spain still retain their hold on the greater part of the population.

Table Showing the Principal Weights and Measures of Foreign Countries, *etc.* — Continued

Name

Can taro .

U

Carga .

U

«

Catty .

U

u

u

u

u

Centai .

Centaro .

Centigramme…

Centilitre .

Centimetre .

Centner .

U

tt

U

Chang .

Chequi .

Chet vert .

Chih .

Cho .

Cuadro .

a

Decagramme… Decalitre (dry) . “ (liquid) .

Decametre .

Decigramme … Decilitre (dry) . . Decilitre

(liquid) .

Decimetre .

Dessiatine .

Ell .

U

u

Fanega* .

U

a

a

a

a

u

Feddan .

Frazila .

U

Frasco .

a

Funto .

Gallon (ale or

beer) .

Gallon, Imperial Garnetz (dry) . .

Gramme .

Guz .

Hectare .

Hectolitre (dry). Hectolitre

(liquid) .

Hundredweight

(cwt.) .

Kilo .

Kilogramme …. Kilolitre (dry) . .

(liquid).

Kilometre .

Kin .

Koku (dry) ….

“ (liquid) . .

Kwan .

Leaguer .

Libra* .

U

«

u

u

a

Country

Tripoli .

Turkey (Smyrna).

Mexico .

Spain (Malaga).. . “ (Valencia)..

China .

Japan .

Java .

Philippines .

Siam .

Sumatra .

Great Britain Central America. . France .

U

((

Austria .

Denmark .

Germany .

Sweden .

China .

Turkey .

Russia .

China . ; .

Japan .

Argentina .

Paraguay .

France .

U

U

a

u

u

u

u

Russia .

Netherlands .

Great Britain

Scotland .

Argentina .

Central America..

Chile .

Cuba .

Mexico .

Spain .

Uruguay .

Venezuela .

Egypt .

Arabia .

Zanzibar .

Argentina .

Mexico .

Russia .

Great Britain ….

« u

Russia .

France .

Persia .

France … . .

U

U

Great Britain ….

Rumania .

France .

U

U

u

Japan .

U

u

a

British South Afri¬ ca ….

Argentina .

Brazil .

Central America. .

Chile .

Colombia .

Costa Rica .

Cuba .

U. S. Equivalent

109.714 pounds

124.682

U

300

U

177.5

a

338.4

a

1.33

a

1.3228

a

1.3563

a

1.39

a

2.667

a

2. 118

a

100

u

4.2631 gallons

0.1543 grains troy

1.057

quarts

0.3937 inch

123.4615 pounds

110.23

U

110.24

a

93.379

a

11. 75

feet

1 1 . 3348 ounces

5 . 9568 bushels 14.101 inches 2 . 45 acres 4.17 “

1.8 “

154.32 grains 0.2837 bushel 2.6418 gallons 32.809 feet 1.5432 grams 0.1081 quart

0.1057 “

3.937 inches 2 . 6997 acres 39.37 inches 45 “

37.06 “

3 . 8936 bushels

1.5743 2.858 1.599

1 . 5549 “

1.5473 “

3.888 “

1.599

1 . 0382 acres 30 pounds 35 “

0.6274 gallons 2 . 5 quarts 0.9028 pound

1 . 2208 gallons 1 . 2009 “

0.0981 bushel 15.432 grains troy 40.95 inches 2.471 acres 2 . 838 bushels

26.418 gallons

112 pounds 12.345 bushels 2 . 2046 pounds 28.38 bushels

264. 18 gallons 0. 6214 mile 1 . 3228 pounds 5.119 bushels 47 . 6538 gallons 8.267 povmds

151.913 gallons 1 . 0128 pounds

1.012

1 . 043 “

1.043 “

1.014

1.014

1.016

* While the metric system is official and its use even compulsory in most Latin-American States these measures derived from Old Spain still retain their hold on the greater part of the population.

WEIHAIWEI

Table Showing the Principal Weights and Measures of Foreign Countries, *etc.* — Continued

Table Showing the Principal Weights and Measures of Foreign Countries, *etc.* — Continued

Name

Country

U. S. Equivalent

Libra* .

Dominican ReU

public .

Mexico .

1.014 pounds

1.0142

1.0143 “

1.016 “

1.012 “

U

Peru .

u

Porto Rico

u

Portugal .

Spain .

1.016 «

0.1181 inch

0.0833 “

Ligne .

Switzerland .

Line .

Great Britain ….

Linha .

Portugal. .

0.0902 “

0. 0284 bushel

0.2642 gallon

Litre (dry) .

France .

“ (liquid) …

It

Litra .

Greece .

0. 2642 “

Mau .

Annam .

239.75 feet

Maund

(Imperial) .

Bengal .

82 . 1333 pounds

Bombay .

28 “

it

Madras .

25 “

Metre .

France .

39. 3709 inches

35.314 cubic feet

“ , cubic …

U

“ , square . .

Millimetre .

il

10. 764 square feet

it

0 . 0394 inch

Miskal .

Persia . .

0.0102 pound _JXri333 ounce

Momme .

Japan . .V …

Morgen .

British South Africa .

2.116 acres

Muid .

British South Africa .

3 . 0945 bushels

Oke .

Egypt .

2.7275 pounds

it

Greece .

3.3714 “

it

Turkey .

2.8337 “

“ (liquid) ….

Crete .

0.3458 gallon

Pack (wool) ….

Great Britain ….

240 pounds

Packen .

Russia .

1 . 082 . 03 “

Pfund .

Austria .

1 . 2347 “

U

Germany .

1.1025

it

Russia .

0.9028 “

Picul .

Borneo .

135.6354 “

a

China .

133.3333 “

a

Japan .

132.277

“ (sugar) ….

Java .

135.6312 «

Pollegada .

Portugal .

1 . 082 inches

Pood .

Russia .

36.1128 pounds

0.947 inch

Pulgada .

Argentina .

U

Mexico .

0.916

U •

Spain .

0.9273 “

Pund .

Denmark .

1 . 1023 pounds

1.2251 quarts

Quart (beer) …

Great Britain ….

“ (Imperial).

U ti

1 . 2006

Quintal* .

Argentina .

101.27 pounds

it

Bolivia .

101.418

U

Brazil .

129.526 “

U

Central America..

104.3 “

u

Chile .

101.4

a

Colombia .

101.4 “

a

Costa Rica .

101.465 “

a

Dominican Republic .

101.4 *

u

France .

220.4621 “

tt

Mexico .

101.418

tt

Portugal .

129.518 “

it

Spain .

101.609 “

a

Turkey .

125 “

tt

Venezuela .

101.438 “

Ri

Japan .

2 . 44 miles

Rik

Persia .

17.075 pounds 0.9819 pound

R ntl

Egypt .

Sa sh pin

Russia .

7 feet

Rppr

India .

2.057 pounds

11.93 inches

Rbakn

Japan .

Sho

0.4765 gallon

Rt.erp

France .

35.314 cubic feet

Stone .

Great Britain ….

14 pounds

Sun

Japan .

1 . 193 inches

T a hri s

Persia .

6.547 pounds

583.3 grains

Tael

China .

T?*n

Japan .

0.245 acre

Tn fdrvl

it

0.4925 bushel

u (linijiH) .

it

3. 9703 gallons

Tola

India .

0.4114 ounce

Ton .

Great Britain ….

2,240 pounds

“ rnptrip

France .

2,204.621

Tnnrlp.

Denmark .

3.9478 bushels

Tondeland .

«

1.3635 acres

• * While the metric system is official and its use even compulsory in most Latin-American States these measures derived from Old Spain still retain their hold on the greater part of the population.

Name

Country

Tonelada

a

Tsubo… Tsun… . Turn T unne, . . Vara* …

U

9 • •

a

it

u

a

u

a

a

a

a

M

«

Vedro Zar. .

Portugal…

Spain .

Japan .

China .

Sweden …

a

Argentina . Bolivia… .

Brazil .

Chile .

Colombia. .

Cuba .

Dominican public… Mexico… . Peru.

Philippines Portugal…

Spain .

Venezuela . Russia Persia .

U. S. Equivalent

113.607 gallons 2,028.66 pounds

3 . 954 square yds. 1.3125 inches 1.1679 “

4. 16 bushels 34. 1208 inches

32.91 42.796

33.367 “

33.38

33.375

32.91 «

32 . 992 “

33.367 “

33.38 42 . 796 33.384

32.874 “

3 . 249 gallons 40.95 inches

* While the metric system is official and its use even compulsory in most Latin-American States these measures derived from Old Spain still retain their hold on the greater part of the population.

Bibliography. — Alexander, (Universal dic¬ tionary of weights and measures, ancient and modern; reduced to the standards of the United States of America) (1867) ; Chaney, (Our Weights and Measures. A practical treatise on the standard weights and measures in use in the British Empire) (1897) ; Oldberg, (A man¬ ual of weights and measures including princi¬ ples of metrology; the weights and measures now in use ; weight and volume, and their recip¬ rocal relations; weighing and measuring; balances (scales) and weights; measures of capacity; specific weight and specific volume, etc.* (1890) ; Adams, (Report upon weights and measures. Prepared in obedience to a resolu¬ tion of the Senate of 3 March 1817 > (1821) ; (Table of Equivalents of the Customary and Metric Weights and Measures. Circular of In¬ formation of the National Bureau of Stand¬ ards* (1903) ; (Laws Concerning Weights and Measures of the United States. Bureau of Standards) (1904) ; (Ready Reference Tables,’ *Carl Hering (1904). Other books of reference are: Hatch, F. H. and Vallentine, E. J., (The Weights and Measures of International Commerce) (London 1907) ; Macfarlane, J. J., Con¬ version Tables of Foreign Weights, Measures and Moneys’ (Philadelphia 1915) ; Robertson, J., dictionary for International Commercial Quo¬ tationsˆ (London 1918) ; Tate, W., (Tate’s Modern Cambist* (London 1912).

WEIHAIWEI, wa'hi'wa', China, a duty¬ free seaport and British naval and coaling station, in the province of Shantung, near the eastern extremity of the Shantung Peninsula, 40 miles east of Chefu. It lies on the south shore of the entrance to the Gulf of Pechili, op¬ posite Port Arthur on the north shore, about 100 miles distant. During the Chino-Japanese War, the Japanese destroyed a Chinese fleet here and captured the town, which they evacu¬ ated early in 1898. By a convention of 1 July 1898 the port of Weihaiwei, together with the adjacent waters and some neighboring

territory, was leased to Great Britain. The leased territory included the island of Liu Kung, all the islands in the bay and a belt of land 10 miles wide along the whole coast of the bay; area, 280 square miles; pop. 120,000; but the population of the town of Weihaiwei is only about 2,500 inhabitants, be¬ ing an old-time walled town. By the terms of the lease Great Britain has sole jurisdiction within the limits of this territory, but within the walls of the city, Chinese officials may ex¬ ercise such authority as is not inconsistent with the defense of the territory. The British government may also erect fortifications and carry out other defensive works in a defined region lying outside of the leased territory. Chinese war-vessels retain the right to use the waters. Weihaiwei is not to be fortified, but is intended to be a naval base, place of ex¬ ercise and sanatorium for the British squadron on the China station. The station is used as a flying naval base, but no troops are sta¬ tioned there, and the Chinese troops that were located there wrere disbanded. In 1917, 639 steamers and 2,563 junks entered and cleared at Weihaiwei. The imports are mainly petroleum, flour, cotton goods, sugar, food¬ stuffs and coal; the exports are ground nuts and ground-nut seeds (290,687 hundredweight in 1917), and salt fish. There is a mail service to Shanghai and Europeans seek the locality in summer to escape the heat of the region farther south. Consult Annual Report on Wei¬ haiwei; Bruce-Mitford, C. E., (The Territory of Weihaiwei > (Shanghai 1902) ; Johnston, R. F., (Lion and Dragon in Northern China > (London 1910).

WEIMAR, vi'mar, Germany, the capital of Saxe-Weimar and also of Thuringia on the Ilm, 13 miles east of Erfurt. It stands in a beau¬ tiful valley surrounded by hills, on ground partly elevated and partly flat. It is irregularly built except in the suburban portions. Its nota¬ ble public edifices are the grand-ducal palace, a handsome structure erected partly under the superintendence of Goethe; the so-called Red and Yellow castles, now united and occupied by several public departments ; the grand-ducal library (in the Green Castle) , containing 300,000 volumes and a large collection of maps ; the museum ; the Stadtkirche, with an altarpiece, one of the finest works of Lucas Cranach, in which he has introduced portraits of himself and Luther and Melanchthon ; and the modern Gothic townhouse. The public monuments comprise the Goethe-Schiller monument in bronze, statues of Herder, Wieland, the com¬ poser Hummel, the Grand-Duke Karl August and various others, and a monumental fountain. Goethe's house is now used as a Goethe Na¬ tional Museum, and Schiller's contains relics of its former distinguished owner. A Goethe and Schiller Archives building was opened in 1896. Goethe and Schiller are interred in the grand-ducal vault in the new cemetery. Stretching away from the palace is a fine park on the banks of the Ilm. Weimar has a gymnasium, a realgymnasium, academy of painting, school of drawing, normal school and other educa¬ tional institutions. It has neither trade nor manufactures of much consequence, the manu¬ factures of iron, wood, straw, leather and cloth being carried on to some extent, but as

the capital of the duchy it is the seat of the legislature and of all the more important courts and public offices. It long ranked as a sort of ((German Athens0 in consequence of the enlightened patronage which the Duke Karl August (d. 1828) afforded to the four great literary men of Germany, Goethe, Schiller, Herder and Weiland. In 1919 the National Assembly of the German nation met at Weimar and there the constitution of the new German Republic was made and adopted. The Treaty of Versailles (1919) was ratified at Weimar during the session of the assembly. Pop. 37,237.

WEINGARTNER, vin'gartner, Felix, Austrian composer: b. Zara, Dalmatia, 2 June 1863. He studied at the Leipzig Conservatory, having received a government scholarship, and in 1884 his opera, ˆakuntala,* was brought out at Weimar under the patronage of Liszt. He was musical conductor at Konigsberg, Dantzig and Hamburg in 1884-89 and in 1891 was appointed court conductor at Berlin. Ill health compelled the resignation of this post, and in 1898 he settled in

Munich as conductor of the Kaim concerts. He has composed numerous songs, several symphonic poems, the operas <Malawika) (1886); <Genesius) (1892); (Kain und AbeP (1914) ; Tome KobolcP (1916), *etc.* He has written (Die Lehre von der Wiedergeburt und das Musikalische) (1895) ; (Beyreuth 1876 bis 1896) (1897). Con¬ sult <Luies) by Lusztig and by Raabe, both published in Berlin in 1908.

WEINMAN, Adolph Alexander, American sculptor: b. Carlsruhe, Germany, 11 Dec. 1870. He came to the United States when a child and later studied art in New York, under Saint Gaudens at the Art Student's League, and at Cooper Union. He is a member of the National Academy, the National Sculpture Society and the National Institute of Arts and Letters. In 1915 he served on the International Jury of Awards at the Panama Exposition. Among his works are the General Macomb monument, Detroit, Mich., the Lincoln me¬ morials at Hodgenville, Ky., and at Madison, Wis., the Lincoln statue at the State Capitol, Frankfort, Ky., the statuette of Lincoln at the Metropolitan Museum of Art, New York, and the Indian head at the Brooklyn Institute Museum.

WEIR, wer, Harrison William, English

artist and journalist: b. Lewes, Sussex, 5 May 1824; d. London, 4 Jan. 1906. He learned the art of wood-engraving, but disliking it turned to painting, and his first exhibition at the British Institution was in 1843. He was the last survivor of the original staff of the London News and was engaged on the Graphic, Pictorial Times, Black and White and other London periodicals. He was an authority on the correct delineation of do¬ mesticated animals, was noted for his paintings of country life and as an illustrator of books and periodicals. He wrote and illus¬ trated <The Poetry of Nature) ; (Every-day Life in the Country > ; <Our Cats and All About Them\ *etc.* Perhaps his greatest achievement was his work (Our Poultry and All About Them> (1903), the writing and illustrating of which claimed his attention for more than 20 years.

WEIR, James, American physician and au¬ thor: b. Owensboro, Ky., 17 Oct. 1856; d. there, 9 Aug. 1906. He was graduated from the University of Louisville in 1878 and studied medicine there and in New York. He pub¬ lished (Religion and LusO (1897) ; (The Dawn of Reason5 (1898); Untelligence in the Lower Animals) (1898).

WEIR, John Ferguson, American painter, sculptor and author, son of R. W. Weir fq.v.) : b. West Point, N. Y., 28 Aug. 1841. He was a pupil of his father and became a member of the National Academy in 1866. Since 1869 he has been professor of painting in the Yale School of Fine Arts. As a sculp¬ tor he is known by his statues of President Woolsey and Professor Silliman of Yale, and in addition to many portraits he has painted (The Gun Foundry) ; (The Forging of the Shaft5 ; (The Column of Saint Mark's, Ven¬ ice, } *etc.* He has written (J°hn Trumbull and His Works) (1902) ; (Human Destiny in the Light of Revelation) (1903).

WEIR, Julian Alden, American artist, son of R. W. Weir (q.v.) : b. West Point, N. Y., 30 Aug. 1852; d. New York, 8 Dec. 1919. He studied with his father and at Paris with Gerome, became a member of the Society of American Artists in 1877 and a National Acad¬ emician in 1886. Mr. Weir was one of the founders of the Society of American Artists, the first organization to rebel at all effectively against the Academy. These societies were later united and Mr. Weir at once refused the presi¬ dency of the Association of American Painters and Sculptors because it was in opposition to the Academy. He painted many kinds of pic¬ tures, subjects, still life, portraits, figures, land¬ scapes. In his later career he was identified with the Impressionist School. Examples are to be found in the Luxembourg, Paris, and in nearly every important art museum in the United States, including the National Gallery, Washington, the Art Institute of Chicago, the Albright Gallery, Buffalo, the Pennsylvania Academy, Philadelphia, and the Brooklyn In¬ stitute. (Breton Interior5 obtained a second-class medal at the Paris Exposition of 1889. His (Idle Hours,5 now in the New York Metro¬ politan Museum, received the $2,000 prize of the American Art Association. In the same gallery are (The Red Bridge5 and (The Green Bodice,5 the latter one of Weir's masterpieces. Weir's long career as an artist was marked by inde¬ pendence and naturalness. It was only after repeated experiments that he achieved the gen¬ eral recognition which the reticent, refined, and distinguished style of his maturity deserved.

WEIR, Robert Walter, American artist: b. New Rochelle, N. Y., 18 June 1803; d. New York, 1 May 1889. After studying under Jar¬ vis he began portrait painting in 1821 and then studied in Florence under

Benvenuti, 1821-28. In 1829 he became a National Academician and was professor of drawing at West Point 1837-79. He was of especial prominence as a histori¬ cal painter and among his works are the (Em¬ barkation of the Pilgrims5 (1845) in the ro¬ tunda of the Capitol at Washington; the (Church of the Holy Innocents 5 (1847), Cor¬ coran Art Gallery, Washington; and (Peace and War,> painted for the chapel at West Point.

WEIR, a dam. See Hydraulics ; Irriga¬ tion ; Water Supply.

WEIRS, Fishing. See Poundnet Fish¬ ing.

WEISER, Idaho, city and county-seat of Washington County, on Snake River, 60 miles northwest of Boise and on the Pacific and Idaho Northern and the Oregon Shortline railroads. The Intermountain Institute is lo¬ cated here. There are flour mills. The sur¬ rounding district is interested in stock-raising and mining. Pop. (1920) 3,154.

WEISHAUPT, vls'howpt, Adam, German mystic: b. Ingolstadt, 6 Feb. 1748; d. Gotha, 18 Nov. 1830. He was the founder of the So¬ ciety of the Illuminati (q.v.). Educated at Ingolstadt, he there became in 1772 extraordi¬ nary professor of law and in 1775 professor of natural and canon law. His appointment to the latter post brought him into collision with the clergy, especially the Jesuits, as after the suppression of their order he became their bit¬ ter enemy, although he had been educated by them. He formed the plan of uniting a large number of men together to sustain certain per¬ fectionist views and his instruction-room soon became a nursery of his doctrines. In 1785 he was obliged to leave Ingolstadt and retired to Gotha, where he was afterward made councillor of state by the duke. His most important writ¬ ings are (Geschichte der Verfolgung der Illu¬ minated (1786) ; das verbesserte System der Illuminated (1787) ; 'Pythagoras, oder Betrachtung fiber die geheime Welt-und Regie-rungskunst5 (1790); (Materialien zur Befor-clerung der Welt-und Menschenkunde) (1850) ; 'Ueber Staatsausgabed (1820) ; and deber das Besteuerungssysteid (1820).

WEISMANN, vls'man, August, German

biologist: b. Frankfurt-on-the-Main, 17 Jan. 1834; d. 6 Nov. 1914. After studying medicine in Gottingen University he was clinical assist¬ ant at Rostock in 1856—57 and in the course of the three years 1858-60 visited Vienna, Italy and Paris, devoting himself especially to

studies in the natural sciences. He lived for a year at Schaumburg Castle as body physician to the Archduke Stephen of Austria and in 1863 went to Giessen to prosecute his zoological studies under Leuckart. Having qualified as a lec¬ turer in the University of Freiburg, he was appointed extraordinary professor there in 1866 and ordinary professor in 1873. His first published work was a treatise on the develop¬ ment of the Diptera5 (1864). It was followed by a work (On the Influence of Isolation on the Formation of Species5 (1872) and (Studien zur Descendenztheorie5 (1875-76). This work, translated into English in 1882 by Professor Meldola under the title (Studies in the Theory of Descent5 (with a preface by Charles Dar¬ win), treats of several important phenomena in natural history from the standpoint of a thorough believer in the doctrine of natural selection. His 'Beitrage zur Naturgeschichte der Daphnoiden5 (1876-79) and 'Die Entstehung der Sexualzellen bei den Hydro-medusen5 (1883) are valuable contributions to the developmental aspect of zoology. A se¬ ries of treatises followed in which he developed his characteristic theories, among them being deber die Vererbung5 ((On Heredity5),

(Uber die Dauer des Lebens) ((0n the Dura¬ tion of LifeQ, (Ueber Leben und Tod) ((On Life and Death*), (Die Kontinui-tat des Keimplasmas als Grundlage einer Theorie der Verebung* ((The Continuity of the Germ-Plasm as the Basis of a Theory of Heredity*), (Die Bedeutung der Sexuel-len Fortpflanzung fiir die Selektionstheorie) ((The Significance of Sexual Reproduction for the Theory of Selection*), (Ueber den Riiclc-schritt in der Natur) ((On Retrograde Devel¬ opment in Nature*) and (Amphimixis.* These have appeared in an English translation under the title (Essays upon Heredity and Kindred Biological Problems* (Vol. I, 1889; Vol. II, 1892). Weismann's other works include (Das Keimplasma) (1892), in English as (Germ PlasirP (1893) ; (Die Allmacht der Naturziich-tung*' ((The Omnipotence of Natural Selec¬ tion, *1893) ; (Aeussere Einfliisse als Entwick-elungsreize* ˆExternal Influences as Stimuli to Development,* 1894) ; (Neue Gedanken zur Vererbungsfrage* ((Fresh Thoughts on the Question of Heredity,* 1895) ; and (Ueber Ger-

minalselektion) ((On Germinal Selection,* 1896). See FIeredity; Weismannism.

WEISMANNISM, the essential teaching of August Weismann (q.v.), sometimes referred to as ((Neo-Darwinism.® Interest and contro¬ versy have gathered mainly round his answer to the question, ((How is it that a single cell of the body can contain within itself all the hered¬ itary tendencies of the whole organism?® In all theories of heredity (q.v.) biologists have assumed that characters acquired by the indi¬ vidual are transmitted to offspring. This Weis¬ mann denies and while biologists have con¬ cerned themselves with speculation as to the mode by which such transmissions are effected, he challenges them to prove that they are ef¬ fected at all. The burden of proof is thus thrown upon his opponents, whose assumptions must give way to experimental evidence, which alone can determine, and that only after pro¬ tracted record of cases, whether individually acquired characters are transmitted or not. Death, he contends, is not a primary attribute of living matter; the protozoans, or one-celled organisms, being immortal in so far that they do not die naturally. The protozoan, a micro¬ scopic jelly-like, apparently — not really — structureless mass, with no seeming unlike¬ ness of parts, multiplies by division. Each half becomes a complete individual and grows in like manner as the whole to which it belonged, till it also divides and so on with the multi¬ plication of protozoans ad infinitum. It cannot be said of either half that one is parent and the other offspring, for both are of the same age, and only, in a limited sense, as the' subdivisions into separate individuals are repeated, can we speak of succession of generations. In these processes there is nothing analogous to death. (<There are,® Weismann says, ((no grounds for the assumption that the two halves of an amoe¬ ba are differently constituted internally, so that, after a time, one of them will die while the other continues to live. Observations show that when division is almost complete the proto¬ plasm of both parts begins to circulate and for some time passes backward and forward be¬ tween the two halves. A complete mingling of the whole substance of the animal and a re¬

sulting identity in the constitution of each half is thus brought about before the final separa¬ tion? Consequently, there is unlimited per¬ sistence of the individual ; potential, although not absolute, immortality so long as life lasts on the earth.

While the one-celled organisms are thus im¬ mortal, only the reproductive cells of the meta¬ zoans, the many-celled, are immortal.

How has this come about? Weismann accounts for it by the failure of certain protozoans to divide equally, whereby unlikeness of parts and differ¬ ences of position of parts resulted. ((The first multicellular organisms were probably clusters of similar cells, but these units soon lost the original homogeneity. As the result of mere relative position there arose division of labor, some of the cells were especially fitted to pro¬ vide for the nutrition of the colony, while others undertook the work of reproduction.® Clearly, those on the outside, being exposed to the direct and constant action of their sur¬ roundings, would be the media of nutrition, and the builders-up of the cell-commonwealth. So the result of this cell-clustering would be that the cells fell into two classes, body cells and germ-cells. While the body cells were solely concerned with the nutrition of the organism, losing in this specialization of function the power of reproduction, that power became con¬ centrated in the germ-cells, or, speaking more precisely, in the germ-plasm, which is located in the nucleus of the germ-cell. It is these germ-cells which are the immortal part of the metazoans. With increasing subdivision of function there has been increasing modification of the organism, but the twofold classification of the somatic or body cells and the germ-cells has remained. The death of the body cells is involved in the ultimate failure to repair waste, because a worn-out tissue cannot forever re¬ new itself, and because cell-division has its limits. In brief, death is the penalty paid for complexity of structure. As it is impossible for the germ-cell to be, as it were, an extract of the whole body, and for all the cells of the body to dispatch particles to the germ-cells whence these derive their power of heredity (the fundamental idea of Darwin's theory of pangenesis, q.v.), the germ-cells, so far as their essential and characteristic substance is con¬ cerned, are not derived from the body of the individual, but directly from the parent germ¬ cell. Heredity, Weismann contends, is se¬ cured by the transference from one generation to another of a substance with a definite chem¬ ical and molecular constitution — in other words, by the ((continuity of the germ-plasm.® This germ-plasm (which, Weismann's critics argue, runs perilously near a metaphysical con¬ cept) is assumed to possess a highly complex but extremely stable structure, so stable (<that it absorbs nourishment and grows enormously without the least change in its complex molec¬ ular structure.® Of this germ-plasm it is fur¬ ther assumed that a small portion contained in the parent egg-cell is not used up in the con¬ struction of the body of the offspring, but is reserved unchanged for the formation of the germ-cells of the following generations. Only variations of the germ-plasm itself are inher¬ ited, and it is upon these variations that natural selection operates. Variations are due not to

the influence of external condition nor to use or disuse of organs, but to sexual conjugation. The process combines two groups of hereditary tendencies derived from the mingled germ-plasms of the male and female parents, result¬ ing in those individual differences which form the material from which new species are pro¬ duced by the action of natural selection. Those differences multiply in geometrical ratio.

The sum of the matter is that natural selec¬ tion (q.v.) is the dominant factor, that use and disuse of parts and the action of the en¬ vironment count for nothing, or, at the most, for but a little. (See Use and Disuse). Here and there Weismann makes concessions as to the modifying influences of body cells on the germ-cells, and as to the ultimate origin of hereditary individual differences in the direct action of surroundings, which are a partial sur- , render of his main contention as to the isola¬ tion of the germ-plasm. It is not easy to recon¬ cile the theory of an insulated germ-plasm with the ceaseless manufacture, secretion and expul¬ sion of germ-cells, the materials of which are derived from the materials nourishing the en¬ tire organism; nor with the subtle influence of the nervous system on the reproductive organs.

Perhaps the most serious difficulty in Weismann's theory is in the reconciliation of psy¬ chological evolution with the continuity of the germ-plasm. For the researches of Spencer, Balfour and others have demonstrated that the nervous system had its origin in modifications of the primitive skin due to the direct action of the environment. Be this as it may, the wide-reaching sociological significance of the doctrine of heredity — which may be regarded, as the physical correlate of determinism — gives an importance to the labors of Weismann that cannot be overrated, and makes urgent the rec¬ ord of extended observations on the lines al¬ ready laid down by Galton.

Bibliography. — Haeckel, (Generelle Mor¬ phology (1866) ; Darwin, (Variation Under Domestication) (1868); Brooks, (The Law of Heredity) (1883) ; Virchow, (Descendenz und Pathology (Virchow's Archiv, ciii, 1886) ; Eimer, (Die Entstehung der Arten) (1888) ;

Galton, (Natural Inheritance) (1889); Ro¬ manes, (An Examination of Weismannism) (1893) ; Spencer, (A Rejoinder to Professor Weismann) (1894); Hertwig, (The Biological Problem of To-day) (1894). For critiques of Weismann, consult Eimer, Virchow, op. fit.; Spencer, < Factors of Organic Evolution > (1886) ; McKendrick, General Physiology) (1888) and the files of Nature.

WEISS, Charles Andre, French authority on international law: b. Mulhouse, Alsace, 30 Sept. 1858. He took his LL.D. at the University of Paris in 1880 and later became a member of the faculty there. He has been prominently connected with various societies and commis¬ sions dealing with international law, and has written voluminously and with praiseworthy clarity upon the subject. He is a chevalier of the Legion of Honor. Author of (Traite elementaire de droit international prive) (1882) ; (Traite theorique et practique de droit. inter¬ national prive) (1892) ; (Le droit civil et la legislation comparee> (1900) ; (Manual de droit international prive) (1905) ; (The Vio¬ lation by Germany of the Neutrality of Belgium

and Luxemburg) (1915); (La Reparation des dommages de guerre) (1917), *etc.*

WEISS, John, American clergyman : b. Bos¬ ton, 28 June 1818; d. there, 9 March 1879. He was graduated at Harvard in 1837; in the winter of 1842ˆ13 studied at Heidelberg, Ger¬ many; was graduated in the last-named year at the Harvard Divinity School, and settled as minister of a Unitarian church in Watertown, Mass. His anti-slavery utterances having dis¬ turbed the harmony of his pastorate, he re¬ signed, and in 1847 became minister of a Uni¬ tarian society in New Bedford, Mass., but was soon compelled by reason of ill health to retire. Again in 1859-70 he was minister of the Watertown church, from which he finally with¬ drew in order to pursue his literary work. He was one of the most brilliant of the New Eng¬ land reformers and transcendentalists, and his writings display a mind at once mystical and scientific, strongly rationalistic on religious sub¬ jects, but endowed with a fine poetic power of interpretation, which he applied to religious history and symbolism, as well as to questions of philosophy and life, to which he brought prophetic insight and fervor. His publications include (./Esthetic Prose) (1845), a transla¬ tion of Schiller's philosophical and aesthetic es¬ says; (Life and Correspondence of Theodore Parker) (1864); American Religion) (1871); (Wit, Humor, and Shakespeare) (1880) ; and (The'Immortal Life) (1880).

WEISSENFELS, vis'senfels, Germany, town in the Prussian province of Saxony, on the Saale River, 14 miles southwest of Leipzig, on the main line of the railroad from Bebra to Frankfort-on-the-Main. It was the capital of the duchy of Saxe-Weissenfels in 1656-1746. The Augustusburg Palace, built in 1664-90, is now used as a military school. There are deposits of lignite and sandstone in the vicinity. Manufactures include machinery, ironware, shoes, paper, sugar and electrical appliances. Pop. 33,581.

WEITENKAMPF, Frank, American con¬ noisseur of prints: b. New York, 13 April 1866. He studied at the Art Students' League, New York. He is chief of the art and print de¬ partments of the New York Public Library, where he has done notable work in arranging continuous exhibitions of carefully selected prints ; and he has also done considerable art propaganda work in disseminating information concerning prints through the press. In 1914 New York University gave him the degree L.H.D. He has prepared many pamphlets cataloging and describing prints; has contrib¬ uted to various encyclopedias and to the Standard Dictionary); and is author of (How to Appreciate Prints) (1908; new ed., 1916) ; American Graphic Art) (1912).

WEITLING, Wilhelm Christian, German communist: b. Madgeburg, Prussia, 1808; d. New York, 25 Jan. 1871. He early became an advocate of communism, traveling and lectur¬ ing in its behalf. He took part in the Revolu¬ tion of 1848 and afterward came to the United States. He founded the Socialist society known as Arbeiterbund in New York, and was con¬ nected with the establishment of a communistic colony in Wisconsin, although he lived in New York. Author of Guaranties of Harmony and

Freedom) (1842) ; (Humanity as It Is and as It Should Be) (1845), *etc.*

WEITSPEKAN (wit'spek-an) INDIANS (from W eitspek, the name of one of their towns). A linguistic stock of North American Indians,

comprising several small tribes col¬ lectively known as the Yurok, occupying the lower Klamath River in California from the mouth of the Trinity down. On the coast Weitspekan territory extends from Gold Bluff to about six miles above the mouth of the Klamath. The Chilula are an offshoot of the Weitspek, living to the south of them, on Red¬ wood Creek to a point about 20 miles inland, and from Gold Bluff to about midway between Little and Mad rivers.

WELBECK ABBEY, England, the seat of the Duke of Portland, in Nottinghamshire, three miles south of Worksop. It occupies the site of an old Premonstratensian abbey and came into the possession of the Portland family by marriage in 1734. It stands in a park 10 miles in circumference and is a stately Palladian edifice of mainly the 17th and 18th cen¬ turies, but was greatly enlarged _ about 1864 by the fifth duke, to whom it owes its semi-under¬ ground picture gallery, ballroom and riding-school, the last 385 feet long, 104 feet wide and 51 feet high.

WELCH, Ashbel, American civil engineer: b. Nelson, N. Y., 4 Dec. 1809; d. Lamber.tville, N. J., 25 Sept. 1882. He was engaged as an engineer on the Lehigh Canal in 1827 ; was made chief engineer of the Delaware and Rari¬ tan Canal in 1835 and afterward planned the route and constructed the Belvidere and Dela¬ ware Railroad. In 1862 he became manager of the Pennsylvania Railroad lines in New Jersey and subsequently was made president. He in¬ troduced the block system (q.v.) in railroading in the United States and published papers on economics and civil engineering. He was elected president of the American Society of Civil Engineers in 1881.

WELCH, Herbert, American clergyman and educator: b. New York City, 7 Nov. 1862. He was graduated at Wesleyan University 1887 (A.M., 1889; D.D., 1902; LL.D., 1906; B.D., from Drew Theological Seminary 1890). Stud¬ ied at Oxford University, 1902-03. He entered the ministry of the Methodist Episcopal Church, joining the New York East Conference in 1890. After several pastorates in important churches in and around New York and Brooklyn he was elected president of Ohio Wesleyan Uni¬ versity, Delaware, Ohio, in 1905. In 1916 he was elected bishop and assigned to Korea. He was president of the Ohio Association of Col¬ lege Presidents and Deans, 1907-08; president of the Methodist Federation for Social Service, 1907-12 and since then vice-president. He has also been a member of the boards of managers of several of the denominational societies of his Church. In 1914 he was fraternal delegate to the Methodist. Church of Canada. He edited Selections from the Writings of John Wesley)

(1901).

WELCH, Philip Henry, American humor¬ ist: b. Angelica, N. Y., 1 March 1849; d. Brook¬ lyn, N. Y., 24 Feb. 1889. From 1882 to 1884 he was attached to the staff of the Rochester Post-Express , and then removing to New York was

employed by the Sun. He was prominent among the humorous press writers of his time and was an able satirist. He published (The Tailor-Made GirP (1888); and Said in Fun >

(1889).

WELCH, William Henry, American pa¬ thologist: b. Norfolk, Conn., 8 April 1850. He was graduated from Yale in 1870 and from the College of Physicians and Surgeons in New York in 1875. He studied pathology abroad, becoming in 1878 demonstrator of anatomy at the Bellevue Hospital Medical College, New York. Since 1884 he has been a professor of pathology at Johns Hopkins University. He is an eminent authority on bacteriology and pathology and is the author of ‘General Pa¬ thology of Fever, > ‘ t hrombosis and Embolism and numerous professional papers. He was Huxley lecturer at Charing Cross Hospital, London, in 1902, and served as president of the Congress of American Physicians and Sur¬ geons in 1897.

WELCH, W. Va., town and county-seat of MacDowell County, situated on the Big Sandy River and on the Norfolk and Western Rail¬ road, 71 miles east southeast of Williamson. It has the county buildings, post office, town hall, several churches, school, *etc.* Agriculture is the basic industry of the surrounding region for which the town serves as a shipping and dis¬ tribution point. Pop. (1920) 3,232.

WELCKER, vel’ker, Friedrich Gottlieb, German archaeologist: b. Griinberg, Hesse, 4 Nov. 1784; d. Bonn, Rhenish Prussia, 17 Dec. 1868. He was educated at Giessen, and in 1806-09 was a tutor in the family of Wilhelm von Humbolt at Rome. In the last-named year he accepted the chair of archaeology at Giessen and in 1816 became professor at Gottingen, a position he resigned in 1819 to accept the chair of archaeology at Bonn. Political troubles in

1832 caused his dismissal, but he was shortly

afterward recalled and occupied the post until 1861 when he retired. As a classical scholar Wei eke r held high rank; his extensive writings on Greek art, history and mythology are of great and lasting value. (Die griechische Tra-godie mit Riicksicht auf den epischen Cyclus geordneD (3 vols., 1841) is perhaps his greatest work. He prepared editions of Aleman, Hip-ponax, Philostratus' Hmagines,* Theognis, Hesiod's <Theogony> and (Kleine SchrifterP (6 vols.). Among the most notable of his other works are (Aeschyleische Triologie) (1824) ; (Der epische Cyclus) (1835-49) ; (Alte Denkmaler (1849-64) ; < Griechische Gotter—

lehre) (1863), *etc.* Consult Kekule, (Das Leben Friedrich Gottlieb Welckers) (1880).

WELD, Theodore Dwight, American phi¬ lanthropist and educator: b. Hampton, Conn., 23 Nov. 1803; d. Hyde Park, Mass., 3 Feb. 1895. He was the son of Ludovicus and Eliza (Clark) Weld, and of lineal descent from Jon¬ athan Edwards. He entered Phillips-Andover Academy, but left school because of impaired sight. He was one of the 63 original founders of the American Anti-Slavery Society, and in

1833 was secretary of that society; and in 1830 he was agent of the Society to Promote Manual Labor in Schools. He entered Lane Theologi¬ cal Seminary, Cincinnati, Ohio, and taught col¬ ored youths evenings. He was conspicuous for unselfish charities and fair dealings, and did not

hesitate to denounce slavery and the slave trade openly and publicly. He left the seminary when the trustees suppressed the local anti-slavery organization and began a course of lectures. He was repeatedly mobbed, but his commanding presence and athletic attainments, as well as his fearless and wonderful eloquence, enforced respect; at Granville, Ohio, when advised that the church would be burned if he lectured as advertised, he informed the trustees that he

would then speak from its foundations; to threatening letters he replied : (<Come, but bring your own winding sheets, which I cannot sup-ply}) ; six undisturbed lectures followed. At Painesville, Ohio, such was his eloquence that the leader of the mob kicked in the head of the bass drum with which he had thought to drown the speaker's voice. In 1836 his voice partially failed him, but he taught school and used his pen vigorously. In 1838 he married Angelina Emiline, daughter of Judge John Grimke, of South Carolina, who, having become a Quaker in 1835, emancipated her inherited slaves. He edited the American Anti-Slavery Society's pub¬ lications in Washington, D. C., and was confi¬ dential adviser with Congressmen who favored abolition of slavery in the District. In 1854 he established a school at Englewood, N. J., for the joint education of white and black youth; in 1864 removed to Hyde Park, Mass., and aided in founding the historical society, the public library and the school system.

WELDING is the intimate union produced between the surfaces of two pieces of metal, when heated to the point of fusion and ham¬ mered or pressed together. To weld a bar of iron to another piece of iron requires an intense white heat and the use of a flux or welding compound. Steel can be welded at a slightly lower temperature than iron. The essential condition to a good weld is that the plastic state of the metal shall be maintained for a short time without its melting away or burning. Borax, ammonium chloride, potassium carbo¬ nate and various alkalis are used as fluxes. (See Electric Welding). Some solids can be welded by pressure, as graphite, coal, asbestos, *etc.* Horn may be welded between hot metal plates by pressure, by using hot water or wet cloth to protect the horn surfaces. Consult Kantny, T., (Autogenous Welding and Cutting* (New York 1915).

WELDING, Electric. See Electric Weld¬ ing. •

WELDING, Gas (Oxy-Acetylene). De¬ velopment of Oxy-Acetylene Processes. —

Gas welding consists of melting the edges of two pieces of metal so that they run together and become solid when cold. A good weld requires a very intense flame, such as is ob¬ tained from acetylene and oxygen. By the oxy-acetylene process two sections of like metal can be so united that the two members form a homogeneous whole, so perfect that the weld cannot be distinguished when machined. Ex¬ amination reveals the same uniformity of metallic texture throughout the weld. In this important respect oxy-acetylene welds are recognized as the highest examples of the science of welding. Oxy-acetylene

welding, now generally spoken of as oxwelding, has attained a very important and practically in¬ dispensable place in the iron and steel industry.

It is used in practically all forms of construc¬ tion and manufacture, and is applied to almost countless operations in production and repairs. It is extensively used in low and high pressure pipelines and for butt-welding of metal tubing. Ninety per cent of the railroads in the United States use this process in their shops and on the road, and approximately 35,000 locomotives now in service have welded joints that with¬ stand standard steam pressure. The extent to which oxy-acetylene welding was used during the World War of 1914-18 in the manufacture of depth bombs, torpedo casings, poison gas tanks and other supplies and munitions in which speed and volume of production were vital is well known. Practically all of the enormous number of high explosive and other large shells manufactured in America during the war were made from steel billets cut to size by the oxy-acetylene process. In the field, army trucks and repair shops were universally equipped with oxy-acetylene welding and cutting outfits, and in France numerous depots were es¬ tablished where broken and damaged metal parts were quickly repaired by oxy-acetylene and put back into service. In peace times the oxy-acetylene cutting torch is extensively used in the wrecking of steel structures, in cutting of scrap to sizes for the cupola, in the cutting of armor plate of any thickness, and in fact wherever steel and wrought iron are to be cut, from the largest shipyard down to the smallest industrial plant.

The equipment required for oxy-acetylene welding consists of a cylinder or tank of oxy¬ gen, a tank of acetylene, two regulators or re¬ ducing valves (one each for the acetylene and oxygen tanks), a welding blowpipe and two pieces of hose to connect the blowpipe to the regulators. The cutting equipment is very similar excepting as to the type of the blowpipe used and special hose to sustain the higher oxygen pressure used in cutting. Of the gases adapted to blowpipe use, acetylene and oxygen are by far the most extensively applied, owing to their special fitness industrially, both being obtainable in portable cylinders at low cost. Acetylene contains 1,475 B.T.U.'s, and this very high heat content, together with its endothermic characteristics, conduces to speed in accomplish¬ ing a given quantity of work as well as being a material factor in the excellence of the work. Acetylene was discovered by Edmund Davy, an English chemist, in 1836; but it

remained a laboratory gas until the development, more than half a century later, of a practical method for producing calcium carbide in commercial quantities. Thomas L. Willson, the American electro-metallurgist, in 1891-92 conducted, a series of experiments with a mixture of lime and coal tar heated to high temperature in a Heroult electric furnace, resulting in what may be termed the (<commercial discovery® of cal¬ cium carbide and leading to the establishment, in 1895, of the first factory in the world for the manufacture of carbide.

In the early years of its commercial applica¬ tion, acetylene generated from carbide was used chiefly as an illuminating gas, and so great was the demand for acetylene for house and town lighting that the industry soon became one of considerable importance. -By 1901 calcium car¬ bide was being produced in large quantities and distributing warehouses were established

throughout the country. This was shortly followed by development of Prest-O-Lite port¬ able acetylene cylinders containing acetylene dissolved in acetone. The convenience of port¬ able acetylene, rendering the gas available everywhere, created a tremendous demand for acetylene in this form and resulted in the Prest-O-Lite company's becoming an enter¬ prise of large magnitude, with plants in various States and distributing and service depots in every important centre in the country.

Up to 1905 the development of economical processes for obtaining oxygen had been al¬ most entirely neglected; so, while the applica¬ tion of acetylene and oxygen to metal welding and cutting dates experimentally from 1901 and industrially from 1903, the development of the processes was seriously retarded owing to the cost of oxygen and the difficulty of obtaining an adequate supply. In the early years of the industry the users of the process were largely dependent on their own limited facilities for the production of oxygen from chemicals. Consequently the oxy-acetylene industry was given a tremendous impulse when, in 1907, a liquid air oxygen plant was put into operation in this country. It is a well-known fact that oxygen

produced by the liquid air process is of the highest purity. This was the first unit of what has since become the great system of oxygen plants developed by the Linde Air Products Company, who now maintain produc¬ ing plants and warehouses in more than 50 of the large industrial centres. From that time on the production of both oxygen and acety¬ lene increased amazingly, keeping pace with the rapidly expanding applications of oxy-acetylene welding and cutting. The now almost uni¬ versal adoption of the processes is due to their speed and economy combined with the char¬ acteristic excellence of oxwelding and cutting that is attained by the competent operator using standard equipment. See Liquefied and Compressed Gases — Acetylene.

WELDON, Richard Chapman, Canadian

legislator and educator: b. Sussex, New Bruns¬ wick, 19 Jan. 1849. He was graduated at Mount Allison University in 1866; took his Ph.D., at Yale University in 1872; later studied at the University of Heidelberg; and in 1884 was called to the bar of New Brunswick. He was professor of mathematics at Mount Allison University in 1875-83 ; and held the chair of constitutional law and was dean of the law faculty at Dalhousie University in 1883-1914. He served in the Dominion Parliament in

1887-96.

WELDON, N. C., a town in Halifax County, on the Roanoke River and the Seaboard Air Line and Atlantic Coast Line railways, 97 miles east of Raleigh. It is at the head of steamboat navigation on the Roanoke. Here are located six churches, a State bank, a winery, several mills and a weekly newspaper. There is excellent water power and cotton mills, a corn mill, knitting mill, oil mill and machine shops have been established. The surrounding region is an agricultural one. Pop. (1920) 1,861.

WELFARE WORK IN INDUSTRIES.

See Industries, Welfare Work In.

WELL-TEMPERED CLAVIER (from Ger. W ohltemperirte Klavier), the celebrated

collection of 48 preludes and fugues composed by J. Sebastian Bach, 1685-1750 (q.v.) to test the system of equal temperament in tuning. For this purpose he wrote a prelude and fugue in each key, the keys following one another not in relation, but in the order of chromatic ascent. (See Meantone; Mode; Temperament). Consult Grove, dictionary of Music and Musicians) (Vol. V, pp. 553-555, New York 1911).

WELLAND, Canada (formerly Merritts-ville), town and county-seat of Welland County, Ontario, on Welland River and the Welland Canal, 20 miles northwest of Buffalo, N. Y., and on the Michigan Central, the Grand Trunk, the Canadian Pacific and the Pere Mar¬ quette railroads. There are two government docks, a turning basin and manufactures of woolens and fencing material. There is also a peat industry. Pop. 5,318.

WELLAND CANAL, Ontario, Canada, a ship canal extending from Port Colborne to Port Dalhousie, across the neck of land west of the Niagara River and Falls, and main¬ taining continuous navigation between Lake Erie and Lake Ontario. See Canadian Canals.

WELLDON, James Edward Cowell, Eng¬ lish prelate and educator: b. Tonbridge, Kent, 25 April 1854. He was educated at Cambridge, was head master of Dulwich College 1883, and of Harrow School, 1885-98. In the last-named year he was appointed to the bishopric of Cal¬ cutta, and as such was metropolitan of India. He resigned in 1902 and returned to England, where he was made canon of Westminster. Be¬ sides standard translations of Aristotle's Poli¬ tics, J (Rhetoric) and (Nicomachean Ethics,* he has published (Sermons Preached to Har¬ row Boys) (1887) ; (The Spiritual Life and Other Sermons) (1888) ; (The Hope of Immor¬ tality* (1898) ; (The Revelation of the Holy Spirit } (1902) ; (The Gospel in a Great City) (1910) ; (The Religious Aspects of Disestablish¬ ment and Disendowment* (1911) ; Recollec¬ tions and Reflections) (1915).

WELLE-MAKWA, wel'le-mak'wa, central Africa, the most important affluent of the Ubangi (q.v.), a tributary of the Kongo. Its source is on the western slope of Mount Emin Pasha, and after a course of about 800 miles through a fertile and rich country to the north and east of the Kongo, it flows into the Ubangi at Dayu, opposite Yakoma, at the confluence of two other headstreams. The identity of the Welle-Makwa was uncertain for many years; explorers thought it was a different stream to the Ubangi, but their connection was fully es¬ tablished in 1888, and the river throughout its entire length of 1,500 miles is sometimes called the Welle-Makwa.

WELLER; Reginald Heber, American Protestant Episcopal bishop: b. Jefferson City, Mo., 6 Nov. 1857. He studied at the University of the South 1875-77, and was graduated from the Nashotah Theological Seminary, Wisconsin, in 1884. Ordained to the priesthood in the last-named year he was rector of Eau Claire, Wis., 1884-88; of Waukesha, Wis., 1888-90 and of Stevens Point, Wis., 1890-1900. He was consecrated bishop-coadjutor of Fond du Lac 8 Nov. 1900, the somewhat spectacular ceremonial practised on this occa-

sion calling forth more or less criticism; and succeeded as bishop 30 Aug. 1912.

WELLES, welz, Gideon, American states¬ man : b. Glastonbury, Conn., 1 July 1802, d. Hart¬ ford, Conn., 11 Feb. 1878. He studied at Nor¬ wich University, Vermont, but did not complete the course there, and for a time turned his attention to the study of law. In 1826, how¬ ever, he entered journalism as editor of the Hartford Times, which under his management became one of the leading Democratic papers of the State. He was one of the first publicly to advocate Andrew Jackson's election to the Presidency, and always warmly supported him. In 1827-35 he was a member of the Connecticut legislature, and both as legislator and editor advocated the abolition of imprisonment for debt, opposed the practice of special legisla¬ tion and succeeded in obtaining the passage of general laws for the incorporation of business corporations. In 1836 he resigned the editor¬ ship of the Times, but continued to write for that paper. In 1835, 1842 and 1843 he was chosen State comptroller; in 1836-41 he was postmaster of Hartford ; and in 1846 was ap¬ pointed chief of the bureau of provisions and clothing in the Navy Department, which office he held till 1849. He had always been opposed to the extension of slave territory, and on the organization of the Republican party in 1855 became identified with it, and was Republican candidate for governor of Connecticut in 1856; and a member of the national committee. In 1861 he was appointed Secretary of the Navy, and conducted the affairs of his department with marked executive ability throughout the Civil War;

he continued in office under President Johnson till 1869. He was later affiliated with the Liberal Republicans, and in 1876 was a supporter of Tilden. He wrote (Lincoln and Seward > (1874). Consult (Diary of Gideon Welles) (New York 1911).

WELLESLEY, welz'li, Arthur. See Wel¬ lington, Arthur Wellesley, Duke of.

WELLESLEY, Richard Colley, Viscount

and Marquis, British statesman: b. Dublin, 20 June 1760; d. London, 26 Sept. 1842. He was educated at Oxford, and on his majority took his seat as Earl of Mornington in the Irish House of Peers. Three years after he was re¬ turned to the British House of Commons as member for Beeralston, and afterward sat for Windsor (1787-96), and for Old Sarum (1795-97). He was appointed governor-general of India in 1797, and in 1799 created Marquis Wellesley in the Irish peerage. His administra¬ tion was notable, both for its ability and the large accessions of territory made under it by the conquest of Mysore and the humbling of the Mahrattas. In 1809 he became Foreign Secre¬ tary under Mr. Perceval. In 1812 he resigned his place chiefly because he was in favor of Catholic emancipation, and did not return to office till 1821, when he became lord-lieutenant of Ireland. This post he retained till 1825, when he was removed from it by his brother, the Duke of Wellington, who was an opponent of emancipation and had become Prime Min¬ ister. In the Grey ministry he held the office of lord-steward till 1833, when he again became lord-lieutenant of Ireland. Displaced in the following year by the Peel ministry, he after¬

ward held the office of lord-chamberlain for a few months of 1835. Consult Martin, (Indian Despatches, Minutes, and Correspondence of the Marquis Wellesley) (1836-37), and biog¬ raphies by Torrens (1880), Malleson (1889) and Hutton (1893).

WELLESLEY, Mass., town in Norfolk County, on the Boston and Albany Railroad, 14 miles west of Boston. It was incorporated as a town in 1881, and includes the villages of Wellesley, Wellesley Hills and Wellesley Farms. It is principally a residential town, with many broad streets and handsome resi¬ dences. It is the seat of Wellesley College (q.v.), and also of Dana Hall, a secondary school for girls; Wellesley School and Rock Ridge Hall, secondary schools for boys; and two Roman Catholic academies, the Academy of the Assumption for girls and Saint Joseph's Academy for boys. There is also a public

high school at Wellesley Hills, founded in 1865, and a public library of about 20,000 volumes. There is a weekly newspaper and three college, publications. The government is vested in the town-meeting and the selectmen, chosen annually. The waterworks are owned and operated by the town. Pop. (1920) 6,224.

WELLESLEY COLLEGE, a college for women located at Wellesley, Mass. It was founded by Henry F. Durant to give (<to young women opportunities for education equivalent to those usually provided in colleges for young men.® The charter was obtained in 1870, and the college first opened to students in 1875. It is non-sectarian in control; three representatives of the alumnae serve on the board of trustees. In 1894 the system of elective courses was established which with some recent modifications is still in force. The college confers one baccalaureate degree, A.B., and the graduate degree, A.M. Certain courses are required in mathematics, philosophy, hygiene, Bible history, English, some foreign languages and natural sciences ; in addition to the required studies every candidate for the degree must take a sufficient amount of elective work to complete the equivalent of 59 one-hour courses, a one-hour course being a course given once a week for one year. Of these electives 18 one-hour courses must be taken in one of the following ways : 9 in each of two subjects, related or unrelated; 12 in one subject with six in a tributary subject. Pedagogical courses are offered in the history and science of education and in methods of teaching; art and music are included in the curriculum ; the courses in history and theory in both departments count toward the degree ; studio work in art counts toward the degree after one course in history is completed; the regular practical work in music does not count toward a degree. A full course in music lead¬ ing to the certificate of the department may be taken by candidates for the A.B. degree who remain at the college five years. The college contributes toward the support of the Ameri¬ can School of Classical Studies in Athens, the American School of Classical Studies in Rome, the Marine Biological Laboratory at Wood's Holl and the women's table at the Zoological Station at Naples. There are 61 scholarships for undergraduates and one graduate fellow-180

ship. The students maintain literary and dramatic societies. The campus has a particu¬ larly beautiful situation within the limits of the

town ; it includes a lake which affords ex¬ cellent opportunity for rowing and skating; on this lake is held the annual ˆFloat.® The buildings include the Farmsworth Art Build¬ ing, Whitin Observatory, Houghton Memorial Chapel Library, Billings Hall for Music, Mary Hemenway Hall for Physical Training, a President's House, Simpson Infirmary, Page Memorial Kindergarten, Guest House and 16 halls of residence; also temporary buildings for administrative, lecture and laboratory purposes, pending the completion of a liberal arts building now under construction and other members of proposed academic group. Productive funds equal $2,783,969.83; special building and equipment funds, $953,677.84. The library contains 87,000 volumes, including the Gertrude Memorial Library, the Library of American Linguistics and other special and departmental libraries. The students in 1918 numbered 1,600 and the faculty 137 ; about 42 per cent of the graduates have become teachers.

WELLESLEY ISLANDS, Australia, in Gulf of Carpentaria, are politically attached to Queensland. Mornington, the northernmost and largest island, is 40 miles long by 15 miles broad.

WELLHAUSEN, vel'how-zen, Julius, Ger¬ man Orientalist and Biblical scholar: b. Hameln, Hanover, 17 May 1844. He studied theology in the University of Gottingen, in 1872 was appointed professor of theology in Greifswald University, but resigned in 1882 be¬ cause he could no longer hold the accepted views of Scriptural inspiration. He went to Halle as extraordinary professor of Oriental languages and in 1885 was appointed to an ordinary professorship at Marburg, whence in 1892 he removed to Gottingen to occupy a similar post. In 1871 he published a text-critical work on the books of Samuel, and in 1874 appeared his treatise (Die Pharisaer und die SadducaerP The first volume of a (Geschichte Israels > was issued in 1878 and a second edition of it in 1883, under the title, (Prolegomena zur Geschichte Israels> (5th ed., 1899). The (Prolegomena) was translated into English in 1885 by Black and Menzies, with a preface by W. Robertson Smith, the volume containing also a reprint of his article UsraeP contributed to the (Encyclopaedia Britannica) (9th edition). The last-mentioned article was published separately in 1881 as a (Sketch of the History of Israel and Judah) (3d ed., 1891), and included in a German form, as an (Abriss der Geschichte Israels und Judas, > in the 1st volume of his (Skizzen und Vorarbeiten> (1884-92). The <Abriss) was amplified to form a work on Usraelitische und Jiidische Geschichte) (1894; 4th ed. 1901). His masterly treatise on (Die Composition des Hexateuchs und der Historischen Bucher des Alten Testa-ments) (1885; 3d ed. 1899) originally appeared in the (Jahrbiicher fiir Deutsche Theologie> (1876-77). Later works are

(Muhammed in Medina) (1882)i; (Der Arabische Josippus) (1897) ; (Reste Arabischen Heidentums> (2d ed. 1897), first published in the (Skizzen und Vorarbeiten) ; (Die Kleinen Propheten iiber-setzt, mit Noten> (1892 ; 3d ed. 1898); dif¬ ferent books on the evangelists ((Mark) 1903) ; (Matthew) (1904); (Luke> (1904) ; <John> (1908) ; and (Einleitung in die drei ersten Evangelien) (1905) ; 2d ed. 1911).

WELLING, James Clarke, American edu¬ cator: b. Trenton, N. J., 14 July 1825; d. Hart¬ ford, Conn., 4 Sept. 1894. He was graduated from Princeton in 1844, was appointed associate principal in the New York Collegiate School in 1848 and in 1856-65 was literary editor of the Washington National Intelligencer. He was clerk of the United States Court of Claims in 1862-67, in 1867-70 was president of Saint John's College, Annapolis, Md. ; occupied the chair of belles-lettres at Princeton in 1870-71 ; and in 1871-94 was president of Columbian University, Washington, D. C. He was a regent of the Smithsonian Institution, president of the Corcoran Gallery of Art and also of the Philosophical and the Anthropological Societies of Washington.

WELLINGTON, Arthur Mellen, Ameri¬ can civil engineer: b. Waltham, Mass., 20 Dec. 1847 ; d. New York, 16 Alay 1895. De¬ fective eyesight prevented his entering a uni¬ versity but he studied civil engineering under Prof. J. B. Henck in Boston. He was later associated with the laying out of Prospect Park, Brooklyn, and from 1868 was a railroad engineer. In 1881-84 he was chief engineer of the Mexican National and the Mexican Cen¬ tral railroads. He was the author of the plan for multiplying the traffic facilities of Brooklyn Bridge by five times, recommended by the Board of Experts in 1887. In 1884-B7 he was and editor of the Railroad Gazette ; and from 1887 until his death he was one of the editors and owners of the Engineering News. He was also active as a consulting engineer in many important public works, among them the plans for the Boston Subway and the abolition of grade crossings in Buffalo. Author of Com¬ putations from Diagrams of Railway Earth¬ works^ (1878); (Field Work of ' Railway Location and Laying out of Works J (1889).

WELLINGTON, Arthur Wellesley, Duke of, British soldier and statesman: b. 1769; d. Walmer Castle, England, 14 Sept. 1852. He was the fourth son of the 1st Earl of Mornington. His mother was the eldest daughter of the 1st Viscount Dungannan. He was edu¬ cated at Eton, privately at Brussels, and finally at the Military College of Angers. On 7 March 1787 he received a commission as ensign in the 73d Foot. He was gazetted under the name of Wesley, the family name till changed by his brother to Wellesley. After a rapid series of changes and promotions he attained by purchase in September 1793 the

command as lieutenant-colonel of the 33d regiment in which he had attained his majority in April of the same year. In 1790 he was returned to the Irish Parliament for the family borough of Trim, in the county of Meath. In May 1794 he sailed with his regiment for Flanders to join the army of the Duke of York. In 1796 he joined his regiment at the Cape, arrived at Calcutta in February 1797, and was attached to the Bengal service. Later the 33d regiment was attached to the Nizam's contingent in the Deccan with Wellesley in command. The army

entered Mysore in March 1799. An engage¬ ment took place at Mallavelly on the 27th, in which Wellesley, who commanded the left wing, turned the right of the enemy. He was subsequently employed to dislodge the enemy from their posts in front of Seringapatam and after the capture of that capital was ap¬ pointed July 1799, to its command. During his administration he was compelled to take up arms against Dhundiah Waugh, a robber chief, who styled himself <(King of the Two Worlds? Wellesley overtook and routed him with a small body of cavalry 10 Sept. 1800. In April 1802 Wellesley attained the rank of major-general. Early in 1803 he was appointed to the com¬ mand of a force destined to restore the Peishwa of the Mahrattas, driven from his capital by Holkar. This operation successfully performed, the other Mahratta chiefs, Scindia and the Raja of Berar, showed hostile designs against the British and Wellesley was ap¬ pointed to the chief military and political com¬ mand in the operations against them. After an active campaign, in which he took Ahmednagar and Arungabad, he encountered a powerful Mahratta army, assisted by French officers, at Assaye (23 September) and en¬ tirely defeated it. The parallel successes of General Lake, and the defeat of the Raja of Berar by Wellesley at Argaum on 29 Novem¬ ber, compelled the submission of the Mahrattas and peace was restored on conditions drawn up by the successful general. The fame of Wellesley's achievements had now spread over India. Before leaving Madras he received his appointment as K.C.B., and the thanks of both houses of Parliament. He sailed for England on 10 March 1805 and

arrived in September.

On 10 April 1806 Wellesley married Lady Catherine Pakenham, third daughter of the Earl of Longford. He had previously been elected and distinguished himself in the House of Commons by the defense of his brother's administration in India. In April 1807 he was appointed chief secretary for Ireland and in August received the command of the reserve in the expedition to Copenhagen under Lord Cathcart and Admiral Gambier. He took Kioge 29 April, the only land operation of importance. On returning he resumed his duties as secretary and received the thanks of Parliament for his share in the expedition. On 25 April 1808 he attained the rank of lieutenant-general.

In June, Wellesley received the command of a force destined to operate in the north of Spain and Portugal in aid* of the revolt against Napoleon. On 30 July he anchored in Mondego Bay, and landed his troops at Figueira. The English began their southward march on 8 August. Wellesley moved on the coast road to Torres Vedras. At Roliˆa he en¬ countered about 5,000 men under Delaborde, whom Junot had sent in advance to arrest his progress. This corps, after a spirited re¬ sistance, was driven back and retired to Torres Vedras. Wellesley now drew nearer the coast, reaching Vimeiro on the 19th, where he was reinforced by two brigades from Eng¬ land, raising his force to 17,000. At the same time he was superseded in the command. The government had determined to increase their

army in the Peninsula, and had appointed Sir Hew Dalrymple to the chief command, with Sir Harry Burrard as second and Wellesley, Moore, Hope, Paget and Fraser as divisional commanders. Junot determined to attack the English on the land side while they were in the immediate neighborhood of the sea. The at¬ tack was made on 21 August and Junot was beaten. After the battle Junot proposed an armistice, the result of which was the famous Convention of Cintra, by which the French agreed to evacuate Portugal on condition of being conveyed to France with their arms and baggage. Public feeling in England over the excessive liberality of the terms ran so high that the generals were recalled to be examined by a board of inquiry, but their conduct was approved of and commended. Wellesley pro¬ ceeded to Ireland in December as chief secre¬ tary, and early in 1809 received the thanks of both houses of Parliament for his conduct of the campaign.

In the latter part of 1808 Napoleon overran Spain with 200,000 men,

and Sir John Moore, pursued by Soult, carried the British army to Coruna, where it embarked for England. Lis¬ bon was still held by Sir John Cradock and a British force occupied Cadiz, when Wellesley was appointed to assume the chief command in the Peninsula. He arrived at Lisbon 22 April 1809. He advanced againt Soult at Oporto and the French were thrown into con¬ fusion and retreated precipitately. Soult now retired to Galicia, followed by Wellesley to the frontiers of Portugal and harassed by the insurgent Portuguese. The Peninsula was at this time occupied by about 250,000 French troops; but after the departure of Napoleon the independence or insubordination of the French marshals prevented effective coopera¬ tion of the different armies, and the French command never extended beyond the districts occupied by their armies. The British com¬ mander had a series of difficulties to contend with. First was the smallness of the armies on which he could rely. The numbers of the British were always comparatively insignificant and reinforcements were slowly and scantily supplied. Almost as formidable was the diffi¬ culty of co-operating with his allies. Spain and Portugal were without regular governments. The Portuguese officers had mostly fled to Brazil, but the Portuguese troops, carefully drilled by Beresford and placed under the com¬ mand of British officers, soon became a tract¬ able and efficient force. It was far otherwise with the Spaniards. The junta and the gen¬ erals were alike ignorant, incompetent and self-conceited and with the raw levies which constituted the Spanish armies it was positively dangerous to co-operate. Even with the Portu¬ guese government, Wellington (as he must now be called) had natural but formidable difficul¬ ties to contend with. The subsistence of the armies was a constant source of danger and embarrassment both in Spain and Portugal. The resources of the country were oppressed by the armies of three nations. The French took all they wanted and wasted much more. The Spanish armies, numerous and inefficient, were a sufficient weight for the junta, which always supplied with reluctance the wants of the British who had commonly much greater

difficulty in procuring provisions for money than either of the other

armies had in seizing them. Through all these difficulties Wellington adhered with undeviating patience and con¬ stancy to the strict principles of discipline he had laid down. He remonstrated with hercu¬ lean labor, and with admirable spirit, as his dispatches show, with authorities of all kinds; but he never under the great temptation took, or suffered others to take, violent means to supply his most pressing wants.

By a misunderstanding between Soult, who held the command in the north of Spain, and Ney, who was under him, Galicia was evacu¬ ated by both marshals and never afterward re¬ covered, a valuable result of Wellesley's first campaign. To co-operate with the Spanish armies, Wellesley had determined to advance into Spain, which he did in July by the north of the Tagus. Nearly every important fortress in Spain was in the hands of the French.

The victory of Talavera, 27-28 July, earned Wellesley the titles of Baron Donro and Vis¬ count Wellington. Next day the French re¬ treated across the Alberche and broke up their army. The first invasion of Spain had resulted in nothing but a series of movements among the French troops. Wellington at this time surveyed the lines of Torres Vedras and formed his plan of fortifications for their defense. Anticipating that invasion would come from the north, he left General Hill to guard the Tagus and fixed his headquarters at Viseu.

The French in the meantime were largely reinforced. Soult was in Andalusia with 60,000 men threatening the south of Portugal, while in the north the army of Portugal was concentrat¬ ing to the extent of 70,000 to 80,000, and the veteran Massena was appointed to command it. Wellington was able to bring into the field from 50,000 to 60,000 British and Portuguese troops. The French invested the Spanish fortress of Ciudad Rodrigo early in June and took it on 10 July. They then advanced to the Coa, from which the British retired. Almeida was cap¬ tured on 27 August. Wellington fell back on the valley of the Mondego. In the middle of September, Massena began his march down the right bank of the river. At the Sierra de Bu-saco, a high ridge in front of Coimbra, Welling¬ ton made a stand and repulsed the French. After the battle, Massena turned Wellington's position, who retreated to Leiria, where he halted two days. On 8 October he entered his lines, just as the autumnal rains were beginning to fall. A powerful fleet and a flotilla of gun¬ boats on the Tagus contributed to their defense. Massena was wholly unprepared for his recep¬ tion and after some vain demonstrations he retired from their front. The Portuguese parties had cut off his communications with Spain and sickness was rapidly diminishing his num¬ bers. On 15

November he fell back to San-tarem.

Napoleon recommended to waste the English with continual engagements of advanced guards and sent Soult instructions to co-operate with Massena. But Soult, with the blockade of Cadiz and with the Spaniards on his hands, could ony spare a sufficient force to besiege Badajoz. In March 1811 Massena was com¬ pelled to begin his retreat, which he conducted with great skill. The French crossed ‘ the Agueda on 6 April. Wellington estimated their

loss in the campaign at not less than 45,000. Wellington blockaded Almeida and cantoning his army between the Coa and the Agueda, re¬ turned to Badajoz, which had been taken by Soult and invested by Beresford. He was speedily recalled by an aggressive movement of Massena to relieve Almeida. Wellington took up a position to cover the fortress at Fuentes de Onoro, where he was attacked by Massena with a superior force. In this battle he performed the exceedingly critical operation of changing his front in presence of the enemy. The manceuver was successful and Massena was repulsed. Almeida surrendered a few days after the battle and Massena was about the same time superseded by Marmont. Soult in the meantime had been defeated by Beresford at Albuera in an attempt to relieve Badajoz. Wellington returned to prosecute the siege and Marmont also moved south to join Soult, but afterward returned to Salamanca. This induced Wellington to push the siege of Ciudad Rodrigo in preference to that of Badajoz and he re¬ turned to the Agueda. Marmont, however, ad¬ vanced with a superior force and he withdrew to the Coa. Marmont returned to Salamancas.

During the winter Wellington continued to occupy himself with preparations for this siege, collecting his stores at Almeida under pretext of repairing it. On 6 Jan. 1812, he moved his headquarters to Gallegos, invested Ciudad Rod¬ rigo on the 8th and took it iby assault on the 12th. An earldom, a pension and a Spanish dukedom awarded this achievement. Welling¬ ton now went south with his principal force to take Badajoz; and Marmont, who had collected his forces to raise the siege of Ciudad Rodrigo, invaded Portugal by Sabugal and ravaged the country. Badajoz was taken on 6 April, with a heavy loss. Having secured the frontier for¬ tresses, Wellington determined again to invade Spain. Leaving Hill on the southern frontier he moved north with his main army and on 17 June reached Salamanca, Marmont retiring to Toro. The French general, when he had con¬ centrated his forces, attempted by a series of pretentious manoeuvres to surprise the

British commander, his ultimate object being to cut him off from his communications. With this pur¬ pose he crossed the Tormes, followed by Well¬ ington, who took up his position between the river and two hills called the Arapiles. Here Marmont's overdisplay of tactics recoiled on himself. Having gained the outer Arapile, in extending his left to attack the British right, he gave Wellington the opportunity he had long desired of attacking him. Marmont was wounded and the French left and centre broken. Clausel, who attempted to re-form the army, was routed. Numerous prisoners were taken by the cavalry in pursuit and the French retired to Burgos. Wellington reached Valladolid on 31 July and turning on Joseph, who had ad¬ vanced to support Marmont, followed him to Madrid, which he entered on 12 August. Hill was now advancing to join Wellington and Joseph fell back from Toledo to Almansa in Murcia. These successes compelled Soult to abandon Andalusia and an Anglo-Spanish force from Cadiz took Seville. Wellington's next movement was against the army he had defeated under Clausel, which had been largely rein¬ forced. He left Hill in Madrid (1 September) and advanced to Burgos, being joined on his

way by a body of Spaniards. The French re- \xrn-eavinF a garrison in the castle, which Wellington deemed it necessary to take before advancing. L he siege, for want of proper artillery, occupied him till 21 October, in the meantime the northern army under Souham was again advancing and Soult with a powerful army marching on Madrid, which Hill had aban¬ doned to fall back on Salamanca. Wellington abandoned the siege and retreated, closely fol¬ lowed by the French, .who repeatedly attacked his rear. At Palencia he was joined by a brigade from England. At Tudela, Souham halted to wait for Soult and Wellington pro¬ ceeded to the Tormes, where he was joined by Hill, and when the French crossed the Tormes in force he took up his old position at the Arapiles. The united armies of Soult and Sou¬ ham amounted to nearly 90,000 men. Welling¬ ton's strength was over 50,000. The enemy, in¬ stead of attacking, threatened his communi¬ cations, upon which he retreated to the Agueda and established his

headquarters at Ciudad Rodrigo. The French, not being prepared to invade Portugal, withdrew their armies to cantonments in Castile. General Hill's corps continued to occupy Estremadura and the rest of the British were cantoned on the Portuguese frontier.

The gains of this campaign were substantial. The French had not only been compelled to re¬ inforce their Spanish armies largely at the ex¬ pense of their operations elsewhere, but had lost Andalusia and given the British a footing in Estremadura. Wellington received (18 Au¬ gust) the title of marquis and Parliament voted him thanks and £100,000. The failure of the Russian campaign compelled Napoleon to recall Soult from Spain and Wellington was able to open the campaign of 1813 with a force of 70,000 British and Portuguese. He had also been appointed commander-in-chief of the Spanish armies. He opened the campaign in May by an advance in the former direction and on 12 June reached Burgos, the French retreating to the Ebro. Wellington turned their position by crossing the Ebro near its source and after some unsuccessful fighting they fell back on Vittoria. In a strong position commanding the principal roads through the town they were defeated by the British on 21 June. Being driven from the town, while the British left had seized the Bay¬ onne road, by which they retreated, they were thrown into confusion and routed. Wellington now occupied the passes of the Pyrenees and besieged Pampeluna and San Sebastian. He was created field-marshal and received the Spanish title of Duke of Vittoria. Soult was dispatched by Napoleon, with the title of lieutenant of the emperor, to restore matters in the Peninsula. He had still a powerful army (80,000), but after a series of engagements, called the battles of the Pyrenees, he retreated into France. Some time being spent in pushing the sieges of Pampeluna and San Sebastian, the former of which sur¬ rendered 31 August, the latter 31 October, Well¬ ington crossed the Bidassoa in October and in November the whole army descended from the Pyrenees into the French plains. Some severe fighting occurred before the armies went into winter cantonments. On 27 February Welling¬ ton defeated Soult at Orthez and the French retreated to Toulouse. Suchet had abandoned Catalonia and reached Narbonne. Another en¬

gagement took place in front of Toulouse on 10 April, in which the French after severe fighting were driven into the town. Next day, Soult evacuated Toulouse and Wellington entered it on the 12th. In the afternoon news arrived of Napoleon's abdication, but Soult declined to submit to the provisional government without futfher advice and Wellington refused an armistice. Advices having arrived from Berthier,

Soult entered into a convention on 18 and Suchet on 19 April. In a sortie of the garrison of Bayonne, before the peace was known, the British suffered severely. On 30 April Welling¬ ton, leaving his army in quarters, set out for Paris. In May he had to visit Madrid to allay political differences among the Spanish generals and on 14 June he issued farewell orders to his army. He was created Marquis of Douro and Duke of Wellington in May, with an annuity of £13,000, commutable for £300,000, afterward £400,000. He received the thanks of both houses of Parliament. In July he went as Ambassador to France and he succeeded Lord Castlereagh as British representative in the Congress of Vi¬ enna. In April he took the command of the army assembled in the Netherlands to oppose Napoleon. (See France; Napoleon I; Water¬ loo). On his return to England after the resto¬ ration of peace he received a vote of £200,000 for the purchase of the estate of Strathfieldsaye, to be held on presenting a colored flag at Wind¬ sor on 18 June each year. Numerous foreign honors were showered upon him ; among others he was made field-marshal of the armies of France, Russia, Austria and Prussia.

With the return of peace he resumed the career of politics. He accepted the post of Master-General of the Ordnance with a seat in the Cabinet of Lord Liverpool in January 1819. In 1822 he represented Great Britain in the Congress of Vienna. In 1826 he was appointed high-constable of the Tower and went to Saint Petersburgh as Ambassador on the affairs of Greece. On 22 Jan. 1827 he succeeded the Duke of York as commander-in-chief of the forces. On the accession of Canning to office (April 1828) he set the bad example of resigning this post on political grounds. He resumed it again on the accession of Lord Goderich. On 8 Jan. 1828 he accepted the premiership and, resigning the command of the forces, gave it to Lord Hill. During his first year of office he carried the repeal of the Test and Corporation Acts. In January 1829 he was appointed governor of Dover Castle and lord warden of the Cinque Ports. This year he carried the Catholic Eman¬ cipation Bill. Both this and the repeal of tests were reforms which he had steadfastly opposed and which he yielded to necessity rather than conviction. He fought a duel in defense of his conduct on this bill with Lord Winchilsea on 21 March. In 1830 repeated motions for parlia¬ mentary reform were defeated, but the growing discontent throughout the country on this sub¬ ject and a defeat in Parliament caused the resig¬ nation of the government in November. His op¬ position to reform made the duke so unpopular that he was assaulted by a mob on 18 June 1832 and his life endangered. He accepted the office of Foreign Secretary under Sir Robert Peel, 9 Dec. 1834, and retired with him, 8 April 1835. In the

Peel ministry in 1841 he took a seat in the Cabinet without office. On 10 Dec. 1842, on the death of Lord Hill, he resumed the

command of the forces, which he held till his death. On the return of Peel to office in 1846 he supported him in carrying the repeal of the corn-laws, which up till then he had opposed. From this time his general policy in Parliament was to support the government of the day.

Bibliography. — (Wellington's Despatches,

1 779— 1815, } edited by Colonel Gurwood (1834-39) ; Supplementary Despatches and Memo¬ randa, 1794-1818,) edited by Wellington's son (1858-72) ; <Civil and Political Despatches, 1819-32,) edited by Wellington's son (1869-80) ; Speeches in Parliament, > edited by Gurwood (1854); the <Lives) by Brialmont (1856-57); Gleig (1858-60); Hamley (1860); Browne (1888), composed of extracts from the records; Hooper (1889) ; Maxwell (1899) ; and those of Wright and Yonge. Consult also Griffiths, (Wellington and Waterloo) ; Napier, (History of the Peninsular War} ; Ropes, (Campaign of Waterloo* ; Oman, (History of the Peninsular War* (1902); and Roberts, (Rise of Welling¬ ton (1895); Robinson, C. W., Wellington's Campaigns* (London 1908) ; Fitchett, W. H., (The Great Duke*, (New York 1912). See also India; Peninsular War; Spain.

WELLINGTON, Chile, an island off the west coast of Magallanes Territory, 138 miles long and 35 miles wide. Its northernmost ex¬ tremity is Cape San Roman.

WELLINGTON, Kan., city and county-seat of Sumner County, situated in the south central part of the State, near the southern boundary, on Slate Creek and on the Atchison, Topeka and Santa Fe, the Southern Kansas and the Chicago, Rock Island and Pacific railroads. It was first settled in 1871 ; and became a city of the third class in 1876 and a city of the sec¬ ond class in 1880. It is situated in an agri¬ cultural region and carries on an important ex¬ port trade in grain and other

agricultural prod¬ ucts ; it contains grain elevators, three flouring mills, plow works, an ice factory and the shops of the Atchison, Topeka and Santa Fe Railroad. There are three banks and a daily and three weekly newspapers. It is the seat of the Sum¬ ner County High School. The city government is vested in a mayor and a council of 10 mem¬ bers, half of whom are elected each year ; the city owns the waterworks and the electric-light plant. Pop. (1920) 7,028.

WELLINGTON, New Zealand, (1) The capital city of New Zealand and also the pro¬ vincial district of Wellington, situated on Lamb-ton Harbor, on the southwest of Port Nichol¬ son, an inlet of Cook Strait, about 1,200 miles southeast of Sydney in Australia. Its fine harbor is the safest and most commodious in New Zealand. It receives most of the direct sea trade of New Zealand. The principal build¬ ings and institutions are government house, a fine building in Italian style, said to be the larg¬ est wooden structure in the Southern Hemi¬ sphere; the houses of legislature (the parlia¬ mentary library building was destroyed by fire 10 Dec. 1907) ; the government building; Su¬ preme Court edifice ; Anglican, Roman Catholic, Wesleyan, Primitive Methodist, Presbyterian, Congregational and other churches; a free pub¬ lic library; Wellington College, a girls' high school, Saint Patrick's College (R.C.), a tech¬ nical school and other similar educational in¬ stitutions; Victoria University College, affili¬

ated to the University of New Zealand; a gen¬ eral hospital ; a lunatic asylum ; the Boys' In¬ stitute; and the botanical gardens. The city is lighted by electricity and has a good water supply and its streets are traversed by electric tramways. The chief industrial establishments are tanneries, candle and soap works, coffee-mills, boot factories, biscuit works, foundries, brickworks, sawmills, woolen-mills, breweries and meat-packing establishments. The town has a harbor that has been improved and fortified. Unlike most New Zealand towns, this one is built of wood, owing to the volcanic nature of its site, where several earthquakes have already occurred. The foreign trade increases steadily, being double in 1912 the figure of 1908 and nearly 70 per cent greater in 1916 than in 1912. The 1916 total was $84,000,000. The population has grown from 69,000 in 1909 to 97,000 in 1919. (2) A provincial district in the south of North Island; area, 10,807 square miles. Its coast is but little indented, the principal openings being Palliser Bay and Port Nicholson in the south. It is traversed throughout almost its whole length by a range of mountains, averaging about 4,000 feet in height. Parallel to this main range and nearer the east coast there is a series of lower ranges and between

these two chief mountain systems extends the broad Wairarapa Plain, merging northward into an undulating country. A considerable extent of fairly level country, increasing in breadth northward, is also found along the west coast. The district is well-watered by several rivers and in the south are Lakes Wairarapa and Onoke. Wellington is well-wooded and timber is one of its chief exports. Much of the surface is admirably adapted for pastoral purposes and there are in the district several million sheep, in addition to large numbers of cattle and horses. Agriculture is also successfully carried on in several parts, the principal crops being oats, wheat, potatoes and turnips. The number of cheese and butter factories is steadily increasing. Little mineral wealth has been found in the district of Well¬ ington, but some gold has been worked. Rail¬ ways run from Wellington to Napier and New Plymouth. Pop. 232,114.

WELLINGTON, Ohio, village in Lorain County, on the Wheeling and Lake Erie, the Cleveland, Cincinnati, Chicago and Saint Louis and other railroads, about 35 miles southwest of Cleveland. It is the commercial centre of a farm and dairy section. It is noted for its large annual shipments of cheese. It has flour mills, lumber mills, a foundry and in the vicinity are a number of butter and cheese factories. There are two banks and a newspaper. Pop.

(1920) 2,245.

WELLMAN, Walter, American journalist

and explorer: b. Mentor, Ohio, 3 Nov. 1858. He obtained a secondary education in Michigan in 1879, established the Evening Post of Cin¬ cinnati and from 1884 was political and Wash¬ ington correspondent of the Chicago Herald and Record-Herald. In 1892, after investiga¬ tion of the subject, he located the landing place of Columbus in the New World on Watling Island (San Salvador) in the Bahamas and built a monument on the spot as he had deter¬ mined it. He led an expedition to the Arctic regions in 1894, reaching lat. 81°, northeast of Spitzbergen, and in 1898-99 a second expedition,

reacning lat. 82° and discovering many islands. He wintered in Franz Josef Land and in the spring of 1899 made an unsuccessful dash for the pole. In May 1899, a party directed by E. EL Baldwin (q.v.), a member of the expe¬ dition, discovered Graham Bell Land. In 1910 he undertook to cross the Atlantic Ocean in a balloon, starting from Atlantic City, N. J. A long sausage-like sea-anchor was trailed from the balloon to the water but proved an unsatisfactory device. After traveling 1,010 miles and breaking what was then the world's record, Wellman and his companions were picked up by the steamship Trent, 375 miles east of Cape Hatteras. His writings include an expose of Dr. Cook's claim to polar discovery and many magazine articles.

WELLS, Amos Russel, American editor and author: b. 23 Dec. 1862 at Glens Falls, N. Y. He graduated at Antioch College in 1883. He was professor of Greek and geology at Antioch College 1883-91 and from 1891 edi¬ tor of the Christian Endeavor World, Boston. From 1901 he was associate author of (Pelou-bet's Notes on the Sunday School Lessons.' He is a member of the International Sunday-School Lesson Committee. Lie is a voluminous author, no less than 63 titles being credited to his pen. They include books dealing with young people's work, the Sunday school, juve¬ nile fiction, poetry and devotional literature.

WELLS, Benjamin Willis, American jour¬ nalist and author: b. Walpole, Cheshire County, N. H., 31 Jan. 1856. He was graduated from Harvard in 1877, studied also at Berlin, was a Fellow of the Johns Hopkins University, in 1891-98 he was professor of modern languages in the University of the South (Sewanee, Franklin County, Tenn.) and from 1899 to 1912 he was a member of the staff of The Church¬ man (New York). His chief publications are (Modern German Literature) (1895) ; (Modern French Literature) (1897); and (A Century of French Fiction ' (1898), historical and critical studies. He also edited numerous German and French texts, contributed largely to encyclo¬ pedias and periodicals, and edited (with W. P. Trent) (Colonial Prose and Poetry) (1902), an anthology.

WELLS, Carolyn, American humorous writer: b. Rahway, N. J., about 1873. She took up literary work in 1895, and her many publica¬ tions, which are chiefly for juvenile readers, in¬ clude (At the Sign of the Sphinx' (1896) ; (The Story of Betty' (1899) ; (Folly in Fairyland) (1901) ; (Eight Girls and a Dog) (1902) ; (The Pete and Polly Stories) (1902) ; (Rainy Day Diversions' (1907); (The Clue' (1909); <The Lovers' Baedecker' (1912) ; (The Maxwell Mystery' (1913) ; (Anybody

but Anne' (1914) ; <Bride of a Moment' (1916) ; (Faulkner's Folly' (1917) ; <The Room with the Tassels'

(1918).

WELLS, Charles Jeremiah, English poet: b. probably London, about 1799; d. Marseilles, France, 17 Feb. 1879. He was a schoolfellow of a younger brother of the poet John Keats, and was the subject of a sonnet by the poet; later, however, he lost his friendship, as well as that of Haslitt. He wrote extensively but not successfully, and upon his wife's death he destroyed most of his work. He was for a

time a solicitor in London, but retired to Wales about 1830, removed to Elertfordshire in 1835, and after 1840 lived abroad. Of his work there remains a volume of prose (Stories After Na¬ ture' (1822; reprinted 1891); and the Biblical drama, (Joseph and His Brethren' (1824). The drama met with little favor until it came to the notice of Rossetti in 1863 and was warmly praised by him, a judgment later confirmed by Swinburne. It was reprinted in 1876 and brought a considerable meed of praise to the author in his last years.

WELLS, David Ames, American political economist: b. Springfield, Mass., 17 June 1828; d. Norwich, Conn., 5 Nov. 1898. He was grad¬ uated from Williams College in 1847, and from the Lawrence Scientific School in 1851, but be¬ fore entering the latter institution had been assistant editor of the Springfield Republican, and was one of the promoters of the invention of a mechanism for folding books and news¬ papers in connection with the printing press. In 1851 he was appointed assistant professor at the Lawrence Scientific School, and was also lecturer on chemistry and physics at Groton Academy; during this earlier period of his life he published several textbooks on the natural sciences. He first attained reputation as a polit¬ ical economist by an address on (Our Burden and Our Strength,' read before a literary so¬ ciety of Troy in 1864; it discussed the resources of the United States in regard to the nation's debt-paying ability, and attracted the attention of the President, who summoned him to a con¬ ference in regard to the national finances. This resulted in the creation of a commission of three for the investigation of questions of taxation and revenue, of which commission Wells was chairman. In this capacity he was the first to collect economic and financial statistics for gov¬ ernment use. In 1866 he was appointed to the office of special

commissioner of revenue, was instrumental in abolishing the many petty taxes which had been imposed during the war, and originated most of the important forms and methods of internal revenue taxation adopted from 1866 to 1870. In the latter year the office which he held was abolished. He had at first been an advocate of the protectionist policy, but after a visit to Europe and a careful study of the English system, he changed his views, and advocated the system of free trade. In 1876 he was an unsuccessful candidate for Congress on the Democratic ticket. He published (Our Burden and Our Strength' (1864) ; (The Creed of the Free Trader' (1875) ; (Why We Trade and How We Trade' (1878) ; (The Silver Question or the Dollar of the Fathers vs. the Dollar of the Sons' (1878) ; (Our Merchant Marine ; How it Rose, Increased, became Great, Declined and Decayed' (1882); (A Primer of Tariff Reform' (1884) ; Practical Economics' (1885) ; (Relation of Tariff to Wages' (1888) ; (Recent Economic Changes' (1898). His writ¬ ings are notable for their clear and forcible presentation of a vast number of details and statistics.

WELLS, Frederic Lyman, American psy¬ chiatrist: b. Boston, Mass., 22 April 1884. He was graduated at Columbia University in 1903 and took his Ph.D. there in 1906. He was con¬ nected with the faculty at Columbia University

in 1905—07 and in 1910-11; was assistant patho¬ logical psychologist at the McLean Hospital, Waverly, Mass., in 1907-10 and in 1911-17; and was connected with the Psychiatric Institute, Ward's Island, New York, in 1910-11. He was commissioned captain of the Signal Reserve Officers' Corps, 18 Sept. 1917, and was assigned to active service at Boston, 28 Sept. 1917. Au¬ thor of (Mental Adjustments) (1917).

WELLS, Heber Manning, American poli¬ tician : b. Salt Lake City, 11 Aug. 1859. He was graduated from the University of Utah in 1875, and began early to take an active part in public life. He was recorder of Salt Lake City in 1882-90, and a member of the city board of public works in 1890 and in 1893. He was a member of the constitutional convention which framed the constitution under which Utah was

admitted as a State ; in 1895 was elected gov¬ ernor of Utah for a five years' term on the Re¬ publican ticket, and in 1900 was reelected for a four years' term. During the prolonged struggle between the mine owners and miners' unions in 1904, he maintained an impartial atti¬ tude as far as possible, but firmly opposed an¬ archy and disorder. In 1905 he retired from politics and engaged in banking business.

WELLS, Herbert George, English author: b. Bromley, Kent, 21 Sept. 1866. He was edu¬ cated at the Royal College of Science (South Kensington, London), published a 'TextBook on Biology) (1892-3), and followed this by a series of works of fiction in which science and mechanics are employed for the accomplishment of various wonders narrated in the circumstan¬ tial and plausible manner of Verne. In his later years he was more versatile, and displayed a tendency to discuss mystic and social subjects in the form of fiction. He has made a place for himself in the very front rank of modern writ¬ ers. Among them are 'The Time Machine> (1895); 'Select Conversations with an Uncle> (1895); (The Wonderful Visit) (1895); 'The Island of Dr. Moreau5 (1896); (The Wheels of Chance) (1896) ; 'Thirty Strange Stories) (1897) ; 'The Invisible Man5 (1897) ; 'The War of the Worlds) (1898) ; (Tales of Space and Time) (1899) ; (When the Sleeper Wakes) (1899) ; 'Love and Mr. Lewisham5 (1900) ; <Anticipations> (1901); (The First Men in the Moon) (1901) ; 'Mankind in the Making) (1903) ; 'Twelve Stories and a Dream5 (1903) ; 'The Food of the Gods) (1904) ; 'A Modern Utopia) (1905) ; ' Kipps 5 (1905) ; 'In the Days of the Comet 5 (1906) ; 'The Future in America) (1906) ; 'This Misery of Boots,) a tract in favor of Socialism (1907) ; 'New Worlds for Old,5 an account of Socialism (1908) ; 'First and Last Things,5 a confession of faith (1908); 'The War in the Air5 (1908); 'Tone Bungay,5 a novel of contemporary life (1909) ; 'Ann Veronica5 (1909) ; 'The History of Mr. Polly 5 (1910) ; 'The New MachiavellP (1911); 'Floor Games for Children) (1911); 'Marriage) (1912) ; 'Little Wars,5 a floor game book (1913) ; 'The Passionate Friends) (1913) ; 'The Wife of Sir Isaac Harman) (1914) ; 'An Englishman looks at the World) (1914) ; 'The World Set Free5 (1914) ; 'The War that will end War5 (1914) ; and 'The Peace of the World) (1915), war pamphlets; 'Boon,5 under the pseudonym Reginald Bliss

(1915); 'Bealby) (1915); 'The Research Mu¬ nificent5 (1915); 'What is Coming?) (1916); 'Mr. Britling Sees it Through5 (1916) ; 'The Elements of Reconstruction,5 under the pseu¬ donym D. P. (1916); 'War and the Future5; 'God, the Invisible King5 ; 'The Soul of a Bishop5 (1917) ; 'The Idea of a League of Nations5 (1919). His short

stories were re¬ printed in a definitive collection under the title of ‘The Country of the Blind5 (1911), and many of his works have been translated into other languages.

WELLS, Horace, American dentist: b. Hartford, Vt., 21 Jan. 1815; d. New York, 24 Jan. 1848. He studied dentistry in Boston and practised it there until 1836, then went to Hartford, Conn. For years he made investi¬ gations and experiments in search of an agent for preventing pain in the extraction of teeth, and finally became convinced that he had found such an agent in nitrous-oxide gas. In 1844 he made a practical test by having one of his own teeth extracted while he was under the influence of his supposed anaesthetic and the operation confirmed his belief in the discovery. Thenceforth he used nitrous-oxide gas in his practice. He published ‘A History of the Ap¬ plication of Nitrous Oxide Gas, Ether and Other Vapors to Surgical Operations5 (1847). His claims to the discovery of anaesthesia were controverted in the interest of G. Q. Colton, C. T. Jackson, W. T. G. Morton and J. C. War¬ ren (qq.v.), to each of whom some of the honors of its introduction belong. Wells may have had a predeceessor in C. W. Long (q.v.), but with regard to the first surgical use of an anaesthetic, all other names must yield priority to his. He became mentally unbalanced while advocating his claims in New York, was taken into custody and committed suicide. A statue of Wells stands in Bushnell Park, Hartford, Conn. See Anesthetics.

WELLS, Horace Lemuel, American chem¬ ist: b. New Britain, Conn., 5 Oct. 1855. He was graduated at the Sheffield Scientific School, Yale, in 1877. He became a. member of the faculty at Yale in 1884, and since 1894 he has been professor of analytical chemistry and metallurgy there. He has made numerous original investigations in inorganic chemistry, and was elected to the National Academy of Sciences in 1903. Author of ‘Studies from the Chemical Laboratory of the Sheffield Scien¬ tific SchooP (1901) ; ‘Chemical Calculations5 (1903); ‘Textbook of Chemical Arithmetic5 (1905), *etc.*

WELLS, Lemuel Henry, American Protes¬ tant Episcopal bishop: b. Yonkers, N. Y., 3 Dec. 1841. He was graduated from Hobart College in 1867, having during the Civil War served as a lieutenant in a Wisconsin regiment and after being graduated from Berkeley Divinity School, Middletown, Conn., took priest’s orders in the Episcopal Church in 1871. He was rector of Walla Walla, Wash., 1871-82; of Saint Louis, Tacoma, 1884-89, and of Trinity Tacoma, 1889-92. In 1892 he was consecrated mission¬ ary bishop of Spokane.

WELLS, Rolla, American capitalist and politician : b. Saint Louis, Mo.,

1856. He en¬ tered business in the employ of a street rail¬ way company and became assistant superin-1

tendent and finally general manager of the com¬ pany. Giving up the latter position in 1883, he became prominently identified with a num¬ ber of manufacturing and commercial corpora¬ tions. - He has been active in local politics as a Democrat ; was a delegate to the Democratic National Convention in 1896 and served two terms as mayor of Saint Louis from 1901 to 1909. His administration was efficient and eco¬ nomical. . He took an efficient part in the preparation for the Saint Louis Exposition of

1904.

WELLS, Webster, American mathema¬ tician: b. Boston, Mass., 4 Sept. 1851; d. 1916. He was graduated from the Massachusetts In¬ stitute of Technology in 1873, pursued special studies in civil engineering and from 1873 was engaged in teaching at the institute, attaining full professorship in 1893. He has written a series of mathematical textbooks, among which are ‘Logarithms* (1878) ; (Plane and Spheri¬ cal Trigonometry* (1884); (Higher Algebra* (1889) ; ‘Complete Trigonometry (1900) ; (Text Book of Algebra1* (1906), *etc.*

WELLS, William Charles, British physi¬ cian: b. Charleston, S. C., 24 May 1757; d. London, England, 18 Sept. 1817. He was the son of a Scottish printer who settled in South Carolina in 1753. He was graduated M.D., at Edinburgh University in 1780, and in 1781 he returned to America to look after his father’s property. He supported the cause of the Brit¬ ish and for a time after 1782 he published a weekly newspaper at Saint Augustine, Fla. In 1784 he engaged in practice as a physician in London, and from 1800 until his death he was chief physician at Saint Thomas’s Hos¬ pital. His scientific observations were char¬ acterized by keen observation and a sincere devotion to the work. He was elected a Fel¬ low of the Royal Society

in 1793 and in 1814 he received the society's Rum ford medal for his (Essay on Dew* (1814). Author of 'An Essay on Single Vision with Two Eyes* (1792) ; (On the Colour of the Blood* (1797) ; 'On Vision* (1811), *etc.* A selection from his essays and his autobiography were pub¬ lished (1818).

WELLS, welz, England, ancient city and municipal borough, county of Somerset; at the foot of the Mendip Hills; 15 miles southwest of Bath. The cathedral, a remarkably beautiful edifice, begun 704, enlarged 1138, is for the most part in Early English ; but its western front, one of the noblest facades in the kingdom, and enriched with 300 statues, is in Gothic. The bishop's palace, founded 1088, is surrounded by a moat supplied from the abundant source of Saint Andrew's Well — from which the town is said to derive its name — and by lofty walls. There are no manufactures, and the trade is chiefly retail. Pop. 4,655.

WELLS COLLEGE, a college for women, located in Aurora, N. Y. It was founded in 1868 by Henry Wells, who at that time deeded to the trustees the main building and 20 acres of land. It is undenominational in its control and policy. In 1888 the main building was de¬ stroyed by fire, but immediately rebuilt with¬ out crippling the work of the college. A prepa¬ ratory course was at first maintained, but was abolished in 1896, when the range of elective system was also greatly increased. Formerly the three degrees of A.B., B.L. and B.S. were conferred, but the A.B. degree is now granted for the completion of the course, which is largely elective, especially in the last two years. Biblical literature is among the required studies, courses in the theory and history of music count toward the degree, but technical musical work does not. The discipline is by a system of student self-government, based on a series of simple rules adopted and enforced by the students themselves. The college is situated on Cayuga Lake, and the College Boat Club has erected a boathouse for the use of their members. The college buildings include the main hall, Morgan Hall, a dormitory (the for¬ mer residence of the founder), a gymnasium, a science hall, and the administration building. The students in 1917 numbered 206, the faculty 34. There are over 30,000 volumes in the library and the productive funds total $521,720. Wells seeks to maintain its distinctive character as a small college, maintaining a high standard of college work, but not attempting university methods.

WELLS AND WELL-SINKING. Wells are excavations for water or other

substances such as petroleum, gas or salt; well-sinking is, therefore, the operation by which deep holes of comparatively small diameter are sunk into the earth. Similar holes are drilled in search of coal, iron ore and other minerals, and, al¬ though in this case water is not the object in view, yet work of this character may properly be regarded as well-sinking. The process of well-sinking usually implies also the casing of the well either to guard against the choking of the well or to shut out liquids from all strata except that which the well is designed to tap. Wells are variously classified accord¬ ing to the method of sinking, a dug, bored, driven, drilled and jetted; a curb, case or tube wells according to the manner of lining them; as open, shallow or deep ; and as artesian, flowing, non-flowing and pumping.

As regards the dug well, the method em¬ ployed is to excavate it with pick, shovel or drill, shoring the sides with stout planking as the excavation proceeds.

Boring or drilling, however, differs essen¬ tially from digging in that all the operations are conducted from the surface, the hole being from 3 to 27 inches or more in diameter. Two distinct methods of well-sinking are commonly included under the terms well-drilling and well-boring, viz., the grinding with pressure, by which a hole is made, and the pounding or shattering of rocks by a heavy chisel-pointed bar. The two methods and the machinery adapted to their application are represented in their highest development on the one hand by the diamond-drill and on the other by the rope-drill or ordinary oil-well apparatus so well known in America. The first cuts or bores a hole, either cylindrical or annular, in any desired direction ; the other pounds and shatters a hole by its own weight, descending vertically. The pounding or percussion drill is in common use for sinking deep wells either for fresh water, brine, petroleum or gas, while the diamond drill is only occasionally used for this purpose, finding the greatest utility in ex¬ ploring the harder, inclined rocks for coal,

iron ore, the precious metals, *etc.* The per¬ cussion drill consists of an iron bar tipped with steel drawn to a blunt cutting edge, which is

raised repeatedly a few inches and dropped upon a rock, thereby cutting a depression. By slightly turning the bar each time it is raised and causing the chisel edge to strike across the mark left by the preceding blow the depression gradually becomes a nearly circular hole. The hole gradually deepens until the powdered rock prevents further progress. Water is now put into the hole and makes a soft mud of the rock dust, which is now drawn out, and the drilling is resumed. To manipulate long, heavy tools required for a deep well the latter are usually suspended from ropes. More or less complicated machinery is employed but the essential parts of the operation are as described above — raising and letting fall the drill and withdrawing the pulverized rock at regular in¬ tervals. The greater number of deep wells are now drilled by steam or gasoline power, while hand and horsepower are used for shallow wells in localities where labor is Cheap.

Wells varying from 1,000 to 2,000 feet and over in depth are being drilled in the United States at the rate of about 500 a month. These are mainly in the oil and gas regions of the coun¬ try, such as Indiana, Ohio and Pennsylvania. The machinery in common use, whether for water or oil, has been developed and brought to its present high degree of perfection in these oil-filds, where certain standard sizes and pat¬ terns have been adopted after years of trial. The most prominent object about a deep-drilling well is the derrick or rig, a framework tower 20 feet square at bottom, tapering to four feet at top, and usually 72 to 100 feet high. This tower is for the purpose of carrying two pul¬ leys, the crown pulley in the centre and the block through which the sand-‘line runs. Over the crown pulley runs the cable by which the drilling tools are suspended and raised or low¬ ered, while the sand-line is a smaller rope and to draw out the sand-pump or bailer, by which the hole is cleaned at short intervals during the drilling. At one side of the rig are the bull-wheels or windlass upon which the cable is wound, and at the other the walking-beam, a heavy timber 20 feet long hung in the centre so that it can oscillate up and down. One end comes directly over the hole, and the other can be attached by a pitman to a crank driven by the band-wheel, which in turn is belted to the engine. This large band-wheel can also be made to run the. sand-reel or long windlass carrying the sand-line, one end of the reel being drawn when in use by a powerful lever against the band-wheel.

The band-wheel imparts motion in a third way, by means of an endless bull-rope turning the bull-wheels which wind or unwind the cable. The drilling “set® consists generally of a bit four feet long, weighing 150 pounds ; an auger-stem about 40 feet long, and

weighing 1,300 pounds; the jars, six feet or more long, weigh¬ ing 300 pounds ; the sinker bar, 16 feet long, weighing 600 pounds; and the rope socket of about 75 pounds on top. The total length of the string of tools is 60 feet, and when sus¬ pended from the crown pulley by means of the cable, one and seven-eighths inches in diameter, the tools swing inside the derrick, and when

necessary can be stood up out of the way. When in use the tools are lowered into the hole by means of the bull-wheels, then are raised a few inches, and the rope is securely clamped to the temper-screw hanging to the end of the walking-beam, the rope above the point of at¬ tachment being allowed to hang freely. By means of the temper-screw the tools can be gradually lowered as drilling progresses, the screw running down five feet. The bit or cut¬ ting-tool is faced with steel, has an obtuse cut¬ ting edge. The auger-stem is to give weight to the bit and efficiency to the blow. The jars consist of two long, flat links, faced on the in¬ side with steel, playing into each other and per¬ mitting a vertical movement of about nine inches. They divide the string of tools into two parts, acting in a degree independently of each other. Above the jars is the sinker-bar, whose purpose is to give efficiency to the up¬ ward blow of the upper half of the jars. The jars are used mainly to loosen the tools if the lower part becomes wedged or stuck in the hole. After drilling has progressed the length of a “screw® — viz., five feet — the tools are hoisted out and water thrown in if the hole is dry. The sand-pump or bailer, a tube 16 feet or more long with a valve in the bottom, is then run in on the end of the sand-line, and when full of mud and water is drawn out and emptied, the operation being repeated until the hole is free from mud. Then a new bit, sharpened and of full width, is put on the end of the tools, they are run in, and drilling proceeds as before. In some localities drilling is done by means of wooden rods instead of a rope. Where the rocks are soft or unconsolidated it is necessary that the well be lined with casing. This not only keeps the walls from falling in, but also, if properly set, keeps out surface or other waters. It is usual to drill the hole as rapidly as possible, and then slip the casing in, its diam¬ eter being less than that of the drill. Some¬ times this cannot be done on account of the instability of the walls, and then it is necessary to adopt some modification, as, for instance, drilling ahead a short distance, and then driving the casing down. The latter is usually of wrought iron, put together by means of screw-joints and collars, and capable of standing a pressure of from 1,000 to 3,000 pounds per square inch. In regard to the cost of boring wells, it is safe to assume that wells of 1,000 feet and under cost about $6 per foot; wells from 1,000 to 1,500

feet are relatively cheaper, being about from $4 to $5 per foot; and very deep wells are again relatively expensive be¬ cause of the special machinery involved and cost over $6 per foot. An essential part of well-sinking equipment are several devices or “fishing tools® to be used in case a rope breaks or the drill becomes wedged in the hole.

Shallow wells are sometimes driven by ham¬ mer blows and are known as driven or tubular wells. The tube so driven usually has a pointed end with perforation on the sides of the lower sections.

Well sinking has been carried on from pre¬ historic times but it was not until the 19th cen¬ tury that improved methods and equipment made possible the boring of deep wells. In 1834-41 a well was sunk at Grenelle, near Paris, to a depth of 1,798 feet; not until 1850 at Kis-‘

singen, Bavaria, was this exceeded, when a salt spring was tapped at 1,878 feet. In 1855-57 a well 1,923 feet was sunk at Passy, near Paris.

The greatest depth reached by human agency is 7,579 feet in the Lake well, completed in 1919, at a point about eight miles southeast of Fair¬ mont, W. Va. Its mouth is about 1,300 feet above sea-level and it was bored in an unsuc¬ cessful attempt to reach certain sands in which gas and oil were expected. The next deepest is a well 7,386 feet deep on the Goff farm eight miles northeast of Clarksburg in northern West Virginia. The third deepest is a well at Czu-chow, Germany, which is 7,348 feet deep. The fourth in order is the Geary well 20 miles south¬ west of Pittsburgh, Pa., 7,248 feet deep. The

following are more than 5,000 feet deep.

Feet

Paruschowitz, Upper Silesia, Germany . 6,572£

Schladenbach, near Leipzig, Germany . 5,735

Springs, 25 miles east of Johannesburg, Africa. 5,582 West Elizabeth, 12 miles south of Pittsburgh, Pa. 5,575

Doomkloof, Transvaal . 5,560

Aleppo Township, southern Greene County, Pa… . 5,322

Jacksonville, Fla . 5,000

There are many from 3,000 to 5,000 feet deep. The deepest mine in the world is shaft three of the Tamarack Copper Mine, Houghton, Mich., 5,200 feet, and other copper mines in Lake Supe¬ rior region are from 4,000 to 5,000 feet deep. Consult Isler, C., (Well-Boring for Water, Brine and OiP (2d ed., revised and enlarged, London 1911).

WELLSBORO, welz'bur-6, Pa., borough, county-seat of Tioga County, on the Fall Brook Railroad (New York Central Railroad, about 35 miles north of Williamsport. It is in an agricultural and coal mining region. It has large chemical works, wagon and carriage fac¬ tories, marble works, lumber mills, tanneries, cut glass works and machine shops. There are two banks and three newspapers. Pop. 3,452.

WELLSBURG, W. Va., city, county-seat of Brooke County, on the Ohio River, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad, about 15 miles north of Wheeling. It is in an agricultural and sheep-raising region, and in the vicinity are numerous coal mines and natural gas. It has a fine city-hall, paper mills, glass factories, a sack factory, grist mill, sheet metal works -and machine shop. There are three banks, a daily and two weekly newspapers. The town was founded in 1790. Pop. 4,918.

WELLSTON, Mo., city in Saint Louis County, on the Missouri River, and on the western outskirts of Saint Louis. ˆEd'en Col¬ lege and the Eden and the McKinley semi¬ naries are located here. There are stockyards, lumber yards and manufactures of electrical goods, steel ranges, tools, wire rope and other articles. Pop. 12,500.

WELLSTON, welz'ton, Ohio, city in Jackson County, on the Cincinnati, Hamilton and Dayton, the Ohio Southwestern, the Detroit, Toledo and Ironton, the Hocking Valley and the Baltimore and Ohio Southwestern rail¬ roads, about 72 miles in direct line southeast of Columbus. It is in an agricultural and coal¬ mining region and has considerable iron manu¬ facturing. There are 40 factories with annual products of $1,500,000. The chief industrial establishments are foundries, blast

furnaces,

barrel factory, machine shops, cement works and brick works. The city has a high school, public graded schools and a public library. There are two banks and a daily and two weekly newspapers. The city owns and oper¬ ates the electric-light plant and the waterworks. The government is vested in a mayor who holds office two years and a city council. The place was settled in 1871 and in 1876 was incorpo¬ rated. Pop. (1920) 6,687.

WELLSVILLE, N. Y., village in Allegany County, on the Genesee River, and on the Erie and the Buffalo and Southern railroads, about 20 miles southwest of Hornellsville. It is in an agricultural and dairy region, and in the vi¬ cinity are a number of oil wells. It has foundries, machine shops, creameries, flour mill, tanneries and cigar factories. There are two national banks and a daily and other news¬ papers. It has a high school, graded elementary schools and a public library. Pop. (1920) 5,046.

WELLSVILLE, Ohio, city in Columbiana County, on the Ohio River, and on the Pitts¬ burgh, Fort Wayne and Chicago Railroad, about 85 miles southwest of Cleveland. It is in an agricultural and coal-mining region, and in the vicinity are valuable deposits of fire clay. The chief manufacturing establishments are machine shops, foundries, iron and steel works, brick and tile works, potteries, nail factory, boiler works and railroad shops. There are 60 fac¬ tories, whose annual finished products total $2,000,000. There are three banks and a daily newspaper, nine churches, a high school, public and parish schools and a public library. The city owns and operates the waterworks. Pop.

(1920) 8,899.

WELSBACH (welz'baH) LIGHT, an in¬ vention of Carl Auer von Welsbach, an Aus¬ trian, in 1884. As now used it is the familiar gas mantle hung over a gas jet to increase the illumination. It is based upon the discovery that certain materials become incandescent at a low temperature. The process followed is to saturate a combustible filament in the form of a network with a solution of a salt of a re¬ fractory earth, such as zirconium. It is then dried out and burned, the combustible element disappearing and leaving a frame of refractory material, which becomes incandescent at a low temperature.

WELSH, Herbert, American reformer: b. Philadelphia, Pa., 4 Dec. 1851. He was grad¬ uated from the University of Pennsylvania in 1871 ; studied art in Philadelphia and in Paris with Bonnat; and practised as an artist in Philadelphia for several years. Visiting the Sioux reservation, impressed with the belief that the Indians required only a just and consistent treatment by the government and the extension of Christian missions to become civilized, he began a movement to secure to them their rights, which resulted in the organization of the Indian Rights Association in 1882. He became corresponding secretary of this association and has been active in its work, which has been instrumental in securing the passage of a bill providing for the individual ownership of land and the application of the civil service law to the Indian service. He also took a leading part in the reform movement in Pennsylvania State politics in 1890; and in 1895 established a weekly

periodical, City and State, published in the in¬ terests of good government. He strongly op¬ posed the tendency toward imperialism and severely criticized the government's policy and the evils attending the army's occupation of the Philippines. He has written (Four Weeks among some of the Sioux Tribes) ; (Civilization among the Sioux Indians* ; (A Visit to the Navajo, Pueblo, and Tualpais Indians> ; (The Other Man's Country) (1900), dealing with the Philippine question.

WELSH, John, American merchant : b. Philadelphia, 9 Nov. 1805; d. there, 10 April 1886. He was educated in his native city, where he became prominent in business and was-active in public affairs in many capacities, having large railroad and financial interests. He was a mem¬ ber of the Sinking Fund Commission, president of the Philadelphia Board of Trade, etc., and rendered efficient service in promoting relief measures during the Civil War, especially in connection with the Philadelphia Sanitary Fair, in 1864, of which he was president, and which raised over $1,000,000 for army hospital work. In 1873 he became president of the Board of Finance of the

Centennial Exhibition, receiving from the citizens of Philadelphia, at its close, a gold medal and the sum of $50,000, with which he endowed the John Welsh chair of English literature in the University of Pennsyl¬ vania. In 1878 he went as Minister to England, but in the following year resigned.

WELSH, Robert E., Canadian Presbyterian clergyman and educator: b. New Cumnock, Scotland, 20 March 1857. He was educated at Glasgow and Edinburgh Universities, was or¬ dained in the Presbyterian ministry in 1880 and went to Japan as a missionary. He was in charge of Saint Paul's, Harrowgate, Yorkshire, in 1882-87, and of Saint George's, Brondesbury, London, in 1887-1904. He was general secre¬ tary to the Canadian Bible Society in 1905-07, and since 1907 he has been professor of apolo¬ getics and church history at the Montreal Presbyterian College. Author of (In Relief from Doubt* (1895) ; (God's Gentleman >

(1898) ; (The Challenge to Christian Missions* (1902) ; (Man to Man* (1905), *etc.*

WELSH CALVINISTIC METHO¬ DISTS, a designation sometimes given to the Calvinistic Methodists, because Wales is the great seat of the sect. The Calvinistic Metho¬ dists are distinguished by their Calvinistic senti¬ ments from the ordinary Wesleyans, who are Arminian. Whitfield is regarded as the father and founder of Calvinistic Methodism. Mem¬ bers of this sect have been active in seeking to bring about the disestablishment of the Anglican Church in Wales. See Methodist Churches of the World; Presbyterianism.

WELSH LANGUAGE AND LITERA¬ TURE. See Celtic Languages.

WELWITSCHIA, wel-wich'i-a, a genus of plants of the family Gnetacece , containing only one species, IV. mirabilis. This species is con¬ fined to the deserts of Southwest Africa, where it was discovered in 1860 by Friedrich Wel-witsch. It has a short and top-shaped stem which never grows much above the surface, but increases in thickness until it may be three feet in diameter, and bears a pair of large opposite leaves. These leaves last throughout the whole

lifetime of the plant and become ultimately torn up longitudinally into long strips, which trail on the surface of the ground. Two cotyledons which are like short-lived leaves of much smaller size precede them. The flowers of the plant grow in cones like those of many conifers, the

cones being arranged in panicles on the end of the stem between the two leaves. The fe¬ male cones are much larger than the male ones and in fruit are of a scarlet color.

WEMYSS, weems, Francis Wemyss-Charteris, 10th Earl of Wemyss and Baron Elcho, English noble: b. 4 Aug. 1818; d. 30 June 1914. He was educated at Edinburgh Academy, gradu¬ ated at Christchurch, Oxford, and became (1841-46) member of Parliament for East Gloucestershire, then (1847-83) member for Haddingtonshire, and (1852-55) he was Lord of the Treasury. He was aide-de-camp to the late Queen Victoria.

WEN, an encysted tumor, or sebaceous cyst, varying in size, occurring in different parts of the body, but mostly on the scalp and neck; commonly situated immediately under the skin. The causes of their formation are not under¬ stood, but a strongly marked tendency to such swellings exists in particular individuals, lead¬ ing to the belief in constitutional causes. At its commencement the wen is indolent, and it is often many years before it attains any con¬ siderable size. It is enclosed in a sac, its con¬ tents being sometimes sebaceous matter, in other cases serum, or a thin fetid brown or black fluid. Sometimes ‘the sac contains cartilaginous or even osseous matter. Frequently the sac, especially when small, may be punctured, and its contents pressed out; but sometimes this gives rise to very severe inflammatory action. Another and safe mode of treatment is to dis¬ sect them out with the knife wherever their position will admit of it, care being taken to remove the whole of the cyst.

WEN-CHOW, wun’chow’,’ China, a treaty port (since 1887) in the province of Che-kiang, on the estuary of the Ta-kai River, flowing into the China Sea, about 200 miles south by west of Shanghai. Ruined palaces, gates, triumphal arches and an immense wall are among the numerous signs of its vanished great¬ ness, but it is still a comparatively clean town, with broad streets and numerous canals. Among buildings of recent erection are the customhouse and the branch of the Imperial Chinese Post Office. The chief imports are cot¬ tons, kerosene, sugar, opium, iron and woolens ; the principal exports are tea, umbrellas, timber and oranges. The average annual values of the imports and exports during several recent years were about $1,500,000 and $1,250,000, respectively. The tonnage of shipping is about 40,000 per annum. There is also a consider¬ able junk trade. Pop. 205,000.

WENATCHEE, Wash., city and county-seat of Chelan County, on Columbia River, 98 miles southeast of Seattle, and on the Great Northern Railroad. It is situated in the midst of superb scenery, and

the surrounding dis¬ trict, for which it is a shipping centre, is interested in agriculture and fruit raising. Pod

(1920) 6,324.

WENATCHI. See Salishan Indians.

WENCESLAS, wen'ses-las or -las, or WENZEL, emperor of Germany and king of Bohemia: b. 1361; d. Schlagfluss, 16 Aug. 1419. He was the son of Charles IV (q.v.), whom he succeeded in 1378. In 1394 the Bohemian nobility formed a conspiracy against him and held him prisoner at Prague, but later released him. Through the influence of the archbishop of Mainz, whose enmity he had aroused by demanding the resignation of the rival popes, Benedict XIII and Borpface IX, he was deposed by the Imperial electors, while the Elector Palatine Rupert was chosen to succeed him. In Bohemia he supported John Huss (q.v.) and the latter's party, and in 1409 compelled by a decree the departure of the Germans from the University of Prague. Shortly afterward he resigned the royal title. Consult Lindner, (Geschichte des Deutschen Reiches unter Konig WenzeP (1875-80).

WEND LANGUAGE. The language of the Wends is similar to the other branches of the northwestern stem of the Slavic languages, the Polish and the Bohemian. It is divided in¬ to the dialect of Lower Lusatia, which is but little developed, and that of Upper Lusatia. The latter is subdivided into the Evangelical dialect, near Bautzen ; the Catholic dialect, near Kamenz, and in the northwest; and the north¬ eastern dialect. The differences are mostly confined to shades of pronunciation. The stock of words in the present language of the Wends is largely mixed with German elements. Orthog¬ raphy has always been in a very unsettled con¬ dition. In their publications, the Wends have mostly made use of the German letters. There are eight vowels, a, o, u, e, i, all of which are pronounced as in German and Italian, 6 (be¬ tween o in note and u in full), e (like long English e) ,

and y (approaching the German ii). There are 32 consonants. There is no article. Nouns ending in a consonant are mostly masculine, those in a and i feminine, and those in o and e neuter. There are seven declensions. The language has a dual number. There are seven cases. The ad¬ jectives end in y, i (masculine), a (feminine), o and e (neuter). The comparative is formed by the termination isi, and in order to form the superlative the syllable naj is placed before the comparative. 'The personal pronouns are irreg¬ ular; the others are declined like adjectives. The verb has six tenses and five moods, besides a gerund; and three participles. Till about the middle of the 19th century Wendish literature consisted almost wholly of ecclesiastical and religious works, and works relating to the needs of peasant life, but there has since been a revival of national feeling, accompanied by a more extended literature. There are gram¬ mars of the Wendish language by Ticinus (Prague 1679) ; Matthai (1721) ; Seiler (Bautzen 1830), and Jordan (Prague 1841).

WENDELL, Barrett, American educator and author: b. Boston, Mass., 23 Aug. 1855; d. 8 Feb. 1921. Graduated, Harvard 1877, studied, Harvard Law School, in 1880-88 was instructor in English at Harvard, in 1888-98 assistant professor, and in 1898 became pro¬ fessor. He was Clark lecturer at Trinity Col¬ lege, Cambridge, England, in 1902. Among his works are <The Duchess Emilia) (1885) ;

(RankeH's Remains) (1897); (English Com¬ position (1891); (Cotton Mather* (1891); (Stelligeri, and Other Essays Concerning America * (1893); (William Shakespere)

(1894) ; (A Literary History of America) (1900; in the (Library of Literary History), a scholarly work, though much criticized for its unjust attitude toward certain writers; and ((Raleigh in Guiana> (1902), an attempt at imitation of the Elizabethan drama; (Liberty, Union and Democracy * (1906) ; <The Mystery of Education * (1909).

WENDS, a former powerful Slavic tribe settled in Germany, now represented by the Slavic people of Upper and Lower Lusatia, who call themselves Serbs {Serb jo), whence the name Sorbs, often applied to them by German authorities. In the earliest historical times the Sorbs occupied the country from the Saale to the Bober, and from the latitude of Berlin south to the Erzgebirge; but the Wends are now confined to a small territory (about 1,270 square miles) in the upper Spree Valley, ex¬ tending from south of Bautzen to north of Kottbus.

The larger part of this Wendish re¬ gion belongs to the Prussian provinces of Brandenburg and Silesia, the smaller southern part being included in the kingdom of Saxony (circle of Bautzen). The Wends are com¬ pletely surrounded by Germans, and being thus cut off from contact with the other Slavs, they are becoming slowly Germanized. Their lan¬ guage, known as Sorbian, falls into two dialects Upper and Lower Sorbian, which are .spoken in the south and the north of the f territory, respectively. (See Wend Language). The total number of Wends is about 120,000, of whom about 50,000 live in Saxony and 70,000 in Prussia. About 12,000 are Roman Catholics, the remainder being chiefly Lutherans.

WENER, va'ner, or VENERN, Sweden, the largest lake of the country, and after those of Ladoga and Onega the largest in Europe, situated centrally between the Ians of Werm-land, Dalsland and Wester Gotland. It is 147 feet above sea-level, and of irregular shape. Its greatest length, northeast to southwest, is about 90 miles ; and its breadth may average about 30 miles, though in its southern part, where two peninsulas stretch far into it from opposite directions, it is not more than 15 miles. This distance is still further narrowed by a group of small islands, and hence the part of the lake above these peninsulas is sometimes considered as Wener proper, while the part below is called Lake Dalbo. The area cov¬ ered by both is about 3,000 square miles. By far the most important feeder is the Klar-elf, which pours in at its north end the accumulated water of a course of more than 250 miles. Its only proper outlet is at Wenersborg at its southwestern extremity, where its superfluous waters are received by the Gota-elf, flowing thence to the Cattegat. In summer steamers and other vessels ply regularly upon the lake; in winter it is frozen for several months, and crossed by sledges. It abounds with fish, par¬ ticularly trout. The Gota Canal connects Lake Wener with Lake Wetter, and the Dalsland Canal connects it with Fredrikshald in Norway.

WENLEY, Robert Mark, American edu¬ cator: b. Edinburgh, Scotland, July 1861. He

was graduated from the University of Glasgow in 1884, and later studied in Edinburgh and on the Continent. He was in charge of the philo¬ sophical department of Queen Margaret Col¬ lege, Glasgow, in 1888-95, and since 1896 has been at the head of that department in the University of Michigan. He has published (Socrates and Christ) (1889) ; (University Ex¬ tension Movement in Scotland) (1895) ; Con¬ temporary Theology and Theism) (1897); Preparation for Christianity in the Ancient World5 (1898) ; (Kant and His Philosophical Revolution5 (1910) ; (The Anarchist Ideal5 (1913); (Robert Flint- (1914), *etc.* He was an associate editor of the dictionary of Philosophy.5

WENLOCK GROUP, a British formation of the Upper Silurian geological series. It in¬ cludes shales and limestones, and is below the Ludlow group and above the Upper Llandovery group, these three comprising the Upper Silurian groups. The Wenlock formation is about 4,000 feet thick, and the fauna has been classed as consisting of 171 genera and 530 species, but many supposed vegetable remains are almost certainly not such. See Silurian.

WENSLEYDALE, wenz'li-dal, James Parke, Baron, English jurist: b. Highfield, near Liverpool, 22 March 1782 ; d. Ampthill Park, Bedfordshire, 25 Feb. 1868. Graduated from Trinity College, Cambridge, in 1803, he was called to the bar at the Inner Temple in 1813, went the northern circuit and became known for his wide knowledge of common law. In 1828 he was made a justice of the Court of King's Bench, in 1834 was transferred to the Court of the Exchequer. Here he remained strongly influential until his resignation in 1856, when he entered the Lords as Baron Wensley-dale of Walton (Lancaster). In Parliament he spoke rarely, and chiefly on legal questions. His judgments were highly ranked. Consult Foss, (The Judges of England5 (1848-64), or the abridgment of the same, (Biographia Turidica5 (1870) ; Manson, (Builders of Our Law5 (1895).

WENTLETRAP, a gastropod mollusk, al¬ lied to the turret shells and of the genus Scalaria, in which the shell is turreted, spiral and ornamented with elevated rib-like processes, crossing the whorls lengthwise of the shell. In some species the spiral is closed; but in the (<true55 wentletraps the whorls are open, that is, separated. Of the former, some are found in northern seas, and the latter are all natives of warm seas. They are inhabitants of deep waters, but their shells are cast up in great numbers on sandy coasts. They are carnivorous in habits. The famous precious wentletrap, or royal staircase (Scalaria prctiosa), formerly brought prices ranging as high as $250 when purchased for the conchologist's cabinet, but its value in the present

day is small. Its shell is about two inches long, and twisted in a wide spiral form, and is generally pale-yellow with white ribs.

WENTWORTH, went'werth, Benning, English governor of New Hampshire: b. Portsmouth, N. H., 24 July 1696; d. there, 14 Oct. 1770. He was graduated at Harvard in 1715, became a merchant at Portsmouth, which town he frequently represented in the provincial

assembly, was appointed a king's councillor in 1734, and when in 1741 New Hampshire was made a distinct province he became its gover¬ nor. He so continued until 1767, when he re¬ signed. He was authorized by the Crown to grant patents of unoccupied land, and in 1749 began making grants on the west side of the Connecticut River, in what is now southern Vermont. These grants were considered by the colonial government of New York as within its domain, and, as Governor Wentworth stoutly maintained for a time his authority, the collision so famous in the history of Vermont respecting the New Hamphshire grants en¬ sued. (See Vermont,, History). Governor Wentworth exacted heavy fees for his grants of land, and thus accumulated a large property, and in all of them stipulated for the reserva¬ tion of a lot for an Episcopal church. The town of Bennington, Vt., was named in honor of him. After his resignation as governor he gave to Dartmouth College 500 acres of land, on which the college buildings were erected. For an account of his second marriage, con¬ sult Longfellow's poem (Lady Wentworth.)

WENTWORTH, Charles Watson. See

Rockingham, 2d Marquis of.

WENTWORTH, George, American mathe¬ matician, son of G. A. Wentworth (q.v.) : b. 1868. He was graduated at Harvard Univer¬ sity in 1888, and from 1894 was his father's assistant in the compilation of textbooks. Since his father's death in 1906 he has col¬ laborated with D. E. Smith (q.v.) in preparing the Wentworth-Smith mathematical series.

WENTWORTH, George Albert, Ameri¬ can mathematician: b. Wakefield, N. H., 31 July 1835 ; d. Dover, N. H., 24 May 1906. He was graduated from Harvard in 1858, and in 1858— 91 was professor of mathematics at Phillips Exeter Academy. With G. A. Hill he prepared a series of textbooks on algebra, arithmetic, geometry and physics, and he was author of the Wentworth Series of mathematical

works com¬ prising about 40 volumes, among which are (Elements of Geometry5 (1878) ; Purveying and Navigation5 (1882) ; ‘Higher Algeibra5 (1891), *etc.*

WENTWORTH, Sir John, English colo¬ nial governor of New Hampshire, and after¬ ward of Nova Scotia: b. Portsmouth, N. H., 9 Aug. 1737 ; d. Halifax, N. S., 8 April 1820. He was a nephew of Benning Wentworth (q.v.). He was graduated at Harvard in 1755, ‘being a classmate of John Adams, became a mer¬ chant, and in 1765 was the agent of New Hampshire to present petitions in England. While there he was appointed to succeed Ben¬ ning Wentworth as governor of New Hamp¬ shire. At the same time he was made Pur¬ veyor of the king’s woods55 for all North America. Having landed at Charleston, S. C., in March 1767, he traveled through the colonies, registering in each his commission as surveyor, and arrived at Portsmouth in June. The office of governor was at that time an ex¬ tremely difficult one by reason of the increasing discontent of the colonists. At the first, Went¬ worth’s administration was very popular. He remonstrated against the taxes imposed by the English government, but sought to maintain the loyalty of the colony, and was successful in pre-WENTWORTH — WERGILD

venting the assent of Portsmouth to the non¬ importation agreements until 1770. In this he was aided by the fact that the Portsmouth mer¬ chants were disinclined to forego such profits as they might still obtain despite the crippled state -of commerce. When the last attempt was made to compel the colonies to receive East In¬ dian tea, he took advantage of lack of in¬ structions from the government, and had the consignee reship the cargo to Halifax. His au¬ thority ended, however, when it was learned that he had endeavored to comply with the re¬ quest of General Gage to obtain carpenters to construct barracks for the British troops at Boston, after Massachusetts workmen had re¬ fused the task. On 14 Dec. 1774 an armed at¬ tack was made on Fort William and Mary (now Fort Constitution) on Great Island, at the entrance to Portsmouth Harbor, and 100 barrels of powder and some cannon and muskets were taken. Wentworth finally found it advisable to withdraw to the fort, and then to a warship in the harbor. At the Isle of Shoals he prorogued the assembly, his last offi¬ cial act. He went to Boston, and thence to England. . From 1792 to 1808 he was

lieutenant-governor of Nova Scotia. He was active in the foundation of Dartmouth College. Nine manuscript volumes of his correspondence are in the public records of Halifax. He was made a baronet in 1795.

WENTWORTH, John, American journal¬ ist: b. Sandwich, N. H., 5 March 1815; d. Chicago, Ill., 16 Oct. 1888. He was graduated from Dartmouth in 1836 and in the same year went to Chicago where for 25 years he was owner and editor of the Democrat. He studied law, was admitted to the bar in 1841, and in 1843 was elected to Congress where he served six terms. He introduced the first steam fire engine into Chicago, was active in procuring the city charter, an earnest promoter of the public school system, and in 1857 and 1860 was elected mayor. He dissolved his connection with the Democrat in 1861, but di'd not retire from active life for many years. He gave $10,000 to Dart¬ mouth College, was president of its alumni in 1883 and wrote descendants of Elder William WenthwortlP (1850) and (History of the Wentworth Family) (1878).

WENTWORTH, Thomas. See Straf¬ ford, 1st Earl of.

WENTWORTH, William Charles, Aus¬ tralian statesman: b. Norfolk Island, New South Wales, 26 Oct. 1793; d. near Wimbourne, Dorset, England, 20 March 1872. He was the son of a government surgeon at Norfolk Island, then a penal colony, and was educated in Eng¬ land, making one return visit to Australia in the meantime. He studied at Cambridge Uni¬ versity and at Middle Temple, and was called to the English bar in 1822. He then returned to Sydney and speedily gained a large law practice. He affiliated himself with the cause of the ((emancipists,® the ex-convict class, as against the <(exclusivists,® made up of civil and military officers and gentlemen settlers, main¬ taining that South Wales was intended pri¬ marily for the ˆemancipists® who had earned their freedom and were entitled to preference as colonists. He was also an advocate of self-government for Australia, and with Dr. Ward-well, a fellow-lawyer, he in 1824 founded the

Australian , which was devoted to both projects. He was one of the founders of the ((Patriotic Association,® and was a leader in the long struggle for self-government which was finally won in 1842, and which victory was generally recognized as being largely due to his labors. He was a member of the first legislative council, and was the

leader of the ((Squatter® party. He was also foremost in the struggle for a new constitution for the Colony in 1854. He after¬ ward lived for several years in England and founded in London the General Association for the Australian Colonies. He earnestly advo¬ cated a federal assembly for Australia and is regarded as the originator of the Australian Commonwealth movement. He returned to Sydney in 1861 and became president of the new legislative council, but after 1862 he lived in England. His body was taken to New South Wales, the legislature unanimously voting him a public funeral. Author of (A Statistical Ac¬ count of the British Settlements in Australasia) (1819) ; <Australasia) poem (1823).

WERFF, verf, Adriaan Van der, Dutch painter: b. Kralingen, near Rotterdam, 21 Jan. 1659; d. Rotterdam, 12 Nov. 1722. He became a pupil of Van der Neer, settled in Rotterdam, and in 1696 attracted the notice of the Elector Palatine, who was thenceforward his liberal patron and who ennobled him in 1703. Among his celebrated paintings are the judgment of Solomon) ; (Christ Carried to the SepulcheU ; (Ecce Homo) ; (Abraham with Sarah and

HagarP and (Magdalen in the Wilderness.) Van der Werff was particularly noted for his small historical pieces, which are most ex¬ quisitely finished, and are still in high request. His brother and pupil, Pieter van der Werff (1665-1718), painted portraits and domestic pieces.

WERGELAND, ver'ge-land, Henrik, Nor¬ wegian poet: b. Christiansand, 17 June 1808; d. Christiania, 12 July 1845. He studied at Chris¬ tiania, in 1836 became custodian of the uni¬ versity library, and in 1840 keeper of the Nor¬ wegian archives. He was one of the leaders of the Ultra-Norwegian party, waging war on all things Danish, but found opponents in Wel-haven and the latter's school. In 1830 he pub¬ lished the dramatic poem (The Creation, Man and Messiah, } a work of formidable length and slight literary merit. His chief publications are the narrative poems, (Jan van Huysum's Flower-Piece> (1840) ; (The Swallow) (1841) ; (The Jew} (1842) ; (The Jewess) (1844), and (The English Pilot) (1844), which take high rank in Norwegian verse. His complete col¬ lected works appeared in 1852-57, a selection in 1859. Consult the biographies by Lassen (1867), Schwanenfliigel (1877) and Skavlan

(1892).

WERGILD, wer'gild, or WEREGILD,

wer'gild, derived from the Anglo-Saxon wer, a man, and geld, satisfaction, and meaning the price in money paid either kinsmen or to the state, or both, as satisfaction in a case of homi¬ cide or other crime against the person. The wergild extended to offenses of the highest grade. It was also sometimes exacted when the killing was not criminal, as in the case of a thief slain in battle. It was eminently a Teu¬ tonic institution, and the amount of wergild varied with different tribes. Among the Anglo-

Saxons, the wergild for taking the life of the king was 7,200 shillings ; for an eolderman, 2,400 shillings; a king's thegn, 600 and a ceorl, 200. In the Anglo-Saxon period an alderman or eolderman was a much more important person¬ age than the alderman of to-day, the aldermen of all England being the first subjects of the realm, and other aldermen being governors of counties. Even kings were called aldermen. The thegn, or thane, was a minor noble, and the ceorl, or churl, a tenant-at-will of the thane, or he might be simply a serf or farm-laborer. As the value of money, measured by its purchasing power, was far greater than to-day, the wergeld for king and alderman and even for thane, must have been prohibitory save for the wealthiest members of the community, or when the state assumed the burden of payment, as in the case of an enemy of high rank killed in war, whose relatives were able to wreak vengeance for his death.

Wergild for a homicide had to be paid to the king and the kindred, and also to the thane, or overlord of the slain man. The relatives were not obliged to accept the price of their kinsman's blood, but might, if they chose, exact life for life. If the relatives were satisfied, however, it was not difficult to make terms with the king and thane. The wergild passed away when Norman succeeded to Anglo-Saxon rule, and while fines continued to be imposed on of¬ fenders, there was no escape from the capital penalty for homicide except in trial by combat.

WERNER, ver'ner, Abraham Gottlob,

German mineralogist : b. near Bunzlau, 25 Sept. 1750; d. Dresden, 30 June 1817. In 1775 he was appointed inspector and teacher of mineralogy and mining in the Mining Academy at Freiberg, in which position he remained for the rest of his life. He was the first to separate geology from mineralogy, and to place the former on • the basis of observation and experience. The geological theory with which his name is con¬ nected is that which attributes the phenomena exhibited by the crust of the earth to the action of water, and is known as the Wernerian or Neptunian theory, in contradistinction to the Huttonian or Plutonic. He was nominated counsellor of the mines of Saxony in 1792, and had a great share in the direction of the Acad¬ emy of Mining, and in the administration of public works. He published Purze Klassifica-tion und Beschreibung der Gebirsarten) (1787) ; (Neue Theorie fiber die Entstehung der Gange) (1771). Consult <Life) by Frisch (1825).

WERNER, Alfred, Swiss chemist : b. Mulhouse, Alsace, 12 Dec. 1866. He was educated at the Carlsruhe Technical School and the Zfirich Polytechnic, and took his Ph.D. at the University of Zfirich in 1890. He was assistant to Prof. Georg Lunge at the Zfirich Poly¬ technic in 1889; later was assistant to Berthelot in the College de France, and in 1895 he was appointed professor at the University of Zfirich, where since 1902 he has been director of the lectures on inorganic chemistry. He was awarded the Nobel Prize in chemistry in 1913. Joint author of Peber die raumliche Anord-nung der Atome in stickstoffhaltingen Mole-kfilen> (1891); and author of <Beitrage Zur Theorie der Affintat und Valenz) (1891; <Beitrage zur Konstitution anorganischer Verbind-

ungen) (1893); (Lehrbuch der Stereocheime) (1904) ; Peber die Konstitution und Kon-figuration von Verbindungen hoherer Ordung) (1914), *etc.*

WERNER, Anton Alexander von, Ger¬ man artist: b. Frankfort-on-theOder, 9 May 1843; d. 5 Jan. 1915. He studied at the Berlin Academy at Carlsruhe and later in Paris and Italy. He executed several state commissions after his return from Italy, and was commis¬ sioned to accompany the general staff of the Third Army corps in France during the Franco-Prussian War. He became professor at the Berlin Academy in 1875, and director there in 1875. His paintings, particularly those of the Franco-Prussian War, are of considerable his¬

toric value. Among his works are (The Capitulation of Sedan* ; <Meeting of Bismarck and Napoleon III at Donchery) ; Proclamation of the German Empire at Versailles) ; (The Congress of Berlin,* and several portraits of ex-Emperor William II.

WERNER, Friedrich Ludwig Zacharias,

German dramatist: b. Konigsberg, 18 Nov. 1768; d. Vienna, 17 Jan. 1823. After attending Kant's lectures in his native town, he became in 1793 chamber secretary in the Prussian service, and in 1805 obtained a government post in Berlin, but two years later he retired from the public service. In 1811 he joined the Roman Catholic Church, and in 1814 was consecrated priest at Aschaffenburg. Taking up his residence in Vienna, he became known as an eloquent preacher and later was appointed head of the chapter of the cathedral of Kaminiec. Werner's dramatic works reveal much of the power and pathos characteristic of Schiller, but overlaid to a constantly increasing extent, as he advanced in years, by mystical and undramatic elements. The chief of them are Pie Sohne des Thals) (1804) ; Pas Kreuz an der Ostsee) (1806) ; (Martin Luther oder die Weihe der Kraft* (1807); <Attila) (1808); <Wanda> (1810); Pie Weihe der Unkraft* (1813), a sort of retraction of the earlier play on Luther; Punigunde die Heilige) (1815); Per 24 Februar* (1815) ; Pie Mutter der Makkabaer*

(1820).

WERNERITE, an important rock-form¬ ing mineral, occurring in cleavable-granular, indistinctly-fibrous or columnar masses, or often in large, coarse crystals. These are tetragonal prisms terminated by pyramids, and show good prismatic cleavage. The hardness in 5 to 6 and specific gravity about 2.7. The most com¬ mon colors are white or gray; lilac is also quite abundant; occasionally greenish and brick-red varieties are found. Wernerite is a member of the scapolite group (q.v.) and is intermediate in composition between meionite and marialite, being a silicate of aluminum, calcium and sodium, with chlorine. It usually occurs in crystalline limestone. Among its many localities a few of the most important are Arendal, Nor¬ way; Bolton, Mass.; northern New York, On¬ tario and Quebec. The mineral was named (in 1800) in honor of the distinguished mineralogist, A. G. Werner.

WERNZ, vernz, Francis Xavier, Director—

General of the Society of Jesus: b. Rottweil, Wurttemberg, 4 Dec. 1842; d. 19 Aug. 1914. He studied philosophy and theology at several

Jesuit colleges and (1857) became member of the Society of Jesus after receiving holy orders at Fcldkirch, and study of canonical law at Dit-ton-Hall. In 1883 he was made professor and (1904) became principal of the Gregorian Uni¬ versity, Rome. He was commissioner for the codification of canonical law, counsel of the Congregation and other church matters. He wrote (Jus Decretalium ad Usum Praelec-tionunP (1898-1904; 2d ed. 1905).

WERTENBAKER, Thomas Jefferson,

American journalist and educator: b. Char¬ lottesville, Va., 1879. His father was Charles C Wertenbaker and his mother Frances Left-wich. He was educated at private and public schools, Charlottesville, Va., and at the Uni¬ versity of Virginia, receiving the degrees of PA. and Ph.D. from the latter institution. In 1906-07 Mr. Wertenbaker was telegraph editor of the Baltimore News, has taught at the Agri¬ cultural and Mechanical College of Texas, the Universit}ˆ of Virginia and Princeton Uni¬ versity. In 1916 he was married to Miss Sarah Rossetter Marshall of Lexington, Ky. At present he is assistant professor of history and politics at Princeton and editorial writer on the New York Evening Sun. He has published Patrician and Plebian in Virginia* (1910) ; and (Virginia under the Stuarts) (1914).

WERWOLF, wer'wulf, or WEREWOLF,

wer'-wulf, a human being transformed into a wolf, according to a belief which has prevailed in all ages and ignorant and superstitious com¬ munities. Herodotus, with great naivete, tells us that when he was in Scythia he heard of a people which once a year changed themselves into wolves, and then resumed their original shape ; "but,® adds he, "they cannot make me believe such tales, although they not only tell them, but swear to them.® But the lycanthropes of the Middle Ages, or loupsgarous, as they were called by the French,

were sorcerers, who during their wolfhood had a most cannibal appetite for human flesh. The Germans called them Wahrwolfe. Many marvelous stories are told by the writers of the Middle Ages of these wolf-men or loupsgarous, and numerous au¬ thentic narratives remain of victims committed to the flames for this imaginary crime, often on their own confessions.

It is certain that faith in the power of witches to assume the shape of animals, such as wolves, dogs, cats or horses, existed at a com¬ paratively recent time, and is probably not ex¬ tinguished yet in Western Europe. In the Balkan States, or part of them, belief in the werwolf flourishes to this day, along with the kindred vampire superstition. An old writer says that “the werewolves are certain sorcerers, who, having anointed their bodies with an oint¬ ment which they make by the instinct of the devil, and putting on a certain enchanted girdle, do not only unto the view of others seem as wolves, but to their own thinking have both the shape and nature of wolves, so long as they wear the said girdle; and they do dispose of themselves as very wolves, in worrying and killing, and most of human creatures.®

The werwolves were said to have in some instances a special hatred of religion and its devotees, and this, coupled with the charge of devouring human flesh, left no doubt as to the fate of anyone who fell under suspicion of

being a werwolf. The superstition itself was doubtless due in part to the brutal and savage aspect of human beings who, owing to melan¬ cholia or other forms of insanity, went wild in the woods — an occurrence not infrequent in remote districts in the Middle Ages. It was also in all probability connected with the belief, which was a prominent feature of mythology, in the power of the gods and inferior spirits to enter the bodies of animals, and with the doc¬ trine of transmigration of souls, common alike to the ancient Egyptians, the followers of Pythagoras and the Hindus. See Witchcraft.

WESEL, ya’zel, Germany, a town in the Rhine province of Prussia, on the right bank of the Rhine, at the mouth of the River Lippe, 35 miles north by west of Diisseldorf. The Rhine is here crossed by a railway and a pontoon bridge, and the Lippe by a railway and two other bridges. The fortifications were de¬ molished in 1890, except the citadel and four outer forts, one of which, Fort Bliicher, is on the left bank of the Rhine. After the World War these forts were ordered

demolished also. The Berlin gate, with statues of Hercules and Minerva, dates from 1722. The principal church was founded in the 12th century, and dates in its present form from 1521. It was restored in 1883-96. The town-hall, with a Gothic faqade, was completed in 1390. The other buildings and institutions include the Lower Rhine Museum, formerly a French church; the artillery barracks, formerly a Dominican mon¬ astery; a royal gymnasium and other higher educational institutions ; two hospitals, an or¬ phanage and the fortress prison. Soap, wire and cement are manufactured, and there are also sugar refineries, brick works, flour and oil mills, steam sawmills, etc., besides a trade in timber, grain, *etc.* There is ample harbor and quay accommodation. Wesel can be traced back to the 8th century. It was a member of the Hanseatic League, and adopted the Refor¬ mation in 1540. It came into Prussian pos¬ session in 1814. Pop. 25,000.

WESER, va'zer (Latin, Visurgis), a river of Germany formed by the junction of the Fulda and Werra at Miinden, between the provinces of Hanover and Hesse-Nassau. It flows tortuously first northwest, then north-northeast between Westphalia and Brunswick and after a circuitous northwestern course, traverses the town and the territory of Bremen, forms the boundary between Hanover and Oldenburg, at Elsfleth turns almost due north, and falls by a wide mouth, incumbered with sandbanks, into the German Ocean. Its whole course is about 480 miles. It is navigable by barges to some distance up both headstreams, but the practical limit of summer navigation is Hameln. The lower part, from Bremen to Bremerhaven, has been deepened and improved for large vessels.

WESLEY, wes'li, Charles, English clergy¬ man and hymn-writer, younger brother of John Wesley: b. Epsom, Lincolnshire, 18 Dec. 1707; d. London, 29 March 1788. He was educated at Christ Church, Oxford, and there he began, he says, "to observe the method of study pre¬ scribed by the university,® adding, "This gained me the harmless nickname of Methodist® — a word at first apparently without religious sig¬ nificance, and meaning one who affected method.

In 1735 he was ordained priest. Charles ac¬ companied his brother to Georgia, where he was not very successful, and having returned to England in 1736, became unlicensed curate of Saint Marv's, Islington, where he remained until 1739. ' In 1739-56 he was an active itiner¬ ant preacher. He differed ffom his brother on some doctrinal and other points, holding, for example, that perfection must be attained by a gradual process. After residing for some years at Bristol and Bath, he went to London in 1771. He is said to have written more than 1,000 hymns, of which very many came into general use. Consult the biographies by Jackson (1849) and Telford (1866), and Julian, dictionary of Hymnology) (1892).

WESLEY, John, English clergyman, founder of Methodism : b. Epworth, Lincoln¬ shire, 17 June 1703; d. London, 2 March 1791. He was a younger son of the Rev. Samuel Wesley (q.v.), and was educated at Charterhouse, and at Christ Church, Oxford. He took his degree in 1724, was ordained deacon in 1725 and became a Fellow of Lincoln College, in which he was appointed Greek lecturer and moderator. He was of a serious and religious turn of mind, and books which impressed him powerfully were the Hmitatio Christi) and Taylor's (Holy Living and Holy Dying. > He took priest's orders in 1728, and about the close of 1729 was called from acting as his father's curate to perform the duties of his fellowship in person. At Oxford he found an association of students of which his brother Charles was a member. It was known by various nicknames, among which were the Holy Club, the Bible Moths, the Sacramentarians and the Methodists. It appears that all the association did at this time to earn these opprobrious epithets was to meet on Sunday evenings to read the Scrip¬ tures, and on other evenings to read secular literature. John Wesley joined this society, which gradually became exclusively religious in its object, and highly ascetic in its tone. Its members fasted twice and communicated once a week, visited prisons and the sick, and engaged frequently in prayer, meditation and self-examination. Among the mem¬ bers were Hervey and Whitefield. At the time John Wesley joined it the society num¬ bered very few members, but it gradually in¬ creased, though it never became a large body. This induced him to decline his father's living at Epworth, that he might continue to exercise his influence at the university. During his residence at the university he became ac¬ quainted with Law, author of the (Serious Call to the Unconverted,* who exercised much in¬ fluence over him. In 1735 he accepted an invi¬ tation from General Oglethorpe to preach to the colonists of Georgia. He sailed on 10 Dec. with his brother Charles and a considerable body of Moravians. During his visit

to the colony he paid his addresses to Sophia Hopkey, niece of the chief magistrate of Savannah, or rather, as the story is told, received her ad¬ vances with favor, but ultimately declined to marry her. Miss Hopkey married a Mr. Wil¬ liamson, and Wesley, without assigning a rea¬ son, refused to admit her to the communion. Her husband threatened legal proceedings, which were not enforced, but Wesley, on ac¬ count of this event, left the colony, <(shaking the

dust from his feet.® He reached England 1 Feb. 1738, just as Whitefield, under whose preaching Methodism had made great progress, sailed for Georgia. At this time an important event took place in the inner religious life of Wesley. He was converted, according to his own account, about a quarter to 9 o'clock on the evening of 24 May 1738, at a meeting to which he had gone very unwillingly, while Luther's <Preface) to the Epistle to the Romans was being read. On 13 June he set out for Germany to visit Herrnhut. He met Count Zinzendorf at Marienborn, spent a fortnight at Herrnhut, and returned to England about the middle of September. Whitefield returned from Georgia soon after and became intimately associated with Wesley.. He began open-air preaching near Bristol in the following Feb¬ ruary and his example was soon followed by Wesley. On 11 Nov. 1739 Wesley first preached at the Foundry, a disused structure, formerly employed by the government for casting brass ordnance. This he enlarged and repaired and until 1778 it remained the Methodist head¬ quarters in London. Somewhat later he founded the <(United Society,® for week-day meetings. From the beginning of this society the incep¬ tion of Methodism is generally dated.

In July 1740 Wesley separated from the Mo¬ ravians on account of doctrinal differences. He soon afterward separated from Whitefield, but without a permanent personal breach. Wesley had now sole control of the religious body which adhered to him and he devoted his entire life without intermission to the work of its organization, in which he showed much practical skill and admirable method. His labors as an itinerant preacher were incessant. He had no permanent residence and never inter¬ mitted his journeys on account of the weather. He would ride from 40 to 60 miles in a day, read or wrote during his journeys and often preached four or five times a day. He married in 1750 Mrs. Vazeille, a widow with four chil¬ dren, but his habits of life, which he did not attempt to accommodate to his wife, produced an alienation, and they finally separated. Wes¬ ley held strongly to the principle of episcopacy, though not a believer in the

apostolic succes¬ sion; and he never formally separated from the Church of England. His collected works were published by himself in 1771-74 in 32 volumes. But in these only a part of his lit¬ erary output was included, his publications being of the most miscellaneous character, including grammars, an English dictionary, biographies, manuals of history, logic, medicine, which together brought him in large sums of money. In 1780 he commenced a monthly, the Arminian Magazine, which he edited during his life, and which after his death was merged in the Methodist Magazine.

Against pre-Revolutionary troubles in Amer¬ ica he directed (A Calm Address to our Ameri¬ can Colonies) (1775), (A Calm Address to the Inhabitants of England* (1777) and (A Serious Address) (1778). He also wrote many hymns, which are included in the (Poetical Works of John and Charles Wesley) (1868-72). A John Wesley bicentenary was celebrated in June 1903. Consult the biographies by Hampson (1791) ; Coke and Moore (1792) ; Whitehead (1791-93) ; ‘ Moore (1824-25) ; Southey (1820), with (Notes* by Coleridge and <Remarks> by Knox, in 1846;

Watson (1831); Tyerman (1870-71) ; Rigg (1875) ; Green (1881) ; and Overton (1891) ; Wesley’s (Journals } and (Correspondence,* parts of which are to be found in the various editions of his collected works, first published under his own editorship in 1771-74; Taylor’s (Wesley and Methodism) (1851) ; Urlin, (Wes-ley’s Place in Church History *(1870) ; a bibli¬ ography by Green (1896) ; Leger, A., (La Jeunesse de Wesley) (Paris 1910) ; Eayes, G., bet¬ ters of John Wesley* (1916) and standard his¬ tories of Methodism. See also Methodist Churches of the World.

WESLEY, Samuel, English clergyman and poet : b. Winterborne-Whitchurch, Dorset¬ shire, 17 Dec. 1662; d. Epworth, Lincolnshire, 25

April 1735. He was the father of Charles, John and Samuel Wesley, Jr. Graduaied irom Exeter College, Oxford, in 1688, he was or¬ dained priest in 1690, became rector of South Ormsby, Lincolnshire, in that year, and in 1695 of Epworth in the same county. He wrote (Life of Christ: An Heroic Poem) (1693); (Eupolis's Hymn to the Creator) (1778) ; and other works, including the posthumous (Dissertationes in Librum Jobi) (1735), *etc.* He is best known by the two hymns to be found in Methodist hymn books, (Behold the Saviour of Mankind> and (0, Thou, Who, When I Did Complain.*

WESLEY, Samuel, English hymn-writer, son of the preceding: b. Spitalfields, London, 10 Feb. 1691 ; d. Tiverton, 6 Nov. 1739. He was headmaster of Bundell's grammar school in Tiverton, in 1732-39. He did not embrace Methodism with his brothers, and wrote of it as ((a spreading delusion.® He was graduated from Christ Church, Oxford, in 1715 and took orders. He is best known by his hymns in the Methodist hymn book. Among the titles of in¬ dividual volumes by him were (Poems on Sev¬ eral Occasions) (1736) ; reprinted in 1808 and 1862; and (The Christian Poet* (1735). Con¬ sult Tyerman, (Life and Times) (1866).

WESLEYAN FEMALE COLLEGE,

Macon, Ga., an institution of higher learning for women, founded in 1836 as the Georgia Fe¬ male College. It was the world's first chartered college for women. It offers courses leading to the degrees B.A. and B.S. and there are be¬ sides a conservatory of music and a sub-col¬ legiate department. It is under Methodist supervision and has about 500 students.

WESLEYAN METHODIST CONNEC¬ TION OF AMERICA, known commonly as the Wesleyan Methodist Church. See Meth¬ odist Churches of the World.

WESLEYAN METHODISTS. See Methodism in America.

WESLEYAN UNIVERSITY, located at Middletown, Conn., was established in 1831 under the auspices of the Methodist Episcopal Church, being the first educational institution of collegiate grade established by that church in the United States. The institution, how¬ ever, has no organic relation with that church and its charter provides that it shall be abso- . lutely non-sectarian. The founders of the university were offered the buildings of the American Literary, Scientific, and Military Institute if an endowment of $40,000 were raised; the gift was accepted and its condition

complied with. In 1868-78 the university's material resources were largely increased and several new buildings erected; and in 1903-16 several additional buildings were erected and the endowment funds doubled; in 1919-20 a campaign for $3,000,000 for endowment and buildings was launched. Though founded and now maintained as a college for young men,, women students were admitted from 1872 to 1912. The curriculum was thoroughly liberal¬ ized in 1873 and since that date the range and number of courses have been steadily extended. Thorough revisions of the curriculum were again made in 1907 and 1919. Under the present plan the university offers courses leading to the degrees of B.A., Ph.B. and B.S. In each course requirements for generalization, apply¬ ing in the first two years, provide that the stu¬ dent shall pursue introductory courses in a con¬ siderable range of departments, under specifi¬ cations varying for the several degrees. For the work of the last two years a concentration requirement prescribes that the student shall select the major portion of his studies in a closely related group of departments in order to acquire a considerable mastery of at least one field of study. Departmental honor work is also provided to encourage still greater thor¬ oughness and to develop the student's initia¬ tive. Courses of graduate study are provided leading to the degrees of M.A. and M.S. There are two fellowship and 38 scholarship endow¬ ments totaling nearly $250,000, besides the scholarships established by the trustees for the remission of the tuition of students considered worthy of such assistance. The students main¬ tain various intercollegiate athletic teams be¬ sides carrying on a system of intramural ath¬ letics ; the control of athletics being vested in an athletic council on which faculty, under¬ graduates and alumni are represented. They also maintain a semi-weekly paper, musical, dramatic and departmental clubs. There are a Commons Club and 11 Greek letter fraterni¬ ties, which have their own houses where many of the students live. The university has a campus of more than 40 acres on high ground at the western edge of the city and overlook¬ ing the Connecticut River. The buildings in¬ clude North College, New Dormitory and two smaller buildings used as dormitories; South College, the administration building, and the only one surviving from the old military acad¬ emy; Memorial Chapel in honor of the stu¬ dents who gave their lives in the Civil War ; Rich Hall, containing the library (113,000 vol¬ umes, $107,000 endowment for book pur¬ chases) ; the Van Vleck Observatory, with a 12-inch equatorial telescope, soon to be re¬ placed by an 18-inch one; Scott Laboratory of Physics; Judd Hall, which houses a valuable museum and the other departments of

science; Willbur Fisk Hall, with recitation rooms ; and the Fayerweather Gymnasium. Plans are being prepared for the erection of a chemistry laboratory in the near future. The productive endowment in 1919 was $2,575,000, and the in¬ come was $243,000. In the college year 1919— 20 the students numbered 595 and the faculty 52 in addition to the president, William Arnold Shanklin, LL.D.

WESSEL, ves'sel, Johann (surnamed Gansefort (Dutch, Goesevort), Dutch theo-

logian: b. Groningen, 1419 or 1420; d. 1489. He passed the latter part of his life in retire¬ ment in his native country, part of the time in convents. He was a decided opponent of the scholastic theology and in intimate relations with some of the prominent humanists, as Agri¬ cola and Hock, yet in his own views leaned strongly toward mysticism. He regarded Chris¬ tianity as something entirely spiritual, con¬ fined to a man's own heart and God. The Scriptures, according to him, are the living source of all true faith; the Church is based upon a compact ; there is a general priesthood of the rational universe; faith is to be reposed only in an orthodox pope and not in every council; sin can be forgiven by none but God; excommunication has only an external influ¬ ence; indulgences refer only to ecclesiastical penalties; the true satisfaction for sin is a life in God; and purgatory is nothing but the purifying influence of a longing after God. After his death some of his works were burned as heretical; his 'Farrago Rerum Theo- logicarum) was published with a preface by Luther (1522). The most complete edition of his works is that edited by Lydius (1617). Con¬ sult Muusling, 'Commentatio Historica-Theo- logica de WesselP (1831) ; Ullmann, 'Reformatoren vor der Reformation) (1847).

WESSEX, wes'eks, England, a former kingdom, from the 6th to the 9th century, one

the most important of the Saxon heptarchy, and that in which the other kingdoms were ultimately merged in the reign of Egbert in 827. Wessex, signifying West Saxons, as an independent unit of the

heptarchy, occupied a territory now comprised in Dorset, Wilts and parts of Somerset and Hants. See Egbert; England.

WEST, Andrew Fleming, American phi¬ lologist : b. Allegheny, Pa., 17 May 1853. He was graduated at Princeton University in 1874 and from 1883 he was professor of Latin there, while in 1901 he became also dean of the graduate school. He served for many years as chairman of the American School for Clas¬ sical Studies at Rome, Italy; is a member of the National Institute of Arts and Letters; and in 1901 was president of the American Philo¬ logical Association. He received the degree D.Litt. from Oxford University in 1902. Be¬ sides writing numerous articles on university and classical education in educational periodi¬ cals he edited Terrence's <Andria) and 'Heau-tontimoroumenos) fl888) ; and (The Philobi-blon of Richard de Bury) (1889); and is author of (A Life of Aluin) (1902); (A Latin Grammar) (1902); 'American Liberal Education) (1907), *etc.*

WEST, Benjamin, American painter: b. Springfield, Chester County, Pa., 10 Oct. 1738; d. London, 11 March 1820. After some instruc¬ tion from William Williams, a Philadelphia painter, and having painted 'The Death of Socrates) for a gunsmith, he established him¬ self as a portrait painter at Philadelphia at five guineas per portrait and subsequently followed the same profession in New York. In July 1760 he visited Rome, whence he proceeded to Florence, Bologna, Venice and Parma. Re¬ turning to Rome, he painted (Cimon and Iphi-gcnia and (Angelica and Mcdora.) He was elected member of the academies of Florence,

Bologna and Parma, and, visiting England in 1763, was so well patronized that he determined to make it his future residence. He executed a historical painting of (Agrippina Landing with the Ashes of Germanicus) for Drummond, archbishop of York, who introduced him to George III. The king became his steadfast patron and gave him commissions for many years. In 1772 he was made historical painter to the king, in 1790 surveyor of the royal pic¬ tures. He was one of four selected to draw up a plan of the Royal Academy, was one of the original members, and there exhibited his 'Death of General Wolfe) (now in the Grosvenor gallery, London) in 1771. In this canvas West departed from the custom of the artists of the day of giving the characters Greek or Roman costumes. Reynolds, who had endeav¬ ored to dissuade him, later said, <(I retract my objections. I foresee that this picture will not only become one of the most popular, but will occasion a revolution in art.)) Woolett's plate after this work had

the largest sale of any engraving of modern times. West painted a series of historical works for Windsor and for the chapel a series on the progress of revealed religion, divided into four series, antediluvian, patriarchal, Mosaic and prophetic. On the death of Reynolds in 1792 he was unanimously elected president of the Royal Academy. When George III became insane the order for painting the religious series was abruptly recalled and the pay stopped. West had finished 28 pictures and sketched the entire series. He afterward painted a number of religious and historical pictures on very large canvases. Among them may be noticed (Christ Healing the Sick) (in the National Gallery), the (Crucifixion,) the 'Ascension) and 'Death on the Pale Horse) (Pennsylvania Academy). The (Battle of La Hogue) is among the best of his historical pieces. West's pictures num¬ bered about 400. They are chiefly of heroic size and display much inventive power and great skill in composition. But they are monot¬ onously reddish-brown in coloring, and, despite their facility, . lack spirit and imaginative value. His position in early American art has won for him a recognition somewhat in excess of his actual merit. Consult Galt, (Life and Studies of Benjamin West) (1820) ; Tuckerman, (Book of the Artists) (1867), and various dictionaries of art.

WEST, James Harcourt, American pub¬ lisher and Unitarian clergyman: b. Melrose, Mass., 13 Jan. 1856. He was educated at Tufts Divinity School, was engaged in printing and as a newspaper correspondent in 1873-84, and in 1884-94 was minister in charge of various Uni¬ tarian and Congregational societies. He founded the New Ideal Magazine in Boston in 1889 and was engaged as a publisher for some years. His writings include 'Holiday Idlesse and Other Poems) (1880); 'Uplifts of Heart and SouP (1887); 'The Complete Life) (1888); 'Visions of Good — Poems of Freedom) (1892); (In Love with Love) (1894) ; 'Life Verses) (1905) *etc.*

WEST, Oswald, American public official: b. near Guelph, Ontario, Canada, 20 May 1873. He was educated in the public schools and from 1889 to 1900 was clerk and paying teller of the Ladd and Bush Bank of Salem' Ore. In 1900-03

he was paying teller of the First National Bank of Astoria, Ore. ; in 1903-07 was State land agent of Oregon and in 1907-10 member of the Oregon Railroad Commission. He was gov¬ ernor of Oregon from 1911 to 1915, resum¬ ing his law practice at Portland. In 1918 he was Democratic nominee for the United States Senate, but failed of election.

WEST, Paul, American journalist and play¬ wright: b. Boston, 26 Jan. 1871 ; d. 30 Oct. 1918. Graduated Peekskill Military Academy in 1888 and soon engaged in literary work. Of his mu¬ sical comedies cThe White HenJ is perhaps the most popular. He was a prolific writer of songs, short poems, magazine articles and news¬ paper stories. The files of Everybody's, Cosmo¬ politan and Munsey's magazines contain a vast amount from his pen. In 1898 he made a per¬ manent connection with the New York World. He wrote (The Love Waltz,' (At the Waldorf, > 'BirdlandC (The Twentieth Century, } (The Song Shop, 5 (Short Letters of a Small Boy.*

WEST, Thomas, Baron Delawarr or Del¬ aware, English colonial governor of Virginia: b. 9 July 1577 ; d. at sea off the Atlantic Coast of America, 7 June 1618. He was educated at Queen's College, Oxford, in 1597 wras returned to Parliament for Lymington, fought in the Low Countries and in Ireland, in 1609 became a mem¬ ber of the council of the Virginia Company and in 1610 was made first governor and captain-general for life. On 10 June he arrived at Jamestown, where he soon restored order and comparative prosperity. He established a post at Riquotau (now Hampton), and built two forts. At the time of his coming want and mis¬ management had almost compelled the settle¬ ment to disperse. By June 1611 he was again in England, where he printed a very favorable report as (The Relation of the Right Honorable the Lord De-La-Warre.* In March 1618 he set sail once more for Virginia, but he died on the voyage. Consult Neill, (The Early Settlement of Virginia) (1878) ; Proceedings of the Vir¬ ginia Company* (Virginia Hist. Soc., 1888).

WEST (THE) AS A FACTOR IN AMERICAN POLITICS. The great West rather 'than the Atlantic Coast is the true point of view in American history — in which the controlling influence of the frontier is the strongest factor. The West has been Amer¬ ica's greatest problem —

the problem of ex¬ pansion by winning a series of frontiers, the last of which marked the completion of the conquest of the continent. Its opportunity of new lands, its presentation of new lessons and duties, its training in adaptation to new condi¬ tions and in the creation of new institutions to serve new needs, and its new optimistic visions and ideals, enabled Americans to achieve a larger conception of American destiny and democracy. It has been a constructive force of the highest significance in the evolution and adaptation of political organs in response to changed environment. In the face of Eastern opposition which feared its influence might control the destiny of the republic, its forest philosophy became the basis of a revised Amer¬ ican democracy. James Bryce in his (American Commonwealth *declared that (<the West is the most American part of America.**

The earliest influence of the West as a fac¬ tor in American politics appeared in the <(con¬

tests** of the interior rural element of the colo¬ nies against the older settlements nearer the coast, and later reappeared in each political di¬ vision in political contests of the back-country frontier against the dominating tidewater re¬ gions which long retained a predominant influ¬ ence in the State governments. Among the early illustrations of frontier influence in Vir¬ ginia were Bacon's rebellion of 1676 and the later increase of small farmer landholders of the interior in the administration of Governor Spotswood by accessions of immigrants and in¬ dented servants, resulting in complaints of the tidewater planters. A later illustration was the War of the Regulation in the back counties of North Carolina in 1771.

Increasing in importance by settlements made in opposition to the king's proclamation line, the western frontier became the rear guard of the Revolution and the advance guard of the republic, influencing the negotiations of 1782-83 which established the western boundary at the Mississippi. A large western territory, whose ownership was a source of both diplomatic and interstate controversy, fortunately (through treaty and subsequent state cessions) became national public domain, the first property of the new nation, constituting a common interest and the first tangible sign of national unity.

At the close of the Revolution the frontier conflicts with the east coast were especially noticeable in western Pennsylvania, western Vir¬ ginia and in the transmontane territory of North Carolina which after the Revolution demanded independent statehood, appealing to the

record of their conquest of the wilderness from sav¬ agery to civilization. In Massachusetts the con¬ test was marked in the significant movement known as Shay's Rebellion of 1786 which awak¬ ened the apprehension of conservative men in the constitutional convention and resulted in re¬ strictions on suffrage which were removed in time only by the development of the interior regions.

In the new constitution frontier influence ap¬ peared in the liberal territorial relations and equality of statehood for western communities whose desire for political autonomy had been expressed in various efforts before Congress ob¬ tained full control of western lands claimed by the various tidewater State governments.

Jefferson, born on the frontier region of his day, became the prophet of democracy, and, by a series of legislative measures in Virginia, pre¬ pared the way for the larger influence and domi¬ nance of the interior class — which, however, was only slowly attained by the slow but steady tide of settlements farther and farther toward the interior.

After the Revolution the advancing frontier of transmontane settlements marked the growth of a new and greater West more influ¬ ential in the nation's destiny. By 1800 the trans-Appalachian region had become the home of about one-tenth of the population. In the decade before 1800 it exercised an important in¬ fluence in foreign relations in connection with the foreign plans to acquire control of the Mis¬ sissippi Valley and the Great Lakes. In the decade and a half after 1800 it became a more powerful influence, notably in the purchase of Louisiana in 1803 and the War of 1812 which insured new areas for advance in three direc¬ tions.

Under its early vision of manifest destiny it successfully resisted the obstacles which checked or restricted its advance. From its early posi¬ tion on the Ohio Valley, as the flying column of the nation, it served as an entering wedge to the possession of the Mississippi Valley. The acquisition of Louisiana, dictated by frontier needs, marked the

downfall of a policy of strict construction and furnished a new area for na¬ tional legislation. It furnished new opportuni¬ ties for the rise of younger commonwealths which shook the older ones out of their self-centred life, and for the rise of new problems which broadened the processes of nationalization and greatly influenced questions of politics.

In turning the scale in favor of the War of 1812 the West gave voice to the newer nation¬ ality of the newer States.. Meantime, the pos¬ sibilities of its great historic waterway furnished the incentive for Fulton's successful invention of the steamboat.

The steady increase of westward extension and the consequent increase of western ideals, between 1800 and 1820, alarmed the established classes of the . East who — already sighting a new problem in the labor populations of its cities which began to assert a determination to share in government — saw in the democratic tendencies, of the newly-created frontier States, contagious influences which were already blow¬ ing from the West to liberalize the more con¬ servative constitutions of the East.

In the years following the War of 1812, aided by the revolutionizing effect of steam navigation on transportation, and with its prac¬ tical backwoods ideal of democracy, the phe¬ nomenal rise of the new West was the most significant fact in American history. For the half decade after 1815 it furnished a new State each year, carrying the wedge of settlement up the Missouri to its bend at the junction with Kansas on the edge of the traditional "American desert® where the apex of the frontier lines halted for almost three decades awaiting the ad¬ vance of the right and left flanks which the apex had so far outdistanced.

Thus, by 1820, the West had nine States whose achievement in the extension of more liberal political ideas in American democracy re¬ acted upon the older and more conservative States of the East, both by example and by ac¬ tual pressure from loss of population through emigration resulting from the more attractive conditions of political equality in the West.

On its advancing frontier depended largely the growth of nationalism and the evolution of American political institutions. Its economic influences after 1815 made it a nationalizing force in the field of domestic policy, as shown in a series of congressional legislative acts which increased the power of the Federal gov¬ ernment. In legislative action and in the eco¬ nomic and social characteristics, it stood in op¬

position to the sectionalism of the coast. In the problems of internal development and eco¬ nomic legislation, in the period between 1815 and 1860, it held the balance of power and set the course of national progress.

By 1822 it had a congressional voting power which gave to its interests and ideals a powerful if not a controlling voice in national coun¬ cils, and with its strong nationalistic feeling it had a self-confidence untroubled by any doubts of its capacity to rule. Increasingly reacting

upon the older sections, by its competition and attraction for settlers, it gradually became a dominant force upon the economic and political life of the nation. Its rising commerce and de¬ mand for eastern manufactures attracted the attention of eastern ports (New York, Philadel¬ phia, Boston and others) which entered a race of competition for control of trade through de¬ velopment of State systems of internal improve¬ ments in transportation — a rivalry for access to new tributary spheres of influence whose latest phase appeared in railroad legislation.

The result of its influence was liberal con¬ struction of the constitution and a larger na¬ tionality. Its nationalizing tendency trans¬ formed the democracy of Jefferson into the na¬ tional republicanism of Monroe and later into a new democracy which marked the triumph of the frontier as an effective force in the nation.

Finally in 1829, it elected to the Presidency its typical Scotch-Irish representative, Andrew Jackson, who had become the hero of the whole West in the War of 1812 and by subsequent In¬ dian fighting, and who especially became the mouthpiece of the Western popular will in his assaults upon the national bank as an engine of aristocracy and in his denunciation of nullifica¬ tion in South Carolina. Although its triumph marked the end of an old era of trained states¬ men, and a new era of the Spoils system in politics and of lax financial integrity (illustrated by wildcat banking), it prepared the way for a broader and better democracy whose first great representative was the pioneer rail-splitter, Abraham Lincoln of the old Northwest.

From 1816 to 1832, under the principle of the American system, it turned the scale in favor of protective tariff bills. Under Jackson its characteristic financial policy was expressed in the opposition to the United States Bank.

Its persistent influence induced Congress to abandon its earlier policy of forbidding settle¬ ments by “squatters® on unsurveyed lands and periodically to enact emergency indemnifying pre-emption acts; and, finally, in 1841, it suc¬ ceeded in securing a general pre-emption law — the forerunner of the later Homestead Act of

1862.

Meantime through experience and struggle the West caught the vision of continental des¬ tiny. The call of a farther West stimulated new explorations, resulting in continental trails, new problems of long distance government for Ore¬ gon and a new California, and new Indian prob¬ lems.

In the decade after 1840, its advancing fron¬ tier influenced diplomatic relations in regard to Texas, Oregon and California, and bore a close relation to the political contests in regard to slavery.

Fostered by the liberal Federal policy which sold land cheaply for “squatters® homes and gave it freely to aid the construction of roads and canals, it received new impetus from the picturesque and spectacular rush to California which so rapidly grew to Statehood and precipi¬ tated new problems in American politics.

In 1848 its political influence aided the Demo¬ crat nomination of Cass for the Presidency, and also the nomination of Van Buren by the newly-formed Free Soil party. In 1860 it fur¬ nished for the Presidency two candidates _

Douglas, whose support was in the border zone, and Lincoln, whose strength was in the north-

ern zone. After 1860, its economic and political power continued to increase.

Although early regarded as the child of the South, the Middle West of the Ohio Valley re¬ gion, with its commerce gradually diverted by the lakes and by rail to the East, became grad¬ ually less dependent upon the South and disap¬ pointed the hopes of Calhoun and others who planned too late to control it, politically as well as commercially, by the construction of a rail¬ road from Charleston via Chattanooga to west¬ ern terminals at Cincinnati and at Mobile.

In the critical issues presented by the War of Secession, it and the Upper Northwest fur¬ nished the men and the long trains of provisions which drove back the three successive western lines of Confederate defense, opened the Missis¬ sippi, pierced the southern gateway of the Ap¬ palachian Valley at Chattanooga and drove back the Confederates to Atlanta. With deter¬ mination that the control of the Mississippi must belong to only one nation, it was a power¬ ful force in preserving the integrity of the Union against the attacks of the slave-holding aristocracy — as it had been in shaping the de¬ velopment of the nation. Its operations were considerably aided by the attitude of the Ap¬ palachian frontier region of retarded develop¬ ment — and especially by the new common¬ wealth of West Virginia, a child of the war, which by keeping the Baltimore and Ohio Rail¬ way open for troop transportation between East and West, was a prominent factor in pro¬ tecting Washington and in saving the Union.

Increased Western political influence after the war was partly due to the leadership of re¬ turned soldiers. Following the victory of the Union against disunicjn, new calls of the far¬ ther West finally resulted in the construction of Pacific railways with Federal aid, in a com¬ plete change of Indian policy (by the acts of 1871 re-enforced by the Dawes ((Indian Land in Severalty® Act of 1887), and in a Greater West whose territory has been formed into self-governing commonwealths marking the extinc¬ tion of the last frontier.

Between 1870 and 1890 the importance of the West increased with the disappearance of the wilderness in the rapidly diminishing areas between eastward and westward moving fron¬ tiers which finally merged. In the Granger legislation of 1873, a phase of political discon¬ tent, looking to the government for relief, the West was sustained by legal decisions which prepared the way for the later Interstate Com¬ merce Commission and subsequent extensions of Federal regulations of interstate commerce. Another important phase of Western influence, having its origin in a period of declining agri¬ cultural prices contemporaneous with an in¬ creased production of silver mines of the Rockies, expressed itself in the Bland-Allison Silver Law of 1878 and the Sherman Silver Purchase Law of 1890. In the

Populist move¬ ment, a later phase of discontent especially prominent in States of the later frontier, the West expressed a large faith in the power of the national government to cure various evils by government control or ownership of public utilities, expansion of national currency and government regulation of other economic con¬ cerns of life in the interest of the common people.

By 1890 its political influence was increased

by a group of six new frontier States (North Dakota, South Dakota, Montana, Washington, Idaho and W yoming) in proximity to the new railroads of the farther Northwest, and it espe¬ cially appeared as a factor in the revolutionizing of the Democratic party under W. J. Bryan in the election of 1896. The failure of the Western political revolution was due in large part to the older States of the Middle West which, having become adjusted to conditions, had ceased to be discontented, were no longer political enemies of the East and refused to favor free silver. Later, in 1912, after leading his party to defeat three times, Mr. Bryan, as the champion of western interests, reached the height of his spectacular party leadership in the strategy of the Democrat convention at Baltimore which resulted in the nomination of Woodrow Wil¬ son on a platform acceptable to the West. The West was thus the most potent factor in Wilson's nomination, and four years later it sent him to the White House a second time; California was the pivotal State in that election and while it returned Hiram Johnson, a Progres¬ sive Republican, to the Senate, it chose Demo¬ cratic presidential electors and their votes gave President Wilson a majority in the Electoral College. In 1898, after the extinction of the last continental frontier, the West found for its ex¬ pansive spirit new expression in the overseas expansion which marked America's maturity as a world power; and later, with its discontent relieved by a tide of prosperity, it exerted a new national influence illustrated in the political <(insurgency® movement and in the subsequent Progressive movement for direct popular gov¬ ernment and political control of economic life.

In its latest development the West, in the face of new conditions, was forced to abandon its idea of individualism in favor of coopera¬ tion and governmental activity under the power¬ ful arm of national authority — which was re¬ garded as necessary for the construction of ex¬ pensive irrigation works for utilization of the arid lands, and to protect public resources from absorption by the captains of industry.

In the recent World War, the West, in spite of its earlier indifference and its strongly anti-American and pacifist areas, was awakened by the stirring speeches of Roosevelt and President Wilson, and proved loyal to duty in a great cause.

The frontier West exerted a useful influ¬ ence in producing in American life a renewal of the principles of free government upon which the republic was founded, in keeping alive the principles of democracy in the midst of great accumulations of wealth, in widening the scope of the national government in meet¬ ing popular needs for ((public improvements,® in. determining a liberal public land policy based on the idea of homesteads for a democracy of small landholders, in establishing systems of free education culminating in coeducational State universities and in furnishing a reason for the maintenance of a small defensive force of national troops. It provided the way to the fortunate erection of logical and permanent boundaries of the republic at the borders of the Pacific. After the achievement of continental occupation it continued the movement for ex¬ tension of American influence by advocacy of a vigorous foreign policy, a revived merchant marine and interoceanic canal. Its latest

influence appears in the recent movements for extension of popular participation in govern¬ ment through direct primaries, initiative and referendum and woman suffrage — movements widely popularized by the sympathetic attitude of President Roosevelt who understood the spirit of the West by a period of residence and by close study of its history and problems.

Bibliography. — Brigham, Albert P., (Geo¬ graphic Influences in American History) (1903) ; Buck, S. J., (Granger Movement (1913) ; Co¬ man, K. C., (Economic Beginnings of the Far West) (1913) ; Dewey, D. R., financial His¬ tory of the United States} (1909) ; Fite, E. D., (Social and Industrial Conditions in the North during the Civil War> (1910) ; Garrison, G. P., (Westward Extension) (1906) ; McElroy, R. M., (The Winning of the Far West) (1914) ; Mc-Vey, F. L., (Populist Movement (1896) ; Ogg, F. A., (Opening of the Mississippi

(1904) ; Paxson, F. L., (Last American Frontier) (1910); Roosevelt, Theodore, (Winning of the West) (1889-96) ; Sparks, E. E., (National Development (1907) ; Turner, F. J., Mist of References on History of the West) (1913) ; Turner, F. J., (Rise of the New West) (1906) ; Turner, J. F., Significance of the Frontier> (Am. Hist. Rep. 1903) ; Treat, P. J., 'National Land System > (1910) ; Winsor, Justin, (Western Movement (1897).

James Morton Callahan, Professor of History and Political Science, West Virginia University.

WEST ALLIS, Wis., city in Milwaukee County, on the eastern outskirts of Milwaukee, and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads. Ii is an industrial suburb of Milwaukee and manufactures automobiles, trucks, engines, ma¬ chinery, steel castings, tools and woodwork. Pop. (1920) 13,765.

WEST BAY CITY, Mich. See Bay City.

WEST BEND, Wis., city, county-seat of Washington County, on the Milwaukee River, and on the Chicago and Northwestern Railroad, about 35 miles north of Milwaukee. It is in an agricultural and stock-raising region. The chief manufactures are flour, wagons, harnesses, spokes, hubs, aluminum ware and pocket-books. It has grain elevators, machine shops, a foun¬ dry and a creamery. There are six churches, public and parish schools and one bank. Pop.

(1920) 3,378.

* WEST BERWICK, Pa., borough in Co¬ lumbia County, on the Susquehanna River, a suburb of Berwick, 24 miles from Wilkes-Barre, and on the Delaware, Lackawanna and Western Railroad. There is a car and foundry plant here. Pop. about 5,512.

WEST BLOCTON, Ala., town in Bibb County, 40 miles southwest of Birmingham, on the Louisville and Nashville, the Mobile and Ohio and the Southern railroads. Its principal industries are coal mining and lumbering. It has a savings bank, four public schools and municipal waterworks. The value of its tax¬ able property is $500,000. The receipts and expenses average $6,000 annually. The govern¬ ment is vested in a board of aldermen. Pop.

(1920) 1,023.

WEST BROMWICH, brum'ich, England, a manufacturing town in Staffordshire, between Wednesbury and Birmingham. The principal buildings include the town-hall with a massive tower ; a number of fine modern churches ; sev¬ eral chapels of different denominations; public schools ; an institute, art and technical schools, a free library and a hospital. There is a fine public park. West Bromwich has a share in the mining and manufacturing industries of this busy district and has grown largely of late years, carrying on the manufacture of iron goods of various kinds, smelting, brass-found¬ ing, *etc.* It was an important centre of arms manufacture during the World War. Pop.

70,000.

WEST CHESTER, Pa., borough, county-seat of Chester County, on the Wilmington and Baltimore and the Philadelphia railroads, about 27 miles west of Philadelphia. It was originally called Turk's Head, but in 1786 the county was divided and the name was changed to West Chester when it was made the county-seat. The new county was called Delaware, but it retained the old county-seat, Chester. West Chester has a number of manufacturing estab¬ lishments, among which are carriage factories, creameries, gas engine works, sash and door factories and manufactories of hosiery, um¬ brella tags and wood products. The principal public buildings are the Chester County Hospital, the county courthouse, prison, theatres, a large convent and the municipal buildings. Marshall square contains a soldiers' monument and a handsome fountain. The educational institu¬ tions are a State normal school, Villa Maria Academy, Friends' Select School, The Darling¬ ton Seminary, West Chester Business College, a public high school established in 1865, public and parish schools, a public library, a law library and three school libraries. There are eight banks and a daily newspaper. Pop. 11,717.

WEST FARNHAM, Canada. See Farnham.

WEST FLORIDA, that part of the English possessions in Florida in 1763 west of the Apalachicola River, bounded on the west by Lake Pontchartrain, the Mississippi and Lake Maurepas and on the north by the 31st parallel of latitude. In 1763 it was made into a sepa¬ rate administration district. The governor had the power of convening general assemblies. Laws were made by the governor with the approval of an advisory council and the gen¬ eral assembly. During

the Revolutionary War West Florida sided with the British Crown; in 1780 it was attacked by the Spaniards and by 1782 the British were driven out. By the Treaty of 1783, in which England acknowl¬ edged the independence of the United States, Spain was permitted to retain Florida but a secret clause of the treaty made the southern boundary of the United States the 31st parallel instead of the line 32° 28' as had been fixed in February 1764. Spain refused to evacuate the portion between the two lines and a bitter dispute followed with the United States which nearly resulted in hostilities. Finally Pinck¬ ney succeeded in negotiating a treaty by the terms of which the 31st parallel was acknowl¬ edged as the boundary of West Florida, while the United States assumed all claims against

Spain by citizens of Georgia for spoliation, *etc.* A new disagreement with Spain developed in 1803 when the United States claimed that part of West Florida west of the Perdido River as part of the Louisiana Territory which it had just, purchased from France. The dispute dragged on until in 1810 the part of West Florida between the Perdido and the Missis¬ sippi declared its independence of Spain and became the Republic of West Florida. This mushroom State was seized by the United States and law and order were restored to the dis¬ tracted region. The part west of Pearl River became part of the Territory of Orleans. In 1812 West Florida was added to Louisiana and the part between the Perdido and Pearl riv¬ ers was annexed to the Territory of Missis¬ sippi. In 1812 English troops had their base in the Floridas in their operations against the United States. Jackson drove them out in 1814 and took Pensacola. During the Semi¬ nole War, Jackson again occupied a part of West Florida. The province was administered by United States officials appointed by Jackson until 1819 when it was returned to Spain. In 1819-21 negotiations for the purchase of Florida were undertaken by the government of the United States. On 17 July 1821 Spain ceded all her claims to the United States and in 1822 the portion of West Florida east of the Perdido was incorporated in the Territory of Florida. Consult Fairbanks, G. R., his¬ tory of Florida) (1871) ; Fuller, H. B., Pur¬ chase of Florida) (1906) ; Green, E. L.,

(History of Florida) (1898).

WEST HAMMOND, Ill., city in Cook County, on the Calumet River, a southeastern suburb of Chicago. It has a hospital and a high school and there are glue factories. Pop.

(1920) 7,492.

WEST HARTFORD, Conn., town in Hart¬ ford County, on the southwestern outskirts of Hartford. It has an orphanage, an old people's home, a high school and two parks. The Mount Joseph Seminary is situated here, as is the Saint Augustine Normal School. The public library is a memorial to Noah Webster, who was born here. The town is a shipping centre for the surrounding district, which is interested in tobacco culture, dairying and truck garden¬ ing. Pop. (1920) 8,854.

WEST HAVEN, Conn., village and former borough in New Haven County, now a part of Orange township ; it is situated on Long Island Sound and New Flaven Harbor, on the southwestern limits of New Haven and on the New York, New Haven and Hartford Rail¬ road. It is principally a residential town, has a high school, two sanitoria, the county hospital and orphan asylum, an inebriates' home and the Florence Crittenden Home. There are manu¬ factures of automobiles, safes and fertilizers. Pop. (1920) 12,369.

WEST HAZLETON, Pa., borough in Lu¬ zerne County, a suburb of Hazleton, 22 miles southwest of Wilkes-Barre, on the Pennsyl¬ vania Railroad and on the Wilkes-Barre and Hazleton Electric Railroad. Its chief industry is a foundry. There are coal mines in the vicinity. Pop. (1920) 5,854.

WEST HOBOKEN, N. J., town in Hudson County, enjoying the distinction of being the largest community under town government in the United States, adjoining Hoboken and Jer¬ sey City, about one mile from the Hoboken ferry on the Hudson River. It is on elevated land which rises somewhat abruptly from the land along the river at Hoboken. It is a resi¬ dence place for workers in New Jersey and New York City, and has considerable local manufacturing, especially silk-mills, embroidery works, rubber and feather works. In 1918 the town had 250 manufacturing establishments, which were capitalized for about $6,000,000, the silk factories alone being capitalized for $^1

,000,000. The yearly production is estimated as $7,000,000. The principal public buildings are Saint Michael's Monastery (Passionist Fathers) and the Dominican Convent. The educational institutions are a theological school at the monastery for their own members, a high school established in 1897, public elemen¬ tary schools and two large parish schools. There are prosperous banks and two news¬ papers. Pop. (1920) 40,068.

WEST HOMESTEAD, Pa., borough in Allegheny County, on the south bank of the Monongahela River, a suburb of Homestead, opposite the eastern portion of Pittsburgh and on the Baltimore and Ohio Railroad. There are steel-mills, brickworks and manufactories of machinery, axles and car wheels. Pop. 3,009.

WEST HOUGHTON, ho'ton, England, a township in Lancashire, five miles west-south¬ west of Bolton, with manufactures of silk and cotton and coal-mining.

WEST INDIA ISLANDS or WEST INDIES. The archipelago that includes the Great and Lesser Antilles and the Bahamas has a total land area of bout 92,000 square miles — more than twice the size of Pennsylvania; the islands are, however, dispersed far and wide over a region continental in size, which extends from lat. 10° N. to 28° N. and from long. 58° W. beyond 85° W. For the geographical subdivi¬ sions of the main groups, see Antilles and Bahamas; for the geologic relations of some of them to the mainland portions of the Antil¬ lean continent, see Central America and Ca¬ ribbean Sea ; and for the characteristic features of the Great Antilles see the separate articles Cuba, *etc.* •

To pass from a western to an eastern point in this archipelago, one may be obliged to sail about 2,000 miles; and to pass from its north¬ ernmost to its southernmost island one must sail more than 1,500 miles. This wide disper¬ sion is the fact which should be first noted. The next step is to realize fully the disjunctive political conditions, the results of the distribu¬ tion of the islands among a number of compet¬ ing nations. Let us now consider the political subdivisions. The British possessions are : The Bahamas, including 20 inhabited and many desert islands; Jamaica, with Turks and Caicos Islands, *etc.* ; Windward Islands, including Grenada (the governor's residence), Saint Lucia, Saint Vincent and the Grenadines ; Bar¬ bados, east of the Windward Islands; Trinidad and Tobago, near the South American coast; and the Leeward Islands, comprising Antigua

(with Barbuda and Redonda), the Virgin Islands, Saint Kitts (Saint Christopher), Nevis, Anguilla, Dominica and Montserrat. The total area of the British West India islands is 12,631 square miles (4,431 in Jamaica and its dependent smaller islands). The exchange of ratifications of a treaty between Denmark and the United States on 17 January 1917 had the effect of transferring to the latter the small islands of Saint Thomas, Saint Croix or Santa Cruz and Saint John, with a total area of 139 square miles and a total population of about 27,000. The amount paid by the United States for these Danish islands (the possession of which in¬ sures substantial control of the Virgin Passage through the Lesser Antilles) was $25,000,000. French possessions are Guadeloupe and its de¬ pendencies, and Martinique, their total area being about 1,073 square miles and total popu¬ lation about 406,430, combined exports about $9,400,000 and imports about $8,300,000. A French and Dutch possession is the island of Saint Martin, 38 square miles in area, of which it has been well said : «The political complex¬ ion of Saint Martin is peculiar. Seventeen square miles of the northern section belong to France and the rest to Holland, while the set¬ tlers, largely blacks, are principally British, who outnumber both the Dutch and French. About 3,000 of the inhabitants are in the French por¬ tion of the island, and 5,000 in the Dutch® (Hill's Cuba and Porto Rico, etc.) ; further¬ more, ((each maintains an administrative force as large as that of the State of Texas.® The Dutch possessions — fragments on opposite sides of the Caribbean Sea — are the islands of Curasao, Aruba, Bonaire or Buen Ayre, Saint Eustache, Saba and part of Saint Martin, as just stated. Venezuelan possessions are some of the islands, not appropriated by the English or Dutch, in the east-and-west line between Trini¬ dad and the Gulf of Maracaibo. The list is completed by adding Cuba and the Isle of Pines, a republic, subject in certain matters to the control of the United States: Porto Rico, with the small neighboring islands, a possession of the United States ; and Santo Domingo, or Haiti, with adjacent small islands. Mr. Hill's observation in 1898 was that, «As we sail down the eastern islands, hardly a score in number … we find five foreign flags and

no less than a dozen distinct colonial govern¬ ments … with no

between them, or even cooperation of any kind.® For example, Dominica, though lying between Guadeloupe and Martinique, and with¬ in sight of both, is commercially farther from them than from England, because it is cut off from the French neighbors by tariff and quar¬ antine laws.

Edwards, in his history of the British West Indies,, says that, the ((state of the population® in the islands which he described in 1791 was as follows: Whites, 65,305, and blacks, 455,684. The proportion of Caucasians has decreased owing to causes mentioned in the articles Jamaica, *etc.* The principal attraction of these islands for immigrants from Great Britain and white residents (what there was left of it after the manumission of the slaves which was com¬ pleted in 1838) ceased when the cane-sugar in¬ dustry became unprofitable. To speak of this as a new or temporary crisis is absurd: it is an

old story. Anthony Trollope, when he wrote of (The West Indies and the Spanish Main* in 1859, said: (<That Jamaica was a land of wealth, rivaling the East in its means of riches, nay, exceeding it as a market for capital, as a place in which money might be turned ; and that it now is a spot on the earth almost more pov¬ erty-stricken than any other — so much is known almost to all men.® Now, such distress, long-endured and notorious, has more or less discouraged immigration, commerce and other influences that make for uniformity in popula¬ tion, manners and usages. Mr. Hill's assertion that (<each of these islands is breeding a dif¬ ferent species of mankind® may seem at first view rather extravagant; but when we reflect that geography, politics and poverty combine to isolate and segregate those communities, we shall regard the following statements as decid¬ edly moderate: <(The West Indian people rep¬ resent many original stocks, which have de¬ veloped variations of habits and customs in their New World environment. They are prac¬ tically divisible into three great races, the white, colored and black, modified by Spanish, English and French civilizations.® The influence of the aboriginal stock should by no means be over¬ looked (see Carib, Porto Rico, Cuba, etc.), nor can we regard that of the Dutch and Danes as a negligible quantity. Mr. Hill writes: <(In the countries in which the French race habit has been implanted, Haiti, Martinique and Guade¬ loupe, there has resulted a more complete elim¬ ination of the Caucasian type than in either the English or (until 1898) Spanish islands… .

The black races of the West Indies and their habits are most interesting studies. Gathered as they were from numerous tribes of Africa, and settled upon the different islands, they naturally show not only differences in inherited qualities, but in those habits acquired from dif¬ ferent masters for which the African is noted. Thus there are English, French, Spanish, Irish, Scotch and Dutch negroes in the various islands.® Again, differences in topography, soils, flora and climate, which, as we have said, require separate studies, have been summarized most intelligently by Mr. Hill, who writes: <cThese islands, far from being alike in natural features and economic possibilities, present great extremes. Some are low, flat rocks barely peeping above the sea ; others gigantic peaks rising straight to the clouds, which per¬ petually envelop their summits ; others are com¬ binations of flat and rugose types. Some pre¬ sent every feature of relief configuration that can be found within a continental area — moun¬ tains, plains, valleys, lakes; some are made up entirely of glaring white coral sand or-reef rock; others are entirely composed of black volcanic rock, and still others are a combination of many kinds of rocks. Many are as arid as a western desert and void of running streams, and others have a most fertile soil, cut by a hundred picturesque streams of living water, and bathed in perpetual mist and daily rainfall' Some are bordered only with the fringing salt¬ water plants or covered with thorny coriaceous vegetation ; others are a tangled mass of palms, ferns and thousands of delicate, moisture-loving plants which overwhelm the beholder with their luxuriance and color. Some are without human habitants; others are among the most

Longitude West from Greenwich

,8.*.CO |

turtle Keys

r,U Harbor Keys

Little Bahama Bank

FLORIDA

(U. S.)

‘GUADELOUPE (FR.)

Pt. du Motile

XoX-rr&ˆ La Desirade

ˆOronde Aubo

’sd ‘ & — 35 Pt* d#B Chateaux

Xu*’. /»>, Petite Teh re

\8g*Z***. 1 _ .

Elbow

Little Harbor

. aN

tei/n -ˆAguadi Rincon

M auaU

La Bsthio

Lares

ˆˆUtuadoj s Marias (t

uMaricab.‘vv. \ %• npn,, Adjiintaˆo*’; >XˆN‘8abatfUA(Lrorfdf\j ‘ubo IL’jJˆˆVYaucdV A*

Cialeso

Miami,

iarroe o

Honda

Mayagrui

Vieques I.

a-’V

Terre di

Vpi#. d* Grand/ .s%\ouiB MAL VUatFort Bour«\ ) GALA,

h»A2«. Capeeterre

Terre de Haut

LES SAINTES

Jaquct Hampstead /^Pctlt MorJgot

1 DOM INI

David liny qtfg|TlT£ SOUFRlEH aˆMl-a Plain* | f’jigVpctitc Mulatra dr Grand Bay

Orange Cay’

PORTO RICO

C. Melville/W Portsmouthfefe Prince Rupert

MORNE DI ABLOT-IN “

St. Joscphb’ Belfast \>

Kohcuu

(Charlottetown]

Cachacrou

Lit.S. Salvador

“•* Exum’a

|Columbus

Green

Elbow Cay

ST. THOMAS

8CALE.

•reat G uana*

ˆWatlino or San Salvador

Cay Sal* ?

C J *, c

Bank »

Anqoila l«.a .V

(Landing of Christopher Columbus,

% Sound

Little Hans

• Conception I. October 12, 1402.)

CO Rum Cay

Ilong I. ■/

(L rtfir <w Samana or

ˆClawiw «£* Atwoods Cay

■ 1 ˆfeKKD‘-

Plana Cays

elV Fortuneˆ J)

I. ‘ j*CKLIN I. Miraporyor nr

1*. * - Caitl# I.

Great, Kxuma I

Outside Brasˆ Lizzaud Rock .

Hans Lollik Inside Bras

Little Ex

‘ c, , ri .,, 1 1|, S

‘?<. ItabiK

lolh/ . rp*^^_y °* vsjj?,n’n*<’r\ /-‘Ys*t<ruces

Thatch Cay

>„ *aNwl5?hli»«»- X n

Flamingo

Cay

[% .Aitn,. D » ■fFL’

J_p ‘to D°S 0 • s’.,

I ojsmrev. , ^ -‘x,

si c. Fr.li,-, 0 C JsCeV- “‘‘Eos

‘7\ \ i O I ^

< "* xˆClUy ‘ ‘ *•’

j ** Punta del Bate V

idjdlli

’iauctas

Grand Raggei ˆCajs. Doming.. • Cay Verde

#0, I

, J 1100

> PROVIDENCtAl.IRfV W. Caicosˆ®*

InaouaO

St. James II .

Precheur if. Bite of St. Pierre’s v Carbet 1 la Caee Piloted

Fort de France” MARTINIQUE‘S

(FK.) mu«; Ao»m 4 y,»’

fe‘Tvs®ˆeA”

s. Jo caro/ K J

Littlk Sara

vV Si

i. Havre

Robcrt’ 3 ˆ ” Robert :ntln

＞i Vauclin,

pd s&aQG Baˆk

,,„le pa»s＜,0e

Bibanicu

ˆy/CKKAT jl/1XAGUA lathew Town

Le Marin rC. Ferre

ˆ ipGuamo/S#|) ˆsAlto Cedro

ManzanllbyTfˆiuTS 4lˆˆong

c» -iri-i o J 1 .V/

ytr\Bayamof ˆCrleto1]

Silver Bank:

Port Dauphin , t . - • - 7 4

Brie*

LAnne d’Enncry [Port du Volet

vGuimtanf

ST. LUCIA (BR.) La Raiej Soufriere x Choiseul

Little CatmarV

(Br.)

Grand Caym (Brˆ

p\mcnt ,,i»’

Gonai vesˆP

fa’t.dee SnvnnneB C. Moulachlfjue

ˆ■flii’Santiago) \o Moca

rjavtoV’ ,, /(. \ Macoria a <

»ˆWd?ij > vˆaˆ5ˆ0c3»£Uix.DOMINICAN’-REPi /

r~ a i epvi» tink* V’SeiUo 1 t. Enri(nltUo Compoetol. ‘,,,, Higuey

GONAIVES I,

■\V

0v > fe

TiburonNˆ)*,

Virgin 1b. ‘(Br.)

JAMAICA

I BR.) . <

Porur

Vieques

ˆ Phillpsburg f

,s’.; Saba I. ˆ pt. EustatiuB

(D-) f (» ‘

Orangetowrn c;.

a,

Charlostown

‘!■ ‘u“(rivo

ronceˆ

:odrington Bakduda

er(Br.)

a AvriouA (Br.)

* Falmouth Redon da 1. a Montserrat tBR-)

Vlymouth gu’!l0“’*

port Louis -pesirade

> GUADELOUPE tFr.l

(Fr.)

ˆ _ Basso Torre Lg

tP Les Saintes

HJuayama

PORTO RICO

(U.S.)

Pedro Cays

* Gorda Cay

Marir Galante

(Fr.)

DOMINICA 15|petit Marigot Roseau®1’

o£ MT. «VEE VOL. | ˆPierraˆMAKtjm* Fort de Franctfˆˆ ‘ ”)

* .(a Ca»»l 1

a S curia L’rt 7, Castries cA St. Lucia

■v G) >

vJ C. MoulRohlQue 1

cn wf«‘6Re V0L—

M . Barba]

5t YlNCENt(Ba-) ˆKioorffetown g(t “

Q JmKinsstown’

C Gracias

‘Old Providence I.

“*M’>uBtlqUe I)

ˆ ˆtanntt’ian L,

U oJˆUniunl. Qp’°

X ACarrkacou I.

P O 4»d.ittl« Martinique Tantes

ˆeˆjGRENADA (Br.) David

Andrews

Willemstad

Orchilla

WEST

INDIES

BlanqUIlla

.• Is.

!| King Geerge

Testioos

Margarita

Santa Mari

Tortuga I.

rGalera Pi

Barranqifilla

iilpdj/oiSpal n ■jT” Gulf of Farm i ( ) S. Fernanda*

Statute Miles. 140 = 1 Inch,

100 _ . goo

Trinidad | (Br.)

GaleotaPt.

Cuinana

,Itand McNally’s New 11 x 14 Map of the West Indie*. Copyright by Rand McNallj & Co.

Moruga

i

■

,

.

■

-

.

*

. *

densely populated portions of the world® (for example, Barbados: 1,120 to the square mile). “The diverse configuration produces climatic differences, and each kind of rock weathers into its peculiar soil… . Some of these islands,

through possibilities of a diversified agriculture and hygienic condition, are adapted to higher civilization, and others, either through sterility or ruggedness of relief, are capable of support¬ ing only inferior races.® The total number of inhabitants is approximately 6,000,000.

Volcanic eruptions are fortunately confined to Martinique and Saint Vincent, although we see nearly everywhere in the Lesser Antilles evidences of the activity of mighty volcanic forces in times not vastly remote, geologically speaking — for the submerged Antillean con¬ tinent is fairly bordered with these much later cones that form the eastern volcanic chain.

The climate is not only very agreeable in the winter months but also decidedly healthful, and in many parts of the archipelago, especially toward the northern part, it deserves such com¬ mendation at all seasons. The rainy half-year begins, as a rule, in June and (with an interval of clearing weather about August or Septem¬ ber) extends to the end of December. From January to June, then, almost ideal conditions of sunshine and cool breezes prevail in the southern and central islands as well as the northern. The northeast trade-winds are most constant in their ministrations to comfort and health during January, February and March; in August, September and October, on the other hand, there are occasional hurricanes — sometimes of great violence.

History. — The history of the West Indies opens 12 October 1492. The

royal standard of Spain was then unfurled on an island known to the natives as Guanahani, but named by Columbus, very gratefully, San Salvador. Sir Henry Blake and others have succeeded in identifying the scene of this first landfall as Watling's, the only West Indian island which in every ((minute particular® answers the de¬ scription (by the discoverer himself) of San Salvador or Guanahani. Greatest periods and events in West Indian history are these and such as these : The period of Elizabethan ad¬ venturous seamen whose achievements in these waters helped to immortalize the names of Francis Drake and Walter Raleigh and John Hawkins ; the period of the buccaneers and of Henry Morgan; that most important, decisive triumph for British naval and colonial enter¬ prise, Rodney's brilliant success in the engage¬ ment with the French fleet under de Grasse in 1782; the period or episode, of Nelson, ((who chose his bride in Nevis,® writes Aspinall, "and, in the Victory , the very ship that now lies peacefully in Portsmouth harbor, pursued Ville-neuve to the West Indies and back, a fitting prelude to the battle of Trafalgar® ; the period of the manumission of the slaves, which was followed, in the British West Indies, by long years of financial distress bravely met (about 1834-38 to the end of the century) ; and finally the period characterized by that radical im¬ provement in the conditions of agricultural in¬ dustries and foreign trade which we observe with satisfaction to-day. \ he author of "Ca¬ ribbean Interests of the United States® (see Bibliography) says: "With European colonies

in the West Indies, the development of our trade relations is hampered by a number of causes… . Lack of transportation lines

hinders exchange with some of the colonies. The subsidized steamship line between the Brit¬ ish West Indian ports and Canada drains off some of their trade in that direction. The preferential tariff in force since 1913 affects our trade adversely. The policy of France, also, is to shape her tariffs in the West Indies to shut out the sending of colonial goods to foreign countries and to insure the home mar¬ ket a monopoly of imports where possible. Banking houses, especially when they have government connections, may be used to make the trade run on national lines. The banks in the French West Indies, it is reported, charge 3 per cent in addition to the regular rate of exchange on all payments made through New York. In some of the colonies branches of commercial houses in the home country are es¬ tablished. They buy only for their principals. Furthermore there is a French reciprocity treaty with Haiti which operates to their ad¬ vantage. Beside these efforts on the part of other governments or their

nationals to pro¬ mote their foreign commerce, our foreign trade is, of course, affected by our tariff.® In causes such as these must be sought the explanation of the circumstance that the commerce of˜ the United States expands less readily in the Euro¬ pean dependencies than in the Latin American republics of the West Indies. The increase noted in exports from the United States to the British West Indies during the period 1902-14 was 36 per cent; to the Dutch West Indies 43 per cent ; to the French West Indies 23 per cent. The increases in the imports into the United States during the same period were : From the British West Indies 27 per cent; from the Dutch West Indies 147 per cent; from the French West Indies 175 per cent. A fact not to be overlooked in this connection is that the British West Indies are as a reward of per¬ severance, with courage and enterprise, in the face of adverse circumstances, recovering from the long period of depression to which we have referred. Sir Charles Lucas, head of the West Indian Department of the British Colonial Office, has said that while the 19th century had witnessed their distress the 20th would be the century of their regeneration; and Mr. Asquith has given high authority to the statement that they have grown to be independent of financial assistance from Imperial funds. The financial situation, the natural resources, foreign com¬ merce, etc., of the Greater Antilles are sub¬ jects of special studies in the articles Cuba, Dominican Republc, Haiti, Jamaica and Porto Rico.

Bibliography. — Aspinwall, A. E., (The Pocket Guide to the West Indies > (Chicago and New York 1914) ; Brigges, W., <A Sum-maria and True Discourse of Sir Francis Drake's West Indian Voyage* (London 1589); Casas, B. de las, (A Briefe Narration of the Destruction of the Indies by the Spaniards) (Purchas his Pilgrimes, Vol. IV, Book 8, London 1625) ; Champlain, S. de, 'Narrative of a Voyage to the West Indies and Mexico in 1 599— 1602> (London 1859) ; Cundall, F., 'Bibli¬ ography of the West Indies, excluding Jamaica* (Kingston 1909) ; Henderson, J., 'The West

Indies ; Painted by A. S. Forrest, Described by John Henderson }

(London 1905) ; Hill, R. T., ‘Cuba and Porto Rico, with the Other Islands of the West Indies) (New York 1898) ; Jones, C. L., ‘Caribbean Interests of .the United States* (New York 1916); Lowe, P. R., ‘A Naturalist on Desert Islands) (London and New York 1911) ; Ober, F. A., ‘Our West In¬ dian Neighbors* (New York 1904) ; Taylor, C. E., ‘Leaflets from the Danish West Indies* (London 1888) and ‘An Island of the Sea: Description of the Past and Present of Saint Thomas* (Saint Thomas, no date) ; Treves, F., ‘The Cradle of the Deep) (London 1908) ; Trollope, A., ‘The West Indies and .the Span¬ ish Main) (New York 1860) ; “Vaquero,** ‘Life and Adventure in the West Indies* (London 1914) ; Wright, I. A., ‘The Early History of Cuba) (New York 1916).

WEST INDIA TRADE, 1783-1833. When the United _ States of America declared and won their independence they lost -simultane¬ ously the unrestricted trade with those islands in the Antilles which were under -the British flag. The Treaty of 1783 made no provi¬ sions for the commerce of this region and in the same year trade into and out of the British West Indies was restricted to British vessels by Orders in Council. In 1814 efforts were made in the United States to secure a part of this trade through a modification of the British restrictions; nothing came of these efforts and in 1818 Congress retaliated by clos¬ ing American ports to British ships from the West Indies. A few years later, in 1822, the English Parliament modified the restrictions, but placed a differential duty in favor of Brit¬ ish products. The policy of retaliation was again resorted to in order to have American goods placed on the same footing as British goods. Smuggling was resorted to and a diplo¬ matic deadlock ensued. In 1830 the retaliatory laws of the United States were repealed and British vessels were thereafter admitted on the same terms as American vessels clearing from the same ports. Britain thereupon granted reciprocal privileges. Consult Moore, J. B., ‘American Diplomacy> (1905).

WEST MINNEAPOLIS, Minn., village in Hennepin County, on the southwestern limits of Minneapolis. There are manufactories of sewer pipes, threshing machinery and steel springs. Pop. (1920) 3,055.

WEST NEWTON, Pa., borough in West¬ moreland County on Youghioghenv River, 30 miles southeast of Pittsburgh, on the Pittsburgh and Lake Erie and the Baltimore and Ohio railroads. Its principal industries include the manufacture of boilers and radiators. Pop.

(1920) 2,645.

WEST NEW YORK, N. J., town in Hud¬ son County, on the Hudson River, north of Weehawken and connected with New-York by a ferry to 42d street. It has a water front one mile in length and has docks and grain eleva¬ tors. It is chiefly an industrial community, and manufactures include pianos, silks, textiles, rub¬ ber goods, cottonseed oil, sugar, buttons, braid and other products. Pop. (1920) 29,926.

WEST ORANGE, N. J., town in Essex County, 13 miles west of New York and five miles northwest of Newark, on the Erie Rail¬

road. It is built at the base and on the slopes of Orange Mountain, and has fine parks and many beautiful residences. Eagle Rock, with its elevation of 650 feet, affords a splendid view. There are manufactures of phonographs, felt hats, lawn mowers and other articles. The place was organized as a township under the name of Fairmount in 1862, was renamed West Orange in 1863, and was incorporated as a town in 1890. Pop. (1920) 15,573.

WEST PARK, Ohio, village in Cuyahoga County, on the outskirts of Cleveland and on the Lake Shore and Michigan Southern and the Cleveland, Cincinnati, Chicago and-Saint Louis railroads. It is a residential suburb of Cleve¬ land. Pop. (1920) 8,581.

WEST PITTSTON, Pa., borough in Lu¬ zerne County, on the Susquehanna River, and on the Delaware, Lackawanna and Western Railroad, opposite Pittston. Two bridges span the river and connect the borough with the city. It is mainly a residential borough. Many of the men who do business in Pittston (q.v.) have their homes in West Pittston. Pop. (1920) 6,968.

WEST PLAINS, Mo., city, county-seat of Howell County, on the Saint Louis and San Francisco Railroad, about 125 miles south of Jefferson City. It is the centre and shipping point. of a region where there are farming, fruit¬ growing and lumbering interests. Large quan¬ tities of apples, grapes, dairy and farm-and lumber products are freighted from this locality. There are two State banks, one daily and four weekly newspapers. The city has adopted the commission form of government. Pop. (1920) 3,178.

WEST POINT, Ga., city in Troup County, on the Chattahoochee River, and on the Atlanta and West Point and the Western of Alabama

railroads, about 85 miles southwest of Atlanta. It is in an agricultural region in which cotton is one of the chief products. It has cotton gins, cottonseed-oil -mills, cotton factories, an iron foundry and a machine shop. During part of the Civil War it was a supply depot for the Confederate army. Pop. (1920) 2,138.

WEST POINT, Miss., town, county-seat of Clay County, on the Mobile and Ohio, the Southern and the Illinois Central railroads about 16 miles northwest of Columbus. It was founded in 1857 and is in an agricultural region in which cotton is one of the principal products. The chief industrial establishments are wagon and carriage factories, foundries, machine shops, brick and tile works, lumber mills, sash, door and blind factories, milling and ginning estab¬ lishment and ice factories. It has six churches, the Southern Female College, Carnegie Library and elementary schools. There is a national bank and a daily newspaper. Pop. (1920) 4,400.

WEST POINT, Neb., town, county-seat of Cuming County, on the Elkhorn River, and on the Fremont, Elkhorn and Missouri Valley Rail¬ road, about 36 miles northwest of Fremont and 80 miles northwest of Omaha. It is in an agricultural region, in which the chief products are wheat and corn. It has a flour mill, cream¬ ery, grain elevator, carriage and furniture factories, stockyards, and coal and lumber yards. There are three banks and two news¬ papers, besides a high school, graded schools and a school library. Pop. 2,002.

WEST POINT, N. Y., United States mili¬ tary post, Orange County, on the west bank of the Hudson River, on the West Shore Railroad, and connected by ferry with the New York Central, 50 miles north of New York. It is a stopping point for the Hudson River daily steamers. Its site is very picturesque, the east¬ ern end of the point slopes abruptly to the river ; on the northern side the slope is more gradual ; to the northwest are Crow Nest and Storm King. The government reservation con¬ tains 2,330 acres, 2,100 of which were acquired in 1790. It was occupied as a military post by the Americans during the Revolution and was strongly fortified. A part of the fortifications consisted of a strong chain stretched across the river to Constitution Island to prevent British vessels ascending. It was for a time Wash¬ ington's

headquarters; and in 1780 was under the command of Benedict Arnold (q.v.) whose plan to betray it to the enemy was frus¬ trated by the capture of Andre (q.v.). West Point was occupied as a military post after the Revolution, and a military school was established there as early as 1794; in 1802 the Military Academy was organized, and West Point desig¬ nated as the site. See Military Academy, United States.

WEST POINT, town in King William County, Va. ; at the junction of the Pamunkey, Mattapony and York rivers; at terminus of the Richmond and Danville Railroad, 38 miles east of Richmond, in a region which was the scene of memorable events in the Civil War. West Point is an important cotton-shipping port. It has extensive docks and wharves, is supplied with water for drinking and cooking by about 200 artesian wells, and does a large business in lumbering, canning oysters and manufacturing fertilizers from phosphatic marl and potash deposits on the Pamunkey. There are cotton compresses, oyster-packing houses, a hosiery-mill, a planing-mill and tinware works ; two female seminaries, a male academy, several public and private schools and a large hotel and sanitarium, gas and electric-light plants. There is regular steamship communi¬ cation with Baltimore, New York and Boston. Pop. (1920) 1,635.

WEST POINT, or ELTHAM'S LAND¬ ING (Va.), Engagement at. When Yorktown (q.v.) was abandoned, 4 May 1862, it was intended by General McClellan that Franklin's division, followed by Sedgwick's, Porter's and Richard¬ son's, should be moved in transports up York River to a place opposite West Point and, strik¬ ing across to the main roads, cut off the retreat of such bodies of Gen. J. E Johnston's army as might be below, making their way to New Kent Court House. But the day before the evacuation of Yorktown, Franklin had received permission to land his men, who had been on the transports several days, and it was not until the morning of the 6th that he could get them on board again and ready to sail. About 1 p.m. that day he arrived at Eltham's Landing, above West Point, landed his men and sent the transports back for Sedgwick's division. He had no instruc¬ tions except to wait for orders. The division was first encamped on a plain beyond which was high wooded ground, over which ran a road from the landing to Barhamsville and thence toward New Kent Court House. Frank¬

lin proceeded to occupy the wood. Newton's brigade was put in position on both sides of the road leading to Barhamsville. Parts of Tay¬ lor's and Slocum's brigades were on Newton's left; two batteries

were in his rear, and two regiments of Taylor's brigade were in reserve. Next morning Dana's brigade of Sedgwick's division continued the left of the Union line back to the river. The presence of Franklin threatened the road through Barhamsville toward New Kent Court House, on which part of the Confederate army was retreating from Yorktown and Williamsburg, and under General Johnston's orders Whiting's and Hampton's bri¬ gades had been put in position to protect the road. On the morning of the 7th, soon after Dana's brigade had come up, Whiting was ordered to advance and drive Franklin back to his landing-place. His skirmishers went for¬ ward and encountered those of Newton, and closely following came Hood's Texas brigade and Balthis' Virginia battery, supported on the right by two regiments of Wade Hampton's brigade. Newton's skirmishers were driven in and closely followed, then Newton threw for¬ ward two regiments, which were driven back, and the entire line was forced out of the wood. On Hood's right Whiting's brigade protected that flank, while on his left S. R. Anderson's Tennessee brigade had come up, and by noon Franklin had been pushed back under cover of the gunboats. The Confederates then attempted to shell the transports in York River, but the range was too great, while the fire from the Union gunboats was effective, and compelled the Confederates to withdraw about 3 p.m., and resume their position near Barhamsville. Frank¬ lin's troops resumed their former position. The Union loss was 48 killed, 110 wounded, and 28 missing; the Confederate loss, 8 killed and 40 wounded.

WEST POINT GRADUATES KILLED IN THE WORLD WAR. Official informa¬ tion given out by the War Department at Wash¬ ington, 21 Nov. 1919, disclosed the fact that 33 graduates of the United States Military Academy at West Point were killed in action or died of wounds received in action during the World War. None of these officers was of higher rank than colonel. The list includes three colonels, five lieutenant-colonels, eight majors, nine captains, seven first lieutenants and one second lieutenant. All of the officers were killed in France with the exception of Second Lieut. Albert F. Ward, who was killed at Vladivostok. The officers belonged to 15 graduating classes. The classes of 1917 and 1918 sustained the heaviest losses, six members of the class of 1917 and 10 of the class of 1918 having been killed. The class of 1918 was graduated 30 Aug. 1917, almost a year ahead of time, in order to supply additional officers for the great army which was then being organized. The complete official list of West Point graduates who were killed in action or who died of wounds received in action, with the dates of their deaths, follows:

Classes Earlier than 1915.

Class of 1886 — Col. Bertram T. Clayton, Q.M.C., killed in action, 30 May 1918.

1892 — Col. William D. Davis, Inf., killed in action, 1 Nov. 1918.

1893 — Col. Hamilton A. Smith, Inf., killed in action, 22 July 1918.

1896 — Lieut. Col. Robert J. Maxey, Inf., died of wounds, 28 May 1918.

1901 — Lieut. Col. Emory J. Pike, Cav., killed in action, 15 Sept. 1918.

1903 — Lieut. Col. James A. Shannon, Cav., died of wounds, 8 Oct. 1918.

1905 — Lieut. Col. James H. Dickey, Inf., died of wounds, 27 Sept. 1918.

1906 — Major Fred A. Cook, Inf., killed in action, 7 Oct.

1918.

1908 — Major Arthur E. Bouton, Inf., killed in action, 18 July 1918.

1914 — Lieut. Col. Roy M. Smyth, Inf., killed in action,

15 Oct. 1918.

Class of 1915.

Major J. H. Reaney, Inf., killed in action, 15 July 1918. Major Harry A. Harvey, F.A., killed in action, 12 Sept.

1918.

Major Edwin R. Kimble, C. of E., died of wounds, 9 April

1918.

Class of 1916.

Major John H. Wills, C. of E., killed in action, 29 July

1918.

Major Alfred K. King, F.A., killed in action, 9 Nov. 1918. Major John A. Street, Inf., killed in action, 4 Oct. 1918.

Class of 1917.

Capt. Francis H. Dougherty, Inf., killed in action, 15 Oct.

1918.

Capt. Daves Rossell, Inf., died of wounds, 13 Oct. 1918. Capt. Stewart W. Hoover, Inf., killed in action, 1 March

1918.

Capt. George W. Sackett, Inf., killed in action, 15 Oct.

1918.

Capt. Henry H. Chapman, Inf., killed in action, 29 Sept.

1918.

Capt. Edward W. Leonard, Inf., killed in action, 14 Oct.

1918.

Class of 1918.

Capt. Charles D. Harris, C. of E., killed in action, 20 Oct.

1918.

Capt. Thurston E. Wood, F.A., killed in action, 21 July

1918.

Capt. Robert E. Symmonds, Cav., died of wounds, 22 Nov.

1918.

First Lieut. Edward J. Wolff, Jr., F.A., killed in action,

16 Aug. 1918.

First Lieut. Kenneth P. Murray, Inf., died of wounds, 15 July 1918.

First Lieut. Louis A. Freeman, Inf., died of wounds, 18 Aug. 1918.

First Lieut. Theodore D. Schmidt, Inf., died of wounds, 7 Sept. 1918.

First Lieut. Josephus B. Wilson, Inf., killed in action, 15 Oct. 1918.

First Lieut. Frank S. Long, Inf., killed in action, 5 Oct.

1918.

First Lieut. Earle A. Billings, Inf., killed in action, 18 July

1918.

Class of 1919.

Second Lieut. Albert F. Ward, Inf., killed in action, 22 June 1919.

WEST POINT MILITARY ACADEMY.

See Military Academy, United States.

WEST RIVER, China. See Si-Kiang.

WEST RUTLAND, Vt., town in Rutland County, on Otter Creek and on the Delaware and Hudson Railroad, about 55 miles south¬ west of Montpelier, the capital of the State. In 1887 it was set off from Rutland and or¬ ganized as a separate town. The principal mar¬ ble quarries, for which this region is famous, are in West Rutland. It has seven churches, graded schools and a library. It is one with Rutland except in government. Pop. about 3,427.

WEST SAINT PAUL, Minn., city in Dakota County, on the outskirts of Saint Paul and on the Chicago, Great Western Railroad. It is a residential suburb of Saint Paul. Pop.

(1920) 2,962.

WEST SPRINGFIELDˆ Mass., town in Hampden County, on the Connecticut River and on the Boston and Albany Railroad, op¬ posite Springfield. It was settled about 1655 and at first was a part of Springfield. In 1774

it was incorporated. It is mainly a residential town, many of the business men of Springfield have their homes here. There are several in¬ dustrial establishments, chief of which are paper mills, railroad repair shops and machine shops. Many of the people are interested in market gardening. The public library has over 8,000 volumes. Pop. (1920) 13,443.

WEST TAMPA, Fla., city in Hillsboro County, on the outskiits of

Tampa. It is one of the principal cigar manufacturing towns in the United States. Pop. (1920) 8,463.

WEST TERRE HAUTE, Ind., town in Vigo County, on the Wabash River, on the western outskirts of Terre Haute, and on the Cleveland, Cincinnati, Chicago and Saint Louis Railroad. Its industries include the working of extensive deposits of coal, clay, sand and gravel and there is a paving-brick plant. Pop. 3,084.

WEST TROY, N. Y. See Watervliet, N. Y.

WEST UNION, Iowa, city, county-seat of Fayette County, on the Chicago, Milwaukee and Saint Paul and on the Chicago, Rock Island and Pacific railroads, about 85 miles north¬ west of Dubuque. It is in an agricultural and stock-raising region and has large creameries, a flour mill and stockyards. There are three banks and two newspapers. Pop. 1,773.

WEST VIRGINIA, prior to its separation from the mother State, known as the Trans-Allegheny Region of Virginia, was admitted to the Union 20 June 1863 as the 35th State. In area it is the 40th among the States, covering 24,170 square miles of which 148 square miles is water surface. It lies between 37° 6’ and 40° 38’ N. latitude and between 0° 40’ and 5° 35’ longitude West from Washington.

With a very irregular boundary of 1,170 miles, West Virginia is encircled by Pennsyl¬ vania, Maryland, Virginia, Kentucky and Ohio. On the northeast, it finds a natural boundary in the south bank of the Potomac. The cen¬ tre of the Big Sandy serves a like purpose on the southwest. On the west the Ohio forms a navigable boundary for 256 miles — the juris¬ diction of the State extending to low-water mark on its western bank. From northeast to southwest the separation from old Virginia, in an irregular and ill-defined line, follows the crest of meandering mountain ridges. The narrow strip in the north between Ohio and Pennsylvania is called ((the northern pan¬ handle.® A similar extension in the northeast corner is similarly styled <(the eastern pan¬ handle® ; hence <(the Panhandle State.® The main part of the State is, in form, a rough oval from northeast to southwest, about 250 miles in length, with an average breadth of 150 miles. Capital, Charleston, in Kanawha County.

Topography. — West Virginia is of rolling, uneven surface, and in the east, distinctly mountainous. From the Ohio river in the west to the crest of the Allegheny Mountains on the east, the surface rises with steadily increasing altitude, though irregular surface. This gives rise to

three of the four definite physiographic regions of which West Virginia is composed: namely, the Ohio Valley region, the Cumber¬ land Plateau region and the Allegheny High¬ land region. Crossing the Alleghenies — in the northeastern section of the State we find

WEST VIRGINIA.

Estimated population, 1,386,038

COUNTIES

15,858

Barbour .

. .B 6

16,674

Mineral .

…B9

21,999

Berkeley .

. B 10

19,431

Mingo .

…E 2

10,331

Boone .

. . D 3

24.334

Monongalia …

. . A 6

23,023

Braxton .

. .C 5

13,055

Monroe .

…E5

11,098

Brooke .

.Ell

7,848

Morgan .

. .A 10

46,685

Cabell .

. . D 2

17,699

Nicholas .

. . D 5

11,258

Calhoun .

. .C 4

57,572

Ohio .

..Ell

10,233

Clay .

. .D 4

9,349

Pendleton _

… .C 8

12,672

Doddridge .

. .B 5

8,074

Pleasants .

…B 4

51,903

Fayette .

. . D 4

14,740

Pocahontas …

… D 6

11,379

Gilmer .

. .C 5

26,341

Preston .

… B 7

7,838

Grant .

. .B 8

18,587

Putnam .

…C3

24.833

Greenbrier .

. . D 5

25,633

Raleigh .

… E 4

11,694

Hampshire .

. . B 9

26,028

Randolph ….

,…C6

10,465

Hancock .

.Dll

17,875

Ritchie .

…B 4

9,163

Hardy .

. .C 9

21,543

Roane .

… .C 4

48,381

Harrison .

,.B6

18,420

Summers .

…E 5

20,956

Jackson .

. .C 3

16,554

Taylor .

…B6

15,889

Jefferson .

.B 11

18,675

Tucker .

. ,B 7

81,457

Kanawha .

. D 3

16,211

Tyler .

. . B 5

18.281

Lewis .

. .C 5

16,629

Upshur .

… .C 6

20,491

Lincoln .

. .D 2

24,081

Wayne .

… D 2

14 476

Logan .

. .E 2

9.680

Webster .

…D5

47,856

McDowell .

. .F 3

23,855

Wetzel .

. . A 5

42,794

Marion .

. .A 6

9,047

Wirt .

…B 4

32,388

Marshall .

. F 10

38,001

Wood .

. B 3

23,019

Mason .

. .C 2

10,392

Wyoming .

… E 3

38,371

Mercer .

. ,E 4

Incorporated Cities.

Towns, Villages. *Etc.*

1,200

Adamstown, Harrison,

200

Franklin .

… .C 8

. .B 6

217

Friendly .

… B 4

500

Addison (P. O.Web-

1,038

Fulton, Ohio, .

…Ell

ster Springs),

1,086

Gassaway .

… C 5

W ebster .

.D 6

281

Glady .

…C7

1,252

Alderson .

,.E5

722

Glen Jean .

… .D 4

229

Alvord, Roane, .

,.C4

336

Glenville .

… .C 5

1,030

Ansted .

. . D 4

7,563

Grafton .

… B 7

575

Athens .

. .E 4

282

Grantsville …

… .C 4

199

Auburn .

,.B5

1,702

Guyandotte …

… D 2

1,432

Avis, Summers, .

. .E 5

1,300

Hambleton, Tucker, B 7

907

Barboursville …

. .D 2

105

Harding .

655

Barnstown, Marion,

149

Harman .

….C 7

. A 6

766

Harpers Ferry

…B 11

417

2,161

1,481

4,976

864

433

438

204

15,442

687

1,458

96

577

627

116

2,225

384

500

770

668

263

1,660

213

11

496

457

679

113

1,215

29,941

2,662

3,184

165

12,438

815

665

312

2,615

390

551

1,455

674

438

5,260

204

1,899

15,506

782

384

270

519

399

671

284

.2,031

163

102

Bayard . B 8

Beckley . E 4

Belington . C 6

Benwood . E 10

Berkeley Springs. A 10

Bethany . E 11

Beverly . C 7

Blacksville . A 6

Bluefield . F 4

608

358

120

328

286

640

392

181

Harrisville . B 4

Hartford . B 3

Hawks Nest . D 4

Hedgesville . All

Henderson .C 2

Hendricks . B 7

Henry, Clay . D 4

Hillsboro (P. O.

Academy), Poca-

Bolivar .

.B 11

hontas .

. . D 6

Bramwell .

. .F 4

761 Hill Top .

D 4

Brandonville,

3,656 Hinton .

. . E 4

Preston .

. .B 7

557 Hundred .

. . A 5

Bridgeport .

. .B 6

45,629 Huntington … .

. 1) 1

Brooklyn, Wetzel, A 5

422 Hurricane .

. . D 2

Bruceton Mills. .

. .A 7

251 Huttonsville … .

. .C 6

Buckhannon … .

. ,C 6

236 Ivy dale, Clay, .

. D 4

Buffalo .

…e 3

327 Janelew .

. . B 6

Burkes Garden,

Me

190 Job, Randolph,.

..C 6

Dowell .

… F 3

435 Junior .

. .C 7

Burnsville .

,.C5

992 Kenova .

. D 1

Cairo .

. . B 4

3,705 Keyser .

. .B 9

Camden on

2,047 Keystone .

,.E3

Gauley .

. .D 5

730 Kilsythe, Fayette, D 4

2

3

5

1

3

Cameron . F 10

Capon Bridge…. B 10 Capon Springs. ..B 10 Cass, Pocahontas, D 6
Cassville, Wayne, D

Cedar Grove . D

Centerville, Tyler, .B (P. O. Alma)

Ceredo . D

Charleston … D

Charlestown . B 11

Chester . D 11

Clark, McDowell, .F 3

Clarksburg . ,B 6

Clendenin . C 4

Coalton . C 6

Co wen . D 5

Davis . B 8

Durbin . C 7

Eastbank . D 4

Edgewood, Ohio, Ell

Elizabeth . B 4

Elk Garden . B 8

Elkins . C 7

Ellenboro . B 4

Elm Grove . E 11

Fairmont . B 6

Fairview . A

Fairview, Wayne. . D Falling Spring… D

Farmington . A

Fayette . D

Fayetteville . D

Flat Woods . C

Follansbee . E 1 1

Frametown . C 4

Frankford … E 5

800

333

156

144

240

803

712

1,640

656

561

1,153

2,921

295

2,672

1,045

12,666

784

520

588

546

740

837

2,084

1,888

112

646

13,709

11,153

494

823

1,807

2,176

425

5

5 3

6

. F 3

Kingwood . B 7

Laneville, Tucker, B 7 Layopolis, Gilmer, C 5 Leatherwood, Ohio,

. E 11

Leon . C 3

Lewisburg …… . E

Littleton . A

Logan . E

Lumberport . B

Mabscott, Raleigh, E 4

Macdonald . E 4

McMechen . E 10

Madison, Boone ,.D3

Mannington . B 6

Marlinton . D 6

Martinsburg . E 5

Mason . B 2

Masontown . B 7

Matewan . E 2

Middlebourne . B 5

Mill Creek . C 6

Milton . D 2

Monongah . B 6

Montgomery . D 4

Montrose . B 7

Moorefleld . B 9

Morgantown . A 7

Moundsville . E 10

Mt. Hope . E 4

Newburg . B 7

New Cumberland D 10 New Martinsville. .A 4 Northfork . E 3

452

North Point Pleasant

692

Mason .

. .C 2

764

Oak Hill .

. D 4

1,224

278

Oak vale .

. .F 4

135

129

Oceana .

. .E 3

1,209

210

Ogden City, Fayette,

245

. ,D4

1,358

20,612

Parkersburg ….

. .B 4

318

1,780

Parsons .

..1)7

713

Patterson, Ohio,

.E 11

511

725

Paw Paw .

.A 10

930

Pennsboro .

. .B 4

697

257

Peterstown .

. .E 5

204

1,038

Philippi .

. ,B 7

1,121

2,054

Piedmont .

,.B8

1,126

474

Pine Grove .

2,354

334

Pineville .

. . E 3

315

346

Pleasant Valley,

Ohio,

261

.E 11

144

2,045

Point Pleasant . .

. .C 2

792

413

Powell ton .

. D 4

298

306

Pratt, Kanawha,

D 3

123

3,027

Princeton .

. . E 4

11

230

Pullman .

. .B 5

1,081

Ravenswood … .

. .C 3

1,526

208

Recdsville .

. .B 7

4,189

313

Reedy .

. .C 4

212

3,061

Richwood .

,.D5

2,213

591

Ripley .

. .C 3

779

190

Rivesville .

. .B 6

43,377

1,112

Romney .

. . B 9

338

2,157

Ronceverte .

,.E5

936

Rowlesburg ….

. .B 7

650

2,169

Salem .

. B 5

1,533

Scarbro, Fayette, . D 4

134

190

Seebert, Pocahontas,

120

. .D 6

3,561

1,070

Shepherdstown .

.B 11

1,139

1,224

Shinniston .

. .B 6

291

2,684

Sistersville .

. .A 4

665

765

Smithfield .

. B 5

681

South Buckhannon.

831

U pshur .

C 6

292

South Keyser, Mineral,

. B 9

Spencer . C 4

Springfield . B 9

St. Albans . D 3

St. George . B 7

St. Marys . B 4

Star City, Monongalia,

. A 5

Stealey Heights, Harri¬ son . B 6

Stuart . D 4

Summersville . D 5

Sutton . C 5

Terra Alta . B 7

Thomas . B 8

Thurmond . E 4

Triadelphia . E 11

Troy . C 5

Tunnelton . B 7

Union . . E 5

Wardens ville . B 9

Watson, Hampshire

. B 9

Welch . E 3

Wellsburg . E 10

West Milford . B 5

Weston . B 5

West Union . B 5

Wheeling . E 10

White Sulphur

Springs . E 6

Whitmer, Randolph,

. : . C6

Wileyville, Wetzel, A5

Williamsburg . D 5

Williamson . E 2

Williamstown …. B 4

Winfield . D 2

Womelsdorf, Rand¬ olph . C 6

Woodsdale, Ohio. E 11 Worthington . B 6

ˆrauklln

MARSHALL/

xJIUa Bellton A

Board TW I’roclur ‘ “3!

Wood* Avid

Hr

Connells* ille

Brave

＞rland

Finkabors’

tok L£V3ˆ oOladc

tl Irott Tforks Fanns /©ruceton Mills

• o

(LoiZ’oˆ ˆMorgans Glade

ˆS?*4** • v*He» *olnt ”aN-v, O Pleasant Hill c iUnˆJ, Gr»ne＞iillet, IwtalU.ˆ

‘TIC 7r ..UllbfM ˆ

Miracle Bufl

/ Bareavilfe;

lurtinsviH’e

Barnett ArncluiX Qrˆ« Flatp Raster 0

mPotomaC

S tˆobuyˆj

N_hurp/ > Coy« ithficHi Foin <

c

M H.ll

Tree.

Middleˆ

fa. Branch Hen y /°Sprinaf W uap \ hgffvn&r Forka of r* F «/y Capoiy**

Jrifedi

jpnartiiu4,A%;S2r |2P < »1 burg y«*7\ MiWp > …. v.-//* •,

a“vA ALi.4 »/<

ill rfˆ-,-1 »/ 8ben»mlofah J>

St, , . . J

iibon-.VMilU * GraogeillU

e IluVrcttl ˆ{j

. ° BWfiS i u\S n ” V° ‘&

/JˆaVen

Keyser

,4e®einowcrffillc > - -

rftrtjA /lT Marion / Terra

fund ton /

.(° *Rodfiner J*

‘ ManHaimW > AmhlcncburgJ wills OAmboˆi

A,,r““o ,] S’ t® Erwin a jl • Eglon 1

jcj-. ■»! O J

an null 8 ville 7 jfP’X *Horse shoe’RuD0‘* OliCad’kffiietr-jMttafcy

jgf 8‘ˆ)or8c|‘4lSˆT>

crefHTQU 0~ycKfm \

3. .->• yˆy ,*Z2ˆ<a

sWVr’i V « H l’Vi . v~. =

‘ *0 > ˆ < y’Sfc I ‘ ˆJJlandville

-IT E Bolbrok(!Q0 Kel|, , „ ,£1Sm A

oTTafClL’reetV’ Saint Clars . **

©urst Sue

Weston

Zdlum Bridget

El«k die ‘a i Three 0 illlf’ v :&f JChurchcdj

x, *jˆL ˆ

Worthing

ˆCVorfftˆtivjr Hills

ˆ ˆ“\jfcaP°nˆihd9*

sant Ddlef Highview \

1111* o Jericho

NW A,mwra’ \ «,

fYellofcSprings W llnte.fiobpfeˆ x V

Shlnnit

Valley Mills

pc»remono ° WaY&JwWi” ‘ Parkersburg q K °HedBUl ˆ

S\ Jackson K\o**#®*nrˆy r?ˆ:

v. «\k*’ - — -0.

Clark,

•ˆ•ItfartihTf

GjVilliamsJ A® ponjR

ˆSSˆsinclMr

BtjwX&bfcni

ˆ—~/oNlcklo’

‘Waflhingtt _Me Mali -Harris Fer {■/{

Ult’Arlliur

Voˆ Nictfett),

“““••‘k.,, wtti-iijtM r\v i IkllevLle 4 vˆi

I WTyneˆ OVˆO,

.’ ! Lono Cedar00“‘11 ˆ

*“”0 RoffCr,

ˆiˆwlle 2Ior?U *

KgNfjjfj

_ *vf c/2’*

[Riple/ !■*:-. !-‘lr Lc VV*°‘F’“”i

ffillwood Sw* • fSjWjK.V, ‘.,

v Oˆlnscrona flere/ord \P. ‘Vrio, “M1

fe?, ‘ V＝V) «,\)ˆe/°o ?”’*«? CampNLSpencei^4ˆ«

£,,,W ’i p“le’i

„•“ ＜»!(» M(a. \ “\ T3‘3

ˆ LindeoX

I R O ° A N .Ej

S; ? Sjlra © *hambli*j)j*TdG/

ˆt. TelVwJfojioˆJˆˆna Okaf Vewtono ,:.

＞tom~jJ 3pfl＞*k»r«a ooˆ\ lor Or”＞vˆy i* ij\ V

Kfegsaat

ˆ ˆ Roˆ ‘ ° (L

°’ .ˆSv j Dˆ.fo

JˆMCffiVRLECTON a S_ a/ n\\ AˆlWiVlJ «

jaeanii ;

ˆ0M.TS’inte

L_Rockoivl

c cˆoid - &MfitSP

/,

LMoorSdeltf ;

V, t &: Baker

rˆMatW:

rRntWford

‘J OrTTimˆ

r Elirabofh

-*Sglg*tjneV«P’

OneoM,„„W Hurl

f?‘aracn9j|]

Uo > W*nf’

C&MiUs

? o»i > °i’rJ

/ .A ‘(Til..’. ˆ

iˆ/M°ntr(*e‘

ˆ Bo*to’

Haven _

fcanam

sRaveuawi

JFasatˆC]

Petersburj

O’Uˆen kciejaent \Mi l.ca u

lots Mills] Troji, J “Ali«o ;

Jtraaburjr-

- y

.Spilmon’ (o Maggie ■owns I

Rectortowu

Mathias ˆ

Woodstock

Gallipoli’

\y

Gallipolls F

„ Stouta Mi*-,- Aj noXAtfl Letter Gap_ˆyˆnvf]}r Vc ’ ˆ ˆSarmantpwnl

Sett o/ˆiW }> /ˆCcnflucncej

Sbut’k i’CutlipB / * ■‘ylrelind I, Ruse dale I RollyronH itUe \ N

b ” ˆ I Vlt LHk ?’•*-*{ -Lj

r tinnnol - I I l..viiarn . A.7>. t

yBr&ncliQJ

*E2&

£ ma

■NiAEIkinW

i ;$£&m

,IiunWiPi(lt

! c Irrai-er. (Con

• ‘fTattrfoo -jr

‘nit Plain o

i’astle ‘V f’vrda. JZ enna>

RAPPA- ˆ

®W‘a»limi

WANNOCk

Oakland t

jGrimms

ft»c« TTinojˆVa’lej j Ifth/sj

wmnmd II J-j?-

ˆldaUnˆmi ar Creek A/gwS u ˆnuttunsf-a •» ’

wr4#i/

SMp’Cbeat Biflidfte P

w&jpj Hea,y Sfi

-TOUuntervilk s‘J >°

saˆLi

o<&?£p’t

> _ 5 Upland’

rWkrreuton

[Buffalo

-fe.,

0Jˆp.e Green Bottom

Servia ˆir

op*CT?*» ■ Jumbo *(

‘ ˆteit » o i ireeqeo VVoodzeli

‘r— VTj W c.bs ttr—

•;fAjZi — ‘iˆrgoo

CˆG»lttO»Pe\«‘pt : Canfield Centralia Creek ETtfle Birch J

®krr«iiuTi»ˆ

P> /§

T)ry

ZRyn Jy-d6ˆ

i/M i 1 le rsportTc rry I Usage \ iCoxs Union -X [L,1e. A«ip«r.tesi>,

Inrriso’a Her old , ° t Ulias.o

NORTHERN PORTION

r°n’urer

s Huntersville ■ Z/ˆ*.

ˆ-DrtsrpT .v.s-y J ˆ<C’>

WEST VIRGINIA

Uliirrlsonburg

’•rnadt

I Winslow*

ˆnchardˆˆWiNˆˆ- J

Hubbard#} 1 V yf

■0-′ 1″ Oilboio oEo(

N„Tol|odo (t„ J.

ˆFowtcra Knobheˆ

l/a Mt. Lookout ˆ ;?• Hominy Falld

,«- Snnw-O ＜0,

P1 n;u O Jfe’-bi3ES

ˆGaoley Miilfl isvillc

Hmden-on—

Perslngcr

Bretts

Bend

kChlltonA, * MS

\ rilnrmeti* VC*. A

ftvH < • r n sh iˆ/\Wr

o Foster %y& i V Mjilk

Nelaon Cbn.o.oˆEdce WSt«

PO 0 «ˆoVv3

V/7Mill Point

aAllshoro

SlaiianKbilleˆ

Snowdeg ! Carlyb

%kvi|led.‘

Mod / -

IMt. Sidney

o Jetsi’ill

uoSvn*ˆ

\T\f

g)fei.a.

®ViA£2SScuffTr

Loc’uVti

＞unlow V*?

c,\＞»on

lew Cunibcrlan

«tei» »,,, fc r , °ei» v V

XjjpR&rilc]

‘A TJˆ 1C © Warm in»rings

Staunton

RobinSWn FnarWllill a J -kt.S”g:5ˆI iUiameLurgCfi,tfˆ

oSˆBrea’lfnV

rettiy - Aor Brccdc

si＜iS-,-iri/JtaK’n.i

Charlotte** llle

;”*v > bnHtwdt

Veadduf 1

TrfeepalH

ˆluthier

J: Bald £nob

MARTIN txl ir«rllel(L*|

TˆMhyS.

V.OK ˆProederitfˆ*ˆ Sl»rYh* <ˆˆ °(Oley ‘ c

‘ffiLCh #0A7/ JPro-,ˆr,

Branch.ˆA/Zy /,’ ,

/ Canterbury

oBurch •/ ˆCinderella i’i M I N GO /?

Cadlt

‘.OilvUlaV Man’-,

Irirttan J \F-Wt

tble Ruck j JVcw V

- wlivi*’/’ ”“P’ ”’

^ ‘hllltd’ir/’

rt&‘iovjr

■Gzujnpii Bo)

Athens

RiTni-cbtrte.

1 «^j

TMorcoal V . Devon’

X^xlngton

ruaU’v.MU ^ .

^^^Bartley °^{ewfc

Vfell ullivno0 <VSbadjr Spry - iffrchrt«ld>S(

Wlicvl I les’Llmill.’^j iLf -^loeB Branchv/ . ^

llH»l, * OV °

* s #X-fA’^

5saS:^’ •”life >/ ‘,A/.VCNro2S

• H ° / A7F h •“oon® ’ I p

X • (iff (Watwood ˆoltoit

fXo . llM/a.- x’iioioop. • ‘

o L.3

Wnecll/nfty, .SAˆTriadelVhia

V.m, ,\M.Jln VJlnfing-t .

tk PR. Spring ‘xlp T.auuj*.’.ˆ

2£53

organ

datura?

‘New Castle

Dallas

WEST

C E R’

Princeton ˆ

,Tlucaitle

VIRGINIA

Jrˆ. Glendˆb pBounl

und Botlij

Black ey1

°Avondalo’

ˆp!＝S x.asA’ˆV Itul/.

3(ˆ ■AjO/.ˆeri 3t*- ˆ

?/＜r • ALˆCo Louden

j*

[ft Meighcu 1

Xt»« Ca«j＞ U’eMec

RW’JgXJte”*’ V

irisljurg

S\En?u«h / WVSsTsWk

i Filbert VM*’

«ocrVˆ’ ˆ

ti, Grand/ 0

Statute Miles, 23 Inch,

Salem

‘ fToodlai i hanklf

ClaringtA

ProcJ

luTE8vli Wle

WP’N, vi v

V«v

“^Bland

Rand Mc Nally’s Nsw H 1 14 May of Waft Virginia, Copyright by Rand McNally & Co,

longitude West from Greenwich.

^»A%rJ!r T ■

WEST VIRGINIA

the land sloping to the eastward as the Poto¬ mac Valley region. The Ohio Valley region extends from the northernmost point of the State southwestward along its western border to the mouth of the Big Sandy. With but a few exceptional points, the general level of this region runs from 500 feet at the mouth of the Big Sandy, to 1,000 feet at Dingess in Mingo County and at Grafton in Taylor County. The total area of this fertile, well-cultivated agri¬ cultural section is 8,326 square miles, or 5,327,- 640 acres. In it lie the largest cities of the State; Huntington, at an elevation of 538 feet, Charleston, 603 feet, Parkersburg, 624 feet, Wheeling, 647 feet, Morgantown, 822 feet and Fairmont, 842 feet, all elevations at railroad level. This region embraces about one-third of the area and more than one-half of the population, of the State.

The Cumberland Plateau, with a general elevation from 1,000 to 2,000 feet, parallels the Ohio Valley region, stretching southwestward from the Pennsylvania line to the upper waters of the Big Sandy and the Tug. It crosses the State as a broad belt from 40 to 60 miles in width, rising in swift elevation to meet and merge into the Allegheny Highlands. The rivers of this section, with a fall varying from 12 feet to 25 feet per mile, rush with corre¬ sponding velocity and furnish admirable water power. The area of this section is 6,700 square miles or 4,290,000 acres. Within it are found many of the smaller cities and prosperous towns of the State, — Clarksburg at an elevation of 1,008 feet; Weston, 1,017 feet; Buckhannon, 1,401 feet; Welch, 1,297 feet; Hinton, 1,378 feet, and Elkins, 1,920 feet. This section nurtures and maintains about one-fourth of the State's population.

The Allegheny Highlands takes its name from the predominating mountain range. The general topography is marked by the long, regular, symmetrically-paralleled folds of the Allegheny mountain system. Mountain rolls beyond mountain till the lofty Allegheny crest rises as a barrier wall between the two Vir¬ ginias. Various parallel and outlying exten¬ sions serve to broaden this mountain section which covers, at an altitude ranging from 2,000 to 4,000 feet, nine counties of the State and reaches partly across seven more. The highest peak in the State is Spruce Knob, in Pendleton County, 4,860 feet. Other points of high elevation in this section are High Knob, 4,710 feet and Sharp Knob, 4,545 feet, with more than 20 other peaks exceeding 4,000 feet. Richwood, Nicholas County, 2,189 feet; Coal-dale, McDowell County, 2,336 feet; Terra Alta, Preston County, 2,549 feet; Horton, Randolph County, 2,729 feet ; Fairfax, Grant County, 3,060 feet, are thriving coal and lumber towns of high altitude.

The Potomac region consists of the five counties lying east of the

Allegheny Moun¬ tains and gradually sloping to the lowest point in the State, 286 feet, at Harper's Ferry. The area of this section is 1,780 square miles, or 1,139,200 acres, and the population closely ap¬ proximates 100,000 people. Broad bottom lands border the rivers and creeks of this section. The lower Shenandoah Valley extends through Berkeley and Jefferson counties, rich alluvial soil and highly cultivated. The agricultural vol. 29 — 14

life of the State reaches its highest develop¬ ment in this section.

River System. — The drainage of West Virginia is accomplished by two river systems each entirely distinct from the other. From the culminating apex of the Alleghenies at the junction of Pendleton, Pocahontas and Ran¬ dolph counties, the eastern drainage is through the Potomac into Chesapeake Bay and the At¬ lantic Ocean. The western drainage,, by far the greater, crosses the State in six river basins, tributary to and forming part of the Ohio system and finally, through the Missis¬ sippi and the Gulf of Mexico, likewise mingles with the waters of the Atlantic. The drainage areas are as follows : on the east, the Potomac and its tributaries 3,500 square miles; on the west, the Monongahela and its tributaries 4,300 square miles ; the Little Kanawha and its tribu¬ taries 2,200 square miles ; the Great Kanawha and its tributaries 8,800 square miles ; the Guyandotte and its tributaries 1,800 square miles; the Twelve Pole and its tributaries 500 square miles; the Big Sandy and Tug and their tribu¬ taries 2,300 square miles. The Ohio is navi¬ gable for its entire length up to Pittsburgh. From thence the Monongahela is dammed for slack water navigation as high up as Fair¬ mont. The Great Kanawha is navigable for 90 miles, as far up as Montgomery. West Vir¬ ginia enjoys thorough irrigation and complete drainage. Not a single square mile is without proper irrigation yet not a single square mile of stagnant water is to be found.

Climate and Rainfall. — West Virginia has a continental climate with the usual variations arising from an extent covering 3pV of lati¬ tude and 4,500 feet of altitude. The mean annual temperature at Wheeling in the northern part is 51.64° ; at Charleston in the southern part, 54.27° ; of the State, 52.30°. Between the last damaging frost in spring, 10-20 April, and the first killing, frost of autumn, 10-20 October, there is, every season, ample time to mature fully crops of every variety. The average an¬ nual precipitation, including melted snow, is 45 inches. Southwest winds prevail in West Vir¬ ginia, though somewhat broken up and de¬ flected by the rugged contour.

Geology, Mineral Resources and Mining.— That .portion of the earth's crust which is in evidence in the northern and eastern part is made up chiefly of limestone and sandstone. Three well-known and easily-recognized lime¬ stones are found here, — the Shenandoah or Trenton; the Lewiston or Helderberg and the Mountain or Greenbrier limestone. Three sandstones exist in like profusion, — the inde¬ structible Medina, the more friable Monterey or Oriskany and the Hamilton shale. Preced¬ ing the carboniferous measure is the Great Conglomerate or Millstone Grit, extending across the centre, while the remaining west¬ ern two-thirds of the State is formed prin¬ cipally of coal measures made up of alternating layers of shales, sandstones, fire clays and coal seams. Some peat is found in the cold and densely-shaded uplands of the Allegheny Highlands.

West Virginia has no deposits of the more valuable metallic ores, though rich in the com¬ mon minerals. Her most important mineral is coal in the production of which she ranks

second only to Pennsylvania. The Appalachian coal field, like an Indian canoe in shape, with one prow in northern Pennsylvania and the other in western Alabama, extends from the north to the southwest throughout West Virginia. Here it reaches its greatest width, about 100 miles and shows its richest deposits of bitumi¬ nous coal of varying kinds and qualities. In length 150 miles with an average breadth of 65 miles, the approximate area of the State's coal bed is 9,500 square miles or 6,080,000 acres. Within this area are to be found 85 different seams of coal. Of the 55 counties of the State, 49 are underlaid with coal. More numerous seams of greater thickness, aided by favor¬ able topographical conditions, render it possible, at the same rates of labor, to mine coal in West Virginia at less expense and with greater econ¬ omy than in any other State, without exception. In 1917, J.,000 mines in operation furnished nearly 16.5 per cent of all the coal produced in the United States. The production fields, for¬ merly five in number, have of late years been reclassified into 11 distinct fields. For the fis¬ cal year ending 30 June 1914 —

the Department of Mines reports the following production in short tons: Pocahontas, 18,934,335; Fairmont, 13,115,416; New River, 11,384,111; Kanawha, 10,736,285 ; Logan, 6,209,748; Preston-Barbour, 4,797,676; Mingo, 2,873,503; Elk Garden, 2,316,- 275; Panhandle, 2,213,799; Putnam, 621,514; Mason, 138,466; all other mines 336,000, making the total production for 1914, 73,677,058

short tons. Subsequent reports show produc¬ tion for 1915, 74,184,169; 1916, 79,612,298; 1917, 89,353,450 short tons. The total amount of coal stored in the hills of West Virginia is estimated to exceed 160,000,000,000 short tons, which, at the present rate of production, would not be exhausted in 1,800 years; in fact, the entire production of coal credited to this State to 30 June 1917 exceeds but 1,000,000,000 short tons. So far the coal deposits of West Virginia have only been scratched. Owing to the moderate development of manufactures and the large consumption of natural gas — only 8 > per cent of the coal produced is used “within the State. Prior to 1910, West Virginia showed annually a steadily-increasing produc¬ tion of coke. High tide was reached that year with 4,217,380 tons valued at $7, 525,923. The Solvay process of securing the by-products and ether methods of conservation have taken the place of the coke oven. There has been a steady diminution in coke production since 1910, the production in 1916 being 1,957,632 tons. Iron ore exists in West Virginia to the extent of 300,000,000 tons or more. The only production to date is at Orebank on the Poto¬ mac above Harper’s Ferry and that is less than 20,000 tons annually. The chief deposits are in the wild mountain regions, remote from transportation facilities and are at present inac¬ cessible for commercial mining.

No beds of rock salt have yet been reached in the deep borings made, but brines of great salinity have been secured from wells of vary¬ ing depth throughout the State. These brines of great strength and abundance are readily accessible for the increased production of salt and its by-products. At present, the production is confined to the Great Kanawha Valley just above Charleston and along the Ohio River in

Mason County. In the latter region, extending across the river into Meigs County, Ohio, is the greatest bromine manufacturing field in this country producing 70 per cent of the entire output in the United States.

Inexhautible deposits of almost solid lime¬ stone unmixed with shales stretch for many miles in length and several in breadth through the

east and northeast. This lies in two broad belts. The one follows the Potomac valleys, along both the north and south branches ; the other west of the Allegheny crest and parallel to it, extends from the Pennsylvania line in Preston, to the Virginia line in Mercer County. This latter is of Mountain or Greenbrier, the former of Shenandoah limestone. Great quar¬ ries, along the Baltimore and Ohio, from Martinsburg east, produce a large amount of lime and limestone of high grade. West Vir¬ ginia takes second rank in glass sand produc¬ tion, with immense deposits of the finest qual¬ ity. The main quantities are in Morgan County, near Berkeley Springs. Great quantities of a lower grade are mined also in Preston and Monongalia counties.

West Virginia abounds in mineral springs, sharing with old Virginia that celebrated plaza, known as the “Spring Region.® Berkeley Springs, in Morgan County, also known as ((The Warm Springs® and (<Bath Springs,® has been known to civilization since 1747. It is famous for its unceasing supply of water at the rate of 2,000 gallons per minute, at a uni¬ form temperature of 70°. It is owned and controlled by the State to whom it was devised by Lord Fairfax. Of the remaining score or more of health resorts the most famous is Greenbrier White Sulphur Springs, in Green¬ brier County, <(the Saratoga of the South.® The springs of the State present a variety of chemical composition and therapeutic adapta¬ tion. They comprise sulphur, chalybeate acidu¬ lous or carbonated, saline, aluminated chaly¬ beate and thermal waters.

Oil and Gas. — The latest United States reports show a diminution in production of oil in West Virginia during the five-year period, 1912-16, with an increase of value. In 1912 12,128,962 barrels were marketed at an average price per barrel of $1,643, making a value of $19,927,721. In 1916 8,731,184 barrels were produced, selling at an average price per barrel of $2.51, a value of $21,914,080. Lack of dis¬ covery of new pools and the small capacity of new wells sunk has failed to offset the decline in production in the older districts.

Since 1906 West Virginia has ranked first among all the States in the production of gas. The increase in production has been specially rapid of late years. In 1915 it was 244,004,- 599,000 cubic feet, in 1916, 299,318,907,000 cubic feet, and in 1917, 305,264,926,000 cubic feet, with a value of $50,000,000. This is probably high tide in gas production, at least for the present decade. War conditions, less drilling and nat¬ ural decline in productive capacity have already diminished the supply. The year ending June 30, 1918, shows 289,123,513,000 cubic feet. West Virginia contains 30 per cent of all

the natural gas land acreage, and 21 per cent of all the productive gas wells in the United States. Forty per cent of all the natural gas produced in the United States is furnished by West Virginia.

The Stale consumes itself 13.5 per cent of all the natural gas consumed in the United States, 4a per cent of the population depending on gas for lighting, heating and cooking. It is con¬ veyed by pipe lines to the leading cities in the State, and to Cleveland, Ohio, Cincinnati, Ohio, Pittsburgh, Pa., and Baltimore, Md. The ap¬ proximate investment in gas plants, service con¬ nections and gas-using appliances is $137,000,- 000. In importance the gas business in the State is second only to that of coal.

Agriculture, Horticulture and Stock Rais¬ ing.— The total value of farm property in West Virginia in 1910 was $314,738,540, of which amount land was represented by $207,075,759 ; buildings by $57,315,195; implements and ma¬ chinery by $7,011,513; and livestock by $43,- 336,073. This total was an increase in 10 years of $110,831,191. The additional increase of the past eight years will place this value (1918) at $400,000,000. The value of the farm prod¬ ucts included cereals, $15,997,700; hay and for¬ age, $7,492,747 ; potatoes, $2,278,638 ; sweet pota¬ toes, $170,086; tobacco $1,923,180; dairy prod¬ ucts, $5,000,138; poultry and eggs, $9,215,289; wool, $839,555; honey and wax, $231,630; and domestic animals sold and slaughtered, $18,- 456,122. The total land area of the State is 15.374,080 acres. Of this 10,926,442 acres are held in farms, of which 5,521,757 acres are im¬ proved. From the northeast corner of the State extending south and southwest to the Big Sandy River the country is mountainous with narrow valleys. There are no transportation soils, all being from disintegration of lime¬ stone, sandstone, or mixtures of shales and clays. The soil is generally fertile and does not wash into gullies, and the land is produc¬ tive to the tops of the mountains. Clay soil is found in some of the higher portions, alluvial soil in the upland valleys, and unproductive sandy soil in the northeast. In the extreme northeastern counties the soil is of

rich lime¬ stone. West of the mountains the broad flat hills furnish grazing for cattle, while the val¬ leys produce good crops. The surface near the Ohio River is gently rolling and the soil — day and sand loams — is rich. Farms are now decreasing in size and are more intensively cul¬ tivated. The average size is now 103.7 acres with an average value of $3,000. On most of the farms the principal source of income is from stock raising; hay and grain come next in value ; in the eastern panhandle, apples grown for commercial use prove a profitable source of income. The crops for 1918 were (United States Bureau of Crop Estimates) corn, 24,911,000 bushels; hay, 1,000,000 tons; wheat, 4,837,000 bushels; buckwheat, 917,000 bushels ; potatoes, 5,568,000 bushels ; sweet pota¬ toes, 212,000 bushels; tobacco, 10,200,000 pounds; apples, 1,145,000 barrels, an increase of 443,000 barrels over 1917. The leading do¬ mestic animals with their values, in 1916, were — horses, $21,340,000; mules, $1,800,000; milch cows, $14,460,000; other cattle, $14,480,000; sheep, $4,178,000; swine, $3,402,000. The larg-esl corn growing counties are Wayne, Kana¬ wha, Jackson and Mason; Jefferson, Berkeley and Mason lead in the production of wheat; Hampshire, Hardy and Morgan in rye; and Preston, in oats and buckwheat. West Vir¬ ginia offers unusual orchard possibilities and,

with improved transportation facilities, there is a corresponding extension aqd development of fruit industries. In 1910 there were 7,000,000 fruit trees of bearing age and 5,000,000 under bearing age, a total of 12,000,000. A careful estimate this year places this total in excess of 16,000,000. Some of the largest and most profitable apple and peach orchards in the whole country are in West Virginia. The State to-day produces more apples than the en¬ tire section of the United States west of the Mississippi. The average output of Berkeley County (500,000 barrels) exceeds the entire crop of either Oregon or Washington, the apple growing States of the Pacific section. Small fruits (berries) are raised in Brooke, Harrison, Ohio and Wood counties; tobacco in Lincoln, Wayne. Putnam and Cabell counties. The average expenditure on each farm for labor is $22, which shows that the West Vir¬ ginia farmer does most of his own work. The United States Agricultural Experiment Station is located at Morgantown and is conducted by the State University.

Timber and Lumbering. — There are 15,000 square miles of timber lands in the State, about 74 per cent of the total area. The largest hard¬ wood mills in the world are in Pocahontas, McDowell and Randolph counties. High-water mark in production in West Virginia

seems to have been reached in 1909, since which time there has been a slight decrease. The cut of the saw mills for this and four succeeding years was 1909, 1,472,942,000; 1910, 1,428,789,000;

1911, 1,387,786,000; 1912. 1,318,732,000; 1913,

1,249,559,000 feet. The saw mills, during this pe¬ riod, probably reached their maximum; 1,524 in operation, of which 83 were band-saw mills. There are large forests of white pine in the upland regions which scarcely have been touched by the lumberman. The densest for¬ ests are in the eastern and southern counties. The principal trees of value found in the State are oak, both red and white, and chest¬ nut, hickory, locust, maple, poplar, birch, hem¬ lock, white pine and spruce. With the multi¬ plication of short railroads and the installation of larger mills, the virgin forests are being reduced rapidly and yet lumbering will continue for years a leading industry of the State.

Manufactures. — In 1914 there were in West Virginia 2,749 manufacturing establishments, with capital invested $175,595,011 and produc¬ tion valued at $193,511,782. Seventy-nine thou¬ sand three hundred and fifty-three persons were employed earning $51,377,760. West Vir¬ ginia, with its vast deposits of coal, great oil pools, immeasurable gas supply and innumerable opportunities for hydro-electric power, possesses inestimable advantages for turning raw mate¬ rial into finished products. Present recognition of this fact is giving promise of rapid growth in manufacturing lines. The added advantage of water transportation along the Ohio has had its effect; the 12-river counties furnish over 60 per cent of the manufactures. The leading manufacturing counties, each producing over a million dollars' worth, are Ohio, Mar¬ shall, Wood, Kanawha, Cabell, Tucker, Mc¬ Dowell, Berkeley, Fayette, Randolph, Marion, Morgan, Mineral, Jefferson and Grant. Bv the same report (United States Census of Manu-212

factures 1914) the cities of the State (pop. over 10,000) rank in manufacturing as follows :

Wheeling, 201 establishments, with capital $26,857,896. and giving employment to 9,098.

Huntington, 102 establishments, with capital $7,843,648, and employment to 5,079.

Parkersburg, 83 establishments, with capital $5,741,036, and employment to 2,179.

Fairmont, 50 establishments, with capital $5,276,426, and employment to 2,048.

Charleston, 89 establishments, with capital $3,226,595, and employment to 1,333.

Martinsburg, 37 establishments, with capital $2,629,707, and employment to 1,709.

Moundsville, 27 establishments, with capital $2,530,369, and employment to 1,692.

Morgantown, 49 establishments, with capital $2,306,383, and employment to 1,600.

Bluefield, 24 establishments, with capital $1,129,602, and employment to 1,337.

Clarksburg, 43 establishments, with capital $948,306 and employment to 422.

Lumber and timber products still continue the leading industry in the State, giving em¬ ployment to 17,417 wage-earners, with produc¬ tion valued at $28,994,240. Iron and steel prod¬ ucts easily take second place, with 6,823 em¬ ployed, and production valued at $28,795,938. Glass-making sands and natural gas have given West Virginia fourth place among glass-pro¬ ducing States. Sixty-three establishments em¬ ploy 8,889 wage-earners and turn out products valued at $14,631,171. Tanneries, in number 18, employing 1,072 men, produce leather to the value of $11,014,540. Railroad shops, in con¬ struction and repair of cars, employ 8,437 men and turn out product worth $10,990,193. Other important industries are flour and grist mills with a production of $7,052,814; and brick, tile, pottery and other clay products amounting annually to $6,798,118. From 1899 to 1904 the value of manufactures increased 47.8 per cent; from 1904 to 1909, 63.5 per cent; and from 1909 to 1914, 19.5 per cent. In 1918, the United States government completed two great war in¬

dustries — a projectile plant at Charleston and a high-explosives plant at Nitro, 16 miles down the Kanawha — at an expenditure of more than $60,000,000. The future status of these im¬ mense plants, just beginning production, is left uncertain by the termination of the war.

Railroads. — The railway mileage in West Virginia is approximately 4,000 miles. Three trunk-lines cross the State : The Baltimore and Ohio, in the northern part, from Harper's Ferry to Wheeling with (<the Southwestern^ branching off at Grafton and crossing the Ohio at Parkersburg, and the Ohio River branch following the river from Wheeling to Kenova. The Baltimore and Ohio with many short branches fairly well covers the western part of the State. The Chesapeake and Ohio, in the southern part, crossing the mountains into the State at White Sulphur Springs, follows the Greenbrier and Kanawha valleys until it strikes the Ohio River at Kenova and crosses the Big Sandy into Kentucky. It has 22 tributary short lines in this State. The Norfolk and Western crosses the Ohio into West Virginia at Kenova and with four blanches traverses the Big Sandy valley and southwestern part, leaving the State at Wills, in Mercer County. Other rail¬ roads are: The Western Maryland — from Baltimore to Belington — crossing the Potomac River just above Piedmont and running south 101 miles into the State with eight short branches; the Virginian, from Norfolk to the

West Virginia coal fields — entering the State at Rock, in Mercer County — connecting with the Norfolk and Western at Matoaka and 80 miles further on, with the Chesapeake and Ohio at Deepwater ; the Kanawha and Michigan entering the State at Point Pleasant and fol¬ lowing up the Kanawha River to Gauley Bridge; the Coal and Coke, 175 miles from Charleston to Elkins. Numerous other shori lines of less importance traverse the State and feed into these larger lines. The great produc¬ tion of coal, coke and lumber is crowding the present facilities for transportation and will doubtless lead to further railroad construction in the near future.

Banks and Banking. — By compliance with certain legal requirements, charters for banks may be obtained from the secretary of state. There must be a capital not less than $25,000 nor more than $500,000. Ten per cent must be paid in before the granting of the charter and 40 per cent before the bank can open. The State commissioner of banking has authority over the State banks which does not, however, extend to the national banks. The condition of the banks, 30 June 1917, was as follows:

National State

Number . 115 202

Capital . $10,087,000 $13,856,787

Surplus.- . 6,731,000 8,542,042

Loans . 68,515,000 89,590,479

Deposits . 94,582,000 112,210,611

Finances. — West Virginia is in wholesome financial condition. It would have no debt whatever were it not for the recent decision of the LIni ted States Supreme Court that the State must assume its share of the ante-bellum debt of Virginia. With accrued interest to date, West Virginia is debited with $12,393,929. The State has at present in bonds and other securi¬ ties $2,970,400, of which $936,400 stands to the credit of the school fund and $2,034,000 to the workmen's compensation fund. The current funds are deposited with various banks named as State depositories and draw 3 per cent in¬ terest. The receipts for the fiscal year ending 30 June 1917 were $5,071,911.37 and the dis¬ bursements $4,034,835.06. The State tax for 1918 is seven cents on $100 and the assessed valuation, including public service corporations, is $1,366,139,828.

Education. — The educational system of West Virginia is rapidly developing in scope and efficiency. In 1916 the total amount disbursed for the State educational system was $7,651,- 772.28, of which the expenditure for the com¬ mon schools was $6,438,007, an increase of more than 57 per cent over the expenditure ($4,094,092) in 1910. The enumeration of minors — 6 to 21 — entitled to public school privileges, was 419,890. Of these 313,873 were enrolled, making a per capita expenditure of $20.51. Ten thousand three hundred and twenty-four teachers were employed, 9,867 white and 457 colored in 6,874 buildings. By con¬ stitutional enactment separate schools are pro¬ vided for the negroes. The average term was six and three-fourths months of 20 days, and the average salary for the term $332.41. The total value of public school property was $15,- 599,531 in 1916 as against $9,331,694 in 1910. The number of high schools was 164 of which

State Capitol at Charleston

1 Library of West Virginia University at Morgantown

2 View of Cheat River in the Mountains of West Virginia

three were county, 115 district and 46 town and city high schools The total high school en¬ rolment was 13,961. Most of the rural schools are graded and consolidation for greater effi¬ ciency is making rapid headway. Agriculture is a prescribed study in all the schools, while manual training and domestic science are being voluntarily introduced in many of them. Of the South Atlantic States, Maryland and Delaware are the only ones having a lower percentage of illiterates. A still greater degree of efficiency and economy in school administration is antici¬ pated from a pending revision of the school code — a commission appointed for that purpose being expected to report to the next legislature.

For secondary and higher education the State supports two preparatory schools for the university, at Montgomery and at Keyser, and six normal schools, at Athens, Huntington, West Liberty, Glenville, Fairmont and Shepherdstown. Two similar schools for negroes are located at Bluefield, Mercer County, and at Institute,

Kanawha County. Storer College (for negroes) at Harper's Ferry is a private institution, aided by an annual State appropria¬ tion. The capstone of the State educational system is the West Virginia University of Morgantown. Other institutions of collegiate rank are Bethany College (Christian) at Beth¬ any; West Virginia Wesleyan (Methodist Episcopal) at Buckhannon ; Morris Harvey (Methodist Episcopal South) at Barboursville ; Davis and Elkins (Presbyterian) at Elkins and Salem College (non-sectarian) at Salem. These are all coeducational. Prominent secondary schools are Linsly Institute (non-sectarian) and Mount de Chantal (Roman Catholic) at Wheel¬ ing; Broaddus Institute (Baptist) at Philippi; and Lewisburg Seminary (Presbyterian). The Roman Catholic Church has large parochial schools at Charleston, Huntington, Parkers¬ burg, Benwood, Wheeling, Clarksburg, Grafton and Martinsburg. Prosperous business col¬ leges are located at Wheeling, Clarksburg, Parkersburg, Huntington and Charleston.

Libraries. — In 1916 there were 4,899 public school libraries, totaling 428,896 books, valued at $358,275.90. Good libraries are maintained at the normal schools and various sectarian in¬ stitutions. The largest general libraries in the State are at Wheeling, Huntington, Parkers¬ burg and West Virginia University at Morgan¬ town. At Charleston the State Law Library numbers 23,000 volumes and the library of the Department of Archives and History over

78,000.

Charitable and Reformatory Institutions.

— The State maintains the following charitable institutions: Hospitals for the insane at Wes¬ ton and Spencer; home for incurables at Hun¬ tington; miners' hospitals at Fairmont, Mc-Kendree and Welch ; a school for the deaf and the blind at Romney; a tuberculosis sanitarium at Terra Alta; a tuberculosis sanitarium (for negroes) at Denmar, Pocahontas County; and a colored orphans' home at Huntington ; The Sheltering Arms Hospital at Hansford and the Reynolds Memorial near Moundsville are sup¬ ported by the Episcopal Church; the West Vir¬ ginia Humane Society, appointed by the gover¬ nor, one member from each congressional dis¬ trict, has the care of the aged and infirm, desti¬ tute children and animals.

The corrective institutions are the Reform School for Boys at Pruntytown; the Industrial Home for Girls at Salem; the State Peniten¬ tiary at Moundsville. This latter institution is more than self-supporting.

Population. — The State's population at each Federal census has been as follows: (1870),

442,014; (1880), 618,457; (1890), 762,794;

(1900), 958,800; (1910), 1,221,119; (1920),

1,463,701. In 1910 the State ranked 28th in population; in 1920 it ranked 27th. The in¬ crease from 1910 to 1920 was 19.9 per cent. There, are four cities in the State with popula¬ tions in excess of 25,000, as follows : Charles¬ ton, 39,608; Clarksburg, 27,869; Huntington, 50,177; Wheeling, 54,322. Other important cities are Bluefield, 45,282; Fairmont, 17,851; Martinsburg, 12,515 ; Morgantown, 12,127; Moundsville, 10,669, Parkersburg, 20,050 and Grafton, 8,517.

The census of 1910, in detail, gives urban population, 228,462; rural population, 992,877; male, 644,044; female, 577,075 ; native-born, 1,163,901, of whom white, 1,156,817, negroes, 64,173; foreign-born, 57,218, of which 24,911 are Germans, 21,183 Italians, 18,446 Austro-Hungarians, 13,633 English and Scotch, 13,138 Irish. The foreign population lies chiefly in Marion, Marshall, Ohio, Tucker and Wood counties — in the mining districts and in the cities. The counties of greatest negro popula¬ tion are Berkeley, Cabell, Fayette, Greenbrier, Harrison, Jefferson, Kanawha and McDowell. In no county do the negroes total 50 per cent of the population. The cities having the largest proportion of blacks (3,000 to 5,000) are Char¬ leston, Huntington and Bluefield. The prin¬ cipal immigration into West Virginia, exclud¬ ing foreigners, has been (by census of 1900) from Virginia, 61,508; from Ohio, 40,301; from Pennsylvania, 28,927. The white voters are 247,970, of whom 23,577, 11 per cent, are illiter¬ ate. The black voters are 14,786, of whom 5,583, 38 per cent, are illiterate. Seventy-four thousand eight hundred and sixty-six illiterates are in the State, 8.3 per cent of the population above 10 years of age. The school-age enu¬ meration (6 to 21) is 396,818, of whom 259,971 attend school. More recent figures (Free Schools Report, 1918) show an enumeration of 437,620 and a school enrolment of 313,873.

Churches. — The churches in West Virginia in order of membership are Methodist Epis¬ copal; Baptist (North); Methodist Episcopal (South) ; Catholic; United Brethren; Methodist Protestant; Presbyterian; Disciples; Colored Baptists, Regular; Episcopal; Free Will Bap¬ tists ; Lutheran, United Synod, South ; Lu¬ theran, General Synod; Baptist (South). Eighty-six per cent of the church membership is Protestant. There are 3,486 Sunday schools in the State, with 27,577 officers and teachers and 212,577 scholars.

Government. — The governor, auditor, treas¬ urer, secretary of state, attorney-general, su¬ perintendent of free schools and commissioner of agriculture constitute the executive corps of West Virginia, and form the board of public works. This board looks after the interest of the State in all internal improvements ; fixes the direct State tax, and assesses for taxation all railroads, pipelines and public utility prop¬ erty. All the officials above named except the

attorney-general are obliged to reside at the capitol. All are elected every four years. Each of the above officials report in writing to the governor 10 days before the meeting of the legislature. The governor must have resided in the State five years and must be at least 30 years of age. In case of a vacancy in the governorship within the first three years after election a new election is held. If the remainder of the term is less than one year the president of the senate acts as governor, and after him the speaker of the house is eligible. The salaries paid are as follows: Governor, $5,000; secretary of state, $4,000; superintend¬ ent of free schools. $4,000; treasurer, $3,500; auditor, $4,500; the attorney-general, $4,000; and the commissioner of agriculture, $4,000. The auditor is not only comptroller of the currency but is also register of the land office and commissioner of insurance. Other State officials are the tax commissioner, commissioner of banking, commissioner of labor, compensa¬ tion commissioner, road commissioners (two), chief of department of mines, health commis¬ sioner, game and fish warden, State geologist, State historian and archivist, State librarian, fire marshal and adjutant-general.

The public service commission, three mem¬ bers, is a court of the people in all complaints against public utilities. The board of control, three members, has the financial management of all institutions, charitable and educational, receiving State appropriations. The board of education, six members, three from each domi¬ nant party, together with the State superintend¬ ent as chairman ex-officio, has control of the educational affairs of the university, the normal schools and other State educational institutions.

The election for State officials is held at the time of the Presidental election and the new officials take office 4 March of the next year. The legislature meets biennially in January of the odd-numbered years and may remain in session not more than 45 days. Half of the senators are elected every two years, and all of the members of the house of delegates. There are 30 senators, two from each of 15 senatorial districts, and, by present apportionment, 94 delegates. A senator must be at least 25 years of age, but only voting qualifications are re¬ quired of a delegate. The pay is $4 per diem and mileage. A simple majority suffices to override the governor's veto; after five days a bill may become a law without his approval, the legislature is prohibited from anything ex¬ cept general legislation. The State is divided into six congressional districts. The judiciary is composed of (1) the Supreme Court of Appeals; (2) Circuit Courts; (3) nine courts of limited jurisdiction; (4) the courts of county commissioners; (5) justices of the peace; (61 C;ty Courts. The Supreme Court is composed of five judges elected for 12 years, and holds its sessions at Charleston. The judges arc paid $5,500 and mileage. There are 23 circuit judges for 23 Circuit Courts; they are paid $3,300 and mlileage. A Circuit Court is held four times a year in each county. The rapid development of some parts of the State ren¬ dered more courts necessary, so the legislature created nine courts of limited jurisdiction with appeal to the Circuit Courts. Each county is divided into from three to 10 magisterial dis¬

tricts, and each district elects one justice of the peace, or two if the population is greater than 1,200. These justices have the usual powers of American justices of the peace, and jurisdiction over civil suits involving $300 or less. The County Court is not a common-law court and not a court of record, but rather an administrative board for county affairs. There are no chancery courts, but the courts of record have equity jurisdiction; in equity cases the trial court may appoint four commissioners in chancery who decide such questions as the court refers to them and upon their decisions and reports the judge

bases his decrees. Notaries public and commissioners are appointed by the governor without limit as to number. The unit of local government is the county under the usual elective county officers ; county commissioners, sheriff, clerk, tax assessor, sur¬ veyor, *etc.* The township system was adopted in 1863, but did not work satisfactorily, and in 1872 was abolished and the old county system revived.

History and Politics. — Governor Berkeley of Virginia, in 1670, commissioned Maj.-Gen. Abram Wood (<for the finding out the ebbing and flowing of the water on the other side of the mountains.® The next year Wood sent out Capt. Thomas Batts and four men. They left Appomattox, now Petersburg. Va., 1 Sept. 1761, crossed the Blue Ridge 7 September, the Alle¬ ghenies, 10-13 September, and reached the Great Kanawha at <(the Falls,® 16 September. Governor Spottswood, in 1716, led a party of 30 cavaliers, crossing the mountains at what is now Pendleton County. In commemoration of this expedition and to encourage westward emi¬ gration he founded the <(Knights of the Golden Horseshoe,® with the motto ((Sic jurat tran-scendere montes.® In 1725, John Van Meter ex¬ plored the valley of the South Branch. In 1727, Morgan ap Morgan built the first cabin in' what is now Berkeley County. After 1735, the South Branch Valley began to fill up with t'lfe overflow from the Shenandoah Valley and from Pennsyl¬ vania and Maryland. The settlers were of sev¬ eral nationalities — and the composition of the people of West Virginia has always been differ¬ ent from that of the country east of the moun¬ tains. Some of the land in West Virginia was embraced in the <(Northern Neck® grant to Lord Fairfax, and his surveyors, in 1746, planted the Fairfax stone at the head of the North Branch of the Potomac to mark the western limits of the grant. The first permanent settlement west of the Alleghenies was made, in 1764, by John and Samuel Pringle, at Turkey Run, now in Upshur County. In 1768, after the expulsion of the French who claimed the territory drained by the Ohio, the Six Nations sold the land to the English, though several other Indian tribes claimed the country. But. within historic times no Indians have ever occupied any part of West Virginia. The attempts of the whites to take possession of these Indian lands led to bloody conflicts that lasted until after the Revo¬ lution. The West Virginians heartily supported the Revolution and sent troops to help New England and the Middle Colonies. The history of western Virginia before 1861 is a history of controversy with eastern Virginia. Socially, politically and economically the two sections of the State were unlike from the first. Western

Virginia was democratic, eastern Virginia was aristocratic, in institutions. The idea of sepa¬ ration was older than the Union ; the Conti¬ nental Congress had been petitioned to set up a State west of the Alleghenies; the people of the West were always ready for independence. The western counties complained that they were gov¬ erned for the benefit of the eastern counties. Unlike Tennessee and Kentucky, western Vir¬ ginia had to wait half a century for separate State existence. The crisis came during the secession movement in 1861. The Virginia con¬ vention passed the ordinance of secession, the delegates from the western counties opposing, and submitted it to the people. From Novem¬ ber 1860 to May 1861 meetings were held in the western counties which made it clear that that section would not go with the South. An irreg¬ ular convention of 26 counties met in Wheeling 13 May 1861 and came near breaking away be¬ fore the vote on the ordinance of secession. The western counties voted 40,000 against and 4,000 for secession. The second Wheeling con¬ vention, composed of the newly-elected mem¬ bers of the legislature and irregularly-elected delegates from the counties west of the moun¬ tains, met 11 June, declared the ordinance of secession void, vacated the offices of the State of Virginia and formed a “reorganized® gov¬ ernment of Virginia, with Frances H. Pierpont as governor. The legislature calling itself the Virginia legislature, elected senators for Vir¬ ginia, John S. Carlile and Waitman T. Willey, who were received at Washington. The con¬ vention made a provision for organizing a new State by calling a third convention at Wheel¬ ing on 26 November, in which 41 counties were represented. A constitution for the new State was formed and ratified by the people in April

1862. It was at first proposed to call the new State Kanawha, but the name West Virginia was finally adopted. The “reorganized® gov¬ ernment of Virginia gave its consent to the erection of the new State, and on 31 Dec. 1862 Congress consented to admit West Virginia to the Union, as soon as it should provide for gradual abolition of slavery. On 20 April 1863 President Lincoln issued his proclamation, and in accordance therewith, West Virginia became the 35th State of the Union, 20 lune

1863.

The long desired separation was effected, not with the Civil War as a cause, but rather as an opportunity. During the war no important mili¬ tary operations were carried on in West Vir¬ ginia. The Confederates early lost control of the State, but there were skirmishes and raids until near the end of the war. However, as compared with the other Southern States, West Virginia suffered little. From the State about 29,000 soldiers entered the Union army and about 10,000 went into the Confederate army. Laws were passed by the legislature confiscating the property of the Confederates, and after the war all Confederates and Con¬ federate sympathizers were disfranchised from voting and holding office. In 1860 it was offi¬ cially reported that 29,316 persons — nearly half of the voting population — were disfran¬ chised. The election of 1870 overthrew the Union Republican party and gave the control of State affairs to the Democrats. The next year there was framed the second constitution, settling the question of franchise, and this was

endorsed by the people of the State August 1872. The Democrats retained control of the State until 1896 when the Republicans carried the elections. This change in political com¬ plexion was due to the great industrial develop¬ ment of the State which attracted a heavy im¬ migration from the States north and west. West Virginia was the first State to begin the undoing of reconstruction; and the first to break from the ranks of the (<Solid South.® The first break in Republican control of the State took place in 1916 when Cornwell (Dem.) was elected governor over Robinson (Rep.) by 2,755 majority. At the same election Hughes (Rep.) for President carried the State by 2,721 over Wilson (Dem.). In 1912, the State went ((dry® by a majority of 92,342 for the prohibi¬ tory amendment. In 1918 a (<Budget Amend¬ ment,® governing the legislature in the matter of appropriations, was added to the constitution by the vote of the people.

Governors of West Virginia.

Arthur I. Boreman . Republican . 1863-1869

Daniel D. T. Farnsworth*. ... “ . 1869

William E. Stevenson . “ . 1869-1871

John J. Jacob . Democrat . 1871-1877

Henry M. Mathews . “ 1877-1881

Jacob B. Jackson . “ 1881-1885

E. Willis Wilson . “ 1885-1890

A. Brooks Fleming . “ 1890-1893

William A. MacCorkle . “ 1893-1897

George W. Atkinson . Republican . 1897-1901

Albert B. White . “ 1901-1905

William M. O. Dawson . “ 1905-1909

William E. Glasscock . “ 1909-1913

Henry D. Hatfield . ” . 1913-1917

John J. Cornwell . Democrat . 1917-1921

Ephraim F. Morgan . Republican . 1921—

Bibliography. — Byrne, (Hand-Book of West Virginia5 (1915) ; Callahan, J. M., < Semi-Centennial History of West Virginia) (1913) ; Callahan, Maud F., ‘Evolution of the Con¬ stitution of West Virginia5 (1909) ; Fast and Maxwell, ‘History of West Virginia5 (1901) ; Hale, (Trans-Allegheny Pioneers> (1887); Hall, ‘Rending of Virginia5 (1902); Harris, West Virginia Legislative Handbook

and Manual (1918) ; Kercheval, (Valley of Virginia5 (1833) ; Lewis, (Hand-Book of West Virginia5 (1904) ; Lewis, (History of West Virginia5 (1889) ; Summers, ‘The Moun¬ tain State> (1893) ; Willey, formation of West Virginia5 (1901) ; Withers, ‘Chronicles of Bor¬ der Warfare) (1831) ; United States Reports: ‘Geological Survey of West Virginia5 (Bulletin 2, 1911) ; (Mineral Resources of the United

States5 (Part II, 1916) ; ‘Bureau of Census5 (1910—15) ; Comptroller of Currency5 (Vol. 2, 1917) ; West Virginia Reports (1916) ; ‘State Geological Surveys5 ; ‘Public Service Commis¬ sion5 ; ‘Department of Mines5 ; ‘Department of Banking5 ; ‘Bureau of Labor5 ; ‘Tax Commis¬ sioner5 ; ‘Department of Free Schools5; ‘De¬ partment of Agriculture.5

Wilson M. Foulk, Late State Historian and Archivist.

WEST VIRGINIA CAMPAIGN OF 1861. At the outbreak of the Rebellion, West Virginia had few slaves, no sympathy with the secession movement and adhered to the Union.

* As president of the senate, filled the unexpired term of Governor Boreman, who had been elected to the United State? Senate.

f Title oyer the governorship contested by Nathan Goff — contest lasting eleven months.

Her citizens denounced the action of the State convention in adopting an ordinance of seces¬ sion and at town and county meetings passed resolutions looking to a separation of the west¬ ern counties from the rest and the organization of a new State. On 13 May 1861 a delegate convention was held at Wheeling, 26 counties being represented by nearly 400 leading Union men, and an interchange of views resulted in a decision to secede from the State should the ordinance of secession be ratified by the vote of the people to be given on the 23d of May, and a provisional convention was called to meet on 11 June following. The vote cast on 23 May was large and showed a majority against secession in the west. Out of a vote of about 44,000 in 50 counties 40,000 were against the ordinance of secession.

Meanwhile Governor Letcher had called out the militia of West Virginia and ordered offi¬ cers to protect the Baltimore and Ohio Railroad and guard the frontier of the State against in¬ vasion by Ohio and Pennsylvania. The principal officer assigned to this duty was Col. Geo. A. Porterfield, who 4 May was ordered by Gen. R. E. Lee to Grafton to call out the militia and enroll volunteers to protect the railroad and encourage secession sentiment. Five thousand men were thought ample for the purpose, but Porterfield could not raise a 10th of that num¬ ber and troops had to be sent from the eastern part of the State. General Lee had informed Porterfield that it was not intended to interfere with the peaceful use of the railroad, but Gov¬ ernor Letcher, incensed at the overwhelming Union sentiment and the apathy of the citizens in volunteering, and moved also by the collec¬ tion of Ohio troops on the border, ordered Por¬ terfield to make a descent on Wheeling, seize and carry away the arms sent there by the na¬ tional government and arm his men with them, and specially commanded that should troops of Ohio or Pennsylvania endeavor to pass over the railroad, to destroy it and the bridges. To seize Wheeling was impossible with the few men at his disposal, but, convinced that the Ohio troops were on the eve of a movement eastward, Por¬ terfield burned the bridges of the railroad be¬ tween Farmington and Mannington. This ac¬ tion was immediately followed by the occupa¬ tion of the railroad and contiguous country by loyal West Virginia, Ohio and Indiana troops, under command of General McClellan, who had been assigned to the command of a military de¬ partment embracing Ohio, Indiana, Illinois and West Virginia. Upon the advance of these troops from Wheeling and Parkersburg on the 27th, Porterfield abandoned Grafton on the 28th and fell back to Philippi, from which place he was driven on 3 June to Beverly. (See Phil¬ ippi, Engagement at). General Garnett was sent to relieve Porterfield and took position at Rich Mountain and Laurel Hill. Col. John Pegram's detachment at Rich Mountain was at¬ tacked and defeated by McClellan 11 July, many men were taken prisoners and the rest retreated over Cheat Mountain. McClellan pursued through Beverly and Huttonsville, seized the summit of Cheat Mountain and entrenched a part of his command on the main Staunton turnpike leading over the mountain. (See Rich Mountain, Battle of). Garnett, who was at Laurel Hill, abandoned his position on the night of the 11th and retreated northeast

toward the Northwestern turnpike, was over¬ taken at Carrick's Ford, on Cheat River, on the 13th, was killed and his command, making a rapid retreat, reached the Northwestern turnpike and turning

southward arrived at Monterey in a demoralized condition. There are but three routes across the mountains separating West Virginia from the Shenandoah Valley that are practicable for military operations: the North¬ western turnpike on the north ; the Staunton and Parkersburg turnpike farther south and the Kanawha turnpike, leading past Gauley Bridge, still farther south. While McClellan was seiz¬ ing the two first, a column under General Cox was operating on the latter. At the time Gen¬ eral Garnett was sent to Rich Mountain, Gen. H. A. Wise was ordered to raise a force for the defense of the Kanawha Valley and Gen. J. B. Floyd was directed to raise a brigade for serv¬ ice in southwestern Virginia. It had been Mc¬ Clellan's intention to conduct his campaign in West Virginia by way of the Kanawha Valley, but the gathering of the Confederates near Bev¬ erly determined him to proceed to that region and postpone his Kanawha campaign till north¬ western Virginia should be cleared of the enemy. Later it was found that the presence of Wise in the Kanawha Valley menaced his flank and 2 July General Cox, with a brigade, was ordered to cross the Ohio at Gallipolis and con¬ duct a campaign against Wise, and on the 6th he wTas ordered to march on Charleston and Gauley Bridge. Cox crossed the Ohio, with about 3,000 men, drove in some of Wise's ad¬ vanced detachments and on 11 July moved up the Great Kanawha River in transports. The river was navigable for small steamers about 70 miles, to a point 10 or 12 miles above Charles¬ ton, the only important towrn of the region which is at the confluence of the Kanawha and Elk rivers. On the evening of the 16th Cox reached the mouth of the Pocotaligo, a large creek which enters the Kanawha from the north, where he heard that some of Wise's forces were in position above the mouth of Scarey Creek on the south side of the Kanawha and about three miles distant. It was necessary to dislodge this force before he could proceed farther. Troops were landed on the south side of the river, on the 17th, and the position was attacked, but Cox's men were repulsed with a loss of 14 killed and 47 wounded. (See Scarey Creek, Engagement at). This check delayed Cox until he could get land transportation, which came on the 23d, and the next day he advanced, took Charleston on the 25th, which Wise had hurriedly abandoned, and on the morning of the 29th reached Gauley Bridge, Wise retreating before him and not halting until he reached Greenbrier and the White Sulphur Springs, where he was joined by General Floyd. The whole of West Virginia, with the gate¬ ways to the East were now in Union possession, but the Confederates did not let the possession go unchallenged and made efforts to recover the lost ground.

After the defeat and death of General Gar¬ nett, Gen. W. W. Loring was ordered to the command of the Confederate forces in north¬

western Virginia, and being strongly reinforced began preparations to retake Cheat Mountain. Before these preparations were completed, Gen. R. E. Lee was assigned to the command of all the Confederate forces in West Virginia and

early in August joined Loring at Valley Moun¬ tain, where he remained a month, making him¬ self acquainted with the country, bringing up re¬ inforcements and supplies and elaborating a plan o) campaign by which he proposed to break through the Alleghanies and recover the coun¬ ty west to the Ohio. His point of attack was the Union position covering Beverly and the road westward. McClellan had been called to \ ashington, leaving General Rosecrans in com¬ mand in West Virginia, and Gen. J. J. Reynolds had command of the Union troops holding en¬ trenched positions at Cheat Mountain summit. Elk Water and Huttonsville. Two Confeder¬ ate columns were sent by the Staunton road against Cheat Summit and one by the Lewisburg and Huntersville road against Elk Water. At the same time another column was ordered to pierce the line between Elk Water and Cheat Summit, a distance of eight miles through a trackless mountain forest, to gain the rear of both posi¬ tions. The movement began on 11 September, a part of Lee's command succeeded in reaching the rear of the Union troops at the summit, a part attacked by the Staunton road in front and both were repulsed. The column sent against Elk Water appeared before that position but, upon the failure of the other columns, made no attack, and on the 15th all the columns retired to their old positions. Lee was greatly disap¬ pointed and deeply mortified at his failure and was under a cloud from which he did not emerge till after he had succeeded to the com¬ mand of the Army of Northern Virginia, in June 1862. No further effort was made by the Confederates to regain the ground lost in the northwest, nor was a general Union advance at¬ tempted, but there were sharp encounters at Camp Bartow and Camp Alleghany (qq.v.), both resulting in Confederate success.

Floyd and Wise, who had united forces near Lewisburg, moved forward in the middle of August to Sewell Mountain and on the 23d Floyd crossed to the north side of Gauley River at Carnifax Ferry to flank Cox at Gauley Bridge and drive him down the Kanawha Val¬ ley to the Ohio. He attacked and defeated the Seventh Ohio at Cross

Lanes, on the 26th, and on 10 September was attacked by General Rose¬ crans and that night recrossed the Gauley and retreated to Sewell Mountain. (See Carnifax Ferry). After some delay Rosecrans advanced to the top of Big Sewell Mountain, 34 miles from Gauley Bridge and began skirmishing with the Confederates. Lee, with a part of Loring's command, joined Floyd on 29 Sep¬ tember and assumed command. The two oppos¬ ing armies that lay opposite each other upon the crests of Big Sewell, separated by a deep gorge, were about equal in number, but each com¬ mander had exaggerated ideas of the strength of the other and it was difficult for either to make an offensive move. Each was looking for weak points in his adversary's position, using extraordinary energy to feed the men and ani¬ mals, and waiting for the rains to cease and the roads to dry. But the rains did not cease, there was an extraordinary rise in the waters and on the night of 5 October Rosecrans began to fall back and at the end of four days his brigades were in camp between Hawks' Nest and Gauley Bridge. When Lee discovered that Rosecrans had gone he ordered the cavalry to follow ; when satisfied that he had gone clear to

Gauley Bridge he began repairing the road from Sewell Mountain to Lewisburg and projected a campaign for Floyd down the left bank of New River and then to the mouth of Loop Creek, the head of navigation of the Kanawha, to intercept Rosecrans' communications, while an effort was being made to press him in front. Floyd lost no time in preparing for the move¬ ment to drive Rosecrans from Gauley Bridge back to Charleston, probably to the banks of the Ohio. On 10 October he started and after a difficult march over mountain roads, crossed New River at Richmond Ferry and toiled on over the Raleigh, Fayette and Kanawha turn¬ pike, through Fayetteville, and on the 22d camped on Cotton Hill, five miles beyond Fay¬ etteville, in the elbow south of the junction of the New and Gauley rivers. On the next day he wrote the Confederate Secretary of War that with a proper force he could dislodge Rose¬ crans from Gauley Bridge and drive him back to Clarksburg, with 10,000 additional men he would win the whole Kanawha Valley before the conclusion of the campaign. Meanwhile Lee had informed him that Loring's troops would march back to the Cheat region, and this settled the fact that he would have to measure strength with Cox unaided by any advance on the Lewis¬ burg road. On 1 November he opened on Rose¬ crans with artillery. Rosecrans planned to cap¬ ture him, and on the 12th Floyd retreated, nar¬ rowly escaping capture. (See Gauley Bridge). The campaign on the Kanawha, as in the Cheat region, was ended. The inclement weather ren¬ dered extended movements impracticable and both Union and

Confederates found ample em¬ ployment in getting up supplies, maintaining the roads in condition, providing shelter and guard¬ ing against surprise. Scouting was restricted to narrow limits and the results were unimportant. But the campaign had been one of the greatest importance. The whole line of the Alleghanies, from the Pennsylvania border on the north and beyond the Kanawha on the south, was securely guarded against incursions from the east, and westward to the Ohio River, western Virginia was in the hands of the Union government. The political transformation of West Virginia kept pace with the military movements, finally resulting in a new State. Consult (Official Records > (Vols. II, V) ; The Century Com¬ pany's (Battles and Leaders of the Civil WaO (Vol. I) ; Cox, (Military Reminiscences of the Civil War> (Vol. I).

E. A. Carman.

WEST VIRGINIA AND MARYLAND BOUNDARY DISPUTE. The principal dis¬ pute was an old one in regard to the meaning of the ((first source of the Potomac® which in Lord Baltimore's charter was mentioned as a point from which to determine the boundary of western Maryland. This was marked in 1746 by the Fairfax Stone at the head of Fairfax Run, which was regarded as the head of the North Branch, in accord with a decision in council based upon a careful survey by a bound¬ ary commission. Although in 1852 Maryland finally accepted the Fairfax stone as a point marking the meridian of her western boundary, ir. 1859 she secured a new survey of the meri¬ dian fine northward which terminated at the Pennsylvania boundary about three-fourths of a mile west of the old line (surveyed in 1788)

thus laying the basis of later controversies with West Virginia in regard to conflicting land claims and jurisdiction in the triangular strip between the two lines — some of which culmi¬ nated in personal encounters and breaches of the peace which each State treated as a crime within its jurisdiction and attempted to punish.

In the suit begun against West Virginia in 1890, Maryland, besides

claiming that the source of the North Branch should be located nearly a mile west of the Fairfax stone, also in¬ jected the old claim to the South Branch as the farthest source of the Potomac — a claim which would have divided West Virginia into two non-contiguous parts. The court decided both of these questions in favor of West Vir¬ ginia on the basis of prescriptive right arising from long-continued possession of people claim¬ ing rights on the West Virginia side of the long-recognized line. Maryland also claimed that the rights of Lord Baltimore included the bed of the Potomac to high-water mark of the southern shore. The court, however, decided that, consistent with long-continued exercise of political jurisdiction, the uniform southern boundary of Maryland was at low-water mark on the south bank of the river to the intersec¬ tion of the north and south line forming the western boundary of Maryland. The survey and marking of the boundary in accord with the court decision was accomplished by a joint commission in 1912.

James M. Callahan,

Professor of History and Political Science, West Virginia University.

WEST VIRGINIA UNIVERSITY, a co¬ educational State institution located at Mor¬ gantown, 100 miles south of Pittsburgh. The university grounds, with a picturesque outlook upon the adjacent Monongahela River, have an attractive natural site equaled by few institu¬ tions of learning. The campus contains about 50 acres.

The university originated from the national land grant act of 2 June 1862, and from the subsequent action of the State legislature in accepting and carrying out the provisions of the act. Its location at Morgantown was largely determined by the foundation of an edu¬ cational institution which had already been laid at Morgantown through an academy first es¬ tablished in 1814 and re-established in 1832. On 30 Jan. 1867, the legislature accepted the property of the old Monongalia Academy and on 7 February passed an act permanently es¬ tablishing <(The Agricultural College of West Virginia® and authorizing the governor to ap¬ point a Board of Visitors which at their first meeting on 3 April 1867 appointed the first president and established <(collegiate, scientific and agricultural® departments of instruction. A department of military science was organized soon thereafter. By an act of 4 Dec. 1868, the name of the college was changed to ((West Virginia University® and the close corporation (<Board of Visitors® to the <(board of regents,® which in 1895 became bipartisan and rotary. The original college (Arts and Sciences) began in 1867 with five departments

which by differ¬ entiation and expansion increased to more than 25 by 1907. After the original college, other colleges and schools were established as fol¬ lows : the College o f Law 1878; the College of Engineering, 1887; the College of Agriculture,

1897; the School of Music, 1897; the School of Medicine, 1902. The agricultural experiment station was established in 1888 and is now un¬ der the direction of the dean of the College of Agriculture. The division of agricultural ex¬ tension was organized in 1912.

For many years the growth of the new in¬ stitution was very slow and uncertain, largely due to old sectional questions, new post-bellum political questions and the lack of a satisfac¬ tory system of secondary schools.

Gradually the obstacles to growth were re¬ duced or removed by changing conditions. In¬ dustrial progress, stimulating better communi¬ cation, was a prominent factor in the transfor¬ mation of the earlier poorly-equipped school into a real college which may now claim uni¬ versity rank. The first remarkable increase in attendance was coincident with the admission of women between 1889 and 1897. after a long struggle against conservative opposition. In the last decade it has had phenomenal growth, greatly aided by the development of better secondary schools, and is worthy of recognition as one of the leading State insti¬ tutions. A preparatory school which throughout the earlier years was maintained in connec¬ tion with the university, was abolished in 1912.

In recent years the curriculum and many of the courses have been readjusted to the new needs resulting from rapidly changing condi¬ tions of life. Students are admitted either by examination or on certificate (detailed statement of work) from an accredited preparatory school. Entrance requirements are 15 units (four years of high-school work) with liberal provision for electives. The time required for completion of baccalaureate degrees is four years. Ancient language requirements for graduation in the A.B. course were recently abolished. By a combination of academic and professional work a student may earn the regu¬ lar university degree and the professional de¬ gree in six years.

The problem of securing suitable buildings to meet the needs of expansion and more efficient instruction has been a continuous one. There are now eight main buildings, several with annexes, besides

several temporary frame buildings, used for classrooms. A modern library building was completed in 1902. The most recent modern building (Oglebay hall) was completed in 1919 for use by the College of Agriculture. A new building for the Col¬ lege of Law was erected in 1919-20. Build¬ ings and grounds and equipment were valued in 1919 at approximately $2,600,000.

Equipment, which in the earlier days was scarce and poor, has recently been provided liberally. Laboratories are equipped for con¬ ducting modern scientific work. The general library contains over 60,000 volumes.

The annual income of the university and experiment station from all sources for the year ending July 1919 was approximately

$934,000.

A special feature since 1902 is the Summer School which is meeting the needs of many students who cannot attend during the regular semester.

Recently more attention has been given to advanced courses suitable for graduate work. The master's degree may be completed in an additional year (36 weeks) of advanced study

in residence after completion of the bac¬ calaureate degree. The degree of Ph.D. is not conferred, but graduate work applicable to¬ ward this degree may be pursued for certifica¬ tion to other institutions which give their larger attention to graduate instruction. Re¬ search is steadily developing in all colleges.

The total number of students in 1911-12 was 479, of which 449 were candidates for degrees. The total enrolment in the year 1918— 19 in the colleges and the School of Medicine (and excluding the School of

Music and various short courses) was 1,305, of which 1,281 were candidates for degrees (and 379 were women). The total enrolment in the College of Arts and Sciences was 681, of which 314 were women. That of the College of Engineering was 428; of the College of Agriculture 130 (of which 59 were women) ; of the College of Law 21, and of the School of Medicine 45 (5 women) . The enrolment of the Summer School was 631 in 1919.

In 1911-12 the total number of the instruc¬ tional force (exclusive of assistants, library staff and experimental station staff) was 68, of which 37 were full professors. In 1918—19 it numbered a total of 118 including 47 professors, 16 associate professors, 20 assistant professors and 35 instructors.

In 1909 the financial and business affairs of the university (and of other State educa¬ tional institutions) was placed under the direc¬ tion of a State board of control, consisting of three members appointed by the governor. The academic control remained in a bipartisan board of regents, which until 1919 consisted of the State superintendent of free schools (ex-officio) elected by the people, and of four other mem¬ bers appointed by the governor, but which in 1919 was merged into the State board of edu¬ cation consisting of seven members including the State superintendent.

James M. Callahan,

Professor of History and Political Science, West Virginia University.

WEST VIRGINIA AND VIRGINIA DEBT QUESTION, The. The Virginia debt question arose with the formation-of West Vir¬ ginia, and has been a prominent factor or issue m State politics at various times. At the time of its separation from Virginia, the new State in its constitution agreed to assume a just pro¬ portion of the public debt of Virginia prior to 1861 <(to be ascertained by charging to it all the expenditures within the limits thereof and a just proportion of the ordinary expenses of the State government, since any part of said debt was contracted, and deducting therefrom all moneys paid into the treasury of the common¬ wealth from the counties included within the said new State, during the same period.® As early as 1866, and again in 1870, Virginia ap¬ pointed commissioners with authority to nego¬ tiate for adjustment of the debt. A West Vir¬ ginia commission failed to act in 1870, because it was not provided with an appropriation for expenses. In 1871, it declined the proposal of Virginia's new policy of arbitration by commis¬ sioners not citizens of either State. Acting alone in the examination of documents at Rich¬

mond, however, it reported a net credit of $953,360.23 in favor of Virginia — a conclusion which the West Virginia legislature did not ac¬

cept. In 1873 a new consideration by the West Virginia Senate finance committee, whose chair¬ man (J. M. Bennett) had been auditor of Vir¬ ginia for eight years, resulted in a report of $525,000 in favor of West Virginia, which be¬ came the basis of public opinion in the new State thereafter.

Meantime, by act of 1871, Virginia funded two-thirds of the debt, and for the remaining third gave certificates making her liable only in accordance with future settlement with West Yirginia. Later she released herself from all liability for the one-third by certificates of 1879, 1882 and 1892 which were placed upon the market under the name <(West Virginia certifi¬ cates."

After compromising and settling with her creditors and securing release from all liability, she provided in 1894 for the appointment of a commission (of seven members) which in 1895 and 1896 unsuccessfully proposed negotiations with the West Virginia on the basis that Vir¬ ginia was liable for only two-thirds of the old debt. In 1900, as trustee of the certificate hold¬ ers, she again proposed adjustment on condi¬ tions which West Virginia declined to accept.

Later, Virginia instituted a suit for settle¬ ment under supervision and direction of the United States Supreme Court, which, in 1908, appointed a special master of accounts to take evidence for later presentation. The Supreme Court, before which the final arguments were presented in January 1911, promptly rendered a decision tentatively fixing West Virginia's share of the old debt at $7,182,507.48 and leaving the question of interest for later adjustment. West Virginia then created a ((Virginia Debt Commission® to reduce the amount, if possible, preparatory to contingent arrangements for pay¬ ment. On 14 June 1915 the court issued a judg¬ ment against West Virginia for $12,393,929.50 including accrued interest, and for 5 per cent interest thereafter until paid.

In June 1916, Virginia asked the Supreme Court for a writ of execution by levy upon public property of West Virginia. This the court denied for the time in order first to give the West Virginia legislature a ˆreasonable op¬ portunity to provide for the payment of

the judgment.® In February 1917, Virginia filed application for a writ of mandamus against the legislature of West Virginia to compel the levy of a tax to pay the judgment. The court, al¬ though (in April, 1918) it deferred action, indi¬ cated that appropriate remedies for enforce¬ ment could be found, both in the power of Congress and in the power of the judiciary under existing legislation, in case West Vir¬ ginia should fail to do her duty. On 1 Jan. 1919, the amount of the debt was $14,562,867.16. Of this amount, West Virginia, by act of 31 March 1919, arranged to pay $1,062,867.16 in cash and the balance by an issue of <(li.stable® 3J/2 per cent bonds (coupon and registered) payable in 1839 (or earlier). Consult Ambler, C. H., Sectionalism in Virginia) (1910) ; Fast, R. E., and Maxwell, H., (History and Govern¬ ment of West. Virginia) (1908) ; Callahan, J. M., Semi-Centennial History of West Virginia) (1913).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

WEST WIND DRIFT. See Currents, Ocean.

WESTALL, Richard, English painter: b. 1765; d. London, 4 Dec. 1836. He was appren¬ ticed in London to an engraver on silver in 1779 ; subsequently studied at the schools of the Royal Academy and began to practice his art in association with Thomas Laurence in Soho Square. Here he became very popular as an illustrator of books and for a single design in water colors sometimes received $400 or $500. He also painted historical subjects. His (Elijah Restoring the Widow's Son to Life1 was purchased for some $2,250 by the directors of the British Institution; but his paintings in oil were not generally salable ; his designs and figures are monotonously conventional, although some of his scenes from peasant life are by no means destitute of freshness: and charm. One of his last occupations was that of teaching drawing to Princess afterward Queen Victoria of England. His water-color painting, Cassan¬ dra Prophesying the Fall of Troy,1 is in the South Kensington Museum, and his pictures in oil of Christ Crowned with

Thorns) in All Souls' Church, Langham Place, London.

WESTALL, William, English novelist: b. White Ash, Lancashire, 7 Feb. 1834; d. 9 Sept. 1903. He was educated at the Liverpool High School, engaged in business and in journalism and was foreign correspondent for the London Times and Daily News, traveling in North and South America and in the West Indies. He has been a prolific writer and among his publi¬ cations are (Tales and Traditions of Saxony and Lusatia1 (1877) ; (In Tropic Seas) (1878) ;

(Harry Lohengrin1 (1879), and Che Old Factory) (1881); (Red Ryvington1 (1882); <A Queer Race) ; (A Phantom City.1

V/ESTBORO, Mass., town in Worcester County, on the Boston and Albany Railway, 12 miles east of Worcester, 32 miles west by south cf Boston. It contains five churches, a public library with 18,000 volumes, the Westboro In¬ sane Hospital, the Lyman Reform School, a savings bank, a national bank, a weekly news¬ paper and numerous important manufacturing industries, the chief being those connected with straw and leather goods, boots and shoes and automobiles. Westboro was settled about 1659, and at first known as Chauncey, but in 1717 it was incorporated under its present name. It is the birthplace of Eli Whitney (q.v.), inventor of the cotton gin. Pop. (1920) 5,789.

WESTBROOK, Maine, city in Cumberland County, on the Presumpscott River and on branches of the Boston and Maine and the Maine railroads, six miles west of Portland, with which it is connected by electric lines. The river furnishes considerable water power, which is utilized by manufactories, chief of which are silk and cotton mills, paper and flour mills and machine shops. The silk and cotton products are mainly dress goods, cotton warp and seamless bags. The manufacturing interests include some 42 establishments, with over 1,500 employees and an annual production of $3,500,- 000. The city has eight churches, the Presenta¬ tion Convent, a high school, public and parish elementary schools, the Walker Memorial Li¬ brary, a bank and a newspaper. A city govern¬

ment was inaugurated in 1891. Pop. (1920)

9,435.

WESTBURY, Richard Bethell, Baron, English jurist and statesman: b.

Bradford-on- Avon, Wiltshire, 30 June 1800; d. London, 20 July 1873. Graduated from Oxford in 1818, he was admitted to the bar at the Middle Tem¬ ple in 1833, in 1852 became solicitor-general, and in 1856-58 was attorney-general under Lord Palmerston. This post he held a second time, in 1859-61 and in 1861 he became lord high chancellor of Great Britain. As chancellor he did much by his decisions to aid the develop¬ ment of British equity jurisprudence, especially so in joint stock company law, ecclesiastical ap¬ peals and patent law.

WESTCOTT, west'kot, Brooke Foss, Eng¬ lish bishop and theologian : b. Birmingham, January 1825; d. Bishop Auckland, 27 July 1901. He was graduated from Trinity College, Cambridge, in 1848, was elected a Fellow of his college in 1849 and in 1851 was ordained in the English Church. He was assistant master at Harrow 1852-69, and here he remained till 1869, when he became a residentiary canon of Peter¬ borough. He became canon of Westminster in 1883 and on the death of his friend, Lightfoot, bishop of Durham, was appointed his successor in 1890, and in this see he remained until his death. He showed a deep interest in the lot of the miners in his diocese, which won him their genuine esteem, and he was very successful in preventing and settling industrial disputes. From 1870 to 1890 he was regius professor of divinity at Cambridge and during his tenure of the office exercised a powerful and abiding in¬ fluence on undergraduates and scholars. As a scholar and theologian Westcott's position was a very high one. As a textual critic he is best known for his share in the revision of the Greek text of the New Testament, which occu¬ pied him and J. F. A. Hort for 28 years, and resulted in the publication of their important work, (The New Testament in the Original Greek,) in 1881. The text formed the basis of the Revised Version of the New Testament. His other published works include (General Survey of the History of the Canon of the New Testament During the First Four Centuries> (1855), which has gone through many editions; Hntroduction to the Study of the Gospels) (1860) ; (A General View of the His¬ tory of the English Bible) (1868) ; (The Para¬ graph Psalter> (1879) ; <The Revelation of the Risen Lord1 (1882) ; (Social Aspects of Chris¬ tianity1 (1887) ; (Essays in the History of Religious Thought in the West1 (1891); <The Gospel of Life1 (1892) ; <The Incarnation and Common Life1 (1893) ; (Lessons of the Re¬ vised Version of the New Testament1 (1894) ; (Christian Aspects of Life1 (1895) ; 'Lessons from Work1 (1901), and (Words of Faith and LI ope1 (1902). He was one of the New Testa¬ ment revision company. Consult <Life,1 by his son (1903).

WESTCOTT, Edward Noyes, American

novelist : b. Syracuse, N. Y., 27 Sept. 1847 ; d. there, 31 March 1898. He was a banker in his native city, but compelled to retire because of failing health, spent the winter of 1895-96 in Italy and in the latter year completed the novel

David Harum,) which he had begun soon after his retirement from business. It was de¬ clined t>y many leading publishers, but when issued in the autumn of 1898, six months after the author's death, became at once a success, reaching a sale of 400,000 copies in a little more than a year. The human nature of the book is its strong characteristic; it is a faithful re¬ flection of certain phases of life in central New York and its humor is undeniable.

WESTERLY, R. I., the largest town in the State south of Providence, in Washington County, on the Pawcatucket River, and on the main branch of the New York, New Haven, and Hartford Railroad. It is in the south¬ western part of the State, and near Long Island and Fishers Island' sounds. The first white settlers came from Newport, and for a while kept the Indian name, Misquamicut. For a time it was also known as Southernton. On 14 May 1669, it was incorporated under the present name. In 1686 it changed its name to Haver-sham, and in 1689 it was again renamed, West¬ erly. The town contains five villages, each with its own post office. The chief manufacturing industries are cotton, wool and silk mills, printing presses and thread. The granite quar¬ ries, among the largest in the country, have made the name <(Westerly Granite® known the world over. The summer resort Watch Hill, one of the villages of the town, has a summer population of 3,000. Other summer resorts within the town limits are the beaches known as Atlantic Beach and Weekapang. The town has eight churches, a Federal post office and a county courthouse. The public library, <(The Wilcox Memorial Library,® a heavily en¬ dowed institution, is one of the best in New England. There are two banks with deposits of about $6,000,000. Pop. (1920) 9,952. Con¬ sult Denison, (Westerly and Its Witnesses y ; Weeden, (Early Rhode Islandˆ (1910); also various publications of the Westerly Historical

Society.

WESTERMARCK, Edward Alexander,

Finnish anthropologist: b. Helsingfors, 20 Nov. 1862. He was educated at the Lyceum at Helsingfors, and at the University of Finland. He was appointed professor of moral philosophy at the University of Helsingfors in 1894; was engaged in travel in northern Africa in 1898-1902, studying the moral conditions of the primitive races ; and in 1907 was appointed pro¬ fessor of sociology at the University of Lon¬ don. He also lectures frequently at the Uni¬ versity of Helsingfors. His book (The His¬ tory of Human Marriage) (1891) went through several editions and was translated into French, Italian, Spanish, Swedish, Russian, German and Japanese, and gained for him a worldwide reputation. He is also author of (The Origin and Development of the Moral Ideas) (2 vols., 1906-08) ; (Marriage Ceremonies in Morocco> (1914), *etc.*

WESTERN AUSTRALIA, one of the

States of the new Commonwealth of Australia. See Australia, West.

WESTERN EMPIRE, The, the western portion of the Roman empire, consisting of Italy, Illyricum, Spain, Gaul, Britain and Africa, as distinguished from the Eastern or Byzantine empire, comprising the eastern half

of the Balkan Peninsula, Greece, Egypt, Syria and Asia Minor, so far as Persia. This parti¬ tion of the Roman empire occurred in 364 when Valentinian I shared the imperial authority with his brother Valens, who ruled in Con¬ stantinople as emperor of the East, while Valentinian ruled in Rome as emperor of the West. The partition became final in 395 when Theodosius the Great divided the Roman world between his two sons Honorius, who became emperor of Rome and the West, and Arcadius, who became emperor of Constantinople and the East. The Western empire terminated in 476. See Byzantine Empire; Rome.

WESTERN FEDERATION OF MINERS (since December 1916 known as the International Union of Mine, Mill and Smelter Workers) , a labor organization of per¬ sons working in mines, mills and smelters, founded 15 May 1893, at Butte, Mont., and hav¬ ing for its object the general improvement of its members, the abolition of child labor, govern¬ ment by injunction, *etc.* The executive board is made up of a

president, vice-president, secre¬ tary-treasurer and four organizers. This board passes on all joint contracts to which local unions are a party, on every strike and acts as a board of arbitration when occasion offers. It directs the federation except during the bi¬ ennial convention, when the latter is supreme. The Federation resulted from the strike of 1892 at Coeur d'Alene. It was involved in an¬ other strike there in 1899, in which the struggle between operators and miners became most bitter. In 1896-98 it was affiliated with the American Federation of Labor, and thereafter to 1905 with the American Labor Union. It helped form the Industrial Workers of the World in 1905, but withdrew in 1906. In 1911 it again joined the American Federation of Labor. The member¬ ship is not bound by any political party or platform. The Miners' Magazine is the official publication.

WESTERN ISLANDS. See Azores ; Hebrides.

WESTERN MARYLAND COLLEGE,

located at Westminster. Md. It was founded under the auspices of the Methodist Protestant Church, and was first opened to students in 1867. It was the first college in the South to offer equal educational privileges to both sexes ; but it is not strictly coeducational, as there are separate classes for women, though they are taught by the same instructors and have practically the same courses of study as the men. The courses of study are arranged in three groups, which are practically the same in the first two years, but differ in the last two, and in accordance with the predominating study are known as the classical, the scientific and the historical. The degree of A.B. is conferred for the completion of a four years' course in any of these groups. In addition, courses are offered in music, art and elocution, and students who complete one of these courses may substitute it for certain studies of the junior year. There is also a pre¬ paratory school which in 1899 was established in a separate building (Levine Hall) a short distance from the campus. There are two State scholarships for each senatorial district. The campus contains 14 acres situated on elevated ground in the western part of the city. The

main building consists of a central part, the original building and five wings: (1) Owings Hall, extending back from the central part; (2) Smith Hall, extending to the east; (3) Hering Hall, extending to the west; (4) Ward Hall, a rear extension of Hering Hall, and (5) a rear extension of Smith Hall. Other buildings are the Yingling Gymnasium, Y. M. C. A. Hall, Baker Chapel, built of white stone, and Alumni Hall, containing a large assembly room, the halls of the literary societies, *etc.*

WESTERN PORT, Md., town in Alle¬ ghany County, on the north branch of the Potomac River, 20 miles southwest of Cumber¬ land, and on the Western Maryland Railroad. It is situated in a coal mining district, and there are paper factories. Pop. 2,702.

WESTERN RESERVE, or CONNECTI¬ CUT RESERVE, that portion of the North¬ west Territory (q.v.) reserved by Connecticut when, in 1786, that State ceded to the United States other parts of the territory claimed under the charter of 1662, which granted to Connecticut lands limited east and west by the sea. This section of land is what is now in¬ cluded in the northeastern part of Ohio; it was all the territory between lat. 41° and 42° 2' N., and extending 120 miles from the western boundary of Pennsylvania. In 1795-96 Con¬ necticut sold this land, except 500,000 acres, to a number of men who established what was known as the Connecticut Land Company. At first settlers hesitated about purchasing any of the land on the "Reserve,® fearing the validity of the title, but when the State of Con¬ necticut yielded all claim to the government, there was no longer any doubt about the titles. There were a large number of colonists from Connecticut who settled on this "Reserve,® counties were organized, 13 in all, which were in whole or in part from lands of the "Reserve.® (See Norwalk, Ohio). The people were characterized by their thrift, industry and the manner in which they established schools. A large part of the money received by Connecti¬ cut for the sale of the lands was set aside "as a perpetual fund, the interest of which should be appropriated to the support of schools.® This school fund was the means of influencing in Ohio a unique system of education, in some respects different from that of any other State. Consult Matthews, (Ohio and Her Western Re¬ serve } (1902).

WESTERN RESERVE UNIVERSITY,

located at Cleveland, Ohio, includes the College for Women, the Graduate School, the Medical School, the Law School, the Dental School, the Library School, the School of Pharmacy, the School of Education (summer sessions) and the School of Applied Social

Sciences. As a working, though not a corporate, part of West¬ ern Reserve University is Adelbert College of Western Reserve University. Adelbert College of Western Reserve University was founded as Western Reserve College in Hudson, 26 miles from Cleveland, in 1826. As the territory for¬ merly belonged to Connecticut, and derived its name from being territory in the West re¬ served for special purposes, so also the in¬ fluence of Connecticut's great college domi¬ nated in its establishment and during its first decades. In affiliation with the college at Hud¬

son for many years was the Cleveland Medical School. Theological instruction was also given for many years, ceasing in 1853. In 1882 West¬ ern Reserve College was moved to Cleveland. Amasa Stone (q.v.) gave to the college the sum of $600,000. In recognition of the gift the college took the name of a beloved son of Mr. Stone, who died while a student at Yale, be¬ coming Adelbert College of Western Reserve University. Subsequent gifts and bequests, to¬ gether with gifts made by members of his family, have amounted to more than $1,100,000. In 1884 a university charter was obtained. The following departments, in addition to the Medi¬ cal School, were established : In 1888 the Col¬ lege for Women, in 1892 the Dental School, the Law School and the Graduate School, in 1903 the Library School, in 1882 the School of Pharmacy, in 1915, the School of Education and the School of Applied Social Sciences. The Library School was endowed by a gift of $100,- 000 made by Andrew Carnegie.

The college and the university have through¬ out their history been distinguished by a high type of scholarship. Among the professors have been Rev. Laurens Perseus Hickok, 1836-44; Rev. Clement Long, 1844-52; Nathan Per¬ kins Seymour, 1840-70; Elias Loomis, 1836-44; Charles Augustus Young, 1856-66; Elijah Por¬ ter Barrows, 1837-52; Samuel St. John, 1838-52; Samuel Colcord Bartlett, 1846-52. Its presi¬ dents have been Charles Backus Storrs, 1830-33 ; George Edmond Pierce, 1834-55 ; Lawrence Hitchcock, 1855-71; Carroll Cutler, 1871-86; Hiram Collins Haydn, 1887-90. Charles Frank¬ lin Thwing has been president of the university since 1890. The whole number of students in the different departments, from the beginning, has been as follows : Adelbert College, 3,545 ; The College for Women, 2,500; the Graduate School, 400; the School of Medicine, 5,200; the Law School, 1,800; the Dental School, 700; the Library School, 496; the School of Education (summer sessions) 2,781 ; the School of Ap¬ plied Social Sciences, 329 (including students in extension courses). The buildings and equip¬ ment are valued at

almost $4,000,000 and the entire property $8,000,000.

In the fall of 1918, there was begun the erection of a new Gymnasium Armory. This building is 175 feet in length by 90 feet in width.

In the general educational endeavor known as Western Reserve University are two administrative features of special significance. One lies in the co-ordinate method of educa¬ tion. A college for men, Adelbert College, and a college for women exist as essential members of the same university. Each has its own faculty and government. The two bodies of students are distinct. Each college has its en¬ dowment and buildings. The work, in the sciences, however, is done in the same labora¬ tories, but usually at different times. Profess¬ ors in the same departments of the two in¬ stitutions exchange courses of instruction to a certain extent. The co-ordinate method is in part a co-operative method. In a State and a part of the country noted for coeducation, the method prevailing in Western Reserve Univer¬ sity is conspicuously successful. A further significant method of administration relates to the co-operative course of study established be-WESTFIELD— WESTLAKE

tˆle f”ase School of Applied Science and Adelbert College. 1 hese two institutions are planted upon the same campus and each has its own board of trustees. But the two faculties have arranged a course of instruction covering five years, three of which are spent in pursuing the liberal studies of the undergraduate col¬ lege (Adelbert College) and the last two years are spent in the technical school (Case School of Applied Science). At the conclusion of the five-year course a bachelor of arts and a bachelor of science degree are given. Thus, the advantages of the liberal course of study are conserved and the efficiency of the specialized course also gained.

Students also may have the privilege of combining the course in Adelbert College with either the course in the Law School or the School of Medicine of Western Reserve Uni¬ versity. T. he course in arts and law covers six years. The course in arts and medicine takes seven years. Both the Law School and the School of Medicine are graduate schools. Through the combined courses one year of time is saved. With the beginning of the academic year, 1918-19, women

were received into the Law School. Previous to this time, the courses had been open only to men.

WESTFIELD, Mass., town in Hampden County, on the YVestfield River, and on the Boston and Albany, and the New York, New Haven and Hartford railroads, nine miles west of Springfield. It is on the site of an Indian village, which was called Woronoco. The chief manufacturing establishments are machine shops, paper mills, thread mills, motorcycle, patent leather and whip factories, and cigar factories. The town has nearly 200 fac¬ tories, employing 3,500 persons, with annual products of about $7,500,000. The valley in which Westfield is located is noted for its beauty; the town has a park, Woronoco, an excellent water-supply, which is brought from Montgomery Mountain, seven miles distant, and a good sewerage system. The water plant, completed in 1874, cost nearly $250,000. There are seven churches, the Noble Hospital, the Massachusetts State Normal School, a public high school, established in 1855, public and parish elementary schools, kindergartens, and a public library, which contains over 25,000 vol¬ umes. There are four banks, and a daily and a weekly newspaper. Pop. (1920) 18,603.

WESTFIELD, N. J., village in Union County, on the Central Railroad of New Jersey, about 20 miles southwest of New York. It is mainly a residential village, in a beautiful loca¬ tion, on an elevation. There are six churches, public and private schools, two newspapers and two banks. Pop. (1920) 9,026.

WESTFIELD, N. Y., village in Chautauqua County, on the Chautauqua Creek, and on the New York, Chicago and Saint Louis and the Lake Shore and Michigan Southern railroads, about 60 miles southwest of Buffalo, and 20 miles southwest of Dunkirk. It is in an agri¬ cultural and fruit region, in which the chief products are grapes, apples, peaches and pears. It has railroad shops, a grist-mill and fruit-basket and crate factories. There are six churches, a union school and academy, which has two endowed scholarships, and a public library, founded by Hannah Patterson by a gift of $100,000. There is a national bank and a newspaper. Pop. (1920) 3,413.

WESTFORD, Mass., town in Middlesex County, on the Boston and Maine Railway, 6 miles southwest of Lowell. It contains several villages, and has four churches and a public library. There are manufactures of woolen goods and machinery, and agriculture and

granite quarrying are carried on. Pop. about

2,851.

WESTINGHOUSE, George, American inventor: b. Central Bridge, N. Y., 6 Oct. 1846; d. New York, 12 March 1914. He entered the machine shop of his father, a manufacturer of agricultural implements, when very young and early evinced an inventive genius, designing at 15 a rotary engine. He served in the Union army in 1863-64, and in 1864-65 was assistant engineer in the United States navy, after which he studied at Union College for two years. He continued his interest in mechanics, his first in¬ vention of importance being a railway frog. In 1868 he introduced the famous Westinghouse brake (see Air-Brake), which has since been developed to a remarkable degree of effi¬ ciency, and has come into international use. At first his invention was scouted as im¬ practicable. The story is told that he inter¬ viewed Commodore Vanderbilt, and explained his designs. The Commodore is said to have replied, ((If I understand you, young man, you propose to stop a railroad train with wind; I have no time to listen to such nonsense.® A few years later the “impossible® device was operating on all the Commodore’s lines. Mr. Westinghouse was one of the pioneers in introducing alternating-current machinery, and he succeeded in securing the use of this method at the Chicago Exposition in 1893. He has also made numerous improvements in railroad signaling, and through his devices the safety of high-speed railway traveling has been greatly increased. He erected extensive works in this country and abroad for the manufacture of his various inventions, was president of over 30 cor¬ porations and proved to be as good a business man as he was a skilled mechanician. He re¬ ceived the Order of Leopold from the Belgian king in 1884, and in 1889 the Royal Order of the Crown from the king of Italy. He was also decorated with the French Legion of Honor. Consult Leupp, F. E., (George West¬ inghouse: His Life and Achievements* (Bos¬ ton 1918).

WESTLAKE, Nathaniel Hubert John,

British painter, designer and writer in art: b. Romsey, 1833. He studied at Lees’s, at Somer¬ set House, under Dyce and Herbert, at the British Museum, and also at Antwerp and Paris. At the suggestion of the late W. Burges he went to a firm of glass painters to design, and afterward became art manager and partner of the firm about 1880. He has frequently ex¬ hibited at the Royal Academy, Arts and Crafts, *etc.* His paintings are in Saint John’s Church, Richmond, Portsmouth

Cathedral, Saint Augus¬ tine's, Tunbridge Wells, Bute Memorial Chapel, Cardiff Castle, Wales, the Chapel of Maynooth College, Ireland. Mr. Westlake de¬ signed glass for Saint Paul's Cathedral, Lon¬ don, the cathedrals of Peterborough and Wor-

cester, the Gate of Heaven Church, South Bos¬ ton, Mass., the Via Crucis of Saint Francis's, Notting Hill, London. He designed Salviati's mosaic of Blessed James of Ulm at the South Kensington Museum, London, the apse mosaic in the Newman Memorial Church, Birmingham, and has colloborated with many famous archi¬ tects. His publications include (Outlines of the History of Design in Mural Painting) (3 vols.) ; (History of Painted Glass) (4 vols) ; (True Portraiture of St. Francis) ; (Sketches at Malines Exhibition. > He edited Reproduc¬ tion of Royal Manuscripts, 2 B VII, British Museum) ; (Queen Mary's Psalter, J *etc.*

WESTLAKE, William, American inventor: b. Cornwall, England, 23 July 1831; d. Brook¬ lyn, N. Y., 28 Dec. 1900. He came to the United States in 1847, settled in Milwaukee, Wis., and there was employed in a printing office. He was subsequently an apprentice to a tinsmith, and in 1853 made for Captain John Ericsson the models for his first hot-air en¬ gine. He entered the employ of the La Crosse and Milwaukee Railroad Company in 1857, and soon after began the series of inventions which made him famous. Among them are the Westlake car heater, the globe lantern, the first practical car lamp, the oil cook stove, the stove-board, *etc.*

WESTLAND, New Zealand, a provincial district in South Island, bounded north by Nel¬ son district, south by Otago, west by the ocean and east by Canterbury, from which it is sepa¬ rated by the chain of the Southern Alps. It is about 200 miles long and about 25 miles in average breadth, its area being about 4,642 square miles. It consists principally of hills branching off from the great alpine system, in¬ tersected by narrow bush-clad valleys, and merging coastward into undulating plateaus, river valleys and shelving coasts. The streams are numerous but short. Practically the whole of the district is covered

with forest. Large tracts can be prepared easily for pastoral pur¬ poses, but there is little ground suitable for agriculture. Gold is found in the valleys of the rivers, especially in those of the Arahura and Waiho, and gold-bearing quartz is also worked in some places. Silver, copper, iron and tin are among the other metallic treasures of the district, which has also yielded much coal, especially from the valley of the Grey. The climate is equable and temperate. The rainfall is heavy, and snow lies on the high mountains during much of the year. The capi¬ tal is Hokitika, the other chief towns being Greymouth, Brunnerton, Kumara and Ross. Railways connect Greymouth with Hokitika, Jackson and Reefton (in Nelson district). Westland was formerly part of Canterbury dis¬ trict. Pop. about 17,000.

WESTMACOTT, west'ma-kot, Richard, English sculptor, son of Sir Richard Westmacott (q.v.) : b. London, 1799; d. there, 19 April 1872. He studied under his father and also in Italy 1820-26, and after returning to England rose to prominence in his art. In 1857 he suc¬ ceeded his father as professor of sculpture at the Royal Academy, having become associate member of the academy in 1838 and a full mem¬ ber in 1849. His style resembled that of his father in many respects. He published a (Hand¬

book of Sculpture* (1864) and a pamphlet (On Coloring Statues. *

WESTMACOTT, Sir Richard, English sculptor: b. London, 1775; d. there, 1 Sept. 1856. He was the son of Richard Westmacott, also a sculptor, and was early trained to a knowledge of art by his father. In 1793 he was sent to Rome to study his profession under Canova, and there gained the annual gold medal for sculpture given by the Pope at the Academy Saint Luke. He also obtained a first prize for sculpture at Florence, and was elected a mem¬ ber of the Academy there. In 1798 he returned to England and rose rapidly in estimation as an artist. Many of the monuments in Saint Paul's Cathedral are by him, and that building forms, in some respects, a gallery of his works. The figure of a Welsh girl in a monument to the memory of Lord Penrhyn, at Penrhyn, in North Wales, is considered by many as his best creation. He designed also the statue of Nelson in Birmingham, besides figures of Addison, Pitt and many others. He became an associate of the Royal Academy in 1805, a full member in 1811 and in 1827 succeeded Flaxman as lecturer to the academy on sculpture. He was knighted in 1837.

WESTMEATH, Ireland, inland county of the province of Leinster,

having Meath on the east, Roscommon on the west, Cavan on the north and King's County on the south ; greatest length, east to west, about 40 miles ; greatest breadth, north to south, about 35 miles; its area is 708 square miles, or 453,468 acres, of which 111,752 are under tillage. The surface is generally level, the land is chiefly in pasture. Mullingar is the chief town, but Athlone is the great manufacturing centre. Pop. 59,812.

WESTMINSTER, London, England, a metropolitan and Parliamentary borough, for¬ merly the ancient city and Liberty of Westmin¬ ster, which still retains its civic title and certain privileges. Area, 2,502 acres. It is bounded on the south and east by the river Thames ; east by the citv of London, from which it was separated by the former Temple Bar; north by Holborn, Marylebone and Paddington, and west by Kensington and Chelsea. It is connected with Lambeth by Vauxhall, Lambeth, West¬ minster and Waterloo bridges. It has the high¬ est valuation of any of the London boroughs (£6,821,491 in 1915), not excepting the City of London. The city contains some of the finest and most imposing buildings in London and teems with historical and literary associations. All the metropolitan royal palaces are within its limits and also Westminster Abbey, the Houses of Parliament, a fine modern Roman Catholic cathedral, the principal government buildings, the headquarters of the metropolitan police force, the National Gallery and the Tate Gallery, Burlington House, Somerset House and the principal theatres and opera-houses. It is divided into three Parliamentary constituencies, each returning one member, Saint George's, Planover Square, the Abbey and Strand.

The History of Westminster goes back to a very early period. It became a city when, in 1540, Henry VIII made it the see of a bishop, and even though the see was suppressed 10 years later it retained the right to the style of city. The only (Anglican) bishop of Westmin-

stcr was Thomas Thirlby. Since 1831 a branch of the Grosvenor family has borne the title of marquis, and since 1874 of Duke of Westmin¬ ster. In 1850 a Roman Catholic archiepiscopal see of Westminster was

created by Pope Pius IX, the first occupant being Cardinal Wiseman. Pop. -about 160,261. Consult Besant, (Westminster> (1895) ; Terry, (Greater Westminster (1899) ; Walcott, (Westminster (1849). See London.

WESTMINSTER, Md., city, county-seat of Carroll County, on the Western Maryland Railroad (Wabash System) about 35 miles northwest of Baltimore. The city is in an agri¬ cultural section, but it has considerable manu¬ facturing interests. The chief industrial estab¬ lishments are flour-mills, carriage factories, canneries and cigar factories. In the canning season about 500 employees are engaged in the canning factories. There are nine churches. The educational institutions are the Western Maryland College (Methodist Protestant), opened in 1868; public and parish schools. There are three national and two savings banks. The government is vested in a mayor and com¬ mon council of five members, elected annually. The place was settled in 1724 by persons from the north of Ireland and a colony of English from Prince George County, of which at that time it was a part. Some Germans were also among the first settlers. The inhabitants are nearly all American born, descendants of Ger¬ mans, Irish, English, Dutch and French. Pop.

(1920) 3,521.

WESTMINSTER, Order of the Holy Cross of. See Orders, Religious.

WESTMINSTER ABBEY. See London,

Church Buildings.

WESTMINSTER ASSEMBLY OF DI¬ VINES, a celebrated assembly held in the middle of the 17th century for the settlement \of a general creed and form of worship throughout Great Britain, at a time when Pres¬ byterianism had gained a strong position in England as well as in Scotland. On the 23d of Nov. 1641 the House of Commons (Long Parliament) addressed to the king a remon¬ strance desiring a synod of the. most learned and pious men throughout the island for the settling of the government of the Church; but it was not till 1643, after the civil war had begun, that an ordinance was passed (on 12 June) convoking the long-proposed assembly of divines. By this act 121 clergymen, with 10 lords and 20 commoners as lay assessors, were nominated as constituents of the assembly. The assembly began its sittings on 1 July 1643 in Henry VIPs Chapel, at Westminster

Abbey, but in the meantime a proclamation forbidding the assembly to meet had been issued by the king on 2 June, which had the effect of inducing the greater part of the Episcopal members to absent themselves, and Episcopacy was thus almost en¬ tirely unrepresented. The majority of those who remained were Presbyterians, but there was a powerful and energetic minority of Independ¬ ents. A deputation was now sent along with commissioners from the English Parliament to the general assembly of the Scottish Church and the Scottish Convention of Estates, solicit¬ ing their cooperation in the proceedings of the Westminster Assembly, and accordingly on VOL. 29 — 15

15 September four Scottish clergymen, Alex¬ ander Henderson, George Gillespie, Samuel Rutherford and Robert Baillie, with two lay¬ men, Lord Maitland and Sir Archibald Johnston of Warriston, were admitted to seats and votes by an act of the English legislature. The assem¬ bly continued to hold its sittings till 22 Feb. 1649. Among the results of its deliberations were the (Directory of Public Worships which was presented to Parliament on 20 April and ratified on 2 Oct. 1644; the (Confession of Faith) presented to Parliament in October and November 1646 and ratified with a few verbal alterations in March 1648; the (Shorter Cate¬ chism, } presented to the House of Commons on 5 Nov. 1647 and the (Longer Catechism* on 15 Sept. 1648. In the latter period of the sittings of the assembly the growing power of the Inde¬ pendent party in Parliament presented a serious obstacle to the carrying into effect of its recom¬ mendations, though in 1648 an order of Parlia¬ ment was pronounced declaring ((all parishes and places whatsoever,® with the exception of chapels for the king and peers, to be under the Presbyterian form of church government. The accession of Cromwell to power destroyed the hopes of the Presbyterians, and on the Restoration the whole proceedings of the West¬ minister Assembly, with the ratification of Par¬ liament, were annulled as invalid.

While this celebrated convocation was thus allowed, as regards England, to remain almost inoperative, its deliberations have left on Scot¬ land and on Presbyterianism as established in the United States, an impress which will never be effaced. The present standards of the Pres¬ byterian churches are made up of the various formularies above enumerated. They were rati¬ fied by the Scottish General Assembly as fol¬ lows : The (Directory of Public Worship) in February 1645; the (Confession of Faith* in August 1647, and the ˆLonger and Shorter Cate¬ chism } in July 1648. Consult Hetherington's (History of the

Westminster Assembly) (1843; 6th ed. 1891) ; the (Minutes of the Assembly,* edited by Mitchell and Struthers (1874) ; Mitch¬ ell's <The Westminster Assembly) (1883); ˆCambridge Modern History) (Vol. 4, New York 1906), *etc.* See Presbyterianism.

WESTMINSTER COLLEGE, located at Fulton, Mo. It was founded in 1853 by the Missouri Synod of the Presbyterian Church. Though badly crippled during the Civil War by reduction in numbers and loss of endow¬ ment, the college continued its work through¬ out the war. In 1892 a bequest of nearly $120,- 000 for permanent endowment was received and in 1897 the Alumni Association began a movement for further increase of this fund. In 1901 an amendment of the charter placed the college under the joint control of the South¬ ern and the Northern synods of Missouri. The college formerly conferred the three degrees of A.B., B.L. and B.S. for the completion of the classical, literary and scientific courses re¬ spectively; but recently arranged its course in three groups corresponding to the former three courses, and confers the single degree of A.B. Each group includes required and elective studies. Bible study is required and Hebrew is among the electives. There is also an acad¬ emy offering a classical and a literary and

scientific course and commercial courses. The campus comprises 18 acres on a wooded slope bordering on Stinson Creek. There are now four buildings, and productive funds totaling $247,219. The library contains over 10,000 vol¬ umes ; the students average annually 170 and faculty 16.

WESTMINSTER COLLEGE, located at New Wilmington, Pa. It was chartered in 1852, as Westminster Collegiate Institute under the auspices of the United Presbyterian Church. The board of trustees now consists of 40 mem¬ bers, the majority of whom are elected by two synods of that Church. The name was changed to Westminster College in 1892. The college offers two four year courses, leading to de¬ grees, the classical and the scientific, and con¬ fers the degrees of A.B. and B.S. The work of the scientific course is mostly required; that of

the classical course largely elective in the junior and senior years. Greek is required for the A.B. degree. There are also a three years' preparatory course, a department of music and an art department. Students maintain four liter¬ ary societies. Any student taking more than one study of the classical course is required to belong to one of these societies. There is no general athletic association, but a football as¬ sociation, baseball association, *etc.* The college has a pleasant situation on elevated ground, some parts of the campus commanding a fine view. The buildings are the main building, scientific hall, the ladies' hall and the gymnasium. The productive funds in 1917 totaled $498,201. The students average annually 250, the faculty 22.

WESTMINSTER CONFESSION OF FAITH. See Confession of Faith, West¬ minster.

WESTMINSTER HALL. See London,

Houses of Parliament.

WESTMINSTER PALACE, London, Eng¬ land, an alternative name for the Houses of Parliament, perpetuated from the ancient palace built by Edward the Confessor as a royal resi¬ dence and which contained the various national administrative and judicial offices. With the exception of the great hall, the building was destroyed by fire in 1834. The site is occupied by the new palace of Westminster or Houses of Parliament. See London, Houses of Parlia¬ ment.

WESTMINSTER SCHOOL, an ancient English public school established in Westmin¬ ster Abbey by Henry VIII, and refounded in 1560 as Saint Peter's College by Queen Eliza¬ beth. The school buildings closely adjoin the abbey, several of them having once been a part of the domestic buildings of the abbey, the great schoolroom being originally the monks' dormitory; others, such as Ashburnham House, belonging to the Post Reformation period. The institution was reorganized in 1868 as one of the seven principal public schools of England. The Westminster play, for which this school is noted, is a yearly performance by the pupils of some Latin comedy. Many eminent Englishmen have been educated at this school. Consult Forshall, (Westminster School, Past and Pres¬ ent (1884) ; Barker and Stenning, (Westmin¬ ster School Register> (1893).

WESTMINSTER STANDARDS. See

Presbyterianism.

WESTMOUNT, Canada, city in Hochelaga County, province pf Quebec. It is a residential suburb of the city of Quebec. Pop. 14,579.

WESTON, Edward, American electrician: b. London, England, 9 May 1850. He came to the United States in 1870 and engaged as chemist to a nickel-plating company. He de¬ vised various improvements in the process of nickel-plating and invented several dynamo-electric machines, establishing at Newark, N. J., in 1875, the first factory in America devoted exclusively to the manufacture of the latter class of machines. After the consolidation of his plant with another company in 1881 he con¬ tinued as its electrician until 1888. He has since devoted his attention to the improvement of appliances for lighting by electricity and has introduced improvements in both arc and in¬ candescent lighting. He was one of the founders of the American Institute of Electrical Engi¬ neers, of which he was president in 1888.

WESTON, Edward Payson, American pe¬ destrian: b. Providence, R. 1., 15 March 1839. In his youth he was a reporter on the New York Herald and was valued because of his ability to bring his night copy back to the office on foot quicker than could others traveling on the horse-cars of the period. He attracted atten¬ tion in 1861 by walking 443 miles in 208 hours to attend the inauguration of Abraham Lin¬ coln. His professional career began in 1867, when he walked 1,326 miles from Portland, Me., to Chicago, in 26 days. Later he engaged in six-day races, first in the effort to make 500 miles in a week, and when that record was passed he learned to run and created higher records. Some years later he again took to long walks on the highway, and in 1907 re¬ peated his trip from Portland, Me., to Chicago, bettering the time 29 hours. Next he walked from New York to San Francisco, 3,895 miles (1909), in 104 days, 7 hours. The following year he walked back to New York, 3,500 miles, in less than 77 days. He has lectured on pedestrianism and temperance in numerous cities of the United States and England.

WESTON, W. Va., town, county-seat of Lewis County, on the West Fork of the Monongahela River and on the West Virginia and Pittsburgh Railroad, about 78 miles south of Wheeling and 71 miles southeast of Parkers¬ burg. It is in an agricultural region, in which considerable attention is given to stock-raising. It has a flour-mill, lumber and planing-mill and machine shop. A State hospital for the insane is located here. The two banks have a com¬ bined capital of $150,000. Pop. (1920) 5.701.

WESTPHALIA, west-fa'li-a, or WEST¬ FALEN, vest"fa'len, Germany, a name origi¬ nally given (1) to a large region of Germany; (2) to a

duchy; (3) to an ancient imperial circle; (4) to a kingdom; (5) to a province of Prussia. These various divisions will be de¬ scribed in the above order.

1. The name of Westphalia was given from the second half of the 8th century to the west¬ ern part of the ancient Duchy of Saxony in¬ corporated by Charlemagne in the kingdom of the Franks, that is, to all the country between

the Weser and Rhine while the territory be¬ tween the Elbe and Weser was called East-phalia (Ostfalen). The latter name was lost after the dissolution of the Duchy of Saxony in 1180; the former was retained and was ap¬ plied in the first place to a newly-erected duchy.

2. Duchy of Westphalia. — This was formed out of the part of the old Duchy of Saxony, then and still called Siiderland or Sauerland, on the Upper Ruhr and Lenne. When Henry the Lion, the last of the old dukes of Saxony, was put under the ban of the empire, this terri¬ tory was taken possession of by Philip of Heins-berg, achbishop of Cologne, who obtained the title of duke from Frederick Barbarossa. Cologne remained in possession of it until the dissolution of the archbishopric in 1801, upon which it was given, by way of indemnity, to Hesse-Darmstadt. In 1815 it was ceded by this power to Prussia and was united with the Prus¬ sian province of Westphalia.

3. Circle of Westphalia, one of the 10 circles into which the empire of Germany was divided by Maximilian I in 1512. It comprised the region between Lower Saxony, the Nether¬ lands, Thuringia and Hesse, as well as con¬ siderable tracts on the left bank of the Rhine; but the proper Duchy of Westphalia, as an ap¬ pendage of Cologne, was considered as belong¬ ing to the electoral circle of the Rhine. Its total area was 22,175 square miles.

4. Kingdom of Westphalia. — -The Peace of Tilsit (July 1807) had made Napoleon master of all the Prussian territory west of the Elbe and he also kept possession of the territories of the electors of Hesse and Hanover and the Duke of Brunswick. Out of the countries just mentioned he created by decree of 18 Aug. 1807 a kingdom of Westphalia, with an area of 14,712 square miles and a population of nearly 2,000,000. Napoleon gave the kingdom to his youngest brother, Jerome, and on 15 Nov. 1807 a constitution similar to the French was granted to it. The insurrections that broke out in several parts in 1809 occasioned the adoption of various severe measures, and the introduction of an oppressive system of police. At the same time the king was required to bring his army up to a strength of 30,000 men, which produced great disorder in the finances. In 1810 a part of Hanover was added to the kingdom, the whole area of which was now 17,540 square miles. After the battle of Leipzig (1813) the kingdom was dissolved. On 26 October, Jerome was obliged to quit his capital (Cassel) and make his escape from the kingdom, whereupon the territories of which it was composed re¬ turned to their former possessors.

5. The Prussian Province of Westphalia was formed in 1815 out of some of the prov¬ inces which Prussia formerly possessed in the circle of Westphalia. It is bounded on the north by the province of Hanover; on the east by Hanover, Schaumburg-Lippe, Lippe-Det- mold, Brunswick, Hesse-Nassau and the prin¬ cipality of Waldeck; south by the province of Hesse-Nassau, and west by the province of the Rhine and the kingdom of Holland. Its area is 7,800 square miles. The capital is Munster. The province in the south and northeast is generally mountainous, being traversed by the Westerwald, Rothhaar, Teutoburgerwald and the Wesergebirge. The northwest spreads out

into extensive and often marshy plains and be¬ longs to the basin of the Ems ; the northeast and a small part of the east to the basin of the Weser; the remainder, constituting the far larger portion of the whole, belongs to the basin of the Rhine. The soil is in general far from fertile. Livestock are numerous, par¬ ticularly horned cattle, sheep and swine ; the hams made from the latter have long been famous. The staple manufacture is linen, but that of iron is also very extensive. The region possesses the principal Prussian deposits of iron and coal and these were heavily drawn upon during the World War. Other minerals mined include copper, lead, zinc and salt. The province is divided into the three governments of Mun¬ ster, Minden and Arnsberg. The population is about 4,250,000.

WESTPHALIA, Peace of, the treaty con¬ cluded in 1648 at Munster and Osnabriick, West¬ phalia (q.v.), which ended the Thirty Years' War and established a new political system in Europe. After preliminaries had been settled . at Hamburg toward the end of 1641 the actual negotiations were begun in 1644, at Osnabriick, between the empire, Sweden and the Protestant states, at Munster between the empire, France and Other foreign powers. Two treaties were drawn up, one at Osnabriick, signed 6 Aug. 1648, and one at Miinster, signed 24 Oct. 1648. Peace was restored with the signing of the lat¬ ter. By this peace the religious and political state of Germany was settled. The sover¬ eignty of the members of the empire was ac¬ knowledged. They received the right of con¬ cluding treaties among themselves and with for¬ eign powers, only not against the emperor and empire. Their consent was made necessary to enable the emperor to put any of the members under the ban. The concessions that had beer, made to the Protestants since the religious peace in 1555 were confirmed. The form of public worship and the right to secularize ecclesiastical benefices were to return to what they were at the beginning of the so-called normal year 1624. The Calvinists (Reformirten) received equal rights with the adherents of the Augsburg Con¬ fession or the Lutherans. The elector-palatine had the palatinate of the Rhine and the elector¬ ate restored to him ; Alsace was ceded to France; Sweden received western Pomerania, Bremen, Verden, Wismar and a sum equal to $3,750,000; Brandenburg, Mecklenburg, Han¬ over and Brunswick were compensated by the secularization of numerous ecclesiastical foun¬ dations. Germany lost altogether more than 40,000 square miles of territory and about 4,500,000 inhabitants. The independence of the United Provinces was recognized by Spain, and that of Switzerland by the empire. The sol¬ emn protest of Pope Innocent X against these terms, particularly in respect of the seculariza¬ tion of bishoprics and abbeys, etc., was not re¬ garded; but the complete execution of the treaty was obstructed by many difficulties.

WESTPORT, Conn., town in Fairfield County, on Long Island Sound at the mouth of the Saugatuck River, and on the New York, New Haven and Hartford Railroad, four miles cast of Norwalk. It was established from por¬ tions of the towns of Weston, Fairfield and Norwalk. Westport contains three villages. It

is in an agricultural region and has a number of industrial establishments, chief of which are cotton-twine and button factories, machine shops and manufactories of satchels and mo¬ rocco. It has a high school, elementary schools and a public library. There are two banks and a newspaper. Pop. about 4,259.

WESTPORT, Ireland, small seaport of the province of Connaught, county Mayo, at the mouth of a small stream that falls into Clew Bay, about 35 miles north-northwest of Galway. Formerly Westport was supported principally by linen manufactures ; but is now known mostly for its trade in grain and pro¬ visions, and for its facilities for sea-bathing. In the immediate vicinity is the Reek Croagh Patrick, a mountain 2,510 feet high. Pop.

(1920) 5,114.

WESTPORT, Ma,ss., town in Bristol County, on the Atlantic Ocean, seven miles south of Fall River. Its Horseneck Beach is one of the finest beaches on the coast. There are manufactures of cotton products. Pop. 2,928.

WESTVILLE, Ill., village in Vermilion County, 128 miles south of Chicago, on the Chicago and Eastern Illinois and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. Its industries include coal mining and steel manufactures, and considerable corn is raised in the surrounding district. Pop. (1920) 4,241.

WESTWARD HO, one of the best known historical novels of Charles Kingsley, was be¬ gun in the spring of 1854 while Kingsley was living at Bideford and appeared the following year. The scene, laid chiefly in Bideford and at Plymouth and neighboring parts in the west of England, deals with the sea-faring English about the time of the Spanish Armada. The attempt is to picture the spirit of the English in their warfare against Spain. Historical char¬ acters, as Drake and Raleigh, are introduced, but the particular story is that of Amyas Leigh, his brother Frank and other members of the League of the “Rose of Torridge,® so called from the beautiful heroine for whose hand these chivalrous and high-minded youths were rivals. Their individual rivalry was merged in the common cause against Spain, in which several, including Frank Leigh and the Rose, met their deaths.

Finally Amyas, a stout¬ hearted young giant who had been particularly successful in vanquishing Spaniards, losing his eyesight, was obliged to pass the long remainder of his life in helplessness. The picture is a spir¬ ited one, though by no means in all respects his¬ torically accurate. The character and achieve¬ ments of the English and the wiles and wicked¬ ness of the Spanish are painted with unstinting hands. As is usual in Kingsley's best-known works, like 'Alton Locke) and 'Hypatia,* even such chivalrous achievements do not constitute the best end of life. Only when Amyas Leigh, blind and helpless, can turn from an active to a spiritual life, is his highest happiness won.

William T. Brewster.

WESTWOOD, John Obadiah, English entomologist and archaeologist : b. Sheffield, England, 22 Dec. 1805 ; d. Oxford, England, 2 Jan. 1893. He devoted himself to sciences, mak¬ ing extensive researches in the fields of ento¬ mology and archaeology; was one of the found¬ ers of the Entomological Society of London in

1833, and from 1883 its honorary life president. From 1861 until his death he was professor of invertebrae zoology at Oxford. His works on both entomology and English archaeology are numerous and important. Among the former are 'The Entomologists' Text-Book0 (1838) ; 'Introduction to the Modern Classification of Insects* 0839-40) ; < Arcana Entomologica)

(1841-45); (The Butterflies of Great Britain* (1855); 'Catalogue of Orthopterous Insects in the British Museum, Part I, Phasmidae* (1859) ; 'Thesaurus Entomologicus Oxoniensis* (1874) ; 'Revisio Insectorum Familiae Mantidorum* (1889), *etc.* His archaeological works, which are enriched by his excellent reproductions of manuscripts and illuminations and also by his drawings of inscribed stones and old ivories, are well known. Among them are 'Palaeo-graphia Sacria Pictoria> (1843-45) ; 'Wood Carvings> (1864); 'The Utrecht Psalter* (1874); 'The Early Inscribed and Sculptured Stones of Wales) (1876-79) ; 'The Book of Kells: a Lecture) (1887), *etc.*

WET BULB THERMOMETER. See

Thermometer.

WETASKIWIN, Canada, city and capital of Strathcona district, province of Alberta, 40 miles south of Edmonton and on the Canadian

Pacific Railroad. It is situated in a rich agri¬ cultural district and is of growing importance as a manufacturing town. Pop. 2,411.

WETHERALD, Agnes Ethelwyn (Bel Thistlewaite), Canadian poet: b. Rockwood, Ontario, 26 April 1857. She was educated at Pickering College, Ontario. For some time she edited the women's department of the Toronto Daily Globe , and she was subsequently connected with the staff of the Ladies' Home Journal. Her verse appeared in numerous magazines and she is author of 'The House of Trees) (1896) ; 'Tangled in Stars) (1902) ; 'The Radiant Road* (1904); 'The Last Robin* (1907), *etc.*

WETHERELL, wet'h'er-el, Elizabeth. See

Warner, Susan.

WETHERELL, Emma (Abbott), Ameri¬ can soprano opera-singer : b. Chicago, Ill., 9 Dec. 1849; d. 5 Jan. 1891. She first sang in public at the age of nine. Through the patronage and friendship of Clara Louise Kel¬ logg she was enabled to go to New York 1870, where she was engaged in the choir of the church of the Divine Paternity, a number of whose members in 1872 contributed to send her abroad, and she studied for four years in Paris. She made her debut in London 1876 as Mar¬ guerite. For refusing to take the part of Vio¬ letta, in 'La Traviata,* on moral grounds, her engagement was canceled. In 1874 she was married to Eugene Wetherell. She made her first appearance in New York in 1877.

WETHERSFIELD, wet'h'erz-feld, Conn., town, Hartford County, on the Connecticut River and on the New York, New Haven and Hartford Railroad, three miles south of Hart¬ ford. In the summer it has regular steamer connections with New York and intermediate ports and it is connected with Hartford and other nearby places by electric railways. It has manufactories of mattresses, copying presses and agricultural implements. Important indus¬ tries of the town are connected with the culti¬ vation of seeds and the packing and shipping of

the same. It was one of the first places in the otate settled by the colonists. It has a famous elm tree 26.6 feet in circumference. The First Church (Congregational) dates from 1761. A FLˆ0r1ˆ building is the Webb house, where, in 1761. W ashington and Rochambeau met. A otate prison is located here. The educational institutions are a high school, public and pri¬ vate schools and a public library. Pop. 3,500.

WETMORE, Claude Hazeltine, American author: b. Cuyahoga Falls, Ohio, 1862. He was educated at Western Reserve University, Cleve¬ land, Ohio, and the ficole Polytechnique, Lau¬ sanne, . Switzerland, and subsequently spent 10 years in South American travel. He has pub¬ lished (Sweepers of the Sea> (1900) ; lighting under the Southern Cross* (1901); <In Inca-land> (1902) ; (In a Brazilian Jungle* (1903).

WETMORE, Edmund, American lawyer: b. Utica, N. Y., 1838; d. 11 July 1918. He was graduated at Harvard University in 1860 and at the Columbia University Law School in 1863. He was thereafter engaged in law practice in New York and became one of the most promi¬ nent lawyers in the city. In 1900-01 he was president of_ the American Bar Association. The degree LL.D. was conferred upon him by Yale University in 1906.

WETMORE, Elizabeth Bisland, American author: b. Fairfax Plantations, La., 11 Feb. 1861. She was privately educated, and was for a time on the staff of the New Orleans Times-Democrat. She later established herself in New York, became one of the editors of the Cosmopolitan Magazine and was known as a magazine writer. She was married to C. W. Wetmore in 1891, and has lived much in Eng¬ land. Her work, published under her maiden name includes, <A Flying Trip Around the World) (1891) ; (A Candle of Understanding* (1903); (At the Sign of the Hobby Horse) (1910) ; (The Case of John Smith) (1916), *etc.* She edited (Life and Letters of Lafcadio Hearn) (2 vols., 1906) ; Japanese Letters of Lafcadio Hearn) (1910).

WETTER, vet'ter, Sweden, a lake about 24 miles southeast of Lake Wener, extending be¬ tween the Ians of Mariestad, Orebro, Linkop- ing, and Jonkoping; greatest length, 80 miles; medium breadth, about 15 miles; area, 715 square miles. Its height above the level of the Baltic is nearly 300 feet, but its depth is in some parts above 400 feet, or 120 feet below the Bal¬ tic level. Its water is very clear. It has peri¬ odic rises and falls independent of the wetness or dryness of the season and is subject, even in the calmest weather, to violent underground swells. When these take place in winter the sounds emitted by the ice in cracking and breaking up are often tremendous.

An under¬ ground ridge is traceable throughout the whole length of the lake from north to south and its culminating points form the few islands which appear above its surface. The largest of these is the Visingso, in the south. The Wetter forms part of a general line of navigation, which extends across the kingdom from east to west and far into the interior. By the Gotha Canal it communicates with Lake Wener, and by the Motala Canal with the Baltic. The scenery of the lake is in many places magnifi¬ cent ; the chief town on its shore is Jonkoping.

WETTERHORN, vet'terhorn (((peak of tempests**), Switzerland, one of the most strik-mg peaks of the Bernese Oberland ; has three summits — the west, called by the natives Hasli-Jungfrau, 12,147 feet high; the middle, known as the Mittelhorn, 12,165 feet; and the east, the Rosenhorn, 12,110 feet. These were ascended first in 1844 and frequently since, the ascent be¬ ing made from Grindelwald. The contrast be¬ tween the bright fresh pastures and the black precipices and dazzling snow ridges of the Wet-terhorn is particularly striking, making the val¬ ley of the Reichenbach a favorite resort of artists.

WEXFORD, Ireland, maritime county of the province of Leinster, bounded north by the county of Wicklow, east by the English Chan¬ nel, south by the Atlantic, west by the coun¬ ties of Waterford, Kilkenny and Carlow; great¬ est length, north and south, about 60 miles ; greatest breadth, east and west, 34 miles; area is about 901 square miles, or 576,588 acres. Pop. about 104,100.

WEXFORD, weks'ford, Ireland, a seaport town, capital of the county of the same name, at the mouth of the River Slaney. The town is ir¬ regularly built and the streets narrow, but it contains some handsome buildings. It has a county courthouse, town hall, prison, theatre, barracks, *etc.* ; three Roman Catholic churches, besides several Protestant places of worship, nunneries, a Roman Catholic college and vari¬ ous schools. Above the town there is a bridge across the river 1,500 feet in length. Wexford was a Danish settlement of great strength; it was captured by Cromwell in 1649; remains of its ancient walls exist. The harbor is spacious, but has a bar across the mouth. There is a dockyard and patent slip. The herring and sal¬ mon fisheries employ many persons ; malt, agri¬ cultural implements and machinery are manu¬ factured and distilling and brewing are carried on. The chief trade consists in the exportation of grain, cattle, poultry, butter, *etc.* In 1885 Wexford ceased to be a parliamentary borough. Pop. 11,154.

WEYBURN, Canada, town and capital of Assiniboia district, Saskatchewan, 300 miles southwest of Winnipeg, on the Canadian Pacific Railroad. The manufactures of the town are of growing importance. Pop. 2,210.

WEYDEN, vi'den, Rogier van der, Flem¬ ish painter: b. Tournay, about 1400; d. Brussels, 16 June 1464. In 1426 he was apprenticed to learn painting, in 1432 became master in the painters' guild of Tournay, and in 1436 was chosen town artist of Brussels. His four works illustrating justice, executed for the <(golden chamber® of the Hotel de Ville, were destroyed by fire in 1695. In 1449 he journeyed to Italy, where he worked at Ferrara for Leonella d'Este, and painted also for the Medici and the Sforzas. He was the founder of the Brabant school. Among his principal extant works are a triptych in the Belvidere of Vienna; a triptych, (The Last Judgment,* in the Beaune Hospital; and <The Descent from the Cross) (Madrid gal¬ lery). Consult the study by Wauters (1856); and Crowe and Cavalcaselle, (Early Flemish Painters) (3d ed., 1879).

WEYER'S (wee'erz) CAVE, in Augusta County, Va., 11 miles northeast of Staunton.

It is a large stalactic cavern, in a spur of the Blue Ridge; and it contains a number of cham¬ bers, the largest of which is called Washington's Hall. This chamber is 250 feet long and nearly 100 feet high. This cave ranks next in import¬ ance to Mammoth and Wyandotte caves.

WEYLER Y NICOLAU, wa ler e ne'ko-low, Valeriano, Marquis of Teneriffe, Span¬ ish general: b. Palma, Island of Majorca, 17 Dec. 1838. He was educated in Granada, en¬ tered the infantry school in 1853, and became under-lieutenant in the staff school in 1857. He was appointed lieutenant of the staff in 1860 and rose through higher ranks until in 1878 he became lieutenant-general. He was military attache of the Spanish legation at Washington during the American Civil War and in 1868 was ordered to Cuba, where he served under

Bal-maceda through the 10 years' war. He was ap¬ pointed governor-general of the Canaries in 1879, captain-general of the Philippines in 1889, and \vas afterward provincial governor of Catalonia. He succeeded Martinez Campos as captain-general of Cuba in 1896 and by the per¬ petration of many barbarities added to an al¬ ready infamous record for cruelty in the con¬ duct of the war then being waged on the island. His inhuman methods aroused the indignation of the people of the United States, where he be¬ came known as ((Butcher Weyler,® and in 1897, upon the change of cabinets in Spain, he was re¬ called. His reputation did not appear to suffer in his own country and in 1901-02 he was Min¬ ister of War in Sagasta's Cabinet and again re¬ ceived the post in 1905. When the rioting in Barcelona (1909) called for military interfer¬ ence, he took the field as captain-general and promptly restored a condition of order.

WEYMAN, wi'man, Stanley John, Eng¬ lish novelist : b. Ludlow, Shropshire, 7 Aug. 1855. He was educated at Shrewsbury School and Christ Church, Oxford, studied law, and was called to the bar in 1881. For nine years he practised on the Oxford circuit and then be¬ gan a literary career in 1890 by publishing a romance entitled (The House of the Wolf.* It was succeeded by (The New Rector* (1891) and (The Story of Francis Cludde) (1891), but it was his brilliant story, (A Gentleman of France) (1893), that first brought him into prominence and on his historical novels his reputation rests. His later works include (Under the Red Robe) (1894); (My Lady Rotha) (1894) ; (The Red Cockade> (1895) ; (The Man in Black) (1896) ; (Shrewsbury J (1897); <The Castle Inn> (1899); (Sophia> (1900) ; (Count HannibaP (1901) ; (In Kings' Byways* (1905); <Wild Geese> (1908). His tales are well constructed and written in a workmanlike manner, with plenty of incident and adventure, and the interest is well sus¬ tained.

WEYMOUTH, wa'muth, England, seaport in Dorsetshire, on a beautiful semi-circular bay, seven miles south-southwest of Dorchester. The borough comprises Melcombe-Regis, from which it is separated by the small river Wey. It is well built ; has two parish churches, one of them in Melcombe-Regis ; several other places of wor¬ ship, a general and an eye infirmary, town-hall, reading-room, Victoria jubilee hall, libraries, *etc.* There is a considerable coasting trade and an active traffic, passenger and other, with

the Channel Islands and France. There are shipbuilding, sail-making and rope-making es¬ tablishments. Portland stone is exported from

the neighboring isle of Portland (q.v.). Both Weymouth and Melcombe-Regis, particularly the latter, from the beauty of the bay and its smooth, firm sands, attract numerous visitors. There is a fine esplanade about one mile in length. Pop. about 23,000.

WEYMOUTH, Mass., town in Norfolk County, on Boston Harbor, and on the New York, New Haven and Hartford Railroad, 10 miles southeast of Boston. Electric lines con¬ nect the town with Boston and the nearby towns. Weymouth contains seven villages, each one having a post office. It has manufactories for boots and shoes, hammocks, fireworks and machinery. It has car-repair shops and exten¬ sive wool-scouring yards. The educational in¬ stitutions are grammar and primary schools ; private schools; Tufts Library, which contains about 25,000 volumes ; the Fogg Library, and a high school at Weymouth Centre. The town owns and operates the waterworks. The first permanent settlement was made in 1623 by Capt. Robert Georges, but the place had been visited often before this time, notably in 1622 by Thomas Weston. The place was first called by the Indian name Wessagusset, until it was incorporated 2 Sept. 1635, when the present name was adopted. Pop. (1920) 15,057. Consult Adams, Proceedings on the 250th Anniversary of the Permanent Settlement of Weymouth. *

WEYR, vir, Rudolf, Austrian sculptor : b. Vienna, 22 March 1847. A pupil of Bauer and Cesar at the Vienna Academy, he won the Reichel prize with his (Samson and Delilah* (1870) and in 1878 was commissioned to exe¬ cute the decorations of the Grillparzer monu¬ ment. His reliefs and experiments in poly¬ chrome sculpture won for him a considerable reputation. Besides numerous decorations for the university and museum buildings at Vienna, his works include the (Triumphal Procession of Bacchus and Ariadne) for the pediment of the Burgtheatre, and the great fountain before the imperial palace

WHALE. Any large cetacean is called a whale, while any small representative of the order is usually called a porpoise or dolphin. This division of the group is unscientific, how¬ ever, and breaks down when the moderate¬ sized forms are in question, the layman being always in doubt whether these are to be classified as whales or as porpoises.

It happens that all cetaceans having whale¬ bone, instead of teeth, or those constituting the suborder Mystacoceti, are of large or huge size. These may be all quite properly called whales, but it will be necessary for the present purpose to add to this natural group the sperm whale, a representative of the toothed whales, or sub¬ order Odontoceti and

the bottlenosed, or ziphioid, whales, which constitute the family Ziphiidce, and also belong among the toothed whales. The order then stands as follows :

Order Cetacea. Cetaceans.

Suborder Mystacoceti. All cetaceans with whalebone.

Family Balcenidce. (Co-extensive with the suborder.)

Suborder Odontoceti. All cetaceans with teeth.

Family Physeterida. Sperm whales.

Family Ziphiidce. Bottlenosed whales.

Family Delphinidce. Porpoises or dolphins.

Family Platanistida. River dolphins.

Whalebone Whales. — Whalers recognize several species of groups of whales with whale¬ bone, to which they give the names of right whales, humpbacks, finbacks and sulphurbottoms. These correspond to natural groups or genera, except that the sulp'hurbottom is really a kind of finback. To these are to be added the California gray whale, or grayback, a very dis¬ tinct genus, combining characters of right whales and finbacks, and the pygmy right whale of New Zealand. These various genera may be distinguished by the following external characters :

Humpbacks (genus Megaptera). — Form bulky and uncouth. Head broad and rounded in front, and flat on top, with rows of hemi¬ spherical tubercles. Belly with many broad longitudinal ridges and furrows. Pectoral fins very long (about one-third the length of the body), with serrations corresponding to the joints of the index finger. A low, thick dorsal fin. Flukes with a serrated margin. Color black and white. Whalebone short, dull blackish.

Finbacks (genus Balcenoptera) . — Form slender and graceful. _ Head broad and flattish, more or less pointed in front. Belly with very numerous narrow ridges and furrows. Pectoral fins short, with plain margins. A falcate dorsal fin. Color gray and white. Whalebone short, striped gray and white, or entirely black, or black with white bristles, or entirely white.

California Gray Whale (genus Rhacianec-tes). — Form rather slender. Head compara¬ tively narrow, moderately arched and pointed. No abdominal ridges or furrows, but two short furrows on the throat. No dorsal fin. Pec¬ torals short. Color mottled gray. Whalebone short, white.

Right Whales (genus Balcena). — Form heavy and compact. Snout very narrow, and strongly arched. No ridges or furrows. No dorsal fin. Pectoral short and very broad. Color entirely black, or with a little white below. Whalebone very long, narrow, black.

Pygmy Right Whale of New Zealand (genus Neobalcena). — Similar to Balcena , but size small. A dorsal fin present. Whalebone white.

Humpbacks. — The humpback is in many re¬ spects the most remarkable of all whales. It reaches a length of about 50 feet. The anterior part of the body is very massive, but the posterior quite slender and at the same time so irregularly shaped and so awkwardly joined to the thorax that the animal appears mis¬ shapen. This effect is heightened by the dorsal fin, which is low and thick, with a concave anterior margin and rounded tip. Not less striking are the immense crenate-margined pectoral fins, like the wings of a bird, and about one-third as long as the body. The broad abdominal ridges nearest the median line join below on the throat, forming a chin-like protuberance. Humpbacks are infested by large barnacles of the genus Coromila, which fasten on the head, fins, flukes and abdominal ridges. Where they settle on the black skin but are afterward rubbed off, or otherwise got rid of, they leave behind distinct white marks, in the form of discs, circle, crescents, etc., which add to the singular appearance of these whales. Fastened to the large barnacles, are often

bunches of stalked barnacles, genus O tion, which hang down like fringes on the fins. Some 9 or 10 species of humpbacks have been described, but wherever observed they present characters so nearly alike that it is extremely probable that all belong to one widely-diffused species. The species of the Atlantic Coast of North America

and Europe is Megaptera nodosa. Humpbacks occur in all seas, from the Arctic to the Antarc¬ tic. They congregate in bands, or schools, which sometimes number hundreds or even thousands of individuals. They are very ir¬ regular in their movements and indulge in all manner of uncouth actions. When they dive or sound they throw the flukes out of the water. Like other cetaceans they engage in seasonal migrations northward and southward. In the North Atlantic they withdraw from the waters of Greenland, Newfoundland, Iceland and Nor¬ way in fall and return in spring. They feed chiefly on fish.

Sulphurbottom, or Blue Whale (Balcenop - tera musculus). — The sulphurbottom, as al¬ ready stated, is a species of finback. Wherever finbacks are observed there are found to be four distinct forms. Each of these has been de¬ scribed from different localities under different names, but the variations are slight in each case, and have never been fully established, so that there is a strong probability that there are but four cosmopolitan species. These are the sul¬ phurbottom, the common finback, the pollack whale and the little piked whale. Each form will now be considered separately, beginning with the sulphurbottom. The sulphurbottom is the largest of whales and the largest of all ani¬ mals now existing, and was probably not sur¬ passed in size by any animal living in earlier geological times. The largest individual of which there are authentic measurements was 88 1/2 feet long. The average length for adults is about 76 feet. The sulphurbottom has a mass¬ ive head and broad snout, and the body tapers gradually to the flukes. The dorsal fin is fal¬ cate and less than a foot long, and is situated at a point a little more than three-fourths the distance from the top of the snout to the notch of the flukes. The pectoral fins are falcate and about seven and one-half feet long, from the axilla. In color the sulphurbottom is gray, nearly uniform on the head, but mottled on the back and sides. On the belly are numerous white spots. The pectoral fins are gray above and white below, the flukes gray on both sides and the dorsal fin also gray, sometimes with a whitish centre. The abdominal ridges number 62 to 88. The whalebone is about three feet long, broad at the base and black in color, both plates and bristles. These huge whales feed exclusively on small crustaceans, the species in the North Atlantic being the thysanopod Eupliausia inermis. The sulphurbottom congre¬ gate in the bays of southern Newfoundland, Iceland and northern Norway in early spring and remain until about July. Some individuals, however, appear to remain throughout the year, and their migrations are irregular and not well understood. They rarely strand on the east coast of the United States, nearly all the indi¬ viduals reported as such belonging to the next species, the common finback.

Common Finback (Balcenoptera physalus). — This is the most commonly observed and best

known of the finbacks. In size it ranks next to the sulphurbottom. The form is exceedingly attenuated. Adult individuals reach an average length of 65 feet. The head is narrow an¬ teriorly. The dorsal fin exceeds a foot in height and is situated as in the sulphurbottom. The pectoral fins are small, somewhat triangular, and about five feet long, from the axilla. This whale is gray on the back and upper surfaces of the pectoral fins and flukes and white on the belly and the under surfaces of the pectoral fins and flukes. The whalebone as a whole is gray, striped longitudinally with white, but at the anterior end of the jaw on the right side the whalebone is all white. The outside of the right lower jaw is also white. These parts are dark on the left side. This singular asymmetry of coloration is peculiar to, and characteristic of, the species. The common finback feeds on va¬ rious kinds of small fish, especially the capelin, herring, young cod, *etc.*

In the North Atlantic it appears in spring in Massachusetts Bay, the Gulf of Maine, about Newfoundland, and in Greenland waters, as well as on the coasts of northern Europe. In the fall it withdraws from these waters and is supposed to migrate southward. The large whales which strand on the east coast of the United States are almost invariably of this species. When swimming or rising to spout, this whale, like the sulphurbottom, shows the top of the head and back and the dorsal fin, but nothing beyond. The flukes are not thrown out of the water when it dives or sounds.

Pollack Whale, or Rudolphi's Rorqual (Balcenoptera borealis). — This is a smaller whale than either of the preceding, adults reaching a length of about 45 feet. The form is more compact, the dorsal fin larger and more anteriorly placed. It is black on the back and sides, with a restricted gray or whitish area on the belly. The pectoral fins and flukes are dark gray, both above and below. The whale¬ bone plates are black, but the bristles white. This whale, like the sulphurbottom, feeds on small crustaceans. Although large numbers of

individuals were taken on the northern coast of Norway in some years when the fishery was at its height, it appears to be less abundant than the larger species. It was not positively known to occur on the east coast of North America until 1903, when four specimens were taken at the Newfoundland wdialing stations. It can¬ not yet be considered more than a straggler in American w'aters. A similar, or identical, species has been observed in the Pacific Ocean, but little is known regarding it.

Little Piked Whale, or Lesser Firmer (Balcenoptera acuto-rostrata) . — This is the smallest of the finbacks and is not sought for by v/halers. The form is thickset like that of a porpoise and the head pointed. When adult, it is about 25 feet long, and the maximum length is about 28 feet. The dorsal fin is larger than in any of the other finbacks and is situated farther forward, or at a point only about two-thirds the distance from the tip of the snout to the notch of the flukes. It is very dark gray or blackish on the back and sides and white on the belly, a little clouded with gray. The pec¬ toral fins are blackish above, with a broad cross¬ band of white near the middle; below they are white. The flukes are blackish above and whit¬ ish below. In this species the abdominal ridges

are very numerous and narrow. The whalebone is very short and entirely white. The little piked whale feeds upon fish. It is found with the other species of finbacks in the North Atlantic, migrating northward and southward in the same manner, according to the season. A few speci¬ mens have been observed on the coast of New England, New York and New Jersey, either stranded or entangled in the nets of the fisher¬ men. Whales of the same size and form and with the same peculiar markings have been ob¬ served on the coast of New Zealand, Argentina, Washington, Alaska and in other widely sep¬ arated localities.

California Gray Whale, Grayback or Dev¬ ilfish (Rhachianectes glaucus). — This remark¬ able whale is found only in the North Pacific. Its characters have been already enumerated above. When full-grown it has a length of about 40 feet. It is a restless and sagacious animal, and when wounded frequently attacks the boats sent out for its capture. In earlier days it was found abundantly in the winter months in the lagoons and bays of Lower Cali¬ fornia whither it repaired to breed. It is fond of playing in the surf and approaches close in¬ shore to indulge in this recreation without fear of stranding. The gray whale is found as far northward as Bering Sea and occurs

also on the coast of Japan, but has no counterpart in other seas.

Greenland Right Whale, Arctic Right Whale, or Bowhead (Balcena mysticetus). — In reviewing the observations of earlier zoologists, Cuvier came to the conclusion that but one species of right whale existed in the North At¬ lantic and Arctic oceans, an erroneous opinion, which neveretheless was accepted until the Dan¬ ish cetologist, Eschricht, proved that the right whale of the Arctic was quite distinct from the species occurring farther south. This Arctic right whale, or bowhead, as it is called by American whalers, is most remarkable in ap¬ pearance. The snout is narrow and arched like a bow. From the roof of the mouth de¬ pends the extraordinary, narrow black whale¬ bone, which may be 12 feet long or even longer. This whalebone is enclosed and protected by the immense oblong lower lip, the curved upper edge of which fits aeainst the side of the upper jaw when the mouth is shut. The back is with¬ out a fin, while the pectorals are short and broad. There are no ridges or furrows on the belly. Adults reach a length of about 60 feet. The bowhead rarely or never leaves the Arctic ice, but like other whales it migrates north¬ ward and southward with the changes of the seasons. On the east coast of America it is never seen as far south as the southern ex¬ tremity of Greenland, thouerh there is a tradi¬ tion that at the time of the discovery of the country it ranged a? far south as the Strait of Belle Isle in winter. It occurs in the Arctic Ocean north of Alaska and ranges southward into Bering Sea. Individuals are believed to pass back and forth through the channels be¬ tween the islands north of the continent from the eastern to the western side. The bowhead feeds chiefly on small pteropod mollusks and crustaceans which occur in vast multitudes in the Arctic Ocean. It is the most valuable of whales from a commercial point of view, on account of the thickness of the blubber and the length and fine quality of the whalebone, which

at present commands exceedingly high prices, its constant pursuit for three centuries has now very greatly diminished its abundance

Atlantic Right Whale, or Black Whale (Balcena glacialis). — This

whale resembles the bowhead in general appearance, but the head is smaller and less arched, and the whalebone shorter, or only about seven feet long. Near the end of the snout is a low rounded protuber¬ ance, called the “bonnet® by whalers. This bonnet is covered with barnacles, which are not found adhering to the bowhead. The black whale, as its name implies, is usually entirely black, but some individuals have been reported as whitish or grayish on the throat and breast. When fulbgrown it reaches a length of about 50 feet. Like the bowhead it feeds upon crusta¬ ceans and pteropod mollusks. The species has been nearly exterminated, but in former days it appeared regularly in the Bay of Biscay in win¬ ter and migrated northward to Iceland and northern Norway in spring. On the North American coast it ranges, or did range, as far south as Georgia in winter and toward the close of that season, or in early spring, ap¬ peared in Delaware Bay and off the coast of Long Island and Massachusetts, and later in the Gulf of Saint Lawrence. A few individuals still appear quite regularly off Long Island.

There is every reason to believe that this whale was the object of pursuit of the earliest whale fishers among the Basques in the Bay of Biscay in the Middle Ages. It was the species on which the American Colonial shore whale-fishery was based. So persistently was it pursued, however, that for many years it was supposed to be extinct and no remains which could be identified with it were to be found in any museum. Within the last 25 years, a few individuals have appeared every spring off the east coast of the United States, and a few have been captured, or have stranded, on the coasts of southern Europe and Iceland. As the right whale does not occur within the tropics, it has been questioned whether the large species ob¬ served about New Zealand, in the North Pacific and in other waters is the same as that of the North Atlantic. Opinion is at present divided on the subject, but it is generally conceded that the real differences between the right whales of the northern and southern temperate seas, if any, have yet to be pointed out. The Atlantic right whale, like the bowhead, feeds upon pteropod mollusks and crustaceans.

Pygmy Right Whale of New Zealand (N cohalcena marginata) . — - This is a remark¬ able little whale, resembling the large right whales, but reaching a length of only about 20 feet. It has a small dorsal fin, but no abdominal ridges or furrows. The whalebone is long and white. In color the whale is black, with a line of white along the belly. It has many osteo-logical peculiarities, among which one of the most striking is the flatness and breadth of the ribs, of which there are 17 pairs. The lumbar vertebrae are only two in number. Little is known of the habits of this whale.

Sperm Whale (Physeter macro ce p halus) . — This whale, as already stated, belongs to the Odontoccti, or toothed whales, one of the two main divisions of the order Cetacea, which in¬ cludes also the porpoises, river-dolphins and bottlcnosed or beaked whales. But one species

of sperm whale is known. When full-grown the male reaches a length of 60 or 65 feet, but the female is much smaller. The head is of immense size, and is shaped like an elongated wedge with the base uppermost, and the edges and free end rounded. The blowhole is single and situated at the end of the snout on the left side. The lower jaw is very narrow and much shorter than the upper, and the two sides are joined together anteriorly for about one-half the length. In it are implanted about 44 large conical teeth which fit into pits in the upper jaw when the mouth is closed. There are no teeth in the upper jaw. The back is without a fin, but is raised into a number of low ir¬ regular humps posteriorly. The pectoral fins are broad and about six feet long. In colo'r the sperm whale is blackish above and somewhat mottled with gray below. It occurs in all seas except the Arctic and Antarctic, but is essen¬ tially an animal of the tropics. The herds or schools are diversified in character, some com¬ prising only young bulls; others, females and young led by an old bull, *etc.* At times old bulls are encountered wandering singly or in small groups. These old males are ill-tempered and pugnacious, and do not hesitate to attack the boats of the whalers. The sperm whale feeds upon large cuttlefish, which its great strength and powerful under-teeth are supposed to enable it to dislodge from their rocky re¬ treats at the bottom of the sea.

Bottlenosed Whales, or Beaked Whales (family Ziphiidce). — This family comprises four or five genera of small whales, none of them exceeding about 30 feet in length. Several species of each genus have been described, but many of them appear to be without a certain foundation. Like the sperm whale, they belong to the suborder Odontoceti, or the toothed whales. They never have, however, more than four teeth regularly implanted in the jaws, but some species have numerous minute rudi¬ mentary teeth imbedded in the lips. The head of all the forms, at least in the young, is pointed, the dorsal fin low and placed far back toward the flukes, the pectoral fins narrow and of moderate length. In the bottlenosed whale of the North Atlantic (Hyperoodon rostratum) the forehead gradually increases in size with age, until it is sharply marked off from the narrow beak, like the shoulder of a bottle. The species congregates in large herds and is

eagerly sought by whalers for its oil. The beaked whales of the remaining genera Mesoplodon, Berardius, and Ziphius, are far less abundant. They travel in pairs. Hyperoodon is peculiar to the North Atlantic, Berardius occurs only in Bering Sea and about New Zealand, while Mesoplodon and Ziphius appear to be cosmo¬ politan genera. The beaked whales subsist upon cuttlefish.

Spermaceti. — Spermaceti is the solid con¬ stituent of the crude oil of the sperm whale and some other cetaceans. The head of the sperm whale, between the skull and the integuments, is a kind of large reservoir of a semi-solid “head-matter® rich in spermaceti, but the sub¬ stance is also contained in the oil of other parts of the body and especially the dorsal humps. To extract the spermaceti, the oil is boiled, chilled and afterward submitted to a very heavy pressure. The crude brown spermaceti is

refined by heating and bleaching with alkali. Spermaceti is a whitish, translucent substance, a little lighter than water, and soluble in chloro¬ form, ether and carbon bisulphid. It melts at about 125° F. Though an excellent substance for candles, it has been very largely supplanted for that purpose by paraffin and other low-priced materials. The production in the United States in 1901 amounted to 400,000 pounds, valued at $100,000.

Whalebone. — Whalebone is the outgrowth of horny substance from the epidermis of the upper jaw in whales of the family Balcenidce. It takes the form of triangular plates, which differ greatly in size, proportions and color in differ¬ ent species. Plates to the number of 200 or 300 are attached by their bases transversely to the roof of the mouth on each side. They are long¬ est in the middle of the series and at the ends become mere bundles of fibres. The plates are smooth and straight on the outer edge, but the inner edge is fringed with coarse bristles. The bristles of adjoining plates become matted to¬ gether, forming a strainer by which the whale is enabled to retain in its mouth the fish or small crustaceans, etc., on which it feeds, while the water is squeezed out through the plates by the action of the tongue.

In the right whales, the humpback and the sulphurbottom, the whale¬ bone is black or blackish ; in the common fin¬ back, striped gray and white; in the pollack whale, black with white bristles ; and in the little piked whale, the California gray whale and the pygmy right whale of New Zealand, yellowish-white. The most valuable whalebone commer¬ cially is that of the right whales and especially that of the bowhead, which may have a length of from 10 to 12 or even 15 feet, and is very flexible. A single bowhead yields 2,000 pounds of whalebone, valued at from $5 to $7 a pound.

Whalebone from the humpback, sulphurbottom and finback is short, coarse and brittle, but also enters into commerce. Whalebone is used in the manufacture of corsets, in stiffen¬ ing and adding gloss to certain kinds of cloth, for surgical instruments, whips, *etc.*

Bibliography. — For American whales con¬ sult Goode, (Fishery Industries* (10th Cen¬ sus, Sec. 1, Washington 1884) ; Scammon, Ma¬ rine Mammals) (San Francisco 1874) ; Bullen, (Cruise of the Cachalot* (New York 1900). For cetaceans in general consult Beddard, (Book of Whales* (London and New York 1900), which contains a copious list of references to other books. An exhaustive account of the whale fishery will be found in the (Annual Re¬ port of the United States Fish Commission for 1883,* by Temple Brown.

F. W. True,

United States National Museum.

WHALE-BIRD. See Fulmar.

WHALE-HEAD, a stork. See Balˆeni-ceps.

WHALE-LOUSE, any of various small crustaceans parasitic on whales. (See Fish-lice). These crustaceans have a rudimentary abdomen, and have the limbs of the first joint of the thorax or chest inserted beneath the throat. The body is flattened and of oval shape and the legs are all prehensile. They burrow deeply into the skin of their hosts.

WHALE OIL. Oil obtained from a whale's blubber by trying out. (See Whale). It is light yellow to dark brown. The variety known as sperm oil comes from the head of the sperm whale. The use of whale oil appears to be of ancient origin. It was doubtless first obtained from whales accidentally stranded on the shores, a more frequent occurrence during the early abundance of the cetaceans than at

present, when their numbers have been so greatly reduced by excessive fisheries. As the demand for the oil increased beyond the supply available from stranded whales, individuals sighted from the shore were attacked and beached. Owing to the frailty of the boats and equipment, this was a more daring attempt than might be supposed. Just prior to the Revolu¬ tionary War there were 183 American vessels in the right-whale fishery of the North Atlantic waters and 125 were engaged in cruising for sperm whales from Newfoundland to the coast of Brazil. The Revolutionary War and the War of 1812 interfered with the fisheries ; but dur¬ ing the period of peace following 1815 they in¬ creased greatly in extent until 1846, when the fleet numbered 678 ships and barks, 35 brigs and 22 schooners, a total of 735 vessels, with an aggregate tonnage of 233,189 tons and a value of $21,075,000, exclusive of outfits and supplies. The entire capital invested in the fishery and its associated industries at that time approximated $40,000,000 and 40,000 persons derived from it their chief support. During the same year the whaling fleet of all Europe numbered but 230 vessels. Large whales have been known to yield 250 barrels of 32 gallons, but probably an aver¬ age for a large whale was 75 barrels and down to 12 barrels for a small bottlenose whale. The crude value of the American catch from 1840 to 1860 averaged about $8,000,000 an¬ nually. The greatest value was in 1854, when 2,315,924 gallons of sperm oil worth $1.48j£ per gallon, 10,074,866 gallons of whale oil worth 59ˆ4 cents per gallon and 3,445,200 pounds of whalebone worth 39 y$ cents per pound were secured, the total value being $10,802,594. In the preceding year, 1853, the total product was 3,246,925 gallons of sperm oil, 8,193,591 gallons of whale oil and 5,652,300 pounds of whalebone, the whole valued at $10,766,521. Sperm oil and whale oil then served nearly all the diversified uses for which oil was required, the chief exception being leather-dressing, for which neatsfoot and cod oils were largely em¬ ployed. The principal uses were as illuminant, lubricator, in cordage manufacture, screw-cut- ting and steel-tempering. The streets of the principal cities were lighted with the oil and theatres and public buildings were lighted with gas made from the oil settlings.

In 1902 the whaling fleet of the United States consisted of eight steamers, 18 barques and brigs and 12 schooners, aggregating 8,366 tons. Of these, 11 barques and 10 schooners were sperm-whale fishing in the Atlantic Ocean, eight steamers in the Arctic, six barques in Okhotsk Sea and off the coast of Japan, two schooners in Hudson Bay and one brig at Desolation Island. The total whale-oil prod¬ uct of the world in 1902 approximated 3,000,000 gallons, of which 750,000

gallons were produced by the United States fish¬ eries, 900,000 by those of Norway and the

remainder by Scotland, Russia, Japan, New¬ foundland, *etc.* Since that date the product has steadily reduced.

WHALEBACK STEAMSHIP. See

Steam Vessels.

WHALEBONE. See Whaling.

WHALING, or the pursuit of whales as an industry, existed in the North Atlantic Ocean at a remote period. There are obscure refer¬ ences to it in Norwegian and English history as early as the beginning of the 10th century. In the 11th century the Basques pursued the North Atlantic right whale, or black whale (Balcena glacialis), with harpoons, in open boats. It is even asserted that they crossed the Atlantic in pursuit of their quarry before the time of Columbus, but this has not been sub¬ stantiated. Certain it is that they visited New¬ foundland immediately after the discovery of America and captured the same species of right whale in those waters. They are supposed also to have first seen the Arctic right whale, or bowhead (Balcena mysticetus) , in the Strait of Belle Isle. In 1607 Henry Hudson encountered the bowhead in the vicinity of Spitzbergen. The Spitzbergen fishery developed rapidjy on ac¬ count of the large amount of oil yielded by this species and was extensively engaged in by various European nations, especially the Dutch, who in 1680 employed 260 vessels and about 14,000 men in the industry. During the decade beginning 1679, the Dutch took an average of about 1,000 whales annually. As the bowheads decreased about Spitzbergen, they were sought for to the westward, and in 1719 a Dutch ves¬ sel first entered Davis Strait. This fishery was developed .chiefly by the British, Danes and Americans; in 1789 there were 255 British ves¬ sels engaged in it. The first American vessel visited Davis Strait in 1732. The number in¬ creased rapidly and at the height of the fishery, just

before the Revolutionary War, Massa¬ chusetts alone sent 183 vessels to the strait.

About 1670, the American colonists suc¬ ceeded in establishing a boat shore-fishery for the Atlantic right whale, which in those days was abundant on the coast, especially off Long Island and in Delaware Bay, and was well known from a much earlier date through stranded individuals. Later the colonists pur¬ sued the whales in sailing vessels farther from shore and in the Gulf of Saint Lawrence, but finally turned their attention to the Arctic right whale, or bowhead, in Davis Strait, as already mentioned.

About 1712 the first sperm whale was cap¬ tured at sea by a Nantucket whaler. This fish¬ ery rapidly rose in importance and was pursued in all the oceans of the globe, especially by the Americans. The British did not apply them¬ selves to it until 1775, but in 1790 a British whaling vessel rounded Cape Horn and opened up the Pacific fishery, which immediately grew to enormous proportions, and was at its height in 1837. The American whaling fleet in 1839 comprised 555 vessels, of which the majority were engaged in the Pacific sperm-whale fish¬ ery. In 1847 the number rose to 594, while the foreign whaling fleet numbered 230 vessels. The size of the American fleet reached its maximum in 1846, when 729 vessels were em¬ ployed.

While a large part of the American fleet was engaged in the pursuit of the sperm whale, the remaining vessels were chiefly employed in hunting right whales, especially in the North Pacific. As the sperm-whale fishery declined, this branch increased in importance. In 1835 the famous Kadiak ground was discovered. A new epoch opened in 1843 when bowhead whales were first taken off the Kamchatka Coast. In 1848 the first vessel passed through Bering Strait to pursue these large whales in the Arctic Ocean. The fishery in the North Pacific and adjoining Arctic was at its height in 1852, when 278 vessels were employed. In 1866 the first American steam whaling-vessel was brought into use, and in 1880 two steamers were added to the Pacific-Arctic fleet.

The introduction of mineral oils for illumi¬ nating and other purposes and the decrease in the abundance of whales gradually broke down the fishery for right and sperm whales and at the present time the number of vessels engaged in the industry is negligible. A few sailing vessels still pursue the sperm whale, but in 1902 only five British vessels (steamers from Dun¬ dee, Scotland) entered Davis Strait in

pursuit of the bowhead. The American whaling fleet in 1902 comprised 38 vessels, including eight steamers engaged in the Pacific-Arctic bowhead fishery. Of the remaining 30 sailing vessels, 21 engaged in sperm whaling in the Atlantic; six visited Okhotsk Sea and the coast of Japan, two entered Hudson Bay and one remained about Desolation Island. To-day (1918) there are so few that little record is kept of their activities.

The humpback whale was always pursued to some extent by right-whale whalers, but the finbacks and sulphurbottoms, besides furnishing a relatively small amount of oil, were too swift to be attacked successfully with hand-harpoons. About 1865, Svend Foyn, a Norwegian fisher¬ man, invented a method of shooting them with a combined harpoon and bomb fired from a swivel gun mounted at the bow of a small steamer and for 30 years large numbers of sul¬ phurbottoms, finbacks and humpbacks were killed annually at stations established on the coast of Finmark. Later the same method was employed at Iceland, The Faroe and Shetland Islands and also about Japan. In 1898 this mode of whaling was introduced into New¬ foundland, where a number of sulphurbottoms, common finbacks and humpbacks are still killed annually.

A considerable number of common finbacks and humpbacks have been killed in Massachu¬ setts Bay and the Gulf of Maine by means of explosive bombs attached to a special form of hand-harpoon, called a (<darting gun.® A boat-fishery of limited extent has been in existence for many years on the coast of California. It has for its object the capture of the California gray whale, and the humpback, which are killed by harpoons fired from a swivel gun mounted at the bow of a whale boat. Similar boat-fisheries exist on the coast of New Zea¬ land, in the West Indies and in other parts of the world.

WHALLEY, hwol'i, Edward, English regicide: b. England, about 1616; d. Hadley, Mass., about 1675. He was in trade, probably that of woolen-draper, at the outbreak of the

Civil War, when he enlisted for Parliament. In 1643 he became major in Cromwell's regiment of horse and in 1644 after having fought at Gainsborough and Marston Moor, appears as a lieutenant-colonel. He was made colonel of one of the two parts into which Cromwell's regiment was divided and with this force took Banbury and Worcester. Later, he was super¬ seded. After Charles I was seized, Whalley was ordered to take charge of the king and in that post displayed much tact. He sat for Nottinghamshire in the two parliaments as¬ sembled by Cromwell, and in 1657 was made a member of the new House of Lords. He went to Scotland as agent of the army to mediate with General Monk, but had no success. On the Restoration he did not obey the summons of surrender of the king's judges and was therefore excluded from the indemnity. He sailed with William Goffe (q.v.) for New Eng¬ land, arrived at Boston 27 July 1660, resided for a time in Cambridge, but when the act of indemnity reached Boston in November and the town council met (February 1661) to consult regarding the refugees, went with Goffe to New Haven, where they arrived 7 March. He was associated with Goffe in the subsequent wander¬ ings and concealments which have lent such interest to their history. Consult Stiles, his¬ tory of Three of the Judges of Charles P (1794) ; Noble, (Lives of the Regicides) (1798) ; Hutchinson, (History of Massachusetts> (3d ed. 1795) ; and the <Collections) of the Massachusetts Historical Society, 3d ser. I 60, 4th ser. VIII 122. Mrs. H. M. Lothrop's romance (The Judges' Cave) (1901) is founded on incidents in the New England career of Goffe and Whalley.

WHARTON, hwar'ton, Anne Hollings¬ worth, American author: b. Southampton Fur¬ nace, Pa., 15 Dec. 1845. She has written mainly though not entirely upon colonial themes and among her books are 'The Wharton Family) (1880) ; 'Through Colonial Doorways) (1893) ; 'Colonial Days and Dames) (1894) ; 'A Last Century MaicP (1895) ; 'Martha Washington: A Biography) (1897); 'Heirlooms in Miniature> (1897) ; (Salons

Colonial and Republican > (1900) ; and 'Social Life in the Early Republic (1902) ; 'An Eng¬ lish Honeymoon) (1908) ; (In Chateau Land* (1911); 'English Ancestral Homes of Noted Americans* (1915).

WHARTON, Edith (Newbold Jones),

American novelist: b. New York, 1862. She was privately educated and was married to Edward Wharton in 1885. She has since resided much abroad and has published 'The Greater Inclination (1899); 'The Touchstone* (1900) ; 'Crucial Instances) (1901) ; 'The Valley of Decision) (1902); <Sanctuary> (1903) ; (The Descent of Man) (1904)

; and ‘The House of Mirth* (1905) ; (The Fruit of the Tree* (1907); (Artemis to Actaeon* (1909); (Tales of Men and Ghosts) (1910) ; ‘The ReeP (1912) ; ‘The Custom of the Country* (1913); (Fighting France) (1915); <Summer) (1917). In return for services rendered during the World War Mrs. Wharton was made chevalier of the Legion of Honor of France. Consult Hawthorne, H., ‘Women and Other

Women) (New York 1908) ; Underwood, J. C., ‘Literature and Insurgency1* (ib. 1914).

WHARTON, Francis, American jurist: b. Philadelphia, Pa., 7 March 1820; d. Washington, D. C., 21 Feb. 1889. He was graduated at Yale in 1839, studied law, and was admitted to the bar in 1843. He was professor of logic and rhetoric in Kenyon College, Ohio, 1856-63; in 1863 took orders in the Episcopal Church and became rector of Saint Paul’s, Brookline, Mass. In 1866 he became a professor in the Episcopal Divinity School at Cambridge, Mass., and also held the chair of international law in the Boston Law School. In 1885 he was appointed counsel for the State Department at Washing¬ ton and under a resolution of Congress (1888) was made editor of the Revolutionary diplomatic correspondence of the United States. His best known work is a ‘Treatise on the Criminal Law of the United States) (1846), which is accepted as a standard and has passed through many editions. Other works of his are ‘Precedents of Indictments and Pleas) (1849); a ‘Treatise on Medical Jurisprudence) ; ‘The Conflict of Laws) (1872) ; ‘The Law of Agency and Agents* (1876) ; ‘Commentary on the Law of Contracts) (1882) ; ‘Treatise on the Law of Evidence and Criminal Issues. *

WHARTON, Philip, Duke of, English politician: b. December 1698; d. Tarragona, Spain, 31 May 1731. At 16 he married clandestinely and in 1716 traveled on the Continent and visited the Pretender at Avignon. That prince, gratified by his attentions, gave him the title of Duke of Northumberland. About the end of 1716 he returned to England and thence to Ireland, where he possessed a peer¬ age, and was allowed, although not yet 19, to take his seat in the Irish House of Peers. He obtained a British dukedom in 1718 and on attaining his majority made his appearance in the English Parliament, where he distinguished himself as the defender of Bishop Atterbury, impeached as an adherent to the House of Stuart. He also published a virulent opposition paper called The True Briton. He later entered the Spanish service and in 1727 served against the British at the siege ol Gibraltar, for which he was in the following year at¬ tainted. His ‘Life and

Writings> appeared in 1732. Consult Robinson, ‘Philip, Duke of Wharton * (1896).

WHARTON, Thomas, American journal¬ ist: b. Philadelphia, Pa., 1 Aug. 1859; d. there, 6 April 1896. He was graduated from the Uni¬ versity of Pennsylvania in 1879, joined the edi¬ torial staff of the Philadelphia Times in 1888 and at the time of his death was Sunday editor of that journal. He published ‘A Latter-Day Saint) (1884); ‘Hannibal of New York) (1886). His short story ‘Bobbo) enjoyed wide popularity and was republished, prefixed by a biographical sketch of the author by Owen Wister as “‘Bobbo** and Other Fancies) (1897). It was dramatized and successfully played in England.

WHARTON, N. J. (formerly Port Oram), borough in Morris County, on the Rockaway River and on the Morris Canal, 23 miles west of Paterson and on the Delaware, Lackawanna and Western, the Central of New Jersey and the Wharton and Northern railroads. The

borough is situated in a coal-mining region, and there are blast furnaces. Manufactures include silks, paper and gunpowder. Pop. 2,983.

W H A R V E S AND WHARF CON¬ STRUCTION. The modern methods of wharf construction vary but little (except as to minor details) from the methods of the ancients. The process of constructing timber piers or wharves as practised in all of the ports of the Atlantic and Pacific seaboards is as follows: Piles of the best obtainable timber (generally pine or oak) are first driven to a solid foundation into the material forming the bottom of the harbor; these are designated as standard piles and are spaced from 6 to 10 feet from centres longi¬ tudinally and transversely (see Fig. 1), ac¬ cording to the desired carrying capacity of the wharf. These piles are then sawed off at the proper height above the tide level and on their tops (and fastened thereto with drift bolts) are placed timbers, often of yellow pine about 12 inches square. These timbers are known as the caps of the wharf. On these caps are placed the stringers or floor beams. They are

generally four inches thick and vary from 12 to 16 inches in depth, according to the load to be sustained. They are commonly fastened to the caps of the wharf with spikes. The stringer system is placed about two feet on centres on this superstructure ; the covering planks from three to six inches in thickness being fastened with the ordinary commercial spike of requisite length. After this portion of the wharf is finished nothing remains but to protect the same, either with a system of piles driven along the side used for mooring vessels (usually called fender piles and which are fastened to the superstructure of the wharf) and are sometimes additionally protected by wearing strips of timber and plank. (See Fig. 1.) A wharf projecting out from the

centre longitudinally and about five feet trans¬ versely; the outer pile in each bent is cut off one foot below the grade of the balance and is capped with a longitudinal sub-cap 12 inches square. The balance of the standard piles in each bent are cut off to conform with a crown of four inches in a 60-foot wharf and are capped transversely with 12 X 12-inch timbers. The piles after being stayed into position are mortised into caps having tenons seven and one-half inches wide longitudinally with the caps, three and one-half inches thick and three inches long; the caps are also drift bolted to each standard pile with a wrought-iron bolt one inch square. (In San Francisco, the caps are merely drift-bolted to each pile with, a one-inch round iron drift bolt; no tenons are used). The stringer system, or as they call it there, rangers, are 12 X 12-inch timbers, spaced five feet apart, or so as to come directly over each standard pile, the outside stringers being composed of two pieces. The covering of the wharf is of two thicknesses of four inches each. In place of fender piles, the otftside standard piles are utilized for fastening vertical fenders of 8 X 12-inch white oak timbers, extending from the sub-caps to the line of low water; there are also two lines of horizontal fenders of 8 X 12-inch oak ex¬ tending the entire length of the wharf (with the exception of the four outer bents) ; one of these is fastened to the sub-caps and the other to the backing block; between these vertical fenders there are placed intermediate fenders of the same material but reaching merely be¬ tween the two longitudinal fenders. In place of mooring piles there is used a cast-iron moor¬ ing bit. The four outer bents of the wharves are spaced about 20 feet from centre to centre. They consist of a double row of piles, each row containing the same number of piles as are

water front line of the harbor is generally rein¬ forced or braced by means of brace or batter piles driven on both sides of the wharf (see Fig. 1) at an angle of about 35 degrees with the perpendicular and they are fastened to the outside stringer as shown. The above describes more particularly the wharves as constructed on the Pacific Coast and in use in San Francisco since 1880. These wharves are 100 feet in width and about 600 feet in length.

New York Wharves. — In New York City, in wharves of the same area, contractors use about double the number of standard or bear¬ ing piles (with the exception of the four outer bents) as were used in those of San Francisco. The piles are driven 10 feet from centre to

under the regular caps, or making this row of double the carrying capacity of those caps. The end piles in each of these bents and the sheath¬ ing are so arranged that they present a rounded edge to the current. This is covered for a dis¬ tance of four feet with an armature of boiler steel one-half inch in thickness and six feet in height, securely fastened to piles and sheathing. The wider spacing of the outer bent, the addi¬ tional bracing and armature plates are for pro¬ tection against floating ice. The timber for superstructure used there is what is known as hard yellow pine. The standard piles are gen¬ erally of spruce and vary from 50 to 60 feet in length. The wharf timbers rarely exceed 30 feet in length.

Boston Wharves. — The ordinary wooden wharves of Boston are constructed as follows : Standard piles, generally of oak, are driven nine feet transversely and 10 feet longitudinally. They are bound together transversely on top with two girder caps of 6 X 10-inch hard pine and fastened to piles with one-inch screw bolts; the girder caps are let into the piles so that the same are spaced three inches apart. The outside stringers are of 10 X 12-inch and all inside stringers of 6 X 12-inch hard pine, spaced two feet from centre to centre. The wharves are covered with three-inch hard pine planks. The wharves are braced

by brace piles called there spurshores ; they are of oak and are shouldered against the outer standard pile at about one foot below mean high water and fastened thereto with one and one-fourth-inch screw bolts. In addition to bracing with piles, each bent has a set of crossbraces of 4 X 8-inch oak, running from a point about two feet above mean low water to the underside of the girder caps. These braces are fastened to each standard pile at each intersection with one-inch screw bolts ; a horizontal tie of 4 X 8-inch oak is also placed one foot above mean low water and fastened to each pile with one-inch screw belts. Fender piles of oak are driven in trans¬ verse lines with standard piles close up against the outer ones, and fastened thereto just below the girder cap with one and one-quarter-inch screw bolts. The fender piles are cut off nine inches below the top of the planking and are capped with 12 X 12-inch hard pine caps run¬ ning longitudinally. These caps answer as longitudinal fenders and projecting three inches above the planking also as a curb or backing block. Mooring piles of oak are driven just in¬ side of outer stringers and are held in place by four-inch planks fitted down into adjoining stringers and around mooring piles. The cor¬ ners of these wharves are similarly piled and finished as are the wharves of Philadelphia and New York. A safe load for these wharves would be about 300 pounds to the square foot.

bents are five feet apart from centres trans¬ versely and before being cut off at the proper level, they are straightened and stay lathed into position. They are then bound together trans¬ versely with girder plank of 6 X 12-inch, gained into piles, equally on each side, leaving a tenon of four inches thick, 12 inches long and the width being the full diameter of the pile. They are fastened to each pile with two screw bolts. The cap proper is a single piece 8 X 16 inches laid on flat, covering the pile and flush on each edge with the girders; they are drift-bolted to the piles and well spiked to the girder planks or clamps, as they are called. The wharf is braced in the following manner At the line of mean low water two girders of 5 X 10 inches are fastened to each pile in each bent, one on either side of the pile ; the spaces between these planks and the four outer piles on each side are chocked with 12 X 12-inch timbers securely bolted to the girder plank. The bents are then diagonally braced with <(A® braces of 5 X 10 on each side, four in number, dividing the bent into two panels, that is, a set of braces extend from the girder either way from the centre of -the wharf to a point at the under side of the deck line, distant from the outside of wharf one-fourth of its entire width. From the outside of wharf, at this same lower girder, another set extends to the bottom

deck, and, meeting the. first set, they are bolted to each pile at each inter¬ section with galvanized screw bolts. The stringer system is composed of an outside stringer of 12 X 14 inches and intermediates of 6 X 14 inches laid two feet six inches from centres. They are gained out at caps one inch. The floor is composed of two layers of three-inch plank, dressed to a uniform thickness; the first is laid at right angles to the axis of the wharf, and the planks are placed six inches apart, these spaces over the stringers being filled solid for the full width. The planks in the outer section of this layer, about 12 feet in length, are creosoted with 14 pounds of dead oil to the cubic foot; they are fastened to the

Fig. 2. — Cross Section through Wooden Cylinder Pier.

Philadelphia Wharves. — These wharves, with the exception of two outer bents, are con¬ structed as follows : Standard piles are, as pre¬ scribed by the rules of the board of port ward¬ ens, driven in bents located longitudinally, 10 feet from centre to centre. The piles in these

stringers with wrought spikes one-half inch square and seven inches long. The sheathing plank or upper layer are laid close and at an angle of 45 degrees with the axis of the wharf, and are spiked to the lower plank with five-inch wire nails averaging three feet apart. The

WHARF CONSTRUCTION

Views of new Howard Street Wharf, San Francisco, Cal., showing the wooden cylinder nier system of construction

backing log or curb is a 10 X 12-inch oak tim¬ ber, raised above the planking of the wharf and supported on blocking of 2 X 12 inches, laid five feet apart. Fender and brace piles are used only on the outer bents. The usual system of fenders is a series of 6 X 8-inch white oak tim¬ bers placed horizontally around the wharf be¬ tween the top and the line of mean low water. They are placed about six inches apart and are fastened to vertical furring pieces of 8 X 12-inch yellow pine which are bolted to the front row of standard piles in each bent, these piles being surfaced off to receive them. The two outer bents are constructed as to spacing, protection, number of piles and braces as are the New York wharves. They have rounded corners, white oak fender piles, and in addition, fender piles at the ends of these two outer bents ; they have also brace piles and corner bands and chocks connecting fender piles.

Comparisons. — Comparing the construction of eastern wharves with those of San Francisco, leaving aside those parts in the eastern wharves which are designed to resist the floating ice, the details of the construction of the San Francisco wharves are simpler; having no gains or tenons, they are not so apt to suffer from dry rot; and the fact of having but few joints in caps and stringers, they are, consequently, in this respect superior to the eastern structures. However, the construction of the San Francisco wharves is better, owing to the better materials for which the coast is famous. The length of tim¬ bers for wharf construction in the east very rarely exceeds 40 feet, but generally timbers up to 30* feet in length only are specified and used. In San Francisco wharves, timbers of from 60 to 100 feet and over in length are frequently employed and are to be had with only a very small additional cost. With piles it is the same, in eastern wharf construction ; a pile 60 feet long is considered a very long pile, whereas on the Pacific Coast, piles from 100 to 130 feet in length can be had at any time. The life of the superstructure of the above-described wharves, especially if covered with sheds and buildings, is from 15 to 25 years, aside from the actual wear of the planking, but. in sea water the life of an unprotected pile is from six months to three years owing to the ravages of the marine pests.

Marine Pests. — ■ The most destructive of these are the Teredo N avails or ship worm and the Limnoria Terebrans. The teredo navalis is worm-shaped, being from six inches to 14 inches in length and one-fourth of an inch in diameter. It is of gelatinous nature and trans¬ lucent. Its head is provided with calcareous substance or shell in two parts working on a hinge which performs the office of an auger. The

head, like the body, completely fills the cavity bored and the outward appearance of the pile attacked shows no indication of the de¬ struction going on within. Having once en¬ tered the timber it never works out nor will one cross another hole although they are some¬ times less than one-thirty-second of an inch apart, or from the surface. The teredo enters the timber at the ground level and works up¬ ward, generally about two feet above low water, although it will attack floating timber ; the wooden floats or buckets of a ferry steamer making half-hour trips for 18 hours at a stretch and almost constantly in motion, have been

completely hollowed by the tredo. It was a theory at one time that the bark on a pile was a protection against the teredo. While this is true to a certain extent, piles taken from some of the old wharves in San Francisco Bay have been found badly eaten by these worms, the bark being otherwise intact. The lim¬ noria terebrans resembles a wood louse in appearance. It is about the form and size of a grain of wheat; it works between high and low water and is very destructive. It completely destroys the pile between the tide lines avoid¬ ing all metal fastenings and knots in the wood. The borings are so close together that the wood is completely disintegrated; ends and joints of timbers seem to be the most favorable points of attack. The protection of piles and timbers from these marine pests has been the study of engineers and scientists for many years and millions have been expended on experiments with varying success. In the direct preservation of piles proper, two methods have been followed. The first and longest in use is impregnating it with chemicals that, are destructive to animal life and the second is by covering the pile with an insoluble armor or artificial bark impervious to the worms.

Creosoting. — Without doubt the creosoting process is the most valuable and efficient of all processes known for prolonging the life of tim¬ ber. The process was invented in England about the same time that kyanizing and the other metallic salt antiseptics came into use ; it has survived all other processes and is used to a greater extent than any other method both in Europe and this country. The creosote is de¬ rived from the destructive distillation of wood and coal and consists of oil products designated as dead oil when derived from the distillation of coal or coal tar and wood creosote oil when derived from the distillation of wood or wood tar. The dead oil contains naphthaline, phenic or carbolic acid and other powerful antiseptics which change the chemical nature of the sap by forming therewith soluble compounds while the naphthaline rendered sufficiently fluid

by prelim¬ inary heating, enters the wood cells, solidifies and . becomes permanently fixed, mechanically coating and protecting the fibres against forma¬ tion of fungi. The wood creosote contains par¬ affine, pyroligneous acid and other antiseptics. The advantages claimed for this oil are that its penetrating power is much greater and it is less expensive than dead oil and is equally soluble in water. The limited use of this oil seems to con¬ firm these claimed advantages, but the matter cannot be considered conclusive until more defi¬ nitely established by further experience and the test of time. All experts on preservation of tim¬ ber agree that the density of timber must be favorable to impregnation ; in other words, only open-pored timbers should be used for treat¬ ment with creosote, this having the least liquid¬ ity and, therefore, the hardest of all preserv¬ ative chemicals to force into and thoroughly impregnate the wood. The Oregon pine or yellow fir used on the Pacific Coast is con¬ sidered too dense to permit a thorough im¬ pregnation and if treated with creosote requires a longer steaming and a greater heat to extract the sap and open the pores and also a. greater pressure to force the material into the wood. The consequences therefrom have been check¬ ing and cracking the timber, making it brittle

and when used for piles the process has cracked them so extensively that the limnoria were found in and behind these cracks in sheltered places in which it has done its destructive work under cover and more rapidly than when ex¬ posed to swell and current. It has also made examination of those piles more difficult, as the outer shell of the pile was apparently unat¬ tacked while the inner portion of the same was entered and destroyed by the limnoria. All authorities in writing on the preservation of piles for marine work seem to ignore the ex¬ istence of the limnoria terebrans. In my opinion it is much more destructive on the Pacific Coast than is the teredo, and while a pile that has been thoroughly creosoted will resist the

Fig. 3. — Detail of Wooden Cylinder.

teredo, even if somewhat checked, the limnoria will find the slightest opening and destroy the pile. There have been several methods for the preservation of piles in San Francisco Harbor by means of an exterior covering or artificial bark, some of which have been more or less successful, the success depending upon the dura¬ bility of the covering, or, in other words, the life of the pile is the life of the artificial bark. The one making the best showing, from the fact that it has been the longest in use, is the paraf¬ fine method. It consists of a surface of paraf¬ fine paint, covered with battens which have been treated with the paint. The secret of the success of this process is the fact that it is applied cold. Previous coverings of this char¬ acter having been applied hot to a wet pile, no adhesion was obtained between covering and the pile for the reason that the hot material

draws the moisture to the surface. This diffi¬ culty claims to have been avoided by the parties kiln-drying the piles before covering. This process consists in covering the piles spirally with a double thickness of burlap treated with asphalt, the application or winding of the burlap being done by means of a large lathe in which the piles are turned. Another protection against these marine pests is a pile built up from a core of 6 X 6 with one-inch boards until it is 12 inches square, each layer being tarred and sanded. It is built on the theory that the teredo is loath to cross a seam and the test pile taken from section I of the seawall, a par¬ ticular feeding ground of the teredo, after 10 years' immersion, verified this theory. But this was a case of again ignoring the ever active limnoria, and piles built since have shown that the limnoria found a home in the seams of the boards of which the pile was constructed. An improvement was made in the details of construction which has resulted in keeping the limnoria out and that was the placing of ship felt between the last two layers of boards from high water to two feet below low water (lim¬ noria working only between high and low water). In many of the government piers where the teredo and limnoria are particularly active, numerous iron piles have been used, both wrought and cast. These are prohibitory in many places by reason of excessive cost of the material and construction, most of the piles having either to be screwed into the bottom or driven with a water jet. Another objection is the rapid destruction by oxidization of the joints in the bracing system.

Cylinder Construction. — A mode of con¬ struction which has been very successful on the Pacific Coast was invented by the writer and

has been in use in the San Francisco Harbor for many years. It is the wooden cylinder pier construction. (See Fig. 2). The foundation proper consists of cylinders of con¬ crete and piles placed about 15 feet on centres. The details of construction are as follows: The core consists of one or more piles, gener¬ ally three ; these are driven to a firm foundation and are left at different heights from the fin¬ ished top of the proposed wharf, for ex¬ ample, say one pile is 50 feet in length, one 55 feet and one 60 ; this is for two reasons : first, for economy, as in the San Francisco Bay most of the piles depend absolutely on the friction of the mud for sustaining purposes (there being no known bottom) and it will readily be seen that the 50-foot piles will be as deep in the mud as the 60; secondly, it admits of a larger body of concrete at the top of the cylinder where required. After this cluster of piles is driven, there is then driven over and encircling same a wooden stave cylinder, gen¬ erally four feet inside diameter ; these staves are from three to four inches thick and bound together with wrought-iron hoops having ad¬ justable lugs; these hoops are placed about two feet on centres and the cylinder is made per¬ fectly watertight. It is driven with an ordi¬ nary pile-driving machine from 10 to 15 feet into the mud. The water and mud in the interior is then pumped out to a depth of from two feet to five feet below the mud on the out¬ side; then inside of this cylinder of wood, be¬ tween it and the piles, is placed an interior cylinder of expanded metal or similar metallic

interstitial web about one foot less in diameter than the interior of the wooden cylinder. The interior is then filled with a rich concrete of hydraulic cement and broken rock. The cylinder pier is complete and forms a teredo-proof con¬ crete pier, having a wooden core reinforced with an interstitial web of expanded metal and protected for at least four years with an iron bound wooden jacket. (See Fig. 3). These cylinders are then capped with caps of struc¬ tural steel, generally two 15-inch I-beams and the balance of the superstructure is as in the ordinary wharf. The fender system is some¬ what different from that in general use and is as follows : The fender piles are driven in pairs about 10 feet apart and about one foot away from the wharf proper;

they are con¬ nected together longitudinally with a ribbing composed of three timbers both at the surface and below the top of wharf. (See Fig. 4). Be-WHAT-CHEER, in Rhode Island, a watch¬ word or shibboleth, derived from the fact that the Indians of the colony thus greeted Roger Williams and his companions, when they first landed on the Sekonk River near the present site of Providence.

WHATCOM, hwot'kom, Wash., city, for¬ mer county-seat of Whatcom County. See Bellingham.

WHATELY, hwat'li, Richard, English prel¬ ate, archbishop of Dublin : b. London, 1 Feb. 1787 ; d. Dublin, 8 Oct. 1863. He was educated at Oriel College, Oxford, and in 1819 made his first appearance as an author by publishing his since famous (Historic Doubts relative to Napo¬ leon Bonaparte.* This pamphlet is among the most popular of the author's writings, more than 12 editions of it having been published. Its object is to show that objections of the

tween these fender piles and the outside stringer are placed a nest of heavy spiral springs similar to those used on a buffer in a freight car. This is the only direct connection between the wharf proper and the fenders; the upper ribbing at the surface of the wharf acts in the dual capacity of a curb for the wharf and a support for the fender line. This spring fen¬ der line saves the jar to both vessel and wharf and in ordinary choppy weather there is not the slightest motion to the wharf ; it also saves the wear on the fender piles as these last but from one to two years, due to wear and breakage. For example, in pier No. 12, San Francisco, used by the United States transport steamers, the fender piles with the spring system have been in use seven years without a single renewal, while at pier No. 4, used by steamers of half the tonnage, all the fenders have been renewed twice in that period of time. The cylinder pier system construction has been used by the Santa Fe System, the North Shore Railroad Company and the San Francisco, Oakland and San Jose Railroad Company and is to be used by the Pacific Mail Steamship Company in the con¬ struction of four new piers. * See Harbors, Docks and Breakwaters ; Pier.

WHAT CHEER, Iowa, city in Keokuk County, on Coal Creek and on the Chicago and North Western and the Chicago, Rock Island and Pacific railroads, about 70 miles southeast of Des Moines. It is in an agri¬ cultural and coal mining region, and has several industries connected with farm and dairy products. It has six churches. The two banks have a combined capital of $80,000. Pop.

(1920) 1,626.

same kind as those brought forward by skeptical writers of the truth of the gospel narratives, founded on apparent inconsistencies and absurdities in these narratives, may be brought against any well-known and incon¬ trovertible piece of history, such as that of Napoleon Bonaparte. In 1822 Whately de¬ livered the Bampton lectures at Oxford, (On the LTse and Abuse of Party Feeling in Matters of Religion.* The same year he received the living of Halesworth in Suffolk, and was ap¬ pointed principal of Saint Alban's Hall, Ox¬ ford, in 1825. In 1825 was published perhaps the most widely known of his works, (The Elements of Logic, *and the scarcely less popular Elements of Rhetoric) in 1828. Whately was appointed professor of political economy in 1830. The lectures he then de¬ livered were afterward published under the title of Untroductory Lectures on Political Economy.* In Oxford, Whately stood in the front rank of those who held liberal views in ecclesiastical and social matters and among these his earnest love of truth, his contempt for arguments resting solely on tradition and the keeness of his logic gave him great influence. In 1831 he was appointed archbishop of Dublin and bishop of Glendalough. The cause of na¬ tional education in Ireland he warmly embraced and for 20 years was an active and influential member of the board. Consult (Life and Correspondence of R. Whately, D.D.,* by his daughter, E. J. Whately (1866).

WHEAT. Wheat belongs to the Hordeae tribe of the Graminea or grass family. There are four principal kinds of sub-races : common wheat (Triticum sativum vnlgare), Egyptian

and English wheat (Triticum sativum turgi-dum) , flint wheat (

Triticum sativum durum), to which the durum and macaroni varieties be¬ long, and a dwarf variety (Triticum sativum compaction) , supposed to have been the kind produced in ancient times. Each sub-race is in turn divided into many varieties. The wheat most generally cultivated and in most common use for bread purposes is Triticum sativum vulgare, although varieties of durum and spelt are extensively grown in some localities.

Wheat is of ancient origin and was culti¬ vated by prehistoric races, as the Swiss Lake-Dwellers. In the earliest writings it is men¬ tioned and samples which are not materially different from similar modern varieties have been found in a fair state of preservation in an¬ cient tombs. Attempts have been made to ger¬ minate this <(mummy wheat,® but without suc¬ cess. The Chinese claim that wheat was Used by them as food 2,700 years before the Christian era and in Egypt its use as food appears even to antedate this period. A number of varieties have been cultivated from early times, as spelt, durum, and winter and spring varieties of Triticum sativum vulgare. Wheats produced in different countries have been subject to dif¬ ferent climatic and soil conditions as well as to different methods of cultivation until material changes have taken place and numerous hard and soft varieties have been produced. There appears to be no authentic record of wheat growing wild and sowing itself without the help of man.

The world's wheat crop normally amounts to about 3,750,000,000 bushels, of which the European countries produce a little more than half. At present the United States is the great¬ est wheat-growing country — about 850,000,000 bushels are produced annually. In 1915 the yield was about 1,000,000,000 bushels. There are large wheat areas in the northwestern pos¬ sessions of British North America which have not yet been brought under full cultivation. There also are large undeveloped wheat regions in South America, particularly in the Argentine Republic, and it is claimed that some undevel¬ oped parts of Siberia are suitable for wheat production. Thus it is evident that there are vast areas of fertile virgin soil yet to be brought under wheat cultivation.

Wheat can be grown on a variety of soils. It thrives best, however, and produces largest yields upon rich alluvium, and soils formed from different kinds of rock thoroughly disin¬ tegrated and mixed with vegetable mold. The wheat soils of the northwestern wheat region of the United States are largely of glacial for¬ mation and composed of clay and silt with small amounts of fine sand and containing liberal amounts of alkaline matter, particularly disin¬ tegrated limestone.

The best wheat soils are rich in humus (decaying vegetable matter), which through decay supplies nitrogen, one of the principal elements used by the wheat plant for the formation of gluten.

The tendency in wheat farming upon new soils has been to grow the crop for a number of years without practising rotation or using fer¬ tilizers. After a time this results in reduced yields and an inferior crop, due in part to the loss of nitrogen from the land. Wheat does

not remove a large amount of gross fertility from the soil, but exclusive wheat culture on virgin soil causes a rapid decay of the humus and a consequent loss of nitrogen, one of the elements of which humus is composed. When wheat is grown along with other farm crops in a good rotation and manures are intelligently used the wheat does not have an exhausting effect upon the soil. The chemical compo¬ sition of a wheat soil of high productiveness from the Red River Valley of the North is as follows :

Surface per cent

•

Sub soil per cent

Insoluble matter .

47.64

41.21

Soluble silica .

15.43

8.37

Potash .

0.54

0.25

Soda .

0.45

0.48

Lime .

2.44

7.45

Magnesia .

1.85

4.48

Iron oxide .

4. 18

3.48

Aluminia … . • .

7.89

10. 72

Phosphoric anhydrid .

0.38

0. 17

Sulphuric anhydrid .

0. 11

0. 10

Carbonic anhydrid .

2.42

14. 26

Volatile matter .

15.55

6.22

Humus and volatile matter .

5.34

0.89

Nitrogen in volatile matter .

0.38

0. 11

The yield of wheat ranges from 10 bushels • and less to 30 bushels and more per acre. In countries where land is expensive, and intensi¬ fied farming is practised, the yield per acre is generally larger than in new regions where more land is available. The yield per acre of wheat in the LJnited States is much less than the soils are capable of producing.

Formerly plowing was done with a bent stick or wooden plow, the wheat was sown broadcast by hand, the crop was cut with the cradle and bound in sheaves by hand, and finally thrashed with the flail or by the trampling of horses. Improvements in machinery, as steam and gang plows, seeders, reapers, self-binders and thrash¬ ers, have greatly reduced the cost of production and increased the world's supply of wheat. Equally as great have been the advances in transportation, storage and milling facilities. Wheat is now transported in specially con¬ structed freight cars and boats, and stored in large elevators in which 120,000 bushels are placed in one compartment, when formerly it was often transported on horse or mule back in bags, loaded and unloaded by hand and stored in small bins and granaries. The milling proc¬ ess has developed from crushing between two stones to reduction by steel rolls.

Wheat is subject to a number of diseases, as rusts, smut and other vegetable parasitic dis¬ eases, . many of which have been studied and are now in part capable of being controlled. The smuts are destroyed by treating the seed wheat with chemicals which kill the smut spores, while the rusts are held in check by destroying the host plants, as the barberry, upon which the parasite spends part of its cycle of life. There are a number of insect pests which often cause great destruction of the crop, as grasshoppers, frit flies, Hessian flies and chinch bugs. Eco¬ nomic entomologists have done much to save the wheat crop from insect ravages.

The wheat kernel is surrounded by a seed pod composed of cellulose which constitutes the outer layer and is called the pericarp. The sec¬ ond covering or episperm, which is just within the pericarp, consists of the outer and inner integuments. The perisperm or third bran layer is a thin mass of collapsed cells. The aleurone layer — so-called gluten cells — is composed mainly of nitrogenous matter and lies within the three-bran layers. The endosperm of floury portion constitutes about 80 per cent of the wheat kernel and is within the three-bran layers and aleurone cells. The germ or embryo plant is stored in the lower part of the kernel where its outline can be traced by the indentations, the germ makes up about 6 per cent of the offal of the kernel, or about \l/z per cent of the entire kernel, the bran layers about 12. The relation of the different parts, one to the other, as bran to endosperm, varies in different kinds and vari¬ eties of wheat, some producing a larger amount of flour than others and some more bran.

The character of the wheat, as starchy or glutinous, is determined largely by soil and cli¬ mate. A short, forcing growing season and a fertile soil have a tendency to produce glutinous wheat, while the opposite conditions produce starchy wheat. When hard glutinous seed wheat is sown in regions which produce starchy soft wheats, the hard wheat gradually changes its character and in about two years becomes starchy. Whether a wheat is hard or soft de¬ pends upon the amount and character of its gluten. Hard wheats usually contain over 12 per cent gluten, of which 45 to 65 per cent is in the form of gliadin, an alcohol soluble protein, while soft wheats contain less gluten, but gluten of a higher gliadin content.

Extensive experiments have been performed by Lawes and Gilbert of Rothamsted, England, to determine the influence which different kinds of fertilizers have upon the wheat crop. They have shown that fertilizers influence the yield more than the percentage composition of wheats and that it is not possible by means of fertilizers alone to increase materially the amount of starch or gluten. Climatic conditions affect the com-and that it is not possible ‘by means of fertilizers Wheats grown upon the same soil in different years show greater variations in composition than wheats grown the same year but differently fertilized.

Different varieties of wheat when grown under the same conditions are fairly constant in composition. In protein content, wheats range from 7 to 18 per cent. The most nitro¬ genous wheats do not necessarily make the most glutenous flours, as frequently a large por¬ tion of the nitrogen is in the germ and offals.

The grading of wheat is based entirely upon the physical qualities as weight per bu-shel, color and plumpness. Smut and blemishes, caused by unfavorable climatic conditions, are also considered in grading wheat. When new wheat is stored in elevators, a slight fermenta¬ tion change takes place known as ˆsweating.® If the wheat is sound this change is slightly beneficial for flour production, as it improves the qualities of the flour. Unsound wheats, as those which are bleached, frosted, immature and sprouted, usually have a somewhat different composition from fully matured wheat. Such wheats may contain a larger amount of soluble

proteids, soluble carbohydrates, and organic acids than normal wheats. Damaged wheats generally yield a smaller amount of flour as well as flour of poor keeping qualities.

It is not possible to make accurate compari¬ sons as to composition of wheats grown in dif¬ ferent countries. It will frequently be found that wheats grown in different localities of the same country vary as much in composition as do wheats grown in different countries.

Wheat contains slightly more protein and less starch than corn, oats, rye or barley. Oats from which the hulls have been removed con¬ tain more protein and fat than wheat. The difference in composition between wheat and the other cereals is not large and occasionally indi¬ vidual samples of corn or rye will be found containing more protein than individual samples of wheat. Wheat differs in composition from all other cereals in that its gluten is composed of the two proteids, gliadin and glutenin. This gives flour its bread-making value. It has also been found that the wheat proteins contain both different kinds and amounts of animo acids from the proteins of other curds. No other cereal except rye contains a gluten that is capa¬ ble of expanding and forming a light porous loaf. Because of its unique composition no other cereal can take the place of wheat for bread-making purposes.

Numerous experiments have been made to improve the quality of wheat by selection of seed, and by breeding and crossing of standard varieties. Wheat responds readily to such tests, but unless great care is taken it as readily re¬ verts to its original condition. In the United States two main classes of wheat are produced, namely: winter and spring wheat, of which there are a number of varieties, as white and red winter wheat, <(Turkey Red,® Oregon Club, Blue Stem, Scotch Fife, Marquis, *etc.* Minnesota, North and South Dakota, and Montana

consti¬ tute the main spring wheat region ; spring wheat is, however, grown in other localities.

The wheat plant assimilates its mineral food and nitrogen from the soil at a rapid rate. In the case of spring wheat, by the time the crop is half grown, over three-fourths of the min¬ eral food and nitrogen needed for construction purposes have been taken from the soil. Wheat is not a strong feeding plant and taking its food from the soil in so comparatively short a time, the soil must be in a high state of pro¬ ductiveness in order to yield a good crop. The wheat plant needs greatest assistance in securing its nitrogen, hence fertilizers for wheat should be nitrogenous in character. Wheat also needs a good supply of available mineral food as phos¬ phoric acid and potash, but is better able to secure these elements from the soil than it is nitrogen..

The flour yield of wheat is determined ap¬ proximately from the size and weight of the kernels. Light weight wheat has a low flour content.

Because of its usually high price, wheat has never been extensively used as animal food, but at times when it has been cheap and abundant, it has been used for the feeding of all farm animals and has proven equally as valuable as other grains for the production of beef, pork, mutton and milk. In the feeding of wheat to farm animals, the best results are secured by

coarsely grinding or pulverizing the grain in¬ stead of feeding it whole. The main use of wheat, however, is to manufacture flour for hu¬ man food. It is used more extensively as human food than any other cereal.

It has been found from extensive experi¬ ments conducted by the United States Depart¬ ment of Agriculture that the highest degree of digestibility and nutritive value of wheat are secured when the bran and indigestible fibre are removed from the flinty portions of the kernel. The human digestive tract is unable to digest wheat bran ; animals, however, with greater digestive powers are capable of doing

so. Wheat produces one of the cheapest, most nutritious and most wholesome of foods.

Bibliography. — Dondlinger, P. T., (The Book of Wheat) (New York 1908) ; Hunt, T. F., (The Cereals in America) (ib. 1904) ; Rutter, W. P., (Wheat-Growing in Canada, the United States, and the Argentine, including Comparisons with Other Areas) (London 1911)'; Smith, R. E., (Wheat Fields and Mar¬ kets '.of the World* (Saint Louis 1908) ; Ten Eyck, A. M., (Wheat: A Practical Discussion of the Raising, Marketing, Handling, and Use of the Wheat Crop, relating largely to the Great Plains Region of the United States and Canada) (Lincoln, Neb., 1914) ; also Bulletins of the United States Department of Agriculture, Nos. 534, 596, 616, 678, 680, *etc.*

Harry Snyder,

Chemist, Russell Miller Milling Company.

WHEAT INSECT PESTS. Insects in¬ jurious to growing wheat-crops. These number from 50 to 100 different kinds in the United States alone, many of which have been imported from the Old World; and they represent a wide va¬ riety of forms and classes. The most impor¬ tant, probably, are flies, more or less closely re¬ lated to the house fly and mosquito; and of these the Hessian fly is the most dreaded and widespread. This is a small fly (Cecidomyia destructor) of the family Cecidomyidce, the larva of which is very destructive to wheat, barley and rye, but does not attack oats. It is named from the unfounded belief that it was brought to America from Europe (where it is native, and has been a pest for centuries) in the baggage of the Hessian mercenaries em¬ ployed against the Americans in the war of independence. The female fly is about a tenth of an inch in length. Its body is brown, with the upper parts, the thorax, and the head of a darker shade, approaching to black. The wings are dusky gray, and are surrounded with fringes. The male is somewhat smaller than the female and has longer antennae. The fe¬ male flies usually lay their eggs on the young plants twice in the year, in May and September, the maggots being hatched in from four to 14 days. These work themselves in between the leaf-sheath and the stem and fix themselves near the lowest joints, often near the root, and suck the juices of the stem, so that the ear falls down at a sharp angle. These maggots turn to pupae (((flaxseed®) from which the flies develop in about 10 days; those of the fall brood hibernate in the pupa state, and are ready to begin their depredations with the early sprout¬ ing of the spring crop. In view of these habits,

wherever the presence of these insects is known or suspected, the winter wheat should be planted as late as possible, or the early planting of a <(trap® strip at one side of the field. In this the flies will lay their eggs, after which the strip may be plowed under and the young destroyed ; volunteer wheat should be destroyed and stubble burned.

Other true flies attacking wheat and other grain-crops are mainly of the family Oscinidoe which contains a large number of species of variable habits, those of interest in the present connection mainly inhabiting the stems of grain and grasses. Here belongs the frit-fly of Europe, so terribly destructive both in Great Britain and on the Continent, and many species in this country whose depredations are insig¬ nificant or local or obscure. That one of most consequence, and most thoroughly studied is the <(wheat bulb-worm® or <(wheat stem-maggot® (Meromyz americana), which has been a con¬ stant evil ever since civilized agriculture began here. It is a native of the whole of North America, apparently, originally feeding on the wild grasses. In the middle latitudes of the United States three annual broods develop; there are more farther south, but only two in Canada. The life-cycle of this insect within the wheat-belt of the United States, according to Webster, is as follows: The winter is passed in the larval stage, and the short pupal stage coming in May brings the emerging of the adults at the time when the female is able to place her eggs on the plants where the young, on hatching, will make their way to the tender and succulent stem just above the upper joint. By the time the straw has ripened the larvae have ceased to require food and pass through the pupal stage, the adults of this brood appear¬ ing in July. Eggs are now deposited in volun¬ teer wheat and grass, and, owing either to the retarding effects of meteorological influences or a diversity of food of the larvae or both, perhaps, the emerging of the adults is pro¬ longed throughout a period extending from late August through September until late October. At this period the fall wheat offers a decidedly inviting plant to the female fly on which to place her eggs with a prospect of her progeny having an abundant food supply. It is the lar¬ vae from eggs deposited during this period that winter over in the plants and give rise to the May-June generation of flies. It is this last brood that is of more especial interest to the farmer, as it is very seldom that the pest does serious injury to grain except in fall and early spring. The effect on the plant is this : in young plants the central spindle-shaped en¬ folded leaf is killed, the detached portion turn¬ ing first yellow and later brown, then shrivel¬ ing up and dying, leaving the outer lower leaves uninjured. In Hessian-fly

attacks this spindle-shaped leaf is absorbed and does not appear at all in the young wheat in autumn, so that there need never be any confusion of the work of these two insects in fall wheat, and the effect on the full-grown straws is even more easily distinguishable. When attacked by the maggots of this species the fully grown straw withers at the upper joint, and all that portion of the stem including the head, the sheath excepted, changes to a whitish color, the remainder of the plant,

including the upper sheath, continuing unin¬ jured and of the usual green color. The Hes¬ sian fly never affects the full-grown straws in this manner and the lesser wheat stem-maggot (Oscinis carbonaria) does so but rarely, so that the presence of these maggots in the straw can be easily detected shortly prior to harvest by their whitened color from the upper joint up¬ ward. The larvae are within the stem and not outside and under the sheath, as with the Hes¬ sian fly; they are larger and of a more glassy green color than those of the lesser wheat stem-maggot, and it is only when still very young that the ordinary farmer need ever mistake them for any of the others mentioned in this article. The liability of attack from this insect is not sufficiently great to warrant expensive preventive measures. It occasionally comes in vast numbers, but no way is yet known of fore¬ telling these epidemics. The same precautions and methods as those taken against the Hes¬ sian fly are recommended. Several other spe¬ cies of Oscinis are known, among which the American frit-fly (O. soror) may prove for¬ midable hereafter, as it has already committed extensive depredations in Minnesota. The more careful and cleanly the method of farm¬ ing, the less are these and other insect pests to be dreaded.

The chinch-bug is another far too prevalent plague of grain-fields ; it is, indeed, regarded as the most destructive insect in the country. It is a small blackish plant-bug (Blissus cucop-terus), with white wing-

covers each marked with a dark line like a figure 6. Arising from her winter sleep in the old grass and rubbish of the fields and fence-corners, the female lays several hundred eggs on the stems and roots of the sprouting grasses and grains near her. The young hatch quickly, and in a crowd of reddish dots suck out the juices of the grow¬ ing plants, causing them to wither and die. There is another brood in the fall. Severe winters and wet and cold springs reduce the numbers of this pest, and certain diseases are known which spread among the bugs and de¬ stroy them. Infected bugs have been sent from diseased districts to other regions and imparted to the bugs there with good effect. There seems to be no preventive, however, except great care in burning stubble and rubbish, keep¬ ing the fields clean, and planting as late as pos¬ sible.

Another group of highly injurious insects is found in the family Chalcididce — a fam¬ ily of gall-flies with one genus (Isosoma), whose species prey upon growing plants of this kind and are called ˆstraw-worms® or “joint-worms,® because their larvae attack the nodes or ((joints® of the grain-stem. The species of special interest as affecting wheat is I. grande (or I. tritici). This gall-fly is about an eighth of an inch long and black, with a body shaped much like that of an ant and four dark wings. When, in the spring, the young wheat plants are only starting to throw the stem upward, the females (at that time minute and wingless) push their ovipositors through the stem until they penetrate the head of the embryo plant within and leave an egg there. The larva soon hatching devours this vital part of the plant and kills it, though the stem may continue to grow for some time. By the middle of June

the young have developed and cut their way out to appear as the adult summer form, which wander widely. These mature, winged females now deposit eggs within the stems of wheat just above the uppermost joint, where a hardy woody gall forms about the larva, within which it transforms into the pupa stage and stays on, inert, through the winter. The best preventive measure is an annual rotation of crops ; next to that, the burning of the stubble, purposely left long, but this must be done not later than early September. Various other species of Isosoma attack other grains, espe¬ cially barley and rye, and some others also in¬ jure wheat.

Purples, ear-cockle or peppercorn is a dis¬ ease of British wheat, produced by a minute nematoid worm called “wheat-eel® (Vibrio tritici), which are placed by their parents in the germ of the seed, and

cause the formation of the purplish-black galls or ((cockles® which are a feature of the disease, and in which the worms are contained. When fully grown they may attain a length of a quarter of an inch.

The Department of Agriculture has issued a large number of special illustrated publica¬ tions upon the insects injurious to wheat and other grains, which should be consulted. Promi¬ nent among them are Marlatt, (The Principal Enemies of Growing Wheat* (1901); Webster,

(Insects Attacking the Stems of Growing Wheat, } *etc.* (1903) ; Osborn, <The Hessian Fly in the United States *(1898) ; Webster, •(The Chinch-bug* (1898).

WHEATEAR, or FALLOW-CHAT

(Saxicola ccnanthe) , an European terrestrial warbler, allied to the stonechat. Its average length is six and one-half inches, and its color is gray above, the wings being tipped with black; a black streak encloses the eye and ear-coverts. The breast is brown and the under parts white. The wheatear is much sought after when in good condition as a table bird, its flesh being very delicate and is usually caught in traps. By the British peasants the wheatear's presence is regarded as a sign of ominous and unfavorable kind ; and probably the fact of the nest being often found in col¬ lections of old stones in burial-places has tended to increase the superstitious feeling. The nest is buried deeply among stones or in rock-clefts, the eggs being of pale-blue color and numbering from four to six.

WHEATLAND, a famous estate and former residence of President James Buchanan, located a mile from Lancaster, Pa.

WHEATLEY, hwet'li, Francis, English painter : b. Wild Court, Covent Garden, Lon¬ don, 1747; d. London, 28 June 1801. In early life he carried off several premiums given by the Society of Arts and was employed by Mor¬ timer in decorating the ceilings at Brocket Hall. He set up as a portrait painter at Dublin, and was much employed on small whole-lengths, among his sitters numbering many members of the Irish House of Commons. Becoming in¬ volved in a scandal he left the Irish capital for London and between 1765 and 1783 ex¬ hibited many pictures classed as "domestic,® but his works also included the (Riots of 1780, > the original of which perished in a fire, al¬ though Heath's engraving of it gives a good

idea of the work. As a contemporary of Morland he was superior to that painter in the re¬ finement both of his subjects and his treatment of them, and was really masterly in his hand¬ ling of equestrian portraits, such as (The Second Duke of Newcastle and a Shooting Party.) He was elected R.A., in 1791. He was an important figure, being one of the found¬ ers of English rural genre, and painted pretty and graceful rustic figures of women and chil¬ dren, while his sense of landscape coloring was really exquisite.

“WHEATLEY, Henry Benjamin, English philologist and bibliographer : b. Chelsea, 2 May 1838. He was clerk to the Royal Society (1861— 79), honorary secretary to the early English Text Society (1864-72) and its treasurer (1872— 1901). Besides editing for the Text Society (The Romance of Merlin) (1865-99) and other works he is the author of (Anagrams’ (1862) ; (What is an Index ?) (1879) ; (Samuel Pepys and the World he Lived In) (1880) ; (How to Form a Library) (1886) ; (London Past and Present’ (1891) ; (Literary Blunders > (1893) ; his¬ torical Portraits > (1897) ; (The Story of Lon-don) (1904) ; (Hogarth’s London) (1909), *etc.*

WHEATLEY, Phillis, Afro-American verse writer: b. Africa, about 1753; d. Boston, 5 Dec. 1794. She was brought to Boston in 1761, was purchased by Mrs. Wheatley, and, exhibiting a fondness for books, was instructed by her mistress and her daughters, and acquired for the time a superior education, reading Latin with facility. At an early age she began to express her thoughts in verse, and sortie of her poems written at 14 give evidence of poetic ability. At 19 she visited England, where she attracted much attention. A volume of her poems dedicated to the countess of Huntington was published there, containing her portrait and bearing the title, (Poems on various Sub¬ jects, Religious and Moral, by Phillis Wheatley, Negro Servant to Mr. John Wheatley of Bos¬ ton, in New England.’ After return from England she published several poems, among others an address to General Washington. Her book was reprinted in Boston and passed through several editions. The family of Mr. Wheatley being broken up by death soon after her return, she married a negro named Peters, and her last days were spent in extreme want.

WHEATON, hwe’ton, Frank, American military officer: b. Providence,

R. I., 8 May 1833; d. Washington, D. C., 18 June 1903. He was educated at Brown University, went to California in 1852 and studied law at Poitiers, France; lieutenant in the United States cavalry, subsequently participated in various Indian cam¬ paigns, and at the outbreak of the Civil War was promoted captain. He served with the Army of the Potomac through the war, was promoted brigadier-general of volunteers in 1862, commanded a division at Gettysburg and in the Shenandoah, and was engaged in other famous movements. He was made colonel in 1874, brigadier-general in 1892 and major-gen¬ eral in 1897. He was retired in the year last named.

WHEATON, Henry, American jurist: b. Providence, R. I., 27 Nov. 1785; d. Dorchester, Mass., 11 March 1848. He was graduated from

Rhode Island College (now Brown University) in 1802, and studied law at Poitiers, France; he then took up the practice of law in Provi¬ dence and later served as an editor and a jus¬ tice; and in 1816 became reporter for the United States Supreme Court; his reports, which were published in 12 volumes, are ex¬ ceptionally complete and valuable. In 1827 he was appointed charge d'affaires to Denmark, being the first regular diplomatic agent from the United States to that country, and resided at Copenhagen until 1835, when he was ap¬ pointed Minister Resident to the court of Prus¬ sia. Two years later he was made Minister Plenipotentiary by President Van Buren, which office he retained until 1846. His diplomatic work was most successful; in 1844 he negotiated a treaty with Germany, which, though rejected by the United States Senate, served as a basis for subsequent treaties. In 1843 he was elected a corresponding member of the French Insti¬ tute, and in the following year a foreign mem-, ber of the Royal Academy of Science of Berlin. He returned to the United States in 1847. His most important work is his (Elements of Inter¬ national Law,' published in 1836, which has always been regarded as a standard authority on the subject; numerous editions have ap¬ peared in the United States, including one by Lawrence (1855) and one by Dana (1866) ; there is also an English edition and a French translation. His other writings include di¬ gest of the Law of Maritime Captures or Prizes) (1815) ; (Life of William Pinkney' (1826); (History of the Northmen) (1831); (Histoire du Droit du Gens en Europe, depuis la Paix de Westphalie jusqu'au Congres de Vienne' (1841), translated into English in 1846; and (An Inquiry into the British Claim of a Right of Search of American Vessels'

(1842).

WHEATON, Loyd, American military officer: b. Pennfield, Mich., 15 July 1838; d. 17 Sept. 1918. He entered the Union army at the outbreak of the Civil War as sergeant, served through the war, receiving promotion to cap¬ tain of volunteers in 1862, major in 1863 and lieutenant-colonel in 1864. In 1866 he was ap¬ pointed captain in the regular army, was sub¬ sequently employed on frontier duty, and on the outbreak of the Spanish-American War in 1898 he was appointed brigadier-general of volun¬ teers, was assigned to duty in the Philippines in 1899 and in 1900 received rank as major-general of volunteers. He was engaged in all the im¬ portant engagements in the Philippines, and in 1900-02 was in command of the departments of North Luzon and the Northern Philippines. He was promoted brigadier-and major-general in the regular army in 1901 and in 1902 was retired.

WHEATON, Ill., city, county-seat of Du Page County, on the Chicago and Northwest¬ ern Railroad, 25 miles west of Chicago. It is in an agricultural and stock-raising region. It has industrial establishments connected with farm and dairy products, and ships annually consid¬ erable hay, vegetables, wheat, flour, livestock and dairy products. The waterworks plant cost originally $60,000. The city has eight churches, Wheaton College (Congregationalist) , a high school, opened in 1874, public and parish schools, a public library presented by J. O.

Adams, a college library, two newspapers and a bank. Pop. (1920) 4,137.

WHEATON COLLEGE, located at Nor¬ ton, Mass., was one of the pioneer schools for the education of women. It was founded as Norton Female Seminary by Judge Wheaton in 1834 and organized by Mary Lyon. The school was opened for students in 1835 and in¬ corporated by an act of the Genera1 Court in 1837. The name was changed to Wheaton Female Seminary in 1839, but the institution was commonly known as Wheaton Seminary until by an act of the legislature of

Massa¬ chusetts in 1912, the name was changed to Wheaton College and it was authorized to grant degrees. The school was never coedu¬ cational. Wheaton College is situated on a slight elevation and in a healthful pine-tree region. The extensive grounds include more than 100 acres of land, diversified by gardens, lawns, hedges, trees and meadows, containing an athletic field, tennis courts, basketball stand¬ ards and other equipment for outdoor sports. The college has 20 buildings, nine of which are new brick buildings in the colonial style of architecture and six are dwelling-houses just outside the campus. The college has an en¬ dowment of about $1,000,000. 'Wheaton recog¬ nizes the new intellectual needs of the home without lessening the opportunities for those who aim at professional work. It is the only small separate college for women in Massa¬ chusetts. It allows for personal association, especially between student and teacher, and for the development of individuality. It is demo¬ cratic in spirit and unsectarian but thoroughly Christian. There are no secret societies. The faculty is composed of both men and women, selected not alone for their ability in research work, but primarily for their efficiency as teach¬ ers. The curriculum is carefully planned, and a matter of considerable importance is the organization of the studies of the curriculum into a group system. This affords a well-rounded course of instruction for each student and at the same time allows room for the ex¬ ercise of individual taste. Wheaton College admits students on three years of Latin, the fourth year to be taken in college. With this exception all courses in Latin are elective. College mathematics is also elective. Wheaton offers a limited number of assistantships which yield various sums annually up to $100 each, according to the service rendered.

WHEATSTONE, hwet'ston, Sir Charles,

English physicist: b. Gloucester, February 1802; d. Paris, 19 Oct. 1875. He commenced business for himself in London as a maker of musical instruments and in 1823 attracted the attention of scientists by the publication in Thomson's Annals of Philosophy1 of a paper entitled <(New Experiments on Sound. 11 In 1834 he was appointed professor of experimental philosophy in King's College, London, and in 1836 exhibited at King's College experiments showing the velocity of electricity. For this purpose he used a circuit of four miles of cop¬ per wire. These experiments suggested to him the idea of applying his apparatus to telegraph¬ ing. In 1837 with W. F. Cooke, he took out the first patent for magnetic telegraph, but no practical application of this was made till after

the Morse telegraph had been operated. An¬ other subject that engaged much of his atten¬ tion was vision, on which he published various papers, among them a memoir contributed to the Philosophical Transactions1 in 1848, (<On some Remarkable and Hitherto Unobserved Phenomena of Binocular Vision.11 He was knighted in 1868; was a Fellow of the Royal Society from1 the year 1836, and was also a corresponding member of the French Institute and honorary member of the principal acad¬ emies of science in Europe. He wrote no con¬ siderable work, but was the author of numer¬ ous papers chiefly contributed to the Philo¬ sophical Magazine and the Journal of the Royal Institution.

WHEATSTONE'S BRIDGE, in electric¬ ity, a well-known form of the electrical bridge or balance for testing electrical resistance. See Electricity.

WHEDON, Daniel Denison, American clergyman, educator and editor : b. Onondaga County, N. Y., 20 March 1808; d. Atlantic Highlands, N. J., 8 June 1885. He graduated from Hamilton College in 1828. The following year he taught in Cazenovia Seminary and then was for two years tutor in Hamilton Col¬ lege. From 1831-45 he was professor of Greek and Latin in Wesleyan University, Middleton, Conn. Then, after pastorates at Pittsfield, Mass., and at Rensselaer, N. Y., from 1845-52 he was professor of rhetoric, logic and history at the University of Michigan, and resigned because of his abolition sympathies. He then became principal of a private school and later had two brief pastorates in New York. Though not a member of the General Con¬ ference of 1856 he was elected by that body editor of the Methodist Quarterly Review and book editor of the Methodist Episcopal Church. Six times he was reelected by acclamation and served for 28 years. He was the author of Public Addresses1 (1833-52) ; (A Commen¬ tary on the New Testament1 (5 vols., 1860-80; the volumes on the Old Testament are by other authors and most of the eight volumes appeared after his death) ; Preedom of the Will1 (1864) ; (Essays, Reviews and Dis¬ courses1 ; and Statements Theological and Critical1 (edited by J. S. and D. A. Whedon, 2 vols., 1887). He was also the author of many pamphlets and articles.

WHEEL, Breaking on the, a horrible mode of putting to death by torture formerly in use in Europe. The condemned criminal was first fastened to two pieces of wood, in the form of a Saint Andrew's cross, with his legs and arms extended, and had the hones of his shins and thighs and of the fore and upper arms broken by blows with a bar of iron. After that he was attached to a small carriage wheel balanced on a stake, and allowed to suffer in this position till he died, sometimes

several days after the breaking of his limbs. Later the punishment was so far mitigated that the crim¬ inal was put to death by a final blow on the breast, spine or neck before being exposed on the wheel, and sometimes he was strangled before even the breaking of his limbs took place. This torture was last used in Prussia about 1811.

WHEEL, The, a popular name for the bicycle or the bicycle trade when at the height of its prosperity, about 1900.

WHEEL AND AXLE, one of the me¬ chanical powers consisting of a wheel mounted on an axle, with a rope or cord wound a few times around a groove in the wheel and another rope or cord turned around the axle. The wheel having the larger diameter, a small power applied at its circumference will balance a larger resistance or force on the cord around the axle, the gain in power being proportioned to the respective diameters of the wheel and the axle. The common winch, the windlass, the capstan and the treadmill are so many appli¬ cations of the wheel and axle ; and the same principle may be adapted to a train of wheel-work wherein motion is regulated and power acquired.

WHEEL-BUG, any of several species of conenose (q.v.).

WHEEL-GEARING, a general term ap¬ plicable to all forms of mechanical devices by which motion is transmitted by means of toothed or cog wheels. The different parts of

a machine may transmit motion to each other by ((direct contact® or by means of an ((intermediate connector® ; in the latter case the mo¬ tion of the connecting part being usually of no

importance since the desired object is simply the proper relative motion of the two parts thus connected. In elementary combinations

of either kind, the part receiving the motion from the source of power is termed the <(driver® and

the part to which that motion is transmitted by the driver is termed the <(follower.® A train of mechanism consists of a series of such ele¬ mentary combinations, the motion being trans¬ mitted to each piece from the one immediately

preceding it, and so on throughout the entire series ; therefore, in order to ascertain the ac¬ tion of a complete machine, the (<velocity ratio® and the (< directional relation® of each combina¬ tion of the series has to be determined. These factors depend upon the mechanical connection of the two parts, forming the combination, and are absolutely independent of the true velocities or directions of the parts themselves, which may or may not be liable to continual variation. For example, in two circular wheels, in contact

Face Gearing.

with each other, and rotating upon fixed axles, the velocity ratio is constant If the diameter of one is twice that of the other, the angular velocity of the larger will be one-half that of the smaller, but during any changes of velocity

whatsoever since the length of the respective radii of the wheels remains unchanged, the velocity ratio at any instant is the same. As to the directional relation, if the wheels are in internal contact, they will rotate in the same direction, and if in external contact, in opposite directions ; but in both cases the directional re¬ lations will remain

unchanged regardless of any change of the absolute direction of the driver. On the other hand, if the wheels are elliptical, while the directional relation will remain con¬ stant, the velocity ratio will be subject to varia¬ tion according to varying lengths of the contact radii. All elementary combinations may be di¬ vided into four classes — rolling contact, sliding contact, link work and wrapping connections. The first two are direct methods, while the two last named communicate the motion through in¬ termediate connectors.

The theoretical forms required to transmit motion by rolling contact are cylinders, cones and hyperboloids of revolution. In the various forms of ˆfriction gearing,® employed to drive light machinery, the rolling pieces are made of different materials, one of wood and the other of iron, or one of them is covered with leather or rubber, and the necessary amount of adhesive contact is secured by adjusting the bearings of the pieces or by the application of weights or springs. It is impossible to transmit motion against any considerable amount of resistance by means of smooth surfaces, and toothed gears are, therefore, generally employed and may be conveniently divided into five classes, according to the form of the pitch or contact surfaces of the equivalent toothed wheels, and designated as (<spur® gears, ((bevel® gears, (<skew® gears, ((screw® or ((worm® gears and <(face® gears.

In spur gearing, the wheels act upon each other in the same plane ; the pitch surfaces are cylinders and the teeth engage along straight lines parallel to the sides of the cylinders. If one is considerably smaller than the other it is usually termed the Opinion,® while the larger is commonly known as the <(wheel.® When the teeth are formed on the inner side of the wheel, or convergent to its centre, it is called an in¬ ternal wheel. Wheels in external contact rotate in opposite directions, but wheels in internal contact rotate in the same direction. As the diameter of the pitch circle of a <(wheel® is in¬ creased its curvature decreases and finally be¬ comes a straight line and results in a <(rack and pinion® combination.

In bevel gearing the wheels act upon each other at an angle; the pitch surfaces are cones and the teeth engage along straight lines which pass through the common vertex of the two cones. When the angle of contact is equal to 45 degrees they are called <(mitre gears.® In skew gearing the axles are neither parallel nor intersecting, the pitch surfaces are hyperbo¬ loids of revolution, and the teeth engage in lines approximating to the general direction of the common element of the hyperboloids. Owing to the difficulty of constructing the teeth, this class of gearing is not much used, and where the conditions

require their application, two pairs of cone wheels are generally employed.

In screw gearing the axles of the cylinders are neither parallel nor intersecting, and the pitch surfaces are in contact only at one point.

In its practical form it is known as <(endless screw® or ((worm gear,® and is commonly em¬ ployed to convert rapid into slow motion. The mounting of the screw prevents any other motion except that of rotation, so that at each complete turn of the screw a tooth of the en¬ gaging wheel passes across the line of centres, and there being no limit to this action, the wheel continues to rotate so long as the screw is turned around its axis.

Spur Gearing.

(a) External Contact.

(b) Internal Contact (annular).

(e) Rack and Pinion.

In face gearing, the teeth consist of pins arranged in a circle and fastened to a flat cir¬ cular plate attached to an axis. The wheels act at right angles to each other and the points of contact are situated only upon the surfaces of the pins. Prior to the introduction of bevel gears, it was the method usually employed to transmit motion between axes that were not parallel, but at the present time it is almost

exclusively used in connection with modern mill machinery.

There are a great many other forms of gear¬ ing which are adapted for various purposes. Of them the stepped, twisted, spiral and differ¬ ential gearing are the most important. (For description of differential gearing see Auto¬ mobile). The particular advantage of the last-named over ordinary spur gearing is the slight friction and the consequent lack of wear of the teeth. Bevel gears of this type have been used with great advantage in mowing machines. By the substitution of epicycloidal and hypocy-cloidal curves and involutes for the circular arcs in the forms of the teeth, the rolling con¬ tact action of the circles, in its relation to the production of a constant velocity ratio, is re¬ placed exactly by a sliding contact action. The teeth of all gear wheels are designed upon the principles of these curves, so that when run¬ ning together their action is smooth and free from vibration and shock.

Bibliography. — For specific information rel¬ ative to the application and design of gearing consult Rankine, (Machinery and Millwork) ; Grant, (Teeth of Gears y ; Kent, (Mechanical Engineer's Pocket Book) (1903) ; and Stahl and Woods, (Elementary Mechanism* (1903).

WHEEL WINDOW, in architecture , a circular window with radiating mullions resem¬ bling the spokes of a wheel.

WHEELER, hwe'ler, Andrew Carpenter,

American journalist and author: b. New York, 4 July 1835; d. Monsey, Rockland County, N. Y., 10 March 1903. He began newspaper work on the New York Times, and later became city editor of the Milwaukee (Wis.) Sentinel. Soon after the outbreak of the Civil War, he went with the Federal army as correspondent for several eastern and western papers ; and after¬ ward, following two years of incidental writing for the Chicago press, joined the New York Leader staff, then numbering many prominent names. For a time he wrote for the Leader dramatic critiques over the signature ((Trin-culo.® Then he became dramatic and mu¬ sical critic of the World, and began writing the articles signed ((Nym Crinkle.® Later still he was on the staff of the Sun. As <(Nym Crinkle® be published (The Chronicles of Milwaukee) (1861) ; (The Toltec Cup* ; (The Primrose Path of Dalliance, *(The Iron Trail,* and other books. Latterly, having withdrawn from jour¬ nalistic work, he published under the new pseudonym ((J. P. Mowbray® (or J. P. M.), two series of essays and two books of fiction — (A Journey to Nature* (1901) ; (The Making of a Country Home) (1902) ; (Tangled Up in Beulah) (1902), and (The Conquering of Kate) (1903). His authorship of these later works was not known until after his death.

WHEELER, Arthur Oliver, Canadian topographer: b. near Kilkenny, Ireland, 1860. He was educated at Ballinasloe and Dulwich colleges and in 1876 became a government land surveyor in Canada. He was later appointed Dominion topographer, and made irrigation and phototopographical surveys of Alberta near the Alaskan boundary. He also explored and sur¬ veyed the territory now known as Mount Rob¬ son Park. He is an enthusiastic mountain climber and has scaled most of the peaks of the Canadian Rockies. He was one of the

organizers of the Canadian Alpine Club, and was its president in 1906-10. He edited the Canadian Alpine Journal in 1906-13; and is author of (The Selkirk Range) (1903); and joint author of (The Selkirks: a Guide for Mountain Pilgrims) (1911).

WHEELER, Benjamin Ide, American col¬ lege president: b. Randolph, Mass., 15 July 1854. He was graduated from Brown University in 1875, and afterward studied for four years in Germany, traveling also in Greece. He was subsequently engaged as an instructor at Brown, Harvard and Cornell, and in 1886 was ap¬ pointed professor of philology at the last-named university, receiving the chair of Greek in 1888. In 1896 he accepted the directorship of the American School of Classical Studies, at Athens, Greece. From 1899 to 1919 he was president of the University of California. He was editor of the department of philology in Johnson's (Universal Cyclopaedia) and in Macmillan's dictionary of Philosophy and Psychology,* and has written (The Greek-Noun Accent* (1885); (Analogy and the Scope of its Influence in Language) (1887) ; (Introduction to the History of Language, *joint author (1890) ; Organization of Higher Education in the United States) (1896) ; (Life of Alexander the Great* (1900) ; (Unterrichte und Demokratie in Amerika> (1910), *etc.*

WHEELER, Claude L., American phy¬ sician and editor: b. Montreal, 5 March 1864; d. Brooklyn, 30 Dec. 1916. He was graduated at Laval University, Quebec, and then studied medicine at McGill University in Montreal. He engaged in the practice of medicine at Burling¬ ton, Vt., and then came to New York in 1890, where he served on the staff of the Manhattan Eye and Ear Hospital. In 1902 he became assistant editor of the New York Medical Journal, succeeding Dr. Frank P. Foster as editor in 1909. His publications include many brilliant discussions of medical topics.

WHEELER, Henry Lord, American chem¬ ist : b. Chicago, Ill., 14 Sept. 1867. He was graduated at Yale University in 1890 and took his Ph.D

there in 1893, later specializing in chemistry at the universities of Chicago and Leipzig. Since 1908 he has been professor of chemistry at Yale University. He was elected to the National Academy of Sciences in 1909. Author of many papers dealing with organic chemistry, which have usually appeared in the American Chemical Journal and in the Journal of the American Chemical Society.

WHEELER, James Rignall, American archaeologist: b. Burlington, Vt., 15 Feb. 1859; d. New York, 8 Feb. 1918. He was graduated at the University of Vermont in 1880, and re¬ ceived the degree of Ph.D. from Harvard Uni¬ versity in 1885. He went to Greece during the summer while taking courses at Harvard and from 1882 to 1883 attended the American School in Athens. In 1885-86 he attended the uni¬ versities of Berlin and Bonn, Germany. On his return to America he became lecturer at Johns Hopkins University and in 1886 became instructor in Greek and Latin languages at Harvard. From 1889 Jo 1895 he was professor of Greek in the University of Vermont, of which his father had been president. In 1894 he was elected secretary of the American School

of Classical Studies at Athens and after 1901 he served as chairman of the managing com¬ mittee. In 1895 he came to Columbia University as professor of Greek, serving in that capacity until 1906, when he succeeded to the chair of archaeology and Greek art. From 1906 until 1911 he was acting dean and dean of the Columbia College of Fine Arts. During those years he was also associate editor of the American Jour¬ nal of Archceology. With Prof. Harold Fowler, he was joint-author of (A Handbook of Greek Archaeology,) and contributed various articles on archaeology and philology to professional periodicals.

WHEELER, Joseph, American soldier and statesman: b. Augusta, Ga., 10 Sept. 1836; d. Brooklyn, N. Y., 25 Jan. 1906. He was graduated from the United States Military Academy in 1859; served in several scouting expeditions against Indians in Kansas and New Mexico; in February 1861, resigned his com¬ mission, and in April following was

made a first lieutenant of artillery in the army of the Con¬ federate States. In September, he became colonel of the 19th Alabama infantry. He com¬ manded a brigade at Shiloh (6-7 April 1862), distinguished himself by his services, and was selected to command the rear guard when, at the end of the second day's fighting, the Confed¬ erates retired from the field. By reason of his success as commander of the rear guard when the Confederates withdrew from before Halleck's army (30 May 1862), and his equally suc¬ cessful command of the salient outpost at Corinth, led to his appointment as head of the cavalry of Bragg's army. As such he led the advance in every forward movement of the forces and commanded the rear guard with the exception of Hood's Nashville campaign (winter of 1864). In August and September 1862 he led Bragg's advance into Kentucky, and de¬ tained Buell until Bragg had captured Mum-fordsville, with cannon, munitions and supplies. At Perryville (see Perryville, Battle of, and The Kentucky Campaign of 1862), 8 Oct. 1862, Wheeler commanded the cavalry and displayed great energy and skill. He led a brilliant charge and captured a battery. Ordered to cover the retreat of Bragg's army, he made possible that general's successful escape, with large supply trains, to Cumberland Gap. Rosecrans on 25 December moved forward to attack Bragg be¬ fore Murfreesboro. Wheeler skilfully retarded Rosecran's advance, and during the battle (31 Dec. 1862 to 3 Jan. 1863) (see Stone River, or Murfreesboro) was, in the words of Bragg's official report, <(pre-eminently distinguished.ˆ He was commissioned major-general in January 1863, and in June and July took a prominent part in the battles attending Bragg's retreat to Chat¬ tanooga. At Chickamauga (19-20 September) he defeated the right flank of Rosecrans' army (20 September), penetrated to the rear, and de¬ feated Watkins in a severe combat. On 20 September he crossed the Tennessee and cap¬ tured substantially all of Rosecrans' ordnance and supply trains. He fought in the Knoxville campaign in November, and on the 27th with Cleburne, defeated Hooker at Ringgold Gap. During the spring of 1864 he aided in opposing Sherman's advance from Dalton to Atlanta, com¬ manding the cavalry of the Confederate right wing, under Johnston and Hood. He fought

almost daily, his force frequently being dis¬ mounted. On 28-31 July he defeated a Federal raiding force under Generals Stoneman, Garrard and McCook, capturing many prisoners and all the transportation and artillery. On 10 Aug. 1864 he was again in the rear of Sherman's army, capturing supplies, burning bridges and destroying railways. He went as far as the Kentucky line in eastern Tennessee, and then proceeded to northern Alabama. It was impos¬ sible, however, to

arrest Sherman's advance or destroy his communications. Wheeler was then sent in advance of Sherman's army, keeping the Confederate government and commanders ad¬ vised of the enemy's movements and preventing foraging parties from leaving the main force. He thus restricted the spoliation of Georgia to a comparatively narrow area. He defended Macon, Augusta and Savannah, and defeated Kilpatrick at Aiken and Johnsonville. During the operations in North Carolina in 1865, he dis¬ tinguished himself at Bentonville (19-21 March) by opening an avenue for Johnston's retreat. He was promoted lieutenant-general on 28 Feb¬ ruary, and commanded Johnston's cavalry until the surrender of the Confederate armies. Sub¬ sequent to the war he studied law, and followed that profession and the occupation of a planter until 1880, when he was elected a Democratic representative in the 47th Congress. He was unseated by W. M. Lowe in 1882, but on Lowe's death not long after was reelected, and in 1884 was returned to the 49th. He was continually reelected, and was serving at the outbreak of the Spanish-American War. In April 1898 he volunteered for duty, and on 4 May 1898 was commissioned major-general of United States volunteers. On 14 May he was assigned to command the cavalry division, United States army, about to leave for the invasion of Cuba. He planned, and commanded in, the bat¬ tle of Las Guasimas, 24 June 1898, and partici¬ pated in the battle of San Juan, 1-2 July 1898. He commanded the cavalry division of the Fifth corps in Cuba from 22 June to the surrender at Santiago, 17 July. Subsequently he was in com¬ mand of the troops at Montauk Point, L. I., and from 7 October to 3 December was in command of the Fourth army corps at Huntsville, Ala. From August 1899 to January 1900 he com¬ manded the First brigade, Second division, Eighth corps, in Luzon, Philippine Islands. On 16 June 1900 he was commissioned brigadier-general, United States army, and in June-Sep- tember commanded the Department of the Lakes. On 10 September he retired from the service. His publications include (Account of the Kentucky Campaign) (1862) ; (History of the Santiago Campaign > (1898) ; a (History of Cuba) (1899), and eight volumes of Congres¬ sional speeches (1883-98).

WHEELER, Nathaniel, American inventor: b. Watertown, Conn., 7 Sept. 1820; d. Bridge¬ port, Conn., 31 Dec. 1893. He was engaged with his father in the manufacture of carriages, but about 1848 joined Allan B Wilson in manufac¬ turing sewing machines. In 1852, on the estab¬ lishment of the Wheeler and Wilson Manufac¬ turing Company, he became its president, and by his practical knowledge of machinery and ability as an organizer soon built up what was then the largest sewing machine factory in the world. Subsequently he served

for six sessions

in the Connecticut legislature ; and invented and patented many improvements in sewing ma¬ chines, railway cars, wood-finishing processes, *etc.*

WHEELER, Wayne Bidwell, American temperance worker: b. Brookfield, Ohio, 10 Nov. 1869. He was graduated at Oberlin College in 1894 and took his degree in law at the Western Reserve University in 1898. He became field secretary of the Ohio Anti-Saloon League in 1898, and superintendent of that organization in 1902. He later served as general counsel of the national organization.

WHEELER, William Adolphus, American

lexicographer: b. Leicester, Mass., 14 Nov. 1833; d. Roxbury, Mass., 28 Oct. 1874. He was grad¬ uated from Bowdoin in 1853, was engaged in teaching for several years, and subsequently assisted Joseph E. Worcester (q.v.) in the prep¬ aration of his (Dictionary) (1856-59). He was afterward occupied with the revised edition of Webster's (Dictionary } (1864) for which he

compiled Explanatory and Pronouncing Vocab¬ ulary of the Names of Noted Fictitious Persons and Places, including Familiar Pseudonyms, Surnames, etc.,* which was issued separately in 1865. In 1867 he was appointed assistant super¬ intendent of the Boston Public Library. He left unfinished an encyclopedia of Shakespearean literature and an index to anonymous literature entitled (Who Wrote It? > The latter, com¬ pleted by C. G. Wheeler, was published in 1881. He edited Hole's (Brief Biographical Diction¬ ary } (1866) ; a (Dickens Dictionary* (1873) ; and also (Familiar Allusions> (1882).

WHEELER, William Almon, American legislator: b. Malone, N. Y., 30 June 1819; d. there, 4 June 1887. He was educated at the University of Vermont and was admitted to the bar in 1845. He was United States district at¬ torney of Franklin County in 1847-49 and in 1849

was elected as a Whig to the State assem¬ bly, but in 1856 he joined the ranks of the then newly-organized Republican party. He was a member of the New York assembly in 1858-59; in I860 was elected to Congress; in 1867 was president of the State Constitutional Convention ; was reelected to Congress 1869 and served until 1877, taking a prominent part in the adjustment of Southern affairs under the Reconstruction Act and settling the political difficulties in Louisiana by the well-known ((Wheeler Compro¬ mise.® He was Vice-President of the United States under Hayes in 1877-81.

WHEELING, hwe'ling, W. Va., city, county-seat of Ohio County, on the east bank of the Ohio River, in the northern panhandle and in the same latitude as Philadelphia, 60 miles southwest of Pittsburgh. It is on the Balti¬ more and Ohio Railroad, and its branch lines; the Pennsylvania System ; the Wheeling and Lake Erie Railroad of the Wabash System; the Ohio River and Western Railroad and the Wheeling Terminal Railway, a belt line con¬ necting all the roads. It is the largest and most important city in West Virginia. The land area is 2,050 acres and it has an elevation of 660 feet above sea-level. Part of the city, a beautiful residential section, is on Wheeling Island, which is over a mile long and contains 400 acres. A historic suspension bridge con¬ nects the island (the Seventh Ward) with the

main part of the city, and two other steel bridges span the west channel of the river from the island to the Ohio side. Eighty miles of trolley lines in Wheeling and suburbs place a population of 75,000 in West Virginia, eastern Ohio and western Pennsylvania in connection with the city as a commercial centre. It has steamer connections with the Ohio and Kana¬ wha river points and commands a large river trade. Among the features of interest are the courthouse and city hall combined (formerly the State Capitol), the new government build¬ ing, the site of old Fort Henry, the Henry Clay monument, Wheeling and Mozart parks, Roman Catholic cathedral, Elks Home, Y. M. C. A. and Y. W. C. A. buildings, Market auditorium, Board of Trade building, the high school and the Home for the Aged. The excellent trans¬ portation facilities of the city, the large supply of natural gas piped from West Virginia and Pennsylvania fields, the extensive coal fields of the vicinity and the abundance of raw material nearby have served to make Wheeling an im¬ portant manufacturing city. In 1918 Wheeling had over 200 manufacturing establishments, capitalized at $40,000,000, in which were em¬ ployed 18,000 persons, receiving annual wages of $24,000,000. The yearly cost of raw material used was $38,000,000 and the finished products were valued at

$75,000,000. The chief manu¬ factures are iron and steel products, pottery, glass, tobacco, leather, lumber products, wagons and carriages. There are also print works, tanneries, packing-houses, canning factories of national reputation and the largest proprietary remedy company in the world.

Wheeling has 42 churches, embracing 13 denominations. It is the seat of the Roman Catholic diocese of Wheeling. Besides a mod¬ ern public school system, including a high school, opened in 1897, there are the Linsly Institute, Mount de Chantal Academy (Roman Catholic), two business colleges, several parish schools and a public library with 40,000 volumes. Bethany College and the West Liberty State Normal School are located a few miles to the north. There are in all 51 schools, valued at $3,000,000. The city has the North Wheeling and City hospitals, two private hospitals, sev¬ eral orphanages, a day nursery and homes for the aged and friendless. There are 16 banks, with total clearings in 1918 of $206,985,000; four clubs occupying their own buildings, four theatres, 16 banks, four daily newspapers, a flourishing Y. M. C. A., with a commodious building, an active chamber of commerce and numerous secret and fraternal organizations. The commission form of government went into effect in 1917. The waterworks cost $1,500,000 and are maintained at a cost of $100,000 annu¬ ally. The city's annual budget is about $600,000. The assessed valuation of real estate is $39,- 782,200. There are 30.20 miles of paved streets and 20.25 miles of paved alleys, and several miles of macadamized and graded streets. Wheeling was one of the first towns founded on the Ohio River and is supposed to have derived its name from the Wheeling or me¬ andering character of Wheeling Creek. The first settlement was made in 1769 by Ebenezer Zane. In 1774 a stockade fort — Fort Henry, named in honor of Patrick Henry — was built here as a defense against the Indians. On 1

Sept. 1777 this fort was attacked by an Indian force of 300, who were repulsed, but 15 of the settlers were killed. In 1781 another attack was made. On 11 Sept. 1782 the fort was again besieged by a force of 40

British soldiers and 260 Indians, who continued the attack for two days^_ but were forced to abandon the fight. In 1769 the town was laid out by Colonel Zane and in 1795 was incorporated. In 1836 it was chartered as a city and became widely known as an important trading post on the great Na¬ tional Road and the Ohio River. In 1861 Wheeling was made the capital of the <(restored government of Virginia^ by the people of Virginia opposed to secession. It was the State capital from 1863 to 1870 and again from 1875 to 1885. Pop. (1920) 54,322.

H. P. Corcoran,

Assistant Manager, Wheeling Chamber of Com¬ merce.

WHEELING AND LAKE ERIE RAIL¬ WAY, The. Corporate name of a transporta¬ tion company organized 14 Dec. 1916 in Ohio as successor to the Wheeling and Lake Erie Railroad Company, whose property was sold under foreclosure on 30 Oct. 1916, and pur¬ chased on behalf of the bondholders in accord¬ ance with the plan of reorganization of 20 Sept. 1916. The lines owned by the company are as follows: Main line, Toledo to Terminal Junc¬ tion, Ohio, 210.05 miles ; main line : Cleveland to Zanesville, Ohio, 144.20 miles; Aetnaville Extension: Terminal Junction to Aetnaville, 2.75 miles; Huron Branch: Huron Junction to Huron, Ohio, 12.80 miles ; Steubenville Branch : Warrenton to Steubenville, Ohio, 13.65 miles; Sherrodsville Branch : Canton to Sherrodsville, 45.47 miles; Massillon Branch: Orrville Junc¬ tion to Run Junction, 22.09 miles. Lines oper¬ ated: Chagrin Falls Branch: Falls Junction to Chagrin Falls, 8.19 miles; leased line: Adena Railroad: Adena to Saint Clairsville Junction, Ohio, 20.93 miles ; trackage rights : Cleveland, Cincinnati, Chicago and Saint Louis Railroad from Linndale to Wellington, 32 miles, making a grand total of 512.13 miles. In 1917 the equipment comprised 205 locomotives, 79 pas¬ senger cars, 893 box-freight cars, 80 stock cars, 7,291 coal cars, 126 flat cars and 535 service cars. The railroad moved in the same year 14,218,970 tons of revenue freight, of which 62 per cent came from mines, 27.62 per cent were manufactures and 2.05 per cent agricul¬ tural products. The average haul per ton was 106.5 miles and the average rate per ton per mile was 0.623 cents. The system carried 1,623,885 passengers in 1917, at an average rate per passenger per mile of 1.65 cents. The total operating revenue was $11,028,904, the total operating expenses $7,378,212, leaving the net revenue from operations $3,650,692. The net income was $1,113,895.

WHEELOCK, hwe'lok, Eleazar, American clergyman: b. Windham, Conn., 22 April 1711; d. Hanover, N. H., 24 April 1779. He was grad¬

uated at Yale in 1733, and from 1735 to 1770 was pastor of the Second Congregational So¬ ciety in Lebanon, near Columbia, Conn. In 1754 he opened a missionary school for Indians, known from Joshua Moor, who gave for its use a building and two acres of ground, as Moor's Indian Charity School. This he removed in August 1770 to Dresden (now Hanover), N. H.,

founded Dartmouth College, to which a charter had been granted in 1769.

WHEELOCK, John, American educator : b. Lebanon, Conn., 28 Jan. 1754; d. Hanover, N. H., 4 April 1817. He was son of Eleazar Wheelock (q.v.). He entered Yale in 1767, but became a member of the new Dartmouth Col¬ lege at Hanover, N. H., and was graduated with the first class in 1771. In 1775 he was elected a member of the provincial assembly, in 1777 was appointed a major in the New York forces and soon after lieutenant-colonel in the Conti¬ nental army. In 1778 he led an expedition against the Indians. In 1779 he was elected president of Dartmouth College and remained there, except two years, till 1817. He be¬ queathed half his large estate to Princeton Theological Seminary. He published (Essay on the Beauties and Excellencies of Painting, Music and Poetry> (1774) ; (Sketches of the History of Dartmouth College) (1816), *etc.*

WHEELWORK. See Clock.

WHEELWRIGHT, hwel'rit, Edmund March, American architect : b. Roxbury, Mass., 14 March 1854; d. 16 Aug. 1912. He was gradu¬ ated at Harvard University in 1876 and later studied architecture at the Massachusetts In¬ stitute of Technology and in Europe. He was afterward connected with different architects in Boston, Albany and New York, and from 1883 conducted his own business in Boston. He was senior partner in the firms Wheelwright and Haven and Wheelwright, Haven and Hoyt. He was city architect of Boston in 1891-95. He designed the Hartford Bridge, the Cambridge Bridge, the Boston Opera House, Jordan Hall at Boston, the Cleveland Museum of Fine Arts, and was one of the architects of the Boston Museum of Fine Arts. He wrote (Municipal Architecture in Boston > (2 vols., 1898) ;

(School Architecture) (1901).

WHEELWRIGHT, John, American Pur¬ itan clergyman: b. Lincolnshire, England, about 1592; d. Salisbury, N. H., 15 Nov. 1679.

He was a graduate of Cambridge and vicar of Bilsby, near Alford, Lincolnshire ; but in 1636, being driven from his church by Arch¬ bishop Laud, he emigrated to Boston, Mass., where the same year he was chosen pastor of a branch of the Boston church at Mount Wollaston, in what is now Quincy. The cele¬ brated Anne Hutchinson (q.v.) was his sister-in-law, and lie partook of her views. Differ¬ ences of opinion led to personal animosities between him and John Wilson, the pastor of the Boston church; and the General Court ap¬ pointed a fast in January 1637, partly to heal these dissensions. On this occasion Wheel¬ wright preached in Boston and, as his enemies asserted, denounced the ministers and magis¬ trates. The General Court pronounced him guilty of sedition and contempt, for which in November 1637 he was banished from the colony. In 1638 he formed a settlement on the banks of the Piscataqua, which he called Exeter. After a residence of five years here the town was declared to be within the limits of Massachusetts, and he removed with a part of his church to Wells in the district of Maine. In 1644 his sentence of banishment was re¬ voked, in consequence of some acknowledg¬ ments on his part, and he returned to that

colony in 1646 and settled in Hampton. In 1654 he published his Vindication. } About 1657 he went to England, where Cromwell, who had been his college classmate, received him cor¬ dially; but he returned in 1660 and in 1662 set¬ tled as pastor in Salisbury, N. H. His (Writ¬ ingsˆ with a memoir, edited by C. H. Bell, were published by the Prince Society in 1876.

WHELAN, hwe'lan, Richard Vincent,

American Roman Catholic prelate : b. Balti¬ more, Md., 28 Jan. 1809; d. there, 7 July 1874. He was educated at Mount Saint Mary's Col¬ lege, Emmitsburg, Md., and at the Seminary of Saint Sulpice, Paris,

where he was graduated in 1831. He was ordained to the priesthood in 1832, returned to the United States and in 1832-35 was a professor at Mount Saint Mary's. He was engaged in missionary work at Harper's Ferry and other towns in Virginia and Mary¬ land in 1835-40, and in the latter year was consecrated bishop of Richmond. He built a theological seminary near Richmond, founded schools and academies, built a cathedral at Wheeling, and in various ways greatly improved the condition of his diocese. When the diocese was divided in 1850 he became bishop of Wheel¬ ing. The Wheeling diocese then contained but two churches and two priests, with no supple¬ mentary institutions of any kind. At his death it possessed 48 churches, 40 stations for re¬ ligious services, 29 priests, six academies, four convents, a hospital, an orphan asylum and a college. He was present at the Vatican Council of 1869-70 and opposed the definition of the dogma of papal infallibility, considering the time inopportune.

WHELK, a gastropod mollusk of the genus Buccinum and order Ctenobranchiata. The large or common whelk (B . undatum) is of common occurrence on both sides of the north Atlantic, and is distinguished by the shell hav¬ ing its canal notched, and the mouth or aper¬ ture of large size. The whorls of the shell, which has a thick horny epidermis, are few and rounded. In England these animals are largely used for food and bait, and are caught in ˆcreels® baited with garbage, but in America they are not eaten. The eggs are contained in egg-cases, bundles of which are common on the seacoasts; each capsule contains several eggs, some of which develop and devour the others. The red whelk, or (<roaring buckie® of the Scotch ' (Fusus antiguus), belongs to the family Fusida (q.v.). The tulip whelk (Fasci - olaria tulipa) is very richly colored and in¬ habits the tropical seas. The purple whelk (Purpura lapillus) is so named from its afford¬ ing a part of the dye which made Tyre of old so famous.

WHEN LILACS LAST IN THE DOOR-YARD BLOOMED. Swinburne called this elegy on Abraham Lincoln by Walt Whitman <(the most sonorous anthem ever chanted in the church of the world.® Such praise may be too high for the poem, but it can hardly be denied a place among the great elegies of the English language. The highly artistic and carefully wrought structure of the poem somewhat corre¬ sponds to that of a symphony, in its varied and intricate harmonies, and its three leading motifs of the lilacs, the evening star and the song of the thrush, which, constantly recurring, finally

merge into the poet's song of love, regret and consolation. As in much

of Whitman's best work, nature is here not a mere background, but is suffused with human feeling and becomes one with it. The scenes before the house in the dusk and in the swamp with the thrush, the vast panorama of country and town which loved Lincoln and which now laments him — these are not mere pictures, but realities; are not apart from the human passions of the poem, but an essential ingredient of them. The free verse, with its irregular rhythms and its lines of varying length, permits an immense range of emotional effects, of exquisite melodies and vast harmonies, perhaps not attained by any other poem in American literature; and Whit¬ man's characteristic magic of phase weaves its spell in such lines as ((the yellow gold of the gorgeous, indolent,' sinking sun,® and ((the huge and thoughtful night.® The elegy gives no such intellectual estimate of Lincoln as Lowell at¬ tempts in the Commemoration Ode1* ; it is sim¬ ply a song, — a lament and a consolation. Its emotion appears as spontaneous and unstudied as it is sincere and unrestrained; but for all that the poem is none the less a nobly planned and carefully executed work of art.

Marion Tucker.

WHERRY, William Macky, American soldier: b. Saint Louis, Mo., 13 Sept. 1836; d. 3 Nov. 1918. He was educated at the Univer¬ sity of Missouri and studied law; served through the Civil War; and was present at the battles of Wilson's Creek, Dallas, Kenesaw Mbuntain, Atlanta, Jonesboro, Nashville and at the surren¬ der of Gen. J. E. Johnson. He was brevetted brigadier-general of volunteers in 1865, mustered out of the volunteer service in 1866, and ap¬ pointed captain in the regular army and subse¬ quently served on frontier duty. In the war with Spain in 1898 he took part in the battle of San Juan Hill and in the capture of Santiago. He was promoted brigadier-general, United States of America, 7 Jan. 1899, and was re¬ tired the same month. He published (Battles and Leaders of the Civil War) (1888-89).

WHERRY, a light, shallow boat, for ply¬ ing on rivers; also a light, half-decked fishing vessel, used in different parts of Great Britain and Ireland.

WHETSTONE, any stone used for sharp¬ ening tools. Sandstones and fine mica schists form the coarser kinds. Silicious clay rocks and particularly the fine compact rocks made of quartz-mud, such as the Arkansas stone or nova-culyte, form the more desirable varieties for oil¬ stones and delicate hones. See Sedimentary Rocks; Schists.

WHEWELL, hu'el, William, English scholar: b. Lancaster, 24 May 1794; d. Cam¬ bridge, 6 March 1866. He was graduated from Trinity College, Cambridge, in 1816, and in due course became Fellow and tutor of his college. He labored with Herschel, Babbage and Peacock to raise the standard of mathematics in the uni¬ versity, and wrote textbooks which were justly celebrated. From 1828 till 1832 he was profes¬ sor of mineralogy, and in 1838 was elected to the Knightbridge chair of moral philosophy, which he held till 1855. In 1841 he became master of Trinity and in this position labored earnestly and successfully to obtain for the natural and

moral sciences a better recognized position among the studies of the university. He became Fellow of the Royal Society in 1820, and was one of the first members of the British Associa¬ tion, of which he was president in 1841. Whewell was a strong, healthy, clear-headed man, possessed of a vigorous and capacious intellect, and endowed with extraordinary powers of ac¬ quiring and retaining knowledge. The extent and variety of his attainments were very unusual. Yet there was nothing superficial about his learning, notwithstanding the well-known mot of Sydney Smith, that (<science was his forte and omniscience his foible.® Besides other gifts, he built at his own expense, and presented to his college, a hostel , or collection of chambers for undergraduates. His principal writings include the Bridgewater treatise 'Astronomy and General Physics, considered with reference to Natural Theology* (1833) ; 'History of the Inductive Sciences) (1837); 'Philosophy of the Inductive Sciences* (1840) ; 'Novum Organum Renovatum* ; 'Indications of the Creator) ; 'History of Scientific Ideas* ; (Elements of Morality, including Polity* ; lec¬ tures on Systematic Morality* ; Architectural Notes on German Churches) ; 'On Liberal Edu¬ cation in General* ; (Lectures on the History of Moral Philosophy in England* ; (Philosophy of Discovery* ; (History of Moral Philosophy1* ; 'Platonic Dialogues for English

Readers. *He was the author of the well-known anonymous essay, 'The Plurality of Worlds.) Consult Todhunter, 'Whewell : an Account of His Writ¬ ings* (1876) ; 'Life,* by Mrs. Stair Douglas (1881) ; Clark, 'Old Friends at Cambridge and Elsewhere* (1900).

WHEY, a clear, straw-colored liquid, con¬ sisting of the part of milk which remains fluid after the milk has been curdled by the use of rennet in cheese making, or by the action of the acid in the natural souring of the milk. Its average percentage of solids is 6.96, of which .36 per cent is fat, .84 per cent proteins and 5.76 per cent chiefly sugar, with a trace of salts and other matter. It is ordinarily used in the feed¬ ing of swine and calves, not because of any great nutritive value but as a means of conserv¬ ing economically the solids it contains. Whey cheese is made by evaporating the liquid and then adding cream. In large cheese-making es¬ tablishments the whey is sometimes put through a separating process to collect the fat, which is made into a good quality of butter. Milk sugar is also made from whey in factories large enough to make it profitable. Various cooling drinks are made from whey, and in some Euro¬ pean countries "whey cures® for certain diseases consist of drinking a prescribed amount of the liquid, and sometimes of bathing in it.

WHIGS, a word of British origin, used for many years to designate members of an Ameri¬ can political party. It had previously been used in America in colonial and Revolu¬ tionary times to indicate those who were op¬ posed to the attempts of the British Crown to deprive the Americans of their political and commercial rights. It disappeared with the close of the Revolution, and did not appear again until the National Republicans, successors to the Federalists (q.v.), adopted the name of Whigs. Those Whigs who considered the slav¬

ery question settled by the compromise of 1850 were called in Massachusetts "Cotton Whigs,® and in New York "Silver Grays.® The Whigs continued to exist as one of the two great par¬ ties until the election of 1852, which was fol¬ lowed by a division on the slavery issue, the anti-slavery Whigs joining the Republican party, and the others making common cause with the Democracy.

The term was prominent in British political history for nearly two centuries to designate the political party which advocates such changes in the Constitution as tend in the direction of democracy. Defoe thus accounts for the origin of the name : "The use of it began then when the western men (the peasantry of the West Lowlands of

Scotland), called Cameronians, took arms frequently for their religion. Whig is a word used in those parts for a liquor {whig, Scotch for whey), which the men used to drink … and so became common to the people

who drank it. It afterward became a denom¬ ination of the poor harassed people of that part of the country, who, being unmercifully persecuted by the government, against all law and justice, thought they had a civil right to their religious liberties, and therefore resisted the power of the prince (Charles II).® Mon¬ mouth was sent to quell the insurrection, and "at his return he found himself ill-treated for having used the rebels too mercifully; and Lau¬ derdale told Charles, with an oath, that the duke had been so civil to the Whigs because he was a Whig himself in his heart. This made it a court word, and in a little time the friends and followers of the duke began to be called Whigs.®

A different origin is, however, assigned to the term. Sir James Balfour, in writing of an outbreak which occurred in 1648, in his own day, calls the enthusiasts "whigamores,® and Burnet, who was then five years old, offers the following explanation: "The southwest coun¬ ties of Scotland have seldom corn enough to serve them throughout the year, and the north¬ ern parts producing more than they need, those in the west come in the summer to buy at Leith the stores that come from the north; and from a word, whiggam, used in driving their horses, all that drove were called the whigamores, and shorter, the whiggs. After the news came of Duke Hamilton's defeat (in 1648), the minis¬ ters animated their people to rise and march to Edinburgh ; and they came up, marching at the head of their parishes, with an unheard-of fury, preaching and praying as they came,

… This was called the whigamores inroad,

and ever after that, all that opposed the court came in derision to be called whigs ; and from Scotland the word passed to England.® The Whigs brought about the Revolution of 1688-89, and established the Protestant succession; they were chiefly instrumental in obtaining the aboli¬ tion of the slave-trade and slavery, the repeal of the Test and Corporation Acts, Catholic emancipation, Parliamentary and municipal re¬ form, the repeal of the corn-laws and similar measures. The term Liberals is now generally applied to the representatives of this party; the extreme section of the party, who agitate for sweeping innovations, usually have a more or less close connection with the Whigs, and have

adopted the name of Radicals. See Political Parties.

WHIN. See Furze.

WHIN, WHINSTONE, a mining term for intruded igneous or basaltic rock generally of a firm texture and resistant character. The great Whin Sill of Northumberland is a typical example.

WHINCHAT, European warbler (Pratin - cola rubetra), allied to the stonechat, and is named from its frequenting the neighborhood of whin and furze bushes. It is also called furzechat. It possesses a long white streak, passing across the sides of the head, which, as well as all the upper parts of the body, is colored brown. The lower parts are yellow¬ ish. Its length is usually under 10 inches ; four to six green-blue eggs are laid in ground nests. Its song is very sweet and it has been known to imitate the song of other birds. Its range is not confined to Europe, as it is found in many parts of Africa and occasionally in west¬ ern Asia.

WHIP-SNAKE, a light brown harmless snake (Masticophis flag ellif ormis) with whitish tail, closely related to the blacksnake ; called also coach-whip. It is found in the southern United States and Mexico, and is especially abundant in Texas. Its name is given it on account of its general appearance ; and the more ignorant Indians and negroes believe it will whip or lash its adversary with its tail. It runs with the utmost swiftness, and has the general habits of a blacksnake (q.v.). A group of very slender poisonous African and Asiatic tree-snakes, the Dipsadince, are called whip-snakes in some books. They are elapine and poisonous and conceal themselves aided by their leaf-green color, in bushes where they dart upon birds, lizards, insects, etc., unsuspicious of their presence.

WHIPPING or FLOGGING. ‘See Flog¬ ging; Whipping-Post.

WHIPPING POST, a post at which punish¬ ment was inflicted by the law of England, and until recent years in the State of Delaware, chiefly

for minor offenses. The criminal law in England enumerates several offenses for which whipping at the post may be inflicted on males under 16. A subsequent act enacts that when the offender is under 14 the number of strokes is not to exceed 12. In Scotland no person above 16 is to be whipped for theft or crime committed against person or property. In con¬ nection with the pillory (q.v.) it flourished in America in colonial times and was commonly employed on blacks in slavery. In Delaware robbery, theft and other crimes were for many years punished by whipping. See Flagella¬ tion.

WHIPPLE, hwip'l, Abraham, American naval officer: b. Providence, R. I., 1 733; d. near Marietta, Ohio, 29 May 1819. In the French and Indian War he commanded the pri¬ vateer Gamecock and on one cruise alone cap¬ tured 23 prizes. He was in charge of the ex¬ pedition which on 8-9 June 1772 destroyed the British armed schooner Gaspee, commanded successively the Columbus , the schooner Provi¬ dence and the frigate Providence, and from 1775-79 with the schooner Providence took

more prizes and destroyed more vessels than any other commander in the colonial service. With the frigate Providence he evaded British surveillance and succeeded in getting to sea with important dispatches for France, and in 1779 performed the daring exploit of capturing 10 vessels from a merchant fleet of nearly 150 sail, eight of which reached Boston safely, and brought about $1,000,000 when sold. He com¬ manded the naval forces at Charleston, S. C., in 1780, but was captured and held a prisoner until the close of the war. He commanded the vessel which in 1784 unfurled the first American flag on the river Thames.

WHIPPLE, Edwin Percy, American author and critic : b. Gloucester, Mass., 8 March 1819; d. Boston, 16 June 1886. After a sec¬ ondary education, he began writing for news¬ papers, in 1837 became a clerk in a Boston brokerage office and from 1837 to 1860 was superintendent of the reading-room of the Mer¬ chants' Exchange. In 1843 he first attracted attention by a critical panegyric on Macaulay in the Boston Miscellany, and in October of that year entered upon his successful career as a lecturer, chiefly on literary topics. He con¬ tributed much to reviews and journals, pub¬ lishing in 1848-49 two volumes of (Essays and Reviews,* including discussions of (English Poets of the 19th Century,* (Byron,* (Rufus Choate) and (Henry Fielding.* In 1872-73 he was literary editor of the Boston Globe, a newly-established daily. The greater part of his work is composed of

essays on literature and authors, though he treated of other sub¬ jects with an almost equal discrimination. His (Literature of the Age of Elizabeth) (1876) probably shows him to best advantage, though his estimates of the moderns are also pains¬ taking and for the most part just. His char¬ acterizations were penetrative, and at times very effectively expressed. He lacked, however, to a large extent, originality and power, and Whit¬ tier's declaration that <(with the possible ex¬ ception of Lowell and Matthew Arnold, he was the ablest critical essayist of his time® cannot now be accepted. Among his further publi¬ cations are (Literature and Life) (1849), a small volume of lectures; (Character and Char¬ acteristic Men* (1866) ; (Success and its Conditions) (1871). Three books appeared post¬ humously, (Recollections of Eminent Men, with Other Papers) (1887), with an introduction by C. A. Bartol; (American Literature and Other Papers> (1887), with a brief introduction by Whittier, and containing the centennial review of American literature written in 1876 for Harper's Magazine; and Outlooks on Society, Literature and Politics (1888). Consult pa¬ pers by T. W. Higginson in the Atlantic, Vol. lviii. 345, and by T. W. Hunt in the (Biblio¬ theca Sacra, * 1. 30.

WHIPPLE, Henry Benjamin, American Protestant Episcopal bishop: b. Adams, Jeffer¬ son County, N. Y., 15 Feb. 1822; d. Faribault, Minn., 16 Sept. 1901. Ill health prevented his entering college, for which he had prepared, and he engaged in business for several years. In 1847 he began a theological course privately, took priest's orders in the Episcopal Church in 1850 and was rector of Zion Church, Rome, N. Y., 1850-57 and of the church of the Holy

Communion, Chicago, 1857-59. In October 185J he was consecrated first bishop of Minne¬ sota. He very soon afterward organized the beabury Mission at Faribault, out of which nave since been developed the cathedral of Our Merciful Saviour, Seabury Divinity School, the Shattuck School for boys, and Saint Mary's Hall, a school for girls. Bishop Whipple was widely known as <(the apostle to the Indians® on account of his labors among them both for their material as well as

spiritual welfare. By the Indians he was called “Straight Tongue.® He thoroughly understood the Indian character and at the time of the Sioux massacre in 1862 insisted that the trouble came directly from the false dealing of the whites with the Indians. In 1876 he secured the Sioux treaty, opening up the best portions of Dakota to white settlement, and his advice in regard to Indian affairs was sought by every President from Lincoln to McKinley. In his (Lights and Shadows of a Long Episcopate) (1899) the character of the Indian problem will be found very fully treated. Bishop Whipple traveled extensively and was well known and highly regarded in England, while in his own country he was beloved and respected by men of every creed.

WHIPPLE, Squire, American civil engi¬ neer: b. Hardwick, Mass., 24 March 1804; d. Albany, N. Y., 15 March 1888. He was grad¬ uated from Union College in 1830 and engaged in canal and railway surveying. He patented in 1840 an iron bridge truss of the bowstring type, several of which were built over the Erie Canal. After 1852 he built several bridges known as the ((Whipple trapezoidal type,® and in 1872 took out a patent for a lift drawbridge, one of which was built over the Erie Canal at Utica. He wrote (The Wˆay to Happiness> (1847) ; (Treatise on Bridge Building) (1847) ; and (The Doctrine of Central Forces) (1866).

WHIPPLE, William, American soldier and politician: b. Kittery, Me., 14 Jan. 1730; d. Portsmouth, N. H., 28 Nov. 1785. Before 1751 he was captain of a merchantman trading with the West Indies and making voyages to Africa for slaves. But in 1759 he set up as a merchant at Portsmouth, and in 1775 was chosen a dele¬ gate to the New Hampshire provincial congress. He was also made a member of the provincial council of safety. In January 1776 he was elected to the Continental Congress, continuing to hold his seat until September 1779, and sign¬ ing the Declaration of Independence. As briga¬ dier-general of New Hampshire troops, he com¬ manded a brigade in the operations against Burgoyne in 1777, and assisted in negotiating the terms of the surrender of the British gen¬ eral. Commanding the New Hampshire forces, he cooperated with Sullivan in the campaign against the British in Rhode Island in 1778. From 1782 to 1784 he was superintendent of finance for New Hampshire, and from 1782 until his death a judge of the Superior Court. He was president of the commission for the adjustment of the dispute between Connecticut and Pennsylvania regarding the Wyoming Val¬ ley region.

WHIPPOORWILL, a North American

nightjar (Antrostomus vociferus) . In this genus the rictal bristles are

greatly developed and

reach far beyond the tip of the small, weak bill, and sometimes they are fringed. The nostrils are not tubular as in Nyctidromus. The whip¬ poorwill is ordinarily 10 inches long with a spread of wings of about 18 inches, the mouth bristles are simple, the tail long and rounded, and the soft lax plumage closely and delicately mottled with gray, black, white and yellowish brown, the female with the tips of the outer tail-feathers tawny, the same parts in the male white. These birds inhabit the United States and British provinces east of the plains, and breed chiefly northward, throughout most of this area. Being migratory, they reach the Middle and New England States in May. The whippoorwills are strictly nocturnal, but usually become quiet by midnight, except on moon¬ light nights when they continue active till dawn ; but at all times they are most vociferous during the early evening. The song is a clear, ener¬ getic whistle, aptly syllabified in the name, strongly accented on the last syllable, and is repeated many times ; then, after a short pause begins anew. They fly noiselessly in pursuit of flying insects, skimming low over stone walls and bushes, or even alighting on the ground to pick up an insect. Large moths, nightflying beetles and insects frequenting forest borders are their chief food. When they pass close to a person at night they may be heard to utter a low murmuring sound. Unlike the great ma¬ jority of birds they always perch along and not across a bough, a peculiarity which they share with other weak-footed birds. Whippoorwills do not fly abroad during cloudy days like the night hawk, and as a consequence their appear¬ ance is unknown to many persons to whom the song is quite familiar. No nest is made, and the two elliptical, creamy white eggs, marked with brown and lavender, are laid in a depres¬ sion on the bare ground, or a log. When dan¬ ger threatens the old birds often carry the eggs or young in their mouth to a place of safety. A much larger species of similar colors and habits, but more southern in its range, is the chuck-will's-widow (A. carolinensis) > (q.v.). In this species the rictal bristles are provided with lateral filaments.

WHIPTAIL SCORPION. See Scorpion,

WHIRLIGIG BEETLE. See Water—

beetles.

WHIRLPOOL, a circular eddy or whirling current in a stream or the sea, of considerable dimensions, produced by the configuration of the channel, by meeting currents, by winds meeting tides, *etc.* There are some very cele¬ brated whirlpools, such as Charybdis, in the strait between Sicily and Italy; and the Mal-strom, off the coast of Norway. When the agitation is increased by high tides or winds they sometimes become dangerous to navigators. But large modern vessels cannot be sucked into any whirlpool, like some of the small craft of the ancients.

WHIRLWIND. See Cyclone; Water¬ spout.

WHISKY, the name applied to a well-known liquor distilled from corn, barley, wheat, oats and other grains ; potatoes, beet and other roots and sometimes molasses and subsequently refined, colored and flavored by various proc¬ esses. However under regulations under the

Federal Food and Drug Act the name whisky alone is limited to grain distillates. Whisky from malt alone is made in the Scotch dis¬ tilleries as follows: The malt is bruised upon cylinders and the quantity intended to be mashed is put into the mash pan, water at a temperature of about 170° F. being then added. After two or three hours' agitation the whole is left to repose for an hour and a half, and then the worts are drawn off to about one-third of the water employed. About two-thirds of the first quantity of water of a somewhat higher tem¬ perature is put into the pan, and the agitation is renewed for about half an hour. After a second period of repose these second worts are drawn off. Both infusions are now cooled down as quickly as possible to the temperature of 80° or 7(r to prevent souring; the wort is cooled down by being exposed in shallow coolers to currents of air, or by being passed through serpentine tubes surrounded with cold water. More water may be let into the pan, and a third wort drawn off, which may be fixed with the other worts, or used instead of water for the first infusion of malt. The quantity of sac¬ charine matter converted into alcohol depends upon the proportion of ferment or yeast intro¬ duced into the worts; if too little be used, a portion of the sugar will remain undecomposed; if too

much, the spirits will have an unpleasant taste. Generally the worts are let down at the specific gravity of 1.050 or 1.060, and at a tem¬ perature of 60° to 50°. For every 100 gallons a gallon of good porter yeast is added and thoroughly incorporated by agitation. An hour after the addition of the yeast fermentation begins to show itself by a ring of froth around the edges of the vat, and in about five hours frothy bubbles cover its whole surface. Large vats generally afford a better result than small ones, owing to the equality of the fermenting process. It is considered good worts when the specific gravity comes down to that of water and superior worts when it falls to 0.995. In about 48 to 60 hours the wash begins to get clear and comparatively tranquil, and is then ready for distillation. In its simplest form the still con¬ sists of a copper boiler into which the wash is poured. This vessel is furnished with a close head terminating in a bent tube which passes in a spiral form through a vessel filled with cold water. (See Distillation). On the application of heat to the still the spirit begins to rise in vapor at 175°, along with more or less steam. These vapors are condensed in passing through the spiral tube, and trickle in fluid form into a receiver. The product of this first distillation is called low wines. This is again distilled at a lower temperature, which gets rid of part of the water and of the fetid oils that had come over with the alcohol. Great purity and strength can only be obtained by repeated distillation. The casks or packages into which these spirits are put are never charred, as in America, but preference is given to empty wine or rum casks which impart both flavor and color, and when plain casks are used, flavoring and coloring is accomplished by means of blending wines. If nothing whatever is added to the spirits which are put in plain casks, the coloring and flavor¬ ing is attributable to the tannic acid extracted from the wood, and the oxidation of the alde¬ hydes in combination with the ethyl alcohol.

Before prohibition in the United States, Kentucky, Maryland and Pennsylvania whiskies constituted the majority of those consumed for drinking purposes, either medicinal or otherwise Kentucky whiskies were known as Sour Mash, Sweet Mash and Bourbons and Pennsylvania and Maryland whiskies as Eastern Ryes. At the head of the various processes of distillation, for excellence of quality of the spirit produced thereby, stood that known as <(fire copper,® which was the method that origi¬ nally established the high reputation of whisky in these States ; those later employed, while giv¬ ing a larger yield of spirit to the bushel of grain, procured it at the expense of the quality and flavor thereof. In this process the corn and rye meals were scalded or mashed, with hot spent beer, which was the liquid residue

of the previ¬ ous distillation. The mash was then allowed to cool to the proper temperature, when malt was added, and the mash, diluted with a sufficient quantity of water, was left to ferment the time established by law. The diluted mash when fermented was called beer. The beer was dis¬ tilled -in three different ways. In the very smallest distilleries, it was sometimes boiled in copper stills, over wood fires; the vapor, passing through a copper coil or worm, immeised in cold water, was condensed and delivered into a receiver. The condensed liquid was called low wines or singlings. Singlings contained only a small amount of spirit. This manner of boiling the beer was seldom used, as the large quantity of grain contained in the beer made it apt to cake in the still ; and, becoming scorched, it gave the whisky a strong, smoky flavor, a very little of which, however, was not considered objection¬ able. The singlings were doubled or again dis¬ tilled in small copper stills, or doublers, over wood fires and the vapor again condensed in a copper worm, whence it wras delivered into the receiving cistern. Another name for doublings is high wines. The usual way of distilling sour mash whisky was to boil the beer in a wooden still by admitting steam, the vapor being con¬ densed into singlings ; the singlings were doubled as above. In the third way the beer was boiled in a copper still by steam confined in a copper pipe placed inside the still. The singlings were doubled in small copper stills, over wood fires, in the same manner described. This latter way was considered a great improvement, as it avoided both the scorching of the grain in dis¬ tilling the beer and the admission of live steam, while it preserved all the characteristics so highly prized in (<sour-mash, fire copper® whiskies. The yield by the sour-mash process was from two to three gallons to the bushel of grain.

Most whisky was made by the process known as ((steam.® In this the corn and rye meals and malt were mixed with water in the mash-tub, where they were scalded with direct or live steam, introduced by means of a perforated pipe at the bottom of the tub. When fully scalded the mash was cooled down and run into the fer¬ menting tubs. Fresh yeast used in ferment¬ ing, which gave the name of <(sweet mash.® The still was made of wood and divided into two or three compartments. When the still was charged a certain amount of beer was placed in each compartment, live steam was admitted into the lower, which boiled the beer, and the vapor from it ascended through a curved pipe into the

compartment above, where its continued recep¬ tion boils the charge therein contained ; the \ apor f rom this again ascended into the next compartment above, where the same process was repeated. The vapor then passed through a pipe into a wooden doubler, where it boiled the low wines; and the vapor arising thence passed into a copper worm, where it was condensed and then run into the whisky cistern. Only one worm was used and one condensation made. Highwines, as well as whisky, was manufactured by this process. The yield was from three and a half to four and a half gallons. In making whisky by the asteam copper® process, the mash was made and fermented and the beer boiled in the same manner as . for the “steam® process. The same wooden still was used ; but, instead of the vapor from the upper compartment passing di¬ rectly into a wooden doubler, it was run through a worm and condensed into singlings, which was doubled in a copper still by live steam, or by steam confined in a jacket around the still, or sometimes by fire underneath.

In locating a distillery a full supply of clear, bright water that contains the proper chemical qualities is the first consideration. It is well known to both chemists and practical distillers that water containing a large quantity of sul¬ phate of lime, earthy carbonates and no organic matter is best adapted to distilling. The lime and carbonates being dissolved in the acid gen¬ erated during the fermentation of the mash mostly pass off in the form of carbonic acid gas and leave the water soft and best suited for extracting the active properties of the malt and grain. Great care has to be taken in the selection of the grain to have it well developed and sound. Musty or unsound grain is fatal to the production of fine whisky, and its defects become more prominent as the whisky increases in age. Those distillers most careful to manu¬ facture only fine goods use the grain that is grown in their own section of the country in order to have both the grain and water spring from the same kind of soil. Successful fer¬ mentation requires of the distiller not only con¬ stant attention, but also extensive knowledge both of the principles of chemistry and of prac¬ tical results. It is exceedingly injurious to allow the fermentation to be prematurely con¬ cluded or to proceed too long. As a general rule, the slower the fermentation and lower the heat at which the distillation is carried on the finer and purer will be the spirit. The mash being made and fermented, and the beer distilled by whatever process, the whisky is

col¬ lected in the cistern and thence run into barrels, under the control of the United States in¬ spector, and in the custody of the United States storekeeper, who has also charge of it while in the bonded warehouse, till the tax is paid. Barrels, and the cooperage thereof, require much attention, and must be made of well-seasoned oak. For highwines they are not charred, but for whisky they should be well charred, as the char has some peculiar chemi¬ cal effect on the character and ripening of the whisky that is very desirable.

The subsequent purity of the product depends largely upon the care exercised by the distiller in stopping the distillation when the temperature of the vapor rises above the boiling point of ethyl alcohol and water and certain flavoring bodies depending upon the material employed.

The process of fermentation which precedes that of distillation produces a number of alco¬ hols radically different from ethyl alcohol (which, with water, is the body of whiskies) and which seriously serve to contaminate the product. These are usually referred to by the distiller in America as the “heads® and “tails,® because the former have a lower boiling point than that of ethyl alcohol, and the latter a higher boiling point, as a result of which a careful distiller can separate them from the main body of the distillate which is to be preserved.

In England these heads and tails are called “feints.® Among these is fusel oil, from which it is very desirable that the spirit should be freed as much as possible. This may be par¬ tially accomplished by the action of charcoal and heat, which are the principles underlying the barrel-charring process of refination and maturation. If, however, the fusel oil contents are too large to start with, they will never be sufficiently reduced by such process to make the product wholesome and palatable. In such case, they can only be removed or reduced by a sub¬ sequent process of rectification, including redis¬ tilling and the passage of the spirits through leach tubs. It follows, therefore, from the process of manufacture, that the fusel oil con¬ tents or percentage of impurities is not fixed or constant, and this fact led to the process called blending. Under the present system of Internal Revenue Laws in the United States distilled spirits can be sold only by one who qualifies thereunder as a wholesale liquor dealer, and such person may also be a rectifier. A rectifier is one who rectifies, purifies or refines distilled spirits, or who merely mixes without refining. Whenever it is found that whisky which has been subjected to the barrel-charring process

still contains an excessive quantity of fusel oil, or has acquired an excessive quantity of tannic acid, it can only be corrected by redistillation or other rectifying processes or by the addition thereto of ethyl alcohol and water (termed for commercial purposes either “neutral spirits® or “cologne spirits®) which contains no fusel oil and no tannic acid. One effect of charring a barrel is to produce a coating of a gummy, resinous substance beneath the char and next to the hard wood which is classed as caramel and which not only imparts a flavor, but pro¬ duces about two-thirds of the color usually ob¬ tained by spirits which have been stored in such a barrel for a length of time. The other one-third of the color is imparted by the tannin or flavescin which the spirits extract from the wood.

Since neutral spirits are seldom put in charred barrels, they retain their original color, which is water white, and when they are mixed with the whisky which has been colored, it necessarily lightens the color which has to be restored by the addition of plain caramel. Harmless flavorings are sometimes added to modify or soften the effect of the tannin, which is a severe astringent. Oa account of their diminished toxicity, smoothness which some¬ times results from the addition of sugar, and improved flavor which results from diluting or diminishing the tannic acid, acetic acid and fusel oil, blends are considered by some more desirable than a simple whisky.

The bulk of the so-called straight or simple

whiskies in America were made by adding water to the highwines or doublings in the receiving cistern until they were reduced to <(100 proof® or ((proof,® — approximately half ethyl alcohol and half water, — and then storing them in charred barrels.

Highwines contain higher alcohols known as ˆimpurities,® created during the process of fermentation. If these impurities are removed from the highwines, the spirit is then termed ˆneutral,® but that term is properly applied to it only so long as it is kept in its original con¬ dition, free from any coloring or flavoring mat¬ ters. To insure this

result, neutral spirits are stored in paraffined or waxed barrels. Neutral spirits when put into charred barrels are con¬ verted into whisky, but milder in flavor and less fiery than whisky produced from high wines. Being unsuitable for blending purposes, such whisky was seldom produced in America, although all foreign whiskies partake more of its characteristics than of whisky produced from highwines.

The recent custom of steam-heating ware¬ houses in which whisky in charred barrels is stored increases the proof very materially. If kept in damp storage, the proof would diminish. Whisky ranges in proof from 70 to 120, but all spirits that have been subjected to the process usually recognized as producing whisky are considered whisky without reference to their <(proof,® though regulations under the Food and Drugs Act required the proof to be between 80 and 110 if the actual proof is not stated.

Other than the above no standard for whisky was created by the Federal laws, but many of the States adopted the standard which was originally laid down in the United States Pharmacopoeia, which required that whisky for medicinal purposes should be approximately from 88 to 110 proof, should contain no more than traces of fusel oil from grain and oak tannin from casks, a stated limit of free acid, and show a residue from 100 C. C. evaporated on a water bath and dried at 212° F., of not more than 0.5 Gm. Blended whiskies more nearly meet these requirements than straight whiskies. The subject was omitted from the last revision of the Pharmacopoeia.

Whisky, whether called (<straight® or ((blended,® is composed of approximately half water and half ethyl alcohol, plus a color and a flavor, and the only substantial difference be¬ tween the two consists in the percentage of fusel oil and tannic acid, which exists in straight whiskies in a larger amount than in blended whiskies.

According to the report of the commis¬ sioner of internal revenue for the fiscal year ended 30 June 1918, grain to the amount of 16,655,125 bushels was consumed in the manu¬ facture of whisky, the product of which for that year in the United States amounted to 186,555,202 gallons. The distillation of grain for potable beverages was discontinued 9 Nov. 1917 under Food Control Act of 10 Oct. 1917, as a war measure, since which time only whisky previously distilled has been sold. In view of the prohibition amendment to the Federal Con¬ stitution resumption of distillation for beverage purposes is forbidden.

WHISKY FRAUDS, The, in American civil history, a national internal

revenue scandal,

which reached its climax in 1874 through the efforts of Secretary of the Treasury D. H. Bris¬ tow. Statistics showed that for some years prior to 1874 the United States had, in Saint Louis alone, lost at least $1,200,000 of revenue which it should have received from whisky, yet spe¬ cial agents of the Treasury set to work from time to time had failed to do more than cause an occasional flurry among the thieves. The Whisky Ring was organized in Saint Louis when the Liberal Republicans there achieved their first success. It occurred to certain poli¬ ticians to have revenue officers raise a cam¬ paign fund among the distillers. This idea the officers modified later, raising money in the same way for themselves, and in return conniv¬ ing at the grossest thievery. As it became necessary to hide the frauds, newspapers and higher officials were hushed, till the ring as¬ sumed national dimensions. Its headquarters were at Saint Louis, but it had branches at Milwaukee, Chicago, Peoria, Cincinnati and New Orleans, and an agent at Washington. A huge corruption fund was distributed among gaugers, storekeepers, collectors and other offi¬ cials, according to a fixed schedule of prices. As a result of the investigation by Secretary Bristow arrests were made in nearly every lead¬ ing city. Indictments were found against 152 liquor men and other private parties, and against 86 government officials, notably the chief clerk in the Treasury Department, and General Grant's private secretary, Gen. O. E. Babcock.

WHISKY INSURRECTION, a popular name given to a local outbreak in opposition to the excise laws passed by Congress 3 March 1791. General objections were urged against the measure, and in western Pennsylvania the inhabitants considered the tax an unfair dis¬ crimination against their particular region and raised an insurrection. It became necessary for President Washington to call out an army of 15,000 militia to subdue the rebels, who dis¬ persed without bloodshed.

WHISKY RING. See Whisky Frauds, The.

WHISPERING GALLERY, a gallery or dome of an elliptical or circular form, of pecu¬ liar acoustic qualities, arranged to echo faint sounds between certain points, the sounds being conveyed around the interior wall so that they may be readily heard, while the same are in¬ audible elsewhere in the interior. Thus, in an elliptical chamber, if a person standing in one of the foci speak in a whisper, he will be heard

distinctly by a person standing in the other focus, though the same sound would not be aud¬ ible at the same distance under any other circumstances, or at any other place in the chamber. There is a whispering gallery in the Capitol at Washington, one at Saint Paul's Cathedral, London, and another at Gloucester Cathedral, England.

WHIST, a well-known game at cards, first clearly described by Edmond Hoyle (q.v.) in his (Short Treatise on the Game of Whist) (1743). See Bridge.

WHISTLE-WOOD, a North American mapletree (Acer pennsylvanicum) . It is a small tree, or sometimes only a shrub, common in the mountainous districts of the eastern United

thicket Hke Canada* Generally it is found in rocky sod yT°,UnS woods, growing in damp rocky soil. The flowers are m long axillary

racemes and bloom late in spring, " drooping under the branches. They are succeeded by /,ngs. ˆocelled winged fruits of a

yellowish green tint. The slender trunks are o n e-green, when older becoming a reddish-brown, striped with short, delicate streaks of white pigment, which may be scraped off. and tor this reason the tree is often called striped maple ; it is, however, also known as moose-wood, since the deer are fond of the young shoots when the sugary sap is flowing. The bark is easily stripped off the young branches, leaving white withes from which country folk make whistles. Other whistles are made from the basswood (Tilia americana) , and the name /ScglIen *n Great Britain to the mountain-ash (•S orbus) and to the common and sycamore maples.

T\/r hwis'ler, James Abbott

McNeill, American artist: b. Lowell, Mass., 10 July 1834; d. London, 17 July 1903. In 1851 he was appointed to the West Point Military Academy, which he left in 1854; and in 1854-55 was a draughtsman

in the Coast and Geodetic Survey. This employment he soon quitted, going to England and thence to Paris, where in 1855-57 he was a pupil in the studio of C. G. Gleyre, an artist of Ingres' school, who <(never drew a line without having first assured him¬ self how Raphael would have proceeded.® Pre¬ vious to the series generally styled the <(French Set,® Whistler is known to have etched three plates, and other early attempts were made. The <(French Set,® renderings of figures, street scenes and interiors, appeared in 1858 (pub¬ lished by Delatre) — 12 plates, with an etched title. But few copies were printed. In 1863 Whistler went to London and settled in Chelsea. During his earlier days there he completed the (Thames Set5 of etchings, 16 in all, treating of the craft of that stream and the quaint build¬ ings along its edge. Some rare prints of these, generally considered superior, were made be¬ fore their publication in 1871. (The PooP and (Black Lion Wharf) are among the best of them. He exhibited paintings frequently at the Royal Academy, one of the earliest being (At the Piano, 5 purchased by the Scottish painter John Phillip for 30 guineas. In 1872 the (Ar¬ rangement in Gray and Black) ((The Painter's Mother5), now in the Luxembourg Gallery, was accepted by the Academy only on the insistence of Sir William Boxall. Whistler sent other pictures, such as (The Last of Old Westmin¬ ster,5 and (Symphony in White III,5 but he could not agree with the management of that institution, long before his death ceased to ex¬ hibit there and was never made A.R.A. Some of his best work was shown at the Grosvenor Gallery, opened by Sir Coutts Lindsay in 1877, including famous portraits, Hrving as Philip II5 and the Arrangements,5 (Harmonies,5 and (Nocturne,5 novel in title and character. It was in 1877 that Ruskin wrote of the (Nocturne, Black and Gold5 ((The Falling Rocket5), then at the Grosvenor : (<I have seen and heard

much of cockney impudence before now, but never expected to hear a coxcomb ask 200 guineas for flinging a pot of paint in the pub-

lics fa.ce® ((Fors Clavigera5). Then ensued the diverting Ruskin suit, brought for libel by the artist and heard in November 1878. The vei diet was for the plaintiff, and the farthing assessed for damages Whistler afterward wore chain-The costs gainst Ruskin, i s* were met by a public subscription. Whistler followed up the affair by his pamphlet, Art vs. Art-Critics,5 in which he first proved his cleverness in controversial satire. He pre¬ ferred to exhibit his works under conditions which he could himself direct and gave a spe¬ cial exhibition in 1874. Others, of either prints or paintings, were held in

the rooms of the Fine Arts Society in 1880, 1881, 1883, 1884 and 1886. At the International Society, Knightsbridge, he always had chief place. He became a member ot the Royal Society of British Artists in 1884 and in 1886 some ˆrevolutionary members® made him its president. His administration im¬ proved the artistic quality of the exhibitions, but was not commercially successful, and in 1889 he failed of re-election and many of his following resigned. His explanation was char¬ acteristic: «It is all very simple. The Royal Society of British Artists has disintegrated — * the (artists5 have come out, the (British re¬ main.5 ® He failed for a long time of the recognition he merited; but latterly many dis¬ tinctions were conferred upon him. He was a member of the Legion of Honor and the Ba¬ varian Order of Saint Michael, member of the Munich, Rome, Dresden and other academies; in 1900 received the unusual award at the Paris Exposition of the gold medal for etching and also for painting; and in 1902 the gold medal of honor from the Pennsylvania Academy of Fine Arts. By many Whistler's etchings have been ranked as the consummate product of his art, classed with those of Rembrandt and even said to surpass the world's greatest etcher in the process of selecting essentials and a cer¬ tain subtlety in execution. He did not keep a set of proofs or memoranda of his work and probably no complete list of his etchings. The first catalogue of them appeared in 1874 Wedmore gave 214 in 1886, 268 in 1889; a supplement to Wedmore increased the number to 372. It is probable that the total is more than 400 prints. It has been said that while Rem¬ brandt chose greater subjects, only a com¬ paratively small part of the total number of his plates is sought by collectors, but all of Whistler's are highly esteemed by connoisseurs. ((There are no failures,® declares one writer; some are sketchier than others, but all are genuine expressions of Whistler's art. Whistler used an increasing economy of means; the (First Venice Set,5 published by the Fine' Arts Society in 1880 (12 plates), and the twenty-six Etchings5 (1886), principally of Venetian subjects, though including some English also, show in this respect great difference from the (French 5 and (Thames 5 sets. The unfailing characteristics of the etchings are precision and flexibility of line and remarkable picturesque¬ ness in the rendering of shade and light. Their observation and their technical skill are alike noteworthy. Of the single plates may be men¬ tioned (Joe, 5 (Little Putney, 5 (Battersea

Bridge,5 (Old Chelsea5 and < Speke Hall.5 Examples are to be seen in many important

public collections, including the Venice Acad¬ emy, Bibliotheque Nationale, British Museum, the New York Public Library and the Dresden Gallery. In dry-point and lithography, too, Whistler was very successful. His first lith¬ ographs were made in 1877 and he greatly improved the art. His London exhibition of 1883 contained, besides etchings, a number of dry-points ; in 1896 about 70 lithographs were shown at the Fine Arts Society. The Way catalogue, no longer in print and claiming to include all those printed down to 1897, gave 130, to which at least eight must further be added. The list of nearly 400 etchings and dry-points and 138 lithographs, known to be in existence, reveals a large amount of work, even supposing that the artist had done noth¬ ing else. In pastel and water-colors, Whistler wrought sparingly, although some of the Venetian pastels are the equals of anything yet attempted in that medium. His creed as a painter he stated in two series of (Proposi¬ tions, } and the lecture 'Ten o'Clock) first given in London 20 Feb. 1885. One of the proposi¬ tions was that a painting had <(no mission to fulfil,® but was a <(joy to the artist, a delusion to the philanthropist, a puzzle to the botanist.® Critics he thought a herd of ignoramuses; but they had their utility — ((they keep one always busy, always up to the mark, either fighting or proving them idiots.® For a long time in Lon¬ don he. was better known for his pugnacity than for his art. His arrogance, his mordant wit, his sparkling bon-mots, his striking individuality — these were sooner recognized than his genius. His fondness for sarcasm and the severity and clearness with which he lambasted those he did not like — and they were many — qualified him as a past-master in ((the gentle art of making enemies.® It is to be regretted that his excep¬ tional genius was thus marred. He had in oils a broad range of subjects. There are the nu¬ merous portraits; marines ('Valparaiso Har¬ borˆ (Blue Wave — Biarritz*; 'The Ocean*; and landscapes of many sorts, especially those interpretative of night. His method was to apply many coats of thin color instead of one or a few of greater consistency) this guarantees to his work a superior permanence. He was above all the colorist and in pure line and color harmonies has been called one of the supreme artists. His work has repeatedly been compared to that of Velasquez, but study shows very important dissimilarities and Whistler must re¬ main unique. He

borrowed somewhat from Oriental art, though always subordinating these elements to his own ends. Among portraits not referred to is that of Carlyle, now in the Glasgow Museum, of which the philosopher ob¬ served, ((weel, man, you have given me a clean collar, and that is more than Meester Watts has done.® Whistler did some work in interior decoration, such as the music-room of Sarasate (Paris* and the <(Peacock-room® for Mr. Ley-land (London). Many fine examples of his paintings are in American galleries, public and private. His place in the history of world art cannot yet be estimated, but he may safely be put among the greatest painters of the 19th century.

Bibliography.— 'Recollections and Impres¬ sions, > by Eddy (1903); Menpes' 'Whistler as

I Knew Him) (1904) ; Seitz, Don O., 'Writ¬ ings by and About Whistler* (New York 1910), and 'Whistler Stories) (New York (1913) ; Duret, Theodore, 'Whistler) (Paris 1904) ; Cary, E. L., 'The Works of James McNeill Whistler) (New York 1907) ; Bacher, O. H., 'With Whistler in Venice) (ib. 1908) ; Hart¬ mann, Samuel, 'The Whistler Book) (Boston

1910) ; Rutter, Frank, 'Whistler) (New York

1911) ; Gallatin, A. E., 'Whistler's Portraits and Other Modern Profiles) (2d ed., New York 1913) ; id., 'Portraits and Caricatures of James McNeil Whistler* (ib. 1913) ; id., 'Notes on Some Rare Portraits of Whistler* (ib. 1916) ; Kennedy, E. G., 'Etchings of Whistler* (ib. 1910) ; Way and Dennis, 'The Art of James McNeill Whistler* (ib. 1905) ; Wedmore, F., 'Whistler and Others) (ib. 1906) ; 'Masters in Art* (Vol. VIII, Boston 1907) ; 'Descriptive Catalogue of the Etchings and Drypoints of James A. McNeill Whistler* (Chicago 1909).

WHISTLEWING, or WHISTLER, a

duck. See Golden-eye.

WHISTON, hwTs'ton, William, English mathematician and Anglican clergyman : b. Nor¬ ton, Leicestershire, 9 Dec. 1667 ; d. London, 27 Aug. 1752. He took his degree at Clare Hall, Cambridge, in 1690, and in 1691 was elected to a fellowship there. He was ordained a deacon in 1693, was appointed chaplain to the bishop of Norwich, and in 1698 became vicar of Lowe¬ stoft, Suffolk. He was appointed deputy pro¬ fessor of mathematics to Newton at Cambridge in 1701, and in 1703, upon Newton's resigna¬ tion, succeeded to the Lucasian

professorship. He continued to preach, but having given ex¬ pression to Arian views, was in 1710 summarily expelled from his professorship and the uni¬ versity. He removed to London where he pub¬ lished ‘An Historical Preface to Primitive Christianity Revived* (1711). He was there¬ upon prosecuted for heresy, but after proceed¬ ings lasting five years, was permitted to remain in the English Church. He subsequently en¬ gaged in lecturing upon scientific subjects, being among the first to introduce lectures with ex¬ periments in London. He founded in 1715 a society for the promotion of primitive Chris¬ tianity, the meetings of which were held in his home, and afterward became a Baptist. He made a translation of Josephus (1737) which ran through many editions and wrote ‘New Theory of the Earth* (1696); ‘The Accom¬ plishment of Scripture Prophecies® (1708); ‘A New Method of Discovering the Longitude) (1714); ‘The True Origin of the Sabellian and Athanasian Doctrines of the Trinity) (1720); ‘The Testimony of Phlegon Vindi¬ cated^ (1732) ; ‘The Longitudes Found by the Ellipsis of Jupiter’s Planets) (1738); ‘ Mem¬ oirs * (1749), *etc.*

WHITAKER, hwit’a-ker, Alexander,

American clergyman: b. Cambridge, England, 1585; d. Henrico County, Va., after 1613. He was graduated from Cambridge, was for some years rector of a north of England parish, set¬ tled in Henrico County, Va., in 1611 and was active in missionary work. He baptized Poca¬ hontas and officiated at her wedding. He wrote ‘Good Newes from Virginia,* (1613), one of the first books written in the colonies.’

WHITAKER, hwit’a-ker, Daniel Kimball,

iQmeri?niAe(1itor.: b-Sharon> Conn., 13 April -801; d 10 April 1881; grandson of the Rev. Nathaniel \ hi taker. He was graduated at Harvard, 1820, studied law and settled in South Carolina, becoming the law partner of ex-Gov- ernor John Lyde Wilson. Though eminently successful as a lawyer, his preferences were for literature and he established and edited a num¬ ber of periodicals, among them the Southern Literary Journal and IVhitake/s Magazine. In 1841 he

established at Charleston, S. C., the southern Quarterly Review, which he edited until the Civil War. In 1866 he moved to New Orleans, La., and founded and for many years edited the New Orleans Monthly Revieiv. He was corresponding secretary of the New Or¬ leans Academy of Sciences.

WHITAKER, Edward Gascoigne, Ameri¬ can judge: b. New York, 13 April 1853. He received his education at Southampton Acad¬ emy and at a German university, and was ad¬ mitted to the bar in 1876. In 1884 he was ap¬ pointed deputy attorney-general of New York, which office he occupied for seven years. In 1912 he received the appointment as justice of the Supreme Court of New York, first district. As president of the State Bar Association (1897), Mr. Whitaker served on the committee concerned with international arbitration prob¬ lems ; was active in promoting expedient meas¬ ures for the prompt publication of appellate reports, and was instrumental in establishing the system of uniform examinations for ad¬ mission of students to the -bar.

WHITAKER, John, English Anglican divine: b. Manchester, about 1735; d. Ruan-Langhorne, Cornwall, 30 Oct. 1808. He was educated at Oxford. In 1771 he published a (History of Manchester, > and in refutation of Macpherson's theory that the modern Highland¬ ers were descendants of the Caledonians of Tacitus, wrote his (Genuine History of the Britons) (1772), maintaining that they were descended from an Irish colonization which followed the Roman invasion. In 1778 he was presented by his college to the rectory of Ruan-Langhorne. His most important works are (Sermons upon Death, Judgment, Heaven and HelP (1783) ; cMary, Queen of Scots, Vindi¬ cated } (1787); (The Origin of Arianism Disclosed) (1791) ; (The Course of Hannibal over the Alps Ascertained) .(1794) ; Rife of Saint Neot> (1809).

WHITAKER, Joseph, English publisher: b. London, 4 May 1820; d. Enfield, Middlesex, 15 May 1895. In 1849 he started a church monthly called The Penny Post, soon after es¬ tablished a theological publishing business of his own in Pall Mall, and in 1856-59 was editor of The Gentleman s Magazine. He founded The Bookseller in 1858, but his name is remem¬ bered principally in the title of (Whitaker's

Al¬ manac, J which first appeared in 1868. The Ref¬ erence Catalogue of Current Literature* was started by him in 1874.

WHITAKER, Nathaniel, American Pres¬ byterian clergyman : b. Long Island, N. Y., 22 Feb. 1732; d. Woodbridge, Va., 21 Jan. 1795. He was graduated from Princeton in 1752, en¬ tered the ministry and became pastor of a church at Chelsea, Conn, and visited England

in 1765-66, accompanied by Samson Occom, an educated Indian, for the purpose of soliciting funds for the establishment of an institution of learning in America for the use of the Indians. His mission resulted in the foundation of Dart¬ mouth College. He was subsequently engaged in pastoral duties in Massachusetts and in Maine, finally removing to Virginia. He was a staunch Whig and ardently supported the cause of the colonies during the Revolution. Several of -his sermons were published.

WHITAKER, Ozi William, American Protestant Episcopal bishop: b. New Salem Mass., 10 May 1830; d. 9 Feb. 1911. He was graduated from Middlebury College, Vermont, in 1856 and from the General Theological Semi¬ nary in 1863. He took priest's orders in the last-named year, was rector of Saint John's, Gold Hill, Nev. (1863-65), of Saint Paul's, Englewood, N. J. (1865-67), and of Saint Paul's, Virginia City, Nev. (1867-69). In 1869 he was consecrated missionary bishop of Ne¬ vada, was transferred to the diocese of Penn¬ sylvania as assistant bishop in 1886, and upon the death of Bishop Stevens in 1887 became bishop of Pennsylvania.

WHITBREAD, hwit'bred, Samuel, Eng¬ lish politician: b. Cardington, .Bedfordshire, 1758; d. 6 July 1815. He was educated at Ox¬ ford and Cambridge and entered the House of Commons in 1790 as Whig member for Bed¬ ford. He at once made his mark as an able advocate of Parliamentary reform, religious and civil liberty, the abolition of slavery and similar liberal causes, and as a strong opponent of Pitt's war policy. He took a leading part in the impeachment of Viscount Melville in 1805— 06 and against Lord Chatham for his misman¬ agement of the Walcheren Expedition in 1809. He committed suicide after being engaged in a very trying controversy over the rebuilding of Drury Lane Theatre. Consult <The Creevv Papers> (1903).

. WHITBY, hwit'bi, Canada, capital of Onta¬ rio County, a town and port of entry on Lake Ontario, at the southern terminus of the Whitby and Port Perry Railway, and on the Grand Trunk Railway, 30 miles

east of Toronto. It has iron foundries, tanneries, manufactories of agricultural implements, mill machinery and musical instruments and carries on an active agricultural trade. Pop. 2,500.

. WHITBY, England, seaport in the North Riding of Yorkshire, 48 miles north-northeast °f S ork, at the mouth of the Esk, which di¬ vides it into two parts. The houses are ranged on bold acclivities and an ancient restored cruciform church stands on the verge of a lofty cliff; there are several modern churches and Non-Conformist chapels ; a town-hall, courthouse, museum, temperance hall, seamen's hospital, etc! The harbor is spacious and commodious, hav¬ ing wet and dry docks, *etc.* The manufacture of jet ornaments is carried on, a very hard black ossified wood being abundant in the neighborhood. There are also yards for ship and boat, building and productive sea fisheries. In 657 Saint Hilda founded her famous priory on the site of Whitby, then called Streoneshalh, and in it was held the important Synod of Whitby in 664, at which the Roman usage as regarded Easter was adopted (see Easter). The poet

Caedmon (q.v.) was a resident in this monastery, of which nothing now remains, though the choir, north transept and part of the nave of an abbey erected on the site in the 11th century are still standing. The ruins are in early English style and extremely beautiful. The neighbor¬ hood is rich in picturesque scenery and interest¬ ing features. Pop. about 13,000. Consult Kitchen, (Whitby Abbey and Other Essays5

(1904).

WHITCHER, hwich'er, Frances Miriam Berry, American humorist: b. Whitestown, N. Y., 1 Nov. 1811; d. there, 4 Jan. 1852. She was married in 1847 to Rev. B. W. Whitcher, an Episcopal clergyman of Elmira, N. Y. Her (Widow Bedott's Table-Talk5 first appeared in Neal's Saturday Gazette, published by J. C. Neal, author of (Charcoal Sketches.5 After her death these and other humorous articles of the

jour¬ nalistic type, once very popular, were collected in (The Widow Bedott's Papers5 (1855) and (Widow Sprigg, Mary Elmer and Other Sketches) (1867).

WHITE, Andrew Dickson, American diplomat, educator and author : b. Homer, N. Y., 7 Nov. 1832; d. Ithaca, N. Y., 4 Nov. 1918. He was graduated from Yale in 1853 and studied at the College of France, Paris, and at the University of Berlin. He was attache of the American legation at Saint Petersburg in 1854-55 at the time of the Crimean War, and in 1857, shortly after his return to the United States, became professor of history and English literature at the University of Michi¬ gan. In 1863 he returned to Syracuse and was elected to the New York State senate, where he was especially interested in educational leg¬ islation, obtaining the passage of bills organiz¬ ing the State normal system and providing for the codifying of the educational laws. He also had an important part in the founding and organization of Cornell University, contribut¬ ing $300,000 for the purpose, and also procuring for that institution the national land grant for agricultural colleges ; in 1867 he became president of the university and was also pro¬ fessor of history. He maintained his connec¬ tion with Cornell until 1885, when he resigned both presidency and professorship. He gave to the university his excellent historical library of about 30,000 volumes, and on the acceptance of this gift the departments of history and economics were reorganized as the White School of History and Political Science. While president of Cornell, he was also active in pub¬ lic affairs; in 1871 was one of a commission to study and report on the desirability of annexing Santo Domingo ; in 1878 was honorary com¬ missioner to the Paris Exposition, and in 1879— 81 Minister to Germany, during which time he had leave of absence from the university. In 1892-94 he was Minister to Russia ; in 1896 ' was one of the commissioners to investigate the Venezuela boundary question, and in 1897— 1902 was Ambassador to Germany, holding that position longer than any other American Min¬ ister. Before his retirement from the German Ambassadorship he was elected a member of the Berlin Academy of Sciences. In 1899 he was president of the United States delegation to The Hague Peace Conference. He retired from public life in 1902 and passed his remain¬

ing years at Ithaca. His published works in¬ clude (History of the Warfare of Science against Theology5 (1898), an enlargement of his (Warfare of Science) (1876); (Studies in General History) ; (The New Germany5 ; Eu¬ ropean Schools of History5 ; (Paper Money In¬ flation in France5 (1876) ; (Chapters from My Diplomatic Life5 (

Century Magazine, 1903) ; (Autobiography5 (1905); (Seven Great States¬ men in the Warfare of Humanity with Un¬ reason5 (1911).

WHITE, Arthur Silva, English publicist: b. London, 1 Feb. 1859. He was secretary to the Royal Scottish Geographical Society and editor of the Scottish Geographical Magazine in 1884-92, and for 15 years was engaged in foreign travel. In 1898 he explored the oasis of Siwa and in 1900 traveled in the Sudan. His publications include development of Africa5 (1890) ; Report to the Paris Geographi¬ cal International Congress (1898) ; (From Sphinx to Oracle5 (1899) ; (The Expansion of Egypt5 (1899), *etc.*

WHITE, Bouck, Socialist writer and ora¬ tor: b. Middleburg, N. Y., 1874. He completed the Harvard course at 18 and was graduated from the Union Theological Seminary in 1902. In following years he held several charges and from 1908 to 1913 was resident pastor of Trin¬ ity House, Brooklyn. Always extremely social¬ istic in his views, he aroused antagonism and was relieved of his charge. He at once organ¬ ized the church of the Social Revolution, in Manhattan, N. Y. The following year he was arrested for interfering with a church service and sentenced to six months for disorderly conduct. In 1916 he trampled on an American flag and was again sent to prison for treason¬ ous utterances. He is a writer of considerable force and has produced (Quo Vaditis5 (1903) ; (The Mixing5 (1913) ; (The Carpenter and the Rich Man5 (1911) ; (Letters from Prison5

(1915).

WHITE, Charles Abiathar, American geol¬ ogist: b. North Dighton, Mass., 26 Jan. 1826; d. 1910. He was State geologist of Iowa in 1866-70, occupied the chair of natural history at the Iowa State University in 1867-73, and in 1873-75 held that chair at Bowdoin College, Maine. In 1874-92 he was engaged as geologist and palaeontologist on different United States government surveys, and after 1876 was con¬ nected honorably with the Smithsonian Insti¬ tution and the United States National Museum, where he was associate in palaeontology. He has published (Report on the Geological Sur¬ vey of Iowa5 (1870) ; (Report on Invertebrate Fossils and Surveys West of the 100th Merid¬ ian5 (1875) ; (Review of the Fossil Ostreidae of North America5 (1883) ; (The Relation of Biology to Geological Investigation5 (1894), *etc.* A complete list of his writings, including 211 titles (1860-85), was catalogued by J. B. Marcott (1885).

WHITE, David, American geologist: b. Palmyra, N. Y., 1 July 1862. He was graduated at Cornell University in 1886; has been with United States Geological Survey since 1886 and is at present chief geologist of that bureau. His specialty is paleozoic paleobotany and he has served as associate curator of that branch in United States National Museum since 1903.

He is. a member of the National Academy of Sciences, Fellow of the Geological Society of America and of the American Association for I-1? j yˆnce.ment Science, *etc.* He has pub¬ lished ‘Fossil Flora of Carboniferous of South¬ western Missouri >; (Flora of Lower Coal

Measures of Missouri } ; ‘Effect of Oxygen in Coal ; ‘Fossil Plants of the Group Cycado-filices) ; ‘Fossil Flora of West Virginia> ; ‘Northern Appalachian Coal Field > ; (Origin of CoaP; ‘Fossil Flora of Coal Measures of Brazil, > and many papers, reports, *etc.*

WHITE, Edward Douglass, American jurist: b. parish of Lafourche, La., 3 Nov. 1845; d. Washington, D. C., 19 May 1921. He was educated at Mount Saint Mary’s Col¬ lege, Maryland, and at the Jesuit College in New Orleans and during the Civil War served in the Confederate army. He subsequently studied law and was admitted to the Louisiana bar. He was State senator in 1874; associate justice of the Supreme Court in Louisiana in 1878, and United States senator in 1889-94. While still a member of the Senate he was appointed an associate justice of the United States Supreme Court, and 12 Dec. 1910 he was created chief justice. His opinions on trust cases and the Sherman law added much to his reputation. He owed his position to his ability, being ad¬ vanced first by President Cleveland and later by President Taft.

WHITE, Edwin, American naval officer: b. Ohio, 1843; d. Brooklyn, N. Y., 23 Dec. 1903. He was graduated from the United States Naval Academy in 1864; was promoted lieu¬ tenant-commander in 1869; commander in 1886; wras on duty at the Naval Academy as com¬ mander of cadets in 1895-98; received rank as captain in 1898 and

was assigned to command the Philadelphia , flagship at the Pacific station. He returned from Samoa in 1899 with broken health and was retired from active duty with rank of rear-admiral.

WHITE, Eliza Orne, American author: b. Keene, N. H., 2 Aug. 1856. Her publications include ‘Miss Brooks* (1890); ‘Winterbor-ough) (1892) ; ‘When Molly Was Six* (1894) ; (The Coming of Theodora) (1895) ; ‘A Little Girl of Long Ago* (1896); ‘A Browning Courtship and Other Stories) (1897) ; ‘A Lover of Truth* (1898) ; ‘Edna and Her Brothers) (1900); ‘John Forsyth’s Aunts) (1901); ‘The Wares of Edgefield) (1909) ; ‘The Enchanted Mountain (1911).

WHITE, Frank, American politician: b. Stillman Valley, Ill., 12 Dec. 1856. He was graduated in civil engineering from the Uni¬ versity of Illinois in 1880. A few years later he moved to North Dakota, where he became active in politics as a Republican ; in 1891-93 he was a member of the lower house of State legislature, and in 1893-99 a member of the senate. During the Spanish-American War he joined the army, was major of the First North Dakota regiment and served in the Philippines.

In 1901 he was elected governor of the State for a term of four years.

WHITE, Sir George Stuart, English sol¬ dier: b. 6 July 1835; d. Chelsea, 26 June 1912. He was educated at Sandhurst, entered the army in 1853, served in the Indian mutiny and

the Afghan War, became military secretary to the viceroy of India, and in 1881 lieutenant-colonel of the Gordon Highlanders. His sub¬ sequent promotions were colonel (1885) lieu¬ tenant-general (1895), major-general and field marshal. From 1893 to 1898 he was commander-in-chief of the forces in India, in 1898-99 quartermaster-general to the forces, and in 1899-1900 was general on staff to command troops at Ladysmith. He defended Ladysmith 118 days (2 Nov. 1899—18 Feb. 1900) against the Boers, being relieved by Lord Dundonald after a disastrous siege. In 1900 he was made governor of Gibraltar, where he remained four years, during which period he was made field marshal. In 1905 he received the Order of Merit, and was transferred to the governor¬ ship of Chelsea Hospital. See South African War.

WHITE, Gilbert, English naturalist : b. Selborne, Hampshire, 18 July 1720; d. there, 26 June 1793. He was graduated from Oriel Col¬ lege, Oxford, in 1743, and having taken deacon's orders in 1747, acted as curate to an uncle at Swarraton. After being ordained priest he was for a short period in 1751 curate to the vicar of Selborne. Appointed dean of his college in 1752 he soon after became curate of Durley, Hampshire. He failed to secure the provostship of Oriel in 1757, but in the same year obtained the vicarage of Morton Pinkney, in Northamp¬ tonshire, which was in the gift of his college. He never resided on his Northamptonshire liv¬ ing, but throughout his whole life remained closely associated with the Hampshire parish which he has made famous. About 1758 he gave up the Durley curacy for that of Faring-don, near to his home, though for a time he acted as curate of West Deane, Wiltshire. White's great English classic 'The Natural His¬ tory and Antiquities of Selborne,* the only work of the kind in the langauge to attain that rank, was published at the end of 1788, with the date 1789 on the title-page. It consists of letters to his two friends, Thomas Pennant, author of the 'British Zoology* and Daines Barrington, who devised the form of 'Natural¬ ist's JournaP which White kept from 1767, when he discontinued the 'Garden Kalendar* begun in 1751. In the preparation of the part on antiquities, compiled only when he had been in¬ duced to publish, he was greatly assisted by Richard Chandler, the classical antiquary and traveler. His 'Natural History of Selborne* has won the enthusiastic admiration of men of widely different tastes, and has gone through a very large number of editions. Professor Newton says that . such was White's keenness of observation, his undoubted errors are scarce worthy of notice. In America, where most of the plants and animals mentioned are, save to

a few experts, known only by name, the popu¬ larity of the work has been great. The most important editions after the first are the fol¬ lowing: the so-called Markwick's or Aikin's (1802), including 'The Naturalist's Calendar > which Dr. Aikm had compiled from White's papers and published in 1795, but excluding the 'Antiquities*; the 1813 octavo, including his poems for the first time; Mitford's (1813) * Rennie's (1833); Bennett's (1837), based upon the preceding; Jardine and Jesse's (1851);

Jardine's (1853) ; Harting's (1875), one of the best, based upon Bennett's; Buckland's (1875), with a chapter on the (Antiquities > by the Earl of Selborne; Bell's (1877), which superseded all previous ones, and may still be regarded as the best (see Bell, Thomas) ; Grant Allen's (1889), without the <Antiquities) ; and Bowd-ler Sharpe's (1900-01),, including the (Antiquities) and the (Garden KalendarP There is a bibliograph (1897) by E. A. Martin. Con¬ sult Jesse, (Gleanings in Natural History,* 2d series (1834) ; Gordon, (Gilbert White in Sus-sex) (1893) ; and Shelley's (Gilbert White and Selborne } (New York 1906).

WHITE, Henry, American diplomat : b. Baltimore, Md., 29 March 1850. He was pri¬ vately educated in the United States and in Europe, and entered the United States diplo¬ matic service. He was secretary of the United States Legation at Vienna in 1883-84; was second secretary of the Embassy at London in 1884-86, and afterward secretary until 1893, when his connection with the diplomatic service was intei rupted by the Cleveland administra¬ tion in 1893. In the meantime he had fre¬ quently acted as charge d'affaires, and in 1886 he was special American representative at the International Conference which abolished sugar bounties. He was reappointed secretary of the Embassy at London by President McKinley in 1897, and occupied that office until he was appointed Ambassador to Italy by President Roosevelt in 1905. He was Ambassador to France in 1907-09, and in 1910 was sent as special Ambassador to Chile. He headed the American delegation at the Algeciras Con¬ ference

concerning Moroccan affairs in 1906; and in 1917 was appointed manager of the Potomac division of the Red Cross. On 30 Nov. 1918 he was appointed a member of the United States delegation to the Paris Peace Conference, where he served on the Water¬ ways Commission, and was chairman of the sub¬ committee of the Commission of the Inter¬ nationalization of Ports, Waterways and Rail¬ roads.

WHITE, Henry Kirke, English poet: b. Nottingham, 21 March 1785; d. Cambridge, 19 Oct. 1806. The son of a butcher, he was ap¬ prenticed to a stocking weaver, and later to an attorney, in whose office he devoted his spare time to the study of Latin and Greek. At 14 he wrote verse which was published in different magazines, and in 1803 published (Clifton Grove, a Sketch in Verse, with Other Poems, * a venture which won for him the attention and friendship of Southey and other literary men. He obtained a sizarship at Saint John's Col¬ lege, Cambridge, in 1804, and entered upon his studies with such close application that his health broke under the strain, resulting in his death from consumption. After his death his manuscripts were placed in charge of Southey, who edited his poems, letters, etc., and pub¬ lished them under the title < Remains, etc., with an Account of his Life) (1807). He will be longest remembered by his hymn beginning

"When marshalled on the nightly plain

The glittering host bestud the sky.'*

WHITE, Henry Seely, American mathe¬ matician: b. Cazenovia, N. Y., 20 May 1861. He was graduated at Wesleyan University in 1882,

and took his Ph.D. at Gottingen in 1891. He was professor of pure mathematics at North¬ western University in 1894—1905, also serving as secretary of the faculty there in 1903-05 ; from 1905 to 1918 he was professor of mathe¬ matics at Vassar College. He was also presi¬ dent of Vassar Brothers Institution in 191 1— 13, and has occupied that position since 1916. He was president of the American Mathemati¬ cal Society in 1907-08; and was elected to the National Academy of Sciences in 1915. He was associate editor of the Transaction's of the American Mathematical Society in 1902-06, and its editor in 1907-13. He has special¬ ized on the geometry of curves and surfaces and on the theory of variants.

WHITE, Hervey, American author : b. New London, Iowa, 26 Nov. 1866. He was graduated from Harvard in 1894, and was ref¬ erence librarian in the John Crerar Library 1896-99. He has published differences* (1899) ; Quicksand' (1900) ; (When Eve was not Created, and Other Stories) (1900); (Noll and the Fairies) (1902) ; (In an Old Man's Garden) (1910) ; (The Adventures of Young Maverick) (1911).

WHITE, Horace, American editor : b. Cole-brook, N. H., 1834; d. New York City, 16 Sept. 1916. He was graduated from Beloit Col¬ lege, Wisconsin, and from Brown University. Entering upon the career of journalism, he be¬ came city editor of the Chicago Evening Journal, correspondent of the Associated Press, and assistant secretary of the National Kansas Committee. As correspondent for the Chicago Tribune,, he accompanied Abraham Lincoln on his political campaign against Douglas. He headed a syndicate for the publication of Civil War news during 1864, and from 1865-74 was editor-in-chief of the Chicago Tribune. Leav¬ ing this post, he went to New York in the capacity of treasurer of the Oregon Railway and Navigation Company. He was one of the founders of the New York Evening Post, act¬ ing first as head of the company, and later (1899-1903) as editor-in-chief, retiring as editor emeritus. In 1909 he was appointed by Gov¬ ernor Hughes to serve on the New York State Commission on Speculation in Securities and Commodities. As an author he published sev¬ eral noteworthy works, including (Money and Banking) (1895); (Life of Lyman TrumbulP (1913), and edited several French and Italian works on finance.

WHITE, Horatio Stevens, American edu¬ cator: b. Syracuse, N. Y., 23 April 1852. He was graduated at Harvard University in 1873, later studied in Europe, and was admitted to the bar of New York in 1878. He was assist¬ ant professor of Greek and Latin at Cornell University in 1876-78, later was assistant in German, and was appointed professor of Ger¬ man in 1891. From 1902-19 professor of Ger¬ man at Harvard University; professor emeri¬ tus thereafter. Edited Selections from Les¬ sing's Prose* (1888) ; Selections for German Prose Composition (1891) ; deutsch Volk-lieder* (1892) ; .Appleton's twentieth Century Series of German Classics* (1901—05) ; Fiske's dhess Tales and Chess Miscellanies) (1912), *etc.*

WHITE, Hugh Lawson, American jurist and legislator: b. Iredell County, N. C., 30 Oct.

1773; d. Knoxville, Tenn., 10 April 1840. He served as a volunteer against the Cherokees in 1792, studied law and began practice at Knox¬ ville in 17%. He was judge of the Supreme Court of Tennessee, 1801-07, and 1809-15, be¬ came-United States district attorney in 1807, in 1809 was elected to the State senate, was president of the Bank of Tennessee in 1815-27, State senator in 1817-25, United States com¬ missioner in 1821-24 for the adjustment of claims against Spain, and in 1825 was elected to the United States Senate to succeed General Jackson. He was opposed to the making of internal improvements by the Federal govern¬ ment, and led in the movement which resulted in the abolishment of the National Bank. He was an earnest advocate of the removal of the Indians west of the Mississippi, and by his sup¬ port of the bill to limit executive patronage incurred the enmity of Jackson. In 1835 he was nominated for the Presidency, his electors carried Georgia and Tennessee, and he received 25 votes in the electoral college. He became a declared Whig in 1838, and in 1839 resigned his seat in the Senate because of his unwill¬ ingness to vote for the Sub-Treasuary Bill, as he had been instructed to do by the Tennessee legislature. Consult Scott, Nancy N., <Memoir of Judge White> (1856).

WHITE, Israel Charles, American geolo¬ gist: b. Monongalia County, W. Va., 1 Nov. 1848. He was graduated at West Virginia Uni¬ versity in 1872. He was assistant geologist of the Pennsylvania Geological Survey in 1875— 84; of the United States Geological Survey in 1884-88; and in 1877-92 he was professor of geology at West Virginia University. He re¬ signed his professorship in 1892 in order to take charge of a large petroleum business, and since 1897 he has been State geologist of West Virginia. He is an authority on coal, petroleum and natural gas, and with Edward Orton he was co-developer of the anticlinal theory of gas accumulation. The West Virginia Geologi¬ cal Survey> contains many of his reports.

WHITE, James, Canadian geographer : b. Ingersoll, Ontario, 3 Feb. 1863. Fie was grad¬ uated at the Royal Military College, Kingston, in 1883. He was a government surveyor in the Rocky Mountains, Quebec and Ontario in 1884 — 94 ; was geographer and chief draughtsman of the Canadian Geological Survey in 1894-99; and was chief geographer of the Department of the Interior in 1899-1912. He was appointed

secretary of the Royal Conservation Commis¬ sion in 1909, and became its assistant chair¬ man and deputy head in 1913. Since 1917 he has also been chairman of the advisory board on Wild Life Protection. He has published a relief map of Canada, and several large scale maps; and is author of < Altitude in Canada5 (1901); (Maps and Map Making in Canada) (1905); (Atlas of Canada5 (1906); 'Oregon and San Juan Boundaries> (1908) ; (Deriva¬ tion of Place 1 Names in Canada5 (1912); (Dictionary of Altitudes5 (1903; 1916), *etc.*

WHITE, James William, American sur¬ geon: b. Philadelphia, Pa., 2 Nov. 1850; cl. there, 24 April 1916. He was graduated M.D. and Ph.D. at the University of Pennsylvania in 1871, and in 1871-72 served on Professor Agassiz's staff in the Hassler Expedition to the

West Indies, the coasts of South America and the Straits of Magellan. He then engaged in practice at Philadelphia, held several hospital charges and was successively professor of genito-urino surgery, of clinical surgery and John Rhea Barton professor of surgery at the University of Pennsylvania until he retired, becoming professor emeritus. He was attached to the American Ambulance Hospital at Neuilly, France, in 1915. Aberdeen University conferred the degree LL.D. on him in 1906. He left a bequest of $400,000 to the University of Pennsylvania. He was co-author of (American TextBook of Surgery) (1896) ; Genito-Urinal Surgery> (1897) ; (Human Anatomy5 (1906), and author of (TextBook of the War for Americans) (1915).

WHITE, John Blake, American artist and author: b. Eutaw Springs, S. C., 2 Sept. 1781; d. Charleston, S. C., 24 Aug. 1859. He studied under Benjamin West in London in 1800-04. Returning to the United States, he established himself in Boston, but on account of the lack of practice went to Charleston, S. C., and be¬ came a lawyer, was successful in that profes¬ sion, and was several times a member of the South Carolina legislature. His best-known pic¬ ture, (The Unfurling of the United States Flag in the City of Mexico,5 was destroyed during the Civil War. His other paintings include (Battle of Eutaw Springs) (1804) ; (Battle of Fort Moultrie) (1806) ; (Battle of New Orleans) ; (Mrs. Motte Presenting the Arrows5, and (Marion Inviting the British Officer to Dinner5 (1836). He also wrote the dramas (Foscari, or the Venetian Exile) (1805) ; Mys¬ teries of the Castle) (1806) ; Modern Honor5 (1812) ; (Triumph of Liberty, or Louisiana Preserved1* (1819), and Untemperance5 (1839).

WHITE, John Campbell, American reli¬ gious worker and university

president ; brother of Wilbert W. White (q.v.) : b. Wooster, Ohio, 31 March 1870. He was graduated at the Uni¬ versity of Wooster in 1890. In 1890-91 he was national college secretary of the Young Men's Christian Association, and he was traveling secretary of the Student Volunteer Movement in 1891-92. He was general secretary of the Y. M. C. A. at Calcutta, India, in 1893-1903, and served as secretary of the ways and means committee of the United Presbyterian Church in 1903-4)6. He was secretary of the Laymen's Missionary Movement in 1907—15, and has since been president of the University of Wooster. He is author of Missions and Leadership5

(1915).

WHITE, John Hazen, American Protestant Episcopal bishop : b. Cincinnati, Ohio, 10 March 1849. He was graduated from Kenyon College in 1872, and Berkeley Divinity School, Middletown, Conn., in 1875. He was ordained priest in 1876, was rector of Grace Church, Old Saybrook, Conn., 1878-81 ; of Christ Church, Joliet, Ill., 1881-89; Saint John's Church, Saint Paul, 1889-91, and warden of Seabury Divinity School, Faribault, Minn., 1891-95. In the last-named year he was consecrated bishop of In¬ diana, and on the division of the diocese in 1899 chose the northern portion with the title of bishop of Michigan City.

WHITE, Joseph Blanco, English clergy¬ man and author: b. Seville, Spain, 11 July 1775;

d. Liverpool, 30 May 1841. After study in Seville University, he was ordained sub-deacon (1796) and priest (1800) in the Roman Catholic Church, in 1802 was appointed to a chaplaincy in the Chapel Royal of Saint Ferdinand at Seville, but having abandoned his belief in Christianity, withdrew from the priesthood, and went to England in 1810. There he became editor of Espanol, a monthy periodical, circu¬ lated in Spain (partly by the English govern¬ ment) in aid of the

national cause; in 1812 again became a Christian ; and in 1814 quali¬ fied as an English clergyman. He began con¬ tributing in 1820 to the New Monthly , edited by Thomas Campbell (q.v.), and in 1825 pub¬ lished (Evidences against Catholicism.) In 1826 he settled at Oxford as a member of Oriel, and there Newman, Pusey and other leaders of the Oxford movement learned much from him respecting Catholic theology. He finally became an acknowledged Unitarian, and from 1835 lived at Liverpool, doing some desultory literary work. Many of his books had a real interest in their time; but he is best known to literature by his sonnet (Night and Deaths which Coleridge, in a letter of 1827, declared to be the finest in the English language. Among his further publications are. (Letters from Spain by Don Leucadio Doblado* (1822) ;

(Second Travels of an Irish Gentleman in Search of a Religion> (1833) ; in answer to Thomas Moore's <Travels,) and Observations on Heresy and Orthodoxy) (1835).

WHITE, Octavius Augustus, American

physician: b. Charleston, S. C., 8 Feb. 1826; d. New York, 25 May 1903. He was graduated from the College of Charleston in 1846 and from the South Carolina Medical College in 1848, he practised with success until the out¬ break of the Civil War, and he was made sur¬ geon in the Confederate army. He became an expert on yellow fever, during the war he was sent within the Union lines at Goldsborough, N. C., for medical services connected with the fever, and wrote much on the subject, as well as on general topics of medicine and surgery. Several professional inventions are to be cred¬ ited to him.

WHITE, Percy, English novelist: b. Lon¬ don 1852. He taught English literature and language in a French college for some years, entered journalism in 1880 and for 10 years edited Public Opinion. He has published several brilliant novels, strongly satirical in character, among them being (Mr. Bailey-Martin1 (1893); <Andria) (1896); (A Mil¬ lionaire's Daughter > (1898) ; (The Heart of the Dancer1 (1900) ; (The New Christians) (1902).

WHITE, Peregrine, the first child born in

New England of English parents: b. on board the Mayflower, in the harbor of Cape Cod, 20 Nov. 1620; d. Marshfield, Mass., 22 July 1704. He was the son of William and Susanna White, and on account of his birth received 200 acres of land from the General Court. He filled vari¬ ous civil and military offices, and ((was vigor¬ ous and of a

comely aspect to the last.® His father died during the colonists' first winter at Plymouth, and the marriage of his mother to Gov. Edward Winslow was the first wedding in New England.

WHITE, Richard Grant, American author and critic: b. New York, 22 May 1821; d. there, 8 April 1885. He was graduated from the New York University in 1839, studied medi¬ cine and then law, and became a contributor of musical, art and dramatic critiques to the New \ork Courier and Enquirer. From 1854 to 1859 he was an editor of this journal; and of the IV'Orld, 1860-61. His (Yankee Letters,1 contributed in 1863-67 to the London Spectator, were interesting narratives of contemporary events and of considerable service to the na¬ tional cause. In 1861-78 he was chief clerk of the United States revenue marine bureau for the district of New York. White was particu¬ larly known as a Shakespearean scholar. He contributed articles on Shakespeare to Putnam's Magazine in 1853, in 1854 published Shakes¬ peare's Scholar,1 and in 1857-63 a critical edi¬ tion of the poet's works. Other volumes on this general subject were, (Essay on the Authorship of the Three Parts of Henry The Sixth1 (1859) ; (Memoirs of William Shakespeare, with an Essay toward the Expression of his Genius) (1865), and the posthumous Studies in Shakespeare) (1885). White's (Riverside edition of Shakespeare) (1883) was one of the most popular prepared by an American. He was also one of the leading American critics of his time, dogmatic at times and over-hasty in generalization, but vigorous, acute and fre¬ quently brilliant. Philological studies were represented by his (Words and their Uses: A Study of the English Language) (1870; rev. ed., 1872), and (Every-Day English1 (1881). The most widely circulated of his writings was the anonymous satire (The New Gospel of Peace) (1863-4)6). He also wrote a novel (The jeate of Mansfield Humphreys) (1884), and edited ˆIllustrated Record of the New York Exhibi¬ tion of the Industry of All Nations) (1854), and (Poetry, Lyrical, Narrative, and Satirical of the Civil War1 (1866). His scholarship was considerable, his style readable and often marked by satire, and his authority in his day decided. An interesting article regarding him by F. P. Church appeared in the Atlantic for March 1891, Vol. 67.

WHITE, Stanford, American architect : b. New York, 9 Nov. 1853; d. New York, 25 June 1906. He was the son of Richard Grant White (q.v.) and was graduated from the Uni¬ versity of New York and received his profes¬ sional training under Charles D. Gambrill and H. H. Richardson, and was the chief assistant of the latter in the construction of Trinity Church, Boston. In 1881 he became a member

of the firm of McKim, Mead and White. He was the designer of Madison Square Garden, the Washington Arch, the Tiffany apartments,' Columbia University Library, the Century and Metropolitan Club buildings, and other import¬ ant structures. He was killed in the Madison Square Garden, New York, by Harry K. Thaw.

WHITE, Stewart Edward, American novelist: b. Grand Rapids, Mich., 12 March 1873. He was graduated from the University of Michigan in 1895 and studied law at the Columbia Law School (1896-97). He has pub¬ lished stories of Western life, including 'The Westerners1 (1901); <The Claim Jumpers1 (1901); (The Blazed TraiP (1902); <Con-

r* House' (1903); <The Forest' (1903); : Mystery' (1907); <The Cabin' (1910); ; Land of Footprints' (1912): (Gold'

juror'

<The

^"e Land of Footprints' (1912); (Gold5 (1913); (Rediscovered Country' (1915).

WHITE, Wilbert Webster, American re-Jifi9us leader and educator, brother of J. C. White (q.v.) : b. Ashland, Ohio, 16 Jan. 1863. He was graduated at the University of Wooster in 1881, at Xenia Theological Seminary in 1885, Tn^iom^-'S Ph-D., at Yale University in 1891. nu t y5 w.as Processor of Hebrew and Old Testament Literature at Xenia Theological Seminary; and after serving as a teacher at the Moody Bible Institute, Chicago, in 1895-97 he engaged in religious work in England and India in 1897-1900. In 1900 he became president of the Bible Teachers' Training School, New York. He is editor of the Biblical Review and is author of (Thirty Studies in Jeremiah' (1895) ; (Thirty

Studies in Revelations' (1897) ; (Studies in Old Testa¬ ment Characters' (1900 ; 2d ed., 1904) ; (Thirty Studies in the Gospel by Matthew' (1903), *etc.*

WHITE, William, American Protestant Episcopal bishop: b. Philadelphia, Pa., 4 April 1748 ; d. there, 17 July 1836. He was graduated at the College of Philadelphia in 1765, com¬ pleted his theological studies in 1770, and going to England to obtain holy orders, was admitted to the diaconate by the bishop of London in 1770, and to the priesthood by the bishop of Norwich in 1772. Returning to Philadelphia, he became assistant minister and afterward rector of Christ Church and Saint Peter's Church, being at one period the only Episcopal clergyman in Philadelphia, and in 1777 was chaplain to Congress. The degree of D.D., the first honorary degree of the Uni¬ versity of Pennsylvania, was conferred on him 1782. The meeting which issued the summons for a convention preparatory to organizing the Protestant Episcopal Church, was held at his house in 1784 and he presided over the First General Convention in 1789. In 1786 he was elected bishop of Pennsylvania and was conse¬ crated in Lambeth palace, England, 1787. He wrote (Memoirs of the Protestant Episcopal Church' (1820) ; (Lectures on the Catechism' (1813), *etc.* Consult (Memoir,' by Bird Wil¬ son (1839) ; McConnell, (History of the Amer¬ ican Episcopal Church' (1890).

WHITE, William Alanson, American neurologist and alienist : b. Brooklyn, N. Y., 24 Jan. 1870. He studied at Cornell University in 1885-89, and was graduated M.D. at the Long Island College Hospital in 1891. He was as¬ sistant physician at the New York State Hos¬ pital for the Insane at Binghamton in 1892-1903, and since 1903 he has been superintend¬ ent of Saint Elizabeth's Hospital for the In¬ sane at Washington, D. C. He has also held the chair of nervous and mental diseases at Georgetown University since 1903 and at George Washington University since 1904, as well as lecturing at the United States Naval and Army Medical School. He has collaborated with Dr. Smith Ely Jelliffe (q.v.) in preparing different medical treatises. Author of (Mental Mechan¬ isms' (1911); (Outlines of Psychiatry' (5th ed., revised 1915), *etc.*

WHITE, William Allen, American author: b. Emporia, Kan., 1868. He was educated at the

LIniversity of Kansas and in 1890 became editor of the Eldorado Daily Republican. He afterward was engaged on the editorial staffs of the Kansas City Journal and of the Star , and in

1894 purchased the Emporia Gazette. His edi¬ torial, (What's the Matter with Kansas?' pub¬ lished in that paper in August 1896, was read and reprinted throughout the country. He has published (The Real Issue' (1896) ; (The Court of Boyville' (1899) ; (Stratagems and Spoils' (1901) ; (A Certain Rich Man' (1909) ; (The Old Order Changeth' (1910); (God's Puppets' (1916); (In the Heart of a Fool' (1918); (The Martial Adventures of Henry and Me' (1918), *etc.*

WHITE, Sir William Henry, English naval constructor: b. Devonport, 2 Feb. 1845; d. 1913. He was educated at the Royal School of Naval Architecture, served in the construc¬ tive department of the Admiralty, 1867-83, be¬ coming chief constructor, and from 1870 to 1881 was professor of naval architecture at the Royal School of Naval Architecture and at the Royal Naval College. In 1883—85 he organized and directed the warship building department of Armstrong and Company, Newcastle. From 1885 to 1902 he was director of naval construc¬ tion and assistant comptroller of the navy, and during that period was the responsible designer of all British ships of war. Upon his resigna¬ tion, due to failing health, he received from Parliament a special money grant in recogni¬ tion of his services to the navy. He has pub¬ lished (A Manual of Naval Architecture' ; (Architecture and Public Buildings' ; (A Treatise on Shipbuilding,' and numerous pro¬ fessional papers.

WHITE, Sir William Thomas, Canadian statesman: b. Bronte, Ontario, 13 Nov. 1866. He was graduated at Toronto University in

1895 and was called to the bar of Ontario in 1899. He was for some years engaged in newspaper work on the staff of the Toronto Evening Telegram, and later was connected with the assessment department of the Toronto municipal government. He became prominent in financial circles and was president of the National Trust Company in 190(M1. He was a determined opponent of the Reciprocity Treaty between Canada and the United States, and although a Liberal in politics was instru¬ mental in defeating the Laurier Ministry. He has been Minister of Finance in the Conserva¬ tive Cabinet of Sir Robert L. Borden since October 1911. He was knighted in 1916.

WHITE ANTS. See Termites.

WHITE BASS. See Bass.

WHITE BOOK, a government publication in Germany and Portugal, corresponding to the British Blue Book and the Yellow Book of France. See Blue Books.

WHITE BOYS, an illegal association formed in Ireland in 1760, composed of starv¬ ing day-laborers, evicted farmers and others in a like condition, who used to assemble at nights to destroy the property of landlords or their agents, the Protestant clergy, the tithe collectors or any others that had made themselves ob¬ noxious in the locality. In many cases they did not confine their acts of aggression merely to plunder and destruction, but even went the length of murder.

WHITE BRETHREN a sect which caused a commotion in Europe about the beginning of the 15th century. A priest whose origin is un¬ known, his nationality being variously alleged as Spanish, French and Scotch, made his appear¬ ance in Lombardy, and said that he was the prophet Elias, and had come back from heaven to give notice of the coming destruction of the world. He had thousands of followers, who were arrayed in white, and carried large cruci¬ fixes, as they marched from the Ligurian Alps into central Italy. Pope Boniface IX caused him to be apprehended, and he was burned as an impostor. The White Brethren then dis¬ persed.

WHITE CAMELIA, The Knights of the,

formed in May 1867 at New Orleans, was the largest of the revolutionary orders called into existence by the misgovernment of Reconstruc¬ tion. Its principal strength was in the Gulf States, farther south than the notorious Ku Klux Klan (q.v.). The organization was as follows : A supreme council for the United States ; a grand council in each State ; a cen¬ tral council in each congressional district and councils in each county. Each council was di¬ vided into circles and groups. The officers of the council were known as commander, lieuten¬ ant-commander, *etc.* ; the members were called (<brothers.®

The objects of the order were, to nullify radical legislation, to reduce the influ¬ ence of the blacks in politics, to prevent amal¬ gamation of the races and to defend the white race against radical encroachment. The mem¬ bers swore to vote for no black for office, to observe always a marked distinction between the races, to maintain the social and political superiority of the white race, at the same time protecting the blacks in the privileges rightfully theirs. The constitution forbade the indorse¬ ment of any political party by the order. Each member was free to vote as he pleased, sub¬ ject to his oath always to oppose negroes for office, or those favorable to negro political rights. The order sometimes operated also as a body of .regulators using such methods as were usually attributed to the Ku Klux Klan, but the membership was of a higher order. The discipline was good and the effect of its opera¬ tions was to control the lawless negroes, in¬ timidate and drive from the country the carpet¬ baggers and to secure again to the whites con¬ trol of the State and county governments. These objects being accomplished, the order gradually disbanded. Its secrets were well kept and not until recent years was anything definite known of the order. The White Brotherhood and the White League were closely related or¬ ders that existed in the same territory a few years after the White Camelia had disintegrated. Consult Brown, (Lower South American His¬ tory) (1902) ;■ Constitution and Ritual of the Knights, of the White Camelia, J in West Vir¬ ginia University Documents relating to Recon¬ struction, Nos, 1 and 2.

WHITE CAPS, in American history, the lawless bands in southern Indiana, who, from 1880, undertook the regulation of the manners and morals of that section. During the Civil War, the Knights of the Golden Circle (q.v.) flourished in the same parts. The White Caps dressed differently in different parts of the

country which they terrorized. Where they were regularly organized and did the most mis¬ chief they generally had nearly a full uniform or regalia. They wore white paper foolscaps, with paper masks, and coats of coffee sacking. To make the coats they merely cut arm or sleeve holes in the sides of coffee sacks close to the bottoms and holes in the bottoms to put their heads through.

WHITE CATTLE (of Chillingham),

certain cattle preserved in a semi-wild state in Chillingham Park, England. They are pure white, except the muzzle, which is black, and the horns which are tipped with black. The white color on the body,

however, is artificially produced, the owner causing all spotted calves to be killed. They are now generally believed to be the descendants of the mountain bull or urus (see Ox), which was wild in Gaul at the time of Caesar's invasion, and the stock whence modern breeds of domestic English cattle have been partly derived. Dawkins, however, con¬ siders them the last surviving representatives of a still more primitive race, the gigantic ox, known by its remains in caves to have occupied Great Britain in the Pleistocene Period. He considers them much modified in every respect by their small range and their contact with man.

WHITE CLOVER, OAK PINE. See

Clover; Oak; Pine.

WHITE COLORS, in painting, white pig¬ ment or white lead. Baryta yields several com¬ mercial varieties of white color, largely used for adulterating white lead. The substances used are heavy spar, the native sulphate, and witherite, the native carbonate, of baryta. An artificial sulphate of baryta is also used in per¬ manent white. Zinc white or Chinese white is a hydrated oxide of zinc and pearl white is yielded by the nitrate of bismuth. A fine chalk yields Spanish white, and whiting is ordinary ground chalk. Quicklime is a sanitary white for external walls, *etc.*

WHITE CROSS, a self-supporting Ameri¬ can organization which had a large membership throughout the Union, having for its motto, ((Truth, Charity and Philanthropy,® and for its emblem cross bandages of white on a field of red. It was founded in 1898 by Mrs. Jane Creighton of Portland, Ore., and its object was the care of wounded and sick American sol¬ diers and sailors, and aid to the widows and or¬ phans of those who had fallen in battle, or died of disease or accident.

WHITE CROSS SOCIETY, an associa¬ tion founded in England, in 1883, by the bishop of Durham, and introduced in the United States in that year by the Rev. B. F. De Costa, rector of the Protestant Episcopal Church of Saint John the Evangelist, New York, who became a Roman Catholic in 1899. The objects of the society are ((to urge upon men the obligation of personal purity; to raise the tone of public opinion upon the subject of morality; to secure proper legislation in connection with morality.® Those who become members of the society promise <(by the help of God® to treat all women with respect and endeavor to protect them from wrong and degradation ; to endeavor to put down all indecent language and coarse jests; to

maintain the law of purity as equally

binding on men and women ; to endeavor to spiead these principles and try to uplift younger brothers and to use every possible means to fulfil the command, ((Keep thyself pure. The society seeks to forward its ob¬ jects by the full presentation of those spirit¬ ual truths which form distinguishing character¬ istics of Christianity and demonstrate its unalterable hostility to every form of impurity.” Ihe Society has been established also in Canada,

WHITE-CROWNED SPARROW. See

Sparrow.

WHITE EAGLE, Order of. See Orders (Royal) and Decorations.

WHITE ELEPHANT, an elephant aflected with albinism. Such animals, always rare, are highly esteemed by some Eastern potentates and are considered sacred in Siam, where the animal has become a national symbol, so that Siam is called (<the land of the white elephant,” and one of the highest decorations conferred by its rulers is that of the Order of the White Elephant. A specimen purchased bj» the late P. T. Barnum from King Theebaw, of Burma, was brought to the United States in 1884. It stood seven feet and a half high and the face, ears, front of trunk, fore feet and part of breast were of a light ash color. Fig¬ uratively, a present which does one much more harm than good, or more generally any nominal advantage which has this effect. It is reported that when in old times the ruler of Siam de¬ sired to ruin any one, he made him a present of a white elephant. The sacred elephant has an enormous appetite, and, being sacred, it would be a crime to let it die, so that the gift generally entailed ruin on the recipient.

WHITE-EYES, one of the numerous small insectivorous birds of the New Zealand region, called blight-birds locally, because they feed so largely upon the plant-lice which tor¬ ment garden plants and orchard trees. They belong to the genus Zosterops, which is vari¬ ously

classified by ornithologists, but seems most nearly related to the titmice. Other species are scattered elsewhere throughout the Old World tropics. All are neatly but not gaudily dressed have in most cases a con¬ spicuous ring of white feathers around the eye and build pretty nests. The genus is in¬ teresting, further, from the fact that many of its species are confined to small islands, ap¬ parently affording examples of the effect of isolation (q.v.).

WHITE FEATHER, a symbol of coward¬ ice ; a term introduced in the days when cock-fighting was in vogue. As a thoroughbred game cock has no white feathers, a white feather was a proof that the bird was not game.

WHITE FLY, a minute insect of the fam¬ ily Aleyrodida, closely allied to the aphids and coccids, which infest the leaves of plants, usu¬ ally on the lower side, and are pests in green¬ houses. (See Greenhouse Insects). They are covered with a whitish mealy secretion, and when young also secrete wax. The group is not a large one and does not do much harm to fruit or forest trees, except that one species (Alcyrodes citri) has been prevalent in Florida orange groves since about 1890. The evil they do results not only from their sucking the nu¬ tritive juices of the plants, but from the spread

of smut-fungus which is promoted by their presence. Consult Howard, (The Insect-book' (New York 1901).

WHITE FRIARS, a name formerly given to the friars of Our Lady of Mount Carmel, be¬ cause they wore a white scapular and cloak over their brown habit. See Carmelites.

WHITE GOAT. See Rocky Mountain Goat.

WHITE HATS, a badge of the Demo¬ cratic party in Flanders in the 14th century. White hats w;ere used in England to denote radical proclivities, because Orator Hunt (1773-1835), the great demagogue, during the Welling¬ ton and Peel administration, used to wear a white hat.

WHITE HELLEBORE, a liliaceous plant of the genus Veratrum, a source of insect-poi¬ son, the principle of which is the alkaloid vera-trin. See also Hellebore.

WHITE HOUSE, the official residence of the President of the United States, in Wash¬ ington, D. C. The name arose from the fact that the

building is constructed of freestone and painted white. It is 170 feet long, 86 feet deep and two stories in height. It has an Ionic por¬ tico, the main entrance faces north. Reception rooms are on the first floor and the private apartments of the President are on the second floor. Among the reception rooms are the Blue Room used for diplomatic functions, the East Room used for public receptions, and the Red and Green rooms. The original official resi¬ dence for the President was begun in 1792; it was first occupied by Adams, in 1800. In 1814 it was burned by the British and four years later was rebuilt. In 1903 executive offices con¬ nected with the main building were built on the grounds. President Harrison and McKin¬ ley used for the official name, “Executive Mansion” ; President Roosevelt returned to the old name, White House.

WHITE LADY, an apparition which fig¬ ures in the legends and traditions of various countries, as presenting herself to give warning of death and other momentous events in royal and titled households. The White Lady is sup¬ posed to be an ancestress of the family she vis¬ its, and the association of such a legend with a family name is regarded as a guarantee of noble and ancient lineage. The one-time imperial house of Hohenzollern had its White Lady, and Hampton Court, England, is said to be invaded at times by a supernatural visitor, although there seems to be some doubt whether it is a White Lady or the ghost of Henry VIII. The earliest historical instance of the apparition is recorded as having occurred in the 15th century and is celebrated under the name of Bertha of Rosenberg, in Bohemia. Similar appearances are said to have been witnessed in the Schloss at Berlin, one as recent as 1879.

WHITE LEAD, a white pigment very largely used in painting. Many processes have been devised for its manufacture. The old Dutch method was to expose sheet lead in coils, placed in earthenware jars partly filled with vinegar, to the combined action of air, moist¬ ure and carbonic acid gas. This was done by immersing the jars with their contents in de¬ composing horse manure which furnished the heat and carbonic acid gas necessary for the

process. The English process, which is the one by which most of the white lead is made, differs from the Dutch process by the use of ferment¬ ing tan bark instead of manure. The pots con¬ taining the lead and dilute acetic acid or vinegar are piled in rows in the so-called stacks and surrounded with the fermenting tan bark. After about three months the lead is removed and purified. The process is slow and the methods of purification dangerous to the workmen, but the resulting white lead is of the best quality. In the French method a solution of basic lead acetate is first prepared by the action of an im¬ pure acetic acid on litharge or lead oxide. Car¬ bonic acid gas is then passed through this solu¬ tion and the white lead precipitated. White lead is also produced electrolytically, by employing a solution of sodium-nitrate, preferably in a cell of wood and a porous diaphragm. The anode is of lead and the cathode of copper. When the current is turned on, nitric acid appears at the anode as lead nitrate and from the cathode ap¬ pears caustic soda. The lead hydroxide' ob¬ tained is later treated with sodium bicarbonate to secure the carbonate of lead. White lead is subject to frequent adulteration. It may be tested for purity by making a solution of the powder in acetic acid, which should take up all the lead and leave the adulterant. White lead is a basic carbonate of lead of somewhat vari¬ able composition. That formed by the Dutch and English processes may be represented by the formula 2PbC03,Pb(0H)2.

WHITE LEAGUE, The, in American his¬ tory, a popular name for a semi-military or¬ ganization, gathered to repress the negroes of the State of Louisiana, who, it was asserted, were meditating insurrection. The organization had its inception in New Orleans in 1874 and on the refusal of the city authorities to allow the landing of a cargo of firearms, which the league had imported from New York, a riot ensued which resulted in more than 100 deaths. The league afterward became a powerful factor in Louisiana politics.

WHITE METAL, a term used for an al¬ loy of lead, antimony and tin used for bearings in machinery. Also applied to many other al¬ loys that have a white color.

WHITE MONKS. See Bernardines under

Orders, Religious.

WHITE MOUNTAINS, a group of peaks and hills, or a range of monuments, principally in New Hampshire, in the northern part; but

which extend into Maine on the east and on the west are connected with the Green Moun¬ tains in Vermont. They belong to the Ap¬ palachian system. Mount Katahdin, in Maine, is the highest elevation on the eastern rim, and in New Hampshire there are about 20 peaks, with deep narrow valleys and long lines of rounded foothills. The peaks are in two groups; the eastern or White Mountain group proper and the Franconia group, separated by a tableland varying from 10 to 20 miles in width. The principal summits of the eastern group are, beginning at the Notch and passing around to Gorham, Mounts Webster, Clinton, Pleasant, Franklin, Monroe, Washington, Clay, Jefferson, Adams and Madison. Of these Mount Washington is the highest and is indeed the highest mountain summit in New England, being

6,293 feet above the level of the sea. The prin¬ cipal peaks of the Franconia group are Pleasant, Lafayette, Liberty, Cherry and Moosehillock. Near the southern border of the plateau are Whiteface, Chocorua, Red Hill and Ossipee, and in the southeast, Kearsarge. North of the plateau and near the upper waters of the Con¬ necticut, are several elevations, among which are the twin mountains known as Stratford peaks. The plateau is deeply furrowed by sev¬ eral streams. The geological formation of the White Mountains is almost entirely of ancient metamorphic rocks. In many of the peaks the upper portion is composed of huge masses of naked granite or gneiss, and the debris which in the course of ages has clothed the lower portion with a coarse gravelly soil, possesses only enough of the constituents of vegetable life to support those trees and shrubs which will grow in the hardest and poorest soil. Land slides, the result of dislodgment of bowlders and loosely adherent soil after heavy rains, are not infrequent. One of these occurred in the notch of the White Mountain group in August 1826 and destroyed a whole family named Willey. The most noteworthy of many water¬ falls among the mountains are the Artist's Fall in North Conway; the Silver Cascade, a beauti¬ ful thread of water descending from far up the side of Mount Webster; Ripley's Falls, on a tributary of the Saco, below the Willey house, the lower one, Sylvan Glade cataract, falling at an angle of 45 degrees, 156 feet, in a stream from 50 to 75 feet in width; the falls of the Ammonoosuc, which in a course of 30 miles descends over 5,000 feet ; the Berlin Falls on the Androscoggin, descending over 200 feet in the course of a mile, and the Crystal Cascade and Glen Ellis Fall, near the Glen house, on a tributary of the Andro¬ scoggin. Of the "notches,® or passages (not rent through the solid granite of the moun¬ tains by some violent convulsion of nature as has often been supposed, but

carved by the slow action of rivers), there are five; the White Mountain Notch, two miles in length and at its narrowest point only 22 feet wide, through which the Saco River passes; the Fran¬ conia Notch, which permits the passage of the Pemigewasset ; the Pinkham Notch, through which a branch of the Saco and one of the Androscoggin find their way, and the Grafton and Dixville notches, through which flow the Androscoggin and one of its tributaries. The first two of these are those best known. “The Flume® at Franconia Notch is the most noted of those narrow waterways excavated through the rock, though there are others hardly in¬ ferior to it in attractiveness. Among the other objects of interest in the Franconia group is the “Old Man of the Mountain,® a well-defined profile of the human face formed by three projecting rocks. (See Franconia). At the base of the mountain lies a beautiful lakelet one-fourth of a mile long and one-eighth wide, called “Profile Lake,® or the “Old Man’s Wash¬ bowl.® Five miles south of the notch is the “Basin,® a circular bowl-like cavity 45 feet in diameter and 28 in depth, produced by the whirling of large stones in a natural hollow in the rock by the current. It is filled with clear sparkling water, which flows down the mountains in a succession of beautifully clear

cascades The “Pool,® in the same vicinity, is a natural well in the solid rock 60 feet in diam¬ eter and 190 feet deep, of which 40 feet is water. I he White Mountains were first visited • u)ollteiman’ Darby Field, of Pascataquac, m 1044 when with two Indians he ascended Mount YVashington. Later in the same year i nomas Gorges and companions traveled up the oaco and explored the mountains and the plateau and discovered the sources of the Saco, Connecticut, Androscoggin and Kennebec rivers. 1 he White Mountains are a famous summer lesort. Several railroads enter the mountains, and in the seasons special trains carry passen¬ gers direct from many of the large cities.

WHITE OAK SWAMP, Battle of. See

Glendale, Battle of.

WHITE PLAINS, N. Y., village, county-seat of Westchester County, on the Harlem Di¬ vision of the New York Central and Hudson lvi\ er Railroad, about 20 miles from the cen¬ tral part of New York City. It has several manufactories and has grown rapidly as a residential suburb. It has a high school, opened in 1894, graded elementary public and parish schools, Saint John's Academy for Boys, Good Counsel Training School, several private schools and a public library. Bloomingdale Asylum for the Insane occupies a prominent position over¬ looking the village, nearby are several beauti¬ ful lakes, connected with the water supply of New York City. Several golf clubs maintain splendid grounds, as does also the Westchester Fair Association. It has been an incorporated village since 1886, and owns and operates the waterworks. The government is vested in a president and board of trustees. Pop. 21,031.

White Plains and vicinity were the scenes of many battles and skirmishes during the Revolution. Fortifications or their ruins were to be seen on all sides. On 21 October Washing¬ ton established his headquarters at White Plains. On the evening of 27 October Haslett with about 1,600 American troops had taken possession of Chatterton Hill, a commanding emi¬ nence on the west side of the Bronx, and on the morning of the 28th, re-enforced by a small additional force under McDougall and two pieces of cannon under command of Alexander Hamilton, he fortified his position as well as time would allow. On the morning of that day Howe advanced with his forces in two columns (numbering about 13,000 men) upon the American army posted along the Bronx. Per¬ ceiving the importance of the position on Chat¬ terton Hill and regarding it as the only assail¬ able point of the American army, Leslie was sent with a strong detachment to cross the Bronx and attack it in front, while Rail with a Hessian regiment was ordered to cross the river a quarter of a mile below and attack Haslett in flank. The hill was carried with great difficulty, the Americans retreating in good order and without being pursued. The British troops rested that night on Chatterton Hill. The next day, 29 October, a skirmish took place between the two armies; but Howe, finding the Americans still too strongly posted to be attacked with safety, waited for re-en¬ forcements. These arrived on the evening of the 30th, but a storm coming on, the Americans took advantage of it and withdrew to the still

stronger position of Newcastle, two miles above, which they had previously fortified. Afraid to attack them in this position, Howe fell back to the junction of the Harlem and Hudson rivers and encamped

on Fordham Heights, and Washington withdrew his army leisurely into New Jersey and made his headquarters at Hack¬ ensack. The loss of the Americans in the battle of White Plains and the skirmish of the succeeding days were nearly 300 in killed, wounded and prisoners, and that of the British about the same.

• WHITE RIVER, in Arkansas, has its rise in the Ozark Mountains, in the northwestern part of the State, flows northeast into Missouri, forming a large curve and entering Arkansas again in Marion County, then flows southeast to the Mississippi River. It enters the Missis¬ sippi through several channels, some of which pass through the mouth-channels of the Arkan¬ sas River. Except in the highlands of the Ozark Mountains, fhe greater part of the course of the river is through marshy forest land. It is navigable to Batesville, about 300 miles. The total length is about 500 miles.

WHITE RIVER, in Indiana, the chief branch of the Wabash in the State, is formed by the confluence, in Pike County, of the East and West Fork, which have their rise near the eastern boundary of the iSta,te. From fhe junction of the two forks to the mouth of the White, where it enters the Wabash, is 50 miles; the total length from the source of the West Fork is 350 miles. The river is navigable to Martinsville on the West Fork and to Rock¬ ford on the East Fork.

WHITE RIVER, in South Dakota, the chief river of the southwestern portion of the State, rising in Dawes County, northwestern Nebraska, and flowing northeast into South Dakota, through Shannon and Washington counties, thence easterly to the Missouri River, which it joins a little south of Oacoma. The territory drained is locally known as the <(Bad Lands,® length about 425 miles.

WHITE RIVER JUNCTION, Vt, vil¬ lage in Windsor County, on the Connecticut River at the mouth of the White River and on the Central Vermont, the Boston and Maine and the Woodstock railroads, about 65 miles south by east of Montpelier and 14 miles east by north of Woodstock. It is a commercial centre for a large agricultural region in both Vermont and New Hampshire. The national bank has a capital of $100,000 and deposits amounting to over $1,275,000; the savings bank has deposits amounting to $481,150. White River Junction is in the town of Hartford and the government census does not give the popu¬ lation of the village separate. Pop. 4,179.

WHITE SAGE. See Eurotia; Goosefoot.

WHITE SANDS. A remarkable accumu¬ lation of granular gypsum in

the Tularosa Desert in west-central part of Otero County, N. Mex. _ It consists mostly of dunes five to 50 feet high of dazzling whiteness and covers an area of about 270 square miles and its amount is at least 2,000,000,000 tons. Most of the material is nearly pure gypsum containing about 95 per cent of that mineral. To the north it grades into quartz sand. Attempts have been

made to utilize .the deposit for manufacture of plaster of paris but local demand for this prod¬ uct is small and cost of long distance shipment is too great. The gypsum was carried into the basin in solution from the adjoining mountains and after crystallizing by evaporation of the water has been blown by the wind into dunes. Some of it is brought to the surface by ground water.

WHITE SEA, northern Russia, a large gulf opening into the government of Archangel, between the Kola Peninsula on the west and the Kanin Peninsula on the east. Near its mouth, and on the eastern side, is a branch called the Gulf of Mezen, which receives the waters of the river Mezen, and the inner part of the sea sends off three large arms, namely, the Gulf of Kandalak, penetrating northwest into Lapland, the Gulf of Onega, receiving the river Onega and the Gulf of Archangel, into which flows the Northern Dvina. Of the islands in the sea, Solovetskii is the largest. The White Sea is comparatively shallow, and is frozen over from October to May. Archangel, at the mouth of the Northern Dvina, is the leading port of northern Russia, and other ports on the shores of the sea are Onega and Kem. Canals connect the White Sea basin with basins of the Caspian, Baltic and Black Sea.

WHITE SULPHUR SPRINGS, Mont., city, county-seat of Meagher County, about 65 miles east by south of Helena. It is reached by stage from the Northern Pacific Railroad, a distance of about 40 miles. It is the commercial centre of a large agricultural, stock-raising and mining region and is noted for its thermal springs. The national bank has a capital of $100,000. Pop. 903, which includes only those within the limits and not the number who transact business in the city.

WHITE SULPHUR SPRINGS, W. Va., a district in Greenbrier County, on the Chesa¬ peake and Ohio Railroad, about 230 miles west by north of Richmond and 90 miles west of Staunton. The locality has long been noted for its medicinal springs. The temperature of the water is 62° F. It is a famous health-resort. Pop. (1920) 837.

WHITE-SWELLING, any severe disease of the joints resulting from chronic inflamma¬ tion in the bones, cartilages or membranes. The knee, ankle, wrist and elbow are the joints most subject to this form of disease. It is dis¬ tinguished from simple inflammation of the synovial membrane (synovitis) by the fact that the synovial membrane passes into pulpy degen¬ eration. Amputation is frequently necessary. The disease may be local or constitutional in origin, being in the latter case due to rheuma¬ tism, gout, syphilis, pyaemia, *etc.*

WHITE WHALE. See Whale.

WHITEAVES, Joseph Frederick, Cana¬ dian paleontologist : b. Oxford, England, 26 Dec. 1835; d. 8 Aug. 1909. He studied at the University of Oxford in 1858-61 and made investigations of the land-and freshwater mollusca and fossils of the oolitic rocks in the vicinity of Oxford, adding considerably to the information possessed. He removed to Canada in 1861, was engaged in geological investiga¬ tions in Montreal and Quebec in 1861-62, and

in 1863-75 he was curator of the museum and secretary of the Natural History Society of Montreal. He made a special study of the land-and freshwater mollusca of Lower Canada in 1867-73. He was appointed to the Canada Geological Survey in 1875, became its paleon¬ tologist in 1876, and in 1877 was appointed zoologist and assistant director. He was one of the original Fellows of the Royal Society of Canada and contributed to the society's Transactions as well as to the Canadian Naturalist and similar periodicals.

WHITEBAIT, a small fish, called by Val¬ enciennes Rogenia alba, and for which he con¬ stituted the genus Rogenia as a distinct genus of the Herring fanily (Clupeidce) , but which is now regarded by naturalists as merely the fry of the herring or of similar fish. The whitebait-fishery is actively prosecuted -on some parts of the British Coast, particularly in the estuary of the Thames, where the whitebait is very abundant in spring and summer, beginning to appear in the end of March or early in April. Adult whitebait are caught on the coasts of Kent and Essex during winter, and in this condition are about six

inches in length. Whitebait is found also in the Forth. It is much in request as_a delicacy for the table. At the time when ordinarily captured, whitebait are only fr_>m one and one-half to four inches in length. They are caught by means of bag nets sunk four or five feet below the surface of the water. For several months they continue to ascend the river in shoals with the flood-tide and descend with the ebb-tide, not being able to live in fresh water. They are fried with flour or crumbs ; they are often laid on a napkin and sprinkled with fine flour and a little salt, rolled about till well covered with flour and then thrown into a pot of boiling lard, where they remain till they are of a pale-strawˆ color. The whitebait has the body more compressed than the mature herring; belly serrated; lower jaw longer than the upper; scales very soft, small and thin, and very easily rubbed off ; color silvery white, greenish on the, back. The food of the whitebait seems to consist of minute crustaceans. It is probable that under the name whitebait the fry of all the British Clupeidce — the pil¬ chard, the sprat and the shad — are indiscrimi¬ nately taken and used like the fry of the her¬ ring.

WHITECHAPEL, London, England, a parish and parliamentary district, east of the nucleate city of London, one of the poorest por¬ tions of the metropolis, and formerly notorious for its criminal population. From 1888 to 1891 it was the scene of the atrocities of the myste¬ rious Jack the Ripper. Within its boundaries are the Tower of London and London Hos¬ pital, and it is intersected by Whitechapel Road. The name is derived from a former mediaeval chapel, whence all distances east of London were calculated. The pop. is about 100,000.

WHITEFIELD, hwit'feld, George, Eng¬ lish evangelist, founder of the Calvinist Methodists: b. Gloucester, 16 Dec. 1714; d. Newburyport, Mass., 30 Sept. 1770. He was sent to the grammar school of Saint Mary de Crypt at Gloucester, and at 18 entered as servitor at Pembroke College, Oxford, where he became acquainted with the Wesleys, and

joined the small society which procured them the name of Methodists.

Hearing of his de¬ votional tendencies, Dr. Benson, bishop of Gloucester made him an offer of ordination at , » which he accepted, and he was ordained a deacon in 1736. Such was his powerful and exciting preaching, that, after his first sermon at Gloucester, a complaint was made to the bishop that he had driven several people mad; on which the prelate observed that he hoped the madness would not be forgotten before the next Sunday. He for some time supplied a curacy at Dummer, in Hampshire, but the next account sent him by the Wesleys of their progress in Georgia excited in him a desire to assist in their labors, and he arrived at Savannah in May 1737. Observing the deplor¬ able want of education in the colony, he pro¬ jected an orphan-house for which he de¬ termined to raise contributions in Eng¬ land, where he arrived in the beginning of

1739. Although discountenanced by many of the clergy, Bishop Benson did not scruple to confer on him priest's orders; and on going to London the churches in which he preached were incapable of holding the crowds assembled. He then adopted the practice of preaching in the open air, which he first carried out at Kingswood, near Bristol, among the colliers, on whom his discourses produced a surprising effect, and whose vicious manners and habits he visibly improved. He afterward preached in the open air in Bristol, and in Moorfields, Kennington, and other places in the neighbor¬ hood of London, to vast assemblages of peo¬ ple. In August 1739, he again embarked for America, and made a tour through several of the provinces, where he preached to im¬ mense audiences, with an effect vividly por¬ trayed in the autobiography of Benjamin Franklin. He arrived at Savannah in January

1740, where he laid the foundation of the or¬ phan-house, and after making another exten¬ sive tour, returned to England, in March 1741. During his absence his cause had been declin¬ ing at home, and the differences between him and Wesley on the doctrines of election and reprobation deprived him of many followers. After visiting many parts of England, Scot¬ land and Wales, where he married in 1741, he again returned to America (1744), and re¬ mained there nearly four years. His preach¬ ing met with great opposition in New England at this time and Harvard College put forth a ˆtestimony® against him. Returning to England in July 1748 he was soon after introduced to the Countess of Huntington, who made him one of her chaplains. A visit to Ireland and two more voyages to America followed, and for several years his labors were unremitting. He preached at Exeter, N. H., the day before his death, and also at Newburyport. He is buried beneath the pulpit of the Federal Street Church at Newburyport. His works were pub¬ lished in 1771-72. Consult Gillies, (Memoirs) (1772) ;

Tyerman, L., (Life of Whitefield)

(1876-77).

WHITEFISHES, a name given in the United States to various species of salmonoid fishes of the genus Coregonus and sometimes to those of Argyrosomus, more properly desig¬ nated ciscoes. Coregonus has a comparatively small and nearly toothless mouth, the pre-

maxillaiy bones broad and with the edge nearly vertical, and the lower jaw short. The thin cycloid scales are much larger than in the salmons and trouts, and the caudal fin is deeply forked. Internally, the stomach is horse-shoe shaped and provided with very numerous pyloric caeca, and the swim-bladder is very large. The species, about 15 in num¬ ber, though some ichthyologists recognize many more, are confined to the clear lakes of the northern portions of the northern hemisphere often _ extending into the Arctic regions and sometimes there becoming anadromous. Wher¬ ever found they are highly valued for food. North America has about eight species. The common whitefish (C. clupeiformus) has its centre of distribution in the Great Lakes, but extends into the various lake systems of New York and southern Canada. It reaches a length of two feet and may be distinguished from the related species by its numerous and long gill-rakers, the toothless mouth and the elevoted but not compressed back. As generally in the whitefishes, the color is olivaceous above and white below. It receives various local names from the fishermen, such as buffalo-back; and the variety landlocked in Otsego Lake at the head of the Susquehanna River is known as the Otsego bass. During the greater part of the year the whitefish remains in the deeper waters of the lakes, moving about in schools which change their feeding grounds with considerable regularity. Being toothless they feed only upon small animals, such as crustaceans, snails and insect larvae, the first being by far the most important part of their diet. During the late fall and early winter the schools congregate on the shallows Jo spawn; in the act of spawn-lng the female rises to the surface and is imme¬ diately followed by a male which mingles the sperm with the stream of eggs issuing from her vent. The eggs are about one-eighth of an inch in diameter and sink to the bottom, where most of them are eaten by the small fishes and mud-puppies which swarm, on the spawning grounds. They develop slowly and require several weeks to hatch, the exact time depending upon the temperature of the water.

Each female pro¬ duces from 10,000 to 75,000 eggs, depending upon her size.

Besides the enemies affecting the eggs and young the adult whitefish are preyed upon by the large pike and lake-trout which follow the schools, and to a less extent by smaller preda¬ ceous fishes. The extensive development of the fisheries, which are prosecuted most vigorously at the very season when .the spawning fish are most accessible on the shallows, has so depleted the numbers of the whitefish that the fisheries are now dependent upon artificial propagation for their maintenance. The methods are essen¬ tially the same as those employed in the artifi¬ cial propagation of the shad, though many modifications in detail have been found neces¬ sary. Hundreds of millions of eggs are now annually taken and hatched under the auspices of the United States and State commissions of fisheries. Such extensive and even greater operations are required to sustain these fish¬ eries at a point of production equal to satisfying the demand of the market. These figures represent the American catch alone and' dur¬ ing the same year the Canadian fisheries prob-

ably yielded about 40,000,000 pounds more. Whitefish are sold fresh or are frozen imme¬ diately after capture and placed in cold storage at a temperature several degrees below freez¬ ing and in this condition shipped, especially during the winter, to all parts of the country. Relatively small quantities are also pickled or smoked.

Other species of Coregonus are found in the Great Lakes as well as in other lakes particu¬ larly northward and westward, but at the pres¬ ent time none are so highly valued as the com¬ mon whitefish. An important one is the shad-waiter or round whitefish (G . quadrilat er alls') . The genus Argyrosomus, however, includes two species of great and increasing importance, though inferior in quality to the common whitefish. The genus differs from Coregonus chiefly in the projecting lower jaw, larger mouth and horizontal premaxillary bones. The numerous species are similarly distributed in North Amer¬ ica, which has eight, Europe and Asia, and ex¬ cept for their great activity and predatory mode of life their habits in general resemble those of the true whitefishes. The cisco whit¬ ing or lake herring (A. artedi) is about a foot long, bluish or greenish above, with dark, speckled

silvery sides. It abounds in shallow waters of the Great Lakes and, as indicated above, is of great commercial value. The moon-eye cisco (A . hoyi) has a very large eye and the sides are brilliantly silvery. It is about a foot long and is the object of a considerable fishery in the western part of Lake Michigan. It spawns in November in relatively deep water. A third important species of this genus is the blue-fin whitefish (A. nigripennis) , distinguished from all of the preceding which have pale fins by the blue-black color of its pectorals, anals and ventral. It attains a length of 18 inches and is plentiful in the deep waters of Lake Michigan and the small lakes of Minne¬ sota and Wisconsin and thence northwestward to Athabasca.

Whitefishes seldom take the hook, but are captured by means of pound, trap and gill nets and to a smaller extent with seines. The pound and trap nets are arranged in lines which sometimes reach to a distance of 10 or 12 miles from shore, while the gill nets are set much farther out in deep water and are weighted to the bottom.

Consult Brown Goode, (Natural History of Aquatic Animals) (Washington 1884), and American Game and Food Fishes) (New York 1902) ; Townsend, Statistics of the Fish¬ eries of the Great Lakes, > Report United States Fish Commission for 1901 ; and special papers of the United States Bureau of Fishes, and of the Canadian Fisheries Department.

WHITEHALL, London, England, a street leading from Parliament Square to Trafalgar Square, containing several public offices, and named after a palace that once stood there. The building known as the Horse Guards, the office of the commander-in-chief of the army, is so called in consequence of being the station where that part of the troops usually do duty. The treasury, near the Horse Guards, is built on the site of part of the old palace; the First Lord of the Treasury, however, has his official residence in Downing Street, where also the Cabinet meets. The Admiralty Office contains

the offices connected with the administration of the naval affairs of the country. The origi¬ nal Whitehall succeeded a palace built by Hubert de Burgh before the middle of the 13th century. It afterward came into the possession of the archbishops of York, was inhabited by Wolsey (under the name of York Place), then passed to Henry VIII and was called White¬ hall. Charles I was executed in front of White¬ hall and he was led to the scaffold out of one of the windows. Oliver Cromwell died in Whitehall. In 1697 the building was destroyed by

fire, except the banqueting hall, which had been added by James I, according to a design of Inigo Jones, in 1619. This portion still re¬ mains and chiefly consists of one room, of an oblong form and 40 feet high. The ceiling, representing the apotheosis of James I, was painted by Rubens and was retouched by Cipriani. This building was long a royal chapel, but it now contains the museum of the Royal United Service Institution.

WHITEHALL, Ill., city in Greene County, on the Chicago and Alton and the Chicago, Burlington and Quincy railroads, about 25 miles southwest of Jacksonville and 63 miles north of Saint Louis. It is in an agricultural and stock-raising region and in the vicinity are de¬ posits of fire clay. The chief manufactures are flour, sewer-pipe, tiles, stoneware and ma¬ chinery. Its shipping trade ischiefly in farm and dairy products, livestock and clay products. There are six churches, a high school and li¬ brary. The two banks have a combined capital of $100,000. Pop. (1920) 2,954.

WHITEHALL, N. Y., village in Wash¬ ington County, on Lake Champlain, Poultney River, the Champlain Canal and the Delaware and Hudson Railroad, about 75 miles north by east of Albany. It is at the foot of Skene's Mountain, in a narrow valley. It has railroad shops, silk and knitting mills, grist mills, lumber mills, graphite mills, novelty works, condensed milk plant, paint manufactories, motor-boat fac¬ tory and machine shops. It has a high school and a library. The village owns and operates the waterworks. The government is vested in a board of trustees and a president chosen an¬ nually by popular vote. In 1761 Whitehall was settled by Maj. Philip Skene and a colony of about 30 families; in November 1763 it was in¬ corporated. When differences arose between America and England, which culminated in the Revolution, Skene joined the British and the Americans took possession of his property. An American garrison was stationed at Whitehall in 1776; but fearing capture by Burgoyne, they destroyed thˆ fort, and the houses, and aban¬ doned the place. At the close of the war nearly all the people returned and claimed their former holdings. The whole of the Skene prooerty was sold at auction, and the highest bidder gave . ill 10s. In 1806 it was incorporated as a vil¬ lage. In 1812, when the Lake Champlain towns and villages were again near the centre of danger, a fort and block house was built. In 1819 the Champlain Canal was built from Whitehall to Fort Edward, and five years later it was extended to Troy. Pop. (1920) 5,258.

WHITEHAVEN, England, a seaport and important coal-mining centre in Cumberland, situated on a bay of the Irish Sea, 40 miles

southwest of Carlisle. It is well built, and has a town-hall, customhouse, market-house, public library, public baths, with swimming-pond ; a theatre, etc., a good harbor and a deepwater floating-dock., lliere is a considerable shipping trade, coals, iron-ore, pig-iron, steel rails, etc., being exported and American and other produce imported. The manufactures comprise sail¬ cloth, cordage, anchors, nails, cement, alabaster, earthenware, candles and soap. Iron ship¬ building also is carried on, and there are blast¬ furnaces, iron- and brass-foundries, engineering works, flour-and sawmills, breweries, a tan¬ nery, *etc.* There are here extensive coal and iron mines, in which a large number of the in¬ habitants are employed. The coal-mines, which have been worked since the 17th century, extend some miles under the sea, and coal is mined beneath the town. Pop. 20,000.

WHITEHEAD, Charles, English poet: b. London, 1804; d. Melbourne, Australia, 5 July 1862. He was_ engaged in a London mercantile house until 1857 when he went to Australia and entered journalism. He was the author of numerous poems, plays and sketches, among which are (The Solitary> (1831) ; <The Auto¬ biography of Jack Ketch* (1834); <The Cava¬ lier,) drama (1836) ; (Richard Savage) (1842), subsequently dramatized; Smiles and Tears, or the Romance of Life> (3 vols. 1847) ; <Life and Times of Sir Walter Raleigh) (1854), *etc.* Consult Bell, Mackenzie, (Charles Whitehead, a Forgotten Genius) (1884).

WHITEHEAD, Cortlandt, American Protestant Episcopal bishop: b. New York, 30 Oct. 1842. He was graduated from Yale in 1863 and from the Philadelphia Divinity School in 1867. Ordained to the priesthood in 1868 he was engaged in pastoral work in Colorado for three years and was rector of the Church of the Nativity, South Bethlehem, Pa., 1870-82. In January 1882 he was consecrated bishop of Pittsburgh.

WHITEHEAD, William, English poet: b. Cambridge, 1715; d. London, 14 April 1785. He was educated at Winchester and Clare Hall, Cambridge, was appointed secretary and regis¬ trar of the order of the

Bath in 1755, and in 1757 was appointed poet-laureate, in succession to Colley Cibber (q.v.). His identity is fre¬ quently confused with that of the satirist Paul Whitehead. He was the author of the trage¬ dies: (The Roman Father> (1750) ; and (Creusa, Queen of Athens) (1754); the comedy, (The School for Lovers) (1762) ; a farce, (The Trip to Scotland) (1770); and numerous minor poems. His collected works were edited and published with a memoir by William Mason (1788). Consult Thompson, E., (Poems and Miscellaneous Compositions of P. Whitehead) (London 1777).

WHITEHILL, Clarence Eugene, Ameri¬ can opera singer: b. Marengo, Iowa, 5 Nov. 1871. He studied under L. A. Phelps in Chicago and was engaged as a church singer until, fol¬ lowing the advice of Madame Melba, he went to Paris to study for the operatic stage. He studied under Giraudet and Sbriglia in Paris and in 1900 made his debut successfully at Brussels. In 1901 he made his first appearance at the Opera Comique in Paris. He studied the great Wagnerian roles with Cosima Wagner and

was highly successful in them. He appeared at Baireuth, and at Covent Garden, London; and after 1909 at the Metropolitan Opera Company, New York, and with the Chicago Opera Com¬ pany.

WHITEING, Richard, English jounalist and novelist: b. London, 27 July 1840. He was educated privately and began his career in jour¬ nalism in 1866 with a series of satirical sketches on social and political topics afterward repub¬ lished as (Mr. Sprouts — his Opinions> (1867). He was subsequently engaged on the Morning Star as leader-writer, and was afterward Paris correspondent for various New York, London and Manchester papers, but returned to London to join the editorial staff of the London Daily News, a position he resigned in 1899. He has written (The Democracy* (1876); (The Island) (1888) ; (No. 5 John Street* (1899) ; <The Life of Paris) (1900) ; (The Yellow Van) (1903) ; (A11 Moonshine) (1907); (My Harvest* (1915), *etc.*

WHITELOCKE, hwft'lok, Bulstrode,

English statesman : b. London, 2 Aug. 1605 ; d. Chilton Park, Wiltshire, 28 July 1675. Edu¬ cated at Oxford he studied law at the Middle Temple, was called to the bar in 1626, and en¬ tered Parliament as member for Stafford. He was elected to the Long Parliament of 1640 from Great Marlow, was chairman of the com¬

mittee for drawing up Stafford's charges of impeachment, and one of the commissioners appointed to treat with the king at Oxford. As a member of the Westminster Assembly (1643) he opposed the adoption of Presbyterian¬ ism, and as a commissioner of the Great Seal (1649) withheld consent to the king's death. In 1623 he was Ambassador to Sweden, where he concluded a treaty with Queen Christina, and on his return was speaker of the House of Com¬ mons (1656), and one of Cromwell's lords (1657). From his manuscripts have been pub¬ lished (Memorials of English Affairs from the Beginning of the Reign of Charles I to the Restoration (1682; new ed. 1852) ; (Memorials of English Affairs from Bruce to the End of the Reign of James P (1709) ; (J˚iirnal Gf the Swedish Embassy * (1 722; new ed., 1845), and other works.

WHITESTONE, N. Y., in New York City, borough of Queens. The village was a place of importance, on account of its good harbor, and its position near the eastern entrance to New York Harbor. It is near the United States military post at Willett's Point and Fort Schuy¬ ler, on Throgg's Neck. Pop. 3,000.

WHITETHROAT, a bird, either of two species of Old World warblers — Cnrrnca cinerea, the greater, and C. sylviella, the lesser whitethroat; or a hummingbird (Leucochloris albicollis) of Brazil ; or a whitethroated spar¬ row (Zonotrichia albicolis), commonly known in the eastern United States, where it is a mi¬ grant, as Peabody-bird.

WHITEWASH, a milky fluid produced by mixing good slaked lime with water: used as a cheap coating for walls, fences, *etc.* When mixed with a little size and sometimes colored it is used on interior walls under the name of calcimine.

WHITEWATER, Wis., city in Walworth County, on the Whitewater River, and on the

Chicago, Milwaukee and Saint Paul Railroad, about 46 miles southeast of Madison and 50 miles southwest of Milwaukee. It is in an agri¬

cultural and stock-raising region and has creameries, paper mill, wagon works, sash and door factories, flour mill, machine shops and furniture factory. It has a State normal school, a high school, opened in 1886, public and parish schools and a public library. There are two banks and a newspaper. Pop. (1920) 3,215.

WHITEWOOD. See Linden.

WHITFIELD, hwit'feld, or WHITFELD, Henry, English clergyman : d. Winchester, Eng¬ land, about 1658. Of the date of his birth and his early life nothing is definitely known. He appears to have been appointed to the living of Ockley, Surrey, in 1616, but having protected several Puritan clergymen during the Laudian persecution incurred the displeasure of Laud, which was further increased by his refusal to read to his parishioners from the (Book of Sports. > He, therefore, emigrated to New Eng¬ land in 1637 with many followers and was one of the founders of Guilford, Conn. In 1650 he returned to England and was minister at Win¬ chester. His writings include (Some Helpes to Stirre up to Christian Duties) (3d ed., 1636) ; (The Light Appearing more and more toward the Perfect Day) (1641) ; and (Strength out of Weakness) (1652).

WHITFIELD, Robert Parr, American

geologist: b. New Hartford, N. Y., 27 May 1828; d. 1910. He studied natural history and geology almost unaided, was assistant on the New York State geological survey in 1856— 76, and in 1872 was attached to the United States Geological Survey. He was instructor in geology at the Rensselater Polytechnic In¬ stitute in 1872-75, professor in 1875-78 and for many years after 1887 was curator of the Amer¬ ican Museum of Natural History in New York.

WHITGIFT, John, English prelate: b. Great Grimsby, Lincolnshire, about 1530; d. Lambeth, 29 Feb. 1604. He was educated at Pembroke Hall, Cambridge, and after the ac¬ cession of Elizabeth took holy orders (1560) and was made chaplain to Cox, bishop of Ely. In 1563 he was appointed Lady Margaret pro¬ fessor of divinity at Cambridge, in which office he gained a high reputation by his lectures on the book of Revelations and the Epistle to the Hebrews, and in 1567 was elected master of Pembroke Hall. Soon after the queen made him her chaplain and master of Trinity Col¬ lege, Cambridge, and the same year he also be¬ came regius professor of divinity. He was made dean of Lincoln in 1571, and in 1576 bishop of Worcester, and, being also vice-president of the marches of Wales, made constant use of both the temporal and spiritual powers to put down Roman Catholicism and

Puritanism within the limits of his jurisdiction. In 1583 he became archbishop of Canterbury, and soon exacted from every clergyman in the church a subscription to the three points of the queen's supremacy, the lawfulness of the common prayer and ordination service, and the truth of the whole 39 articles. Making use of the court of high commission he removed from positions in the church all non-conformists. In 1585 the star chamber, at his instigation, passed ordi¬ nances for the regulation of the press, by which

no one was allowed to print except in London, Oxford and Cambridge ; the number of printers was to be determined by the ecclesiastical com¬ missioners; and none but a few special printers were to be suffered to print any book, matter or thing whatsoever until it should be perused and allowed by the archbishop of Canterbury and the bishop of London ; and every one sell¬ ing books contrary to the intent of the ordi¬ nance was to be imprisoned for three months. In 1586 he was sworn of the Privy Council and framed the statutes of cathedral churches. The hospital and grammar school at Croydon were founded by Whitgift. Consult <Lives) by Strype (1718) and by Sir George Paule (1612) ; and Frere, W. H., (The English Church of 1 558-1625* (London 1904).

WHITING, hwi'ting, Arthur, American

musician: b. Cambridge, Mass., 20 June 1861. He studied music in Munich at the Royal Music School with Rheinberger. He is a pianist and has composed orchestral and chamber music, as well as numerous songs, pianoforte pieces, concertos and sacred music. His series <(University Concerts® have been well received at Harvard, Yale and Princeton and at other colleges.

WHITING, George Elbridge, American

musician and composer: b. Holliston, Mass., 14 Sept. 1842. He early displayed musical talent and was engaged as an organist successively at Hartford, Conn., Boston and at Albany. He studied in Europe in 1863 and in 1872, was organist at the church of the Immaculate Con¬ ception, Boston, in 1876-78 and has occupied that position since 1883. In 1878-83 he was organist at the Cincinnati Music Hall and pro¬ fessor of organ and composition at the Cincin¬ nati College of Music. He was engaged as a teacher in the New England Conservatory of Music for several years but resigned in 1897. His compositions include (Grand Sonata) ; (Tale of the Viking) ; (Dream Pictures, Can¬

tata* ; (Midnight, Cantata) ; a one-act opera in Italian, <Lenora) (1893) ; and numerous pre¬ ludes, symphonies, *etc.*

WHITING, Lilian, American author: b. Niagara Falls, N. Y., 3 Oct. 1857. She engaged in journalism in Saint Louis, Mo., in 1876, in 1880-90 was literary editor of the Boston Traveler and was editor of the Boston Budget in 1890-93. Her published books are character¬ ized by familiarity with occult subjects and a disposition to lead her readers unconsciously to recognize the genuineness of mysticism and spiritualistic teaching. They include (From Dreamland Sent,* verse; (The World Beautiful> (3 vols., 1894-96-98) ; <Kate Field: a Rec- ord) (1899) ; (The World Beautiful in Books> (1901) ; (Boston Days) (1902) ; (The Outlook BeautifuP (1905) ; (Life Transfigured) (1910) ; (The Brownings — Their Life and Art* (1911); i Athens the Violet Crowned) (1913) ; <The Lure of London) (1914) ; (Women Who Have Ennobled Life) (1915) ; (Canada the Spell¬ binder* (1917) ; (The Adventure BeautifuP

(1917).

WHITING, William Henry Chase, Ameri¬ can Confederate soldier: b. Mississippi about 1825; d. Governor's Island, New York Harbor, 10 March 1865. He was graduated first in his class at the United States Military Academy

in 1845. He entered the engineering corps and was engaged in military construction work, reaching the rank of captain in 1858. He re¬ signed from the army 20 Feb. 1861 and entered the service of the Southern Confederacy. He was chief engineer of the Army of the Shenan¬ doah under Gen. J. E. Johnston in June and July 1862,

holding the rank of major; and was promoted brigadier-general 27 Aug. 1861. He saw service at the first battle of Bull Run and at the battle of West Point, Va. He was pro¬ moted major-general in 1863, built Fort Fisher, N. C., and in 1864 was placed in command there. He was wounded and taken prisoner when Fort Fisher fell, 15 Jan. 1865, later dying from his wounds.

WHITING, Ind., town in Lake County, on Lake Michigan, and on the Pennsylvania Railroad, about 16 miles southeast of Chicago. It has a good harbor and steamer connections with the Lake Michigan ports. It has a large oil refinery, machine shops and several indus¬ trial establishments connected with refining and shipping petroleum and with shipping farm products. The manufacturing establishments, though small in number, are capitalized for over $15,000,000, and the value of the annual products is about $20,000,000. Pop. (1920) 10,140.

WHITING, a name applied to several quite unrelated fishes probably in allusion to the note¬ worthy whiteness of their flesh, or, in some cases, of the skin of the lower parts. In the United States, and more especially in the South, several species of Menticirrhus, a genus of Scicenidce, are known as whiting, but more widely as kingfishes (q.v.). The common whiting (M . americanus) reaches a length of about a foot ; the body is elongated and slender with a high spinous dorsal and a long low soft dorsal fin, an undulate caudal fin, and is com¬ pletely covered with ctenoid scales; the outer row of teeth of the upper jaw are enlarged and strong and the color silvery gray with faint oblique dusky bars. It is very common along sandy shores of the entire Gulf Coast and on the Atlantic Coast northward to about the mouth of Chesapeake Bay and southward to Brazil. Though remaining on these coasts throughout the year they are most plentiful in summer when they frequent the bays and estu¬ aries, but prefer strong currents and the deeper waters. They feed upon crabs, shrimps and other crustaceans, and being vigorous biters and gamy fighters afford splendid angling. Great numbers are caught on lines for the market and the flesh is unusually firm, delicate and well-flavored. Spawning is said to occur in May. The surf whiting (M. littoralis) is so called because, unlike the last, it frequents shallow waters along sandy shores and is captuied in large quantities by means of seines. The outer teeth of the upper jaw are not enlarged; the gill-rakers are better developed than in the com¬ mon whiting; and the black tip of the caudal fin is another mark of distinction. The com¬ mon northern kingfish (.M. saxatilis) also ex¬ tends into southern waters and is there con¬ fused with the above species under the name of whiting. It may be recognized by its dusky color and the distinct, dark bands which

cross the sides obliquely. Other species occur on the Pacific Coast. By the New England fisherman the name of whiting or silver hake is given to a

common species of the cod family (Gadidce), the Merluccius bilinearis of American ichthyolo¬ gists, though many European authorities fail to distinguish it from the Old World M. vulgaris. From the great majority of the cods the whiting is distinguished by the total absence of a chin-barbel and by the peculiar excavated area of the top of the skull ; the second dorsal and the anal fin are long and each divided nearly in two by a deep notch. The body is elongated and covered with small scales ; the color grayish silvery white below. This whiting is common in waters of moderate depth along the shores of New England and somewhat northward, and extends southward in deep water to Virginia and even to the Bahamas. Unlike most of the Gadidce, which are essentially bottom-feeders, it is an active, roving species, which comes to the surface to pursue and feed upon herring and other fishes. Sometimes large schools appear on our coasts and many are captured in purse-seines and poundnets. Spawning takes place at the bottom on the edge of the continental slope. Owing to its comparatively small size and the softness of its flesh it is one of the least important economically of the family.

The European whiting (M . vulgaris) is scarcely distinguishable from the American, but has much smaller scales, fewer spines in the first dorsal fin and larger teeth. It frequents shallower water and is very abundant along the northern coasts of Europe. It makes its ap¬ pearance in vast shoals, keeping at a short dis¬ tance from the shore, and is taken by the line in great numbers. It is considered the most delicate and most wholesome of all the species of cod; but it does not attain a large size, usually not exceeding a foot in length and under two pounds in weight. The food of the adults consists chiefly of fishes and of the young of shrimps and other crustaceans. Spawning occurs in, and the young frequent, the shore waters. As long as the young feed chiefly on the bottom they retain a chin-barbel, but as their habits change this degenerates and finally disappears. Other fishes sometimes called whit¬ ing are the hog-fish, harvest-fish and a whitefish (q.v.).

WHITING, a preparation of white chalk from which the grosser impurities have been removed. It is extensively used in the arts, also for cleaning silver and making putty.

WHITLEY'S WORKSHOP COMMIT¬ TEES, or WHITLEY'S INDUSTRIAL COUNCILS. See Workshop Committees.

WHITLOCK, Brand, American ambassa¬ dor and author: b. Urbana, Ohio, 4 March 1869. He was engaged in journalism in To¬ ledo, Ohio, in 1887-90, and was on the staff of the Chicago Herald in 1890-93. He was a clerk in the office of the Illinois secretary of state in 1893-97. He had meanwhile studied law and was admitted to the bar of Illinois in 1894 and to that of Ohio in 1897, then establishing him¬ self in law practice at Toledo. He was elected mayor of Toledo in 1905 and served four suc¬ cessive terms, declining a fifth nomination. He succeeded in securing a new city charter pro¬ viding for the initiative, referendum, recall and direct nominations. He was by this time a well-established magazine writer, producing both verse and prose, the latter dealing in the

main with politics and economics in an un¬ compromising fashion. He was appointed Min¬ ister to Belgium by President Wilson in« 1913 and was in office at the outbreak of the Euro¬ pean War. He was entrusted with the repre¬ sentation of seven of the warring nations, re¬ maining at his post after the German invasion. His skill in dealing with the difficulties of the situation under the German occupation earned for him a worldwide reputation ; and he won scarcely less praise for his handling of the Belgian relief work. The necessity for his leav¬ ing invaded Belgium when the United States declared war upon Germany in April 1917 was viewed with deep regret in Belgium. He re¬ fused to leave Brussels unless accompanied by the other Americans there, and crossed into Switzerland 4 April 1917. He later visited King Albert of Belgium at the battle front, and after the signing of the armistice in November 1918 he resumed his duties at Brussels. He returned to the United States for a visit in 1919, and while at home the country's repre¬ sentation in Belgium was raised to rank of an embassy, Mr. Whitlock thus becoming Am¬ bassador. He is author of (The Thirteenth District (1902); (Her Infinite Variety) (1904); (The Turn of the Balance) (1907); 'Abraham Lincoln> (1908); 'The Gold

Brick* (1910); ‘On the Enforcement of Law in Cities) (1910— 13); (Forty Years of It: An Autobiography) (1914) ; ‘Memories of Belgium Under the Ger¬ man Occupation (1918); Belgium, A Personal Narrative* (1919), *etc.*

WHITLOCK, hwit’lok, Elizabeth Kemble,

English actress, fifth child of Roger Kemble (q.v.) : b. Warrington, Lancashire, 2 April 1761 ; d. 27 Feb. 1836. She first appeared at Drury Lane theatre in February 1783, as Portia. In 1785 she was married to Charles Edward Whitlock, a provincial manager and actor, and seven years later accompanied her husband to this country, where they performed for mtany years in the principal cities. Mrs. Whitlock became the most popular actress of the day in America, and in Philadelphia frequently per¬ formed before President Washington and other distinguished persons. She returned to Eng¬ land in 1807 with a competency and thenceforth retired from the stage. In personal appearance and voice she was said to have strongly re¬ sembled her sister, Mrs. Siddons.

WHITMAN, Charles Otis, American zool¬ ogist : b. Woodstock, Me., 14 Dec. 1842; d. 6 Dec. 1910. He was graduated from Bowdoin in 1868, studied at Leipzig, and in 188CC81 was professor of zoology at the Imperial University, Tokio, Japan. He was engaged in further studies at the Naples Zoological Station in 1882, and in 1883-85 was assistant in zoology at Har¬ vard. He was director of the Allis Lake Laboratory, Milwaukee, in 1886-89, and in 1889-92 professor of zoology at Clark University, Worcester, Mass. He became director of the Marine Biological Laboratory at Woods Hole, Mass., upon its foundation in 1888, and from 1892 until his death was at the head of the department of zoology at the University of Chicago. He was elected to the National Acad¬ emy of Sciences in 1895. He founded the Journal of Morphology in 1887, and after 1883 was editor of the microscopical department of

the American Naturalist. He has made a specialty of the development of the vertebrates and of the structure and development of worms. His writings include ‘Methods of Research in Microscopical Anatomy and Embryology *(1885); (Biological Lectures* (1890-95); ‘The Inadequacy of the Cell Theory of Develop¬ ment (1893) ; ‘Animal Behavior* (1898), *etc.*

WHITMAN, Charles Seymour, American lawyer : b. Hanover, Conn.,

28 Aug. 1868. He studied at Amherst College and then studied law at New York University, and was ad¬ mitted to the bar in 1894. In 1901 he was ap¬ pointed assistant corporation counsel of New York City where his effective work won for him the post of city magistrate. In this capac¬ ity he founded the Night Court in that city for the immediate trial of all offenders arrested at night. In 1907 Governor Hughes appointed him a judge of the Court of Sessions, and in the following year deputy attorney-general in the investigation of election frauds in the north¬ ern part of the State. In 1909 he was elected district-attorney of New York City on a Fu¬ sion ticket. In this capacity he secured repre¬ sentation of the district-attorney's staff in the city magistrate's office, and was active in sup¬ pressing arson offenders. The noted Becker trial came up during his tenancy of office, and Whitman's mastery of the case was most effective in unearthing and reforming the re¬ lations between certain members of the New York City police and professional criminals. The handling of the Schmidt murder case, the prosecution of the poultry trust and of elec¬ tion frauds won for Mr. Whitman the highest commendation. He was renominated in 1913 and elected almost unanimously. In 1914 Whit¬ man was elected to the governorship of New York State. His principal plank was the refor¬ mation of the State finances, which he pro¬ ceeded to institute vigorously by a reorganiza¬ tion of State departments and a thorough in¬ vestigation of the salaries of Civil Service em¬ ployees. In 1916 he was elected chairman of the Republican National Convention, where he urged the nomination of Charles E. Hughes for President. In September of the same year he was reelected to the governorship and es¬ tablished a precedent by sending to every en¬ rolled voter a report of his first term as gov¬ ernor, containing also reports of the heads of other State departments. In connection with the European War, the governor ably supported the Federal administration in war policies and effectively mobilized the State's resources. He also inaugurated a State Constabulary, and a new State Guard to replace the National Guard on service in France. In 1918 he was again nomi¬ nated for governor on the Republican ticket, but was defeated by Alfred E. Smith, the Democratic candidate.

WHITMAN, Frank Perkins, American physicist: b. Troy, N. Y., 29 July 1853; d. 15 June 1919. He was graduated at Brown Uni¬ versity in 1874 and took his A.M. there in 1877, later studying at Johns Hopkins University. He was professor of physics at Rensselaer Po1 >m technic Institute, Troy, in 1880-86; and there¬ after occupied that chair at Western Reserve University.

WHITMAN, Marcus, American mission¬ ary and pioneer: b. Rushville, N. Y., 4 Sept.

d ˆW,alla,Walla' Ore. (now Wash.), ˆ 47. Studied medicine at Berkshire Medical Institution, Pittsfield, Mass., and practised in Canada for four years. He offered his services as a missionary (1834) to the American Board of Commissioners for Foreign Missions, and in 1835 went with Samuel Parker to explore the region of the Oregon, but did not go beyond Green River. In 1836, having married, with his wife and three fellow mis¬ sionaries he set out to work among the Indians of the upper Columbia. The party crossed the plains by wagon, being the first persons to reach the Pacific Coast by this means. On 1 May they reached the Columbia River, and located themselves near the site of the present Walla Walla, Wash. They were soon followed by a large number of emigrants, who settled in what was then known as Oregon, and now forms the States of Oregon, Washington and Idaho. At this time the Hudson Bay Company was using every possible means to secure this territory to the English. When this plan be¬ came evident to Whitman he decided to take every precaution to forestall it. The Ashbur¬ ton Treaty was then before Congress, and was expected to settle the Oregon question. In 1842-43 Whitman traveled over 3,000 miles to the East on horseback, enduring all the hard¬ ships of a Western winter in the mountains, and according to the statement of H. H. Spald¬ ing, one of his missionary companions, he reached Washington (3 March 1843) only to find that the treaty had been signed, but that the Oregon question had not been included. Whitman, as Spalding's version represents, at once went to work to show the government the value of the land it had deemed worthless, demonstrated to the people the fertility of the soil of Oregon, and the fact that it could be reached by wagon, and then returned at the head of a large body of emigrants. By his daring ride and earnest endeavors Whitman, in this view of the matter, won this great sec¬ tion for the United States and the results of his work were secured by the treaty of 1846. This claim, however, has been the subject of much controversy, and to the satisfaction of some students has been disproved. Whatever its merits, there is no doubt that Whitman's ride (he reached Boston 30 March 1843) re¬ sulted in the reversal of the missionary board's

purpose to discontinue the southern branch of the mission in which he was engaged; and his work and that of his companions has a historical relation to the American settlement of the Oregon country. Whitman, his wife, and 12 of their companions were massacred by the Cayuse Indians. Consult Nixon, (Life of Marcus Whitman) (1895); Mowry, (Marcus Whitman) (1901) ; and Bourne, (Essays in His¬ torical Criticism > (1901), in which the Whit¬ man claims are examined and discredited; and Marshall, W. J., (The Acquisition of Oregon and the Long Suppressed Evidence about Mar¬ cus Whitman* (Seattle 1911). See Oregon; Oregon Question, The.

WHITMAN, Sarah Helen Power, Ameri¬ can poet: b. Providence, R. I., 1803; d. there, 27 June 1878. She was married to John W. Whitman, a Boston lawyer, was once engaged

to Edgar Allen Poe, afterward writing a de¬ fense of him entitled (Edgar A. Poe and His Critics* (1860) ; contributed numerous critical articles and poems to periodicals, and was noted for her conversational powers. Her verse was in part collected in the volume (Hours of Life, and Other Poems > (1853), and fully in the posthumous <Poems> (1879). (Fairy Ballads) and some other works vyere written with her sister, Anna M. Power. Her . finest poem, (A Still Day in Autumn,) has much melody and beauty of expression and retains an hon¬ ored place in anthologies.

WHITMAN, Walt (originally Walter), American poet: b. West Hills, Long Island, N. Y., 31 May 1819; d. Camden, N. J., 26 March 1892. He was educated in the pub¬ lic schools of Brooklyn, and learned the print¬ er's trade, after which he taught in country schools in Long Island. For a brief period he did editorial and reportorial work on newspa¬ pers, and in 1847-48 he made an extensive pe¬ destrian tour as a workman through the United States and Canada, subsequently employing him¬ self as a carpenter and builder. His first and chief work, (Leaves of Grass, *was published by himself in New York in 1855. This thin vol¬ ume of 94 pages was received, for the most part, with abuse, mainly because of its uncon¬ ventional metrical style and the freedom with which the poet dealt with moral and social subjects. ˆ During the American Civil War, Whitman's brother was wounded on the battle¬ field, and the poet, who hastened to his aid, remained afterward as a volunteer army nurse at Washington and in Virginia for the years 1862-65. One result of this experience was the small volume (Drum Taps* (1865), subse¬ quently included with leaves of Grass.) After the war he held a government clerkship in Washington, but the fatigue and mental strain of his

labors in the hospitals brought about a severe attack of paralysis in 1873. He was re¬ covering from this when the sudden death of his mother in his presence caused a serious relapse. From this time he resided at Camden, N. J., never securing robust health. During all these years Whitman wrote with the old vigor and freedom of rhythm, but with less of the early crudeness of expression. Though Whitman, like Carlyle and Browning, may be a dangerous and dangerously easy model for imitation, he undoubtedly worked out for him¬ self a style of distinction as notable as theirs. This in itself is a title of fame, or at least a charm against oblivion, even though his lit¬ erary style ran to extremes and vices. His evolved style was a rhythmic recitative or ir¬ regular chant, precursors of which may be found in the English translation of the Psalms and other Biblical poems,, in; Macpherson's (Ossian,* and in the later poems of William Blake. These chants vary in movement and seem governed by laws rhythmic rather than metric, which (like the grammar of an un¬ written tongue) have never been formulated even by the inventors themselves. They have a peculiar, wild, stirring charm, which is apt, for a time, to make regular verses seem tame and insipid. As to subject, Whitman set him¬ self the Atlantean task of uplifting into the sphere or dominion of poetry the whole of modern life and man, omitting nothing, con-282

cealing nothing. His thesis is that of Saint Peter's vision : "There is nothing common or unclean.® Hence the logical necessity with Whitman to include the treatment of subjects which in modern society are tabooed as obscene and unmentionable ; hence, too, the accusations of indecency, so evident and pertinent from the accuser's point of view, but so futile and irrelevant from that of the accused. Whit¬ man was an idealist who bound himself by a solemn vow to be a thorough-going realist ; and his resolute and often successful endeavor to secure this union gave his work its excep¬ tional artistic quality. He was a prince of impressionists in literature. But so hard and high was the task that he set himself, that it is no matter of surprise that he sometimes, if not often, fails, and from heights where he was approaching the sublime, falls perilously near the ridiculous.

This is the fate of all artists who strive for the highest things, that their failures — often only apparent — are more easily detected than their solid achievements ; hence the contumely and ridicule that a Tur¬ ner or a Wordsworth, Keats or Shelley suffers at the hands of a clever but uninitiated critic. So it was largely with Whitman ; but it is bet¬ ter to approach him in the same spirit that he has shown toward man and nature, that of for¬ ever seeking for what was great and good, while outfacing steadily and bravely every stern and refractory reality. As the years roll on, Whitman's work is more highly esteemed. He had the true poetic fire, and was one of those who "talked with angels,® and had glimp¬ ses of the life beyond. Several writers have contended that he was ((illuminated,® like Moses and Swedenborg. Besides the two books already mentioned, he published 'Drum-Taps' (1865) ; 'Memoranda During the War' (1867) ; democratic Vistas' (1870) ; (Passage to India) (1870) ; (After All, Not to Create Only) (1871) ; 'As Strong as a Bird on Pin¬ ions Free) (1872) ; (Two Rivulets) (1873); (Specimen Days and Collect' (1883) ; Novem¬ ber Boughs' (1885) ; 'Sands at Seventy) (1888); and 'Goodbye, My Fancy) (1892).

The Conservator, of Philadelphia, is the organ of Whitman study. Consult 'Auto-biographia,' selected from the poet's writings (1892); Bazalgatte, Leon, (Walt Whitman — The Man and the Artist) (Garden City, N. Y., 1919) ; Burroughs, (Whitman as Poet and Per-son) (1866) ; Buche, authorized (Life) (1883) ; Burroughs, (Whitman: A Study) (1896); Harned, Thomas B., (ed.) 'Letters of Anne Gilchrist and Walt Whitman' (1918) ; O'Con¬ nor, (The Good, Gray Poet' (1866) ; Dowden, (Studies in Literature' (1878) ; Symonds, 'Es-says, Speculative and Suggestive' (Vol. II, 1890) ; Shay, 'Walt Whitman, Bibliography' (New York 1916).

WHITMAN, Mass., town in Plymouth County, on the New York, New Haven and Hartford Railroad, about seven miles east of Brockton and 20 miles south by east of Boston. The chief manufacturing establishments are boot and shoe factories, paper and wood box factories, tack and nail works and steel shank factory. Whitman has 65 manufacturing estab¬ lishments, employing about 2,500 persons, with annual products of over $6,000,000. It has

seven churches, public schools and a public li¬ brary. There are two banks, one national and one savings bank. The government is adminis¬ tered by annual town meetings. The town was originally a part of Abington, but was set off in 1875 and incorporated as South

Abington. In 1886 the present name was adopted. Pop.

(1920) 7,147.

WHITMAN COLLEGE, located at Walla Walla, Wash. It was founded by Cushing Ells as a memorial to Marcus Whitman (q.v.) ; it was chartered in 1859 as Whitman Seminary, but was not open to students till 1866; in 1882 the courses were extended, the standard raised and a new charter obtained in 1883 by which the name was changed to Whitman College. Women are admitted on equal terms with men students. The organization includes in addition to the College Department, the Conservatory of Music and the Academy. The college con¬ fers the degrees of bachelor of arts, bachelor of letters, bachelor of science and bachelor of music. Certain studies, including Biblical liter¬ ature, are required for all courses ; Greek is required for the H.B. degree, French or German for the B.L. and B.S. degrees, and one year's work in theory of music, history of music, har¬ mony and counterpoint for the music degree. Each student by the end of the freshman year must elect a major study in which three years' work must be done; the major for the B.S. de¬ gree must be in mathematics or a science. The rest of the required number of hours are free electives. Courses in pedagogy are included in the curriculum. Practical music work does not count toward a degree in the above-mentioned courses; but in the conservatory the degree of bachelor of music is conferred on students who hold a bachelor's degree and complete the reg¬ ular music course. There are 20 scholarships and one loan fund ; students are aided in secur¬ ing employment. The students maintain Chris¬ tian associations, literary societies and an ora¬ torical association, glee clubs, athletic associa¬ tions and a general organization known as the "Associate Students" ; the college is affiliated with the InterCollegiate Debating Association and the InterCollegiate Athletic Association. The campus consist of 27 acres near the centre of the city and includes a small lake. The buildings include the Whitman Memorial, Bill¬ ings Hall (men's dormitory), Reynolds Hall and Prentiss Hall (women's dormitories), Asso¬ ciation Hall, the conservatory and the gymna¬ sium. ' The library in 1917 contained 27,000 volumes; the students numbered 495, and the productive funds totaled $684,044.

WHITMARSH, Hubert Phelps, American

journalist : b. Madpc, province of Quebec, 10 Aug. 1863. He was a druggist in New York and Boston in 1887-1900, and in the latter year

became the representa¬ tive of the Century in Cuba. He subse¬ quently went to the Philippines for the Out¬ look and in 1900-01 was governor of Benguet, P. I., resigning in the last-named year. He has published ‘The World’s Rough Hand’ ; ‘The Golden Talisman’; ‘Mysterious Voyage of the Daphne’ ; ‘The Young Pearl Divers,’ *etc.*

WHITNEY, hwit’m, Adeline Dutton Train, American author: b. Boston, Mass., 15 Sept. 1824; d. Milton, Mass., 21 March 1906.

(

l

\

V*

.

She was married to Seth D. Whitney of Milton, Mass., in 1843. Although a frequent contribu¬ tor to different periodicals during her earlier years, her real literary career did not begin until 1859, and her best work was done in the two following decades. Her writings, which are chiefly for young people, are wholesome in tone and entertaining in style, and include, among many others, (Footsteps on the Seas, a Poem’ (1857) ; (Boys at OhequasseP (1862) ; (Faith Gartney’s Girlhood,* which first brought her into general notice (1863) ; (A Summer in Les¬ lie Goldthwaite’s Life) (1866) ; (Patience Strong’s Outings) (1868); (Hitherto: A Story of Yesterdays) (1869) ; <Real Folks) (1871) ; (Pansiesˆ verse (1872) ; (Sights and Insights* (1876) ; (Bonnybo rough *(1885) ; (Bird Talk,* verse (1887); (A Golden Gossip) (1890); (Friendly Letters to Girl Friends) (1897), *etc.*

WHITNEY, Anne, American sculptor and poet : b. Watertown, Mass., September 1821 ; d. 23 Jan. 1915. She contributed to magazines and

newspapers considerable verse of high quality collected in 1859 in a volume of <Poems.) In 1860 she began work as a professional sculptor, opening a studio at Watertown, whence, after four years of study abroad, it was transferred in 1872 to Boston. Among her works are the statue of Samuel Adams for the Capitol at Washington, a bronze replica of which stands in Adams square, Boston ; one of Lief Erikson in Boston (replica in Milwaukee, Wis.) ; and many designs and studies, including (Roma,) an enlarged copy of which was exhibited at the Columbian Exposition.

WHITNEY, Asa, American inventor and manufacturer: b. Townsend, Mass., 1 Dec. 1791; d. Philadelphia, 4 June 1874. As a boy he worked at the blacksmith's trade, also became a machinist, and afterward manufactured ma¬ chinery in Vermont and at Brownsville, N. Y. In 1830 he was appointed master machinist of the Mohawk and Hudson railroad shops, and three years later became superintendent of the road. In 1839-41 he was a State canal commis¬ sioner in New York, and in 1842 removed to Philadelphia, where he entered into partnership with Matthew Baldwin in the building of loco¬ motives. In 1847 he perfected a process for annealing cast-iron carwheels, and began to manufacture them extensively. By his further improvements in carwheels, etc., he did much to increase the convenience and safety of rail¬ road service and travel. He left $50,000 to the University of Pennsylvania to found a chair of dynamical engineering.

WHITNEY, Caspar, American journalist and author: b. Baltimore, Md., 2 Sept. 1862. He was graduated from Saint Mathew's Col¬ lege, Cal., spent several years in traveling and hunting, acting as correspondent for Harper's Weekly during much of the time and writing on outdoor sports. For five years he was editor of Outing, and later of Outdoor America. His writings include (A Sporting Pilgrimage) ; <On Snowshoes to the Barren Grounds) ; (Hawaiian America) ; (Jungle Travels and Jungle People* ; (The Flowing Road," *etc.*

WHITNEY, Eli, American inventor: b. Westboro, Mass., 8 Dec. 1765; d. New Haven, Conn., 8 Jan. 1825. He was graduated at Yale in 1792; while there having paid his expenses

partly by teaching, partly by mechanical labor. He went to Georgia as a teacher, but finding a patron in the widow of General Nathaniel Greene, of the Revolutionary army, he resided on her estate and studied law. The cotton cul¬ ture at this period, especially that of the best kind, the green-seed cotton, was limited by the slow and difficult

work of separating the cotton from the seed by hand. Whitney set to work to remedy this by inventing a machine, but worked under great disadvantages, for he had to make his own tools. Reports of his success prompted some lawless people to break into his workshop and steal his machine, and get others made before he could secure a patent. He formed a partnership with one Miller in 1793 and went to Connecticut to manufacture cotton gins; but the lawsuits in defense of his rights carried off all his profits and $50,000 voted him by the State of South Carolina. Finally in 1798 he got a government contract for the manu¬ facture of firearms, and was the first to effect the division of labor by which each part was made separately. He made a fortune by this manufacture, carried out with ingenious ma¬ chinery at Whitneyville, Conn.; while he re¬ ceived little credit for the perfection of the gin, one of the most important of the whole series of inventions connected with the cotton manu¬ facture. See Cotton; Cotton Cultivation in the United States.

WHITNEY, Gertrude Vanderbilt (Mrs. Harry Payne Whitney), American sculptor, daughter of Cornelius Vanderbilt, 1843-99 (q.v.) : b. New York City. She was married to H. P, Whitney, son of William C. Whitney (q.v.), in 1896, is prominent socially and has gained a considerable reputation as a sculptor. She organized the Society of Friends for Young Artists; and during the European War she maintained a hospital at Neuilly, France, for which service she received a gold medal from the French Foreign Office in 1915. She de¬ signed the (Titanic MemoriaP for Potomac Park, Washington, D. C. ; the (Aztec Fountain,* Pan-American Union, Washington; (The Foun¬ tain of El Dorado) (exhibited at San Francisco, 1915), *etc.*

WHITNEY, Henry Howard, American

military officer: b. Glen Hope, Pa., 25 Dec. 1866. He was graduated from West Point in 1892, and was on special duty at the War Depart¬ ment in 1896-98. In the last-named year, under orders from the Secretary of War, he disguised himself as an English sailor, communicated with General Gomez, and made a military reconnais¬ sance of the island of Porto Rico, thereby gain¬ ing the information upon which General Miles based the campaign on that island. He was captain of volunteers in 1898-99, served through the Spanish War as captain and assistant adju¬ tant-general on the staff of General Miles, and in 1899 was appointed lieutenant. He accom¬ panied General Miles in his tour around the world in 1902-03. He was chief-of-staff, Dis¬ trict of Paris, 1918-19.

WHITNEY, Sir James Pliny, Canadian statesman : b. Williamsburg,

Ontario, 2 Oct. 1843; d. 24 Sept. 1914. He was called to the bar of Ontario in 1876, and engaged in practice at Morrisburg, Ontario. He was elected to the Ontario legislature in 1888, where he became

the leader of the Conservative Opposition ; and fiom 1905 until his death he was Premier of Ontario. He was knighted in 1908.

WHITNEY, Josiah Dwight, American geologist, brother of W. D. Whitney (q.v.) : b. Northampton, Mass., 23 Nov. 1819; d. Lake Sunapee, N. H., 18 Aug. 1896. He was grad¬ uated at Yale in 1839, and spent the years 1842-47 in study in Europe, and then explored, with J. W. Foster, the Lake Superior region. Their (Synopsis } of the explorations was published in 1849 and their <Report) on the geology, 1850-51. He was appointed State chemist and professor in the Iowa State University in 1855 and State geologist of California in 1860. He labored on the survey of that State till 1874, publishing his (Geological Survey of California) (1864-70). In 1865 he was appointed to the chair of geology at Harvard. Among his publications not al¬ ready named are (The Metallic Wealth of the United States) (1854) ; (Yosemite Guidebook) (1869); (Contributions to American Geology) (1880); (Studies in Geographical and Topo¬ graphical Nomenclature) (1888). The highest peak of the Sierra Nevada was named Mount Whitney (q.v.) in his honor.

WHITNEY, William Collins, American

capitalist and politician : b. Conway, Mass., 15 July 1841; d. New York, 2 Feb. 1904. He was graduated at Yale in 1863, and at the Harvard Law School in 1865 ; studied law with Abraham R. Lawrence in New York, and was admitted to the bar in that city. He took an active part in the organization of the Young Men's Demo¬ cratic Club, and in the proceedings against the <(Tweed Ring® ; served as corporation counsel of the city in 1875-82, thoroughly reorganizing the law department; and was secretary of the navy in the Cabinet of President Cleveland from 1885 to 1889. In this position he accomplished much in the development of plans for strength¬ ening

the naval service, and the (<new navy® owes its subsequent increase in considerable part to his progressive policy. He did effective work for the election of Grover Cleveland as governor of New York in 1882, and as President in 1884, and again in 1892, when he was manager of the Democratic campaign. He declined to enter the Cabinet again, preferring to pursue his business career, in which his interests had grown to great proportions. One of his largest enter¬ prises was that which resulted in the consolida¬ tion of the various street railway lines in New York City. The Metropolitan Street Railway system was mainly organized by him, and he was a director in many corporations and socie¬ ties. He was also a man of recreations, was especially interested in the breeding and train¬ ing of horses, and became the recognized leader of the American turf, for the elevation of which to higher levels of sportsmanship he suc¬ cessfully strove. At the time of his death he was one of the largest landowners in the East, his holdings being in several States, and includ¬ ing a game preserve of 16,000 acres in the Adirondacks. While his main residence was in New York, he also maintained others on his various estates, North and South, as well as a house in London. He left two sons, Harry Payne Whitney and Payne Whitney.

WHITNEY, William Dwight, American philologist, brother of J. D. Whitney (q.v.) : b.

Northampton, Mass., 9 Feb. 1827; d. New Haven, 9 June 1894. He was graduated from Williams College in 1845, studied at Yale in 1849-50, and then went to Germany, where he continued his philological and Sanskrit studies under Bopp at Berlin and Roth at Tubingen. He was appointed to the professorship of Sanskrit at Yale in 1854, and in 1870 he received in addition the chair of comparative philology, posts which he retained till his death. In 1856 he published, with Roth, an edition of the Atharva-Veda Sanhita, and in 1862 issued at New Haven an edition, with translation and notes, of the (Atharva-Veda PratigakhyaP His (Language and the Study of Language> (1867) was an admirable exposition of the main principles of comparative philology. His other published works include (A Compendious Ger¬ man Grammar) (1869) ; (A German Reader > (1869) ; an edition of the (Taittiriya-Prati- qakhya) (1872), for which he was awarded the Bopp medal of the Berlin Academy; (Oriental and Linguistic Studies) (1872) ; (The Life and Growth of Language J (1875) ; (Essentials of English Grammar) (1877); (A Sanskrit Grammar) (1879) ; (The Roots, Verb Forms, and Primary Derivatives of the Sanskrit Language) (1885), a supplement to the grammar; (A

Practical French Grammar) (1886), *etc.* He was a contributor to Bohtlingk and Roth's great (Sanskrit Dictionary) (1853-75) and editor-in-chief of (The Century Dictionary of the English Language) (1889-91). He was elected a member of the American Oriental Society in 1850 and wrote more than half of the contents of Vols. 6-12 of the (Journal > of that society. For a complete bibliography of his work, consult the 19th volume of the (J°iirnal of the American Oriental Society) (1897).

WHITNEY, Willis Rodney, American chemical engineer: b. Jamestown, N. Y., 22 Aug. 1868. He was graduated at the Massachusetts Institute of Technology in 1890 and took his Ph.D. at the University of Leipzig in 1894. He was appointed nonresident assistant professor of theoretical chemistry at the Massachusetts In¬ stitute of Technology in 1904, and nonresident professor in 1908. Since 1904 he has been direc¬ tor of the research laboratory of the General Electric Company, Schenectady, N. Y. Among other results of his research work may be mentioned the perfecting of the metallic electric lamp filaments and the development of wrought tungsten. He was president of the American Chemical Society in 1910 and received its Wil¬ lard Gibbs Medal in 1916. He was also presi¬ dent of the Electrochemical Society in 1911; and was appointed to the Naval Consulting Board in 1915. He is author of many papers in technical magazines and translator of Le Blanc's (Electro-Chemistry> (1896).

WHITNEY, Mount, a peak of the Sierra Nevada, in the southeastern part of California; altitude, 14,522 feet. It is the highest elevation in the United States, outside of Alaska. On the east side the slope is precipitous, rising abruptly from Owens Valley about 11,000 feet. In 1881 Prof. S. P. Langley remained for some time on the summit, making daily observations on the solar heat.

WHITNEYITE, a metallic mineral, con¬ taining 88.4 per cent of copper and 11.6 per cent of arsenic and having the formula Cu9As. It is

known only massive, its structure being very fine-granular. It is malleable, has a hardness of 3.5 and specific gravity of about 8.5. Its color is pale reddish-white, tarnishing quickly to a bronze or nearly black. It has been re¬ garded as a rare mineral until discovery of large quantities in the Mohawk mine, Michigan, where it is now a valuable ore of copper.

WHITON, James Morris, American Con¬ gregational clergyman: b. Boston, Mass., 11 April 1833; d. 25 Jan. 1920. Graduated, Yale, 1853 and in 1861 received the degree of Ph.D. He became rector of the Hopkins Grammar School in New Haven, Conn. (1854—64) and was a Congregational pastor in Lynn, Mass. (1865-75) and from 1876-78 at Williston Seminary, Easthampton, Mass. Later he was Congregational pastor in Newark, N. J., and New York (1879— 91) and' Haworth, N. J. (1898-1901). After 1896 he was on the editorial staff of the Outlook and in 1899 was elected chairman of the New York State Conference of Religion. Among his published works are several school textbooks in Greek and Latin and the following: (Select orations of Lysias) (1875) ; (Is Eternal Punish¬ ment Endless ?> (1876) ; (Beyond the Shadow) ; (Gospel of the Resurrection (1881) ; (The Evolution of Revelation (1885) ; (The Divine Satisfaction (1885) ; several volumes of ser¬ mons preached in Great Britain (1887-89) ; (Gloria Patri, Our Talks about the Trinity) (1892); Reconsiderations and Re-enforcements y (1896) ; < Miracles and Supernatural Religion (1903) ; Hnterludes, Ethical, Social, Theolog-icaP (1910); (Getting Together, Essays by Friends in Council* (1913).

WHITRIDGE, Frederick Wallingford,

American lawyer: b. New Bedford, Mass., 8 Aug. 1852; d. New York, 30 Dec. 1916. He was graduated at Amherst College in 1874 and at the Columbia University Law_ School in 1878. He was admitted to the bar in 1879 and engaged in practice in New York, where he later became senior partner in the law firm Whitridge, Butler and Rice. He was also presi¬ dent of several electric railway lines in New York and its surrounding suburbs. He was lecturer on administrative law at Columbia University in 1883-94. In 1906 he was special United States Ambassador to Spain to attend the coronation of King Alphonso XIII. He is author of many papers on politics and econom¬ ics and of (One American's Opinion of the European War: An Answer to Germany's Ap-peaP (1914).

WHITSIDE, hwit'sld, Samuel Marma-duke, American military officer: b. Toronto, Canada, 9 Jan. 1839; d. 1904. He entered the United States army in 1858; served through the Civil War, was brevetted

major in 1865 and in 1866 was appointed captain. He was afterward engaged for more than 25 years in the Indian wars on the Western frontier, where he cap¬ tured Big Foot and his 400 Sioux warriors in December 1890; and commanded his regiment at the battle of Wounded Knee on the follow¬ ing day. He was promoted lieutenant-colonel in 1895; was in command of the Fifth United States cavalry during the Spanish-American War and was placed at the head of the Depart¬ ment of Santiago and Puerto Principe, Cuba, in January 1900. He was promoted brigadier-general of volunteers in 1901, receiving that

rank in the regular army in 1902, and in the same year was retired from active service.

WHITSITT, hwit'sit, William Heth,

American Baptist clergyman and educator : b. Nashville, Tenn., 25 Nov. 1841; d. 1911. He was graduated from Union University, Mur¬ freesboro, Tenn., in 1861, served in the Con¬ federate army, 1862-65, and was pastor of Mill Creek Church, Nashville, 1865-66. He subse¬ quently studied at the University of Virginia, the Southern Baptist Theological Seminary, Louisville, Ky., and at Leipzig, and became pastor of a Baptist church in Albany, Ga., in 1872. He was professor in the Southern Bap¬ tist Theological Seminary, 1872-95, president of that institution, 1895-99, and was also pro¬ fessor of philosophy at Richmond College, Va., after 1901. He has published (History of the Origin of Infant BaptisnP ; (Origin of the Disciples of Christ* ; (A Question in Baptist History) (1897).

WHITSON, John Harvey, American nov¬ elist : b. Seymour, Ind., 28 Dec. 1854. He was admitted to the Indiana bar in 1876, but after practising his profession for a time turned to journalism. He has published (The Young Ditch Rider and Other Stories) (1899) ; (Barbara, a Woman of the West) (1903); (With Fremont the Pathfinder* (1903) ; cThe Rain¬ bow Chasers) (1904) ; (A Courier of the Em-pier> (1904) ; ˆCampaigning with Tippecanoe* (1904) ; (Justin Wingate, Ranchman) (1905) ; cThe Castle of Doubt* (1906).

WHITSUNDAY, the seventh Sunday after Easter; a religious festival in commemoration of the descent of the Holy Spirit on the day of Pentecost. The name was derived from the white garments worn on that day by candidates for ordination and children presented for bap¬ tism. The older name was Pentecost. See Pentecost.

WHITTEMORE, hwit'e-mor, Amos, American inventor: b. Cambridge, Mass., 19 April 1759; d. West Cambridge (now Arling¬ ton), Mass., April 1828. He worked for some years as a gunsmith, and finally formed a co¬ partnership with one of his brothers and sev¬ eral other persons for the manufacture of cot¬ ton and wool cards. He had not been long en¬ gaged in this business before he invented a machine for puncturing the leather and setting the wires, a work previously performed by hand. In experimenting for this invention he met with great difficulty in bending the wires to a given angle after they were finally fastened in the leather, and was on the point of giving up the attempt when in a dream he discovered a method of effecting it. The invention was patented in the United States in 1797, and Whittemore went to England to secure his rights there, but was unsuccessful. In the United States the patent was sold for $150,000; but afterward his brother Samuel Whittemore repurchased it, and carried on the business. Amos Whittemore devoted his last years to the invention of an orrery, in which every planet was to describe its own orbit, but did not live to complete it.

WHITTEMORE, Thomas, American Universalist clergyman: b. Boston, 1 Jan. 1800; d. Cambridge, Mass., 21 March 1861. He studied for the ministry under the Rev. Hosea Ballou,

in April 1821 ; was settled as the Universalist minister at Milford, Mass., and the next year removed to a church in Cambridgeport, Mass. He resigned in 1833, but resided in Cambridge for the remainder of his life. Early in his min¬ istry he was joint editor of the' Universalist Magazine, and in 1828 commenced the publi¬ cation of the Trumpet , a Universalist news¬ paper in Boston, of which he was sole editor and proprietor for nearly 30 years. He was also president of the Cambridge bank and of the Vermont and Massachusetts Railroad, and represented Cambridge repeatedly in the State legislature. He published (A History of Universalism' (1830; enlarged 1860) ; (Notes and Illustrations of the Parables) (1832) ; (Songs of Zion) (1836) ; (Plain Guide to Univeralism' (1839) ; (Life of Hosea Ballou) (1854-55), *etc.* Consult his

(Autobiography ' (1859).

WHITTIER, hwit'i-er, John Greenleaf,

American poet: b. Haverhill, Mass., 17 Dec. 1807 ; d. Hampton Falls, N. H., 7 Sept. 1892. A Quaker, he labored in boyhood on the farm made celebrated by (Snowbound, ' and received but little formal education, though he con¬ trived by working at shoemaking and teaching to pay for two periods of six months at Haver¬ hill Academy in 1827-28. The acceptance of a poem from him in 1826 for the Newburyport free Press led to a lifelong friendship with its editor, William Lloyd Garrison (q.v.). His fame had become so firmly established as a poet, that most people forget his long career as an editor and reformer. He edited the American Manufacturer, a weekly concerned chiefly with mechanics, the industries and agriculture, in Boston in 1829, and in the following year the Haverhill Gazette. During 1830-32 he conducted the New England Review, which G. D. Pren¬ tice (q.v.) had brought into some prominence, at Hartford, Conn., and to this time belong his first independent publications, (Legends of New England) (1831), and (Moll Pitcher' (1832). In 1833 he issued (Justice and Expediency,' an anti-slavery pamphlet and acted as a secretary of the anti-slavery convention at Philadelphia, and a member of the committee which drafted the ˆdeclaration of principles." He sat in the Massachusetts legislature in 1835, and in the following year sold his farm and removed to Amesbury, some eight miles northeast of Haver¬ hill, where he chiefly resided for the rest of his life. In 1836 he became secretary of the Anti-Slavery Society, and in 1837 there appeared a volume of (Poems Written During the Progress of the Abolition Cause in the United States.' With that cause he was now thoroughly identi¬ fied. At Concord, N. H., he, with George Thompson (q.v.), was mobbed during the lat¬ ter's lecturing tour. Whittier edited the Penn¬ sylvania Freeman in Philadelphia during 1S3S-40, and in the first of these years his office was sacked and burned by a mob. In 1844-45 he edited the Middlesex Standard in Lowell, and during 1847-60 was corresponding editor of the National Era, a Washington paper, sometimes writing half-a-dozen columns weekly of general articles and reviews. He also contributed to the Atlantic Monthly from its foundation in 1857. His poem, (A Word for the Hour' (Jan¬ uary 1861), shows that he shrank from the Civil War and was prepared to let the Southern

States secede. He hailed the end of the war and of slavery with delight, and did his utmost to induce the North to welcome back the

South in the most generous spirit. His publications, after those above mentioned, include the fol¬ lowing: (Mogg Megone' (1836); (Poems'

(1838) ; (Lays of My Home and Other Poems' (1843) ; (The Stranger in Lowell' (1845) ; (Supernaturalism in New England' (1847) ; (Leaves from Margaret Smith's Journal' (1849), an imaginative description of early New England, and (01d Portraits and Modern Sketches' (1850), all four collected from the (Era' ; (Voices of Freedom' (1846); 'Songs of Labor, and Other Poems' (1850) ; (The Chapel of the Hermits, and Other Poems' (1853) ; (Literary Recreations and Miscellanies,' also gathered from the (Era' (1854); (The Panorama, and Others Poems' (1856) ; (Hoine Ballads and Poems' (1860) ; Un War Time, and Other Poems' (1864) ; (National Lyrics' (1.865); (Snowbound: a Winter Idyl' (1866); (The Tent on the Beach, and Other Poems' (1867); (Among the Hills, and Other Poems' (1869); (Miriam, and Other Poems' (1871); (The Pennsylvania Pilgrim, and Other Poems' (1872); (Hazel Blossoms' (1875); (Mabel Martin: a Harvest Idyl' (1875); (The Vision of Echard, and Other Poems' (1878) ; (The King's Missive, and Other Poems' (1881); (The Bay of Seven Islands, and, Other Poems' (1883) ; (Saint Gregory's Guest, and Recent Poems' (1886), and (At Sundown' (1892), a posthumous volume. The Riverside edition of his works, both in prose and in verse, carefully revised and annotated by himself, appeared at Boston in 1888-89. The most complete edition of the poems is the one-volume Cambridge edi¬ tion (1895). Whittier was long interested in politics, though his active participation largely ceased with the development of anti-slavery opinion in the North. His services to the cause of anti-slavery were important. He wrote nu¬ merous occasional poems celebrating or de¬ nouncing incidents and events of the conflict, the best known being the Hchabod' verses, ((the most powerful that he ever wrote," rebuk¬ ing the defection of Webster from the anti¬ slavery principles in the (Seventh of March' speech. Opposed to the Civil War, he insisted, when it was begun, that slavery was the vital question, and during its progress contributed largely to the small quantity of valuable poetry that it evoked.' Subsequently he devoted him¬ self to presenting in narrative and ballad poems the legends, traditions and history of colonial America, particularly New England; to de¬ scribing, as he did notably in (Snowbound,' rural scenes and conditions, many of which have passed into history, and to writing several hymns which appear in the collections of many denominations. His work had been criticized for its inequality and faulty rhymes, and also somewhat for its moralizing tendency. Much cf his verse does reveal a certain want of com¬ pression and verbal selections, due principally to the fact that it was written with a

readiness approaching improvisation. To object to his moralizing tendency is simply to object to the point of view of one who was originally and strongly, a reformer. His leading characteris¬ tics are a fine simplicity, a convincing quality and what Lowell styled as his ˆgenial piety.”

He was less cosmopolitan than Longfellow, but by many critics has been ranked as not greatly inferior to that poet. Consult the biographies by Underwood (1875; new ed., 1883) ; Kennedy (1882) ; Linton (1893) ; Pickard (1894; the au¬ thoritative ‘Life and Letters*); Barton (1900; ‘Beacon Biographies)) , and Carpenter, G. R. (1914). Also Fields, ‘Whittier: Notes of His Life and His Friendships) (1893) ; Claflin, ‘Personal Recollections of John G. Whittier) (1893) ; Pickard, ‘Whittier as a Politician (1900) and ‘Whittier Land) (1904) ; Stedman, ‘Poets of America) (1886), and Eastburn’s ‘Whittier’s Relation to German Life and Thought* (Philadelphia 1916).

WHITTIER, Cal., city in Los Angeles County, 15 miles southeast of Los Angeles, on the Southern Pacific Railroad. The city was founded as a Quaker colony in 1887. Whittier College is located here. The surrounding dis¬ trict produces oil, walnuts and citrus fruits. Pop. (1920) 7,997.

WHITTINGHAM, hwlt ‘ing-ham, William Rollinson, American Protestant bishop: b. New York, 2 Dec. 1805; d. Boston, 17 Oct. 1879. He was graduated at the General Theological Seminary, New York, in 1825, ordained deacon in 1827, and priest 1829, and was in charge of Saint Mark’s Church, Orange, N. J., until 1831. He then became rector of Saint Luke’s, New Y’ork, and in 1835 was professor of ecclesiastical history in the General Seminary, which posi¬ tion he held until his consecration as bishop of Maryland in 1840. In this office he com¬ manded universal respect by the fullness and breadth of his scholarly attainments. He was generally recognized, especially in the historical field, as the most learned prelate in his com¬ munion. A convinced but fair and chivalrous controversialist, he advocated the principles of his faith in such a way as to win adherence to them in all parts of the

country. The written evidence of his learning is, however, preserved principally in the pages of various periodical publications, such as The Churchman, of which one time he was editor. During the Civil War, in opposition to many of the people in Mary¬ land, he was unflinching in his advocacy of loyalty to the Federal government.

WHITTINGTON, hwit'ing-ton, Richard, English magistrate : b. Pauntley, Gloucester¬ shire, about 1359; d. London, March 1423. He became a mercer in London, a member of the common council in 1385 and 1387, subsequently alderman and sheriff, and mayor in 1397-98, 1406-07 and 1419-20. He was very liberal in charitable gifts. The legend which represents him as making his fortune by sending a cat in an outgoing ship to Barbary, where it was sold for a large sum, and as returning to Lon¬ don, which he had just quitted on hearing Bow bolls sounding what seemed to be

" Turn again, Whittington,

Lord Mayor of London,"

is without foundation ; though it is treated as fact in the uncritical 'Lives) by Lysons (1860) and Besant and Rice (1881; 2d ed., 1894). Consult Clonston, 'Popular Tales and Fictions* (1887) and Wheatley's edition (for the Villon Society) of the 'History of Sir Richard Whit¬ tington } by T. H. (1885).

WHITTLESEY, hwit'l-si, Charles, Ameri¬ can geologist: b. Southington, Conn., 4 Oct. 1808; d. Cleveland, Ohio, 1886. He was gradu¬ ated from West Point in 1831, served in the Black Hawk War of 1832 and resigned from the army in that year. He was admitted to the bar and engaged in law practice at Cleve¬ land, where he was on the editorial staff of the Herald in 1836-37, and in 1837-38 was engaged in the Ohio State geological survey. He was occupied in making a mineralogical and geologi¬ cal survey of the Lake Superior and upper Mississippi regions for the United States gov¬ ernment in 1847-51, and in 1858-60 was attached to the Wisconsin geological survey. On 17 April 1861 he was appointed assistant quarter¬ master-general in the staff of the governor of Ohio, and in the western Virginia campaign served as chief engineer of the Ohio troops. He was appointed colonel in August 1861 and was subsequently chief engineer of the Depart¬ ment of the Ohio. He led his regiment at the battle of Fort Donelson and at the battle of Shiloh was in command of a division. Failing health compelled his resignation in 1862 and he

resumed his surveys in the Lake Superior and upper Mississippi regions. He was one of the founders in 1867 of the Western Reserve Historical Society of Cleveland and was for many years its president. His writings include more than 200 titles. Among them are ‘De¬ scription of Ancient Works in Ohio* (1851); ‘Ancient Mining on the Shores of Lake Su¬ perior (1863); ‘Early History of Cleveland and Vicinity) (1867), *etc.*

WHITTREDGE, hwit’rej, Worthington,

American artist: b. Springfield, Ohio, 22 May 1820; d. 1910. He studied art in Cincinnati, worked there as a portrait-painter 1842-49, later went to Europe and studied under Andreas Achenbach at Dusseldorf, also in Paris, Bel¬ gium, Holland and Rome, returning to the United States in 1859, to become noted as a landscape painter, his chief subjects being drawn from American scenery. Accompanying General Pope on a tour of inspection at the West in 1874, he sketched many Rocky Moun¬ tain views. He was president of the National Academy of Design in 1875-76. His chief works include ‘House on the Hudson River) (1863, in the New York Public Library) ; ‘Old Hunt¬ ing Ground* (1864); ‘View of the Rocky Mountains from the River Platte) (1868) ; ‘Trout Brook) (1875) ; ‘Camp Meeting) (1906, in the Metropolitan Museum), *etc.*

WHITWORTH, hwit’werth, Sir Joseph, English mechanical engineer : b. Stockport, 21 Dec. 1803; d. Monte Carlo, Italy, 22 Jan. 1887. He worked as a mechanic in Manchester and London, discovered the method of making a truly plane surface, and in 1833 established himself as a tool-maker at Manchester. Be¬ tween 1840 and 1850 he developed his measur¬ ing-machine, by means of which he elaborated his standard system of uniform measures and gauges which was found by engineers to be of great usefulness. One of his devices which proved to be of much immediate service was that of a uniform system of screw-threads. He made many experiments in connection with rifles, and in 1857 perfected a hexagonal-bar- reled rifle of great range, accuracy and pene-

trative power, highly excelling the Enfield, then largely in use. It was not accepted at the time bv the War Department, as being of a cafibre too small (4.5) for a military weapon; though in 1869 the War Office declared that a weapon of such calibre would appear to be the most suitable. He was equally successful in the' build¬ ing of cannon, but his rifled gun with a 250-pound shell and a six-mile range, was rejected by the ordnance board in 1865, greatly to the detriment of British ordnance. His invention of compressed cast steel for ordnance was an important one, and came into general use. His works at Manchester were converted into a limited liability company in 1874, and. in 1897 united with the Elswick works, established by Sir William Armstrong (q.v.). His fortune was devoted to the endowment of 30 scholar¬ ships in mechanics and to the furthering of char¬ itable and educational work. He was made a baronet in 1869. Among his writings were <The Industry of the United States in Machinery, Manufactures and Useful and Ornamental Arts* (1854) and Miscellaneous Papers on Mechani¬ cal Subjects > (1858). Consult the memoir, m the Proceedings* of the Institution of Civil Engineers, Vol. XCI (1887-88).

WHITWORTH GUN. See Ordnance.

WHITWORTH SCHOLARSHIPS, cer¬ tain scholarships established in England in 1869 by Sir Joseph Whitworth, to encourage the cultivation of combined theoretical and practi¬ cal skill in the industrial arts of mechanics and engineering. They were placed by the founder under the charge of the English council of edu¬ cation, and are open to be competed for by any young man not 26 years complete, and who has been engaged in handicraft in the workshop of a mechanical engineer for at least three years. There are now four scholarships annually competed for of the value of $500, tenable for three years, besides exhibitions ten¬ able for one year, value $250 and $400.

WHOLE FAMILY PROTECTION. See

Insurance, Fraternal.

WHOOPER, the whooping swan. See Swan.

WHOOPING-COUGH. See Hooping—

cough.

WHOOPING CRANE. See Crane.

WHORTLEBERRY. See Vacciniaceal

WHYDAH, hwid'a, French West Africa, a seaport town of Dahomey, on a lagoon com¬ municating with the Bight of Benin, about 70 miles south of Abomey. It has a considerable trade in palm-oil. Pop. about 15,000.

WHYDAH-BIRD, WHIDAH-BIRD, or WIDOW-BIRD, a weaver-bird (q.v.) of the West African subfamily Viduince, in which the tail-feathers are greatly prolonged and modified. The paradise whydah-bird is brownish-black, the head, chin and throat being black and the neck encircled by a brown collar. The under parts are pale brown. The tail is long and the two central feathers are elongated and possess broad webs at the tip and a slender shaft, while the two next feathers are about 11 inches long and are broadly webbed. The other tail feathers are set vertically. This species attains a length of five or six inches, exclusive of the tail feathers.

The nest is said to be ingeniously made of cot¬ ton fibres and to be divided into two compart¬ ments, in one of which the female sits on the eggs, the other being occupied by the male bird. The shaft-tailed whydah-bird (V. regia) is colored a rusty red on the head and neck, the back of the head and crown being black. The average length of this species is eight or nine inches, and the four central feathers are elongated, but consist each of the bare shaft or quill only, a slight web existing at their tips. Consult Newton, dictionary of Birds* (New York 1896).

WHYMPER, hwim'per, Edward, English

author and traveler: b. London, 27 April 1840; d. 1911. He was educated privately, and in 1860 was sent by a London firm to make sketches of Alpine peaks. He ascended Mount Pelvoux in the French Alps in 1861, the Pointe des Ecrius in 1864 and in 1865 the Matterhorn. He visited northern Greenland in 1867 and in 1872, making valuable discoveries in evidences of a previous abundant rich vegetation there, his collection of specimens being now a part of the collection of the British Museum. In 1879-80 he explored the Andes in Ecuador, discovered the Andean glaciers, and succeeded in ascending Chim¬ borazo, a feat which Humboldt attempted and had failed to accomplish. In 1901 he made an exploring tour of Canada, ascending mountains and making investigations in the region of the ((Great Divide.® His publications include Scrambles Amjong the Alps in the

Years 1860-69) (1871); (Travels Among the Great Andes in the Equator* (1892) ; (Zermatt and the Matterhorn* (1897), and (Chamonix and Mont Blanc) (1896). The two latter are reprinted almost every year for sale to tourists.

WHYTE, Alexander, clergyman of the Free Church of Scotland: b. Kirriemuir, For¬ farshire, Scotland, 13 Jan. 1837. His education was received at the University of Aberdeen and at New College, Edinburgh. He was assistant minister of Free Saint John's, Glasgow, 1866-70; assistant minister, 1870-73 and minister, 1873-1909 of Free Saint George's, Edinburgh. Since 1909 he has been professor of New Testa¬ ment Literature and principal of New College, Edinburgh. He is the author of (A Com¬ mentary on the Shorter Catechism* (1882) ; (Bunyan Characters* (4 series, 1893-1908) ;

(Samuel Rutherford and some of his Corre¬ spondents* (1894) ; (Jacob Behrnen; An Appre¬ ciation (1894); (Lancelot Andrewes and His Private Devotions) (1895) ; (Four Tempera¬ ments* (1895; later ed., 1910); (Bible Char¬ acter (6 vols., 1896-1902); (Saint Teresa: An Appreciation (1897, 1910) ; (Father John of the Greek Church) (1898) ; (Sir Thomas Browne: an Appreciation (1898); Characters and Characteristics of William Law) (1898) ; (Newman: an Appreciation (1901); (Bishop Butler: an Appreciation (1903); (The Apostle PauP (1903) ; (Walk, Conversation, Charac¬ ter of Jesus Christ Our Lord) (1905) ; (Thomas Shepherd, Pilgrim Father and Founder of Harvard* (1909) ; ˆThirteen Appreciations of Old Time Divines, Mystics, and Churchmen *

(1914).

W H Y T E-M ELVILLE, hwit'mel'vil, George John, British novelist : b. Fifeshire, Scotland, 19 June 1821 ; d. Vale of Aylesbury,

Berkshire, 5 Dec. 1878. He was educated at Eton and at 18 joined the

93d Highlanders, from which he exchanged in 1846 into the Coldstream Guards. He retired in 1849 with the rank of major, but volunteered for active service in the Crimean War and was appointed major of the Turkish irregular cavalry. The rest of his life was chiefly devoted to fox-hunting and other field sports, and to the writing of novels of fashionable and sporting life. He was killed by the fall of his horse while hunting. The fol¬ lowing are among his novels: (Kate Coventry> (1856) ; (Holm,by House5 (1860); (The Queen's Maries5 (1862) ; <Bones and I5 (1868) ; Con¬ traband5 (1870); (Sarchedon5 (1871); (Satan-ella5 (1873); <Rosine5 (1875); <Roy's Wife5 (1878) ; (Black but Comely5 (1879). He also published some volumes of verse, including notable sporting lyrics.

WIARD, Norman, American inventor: b. Normandale, Ontario, 1826; d. Reading, Pa., 11 Sept. 1896. In early life he was foreman in a foundry at Bradford, Ontario, where he be¬ gan experiments in founding ordnance. Dur¬ ing the Civil War he was employed by the United States government in the manufacture of ordnance and projectiles, and was frequently called into consultation by the President and Secretary Stanton. After the war he applied himself to experiments and inventions in his special lines ; patented a device for preventing the explosion of steam boilers, which he sold to the United States and Japanese governments; he spent two years in Japan in government employ; was for some time a military engineer in that country; and on his return to the United States conducted, near Boston, a series of ex¬ periments in gunnery which attracted wide attention.

WIARTON, Canada, town in Bruce County, Ontario, on Georgian Bay, 125 miles northwest of Toronto, and on the Grand Trunk Railway. There are manufacturing interests. Pop. 2,266.

WIBERT. See Guibert.

WIBORG, vTborg, or VIBORG, Finland. (1) A town and capital of the government of its own name, on a bay in the Gulf of Fin¬ land. 72 miles northwest of Petrograd, with which and with Helsingfors it is connected by railway. It is regularly built in spacious streets ; and has the ruins of a fine old castle, situated on an isolated rock in an arm of the sea. A third-class Russian fortress was located here in 1914. It carries on some iron founding and other industries, and has a considerable trade in timber, deals, tar, tallow and fish. The canal that connects the Gulf of Finland, with Lake Saima, starts at Wiborg. In 1918 it was the seat of government of a Red Guard move¬ ment. Pop. about 29,329. (2) The govern¬

ment forming the southeastern region of Fin¬ land; has an area of 13,530 square miles. Pop. about 400,000.

WICASSET, Me., town, port of entry, county-seat of Lincoln County, on the Sheepscot River and on the Maine, Central Railroad, about 48 miles northeast of Portland and 20 miles from the Atlantic. In 1760 the town was incorporated under the name of Pownalboro, and in 1802 it was reincorporated under the present name. Wicasset is a popular summer VO!.. 29 — 19

resort with some manufacturing interests. There are two banks. Pop. 1,287.

WICHERN, viH'ern, Johann Heinrich,

German philanthropist: b. Hamburg, 21 April 1808; d. there, 7 April 1881. He studied the¬ ology at Gottingen and Berlin, and then return¬ ing to his native town gave himself up to en¬ deavors to improve the condition of the poor and suffering. In the Rauhes Haus (founded 1 Nov. 1833) he established an institution for neglected children, with a training seminary for teachers connected with it, and similar institu¬ tions were shortly afterward formed through¬ out Germany. In 1856 he was appointed coun¬ cillor of the Prussian Ministry of the Interior, and in 1858 superintendent of all penal and reformatory institutions in the kingdom. His writings include (Die Innere Mission der Deutschen Evangelischen Kirche5 (1849) ; (Die Behandlung der Verbrecher und Entlassenen Straflinge5 (1853) ; (Der Dienst der Frauen in der Kirche5 (1858). Consult Lives by Olden¬ burg (1881-86) ; Krummacher (1882).

WICHITA, Kan., city and county-seat of Sedgwick County, in the south central part of the State on the Arkansas River, about half way (216 miles) between Kansas City and Oklahoma City, and on the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Missouri Pacific and the Saint Louis and San Francisco railroads. It is the northern terminus of the Midland Valley and the Kansas City, Mexico and Orient railroads and the southern terminus of the Arkansas Valley Interurban. Located in the rich Ar¬ kansas Valley its chief products are wheat, oats, corn, broom corn, kaffir, alfalfa, cattle, hogs and poultry. These agricultural products have made it one of the largest milling and packing centres in the central part of the United States. There are several factories de¬ voted to the manufacture of breakfast foods and stock foods. Other manufactories of note are

foundry and machine products, automobiles, automobile tires, shirt and overall factories, fur¬ niture factories, boot and shoe factories, book binderies and printeries, planing mills. The city has a large wholesale and jobbing trade. The wholesale trade amounted to about $25,000,000 in 1918, the manufacturing to about $125,000,000. The city is the chief distributing point of the southwest for automobiles, tractors and trucks as well as all kinds of farm machinery. The two daily newspapers have the largest number of readers in the State. Among the principal public buildings are the United States govern¬ ment building, the courthouse, the city hall, the Scottish Rite Masonic Temple, the Forum and Exposition hall (seating 8,000), the Catholic cathedral and the high school. The city can now boast of one of the finest hotels in the southwest. There are about 40 different churches representing half as many different denominations. Other buildings of importance are the Wichita City Hospital, Saint Francis Hospital, the Wesley Hospital, the Wichita Children's Home, the Masonic Home and the Kansas Sanitarium. . Among the educational institutions are Friends University (1898), Fairmount College (Congregational), opened 1892, All Hallows Academy (Roman Catholic), two business colleges, three colleges of music

and a beautiful public library. The city has a very efficient motorized fire department, an adequate system of waterworks and a modern sewage system. The natural gas supply is suffi¬ cient for domestic use. The park system is the largest and most beautiful in the State. There are 18 State banks and four national banks. Oil was discovered 20 miles east of Wichita in 1914. During the year 1917 the average daily output from this field was 150,000 barrels. The discovery of oil led to the invest¬ ment of $30,000,000 in refineries in Wichita. Since April 1917, Wichita has been governed by a board of five commissioners who chose a city manager to execute the laws and ordinances and to appoint the heads of all departments and all subordinate officers. The public schools consist of six years' work in the elementary schools, three years in the intermediate schools, three years in the high school. There are 31 buildings and 375 teachers. The net funded debt is

$1,363,277; the total realty assessed valuation $85,000,000, which is 85 per cent of the market value. The tax rate per $100 valua¬ tion is $1.80. Pop. (1920) 72,128.

WICHITA FALLS, Tex., city and county-seat of Wichita County, situated in the northern tier of Texas counties, about 20 miles south of Red River, on the Fort Worth and Denver City, the Missouri, Kansas and Texas, the Wichita Valley, the Wichita Falls and Southern, the Wichita Falls and Northwestern and the Wich¬ ita Falls and Oklahoma railroads. Wichita Falls is the most important city adjacent to the new and rapidly developing oil fields of Texas. It is only 15 miles from the Burkburnett field, 11 miles from Iowa Park, 26 miles from Electra and is connected with these fields by rail¬ roads. It is 85 miles from the Stephens County fields and 100 miles from the Ranger fields. There are 10 oil refineries now operating in Wichita Falls, Burkburnett, Electra and vicinity, with as many more under construction or con¬ templated. This city is headquarters for the oil fraternity of this entire section. The city has more than 45 manufacturing plants, ex¬ clusive of oil refineries, with a total investment of more than $6,000,000, and an annual gross output of about $20,000,000. Among the articles manufactured here are motor trucks, window glass, glass fruit jars, sashes and doors, *etc.* The Wichita Mill and Elevator Company, one of the most complete plants of the kind in the South, costing three-fourths of a million dollars, does an enormous domestic and export busi¬ ness. Wichita Falls is the distributing and jobbing centre of a large section of North Texas and Southern Oklahoma. The population of Wichita Falls in 1920 (United States official) was 40,079. The city is growing perhaps more rapidly than any city of the South. While the enormous increase in population in so short a time has added a gigantic task upon the city, facilities are rapidly becoming adjusted to new conditions. A new eight-story hotel to cost approximately $1,000,000; two 10-story build¬ ings, one six-story building and 30 smaller business buildings are being erected. A bond issue of $1,500,000 for permanent public high¬ ways was voted recently in the county, and this money is to be expended for good roads as rapidly as possible. Nearly $1,000,000 is to be spent in the near future for additional street

paving and civic betterment. Besides the re¬ cent county road bond issue other available road money will bring the total county and city expenditure for highways to about $3,000,000. It is planned to have the most elaborate and imposing rural highway system in the South¬ west. There are five strong, growing banks with total deposits of

$25,000,000 and clearings of $83,209,758 for the period from 1 Jan. 1919 to 14 June 1919. Total bank deposits for this city are exceeded by only six Texas cities. Annual postal receipts now approximate $180,- 000, or an increase of more than 150 per cent in 12 months. The assessed valuation exceeds $20,000,000, while the real value of the city property exceeds $50,000,000. Wichita Falls is a city of homes, schools and churches. There are 25 imposing edifices of worship represent¬ ing all the leading denominations and faiths. Kemp Public Library, a gift to the citizens from one of Wichita Falls' leading builders, is one of the most complete library buildings in the State and contains an excellent selection of the best literature. Wichita Falls has a modern and efficient system of public schools, and $100,000 was expended in 1919 for additional buildings. The State of Texas is expending $750,000 in the erection of one of its eleemosy¬ nary institutions located on the shore of Lake Wichita about four miles from the city.

Hubert M. Harrison,

Secretary Wichita Falls Chamber of Commerce.

WICHITA INDIANS. One of the south¬ ern tribes of the Caddoan linguistic stock of North American Indians whose traditional home was the Wichita Mountains of Oklahoma, near which their reservation now lies. In the first half of the 19th century their principal village was on the north fork of Red River, a short distance below the mouth of Elm Creek, in Oklahoma, but three centuries ago (in 1541) Coronado found them in Kansas, between the Arkansas and Kansas rivers, in what the Span¬ iards designated the province of Quivira (q.v.). The typical house of the Wichitas is the grass lodge ; they were always agriculturists, and for¬ merly practised tattooing, from which custom and from their resemblance to their congeners, the Pawnees, they are called by the French Pani Piques. They are now under the Kiowa agency in Oklahoma, where, with their sub¬ tribes, the Tawakoni and Waco, they number more than 300.

WICKER WEAVING AND PROD¬ UCTS. The predecessor of all arts, the most universal art and the least changing art in the realms of history is wicker weaving. True, there have been changes in the commodities used for weaving and changes in the articles made by weaving, but the actual method of weaving wicker strands has passed down from the very earliest days of mankind with marked uniformity. Weaving in its general sense — in¬ cluding that of textiles as well as wicker — is considered by historians and biblical students as the oldest of arts, but when the general sub¬ ject is studied it is found that

wicker weav¬ ing even precedes all other processes. Just when it was born and by whom created is im¬ possible to say. Some biblical students con¬ tend that Eve, following her great sin, wove a skirt of twigs and leaves through an endowed art. Other equally studious students assert that

Eve and her fellow biblical personages learned the art of weaving by viewing the interlacing growths of tree limbs and noting the protection resulting therefrom. Still more assert that the art became known by persons through watch¬ ing and adopting methods used by birds in weaving their nests or spiders and other in¬ sects in weaving their webs. Whatever caused human intelligence to grasp the art of weaving may never be known, but that it is the earliest art is taken as an established or accepted fact. Actual biblical evidences showing an early knowledge of weaving are found in Exodus xxviii, 32, where it relates that bindings were made of woven work. The same book, xxxix, 22, says that robes were made by weaving. Exodus ii, 2, tells of an ark (basket) being woven of papyrus reed and Moses set adrift in it on the river Nile. Biblical commentaries also add that boats, sails, mats and ropes were made by weaving. There are other Bible references to weaving, thus in¬ dicating that the art, so far as wic¬ kerwork . is concerned, was well known in those days. Historians, here and there, speak further of wicker weaving although they do not specifically use the word <(wicker.®

The word has long -been understood, however, as perfectly proper in classifying all materials used in the weaving of furniture, baskets and baby carriages. Modern dictionaries define (<wicker® as (1) ((a pliant

young shoot or rod; twig; osier; withe; as, a willow wicker; (2) ware made of wicker work; (3) a wike ; mark.® (<Wickerwork® is de¬ fined as (<a fabric or texture, as a bas¬ ket, of woven or platted osiers, withes or twigs ; basket work, as a chair of wickerwork.® Since the ac¬ cepted meaning is so broad it is quite easy to trace wicker weaving down through the many ages to the present day although

there is a sur¬ prising lack of written information on the entire subject. It is known that practically every race of human beings has been familiar with the art of wicker weaving, for in the his¬ tory of all races there are references to woven bags, baskets, roofs, floors, furniture, *etc.* And yet with all this great age and universal use we find that wicker weaving (no textile weaving) has remained as it began — a slow hand vocation in which the strands have been woven about a frame. That is, the development has remained unchanged until 1916, when Marshall B. Lloyd of Menomi¬ nee, Mich., invented and put into practical use a new method for weaving wicker and a loom which weaves the strands into shapes desired.

Commodities. — Biblical data shows that the first wicker weaving was done by using natural leaves and twigs, interlacing them at right angles in just the same manner as mod¬ ern hand weavers work with their more modern commodities. Then came heavier pieces of wood as is indicated in 2 Kings xxiii, 7, which says, “women weave hangings from the grove.® Whether this means limbs of trees or vines

hanging from trees is unknown although the latter is the accepted version. Exodus ii, 2, specifically states the ark (basket) of Moses was woven of papyrus reed just as were boats, sails and other articles. Mediaeval days find the willow branch popular for wicker weaving. It has remained so to the present day although the scarcity of it and the growing demand for woven work in general has made it necessary, as well as wise, for manufacturers to turn to other forms of wicker. Rattan has been most generally used in making wicker articles during recent years. It is a vine growing in India, China, South Africa and elsewhere in the Orient. It was first used as ballast for vessels returning from the Orient. When the rattan reached America it was burned as firewood or waste. A man named Wake¬ field, during the days of the hoopskirt, found that rattan would lend itself to the manu¬

facture of hoops. This led to its becoming prominent in the manufacture of woven fur¬ niture and bodies for baby carriages. Rat¬ tan is usually known as reed when used for these purposes. The rattan vine is harvested by natives, then cured and classified as to size and texture. The bark is removed and treated, thus becoming <(cane® and used most exten¬ sively as seats for chairs, davenports and the like. The wood part of the rattan vine inside the bark is also treated

and the finished prod¬ uct is known as <(reed.® While being woven, reed is kept in water so as to make it pliable. If it is not soaked the reed will not bend with¬ out breaking, and despite its extensive use the article gives only limited satisfaction owing to its brittleness. The most recent form of wicker is a fibre made from paper. Just whether it

Wicker Baby Carriage of the Closing Years of the 19th

Century.

The running gear is practically the same as that of to-day. The body is woven loosely of flat reed and with as little wickerwork as pos¬ sible because of the extreme cost of hand weaving.

should be classified as a textile or wicker has not been established. It is manufactured much like a textile (see Textile Industry) and is used very extensively as a wicker and a tex¬ tile. It, however, quite naturally fits in under the wicker classification. The lack of willow and the dissatisfaction over reed has long caused baby carriage, furniture and basket makers to seek a new article. The World War of Europe, perhaps, had most to do with the discovery of paper and its adaptability to tex¬

tile and wickerwork. During the war there arose an amazing lack of clothing, bags, cord¬ age and other articles of this nature. The strength of paper, which has long been used in railway car wheels, its pliability and other abilities to be treated chemically, so that when completed it can resist weather conditions with¬ out injury, evidently turned the human mind to paper. Tests have proven that a piece of twisted paper gauging of an inch is

stronger than any known steel of the same weight. Experiments have

proven that certain hard or tightly-twisted paper of an inch

in diameter will not break unless the tension is more than 50 pounds, while the same thickness of reed will not stand a strain of 13 pounds. G. L. Brownell made the first real paper-twine machinery 17 Dec. 1895. Gradually the use of twisted paper as a textile became general in the manufacture of clothing, bags, cordage, belts, caps, hats, braces and leather substitutes. Then it spread to wickerwork, where it finds its most adaptable place. Germany and Austria have made tremendous strides in the paper-fibre trade. Special machinery for making tex¬ tile and wicker fibre from reels of paper are now manufactured. The Scandinavian coun¬ tries are producing large amounts of paper fibres, while the British government has for some time been interested and busy in the manufacture of paper fibre articles. The even¬

ness of strength, freedom from odor, absence of loose ends, flexibility, elasticity, strength, as well as weather and waterproofing qualities make paper fibre to-day the most important strand in the manufacture of wicker-woven articles. In addition to the above advantages it is much cheaper and more abundant than any other form of wicker. The ability of paper to permit itself to be manufactured into wicker fibre, either alone or with cotton, wool and even wire centres, and its ability to accept modern chemical and other treatments for purposes of strength and elasticity, adds to its importance and growing popularity. All other forms of wicker are used in a more or less natural state and do not require or lend themselves to chemical or other advanced treatments of mankind. Wicker fibre, however, overcomes these objections. Since all other wickers except wicker fibre are used practically in their natural state it is necessary to weave the strands in large sizes. This does not make pos¬ sible for them the beautiful finishes of the wicker-fibre articles. Owing to the smallness of the best hard wicker fibres, the article manufac¬ tured usually has from two to four times as many feet of fabric as the natural wicker woven articles, there¬ fore making the wicker fibre article stronger. The shortness of natural wickers, like willow and reed, make it necessary for ends to occur fre¬ quently in furniture, baskets or baby carriage bodies. Wicker fibre can be made in endless strands, thus doing away with unsightly ends. Wicker fibre originates, like paper, from the forest with fir and pine proving the most satisfactory wood, although almost any kind can be used. After the trees have been cut and the logs sent to the paper mills a pulp is formed. (See Paper). This pulp becomes paper and is cut into ribbons of various widths. These reels of paper ribbon are run through baths of casein glue for pur¬ poses of

preservation and toughening. Then the ribbons enter twisting devices running 5,000 revolutions per minute. Sometimes wire cen¬ tres are used but usually pure paper fibre is manufactured. The twisted paper ribbon is dried on large drums and then ready for weav¬ ing. After being woven the shaped article is dried and painted from two to four times with enamel or shellac. These various treatments make the fibre absolutely impervious to water, sunshine and other weather conditions.

Methods of Weaving. — Hand weaving must have been the only method used in biblical days, so far as wicker weaving is concerned, for there is no mention of any machine being used. The biblical method consisted of weav¬ ing two strands at right angles to each other, considerably or exactly like textile weaving. (See Textile Industry). When wicker was to be woven a frame was made and the up¬ right strands or weft attached to it. Then the warp was interlaced through the weft. This method has been handed down through all

Modern Wicker Baby Carriage.

It is woven of wicker fibre made on the Lloyd Loom. Note the fine¬ ness of the strand used in comparison to the flat reed of the other pho¬ tograph.

WICKER WEAVING

1 MAKING THE WEFT.— This machine is twisting specially manufactured paper about wire, shaping it and cutting

off to desired lengths. The paper is the same as that used in making the warp. It is one-eighth of an inch in diameter and has a breaking point of 175 pounds. (A) Reel of paper ribbon; (B) Strand entering machine; (C) Strand in casein glue bath; (D) Twisting paper entering dies and twisting device; (E) Sizing die; (F) Partially twisted wicker fibre; (G) Feeding device; (H) Automatic guide for winding fibre on spool; (I) Spool of wicker fibre; (J) The warp

» 2 MAKING THE WARP. — The above machine shows how paper is twisted into wicker fibre. Before coming to this machine the paper has gone through many mechanical and chemical treatments so as to

make it specially adaptable for wicker usage. Following its formation the wicker still has many other processes to pass through before being ready for market in the shape of manufactured articles. The wicker fibre being made in the above is one-thirteenth of an inch in diameter and has a breaking point of 50 pounds.' (A) Spool of wire; (B) Wire entering machine; (C) Straightener; (D) Rolls of paper ribbon; (E) Paper being wrapped about wire; (F) Paper being twisted tightly about wire while held by die; (G) Wicker fibre with wire centre; (H) Feed rollers shaping wicker; (I) Automatic cutter; (J) The weft

1 Lloyd Loom 2 Wicker woven chair made of wicker fibre on the Lloyd loom. Note the close and even weave

WICKER WEAVING

…… -.CittMVtUitH

■ .

«'•• > -hi •

■

• ,.. wtmimmimmnii I ,

mS&isSttssa* :JBK4 SEsn

.

liim < *!«X.'U i tin

n< J> ’*$!*, ˆliifti

-•

fˆinutiu

■

“■ . .

_ ■■•■•■

mMa.

I SgSS®?

;. ,

ages and through all peoples until to-day. Many men have tried to change the method of the biblical days but failed. More tried to use the same method and weave wicker on machines like textiles are woven. But all of these in¬ ventors, save one, were doomed to failure. Marshall B. Lloyd of Menominee, Mich., spanned the gap of centuries by changing the method of weaving before trying to make a machine loom which would do the weaving. Instead of attaching either the weft or warp to the frame of the article desired, he found a way of weaving the wicker independent of the frame and then attaching the wickerwork to the frame. Any of the modern wickers lend themselves to his method. Later he produced a machine known as the Lloyd Loom, which weaves the wicker 30 times faster than the most expert hand weaver can and with far greater superiority. The loom also lends

itself to weav¬ ing any kind of wicker strand. The Lloyd Loom requires that the weft be attached to a drum. The warp is fed through a station¬ ary shuttle after being made more or less continuous by connecting the ends of vari¬ ous pieces of wicker or by making con¬ tinuous wicker fibre. The average baby-car¬ riage body of endless wicker fibre is usually woven on the loom in 18 minutes, while a hand weaver would require an entire day of nine working hours to accomplish the same results. And even then his work would not be nearly as smooth and beautiful. This is due to mechanical exactness in weaving as com¬ pared with human lack of exactness, as is very evident when the old home-spun textiles are compared with modern machine-woven products. The weaving of cane for chair seats, etc., has been in vogue for 25 years. This kind of weav¬ ing is called flat weaving and requires no shap¬ ing as does furniture, baby carriages and baskets. Hence, the early solution of its mechanical weaving problems.

Wicker-Woven Baby Carriages. — The de¬ velopment of the baby carriage has been slow. The first ((baby carriages" were merely baskets like that in which Moses was found. The American Indian mother with her papoose strapped on her back, either in skins or in woven articles, according to weather condi¬ tions, originated another form of the <(baby carriage." While there is no authentic data to show the development of the baby carriage yet it is taken for granted that when man put wheels under a sledge, thus making a wagon, he conceived the idea which led to the modern wagon, baby carriage, train and even the auto¬ mobile. The first form of a baby carriage was a basket with a wheel on either side. Then came the elaborate chariot-like carriage but still with only two wheels. The latter came into prominence in the 18th century. Early in the 19th century the baby carriage took the shape of the average toy express wagon with four solid wood wheels. Then came the collapsible carts which could be folded up into a small article. Wicker-woven carriages regained prominence in the 20th century, and to-day they dominante. Most of them are made of beauti¬ fully woven bodies or baskets. The finer the strand the more even the weaving, and the greater the cost to the ultimate purchaser. The bodies are set on steel springs which

are either air or oil tempered, the latter pro¬ ducing more resiliency and solidity. Four wheels, two on either side, made of wood or wire and with rubber tires, a woven hood or top, a storm shield, smooth and soft upholster¬ ing and wheel brakes complete the carriage.

Wicker-Woven Baskets. — These articles have been made ever since biblical days, as shown in the above Bible references. There has been little advancement in the art. The usual wickers described above have been and are being used.

Wicker-Woven Furniture. — The Bible gives very little information on what sort of furniture was used at that time. It is said that the early Egyptians wove bedsteads of wickerwork, but what the make-up of the wicker was is not known. In 1650 a few chairs were made of wicker, while in 1711 wicker and cane chairs seem to have secured considerable general usage. In the 16th century the Hollanders made heavy wooden chairs and used woven cane or rush seats. The 19th century found chairs made of wicker willow and wicker reed. Tables, davenports, desks and bedroom furni¬ ture later were made of various kinds of wicker. The high cost of weaving, great waste of mate¬ rial, numerous short unsightly ends, combined with the lack of wearing and weather-proofing qualities kept the quantity of wicker-woven fur¬ niture to a . very low ebb when compared with the vast volume of furniture made and used in the world.

George W. Rowell, Jr.

WICKERSHAM, George Woodward,

American cabinet officer and lawyer: b. Pitts¬ burgh, Pa., 19 Sept. 1858. He studied at Lehigh University and took his degree in law at the University of Pennsylvania in 1881. He first engaged in practice in Philadelphia, but after 1882 he practised in New York. He was for many years a member of the law firm of Strong and Cadwalader; was counsel for the com¬ panies reorganizing the Chicago traction lines; for the Interborough Rapid Transit Company in the construction of the New York subway; and for the builders of the Pennsylvania tunnels in New York. He was connected with the reorganization of the Mexican railway system ; and had a wide experience in railway litigation in the United States. He was appointed At¬ torney-General of the United States by Presi¬ dent Taft in 1909, and served in that capacity throughout the Taft administration. He was especially successful in his handling of the government's anti-trust litigation, and his man¬ agement of the cases against the Standard Oil Company and the Tobacco Trust was particu¬ larly brilliant. He was afterward a member of the law firm of Cadwalader, Wickersham and Taft.

WICKET (Wall, wichet ; Norman, viquet; French guichet, a little door within a gate; all from Iceland vikja, to give way), a small gate or door; part of a massive or large door for the admission of persons on

foot only ; the three stumps or rods stuck in the ground and sup¬ porting the bails, against which the ball is directed in the game of cricket.

WICKING, in curling, an ingenious mas¬ ter-stroke by which a stone is sent in an oblique

direction so as to hit the winner’s stone and drive it from the tee, the former often replac¬ ing the latter and so becoming the winner in turn ; also called <(inringing.®

WICKLOW, wik’lo, Ireland, a maritime county of Leinster Province, on the Irish Sea, with an area of 782 square miles. Chief town, Wicklow. The county generally is mountain¬ ous, but has fertile lowlands where oats and potatoes are cultivated, and much pasture land devoted to stock-raising. Iron and lead are mined, and a little copper. Pop. about 60,000.

WICLIF, wik’lif, WICLIFFE, WICLEF, WICKLIFF, or WYCLIFF, John, English reformer : b. Spreswell, Yorkshire, probably about 1330; d. Lutterworth, 31 Dec. 1384. He studied at Balliol College, Oxford, of which he became master between 1356 and 1361, in which later year he was appointed by his college to the living of Fillingham, in Lincolnshire. About the same time the Pope bestowed upon him a prebend in the collegiate church of Westbury-on-Trym, near Bristol, in which he was confirmed by the king. In 1368 he gave up Fillingham and accepted the living of Ludgers-hall, in Buckinghamshire, and four years later qualified as doctor of theology. He was pre¬ sented by the Crown in 1374 to the benefice of Lutterworth, in the south of Leicestershire, which he held till his death. A Latin tract (Determinatio quaedam Magistri Johnannis Wy-clyff de Dominio contra unum MonachumP has been regarded as belonging to the controversy raised by the refusal of the Parliament of 1366 to pay a tribute demanded by the Pope Urban V, in virtue of the homage paid by King John to Innocent III, but some authorities refer it to a date about 10 years later, when similar cir¬ cumstances arose. At the time of writing the

tract, Wiclif was regarded as royal chaplain, for he calls himself peculiaris regis clericus, and in 1374 was named second on a commission which went to Bruges to try to settle disputes concerning ecclesiastical jurisdiction with the representatives of the Pope Gregory XI. He had shortly before been appointed a canon of Lincoln, but never actually obtained a prebend in that cathedral. The development of his views on the relation between the ecclesiastical hierarchy and the secular authorities brought him into close association with John of Gaunt, duke of Lancaster, and his party, and in 1377 the anti-Lancastrians sought to strike at their political opponents through Wiclif. He was summoned in that year before Archbishop Sud¬ bury and his suffragans at Saint Paul's, and at¬ tended, accompanied by Lancaster, Lord Percy, and other powerful Lancastrians. A violent altercation between the duke and William Courtenay, bishop of London, caused the break¬ up of the meeting, and the infuriated populace plundered Gaunt's palace and attacked Percy's house. Soon afterward Pope Gregory sent several bulls to the University of Oxford, the archbishop of Canterbury, and the bishop of London, in which he accused Wiclif of teach¬ ing the condemned doctrines of Marsilius of Padua and John of Jandun, and ordered him to be arrested and examined. The parties were reluctant to move in view of Wiclif's great popularity and influence, and even after the

bulls had arrived he was consulted by the gov¬ ernment as to whether they might legally pre¬ vent money from going abroad to absentee holders of benefices. He eventually appeared before the prelates at Lambeth in 1378, but the king's mother sent a message forbidding them to interfere with him, and a popular demon¬ stration in his favor put an end to the pro¬ ceedings. In the Gloucester Parliament of 1378 he made a defense of John of Gaunt, who had grossly violated the Westminster right of sanc¬ tuary.

This year, 1378, was an important date in Wiclif's religious career. While continuing to inveigh against certain abuses, he began to question the whole basis of sacerdotalism and its authority, and by 1381 had attained to a substantially Lutheran position in regard to transsubstantiation and the mass. About this time also he commenced his appeal to the common people and presented religion as a popular force rather than a dogmatic system or an organized institution. This appeal assumed two forms, the sending out of his ((poor preachers® and the translation of the Bible from the Vulgate into the English of his day. His itinerant evangelists spread his doctrines throughout the land and soon made the Lollard movement one of great strength and

importance. In his translation of the Bible he had the assistance of Nicholas Hereford, who was responsible for most of the Old Testament, and the whole work was re¬ vised by his assistant, John Purvey, who finished it soon after Wiclif's death. Wiclif's views on the eucharist were promptly con¬ demned at Oxford and forbidden to be taught there, and in 1382 Courtenay, archbishop of Canterbury, summoned a council in the Blackfriars' convent hall, at which Wiclif's teaching was condemned and some of his followers ex¬ communicated. This council known as the ˆearthquake council® because a violent earth¬ quake occurred during the meeting, ordered the Carmelite, Dr. Stokes, to publish the con¬ demnation at Oxford. The chancellor of Ox¬ ford University at that time, Robert Rygge, was a supporter of Wiclif and evaded the duty of carrying out the council's mandate until absolutely compelled to do so. Wiclif himself remained untouched, but he retired to Lutterworth, where he occupied himself in preaching and writing. It is said that Urban VI summoned him to Rome in 1384, but this is doubtful. He had a paralytic stroke in 1382 or 1383, and again in 1384, from which he died. He was buried at Lutterworth, but in 1428, in accordance with a decree of the council of Constance in 1415, his body was exhumed and burned, and his ashes thrown into the river Swift.

Of the 24 Wiclifite propositions condemned by the earthquake council, 10 were described as heretical and 14 as erroneous. The most import¬ ant of the 10 were : that transsubstantiation is philosophically false, since the substance cannot be changed while the accidents remain ; that transsubstantiation is not taught in the Gospels ; that confession is not necessary to salvation; that no one after Urban VI should be recog¬ nized as Pope; and that it is unscriptural for ecclesiastics to hold temporal possessions. Of the erroneous doctrines, several seriously limited the right of excommunication in a distinctly

Protestant sense, one asserted the right of un¬ licensed preaching, another declared that domin¬ ion, whether civil or ecclesiastical, could not be¬ long to one in mortal sin, and another distinctly

asserted the authority of the temporal power over the ecclesiastical in temporal affairs. Wic-lif unmistakably made his appeal to Scripture as of higher authority than Church tradition or decrees, and had a strong sense of the individual¬ istic basis of religion. He never reached the Lutheran doctrine of justification by faith, but from denunciation of abuses in the Church rap¬ idly advanced to his three main positions : that all dominion was of divine origin and was for¬ feited by anyone in mortal sin; that transsub¬ stantiation was a doctrine both unphilosophical and unscriptural ; and that monasticism in every form was a corrupt institution.

At first he attacked only the luxurious and corrupt orders of monks and was on friendly terms with the friars, but from about 1379 the friars were also included in his condemnation. He was one of the last of the realists in philos¬ ophy, and he tried to reconcile predestination with the freedom of the human will. Not only was Wiclif one of the chief forerunners of the Reformation, but he was also a pioneer in English prose literature. He wrote many learned works in Latin, but the nature of his message and the necessities of his position led him to appeal to the people in works in their own tongue. His chief Latin works are (De Dominio Divino) ; (De Dominio CivilP ; (De Officio Pastorali,* and ˆrialogusP All, except the (Trialogus) and the cDe Officio Pastorali,* and also volumes of Latin sermons and a vol¬ ume of Polemical Works, have been edited by English and foreign scholars for the Wiclif So¬ ciety. The excepted words were edited by Lechler (1869 and 1863 respectively). His translation of the Bible was edited by Forshall and Madden (1850) ; and his English works are to be found in the three collections (Three Treatises of John Wycliffe) (1851), by Todd; (Select English Works of WycliP (1869-71), by T. Arnold; and (The English Works of Wy¬ cliP hitherto unprinted (1880, Early English Text Society), by F. D. Matthew.

Bibliography. — (Wiclif) in the Dictionary of National Biography; Lechler, (Johann von Wiclif und die Vorgeschichte der ReformatioiP (1873) ; Poole, (Wycliffe and Movements for Reform > (1889), and (History of Mediaeval

ThoughP (1884) ; Burrows, (Wyclif's Place in History) (1881) ; Buddensieg, (Johann Wiclif und seine ZeiP (1885) ; Stevenson, Jos., (The Truth About John WicliP ; Parson, (Studies in Church History) (Vol. 2) ; Gasquet, F. A., (The Eve of the Reformation) ; and Cadman's article on Wycliffe> in (Three Religious Leaders of Oxford> (New York 1916).

WIDDIN, vid'in, or VIDIN, Bulgaria, a town on the right bank of the

Danube, near the Serbian frontier, consisting of three parts, the town on the Danube, the walled city and the citadel. The principal buildings are the palace, several mosques with lofty minarets and. a range of bazaars lining the main street. Ships can reach the town at high-water. There is a considerable trade, chiefly in corn, wine and salt, and the chief manufactures are gold and silver filigree work and jewelry. Widdin

was formerly strongly fortified and during Russo-Turkish wars was important strategically, but the Treaty of Berlin (1878), which erected Bulgaria into a hereditary principality tributary to the Porte, decreed that its fortifications should be dismantled. Pop. about 15,000.

WIDE AWAKES, in American political history, a name adopted by numerous Republi¬ can campaign clubs organized for the purpose of aiding in the election of Abraham Lincoln during the Presidential campaign of 1860. The first club was organized in Hartford, Conn. It is stated that in New York City there were on one occasion 20,000 Wide Awakes marching in procession.

WIDE, WIDE WORLD, The, a tale by Susan Warner, published in 1851 under the pen name of (<Elizabeth Wetherell® It reached a sale of over 300,000 copies. The life of the heroine, Ellen Montgomery, is followed from early childhood to her marriage with a fullness of particulars which leaves nothing to the read¬ er's imagination. The scenes and episodes are those of a homely, every-day existence, de¬ scribed with close fidelity to detail. Ellen's spiritual experience is minutely unfolded, and the book was long regarded as one of those which are <(good for the young.® The criticism of a later generation pronounces it mawkish in sentiment and unreal in conduct. It stands among the fading fancies of an earlier and less exacting literary taste.

WIDENER, Peter A. Brown, American capitalist: b. Philadelphia, Pa., 13 Nov. 1834; d. 6 Nov. 1915. He acquired a large fortune in the meat business, entered politics, was ap¬ pointed city treasurer of Philadelphia in 1873 and in 1874 was reelected to that office. He became largely interested in street railway cor¬ porations, and was associated with both the tobacco and Standard oil groups of capitalists. In 1897 he presented to the city of Philadelphia his private residence, valued at $600,000, for a branch of the Free Lending Library, and in the following year gave to the library a col¬ lection of 500 rare books valued at $28,000. In 1899 he endowed at Philadelphia the Widener Memorial Training School for Crippled

Chil¬ dren, a combined home, hospital and school. The school site consists of a tract of 36 acres at Logant a Philadelphia suburb.

WIDGEON, or WIGEON, a river-duck of the genus Mareca. Widgeons have a short bill, rounded at the tip, with a strong, broad nail, and the upper lamellae prominent ; wings long and pointed ; tail, moderate and wedge-shaped. There are about 10 species in various parts of the world. They are found on the seashore and on the margins of lakes and rivers, feeding chiefly on vegetable substances, and performing periodical migrations at night in vast flocks. The American widgeon or baldpate (M. americcma) is about 18 inches long; the bill is blue, black at the base and tip ; upper parts finely waved transversely with dark lines ; lower parts mostly white; top of head nearly white, with a broad green patch around and behind the eyes; the rest of the head and neck grayish, spotted and banded with black; the wing-covers are white, the greater part tipped

with black ; the speculum is green, encircled by black. The baldpate is found throughout North America, breeding chiefly north of the United States and wintering in Central America. It is ar. active bird, with a swift and well sustained flight, in ranks of various and irregular forms, and it associates during the winter with teals and other ducks. The flesh is highly esteemed, especially when they have fed in the rice fields of the South, or along with the canvas-back on the water-celery of the Chesapeake. They do not dive, but feed with the head and neck im¬ mersed, swimming very near together. Their food consists of aquatic seeds, roots, insects, worms, small fry, leeches, nuts and grain, espe¬ cially rice in the rainy season ; being very fond of the tender aquatic plants on which the can¬ vas-back feeds, and no diver itself, it watches the latter and snatches the morsels as it emerges and before it has had time to open its eyes. They are among the most difficult ducks to shoot, owing to their shyness and swift, irregu¬ lar flight. The nest is built on the ground, often far from water and usually of leaves lined with down. The eggs number eight or 10, are pure ivory white and about two inches long by nearly one and one-half in diameter. The

European widgeon (M . penelope) is rather smaller, and not uncommon all along the Atlantic Coast of the United States, as well as on the Pacific. It differs chiefly in having the head and neck red¬ dish brown or cinnamon, the top of the head cream-colored. Consult Grinnell, (American Duck Shooting) (New York 1902).

WIDNES, England, a manufacturing town in Lancashire, on the Mersey, opposite Run¬ corn, 13 miles east-southeast of Liverpool. There are extensive chemical, alkali and soda works ; soap, candle, grease and manure works ; copper-smelting works and rolling-mills, and iron-foundries. The town has a considerable carrying trade, which has been further devel¬ oped by the construction of large docks in 1866, extended in 1884. Pop. 30,000.

WIDNMANN, vid'n-man, Max, German sculptor: b. Eichstatt, Bavaria, 13 Oct. 1812; d. Munich, Bavaria, 3 March 1895. He was edu¬ cated at Munich and at Rome, executing while at the latter city his ((Shield of Hercules,® con¬ sidered one of his masterpieces, and in 1849 be¬ came proiessor of sculpture at the Academy of Art at Munich. Several of the public monu¬ ments in that city are by him, but his best work is considered to be shown in his busts and stat¬ uettes, which, however, are fewer in number. His statues include those of Orlando de Lasso (1848) ; Schiller (1863) ; Goethe (1868) ; Castor and Pollux (1877). Specimens of his work¬ manship are to be found at Bamberg, Ratisbon, Wurzburg and other cities.

WIDOW, one who has lost her husband by death and remains unmarried. A <(grass-widow" is a divorced woman. Among the ancients was practised a form of funeral sacrifice, in which the widow was slain or induced to commit sui¬ cide so that she might be buried with her hus¬ band and accompany him to the world of spir¬ its. This practice is mentioned as existing among the Greeks by Euripides and Pausanies, and from Caesar it may be inferred that it ex¬ isted also in Gaul. Widow sacrifice is still the

custom in some African tribes; traces of it may be found in China; it lingered till late in the first half of the 19th century in Fiji, and though abolished by law in British India in 1829, was not wholly stamped out until late in the 19th century.

WIDOW BEDOTT (be-dot') PAPERS, The, a collection of broadly humorous sketches by Frances Miriam Whitcher, which appeared first in Neal's Saturday Gazette of Philadelphia, about 1847, and in book

form in 1855. They were extremely popular in their day and are still read and quoted from, though they have been followed by many works in a similar vein.

WIDOW-BIRD. See Whydah-bird.

WIELAND, ve'lant, Christoph Martin,

German author : b. in the Swabian village of Oberholzheim, near Biberach, 5 Sept. 1733; d. Weimar, 20 Jan. 1813. The son of a country clergyman, after thorough preparation, he went in 1750 to the University of Tubingen to study law, but most of his time was devoted to belles-lettres. In 1751 appeared his (Zwolf Moral-ische Briefe,' which met with very favorable reception. He also wrote at this time the di¬ dactic poem, (Anti Ovid.' In 1752 he went to Zurich as a literary companion to J. J. Bodmer (q.v.). Inspired by the deeds of Frederick the Great to write a poem exhibiting the ideal of a hero, he chose the story of Cyrus. The first five cantos appeared in 1759, but the poem re¬ mained unfinished. About this time he pub¬ lished (Araspes and Panthea,' an episode from the (Cyrop3edia) of Xenophon. After a brief residence he left Bodmer's house, became a tutor, and in 1760 returned to Biberach. In 1762 he went to live with Count Stadion, an ac¬ complished scholar, but a thorough man of the world, averse to all religious enthusiasm. Wieland had been prone to religious mysticism; but the gay pleasure-seeking life of the society with which he now came in contact, and the scepti¬ cal and cynical kind of literature now most at his command, produced an entire change of sentiment. The first indication of this new philosophy of life appears in the tale of < Na¬ dineˆ which he styles a composition in Prior's manner. This was followed in 1764 by (Die Abenteuer des Don Sylvio de Rosalva) ((The Adventures of Don Sylvio de Rosalva'), a work for which Don Quixote serves as model. In 1766-67 appeared his (Agathon,' which es¬ tablished his reputation. The <Musarion) (1768), a production distinguished for grace, ease and harmony, advocates a rational unit} of the sensual and spiritual. In 1770 he wrote (Die Grazien) ((The Graces)) ; and the (New Amadis) in 1771, a poem which celebrates the triumph of intellectual over mere physical beauty. In 1769 he was appointed professor primarius of philosophy at the University of Erfurt. In his Werklagter Amor) ((Cupid Accused') he defended amatory poetry; and in the (Dialogen des Diogenes von Sinope' (1770) gave a general vindication of his philo¬ sophical views. In 1772 he was invited to Weimar by the Duchess Anna Amalia as tutor to her two sons. Turning his attention to dramatic poetry, he wrote the (Wahl des Her¬ cules' ((Choice of Hercules'), and the (A1-

ceste.* He also edited the (Deutscher Mercur,* a monthly, which he conducted till near the close of his life. His views, as exhibited therein, however, showed so much of the nar¬ row conventional spirit of French criticism, that he was attacked by Goethe in the satire ‘Gotter, Helden und Wieland) ((Gods, Heroes and Wieland*)- This Wieland answered with great good nature, recommending it to all who were fond of wit and sarcasm. Goethe and Herder were soon drawn to Weimar, where the Duchess Anna Amalia formed a circle of talent and genius, later also joined by Schiller. In 1774 appeared the ‘Geschichte der Abderiten,) in which Wieland sought with an engaging wit to correct the provincialism of his time. (Oberon) (1780), a romantic epic, is the most finished of his works.* Wieland also prepared translations of Horace, Lucian and the (Let¬ ters *of Cicero. His translations of Shakes¬ peare (1762-66), made the English poet “an open book for Germans.® He superintended (1794-1802) an edition of his ‘Works* in 45 volumes. These were also edited by Gruber (1818—28 and 1867-75), and there are many editions of selections, some of which have been translated into English. Wieland’ s place in literature in a sense falls within the group headed by Goethe, Schil¬ ler and Lessing; not so stellar as these, he was yet singularly attuned to his time. A veritable German Voltaire, his influence, exerted espe¬ cially through the ‘Deutscher Mercur,* was immense. Of facile and incessant wit, no other writer had more to do with shaping the. Ger¬ man language to elegant expression. This ex¬ plains the delight with which the work of Wie¬ land was met in his day. Consult Loebell, ‘Entwickelung der Deutschen Poesie* (1858); Ranke, (Zur Beurtheilung Wielands) (1885); Hirzel, (Wieland’s Beziehungen zu den deutscher Romantikern* ; Lenz, W., (Wieland’s Verhaltniss zu Spenser, Pope, und Swift) ; and Gruber’s biography, with his editions.

WIENER, ve’ner, Leo, Jewish-American author: b. Russia, 26 July 1862. He was educated at the gymnasia of Minsk and War¬ saw, at the University of Warsaw and the Poly¬ technic of Berlin. From the latter city he went to New Orleans, worked in a cotton factory, and later sold fruit in Kansas City, Mo. He then obtained a position as teacher in Odessa, Mo., and afterward a professorship in the .Uni¬ versity of Missouri. He was appointed assistant professor of Slavonic languages at Harvard in 1901; professor in 1911. He contributed many etymologies to Webster’s New International Dictionary, but his

greatest editorial pro¬ duction is the 24-volume compilation of Count Tolstoy's works. Among his other publications are (History of Yiddish Literature in the 19th Century* ; (Anthology of Russian Literature* ; 'Slavic Anthology) ; and (An Interpretation of the Russian People) (1915) ; he has also edited Rosenfeld's 'Songs from the Ghetto.*

WIENER-NEUSTADT, ve'ner-noi'stat,

Austria. See Neustadt.

WIERTZ, verts, Anton Joseph, Belgian painter: b. Dinant, 22 Feb. 1806; d. Brussels, 18 June 1865. He studied art in the Antwerp

Academy, where he gained, in 1832, a prize which enabled him to continue his studies in Rome. On his return to Belgium he lived at Liege for a time, and from 1848 at Brussels, where the Belgian government erected a large studio for him in 1850. Wiertz was a painter of great, though eccentric, genius, with a strange predilection for horrible and fantastic subjects, and invented a method of painting, called by himself peinture mate, in which the characteristics of fresco and oil painting are combined. His principal pictures are 'Greeks and Trojans contending for the Body of Patro-clus) ; 'The Flight into Egypt* ; 'Death of Dionysius *; 'The Triumph of Christ* (1848), his masterpiece; 'The Things of To-day in the Eyes of the Men of the Future) ; 'The Beacon of Golgotha) ; 'The Last Cannon*; 'Napoleon in HelP ; 'A Second after Death. *He did not sell any of his chief paintings, which he be¬ queathed to the state, but supported himself by painting portraits. His Brussels studio, fitted up after his death as the Musee Wiertz, contains his large pictures. He wrote 'Eloge de Rubens* (1840) ; and 'Caracteres Constitutifs de la Pein¬ ture Flamande* (1863). Consult Labarre, 'An¬ toine Wiertz) (1866).

WIESBADEN, ves'ba-den, Prussia. (1) A town in the province of Hesse-Nassau, capital of the government of Wiesbaden, and formerly capital of the Duchy of Nassau, beautifully sit¬ uated among vineyards and orchards on the southern slopes of the Taunus range, about three miles north of the Rhone and 20 miles west of Frankfort. For many years it attracted about 80,000 visitors from all parts of Europe by its baths. Among notable buildings are the royal palace, the ducal palace, the townhouse, the government buildings, the courthouse, the museum and picture-gallery, the library (100,000 vols.) , the royal court theatre, the Trinkhalle, and the Kurhaus, consisting chiefly of a large and splendid saloon, forming the east side of a square, while the

north and south sides are lined by colonnades, filled with gay shops, and uniting a promenade and a bazaar. The springs, all of which except one are alkaline and among the most powerful of their class, are very numerous, and have temperatures verying from 100° to 153° F. The springs of Wiesbaden are spoken of by Pliny as the “Fontes Mattiaci,® and on the Heidenberg, north of the town, traces of a Roman fortress were discovered in 1838, which seems to have been connected with the town by a wall, the Heidenmauer (“heathen’s wall®), in the ruins of which votive tablets and inscrip¬ tions have been discovered. Pop. 90,000. (2)

The government of Wiesbaden comprises al¬ most the whole of the former Duchy of Nas¬ sau, most of the territory which belonged to the city of Frankfort, *etc.* Area, 2,108 square miles; pop. about 1,200,000.

WIFE. See Husband and Wife.

WIG, an artificial hair covering for the head to conceal baldness, or to alter the appearance. They are usually made of human hair woven into a cap that fits the head tightly. Those worn for baldness are politely termed toupees. The use of wigs is traced back to the ancients. They were used especially by the women. The fashion is said to have been copied by the Greek

ladies from those of Egypt. Under the Roman emperors it became common even for men to wear wigs, and several of the emperors them¬ selves used this ornament. In the latter half of the 16th century the fashion became much in vogue in France, Italy and England. In 1560 no lady appeared at the French court without a blonde wig. Louis XIII set the fashion, wear¬ ing a wig of long curls, being himself bald. The courtiers naturally followed. Louis XIV was at first averse to wigs ; but in the latter part of his reign, when he began to lose his own hair, he reintroduced the fashion, which went to a greater extreme than ever. About 1660 they began to be worn by the clergy, who had at first shown themselves hostile to the practice. The practice of powdering these wigs was adopted about the year 1700. About

1720 the great wig began to give place to the queue, which remained the fashion till early in the 19th century. Modern refinement has abolished the wig as an ornament except in Great Britain for the lord-chancellor, judges and barristers. They are still worn by actors and actresses as a part of the make-up or dress suitable to a par¬ ticular character.

WIGAN, England, a town of Lancashire, on the Douglas, 21 miles northeast of Liver¬ pool. Wigan stands in the centre of an exten¬ sive coal field, and its manufactures, which are important, consist chiefly of calicoes, fustians and other cotton goods, linens, checks, cotton twist, etc., besides iron foundries, iron forges, railway car works, iron rolling mills, large breweries, chemical works and corn and paper mills. It has a Mining and Technical College. Pop. 90,000.

WIGGIN, wig'in, Kate Douglas Smith,

American author: b. Philadelphia, Pa., 28 Sept. 1859. She was educated at Abbott Academy, Andover, Mass., and in 1876 went to California, where she studied the kindergarten system in Los Angeles, and later at San Francisco organ¬ ized the first free kindergarten in the West. In 1880 she was married to S. B. Wiggin, a law¬ yer (d. 1889), and removed to New York. In 1895 Mrs. Wiggin was married to George C. Riggs. In 1906 Bowdoin College gave her the Litt.D. degree. She published, with her sister, Nora A. Smith, (Froebel's Gifts> (1895) ; kin¬ dergarten Principles and Practice) (1896), *etc.* Her other works, several of which have attained great favor in this country and England, in¬ clude (The Bird's Christmas CaroP (1888) ; (The Story of Patsy) (1889) ; (A Cathedral Courtship) (1893) ; (Mann Lisa) (1896) ; (Penelope's Progress) (1898) ; Penelope's Ex¬ perience in Ireland) (1901) ; (Diary of a Goose-girP (1902) ; (Rebecca of Sunnybrook FarnP (1903); (New Chronicles of Rebecca5 (1907); (Susanna and Sue) (1909) ; (Mother Carey's Chickens5 (1911; dramatized 1915), *etc.*

WIGGINS, Benjamin Lawton, educator: b. Sand Ridge, S. C., 11 Sept. 1861; d. Sewanee, Tenn., 1909. His education was received at the University of the South from which he was graduated in 1880. He afterward (1883-84) pursued graduate work at Johns Hopkins Uni¬ versity. In 1882 he returned to the University of the South as professor of Greek, which posi¬ tion he held until his death, with the added

duties (after 1893) of vice-chancellor or presi¬ dent. Under his

supervision the University of the South became one of the leading institutions in the Southern States.

WIGGINS, (John) Carleton, American artist : b. Turners, N. Y., 4 March 1848. He studied at the National Academy of Design in New York and under George Inness and H. Carmiencke and later in Paris. He first ex¬ hibited at the National Academy in 1870, and at the Paris Salon in 1881. He painted land¬ scapes, and was especially successful in his paintings of cows. He was elected to the National Academy in 1906. His works are well represented in both public and private col¬ lections. Among them are (A Holstein Bull5 (Metropolitan Museum c>f Art, New York) ;

(Morning on the Hills5 (Brooklyn Museum) ;

(October5 (Corcoran Art Gallery, Washing¬ ton) ; (Lake and1 Mountains5 (Chicago Art Institute) ; (Evening after a Shower5 (Na¬ tional Gallery, Washington) ; <The Wanderers5 (Hamilton Club, Brooklyn) ; (Ploughing in

France5 ; (Plough Horse5 (Lotus Club, New York); (After Wind — Rain,5 *etc.*

WIGGINS, Guy Carleton, American ar¬ tist, son of (J.) C. Wiggins (q.v.) : b. Brooklyn, N. Y., 23 Feb. 1883. He studied under his father and at the Polytechnic Institute, Brook¬ lyn, and the National Academy of Design, New York. He is notably successful in his portrayal of scenes in New York, and is also known for his landscapes. Among his works are Metro¬ politan Tower5 (Metropolitan Museum, New York) ; (Columbus Circle, Winter5 (National Gallery, Washington) ; Berkshire Hills, June5 (Brooklyn Museum), *etc.* He was made asso¬ ciate of the National Academy in 1916.

WIGGINS, Joseph, English sea captain and explorer: b. Norwich, 3 Sept. 1832; d. Harrogate, 13 Sept. 1905. He was apprenticed to his uncle, a shipowner, at the age of 14 and at 21 rose to be master of a ship. He afterward became owner of several cargo vessels and developed a keen interest in the project of developing a trade route between the countries of northern Europe and Siberia by means of the Northeast Passage through the Arctic seas. His first voyages, in 1874, 1875, 1876 and 1886-87 were less successful for the actual cargo delivery than for their awak¬ ening of interest in the matter and for his bril¬ liant achievements as a navigator, demonstrat¬ ing the possibility of taking ships far beyond any point hitherto reached. In 1887 he sailed up the Yenisei River to Yeniseisk. His first notable

achievement in the delivery of a cargo was that of a shipment of rails for the Trans-Siberian Railway, in 1893, for which feat he was honored by the tsar. He made another successful visit to Yeniseisk in 1895. He was selected to take charge of a relief expedition into Siberia at the time of the famine in 1905 but died while preparations were under way. He received in 1894 the Murchison Medal of the Royal Geographical Society. Consult John¬ son, H., (Life and Voyages of Joseph Wig¬ gins5 (London 1907).

WIGGLESWORTH, wig'lz-werth, Mi¬ chael, American Puritan clergyman : b. York¬ shire, England, 1631 ; d. Malden, Mass., 10 June

1705. In 1638 he was brought to Charlestown, Mass., by his father and accompanied him in the same year to New Haven, Conn. He was graduated from Harvard in 1651, subsequently becoming a tutor there. He then studied theol¬ ogy and was settled as pastor of the Church of Malden in 1656. He was accounted skilful in medicine, and was offered the presidency of Harvard in 1684, but on account of ill health declined the honor. His best-known work, 'The Day of Doom) (1662), was a popular poem in New England for a long period. Two editions were printed in England and the sixth edition in New England appeared in 1715. The savage Calvinism of the poem is unsurpassed in literature save perhaps in Jonathan Edwards' sermon, (Sinners in the Hands of an Angry God,* but the work contains not a little dramatic force and here and there passages of dignity and beauty. He also wrote 'God's Controversy with New England *and (Meat out of the Eater,* in verse; and 'A Discourse on Eter¬ nity. > Consult Tyler's (History of American Literature> (1878) ; and Dean, (Memoir of Michael Wigglesworth) (1863; new ed., 1871).

WIGHT, wit, Orlando Williams, American physician and translator: b. Centreville, N. Y., 19 Feb. 1824; d. Detroit, Mich., 19 Oct. 1888. He was educated at the Rochester Collegiate Institute, removed to New York in 1847, studied theology and was ordained to the Universalist ministry. He subsequently studied medicine, being graduated from the Long Island College Hospital in 1865. He engaged as a medical prac¬

titioner in Wisconsin, and was appointed State geologist and surgeon-general in 1874. He was health commissioner of Milwaukee in 1878-80, and health officer of Detroit in 1882-88. He was a noted translator and throughout his life de¬ voted a large share of his time to literary work. He wrote ‘Maxims of Public Health) (1884); (Peoples and Countries Visited* (1888), *etc.* His translations include ‘History of Modern Philosophy, *with F. W. Ricord (1852) ; ‘Lives and Letters of Abelard and Heloise* (new ed., 1861) ; Martin’s ‘History of France, > with Mary L. Booth (1863), *etc.* He also edited ‘Standard French Classics) (14 vols., 1858-60) ; ‘The Household Library* (18 vols., 1859, et seq.), *etc.*

WIGHT, Peter Bonnett, American archi¬ tect: b. New York, 1 Aug. 1838. He was grad¬ uated from the College of the City of New York in 1855, practised as an architect in New York in 1861-71, and since 1871 in Chicago. He has been secretary of the Illinois State board of architects since 1897, was elected to the Amer¬ ican Institute of Architects in 1866, and from 1900 to 1905 was secretary of the Municipal Art League of Chicago.

WIGHT, Isle of, England, off the south coast, in the county and opposite to the main¬ land portion of Hants, is separated from the mainland by the roadstead or channel of Spithead on the east, and by the Solent or continu¬ ation of this on the west. It is about 23 miles in length from east to west, by 15 miles broad; circuit about 70 miles; area, 146 square miles. The land is rolling, affording agreeable scenery ; the air is remarkably healthful. Only a small portion of the surface is waste, dhe downs, which cross the island from east to west and

form excellent sheep-walks, separate it into two districts, which in their general character con¬ trast with each other, the soil on the north side being generally a stiff, cold clay, and on the south side a fertile sandy loam. On the prom¬ ontory that forms the western extremity of the island are three notable chalk cliffs locally called the “Needles.** Celtic tumuli occur on a num¬ ber of the chalk downs, and there are mono¬ liths of geologic interest. Excellent cement is manufactured at the works on the west side of the Medina, and largely exported. The chief imports are cattle, coal, timber and building material. The island is well defended, being protected on the east side by Sandown Fort, Bembridge Fort and Battery, and by other forts which lie between the island and the mainland. The western approach is guarded by Hurst Castle and other forts. The chief towns are

Newport (the capital), Ryde, Cowes, Ventnor, Brading, Yarmouth and the fashionable health resorts of Sandown and Shanklin on the south¬ east coast. Osborne, near Cowes, was a resi¬ dence of Queen Victoria, and with its beautiful grounds is now a national memorial, the gift of Edward VII. Its most recent use is as a college for naval cadets. Among the antiqui¬ ties of the Isle of Wight the most inter¬ esting is Carisbrooke Castle, which stands a little southwest of Newport, and consists of extensive , and well-preserved picturesque ruins. It has many historical associations : it is supposed to have originally been a fortress of the Britons, was afterward repaired and en¬ larged by the Romans, was considerably strengthened under Cerdic, who founded the kingdom of Wessex, and rebuilt in the reign of Henry I. During the Parliamentary War it be¬ came the asylum of King Charles I on his es¬ cape from Hampton Court, and afterward his prison. Another interesting remain is Quarr Abbey, about two and one-half miles from Ryde, which was built in 1132, and is now a farmhouse. Pop. 90,000. Consult Thomas's 'Isle of Wight* (Boston 1912).

WIGMORE, John Henry, American law¬ yer and university dean: b. San Francisco, 4 March 1863. He studied law at Harvard and practised at Boston from 1887-89. For three years following, he was professor of Anglo-American law at Keio University, Tokyo, Japan. He has since been connected with Northwestern University, first in the capacity of professor of law, and subsequently, since 1901, as dean of the faculty of law. His published works include 'Digest of the Decisions of the Massachusetts Railroad Commission (1888) ; 'The Australian Ballot System) (1889) ; 'Notes on Land Tenure and Local Institutions in Old Japan* (1890) ; 'Materials for the Study of Private Law in Old Japan* (1892) ; 'Treatise on Evidence* (4 vols., 1904-05) ; 'Pocket Code of Evidence* (1909) ;' 'Principles of Judicial Proof* (1913). He is also editor of 'Greenleaf on Evidence* (16th ed. 1899) ; 'Compiled Examinations in Law* (1900) ; 'Cases on Torts* (2 vols. 1911); 'Cases on Evidence* (1913), and coed¬ itor of 'Select Essays in Anglo-American Legal History* (1907) ; 'Evolution of Law Series* (1915). Mr. Wigmore was president of the American Institute of Criminal Law and Crim¬ inology* (1909-10), and in 1916 received the

commission of major on the staff of the Judge-Advocate-General of the United States, being promoted commanding lieutenant-colonel in 1918. In February 1917 he was appointed a member of the United States High Commission.

WIGTOWN, or WIGTON, county form¬ ing the southwest corner of Scotland; bounded west by the North Channel, north by Ayrshire, east by the Stewartry of Kirkcudbright and the Solvay Firth, and south by the Irish Sea. The extent from east to west is about 33 miles, from north to south about 26 miles; area, 485*4 square miles, of which about 46 per cent is arable. This county which constitutes West Galloway was formed about 1341. It lies between lat. 54° 38’ and 55° 4’ N., and long. 4° 16’ and 5° 6’ W. Wigtown is somewhat irregular in form, being deeply intersected by two arms of the sea, one of which, Loch Ryan, a long narrow inlet, stretches south from the northwest corner for nine miles into the county, while Luce Bay on the south makes a wide indentation 18 miles long with an average width of 12 miles, the heads of the inlet and bay being only six miles apart. The western part of Wigtown, known as the <(Rhins of Galloway,® thus forms a pe¬ ninsula whose length north to south is 28 miles, and breadth one and one-half to six miles; its northern extremity is Corsewall Point, and its southern the Mull of Galloway, each promon¬ tory being provided with a lighthouse. The southeastern half of Wigtown is separated from the Stewartry of Kirkcudbright by Wig¬ town Bay, 15 miles long and 14 wide at its mouth, and between this bay and Luce Bay Wig¬ town extends south in a blunt triangular form, terminating in Burrow Head. Wigtown is ir¬ regular in surface, but with no eminences ex¬ ceeding 500 feet. The soil is varied, and except a portion along the seashore, especially in the southeastern part which consists of a rich loam — the quality is inferior. The climate is mild but moist, the rainfall being comparatively great. There are many dairy establishments. Wig¬ town contains three rivers of considerable size, the Cree, the Bladnoch and the Luce — the Cree and Bladnoch being navigable for a few miles. Small freshwater lochs are numerous. There were at an early period many religious houses in the country and the church, believed to be the oldest in Scotland, founded by Saint Ninian, was built near the site the present village of Whithorn. The principal towns are Wigtown, Newton-Stewart, Stranraer and Whithorn. There is no mineral wealth and little trade or manufacture. Pop. 32,685.

WIGWAGGING, a system of visual sig¬ naling by means of hand flags and for short distances only. The color of the flags depends on the

background. The flags used in the United States army are 18 inches square with a nine-inch centre, while those of the navy are from 12 to 15 inches square. The staffs are light and average about 24 inches in length. See Signals and Signaling.

WIGWAM, among the American Indians a lodge, cabin, hut or tent, generally of a conical shape, formed of bark or mats laid over stakes planted in the ground, and converging toward the top, where there is an opening for the escape of the smoke. The most common form is the teepee, which is portable, being usually a frame¬

work of roughly trimmed poles, lashed together with split wood, thongs, etc., and covered with hides, bark, matting, *etc.* Those designed to be more permanent, approached the log-house or bark shack in construction, and often sur¬ rounded an earth or rock fireplace, whose smoke was carried off through a central hole at the top. The word has also been applied to a large temporary structure for public gatherings.

WILARS DE HONECOURT, ve-lar de hon-koor, French architect of the 13th century. He is one of the earliest recorded experimenters with the perpetual motion theory, his rude draw¬ ings of his plans being still preserved in his sketch book at the Ecole des Chartes at Paris.

WILBER, wil'ber, Neb., village, county-seat of Saline County, on the Big Blue River and on Chicago, Burlington and Quincy Rail¬ road, 30 miles southwest of Lincoln. It is in a rich agricultural region, in which the chief products are wheat and corn. It has flour mills, grain elevators, machine shop, creameries and cigar factories. There are six churches, a high school, two newspapers and a county courthouse. The two banks have a combined capital of $100,000. (Pop. (1920) 1,255.

WILBERFORCE, wil'berfors, Robert Isaac, English clergyman, 2d son of William Wilberforce (q.v.) : b. Clapham, Surrey, 19 Dec. 1802; d. Albano, Italy, 4 Feb. 1857. He was graduated from Oriel College, Oxford, in 1823, and was subsequently chosen Fellow of his college, associating in that capacity with Pusey and Newman, Hurrell Froude and other leaders of the High Church party. In 1830 he left Oxford to take charge of a parish, and became vicar in 1840 of Burton Agnes, York¬ shire. He published (Church Courts and Discipline) (1843) ; (Lucius, or Stories of the Third Age> (1842) ; < Doctrine of the Incarnation (1848) ; and (Doctrine of Holy Baptism* (1849), the two

last attracting great attention by the very positive doctrines they enunciated. He also published a (History of Erastianism* (1851); (Doctrine of the Eucharist* (1852);

(Inquiry into the Principles of Church Author¬ ity) (1854), *etc.* Finding that he could no longer consistently hold his position in the Church of England, he was received into the Roman Catholic Church in Paris in October

1854.

WILBERFORCE, Samuel, English prelate, 3d son of William Wilberforce (q.v.) : b. Clapham, Surrey, 7 Sept. 1805 ; d. near Dorking, Surrey, 19 July 1873. He was graduated from Oriel College, Oxford, in 1826, ordained deacon in 1828, and appointed curate of Checkendon, Oxfordshire, the same year. He was rector of Brightstone, in the Isle of Wight, 1830-40, in 1839 became archdeacon of Surrey, and in 1840 a canon of Westminster. In the last-named year also he became rector of Alverstoke, Hampshire. He received the deanery of West¬ minster in March 1845, but before the close of that year was promoted to the bishopric of Winchester. He was the leader of the High Church party, though much opposed to ritual¬ ism, and was both witty and eloquent as well as a skilful debater in the House of Lords. His readiness in argument and his versatile qualities gained him the title of (<Soapy Sam.® He pub-WILBERFORCE — WILBURITES

fished ˆNotebook of a Country Clergyman) (1833) ; (Eucharistica (1839) ; (A History of the Protestant Episcopal Church in America) (1844); (University Sermons, } *etc.* Consult the (Life) by his son, R. G. Wilberforce (1888) ; Daniell, (Bishop Wilberforce* (1891).

WILBERFORCE, William, English phi¬ lanthropist: b. Hull, Yorkshire, 24 Aug. 1759; d. London, 29 July 1833. Educated at Cam¬ bridge, he was in 1780 elected member of Par¬ liament for his native town ; and in 1784 was returned both by his former constituency and by the county of York. He chose to represent the latter. In 1786 he made the acquaintance of Clarkson, who gained his sympathies on behalf of the

agitation against the slave-trade, to which he henceforth devoted all his energies in Parliament till the agitation proved success¬ ful. He first called the attention of the house to the subject in 1787, and in 1791 moved for leave to bring in a bill to prevent further im¬ portation of African negroes into the British colonies. Year after year he pressed this meas¬ ure, but was defeated till 1807, when it was passed during the short administration of Fox. Having secured the abolition of the slave-trade in the British colonies, he addressed himself to the task of obtaining emancipation for those already reduced to or born in slavery. In 1812, after having sat for Yorkshire in six Parlia¬ ments, he withdrew from the representation, and until 1825, when he retired from Parlia¬ ment, sat for the borough of Bramber. He died shortly after the government plan for the total abolition of slavery in the British colonies had passed in the House of Commons. His remains were interred in Westminster Abbey, and his funeral was attended by distinguished men of all parties. Wilberforce was the author of a treatise entitled (A Practical View of the Pre¬ vailing Religious Systems of Professed Chris¬ tians in the Higher and Middle Classes con¬ trasted with Real Christianity* (1797) . Con¬ sult (Life of William Wilberforce* by his sons (1838) ; his < Correspondence* (edited 1840) ; and (Private Papers of William Wilberforce) (edited 1897).

WILBERFORCE UNIVERSITY, an in¬ stitution for the education of the colored race located at Wilberforce, a suburb of Xenia, Ohio. It was founded in 1856 under the auspices of the African Methodist Episcopal Church. It in¬ cludes the Collegiate Department, the Normal Department, the Payne Theological Seminary, a Law Department, the Academic Department and Music and Commercial departments, and a Nurses' Training School. Women are admitted to all departments. The Collegiate Department offers two four years' courses, the classical and the scientific leading to the degrees of A.B. and B.S. The Theological Seminary offers a three years' course and confers the degree of B.D. A practice school is connected with the work of the Normal Department. Industrial training is not included in the curriculum; students, how¬ ever, care for their own rooms. Emphasis is placed upon the development of moral charac¬ ter ; there are few rules for behavior and gov¬ ernment, but these are strictly enforced. The income in 1917 and recent years has been slight, mostly obtained from tuition fees. The grounds and buildings are valued at over

$380,000; a new dormitory was built in 1900-01 ; the library contains nearly 10,000 volumes. The students numbered 455 and the faculty

39 in

1917.

WILBOUR, Charlotte Beebe, American

woman-suffrage worker: b. East Hartford, Conn., 2 March 1833; d. New York, 25 Dec. 1914. She was educated at the Wilbraham (Mass.) Academy, and was married to Charles E. Wilbour, an Egyptologist, in 1858. She was associated with Susan B. Anthony and Eliza¬ beth Cady Stanton as a worker for suffrage for women, and became known as a public speaker of much force and eloquence. She was one of the founders of the Sorosis Club in New York in 1868, which in 1869 became the first incorporated women's club in the United States. She was president of the club in 1870-75 and in 1903-07, then becoming honorary president. She lived abroad with her husband in 1875-1900.

WILBUR, wil'ber, John, American preacher of the Society of Friends: b. Hopkinton, R. I., 17 July 1774; d. there, 1 May 1856. He was a teacher and surveyor, who was a strongly con¬ servative member of the Society of Friends and opposed innovations which he believed to be at variance with the original doctrine of the so¬ ciety. For his alleged statements reflecting on J. J. Gurney (q.v.), the English Quaker, he was denounced by several members of the Rhode Island yearly meeting of 1838. He wasˆ sus¬ tained by a large majority of his own (South Kingstown) monthly meeting; but that meet¬ ing was dissolved and its members added to the Greenwich meeting, by which he was for¬ mally disowned in 1843. This action was con¬ firmed by the quarterly meeting and the Rhode Island yearly meeting. Wilbur's adherents then withdrew from the orthodox society in such numbers as to form an independent conservative yearly meeting whose members were styled Wilburites (q.v.). Among Wilbur's writings, largely polemical, was (A Narrative and Expo¬ sition (1845). His (Journal and Correspond¬ ence * appeared in 1859.

WILBUR, Ray Lyman, American physi¬ cian and university president: b. Boonesboro, Iowa, 13 April 1875. He was graduated at Leland Stanford Junior University in 1896 and received the degree of M.D. at Cooper Medical College, San Francisco, in 1899, later studying at Frankfort-on-the-Main, London and Munich. He was appointed to the chair of medicine at Leland Stanford Junior University in 1909, and also filled the office of dean from 1911; since 1915 he has been president of the university. He was president of the American

Academy of Medicine in 1912-13; was appointed chief of the division of conservation of the United States Food Commission in 1917 ; and in 1917 also became a member of the California State Council of Defense.

WILBURITES, a branch of the Society of Friends, or Quakers, who adopted the principles of Rev. John Wilbur (q.v.), and maintain an independent yearly meeting. Wilbur became a preacher of the Society of Friends, and took a strongly conservative stand against what he regarded as innovations antagonistic to the original doctrines of the society. Wilbur's fol¬ lowers in 1918 included 49 ministers, 47

churches, and about 4,000 communicants. See Friends, The Religious Society of.

WILCOX, wil koks, Cadmus Marcellus, American soldier: b. Wayne County, N. C., 19 May 1826; d. Washington, D. C., 2 Dec. 1890. He was graduated from West Point in 1846, served in the Mexican War, and in 1860 was promoted captain. In 1861 he resigned from the army and entered the service of the Con¬ federacy. He participated in the first battle of Bull Run, was promoted brigadier-general in October, and in 1863 became major-general. He was engaged in the second battle of Bull Run, at Fredericksburg, Chancellorsville, Salem Heights, Gettysburg and other important battles, and was present at the surrender at Appomattox courthouse. He was offered a commission as brigadier-general in the Egyptian army after the close of the Civil War, but declined it. In 1886-89 he was chief of the division of railroads at the general landoffice in Washington. He wrote (Rifles and Rifle Practice) (1859) ; trans¬ lation (Austrian Infantry Evolutions of the Line> (1860) ; and an excellent (History of the Mexican War,* the manuscript of which was completed and published by his niece, M. R. Wilcox (1892).

WILCOX, Delos Franklin, American municipal government expert: b. Ida, Mich., 22 April 1873. He was graduated at the Uni¬ versity of Michigan in 1894 and took the de¬ gree of Ph.D at Columbia

University in 1896. He edited the Detroit Civic News in 1905-07 ; and in 1907-13 he was chief of the bureau of franchises in the first district of the New York Civil Service Commission; while in 1914-17 he was deputy commissioner of the New York department of water supply, gas and elec¬ tricity. He is a recognized authority on munic¬ ipal government and has written extensively on the subject. His works include (The Study of City Government (1897); (Ethical Marriage) (1900) ; (The American City) (1904) ; (The Government of Great American Cities) (1908); (Municipal Franchises* (2 vols., 1910— 11) ; (Great Cities in America) (1910) ; Gov¬ ernment by all the People) (1912), *etc.*

WILCOX, Ella Wheeler, American poet: b. Johnstown Centre, Wis., 1855; d. South Beach, Conn., 30 Oct. 1919. She was edu¬ cated at the University of Wisconsin and in 1884 began her literary career by contributing to the periodical press, and her work has been widely read and extensively reprinted. (Poems of Passion) (1883) gave her a national reputa¬ tion. Her verse has been widely published in daily newspapers. In recent years she dealt more and more with subjects pertaining to the higher life, the brotherhood of man, faith in a future life, reincarnation, *etc.* Among her other publications, in verse, are (Drops of Water* (1872) ; (Maurine and Other Poems) (1876); (Poems of Pleasure) (1887); (The Beautiful Land of Nod' (1892), *etc.* She also wrote the novels, (Mal Moulee* (1885) ; (A Double Life* (1890) ; (An Erring Woman's Love) (1892) ; (The Story of a Literary Career) (1904) ; (Poems of Sentiment* (1906) ; (Poems of Progress and New Thought Pastels) (1910) ; (Sailing Sunny Seas) (1911) ; historical Mother Goose) (1914) ; (Poems of Problems) (1914); <The World and I> (1919).

WILCOX, Marrion, American author: b. Augusta, Ga., 3 April 1858. He was graduated from Yale in 1878, made special studies at the universities of Oxford, Heidelberg, Jena and Berlin, and was subsequently admitted to the New York bar. He acted as instructor at Yale in 1884-86, was associate editor of the New Englander and Yale Review, and since 1893 has been engaged in editorial and other literary work in New York. In 1902 he became noted as an advocate of fair play to Cuba, defending the principle of reciprocity in the United States and urging concessions from the political lead¬ ers and

economic associations of Cuba. His principles were approximately those embodied in the treaty submitted to Congress and ac¬ cepted in 1903. In 1906—07 he visited South America and Mexico. In 1907 and especially in Mexico, Brazil and Argentina Mr. Wilcox suggested the interchange of professors between the United States and Latin-American countries'- He has published heal People* (1886) ; (A Short History of the War with Spain) (1898) ; harper's History of the War in the Philip¬ pines > (1900) ; < Sketches in Spain, England and Italy,* *etc.* He contributed many articles on Central and South American topics to the (Encyclopedia Americana * and edited, in col¬ laboration with George E. Rines, 'The Ency¬ clopedia of Latin-America) (1917). Mr. Wil¬ cox has contributed to the North American Re¬ view, the Churchman, Atlantic Monthly, the Scientific American, the Architectural Record, and other periodicals.

WILCOX, Robert William, American legislator: b. Kuhulu, Honolulu, Hawaii, 15 Feb. 1855; d. Honolulu, Hawaii, 24 Oct. 1903. He was educated in Hawaii and at the Royal Military Academy, Turin, Italy. He was a member of the native legislature, led the revo¬ lution to restore the old constitution in 1889, and in 1895 again commanded a revolution, on this occasion .for the purpose of restoring Queen Liliuokalani to the throne. He was cap¬ tured and sentenced to death, but through the mediation of the United States Congress the sentence was commuted to 35 years' imprison¬ ment and $10,000 fine. He was pardoned, con¬ ditionally in 1896, and fully in 1898, by Gov¬ ernor Dole. He was elected a delegate to the United States Congress in 1901 and served one term.

WILD, Heinrich, hm'riH vilt, Swiss mete¬ orologist: b. Uster, 17 Dec. 1833; d. Zurich, 5 Sept. 1902. His education was obtained at Zu¬ rich, Konigsberg and Heidelberg, and from 1863 to 1865 he was director of the central meteoro¬ logical bureau at Bern. He was called to Saint Petersburg, and was director of the Russian meteorological service 1868-95, when he retired. He invented the polaristrobometer, a polariza¬ tion plutometer, a magnetic theodolite and other optical instruments, edited the Russian (Neues Repertorium fur Meteorologies and published <Temperatur-Verhaltnisse des russischfen Reichs) (1876), and technical papers.

WILD, Jonathan, English thief and in¬ former: b. Wolverhampton, England, about 1682; d. London, 24 May 1725. He was a Bir¬ mingham buckle-maker who in 1706 went to London intending to engage in his trade, but becoming involved in debt was imprisoned for

four years, after which he became a receiver or stolen goods and an informer against such criminals as were not in his employ. He was hanged at Tyburn. He was the subject of Fielding's satire, (History of the Life of the Late Mr. Jonathan Wild the Great) (1743), and also appears in Ainsworth's novel, (Jack Shepherd,5 as well as in various other tales and pretended biographies.

WILD DUCK, The. Henrik Ibsen, in his ironic play (The Wild Duck5 ((Vildanden)), published in 1884 and performed the year fol¬ lowing, sought to exhibit the folly of obedience to any mere formula of conduct, a doctrine already propounded in his early poetic drama, (Brand.5 Incidentally, he made clear the dangers of a shallow idealism, and challenged his admirers to decide each case of conduct on its own merits, rather than according to some nicely worded law discovered in his plays. In (The Pillars of Society) and (An Enemy of the People,5 Ibsen had insisted that truth and freedom are essential to social welfare; and in (A Doll's House) he had declared for per¬ fect confidence between husband and wife. Yet in (The Wild Duck,5 he lets us under¬ stand that there are instances when ((the truth, the whole truth, and nothing but the truth,® may work more harm than good.

A busy-body reformer, sincere though short¬ sighted, finds that his former classmate in college has been wedded to a woman with a past. He discovers that it is his own father who has disgraced her, and feels in duty bound to enlighten Hjalmar Ekdal and convince him of the necessity of beginning life afresh with Gina on a basis of mutual understanding. But no sooner does Hjalmar learn from the idealist reformer that his Gina has once been the mis¬ tress of another than he rebuffs her and the innocent child he had thought his own, and proposes to forsake them both. The little girl, having been taught by the meddling ideal¬ ist the doctrine of self-abnegation, accepts it literally, and, instead of sacrificing only her pet duck to win back Hjalmar's love, sacrifices her dearest possession, life itself. Thus the idealist — Gregers Werle — with the best of intentions, has wrought havoc in a family hitherto happy, though in part deluded.

Quite aside from its central meaning, the play is of interest as

depicting with minute fidelity a curious group of characters. Of es¬ pecial note are the Ekdals, all victims of old Werle. There is the lieutenant, once his part¬ ner in a dishonest business, serving in prison as his scape-goat, and emerging to find his only pleasure in hunting pretended game in a pretended forest in an attic. There is the lieutenant's son Hjalmar, ostensibly a pho¬ tographer, but in fact an idle dreamer assum¬ ing poses to deceive himself and others, mouth¬ ing conventionally when informed that old Werle has married him to Gina to conceal her fault and his. There is little Hedvig, cursed by her inheritance from old Werle with weak eyes, straining them unduly in touching up negatives for the lazy Hjalmar, for whose sake she mistakenly lays down her life. And there is Gina, loyal and industrious, the embodiment of common sense, little troubled by remorse for her past, yet unconsciously atoning for it

by devotion to her husband and her child. Not the least enigmatic characters are the minor folk Molvik and Relling, the latter pro¬ claiming the need of every creature for some life-lie, some delusion to make him happy.

Technically, the piece is noteworthy for its decorative and incidental symbolism, an in¬ sinuated parallel being drawn between the bird that was shot by old Werle and sunk in the marsh until retrieved and further lamed by his dog; and the Ekdal family, injured by Werle and hurt even more by the efforts of Gregers to redeem it. English versions of (The Wild Duck5 have been made by Mrs. E. Marx-Aveling, Mrs. F. E. Archer and R. F. Sharp.

Frank W. Chandler.

WILD FLOWERS. A somewhat indefinite term applied to flowers of plants growing with¬ out cultivation, which by reason of their size and colors are conspicuous objects to the ordi¬ nary observer.

Plants are grouped by botanists into orders, families and genera. For example, the wild yellow or field lily is known as Lilium cana-densc. Canadense is the specific name. Lilium . is the generic name (Lilium philadelphicum being another species belonging to the same genus). Lilium belongs to the lily family, Liliacece , which contains a number of closely related lily-like genera. The lily family in turn belongs to the Order Liliales, which contains in addition to the Lily family the Trillium family (Trilliacecz) , the Lily of the Valley family (Convallariacece) and other rather closely al¬ lied families.

Some families of flowering plants contain a large number of species, others contain but a few species. The largest families of flowering plants in the northeastern United States are the following:

Sunflower Family . (Composite), 511 species.

Grass Family . {Graminea) , 378 species.

Sedge Family . (Cyperacea) , 333 species.

Rose Family . {Rosacea), 215 species.

Pulse Family . (Leguminosa), 182 species.

Mint Family . (Labiata), 119 species.

Figwort Family . (Scrophulariacea), 115 species.

Mustard Family . {Crucifer a), 102 species.

Buttercup Family . (Ranunculacea) , 93 species.

Heath Family . (Ericacea), 79 species.

Carrot Family . (Umbellifera), 77 species.

Orchid Family . {Orchidacea) , 68 species.

The whole number of species of flowering plants (native and introduced) treated in the .last edition of Gray's (Manual 5 is 4,079 (includ¬ ing 115 species of ferns and 25 species of Gym-nosperms or cone-bearing trees). The number of species treated in Britton and Brown's (Illus¬ trated Flora5 is slightly larger.

The number of wild flowers described and illustrated in the (Wild Flowers of New York5 is slightly less than 400, which does not include all plants with conspicuous or attractively col¬ ored flowers, and which might be called ((wild flowers.55

Small's (Flora of the Southeastern United States5 contains 6,364 species. Rydberg's (Flora of the Rocky Mountains and the Adja¬ cent Plains5 describes 5,897 species, and the total number of species of flowering plants in the United States and Canada is estimated to be

between 9,000 and 10,000.

WILD FLOWERS

The common wild flowers of the United States are tabulated by regions as follows :

Northeastern United States.

J A CK-IN-TH E-P ULPI T .

Wild Calla .

Pickerel-weed .

Red, Wood or Philadel¬ phia Lily .

Wild Yellow or Canada

Lily .

Yellow Adder ’s-tongue, or Dog’s-tooth Violet. . Yellow Clintonia, Dog¬ berry .

Wild or False Spikenard. . Bellwort .

Red Trillium; Wake Robin White Trillium; Large-flowered Wake Robin. .

Painted Trillium .

Blue Flag .

Blue-eyed Grass .

Showy Lady’s-slipper .

Yellow Lady’s-slipper… .

Moccasin Flower .

Showy Orchis .

Yellow Fringed Orchis.. . White Fringed Orchis… . Purple Fringed Orchis…

Grass Pink, Calopogon …

Arethusa .

Pogonia .

Lady’s-thumb .

Wild Pink .

Large Yellow Pond Lily. Sweet-scented White Wa¬ ter Lily .

Marsh Marigold .

Baneberry .

Wild Columbine .

[Wind Anemone Anemones \ Canada “

{ Rue “

Spring Beauty .

Hepatica .

Buttercup .

Early Meadow Rue .

Fall Meadow Rue .

Virgin’s Bower .

Blood root .

Squirrel Corn .

Dutchman’s Breeches …. Crinkleroot, Pepperroot.

Pitcher Plant .

Grass-of-Parnassus .

Foamflower .

M E ADO WSWEET .

Hardhack, Steeplebush…

Low or Pasture Rose .

Wild Lupine .

Goat’s Rue, Wild Sweet

Pea .

Wild Geranium, Crane’s—

bill .

Spotted Touch-me-not… .

Pale Touch-me-not .

Fringed Milkwort .

Musk Mallow .

Swamp Rose Mallow .

Bird’s-foot Violet .

Yellow Violet .

Common Blue Violet .

Sweet White Violet .

Canada Violet .

Long-spurred Violet .

Evening Primrose .

Flowering Dogwood .

Low or Dwarf Cornel,

Bunchberry .

Sh inleaf .

Indian Pipe, Corpse Plant.

Trailing Arbutus .

Purple or Pink Azalea,

Pinkster .

Mountain Laurel .

Fringed Gentian .

Closed Gentian . .

Butterfly Weed ……..

Common Milkweed .

{Ariscema triphyllum) .

{Calla palustris).

(Pontederia cor data).

(Lilium philadelphicum).

(. Lilium canadense) .

{Erythronium americanum) .

{Clintonia borealis).

{Vagnera racemosa).

{Uvularia grandifiora, perfoliata) .

{Trillium erectum).

{Trillium grandiflorum) .

(T rillium undulatum) .

{Iris versicolor) .

{Sisyrinchium angustifolium) . {Cypripedium regina). {Cypripedium parviflorum, pubescens).

{Fissipes acaulis) .

{Galeorchis spectabilis) . {Blephariglottis ciliaris). {Blephariglottis blephariglottis) . {Blephariglottis psy codes, grand¬ ifiora) .

{Limodorum tuberosum). {Arethusa bulbosa).

{ Pogonia ophioglossoides) .

{ Persicaria persicaria) .

{Silene caroliniana) .

{Nymphcea advena).

{Castalia odorata).

{Caltha palustris).

{Actcea rubra, alba).

(A quilegia canadensis) .

{A nemone quinquefolia) . {Anemone canadensis) . {Syndesmon thalictroides) .

{ Claytonia virginica, carolin¬ iana).

{Hepatica hepatica, acutiloba). {Ranunculus acris, hispidus, septentrionalis) .

{Thalictrum dioicum). {Thalictrum polyganum) . {Clematis virginiana). {Sanguinaria canadensis) . {Bicuculla canadensis) . {Bicuculla cucullaria) .

{Dentaria laciniata, diphylla). {Sarracenia purpurea). {Parnassia caroliniana).

{ T iarella cor difolia) .

{Spircea latifolia).

{Spiraea tomentosa).

{Rosa virginiana).

{Lupinus Perennis).

{Cracca virginiana).

{Geranium maculalum). {Impatiens biflora).

{Impatiens pallida).

{ Poly gala paucifolia) .

{Malva moschata) .

{Hibiscus moscheutos) .

{ Viola pedata).

{Viola pubescens, eriocarpa). {Viola papilionacea, cucullata, sororia) .

(Viola blanda).

{Viola canadensis).

{Viola rostrata).

{Ornothera biennis).

{ Cornus florida).

{Cornus canadensis) .

{Pyrola elliptica).

{Monotropa uni flora).

{Epigaea repens).

{Azalea nudiflora).

{ Kalmia latifolia) .

{Gentiana crinita).

{Gentiana andrewsii) .

{Asclepias tuberosa).

{Asclepias syriaca).

Hedge Bindweed .

Ground or Moss Pink .

Virginia Cowslip, Blue¬ bells .

Forget-me-not .

Oswego Tea, Bee Balm.…

Wild Bergamot .

Turtle-head .

Large Purple Gerardia …

Wood Betony .

Bluets .

Pearly Everlasting .

Twinflower .

Harebell .

Cardinal Flower .

Purple Boneset .

Flat-topped Goldenrod …

Wreath Goldenrod .

White or Pale Goldenrod.

Canada Goldenrod .

Red-stalked Aster .

New England Aster .

Mountain Aster .

White Daisy .

Yellow Daisy, Black-eyed

Susan .

Green-headed Cone-flow¬ er .

Tall, Giant or Wild Sun¬ flower .

{Convolvulus sepium) . {Phlox subulata).

{Mertensia virginica). {Myosotis scorpioides). {Monarda didyma). {Monarda fistulosa).

{ Chelone glabra).

{Gerardia purpurea). {Pedicularis canadensis) . {Houstonia coerulea). {Anaphalis margaritacea). {Linncea americana). {Campanula rotundifolia). {Lobelia cardinalis) . {EuPatorium purpureuni). {Solidago gramini folio). {Solidago caesia).

{Solidago bicolor).

{Solidago canadensis) .

{Aster puniceus).

{Aster novce-anglia) .

{Aster acuminatus) . {Chrysanthemum leucanihe • mum).

{Rudbeckia hirta). {Helianthus laciniata) .

{H elianthus giganteus).

Rocky Mountain Region and Adjacent

Plains.

Bear Grass, Turkey-beard

White Camas .

Wild Hyacinth .

Mountain Lily .

Western Red Lily .

Tiger Lily .

Dog’s-tooth Violet .

Alp Lily .

Blue Camas .

Mariposa Lily .

Western Blue Flag .

Umbrella Plant .

Sand Verbena .

Four-o’clock .

Umbrella-wort .

Bitter-root, Redhead

Louisa .

Moss Campion .

Yellow Pond Lily .

Pasque-flower, Wild Cro¬ cus … .

Purple Virgin’s Bower …

Marsh Marigold .

Globe-flower .

Y ellow Columbine .

Blue Columbine (State

Flower of Colorado) .

Larkspur .

Prickly Poppy .

Yellow Saxifrage .

Flowering or Golden

Currant . .

Meadow-sweet .

Dryad, Mountain Avens . . Wild Rose .

Wild Lupines .

Pomme de Prairie .

Prairie Clover .

Rattle-weed .

Milk Vetch .

Pink Lady-finger .

Vetchling .

Cranebill, Wild Geranium

Wild Hollyhock .

Scarlet Mallow .

Violet, Blue .

“ Yellow .

“ Dog .

Sand Lily .

Fireweed .

{Xerophyllum tenax).

{Anticlea elegans).

(T riteleia grandifiora) . {Leucocrinum montanum) . {Lilium umbellatum, monta¬ num).

{Fritillaria atropurpurea). {Erythronium grandiflorum) . {Lloydia serotina).

{Quamasia quamash).

{ Calochortus apiculatus, eury-carpus, gunnisonii) .

{Iris missouriensis) . {Eriogonum, numerous species). {Abronia fragrans). {Quamoclidion mulliflorum) . {Allionia nyctaginea, linearis, etc.) .

{Lewisia redeviva).

{Silene acaulis).

{Nymphcea polysepala, varie-gata, etc.).

{Pulsatilla ludoviciana) . {Atragene columbiana, pseu¬ doalp ina) .

{Caltha leptosepala).

{Trollius albiflorus) .

{Aquilegia flavescens) .

{Aquilegia coerulea). {Delphinium, several species). {Argemone mexicana, hispida). {Leplasea chrysantha).

{Ribes odoratum, aureum). {Spircea lucida, densiflora). {Dry as octopetala).

{Rosa macounii, woodsii, and numerous other species). {Lupinus, numerous species). {Psoralea esculenta). {Petalostemon candidus, pur-pur eus, etc.).

{Pliaca americana, longifolia, etc.) .

{Astragallus canadensis, spicatus, etc.).

{Xylophacos utahensis). {Lathyrus ornatus, venosus, etc.).

{Geranium richardsonii, vis-cossimum).

{Sidalcea Candida).

{Sphaeralcea coccinea).

{Viola Pratincola, retusa, etc.). {Viola venosa, linguaefolia, nuttallii).

{Viola adunca).

{Mentzelia albicaulis) . {Chamaenerion spicatum) .

WILD FLOWERS

1. Wild Red or Philadelphia (Lilium philadelphicum) 6. Wild or Pasture Rose (Rosa virginiana)

2 Wild Columbine; Rock-bells (Aquilegia canadensis) 6. Cardinal Flower; Lobelia (Lobelia cardinalis)

WILD FLOWERS

4. Marsh Marigold i. New England Aster

(Trillium erectum) (Gentinna arinita)

(Caltha palustris) (Aster novae-angliae)

3. Red Trillium or Wake-robin 7. Fringed Gentian

Baby’s Breath .

Evening Primrose .

Mountain Primrose .

Red or Purple Heather.. . Moss-plant, White Heath¬ er .

Parry’s Mountain Prim¬ rose .

Mountain Pink .

Shooting Star .

Gentian, Blue .

“ Fringed .

Moss .

American Columbo .

Deer’s-tongue .

Milkweeds .

Bush Morning Glory .

Wild Sweet William .

Baby-blue-eyes .

Lungwort, Bluebells… .

Verbena, Vervain .

Beard-tongue .

Monkey-flower, Yellow. .

“ Crimson .

Paint-cup, Indian Paint¬ brush .

Lousewort .

Bellflower, Harebell …

Blazing Star, Button Snakeroot .

Goldenrods .

Wild Asters .

Fleabane .

Purple Cone-flower .

Blanket-flower .

Arnica .

Squaw-weed, Ragwort… .

(‘ Gayophytum diffusum).

(Oenothera hookeri, jamesii, etc.).

(Pachylophus caespitosus).

(Phyllodoce empetriformis) .

(Cassiope mertensiana) .

(Primula parryi).

(Douglasia nivalis, montana) . _

(Dodecatheon multiflorum, phi-loscia, hendersoni, etc.).

(Gentiana parryi, bigelovii, etc.).

(Gentiana thermalis, barbellatus, simplex).

(i Gentiana fremontii,americana) .

{Fraser a fastigiata, albicaulis) .

(Fraser a speciosa).

(Asclepias speciosa, latifolia, etc.).

(Ipomcea leptophylla) .

(Phlox longifolia, stansburyi, etc.) .

(Nemophila brevi flora).

(Mertensia, numerous species).

(Verbena bracteosa).

(Pentstemon, numerous species) .

(Mimulus geyeri, langsdorfii, moschatus) .

(Mimulus lewisii).

(Castilleja, numerous species).

(Pedicularis racemosa, parryi, etc.).

(Campanula parryi, petiolata, etc.).

(Lacinaria squarrosa, Punctata, etc.).

(Solidago scopulorum, missouriensis, elongata, and several other species) .

(Aster conspicuus, douglasii, and numerous other species).

(Erigeron simplex, grandiflorus, etc.).

(Brauneria angustifolia) .

(Gaillardia aristata) .

(Arnica cordifolia, and other species).

(Senecio plattensis, and numer¬ ous other species).

Wild Clover .

Vetchling .

Wood Sorrel .

Saint Johns wort .

Yellow Violets .

Blue Violets .

Fireweed .

Clarkia .

Western Flowering Dog¬ wood .

WlNTERGREEN .

Rhododendron .

Labrador Tea .

Salal .

Shooting Star .

Star-flower .

Gentian .

Gilia .

COLLOMIA .

Baby-blue-eyes .

Fiddle Neck, Buckthorn—

weed .

YeRBA BUEIsfA .

Blue-eyed Mary, Blue—

lips .

Turtle-head .

Yellow Monkey-flower…

Red

Painted Cup, Indian Paint

Brush .

Honeysuckle .

Valerian .

Harebell .

Hawkweed .

Gum-plant, Resin-weed…

Goldenrod .

Fleabane . : .

Aster .

Tarweed .

Yarrow .

Arnica .

Balsam-root .

Sweet Coltsfoot, Butter¬ bur .

Groundsel, Ragwort .

Pearly Everlasting .

(Trifolium variegatum, fimbri-atum, etc.).

(Lathyrus polyphyllus) .

(Oxalis oregano).

(Hypericum scouleri).

(Viola glabella, sempervirens, nuttallii) .

(Viola palustris, adunca).

(Epilobium angustifolium) . (Clarkia pulchella).

(Cornus nuttallii).

(Pyrola bracteata).

(. Rhododendron calif ornicum) . (Ledum groenlandicum) .
(Gaultheria shallon).

(Dodecatheon lalifolium, etc.).

(T rientalis latifolia) .

(Gentiana sceptrum).

(Gilia gracilis, etc.).

(Collomia grandiflora) . (Nemophila parviflora).

(Amsinckia lycopsoides) . (Micromeria chamissonis) .

(Collinsia tenella, parviflora). (Chelone nemorosa) .

(Mimulus langsdorfii, dentatus, nasutus) .

(Mimulus lewisii, cardinalis, nanus) .

(Castilleja angustifolia, etc.). (Lonicera ciliosa, hispidula,etc.) .
(Valeriana sitchensis). (Campanula scouleri, rotundifolia) .

(Hieracium albiflorum) . (Grindelia oregano).

(Solidago elongata, etc.). (Erigeron speciosus, philadelphicus, etc.).

(Aster douglasii, major, etc.). (Madia dissiti flora).

(Achillea lanulosa).

(Arnica mollis, cordifolia). (Balsamorrhiza sagittata) .

(Petasitis speciosa) .

(Senecio triangularis) . (Anaphalis occidentals).

The Northwest.

(Oregon, Washington and British Columbia).

Brodiaea .

Western Red Lily .

Leopard Lily .

Dog’s-tooth Violet .

White Hellebore .

Pine Lily, Bear Grass ….

Wake Robin …

Two-leaved Solomon’s

Seal .

Blue Flag, Iris . .

Calypsa .

Rattlesnake Plantain -

Wood Orchis .

Bog Orchis .

Wild Ginger .

Spring Beauty .

Wild Pink .

Yellow Pond Lily .

Trautvetteria .

Columbine .

Larkspur .

Aconite, Monks-hood .

Oregon Grape .

Vanilla-leaf .

Foam Flower .

Miterwort .

Red-flowering Currant..

Syringa .

Ocean Spray .

Western Hardhack .

Dewberry .

Salmonberry .

Thimbleberry .

Wild Rose .

Indian Plum .

Wild Lupine .

(Hooker a coronaria).

(Lilium columbianum) . (Fritillaria lanceolata) . (Erythronium grandiflorum) .

(V eratrum calif ornicum) . (Xerophyllum tenax).

(Trillium ovaium).

(Unifolium kamtschaticum) . (Irix tenax, mis sour iensis). (Cytherea bulbosa).

(Peramium decipiens) .

(Piper ia elegans).

(Limnorchis dilitata).

(Asarum caudatum) .

(Claytonia sibirica, parvif olia). (Silene menziesii, scouleri, douglasii) .

(Nymphcea polysepala). (Trautvetteria grandis).

(A quliegia formosa) . (Delphinium menziesii, simplex, columbianum)

.

(Aconitium columbianum). (Berberis aquifolium, repens). (Achlys triphylla).

(Tiarella trifoliata).

(Tellima grandiflora, parviflora, Leptaxis menziesii) .

(Ribes sanguineum) . (Philadelphus gordonianus) . (Schizonotus discolor).

(Spiraea douglasii).

(Rubus macropetalus) .

(Rubus spectabilis).

(Rubus parviflorus).

(Rosa nutkana, gymnocarpa, pisocarpa) .

(Osmaronia cerasiformis) . (Lupinus columbianus, poly¬ phyllus, micranthus).

Southern States.

(Excluding for the most part those of the Northern States which extend southward in distribution).

Yellow-eyed Grass .

Spider wort .

Turkey-beard .

Blazing Star .

Bunch-flower .

Wood Lily .

Wild Hyacinth .

Bear Grass, Spanish Bayo¬ net .

Wake Robin, Yellow .

“ Red .

Colic-root, Star-grass…

Atamasco Lily .

Prairie Lily .

Violet Iris .

Tree Orchis .

Bletia .

Dog-tongue .

Wild Pink, Fire Pink….

Shrub Yellow-root .

Black Snakeroot .

Leather-flower .

Laurel, Bull Bay .

Sweet Bay .

Watches, Trumpets .

Hydrangea .

Mock Orange, Syringa …

Goat’s-beard .

Prairie or Climbing Rose.

Cherokee Rose .

Yellow-wood .

Rattle-box . .

Wistaria .

Rose Acacia .

Lead-plant .

Butterfly Pea .

(Xyris flexuosa, fimbriata, etc.). (Tradescanlia virginiana, mon¬ tana, etc.).

(Xerophyllum asphodeloides) . (Chamaelirium luteum). (Melanthium lalifolium) .

(Lilium catesbaei, grayi, etc.). (Quamasia hyacinthina) .

(Yucca filamentosa, gloriosa, etc.) .

(Trillium luteum).

(Trillium underwoodii, vaseyi) . (Aletris farinosa) .

(Atamosco atamasco).

(Cooperia drummondii) .

(Iris verna).

(Epidendrum cochleatum, etc.). (Bletia verecunda) .

(Eriogonum tomentosum) . (Silene caroliniana, virginica). (Xanthorrhiza apiifolia). (Cimicifuga racemosa).

(Viorna viorna).

(Magnolia foetida).

(Magnolia virginica). (Sarracenia flava).

(Hydrangea arborescens, radi-ata).

(Philadelphus inodorus, hir-sutus, etc.).

(Aruncus aruncus).

(Rosa setigera).

(Rosa cherokeensis) .

(Cladastris lutea).

(Crotalaria sagittalis) .

(Wistaria frutescens).

(Robinia hispida).

(A morpha fruticosa) . (Bradburya virginiana; Clitoria mariana).

Violet Wood Sorrel .

Wild Bachelor's Button.

Spurge, Poinsettia . .

Red Buckeye .

New Jersey Tea, Red-root

Sweating-weed .

Saint Andrew's Cross… . Shrubby Saint John's Wort

Stuartia .

Loblolly Bay .

Blue Violets .

May-pop .

Meadow Beauty .

Sundrops .

Sweet Pepperbush .

Sand Myrtle .

Flame Azalea .

Mountain Azalea .

Great Laurel, Rose Bay. .

Sheep Laurel, Wicky… .

Mountain Laurel .

Fetterbush .

Pyxie .

Shortia .

Galaxy .

Shooting Star .

Styrax .

SlLVERB ELL-TREE .

Yellow Jessamine .

Indian Pink .

Sabbatia .

American Columbo .

Wild Sweet Potato .

Wild Morning Glory .

Cypress-vine .

WTld Phlox .

Wild Salvia .

Yellow False Foxglove. .

Butterwort .

Trumpet-flower, Cross¬ vine .

Trumpet Creeper .

Unicorn Plant .

Japanese Honeysuckle. .. Trumpet Honeysuckle… .

Ironweed .

Button Snakeroot .

Golden Aster .

Goldenrod . .

Aster .

Marsh Fleabane .

Cup Plant .

Cone-flower .

Purple Cone-flower .

Sunflower .

Tickseed .

Sneezeweed .

Leopard’s-bane .

Indian Plantain .

Squaw-weed, Ragwort, Groundsel …

(Ionoxalis violacea).

(Poly gala lutea).

(Poinsettia heterophylla).

(Aesculus pavia).

(Ceanolhus americanus) . (Hibiscus militaris).

(Ascyrum hypericoides). (Hypericum nudiflorum, etc.). (Stuartia malacodendron). (Gordonia lasianthus).

(Viola palmata, cucullata, sep-temloba, Carolina, emarginata, etc.).

(Passi flora incar nata) .

(Rhexia lutea, mariana, virginica, ciliosa, etc.).

(Kneiffia longipedicellata, pu-mila, linearis).

(Clethra alnifolia, acuminata). (Dendrium prostratum, buxi-folium, hugeri).

(Azalea lutea).

(Azalea arbor escens, canescens, etc.).

(Rhododendron maximum, ca-tawbiense) .

(Kalmia angustifolia) .

(Kalmia laiifolia).

(Andromeda fioribunda, mari¬ ana).

(Pyxidanthera barbulata). (Sherwoodia galacifolia) .

(Galax aphylla).

(Dodecatheon media).

(Styrax americana) . (Mohrodendron carolinum, dip-terum) .

(Gelsemium sempervirens) . (Spigelia marylandica) . (Sabbatia angular is, dodecandra, etc.).

(Fraser a carolinensis) .

(Ipomcea pandurata).

(Ipomcea purpurea, hederacea, etc.) .

(Quamoclit quamoclit) .

(Phlox divaricata, pilosa, etc.). (Salvia coccinea, lyrata, etc.). (Dasy stoma pectinata, pedi—

cularia, jlava, virginica). (Pinguicula lutea).

(Bignonia crucigera).

(Tecoma radicans).

(Martynia louisiana).

(Lonicera japonicd).

(Lonicera sempervirens).

(V ernonia noveboracensis, etc.). (Lacinaria elegans, scariosa, spicata, etc.).

(Chrysopsis mariana, etc.). (Solidago, several species). (Aster, several species).

(Pluchea camphor ala) . (Silphium perfoliatum) . (Rudbeckia, several species). (Brauneria purpurea). (Helianthus, several species). (Coriopsis lanceolata, tripteris, major, etc.).

(Helenium tenuifolium) .

(Arnica acaulis).

(Mesadenia reniformis, tuberosa, etc.).

(Senecio rugelia, aureus, smallii, tomentosa, etc.).

California.

Toothwort .

Zygadene .

Poison Oak .

Wake Robin .

Manzanita .

California Saxifrage… .

Miner’s Lettuce .

Wood Anemone .

Mist maiden .

Wild Date .

Thimbleberry .

Heart’s-ease .

Mountain Heart’s-ease…

Modesty .

Wild Buckwheat .

Wild White Lilac .

California Lilac .

(Dentaria calif ornica) . (Zygadenus fremontii) .

(Rhus diversiloba) .

(Trillium ovatum). (Arctostaphylos tomentosa). (Saxifraga calif ornica) .

(Montia perfoliata).

(Anemone quinquefolia) . (Romanzoffia sitchensis) ,

(Yucca mohavensis).

(Rubus parviflorus) .

(Viola ocellata).

(V iola beckwithii) .

(Whip plea modesta).

(Erigonum fasciculatum) . (Ceanothus velutinus). (Ccenothus thyrsiflorus, divari-catus) .

White Nemophila .

Rattle Weed .

Wild Morning-Glory .

Wood Balm .

Yucca Palm .

White Evening Primrose. .

Scarlet Gilia .

Evening Snow .

Wild Bouvardia .

Ground Pink .

Californian Goldenrod… Ice Plant .

Squaw Grass .

White Owl’s-clover .

Harebell .

Mariposa Tulip .

Butterfly Tulip .

Yellow Globe Tulip .

Yerba Santa .

Alum-root .

Chamisal .

Yerba Buena .

Matilija Poppy .

White Sage .

Pussy’s-Paws .

Spanish Bayonet .

Ruby Lily .

Thistle Poppy .

Yerba Mansa .

Soap Plant .

Common White Lupine …. Large Yellow Lupine… .

Meadow Sweet .

American Barrenwort… .

Christmas-Berry .

Tarweed .

Virgin’s Bower .

Large-flowered Dogwood. Rein Orchis .

Rattlesnake Plantain… . White-veined Shin-leaf…

Pipsissiwa .

Large-White Mountain

Daisy .

Cream Cups .

California Poppy .

Tree Poppy .

Oregon Grape .

Sunshine .

Meadow Foam .

Whispering Bells .

Fawn Lily . .

Sticky Monkey Flower…

Hen-and-Chi ckens .

Yellow Sand Verbena… .

Tidy-Tips .

Brass Buttons .

Deer Weed .

Golden Stars .

Californian Dandelion…

Blazing Star. \ .

Gum Plant .

Sulphur Flower .

Tarweed .

Wild Hollyhock .

Shooting Star .

Californian Four-O’Clock

Tree Mallow .

Californian Rose Bay… .

Common Wild Rose .

Clarkia …

Firecracker Flower .

Farewell to Spring .

Great Willow Herb .

Alpine Phlox .

Sierra Primrose .

Brown Lily .

Skullcap .

Blue-eyed Grass .

Wild Canterbury-Bell…

Californian Lobelia .

Harvest Brodiaea .

Coulter’s Snapdragon… . Violet Snapdragon. ……

Tall Mountain Larkspur.

Indian Paint Brush . :

Pink Paint Brush .

Northern Scarlet Lark¬ spur .

Columbine. .

Indian Pink … . .

Scarlet Monkey Flower.. Yellow Monkey Flower.. Snow Plant .

(Nemophila atomaria). (Astragalus leucopsis). (Convolvulus luteolus).

(Sphacele calycina).

(Y ucca arbor escens) .

(Oenothera calif ornica) .

(Gilia aggregata).

(Gilia dichotoma).

(Gilia grandiflora) .

(Gilia dianthoides) .

(Solidago calif ornica) . (Mesembryanthemum crystal - linum).

(Xerophyllum tenax). (Orthocarpus versicolor). (Calochortus albus).

(Calochortus venustus). (Calochortus lutens). (Calochortus pulchellus) . (Eriodiclyon calif ornicum). (Heuchera micrantha) . (Adenostema fasciculatum) . (Micromeria douglasii). (Romneya coulleri).

(Audibertia polystachya) . (Spraguea umbellata). (Hesperoyucca whipplei). (Lilium rubescens) .

(Argemone platyceras) .

(A nemopsis calif ornica) . (Chlorogalum pomeridianum) . CLupinus densiflorus) .

(Lupinus arbor eus).

(Holodiscus aricefolius) .

(V ancouveria parvi flora) . (Heteromeles arbutifolia). (Chanuzbatia foliolosa). (Clematis ligusticifolia) .

(Cornus nuttallii).

(Habenaria leucostachys, ele¬ gans).

(Peramium menziesii).

(Pyrola picta).

(Chitnaphila menziesii).

(Erigeron coulter i).

(Platystemon calif ornicus) . (Eschscholtzia calif ornica) . (Dendromecon rigida).

(Berberis aquifolium).

(Baeria gracilis).

(Floerkia douglasii) . (Emmenanthe penduliflora). (Erythronium giganteum). (Diplacus glutinosus) . (Cotyledon calif ornicum) . (Abronia latifolia).

(Layia platyglossa) .

(Cotula cor onopif olid) . (Hosackia glabra).

(Bloomer ia aurea).

(Troximon grandiflorum). (Mentzelia Icevicaulis) . (Grindelia cuneifolid) . (Erigonum umbellatum).

(Madia elegans) (Hemizoniu luzulcefolia) .

(Sidalcea malvceflord) . (Dodecatheon hendersoni). (Mirabilis calif ornica) . (Lavatera assurgentiflora) . (Rhododendron calif ornicum) . (Rosa calif ornica) .

(Clarkia elegans, concinnd). (Brodicea coccinea).

(Godetia amoena).

(Epilobium spicatum).

(Phlox douglasii).

(Primula suffrutescens) . (Fritillaria lanceolata) . (Scutellaria tuberosd). (Sisyrinchium bellum).

(Phacelia whitlavia) . (Downingia pulchelld).

(Brodiaea grandiflora). (Antirrhinum coulterianum) . (Antirrhinum vagans). (Delphinium scopulorum) . (Castilleja latifolia) . (Orthocarpus purpurascens) .

(Delphinium nudicaule) . (Aquliegia truncata).

(Silene calif ornica) .

(Mimulus cardinalis). (Mimulus luteus).

(Sar codes sanguined) .

California Fuchsia . (Zauschneria calif ornica) . j

Mountain Lady’s-slipper. . (Cypripedium tnontanum).

False Lady’s-slipper . (Epipactis giganlea).

California Pitcher Plant. (Darlingtonia californica).

Bibliography. — A knowledge of the funda¬ mentals of botany, especially the structure of flowers, is necessary for a broad acquaint¬ ance with the wild flowers. For this purpose the following textbooks may be consulted: Gray, A., ‘Lessons in Botany* ; Curtis, ‘Nature and Development of Plants) ; Stevens, ‘An Illustrated Guide to the Flowering Plants) ; At¬ kinson, ‘Elementary Botany) ; Coulter, ‘Plant Structures-* ; Willis, Practical Flora for Schools and Colleges) ; Bergen, (Botany, Key and Flora > ; Jepson, (School Flora for the Pa¬ cific Coast.)

The student interested in the subject of wild flowers in the United States and Canada may refer to some of the following books for fuller, information : Bailey, William Whitman, ‘New England Wild Flowers and Their Seasons) ; id., (Among Rhode Island Wild Flowers) ; Blanchon, Neltje, ‘Wild Flowers) ; id., ‘Nature’s Garden-* ; Creevey, Carolina A., ‘Flowers of Field, Hill and Swamp* ; id., ‘Harper’s Guide to Wild Flowers* ; Dana, Mrs. William Starr (Frances Theodora), ‘How to Know the Wild Flowers* ; Davidson, Alice M., ‘California Plants in their Homes* ; Dowd, Alice M., ‘Our Common Wild Flowers of Springtime and Autumn* ; Gibson, William Hamilton, ‘Our Native Orchids* ; Goodale, George L., ‘Wild Flowers of America* ; Hen-shaw, Julia W., ‘Mountain Wild Flowers of America* ; House, Homer D., ‘Wild Flowers of New York* ; Lounsberry, Alice, ‘Guide to the Wild Flowers* ; id., ‘Southern Wild Flowers and Trees* ; Mathews, F. Schuyler, ‘Familiar Flowers of Field and Garden*; id., ‘Field Book of American Wild Flowers* ; Meehan, Thomas, ‘The Native Flowers and Ferns of the United States* (2 series, 4 vols., 1878-80) ; Parsons, Mary. E., ‘Wild Flowers of California* ; Ramaley, Francis, ‘Wild Flowers of Colorado* ; Reed, Chester A., ‘Wild Flowers East of the Rockies*; Thayer, (Mrs.) Emma, ‘Wild Flowers of Colorado.*

For the more advanced student who desires to have at hand complete floras of the various regions with which any plant may be determined by the aid of analytical keys, the following books are suggested:

Eastern United States. — Britton, N. L., ‘Manual of the Flora of the Northern States and Canada* ; Britton and Brown, ‘Illustrated Flora of the Northern United States and Can¬ ada* (3 vols.) ; Robinson and Fernald, ‘Gray’s Manual of Botany* (ed. 7).

Southern United States. — Chapman, ‘Flora of the Southern United States* ; Small, ‘Flora of the Southeastern United States* ; Coulter, ‘Botany of Western Texas.*

Rocky Mountain Region. — Coulter, ‘New Manual of Botany of the Central Rocky Moun¬ tains* (revised by Aven Nelson, 1909) ; Brown and Shaffer, ‘Alpine Flora of the Canadian Rocky Mountains*; Rydberg, ‘Flora of the Rocky Mountains and Adjacent Plains.*

Northern Pacific Coast Region. — Howell, ‘Flora of Northwestern America*; Piper, ‘Flora of the State of Washington.*

California. — Abrams, ‘Flora of Los An¬

geles and Vicinity* ; Jepson, ‘Flora of Califor¬ nia* ; id., ‘Flora of Middle Western California.*

Homer D. House,

Slate Botanist, The University of the State of New York.

WILD HUNT (Ger. Wilde Jagd; also Wiithenlieer) , in German folklore, a fancied noise in the air at night, most usually sup¬ posed to be heard between Christmas and Epihany. The sound is compared to that of a spirit host rushing along, accompanied by the shouting of huntsmen and the baying of dogs. The root of the notion is thought to lie in the Christian degradation of the old heathen gods. Like Odin, the lord of all atmospheric and weather phenomena, and consequently of storms, the wild huntsman also appears on horseback in hat and cloak accompanied by a train of spirits — by the ghosts of drunkards, suicides and other malefactors, often without heads or otherwise mutilated. When he comes to a crossroad, he falls, and gets up on the other side. Generally he brings hurt or de¬ struction, especially to any one rash enough to address him or join in the hunting cry, as many persons valiant in their drink have done. Whoever remains standing in

the middle of the highway, or steps aside into a tilled field, or throws himself in silence on the earth, is sup¬ posed to escape the danger. In many dis¬ tricts heroes of the older or of the more mod¬ ern legends take the place of Odin : thus, in Lusatia, Dietrich of Bern; in Swabia, Berch-told; in Sleswick, King Abel; in Lower Hesse, Charles the Great ; in England, King Arthur; in Denmark, King Waldemar. The legend has in recent times attached itself to in¬ dividual sportsmen, who, as a punishment for their immoderateness or cruelty in sport, or for hunting on Sunday, were condemned hence¬ forth to follow the chase by night. In lower Germany there are many such stories current of one Hakkelberend, whose alleged tomb is shown in several places.

Another version of the wild hunt is to be found in the legend prevalent in Thuringia. There the procession, formed partly of chil¬ dren who had died unbaptized, and headed by Frau Holle or Holda, passed yearly through the country on Holy Thursday, and the as¬ sembled people waited its arrival, as if a mighty king were approaching. An old man with white hair, the faithful Eckhart, preceded the spirit-host to warn the people out of the way. In one form or other the legend of the wild hunt is spread over all German countries, and is found also in France and even in Spain. In England we meet substantially the same notion in folklore — phantom dogs, like the black Shuck-dog of Norfolk and the Mauthe hound of Peel in Man, the “Wisht Hounds** of Dartmoor, headless horses, a ghostly coach and horses swept along in a storm of wind. Such tales, with innumerable variants, are found in the mythical and legendary records of all the older peoples.

WILD IRISH GIRL, The, a novel by Lady Morgan, published in 1806. It instantly became a favorite in England, went through seven editions in less than two years, and in 1807 reached its fourth American edition. The story is in the form of letters and suffers from

the consequent limitations ; but the sketches of Irish life are curious and picturesque.

WILD LIFE, Conservation of, in Amer¬ ica. Nothing in the New World impressed the first American explorers more than the abund¬ ance of its animal life. Early accounts of the country and its resources are filled with re¬ joicing over the plenitude of its fishes in both the sea and the inland waters ; and of the edible or otherwise useful creatures of forest and plain, especially fur-bearers. During the first century of colonization the fisheries and the fur-trade engaged a large part of the population, and all were utterly unrestrained in their drafts on what seemed to them an in¬ exhaustible wealth. This reckless destruction of American animal life, for the sake mainly of pelts or hides, continued as civilization pene¬ trated to the interior until finally not only beasts of prey but the valuable beaver and marten, the wapiti and other deer, and the bison, antelope and bighorn sheep were all but exterminated, various game-birds and water-fowl were depleted and many of the most im¬ portant fishes, especially those of anadromous species, like the salmon and shad, were nearly destroyed. The wild pigeon is only a conspic¬ uous example of a dozen or more species of useful or beautiful birds that have become totally extinct, and many more have been saved only at the last moment by the strenuous efforts of men who fought the ignorance and greed of lawless gunners and fishermen, often at the peril of their lives. The loss to this country and to Canada (included in this sur¬ vey) has been incalculable. It is true that a large part of it was inevitable, for it is impos¬ sible to civilize a region and maintain the whole of its animal life, much of which could not survive the changed conditions apart from any enmity of man ; but the needless waste has been prodigious and sinful. Nevertheless, it is only within a comparatively recent time that even the wisest men of America have awakened to the importance of preserving what remains of the continent's wild life.

Regulative efforts began to be made in the 18th century in the older Eastern States by local laws forbidding shooting in the breeding season, the taking of fish on their spawning-grounds, or on their way thereto, and conserving certain fur-bearers, but these regulations were local and related almost wholly to animals of market value. Gradually these enactments were copied in newer western and southern communities, and were broadened in scope, yet had only a limited effect, partly because they were far from uniform even in adjoining States and were weakened by many exceptions, but mainly because they were not, and perhaps could not, be well enforced, for the people generally were not interested or even felt an inherited preju¬ dice against <(game laws® of any sort.

The first popular alarm was felt when, in the middle of the last century, the governments of both the United States and Canada dis¬

covered that the decline in the fisheries had reached a danger-point. This led to the mak¬ ing of more stringent laws and their better enforcement, particularly on the Great Lakes. Accompanying this revival of effort scientific studies of food-fishes were promoted by the governments, which resulted in learning how

to propagate fishes artificially on a commercial scale, and thus restock depleted waters. With this movement, by which alone the fisheries of the Great Lakes and other inland waters have been maintained, the name of Soencer F. Baird (q.v.) is permanently associated. These methods, protected by stringent laws and policing, have kept a supply of shad, salmon and other anadromous fishes in our rivers ; and sensible regulations are preserving the great sea-fisheries for cod, herring, mackerel and many southern species. Similarly the small lake and river fishes of local food value, or interesting to anglers, are now fairly well protected and re¬ plenished under the watchful care of State commissions and various anglers' associations. Regulative care is preserving well also the oyster, clam, crab and other shellfish supply.

Public sentiment and legal control had been steadily improving and were stimulated by the sudden perception, about 1875, that the bison, the wild pigeon, the prairie chicken and other well-known animals would soon become ex¬ tinct unless rescued. At this time, too, sprang up the worldwide fashion of using stuffed birds, and their wings and feathers, in millinery. Ruthless slaughter of egrets, hummingbirds and every sort of song-bird as well as larger kinds began; and in 1885 the Audubon Society was organized to try to stem the tide of de¬ struction and bring to the minds of women a knowledge of the economic as well as moral wrong involved in the fashion that was sacri¬ ficing bird-life all over the world. Out of this movement grew the National Association of Audubon Societies (q.v.), which has been the most powerful factor in bringing all the birds of the country under the protection of good laws. Finally, it was largely instrumental, in cooperation with the United States Biological Survey and several sportsmen's organizations, in arranging a treaty with Canada covering the safety of migratory birds equally in both countries. This treaty, the way for which was paved by the United States Federal law of 1913, protecting all migratory birds, regardless of State lines, was finally ratified in 1916 — abolishing in this respect international lines — by the Congress of the United States and by the Parliament of the Dominion of Canada, both of which bodies arranged for its enforce¬ ment. The conservation of American bird-life may now be said, therefore, to be in a satis¬ factory condition.

Meanwhile, under the sympathetic encourage¬ ment of President Roosevelt, continued by his successors, certain areas have been set apart from the public domain — in most cases tracts virtually useless for agriculture or grazing — as ˆReservations® wherein the destruction of all living and harmless creatures is prohibited. This policy began with the seclusion of the animals of the Yellowstone, Glacier, Mount Olympus and other national parks. But these mountainous and forested places were not suited to the larger plains-animals, for which special reservations were soon prepared. This policy ’began with the Wichita National Game Preserve in southeastern Oklahoma, covering 57,120 acres. It contains a fenced bison-range of 9,760 acres, which in 1908 was stocked with a band of bisons by the New York Zoological Society; this band has since increased to nearly

100, and many antelopes and deer have been set free in similar great enclosures. Another bison-range was established in northern Mon¬ tana and stocked in 1910 by the Bison Society, and a large herd is now in existence there. Minnesota has a great deer-preserve in a region of forest, ponds and rocks adjacent to the Canadian line ; and a similar refuge for deer exists under State guardianship in the Adirondackˆ. Greater in extent than all these combined is the grand Canyon National Game Preserve,, vvhich embraces the whole region through which the Grand Canyon of the Rio Colorado has been carved. Its area is 2,333 square miles of mountains, plateaus and can¬ yons inhabited by animals that are adapted to the local conditions and could hardly be pre¬ served elsewhere.

For birds about 70 areas have been reserved, including many breeding resorts of sea-birds on the coasts of the Pacific States, British Columbia and Alaska, heretofore raided by egg-hunters ; large areas of marshes and lakes in the Pacific States and in the interior necessary as breeding-and feediug-places for western wildfowl and secure refuges for them on their migrations ; and many heronries and resorts of shore-birds and ducks in Florida and else¬ where along the Gulf Coast.

Similar reserva¬ tions have been created in Canada and in the insular possessions of the United States. Be¬ sides this several of the States, and Provinces have established reserves for animals — notably New York, Pennsylvania, Minnesota, Louisiana and the northern Rocky Mountain States ; and in Canada, Quebec, Ontario, Manitoba and Alberta. The Canal Zone is as a whole a bird-reservation ; this is the only American one not controlled by the Department of Agriculture and administered by the Biological Survey. It must not be forgotten, also, that the conscientious enterprise of outdoor societies of various kinds and of individual citizens have made many private game-preserves and bird-sanctuaries, and in so doing have not only provided local refuges, but have interested and educated the people of the neighborhood. The education of the young and the general interest now felt in animal life in a scientific as well as a humane way is really the greatest safeguard wild life has.

In addition to the federal supervision now exercised in both the United States and Canada to prevent the waste of wild life while enjoy¬ ing its proper utilization, every State and province has a board of commissioners charged with the same duty, and with the execution of the game laws. These public officials are both aided and criticized by several vigorous or¬ ganizations, the most powerful of which are The American Game Protective and Propaga¬ tion Association, The Wild Life Protective As¬ sociation, The New York Zoological Society, The National Association of Audubon Societies, The Camp Fire Club of America and The Boone and Crockett Club. To this list might well be added the names of a large number of lesser organizations exerting a most useful vigilance and influence locally. Consult the publications of the United States Department of Agriculture, especially those of the Biologi¬ cal Survey and of the Canadian Conservation Commission ; also the annual reports of the

State game and fish commissions and of the societies listed above. The best guide to fur¬ ther study, and summary of results up to the beginning of the Great War, is to be found in William T. Hornaday's <Our Vanishing Wild Life) (New York 1913).

Ernest Ingersoll.

WILDBAD-GASTEIN, vilt'bad gas'tln, Austria, a watering-place in Gastein valley, 3,000 feet above the sea, 48 miles south of Salz¬ burg, with thermal springs varying from 64° to 100°, and containing some salt and car¬ bonates of magnesia and lime. The place gives the name

to a treaty signed here in 1865 by the emperor of Austria and the king of Prussia, the non-observance of the terms of which led to the German War of 1866.

WILDCAT, any of the smaller species of feline animals (family F elide?, q.v.) in its feral condition ; a lynx. The term is a general one applying to all the smaller felines; but locally has usually some specific application. Thus in European books and speech the ((wildcatw prop¬ erly and ordinarily means Felis catus, formerly well known in all forested districts from the British Isles to Siberia, and still to be found in the less settled districts of the Continent south of Swreden, though extinct in Great Britain, France and Italy; it is also numerous in north¬ ern Scotland. The wildcat is larger, heavier and more strongly built than the domestic cat (to which it has contributed little, if anything: see Cat), has a stouter head and shorter and thicker tail, which does not taper; besides other peculiarities. Its body is yellowish gray, with a dark stripe along the spine, and with numer¬ ous darkish stripes descending more or less vertically down the sides, marking the limbs transversely and forming rings around the tail. It is noted for its savagery, and thoroughly tamed examples are very rare, if any ever existed. Like most of the wild felines the female makes her nest in a hollow tree, or cleft of rocks, in an abandoned crow's nest, or some similarly convenient place, and brings forth there in early summer an annual litter of young, which show the ferocity of their native disposi¬ tion from the start.

Lynxes. — The other European wildcat and the North American wildcats are lynxes, for¬ merly set apart in a separate genus (Lynx) ; but most modern zoologists do not do so. (<The lynxes, w says Mivart, ((are animals which pre¬ sent a markedly different aspect from that of other cats. Their legs are long, and their tail is, with one exception (that «of the caracal), very short. Their ears also are tufted at the tip. The pupil is linear when contracted. The orbits are incompletely surrounded by bone. They have no tooth representing the common cat's first upper premolar, while that answering to its second upper premolar is largely devel¬ oped. The intestines are also very short… . Still the above given characters are variable in the cat group. In some cats other than lynxes the tail is short, and some have the ears more or less penciled. Some, as we have seen, have long legs, and in many the upper premolar is wanting. The lynxes, therefore, cannot be separated off as a nominally distinct group of genus. The lynxes are very variable in their color and markings, and the Northern lynx also varies greatly in the abundance of its hair,

according to the season, the animal having a very different aspect in winter from that which it presents in summer. The Northern lynxes are generally reckoned as forming two species, one belonging to the Old World (F. borealis), and at least one species belonging to the New (F . canadensis). The American forms are often also described as alone constituting three spe¬ cies — namely, F. canadensis, F. rufa, and F. maculata. After a careful examination … I am, however, not only quite unable to regard the American varieties, as anything more than varieties, but I am inclined to the opinion that there can be no real specific distinctness be¬ tween the Northern lynxes of the two hemi¬ spheres, their skulls as well as their skins being so much alike.®

The European lynx is still found in northern Scandinavia, Russia and eastward, and in some of the wilder mountain chains of central Eu¬ rope. It is reddish gray, as a rule, indistinctly spotted or not at all, most prominently when young. A large one will measure 40 inches from the snout to the root of the short, thick tail. The lynx of northern America is very similar, the color grading from nearly uniform grizzly gray in far northern specimens which are the largest in average size, toward the red¬ dish and yellowish, more or less spotted south¬ ern specimens, which run much smaller : these colors are always brighter in summer than in winter. The long hair depending from the cheeks is characteristic of the group, especially in old males, and gives a very grim aspect to the countenance. These variations, which are local in some of their manifestations, have led the more recent school of American zoologists, led by Merriam, to name several species and subspecies. Thus the Canadian lynx (F . cana¬ densis) is not regarded as findable south of Canada, and is characterized by its long gray unspotted coat. The lynxes or “bobcats® of the United States generally are F. rufa, yellow¬ ish brown spotted on the sides, with dark brown, and having other markings ; a sub¬ species {maculata) , more profusely spotted, ex¬ tends the range of the cat to the Pacific Coast ; and various other subspecies, distinguished by color, are found in the Gulf States and west¬ ward to Central America. All have substan¬ tially the same rapacious qualities and habits, varying with the character of the country and climate in which each variety lives, and

the kind of small animals upon which they must depend for food. They are chiefly solitary and nocturnal ; and soon disappear from all well-settled regions.

African and Asiatic Wildcats. — The Egyp¬ tian or gloved cat (F . caligata) is the most in¬ teresting of the Old World wildcats, because it is the source, or main source, of our domestic races. (See Cat). It inhabits northern Africa, and is about a third smaller than the European wildcat; it is yellowish, growing nearly white on the belly, and has obscure stripings on the body, limbs and tail, . which is rather long, slender and tipped with black, while the feet are usually blackish. Another well-known Afri¬ can cat is the large, long-legged serval (F . ser-val) found throughout the whole Continent. It becomes as much as 40 inches long from nose to root of tail, and the tail may be 16 inches in length. In color it is tawny, with black spots,

forming two irregular bands along the back, and black rings on the tail; its fur is a valuable commodity. Three or four other species dwell along the West African Coast, as the rare red-brown “golden-haired® cat (F. rutila) , the smaller gray, spotted, F. neglecta, and the more yellowish F. servalina, but none is well known.

Asia and the Malayan archipelago have a large number of wildcats, some of which when better known may prove to be more local va¬ rieties of othee species. The most familiar are the common Indian wildcat (F. forquata), which has much resemblance to the European one, but is more slender, a brighter fulvous in tint and less striped. Another wide-ranging species in India is the chaus, or jungle cat (F. chans), about 26 inches long to the tail, which measures 9 to 10 inches and drops to the heels. It is yellowish gray, more or less dark and unspotted, more reddish on the sides, where it unites with the lower parts; a dark stripe ex¬ tends from the muzzle to the eye, and there are faint bars on limbs and tail. A very similar species, restricted to the arid plains of northern India, is the “ornate® jungle-cat (F . ornata). Another large East Indian cat, known from Nepal to Borneo, but nowhere numerous, is called the baycat (F. aurata), in reference to its bay-red color, which is unspotted and be¬ comes whitish on the under surfaces. India also has several spotted cats, of which the best known is the widely distributed fishing-cat (F. v’vuerrina) , which may be 30 to 32 inches long in body, with a tail 9 to 10 inches long; it feeds mainly on fish, snails and other mollusks, yet is noted for its fierceness, and has even been known to seize and carry away small native children. This cat is dark gray in general color, profusely

spotted and striped with black¬ ish like a civet. Smaller, more yellowish and much spotted, is the Indian leopard-cat (F. bengalensis) which occurs in all parts of India and eastward to Java. Resembling it, but smaller, is the rare wagati ; but more distinct and richly ornamented is the tiger-cat (F. mar-morata), whose tawny coat is marbled or clouded with elongate wavy black lines and commingling spots. It is of small size, but has a very long spotted tail. In the jungles of southern India the sportsman encounters about grassy places a small handsome species, with slender body and head, and rather short legs and long tail, called the rusty-spotted cat (F . rubiginosa), which is greenish gray with white under parts, and has dark stripes and lines of small spots extending from nose to rump, and pretty white marks about the face. A similar species (F. chinensis) belongs to southern China and Formosa; and several others in the Malayan region. It is quite likely that future increase of knowledge and connect¬ ing specimens will bring them all under one name. In Borneo, however, lives a very distinct little cat (F. badia), tinted bright chestnut, white on the breast and belly, and without markings, except a few on the face, and a streak on the long tapering tail. The flat¬ headed cat (F. planiceps) of Malacca, Sumatra and Borneo, is another distinct form. It is about the size of a domestic cat, but the body is unusually long, the neck short and thick, the head globular and flat on top, the legs remark¬ ably short and the tail short and thick. Its

EUROPEAN WILDCAT {Felis Catus)

tur is dark-brown above, each hair tipped with white, and it is spotted white on the lower parts, with yellow lines forming a V on the face. Central Asia has several notable wildcats, as the manul (b. manul), the steppe cat (F. caudatus) , and Tibetan tiger-cat (F . scripta), all of which are handsomely striped or spotted, or both.

American Tropical Cats. — South and Cen¬ tral America are the home of a large variety of small felines, as well as of the puma and jaguar.

Of these the most notable are the eyra, ocelot, and jaguarondi (qq.v.) elsewhere de¬ scribed. In addition to these are several of much local interest. The margay or chati (F . tigrina) is a widespread and variable species, which is met with from Mexico to Paraguay, in warm and well-wooded lowland regions. Its fur may be a grizzly gray, or vapˆ from that to a fox-red, profusely marked with black spots and rings, which extend along the tail, but do not form rings. There are three upright bars upon each cheek. The margay measures about two feet in length of body and its tail about 11 inches. Geoffroy's cat (P . guigna) is a little known species of southern Brazil. The Pampas cat or straw-cat (F . pajeras) is a well-marked form. It is much larger and more robust than a house-cat, with short thick legs, a short, club-shaped tail, thick neck and small head, with great round eyes and very small ears. This appearance of weight and size is largely due to the unusual length of the hair, which is yellowish gray, marked with transverse brownish bands on the body, patches on the face and rings around the tail. It inhabits the open plains of Argentina, and with similar habits has become a curious counterpart of the manul of the Asiatic steppes.

Bibliography. — Mivart, 'The Cat5 (New York 1892) ; Elliot, 'Monograph of the Feli¬ dae5 (London 1878-83) ; Hamilton, 'The Wild¬ cat of Europe5 (London 1896) ; Blanford, 'Fauna of British India — Mammals) (London 1888) ; 'Zoology of Persia) (London 1876) ; Blythe, 'Monograph of the Species of Lynx5 (Calcutta 1846) ; Stone and Cram, 'American Animals 5 (New York 1902) ; and standard authorities.

WILDE, wild, George Francis Faxon,

American naval officer: b. Braintree, Mass., 23 Feb. 1845. He was graduated from the United States Naval Academy in 1864 and in 1864-66 was attached to the Brazil squadron. He re¬ ceived promotion to lieutenant-commander in 1869, to commander in 1885, and while com¬ manding the dispatch boat Dolphin in 1885-88 made a trip around the world, the Dolphin being the first steel vessel in the United States navy to accomplish that feat. He became cap¬ tain in 1898, commanded the ram Katahdin in the Spanish-American War and later, in com¬ mand of the Boston, he landed the first marine troops ever landed in China, sending them to guard the legation at Peking. He captured Iloilo in the Philippine Islands in 1899, and was placed in command of the Oregon in that year. In 1900 he captured Vigan in the Philip¬ pines, and he was in command of the Oregon when she was grounded on an uncharted ledge of rock in the Pechili Gulf. In 1901-02 he was in command of the navy yard at Portsmouth,

N. H., and after 1902 was in charge of the yard at Boston.

WILDE, Jane Francesca Elgee, Lady

(“Speranza55) , Irish poet: b. Wexford, Ireland, 1826; d. Chelsea, England, 3 Feb. 1896. She was married to Sir William Robert Wills Wilde in 1851. Her literary career began in 1845 with her contributions in prose and verse to the ‘Nation.5 The publication of her essay ‘Jacta alea est,5 under her pen-name “Speranza,55 was made the basis of the unsuccessful prosecution of the editor after the suppression of the Na¬ tion in 1848. Among her writings are ‘Ugo Bassi5 (1857); ‘Poems by Speranza) (1871); ‘Ancient Legends, Mystic Charms, and Super¬ stitions of IrelamP (1887); ‘Notes on Men, Women and Books) (1891) ; ‘Social Studies> (1893), *etc.*

WILDE, Oscar (Fingal O’Flahertie Wills), Irish poet: b. Dublin, Ireland, 1856; d. Paris, 30 Nov. 1900. His father was Sir Wil¬ liam Wilde, a noted surgeon, and his mother was Lady Jane Wilde (q.v.). He was grad¬ uated from Oxford in 1878, winning the New-digate prize for English verse. In 1879 he went to live in London, where he soon became the leader of the so-called aesthetic movement and was satirized by Du Maurier as ‘Postle-thwaith) in Punch, and by Gilbert in the opera ‘Patience.5 He visited the United States in 1882, lecturing extensively on art topics, and later lectured similarly in his own country and in Paris. As an orator he was a flat failure, but he had a faculty of keeping himself in the public eye. His poetry and plays constitute his best claim to recognition. In 1895 he was con¬ victed of a serious moral offense and con¬ demned to penal servitude for two years. Dur¬ ing his imprisonment he wrote ‘A Ballad of Reading Gaol,5 a poem of great force, and ‘De Profundis,5 published in 1905. After his release he lived mainly in France. His other published works include ‘Poems5 (1880) ; ‘The Picture of Dorian Gray,5 a novel; ‘The Happy Prince and Other Tales> (1888) ; the tragedies ‘Guido Ferranti 5 (1890), and ‘The Duchess of Padua) ; ‘Intentions,5 essays (1891) ; ‘Lord Arthur Savile’s Crimes, and Other Stories5 (1891); ‘Lady Windermere’s Fan,5 ‘A Woman of No Importance,5 and ‘The Importance of Being Earnest,5 *etc.* His comedies are extremely clever, and his poems are characterized by melody of movement and beauty of thought. A complete edition of his poems appeared in 1903. Consult Ransome, A., ‘Oscar Wilde: a Critical Study5 (London 1912) ; Douglas, Lord Alfred, ‘Oscar Wilde and Myself5 (New York 1914) ; Mason, S., ‘Bibliography of Oscar Wilde5 (London 1914).

WILDE, Richard Henry, American scholar: b. Dublin, Ireland, 24 Sept. 1789; d. New Orleans, La., 10 Sept. 1847. He came with his parents to the United States in 1797 and settled in Georgia, where he studied law, and in 1809 was admitted to the bar. He was elected attorney-general of his State, and in 1815-17, 1824-25 and in 1827-35 was a member of Congress. He spent the years 1835-40 in Europe, made a special study of Dante and Tasso, and was instrumental in the discovery of a portrait of Dante by Giotto on the wall of the chapel of Bargello. He subsequently

removed to New Orleans, re-engaged in law practice, and in 1844 accepted the chair of con¬ stitutional law at the Louisiana State Univer¬ sity. He wrote the widely popular poem, (My Life is Like the Summer Rose,* and also pub¬ lished Conjectures and Researches Concern¬ ing the Love, Madness and Imprisonment of Torquato Dante* (1842). His poem (Hesperia,* edited by his son, was published in 1867.

WILDE, Thomas. See Truro, Thomas Wilde, Baron.

WILDER, wll'der, Alexander, American physician and author: b. Verona, N. Y., 14 May 1823 ; d. 19 Sept. 1908. He was graduated at Syracuse Medical College in 1850, and in 1852 began an editorial career on the Syracuse Star being subsequently connected with the Syracuse Journal (1853), New York Teacher (1856), and New York Evening Post (1858-71). He was an anti-Tweed alderman in New York in 1872, inspector of schools in 1873, and from 1875 to 1895 secretary of the National Eclectic Medical Association, editing 19 volumes of transactions.1* He was president of the New York School of Philosophy. Among his pub¬ lished works are (Secret of Immortality Re¬ vealed* (1846) ; (Neo-Platonism and Alchemy* (1869); (Our Darwinian Cousins* (1873); (Eleusinian and Bacchic Mysteries* (1874) ; (Ancient Symbol Worship* (1874) ; (Serpent and Siva Worship* (1875) ; (Vaccination, a Fallacy* (1879) ; Psychology as a Science* (1884) ; (The Soul* (1884) ; (Higher Sources of Knowledge* (1884) ; (Ethics and Philosophy of the Zoroasters*

(1885) ; (Ancient Smybol-ism and Serpent Worship* (1886); (Later

Platonists* (1887); Antecedent Life* (1895); the Ganglionic Nervous System* (1900) ; Perennial Life* (1902) ; (History of Medi¬ cine* (1902). He translated and edited Uamblichus on Egyptian Mysteries.*

WILDER, Burt Green, American scholar and physiologist: b. Boston, Mass., 11 Aug. 1841. He was graduated from the Lawrence Scientific School at Harvard in 1862, was assistant surgeon in the Union army in 1863-65, and in 1866 was graduated from the medi¬ cal department at Harvard. He was assistant in comparative anatomy at the Harvard Museum of Comparative Zoology in 1866-67, and in 1867 accepted the chair of zoology at Cornell, which he occupied until 1916, when he was made professor emeritus. In 1874-84 he was lecturer in physiology at the Summer Medi¬ cal School of Maine. He has made many in¬ teresting researches concerning the habits of the spider, and spent much time in an endeavor to secure a simple anatomic nomenclature. In 1885-86 he was president of the American Neurological Association. He has written numerous professional papers, and much miscel¬ laneous literature, besides several hymns and music, and has published in book form (What Young People Should Know* (1874) ; < Health Notes for Students* (1883) ; Physiology Practicums* (1888); (Health Notes for Stu¬ dents* (1890) ; (History of 55th Mass. Infan¬ try* (1918). His best known music is (The Founders' Hymn* (1907) ; Plumber Song* (1908); Past Night* (1909), and <01d Iron¬ sides* (1912).

WILDER, Marshall Pinckney, American horticulturist: b. Rindge, N. H., 22 Sept. 1798; d. Boston, Mass., 16 Dec. 1886. He was en¬ gaged as a merchant in the West India trade at Boston after 1825, in 1839 was chosen to the State legislature, was president of the State senate in 1850, and in 1849 served as member of the executive council. He was prominent in the organization of the Constitutional Union Party, was a delegate to the convention which nominated Bell and Everett in 1860, and throughout the Civil War was a firm supporter of the Union. He founded the Massachusetts Agricultural Society, the Massachusetts Agri¬ cultural College, and was active in the move¬ ment which resulted in the establishment of the Massachusetts Institute of Technology. He was author of numerous articles on horticulture, and lectured extensively on the subject. Among his published addresses may be mentioned (The Hybridization of the Camellia and Its Varie¬ ties* (1847).

WILDER, Marshall Pinckney, American professional entertainer : b. Geneva, N. Y., 19 Sept. 1859; d. 10 Jan. 1915. His occupation was at first a peddler, and later a stenographer, but he abandoned it in order to become a drawing¬ room entertainer, in which capacity he became widely popular. Though a hunchback he pos¬ sessed such a pleasing presence with unfailing good humor that he made friends everywhere. At first he entertained for 50 cents an evening, but in 1883 he went to London, was well re¬ ceived by royalty, and his fame was thus es¬ tablished. In 1899 he began to appear in vaudeville. In 1904-05 he toured around the world. He published People I've Smiled With* ; (The Sunny Side of the Street* (1905) ; (Smiling Around the World* (1907).

WILDERNESS, The Battle of the. On

9 March 1864 President Lincoln handed to Gen¬ eral Grant his commission as lieutenant-general and two days later placed him in command of all the armies of the United States. Grant made immediate preparations for an early cam¬ paign to be conducted simultaneously, east and west. He made his headquarters with the Army of the Potomac. Before coming to the East he had expressed himself as favoring a coast movement south of James River, and an ad¬ vance on Richmond on that line. After his arrival at Washington and a study of the prob¬ lem he proposed to act with the Army of the Potomac on what was known as the overland route from the Rapidan to the James, while General Butler, with 30,000 men, should ascend James River from Fort Monroe and establish himself in an intrenched position near City Point, whence he could operate against Rich¬ mond and its communications with the south, and at a proper time form a junction with the Army of the Potomac, moving down from the north. At the same time General Sigel, commanding troops in West Virginia and the Shenandoah Valley, was instructed to form two columns, one of 10,000 men, under General Crook, to move from the Kanawha and operate against the Virginia and East Tennessee Rail¬ road, the other 7,000 strong, under Sigel, in person, to advance, as far as possible, up the Shenandoah Valley, to draw detachments from Lee. Grant's main reliance, however, was the

Army of ihc Potomac, which, 30 April 1864, was composed of the Second, Fifth and Sixth corps of infantry and a cavalry corps, com¬ manded respectively by Gens. W. S. Hancock, G. K. Warren, John Sedgwick and P. H. Sheri¬ dan. The Ninth corps, Gen. A. E. Burnside, united with the Army of the Potomac on 6 May, but acted under the immediate orders of General Grant, until the 24th, when it became a part of the Army of the Potomac.

The strength of the army, including the Ninth corps, 30 April, was 118,769 officers and men, with 316 guns. The army was commanded by Gen. George G. Meade. Formed in battle line, two ranks deep, with one-third in reserve, it would cover a front of 21 miles. Its train of 4,000 wagons was 65 miles long. The assigned duty of this army was to attack the Army of Northern Virginia, and by constant hammering destroy it and take Richmond. The army of Northern Virginia, commanded by Gen. R. E. Lee, was composed of the First, Second and Third infantry corps, commanded by Gens. J. Longstreet, R. S. Ewell and A. P. Hill. A cavalry corps of two divisions (Wade Hamp¬ ton's and Fitzhugh Lee's) was commanded by Gen. J. E. B. Stuart. The most reliable esti¬ mate gives Lee's strength, present for duty, on 1 May 1864, as 48,700 infantry, 4,854 artillery and 8,399 cavalry, an aggregate of 61,953 officers and men, with 224 guns. On 1 May the Army of the Potomac was encamped in the vicinity of Culpeper Court House, De¬ tween the Rapidan and the Rappahannock, and the Ninth corps on the railroad from Man¬ assas Junction to the Rappahannock. Lee's army lay south of the Rapidan, Ewell's corps above Mine Run and A. P. Hill's on Ewell's left, higher up the Rapidan. Longstreet's corps was near Gordonsville. Stuart's cavalry lay along the lower Rappahannock. Lee's head¬ quarters were near Orange Court House, 70 miles from Richmond.

Lee's army being the first objective, it was finally determined to cross the Rapidan, turn his right and compel him to fall back toward Richmond or come out of his intrenchments and give battle on open ground. The principal objection to this movement was the difficulty presented by the Wilderness, a forest of un¬ usually dense growth, with an almost im¬ penetrable undergrowth, where infantry could pass with great difficulty and where cavalry and artillery could not be used. It was thought to avoid this difficulty by moving at night, cross¬ ing the Rapidan and getting through the Wilder¬ ness before Lee could discover the movement and intercept it by moving on the Orange turn¬ pike and Orange plankroad. These two roads lead from Orange Court House down the Rapi¬ dan toward Fredericksburg. They

follow the general direction of the river and are almost parallel to each other; the turnpike nearest the river and the plank road a short distance south of it. Grant's proposed route lay directly across these two roads along the western bor¬ ders of the Wilderness. The movement began at midnight of 3 May. Hancock's Second corps, preceded by Gregg's cavalry division, crossed the Rapidan at Ely's Ford and moved to Chancellorsville, where the entire corps with its trains had arrived by noon of the 4th. War¬ ren's corps, preceded by Wilson's cavalry,

crossed the river at Germanna Ford and marched to Wilderness Tavern, at the inter¬ section of the Germanna road by the Orange turnpike. It reached its position by 2 p.m. of the 4th.

Wilson's cavalry was thrown forward to Parker's Store on the Orange plankroad. Sedg¬ wick's Sixth corps followed Warren's across the Germanna Ford and halted a short distance be¬ yond it. The crossing of the river was very gratifying to Grant who regarded it as a great success, and it removed from his mind the most serious apprehension he had entertained <(that of crossing the river in the face of an active, large, well-appointed and ably commanded army, and how so large a train was to be carried through a hostile country and protected." At noon of the 4th Grant knew that' Lee was aware of his movement, upon which he sent a dispatch to Burnside to make a forced march from beyond the Rappahannock to Germanna Ford, and by the morning of the 5th his ad¬ vance was crossing the Rapidan. The orders for the 5th were for Sheridan, with two di¬ visions of cavalry, to move against the Con¬ federate cavalry, near Hamilton's Crossing, and at 5 a.m. Wilson's cavalry division was to move to Craig's Meeting House and reconnoitre the Orange pike and plankroads and other roads on his right and left. Hancock's Second corps was to march from Chancellorsville to Shady Grove Church and extend its right toward Parker's Store on the Orange plankroad, to which point Warren's corps was ordered to advance from Wilderness Tavern. Warren, in turn, was to extend his right toward Sedgwick's Sixth corps, which was ordered to Wilderness Tavern.

General Lee interfered with the full execu¬ tion of these orders. He had been expecting Grant to move on his right and when he saw on the morning of the 4th that the movement was being made, determined to attack him be¬ fore he could get out of the Wilderness and ordered Ewell to march by the Orange pike and A. P. Hill down the plankroad, and that night Ewell bivouacked within five miles of

Wilder¬ ness Tavern, and Hill's advance division halted for the night at Mine Run, seven miles from Parker's Store on the plankroad, and about 10 from the intersection of the Brock road. Longstreet moved from near Gordonsville at 4 p.m. Stuart's cavalry was drawn in and or¬ dered to cover the Confederate right. On the morning of the 5th Ewell continued his march on the Orange pike, under instructions to regu¬ late his march with that of A. P. Hill, on the plankroad, and both informed that it was not desired to bring on a general engagement be¬ fore Longstreet came up, who was under orders to follow Hill on the plankroad. When Ewell was two miles from the Wilderness Tavern, he halted, as he was three or four miles farther advanced than Hill. Warren had discovered that the Confederates, under Ewell, were in force two miles beyond Wilderness Tavern and before 7 a.m. had informed Meade of the fact, who ordered Warren to make an attack with his whole force. Sedgwick was directed to move up by a cross road, attack the enemy and connect with Warren on the turnpike, and a dispatch was sent to Hancock, informing him of what had become known and directing him to halt at Todd's Tavern, until further de-314

velopments. Warren had started early in the morning for Parker's Store, on the Orange plankroad, and when near it Crawford's di¬ vision had been ordered to halt in a good posi¬ tion on high ground, and finding that Wilson's cavalry at Parker's Store needed assistance Crawford threw forward a skirmish line that encountered the flankers of A. P. Hill's corps.

Soon after 8 a.m. Crawford was informed by Warren that Griffin's and Wadsworth's di¬ visions would attack Ewell on the turnpike and he was ordered to join in it with one of his brigades. Between 9 and 10 a.m. Hancock was ordered to move up the Brock road to the Orange plankroad and be prepared to move out that road toward Parker's Store, and about the same hour three brigades of General Getty's division of Sedgwick's corps were ordered from the Wilderness Tavern to the intersection of the Brock road with the Orange plankroad, and directed to move out the latter road and attack the enemy, and, if they could, drive them back beyond Parker's Store. As described by Humphreys, (<The Brock road begins on the Orange pike about a mile east of the old Wil¬ derness Tavern, and runs in a southeast

direc¬ tion to Spottsylvania Court House, intersecting the Germanna plank, the Orange plank, the Furnace, the Catharpin and other roads running in a southwest and south direction.® Ewell had formed for battle across the Orange pike when about noon Warren opened the attack. Griffin's division advancing on both sides of the pike struck Johnson's division, broke it and drove it back. Rode's division was thrown in on Johnson's right, south of the pike, and sup¬ ported by Early, who was formed across the pike, the line was re-established. After a severe and bloody fight Griffin was driven back, losing many prisoners and two guns. Wads¬ worth's division, which had advanced on the left of Griffin, lost direction, exposed its left and was thrown back in confusion. Mc-Candless' brigade of Crawford's division, at¬ tempting to unite with Wadsworth's left, was nearly surrounded by Ewell's right and fell back with heavy losses, and Crawford's entire division had to be drawn in.

Thus all the ground gained by Warren was given up and he assumed a new line somewhat in rear, but still in front of Wilderness Tavern, with his right on the Orange pike. He had lost more than 3,000 men. On his right General Wright's division of Sedgwick's corps came up early in the afternoon and with Neill's brigade of Getty's division formed within 300 yards of Ewell's front and repulsed one of his attacks. Soon after this Seymour's brigade of Rickett's division came up on the right of Neill, and about 5 p.m. two brigades of Sedg¬ wick attacked Ewell's left and were repulsed. Meanwile General Getty, who had arrived at the crossing of the Brock road and the plank¬ road, had been ordered to attack. Heth's Con¬ federate division was in his front supported by Wilcox's. Hancock, who had been ordered from Todd's Tavern, 10 miles distant, by the Brock road, was instructed to support Getty, drive A. P. Hill beyond Parker's Store and connect with Warren's left. It was 3.15 p.m. when Getty received his order to attack. Mean¬ while Hancock's advance had arrived and began intrenching on the Brock road. At 4.15 Getty

advanced to the attack through the thick woods and had gone less than 400 yards beyond the Brock road, when he became hotly engaged with Heth's division. Although Hancock had not completed his dispositions he moved forward to Getty's support and the fight became fierce and deadly at very close quarters and con¬ tinued until near 8 p.m., when darkness put an end to the fierce contest. Hancock had not gained much ground, but Hill's lines had been broken and his right driven back by two brigades of Barlow's division. While Hancock and Getty were engaged, Wadsworth's division had been ordered in a

southeast direction to strike the flank of the Confederates engaging them, but did not become seriously engaged and was halted by darkness, about a half mile from the Brock road.

The Union army had fought in detachments, with no connection of its corps or divisions. Grant said that he had never seen such hard fighting, but prepared to renew it next day, and Hancock, Warren and Sedgwick were or¬ dered to attack at 5 o'clock next morning, and Burnside was ordered to have two divisions in position between Warren and Hancock so as to advance with them. Each corps commander was advised of the instructions given to the others. To note briefly the action of the cavalry on the 5th : Wilson's division, after leaving 500 men at Parker's Store, had proceeded toward Craig's Meeting House on the Catharpin road, and was driven back on that road as far as Todd's Tavern. General Gregg had found nothing at Fredericksburg, but had discovered two brigades of cavalry falling back from Ham¬ ilton's Crossing to Lee's right flank, and fell back to Todd's Tavern before 3 p.m. to check the enemy pursuing Wilson and drove them back beyond Corbin's Bridge.

During the night of the 5th Ewell's and Hill's corps strengthened their intrenchments and put artillery in position, and a few minutes before 5 a.m. of the 6th opened the second day's fight by an attack upon the Union right, which was promptly met by the advance of Wright's division of the Sixth corps, which made two vigorous assaults against the Confederate left, which were repulsed with severe loss. Warren made several attacks on Ewell's right which were repulsed. These persistent and unsuccess¬ ful attacks were continued until after 10 o'clock, when Sedgwick and Warren were directed to suspend them, to strengthen their intrenchments and throw up new works, in order that a part of their troops might be available for an attack¬ ing force to move from the vicinity of Han¬ cock's right, which had been desperately en¬ gaged. Hancock had disposed Gibbon's and Bar¬ low's divisions, both under command of Gen¬ eral Gibbon, to defend his left flank against an apprehended attack by Longstreet, and at 5 a.m. launched Birney's, Mott's and Getty's di¬ visions, all under General Birney, along the Orange plankroad, Wadsworth's division of Warren's corps at the same time advancing on Birney's right. They fell upon Heth's and Wil¬ cox's divisions of Hill's corps with great fury and after a desperate contest broke them and drove them a mile and a half, through the dense woods, under heavy loss, and back on the trains and artillery, and General Lee's headquarters. Just before Hill's troops gave way the head of

Longstrect's corps, which had marched nearly all night, came upon the field at Parker's Store and was hastened along the plankroad to relieve the divisions of Heth and Wilcox. Kershaw's division was in the lead and began to form on the right of the road.

Humphreys says : <(The advance through the forest, underbrush, and swamps more than a mile, in a hot contest, had separated and dis¬ ordered Hancock's corps, and Birney's left, met in this condition by Kershaw's division, was not only brought to a standstill, but at some points swayed back and forward, until at length Kershaw, himself leading his di¬ vision, forced Birney's left back as far as his center. Wadsworth's advance had crowded many of Birney's .troops to the south side of the plankroad, so that the greater part of his, Birney's, command was on the left of that road. Field's division of Longstreet's corps following close on Kershaw's division, some of it coming on the ground at double-quick, was formed on the Confederate left of the plankroad, and, advancing, at once became hotly engaged with Birney's right and Wadsworth's troops, Gregg's Texans and Benning's Georgians' in the lead, bearing the brunt of the fight and losing heavily in killed and wounded. R. H. Anderson's di¬ vision of Hill's corps, following Field's divi¬ sion, formed on the same part of the line, one portion uniting with Field's troops in the at¬ tack, the other portions supporting. It was when Hancock's troops were partially checked by the fresh troops of Longstreet that the neces¬ sity of readjusting inis formation became im¬ perative. Regiments were separated from their brigades and mixed with others, and the line of battle was very irregular, and commanders were in this way losing the control of their troops. This was about half past six o'clock.'*

At 9 a.m. Hancock again attacked with the divisions of Birney, Mott, Wadsworth, Steven¬ son's of Burnside's corps, and three brigades of Gibbon's division and though fighting furi¬ ously made no headway, and at 11 o'clock the firing on his front died away. Meanwhile Longstreet had discovered that Hancock's left ex¬ tended but a short distance from the plankroad and he moved a part of his command to the right to attack Hancock's left and rear, the flank movement to be followed by a general advance of his entire corps. The attack first fell

on the left of the advanced line held by Frank's brigade, partly across the Brock road, which was fairly overrun and brushed away; it then struck the left of Mott's division, which in turn was driven back in confusion to the Brock road, and the confusion spread to the troops on the right, and Hancock was com¬ pelled to withdraw his entire corps to the Brock road, from which they had advanced in the morning, where they were reformed in two lines behind their intrenchments. Wadsworth, ori the right of Hancock, made heroic efforts, but his troops broke, and while striving to rally them he was mortally wounded and died within the Confederate lines next day. When this movement had succeeded Longstreet ordered, a general advance, and while riding at the head of column, moving by the flank down the plank¬ road, when opposite the force that had made the flank movement, which were drawn up parallel with the road, about 60 yards from it,

a volley was fired which killed General Jen¬ kins, commanding the leading brigade of Field's division, and severely wounded General Long¬ street. Lee soon came up, postponed the at¬ tack to a later hour and extended his line so that its right rested on the unfinished Orange * Railroad.

Meanwhile a brigade of the Ninth corps, which had been sent to the left, under Gibbon, swept down in front of Hancock's line from left to right and cleared it of the enemy. In the action of the previous day there had existed an interval between Warren on the turnpike and Hancock on the plankroad, through which Burnside was expected to advance and attack Hill and Longstreet in flank, but in advancing through the woods the enemy was encountered on a wooded crest near the plankroad. An attack was not deemed advisable and Burn¬ side's troops were moved farther to the left. It was not till afternoon and after Hancock's repulse that they became engaged, without ac¬ complishing much, and toward evening they fell back and intrenched. The lull that had followed the successful attack of Longstreet gave Hancock time to re-establish his position now strengthened' by fresh troops sent by Meade, and Hancock was directed to renew the fight at 6 p.m. But again Lee anticipated the Union commander, and at 4.15 p.m., having gotten well in hand the troops of Longstreet and Hill, he advanced in force against Han¬ cock's intrenched lines, until he came within 100 yards of the front one, when he opened a severe fire, which was heaviest on Hancock's left, and at the end of half an hour a portion of Mott's division and of a brigade of Birney's gave way in disorder.

The moment this break occurred the Con¬ federates pushed forward and Anderson's brigade of Field's division took possession of that part of the first line of intrenchments and planted their colors on them. Near the point where the line was broken through a fire had, during the afternoon, sprung up in the woods, and at the time of Lee's attack had communi¬ cated to the log breastworks on that part of the line. At the critical moment they became a mass of flames, which could not be extin¬ guished and which extended for many hun¬ dred yards to the right and left. The heat and smoke were driven by the wind into the faces of the Union troops, preyenting them on por¬ tions of the line from firing over the parapet, and at some points obliged them to abandon it. It was this condition of affairs that permitted Anderson's brigade to seize a part of the breast¬ works, from which they were quickly driven by Carroll's brigade, which was near at hand and v/ hich rushed upon them at the double-quick. By 5 p.m. Lee's troops had been completely re¬ pulsed on Hancock's front, and fell back with heavy losses in killed and wounded.

Just before dark Ewell moved two brigades of Early's division around the right of Sedg¬ wick's corps, held by Ricketts' division, and in cooperation with the rest of Early's divi¬ sion, succeeded in forcing Ricketts back in some confusion, capturing Shaler and Seymour, brigade commanders, and a large number of their men. Wright's division, also, was thrown into some disorder but Wright restored order

and Early drew back and formed a new line in front of his old one.

During the night an entirely new line was taken up by the Sixth corps, its front and right . thrown back, a change which was conformed to by the right of the Fifth corps. On the left Sheridan's and Stuart's cavalry had some severe fighting at and near Todd's Tavern in which Sheridan had the advantage. On the morn¬ ing of the 7th reconnaissances were made of the Confederate position which was found well intrenched ; neither commander showed any disposition to renew the fight on that field, and Grant decided to continue the movement by the left flank,

and when darkness came the Union columns began their march for Spottsylvania Court House (q.v.). The Union troops engaged numbered about 101,000; the Confed¬ erates numbered about 60,000. The Union losses, as officially reported, were 2,246 killed, 12,037 wounded and 3,383 missing, an aggregate, of 17,666. The Confederate reports are very in¬ complete ; the most reliable estimate places their entire loss at 7,750.

Bibliography. — (Official Records' (Vol. XXXVI) ; Humphreys, (The Virginia Cam¬ paign of 1864-65) ; The Century Company's (Battles and Leaders of the Civil War' (Vol. IV) ; Swinton, (The Army of the Potomac) ; Walker, < History of the Second Army Corps ' ; Grant, (Personal Memoirs' (Vol. II) ; Penny-packer, (Life of General Meade' ; Long, (Life of General Lee) ; Gordon, (Reminiscences of the Civil War.'

E. A. Carman.

WILDERNESS ROUTE, in American history, a famous emigrant road or trail from the Atlantic seaboard to Ohio through Cumber¬ land Gap. Thousands of emigrants passed over this road to Ohio and Kentucky. The <(Wilderness Road® was marked out by Daniel Boone. In 1775 the Transylvania Company, with Col. Richard Henderson as head, engaged Boone to mark out a road from Fort Wautaga, on a branch of the Holston, to the Kentucky River, where the company's newly-purchased lands lay. (<This I accepted,® wrote Boone, <(and undertook to mark out a road in the best passage through the wilderness to Kentucky with such assistance as I thought necessary to employ for such an important undertaking.®

WILDES, Frank, American naval officer: b. Boston, Mass., 17 June 1843; d. on steamer China, off San Francisco, Cal., 6 Feb. 1903. He was graduated from the United States Naval Academy in 1863, served in the West Gulf squadron, and later on the monitor Chick¬ asaw. He was promoted master in 1866, be¬ came commander in 1880, was in charge of the Portsmouth, N. H., navy yard in 1885-88, and in 1894 was commissioned captain. He com¬ manded the cruiser Boston at the Asiatic Sta¬ tion in 1895-98, and served under Dewey at the battle of Manila, 1 May 1898. In 1901 he was advanced to the grade of rear-admiral, was as- • signed to the Asiatic Station as junior squadron commander, and in 1903 was ordered home on sick-leave, but died on the way.

WILDFOWL, in modern usage, water-birds, as ducks, geese and swans, pursued by gunners for sport or for market. American methods of wild

fowling will be found where

these birds are described. (See Ducks). An interesting method in Europe, still extensively pursued in some parts of England, at the Fens, is by decoying wild ducks in large trap-ponds. The pond is constructed in a secluded place, well sheltered by trees, and with a plentiful supply of reeds and sedges. From this pond pipes or narrow passages are led, 60 to 80 yards, gradually narrowing toward the termina¬ tion. Above, the pipe is bridged and covered by a light network, and at its termination it ends in a tunnel net, which is, as a rule, carried out on to the land. Decoy ducks, which come to be fed at the call of the attendants, are used to entice their wild neighbors into the pipe ; but the decoy dog is perhaps a more valuable ally of the fowler. This* dog is named a <(piper.® It is of a small breed, and indulges in playful gambols by the side of the pipe, appear¬ ing now and then in advance of the fowl, which, led by curiosity, swims onward toward the dog, and is thus drawn toward the terminal net. The dog preserves a perfect silence dur¬ ing its manoeuvres. Devices of the same char¬ acter are used in the Orient, especially in Japan. Another Old World method is by employing the stalking horse, still used in some parts of England ; the body of the horse — which re¬ quires special training for its work — being used to conceal the sportsman from the game. Consult Sanford and Van Dyke, (Water Fowl,' American Sportsman's Library (New York 1903) ; Grinnell, (American Duck-shoot¬ ing' (New York 1901) ; Elliot, (The Wild Fowl of the United States, Etc.' (New York 1898) ; Mayer, (Sport with Rod and Gun' (New York 1892) ; Aflalo, (Sport in Europe' (London 1901) ; Hornaday, W. T., (Our Van¬ ishing Wild Life' (New York 1913) ; the files of Outing, and bulletins' of the United States Bureau of Biological Survey (Washington, D. C.)

WILES, Irving Ramsay, American ar¬ tist: b. Utica, N. Y., 8. April 1861. He was the son of Lemuel L. Wiles, also an artist and director of fine arts at Ingham University, Le Roy, N. Y. He studied under his father and at the Art Students League, New York, and under Carolus-Duran in Paris in 1882-84. He afterward established himself in New York and specialized in the painting of figures and por¬ traits. His fine conception of line and color¬ ing and his strong and sympathetic character¬ izations have gained him a high place among American artists. He was elected to the Na¬ tional Academy in 1897. He received gold medals at the expositions at Buffalo (1901) ; Saint Louis (1904) ; Buenos Aires (1910) ; and at San Francisco (1915) ; and was awarded the Proctor portrait prize at the National Acad¬ emy of

Design. Among his paintings are (Golden Dreams' (Saint Louis Museum)-, (Shelter Island, Summer' (Metropolitan Mu¬ seum, New York) ; <The Student' (Corcoran Art Gallery, Washington) ; (Russian Tea' (Na¬ tional Gallery, Washington) ; (Julia. Marlowe,' .portrait (1903); (Mrs. Gilbert,' portrait (1904); bemuel Maynard Wiles,' portrait (Metro¬ politan Museum, 1904) ; <George A. Hearn,' portrait (Metropolitan Museum, 1914), *etc.*

WILEY, Harvey Washington, American chemist: b. Kent, Ind., 18 Oct. 1844. He was

graduated from Hanover College in 1867; from the Indiana Medical College in 1872; from Harvard in 1873, and in 1878-79 studied abroad, chiefly at the University of Berlin. He was professor of chemistry at Purdue University in 1874-783, and in 1881-83 was also State chemist of Indiana. In 1883 he became chief chemist of the United States Department of Agricul¬ ture, occupying also the position of professor of agricultural chemistry at the graduate school of Columbia University from 1895. He was secretary of the Association of Official Agri¬ cultural Chemists in 1889 ; was president of the American Chemical Society in 1893-95, and was sent to Europe several times as the leading American scientist on the chemistry of foods. He made a specialty of sugar and glucose investigations and was interested in the pre¬ vention of food adulteration. In this work he was so active, and wrote so much against the use of artificial "preservatives® in foods, that he gradually antagonized the leading food companies of the country, and through political pressure was removed from the Department of Agriculture. He is deserving of high com¬ mendation for his long fight to help keep pure the food of the nation. He has pub¬ lished (Songs of Agricultural Chemists' (1892) ; Principles and Practices of Agricul¬ tural Chemistry' (3 vols., 1894-97) ; Poods and Their Adulterations) (1911) ; (The Lure of the

Land) (1915), and the bulletins' of the United States Department of Agriculture, *etc.*

WILEY UNIVERSITY, an institution for the education of the colored race, located in Marshall, Tex. It was founded in 1873 by the Freedmen's Aid and Southern Educational Society of the Methodist Episcopal Church, by which it is now chiefly supported. It is open to both men and women. It has elementary, secondary and collegiate departments, and nor¬ mal, commerical and industrial courses. The Collegiate Department confers the degrees of A.B. and B.L. Industrial work and instruction is given in carpentry, bricklaying, printing, sew¬ ing and cooking. The grounds and buildings in 1909 were valued at $60,000; a building for general purposes was erected in 1900-01. The income in 1917 amounted to $28,000; the library contained 6,000 volumes ; the students num¬ bered 400, and the faculty 26.

WILFRID, or WILFRITH, Saint, Anglo-Saxon prelate: b. about 634; d. Oundle, North¬ amptonshire, 709. He studied at Lindisfarne, became a monk, and in 653 accompanied Bene¬ dict Biscop to Rome in order to obtain an authoritative answer to the question of the proper time for celebrating Easter. On his re¬ turn he obtained from Alchfrid, king of Northumbria, a grant of land and a monastery at Ripon, and here he was ordained priest in 664. In this same year he took a leading part in the conference at Whitby, where he per¬ suaded the king to decree that, in the cele¬ bration of Easter, the Roman usage should be substituted for that of the Scottish Church, which had hitherto prevailed in Northumbria. At this time also the king appointed him arch¬ bishop of York, hut having gone to France to be consecrated by a bishop holding orthodox views on the Easter question, he found on his

return that his see was occupied by one of the opposite party, and he did not get possession till 669. Becoming obnoxious to King Egfrid (who had succeeded Alchfrid in 670), the king, to reduce his influence, divided his diocese into three, and when Wilfrid opposed this proceed¬ ing, deprived him of his see altogether (678). Wilfrid thereupon set out for Rome to obtain from the Pope a reversal of the king's act of deposition. Having been driven by a storm on the coast of Friesland, he preached to the people (who had no difficulty in understanding the Anglo-Saxon) with such effect that all the princes and many thousands of the people offered themselves for baptism. Having reached Rome he easily obtained from the Pope the desired decision, but during the reign of Egfrid remained under persecution or

in exile ; in 687, however, Aldfrid, who had suc¬ ceeded Edfrid, reinstated him. But Aldfrid also in course of time was offended by his de¬ votion to Rome, and Wilfrid was again de¬ posed in 691. He then made another journey to Rome, and did not return till 705. Consult Eddis, (Vita Wilfridi,' in (Historians of York) (Vol. I, (Rolls Series'); Bright, (Early Eng¬ lish Church History) (3d ed., 1897) ; Hunt, (The English Church from its Foundation to the Norman Conquest' (1899).

WILGUS, William John, American rail¬ road engineer: b. Buffalo, N. Y., 20 Nov. 1865. He studied civil engineering and entered rail¬ road service in 1885 ; and was later division engineer of construction on the Minnesota and Northwestern Railroad. He was in charge of the construction of the Chicago Union Trans¬ fer Railroad in 1890-93; and in 1893-1907 he was with the New York Central Railroad. He was chief engineer of construction with that railroad in 1899-1903 ; and later, as vice-presi¬ dent in charge of construction on the New York Central, he superintended the electrifi¬ cation of the lines within a certain radius of New York. He was chairman of the board of engineers constructing the tunnel under the Detroit River. Since 1908 he has been estab¬ lished as a consulting engineer. He was ap¬ pointed major in the Engineering Reserve Corps of the United States in 1917, and was later colonel in the Railway Transportation Corps with the American Expeditionary Force in France. He was awarded the Rowland prize of the American Society of Civil Engineers in 1909 and the Telford medal of the Institute of Civil Engineers, London, in 1911. He has pub¬ lished Physical Valuation of the Railroads'

(1913).

WILHELM MEISTER, Goethe's greatest novel, consists of (Wilhelm Meister's Ap¬ prenticeship, ' published in 1796, and (Wilhelm Meister's Travels or the Renunciants,' pub¬ lished in final form in 1829. Both parts of the novel deal with the adventures of a young man and the development of his character, each part, however, being conceived from a dif¬ ferent point of view. In the Apprenticeship' Wilhelm Meister, the son of a well-to-do mer¬ chant, decides to join a band of strolling actors, both from personal enthusiasm for their pro¬ fession and for the noble purpose of raising the German stage to a higher level. But he re¬ alizes, after some time, that he is not a born

»

actor ; the company to which he belongs can not keep up the high standard1 which it had reached in the presentation of Shakespeare's (Hamlet > (book 5), and makes the stage a place of cheap amusement instead of a place of education; the life of the actors is of an indifferent, drifting nature, depending on the opportunities of the moment. Wilhelm with¬ draws from the stage and feels more at home with a certain secret society — The Society of the Tower — whose members as a rule belong to the nobility. Real culture and superior skill in worldly matters can be found among them. The high goal which they pursue in the education of man is to develop and to reconcile with each other all the qualities with which the individ¬ ual is endowed by nature. The common problem which all men have to solve in the course of their lives is the reconciliation of the moral and the sensual, the ideal and the real, while art and perhaps religion are con¬ sidered the means for attaining such a com¬ plete, harmonious personality. Man is to make himself a work of art which, independent of its surroundings, has its object exclusively in itself. Against this inspiring conception of man by which Wilhelm is attracted and which his fiancee Natalie and to some extent also her aunt represent (Cf. Confessions of a Fair Saint,) book VI), stand out the pathetic figures of Mignon and the harper, who are doomed to a tragic end. Characteristic fea¬ tures of Germany in the 18th century are the separation of classes into nobles and com¬ moners, the conception of the theatre as a place of education, and the tendency to form secret societies. The construction of the (Travels) is decidedly loose. Wilhelm himself no longer plays so prominent a part; reflections and maxims, descriptions of conditions and institu¬ tions take up a great deal of space, and a number of short stories but vaguely connected with the main story are inserted at different places. The whole is conceived in a new spirit, the spirit of renunciation, the power of which every individual must experience in the course of his life and without which mutually beneficial relations with our fellowmen cannot be established. Accordingly a new standard is set up for the individual and for society. Above all, the individual is to be made a use¬ ful member of society, and to this end it is necessary that he should confine his best efforts to one definite activity; Wilhelm chooses sur¬ gery for his specialty. The separation of classes, already disregarded at the end of the Apprenticeship,* where marriages between nobles and commoners are contracted, is set aside for democratic ideas in the

travels' where noblemen in leading positions consider themselves no better than their fellow-workers. The feeling between men has become wider and freer, andl so has the feeling between countries. While, in the first part of the novel, emigration to America is rejected, the second part pronounces both emigrating and staying at home equally good, indeed the chief char¬ acters — among them Wilhelm — make up their minds to go to America. For good men are at home anywhere where they are useful. A world-society is hoped for which will inform its members about all parts of the world and foster in them a (<world-piety)> which respects all

forms of religion and government serving man¬ kind while fulfilling their special tasks. The individual, aesthetic man of the 18th century is replaced loy the social, practical man of the 19th century; the ideal of the harmony of the individual is eclipsed by the ideal of the har¬ mony of the world. We see the author of Vilhelm Meister) like the colossal mythical statue of Apollo at Rhodes standing as it were on the shores of two centuries. Con¬ sult edition of Goethe's works in (Deutsche National-Literatur) (Vols. XV-XVI, 1882-98) ; (Wilhelm Meister's theatralische Sendung) (1911); English translations in Everyman's Library,* by Carlyle, and in (Bohn's Libraries.* Bielschowsky, (Goethe* (Vol. II, 26th edi¬ tion, pp. 128-183, 513-568) ; Creizenach, intro¬ ductions and notes in (Goethe's Samtliche Werke, Jubilaums-Ausgabe* (Vols. XVII-XX).

Ewald Eiserhardt.

WILHELM TELL. Schiller's most popu¬ lar play, if not his best, is <William Tell,* of which more copies have been sold than of any other German work of literature. During the years 1899 to 1905 a yearly average of 232 stage performances in German lands was maintained, a record equalled by no other Ger¬ man drama. Many critics condemn its struc¬ ture, others find Tell's slaying of the tyrant Gessler from ambush morally indefensible ; but it has become the national poem of the Swiss people. Read and seen on the stage in Ger¬ many's dark days it inspired the revolt against the despotism of the great Napoleon,, and again in 1848 and later in 1870 its powerful influence was felt and the Riitli oath became the motto of the new empire. On the 100th anniversary of Schiller's birth in 1859 the <Urkantone> dedicated the immense Mytenstein near the Riitli <(To Schiller, Tell's Singer.**

Although every child knows the story of Tell's appleshot, it is not Tell

but the Swiss people who are the heroes of the drama, or more exactly the three forest cantons Schwyz, Uri and Unterwalden, who by their historical defeat of the forces of the duke of Austria at Morgarten in 1315 and by later victories, made themselves independent of the House of Habsburg while remaining in the empire down to the Thirty Years' War, Still, the drama is built about the Tell legend, for history knows no Tell, nor any tyrannical Gessler, nor was there any revolt against Kaiser Albrecht, as in the drama, which follows the chronicle of Egidius Tschudi (1505-72). The legend, it¬ self, most probably came we know not how, from the Dane Saxo Grammaticus, who wrote in the 12th century, but long before Goethe's visit to the Forest Cantons in 1797, it had been accepted by the Swiss as fact. Goethe had wished to treat the subject in an epic, but resigned it to Schiller for dramatic treatment, helping him with all his data and knowledge of Swiss customs, topography and local color, for Schiller never saw Switzerland. It was finished and first produced in March 1804, and rapidly made its way over delighted Germany, but was not tolerated in Vienna till 1827.

In their revolt against Habsburg tyranny, representatives of the three original cantons met on the Riitli and swore their (<desire to ' be a united people of brothers, to be separated

in no trial and danger; to be free as their fathers were ; to suffer death rather than live in servitude ; to trust in God on high and not to fear the power of men.® Hence Schiller carried three parallel plots, of which Tell, the yeomanry and the nobles were the protagonists, but all blend into one compact whole, leading from a common revolt against tyranny to common success.

The noble blank verse, the occasional lyrics and the striking scenery conspire to make a drama of irresistible charm, such that amateur actors give the play twice a week during the summer at Altorf to never-diminishing audi¬ ences.

Editions: Schiller's <Werke,) ˆoedeke,* etc., 1868-76 (Vol. XIV) ;

(Sakular-ausgabe) (Vol. VII) ; American school editions: E. C. Roedder, 1905 ; Arthur H. Palmer, 1915, and a dozen others. Consult Bulthaupt, Heinrich, drama¬ turgic des Schauspiels) (Vol. I) ; Kuenen, E., Schiller's Wilhelm Tell, erlaiitert und gewiirdigtP There is an English translation by E. B. Lytton, 1844, and nearly 20 others.

Carl E. Eggert.

WILHELMINA I, vil-hel-mena (Wilhelmina Helene Pauline Marie), queen of the Netherlands: b. The Hague, 31 Aug. 1880. She is the daughter of King William III of the Netherlands by his second wife, Emma of Waldeck. She became queen on the death of her father in 1890, but as she had not attained her majority her mother ruled as queen-regent; Wilhelmina meanwhile was carefully educated under the best tutors. Shortly after her 18th birthday, on 6 Sept. 1898, she was crowned queen at Amsterdam. Her charming person¬ ality and strength of character have made her very popular with her people ; she has also been strongly influenced by her mother, who is equally well loved by the people. In February 1901 she was married to Henry Frederick, Duke of Mecklenburg-Schwerin ; and 30 April 1909 she became the mother of Juliana, Duchess of Mecklenburg.

WILHELMSHAVEN, vil'helms-ha-fen, Germany, town and naval station, on the north¬ ern coast of the state of Oldenburg, at the west entrance of the Bay of Jade,. 40 miles northwest of Bremen, with which it is con¬ nected by rail. In 1853 the land was bought from Oldenburg by Prussia; and the town laid out in 1856; it was first used as a naval station in the Franco-Prussian War, and subsequently was made a fortress of the first . rank. The harbor and fortifications were built at great cost, as the ground is soft and marshy and without natural advantages. The harbor basin, which is artifically constructed and walled With granite, is connected with the bay by a canal and contains three large dry docks; it was de¬ fended by forts of immense strength and pro¬ vided with a torpedo station. The naval work¬ shops were located here; it was one of the most important naval stores of the German empire in the World War. There is also a commencal harbor connected with the naval harbor, but the town has not attained commercial importance. Pop. about 36,000.

WILIBRORD, wil'i-brord, or WILLI-BROD, Saint, English missionary, called the Apostle of the Friesians: b. Northumbria,

about 657 ; d. about 738. He was brought up in Saint Wilfred's

monastery at Ripon, spent 13 years in Ireland, and at 33, with several asso¬ ciates, embarked as a missionary for Friesland, where he was warmly welcomed by the Fran¬ conian prince, Pepin. Wilibrord made two vis¬ its to Rome (692 and 695), and on the latter occasion was made bishop by Pope Sergius over all the converted Friesians. In that part of Friesland under the rule of the Franks, he founded many Christian churches, some of which were destroyed a few years later in con¬ sequence of the successes of the pagan Frie¬ sians. He was buried in the monastery of Echternach, near Treves, and is commemo¬ rated in the Roman Catholic Church on 7 No¬ vember.

WILKES, wilks, Charles, American naval officer and explorer: b. New York, 1798; d. Washington, 8 Feb. 1877. He entered the navy as a midshipman in 1818, served on the Medi¬ terranean Station in 1819-20, in the Pacific 1821-23 and was then selected for separate com¬ mand. In 1826 he was promoted lieutenant, and in 1830 was appointed to take charge of the government charts and instruments. In 1838 he was put in command of an expedition for ex¬ ploring and surveying the Southern seas, the first scientific expedition ever fitted out by the United States government. During the next five years the expedition visited Madeira, Rio de Janeiro, Tierra del Fuego, Chile, Peru, the Paumota group, Tahiti, Tutuila and the Sa¬ moan group, New South Wales, the Antarctic regions, New Zealand, the Fiji group, the Sand¬ wich (Hawaiian) Islands, the Columbia River, Willamette Valley, the coast of California, the Philippine Islands, Sulu Archipelago, Saint Hel¬ ena, Singapore and the Polynesian Islands. The results of the expedition were published in 19 volumes, those on (Hydrography> and (Meteorology) being written by Wilkes himself, who also wrote the (Narrative of the United States Exploring Expedition (1845). Wilkes claimed to have discovered an Antarctic continent, but the claim was long disputed. Shackleton's re¬ cent discoveries tend to prove the accuracy of Wilkes' announcement. In 1843 he was made commander, in 1855 a captain, and at the be¬ ginning of the Civil War in 1861 was placed in command of the San Jacinto, in which he went to the West Indies in search of the Confederate vessel Sumter. On 8 November of that year he took the Confederate commissioners Mason and Slidell from the British mail steamer Trent. (See Trent Affair, The). In 1862 Wilkes was in command of the Potomac flotilla and afterward of the flying squadron that operated against blockade-runners. In July 1862 he was promoted commodore, in 1864 was placed on the retired list, and thereon in July 1866 be¬ came rear-admiral. Besides those above men¬ tioned his publications are (Western America, Including California and Oregon> (1849) ; and (The Theory of the Wind} (1855).

WILKES, John, English politician : b. Lon¬ don, 1727 ; d. December 1797. He was the son of a wealthy distiller and was educated at the University of Leyden. In 1757 he was returned to Parliament as member for Aylesbury and in 1762 attained considerable reputation by the publication of a paper entitled the North Briton, in which the administration of Lord

Bute was severely attacked. These papers has¬ tened the resignation of Lord Bute, April 1763, and the same month the North Briton com¬ mented on the king's speech in such caustic terms that a prosecution was determined upon. Wilkes, among others, was apprehended; but he asserted the illegality of the warrant and re¬ fusing to answer interrogatories was com¬ mitted to the Tower. Some days after, he was brought by writ of habeas corpus before the court and ordered discharged on the ground that his privilege as a member of Parliament had been violated. On the next meeting of Parliament, however, a special law was passed to sanction Wilkes' prosecution, and in January 1764 he was expelled from the House of Com¬ mons. A second charge was also brought against him for printing an obscene poem, en¬ titled an (Essay on Women, > and he was found guilty of blasphemy as well as libel. As he had by this time withdrawn to France and did not appear to receive sentence, he was outlawed. He made vain attempts to procure the reversal of his outlawry, but trusting to his popularity ventured to return on a change of ministry (1768). He was elected to Parliament for Mid¬ dlesex, but before he could take his seat was committed to prison to fulfil the sentences previously passed upon him, and not long after was expelled from the House for an alleged li¬ bel upon the Secretary of State and Secretary at War. Three times after this he was re¬ elected within a few months, but the House of Commons persisted in keeping him out, and after the third election the other candidate, al¬ though he had got but a small minority of the votes, was declared duly returned. In 1770 he was released from his imprisonment. He was now more than ever the idol of the people. He was elected alderman of London, sheriff of Middlesex, and finally mayor (1774). In 1774 he was again elected to Parliament for

Middle¬ sex and allowed to take his seat, which he held till 1790. His last triumph was obtained in 1782, when the resolutions respecting the disputed Middlesex elections were ordered to be ex¬ punged from the journal of the House of Com¬ mons. From the year 1779 he was chamberlain of the city of London. Wilkes, as a writer and speaker, did not reach beyond medi¬ ocrity. His private character was very licen¬ tious, but he possessed elegant manners, fine taste, ready wit and pleasing conversation. His (Letters and Speeches> were published by him¬ self in 1786; and much light is thrown upon his conduct by the (Letters from the Year 1774 to the Year 1796 to His Daughter0 (1894). His cor¬ respondence was also published (1805), with a memoir by Almon. Consult Fitzgerald, (The Life and Times of John Wilkes, M.P.* (1888).

WILKES-BARRE, Pa., county-seat of Lu¬ zerne County and regarded by many as the most beautiful city in the State, on the north branch of the Susquehanna River, and on the Central Railroad of New Jersey, the Wilkes-Barre and Eastern, the Delaware and Hudson, the Wilkes-Barre and Hazleton, the Delaware, Lackawanna and Western, the Lehigh Valley, the Lackawanna and Wyoming Valley and the Pennsylvania railroads, 110 miles northwest of Philadelphia and 110 miles west of New York City. It was first settled in 1769 by New Eng¬ land people, mainly from Connecticut, under

the auspices of The Susquehanna Company, and was named in honor of John Wilkes and Isaac Barre (qq.v.), members of the British Parlia¬ ment. During the Revolutionary War the set¬ tlers were, with few exceptions, loyal to the pa¬ triot cause. July 3, 1778, the male inhabitants of Wyoming Valley, who were assembled at Forty Fort to repel an invading foe, were at¬ tacked near the fort (on Abraham's Plains, some seven miles from Wilkes-Barre) by a bat¬ talion of British Rangers with their Indian al¬ lies, and were badly defeated. The Wyoming Monument, erected near the field of battle, commemorates the valor of the Americans who fought on this bloody field. Following the sur¬ render of Forty Fort, on 4 July 1778, Wilkes-Barre was almost wholly destroyed by the en¬ emy. Wilkes-Barre was, in the period of 1769 to 1784, the centre of the controversy between Connecticut and Pennsylvania, each State claim¬ ing territorial jurisdiction over the Wyoming region (see Pennsylvania, History) and was the scene of several conflicts during that con¬ troversy, being almost entirely destroyed by fire at one time in 1784. It was gradually re¬ built and was incorporated as a borough in 1806; its growth has been rapid since the Civil War; and in 1871 it was incorporated as a

city. It is situated near the centre of Wyoming Val¬ ley, in the midst of picturesque scenery. Wilkes-Barre is the birthplace of the anthracite coal¬ mining industry. It was here the discovery was made that there existed on this continent such a mineral as anthracite (or (<stone coal® as it was early called). Here anthracite was first used for fires in naileries and blacksmiths' shops; and was thus used for upward of 20 years before the existence of anthracite in any part of Pennsylvania save Wyoming Valley was known. Here anthracite first came into use as a fuel for domestic purposes. Wilkes-Barre lies in the seventh anthracite mining dis¬ trict of Pennsylvania and from the 37 mines and washeries in operation in the district there are produced annually about 5,000,000 tons of coal. The manufacturing and mechanical in¬ dustries of the city are large ; the census for 1914 reported over 400 establishments, with a combined invested capital of $19,000,000 and a gross production of nearly $17,000,000. Among these, silk and lace mills, axle-works, foundries and machine shops and wire-rope works are the most important. The city also contains breweries, manufactories of cotton goods and the Lehigh Valley Railroad shops. There are three national banks and six savings banks and trust companies working under State charters. The city is well built and has a public square containing four acres and a park (((The River Common®) containing 35 acres along the river front. In the vicinity of the city are the Wy¬ oming Monument, already mentioned, the old Forty Fort Church, Harvey's Lake (the largest lake in Pennsylvania) and other points of his¬ toric interest. The notable public buildings are the city hall, courthouse, jail, post office, ar¬ mory and Memorial Hall. The city has a num¬ ber of charitable institutions, including two hos¬ pitals — one the City Hospital and the other Mercy Hospital (under the management of the Roman Catholics) ; a Home for Friendless Chil¬ dren and a Home for Homeless Women. It has 20 public school buildings, including the

high school building erected in 1890, in which, in addition to the usual studies, instruction in manual training is given. It has also six Roman Catholic parish schools and is the seat of Harry Hillman

Academy (for boys), the Wilkes-Barre Institute (for girls), the Wilkes-Barre Busi¬ ness' College, the New Century School of Cor¬ respondence and two Roman Catholic academies for girls — Saint Mary's, connected with Saint Mary's Convent, and Saint Ann's, connected with Mallinckrodt Convent. There are two large public libraries — The Osterhout Free Li¬ brary (having reference and circulating depart¬ ments), and the reference library of the Wyom¬ ing Historical and Geological Society. In ad¬ dition, the Law and Library Association, the Young Men's Christian Association and other organizations have library collections. The gov¬ ernment of the city is of commission form, the mayor being elected for four years and the four councilmen for two years; the appoint¬ ing power rests with the mayor and commis¬ sion. Pop. 73,833. But, elbowing the city on all its boundaries are boroughs and hamlets, so that within a radius of nine miles from the centre of Wilkes-Barre there is a population of approximately 200,000.

WILKIE, wll'ki, Sir David, Scottish painter: b. Cults, Fifeshire, 18 Nov. 1785; d. at sea, off Gibraltar, 1 June 1841. In 1799 he en¬ tered the Trustees' Academy, Edinburgh, where he studied for several years. In 1804 he re¬ turned home and painted (Pitlessie Fair,* the first of that class of works for which he became famous. In 1805 he went to London, taking with him the (Village Recruit, > which at length found a purchaser for £6. The Earl of Mans¬ field purchased his (Village Politicians,* which at the Royal Academy (1806) excited universal admiration. It was succeeded by the (Blind Fiddler* and among the works painted between this period and 1821 may be mentioned the <Rent Day) (1807) ; (Blindman's Buff* (1813) ; (Distraining for Rent* (1814) ; (The Penny Wedding) (1818) ; the (Reading of the WilP (1820); and the,(Chelsea Pensioners, > begun in 1817 and finished in 1821, for the Duke of Wellington. Among the most noted of his later pictures are the <Entrance of George IV into Holy rood* ; the (Spanish Council of War* ; and the (Maid of Saragossa.) In 1836 William IV created him a knight. In 1840 he made a journey to the East and on the way home was attacked by fever at Malta and died at sea.

WILKINS, wil'kinz, Mary Eleanor. See

Freeman, Mary Eleanor Wilkins.

WILKINSBURG, wil'kinz-berg, Pa., bor¬ ough, Allegheny County, on the Pennsylvania Railroad, seven miles east of Pittsburgh. It was formerly called McNairville and Rippeyville and was given its present name in honor of William Wilkins, Secretary of War in 1843-45; it was

incorporated as a borough in 1887. Its business interests are identified with those of Pittsburgh and it is almost entirely a residen¬ tial town ; it contains two banks and two news¬ papers. It is the seat of a home . for aged women (Protestant) and of the United Pres¬ byterian Home for the Aged ; and there is a high school, established in 1898. Pop. 25,000.

WILKINSON, wil'kin-son, Henry Spen¬ ser, English author : b. Manchester, England, 1 May 1853. He was educated at Owens College,

Manchester, and at Merton College, Oxford, and in 1880 was called to the bar. He was on the staff of the Manchester Guardian, 1883-92, and since 1895 has been on the staff of the London Morning Post. His writings include (Essays Toward the Improvement of the Vol¬ unteer Forces> (1886) ; (The Brain of an Army* (1890) ; (The Great Alternative, a Plea for a National Policy *(1894) ; (The Nation's Awakening) (1896) ; (British Policy in South Africa* (1899); (War and Policy) (1900); (The Nation's Need, Chapters on Education* (edited, 1903), *etc.*

WILKINSON, James, American soldier: b. Benedict, Md., 1757 ; d. near City of Mexico, 28 Dec. 1825. He studied medicine in Philadel¬ phia and in 1775 enlisted in Washington's army. He became intimate with Benedict Arnold and Aaron Burr, and, having received a captain's commission, joined Arnold's expedition to Can¬ ada. He was later appointed to the staff of General Gates, was promoted colonel, and subsequently became deputy adjutant-general of the army of the northern department. In the Saratoga campaign he appropriated as his own the information of the British position and strength which had been secured by Col. John Hardin and after the surrender of Burgoyne was commissioned to bear the news to Congress, carrying with him also the recommendation of Gates that he be appointed brigadier-general. He was 18 days in making the journey and the news was a week old when he delivered his message. Congress refused to grant his promo¬ tion at that time, but a few weeks later, through the influence of Gates, he was brevetted briga¬ dier-general and subsequently was appointed sec¬ retary of the board of war, of which Gates was also a member. He was deeply implicated in the Conway Cabal (q.v.), which his indis¬ cretion betrayed and was then forced to resign his brevet rank, though retaining his colonelcy. He took no further active share

in the war until 1779, when he was appointed clothier-general, an office which he resigned in 1781. He removed to Kentucky in 1784 and in 1786 founded Frankfort. He gained considerable po¬ litical influence there, intrigued with the Span¬ ish government, with the hope of forming of the Western country a separate republic under the protection of Spain. His reward for this betrayal of his country was to be the exclusive control of commerce on the Mississippi and a yearly pension from the Spanish government. The plot was to be consummated at the conven¬ tion which met in 1788 for the purpose of forming a constitution for the new State of Kentucky. Wilkinson's influence, however, proved insufficient, and the plot, becoming known to other leaders, fell through. The part of Wilkinson remained a secret, and though he continued to receive his pension from the Span¬ ish government until 1800, he applied in 1791 for service in the army. His treasonable act not being known, he was appointed lieutenant-colonel, served in the Indian wars of the West and was prominent in Anthony Wayne's cam¬ paign. He was promoted brigadier-general in 1792, and in 1796 succeeded Wayne in the com¬ mand of the army. After the acquisition of Louisiana he was appointed in 1805 governor of the Territory of Louisiana and in this posi¬ tion engaged with Aaron Burr (q.v.) in the lat¬ ter's scheme for founding an empire in Mexico.

In 1806 Wilkinson, perceiving an opportunity to drive a double bargain, betrayed the scheme to the President, and at the same time de¬ manded from the viceroy of Mexico a reward for saving that kingdom to Spain. The asser¬ tions of Burr as to Wilkinson's complicity in the plot were generally believed, but at that time no proof of his guilt was obtainable, though he barely escaped indictment on the same charge with Burr in 1807. Inquiry con¬ cerning his pension from the Spanish govern¬ ment was made in that year upon a resolution of John Randolph, but he was ' exonerated. Charges were again made against him in 1810 on the score of complicity with Burr and of receiving pay from the Spanish government, but he was finally acquitted in December 1811, and resumed command in the army. He

was pro¬ moted major-general during the War of 1812, and commanded the Canada Expedition, but proved incompetent and in 1814 was superseded. He was court-martialed in that year on several serious charges — neglect of duty, conduct un¬ becoming an officer, drunkenness, *etc.* — but in 1815 was acquitted and honorably discharged from the army. He then removed to the City of Mexico, where he spent the remainder of his life. He published (The Aaron Burr Con¬ spiracy Exposed) (1808) ; and (Memoirs of My Own Times) (1816). Consult Clark, (Proofs of the Corruption of Gen. James Wilkinson) (1809); Gayarre, (Spanish Dominion in Louis¬ iana) (1854) ; Gilmore, (Advance-Guard of Western Civilization) (1887) ; Roosevelt, (Win¬ ning of the West,) Vol. Ill (1894) ; Green, (The Spanish Conspiracy) (1891); McCaleb, <The Aaron Burr Conspiracy) (1903); and (Later Intrigues of Wilkinson with the Span¬ iards) (in (Amer. Hist. Review,) Vol. XIX, New York 1914).

WILKINSON, Jemima, American reli¬ gious visionary: b. Cumberland, R. I., 1753; d. Jerusalem, Yates County, N. Y., 1 July 1819. She was educated as a Quaker and at 20, after a severe attack of fever, professed that she had been raised from the dead, that her carnal life was ended and that henceforth her body was reanimated by the spirit and power of Christ. She pretended to work miracles, and, though entirely illiterate, induced many intelligent peo¬ ple to become her followers, her attractive per¬ son and extraordinary tact and shrewdness aid¬ ing her in maintaining the imposture. In 1786, at a meeting of her disciples, it was resolved to found a colony in Yates County, N. Y., in the present town of Torrey. The next year 25 of her followers went to the new purchase and prepared the land for wheat. In 1789 two of the number purchased 14,000 acres of land in that vicinity, to which was afterward added the township of Jerusalem. The same year Jemima and a large number of her followers came, and a house was erected for her. She had taken the name of the “universal friend, w and assumed a costume which belonged about equally to either sex, as she asserted that in her spiritual body there was no sex. She was accompanied by two <(witnesses,)) Sarah Rich¬ ards and Rachael Miller. She exacted from her followers the most complete submission and the most menial services, her influence over them being practically supreme. A farm of 1,000 acres was set apart for her special use

and cultivated freely by her followers. She insisted on the Shaker doctrine of celibacy, and the exercises at her religious meetings re¬ sembled those of that sect. She never relin¬ quished her pretensions,

but after some years her influence waned, and the latter part of her life was embittered by jealousies and annoy¬ ances which she bore with no great fortitude. After her death the sect was entirely broken up. Consult Hudson, ‘Jemima Wilkinson, a Preacheress of the 18th Century) (1821) ; ‘Memoir of Jemima Wilkinson) (Bath, N. Y.,

1844).

WILKINSON, Sir John Gardner, Eng¬ lish archaeologist: b. Haxendale, Westmoreland, 5 Oct. 1797; d. Llandovery, Caermarthenshire, 29 Oct. 1875. He was educated at Harrow and Oxford, and after leaving Oxford lived in Egypt 1821-33, during his stay making a thorough study of the ancient monuments of that country as well as of the languages and manners of the modern inhabitants. The most important fruit of his labors was a work en¬ titled ‘Manners and Customs of the Ancient Egyptians Derived from a Comparison of the Painting, Sculpture, and Monuments Still Ex¬ isting, with the Accounts of Ancient Authors) (1837-ˆ11), which still remains a standard au¬ thority on all that relates to Egyptian art. His later works about Egypt are of a more popular character. Among them are ‘Modern Egypt and Thebes) (1833), afterward abridged and published as a ‘Handbook for Travelers in Modern Egypt) (1847) ; ‘A Popular Account of the Ancient Egyptians) (1853), and (The Egyptians under the Pharaohs) (1851), form¬ ing a supplement to the previous work. His principal other works are ‘Dalmatia and Monte¬ negro) (1848), and (Color, and the Necessity of a General Diffusion of Taste Among All Classes) (1858). He was knighted in 1839. The collections made by him were given in part to the British Museum, but a considerable pro¬ portion of them was presented to Harrow.

WILKINSON, William Cleaver, Ameri¬ can educator: b. Westford, Vt., 19 Oct. 1833; d. 25 April 1920. He was graduated from the University of Rochester in 1857, ordained in the Baptist ministry in 1859 and in 1859-61 was pastor of the Second Church, New Haven, Conn. He was professor ad interim of modern lan¬ guages at the University of Rochester in 1863— 64, and was engaged in pastoral work at Cin¬ cinnati, 1863-66. He was professor of homilet¬ ics and pastoral theology at the Rochester The¬ ological Seminary in 1872-81, was engaged in literary work in 1873-92 and afterward was professor of poetry and criticism at the Uni¬ versity of Chicago. He was counsellor of the Chautauqua Literary and Scientific Circle and published ‘The Dance of Modern Society) (1868) ; ‘A Free Lance in the Field of Life and Letters) (1874) ; ‘The Baptist Principle) (1881) ; (Poems) (1883) ;

‘Edwin Arnold as Poetizer and Paganized (1885) ; ‘Classic Ger¬ man Course in English) (1887) ; ‘The Epic of SauP (1891); ‘The Epic of PauP (1898); ‘The Epic of Moses) (1903) ; ‘Daniel Web¬ ster: a Vindication) (1911); (Paul and the Revolt Against Him) (1914).

WILKINSONIANS. See Religious Sects.

WILL. It has been usual to classify mental phenomena under the three headings of cogni¬ tion, feeling and will or conation. In the last class are included all those processes in which the mind is regarded as effecting some change in its own states, or in the physical environment by means of bodily movements. These changes may take place in a more or less conscious way : that is, in producing changes by means of inner or outer acts of will, we may be more or less explicitly aware of the nature of the result to be attained and of other possible lines of action. It is an essential characteristic of the states that we name impulses or instincts that they are not deliberative. These processes, however, as expressions of the appetitive or active powers of the mind, are conative in character. Automatic or reflex acts, on the other hand, being brought about without any mediation of consciousness, cannot be regarded as belonging to will at all. In impulse the act is initiated by a feeling of uneasiness or crav¬ ing which has a tendency to discharge imme¬ diately in some movement to relieve this feel¬ ing. It is from such immediate and impulsive reactions of consciousness that those more ex¬ plicit and conscious processes that we call volun¬ tary acts develop. We are not born with the power of performing voluntary acts, but this is a progressive acquirement that presupposes an experience of the results of involuntary acts, and the means of obtaining or avoiding these results. The development of will, in the true sense in which it is an endowment that belongs only to rational beings, as it passes from the stage of impulse and instinct, involves a grow¬ ing consciousness of the relative value of various ends, and also of the means that may be used for the realization of these ends. The development of will is thus only possible through the development of the mind as a whole.

Moreover, it is to be noted that this development implies further the systematic integration and union of the rational and emotional sides of mind with its active or conative aspect. As mind develops, all of its functions become more closely and organically connected.

What has just been said may serve to show the fallacy in the view of the older psychology which regarded will as a distinct faculty, op¬ posed, as if it were a separate department, to feeling and cognition. It was too often forgot¬ ten in making this division that these faculties were not each sui generis, and that the so-called ((faculty)) is only an abstraction if thought of as a kind of entity apart from the concrete proc¬ esses of consciousness. Moreover, the emotional and cognitive states of mind do not exist in separation from the conative aspect, but the latter is necessarily implicated and involved in them. It has been one of the most important achievements of recent psychological analysis to exhibit the presence of will in various .intel¬ lectual processes, like perception, association and thinking, in the form of the selective ac¬ tivity of attention. The true view then is that cognition, feeling and conation are t<moments)) or ((aspects® of mind that can be distinguished by analysis, but which exist and function con¬ cretely only in relation to each other. At the present time, psychologists are not agreed as to whether it is possible to discover by analysis any definite conative process as a structural ele¬

ment in conscious life, corresponding to the elementary sensations or feelings. The reality and functional efficiency of the will is not really at stake in this question, however, as has been •too hastily assumed by certain representatives of both parties to the dispute. Even if it is found that the processes of will cannot be iso¬ lated as separate and distinct states of mind, there will be no ground for denying the real activity of the subject. The truth seems to be that will cannot properly be represented in the form of one particular kind of mental con¬ tent, just because it is the expression of the attitude of the self toward all mental content.

We have seen that those processes of fully explicit will that we term voluntary acts are always accompanied by a somewhat clear con¬ sciousness of the end to be realized and of the relation of means to this end. Moreover, in a fully deliberative act of will, there is also a recognition of various competing possibilities and a conscious selection of one to the exclusion of the others. Instead of allowing an impulse to pass at once into action in accordance with the immediate demands of some single want or uneasiness, in voluntary states

consciousness takes control, looking before and after and comparing the consequences of different lines of action. In many cases its efficiency and control are shown by checking or inhibiting the imme¬ diate impulse by the thought of some more val¬ uable end with which it conflicts.

How are such volitions to be described psy¬ chologically? What actually goes on when a decision is voluntarily made? If we leave out of account the various sensations of muscular strain that accompany volitions, we may say that the essence of the act consists in fixing one alternative and holding it fast before us by means of selective attention. This attention is not passively determined by the greater intensity or immediate attractiveness of one object, but is the result of the fullest activity of the subject, and is at once a psychological fact and a mov¬ ing force in the external world. As Professor James remarks: ((We do not first have a sen¬ sation or thought, and then have to add some¬ thing to it to get a movement. Movement is the natural immediate effect of feeling, irre¬ spective of what the quality of the feeling may be. It is so in reflex action, it is so in emotional expression, it is so in voluntary life.®

The Freedom of the Will. — The vexed problem of the freedom of the will arises from the fact that there seems to be an antagonism between the demands of our intellect and those of our moral nature. On the one hand, there is the requirement that all phenomena of the inner life, like those of external nature, shall be capable of explanation according to the law of cause and effect. On the other hand, it is maintained that if morality is to have any meaning, the individual must be free and thus responsible for his acts. In favor of determin¬ ism, it is argued that the mental life is com¬ posed of a series of states or processes that are related to each other causally just as are events in the external world ; this is the neces. sary assumption of psychology and of all the sciences that attempt to explain the mental life. <(Whenever determination by necessary laws ceases, there ceases also the possibility of any explanation.® Moreover, determinists point out

that the individual is moved to act by certain motives and that these motives are the resultant of certain external influences as modified by his character. This character again is the product of previous acts, either of his own or of his ancestors ; so that at any time the act performed is the necessary reaction of the individual in the given circumstances. Furthermore, it is maintained that there is an unbroken line be¬ tween acts that are performed from instinct or impulse, and where consequently there can be no claim made for freedom, and the most com¬ plicated and deliberate acts of will. On the other side, those who contend for freedom argue that we have no right to consider the mind of man as simply a part of nature and subject like it to necessary laws of causation. They urge in support of their position that per¬ sonality, the principle of intelligence itself, can¬ not properly be represented as one factor on a level with others, but that it is the centre from which the very conception of law springs, and on another side is the determining ground of all motives and furnishes the standard by which they are evaluated. . Appeal is also made to the immediate conviction of freedom that is present in all genuine cases of willing. Further, it is said that it is only on the assumption of freedom that such terms as ˆresponsibility,® <(duty,® ˆobligation® and (<remorse® have any meaning. He who denies freedom, then, declares the experiences denoted by these words to be illusory.

It is impossible to give in the present article a detailed examination of these arguments. A few remarks may, however, be added regarding the general nature of the problem and the lines along which a reconciliation may be effected. In the first place, it is obvious that this con¬ troversy is a special phase of the general prob¬ lem of mechanism (q.v.) and teleology (q.v.). Is everything to be explained according to neces¬ sary laws of cause and effect, or is it possible without doing violence to this principle to main¬ tain a determination according to ends? If it is possible for the individual to set before him¬ self the ends of his life, and to work for their realization, he is free in the only sense in which the word has any meaning. If, however, his acts are determined by some force that acts independently of him, he cannot, be held re¬ sponsible. Again, determinism is the only standpoint from which psychology as a natural science can proceed. For this science views the mental life as made up of a series of processes or mental phenomena. Its task, therefore, is to discover how these various elements are linked together according to causal laws. From the very nature of its postulates it is impossible to admit that there is any break in the line of causes and effects; every (<state of mind® must be explained by

showing that it stands in neces¬ sary relations to some other phenomena belong¬ ing to the same series. But this is to look at the mind from the outside, as composed of a number of phenomena, or mere occurrences in time. It is, however, possible to describe mind in a way that is truer to the direct experience of life, as a system of conscious functions or acts in which purposes are being realized and ends attained through the self-directed activity of the subject. As soon as this point of view is taken the causal and deterministic position is

left behind, and the only possible assumption is that of self-determination or freedom. The conclusion we have reached then is that, so long as we regard mind from the standpoint of psy¬ chology as a science, everything must be ex¬ plained causally, and that there is no possibility of introducing here the conception of freedom. But we have also seen that this standpoint is not final, but that experience can be more ade¬ quately interpreted as a process in which a con¬ scious subject realizes ends that he himself sets, and that this view necessarily regards mind as something more than a series of causally deter¬ mined phenomena.

Bibliography. — Schopenhauer, A., (The World as Will and Idea) ; Mill, J. S., Examina¬ tion of Sir W. Hamilton's Philosophy } ; Sys¬ tem of Logic > (Bk. VI) ; Bain, Emotions and WilP (1888); Munsterberg, (Die Willenshand-lung> (1888) ; Ladd, G. T., Esychology De¬ scriptive and Explanatory) (1894); Kant, (Metaphysic of Morals> ; Baldwin, J. M., Eeel-ing and *WilP (1891) ; James, W., Erinciples of Psychology* ; Schneider, (Der menschliche Wille* (1882) ; Wundt, W., Ethik) ; and Essays) ; Martineau, J., (Types of Ethical Theory.*

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

WILL, in law, is a disposition made by a competent person known as the testator, in a form more or less prescribed by law, or prop¬ erty over which he has the legal power of dis¬ position, to take effect at death. Technically, the term <(will® is used to describe a document which disposes of real property, while ((testament® is used to describe one that disposes of personal property, Svill and testament® includ¬ ing both. Broadly, and by common use, the term <(will® covers both meanings and is ac¬ cepted as describing a written instrument that disposes of both realty and personalty. Any person of legal age, being of sound mind and memory and not under duress,

may make a will disposing of whatever interest he has at his death in either real or personal property. All wills to be valid in the United States, with the exception of a favored class known as ˆnuncupative wills® which are oral, must be written and signed by the testator and wit¬ nessed by at least two (or ‘in several of the United States three) persons, who must sign in the presence of the testator and of each other, and are not beneficiaries under the will. The maker of a will must be 21 years of age in most of the States, but a few allow women of 18 to thus legally dispose of their property. Oral wills are permitted in the case of soldiers and sailors in actual service, and these ((nuncupative® wills are definite statements of the will of the maker with two or more witnesses, who shall within a reasonable time thereafter reduce the statement to writing and sign as wit¬ nesses. A beneficiary cannot be a competent witness to a nuncupative will. A will may be * altered or amended by the addition of the fur¬ ther wish of the testator, the amendment being known as a ((codicil,® which must be signed by the testator and witnessed with the same formality as the original will. A will may be revoked by the testator by destroying it, as by canceling, tearing, burning or otherwise mutilat-

ing it, or by making a new will, which later document invalidates all preceding wills. The destruction of a later will revives a former will if still in existence, which will then have full effect. In some States the subsequent mar¬ riage pf the testator invalidates a will. The laws of .the different States vary as to the pro¬ visions for the heirs and next of kin.

A will may he written in any form of language that expresses the intention of the testator. A very common form of beginning a will is: (<In the name of God, amen. 1,

John Smith, being of sound mind,® *etc.* It need not be written in any prescribed form, but must show the intention. It may be writ¬ ten in any sort of writing material or on several pieces of paper if their sense shows them to be connected each to the other. Separate docu¬ ments may be included in the will if the will speaks of their incorporation in the will as a part of it, and in such a way as to identify the documents. Publication is the act of making known in the presence of witnesses

that the instrument executed is the will of the testator. It is not necessary for the witnesses to know the contents of the will, but the fact that it is a will. Publication is not necessary in all States. A will usually names one or more persons who shall carry out the will of the testator. This person is known as the executor or executrix. When no person is named in the will the court appoints such person, who is known as the administrator or administratrix. At the death of the testator the will is placed on file for pro¬ bate in the Probate or Surrogate Court. _ A will is construed liberally, the words taken in their plain and usual sense, and the intention of the testator allowed to prevail wherever possible to understand such intention. Effect is given to every part of a will. Rules of construction are valuable only in case the will is contested. Favor is shown in case of contest to natural heirs and next of kin. Conditions may be made, and trust estates created, and whatever interest the testator may have at death may be disposed of by will during his lifetime to take effect at death. When a testator has a large estate it is customary to have his will drawn up by an attorney who is familiar with rules of construction and of evidence. This . is not necessary to the validity of a will, which may be written by any one so long as it is properly signed and witnessed.

WILL-O'-THE-WISP. See Ignis Fat-uus.

WILLAMETTE, wiLa met, a river in Ore¬ gon which has its rise in Lane County, flo\s nearly north and enters the Columbia River in Columbia County, in the northwestern part of the State. The total length is about 225 miles. It was originally navigable only for large steamers to Portland (q.v.), 15 miles from its mouth, but the canal around the Willamette Falls permits river traffic 100 miles or more.

WILLAMETTE UNIVERSITY, a co¬ educational institution of higher learning at Salem Ore. It was founded as an Indian mis¬ sion school in 1834 and became a school or white children in 1844; while it was established as the present university in 1853. Its school of medicine was organized in 1867 and that of law in 1884. Its other courses include liberal arts,

theology, art and music. It confers the de¬ grees A.B., A.M., B.D., M.D., D.D. and LL.D.

In 1918 it had 283 students enrolled, 46 with the colors, and there were 16 instructors. The grounds and buildings are valued at $350,000, while the endowment is about $575,000.

WILLARD, Archibald M., American painter and illustrator, son of a Baptist clergy¬ man : b. Bedford, Ohio, 1836; d. Cleveland, Ohio, 11 Oct. 1918. The family settled later at Wellington, where the boy developed a marked interest in sketching, but opportunity for training in artistic lines being wanting, he worked for some years at decorative painting and continued his efforts in sketches and por¬ traits. At the outbreak of the Civil War he enlisted with the 88th Ohio regiment and served as color-bearer. After the war he made battle sketches but at length found his forte in sketches showing humor and intensity of ac¬ tion and emotion. His better known subjects are (Pluck) ; <The Nursery'; The Drummer's Last YariP ; (Deacon Jones's Experience' ; and (Pitching the Tune.' His more serious work includes (Minute Men of the Revolution' and (Spirit of '76. ' The last named was originally entitled < Yankee Doodle,' and was produced for Centennial year. The models used were Hugh Mosher, a local fifer, and his father, and Harry, son of Gen. J. W. Devereux, as the drummers. The picture was received with popular enthusiasm and exhibited at the Phila¬ delphia Centennial and the larger cities of the United States. It was finally purchased and presented by General Devereux to his native town, Marblehead, Mass., where it hangs in Abbott Hall. The artist lived for some years in New York but passed his earlier and later years in Cleveland.

WILLARD, Ashton Rollins, American art critic: b. Montpelier, Vt., 14 April 1858; d. 3 Oct. 1918. He was graduated from Dartmouth in 1879, removed to Boston in 1887 and after¬ ward spent much time in Europe. In 1902 was made chevalier of the Order of the Crown of Italy. His writings include (Life and Work of Painter Domenico Morelli' (1895) ; (History of Modern Italian Art' (1898); (Land of the Latins' (1902).

WILLARD, Edward S., English actor: b. Brighton, Sussex, 1853; d. 9 Nov. 1915. His first appearance on the stage was made at WAymouth in 1869, but his London debut was not made until 1881. He became manager of the Shaftesbury Theatre in 1889 and in 1890 came to the United States, where he played successfully for three years. He leased the Comedy and Garrick Theatres in London in 1894 and later made several tours of the United States, playing various leading parts under his own management.

WILLARD, Emma Hart, American edu¬ cator: b. Berlin, Conn., 23 Feb. 1787; d. Troy, N. Y., 15 April 1870. She began her career as a teacher in 1803, subsequently became principal of a girls' academy at Middlebury, Vt., and in 1809 was married to Dr. . John Willard. She opened at her home in Middlebury, Vt., in 1814, a boarding school for

girls in which she intro¬ duced various improvements in methods of in¬ struction and also taught subjects hitherto not included in the curriculum of girls' schools.

Desiring a broader field for the development of her ideas of education she addressed to the New York legislature in 1819 a treatise entitled (A Plan for Improving Female Education. y It was an able exposition of excellent ideas and found favor with Gov. John Clinton, resulting in the establishment in that year of a seminary for girls at Waterford, N. Y., which was in¬ corporated and was partially supported by the State. She removed to Troy in 1823, where she was presented by the city with a suitable build¬ ing for her school, henceforth known as the Troy Female Seminary. After the death of her husband in 1825 she conducted the business management of the school in addition to her other work until 1838, when she resigned her duties into the hands of her son. She trav¬ eled in Europe in 1830, assisted in founding a school for girls in Athens, Greece, and after¬ ward published (Journal and Letters from France and Great Britain* (1833), the proceeds of which she presented to the school. She was married to Dr. Christopher C. Yates in 1838, but in 1843 she secured a divorce from him and resumed her former name. She traveled 8,000 miles through the Southern States in 1846 en¬ gaged in lecturing before conventions of teach¬ ers, and in 1854 was present at the World's Educational Convention in London. Mrs. Wil¬ lard is one of the most prominent figures in the history for higher education for women in the United States. She was not only an advocate of advancement but a practical worker for it, and brought to her task great earnestness of purpose, coupled with high abilities and execu¬ tive capacity. Her school-books were widely used and were translated into European and Asiatic languages. They include (The Woodbridge and Willard Geographies and Atlases) (1823) ; ˆHistory of the United States) (1828) ; (Treatise on the Circulation of the Blood) (1846) ; (Last Leaves of American History) (1849) ; (Astronomy } (1853) ; (Morals for the Young* (1857), *etc.* She also wrote some ex¬ cellent verse, which includes the famous (Rocked in the Cradle of the Deep.* A statue was unveiled to

her memory at Troy in 1895. Consult Lord, John, (Life of Emma Willard)

(1874).

WILLARD, Frances Elizabeth, American educator and temperance reformer: b. Churchville, N. Y., 28 Sept. 1839; d. New York, 18 Feb. 1898. She was graduated from the North¬ western Female College, Evanston, Ill., in 1859, engaged in teaching, was appointed professor of esthetics in the Northwestern University in 1869, and became dean of the Women's College of that institution in 1871. In 1874 she re¬ signed this position, was elected secretary of the Woman's Christian Temperance Union in that year, and in 1879 she became its president, an office she held until her death. In her management of the association she displayed great executive ability and a remarkable genius for organization. She founded in 1883 the World's Christian Temperance Union, and in 1888 became its president. She declared her¬ self in favor of woman's suffrage in 1876, and thereafter lectured occasionally upon the sub¬ ject, deeming the ballot a protection to women from the miseries caused by drink. In 1892 she visited England, where she was the guest of Lady Henry Somerset, the temperance re¬

former, and while there addressed a mass meet¬ ing at Exeter Hall, said to have been one of the largest assemblages ever held there. She devoted her life to a cause, and won the ad¬ miration and love of a vast number of people, even those who did not agree with many of her views. In all the long list of reformers who have sought to rid the world of the evils of the liquor traffic there is no name that stands higher than that of Frances E. Willard. In her work Miss Willard displayed an untiring energy, and for 10 years she averaged a meet¬ ing a day, meanwhile continuing her literary labors. She was editor of the Chicago Post and Mail for a short time after 1878, and from 1892-98 editor-in-chief of the Union Signal, the official organ of the temperance movement. Her publications include (Nineteen Beautiful Years> (1868) ; (Woman ancf Temperance)

(1883) ; (Glimpses of Fifty Years* (1889) ; (A Great Mother) (1894), *etc.* She also edited with Mary A. Livermore, (A Woman of the Century* (1893).

WILLARD, Joseph, American clergyman and university president, great-grandson of Samuel Willard (q.v.) : b Biddeford, Me, 9 Jan. 1738; d. New Bedford, Mass., 25 Sept. 1804. He was graduated at Harvard University in 1765 and was a tutor there in 1766-72. In 1772 he was ordained in the Congregationalist ministry and became joint pastor of the First Congregationalist Church at Beverly, Mass. From 1781 until his death he was president of Harvard University. His publications include a number of sermons and some papers on astronomy and mathematics. He left an unpub¬ lished Greek grammar.

WILLARD, Joseph Edward, American

Ambassador: b. Washington, D. C., 1 May 1865. He was graduated at the Virginia Mili¬ tary Institute in 1886 and later took a summer course in' law at the University of Virginia. He served as a captain of United States volun¬ teers in the Spanish-American War. He was a member of the Virginia legislature in 1894-1902; was lieutenant-governor of Virginia in 1902-06; and was State Corporation Commis¬ sioner in 1906-10. He was appointed United States Minister to Spain by President Wilson in 1913, and his rank was raised to Ambassador 13 Sept. 1913.

WILLARD, Josiah Flynt, American au¬ thor and sociologist : b. Appleton, Wis., 23 Jan. 1869; d. Chicago, Ill., 20 Jan. 1907. While studying at the University of Berlin in 1890-95 he became interested in sociological problems, and was impressed with the danger impending to the United States through its being a haven of refuge for European criminals when their own country would no longer suffer their being at liberty. In order thoroughly to understand the situation and the actual conditions and feelings governing the tramp world he led for several years the life of a vagrant, publishing the results of his observations in (Tramping with Tramps> (1899). His other writings in¬ clude (Powers that Prey) with F. Walton (1900); (Notes of an Itinerant Policeman* (1900) ; (The World of Graft) (1901) ; <The Little Brothei0 (1902) ; (The Rise of Ruderick Clowd) (1903).

WILLARD, Samuel, American clergyman, scholar and educator : b. Concord, Mass., 31 Jan. 1640; d. Boston, Mass., 12 Sept. 1707. Graduated from Harvard in 1659, he studied theology, and in. 1663 was ordained minister at Grotpn, Mass. This village having been de¬ stroyed by the Indians (1676) during King Philip's War, he removed to Boston, where he was made colleague of Thomas Thacher, pas¬ tor of Old South, and upon the latter's death (15 Oct. 1678) succeeded to the pastorate, which he held until his death. In 1700 he became vice-president of Harvard, and in 1701, upon the resignation of President Increase Mather (q.v.) (6 Sept.), assumed the direction of the institution. He retained the active pastorate of the South Church, however, and by order of the General Court was debarred from the title of president. He was opposed to the per¬ secutions for witchcraft, and wrote and spoke against the delusion. In 1688 he began to give a series of Tuesday afternoon lectures on theology, and these he continued for the rest of his life. The lectures were printed in 1726 in a folio of 914 double columned pages. ((The thought and expression of this literary mammoth,® says Tyler, <(are lucid, firm, and close.® Willard published numerous sermons and other writings.

"WILLARD SCHOOL, The Emma. The

Emma Willard School, which in 1914 entered on its second century of usefulness, is one of the oldest institutions for the higher education of women in the United States. It is the out¬ growth of an institution founded by Emma Willard (q.v.) in Middlebury, Vt., in 1814. In 1819, the patrons of Waterford, N: Y., urged removal of the school to that place, be¬ lieving the richer State of New York would grant it an appropriation. The legislature did not grant an endowment, but the application led to the allowing of a portion of the litera¬ ture fund for girls' schools, to be given to the school, the first legislative appropriation of money for the education of girls. In 1821, Mrs. Willard accepted an invitation from the citizens of Troy to remove the seminary to that city, where the school became known as the Troy Female Seminary. From the estab¬ lishment of the seminary in Troy in 1821, to 1875, more than 15,000 pupils were connected with the school. In 1892, a complete reorgani¬ zation of the course of study was made, the art department was introduced, the boarding department was opened in Russell Sage Hall, and the old name gave way to that of Emma Willard School, thus bringing the school into close touch with its famous past and asso¬ ciating it in name with its illustrious founder. The school is situated in Troy, N. Y., on the Hudson River, in a healthful climate.

WILLCOX, Cornells DeWitt, American army officer and educator: b.

Geneva, Switzer¬ land, 26 Feb. 1861. He came to the United States was graduated at the University of Georgia in 1880, at the United States Mili¬ tary Academy in 1885, at the Artillery School in 1892, and in 1913 studied at the Univer¬ sity of Grenoble. He was a captain of volun¬ teers in the Spanish-American War, and in 1908-10 he was chief of the military informa¬ tion division at Manilla, P. I. He was ap¬

pointed professor of modern languages with rank of lieutenant-colonel at the United States Military Academy in 1910 and was promoted colonel in 1914. He was one of the founders of the Journal of the United States Artillery in 1892; and from 1915 was editor of the Interna¬ tional Military Digest. In 1917-18 he was with the American Expeditionary Force in France. Besides translating several works from the Span¬ ish he is author of (A French-English Military Technical Dictionary > (1900; new ed., 1910); <The Head Hunters of Northern Luzon* (1912) ; (A Reader of Scientific and Technical Spanish* (1913) ; (Spanish Official Account of the Attack on the Colony of Georgia> (1913) ; (War French* (1917).

WILLCOX, Orlando Bolivar, American soldier : b. Detroit, Mich., 16 April 1823 ; d. Cobourg, Ontario, Canada, 10 May 1907. He was graduated from West Point in 1847, served in the Mexican. War and later in the Seminole War and other Indian campaigns. He was promoted lieutenant in 1850 and in 1857 re¬ signed from the army, thereafter engaging in law practice at Detroit until the outbreak of the Civil War, when he re-entered the army as colonel of volunteers. He was engaged at the capture of Alexandria, and at the first battle of Bull Run was wounded and taken prisoner. He was exchanged in 1862 and afterward par¬ ticipated in the battles at South Mountain, Antietam and Fredericksburg, led a division at the battle of the Wilderness and in the Richmond campaign, and in 1864 was brevetted major-general of volunteers. He was the first to enter Petersburg, receiving its surrender, and in 1866 was mustered out of service. He re-entered the regular army with rank as colo¬ nel in 1866, was brevetted brigadier-general and major-general in the regular army in 1867 for services at Petersburg and Spottsylvania, and was voted a Congressional medal of honor for gallantry at Bull Run in 1861. He received full rank as brigadier-general in 1886 and in the following year was retired. He wrote (Shoe-pac Recollections by Walter March) (1856) ; and (Faca: An Army Memoir, by Major March) (1857).

WILLCOX, Walter Francis, American

statistician : b. Reading, Mass., 22 March 1861. He was graduated at Amherst College in 1884, at the Columbia Law School in 1887, later studied at the universities of Yale and Berlin and received the degree of Ph.D. at Columbia University in 1891. He was appointed pro¬ fessor of statistics and economics at Cornell University in 1901 and served also as dean of the faculty of arts and sciences in 1902-07. He was one of the five chief statisticians of the 12th United States Census in 1890-1901 ; was president of the American Statistical Associa¬ tion in 1911-12 and of the American Economic Association in 1915. His works include (The Divorce Problem: A Study in Statistics) (1891 ; 2d ed., 1897) ; Supplementary Analysis and Derivative Tables, Twelfth Census* (1906). He has also contributed to periodicals and encyclopedias.

WILLCOX, William Russell, American lawyer and public official : b. Smyrna, N. Y., 11 April 1863. He studied at the University of Rochester and was graduated at the Columbia

Law School in 1889. He engaged in law prac¬ tice in New York in 1890; served as president of the New York park board in 1902-03; and was postmaster of New York in 1905-07. He was chairman of the New York Public Service Commission in the first district in 1907-15, and in 1916 was appointed chairman of the Re¬ publican National Committee.

WILLEMITE, an important ore of zinc and a mineral of much mineralogical interest. It is essentially a zinc orthosilicate, Zn_2SiO_4, but all of the many varieties from Franklin Furnace and Ogdensburg, N. J., its two most prolific localities, contain considerable man¬ ganese. The colors of the New Jersey willemite are very varied, white, green, yelffiw, flesh-red, brown and gray, the last three being characteristic of the variety troostite which occurs in crystals up to six inches in length. The crystallization of willemite is rhombohedral, the common form being a hexagonal prism, either stout or much elongated, termi¬ nated by obtuse rhombohedrons. It occurs in small crystals of prismatic or obtuse rhombohedral habit in New Mexico. A

granular form is also found in New Jersey in large quantities, intimately mixed with franklinite. Crystals from Belgium have an easy basal cleavage, but this cleavage is difficult in New Jersey crystals, which have eminent prismatic cleavage. The mineral has a hardness of 5.5 and a specific gravity of 3.9 to 4.2. Transparent crystals and masses have been found in New Jersey which yield gems whose beauty is much enhanced by the strong double refraction of the mineral, though the inferior hardness precludes their use as jewels. Ordinarily willemite is opaque, but with transparent portions scattered through the mass. The green phosphorescence of wil¬ lemite when struck with a hammer has been known for many years. During exposure to the Rontgen rays and to the ultra-violet and other rays of the Piffard lamp a gorgeous green fluorescence is observed in the New Jersey mineral and some specimens are also highly phosphorescent, but these properties are not possessed by willemite from other localities. Radium salts excite instant luminescence in the New Jersey mineral. These observations have attracted widespread interest.

WILLEMS, vfl'lemz, Florent, Belgian ar¬ tist: b. Liege, Belgium, 9 Jan. 1823; d. Neuilly, France, 22 Oct. 1905. He studied at the Acad¬ emy of Mechlin and formed his style upon that of the old Dutch masters. He removed to Paris in 1844 and was awarded first-class medals in 1855, 1867 and 1878. His work has been well received in the United States and examples of it are included in many private collections. Especially good canvases by him may be seen at the Metropolitan Museum of Art in New York, and at the Art Institute of Chicago.

WILLEMS, Jan Frans, Flemish philolo¬ gist: b. Bouchout, near Antwerp, Belgium, 11 March 1793; d. Ghent, 14 June 1846. In 1809 he was placed in the office of an Antwerp no¬ tary, and in 1811 won a prize for the best poem on the battle of Friedland and peace of Tilsit (1811). His ode, (Aen de Belgen) ((To the Belgians,* 1818), hailing the revival of Bel¬ gian nationality under Holland's protection,

brought him a position under the Dutch govern¬ ment and a series of masterly philological works, including (Over de Nederduitsche Taal en Letterkunde) (1819-20), procured him ad¬ mission to the Academy of Antwerp. On the formal separation of Belgium from Holland in 1830 he was removed from office and settling at Encloo, he labored there on the Flemish version of <(Reynard the Fox,** in his edition of it (1834) calling on Flemings to help to preserve their ancient tongue. As archivist of Ghent from 1835 he edited the (Rymkronyk van Fan van Helu) (1836), (Brabantsche Yeesten* (1839-43), etc., and after his

death appeared his collection of old Flemish songs, and his (Mengelingen van Vaderlandschen Inhond.* Consult (Lives* by Snellaert (1847) ; Rooses (1874); and Rooses, Buylstede, and Bergmann,

(Jan Frans Willems> (1893).

WILLET, a large American snipe of the genus Symphcemia; sometimes called pill-wil- lett. The bill is thick, compressed, straight, longer than the head; wings long, legs long

and strong; tail short and nearly even. The

S. semipalmata is about 15 inches long and 31 in alar extent, the bill 2]/2\ it is darkly speckled above ; rump, upper tail coverts, and under parts white ; tail ashy white, the two middle feathers spotted; secondaries white, with brownish black spots. The young are spotted and transversely banded with brown¬ ish black. It is found throughout eastern temperate North America, and in South Amer¬ ica, rarely going far from shore; on the Pacific it is represented by a distinct subspecies. It goes South in winter as far as the Gulf States where it also breeds sparingly; and is often found in company with the godwits. It breeds in both fresh and salt marshes on the ground and remains in separate flocks during the fall and winter. The eggs and the flesh, especially of the young birds, are excellent eating. The food consists of small crustaceans, and aquatic worms and insects. They are rather shy, rapid and strong fliers, and good swimmers if necessary, though they cannot dive. They are noisy while breeding, the shrill cry being re¬ iterated as long as an intruder remains in sight. The name is derived from the resemblance of their notes to the ((will-willet.** Owing to their shyness, the keen sight which enables them to detect the sham of decoys, and their swift, often elevated flight they are difficult to shoot, and offer fine sport to the skilful sportsman. For these reasons, and because of their large size and excellent table qualities they are much sought. Consult Eliot, (North American Shore-birds* (New York 1895).

WILLETT, Marinus, American soldier: b. Jamaica, N. Y., 31 July 1740; d. New York, 22 Aug. 1830. He served in the French War with rank as lieutenant, was especially prominent in the expedition against Ticonderoga in 1758, and in the capture of Fort Frontenac. He was ac¬ tive in the movements of the Sons of Liberty and on 6 June 1775 took measures to prevent the forwarding of arms from New York to the British troops in Boston Harbor. He served as captain under Montgomery in his expedition against Canada in 1775, remaining in

command of the post at Saint John's until January 1776; was second in command at Fort Stanwix in

1777, led and held the fo'rt until relieved by Arnold. In June 1794 he accepted a mission to the Creek Indians present at Monmouth, and in 1779 joined the expedition of General Sullivan against the Six Nations. He commanded the forces ,in the Mohawk Valley from 1780 until the close of the war, conducting in 1783 the at¬ tempted surprise of the garrison at Oswego, which was the last hostile movement against the British. In 1784-92 he was sheriff of New York, and in 1794 accepted a mission to the Creek Indians and succeeded in concluding with them a treaty of peace. He was appointed mayor of New York to succeed De Witt Clinton in 1807, and in 1812 was secretary of a mass meeting which favored military preparations against the British. He left several manuscript journals from which his son. W. M. Willett, prepared (A Narrative of the Military Actions of Col. Marinus Willet) (1831).

WILLETTS POINT, N. Y., national mili¬ tary reservation on the south shore of East River at its entrance to Long Island Sound. The reservation comprises 136 acres, purchased partially in 1857 and partially in 1863; the con¬ struction of a fort was begun here in 1862, but the work was suspended and the fort remains unfinished. After the war an. engineer battalion was ordered here to establish a depot for stores, a station for torpedo experiments, and a school of practice. The post which constitutes one of the defenses of New York Harbor is also known as Fort Totten (q.v.).

WILLEY, Waitman T., American states¬ man: b. Monongalia County, Va. (now W. Va.), 18 Oct. 1811; d. Morgantown, W. Va., 3 May 1900. In 1828, at the age of 17, he entered Madison College (now Allegheny Col¬ lege), Pennsylvania, from which he gradu¬ ated in June 1831. In 1832 he began the study of law with the distinguished Philip Dodd¬ ridge at Wellsburg, Va., and in September 1833 was admitted to the bar. Thereafter he resided at Morgantown. He was clerk of both county and circuit courts of Monongalia County from 1841 to 1852.

For a quarter of a century be¬ fore the Civil War, he and George W. Sum¬ mers of Kanawha County were universally re¬ garded as the Whig wheel-horses of western Virginia. He was a member of the constitu¬ tional convention of Virginia, 1850-51. He was the Whig candidate for Congress in 1852, but was defeated, and was also the Whig candidate for lieutenant-governor of Virginia in 1859 but was again defeated. In 1860 he was a delegate to the constitutional union convention which nominated Bell for President. In 1861 he was a member of the Virginia convention in which he voted against the ordinance of secession. In the same year he was elected by the legislature of the ((Restored government of Virginia at Wheeling® to a seat in the United States Senate, in place of James M. Mason who had resigned after the secession of Virginia. He was a mem¬ ber of the Wheeling constitutional convention which framed the first constitution of West Virginia, and in 1863 he was chosen to repre¬ sent the new State in the Senate. In 1864 he was reelected to the Senate for a term of six years which expired 4 March 1871. In. 1871 he served as a member of the second constitutional convention of West Virginia which met at Charleston and framed the present constitution

of the State. In 1876 he was a delegate at large to the National Republican Convention which met at Cincinnati.

WILLIAM (Friedrich Wilhelm Viktor August Ernst), ex-crown prince of Prussia and of the German Empire, eldest son of Wil¬ liam II, ex-German emperor, and of ex-Empress Auguste Victoria: b. Potsdam, 6 May 1882. In 1905 he was married to Cecilie Auguste Marie, daughter of the Grand Duke Frederick Franz III, of Mecklenburg-Schwerin, of which union several sons were born. He was closely allied with the militaristic group in Germany and was often at variance with his father. He was bitterly criticized for his attitude toward the Zabern incident of 1913. He was also in dis¬ favor with his father because of his book, (Aus meinem Jagdtagebuch) (1912). At the outbreak of the European War, however, all differences between the emperor and the crown prince appeared forgotten. He commanded the army employed in the operations against Ver¬ dun and apparently every effort possible was exerted in the attempt to give him the prestige of victory. At the close of the war he fled to Holland where he was interned at Wieringen, an island in the Zuider Zee. Consult Liman, Paul, (Der Kronprinz) (Minden 1914), and Gardiner, A. G., (The War Lords* (New York 1915). See War, European — Military Oper¬ ations on the Western Front.

WILLIAM I, surnamed the Conqueror, king of England and Duke of Normandy: b. Falaise, Normandy, 1027 or 1028; d. Rouen, 9 Sept. 1087. He was the natural son of Robert, Duke of Normandy, by Arietta, the daughter of a tanner of Falaise, and his father, having no legitimate son, when about to set out on a pil¬ grimage to Jerusalem, nominated him as his heir. Robert died in 1035, while returning from Palestine; and Normandy fell for a time into a condition of anarchy. When William succeeded to the dukedom his vigor and ability soon re¬ stored order, and his power increased so much as to excite the jealousy not only of the sur¬ rounding nobles, but of his suzerain the king of France. Two combinations were formed against him, and twice his territory was in¬ vaded; but he repelled these aggressions, and reduced the French king to the necessity of peace. The opportunity of gaining a wider do¬ minion presented itself on the death of his sec¬ ond cousin, Edward the Confessor, king of England. When this event took place he laid claim to the English Crown, alleging that Ed¬ ward had bequeathed it to him. To enforce his claim he invaded England, and the victory of Senlac or Hastings, in which his rival Harold was killed, ensured his success (1066). On the following Christmas Day, William was crowned, after tumultuary election on the part of the English nobles, and took the customary corona¬ tion oath. His first measures were mild: he sought to ingratiate himself with his new sub¬ jects, preserved his army in strict discipline, con¬ firmed the liberties of London and other cities, and administered justice impartially. On his return to Normandy, however, the English, being treated by the Norman leaders like a con¬ quered people, revolted, and a conspiracy was planned for the massacre of all the Normans in the country. On this intelligence William returned, and began with a show of justice by

repressing the encroachment of his followers; but on reviving the Danegelt, which had been abolished by Edward the Confessor, the discon¬ tents were renewed. These he repressed with his usual vigor, and a temporary calm succeeded. The resistance of two powerful Saxon nobles, Edwin and Morcar, who had formed an alli¬ ance with the kings of Scotland and Denmark, and with the prince of North

Wales, soon after drew William to the north, where he obliged Malcolm, king of Scotland, to do homage for Cumberland. From this time he treated the English like a conquered people, multiplied con¬ fiscations in every quarter, and forced the na¬ tive nobility to desert the country in great num¬ bers. In 1069 another formidable, insurrection broke out in the north, and at the same time the English resumed arms in the eastern and south¬ ern counties. William first opposed the storm in the north, and executed such merciless ven¬ geance in his progress that the whole country between York and Durham was turned into a desert; and above 100,000 of both sexes and all ages are said to have perished. There being now scarcely a landed proprietor who had not incurred the forfeiture of rebellion, he put into execution his plan of introducing a total alter¬ ation of the state of English law and property, by dividing all the lands into baronies and adopting the feudal system in regard to land tenure and services. He also reduced the eccle¬ siastical property to a similar system, and, to prevent resistance from the clergy, expelled most of the English church dignitaries, and placed Normans or other foreigners ir\ their stead, Lanfranc being made archbishop. Still further to humble the English, he caused French to be used in the courts of justice and in law proceedings, and ordered it to form a leading part of instruction in all the schools throughout the realm. In 1076 he received a demand from Pope Gregory VII, requiring him to do homage for his kingdom, and to pay the accustomed tribute from England to the Holy See. William denied the homage; nor would he allow the English prelates to attend a general council summoned by Gregory, but consented to the levy of Peter's pence. Toward the end of his reign he instituted that general survey of the landed property of the kingdom, the record of which still exists under the title of (Domesday Book.1* The manner in which he laid waste a large district in Hampshire, where he demolished villages, churches and convents, and expelled the inhabitants for 30 miles round, merely to form the New Forest for hunting, exhibits his indifference to the suffering of his subjects, as well as his love of the chase, which he further protected by a most severe code of game laws. In 1087 he went to war with France, whose king had encouraged a rebellion of Norman nobles, entered the French terri¬ tory, and committed great ravages, but, by the starting of his horse at Nantes, received an in¬ jury which caused his death, at the Abbey of Saint Gervais, near Rouen (1087). He left three sons — Robert, to whom he bequeathed Normandy; William, who inherited England; Henry, who received only his mother's property, and five daughters. William the Conqueror was the most powerful sovereign of his time. He possessed superior talents, both political and martial, and employed them with remarkable

vigor and industry. .His passions were, how¬ ever, strong; his ambition severe and merciless ; and his love of sway often led him to dis¬ regard all restraints of justice and humanity. Consult Lappenberg, (England under the Anglo-Norman Kings, } translated by Thorpe (1857) ; Palgrave, (Normandy and England,* Vol. Ill (1864); Freeman, <History of the Norman Conquest of England) (1867-71) ; Stubbs, (Con¬ stitutional History of England* (1874) ; Green,

(Conquest of England * (1884) ; Freeman, Wil¬ liam the Conqueror) (1888) ; Round, cFeudal England) (1895).

WILLIAM II, surnamed Rufus, from his red face, king of England: b. Normandy, 1056; d. New Forest, Hampshire, 2 Aug. 1100. He was the third son of William I and was sent to England by his father the day before the death of the latter with a recommendation to the barons and bishops that he should be the Conqueror's successor. His wishes were re¬ spected and William Rufus was crowned at Westminster 26 Sept. 1087. The division of England and Normandy did not, however, please the great barons, who possessed territories in both; and a conspiracy was formed for effecting the deposition of William in favor of his brother Robert; but the conspiracy was re¬ pressed with great vigor ; the confederate nobles were forced to withdraw to Normandy, - and their English estates were confiscated. It is worthy of notice that in this instance a Norman ruler was supported by his English subjects against his Norman ones. Once firmly seated on his throne, William forgot his promises to the English; and the death of Lanfranc, arch¬ bishop of Canterbury, freeing him from an au¬ thority which he respected, he extended his rapacity to the church, and seized the temporali¬ ties of vacant bishoprics and abbeys, to which he delayed appointing successors. In 1090 he made an incursion into Normandy, to retaliate on his brother Robert ; but a reconciliation was effected between them. In 1096 Robert mortgaged his dukedom to William for the sum of 10,000 marks to enable him to fit out an expedition and join the crusaders in the Holy Land. William accordingly took possession of Normandy and Maine, although in the case of the latter he was not allowed to do so without a struggle. William Rufus met his death while hunting in the New Forest. His body was found pierced by an arrow, which is generally believed to have been shot, whether accidentally or purposely cannot be said, by a French gentleman named Walter Tyrrel. Tyrrel immediately galloped to the coast, and embarked for France, where he joined the crusaders. The body was interred without ceremony at Winchester. This event took place when the king was in the 44th year of his age, and 13th of his reign.

William Rufus possessed vigor, decision and policy, but was violent, perfidious and rapacious. Consult Freeman, (Norman Conquest of England,* Vol. V (1876), and his (Reign of William Rufus*

(1882).

WILLIAM III, king of England and heredi¬ tary stadtholder of Holland : b. The Hague, 4 Nov. 1650; d. Kensington, England, 8 March 1702. He was the son of William II of Nassau, prince of Orange, and his mother was Henrietta Mary Stuart, daughter of Charles I of Eng-

land. Educated by the grand pensionary, John De Witt, he gained the love of the people, who in 1672, when Louis XIV invaded the republic, appointed him at once captain-general, grand-admiral and stadtholder of the United Prov¬ inces, -after enforcing' the abrogation of a reso¬ lution which De Witt had got passed in 1667, and which declared that in future no captain-general should at the same time be stadtholder. William's management of the war against France was masterly. In the campaign of 1673 he opened the sluices in the dikes around Amsterdam, inundating the whole of the neigh¬ boring district and forcing the French to retire. He was able to keep the enemy in check, and by his policy engaged the empire, Spain and Brandenburg to take part with Holland, so that at the Peace of Nijmegen in 1678 the integrity of Holland was respected. William's whole policy was directed against Louis XIV, for whom he entertained a personal hatred, and to curb the ambition of the French monarch he instituted the league of Augsburg, July 1686, between the emperor, Spain, Sweden and Hol¬ land, to which Denmark and some German princes also acceded. His wife, Mary, whom he had married in 1677, was the daughter of James II of England, and presumptive heiress to the throne. Unexpectedly James' second wife gave birth to a son, 10 June 1688, and the greater part of the Parliament and of the nation now feared that the bigoted James would intro¬ duce Roman Catholicism as the state religion and subvert the constitution. Rumor also as¬

serted that the prince was supposititious. The Episcopalians and Presbyterians in England, under these circumstances, united, in order, by the aid of Holland, to give Mary the succession to the throne. William foreseeing that England, by the policy of his father-in-law, would be¬ come more and more closely connected with France, joined' with the great majority of the British nation; and the pensionary Fagel per¬ suaded the States-General to support him with ships and troops for the preservation of British freedom and the Protestant religion. William arrived suddenly at Torbay, 5 Nov. 1688, with a fleet of 500 sail, ostensibly equipped against France, and with 14,000 troops. Upon his land¬ ing a great part of the nobility immediately declared for him; and James' soldiers by de¬ grees went over to him. In December the king fled with his family to France, after which Wil¬ liam made his entry into London. The two houses of Parliament in convention now de¬ clared that James II had broken the funda¬ mental compact between the king and the people, and by withdrawing from the kingdom had abdicated the government. On 13 Feb. 1689 Mary was proclaimed queen, and William, her husband, who had meanwhile gone oven to the English Church, was proclaimed king. At the same time the declaration or bill* of rights set¬ tled the limits of the royal power and the order of succession. Scotland followed England s example; but in Ireland, whither Louis XIV sent James with an army, the majority of the Roman Catholics maintained the cause of the deposed king. But William's victories over the army of James on the Boyne, 1 July 1690, and at Aughrim, 13 July 1691, assisted by the clem¬ ency with which he treated the vanquished party, made him master of Ireland. In the war

on the Continent he was less successful. At Steinkirk he was defeated by Marshal Luxem¬ bourg in 1692 and at Neerwinden by the same general in 1693 ; but always succeeded in wrest¬ ing from the French the fruits of their victories by skilful retreats and marches. Louis was finally compelled to acknowledge him as king of England at the Peace of Ryswick in 1697. The Parliament insisted at that time on the disband¬ ing of nearly the whole army, deeming a stand¬ ing army incompatible with the security of the constitution. Soon after, the will of Charles II of Spain, who had made the grandson of Louis XIV his heir, induced William to arm all Europe against Louis in the great alliance of The Hague 7 Sept. 1701. But in the midst of these projects he broke his collar-bone by a fall from his horse between Kensington and Hamp¬ ton Court, 21 Feb. 1702, and died in consequence of the accident. His wife, Mary, had already died childless in 1694. William's manners were too cold and ungracious to allow him to be popular

with the English people. Under a re¬ served exterior he concealed a strong love of renown and power, and to obtain the majority of votes in Parliament made use of bribery. Immersed in politics and war, he had neither leisure nor inclination for literature and art. In conversation he was grave and unattractive; but in business, penetrating, quick and decided ; in danger, undaunted ; in difficulties, unshaken ; in war, bold without ostentation. Consult Burnet, 'History of His Own Times) ; Trevor, 'Life and Times of William IIP (1835) ; Mac¬ aulay, 'History of England y ; Hallam, (Con¬ stitutional History > ; Ranke, 'History of England) (1875); Traill, 'William IIP (1888); Hippold, 'William III, Prince von Oranien, Erbstatthalter von Holland, Konig von England) (1900) ; Lodge, R., 'History of England*

(1910).

WILLIAM IV, king of Great Britain and Ireland, third son of George III: b. 21 Aug. 1765; d. Windsor, 20 June 1837. From 1779 to 1790 he served in the navy, and after quitting active service was raised successively to all the higher grades of naval command, becoming in 1801 admiral of the fleet. In 1789 he was raised to the peerage with the title of Duke of Clar¬ ence. He frequently spoke in the House of Lords, and held the office of lord high-admiral (1827-28). He became heir presumptive to the throne in 1827 and succeeded his brother George IV as king 26 June 1830. On his accession he retained the ministers then in office with assur¬ ances of his confidence in their zeal and ability. In the new Parliament, which met in November, the ministry, being left in a minority on a mo¬ tion of Sir H. Parnell for referring the civil list to a select committee, immediately sent in their resignation ; and a Whig administration was formed with Earl Grey at its head. The great events which render his reign memorable are the passage of the reform act, the abolition of slavery in the colonies and the reform of the poor laws. William IV married in July 1818 Adelaide, sister of the Duke of Saxe-Meiningen, by whom he had no surviving chil¬ dren. He had, however, a large family by Mrs. Jordan, the celebrated actress, who was for many years his mistress, while Duke of Clar¬ ence. Her liaison with the duke lasted from about 1790 till 1811, when an arrangement was

made by which she and her family were pro¬ vided for. William IV was succeeded by his niece Victoria. Consult Fitzgerald, (Life and Times of William IV> (1884) ; Walpole, < His¬ tory of England from the Conclusion of the Great War in 1815> (1878-86); Malloy, J. F., (The Sailor King, William IV> (1903).

WILLIAM I, or WILHELM I, emperor of Germany and 7th king of Prussia: b. Berlin, 22 March 1797 ; d. there, 9 March 1888. He was the second son of Frederick William III and Louisa of Mecklenburg-Strelitz, and from his earliest years was trained in military exercises. In the campaign of 1813-14 he joined the Prus¬ sian forces as captain, receiving then, for his bravery, in the field, the ((Cross of Saint George® from the Tsar Alexander. On the death of his father in 1840 he became heir presumptive to the throne, and received the title of Prince of Prussia. On the outbreak of the revolution in 1848 he left Berlin for England, but was soon recalled and in the following year pro¬ ceeded against the insurgents with military vigor and suppressed the insurrection in Baden and the Palatinate. His brother having be¬ come incapable of ruling William (1857) was appointed regent, and in January 1861 became king, being crowned at Konigsberg in October of the same year. With the assistance of Otto von Bismarck (q.v.) as president of the Cabinet and Von Roon as War Minister, he demanded from the nation a large scheme of army reform, and his foresight in this matter was justified by the Prussian success in the war with Den¬ mark (1864) and the complete overthrow of Austria at Sadowa (1866). The latter war had been brought about by the diplomacy of Bis¬ marck, who now proceeded to form a North-German Confederation with King William as its head, and to conclude a treaty of alliance, offensive and defensive, with the South German States. This growing power of Prussia pro¬ voked the jealousy of France, and a crisis was reached in the negotiations concerning the Spanish crown. War was proclaimed between Prussia and France (1870), and the South-German States having declared in favor of the former, King William led the combined Ger¬ man forces through the campaign, which re¬ sulted in the defeat of Napoleon at Sedan, and finally in the siege and capitulation of Paris. Meanwhile the North-German Parliament, unit¬ ing with the German princes, desired the king to become German emperor. This honor he ac¬ cepted, and he was crowned as Emperor Wil¬ liam I at Versailles on 18 Jan. 1871. After the conclusion of peace with France, and having entered Paris with his army, the emperor re¬ turned to Berlin amid great enthusiasm. The

latter part of his reign was passed in consoli¬ dating the power of the new German empire, and in parliamentary and political conflicts with the Catholic, Liberal and Socialist parties in the state. (See Germany). His life was at¬ tempted several times. Among biographies are those of Forbes (1888) ; Smith, G. B., (1887) ; Strauss (1887) ; Simon (French, 1887, Eng. trans.) ; Marcks, (Kaiser Wilhelm P (1899). Consult also Von Sybel, <Die Begrundung des Deutschen Reichs) (1889-94; Eng. trans. 1890-92) ; Malleson, (Refounding of the German Empire> (1892) ; Krause, (Growth of German Unity > (1892) ; Oncken, (Das Zeitalter des

Kaisers Wilhelm > (1890-92); Blume, (Kaiser Wilhelm* (Berlin 1906) ; Delbruech, F., (Die Jugend William P (Berlin 1907).

WILLIAM II (Friedrich Wilhelm Victor Albert), ex-German emperor and king of Prus¬ sia, commonly called Kaiser Wilhelm, son of Frederick III and Victoria, Princess Royal of Great Britain, and grandson of William I : b. Berlin, 27. Jan. 1859. At birth he suffered an injury of the left arm which would have dis¬ qualified a private person for the army, but nevertheless he received a thorough military education. In 1869 he was enrolled in the army as second lieutenant, in 1874 entered the gym¬ nasium at Cassel, and three years later, as first lieutenant, was admitted to the University of Bonn, where he remained until 1879, his principal studies being political science and law. He married (27 Feb. 1881) Princess Vic¬ toria of Schleswig-Holstein-Sonderburg-Au- gustenburg, and they had issue : six sons and a daughter.

In 1880 William entered the army to which he devoted himself with all earnestness, and in 1885 became colonel of the Hussars of the Guard. In spite of his physical defect he was soon one of the most capable and dashing officers in the army. He also displayed talents in literature and art, which he has pursued in various di¬ rections. Strengthened by physical culture and the diversions of hunting and other sports in which he excelled, he came to the throne (15 June 1888) well trained in mind, inured to ex¬ acting labors and filled with self-reliance and enthusiasm. Statecraft he had learned in the school of Bismarck (q.v.), and his political and personal ideals were imbued with veneration for his grandfather, whose conviction of ((di¬ vine right® he embodied in his own view of the imperial office. His personal aggressiveness and military methods gave rise to popular fear of indiscretions whereby he might endanger the peace of Germany and of the world, but he vigorously repelled those suspicions of his

mo¬ tives which led to his designation as the ((War-lord.® Quite early in his reign Gladstone ex¬ pressed a fear of what might happen through the young kaiser's indiscretions, but the warn¬ ing was largely unheeded. During the mortal illness of his father when crown prince, Wil¬ liam was called upon to repudiate a charge of conspiracy to keep him from the throne; his own behavior in the three months of his father's reign betrayed no want of filial devo¬ tion. Upon his father's death his attitude to¬ ward his mother was the subject of much criticism, but on his accession William at once asserted his ideas of personal rulership, which he maintained in theory, and in practice re¬ laxed only in submission to demands of policy. After he had been on the throne two or three years, there were 1,800 Germans in confinement for lese majeste, many of whom had been guilty of most trifling indiscretions in speaking of the young kaiser. This created scandal, and William became aware that it was a bad policy and the law was relaxed. The kaiser soon actively concerned himself with every de¬ partment of German life, and his personal sway was qualified only by the limitations of the constitution and of public opinion. By travel, in which he visited all the principal capitals of Europe, he familiarized himself with inter-WILLIAM II

national affairs and became an expert in world-politics. When Moltke died the emperor de¬ clared that he had ((lost an army,® but when he quarreled with Bismarck he showed no mis¬ givings at the loss of the masterful chancellor and. reputed creator of the empire, whose re¬ tirement he virtually compelled in March 1890. By this act, cleverly characterized by his critics as ˆdropping the pilot,® he made himself more distinctly master of the ship of state. He had evidently begun to have confidence in his own powers and judgment. His able chancellors — • Caprivi, Hohenlohe, Bulow — were compliant to the imperial will. Shortly before Bismarck's death the emperor sought reconciliation, and their friendship was partially restored. In some things, notably in maintaining the Triple Alliance, the emperor followed the policy of Bismarck. William measured his strength against all liberalizing parties, and his early solicitude for the laboring classes latterly seemed lost in his bitter antagonism to social¬ istic elements. Bismarck's kulturkampf legacy William sagaciously disposed of through con¬ cessions which he turned to profit by making an implicit alliance of the Vatican and the Ger¬ man schools in his anti-

revolutionary policies and by remodeling the schools themselves.

With all his alleged autocratic, tendencies William undoubtedly sought the aggrandize¬ ment of Germany, her industrial and commer¬ cial supremacy, colonial expansion and primacy among the great powers. He extended the im¬ perial influence to Turkey and Asia Minor, and strengthened German interests in the Far East and in Africa and South America. He held the press to a strict account ; the army and navy, which he would make superior to all others, he kept in strong control. For many years his attitude indicated no menace, rather a promise of protection to the cause of peace, which on more than one occasion he doubtless aided in preserving. Herein his conduct was less ag¬ gressive than many of the speeches in which he addressed himself through Germany to the world. The sending of his brother, Prince Henry of Prussia, to the United States, in 1902, did much to promote friendly sentiment and to cover up the unpleasantness aroused in Amer¬ ica over the 'suspicious conduct of the German naval vessels at Manila Bay when Admiral Dewey opened the battle there with the forces of Spain in May 1898.

Notwithstanding William's general good conduct, his occasional outbursts of ambition, and his persistence in building up the army and navy, constantly aroused suspicions of his intentions. From 1895 to 1908 he was continu¬ ally at war with the Reichstag over the de¬ velopment of naval power. He kept demand¬ ing and he got larger and larger appropria¬ tions for battleships. He developed the Heli¬ goland stronghold and the Kiel Canal, and managed things so that the Baltic was virtu¬ ally a German lake. He backed and encour¬ aged Zeppelin in the development of his great unwieldy aircraft, designed to maintain su¬ premacy in the air. The apprehension de¬ veloped by all these things in the British isles was so marked that 28 Oct. 1908 William per¬ mitted an interview to be printed in the London Telegraph , in which he explicitly stated that he held the friendliest feelings toward Eng¬

land and that his naval policy was intended for the protection of German interests in the Far East. This did not particularly reassure the British and it did create a stir among Eastern diplomats, especially in Japan, China and Russia, as well as among Germans at home.

With all his wonderful abilities for organi¬ zation and domination William had a streak of indiscretion in many of his public utter¬ ances, and was frequently expressive of ideas appropriate to

sovereigns of the Middle Ages. He was a firm believer in the divine right of kings and of kaisers in particular. On nu¬ merous occasions he spoke of himself as (<the instrument of the Lord,® and took such exces¬ sive interest in the army, so often spoke of his confidence in it, and permitted and even fos¬ tered such arrogance in his officers, that the whole world came to recognize that the army ruled Germany and the kaiser ruled the army. The important men were the generals, and the business interests too often centered around the Krupp works.

From other viewpoints William was much admired. He had a keen interest in industrial development, and understood and appreciated the wonders of modern mechanism. He was a musician of no mean ability and fond of the theatre. He had energy plus, and gave more thought to the details of Germany's progress than had any other ruler. Had his ambition stopped here, he had gone down to history as one of the world's most efficient sovereigns, who though ruling with a rod of iron, sought mainly the progress of the country as a whole. But his selfish ambition had no bounds. It is now generally conceded that almost from the first day of his reign he began to plan for world domination ; that he dreamed of what Napoleon might have done had he been a little more shrewd and painstaking, and re¬ solved that he, William, would show the world that one man could raise himself to the top¬ most pinnacle and not only rule Germany, but through Germany might rule the civilized earth.

His effort to attain his ends by means of the cruel World War made him the most hated man on the globe. His intentions were laid bare, and he stood in naked repulsiveness the embodiment of mad and selfish ambition that cared not what seas of blood flowed so long as ((I am lord of all.® It is difficult for this generation to judge calmly of the character of the world's greatest criminal, as he appears to our eyes to-day, an exile and outcast in Hol¬ land, awaiting judgment and condemnation. Only the historians of the future can sift his character and determine with some degree of accuracy the elements that ruled him. Was he so obsessed with the idea of becoming the world's ruler that he became irresponsible in his personal conduct and dead to all sense of suffering inflicted on millions of his own people and the people of other lands? Or was he always callous to the feeling of humanity and sympathy, rather enjoying, like Nero, the suf¬ ferings of his victims?

The principal details of William's career are given elsewhere in the articles on Germany and the European War, to which the reader is referred. For his earlier career consult

WILLIAM I

Bigelow, (The German Emperor) (1889) ; Fred¬ eric, (The Young Emperor, William IP (1891) ; Meister, (Kaiser Wilhelm IP (1894) ; Lowe, (The German Emperor, William IP (1896) ; 5The Kaiser's Speeches* (1903) ; Topham, Anne, (Memoirs of the Kaiser's Court* (New York 1914) ; Gauss, (The German Emperor: His Public Utterances* (1915).

Charles H. Cochrane, Editorial Staff of The Americana.

WILLIAM I, prince of Orange, count of Nassau, surnamed the Silent: b. Castle of Dillenburg, Nassau, 16 April 1533; d. Delft, Holland, 10 July 1584. He was the eldest son of William, count of Nassau, and Juliana, countess of Stolberg, and was educated in the Roman Catholic faith by Maria, queen of Hun¬ gary, sister of Charles V. He spent nine years in attendance on the person of the emperor, who had so high an esteem for his spirit, prudence and intelligence that he asked his opinion respecting the most important matters, and when he was but 22 entrusted him with the chief command of the army in the Netherlands, in the absence of Philibert, duke of Savoy. He also recommended him to his successor, Philip II, who regarded him with distrust. As Cardi¬ nal Granvella had now the entire confidence of Philip, and Margaret of Parma, who was charged with the government of the Nether¬ lands, was obliged to do whatever Granvella suggested, especially with respect to the intro¬ duction of the Spanish inquisition, and the erection of new bishoprics, the Count of Eg-mont, the Prince of Orange and the Count of Horn represented to the king in writing, that unless the cardinal were speedily recalled his violence would drive the country to rebellion. Though Philip looked on this step as treason, he concealed his anger, and recalled the cardi¬ nal (1564). After the remonstrance offered in 1566 by 300 noblemen (the Gueux), with Count Louis of Nassau, the brother of William, at their head, against the introduction of the In¬ quisition and the establishment of new bishop¬ rics, had been rejected and the Duke of Alva had been appointed governor of the Nether¬ lands, William had a meeting with Egmont, Horn, his brother Louis and others at Dender-

mond, to deliberate on the means of averting the threatening danger. The majority advised an armed resistance, but this proposal came to nothing on account of the opposition of the Count of Egmont. The prince with his family now went to his castle at Dillenburg. Alva arrived in the Netherlands in 1567 and many men of consequence, including Egmont and Horn, were immediately arrested. In the be¬ ginning of 1568 he caused the prince and others, who had retired from the country, to be summoned before the Council of Twelve. The prince did not appear, in consequence of which Alva declared him an outlaw, confis¬ cated his property and removed his son Philip William, from the University of Louvain, and sent him as a hostage to Spain. The Prince of Orange now determined on waging war against Alva. In a document issued in the summer of 1568, and called his ˆjustification,** he gave the reasons for his conduct and pub¬ licly professed the Protestant religion. In con¬ sequence of this he received aid in money and

troops from several Protestant princes. Wil¬ liam now raised an army of 24,000 Germans, who were joined by 4,000 French soldiers, conducted his forces with great skill across the Rhine and Meuse, entered Brabant and defeated a division of the hostile army but was unable to bring the Duke of Alva, who threw himself into the fortresses, to an engagement, or to excite the people, who feared the Span¬ iards, to a general insurrection. His army now dispersed. He then took part in an ex¬ pedition to France against the Catholic party of the Guises (1569). In France Admiral Coligny had advised him to fit out privateers against the Spanish, and establish himself par¬ ticularly in Zealand and Holland, from which the Spaniards would hardly be able to drive him. The prince followed this advice, and the privateers made themselves masters, in 1572, of the town and harbor of Briel, on the island of Voorn and also took Flushing. As Alva's tyranny became more intolerable and the people were exasperated by new exactions, several cities of Holland, Zealand, Overijssel and Gelderland publicly declared for the Prince of Orange. Relying on the assistance of France, which Admiral Coligny had promised to ob¬ tain for him, William crossed the Rhine, but the news of the massacre of Saint Bartholo¬ mew deprived him for the time of all hope of French aid. He then retired into the prov¬ ince of Holland, which steadfastly supported him. He now resumed negotiations with France and obtained a treaty in which France promised to support him, provided that it should receive the protectorate over all the provinces of the Netherlands, which he suc¬ ceeded in wresting from the Spaniards. At the end of 1573 Alva was recalled and re¬ placed by Requesens. In 1574 Louis

and Henry of Nassau, William's brothers, made an effort to join him, but were totally defeated by Requesens at Mookerheide, near Nijmegen. Both of William's brothers fell on the field of battle. This blow was compensated by the relief of Leyden, at that time hard pressed by the enemy. The raising of the siege of Leyden saved the province of Holland for the time, but the Spanish were still formidable, and Hol¬ land might have been completely crushed had it not been for the death of Requesens, which took place in March 1576. After this event William succeeded in bringing about the so-called pacification of Ghent (8 Nov. 1576), in which nearly all the provinces of the Low Countries united to expel the foreign troops, and promised mutual toleration in matters of religion. The new stadtholder, John of Aus¬ tria, sought to break the force of the union by granting, in the perpetual edict, almost all the demands of the people (1577), but his con¬ duct soon manifested his insincerity and the states of Antwerp then called the Prince of Orange to their aid. The people received him with acclamations in Brussels, and he was ap¬ pointed to the rank of lieutenant-general. The war was now renewed and by the victory at Gemblours in the end of January 1578, the Spaniards recovered their superiority in the Walloon provinces, which were zealously Catholic. In 1579 Don John of Austria died, and the king appointed Alexander Farnese of Parma as hU successor. The policy of Farnese

succeeded in gaining over to the king the south¬ ern provinces and the prince, therefore, brought the five northern provinces, Holland, Zealand, Utrecht, Gelderland and Friesland, into closer connection by the union of Utrecht, 23 Jan. 1579 and thus laid the foundation of the re¬ public of the United Netherlands. In 1580 the king, finding it impossible to triumph over William by fair means, put a price upon his head. This step induced the united provinces to renounce their allegiance to Philip, and Wil¬ liam was offered the dignity of sovereign count of Holland and Zealand, which he accepted. But the edict of Philip proclaiming a reward for his life was not without effect. In 1582 an attempt was made by a Spaniard named Jaure-guy to assassinate him at Antwerp, and a sec¬ ond attempt made at Delft on 10 July 1584, by a Burgundian fanatic, Balthasar Gerard, succeeded. William of Nassau was four times married. Maurice of Nassau, who distin¬ guished himself as a general in the Thirty Years' War, was one of his sons and William III of England, a grandson. Consult Gachard, cCorrespondance de Guillaume le Taciturne* (1847-66) ; Motley, (The Rise of the Dutch Republic* (1856) ; Klose, (William I von Oranien* (1864) ; Juste, (Guillaume le Taciturne d'apres sa Correspondance et ses Papiers d'Etat* (1873) ; Putnam, (William the Silent, Founder of the Dutch Republic* (1895) ; Fred¬ eric Harrison (William the Silent* (1897) ; and (Cambridge Modern History* (Vol. III).

WILLIAM I, Frederick, king of the Netherlands, grand duke of Luxemburg, prince of Orange and duke of Nassau: b. The Hague, 24 Aug. 1772; d. Berlin, 12 Dec. 1843. He was the eldest son of William V, Prince of Orange-Nassau, and was married to Frederike Luise Wilhelmine, daughter of Frederick William II of Prussia in 1791. He distinguished himself in the wars with the French republic, and be¬ came an exile with his father, the hereditary stadtholder of the Dutch republic, in 1795, and for several years lived at Fulda. After his father's death, in 1806, he succeeded to the duchy of Nassau and joining the Prussian army against Napoleon, was captured at Jena and his possessions confiscated. Released soon after¬ ward he fought against the French at Wagram. At the Congress of Vienna the kingdom of the Netherlands was formed composed of Holland and Belgium and 16 March 1815 William I was proclaimed king. His hereditary estates having been given to Prussia and Nassau, he received in exchange the grand duchy of Lux¬ emburg. Belgium was, however, separated from Holland by the revolution of 1830, and as William was unwilling to recognize its exist¬ ence as an independent state, he became un¬ popular. He continued to protest up to 1839, and the next year abdicated in favor of his son, retiring to Berlin at the same time with

an immense fortune.

WILLIAM II, Frederick George Louis,

king of the Netherlands: b. The Hague, 2 Dec. 1792; d. 17 March 1849. He was the eldest son of the preceding monarch ; distinguished himself in the Peninsular War under Lord Wel¬ lington, and also commanded the army of the Netherlands at the battle of Waterloo. In

1816 he was married to the grand duchess Anna Paulovna, sister of Alexander I of Rus¬ sia. His reign began at his father's abdication in 1840, but although he brought order out of the financial chaos caused by his father, he was by nature opposed to political reform. In 1848 events obliged him to consent to an entire reorganization of the government, but his death took place before the new constitution could go into effect.

WILLIAM III, Alexander Paul Freder¬ ick, king of the Netherlands: b. The Hague, 19 Feb. 1817; d. Loo, 23 Nov. 1890. He was the eldest son of the preceding emperor and his reign was chiefly distinguished by undertakings for internal improvement. Under his rule, the kingdom enjoyed uninterrupted peace and ma¬ terial prosperity. He carried out the parlia¬ mentary reforms instituted in 1848 and in 1862 decreed the abolition of slavery in the Dutch Wes t Indies. In 1866 the Dutch prov¬ ince of Limburg, a member of the Germanic Confederation from 1815, was restored to the Netherlands and by the treaty of 11 May 1867, the grand duchy of Luxemburg was de¬ clared neutral territory under the sovereignty of the house of Orange-Nassau. While Prince of Orange, he married in 1839, the Princess Sophia Frederica Matilda, daughter of the late King William I, of Wurtemberg. They had two sons, William Nicholas Alexander Frederick Charles Henry, Prince of Orange (b. 4 Sept. 1840; d. 11 June 1879), and Wil¬ liam Alexander Charles Henry Frederick (b. 25 Aug. 1851 ;" d. 21 June 1884), the last male heir of the house of Orange. In 1879 King William was married to Emma, Princess of Waldeck-Pyrmont, their daughter Wilhelmina becoming heir to the throne.

WILLIAM I, surnamed The Lion, king of Scotland: b. 1143; d. Stirling, 1214. He was a grandson of David I and brother of Malcolm IV, whom he succeeded in 1165. The source of his designation is one of the mysteries of history. His predecessors had long contested with the kings of England the sovereignty of Northumberland and other districts of the north of England, but under Malcolm these claims were

virtually abandoned and the king of Scots received, as an equivalent for them, the earldom of Huntingdon and other valuable estates. William still coveted the Northum¬ brian region and while attending Henry II of England in his wars upon the Continent, is supposed to have asked for a portion of the disputed territory. On being refused he in¬ vaded the district after the example of his ancestors, but on 13 July 1174 fell into the hands of the English. For security he was conveyed to Normandy, and there consented, as the price of his liberation, to perform that homage for his kingdom which the English kings so long vainly required from the govern¬ ment of Scotland. The treaty of Falaise, as the arrangement was termed, from the place of its adjustment, was revoked in 1189 Ly Richard I of England in consideration of a payment of 10,000 marks, needed for his ex¬ pedition to Palestine. William had several dis¬ putes with the Church, but was one of the early benefactors of the regular ecclesiastics,

and founded in 1178 the great abbey of Ar¬ broath, which he dedicated to Saint Thomas a Becket.

WILLIAM IX, Duke of Aquitaine and Count of Poiton, the first great Provengal poet: b. 1071; d. 1127. He appears to have led a very licentious life, which is constantly re¬ flected in his poems. His poetical work is of special interest as it stands at the beginning of the Classical period in Provengal literature, and marks the transition from the popular minstrel ballads to the more Classical and arbitrary literature of the courts of the sev¬ eral Provengal principalities. Much of the work of William of Aquitaine is very close to the popular poetry that he must have found existing in the south of France when he began to write. One of his poems — a romance of licentious adventure, probably quite in the style of the approved poetry of his time — shows spe¬ cial signs of being close, not only to the popular ballad, but bears imprinted upon it the stamp of the loose manners and customs of the age in which it was written. In his poetry there is already developed the stereotyped poem de¬ scribing the devotion of the knight to his lady. So assured is this form even at this early day, in

the mouth of one who, on his own confes¬ sion, was true to no lady, that it would seem as if it must have already existed long enough to have acquired a set form and character. But the disappearance of practically all the Provengal poetry of the time preceding the practical activity of William of Aquitaine, has obliterated the record of the past upon which he undoubtedly builded. William of Aquitaine led a very active life, most of which.was taken up with wars against the neighboring rulers. He led a plundering expedition into Normandy and conquered Toulouse. But his greatest ex¬ ploit was the crusade of the year 1100, on which he started out for Palestine with an army of 60,000. He reached Jerusalem, but was finally defeated and forced to flee with a handful of followers. On the way back he was shipwrecked; so that it was over three years before he reached home. Notwith¬ standing this religious expedition William quarreled with the Church, defied the papal au¬ thority and was twice excommunicated. A poem written toward the close of his life, how¬ ever, expresses repentance for his sins and his ecclesiastical attitude and repentance. In it he vows the renunciation of all worldly pleasures and the dedication of himself to the service of God. It seems probable, in view of what is known of his life, that his execu¬ tion was not equal to the facility of his poeti¬ cal expression. Consult Holland and Kellar for an incomplete edition of his works (1850) ; Sachse, (Uber das Leben und die Lieder des Troubadours Wilhelm IX Graf von Poitou) (Leipzig 1882).

WILLIAM OF LORRIS, French poet: b. about 1212. His chief fame rests on the Ro¬ mance of the Rose) of which he wrote the first 4,000 verses. This is a long allegorical poem written in 1237, but left unfinished by the author who is supposed to have died young. It has been said that the (Romance of the Rose) is a sort of art of love. At any rate it was the forerunner of a kind of literature which became

very popular in France and continued to exer¬ cise its influence for a considerable length of time there and in most of the Latin and Ger¬ manic countries of Europe. His work is among the best and most original of his age; but the rhetorical figures and allegories which were its most distinguishing feature were seized upon by subsequent writers, imitators of the. Ro¬ mance of the Rose,* and the result was a very extensive and popular literature which tended to grow more and more untrue to nature, art and correct literary expression. See c Romance of the RoseP Consult Jarry, L., <Guillaume de Lorris et le testament d'Alphonse de Poitiers) (Orleans 1881) ; Langlois, E., (Origines et Sources du Roman de la Rose* ('Paris 1891) ; Paulin,

(Histoire Litteraire de la France > (Paris).

WILLIAM OF MALMSBURY, mamz'- ber'i, English historian : b. probably in Somer¬ setshire, about 1070; d. Malmsbury, Wiltshire, about 1143. He was educated at the Benedic¬ tine Abbey of Malmsbury of which he subse¬ quently became librarian and precentor, and from which his name is derived. His works are in Latin and are of great historical value. They include (De Gestis Regum Anglorum,* a gen¬ eral history of the kings of England from 449 to 1128; (Historia Novella,* containing the nar¬ ration to 1142; (De Gestis Pontificum Anglorum, *an ecclesiastical history of England down to 1123; (Vita S. DunstanP ; (Vita S. Wulf-stani, etc.* The best edition of his English and Church histories is that of Stubbs in the Rolls Series (188 7-88). Consult Birch, (Life and Writings of William of Malmsbury* (1874) ; Stubbs' Prefaces in the Rolls Series; Norgate,

(England Under the Angevin Kings, * Vol. I

(1887).

WILLIAM OF NEWBURGH, English chronicler: b. Bridlington, Yorkshire, about 1136; d. Newburgh, near Coxwold, Yorkshire, about 1198. He was educated, lived all his life, and died in the Augustinian Abbey of New¬ burgh. He is one of the chief authorities for the reign of Henry II. His (Historia Rerum Anglicarum* covers the period from 1066-98, is written in five books, and is highly valuable as a broadminded, just and clear presentation of the happenings of the times, though his state¬ ments are not always accurate. His other works consist of three sermons. Consult Howlett in the Rolls Series, (Chronicles of Stephen, Henry II and Richard P (1884).

WILLIAM OF NORMANDY (The Clerc), a French poet of the first half of the 13th century. He wrote principally moral poems and religious legends and traditions. There has been much strife among critics as to just what poems of those attributed to him were really written by him. Among his surviving poems about which there does not seem to be any reasonable doubt, are (Le Bestiaire divin* (edited by Hippeau in 1852; and by Reinsch 1890) ; (Le Besant de Dieu) (edited by Hip¬ peau, 1852; by Martin, 1879) ; (Les Joies Notre-Dame) (edited by Reinsch, 1879) ; (Sainte Madeleine) (edited by Schmidtˆ 1880) ; (Tobie> (edited by Schmidt, 1880), and (Le Roman des Romans. * Among the poems which have been attributed to him by some critics and editors, a verdict strongly contested by others, are cer-

tain tables and ‘ Fergus. > Consult Mann, (Der-Bestiaire divin des Guillaume le Clerc) (in (Franzosische Studien,> 1889); Schmidt, Guil¬ laume le Clerc de Normandie im besondere seine Magdalenenlegende) (in Romanische Studien,’ 1880) ; Seeger, (Ueber die Sprache des Guillaume le Clerc de Normandie) (Halle 1881).

WILLIAM OF TYRE, Syrian historian and archbishop: b. probably in Syria, about 1137; d. about 1184. He was educated at An¬ tioch and Jerusalem, and in 1175 was made archbishop of Tyre. He was one of the six bishops who represented the Latin Church of the East at the Lateran Council in 1179. His (Historia Rerum in Partibus Transmarines Ges-tarunP is one of the best histories of mediaeval times, and is the principal authority for the his¬ tory of the Latin kingdom in the East from 1127-84. He also wrote (Historia de Orientalibus PrincipibusP

WILLIAM OF WYKEHAM, wik’am,

English prelate, architect and statesman : b. Wykeham, Hampshire, 1324; d. South Waltham, Hampshire, 24 Sept. 1404. He received a liberal education from the lord of the manor of Wyke¬ ham, and was afterward recommended by him to the notice of Edward III, who made him chief keeper and surveyor of the several of the royal castles. He built Windsor Castle, and afterward, taking orders, held various ecclesias¬ tical posts, becoming bishop of Winchester in 1367. He was lord chancellor of England 1367-71, founded in 1373 a grammar school at Win¬ chester, which still exists as Winchester College, and New College, Oxford, which he completed in 1386. He was lord chancellor for the second time 1389-91 and rebuilt the nave of Winchester Cathedral in the Third Pointed manner 1395— 1405. He is buried in a magnificent chantry chapel in the south arcade of the nave at Win¬ chester. Consult (Three Chancellors) (1860) ; and Gives, > by Lowth (1758), and Moberly

(1887).

WILLIAM HENRY, Fort, in the town of Caldwell, N. Y., at the head of Lake George (q.v.). In August 1757, it was taken from the English by a force of French and Indians under Montcalm.

WILLIAM JEWELL COLLEGE, loca¬ ted in Liberty, a suburb of Kansas City, Mo. It was founded in 1849 by the Baptists of Mis¬ souri; Dr. William Jewell of Columbia, Mo., was one of the leaders in the movement for the establishment of the college, and contributed $10,000 in lands toward the endowment, hence the college was named for him. It was opened to students in 1850, and on account of financial difficulties was closed in 1855-57 ; just as the college was becoming prosperous, the Civil War again forced the work to suspend from 1861 to 1868; for a part of that time the building was occupied by the Federal troops. Since 1877 the endowment has been raised to over $200,000. The college offers four courses or groups, lead¬ ing to the degree of A.B. Some studies are required in all groups, and some are free elec¬ tives. The curriculum includes several theolog¬ ical courses, completion of which by arrange¬ ment with the Southern Baptist Theological Seminary at Louisville, Ky., entitles the student to credit at that seminary. The degree of A.M.

is conferred for graduate work. There are also courses in elocution, oratory and music, and an Academic Department. A college band and a college orchestra are maintained. There are 44 scholarships. The student organizations in¬ clude four, literary societies, Philharmonic (a musical society), a Young Men's Christian Asso¬ ciation and missionary societies. The buildings include Jewell Hall (the original building), Vardeman Hall, Brown Hall, Wornall Hall, Ely Hall, The Cottages, and the gymnasium. The library contains 29,000 volumes; the students average 350, and the faculty 28, while the pro¬ ductive funds total $513,330.

WILLIAM AND MARY COLLEGE, lo¬ cated at Williamsburg, Va. It was chartered in 1693, thus being the second oldest college in the United States; but an attempt was made to found a college at Henrico in Virginia as early as 1619 when a grant of land for a ((seminary of learning® was made by the Virginia Com¬ pany; a collegiate school was established at Charles City in 1621, but closed on account of Indian troubles in the next year. In 1635 Ben¬ jamin Symes

established a free school in Eliz¬ abeth City County, the first in the 13 colo¬ nies. In 1660 the Virginia assembly voted a grant of land for a college, but the disturbed condition of England at that time, and the dis¬ orders within the colony, prevented any further progress toward establishing an institution of higher learning until in 1691, when Rev. James Blair was sent to England to obtain a charter from the Crown. In this he was successful, the charter being signed 8 Feb. 1693. Certain lands, a duty on the exports of tobacco, and other funds were appropriated to the use of the college. During the Revolutionary War the college lost a large part of its endowment, the buildings were occupied by the British and the American and French troops, and the institution was closed for a short time in 1781. After the Revolution, the college was reorganized and re¬ ceived a grant of land from the Virginia legis¬ lature; George Washington served as chan¬ cellor from 1788-99. During the Civil War the college was closed, and about 90 per cent of its students enlisted in the Confederate serv¬ ice. It was occupied by the Federal troops and most of its buildings and property destroyed. In 1869 the main building was restored, and the college again opened, but under serious embar¬ rassment; so serious did the financial difficulties become that its sessions were suspended in 1882, until 1888, when the State legislature appropri¬ ated $10,000 a year, gradually increased to $50,000. In 1893 the college received $64,000 from Congress as indemnity for loss suffered during the Civil War.

The college has always given history and political science a recognized place in its curric¬ ulum, and was the first American institution to establish chairs of law and history. Partially perhaps for this reason, its influence has always been felt in State and national history; it num¬ bers among its graduates some of the leading men of the nation, including three presidents of the United States (Jefferson, Monroe and Ty¬ ler), also Chief Justice Marshall, Edmund Ran¬ dolph and General Scott. The first chapter of Phi Beta Kappa was established at William and Mary 5 Dec. 1776. The college was also the

first to introduce the elective system which was done in part in 1779

under Jefferson's guidance. In 1819 Jefferson declared in a letter to Francis Eppes that at William and Mary the student could pursue the course of his choice. At this time there appear to have been two classes of students — ((regulars and irregulars.® The first class took a prescribed course for A.B., the lat¬ ter followed their own inclinations, and attended the schools of their own selection. The college was also the first to try the honor system, and a remarkable degree of freedom was permitted the students in the lecture room and on exami¬ nation. They were neither watched nor spied upon, and their word was taken as conclusive on any subject. There are now two courses of¬ fered, the Collegiate and the Normal. The Col¬ legiate course is entirely elective in accordance with the group system; three degrees are con¬ ferred, A.M. (for graduate work), A.B. and B.S., according to the subjects elected. The Normal course is two years in length, to which is added one year's practice work in the Mat¬ thew Whaley Model and Practice School. The most recent new feature at the college is the admission of women to all the classes. The campus consists of 42 acres upon which there are 13 buildings. In the centre is the main col¬ lege structure. Though it has passed through three fires, the walls are the same as were orig¬ inally put up in 1693. They are, therefore, the oldest college walls in the United States. The lawn in front of the college is covered with beautiful trees, and the buildiners are furnished with electric lights, artesian well water, and new equipment. The college receives annually from the legislature $50,000. The students average 237, and the teaching force 22. Young women were admitted upon equal terms with young men for the first time in September 1918.

WILLIAM PENN CHARTER SCHOOL, a secondary day school for boys, lo¬ cated at Philadelphia. In 1683 the governor and council of the province engaged a schoolmaster (Enoch Flower) for ((the instruction of the youth® of Philadelphia; from this grew the Charter School, founded in 1689 and incorpo¬ rated in 1698 by the council and lieutenant-gov¬ ernor as <(the public school founded in Philadel¬ phia at the request, costs and charges of the people of God called Quakers.® Although sup¬ ported by the Quakers, it was open to all, and for more than 60 years continued to be the only public place for instruction in the province. In 1701 Penn was asked to confirm the lieutenant-governor's charter by one under his own hand and seal. This he did on the same day that he chartered the city itself. The school therefore enjoys, in this regard, a unique distinction. The two subsequent charters issued by Penn, one in 1708 and the other in 1711 (the last the legal one under which the board now works) ren¬ dered broader and more far-reaching the meas¬ ures for the school's future development. The school was entirely emancipated from

denomi¬ national control, and the title of the corporation changed by omitting the words (<at the request, costs and charges of the people of God called Quakers,® the title in the final charter standing : <(The Overseers of the Public School founded by Charter in the Town and County of Phila¬ delphia in Pennsylvania® (the word (<public®

being used in the English sense, open to all will¬ ing to pay the fees). The school premises are now located in the heart of the city and, taken with the beautiful playing fields in the suburbs presented to the school in 1903, are valued at $250,000; and the scholarship funds amount to about $50,000. It is purely a day college preparatory school for boys, and has for years been famed for both its high standard of scholarship and the intelligent care devoted to physical training. The students have long num¬ bered over 500, it being the largest boys day school of its class in the United States. Its at¬ tendance is not confined to residents of Phila¬ delphia.

WILLIAM TELL. See Wilhelm Tell.

WILLIAMS, Alpheus Starkey, American soldier; b. Saybrook, Conn., 20 Sept. 1810; d. Washington, D. C., 21 Dec. 1878. Graduated from Yale in 1831, he studied in the law school there in 1831-33, and in 1836 began legal prac¬ tice in Detroit, Mich. There he held local offices, and in 1840-44 was probate judge of Wayne County. He became proprietor of the Daily Advertiser of Detroit in 1843, and re¬ mained its editor until 1848. During the Mexi¬ can War he was lieutenant-colonel of the First Michigan volunteers. In May 1861 he received the commission of brigadier-general of volun¬ teers. Later he was a division commander in the Shenandoah, and in 1862 became temporary commander of the 12th corps, which he directed until April 1863, leading it at South Mountain and Antietam. He was also in command of a corps at Gettysburg and, after his transfer to Tennessee, at Lookout Mountain. After com¬ manding a division of the 20th corps in Sher¬ man's Atlanta campaign, he was appointed in November to command that corps, and led it in the <(March to the Sea® and the campaign in the Carolinas. Upon the capture of Savannah he was brevetted brigadier-general of volun¬ teers. Mustered out in January 1866, he was Minister to San Salvador in 1866-69 and mem¬ ber of Congress in 1875-78. In 1870 he was Democratic candidate for the governorship of Michigan.

WILLIAMS, Anna Bolles, American

writer of juvenile tales: b. New London, Conn., 1840. She published, under the nom-de-plume J. A. K., <Birchwood> (1885) ; (The Fitch Club) ; (Professor Johnny) (1887) ; (Rolf and His Friends) ; (Who Saved the Ship) ; (The Giant Dwarf* ; (The Riverside Museum* ; his¬ tory of the Rogerenes.*

WILLIAMS, Arthur Llewellyn, American Protestant Episcopal bishop: b. Owen Sound, Ontario, 30 Jan. 1856; d. 27 Jan. 1919. He received an academic education and engaged in the railroad business in Colorado for several years. He then studied theology and was gradu¬ ated at the Western Theological Seminary, Chicago, in 1888. Admitted to the diaconate in 1888 and to the priesthood in 1889, he served as missionary in White River Valley, Colo., 1888-89, was rector of Saint Paul's Church, Denver, 1891-92 and of Christ Church, Chicago, 1892-99. In October 1899 he was consecrated bishop-coadjutor of Nebraska.

WILLIAMS, Benjamin, American states¬ man: b. North Carolina, 1754; d. Moore County,

N. C., 1814. He served in the revolutionary army, and was promoted colonel for service at Guilford. He was member of Congress 1793-95; governor of North Carolina 1799-1802, and again 1807-08.

WILLIAMS, Channing Moore, American

Protestant Episcopal bishop: b. Richmond, Va., 18 July 1829; d. 2 Dec. 1910. He was gradu¬ ated from William and Mary College in 1853 and from the Theological Seminary at Alex¬ andria, Va., in 1855. He took deacon's orders in 1853 and was ordained to the priesthood in 1857. He served as a missionary in China in 1857-66, and in the last-mentioned year was consecrated bishop of Yeddo, Japan, resigning his bishopric in 1889, when he retired from episcopal duties, but continuing his missionary labors for some years.

WILLIAMS, Edward (bardic name, Iolo Morganwg), Welsh poet and

Celtic scholar: b. Llancarvan, Glamorganshire, 1745: d. Flem-ingstone, Glamorganshire, 17 Dec. 1820. With Owen Jones and Pughe, he edited the (Myvyrian Archaeology > (1801-07), and himself published (The Fair Pilgrim, a Poem Trans¬ lated from the Welsh) (1792) ; (Poems Lyric and PastoraP (1794) ; (Psalms of the Church in the DeserP (1812) in Welsh. To the (Fair PilgrinP he appended specimens of Druidical < Triads, > which, after a long protracted contro¬ versy and on the non-production of their manu¬ scripts, are commonly looked on as a literary forgery. Williams was a friend of Southey and ranked foremost among Welsh poets of his time. His posthumous Welsh work, (Secrets of the Bards of the Isle of. Britain* (1829) was edited by his son, Taliessin Williams. Consult Warring, (Recollections and Anecdotes of Ed¬ ward Williams) (1850).

WILLIAMS, Eleazer, American mission¬ ary to the Indians: b. about 1788; d. Hogans-burg, Franklin County, N. Y., 28 Aug. 1858. After obtaining a secondary education in Mas¬ sachusetts, upon the outbreak of the War of 1812 he became a United States government agent among the northern Indians, and later fought in several actions and was severely wounded at Plattsburg (14 Sept. 1814). After the war he became a clergyman of the Prot¬ estant Episcopal Church, and for many years labored as a missionary among the Indians of the northern Wisconsin region. By many he was identified with Louis XVII of France (q.v.), and on this subject much has been writ¬ ten from J. H. Hanson's article in Putnam's for' February 1853 to M. H. Catherwood's (Lazarre) (1901). Among his writings were (Caution against Our Common Enemy) (1815) and a translation into Mohawk of the (Book of Common Prayer* (1853).

WILLIAMS, Ephraim, American soldier: b. Newton, Mass., 24 Feb. 1715; killed near Lake George, N. Y., 8 Sept. 1755. In early life he was a sailor, but in the war with France 174Q-48, served as captain of a New England company in Canada. He received from Massa¬ chusetts in return for his services a grant of 200 acres of land in the present township of Adams and Williamstown and was made commander of all the frontier posts west of the Connecticut River. When hostilities broke out afresh he was put in command ot a icgiment and ordered to join the New York foices under

Sir William Johnson, who was marching north¬ ward to attack the French. He was proceeding with a large body of soldiers to attack Dieskau's advance force, when the whole party was en¬ trapped in an ambuscade of French and Indians, and at the first fire Colonel

Williams fell mor¬ tally wounded. While in camp at Albany he had made his will, bequeathing his property for the establishment of a free school in Massa¬ chusetts, which later became Williams College. In 1854 the alumni of Williams College erected a monument to his memory on the spot where he fell. See Williams College.

WILLIAMS, Francis Churchill, American author, son of Francis Howard Williams (q.v.): b. Philadelphia, Pa., 23 April 1869. He was graduated at the University of Pennsylvania in 1891 and until 1900 was engaged in journal¬ ism. His books include (J-Devlin, Boss1* (1901); (Stories of the College) (joint author, 1902) ; (The Captain) (1903). He was literary adviser to J. B. Lippincott Company, Phila¬ delphia (1902-06). Since 1907 he has been associate editor of The Saturday Evening Post and contributor of biographical and critical articles and fiction to the magazines.

WILLIAMS, Frederick Ballard, American artist: b. Brooklyn, N. Y., 21 Oct. 1871. He studied at the Cooper Union Art School and at the National Academy of Design in New York, and specialized in landscape and figure paint¬ ings. He was elected to the National Acad¬ emy in 1909. He was awarded a medal at the Panama-Pacific Exposition, San Francisco, in 1915. Among his works in public collections are happy Valley* (Metropolitan Museum of Art, New York) ; (Chant d'Amour* (Brooklyn In¬ stitute Museum) ; (Vivacetto* (Albright Gal¬ lery, Buffalo) ; (Conway Hills) (National Gal¬ lery, Washington), *etc.*

WILLIAMS, Sir George, English founder of the Young Men's Christian Association: b. Dulverton, Somerset, 11 Oct. 1821; d. London, 6 Nov. 1905. He became converted in 1837 and was active in attempts to promote the religious welfare of his associates. In 1841 he went to London, gathered together the young men employed in the same establishment as himself, and on 12 June 1844, organized, with others, a society called the (< Young Men's Chris¬ tian Association,® which was designed to be ((a society for improving the spiritual condition of young men engaged in the drapery and other trades.® He was treasurer of the Young Men's Christian Association, 1863-85, and succeeded Lord Shaftesbury as its president in the last-named year. He was knighted in 1894. (See Young Men's Christian Association). Con¬ sult Stevenson, historical Records of the Young Men's Christian Association from 1844 to 1884> (1884).

WILLIAMS, George Frederick, American politician: b. Dedham, Mass., 10 July 1852. He was graduated from Dartmouth in 1872, studied later at Heidelberg and Berlin, was admitted to the bar and has since

practised his profession in Boston. He edited Williams' (Citations of Massachusetts Cases* and the (Annual Digest of the United States,* Vols. X to XVII. He was a member of the State legislature in 1889, sat in Congress 1891-93 and was an unsuccess¬ ful Democratic candidate for governor of Massachusetts in 1895, 1896 and 1897.

WILLIAMS, George Henry, American

senator, Cabinet officer and jurist: b. New Lebanon, N. Y., 23 March 1823; d. 4 April 1910. He was admitted to the bar in 1844 and re¬ moved to Iowa where he engaged in practice. He was judge of the First Judicial Court of Iowa in 1847-52; and in 1853-57 he was chief justice of the Oregon Territory. He was one of the framers of the constitution of the State of Oregon, and served as United States senator for that State in 1865-71. He was Attorney-General under President Grant in 1872-75. His nomination by President Grant for justice of the Supreme Court of the United States was not confirmed by the Senate. After his re¬ tirement as Attorney-General he practised law at Portland, Ore., and he was mayor of that city in 1902-05.

WILLIAMS, George Huntington, Ameri¬ can geologist: b. Utica, N. Y., 28 Jan. 1856; d. there, 12 July 1894. He was graduated at Amherst College in 1878, later studied at Brunswick and Gottingen and took the degree of Ph.D. at Heidelberg in 1882. He was after¬ ward connected with the faculty of Johns Hop¬ kins University, and was appointed professor of inorganic chemistry there in 1892. He made special investigations of the geology of Mary¬ land and materially assisted the United States Geological Survey of that State. He was editor of the department of mineralogy and petrog¬ raphy of the (Standard Dictionary) (1893); was author of 72 papers on geology, and of (Elements of Crystallography) (1890).

WILLIAMS, George Washington, Ameri¬ can author: b. Bedford Springs, Pa., 16 Oct. 1849; d. 1891. He was of African descent, served in the Civil War, subsequently attended school and was for a_ time engaged as a preacher and then as a journalist. In 1877 he was

graduated from the Cincinnati Law School and in 1879-81 served in the Ohio legislature. He was United States Minister to Haiti in 1885-86, and in 1888 was a delegate . to the World's Conference of Foreign Missions at London. He was editor of the Cincinnati Southwestern Review and of the Washington Commoner _, and published (History of the Negro Race in America from 1619 to 188(P (1883); (History of the Negro Troops in the War of the Rebellion (1887) ; 'History of the Reconstruction of the Insurgent States) (2 vols., 1889), *etc.*

WILLIAMS, Gershom Mott, American Protestant Episcopal bishop: b. Fort Hamilton, N. Y., 11 Feb. 1857. He studied at Cornell, 1875-77, was in mercantile business for several years and after studying law was admitted to the Michigan bar in 1879. The next year he was ordained to the Episcopal ministry and held rectorships at Detroit, Buffalo, Milwaukee and Marquette (1880-96). In 1896 he was con¬ secrated bishop of Marquette.

WILLIAMS, Helen Maria, English au¬ thor: b. London, 1762; d. Paris, 15 Dec. 1827. She was introduced to public notice by Dr. Andrew Kippis, who recommended very highly her first work, a legendary tale in verse, en¬ titled (Edwin and Eltruda,3 which was pub¬ lished in 1782. Between this period and 1788 she published an 'Ode on Peace) (1783) ;

'Peru, a Poem3 (1784); and a collection of mis¬ cellaneous poems (1786). In 1790 she settled in Paris, in the same year published a series of 'Letters Written in France, 3 and in 1792-96 a second series, (Letters from France, 5 and in 1795 a third, (Letters Containing a Sketch of the Politics of France.) These 'Letters3 advo¬ cated the doctrines of the Girondists, on whose downfall she was in great danger, and for some time imprisoned. They are one-sided and replete with inaccuracies and misrepresentations. Among her remaining works are (A Tour in Switzerland) (1798) ; (Narrative of Events in France3 (1815); Correspondence of Louis XVP (1803); (Letters on the Events Which Have Passed in France since the Restoration in 1815) (1819); an English translation of Hum¬ boldt's (Personal Narrative) (1814) ; 'Julia,3 a novel (1790); and the story, 'Perourou, the Bellows-mender > (1801), on which was based Lord Lytton's 'The Lady of Lyons.) Mention may be made of several well-known hymns by her, such as 'My God, all Nature owns Thy Sway3 and (While Thee I Seek, Protecting Power.3

WILLIAMS, Henry Shaler, American

geologist and palaeontologist: b. Ithaca, N. Y.,

6 March 1847 ; d. 1 Aug. 1918. He was gradu¬ ated from Yale in 1868, occupied the chair of geology at Cornell in 1879—92, resigning in the last-mentioned year to accept a similar chair at Yale, which he held until 1904, when he re¬ turned to Cornell. He was secretary of the International Congress of Geologists at Washington in 1891 and was chairman of the section of geology and geography of the American Association of Advanced Sciences in 1892. He made extensive studies of the Devonian and Carboniferous systems and published (The Classification of the Upper Devonian3 (1885) ; 'Fossil Faunas of the Upper Devonian3 (1884 — 87) ; 'The Cubiodes Zone and Its Fauna3 (1890) ; (Correlation Papers, Devonian and Car¬ boniferous3 (1891) ; (Shifting of Faunas as a Problem of Stratigraphic Geology3 (1903) ; (On the Theory of Organic Variation3 (1911), *etc.*

WILLIAMS, Isaac, English theologian and author : b. near Aberiptwith, Cardiganshire, 12 Dec. 1802; d. Stinchcombe, Gloucestershire, 1 May 1865. He studied at Trinity College, Oxford, in 1831 became Fellow there and took priest's orders, and was known as one of the leading Traetarians (q.v.). He was Newman's curate at Saint Mary's and was later in charge of the church at Littlemore. With Newman, Froude and Keble he contributed to the Brit¬ ish Magazine the verse later collected as 'Lyra Apostolica3 (1836) ; and in the 'Tracts for the Times,3 he wrote Tract 80, 'Reserve in Com¬ municating Religious Knowledge,3 the subject of much discussion. In 1842 he was an unsuc¬ cessful candidate for the Oxford chair of poetry, the defeat being regarded as also the first for the Traetarians as a party. From 1842 to 1848 he was curate at Dartington, and after¬ ward resided at Stinchcombe, where he assisted somewhat in the clerical duties of the parish. Among his further publications are several books of poetry, such as (The Cathedral3 (1838; 8th ed., 1859; reprinted 1889 ed., Ben-ham) ; 'Thoughts in Past Years3 (1838; 6th ed, 1852) ; and (The Baptistry, or the Ways of Eternal Life3 (1842-44; 6th ed., 1863); and some

volumes of prose, chiefly sermons. Selections' from his writings appeared in 1890; his (Autobiography) in 1892.

WILLIAMS, James Douglas, American politician: b. Pickaway County, Ohio, 16 Jan. 1808 d. Indianapolis, Ind., 20 Nov. 1880. After a common-school education, he became a farmer in Knox County, Ind., first held office in 1838 as justice of the peace for Harrison township in that county, and in 1843 was elected as a Demo¬ crat to the house of representatives in the gen¬ eral assembly. He sat in the house during seven sessions, and in the senate for 12. In 1874 he was chosen to Congress, where he served until 1876, resigning upon his nomina¬ tion as governor of Indiana. He was elected to the office in October, after a vigorous contest, his Republican opponent being Gen. Benjamin Harrison. His administration was one of economy and stability. His chief interest was in connection with the development of the agri¬ culture of Indiana, and he was an incorporator and president of the State Board of Agricul¬ ture. He was widely known by his sobriquet of <(Blue Jeans."

WILLIAMS, Jesse Lynch, American au¬ thor: b. Sterling, Ill., 17 Aug. 1871. He was graduated at Princeton in 1892 and has pub¬ lished (History of Princeton University' with J. De Witt (1898) ; (The Stolen Story and Other Newspaper Sketches' (1899) ; (The Ad¬ ventures of a Freshman' (1899) ; (New York Sketches' (1902) ; (The Day Dreamer' (1906) ; (My Lost Duchess' (1908) ; (The Girl and the Game, and other College Stories' (1908) ; (Mr. Cleveland, a Personal Impression' (1909); (And So They Were Married,' a comedy (1915) ; 'Remaking Time' (1916), *etc.*

WILLIAMS, John, English prelate, arch¬ bishop of Canterbury: b. Aberconway, Carnar¬ vonshire, Wales, 25 March 1582; d. Glodded, 25 March 1650. He was educated at Cam¬ bridge, took orders in the English Church in 1609, succeeded Bacon as keeper of the great seal in 1621, an office which he held till 1626, and was consecrated bishop of Lincoln in No¬ vember 1621. Though a favorite with James I he incurred the dislike of Charles I, and hav¬ ing supported the Petition of Right in 1628, was prosecuted by Laud before the Star Cham¬ ber, charged with betraying the king's secrets. After eight years' legal proceedings he was suspended from his see, fined successively £10,000 and £8,000 and imprisoned in the Tower, 1636-40. Released by the Long Parliament and restored to his see, he was made archbishop of Canterbury in 1641, but was again sent to the Tower with 11 other bishops on account of their protest against the validity

of acts passed during their enforced absence from the House of Lords. He was released in 1643 and during the civil war supported the royal cause and fortified and held Conway Castle. Consult (Scrinia Reserata,' a Latin life of the prelate, by Hacket and Philips (1700).

WILLIAMS, John, American clergyman, known as (<the redeemed captive" : b. Roxbury, Mass., 10 Dec. 1664; d. Deerfield, Mass., 12 June 1729. He was graduated from Harvard in 1683, was settled in Deerfield in 1686, and ordained in 1688. On 29 Feb. 1704, a party of 200 French and 142 Indians surprised the

town, and some of them, breaking open Wil¬ liams' house, killed two of his children and his negro servant, and forced him with his wife and six of his surviving children (his son Eleazer was absent) to set out with other pris¬ oners for Canada. On the second day's march Mrs. Williams fell from exhaustion, and was dispatched with a tomahawk. About 20 other prisoners were murdered under similar circum¬ stances. On his arrival in Canada, after a jour¬ ney attended by almost unexampled hardships, Williams was treated .by the French with great humanity and even courtesy, and at length was redeemed, and arrived in Boston, 21 Nov. 1706, with 57 other captives, among whom were two of his children. His daughter Eunice, 10 years of age, was left behind, and married an Indian. Williams, soon after his return, resumed his pastoral charge at Deerfield and published a narrative of his captivity, entitled 'The Re¬ deemed Captive Returning to Zion' (1707), a narrative of his adventures which furnishes a good picture of the frontier dangers of the time.

WILLIAMS, John, English missionary: b. Tottenham, Middlesex, 29 June 1796; d. Erromango, New Hebrides, 20 Nov. 1839. At 14 he was apprenticed to an ironmonger, but hav¬ ing offered himself to the London Missionary Society, was sent in 1816 to Eimeo, one of the Society Islands. Later he settled in Raiatea, the largest of the group, and labored here with marvelous success, his powers of organization being as conspicuous as his zeal. In 1823 he went to Raratonga, the chief of the Hervey Islands, where he met with continued success. He next built a boat with his own hands in which during the next four years he visited many of the South Sea Islands, extending his missionary labors to the Samoa Islands. In 1834 he returned to England, there superintend¬ ing the printing by the Bible Society of his Raratongan New Testament, and raising $20,000 to equip a missionary ship for Polynesia. In 1838 he went out again, visited many of the stations he had already established, and sailed as far west

as the New Hebrides, where he hoped to plant a mission, but was killed and eaten by the savages natives of Erromango. He published (Narrative of Missionary Enter¬ prises' (1837). Consult the biographies by Campbell (1842) and Prout (1843).

WILLIAMS, John, American Protestant Episcopal bishop : b. Deerfield, Mass., 30 Aug. 1817; d. Middletown, Conn., 7 Feb. 1899. He was graduated from Harvard in 1835, studied theology and was ordained deacon in 1838 and priest in 1841. From 1837 to 1840 he was tutor in Washington (now Trinity) College, then was for a time assistant minister of Christ Church, Middletown, Conn., and rector of Saint George's, Schenectady, N. Y., 1842-48. In 1848 he was elected president of Trinity College and professor of history and literature. He was consecrated assistant bishop of Connecticut in 1851, but retained the presidency of Trinity for two years longer, and then became vice-chancellor. Several students for holy orders having placed themselves under his direction, an informal theological department grew up, which was afterward incorporated as the Berkeley Divinity School at Middletown, Bishop Wil¬ liams remaining the principal instructor. On

the death of Bishop Brownell in 1865, he as¬ sumed sole charge of the diocese, whose admin¬ istration had for a long time been practi¬ cally in his hands, and at the same time became chancellor of Trinity College. In the General Conventions of 1883 and 1886, he was chosen chairman of the House of Bishops, and in 1887 succeeded Bishop Lee as presiding bishop of the Episcopal Church. His published works include (Thoughts on the Gospel Miracles > (1848) and (Studies in the Book of Acts) (1888).

WILLIAMS, John Joseph, American Ro¬ man Catholic prelate : b. Boston, Mass., 22 April 1822; d. there, 30 Aug. 1907. His ele¬ mentary education was obtained at the cathe¬ dral parochial school ; in the Sulpician College, Montreal, Canada, he studied philosophy, and later theology with the Sulpicians in France. In 1845 he was ordained priest by Archbishop Affre and upon returning to Boston, Mass., was appointed assistant at the cathedral, in 1855 be¬ coming

its rector. Two years later he was made vicar-general of the diocese and rector of Saint James' Church, both of which positions he held for nine years, being then chosen coadjutor to Bishop Fitzpatrick, whose death, however, occurred before the arrival of the papal bulls for Father 'Williams' consecration. Therefore, on 11 March 1866, Father Williams was consecrated bishop of Boston. A vast territory was then under his jurisdiction, as his diocese included the entire State of Massa¬ chusetts, but when, in 1870, Bishop Williams went to Rome to attend the Vatican Council, he applied for the division of his diocese, the re¬ sult being that Springfield, Mass., was erected into an episcopal see. In 1875 Pope Pius IX elevated Boston to a metropolitan see, Bishop Williams becoming its first archbishop, the pallium being conferred upon him 2 May 1875. Foremost among the monuments to his zeal and energy are the new Holy Cross Cathedral of Boston and Saint John's Theological Seminary.

WILLIAMS, John Sharp, United States senator: b. Memphis, Tenn., 30 July 1854. He is the descendant of one of the most distin¬ guished of Southern families, whose founder was John Williams, member of the Continental Congress. John Sharp Williams studied at the Kentucky Military Academy, the University of the South, at Sewanee, Tenn., and at the Uni¬ versity of Virginia. His general training was completed at the University of Heidelberg, Germany; but on his return home he studied law at the University of Virginia and privately at Memphis. In 1878 when he was only 24 years old he settled at Yazoo, Miss., where he arose immediately to eminence at the local bar. Following the bent of Southerners he also be¬ came a landowner and planter. In the early '90s he began to take an active interest in politics and was elected to the national House of Representatives where he remained from 1893 to 1909. He entered Congress in the midst of that trying period when all the agricultural interests of the country were sorely depressed and when laboring men were uniting with farmers' organizations in the hope of weaken¬ ing the grip of financiers and industrial leaders upon the government. Williams was in full sympathy with their efforts. He was an ardent advocate of a low tariff, if not an advocate of actual free trade. He was a member of that

group of earnest Democrats who opposed President Cleveland in 1895 when the so-called gold bonds were issued to a syndicate controlled by Messrs. Belmont and Morgan of New York, as a means of maintaining the credit of the treasury. Mr. William Jennings Bryan was the leader of these protesting Democrats. Early in 1895 Mr. Williams signed, with Bryan and 31 other leaders of Congress and

newspapermen, an address to the people which had a great in¬ fluence upon the history of the country. . It proved to be the beginning of the campaign of Mr. Bryan for the control of the Democratic National Convention of 1896. It was not only a protest against the proposed gold standard, for which Eastern men, Democratic and Republi¬ can, were clamoring; it was an appeal to inde¬ pendent Democrats very much like that which Salmon P. Chase and others issued to the country against the famous Nebraska bill of 1854. It rallied the whole West, regardless of party, and when the Republicans met in con¬ vention in Saint Louis, it was with great diffi¬ culty that the party was prevented from declar¬ ing against the gold standard. But the Demo¬ cratic National Convention which met in Chi¬ cago was entirely won and Mr. Bryan was made candidate for the Presidency. Mr. Wil¬ liams was an earnest champion of free trade and free silver and as such had a large share in the extraordinary campaign in which both issues were lost. Williams continued an influential member of the House of Representatives and during the Roosevelt Presidency he was the leader of the minority, a witty, alert and force¬ ful critic of governmental measures. Although he was never an organizer, nor a politician ex¬ cept in the better sense, he was twice the un¬ disputed candidate of his party for speaker. The last time he offered for Congress in his dis¬ trict, he received every vote cast. But he had already made up his mind to enter the Senate It was at the time of the growing Vardaman movement in Mississippi. Notwithstanding the popularity of Governor Vardaman, who opposed Williams, the latter easily won a seat in the Senate. The issue was mainly the question of the negro in the State, Williams taking the more moderate attitude that there would be no negro question if it were left out of party poli¬ tics. In the Senate Williams fought persist¬ ently for a lower tariff, although he broke with Bryan and many of his earlier political friends, and in 1911 aided in the passage of the Under¬ wood tariff which President Taft vetoed. When President Wilson entered office Williams be¬ came a warm supporter of the great reforms, tariff, finance and income tax laws, which were made effective in 1913 and 1914, after all realiz¬ ing the purposes of the movement of 1896. He was almost from the beginning of the European War an advocate of American intervention, and when the country entered the war he was an earnest supporter of the Allied cause, while his colleague from Mississippi, Senator Varda¬ man, took the opposite view. In the winter of 1919 Williams was the only senator who voted against a resolution urging President Wilson to press the cause of Ireland, against the wishes of the British government, before the Paris Peace Conference. He declared that Congress should not interfere in the internal relations of a friendly

power.

WILLIAMS, John Skelton, American financier, government official and railroad or¬ ganizer: b. Powhatan County, Va., 6 July 1865. He was educated at the University of Virginia, and engaged in banking and other business un¬ dertakings at Richmond, gaining a large for¬ tune. He organized the Seaboard Air Line under Southern control and capital, and was its president in 1894-1904. He has been actively interested in the development of Southern re¬ sources. He was appointed Assistant Secretary of the Treasury in 1913, and in 1914 became Comptroller of the Treasury, serving also as an ex-officio member of the Federal Reserve Board. In 1918 he was appointed a member of the advisory committee to the Director-Gen¬ eral of Railroads and also director of the division of finances and purchases in the depart¬ ment of railroads.

WILLIAMS, John Stuart, American sen¬ ator and Confederate soldier : b. Montgomery County, Ky., 1820; d. there, 17 July 1898. He was graduated at Miami (Ohio) University in 1838, and was admitted to the bar of Kentucky in 1840. He served in the Mexican War, was promoted to the rank of colonel and afterward resumed his law practice. He was a member of the Kentucky State legislature in 1851-52. He was opposed to the secession of the Southern States, but organized a brigade for service in the Confederate army and served as brigadier-general throughout the war. He later urged speedy renewal of allegiance to the United States. He served in the Kentucky legislature in 1873-74, and was United States senator in

1879-85.

WILLIAMS, Jonathan, American soldier: b. Boston, Mass., 20 May, 1750; d. Philadelphia, Pa., 16 May 1815. He was secretary to his granduncle, Benjamin Franklin, while the lat¬ ter was Ambassador to France, and while abroad read widely concerning fortification and

made an especial study of military science. He returned with Franklin in 1785 and was for some years a judge of Common Pleas at Phila¬ delphia. In 1801 he entered the army, soon be¬ coming inspector of fortifications and taking command of West Point in 1802-03. He re¬ signed in the year last named, but returned to the army in 1805 as chief engineer and superin¬ tendent at West Point. While in charge of the fortifications of New York he built Fort Columbus and Castle William on Governor's Island, Castle Clinton (Castle Garden), and Fort Gansevoort. On the breaking out of the War of 1812, as senior officer at Castle William, he claimed command of that fort, and on his being assigned elsewhere, he resigned. He was elected to Congress in 1814, but did not take his' seat. As the first person in the United States to apply the principles of scientific en¬ gineering he has often been called (<the father of the corps of engineers.® He published (The Use of the Thermometer in Navigation > (1799) and translated (Elements of Fortification' (1801), and (Kosciusko's Manoeuvres for Horse Artillery } (1808).

WILLIAMS, Sir Monier Monier-. See

Monier-Williams, Sir Monier

WILLIAMS, Roger, pioneer of religious liberty and founder ot Rhode Island: b. Wales, 1607; d. Providence, R. I., March 1684, There

is considerable doubt as to the year of Wil¬ liams' birth; authorities differ. Some of them claim he was born in 1601, others in 1603. The writer after a careful examination of all the records places the date at 1607. Consult Straus' (Roger Williams, the Pioneer of Re¬ ligious Liberty,* pp. 5-11.

The most recent investigations have shown that he was the son of James Williams, a mer¬ chant tailor of London, and of his wife, Alice Williams. While yet a mere boy, he attracted the attention of Sir Edward Coke, while tak¬ ing shorthand notes of sermons and speeches in the Star Chamber, and Coke placed him (1621) in the Charter House School. From there (1623) he went to Pembroke College, Cambridge University, from which he took his degree in 1626. Williams soon developed into a decided opponent of the liturgy and cere¬ monies of the Church, thereby placing himself on the side of the most radical Puritans. On 1 Dec. 1630 he embarked from Bristol with his young wife in the ship Lyon, and arrived at Nantasket 5 Feb. 1631. No sooner had he set foot upon the shores of New England than

he came in conflict with the ecclesiastical and civil authorities of the colony, whom he found ar¬ rayed against him, for asserting and maintain¬ ing with unwavering fidelity those principles which have immortalized his name as the champion of religious liberty.

The arrival of Williams in America was-noted by Winthrop as that of a ((Godly minis¬ ter.® He was already known and esteemed by the leading men in the colony, and he was im¬ mediately invited to officiate in the place of John Wilson as teacher of the church at Bos¬ ton, which, however, Williams declined on the ground that they of Boston were an unsepa¬ rated people. It is well to note here a dis¬ tinction between the Pilgrims and the Puritans. The former were Separatists, and were asso¬ ciated as a distinct church before they left Hol¬ land. A principle of their Church was, that the state had no right to punish for spiritual sins. The Puritans, on the other hand, though Non¬ conformists, were not separated from the Estab¬ lished Church. Their scruples were against con¬ forming to many of the ceremonies of that Church. He was invited by the Pilgrim church at Salem to become an assistant or teacher in place of Higginson, who died a few months be¬ fore. This call Williams accepted, but the civil authorities, the General Court of Boston, inter¬ fered and remonstrated with the Salem church for choosing him. He remained at Salem only a short while, and in August removed to Ply¬ mouth, where he was received with much re¬ spect. Here he remained for two years, sup¬ porting himself by manual labor and officiating as (<teacher® in the church among the Pilgrim fathers. During his residence here he became intimately acquainted with various Indian chief¬ tains in the neighborhood, which intimacy had an important bearing in his subsequent life in the founding of Rhode Island.

In August 1633 he returned to Salem and resumed his ministerial labors there, but at every turn he found himself in conflict with the clergy and the court of Massachusetts. He was frequently cited to appear before the court. In October 1635 he was tried before the General Court, consisting of the governor, the deputy

governor, eight assistants and some 25 deputies. The formal charges against him were four in number, but the basis of them may be summed up by the statement that he maintained that the civil power has no jurisdiction over the con¬ science, or, in other words, he maintained the absolute liberty of conscience. The court con¬ victed him and sentenced him to banishment. In January 1636 he left Salem to escape arrest, and to seek a refuge from the tyranny of the church brethren. He went first to Seekonk, and afterward with four companions who joined him embarked in a canoe to seek a spot beyond the jurisdiction of the Massachusetts and Ply¬ mouth colonies. The site selected by him was Providence, so named by him in gratitude for <(God's merciful providence to him in his dis¬ tress.®

In March 1638 a large section of land was conveyed to him by deed from the Indians, which land he divided equally among his fol¬ lowers. Mrs. Williams and her two infant children joined him, and friends from Massa¬ chusetts and England soon joined the Rhode Island colony.

William Coddington, who had been a mer¬ chant in Boston, was elected as magistrate with the title of judge, and three elders were elected to assist him. This form of government continued until 1640. Meanwhile the antag¬ onism of the Boston Colony to Williams con¬ tinued, and a law was passed which practically excluded the inhabitants of Providence from entering Massachusetts. In March 1641 the government of Rhode Island was regularly or¬ ganized.

The formation of the New England Confed¬ eracy, in 1643, which included the four colonies, Massachusetts, Connecticut, Plymouth and New Haven, was a matter of anxious concern to the Rhode Island and Providence settlements. The open hostility of the Confederacy, together with the claim made by Massachusetts that the Rhode Island and Providence colonies had no authority to set up civil government, induced these latter colonies to seek a charter from Eng¬ land. At an assembly held in Newport 19 Sept. 1642, a committee was appointed to procure a charter, and in July 1643 Williams set sail from New York for England. Here on 17 March 1644 he obtained a charter which gave to the towns of Providence, Portsmouth and New¬ port full power to rule themselves under the name ((The Providence Plantations of Narragansett Bay.® This charter granted in the most friendly spirit everything that Williams prayed for.

Williams returned to America in 1644, land¬ ing in Boston 17 September. He ventured to tread on this forbidden ground by exhibiting a letter from 12 leading members of the Parlia¬ mentary

party in England, addressed to the gov¬ ernment of Massachusetts. He, therefore, pro¬ ceeded without hindrance to Providence. In May 1647 a form of government was agreed upon after many delays; the office of president of.the colony, which so naturally belonged to Williams, was bestowed upon John Coggeshall of Newport. Dissensions arose within and without the new colony; Williams was called upon to pacify the Indians and to settle numerous disputes, ecclesiastical and civil. In October 1652 Williams was again in England

making efforts to secure a renewal of the colony's charter; this he secured and returned to America, landing in Boston in 1654. In this same year the reorganization of the Rhode Is¬ land government took place, and on 12 Septem¬ ber Williams was elected president of the colony. He was again elected 20 May 1656. In this year the persecution of the Quakers in Bos¬ ton soon made Rhode Island a Quaker refuge, and they were made welcome largely through the influence of Roger Williams. For many years, until 1677, Williams continued to hold various offices and to guide the affairs of the colony. In the Indian wars of 1675-76, when Providence was attacked, Williams was cap¬ tain of militia and drilled companies in Provi¬ dence. See Rhode Island.

The life of Roger Williams was now rapidly nearing its end. His Providence friends did not fully appreciate the life-work of this sturdy champion of soul liberty, which was destined to bring happiness to a continent. At his death the brief record was conveyed to the outer world in a letter dated 10 May 1684, stating (<The Lord hath arrested by death our ancient and approved friend, Mr. Roger Williams, with divers others here.® He was buried in a spot which he himself had selected on his own land, near where, 47 years before, he had first landed within the colony he founded.

The principles of religious liberty had been proclaimed in all ages and under many climes, with more or less plenitude, but Roger Wil¬ liams was the first to organize and build up a political community with absolute religious lib¬ erty as its chief cornerstone. To him the suc¬ cessful pioneer of these principles is due to a larger extent than to any man, the American system of a (<free church in a free State.®

No portrait of him in bronze or in marble, or of any kind, has come down to us, and when in 1872 the State of Rhode Island presented a statue of her founder to the nation, which now stands in the rotunda

of the Capitol at Wash¬ ington, the artist had to make the memorial from an ideal conception.

Among the great men of his times with whom Williams stood in close personal rela¬ tions, besides his early patron, Sir Edward Coke, were Cromwell, John Milton, Sir Henry Vane, the younger, Major-General Harrison of the Parliamentary army, Lawrence Lord, presi¬ dent of the Council of State, and others of dis¬ tinction in England and America. (See United States — Civil and Religious Liberty). Con¬ sult (Memoirs, > by James D. Knowles (Boston 1833) ; Gammell (Boston 1846) ; Elton (Lon¬ don 1842) ; Guild, R. A., (Biographical Intro¬ duction, etcP (Providence 1866) ; (Works of Roger Williams,* published by the Narragansett Club of Providence (6 vols., Provi¬ dence 1866-74) ; biographies by Oscar Straus (New York 1894) and Carpenter, E. J. (ib. 1910) ; Tyler, M. C., 'History of American Literature, 1607—1 765) (New York 1878) ; Dexter, Henry M., (As to Roger Williams and his "Banishment® from the Massachusetts Plantation (Boston 1876).

WILLIAMS, Rowland, Anglican clergy¬ man and educator: b. Halkyn, Wales, 16 Aug. 1817 ; d. Broad Chalk, near Salisbury, Wiltshire, 18 Jan. 1870. He was graduated from King's College, Cambridge, in 1841, and was Fellow and

tutor there in 1839-50. He accepted the chair of Hebrew at the theological college of Saint David's in 1850, acting also as vice-president of that institution. In 1854 he became select preacher at Cambridge and became vicar of Broad Chalk in 1858, while still retaining his offices at the college. His views on inspira¬ tion brought him into disfavor with the Welsh clergy and in 1862 he was prosecuted and con¬ demned for heresy in the Court of Arches. He resigned his professorship and retired to his vicarage at Broad Chalk, where he henceforth lived, though in 1864 he secured from the Privy Council a reversal of the judgment against him. His publications include (Rational Godliness) (1855); (The Hebrew Prophets> (1868-71); (Psalms and Litanies) (1872), *etc.* Consult Williams, Ellen,

(Life and Letters of Rowland Williams > (1872).

WILLIAMS, Samuel Wells, American mis¬ sionary and philologist: b. Utica, N. Y., 22 Sept. 1812; d. New Haven, Conn., 17 Feb. 1884. He was graduated from the Rensselaer Institute, Troy, N. Y., in 1832, and in 1833 went to Can¬ ton, China, as printer to the American Mission. He was compelled to remove to Macao in 1835, and in 1845-48 was in the United States, after which he resumed his work in Canton. He acted as interpreter to Commodore Perry on his Japanese mission in 1853-54, and in 1857 re¬ signed his position in the mission and became secretary and interpreter to the United States legation. He assisted in the negotiation and ratification of the treaty of Tientsin in 1858-59. Upon the establishment of the United States le¬ gation at Peking under Burlingame in 1862 he became its secretary, occupying the post until 1876, when he returned to the United States and accepted the chair of Chinese at Yale, where he remained until his death. He was editor and contributor to the Chinese Repository during the time of its publication (1832-51), and was a leading authority on the Chinese and Japanese languages. He superintended the press work of Medhurst's dictionary of the Hokkien Dialect y (1837) and with Bridgman issued (Chinese Christomathy* (1841). His other works in¬ clude (Easy Lessons in Chinese) (1842) ; (The Topography of China) (1844) ; (The Middle Kingdom > (1848); (A Syllabic Dictionary of the Chinese Language) (1874), *etc.* The two last mentioned are the greatest of his works and are still among the highest authorities in their field. Consult Williams, F. W., (Life and Letters of Samuel Wells Williams) (1888).

WILLIAMS, Seth, American soldier: b. Augusta, Me., 22 March 1822; d. Boston, Mass., 23 March 1866. He was graduated at the United States Military Academy in 1842, and in the Mexican War served as aide-de-camp to Gen. Robert Patterson. He was adjutant of the United States Military Academy in 1850-53, and was thenceforth until his death connected with the adjutant-general's office. He was pro¬ moted brigadier-general of volunteers 23 Sept. 1861, and later served as adjutant-general on the staff of Generals McClellan, Burnside, Hooker and Meade. From 1864 until the close of the war he was inspector-general of the army on the staff of General Grant. He was brevetted major-general of volunteers 1 Aug. 1864 for conduct at Gettysburg, and major-

general of regulars 13 March 1865 for his services in the war. His health was seriously undermined in the war but he remained on duty.

WILLIAMS, Talcott, American journal¬ ist and educator: b. Abeih, Turkey, 20 July 1849. His parents were Congregationalist mis¬ sionaries. He was graduated at Amherst Col¬ lege in 1873. He was on the staff of the New York World in 1873-77; was Washington cor¬ respondent of the New York Sun and of the San Francisco Chronicle in 1877-79; and was editorial writer on the Springfield (Mass.) Republican in 1879-81. He was one of the editors of the Philadelphia Press in 1881-1912. In 1912-19 he was director of the School of Journalism founded at Columbia University by Joseph Pulitzer, becoming emeritus professor in the latter year. He was president of the Ameri¬ can Conference of Teachers of Journalism in 1913. He has been the recipient of honorary dgrees from almost a dozen prominent institu¬ tions of higher learning and was associate editor of (New International Encyclopedia) (2d ed.).

WILLIAMS, Walter, American journal¬ ist and educator: b. Boonville, Mo., 2 July 1864. He was editor and part owner of the Boonville Advertiser in 1884-89; and edited the Columbia (Mo.) Herald in 1890-1908. He also edited the Saint Louis Presbyterian in 1897-98; the Daily State Tribune, Jefferson, . Mo., in 1898-1902; and founded the Country Editor in 1895. Since 1908 he has been pro¬ fessor of the theory and practice of journalism at the University of Missouri, serving also as dean. He was the organizer and-secretary of the World's Press Parliament held at Saint Louis in 1904; was elected the first president of the Press Conference of the world for 1916— 20; and was the first president of the American Association of Schools and Departments of Journalism in 1916. He has published (Some Saints and Some Sinners in the Holy Land* (1902) ; (History of AlissourP (1908) ; (From Missouri to the Isle of MulP (1909) ; (The Practice of JournalisnP (1911) ; <The World's Journalism? (1915) ; (History of Northeast MissourP (1915); (History of Northwest MisSourP (1915).

WILLIAMS, William, American patriot and signer of the Declaration of Independence b. Lebanon, Windham County, Conn., 8 April 1731; d. there, 2 Aug. 1811. He was graduated at Harvard College in 1751, in 1755 served on the staff of Col. Ephraim Williams in the Lake George expedition, and after the revolutionary troubles began was an active member of the council of safety, and in October 1775 was chosen a representative in the Continental Con¬ gress. His property was nearly all expended in the war, and he was tireless in obtaining pri¬ vate donations to supply the. army, going from house to house to collect articles that could re¬ lieve the destitution of the soldiery. He held nearly every office in the gift of his constitu¬ ents, served nearly 50 years in the State legisla¬ ture, and was a member of the convention of his State which adopted the Federal Constitu¬ tion.

WILLIAMS, Sir William Fenwick, Brit¬ ish soldier: b. Annapolis Royal, Nova Scotia, 4 Dec. 1800; d. London, 26 July 1883. He was

graduated at Woolwich in 1821, entered the Royal Artillery in 1825, and after serving in the East Indies several years was appointed British commissioner to the conference in Erze-rum, to settle the boundary dispute between Persia and Turkey in Asia. During the Cri¬ mean Warˆ he was sent as commissioner to the relief of Kars, and there promptly reorganized the troops. After defending Kars for four months against the Russians he met their com¬ mander, Gen Mauravteff, on the heights above the city and defeated him with great slaughter. Assisted by the Hungarian General Kmety, he did all in his power for the defense of Kars, but on 14 Nov. 1855 was forced by famine to capit¬ ulate. On his return to England he was created baronet, received the rank of pasha of the high¬ est order and the decoration of the Medjidieh from the sultan; and was made a grand officer of the Legion of Honor of France. He sat in Parliament for Caine 1856-59 and then assumed the command of the forces of British North America. He was administrator of Canada in 1860-61; became full general in 1868; was gov¬ ernor-general of Gibraltar 1870-75; and retired from the army in 1877.

WILLIAMS COLLEGE, located at Williamstown, Mass. It owes its origin to the be¬ quest of Col. Ephraim Williams, for establishing a ((Free School® in Williamstown. The be¬ quest was made in 1755; the property was sold, and the funds were allowed to accumulate until 1785, w;hen a free school was incorporated by the legislature, and a lottery granted for rais¬ ing funds to erect a building; in 1790 the build¬ ing (now West College) was completed, and the school was opened 20 Oct. 1791. In 1793 the institution was incorporated as a college under its present name, the property vested in the free school was transferred to the college, and a grant of $4,000 was made by the State to purchase a library and apparatus. The col¬ lege subsequently received other appropriations from the State; in 1796 the legislature granted two townships of land; in 1809 an additional township; and in

1814 appropriated the taxes from the Massachusetts bank for 10 years to Harvard, Williams and Bowdoin, Williams' share in which amounted to $30,000; in 1859 the legislature* appropriated $25,000, and in 1868, $75,000. In 1806 the first foreign* missionary society in the United States was formed at Williams. In 1836-72 Mark Hopkins (q.v.) was president of the college, and during his ad¬ ministration it attained a high degree of pros¬ perity

The curriculum prescribes the work of the freshman year, and organizes the courses of the last three years in 11 major groups arranged in three divisions. The aim is to secure the con¬ centration of part of the student's work in one well-defined field and the distribution of another part among different subjects. The degree of A.B. is conferred, and A.M. for graduate work and thesis. There are 76 general scholarships and one special prize scholarship. The principal college buildings are West College, the oldest, erected 1790; East College, erected in 1798, burned in 1841, and rebuilt; South College; Griffin Hall; Hopkins Observatory, built in 1837, under the direction of Prof. Albert Hop¬ kins, the first college observatory in the United

States; Lawrence Hall Library; Jackson Hall; Alumni Hall Chapel; College Hall; Clark Hall; Field Memorial Observatory, erected 1882, con¬ taining a fine meridian circle by A. Repsold and Sons, Hamburg; Morgan Hall; Lasell Gymna¬ sium; Hopkins Memorial Hall; Thompson Chemical Laboratory; Thompson Biological Laboratory; Thompson Physical Laboratory; College Infirmary; Jesup Hall; Williams Hall; Grace Hall. The library contains about 89,000 volumes. The productive fund amounts to $2,900,883.58 ; the student attendance is 552 and the faculty 61 ; the total number of graduates nearly 6,000.

WILLIAMSBURG, wdl'yamz-berg, Ky., town, county-seat of Whitley County, on the Cumberland River, and on the Louisville and Nashville Railroad, about 95 miles south by east of Lexington. It is in an agricultural and coal¬ mining region and has flour and lumber mills and large coal yards. Pop. 2,000.

WILLIAMSBURG, Va., city, county-seat of James City, County, on the Chesapeake and Ohio Railroad, about 48 miles southeast of Richmond. It is the oldest incorporated town in the State. It was established in 1632, and prior to the Revolution it was the capital of the prov¬ ince. It was also the State capital until 1779, and here in 1765 Patrick Henry made his famous speech against the stamp act, in which he re¬ minded his auditors that George III might profit by the

example of Caesar and Charles I. The city has many historic associations connected with the pre-Revolutionarv days and the Civil War. It is the seat of William and Mary Col¬ lege (q.v.), and it has the Eastern Lunatic Asy¬ lum, opened in 1773, the oldest institution of its kind in the United States. On 3 May 1862 it was occupied by the Confederate forces, who had withdrawn from Yorktown, and three days later an attack was made by the Union forces. The battle lasted all day. No decisive result was gained by either side. The Federal loss was 2,230 and the Confederate losses 1,560. Pop. about 2,714.

WILLIAMSBURG CANALS. See Cana¬ dian Canals.

WILLI AMSITE. An ornamental and semi¬ precious variety of sepentine of apple-green color obtained in Lancaster County, Pa.

WILLIAMSON, wil'yam-sorr. Alexander William, English chemist and educator: b. Wandsworth, Surrey, 1 May 1824; d. 1904. He was educated at Paris, Heidelberg and Giessen; in 1849 was appointed professor of practical chemistry at University College, London; in 1875 he accepted the chair of chemistry also, occupying both chairs until 1887 when he re¬ signed and was appointed professor emeritus. He made important researches on etherification, gas analysis, the atomic theory, etc., and wrote several important papers concerning his in¬ vestigations, including (Etherification and the Constitution of Salts, > which attracted wide¬ spread notice. He also published < Chemistry for Students. > He served two terms as presi¬ dent of the Chemical Society of London, and was president of the British Association for one term.

WILLIAMSON, Alice Muriel Living¬ ston, American novelist, wife of C. N. William-sop (q.v.) : b. Livingston Manor House, near

Poughkeepsie, N. Y., 19th century. She was educated privately and became known as a writer of fiction. Later she collaborated with her husband in writing novels which made their joint signatures "A. M. and C. N. Wil¬ liamson® widely known. Independently she was the

author of ‘The Barn Stormers) ; ‘The Golden Silence,’ *etc.*

WILLIAMSON, Charles Norris, Eng¬ lish novelist : b. Exeter, 1859 ; d. 5 Oct. 1920. He was educated at University ‘College, London, and engaged in journalism. He worked for the Examiner and on the Graphic, and in 1891 founded Black and White. He wrote numer¬ ous magazine articles and ‘Life of Thomas Carlyle) (2 vols., 1881). He is best known, however, for the novels written in collaboration with his wife, A. M. Williamson (q.v.), under their joint signatures. Among them are ‘The Lightning Conductor’ (1903) ; ‘The Princess Passes) (1905) ; (The Car of Destiny’ (1906) ; (Set in Silver) (1909) ; (The Motor Maid’ (1911) ; (The Heather Moon) (1912) ; ‘It Hap¬ pened in Egypt’ , (1914) ; (The Lightning Con¬ ductor Discovers America-* (1916) ; ‘Tiger Lily’ (1917) J ; ‘Everyman’s Land) (1918); ‘The Lion’s Mouse) (1919).

WILLIAMSON, Francis John,. English sculptor: b. Hampstead, England, 17 July 1833; d. 12 March 1920. He was a pupil of J. H. Foley and later his assistant, afterward settling at Esher, Surrey, where he lived’ till his death. He executed many ideal and private commissions, including portraits of the royal family at the order of Queen Victoria. Among his works are statues of Queen Victoria in Australia, India, Ireland, London, *etc.* ; Dean Milman in Saint Paul’s Cathedral ; and numerous public statues in different parts of the British Isles.

WILLIAMSON, George Charles, English writer on art : b. Guildford, Surrey, 1858. He was educated at London University. As an au¬ thor he began with newspaper articles on local archaeological matters and issued a small book on local coins. He also wrote a book on trader’s tokens and another on coins of the Bible. For many years he has been art editor to George Bell and Sons, publishers. He has traveled extensively, visiting the picture galleries of Europe, both public and private. Mr. Williamson is the author of ‘Life of John Russell, R.A) ; ‘John Downman) ; Rich¬ ard Cosway, R.A.’; (George J. PinwelP ; Por¬ trait Miniatures) ; (Bernardino LuinP ; (George Engleheart’ ; ‘Velasquez’ ; ‘Holman Hunt’ ; ‘Lord Leighton’ ; ‘Murillo’ ; ‘Raphael’ ; (Cities of Northern Italy’; ‘Andrew and Nathaniel Plimer’ ; (History of Portrait Miniatures’ ; ‘The Anonimo Morelliano’ ; (How to Identify Portrait Miniatures’ ; (Life of George Morland’ ; ‘Life of Milton’ ; Guild¬ ford in the Olden Time’ ; Catalogue of the Pierpont Morgan Collection of Miniatures’ (4 vols.) ; ‘Catalogue of the Pierpont Morgan Collection of Jewels’ ; ‘Catalogue of the Pier¬ pont Morgan Collection of Watches’ ; ‘The Imperial Wedgwood Dinner Service’ ; ‘Minia¬ tures, English and Foreign’; ‘Catalogue of the Portraits of Milton,’ *etc.* Mr.

Williamson is editor of a new edition of Bryan's 'Painters

and Engravers' (5 vols.) and was a collabora¬ tor in The Catholic Encyclopedia.

WILLIAMSON, Hugh, American physi¬ cian and legislator: b. West Nottingham, Pa.,

5 Oct. 1735; d. New York, 22 May 1819. He was graduated at the College of Philadelphia in 1757, studied theology and in 1759 was licensed to preach in Connecticut. He preached for a time and was professor of mathematics at the College of Philadelphia in 1760-63. He then studied medicine at the universities of Edin¬ burgh and Utrecht, and became a highly suc¬ cessful practitioner in Philadelphia. While in England in 1774 he was examined by the Privy Council in regard to the affairs of the Ameri¬ can colonies. He was a surgeon in the North Carolina militia in 1780-82; served in the Con¬ tinental Congress in 1784-86; and in 1787 was a delegate to the convention which framed the Constitution of the United States. He served in Congress from its first organization until 2 March 1793, when he removed to New York. He wrote 'Paper Currency' (1786) ; 'Dis¬ course on the Benefits of Civil History' (1810) ; 'History of North Carolina' (2 vols., 1812), *etc.*

WILLIAMSON, W. Va., city and county-seat of Mingo County, situated on the Nor¬ folk and Western Railroad, 75 miles southeast of Huntington. The chief public buildings are the county courthouse, city hall and public - schools. Because of its location in the coal-producing region of the State, coal-mining is its chief industry. In 1916 the commission form of government was put in operation. Pop. (1920) 6,819.

WILLIAMSON FREE SCHOOL OF MECHANICAL TRADES, an educational in-sitution for boys dependent upon their own resources, founded in 1888 at Williamson School Station, near Philadelphia, Pa., by I. V. Williamson. It is non-sectarian and preference in admission is given to boys in the surround¬ ing sections. Boys between the ages of 15 and 18 are admitted, and are bound for three years as apprentices to the trustees. There is an academic course for general education and each student is taught one trade, which may be carpentering, brick laying, machine trade, pat¬ tern making, steam and electrical engineering or agriculture. The students live in cottages in families of 24 or less. The endowment is about $3,000,000. There are 20

instructors and assistants, and about 250 students are accom¬ modated. The library contains about 4,000 vol¬ umes.

WILLIAMSPORT, wil'yamz-port, Ind., city, county-seat of Warren County, on the Wabash River and the Wabash Railroad, 71 miles northwest of Indianapolis. It was founded in 1827. It is the trade centre of an agricultural region, and is also situated within three miles of large coal mines; it has a build¬ ingstone quarry, grist-mills and warehouses; there are two State banks and two weekly news¬ papers. There is a high school founded in 1884. Pop. about 1,243.

WILLIAMSPORT, Md., town in Wash¬ ington County, on the Potomac River, the Chesapeake and Ohio Canal, and the Cumber¬ land Valley and West Maryland railroads, 65

miles northwest of Washington. It was founded in 1787 ; in 1863 Lee's army crossed the Potomac at this point on the march to Gettys¬ burg. It is situated in an agricultural and tim¬ ber region, and is a shipping point for peaches. It has flour and lumber mills and sash and door factories, a national bank with a capital of $100,000 and one weekly newspaper. There is a high school, and several elementary schools, including one for colored pupils. Pop. (1920)

1,615.

WILLIAMSPORT, Pa., city, county-seat of Lycoming County, on the West Branch of the Susquehanna River, and on the Pennsyl¬ vania, the Northern Central, and the Phila¬ delphia and Reading railroads, about 75 miles north of Harrisburg. It is on the Alleghany plateau, covering an area of seven square miles, in an agricultural and mining region. The chief manufacturing establishments are steel works, lumber mills, furniture and rubber goods factories, woodworking machinery works, wire rope, nail and engine factories, boot and shoe factories, silk mills, a sewing-machine factory and fire escape works.

In 1918 the estimated number of wage-earners was 6,500, and of wages paid over $3,000,000. The gross pro¬ duction of these factories was nearly $14,000,- 000 in the census year, and fully $20,000,000 in 1918. The city has an extensive trade in lum¬ ber products and coal. Williamsport was for many years a shipping point for lumber, being styled the <(Sawdust City.® But as the forests were cut the trade disappeared, and numerous foundry and machine shops were located here ; gas and gasolene engines are manufactured, also rubber goods, woolen and silk goods, fur¬ niture, shoes, *etc.*

The principal public buildings are the gov¬ ernment building, city hall, opera house, city hospital, Home for the Friendless and Masonic Temple. The city has two parks, Brandon and Vallamont; and Sylvan Dell and Starr Island are near by. There are over 50 churches, with 17,000 communicants. The educational institu¬ tions are Dickinson Seminary (Methodist Episcopal), a high school opened in 1869, 14 public schools, two large Roman Catholic parish schools and two commercial colleges. There are two dailies and one Sunday newspaper, be¬ sides several weeklies and a tri-weekly. The Sunday newspaper Grit, has a national circu¬ lation.

Williamsport was settled in 1779, and set off as a town in 1795. In 1806 it was incorporated as a borough, and in 1866 was chartered as a city. The city grew slowly until 1850, when the lumber industry began. Since then the growth has been rapid and the manufacturing and commercial industries have kept pace with the population. Pop. (1920) 36,198.

WILLIAMSTOWN, Australia, a seaport in Victoria, on the southwest shore of Hobson's Bay, immediately opposite Port Melbourne and nine and one-quarter miles southwest of Mel¬ bourne. The business interests of the town largely centre in the shipping. The piers are commodious and there are shipbuilding yards, patent slips and a drydock called the Alfred Graving Dock, opened in 1874 and improved in 1897-98. There are glass works, a woolen mill and refrigeration plants. The chief buildings

are the churches, the merchants' institute, the customhouse, the sailors' rest, banks and sim¬ ilar structures, *etc.* Basalt and brown coal are worked near the town and several manufactures are carried on. Pop. about 16,000.

WILLIAMSTOWN, Mass., town in Berk¬ shire County, on the Hoosac

and Green rivers, and on the Fitchburg (Boston and Maine) Railroad, about five miles west of North Ad¬ ams and 40 miles east of Troy, N. Y. It was settled in 1753 and was named West Hoosic. In 1765 it was incorporated and its name was changed to Williamstown in honor of Ephraim Williams. In 1793 Williams College (q.v.) was opened, since when it has been a favorite resi¬ dential town. There are five villages within the town limits. The chief industrial establish¬ ments are a cotton mill, a large bleachery and large freight yards. Market gardening is car¬ ried on to quite an extent. Mission Park is so named because the movement for American foreign missionary work was started here. There are two banks, one national and one State. Pop. about 3,700.

WILLIAMSTOWN, Pa., borough in Dau¬ phin County, 26 miles northeast of Harris¬ burg, on the Pennsylvania and the Williams Valley railroads. It is situated in an anthra¬ cite coal mining region, and has hosiery mills. The borough was settled in 1865 and was in¬ corporated in 1888. Pop. 2,904.

WILLIMANTIC, wfl-i-man'tik, Conn., city in Willimantic County, at the confluence of the Willimantic and Natchaug rivers, and on the Central Vermont and the New York, New Haven and Hartford railroads, about 32 miles east of Hartford. It has the water power from the Willimantic River, which here has a fall of 91 feet within the city limits. The chief manu¬ facturing establishments are the American Thread Company, cotton warp mills, print fac¬ tories, silk mills, a foundry, machine shops, a spool factory and silk machinery works. The educational institutions are a State normal school, a high school, public graded schools, a large parish school, a public library containing about 6,000 volumes, and the Dunham Hall Library. There are two banks and a daily and weekly newspapers. It was incorporated as a borough in 1833 and in 1893 was chartered as a city. Pop. (1920) 12,330.

WILLING, Thomas, American jurist, mer¬ chant and financier : b. Philadelphia, Pa., 19 Dec. 1731 ; d. there, 19 Jan. 1821. He was educated at Bath, England, and studied law at the Temple, London. He then returned to Philadelphia, where with Robert Morris he established the mercantile firm of Willing and Morris, which became the largest in the coun¬ try. During the Revolution the firm was com¬ missioned by Congress to purchase the military and naval supplies required by the government. Willing was mayor of Philadephia in 1763; and in 1767-74 was an associate justice of the Supreme Court of Pennsylvania. He was a member of the Continental Congress in 1774-75, and voted against the Declaration of In¬ dependence. However, when in 1780 the Con¬ tinental army was hard pressed for

funds he was prominent among the Philadelphians who raised £260,000, himself contributing £5,000. In 1781 he was one of the founders of the

Bank of North America, the first bank char¬ tered in the country ; and he was its president in 1781-92. He was likewise the first president of the United States Bank, founded in 1791.

WILLIS, H(enry) Parker, American finan¬ cial expert: b. Weymouth, Mass., 14 Aug. 1874. He was graduated at the University of Chicago in 1894, took the degree of Ph.D. there in 1897, and later studied at Leipzig and Vienna. He was for a time engaged as a journalist; was assistant to the Monetary Commission in 1897-98; and was professor of finance at George Washington University in 1905-06 and 1907-10. He was expert to the Ways and Means Banking and Currency Committees of the House of Representatives in 1911-13; was appointed sec¬ retary to the Federal Reserve Board in 1914; and in 1916-17 he was president of the Philip¬ pine Insular Bank, Manila, P. I. He has been professor of banking at Columbia University since 1917. His published works include his¬ tory of the Latin Monetary Union) (1901) ; 'Our Philippine Problem) (1905) ; Principles and Problems of Modern Banking* (1910) ; 'The* Federal Reserve* (1915) ; (American Banking) (1916).

WILLIS, Nathaniel Parker, American author: b. Portland, Me., 20 Jan. 1806; d. Idlewild, N. Y., 20 Jan. 1867. He was graduated from Yale in 1827 and was employed by S. G. Goodrich (Peter Parley®) to edit two annuals, the Legendary in 1828 and the Token in 1829. In 1828 he established at Boston the American Monthly Magazine , which, after he had conducted it for two and a half years, was merged in the New York Mirror. He then set out on a tour of travel through Europe, visit¬ ing France, Italy, Greece, European Turkey, Asia Minor, and finally England, with the rank of an attache to the American embassy at Paris, but chiefly as a correspondent of the Mirror, for which he. wrote his (Pencillings by the Way,* later (1835) published in book-form. He returned in 1836, became in 1839 editor of the Corsair, a

New York periodical (1839-ˆ40), and in the same year again went to England. He returned to New York in 1846 and subse¬ quently directed two short-lived papers, The New Mirror (1843-44) and The Evening Mir¬ ror (1844-45). Once more in Europe in 1845— 46, he became in the last-named year editor of The Home Journal, the most successful of all his journalistic ventures, in the management of which he was associated with George P. Morris (q.v.). Willis was from the first a facile versi¬ fier and a prose-writer of great reportorial cleverness. His scriptural poems were in their day very popular, and many are still readable; and his other verse, when nothing else, was metrically able. Sometimes it reached real poetic value and effective specimens of it have been preserved by the anthologist. His fiction, except the 'Slingsby* papers, written for the English New Monthly, is popular but not strong. 'Pencillings by the Way* (1835) abounds in talented sketches of contemporaries. Willis was the most successful American journalist of his time, and his vogue was great. Among his principal works are (Pencillings by the Way) (1835); Unklings of Adventure) (1836); two dramas entitled (Two Ways of Dying for a Husband* (1839); 'Loiterings of Travel* (1840); 'Dashes at Life with a Free PenciP

(1845) ; 'People I Have Met, or Pictures of Society and People of Mark, Drawn Under a Thin Veil of Fiction> (1850) ; 'Hurrygraphs) (1851) ; a 'Health Trip to the Tropics* (1853) ; 'Outdoors at Idlewild> (1854) ; 'The Rag-bag, *a collection of ephemera (1855) ; 'The Con¬ valescent, His Rambles and Adventures.* Con¬ sult the 'Life) by Beers ('American Men of Letters,* 1885). There is an estimate of Willis in Lowell's 'Fable for Critics.*

WILLIS'S ROOMS. See Almack's.

WILLISON, Sir John Stephen, Canadian journalist: b. Huron County, Ontario, 9 Nov. 1856. He engaged in journalism, became par¬ liamentary correspondent of the Toronto Globe, and in 1890-1902 he was its editor. He was editor of the Toronto News from 1902, and in that position contributed largely to the de¬ feat of the Reciprocity agreement of 1911 and the downfall of the Laurier administration. He was elected president of the Parliamentary Press Gallery in 1890; and of the Canadian Press Association in 1900. Since 1910 he has been Canadian correspondent of the London Times. He was knighted in 1913. He has written 'The Railway Question in Canada> (1897); 'Sir Wilfrid Laurier and the Liberal Party: a Political History) (2 vols., 1903); 'The United States and Canada* (1908) ; 'The New Canada *

(1910).

WILLISTON, Samuel, educational bene¬ factor: b. Easthampton, Mass., 17 June 1795; d. Easthampton, 18 July 1874. He was son of the Rev. Payson Williston, who served as Congre¬ gational pastor in Easthampton for 44 years. His education was interrupted by ill health ; and he began to sell cloth-buttons made by his wife and assistants, the first manufactured in this country. Joel Hayden, of a neighboring town, invented machinery for the work, and went into partnership with Williston, who acquired large wealth in this and other manufactures. Besides giving freely to many objects, he founded (1840) the high-class preparatory school at Easthampton (Williston Seminary), his entire gifts to which were $770,000. To Amherst Col¬ lege he gave $150,000, and much to Mount Hol¬ yoke Seminary. His benefactions have been es¬ timated at $1,500,000.

WILLISTON, Samuel, American lawyer and educator : b. Cambridge, Mass., 24 Sept. 1861. He was educated at Harvard University. He became assistant professor of law there in 1890, professor in 1895, and since 1903 has been Weld professor of law. He assisted in the codification of the Law of Warehouse Receipts and the Law of Stock Transfer. Besides con¬ tributions to legal publications he is author of 'The Law of Sales * (1909) ; 'Commercial

Law) (1915); 'Negotiable Instruments> (1915).

WILLISTON, Samuel Wendell, American paleontologist and anatomist : b. Boston, Mass., 10 July 1852; d. 30 Aug. 1918. Graduated at the Kansas Agricultural College in 1872, took the degree of M.D., at Yale University in 1880 and that of Ph.D there in 1885. He was professor of anatomy at Yale in 1886-90; held the chair of historical anatomy and ge¬ ology at the University of Kansas in 1890-1902, and was also dean of the Medical School there; and since 1902 he has been professor of paleontology at the University of Chicago. He

was paleontologist to the United States Goo-logical Survey of Kansas.

In 1903 he was president of the Society of Vertebrate Pale¬ ontology; and he was elected to the National Academy of Sciences in 1915. He has pub¬ lished (North American Diptera) (1896) ; (Water Reptiles of the Past and Present* (1914) ; and about 250 papers on entomology, sanitation, zoology.

WILLMAR, wil'mar, Minn., village, county-seat of Kandiyohi County, on Foot Lake and on two branches of the Great Northern Railroad, about 90 miles west of Minneapolis. The vil¬ lage was founded in 1868. It is in an agricul¬ tural and stock-raising region and has a large trade in grain, hay, dairy products and live¬ stock. There are railway car shops and a State Hospital for Inebriates. It has nine churches, a high school and graded schools, a hue courthouse, city hall and Carnegie library. There are three banks, one national and two State, and three weekly newspapers. Pop.

(1920) 5,892.

WILLOPAH, an Athapascan tribe of North American Indians who formerly occu¬ pied the territory drained by the upper waters of Chehalis River and its tributaries in south¬ western Washington. They ceded their lands to the United States in 1864, when but few of them remained.

WILLOUGHBY, wil'o-bi, Sir Hugh, Eng¬ lish Arctic explorer : b. probably Risby, Derby¬ shire, about 1500; d. about 1554. In 1553 he was appointed to command an expedition fitted out by London merchants ((for the discovery of regions, dominions, islands, and places un¬ known,® and on 10 May sailed from Deptford with three vessels, the Bona Esperanza, his own ship, with 35 persons; the Edward Bonaven-turc, carrying 50 men; and the Bona Confidentia, with 28 men. They sighted the coast of Norway about the middle of July and during a storm in the middle of September the Edward Bonaventure, at Senjen, parted company with the two other vessels, which reached Russian Lapland, where they found a good harbor at the mouth of the river Arzina. Here Wil¬ loughby and his 62 companions perished during the course of the winter. The following year Russian fishermen found the ships with the dead bodies of the crews, together with com¬ mander's journal, and a will witnessed by Wil¬ loughby, showing that some of the mariners were alive in January 1554. Richard Chancel¬ lor, in the remaining vessel, after being sepa¬ rated from his comrades, finally reached Arch¬ angel, near the mouth of the river Dwina, in the White Sea. News of his

arrival was im¬ mediately dispatched to the Tsar Ivan Vasilie-vitch, who invited the mariners to the court of Moscow. A direct trade with Russia resulted from Chancellor's discovery.

WILLOUGHBY, Westel Woodbury,

American educator and publicist : b. Alexandria/? Va., 20 July 1867. He was graduated from Johns Hopkins University in 1888 and for sev¬ eral years practised law in the District of Co¬ lumbia. In 1894-95 he was acting assistant in political science at Leland Stanford Jr. Univer¬ sity and since 1897 has been professor of politi¬ cal science at Johns Hopkins. In 1916-17 he was constitutional adviser to the Chinese gov¬

ernment. He has published (The Supreme Court of the United States : its History and Ad¬ ministrative Importance* (1890) ; Govern¬ ment and Administration of the United States) (1891); (The Nature of the State) (1896); (Rights and Duties of American Citizenship *(1898) ; (Social Justice) (1900) ; (Political The¬ ories of the Ancient World) (1903) ; (The American Constitutional System* (1904) ; (Con¬ stitutional Law of the United States* (2 vols., 1910) ; Principles of the Constitutional Law of the United States* ; (Prussian Political Philosophy) (1918) ; (The Problem of a National Budget) (1918) ; (Movement for Budgetary Re¬ form in the United States) (1918). From 1907 to 1917 Dr. Willoughby was managing editor of the American Political Science Review.

WILLOUGHBY, William Franklin, Amer-can economist, twin brother of Westel Wil¬ loughby (q.v.) : b. Alexandria, Va., 20 July 1867. He was graduated at Johns Hopkins Uni¬ versity in 1888; was expert in the United States Department of Labor 1890-1900; and in 1900 was made special agent on education and social economy of the United States Commis¬ sion to the Paris Exposition. He has several times represented the Department of Labor at international congresses for the investigation of labor conditions in Europe; is a member of the American Economic Society, a Fellow of the Royal and American Statistical societies and a lecturer on economics at Johns Hopkins. He published (Workingman's Insurance* (1898).

WILLOUGHBY, Lake, lake in north Ver¬ mont, about 24 miles north of Saint Johnsbury; in the township of Westmore, Orleans County; seven miles long and two miles wide, and very deep. It lies between two mountains, of which the highest, Willoughby Mountain, rises about

3;800 feet above sea-level, and has many rare plants. The mountain presents a fine view from its summit and the lake is an attractive summer resort.

WILLOW, a genus of trees and shrubs (Salix) of the family Salicacece. The species, of which more than 150 have been described, are natives mostly of the North Temperate Zone, but a few are indigenous in the tropics and in the South Temperate Zone, and some are found close to the limit of perpetual snow in the Arctic Zone and upon lofty mountains, where they are reduced very greatly in stature, *etc.* One of these last, a European species (N. herbacea), rarely exceeds an inch in height. Willows are characterized by simple, usually lanceolate leaves, which in the bud are sur¬ rounded by a single bud-scale, flowers naked, dioecious, in catkins, followed by dehiscent fruits containing little appendaged seeds which usually float readily with the breeze. In gen¬ eral, the species are best adapted to wet ground, along streams, etc., and on this account are fre¬ quently planted to dry out damp ground and for improving the sanitary conditions around cess-pools. Like the Australian gum-trees (Eucalyptus, q.v.), which are similarly used, they transpire immense quantities of water. Some of the species are of importance along streams and lakes where they prevent the wash¬ ing of the soil either by current or wave. In pleasure grounds, summer resorts, etc., they are often planted because they will thrive almost anywhere and also because they quickly produce

an effect. In such capacity, however, they should be used more as temporary than as per¬ manent trees and should be replaced by better, sturdier trees, such as maples, elms, beeches, and others of slower growth. Some of the spe¬ cies' or their varieties produce pleasing effects during winter because of their yellow or red branches; in spring by their yellow catkins, or their weeping habits. Willow wood is white, light, soft, porous, generally durable in water. It is used for turning, cabinet work, fuel and for charcoal-making. The charcoal is highly valued for making crayons and gunpowder. The trees are widely planted in Europe for pollard¬ ing (q.v.), to supply fuel, poles,

etc.

The most important industry connected with willows is the growing of osiers (q.v.) for mak¬ ing baskets, wickerwork, *etc.* The species pop¬ ularly used in Europe, where the industry is very important, are the common osier (.S', vimi-ncilis), which yields general purpose rods; fine basket osier (S. purpurea) ; green-leaved osier or ornard (5". triandra) ; golden, or white osier, or willow (S. alba) ; and varieties of these. In America the climate is considered unfavorable to some of the European species and so native species and varieties are more popular. Propa¬ gation for osier culture is always by means of cuttings, which are either pieces of branches or single-eye cuttings. The former are made about 15 inches long, planted 15 to 18 inches asunder in rows from 18 to 24 inches apart; the latter are planted very close together so as to produce attenuated shoots of small diameter. The cuttings are planted preferably upon allu¬ vial soils since such produce the finest rods and will continue profitable much longer than plan¬ tations on lighter soils. On light soils the use¬ ful age ranges from 15 to 20 years. Plantations are not made upon clay soils since such give un¬ satisfactory results.

Having been planted, the only attention usu¬ ally given is an occasional shallow cultivation to destroy weeds. After the leaves have fallen the harvest is made, the rods graded, those for brown baskets dried and piled under cover; those for white baskets tied in bundles, placed upright in shallow trenches containing about three inches of water until growth starts in the spring when they are peeled by means of a "break.* In unfavorable seasons they may re¬ quire a sort of fermentive process under litter to loosen the bark. The osier industry of Hol¬ land, Belgium, France and England is very ex¬ tensive. It is mainly confined to low grounds flooded by the tide. In the United States the leading regions of osier culture are western New York and southeastern Michigan; lesser areas exist near Baltimore, Md., Milwaukee, Wis., and Cincinnati, Ohio. The annual pro¬ duction of baskets in the United States is esti¬ mated at approximately $4,000,000.

The white or Huntingdon willow (S. alba) is one of the most widely used European spe¬ cies, but is little grown in America. It is a large tree, often 80 feet high, with usually a short thick trunk often exceeding three feet in diameter. It is specially noted for its exceed¬ ingly rapid growth and th<? large number of uses that are made of it, both ornamentally and economically. The brittle willow (S. fragilis), a native of Europe and northern Asia, becomes 50 or more feet in height and is well known in America, where it was introduced as a hedge

tree about the middle of the 19th century. Stakes cut from the tree in early spring and driven in the ground will soon become trees. It is less useful than the preceding, but is popu¬ lar for pollarding. Its twigs and smaller branches are very brittle at the point of union with the main stem. The weeping or Napo¬ leon's willow (S', babylonica) is a native of the Caucasus, whence it has been taken to most civil¬ ized countries throughout the world, in many of which it has become a favorite tree in ceme¬ teries. It has a large number of varieties. The Egyptian willow (S', cegyptica) is noted for the perfumed water distilled from its flowers in India.

In North America the black willow (S'. nigra) is probably the best known. It grows about 35 feet tall and is noted for its rapid dis¬ tribution along streams into which its brittle twigs fall as they are broken off by every strong wind and carried far away by the cur¬ rent before they lodge and take root. Other species exhibit this trait more or less also. The pussy willow (S. discolor) is also an eastern species well known because of its silky downy catkins which appear in early spring before the leaves. It is usually a shrub, but sometimes be¬ comes a short-boled tree 15 or 20 feet high. Its twigs are often gathered in late winter, placed in water in a warm room or greenhouse, and the catkins thus forced into bloom. Treated in this way it is sometimes seen in florists' stores. Other well-known American species are N. lucida which grows about 12 feet tall, and the heart¬ leaved willow (S. cordata) which grows about twice as large. Some species are popularly called "sallow* in Great Britain. Of these the best known are the long-leaved sallow (S . grandiflora), gray sallow (S . cinerea), round¬ eared sallow (S. aurita), and round-leaved sal¬ low (S. caprca). Their chief uses are for hoops, stakes, tools, *etc.* They are used very little for baskets and wickerwork, since they are usually less pliable than osiers.

A very large number of insects feed upon the willow; 223 have been enumerated by Packard as found in America; in Europe 386 have been recorded. Among these are several species of plant-lice, gail-mites and scale insects. The larvae of two longicorn beetles bore in the trunk and branches, and a twig-boring larva, the wil¬ low-shoot horntail (Phylla'cus integer) bores in the twigs in which the mother deposits her eggs, and in which the pupa state is passed during the winter. The larva of the American cimbex (Cimbex americana) which is the largest species of America saw-flies, lives upon the foliage, as do also the larvae of another saw-fly, the yellow spotted willow-slug (Nematus ven-tralis) .

Consult Bailey, Standard Cyclopedia of Horticulture* (New York 1916) ; Packard, (Insects Injurious to Forest Trees> (Washing¬ ton 1890).

WILLOW GROUSE, or PTARMIGAN.

See Ptarmigan.

WILLOW HERB. See Epilobium.

WILLOW OAK. See Oaks.

WILLOW WREN, or WILLOW WAR¬ BLER, a European warbler (Phylloscopus irockilus), dull olive-green on the upper part of the body, yellowish-white on the breast and below, and about five inches in length. The

nest is placed on the ground, most commonly against a bank among long grass or weeds, but often at the foot of a bush, and, like that of the wood wren, is covered with a dome having a rather wide hole in the side, whence this spe¬ cies and its congeners are called ((oven birds.}) The willow wren is a graceful, active bird, flit¬ ting restlessly from twig to twig, and its song is loud and sweet.

WILLOWS, Cal., town, county-seat of Glenn County, on the Southern Pacific Rail¬ road, about 140 miles north by east of San Francisco. In the centre of the town is a grove of willows, the only one in that section, hence the name of the place. The county courthouse is a handsome building, erected in 1894 at a cost of $150,000. The town ships quantities of farm products and fruit. It has a State bank and three newspapers are issued daily. Pop. 3,800.

WILLS, William Gorman, Irish dramatist: b. Kilmurry, Ireland, 28 Jan. 1828; d. London, 13 Dec. 1891. He was educated at Trinity College, Dublin, studied art in the Royal Hibernian Academy, and for a time

engaged as a portrait painter. After 1862 he devoted himself extensively to literature, though in 1868 he resumed portrait painting. He was the author of (Notice to Quit* (1861) ; (The Life's Evidence > (1863), and the dramas (Charles the First) (1872) ; 'Eugene Aram) (1873); 'Marie Stuart) (1874); 'Jane Shore) (1876); 'Olivia* (1878); 'Sedgemoor* (1881); 'Claudian* (1885) ; 'A Royal Divorce*

. (1891), etc., and in conjunction with Sidney Grundy, ' Madam Pompadour.* Consult Archer, 'English Dramatists of To-day* (1882) ; Cook, (Nights at the Play) (1883) ; Wills, Freeman, (W. G. Wills, Dramatist and Painter* (1898).

WILLS, William Henry, English writer: b. Plymouth, England, 13 Jan. 1810; d. YVelwyn, Hertfordshire, 1 Sept. 1880. He was a member of the original staff of Punch, act¬ ing as dramatic critic and also contributing both prose and verse. His contributions in¬ cluded ' Natural History of Courtship) ; 'Comic Mythology1* ; information for the People,* *etc.* In 1846 he became associated with Dickens, with whom he formed a lifelong friendship, as sub-editor of the Daily News. In 1849 he became assistant editor of House¬ hold Words, and in 1859 of All the Year Round. He published (01d Leaves Gathered from Household Words) (1860).

WILLS, William John, Australian ex¬ plorer: b. Totnes, Devonshire, 5 Jan. 1834; d. Cooper's Creek, Australia, about 1 July 1861. He studied medicine in London and in 1852 emigrated to Australia where he was joined in the following year by his father, and together they practised medicine at Ballarat. In 1855 he became a surveyor of crown lands, and in 1858 was appointed to the staff of the magnetic and meteorological observatory at Melbourne. In 1860 he joined the expedition under Robert O'Hara Burke (q.v.) as third in command, later becoming second, and crossed the con¬ tinent northward, reaching the Gulf of Car¬ pentaria, but on the return journey both Burke and Wills died of starvation. Wills' journal v/as recovered and published (A Successful Exploration from Melbourne to the Gulf of

Carpentaria, from the Letters and Journals of William John Wills) (1863). Consult Howitt, 'History of Discovery in Australia-* (1865).

WILLSON, (Henry) Beckles, Canadian author and journalist: b. Montreal, 26 Aug. 1869. He was educated at Kingston. He served as newspaper correspondent in Cuba, London and Paris, and is widely known as a magazine contributor. He was appointed major in the

Canadian Expeditionary Force. Author of ‘The Tenth IslamP (1897); ‘The Great Company) (1899) ; ‘Lord Strathcona* (1902; 2d ed., 1915) ; ‘The Romance of Canada* (1907); (Nova Scotia: the Province that has been Passed By* (1910) ; (Quebec: the Laurentian Province) (1913) ; ‘The Life of Lord Strathcona) (1915).

WILLUGHBY, wil’o-bi, Francis, English ornithologist: b. YVollaton Hall, Nottingham¬ shire, 1635; d. 3 July 1672. He studied at Cambridge, where he became the pupil of the famous naturalist, John Ray (q.v.), and with him made a continental tour (1663-64), making studies and collecting zoological specimens. Ray edited and translated his Latin ‘Orni-thologia) (1676), and in 1678 published it in English as ‘The Ornithology of Francis Willughby.* Ray also edited Willubghy’s his¬ tory of Fishes) (1686). To the ‘Orni-thologia> Buffon and Linnaeus were much in¬ debted, and it is claimed that Willughby origi¬ nated the Linnaean system of zoological classi¬ fication.

WILMERDING, Pa., borough in Allegheny County, on the Pennsylvania Railroad, 13 miles east by south of Pittsburgh. It was founded in 1859 and wa’s laid out by the Westinghouse Air-brake Company, who have here their large manufacturing works. There are also railroad repair shops, two banks and a newspaper. The water supply comes from the Monongahela River; natural gas is used for fuel, and every street is sewered. Pop. (1920) 6,441.

WILMETTE, Ill., village in Cook County, on Lake Michigan, on the northern outskirts of Chicago, and on the Chicago and Northwestern Railroad. It is chiefly a residential suburb and has many beautiful homes. The surrounding district is interested in floriculture. Pop. (1920)

7,814.

WILMINGTON, Del., city, port of entry, county-seat of New Castle County, at the ex¬ treme north end of the State, on the Brandy¬ wine and Christiana rivers, above their outlet in the Delaware River, and on the Pennsyl¬ vania (Philadelphia, Baltimore and Washing¬ ton), the Baltimore and Ohio and the Phila¬ delphia and Reading railways, about 27 miles southwest of Philadelphia and 69 miles north¬ east of Baltimore. Several regular lines of steamers, for passengers and freight, connect the city with Philadelphia, and with the Dela¬ ware River and Bay ports. It ranks as the first city in the State in population, commerce and industries.

Industries. — The chief industrial establish¬ ments are shipyards, car works (the Pullman Company and the Pennsylvania have shops in the city), steel works, machine shops, foundries, paper mills, cotton mills, malleable iron works, and fibre goods factories. Leather goods, especially morocco, are manufactured in

large quantities here. Dupont powder and dye mills, two plants covering 4,000 acres, the largest in the world, located nearby, in New Jersey across the Delaware River, contribute much to the city's trade. The 1909 census located 261 industrial concerns, with 16,285 wa'ge-earners, this being two-thirds of the State's total of factory workers. There are estimated to be 25,000 wage-earners in 1918, an invested capital of over $50,000,000, and an¬ nual gross products of $65,000,000.

Buildings and Municipal Improvements. — The city is on land elevated sufficiently to materially increase its healthfulness. It ex¬ tends about four miles back from the Dela¬ ware. The houses are nearly all of brick and stone — no wooden buildings are permitted to go up in the city proper, but the old wooden buildings are allowed to remain. There are 10 parks, 11 squares, seven playgrounds having a total area of 665 acres. The streets are well paved and sewered. There is a good water¬ works system. The principal public buildings are the government buildings, city and county building. A building of special interest is the Old Swedes' Church (Holy Trinity), built of brick in 1698. It is said to be the oldest build¬ ing in the United States which has been in continuous use as a church since its erection. The city owns and operates the waterworks.

Churches and Charitable Institutions. — The principal religious societies in the city are represented as follows: Methodist (white), 18 churches, (colored), seven churches; Baptist (white), nine, (colored), three; Roman Catholic, 13 and Protestant Episcopal, eight each; Presby¬ terian, nine; Jewish, three Lutheran and Friends two each ; Adventist, Unitarian and Swedenborgian, one each. There are a large number of charitable institutions ; chief among them are the Home for

Friendless Children; Saint Peter's Orphanage (Roman Catholic) for girls; Saint Joseph's Home (Roman Catholic) for colored children ; two homes for aged men and women, and three hospitals. At Farnhurst, two miles out, is the Delaware State Hospital for the Insane, and near it the county alms¬ house.

Educational Institutions. — The State In¬ dustrial Schools for Girls and the Ferris Re¬ form School for Boys are located near here. Other educational institutions established here are Hebbs School, Wilmington Friends' School, Ursuline Academy, a public high school es¬ tablished in 1872, Goldey College, the Wilming¬ ton Business School, public and parish elemen¬ tary schools, a free public library (established in 1788 and incorporated as the Wilmington In¬ stitute in 1859), which now contains about 95,000 volumes; the Historical Society Library, containing 5,000, and the library of the Law Library Association of the county, which has about 16,000 volumes.

Banks and Finances.— There are three na¬ tional banks and one State bank; four trust companies and-a number of loan associations. The annual amount of business is about $180,- 000,000. The foreign trade transacted through the port of Wilmington in normal years amounts annually to about $8,000,000, nearly all of which is in exports. The annual cost for city maintenance and operation is about $1,300,000. The principal items of expenditure are $300,- vol. 29 — 23

000 for schools; $120,000 for police; $75,000 for fire department; $155,000 for waterworks, and $190,000 for interest on debt.

Government. — The government is vested in a mayor, who holds office two years, and in a council composed of 13 members, who are elec¬ ted by wards, except the president who is elected at large. The mayor appoints the board of water commissioners and the board of 'directors of the street and sewer depart¬ ment. The council elects the city auditor, city clerk and inspectors of meat, milk, oil and markets. The judge of the Supreme Court appoints the police commissioners. The board of education, one member from each ward and a president at large, the city tax collectors and city treasurer are chosen by popular vote.

History. — The first settlement was made in 1638 by a colony from Sweden, under Peter Minuit. They found here an Indian village called Minquas. The Swedes erected a fort to which they gave the name Fort Christiana, in honor of the young daughter of Gustavus Adolphus, the

king of Sweden. The village was called Christianaham. In 1655 the Dutch from New Netherlands bought the land on which Wilmington now stands, and other lands adjoining from the Indians, and took forcible possession of the fort. The name was changed to Fort Altena. The Dutch retained possession for nine years, when they were supplanted by the English. It came under control of Wil¬ liam Penn, after which the colony gave more attention to civic pursuits instead of wars and conquests. In 1731 the village was named Willingtown, in honor of Thomas Willing, who had laid out the town. Later the name was changed to Wilmington. It was incorporated as a borough in 1739, and the first borough election was held 8 Sept. 1740. In 1832 it was chartered as a city.

Population. — (1880) 42,478; (1890) 61,431;

(1900) 76,556; (1910) 87,411; (1920) 110,-

168. Consult Powell, (Historic Towns of the Middle States) ; Ferris, (History of the Origi¬ nal Settlements on the Delaware.)

WILMINGTON, N. C., city, port of entry, county-seat of New Hanover County, on the Cape Fear River, 30 miles from the ocean bar and yet its harbor is of fresh water; and on the Atlantic Coast Line and the Seaboard Air Line railroads. It was first settled in 1730 and was first called New Liverpool and then Newton; in 1739 it was incorporated as a town and named Wilmington, and in 1744 was made the capital of the province. In 1765 the town took a de¬ cided stand against British authority and re¬ fused to permit a British man-of-war to land a quantity of stamps, this being the first open armed resistance to the Stamp Act. On 18 July 1775, Fort Johnson, at the mouth of the river, was captured by the militia under Col. John Ashe, and the royal governor was forced to leave the place. In 1781-82 Wilmington was occupied by the British, Cornwallis having his headquarters here. During the Civil War Wil¬ mington was the most important port of the Southern States, the ˆgateway® between the South and foreign nations ; and was conse¬ quently the chief resort of the blockade run¬ ners. The harbor and its approaches were strongly fortified by the Confederates; in Janu¬ ary 1865 Fort Fisher was taken by the Federals,

and this resulted in the evacuation of the other forts and the surrender of Wilmington. Wil¬ mington was chartered as a city in 1866.

It is an • important commercial city. Im¬ provements in the harbor and river channel have been made by the Federal government at considerable cost. There are weekly steamboat lines to New York, Baltimore and points on the Cape Fear and Black rivers and a large import and export trade, both foreign and domestic.

Wilmington is a city of varied resources, being in the heart of a rich agricultural district and also a port city. Its harbor channel has a mean low depth of 26 feet, with 30 feet pro¬ jected, and it has over 600,000 square feet of warehouse space, while 16 ocean-going ships can load at one time at its docks. Shipbuilding is one of the livest of industries, steel, con¬ crete and wooden vessels being built here si¬ multaneously. At Wilmington is located the only government steel shipyard in the South and the first government owned concrete shipyard in the country.

Other industries located in Wilmington in¬ clude fertilizer factories, packing-houses, ma¬ rine railways, candy, woodwork, tea-chest, box, metal and fish can factories, cotton, hosiery and lumber mills, while it is one of the biggest fer¬ tilizer distributing points in the country. Im¬ mense cotton compresses are located along its river front and exports of cotton to Europe amount to 500,000 bales annually. The com¬ merce on the Cape Fear River at and below Wilmington averaged 945,361 tons, with an average valuation of $55,685,191 for the five calendar years ending in 1913, and during the five-year period ending 30 June 1915 the for¬ eign exports increased 26 per cent and the im¬ ports increased 239 per cent. Even this normal time increase is expected to expand, due to de¬ velopment of trade with Latin America.

Wilmington has many churches and a thor¬ ough public school system, its schools being of modern type and all of brick. Its bank depos¬ its in October 1919 were over $30,000,000.

Here is located the New Hanover County courthouse, as well as many other public build¬ ings, including a new customs-house, costing over $600,000 and placed in commission in 1919. Many organizations for

the social welfare of the community and for dispensing chanty are in existence, while the city and county jointly carry on extensive health work, having most stringent regulations, with rigid inspections of food and dairies, while appropriating $30,000 annually for mosquito extermination work. Wilmington is governed by a council of six, representing as many wards, into which the city is divided, and a mayor. The population of the city in 1920 was 33,372.

James H. Cowan,

Secretary, Wilmington (N. C .), Chamber of

Commerce.

WILMINGTON, Ohio, city, county-seat of Clinton County, on the Cincinnati and Mus¬ kingum Valley and the Baltimore and Ohio railroads, about 43 miles northeast of Cin¬ cinnati and 30 miles southeast of Dayton. It is an agricultural region. The chief manufac¬ turing establishments are bent-wood and bridge-work factories, iron furnaces, machine shops, automobile parts factories, creameries and flour and lumber mills. The Wilmington Col¬

lege (Orthodox Friends) was established here in 1870. There are twd banks and four news¬ papers, one of which is issued daily. Pop.

(1920) 5,037.

WILMINGTON, Capture of. After Gen¬ eral Terry's capture of Fort Fisher (q.v.) 15 Jan. 1865, Terry posted his troops on an in¬ trenched line across the peninsula, about two miles above the fort. An advance on Wilming¬ ton was not considered prudent until he could be reinforced, as General Hoke, the Confeder¬ ate commander, was holding Fort Anderson, on the west bank of Cape Fear River, about midway between Fort Fisher and Wilmington, and on the opposite bank had thrown up a line of intrenchments across the peninsula in Terry's front, behind which he had about 4,500 men. Fort ' Anderson was an extensive earthwork, mounting 10 heavy guns, commanding the ap¬ proaches by land and water and held by General Hagood's brigade of 2,000 men. General Grant ordered General Schofield, with the 23d corps, from Tennessee to the coast of North Caro¬ lina to co-operate with General Sherman. Schofield's troops arrived at Alexandria and Washington late in January, where they were detained

some days by the ice in the Potomac. General Cox's division of 4,400 men went by steamers from Alexandria and landed on the peninsula, in rear of Terry, 9 February, raising Terry's command to 8,000 men. Schofield now took command; the fleet under Admiral Porter occupied positions in Cape Fear River and off the coast, covering both flanks of Terry's line, and, 11 February, Terry was pushed forward, supported by Cox, drove in Hoke's pickets and intrenched within 500 yards of his main line. An attempt on the 12th to turn Hoke's left by a cooperation of the army and navy was foiled by high winds and a violent storm. On the night of the 14th an attempt was made to move the pontoons upon their wagons along the beach with the troops; the wagons sank deeply in the sand, progress was very slow, and it having become evident that the pontoons could not be got up to the point of crossing of Mason-borough Sound before daylight, when the enemy would discover the movement, the at¬ tempt was abandoned and attention turned to Hoke's right, where it would not be required to contend with the difficulties of both land and sea. On the 16th Cox's and Ames' divisions were crossed by steamboats to Smithville, on the right bank of the river, where they were joined by Col. O. H. Moore's brigade, of Couch's division, and a battery, and, on the 17th Cox with four brigades and the battery ad¬ vanced along the main Wilmington road, driv¬ ing the Confederate pickets and bivouacking near Fort Anderson, with his right resting on the river. Next morning the advance was re¬ sumed and the enemy driven within the works. Moore's and Henderson's brigades were in¬ trenched on the south side of the fort, while Cox, with his other two brigades, followed later by Ames' division, started around Orton Pond, covering the Confederate right, to gain the Wilmington road in rear of the fort, the distance to be traveled being about 15 miles. The guns of Fort Anderson opened fire on the two brigades confronting the fort, and the gun¬ boats opened heavily on the fort, the monitor Montauk lying close to it and the others en-WILMINGTON COLLEGE — WILMOT PROVISO

filading its parapet. General Hagood, warned by his cavalry of Cox's movement around his right, hastily abandoned Fort Anderson during the night, taking with him six light guns and falling back behind Town Creek, eight miles above the fort. Hoke also retreated from his lines opposite Fort Anderson to within four miles of Wilmington. By these movements Schofield gained possession of the main de¬ fenses of

Cape Fear River and of Wilmington, with several pieces of heavy ordnance and a large amount of ammunition, and with but small loss. In this he had the assistance of the gunboats that moved up the river removing torpedoes and silencing batteries on both banks. On the 19th Cox pursued Hagood to Town Creek, behind which and near its mouth he was found intrenched and had destroyed the only bridge. The creek was not fordable and could not be bridged. Terry also advanced on the east side of the river, following Hoke, and found him in force, and Ames' division was re¬ crossed to the east bank and joined Terry in the night. Terry again advanced on the morn¬ ing of the 20th and after some sharp skirmish¬ ing came upon Hoke well intrenched with artil¬ lery in position. On the same day Cox crossed Town Creek below Hagood's position, by the use of a single flat boat found in the stream, which carried 50 men at a trip, and, by march¬ ing through woods and swamps, reached Hagood's flank and rear, attacked and routed his brigade, after a stubborn resistance, captur¬ ing two guns, three battle-flags and 375 prison¬ ers, including Colonel Simonton, temporarily commanding the brigade, and nearly all the officers. During the night Cox rebuilt the bridge over Town Creek, crossed his artillery and the next morning pushed on toward Wil¬ mington without opposition. Terry was unable to make any farther advance, but occupied Hoke's attention, so that he could not send any part of his force to replace the losses in Hagood's brigade. On the 21st Cox secured a portion of the Confederate pontoon bridge across Brunswick River, which Hoke had en¬ deavored to destroy, put the 16th Kentucky regiment upon Eagle Island abreast Wilmington and threatened to cross Cape Fear River above the town. Hoke at once set fire to steamers, boats, cotton and naval stores, and abandoned the place, retreating in the direction of Golds¬ boro. General Terry entered the place without opposition early in the morning of 22 February and pursued Hoke across Northeast River. Schofield reports that he took 51 heavy guns, 15 light ones, and a large amount of ammuni¬ tion. The Union loss from 11 February to the capture of Wilmington on the 22d was about 200 killed and wounded. The Confederate loss is not definitely known, Schofield estimates it at not less than 1,000, in killed, wounded and prisoners. Consult (Official Records) (Vol. XLVII) ; Cox, < March to the Sea> ; Cox, Mili¬ tary Reminiscences of the Civil War} (Vol. II).

E. A. Carman.

WILMINGTON COLLEGE, located at Wilmington, Ohio. It was opened to students in 1870, and chartered in 1875, under the auspices of the Society of Friends. It is open to women on equal terms with men. The col¬ lege organization includes a preparatory school. Two full

collegiate courses are offered, the

classical, for which Greek is required, leading to the degree of A.B., and the scientific, leading to the degree of B.S. ; a part of the work of the last two years is elective in both courses. A course in bookkeeping is included in the curriculum. The degrees of A.M. or M.S. are conferred for graduate work. There are six county scholarships and three others ; and a student loan fund. The campus consists of 12 acres, and is located in the eastern suburbs of Wilmington. The buildings include the main building, the observatory, South Hall (men's dormitory), the women's dormitory, the gym¬ nasium and the Auditorium. The library con¬ tains over 6,000 volumes ; the total productive funds are $83,000.

WILMOT, David, American jurist and poli¬ tician : b. Bethany, Pa., 20 Jan. 1814; d. Towanda, Pa., 16 March 1868. He was ad¬ mitted to the bar in 1834, and practised at Towanda. He was a member of Congress in 1845—51 ; was elected as a Democrat, but stood in opposition to the extension of slavery into prospective new territory of the United States; and in 1846 he offered the famous amendment known as the Wilmot Proviso (q.v.). He sup¬ ported Van Buren in 1848 against Cass, the regular Democratic candidate, and later joined the Republicans. In 1853-61 he was president-judge of the 13th district of Pennsylvania, in 1857 was an unsuccessful Republican candidate for governor of that State, sat in the United State Senate from 1861 to 1863, and from that time until his death served as judge of the United States Court of Claims.

WILMOT, John. See Rochester, John Wilmot, 2d Earl of.

WILMOT, Robert Duncan, Canadian statesman: b. Fredericktown, New Brunswick, 16 Oct. 1809; d. Oromocto, New Brunswick, 11 Feb. 1891. He was educated in Saint John, engaged for a time in shipping, and in 1846 entered Parliament, where he sat for Saint John until 1861 and again in 1865-67. He was mayor of Saint John in 1849, surveyor-general of New Brunswick and member of the execu¬ tive council of the province in 1851-54, pro¬ vincial secretary in 1856-57, and a delegate to the colonial conference in London, in 1866-67. He became a member of the Senate in 1865, of the Privy Council in 1878, was speaker of the Senate in 1878-80 and in 1880-85 was lieutenant-governor of New Brunswick.

WILMOT PROVISO, an amendment

offered in the United States Congress by David Wilmot (q.v.), 8 Aug. 1846, pending the con¬ sideration of a bill placing $2,000,000 at the dis¬ posal of President Polk to negotiate a peace with Mexico. The amendment was as follows:

Provided, that, as an express and fundamental condition to the acquisition of any territory from the republic of Mexico by the United States, by virtue of any treaty which may be negotiated between them, and to the use by the executive of the moneys herein appropriated, neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted.

It was adopted in the House, and was un¬ der debate in the Senate when the hour arrived previously fixed for adjournment cf the ses¬ sion. At the next session (8 Feb. 1847) Wilmot again introduced it, and a fierce and angry contest began. The House remained

firm in favor of the amendment, and it was passed (15 February) by a decided majority, but was not acted on by the Senate. It caused great agitation throughout the country. The principle involved long continued to be an im¬ portant factor in party politics, its influence being affected by many fluctuations of opinion and political action ; and it may be said finally to have triumphed through the act of 19 June 1862 forbidding slavery in ((any of the Terri¬ tories of the United States now existing, or which may at any time hereafter be acquired.® Consult Stephens, Constitutional View of the Late War Between the States) (1868-70); Wil¬ son, (Rise and Fall of the Slave Power5 (1872-77) ; Schouler, (History of the United States of America Under the Constitution (1899) ; Von Holst, Constitutional and Political His¬ tory of the United States) (1899).

WILSON, Alexander, American ornitholo¬ gist: b. Paisley, Scotland, 6 July 1766; d. Phila¬ delphia, Pa., 23 Aug. 1813. In his 13th year he was apprenticed to a weaver, but after seven years abandoned the loom and adopted the life of a peddler. Three years were thus spent

and in 1789, having already prepared a volume of poems for publication, he offered his muslins and solicited subscriptions for this work. It was published in 1790, but had little success; and he again returned to the loom. In 1792 he published (Watty and Meg,5 which, having ap¬ peared anonymously, was ascribed to Burns, though the style is very different. It is said to have had a sale of 100,000 copies in a few weeks. Having written a severe satire upon a person in Paisley, Wilson was thrown into prison, and was afterward compelled to burn the libel with his own hand at Paisley Cross. Upon his release he came to this country, arriv¬ ing at Newcastle, Del., in 1794. He again re¬ sumed his former trade, but soon turned to schoolmaster, acting in this capacity in several places in Pennsylvania. While thus engaged at Kingsessing near Philadelphia, he became ac¬ quainted with William Bartram, the naturalist, and Alexander Lawson, an engraver, whose tastes and instructions stimulated his own talents. He had already undertaken long ex¬ cursions for making ornithological researches, and devoted much time to the study, when he was engaged, in 1806, to assist in editing the Amercian edition of Rees's Cyclopedia, and now began to' prepare for the publication of his (American Ornithology,5 the first volume ap¬ pearing in 1808, and the seventh in 1813. The interval had been passed in exploring different parts of the country for the purpose of extend¬ ing his observations, collecting specimens, and watching the habits of birds in their native haunts. In 1813 the literary materials for the eighth volume of the (Ornithology5 were ready, but its progress was greatly retarded for want of proper assistants to color the plates. Wilson was, therefore, obliged to undertake the whole of this department himself, in addition to his other duties; and these multifarious labors soon exhausted his strength and brought about his death. All the plates for the remainder of the (Ornithology5 having been completed under Wilson's own eye the letter-press of the ninth volume was supplied by his friend, George Ord, his companion in several of his expeditions, who also wrote a memoir of Wilson to accompany

the last volume, and edited the eighth. Four supplementary volumes, containing American birds not described by Wilson, were published by Charles Lucien Bonaparte (1825-33). An edition of the original work, with Bonaparte's continuation, and notes and life of Wilson by Sir William Jardine, was published in London in 1832. Wilson continued to write poetry after leaving Scotland, one of his chief productions being (The Foresters,5 a poem describing a pedestrian tour to the Falls of Niagara, and several collective editions of his poems have appeared. A bronze statue of Wilson has been erected at Paisley.

Consult (Life of Wilson,5 by Peabody, in Sparks' (Library of American Biography5 (1834-56) ; Brightwell, difficulties Overcome : Scenes in the Life of Alexander Wilson5 (1860) ; Paton, (Alexander Wilson, the Ornithologist5 (1863) ; (Leading Men of Sci¬ ence5 (New York 1910).

WILSON, Allen Benjamin, American in¬ ventor: b. Willet, N. Y., 18 Oct. 1824; d. Wood-mont, Conn., 29 April 1888. He was a cabinet maker by trade, but in 1849 invented a sewing machine which made a stitch at each movement of the shuttle, thus enabling the operator to make an endless seam at any curve, and there¬ after devoted himself to its improvement. In 1851 he secured a patent for the rotating hook, and a year later invented the four-motion feed, which was subsequently adopted in all machines. In 1848 he entered into partnership with Nathaniel Wheeler (q.v.), with whom he es¬ tablished, at Bridgeport, Conn., the then largest factory in the world for the manufacture of sewing-machines. In 1852 on the reorganiza¬ tion of the firm, he withdrew from the business and settled in Waterbury, where he engaged in other enterprises. See Sewing Machines.

WILSON, Alpheus Waters, American

bishop of the Methodist Episcopal Church, South: b. Baltimore, Md., 5 Feb. 1834; d. Baltimore, Md., 21 Nov. 1916. He was edu¬ cated at Columbian College, Washington, D. C., was received into the Baltimore Methodist Con¬ ference in 1853; and, on the organization of the Baltimore Conference of the Methodist Church, South, identified himself with that body. He became the secretary of the board of missions of his Church in 1878, and was elected bishop in 1882. In 1894 he was a lec¬ turer at Vanderbilt University, and was also author of a book on missions.

WILSON, Sir Archdale, English soldier: b. Didlington, Norfolk, 1803; d. London, 9 May 1874. He entered the Bengal Artillery in 1819 ; distinguished himself at the siege of Bhartpur, 1825-26, and took part in the Sikh War, 1848—49. At the outset of the Sepoy revolt in May 1857 he was the earliest officer to encounter the Sepoys in battle, defeating them on May 30 and 31, and succeeding to the command of the force before Delhi in July, held his position until 14 September, when the city was taken. He was rewarded for his services with a baronetcy, was promoted major-general, made lieutenant-governor in the following March, and took part in the siege and capture of Lucknow, 19 March 1858.

WILSON, Augusta Jane Evans, American

novelist : b. Columbus, Ga., 8 May 1835 ; d. 1909. She was married to L. M. Wilson of

Mobile in 1868. She conducted a southern soldiers hospital during the Civil War. Her writings include <Inez, a Tale of the Alamo> (1856) ; 'Beulah,5 the most popular of her novels (1859) ; <Macaria) (1864) ; (St. Elmo,' parodied by Webb in (St. Twel,mo> (1866) ; (Vashti> (1869); Hnfelice5 (1875); <At the Mercy of Tiberius> (1887) ; (A Speckled Bird) (1902); (Devota5 (1907). The earlier books had a great popularity. They attempted to be massive, but contained no permanent elements, though attaining at times some power of expression. The later volumes, written in the same manner, did not obtain wide recogni¬ tion.

WILSON, Sir Charles Rivers, English financier: b. London, 1831; d. 1916. He was graduated from Oxford in 1851, became a treasury clerk in 1856, was private secretary to Disraeli 1867-68, and comptroller-general of the National Debt Office 1874-94. He became one of the British administrators of the Suez Canal in 1876, and was finance minister to the khedive of Egypt 1877-79. He removed to Canada and was president of the Grand Trunk Railway for 20 years.

WILSON, Sir Daniel, Canadian archaeolo¬ gist: b. Edinburgh, 5 Jan. 1816; d. Toronto, Ontario, 7 Aug. 1892. He was educated at Edinburgh University, and on leaving college entered with earnestness into antiquarian pur¬ suits, and published in 1847 (Memorials of Edinburgh in the Olden Time.5 It was fol¬ lowed by (Oliver Cromwell and the Protec¬ torate5 (1848) and (The Archaeology and Pre¬ historic Annals of Scotland) (1851). At this time he was secretary of the Scottish Society of Antiquaries, but in 1853 was called to fill the chair of history and English literature in the University of Toronto. While resident in Canada he .published (Prehistoric Man) (1862; revised 1876) ; (Chatterton, a Biographical Study> (1869) ; (Caliban, the Missing Link' (1873) ; (Spring Wild-Flowed (1875), a vol¬ ume of poems; ˆReminiscences of Old Ed¬ inburgh5 (1878) ; Anthropology5 (1885) ; (The Right Hand: Left-handedness5 (1891). In 1881 he

became president of Toronto Uni¬ versity, a position which he held until his death. In recognition of his services to edu¬ cation and literature he was knighted in 1888.

WILSON, Edmund Beecher, American zoologist: b. Geneva, Ill., 19 Oct. 1856. He was graduated at Yale University in 1878 and re¬ ceived the degree of Ph.D. at Johns Hopkins University in 1881. He was professor of biology at Bryn Mawr in 1885-91 ; and was af¬ terward connected with the faculty at Colum¬ bia University, where since 1897 he has been professor of zoology. He was president of the American Society of Naturalists in 1900 and of the American Association for the Advance¬ ment of Science in 1913. His works include (The Embryology of the Earthworm5 (1889) ; Amphioxus and the Mosaic Theory of De¬ velopment5 (1893) ; (The Cell in Development and in Inheritance5 (1896; 2d ed., 1915).

WILSON, Edward A., English physician and explorer: b. 1872; d. Antarctic regions, 29 March 1912. He was graduated at Cheltenham College and at Caius College, Cambridge. He was chief of the scientific staff of Capt. R. F.

Scott's last expedition to the Antarctic in 191 1— 12. He was one of the five members of the ex¬ pedition to reach the South Pole and perished with the other two remaining members of the party on the return trip from the pole. Con¬ sult (Scott's Last Expedition5 (New York

1913).

WILSON, Florence, commonly known by the Latinized form of his name, "Florentius Volusenus, Scotch theologian: b. near Elgin, about 1500; d. Vienne, Dauphiny, France, 1547. He was educated at King's College, Aberdeen, became a member of the household of the learned Cardinal du Bellay, archbishop of Paris, and was appointed by Cardinal Sadolet master of the public school of Carpentras. Here he wrote his famous dialogue (The Tranquillity of Mind5 (1543), much prized for its classical erudition and the beauty of its Latin style.

WILSON, Floyd Baker, American lawyer and author: b. Watervliet, N. Y., 23 June 1845. He was graduated from the University of Michigan in 1871, and from the Cleveland Law College (now Adelbert University) in 1873. Admitted to the bar in 1873, he practised in

Cleveland until 1880, and since the year last named in New York, making a specialty of corporation law. He is the author of (Uphill,5 a novel (1880) ; (Paths to Power5 (1901), and has translated (La Coja y el Encogidio5

(1901).

WILSON, Francis, American actor : b. Philadelphia, Pa., 7 Feb. 1854. He made his first appearance on the stage in a minstrel company, his debut in regular comedy occurring at the Chestnut Street Theatre, Philadelphia, in 1877. He played in various parts with much success, and made his initial appearance in comic opera as Sir Joseph Porter in Aina-fore.5 He later became leading comedian in different New York theatres, and afterward organized his own company, himself playing the leading comedy roles. He published (The Eugene Field I Knew5 ; (Recollections of a Player,5 and (Going on the Stage5 ; (Joseph Jefferson5 (1906) ; also the dramas (The Magic Ring5 ; (The Bachelor Baby5 ; (The Spiritual¬ ist5 ; (The Dancing Master.5

WILSON, George, Scottish chemist, brother of Sir Daniel Wilson (q.v.) : b. Edinburgh, 21 Feb. 1818; d. 22 Nov. 1859. He was educated at the Edinburgh University, became a popular lecturer on chemistry, and in 1855 was ap¬ pointed professor of technology in Edinburgh University. Among his scientific works were (Textbook of Chemistry5 (1850) ; (Researches in Color-blindness5 (1855), and (The Five Gateways of Knowledge5 (1856), a de¬ lightful hymn or prose-poem of science.

WILSON, George Grafton, American edu¬ cator and authority on international law : b. Plainfield, Conn., 29 March 1863. He was grad¬ uated at Brown University in 1886 and took the degree of Ph.D. there in 1889, later studying at the universities of Heidelberg, Berlin, Paris and Oxford. He was professor of social and political economy at Brown University in 1894-1910; and since 1910 has been professor of international law at Harvard University. He has also been lecturer on international law at the United States Naval War College since 1900; and in 1912-13 he was exchange pro-

fessor to France. Since 1907 he has been one of the board of editors of the American Journal of International Law. He has published cTown and City Government in Providence) (1889) ;

(Insurgency > (1900) ; Submarine Telegraph

Cables in Their International Relations } (1901) ;

(International Law Situations } (15 vols., 1902-16) ; international Law) (1910) ; (lhe Hague Arbitration Cases J (1915).

WILSON, Gilbert Lord, American clergy¬ man and author: b. Centre Point, Iowa, 4 March 1856. He was educated at Cornell Col¬ lege and Taylor University. He is a member of various national and international societies of learning, among them being the American Association of Writers, the Society of Eco¬ nomic Endeavor and

Research, and the National Geograpic Society ; he was one of the speakers in the (<Hall of Congress* at the Saint Louis Exposition. After collecting a record of eclipses coving over 3,000 years, restoring the ancient five-day, seven-day, eight-day, nine-day and 10-day week calendars of all nations, and reading the Scriptures in eight different lan¬ guages, he wrote a work on the astronomy of the Bible, (Christ in Chronology and Science of the Sabbath. > He claimed that the Sunday Seventh Day had been lost, under the 10-day week of Egypt, and restored in Moses; lost again, under the eight-day week of Rome, and restored in Christ, one Hike unto Moses.* He has published many writings on the Bible and science, and also on a federation (<Creed of Christendom.*

WILSON, Harry Leon, American novelist: b. Oregon, Ill., 1 May 1867. He has edited Puck from 1896, and is the author of (Zig Zag Tales) (1896); <The Spenders) (1902); <The Lions of the Lord> (1902); (Ewing's Lady> (1907); (Bunker Bean> (1912); Ruggles of Red Gap> (1915); (Ma PettengilP (1919). In collaboration with Booth Tarking-ton (q.v.) he wrote (The Man from Home* (1908), which passed several editions and was dramatized.

WILSON, Henry, American statesman: b. Farmington, N. H., 16 Feb. 1812; d. Washing¬ ton, 22 Nov. 1875. His name was originally Jeremiah Jones Colbaith, legally changed to Henry Wilson on his reaching manhood. He was a farm apprentice in his native town till the age of 21, when he moved to Natick and learned the shoemaker's trade. After two years' work at this business he had accumu¬ lated a small sum of money, which enabled him to attend the academies at Stafford, Wolfs-borough and Concord. But the loss of some of his money forced him to cut short his plan for an education, and he returned to his work at Natick in 1838, and finally built up a prosperous shoe factory. In 1840 he took an active part in the presidential campaign in be¬ half of the Whig party, and in the same year was elected to the lower house of the Massachusetts legislature; was reelected to the State senate. At this time he became known as an active opponent of slavery and in 1845 was selected with J. G. Whittier (q.v.) to pre¬ sent to Congress the anti-slavery petition from Massachusetts against the annexation of Texas. In 1848 he withdrew from the Whig party be¬ cause of its rejection of anti-slavery resolutions,

and took a prominent part in organizing the Free Soil party, purchasing and editing the Boston Republican in the interests of that

party. In 1850 and 1851 he was elected to the State senate, and was president of that body during both terms. In 1852 he was president of the Free Soil National Convention, and chairman of the national committee ; and in 1853 w as a member of the Massachusetts Constitutional Convention. In 1855 he was elected to the United States Senate, and shortly after taking his seat made a speech advocating the repeal of the fugitive slave law and the abolition of slavery in the District of Columbia and in the Territories. For a time in 1855 he was asso¬ ciated with the American party; but on its adoption of a pro-slavery platform he with¬ drew from it and took an active share in or¬ ganizing the Republican party on the basis of opposition to the extension of slavery. In 1856 he denounced the assault of Brooks on Sumner, and was challenged to a duel by Brooks; though he refused the challenge, he stated that he believed in his right to defend him¬ self if attacked. During the years of 1856-60 he took part in all important debates in the Senate; and his speech in defense of free labor, in reply to Senator Hammond of South Carolina, was widely circulated in the Northern States. In January 1859 he was reelected to the Senate by an almost unanimous vote of the Massachusetts legislature; and on the as¬ sembling of the Senate in 1861, was made chairman of the committee on military affairs, a post which the Civil War rendered one of great labor and responsibility. In this capacity he introduced and carried through Congress, during the extra session of 1861, the acts to authorize the employment of 500,000 volun¬ teers, to increase the regular army, and to reorganize the military system. In 1865 he was a third time elected to the Senate, and took a prominent part in all the reconstruction measures, favoring the granting of full civil and political rights to the negroes, but also desiring a liberal treatment of the Southern whites. In 1871 he was reelected to the Sen¬ ate but resigned in the next year when elected to the vice-presidency of the United States on the Republican ticket. In 1873 he suffered a stroke of paralysis from which he never fully recovered. At the time of his death he was engaged in writing the last volume of his his¬ tory of the Rise and Fall of the Slave Power in America) (1873-75) which he left partially complete. He also wrote (History of the Anti-Slavery Measures of the 37th and 38th United States Congresses) (1865) ; (Military Measures of the United States Congress) (1866) ; ˆTesti¬ monies of American Statesmen and Jurists to the Truths of Christianity } (1867) ; (History of the Reconstruction Measures of the 39th and 40th Congresses 1865-68) (1868). Con¬ sult Russell and Nason, (Life and Public Serv¬ ices of Henry Wilson) (1872) ; Stowe, (Men of Our Times) (1868).

WILSON, Henry Bristow, English Aagli-can clergyman : b. London,

1803 ; d. Lee, Kent, 10 Aug. 1888. He was educated at Oxford, took orders in the Church of England and was one of the four Oxford tutors who in 1841 sent a protest to the editor of Tracts for the Times.

He later became professor of Anglo-Saxon at Oxford, in 1851 vicar of Great Staughton, Hunt¬ ingdonshire, and was one of the seven clerical authors of the famous volume of (Essays and Reviews* (1860); his contribution being (The National Church.* He was tried for heresy before the Court of Arches but his sentence of a year's suspension from his benefice was reversed by the Privy Council. He was also the author of (The Communion of Saints: An Attempt to Illustrate the Principles of Church Union* (1851), the Bampton lecture contributed to (Oxford Essays. *

WILSON, Sir Henry Hughes, English general: b. 1864. Early in November 1917 the Allied premiers held a conference at Rapallo, Italy, to discuss the Italian military crisis. It was decided to create a supreme political council of the Allies for the whole of the western front. This council was to be assisted by a military committee composed of three generals. France was represented by General Foch (q.v.) ; Italy by General Cadorna (q.v.) ; and Great Britain by General Wilson. The last-named entered the army at 20 and served in the Burmese War 1885-87, was wounded and returned for an¬ other two years, winning a medal and promo¬ tion. He became a member of the Staff Col¬ lege at Camberley in 1892 and in 1894 staff captain of the intelligence division. He served in the South African War and later was di¬ rector of military operations at the War Office. He accompanied the British Expeditionary Force to France as subchief of the general staff in August 1914 and was specially mentioned by Sir John French for his services during the retreat from *Mons.*

WILSON, Henry Lane, American Ambas¬ sador: b. Crawfordsville, Ind., 3 Nov. 1857. He was graduated at Wabash College in 1879. He edited the Lafayette (Ind.) . Journal in 1882-85 ; and in 1885-96 he was engaged in law prac¬ tice and in banking at Spokane, Wash. He was appointed Minister to Chile by President McKinley in 1897,

serving until 1905. He was Minister to Belgium in 1905-10; and Ambassa¬ dor to Mexico in 1910-13. He was in office at the close of the Diaz presidency and during the Madero administration. He opposed President Wilson's policy of refusing to recognize Huerta and eventually tendered his resignation, which was announced by the State Department 4 Aug. 1913 to take effect 14 October. He was special Ambassador to Belgium for the coronation of King Albert.

WILSON, Horace Hayman, English Ori¬ entalist: b. London, 26 Sept. 1786; d. there, 8 May 1860. Educated for the medical profes¬ sion, in 1S08 he went to Bengal as assistant surgeon in the service of the East India Com¬ pany, but soon obtained an office in the Cal¬ cutta mint, where he became associated with John Leyden. His leisure was devoted to the study of Sanskrit and so soon did he become known as an able Sanskrit scholar that in 1812 he was elected secretary of the Asiatic Society of Bengal. He acted for many years as secre¬ tary of the committee of public education, and his exertions contributed to revive the interest of the Hindus in their own literature as well as to create among them an interest in the science and literature of Europe. He remained in India till his election in 1832 to the Boden

professorship of Sanskrit at Oxford University, and in 1836 he was appointed librarian of the East India Company and elected Fellow of the Royal Society. Among his numerous publica¬ tions are (The Meghaduta, or Cloud Messen¬ gerˆ a Sanskrit poem, with an English trans¬ lation, notes, *etc.* (1813) ; (Sanskrit-English Dictionary * (1819-40) ; (Select Specimens of the Theatre of the Hindus* (2 vols., 1826-27 ; 3d ed., 1871) ; (The Vishnupurana — A System of Hindu Mythology and Tradition,* translated from the original Sanskrit and illustrated by notes (1840; new ed., 1864— 77) ; (Grammar of the Sanskrit Language for the Use of Early Students> (1841) ; (History of British India from 1805 to 1835* (1844-48); <Rig-Veda-Sanhita,* translated from the original Sanskrit (1850-58), the last volumes being prepared by Cowell and Webster, after Wilson's death; (Glossary of Judicial and Revenue Terms, from Arabic, Persian, Hindustani, etc.* (1855).

WILSON, James, American jurist: b. near Saint Andrews, Scotland, 1742 ; d. Edenton, N. C., 28 Aug. 1798. Educated at the univer¬ sities of Saint Andrews, Glasgow and Edin¬ burgh, he came to New York in 1763 but re¬ moved to Philadelphia in 1766. After tutoring in what is now the University of Pennsylvania he studied law and was admitted to the bar in 1767. He sat in the Pennsylvania provincial convention

in 1775 and in the Continental Con¬ gress 1775-77, 1782-83 and in 1785-87, and was a signer of the Declaration of Independence. He served as delegate in the Constitutional Con¬ vention of 1787, taking a prominent part in the debates and later helping to secure the ratifica¬ tion of the Federal Constitution by Pennsyl¬ vania (1790). His speeches in these conventions have been highly commended for their profound comprehension of constitutional theory. In September 1789 he was appointed an associate justice of the United States Supreme Court and in 1790 became professor of law in the University of Pennsylvania. His writings in¬ clude such important pamphlets as Considera¬ tions on the Nature and Extent of the Legis¬ lative Authority of the British Government. *(1774) ; (Address to the Citizens of Philadel¬ phia* (1784). Consult his (Works, *edited by his son, Bird Wilson (3 vols., Philadelphia 1803-04), and James D. Andrews (Chicago 1896) ; consult also Alexander, L. H., editor, (James Wilson) (Philadelphia 1908) ; Harlan, Justice J. M., (James Wilson and the Formation of the Constitution (in American Law Review, Vol. XXXIV); Konkle, B. A., et al, «The James Wilson Memorial** (in American Law Register, Vol. LV, 1907).

WILSON, James, American globe maker: b. Londonderry, N. H., 1763; d. Bradford, Vt., 26 March 1855. Up to the age of 33 he was a farmer in his native place, at the same time reading and studying geography and astronomy. In 1796 he moved to Bradford, Vt., where he began experimenting with balls turned from blocks of wood and covered with paper. This rude beginning was followed by a much better method. The solid balls were thickly covered with layers of paper firmly pasted together and this shell was then divided into hemispheres, which being removed were again united and finished with due regard to lightness, strength and smoothness. He procured copper plates of

sufficient size for his 13-inch globes, protracted his maps on them in sections, tapering as the degrees of longitude do from the equator to the poles and engraved them with such admirable accuracy of design,

that when cut apart and duly pasted on his spheres the edges with their lines and even the different parts of the finest letters would perfectly coincide and make one surface, truly representing the earth or celestial constellations. He published his first globes, in 1814. When past 80 he constructed a machine which illustrated the daily and yearly revolu¬ tions of the earth ; the cause of the successive seasons ; and the sun's place for every day of the year, in the ecliptic. These movements were produced by turning a crank, which caused the earth to revolve about the sun in the plane of the ecliptic, always retaining its true relative position. For want of a more definite name the machine was called Wilson's Planetarium. The large copper plate, on which are printed the months of the year, with their days and the corresponding signs of the zodiac with their degrees, was engraved by Wilson after he was 83 years of age.

WILSON, James, American politician : b. Ayreshire, Scotland, 16 Aug. 1835 ; d. 26 Aug. 1920. He came to the United States in 1851, and settled in Iowa in 1855. He was educated at Iowa College, engaged in farming in 1861 and in that year was elected to the State legis¬ lature, where he served for three terms, acting as speaker for the last term. He was a member of Congress in 1873-77, State railway commis¬ sioner in 1877-83, and in 1883-85 was again a member of Congress. He was a regent of the State University in 1870-74 and in 1890-97 was director of the agricultural experiment station and professor of agriculture at the Iowa Agri¬ cultural College, Ames, Iowa. He was ap¬ pointed Secretary of Agriculture by President McKinley in 1897, was reappointed in 1901 and retained in office by both President Roosevelt and President Taft, serving for a period of 16 years. During this time the Department of Agriculture developed rapidly; forest reserves were made; experiment stations were estab¬ lished ; and farm demonstration work carried on on a national scale. Consult Wear Book of the Department of Agriculture for 1912' (Wash¬ ington 1913).

WILSON, James F., American politician; b. Newark, Ohio, 19 Oct. 1828; d. Fairfield, Iowa, 22 April 1895. He studied law, settled at Fairfield, Iowa, in 1853, was elected to the con¬ vention for a revision of the State constitution in 1856, sat in both houses of the State legis¬ lature and was president of the senate in 1861. From 1861 to 1869 he was a member of Con¬ gress, wrhere he was chairman of the judiciary committee and one of the managers of the im¬ peachment of Andrew Johnson. In 1883 he was elected to the United States Senate and in 1889 reelected. He was made a commissioner for the Pacific Railway.

WILSON, James Grant, American author: b. Edinburgh, Scotland, 28 April 1832 ; d. 1914. He was brought to America in infancy by his

father, William Wilson (q.v.), served in the Union army during the Civil War and reached the rank of brigadier-general. After the war he settled in New York and in 1885 became president of the New York Genealogical and Biographical

Society. Among his numerous publications are (Biographical Sketches of Illinois Officers' (1862-63) ; (Love in Letters, Illustrated in the Correspondence of Eminent Persons) (1867); (Life of Fitz-Greene Halleck> (1869) ; (Sketches of Illustrious Soldiers) (1874) ; (Poets and Poetry of Scotland) (1876) ; (Centennial His¬ tory of the Diocese of New York, 1775-1885' (1886); (Bryant and His Friends' (1886);

(Commodore Isaac Hull and the Frigate Con¬ stitution' (1889); <Life of General Grant' (1897) ; (The Presidents of the United States) (1901) ; (Thackeray in the United States) (2 vols., 1904). He was the editor (with John Fiske) of < Appleton's Cyclopaedia of American Biography) (6 vols., 1887-89; Vol. VII, 1900), and alone, of (Memorial History of the City of New York) (1892-93).

WILSON, James Harrison, American sol¬ dier : b. Shawneetown, Ill., 2 Sept. 1837. He was graduated from West Point in 1860, was promoted lieutenant in 1861 and was chief topographical engineer on the Port Royal ex¬ pedition. He was brevetted major 11 April 1862 for conduct at Fort Pulaski, Ga., and subsequently was aide-de-camp to General Mc¬ Clellan, participating in the battles of Antietam and South Mountain. In the campaign against Richmond and in the operations against Chat¬ tanooga and Knoxville he was assistant engineer and inspector-general of the Army of Tennessee, and in 1863 was made brigadier-general of vol¬ unteers and brevet lieutenant-colonel of regulars for gallantry at Chattanooga. He was brevetted colonel for conduct at the battle of the Wilder¬ ness and was engaged in the siege of Peters¬ burg and in the Shenandoah campaign. In Sep¬ tember 1864 he was transferred to the command of the cavalry of the Mississippi Division, took part in General Thomas' campaign in Tennessee and was conspicuous at the battles of Franklin and Nashville. In March 1865 he made a raid into Alabama and Georgia and in 28 days captured Selma, Montgomery, Columbus and Macon, taking 6,820 prisoners, among whom was Jefferson Davis. He received brevet rank as brigadier-and major-general and in 1866 was mustered out of the volunteer service. He was appointed lieutenant-colonel in the regular army in that year, but resigned in 1870 and was subse¬ quently engaged in railroad engineering until the outbreak of the Spanish-American war when he was appointed major-general of

volunteers and was assigned to command a division in Porto Rico. In 1900 he joined the China relief ex¬ pedition and was commander of the American forces in Peking. He was retired with the rank of brigadier-general of the United States army in 1901. In 1902 he represented the United States army at the coronation of Edward VII. He has published (Life of Andrew Alexander) (1868) ; (Life of General Grant) (with Charles A. Dana, 1868); (China — Travels and Inves¬ tigations in the Middle Kingdom' (1887; new ed., 1890) ; (Life of Charles A. Dana' (1907) ; (Under the Old Flag' (1912).

WILSON, Jeremiah Morrow, American jurist; b. Warren County, Ohio, 25 Nov. 1828; d. Washington, D. C., 24 Sept. 1901. He re¬ ceived an academic education; was judge of the Court of Common Pleas of Fayette County, Ind., 1860-65; judge of the Circuit Court 1865— 71 and member of Congress in 1871-75. After

(

retiring from Congress he took up the practice of law in W ashington, D. C., and during his professional career in that city was connected with numerous famous cases. Besides having acted as attorney for the Union Pacific Railroad and the Mormon Church, he was counsel in the court-martial of General Swain and was con¬ nected with the ((Alabama Claims® and the French ˆSpoliation® cases; *etc.*

WILSON, John, American colonial clergy¬ man : b. Windsor, England, 1588; d. Boston, Mass., 7 Aug. 1667. He was educated at King's College, Cambridge, in 1606; was made Fellow there ; studied law, but took orders ; was min¬ ister of Sudbury, Suffolk; and having fre¬ quently been suspended as a Puritan, embarked with John Winthrop for America in 1630 and landed at Salem, Mass. At Charlestown he organized what afterward became the First Church of Boston, of which he was ordained pastor in 1632. He visited England in 1634, returning the following year with his wife and also Hugh Peters (q.v.). He was opposed to the so-called <(antinomian heresy® of the time ; was associated with John Eliot (q.v.) in mis¬ sionary work among the Indians ; and was chaplain to the force sent against the Pequots of Connecticut. He published (Some Helps to Faith) (1625) ; a poem, (Famous Deliverances of the English Nation'* (1626) ; a Latin poem commemorating John Harvard; and (The Day Breaking, If Not the Sun Rising, of the GospeP (1647; new ed. 1865). He had, says Cotton

Mather, ((so nimble a faculty of putting his devout thoughts into verse, that he signalized himself by … sending poems to all persons, in all places, on all occasions.®

WILSON, John, Scottish author, best known by his pseudonym <(Christopher North®; b. Paisley, 18 May 1785; d. Edinburgh, 3 April 1854. He was educated at Glasgow University and Magdalen College, Oxford, and while at Oxford was noted for his skill in boating, cricketing and other athletic sports. Having ‘at 21 come into a large fortune, he purchased the property of Elleray, on Windermere, and retired there to live at his ease, writing poetry. Here he became closely asso¬ ciated with Wordsworth, Southey, De Quincey and Coleridge. In 1812 he wrote the once-famed (Isle of Palms.-* Another poem in dra¬ matic form, (The City of the Plague* (1816), was still more successful ; but is now for¬ gotten. At this time Wilson suffered reverses of fortune through fraudulent speculation of an uncle and it became necessary for him to earn his livelihood. In 1817 he went to Edin¬ burgh and together with J. G. Lockhart (q.v.), became connected with Blackwood’s Magazine. His fame with posterity rests on his prose writings and more especially his contributions to this famed Tory organ. Among the numer¬ ous papers furnished by Wilson may be men¬ tioned those celebrated ones on fishing, shooting and kindred pursuits produced under the well-known sobriquet of ((Christopher North® and above all his renowned (Noctes Ambrosianae,* a series of conversations on literary and general subjects, supposed to take place at certain con¬ vivial meetings held in Ambrose’s Tavern by the contributors to the Magazine and since reprinted separately. In 1820 he obtained the chair of moral philosophy in the University of

i—

Edinburgh, a post he occupied with credit for 31 years. In 1822 to 1824 he published three prose works of fiction, (Lights and Shadows of Scottish Life) ; (The Foresters) ; and (The Trials of Margaret Lyndsay,* which are marked by pathos and beauty of description, but are far from being faithful transcripts of human nature, and degenerate at times into mawkish sentimentality. He resigned his professorship in 1851, and a government pension of £300 per annum was bestowed upon him. There is an incomplete edition of his works by Ferrier (12 vols., 1855—58), and a separate edition of the (Noctes) by R. S. Mackenzie (5 vols., 1866). Consult (Memoir) by his daughter, Mrs. Gordon (2 vols., Edinburgh 1862) ; Saintsbury, (Essays in

English Literature) (London 1890) ; Mrs. Oliphant, (William Blackwood and His Sons) (1897); Douglas, (The Blackwood Group *(1897) ; Winchester, C. T., ((John Wilson® (in (Group of English Essayists of the Early Nineteenth Century,* New York 1910).

WILSON, John, Scottish missionary: b. Lauder, Scotland, 11 Dec. 1804; d. Bombay, India, 1 Dec. 1875. He was educated at the University of Edinburgh, went to Bombay in the service of the Scottish Missionary Society in 1828, and in 1835 transferred his labors to the mission work of the Free Church of Scot¬ land. He established numerous schools ; be- ‘ came vice-chancellor of the University of Bom¬ bay; contributed largely to the abolition of the practice of suttee; traveled all over India es¬ tablishing missionary centres ; and was uni¬ versally honored and beloved by the natives, among whom he spent the remainder of his life with the exception of the years 1843-47. He founded in 1830 the Oriental Christian Spectator issued for 30 years, and was the pioneer of Christian periodicals in India. His linguistic ability was remarkable, and his con¬ tributions to literature included (The Parsi Re¬ ligion } (1843) ; (India Three Thousand Years Ago) (1858) ; (Memoirs on the Cave-Temples of India* (1859) ; (The Lands of the Bible Visited and Described) (1867); and Undian Caste) (1877). Consult Smith George, (Life of Wilson) (1878).

WILSON, John Mackay, Scottish author: b. Tweedmouth 1804; d. Berwick-on-Tweed,

2 Oct. 1835. He edited for several years the Berwick Advertiser and was editor and prin¬ cipal author of the popular (Tales of the Borders) (1835-40). The latest edition, revised and enlarged to 24 volumes, appeared in 1869.

WILSON, John Moulder, American mili¬ tary engineer: b. District of Columbia, 8 Oct. 1837 ; d. 1 Feb. 1919. He was graduated from West Point in 1860, gazetted lieutenant in 1861 and served in the Manassas, Penin¬ sular and Maryland campaigns. He was con¬ spicuous for gallantry at Gaines’s Mills and at Malvern Hill in 1862 and in 1863 was pro¬ moted captain, subsequently serving in the engineer corps. In 1865 he was brevetted colo¬ nel of volunteers and both lieutenant-colonel and colonel of regulars for gallantry at the cap¬ ture of Spanish Fort in Mobile Harbor and at Fort Blakely. After the war he was in charge of various important engineering works under the government and in 1885-89 was superintendent

of public buildings and grounds in the District of Columbia. He directed the completion of the Washington Monument, the construction of the Army Medical Museum and Library and other public buildings and memorials. He was appointed superintendent of the Naval Academy in 1889; in 1897 was appointed chief of engineers with rank of brigadier-general and was retired at his own request in 1901.

WILSON, Luther Barton, American cler¬ gyman: b. Baltimore, Md., 14 Nov. 1856. He was graduated from Dickinson College 1875, and also from the University of Mary¬ land Medical College, M.D., 1877. He entered the ministry of the Methodist Episcopal Church, joining the Baltimore Conference in 1878. After several successful pastorates and two terms as presiding elder in Washington and Baltimore, he was elected bishop in 1904. He was Fraternal delegate to the Methodist Church of Canada in 1902. He was one of the chief founders of the Anti-Saloon League of Amer¬ ica and one of its first vice-presidents, and when Hiram W. Price of Iowa, the first presi¬ dent, died Bishop Wilson became president and continues to serve in that office. He is a trustee of several institutions and societies and had been for some years president of the board of trustees of Drew Theological Seminary. During the European War he was active in promoting the welfare of the soldier — visit¬ ing the firing line in France and Italy several times. He has written (The Moslem Menace) (1912) ; with H. H. Meyer and L. H. Hough, (Marshalling the Forces of PatriotisnP (1918) ;

(America Here and Over There> (1918).

WILSON, Richard, Welsh landscape-painter: b. Penegoes, Montgomeryshire, 1714; d. Llanberis, Carnarvonshire, May 1782. He went to London and studied portrait-painting with Thomas Wright. He was somewhat suc¬ cessful in London, but a-t length went to Italy where he met Zuccarelli, the artist, who per¬ suaded him to devote himself wholly to land¬ scape. After staying some time at Rome and Naples, where he acquired great reputation, he returned to England in 1755 and settled in the metropolis. He had for a while much employ¬

ment; but was at length doom.ed to undergo indifference and neglect, and was glad to ob¬ tain the office of librarian to the Royal Acad¬ emy in 1776. His taste was exquisite and whatever came from his easel bore the stamp of elegance and truth. Among his best works are the <Niobe,) (Ruins of the Villa of Mae¬ cenas, } <Phaethon,) (Snowdon, > (View of Rome from the Villa MadamaP Three of his works are to be seen in the New York Metro¬ politan Museum. Consult Hastings, Thomas, (Etchings from the Works of Richard Wilson, with some Memoirs of his Life) (London 1825) ; Wright, T., (Some Account of the Life of Richard Wilson > (London 1824).

WILSON, Sir Robert Thomas, English soldier and author: b. London, 17 Aug. 1777; d. there, 9 May 1849. He was educated at the Westminster and Winchester schools, volun¬ teered for the war in Flanders in 1793-94, and was a member of the staff during the Irish re¬ bellion of 1798. He served in Holland in 1799 and in 1800 was engaged under Abercrombie in Egypt. He served under Lord Hutchinson

on a secret mission to the allied armies on the Russian frontier in 1806-07, and in 1808-10 commanded a Lusitanian legion and later a Spanish brigade in Spain and Portugal. He sat in Parliament for Southwark in 1818-31 and for his espousal of the cause of Queen Caroline he was dismissed from the army in 1821 but subsequently reinstated. He received promotion to full rank as general in 1841 and in 1842-49 was governor of Gilbraltar. He was author of several works on military sub¬ jects, several of which were not published until after his death, when they were edited by his son-in-law, Rev. Herbert Randolph. They include (History of the British Expedition to Egypt" (1802) ; (Sketches of the Campaigns in Poland) (1810) ; (Military and Political Power of Rus-sia) (1817) ; (Narrative of Events During the Invasion of Russia* (1860) ; (Diary* (1861), *etc.* Consult Randolph, (Life of Gen. Sir Robert Thomas Wilson* (1863).

WILSON, Rufus Rockwell, American au¬ thor: b. Troy, Pa., 14 March 1865. He was engaged in journalism in Pittsburgh, Washing¬ ton and New York in 1883-91 ; in 1891-1906 he became known as magazine writer and newspaper editor, also for a time being man¬ ager of a newspaper syndicate; he entered political reform work in 1910, and the follow¬ ing year organized and superintended certain Chinese famine relief work. He has published (Rambles in Colonial Byways) (1900) ; (Wash¬ ington — The Capital City) (1901); (New York, Old and New* (1902) ; (Lincoln in Caricature) (1903); (The Sea Rovers*

(1906); (A Noble Company of Adventurers) (1908) ; (Literary Landmarks of America) (1915).

WILSON, Theodore Delevan, American

naval constructor: b. Brooklyn, N. Y., 11 May 1840; d. Boston, Mass., 29 June 1896. He served an apprenticeship in the Brooklyn navy yard and in 1861 was appointed a carpenter in the construction department of the navy. In 1866 he was appointed assistant naval con¬ structor ; subsequently he was engaged in the navy yards at Pensacola, Philadelphia and Washington. In 1869-73 he was instructor in naval architecture and shipbuilding at the Naval Academy, Annapolis, Md., and in the last-men¬ tioned year was promoted to be naval con¬ structor. He was chief constructor of the navy from 1882-93, when he resigned because of failing health, and was granted a two years' leave of absence, resuming his duties at the Boston navy yard in 1895. He was an honor¬ ary member of the Institute of Naval Archi¬ tects of England, the first American to be elected to that body. He patented in 1870 the <(air-ports,** since generally adopted in the navy and in merchant-ships, and in 1880 patented a bolt extractor which has since come into gen¬ eral use. During his service he designed the battleship Maine, the cruisers Boston, Chicago and San Francisco, the gunboats Concord, Ben¬ nington, Petrel and other vessels. He wrote Shipbuilding, Theoretical and PracticaP (1873), which was adopted as a textbook at the Naval Academy.

WILSON, Thomas, English Anglican p'rel-ate : b. Burton, England, 20 Sept. 1663; d. Isle of Man, 7 March 1755. He was educated at Trinity College, Dublin, and was curate of

Newchurch Kenyon, 1686-92. He then became chaplain to the Earl of Derby, who appointed him bishop of Sodor and Man in 1697, his con¬ secration taking-place in 1698. His episcopate covering a period of 58 years is noted for his strict insistance upon his privileges as head of the ecclesiastical court. This occasioned fre¬ quent disputes with the governor of the Isle of Man and he was at one time imprisoned for two

months. He was the author of Princi¬ ples and Duties of Christianity) (1707), com¬ monly called the Manx Catechism — the first book printed in the native tongue: (Short and Plain Instructions for the Better Understand¬ ing of the Lord's Supper > (1736) ; (The Knowl¬ edge and Practice of Christianity Made Easy to the Meanest Capacities) (1775) ; (Sacra privata, Private Meditations, Devotions and Prayers} (1800); (Parochialia or Instructions for the Clergy y (1788) ; (Maxims of Piety and Christianity) (1789). He instituted a Manx translation of the Bible, completed 1772-75. Consult (Lives) by Crutwell (1781) ; Keble (1847) ; also Stubbs, J. W., (History of the University of Dublin* (London 1889).

WILSON, William, American poet: b. Perthshire, Scotland, 25 Dec. 1801 ; d. Pough¬ keepsie, N. Y., 25 Aug. 1860. He edited the Dundee Review, 1821-23, did newspaper work in Edinburgh, where he was a friend of the brothers Chambers, and coming to this coun¬ try in 1833 established himself at Poughkeep¬ sie as bookseller and publisher. His (Poems, J edited by Lossing, appeared in 1870, and re¬ vised and enlarged editions in 1875 and 1884.

WILSON, William Bauchop, American cabinet officer and labor leader : b. Blantyre, Scotland, 2 April 1862. He came to the United States when a child, and at an early age was employed in the Pennsylvania coal mines. He v/as a member of a labor union at the age of 11 ; at 26 he was president of the District Miners' Union, at the same time serving on the execu¬ tive board of the United Miners' Union ; and in 1900 he became secretary and treasurer of the National Union of Miners. He served in Congress in 1907-13, was chairman of the com¬ mittee on labor, drafted a bill to create a de¬ partment of labor, and upon the establishment of the department in 1913 he became Secretary of Labor in President Wilson's Cabinet.

WILSON, William Dexter, American phi¬ losopher and Episcopal clergyman : b. Stoddard, N. H., 28 Feb. 1816; d. Syracuse, N. Y., 30 July 1900. He was graduated from the Har¬ vard Divinity School in 1838 and took orders in the Episcopal ministry in 1842. In 1850— 68 he occupied the chair of philosophy at Ho¬ bart College, resigning in the last-mentioned year to become registrar and professor of moral philosophy at Cornell University. He was made professor emeritus there in 1886 and during the last years of his life was dean of Saint Andrew's Seminary at Syracuse. He published (Introduction to the Study of the History of Philosophy* (1872); (First Prin¬ ciples of Political Economy* (1875) ; (The Foundations of Religious Belief * (1883) ;

‘Theories of Knowledge Historically Considered) (1889).

WILSON, Sir William James Erasmus,

English surgeon and philanthropist : b. London,

25 Nov. 1809; d. Westgate-on-Sea, Kent, 8 Aug. 1884. He went through a course of hospital practice in Paris, where he became known to Cuvier and Geoffroy de Saint Hilaire, later at¬ tached himself to the Aldersgate School of Medicine, and was engaged in 1831 as assistant to Dr. Quain, professor of anatomy in Uni¬ versity College. His first work, Practical and Surgical Anatomy,* was published in 1838, followed in 1840 by the ‘Anatomist’s Vade Mecum.* About this time he determined to .devote himself to dermatology, and soon be¬ came the acknowledged authority in that hitherto obscure branch of medical science. He became Fellow of the Royal College of Sur¬ geons in 1843, and president in 1881. In 1845 he was elected a Fellow of the Royal Society. By the time he had reached his 50th year he had amassed considerable wealth, and he then began a series of public and private acts of munificence, founding a professorship of der¬ matology in the College of Surgeons, the chair of which he filled for nine years, contributing £7,000 to Epsom Medical College, restoring the ancient church of Swanscombe, Kent, founding a chair of pathology at Aberdeen, subscribing liberally to the Royal College of Music, and to the Margate Sea-bathing Infir¬ mary. He devoted much attention to Egyp¬ tology, was president of the Eˆypt Exploration Fund, and furnished £10,000 for the transport of the obelisk known as ((Cleopatra’s Needle** from Alexandria to its present site on the Thames Embankment. In 1881 he was knighted. Besides many publications in his special science he published, ‘Cleopatra’s Needle, with Notes on Egypt and Egyptian Obelisks *; and (The Egypt of the Past.*

WILSON, William Lyne, American edu¬ cator and legislator: b. Jefferson County, Va., 3 May 1843; d. Lexington, Va., 17 Oct. 1900. He was graduated from Columbian College in 1860, and later studied at the University of Vir¬ ginia. He served as a private in the Confed¬ erateˆ army through the Civil War, and in 1865-71 was professor of ancient languages at Columbian College. He was meantime engaged in the study of law, in 1867 was admitted to the bar, and several years later began practising law in Charlestown, W. Va. He was elected president of the University of Virginia in Sep¬ tember 1882 and in the same month was elected to Congress. In June 1883 he resigned his

pres¬ idency of the university, but served continuously in Congress until 1894. He framed the Wilson Tariff Bill (see Tariff), but disapproved of the amendments it received in the Senate. In 1895 was appointed Postmaster-General by Pres¬ ident Cleveland, and from 1897 until his death was president of Washington and Lee Uni¬ versity.

WILSON, Woodrow (christened Thomas), 28th President of the United States: b. Staunton, Va., 28 Dec. 1856. He is the son of Scotch-Irish parents, who had lived in Pennsyl¬ vania, Canada and Ohio. James Wilson, his pa¬ ternal grandfather, emigrated from Ireland in 1807. When young Wilson was about a year old the father, Rev. Joseph Ruggles Wilson, became the pastor of the Presbyterian church in Au¬ gusta, Ga., where the family remained till 1870 when Dr. Wilson removed to Columbia, S. C.,

where he was a professor in the Presbyterian Theological Seminary. Woodrow experienced some of the terrors of the Civil War when the people of the town of Augusta daily expected a visit from Sherman's army, and again in Colum¬ bia where a large part of the city remained a burnt-over area till the Wilson's moved away to Wilmington, N. C., in 1875. Woodrow's early training was received in private schools in Au¬ gusta and Columbia, and from his father and grandfather, Dr. Thomas Woodrow, of Colum.- bus, Ohio, the latter being a devotee of the an¬ cient classics and frequently in the Wilson home. From this Presbyterian home, Woodrow went to Davidson College, North Carolina, a staunch Presbyterian college, in the autumn of 1874, v/here he remained a year. But in the autumn of 1875 he went to Princeton where the father had studied theology and where the great Pres¬ byterian leaders of the country were wont to live and teach.

At Princeton, Wilson took rank as a leader among his fellows, attained a fair standing in his class, but made it plain to all that wide read¬ ing and close study of public affairs were his chief interests. He and his family were already close observers of British politics, Gladstone being

a hero in their circle. Wilson showed this interest in a remarkable article published, while he was still an undergraduate, in the Interna¬ tional Review, in which the germ of his first book was uncovered. He was graduated in 1879 and the next year went to the University of Vir¬ ginia to study law. There he took a law de¬ gree in 1881 and early in 1882 settled in At¬ lanta to practise his profession. There he prob¬ ably did not make his mark as a lawyer; but he continued his study of government and poli¬ tics, as illustrated in the workings of Congress. True to his bent, he abandoned the law and en¬ tered Johns Hopkins University in 1883 where he wrote his first book, Congressional Govern¬ ment, > published in 1885. The same autumn he began teaching history and political economy in Bryn Mawr College and the next year, some¬ what against his wishes, he took his examina¬ tions at Johns Hopkins and was awarded the degree of doctor of philosophy, then so highly prized among college teachers everywhere. In 1888 he went to Wesleyan University, Middletown, Conn., as professor of history and politi¬ cal economy. There he gained a grip upon stu¬ dent life and opinion that marked all his later educational career. But the popularity of Congressional Government and the import¬ ance of its criticism of American governmental practices were making him a national and even international reputation. At Wesleyan he wrote a review of Bryce's (American Com¬ monwealthˆ which brought him into close friendly relations with that eminent English¬ man. In this review one sees the reflection of a keen historical mind and independent thinker.

In 1890 Wilson was called to Princeton as professor of jurisprudence and political econ¬ omy, which position he held till 1910 when he ceased his connection with the university to be¬ come governor of New Jersey. As professor at Princeton, he practically founded the de¬ partment of political science, as it is now taught in all American universities. Hi; power over students, his activity as a leader in the rapid de¬ velopment of the college into a university, his

many articles in periodicals, his lectures in vari¬ ous parts of the country and his books raised him to the foremost position in the faculty and when President Patton resigned in 1902, he was chosen to head the university. He at once set about far-reaching reforms. American college and university students, reflecting the growing riches of their parents, had already become loi¬ terers at their work. Wilson endeavored to compel them to study. Instead of increasing the number of students at Princeton, he pressed so closely his requirements that scores, even hun¬ dreds, of young men were sent

away each year because they failed in their examinations. Some witty undergraduate is reported tc have said that if Dr. Wilson kept on he would make Princeton an educational institution. But the necessity of passing the examinations was not all. Wilson introduced what has been called the preceptorial system at Princeton By this method every student was brought into close re¬ lations with a teacher who made it his business to lead a small group of young men in their work and introduce them to the world of books. The new system cost a great deal of money and Wil¬ son endeavored to collect it. His activity in that direction brought him into closer touch with Princeton men all over the country and he be¬ came very popular. His next reform was of a similar nature. There had grown up at Prince¬ ton an elaborate club system which was more important to most of the undergraduates than the passing of examinations. To become a mem¬ ber of one of the clubs was the first ambition of most students. Moreover the social life of the students was absorbed by these clubs. Wil¬ son proposed in 1907 that as soon as suitable dormitories could be provided, all students should live together and have their rooms as¬ signed to them by lot ; that they should eat to¬ gether, the rich and the poor, in dining-places on or near the quadrangle ; and that the un¬ married tutors should live with the students in the dormitories. This reform was aimed at making student life democratic and helpful to all alike. This, too, would cost large sums of money and require several years to become ef¬ fective. It was, however, too much for the students.. Some professors also found the new pace a little too swift and the alumni encour¬ aged resistance.

But before the resistance became effective, a gift to the proposed graduate school, which all held as necessary to the very existence of the university, introduced a new subject of dis¬ cussion. Dean Andrew West, a close * friend of the president, desired the graduate school to be set up at a distance from the quadrangle which Wilson would make the centre of college life. Wilson objected gently. The matter re¬ mained in abeyance till in 1909 a conditional gift of something like a million dollars to the graduate school compelled a decision. The gift was to be applied according to the wishes of Dean West. Wilson refused to accept it on those conditions. The segregation of the graduate students seemed to him to thwart the democratic purposes of his whole reform pro¬ gram. The trustees sided with Wilson and the gift was formally declined, but not before the subject had become a national one, for the news¬ papers of the country discussed the issue. In May 1910, Isaac Wyman of Boston died and left

a legacy, reported to be several millions, to the graduate school. Dean West was to be one of the executors of the will and he was to use the new millions to carry out his ideals in the new school. Wilson could not refuse these mil¬ lions. And, before this time, the opposition to his quadrangle reforms had assumed formida¬ ble proportions. Dean West's influence and that of the students and professors who opposed the president were united. The Wilson reforms, popular as they were in educational circles throughout the county, were halted. It was commonly rumored that Wilson would resign at commencement 1910.

This work at Princeton had made Wilson widely known in the United States as an educa¬ tor. Before it took its final turn in 1910, Col. George Harvey, representing the conservative wing of the Democratic party and editor of Harper's Weekly, inaugurated a movement to bring about Wilson's nomination for President by the Democratic party in 1912. Harvey en¬ listed newspaper editors and political party lead¬ ers of the type of James Smith, Jr., of New Jer¬ sey in the cause. The country was growing rest¬ less at the conduct of the Republican party. Wil¬ son was a progressive Democrat ; Harvey and his friends were reactionary Democrats. The presidential election was then two years off and the situation in the Democratic party was one of great uncertainty. The efforts of Wilson's friends, however, had resulted in making him a prominent political figure and there arose a popular demand in his home State for his nomi¬ nation as a candidate for governor. His nomi¬ nation followed in September 1910, and in Octo¬ ber the presidency of Princeton was given up. The campaign that Wilson conducted that au¬ tumn in a stalwart Republican State attracted the attention of the country. The election of Wilson by a majority of 49,000 made him a real candidate for the Presidency which his admin¬ istration as governor further advanced. He could not fulfil the hopes of the conservative Democrats as governor and broke with Smith. Later he broke with Harvey. When the con¬

servatives abandoned him and endeavored to give all their influence to other candidates for the Democratic Presidential nomination, the more* progressive elements of the Democratic party turned to Wilson. Of greater moment was the break-up of the Republican party in June 1912. Colonel Roosevelt endeavored to prevent the renomination of his former friend, Taft, and, failing to do so, led a revolt from the convention. It was plain that a new con¬ vention, composed of the Roosevelt men, al¬ ready announced in Chicago, would nominate the colonel. These events focussed the na¬ tional attention upon the Democratic party when it assembled in convention at Baltimore 25 June 1912. No such convention had ever been held in American political history. It lasted until 2 July and was marked from the begin¬ ning by intense bitterness between the conserva¬ tive and progressive elements of the party. In addition to Mr. Wilson the leading candidates were Speaker Champ Clark of Missouri, Judson Harmon of Ohio and Oscar W. Underwood of Alabama. Mr. Wilson won on the 46th ballot, largely through the support thrown to him by William Jennings Bryan.

Wilson made an active campaign and was elected by a vote of 435 in the electoral colleges

against 88 for Colonel Roosevelt and eight for Mr. Taft, the regular Republican candidate. The popular vote for Wilson, however, totaled only 6,293,019 as against 7,604,463 votes cast for Roosevelt and Taft. But the Democrats won large majorities in both houses of Congress and Wilson entered the Presidency in March 1913, with every branch of the government at his command. He summoned Congress in extra session in April. All the great committees were headed by Democrats, if not by his friends. He urged at once some of the greatest reforms that have ever been effected in the history of the country. Acting on his recommendations Congress reduced the tariff from a general level of 45 to 25 per cent and greatly enlarged the free list. Many economists alleged that for the first time in half a century the tariff was written in the interest of the masses and not in that of the manufacturers. Of even greater importance was the reform of the national cur¬ rency system in the Federal Reserve Act of 1913, by which the control of the money of the country was taken from private hands and placed in the Treasury Department. The coun¬ try was divided into 12 banking districts and the reserves of those districts were placed in certain reserve cities in order that the needs of the country as a whole might the better be served and what had been called financial pan¬ ics, produced by the nervous financial state of

mind of New York, the reserve centre under the old system, might be averted. This meas¬ ure was immediately successful. These re¬ forms of 1913 were followed by the Clayton Anti-trust and the Federal Income Tax laws of 1914, the former of which definitely settled an old issue, while the latter subjected the in¬ comes of the country to a graduated tax that quickly proved to be of revolutionary character.

Although the Democratic party was not in entire accord with Wilson, and the Republicans as a whole resisted him with all their might, he held Congress in session almost continuously till the great European War brought another series of problems before the country. But al¬ ready the Wilson foreign policy was shown in his refusal to allow the army and navy to be used on behalf of money lenders or investors in Mexico and South America. He even went so far as to say at Mobile, in October 1913, that the United States would never again annex a foot of land against the will of those most concerned. This attitude bewildered European diplomats and it angered important elements in the United States. Wilson had an excellent op¬ portunity to illustrate his foreign policy in Mexico where General Huerta rose to the presi¬ dency. through the assassination of Madero early in 1913. Huerta was favorably disposed toward American investors in Mexico. Wilson refused to recognize Huerta and by his atti¬ tude compelled the overthrow of that leader, only to find that the two Mexican generals who had together fought Diaz and Huerta now fell to fighting each other. Wilson gave his support to Carranza, but the months and years that passed did not suffice to pacify the distracted country; and in 1916 Wilson was compelled to send expeditions into the country to compel re¬ spect for American law and international rights. The Mexican difficulty, however, soon paled into insignificance in comparison with the difficulties produced by the European War

which began on 1 Aug. 1914. While the President was preparing for his first taking of the sense of the country on the policies he had put into practice, this great upheaval set men’s thoughts upon other subjects. The election of 1914 resulted in a return to Congress of a

ma¬ jority of Democrats, most of whom were pledged to support the administration.

Meanwhile, on 18 August, Wilson declared in a proclamation to the country that all men must maintain a strict neutrality as between the warring powers. Leading public men and newspapers, regardless of party alignments, gave him hearty support ; but as the war con¬ tinued and cast its shadow over .the whole world, the different elements of the composite country took sides. A particular source of ir¬ ritation was occasioned by German propagand¬ ists who did their utmost to break the coun¬ try's neutrality; others of the same group tried to affect the course of the war by attempting the destruction of bridges and caijals and by inciting strikes in munition plants from which the Allies derived a considerable portion of their supplies. Wilson took every possible oc¬ casion to press upon the country the necessity of national unity, of devotion to the ideals for which the United States had been established and of refraining from deeds that might com¬ mit the country to either side. He went so far even as to say that ((there was such a thing as being too proud to fight.® He endeavored to bring about peace in Europe by the offer of his services as a mediator. On 7 May 1915, a German submarine commander deliberately sunk the great British liner, the Lusitania, sending 1,154 persons to their death, of whom 114 were American citizens. The country was intensely excited; but Wilson felt that he could not then go to war. He demanded apology and repara¬ tion and gave Germany solemn warning. Other ships were sunk during the year and other American lives were lost ; but confronted with a national election in 1916, neither Wilson nor the Republican national convention of that year proposed war as a remedy. Nor did the Pro¬ gressive convention, which Colonel Roosevelt dominated, suggest war. The leaders did not know what the people thought. The Republicans finally nominated Mr. Justice Hughes as their candidate and the Progressives confirmed him as their choice. The platforms dealt with domestic problems insisting on foreign affairs only in the commercial rights of the country.

Wilson was renominated. The Democratic platform simply approved the Wilson policies and asked that he be returned to office on the ground that as President he had kept the country out of war. Wilson was reelected, his plurality reaching 581,941 votes. Yet so close was the contest in the Electoral College that a reversal of 2,000 votes in California would have made Mr. Hughes President. During the campaign Wilson had said that the role of neutrality had been about played out. The President's attitude at this time toward the struggle in Europe is best gathered from his address at Omaha on 5 Oct. 1916, in

which he said : <fIt will take the long enquiry of history to explain this war, but Europe ought not to misunderstand us. We are holding off, not because we do not feel concerned, but because when we exert the force of this nation we want to know what we are

exerting it for. … We want to know whenever we act what the purpose is — v/hat the ultimate goal is.® In the request for the passage of the so-called Adamson law, of the preceding September, he had asked for the ex¬ tension of the United States eight-hour law to include workers in the railroad trains service. A great strike was averted. He was about to make one more effort to bring the European war to an end, when Germany on 12 December asked for a conference of the warring powers for the purpose of securing peace. Germany did not disclose her conditions. Wilson sub¬ mitted the German proposal to the Allied powers. The reply was a quick refusal. On 22 Jan. 1917, Wilson spoke to the Senate in what was at once called a remarkable address. The principal ideas that later became famous in the Fourteen Points were now suggested to Europe as a basis of peace. He even said that a lasting peace could only be secured by a ((peace without victory.® He meant that the bitterness of a war to the <(last man® ought to be avoided.

His effort failed. On the last day of Janu¬ ary the German Ambassador in Washington handed the government a note in which the German government announced its intention to declare a submarine blockade about England, France and Italy and warned all nations to beware on penalty of having their ships and their people sunk without notice. Wilson's reply was to dismiss the German Ambassador and re¬ quest Congress to declare the country in a state of armed neutrality. Congress failed to grant the request and Wilson set about pre¬ paring for American entrance into the conflict. When the regular session of that Congress came to an end, he promptly summoned the new Congress in extra session for 2 April <(to receive a communication concerning grave matters of national policy.® On 2 April he addressed Congress in a great speech recom¬ mending that Congress declare <(the recent course of the Imperial German government to be in fact nothing less than war against the government and people of the United States.® On 6 April war was declared by large major¬ ities. But Wilson took pains to insist to the country and all the world that the United States did not go to war for any material interests or any imperialistic purposes of any of the powers concerned. It was to be a war to <(make the world safe for democracy.® He endeavored to convince the people of the United States that annexations and

commercial exploitation were the natural causes of war ; and he sought to impress Europe with the idea that democracy was the only safe rule for governments and that absolute equality among all peoples, great and small, was the only safe rule of inter¬ national conduct. From 2 April 1917 to 11 Nov. 1918, Wilson's career is in great part world history; he swayed the whole world as no other statesman had ever swayed it. An English Liberal has said that ((it was like the voice of God talking over our heads to the continent and to the nations of the world.® The sum of it all was expressed on 8 Jan. 1918, in the marvelous address in which the Fourteen Points, now so well known to the world, were laid down. He wished to commit all men to the freedom of the seas, the self-determination of peoples, open diplomacy, the

Copyright, Underwood & Underwood, N. Y,

PRESIDENT WILSON AND HIS WAR CABINET

1 Woodrow Wilson, President; 2 William Gibbs McAdoo, Secretary of the Treasury; 3 Thomas Watt Gregory, Attorney-General; 4 Josephus Daniels, Secretary of the Navy 5 David Franklin Houston, Secretary of Agriculture; 6 Robert Lansing, Secretary of State; 7 William Bauchop Wilson, Secretary of Labor; 8 Newton Diehl Baker Secretary of War; 9 Albert Sidney Burleson. Postmaster-General; 10 Franklin Knight Lane, Secretary of the Interior; 11 William C. Redfield, Secretary of Commerce

freest possible trade among nations, access of inland nations to harbors, disarmament every¬ where and a League of Nations that should lead and guide mankind into better ways. Upon such a basis would the United States conclude peace. From public statements of European leaders and from the avowals of responsible diplomats, these points were accepted, although thoughtful men everywhere doubted whether, at the end, the greater European powers would

actually abide by such a program of self-denial.

There was a strenuous protest in the indus¬ trial centres of the United States against the possibility of free trade. Colonel Roosevelt denied in a vigorous campaign in the autumn of

1917 that the United States fought to make the world safe for democracy. In January

1918 he and many other prominent leaders, both Democratic and Republican, tried to press through Congress a bill which would have set up a war cabinet to assist the President. Wil¬ son opposed the movement and it failed. But the fight upon the President and his war plat¬ form was continued till the Congressional elec¬ tion of 1918. Wilson asked the country in a formal statement to return Democrats to Congress in order that he might the better carry the war to a conclusion. It was a close election in which the Republicans won a major- • ity in the Senate by two votes and in the House by a larger margin. Much money was spent in the campaign and one of the senators was still defending himself in court, late in 1919, against the charge of corrupt use of money. It was the first time that Wilson was confronted with the prospect of a hostile Congress, a fact which appeared the more significant as the near approach of a breakdown of Germany and her allies became known. When an armis¬ tice was proposed by Germany, the Allied governments agreed that Wilson should be the common spokesman ; but Colonel Roosevelt and Senator Lodge gave out a statement of Republican conditions of peace which were supposed to be more hostile to Germany than Wilson's Fourteen Points. The Republicans an¬ nounced that they were unwilling to allow Wil¬ son to represent the country in the peace confer¬ ence.

In his annual message of December 1918, Wilson announced that he would go in person to Paris to aid in the negotiation of a world peace. The leaders of the Senate warned him against this course and many of the greatest papers in the North took the view that it was inexpedient if not improper and unconstitu¬ tional for the President to attend the peace conference in person. A former senator and a former attorney-general of the United States gave it as their matured opinions that Wilson would cease to be President the moment his ship passed beyond the boundary of the country. Nevertheless Wilson sailed for Europe on 4 December, and arrived in Paris on the 14th. He received an ovation that surpassed anything witnessd in France since the days of Napoleon I. In London a similar demonstration was made when he arrived there just after Christ¬ mas. Early in January he visited Rome where he was counted as a sort of messiah, come to save Europe from

the terrors of future wars. These visits were made at the request of the govern¬ ments concerned and during the delays incident

to the gathering of the peace conference. Still, he was not unaware of the risks of his position. He had remarked to a friend in September preceding that he almost dreaded to think of the end of the war, for then every nation of Europe and every group of interests in the United States would begin to think of selfish ends.

When the peace conference opened, it was promptly discovered that the first of the Four¬ teen Points, open covenants openly arrived at, could not be realized. Men simply would not discuss in public the graver issues involved, lest the very ends they sought should be jeopardized. The conference decided to sit behind closed doors. Then it was found that the conference was too large for rapid work and a council of five, including Wilson, Lloyd George, Clemen-ceau, Orlando of Italy and Makino of Japan took its place. This was later changed to a council of four, the Japanese representative simply absenting himself. Wilson labored a month to induce his colleagues to accept the Fourteen Points, including the proposed league of nations, the most important of all. The other repre¬ sentatives endeavored for a month to arrange the preliminaries of a peace without applying the Wilson principles and without accepting the league idea. But unable to agree, the whole conference met on the 14th of February and accepted the idea of a league as a part of the treaty. Wilson returned to America and in public addresses warned his opponents that the covenant of the League of Nations would be so interwoven with the Treaty of Peace that the rejection of the former would involve the rejection of the latter. How little this state¬ ment availed its author was revealed in the months that followed.

Returning to Paris about the middle of March 1919, Wilson found the conference had abandoned the League of Nations idea and had set about a peace of indemnities, annexations and reprisals. For a month Wilson fought almost single-handed for a peace which he could call democratic. He won to the extent that France abandoned her demand for a Rhine frontier and agreed to self-determina¬ tion in Poland and other European sub¬ merged nationalities; and the League of Na¬ tions was made a part of the treaty. But the concessions greatly weakened the President, while the opposition to him on substantially imperialistic grounds gained constantly in the United States. Wilson returned with the Treaty and, calling Congress together, laid it before the Senate on 10 July 1919. Immediately the bitterest opposition was

manifest. Wilson fought for his work at Paris. He recognized that the essentials of his whole career in the White House were under attack. He made a tour of the country on behalf of the adop¬ tion of the Treaty and the League of Na¬ tions. He spoke at Columbus, Ohio, at Saint Louis, at many other points in the Middle West and on the Pacific Coast. Everywhere he urged acceptance of the Treaty and at many places received extraordinary ovations. But he was taken ill at Wichita, Kans., and was hurried home to Washington, where he was kept in bed for several months. The judgment of history upon his contribution to the progress of ((all men everywhere,® as the American ideal

runs, cannot now be made up, although none may doubt that he will be counted among the greatest of American Presidents. The Nobel Peace Prize for 1920 was awarded to Presidnt Wilson.

Consult Woodrow Wilson, Congressional Government (1885), (The New Freedom* (1913), and the volumes of his (Addresses and Messages,* published from time to time by Harper's, form, the chief sources for his ideas and recommendations. The Congressional Record® and the newspapers of the day from 1913 to 1920 give his addresses to Congress and show how much of his work has passed into law. Consult also Hale, William Bayard,

< Woodrow Wilson: His Story > (1912); Har¬ ris, H. W., (Life of Woodrow Wilson) (1917) ; Low, A. Maurice, (Woodrow Wilson: An In¬ terpretation (1918) ; Robinson and West, ˆThe Foreign Policy of Woodrow Wilson (1917).

William E. Dodd,

Professor of American History, University of Chicago.

WILSON, N. C., city and county-seat of Wilson County, on the Atlantic Coast Line and the Norfolk Southern railroads, 'about 42 miles east by south of Raleigh. It is in an agri¬ cultural region in which the chief

products are cotton and tobacco. It is the largest bright leaf tobacco market in the world. The principal manufacturing establishments are cotton and lumber mills, carriage factories, foundries, ma¬ chine shops, tobacco works and flour mills. The town owns the electric-light plant, gas plant and the waterworks. The five banks have a combined capital of over $450,000. There are public and private schools for both races. Pop.

(1920) 10,612.

WILSON BILL, The, a tariff measure en¬ acted by Congress in 1895, succeeding the Mc¬ Kinley Act (q.v.) of 1890. The Wilson tariff bill was based on the cost of raw material rather than on the cost of production, and was passed in the interest of the manufacturer. By this bill wool *as placed on the free list or was made free of duty.

WILSON COLLEGE, a college for women, located at Chambersburg, Pa. It was estab¬ lished in 1870 under the auspices of the Presby¬ terian Church. The majority of the board of trustees are Presbyterians and the college is under the special care of the Synod of Penn¬ sylvania. The courses offered are a classical course leading to the degree of A.B. and a scientific course leading to the degree of B.S. Each course is four years in length ; the work in all courses includes required and elective studies. Bible study is required in all courses. History and theory of art and music are in¬ cluded among the regular electives ; and stu¬ dents can take technical music courses and at the same time do the full amount of work required for the A.B. degree. Courses in physical education are required for three years of the college course, and the outdoor sports of rowing, tennis, basketball and hockey are encouraged. The students maintain three liter¬ ary societies, one open to all from which the most able members are chosen to the two honor societies; membership in one of these societies is required. The college campus comprises 50 acres located in the suburbs of Chambersburg ; the Conococheague flows through the grounds,

affording opportunity for rowing and fishing. The buiidings include Main Hall, Fletcher Hall, South College, Science Hall, the dining hall, the gymnasium, with a new swimming pool, Frank Thomson Music Hall, with a large audi¬ torium, the infirmary and faculty residences. The library contains 14,000 volumes ; the students average 245, of

whom over 200 are candidates for the A.B. degree.

WILSON'S CREEK, Battle of. Battle of

the American Civil War fought 10 Aug. 1861 near Wilson's Creek, about 10 miles south of Springfield, Mo. General Lyon commanded the Federals who numbered about 6,000, while the Confederates under McCulloch were about 10,000. Lyon on 9 August sent 1,200 men under Col. Franz Sigel to take up position for attack on the Confederate right flank on the morning of the 10th. Lyon meanwhile prepared to at¬ tack the Confederate left. Sigel failed in his attack and the Confederates resisted Lyon and compelled his forces to retreat to Rolla. Lyon was killed during the battle. The losses were about even — • 1,100 on each side. Consult John¬ son and Buel, (Battles and Leaders of the Civil War* (New York 1887).

WILSON'S RAID FROM CHICKA¬ SAW TO SELMA, ALA., AND MACON,

GA. After the defeat of Hood's army at Nash¬ ville (q.v.) 1 5—16 Dec. 1864, Gen. James H. Wilson proceeded to complete the organization of a cavalry corps, with which it was proposed to overrun the South and destroy its railroads and manufacturing centres. Early in March 1865 27,000 men had been gathered and organ¬ ized, nearly all well mounted, finely equipped and brought to a high state of efficiency. Some of this force was detached for other duty. Wilson, who had been encamped along the north bank of the Tennessee River from Gravelly Springs to Waterloo Landing, crossed the river on 18 March and started from Chicka¬ saw and Waterloo, on the 22d, for a march through northern Alabama, his first objective point being Selma, a great manufacturing place. He had the three divisions of Gens. Emory Upton, Eli Long and E. M. McCook, aggre¬ gating 12,500 mounted men with 24 guns. He had also 1,500 dismounted men, who were to act as train guards till they could be mounted from captured horses. General Sherman says it was the largest, most efficient and most powerful body of horse that had ever come under his command. It' was not excelled by any body of cavalry in the army. Accompany¬ ing it was a small canvas pontoon train of 30 boats, hauled by 50 six-mule teams, and a supply train of 250 wagons which were sent back to the Tennessee as fast as they were unloaded. This train carried 45 days' rations of coffee, 20 of sugar, 15 of salt and 80 rounds of ammuni¬ tion. Each man carried five days' light rations, with 100 rounds of ammunition, and five days' rations of hard bread and 10 of sugar and salt were carried on pack animals. As the entire country near the Tennessee was nearly destitute of forage it was necessary to scatter

the troops over a wide extent and march as rapidly as circumstances would permit. This, Wilson says, was rendered safe by the fact that General Forrest's Confederate forces were at the time much scattered, some near West Point,

Miss., 150 miles southwest of Eastport, while Roddey's forces occupied Montevallo, on the Alabama and Tennessee Railroad, nearly the same distance to the southeast. By starting on diverging roads the enemy was left in doubt as to the real object and compelled to watch equally Columbus, Tuscaloosa and Selma. Therefore the divisions marched on different roads, but the objective point of each was Selma, distant 180 miles, and the average march of each division to reach it was 250 miles. The command moved southward in three col¬ umns and on the 26th reunited at Jasper, about 80 miles southeast of Tuscumbia, from which it crossed the two forks of the Black Warrior, and pushed for Montevallo, a centre of iron manufacture. General Croxton's brigade was detached to move on Tuscaloosa, to burn bridges, factories and public stores, and rejoin the command in the vicinity of Selma. Iron¬ works and rolling mills were destroyed near Elyton, and 31 March, after passing Monte¬ vallo a mile, Upton encountered Roddey, who disputed the road to Randolph. After two brisk engagements Roddey was driven back, los¬ ing 100 men, and was pursued by Upton, who occupied Randolph at dark. Here a courier was captured with dispatches to Forrest, # showing that several columns were moving to join For¬ rest for the defense of Selma, and detachments were sent to check them. McCook was left at Randolph to guard the trains and rear, while Wilson, with the divisions of Long and Upton, on 1 April, rode straight for Selma, encountered and brushed away several detachments of For¬ rest's cavalry and at Ebenezer Church came upon Forrest in position, with the brigades of Roddey, Crossland and D. Adams, about 1,500 men, covering the two roads from Randolph by which Wilson had marched. Long's division and Alexander's brigade of Upton's attacked and carried the position in less than an hour, the Confederates retreating in great disorder toward Selma despite all of Forrest's efforts to rally

them. At night the whole command bivouacked about Plantersville, 19 miles from Selma, after almost constant fighting during the day of 24 miles, during which Wilson had captured three guns and over 200 prisoners. Early in the day McCook, with Colonel La Grange's brigade, had been ordered to march rapidly to Centreville, 40 miles distant, to seize and hold the bridge over the Cahaba, and to fall upon Jackson's Confederate cavalry divi¬ sion, which had thrust itself between the main body and Croxton. At daylight, 2 April, Wil¬ son resumed his march and by rapid move¬ ment, without opposition, the troops were in sight of Selma and mostly in position by 4 p.m. The city had been sufficiently fortified, as was believed, against any possible cavalry attack. The works contained 24 bastions and a num¬ ber of strong redans, with deep ditches and an interior line of four detached forts. They were of semi-circular form, nearly three miles in extent, with both flanks resting on the Alabama River, above and below the city. They mounted 32 guns and were held by Forrest, with about 4,000 veteran cavalry and some 2,000 Alabama militia, home guards and citizens, mostly old men and young boys. Wilson had obtained accurate plans of the works and of the ground in front of them. During the day these

sketches were shown to all his general officers and the plan of attack explained, from which it resulted that upon reaching the vicinity of the works, the various brigades went quickly into position, with great precision. At a given signal Long's division was to lead in the as¬ sault, supported by Upton, but before the sig¬ nal had been given Long had become engaged and without waiting he ordered the charge, and in the gathering darkness his men went for¬ ward, under a severe fire of artillery and mus¬ ketry, scaled the works and after a hand-to-hand encounter drove the Confederates from them and took many prisoners. Some of Upton's men joined in the fight. Gens. Forrest, Armstrong, Roddey and Adams escaped, with a number of men, under cover of darkness. A portion of Upton's division pursued on the Burnsville road until long after midnight, cap¬ turing four guns and many prisoners. Wilson had engaged and in support 8,000 men. His loss was 44 killed, 277 wounded and seven miss¬ ing. Forrest's loss in killed and wounded was less. It was one of the most remarkable feats ever accomplished by cavalry, and its result was the capture of 2,700 prisoners, many colors, nearly 2,000 horses, 104 field and siege guns and an immense quantity of ammunition. Wil¬ son destroyed the arsenal, with 44 buildings, covering 13 acres, filled with machinery

and munitions, powder works, three gun foundries, three rolling mills and several machine shops, and large accumulations of quartermaster and commissary stores. On the 3d Upton's divi¬ sion was sent from Selma to open communi¬ cation with McCook and Croxton, west of the Cahaba. McCook had found Jackson's cav¬ alry between himself and Croxton, and after skirmishing with it at Scottsville, had retired east of the Cahaba. Nothing was heard of Croxton and Upton, and McCook returned to Selma on the 6th. Croxton made a wide de¬ tour to the west and south of Tuscaloosa, and then northward and eastward across Alabama into Georgia before rejoining the corps. Prep¬ arations were now made to march on Mont¬ gomery. It was necessary to prepare 900 feet of bridging to cross the Alabama River, which was running high, horses enough had been cap¬ tured to mount the whole command, supplies in the country were abundant, and on the 9th the entire command, except Croxton's brigade, started for Georgia by way of Montgomery. When the advance, which had not been strongly resisted, was near Montgomery on the 12th, the mayor surrendered the city, Adams, who was in command, having retreated, after burning 90,000 bales of cotton. With bands playing and colors flying the column marched through the city and encamped. Here five guns, a large quantity of stores, small arms and cot¬ ton were destroyed, also five steamboats loaded with military supplies. On the 14th the com¬ mand moved with the greatest celerity to secure the crossings of the Chattahoochee at Colum¬ bus, on the direct road to Macon and West Point, further, up the river. On the afternoon of the 16th Upton's division, in the advance on the Columbus road, struck Buford's cavalry pickets and drove them rapidly through Girard to the lower bridge over the Chattahoochee. The bridge-was fired by the Confederates be¬ fore it could be seized, and it was then decided

to make a night attack upon the central bridge, one of the three that crossed the river at this point. Three hundred men of the Third Iowa cavalry, properly supported, were selected to make the attack. The lines were quietly formed and moved up to within range of the intrenchments covering the bridge, and at a signal the attack began at

9 p.m.; the troops opened a rattling fire from their Spencer rifles, which was replied, to by a storm of canister from 27 guns, but the Iowa men went over the works at many points and all rushed for the bridge. At the same time the Confederates tried to escape by the bridge, which was so crowded with the men of both forces that the Confed¬ erates holding the works at the east end of the bridge and commanding it with two guns, were restrained from firing and the Union forces made a rush upon them and gained possession, and Columbus was taken. Wilson's loss was six killed and 24 wounded. He captured 1,200 prisoners, nearly half of the militia that had defended the place under command of Gens. Howell Cobb and Robert Toombs. Columbus was one of the great manufacturing centres of the Confederacy, and its capture resulted in the destruction of a great quantity of war material, 63 guns, the ram Jackson, mounting six guns, 125,000 bales of cotton, 15 locomotives, 250 cars, a navy yard and armory, two rolling mills, powder magazines and an arsenal, with a great quantity of machinery, two ironworks, three foundries and 10 mills and factories turning out war material. The Confederates abandoned and burned the gunboat Chattachoochee 12 miles below Columbus, On the same day that Wilson captured Columbus, La Grange's bri¬ gade captured West Point. La Grange had been detached at Tuskegee and marching north¬ east, after some sharp skirmishing, appeared before West Point about 10 a.m. of the 16th to find that the bridge spanning the river was defended by an earthwork, mounting three guns, and held by Gen. R. C. Tyler with about 265 men. The fort was taken after a hard fight, during which La Grange's men bridged the ditch of the work, under fire. General Tyler and 18 of his men were killed, 28 wounded and 218 captured. La Grange had seven killed and 29 wounded. The captures were three guns, 500 stands of small arms, 19 engines and 245 cars loaded with army supplies. After destroying the bridges, railway equipment and stores, La Grange moved toward Macon. With the main column Wilson also marched for the same place on the 18th and when nearing the city, on the 20th, his advance was met by a communication from General Beauregard, with information of a truce between Generals Johns¬ ton and Sherman. Before the communication could reach Wilson, who was marching near the rear of his column, his advance had dashed into Macon and received the surrender of Gens. G. W. Smith, Howell Cobb and other promi¬ nent officers, and these, with the garrison, were held as prisoners of war. Here Wilson heard of the surrender of General Lee, and the next day, 21 April, he received a dispatch from General Sherman to suspend hostilities until notified of the result of the negotiations then pending between Sherman and Johnston. The surrender of Macon included four generals, 3,500 men, five colors, 60

guns, a large number

of small arms and great quantities of military stores and supplies.

Croxton, who had been detached from Mc¬ Cook's division at Ely ton on 27 March, rejoined the corps at Macon 1 May. He had captured Tuscaloosa and advanced as far as Bridgeville, then returned to Tuscaloosa and Jasper, thence his line of march was 100 miles north of that pursued by Wilson, and on the way through Alabama he had a sharp engagement at Blue Mountain, near Talladega. He marched 653 miles, most of the time through a mountainous country, so destitute of supplies that his com¬ mand could be subsisted and foraged only by the greatest efforts. Swimming four rivers, destroying five large ironworks — the last in the cotton States — three factories, numerous mills, immense quantities of supplies, capturing four guns andj several hundred small arms and near 300 prisoners, he rejoined the corps with men and horses in fine condition. He lost in all 172 officers and men. The closing act of Wilson's campaign was the capture of Jefferson Davis by regiments from his command.

In the campaign Wilson had marched 525 miles, captured five fortified cities, 288 guns, 6,820 prisoners and 23 colors. He subsequently paroled over 59,000 officers and men of the armies of Lee, Johnston and Beauregard, and had destroyed a vast amount of property of every kind. He lost 99 killed, 598 wounded and 28 missing, an aggregate of 725.

He had conducted the most notable cavalry movement of the war, none other equaled it in skilful planning, bold and successful execution. Consult (Official Records* (Vol. XLIX) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. IV) ; Cox, (The March to the Sea) ; Piatt, (Life of Gen. George H. Thomas* ; Boynton, (Gen. Geo. H. Thomas at Nashville. *

E. A. Carman.

WILTON, Joseph, English sculptor: b. London, 17 July 1722; d. there, 25 Nov. 1803. He studied in Paris and in Rome, and while at Rome in 1750 won the gold medal awarded for sculpture by Benedict XIV on the occasion of his jubilee. He returned to England in 1755 and in 1758 became director of the art gallery of the Duke of Richmond. He was one of the founders of the National Academy and one of its first exhibitors. His busts and 'monuments were in much demand, among

the former being those of Bacon, Cromwell, Isaac Newton, Ches¬ terfield, Chatham and other prominent charac¬ ters. From 1790 until his death he was keeper of the National Academy.

WILTON, Me., town in Franklin County, on the Maine Central Railroad, about eight miles southwest of Farmington. It was settled in 1789 and in 1803 was incorporated. It has lumber mills, trunk and carriage factories, creameries, woolen mills and agricultural imple¬ ment works. The educational institutions are Wilton Academy, public schools and a school library. Pop. 2,143.

WILTON CARPET, a variety of carpet made similar to Brussels, excepting that the wire is flattened instead of being round and has a groove along the upper surface, which acts as a director for the knife by which the loops are cut and the wire liberated.

WILTS, or WILTSHIRE, England, a southwestern county bounded on the north and northwest by the county of Gloucester, on the west by Somerset, on the south by Dorset and Hampshire, on the east by Hampshire and Berk¬ shire; area, 1,350 square miles. The county town is Salisbury. The north is principally a fertile flat, with scarcely any perceptible slope, except on the frontier where it begins to rise in the direction of the Cotswold Hills and near the centre, where it is broken by a ridge of downs ; the south, though presenting at a dis¬ tance the appearance of an almost uninterrupted plain, has an undulating surface, broken by downs and intersected by some fertile and well-watered valleys. In this south division is Salis¬ bury Plain, an elevated plateau, covered with a scanty herbage. On the plain are the megalithic remains of Stonehenge, situated about nine miles north of Salisbury and those of Avebury, about five miles west of Marlborough. The chief rivers are the Bristol Avon, the Salisbury Avon and its tributaries Bourne, Wily and Nadder. Though the arable land is of considerable extent, the larger proportion of the surface is kept in pasture, devoted chiefly in the south division to the rearing of sheep, and in the north to cattle-grazing and the dairy. Wiltshire bacon and cheese are famous. The manufactures com¬ prise woolen goods for

which the principal local¬ ities are Wilton, famous particularly for carpets, Bradford, Trowbridge, Westbury, etc.; excellent cutlery and steel goods at Salisbury, ropes and sacking at Marlborough, large engineering works at Devizes ; and iron ore found in mines nearby is smelted at Westbury. Pop. 286,822.

WIMAN, Erastus, American mercantile agent: b. Churchville, Ontario, 21 April 1834; d. Saint George, S. I., 9 Feb. 1904. He entered the mercantile agency service in 1858 and in 1867 removed to New York, where he became interested in rapid transit schemes for Staten Is¬ land. He increased the number of steamboat trips between that island and New York from 15 to 65 a day, built the Arthur Kill bridge and in 1902 secured congressional authority for the construction of a tunnel under New York Bay connecting New York, Long Island and Staten Island. His later years were clouded by finan¬ cial reverses and the frustration of his exten¬ sive plans for rapid transit. He wrote (Chances of Success> (1892).

WIMBLEDON, wim'bl-don, England, a town of Surrey, eight miles southwest of Traf¬ algar Square, London. It is practically a suburb of London, being located at the north¬ east extremity of the common of same name, which until 1889 was well known in connection with the shooting competitions of the National Rifle Association. It has a free library, alms¬ houses, hospitals and many fine residences, being a favorite residential locality. Area, 3,221 acres; pop. 58,003.

WIMBORNE, wim'bern, or WIMBORNE MINSTER, England, a market-town of Dorsetshire, on the Wimar Allen River, near its confluence with the Stour, about seven miles northwest of Bournemouth. It is of historical interest in connection with its fine cruciform minster, the collegiate church founded by Edward the Confessor which succeeded the convent established by Saint Cuthburh, King Ine's sister, in 705. The minster exhibits vari¬

ous styles of transitional architecture from the Norman onward, has a central and a west tower and contains several interesting features, includ¬ ing the tomb of Ethelred I, and a mediaeval chain-library, one of the few in existence where the books are chained to the shelves. The grammar school in the town was founded in 1496. Pop. about 5,000. Consult Hutchins, John, (The History and Antiquities of the County of Dorset) (Westminster 1861) ; Per¬ kins, cWimborne Minster and Christ Church Priory* (1899) ; Yeatman, (Wimborne Minster*

(1878).

WIMPLE, or WIMPEL, a covering of silk or linen for the neck, chin and sides of the face, worn usually out of doors. It is still retained as a conventual dress for nuns.

WINAMAC, win a-mak, Ind., county-seat of Pulaski County, on the Tippecanoe River, and on the Pittsburgh, Cincinnati and Chicago Railroad, about 90 miles southeast of Chicago and 23 miles northwest of Logansport. It has considerable trade ; the principal shipments are farm and dairy products. The principal public buildings are the courthouse, four churches and the public and parish schools. Pop. (1920) 1,684.

WINANDERMERE. See Windermere.

WINANS, Ross, American inventor: b. Vernon, N. J., October 1796; d. Baltimore, Md., 11 April 1877. He went to England to exam¬ ine English railroad systems in the interest of the Baltimore and Ohio Railroad; and after his return built the first locomotive used on that railroad. He also invented the camel-back locomotive and the eight-wheeled car, and estab¬ lished in Baltimore some of the largest machine shops in the United States. He was active in political matters prior to the Civil War and in 1861 was elected to the extra session of the Maryland legislature, but was imprisoned in Fort McHenry. He was author of several pamphlets on religious subjects and also of (One Religion, Many Creeds > (1870).

WINANS, Thomas DeKay, American en¬ gineer, son of Ross Winans (q.v.) : b. Vernon, N. J., 6 Dec. 1820; d. Newport, R. I., 11 June 1878. He was taken into partnership by his father on coming of age and was sent by him in company with his brother William to make contracts with the Russian government for fur¬ nishing and managing the equipment of a rail¬ road between Moscow and Saint Petersburg. With Andrew M. Bostwick and Joseph Harri¬ son he entered into a contract for $3,000,000, and afterward was engaged in other lucrative contracts with Russia. Upon his return to the United States he became interested in inven¬ tion, and with his father and brother invented a system of steam navigation known as the ˆcigar-ship** ; a tubular adjustment for the feed¬ ing of young trout ; and various other mechan¬ ical devices.

‘ WINATSHIPUM INDIANS, a small

tribe of the Salishan stock of North American Indians, also known as Piskwaus or Pisquouse, residing on Wenatchee River (whence the name of the tribe) and the north branch of Yakima River in Kittitas County, Wash. They took part in the Yakima treaty of 1855, but do not live on the reservation. There are six smaller tribes or bands connected with them and speaking the same language.

WINCHELL, Alexander, American geolo¬ gist: b. North East, Dutchess County, N. Y., 31 Dec. 1824; d. Ann Arbor, Mich., 19 Feb. 1891. He was graduated from Wesleyan University, Middletown, Conn., in 1847, became professor of physics and civil engineering at the University of Michigan in 1853 and of botany and geology there in 1855. He served as State geologist of Michigan 1859-62, professor of geology in the Kentucky University 1866-69, director of the Michigan Geological Survey 1869-71, and chan¬ cellor of Syracuse University 1873-74. From 1879 till his death he was professor of geology and palaeontology in the University of Michi¬ gan. He lectured extensively and published (Sketches of Creation) (1870) ; (Geological Chart' (1870) ; (The Doctrine of Evolution' (1874) ; (Science and Religion) (1877) ; (Pre-adamites) (1880) ; (Sparks from a Geologist's Hammer' (1881); (World-Life' (1883); geo¬ logical Studies' (1886) ; (Walks and Talks in the Geological Field' (1886).

WINCHELL, Newton Horace, American geologist, brother of Alexander Winchell (q.v.) : b. North East, N. Y., 17 Dec. 1839; d. 2 May 1914. He was graduated at the University of Michigan in 1866. In 1869-70 he was assistant State Geologist of Michigan; he assisted in the Ohio Geological Survey in 1870-72 ; and in 1872-1900 he was State Geologist of Minnesota, and also professor of geology and mineralogy at the University of Minnesota in 1873—1900. He was archaeologist of the Minnesota Historical Society after 1906. He served as president of the American Geological Society in 1902; and he edited the American Geologist with his son, Horace V. Winchell, an economic geologist ; he was joint author of (The Iron Ores of Minne¬ sota' (1891), and with another son, Alexander N. Winchell, professor of

mineralogy and pe¬ trology at the University of Minnesota, he was author of (Elements of Optical Mineralogy' (1909). Independently he was author of Cata¬ logue of the Plants of the State of Michigan' (1861) ; (Geology of Ohio and Michigan'

(1872-1900); (The Aborigines of Minnesota' (1911) ; (Weathering of Aboriginal Stone Arti¬ facts' (1913).

WINCHENDON, Mass., town in Worces¬ ter County, on the Miller River, and on the Boston and Albany and Boston and Maine railroads, 36 miles north-northwest of Worces¬ ter and 68 miles northwest of Boston. Electric lines connect it with nearby cities. It was set¬ tled in 1752 and incorporated as a town in 1764; the town includes the villages of Winchendon, Waterville and Winchendon Springs. It is principally a manufacturing town; the chief manufactures are woodenware, tubs, pails, etc., woodworking machinery, toys, ice-cream freezers, cotton goods, rattan and reed furni¬ ture, knit goods, spools, bobbin's, chairs, *etc.* ; there is a national bank with a capital of $200,- 000, and a savings bank, one of the best in the State. It contains Murdock High School es¬ tablished in 1865 with a school library of about 1,500 volumes, and occupying a fine building valued at $100,000 ; the Beals Memorial Li¬ brary of 12,500 volumes. There is an excellent school system, a board of trade and clubs for both women and men. There are three banks with combined resources o f over $3,600,000. The assessed valuation of the town is $4,500,-

000. The town owns and operates the system of waterworks. A modern hydro-electric plant furnishes current for lighting and power. Pop.

5,968.

WINCHESTER, Caleb Thomas, Ameri¬ can educator: b. Montville, Conn., 18 Jan. 1847 ; d. 24 March 1920. He was graduated from Wes¬ leyan University 1869, and studied at the Uni¬ versity of Leipzig 1880-81. He served his Alma Mater as librarian 1869-73 ; was prof essor of rhetoric and English literature 1873-90 arid since (then professor of English literature. He was a lecturer of great charm and wide reputation. He is the author of (Five Short Courses of Read¬ ing English Literature' (1892; 3d ed., 1911); (Some Principles of Literary Criticism' (1899) ; (The Life of John Welsey' (1906), considered by

many critics the best published; (A Group of English Essayists' (1910) ; (Representative English Essays, with introduction and notes' (1914); (Wordsworth — How to Know Him'

(1916).

WINCHESTER, Charles M., American printer and publisher: b. Providence, R. I., 2 April 1867. He is the son of a clergyman who was chaplain of the 12th Rhode Island regi¬ ment in the Civil War and for many years in charge of the First Christian Church at Middletown, N. Y. Mr. Winchester was educated in the public schools of Middletown ; learned the printing trade at Dayton, Ohio, and was proof¬ reader and foreman of a composing room at Akron, Ohio. He returned to New York City in 1891, where he was employed as a compositor, proofreader and foreman of a composing room. In January, 1896, he moved to Albany, N. Y., to manage a branch in that city for a New York printing concern, which was later merged with the J. B. Lyon Company, of which he became general manager, vice-president and subse¬ quently president and one of the owners. Mr. Winchester became associated in many clubs and fraternal societies of the city of Albany, being active head of several, including the Albany Chamber of Commerce, to which he was elected President in 1919 and again in 1920.

WINCHESTER, England, an ancient city, capital of Hampshire, situated on the right bank of the Itchen, 11 miles north of South¬ ampton. The most important edifice is the ca¬ thedral ;' the oldest parts date from the 11th cen¬ tury, but the greater part of the main building was erected at various times from the 13th to the 16th century, William of Wykeham (1324-1404) having an important share in the work. It has a low central tower which alone rises above the general level of the roof ; length from east to west, 545 feet, width of the transepts 186 feet. The length of the nave, which has a beautiful interior, is 351 feet, height 86 feet; the transept contains several beautiful chapels and altars. Numerous monuments include the tombs of William Rufus, of Edmund, son of King Alfred, of William of Wykeham, Cardinal Beaufort, and of Izaak Walton; the shrine of Saint Swithin, *etc.* It is said that there was a Christian church erected at Winchester in the latter part of the 2d century. Late in the 3d cen¬ tury it was converted into a temple to Wodin. In the second half of the 7th century, the exact date not being definitely known, Winchester be¬ came an episcopal see with an unbroken line of

bishops, including the famous Saint Swithin, down to the present. Other notable edifices and establishments are Saint Mary's College (Winchester College or School, one of the great English public schools), founded by William of Wykeham in 1387, richly endowed and accom¬ modated in a large range of* buildings, of which the chapel, hall and library are beautiful speci¬ mens of architecture; the guildhall; the old castle, which has been restored, and assize courts built adjoining; a corn exchange ; barracks for infantry; the hospital of Saint Cross, founded in 1132, several other charitable institutions, a free library and museum, school of art, *etc.* The Abbey Gardens are very beautiful, and statues of Alfred the Great by Hamo Thorny-croft, erected for the millenary of the king celebrated at Winchester in 1901, and of Queen Victoria by Alfred Gilbert, adorn the town. There are no manufactures or trade of any consequence. Winchester was called Caer-Gwent by the Britons, Venta Belgarum by the Romans — under whom it was an important place, with a Christian church — and Wintanceaster by the Saxons. It became the capi¬ tal of England under the Saxons, when the country was united under the sway of Egbert, in the first half of the 9th century, and it re¬ tained this dignity till the middle of the 11th century, being a royal residence and place where Parliaments met after this also. After the bat¬ tle of Naseby it stood a week's siege by Crom¬ well. Pop. 24,146. Consult Heath, <Winchester) (Boston 1912) ; Kitchin, (Winchester) (London 1890) ; Varley, <Winchester) (New York 1910).

WINCHESTER, Ill., city and county-seat of Scott County, on the Big Sandy Creek, and on the Chicago, Burlington and Quincy Rail¬ road, 45 miles west-southwest of Springfield, Ill. It was first settled in 1830. It is in an agricultural region for which it is the shipping point ; it contains grain elevators, flour mills, a meat-packing establishment, and a plow factory; there are two private banks. It has a public high school. Pop. 2,000.

WINCHESTER, Ind., city and county-seat of Randolph County, on the White River, and on the Grand Rapids and Indiana, and the Cleveland,

Cincinnati, Chicago and Saint Louis railroads, about 68 miles northeast of Indian¬ apolis. It is in an agricultural region and in a natural-gas belt. It has flour and lumber mills, brick and tile works, machine shops, and a number of repair shops. The educational in¬ stitutions are a high school, established in 1894, public graded schools, and the Randolph County Law Library. Pop. 4,266.

WINCHESTER, Ky., city and county-seat of Clark County, on the Chesapeake and Ohio, and the Louisville and Nashville railroads. 18 miles southeast of Lexington. It is in an agri¬ cultural region, in the (<Blue Grass® country. It has flour mills, spoke and rim factory, planing mills and machine shops. The principal ship¬ ments are farm products and livestock. The educational institutions are the Kentucky Wes¬ leyan College (Methodist Episcopal South), opened in 1866, and the public and private schools. There are also a Carnegie library and hospital. The two banks have a combined capital of over $200,000. The town was in¬ corporated in 1792. Pop. (1920) 7,866.

WINCHESTER, Mass., town in Middle¬ sex County, on the Boston and Maine Railroad, about eight miles north by west of Boston. In 1638 the place was known as Waterfield, which, in 1640, was changed to Charlestown Village. In 1642 it was called Woburn, and in 1850 the present name was adopted. It has many places of great beauty, and it is a favorite residential suburb for Boston. It has manufactories for watch hands, leather and felt goods. There are machine shops and grist mills. A part of ((Middlesex Fells,® a State park, which has an area of 3,020 acres, is in this town. It has a State Aviary, and a Home for Aged People. The educational institutions are a high school, established in 1850, graded public schools and a public library which contains about 20,000 volumes. There are two banks. Pop. 10,485. Consult Hurd, (History of Middlesex County) (2 vols., Philadelphia 1890).

WINCHESTER, Tenn., town and county-seat of Franklin County, on the Elk River and on the Nashville, Chattanooga and Saint Louis Railroad, about 80 miles south by east of Nash¬ ville. It is near the foot of the Cumberland Mountains, in an agricultural region. The town has considerable mining and lumbering interests. It is a favorite health resort. The chief industrial establishments are lumber and planing mills, wagon and carriage factories, woodworking factories, marble works, flour mills and machine shops. It has one bank with a capital of $75,000. Pop. (1920) 2,203.

WINCHESTER, Va., city and county-seat of Frederick County, on the Cumberland Val¬ ley and the Baltimore and Ohio railroads, about 81 miles west by north of Washington, D. C. It is in an agricultural and stock-raising region and has considerable lumbering interests. It has flour and paper mills, lumber mills, woolen mills, glove factories, tanneries and machine shops. The educational institutions are Valley Female College (Methodist Episcopal South), opened in 1874; the Shenandoah Valley Academy, Fairfax Hall, the Handley Library, the John Kerr High School (white), established in 1872; a high school for colored pupils and element¬ ary schools for both races. The principal public buildings are the courthouse and the city hall. There are National and Confed¬ erate cemeteries.

Fort Loudoun, built under Washington, and Washington's headquarters are of historic in¬ terest. Washington's occupancy of Winchester was in 1755, after Braddock's defeat. Wash¬ ington was stationed here, in command of the Colonial and British forces. During the Civil War, Winchester was for some time a battle centre. On 19 Oct. 1864 Sheridan left Win¬ chester on his famous ride to Cedar Creek. Pop. 6,883. See Opequon, Battle of; Win¬ chester, Military Operations at and Near.

WINCHESTER, Battle of. See Ope¬ quon, Battle of.

WINCHESTER, Military Operations at and Near. Winchester was an important strategic point during the Civil War, and it is stated on good local authority that it was occupied or abandoned 68 times by the troops of both armies. It was held by the Con¬ federates until 11 March 1862 when Gen. J. E. Johnston having retreated from Centreville and

Manassas, Gen. ˆStonewall® Jackson, under Johnston's orders, withdrew from the place and retired up the Shenandoah Valley, and the Union troops, under General Banks, occupied it on the 12th. General Shields, who had followed Jackson up the valley, with a division of Banks' command, fell back to Winchester and Jackson

followed him as far as Kernstown (q.v.), four miles south of Winchester, where Shields at¬ tacked and defeated him on 23 March; Jackson again retreating up the valley, Banks following and finally taking up a fortified position at Strasburg. Jackson flanked Banks out of Strasburg by moving through Luray Valley and defeating Colonel Kenly at Front Royal (q.v.) 23 May, and Banks retreated to Win¬ chester closely pursued by Jackson.

Winchester, First Battle of. — Banks ar¬ rived in Winchester late on the 24th with about 8,000 men and 16 guns. Colonel Donnelly's small brigade was put in position to cover the Front Royal and Millwood roads, and was sup¬ ported by eight guns, judiciously placed on ris¬ ing ground. Colonel Gordon's brigade, on the right, held a low ridge running southwest from the town and west of the Valley turnpike, a little over half a mile from the suburbs. Its left rested on the turnpike and its right ex¬ tended westward along the ascending ridge in front of Winchester. Skirmishers were thrown cut in advance and guns were placed on either flank. Five companies of Michigan cavalry were held in reserve under cover of the ridge. Between Gordon and Donnelly was an interval of nearly a mile, which was filled by the princi¬ pal part of General Hatch's cavalry brigade and two guns. The line formed the arc of a circle, covering Winchester from the west around by the south to the east. Jackson confronted this position with 16,000 men and 48 guns, and with the main body lay close to Gordon, while Ewell, with two brigades which had marched directly from Cedarville on Winchester, bivouacked opposite Donnelly's position. Jack¬ son's plan was to hold Gordon fast, throw Ewell upon Donnelly, and then move his main body around Gordon's right, and he expected to advance upon a disorganized and demoralized army. At dawn of the 25th Ewell advanced the 21st North Carolina and opened with his artillery, whose shells fell among Donnelly's men, as they were preparing coffee and brought them to arms as they saw the Carolinians ad¬ vancing in line across an open field upon the centre of the position crossing the Front Royal road. The North Carolina men met a severe front and flank fire from the stone fences, and as they fell back Captain Best's guns threw canister into their disordered ranks and they left the field with a loss of 80 officers and men, including the two field officers with them. A Confederate officer says, <(The slaughter was appalling and the survivors fled to the rear in the utmost confusion.ˆ Ewell now brought up two batteries, and an artillery duel ensued, which soon ceased as a heavy fog settled over the field. Ewell then made an unsuccessful at¬ tempt to turn Donnelly's right and then en¬ deavored to turn his left and gain the Martinsburg road in his rear. The attempt was checked, Donnelly

losing some ground, but at this mo¬ ment he received an order to retreat, as Gordon had been driven from position and was in re¬

treat through Winchester. Donnelly moved his three regiments and guns from the field in per¬ fect order, under a heavy fire of shot and shell, and continued his retreat, keeping to the right of the Martinsburg road. He had made a suc¬ cessful resistance of over four hours against double his number, with trifling loss.

Jackson attacked Gordon's small brigade with six brigades, his attack beginning at daybreak, and being several times repulsed. Finally he got artillery in position and opened on Gordon's front and gradually worked his infantry toward the left. Then he moved two brigades around Gordon's right. Gordon detected the movement while it was in progress and changed position to meet it, pouring a destructive fire of musketry into the Confederate ranks, making great gaps in the line, without checking its advance ; the gaps were closed and with almost perfect align¬ ment the two brigades came on and flanking Gordon's two right regiments drove them back in some disorder. The five companies of Mich¬ igan cavalry were now brought up and as quickly swept away. At this juncture Jackson ordered forward his entire line of six brigades and Gordon ordered a retreat through Win¬ chester, which was conducted in a manner to command Jackson's admiration. There was some confusion in the streets of the town, but once clear of it, Hatch's cavalry and the artillery covered the withdrawal, until the infantry was well on the Martinsburg pike. Jackson with his main body pursued five miles beyond Win¬ chester and Banks continued his retreat to the Potomac, crossing it at Williamsport on the 26th. Banks' loss May 23-25, including Front Royal and the retreat from Strasburg to the Potomac, was 62 killed, 243 wounded and 1,714 missing. Jackson's loss was 68 killed, 329 wounded and three missing. Jackson remained at and in the vicinity of Winchester until 31 May, when, his rear being threatened by the converging columns of Fremont from the west and McDowell from the east, he retreated up the valley and the Union troops reoccupied Winchester. Consult (Official Records) (Vol. XII) ; Allan, (Jackson's Valley Campaign.*

During Lee's campaign against Pope the town was occupied by Gen. Julius White with a brigade of over 2,000 men. On the night of

2 Sept. 1862 White, under General Halleck's order, spiked four heavy siege guns in the works and withdrew to Harper's Ferry; the Confederates occupying the place next day. The Confederates held the

place in small force until

3 December, when, upon the advance of a Union column from Harper's Ferry, under General Geary, they retired, and Geary occupied the town next day. Geary soon withdrew and the Confederates reoccupied and held the town until near the end of December, when it was again taken by Union troops under General Milroy. Milroy fortified the place and occupied also Berryville and Romney, with outposts toward Strasburg and Front Royal. Harper's Ferry, Martinsburg, Williamsport and posts westward to Cumberland and New Creek were held by Union troops belonging to Gen. B. F. Kelley's command.

Winchester, Second Battle of. — When

General Lee began his preparations for the second invasion of Maryland, which culminated in the battle of Gettysburg, he turned his

thoughts to the clearing of the Shenandoah Valley. At this time Winchester was held by General Milroy, with the two brigades of Gen. W. L. Elliott and Colonel Ely, numbering about 7.000 effective men. Colonel McReynolds' brigade of 1,800 men was at Berryville. The main works defending Winchester were on a ridge north of the town and consisted of two forts known as the <(main fort® and the ((Star fort,® mounting four 20-pounder Parrotts and two 24-pounder howitzers. Surrounding these were smaller works connected by rifle-pits. The expressed object in holding the place was to observe and hold in check the enemy in the valley, and to secure the Baltimore and Ohio Railroad against depredations. Milroy was ex¬ pressly instructed to undertake no offensive operations in force. On 7 June General Lee be¬ gan his operations in the valley by ordering General Imboden, in the upper valley, to make a demonstration with his cavalry brigade on Romney in order to cover the movement against Winchester and prevent the Union troops at that place from being reinforced by Kelley's troops on the line of the Baltimore and Ohio Rail¬ road. General Jenkins' cavalry brigade was ordered to join Ewell's infantry

corps near Front Royal. Both Imboden and Jenkins were in position by the 10th, and on that day Ewell set out from near Culpeper Court House for Winchester by way of Gaines' Cross Roads, Chester Gap and Front Royal, to Cedarville, which was reached on the 12th. Here, next day, Ewell detached Rodes' division and Jenkins' cavalry brigade to move on Berryville and en¬ deavor to capture McReynolds' brigade, but, warned by Milroy, McReynolds made good his retirement, with small loss, joined Milroy at Winchester on the night of the 13th, and was assigned to the Star fort, immediately north of the main work. On the same day Early's divi¬ sion marched on Winchester by Newtown and the Valley pike, while Edward Johnson's divi¬ sion moved upon the town by the direct road from Front Royal. The two divisions, driving in Milroy's outposts, were in position before Winchester on the evening of the 13th. For some days Milroy had felt the pressure from Confederate cavalry, but had no idea that Lee was threatening the valley until a prisoner taken in a skirmish on the Strasburg road, on the evening of the 13th, informed him that he was confronted by Ewell's corps and that Longstreet's was near. Fully recognizing the fact that an orderly withdrawal was imprac¬ ticable, he resolved to act on the defensive, and, if not relieved, force his way through what might appear the weakest part of his lines. At night of the 13th Ewell ordered Early to attack the works on the north and west of the town next morning, while, as a diversion, John¬ son demonstrated against the east and south¬ east. In the forenoon Johnson made his attack on the eastern side of the town, between the Millwood and Berryville roads, held by Colonel Ely's brigade, and was repulsed by the Eighth and 87th Pennsylvania, which charged John¬ son's retreating troops, but were speedily driven back by fresh troops, and after some sharp fighting Johnson gained part of the town, but was quickly shelled out and made no further effort. West of the ridge on which the main forts were thrown up, and about 1,300 yards

distant, is another parallel ridge, called Flint Ridge, where an isolated earthwork of slight strength had been thrown up to command the Pughtown and Romney roads. It was held by the 110th Ohio, a company of the 116th, and a reg¬ ular battery, commanded by Lieutentant Wallace F. Randolph, all under command of Col. J. W. Keifer. Early, leaving Gordon's brigade south of the town to engage Milroy's attention, moved with the remainder of his division to the left and west, then north, crossed the Romney road, and about 5 p.m., having gained Round Moun¬ tain, south of the Pughtown road, and put 20 guns in position, without being perceived, opened an unexpected fire on Keifer's work and soon silenced Randolph's battery,

upon which Hays' brigade, in two lines, made a quick dash, and after a stubborn resistance carried the work, and captured the battery of six guns. Keifer, with a loss of over 40 men, withdrew under cover of the fire from the guns of the main works. This was followed by an artillery duel which was kept up until 8 p.m., during which Milroy withdrew his detachments to his main works. Darkness ended the contest.

Milroy was now in a critical position. His cannon ammunition was nearly exhausted and he had but one day's rations for his men. At 9 p.m. he assembled his brigade commanders, and it was concluded to give up further effort to defend the place, to abandon all the artillery and wagons, and to force a way through the Confederate lines that night, taking with them only the horses, small arms and usual supply of ammunition. All the guns were spiked and the ammunition thrown into the cisterns. At 1 a.m. of the 15th Milroy, abandoning his sick and wounded, avoiding the town, moved silently through a ravine about a mile and struck the Martinsburg pike, which was followed cau¬ tiously, with many halts to close up the strag¬ glers, for about three miles, when, about 3.30 a.m., Elliott's brigade, which was in the ad¬ vance, was fired upon by Confederate skirmish¬ ers, and it was soon ascertained that their main body was east of and very near the road. The retreat had been anticipated and intercepted. Under Ewell's order, General Johnson had left one brigade to prevent Milroy from escaping toward the east, and moved with the remainder of his division by way of Jordan Springs to Stephenson's Depot, about five miles north of Winchester, to intercept the retreat in that di¬ rection. Just as Johnson's head of column reached the railroad, 200 yards from the Mar¬ tinsburg pike, Milroy's men were heard coming down the road and Johnson formed his line on elevated ground in a woods east of the road and in a field south of and adjoining the woods. The greater part of his men were sheltered by a stone fence which bounded a railroad cut. As soon as Elliott took in the situation he formed line of battle with his three leading regiments to push back the Confederates and thus clear the way for the rest of the column to pass on toward Martinsburg. An hour's fight ensued with varying success, Johnson's right being forced back and his artillery silenced, but the left of his line held firm against all efforts to shake it.. The main road being blocked, Mil¬ roy determined to try another, and directed the troops to fall back a short distance and turn to the right. Part of them did so, but the greater

number filed to the left, leaving the Martinsburg road and taking that to Bath. The diverg¬ ing columns could not be reunited. A part of the command, accompanied by Milroy, reached Harper's Ferry by way of Smithfield late in the afternoon. Those retreating on the Bath road made good their escape, crossed the Poto¬ mac at Hancock and rallied to the number of 2,700 at Bloody Run. The greater part of Ely's and McReynolds' brigades were captured. John¬ son claims the capture of 2,300 men, 175 horses and 11 colors. The capture of Winchester and defeat of Milroy gave the Confederates 28 guns, 300 loaded wagons, many horses and 4,000 prisoners. The Union loss was 95 killed, 348 wounded and 4,000 captured or missing. The Confederate loss was 47 killed, 219 wounded, three missing. Consult (Official Records) (Vol. XXVII) ; Doubleday, (Chancellorsville and Gettysburg. >

On marching into Maryland General Early left a small garrison at Winchester, and after the return from Gettysburg Lee's army was en¬ camped around the place until it fell back be¬ yond the Rappahannock. The town was not then reoccupied in force by Union troops, being only visited occasionally by small detachments from Harper's Ferry and Martinsburg. It was subject also to Confederate forays from the upper valley. In December 1863 General Early was sent into the valley, and throughout the winter and early spring of 1864 kept his troops very active, occasionally making dashes into Winchester. On 29 Feb. 1864 General Sigel was assigned to the command of the Union troops in the lower valley, and soon thereafter Win¬ chester was occupied as an outpost to Harper's Ferry and Martinsburg. Sigel was relieved by General Hunter after the battle of New Market (q.v.), 15 May, and when Hunter was repulsed at Lynchburg and forced to retreat to the Kanawha General Early moved down the valley, and driving everything out of it, encamped near Winchester, 3 July, preparatory to his attempt on Washington (q.v.). After his failure on Washington Early returned to the lower valley and being hard pressed from the east and north fell back toward Strasburg, at the same time sending Ramseur's division of infantry toward Stephenson's Depot, a few miles northeast of Winchester, to support his cavalry and check General Averell's division of Union cavalry, advancing from Martinsburg. Averell defeated Ramseur at Stephenson's Depot (q.v.), 20 July, and followed him through Winchester. He was joined by General Crook's division, on the 22d,

Crook assuming command, and the two divi¬ sions of 11,000 men advanced to Kernstown on the 23d. Early returned, defeated Crook at the second battle of Kernstown (q.v.) 24 July, drove him through Winchester and across the Potomac, and reoccupied Winchester and Mar¬ tinsburg. Early's successes called for a strong commander of the Union forces to oppose him, and General Sheridan was selected. On 7 August when Sheridan assumed command, near Harper's Ferry, Early's army was concentrated west of the Opequon River, covering Winches¬ ter and Bunker Hill. Sheridan advanced from Halltown toward Winchester, on the morning of the 10th, and Early, abandoning Bunker Hill and Winchester, fell back to Strasburg to await reinforcements coming from Lee's army at

Richmond. Sheridan followed to Cedar Creek on the 12th. Early's reinforcements arriving, Sheridan's infantry fell back to Winchester on the night of the 16th, the cavalry following next day. From Winchester Sheridan, on the 17th, fell back to Berryville, behind the Ope¬ quon, leaving his cavalry to cover the with¬ drawal. Wilson's cavalry division, Lowell's cavalry brigade and Penrose's brigade of New Jersey infantry, 850 men, were ordered to coyer the flank of the army in its march from Win¬ chester to Berryville. The Jersey brigade was deployed along a small branch of the Opequon, south of and near Winchester, with dismounted cavalry on the flanks, the remainder of the cavalry massed near the town. Early had fol¬ lowed Sheridan from Cedar Creek and, in the afternoon of the 17th, his cavalry advanced driv¬ ing in the Union cavalry, was checked and held by the Jerseymen, until Wharton's division of infantry attacked their right and Ramseur's their front, while Gordon's division advanced against the cavalry. Under this pressure the entire Union line gave way about dark and fell back to Summit Point. The Jersey brigade lost 97 killed and wounded and about 200 prisoners. The cavalry had about 50 captured. Early again occupied Winchester and advanced to confront Sheridan at Halltown. For some days both parties were feeling each other's lines and suf¬ fering some losses, and 2 September, General Averell, who had been guarding the crossings of the Potomac, south of Hancock, advanced through Martinsburg to near Bunker Hill, where he attacked and routed General Lomax's cavalry division of two brigades, capturing two battle-flags, 55 prisoners, some wagons and a herd of cattle, finally driving Lomax nearly into Winchester next day, but Averell, in turn, was driven back by Rodes' infantry division. On the 13th General McIntosh, with five cavalry reg¬ iments and two guns, started from Sheridan's lines near Berryville, captured some prisoners, and on approaching Winchester caught sight of an infantry

line and charged it, driving it to a piece of woods, which he surrounded, cap¬ turing the Eighth South Carolina of Kershaw's division, with its battle-flag. The rest of Ker¬ shaw's division advanced and McIntosh fell back with his 143 prisoners. These minor en¬ counters were followed on the 19th by the greatest battle fought at Winchester, which to distinguish it from other battles of Winchester is known as the battle of the Opequon (q.v.), in which Sheridan with 38,000 men defeated Early's 15,000, and drove him from Winchester up the valley, not again to return. From this to the close of the war Winchester remained in Union possession. See also Shenandoah Valley, Military Operations in.

E. A. Carman.

WINCHESTER COLLEGE, a public

school at Winchester, England, the oldest of the ffGreat Public Schools® of that country. It was founded in 1382 by William of Wykeham, and was opened in 1393, although its buildings were not finished until 1395. The original foundation consisted of a warden, 10 fellows, three chaplains, 16 choristers and 70 students who were to live at the school. Out¬ side scholars, or ((Commoners,® to the number of 10, were admitted, and this number was after¬ ward increased. The original buildings are still

in use and are exceptionally fine architectural types. Newer buildings have been added at various times as the requirements of the school have demanded them. The Public School Com¬ mission in 1862 abolished the sinecure fellow¬ ships, thereby saving for the school consider¬ able* revenues for improvements. The original foundation openings are filled by competitive examinations, and occur at the rate of about 12 annually. The school from the time of its establishment prepared for New College, Ox¬ ford, and it has six scholarships at that insti¬ tution. The new house built for the ((Commoners,® together with the accommodations for the 70 students in the old house, permit a total stu¬ dent body of about 450. The curriculum is classical in its

base, gives mathematics, one mod¬ ern language, and chemistry, geology or physics. There is also an army class which offers special instruction for entrance examinations into the army. Consult Holgate, C. W., (Winchester Long Rolls) (1899) ; Leach, A. F., (History of Winchester College* (London 1899) ; Vaughan, John, <Winchester Cathedral Close> (New York 1914) ; Shawell, L. L., Enact¬ ments in Parliament (4 vols., Oxford 1912).

WINCHESTER LINE. See Boundaries of the United States.

WINCKELMANN, vmk'el-man, Johann Joachim, German archaeolgist and art histo¬ rian: b. Stendal, Prussia, 9 Dec. 1717; d. Trieste, Austria, 8 June 1768. The son of a poor cob¬ bler he acquired his early schooling as charity pupil in his native town. He was graduated from a gymnasium at Berlin, and later studied theology at Halle. He next undertook the study of medicine at Jena, but was unable to complete the course because of lack of means and for a number of years he was obliged to serve as private tutor and schoolmaster, but in 1748 he was appointed by Count Heinrich von Biinau secretarv in his library at Nothnitz, near Dresden. In 1755 he joined the Roman Catho¬ lic Church, and through the efforts of the papal nuncio at Dresden was enabled to visit Rome. Here he became librarian to Cardinal Archinto after whose death he entered the service of Cardinal Albani, an art connoisseur and col¬ lector, and gave the public his ideas on an¬ cient art. The more important of his works are (Geschichte der Kunst des Alterthums* (1764) ; and (Monumenti antichi inediti* (1767-68) ; with various sets of letters on the remains at Herculaneum and Pompeii. He was recognized as the leading authority in Eu¬ rope in the field to which he had devoted him¬ self. In 1768 he revisited Germany, but at Munich a longing for Italy so overmastered him that he determined to return. Going by way of Vienna, he was well received there, and was presented to the Empress Maria Theresa, who bestowed rich presents on him. At the beginning of June he departed for 1 rieste, where, for the sake of. the gold medals and valuables in his possession, he was murdered by a fellow-traveler, named Arcangeli. The robber was interrupted, and fled without secur¬ ing any booty, but was subsequently takea and executed. A collective edition of Winckelmann's works was published (1808-20) and an¬ other (1825-29). Winckelmann is considered by all authorities as the founder of modern scien¬ tific archaeology and his conception of the beau¬

tiful elicited Lessing's (Laokoon.> Consult Justi, (Winckelmann und

seine Zeitgenossen) (2d ed., 3 vols., Leipzig 1898) ; John, (Biographische Aufsatz* (1866) ; Pater, Walter, (The Renaissance: Studies in Art and Poetry) (London 1910) ; Vogel, in (Allgemeine deutsche Biographies XLIII (1898).

WIND, a current of air established at cer¬ tain times and places within the body of the atmosphere at large, and flowing during pe¬ riods longer or shorter in certain general direc¬ tions ; such currents being occasioned chiefly by differences of temperature at different times or localities, and by variations in the production and condensation of watery vapor. The por¬ tion of the surface of the globe over which any particular wind, permanent or occasional, may extend, is comparatively small, as is conse¬ quently the tract of the entire aerial ocean resting on that surface that is involved. At all times, also, there are parts of the atmosphere that are sensibly at rest or calm ; and such ap¬ parently motionless tracts of air are sometimes of very great extent. (For a statement of the physical properties of the air, see Atmosphere; and in reference to the mechanical principles of equilibrium, mobility and disturbance of a fluid mass circumstanced as is the air, see Pneu¬ matics). The atmosphere is held to the earth only by gravity and the action of this force does not interfere with its fluidity or elasticity, nor with the effect of any pressures acting at points within it; so that its parts have entire freedom of motion about or among each other, and it is in every part sensitive to the slightest disturbing forces. Since, however, the globe with its aerial envelope is to be re¬ garded as moving in unresisting space, and since the friction of the earth's surface upon the low¬ est stratum of air, and of the strata successively one upon another, has sufficed to communicate to the entire body the earth's own velocity, it follows that the atmosphere, if it were left at rest within itself, must partake of the earth's movements as perfectly as if it were a solid part of that body. The simplest of the dis¬ turbances affecting the atmosphere are the movements of (<atmospheric waves® of greater or less magnitude and duration, but of two sorts, the daily and the occasional or irregular, the occurrence of which is shown by certain periodical or rare, but gradual variations of barometric pressure. From the nature of the medium, these waves are, as compared with those of water, on a vast scale. The indica¬ tions of the barometers at stations scattered over a large area of country show that these waves move singly, and indicate their breadth, and the direction and rate of advance ; a gener¬ ally increased or maximum pressure showing at a given time the presence of the crest, while at distances on either side of this a minimum press¬ ure shows the margins or accompanying troughs of the wave. Of daily atmospheric waves, or tides, there are two: (1) that

due to attraction of the sun and moon, and which fin periods and character is, therefore, similar to the oceanic tides, but which, its maximum ef¬ fect on the mercury column not exceeding of an inch, cannot be a cause adequate to pro¬ duce winds; (2) the heat tide, or elevation of a crest of air along a meridional line following the sun at no great distance, while the cooling on the opposite side of the globe occasions the ad-378

vance of a corresponding line of depression, this tide having, therefore, for its period a solar day, and within that period but a single crest, instead of two opposite ones. Beside these pe¬ riodic fluctuations, there are occasional vast at¬ mospheric waves, due perhaps to previous winds, to great local disturbances of temperature, or to combinations of causes not yet understood. The disturbances by heat that give rise to or¬ dinary periodical or irregular winds are such as occur along certain latitudes, or as are local and irregular altogether. An increase of tem¬ perature equal to 50° F. dilates the air receiv¬ ing it by only about one-tenth of its volume. From the direct rays of the sun air absorbs heat chiefly near the surface of the earth, and yet slowly even here, the warming of the air being more largely due to secondary radiation from the heated surface of the land or water. The heat acquired within a given time is usually by a very gradual increase and limited in amount. If the warming of the air is quite uniform over a large surface, the equilibrium between the af¬ fected and the surrounding bodies may be steadily adjusted and preserved, so that no wind shall result ; and it is a common experience of the hot season that, though the air at a place may be intensely heated, or through many de¬ grees within a few hours, yet no wind may occur. During subsequent cooling of the same body of air a wind is more likely to arise, and especially so if clouds form at no great dis¬ tance. Very generally, however, the effect of heating a tract of air in excess over that around it is to occasion expansion and diminution of density; the column of air so affected moves or flows upward, and while the effect of its mo¬ mentum further relieves its lowermost portions of pressure and diminishes the resistance they can oppose to the surrounding air, the ascending body, losing at considerable height its excess of heat, acquires the density of air at such eleva¬ tion and flows over or outward, increasing the weight and pressure of some or all the sur¬ rounding portions. The lateral equilibrium be¬ low is thus

destroyed and a double movement of the air established, the air flowing in from one or more directions below the heated space, and flowing out above. But the momentum acquired in some given direction by the air rushing into the affected space may predom¬ inate, and, the conditions of neighboring por¬ tions of air favoring, a wind may thus be estab¬ lished that shall blow far beyond the point of first disturbance, as well as successively affect portions of atmoshphere further back of it, and also extend widely, continuing for a long time before equilibrium and calm are restored. As a well-known fact, however, high or widely ex¬ tending winds are more likely to arise just be¬ fore or during storms in which a considerable body of watery vapor is condensed and precip¬ itated from the air, and yet more likely to be felt chiefly after such storms. Winds are also known to be produced in consequence of rapid and great evaporation, and even during the rapid formation of belts or masses of cloud without rain. In all the great oceans, however, there are certain winds, called trade-winds, which always blow in the same direction, though with seasonal variations in the area over which they blow. These are cold currents of air constantly flowing in from the polar regions to replace the warmer and lighter air which is

constantly ascending from the tropical belt and which finds its way back, at first entirely through the upper strata of the atmosphere, to the re¬ gions in which the cold currents take their rise. The direction of these winds, which is nearly due. west, but slightly south or north, according as it is a northeast or southeast trade-wind, results from the axial rotation of the earth from west to east. The general character of the air-movement is twofold. There is a move¬ ment from the poles toward the equator, and a return movement from the equator to the poles. In low latitudes the latter takes place exclu¬ sively in the higher strata of the atmosphere, but in higher latitudes its effect is often felt on the surface of the earth. In these latitudes, then, the winds may be divided into equatorial and polar, the former being as a rule more or less westerly, the latter more or less easterly. The equatorial winds are distinguished in gen¬ eral by the highest temperature, the greatest degree of saturation, the most cloudy weather, the most frequent rainfall and the lowest at¬ mospheric pressure; and the polar by the low¬ est temperature, the least degree of saturation, the clearest weather, the least rainfall, and the highest atmospheric pressure. This explains why the southwest wind is that which brings the most rain, and why a falling barometer is as a rule a sign of approaching rain, and also why the barometer, as is well known, usually shows an upward tendency with an east wind. Certain winds have a seasonal

character, being cither confined to certain seasons of the year, as the harmattan of the Guinea coast and the etesian winds that blow from the north in summer in the eastern part of the Mediterranean, or changing their direction at certain seasons, such as the monsoons of the Indian Ocean. (See Anemometer; Chinook Wind; Meteorology; Sirocco). Consult Bigelow, F. H., (Report on International Cloud Observations } (Washing¬ ton 1901) ; Cave, C. J. P., Structure of the Atmosphere in Clear Weather* (New York 1912) ; Ferrel, W., <Popular Treatise on the Winds) (New York 1889).

WIND CAVE NATIONAL PARK. This

park, created by act of Congress on 9 Jan. 1903, is 12 miles northwest of Hot Springs in Fall River County, S. Dak. It is on the southeast slope of the Black Hills and has an area of nearly 15,000 acres. The cave has extensive galleries in Pahasapa limestone with many fine crystal formations on its walls. It was once the channel of subterranean streams and owes its origin to the solution of the limestone by water. The name is appropriate because at most times a strong air current is passing into or out of the narrow entrance to the cave. The park includes a game preserve of 4,160 acres in its northwestern corner, maintained by the United States Biological Survey. It contained (1918) 42 head of buffalo, 90 head of elk and a small herd of antelope.

WIND-FLOWER, the delicate Anemone nemorosa, A. qninque folia, and other members of this genus of the Ranunculacece, so-called be¬ cause. the ancient Greek name of some plant associated in Greece with the winds has been given to the Anemone, or because the little plants bloom when spring winds are rampant. The two species mentioned send up an early flowering stem, bearing about its centre a whorl

of three digitately divided leaves; above them is a solitary white-petaled starry flower, often tinged with shell-pink on the outside. They expand fully only in sunshine and nod with half-closed corollas on cold, dark days and at night. The plants choose mossy stumps in swamps, or damp thickets for their habitat and have large basal leaves

later in summer. On the prairies the red wind-flower (A. hudsoni-ana) and the pasque-flower (Pulsatilla patens) bear this name. Another European wind-flower is Gentiana pneumonanthe , a low, blue-flowered marsh plant.

WIND GAP. See Stream Piracy; Trellised Drainage.

WIND INSTRUMENTS, a general name for musical instruments played by the human breath, as the flute, the cornet, etc., or by arti¬ ficially-produced currents of air, as the organ, harmonium, etc., in all of which the vibrations of a column of air produce the sound. The wind instruments of an ordinary orchestra are usually divided into two classes : wood instru¬ ments and brass instruments; the organ or har¬ monium being classed apart. The woods, some of which are partially composed of ivory, are the piccolo, flute, flageolet, clarionet, basset-horn, oboe and bassoon. Their tone is light, smooth and soft, and almost vocal in its char¬ acter and can be produced in all the delicate crescendo and diminuendo shadings. The brasses comprise the cornet-a-piston, horn, trumpet, trombone, euphonium, bombardon, *etc.* Their tone is somewhat harder and generally more powerful and majestic than that of the woods. Being fixed-toned instruments (except the trombone) they cannot, like the strings, play in perfect tune, and the}'- can only produce one sound at a time. See Musical Instru¬ ments ; Orchestra ; Orchestral Instruments ; Organ.

WIND-KANTER. See Dreikanter.

WIND VANE. A contrivance, sometimes known as an anemoscope for showing the di¬ rection of the wind. The simplest and most common form of vane consists of an arrow balanced delicately on an upright post and free to revolve. The post or rod often carries a compass scale, which is placed near the arrow. The United States Weather Bureau uses a vane in which the arrowhead balances a tail-piece of two thin boards, six inches wide and 36 inches long. These boards are close together near the axis but diverge about five inches at their outer extremities, thus steadying the os¬ cillations. . The axis is fitted with ball-bearings to reduce friction and is provided with me¬ chanical or electric arrangement for the auto¬ matic registration of wind direction. To indi¬ cate the true local wind the vane must be placed in an open space and at a sufficient height above surrounding buildings or other ob¬ structions which might cause it to show a wind direction other than the true one. See Ane¬ mometer. Consult Abbe, (Meteorological Ap¬ paratus and Methods) (Washington 1887) and instructions to Observers,'* issued by the United Slates Weather Bureau.

WINDAGE. See Projectiles.

WINDBER, Pa., borough in Somerset County, on Pennsylvania Railroad and Johns¬ town trolley line, nine miles south of Johns¬ town. The chief industry is coal mining, the

region being underlaid with the famous Som¬ erset smokeless coal, and there being within a radius of five miles 15 active mines employing nearly 4,000 men. Next in importance are the lumber and the fire brick manufacturing industries. Each of the two banks has assets of approximately $2,000,000 and the postal savings bank has deposits of over $100,- 000. Practically all residence properties in the borough are owned by the occupants. The electric light and power, as well as water and steam-heat are furnished by subsidiary com¬ panies of the Berwind-White Coal Mining Company; the fire department has apparatus and equipment valued at $22,000. The town has a handsome municipal building, 14 churches, a large opera house, eight hotels and prosperous stores, together with one weekly newspaper, the Windber Era. There are over 2,100 pupils in the public schools. Pop. (1920) 9,462.

WINDBREAK, in agriculture, rows of trees planted along the edge of fields of grain, orchards, etc., to break the force of the wind and to protect the crops.

WINDER, win'der, William Henry, Amer¬ ican general: b. Somerset County, Md., 18 Feb. 1775; d. Baltimore, 24 May 1824. He was grad¬ uated from the University of Pennsylvania and became a lawyer in Baltimore. In March 1812, at the breaking out of the war he was appointed lieutenant-colonel of infantry and was made colonel in July of the same year. He led a suc¬ cessful expedition from Black Rock to the Can¬ ada shore, 28 Nov. 1812; was promoted to be brigadier-general in March 1813 ; appointed ad-juant and inspector-general in May 1814; com¬ manded at the battle of Bladensburg and the unsuccessful defense of Washington, in Au¬ gust 1814; and was honorably discharged in June 1815. He then resumed his law practice and was subsequently a member of the Mary¬ land senate.

WINDERMERE, win'der-mer, or WINANDERMERE, England, a lake in Lanca¬ shire and Westmoreland, about 11 miles in length and from one-third of a mile to a mile in width, its area being a little over five square miles; its depth varies from 30 to 240 feet. Its out¬ let is the river Leven, which discharges its wa¬ ters into Morecambe Bay. The

lake is sur¬ rounded by gentle, well-wooded eminences and the neighborhood is noted for its beautiful scenery, celebrated by the Lake poets, Words¬ worth, Coleridge and Southey. Wordsworth lived at Rydal Mount, about two miles from the head of the lake. Windermere, a small town near the eastern shore of the lake, is lo¬ cated in Westmoreland and is the terminal of a branch of the London and Northwestern Railway. In 1905 this town and Bowness were united into one district. Pop. 2,379.

WINDGALLS, puffy swellings about the fetlock-joints of animals, particularly of horses, resulting from an increased secretion of syno¬ via arising from work, particularly on hard roads ; they are generally unassociated with any pain, heat or lameness and are not generally considered to be causes of unsoundness. If the horse is young they may disappear if the ani¬ mal is allowed a long rest and the parts blis¬ tered once or twice. Old horses having wind-galls are generally kept at work, the legs being bandaged when in the stable. Consult (Special

Report on Diseases of the Horse1* (United States Bureau of Animal Industry, Washington

1911).

WINDHAM, win'dam, William, English orator and statesman: b. London, 3 May 1750; d. there, 4 June 1810. He was educated at Eton, Glasgow and Oxford, and he entered Parlia¬ ment as member for Norwich in 1784. During the early part of Pitt's administration he sat in the opposition, but during the course of the French Revolution joined Burke in condemning the revolutionary principles and

advocating the war that Pitt declared against France. He was Secretary-at-War in Pitt's Cabinet 1794—1801, and under the Fox and Grenville ministry, which came into office in January 1806, held the rank of Colonial Secretary. During his ten¬ ure of office, which continued till March 1807, he brought in and succeeded in passing against strenuous opposition, a measure for reducing the duration of the period of enlistment for sol¬ diers, and making various provisions for im¬ proving the condition of the soldier. Windham was a man of thoroughly independent character, but his independence sometimes passed over into eccentricity. A collection of his speeches with a memoir by Thomas Amyot was pub¬ lished in 1806, while he was yet in office ; his diary was edited by Mrs. Henry Baring in 1866. Consult also Correspondence of Edmund Burke and William Windham* (ed. J. P. Gil¬ son, Cambridge 1910) ; (The Windham Papers* (2 vols., London 1913).

WINDHOVER, a name in Great Britain for the kestrel (q.v.), referring to its habit of holding a stationary position facing the wind, while it searches the ground beneath it for indi¬ cations of prey.

WINDHUK, WINDHOEK, or GREAT WINDHOEK, Africa, city and capital of the former colony of German Southwest Africa, 170 miles east of Swakopmund and the coast, with which it is connected by rail and telegraph. The city is situated in a mountainous district, and at Little Windhuk, a short distance to the southwest, there are hot springs. It is an ex¬ cellent fruit-growing region and produces grapes, figs, dates, peaches, oranges and pome¬ granates. It was occupied by the South Af¬ rican Commonwealth Army under the British flag 12 May 1915. The population is about 25,000, of which about 1,500 are whites. See War, European — 'Colonial and Japanese Campaigns.

WINDLASS, in mechanics, a machine for raising weights from a pit, consisting of a cylin¬ der or roller moving on an axle supported on a frame and turned by levers inserted in square holes cut in the cylinder, or by a crank fitted on to one or both ends of the axle. One end of a rope or chain is attached to the cylinder, and the other to the weight, which is raised by the rope being shortened in passing round the roller.

WINDLE, Sir Bertram Coghill, Irish edu¬ cator : b. Mayfield, Staffordshire, 8 May 1858. He was educated at Repton School and at the University of Dublin. For four years he was president of the Birmingham Library and at various times was member of the education sub-committee of the Birmingham School Board. Dr. Windle is a member of the Joint Univer¬ sities Catholic Board and from 1884

to 1904 was professor of anatomy and for many years

dean of the medical faculty of Birmingham University and bodies which preceded it. From 1904-18 he was president of University (formerely Queen's) College, Cork, and after 1910 was professor of archaeology there. He was also senator of the National University of Ireland and Commissioner of Intermediate Education in Ire¬ land. In 1918 he became professor of anthro-ology in St. Michael's College, Toronto. In 1912 e was knighted. His publications include cPro-portions of the Human Body* (1892) ; (Life in Early Britain* (1897); (Shakespeare's Coun¬ try* (1899) ; (The Malvern Country* (1900) ; (The Wessex of Thomas Hardy* (1901) ; (Chester* (1903) ; (Remains of the Prehistoric Age in England* (1904) ; (School History of Warwickshire* (1906); (What is Life? A Study of Vitalism and Neo-Vitalism* (1908) ; (Facts and Theories* (1912) ; (A Century of Scientific Thought* (1915) ; (The Church and Science* (1917), and many scientific papers and articles in Dublin Review, Catholic World, America, and Studies.

WINDMILL, a machine for furnishing power for grinding grain, pumping water, or doing other useful work, operated by the wind. History does not record the date of invention of the windmill ; but it is known that it was used in Europe as early as the 12th century a.d. A common form of European windmill is shown in Fig. 1. The sails, upon which the wind

acts in driving the machine, consist of a light framework upon which canvas is stretched. The surface of the canvas makes an angle (called the angle of weather) with the plane of the windwheel, and this angle is usually about 18° at the inner end of the sail, gradually decreasing to about 7° at the outer end. The length of the sail is generally about five-sixths the length of the arm, the width of the outer end one-third the length, and the width of the inner end one-fifth the length. For proper

action the axis of the windwheel shaft should be parallel to the direction of wind. In most cases it is, however, inclined upward at an angle of about 15° to permit the ends of the sails to clear the tower, and since the direction of the wind' is, in general, horizontal, this condition for proper action is not fully realized in windmills of the European type. To allow the windwheel to be turned as the direction of the wind changes, the upper part of the structure is adapted to rotate about the verticle axis of the tower, being supported upon rollers at A and the auxiliary wheel B is provided to maintain it in its proper relation with the direction of the wind. This auxiliary wheel is so connected, by gearing, with the fixed part of the structure that in rotating it causes the movable part of the structure to turn about its axis. When the main windwheel is properly directed the auxil¬ iary windwheel presents its edges to the wind, and is, therefore, not affected by it ; a change in the direction of the wind tends to cause rota¬ tion of the auxiliary wheel which in rotating brings the main windwheel into proper relation with the wind. Before the invention of the auxiliary steering wheel, and to a large extent after its invention, the main windwheel was

kept in position by hand. In many cases the whole tower, instead of merely the upper part thereof, is made to pivot about its vertical axis, this latter construction being generally fol¬ lowed in German practice, while that above de¬ scribed is common to machines built by the Dutch. In some very crude windmills of the European type no provision whatever was made for changing the direction of the windwheel. The speed of a windwheel tends to vary with the wind velocity. In windmills of the European type, where speed regulation is desired, it is accomplished by varying either the load or the sail area exposed to the action of the wind. A friction brake is often used to vary the load, while to vary the sail area the canvas forming the sail surface is rolled up or unrolled, or the sail surface is formed from slats, after the fashion of the Venetian blind, and changed by opening or closing the slats. The devices for varying the sail area are actuated either by hand or by a suitable auto¬

matic governor. It is to be observed that the sails of the European windmill occupy only a small portion of the area swept by them. In the American type the sails are much greater in number and occupy,

comparatively, a much larger part of the area swept by them. The

greater number of sails makes it possible to re¬ duce the diameter of the windwheel, for a given power, considerably below that necessary in the European windmill ; as a result the American windmill is much smaller than that of Europe.

Fig. 5.

The windwheels of the latter were often as large as 100 feet in diameter; those of Ameri¬ can type are rarely larger than 30 feet in diameter.

American windmills are built in a very large variety of styles, some being constructed prin-

cipally of wood, others entirely of metal. Each is, however, designed automatically to maintain the windwheel in its proper relation with the direction of wind, to deliver the power devel¬ oped either by means of a rotating shaft or re¬ ciprocating rod, and automatically to keep its speed below a certain definite and safe limit. A certain number of methods have been de¬ vised for each of these operations. Different

combinations of these methods, together with variations in minor details, result in the large variety of styles. Figs. 2, 3 and 4 show sev¬ eral windmills of ‘the American type, these particular forms being selected because among them may be found examples of each of the methods by which the results before mentioned are accomplished. The

windwheel may be held in proper position with regard to the direction of wind in three ways, namely, by means of a rudder or tail, as in Figs. 2 and 3, by means of an auxiliary steering wheel, as in Fig. 4; and by the pressure of the wind upon the windwheel itself, which is placed on the opposite side of the tower to that from which the wind proceeds, as in Fig. 4. When the windmill is to be used for pumping purposes exclusively, the power is, in general, transmitted from the windmill to the pump by means of a reciprocat¬ ing vertical rod, as in Figs. 2 and 3. Those in which the pump rod makes one complete stroke for each revolution of the windwheel, as in Fig. 4, are termed direct stroke windmills ; when 'the pump rod makes only a fraction of a stroke for each revolution of the windwheel, as in Figs. 2 and 3, the windmill is said to be back geared. The back gearing may be accomplished either by means of a pair of spur gears, as in

Fig. 2, or by means of a rack and pinion, as in Fig. 3. In pumping windmills of recent construction back gearing is very largely em¬ ployed, its object being to avoid the great shocks and violent churning of the water resulting from the rapid action of direct stroke wind¬ mills, and to reduce the losses in the pump due to friction and to backlash of the valves. When the windmill is to be used for general power purposes, which may include pump¬ ing, sawing, grinding, etc., the power is transmitted through a train of gears to a vertical shaft, those of this general type being known as geared, or power windmills. Any torque exerted by the gearing upon the vertical shaft reacts upon the windmill itself, tending to rotate it out of its normal position with re¬ gard to the direction of wind. Neg¬ lecting friction, the torque at the vertical shaft is equal to that exerted by the windwheel divided by the number of turns which the vertical shaft makes to one turn of the windwheel. Hence the effect of the vertical shaft in disturbing the posi¬ tion of the windwheel becomes smaller in amount as the ratio of gearing between them is increased, and for this reason the ratio of gear¬ ing is in best practice made about six to one ; that is, the vertical shaft makes six revolutions to one revolu¬ tion of the windwheel. This high ratio is also an advantage in that it allows the diameter of the vertical shaft, for a given size of windwheel, to be made considerably less than that which would be necessary with a smaller ratio.

When the pressure of the wind upon the windwheel becomes so great as to approach the danger point, it is lessened by reducing the sail area ex¬ posed to the wind. In the windmill shown in Fig. 2 the windwheel is so placed that a line drawn through its centre parallel to

the normal direction of the wind passes to one side of the axis about which the windmill pivots. The tail is in each case supported upon the windmill frame by the hinge joints, C, C\ and is held in its normal position with reference to the windwheel by the spring D. Wind-pressure upon the windwheel tends, therefore, to stretch the spring, and it does so when it is sufficient to overcome the initial tension of the spring, thus turning the windwheel so that the wind acts obliquely upon it and reducing the exposed sail area. The initial tension of the spring is so determined that it will begin to stretch when the pressure of the wind upon the windwheel approaches the safe limit. In the windmill shown in Fig. 3 the windwheel is so placed that a line through its centre parallel to the normal direction of the wind intersects the axis about which the windmill pivots. The side vane E is fixed to the windmill frame, upon which the tail is also carried, being sup¬ ported by the hinge joints, C, C\ The tail is held in its normal position with reference to the windwheel by means of the spring F. Press¬ ure of the wind upon the vane E tends, there-Fig. 4. — Vaneless Airmotor.

turns which a windwheel will make in a given time varies inversely as its diameter. (6) There is .nothing gained by having the sail area of a windwheel greater than seven-eighths of the area swept by the sails, and there is little gained by having it more than three-fourths the latter area.

In order that the maximum power may be fore, to stretch the spring F, and the spring is so determined that it will be stretched when the wind pressure upon the vane E approaches the is evident that any change in the relative posi¬ tion of the windmill is changed so that the exposed sail area is reduced, in the same man¬ ner as with the windmills shown in Figs. 2 and 3. In the windmill shown in Fig. 4 it is evident that any change in the relative posi¬ tions of the steering wheel and the main windwheel will result in a change in the position of the latter relative to the wind. The frame carrying the steering wheel is pivotally mounted upon the frame which carries the mam

windwheel, and is held in its normal position with reference to it by the coiled spring H. In the ordinary running position the wind falls per¬ pendicularly upon the side of the tail of the steering wheel, and when the pressure upon it exceeds the safe limit it overcomes the resist¬ ance of the spring and changes the position of the steering wheel so that the wind falls upon its face; this causes the steering wheel to act, which moves the main windwheel so that the wind falls obliquely upon it, thus reducing the exposed sail area. Other methods of regula¬ tion, involving centrifugal governors or varia¬ tions from the arrangements above described, have been devised, but have not come into ex¬ tended use. The particular mechanical details involved are subject to very wide variation, but the arrangements shown in the figures serve to illustrate the principal types.

Windmills of the usual forms are, in gen¬ eral, mounted upon towers of heights ranging from 10 to 100 or more feet, so that the wind which acts upon them will not be seriously affected by obstructions which may exist in their immediate neighborhood. Provision is al¬ ways made for controlling, or furling, the wind¬ mill from a convenient place near the base of the tower, generally by means of a wire, termed the furl-wire. Furling is in general accom¬ plished by reducing the exposed sail area to such an extent as to prevent the action of the windmill. The reduction of the exposed sail area is in each case accomplished in the same manner as in the process of regulation, except that the force necessary to lift the weight or overcome the tension of the spring is applied through the furl-wire and transmitted by a suit¬ able arrangement of levers or pulleys, instead of being supplied by the energy of the wind. Thus in the windmills shown in Figs. 2 and 3 a pull transmitted through the furl-wire is applied to the tail in such manner as to bring it into a posi¬ tion parallel to the plane of the windwheel. In that of Fig. 5 the auxiliary wheel is turned through an angle of 90 degrees by means of a pull on the furl-wire. It is to be observed that in each of the windmills heretofore mentioned the windwheel is adapted to rotate about an axis the normal position of which is parallel to the direction of the wind. A number of types of windmills have been devised in which the

windwheel rotates about an axis, the normal position of which is in a plane perpendicular to the direction of the wind, but they have not attained a sufficient degree of success to war¬ rant considering them here. If A represents the plane area, in square feet, swept by the sails of the windwheel, V, the velocity of the wind in feet per second, and 3

the weight in pounds of a cubic foot of the air, then the weight of air available per second for use by the windwheel is W = AV 3, and its energy is equal to

WV2 ,

~2g - ,9 being a constant representing the accele¬ ration due to gravity. The power in foot¬ pounds per second brought to the windwheel by

WV2 V3A4

this air is, therefore, L = — — = —■■■■-. This

$$\frac{2g}{2g}$$

expression indicates that, other conditions re¬ maining the same, the power of a windwheel varies directly as the cube of wind velocity, and directly as the area swept by the sails, both of which relations have been substantially verified by experiment. In the construction of wind-

Fig. 6.

mills considerations of strength require that, in general, the linear dimensions of all of the parts shall bear the same proportional relation to each other, regardless of the size of the windwheel. Other conditions being equal, the weight of a windmill, therefore, varies directly as the cube of the diameter of its wheel, while its power varies directly as the square of the diameter of the wheel. Hence, in increasing the size of windmills, the weight, and the conse¬ quent cost of material, increase more rapidly than the capacity, and it is not, therefore, found practicable to increase their size beyond a cer¬ tain degree. When a windmill is in operation the air currents which act upon it are so modi¬ fied and broken up, by their contact with the sails and other members, as to render accurate mathematical treatment of the case impossible, in the present state of our knowledge. For this and other reasons, mathematical considera¬ tions of the case are chiefly of theoretic interest and the development of the form of the windwheel has been due rather to experiment than to theory.

The most notable among the experiments which have been made upon windwheels are those made about the middle of the 18th cen¬ tury, upon windwheels of the European type, by John Smeaton, and those made in 1882 upon windwheels of the American type by Thomas O. Perry. In these experiments the following im¬ portant facts were, among others, established: (1) The maximum power which may be ob¬ tained from a given windwheel varies directly as the cube of the wind velocity. (2) The sail speed of a windwheel, when developing its max¬ imum power, varies directly as the wind ve¬ locity. (3) The load upon a windwheel, when developing its maximum power, varies directly as the square of the wind velocity. (4) The capacity of a windwheel varies directly as the square of its diameter. (5) The number of

turns which a windmill will make in a given time varies inversely as its diameter. (6) There is nothing gained by having the sail area of a wind'wheel greater than seven-eighths of the area swept by the sails, and there is little gained by having it more than three-fourths.

In order that the maximum power may be obtained from a windmill, in winds of vary¬ ing velocity, the load must vary directly as the square of the wind velocity. In practice the load is seldom, if ever, made to vary in this manner. The most common form of installa¬ tion is that in which a pumping windmill is directly connected to a single acting pump oper¬ ating under a constant head. In such cases the average load during a complete cycle of the pump is practically constant regardless of the wind velocity. Moreover, the load varies, in general, from about zero during one stroke to a maximum at about the middle of the other stroke. This periodic variation of load is also a source of loss, especially when the windwheel is rotating slowly, and the amount of kinetic energy stored in it is small. In the case of

power windmills the load depends upon the character of the work. Some grain-grinders for use in connection with power windmills are constructed so that the grain is fed to them by centrifugal action, and in these instances the load upon the windmill is made to increase as the speed increases.

Consult Barbour, (Wells and Windmills in Nebraska) (Washington 1899) ; Murphy, E. C., (The Windmill: Its Efficiency and Economic Use) (in U. S. Geological Survey, Water Sup¬ ply and Irrigation Papers, Nos. 20, 29, 41, 42, ib.

1899-1901).

WINDOM, wm'dom, William, American financier: b. Waterford, Ohio,

10 May 1827; d. New York, 29 Jan. 1891. He was admitted to the bar in 1850, engaged in law practice at Mount Vernon, Ohio, and in 1852 was prosecut¬ ing attorney of Knox County, Ohio. He held this position for three years, when he removed to Minnesota. Sent to Congress from that State in 1859, he was reelected to serve four successive terms, a period of 10 years, ending his career in the House in 1869. He was appointed to the United States Senate in 1870 to fill the unexpired term of Daniel S. Norton, deceased, and was also elected for the terms ending in 1877 and 1883. He resigned, how¬ ever, in 1881, to accept the Treasury portfolio in President Garfield's Cabinet, and on his re¬ tirement from the Cabinet after that President's death he was returned to the Senate where he served the remainder of his term. He was oc¬ cupied with various financial interests in New York from 1883-89, when he was appointed Secretary of the Treasury in President Harri¬ son's Cabinet and occupied that position until his death. He was one of the earliest expo¬

nents of the gold standard, and was considered available as a Presidential candidate in three national conventions, those of 1880, 1884 and

1888.

WINDOW, an open space reserved, as in a wall, for the admission of daylight into the in¬ terior. (See also Dormer Window). The window generally is in a vertical wall. The opening may be filled with glazed sash or case¬ ment arranged to open and shut, as in the mod¬ ern houses; or with glazed sash of wood, iron, or lead fixed firmly to the solid frame of the window, or with only a single panel here and there made to open, as in the case of churches both ancient and modern ; or the space may have a slab of semi-transparent stone let into it through which much light may enter, as in some Oriental and ancient European buildings; or a slab of marble with holes cut in it may be in¬ serted, or in place of this a continuous grating, as of bronze, both of which were frequent in classical Roman buildings ; or, finally, the space may be left without permanent fill¬ ing of any sort, shutters being used to close it when needed, as in many parts of Europe in the Middle Ages, and as common now in the tropics. Still a further modification of the last-named scheme is found in those tropical houses which have all the openings filled with jalousies, namely, shutters with slats (louver shutters), some of which may even be fixed

fast, while others open on hinges. As the climate becomes too warm for the necessity of closing the windows at any time in the year, these devices tend to replace solid shutters and casements.

Architecturally the window is of the greatest importance to certain styles, and in others does not count at all. Thus in Grecian architecture there are no windows ; and in Greco-Roman architecture the window has never been a con¬ trolling member because the great windows of the public halls are commonly the lunettes under the vaulting, simply pierced and filled with gratings instead of built up solid with masonry. The window of the ancient Roman dwelling, also, so far as we know it, was of less consequence because there were no open¬ ings of any great size in the outer walls, and the room9 opening inward upon the court or garden were more or less without walls on that side, a large doorway and a square window above the bed-place needing nothing but a cur¬ tain or the like to screen them. Even in Byzan¬ tine and Syrian art the window, though begin¬ ning to be emphasized by a stone trimming or casing, is not that wffiich the style depends upon. But in the mediaeval styles of northern and western Europe the window is the chief feature after the roofs with their fixed slope and their height above the walls. The earliest Roman¬ esque had windows, small indeed, but with jambs richly molded in the thickness of the heavy walls ; and the later style takes on some of the variety and brilliancy of the Gothic work. The Gothic window in a church is the opening up of the whole wall space between buttress and buttress and below the vault ; and this space tends to be filled with elaborate tracery. Even apart from the tracery, the moldings of the jamb — often with colonnettes produced by fitting a round molding with capital and base, and with sculpture added to the sill-course — may be very decorative. In dwelling-houses

tracery was rare, but the window, if large, was closed with a pointed arch and the head filled with a slab of stone pierced with a decorative opening and supported by colonnettes, or in some other way architecturally treated. The very numerous windows with square

heads, that is, with lintels instead of arches, are made ornamental by moldings, sometimes very rich and elaborate, and by the free use of colon¬ nettes to carry the lintels. In the neo-classic style a curiously regulated and ordered system of arranging the windows became customary in the early days of the Renaissance, and was completely developed in the 16th century in Italy, and 50 years later in the north. Under the name of fenestration this ordering of the windows has become a most important part of designing, especially in the street fronts of city buildings. The window-casings may even be ornamental in themselves, though with an ornamentation not strictly belonging to them, but borrowed, as it were, from other parts of the structure: thus, small pediments are used to crown the window openings, and even col¬ umns are used one on either side of the window opening, to support these pediments. But the main thing is still the arrangement of the win¬ dows in the wall and the proportioning of these openings and the solid wall between them.

WINDOW GLASS. See Glass, Varieties

OF.

WINDOW TAX, a tax formerly imposed in Great Britain on all windows in houses (latterly above six in number). It was abol¬ ished in 1851, a tax on houses above a certain rental being substituted.

WINDSOR, wm'zor, Canada, a seaport town, capital of Hants County, Nova Scotia, on an inlet of Minas Bay, and on the Dominion Atlantic Railway, 45 miles northwest of Hali¬ fax. Its chief institution is King's College (q.v.), or Windsor University, founded in 1788. It is a busy shipping port, is electrically lighted, and has a considerable export trade in the gyp¬ sum and limestone of the region. Pop. 3,452.

WINDSOR, Canada, the largest town in Essex County, situated on the banks of the Detroit River, opposite the city of Detroit. Five railways enter the city, including the Grand Trunk, Canadian Pacific, Michigan Cen¬ tral, Wabash, and the Ontario division of the Pere Marquette. The location makes Windsor one of the desirable residential cities of the continent. It has a number of churches and schools, a collegiate institute and Saint Mary's Academy. The chief manufactories are salt works, paint and varnish works, sash, door and planing factories, boiler works and ma¬ chine shops, with various minor industries. It has several miles of paved streets and an ade¬ quate sewerage system. Pop. 17,829.

WINDSOR, Conn., town in Hartford County, on the Connecticut and

Farmington rivers, and on the New York, New Haven and Hartford Railroad, six miles north of Hartford. It is in an agricultural section in which the chief products are vegetables, fruit and tobacco. The principal manufactures are worsted goods, paper, electrical motors, knit goods, tobacco products and dairy products. The educational institutions are the Campbell School for girls, the Loomis Institute, public schools and a public

library. The first settlement was made in 1633 by William Holmes and companions from Ply¬ mouth. They established here a trading post. In 1635 Roger Ludlow and a colony from Dorchester, Mass., settled near the trading post and called the place Dorchester. In 1637 the name was changed to Windsor. In 1639 Wind¬ sor united with Hartford and Wethersfield, under ˆFundamental Orders, » to form the com¬ monwealth of Connecticut. Pop. 4,178. Con¬ sult Stiles, (Ancient Windsor* (New York 1891) ; (Memorial History of Hartford County.*

WINDSOR, or NEW WINDSOR, Eng¬ land, a town in Berkshire, on the Thames, 21 miles by rail west of London. Windsor and Eton (q.v.) practically form one town, which is chiefly interesting on account of the castle and park, a favorite residence of the English sovereigns since the time of William the Con¬ queror. The original royal palace, where the Saxon kings lived before the Conquest, was at Old Windsor, about two miles distant, but the present site was chosen and the castle built by William; later extensions were added by Henry I and Henry II, but during the reign of Ed¬ ward III it was torn down and rebuilt by Wil¬ liam of Wykeham, bishop of Winchester. The new castle received various additions by the orders of succeeding monarchs until the time of Queen Victoria, who restored and sump¬ tuously decorated Albert chapel as a memorial to the Prince Consort, Albert. The buildings com¬ prise upper, lower and middle wards, extending along the crest of an eminence rising 42 feet above the river and covering 12 acres in the Little or Home Park, which is connected with the Great Park and adjoining Windsor Forest, the whole occupying an area of 13,000 acres, 56 miles in circumference. The lower ward on the west contains Saint George’s chapel, the Albert chapel, the houses of the military knights, clois¬ ters, etc.; the Middle Ward, dominated by the Round Tower, rising to a height of 80 feet, built by Edward III to accommodate the round table of the Knights of the Order of the Garter, containing the rooms which were up to 1660 used as a prison; the Upper Ward on the east, comprised of the sovereign’s private

apartments, the library and the long corridor. Saint George's Hall, the Waterloo Chamber, the Throne Room and the old Ball Room, compris¬ ing the state apartments in the Upper Ward, have valuable collections of paintings, statuary, *etc.* Under Saint George's chapel is the burial vault of several English rulers and members of the royal family. The royal palace and the mausoleum of Frogmore, Cumberland Lodge and Virginia Water are in the park. The town hall of Windsor was built by Christopher Wren in 1658. Consult Dixon, W. H., (Royal Wind¬ sor* (London 1879-80) ; Hope, W. H., (Windsor Castle: An Architectural History* (2 vols., London 1914) ; Laking, G. F., (Furniture of Windsor Castle> (New York 1905) ; Loftie, W. J., (Windsor: The Castle, Park, Town and Neighborhood) (London 1886) ; Tighe, J. E., (Annals of Windsor * (1858).

WINDSOR LOCKS, Conn., town in Hart¬ ford County, on the Connecticut River, and on the New York. New Haven and Hartford Rail¬ road, about 12 miles north of Hartford. It was a part of the town of Windsor until 1854,

when it was set off and incorporated. It is a manufacturing town ; extensive water power is obtained from the Connecticut by means of a canal. The chief industrial establishments are paper mills, cotton yarn and thread factories, a foundry, machine shops, steel works and silk factories. Other manufactures are furniture, trucks, school globes and carpet-loom chains. The principal public buildings are Memorial Hall, presented by Charles E. Chaffee to J. H. Converse Post 67, G. A. R. ; four churches and the public and parish schools. It has one bank. Pop. 3,715.

WINDSOR MILLS, Canada, town in Rich¬ mond County, Quebec, on the Saint Francis River, 80 miles east of Montreal, on the Grand Trunk and the Canadian Pacific railways. It has abundant water power and manufactures paper and pulp, powder and cheese. Pop. about 2,233.

WINDTHORST, Ludwig, leader of the Catholic or Centre party in the German Reichs¬ tag from 1874 to his death: b. at Kaldenhof, near

Osnabriick in Hanover, 17 Nov. 1812; d. Berlin, 14 March 1891. He received his early education at the Caroline Gymnasium in Osnabriick and studied law at Gottingen and Heidel¬ berg. He began the practice of law at Osnabriick. He occupied various official positions in connection with German courts of law and his talents and impartial character were widely recognized. Politically he clung to the opinion that there should be a union of the German states including Austria. He emphasized the necessity for the preservation of the independ¬ ence of* the various petty German governments and of absolute freedom of religion and edu¬ cation. In 1851 he was elected president of the second chamber of the legislature of Hanover, and in 1853 became the Minister of Justice in the Cabinet of George V. He held this same portfolio ten years later. In this position his treatment of vexed questions between Catholics and Protestants called forth praise from both parties. When the reigning house of Hanover fell as the result of the war of 1866, he was sadly disappointed, but fitted himself at once into the new order of things in the fatherland by accepting election for the town of Meppen to the Prussian Lower House and to the Reichs¬ tag of the North German Confederation. Here he soon came to occupy a prominent place as a valuable assistant of the leader of the Catholic party, Mallinckrodt. At Mallinckrodt's death, 1874, Windhorst was selected to replace him. For nearly 20 years he remained a successful leader of the party, which under his influence gradually came to have the balance of power in the Reichstag. While he was a devoted Catholic, he was an intense lover of his country, believed thoroughly in the maintenance of the German army in order to assure peace, and the last speech that he ever made, scarcely a month before his death, was in favor of a liberal pro¬ gram of development for the navy. Once when Vatican influence seemed to be used to urge a political measure, in which the German gov¬ ernment was very much interested, he came out distinctly in opposition. Just before the decla¬ ration of the infallibility of the Pope, he joined with those who thought the moment inoppor¬ tune but he was always devoted to the Holy See.

He was the model of a successful party leader; an expert in the management of men ; an excel¬ lent judge of character and one of the best Parliamentary debaters of the 19th century. In spite of his years of occupation of an influential political position, he died quite poor. When the Catholics of Germany wished to recognize his great services to their cause by the sub¬ scription of a large sum of money, he di¬ verted it to the foundation of a church in honor of the Blessed Virgin to be erected in Hanover. Few statesmen have been more bit¬ terly

maligned than was Windthorst at the be¬ ginning of his career. After his death political foes joined with friends in recognizing his talents, his uprightness of character and the ab¬ solute purity of his motives, besides his lofty patriotism. His great merit is to have suc¬ ceeded in preventing Bismarck from making the Church merely a department of state in Ger¬ many. The Catholic party agreed that it was to his talents as a leader that they owed most of their success in the struggle with the German Chancellor. Consult Menzenbach <Windthorst) (Treves 1892) ; Knapp, <Windthorst) (Manner der Zeit Series; Leipzig 1898).

James J. Walsh, M.D.

WINDWARD (windward) ISLANDS, a

group of the West Indies forming the southern part of the Lesser Antilles, including Saint Lucia, Saint Vincent, Grenada and the Grena¬ dines. They are of volcanic origin, the larger islands are mountainous ; the lower levels being generally fertile and producing sugar, cocoa and spices ; logwood and other timber are also ob¬ tained. They belong to Great Britain ; the gov¬ ernor resides at Saint George's, Grenada. The islands have no common legislature, laws or tariff ; but there is a common court of ap¬ peal, and they unite for other purposes. (See articles under the names of the individual is¬ lands of the group). As a geographical divi¬ sion the Windward Islands include also Bar¬ bados and the other smaller islands lying be¬ tween Saint Lucia and Grenada. The name was applied because the group was the most exposed of the Lesser Antilles to the northeast trade winds.

WINE-BERRY, a Japanese plant (Rubus phcenicolasius) , closely related to the raspberry, with long recurving canes which root at the tips and are clothed with red glandular hairs. The leaflets are usually three, white, tomentose be¬ neath, and the flowers are in dense axillary clusters, forming a loose panicle. The bristly calyx-lobes enlarge in fruit and enclose the immature berry as in a bur, but eventually spread apart; the mature fruit is small, soft, cherry-red in color, in flavor insipid or acid. The wine-berry is frequent in cultivation and has run wild in some parts of the eastern United States.

The grape, the whortleberry, the goose¬ berry and the red and the black currants are called wine-berry; as are also the edible, berry¬ like fruits of the poisonous toot-plant (Coriaria sarmentosa) , a large shrub of New Zealand.

WINE MEASURE, an old English meas¬ ure by which wines and spirits were sold. The gallon contained 231 cubic inches.

WINE PRESS, a machine in which the juice is pressed out of grapes. The wine press

of the Bible was a vat in which the juice was expressed by the feet of men who trampled the fruit.

WINE AND WINE-MAKING. It may

have been design, but it was probably an acci¬ dent, that first led man to crush or to press grapes in order to obtain a palatable and stimu¬ lating beverage. As long as the juice is con¬ fined within the grape, it becomes sweeter and sweeter as the fruit grows riper and riper. But when the skin is broken by crushing or press¬ ing, and when the juice is allowed to remain a short time exposed to warmth and air, it changes its character and develops new and un¬ suspected qualities or properties.

The changes from the fresh grape juice to an alcoholic drink are briefly as follows:

When the juice, c-r <(must,)) is exposed to temperatures ranging from 59° F. to 65° F. the liquid very soon begins to become turbid, small bubbles collect on the surface and the grape skins, stems and other solid particles form a dense cover or <(cap® on the top. Carbonic gas, which is developed in increasing quantities, es¬ capes with a loud bubbling sound, and, as the temperature rises, the juice appears as though it were really boiling. After a few days, and sometimes after a few hours, the ebullition sub¬ sides and gradually the crust and undissolved substances fall to the bottom. Meanwhile, the must has lost its sweetish taste and its original character and chemical composition ; among other things, it has acquired a richer, deeper color, a vinous flavor and odor, and a certain amount of alcohol.

This interesting natural process, which leads to the formation of alcohol, was described by the term ˆfermentation,® from the Latin fer-inentum, the root word being fervere, to boil. This feature of the phenomena, whereby the evolution of the gas makes the liquid appear to boil, evidently struck the early wine-makers and natural philosophers as most important. It was a long time before the true nature of the proc¬ ess of vinous or alcoholic fermentation was clearly perceived and properly understood.

Early in the last century (from 1810-25) chemical analyses by Gay-Lussac, Thenard and De Saussure fixed accurately the composition of sugar in the must and of alcohol in the wine. In 1835 Cagniard de Latour found that the globules were definite organisms, capable of re¬ producing themselves by budding, and thus ap¬ parently belonging to the vegetable kingdom. He came to the conclusion that, in the course of vegetation, these globules, or ˆferments,® disengaged carbonic acid gas and converted the liquid into an alcoholic liquor.

This discovery was confirmed two years later (1837) by Schwann at Jena and Kiitzing at Ber¬ lin. The newly-found organism was regarded by some as belonging to the fungi and by others to the algae. Meyen showed that the organism was a fungus and established a new genus for it under the name of Saccharomyces. In other words, the agents of alcoholic fermentation are called ((yeasts)) and belong to the order Sac¬ charomyces.

Recent Researches in Alcoholic Fermen¬ tation. — The work of the great chemist Pasteur threw a flood of light upon the whole process of fermentation. His investigations extending over a series of years were first summed up in

his (Studies on Wine) ((Etudes sur le Vin*), published in 1872, and further in his book, (Studies on Beer> ((Etudes sur la Biere}), pub¬ lished in 1876.

To Pasteur belongs the honor of establish¬ ing beyond question that fermentations were the work of infinitely small organisms called <(microbes.® He classified and described many of these micro-organisms. He divided them into two classes : aerobic, those which cannot live without the presence of free air; and anaerobic, those which can exist in the absence of air. The former saccharomyces are found at or near the top of the liquid during fermentation ; the latter are at work lower down in the body of the liquid.

The microscopical examination of the agents of alcoholic fermentation has revealed quite a number of different forms and varieties. Some 25 or 30 types of the genus Saccharomyces have been identified.

The question may very naturally be asked : Where do these yeast organisms come from? Pasteur showed very clearly that the ripe grape is covered with a mass of micro-organisms. These microbes collect on the fruit and stems, and constitute the <(bloom® of the grape. Just why they should fix themselves on the fruit, and remain, as it were, in readiness to be trans¬ formed from their dormant state to one of great activity when carried into the juice of the fruit is a mystery. At the same time a great number of other and less desirable yeast cells (bacteria) become submerged in the grape juice, or must, and these foreign yeasts are the ones that give the wine-maker trouble and lead to many dis¬ eases of wine.

Cultivated and Selected Yeasts in Wine¬ making. — A brilliant Danish chemist, Emil Chr. Hansen took up the study of alcoholic fermen¬ tations and (<disease ferments,® where Pasteur left off. He brought out many new facts with regard to the many different races or species of Saccharomyces , which gave very different char¬ acters to beers. Hansen found that it was prac¬ tical to separate and cultivate the better species or races of brewer's yeasts. With great skill and much care he was able to select two varie¬ ties of <(low® yeast and then he worked out a method for the cultivation of selected yeasts.

The use of pure cultivated yeasts has been attended with good results in wine-making. Musts which have been prepared with pure yeasts have been compared with musts fer¬ mented at the same time without such yeast. In most cases the pure-yeast wine has been re¬ garded as superior to the other. One practical value of employing pure cultivated yeasts in wine-making is that under proper conditions they will control the progress of fermentation, and thus overcome the influence of the unde¬ sirable organisms in the must, such as mold-fungi, wild yeasts, bacteria and mycoderma. By using selected yeasts from celebrated vintages, wine-makers have been able to obtain finer fla¬ vors and bouquets, all of which adds to the quality and value of their product.

Fermentation and Enzymes. — In order to grasp and properly understand the various prob¬ lems connected with the phenomena of fermen¬ tation, it is necessary to say something about its relation to enzymes. The term "enzyme® is now used to indicate the soluble ferments

secreted or formed in the yeast cell. Pasteur's theory makes fermentation a vital act, depend¬ ing on a living organism. However, fermenta¬ tion may also be a chemical act. About 20 years ago Buchner showed that alcoholic fermentation can be carried out by a soluble fer¬ ment which is extracted from the yeast cell. So that we can have the phenomena of fer¬ mentation without the growth and multiplica¬ tion of yeast cells. To this enzyme in the yeast extract Buchner gave the name zymase.

The effect of these recent discoveries in fer¬ mentation may be very great and far-reaching, and just what practical form they will take in wine-making and other industries it is impos¬ sible to predict.

The Vintage. — The word "vintage® has come to have quite a wide signification. It may be used to include three distinct steps: (1) the gathering of the grapes; (2) the processes of fermentation, and (3) the general cellar operations connected with the care and handling of the new wine.

The practices of wine-makers are different in different countries and in different localities of the same country. This is owing to dif¬ ference in soils, climates, conditions, varieties of grapes used, and in the kinds or types of wines to be produced. And yet, the main prin¬ ciples which give the best results in practice in one country are practically the same in any other country where wine is made.

It should be borne in mind, however, that wine-making is partly an art and partly a science. As such, it cannot be learned and mas¬ tered by reading, or from books. The best we can here do is to describe briefly some of the more important details connected with the manufacture of wines.

Gathering of the Grapes. — The general rule is that grapes should not be gathered till they have reached a state of complete maturity. This condition is shown by certain well-known indi¬ cations, such as the brownish color of the stem, the softening of the berry and its easy

separa¬ tion from the stem, the skin is translucent, the juice becomes sweet, thick and somewhat sticky.

The wine-maker determines the best time for gathering the grapes by using various in¬ struments, known as a must-scale, mustimeter, glucometer, *etc.* They are employed for the purpose of finding out the saccharine richness or strength of the grape juice, or must. To judge of the sugar content of the grapes a few bunches representing the average condition are first gathered, the juice is expressed and strained through a cloth, collected in a suitable recep¬ tacle, and then the must-scale is carefully drop¬ ped into it. The quality of the must will be in¬ dicated on the stem of the scale. The grapes should be tested from day to day until the density, as shown on the scale, remains station¬ ary, when it is time, as a rule, to gather the crop.

The oldest scale, that of Baume, was de¬ vised to indicate the specific gravity of liquids, or their weight, as compared with that of water. Later scales give the density of the liquid direct, the density of water being indicated by 0. The glucometer invented by Dr. Guyot is very con¬ venient and is used by the French wine-makers. This scale indicates at once, the degree Baume, the quantity of sugar in the must per hectoliter,

and the amount of alcohol that will result from the fermentation of the must per hectoliter. The Salleron mustimeter is another very use¬ ful instrument, highly regarded by French wine¬ makers. The instruments mostly used in the United States were Oechsle's must scale and Ball¬ ing's saccharometer. The must scales are also used during fermentation to determine when the sugar contained in the must has been par¬ tially or entirely transformed into alcohol.

Composition of the Must. — A very good idea of the qualities of a good, average must may be gained from the following table pre¬ pared by Dr. Guyot:

Water . 78.

Grape sugar (glucose) … 20.

Free acids (tartaric and tannic, etc.) . 0.25

Bi-tartrate of potash . 1 . 5G

Mineral salts . 0.20

Albuminous substances]

Essential oils 1 . 0.05

Mucilaginous and starchy substances j

Total . 100-00

It should be pointed out that these dif¬ ferent ingredients are not always in the same proportion; that some of them may rise to double the average quantity above given, or may fall, in some cases, to one-fourth of it. In brief, the composition of the must varies ac¬ cording to the variety of grape, degree of ma¬ turity, kind of soil, climate, *etc.*

After water, grape sugar or glucose is the most important element of the must. By the agents of fermentation it is transformed prin¬ cipally into alcohol and carbonic acid. This transformation is represented by the following chemical formula :

C6H1206 = 2C2H60 + 2C02 Grage sugar. Alcohol. Carbonic

anhydride.

There remains a very small proportion of gly¬ cerine and succinic acid, and matters dissolved in the liquid. According to Pasteur, 100 parts of glucose yield through fermentation : Alco¬ hol, 48.46 ; carbonic acid, 46.67 ; glycerine, 3.20 ; succinic acid, .61, and other substances left, 1.03.

The organic acids and acid salts, while they exist in very small proportions, have great in¬ fluence on the course of fermentation and the quality of the product. The must of grapes picked too soon will contain an excess of acids and a corresponding lack in sugar; while in overripe grapes there will be much sugar but a deficiency in acids. Therefore, wine-makers endeavor to correct such imperfections by water¬ ing the must, or by adding sugar, or by adding tannic or tartaric acids, *etc.* To determine the acidity of must, several instruments, or acid-imeters, have been invented. Most of them require considerable skill and knowledge to be properly used, but the Dujardin acidimetric Tube will answer for all practical purposes.

The other substances contained in the must — albuminous matters, *etc.* — contribute to the formation of extractive matters, after having served to feed the yeast organism.

Vinification. — The French word “vinifica¬ tion® is a convenient and common term used to cover the details of wine-making. The special treatments of the must result in different kinds of wines.

Thus, we have two distinct classes: (1) <(dry® wines, and (2) sweet wines.

Dry wines are those in which the sugar has been fermented out.

Sweet wines are those which, after their ac¬ tive fermentation, still retain a quantity of sugar. Many of the sweet wines are fortified by the addition of brandy.

Wines are often classed as <(stilF and (<sparkling.®

. Still wines are those in which the carbonic acid gas has wholly escaped. Sparkling wines are those which hold a greater or less amount of carbonic acid gas.

It is useful and convenient to make two classes, namely (a) red wines, and (b) white wines. Red wines are produced from red or other colored grapes, the color being extracted from the skins during fermentation. The color¬ ing matter is purplish blue, but is changed to red by the acids in the must. White wines are produced from both white and colored grapes. In order to avoid dark color, the must is quickly separated from the skins and other solid parts of the grape.. The following is briefly the method of vinification of red wines:

. Crushing. — The ancient method consisted in tramping the grapes with the bare feet or with, heavy boots in a big trough from which the juice ran as it was expressed. While this old-fashioned method still obtains in a few dis¬ tricts in Europe, it has been superseded there

and in other countries by machines, which are called (<crushers.® There are several kind of mechanical crushers, but the type most gener¬ ally used consists of a hopper beneath which revolve two grooved cylinders.

The grapes when dumped into the hopper are then crushed between the rollers, which only break the skins without crushing the seeds. They next pass into the stemmer.

Stemming. — Formerly done by hand, or by a rake over a sieve or screen, the stems are now removed by machines in a very ingenious man¬ ner. The grapes after passing through the crusher fall into the stemmer. The stems are carried to one end of the machine, where they are discharged; the seeds, skins, pulp and juice escape through the bottom, and are conveyed by chutes into the fermenting tanks, which are usually on the floor underneath.

Stemming has its advocates and opponents. The advantages claimed for stemming are that it facilitates the free access of air and so helps the fermentation, especially in case of damaged vintages ; that stemmed wines have more finesse and are more alcoholic than wines from un¬ stemmed grapes. In the south and southwest of France wine-makers seldom stem their grapes. As a rule grapes were stemmed in the leading wineries in our Eastern States and in California.

Fermenting Tanks or Vats. — These are generally made of oak, although in California redwood was generally adopted. The capacities of fermenting tanks vary from 1,000 to 10,000 gallons.

There is a difference of opinion among wine-makers as to whether the must should be fermented in open or in closed vats. For open vats it is claimed that the fermentation is gen¬ erally more rapid and complete, the wine is

better colored, *etc.* Against the open vat, it is urged that the exposure to the air transforms the alcohol in the (<head® or cap, which is raised to the top by fermentation, into acetic acid and thus injures the wine. An easy way to overcome this objection is by having a false head resting on the cap, and thus keep it sub¬ merged during the fermentation. The best practice would seem to be in having a sub¬ merged head fermentation.

Duration of Fermentation. — This depends on a number of conditions, such as the amount of sugar in the must, the activity of the fer¬

ments, the temperature of the vat, *etc.* It may be completed in two or three days, or it may run on for 15 or 20 days.

Three distinct phases of fermentation will be observed: (1) the first day or two when the ferments are multiplying; (2) the tumultuous . fermentation, accompanied by a violent bubbling of the liquid and a rise in temperature, and

(3) the active but relatively quiet fermentation.

As a general rule, the more rapid the fer¬ mentation the better is the result. In the South¬ ern States and in southern California the proc¬ ess was usually completed in one or two days. In the northern or temperate climates the time will run from seven to ten days.

The Influence of Temperature. — As we have already indicated, temperature exerts a controlling influence on fermentation. The yeast works best in temperatures ranging from 59° F. to 75° F. Below 59° its action is very feeble and slow; above 75° fermentation be¬ comes retarded and even stops if the tempera¬ ture passes much above 90°.

Thus, wine-making both in very hot and in very cool climates often presents many difficul¬ ties to be overcome. The must frequently be¬ comes what is called ((stuck® — that is, fer¬ mentation ceases before all the sugar is trans¬ formed into alcohol.

If the trouble comes from too low a tempera¬ ture, the remedies are; (1) To raise the tem¬ perature by heating part of the must; (2) to heat up the fermenting room; (3) to increase the activity of the yeast by adding sediment from vats already through fermentation, and

(4) to stir up the pomace so as to bring the germs in contact with the air, as the yeast is always <(greedy for oxygen.®

When the temperature of the must in the vats rises too high, it is necessary to lower the temperature in one way or another. Several methods are employed for cooling the must. Among these we may mention the use of shal¬ low vats, racking off and refrigerating systems. The difficulties of wine-making in our Southern States and in southern California were over¬ come only by the adoption of a suitable system for cooling musts.

The success of the wine-maker will always depend on his success in being able to control the progress of fermentation. Therefore, he should be able to control the temperature, which during fermentation has a most important in¬ fluence (1) on the yield in alcohol, (2) on

the qualities of wine, and (3) on the keeping qual¬ ity of wines.

Drawing off the Wine.— Active fermenta¬ tion can be recognized as being over, by the falling of the temperature, the settling down

of the solid mass or marc, by the clearing of the liquid and the vinous taste and smell. The new wine will show from 0° to 2° by Balling's saccharometer, nearly all the sugar having been transformed into alcohol. It is either run into a large tub and emptied into casks or it is pumped into casks. The drawing off of the new wine leaves in the vat the ((marc,® which still contains a considerable quantity of material that can be made into an inferior wine.

The Different Wine Presses. — It is not necessary to enter into a detailed description of the different forms of wine presses. They work by a screw or by hydraulic pressure and they are operated by hand, steam and electric power. Where grapes are handled on a large scale, as in some sections of France and Germany, continuous presses of recent invention are used. These are composed of two or more cylinders, worked as crushers, and after passing through these cylinders the grapes are carried by a screw, 'which forces them in a perforated horizontal cylinder, terminating in an orifice through which the marc in a compact cake is ex¬ pelled. Even the improved types of presses are not perfect as far as the yield or quantity of wine is concerned. Recent experiments show that the residue of the marc can be exhausted without presses by a process called diffusion.

The first run from the press is of course the best. The second and third pressings are inferior and seldom mixed with the other wine; the last run is used for making brandy or vinegar.

Utilization of the By-Products. — From the husks and lees are obtained the following prod¬ ucts : ((piquettes,® brandies and tartar. Second wines are produced by adding water to half the amount of the wine already drawn off, suffi¬ cient sugar to give from 6 to 7 per. cent of alcohol and tartaric and tannin when acidity is needed. The

piquettes are thin, sour wines obtained by adding pure water to the marc, be¬ fore or after pressing; the cask is filled and closed. In course of time a wine having from 3 to 4 per cent of alcohol is produced, but it will not keep long. This is the cheap but health¬ ful drink so largely consumed by the peasants and working people in France.

Brandies. — They are obtained either by dis¬ tilling the marc direct or by the distillation of a piquette wash. The best kind of brandy of the Cognac type is produced by distillation of a sound, clean wine. This process of distillation requires improved stills and special treatment. The ((wash® for brandy spirits is obtained by running water into a tank filled with the marc or pomace ; the overflow is allowed to run into a second tank containing pomace, and the over¬ flow from this tank passes into a third tank filled with pomace. It is seldom profitable to distil the wash unless it contains from 5 to 7 per cent alcohol.

Tartar. — This is extract from the lees, or deposited as a crust in the vats. It is obtained by causing a mixture of the marc and water to boil slowly for an hour or so; when the boiling liquid is drawn off and cooled the tartar crystallizes out. From the crude product is manufactured C(cream of tartar® and tartaric acid.

Manufacture of White Wine. — The making of white wine differs from that of red wine

principally in the matter of not having fer¬ mentation of the must take place in contact with the skin and solid parts of the grape. Two processes are to be taken into account: (1) the making of white wine from white grapes, and (2) the making of white wine from red or dark-colored grapes. The first-named process is of course the easiest one. Briefly stated, it consists in crushing the grapes, drain¬ ing them, putting the drained marc in the press and then leaving the juice from both of the operations to ferment. The main thing is to get the liquid free from impurities, as white wine should be -perfectly clear. The usual method is to allow the must to settle and the suspended impurities to be deposited. The liquid must, therefore, be kept perfectly still for the required time; in other words, it is kept from starting into fermentation. This is accomplished by the process called <(sulphuring.® The effect of applying sulphurous acid to the must is to paralyze the action of the ferments or yeasts.

After the must has become clear, it is sepa¬ rated from the deposit and run into the vat to undergo fermentation. During this process the

must should be aerated as much as possible in order to drive off all odor of the sulphurous acid, as well as to encourage the activity of the yeast. The fermentation starts slowly and is always less vigorous than in case of red wines. When the fermentation is over, the white wine should be racked and put in casks which have been lightly sulphured and allowed to remain until perfectly cleared.

The manufacture of white wine from red or dark-colored grapes is attended with much more difficulty and labor than in the process of using white grapes. Without going into de¬ tails, the main points to be observed are :

(1) to avoid breaking the skins of the grapes and thus start fermentation before crushing;

(2) to proceed rapidly with the work of crush¬ ing and pressing; (3) to crush the grapes so as not to free the coloring matter in the skins ; (4) to suppress all traces of coloring matter in the must and separate the suspended impuri¬ ties by the method above described. It is the opinion of expert wine-makers that in order to obtain the best results, white wine should be made from both white and red grapes.

Sweet Wines. — The familiar French term for sweet wines is vins de liqueur. These wines are the result of special treatment or handling The best-known types of sweet wines are : Port, Sherry, Tokay, Madeira, Malaga, *etc.*

Port Wine. — Wines of this type are pro¬ duced by fermenting the must down to 6 or 8 degrees of sugar and then from 8 to 10 per cent of brandy is added to arrest further fer¬ mentation. This will give a wine having from 14 to 18 degrees alcoholic strength. In the fol¬ lowing spring the wine is racked and from 2 to 3 degrees more of brandy added. Thus, in the course of a year or so Port wine is gradu¬ ally brought up, or <(fortified,® to 20 and 22 per cent alcoholic strength. Contributing to the final result is the <(blending,® whereby improved color, body, flavor, bouquet, etc., are obtained.

Sherry Wine. — Our word <(Sherry® is de¬ rived from the Spanish name Xeres, and this type of wine was originally produced and shipped from the town of Xeres. It is made from several varieties of white grapes grown

in the province of Andalusia. The former Spanish custom was to sprinkle each pressing of grapes with a certain amount (two or three handfuls) of gypsum. This operation, called plastering, was regarded as favoring fermenta¬ tion.' The must is fermented down to about 8 or 10 degrees of sugar and then alcohol is added, bringing the wine up to 18 or 20 degrees of alcoholic strength.

One feature of the manufacture of sherry wine in Spain is the system of Soleras. The word describes fine old mother wine, and the system consists in blending wines of different ages or years. Thus, the casks of sherry wine are arranged in groups, piled in tiers and the groups graded according to quality. When wine for blending or shipment is drawn from the group of casks constituting the oldest solera, they are refilled with wine from the casks of the next younger solera, and these again from the next, and so on down to the last group.

In order to hasten the ageing or maturity of the wine, it is baked by natural or artificial heat. The casks containing the wine are ranged in a building with the roof and side exposed to the hot sun covered with glass. The tem¬ perature in this sherry-house during the day runs as high as 140° F. and is maintained at night by fires. The large producers of sherry in California and elsewhere attained the same end by baking the wine in a specially-built chamber or room, which was heated by steam or hot air.

Champagne and Sparkling Wines. — The word ˆChampagne® was originally very prop¬ erly applied to wines, whether still or sparkling, made in the Champagne district of France. It now has a wider and more special meaning. By custom and popular usage champagne is the name given to a type of sparkling wine produced by a process of fermentation in the bottle. Thus, we have not only French cham¬ pagne, but German champagne, Italian cham¬ pagne, and before Prohibition, American cham¬ pagne, *etc.* Sparkling wines are produced in most wine-making districts ; some of the best known are Sparkling Saumur, Sparkling Burgundy, Sparkling Beaujolais, in France; Sparkling Moselle in Germany; Sparkling Catawba, in the United States, *etc.* There are also ˆimitation chamnagnes.® These are still wines which haye been made sparkling by having carbonic acid gas forced into them somewhat after the same fashion as soda water is

produced.

The manufacture and manipulation of cham¬ pagne requires considerable skill and knowl¬ edge. Some of the steps in the process may be described :

After the wine has gone through its first fermentation, it is racked off into casks and a blend of the juices of different grapes is made. The cuvee, as it is called, is generally a blend of the new wine with some old wine. Then the wine is bottled and put in a warm place in order to start a second fermentation. At the proper time the bottles are stored in cool vaults, where the temperature is 50° F. or lower the year round and where fermentation proceeds very slowly. It is important to keep the vaults at an even temperature, in order to prevent serious loss from breakage which a sudden rise in temperature would cause. This was met by the installation of cold storage plants in champagne cellars in this country and abroad.

At first the bottles are stacked in horizontal layers, and as the wine begins to mature the bottles are placed in A-shaped racks. The bot¬ tles are gradually worked neck downward, in order to bring the sediment, which forms dur¬ ing the slow fermentation, down upon the cork. This is done by the workmen giving each bot¬ tle a quick shake once or twice a day during a period of four to six weeks. In many of the champagne cellars a machine is used to accom¬ plish the same result in less than half that time.

When the wine is taken to the finishing-room, the sediment down on the cork is <(disgorged®— that is, the workman loosens the cork and the lively pressure of the gas in the bottle forces out the sediment, leaving the body of the wine perfectly clear. Champagne in this state is ((brut® — almost absolutely ((dry.® To please the taste and palate of consumers, the wine is sweetened by adding a little liqueur or ((dosage® as the French call it, composed of rock candy syrup dissolved in old wine or brandy. The final operations comprise putting in a fine cork in the bottle, wiring and capping it, pasting on the label and casing the bottles in boxes for shipment. It has been figured that a bottle of champagne from start to finish is handled about 200 times.

Handling and Taking Care of Wine. — It

is. always necessary to keep casks or barrels of wine in a well-ventilated cool place. When wine is drawn off and when there is loss

from evaporation, the barrel should be filled up.

New wine soon begins to clear itself by the deposit of solid matters held in suspension. The thick deposit which forms at the bottom of the cask is called the lees. In order to prevent the lees from mixing with the liquid, wines are <(racked® or drawn off several times a year. The sudden changes of temperature in the spring and autumn disturb wines, and so it is the practice to rack them at these periods. When racking it is not desirable to let the wine come in contact with the air. In order tc obtain perfectly clear wines it is usually necessary to filter or clarify them.

The following method for clearing red wines, such as claret, etc., may be recommended : Take the whites of five fresh eggs for every 50 gal¬ lons of wine, beat them up into a foam. Then put this foam into a gallon of the wine to be fined and after beating it again pour the mix¬ ture into the barrel.

Then take a stick and stir the whole barrel of wine until the foam appears at the bung-hole, which should be in about 10 minutes. Leave the bung off over night. The next day fill up the barrel with same kind of wine and drive in the bung. The wine should be bright in from 10 to 15 days; if not, then fill up, and at the end of another week it should be.

For clearing white wines, such as Riesling, Hock, Sauterne, etc., take one wineglassful of dissolved isinglass for every 50 gallons of wine. Beat this into a foam with a gallon of the wine to be fined. Pour it back into the cask and follow the directions above given for red wines. Usually the white wines take a little longer time to clarify than do clarets.

Some Diseases of Wine. — Wines are sub¬ ject to many diseases. They often become <(sick.® Then they need C(nursing® and doctor¬ ing.

Acid Wines. — They are due to the change of alcohol into acetic acid

under the action of the air and heat. When wine has become acetic, there is no cure for it. A temporary improvement may be made by racking it into a cask strongly sulphured and clear it with six whites of egg to about 250 bottles. Some try to correct sour wine by mixing it with good, sound new wines or with fresh lees, but the cure is only temporary. Wines so corrected only have their acidity disguised, and must be used soon.

Greasy Wines. — When wines turn greasy they cloud and rope like oil. White wines are more subject to this disease than red. Wines weak in alcohol and tannin are subject to the disease. Therefore, the addition of brandy spirits and tannic acid is recommended. Some also use half a pound of alum to a cask, which should be stirred thoroughly and racked off sev¬ eral days afterward.

Flat or Cloudy Wines. — This trouble is found in wines poor in alcohol and having an excess of albuminous material. Such wines can be improved by transferring them to a freshly sulphured cask and adding brandy. The wine should be fined and after a few days from 50 to 60 grains of tartaric acid per 50 gallons should be added.

Bitterness. — French Burgundy wines have been subject to this disease, which is not com¬ mon in America. The trouble may be cor¬ rected at the start by putting the wine in sul¬ phured cask and adding sufficient alcohol, tan¬ nin and tartaric acid.

Classification of Wines. — The following is a list of well-known types of wines, arranged according to the countries where produced :

1. French Wines. — Claret, Graves, Sauternes, Barsae, Burgundy, Hermitage, Roussillon, Chablis, Fronlignac, (Muscat), Champagne, Saumur, *etc.*

2. German Wines. — Riesling, Gutedel, *etc.* The terms Rhine, Moselle and Pfalz are usually applied to the growths in these districts. The word Hock is also applied to certain Rhine wines.

3. Austrian Wines. — Vdslauer, Goldeck. Hunga¬ rian Wines. — Tokay, Ausbruch, *etc.*

4. Italian Wines. — Barolo, Barb era, Nebbiolo, Grigno-lino, Valtellina, Asti, Chianti, Lacryma Christi, Velletri, Capri, Marsala, Muscat of Syracuse, *etc.*

5. Spanish Wines. — Sherry, Malaga, Val de Penas, Vinos Tinlos (Spanish Reds).

6. Portuguese Wines. — Ports. Lisbon, Collar es, Car-cavellos.

7. Madeira and Canary Island Wines. — Madeira, Malvasia, Canary (sack), Malmseys.

8. Grecian and Ionian Wines. — Hymettus, Noussa, Kephisia, Corinth, Patras, Santorin, *etc.*

9. Swiss Wines. — Neuchdtel, Gringet, and Montreux.

10. Turkish Wines. — Candian (Island of Crete), Cyprus, Mount. Lebanon, *etc.*

11. Russian Wines. — Crimean, Kakhetian (Cauca¬ sus), Donski and Krimski Champagnes.

12. Australian Wines.— Australian Burgundy, Her¬ mitage, Sauterne, Port, *etc.*

13. Cape of Good Hope Wines. — Cape Madeira, Constantia.

14. Persian Wines. — Shiraz.

15. Wines of the United States. — (a) From native varieties of grapes grown east of the Rocky Mountains were produced, 5cm ppernong (in the Southern States) Catawba, Delaware, Norton's Connua and Ives Claret, Concord, Iona, Champagne, *etc.* (b) European or foreign varieties of grapes are grown in California which also produced Claret, Cabernet, Burgundy, Zinfandel, Riesling, Sauterne, Port, Sherry, *etc.*

For convenience we may group some of the leading wines as to color and taste, although it should be remembered that many of them are made in color both red and white, in taste, sweet and dry.

Red Dry Wines

Claret

Burgundy

Cabernet

Hermitage

Barolo

Barbera

Chianti

Zinfandel

Norton's

Ives

Concord, *etc.*

White Dry Wines

Graves

Sauternes

Chablis

Montrachet

Rhine, or

Riesling

Moselle

Catawba

Delaware, *etc.*

Red Sweet Wines Port .

Tokay • Constantia Roussillon Tarragona (Port)

White Sweet Wines

Sauternes

Sherry

Muscatel

Angelica

Lacryma Christi

Marsala

Malaga

Madeira

Catawba

Delaware

Scuppernong, *etc.*

Alcoholic Strength, etc., of Wines. — The

figures in the following table have been taken from the various analyses by competent authori¬ ties :

Average per cent Specific of alcoholic gravity strength

Claret . 995 . 0

Rhine . 992.8

Sauterne . 993.7

Burgundy . 991.3

Champagne . 1,010.9

Sherry (natural) . 985 . 9

Sherry (fortified) .

Marsala (natural) . 995.9

Marsala (fortified) .

Port (natural) . 999 . 2

Port (fortified) .

(Specific gravity water = 1,000)

10.5

10.5 11.0

11.5 11.0 16.0 20.0 16.0 20.0 16.0 22.0

It may here be noted that many chemical analyses of European wines have been made and the data thus obtained have been used for the purpose of arriving at a standard for judg¬ ing wines. In this way it is possible to deter¬ mine the purity and quality of any type of wine. The limits of composition and the ratios which have been adopted in European countries for applying analytical results in judging the purity and quality of wines, together with a number of analyses of American wines, have been compiled by Dr. W. D. Bigelow of United States Department of Agriculture. Consult Bureau of Chemistry Bulletin No. 59, (The Composition of American Wines, y 1900.

The standards which have been adopted for European wines were met in all particulars by the best American wines. This is shown by the chemical analyses of American wines re¬ ceiving awards at the Paris Exposition of 1900. (Consult Bulletin No. 72, Bureau of Chemistry, United States Department of Agriculture, 1903). According to this report, <(the percentage of alcohol in the samples of dry wines conforms to the standards that have been adopted for European wines. The ratio of alcohol to ex¬ tract and the sum of the alcohol expressed in grams per litre and the total acidity expressed as grams per 100 cubic centimeters conform to the ratios adopted in France for wines to which neither alcohol nor water has been added.® It is also stated that the percentage of acids in the samples examined conforms to the stand¬ ards of the wine-producing countries. These and other facts go to prove that our American wines challenged favorable comparison with

European wines. It is only a few foreign types of special excellence which surpass those of the same kind that we produced. In all respects — in purity, color, taste, bouquet, *etc.* — the average American wines are better than the average wines of Europe. Consult Alwood, Wm. B., ‘Etiological Studies } (in Bulletins No. 140 and No. 145, Bureau of Chemistry, United States Department of Agriculture, Washington 1911) ; Vance, Lee J., (Some Characteristics of American Wines y in Original Communica¬ tions, Eighth International Congress of Applied Chemistry, 1912, Vol. XIV, p. 173) ; Aschi, Chas. S., interpretation of the Results of Wine Analysis* (in Original Communications, Eighth International Congress of Applied Chemistry, Vol. XVIII, p. 17) ; consult also various papers in the Report of the International Congress of Viticulture, at San Francisco, Cal., 1915.

The Wine Production of the World. — The wine production of every country, and, there¬ fore, of the world, varies greatly from year to year, due for the most part to climatic or weather conditions. Thus when the season is unfavorable and the vines bear light crops, the wine output falls below normal.

The great European War, which broke out in the summer of 1914, did not have the im¬ mediate effect of unduly decreasing the wine production of that year. But in the following year, the labor shortage and the consequent neglect of the vineyards, combined with un¬ usually bad weather, resulted in the smallest wine crops in Europe in the last 50 years.

The following figures, which are compiled from official sources, show the wide fluctuations in the vintages of the leading wine-making countries of the world for three recent years :

COUNTRY

1913

gallons

1914

gallons

1915

gallons

France .

971,778,000 163.476,000 1 , 138,038,000

1,316,849,000

226,980,000

448,819,000

Algeria .

113,058,000

Italy .

947,000,000

418,000,000

Spain .

360,276,000

72,050,000

355,690,000

222,000,000

Portugal .

88,000,000

74,000,000

Russia .

107,800,000

105,600,000 120,000,000 87,000,000 60 , 000 , 000

86,000,000

Argentine .

Chile .

102,200,000

98,000,000

61,600,000

106,000,000

82,000,000

Greece .

43,000,000

United States.. Austria .

47,500,000

46,200,000

48,900,000

44,000,000

32,000,000

24,000,000

Hungary .

45,100,000 26,000,000 19,800,000 22,000,000 5,800, 000 2,000, 000

55,000,000

42,000,000

Germany .

Turkey .

24,300,000

17,000,000

20,000,000

10,000,000

Rumania .

Switzerland … Bulgaria .

14,540,000

11,150,000

1,000,000

30,000,000

19,100,000

15,000,000

Since 1915 the wine production both in France and Italy has steadily increased ; in France it was 760,000,000 gallons in 1916; 840,-900,000 gallons in 1917, and 980,000,000 gallons in 1918.

Although the greatest wine-producing coun¬ try of the world, France imports more wine than it exports. The average Frenchman, ac¬ cording to statistics, drinks 70 times as much wine as the average Englishman. In other words, the per capita consumption of wine in France is 32 gallons; in Italy 25 gallons; in Spain 18.5 gallons; in Austria, 3.5 gallons; in Ger¬ many 1.5 gallons; in Belgium 1.04 gallons; in the United' States (before 1919) 0.45 gallon, and in Great Britain 0.35 gallon. Thus, with a population of about 100,000,000 people the consumption of domestic and imported wines

in the United States was from 45,000,000 to 50,000,000 gallons per

annum before 1919.

However, the consumption of wine was slowly increasing from year to year in the United States until the enactment of Prohibition, and this increase would have been much larger if there had been better means of distribution and if there had not been so much unfavorable legis¬ lation. Many people still need to be educated to the use of light wine with their meals, such as is the custom in the grapeigrowing countries of Europe, where almost everyone — men, women and children — drink the wine of their country daily at table with their other food, and they are among the most sober, thrifty, in¬ dustrious and temperate people of the world.

The Wine Industry in the United States. — The wine industry in the United States was of comparatively recent date and growth. In 1850 the total output of wine in the United States was not more than 250,000 gallons. In 1860 it was about 500,000 gallons. In 1870 it had risen to about 5,000,000 gallons. In 1880 the wine yield of the country was about 15,000,000 gallons. In 1890, when the statistics of viticul¬ ture were gathered for the first time in the United States, there were 307,000 acres of vine¬ yards and a production of over 24,000,000 gal¬ lons of wine. The census of 1900 showed a pro¬ duction of over 30,000,000 gallons of wine. In 1910 it was more than 45,000,000 gallons.

The wine production of the United States during the 10 years 1910-19 averaged about 44,000,000 gallons. There were sharp decreases in production in 1915 and 1918, due almost en¬ tirely to excessive war revenue taxation. The vintage of 1916, which was a good one, was made up as follows :

Gallons

New York .

New Jersey… .

Ohio .

Western States.

California. .

All other States

4,000,000

350,000

3,500,000

500,000

42,262,000

500,000

Total

49, 112,000

The greatest progress in viticulture and wine-making was made in California during the years 1900-18. That Golden State with its great range of climate and with its variety of soils has an area almost equal to that of France. The production of wine in California began to assume large figures in 1877, when it was 4,000,000 gallons. In 1880 the yield was more than double, or 10,000,000 gallons ; in 1890 it was 15,000,000 gallons. In 1900 the wine production had risen to 23,400,000 gallons ; and in 1910 it reached 45,486,000 gallons.

The wine production of California in the six years before Prohibition was as follows:

YEAR

Dry wines, gallons

Sweet wines, gallons

Total

gallons

1913

1914

1915

1916

1917

1918

22 000,000 26,300,000 21,571,000 23,000,000 20,000,000
25,000,000

17,927,812

17,473,353

4,035,240

19,262,475

16,585,508

4,168,240

39,927,812

43,773,353

25.606.240 42,262,475 36,605,508

29.168.240

The figures for ‘the years 1913-14 are taken from the 1915 annual report of the California State Board of Agriculture ; those for the years 1915-16-17 and 18 from Bulletins Nos. 10 and

13 issued by the California Board of State Viticultural Commissioners. In the season of 1918, 6,000 carloads of wine grapes, amounting to about 90,000 tons, were shipped out of the State; The sharp drop in sweet-wine production in 1915 and 1918 was due, as has been mentioned, to new and excessive taxation. The wine industry of the United States was dealt a crushing blow when national prohibition went into effect on 16 Jan. 1920. The prohibition of the manu¬ facture and sale of wines .struck at the thou¬ sands of vineyard owners whose crops were taken and used by the wine-makers. Thus, of the 350,000 acres of vineyards in California just about one-half, or 170,000 acres, were de¬ voted entirely to <(wine grapes,® that is, to spe¬ cial varieties of grapes which were not fit or wanted for eating or table purposes, but on account of their vinous qualities were pecu¬ liarly adapted for wine-making purposes. It appeared that the enforcement of prohibition would bring heavy loss to the growers and will greatly depreciate the value of their properties.*

By many such legislation was regarded as unfortunate in view of the fact that grape and wine growing had been fostered and encouraged for over 50 years by our State and national governments. Large appropriations had been made from year to year; experts had been engaged to help the vineyardists ; experimental grape stations had been established — there were

14 such stations in California alone — the farmers and growers had put in their labor and capital in the confidence that viticulture, which is such an important branch of agriculture, would not be ruined or destroyed. Few there are who claimed that the grape and wine in¬ dustries were responsible for the alleged evils which are sought to be remedied by prohibi¬ tion. Hence it was claimed that a great wrong

and injustice would be done by drastic and confiscatory legislation to these two great in¬ dustries, which gave employment to some 60,000 persons and which represented an investment of $150,000,000 capital.

Two Distinct (<Types® of American Wines. — The wines produced in the United States were divided into two classes: (1) wines made east of the Rocky Mountains; (2) wines of California and the Pacific Coast States.

This division is due to the fact that there are two entirely different stocks, or kinds, of grapes grown in the United States.

East of the Rocky Mountains, only Ameri¬ can or native varieties of grapes are grown.

In California and on the Pacific Coast, prac¬ tically only European or foreign varieties of grapes are grown.

Therefore, our Eastern wines were of a dif¬ ferent ((type® from California wines, which for the most part resembled and had the well-known characteristics of their European prototypes.

The leading grape and wine-growing States east of the Rocky Mountains are: North Caro¬

* According to latest reports the California vineyardists, far from meeting heavy losses from so-called Prohibition, reaped greater profits than ever. They shipped fresh wine grapes all over the country and to Canada, and to still further points they shipped the grapes in a dried form for wine-making. The demand was created by the fact that the people in 1919 made their own wines. Grape syrup was made in great quantities in 1919. It was hoped chat it would supplant maple and molasses syrups, but quantities of it were used in wine-making.

lina, Virginia, New Jersey, New York, Ohio, Michigan and Missouri.

Considerable progress in Eastern wine-mak¬ ing was made in producing a fine quality of champagne by the French process of fermenta¬ tion in the bottle. A number of brands of American champagne, in color, taste, sparkle and purity, compared very favorably with the best imported kinds. The headquarters of the

champagne industry in the United States was in the Lake Keuka region of western New York, which produced about 75 per cent of the exutput. Considerable champagne was also pro¬ duced in northern Ohio and a fair amount in California. The total production of American champagne was estimated at more than 150,000 cases, or 1,800,000 quart bottles per year.

In conclusion, the manufacture of wine and champagne was an infant industry in the United States. But we had in the Eastern States and in California all the opportunities and all the conditions for success. We had here the right climates, the proper soils, the best varieties of grapes, sufficient capital and the most intelli¬ gent labor and supervision in the world. There¬ fore, with all these things and with the grow¬ ing demand for American wines, the wine in¬ dustry in this country, if not discouraged or forbidden by unfavorable legislation, would

have had a prosperous future.

Bibliography. — The best books on wines and on the technical details of wine-making are in French. The following standard French works may be noted: Coste-Floret, (Procedes modernes de Vinification,* in 3 parts, (1) Vins rouges, (2) vins blancs, (3) le residus (1895— 1902) ; Jacquemin, Production rationelle et conservation des vins) (1909) ; Cazalis, (Traite pratique de l'art de faire le vin* (1900) ; con¬ sult also a valuable little book by Chancrin, (Le vin) (1910). For making wines in hot climates consult Roos, P'industrie vinicole meridional (1898). For making sweet wines, Sebastian, (Les vins de luxe) (1897). For making champagne and sparkling wines, Robert's (Manuel pratique vins mousseux) (1904) ; Salleron et Mathieu, Ptudes sur le vin mousseux) (1895), and Manceau's (Oenologie Cham-penoise> (1917).

There are but few really useful books in English of recent date on the practical side of wine-making. We note the following: Thudi-cum and Dupre, (Origin, Nature and Varieties of Wine* (1872) ; Rixford, (The Wine Press and the Cellar) (1883); Husmann, (Grape Growing and Wine Making* (1897) ; Mathews, (Manual of Alcoholic Fermentation) (1909) ; Jordan, (Quality in Dry Wines * (San Francisco, Cal., 1911) ; Bioletti, F. T., (The Manufacture of Dry Wines in Hot Countries) (in Bulletin No. 167, University of California, College of Agriculture 1905), and Bulletin No. 177 on (New Methods of Making Dry Red Wines) (1906). Consult also bulletins issued by the United States Department of Agriculture, the California State Board of Viticulture and spe¬ cial articles in the trade journals.

Lee J. Vance,

Publisher, iThe Beverage News? New York.

WINEBRENNER, win'bren-er, John, American clergyman, founder of the denomi¬ nation known as the <(Church of God®: b. Frederick County, Md., 24 March 1797; d. 12

Sept. 1860. He was ordained a minister of the German Reformed Church in 1820, and was called in the same year to the Salem church, Harrisburg, Pa. He retained that charge until 1827 when his outspoken attitude against slavery and the traffic in intoxicating drinks led to his being asked to withdraw, and in 1828 he ceased to be connected with the Reformed Church. In October 1830 he established the denomination called the ((Church of God,® whose members also became known as Winebrennerians. He edited for some time the Gospel Publisher, afterward the Church Advocate, and issued several works, including (A Treatise on Re¬ generation5 ; Practical and Doctrinal Sermons) ; the (Church Hymn Book5, *etc.* See Churches of God.

WINEBRENNERIANS. See Churches

of' God.

WINES, Enoch Cobb, American penolo¬ gist: b. Hanover, N. J., 17 Feb. 1806; d. Cam¬ bridge, Mass., 10 Dec. 1879. He was graduated from Middlebury College, Vt., in 1827, taught school in Philadelphia and Burlington, N. J., and entering the Congregationalist ministry in 1849 held pastorates at Cornwall, Vt., and Easthampton, L. I. In 1853 he became professor of languages in Washington College, Pennsylvania, and he was appointed president of Saint Louis University in 1859. He became secretary of the New York State Prison Association in 1862, and afterward devoted his life to the pro¬ motion of reform in the administration of criminal law and treatment of criminals. He founded the National Prison Association in 1870 and

was instrumental in securing the at¬ tendance of representatives from 26 govern¬ ments at the International Penitentiary Congress in London 4 July 1872. Among his writings are included Two Years and a Half in the Navy5 (1832) ; (A Trip to China5 (1832) ; (Hints on Popular Education5 (1838) ; (Prisons and Re¬ formatories in the United States and Canada5 (1867) ; (State of Prisons and Child-Saving Institutions5 (1880).

WINES, Frederick Howard, American

statistician, son of E. C. Wines (q.v.) : b. Philadelphia, Pa., 9 April 1838; d. 1912. He was graduated at Washington College, Pa., in 1857, and studied at Princeton Theological Seminary; was a chaplain in the Union army 1862-64; pastor of the First Presbyterian Church, Springfield, Ill., 1865-69, was secretary of the Illinois State Board of Commissioners of Pub¬ lic Charities 1869-93, and again 1897-99. He devoted much time to the interests of the work carried on by the National Conference of Charities and Correction, being its president in 1883; the National Prison Association of which he was president in 1904; and the International Prison Congress. He was assistant director of the United States census in 1899-1902. His publications include (Defective, Dependent and Delinquent Classes in the United States5 (10th Census); (Crime, Pauperism, and Benevolence in the United States5 (11th Census) ; (Punish¬ ment and Reformation5 (1895; rev. ed., 1910); (Liquor Problem in Its Legislative Aspects (1897; 2d ed., 1898); (Punishment and Refor¬ mation5 (posthumously, 1919).

WINFIELD, Kan., city and county-seat of Cowley County, on the Walnut River and on

the Atchison, Topeka and Santa Fe (three lines), Missouri Pacific and Frisco railroads, also the Southwestern Interurban. It was set¬ tled in 1870 and incorporated in 1871. The chief industrial establishments are butter plant, poultry packing, flour mills, metal manufactur¬ ing, stock food plant and coid storage. Plenty of natural gas, at door, for domestic consump¬ tion. Winfield has two colleges of Liberal Arts, Southwestern (Methodist Episcopal) and Saint John’s Lutheran, also College of Music. The public schools of Winfield are rated first by the State University and the Manual Arts build¬ ing was erected in 1916 in addition to regular High School and Junior High School. Music and drama are taught and also community ex¬ tension work emphasized. The Commercial Club is unique in its size and operation and has among its committees one on Child Welfare. Winfield also has the

unique distinction of hav¬ ing won the Stubbs-Horner prize in 1915 for being the best second class city in Kansas in which ‘ to rear children. The electric lighting and water plant is municipally owned and the water supply for palatability and purity is not outranked in Kansas. The city fire apparatus is all motor driven. Pop. (1920) 7,933.

WING, an organ of flight. In birds, the wings consist of the bones of the fore limbs, specially modified to form a support and axis, while attached to this skeleton are the muscles moving the limb (see Ornithology), externally clothed with strong flight-feathers or (<wing quills.55 (See Flight). In the bat (q.v.) the wing consists of an expansion of the skin, sup¬ ported on four of the fingers, which are ex¬ tremely long. This leather-like membrane, or ((patagium,55 extends from the fore limbs to the hind limbs, and in many cases between the hind limbs and tail as well. In such mammalia as the flying-foxes, flying-squirrels, flying phalangers, and in the lizards known as flying-dragons (qq.v.), the wing is a mere expansion of skin, extending along the sides of the body, often connecting hind and fore limbs, and serving as a parachute to sustain the animals in their fly¬ ing leaps from tree to tree, but in no sense serving as an organ of true flight. In insects (q.v.), the wing is formed of two delicate skin layers, supported on hollow tubes or nervures, placed in communication with the respiratory or breathing system. The wings of insects be¬ come thus related to respiration,, and by their movements probably aid in the diffusion of air through the breathing tubes.

WINGATE, George Wood, American law¬ yer: b. New York, 1 July 1840. - He was edu¬ cated in the public schools, and served with the 22d New York Volunteers during the Civil War. He originated systematic rifle practice for the instruction of the National Guard, and through his efforts the Creedmoor rifle range on Long Island was established. He was presi¬ dent of the National Rifle Association for 25 years, and is the author of (Wingate’s Manual of Rifle Practice5 (1872) ; (The Great Cholera Riots5 (1880); (On Horseback Through the Yellowstone5 (1886) ; (History of the 22d Regi¬ ment5 (1896), also of many articles on military subjects.

WINGED BULL, in architecture, a decora¬ tion of frequent occurrence in ancient Assyrian

temples, where winged human-headed bulls and lions of colossal size usually guarded the por¬ tals.

WINGED LION, the symbol of the evangelist Saint Mark, which was adopted as the heraldic device of the Venetian Republic. A celebrated bronze figure of the winged lion of Saint Mark surmounting a magnificent red granite column, formed out of a single block stands in the Piazzetta of Saint Mark at Venice.

WINGHAM, Canada, town in Huron County, Ontario, on the Maitland River, 110 miles northwest of Toronto, and on the Grand Trunk and the Canadian Pacific railways. Manufactures include furniture, planing mill products, woodwork, stoves, salt, flour and lum¬ ber. It is a shipping centre for grain. It has a business college, hospital, public library and park. Pop. about 2,238.

WINGSHELL, the name of several bivalve shells, which have wing-like extensions -of the hinge-margin, as Unio alatus, or are wing¬ shaped; especially species of the genus Pinna. See Pinna.

WINIFRED, WENEFRIDE, or WINE-FRIDE, Saint, according to the legend, a noble British maiden, possibly of the 7th century, whose head the Prince Caradoc cut off when she lied from his unholy proposals. The head rolled down a hill, and where it stopped a spring gushed forth; famous afterward as a place of pilgrim¬ age, Holywell in Flintshire. She was restored to life by Saint Bueno, who replaced her head, survived the miracle 15 years, and after the death of Saint Bueno entered the nunnery of Gutherin, in Denbighshire. Her festival is ob¬ served on 3 November.

WINKELRIED, vink'el-red, Arnold von,

Swiss patriot. He was a knight of the Swiss canton of Unterwalden, whose self-sacrificing valor is said to have decided the victory of Sempach, 9 July 1386. The Austrian troops, under Archduke Leopold, were formed into a compact body which resisted the efforts of a small body of Swiss drawn up in form of a wedge and rushing to the attack. The Aus¬ trians were now beginning to surround their enemies when

Winkelried, seeing the desperate condition of affairs, burst from the ranks, threw himself upon the ranks opposed to him, and, grasping all the pikes within his reach, buried them in his bosom, and bore them by his weight to the earth. Over his dying body his com¬ panions rushed into the opening he had made in the Austrian line and defeated their enemy with great slaughter. The truth of this legend has been much discussed, but in 1886 a monu¬ ment to Winkelried was raised at Stantz, Un¬ terwalden. Consult Von Liebenau, H., (Arnold von Winkelried, seine Zeit und seine That) (1862) ; Kleissner, <Die Quellen zur Sempacher Schlacht und die Winkelried Sage' (1873); Burkli, (Der wahre Winkelried: die Taktik der alten UrschweitzeU (1886) ; Von Liebenau, T., <Die Schlacht bei Sempach.)

WINKLE, a local name about Long Island Sound and New York Bay for either of the large conchs (q.v.), Fulgur and Sycotypus, which are extremely common and very destruc¬ tive to cultivated oysters. Their shells were utilized by the Indians as spoons, ladles, dig¬

ging-tools, *etc.* ; and out of their central col¬ umns were made the inferior beads called (<white wampum.®

WINLOCK, Joseph, American astronomer: b. Shelbyville, Ky., 6 Feb. 1826; d. Cambridge, Mass., 11 June 1875. He was graduated from Shelby College in 1845 and in that year was appointed professor of mathematics and astron¬ omy there. He was engaged as one of the computers in the office of the (American Ephem-eris and Nautical Almanac* in 1852—56, and in the last-mentioned year was appointed pro¬ fessor of mathematics in the United States navy. He shortly afterward returned to the office of the (Nautical Almanac> as second su¬ perintendent, but in 1859-61 was at the Naval Academy at Annapolis, Md., in charge of the mathematical department; on the outbreak of the Civil War he resumed direction of the (Al¬ manac. * In 1866 he was appointed to the chair of astronomy at Harvard, at the same time be¬ coming director of the observatory at Cam¬ bridge, in which offices he continued until his death. He was elected by Congress to the Na¬ tional Academy of Sciences in 1863, was in charge of the expedition to Kentucky to ob¬ serve the solar eclipse of August 1869 and of that to Spain in December 1870. He made numerous and important improvements in the equipment of the Harvard Observatory, and his researches and observations were of great scientific value.

WINNEBAGO (Algonquian name: ((Turbid water people®), an

important tribe of the Siouan stock of North American Indians, who are closly related to the Chiwere division (the Iowa, Oto and Missouri) and to the Mandan. Their own name is Hochdngara, ((People of the early or primitive speech.® They were first mentioned in the (Jesmt Relations) of 1636, but the first use of the name Winnebago occurs in the (Relation* of 1640. It is said that they were almost annihilated by the Illinois tribe in early days, and that the historical group was made up of the survivors of this warfare and of members of other tribes. In 1639 they were on Green Bay, Wis. ; in 1736 they or a part of the tribe resided on Lake Superior, but by 1761 they were again on Green Bay, and in 1788 had a village on a small island in Winnebago Lake. In 1822 their population was estimated at 5,800 and their country extended from Winnebago Lake southwestward to the Mississippi. By treaty of 1825 and 1832 they ceded their lands south of Wis¬ consin and Fox rivers for a reservation on the Mississippi above the Oneonta. In the latter year one of their villages was at Prairie la Crosse. They suffered several visitations of smallpox; the third, which occurred in 1836, carried off more than a quarter of the tribe. A part of the Winnebago long remained widely distributed over their old country east of the Mississippi and along that river in Iowa and Minnesota. In 1846 they surrendered their res¬ ervation for another above the Minnesota, and in 1856 they were removed to Blue Earth, Minn. Here they were mastering agriculture when the Sioux War broke out and the set¬ tlers demanded their removal. Those who had taken farms were permitted to remain, but the others were taken to Crow Creek, on the Missouri, whence they soon escaped; but their privations and sufferings were such that of

the 2,000 removed to Crow Creek, only 1,200 reached the Omaha reservation, whither most of them had fled. These survivors were as¬ signed a new reservation on the Omaha lands, where they remain, allotted lands in severalty. They numbered in 1896 1,131 under the Omaha and Winnebago Agency, Nebraska, and 1,403 in Wisconsin. These, however, included only those on reservations. Since then many of the Win¬ nebago have left the reservations and have be¬ come

citizens of the United States, so that it is difficult to estimate their population ; but it is considerably greater than in 1896. Consult McGee, (Siouan Indians) (14th Rep. Bureau Amer. Ethnology, Washington 1897) ; Hodge, 'Handbook of American Indians) (Washing¬ ton).

WINNEBAGO, wm-e-ba'go, a lake in the eastern part of Wisconsin, the largest in the State. It is about 750 feet above sea-level, nearly 28 miles long and 10 miles wide in the broadest part; area, 212 square miles. It has an abundance of fish. Its clear waters, well-wooded shores, with the pretty towns interven¬ ing, make it most attractive. On the east shore is found a curious wall made by stones being pressed against the shore at times of ice ex¬ pansion. The Fox River is both an inlet and an outlet of the lake. It is navigable from its mouth at the head of Green Bay; so Lake Win¬ nebago has steamer connections, by means of the Fox River and Green Bay, with the Great Lakes.

WINNEMUCCA, wm-e-muk'a, Nev., town, county-seat of Humboldt County, on the Hum¬ boldt River, and on the Southern Pacific Rail¬ road, about 170 miles northeast of Reno. It is in a silver mining region, and is surrounded by some excellent farm lands. It has large ship¬ ments of livestock, beef and wool, and some grain. Pop. 1,786.

WINNEMUCCA, a lake in the western part of Nevada. It is in a desert valley in which is Pyramid and several other lakes. Win-nemucca is 26 miles long, north to south, from two to five miles wide, and from 50 to 87 feet deep. Truckee River is the only inlet, which is also an inlet of Pyramid Lake. It has no ap¬ parent outlet. The mineral matter, chiefly salt, is 3.6 parts per 1,000.

WINNEPESAUKEE ("Beautiful water of the high land})), a division of the Pennacook confederacy of the Algonquian stock of North American Indians, formerly inhabiting the vicinity of Winnipiseogee Lake (q.v.), New Hampshire.

WINNEPESAUKEE, Lake, New Hamp¬ shire, in Carroll and Belknap counties, 27 miles northeast of Concord. It is irregular in outline, with many inlets and islands, and is about 18 miles long and from three to II miles wide. Its greatest depth is about 300 feet and it is 470 feet above sea-level. Its waters empty into a small stream tributary to the Merrimac River. The surrounding scenery is charming. There are several small towns upon its shores, the largest being Wolfsboro; and there are nu¬ merous summer cottages and a considerable summer resort business.

WINNETKA, Ill., village in Cook County, a northeastern residential suburb of Chicago,

on the Chicago and Northwestern Railroad. Public buildings include the Community House, The Henry D. Lloyd Public Library and the North Shore Health Resort. Pop. (1920) 6,694.

WINNFIELD, La., city and parish seat of Winn Parish, on the Dugdemona River, 135 miles northeast of Baton Rouge, on the Chicago, Rock Island and Pacific, the Tremont and Gulf, the Louisiana Railway and Navigation Company and the Louisiana and Arkansas railroads. It is situated in a cotton region, and manufactures lumber, ice, brick, shoes and har¬ ness. Pop. about 2,975.

WINNINISH. See Ouananiche.

WINNIPEG, Canada, city and capital of the province of Manitoba, situated at the con¬ fluence of the Assiniboine and Red rivers, and on the Canadian Pacific, the Great Northern and the Canadian National railways, 1,425 miles west of Montreal and about equidistant from the Gulf of Mexico, the Pacific and Atlantic oceans and the Arctic Sea.

Public Buildings, Parks, *etc.* — Of these the principal are the Provincial government build¬ ings, corresponding somewhat to the State capitols in the United States. There are also the Court House, City Hall, with a fine open space in which is located a military monument, Union Bank, Merchants' Bank, post office, the great office buildings on Main street, Portage avenue, ' Broadway, etc., the railway stations, modern apartment buildings, Fort Garry Hotel, the Royal Alexander Hotel, the Eaton building, Y. M. C. A. building and the several school buildings throughout the city. Assiniboine, River and Elm parks are the chief recreation spots of the city. A fine zoological garden is maintained in River Park. There are numer¬ ous small parks.

Education.—- The city has a good public school system with modern buildings and equip¬ ment. There are also a number of private schools. There are several Catholic parochial schools, which the authorities recognize for at¬ tendance only; otherwise they are classed as private. At the head of higher education is the University of Manitoba and its affiliated denominational colleges : Saint John's (Church of England), Wesley College (Methodist), Saint Boniface (Roman Catholic) and Mani¬ toba College (Presbyterian). The

Manitoba Medical College is now affiliated with the uni¬ versity as is the Manitoba Agricultural College.

Religious and Charitable Activities. — The most numerous denominations are the Presby¬ terian, Church of England, Methodist and Roman Catholic. There are also Baptists and Congregationalists, together with several for¬ eign churches in which the languages of Con¬ tinental Europe are used. There are about 80 churches in the city. Among the institutions for helping the sick, poor and unfortunate are the Girls' Home of Welcome, House of the Friendless, Winnipeg's Children's Home, the Provincial Home of Detention, Jewish Orphan¬ age and Children's Home of Western Canada, Knowles' Home for Boys, Manitoba School for the Deaf, Saint Joseph's Orphanage, Salvation Army Industrial Home, the General Hospital, Saint Boniface Hospital, Grace Hospital and Saint Roch's Hospital, the Children's Aid

Society, the Manitoba Neglected Children's So¬ ciety, the Old Folks Home, *etc.*

Libraries. — The Winnipeg city library was erected by the Carnegie Foundation and is maintained by the city council. It cares for the collections of the Manitoba Historical Society. There are several branches throughout the city in which fiction and books of popular circula¬ tion are housed for the convenience of readers and borrowers. The Legislative Library is housed in the Provincial Parliament Buildings and is large and complete in its special field. The University and several college libraries are ample and elaborate. There is a valuable law library in the new Courthouse.

Banks and Banking. — The banking system is carried on by private companies but under strict supervision by both the provincial and Dominion governments. The Merchants' Bank of Canada began its business in 1872 in Win¬ nipeg. Other banks now operating there are the Bank of Hamilton, the Bank of Nova Scotia, the Bank of Ottawa, the Bank of To¬ ronto, La Banque de Hochelaga, Canadian Bank of Commerce, Credit Fonder Franco-Canadien, Union Bank of Canada,

Home Bank of Can¬ ada, Imperial Bank of Canada, Molson's Bank, Royal Bank of Canada and the Winnipeg Fi¬ nancial Corporation.

Industries. — Being the outlet of a vast agricultural area to the markets of the world, Winnipeg ranks as one of the great grain cen¬ tres both of America and Europe. It 'is also a market centre for horses, cattle and swine from the vast prairie areas. There are large engine, machine and railroad car shops of the three great systems entering the city. There are in addition slaughter-houses, packing es¬ tablishments, lumber mills, rolling mills, foun¬ dries, flour mills, boiler and carriage works and a great number of minor manufacturing estab¬ lishments. The value of its manufactured prod¬ ucts is about $75,000,000 annually. Ample power facilities are afforded by the Winnipeg River, 60 miles distant. The water-supply sys¬ tem, municipally owned, brings water through a great aqueduct about 100 miles long from Lake of the Woods, the latter being about 100 feet above the level of the city.

History. — On the site of the present city in the days of the fur trade there was built Fort Rouge, in 1738, followed by Fort Gibraltar, Fidler's Fort, Fort Douglas and Fort Garry, the last named a post of the Hudson's Bay Company. The fort was dismantled in 1881. The modern city may be said to date from 1871, when there was a settled population of 215. The present city was incorporated in 1874, when the population was between 3,000 and

4,000.

Government and Population. — The city's affairs are vested in a mayor, four controllers and a board of 12 aldermen. The Parks Board is appointed by the city council and administers a fixed percentage of the city revenue. Since 1900 the population has increased rapidly. In 1904 it was 67,262 and in 1916 was 163,000. With the suburbs it is at present about 200,000.

George Bryce,

Author of (Short History of the Canadian Peopled

WINNIPEG, Lake, Canada, is in the province of Manitoba and the district of

Keewatin, and lies at an altitude of 710 feet above sea-level, between lat. 50° 20’ and 53° 50’ N. and long. 96° 20’ and 99° 15’ W. It is over 250 miles long, from 25 to 70 miles wide and covers an area of over 8,500 square miles. It contains a number of islands, the longest being Reindeer and Big Island embracing respectively 70 and 60 square miles. It re¬ ceives the surplus waters of Lakes Win-nipegoosis and Manitoba and discharges by Nel¬ son River in a northeasterly direction into Hudson Bay. The principal rivers flowing into it are, from the south, Red River; from the west, Dauphin and Saskatchewan rivers ; and from the east, Winnipeg, Bloodvein, Berens and Poplar rivers. Lake Winnipeg is com¬ paratively shallow, nowhere reaching the depth of 100 feet, a consequence being that its fre¬ quent storms are often exceedingly dangerous; this feature is augmented by its exposed con¬ dition owing to the low character of its shores which, on the south, are also very marshy. Fish in abundance are found in its waters, the white fish being widely known and valued on account of their size and flavor.

WINNEPEG RIVER, Canada, rises near Savanne in lat. 48° 47’ N. and long. 89° 57’ W., and flows in a general westerly direction under the names of Savanne, Seine and Rainy rivers into the Lake of the Wroods. After it leaves this lake it is known as Winnipeg River and follows an extremely tortuous and often tur¬ bulent course until it finally discharges into Lake Winnipeg. It is navigable for a distance of 208 miles.

WINNIPEGOOSIS, wln’T-pe-goo’sis, Lake, a lake in northwestern Manitoba extend¬ ing into Saskatchewan. It lies to the west of Lake Winnipeg (q.v.) and-parallel with it; its length is 127 miles, the width 17 miles; its elevation above sea-level 828 feet. It is gen¬ erally shallow, the greatest depth not being over 40 feet. It receives the Red Deer and Swan rivers, and a few other smaller streams, and discharges into Lake Manitoba to the south¬ east, through the Water Hen River.

WINNIPISEOGEE, win-e -pe-sa’ge, a lake in the east central part of New Hampshire. Its average length is about 25 miles; width from one to 10 miles; area, 178 square miles; and 475 feet above sea-level. The outlet is Winnipiseogee River, which flows into the Merrimac River. It has an irregular coast line, and contains a number of islands. The waters abound with fish. There are many summer cot¬ tages on the islands and along the shores.

WINNOWING MACHINE, a machine

for winnowing grain by means of agitated sieves and a blower. The

grain is usually introduced at the top of the machine into a hopper whence it falls on a sieve or series of sieves moving rapidly to and fro. Meanwhile a strong current of air is sent through the machine and blows out the chaff at one end. The cleansed grain is then graded by a series of sieves of different mesh and each size led to its proper chute. The early type of winnowing machines was of wood, and was moved by hand. The present-day ma¬ chine, in America at least, is merely an attach¬ ment to the big power-driven threshing ma¬ chines. Before the introduction of these machines the process of winnowing was slow

WINNIPEG

1 Law Courts

2 City Hall Square, with Municipal Building, on the left

r

.

‘ ■! V

.

‘

■

WINNSBORO — WINSLOW

399

and laborious. It consisted in throwing up the grain by means of sieves or shovels while an air current, blowing across, carried away the chaff. Consequently winnowing was impossible on a windless day. When the first machine was introduced into Britain, by a farmer in Scotland in 1737, it met strong opposition, as interfering with the divine prerogative which alone had power over the winds. But the ad¬ vantages soon overcame the prejudice whose record Walter Scott has preserved in <01d Mortality) — making Mause Headrigg speak anachronously to her mistress about ((a new¬ fangled machine for (lighting the corn frae the chaff, thus impiously thwarting the will o’Divine Providence, by raising wind for your leddy-ship’s use by

human art, instead of soliciting it by prayer, or patiently waiting for whatever dis¬ pensation of wind Providence was pleased to send upon the shielin-hill.**

WINNSBORO, S. C., city and county-seat of Fairfield County, on the Southern Railroad, about 34 miles north of Columbia. It is in an agricultural region, and in the vicinity are large stone quarries. At one time the city manufac¬ tured all the cotton-gins used in the United States. The educational institutions are Mount Zion Institute, established in 1878, as a public high school, but chartered as a school in 1777, and graded elementary schools. Pop. 1,822.

WINONA, wi-no'na, Minn., city and

county-seat of Winona County, on the Missis¬ sippi River, and on the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, the Green Bay and Western, the Chi¬ cago Great Western, and the Chicago and Northwestern railroads, about 105 miles south¬ east of Saint Paul. The surrounding scenery is most picturesque, the peculiar rocks in and near the city are of interest. Sugar Loaf and Trempealeau Mountains are remnants of once lofty elevations, but are now included with the high bluffs which border the city. The city has steamer connection with all the Mississippi River ports, and the bridges which span the river at this point connect the city with places in Wisconsin. It is in an agricultural and stock-raising region. The chief manufacturing establishments are flour and lumber mills, agri¬ cultural implement works, wagon and carriage factories, railroad shops, breweries and patent medicine works. In 1914 the reported com¬ bined capital of the manufacturing establish¬ ments amounted to $12,013,000, while the value of production was $14,304,000. Winona has excellent transportation facilities and ships an-nuallv large quantities of grain, hay, vegetables, lumber and livestock. The principal public buildings are the government buildings, the courthouse, municipal buildings, the Winona General Hospital, the Margaret Simpson Home, opera house, churches and schools. There are several churches, including a Roman Catholic cathedral. The educational institutions are a State normal school, established in 1868; Winona Seminary (Roman Catholic), for young women, a public high school, opened in 1887, public and parish schools, Poland's Busi¬ ness University, and several private schools. The city owns and operates the waterworks. Winona was settled in 1851 and in 1852 was laid out as a town. In 1857 it received a city charter. Its growth has been somewhat

rapid; but it has had no fictitious booms nor serious drawback. Pop. (1920) 19,143.

WINONA, Miss., town and county-seat of Montgomery County, on the Southern and the Illinois Central railroads, about 85 miles north by east of Jackson. It is in an agricultural region in which cotton and grain are the chief products. It has flour and grist mills, cotton gins and agricultural implement works. The two banks have a combined capital of $150,000. The high school was established in 1887. Pop.

2,512.

WINOOSKI, Vt., village in the town of Colchester (q.v.), in Chittenden County, on the Central Vermont Railroad, two miles north of Burlington. It has an electric railway to Bur¬ lington. It is in a fertile agricultural region, and has considerable manufacturing interests. The chief industrial establishments are sash, door and blinds factories, wagon and carriage works, cotton and woolen mills, iron and brass works, machine shops, flour mill and furniture factory. It has a high school, Providence Acad¬ emy (Roman Catholic), public and parish schools and the Fanny Allen Hospital. Pop.

4,520.

WINOOSKI, or ONION, a river in Ver¬ mont, which has its rise in the northeastern part of the State, flows in a southwesterly, then northwesterly direction, breaking through the Green Mountains, and enters Lake Champlain about five miles northwest of Burlington. To¬ tal length about 100 miles. In several places it has cut deep picturesque gorges, and it has several falls. The falls at Middlesex and Winooski furnish extensive water power for manufacturing. The valley of the Winooski is noted for its beautiful scenery.

WINSHIP, Albert Edward, American editor: b. West Bridgewater, Mass., 24 Feb. 1845. He studied at Andover Theological Seminary, and in 1876-83 was pastor of the Prospect Hill Church, Somerville. Since 1886 he has edited the Journal of Education, Bos¬ ton. He was a member of the Massachusetts Board of Education in 1903-09. He has lec¬ tured extensively, and is author of (Life of Horace Mann* (1896) ; (Great American Educators) (1900) ; (Our Boys* (1909), *etc.*

WINSHIP, George Parker, American au¬ thor and librarian: b.

Bridgewater, Mass., 1871. He was graduated from Harvard in 1893, and was assistant in history there in 1893-95. He was librarian in charge of the John Carter Brown Library, Providence, R. I., from 1895 to 1915, when he became librarian of the Harry Elkins Widener Collection, in the Widener Memorial Library, Harvard. He has written (The Coronado Expedition *(1896) ; (Geoffrey Chaucer* (1900) ; (Cabot Bibliography* (1900), etc., and has edited Wafer's (Darien* (1903) ; <The Letters of Three Rhode Island Children* (1904) ; (Boston in 1699* (1905) ; (Three

Proclamations Concerning the Lottery for Virginia, 1613—21 *(1907) ; (Fifteenth Century Books in Brown University Libraries* (1910) ; (Major Bradford's Letter, 1676* (1914).

WINSLOW, winz'lo-, Edward, American colonial governor : b. Droitwitch, Worcester¬ shire, England, 19 Oct. 1595; d. at sea, between Santo Domingo and Jamaica, 8 May 1655.

While making a tour of the Continent he be¬ came a member of John Robinson's Leyden congregation. He was one of the passengers in the Mayflower , and in the first conference with Massasoit offered himself as a hostage, and won the attachment of the Indian chief, which he increased in 1623 by curing him of a severe illness. After the death of his wife dur¬ ing the first winter at Plymouth he married Mrs. Susannah White, mother of Peregrine White, her husband having died in that same winter also, and theirs was the first marriage in New England. In 1623-24 he made two voy¬ ages to Europe as agent for the colony, of which he was chosen governor in 1633, 1636 and 1644. While visiting England again in 1635 as agent for the colony, he was im¬ prisoned by Laud in the Fleet prison for 17 weeks on the charges of having taught in the church, although a layman, and of having per¬ formed marriage as a magistrate. Another voyage was made by him in 1646 to answer charges against the colonists of religious per¬ secution and intolerance. In 1649 he again visited England, was instrumental in the organ-ziation of the society for the propagation of the gospel in New England, and was employed in various public affairs under the

Common¬ wealth. In 1655 Cromwell appointed him one of three commissioners to superintend an ex¬ pedition against the Spaniards in the West In¬ dies, and he died before its completion. He was the author of several works, mostly con¬ troversial writings in defense of New England. The principal are (Good News from New Eng¬ land5 (1624); (Hypocrisie Unmasked5 (1646); (The Danger of Tolerating Levellers in a Civil State) (1649), and 'Glorious Progress of the Gospell amongst the Indians) (1649). These have been reprinted by the Massachusetts His¬ torical Society.

WINSLOW, Forbes Benignus, English

alienist : b. London, of a Massachusetts family, August 1810; d. Brighton, Sussex, 3 March 1874. He came to this country in early life, studied medicine in New York, was graduated from the College of Surgeons, London, in 1835, and took his M.D. at Aberdeen. Having after 1830 paid special attention to the study of in¬ sanity, he opened a private asylum at Hammer¬ smith, and later another in London, and came in time to be a supreme authority on all relat¬ ing to diseases of the brain. He founded and edited the Quarterly Journal of Psychological Medicine and Mental Pathology (1848) and the Medical Critic (1861), was the juridical and president of the Medical Society of London (1853), and a member of numerous scientific bodies. He published (The Application of Phrenology to the Elucidation and Cure of Insanity) (1831); (Anatomy of Suicide) (1840); 'Plea of Insanity in Criminal Cases> (1843); 'Notes on the Lunacy Act5 (1845) ; 'Softening of the Brain) (1849) ; 'Lethsonian Lectures on Insanity5 (1854) ; (Obscure Diseases of the Brain and Disorders of the Mind5 (1860 ; 4th ed. 1868) ; 'Light, its Influence on Life and Health > (1867).

WINSLOW, Hubbard, American Presby¬ terian clergyman : b. Williston, Vt., 30 Oct. 1799; d. there, 13 Aug. 1864. He was graduated from Yale in 1825 and from Yale Theological

Seminary in 1828. He was pastor of the First Church, Dover, N. H., 1828-32, and of the Bowdoin Street Church, Boston, 1832-44, and during the next 10 years was the principal of the Mount Vernon Young Ladies' Institute at Boston. He edited the Religious Magazine 1837-40, lectured widely on religious and secu¬ lar topics, was pastor of the First Presby¬ terian Church, Geneva, 1857-59, and of the Fiftieth Street Presbyterian Church, New York, 1861-62. He was a voluminous writer, and among his works may be cited (The Doctrine

of the Trinity5 (1831); Controversial Theology) (1832) ; ‘The Appropriate Sphere of Woman5 (1837), republished as ‘ Woman as She Should be5 (1838) ; dements of Intel¬ lectual Philosophy5 (1852) ; ‘The Hidden Life5

(1863).

WINSLOW, John, American soldier: b. Plymouth, Mass., 27 May 1702; d. Hingham, Mass., 17 April 1774. In 1740 he was appointed by the council captain of a company recruited in Boston for the expedition against Cartagena (q.v.) ; and in June 1754 sailed in the provincial ship Massachusetts to build a fort on the Ken¬ nebec. This he began on a point half a mile below the Teconick Falls, where it was finished by William Lithgow in the next year. With Scott he was a commander of the 1,800 troops sent by New England in 1755 to remove the French from the posts established on the ‘Bay of Fundy. The French forts at Beausejour and Gaspereau were taken, and on 11 August Winslow, then with rank of lieutenant-colonel, and in command at Mines, was instructed to remove the Acadians in his vicinity, a task which he described to the French inhabitants as (<very disagreeable.55 He strictly followed his orders, however, as <(it is not my business to animadvert.55 In 1756 he was appointed to com¬ mand the campaign on Lake Champlain, hold¬ ing now the grade of major-general, and was stationed at Fort William Henry. He led an¬ other expedition to the Kennebec in 1758-59, and subsequently was chief justice of the Court of Common Pleas for Plymouth County and a member of the legislature and the council. He was associated with Samuel Adams in the preparation of documents regarding the Stamp Act troubles.

WINSLOW, John Ancrum, American naval officer: b. Wilmington, N. C., 19 Nov. 1811 ; d. Boston, Mass., 29 Sept 1873. He was appointed midshipman in the navy in 1827, was promoted lieutenant in 1839, and served in the Mexican War, participating in the expeditions against Tabasco, Tampico and Tuspan. He was made commander in 1855, in 1861 joined the Mississippi flotilla, and in 1862 was com¬ missioned captain. In 1863-64 he was in com¬ mand of the steamer Kearsarge, assigned to the special duty of pursuing the Confederate pri¬ vateer Alabama. On 14 June 1864 he found the Alabama off Cherbourg, France, and blockaded her in that harbor until 19 June, when Captain Semmes notified Winslow of his intention to fight. The Kearsarge steamed seven miles out from shore in order to be on neutral waters, and then turned to meet the privateer. The Alabama

fired the first shot, and the battle continued for an hour and a half, the vessels fighting in circles, which brought

them constantly closer until the distance be¬ tween them was but 600 yards. The Alabama then began to sink and raised the white flag. Winslow numbered but three killed and wounded out of his crew of 163 officers and men, and took, 65 prisoners. It was the most important sea fight of the war 'between two ships, and Captain Winslow received a vote of thanks from Congress, and was promoted commodore, his commission dating from the hour of his vic¬ tory. He was in command of the Gulf squad¬ ron in 1866-67, was promoted rear-admiral in 1870, and was commander-in-chief of the Pacific squadron in 1870-72. Consult Ellicott, <The Life of John Ancrum Winslow> (New York

1902).

WINSLOW, Josiah, American colonial governor, son of Edward Winslow (q.v.) : b. Marshfield, Mass., 1629; d. there, 18 Dec. 1680. From the command of the Marshfield military company in 1652 he rose to the rank of major and commander-in-chief of the forces of the Plymouth colony in 1658. He was chosen deputy to the general court in 1653, and was one of the commissioners of the united colonies from 1658 to 1672. He was assistant governor of the Plymouth colony for several years prior to 1673, and from that date till his death was its governor, the first native-born governor in New England. During King Philip's War he was ex officio, and, according to rank, general-in-chief of the entire army of the united colonies. He wrote a poem commemorative of Governor Bradford, which may be found in Morton's (New England MemoriaP (1669).

WINSLOW, Miron, American missionary: b. Williston, Vt., 11 Dec. 1789; d. Cape of Good Hope, Africa, 22 Oct. 1864. He was graduated from Middlebury College, Vermont, in 1815, and from Andover

Theological Seminary in 1818. He went as a missionary of the American Board to Ceylon 1819, and continued in the mission field for 44 years. He founded the Madras mission 1836; was president of the native college at Madras 1840; translated the Bible into Tamil 1835, and published (A Tamil and English Dictionary) (1862), a great work, containing over 67,000 Tamil words, the most complete of its time.

WINSLOW, William Copley, American Egyptologist, son of Hubbard Winslow (q.v.) : b. Boston, Mass., 13 Jan. 1840. He was gradu¬ ated from Hamilton College, Clinton, N. Y., in 1862, and from the General Theological Sem¬ inary, New York, in 1865. He took orders in the Episcopal Church, was rector of Saint Luke's Church, Lee, Mass., 1867-70, and in 1883 became secretary of the Free Church Asso¬ ciation in the Episcopal Church. He was assist¬ ant editor of the New York World 1862-63, and of the Christian Times 1864-65. He founded the American branch of the Egypt Exploration Fund in 1883, and served until 1903 in some official capacity. He has written (Israel in Egypt* (1883) ; (The Store City of PithorrP (1885) ; (A Greek City in Egypt* (1887) ; (The Egyptian Collection in Boston) (1890) ; (The Pilgrim Fathers in Holland) (1891) ; Gover¬ nor Edward Winslow, * *etc.*

WINSLOW, Me., town in Kennebec County, at the confluence of the Kennebec and Sebasti-cook rivers, 18 miles north of Augusta, on the

Maine Central Railroad. The Block House, built in 1754, is still in excellent condition. There is a high school. Manufactures include woodwork and paper. The town was incorpo¬ rated in 1771. Pop. (1920) 3,280.

WINSOR, win'zdr, Justin, American his¬ torian and librarian: b. Boston, Mass. , 2 Jan. 1831 ; d. Cambridge, 22 Oct. 1897. He was educated at Harvard, and subsequently studied at Paris and Heidelberg. He was superintend¬ ent of the Boston Public Library 1868-77, and librarian of Harvard 1877-97. He published (History of the Town of Duxbury > (1849) ; (Bibliography of Original Quartos and Folios of Shakespeare* (1876) ; (Reader's Handbook of the American Revolution (1880) ; (Me¬ morial History of Boston (edited 1880-82) ; (Narrative and Critical History of America) (edited 8 vols., 1884-89), his most scholarly achievement; (Christopher Columbus*

(1891); (From Cartier to Frontenac) (1894) ; (The Mississippi Basin : The Struggle in. America between England and France * (1895). He

ranked as the highest authority on the early history of North America.

WINSTED, Conn., city, one of the county-seats of Litchfield County, on the Mad and Still rivers, and on the Central New England and the New York, New Haven and Hartford railroads, about 26 miles northwest of Hart¬ ford. It is in an agricultural region, and is the commercial and industrial centre for quite an extent of country. The Mad River furnishes considerable water power, which is utilized for manufactories for cutlery, clocks, sheet brass, brass novelties, bolts, chain hoists, spool silk, edge tools, pins, hosiery and undertakers' sup¬ plies. The town of Winchester, in which is the city of Winsted, had, in 1914 (government census), 147 manufacturing establishments, capitalized at $4,233,578, and employing 3,168 wage-earners. The value of the annual prod¬ ucts was $4,131,327. From 1914 to 1919 the manufacturing industries have increased; the number of employees is now about 4,000. The educational institutions are Gilbert (high) school, Saint Margaret of Cortona Academy, public and parish schools and the Memorial and Gilbert School libraries. Located in Win¬ sted are the Litchfield County Hospital of Winchester, and the William L. Gilbert Home for Indigent Children. There are four banks, which in 1918 had deposits amounting to $4,537,534. Winsted receives considerable water power from Highland Lake, a body of water on the western side of the city; and the water supply comes from Crystal Lake. The place was settled in 1756. The town of Winchester war founded in 1771. Winsted was incor¬ porated as a borough in 1858, and town and borough governments were consolidated in 1915. The town government is vested in a commission of five selectmen. Pop. (1920)

8,248.

WINSTON, John Anthony, American politician : b. Madison County, Ala., 4 Sept. 1812; d. Mobile, Ala., 21 Dec. 1871. He was educated at Lagrange College, Alabama, and at the University of Nashville, Tennessee, and subsequently engaged as a cotton planter and commission merchant. He was elected to the State assembly in 1839-40 and in 1842; to the

State senate in 1843, serving until 1852, and was president of that body in 1845ˆ8. At the Baltimore convention of 1848 he was the recognized leader of the Alabama Democracy, and m 1853-56 was governor of his State. He was the first native-born governor of Alabama, and by his refusal to sign certain bills for aiding railroad companies by State loans he gained the title of the “veto governor.® His course was sanctioned, however, by the people, as he was reelected in 1855, and his measures were sustained by the legislature in the fol¬ lowing session. He was a delegate to the Charleston convention of 1860 and opposed secession, but later became a colonel in the Confederate army. He commanded a brigade in the Peninsular campaign, and was con¬ spicuous for gallantry at Seven Pines, but his health compelled his retirement from the army soon afterward, and he took no further active part in the war. He was a member of the State constitutional convention in 1865, and in 1866 was elected to the United States Senate, but was refused admission.

WINSTON, N. C. See Winston-Salem.

WINSTON-SALEM, N. C, twin city, county-seat of Forsyth County, on the Nor¬ folk and Western and the Southern railroads, 115 miles north of Raleigh and 28 miles west of Greensboro. Winston and Salem have in¬ dependent municipalities, but as they are one commercially and industrially, they are usually called Winston-Salem. The city is the com¬ mercial centre of a fertile agricultural region, especially noted for its tobacco. It is a manu¬ facturing city of importance; the tobacco manufacture is the leading industry; there are large tobacco warehouses, and plug and leaf tobacco factories, representing about $2,000,000 capital invested; other industrial establishments include chemical works (the largest in the South), roller mills, cotton mills, knitting mills, a box factory, machine shops and foundries. The business is mostly concentrated in Winston, while Salem is mainly residential. The streets are broad and well paved, and there is a large park; the city has an electric railway and two systems of waterworks, one under the owner¬ ship of the municipal government of Winston. Of the public buildings the courthouse in the central square of Winston and the city hall and armory are the most notable ; in 1904

plans were laid out and soon work was begun on the erection of a United States government build¬ ing. There is an excellent public school sys¬ tem, including a graded school for colored children; and the city is also the seat of the Salem Academy and College ; a Moravian school for young women, founded in 1802; the Salem Boys' School (Moravian), and the Slater In¬ dustrial and Normal School, a non-sectarian institution for the colored race. Salem was founded in 1766 by Moravians as a church com¬ munity. For a number of years the town was governed by the church in affairs secular as well as religious. The Moravian bishop, Count Zinzendorf (q.v.), made the plans for the city and for the government which existed during the first years. The government of Salem is now administered under the revised charter of 1891 ; the government of Winston under the charter of 1899; in both cases the

mayor is elected every two years. Pop. (1920)

48,395.

WINT, Peter De. See De Wint, Peter.

WINTCHEVSKY, Morris (nom de plume of L. Benedict), Yiddish poet: b. Government of Kovno, Russia, 1856. He received a good education, and his verse first appeared in the periodical Ha-Magid in 1873. He was con* nected with Socialistic propaganda work in Lon don in 1879-1906 ; and in 1906-14 he edited Die Zukunft, a Socialistic periodical published in Yiddish, in New York. He ranks among the leading Yiddish poets and is known also for his satirical and philosophical sketches. In English he is author of 'Stories of the Struggle'

(1908).

WINTER, Sir James Spearman, Canadian statesman: b. Lamaline, Placentia Bay, New¬ foundland, 1 Jan. 1845; d. Toronto, 6 Oct. 1911. He was called to the bar in 1867 and was notably successful in his profession. He served in the Newfoundland House of Assem¬ bly in 1874-89, was its Speaker in 1877-78, Solicitor-General in 1882-85, and Attorney-General in 1885-89. He was a judge of the Supreme Court of Newfoundland in 1893-96; and in 1897-1900 he was

Premier. He repre¬ sented Newfoundland at the Washington Fish¬ eries Conference in 1887-88; and in 1890 and 1898 he was a delegate to the London confer¬ ences in regard to the French Treaties ques¬ tion. He was also a member of the Anglo-American International Conferences at Quebec and at Washington in 1898.

WINTER, John Strange. See Stannard, Henrietta.

WINTER, William, American author and dramatic critic: b. Gloucester, Mass., 15 July 1836; d. 30 June 1917. He wras graduated from the Harvard Law School in 1857 was admitted to the Suffolk County bar, but never practised, preferring to devote his time to literature. He published in 1854 a book of verse, 'The Con¬ vent, and Other Poems' ; and was for a time a successful lyceum lecturer. From 1860 he was a contributor to the Saturday Press and other New York periodicals; for several years was assistant editor of the Albion; and in 1865 be¬ came dramatic reviewer for the New York Tribune for which he continued to write until 1909. He was at: one time also managing editor of the New \ ork Weekly Review i and he was a frequent contributor to leading maga¬ zines and reviews. In addition to his criticism, he became known also for his biographical studies, and his sketches of travel abroad and historic foreign localities. His prose style is one of considerable distinction, and his verse is finished in character. He wrote further (The Queen's Domain, and Other Poems' (1856); 'My Witness' (1858\ poems; 'Thistledown' (1878), poems; (Poems,' complete edition (1881); 'The Jeffersons' (1881); (English Rambles' (1884); (Henry Irving' (1885); 'Stage Life of Mary Anderson' (1886); Shakes¬ peare's England' (1888-1910), chapters of travel and historical study; 'The Wanderers' (1889-92) ; 'Gray Days and Gold' (1889-1911), and 'Old Shrines and Ivy' (1892), essays on England; 'Shadows of the Stage' (1892—95) ; 'The Life and Art of Edwin Booth' (1893), and 'The Life and Art of Joseph Jefferson"

(1894); (A Wreath of LaureP (1898); <The Iheatre and the Public^ (1905); <Over the Border) (1911); 'Vagrant Memories) (1915). He also edited (1881) the works of Fitz-James O Brien (q.v.), and 'The

Shakespearean and Miscellaneous. Plays of Edwin Booth) (1899).

WINTER, one of the four seasons, the coldest of the year. Astronomically considered, winter begins in northern latitudes when the sun enters the sign of Capricorn, or at the solstice about 21 December, and ends at the equinox in March ; but in its ordinary sense it is taken to include the months of December, January and February.

WINTER-BERRY. Several members of the genus Ilex, of the holly family, are known by this name, including the inkberry (q.v.). They are all native to eastern North America, but the species commonly indicated by the name is the black alder (/. verticillata) , and abore-scent shrub, common in swampy places and along the banks of streams, often overhanging the water. The acute, oval leaves turn black in autumn, and the axillary cymes of tiny polyga-modicecious, whitish flowers, are succeeded by brilliant scarlet berries, that are as large as a pea, and are so crowded on the bare branches as to appear verticillate. They remain on the shrub all winter, and twigs are often sold by city florists for winter decoration. The bark of the winter-berry is tonic and astringent, and in infusion has been employed as a lotion for dressing ulcers. The smooth winter-berry (I. Icevigata) is a handsome shrub at all seasons and is similar to the black alder, but has larger stalked drupes, of a more orange tint, less crowded, and ripening earlier.

WINTER-CHERRY, a solanaceous herb (Physalis alkekengi) of the south of Europe, cultivated for its ornamental fruit. It is a downy perennial, with semi-decumbent stems and broad deltoid leaves. The axillary, solitary flowers have campanulate five-lobed whitish corollas. The calyces are also five-toothed and campanulate, but in fruit become inflated so that they are like miniature membranous bal¬ loons surrounding a pulpy, globose, cherry-like berry, which is edible, well flavored and acidu¬ lous, serving chiefly for preserves. These fruit-bladders are of a bright scarlet hue, and glow far into the winter. They will even keep their color for some time when cut. The plants are also known as alkekengi, bladder-herb, straw¬ berry-tomato, *etc.* The Japanese winter-cherry (Physalis franc heti) is very similar, but larger, having branches perhaps two feet high, with vigorous, soft, green foliage. They are pro¬ fusely hung with bright orange-colored trans¬ lucent lanterns, three inches in diameter.

WINTER CRESS. See Cress.

WINTER FLOUNDER. See Flounder. WINTER WREN. See Wren.

WINTERGREEN, a name applied to sev¬ eral ericaceous plants which retain their foliage over winter. In eastern North America, the aromatic little Gaultheria procumbens (see Gaultheria) is generally the plant referred to by this name. It is a low shrub, barely six inches high, found in rocky woods, with creep¬ ing stems, half hidden, from which arise erect, reddish branches, bearing ovate glossy leathery

leaves. These are serrate with bristly tipped teeth and are gathered in a tuft at the top of the slender stalk, the fleshy, white or pinkish, urn-shaped flowers nodding underneath. The fruits are bright scarlet, mealy, and spicy in flavor; and are really enlarged fleshy calyces which have enclosed the seed-capsules and as¬ sumed the form of a berry. They are some¬ times called checker-berries, and remain throughout the winter. The whole plant is aromatic in taste, and is frequently eaten, foli¬ age, berries and all. The spiciness is due to the volatile oil of Gaultheria (q.v.) which is a stimulant, astringent and diuretic drug, but is chiefly used for flavoring, confectionery or pharmaceutical preparations. It is a commer¬ cial product distilled from the wintergreen where it is plentiful, or from the sweet-birch (Betula lenta). The various members of the genus Pyrola are called wintergreen, such as the round-leaved wintergreen, a common plant with a few orbicular or oval, long-petioled, coriaceous leaves. The flowers are somewhat like those of the lily of the valley, and are fragrant. The spotted wintergreen (Chima-phila maculata) is another plant found in shady woods. It has a decumbent stem, sending up slender branches, which bear a few lanceolate leaves mottled with white, and several white flowers, tinged with purple. Still another wintergreen is the chickweed-wintergreen (Trientalis americana) a spring blooming herb, with a dainty white, starry blossom, poised above a whorl of foliage like tiny peach leaves.

WINTERHALTER, vin’ter-hal-ter, Franz, Xavier, German painter : b. Menzenschwand, near Saint Blasien, 20 April 1806; d. Frankfort-on-the-Main, 8 July 1873. He was educated at the academies of Munich and Carlsruhe, and also studied a while in Italy. In 1834 he estab¬ lished himself in Paris, where he obtained the patronage of Louis Philippe, and of many per¬ sons of note. In like manner he was liberally patronized by the English court. His produc¬ tions were principally portraits with a few fancy pieces and pictures of genre. In France he painted portraits of Louis Philippe and his queen, of all the members of the Orleans family, of Napoleon III and his empress, and of the prince imperial. He was the favorite court painter in England during the life of the prince consort and executed por¬ traits of the

Duke of Wellington, Sir Rob¬ ert Peel, and other distinguished persons for the queen. His fancy pictures have little other merit than as elegantly composed figure pieces. He finished carefully, and imparted a pleasing and well-bred expression to his faces, with little or no character.

WINTER'S BARK, the cortex of an ever¬ green magnoliaceous shrub (Drimys winteri) of the mountains of South America. In com¬ merce this bark is quilled or curved, gray out¬ side, brown internally. It has a peculiar aro¬ matic odor, a very pungent and astringent taste, and serves as a tonic, stimulant and anti-scor¬ butic drug. Paratudo bark is a variety of winter's bark. There are many substitutes for the drug, and much of the winter's bark of com¬ merce is obtained from the West Indian Cin~ namodendron corticosum and Canella alba.

WINTER'S TALE, The. <The Winter's Tale,> by William Shakespeare, was probably

composed, and certainly performed, in 1611; is first known to have been published in the First Folio of 1623 ; and by all evidence belongs, with <Cymbeline> and (The Tempest, > to Shakespeare's latest work. In closely packed and elliptical language, and in verse which tends to break down into prose under the strain of its matter, each play of this group exhibits various and contrasting, even incongruous, materials, loosely linked together to produce from an unhappy and unpromising beginning a romantically happy close. From storm and shipwreck and exile, from slander upon women's virtue, from tyrannical usurpation, lust, and rage, from foul-mouthed charges and unmotived and almost pathological jealousies and con¬ spiracies, from the death or exposure of children, such <(dramatic romances® move on through idyllic love-scenes and lucky voyages to the happy marriage of lovers, the reconcilia¬ tion of enemies, and the restoration of children and of thrones. These closing works of Shakespeare were perhaps the outcome of a golden sunset mood — the mood which Dowden named ((On the Heights® ; but they are more likely to have been affected by externals — the vogue of

Beaumont and Fletcher's dramatic romances in particular, and more generally by the prevalent Alexandrianism of con¬ temporary taste, which preferred a staccato suc¬ cession of fortuitous events, contrasted, sur¬ prising, picturesque and idyllic, to any closely knit dramatic structure or well-marked con¬ nection of action with motive, of scene with scene and of cause with effect.

Satisfying this taste there was present in Elizabethan literature a new ingredient, the Greek prose romances, which the Renaissance had made accessible in editions and transla¬ tions — the <2Ethiopica) of Heliodorus, the (Clitophon and Leucippe) of Achilles Tatius, and the (Daphnis and Chloe) of Longus. Mat¬ ter from one or more of them had been used by Sir Philip Sidney in his (Arcadia) and by Robert Greene in several prose tales. From one of these — (Pandosto; The Triumph of Time® (1588, 1607, 1609; often afterward reprinted as (Dorastus and FawniaQ, Shakespeare in turn took nearly the whole plot of (The Winter's TaleP

(Pandosto® is certainly compounded of many simples; and nearly all come from one or another of the Greek romances. Heliodorus gives a hint for Greene's jealous king, and sup¬ plies outright his trial-scene, oracle, exposure of child with tokens, finding of child, and restoration of child to a father who, not know¬ ing her, is about to condemn her to death ; Achilles Tatius gives the imprisonment and brutal wooing of a maiden by a would-be lover ; Longus gives rich details of the exposed child's rearing among the shepherds. <Pandosto) is a rechauffe of Greek fiction, with all its diversity, loose motivation and fortuitousness.

Most of the foregoing material, taken by Greene from the Greek romances, is in (The Winter's TaleP The matters which Shakes¬ peare has discarded are all among those which Greene added — the Queen's death, the King's wooing of his own daughter, the King's suicide. Shakespeare saves Hermione to be restored as a statue come to life; and his Leontes does not woo Perdita or kill himself. Such changes

bring the play still nearer to the Greek ro¬ mance type ; other changes, again, substitute genuine motive and causation for the mere coincidences with which Greene was content; while still others make it probable that for pastoral material Shakespeare -went behind Greene directly to a Greek romance, viz., Angel Day's English version (1587) of (Daphnis and ChloeP The Greek romances thus, both mediately and immediately, are important <(sources® of (The

Winter's TaleP In fact, this play stands as the typical representative of the Greek romance tradition in English drama.

The uramatic structure of (The Winter's Tale) is what might be expected of such a tra¬ dition. Leontes' jealousy, for example, is not only without justification, but — unlike Othel¬ lo's — without plausible motive or cause. Again, between Act III and Act IV the play breaks in two: in time there is a lapse of 16 years; in place a shift from Sicilia to Bo¬ hemia; in action a complete transference of interest to the affairs of the younger genera¬ tion. And again at the end the scene shifts back to Sicilia; Perdita's ˆrecognition® and her betrothal to Florizel occur off-stage and are only reported; while the chief interest is finally shifted back again to the restoration of Hermione. Sir Philip Sidney's ˆDefence of Poesy) gave by anticipation an amusing cen¬ sure of the type; and even the most liberal of modern dramaturgists — one who is not in the least under the spell of rules or (<unities® — is severe upon these shifts. It is as if Shake¬ speare had set out to exemplify to the full not only <(romantic® content but "romantic® struc¬ ture.

Yet (The Winter's Tale> is charming — charming just so far as it is not a type of anything, but is mere Shakespeare. For, as usual, Shakespeare has transmuted his tradition and has added fresh delights. His pastoral is an idyll of the world's springtime — its pure gold foiled just enough by Autolycus's roguery; nothing in all the great gallery of Shakes¬ pearean character surpasses in finish and reality Autolycus or the loyal Paulina ; nothing in the tragedies is grander than the grand emotional play of the statue scene. What we remember of (The Winter's Tale) is Perdita's daffodils and Autolycus' patter, Paulina's plain speaking, and above all, Hermione, every inch a queen, moving like some celestial luminary through all her noble phases, from ascendency, past crooked eclipses, back into the main of light.

(The Winter's Tale> was performed in 1611, in 1612-13, 1624 and 1634; but when revived in 1741, <(it was announced as not having been played for nearly 100 years.® Morgan's version of it, performed in 1754, was superseded in 1756 by Garrick's ((Florizel and PerditaQ, which continued to be performed as late as 1796. Kemble revived the original at Drury Lane in 1802, playing Leontes to Mrs. Siddons's Hermione ; and Charles Keene gave it in 1856 as a Greek play. Among celebrated Hermiones have been Helen Faucit (1847); Mary Anderson (1887), who played the double role of Hermione and Perdita ; and Ellen Terry

(1906).

For the less familiar views offered above consult Thorndike, Ashley H., (The Influence of Beaumont and Fletcher on Shakespeare)

(New York 1901) ; Baker, George Pierce, (The Development of Shakespeare as a Dramatist (New York 1907) ; Wolff, Samuel Lee, <The Greek Romances in Elizabethan Prose Fiction> (New York 1912) ; Matthews, Brander, (Shakespere as a Playwright5 (New York 1913).

Samuel Lee Wolff.

WINTERSET, Iowa, city and county-seat of Madison County, on the Chicago, Rock Is¬ land and Pacific Railroad, about 45 miles south¬ west of Des Moines. It is in an agricultural region in which the chief products are wheat, corn and hay. In the vicinity are large stone quarries. It has flour mill, creameries, machine shop and coal and stock yards. It has an ex¬ tensive trade in farm and dairy products. There are several churches, public and private schools and a public library, founded in 1891, Pop. (1920) 2,906.

WINTERTHUR, Switzerland, town in the canton of Zurich, on the Eulach, 17 miles north¬ east of Zurich. It has a fine townhouse, a number of fine churches, a gymnasium, and a museum of natural history. Its situation among hills, many of which are clothed with vines, is specially pleasant. Cotton-spinning, cotton¬ printing, dyeing and the manufacture of ma¬ chinery are actively carried on. Pop. about

25,333.

WINTHER, vin’ter, Rasmus Villads Christian Ferdinand, Danish poet: b. Fens-mark, Zealand, Denmark, 29 July 1796; d. Paris, 30 Dec.

1876. He was educated at the University of Copenhagen, and became immediately popu¬ lar on the appearance in 1828 of his first vol¬ ume of poems. He was one of the truest interpreters of the Danish national character. Some of his numerous publications are (Sang og Sagn) ((Song and Legend, 5 1841) ; (Lyriske Digte5 ((Lyrical Poems,5 1849); (Nye Digte5 ((New PoemsJ 1850); <Hjortens Flugt5 ((The Flight of the Hart,5 1856), a lyric romance of the Danish Middle Ages, his greatest work.

WINTHROP, Beekman, American gov¬ ernment official: b. Orange, N. J., 18 Sept. 1874. He was graduated at Harvard University in 1897 and took the degree of LL.D. there in 1900. He was admitted to the bar in 1899. In 1900 he went to the Philippine Islands as private secretary to the governor, William H. Taft, whom he later served as assistant execu¬ tive secretary and as acting executive secretary; and in 1903-04 he was a judge of the Court of First Instance. He was governor of Porto Rico in 1904-07; Assistant Secretary of the Treasury in 1907-09; and Assistant Secretary of the Navy in 1909-13. He has since been en¬ gaged in banking in New York.

WINTHROP, win'throp, Fitz-John, Amer¬ ican colonial governor, son of John Winthrop (1606-76) (q.v.): b. Ipswich, Mass., 14 March 1638; d. Boston, Mass., 27 Nov. 1707. He studied at Harvard and afterward in England, where he served in the army of the Protectorate until the Restoration. Returning to Connecti¬ cut in 1663 he was elected to the assembly in 1671, served as major in King Philip's War, and in 1686 as a member of the council of Gover¬ nor Andros. He was a magistrate in 1689, major-general commanding the expedition against Quebec in 1690, Connecticut agent at

London 1693-97, and governor of Connecticut from 1698 till his death.

WINTHROP, James, American jurist, son of John Winthrop (1714-79) (q.v.) : b. Cam¬ bridge, Mass., 1752; d. there, 26 Sept. 1821. He was graduated from Harvard in 1769, was librarian there 1772-87, and for several years was chief justice of the Massachusetts Court of Common Pleas, and register of pro¬ bate. He published (An Attempt to Translate the Prophetic Part of the Apocalypse into Familiar Language) (1794) ; Systematic Ar¬ rangement of Prophecies relating to Antichrist5 (1795), *etc.* His library was bequeathed to Allegheny College, Meadville, Pa.

WINTHROP, John, American colonial governor : b. Edwardston, near Groton, Suffolk, England (O. S.) 12 Jan. 1588; d. Boston, Mass. (O. S.) 26 March 1649. He studied at Trinity College, Cambridge, was bred to the law and, according to the testimony of Cotton Mather, was commissioned at 18 a justice of the peace. His earlier years were spent on his estate of Groton Manor, but his Puritan tendencies and the current of his political sympathies pres¬ ently interested him in plans for colonization in America. When in 1629 a charter was ob¬ tained creating a corporation under the name of the ((Governor and Company of the Massa¬ chusetts Bay in New England,® the piety, learn¬ ing and talents of Winthrop led to his election as governor. Converting his hereditary estate, yielding an annual income of £600 or £700, into money, he set sail in the Arabella from Yarmouth in the spring of 1630, with a com¬ pany of about 900 persons. On the voyage he composed a small treatise, entitled (A Model of Christian Charity.5 On 12 June (O. S.) they arrived at Salem, Mass., and the government was immediately transferred to him by Endi-cott, who had been the acting governor for two years by authority of the London com¬ pany, before the transfer of the charter to New England. He was reelected every year until 1634, when his popularity had somewhat declined, partly on account of his long con¬ tinuance in office. In 1636, when Sir Henry Vane was elected governor, Winthrop was chosen deputy governor, and during this and the follwing year occurred the celebrated con¬ troversy in regard to Mrs. Hutchinson and her doctrines. It this matter Vane and Winthrop were on opposite sides, and in the election of 1637 the latter was chosen governor over Vane. The inhabitants of Boston, however, were friendly to Vane and Mrs. Hutchinson, and Winthrop was at first slighted by his neighbors. Subsequently he engaged in a controversy with his defeated opponent in regard to the alien law passed by the general court. He was re¬ elected every year until 1640; and in 1642 the troubled state of the colony induced the set¬ tlers to call him again to the head of the government. He was again elected in 1643, in the two following years was made deputy governor, and in 1646 governor again, which office he continued to hold the remainder of his life. In his principles Winthrop was opposed to an unlimited democracy; and when the peo¬ ple of Connecticut were forming a government, he wrote them a letter in which he said that <(the best part of a community is always the

least, and of that best part the wiser part is always the lesser.® But he was attached to civil liberty, disinterested, pure and conscien¬ tious. Ht would be erroneous,® says Palfrey, in speaking of the Commonwealth of Massa¬ chusetts, <(to pretend that the principles upon which it was established were an original con¬ ception of Winthrop's mind ; but undoubtedly it was his policy, more than any other man's, that organized into shape, animated with prac¬ tical vigor, and prepared for permanency, those primeval sentiments and institutions that have directed the course of thought and action in New England in later times.® Winthrop kept a journal containing an account of the trans¬ actions in the colony down to the year 1649. The first two books were first published in 1790, and the manuscript of the third, which was for a long time lost, was found in 1816 in the tower of the Old South Church. The three were published in a revised edition, entitled (The History of New England from 1630 to 1649) (with notes by James Savage, 1825-26). Consult Collections of the Massachusetts His¬ torical Society> (3d series, Vols. IX and X) ; Earle, A. M., (Margaret Winthrop5 (New York 1895) ; Twitched, J. H., ˆohn Winthrop5 (in (Makers of America Series, 5 New York 1891) ; Whitmore, (Notes on the Winthrop Family and its English Connections5 (1864) ; Winthrop, R. C., (Life and Letters of John Winthrop) (Boston 1864-67).

WINTHROP, John, American colonial governor, son of Gov. John Winthrop, of the Massachusetts Bay Colony: b. Groton Manor, Suffolk, England, 12 Feb. 1606; d. Boston, Mass., 5 April 1676. He was educated at Bury Saint Edmund's Grammar School, at Trinity College, Dublin, and at the Inner Tem¬ ple, London, where he studied law. He ob¬ tained a commission in the army, and served with Buckingham in the expedition for the re¬ lief of the Huguenots near La Rochelle, France, in 1627, went in the following year to Turkey as an attache of the British embassy, traveled in various countries of Europe, in 1631 joined his father in Massachusetts, where he became governor's assistant, and in 1633 settled at Ips¬ wich, of which he was one of the principal founders. Obtaining a commission under a grant to the Earl of Warwick, he founded Saybrook, at mouth of the Connecticut River, in 1635, built there a fort, and was made titular governor. In 1645 he removed his family from Boston to Pequot Harbor, and in the following year founded New London. After the union of Saybrook with Connecticut he became a magistrate of the increased colony (1651), and from 1657 to the end of his life served almost continuously as its

governor. He was bearer to Charles II (1662) of a loyal address from the Connecticut government, and received from the king a suitable charter for the colony. Under an equally favorable charter he secured the union of the Connecticut and New Haven colonies. He was one of the commissioners of the United Colonies of New England in 1675. A student of physics and chemistry, through his scientific attainments he became a member of the Royal Society, to whose transactions5 he was a contributor. Consult Waters, T. F.,

< Sketch of the Life of John Winthrop, the Younger5 (Cambridge, Mass., 1899).

WINTHROP, John, American physicist, great-grandson of John Winthrop (1588-1649) (q.v.) : b. Boston, 19 Dec. 1714; d. Cambridge, Mass., 3 May 1779. He was graduated from Harvard in 1732, and from 1738 until his death was Hollis professor of mathematics and philosophy there. He was one of the most im¬ portant American scientists of the 18th century and exercised much influence upon the scientific thought of his contemporaries, in particular upon Franklin and Count Rumford (q.v.). He noted the transits of Mercury in 1740 and 1761. going to Newfoundland in the latter year for this purpose in a vessel supplied by the Massa¬ chusetts Province. He twice declined the presidency of Harvard, was for some years a judge of probate for Middlesex County, and was a member of the governor's council 1773 — 74. He was a prominent advocate of political liberty. He published 'Lecture on Earth¬ quakes5 (1755), and is sometimes claimed as the founder of the science of seismology. He published 'Answer to Mr. Prince's Letters on Earthquakes 5 (1756) ; 'Account of Some Fiery Meteors) (1755) ; (Two Letters on the Paral¬ lax and Distance of the Sun as ded'ucible from the Transit of Venus> (1769).

WINTHROP, Robert Charles, American

political leader: b. Boston, Mass., 12 May 1809; d. there, 16 Nov. 1894. He was graduated from Harvard in 1828, studied law with Daniel Web¬ ster, and was admitted to the bar in 1831. He soon became active in political life, allying him¬ self with the Whig party, and in 1834 was elected to the Massachusetts legislature, where he served five years, being speaker of the house for three years. In 1840-50 he was a member of Congress, and in 1847-49 speaker of the House of Representatives. In 1850, on Webster's resignation from the Senate, Win¬ throp was appointed his successor for the un¬ expired term, but in 1851 failed to secure elec¬ tion to the Senate. In 1851, as

Whig candidate for governor, he received a plurality of votes, but the constitution at that time required an absolute majority for election; the election, therefore, went to the legislature, where he was defeated. During his term in Congress he had shown himself a conservative, and, though opposed to the extension of slavery, and to the Mexican War, he had no sympathy with the extreme abolitionists, and desired compromise between North and South. His defeat was due, therefore, to a coalition between the Free-Soilers and the Democrats in the Massachusetts legislature. After the Whig party dissolved, he took no prominent part in political work; he did not join the Republican party, but occasion¬ ally spoke in behalf of the Democrats, though not actively affiliated with them. He made fre¬ quent public addresses on various national an¬ niversaries and occasions, being the chief speaker at the laying of the cornerstone of the Washington Monument in 1848, and on the completion of the work in 1885. He was president of the Massachusetts Historical As¬ sociation for 30 years, and had a leading part in the organization and direction of the Pea¬ body Education Fund (q.v.). He wrote (Life and Letters of John Winthrop) (1864-67) ; (Washington, Bowdoin and Franklin)

(1876); ‘Memoir of Henry Clay5 (1880).

Consult Winthrop, R. C., Jr., (Memoir of R. C. Winthrop* (Boston 1897).

WINTHROP, Theodore, American sol¬ dier and novelist: b. New Haven, Conn., 22 Sept. 1828; d. Big Bethel, Va., 10 June 1861. He was graduated at Yale in 1848; traveled extensively in Central and South America ; studied law at Saint Louis ; was admitted to the New York bar in 1855, and joined the Seventh New York regiment in 1861. The Atlantic Monthly from June to September of that year contained sketches which he had writ¬ ten of early war scenes. He was killed at the head of an assaulting column of Northern troops at Big Bethel. He left completed material for five volumes of novels and essays ; (Cecil Dreeme) (1861) ; (John Brent* (1862) ; (Edwin Brothertoft* (1862) ; (The Canoe and Saddle) (1862) ; and (Life in the Open Air and Other

Papers) (1863). These passed through many editions, and were reprinted in the (Leisure-Hour Series,* with the addition of his (Life and Poems,* edited by his sister, Laura Winthrop Johnson (New York 1884). Consult also a memoir by George William Cur¬ tis, prefixed to the earlier editions of (Cecil Dreeme.*

WINTHROP, Me., town in Kennebec County, on the Maine Central Railroad, 20 miles northeast of Lewiston and 10 miles west of Augusta. It has oilcloth factories, woolen mills, agricultural implement works, a corn can¬ nery and a grist mill. There are six churches, a high school and graded elementary schools. It has a State bank. The oilcloth industry was begun in Maine, in 1845, by C. M. Bailey of Winthrop. Pop. about 2,114.

WINTHROP, Mass., town in Suffolk County, on Massachusetts Bay and on the Bos¬ ton, Revere Beach and Lynn Railroad, about five miles northeast of Boston. It is a popular beach resort and a favorite residential section for Boston. The town was originally a part of Boston, then of Chelsea and later of North Chelsea. In 1852 it was set off and incorpo¬ rated. It contains many features of historic interest, chief of which is the Dean Winthrop house built in 1649. It has also Forts Heath and Banks, the Winthrop Shore Reservation, the Ingalls Park, and the Frost Public Library. Pop. 1920) 15,455.

WINTHROP NORMAL AND INDUS¬ TRIAL COLLEGE OF SOUTH CARO¬ LINA, an educational institution for white women, founded at Rockhill, S. C. in 1886. It gives normal and industrial training and is supported by State appropriations, but about one-half of its property, which is valued at nearly $1,000,000, has come from other sources than State funds. It admits girls of 15 years or over. Tuition fees are low and in case of inability to pay are dispensed with, and living expenses are reduced to a very low figure. Its combined departments enroll about 1,300 students, and its staff numbers about 100. It conducts a summer school. There are 18,000 volumes in the library. The plant and grounds are valued at $900,000.

WINTON, Pa., borough in Lackawanna County, on the Lackawanna River, eight miles northeast of Scranton, on the Delaware, Lacka¬

wanna and Western and the New York, Ontario and Western railroads. It is chiefly occupied in coal mining. Pop. about 5,280.

WINTUN (ˆpeople,® ˆIndians®), a group of tribes, wflich, with the

Patwin group, form the Copehan linguistic stock of North Ameri¬ can Indians. The habitat of the stock is north¬ ern California from Mount Shasta, including the headwaters of the Sacramento and the val¬ ley of McCloud River; thence southeastward along the Sacramento Valley to the mouth of Chico Creek, from which point to its mouth the Sacramento forms the southeastern boundary. On the west the Coast range intersects the territory of the Copehan stock, the western¬ most limit of which extends almost to the south branch of Trinity River, about lat. 40° 30' N. From the latitude of Cape Mendocino the Coast range forms the western boundary as far as John's Peak, whence it extends in an irregular line southeastwardly to San Pablo Bay. The tribesmen live largely by fishing, although va¬ rious roots, nuts, berries, farinaceous seeds and clover blossoms form part of their sub¬ sistence. They are fond of water and are con¬ stant bathers in the streams that drain their country. Salmon are caught with spears, in the use of which they were exceedingly expert. Their weapons were formerly bows and ar¬ rows, and slings. They were indifferent hun¬ ters, but were successful in ensnaring deer in traps of their own construction. The popula¬ tion of the score or more of tribes forming the stock is not known, only the Nomlaki and the Wailaki being officially recognized. These are under the Round Valley Agency and are small in number.

WIRE, Manufacture of. At the present time all wire is made by the drawing process, and while permitting the production of a much thinner wire than could be obtained from the rolls, it also gives a wire of greater tensile strength, so much so that the smaller the size to which the wire is drawn down, the greater is its ultimate breaking strength per square inch. The breaking strength of English piano wire ranges from 225 pounds for No. 12 music wire, which is 0.029 inch in diameter, to 650 pounds for No. 22, which is 0.052 inch in diam¬ eter, indicating an ultimate tensile strength, ranging from 300,000 to 240,000 pounds per square inch. This wire shows a content of carbon, 0.570 per cent ; silicon, 0.090 per cent ; sulphur, 0.011 per cent; phosphorus, 0.018 per cent; and manganese, 0.425 per cent.

In the past all classes of iron wire were made entirely from wrought iron and required very careful preparation of the raw material to insure toughness and high tensile strength ; but, with the discovery of the Bessemer and the open hearth converting processes, and the con¬ sequent lowering of the cost of production ac¬ companied by an enormous increase in the strength of the raw material, wrought iron was quickly supplanted by mild steel. The great increase in the strength of steel wire over that of wrought iron may be better appreciated from the following statement of facts: The ultimate tensile

strength of the best bright, hard-drawn wrought-iron wire is about 70,000 pounds to the square inch, while that of ordi¬ nary Bessemer steel is 80,000 pounds, and that of open-hearth steel is 120,000 pounds to the

square inch. In the special grades of wire man¬ ufactured from high carbon, open-hearth steel, the values range from 200,000 pounds to 340,- 000 pounds per square inch.

A description of the process of manufacture may be begun with the billets. The bulk of the wire of commerce is made from Besse¬ mer steel billets, while open-hearth billets are worked up into rods for the manufacture of chain, for special grades of wire and for vari¬ ous finished products requiring great tensile strength. The reduction of the billets to the rods which are the raw material of the wire-drawer is done by a rolling-mill (q.v.). The billets are generally stored near the continuous heating furnaces located at the upper end of the rod mill. In the larger plants, when the mill is in full operation, four furnaces are con¬ tinually at work, with a fifth held in reserve. The billets, which are 4X4 inches in section, and 36 inches in length, are fed into the fur¬ nace transversely, side by side, and are pushed through the furnace door by a hydraulic charg¬ ing machine. After they have been heated to the right temperature for rolling, they are pushed out, one after the other, through the rear door of the furnace on to a conveyor which takes them to the rod mill, where they are passed through the roughing rolls. This mill consists of eight pairs of rolls, and by its opera¬ tion reduces the billet from its section of 4 X 4 inches to a rod of three-fourths of an inch square and of great ultimate tensile strength. The alternate pairs of rolls are provided with different shaped grooves so as to press the rods into shapes alternately square and oval, oval and round, etc., thus working the metal thor¬ oughly and improving its qualities. In the eighth pair of rolls the grooves are one-fourth of an inch square, and from them the rods are carried to the finishing mill where they are given 10 more passes and brought down to the required dimensions.

The finishing mill lies at right angles to the roughing mill with its 10 pairs of rolls ar¬ ranged side by side. As the rods issue from one pair of rolls, they are seized with a pair of tongs by workmen who bend them around and feed them into the next pair. The rapid in¬ crease in length is accommodated by the in¬ creased speed of the successive pairs of rolls, that of the 10th pair being about 1,350 feet per minute, or about 15 miles per hour. The en¬ tire operation of rolling down the billet to a fin¬ ished rod one-fourth inch square and about a quarter of a mile long, is accomplished in one heat. The smallest size of rod produced in the rolling mill is three-sixteenths of an inch in di¬ ameter. As the rods issue from the last pair of rolls, their ends are seized and attached to the drums of the reels on which they are wound into coils of convenient size, and then dropped upon a conveyor, by which they are carried to the wire mill. In the wire mill, the coils are thoroughly cleaned of scales, oil and dirt by being placed in wooden tanks containing a weak solution of sulphuric acid. They are then placed in lime, and then in the bakeries and dried thoroughly. Up to this point the product is technically known as ˆrods,® and only after it has been drawn to a smaller diameter, at least to one-fifth of an inch, is it known under the commercial designation of “wire.®

The wire-drawing machine consists of a stout bench upon which is mounted a cast-iron drum, around which the wire is wound as it is drawn through the dies. In drawing, the coil of rod is placed on a spool fastened to the floor of the shop near the end of the bench, and the end of the wire having been swaged down, it is inserted in the larger end of the hole in the die-plate, passed through and caught by the tongs attached to the drum which is revolved until the entire coil has been drawn down. The die-plate is a heavy block of cast steel in which are set several dies of various sizes, the latter made of the hardest chrome steel. The hole in the die is conical, the smaller end being the size to which the wire is drawn. In forming the die this opening is made smaller than required and enlarged to the correct size by driving a suitable punch into it — the compression thus exerted increasing the hardness of the drawing surface in the die. The sockets in the die-plate into which the dies are set are slightly conical and as the dies wear to a point at which the wire becomes too large, the dies are driven further into the die-plate, thus reducing the opening and are again sized with the punch. Once started the speed of the drum must be constant or the wire will be of uneven diameter, becoming slightly smaller when the mill is stopped.

Drawing is by the wet or dry process. The latter is used in drawing from No. 6 (B.W.G.) to No. 18, the lubricant employed being tallow and talc. The former is used for the higher numbers, the lubricant being a mixture of meal, flour and water. By some wire-drawers the ef¬ ficacy of stale beer is highly praised. After being drawn through several successively smaller dies the wire becomes hard and has to be annealed before the process can be continued. The annealing is followed by pickling, washing and beating to free it from scale. No. 6 wire can be drawn down to No. 11 in three passes, but from No. 14 down to No. 22 requires seven passes. To reduce the rod one-fifth of an inch in diameter to wire of one-twenty-fifth of an inch in diameter requires 12 drawings and three annealings. The speed at which the wire is drawn through the dies varies with its size and the kind of metal used — from 12 inches to 45 inches per second. Steel wire averages a speed of about 800 feet per minute; iron and brass, 1,000 feet per minute; and copper and silver about 1,200 feet per minute. For the very finest wire the dies are of diamond or ruby.

In drawing wire the centre or core of the metal rod is pulled forward, the outer surface being held back by the friction of the die. The consequence is that a series of strains is set up in the wire which seriously affect its strength and this condition is removed by placing the coils in the annealing pots, where they are care¬ fully sealed with sand to exclude the air, and are then exposed to a steady heat for a period of eight or nine hours. Of the total finished product taken out of the annealing pots, a por¬ tion is ready for the market without any further treatment; a portion is galvanized; but a con¬ siderable portion is converted into wire-cloth, wire nails and barbed wire. See Nails.

Not all wire manufacture, however, is as

TABLE SHOWING THE DIAMETERS IN DECIMALS OF AN INCH OF THE “ NUM¬ BERS ” OF WIRES IN CURRENT COMMERCIAL GAUGES.

COMMERCIAL

NUMBERS

American or Brown

&

Sharpe

Birming¬ ham, or Stubs' Iron Wire

Washburn & Moen, American Steel and Wire Co. and

Roebling Iron Wire

Trenton Iron Co.

British

Imperial

Stubs' Steel Wire

Washburn & Moen, American Steel and Wire Co., and

Roebling Steel Wire

American Steel and Wire Co., Music Wire

nnnnnnn

0 4900

0.5000

000000

0.58000

0.4615

0.4640

0.4600

0.004

00000

0.51650

0.500

0.4305

0.4500

0.4320

0.4300

0.005

0000

0.46000

0.454

0.3938

0.4000

0.4000

0.3930

0.006

000

0.40960

0.425

0.3625

0.3600

0.3720

0.3620

0.007

00

0.36480

0.380

0.3310

0.3300

0.3480

0.3310

0.008

o

0.32490

0.340

0.3065

0.3050

0.3240

0.3070

0.009

1 .

0.28930

0.300

0.2830

0.2850

0.3000

0.227

0.2830

0.010

2 .

0.25760

0.284

0.2625

0.2650

0.2760

0.219

0.2630

0.011

3 .

0.22940

0.259

0.2437

0.2450

0.2520

0.212

0 . 2440

0.012

4 .

0.20430

0.238

0.2253

0.2250

0.2320

0.207

0.2250

0.013

5 .

0. 18180

0.220

0.2070

0.2050

0.2120

0.204

0.2070

0.014

6 .

0. 16200

0.203

0.1920

. 0.1900

0.1920

0.201

0.1920

0.016

7 .

0. 14430

0. 180

0.1770

0.1750

0.1760

0.199

0.1770

0.018

8 .

0.12850

0.165

0.1620

0.1600

0.1600

0.197

0.1620

0.020

9 .

0.11440

0. 148

0.1483

0.1450

0. 1440

0. 194

0.1480

0.022

10 .

0. 10190

0.134

0.1350

0.1300

0.1280

0. 191

0.1350

0.024

11 .

0.09070

0.120

0.1205

0.1175

0.1160

0.188

0.1200

0.026

12 .

0.08080

0. 109

0.1055

0.1050

0.1040

0.185

0.1050

0.029

13 .

0.07200

0.095

0.0915

0.0925

0.0920

0.182

0.0920

0.031

14 .

0.06410

0.083

0.0800

0.0800

0.0800

0.180

0.0800

0.033

15 .

0.05710

0.072

0.0720

0.0700

0.0720

0.178.

0.0720

0.035

16 .

0.05080

0.065

0.0625

0.0610

0.0640

0.175

0.0630

0.037

17 .

0.04530

0.058

0.0540

0.0525

0.0560

0.172

0.0540

0.039

18 .

0.04030

0.049

0.0475

0.0450

0.0480

0.168

0.0470

0.041

19 .

0.03590

0.042

0.0410

0.0400

0.0400

0.164

0.0410

0.043

20 .

0.03200

0.035

0.0348

0.0350

0.0360

0.161

0.0350

0.045

21 .

0.02850

0.032

0.0317

0.0310

0.0320

0.157

0.0320

0.047

22 .

0.02530

0.028

0.0286

0.0280

0.0280

0.155

0.0280

0.049

23 .

0.02260

0.025

0.0258

0.0250

0.0240

0.153

0.0250

0.051

24 .

0.02010

0.022

0.0230

0.0225

0.0220

0.151

0.0230

0.055

25 .

0.01790

0.020

0.0204

0.0200

0.0200

0.148

0.0200

0.059

26 .

0.01590

0.018

0.0181

0.0180

0.0180

0.146

0.0180

0.063

27 .

0.01420

0.016

0.0173

0.0170

0.0164

0. 143

0.0170

0.067

28 .

0.01260

0.014

0.0162

0.0160

0.0148

0. 139

0.0160

0.071

29 .

0.01130

0.013

0.0150

0.0150

0.0136

0.134

0.0150

0.075

30 .

0.01000

0.012

0.0140

0.0140

0.0124

0.127

0.0140

0.080

31 .

0.00890

0.010

0.0132

0.0130

0.0116

0.120

0.0135

0.085

32 .

0.00800

0.009

0.0128

0.0120

0.0108

0.115

0.0130

0.090

33 .

0.00710

0.008

0.0118

0.0110

0.0100

0.112

0.0110

0.095

34 .

0.00630

0.007

0.0104

0.0100

0.0092

0.110

0.0100

0.100

35 .

0.00560

0.005

0.0095

0.0095

0.0084

0. 108

0.0095

0.112

36 .

0.00500

0.004

0.0090

0.0090

0.0076

0.106

0.0090

0.118

**7

0.00450

0.0085

0.0085

0.0068

0.103

0.0085

0.124

0.00400

0.0080

0.0080

0.0060

0.101

0.0080

0.130

…

30 …

0.00350

0.0075

0.0075

0.0052

0.099

0.0075

0.138

40

0.00310

0.0070

0.0070

0.0048

0.097

0.0070

0.146

0 00280

0.0066

0.0044

0.095

0.0066

0.154

AO

0 00250

0.0062

0.0040

0.092

0.0062

0.162

. .

AO.

0 00220

0.0060

0.0036

0.088

0.0060

0.170

AA

0 00200

0.0058

0.0032

0.085

0.0058

0.180

. .

0 00176

0.0055

0.0028

0.081

0.0055

45 .

0 001 57

0.0052

0.0024

0.079

0.0052

46 .

0 00140

0 . 0050

0.0020

0.077

0 . 0050

47 .

O 00124

0.0048

0.0016

0.075

0.0048

48 .

O 00099

0.0046

0.0012

0.072

0.0046

49 .

0.00088

0.0044

•

0.0010

0.069

0.0044

50 .

410

WIRE AND WIRE DRAWING

simple a process as described above. In the mak¬ ing of tungsten wire for electric lamps it is nec¬ essary to develop a fibrous condition in the nat¬ urally brittle metal. This is accomplished by rolling and hammering rods of the metal while it is red-hot. The operation of drawing also must be done with the hot metal. As tungsten is very hard the dies (of high-speed tool-steel) are quickly worn away. The heat and pressure at which the metal has to be drawn renders the ordinary oily or fatty lubricants of no avail and the only lubricant found effective is fine graph¬ ite. This is smeared in paste form over the rod as it passes to the die, and just before it reaches that point a flame heats the rod and its graphite ointment to a red heat, burning in the graphite to a glossy black coating which so ad¬ heres that the lubrication lasts for passes through several successive dies. For the finest sizes of tungsten wire the dies are diamonds.

Barbed wire is manufactured in various pat¬ terns. The general process may be outlined by a brief description of the machine employed in making what is known as 2-point Glidden barbed wire. Four coils of wire on reels are placed behind the machine. The' wire from two of the reels serves to form the strands, while that from the other two is used to form the barbs. The two strand wires, which are larger than the other two, are led between a pair of friction wheels and pulled to a proper tension and then crossed by the other two transversely, one on each side. At fixed inter¬ vals of a few inches, according to the desired spacing of the barbs, the two barb wires are caught by a pair of revolving fingers and twisted around one of the

strand wires, and at the conclusion of the twist, two pairs of shears cut the ends of the barbs diagonally into sharp points. The wires then pass into a combined winding and twisting machine, by which the two strand wires are twisted around each other, and then to the spool where it is wound up ready for the market. When once started, the operation of wire making is continuous and rapid. The barbed wire used in trench warfare has from two to four times as many barbs as that for fencing cattle and requires additional reels and cutters in its production.

Wire in its several sizes is designated by number according to a scale or ((gauge,)) de¬ pending on its diameter. Several different gauges are in vogue in the United States and cause considerable confusion to the uninitiated. The Bureau of Standards at Washington rec¬ ommends for ordinary steel wire the American Steel and Wire Company's gauge. For piano wire the bureau recommends the same com¬ pany's "Music Wire Gauge.® For copper wire and wire of all metals and alloys other than iron and steel the gauge in commercial use is the Brown and Sharpe wire gauge — also called the ((American Wire Gauge.® The Birmingham wire gauge (B.W.G.) has been officially adopted by Congress, and is in use by the United States Treasury Department in laying duties on impor¬ tations. It is almost obsolete in economic prac¬ tice. Consult Smith, 'Wire: Its Manufacture and Uses) (New York 1891); Allen, H., Metal¬ lurgical Manual of Iron and SteeP (London 1911) ; Charnock, G. F., Mechanical Tech-nologv) (London 1915) ; Kiudl, F. H., 'Rolling Milling Industry > (Cleveland, Ohio, 1913).

WIRE AND WIRE DRAWING. Wire is defined as metal elongated into a long thread¬ like form of thicknesses varying from one and one-quarter inches to less than 1/1000 of an inch, each size uniform throughout the piece; these threads having usually the cylindrical form, but they may be square, flat, oval or ribbed, in which case they are known as "shaped wire.® The process by which wire is formed is known as drawing. Essentially, this consists in forci¬ bly pulling a suitably prepared piece of the metal thus worked througfi a series of holes made in hardened steel dies set in a draw-plate, and which successively diminish in diameter. In this way the cross section of the wire is gradually reduced to that of the last hole through which it is drawn ; its length, mean¬ while, being correspondingly and greatly in¬ creased. As a consequence, wire can be pro¬ duced only from such metals as are susceptible in this way of being pulled out or extended by stretching into rods. Such metals are said to be drawable, or to have the property of ductility. This property is not to be confounded

with that of malleability, namely, that in virtue of which a metal is laminable, or admits of being ham¬ mered or rolled into thin plates ; since the same metal is often malleable and ductile in very different degrees. Thus, while gold possesses both these properties in an extreme, and probably in the highest known degree, iron is ductile in a degree far beyond that in which it is malleable, and with tin and lead the reverse is true. Of the familiarly known metals, the most ductile, and in the order named, are gold, silver, plati¬ num, steel, iron, nickel, copper, brass, zinc, tin and lead; while some of the ordinarily brittle metals when made perfectly pure, as bismuth, are said to possess very high ductility. In early times metals were brought to the filamentous form only by means of beating them under the hammer into thin plates, then dividing these by cutting instruments into narrow strips, and finally rounding with the hammer and file. The earliest known mention of “wire drawers® and “wire millers,® as those who produced wire by drawing were variously called, occurs in 1351 and 1360, in the histories respectively of Augs¬ burg and Nuremberg, the previous accounts be¬ ing only of “wire smiths,® or those who fabri¬ cated wire with the hammer. The change from the old to the new method was accomplished, or very soon followed, by the introduction of a machine by which wire was successfully pro¬ duced without direct aid of the hand; this ma¬ chine, probably the invention of one Rudolf, of Nuremberg, was impelled by water power. The precious metals appear to have been the first subjected to this process — brass and iron not until some time later. White wire, or blanch iron wire, is mentioned in a list of articles not to be imported into England in 1463; and in 1484 both iron and latten (fine brass) wire are similarly named. Up to 1565 English iron wire was drawn by hand only, and was of so poor a quality that most of that used in the country, and also wool cards and other articles involving the employment of wire, were imported. As late as 1660 there was no wire mill in England; but in that year patents were granted to manu¬ facture wire in England. In the history of United States industries the first mention of wire drawing occurs in the annals of the town

of Lynn, Mass., where it is recorded that in 1666 Nathaniel Robinson, a <(wyer-drawer):> pe¬ titioned the court for aid in carrying on his trade. This was refused at the time, but later the court authorized the purchase of instru¬ ments and tools for this industry and granted a bonus for its encouragement. In 1775 a wire factory was established by Nathaniel Niles in Norwich, Conn., and in 1788 a large wire mill was running in Dedham, Mass., making wire for cards and fishhooks. Pittsburgh had a wire factory in 1791. In 1834, however, there were only three wire mills in all the United States, and their total output was 15 tons for that year. It is worthy of note that one of these original three mills — that at Worcester, Mass. — is now the largest wire producing plant in the world.

The 1914 census of manufactures reported that in that year there were 99 establishments drawing wire in the United States ; 54 being strictly manufacturers of wire and 45 being

party should consist of 32 workers, if possible exclusive of non-commissioned officers. Form the party in two ranks and number them in threes, both front and rear ranks. The left file is not numbered. For the sake of explana¬ tion letters are given to these parties of three as follows :

000

ooo

ooo

ooo

ooo

B

D

F

H

K

ooo

ooo

ooo

ooo

ooo

A

C

E

G

I

Duties of Parties. — Parties A and B go out almost simultaneously. Party A drives the first row of pickets and so needs a maul. The maul man should be tall. One man mauls, one supplies the pickets, one paces the three yards and holds the pickets for driving. Keeping close up so as not to lose the pickets, comes party B with a coil of barbed wire, a pair of wirecutters and two pairs of hedging gloves. All wire parties carry similar equip-

Double Apron Entanglements.

rolling-mills which drew wire in addition to their other business. Of the entire number 68 drew iron and steel wire: 28, copper wire; 28, brass wire; and 16, wire of other metals. Their equipment totaled 51,181 blocks and their total capacity was 3,852,000 tons of wire per annum. The 1914 output of these mills amounted to 2,435,530 tons of steel and iron wire; 138,924 tons of copper wire; 19,491 tons of brass wire; 106 tons of bronze wire; 375 tons of German silver wire ; and 2,981 tons of wire of other metals. The aggregate value of the year's pro¬ duction was $172,600,546.

The modern system of wire drawing is de¬ scribed under Wire,

Manufacture of.

WIRE CLOTH, a sieve-like fabric whose woof and weft are of wire, the size of the wire, the shape and sizes of the meshes, being adapted to the uses of the completed screen, sifter, or sieve, or the character of the ma¬ chine in which it is to be used.

WIRE ENTANGLEMENTS. By general consent the barbed wire entanglement has be¬ come the standard military obstacle. It was highly developed on the Western front during the European War 1914 —18, the principal de¬ velopments being along the line of simplifying the construction and in the use of artillery fire to open a passage for the artillery troops. In constructing ((low wire entanglements,® the

ment. Starting at the anchor picket, party B runs out to the first straight wire, one man holding and uncoiling the wire, the other two taking round turns, each taking the turns on alternate pickets. About six yards behind is party C, a picket party which drives the second row of pickets, one man again mauling, one holding and pacing, one supplying pickets. This party measures the position of each picket from the front row by going to each picket in the front row, pacing one and one-half yards along the line, turning at right angles and pac¬ ing three yards and then planting the picket ; this eliminates cumulative errors. Starting six yards behind C comes party D, which works on the same system as B and puts on the diagonal, keeping behind its own wire. Party E runs out the first loose wire, starting about 12 yards behind D. One man holds the coil and un¬ winds it. One man places the wire in position on the diagonal. The third man clips the loose wire to the diagonal. Party F comes 13 yards behind E and runs out the second straight wire, Party G drives the third row of pickets, meas¬ uring the position of each from those of the second row. Party H starts six yards behind G and puts on the second diagonal. Party I starts 12 yards behind H and runs the second loose wire. Party K starts 13 yards behind I and completes the bay with the third straight wire. The direction is kept by the men of the

left file, who provide themselves with a piece of string or tape, equal in length to the dis¬ tance from the parapet to the front edge of the wire. They go out with party A. One man places himself at the foot of the parapet with one end of the string in his hand. The other runs the string out until it is taut. The man on the parapet keeps the string always perpen¬ dicular to the general line of the parapet. The other man keeps it taut and moves along with party A. Work can be done with parties of two men, but if one is hit the work is disor¬ ganized. If there are fewer parties the same party may have to do two or more parts of the work. Thus, if there are only six parties A will also do G's work. B will do FTs, C will do I's, D will do K's. The pickets must be driven far enough in the first instance. If they have to be driven after the wire is on, the wire will be too low. Mauls should be muffled with sandbags nailed on.

strand of barbed wire is run along the top of each row of French wire, being fastened to the pickets with a round turn six inches above the French wire. These strands of barbed wire are pulled as taut as possible and are twisted on the French wire with a staple, peg or pair of wire cutters close to each picket and in several places between the pickets. This barbed wire supports the French wire. The two rows of French wire are about two feet apart and tied together by a diagonal strand of barbed wire running from the tops of the pickets of one row to the tops of the pickets of the other row. In addition a strand of barbed wire is run along the front of the front row of French wire and twisted to it. This is partly to hold up people trying to crawl through and partly to hold the French wire together, should it come loose from the fastenings. This wire is usually called the (<apron wire.® After this, more apron wire can be added or loose wires

Double Fence Entanglements.

French Wire. — This consists of a con¬ tinual spiral of plain wire three feet six inches in diameter, each turn of wire being clipped to the turns on both sides in five places. When closed up it looks very much like a coil of plain wire, but when pulled out it makes a cylinder of wire mesh. Each small coil pulls out to the length of 20 yards. A big

coil con¬ sists of five small coils. The extended coil can be easily crushed down by throwing a weight on the top and must, therefore, be sup¬ ported by pickets and barbed wire. It is easily carried and quickly put up. It is held in place by iron staples five inches long. The number of men required for a party is 26. Two men keep the direction with a string as for low wire and the remaining 24 are divided into parties of three as for low wire. Two or more rows of French wire make an obstacle. Each small ceil is stapled down in five places ; that is, at each end, one-fourth, one-half and three-fourths of the way along. Where two coils meet the same staple fastens down both coils. Pickets five feet long are driven into the centre of the coils in five places as for the staple. These pickets should be driven in at least a foot. A

may be inserted between the two rows. Where opposing trench lines are very close together, stakes cannot be driven for the usual form of wire entanglement on account of the noise of driving, which would draw fire. If not too close to the enemy, iron rods with a screw end may be used in lieu of stakes ; these may be three-fourths inch in diameter with one or two loops in their length to which to fasten the wire. In ordinary ground such rods can be screwed into a firm hold without noise. When the enemy is too close for this, various forms of portable obstacles in the nature of chevaux de frise are employed. These are made up at the depots, brought forward through the trenches and tossed out in front by day or by night.

The ((high wire entanglement® is similar in a general way to the low entanglement, but is four to six feet in height. It usually consists of three to five rows of stakes connected by barbed wire. In addition to the horizontal wires conecting the tops of the stakes, it has diagonal wires running from the top of each stake to the bottom of all adjacent stakes. The side toward the enemy should be completed as

an ordinary wire fence. Slight irregularities in height of stakes and

arrangement of wires add to the value of the obstacle. Openings for the passage of troops through wire entangle¬ ments are generally about 10 yards wide and are placed so that two belts of wire over¬ lap the openings. The continuity of the ob¬ stacle may be observed by using gates or bar¬ riers that can be quickly opened and closed.

The best place for the openings is at the flanks of the supporting points, points between the wire entanglements around the supporting points and those in the intervals. If these openings must be placed in the intervals on ac¬ count of the terrain, they must be covered by the close fire of sections of trench placed im¬ mediately irr rear. The maintenance of a wire obstacle requires constant care. It should be inspected every night, and a few men should be detailed in each company as a permanent wir¬ ing party for the repair and improvement of the obstacle. In addition to barbed wire, a charged electric wire is at some places main¬ tained. The wire is charged in section so that in a case of a ground only the section af¬ fected will be out of service instead of the entire wire.

Edward S. Farrow, Consulting Military and Civil Engineer.

WIRE GAUGE, an instrument or mechan¬ ism for measuring the thickness of wire and sheet metals. It is usually a plate of steel hav¬ ing a series of apertures around its edge, each corresponding in width to the diamete'r of wire of a certain number. Commercially the stand¬ ard sizes of wire conform to certain recognized gauges of which the Birmingham wire gauge is used in Great Britain and the American wire gauge in the United States. In 1893 a law was passed authorizing a standard gauge for the United States, for plate iron and steel. This gauge is somewhat used for wire and varies from No. 000,000 =.46 inch to No. 38 — .00625 inch. A special gauge has been developed for measuring electrical wires in units which are called circular mils. Consult (Mechanical Engineer's Pocket Book) (latest issue) and '• Circular No. 31 y of the United States Bureau of Standards.*

WIRE GLASS, a modern invention used in building construction, being a combination of wire and glass. Wire glass is either ribbed, rough rolled, polished plate or ˆmaze,® having wire netting imbedded in its centre during the process of manufacture. The tem¬ perature at which the wire is imbedded in the molten glass insures cohesion between the metallic netting and the glass, and the two ma¬ terials become as one, so that if the glass is broken by shock, by intense heat or from other cause it remains practically intact. It combines the strength of the wire netting and the glass-plate, and the wire is so thoroughly covered as to obviate the possibility of rust or corrosion. Wire glass will break, but it

will not scatter. It can be fractured, but it will retain its place, and the perils incident to fall¬ ing glass and the ingress or egress of draft and flame are avoided.

The first attempts to introduce a metallic mesh into the body of the glass were for the purpose of increasing its strength and to pre-

vent its falling apart when broken. In this re¬ spect the product has been thoroughly devel¬ oped, but in addition it has proved to be one of the most remarkable fire retardants available for building purposes, and in view of the excep¬ tional hazard attaching to window and skylight openings in all buildings,, its use as a fire re¬ tardant is outranking in importance as well as quantity its other values. Many experiments have been-made to develop different processes of manufacturing wire glass, but, owing to the

inherent difficulties of maintaining the homo¬ geneous quality of the glass, preventing damage from excessive heat to the wire and securing a practical central location of the wire in the body of the glass only two methods have proved effective. One of these, known as the Shuman process, from the name of its inventor, Frank Shuman, of Philadelphia, consists of rolling a sheet of glass, laying the wire mesh upon the body of the glass, pressing the same into it instantly and while still plastic, and by a coin¬ cident process, smoothing over the slight abras¬ ions made in the surface of the glass so as to secure a true and smooth surface on both sides. The other process known as the Appert process, from its inventor, Leon Appert, of France, in¬ volves the rolling of one sheet of glass, laying the wire mesh upon this sheet and immediately and by a simultaneous and continuous process pouring and rolling a second sheet upon the top of the wire so as to completely imbed it and secure at the same time an absolutely solid single sheet of finished glass. Wire glass is now made in all the varieties known to the rolled glass process, including rough or hammered, ribbed and figured glass. Wire glass is also polished like plate glass, giving an entirely clear and transparent glass, and is largely used in fireproof office buildings where there is any external

exposure to fire.

The mechanical strength of plate glass is effectively increased by the introduction of the wire mesh, so that it will submit to much

greater strains, and in fact one of its first pur¬ poses and effects was to eliminate the necessity for using in skylights one-half inch glass, it having been proved that by using one-quarter inch wire glass all the requirements were met, the breakage risk decreased and a very large factor of weight and expense in structural ma¬ terial eliminated. See Glass Manufacturing in America.

WIRE NAILS. See Nails.

WIRE ROPE, a variety of ropes of iron or steel wire extensively employed in raising and lowering apparatus in coal mines, as standing rigging for ships, as substitutes for chains in suspension bridges, and for telegraph cables. Endless wire ropes or cables are also used on traction railways, and in transmitting power over long distances where ordinary belting would prove unsuitable. A special type is used for the controls in aeroplanes. Wire ropes were used in 1822 for a suspension bridge at Geneva, and for a similar structure of great span at Freiburg in 1835. Their manufacture, however, is of extreme antiquity, a section of a four-strand wire rope 15 feet in length having been dug up at Pompeii. This rope was of bronze. A variety of machines are in use for making wire rope. The equivalents of round ropes of iron, steel and hemp are here tabulated:

Hemp

Iron

Steel

Diam—

Weight

Diam—

Weight

Diam—

Weight

eter in

per foot,

eter in

per foot,

eter in

per foot

inches

lbs.

inches

lbs.

inches

lbs.

U

1.16

u

.75

i

.39

2|

2.00

II

1.40

!

.62

2*

2.66

ll^

1.80

i

.89

3

3.16

li

2.45

i

1.20

3J

5.66

1 5

4.15

H

2.00

Dimensions and Durability. — In the United States the wire rope generally in use is com¬ posed of a hemp centre around which are laid six strands of 7, 9, 12 or 19 wires, thus forming a rope of either 42, 54, 72 or 114 wires. Ropes with seven wires to the strand are generally used for elevators of all kinds, standing ropes, guys, transmission of power, *etc.* Ropes with nine wires are generally used for haulage ropes in mines, on inclines and for transmission of power. Those with 12 wires to the strand are generally used for shiprigging and 19 wires for hoisting. (<Special flexible® rope has six strands of 37 wires each ; and ((extra flexible® has eight strands of 19 wires each. These ropes are em¬ ployed in hoisting, on dredges, cranes, *etc.* The standard haulage rope has six strands with seven wires to the strand. ((Running rope® has ordinarily six strands of 12 wires each. Wire rope is as pliable as hemp rope of equal strength and therefore can be operated over sheaves and drums of equivalent sizes and is far more dur¬ able and efficient. Durability of wire rope depends principally upon the diameter of the sheaves or drums ; the greater the size of the sheaves or drums, the longer the rope will last. The rule commonly followed in wire trans¬ mission is that the minimum diameter of the

sheave shall equal 100 rope diameters. Ex¬ perience has demonstrated that the wear in¬ creases with the speed. It is therefore better to increase the load than the speed. One-fifth of the ultimate strength of rope is considered a fair working load. Five grades of wire rope are recognized according as they are made of iron ; crucible cast steel; extra strong crucible cast steel ; plow steel ; and ˆMonitor® plow steel — an exceptionally high grade. Each of these may in a general way be

regarded as 10 per cent stronger than the grade preceding it. The Monitor rope, however, is quite stiff in propor¬ tion to its diameter and requires a larger mini¬ mum sheave in operation. The following table shows the minimum diameters of the sheaves required for the more commonly used varieties of wire rope, and the safe load which the sizes named will bear in common usage. The table is based on crucible cast steel, as the material gen¬ erally employed. Wire rope must not be coiled

Size,

NCHES

Haulage rope

Standard hoisting rope

Special flexible hoisting rope

Minimum diameter of sheave

Safe load,

pounds

Minimum

diameter

of sheave

Safe load,

pounds

Minimum

diameter

of sheave

Safe load,

pounds

21 in.

1,000

12 in.

880

27 in.

1,400

15 in.

1 ,240

.

33 in.

1,800

18 in.

1 ,920

12 in.

1,600

36 in.

2,200

21 in.

2,600

14 in.

2,200

r .

42 in.

3,000

24 in.

3,360

16 in.

3,000

48 in.

4,000

27 in.

4,000

20 in.

3,800

‘ .

53 in.

5,200

30 in.

5,000

21 in.

4,400

: .

60 in.

7,400

36 in.

7,000

23 in.

7,000

; .

72 in.

9,600

42 in.

9,200

26 in.

10 000

84 in.

12,400

48 in.

12,000

30 in.

12,000

.

96 in.

14,800

54 in.

15,200

34 in.

14,000

.

108 in.

18,400

60 in.

18,800

38 in.

18,000

.

120 in.

21,200

66 in

22,400

42 in.

22,000

.

132 in.

25,200

72 in.

25,600

45 in.

25 , 200

or uncoiled like a hemp rope. When not on a reel, roll on the ground like a wheel or hoop to prevent twisting or untwisting. Galvanized rope should never be used for running rope. To preserve wire rope under water or under ground, add one bushel of fresh slacked lime to a barrel of mineral or pine tar — boil and apply hot. On inclined planes the grooves of the pulleys or idlers should be lined with wood

or babbitt metal. It is recommended to use as few idlers as possible. In a great many cases they do more harm than good. For transmis¬ sion of power the sheves should be lined with leather or India rubber, to secure increased ad¬ hesion and prevent wear. The radius at the pit of the groove should always be greater than that of the rope, so that the latter drives only by fric¬ tion in the bottom of the groove. The use of cast-steel rope is becoming general because of its lightness, greater strength and durability. To get th&e best results, steel rope should be made of the best quality of crucible cast steel. Ropes made from low grades of steel are in¬ ferior to iron ropes. The use of Bessemer steel in running ropes is not advisable. Ropes should be examined frequently and a new rope ordered before the old one is allowed to wear out. Attention to this will insure safety and prevent serious accidents.

WIRE ROPE

Galvanized Steel Cables are largely used for suspension bridges and are composed of six strands with wire centre.

Diameter

in.

Approximate

circum¬

ference

in.

Weight in pounds per foot

Approximate breaking strain in tons of 2,000 lbs.

21

8f

12.7

310

2f

81

11.6

283

2\

n

10.5

256

2|

71

9.50

232

2\

71

8.52

208

2|

6|

7.60

185

2

61

6.73

164

U

51

5.90

144

n

51

5.10

124

it

5

4.34

106

if

41

3.70

90

if

41

3. 10

75

U

4

2.57

62

Galvanized Steel Hawsers are usually 37 wires to the strand and combine great strength with pliability. The demand for towing a num¬ ber of heavy loaded barges, practically in all kinds of weather, has called for a wire hawser stronger than any Manila hawser made. The two grades presented in the table — Cast-steel and Special — are made with a hemp centre and six strands of 37 wires each, and of six 24-wire strands and seven hemp cores.

Approx-mate di¬ ameter in.

Circum¬

ference

in.

Weight per foot lbs.

Approxima strain ir

2,00(

Cast-steel

te breaking tons of) lbs.

Special

2

61

6.25

128

166

U

51

4.85

101

131

If

5

4.00

84

109

H

41

3.60

76

99

H

41

2.90

62

81

11

4

2.55

55

72

11

31

1.95

42

55

1

3

1.44

Flattened Strand Ropes. — Instead of being made up of strands of circular form in cross-section, flattened strand ropes are constructed with strands, each of which has one or more flattened surfaces, so that one flattened surface is exposed on the outside of the full length of rope, with the result that a plurality of wires in each strand must at all times take the wear in¬ stead of there being only one external wire in peripheral working in each strand, as is the case with ropes of ordinary construction while new. Until the wear has greatly advanced and consequently a considerable diminution of strength has taken place in an ordinary rope, the friction is borne in a very marked manner upon the crown of the one wire nearest the periphery of the rope in each strand, and in cases where small wire is used it is rapidly worn through, while heavier wire has a tendency to fracture where the abrasion has taken place. Owing to the number of wires that are at all times ex¬ posed to wear in a flattened strand rope for a considerable distance along their respective lengths, a smooth or comparatively smooth sur¬ face is presented even while new, and the wear is consequently light upon any individual wire and the tendency to become brittle is minimized.

These ropes are exceedingly flexible and are less liable to the crushing action which fre¬ quently takes place in other ropes. They are made up with the wires in the strands and the strands in the rope laid in the same direction or reversely. Owing to the comparatively little wear which takes place in these ropes, so large a margin between working load and breaking strain is not required as in ropes of ordinary construction. Flattened strand ropes are free from all tendency to spin or kink and a con¬ siderable saving in wear of pulleys and sheaves is effected by their smooth surface which is shown in the two following illustrations :

Worn.

The end sections show a comparison of structure and wearing surface

of round and flat¬ tened strand rope.

A flat or ribbon-like form of this rope is made by laying as many strands as desired side by side, and (<sewing® them together with a soft iron wire. The latter wears away and has to be renewed at intervals.

Hercules Wire Rope. — This is a very high grade of rope, the steel for which is specially prepared for it under a patent process and then the wire tempered and drawn by a patent proc¬ ess, producing a steel strong and tough and that is uniform in density, texture, elasticity, elongation and strength, every wire being care¬ fully tested for these points and the tests regis¬ tered for reference. It is a rope that was evolved originally for use in extrahazardous places and where there is liability for rough usage.

Non-Spinning Rope. — A special hoisting rope of 18 seven-wire strands, six of which are laid around the hemp core to the left and the other 12 outside of them around to the right. This rope will hold a load steady without twist¬ ing and spinning.

Aerial Wire Rope Tramways. — Aerial

tramways may be used to advantage both in operation and construction for transporting ma¬ terial from one place to another. This is especially true with ores, coal, stone, lime, rock, gravel, earth, sand and cord wood. Packages, lumber, logs, light merchandise and water may also be transported economically. Usually the material is loaded on the cables at one terminal or an intermediate loading station and carried to the opposite terminal where it is discharged.

By means of various devices it can be arranged for the discharging of the material at any point along the line for use in such work as construct¬ ing dams, carrying refuse from plants, *etc.* Aerial trams can

be constructed in a hilly coun¬ try without the necessity of making tunnels, cuts, embankments or bridges as in railway construction. Rivers and ravines are spanned while hills and other constructions are overcome by building the line directly over them and supporting it by towers or derricks at the high points. Grades are no barrier to this con¬ struction as they can be built to surmount prac¬ tically any grade and in fact where the loads are carried down grade and the grade is sufficient the entire tramway will be self-propelled, due to the forces of gravity. An aerial tramway is free from surface traffic, so that the underlying ground may be used for other purposes. Tram¬ ways are not affected by the elements, such as snow, sleet, rain or frost and may be operated irrespective of the weather.

There are two distinct classes of aerial tram¬ ways ; namely, single rope systems and double rope systems. The single rope system is the simpler in construction and for limited capacity not exceeding eight tons per hour and an aver¬ age condition of route, is economical in both construction and operation. This system con¬ sists of a moving endless rope to which are attached in various manners the carriers, bug¬ gies or buckets. The entire line is supported by sheaves placed on towers which are located according to the profile of the ground. At each terminal the cable passes around a horizontal sheave or series of sheaves, generally one of them being provided with grips in its periphery for driving or controlling the tramway. When divisible material is carried, mechanical loaders are used and the buckets are arranged so that they discharge automatically .. This is all ac¬ complished while the line continues in operation. Bulky material can be loaded and taken away from the carriers while the tramway continues in motion, owing to its slow speed. The double rope system is always preferable to a single system owing to the fact that a separate track rope or cable is used upon which the buckets travel, the other rope being exclusively for hauling, This diminishes and divides the strains developed greatly increasing the life of the cable and plant. The double rope system will fulfil almost any requirements in the tramway line and may be built practically any length. The practicability of long lengths of tramway is fully demonstrated by the tramway built for the North American Copper Company at En¬ campment, Wyo., which has a total length of over 16 miles and is built in four sections, making it the longest tramway in this country. Another notable cableway is that of the Saline Valley Salt Company at Bishop, Inyo County, Cal. It is 69,925 feet long and carries 20 tons of salt per hour from the floor of the valley over the Inyo Mountains 6,330 feet above that level to the line of the Southern Pacific Railroad on the other side. The track cables are 1ˆ4 and \y8 inches for the

loaded side and % inch for the returning empties. The traction rope is 44 inch in diameter.

The longest cableway in the world is owned by the Argentine Republic and runs from the mining district of Mejicana, 11,500 feet high in

the Cordilleras to the railroad station at Chile-cito. The distance is 21.54 miles. The upper cables are 1 7/16 inches and the lower V/s inches in diameter. The hauling cable is 11/16 of an inch in diameter. The buckets have a capacity of 1,100 pounds each, and are spaced 1,500 feet apart. The cable is run at 400 feet per minute. The entire cableway is in eight sections, and is operated, or rather controlled by five engine plants. Once the cable is started by loading it runs continuously. Lubrication is accomplished by an oil car which is run over the line occasionally. The double rope system is capable of carrying capacities as great as 200 tons per hour and in fact even greater, when conditions demand it. The double rope system in general consists of two tracks or standing cables, upon which the loaded and empty carriers travel respectively and an endless traction rope for propelling them. The track cables are stretched at high tension, one end being anchored solidly and the other being fastened to a tension device. All of the cables are supported by towers, which are located according to the shape of the ground over which the line passes.

In all of the above classes, the traction rope passes around a sheave or a series of sheaves at either terminal ; one, however, being generally provided with grips in its periphery for clamp¬ ing the cable in order to secure the necessary friction for driving or controlling the tramway. In long lines, tension stations are provided at intervals, for dividing the tension and take up on the track ropes. Double rope systems may be subdivided into three classes. One in which the carriers are attached and detached to and from the traction rope by means of a friction or compressing grip. The second in which the carriers are permanent fixtures to the traction cable, the loading of same being effected by mechanical loaders while the buckets are auto¬ matically tripped at the discharging point. And the third in which the traction cable has per¬ manent fixtures attached to it in the shape of clips or buckets. The buckets in this system are automatically attached and detached to and from the same at either terminal of the line by means of a locking device. This latter system is furthermore designed so that the buckets are automatically discharged at the unloading end without any attendants to look after them. A simple self-operating tramway

which is known as a two-bucket tramway may sometimes be used to advantage where the grade is steep and where the capacity is moderate. This is true for short lines. It consists of two cables stretched parallel to each other, upon each being operated a bucket, the two buckets connected to a traction rope which passes around a sheave or series of sheaves at the upper end of the line. When the loaded bucket descends by gravity, it pulls up the empty bucket on the opposite cable and vice versa. This type is sometimes used on level ground or even up-grade simply by applying power to the line for operating. The most suitable system of tramways to be used in any case depends upon the profile of the ground, nature of the material to be transported and terminal requirements and these items should be investigated thoroughly before decid¬ ing upon any particular construction.

WIRELESS TELEGRAPHY. See Teleg¬ raphy, Wireless.

WIRELESS TELEPHONY. See Tele¬ phony, Wireless.

WIRT, wert, William, American jurist and statesman: b. Bladensburg, Md., 8 Nov. 1772; d. Washington, D. C., 18 Feb. 1834. He received a grammar school education, became a private tutor' studied law, was admitted to the bar in 1792 and began practice at Culpeper Court House, Va. In 1799 he removed to Richmond, was elected clerk of the house of delegates and in 1802 received from the legislature the appointment of chancellor of the eastern shore of Virginia. In 1803 he published in the Rich¬ mond Argus his (Letters of a British Spy,* pur¬ porting to be papers left at an inn by an Eng¬ lish member of Parliament traveling in Vir¬ ginia. They consist principally of sketches of prominent public orators, with remarks on elo¬ quence and some pages of local description, and proved extremely popular. A second series ap¬ peared in 1808 in the Richmond Enquirer under the title of (The Rainbow.* Wirt was an as¬ sistant in the prosecution of Aaron Burr and in the course of the trial displayed a learning and eloquence which established his reputation as one of the foremost lawyers in the country. A series of papers somewhat in the style of the (Spectatorˆ

begun by him and several of his friends in 1812 under the title of (The Old Bachelor,* appeared in 33 numbers of the Rich¬ mond Enquirer and afterward in book form. His (Sketches of the Life and Character of Patrick Henry) appeared in 1817 and became immediately popular. In 1816 Wirt was ap¬ pointed by President Madison attorney of the United States for the district of Virginia and from 1817 to 1829 was Attorney-General of the United States. On his retirement he passed the rest of his life in the practice of his profession at Baltimore. In 1832 he was the can¬ didate of the Anti-Masonic party for President of the United States. Consult Kennedy, Mem¬ oirs of the Life of William Wirt* (Philadelphia 1849) ; Trent, William P., <English Culture in Virginia* (in ((Johns Hopkins University Stud¬ ies,® Baltimore 1889).

WIRT, William Albert, American educa¬ tor: b. Markle, Ind., 21 Jan. 1874. He was graduated at De Pauw University in 1898, later studied at the University of Chicago, and sub¬ sequently spent some time abroad studying the educational systems of England, France, Bel¬ gium and Germany. He was superintendent of schools at Redkey, Ind., in 1895—97 ; and in 1897 he became superintendent at Bluffton, Ind. There he put into practice his own theories of educational methods with marked success, at¬ tracting widespread attention among educators. He became superintendent of schools at Gary, Ind., in 1907; and in 1914 he was appointed ex¬ pert adviser to the New York boards of educa¬ tion and of estimate in the reorganization of the New York City schools. His work in New York was branded as anti-democratic and anti-American and the city administration which employed Wirt was repudiated at the polls largely on the ˆGary plan® issue. His method is known both as the Gary plan and as the Wirt Plan. See Gary Plan under Education, Elementary.

WISCASSET, Me., town, county-seat of Lincoln County, on the Sheepscot River, and the Maine Central Railroad, 40 miles northeast

of Portland. It is in a region noted for pic¬ turesque scenery and is a popular summer re¬ sort. It has a good harbor and is a port for coasting vessels ; some vessels are built here, and the town also contains a shoe factory and large sawmills. There is a national bank, cap¬ ital $100,000, and a savings bank. It has several elementary schools and a public academy (high school) founded in 1877. Pop. (1920) 1,192.

WISCONSIN, wis-kon-sin, a north-central State of the United States, popularly called the ((Badger State,® between lat. 42° 30’ and 47° 50’ and 92° 54’ west. It is bounded on the north by Lake Superior and the upper penin¬ sula of Michigan, on the east by Lake Michi¬ gan, on the south by Illinois and on the west by Iowa and Minnesota. The extreme dimensions of the State are about 320 miles from north to south and 295 miles from east to west. The gross area is 56,066 square miles, 810 of which are covered with water. In addition the State has political jurisdiction over 9,878 square miles of water area in the adjoining lakes, Superior and Michigan. The population in 1920 was 2,632,067. Of this total about 78 per cent were native born and about 22 per cent were foreign born. There were about 10,000 Indians, 3,000 negroes and 250 Japanese and other Asiatic races.

Geography, Climate. — Wisconsin’s position as one of the States of the upper Mississippi Valley ; adjoining the Great Lakes, constitutes its chief geographical asset. Located about one-third of the way from the Atlantic to the Pacific, the climate is continental in character, the winters being relatively cold and the sum¬ mers rather hot. The mean annual temperature is about 43° Fahrenheit. The extreme range is from 110° above to 50° below zero. The daily range is about 18° in summer and 14° in winter. The summer temperature corresponds to that of France, Germany and southeastern England; the winter temperature to northern Sweden and central Russia.

The Wisconsin and Fox rivers, separated by an interval of less than a mile in south central Wisconsin and emptying respectively into the Mississippi River and Green Bay, constitute a great water trough across the State from north¬ east to southwest. The geographical character¬ istics of the smaller and southeastern of the two sections into which the State is thus divided differ markedly from those of the larger, northwestern section; these differences have had a marked effect upon the historical devel¬ opment and present condition of the State. The eastern and northern portions of the State drain into Lakes Michigan and Superior by short streams with rapid courses. The western and southern portions (much greater in area) drain into the Mississippi by a number of large rivers. The portion of the State above the Fox-Wiseonsin water-trough was originally heavily wooded and relatively inaccessible. The southern and eastern section was relatively open and comparatively accessible to settlers. Accordingly this region was settled first and is to-day much further advanced industrially than is the northern section. The latter, as late as the admission of Wisconsin to statehood, was commonly regarded as a worthless wilderness, and even to-day retains to a large degree tha characteristics of a frontier region.

WISCONSIN

With 500 miles of Great Lakes coastline, with a western frontage of 250 miles on the Mississippi, with some 2,000 lakes ranging in size downward from Winnebago with 215 square miles of area and with every portion of the State penetrated by rivers, Wisconsin's water resources are of great importance, largely determining the course of agricultural and in¬ dustrial development of the State. The prin¬ cipal rivers are the Rock, Wisconsin, Chip¬ pewa and Saint Croix, tributary to the Missis¬ sippi ; the Saint Louis, Bois Brule, Bad and Montreal, tributary to Lake Superior ; and the Menominee, Peshtigo, Oconto, Wolf, Fox, Manitowoc, Sheboygan and Milwaukee, tribu¬ tary to Green Bay and Lake Michigan. The more important lakes are Winnebago, Kosh-konong, Green, Mendota, Monona, Waubesa, Kegonsa, Geneva, Court Oreilles, Poygan, Chetac, Puckaway and Big Butte des Morts. The streams and lakes abound in fish and wild fowls, and the woods and waters of Wisconsin constitute one of the great playgrounds of America.

Geology. — The State includes a large area of the oldest of rocks, the pre-Cambrian, and a still larger area of Paleozoic rocks, newer than the pre-Cambrian but still very ancient. The Mesozoic formation is not found in Wisconsin, but the State includes rocks belonging to the Cenozoic age. The geological history of the State has included the following epochs: (1) All Wisconsin was mountainous after the pre-Cambrian rocks were deposited and folded;

(2) the whole State was a peneplain, with a few isolated hills rising above the general level ;

(3) all of the State may have been alternately submerged below the level of the ocean and slightly elevated while the Paleozoic rocks were being deposited; (4) again dry land and being fashioned into the present form; (5) all but the southwestern section buried beneath an ice sheet; (6) the ice sheet melted, leaving Wis¬ consin somewhat as before the Glacial Period, but with important manifestations of topog¬ raphy, soil and drainage. The Glacial Period may have lasted nearly 1,000,000 years; it ended perhaps 35,000 to 50,000 years ago.

Mineral Resources. — Although the mineral resources of the State are considerable, Wis¬ consin ranks relatively low among the mineral-producing States of the country. The chief mineral industries are the mining of ores, such as iron, zinc and lead ; the quarrying of stone, such as granite, sandstone and limestone; the digging of clay for making brick, tile, *etc.* ; and the bottling of mineral waters. The most im¬ portant mineral product is iron, Wisconsin ranking fifth among the ore-producing States of the Union in 1910. In lead and zinc pro¬ duction Wisconsin ranks second among the States. She produces about one-twelfth of the zinc, one-fiftieth of the iron and one-hundredth of the lead of the entire country. Granite, sandstone and limestone comprise more than nine-tenths of the rock quarried in the State. Among the granite-producing States Wisconsin ranks fourth or fifth. There are extensive quarries of brown sandstone along the Lake Superior coast ; formerly this was eagerly sought and widely marketed, but the change of style in recent years to light-colored stone has practically destroyed the market for the brown. Limestone quarries are numerous and widely

distributed; the stone is little used for con¬ structing buildings, but is of great value for making lime, for foundation and arch work and for use as crushed stone in road making. Clays suitable for brick-and tile-making are widely distributed. In commercial value of mineral waters (about $1,000,000) Wisconsim ranks first among the States. By far the larg¬ est part of its production comes from the springs of Waukesha, which long since attained a nation-wide reputation. In recent years the total reported value of all mineral produced in the State has been about $20,000,000 annually. The actual value is, doubtless, considerably higher, since because of their widespread dis¬ tribution much clay and stone are utilized with no record ever made of their value.

Agriculture, Soils, *etc.* — The upper Mis¬ sissippi Valley, to which Wisconsin belongs, is a region of unusual fertility. In the southern and eastern parts of the State practically the whole area is farm land, ranking in productive¬ ness and value with the best in the United States. In central Wisconsin is a sandy area of much lower productivity; while in northern Wisconsin there are several million acres still awaiting development, being swamp, cut-over, burnt-over and forest-covered land. As yet only 60 per cent of the land is actually in farms ; of this area, about 60 per cent, again, is devoted to tillage or the raising of hay. Thus, about two-fifths only of the total land area is actually devoted to field crops. This ratio of improved land is less than

half that of such States as Illinois and Iowa, but more than twice that of the United States as a whole. In the northern third of the State less than one-fourth of the land is in farms. In the middle third more than one-half is in farms; and in the southern third more than 90 per cent. The value and adaptability of the north¬ ern section to high-grade farming operations has been thoroughly demonstrated, and in this portion of the State lies the greatest field for present and future development. The census of 1920 showed a total of 189,167 farms in the State, with an average size of 116 acres. Al¬ most two-thirds of this number fell between the limits of 50 and 175 acres, while but 10,378 farms exceeded 260 acres. During the 10 years ending with 1920 about 1,000,000 acres were added to the State's area of cultivated crops, involving a considerable increase in the total number of farms. For reasons already pointed out this increase belongs chiefly to the northern half of the State.

The acreage of the leading crops of the State in 1920, as shown by the government re¬ port for December, was as follows: tame hay, 3,189,000; oats, 2,408,000; corn, 1,960,000; bar¬ ley, 600,000 ; rye, 483,000 ; potatoes, 308,000 ; tobacco, 50,000. The yield of these crops was respectively: hay (all-kinds)., 5,271,000 tons; oats, 108,000,000 bushels; corn, 86,000,000 bushels; barley, 15,913,000 bushels; rye, 7,728,000 bush¬ els; potatoes, 33,264,000 bushels; wheat, 5,1 52,- 000 bushels ; tobacco, 62,400,000 pounds. The total value of each crop, based on the prices prevailing at the close of the year, was as follows: hay, $103,462,000; oats, $52,860,000; corn, $66,254,000; barley, $13,367,000; rye, $10,- 046,000; potatoes, $38,607,000; wheat, $7,934,000; tobacco, $16,162,000. The estimated total value

WISCONSIN.

Estimated population, 2,500,350

COUNTIES

Pop. Pop.

8.604

Adams .

.G 8

21.965

Ashland .

. E 3

29,114

Barron .

.C 5

15,987

Bayfield .

.D 3

54,098

Brown .

.K 7

16,006

Buffalo .

.C 7

9.026

Burnett .

B 4

16,701

Calumet .

. .J 7

32,103

Chippewa .

D 5

30,074

Clark .

. E 6

31,129

Columbia .

.H 9

16,288

Crawford .

.E 9

77,435

Dane .

.H 9

47,436

Dodge .

.19

18,711

Door .

. L 6

47,422

Douglas .

.C 3

25,260

Dunn .

C 6

32,721

Eau Claire .

D 6

3,381

Florence .

. . J 4

51,610

Fond du Lac… .

..18

6,782

Forest .

..14

39,007

Grant .

E 10

21,641

Green .

G 10

15,491

Green Lake .

.H 8

22,497

Iowa .

.F 9

8,306

Iron .

.F 3

17,075

Jackson .

.E 7

34,306

Jefferson .

. .1 9

19,569

Juneau .

.F 8

32,929

Kenosha .

J 10

16,784

Kewaunee .

.K 7

43,996

La Crosse .

. D 8

20,075

Lafayette .

F 10

17,062

Langlade .

.H 5

19,064

Lincoln .

.G 5

44 978

Manitowoc .

.K 7

Incorporated Cit

947

Abbotsford .

.F 6

444

Ableman .

.G 9

669

Albany .

H 10

2,082

Algoma .

.L 6

1,011

Alma .

. .C 7

417

Alma Center … .

.D 7

487

Almond .

.11 7

824

Altoona .

D 6

659

Amery .

. B 5

629

Amherst .

. H 7

274

Aniwa .

.H 6

7,169

Antigo .

. H 5

17,834

Appleton .

.17

1,212

Arcadia .

• O 7

603

Argyle .

G 10

11,594

Ashland .

. E 2

904

Athens .

. .F 5

297

Auburndale .

.G 6

1,405

Augusta .

.D 6

436

Avoca .

. .F 9

584

Baldwin .

.B6

279

Balsam Lake … .

.B 5

692

Bangor .

. .E 8

6,324

Baraboo .

.G 9

317

Barneveld .

G 10

1,449

Barron .

252

Bay City .

,B6

6,758

Beaverdam .

.19

216

Bell Center .

. .E 9

422

Belleville .

. G 10

532

Belmont .

.F 10

18,072

Beloit .

H 10

652

Benton .

.F 10

4,636

Berlin .

..18

678

Birnamwood … .

.H 6

516

Blackcreek .

. ,J 7

479

Black Earth .

,.G9

1,917

Black River Falls

.E 7

486

Blair .

.D 7

643

Blanchardville . .

.G 10

1,204

Bloomer .

. D 5

620

Bloomington …

.E 10

1,525

Boscobel .

.E 9

527

Boyd .

. D 6

684

Brandon .

..18

998

Brillion .

. J 7

1,517

Brodhead .

H 10

458

Brokaw .

. . G 5

362

Brooklyn .

H 10

222

Browntown .

. G 10

565

Bruce .

255

Buffalo .

.G 8

3,212

Burlington .

.J 10

717

Butternut .

. . F 4

765

Cadott .

,D6

657

Cambria .

.H 9

507

Cambridge .

. H 9

562

Cameron .

650

Campbellsport . .

. .J 8

473

Camp Douglas . .

. .F 8

568

Cashton .

. . E 8

890

Cassville .

392

Cazenovia .

. .F 9

351

Cecil .

. .J 6

1,777

Cedarburg .

.K 9

498

Cedar Grove … .

. K 8

55,054 Marathon . GO

33,812 Marinette . J 5

10,741 Marquette . H8

433,187 Milwaukee . K 9

28,881 Monroe . E 8

25,657 Oconto . J t>

11,433 Oneida . G 4

49,102 Outagamie . J 7

17,123 Ozaukee . K 9

7,577 Pepin . C6

22,079 Pierce . B0

21,367 Polk . B 4

30,945 Portage . .H 7

13,795 Price . F 4

57,424 Racine . J 10

18,809 Richland . F9

55,538 Rock . ..H 10

11,160 Rusk . D 5

32,869 Sauk . G 9

6,227 Sawyer . . D 4

31,884 Shawano . 16

54,888 Sheboygan . K 8

25,910 St. Croix . B 5

13,641 Taylor . E 5

22,928 Trempealeau . D 7

28.116 Vernon . E 8

6,019 Vilasj . G 3

29,614 Walworth . I 10

8.196 Washburn . C4

23,784 Washington . J 9

37,100 Waukesha . J 10

32,782 Waupaca . 17

18,886 Waushara . H 7

62.116 Winnebago . 17

30.583 Wood . F 7

ies, Towns, *Etc.*

301 Centuria … . . B 5

829 Chetek . .C 5

1,530 Chilton . J 7

9,395 Chippewa Falls . .. D 6

220 Clayton . B 5

498 Clear Lake . B 5

897 Clinton . I 10

1,747 Clintonville . 16

230 Cobb . F 10

869 Colby . F 6

436 Coleman . K 5

701 Colfax . C 6

2,523 Columbus . H9

291 Coon Valley . D 8

525 Corlis . K 10

1,833 Crandon . 14

967 Cuba . F 10

3,691 Cudahy . K 10

1,445 Cumberland . B 4

342 Dallas . C 5

296 Dane . G 9

1,808 Darlington . F 10

533 Deerfield . H 9

431 De Forest . II 9

2,450 Delavan . I 10

4,477 De Fere . J 7

331 De Soto . D 9

1,791 Dodgeville . F 10

476 Dorchester . F 6

319 Downing . B 5

259 Doylestown . H 9

1,503 Durand . C 6

339 Eagle . J 10

233 Eastman . D 9

707 East Milwaukee,

Milwaukee . K 9

673 East Troy . J 10

18,807 Eau Claire . D 6

746 Edgar . G 6

2,513 Edgerton . H 10

368 Eland . H 6

319 Eleva . D 7

499 Elkhart Lake …. K 8

1,707 Elkhorn . 110

302 Elk Mound . D 6

1,005 Ellsworth . B 6

585 Elmwood . B 6

1,729 Elroy . F 8

283 Embarrass . 16

2.061 Evansville . H 10

678 Fairchild . : . E 6

891 Fair Oaks, Dane. .H 9

523 Fall Creek . D 6

360 Fall River . H 9

1,159 Fennimore . E 10

220 Fenwood . F6

21,113 Fond du Lac . J 8

3,877 Fort Atkinson …. I 10 1,031 Fountain City … .C 7

851 Fox Lake . 18

511 Frederic . B 4

305 Fremont . 17

276 Friendship . G 8

973 Galesville . D 7

557 Gays Mills . E 9

709 Genoa Junction . ..I 11

610 Gillett . J 6

954 Glenwood City… . B 5

818 Grafton . K 9

6,521 Grand Rapids ,…G7

721 Grantsburg.f . A 4

368 Gratiot . F 10

29,353 Green Bay . 17

563 Green Lake . 18

665 Greenwood . E 6

350 Gresham. Shawano I 6

408 Hammond . B 6

510 Hancock . H 7

2,980 Hartford . J 9

728 Hartland . J 9

621 Hazel Green . E 11

1,096 Highland . F 10

572 Hilbert . J 7

804 Hillsboro . F8

265 Hollandale . F 10

1,881 Horicon . 19

863 Hortonville . 17

2,810 Hudson . A 6

615 Hustisford . 19

664 Independence ,,..D7

360 Ingram . E 5

850 Iola .’. . H 7

14,339 Janesville . I 10

2.582 Jefferson . , . 110

425 Johnson Creek … .1 9

1,003 Juneau . 19

4,717 Kaukauna . J 7

477 Kendall . F8

184 Kennan . E5

31,576 Kenosha . K 10

625 Kewaskum . J 9

1,839 Kewaunee . K7

1,244 Kiel . J 8

1,170 Kilbourne . G8

413 Knapp …’ . C 6

31,677 La Crosse . D 8

2,352 Ladysmith ……. .D 5

654 La Farge . E 8

3,079 Lake Geneva … .J 10

1,672 Lake Mills . 19

483 Lake Nebagamon . . C 3

2,329 Lancaster . . ,E 10

421 Lavalle … .’ . F 8

580 Linden . F 10

1,354 Little Chute . J 7

1,044 Lodi . G 9

529 Lomira . J 8

497 Lone Rock . F 9

318 Lowell . 19

677 Loyal . F 6

383 Luck . B 4

402 Luxembourg . K 7

275 Lyndon Station …G 8

274 Lynxville . D 9

130 McMillan . F6

30,699 Madison . H 9

337 Maiden Rock . B 6

820 Manawa . 17

13,805 Manitowoc . K 7

656 Marathon . G 6

14,610 Marinette . K5

798 Marion . 16

892 Markesan . H 8

459 Marshall . H 9

5,783 Marshfield . F6

868 Mattoon . H 6

1,701 Mauston . F8

2,282 Mayville . 19

917 Mazomanie . G9

1,846 Medford . F 5

1,833 Mellen . E 3

6,081 Menasha . J 7

5,036 Menomonie . C 6

919 Menomonee Falls .J 9

8,782 Merrill . G 5

625 Merrillan . E 7

312 Merrimack . G 9

679 Middleton . G 9

250 Milltown . A 4

833 Milton . I 10

436,535 Milwaukee ……. K 9

2,925 Mineral Point. .. .F 10

1,325 Mondovi . C 6

4,410 Monroe . G 10

1,104 Montello . H8

558 Montfort . F 10

671 Monticello . G 10

482 Mosinee . G6

1,048 Mt. Horeb . G 10

615 Mukwonago . J 10

798 Muscoda . E 9

1,054 Necedah . F8

5,734 Neenah . 17

1,957 Neills ville . E 6

1 ,570 Nekoosa . G 7

304 Neosho, Dodge. …19

379 Neshkoro . H 8

364 New Auburn . D 5

708 New Glarus . G 10

839 New Holstein …. K 8

1.074 New Lisbon . F 8

3,383 New London . 17

1,988 New Richmond …B 5 1,960 North Fond du Lac,

Fond du Lac …. I 8 647 North Freedom …G 9 1,860 North Milwaukee . .1 9

502 Norwalk . E 8

522 Oakfield . I 8

3,054 Oconomowoc . J 9

5.629 Oconto . K 6

1,427 Oconto Falls . J 6

1,285 Omro . 17

1,146 Onalaska . D 8

383 Ontario . E 8

380 Oostburg . K 8

712 Oregon . H 10

449 Orfordville . H 10

634 Osceola . A 5

35,065 Oshkosh . 18

548 Osseo . D 6

745 Owen . E 6

649 Palmyra . I 10

987 Pardeeville . H 8

1.972 Park Falls . F4

397 Pepin . B 7

1,975 Peshtigo . K 5

749 Pewaukee . J 9

1.948 Phillips . F 4

450 Pitts ville . F 7

723 Plainfield . H 7

4.452 Platteville . E 10

305 Plum City . B 6

3,094 Plymouth . K 8

• 5.440 Portage . H 8

758 Port Edwards …. G 7 3.792 Port Washington. . K 9

464 Potosi . E 10

656 Poynette . H 9

3,149 Prairie du Chien ..D 9 699 Prairie du Sac …. G 9

368 Prairie Farm . C 5

606 Prentice . F 4

936 Prescott . A 6

1,269 Princeton . H8

436 Pulaski . J 6

46,486 Racine . K 10

937. Randolph . H 9

408 Random Lake… . K 8

515 Readstown . E 9

1,521 Redgranite . H7

2.615 Reedsburg . G 9

550 Reedsville . K 7

352 Reese ville . 19

329 Rewey . \ .E 10

5.637 Rhinelander . G 4

1,018 Riblake . F 5

3,968 Rice Lake . C 5

2,652 Richland Center ,.E 9

437 Ridgeway . F 10

704 Rio . H 9

3,739 Ripon . -..18

1.991 River Falls . A 6

383 Rosholt . H 6

867 Sauk City . G 9

355 Scandinavia . H7

538 Schleisingerville …J 9 889 Schofield,

Marathon . G 6

1,109 Seymour . J 7

879 Sharon . Ill

2.923 Shawano . J 6

28,559 Sheboygan . K 8

1.630 Sheboygan Falls ..K 8

902 Shell Lake . C 4

536 Shiocton . 17

1,063 Shullsburg . F 10

667 Soldiers Grove …. E9 6.092 South Milwaukee K 10

3.973 Sparta . E 8

362 Spencer . F 6

1.453 Spooner . C4

730 Spring Green . F 9

972 Spring Valley . B 6

309 St. Cloud . J 8

569 St. Croix Falls ….A 5

2,675 Stanley . E 6

253 Star Prairie . A 5

237 Steuben . E 9

8,692 Stevens Point …,G7

328 Stockbridge . J 7

204 Stockholm . B 7

343 Stoddard . D 8

4,761 Stoughton . H 10

763 Stratford . G 6

4,262 Sturgeon Bay . L6

1,119 Sun Prairie . H 9

46,226 Superior . B 2

345 Theresa . J 9

741 Thorp . E 6

728 Tigerton . H 6

-3,419 Tomah . E 8

2,907 Tomahawk . G 5

535 Trempealeau . D 7

442 Turtle Lake . B 5

4,850 Two Rivers . K 7

616 Union Grove . J 10

363 Unity . F 6

671 Viola . E 9

2,059 Viroqua . E 8

755 Walworth . I 10

3,830 Washburn …… .E 2

581 Waterford . J 10

1,220 Waterloo . 19

9,074 Watertown . 19

9,570 Waukesha . J 10

550 Waunakee . II 9

2,789 Waupaca . II 7

3,362 Waupun . 18

19,239 Wausau . G 6

964 Wautoma . H 7

3,346_Wauwatosa . K 9

! Virginia

fountain Iron

C-

ˆ Lac < La Belle.

IMamitoo Island

Fairbanks

“ertnoj

Rices Islam

lI*LANl£S?\jrt

*oriage Lake

(Outer Island

Sand Ik lam A . C©„ Sand

gipˆATOSTLE

MkftWRFSˆ * slk

KSjilfe (ISLANDS

iˆmtˆUDEUNE ISLAND

y

ˆ Brookston

Barkpointj

Herbsterˆi/

iri to micron

’We*t°£nd I Bayfield;

Cloquet! .Carltoul \

‘Nestoria’

\Gogebicˆ —

KlnTTI

\/(Sandhurst a VI Craig&tnere’i Rijbbina

rne\Fv’°!

Bessemer

Oˆratzau

•Cu„on’ˆ4 ■ ■«’,

m.&SsM;

ˆGrandview ffr Drummond<—ˆ’ “AG’ < lo’wieeoV

/NYa tx a k Jay on L.]

Moose Lake

Chaffey

A’an Buakirk

＞sb B”4«rjy

PenokeeLrˆ CayugaK*. * Morse O’,

ASH L f

x) C b u i u Lakes

Law bo m

Princetonˆ ITntcs’vlˆ. V?.

Kingadale

/Gordon

Watersmeet

Presque . Isle LI fcCrdoked

(&’ Namakagon

Mercery/”^ Pi Manitowislr\ ^

,^vX5pj|

Lac du Flaijtfic

‘Hazel

Jv udesare*

I ieuJC

feuSsaa«sl0”‘r!l

\L’onaldaonc

Crystal

FnHsf

0 Campbell y Phipps or Lenroot’P. (

/t^%Round v7 J

T^ty7SiLA C - COURT JOR

‘ S£A i W#Y E

Coif^ \ xf ^

, Boulder jc.

fortblani

Ider Jc. _/■

L\ , A S?

seL-J Conover' I a'mofmi oL

Agenda,

Menah

Butternut,

DU. FLAMBEAU

Danbury/v ˆ Webster

jolltun'

i-Ae

- Alvin

Kaiser

BruicˆY.

Florence/;

/ - -T.VOO‘1’

G6«no‘0°Yel,iˆ

_jv | 7 Arbor Vitae

(Ekdallˆ j Karlsborg0

./ ˆGrantsbi

/jywFalun< ”Trade nidall r

-Pik/ L?#

s/WD. RES.

ˆNˆRadissoif

AVeirgor/~“‘y/ “

nhnit k Lake I ?Tpmahawk Lake ˆ

*

Aaron] “■7 Doran |

jCoolidge

Hazel burst !

o.’]Sireu

*ni»J

I ^-‘/Frederic

l5/? Loraine °pJ - lf

^‘Evergreen luck L) . Birronel:

V—*, Wolforcek /oCuflV Cu<

Mill town/ jjala avQLakc i nd<L

CHISAGO^”™,/ R f Cr*H>£l si. croiz rui} */p MVp.5.

hv? .. *X76it’* | *Turn. ixket*O^

ih W ,r,“

J^O’*Ceo1* vAlT’l I*.,,, i A. I lb nr i

z / * >5, v./0»llxk.

- ^ [j Star Prairie Pr#ll£po7

— -Os Phillips

Powers

■~v- ”” ” , 7~v7 Kremlln\

j^Colemanri liolmeS’^* , \

** Luk« Jc. /|Ox£_

,.eanSVUT Girard n’MarekXrr

Pvˆ Ao0-rmbCT®)5

A R IN E TˆT E/i

ISˆhcl.t.nrAˆ* (V

wTˆRliinelander

8 9 I Pelican Lake In roM G-_ ˆMXtC

ˆxeland

lircbwoot

Juscobin)

Highland

ˆentice o> Spirit Falls-Spirit0 I S

‘Ladysmith. VOonrathˆ 1

ˆParrish ˆSuinVij La_K Bass Lake AKoepcrtkk

o Bavaria i PcˆTMiˆr-W’

m-L >Vn|g l|a dvK

wu< ‘ — prˆf Polar0 r-ˆ;

llvoss ? Z Av Ingalls ˆPackard

‘Lf| N ,C O LTN/

Id *Y>ellinr* I ˆ r* ‘ B|e

■WASHINCToi

9? l8,AiS

Pu’mJJ

Island Lalci FlambeSi

lBdalop* O. Dallaro

iver West boro.

IlIAMBERf

Islam’

Arnold J-!

. / - fJM-T ‘

i> (Holcomb) A-RuBjo oComellrLˆ

W A‘1’ 1

/fCobban (Belli)- Oim F alls /el -

Hughey

! Star Prairie’^^”^

EpbraW

!ew. Auburn v

Mount

Ridgeland1’ 8and\ t , CˆL Creek]

PerkinstownVˆ Goodriclˆ \L Medford

lin ˆVliitUeiˆadc

V Heller

[Gilman

＞Polley

Pine Ri -r1’ Naugarto ‘-S ,7: Brokaw - i 1

ˆ Haxnburg ‘•}((

v

Pcshtigo > r^ ‘IMenckauncc vLgg

lloomer nj,

‘Kp

^-Jiagle •

)6Pt. j

Glandoi

Uarboi

‘ewett^

Hehominer, 1

//VO. I Askene(t|

t , vlESER VAT/m

SEamd

/Eluiburl

PhloxJ

Stet80D\’illet <

i’ftcksonport

P jWilcox /Lena xc.j

RUTPallB

[ˆeshtigo B

1 Ofiturge j

ˆChTppeiTa Kails Badger Mills /

iˆAlilan

jtsford Rib Falls

~Fenwood /E<

ft-oi. Bay

Marathot

MenoDii

1 Stilcˆ Iconto J c.7fo

AbnunsJ/

1ˆ /~1

Sobleski/j

Fails

v/ˆukaukee

ˆ7 N ‘

’Wlttenb

Elderonˆ

laj/oˆ J

rrcrTia/.r

L%tcVJ

ˆQrlenvaUeˆl • /Zacbowˆ-J tJ Pulaski Angelica

Reldenville’

IH ˆA\WJ

itcornb \ Sliav Tilltda \ I .Caroline VPlai

S. A Mllmwooc

ofeEllsuorth

/planner

IjVIosinee

Knowltorf

JwnaviUori

ˆDuSiVllR

■‘FallvCreekvooT ˆ rBiMill > .Rodelfˆ

SU’CL Aˆl

Spencer b A /I.OTalˆs. Sy. Me. t (SpokcvilleˆTˆ- Ms - \ Ilo > . Veefkind \ Chill LAr’lr/vTt*- Lynn j Progreai W C 1

liattield DewhurBt0 Aide

rook side ˆ C. !

P I E R)c Ee“ 1 °*“l

Dumon.t Bluff (t -

fil plum 1)1, rand,

””.r.

Caroline

o Pell A)

MarK’i\

JBntonvilie

Mondovi,

-AF.k,l

\6tockholmi

TAIaxwell

‘Savoy

rrU\u„

-v B U I

<tN«r,bl,oJ

■ — (A rnott (V AuSerEt —

DRTAGBˆ. .\K iTljH j » p id s sheridˆ/ j

ˆAcoddtagtoa

SFofCpsV Rurai° W eyau’

!7rden°l°HaSˆ

y C A

isV)UTC

ˆVa»»”

-0,ˆoden. <:-Pweoa

;0F>A L O /ˆjFaUsfl

Iff 7 Whllfl.alˆ>P°

j IndependSnceyLˆiˆi Xavf

a ocvsp i .V 3

V b” aumanaeel/.* ˆi>.

,V ArcadljLTˆ ˆ Blair G. oohrano T1

ooe/a S.dingyˆV” JO.

Lewraunee

West Be

Wocto n

ij n 0 W. N

? Midway \ { title Rapids \ S

abashu

8cra itonJˆL-Jj imtˆ exˆˆˆCr I Babcock!

Daiy// owˆVjllev /

Hixton

Black

River/

Sheppard

Medina

eaver-

j me an driessenl 3:1 ‘

l -o 0 Plainficldf Wild R<

A Boe iyilraoook pjn’c Rir;.t,><0

v /*k”dˆ , VVAUS’HARAl

IvoursJˆralrla ,, .1” aiitouia -* Aurorabvillel

Pun-lasˆ

Itdifiaj]

W. Bloomfield)

Plainview_

lenashj

Lnrsety

:»>sliko|hyˆ/r)fc

Rivers

[(Manitowoc

Minnesota City

lalesvlllel

Gollins-x’i 11 Rt. Nntji

»econne

WlNf

35m&»

Winona

ˆroffipealoau oMlDd0,

ˆwjmytlee - hg

• sSvˆcL o Holmen °

VlfeLA CROSSI

ˆ\N\0naˆˆ5＝

Holstein’

Kdini ＝*C～*Ar kd ale-

>. Necwlah c r Adahffl Center7\

^^-McCc,J Oakdˆ C:

fuliSgSnSit0 fudr-K

? I y/K ortheim. •v eland.

Millhome

‘rPoeblMˆ

rToyr»,e«lHlf|

Neiˆ^W i Lis bon ˆ

iSnatoˆl-r.

t _ lllror

Joon Valley Ontarioˆ Mt. Tabor • h Union Center,

,lio0k,0.% uu,‘1ˆ0 JH§ˆa.ffoa.woc ?S

rg ?We8tby a./u Hillsboro -

E &R nX 0,0 N „ r

|UaJ-M La Farger/ˆ Valley V all ton

…vva-aj

South Jc. | ˆ1 t Calvert f

i*d uj La cv \W&! he b oy gan

7in%*tS,)1’bT SH EBbYˆNAvf d«, pSffiAra.Ac5fmprn,i|OTt «*«#»’«

W“

M n r -‘Sphere saVKewn stuli hoY «/y(Lum

ki]Vˆ«o%er5ffˆ//“|]

. \ S-ˆvAnAllenton) Be ndj7 J U *ljn ruecker

＞Caahton

Irover

HOUSTON

laledonia,®-ˆ-

I i, Chase)

RuvkV

!ocao.Vlrf

Laval 1

Trontoi

est Prairie Readstown ,

‘Lima Cazenovi® o r

Q Woodstock ° rˆHLimerldge

3illingham0 >/ rWn vUUn! Freˆdom’ˆV’

ers Grove ˆ *Loyd X S I A U v. R I C, H L*A N DrfuskJ o’White Mound, ilh Boat H.rsKicblaiui Center Tavera • ˆ “

° Twin Blufli ˆKxcelslor

’Victory

L C’g)L’U .M B I

‘ WO’ˆccna \Rio 0 -tarGtuan; j)0jie6townˆL [Pt/ynett<A o Otsego Fal1 ®

.rtV-AMang-b? Colut >u‘q ton _ /M„rrison.m»

‘Ruecker dffVort Washington ftVVllte Walton Lhniurg Jartel mavlllo Mlquon

ISjuniA

JjSuwaukee •iVChitcfish Bay ˆshoreline

sMIUvaukee

lentonj

Creseo

MlTClHELLl

inneshiek !

leeorah/k 0

\ ” ai|

ALLAMAKEE

Ackertllle

■ Itaghj- .1i

a‘n Witwen Ci ty /

r >) t, Dane"Av‘2f(lt)0

6u K- / Wau.,„.

■ˆrL,7Miuomiuilaai[ˆ jd Pl

ˆ°x£Uc.Dr AˆJn

Black EartfiSˆ: Me.?doEMˆL £ v.\c Cˆobb Plainer-kW-P

I Montcrc;

ˆcorisin °oˆ

Calmer

Waukon Jcˆ

Esr-Tpw»«rt°*

IJohnBon Cr.

ICKASAW

\Waukes

.nkeniills.

unhridge

_}Vest I’nioir

it(ort Jc.

) yLinden ˆ j!

Lfh) in h ollandalep-0 vd/* ‘(Mineral ! ‘oinl\f

fe r *ony(uw5r,”|ˆJ

ˆ Francis ’udahy

Muth Milwaukee mrollville county Line VkNMWtoo

ifarland

|RomeMbi

IStoughtoi 7ˆ Albioi

/xStitzer

Eikuder

Bellevillet

New Gls

llnnchard-

illmtol *8 1

7“ v”ht Troˆ Ccnter/

I Maybe ws/-TT.Tr„>’

. ˆriWALWrOfT-H

Fairfield j

?aToBˆb 9*>™ ˆ7t>ela*anC.Sprlng \ -nˆnfaiˆ‘xT’V.lliam*ˆ-, -L.G.m

Ti£

Lcsli , ■

‘v>RockvIlle4 a v ˆˆˆ/j’otoi/ˆJ Elmo ‘

iluiel UrpA

/G0-^' _ 'Ipswich ?

L A F A

3uba . .

BUTLEI

MonticelloSV V ' V — ,\e Schuˆj^X^ a , bauy T

oodforiP ˆStearM rt\°na / Brodheadji'7—

:LV'y'if,yi'; er,b.\T •' 111

"TivL, v»- 1u,A

ksville

.VKaoine

Biff

(ijerry vllle

E»

[Kenosha

Oelweiu

HilV' |R«wv«d ahrVK EN C 4»"4\5iG*r,a,f0

&

Dub.uquˆ

Cedar Ftalls\

* Manehe«*ei.

Sinsinawaj

BL’ACKflAWK

C-wreP v

‘Galena

JO DAVIESS

GRUNDY

Harvard fb*UaAi

(Vaukegaa

NNEBAQG.

| MCˆhg iWoodstock:

Junction)

•Switch1

Kreepor

RondoutT(

CC S’ \if > tM

-Monticellc

N. Bellevue’

WISCONSIN

Mt. Carroll — ^^shdale

\c A’R”R O L L

Maquoketa

Sabula

SCALE

Statute Miles, 34.5 = 1 Inch,

20 30 40 60 0(

Oregon

SChicago

14 Map of Wisconsin.

Rand McNally's New Hi

Copyright by Rand McNally A Co.

_ Electric Lines.

Cliuton

I T E S I D E

-tLMorrison

Vfheatdi

'DU PAGE I

Railroads

Longitude

Greenwich

476 Wauzeka . ,..E 9 542 Whitelish Bay … .

341 Welcome, Outa-703 Whitehall .

gamie . J 7 3,224 Whitewater .

6.645 West Allis . J 10 551 Wild Rose .

2,462 West Bend . J 9 510 Wilton .

902 Westby . E 8 940 Wlnneconne .

729 Westfield . H 8 443 Withee .

327 Weston . B 6 1,090 Wittenberg .

840 West Salem . D 8 789 Wonewoc .

967 Weyauwega . 1 7 525 Wrightstown .

371 Weyerhauser . D 5 425 Wyocena .

\

K 9

D 7

I 10

H 7

.E 8

.1 7

.E 6

H 6

. F 8

.J 7

H 9

WISCONSIN

419

of all crops in 1920 was $355,000,000. This corn¬ er r < £r77Vltk a total value for the preceding' year of $377,000,000, and an average annual value for the five-year period 1915-20 of $201,000,000. While the yield of the 1921 crop was average the value was much less.

The most striking agricultural development in Wisconsin in recent years has been that of the dairying industry. Within a generation a revolution has taken place in Wisconsin dairy¬ ing as significant as any in the annals of agri¬ culture. Until the early 70's Wisconsin butter was contemptuously quoted on the east¬ ern exchanges as ((western grease® ; while her cheese could be marketed only under the camou¬ flage of eastern trade names. By persistent organization, education and agitation, Wisconsin dairymen have lifted the State to its present position of first rank in the country with re¬ spect to this industry, supplying one-sixth of the nation's creamery butter and three-fifths of its cheese. In 1917 over 8,500,000,000 pounds of milk were produced, with an estimated farm value of $179,135,000, an increase of $69,000,000 over the year 1915. While there has been a steady increase in dairy products of all kinds in recent years the development of cheese mak¬ ing has been particularly rapid; in the period 1909-15 the annual output of butter rose from 105,000,000 to 124,000,000 pounds; that of cheese from 144,000,000 to 234,000,000

pounds. On 1 January 1918 the estimated number of horses and mules in the State was 711,000, valued at $83,187,000; of milch cows, 1,785,000, valued at $133,875,000; of other cattle, 1,394,000, valued at $46,420,000; of sheep, 651,000, valued at $7,747,000; of swine, 2,019,000, valued at $45,- 024,000. The estimated total value of all live¬ stock was $316,253,000. Among minor agricul¬ tural products Wisconsin is conspicuous for to¬ bacco and cranberries. Both crops are highly localized, tobacco being raised in a few south central counties of the State (principally Dane) that have a limestone soil, and cranberries in a small group of west central counties that abound in swamps. Sugarbeet raising and the manufac¬ ture of beet sugar have gained an important foothold in the State. Although it lies in the same latitude as the famous fruit belts of Mich¬ igan, Ontario and New York, Wisconsin shares the fruit-raising advantages of these regions only to a limited extent. Those advantages con¬ sist, aside from soil, chiefly in their proximity to the Great Lakes (bodies of water large enough to exercise a marked control over the temperature of the adjoining regions) and the fact that in this portion of the continent the prevailing winds are from the west. Since Wis¬ consin lies to the west of the Great Lakes only those portions of the State in close proximity to Superior and Michigan enjoy the influence with respect to temperature with which Mich¬ igan and these other noted regions are favored. Along the Michigan and Superior coast lines, however, particularly in the Door County Penin¬ sula, fruit-raising has become an important in¬ dustry with promise of marked development in the near future. The estimated value of the apple and cherry crops for 1917 was $4,277,000, a=. compared with $2,048,000 in 1909.

Forest Products.— Within the memory of men still living more than one hundred billion feet of white pine stood in Wisconsin's splendid

forests, in addition to great quantities of oak, maple, . birch, elm, basswood, spruce, cedar and ash. To-day the white pine forests exist chiefly in memory, and the other timber resources have been squandered with lavish hand. Neverthe¬ less the lumbering industry, until within a decade the State's leading one, still remains im¬ portant, even in decline. The absolute output of lumber products first assumed large propor¬ tions about 1870. It increased by leaps and bounds until 1890, remained at a maximum for a little over a decade, and has since steadily declined. Although the absolute production of lumber was slightly greater in 1890 than in 1900, not until the latter year, with the subsi¬ dence of the lumber output of Michigan, did Wisconsin take foremost rank as a lumbering State. This primacy was

retained until 1905, when it was yielded to Washington. At the height of the logging industry (1890-1900) the value of the lumber produced annually reached well toward $70,000,000, more than the average annual value of the gold mined in the entire country. The value of the present output of rough lumber is about $30,000,000 annually.

Fisheries. — The commercial fishing indus¬ try of Wisconsin in 1915 produced almost 24,- 000,000 pounds of fish, valued at about $850,000. About three-fifths of the total output came from Lake Michigan and Green Bay, and the city of Green Bay is supposed to be the leading fresh water fishing centre in the world. About one-tenth of the State's total output came from Lake Superior, and the remaining three-tenths from the Mississippi River and the interior waters of Wisconsin. The most important fish in the two lake districts are herring and lake trout ; in the Mississippi River, carp and buf¬ falo. The indirect returns to the State from the pleasure fishing of the summer tourists is several times as great as the direct value of the commercial fishing industry; for the year 1916 this was estimated by the State Conserva¬ tion Commission to amount to $5,000,000.

Manufactures. — The centre of population and of manufacturing in the United States has moved westward along the 39th parallel of latitude. Wisconsin lies from 200 to 500 miles north of this line. Moreover the State has no coal deposits; due to its position west of the Great Lakes it is off the main continental routes of traffic from east to west; and the population is still in either the agricultural or the lumbering stage of development. From these facts it might be supposed that manufac¬ turing would have made little headway. How¬ ever, these disadvantages are counterbalanced by certain factors favorable to the development of manufacturing, so that at present in per capita value of manufactured products Wisconsin out¬ ranks every other State west of Ohio. Among the factors contributing to this result may be noted proximity to raw materials, the transpor¬ tation facilities and water power afforded by the waters and rivers bordering and traversing the State, and finally a progressive and aggress¬ ive attitude on the part of the population, lead¬ ing to a vigorous utilization of the potential resources of the State. Unlike the older east¬ ern communities, manufacturing in Wisconsin is still prevailingly shaped by the State's natural resources. Thus the lumbering and wood prod¬ ucts industry far outrank all other branches of

manufacturing in Wisconsin, the decline in value in recent years of the annual output of rough lumber being more than counterbalanced by the increased attention paid to more advanced and specialized manufacture of forest products. In 1914 the total value of the wood products of the State exceeded $109,000,000, made up of lumber, rough and finished, $55,000,000; pulp and paper, $31,000,000; furniture, $22,000,000.

The foremost manufacturing industry is dairying, already treated in connection with agriculture. The manufacture of foundry and machine-shop products comes next after forest products, having enjoyed a remarkable growth in recent years. The figures for 1914 show an annual output of over $60,000,000. The chief centre of this industry is Milwaukee and the other cities along the southern coastline of Lake Michigan. Their location on Lake Michigan within easy reach of the network of railroads centring at Chicago affords them superior transportation and marketing advantages. The dairying industry is, of course, widely diffused over the State, although even here a tendency toward centralization is becoming manifest. Next in importance is the manufacture of leather, the output in 1914 being worth over $42,000,000. The development of the leather industry is due to the abundant supplies of oak and hemlock bark provided by the forests of the State. The tanneries, formerly widely dis¬ tributed, are now largely centred in a few cities in the eastern part of the State. In output of leather Milwaukee leads all the cities of the United States. Malt liquors closely followed after leather, the output in 1914 being valued at almost $41,000,000. Flour and grist mill prod¬ ucts in 1914 were worth nearly $29,000,000. In both these industries a high degree of cen¬ tralization prevails, modified to some extent by the existence of numerous small mills scattered over the State. Milwaukee produced more beer than all the remainder of the State and ranked as the second brewing centre in the country. Popular opinion to the contrary, however, brew¬ ing was not Milwaukee's first or even its second industry in point of importance. Slaughtering and meat packing has grown rap¬ idly in recent years, the industry being centred chiefly at Milwaukee and other nearby cities. The output for 1914 was valued at $32,000,000. The paper and wood pulp industry is increasing rapidly. In 1914 the output was valued at $31,- 000,000, and Wisconsin ranked fourth among the States with respect to this industry. Flour

and grist mill products are slowly declining in importance ; their value in 1914 was $28,700,000, about $3,000,000 less than in 1909. Other im¬ portant and growing manufacturing industries are those of agricultural implements, in which Wisconsin ranked second in 1914, automobiles and boots and shoes. Over one-third (in value) of the manufactured products of the State are made at Milwaukee, and fully four-fifths of the total in the southeastern quarter of the State. Milwaukee has become one of the chief manufacturing centres of the Union, rank¬ ing first in leather, third in foundry and ma¬ chine-shop products, and 10th in total value of manufactures.

The United States Census Bureau figures for 1914 credited Wisconsin with 9,104 manufactur¬ ing establishments, in which over 230,000 per¬

sons were engaged. The capital investment was $754,000,000, salaries and wages paid amounted approximately to $150,000,000, and the total value added to raw materials through processes of manufacture was estimated at $277,750,000.

Banking. — No subject caused more pro¬ longed discussion at the time the State consti¬ tution was adopted than did that of banking. Largely because of the extreme measures with regard to banking contained in the first consti¬ tution, that instrument was rejected by the vot¬ ers. The second constitution drafted, there¬ fore, was more liberal toward banks and bank¬ ing, and a general banking act was passed in 1892. In 1903 a State banking department was created, in charge of a commissioner of bank¬ ing. Private banks were legislated out of ex¬ istence, and State banks were required to be twice examined and to make five reports yearly on call to the bank commissioner. At the close of 1916 there were 737 State banks and trust companies as compared with 240 in 1896. There were also 138 national banks at the close of 1916. The following summary exhibits the principal items concerning the banks of the State at that time :

	State and savings banks, 133	National banks and trust companies, 737
Capital .	$18,468,000 00	$23,672,350 00
Surplus .	8,137,000 00	7,490,949 51

Undivided profits. . 5,058,000 00 5,249,601 00

Resources . 253,560,000 00 298,617,175 61

During the year 1916 there was an increase in the total banking power of the State of $82,- 000,000, an amount almost equal to the total assets of the State banks in 1902.

Transportation. — The advantage which the State derives from the transportation facil¬ ities afforded by Lakes Michigan and Superior has already been adverted to. On the west the Mississippi borders the State for 250 miles and is navigable throughout the distance. The pio¬ neer hopes of a widely developed system of intrastate water transit have not been realized. Nevertheless the rivers of the State have proved of vast importance as affording a means to float the lumber to market. All four of the State's well-developed manufacturing areas owe their prominence, either directly or indirectly, to the transportation advantages afforded by its river and lake systems. These areas are (1) the Lake Michigan shore line; (2) the Fox River Valley; (3) the Rock River Valley (including Madison) ; and (4) the upper Wisconsin Valley. Railroad building in the State was begun in 1851, the first line to cross it being laid from Milwaukee to Prairie du Chien in 1851—57. In the early period of railroad development it was believed that the most important routes would run east and west, connecting Lake Michigan with the Mississippi River, and the second line to cross the State was early built from Mil¬ waukee to La Crosse. The decline in import¬ ance of river commerce, together with the de¬ velopment of Chicago and Milwaukee near the southern end of Lake Michigan and Saint Paul and Minneapolis on the upper Mississippi, have given a pronounced northwest-southeast trend to the transportation lines of the State. In 1921 the State had a main track mileage of 7,716, over 5,000 miles of this total belonging to the Chicago and Northwestern, the Chicago, Mil-WISCONSIN

waukee and Saint Paul, and the Minneapolis, Saint Paul and Sault Sainte Marie systems. In 1911 a state highway commission was created and a scientific and far-reaching system of highways improvements was begun. As yet in its infancy, relatively speaking, by

the close of 1916 nearly 5,000 miles of improved highway had been constructed at a cost of almost $18,- 000,000; work is progressing in accordance with a comprehensive system which will ultimately reach every county-seat in the State and almost every village or town of any considerable im¬ portance. Economically, socially and otherwise such a system of highways will be second in importance only to that of the railway system of the State.

Government. — The constitution under which Wisconsin was admitted into the Union in 1848 is still in force, although a number of amend¬ ments have been made in the 70 years of its operation. Amendments must originate in the legislature. Upon approval by majority vote of the members of each house in two succeed¬ ing legislatures they must be submitted to the electorate, which approves or rejects them by majority vote. To call a constitutional conven¬ tion the question of holding one must be sub¬ mitted, by legislative vote, to the voters at the election of the succeeding legislature and a majority vote must be given in its-favor. The legislative power is vested in a bicameral legis¬ lature consisting of a senate and an assembly. The assembly must never number less than 54 nor more than 100 members ; the senate must not have more than one-third nor less than one-fourth as many members as the assembly. At the present time the assembly consists of 100 members aiid the senate of 33. Regular sessions of the legislature are held biennially, in the odd-numbered years. The governor is the chief executive officer of the State, and has a limited veto power over acts of the legislature. Other executive officers are a lieutenant-governor, secretary of state, treasurer, superintendent of public instruction and attorney-general. All of these except the lieutenant-governor receive an annual salary of $5,000. In recent years, due to the progressive movement led by R. M. La Follette (now United States senator for Wis¬ consin), a number of powerful commissions have been established, and these are quite as im¬ portant elements of the administrative system of the State as any of the older offices already noted. The more important are the industrial, tax and railroad commissions, each consist¬ ing of three members with annual salaries of $5,000. Other important commissions and de¬ partments are the free library, conservation, civil service and highway commissions, the en¬ gineering, banking, insurance and agricultural departments, the State board of control, the State board of public affairs and the State His¬ torical Society. The judicial power of the State is vested in a Supreme Court, Circuit Courts, courts of probate and justices of the peace. Supreme Court justices are elected for 10-year terms, but in practice sitting justices are usually reelected, commonly without op¬ position. Circuit and probate judges are elected for six and four years,

respectively, and jus¬ tices of the peace for two years. The full right of suffrage is granted to all male citi¬ zens of the United States of 21 years of age

and upward and to those of foreign birth who prior to 1 Dec. 1908 declared their intention to become citizens of the United States who have resided in the State one year and in the elec¬ tion district 10 days. Woman suffrage exists as yet only in connection with questions pertaining to schools. Wisconsin was one of the first States to adopt a direct primary law for the nomination of party candidates for office. A comprehensive corrupt practices act eliminates many of the evils attendant upon partisan contests with which the State was formerly familiar. Candidates for office must file at suitable intervals sworn statements of their receipts and expenditures, all political ad¬ vertisements must be accompanied by a state¬ ment concerning their cost and who pays it, and the purposes for which candidates may spend money are limited. Cities are governed by general or specific charters. The commis¬ sion form is permitted and has been adopted by a number of the cities. It seems not to be gaining ground, however, and one city which operated under it for several years has re¬ turned to the old form of government by mayor and council. The towns are governed by offi¬ cers elected by the voters assembled in annual town meeting. Counties are governed by a county board, composed of representatives from the several towns and by the following admin¬ istrative officers : clerk, sheriff, treasurer, dis¬ trict attorney, coroner, clerk of Circuit Court, register of deeds, surveyor and superintendent of schools.

Finance. — The framers of the State con¬ stitution were concerned above all things lest the State be plunged into debt. Stringent safe¬ guards were, therefore, devised to prevent this, and prior to 1918 there was no formal State debt. However, what in effect amounted to one of slightly over $2,000,000 existed, being the obligation of the State toward its own several educational funds, the principal of which had been devoted to the extraordinary expendi¬ tures of the Civil War. In 1915 a beginning was made of paying off this debt at the rate of $100,000 a year. In March 1918, a law passed authorizing the issuance of $1,000,000 in State bonds to defray expenses incurred in equipping Wisconsin soldiers for service in the Great War. The chief sources of revenue are taxes on corporations, inheritances and incomes. With respect to the latter form of taxation, Wisconsin is a pioneer among the States of the Union. For the year ending 30 June 1916, the total income tax assessed was $3,837,370.04. Personal

property tax offsets were allowed to the amount of $1,825,641.62, and the amount of cash actually collected was $1,906,441.69. Ten per cent of the income tax goes to the State government, the remaining 90 per cent to local governmental units. During the same year the general property tax levy amounted to $43,365,000, the corporation tax to $6,517,000, and the inheritance tax to $502,000, the total taxes paid for all governmental purposes be¬ ing in excess of $52,000,000. Of the general property tax, 10 per cent went to the State government, 20 per cent to the counties, 41*4 per cent to local governments, and 28*4 per cent to schools.

Charitable and Correctional Institutions. —

The charitable and correctional institutions are

administered by the State Board of Control. It has supervision, among other things, over the insane, whether in State or county, hospitals, over the county tuberculosis sanitaria, poorhouses, police stations and jails; and, subject to the governor's approval, acts as a board of parole. There are two State insane hospitals (at Oshkosh and Mendota) and 35 county 'hos¬ pitals. There is one State tuberculosis sani¬ tarium at Wales and nine county sanataria. At the State sanitarium were 187 patients in 1916, maintained at a weekly cost of $11.42 for each. The two State insane hospitals together had 1,262 inmates in 1916 supported at a weekly per capita cost of about $5. The Wisconsin State Prison at Waupun had 906 inmates whose weekly support cost $3.80 each. Other State institutions include a home for feeble-minded at Chippewa Falls, a school for the blind at Janesville, school for the deaf at Delavan, a State reformatory at Green Bay, an industrial school for boys at Waukesha, and an indus¬ trial home for women at Taycheedah. At the State prison a binder plant is maintained, and convicts are employed in road building. The cost of maintaining the several charitable and correctional institutions of the State for the year ending 30 June 1920 was $1,951,327. Their total number of inmates at the close of that year was 4,074 with 2,514 on parole.

Population. — For a rural State the popula¬ tion of Wisconsin represents a high degree of racial intermixture. In 1850, two-thirds of all the Norwegians of the country lived in Wis¬ consin. They are still one of the most im¬ portant elements of the population, although Wisconsin is no longer the leading Scandinavian State. From the beginning the German ele¬ ment has been strongly represented, and at the present time after the native Americans, it constitutes the chief racial element of the State. The German element is stronger in Wisconsin than in any other State of the Union, ‘and-Milwaukee is probably more strongly Teutonic than any o’ther important American city. There are important Slavonic settlements in Milwaukee and in central Wis¬ consin, Dutch settlements in Brown, Sheboygan and other counties, and Swiss settlements in Green and adjoining counties. In the latter section dairying has become the dominant in¬ dustry, and more Swiss cheese is manufactured here than anywhere else in the United States. In 1840 Wisconsin had a population of 30,945. From 1840 to 1850 the population increased 10 fold, and from 1850 to 1860, two and one-half fold (775,881 in 1860). In the 60 years from 1860 to 1920 there was a fairly regular increase of approximately 300,000 per decade, the population in 1920 being 2,632,06 7. This absolute rate of increase is supposed to be hold¬ ing since the period of Federal enumeration in January 1920, the estimated increase being about 30,000 yearly. Thus, the absolute increase in population per decade has remained practically constant for 80 years (1840-1920), while the ratio of increase to total population has con¬ stantly decreased. In 1920 the State had nine cities of 25,000 or over, and 11 more with popu¬ lation in excess of 10,000. Of the total popula¬ tion 1,820,000 or 78 per cent were native born and 513,000 or 22 per cent were foreign born.

Religion. — The last census reported 1,000,000 church members in Wisconsin divided among

38 denominational bodies and 4,902 churches. Slightly over half of the total church member¬ ship is Roman Catholic. More than one-fourth is Lutheran. Next in numerical order are the Methodists with about 6 per cent, and the Congregationalists with 2x/i per cent of the total church membership. No one of the remaining 34 denominations possesses as many as 25,000 members.

Education. — N otwithstanding _ the diverse

racial elements and the predominantly rural type of population, the

school system of Wis¬ consin is the chief glory of the State. At its apex stands the University of Wisconsin at Madison, superbly located on Lake Mendota, with grounds stretching for several miles along the shore. It is housed in some 40 main buildings valued at several million dollars. In the year 1920-21 there was a faculty enrol¬ ment of 886 and the student enrolment was 10,155. With our entrance into the Great War in 1917, there came a heavy decrease in num¬ bers, both of faculty and students. The uni¬ versity is built around the College of Letters and Science, and includes a graduate school, law, engineering, medical, music, agricultural, library, pharmaceutical and extension divisions and schools. To a greater extent, probably, than any other American university, the Uni¬ versity of Wisconsin has made its interests identical with those of the people composing the commonwealth. There are nine State nor¬ mal schools, located at Milwaukee, River Falls, Stevens Point, Whitewater, Platteville, Eau Claire, La Crosse, Superior and Oshkosh. Their administration is entrusted to a single Board of Normal School Regents, correspond¬ ing to the Board of Regents of the University; while the State Board of Education correlates, on the business side, the higher educational interests of the State. The more important privately-supported colleges of the State are Lawrence, at Appleton; Ripon, at Ripon; Beloit, at Beloit; Carroll, at Waukesha; Campion, at Prairie du Chien and Milwaukee-Downer (for women) and Marquette University at Mil¬ waukee. There is an excellent system of pub¬ lic, high and graded schools, with suitable pro¬ vision for State aid and State supervision. In 1919-20 there were 59,776 pupils enrolled in the 373 public high schools, an increase of 74 per cent in 10 years. Since the Catholic popu¬ lation of the State outnumbers that of all other religious denominations combined, there is a large enrolment of pupils in the numerous church schools who would otherwise go to the public schools. The number of ungraded rural schools is decreasing slowly, while the propor¬ tion of total school population in attendance upon graded schools is steadily and rapidly in¬ creasing. In 1915-16 continuation schools in 29 cities enrolled 36,700 pupils at a per capita cost of $12.45. In 1919-20, 405,467 were enrolled in the several classes of free public schools and about 75,000 (by estimation) in private and parochial schools. There were 14,122 teachers in the elementary schools of the State in the same period. For nearly a quarter of a century the State has had an ad¬ mirably organized system-of library su¬ pervision and leadership, with the result that the people of Wisconsin probably enjoy more adequate library service than do those of any

other state. The traveling libraries sent out by the bree Library Commission penetrate to every corner of the State ; while the resources of the State Historical Library with its more than 400,000 titles and the University Library with 275,000 more are at the disposal, under reason¬ able administrative regulations, of every resident of the State.

History. — The territory now embraced in Wisconsin has belonged successively to Spain, France, Great Britain and the United States. The Spanish rule was theoretical rather than actual, and need not be dwelt upon in this sketch. The French rule dates from the advent of French explorers on the Upper Lakes, about the middle of the 17th century. The first white explorer known to have visited Wisconsin was Jean Nicolet, who in 1634 came to the shores of Green Bay, seeking there the fabled civilization and wealth of distant China. Three decades later Jesuit missions were established at Lapointe on Lake Superior and at Depere on Green Bay. In 1673 Jolliet and Marquette crossed Wisconsin by the Fox-Wisconsin River route on their famous journey of discovery of the upper Mississippi. Thenceforward for 150 years Wisconsin was the haunt of the fur trader and the abode, as in primeval times, of the red man. As an outpost of New France it shared the economic and political fortunes of that colony. As early as the War of the Span¬ ish Succession Frenchmen and Indians from Wisconsin made the long journey to Lower Canada to participate in the war against the Iroquois and the English. Wisconsin Indians as¬ sisted in the massacre of Braddock's army near Pittsburgh in 1755, and elsewhere throughout the ensuing war with the English. The British regime, 'beginning upon the overthrow of New France in 1763, nominally lasted until the Treaty of Paris of 1783 or (from another point of view) until the cession of the British posts in the Northwest in 1796. Actually, how¬ ever, the English held practically full sway over the Indian and French population at least until 1816, when the United States at length definitely asserted its authority by establishing regular army posts at Green Bay (Fort Howard) and Prairie du Chien (Fort Crawford). Nominally, however, Wisconsin by the Ordinance of 1787 became a part of the Northwest Territory. Upon the admission of Ohio to statehood, as a portion of the remainder of the original Northwest

Territory, Wisconsin became a part of the new Indiana Territory. In 1809 it fell under the jurisdiction of Illinois Territory, and upon the admission of Illinois to statehood in 1812 was added to Michigan Territory. Here it rested until 1836, when Michigan became a State, and Wisconsin Territory itself was or¬ ganized, with boundaries including all of modern Iowa and Minnesota and much of North and South Dakota. The greater part of this do¬ minion was shorn away by the erection of Iowa Territory from its southern and western por¬ tion in 1838, and 10 years later Wisconsin, with its present boundaries, became a State of the Union. Following the War of 1812, for a decade and a half Wisconsin remained dedi¬ cated to savagery and the fur trade. The Black Hawk War of 1832, however, broke for all time the Indian domination of the State. Already the lead mine region of southwestern

Wisconsin was being exploited by hardy miners, chiefly from Illinois, Missouri and Kentucky, and close upon the Black Hawk War came a tide of settlement. Cities sprang up like magic, farming communities were developed almost over night and an era of hopeful speculation and laborious settlement ensued. In 1830 the census returns showed a white population of slightly over 3,000, wholly confined to the lead mines and the old French settlements of Green Bay and Prairie du Chien. In 1840 there were 30,000 (in round numbers) and in 1850, 300,000. Milwaukee in 1835 contained three families of white affiliations ; in the summer of 1836 town lots were selling at $2,000 and more. The wild boom shortly burst, of course, but there are men still living who have witnessed the growth of Milwaukee from a village of 1,000 popula¬ tion to the present city of almost half a million.

Thus in the generation from 1830 to 1860 the Wisconsin wilderness was transformed into a thriving American commonwealth of three-quarters of a million souls. The virgin re¬ sources of soil and forest were tapped, the framework of government and society was firmly erected. The frontier State — • still a wilderness at the time of South Carolina's nullification ordinance in 1832 — in the Civil War poured over 90,000 soldiers into the South to assist the war for the preservation of the - Union. When admitted to statehood in 1848 Wisconsin was a typical frontier commonwealth, and the citizens were for the most part ardent Democrats. Despite the existence in south¬ western Wisconsin of a strong element of southern origin, the progress of the anti-slavery dispute in a few years broke the power of the Democratic party. In 1854 at Ripon was en¬ acted one of the earliest

movements looking to the organization of the new Republican party. In 1856 a Republican governor was elected. Since that date the Republican party has domi¬ nated the State electing every governor but three, and carrying every presidential election but one. The outstanding political feature of recent years has been the cleavage in the Re¬ publican party brought about during the 90's by reason of the progressive reform movement led by Robert M. La Follette. The forerunner by more than a decade of the national cleavage in the party which culminated in the presi¬ dential campaign of 1912, for years was enacted on the Wisconsin political stage the bitter strug¬ gle between (<Stalwart® and (< Half-breed® with which the entire nation became familiar when, in the arena of national politics, the conflict be¬ tween <(stand pat® and ˆprogressive® Republicans was joined. For over a dozen years La Follette dominated the State, serving as governor from 1901 to 1906 and as United States senator from 1906 to the present time. During the earlier years of this period a comprehensive series of progressive measures were adopted looking to the liberalizing of the agencies of government and society, until Wisconsin became a synonym for political experiment and progress. The Presidential campaign of 1912, however, rent in twain not only the national Republican party but the La Follette branch of the party in Wis¬ consin as well. Taking advantage of the fac¬ tional feuds which had developed in the ranks of their opponents, the conservative Republi¬ cans in the election of 1914 once more gained

control of the State administration. Their gov¬ ernor (E. L. Philipp) was reelected in 1916, although in the same year Senator La Follette was reelected, receiving in the party primary a heavy majority over his <(Stalwart" oppo¬ nent. The outbreak of war in Europe in 1914 produced a sharp division of sentiment in Wis¬ consin, with respect to the merits of the con¬ tending parties and the attitude of our gov¬ ernment and nation toward the war. When the United States entered the contest in April 1917, the people of Wisconsin, with substantial unanimity, came to the support of the govern¬ ment against the national foe. In numerous ways the State set the example to the entire

country of enthusiastic and far-sighted support of the war. Her draft returns were reported first of all the States, she originated the State and county councils of defense, and the observ¬ ance of wheatless and meatless days. The years 1917 and 1918 again demonstrated to the world that the creditable record for patriotism and efficiency made by Wisconsin in the Civil War was more than duplicated in the contest.

Governors of Wisconsin

TERRITORIAL

Henry Dodge . 1836-41

James Duane Doty . 1841-44

Nathaniel P. Tallmadge . 1844-45

Henry Dodge . 1845-48

STATE

Democrat

Whig

Democrat

Nelson Dewey .

Leonard J. Farwell .

William A. Barstow Arthur McArthur (acting)

Coles Bashford .

Alexander W. Randall… .

Louis P. Harvey .

Edward Salomon .

James T. Lewis .

Lucius Fairchild .

Cadwallader C. Washburn.

William R. Taylor .

Harrison Ludington .

William E. Smith .

Jeremiah M. Rusk .

William D. Hoard .

George W. Peck .

William H. Upham .

Edward Scofield .

Robert M. LaFollette… .

James O. Davidson .

Francis E. McGovern ….

Emanuel L. Philipp .

John J. Blaine .

Republican .

a

a

u

u

u

u

Democrat-Greenback Republican .

U

U

a

Democrat .

Republican .

U

u

u

1848-52

1852-54

1854-56

1856

1856-58

1858-62

1862

1862-64

1864-66

1866-72

1872-74

1874-76

1876-78

1878-82

1882-89

1889-91

1891-95

1895-97

1897-1901

1901-06

1907-11

1911-15

1915-21

1921-

Bibliography. — (Wisconsin Historical Col¬ lections ’ (25 vols., 1854-1918) ; State Historical tions) (25 vols., 1854-1918) ; State Historical Society of Wisconsin, Proceedings’ (an¬ nually) ; Thwaites, R. G., (Wisconsin, > in American Commonwealth Series (Boston 1908) ; Howe, F. C., (Wisconsin; An Experiment in Democracy) (New York 1912) ; Martin, Law¬ rence, (Physical Geography of Wisconsin’ (Madison 1916) ; McCarthy, Charles, (The Wisconsin Idea’ (New York 1912) ; Merk, Frederick, (Economic History of Wisconsin During the Civil War Decade’ (Madison 1916).

M. M. Quaife,

Superintendent of the State Historical Society of Wisconsin.

WISCONSIN, a river in the State of Wis¬ consin. It has its rise in Vieux Desert Lake, on the northern boundary of the State, flows south to Portage City, then southwest and enters the Mississippi four miles below Prairie du Chien. Total length, about 625 miles. It is navigable for 200 miles to Portage City, from which point it is connected with Fox River by a canal.

Shifting sandbars in this river are a hindrance to navigation. There are several waterfalls along its course, the most famous of which are known as The Dalles of Wisconsin and Grand¬ father Bull Falls. Some of the bluffs which line the picturesque gorges are fully 400 feet high.

WISCONSIN, University of, the State university located at Madison, Wis. As early as 1836 the legislature of the Territory then known as Wisconsin passed an act for the establishment of “Wisconsin University” at Bel¬ mont, now in the State of Iowa, but the insti¬ tution was never organized ; again in 1838 a law was passed for the establishment of the Uni¬ versity of the Territory of Wisconsin,” a board of visitors was appointed and the national en¬ dowment of two townships of land received. Nothing further was done, however, until 1848, when the State constitution provided for the establishment of a State university, and the university was incorporated by act of the legis¬ lature. A preparatory department was opened in 1849 and the collegiate department in 1850. In 1854 a second grant of two townships of land was made by Congress; but this land as well as that of the first grant was sold at very low prices to attract settlers, and the income derived from the fund was meagre; no State appropriation was made till 1870. In 1858 the university was reorganized, the work of the preparatory department restricted and col¬ legiate department organized in six schools. During the War of Secession a large num¬ ber of students entered the army, and though the work of the university was not suspended, no commencement was held in 1864. Since the war the progress of the university has been continuous. In 1866 a reorganization was effected. The Federal grant under the ((Morrill Act” for the establishment of colleges of agriculture and industrial arts was given to the university. Colleges of agriculture and engineering were then established as integral parts of the university. Women, who had been admitted since 1863 to a <lnormal” department, were given the opportunity to follow a regulai collegiate course. At this time, however, the coeducational system was not complete as the work of the women was kept separate from that of the men ; but a few years later com¬ plete coeducation was established. In 1873 the legislature appropriated $10,000 a year to the university; in 1876 an annual 10th of a mill tax was appropriated; in 1883 and 1891 other mill taxes were added ; in 1899 all mill taxes were consolidated with a grant of 1 per cent of the railroad licenses into a specific annual grant, which was increased in 1901 and again in 1903. The total income from all sources was $3,532,305.64 in 1918-19. At the time of the first annual grant of $10,000 a system of free tuition to graduates of high schools in the State was adopted, which led to the elimination of the preparatory department a few years later. This also

resulted in making the university the actual head of the public school system of the State.

Since 1892 the university has extended its work in all directions ; a number of special courses have been added, particular emphasis has been laid on graduate work and the num¬ ber of graduate students increased. The uni-

versity now includes the following colleges and schools: (1) the College of Letters and Science ;

(2) the College of Mechanics and Engineering;

(3) the College of Law; (4) the College of Agriculture; (5) the Graduate School. It also conducts a summer school and a university ex¬ tension department. The College of Letters and Science includes besides the general depart¬ ments of instruction in arts and sciences, the several special departments as follows : The courses in chemistry, commerce, journalism and pharmacy, the School of Music, the Medical School, the Library School, the School of Education, the normal graduates' course and the Washburn Observatory. The degrees of A.B. and Ph.B. (general course) are con¬ ferred upon the graduates of the College of Letters and Science, except in the chemistry, medical and pharmacy courses which lead to the B.S. degree, and the normal graduates' course, leading to the degree of Ph.B. (course for normal-school graduates). For the degree of Ph.B. (general course), special emphasis is placed on mathematics, philosophy and science ; for the A.B. degree, the work is largely elec¬ tive. In the freshman year, an English course is required and during this year the other studies are elected from two groups, (1) lan¬ guage, (2) mathematics, science and history. Certain minima in these groups must be offered, the total covering somewhat less than two years' work. Not later than the beginning, of the junior year a major subject in some one department must be elected and the remainder of the work is free electives. A limited amount of elective work may be taken in the colleges of Engineering and Agriculture, in the School of Music or in the special

courses of the College of Letters and Science. A special two years' course is arranged for normal-school graduates, for completion of which the degree of Ph.B. (course for normal-school graduates) is con¬ ferred. The special courses in pharmacy cover four years, leading to the degree of B.S., or two years, leading to the degree of graduate in pharmacy. The College of Engineering was organized in 1870; it offers five four-year courses, leading to the degree of B.S. ; these are in chemical, civil, electrical, mechanical and mining engineering. The above courses may be taken as five-year courses with the B.S. degree; this allows more elective work in the other colleges. By proper arrangement of elec¬ tive studies, students in the College of Letters and Science secure the A.B. degree at the end of four years and the B.S. degree in engineer¬ ing in two additional years. The College of Agriculture offers a ((long course® and a home economic course of four years, leading to the degree of B.S., a short course of two years, winter and summer dairy courses and a farm¬ ers' winter course; this college also includes the agricultural experiment station and the or¬ ganization of farmers' institutes. The College of Law was established in 1868; it offers a three-years' course, leading to the degree of LL.B. The Graduate School received its pres¬ ent organization in 1895. It includes work in the College of Letters and Science, the College of Engineering and the College of Agriculture, courses especially for graduate work being offered in each department of these colleges; the school as a whole is under the control of

a faculty committee. The degrees conferred are A.M., M.S., M.Ph., Ph D., C.E., E.E., M.E., Ch. E. and Min. E. The Summer School offers courses in the subjects of the general college curriculum, in education, in gymnastics and a special normal course ; it also includes a summer school in shop and laboratory work for me¬ chanics. Tuition in the university is free to Wisconsin students. There are 115 scholarships for undergraduates and 15 student loan funds; there are also 43 fellowships, 24 honorary fellowships and 36 graduate scholarships, most of which are in special departments in the various colleges of the university. In addition, legislative scholarships are granted to the ex¬ tent of 8 per cent of the nonresident enrolment of the previous year.

Gymnasium work and military drills are re¬ quired of men students during part of the course, and gymnasium work of women stu¬ dents. There is also ample provision for athletic sports, which are under the general control of an athletic council, on which faculty, alumni and students are represented. The University of Wisconsin is the only institution of the kind in the West which has a boat crew. The women

students have organized an athletic association. The students maintain four men's literary so¬ cieties and two women's societies; three of the men's societies are in the College of Letters and Science and one is in the College of Agri¬ culture. The men's societies have organized a forensic board which selects debaters for inter¬ collegiate contests. Two of the men's societies and one women's society were organized in the early days of the university and have always had a prominent part in student life. There are also a science club, Sigma Xi, composed of faculty members and graduate students, four dramatic societies and innumerable other stu¬ dent associations, a Woman's Self-Government Association and chapters of Phi Beta Kappa and Tau Beta Pi (engineering). There are several other honorary and professional fra¬ ternities in agriculture, commerce and econom¬ ics, chemistry, engineering, medicine, debating, law, journalism and home economics. The uni¬ versity campus contains about 450 acres, border¬ ing on the south shore of Lake Mendota ; in the eastern part of the grounds the land rises ab¬ ruptly in two hills, of which the eastern and higher is known as University Hill. On this hill are most of the college buildings; the Wash¬ burn Observatory stands on the western hill, which is known as Observatory Hill ; farther west is the farm with its barns and buildings ; to the east of University Hill is the lower campus, used largely for athletic sports ; the State His¬ torical Society Library building, containing the libraries of the society and the university, also stands at the western end of this campus. Among the prominent buildings on and near the University Hill are north hall, south hall, biol¬ ogy building, chemistry building, law building, physics-economics building and university hall, Chadbourne hall, Barnard hall, Lathrop hall, music hall, science hall and the engineering building; on and near Observatory Hill are the Hiram Smith hall (dairy), horticultural build¬ ing, agricultural hall, home economics-extension building, the infirmary, stock pavilion, soils building, agricultural engineering building, agri-426

cultural chemistry building and agronomy build¬ ing. The university library in 1921 contained 275,000 volumes, in addition to which there are departmental libraries, the State historical li¬ brary and legislative reference library open to students. Thus there are about 581,000 volumes and 308,000 pamphlets accessible for the pur¬ poses of the university. The collection is par¬ ticularly strong in American and

English his¬ tory, Greek, political and social science, Shakes¬ peare and the publications of American learned societies. In 1918-19 there were 4,173 students, with 2,884 in the College of Letters and Science, 599 in the College of Engineering, and 531 in the College of Agriculture. Including the Student's Army Training Corps, the total en¬ rolment was 5,274. The students in 1920, the first normal year after the war, numbered 10,- 155, of whom over 3,000 were in the College of Letters and Science, over 600 in the College of Engineering and 1,000 in the College of Agri¬ culture. The University of Wisconsin ranks among the first of the State universities both in numbers and in standard of scholarship.

M. H. Haertel,

Secretary of the Faculty , University of Wiscon¬ sin, Madison, Wis.

WISCONSIN PHALANX. See Ripon, Wis.

WISDOM, Book of, the name of one of the so-called apocryphal books of the Protestant Bible. See Wisdom of Solomon.

WISDOM OF SOLOMON, a book re¬ garded by Protestants as apocryphal, but ac¬ cepted by Roman Catholics as part of the canon of the Old Testament. It purports to be the work of Solomon, but the Protestant view is that it was the composition of a Jew of Alex¬ andria about a century before Christ. The au¬ thor states that he is a king and the son of a king, that he prayed to God for wisdom, and re¬ ceived both wisdom and riches. God directed him to build a temple on the holy mount. Right¬ eousness and wisdom are commended, un¬ believers and idolatry are denounced, and ex¬ amples are given from the Mosaic writings to show how the judgments of God overtake the worshippers of false gods and the wicked gen¬ erally. Nor is the author content with indicat¬ ing earthly penalties for wrongdoers. He points plainly to rewards in a future life for the good, and punishments for the wicked, and without referring to the resurrection of the body, he teaches the immortality of the soul. The book was highly esteemed among the Jews and was evidently well known to Saint Paul, as the epistles to the Romans, the Corinthians and Ephesians indicate. Under the name of (Wis-donP in the Roman Catholic canon of the Old Testament, the book is in the list recognized by the Council of Trent as inspired Scripture. The Roman Catholic position is that it was truly the work of Solomon, and that the Alexandrian Greek version was a translation from the origi¬ nal Hebrew. See Apocrypha ; Bible.

WISE, Bernhard' Ringrose, Australian statesman and author: b. Sidney, 10 Feb. 1858. He was educated at Rugby and Oxford, where he was several times prizeman, founder of the Amateur Athletic Association of Great Britain, and first president of the Oxford Union and Athletic Club. From 1879 to 1881 he was

amateur mile champion. After graduating in law he went to New South Wales, where he was Attorney-General (1887-1904) and Min¬ ister of Justice (1901-04). He was a member of the national committee which framed the constitution of the Commonwealth, and he was very active in promoting industrial law reform and prison reform. He is the author of (In¬ dustrial Freedom* and (The Commonwealth of Australia.*

WISE, Daniel, American Methodist clergy¬ man and author: b. Portsmouth, England, 10 Jan. 1813; d. Englewood, N. J., 1898. He came to the United States in 1832, entered the Metho¬ dist ministry, edited the Sunday School Mes¬ senger, 1838-43, and Zion Herald, 1852-56, as well as many Sunday School publications. He published more than 50 books for young peo¬ ple, mostly under the pen-names of ((Francis Forrester® and ((Laurence Lancewood.® Among these are (Personal Effort* (1841); (Life of Ulric Zwingli* (1850) ; (My Uncle Toby's Library) (12 vols., 1853) ; Vanquished Vic¬ tors* (1876) ; (Heroic Methodists* (1882) ; (Boy Travelers in Arabia) (1885) ; (Men of Renown) (1886) ; and (Some Remarkable Women) (1887).

WISE, Henry Alexander, American law¬ yer and political leader : b. Drummondtown, Accomac County, Va., 3 Dec. 1806; d. Rich¬ mond, Va., 12 Sept. 1876. He was graduated from Washington College, Pa., in 1825, was admitted to the bar in 1828 and began the prac¬ tice of law at Nashville, Tenn. In 1830, how¬ ever, he returned to Accomac County, where he built up a large practice as a lawyer. He was early active in the Democratic party; was a delegate to the National Convention of 1832, and in the same year was elected to Congress. After the election he fought a duel with his opponent, on the latter's challenge. On the removal of the government deposits from the United States bank, Wise, with other Demo¬ crats in the House, joined the Whigs in opposi¬ tion against President Jackson. He was, how¬ ever, reelected to Congress in 1834 and in 1836; and also opposed Van Buren's banking and sub-treasury plan. In 1837 he acted as the second of Graves, of Kentucky, in a duel with Cilley, of Maine, both members of Con¬ gress, in which the latter was killed. This occurrence led to much denunciation of Wise, who was, however, ascertained not to be

re¬ sponsible for the affair. In 1840 he was instru¬ mental in securing the nomination of Tyler for the Vice-Presidency, and after Tyler became President exerted an important influence on the administration policy. In 1844 he was ap¬ pointed Minister to Brazil ; and on his return to the United States in 1847 again gave his sup¬ port to the Democratic party. In 1855 he was Democratic candidate for governor of Virginia, conducted an active campaign, particularly against the Know Nothing party, and was elected by a majority of 10,000. Toward the end of his term as governor occurred the seiz-‘ ure of Harper’s Ferry by John Brown and his followers, and the execution of John Brown at Charlestown, 2 Dec. 1859, was one of the last acts of his administration. He was a member of the State convention which met at Rich¬ mond in 1861 to consider the relations of Vir¬ ginia to the Federal government, and one of

the committee on Federal relations to whom the principal business of the convention was referred. He favored a compromise between North and South, and the avoidance of hostili¬ ties if possible; but after Virginia declared for secession he loyally supported the Confederate cause. He was appointed a brigadier-general in the Confederate army and “occupied the Kanawha Valley, but was rapidly driven out by General Cox in a series of skirmishes. He continued to serve in western Virginia until he was* sent to Roanoke Island, N. C., -with in¬ structions to defend it. At the time of the attack upon the island by General Burnside, in February 1862, he was ill on the mainland, but the greater part of his brigade, known as the (<Wise legion,® took part in the action. He was later at the battle of Appomattox. After the war he resumed the practice of law in Rich¬ mond. He wrote (Seven Decades of War* (1872). Consult Wise, B. H., (Life of Henry Alexander Wise) (1899); Wise, J. S., (End of an Era> (1899).

WISE, Henry Augustus, American naval officer: b. Brooklyn, N. Y., 12 May 1819; d. Naples, Italy, 2 April 1869. He entered the navy as midshipman in 1834, served on the Florida Coast during the Seminole War and on. the Pacific Coast during the Mexican War. He became

assistant chief of the Bureau of Ordnance and Hydrography in 1862, remain¬ ing in that capacity during the balance of the Civil War. He was promoted captain in 1866. Under the pseudonym of ((Harry Gringo® he wrote (Los Gringos; or, An In¬ terior View of Mexico and California, with Wanderings in Peru, Chili, and Polynesia) (1849) ; (Tales for the Marines* (1855) ; (Scampavias, from Gibel-Tarek to StambouP (1857) ; (The Story of the Gray African Par-rot) (1859), a book for children, and (Captain Brand of the Centipede) (1860).

WISE, Isaac Mayer, American rabbi and educator: b. Steingrub, Bohemia, 29 March 1819; d. Cincinnati, Ohio, 26 March 1900. He studied at Prague and Vienna, became rabbi at Radnitz, and, desirous of a broader field, emigrated to New York in 1846. He was elected rabbi of a synagogue at Albany, N. Y., but the ritual changes that he favored led to a division in the congregation, and a new temple was organized by his friends. In 1854 he was elected rabbi of the Congregation B'nai Tes-hurun, of Cincinnati, Ohio. In the same year he wrote a (History of the Iraelitish NatioiP and began to publish The Israelite, followed in 1855 by Die Deborah. Throughout his long years of activity he sought in pulpit, press and on platform to advance the cause of progressive Judaism and became its practical and popular leader, to whose efforts were due the Union of American Hebrew Congregations, the Hebrew Union College and the Central Rabbinical Con¬ ference. In the formative period between 1856 and 1873 Rabbi Wise was enabled by means of his publications to reach the Jews of the United States, even in the remote places, without inter¬ ruption, bringing not only the news, foreign as well as domestic, but industriously making propaganda for a union of congregations for the purpose of establishing a seminary to edu¬ cate and train the rabbis who, in turn, were to preach the liberalization of Judaism and dem¬

onstrate that the ancient faith could be adopted to changed conditions without the sacrifice of even the least of its tenets. Wise was active in so many directions, and was so great a power in the history of Judaism in the United States, that it is necessary to treat under dis¬ tinct headings the various achievements of his long and successful career. He was above all an organizer, and the numerous institutions that he called into being attest to the great influ¬ ence he wielded during his life. In his later years Rabbi Wise was regarded as the most prominent Jew of his time in the United States. More than any of his contemporaries, it may be said of him that he left the impress of his personality upon the development of Judaism in the United States. Among his published works are (Essence of Judaism* (1860) ; (

Judaism, Its Doctrines and Duties* (1862) ; (Prayer Book) and (Hymnal } (1863), which were quickly followed by his (Origin of Chris¬ tianityˆ (The Cosmic God,* (The History of the Hebrews,* (Second Commonwealth, *(A Defense of Judaism versus Proselytizing Christianity) and (Pronaos to Holy Writ.* He was president of the Hebrew Union College from its foundation in 1875 until his death. In 1919 the centenary of his birth was celebrated with great eclat throughout the United States.

WISE, John, American colonial clergyman : b. Roxbury, Mass., August 1652; d. Ipswich. Mass., 1725. He was graduated from Harvard in 1673 and 10 years later was settled as min¬ ister of the Second Parish Church in Ipswich, in which position he continued until his death. For remonstrating against the violation of char¬ ter rights in levying a province tax without authority from the Assembly, he was fined and imprisoned by Governor Andros in 1687. In 1689 he brought a suit against Chief Justice Dudley for denying him the privileges of the habeas corpus act, and in 1690 was chaplain to the expedition to Quebec. He took a decided and successful stand against the attempts of Increase and Cotton Mather to place the Mas¬ sachusetts churches under the authority of ec¬ clesiastical councils, putting forth two essays on the subject, (The Churches' Quarrel Espoused* (1710) and (A Vindication of the Government of New England Churches> (1717). A large edition of both essays was published in 1772 and a fourth edition with historical memoir by J. S. Clark (1860). In the memoir it is stated that several striking passages in the Declaration of Independence are nearly literal transcripts from the Vindication.) Consult Tyler, his¬ tory of American Literature) (Vol. II, 1878).

WISE, John Sergeant, American lawyer, son of Henry Alexander Wise (q.v.) : b. Rio de Janeiro, Brazil, 27 Dec. 1846; d. 12 May 1913. He studied at the Virginia Military Institute at Lexington, which he left in 1864 to join the Confederate army, was graduated from the law department of the University of Virginia in 1867 and began to practise his pro¬ fession in Richmond. In 1881 he was elected to Congress from Virginia. He was defeated for governor of his State in 1885. He pub¬ lished (Diomed) (1898) ; (The End of an Era* (1899) ; (The Lion's Skin* (1905) ; (A Trea¬ tise on American Citizenship * (1906).

WISE, Peter Manuel, American alienist: b. Clarence, Erie County, N. Y., 7 March 1851 ;

d. 22 Sept. 1907. He was graduated at the med'cal department of the University of Buffalo in 1872; was president of the New York State Commission in Lunacy 1896-1901 ; and was pro¬ fessor of psychiatry at the University of Ver¬ mont 1891-95. He published (TextBook for Training Schools) (1896) and monographs on (Asylums of Great Britain (1882) ; (Sexual Perversion) (1883), *etc.*

WISE, Stephen Samuel, American Jewish rabbi : b. Budapest, Hungary, 17 March 1872. He studied at the College of the City of New York in 1887-91, was graduated at Columbia University in 1892, and received the degree of Ph.D. there in 1900. He was pastor of the Madison Avenue Synagogue, New York, in 1892-1900; of Beth Israel, Portland, Ore., in 1900-06; and in 1907 he founded the Free Syna¬ gogue, New York, of which he has since been pastor. He is noted for his liberal views, his eloquence and for his social welfare work. He is an editorial contributor to the Survey, and his sermons at Beth Israel and at the Free Synagogue have been published monthly. He is also author of 'The Ethics of Solomon Ibn GabiroP (1901) ; 'How to Face Life> (1917), *etc.*

WISE MEN OF THE EAST, The, the

three Magi, who, according to the Gospel of Matthew (ii, 1, 2), followed the guiding star to Bethlehem in order to render homage to the new born King of the Jews. A legend, which can be traced back to the 2d century, calls them kings and later times distinguished them as Melchior, Gaspar and Balthasar. They are honored at the feast of the Epiphany and in art the youngest is portrayed as a Moor. In astral theology they were represented by Orion's three stars. Their bones are said to have been placed in the cathedral of Cologne and hence they are often referred to as the Three Kings of Cologne.

WISEMAN, wiz'man, Nicholas Patrick Stephen, English Roman Catholic prelate: b. Seville, Spain, 3 Aug. 1802; d. London, 15 Feb. 1865. He was of Irish parentage, was brought to Waterford, Ireland, at his father's death in 1805 and was educated at the Roman Catholic College, Ushaw, near Durham, and the English College at Rome. He took orders in 1825, be¬ came professor of Oriental languages in the Roman University in 1827 and in 1828 rector of the English College.

He returned to England in 1835 and there delivered in 1836 at Saint Mary Moorfields, London, a series of lectures on (The Principal Doctrines and Practices of the Catholic Churchy which attracted much attention. He was consecrated titular bishop of Melipotamos in 1840 and was made arch¬ bishop of Westminster and cardinal in 1850. This ecclesiastical appointment caused great excitement among English ultra-Protestants, who termed it a “papal aggression® and re¬ sulted in the “Ecclesiastical Titles Act® pro¬ hibiting the assumption of local ecclesiastical titles by Roman Catholics, which was not re¬ pealed until 1872. In the midst of the excite¬ ment Wiseman put forth a temperate address explaining the constitutional rights of Roman Catholics, entitled ‘An Appeal to the Reason and Good Feeling of the People on the Subject of the Catholic Hierarchy5 (1850), which was very instrumental in bringing about a better

state of feeling. In 1836 he established with O’Connell the Dublin Review and was a regu¬ lar contributor to it. He was the author of ‘Lectures on the Connection between Science and Revealed Religion) (1836) ; ‘Letters on Catholic Unity5 (1842); ‘Papal Supremacy) (1850); <Fabiola) (1854); ‘The Four Last Popes5 (1858), *etc.* Consult Fitzgerald, (Fifty Years of Catholic Progress5 (London 1900) ; Houghton, ‘ Monographs 5 (1875) ; Thureau—

Dangin, Paul, (English Catholic Revival in. the Nineteenth Century) (Eng. trans. by W. Wilberforce, rev. ed., 2 vols., New York 1916) ; Ward, ‘Life and Times of Cardinal Wiseman) (1897; new ed., New York 1900); id., ‘Ten Personal Studies) (London 1908) ; White, G., (Memoir> (1865).

WISHAM. See Wushkum.

WISHART, wish’art, George, Scottish preacher and agitator: b. Pitarrow, Forfarshire, about 1513; d. Saint Andrew’s (burnt), 1 March 1546. Leaving Scotland in 1538 to avoid per¬ secution, he became in 1543 a tutor in Christ Church College, Cambridge, where he led, ac¬ cording to the testimony of one of his pupils, a life of singular abstemiousness, charity and purity. In July 1543 he returned to Scotland with the commissioners sent to negotiate a mar¬ riage treaty between Prince Edward and the infant queen of Scots. Under their protection he preached at Montrose, Dundee and other Scottish towns, and his preaching led the peo¬ ple to destroy some convents and Roman Catholic churches. Arrested at Ormiston by the Earl of Bothwell, he was delivered to Car¬ dinal Beaton, who sentenced him

to be burned at Saint Andrew's. Consult Foxe, 'Acts and Monuments5 ; Knox, J., (History of the Ref¬ ormation5 (in 'Works,5 ed. by D. Laing, Edin¬ burgh 1846-64) ; Rogers, 'Life of George Wishart, the Scottish Martyr5 (ib. 1876) ; dic¬ tionary of National Biography5 (Vol. LXII).

WISHART, or WISEHEART, George,

Scottish bishop: b. Yester, East Lothian, 1609; d. Edinburgh, 1671. He is said to have been educated at the University of Edinburgh, and having entered the Episcopal Church, received a charge at Saint Andrew's. In 1639, having refused to take the covenant, he was deposed from the ministry, and during the supremacy of the Presbyterian party was several times imprisoned. He subsequently became chaplain to Montrose, and after that leader's death to Elizabeth, electress palatine and titular queen of Bohemia. He accompanied her to England, and on the Restoration was made rector of Newcastle, and in 1662 was consecrated bishop of Edinburgh. He is chiefly known by his 'History of the Wars of Montrose5 (1647), written in elegant Latin. When Montrose (q.v.) was executed in 1650 a copy of this work was hung in derision about his neck. Several English translations of Wishart's work have appeared, the latest in 1819.

WISHOSKAN, a linguistic stock of North American Indians, comprising the Patawat, Weeyot or Wiyot and Wishosk tribes, occupy¬ ing the coast of California from a little below the mouth of Eel River to a short distance north of Mad River, including particularly the country about Humboldt Bay. They also ex¬ tended up the streams named into the mountain passes. Of these tribes little is known, as they

are classed with the ((Diggers® on account of their habit of living largely on roots. Their number is small, being at present less than 200.
WISHRAM. See Wushkum.

WISMAR, vis'mar, Mecklenburg-Schwerin, the second seaport of the province, situated on the Baltic, at the head of a bay of the same name, 20 miles north of Schwerin. It has an excellent harbor, carries

on an active oversea trade and has varied manufactures. Of the mediaeval walls only four gates remain ; but the numerous quaint old houses are a feature of the place, and several of the brick churches as well as the Fiirstenhof, once a ducal resi¬ dence, date from the 14th and 15th centuries. It was a Hanse town in the 13th century, passed to Sweden in 1649, was taken by the Danes in 1675, and by the Danes, Prussians and Hanoverians in 1712, when its strong fortifi¬ cations were destroyed, and in 1803 was pawned to Mecklenburg-Schwerin, which secured it finally in 1828. Pop. 24,376.

WISSLER, Clark, American anthropologist: b. Wayne County, Ind., 18 Sept. 1870. He was graduated at Indiana University in 1897 and received the degree of Ph.D. at Columbia Uni¬ versity in 1897. He was assistant and later lec¬ turer in anthropology at Columbia in 1903-09; he was also assistant in ethnology at the Ameri¬ can Museum of Natural History, New York, in 1903-06, and since 1906 has been curator there. His published works include (The Correlation of Mental and Physical Tests) (1901) ; (North American Indians of the Plains) (1912) ; Eth¬ nology of the Blackfoot Indians* (1912) ; <The American Indian) (1917).

WISSMANN, vis'man, Hermann von, Ger¬ man African explorer: b. Frankfort-on-theOder, 4 Sept. 1853; d. 15 July 1905. He entered the German army, reaching the rank of lieuten¬ ant in 1874, and crossed the African continent in the employ of the German African Society (1880-82). He commanded an expedition sent out by Leopold II in 1884-85, and as imperial German commissioner in 188ˆ-90 he suppressed the Arab revolt under Bushiri, but failed in attempting to take two steamers to Lake Vic¬ toria via Nyassa and Tanganyika lakes in 1892. He was governor of German East Africa in 1895-96, and president of the Berlin Geographi¬ cal Society in 1897. He published (In the Interior of Africa) (3d ed., 1891) ; (Under the German Flag across Africa) (1880-83) ; (My Second Crossing of Equatorial Africa) (1891) ; (Africa: Descriptions and Advice) (1895), *etc.* Consult Ruhle, 'Hermann von Wissmann* (Munster 1892).

WISTAR, Caspar, American physician: b. Philadelphia, Pa., 13 Sept. 1761 ; d. there, 22 Jan. 1818. He attended the medical department of the University of Pennsylvania in 1782, sub¬ sequently graduated in medicine at the Uni¬ versity of Edinburgh (1786), returning to the United States in 1787. He was professor of chemistry and the institutes of medicine at the College of Philadelphia 1789-92. In the latter year that institution was united with the medical department of the University of Penn¬ sylvania, and he was there adjunct professor of anatomy, midwifery and surgery 1792-1808; then becoming

professor of anatomy and hold¬ ing that chair until his death. He was the first

to show that the posterior portion of the ethmoid bone was attached to the triangular bones. He opened his house once a week for meetings of students, travelers, scientists and citizens, and these symposiums continued long after his death, and were known as the Wistar parties. Wistar became a member of the Amer¬ ican Philosophical Society in 1787, and suc¬ ceeded Thomas Jefferson as its president in 1815. The Wistar Institute of Anatomy and Biology at the University of Pennsylvania was named in Wistar's honor, as was also the climbing shrub, popularly known as the ((wistaria vine.® He wrote (A System of Anatomy for the Use of Students of Medicine) (1811-14).

WISTAR, Isaac Jones, American penol¬ ogist: b. Philadelphia, Pa., 14 Nov. 1827; d. Claymont, Del., 18 Sept. 1905. He was edu¬ cated at Haverford College, Pa., and served in the Civil War as brigadier-general of volun¬ teers, United States army, 1862-65. He was president of the Academy of Natural Sciences of Philadelphia 1892-96, has been inspector of the Eastern Penitentiary of Pennsylvania, was president of the State Board of Charities of Pennsylvania and founded the Wistar Institute of Anatomy and Biology, named in honor of Caspar Wistar (q.v.).

WISTARIA, a genus of leguminous climb¬ ers, named in honor of Caspar Wistar, an American anatomist (1761-1818), which con¬ tains several species, natives of China, Japan and North America. They are high-climbing, hardy shrubs, and have odd pinnate leaves, with entire leaflets and large, terminal, pendu¬ lous racemes of papilionaceous flowers. These have large standards and wings freed from the keel, which is incurved and obtuse, and are usually purple or white. The fruits are cori¬ aceous legumes, opening readily. Nearly all of the wistarias are cultivated for covering walls, verandas, trellises, *etc.* The Chinese wistaria (W . chinensis) , which was introduced into England about 1816, is perhaps the best. It has profuse dense clusters of pea-shaped flowers, which are about a foot long and bloom in May before the leaves appear and occasion¬ ally again in autumn. When grown over a trellis, the blossoms depend in great masses of blue. This vine is a rampant grower, and the flowering wood may be known by its short, jointed, antler-like growth and absence of climbing spines.

Wistaria is a favorite plant of the Japanese, who have a variety (W. chinensis multijuga) with racemes a yard long, loosely flowered, and

with small blossoms, which are fragrant, how¬ ever. This plant they train about their houses and over trellises in the greatest profusion. The American wistaria (W. frutescens) or kidney-bean tree, is not so vigorous as the Chinese species and has slightly pubescent racemes, only about six inches long. It is found, when-wild, climbing over trees at the edges of swamps from Virginia to Florida, and improves with cultivation.

WISTER, Annis Lee Furness, American translator: b. Philadelphia, Pa., 9 Oct. 1830; d. Philadelphia, Pa., 15 Nov. 1908. She was married to Dr. Caspar Wister (d. 1888) in 1854. She made many translations of note, among them E. Marlitt's (The Old Mamselle's Secret* (1868) ; (Gold Else) (1868) ; (The Countess

Gisela5 (1869) ; (The Little Moorland Princess) (1873) ; and (The Second Wife) (1874) ; Wilhelmine von Hillern's (Only a GirP (1870) ; Hacklander's (Enchanting and Enchanted5 (1871) ; Volkhausen's (Why Did He Not Die' (1871) ; Von Auer's (It Is the Fashion) (1872); and Fanny Lewald's (Hulda; or, The Deliverer 5 (1874). Her translations we*re is¬ sued in a uniform edition of 30 volumes in 1888. With F. H. Hedge (q.v.) she published (Metrical Translations and Poems 5 (1888).

WISTER, Owen, American novelist, grand¬ son of Frances Anne Kemble (q.v.) : b. Phila¬ delphia, 14 July 1860. He was graduated from Harvard in 1882, studied law and was admitted to the Philadelphia bar in 1889, but from 1891 has devoted his attention to literature. He has been especially successful in* his delineation of Western life and character and has published (The Dragon of Wantley: His TaiP .(1892) ; <Red Men and White) (1896) ; (Lin McLeaiP (1898) ; (The Jimmy John Boss and Other Stories) (1900); <U. S. Grant, a Biography) (1900) ; (The Virginian,5 which has been widely popular and has been successfully dram¬ atized (1902) ; (01iver Wendell Holmes5 (in (American Men of Letters5 series, 1902) ; (Benjamin Franklin5 (in (English Men of Let¬ ters5 series, 1904); (Lady Baltimore5 (1906); 'Mother5 (1907) ; 'Members of the Family5

(1911) ; ‘The Pentecost of Calamity5 (1915).

WITCH, or WYCH, ELM, the common broad-leaved elm (Ulnius glabra) of England and Scotland, which does not grow to so large dimensions as the field elm; nevertheless at Selborne, Gilbert White measured? a witch elm which, seven feet from the ground, was eight feet in diameter. It is a tree of picturesque habit, and, unless grown in crowded masses, rarely produces a straight trunk. It has a wide, spreading head, often slanted to one side, and the branches begin near the base. These droop¬ ing branches lash neighboring trees unmerci¬ fully, and if they chance to rest on the ground readily strike root. The tree is easily increased by layers or by the abundant seeds. The timber of the witch elm is more durable than that of other English elms, but has their fine-grained, tough and elastic qualities. It is very flexible when steamed, and is utilized for bent-wood work, frames in boat-building and bows; in olden times, if the branches were forked, they served as divining-rods, perhaps because of the likeness of the broad, ovate leaves to those of the hazel, which is one of the so-called light¬ ning plants. These plants are sacred to Thor, are considered to be an actual embodiment of lightning, and their forked branches (having, according to mythology, a resemblance to a lightning flash) are used as talismans to point out the hidden stores of gold or subterranean water.

WITCH-HAZEL, a tall, sometimes arbor¬ escent shrub (Hamamelis virginiana) of eastern American woodlands. It has a characteristic horizontal, straggling growth ; as Thoreau says : «Its spray, so jointed and angular, is not to be mistaken for any other.55 Witch-hazel is one of the most difficult shrubs to eradicate from a clearing, as it has many diverging stems, so crooked and springy as to render axe-work un¬ successful. The bark is pale-gray; the leaves,

somewhat resembling the ovate foliage of the hazel-nut, are more or less oblique and undulate-edged, not at all handsome, but turning to a beautiful clear yellow in autumn. No sooner have they fallen off, with the rest of the forest foliage, in October or November, than the witch-hazels reclothe themselves with a lumi¬ nous vesture of filmy, featherly yellow, which turns out to be the long-delayed blossoms — whether the earliest or the latest flowers of the year botanists cannot decide. Individually, they are not conspicuous, having only four nar¬ row, strap-shaped, golden petals, but are so tufted on the twigs as to gild the bushes. Mean¬ while the fruits, little blunt, horned woody cap¬ sules that have been slowly ripening since the previous fall,

begin to gape, and by elastic As¬ suring and incurving their walls, shoot their stony-hard, bullet-shaped, polished seeds far and wide. Twigs of this witch-hazel, so unortho¬ dox in its season of blooming, and remotely re¬ sembling the hazel-nut in foliage, were chosen as material for the forked divining-rods, which, twisting in -the hand of the treasure-seeker, or well-digger, pointed downward and disclosed the site of subterranean water or gold. A much more practical use for witch-hazel has been found nowadays. An infusion of the leaves of witch-hazel in alcohol furnishes the familiar slightly astringent and tonic lotion for external inflammations known as "witch-hazel55 or ((hamamelis.55 Branches of witch-hazel thrown into the fire exhale the characteristic, peculiar odor of the lotion. Both the foliage and bark, moreover, contain much tannin. The witch-elm (q.v.) of England is also called witch-hazel.

WITCH HILL, the name of a hill in Salem, Mass., so called because of the executions of witches which took place there in 1692. It is also known as Gallows Hill.

WITCHCRAFT, supernatural power which persons were formerly supposed to obtain by entering into a compact with the devil. The compact was sometimes express, whether oral or written, when the witch abjured God and Christ, and dedicated herself wholly to the evil one; or only implied, when she actually en¬ gaged in his service, practised infernal arts, and renounced the Sacraments of the Church. The express compact was supposed to be sol¬ emnly confirmed at a general meeting, at which the devil presided, and sometimes privately made by the witch signing the articles of agree¬ ment with her own blood, or by the devil writ¬ ing her name in his *"black book.55 The con¬ tract was sometimes of indefinite duration, at other times for a certain number of years. The witch was bound to be obedient to the devil in everything, while the other party to the pact delivered to the witch. an imp, or familiar spirit, to be ready at cab and to do whatever was directed. He further engaged that they should want for nothing, and be able to assume what¬ ever shape they pleased to visit and torment their enemies and accomplish their infernal ends. The belief in witchcraft appears to have existed in various forms among ancient na¬ tions, including the Hebrews ; it prevails to-day among savage and semi-savage races, and is not extinct in civilized countries. It was always condemned by the Church, and in the 14th century the popes believed that they recog-WITCHCRAFT

nized in sorcery a prevalent and dangerous evil, and began to issue bulls against it. In the 15th century the Inquisition took charge of the work of exterminating witches, and the close of that century, and the beginning of the 16th, wit¬ nessed thousands of executions in Germany, Italy and other countries. France was slow to permit any general persecution of witches, and it was not until about the time of the break with Rome that the first formal enactment, of 1541, declared witchcraft to be a felony in Eng¬ land. From that time on, for more than a century, the burning of witches was kept up in England and Scotland, the statute of 1563 being the first regular enactment against the supposed crime in the latter country.

The Reformation was attended by, or rather coincident with, an increased intensity of the witchcraft superstition, and its resulting hor¬ rors. Theologians of all creeds were equally believers in the reality of compacts with the devil, and regarded the persons who entered into such compacts as unfit to live. It is prob¬ able that the religious fervor aroused by con¬ troversy over disputed dogmas may have served to bring more vividly to the minds of clergy and laity alike their assumed obligation to obey the Scriptural injunction against witch¬ craft, and that, in this way, the Reformation may have promoted this form of persecution. Besides, the tribunals actively engaged in crush¬ ing out disbelief in the accepted creeds of their respective states could readily devote any sur¬ plus energy and zeal to what seemed to them the related crime of witchcraft. From one end of Europe to the other executions of witches were of daily occurrence, and it is estimated that, from the time of the promulgation of the bull of Pope Innocent VIII against sorcery, in 1484, until 1782, when the last judicial victim, a servant girl at Glarus, in German Switzer¬ land, was executed, 300,000 women perished on this often imaginary charge. Some of the vic¬ tims were probably poisoners, but very many of them were undoubtedly innocent of any wrongdoing whatever. Children of tender years were sometimes among the condemned.

Spanish America witnessed many executions on the charge of witchcraft, and it is stated on credible authority that as late as 20 Aug. 1877 five alleged witches were burned alive at San Jacobo, Mexico. This appears to have been more in the nature of a lynching than of an execution of a sentence of a competent court.

In England and Scotland, as already stated, the 17th century witnessed hideous scenes of witch-torture and extermination. The last vic¬ tims in England were Mrs. Hickes and her daughter, nine years of age,

executed in 1716, and the last in Scotland suffered in 1722. Prosecution for witchcraft was abolished both in England and in Scotland by George II (1736), which made all persons pretending to use the name punishable by imprisonment. By a subsequent act passed in the reign of George IV, they were made punishable as rogues and vagabonds.

All the American colonies had laws against witchcraft similar to those in England at the time, and from the first there were occasional trials and executions on that charge. The great Salem witchcraft delusion, with its attendant

tragedies, occurred near the close of the 17th century and was largely due to excitement caused by the teachings and writings of Cotton Mather, the noted Puritan divine, who was a strong believer in the superstition. The Salem witch frenzy broke out in the family of one Samuel Parris, a minister, but for whose insti¬ gation the delusion, with its accompanying sac¬ rifice of innocent lives, could not have obtained the headway it did. A company of girls sud¬ denly began to act mysteriously, bark like dogs, and scream at something unseen. An old In¬ dian servant was accused of bewitching them. The excitement spread and impeachments multi¬ plied. A special court was formed to try the accused, and as a result the jails rapidly filled, and many were condemned to death. It was unsafe to express a doubt of a prisoner's guilt. Fifty-five persons suffered torture, and 20 were executed before the delusion ended. Witches were supposed to be able, with the assistance of the devil, not only to foretell events, but to produce mice and vermin, to deprive men and animals, /by touching them or merely breathing on them, of their natural powers, and to afflict them with diseases, to raise storms, etc., to change themselves into cats and other beasts, *etc.* General assemblies of witches, called "Witches' Sabbaths,® were held yearly, or oftener, at which they appeared entirely naked, and besmeared with an ointment made from the bodies of unbaptized infants. To these meet¬ ings they were supposed to ride from great distances on broomsticks, pokers, goats, hogs, or dogs, the devil taking the chair under the form of a goat. Here they did homage to their master, and offered him sacrifices of young children, etc., and practised all sorts of license till cock-crowing. Neophytes were introduced to the devil at these meetings, and received his mark on their bodies, in token that they had sold their souls to him. As before remarked, the belief in witchcraft still prevails in many parts of the world, and in some countries where pretended sorcerers exert a powerful influence, lives are often sacrificed as a result of their

practices and in order that they may continue their nefarious work.

Bibliography.— Adams, W. H. D., (Witch, Warlock and Magician > (London 1889) ; Ash¬ ton, (The Devil in Britain and America) (Lon¬ don 1896) ; Baissac, (Les grandes jours de sor-cellerie) (Paris 1890) ; Gummere, A. M.,

(Witchcraft and Quakerism > (Philadelphia 1908) ; Grasse, (Bibliotheca Magica) (Leipzig 1843) ; Hartland, E. S., (Ritual and Belief' (London 1914) ; Garinet, (Histoire de la Magic en France) (Paris 1818) ; Hanson, J., 'Zauber-wahn, Inquisition und Hexenprozess im Mittelalter) (Munich 1900) ; id., (Quellen und Untersuchungen zur Geschichte des Hexenwahns und der Hexenverfolgung im Mittelalter) (Bonn 1901) ; Langin, (Religion und Hexen¬ prozess } (Leipzig 1888) ; Lecky, W. E. H., 'History of the Rise and Influence of the Spirit of Rationalism in Europe) (New York 1866) ; Mejer, (Die Periode der Hexenprozesse) (Hanover 1882) ; Nippold, (Die gegenwartige Wiederbelebung des Hexenglaubens' (Berlin 1875) ; Notestein, Wallace, 'History of Eng¬ lish Witchcraft from 1558 to 1718) (Wash¬ ington 1910) ; Roskoff, 'Geschichte der Teu-fels) (Leipzig 1869) ; Schindler, 'Aberglaube

des Mittelalters) (Breslau 1858) ; Sharpe, C. K., historical Account of the Belief in Witch¬ craft in Scotland > (London 1884) ; Scott, Sir Walter, (Letters on Demonology and Witch¬ craft (new ed., ib. 1884) ; Toy, C. H., intro¬ duction to the History of Religions) (Boston 1913) ; Upham, history of the Salem Delu¬ sion (new ed., Boston 1867).

WITENAGEMOT, wit'e-na-ge-mot', or WITENAGEMOTE, originally an assemblage of all the freemen of a tribe or state, among the Teutonic conquerors of southern Britain, but which, in the course of events, and without any special law, resolved itself into an assembly of the princes, aldermen, thanes, large landowners and leading ecclesiastics. The witen-agemot met once a year or oftener, and had great power, electing a king in the event of disputed succession, approving the regular suc¬ cession, if there was no dispute, passing upon the trial

and punishment of high offenders, en¬ acting laws, and acting as a grand inquest into public affairs. It passed out of existence with the Norman Conquest, and the subsequent Par¬ liament was a separate growth, and not a con¬ tinuation of the Witenagemot. Consult Chad¬ wick, H. M., (Studies on Anglo-Saxon In¬ stitutions J (Cambridge 1905) ; Freeman, E. A., history of the Norman Conquest1 (5 vols., Oxford 1872-79).

WITHER, with'er, or WITHERS, George,

English poet and pamphleteer : b. Bentworth, near Alton, Hampshire, 11 June 1588; d. Lon¬ don, 2 May 1667. He studied at Magdalen Col¬ lege, Oxford (1604-06), but did not obtain a degree, and a few years later he went to Lon¬ don to study law. He devoted much atten¬ tion to literature, and proved his skill in satiric verse by being thrown into the Marshalsea for his (Abuses Stript and Whipt1 (1613). While there imprisoned he wrote busily, and is said to have composed there several of his best poems, among them <The Shepherd's Hunting) (1615), a continuation of (The Shepherd's Pipe) (1614) of William Browne (q.v.). After his release he entered Lincoln's Inn, in 1615. About this same time he wrote the love elegy < Fidelia. 1 In 1621 some official persons thought reflections against the state and leading poli¬ ticians were to be detected in (Wither's Motto, Nec Habeo, Nec Careo, Nec Curo) (1621), and again the author was ordered to the Marshalsea, though soon liberated. After 1622 he wrote nothing, save <Hallelujah1 (1641), a collection of religious verse, that in critical estimation attained the rank of earlier work. He became a Puritan, and wrote largely for the furtherance of the political and religious cause with which he was identified. At the revolution, he re¬ cruited (1642) a troop of horse for Parliament, and was made captain and the commander of Farnham Castle. When taken by Royalists and in danger of capital punishment, he was re¬ leased through the interference of Sir John Denham (q.v.), who protested that <(so long as Wither lived he (Denham) would not be ac¬ counted the worst poet in England.® He was promoted major, made a commissioner for the sale of the king's goods, and (1655) became a clerk in the statute-office of the court of chan¬ cery. For his (Vox Vulgi,1 a poem dissuading from the restoration which remained in manu¬

script until printed by Macray in (Anecdota Bodleiana> (1880), he was committed to New¬ gate in 1660 and imprisoned there until re¬ leased in 1663 under bond for good behavior. (Fragmenta Poetica) (1666; reprinted as (Fragmenta Prophetical 1669) was his last work.

For some time subsequent to his death he was considered a rimer of no merit, was omitted from collections of English poetry, and in¬ cluded in the <Dunciad) as ˆwretched Withers.® But Ellis praised him in (Specimens of the Early English Poets) (1790), and others, in¬ cluding Sir S. E. Brydges by various reprints and Lamb by the essay (The Poetical Works of George Wither1 (Lamb's <Works,) 1818, new ed., New York 1903) obtained for him suitable recognition. His reputation is based chiefly on his earlier work. The greater part of his writings was printed by the Spenser Society (20 vols., 1870-83). Consult besides the books already mentioned Ward's Eng¬ lish Poets) (Vol. II, 1880) ; and Sidgwick, F. (ed.), (The Poetry of George Wither1 (Lon¬ don 1902).

WITHERITE, a mineral composed of ba¬ rium carbonate mined extensively near Hexham, Northumberland, England. Usually found in massive condition though orthorhombic crys¬ tals do occur; hardness, 3 to 3.75; specific gravity, 4.29 to 4.35 ; lustre, vitreous ; color, white, often yellowish or grayish ; streak, white. Used in the manufacture of baryta for sugar refining, in plate-glass making, and in the adulteration of white lead and zinc white.

WITHERSPOON, Herbert, American opera singer: b. Buffalo, N. Y., 21 July 1873. He was graduated at Yale University in 1895, meantime studying harmony and the theory of music under Horatio Parker and Macdowell, and singing under M. Treumann and W. J. Hall of New York. He made his debut at New Haven in 1895, and in 1896 he was basso with the New York Symphony Orchestra. He afterward studied singing in London and Paris, and acting in Vienna, and in 1899 he made his operatic debut at Boston with the Castle Square Opera Company. In 1908-16 he was first basso of the Metropolitan Opera House, New York, singing about 25 leading parts.

WITHERSPOON, John, American Pres¬ byterian clergyman and college president; b. Yester, Haddingtonshire, Scotland, 5 Feb. 1723; d. near Princeton, N. J., 15 Nov. 1794. He was graduated from the University of Edinburgh in 1742, was licensed to preach the next year and was parish minister of Beith, 1745-57. He led a body of militia to the aid of the Pre¬ tender at Glasgow in 1745, and was captured at the battle of Falkirk, but was soon released. He was pastor at Paisley, 1757-68, and then accepted the presidency of the College of New Jersey (now Princeton College) in 1768. He was a delegate for six years from New Jersey to the Continental Congress; and a signer of the Declaration of Independence. Fie greatly increased the efficiency of the college and was a noteworthy figure in the political as well as the educational affairs of his time. He wrote (Ecclesiastical

Characteristics) (1753) ; (Nature and Effects of the Stage) (1757) ; (Essays on Important Subjects1 (1764) ; Considerations

on the Nature and Extent of the Legislative Authority of the British Parliament (1774), *etc.* His collected works appeared in nine volumes in 1804. Consult Sanderson, J.,

(Biography of the Signers of the Declaration of Independence) (Philadelphia 1865) ; Tyler, M. C., (Literary History of the American

Revolution) (Vol. II, 1897) ; Woods, D. W., (John Witherspoon) (New York 1906).

WITHERSPOON, John A., American physician and educator: b. Columbia, Tenn., 13 Sept. 1864. He was graduated M.D. at the University of Pennsylvania in 1887, and en¬ gaged in practice at Nashville, Tenn. He was connected with the faculty of Vanderbilt Uni¬ versity from 1889, and is now professor of medicine and clinical medicine there. He was also connected with the medical faculty at the University of Tennessee in 1889-94. He was president of the American National Medical Association in 1913-14.

WITHINGTON, wit'h'ing-ton, England, a manufacturing town in Lancashire, three miles south of the centre of Manchester, in the parliamentary borough in which it is partly in¬ cluded. It contains modern churches and chapels, Lancashire Independent College, a public hall and library, and numerous resi¬ dential villas. Pop. 41,578.

WITMER, Lightner, American psycholo¬ gist and educator: b. Philadelphia, Pa., 28 June 1867. He was graduated at the University of Pennsylvania in 1888 and received the degree of Ph.D. at the University of Leipzig in 1892. He was connected with the faculty at the Uni¬ versity of Pennsylvania from 1892, and since 1909 he has been director of the psychological laboratory and clinic there, which he organized as a department of the university. He lec¬ tured on

psychology at Bryn Mawr College in 1896-98; and gave courses in psychology at Lehigh University in 1903-05. He has also been psychologist at the Pennsylvania Training School for Feeble-Minded Children at Elwyn, Pa., since 1896. In 1907 he founded the Psycho¬ logical Clinic, of which he is the editor. He wrote Analytical Psychology > (1902) ; (The

Nearing Case > (1915); and edited Experi¬ mental Studies in Psychology* ; (The Special Class for Backward Children*; and is a fre¬ quent contributor to technical and educational ieviews on topics in experimental and clinical psychology.

WITNESS, in lazv, a competent person called to give testimony, as in a court of jus¬ tice, regarding facts in issue. . Formerly the jurors acted as witnesses, and it was not until about the 15th century that the custom was discontinued. A witness, either in a civil or a criminal case, may be compelled to attend court when required by law. A witness is commonly summoned by a subpoena, and if ˆ he does not attend when called without giving sufficient excuse, he is liable for damages to the party who subpoenaed him. In addition, he may be punished by fine or imprisonment. In some jurisdictions, a prisoner is not allowed to be a witness in his own behalf, but the rule is not

general…

Formerly many objections against the com¬ petency of witnesses were allowed, but many of these have been removed by legislation. A

prisoner cannot be called as a witness for the prosecution to give evidence against himself. Usually a wife is not a competent witness against her husband, or a husband against his wife. A witness is exempt from civil arrest while in attendance at court, but not from arrest on a criminal charge. A witness usually testifies orally in open court, but sometimes his testimony is taken in writing before a com¬ missioner or other legal official.

WITTE, vit’te, Emanuel, Dutch painter : b. Alkmaar, Holland, 1607 ; d. Amsterdam, 1692. He was a pupil of Van Alst, lived at Delft in 1642 to 1649 and in 1650 went to Amsterdam. His earlier paintings were mostly historical or portraits, but later he devoted some attention to interior decorations with which he was very successful. His works are found at the muse¬ ums of Amsterdam, Rotterdam, Brussels, Ber¬ lin, Hamburg and Weimar, also in the National Gallery at London, and in

some private English galleries.

WITTE, Pietro de, Dutch painter : b. Bruges, 1548; d. Munich, 1628. His general choice of subjects was confined to history, but it is not known under whom he studied in his native country before going to Italy, where he became an intimate friend of Giorgio Vasari, under whom he appears to have formed his style. When Vasari was employed to decorate' the Vatican with frescoes De Witte became his favorite assistant, and grew almost com¬ pletely Italianized in his artistic ideals. He painted equally well in fresco and oils, and was invited to Florence by the Grand Duke of Tuscany, and there executed some important works. His versatility is shown by the fact that when Maximilian, the Elector of Bavaria, required the services of a designer of tapestry De Witte was commissioned to furnish the necessary cartoons. He was one of the Dutch painters of the Renaissance period who gave himself up entirely to the influence of foreign schools and spent but a short part of his life in the Netherlands. His principal works have been engraved by Jan Sadeler and other famous engravers of his day.

WITTE, Sergei Yulievitch, Count, Rus¬ sian statesman: b. Tiflis, 29 July 1849; d. 1915. He was graduated from the New Russian Uni¬ versity, Odessa; devoted some time to journal¬ ism, and in 1877 entered the governmental rail¬ way service. He had charge of transporting troops on the Odessa Railway during the Russo-Turkish War, in 1879 was given a posi¬ tion on the Southwestern Railway, in 1886 be¬ came general manager of that road, and two years later chief of the Imperial Railway De¬ partment. In 1892 he was made Minister of Finance, and in this capacity he made several commercial treaties with Germany, aided the development of manufacturing industries, made the sale of alcohol a government monopoly and established the gold standard. His policy aroused the opposition of wealthy bankers, and of all conservatives, and in 1903 he was re¬ moved from the office of Minister of Finance, but was appointed president of the committee of ministers. In 1905 he, with Baron Rosen, satisfactorily arranged the Treaty of Ports¬ mouth (q.v.), was created a count, on 30 Octo¬ ber was appointed Premier, Russia's first Prime Minister, but resigned 2 May 1906 and was

appointed a member of the council. (See Russia — History). He wrote Principles of Railway Tariffs) (1883); (Friedrich Liss, the Economist 5 (1888).

WITTEKIND, vit'te-kind, or WIBU-KIND, Saxon leader in the struggle with Charlemagne : d. about 807. He came of a noble Westphalian house, and first appears at the head of the Saxon expedition against the Westphalian fortress of Eresburg in 1774. Charlemagne's return from Lombardy drove him across the Weser, and instead of submit¬ ting to the emperor at the Diet of Paderborn in 777 like many other Saxon leaders, having renewed the revolt in 776, he fled to Jutland. He returned during Charlemagne's absence in Spain, laid waste the Rhineland and surprised and annihilated the Frankish army on the Siintelgebirge (782). The emperor retaliated by executing 4,500 Saxon prisoners, an action that aroused the entire Saxon race to arms. The battle of Detmold was indecisive (783), but that of Osnabriick forced Wittekind to enter on negotiations ; the issue was that in 785 he accepted baptism in the imperial camp at Attigny, in Champagne. The emperor, it is said, made him duke of the Saxons and lord of Engern, and from the castle of Babilonie, near Liibeck, he exercised a benignant sway till he fell in battle with Gerold, the Swabian duke. Various princely houses, as those of Brunswick and Sardinia, claim Wittekind for the founder of their line. The Emperor Charles IV in 1377 placed a monument to him in the parish church at Enger, where he is supposed to have been buried, and in Menden, Westphalia, a monument was erected to him in 1812. Consult Dettmer, J., Per Sachsenfiihrer Widukind nach Geschichte und Sage5 Wurzburg 1879) ; Die-kamp, (Widukind der Sachsenfiihrer, nach Geschichte und Sage5 (Munster 1877) ; Mow-bert, (Charles tlhe Great5 (New York 1888).

WITTENBERG, wit'en-berg (Ger. vit-ten- berg), town on the Elbe, 45 miles southeast of Magdeburg. It was the home of the Reforma¬ tion, and here Luther, while a university pro¬ fessor, nailed his 95 theses to the door of the Schlosskirche. The university in which he was professor was united to Halle in 1817. The principal buildings are the Schlosskirche, in which both Luther and Melanchthon are buried; the Stadtkirche, where Luther and Melanch¬ thon preached ; the remains of the Augustinian monastery, with Luther's apartments ; the houses of Melanchthon and Cranach ; the town-hall, the gymnasium, *etc.* There are public monuments to Luther and Melanchthon. Textiles, hosiery, leather, machinery, pottery, electrical apparatus, bricks, cement,

essential oils, etc., are among the manufactures. Pop.

22,419.

WITTENBERG COLLEGE, located at Springfield, Ohio. It was founded in 1845 under the auspices of the Lutheran Church in Ohio. Its organization included a Preparatory School, a Collegiate Department, a Theological Seminary, a School of Oratory, a Conservatory of Music and a School of Art. There is also a Summer School, designed chiefly for teachers, giving courses in pedagogical methods. The C ollegiate Department confers the single bach¬ elor's degree of A.B. for a four years' course.

Women are admitted to all departments. In 1919 the grounds, buildings and endowments were valued at $1,200,000; the library contained 30,000 volumes. The students average 970 and the faculty 25.

WITTHAUS, wit'hows, Rudolph August,

American toxicologist: b. New York, 30 Aug. 1846; d. 23 Dec. 1915. He was graduated from Columbia in 1867 and from the Medical De¬ partment of the University of New York in 1875; was professor of toxicology and chem¬ istry at Cornell University and held similar chairs in the universities of New York, Ver¬ mont and Buffalo. He became noted as an expert in poisons in connection with many murder cases, and has published (Essentials of Chemistry5 (1879) ; (General Medical Chem¬ istry5 (1881) ; (Manual of Chemistry5 (1879; 6th ed., 1908) ; and laboratory Guide in Urin¬ alysis and Toxicology5 (1886). He has edited (Witthaus and Becker's Medical Jurisprudence5 (4 vols., 1906-11), for which he prepared the introduction, and Vol. IV on toxicology.5

WITWATERSRAND, vit-va'teps-rand

(((White Waters Range,55 colloquially the Rand55), Transvaal, South Africa, a low range of hills extending 25 miles either side of Johannesburg, since 1886 famous as one of the richest gold-mining districts in the world. See Transvaal, Gold-Mining in the.

WIXOM, wik'som, Emma. See Nevada,

Emma.

WIYOT. See Wishoskan.

WO AD, wdd, a cruciferous herb (Isatis tinctoria), which has been used for centuries in the countries of temperate Europe, as a dye-plant, yielding an indigo-blue color. The woad has entire foliage, the stem leaves being sagit¬ tate, and has large coriaceous pods. Caesar tells us that the ancient Britons stained their bodies with woad, so as to give themselves a more formidable appearance in battle; and from Pliny we learn that their women, before engag¬ ing in certain religious rites, also covered their nude bodies with the dye. The plant was formerly much cultivated in England for the sake of its dye, which was extracted from its crushed and fermented leaves, but the stronger and finer blue produced by the indigo-plant (q.v.) finally superseded it,' although at first the latter produced but a crude dye. Those who cultivated woad opposed the introduction of indigo, and the opposition to it became so pronounced that in England and other Euro¬ pean countries royal edicts were issued for¬ bidding its importation. They were repealed by the middle of the 18th century. Woad is now mixed in the vats with indigo juice, but is of use chiefly as a convenient material to induce fermentation, although it is said also to improve the color itself.

WOBURN, wo'bern, Mass., city in Middle¬ sex County, on two lines of the Boston and Maine Railroad, five miles from tidewater and 10 miles northwest of Boston. It is well laid out and has many handsome residences. The chief manufactures are leather, chemicals, ma¬ chinery, glue and foundry products. The water¬ works are owned and operated by the city. There are several churches ; a : high school, es¬ tablished in 1852; public and parish elementary schools and a free public library which con-

tains about 50,000 volumes and a fine art col¬ lection. There are three hanks. The Woburn Five Cent Savings Bank has deposits amount¬ ing to nearly $2,000,000. The government is administered under a charter

of 1898 which provides for a mayor and a council of 15 mem¬ bers. Seven of the members of the council are elected by wards and eight at large. There is also a board of public works, the mayor is president ex officio. • Woburn was settled in 1640 by seven families from Charlestown Church, Mass. It was first called Charlestown Village. In 1642 the town was incorporated, and in 1889 chartered as a city. Benjamin Thompson (Count Rumford) was born here in 1753. Pop. 16,574. Consult Hurd, (History of Middlesex County > (Philadelphia 1890) and Sewall, c History of Woburn) (Boston 1868).

WODAN, WODEN, or WUOTAN, Teu¬ tonic god of the winds and storms, who rose ultimately to the dignity of the greatest of all the gods. See Odin.

WOFFINGTON, wof'ing-ton, Margaret or Peg, British actress: b. Dublin, Ireland, 18 Oct. 1720; d. Teddington, 28 March 1760. She first appeared on the stage at 12 as Polly Peacham, with several other children, in (The Beggar's Opera,) but her first appearance in a mature part was as Ophelia in Dublin in 1737. From 17 to 20 she played on the Dublin stage all manner of parts, from Ophelia to Sir Harry Wildair, and on 6 Nov. 1740 made her first appearance at Covent Garden as Sylvia in the (Recruiting Officer.ˆ She soon became a great success, the exquisite art of her male charac¬ ters being especially remarkable. She kept the affection of the public till the tragic close of her career. On 3 May 1757 she broke down in playing Rosalind, and left the stage forever. Her character appears to advantage in Reade's novel (Peg Woffington,) and his play (Masks and Faces.1 Consult Dobson, Austin, Intro¬ duction to Charles Reade's (Peg Woffington1 (London 1899); Molloy, (Life and Adventures of Peg Woffingtonˆ (New York 1899) ; Daly, Augustin, (Woffington: a Tribute to the Actress and the Woman1 (New York 1888).

WOFFORD COLLEGE, located at Spar¬ tanburg, S. C. It was founded in 1851 under the control of the South Carolina Conference of the Methodist Episcopal Church, South, in accordance with the will of Benjamin Wofford, a minister of that Church, who left a legacy of $100,000 to the conference for establishing a college. It was opened to students in 1854, and the sessions have never been entirely sus¬ pended, though during the Civil War the col¬ lege suffered heavily, the endowment was ren¬ dered worthless, and full college work was not done. Since that time the college has been largely supported by the Church, and the en¬ dowment partially restored, amounting in 1918-19 to $200,000. Two preparatory schools have been established in connection with the college, the Wofford College Fitting School at Spar¬ tanburg, and the Carlisle Fitting Schol at Bamberg, S. C. The

course in the former is three years; in the latter, four years. Ihe Carlisle school is coeducational. The college studies are arranged in four groups, or courses, the classical, the language-scientific, the scien¬ tific and the Latin or Greek-modern language ; each group includes a certain number of elec¬

tives. The degree of A.B. is conferred for the completion of any of these courses. In¬ struction in methods of teaching and in school organization is included in the curriculum. Gymnasium work is required of all students. There are 24 loan funds and four scholarship funds. The students maintain three literary societies, membership in one of which is com¬ pulsory, and a Christian Association which has been in existence over 35 years, and exercises an important influence on student life. The college campus comprises 70 acres ; the build¬ ings include the main building, the John B. Cleveland Science Hall, Alumni Hall (a dormi¬ tory), residence cottages, the Wilbur E. Bur¬ nett .gymnasium, Whiteford Smith Library Building and the fitting school. The library in contains over 26,000 volumes ; the students at Spartanburg average 280, of whom about one-half are in college.

WOHLGEMUTH, vdl'ge-moot, Michael, German painter: b. Nuremberg, 1434; d. there, 1519. He was an eminent member of the Fran¬ conia school of German painting whose most complete representative is Albert Diirer. The latter was indeed his pupil in the large studio or workshop where many branches of art were carried on by the master and a host of pupils and assistants. The occupations of this artistic association comprised altarpieces, consisting of-paintings, or wood carvings in high relief ablaze with color and gilt, such as abound in Spanish churches under the name of retablos ; wood engraving, the blocks being cut from Wohlge¬ muth's designs, which were of supreme vigor and well adapted to the exigencies of printing from wood and easel paintings of portraits and history. Many paintings have been attributed to him which were evidently executed by the less skilful hands of pupils , or assistants, but those whose authenticity is unquestionable are characterized by powerful drawing, rich and harmonious coloring and supreme delicacy of finish. His retable (1465), now in the Munich Gallery, is a remarkable masterpiece, and that which he furnished for the high altar of Saint Mary at Zwickau gained for the painter much applause and the then princely sum of about $3,558. Another work of the same kind is to be found in Nuremberg Museum, having been originally painted for the churches of the Austin Friars at Nuremberg; his last retable was executed for the church at Schwabach (1508). His fidelity and grace

as a portrait painter are acknowledged by critics, who recog¬ nize in his realistic vigor and conscientious mastery of detail the best features of con¬ temporaneous German painting. Two of his paintings, (Pilate Washing His Hands Before the People1 and a (Descent from the Cross,1 are in the Royal Institution Gallery at Liver¬ pool, but few works of this master are to be found elsewhere out of Germany. Consult Dickinson, H., (German Masters of Art1 (New York 1914) ; Stadler, F. J., (Michel Wolgemut und der Ntirnberger Holzschnitt1 (Strassburg 1913) ; Thode, (Die Malerschule von Nurnberg > (Frankfort 1891).

WOJWODE, woi'wod, an old Slavonic name for a general, afterward used as a title of .civil rank and authority. The princes of Wallachia and Moldavia were called wojwode and this name was given in Poland to the

governors of the provinces, a title abolished in 1832. In Serbia and Bulgaria the title of wojwode still lingers with its original signifi¬ cation of "leader in war.®

WOLCOT, wiihkot, or WOLCOTT, John

(((Peter Pindar®), English poet: b. Dodbrooke, Devonshire, May 1738; d. London, 14 Jan. 1819. He studied medicine and in 1767 went to Jamaica as physician to the governor, Sir Wil¬ liam Trelawney. He then took orders in the ♦ Church of England and was a curate in Jamaica, 1769-73. After spending the next 12 years as a physcian in Cornwall he went to London, where his daring poetical satires in¬ volved him in many quarrels and brought him extended fame. So effective were his attacks on King George III that the ministry silenced him with a pension of $1,500 per annum. His ablest opponent was William Gifford, who at¬ tacked him in his 'Epistle to Peter Pindar. > He was an art critic of taste and penetration far beyond his time.; his yearly reviews in verse of the Academy exhibitions are much the best of his work, and still instructive. Among his satires are 'Lyric Odes to the Royal Academicians) (1782-86); 'Bozzy and PiozzP (1786); 'An

Epistle to the Reviewers*; (Peeps at St. James* ; ‘ Royal Visits,* and (The Lousiad) (1785-95). Consult Reitter, (Leben und Werke Peter Pindars) (Vienna 1900).

WOLCOTT, Edward Oliver, American lawyer and politician : b. Longmeadow, Hamp¬ den County, Mass., 26 March 1848; d. Monte Carlo, Italy, 28 Feb. 1905. In 1862 he went to Cleveland, Ohio, with his family, and during the Civil War was enlisted with the 105th Ohio regiment for a few months. He entered Yale in 1866, but did not complete his course ; and was graduated from the Harvard Law School in 1871. He then went to Colorado, where he established a law office in Georgetown, Clear Creek County; in 1876 was elected district at¬ torney for the first judicial district of the State, and before the expiration of his term cleared the docket of all criminal cases. In 1878 he was elected to the State senate, where he be¬ came the Republican leader. In 1879 he was made attorney for the Denver and Rio Grande Railroad ; settled in Denver, where he built up a large private practice ; and in 1884 was ap¬ pointed general counsel of the same road. In 1888 he was elected to the United States Senate, and reelected in 1894. There he was known as an earnest advocate of bimetallism ; in 1896 however, he refused to support the free-silver platform of the Democratic party, continued his affiliation with the Republican party, and in 1900 was president of the National Conven¬ tion. In 1897 he was chairman of a commission appointed by President McKinley to investigate the attitude of the leading European govern¬ ments toward international bimetallism. In 1903 he was again a candidate for election to the United States Senate, but was defeated by H. M. Teller.

WOLCOTT, Oliver, American statesman and signer of the Declaration of Independence, son of Roger Wolcott (1679-1767) (q.v.) :

b. Windsor, Conn., 26 Nov. 1726; d. Litchfield,

1 Dec. 1797. He was graduated at Yale Col¬ lege in 1747 and in the same year received a captain s commission from the governor of New York, and raised a company for the de¬

fense of the northern frontier, where he re¬ mained until the peace of Aix la Chapelle. In 1751 he was appointed sheriff of Litchfield County, Conn., and in 1774 a member of the State council. He was also chief judge of the Court of Common Pleas, a judge of the Pro¬ bate Court and a major-general of militia. In 1775 he was appointed one of the

commission¬ ers of Indian affairs for the Northern Depart¬ ment, whose duty was to-secure the neutrality of the Indians. In 1776 he commanded the 14 Connecticut regiments raised to act with the army in New York, and in the same year took his seat in Congress. After the Declaration was signed he returned to the army, and was present at the battle of Saratoga, but continued to serve in Congress at intervals till 1783. He was lieutenant-governor of Connecticut, 1786-96, when he was elected governor, which office he held at the time of his death. Consult Sanderson, John, 'Biographies of the Signers) (Vol. Ill, rev. ed., Philadelphia 1865).

WOLCOTT, Oliver, American politician, son of the preceding: b. Litchfield, Conn., 11 Jan. 1760; d. New York, 1 June 1833. He was graduated from Yale in 1778, and for a short time served as volunteer aide to his father in the Revolutionary War. After his admission to the bar in 1781 he was for several years in the employ of the financial department of the gov¬ ernment of Connecticut and assisted Oliver Ellsworth in 1784 in settling the accounts be¬ tween his State and the United States. In 1788-89 he was comptroller of the United States public accounts, auditor of the United States treasury 1789-91, comptroller 1791-95, and Secre¬ tary of the National Treasury 1795-1800, in succession to Alexander Hamilton. He was a judge of the United States Circuit Court, 1801— 02, and then removed to New York and was in mercantile business there till 1812. He aided his brother Frederick in building extensive fac¬ tories at Wolcottville, Conn., and was governor of Connecticut 1818-27. His later years were spent in New York. He published several political pamphlets and in 1846 his papers were edited by Gibbs with the title 'Memoirs of the Administrations of Washington and John Adams> (New York 1846).

WOLCOTT, Roger, American colonial governor: b. Windsor, Conn., 4 Jan. 1679; d. East Windsor, Conn., 17 May 1767. At 12 he was apprenticed to a weaver, but by private study secured an education, and in 1711 was ap¬ pointed commissary of the Connecticut colonial forces in the attack on Canada. In the subse¬ quent French wars he was successively pro¬ moted till he attained the rank of major-gen¬ eral at the siege of Louisburg in 1745. He was governor of the colony of Connecticut 1751-54 and had previously been a mem¬ ber of the assembly and of the council, judge of the County Court and of the Superior Court and deputy governor. He published in 1725 'Poetical Meditations, Being the Improve¬ ment of Some Vacant Hours) ; and wrote a poem of 1,500 lines entitled 'A Brief Account of the Agency of the Honorable John Winthrop, Esq., in the Court of King Charles II, A.D. 1662,* in which he gives a description of the Pequot War. The latter was first printed in the collections of the Massachusetts Histori-

cal Society, and the original is among the manu¬ scripts of the Connecticut Historical Society.

WOLCOTT, Roger, American lawyer and governor: b. Boston, 13 July 1847; d. there, 21 Dec. 1901. Graduated from Harvard Univer¬ sity in 1870 and from the law-school of the university in 1874, he was admitted in the latter year to the bar, but subsequently practised little. In 1877-79 he was a member of the common council of Boston, and in 1882-85 of the Massa¬ chusetts House of Representatives, where he gained a considerable reputation by his oratory and his activity in constructive politics and the furtherance of good government. He was sent as a delegate to the State Republican Conven¬ tion in 1885, in 1887-89 was again a member of the Boston common council, and in 1891 was chosen first president of the newly-organized Republican Club of Massachusetts, in which post he rendered valuable service to his party. This was recognized by his nomination as lieutenant-governor. He was elected in 1892, served by re-election until 1896, and upon the death of Gov. F. T. Greenhalge in the latter year became acting governor. In November 1896 he was elected governor by the largest plurality ever given in the State to a candidate for the office. In 1897 and 1898 he was re¬ elected. He declined the position as member of the Philippine Commission, and also the am¬ bassadorship to Italy in 1899. Consult Law¬ rence, W., (Roger Wolcott* (Boston 1902).

WOLF, Emma, American novelist: b. San Francisco, Cal., 15 June 1865. She was educated in the schools of her native city, and early de¬ veloped a bent for authorship. She has pub¬ lished (Other Things Being EquaP (1892) ; (Prodigal in Love) (1894) ; (Joy of Life > (1896); (Heirs of Yesterday) (1900); fulfill¬ ment (1916).

WOLF, volf, Ferdinand, Austrian romance scholar: b. Vienna, 8 Dec. 1796; d. there, 18 Feb. 1866. He studied philosophy and juris¬ prudence at Gratz ; received a position in the Royal Library at Vienna in 1827 and took an active part in the foundation of the Academy of Sciences, of which he became secretary. Among his many publications, all characterized by research and critical acumen, are

Collec¬ tion of Modern Castilian Rhymes) (2 vols., 1837) ; historical Studies of Spanish and Portuguese National Literature> (1859) ; his¬ tory of Brazilian Literature> (1863), *etc.* With C. Hofmann he edited a collection of the oldest Spanish romances and contributed frequently to the Vienna (Jahrbiicher der Litteratur.*

WOLF, Friedrich August, German classi¬ cal scholar: b. Haynrode, near Nordhausen, Prussia, 15 Feb. 1759; d. Marseilles, France, 8 Aug. 1824. He was educated at. the gym¬ nasium of Nordhausen and the University of Gottingen, and in 1782 was appointed rector of the Biirgerschule at Osterode in the Harz. The next year he was called as professor of philos¬ ophy and paideutics to Halle, where he labored for many years with the highest enthusiasm for the cause of education. In 1795 appeared his Prolegomena Homerum) (3d and 4th eds., 1872 and 1875). In this he contended that the <Iliad) and 'Odyssey* were not the work of one man, but of several Homeric rhapsodists (wand-bearing minstrels). The work in which he tried to maintain this statement created a

profound sensation and has had the effect of permanently modifying the opinions of Homeric scholars as to the manner of the composition of the < Iliad } and 'Odyssey.* (See Homer). From a literary point of view his labor has been of immense service. The University of Halle was suppressed in 1807, in the storm of the French invasion, and Wolf then removed to Berlin, where he entered the Ministry of Public Instruction, but soon resigned that he might give himself to the work of academic teaching, which disappointment and ill-health compelled him to give up in 1824 when he went south on a voyage for the sake of his health, but did not long survive his arrival at Mar¬ seilles. Wolf's great work was the invention, or at least the bringing into prominence, of a new instrument of education, namely, philology, which he defined as no meagre study of the forms of language but (<a knowledge of human nature as exhibited in antiquity.® Locke and Rousseau had founded a school of educational theory which they considered to be more in accordance with common sense and modern needs than the classical culture of the Renais¬ sance. Wolf revived the mental discipline and scientific aim implied in the prosecution of classical studies. Consult Arnoldt, 'Friedrich August Wolf in seinem Verhaltnisse zum Schulwesen und zur Padagogik* (Brunswick 1861-62) ; Pattison, Mark, 'Essays* (Oxford 1889) ; Wolf, Prolegomena ad Homerum) (Halle 1795) ; Hiiller, (Homerische Vorschule) (1836); Lachmann, 'Betrachtungen fiber Ho¬ mers Ilias) (1865); Sandys, J. E., (A History of Classical Scholarship) (Vol. Ill,

Cambridge 1908) ; Volkmann, (Geschichte und Kritik der Wolf'schen Prolegomena) (1874) ; also the Ho¬ meric writings of Gladstone, Blackie, Paley, Heyman and Geddes.

WOLF, wfilf, Henry, American engraver: b. Eckwersheim, Alsace, 3 Aug. 1852; d. 18 March 1916. His artistic training was com¬ pleted at Strassburg, and when he came to New York, in 1871, his ability soon made itself known. He exhibited at the Paris Salon in 1888 and 1895, winning a gold medal in the latter year; at the World's Columbian Exposi¬ tion of 1893 ; the Paris expositions of 1889 and 1900; Saint Louis in 1904 and at the Panama-Pacific Exposition, San Francisco in 1915, winning a grand prize. His chief works are (Engravings Illustrating American Artist Series) and 'Gilbert Stuart Series of Women and Men* in the Century Magazine.

WOLF, Hieronymus, German classi¬ cal scholar: b. Gottingen, 13 Aug. 1516; d. 8 Oct. 1580. From 1557 until his death he was director of a school at Augsburg. He was one of the foremost Greek scholars of his century and is held in remembrance for his carefully annotated editions, with Latin trans¬ lations, of Isocrates (1570) and Demosthenes, as well as for editions of Byzantine historians and many other classical labors.

WOLF, Hugo, Austrian composer: b. Windischgraz, Styria, 13 March 1860; d. Vienna, 22 Feb. 1903. He received his early instruction on the piano and violin from his father, who was in the leather trade, but was deeply inter¬ ested in music. He studied at the Vienna Con¬ servatory in 1875-77, but was then dismissed for his supposed implication in a practical joke, and from this time had only self-instruction.

For some years he gave piano lessons and with some slight assistance from his father gained a bare subsistence. In 1884-87 he was musical critic on the Salonblatt. He ardently cham¬ pioned the music of Wagner and as bitterly attacked that of Brahms, with the result that he made many enemies, and in 1887 after the publication of 12 of his

songs he abandoned his work on the Salonblatt to devote himself entirely to composition. His production was irregular, his highly emotional temperament, already foreshadowing the insanity that was to overtake him, spurring him at times to inces¬ sant work and again he lapsed into utter in¬ activity, at which periods he was subject to profound depression. His work, despite his dark moods and mad haste in production, main¬ tained a steady high level that kept a devoted circle of friends, mainly critics and singers, about him ; but his irritability hindered his material success despite their efforts. His work was never financially successful and he lived in cheap lodgings until 1896 when his friends bought a house for him and installed him in it. He enjoyed it only a year before insanity over¬ took him and he was placed in an asylum. A temporary improvement caused his release some months later, but after attempting suicide by drowning he asked to be returned to the asylum, where he died four years later. His fame rests securely upon his songs, of which he wrote 266, and which give him rank as one of the greatest of song-writers. His success was due not alone to his mastery of the art of composition but to a broad knowledge and love of literature. Superbly original, gifted with rare poetic insight and a high dramatic sense, his music invariably expresses the meaning of the poem set to it, as fully as if words and music were evolved simultaneously from his own brain. He scorned the art which made the words of a song a mere vehicle to carry the music, but while faithfully interpreting the sense of the verse he developed a breadth of style and intense dramatic power that leave him unrivaled among song-writers. His work as a composer was practically at an end in 1891. His works include (Morike LiedeD (43 songs) ; (Eichendorff Lieder) (20 songs) ; (Goethe Lieder' (51 songs) ; (Spanisches LiederspieP (44 songs) ; Htalienisches LiederbuclP (1st part 22 songs ; 2d part 24 songs) ; he wrote also settings for 13 lyrics by different authors, several choral works and orchestral pieces, and the opera (Der CorregidorC which was suc¬ cessfully produced in 1895. Consult Decsey, E., (Hugo Wolf) (4 vols., 1903-06) ; Von Hellmer, E., (Hugo Wolf > (1912); Heckel, K., (Hugo Wolf in seinem Verhaltniss zu Richard Wagner* (Munich 1905) ; Batka and Werner, (Hugo Wolfs musikalische Kritiken) (Leipgiz 1911) ; Newman, (Hugo Wolf) (London 1907) ; Schmitz, E., (Hugo Wolf) (Leipzig 1907).

WOLF, Rudolf, Swiss astronomer: b. Fal-landen, near Zurich, 7 July 1816; d. Zurich, 6 Dec. 1893. He was teacher of mathematics and physics in the realschule at Berne, 1839-55, and director of the observatory there in 1847. He was also professor of astronomy in the Berne University in 1853 ; professor of astronomy in the 'Polytechnikum and director of the observa¬ tory at Zurich in 1855,

and later professor of mathematics and astronomy in the university there. He was famous for his investigations

concerning the periodicity of sun spots and the accompanying magnetic variations, and wrote extensively on the history of science, especially astronomy. His (Astronomical Miscellany* (1856-93) is a well-known series of papers, and his (History of Astronomy) (1877) is a standard work of reference.

WOLF, wulf, Simon, American lawyer and communal worker : b. Hinzweiler, Bavaria, 28 Oct. 1836. He was graduated from the Ohio Law College, Cleveland, Ohio, in 1861, and served as recorder of deeds for the District of Columbia, 1869-78. He was judge of the Mu¬ nicipal Court for the District of Columbia, 1878-81, and in 1881-82 United States Minister to Egypt. While prominent in social and benevolent circles in Washington, he is identi¬ fied with Jewish progress in America, was a founder of the B'nai B'rith Orphan Asylum at Atlanta, Ga., and for many years president of the Board of Delegates on Civil and Religious Rights of the Union of American Hebrew Con¬ gregations. In addition to various monographs, he has published (The American Jew as Soldier, Patriot and Citizen) (1898) ; (Biography of M. M. Noah) (1898) ; The Presidents I Have Known* (1917).

WOLF, a river in Wisconsin ; rises in the northeastern part of the State, flows generally south, passes through Pewaugan Lake and en¬ ters the Fox River. Wolf River has been of great benefit in the development of the lumber industry in the northeastern part of the State. It is navigable for small steamers for about 150 miles.

WOLF, a typical wild species of the dog family (Canida ?). So closely related are wolves to the domestic and other true dogs (q.v.) that zoologists have been unable to find any satis¬ factory structural differences. As the distinc¬ tions are purely specific and largely founded upon the habits and character of the fur, all of the wolves are customarily placed in the ex¬ tensive genus Canis along with the dogs and jackals. Excepting some of the domesticated varieties of dogs, wolves are the largest mem¬ bers of the family, and normally they howl and do not bark as do the dogs and jackals. Their natural range is throughout North Amer¬ ica and Eurasia, but no true wolves are found in the Southern hemisphere, where they are re¬ placed by the smaller carrion-eating jackals and fox-dogs. As they inhabit indifferently mountain-tops, plains and swamps, and are equally at home on the frozen Arctic shores and the tropical swamps of Mexico

and India, they exhibit, as might be expected, a great range of variation. Generally they increase in size, vigor and courage northward, and the fur becomes more shaggy and thicker. The species and varieties have never been very satisfactorily discriminated and many zoologists consider that the large northern woodland wolf of both continents is a single wide-ranging variable species. Certainly these active animals are free to cross between the Old and New Worlds in the winter on the ice by way of Greenland or Alaska.

The American gray or timber wolf (C. occi-dentalis) when full-grown measures five and one-half feet in length, whereof 18 inches be¬ long to the tail; its height is 33 inches, and its weight over 100 pounds. The general aspect

is that of a large dog, and, indeed, domestic dogs of the Indians were partly derived from this species and some of the European varieties from the native wolf. They are lank, long-limbed creatures with erect ears and drooping, rather bushy tails; the hair of the neck is gen¬ erally more or less elongated and erectile. The color is very variable, the prevailing tone being gray, more or less marked with black; and be¬ comes paler in winter and more reddish in sum¬ mer. Southward the colors deepen, leading to the black wolf (C. ater) of Florida, the red wolf (C. rufus) of Texas and the dusky wolf (C. nubilus) of the central plains, while in the far North the Arctic wolf (C. albus) is nearly pure white with a black tail-tip. The gray wolf was formerly very abundant and trouble¬ some in most parts of North America, but has more rapidly and completely succumbed to the march of civilization here than in Europe, and long since disappeared from even the forest-clad portions of the Eastern States. At the present time wolves are practically extinct in the country east of the Mississippi River, but still roam in large packs in the northern and western Canadian forests and wooded swamps, and are especially large and plentiful in New¬ foundland and the Hudson Bay region. Owing to their activity and restless wandering habits small parties are likely to appear in the winter at places where none have been known for years.

As the habits of all large wolves are essentially similar the following account of the European wolf (C. lupus), which has remained much more generally plentiful and troublesome than ours, will answer for the whole group :

Wolves inhabit a great variety of country, both hill and plain, especially thick forests and broken ground, with alternate morasses and dry patches, and in the South the steppes. They shelter in woods, marshes, canebrakes and maize fields, roaming over wide areas, often suddenly appearing where none have been seen for years, and as quickly vanishing — nor is this wonderful when it is remembered that they will cover from 25 to 40 miles in a single night. In the neighborhood of dwellings they only ap¬ pear after twilight, but in secluded places carry on their hunting all day. Their food varies ac¬ cording to the season, consisting in summer almost exclusively of wild animals — foxes, hedgehogs, mice, birds, reptiles and even vege¬ tables ; of larger animals, elk and deer, while hares are soon exterminated where wolves abound. While readily associating and inter¬ breeding with large domestic dogs which have run wild, they frequently attack and devour house dogs and even weak or injured members of their own species. They follow herds of lemmings in their migrations, and will devour carrion with avidity; but they do not appear to attack man unless in large numbers or pressed by hunger. Accounts of such attacks in the latter part of winter are frequent in the European press and are occasionally reported from the woods of Minnesota, Michigan and the Canadas. In winter they approach nearer to human habitations, doing much damage to flocks of sheep and poultry. When in packs they will attack horses and cattle. In the chase the wolf exhibits all the cunning of the fox, and in addition courage and the capability of hunting in packs. These will even divide in parties, one following the trail of the quarry,

the other endeavoring to intercept its retreat. In mental qualities the wolf is in every respect the equal of the fox ; his caution is so great that he regards every unfamiliar object with suspicion, will not' pass through a door if he can leap over the wall, and will not, unless famished, attack a tethered animal lest it should be the bait of a trap. When he sees himself captured his courage and ferocity at once for¬ sake him.

In spring and summer wolves are solitary or in pairs, in the autumn in families and in the winter in packs. The pairing season is in December and January, when the males fight savagely together; those who are

fortunate enough to secure a mate remain with her till the young are well grown. The young are born in burrows usually excavated by the wolves themselves, and during her confinement the female is fed by the male. The period of gestation is 63 days, and from three to nine (usually four to six) cubs are found in a litter; these are blind for 21 days, and are suckled for two months, but at the end of one month are able to eat half-digested flesh disgorged by the mother. They quit the parents in Novem¬ ber or December, but many remain together six or eight months longer; they are full grown in three years, and live from 12 to 15 years. Wolves can readily be tamed when - taken young, and then exhibit many of the characteristics of domestic dogs.

Notwithstanding the spread of civilization, the wolf is still widely distributed. Excluding thickly populated regions, it extends over al¬ most the whole of Europe; but Russia and Scandinavia are the only parts where it now occurs in any large numbers. In Asia it is spread over all the continent to the borders of India and the plains of China.

Besides the American forms already men¬ tioned many wolves inhabiting Europe and Asia has been described as species more or less dis¬ tinct from C. lupus.. Among these are C. nigcr and C. langifer of Tibet, C. pallipes of India, C. hodophylax of Japan and C. mexicanus of Mexico. The Indian wolf (C. pallipes) is smaller and slighter than the typical form, with little or no under-fur; but undoubted ex¬ amples of C. lupus differ as much from each other as this does from them. It inhabits the plains south of the Himalayas, but is rare west of the Indus. It does not hunt in large packs, but in numbers of six or eight at most. The superstition of the people prevents its destruc¬ tion, for they imagine that its blood will dimin¬ ish the fertility of the fields. It is seldom heard, not howling like the European wolf. It is remarkable even among wolves for speed and endurance.

A second well-marked species of Cams found in North America is the prairie wolf (C\ latrans). See Coyote.

In Africa and South America several species of hunting dogs belonging to Cams and re¬ lated genera are known locally as wolves, but the name is not properly applicable. Still less should it be applied to the ((native wolf® of the Tasmanians, which is a true marsupial (7 hylacinus cynocephalus) of carnivorous habits and canine aspect. Consult Mivart,

(Monograph of the Canidae) (London 1890) ; Merriam, (Revision of the Coyotes, > Proceed¬ ingsˆ Biological Society of Washington (1897) ;

Audubon and Bachman, ‘Quadrupeds of North America) (New York 1847) ; Seton, (Northern Mammals) (New York 1909), and books of travel and sport.

WOLF-FERRARI, Ermanno, Italian com¬ poser: b. Venice, 12 Jan. 1876. He studied under Rhineberger at Munich in 1893-95, and in 1902-09 he was director of the Liceo Bene¬ detto Marcello, Venice. For some years after 1909 he lived at Munich, devoting himself to composition, chiefly operas, and later he lived in Venice. His operas are highly successful and are characterized by excellent technique and much charm of manner. He has composed several piano pieces, a large choral work, violin sonatas, and other works besides his operas, among which are ‘La Sulamita> (1898) ; ‘Cen-erentola) (1900) ; ‘Le Donne Curiose* (1903) ; (Die vier Grobiane) (1906) ; HI Segreto di Susanna) (1909) ; (I Gioiellj della Madonna/ ‘Jewels of the Madonna* (1911) ; ‘L’Amore Medico* (1913).

WOLF-FISH, a large voracious sea-fish (Anarrhichas lupus), allied to the blenny and named from the wolfish appearance given it by its great interlocking front teeth, and from its disposition to fight hard for its life when caught. It may attain a length of four or five feet. The color is an olive green above, marbled with brown on the head especially. The fish feeds on echinoderms, mollusks and crustaceans. The flesh tastes like that of cod. Several other species are known in various parts of the world constituting the family Anarrhichidce.

WOLFBORO, N. FT., town in Carroll County, on Lake Winnipiseogee, and on the Boston and Maine Railroad, about 43. miles northeast of Concord. It contains five villages. It has marble and granite works, boot and shoe factories, woolen mills, carriage and wagon works, flour mills and lumber works. The town has several churches, graded schools, Brewster Academy and a public library. Pop.

(1920) 2,178.

WOLFE, wiilf, Catharine Lorillard, Amer¬ ican philanthropist: b. New York, 28 March 1828; d. there, 4 April 1887. She inherited from her parents and grandparents a fortune of about $10,000,000, and expended a large portion of her income in benevolent works. Among her bene¬ factions during her lifetime were liberal gifts to Saint Luke's Hospital, New York; $100,000 to Union College; the site and money gifts to the Fordham Home for Incurables; $65,000 to Saint Johnland, Long Island; a proselytizing Italian mission in New York, costing $50,000; a newsboys lodging house, costing with its en¬ dowment $170,000; $250,000 to Grace Church, New York; and generous contributions to the American chapels in Rome and in Paris, as well as to many schools and churches in the United States. She financed Dr. W. H. Ward's archaeological expedition to Asia Minor in 1884. Through her will she left an endowment of $350,000 to Grace Church; and to the Metro¬ politan Museum, New York, she left her collec¬ tion of paintings, together with an endowment fund of $200,000 for maintenance and enlarge¬ ment.

WOLFE, Charles, Irish poet: b. Dub¬ lin, 14 Dec. 1791 ; d. Cove of Cork (now

Queenstown), 21 Feb. 1823. He was graduated at Trinity College, Dublin, in 1814, was tutor there the next year, took orders in the English Church in 1817 and was curate of Donough-more, Ireland. The poem which has secured his fame, 'Ode on the Burial of Sir John Moore/ was published in the Newry Telegraph (1816). Wolfe was also the author of several other poems, and his 'Remains/ with a 'Brief Memoir/ by John A. Russell, were published in 1825.

WOLFE, James, English general: b. Westerham, Kent, 2 Jan. 1727 ; d. Quebec, Canada, 13 Sept. 1759. He was educated at Westerham and Greenwich, and in 1741 received an en¬ sign's commission in a foot regiment. In 1743 he took part in the famous battle of Dettingen ; in 1744 obtained his captaincy; and in 1745-46 was present at the battles of Falkirk and Culloden. In 1747 he was wounded, though not seriously, at the battle of Lawfeldt, and from 1749 to 1757 was engaged in garrison duty in Scotland* and England. In the mismanaged ex¬ pedition against Rochefort (1757) Wolfe acted as quartermaster-general and the only creditable movement in the affair was a night reconnoissance conducted by him which penetrated two miles into the enemy's country. His recom¬ mendation in favor of an immediate attack and his offer to take the place with 500 men and three ships were unheeded; but Pitt, becoming acquainted with the

facts of the case, kept the young officer in view for some future enter¬ prise. This occurred in the following year, when Wolfe was ordered to accompany the expedition under Amherst to Cape Breton, with the rank of brigadier-general. A brilliant suc¬ cess was obtained in the capture of the strong fortress of Louisburg, after a seven weeks' siege, and he became popularly known as the "Hero of Louisburg. ® Pitt was then planning the overthrow of the French dominion in North America by the capture of their chief strong¬ hold, Quebec, and with the instinct of genius singled out Wolfe as the most promising young officer in the army, to command the expedition, notwithstanding many older officers might by virtue of seniority have claimed the honor. Wolfe was accordingly created a major-general, and in 26 June 1759 landed his forces on the Isle of Orleans, opposite Quebec. The system of defense adopted by his adversary, Mont¬ calm, was such as to offer no point of ad¬ vantage. The season during which operations could be continued rapidly advanced, but at last having dropped down the river and scaled the precipitous cliffs known as the Heights of Abraham at a point insufficiently guarded, at daybreak of 13 September, Wolfe found himself on the Plains of Abraham, where, his supplies thus cut off, Montcalm had no choice but to give battle. After a short struggle the French were driven from the field in complete rout ; Montcalm was one of the 500 killed ; the capitulation of Quebec followed five days after; and its fall decided the fate of Canada. Wolfe died in the hour of victory. In person he led the right, till thrice wounded, he was carried to the rear. He lived to hear the cry, "They run ; see how they run !** and expired with the words, "Now God be praised, I will die in peace. w His body was taken to England and buried in Greenwich Church, and a monument was

erected to him in Westminster Abbey. Consult Allison, (Memoir of Wolfe) (in (Twelve Eng¬ lish Soldiers Series*); Bradley, (Wolfe* (in (English Men of Action Series,* 1895) ; Casgrain, H. R., (Wolfe and Montcalm* (Toronto 1905) ; Parkman F.f (Montcalm and. Wolfe* (in (France and England in North America,* 2 vols., Boston 1898) ; Willson, B., (The Life and Letters of James Wolfe* (Lon¬ don 1909) ;

Wright, R., (The Life of Major General Wolfe* (ib. 1864).

WOLFE, Theodore Frelinghuysen, Amer¬ ican author : b. lvenvil, N. J., 1847 ; d. 1915. He was graduated from the medical department of Columbia in 1868, and for several years prac¬ tised his profession in Jersey City, N. J. He published (Literary Shrines of American Authors* (1895) ; (A Literary Pilgrimage Among Haunts of British Authors* (1896); (Literary Haunts and Homes of American Au¬ thors* (1898) ; < Literary Rambles at Home and Abroad* (1900).

WOLFE ISLAND, Canada, at the north¬ east end of Lake Ontario, bisects the outlet of the Saint Lawrence River, and is about 18 miles long, with a maximum width of seven miles, and an area of 34,806 acres. It belongs to Frontenac County, Ontario, is the largest of the famous Thousand Islands and is opposite Cape Vincent, New York State. Its coast is indented with picturesque .bays, it is well-wooded and the surrounding waters abound with fish. Pop. about 2,000.

WOLFENBUTTEL, volf'en-biit-tel, Ger¬ many, a town of Brunswick, on the Ocker, seven miles south of Brunswick. One of the ancient churches contains many of the tombs of the princes of Brunswick. The old castle now accommodates a seminary for teachers and a theatre. The library opposite, built in 1723 in the form of the Pantheon at Rome, became famous for its literary wealth and for the fact that Lessing (q.v.) was its librarian. It was Lessing who edited the ((Wolfenbiittel Frag¬ ments,** professedly from anonymous manu¬ scripts under his charge, but really from the pen of his friend Reimarus (q.v.), which startled the theological world of Germany. The Pantheon building had become so rickety and dangerous that it had to be taken down, being superseded in 1887 by a handsome new edifice, which houses 300,000 volumes and 10,000 manu¬ scripts. There are in the town manufactures of machines, copper goods, flax, cloth, corks, leather, preserves, tobacco, *etc.* The place is very ancient, and dates from 1046; it was besieged and taken in 1193 and 1542; and dur¬ ing the Thirty Years' War a battle was fought here in 1641. Pop. 17,916.

WOLFF, volf, Albert, German sculptor: b. Neutrelitz, Mecklenburg, 14 Nov. 1814; d. Ber¬ lin, 20 June 1892. In 1831 he entered Rauch's studio in Berlin, and in 1844 was sent to Car¬ rara to execute the sculptures for the terraces of the Sans Souci Palace. Upon his return from a sojourn in Italy of nearly two years, he assisted Rauch in the completion of the latter's Frederick the Great memorial for Berlin. In 1849 he became a member of the Berlin Acad¬ emy, in 1858 professor there, and in 1866 a member of its senate. He was three times the

victor in competition for equestrian statues

— in 1861 for that of King Ernest August (Hanover), in 1875 for that of King Fred¬ erick William III (Berlin), and in 1885 for that of General Artigas (Montevideo). Among his further works are busts of German notabili¬ ties, including von Moltke ; a decorative bronze group, (The Lion-tamer,* for the Berlin Mu¬ seum building; colossal statues of the (Four Evangelists* for the Schlosskirche, Neustrelitz; one of Frederick William IV in Konigsberg, and other portrait and ideal productions.

WOLFF, Albert, French journalist: b. Co¬ logne, Germany, 31 Dec. 1835; d. Paris, 22 Dec. 1891. He studied at the University of Bonn, settled in Paris in 1857, where he became secretary to Alexandre Dumas, Pere, and in 1859 began to contribute to the Gaulois Figaro, Charivari, *etc.* Some of these arti¬ cles, collected in book form, were afterward published as (Memoirs of the Boulevard* (1866); (The Two Emperors* (1871); (Vic-torien Sardou and Uncle Sam* (1873), *etc.* He wrote also several novels and farces.

WOLFF, Christian, German philosopher and mathematician: b. Breslau, 24 Jan. 1679; d. Halle, 9 April 1754. He studied at Jena theology, mathematics and philosophy, paying particular attention to the writings of Descartes and Tchirnhausen, and writing an elucidatory - commentary on the (Medicina Mentis* of the latter, which circumstance was the occasion of an intimacy between him and Leibnitz. In 1707 he was called to Halle as professor of mathe¬ matics. By his rationalistic views he here in¬ curred the hostility of certain theologians who denounced him and bv an order from the gov¬ ernment of Frederick William I he was com¬ manded (1723) to resign his office, leave Halle in 24 hours and the Prussian States in two days. But he was ultimately vindicated, and in 1740 appointed by Frederick II vice-chancellor and professor in the University of Halle. Three years later he was made chancellor of that uni¬ versity. The principal service rendered by Wolff to the progress of learning consisted in his persistent application of mathematical meth¬ ods to the investigations of physical science. The decided rationalism which charaterized his philosophical doctrine resulted in a popular¬ ization of the Leibnitzian teaching. While ap¬ propriating many of the conceptions of Leib¬ nitz he controverted his monadology, and re¬ garded the theory of pre-existent harmonies as a mere hypothesis, while he asserted the pos¬ sible interaction of body and soul. Like Wolff, Kant in his (Critic of Pure Reason* divides philosophy into Ontology, Cosmology, Rational

Psychology and Natural Theology. His col¬ lected works make up 22 volumes. Consult Arnsperger, <Christian Wolff's Verhaltniss zu Leibnitz* (1897) ; Lewes, (Biographical His¬ tory of Philosophy* ; Pichler, (Ueber C. Wolff's Ontologie* (1910) ; Piur, (Studien zur sprach-lichen Wiirdigung C. Wolff's* (1903) ; Watcke, (Wolff's eigene Lebensbeschreibung* (Leipzig

1841).

WOLFF, Emil, German sculptor: b. Ber¬ lin, 2 March 1802; d. Rome, Italy 29 Sept. 1879. He was a pupil of his uncle, Gottfried Schadow, and having gained a prize at the Royal Acad¬ emy of Arts went to Italy in 1822 as a pen¬ sioner of Frederic William III, and ever after

resided in Rome. Here he came under the in¬ fluence of Thorwaldsen, and in 1871 was ap¬ pointed director of the Academy of Saint Luke. He held high rank among German sculptors and executed many Greek mythological and genre statues which have been greatly admired. In portraiture, busts of Niebuhr, Thorwaldsen, Winckelmann and Bunsen are among his mas¬ terpieces. Among his noteworthy productions are (The Fisherboy) (1833) ; 'Victory Teach¬ ing Youth History* (1846); <Circe) (in the National Gallery at Berlin).

WOLFF, wulf (Ger. volf), Joseph, Anglo-German missionary: b. Weilersbach, near Bam¬ berg, Germany, 1795; d. Isle Brewers, Somer¬ set, 2 May 1862. He was the son of a rabbi, but became a Christian, taught Hebrew for a time at Frankfort and Halle, studied at Munich, Weimar and Vienna, and in 1815 went to Rome. He entered first the Collegio Romano, and in 1817 the College of the Propaganda, intending to become a missionary. Dismissed for heresy in 1818, he went to England, joined the English Church, spent two years at Cambridge, study¬ ing Oriental languages, preparatory to going as a missionary to the Jews in Palestine, and in April 1821 embarked for Gibraltar. After an extensive tour in the East he returned to England in

1826. In 1827, he married Lady Georgiana Walpole, a daughter of the Earl of Orford, and in April of the same year set out on another missionary tour, and at Jerusalem was poisoned by some bigoted Jews and nar¬ rowly escaped death. On his recovery he set out for Bokhara by way of Persia, and on the journey encountered the plague, was repeatedly robbed, was taken prisoner and sold as a slave, but finally reached Bokhara. He spent some time in Abyssinia, acquired the Amharic lan¬ guage and returned to England in 1834. In January 1836 he again visited Abyssinia, where he was worshipped by the natives as their new aboona or patriarch, visited the Rechabites of Yemen, met a party of Wahabees in the moun¬ tains of Arabia, who horsewhipped him because they could find nothing in the Arabic Bibles he had given them about Mohammed, and in Au¬ gust 1837 came to New York. Here he received deacon's orders in the Protestant Episcopal Church, visited the principal cities, preached be¬ fore Congress and in January 1838 returned to England. He next visited Dublin, received priest's orders, and held several curacies in England. He went again to Bokhara in 1843 in the employ of the English government to obtain the release of Colonel Stoddart and Captain Connolly, but was imprisoned and saved from death only by the effort of the Persian Ambassador. He then returned to England in 1845, and after this eventful career spent the rest of his life in charge of the secluded parish of Isle Brewers, Somerset. He published (Re¬ searches and Missionary Labors among Jews and Mohammedans) (1835) ; (Journal of Missionary Labors> (1839); 'A Narrative of a Mission to Bokhara* (1845); 'Travels and Adventures,* an autobiography (2 vols., London

1860).

WOLFF, Julius, German poet and novel¬ ist: 1). Quedlinburg, in the Harz Moun¬ tains, 16 Sept. 1834; d. 1910. He studied liter¬ ature and philosophy at Berlin, then entered the

manufacturing business of his father, but later withdrew, and in 1869 founded the Harz News. In 1870-71 served in the German army and won the Iron Cross. After this he settled in Ber¬ lin and devoted himself to literary work. His chief works are 'Aus dem Felde,* war poems (1871; 1907); (Tyll Eulenspiegel redivivus* (1874; 23d ed., 1896) ; 'The Rat-catcher of HamehP (1876); 'The Wild Huntsman> (1877) ; 'Tannhauser* (1880); <Lurlei) (1886); 'Der fahrende

Schuler* (1900) ; while among his novels may be cited ‘Der Siilfmeister* (1883); (Der Raubgraf* (1884); ‘Die Hoh-konigsburg* (1902). Consult Ruhemann, ‘Julius Wolff und seine Dichtungen) (Leipzig

1886).

WOLFF, Oskar Ludwig Bernhard, Ger¬ man improvisator and novelist : b. Altona, 26 July 1799; d. Jena, 16 Sept. 1851. He studied medicine in Berlin and subsequently history and philosophy. He became professor of modern languages at Weimar, in 1826, and of modern languages and literature at Jena, in 1832. He published ‘Pictures and Songs) (1840); ‘Nat¬ ural History of the German Student* (1841) ; ‘Bubbles and Dreams) (1844) ; ‘The Minor Ills of Human Life* (1846) ; ‘History of the Novel *(2d ed., 1850), etc.; and edited ‘Treasury of National Poetry) (4th ed., 1853) ; ‘Treasury of German Prose) (11th ed., 1875); ‘The German People’s Treasury of Poetry* (28th ed., 1884), *etc.*

WOLFF AGENCY, the most powerful news agency in Germany, ranks with Reuter’s of London and Havas of Paris. Before the outbreak of the European War in 1914, the Wolff Agency was a private concern doing its greatest business in Germany and Austria, the Norse countries and Russia, though its news service reached all parts of the world. In 1917 the control of the Wolff Agency passed into a syndicate of militarists representing the Ger¬ man government. This increased its influence and power in the German-speaking countries. See Press Associations.

WOLFHOUND, a dog kept and trained for the pursuit of wolves. The ancient Irish wolfhound, now extinct, was of two kinds. One was a tall, shaggy, swift-running dog. somewhat like the modern Scottish deerhound; the other more nearly resembled a mastiff, and similar dogs have been known in Spain under the name of wolf dogs. The modern Russian wolf¬ hound is the beautiful borzoi (q.v.).

WOLFRAM VON ESCHENBACH, me¬ diaeval German epic poet: b. Eschenbach, near Ansbach, Middle Franconia, Bavaria, about 1170; d. perhaps at the same place, about 1219 (?). He was of noble Bavarian family, and served various powerful overlords, such as the counts of Wertheim, the Landgraf Her¬ mann von Thuringen (at whose court he lived about 1203, and who provided him with the material for Wolfram’s ‘Willehalm,* namely, the chanson de geste, ‘Bataille d’Aliscanz*). After the death of Hermann in 1217 he is said to have retired to his native province, perhaps to Wildenberg (Wehlenberg) ;

his remains are reported to have been interred in the church of Our Lady at Eschenbach. Of all the epic poets who wrote in Middle High German, Wolfram has the strongest personality, the

most original artistry and the most mature moral and religious feeling. Although in point of style and passion he is excelled by Gott¬ fried von Strassburg, he stands alone in mediaeval German literature in the realism of his observation, the depth of his psychology, the sanity and originality of his views and a broad toleration and sense of humor. Eight songs and three epics are the sum of his work, as far as it has been preserved. The greatest of these is the epic ParzivaP (finished 1208, preserved in 15 complete manuscripts), prob¬ ably based on the PercivaP* in (Li contes du graaP of Chrestien de Troyes (q.v.) ; but Wol¬ fram mentions another authority (Kyot, den meister wolbekantP In this long biography, in 25,000 lines of verse, Wolfram presents a pic¬ ture of tolerant spiritual knighthood, as dis¬ tinguished from the traditional ideals of chivalry, such as his profoundly generous and balanced nature would evolve it. Thus, he exalts the calm happiness of the state of wed¬ lock as opposed to the conventional intrigue and exaggeration of the minnesingers and their cult of romantic affection. Again, in the epic fragment (Sigune und Schionatulander) (also called (TitureP), he decries the unnatural eti¬ quette of the courts and their knightly minne. In the incomplete epic <Willehalm) the underly¬ ing idea is the principle of Christian toleration toward pagan opponents. Editions of the original text have been published by Karl Lachmann (Berlin 1891) ; Martin, E., (Halle 1900) ; Leitzmann, A. (Halle 1902) ; modern German translations by K. Simrock (Stuttgart 1883) ; Hertz (Stuttgart 1906). Consult San Marte, (Parzivalstudien> (3 vols., Halle 1861) ; Mar¬ tin, E., (Zur Gralsage) (Strassburg 1880); Grimm, (Wolfram von Eschenbach und die Zeitgenossen) (Leipzig 1897).

Jacob Wittmer Hartmann.

WOLFRAMITE, a native tungstate of iron and manganese in varying proportions, having the formula (Fe,Mn)WO<t. It occurs in flat, monoclinic crystals, with eminent cleav¬ age parallel with the

clinopinacoid. It is brittle, has a hardness of 5 to 5.5 and a specific gravity of 7.2 to 7.5, or about that of iron. It has a submetallic lustre, while it is almost or quite opaque and its color and streak are black or nearly black. It is thus distinguished from the closely related mineral hubnerite. It usually oc¬ curs in quartz veins, frequently associated with cassiterite or scheelite. It is of considerable commercial importance as a source of tungsten, the ferro-tungsten used in making tungsten steel being derived from it. Its best-known lo¬ calities have been in Bohemia, Saxony and Eng¬ land, but the recent increased demand for it has brought other localities into prominence, among which are those of New South Wales, Argentina and Connecticut. Much so-called wolframite is really hubnerite.

WOLF'S-BANE. See Aconite.

WOLGAST, voTgast, Prussia, town of Pomerania, on the left bank of the Peene, four and a half miles from its influx into the Baltic, and 40 miles southeast of Stralsund by rail. Its harbor is shallow and larger vessels load and unload on the Ruden, an island at the river mouth. Wolgast has the remains of an old castle, the ancestral seat of the Dukes of Pom¬

erania. Its industries are weaving, boat build¬ ing and the manufacture of leather and tobacco. It has also an active trade in ships' stores. Wolgast, which was strongly fortified early in the 12th century, was destroyed in 1628 by Wallenstein, in 1630 by the Swedes, in 1637 by the Imperialists and in 1638 again by the Swedes. In 1675 it was taken by the Great Elector, was plundered by the Russians in 1713, and by the Swedes again in 1715. But small remains now exist of its former fortifications. Pop. about 10,000. Consult Heberlein, B., (Beitrage zur Geschichte der Burg und Stadt WolgasD (Wol¬ gast 1892).

WOLLASTON, wul'as-ton, William Hyde,

English chemist; b. East Dereham, Norfolk, 6 April 1766; d. London, 22 Dec. 1828. He was educated at Cambridge and was graduated in medicine in 1793. He practised as a physician in Bury Saint Edmunds, and then removed to London, where he presently devoted himself to scientific research, becoming secretary of the Royal Society in 1806, and its president in 1820. He was the inventor of the camera lucida (q.v.), and also the goniometer, an instrument for measuring the angles of crystals, and the dis¬ coverer of palladium and rhodium, in

1803, and the malleability of platinum, for which latter discovery he received the medal of the Royal Society in 1820, and which brought him $150,- 000. Wollaston was a member also of the Geological Society of London, to which he be¬ queathed a sum providing for the Wollaston medal. This award which is bestowed in recognition of ˆresearches concerning the mineral structure of the eartlD is the highest honor the society confers. Many of his papers on research work were published in Philosophical Transactions) and others in the (Annals of Philosophy. >

WOLLASTON LAKE, Canada, a lake of Athabasca, in the Northwest territory. It is about 50 miles long and has its outlet in the Mackenzie River.

WOLLASTON LAND, Canada, a region of Franklin territory, lying west of Victoria Land, in the Arctic Ocean.

WOLLASTONITE, one of the pyroxene group of minerals, crystallizing, therefore, in the monoclinic system. Its crystals are usually tabular, to which fact its name ((tabular spar}> is due. Crystals are, however, rather rare, the common occurrences being compact or in aggregates of brittle fibres, having a splint¬ ery fracture. Its hardness is 4.5 to 5, and specific gravity 2.85. Its lustre is vitreous to pearly and its usual color is white or gray. Some localities yield specimens which show ex¬ cellent triboluminescence. It is a calcium meta¬ silicate, CaSiOs. Its most important American localities are in northern New York. It was named in honor of the eminent English chem¬ ist, W. H. Wollaston.

WOLLE, John Frederick, American mu¬ sician: b. Bethlehem, Pa., 4 April 1863. He studied under Wood at Philadelphia in 1883-84; under Rhineberger at Munich in 1884-85 ; and later studied the organ under S. P. Warren in New York. He was organist at the Moravian Church at Bethlehem in 1885-1905 and also of the Packer Memorial Church at Lehigh Uni-

versity in 1887— 1905. In 1905-12 he was pro¬ fessor of music at the University of California ; and in 1912 he resumed his former positions at Bethlehem. He established the annual Bethle¬ hem Bach Festivals in 1898; the Choral Society at Harrisburg, Pa., in 1914; the Oratorio Soci¬ ety at York, Pa., in 1914; and the Oratorio So¬ ciety at Lancaster, Pa., in 1916. He received the degree of Mus. Doc. from Moravian Col¬ lege in 1904. From 1916 he was organist of Trinity Church, Bethlehem. He is considered one of the leading organists in America.

WOLLIN, vol-len', Germany, an island of Prussia at the mouth of the Oder; on the north side of the Great Haft" ; length, 20 miles; breadth from 3 to 10 miles. Fishing and cattle¬ rearing are the chief occupations. Pop. 14,000.

WOLLSTONECRAFT, wul'ston-kraft, Mary. See Godwin, Mary Wollstonecraft.

WOLSELEY, wiilz'li, Sir Garnet Joseph,

1st Viscount, British soldier: b. near Dublin, 4 June 1833; d. 1913. He entered the army in 1852 as an ensign, served in the Burmese War of 1852-53, went through the Crimean cam¬ paign and was severely wounded before Sebas¬ topol. For his services here he was made a member of the Legion of Honor, and in 1855 was advanced to the rank of captain. He saw active service in India during the Mutiny, from 1858 to 1860 was attached to the Bengal corn-man h took part in the brief China War of 1860, and in 1865 attained the rank of colonel. He was assistant quartermaster-gen¬ eral and deputy quartermaster-general in Can¬ ada 1867-70, and in the latter year led the suc¬ cessful Red River expedition against Louis Riel. On leaving Canada he received the appointment of assistant adjutant-general at headquarters, a post which he held until J873. In the Ashanti War in 1873-74 his admirably planned march resulted in the capture of Kumasi, the native capital, and led to the securing of British au¬ thority on the Gold Coast. In 1875 he went to Natal as imperial commissioner, in 1878 was promoted to the rank of lieutenant-general, and went to Cyprus in the capacity of high commis¬ sioner and commander-in-chief. Leaving Cy¬ prus next year he was again sent to South Africa, this time as governor and high com¬ missioner of Natal and the Transvaal in order to finish the Zulu War and check the

advance of Secocoeni. On returning home in 1880 he was appointed quartermaster-general of the army, a post which he held till 1882, when he was advanced to the rank of adjutant-general, and as commander-in-chief conducted the cam¬ paign in Egypt against Arabi Pasha, which ended in the utter defeat of the latter at Tel-el- Kebir. For this he was raised to the peerage as Baron Wolseley of Cairo and of Wolseley, in the county of Stafford. He commanded the Nile expedition of 1884-85, which was sent too late too relieve General Gordon in Khartum, nevertheless because of his efficient service he was created Viscount Wolseley of Wolseley on his return, and made a Knight of the Order of Saint Patrick. In 1890 he was appointed to the command of the forces in Ireland, be¬ coming at the same time privy councillor of Ireland, and in 1895 succeeded the Duke of Cambridge in the post of commander-in-chief in the United Kingdom. He was succeeded in the latter post by Lord Roberts on his return

from South Africa in 1900. He has published (Narrative of the War with China in 1860) (1862) ; (The Soldier's Pocket-Book for Field Service* (1869; 1882); (The Life of John Churchill, Duke of Marlborough, to the Acces¬ sion of Queen Anne> (1894) ; (The Decline and Fall of Napoleon) (1895) ; (The Story of a Soldier's Life) (1903). Consult Low, Me¬ moir of Sir Joseph Garnet Wolseley* (1878).

WOLSEY, wul'zi, Thomas, English states¬ man and cardinal : b. Ipswich, Suffolk, March 1471 (according to others about 1475) ; d. Leicester, 29 Nov. 1530. He was the son of a butcher and was sent to Magdalen College, Oxford, of which he became a bachelor at 15 and was elected Fellow. Being appointed master of a grammar-school dependent on the college, he had three sons of the Marquis of Dorset under his care, which led that nobleman to present him to the living of Limington, in Somerset. He was afterward chaplain to the archbishop of Canterbury, then to one of the governors of Calais and finally was recom¬ mended to Henry VII, who made him one of his own chaplains. Under Henry VIII his progress in advancement was very rapid. In 1509 he was made dean of Lincoln; in 1510 became rector of Torrington; in 1511, canon of Windsor, registrar of the order of the Garter and privy councillor; in 1513 dean of York and bishop of Tournay (being then in France) ; in 1514, bishop of Lincoln and then archbishop of York. In 1515 Pope Leo X elevated him to the dignity of cardinal, and in the end of the same year Henry made him lord-chancellor. His nomination in 1518 to be the Pope's legate a latere completed his ecclesiastical dignities, by exalting him above the

archbishop of Canter¬ bury. At the time when the rivalry between the Emperor Charles V and Francis I rendered the friendship of Henry of great importance Wolsey was treated with the greatest respect by both sovereigns, receiving pensions from each, as well as a third from the Pope. He ultimately, however, favored the side of Char¬ les, who settled upon him the revenues of two bishoprics in Spain and flattered him with hopes of the Papal chair, which induced him to in¬ volve Henry in a war with France. Insatiable in the pursuit of ecclesiastical emolument, in 1519 he gained the administration of the see of Bath and Wells, and the temporalities of the abbey of Saint Albans, his revenues now nearly equaliug those of the Crown. Part of them he expended in pomp and ostentation and part in laudable munificence for the advancement of learning. His love of splendor was signally dis¬ played on the Field of the Cloth of Gold in June 1520; his love of learning in his founda¬ tion of several lectures, as well as the college of Christ Church at Oxford, and of a collegiate school at Ipswich. He built a palace for him¬ self at Hampton Court, but this he in the end presented to the king. In 1522, on the death of Leo X and again in 1525, on the death of Adrian VI, he failed to secure elevation to the papacy, and on both occasions attributed his failure to Charles V, to whom he ever after¬ ward entertained a strong aversion. The criti¬ cal affair of the divorce of Queen Catharine was one of the first steps to his fall. With Cardinal Campeggio he was appointed to de¬ termine the legitimacy of Henry's marriage

with her, and lost the favor of the king by exposing himself to the suspicion of causing delays in the settlement of the question. He fell still more into disfavor by advising the king against marrying Anne Boleyn, and of course roused the hostility of Anne herself and her friends. Leading nobles deeming this-a good occasion for contriving his ruin, caused him to be accused of having in the exercise of his duties of papal legate violated the statute of praemunire (1529), and he was convicted. The Dukes of Norfolk and Suffolk were sent to require the great seal from him, he was ordered to quit York Palace, his palace in Lon¬ don and retire to Esher, in the diocese of

Winchester, and his lands, goods and chattels were declared forfeited. Henry still assured him of his protection. Part of his revenues were restored to him and he was even rein¬ stated in the diocese of York. But Henry did not continue his protection long. Toward the close of the year 1530 he was arrested at his mansion of Cawood, in-the diocese of York, whither he had retired, and was ordered to be conveyed to London on a charge of high treason. Illness and mental distress obliged him to stop at Leicester, where he was well re¬ ceived at the abbey and where he died a few days afterward. Shortly before his death he is said to have exclaimed to the officer appointed to conduct him : ((Had I but served God as dili¬ gently as I have served my king, he would not have given me over in my gray hairs.® There has -been considerable disposition in later writers to vindicate the character of this minister; and it must not be forgotten that, in the reign of Henry VIII, who had broken his heart; of Mary, the daughter of the much-injured Cath¬ arine; and of Elizabeth, whose mother (Anne Boleyn) was the chief instrument of his down¬ fall, scant justice could be expected to be ren¬ dered to the bettter traits of his mixed char¬ acter. If he was loose in his morals, grasping-in his ambition and rapacious, he was liberal and even profuse toward his dependents, and in his patronage of letters. He was enlightened far beyond the period in which he lived. As a diplomatist it is very difficult to say whether his abilities or industry were the most remark¬ able, and it is to him, that England is indebted for the first notion of a vigorous police and for a regular system in the administration of justice. Consult (Life) by Cavendish (1641) and <Lives-) by G. Howard (1824) ; C. Martin (1862) ; Brewer, J. S., (Reign of Henry VHP (London 1884) ; Creighton, M., Cardinal Wol-sey> (ib. 1888; new ed., 1903); Gardiner, T., (<The Fall of Cardinal Wolsey® (in trans¬ actions of the Royal Historical Society,) ib. 1899) ; Gasquet, the Eve of the Reformation* (1892) ; Law, E., England'-s First Great War Minister* (London 1918) ; Taunton, E. L., (Cardinal Wolsey) (London 1900) ; Williams, <Lives of the English Cardinals* (1868).

WOLVERHAMPTON, wul-ver-hamp'ton. England, a manufacturing town, the "metropolis of the Black Country,® is -built on an eminence amid a network of railways and canals, 13 miles northwest of Birmingham and 126 northwest of London. The town stands on the western edge of the great coal and iron mining district of South Staffordshire, so that the vicinity on the south and east is covered with collieries,

ironstone mines, blast furnaces, forges, iron foundries and rolling

mills, while on the north and west there is pleasant green country. It was first called <(Hamton® and then “Wulfrun-ishamton,® after Wulfruna, King Edgar’s sis¬ ter, had founded in 996 Saint Peter’s Church, which continued collegiate till 1846. It was re¬ built during the 13th, 14th and 15th centuries and enlarged and elaborately restored. The church is a fine cruciform Gothic edifice, with several notable features and monuments. The other public buildings are all modern and include the town-hall, corn exchange, market-hall, agri¬ cultural hall, -hospitals, postoffice, art gal¬ lery, drill-hall, *etc.* The free grammar-school, founded in 1512, occupies handsome new build¬ ings of 1876; and there are also a blue-coat school (1710) and an orphanage (1850). In 1757 Wolverhampton was described as <(a great manufacturing town in all sorts of toys, and particularly of locks in the greatest perfection®; locks — some 2,000,000 yearly — are still its specialty. The other manufactures include tin plate, japanned goods, enameled hollow wares, edge tools, gas and water tubes, electro-plate, papier-mache, chemicals, *etc.* Pop. 95,333.

WOLVERINE, GLUTTON, or CAR¬ CAJOU, a carnivorous mammal (Gulo luscus), of the weasel family (Mustelida) , but differing greatly in appearance from the light and slender - weasels typical of that family. The wolverine is a short, thick, heavily-built animal about two and one-half feet long, whose short legs, sub-plantigrade feet and short, bushy tail add to a decidedly bear-like aspect of body. On the body and especially on the

tail the hair is long, coarse and rough, blackish-brown with a pair of yellowish lateral bands meeting at the root of the tail above. The teeth are 38 in number and the molars are remarkable for their massive¬ ness. The wolverine is a northern animal entering the . Unite-d States only along the Canadian border, and even there very rare.

Apparently there is no distinction between the glutton of northern Europe and Asia and the American wolverine, and in both Old and New Worlds this brute is hated alike by woods¬ men and trappers for its voracity, native mean¬ ness and cunning. It has the reputation of being the most powerful mammal of its size in existence, and in dogged courage is said to have no equal. Those who have had experience with it place it ahead of even the coyote in crafti¬ ness and the ingenuity which it exhibits in finding and robbing the stores of man and beast. It systematically follows the lines of traps set by fur hunters and robs them of both .baits and captured animals ; but is itself one of the most difficult of animals to take, and succeeds in re¬ peatedly springing and robbing traps set for it, even when most cunningly concealed. Nor is its thieving confined to things edible;

sometimes every portable article in a camp equipment will be carried away and hidden .by a wolverine. It devours enormous quantities of food and its European name indicates that it is the type of greedy voracity. It lives on hares, squirrels, beaver, mice, foxes, all kinds of ground birds and their eggs, reptiles, insects, and even such large game as reindeer, which it is enabled to secure by its perseverance, great strength and cunning. The wolverine finds its most con-446

genial home in the great northern forests, but its range extends beyond the tree line to the Arctic shores. Early spring is the mating season, and four or five young are born in June or July in a nest at the bottom of a burrow. The savage courage with which the female will defend her young is almost proverbial among trappers, who dread few animals so much as a mother wolverine with her family. Consult Coues, (Fur-bearing Animals® (Washington 1877) ; Set-on, E. T., (Life Histories of North¬ ern Animals) (New York 1909).

WOLVERINE STATE, a popular name for the State of Michigan, so called for its abounding in early days with wolverines.

WOMAN, Education of. See Education of Women.

WOMAN SUFFRAGE. All political revo¬ lutions have had for their primary object the desire of the revolutionists for a voice in their own government. Men for obvious reasons have taken the largest part in them, but women have assisted in all and yet when a voice in the government has been obtained men have claimed the right to speak for women as well as themselves. Women in the mass, living in isolated homes, in early days absorbed in. all engrossing household duties, without education, pecuniary independence or organization, bound by -social customs and the traditions of ages, have submitted to this usurpation of authority. There are preserved in history, however, enough instances to show that individual women did protest by voice, by pen and by .petition. In Italy, where the universities were open to women in the 14th and 15th centuries; they de¬ manded equality of rights. In England, which was the cradle of representative government, the records show that in 1499 . women signed a petition for the right to a vote, and this was followed by others.

Mistress Margaret Brent brought this spirit with her to the American colony of Maryland, where in 1647, as heir of Lord Calvert, a brother of Lord Baltimore, and executor of the estates of both in the colony, she demanded ((place and voyce® in its assembly, or legisla¬ ture. Representation in England was based on property and this with other English laws was established in the American colonies. Al¬ though the demand of Mistress Brent was re¬ fused, the records show that some women property-owners voted in Virginia, and that in Massachusetts under the Old Province Charter women property-holders voted from 1691 to 1780. When a constitution was adopted they were excluded from a vote for governor and legislature but retained it for other

officials. Under the close restrictions not one-fourth of the men could vote. Doubtless the hard condi¬ tions of domestic life for women in those days precluded any desire or attempt to take part in public affairs.

The American* Revolution, based on the fundamental principle of <(no taxation without representation,® could not fail to rouse in women a sense that they were entitled equally with men to representation. That it did so is evidenced by the famous letter of Abigail Ad¬ ams to her husband, John Adams, while he was sitting in the Continental Congress : <(I long to

hear that you have declared an independency,

and, by the way, in the new code of laws, which I suppose it will be necessary for you to make, I desire you would remember the ladies and be more generous and favorable to them than were your ancestors. Do not put such unlimited power into the hands of husbands. Remember all men would be tyrants if they could. If particular care and attention are not paid to the ladies we are determined to foment a re¬ bellion and will not hold ourselves bound to obey any laws in which we have no voice or representation.® As Mrs. Adams used the plural <(we® she undoubtedly spoke also for Mrs. Mercy Otis Warren, Mrs. Hannah Lee Corbin and other women of influence closely associated with the leading men of the Revolution. In 1778 Mrs. Corbin, sister of Richard Henry Lee, of Virginia, presented her own petition for the right to vote.

It is not likely that Mary Wollstonecraft heard of these protests, but in 1790 she pub¬ lished in London her remarkable book, Vindi¬ cation of the Rights of Women.) In the French Revolution of 1793 Condorcet and other leaders proposed conferring political rights on women. During the preceding four centuries and doubtless in far earlier times treatises were written by men in various countries calling for the education, development and emancipation of women. [Plato in his Republic,* 5th cen¬ tury b.c.] Old manuscripts on the rights of women are in existence dated through the 16th and 17th centuries, but all of these were only individual protests made at long intervals.

In the 18th century the idea and the hope of political liberty were everywhere permeating the minds of men and found practical ex¬

pression through the American Revolution. The Declaration of Independence was written as a guide for all countries, and with this and the Constitution of the United States, framed 1787-89, was begun the greatest experiment ever made in representative government, even though the makers of these documents did not contem¬ plate giving to women a voice in this govern¬ ment. The Constitution did not in fact confer the suffrage on any one but left those who al¬ ready possessed it entirely free, under the juris¬ diction of the State governments, to grant it to or withhold it from any class of citizens. The religious qualifications had practically ended with the colonies. Some of the new States made property or educational requirements and others imposed both; all of them restricted voting to male citizens except New Jersey, whose constitution gave the franchise to (<all inhabitants worth $250, etc.® In 1790 a re¬ vision of the Election Law used the words (<he or she,® thus emphasizing the inclusion of women in the electorate. Enough women voted to gain the enmity of the politicians and in 1807 the legislature passed an arbitrary act limiting the suffrage to ((white male citizens.® This was clearly illegal, as the constitution could be changed only by action of the voters.

In the third decade of the new government most of the States, influenced by Jackson, Jef¬ ferson and others of democratic tendencies, re¬ moved the restrictions which barred the work¬ ing men from the electorate, and this made the discrimination against women still more ap¬ parent. In 1826 a talented and wealthy young Scotchwoman, Frances Wright, having heard

glowing accounts of this land of individual liberty, came here and associated herself with Robert Dale Owen, then making some advanced social experiments, in the publication of his paper. She was greatly surprised to learn that women had no part in the government and for several years in the paper and on the plat¬ form she urged the enfranchisement of women and was the first to bring the question before the public. She was followed in 1836 by Ernes¬ tine L. Rose,

daughter of a rabbi in Poland, who had been banished because of her progress¬ ive ideas. She was only 26, handsome and elo¬ quent, and her lectures on the science of gov¬ ernment were largely attended. She, too, was amazed at the subordinate position of women and not only advocated their full enfranchise¬ ment but also the repeal of the unjust laws under which they suffered. In the winter of 1836-37 she herself circulated a petition in Albany, N. Y., for a law to enable a married woman to hold property, and, although she could get only five signatures, she carried these to the legislature and addressed that body. She kept up this work, which soon attracted atten¬ tion, and by 1840 she had associated with her Elizabeth Cady Stanton and Paulina Wright Davis, two brilliant young married women, and Lydia Mott, a well-known social reformer in Albany. In many localities there began to be signs of an awakening on the part of women. Margaret Fuller, one of a coterie of thinkers in Boston, in her writings and semi-public ad¬ dresses in 1840 demanded political rights for women and published her book, (The Great Lawsuit, Man vs. Women.)

Meanwhile larger forces were moving for the development of women and the extension of their rights. The anti-slavery question was growing more momentous. In 1828 Sarah and Angelina Grimke, of South Carolina, emanci¬ pated their slaves, came North and by. their impassioned speeches aroused public sentiment. Garrison soon entered the contest and the American Anti-Slavery Society was formed. From the beginning women were prominently identified with this movement and the first Women's Anti-Slavery Convention was held in New York in 1837. The names of Lucretia Mott, Lydia Maria Child, Maria Weston Chap¬ man, Abby Kelly, Abby Hopper Gibbons and many others soon became widely known. The whole question of human rights was thoroughly discussed and women then began to recognize their own and to take part in the business meet¬ ings and public debates of the society. This aroused violent opposition and in 1839 the so¬ ciety was rent in twain on this point. The half sustaining the rights of women comprised Garrison, Phillips, Pierpont, Pillsbury, Thomp¬ son, Foster, Stanton, Gerrit Smith — nearly all of those who eventually carried the abolition of slavery to success. Thenceforth these men became the champions of women's rights, in¬ cluding that of the ballot, and the women added to their appeals for the slaves others for their own legal and political liberty..

The question of woman's right to take pub¬ lic part in this movement was carried to the World's Anti-Slavery Convention in London, in June 1840, which refused to recognize the eight women delegates from the United States, who included Lucretia Mott and Mrs. Wendell Phillips. It was at this time that Mrs. Mott

and Mrs. Stanton, a bride, whose husband, Henry B. Stanton, was a delegate, decided that on their return to the United States they would organize a movement especially for the rights of women. Mrs. Mott remained several months lecturing in England and Scotland and found considerable sentiment in favor of permitting women to vote, especially among the Friends, or Quakers. In 1847 Lucy Stone, recently graduated from Oberlin College, began speak¬ ing for the rights of women.

A wave of reform swept over Europe about the middle of the 19th century and reached the shores of the United States. It carried the desire for liberty of thought, speech and action and for the redress of wrongs to human¬ ity. This nation was seething with the discus¬ sion of temperance and slavery. Such temper¬ ance laws as had existed had been repealed and there was no regulation of the liquor business. The question of slavery had become acute by the admission of Texas into the Union as a slave State and intensified by the Fugitive Slave Law. Women were as vitally interested in these questions as were men and they could no longer remain' silent and inactive. Their first timid attempts at speaking in public and taking part in conventions were made in the temperance movement and here they met with a determined attempt by the men to suppress - them. In the (History of Woman Suffrage) may be found detailed accounts of the way they were literally silenced at temperance conven¬ tions, excluded from committees and forced to hold separate meetings. Their treatment by a part of the leaders in the anti-slavery move¬ ment has been referred to.

The Society of Friends, or Quakers, had divided on the slavery question and as this sect had always recognized equality of rights their women especially resented the discriminations that were being made. In 1848 during the yearly meeting of the liberal branch in Water¬ loo, N. Y., Elizabeth Cady Stanton went over from her home in the neighboring village of Seneca Falls to be with Lucretia Mott at the home of a mutual friend, Mary Ann McClin-tock. Mrs. Mott's sister, Martha C. Wright, came from Auburn. The four women talked over the situation and Mrs. Mott and Mrs. Stanton decided to put into effect the resolution they had made in London eight years before to call a convention for a public discussion of the rights of women. So here in the Mc-Clintock home on a Sunday morning in June these four issued a ˆCall® for the first woman's rights convention in all history and published it, unsigned, in a local paper. They then pre¬ pared a declaration of rights modeled after the Declaration of Independence

and a set of resolutions which demanded practically every right that women are enjoying at the present day, including suffrage. The convention met in Seneca Falls, 19, 20 July, in the Wesleyan Methodist Church, and James Mott, of Phila¬ delphia, the husband of Lucretia, and one of the most prominent Friends in the country, presided. As many as the church would hold were present ; the declaration and resolutions were discussed and adopted, and here began the movement for woman suffrage which has continued without cessation.*

* Consult 'History of Woman Suffrage' (Vol. I, p. 67)ˆ for full account.

So much attention was aroused that the con¬ vention adjourned to meet 2 August in Roches¬ ter, the nearest city. The newspapers gave wide publicity and in a short time press, pulpit and platform were denouncing the women. A spark was struck in the breasts of women throughout the country, who were beginning to rebel against the subordinate position they were forced to occupy, their lack of opportunity for education, the unjust laws and the efforts to bar them out from the great reform move¬ ments of the day. The women anti-slavery speakers were sowing the seed and in April 1850 a women's rights convention was held in the Second Baptist Church of Salem, Ohio, and a memorial was adopted calling upon the convention which was about to make a new con¬ stitution to put in a clause for woman suffrage. In 1850 the constitution of Indiana was revised and under the leadership of Robert Dale Owen the laws for women were liberalized beyond any then existing. In October 1851 a woman's rights convention was held in Dublin, Ind., and one appointed to meet in Richmond the next year. A woman's rights convention was held in West Chester, Pa., in June 1852, with prominent speakers from New York and Massa¬ chusetts, and one appointed for Philadelphia the next year.

The women in New York had continued to besiege the legislature until, in April 1848, for the first time in any State the common law was changed to allow wives to hold property. Then they devoted

themselves to securing equal guardianship of children for mothers and juster divorce laws and to work along many lines leading ultimately to woman suffrage, which was their goal from the beginning. By this time the women in other States were carrying forward the same reforms.

In May 1850, during an anti-slavery con¬ vention in Boston, a few women in attendance decided to call a convention, national in char¬ acter, to discuss exclusively the rights of women, and the time and place were fixed for 23, 24 October in Worcester, Mass. The ar¬ rangements were made principally by Luqy Stone and Mrs. Paulina Wright Davis. Nine States were represented by speakers and among these were Garrison, Phillips, Pillsbury, Foster, Burleigh, Douglass, Channing, Mrs. Mott, Mrs. Rose, Abby Kelly, Lucy Stone, Antoinette Brown, Dr. Harriot K. Hunt and many more of note, and letters were read from Emerson, Alcott, Whittier, Gerrit Smith, Joshua R. Giddings, Mrs. Swisshelm, Elizur Wright, Mrs. Stanton and others. Mrs. Davis presided. A national committee was formed, under whose management conventions were held annually in various cities, while the ques¬ tion was always thereafter a leading one in Massachusetts.

In May 1851, Miss Susan B. Anthony, who had been teaching in the academy at Canajo-harie in eastern New York and had returned to her home in Rochester, met Mrs. Stanton for the first time. It was the commencement of 50 years' continuous friendship and effort under their leadership to obtain equality of rights for women. Their first conventions were held in the interest of temperance but they became convinced almost at once that women must have a vote in order to do effective work. In 1852

a woman's rights convention was held in Syracuse with delegates from eight States and Canada. From this time such conventions took place in various parts of the country and the movement for the rights of women had many strong supporters but it had to combat the traditions, customs and prejudices of the ages. Life for the vast majority of people ran in narrow grooves. The Bible was accepted literally as placing women in an inferior posi¬ tion. The Church spoke with much authority and for the most part commanded women to remain in the limited sphere supposed to be fixed for them by divine decree. They had been deprived of education and business ex¬ perience. Women almost as a whole accepted this position without protest. The mass of men could see only disadvantage to themselves in granting more rights to women. Those who were connected in any

way with matters toward which reform movements were directed were bitterly hostile to giving power to women. The political party leaders were as adamant against it. A large class of conservative men were .opposed to any change ; another class wanted to maintain their authority over women ; another feared the effect on the home, the children, the family life; another regarded women as angels, goddesses, queens, to be kept on a cloud, a pedestal or a throne.

Notwithstanding an opposition which in volume and complexity was never faced by any other reform, the movement for woman suf¬ frage was slowly gaining ground when the breaking out of the Civil War banished all other questions from the public thought. After the war was ended and the women again took up their cause they met the vast complication of the rights .of the emancipated negroes and were compelled even by those who had been their strongest supporters to yield their claims to those of negro men. The civil, legal and political results of the 14th and 15th Amend¬ ments to the National Constitution tended still further to hinder the effort to obtain the franchise for women.

Before the Civil War women knew of no way except to have the word “male” taken out of the constitution of every State by consent of a majority of the voters, but these amend¬ ments showed them that there was a speedier and easier way. An Equal Rights Association had been formed to promote the interests of both negroes and white women, but in 1869 the latter were forced to recognize the necessity for a separate organization if they were not to be entirely sacrificed. At the close of a meet¬ ing of this association in New York, women who had come from 19 States to attend it met at the Woman’s Bureau in East 23d street, where now the Metropolitan Life building stands, 15 May 1869, and formed a National Woman Suffrage Association, whose object should be to secure a 16th Amendment to the Federal Constitution which would enfranchise women. Mrs. Stanton was made president and Miss Anthony chairman of the executive com¬ mittee. As there was some division of senti¬ ment at this time, a “Call” was issued by Lucy Stone, Julia Ward Howe and others for a con¬ vention to meet in Cleveland, Ohio, the fol¬ lowing November, and here the American

Woman Suffrage Association was formed, with Henry Ward Beecher, president, and Lucy Stone, chairman ,of the executive committee. It worked principally to obtain the suffrage through amendments to State constitutions. Both societies held national conventions every year thereafter.

In 1890 the two bodies united under the name National American Woman Suffrage As¬ sociation and both methods of work were fol¬ lowed. Mrs. Stanton was elected president of the new organization; Miss Anthony, vice¬ president-at-large ; Lucy Stone, chairman of the executive committee. In 1892 Mrs. Stan¬ ton resigned her office because of advancing age ; Miss Anthony was elected president and the Rev. Anna Howard Shaw, vice-president- at-large. Miss Anthony resigned in 1900 at the age of 80, and Mrs. Carrie Chapman Catt was elected. In 1904 she could not serve longer and Dr. Shaw was made president. In 1915 she resigned and Mrs. Catt was reelected.

Until 1895 the work of the National Asso¬ ciation was conducted principally from the home of Miss Anthony in Rochester, N. Y. That year, Mrs. Rachael Foster Avery, who was corresponding secretary for 21 years, shared the burden by having office headquarters in her home at Philadelphia. In 1900 regular headquarters were opened in New York City under the supervision of Mrs. Catt, chairman of the National Organization Committee. In 1903 they were removed to Warren, Ohio, and placed in charge of Mrs. Harriet Taylor Upton, national treasurer for 17 years. In 1909 head¬ quarters were established on a large scale in New York City and remained there. In 1914 the National Woman Suffrage Publishing Com¬ pany, Inc., was formed and took charge of the literature department. Miss Alice Stone Blackwell was recording secretary 20 years and auditor five years.

Representatives of the National Association had a hearing before the committees of every Congress from 1869 to 1919. A remarkable galaxy of women was developed in the last half of the 19th century — as soon as women had opportunities. The first woman physician, Elizabeth Blackwell, was graduated in 1848, and the first woman minister, Antoinette L. Brown (Blackwell), was ordained in 1853. Among many others were Harriet Hosmer, Maria Mitchell, Harriet Beecher Stowe, Mary A. Livermore, Julia Ward Howe, Lucy Stone, Clara Barton, Frances E. Willard, May Wright Sewall, lane Addams, Mrs. Stanton, Miss Anthony, Dr. Shaw, Mrs. Catt — all pronounced

suffragists.

The leaders soon became convinced that they could not hope for action by Congress until the experiment of woman suffrage had been made by some of the States, and, therefore, they directed the work along the two lines. The first Territorial legislature of Wyoming in 1869 had given suffrage to women and that of Utah had done so in 1870. Wyoming came into the Union as a State in 1890 with this in the constitution. In 1893 the electors of Colorado by a majority vote granted woman suffrage. In 1895 Utah adopted a constitution for statehood containing equal suffrage by a vote of over 10 to 1. In 1896 in Idaho an

amendment to the State constitution to en¬ franchise women received a large majority.

After this gain of four States in six years by the suffragists the opponents took active measures to prevent the submission of the ques¬ tion in other States. In the few cases where this was done the combination of corporations, liquor interests and party ffiiachinesˆ was im¬ possible to overcome. The domination of politics by these forces was so complete that there was no chance for any moral questions, and nothing was left but the slow process of educating public sentiment to demand that the voice of women should be heard in this wilder¬ ness. There have been altogether 56 campaigns for amending State constitutions and a volume Wiould be required for the story of their hard¬ ships and disappointments, of the times when a victory was unquestionably won but by con¬ sent of both parties women were deprived of it. It is the record of a struggle which never has been equalled in other reforms.

At length came the great political ((in-surgentw movement in the Western States, and, as the direct result, the submitting of a woman suffrage amendment in 1910 by almost unan¬ imous vote of the Washington legislature. The women made a thorough campaign and it was carried in every county in the State and received a majority of nearly three to one. - California had been swept clean of its corrupt political forces by the great wave of insur¬ gency and the legislature submitted a number of reform amendments, all of which were adopted at the fall election of 1911, including the one for women suffrage. This was the greatest victory it had ever won, as California was an old,

thickly populated and wealthy State, having commercial relations with, and known in, all parts of the world. It may be said that with this triumph the movement passed the crisis. In 1910 the National Ameri¬ can Association presented to Congress a petition of about half a millon names for a Federal amendment.

In 1912 the legislature of Kansas submitted fin amendment for woman suffrage. Those of Oregon and Arizona refused, but under the Initiative and Referendum Law the women secured enough signatures of voters to compel the submission. The amendment was adopted by the three States in November 1912. In Arizona every county gave a majority with a favorable vote of about two to one. In Oregon there was a majority of 4,161 in a vote of 128,369 ; in Kansas 16,079 in a vote of 334,473.

A Territorial legislature has power to confer the suffrage without a referendum to the elec¬ tors, and Alaska gave it in full to women by unanimous vote as soon as its first legislature met in the spring of 1913.

The enfranchisement of women in Nevada and Montana at the November elections of 1914 made all iof the Western States white on the suffrage map except New Mexico. The amendments were submitted by almost unan¬ imous votes of the legislatures. Victory at the polls, however, was by no means so easy, as in no States did the opposition ever put forth stronger effort and in none were the physical hardships of campaigning so great, owing to the high mountains, vast distances and scattered population, the voters having to be

reached on far away ranches and in isolated mining camps. Montana cast 52 per cent of the whole Viote in favor and Nevada 60 per cent.

When in 1914 the number of equal suffrage States had reached 11 and favorable public sentiment was rapidly increasing, the opposition concentrated its full force on every State where an amendment to its constitution was submitted and no further successes were re¬ corded

until there came the great victory in New York in 1917. Although the first move¬ ment for woman suffrage in the world had be¬ gun in this State in 1848 and never had ceased, and although it had been the first ever to have presented to its legislature a petition to sub¬ mit an amendment to the voters, this request had been annually refused by every one be¬ ginning with that of 1854. The women at last became so strongly organized that by 1915 it could not longer be withheld, but it was de¬ feated in November by 95,000. The women went directly to the legislatures of 1916 and 1917 and demanded its resubmission, which was granted in both, by votes not far from unanimous.

The suffragists then built up the largest State organization of women ever known, ap¬ proximately half a million in New York City and an equal number in the rest of the State. Although they were immersed in the vast work of the European War they made a record cam¬ paign, one feature of which was the securing of a petition for the vote by 1,015,000 women in the State over 21 years of age. On 7 Nov. 1917, the amendment received 675,389 affirma¬ tive votes, later increased to 703,129 by those of the soldiers, who voted two to one in favor; 600,776 negative votes were cast; carried by

102,353.

The success in this influential State gave great prestige to the movement. Three more important victories quickly followed when, on 5 Nov. 1918, the electors of Michigan, South Dakota and Oklahoma enfranchised women. In Michigan the amendment received 229,790 ayes; 195,284 noes, a favorable majority of 34,506; in South Dakota it was adopted by 49,- 213 ayes to 28,885 noes, a majority of 20,328. Oklahoma made the unparalleled record of carrying an amendment with the handicap of a constitutional requirement that it must receive not only a majority of the votes cast on it but a majority of the highest number cast at the election. On the amendment were cast 107,- 009 ayes; 81,481 noes, a favorable majority of 25,528. The highest number of votes cast at the election was 194,435 for governor ; the amendment received apparently a majority of 9,791 of the total, but this is probably an under¬ estimate. It was one of the most remarkable victories ever achieved for woman suffrage. Each of these campaigns required a vast amount of money and work by the women.

Primary Suffrage.— As the constitution of Arkansas is difficult to amend, its legislature took advantage of the authority it had under the

Primary Election Law and in 1917 granted to women the same vote as possessed by men at all primaries, including those for Presidential electors. . This was the first State suffrage granted in the South and as there is practically but one party the primary is really the election.

In 1918 the Texas legislature gave this same pri¬ mary franchise to women.

Presidential Suffrage. — The Presidential election of 1916 aroused nation-wide interest in the question of votes for women, as it was generally accepted that it had been decided by the equal-suffrage States. The injustice was widely recognized of permitting the women of one section of the country to help choose the President of the United States and denying this privilege to those of other sections, so the Na¬ tional Association decided that the time was ripe for pushing its long-cherished plan to ob¬ tain so-called Presidential suffrage for women. The Federal Constitution empowers every legis¬ lature to determine the manner in which the Presidential electors of the State shall be chosen and it is the universal custom to have this done by popular vote. In many States when the legis¬ latures assembled in January 1917 they found themselves confronted by a request from the women that a law should be enacted giving them the right to vote for these Presidential electors, which could be done by a simple ma¬ jority of the legislatures. They had granted this in Illinois in 1913; the women had voted at the election of 1916 and their votes had been ac¬ cepted in the Electoral College without question.

By April this Presidential vote had been con¬ ferred by the legislatures of North Dakota, Ne¬ braska, Indiana, Ohio, Michigan and Rhode Island. The first three added municipal and county suffrage as Illinois had done. The Ver¬ mont legislature in March passed a bill giving only municipal suffrage to women. Tennessee included it with Presidential suffrage in 1919.

The Supreme Court of Indiana declared that the legislature could not constitutionally grant the municipal and county franchise anil as the Presidential was included in the law it also was ruled out. Ohio by means of an initia¬ tive petition, which was clearly unconstitutional, submitted the law to the voters and they de¬ feated it. The same attempt was made in Ne¬ braska, but the court found the petitions so fraudulent that it refused to permit a referen¬ dum and declared the law to be in effect. Michi¬ gan nullified it by giving full suffrage. In the winter of 1919 the legislature of Indiana re- » * ^ 9 r Presidential

suffrage and

it was granted during the winter and spring by the legislatures of Vermont, Wisconsin, Maine, Minnesota, Missouri, Tennessee, Iowa and in July again by Ohio.

By 1 Jan. 1919 women of 30 States, two less than two-thirds, possessed the right to vote for 330 of the 531 Presidential electors. Sixty senators and 154 representatives were elected partly by votes of women. The number of women 21 years of age in the States where they had Presidential suffrage only was esti¬ mated at 8,000,000. There were approximately 7,500,000 women of voting age in ‘the 15 equal-suffrage States. The total number of this age in the entire United States was about 27,000,000.

All the suffrage then possessed by the women of the United States was gained through the efforts of the National American Association and its State branches, by strictly non-partisan, constitutional methods.

Not in any State had the legislature power to confer the full suffrage on women, but this was done by amending State constitutions,

which required submission to the voters. The legislatures could grant the above-mentioned franchises and also a fragmentary vote, vary¬ ing in different States, on school matters, issu¬ ing of bonds, etc., which had been done by over half of them at the start of 1919.

Although the National American Associa¬ tion performed so large a work in obtaining woman suffrage in the States it regarded this as but preliminary to securing a Federal amendment, as a means for bringing pressure on Congress. From 1869 it paused only long enough to have a thorough test made of women’s right to vote under the 14th Amendment. In 1871-72 women tried to vote in ˆvarious parts of the country, Susan B. Anthony among them. She was arrested, tried and fined. Mrs. Vir¬ ginia L. Minor, of Saint Louis, was refused registration and carried her case to the United States Supreme Court (Minor v.

Happersett) .* An adverse decision was rendered in 1875 and the association then returned to its original object. Hearings before committees of Senate and House were held from 1869. Senator A. A. Sargent, of California, presented in 1878 the amendment which thereafter was introduced into every Congress : (<The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.® The appeals and arguments of the women were treated by the committees in a purely academic spirit and it was difficult to get any kind of a report. From 1878 to 1896 there were six favorable majority reports from Senate committees and two from House com¬ mittees and four adverse. Thereafter none of any kind was made until 1913 — after the vic¬ tories in Kansas, Arizona and Oregon.

The movement for woman suffrage at this time entered upon a new era and began to be regarded seriously by politicians. Only once had the amendment been brought to a vote in the Senate — 25 Jan. 1887, through the efforts of Senator Henry W. Blair, of New Hampshire — and the vote resulted in 16 ayes, all Republi¬ cans ; 34 noes, 11 Republicans and 23 Democrats, with 26 absent. The second vote was taken 19 March 1914; ayes, 35; noes, 34, lacking 11 of the necessary two-thirds majority. One Progres¬ sive, 14 Democrats and 20 Republicans voted aye ; 22 Democrats and 12 Republicans voted no.

A Federal amendment for woman suffrage had never been discussed in the House of Rep¬ resentatives. After a long contest it was finally reported and brought to a vote 12 Jan. 1915. The debate lasted 10 hours and the vote stood 174 ayes, 86 Democrats, 75 Republicans, 12 Progressives, 1 Independent ; 204 noes, 33 Re¬ publicans and 171 Democrats.

In 1916 a nation-wide campaign was made to obtain from the Presidential nominating con¬ ventions an endorsement of the Federal Suffrage Amendment, an effort which had been made un¬ successfully every four years since 1872. Dr. Anna Howard Shaw, honorary president, and Mrs. Carrie Chapman Catt, president of the National Association, were present at the Re¬ publican Convention in Chicago and the Demo¬ cratic in Saint Louis, with many other women leaders. Both conventions failed to endorse the amendment but put a plank in the plat¬

Consult 'History of Woman Suffrage (Vol. If, p. 734)

forms declaring in favor of woman suffrage by action of the States. It had long found a place in those of the minority parties and re¬ ceived a strong impetus from its advocacy by the Progressive party in 1912.

The first of December the National Ameri¬ can Association opened large, handsome branch headquarters in Washington for the special work of getting the Federal amendment through Congress. It was here that the Association's Council of One Hundred was summoned by Mrs. Catt to meet 23, 24 Feb. 1917 when the en¬ trance of the United States into the European War seemed at hand and pledged to the gov¬ ernment the services of the association with its millions of members. The following April Dr. Shaw was selected by President Wilson and the Council of National Defense as chairman of the Women's Committee to organize and direct the war work of the women of the nation.

A Federal Woman's Equality Association was organized in 1890 with the Rev. Olympia Brown, president, and Mrs. Clara Bewick Colby, corresponding secretary. It held that Congress, by a majority vote of both houses, could em¬ power women to vote in all elections for mem¬ bers of the House of Representatives, and for United States Senators after the National Con¬ stitution provided that they should be elected by_ popular vote. It had many hearings before com¬ mittees of Congress but the question was never brought before either house. Mrs. Belva A. Lockwood, of the District of Columbia, and Miss Laura Clay and Mrs. Sallie Clay Bennett, of Kentucky, were among the prominent women who supported this measure.

An organization formed in 1913 called first the Congressional Union and later the National Woman's party, also had headquarters in Wash¬ ington to work for the amendment and used partisan, militant methods, ˆpicketed® the White House, burned President Wilson's speeches, *etc.*

It was exceedingly difficult to get a report even <(without recommendation® from the Ju¬ diciary Committee of the lower House, to which the measure was always referred, and the effort frequently made to secure a committee on woman suffrage, such as existed in the Senate, finally succeeded in September 1917. Both Democrats and Republicans now admitted that a Federal Amendment was inevitable and the op¬ ponents realized that all they could hope for was to postpone it as long as possible. After much opposition the measure was put on the calendar for 10 Jan. 1918. The evening before the vote was to be taken President Wilson urged his party to support it. After a long discussion the vote stood 274 ayes, 136 noes;

Republicans, 165 for, 33 against; Democrats, 104 for, 102 against; 2 Independents, 1 Progressive, 1 Socialist, 1 Prohibitionist for; 1 Progressive (Louisiana) against. The amendment received one more than the two-thirds necessary to carry it, but Speaker Champ Clark (Democrat), of Missouri, had promised to vote in favor if there should be a tie. Fifty-six of the affirma¬ tive votes were from Southern States.

The contest was now carried into the Senate. The committee unanimously reported it and in a short time promises were secured for the needed two-thirds, lacking only three or four. Then occurred an unprecedented misfortune in

the death of 10 senators, seven of them pledged to vote for the amendment. Former President Roosevelt and many other eminent men urged its adoption. Prominent senators in both par¬ ties worked for it and against it and at last it was decided to have a vote on 1 October. On 30 September President Wilson went in person to the Senate and made an eloquent appeal for the amendment in the name of true democracy. The vote stood 62 to 34, lacking two votes of the necessary two-thirds majority. His own party polled 57 per cent of its mem¬ bership in opposition and the Republican 27 per cent. Of the 62 senators who voted or were paired in favor 32 were Republicans, 30 Democrats; of the 34 voting or paired in op¬ position 12 were Republicans and 22 Democrats.

Later the amendment was again placed on the calendar and 10 Feb. 1919 was set for an¬ other vote. President Wilson cabled from Paris to a number of senators ‘and William Jennings Bryan came to Washington to intercede for it but all pressure was in vain. There was no change in the preceding vote except that Wil¬ liam P. Pollock (Democrat), of South Carolina, chosen at a special election to fill out the term of Senator Tillman, voted in favor. The amend¬ ment, therefore, was lost by only one vote.

Both political parties would have considered it a calamity not to be able to have a vote on the Federal Woman Suffrage amendment until

the regular session in. December 1919. President Wilson relieved their anxiety by calling a special session of the newly-elected Congress to meet 19 May. The amendment was introduced by six members on the opening day and on the 20th was favorably reported by the committee and placed on the calendar for the next day, even before the President's message was read, in which it was recommended. On 21 May, after two hours' discussion, it was passed by 42 more than the needed two-thirds. The vote stood 304 ayes, 200 Republicans, 102 Demo¬ crats, 1 Prohibitionist, 1 Independent; 89 noes, 19 Republicans, 70 Democrats. Members from Southern States cast 71 of the affirmative votes. The Democrats polled 54 per cent of their voting strength for the amendment and the Republicans 84 per cent.

The Federal Suffrage amendment was intro¬ duced in the Senate 23 May by four members and placed on the calendar for 3 June. The opponents consumed two sessions in discussion. Amendments of various kinds were defeated. The roll was called at 5 p. m. 4 June and the vote was announced, 56 ayes, 25 noes. With the ˆpairsˆ that had been arranged the entire 96 members of the Senate were recorded and they stood; Republicans, ayes, 40; Democrats, 26; Republicans, noes, 9; Democrats, 21; total, 66 ayes, 30 noes.

Before this Federal amendment could become effective it would have to be ratified by the legislatures of 36 States, three-fourths of the whole number. The large majority of them meet biennially, in the uneven years and had adjourned before 4 June, but several were still in. session and of these Illinois, Wisconsin and Michigan ratified in a few days; Pennsylvania and Massachusetts a little later. Mrs. Catt, president of the. National Association, at once began telegraphing to the governors of many States a request that they would call special

sessions for the purpose of ratification, and other influential suffragists exerted pressure. This was favored by leaders in both political parties in order that it might be completed in time for the women of the entire country to vote in the general elections of 1920. Governors Alfred E. Smith of New York, and Henry J. Allen of Kansas, were the first to call special sessions and they were quickly followed by others. Eight States ratified in regular session, 29 in special session, an unparalleled record. Nine legislatures defeated raification, all from the South, if Delaware be included. The States ratified as follows: In 1919: Illi¬ nois, Wisconsin, Michigan, 10 June; Ohio, 'Kansas, New York, 16 June; Pennsylvania, 19-24 June, Massachusetts, 19-25 June; Texas, 24-28 June; Iowa, 2 July; Missouri, 3 July; Arkansas, 28 July;

Montana, 29 July; Nebraska, 1 August; Minnesota, 8 September; New Hampshire, 9-10 September; Utah, 29-30 September; California, 1 November; Maine, 4-5 November; North Dakota, 26 November-1 De¬ cember; South Dakota, 4 December; Colorado,

1 1-12 December ; 1920: Rhode Island, 6 January ; Kentucky, 6 January; Oregon, 12-13 January; Indiana, 16 January; Wyoming, 26-27 Janu¬ ary; Nevada, 7 February; New Jersey, 2-10 February; Idaho, 11 February; Arizona, 12 February; New Mexico, 18-19 February; Okla¬ homa, 27-28 February; West Virginia, 3-10 March; Washington, 22 March; Tennessee, 13-18 August; Connecticut, 21 September.

On 26 August Secretary of State Bainbridge Colby proclaimed the Suffrage Amendment a part of the Federal Constitution.

In Other Countries. — The suffrage move¬ ments in the United States and Great Britain have run in parallel lines since their beginning in each country about 1832. The Worcester (Mass.) convention of 1850 was reported in the New York Tribune and attracted the attention of Mrs. John Stuart Mill who wrote an article about it. which appeared in the W estminster Review in 1851. That year Mr. Mill began his powerful writing on the subject. When a member of Parliament he proposed it in an amendment to the Reform Bill of 1867 and presented a petition of 1,499 names headed by Plarriet Martineau, Florence Nightingale, Fran¬ ces Power Cobbe, Josephine Butler and Mary Somerville. It was lost by 73 to 196. The women then organized societies in Edinburgh, Bristol, Birmingham, Manchester and London, and later a National Association was formed, including Ireland. As president of the London branch, Mrs* Henry Fawcett began her 52 years of continuous service in this cause. In 1869 the Parliament granted the municipal franchise to women taxpayers. Jacob Bright introduced the first separate bill for woman suffrage in 1870 but its progress was blocked by the gov¬ ernment. There was a good prospect that women would be included in the Reform Bill of 1884, which enfranchised agricultural laborers, but they were kept out by the efforts of Gladstone.

From 1866 the movement for woman suffrage in Great Britain and Ireland never ceased and it was supported always by the most eminent men and women. Petitions for it were signed by hundreds of thousands. After 1886 there was always a majority in favor

of it in the House of Commons but the gov¬ ernment, whether Liberal or Conservative, systematically prevented the bills from reach¬ ing a final vote. While many minor objections were made, the fundamental reason for the defeats was the fear of each party that it might lose and the other gain by the en¬ franchisement of women. Through the years there were collateral gains, as in the United States. The laws relating to wives and mothers were improved; local franchises were given to women ; a vote and eligibility for school boards; municipal suffrage; a vote for county councils ; they were admitted to various official positions ; the universities were opened to them. In 1907 they were made eligible as mayors and members of city and county councils.

In the early '90' s Mrs. Emmeline Pankhurst and her daughter Christabel organized a revolt in which many women joined. Their society, the Women's Social and Political Union, adopted militant methods, which grew more vio¬ lent as their treatment by the government be¬ came more rigorous, but not the slightest prog¬ ress was made in obtaining woman suff rage from the Parliament. The opponents simply had an excuse for their opposition which did not exist before. The situation was at its worst when the European War broke out in 1914. The Women's Social Political Union closed its headquarters and disintegrated, Mrs. Pank¬ hurst personally devoting herself to the recruit¬ ing of soldiers. The old National Association, of which Mrs. Fawcett had for many years been president, immediately placed its large equipment and well-trained forces at the service of the government and carried on for four and a half years what was probajbly the largest organized work of women during the war. By the autumn of 1916, the long-time demand for a reform in the franchise laws could no longer be deferred and a conference of members of Parliament from all parties was appointed to prepare the new measure. There was scarcely a question as to the inclusion of women. Prime Minister Asquith, who had been their most powerful opponent, sanctioned and promoted it. Lloyd George urged it. The conference re¬ ported in February 1917, and the Representation of the People's Bill conferred the complete fran¬ chise on all women who were on the local gov¬ ernment list ; on the wives of all men who were on this list and on all women holding a univer¬ sity degree, but they must be 30

years old. This includes Ireland. The reason given for fixing this age was that 2,000,000 men voters would be added to the electorate and the addition of 7,000,000 women was all that could be under¬ taken. This was very unsatisfactory to. the suffragists but they accepted it as an ultima¬ tum at that time.

There were many Parliamentary delays and it was not until December that the bill came before the House of Commons for final read¬ ing. The suffrage clause was carried, by a vote of more than two to one and the bill sent to the House of Lords. Here also it passed by two to one ; the final vote was taken 6 Feb. 1918, and it immediately received the signature of King George. Men can vote at 21 and women also at all local elections, and they are now making a vigorous effort to have the age limit for the Parliamentary vote removed.

In granting the franchise to women Great Britain followed all her colonies except India and South Africa. The South African Parlia¬ ment in 1919 voted its approval of woman suf¬ frage and is likely soon to enact a law for it. There is a considerable demand for it among the educated women of India. In New Zea¬ land, Australia and Canada women had the school and municipal franchise at an early date. The Parliament of New Zealand gave the com¬ plete suffrage in 1893 ; that of South Australia in 1895; of West Australia in 1900. In 1901 the six states federated and in June 1902, the National Parliament gave the women of the entire commonwealth the vote and eligibility for that body. The Parliament of New South Wales granted the state suffrage in 1902 ; that of Tasmania in 1903; that of Queensland in 1905 and that of Victoria in 1908.

There had long been a movement in Canada for the full enfranchisement of women, led at first by the National Suffrage Association and later also by the National Council of Wo¬ men. The patriotism and efficiency of the women during the European War increased public sentiment in its favor and accelerated the action of the state governments. Full suf¬ frage was granted by the legislatures of Mani¬ toba, Alberta, Saskatchewan, and by popular vote in British Columbia, in 1916; by the legis- - latures of Ontario in 1917; of Nova Scotia and New Brunswick in 1918; by the council of the Yukon in 1919. Quebec and Prince Ed¬ ward Island have not given the state suffrage. In 1918 the Dominion Parliament conferred the national suffrage on all women. The bill contained some war time provisions which it is now thought best to remove. The govern¬ ment introduced a bill codifying all the fran¬ chise laws in 1919 but woman suffrage

was retained.

At the beginning of the present century, there was very little suffrage for women any¬ where in the world outside of the United States and Great Britain and her colonies. In various parts of Europe women property-holders could vote by male proxy at local elections and in a few countries at Parliamentary elections. In Russia, among the peasant classes, women voted almost as freely as men at village elections, either as owner of property or proxy for the husband. Sweden in 1862 gave women rate¬ payers a vote for all officials except members of Parliament — ■ more than women possessed any¬ where else in the world at that time. Widows and spinsters in Finland had local voting rights in 1865. Iceland gave women taxpayers the municipal vote in 1882. The ancient little king¬ dom of the Isle of Man, with its independent government and its laws requiring only the sanc¬ tion of the ruler of Great Britain, gave full suffrage to women property-owners in 1880 and to women ratepayers in 1892.

In 1906 the newly-formed government of Finland gave equal and universal woman suf¬ frage. In 1901 Norway gave the municipal and in 1907 the full suffrage to women with a very small taxpaying qualification, which in 1913 was entirely removed. In 1913 Iceland gave the full suffrage. Denmark granted the municipal franchise in 1907 and adopted a new constitution with universal and equal suffrage in 1915.

The International Woman Suffrage Alli¬ ance was formed in 1904. The International Council of Women organized in 1888 made woman suffrage a part of . its work in 1904. These two great associations, with millions of members, through their congresses and propa¬ ganda spread the doctrine among the women of all nations and a movement for enfranchise¬ ment was making progress in many of them at the time the European War began in 1914. It was supposed this would delay it for years but it had just the contrary effect, largely because of the loyalty, work and sacrifices of women during the long contest. This has been referred to in the case of Great Britain, Canada and the

United States. Universal suffrage was the first result of the Revolution in Russia.

As the determination to have self-government spread among the central countries — Hungary, Austria, Bulgaria, Rumania and Germany — women were included in the electorate by com¬ mon consent, and this was true of the smaller nations on gaining independence. The new Constitution of Germany, which went into effect in August 1919, gave universal suffrage to women. The fear of an uprising in Sweden caused the conservative upper house of its Parliament, which long had blocked the way to woman suffrage, to yield to the inevitable and it was granted in full in 1919. The Parlia¬ ment of the Netherlands, fearing a revolution, hastened to enfranchise women as a conserva¬ tive and stable element in 1919. The Belgian Parliament, gathered together after the coun¬ try was restored to its people, gave the munic¬ ipal and communal suffrage to women in 1919. A bill giving complete, universal suffrage to women on the same terms as exercised by men has passed the lower house in the Parliaments of France and Italy almost unanimously but has not yet come before the Senate. The ques¬ tion is under consideration by the national and cantonal legislative bodies in Switzerland. Even in the Orient it is seriously discussed. Probably within a few years women will have the vote in all countries possessing any measure of civilization.

Bibliography. — Stanton, Elizabeth Cady, Anthony, Susan B., Gage, Matilda Joslyn, and Harper, Ida Husted, ‘History of Woman Suffrage) (5 vols., Woman Suffrage Publishing Company, New York 1881-1920) ; Harper, Ida Husted, (Life and Work of Susan B. An¬ thony5 (3 vols., id., New York 1898, 1908) ; id., (Story of the National Amendment (id., New York 1919) ; id., ‘Brief History of Woman Suffage in the United States) (id., New York 1919) ; Bjorkman, Frances M., and Porritt, Annie G., <Woman Suffrage) (id., New York 1916) ; Blackburn, Helen, (Women’s Suffrage in Great Britain) (London 1902); Blackwell, Alice Stone, (Women Suffrage and Temperance) (Boston) ; id., ‘A Bubble Pricked) (New York) ; Blease, Lyon, Emancipation of Women5 (London 1919) ; Carey, Thomas M., (New Fashioned Argument for Woman Suffrage) (New York 1911) ; Catfi Carrie Chapman, (Woman Suffrage by Federal Consti¬ tutional Amendment5 (New York) ; Dorr, Rheta Child, (What Eight Million Women Want5 (id., 1910) ; Fawcett, Millicent G.,

‘Women’s Suffrage in Great Britain5 (New York) ; International Council of Women,

‘Women’s Position in the Laws of the Nations5 (Karlsruhe 1912) ; International Woman Suf¬ frage Alliance, Reports of (1902 et seq.); Kelley, Florence, ‘Some Ethical Gains through Legisla¬ tion5 (New York 1905) ; Kirke, Porter, ‘Suf¬ frage in the United States5 (Chicago 1918) ; McCulloch, Catherine W., ‘Mr. Lex, on the Legal Status of Mother and Child5 (Chicago 1899) ; Macmillan, Chrystal Stritt, Marie and Verone, Maria, ‘Woman Suffrage in Practice5 (New York 1913) ; Mill, John Stuart, ‘Sub¬ jection of Women5 (London 1869) ; Plato, ‘The Republic5 ; ‘Reports5 of International Council of Women (1888 et seq.); Rembaugh, Bertha, ‘Political Status of Women in the United States5 (New York 1911) ; Schirmacher, Dr. Kaethe, ‘Modern Woman’s Rights Move¬ ment5 (ib. 1912) ; Seymour, Charles, and Frary, Donald Page, ‘How the World Votes5 (Springfield, Mass., 1919) ; Shaw, Anna Howard, ‘Ad¬ dress at Birmingham, Ala., 16 April 1915 5 (New York 1915) ; Smith, W. S., ‘Outlines of the Franchise Movement in New Zealand5 (London 1905) ; Whitlock. Brand, ‘Women and Democracy5 (New York 1910) ; Wollstonecraft, Mary, ‘Vindication of the Rights of Women5 (London 1790) ; Zimmern, Alice, ‘Women’s Suffrage in Many Lands5 (London

1909).

Opposed to Woman Suffrage. — Buckley, J. M., ‘The Wrong and the Peril of Woman Suffrage5 (New York 1909) ; Dicey, A. V., ‘Letters to a Friend on Votes for Women5 (London 1909) ; Goodwin, G. D., ‘Anti-Suf¬ frage5 (New York 1912) ; Seawell, Molly E., ‘The Ladies’ Battle5 (ib. 1911) ; Wright, A. E., ‘The Unexpurgated Case Against Woman’s Suffrage5 (ib. 1913).

Consult also The Woman Citizen (New York), the organ of the National American Woman Suffrage Association of the United States; Jus Suffragii now the International Woman Suffrage News (London), the Inter¬ national Woman Suffrage Alliance organ; The Common Cause (London), organ of the British National Union of Societies for Equal Citizen¬ ship.

Ida Husted Harper,

Biographer of Susan B. Anthony and author with Miss Anthony, Elizabeth Cady Stanton and Matilda Joslyn Gage of the ‘ History of Woman Suffrage .5

WOMAN'S BENEFIT ASSOCIATION OF THE MACCABEES, The. A fraternal

benefit society composed entirely of women and officered and managed by women. It exists solely for the benefit of its members and not for profit, having a lodge system with ritualistic work and a representative govern¬ ment, and grants life and disability protection upon satisfactory medical examination. It has members in every part of the world and is firmly established in 55 States, Territories and provinces of this continent with 2,814 local bodies doing business therein. The Woman's Benefit Association was formerly known as "The Ladies of the Maccabees of the World,55 but at the meeting of its legislative body in 1915 adopted the present name, as being more representative of its aims and objects.

Founder. — The founder was Miss Bina M. West, who is now Supreme Commander (presi¬ dent). At the organization of the Association

she was Supreme Record Keeper, which office she held until July 1911, when she became Supreme Commander. She personally intro¬ duced the Association in the original 16 States of its jurisdiction, revised and developed its ritualistic work, assisted in combining the sepa¬ rate State jurisdictions under one central gov¬ ernment, and instituted and perfected the sys¬ tem of general management. The success of the Order has been due primarily to the efforts and executive ability of this great leader. Miss West was born in Saint Clair County, Mich., the daughter of Alfred J. and Elizabeth Conant West, a direct descendant of Roger Conant, first governor of the Massachusetts Colony. She first became identified in 1890 with the woman's auxiliary to the Maccabee Order, then organ¬ ized in Michigan, and in 1891 was so success¬ ful as State Organizer that she was elected Great Lieutenant-Commander (corresponding to vice-president) for Michigan and was thereby a member of the executive committee and con¬ cerned with the management and growth of that branch of the Association. In 1892, mainly through her efforts, a national body called ((The Supreme Hive of the Ladies of the Maccabees of the

World® was established with a view to combining under one central organization the separate groups of women then doing business in the various States under the name of ˆLadies of the Maccabees,® and of carrying the Order into still other States. Miss West was thus the founder and has been the real manager and leader of the Association since its incep¬ tion. Her unselfish and indefatigable services to the Association and her wonderful qualities of leadership have made it the greatest fra¬ ternal benefit society composed and officered solely by women. Every one of the certificates in force, amounting to $155,404,138.26, bears Miss West's signature, and she has with her own hand signed warrants disbursing over $18,500,000 in benefits.

History. — The Woman's Benefit Associa¬ tion was established on 1 Oct. 1892, being or¬ ganized to provide a central government for reviews already established in Michigan, New' York and Ohio (The Michigan branch, how¬ ever, never affiliated completely with the Su¬ preme Body and continued a separate organ¬ ization, thus permitting the Woman's Benefit Association to enter Michigan the same as in other States. The Order in Ohio came under Supreme jurisdiction in 1898 and that of New York in 1899). The first review in New York was organized at Grand Island, 11 March 1891 ; in Ohio at Cleveland, 15 July 1892. The first review organized directly under the juris¬ diction of the National body was at Pittsburgh, Pa, 7 Oct. 1892.

During the first two years of the Associa¬ tion's existence 203 reviews were organized in 18 States. Of these 55 were organized by Miss West's personal efforts. The total of reviews now number 2,555. The growth of the Order has been rapid and steady and its membership has grown in 27 years to 216,290, making it the largest fraternal benefit society in the world conducted wholly by women and for women. The Association is also one of the strongest financially in the fraternal world, having re¬ serves on hand of over $12,000,000 carefully in¬ vested in municipal bonds, the interest alone on

these bonds amounting annually to more than

$550,000.

Government. — The government is purely representative, every member in the Associa¬ tion having a share in its management through the election of delegates to State and National conventions.

The National Convention is called the Supreme Review and is held once in four years for the purpose of enacting laws, electing officers and transacting any other necessary business of the Association. In the interim between meetings of the Supreme Re¬ view the Association is managed by the Su¬ preme Board of Trustees, consisting of the Supreme Commander (president), Supreme Record-Keeper (secretary) and three other members elected by the Supreme Review. Each State has State supervision and the local re¬ views are conducted with a full set of officers and handle their own business direct with the headquarters of the Association at Port Huron, Mich.

The Association was first incorporated on 6 March 1897 and is an independent corpora¬ tion, making its own laws, transacting its own business, collecting rates and paying benefits according to its laws. The sums collected and paid out in the 27 years of the Order's exist¬ ence amount to $18,500,000 and not one dollar has ever been lost through unwise investment - or defalcation, or in any other way, and re¬ ceipted bills are now on file carefully audited by the Board of Supreme Auditors for every penny that has been expended. Annual reports of all business transacted are made to State insurance departments and the Association has since 1904 made annual valuation of its certi¬ ficates to determine its exact condition and re¬ serves for paying promised benefits.

Headquarters. — The Association was estab¬ lished in Port Huron, Mich, in 1892 and still maintains its headquarters there. It has in the best section of that city a Home Office Building which cost $256,000 and which is one of. the most modern and best equipped office buildings in the country. It is two stories high, of stone and reinforced concrete, and is fire¬ proof throughout, with every provision for carrying on the immense volume of the Order's business, for the comfort of its office force of 100 young women and with private offices and meeting rooms for the Supreme Boards of the Association. It has rooms also for the use of local reviews in the city.

Social and Welfare Work. — The Woman's Benefit Association, besides providing death benefits at cost for the protection of home and little ones, gives burial benefits and benefits for members totally disabled. More than this, it provides by general contribution a fund from which hospital service and medical care are given free to needy members. Contracts are in force between the Association and 84 hospitals located in all the large centres of membership in which this free service is given. Since its establishment in August 1915, 5,719 suffering members have been cared for in this way, who would otherwise have been unable to secure the necessary medical attention.

Auxiliary to the Woman's Benefit Associa¬ tion is ((The Order of the Rose,® a society for girls up to 16 years of age. The ritual of this Order is most inspiring, and through its courts,

as the local bodies are known, welfare work for children is being organized throughout the country, under the auspices of the local re¬ views of the Order. It is planned in this way to give vocational training to hundreds of chil¬ dren and it is hoped that its scope will in time be enlarged to embrace general welfare work for children of those not members of the Woman's Benefit Association as well as for the daughters and sisters of members.

Statistics.— On 1 Oct. 1919 there were 216,- 290 members of the Woman's Benefit Associa¬ tion and 2,555 reviews in 55 States, Territories and provinces. The Association had on that date paid out in benefits a total of $18,379,- 122.27, with $220,867.25 additional expended for free hospital service. ' The reserve fund amounted to $11,780,904.87, bearing interest of more than $550,000 annually. The total in all funds was $12,695,473.21. The present executive officers are Miss Bina M. West, Supreme Com¬ mander, Miss Frances D. Partridge, Supreme Record-Keeper, both with offices at Port Huron, Mich., Mrs. M. Louise Hinrichs, Supreme Fi¬ nance-Keeper and Mrs. Grace Meredith, Miss Nellie E. Lounsbury and Mrs. Nellie C. V. Heppert, Supreme Trustees. Dr. Ella J. Fifield is Supreme Medical Examiner for the Associa¬ tion.

Bina M. West, Supreme Commander.

WOMAN'S CHRISTIAN TEMPER¬ ANCE UNION, a reform organization founded at Cleveland, Ohio, in 1874; it was the outcome of a woman's crusade against the liquor traffic in the Middle States from 1870 to 1873. The (<W. C. T. U.,® as the organization is popularly called, had regular associations in every State and Territory, with a total membership of about 500,000. An international association was founded in 1883 largely through the efforts of Frances E. Willard and now has auxiliaries in over 40 countries and provinces.

The head¬ quarters of the American association are at Evanston, Ill. The white ribbon is the general badge of the organization. The union has up¬ ward of 50 distinct departments of work, pre¬ sided over by women experts in various lines. Its greatest work perhaps was securing the passage of laws requiring the study of physi¬ ology and hygiene in the public schools. Official organs are the Union Signal and The Young Crusader, both of which are published at Evans¬ ton, Ill. The State branches publish monthly papers.

WOMAN'S COLLEGE OF BALTI¬ MORE. See Goucher College.

WOMAN'S COLLEGE OF DUE WEST,

a Reformed Presbyterian institution of higher education at Due West, S. C., founded in 1859. Its faculty numbers 14; the average annual attendance of students is 150; the tuition fees are $50, the living expenses, board, etc., $135, the total income, including tuition and inciden¬ tal charges is $22,881. The college colors are garnet and gray. The library contains over 3,200 volumes. The number of graduates since organization is over 1,000.

WOMAN'S RELIEF CORPS, an organ¬ ization created in 1883 by the mothers, wives, daughters and sisters of Union soldiers of the C ivil War of 1861-65, for the purpose of aid¬

ing and assisting the Grand Army of the Re¬ public, and to ((perpetuate the memory of their heroic dead,® to (<extend needful aid to the widows and orphans,® to <(cherish and emulate the deeds of our army nurses.® There are at present about 3,000 corps (local divisions) and 150,000 members. Over $2,000,000 have been ex¬ pended in relief by the organization.

WOMB, The, AND ITS DISEASES.

The womb or uterus is one of the generative organs of the female. In its cavity the im¬ pregnated ovum is received, retained and sup¬ ported during the development of the foetus, and from this cavity the child is expelled at the time of parturition. In the virgin, the womb is pear-shaped, flattened from before backward, and is about three inches in length. It is di¬ vided into body and neck. The fundus or upper extremity of the body is broad and con¬ vex, and is directed forward. From this por¬ tion the body gradually narrows to the neck, the lower rounded and constricted portion of the womb, which is directed downward and backward in the line of the axis of the inlet of

the pelvis and around its circumference is attached to the upper end of the vagina.

The womb is situated in the cavity of the pelvis, between the bladder and the rectum, and is retained in position by ligaments, which in a normal condition of the parts also allow free movements of the womb during respira¬ tion, muscular exercise and change of posture. The ligaments are the two lateral or broad ligaments which pass from the sides of the womb to the lateral walls of the pelvis; the two round ligaments which are attached at the upper angles of the womb, one on each side, and pass out through the internal abdominal rings to end in the labile majora; the two anterior ligaments or folds of peritonaeum be¬ tween the neck of the womb and the bladder; and the two posterior ligaments or folds be¬ tween the womib and the rectum. The womb is a muscular organ, consisting of bundles of unstriped muscular fibres, arranged in layers intermixed with areolar tissue, blood-vessels, lymphatics, and nerves. A serous coat derived from the peritonaeum covers the posterior sur¬ face of the body of the womb and the upper three-fourths of its anterior surface. The cav¬ ity of the womb is triangular and flattened from before backward, its base being toward the fundus, and is lined with mucous membrane, having ciliated epithelium at its upper portion. This mucous coat contains the uterine glands, and is continuous with the mucous membrane lining the vagina, and connects with the peri¬ tonaeum through the orifices of the Fallopian tubes or oviducts, one orifice at each superior angle of the uterine cavity. The two Fallopian tubes (q.v.) are appendages of the uterus at¬ tached to its superior angles and convey the ova from the ovaries (attached to the broad ligaments) to the cavity of the womb. At the inferior angle of this cavity is a small con¬ stricted opening, the internal orifice, which leads into the cavity of the cervix. At the vaginal extremity of the uterus is a transverse aperture, the os uteri or external orifice.

The womb is subject to cancerous, fibroid, fibrous and cystic tumors and polypi, to in¬ flammatory affections of the mucous lining and

the parenchyma, such as endometritis and me¬ tritis of the neck or body of the uterus ; to ulceration of the os and cervix uteri, and to displacement (prolapsus or falling of the womb), versions and flexions. The causes of endometritis are direct injuries (as from pes¬ saries, chemical irritants, etc.), inflammation of the vagina, interference with the men¬ strual flow, *etc.* ; of metritis, mechanical and other injuries, sudden suppression of the men¬ strual flow, endometritis and morbid growths. Ulceration is usually a complication of endo¬ metritis. Among the causes are uterine dis¬ placements causing friction against the cervix, abuse of sexual intercourse, vaginal or uterine lcucorrhcea, the use of pessaries, and injuries in parturition. Displacements of the uterus are quite common and among their causes are : (1) increase in weight of the uterus from inflammation or congestion, tumors, pregnancy, fluid retained in the cavity, *etc.* ; (2) weaken¬ ing of the uterine supports from rupture of the perinseum, loss of tone of vaginal walls, laxity of uterine ligaments and degeneration of uterine tissue; (3) influences pressing the uterus out of place, such as tight clothing at the waist, the weight of heavy clothing on the abdomen, muscular efforts, such as lifting and straining, abdominal tumors, distended bladder, *etc.* ; (4) traction on the uterus, from deposits of lymph in pelvic areolar tissue, cicatrices in vaginal walls, shortening of uterine ligaments, *etc.* Flexions of the uterus are bendings of it forward, backward, or to either side, known as anteversion, retroversion, *etc.* A prolapsus is a falling or descent of the uterus into the pelvic cavity, or the prolapsed organ may pro¬ trude from the body at the vulvar orifice. The first form is known as incomplete prolapsus, the latter as complete prolapsus. The symp¬ toms of uterine diseases include lcucorrhcea, pain in the small of the back, dragging sen¬ sations, a feeling of weight and heaviness, in¬ terference with the functions of the bladder and rectum, dyspepsia and despondency. See Embryology; Menstruation; Obstetrics; Ovary; and consult Kelly and Noble, gyne¬ cology and Abdominal Surgery) (Philadelphia

1916).

WOMBAT, a burrowing marsupial of the phalanger family and genus Phase olomys, na¬ tives of Australia and Tasmania. The species most commonly known (P. wombat) is two to three feet long, with a very short tail, clumsy form, stout limbs, blunt muzzle and rough hair of variable tint. In their general form and actions the wombats resemble small bears, having a similar shuffling plantigrade walk; but they are even shorter in the legs and broader in the back than those animals.

The dentition resembles that of rodents. They live on the ground and in burrows or holes among rocks, feeding on roots, grass and other vegetable substances. They sleep in the day, seeking their food at night, and are usually gentle in their habits, though their large chisel¬ like incisors enable them to bite strongly if provoked. Wombats exhibit small intelligence, but are gentle, and capable of domestication to a limited extent. They are hunted for their flesh, which is highly esteemed, and is said to resemble pork. Several species exist, besides

the one above mentioned. P. ursinus is brown¬ ish gray, like the third species, the hairy-nosed wombat (P . latifrons), which differs from the other two in having smooth silky fur, a hairy muzzle, and large pointed ears. It inhabits southern Australia. The largest living wom¬ bat (P. platyrhinus) is about three feet long, but remains of a large extinct genus (Phas - colonus), which must have been nearly as large as a tapir, have 'been found in Queensland. Consult authorities mentioned under Marsu¬ pials.

WOMBWELL, woom'wel, England, a town in the West Riding of Yorkshire, about five miles southeast of. Barnsley, with extensive coal mines in the neighborhood. Pop. 17,536.

WOMEN, Education of. See Education of Women.

WOMEN, Legal Rights of. During the earliest times of which we have records, the legal rights of women were narrowly circum¬ scribed. By the Mosaic law the rights of the wife were quite subordinate to those of the husband, and daughters could inherit only where there were no sons. Under early Roman law (3d century b.c. and later), the husband could condemn his wife to death for adultery and without public trial. Owing to abuses the law later took away the power of the husband to condemn his wife to death, but provided that the father might put to death a daughter taken in adultery, with the important proviso that her paramour be killed at the same time. Usually a daughter could be forced into mar¬ riage by the father, while he had no such power over a son. However, with the rise of Christianity the rigor of the law in relation to women was greatly abated, and in certain particulars they were shown more leniency than men. For instance, ignorance of the law if the offense did not involve good morals was accepted as a valid defense for women because of the weakness of the sex. Further, a wife could not be convicted in a criminal action for theft from her husband — a provision which persists in a slightly modified form in the law of the United States and other countries to the present day. The power of

initiative in divorce — ‘previously held by the husband only — be¬ came the privilege also of the wife and she was empowered to send her husband a divorce when¬ ever the circumstances warranted such action. Women, whether married, unmarried, or wid¬ owed, could legally dispose of property by will the same as men, and daughters were allowed to inherit equally with sons. In ancient Greece, the legal rights of women were subordinate to the men as in the early Roman law. The Ger¬ manic and other laws of this period were in many particulars equally severe. From an early date in England unmarried women could legally make a contract or a will, could sue or be sued, and needed no guardian as in Roman law. For¬ merly in England criminal laws against women were very severe and rigorously enforced, death being the penalty for bigamy and manslaughter and even for larceny. One anomaly of the English law to-day working to the prejudice of women is that which provides that a husband may obtain a divorce on proving infidelity on the part of his wife, but which denies her a divorce on proving his infidelity unless she further

proves his commission of one of certain other enumerated serious offenses. Mild chastisement of a wife by a husband, however, once sanc¬ tioned by law, is now prohibited. In 1885 by the Criminal Law Amendment Act, the age of consent of females in England was raised to 16, thus eliminating an abuse of long standing. The right of primogeniture, now almost totally super¬ seded on the Continent, in the English-speaking British Colonies, and in the United States, still persists in the law of the United Kingdom and works hardship to female heirs. The law of Scotland is in most respects similar to that of England, but testamentary capacity is given to females by Scots law at a much earlier age than by English law. In many of the Eastern countries even to-day the law has made very few advances from olden times, and women are al¬ most universally treated as the inferior of men, with only slight indications of any amelioration of this deplorable condition.

In the early history of the United States women suffered from the rigor

of the law. As late as toward the close of the 17th century women were refused any rights to an education, were punished for speaking in public, and oc¬ casionally old women were burned as witches. It was not until a century later that women were given the right to a few months' education a year in primary schools, and not until 1819 did the government give any systematic financial aid toward the education of women. Statutory modifications of the severities of the common law with regard to married women began in the United States in 1848, New York taking the initiative. The other States followed rapidly, and within a comparatively short time most of the legal disabilities of married women were swept away. (See Curtesy; Dower; Husband and Wife). Under the Constitution of the United States or at the common law women have no legal right to practise law. By statute, however, they may now do so in the Supreme Court of the United States, and also in the highest courts of all the States. It has been held in a number of State courts, in the absence of statutory or constitutional provisions to the contrary, that women may practise law in the entire absence of statutes authorizing it. Other decisions, however, hold to the contrary. By statute some States provide that no persons shall be precluded from practising any profes¬ sion or employment (except military) by reason of sex; others by legislation or by constitutional restriction provide that women shall not be permitted to work in certain industries, as coal mining, a regulation manifestly for their own protection. By statute in a number of States, a married woman may act as a guardian, adminis¬ tratrix, or executrix. Up to 1915 a large ma¬ jority of the States regulated by law the hours which women were permitted to labor in most industries, usually 8 to 10 hours a day, with restrictions on night work. Minimum wage laws for women have been passed in a number of States, and these have been held constitu¬ tional by the Supreme Court. (See Labor Legislation). During the early history of the United States the age of consent of females was nearly everywhere deplorably low, but legisla¬ tion has raised this age so that in many States it is at present 18 years, with a general average of about 16. In the case of wills of personal property, testamentary capacity in the various

States is often fixed at a lower age for females than for males. For example, in New York State the age for females is l6 years while it is 18 for males. (See Testament). In 1911 the first widows' pension law was passed (Mis¬ souri) and within eight years more than half of the remaining States had adopted this form of remedial legislation. (See Pensions). In a number of States to-day statutes expressly ex¬ empt women from arrest in all civil actions. The rigor of the early criminal

law in the United States in its treatment of women has almost entirely disappeared. The tendency is decidedly toward leniency. With the recent extension of the franchise to women, the favorable indica¬ tions for even wider extension soon, and the corresponding increase in their political power, together with the growing number of women legislators, it is safe to predict that women will add considerably in the near future to the legal advantages they have already secured. See Woman Suffrage.

Edward F. Donovan.

WOMEN, Medical Education of. See

Medical Education in the United States.

WOMEN IN INDUSTRY. Through all the variations and complexities of modern in¬ dustry there runs the simple motive of primi¬ tive human activity, viz., the need of food, clothing, housing and ethical expression. In such activity women have always had a part, though that part has varied with countries and with centuries.

In the United States, before the development of modern industry, women were concerned chiefly with the preparation of food and cloth¬ ing. Women practically monopolized the spin¬ ning of cotton and woolen yarns, the making of hosiery, the manufacture of women's cloth¬ ing; they made all the bread and pastries, and were the nation's canners. With men, women shared the weaving of cotton before the de¬ velopment of modern industry, the manufacture of men's clothing and the slaughtering and curing of meats.

During this period in America's history men were the chief makers of boots and shoes and the principal weavers of wool. They were al¬ most exclusively concerned with the manufac¬ ture of flour and grist-mill products, wood and wood products, clay, glass and stone manu¬ factures, and in the production of fuels.

There are no statistics showing the exact number of men and women that were engaged in the home occupations, but the compilations made by such men as Alexander Hamilton, Tench Coxe and by other early American his¬ torians, together with many State documents, afford ample evidence that although there were some interesting exceptions, broadly speaking the work of providing food, clothing and hous¬ ing was divided in the manner described be¬ tween men and women before the development of modern factory system.

Although the industrial eras, referred to as ˆbefore® and ˆafter® the

development of modern industry, are not abruptly demarked, but merge almost imperceptibly one into the other, there is no difficulty in determining the periods if a transition zone of sufficient width is marked off between the old and new orders in each industry or group of industries. For example, the first stocking mills of any im-

portance were established in the United States about 1820. Before this time, and for a goodly time afterward, hosiery was a household manu¬ facture in the hands of women. They held their own in spite of the factory until the ap¬ plication of power to the looms in 1832. This and later inventions put wings to the factory industry. Forty years after the introduction of the power loom, stockings were practically a factory product, and women, who monopolized the work when it was a home industry, consti¬ tuted about 55 per cent ot the employees in the hosiery mills of 1870. The transition period covers about 40 years, but there is no question now about the complete monopolization of the

the mills, factories and mechanical establish¬ ments, and the immense field of employment dependent upon these industries, viz., the whole¬ sale and retail stores and other distributing agencies and offices. Twelve million women, however, are the approximate total number of women earning their own living in part or in whole, usually by wage-payments or profits from independent business or services. They include domestic servants and women who go from house to house to sew, to wash, to clean; they include teachers and actresses, doctors and nurses and lawyers and women in independent business. They include women working their own farms and women helping on their own or

Table I.

Comparison of Number and Per Cent of Increase Over 1870 of Bread-Winning Women, with Total Female Population 10 Years of Age and Over, and Comparison of Their Increase in Industries, Professions and Other Occupations in Specified Decennial Years.

YEAR

Female

population

Bread-winning

women

Increase of bread-winning women in:

Manufactures, mechanical and mining pursuits

Stores and offices

Professions

Domestic and personal persuits, agriculture

Number

Per

cent

in¬

crease

over

1870

Number

Per

cent

in¬

crease

over

1870

Number

Per

cent

in¬

crease

over

1870

Number

Per

cent

in¬

crease

over

1870

Number

Per

cent

in¬

crease

over

1870

Number

Per

cent

in¬

crease

over

1870

1870.. .

1880.. .

1890.. .

1900.. .

1910.. .

13,970,079

18,025,627

23,060,900

28,246,384

34,552,712

1,836,288

2,647,157

4,005,532

5,319,397

8,075t772

354,021

631,034

1,027,928

1,312,668

1,767,131

20,383

63,058

228,421

503,347

1,202,352

92,054

177,255

311,687

430,597

754,890

1,369,830

1,775,810

2,438,248

3,072,785

4,351,399

29.0

65.1

102.2

147.3

44.2

118.1

189.7

339.8

78.3 189.0 270.8 399. 1

209.4

1020.6

2369.4

5798.8

92.5

238.6

367.7 720.0

29.7 . 77.9 124.4 217.6

The industrial classifications adopted by the census vary widely in the successive decennial years. For the purpose of comparison, however, the 1900 census of occupations made the necessary rearrangement for the three previous decennial years, and these have been used in the accompanying table. The classifications for 1910 used in the table are those adopted by the 1900 census. In some minor occupations the figures did not permit of the necessary rearrangement. If they had, however, the trend shown in the table would have been accentuated.

To the policy of adopting the 1900 census classification wherever the figures would permit, two exceptions were made, the most important being that of trained nurses who were classed with " Domestic and Personal Service " in 1900 and with " Pro¬ fessions " in 1910. The figures would permit the transfer of the 76,000 trained nurses back to the domestic and personal service column and the 5,000 women photographers to the group of manufacturing industries. Such a change would reduce the group representing women in professions from 9.1 per cent of all bread-winning women, as shown on the table, to approx¬ imately 8. 1 per cent. But this reduction would be at least partially offset by the changes referred to which could not be made and which would have increased the per cent in the professional group. Trained nurses were left among the professions because the increasing requirements have, during the last 20 years, raised the whole occupation from the level of domestic and personal service to that of a profession. This was true, perhaps, in large measure in 1900, but the census of that year specified " nurses, trained and untrained " without giving the figures separately. Since trained nursing has become a recognized profession, the number of women reported therein were left in the professional group. The claim of the photographers may not be quite so clear. They certainly seem, however, to belong more properly among professions in view of the artistic requirements of modern photography, than among the group of women in manufacturing industries, where they were in the 1900 census. The number of women photographers involved, however, would change the percentages but a small fraction of one per cent. Therefore, the 1910 classification of trained nurses and photographers, as belonging to the professional group, was accepted, though transferring them to the 1900 classifications would not materially affect the trend shown by the table.

manufacture by the factories, nor about its being a home industry and

in the hands of the women at least before 1820.

The World War effected at least a tem¬ porary revival of home knitting. The relative importance of the home product, however, was not significant even in war time, as it is not probable that the home knitter will become a serious peace time competitor of the factory knitter.

Before discussing in detail the entrance of women into industry, it is necessary to clear away any misconception which may cloud the meaning of the term (<women in industry® as used here. It is not uncommon to hear about the “twelve million women in industry.® This entire army of women workers is commonly, and erroneously, supposed to have “invaded®

others’ farms without wages or payment in kind. Such women are not usually thought of as “women in industry® and many of them are obviously not properly described bv the term.

Just what proportion the women in stores, mills and factories — or the women usually in mind when the term “women in industry® is used — are of the whole number of bread-winning women is best shown by the circle on the following page, which has been divided to illustrate the relative proportion of “women in industry® and other “bread-winning women® according to the occupation census of 1910.

This circle throws into bold relief the fact that of the millions of women who are earning their own bread, scarcely 37 per cent are earn¬ ing it in stores, mills, factories and other mechanical establishments or in offices. These

women have (<invaded® the great domain of modern industry. The other 63 per cent are earning their living in the professions, in agri¬ culture, and in domestic service, or they are winning their bread as

waitresses, boarding and lodging-house keepers, nurse maids, *etc.*

While bread-winners in all pursuits as com¬ pared with the total female population 10 years of age and over have been steadily in¬ creasing during the last half century, the rate of increase in the proportion of women entering factories, mills and stores since 1870 is much greater than the rate of increase in the pro¬ portion of women entering all bread-winning pursuits. This is clearly seen in Table I.

Women in Manufacturing and Mechanical Industries. — Mechanical invention, the de¬ velopment of the factory system, the conse¬ quent decline of production and increase of unemployment in the home, forced many needy women into factory and mill environment. The skill acquired in the home industries exerted a controlling influence on the choice of*industries into which women went for a livelihood. In¬ deed, this early influence is apparent even at present. The largest number of women em¬ ployed in factories in 1914 were making per¬ sonal apparel ; a slightly lesser number were spinning yarn and weaving it into cloth. Al¬ most 200,000 were preparing food products for our consumption.

Table II showing the largest women-employ- ing industries in the United States, therefore, gains in instructive interest when the indus¬ tries represented therein are compared with the division of work as described at the begin¬ ning of the article between men and women before the development of the modern factory system.

Such a comparison brings out clearly the fact that women ((invaded® principally the mills and factories producing commodities which were once woman's chief, if not exclusive, con¬ cern, when such commodities were of household origin.

Women in Mercantile and Clerical Pur¬ suits. — The rate of increase in the number of women going into mercantile and clerical pur¬ suits and professions since 1870 outstrips not

only the rate of increase in the numbers of all bread-winning women, but exceeds the rate at which the total female population over 10 years

Table II.

Per Cent which Six Industrial Groups Em¬ ploy of the Total 1,539,190 Women Em¬ ployed in all Manufacturing Industries in the United States in 1914.

Industrial group	Number employed	Per cent, of total
Textiles (including cotton, linen, silk, felt, worsted and woolen goods) …	305 ,125	19.8
Personal apparel (including men's and women's clothing, hats, millinery, shirts, corsets and buttons) .	356 , 999	23 . 2
Hosiery and knit goods (including sus¬ penders and elastic woven goods) . .	113, 995	7 . 4
Hand and foot wear (Including leather and rubber boots and shoes, cut stock and findings, leather gloves and mittens) .	87,721	5.7
Tobacco manufactures .	98,241	6.4
Food products .	198,817	12.9
Total .	1,160,898	75.4

This 75.4 per cent includes 63 of the 342 divisions into which the census of manufactures of 1914 has separated all industries. The remaining 24.6 per cent of women are employed in the other 279 industries.

of age has increased. This is shown by the table on page 459.

The women in mercantile and clerical pur¬ suits are concentrated, as

might be expected, in a very few occupations. The five occupations of saleswoman, stenographer and typewriter, bookkeeper and accountant, clerk and telephone and telegraph operator claim nearly 90 per cent of all women engaged in mercantile and clerical pursuits according to the occupation census of

1910.

Table III illustrates the pressure which the stream of women entering mercantile and clerical pursuits put upon the five occupational groups named.

Women in Professions. — Until shortly be¬ fore the war school teachers in public and private institutions constituted an overwhelming majority of the ((Women in Professions.® Even in 1910 the teaching profession furnished nearly 500,000 of the total number of the approximately 750,000 reported in the occupation census of 1910. Beginning in the latter part of the last century, however, the number of women in other professions began to increase with great rapidity. While there were fewer than 2,500 women physicians and surgeons in this country in 1880, there were nearly 14,000 in 1910.* The same contrast is afforded by the number of (<literary and scientific persons.® The 1910 census of occupations shows but 579 chemists, assayers and metallurgists, but there are ample evidences that these and many other technical occupations were attracting large numbers of women even before the war.

The profession of law is drawing thousands of women, not all of them engaging in general practice by any means. Many are taking courses in law and securing admission to the bar in order to qualify for positions in legal departments of large corporations, civic and educational, organizations and institutions, and frequently in various departments of the State and Federal governments.

* Consult United States 1910 census of occupations,- page 54.

WOMEN IN INDUSTRY

1 A woman operating a vertical milling machine in the railway motor department of a big electric locomotive factory at Erie, Pa.

2 Women engaged at gun making in United States arsenal

“Social Service® is rapidly reaching the level of a standardized profession, with definite re¬ quirements, though as yet it has not legislative standing as have the professions of law, teach¬ ing and medicine, including trained nursing.* There are evidences that social service and business activities are making heavy inroads on the teaching profession and holding out alluring prospects to women in the better grades of clerical positions.

The foregoing discussion and Table III state in substance the facts concerning the entrance of women into industry and the professions, and throw some light on the causes of the con¬ centration of women in industries of a certain general character.

Influences Determining the Direction of Women into Industry. — Although the annihila-

Second. — This fluctuation in the numbers of women in various industries will in all prob¬ ability continue because there will continue to be changes in the character of mechanical equip¬ ment. Nevertheless, the fact that preference is given to inventions which make it possible to employ cheap labor with profit will tend to keep women in demand in manufacturing and mechancial pursuits.

Third. — Unskilled male labor from foreign countries, physically more able to operate heavy running machines, offered before the World War effective competition to female labor in a number of industries once dominated by women.

Fourth. — The possibilities of mechanical in¬ vention as affecting human labor are more limited in the trade and transportation group

Table III.

Number and Per Cent of Women in Five Leading Occupations in Trade and

Transportation, (a)

These five occupations represent 89 per cent of all female employees and 37.5 per cent of the total number of employees reported in the 100 occupations listed separately under “Trade and Transportation” in the 1910 census of occupations. (Vol. 12, pp. 92-94).

(Figures taken from 1900 occupation census and 1910 occupation census).

YEAR

Bookkeepers

and

accountants

Clerks

Saleswomen

Stenographers

and

typewriters

Telephone and telegraph operators

Number

women

Per cent *

Number

women

Per cent *

Number

women

Per cent *

Number

women

Per

cent*

Number

women

Per

cent*

1870 .

(b) 293

.9

39

.2

(d) 8 , 969

3.8

(f) 7

4.6

(e) (f)35S

4.3

1880 .

(b) 2,365

4.0

192

.7

(d) 31,466

8.2

• •••••••

• • • •

1,275

5.3

1890 .

27,772

17.4

64,219

11.5

58,451

22. 1

21,270

63.7

8,474

16.2

1900 .

74,153

28.6

84,982

14. 1

149,230

23.3

86,118

75.7

22,556

29.3

1910 .

(c)187,155

38.5

122,665

17.0

369,309

28.2

263,315

83.1

96,481

57.5

(a) Females 10 years of age and over.

(b) Includes bookkeepers and accountants in stores only, all others are combined with clerks.

(c) Includes cashiers.

(d) Listed as “ clerks in stores.”

(e) Includes all employees of telegraph company.

(f) Includes officials and employees of telegraph and telephone company. (The fact that all employees are included under telegraph and telephone operators in 1870 and “ Officials and Employees ” in 1880 materially affects the proportion of women in these two censuses, though the number actually involved is not considerable. The real importance lies in the relative increase in the numbers of adult women since 1890 when the numbers are both large and comparable).

* Per cent of total number of workers in occupation.

tion of home industries by mechanical inven¬ tion, the application of power to machines and the development of the factory system are not questions of dispute, and although there is as little chance for argument that this annihilation of home industries is responsible for the influx of women into industrial fields where their skill in home industry could count, yet the influences at work before the recent war in distributing women over the industrial domain are not so easilv determined. A few salient facts, however, can be pointed out.

First. — Successive mechanical inventions, which stimulate the growth of factories and preclude any reasonable probability of the re¬ turn to home manufactures, have checked the increase in the numbers of women in some in¬ dustries and accelerated the rate of increase in others, and have had both effects upon the same industry at different periods. The effect de¬ pends, of course, upon the adaptability of the new mechanism to the physical abilities of women operators.

* See discussion of trained nursing as a profession in con¬ nection with table on page 459-

of industries into which women have entered in such large numbers. The influence of inven¬ tion has been felt most in more or less moder¬ ately skilled clerical work, which has been enormously facilitated by the typewriter, the various adding and computing machines, letter presses, filing systems, *etc.* It has not had, and

reasonably cannot have, any effect upon sales¬ women and women in secretarial positions.

Fifth. — The lighter demands for muscular exertion and physical endurance made by mer¬ cantile pursuits render the physical weaknesses of women less of a handicap in these occupa¬ tions than in manufacturing and mechanical industries.

Sixth. — Occupations of the mercantile and clerical order do not require the women to handle materials or work in surroundings which soil the hands or the clothes. The workers can do their work in their "good clothes.® This is not a negligible factor by any means with men in their choice of occupations but it is unquestionably a telling factor in determining the choice of an occupation by a woman, when any choice is open to her.

Seventh. — This group of occupations re¬ quires more academic training than the manu¬ facturing and mechanical industries. Even the sales girl must be able to express herself fairly well, must write her sales checks legibly and compute her sales correctly. The clerk and stenographer must do better than the sales girl. The services of newly arrived immi¬ grants or of the illiterate native born are, therefore, not available. The labor supply is confined to the graduates who are coming in rapidly increasing* numbers from the common schools, the high schools, the business colleges and other schools of higher education.

Eighth. — This fundamental requirement of academic and technical training has resulted in confining the source of labor supply for the mercantile and clerical occupations to the families sufficiently ambitious and well circum¬ stanced to afford their daughters the needed education. In other words, the demand for training has raised the pursuit in the <(social scale.®

Ninth. — What is true of the allurements of the mercantile and clerical pursuits as compared with the manufacturing and mechanical occupa¬

tions applies even more closely but to a more limited number of women who have it in their power to enter professional pursuits.

The factor described in paragraph five of the foregoing summary particularly should not be overlooked, for while the desire to better or maintain her social position usually out¬ weighs other factors in determining a woman's choice of an occupation, it is nevertheless true that the greater muscular exertion ordinarily required by manufacturing and mechanical in¬ dustries shuts out from these activities many women of less than average physical endurance and makes it necessary for them to earn a living in occupations making lighter physical demands.

The Influence of the World War on the Entrance of Women into Industry. — In peace time the overwhelming majority of workers in all lines are engaged in supplying or distribut¬ ing the normal demands of individual and family life. In war time the paramount de¬ mand upon industry is for means to destroy life — for guns, shells, powder and other ex¬ plosives and for the necessary man power and equipment to make these effective against the enemy. The simultaneous shifting of stress from peace to war production and the drafting of the man power from industry to military and naval service inevitably changes the cur¬ rent of woman labor. How permanent the changes are only the results of succeeding censuses will show, but there are many evi¬ dences that the war emergency of 1917-18 ma¬ terially checked' the momentum of the move¬ ment of women into the old women-employing industries and familiar professions. For ex¬ ample, the records of the United States Employ¬ ment Service for the period of the war showed a growing demand for women workers from em¬ ployers in iron and steel and other metal indus¬ tries; from lumber and timber mills and from the oil refineries. Without question the number of women bookkeepers and accountants has in¬ creased in a marked degree. Occupations in the banking business which were practically closed to women before the war drew large numbers

of women to offset the shortage of men. Trade and business schools during the war threw open to women courses in banking and other responsible commercial positions which were not open to women before the war.

Finally the Federal government which, be¬ fore the war, had offered opportunities to women chiefly in clerical, stenographic and other positions demanding little or no executive or technical training called

women during the war into service requiring technical knowledge, executive ability and administrative experience of no mean order.

Of course, this war draft of women from homes into industry, and from accustomed oc¬ cupations requiring little skill to unaccustomed positions of responsibility, did not proceed to the extent that it did in England. This was due, in the first place, to the longer duration of the war period in England and the conse¬ quent longer and greater drain on her man power ; and, in the second place, to the fact that England entered the war at the outset with a preponderance of women over men, whereas the United States entered the war with a pre¬ ponderance of men over women. It was not until the second draft had been made in this country that the demand for women to take the places of men began to make itself felt. The first draft served only to <(take up the slack in male labor® notwithstanding the fact that the country's mills and factories had been supplying the allied nations with enormous quantities of war materials.

It would seem, therefore, that the demobili¬ zation of the American military and naval forces would have resulted in a corresponding reduction in the number of women drawn into industry. Evidences, however, do not sus¬ tain this conclusion. War conditions shut off the normal labor supply from immigration. Not only so, but conditions in Slavic countries set in motion a flow of emigration especially of the Slavic foreign born which made its influence felt on the general labor supply. In addition, the increasing demand for reconstruction ma¬ terials and the revival of. peace time require¬ ments made demands which readily absorbed labor rendered available by demobilization and also kept the war acquisition of woman labor busy in large measure.

On the whole, unquestionably the war en¬ larged the opportunities of profitable employ¬ ment for women, though as stated before, just in what measure and how permanent the en¬ largements are, only succeeding national census figures will determine.

The Economic Status of Women in In¬ dustry. — • The influence of the war upon the wages of women need not be discussed in an article of this nature, as the war wages of women, like the war wages of men, are deter¬ mined by war conditions which involve factors not included in the general problem of ((securing to the worker an equitable share of the products of his work.®

Obviously, the fundamental conditions de¬ termining the economic status of women in in¬ dustry are wages, working conditions and cost

of living. To one or more of these three all the problems of social and industrial unrest are related, for the cost of living involves the standard of living; working conditions involve

working hours and industrial hygiene ; both in¬ volve the health and earning power of the worker. Wages are entangled with industrial skill, duration of employment and labor supply.

Wages. — The steady increase in the numbers of women entering industry even though the numbers of men may be increasing at a more rapid rate in some lines, renders an equi¬ table wage a matter of growing importance, not only to the industries and workers directly involved, but to society as a whole. The shar.p insistent demand is for a living wage as the minimum limit, for though the terms ((living wage" and (<minimum wage" may be used in¬ discriminately, there is never any question about

mum wage laws definitely stipulate only the cost of living as the factor to be considered in fixing the wage, for even in these cases pro¬ vision for apprenticeship wages are made by commissions.

Amounts Paid in Wages to Women as Compared with Men.— The year 1905 is the last in which the United States census gives the total amount of money paid to women as compared with the amounts paid to men and children. If the industries shown in Table II on page 460 were arranged in the order of those showing the greatest proportions of female labor, hosiery and knit goods would lead, as 66.4 per cent of the total number of wage-earners

Proportion of Women and Proportion of all Wage Money Paid them During 1905 in 10 Industries which in 1910 Employed 57.7 Per Cent of all Women in Manufacturing Industries.

f - 1 Proportion of women employed.

f . ”””” * | Proportion of wages received.

the import of the demands. It is always an effort to secure a living wage.

On the other hand, we are brought abruptly to the question of the standard of skill prevail¬ ing in industries which are large employers of women. In industry, skill is but another name for value contributed to manufacture or com¬ mercial progress by the individual. This is a question which cannot be even intelligently dis¬ cussed from the standpoint of the worker alone. It is a problem which must be ap¬ proached also from the side of industrial ad¬ ministration.

In any case it is certain that the factor of efficiency crops up continually in the attempt to secure a living wage, though some of the mini-

were women 16 years of age and over. However, these women received not 66.4 per cent of the total amount of money paid in wages in 1905, but approximately 61.4 per cent. Of the total number of wage-earners engaged in the manu¬ facture of women’s clothing, adult women con¬ stituted in 1905 about 62.4 per cent, but they received 48.2 .per cent of the amount paid in wages. In men’s clothing, where they consti¬ tuted 59.7 per cent of the total number of wage-earners they received 43.5 per cent of the yearly wage expenditure. The accompanying arrange¬ ment of black and white parallel bars shows that this discrepancy, between the proportion of adult women and the proportion of the total wages they receive, prevails throughout the

industries which are such conspicuous employers of women.

Whatever the cause of these discrepancies they should not be charged to the influence of children's wages, because they have been ex¬ cluded from the comparison.

Sharp emphasis should be placed upon the fact that these discrepancies do not in them¬ selves signify any inequitable division of the money paid in wages. One hundred dollars might be paid to five men for a given piece of work. The quality or grade of work done by two of the five might fairly call for a payment of $50 of the $100 to these two. In other words, it might be an entirely equitable arrangement for two-fifths of the workers to receive one-half of the wage money. A charge of unfair¬ ness in division of wage investment between men and women could be lodged only in case such division was not governed by the relative quality or grade of service rendered.

The significance of the paralleled bars lies in the alternative which they present, *viz.* : That women are either not rendering as high a qual¬ ity of service or performing as high a grade of work as men in the same industries, or they are not possessed of equal bargaining power and are not, therefore, commanding equal pay for equ-al work. This alternative becomes a subject for serious thought in view of the fact that these industries not only employ the majority of women in manufacture, but they are the indus¬ tries with whose fundamental processes women are by training and tradition acquainted. They are the industries which, with one exception, were once the chief domain of women, or were shared equally with men, and in which their skill was sufficient to be regarded as an asset by the pioneers in building up manufacturing industries in this country.

The encroachments which successive me¬ chanical inventions have made upon the domain of skilled labor should not bear more heavily upon skilled women than upon skilled men. On the contrary if men of skill cost more than women of equal skill the factor of economy would tend to reduce the proportion of skilled male labor whenever superior physical strength is not required by the mechanical inventions.

There are ample data to show the extent to which men and women are performing the same occupations, but that does not measure the ex¬ tent to which an equal degree of skill is re¬ quired. Men and women may be performing the same occupations, but may be working on material of entirely different quality — one be¬ ing much more difficult to handle and, therefore, requiring more skill and judgment. On the other hand, there are industries where the di¬ vision of work is

very marked, but this division does not mean necessarily that the sum of skill, speed and endurance required by one group of occupations is not equal to that re¬ quired by another. For example, men and women do not perform the same occupations in pea canning, but it is a question whether the keen observation, the long concentration and quick decision demanded of a woman looking for pin point leaks in filled cans which pass her at the rate of 50 to 80 a minute do not call for as much skill as is exhibited by the male <(tipper® who deftly seals the line of cans before they pass under her inspection.

The census does not furnish corresponding figures concerning the amounts paid men and women in mercantile and clerical pursuits. But there are many evidences, strengthened by the results of sporadic investigations, that of' same conditions prevail in the wage scale of these occupations.

During the war the government agencies, notably the National War Labor Board, stimu¬ lated the efforts to equalize the wage scales of men and women by issuing official pronounce¬ ments in favor of ((equal pay for equal work,® but the records of awards by the board do not furnish evidence of effective application of the principle. The principle was also endorsed by the women in industry service of the United States Department of Labor, which was estab¬ lished by the Secretary of Labor during the war to set up standards of working conditions.

Organization among Women Wage-earners. — Because of the comparative brevity of the industrial life of the average woman wage-earner, organization among them for the improvement of working conditions proceeds much more slowly than among men. The short stay in industry which in turn limits the sta¬ bility creates an apathy toward organization whose purpose is the permanent improvement in a field of activity in which the majority of wage-earning women do not expect to remain. It leads to a high turn-over in the member¬ ship of organizations which have succeeded in establishing themselves in spite of the disad¬ vantage under which they labor. This turn¬ over limits the opportunity of developing stable leadership from the ranks. But in spite of this handicap, able leaders have been developed through the trade unions and through the Na¬ tional Women's Trade Union League.

Legislation Regulating Conditions of Labor for Women.— Practically all the legisla¬ tion regulating the hours, wages and working

conditions for women in industry is restricted to women in stores, mills and factories and kin¬ dred establishments. The legislation has been enacted and judicially sustained upon the doc¬ trine that the State has a peculiar stake in the health of its women as the mothers of its future citizens. Such legislation has been promoted un¬ questionably because of the weaker bargaining power of the wage-earning women. This weaker bargaining power is itself explained in large part by their short stay in industry and the consequences just described as flowing there¬ from. While the laws for women in industry have always included provisions for minors, re¬ strictive legislation for children has outstripped the laws guarding the working conditions of adult women.

At the time of the passage of the Federal Child Labor Law in 1916, barring children under 14 and restricting the hours of those between 14 and 16 to eight hours a day, there were but four States and the District of Columbia that had eight-hour laws for women. While the Fed¬ eral law was annulled in 1918, the Federal tax on the products of establishments employing children had the same purpose. Laws barring women and children from dangerous trades go much farther in the restrictions laid upon the employment, of children than they do in the re¬ strictions laid upon the employment of women. In the framing of minimum wage laws there

is a noticeable effort to discourage the employ¬ ment of children by giving officials power to establish minimum wages which would render the employment of children unprofitable.

These industrial improvement laws for both adult wage-earning women and for minors are undergoing constant modification and extensions by the State legislatures and efforts to secure Federal action were only suspended by the de¬ mands of the war. But through all these ef¬ forts to improve the wages, hours and working conditions of women and minors in industry there is developing a clearer and more effective recognition of the fundamental difference in the principles which must dominate legislation for women and those which shape

the legislation for children.

In a word, the aim of restrictive legislation for adult women wage-earners, unlike that for child workers, is not their elimination from in¬ dustry, but is improvement in the conditions under which their rapidly increasing numbers must labor. This difference throws much light on the greater difficulties in the way of secur¬ ing effective protection through legislation for adult wage-earning women, and upon its slow progress when compared with similar legislation for children. It makes clear the double burden of responsibility resting upon the promoters of such legislation, the necessity of protecting the health of the wage-earning woman without re¬ stricting or imperiling her rightful place in the ranks of adult wage-earners. It is not a simple or an easy task, for the obligation to protect the adult woman's place in industry as well as her health carries with it the necessity of fram¬ ing legislation which will not cripple industry or the adult woman's chances of earning a live¬ lihood therein, but will only prevent industry from crippling or otherwise injuring its adult women workers.

Bibliography. — Abbott, Edith, (Women in Industry: A Study in American Economic His¬ tory * (New York and London 1910) ; American Museum or Universal Magazine (12 vols., Phil¬ adelphia, January 1787-December 1792; Mat¬ thew Carey, editor) ; Bishop, J. L., (A History of American Manufactures from 1608 to 1860) (Philadelphia 1864) ; Coxe, Tench, Observa¬ tions on the Agriculture, Manufacture and Commerce of the United States,* *etc.* (New York 1789) ; Earle, Mrs. Alice (Morse), (Home Life in Colonial Days) (New York 1898) ; Gal¬ latin, Albert, (Manufactures) (in American State Papers, Finance, Vol. II, p. 425, 2d sess., 11th Congress, Washington, D. C., 1832) ; Ham¬ ilton, Alexander, Manufactures* (in American State Papers, Finance, Vol. I, p. 123, 1st sess., 2d Congress, Washington 1832) ; Henry, Alice, (The Trade Union Woman* (New York and London 1915) ; Industrial Welfare Commission of the State of California, (Second Biennial Report* ; Obenauer, Marie L., and Nienburg, B. M., (The Drift of Women into Industry* (New York 1919) ; Trvon, R. M., household Manufactures in the United States, 1640-1860* ; (A Study in Industrial History *(Chicago 1917) ; (Women in Industry Service,* United States Department of Labor, Standards Governing Employment of Women in In¬ dustry* (Washington 1918) ; United States Bureau of Labor, (Report on Condition of Woman and Child Wage-Earners in the

United States* (19 vols., Washington 1910-13) ; United States Bureau of Labor Statistics, Obenauer, M. L., and Nienburg, B. M., (Effect of Minimum-Wage Determinations in Oregon* (Washington 1915) ; LInited States Bureau of the Census, 12th Census, 1902, Popu¬ lation, Occupation Statistics* (Washington 1902) ; United States Bureau of the Cen¬ sus, 13th Census, 1910, Population, Occupa¬ tion Statistics* (Washington 1912-13) ; United States Bureau of the Census, (Census of Manu¬ factures, 1914* (Vol. II, Reports for Selected Industries and Detail Statistics for Industries, by States (Washington 1918, 1919).

Marie L. Obenauer,

Director of Industrial Survey and Information Service , Washington , D. C.

WOMEN'S CLUBS, associations of women organized for purposes of study, recreation, or for the promotion of certain philanthropic or political ends. Organization among women in the United States has grown to enormous pro¬ portions. It is impossible to compute with any degree of accuracy the membership of women's clubs, outside the federated bodies. The num¬ ber probably reaches 3,000,000. Though it is generally said that women's clubs did not exist until the 19th century, there were clubs during the 18th century in the colonies. A ((female club** was flourishing in New York in 1747 ' and there was an earlier one in 1735. The teatable undoubtedly was responsible for social meetings in which the germ of the woman's club may be found. Reading circles and sewing societies, church societies and philanthropic so¬ cieties existed throughout the country; but they were not organized. One of these early clubs was the Sharon Literary Club founded in January 1779, in Sharon, Conn., with the Rev. Cotton M. Smith chairman and John C. Smith secretar}'. The purpose was (<to promote a taste for the study of belles leitres and of logic and to gain some skill in the useful Freeman's Art of Debate.** The club published a magazine called The Clio.

The club movement did not begin until the 19th century. There was a Female Society for the Relief and Employment of the Poor in 1798; in 1834 the American Female Guardian Society was established, and in 1840-50 the Daughters of Temperance came into existence. During the Civil War a great number of or¬ ganizations were formed, such as the Sanitary Commission, Women's Loyal Legion, Freed¬ man's Bureau, to say nothing of the many phil¬ anthropic bodies, the outcome of the conditions. After the Civil War there was a demand for cooperation and popular education, and Sorosis and similar clubs were founded. Undoubtedly a great deal of impetus came from the suffrage

organizations.

Suffrage Organizations. — In 1848 Eliza¬ beth Cady Stanton and Lucretia Mott issued the first call for a national suffrage association. These two women presided and organized the association. It had been a disputed question whether any woman could, or would, be able to fill this important position, the decision ulti¬ mately being given in the affirmative, by the famous negro orator — Frederick Douglass. Susan B. Anthony immediately joined the other two women, and from their united efforts, “Individual Clubs** were formed. Their aim

as expressed in their platform being to (<promote the educational, intellectual, legal and po¬ litical equality of women, especially the right of suffrage.®

From authentic records it has been proved that in 1859 Miss Constance Faunt Lee Roy founded the Minerva, a Woman’s Literary Club at New Harmony, Ind., and Friends in Coun¬ cil, a reading club, founded in Quincy, Ill., in 1866. The ((Sorosis® (q.v.), the first permanent woman’s club organized, is still in existence.

The first associated work of women was re¬ ligious and philanthropic. During the first 10 years of the 19th century a number of religious societies of women were organized to create funds and aid in church mission work, such as the <(Cent® societies of 1801 and 1804. There were_ also women’s auxiliaries to the Board of Foreign Missions. In 1839 there were 680 of these societies but their limited character pre¬ vented them from being productive, and they were nearly extinct by 1900. In 1864 the first independent union of women missionary socie¬ ties was formed in New York by Mrs. Dore-mus and soon afterward every Protestant de¬ nomination had its organized Woman’s Auxil¬ iary to the American Board of Home and Foreign Missions. The oldest purely women societies in America were started for missionary and church work, and the first on the list of these was the Female Charitable Society of Baldwinsville, N. Y. Another early organiza¬ tion was the Piqua Ohio Female Bible Society, founded in 1818 with nine

women. Toward the end of the century the society numbered 900.

<(The early half of the century was marked,® writes Mrs. Croly, one of the founders of Sorosis, in her (History of the Woman's Club Movement,* (<by a crusade for the cause of the better education of women. Simultaneous with this were two other movements — the anti¬ slavery agitation, inspired by the new enthu¬ siasm for human rights and carried on largely by Quakers of both sexes, and the Woman's Rights Movement. The Woman's Rights Move¬ ment was the natural outgrowth of the indi¬ vidual sovereignty idea which the German phil¬ osophers had planted and of which Mary Wollstonecraft was the first great woman exponent. The keynote of the educational advance was struck by Emma Willard in 1821.

<(The woman's club was not an echo, it was not the mere banding together for social and economic purpose like the clubs ot men. It became at once, without deliberate intention or concerted action, a light-giving and seed-sowing centre of purely altruistic and democratic ac¬ tivity. It had no leaders. It brought together qualities rather than personages ; and, by a rep¬ resentation of all interests, moral, intellectual and social, created an ideal basis of organiza¬ tion, where every one has an equal right to whatever comes to the common centre.®

Sorosis was founded in 1868. In 1867 the Press Club of New York gave a dinner to Charles Dickens. A number of women who were either actively engaged in literary work, or connected with it in some manner, asked if they could be present at the dinner. It was ruled that they could not, although eventually a compromise was arranged and a few women attended the dinner — in some irregular way, probably as spectators in the gallery. The fol¬

lowing year these same women met at the resi¬ dence of Mrs. Charlotte Wilbour. All ex¬ pressed their indignation regarding the Dickens Dinner incident, and the question — ((Why can¬ not we have a club of our own?® came up and led to an organization formed by women, to which the name Sorosis was given.

The first meeting took place in March 1868 at the residence of Mrs. Croly. Alice Cary was made president; Mrs. Jennie C. Croly, vice-president; Kate Field, corresponding secre¬ tary; and Mrs. Charlotte B. Wilbour, recording secretary and treasurer.

Simultaneously with Sorosis the New Eng¬ land Woman's Club was organized in Boston by Mrs. Caroline M. Severance, and the first public meeting took place 30 May 1868 at Chick-ering Hall. Mrs. Julia Ward Howe, Mrs. Ednah D. Cheney, John Weiss, O. B. Frothing-ham, James Freeman Clarke and Ralph Waldo Emerson were present, for this club had the cooperation of men.

The Woman's Club of Brooklyn was founded in 1869-70 by Mrs. Celia Burleigh, who was made president. The Fortnightly of Chicago was founded in 1873, mainly through the efforts of Mrs. Kate Newell Doggett. Jane Addams and Mrs. Ellen M. Henrotin were members of this club. In 1876 the Chicago Woman's Club was founded by Mrs. Caroline M. Brown. In 1893 the Civic Club of Philadelphia was or¬ ganized, the first of its kind. As early as 1853 the Laurel Hill Village Improvement Associa¬ tion was founded by Miss Mary G. Hopkins (Mrs. Goodrich) and Miss Sarah Yorke to im¬ prove Stockbridge, Mass. In 1886 the Woman's Health Protective Association of New York was organized.

Sorosis sent in 1873 <(a little messenger® to prominent women throughout the whole world, calling together a <(congress of women.® This act received the commendation of thousands of women, including nearly all the reigning queens. This congress was held in New York at the Union Square Theatre, and formed an Asso¬ ciation for the Advancement of Women,® which held congresses annually in various parts of the country, until it was superseded by the General Federation of Women's Clubs.

General Federation of Women's Clubs. — This organization was formed at a meeting called by Sorosis in New York, March 1889. On that date Sorosis reached its majority and celebrated its 21st birthday. The Federation was designed to bring in closer touch clubs from all over the country.

Soon after the formation of the General Federation, the different States began to agitate the question of State federations. The first State to organize was Maine, 4 Sept. 1892. The other States rapidly fell into line.

The board of directors of the General Fed¬ eration of Women's Clubs consists of forty-nine women. The committees represent art, civics, civil service reform, conservation, education, home economics, industrial and social condi¬ tions, legislation, literature and library exten¬ sion, music, public health and National Educa¬ tion Association, school patrons' department.

The New England section: Maine, 157 clubs r membership, 6,000; New Hampshire, 116 club membership, 9,340; Vermont, 60 clubs, member - ship, 5,539; Massachusetts, 301 clubs, member -

ship, 110,577; Rhode Island, 42 clubs, member¬ ship, 6,088; Connecticut, 87 clubs, membership,

5,188.

Atlantic States section: New York, 444 clubs, membership, 350,000; New Jersey, 200 clubs, membership, 22,000; Delaware, 31 clubs, membership, 2,381 ; Pennsylvania, 373 clubs, membership, 60,000; Maryland, 82 clubs, mem¬ bership, 12,000; District of Columbia, 27 clubs, membership, 7,000; Virginia, 59 clubs, mem¬ bership, 15,000; West Virginia, 67 clubs, mem-ship, 3,754; North Carolina, 156 clubs, member¬ ship, 7,000; South Carolina, 135 clubs, member¬ ship, 5.000; Georgia, 365 clubs, membership, 27,000; Florida, 159 clubs, membership, 9,150.

Middle States section : Ohio, 479 clubs, membership, 60,000; Indiana, 502 clubs, mem¬ bership, 23,340; Illinois, 559 clubs, membership, 66,287 ; Kentucky, 175 clubs, membership, 45,000 ; Tennessee, 162 clubs, membership, 7,000; Michi gan, 343 clubs, membership, 29,564; Wisconsin, 250 clubs, membership 13,000; Minnesota, 450 clubs, membership, 30,000; Iowa, 668 clubs, membership, 20,000; Missouri, 282 clubs, mem¬ bership, 25,000; Arkansas, 225 clubs, member¬ ship, 9,000.

Gulf States section : Alabama, 217 clubs, membership, about 7,000; Mississippi, 123 clubs, membership, 5,000 ; Louisiana, 124 clubs, mem¬ bership, 15,250; Texas, 528 clubs, membership,

27,000.

Western States section: North Dakota, 182 clubs, membership, 4,262; South Dakota, 130 clubs, membership, 4,366; Nebraska, 222 clubs, membership, 10,343 ; Kansas, 370 clubs, mem¬ bership, 10,240; Oklahoma, 278 clubs, member¬ ship, about 7,000; Montana, 87 clubs, membership, 5,000; Idaho (no data) ; Colorado, 159 clubs, membership, 10,500; New Mexico, 48 clubs, membership, 1,827; Wyoming, 39 clubs, membership, 1,500; Utah, 58 clubs, mem¬ bership, 3,000; Nevada, 32 clubs, membership, 12,000; Arizona, 40 clubs, membership, 2,035.

Pacific States section : Alaska, 7 clubs, mem¬ bership, 284; Washington, 208 clubs, member¬ ship, 2,000; Oregon, 120 clubs, membership, 8,000; California, 472 clubs, membership, 37,000.

From the above it will be seen that there are 9,000 clubs and 2,500,000 women represented in the federated clubs, and this does not in¬ clude the large number of unfederated clubs and. the patriotic and civic, industrial and social organizations.

Another body is the National Council of Women, United States of America. The com¬ mittees are child welfare, community, music, education, federal cooperation, immigration, legal status of women, Pan-American, perma¬ nent peace, prison reform, public health, pub¬ licity, extension committee and suffrage.

The International Council of Women em¬ braces 28 organizations of women.

Women's clubs are usually incorporated and are self-governing and self-supporting. They are occupied with every branch of human ac¬ tivity. Those educational in purpose devote themselves to art, history, literature, music, preparation for travel and give readings, lec¬ tures and discussions ; the social clubs give teas and receptions for celebrities, card parties and other entertainments; the clubs of practical nature originate and aid all kinds of philan¬ thropic movements for the betterment of their city, village or State, aiding schools, libraries,

healthful sanitation, municipal or county improvement forestry, parks, tree-planting, vacation schools, manual training, kinder¬ gartens, child welfare, factory inspection, tenement houses, vocation schools, scholar¬ ships for women, laws for the betterment of workingwomen

and children, police matrons, condition of prisons, *etc.* There are also health protective clubs that work with the board of health in their respective cities and towns. There are also clubs that take up cooking and industrial arts of all kinds, and clubs devoted to the study of home economics.

Men at first slow to give their sanction to the idea now work enthusiastically with auxiliary women corporations. In his preface to Mrs. Blatch's book, (Mobilizing Woman-Power^ Theodore Roosevelt says: ((No man who is not blind can fail to see that we have entered a new day in the great epic march of the ages. For good or for evil the old days have passed; and it rests with us. the men and women now alive, to decide whether in the new days the world is to be a better or a worse place to live in for our descendants.

((In this new world women are to stand on an equal footing with men, in ways and to an extent never hitherto dreamed of. In this country they are on the eve of securing, and in much of the country have already se- - cured, their full political rights. … If they show under the new conditions the will to de¬ velop strength and the high idealism and the iron resolution which under less favorable cir¬ cumstances were shown by the women of the Revolution and of the Civil War, then our nation has before it a career of greatness never hitherto equaled.®

The work accomplished by these intelligent bodies of women has been marvelous. For in¬ stance the club in Saint Paul, Minn., known as the Territorial Pioneers secured a State park or forest reserve of 12,000 acres and 200,000 acres of pine land to be cut under forestry regu¬ lations; also a yearly appropriation from the State for a State art society; also an appro¬ priation of $6,000 yearly for a State traveling library. The activities of national societies, such as the Colonial Dames, of the Daughters of the American Revolution, *etc.* ; include the acqui¬ sition and protection of historical spots and the erection of monuments ; the encouragement of historical research ; the preservation of docu¬ ments and relics, and the celebration of patri¬ otic anniversaries.

Alumnaj associations, formed from the graduates of colleges, institutes, academies and seminaries, ((To unite graduates for their mutual benefit, to preserve the pleasant relations formed during college life, and advance the cause of education among women® come under the head of women's clubs. Kindergarten clubs have furthered good work. Library clubs have built up free libraries. In the South and West traveling libraries have accomplished useful work

toward free education. Professional clubs include many associations of teachers, nurses, lawyers and women of other professions. Press clubs, for members of the literary profession in all large cities exist. The Professional Woman's League of New York, one of the strongest clubs of this class, was organized in December 1892 for the benefit of members of the dramatic, musical and literary professions.

It. is a distinctive society in that it loans money to its members when sickness or sudden calamity overtakes them. To this class belong the educational and industrial unions. The Woman's Christian Temperance Union is a large active body, doing the work its name implies.

The International Sunshine Society, founded by Mrs. Cynthia Westover Alden, 1896, and incorporated 8 March 1900 has for its object: (<To incite its members to the performance of kind and helpful deeds, and to thus bring the sunshine of happiness into the greatest possible number of hearts and homes.® This is the largest individual club in the country, although it might be classed in the line of federations, as it has branches all over the United States and a few in other parts of the world. The estimated membership is 250,000.

The National Association of Colored Women was organized in 1894. Its motto is <(Lifting as we Climb.®

Mere mention of all the important organiza¬ tions of women would require a large volume. Many of these bodies are federated with branches, or chapters, or units, in every State. One of the largest of the patriotic societies is the Daughters of American Revolution (D. A. R.), founded in 1890, with headquarters at Memorial Continental Hall, Washington. This numbers 140,853 members with chapters in all the States. The Daughters of the Revolu¬ tion, founded in 1891, also has chapters in all the States. The National Society of Colonial Dames, founded in 1892, comprises 9,000 mem¬ bers. Its council meets in Washington every two years. Each State has its independent so¬ ciety and all are presided over by the national society. The Colonial Dames of America, founded in 1892, has also a large membership. In addition

to these there are the Society of Daughters of Holland Dames; National Soci¬ ety of United States Daughters of 1812, 3,500 members; Pocahontas Memorial Association, 3,200 members ; United Daughters of the Con¬ federacy, 1894, 100,000 members; Daughters of the Cincinnati, incorporated 1894, the purpose of which is to educate a daughter of a naval or army officer with a view to self-support in teachers' college ; Imperial Order Daughters of the British Empire in the United States; Mount Vernon Ladies' Association of the Union, founded in 1853, to care for Washing¬ ton's home on the Potomac, 34 members; Na¬ tional Society of New England Women; Na¬ tional Society of Ohio Women ; Society of Illi¬ nois Women; National Congress of Mothers and Parent Teachers' Associations, 1897, 100,-000 members; National Women's Life Saving League, 1911, 2,000 members, to teach women and children swimming; American Nurses' Association, 3,500 members; Women's Univer¬ sity Club, 1891, 1,200 members; New York Women's League for Animals, free hospital and dispensary, 1910, 1,500 members; Women's Municipal League, New York, 1,500 members; Women Lawyers' Association, New York, 1899, 250 members; College Women's Clubs; Association of Women Painters and Sculptors ; National League for Women's Service, 1917, over 300,000 members, organizations of wo¬ men volunteers doing economic and social emergency service; Vassar Students, 1889, 1,225 members; Camp Fire Girls, 1912, 100,000 mem¬

bers; Girl Scouts, 60,000 members; tUid the Needlework Guild in America, established in, 1885 and incorporated in 1896, office in Phila¬ delphia with 500 branches, the object of which is to furnish garments and household linen an¬ nually to hospitals, homes and other charities and special contributions in times of disaster.

Organization in Great Britain. — The prin¬ cipal London clubs are : Albemarle, estab¬ lished 1874, 1,100 members; Alexandra, 1884, 800 members ; Automobile, 1903, 450 mem¬ bers ; Empress, 1897, 2,500 members ; Halcyon, 1911, 800 members; International, 1911, un¬ limited; Ladies' Army and Navy, 1902, 3,000 members ; Ladies' Athenaeum, 1904, 910 mem¬ bers; Ladies' Empire, 1902, 1,200 members; Ladies' Imperial, 1906, 2,300 members ; Ladies' Park, 1905, 1,400 members; Lyceum, 1904, 2,400 members; New Century, 1899, 3,000 members; New Victorian, 1896, 800 members; Pioneer, 1892, 700 members; Sesame, 1895, 950 members; Three Arts, 1911, 1,200 members; University, 1887, no limit; Victoria, 1894, 450 members, and Writers', 1891, 400 members.

There are also in Great Britain the Woman's Liberal Federation; the Women's National Liberal Association; the Scottish Women's Lib¬ eral Association; Association of Women Clerks and Secretaries; Women's Imperial Health Association; Society for Promoting the Employment of Women; and National Union of Women Workers of Great Britain and Ire¬ land, the governing body of which is the Na¬ tional Council of Women.

Many new organizations of women were founded in England during the late war. The V. A. D. of the British Red Cross and the Or¬ der of Saint John of Jerusalem extended its work and many hospitals were opened in vari¬ ous parts of the country. The work on the Continent was also enormous.

The Women's Royal Naval Service, organ¬ ized in 1917, became a valuable society. The service consisted of (<mobile® and ˆimmobile® women. The first could be sent anywhere ; the second remained at home. The service was strict and exceedingly efficient. There were of¬ ficers, chief section leaders, section leaders and ratings. The uniform was dark blue.

During the war the Woman's Army Auxil¬ iary Corps, 14,000 women, worked in direct con¬ nection with the fighting force and an additional 10,000 was called out each month. This, from its initials, was known as the (<Waacs.® In 1918 this Woman's Army Auxiliary Corps changed its name to Queen Mary's Army Auxiliary Corps, with the queen at the head. Large num¬ bers were engaged in work in France. Their work consisted of every kind of employment undertaken by a soldier except actual fighting. The large majority were skilled workers. One duty was caring for the graves of those fallen in France. The Q.M.A.A.C. wore a khaki uniform. Some of its women lost their lives in service.

The Navy, Army and Canteen Board also wore a khaki uniform. The Woman's Royal Flying Corps was an important organization. The members did not fly, but released men for duty. One section of the corps was that of mo¬ tor bicycles. The Woman's Legion was expert in motor driving, which was one of its branches of work.

The Women's Land Army produced during

the war much of the home-grown food and cared-for stock and barnyard produce. Wo¬ men drivers of the Royal Mail were also among the new corps of women workers called forth by the war. The women police also greatly increased. These bodies of women were all organized and properly governed. Among the other war-time societies were the Women's Service ˆ Bureau ; Women's Farm and Garden Union; Women's Reserve Arribulance Corps; and Health of Munition Workers' Committee.

Workingwomen's Clubs. — The working-girls, or workingwomen's, clubs are organiza¬ tions formed by industrial women and girls (<to secure by cooperation means of self-improve¬ ment, opportunities for social intercourse and the development of higher, nobler aims.® Among the most important of these are the League of Associations of Women's Clubs and the National Women's Trade Union League.

The working-girls' clubs arose out of prac¬ tical needs. They began in London. The Soho Club and the House of 180, the Club and Work¬ ing Girls' House and the Saint Giles's Evening Club for Working Girls were among the earliest. For these members many pleasures and excur¬ sions were provided. In 1883 the movement spread to this country and began with the Indus¬ trial Society of Hoboken, N. J., and the Work¬ ing Girls' Society of 38th Street, New York, which later became the Irene Club. This move¬ ment soon extended throughout the country. In some cases the clubs were formed by the girls themselves; in others by noted club lead¬ ers, or church-workers. The National League of Women Workers, formed in Philadelphia, in 1897, by the Irene Club of New York, the Industrial Society of Hoboken, the New Cen¬ tury Guild and the Saint James Guild of Phila¬ delphia and the Shawmut Club of Boston, is a notable instance of rapid growth. In 1916 it embraced 120 clubs and had 15,000 members. Its official publication is The Club Worker.

Germany was early in the field with such organizations. In 1865 the Berliner Lette Verein was founded for the improvement of the industrial efficiency of girls of the upper classes; and the Universal German Women's Union was for the improvement of women's education and the conditions of workingwo¬ men. In 1888 the Union of Progressive Wo¬ men's Unions was organized, which by 1910 had 23 branches, with 2,000 members and a paper, Die Frauenbewegung. In 1889 the Union of Women Employees was founded, which by 1915

had 150,000 members conducting a labor bureau, loan bureau and giving free legal aid. In 1889 the society Jugendschiitz was estab¬ lished, with a hygienic and an ethical propa¬ ganda and maintaining a home for working-girls. Workingwomen have organized in Ger¬ many into Socialistic Trade-Unions. Two im¬ portant national societies were in existence at the beginning of the World War: one was democratic and the other aristocratic. The first was Bund deutscher Frauenverein, Dr. Gertrud Baumer its president. The member¬ ship consists of half a million women. The sec¬ ond, Der Vaterlandische Frauenverein with 2,150 branches, evangelical and military, was called the Armee der Kaiser. At the beginning of the war the dissemination of all instruction for women in war economics was delegated to

the League of Women's Domestic Science Clubs.

In France feminism and socialism were classed together in the Revolution of 1848. The woman movement did not take root until the Second Empire, when Maria Desraismes and Leon Richer founded in 1876 the Societe pour l: amelioration du sort de la femme. This so¬ ciety was supported by Dumas fils, Victor Hugo and other men of note. In 1880 La ligue pour le droit des femmes was founded; in 1890 I /Union universelle des femmes; in 1891 La Solidarite; and in 1896 Le feminisme Chre¬ tien. In 1909 the French Woman's Suffrage Society was organized. An organization of a different order is UCEuvre de la Chanssee du Maine, founded in 1871 by Madame de Pres-sense to assist child victims of the war of 1871. This has developed into a vast centre of activ¬ ity in all branches of child-welfare. Among other organizations are L'Acceuil Frangaise de¬ voted to the children of the invalided districts; Pupilles de la Guerre and Veuves de la Guerre, which were federated during the war into one society called L' assistance de la mere et hen f ant. The National Council of French¬ women and L'CEuvre Parisienne, the latter founded and directed by Madame Brundsch-vicq, accomplished prodigious results. The As¬ sociation des Surintcndantes d'Usines and In-firmieres yisiteuses were also organizations of far-reaching service during the war.

Among the first French women to mobilize were the members of the Croix Rouge (Red Cross), comprising the three great societies: Secours aux Blesses Militaires; L'Union des Femmes de France; and U Association des Dames Frangaiscs. The Conseil National des Femmes and the Women's suffrage unions — Federation Nationale, Alliance Nationale and L'Union Frangaise — also entered into war-work. These societies held a great meeting in the Sorbonne in 1915 and planned

their work.

Conspicuous among women's organizations during the war was the Woman's Peace Party of America, which became the American Branch of the International Committee of Women for Permanent Peace. This was or¬ ganized in 1 Jan. 1915, Jane Addams, chair¬ man. During 1917 this organization main¬ tained 200 local branches throughout the United States.

The scheme of the International Congress of Women was formulated at a small confer¬ ence of women held in Amsterdam in February 1915. The result was that the Dutch women formed a committee, for an International Con¬ gress of Women to meet at The Hague. Fifteen hundred women convened there 1 May 1915, and conferred on international questions. The United States sent 47 members; Sweden, 12; Norway, 12; Italy, 1; Hungary, 9; Germany, 28; Denmark, 6; Canada, 2; Belgium, 5; Aus¬ tria, 6; Great Britain, 3 and Holland 1,000. The president of the International Committee of the Congress was Jane Addams of Chicago.

The American women came forward magnifi¬ cently to aid in war work. The Red Cross with its 5,000,000 members and 3,000 units produced chapter work-rooms, each of which was a little organism contributing to the whole. The National League for Woman's Service in six months drew to itself 300,000 members.

The Women's Committee of the Council of National Defense held a meeting in Washing¬ ton, 1 June 1917, at which 200 national organiza¬ tions of women met and outlined plans for work and service. The War Work Council of the Young Women's Christian Association; the Division of Women's War Work of the Committee on Public Information ; the Stage Women's War Relief; the Council of Jewish Women; the League of Catholic Women; the Women's Land Army; the Hadessah Women's Zionist Organization for Relief Work in Pal¬ estine and the Mayor's Committee of Women m many cities and 4owns were among the most conspicuous of (the societies produced

by the war. The most important and perhaps the latest society of importance is the Woman's Council, League of Nations Association.

Bibliography. — Consult Burrell, Caroline B., 'The Complete Club Book for Women' (Bos¬ ton 1915) ; Cass, Alice H., 'Practical Pro¬ grams for Women's Clubs' (Chicago 1915) ; Croly, Mrs. Jennie C., (The History of the Woman's Club Movement in America) (New York 1898) ; Evans, Anne Marie, 'Woman's Rural Organizations) (Government Printing Office, Washington 1918) ; Miller, 'The Woman's Club) (United States Department of Labor, Bulletins Nos. 15 and 23, and New York 1890) ; Otto-Peters, 'Das erste vierte-jahrhundert des allegemeine deutschen Frauenvereins gegriindet au 18 Okt. 1865 in Leipzig) (Leipzig 1890) ; Winslow, Helen M., 'Official Register and Directory of Women's Clubs in America) (Vol. XXI, Shirley, Mass. 1919) . Also list of books and articles in Chautauquan, No. 31 ; also Winslow, Helen M., 'Story of the Woman's Club Movement (in New England Magazine „ Boston 1908). Regarding woman's work in the European War, consult Addams, Jane, Blatch, Emily and Hamilton, Alice, 'Women at The Hague) (New York 1915) ; Atherton, Gertrude, 'The Living Present' id. 1917) ; Arbuthnot, C. C., 'Women's Eco¬ nomic Service in Time of War' (in Western Reserve University Bulletin, YTol. 20, No. 3, Cleveland 1917) ; Blatch, Harriet Stanton, 'Mo¬ bilizing Woman-Power,' with a foreword by Theodore Roosevelt (New York 1918) ; Bau-mer, Gertrud, 'Der Krieg und die Frau' (Stutt¬ gart 1914) ; Churchill, Jennie Jerome, 'Woman's Work in War Time' (London 1916) ; Clarke, Ida C., 'American Women and the World War' (New York 1918) ; 'Letters of Tomasina Atkins, Private W.A.A.C. (London 1918) ; Stone, Gilbert, 'Women War-Workers) (id. 1917) ; Usborne, Mrs. H. M., 'Women's Work in War Time' (id. 1917) ; and the following magazine articles: Ballaigue, Camille, 'La femme frangaise et la guerre' (in Revue hebdomadaire , Paris 1916) ; 'Canadian Women War-workers Oversea' (in Canadian Magazine 1919) ; James, Violet S., 'Women's Work in the War' (in Journal of American History, Vol. 12, New York 1918) ; Maud, C. E., 'What French Women are Doing' (Living Age 1918) ; Robins, Elizabeth, 'Conscription for Women' (in Contemporary Reviezv, 1917; and in the Touchstone Magazine, Vol. Ill, 1918).

Esther Singleton,

Author of ' Social New York Under the Georges* ; ' Furniture of Our Forefathers* ; ' Guide to Modern Operas ' ; (A Daughter of the Revolution'* ; *etc.*

WOMEN’S CLUBS, General Federation

of, an organization incorporated in the United States, in 1892, and within a few years was composed of over 2,675 women’s clubs, having a membership of 155,000 women in the United States and foreign countries. The purpose of the federation was declared in its articles of incorporation to be <(to bring into communica¬ tion with one another the various women’s clubs throughout the world, that they may com¬ pare methods of work and become mutually helpful. Constitutions of clubs applying for membership should show that no sectarianism or political test is required, and, while the dis¬ tinctively humanitarian movements may be recognized, their chief purpose is not philan¬ thropic nor technical, but social, literary, artis¬ tic or scientific culture.” Meeti gs of the federation are held biennially. There are now federations in all of the United States and some of the territories, and allied organizations exist throughout the civilized communities of the world. The federation in New York State is far the largest, including nearly 500 clubs and over a quarter of a million individual members. See Women’s Clubs.

WOMEN’S HOME MISSIONARY SO¬ CIETY. See Methodist Churches of the World.

WOMEN’S RIGHTS is the term applied to

the claims, made on behalf of women, to a legal, political, educational and social status equal to that of men. The modern movement in this direction dates from about 1848, having begun in the United States. Notwithstanding the ridicule which assailed its early advocates, the claims of women have been largely recog¬ nized. As the crusade advanced, it assumed form in the Woman Suffrage (q.v.) movement.

WONDER-WORKING MAGICIAN, The

(cEl Mdgico Prodigioso*) . The superficial re¬ semblance between Calderon’s play and Goethe’s ‘Faust’ has made this one of the best known of Spanish dramas. Goethe, who was ignorant of Calderon’s play when he wrote the first part of ‘Faust,’ but jealous of the Spanish playwright’s extraordinary popularity during the early decades of the 19th century, said with much truth and some bitterness, “it is the sub¬ ject of Doctor Faust treated with incredible vulgarity” (1812). In Calderon’s work, ‘Cipriano,’ a passionate young gentleman is dis¬ tracted from the pursuit of love by his studies, but upon seeing beautiful Iustina, he becomes enamored and makes a pact with the devil in order to win her. He is inspired by no yearn¬ ing for

knowledge or power over natural forces, but becomes simply one more of the countless victims of unbridled passion found in Spanish literature of the golden age, the imme¬ diate prototype being in the present instance Friar Giles of Mira de Mesqua's 'El Esclavo del Demonio' (1612). In 'Faust,' on the other hand, we have an old man who has lost faith in science and divine power, and makes a pact with the devil in order to obtain reju¬ venation. Only the incriminating charter is common to the two plays. Calderon wrote his drama for a religious celebration in the town of Yepes, 1637. For his plot he had recourse to the legend of Saint Ciprianus and Saint Iustina of Antioch, who suffered martyrdom in the early centuries of the Christian era. The

historical element is slight; and, although in¬ tended to tell a pious tale, the play soon de¬ generates, after the spirited opening scenes made familiar to English readers by Shelley's inspired rendering into a typical Spanish play of love intrigue, with unpardonable conces¬ sions by way of irrelevant buffoonery to the burghers of Yepes, for whose benefit, likewise, the author adopted a humbler style than when writing for the palace. Like other plays of the time, notably Calderon's (La Vida es Sueno' and (E1 Condenado por Desconfiado,' of doubtful authorship, it offered a defense of the doctrine of free will, the only weapon which Cipriano and Iustina used successfully against the evil one. There are editions by Morel-Fatio, Heilbronn, 1877, and by Krenkel, Leip¬ zig 1885. For translations see article on Calderon.

Milton A. Buchanan.

WONSAN, or GENSAN, Korea,, one of the open ports of the east coast, on Broughton's Bay, midway between Vladivostok and Fusan, connected by railway with Seoul and by steamers with ports in Japan, Siberia and China. It is never closed in winter. Its harbor is deep and spacious. Its superb scenery and fine climate make Wousan a favorite summer resort for foreigners. Gold and copper from the mines in the neighborhood and the agri¬ cultural products, reaching an annual value of $2,000,000, are exported through Wousan. Pop. 20,000, one-

fourth being Japanese.

WOOCHANG, China. See Wu-chang.

WOOD, wud, Alexander, Scottish physi¬ cian: b. Cupar, Fife, 10 Dec. 1817; d. Edin¬ burgh, 26 Feb. 1884. He was graduated from Edinburgh University with the degree of M.D. in 1839; and shortly afterward became one of the medical officers at the Royal College Dis¬ pensary in Edinburgh. He was one of the most prominent members of the Royal College of Physicians and Surgeons there, being president of that organization in 1858-61 and repre¬ senting it in the general medical college in 1858-74. His most important contribution to the practice of medicine was the introduction of the use of the hypodermic syringe for ad¬ ministering drugs ; this he first brought into notice by the publication of a pamphlet in 1855, entitled (New Method of Treating Neuralgia by the Direct Application of Opiates to the Painful Points.' In addition to the pamphlet mentioned he wrote (What is Mesmerism ' (1851); (Smallpox in Scotland) (1860); Pre¬ liminary Education> (1868).

WOOD, Anthony, English antiquary and biographer: b. Oxford, 17 Dec. 1632; d. there, 29 Nov. 1695. He was educated at Merton College, Oxford, and gave his life mainly to matters connected with the history of the uni¬ versity. His researches resulted in his his¬ tory and Antiquities of the University of Ox-ford) (1674). It was written in English; but as it was thought proper that it should appear in Latin for the information of foreigners, it was translated into that language under the inspection of Dr. Fell, dean of Christ Church, and published at the Oxford Press, as (Historia et Antiquitates Universitatis Oxoniensis.' Wood's (Survey of the Antiquities of the City of Oxford' was edited by Clark in 1889-99.

In 1691-92 appeared his (Athenae Oxonienses,' an account in English of the writers and bish¬ ops educated at Oxford from 1500 to 1690, but for his criticisms of the Earl of Clarendon in this work he was expelled from Oxford. The English edition of his first work, first pub¬ lished by John Gutch, appeared as (History and Antiquities of the Colleges and Halls in the University of Oxford) (1786-90) and (History and Antiquities of the University of Oxford' (1792-96). The Oxford Historical Society published an edition of his autobiography and diaries by Andrew Clark in 1891-1901. Many of Wood's original manuscripts, his diaries and much of his correspondence are to be found in the Bodleian Library.

WOOD, De Volson, American engineer: b. Smyrna, N. Y., 1 June 1832; d. Hoboken, N. J., 27 June 1897. He was graduated from the Rensselaer Polytechnic Institute, Troy, N. Y., in 1857, was professor of civil engineer¬ ing in the University of Michigan 1857-72, professor of mathematics in the Stevens Insti¬ tute of Technology at Hoboken 1872-85 and from the last-named date professor of engi¬ neering there. Among valuable inventions by him may be mentioned a steam pump, pneu¬ matic rock drill and an air compressor. He published Resistance of Materials' (1871; 7th ed. 1897); Rridges and Roofs' (1873; 2d ed. 1880) ; (Co-ordinate Geometry' (1879) ; Re¬ action Motors'; thermodynamics' (1887; rev. ed. 1905) ; turbines, Theoretical and Prac¬ tical' (1896).

WOOD, Edmund Burke, Canadian jurist and legislator: b. near Fort Erie, Ontario, 13 Feb. 1820; d. Winnipeg, 7 Oct. 1882. He was graduated at Oberlin College in 1848 and was called to the bar of Upper Canada in 1853. He served in the legislative assembly in 1863ˆ67, and after the Canadian confederation he served in both the Ontario legislature and the Canadian House of Commons, a dual representation being then permitted. He was Provincial Treasurer in the Macdonald administration in 1867-71. He resigned his seat in the Ontario legislature in 1873 and was returned to the Canadian House of Commons. In 187R82 he was chief justice of Manitoba.

WOOD, Edward Stickney, American chem¬ ist: b. Cambridge, Mass., 28 April 1846; d. Pocasset, Mass., 11 July 1905. He was gradu¬ ated from Harvard in 1867 and obtained his medical degree in 1871. He was assistant pro¬ fessor of chemistry in the Merical School 1871-76, and full professor there from 1876. He published a translation of Neubauer and Vogel's (Analysis of Urine' (1879) ; and was an expert on all matters relating to poisons. After 1873 he was chemist of the Massachusetts General Hospital. In 1880 he was a member of the Committee of Revision of the United States Pharmacopoeia.

WOOD, Eleazer Derby, American soldier: b. New York, 1783; d. Fort Erie, Ont., 13 Sept. 1814. He was graduated from West Point in 1806 and in the second war with England con¬ ducted the defense of Fort Meigs in 1813, and was brevetted major for gallantry. He partici¬ pated in the battle of Niagara or Lundy's Lane, 26 July 1814, and was brevetted lieutenant-colonel. In the sortie of 13 September he fell

at the head of his command. A monument to his memory was erected at West Point.

WOOD, Ellen Price, English novelist, best known as Mrs. Henry Wood: b. Worcester, 17 Jan. 1814; d. London, 10 Feb. 1887. In 1836 she married Henry Wood, a member of a bank¬ ing and shipping firm, and from then till 1856 lived in France. She began her literary career by contributing to Bentley's Miscellany and the New Monthly Magazine t and in the in¬ genuity of her plots excelled all her English contemporaries. In 1867 she became editor and proprietor of the Argosy magazine. Her books are not sensational, in the ordinary ac¬ ceptation of the term, and display beside re¬ markable constructive skill, not a little keen character drawing and descriptive power. They have been widely circulated both in this country and England, and among them are (East Lynne) (1861), which has had an enormous success both as a book and a drama, and still continues to be popular; (Mrs. Halliburton's Troubles* (1862) ; (The Channings,* which is a most entertaining study of schoolboy life (1862); (The Shadow of Ashlydyat) (1863); iA Life's Secret) (1867) ; (Roland Yorkc) (1869), a continuation of (The Channings) ; <Dene Hollow) (1871); (Within the Maze* (1872); (Edina) (1876); (Pomeroy Abbey) (1878) ; (Court Netherleigh) (1881) ; (The

House of HalliwelP (1890) ; and the John¬ nie Ludlow Stories> (1874-80). Consult (Memorials> by her son (1894).

WOOD, Sir Evelyn, English general: b. Cressing, Essex, 9 Feb. 1838; d. 2 Dec. 1919. He was educated at Marlborough College and joined the navy in 1852. Dur¬ ing the Crimean War he served in the Naval Brigade and was severely wounded while carrying a scaling ladder to the Redan. In 1855 he entered the army as coronet, in 1858 served in India as a brigade-major and received the Victoria Cross for conspicuous valor, De¬ cember 1859. In 1873 he served in the Ashantee War, and on his return from this campaign was called to the bar at the Middle Temple (1874). He served in the Zulu War of 1879 and was promoted to the rank of brigadier-general after his victory at Kambula. He was second in command of the British forces in the brief Transvaal War of 1881, and in 1882 went to Egypt as commander-in-chief or sirdar. In 1893 he became quartermaster-general to the forces,

and held that position until his appointment in 1897 to the office of adjutant-general. He pub¬ lished (The Crimea in 1854) (1894) ; (Cavalry at Waterloo) (1896) ; (Cavalry Achievements) (1906) ; (The Revolt in Hindustan* (1908) ; (Our Fighting Services) (1916); (Winnowed Memories) (1917). Consult (Life* by Williams

(1892).

WOOD, Fernando, American politician: b. Philadelphia, 14 June 1812; d. Washington, D. C., 14 Feb. 1881. In 1820 he removed to New York, where he was educated, and entered business . as a shipping merchant. He early became identified with political organizations and was active as campaign writer and orator. He was elected to Congress in 1840 on the Democratic ticket, serving one term. In 1850 he retired from business and in that year was the Tammany candidate for mayor of New York, but was defeated. As candidate of the

same organization in 1854 he was elected mayor of New York; introduced various reforms and was reelected in 1856 almost without oppo¬ sition. Discussion in the organization led him and his followers to form a rival body called Mozart Hall. He was the unsuccessful can¬ didate for mayor of this organization in 1858, but in 1860 was a third time elected mayor in opposition to both Republican and Tammany candidates. In 1861, when secession was under discussion, he recommended that New York should secede and become an independent city. He served in Congress in 1863-65 and 1867-77.

WOOD, Francis Carter, American patholo¬ gist : b. Columbus, Ohio, 30 Dec. 1869. He was graduated at the Ohio State University in 1891, at the College of Physicians and Surgeons, Co¬ lumbia University, in 1894, and later studied at the universities of Berlin and Vienna. He es¬ tablished himself in practice in New York and became pathologist and attending physician at Saint Luke's Hospital. He was professor of clinical medicine at Columbia University in 1906-12; and since 1912 he has been professor and director of cancer research under the George Crocker Special Research Fund at Columbia. He is also connected with the lead¬ ing New York hospitals. Besides many medical papers he is author of (Clinical Diagnosis) (1899) ; (Chemical and Microscopical Diag¬ nosis > (1905).

WOOD, George Bacon, American physi¬ cian: b. Greenwich, N. J., 13

March 1797; d. Philadelphia, Pa., 30 March 1879. He was graduated from the University of Pennsyl¬ vania in 1815 and from its medical department in 1818, and was professor of chemistry at the Philadelphia College of Pharmacy 1822-31, and of materia medica there 1831-35. He held the chair of materia medica at the University of Pennsylvania 1835-50, and of the theory and practice of medicine there 1850-60, endowing an auxiliary faculty of medicine in the university in 1865. He published (Treatise on the Prac¬ tice of Medicine* (1847) ; (Therapeutics and Pharmacology* (1856) ; and with Franklin Bache prepared (The Dispensatory of the United States* (1833; 17th ed. 1894).

WOOD, Mrs. Henry. See Wood, Ellen Price.

WOOD, Henry A(lexander) Wise, Ameri¬ can inventor, son of Fernando Wood (q.v.) : b. New York, 1 March 1866. He made a large number of inventions of use in the printing trade, most important of which is the autoplate, a machine for making plates for newspaper use, which formerly were made by hand. He has the record of taking out more patents on printing press machinery than any other in¬ ventor and is president of the Wood News¬ paper Machinery Corporation. He early interested himself in aeronautical engi¬ neering, was vice-president of the Aero Club of America, and president of the American Society of Aeronautical Engineers. In 1915 he was appointed to the Naval Consulting Board, but later resigned. He was chairman of the conference committee on National Prepared¬ ness, and a supporter of Roosevelt for the presr idential nomination in 1916. He founded Flying in 1911. He wrote (Fancies,* poems (1903) ; (The Book of Symbols, *poems (1904) ; (The Money Hunger* (1908).

WOOD, Horatio Curtis, American physi¬ cian: b. Philadelphia, Pa., 13 Jan. 1841. He was graduated in medicine from the University of Pennsylvania in 1862, and was professor of botany there 1866-76, and clinical professor of diseases of the nervous system from 1875 to 1901 ; professor of therapeutics 1876-1907, and thereafter emeritus professor of therapeutics. In addition to many professional papers he

is the author of ‘Thermic Fever) (1872) ; (Materia Medica and Therapeutics’ (1874; 11th to 13th editions rev. with son, Horatio Charles Wood, ‘Therapeutics, Its Principles and Practice,’ 1899) ; (A Study of Fever’ (1875) ; ‘Nervous Diseases and their Diagnosis > (1887); (Syphilis of the Nervous System ‘ (1889).

WOOD, Irving Francis, American bibli¬ cal scholar and educator : b. Walton, N. Y., 27 May 1861. He was graduated at Hamilton College in 1885, at Yale University in 1892, and took the degree of Ph.D. at the University of Chicago in 1902. He taught at Jaffna College, Ceylon, in 1885-89; was appointed professor of ethics and biblical literature at Smith College in 1893, and now holds the chair of biblical crit¬ icism and comparative religion there. He is joint author of ‘The Bible Story’ (5 vols., 1906) ; (The Days of the Kings of IsraeP (1908) ; (The Bible as Literature) (1914) ; and author of (The Spirit of God in Biblical Liter¬ ature — A Study in the History of Religion’ (1904) ; (Adult Class Study’ (1911).

WOOD, James Frederick, American Ro¬ man Catholic prelate: b. Philadelphia, Pa., 27 April 1813; d. there, 20 June 1883. He was educated in England and on returning to the United States entered the banking business. In 1836 he went to Rome to study for the priest¬ hood and after his ordination in 1844 became an assistant rector of the cathedral at Cincinnati, and afterward pastor of Saint Patrick’s Church. In 1857 he became bishop of Philadelphia, where he completed the magnificent cathedral in Logan Square. He also established at Overbrook the Seminary of Saint Charles Borromeo. He was created archbishop in 1875. He was especially opposed to the introduction of political issues from other countries to the United States.

WOOD, John George, English naturalist and Anglican clergyman : b. London, 21 July 1827; d. Coventry, Warwickshire, 3 March 1889. He was graduated from Merton College, Ox¬ ford, in 1848, and took orders in the English Church. In 1856-62 he was chaplain to Saint Bartholomew’s Hospital, in 1858-63 a reader at Christ Church, Newgate Street, and for seven years from 1869 conducted the festivals of the Canterbury Diocesan Choral Union. During 1879-88 he delivered numerous lectures on nat¬ ural history in Great Britain and America. His numerous works contributed very greatly to popularize natural history. Among them are (The Illustrated Natural History’ (1851); ‘Bees’ (1853); ‘Common Objects of the SeaShore’ (1857) ; ‘Common Objects of the Coun¬ try’ (1858); Routledge’s (Illustrated Natural History’ (1859-63), his most important work; ‘Common Objects of the Microscope’ (1861); ‘Our Garden Friends and Foes’

(1863) ; ‘Homes Without Hands’ (1864-65) ; ‘Common Shells of the SeaShore’ (1865); ‘Fresh and Salt Water Aquarium’ (1868); ‘Natural His¬ tory of Man’ (1868-70) ; (Bible Animals’

(1869-71); ‘Insects at Home’ (1871-72); ‘In¬ sects Abroad’ (1874); ‘Man and Beast: Here and Hereafter’’ (1874); ‘Field Naturalist’s Handbook> (1879-80) ; ‘Half-Hours in Field and Forest’ (1884) ; ‘Half-Hours with a Nat¬ uralist’ (1885) ; ‘Romance of Animal Life’ (1887). Consult ‘Life’ by his son the Rev. T. Wood (London 1890).

WOOD, John Seymour, American lawyer: b. Utica, N. Y., 1 Oct. 1853. He was graduated at Yale in 1874 and at Columbia Law School, 1876. He was editor of the Bachelor of Arts Magazine (1896-98), and has published ‘Gram-ercy Park: A Story of New York’ (1892) ; ‘A Daughter of Venice’ (1892) ; ‘College Days’ (1895) ; ‘A Coign of Vantage’ (1896) ; ‘Yale Yarns’ (1897); ‘An Old Beau, and Other Stories’; ‘A Nippon Garden’ (1915)

WOOD, Leonard, American soldier and administrator: b. Winchester, N. H., 9 Oct. 1860. He was graduated at the Harvard Medical School in 1884, and in 1885 -became a contract-surgeon in the United States army. In 1886, as first lieutenant and assistant surgeon, he served in the campaign against Geronimo and was awarded a medal of honor for his services. In 1898, when the war with Spain began, he received authority to raise and was commis¬ sioned as colonel of the first volunteer cavalry, commonly known as the “Rough Riders.” Theodore Roosevelt was lieutenant-colonel of this regiment and succeeded to its command on General Wood’s promotion. Colonel Wood commanded the regiment at Las Guasimas and the second cavalry brigade consisting of the first volunteer cavalry (Rough Riders) and the first and tenth regular regiments of cavalry at San Juan Hill. On 8 July 1898, he was, on the recommendation of his superiors, appointed brigadier-general of volunteers for services at San Juan and Las Guasimas. On the surrender of the city of Santiago, he was appointed gov¬ ernor of the captured city and later, on the relief of General Lawton, he was made governor of all the captured territory embracing the eastern portion of Cuba, including the province of Puerto Principe and Santiago. On 7 Dec. 1898, he was appointed a major-general of vol¬ unteers in recognition of his services as gov¬ ernor of the captured territory. On 13 April 1899 he was mustered out as major-general of volunteers and reappointed on the same day as brigadier-general of volunteers and continued in this grade until 5 Dec. 1899, when he was again appointed as major-general of volunteers and

designated to relieve Maj.-Gen. John R. Brooke as military governor of Cuba. General Wood continued in this capacity until its transfer as an organized republic to the duly elected Cuban government through its representative, Thomas Estrada Palma, the duly elected president.

During this period of reorganization school laws were written, sanitary regulations were enforced throughout the island, laws of public works and charities were revised and rewritten, an entirely new railroad law was prepared and put in force and most extensive judicial reforms accomplished. Especially great attention was given to sanitation, schools and courts. It was under General Wood's supervision that Maj. Walter Reed and his assistants, Doctors Carroll and Lazear of the medical department, con¬ ducted the great work which led to the dis-

covery of the means of transmitting yellow fever and consequently of its control. The death rate of the island was greatly reduced and the system of public education established proved to be admirable.

On 4 Feb. 1901, General Wood was appointed a brigadier-general of the regular army. Dur¬ ing his incumbency of the office of military gov¬ ernor of Cuba, the postoffice cases occurred which led to the indictment, trial and conviction of Rathbone and others and incidentally, through their friends, resulted in an effort to defeat General Wood's confirmation as major-general. He was, however, confirmed by an overwhelming majority, 8 Aug. 1903. In the fall of 1902 he was one of the representatives of the United States government at the Im¬ perial German manoeuvres. In March 1903, at his own request, he was detailed for duty in the Philippine Islands and continued in foreign service until November 1908. While there, he was in command of the Department of Min-danou and the first civil governor of the newly organized Moro province, which included the Mohammedan section of the Philippine Islands. After numerous campaigns he was successful in quelling the organized opposition to occupation by the United States. He later received the assignment of commanding general of the Philippine division, which position he

held until relieved from duty in the islands. On his return to the United States, he was assigned to the command of the Eastern Department, which command he exercised until his detail as chief of staff, United States army, 22 April 1910. In the same year, he was designated special Ambassador of the United States to the Argen¬ tine Republic, on the occasion of the celebration of the 100th anniversary of that country's in¬ dependence. Upon completion of his duties as chief of staff (1914), he was reassigned to the command of the Eastern Department, which he held until 1917, when he was appointed in command of the southeastern department, a subdivision of his old command. In 1908 Gen¬ eral Wood began his vigorous work on pre¬ paredness and pushed it through the length and breadth of the land on all possible occasions. The work was advanced with increasing vigor from year to year and reached its climax in 1913, with the establishment of the training camps of Plattsburgh. While in command of the Southeastern Department, General Wood selected 12 of the National army cantonments for the training of the National army.

While at Camp Funston General Wood organized and trained the 89th division and later on the 10th regular division, with a num¬ ber of pioneer regiments and special organiza¬ tions. He was sent overseas on a tour of observation, was quite seriously wounded, was in a French military hospital for some weeks and returned to the front and completed his tour of observation. When the 89th division was ordered to the front General Wood accom¬ panied it to the sea and was there relieved and sent back to Camp Funston, where he organized and trained the 10th regular division and was in command of it at the time of the armistice.

The degree of LL.D. was given General Wood by Harvard University (1899) ; Williams College (1902) ; Pennsylvania (1903) ; Prince¬ ton (1916) ; University of the South and Uni¬ versity of Georgia (1917) ; University of Michi¬

gan (1918) ; Union College, New York, and Wesleyan, Connecticut (1919). He received the degree of Doctor of Military Science from Norwich University and from Pennsylvania Military College (1912). General Wood holds a Congressional Medal of Honor (Geronimo campaign) ; is fellow of the Royal Geographi¬ cal Society; member of the Society of the Cincinnati; the Society of Colonial Wars, Sons of the Revolution, Foreign Wars, Indian Wars, and of the Spanish-American War. He is fellow of the Academy of Sciences of Havana and Governor-General of the Mayflower So¬ ciety of the United States.

When he repre¬ sented the United States at the German manoeu¬ vres in 1902 and the French and German man¬ oeuvres in 1908, he was named Grand Officer cf the Legion of Honor, permission to accept which distinction was withheld by the United States. Authority to wear this decoration was granted subsequently in the general order which authorized American officers to wear foreign decorations. In 1920 General Wood was a prominent candidate for the Republican Presi¬ dential nomination, receiving as high as 314*4 votes on a single ballot at the Chicago Con¬ vention. In 1921 he was chosen head of the University of Pennsylvania ; but was granted leave of absence that he might undertake the duties of governor-general of the Philippines, to which post he was appointed by President Harding. Besides numerous magazine articles on preparedness, General Wood is the author of 'The Military Obligation of Citizenship' (1915) ; (Our Military History' (1916) ; Na¬ tional Defense' (1917) ; and (Universal Mili¬ tary Training' (1917). Consult Baker, Gen¬ eral Leonard Wood' (in McClure's, Vol. XIV, pp. 368-79, 1900) ; 'The Case of General Wood' (in the Outlook, 2 Jan. 1904) ; (The Amazing Case of General Wood' (in Scientific American, 15 June 1918) ; 'The Removal of Maj.-Gen. Leonard Wood' (ib. 14 April 1917) ; and Mar-casson, T. F. 'Leonard Wood.'

WOOD, Robert Williams, American phys¬ icist. b. Concord, Mass., 2 May 1868. He was graduated at Harvard University in 1891, stud¬ ied at Johns Hopkins University in 1891-92, and at the University of Berlin in 1892-94. He was connected with the faculty of the Univer¬ sity of Wisconsin in 1897-1901 ; and since 1901 has been professor of experimental physics at Johns Hopkins University. He was appointed major in the Officers' Reserve Corps in August 1917, and was later engaged in scientific service in France. He was the originator in 1898 of the electrical method of thawing frozen water mains and service pipes ; has made important researches in the theory of light, for which he was awarded the Rumford medal of the Ameri¬ can Academy of Arts and Sciences; and for his work in color photography he received medals from the London Society of Arts in 1900, the Franklin Institute in 1907, and the Dresden In¬ ternational Exhibition in 1909. He is joint author with A. C. Train of 'The Man Who Rocked the Earth' (1915); and author of 'Physical Optics' (1905; rev. ed., 1915); and of two books of humorous verse, 'How to Tell the Birds from the Flowers' (1907); 'Animal Analogues' (1908).

WOOD, Thomas John, American soldier: b. Munfordville, Ky., 25 Sept. 1823; d. Day-

ton, Ohio, 25 Feb. 1906. He was graduated from West Point in 1845, served under General Taylor in the Mexican War and was on fron¬ tier duty in Texas 1849-55. At the outbreak of the Civil War he was promoted lieutenant-colonel in the Federal army and later brigadier-general of volunteers. He commanded a divi¬ sion at Shiloh and Corinth and also at Chickamauga and Missionary Ridge, and for gallantry at the latter engagement was brevetted briga¬ dier-general. He commanded the Fourth corps at Nashville and for his services there was brevetted major-general in 1865. In June 1868 he was retired from the service.

WOOD, Thomas Waterman, American artist: b. Montpelier, Vt., 12 Nov. 1823; d. New York, 1903. He studied art in Boston in 1848, afterward continuing his studies in Eu¬ rope. In Diisseldorf he was the pupil of Hans Gude. He was well known as a portrait painter and for several years traveled about the country in this capacity, finally settling in New York in 1866. After removing to New York Mr. Wood devoted himself almost entirely to genre painting, in which he chose familiar subjects in American life. He became a member of the National Academy in 1871, and from 1878-87 was president of the American Water Color Society. He was president of the National Academy of Design from 1891 to 1899. He also was one of the founders of the New York Etching Club, and was a regular contributor to its exhibitions, most of his etching being after his own paintings. Three of Mr. Wood's paintings, (The Contraband,) <Recruit) and <Veteran,) exhibited at the Academy of De¬ sign in 1867, now are among the pictures at the Metropolitan Museum of Art. Many of his portraits are in the Chamber of Commerce col¬ lection. During the last decade of his life Mr. Wood visited Europe three times, copying the best masters in London, Paris, Saint Petersburg and Cassel, giving especial attention to Rem¬ brandt and Murillo. With these copies and with original works of his own he founded the Wood Art Museum in his native town.

WOOD, Walter, English author: b. Brad¬ ford, Yorkshire, 10 March 1866. He was for more than 10 years attached to the staff of the Yorkshire Daily Observer and has published ‘Barrack and Battlefield) (1897) ; (Famous British Warships and Their Commanded (1897) ; (With the Flag at Sea) (1901) ; (Wel¬ lington’s Dispatches5 (1902) ; (The Roar of the Sea) ; (A Corner of Spain) ; (In Line of Battle.)

WOOD, Walter Abbot, American inven¬ tor: b. Mason, N. H., 23 Oct. 1815; d. Hoosick Falls, N. Y., 15 Jan. 1892. Having early given his attention to the improvement of farming implements, he in 1850 introduced the Mauny harvesting machine with original improvements. He continued to improve mowers and reapers and in 1884 disposed of 48,300 machines. His inventions were covered by about 30 patents, and he was awarded first prizes at the World’s Fair in Paris in 1867, in Vienna in 1873, in Philadelphia in 1876 and in Paris in 1878.

WOOD, William, English colonist in Amer¬ ica : b. about 1580; d. Sandwich, Mass., 1639. He came to America in 1629, returned to Eng¬ land in 1633, but not long after again sailed for Massachusetts, where he settled first at Lynn, which he represented in the General

Court in 1636, and afterward (1637) at Sand¬ wich, of which he became town-clerk. In 1634 he published in London (New England’s Pros¬ pect,) the first printed account of Massachusetts. The perfect copies extant contain a map of the region. The prose narrative is interspersed with rimed descriptions of natural history. This curious work was reprinted in 1764 (Boston) and 1865 (also Boston; Prince Society).

WOOD, William Charles Henry, Cana¬ dian historian: b. Quebec, 7 June 1864. Lie was educated in England and in Germany, entered the Canadian militia in 1887, and in 1907 became lieutenant-colonel of the Eighth regiment, Royal Rifles. In 1917 he was appointed co¬ ordinating officer of the Canadian Special Mis¬ sion at the Naval and Military Fronts, with rank of lieutenant-colonel in the Officers’ Re¬ serve. He has written (The Fight for Canada) (1904) ; ‘Logs of the Conquest of Canada5 (1909) ; ‘One Sea, One Fleet and Canada) (1910) ; ‘Wolfe5 (1912) ; (In the Heart of Old Canada5 (1913) ; (The Passing of New France> (1914) ; (Select British Documents of the War of 18125 (3 vols., 1915); ‘Laurenciana : Lands and Waters of the Maritime Saint Lawrence5

(1918).

WOOD. Wood is a more or less compact tissue which constitutes the part of the trunks, branches and roots of arborescent vegetable growth, lying between the bark and the soft sapwood next the bark, and the pith at the centre. The word “wood55 is derived from the Anglo-Saxon widu, a tree. The outer layers, or sapwood, are called the alburnum. The inner solid wood is called the duramen. Tim¬ ber is wood large enough for architectural uses, such as boards, planks, beams. The term hardwood is applied to such woods as mahog¬ any and oak where the cells have thick walls and are closely packed together. Soft wood has large cells and thin cell walls, such as white pine, cedar, poplar. It would seem in this century that wood is losing its importance as a material of construction. For framing, iron and steel seem to have dethroned wood ; and even in furniture, iron has taken the place of wood in certain parts. The wooden stagings and centrings with which the stone and iron structures are erected are almost as interesting as the structures themselves. Wood is elastic, comes back into place and is easily worked. Wood is not imperishable, neither is iron. One reason why wood is being used so little in con¬ struction is because it is not employed in a natural way; instead of leaving it natural, it is covered with plaster; often wood is used green when it should be seasoned. A prac¬ tical way of getting at the quality of wood is to find its price in the market. For example, oak which would sell at a low price would be good enough for the best floor, while oak for furniture wrould be sold for half as much more.

The principal countries where wood has been generally used as building material are the United States, Switzerland, Norway and Japan. The chalets of Switzerland with their big over¬ hanging roofs and flat balustrades with jig-sawed patterns, are well known. The wooden construction of Norway and Sweden has some resemblance to these. The Japanese wooden houses and temples are unique and show their artistic development. Vitruvius describes the woodwork of ancient Rome, but nearly all

traces of it have disappeared. Caesar's bridge is well known to all students. The huge con¬ crete and stone buildings of the Roman em¬ pire were built on wooden centring, which was as carefully constructed as if it were to be permanent itself. The half-timber work of the Middle Ages where the framing was made of heavy timbers was filled in between with plaster, making a very solid permanent con¬ struction. The ceilings of the churches of the Middle Ages were frequently worked out in timber, and many of the Gothic churches had timber roofs, which followed out the feeling of the Gothic style. The shingle architecture of the modern American country house, the old colonial buildings and the still earlier log cabins

are good examples of what can be done with wood construction. The defects of timber are caused by splitting, knots, rot, sapwood and warping. Timber should have a straight grain, should be well seasoned, and if not weather-sea¬ soned, should be kiln-dried.

The development of the modern system of wood framing resembles strikingly the still more recent American methods of steel construction, as both are a veneer on a simple framework. Neither the country house nor the office build¬ ing expresses its constructive features on the exterior. This, of course, has an economic cause: it is much easier to start the rough carpentry with the sill when the mason has completed his wall and carry out all the rough framing and boarding with the knowledge that none will show as finished work; all the effort will tend to rapidity and strength. The ex¬ terior is then covered with shingles or clap¬ boards, and the interior with lathing and plas¬ tering, leaving a finished plaster surface. Then follows the "joiner® or carpenter for the fin¬ ished interior work, which is put in after the plastering is dry, and therefore is entirely separate in time and character from the rough framing.

Defects in Timber. — It is very important to remove the sapwood with care, for it con¬ stitutes a soft, spongy mass, containing fer¬ mentable sap and allowing dampness to pene¬ trate very easily; rot develops and worms ap¬ pear, and from the sapwood, go through the whole substance. Lumber is piled or "stuck® after it is sawed with small sticks of wood between the pieces to allow a circulation of air, and allowed to remain for several months. For interior finish, the wood is generally seasoned by artificial means, that is, "kiln-dried.® The pieces are put in a room heated by steam to a temperature of about

150° F. and allowed to remain for several days or weeks until thor¬ oughly dry.

Preservation of Timber.— Up to the pres: ent time the greatest attention has been given to

the preservation of railroad ties. The principal processes are those where either creosote or zinc chloride is used. Sometimes a combination is employed. All French and English ties use the creosote process, which gives them a life of 20 to 25 years. A recommended combination is 38 per cent dead oil of coal tar, 60 per cent resin melted, 2 per cent formaldehyde. Inject this after raising the timber to 250° F.

Quarter-sawing. — This term is applied to a log cut lengthwise into quarters, so that the quarters can be cut into boards parallel to the radius of 45 degrees between these cuts. These sections are so nearly in the plane of the me¬ dullary rays that they show the best grain, especially in oak, and boards cut in this way are less likely to warp and show little shrinkage. Often the grain of wood which renders it weak will give a good effect for paneling or veneer¬ ing. In Fig. 1, plank A is quarter-sawed and will lie flat and will not splinter ; plank B is poorly cut, being taken from one side of the log, as in Fig. 2, A. If the first board were

taken directly through the centre of the log and the others parallel or perpendicular to it the grain would lie nearly parallel with the medullary rays as shown at B (Fig. 2). In Fig. 1, plank B is poorly laid and would stand much better if laid with the heart or hollow side down, as in Fig. 1, C.

Framing. — From the period of the first settlement of America, the cheapness of wood has made it the popular building material. The log-cabin was built of the logs cut when the early settlers cleared the land. Two sides were adzed off and the ends of the logs were notched so as to fit closely at the corners. The cracks were filled in with mud and the roof framed with small roughly-worked rafters which were covered with split shingles. The advent of the sawmill soon brought into use ((dimension® lumber, rectangular in section, to be set so that its broadest side would take the strain. For example, two-inch by eight-inch floorings 12 inches or 16 inches apart and strongly braced

or “bridged® by small pieces nailed in between, took the place of 10-inch by 10-inch timbers which spanned the same space at greater in¬ tervals but necessitated the use of much more timber on account of their own size and also because of the larger amount of timber neces¬ sary for filling in between. This evolution has brought us to two methods of wood con¬ struction, the “full frame® and “balloon fram¬ ing,® the latter being used for small buildings, such as ordinary dwelling-houses only.

Northern Pine (rare) (Pin ns sylvestris) is also called Norway pine and Scotch fir, and is known in Great Britain as red or yellow deal. It is found in the northern parts of Europe, especially in Scandinavia on the mountains where there are large forests of these trees. Its color is warm with reddish tones. . When first cut it is very resinous. It is one of the

COPYRIGHT, 1913. BY F. E. WRIGHT

most useful pine Woods and is strong, durable and easily worked. Its timber, which is used in both civil and naval architecture, is exported from Norway, Sweden, Prussia and Russia.

Canada Red Pine (Pinus resinosa) . — This wood is sometimes called Norway pine. It takes the name of red pine from the color of its bark. The trees are found throughout Canada, but the best red pine is found in the northern parts of Wisconsin and Minnesota. The trees are sometimes 140 feet high. Its wood is tough, and has but few knots. It

is used in construction of all kinds, flooring, pil¬ ing, *etc.*

White Pine (Pinus strobus). — Also called Weymouth pine after Lord Weymouth, who planted it first in England in 1708. The trees are found in large forests in Canada and in the Great Lakes region. The wood is soft and easily worked, of a straight grain, of a light straw color and has but few knots. The tree is tall and impressive, reaching sometimes 200 feet in height. It was formerly the most ex¬ tensively used soft wood in America.

Yellow Pine (Pinus mitis) is also called short-leaved pine, to distinguish it from the long-leaved Georgia pine. It is a native of the Western and Southern States. West of the Mississippi its hard fine grained wood is made into timber, but the timber is not so large as that of the Georgia pine.

Georgia Pine (Pinus palustris), known as the long-leaved or Georgia pine and as the tur¬ pentine tree. Its wood is coarse and owing to its having so much resin it is extremely difficult to work. The wood is used for coarse lumber, shipbuilding, heavy timber, and for obtaining tar, pitch and turpentine.

Norway Spruce (Picea excelsa) is a tree which attains great height, often growing as high as 150 feet, and is a native of the northern parts of Europe and Asia. Its branches grow quite near to the ground as do all firs. This wood has many hard knots, which makes it very difficult to cut. It is used nevertheless for masts, spars, boards, *etc.* Large quantities are shipped from Russian ports and some of the best stock comes from Christiania.

American Spruce (Picea nigra) , or black spruce, much resembles the Norway spruce ex¬ cept that its color is grayer and colder. It grows from 50 to 70 feet in height and is found in British America and northern parts of the United States. Its wood is light and strong and is much used in shipbuilding, and general rough framing.

Cedar, an evergreen tree of the coniferous genus. Its wood is soft and of a reddish brown color and sometimes has a very fragrant odor. It is used for chests and cigar boxes. There are three known species of cedar. The cedar of Lebanon is noted, of which there still re¬ mains a grove of some 400 trees.

Basswood (Tilia americana). — This wood is the American Linden or lime tree; it is also called bass. It is a yellow ochre in color and straight-grained. It does not wear very well but stains and polishes

easily.

American Whitewood (Liriodendron tulipi-fera) is the whitish timber of the tulip tree, the wild cinnamon, basswood and Guiana plum trees. It grows in the Middle States. Its wood is of a pinkish gray color, very soft and of a smooth surface. It is used largely for sheathing. It is exported from New York and Philadelphia.

Birch American (Betula latea), called also yellow birch. This tree has a smooth outer bark, close grain, moderately hard wood and is used for making furniture, for fuel and other purposes. The oil from its bark is used to give Russia leather its odor.

Ebony (Diospyros ebenacece) is the name given to a wood of a very dark color. It is very hard and heavy and often jet black and sinks if put into water. It takes a fine polish and is much used for high class cabinets, toilet sets, inlaying, making flutes, *etc.* It is a native of the flat parts of Ceylon. Its usual color is black, but the variety in Jamaica is green.

Beech (Fagus) is a large straight tree with beautiful thick foliage. Its height is from 50 to 70 feet. The bark has a smooth, hard sur¬ face and is blue gray in color. Beech is not much used for building work, for it is not durable except when very wet or very dry. It warps but little and its hardness makes it well fitted for making a great variety of tools and for cabinet work.

Oregon Pine (Pseudotsuga taxifolia), known also as Oregon fir, Nootka fir and Douglas pine. Large forests of these trees grow in the western part of the United States and Alaska.

The following are the various kinds of lumber which are used for different purposes :

Piles. — Oak, elm, beech, spruce. Posts set in the ground, hemlock, acacia.

Strong Construction. — Oak, teak, yellow or Georgia pine. Available in damp situations, oak, beech, elm, acacia, alder, chestnut. For large timbers, Oregon pine, Georgia pine, oak, bay mahogany, chestnut.

Floors. — Oak, maple, birch, beech and rift Georgia pine are the best floors for hard wear; North Carolina pine for cheaper floors, and spruce floors where they are to be covered or painted. Oak, hard pine,

teak will wear the longest.

Interior Finish and Panels. — Cypress, North Carolina pine, oak, mahogany, sycamore.

Window Sills. — Oak, white pine, mahogany.

Stair Treads. — Oak, hard pine, teak. For school interior finish, ash, hard pine, North Carolina pine.

The wood products of American forests, as shown in the last United States Industrial Census were worth $715,310,333.

Bibliography. — Boulger, (Wood: a manual of the natural history and industrial applications of the timbers of commerce> (1902); Boulton, (The Preservation of Timber, by the Use of Antiseptics) (1885); Charpentier, (Timber: Its Uses> (1902) ; Dupont, (Les Bois) (1875) ; Chandler, (Appliances and Products of Meth¬ ods Employed for the Preservation of Wood) (United States Commissioners to the Paris Ex¬ position of 1889. Reports, Vol. II, 1891) ; Eassie, (Wood and Its Uses) (1874) ; Hartig, (Timbers and How to Know ThenP (1890) ; Hurst, (Handbook for Architectural Surveyors> (1892) ; Hough, (The American Woods, Ex¬ hibited by Actual Specimens> (1888—92) ; Hub¬ bard, Utilization of Wood-Waste) (1902) ; Laslett, (Timber and Timber Trees, Native and Foreign) (1875) ; Newlands, (Carpenter's and Joiner's Assistant (1880), and the publications of the United States Bureau of Forestry.

Frank A. Bourne, Architect , Boston , Mass.

WOOD ALCOHOL, WOOD NAPH¬ THA, WOOD SPIRIT, *etc.* See Alcohol.

WOOD-BORING BEETLES, beetles which lay their eggs in or upon wood, into which the larvae begin to bore immediately after hatching and from which they derive their sole sustenance. Living upon this

innutritious sub¬ stance their growth is generally slow, and by the end of the several years spent in the larval condition they have often excavated extensive galleries which increase in diameter as the larvae grow. The larvae of many beetles feed upon dead or decaying wood only, and many of these may be considered useful to man, as they assist in reducing stumps and fallen limbs to a condition of vegetable mold. ˆ Others con¬ fine their attacks to the bark and are seldom serious pests. Many species bore into sound wood either in the standing growing tree, in the dressed lumber, or even in the finished house or article of furniture. Such often commit in¬ calculable damage. The families C erambycidce and Buprestidce are notorious as comprising species almost exclusively of wood-boring hab¬ its, and those whose larvse do not excavate wood burrow into roots or soft plant tissues. The Cerambycidce (q.v.), or longicorn beetles, in¬ clude one of our largest beetles, the broad¬ necked prionus (Prionns laticollis) , which reaches a length of nearly two inches and is unusually robust for the family ; it is of a deep brown-black color, and the jaws are exceed¬ ingly stout. The great white larvae are two or three inches long and bore into the roots of forest and orchard trees and blackberry plants. The latter are quickly killed and even large trees will succumb if the borers are abundant. They live three years. The apple-tree borer (Saperda Candida) in the beetle state is brown with a conspicuous white stripe running the entire length of the body on each side above. It flies mostly at night during the early summer months and lays its eggs on the trunks of apple, quince and pear trees near the ground. The larva is cylindrical and very strongly annulated and when' fully grown is an inch long. It lives three years, the first one being spent in the sapwood, the others in the interior of the trunk. Its attacks are frequently fatal and the only effective measures are preventives. A strip of tin or wire gauge nailed to the tree trunk from the ground to a height of two feet will prevent most of the females from de¬ positing their eggs. Another exceedingly seri¬ ous pest is the locust-tree borer (Cyllene rob-inice) which has habits similar to the last and which often riddles the trunks of locust-trees with its burrows, killing them in a few years. The beetles are very pretty, being dark velvety brown, with angulated cross-lines of yellow. They abound during the early autumn and feed upon the pollen of the goldenrods. Numerous closely related species attack other hardwood trees. A peculiar habit is possessed by the twig-girdler (Oncideres cingulatus) which in order to provide its larvae with the dead wood upon which they feed cuts a deep circular trench around the twigs of hickory and other forest trees below the point at which its eggs have been deposited. The twig dies, falls to the ground and the larva completes its span of life in security.

The species of Buprestidce (q.v.) differ

greatly in appearance from the longicorns ; but have similar habits. The larvae are distinguish¬ able by the greatly expanded prothoracic ring immediately following the head, which is very small and retractile. They are always footless.' Although the buprestids nearly equal the longi¬ corns in number of species, and exceed them in variety of forms those in our fauna are smaller and because of their plainer colors, much less conspicuous. Many of the tropical species, however, are of great size and brilliant colors and some of their larvae, which may ex¬ ceed four inches in length, are eaten. A species very injurious to pear orchards is the sinuate borer (Agrilus sinuatus) whose extensive winding galleries in the cambium layer often almost completely sever the bark from the wood and kill the tree. The beetle is about half an inch long and both it and the larvae are slender. Blackberry canes are often infested by another species (Agrilus ruficoblis) , the lar¬ vae of which excavate irregular passages and cause the formation of gall-like enlargements. The species of Chrysobothris form excavations beneath the bark and in the sapwood of vari¬ ous forest trees, and one species (C . femorata) is an orchard pest and another (C. harrisii) injures the white pine.

The true bark-borers mostly belong to a family, the Scolytidce. closely related to the weevils (q.v.). They form most elaborate bur¬ rows on the inner-surface of the bark, con¬ sisting of numerous galleries radiating in all directions from a central chamber. See Bark-beetles.

In combating wood-boring beetles the method must be suited to the habits of the par¬ ticular species, but in general all infected wood should be burned or the larvae picked out and destroyed. Egg laying should be prevented as far as possible by painting the tree trunks with soap-suds, kerosene emulsion, or similar re¬ pellents. Woodpeckers perform a valuable serv¬ ice in the destruction of these larvae.

Consult Harris and Flint, (Insects Inju¬ rious to Vegetation) (New York 1884) ; Pack¬ ard, (Insects Injurious to Forest and Shade Trees> (Washington 1890) ; Leconte and Horn, <Coleoptera of North America) (Washington 1883) ; Thompson, (Systema CerambycidarutrP (Paris 1865).

WOOD CARVING, sculpture In wood, either in low relief or in the round. On the whole the grain and structure of wood make it more suitable for carving in relief than for large statues ; some woods

without much dis¬ tinct grain can be carved almost as marble or stone ; in other woods the artist must care¬ fully adapt his design to the grain of the wood. Wood used for carving must be carefully sea¬ soned and specially prepared; one method of seasoning it is to soak it, when newly cut, in run¬ ning water, thus washing away all the sap, and then to dry out the water ; an ancient method was to smoke it with wood smoke; still another method is to dry the wood in hot rooms, after pieces of paper have been glued on the ends to prevent the sap from drying out at the ends too rapidly. The woods most commonly used for carving are oak, chestnut, walnut ; cedar in an¬ cient times; sandalwood and other perfumed woods in the East; pine, fir and similar soft woods ; the last mentioned being especially fitted for carving on a large scale.

History. — Wood carving has occupied an important place in the early development of the fine arts in most nations; although it was almost unknown in Babylonia, Assyria and Persia, it was common in Egypt in early times, in India, in China, and in Japan; and is now practised by many savage and semi-savage races. Par¬ ticularly the Maori and Polynesian races use an abundance of wood carving, not only on the walls and beams of their dwellings, ‘but also on their paddles, weapons, *etc.* Their representa¬ tions of beasts and men are usually grotesque, but they also carve complicated geometrical fig¬ ures, spirals, etc., of real beauty and freedom of design. The oldest example of wood carv¬ ing which is now preserved is Egyptian, a life-size statue of a man known as the Sheikh-el- Beled, dating from 4,000 b.c., which gives evi¬ dence of marked technical skill; several other smaller pieces of Egyptian carving are also preserved. No specimens of Greek and Roman wood carving have been preserved, but the classical writers leave no doubt that wood was used in the early days of art in both Greece and Rome and many of the sacred statues were undoubtedly of this material. Wood carving reached its highest development in the Middle Ages. The best early specimens of mediaeval carving are found in the Scandinavian coun¬ tries, on several church doorways, dating from the 9th to the 13th centuries;

these are carved on pine and the designs consist mostly of inter¬ lacing scroll work, combined with figures. The art reached its highest point in France, Germany, England and Italy in the 14th and 15th cen¬ turies. The best examples are found in the furnishing of churches, the pulpits, choir stalls, altar screens, *etc.* The most careful atten¬ tion to detail, and artistic combination of fig¬ ures, leaf and scroll work, combined with dignity of design, mark the best medieval wood carving. Wood was used for the images of saints and for effigies on tombs ; and also for larger pieces of carving, such as roofs of churches and other edifices, often richly deco¬ rated, with figures or foliage designs. In the Renaissance period wood carving was lavishly used in church decoration, choir stalls, con¬ fessionals, desks and pulpits; in Italy ceilings were also elaborately carved; but the designs, though elaborate and skilfully worked out, began to lose the dignity of the mediaeval carvings, and to indicate a low ebb of taste. In recent times the art of wood carving has lost entirely its former importance. It is best developed among the Swiss peasants, where it is a regularly organized business ; and is to some extent preserved among workmen in the provincial towns of France. In Switzerland it is used mostly for clocks, small articles of fur¬ niture, toilet articles, *etc.* In England and the United States wood carving has recently been revived to some extent as a valuable part of art training or of general manual training.

Consult Bond, F., (Wood-Carving in Eng¬ lish Churches) (2 vols., Oxford 1910) ; Hasluck, P. N., (Wood Carving* (Philadelphia 1908); Jack, (Wood Carving, Design and Workmanship) (1903) ; Masked, Alfred, (Wood Sculpture) (London 1911), the best general work on the subject; Lessing, J., (Holz-schnitzerlien des 15 und 16 Jahrhundert* (Berlin 1882); De Lostalot, (Les arts du bois)

(Paris 1893) ; Ferrari, <11 legno nell' arte italiana) (Milan) ; Rowe, Eleanor, ˆPractical Wood Carving) (London 1907) ; Williams, (History of the Art of Sculpture in Wood)

(1835).

WOOD-CHARCOAL, most important, though not the purest, kind of charcoal. Wood consists of carbon, hydrogen and oxygen, the last two being in the proportion to form water. When heated in the open air, it burns com¬ pletely away, except a small white ash ; but if the supply of air be limited, only the more vola¬ tile matters burn away and most

of the carbon remains. This is the principle of the process of charcoal-burning in countries where wood is abundant. A number of billets of wood are built up vertically in two or three rows into a large conical heap, which is covered over with turf or moistened charcoal-ash, holes being left at the bottom for the air to enter. A hol¬ low space also is left in the middle of the heap to serve as a flue for the gaseous matters which are evolved. The heap is set on fire by throw¬ ing burning pieces of wood into the central opening near the top of which a kind of grate made of billets of wood is placed to prevent the burning fuel from falling at once to the bottom. The combustion then proceeds gradu¬ ally from the top to the bottom, and from the centre to the outside of the heap; and as the central portions burn away, fresh wood is con¬ tinually thrown in at the top, so as to keep the heap quite full. The appearance of the smoke shows how the combustion is proceeding: When it is going on properly, the smoke is thick and white ; if it becomes thin, and espe¬ cially if a blue flame appears, it is a sign that the wood is burning away too fast and the com¬ bustion must then be checked by partially stop¬ ping up the holes at the bottom, or by heaping fresh ashes on the top and sides and pressing them down well, so as to diminish the draught. As soon as the combustion is completed, the heap is entirely covered with turf or ashes and left to cool for two or three days. It is then taken to pieces and the portions still hot are cooled by throwing water or sand on them. One hundred parts of wood yield on the aver¬ age 61 to 65 parts by measure, or 24 parts by weight, of charcoal. (Consult Watts, (Diction¬ ary of Chemistry.*) The charcoal thus pre¬ pared is the best suited for fuel. In England a large quantity of charcoal is obtained in the dry distillation of wood in cast-iron cylinders for the preparation of crude acetic acid; the-charcoal thus prepared is preferable for making gunpowder, but inferior for other purposes. A peculiar kind of charcoal of reddish-brown color, hence termed charbon roux, is prepared in France for manufacture of the gunpowder used in sporting, by subjecting wood in iron cylinders to the action of superheated steam under a pressure of two atmospheres ; powder made with this charcoal absorbs moisture more rapidly than ordinary gunpowder.

The general properties of wood-charcoal are that it is black and brittle and retains the form of the wood from which it was derived; it is insoluble in water, infusible and non-vola¬ tile in the most intense heat; has power of con¬ densing gases and, from its power of destroy¬ ing bad odors, it has been regarded as possess¬ ing considerable antiseptic properties. It is

frequently stated that charcoal is a poor con¬ ductor of heat, but a good conductor of elec¬ tricity; these properties depend on the nature of the charcoal, the lighter wood, such as wil¬ low, yielding a porous charcoal, with little power of conducting heat or electricity; while boxwood yields a very compact charcoal which is a good conductor of heat and electricity. Charcoal never consists entirely of pure carbon, the degree of purity varying directly with the temperature : thus, charcoal charred at 480° contains 65 per cent carbon, while that charred at 750° contains 80, and that charred at 2730° contains 96; but the loss of charcoal occasioned by these high temperatures is very great, the three percentages of charcoal corresponding to these temperatures being 50, 20 and 15.

The uses of wood-charcoal are numerous and extensive. It is very largely used as a fuel, taking in many countries the place of coal. From its being proof against all ordinary chem¬ ical agencies, a superficial charring is frequently resorted to for protecting wood from decay, as in the case of piles driven into mud or into the beds of rivers to serve as foundations. For the same purpose, it is a common practice to char the interior of tubs and casks destined to hold liquids. In a finely-divided state it is commonly regarded as an antiseptic; and there is no doubt that the offensive effluvia from animal matter in an advanced stage of putrefaction disappear when the putrefying substance is covered with a layer of charcoal; but in reality the decay goes on without emission of any odor until at length the whole of the carbon is dissipated as carbonic acid gas, and the hydrogen as water, while the nitrogen remains as nitric acid.. It has been shown that the action consists in a rapid process of oxidation, dependent on the power which finely divided charcoal possesses of condensing oxygen. In a finely divided state, charcoal not only condenses gases to a marvel¬ ous extent, but has the power of absorbing col¬ oring matters, bitter principles, *etc.* ; hence it is of extensive use in the laboratory. From the rapidity of its absorbing action, Stenhouse has proposed to use a respirator filled . with charcoal to protect the mouth and nostrils in an infected atmosphere ; and the employment, of trays of powdered wood-charcoal in dissecting-rooms, in the wards of hospitals and in situations where putrescent animal matter is present, is found to exert

a most beneficial influence in sweetening the atmosphere by absorbing and decomposing the offensive gases. These properties render charcoal a valuable material in the construction of filters, not only for decolorizing, but like¬ wise for purifying water for domestic use. It is employed successfully to prevent the escape of noxious vapors at the ventilating openings of sewers, as it allows free passage of air, but condenses the offensive effluvia in its pores where they are destroyed by a process of oxi¬ dation. Besides its use in the manufacture of gunpowder it has many applications in the arts. In medicine it is at present used chiefly to de¬ stroy fetor, for which purpose it is applied in the form of powder or poultice to gangrenous sores, phagedenic ulcers, *etc.* ; it is also largely employed in tooth-powders, as by its mechan¬ ical action it removes incrustations, while by its chemical action it destroys fetor of the breath. In indigestion, accompanied bv much flatulence, it may be given in doses of two or three tea¬

spoonfuls suspended in water, or may be ad¬ ministered in the form of charcoal-biscuits. Very finely divided poplar charcoal is regarded as the best for medicinal uses.

WOOD DUCK, or SUMMER DUCK,

the most beautiful of American ducks (Aix sponsa). The bill is very high at the base, shorter than the head ; nail very large and much hooked ; head crested ; tail short, wedge-shaped. The head and crest are metallic green, glossed on the sides with purple; line through the eye; two bars on side of head meeting un¬ der the chin, and upper throat, white ; lo\ver neck and sides of tail purple, the former with triangular spots of white ; lower parts white ; sides yellowish banded with black and poste¬ riorly with white; speculum bluish green, tipped with white; primaries silver white exter¬ nally at tip ; back uniform, with bronzed and green reflections; a white crescent in front of wings bordered with black ; scapulae and inner tertials velvet black with violet gloss. In the female the back is more purplish, the sides of head and neck ashy, about the bill white, and lower neck brownish ; the eyes are red. It is 19 inches long and 29 in alar extent. In most parts the plumage is iridiscent with changing metallic reflections.

Formerly the wood duck, one of the most characteristic birds of our fauna, was abundant and widely distributed through the wooded and watered portions of the United States and southern Canada, but as a result of an unholy warfare it has become practically extinct over

large areas. It is confined to fresh water, espe¬ cially secluded ponds in woods. The flight is noiseless, very rapid, graceful and as easy among the branches of trees as that of the wild pigeon. It breeds from April to June, accord¬ ing to latitude, the nest being made in the hol¬ low of a tree, or in the deserted excavations of the woodpecker or squirrel, and usually in deep swamps, though often in the vicinity of houses, for they are not shy birds. The eggs are 6 to 15, 2 by l*/2 inches, pale buff and greenish, smooth and laid on dried plants and feathers. They are much attached to the breeding places. The young leap down, or are conveyed to the ground or water by their parents. The adults are excellent divers and feed on acorns, nuts, grapes, berries, rice, insects, snails, tadpoles and small fry. The chief enemies of the adults are minks, raccoons and snakes, and many of the young are destroyed by snapping turtles, alliga¬ tors and predaceous fishes. It is easily domes¬ ticated and readily breeds in captivity. The only other species of the genus is the famous mandarni duck (q.v.) of China. Consult Grinnell, (American Duck Shooting1* (New York

1902).

WOOD ENGRAVING. The art of wood engraving is also known as xylography, a dis¬ tinctly modern term derived from the Greek words xylos — wood, and grapho — to write, to inscribe. It is the art of producing in relief a reverse or negative of a picture on wood which when inked and impressed on paper or other surface will make a positive of the picture.

If to the art of printing we owe an inestima¬ ble debt for bringing to us the record of the thought and history of all times, to the kindred and older art of the wood engraver we owe almost equal obligations. It gave to the com-

mon people the pictures by which they could be made to understand the purport of written and printed wrords.

Saint Christopher, the earliest wood engraving, size of original 11 5X85. Date 1423

Technique. — While the recent inventions of ((process engraving,® using photography, labor-saving tools, etc., make the technique of working complicated, the great works of the great masters of wood engraving were done in the very simplest manner. A block of close grained w'ood (boxwood only is used these days) receives on one side a perfectly smooth and polished surface. Its thickness is .918 of an inch, known as ˆtype-high,® or the height of the type along with which it may go into the ((form® for the press. The smooth side is next covered with a layer of white chalk (this is known as ˆgrounding®) which is better to draw on than the smooth wood surface. On this the drawing is made in negative (the reverse of what is desired in the impression), any lettering, therefore, must read backwards. The work is now done direct on the block by photography, necessitating a sen¬ sitized surface instead of the above-mentioned grounding. From the artist or photographer the block goes to the wood engraver, who, using formerly a draw-knife but now a burin, cuts away cleanly to a certain depth all that the ar¬ tist has left untouched, so that after the work is finished only the drawing remains on the up¬ per surface, and it is in relief. If the finished woodcut be covered with printers' ink and pressed on paper or similar material it gives the imprint of the original drawing. Over and beyond manual dexterity, won by long practice, the wood engraver must also possess a certain degree of artistic temperament as well as being an expert draftsman, even when it is only a ques-vol. 29 — 31

tion of reproducing the drawing. But, as is the case with many illustrated sheets, there are fre¬ quently no lines, but the drawing is in water colors or stumpwork. In such cases the en¬ graver must translate the soft tones of the paintbrush either with his own technique or imitate them exactly (facsimile or tone cut). This latter art is the modern technique of American wood engravers, they being the in¬ ventors of it. So great is the difference be¬ tween the old and the modern methods of pro¬ ducing wood engraving it is necessary to de¬ vote a few words to these differences in tech¬ nique. From the 15th to the 18th centuries, and even later the blocks were plank cut, that is to say the upper surface ran with the grain. Pear-tree or apple-tree wood was generally used and it was engraved with the draw-knife. The mod¬ ern technique uses the cross-cut surface and boxwood

exclusively, because it has the most regular texture or fibre. The knife has given way to the burin, used as on copperplate en¬ graving; the burins are of several forms used each for its separate purpose, whether for en¬ graving outlines, or cross-hatching, or tone ef¬ fects, *etc.* Again for a series of straight paral¬ lel or curved parallel lines and for the backgrounds of landscapes and portraits spe¬ cial machines have been invented which pro¬ duce lines or stippling of more refinement and accuracy than is attainable by hand, at the same time greatly increasing the speed of execution. By changes in the process of treatment several new styles of wood en¬ graving have come into being which will be treated of later, such as the crible, chiaro¬ scuro, ((color® styles. An original woodcut per¬ mits the taking off of from 6,000 to 10,000 im¬ pressions, but to increase its efficiency in the number of prints possible the process of elec¬ tric deposition of metals has been called into practice and cliches reproduce, in metallic re¬ lief, the surface engraved on the wood. As there is no limit to the number of cliches which can be taken from a single wood block, the number of impressions possible also be¬ comes infinite.

The Grief of Hannah, from the Cologne Bible, about 1475

History. — The date of the actual origin of printing from engravings on wood is still in doubt ; it is an involved question. In India stamps engraved on wood have been in use for printing colors on fabrics from a very distant past. Already in the 10th century the Chinese were acquainted with books printed from tab¬ lets of wood; and the illuminators of the Mid¬ dle Ages used wooden embossed stamps for

impressing the outlines of colored initials on manuscripts. The earliest known examples of wood engraving date from the early part of the 15th century when in various parts of northern Europe, notably in Germany and the Nether¬ lands, there existed various rude prints repre¬ senting scenes from Scripture and the lives of the saints, evidently made from woodcuts. They were printed in a pale brown ink

apparently by rubbing on the back of the paper with some blunt edged instrument and were generally col¬ ored either by hand or with the use of a stencil.

cafaS'lnofcn

The Fall of Lucifer, from the Speculum Humanae Salvationis

One of the most noted of these and the earli¬ est dated print from a wood block is the fa¬ mous Saint Christopher of 1423 found pasted in the cover of a manuscript discovered in the library of a convent in Buxheim, Swabia. It represents Saint Christopher wading across a stream with the infant Jesus on his shoulder. On the right bank a hermit is kneeling before his cell holding a lantern in his hand, on the left a peasant is climbing a steep hill on the way to his home. It is a rude cut without any regard for perspective, but the figure of Saint Christo¬ pher possesses a certain dignity and the pictorial effect is such as would appeal to a primitive people. Many similar cuts were produced in the 15th and 16th centuries in the cities of Augs¬ burg, Nuremberg, Ulm, Cologne and the Flem¬ ish cities. Conventional in design and often repeating again and again the same subjects, they were yet expressive of the mediaeval reli¬ gious conceptions and were no doubt highly ef¬ fective in giving particular and comprehensible value to the biblical lessons they were intended to convey.

It has been contended by some authorities that wood engraving really began with the in¬ vention of playing cards, but no authentic rec¬ ords are available of their having been printed before 1423, the date of the Saint Christopher, and they appear to have been made with a stencil. The making of sacred prints very soon

developed into a large business, and by the mid¬ dle of the 15th century wood engraving was an established and widely familiar art. Coming before the invention of the printing press, when books in manuscript only were the treasured possessions of the great monasteries, these prints were of inestimable, value in the cause of popular religious education. From the very first wood engraving has been an art for the people. In the beginning serving religious pur¬ poses only it soon became a means of satire and comment upon the abuses of the clergy and a record of the manners and customs of the

times.

In the early part of the 15th century many minds were striving toward the invention of a way to print from movable types. The idea came no doubt from the so-called block books. Many of the early prints bore the name of a saint or a short legend which was evidently cut on the block with the picture. From these leg¬ ends it was a natural step to extend the text and add whole columns of text. The date and place of the earliest of these block books is. a matter for conjecture, but they were known in the early part of the 15th century. One of the most widely discussed of these is the (Biblia PauperunV or Poor Preacher's Bible, several editions of which are known. It is a small folio containing 40 pages printed on one side only in a pale brownish ink by means of rubbing on the back. Each page is divided into five compart¬ ments separated by pillars, suggesting the idea of church windows. The central panel shows a scene from the Gospels and on the sides are illustrations from the Old Testament bearing on the central design. There are also texts and Latin verses. Another block book that has given rise to much speculation is the (Speculum Humanae Salvationist or (The Mirror of Hu¬ man Salvation.) In this the text appears to have been printed from movable type in black ink on a press. It is, therefore, the oldest ex¬ tant typographical illustrated work known. Other famous block books are the (Apocalypsis Sancti Johannist Visions of Saint John; (Ars Moriendit The Art of Dying; <Canticum Can-ticorumt or a History of the Virgin prefigured in the Song of Solomon. All of these are curi¬ ously and often grotesquely mediaeval, full of the symbolism and mysticism of primitive hu¬ manity. Rude as they are, though, they were preparing the way for something better.

Other noted block books extant are (Liber Regum, > Book of Kings; (Temptationis Dae-m*onis,) Temptations of a Demon; <Endcrist,) the only copy known is in the Spencer Library ; (De Generatione Christie of the genealogy of Christ; (Miribilia RomaeP The Wonder of Rome; (Confessionale,> of the Confessional; ˆSymbolum Apostolicum,* Symbols of the Apos¬ tles.

These German and Netherlands block books were issued in numerous editions and had quite a large foreign circulation. (Ars MoriendL was issued in Latin, German, French, Italian and English, the texts varying. Some of these block books were cut up later and pieced to¬ gether in different combinations in later edi¬ tions. It must be noted, however, that the en¬ gravings done in the Netherlands were, almost invariably, of a more artistic character than those emanating from German hands.

With the advent of printing the block books

were superseded and wood engraving became a handmaid of the greater art. Illustrations are to be found in many of the books of the early printers. The earliest wood engravings in a printed book with an authentic date appear in the Psalter of Faust (or Fust)1 and Peter Scheffer (or Schaeffer) published at Mayence in 1457. From Cologne, Mayence, Nuremberg, Ulm, Augsburg, Strassburg and Basel came many printed books illustrated with wood en¬ gravings. , . f ,

The Bible was the book on which the early printers spent most of their energies. Numerous editions were published with illustrations. The most important of these was the famous Co¬ logne Bible which appeared before 147a. Its 10) designs were, after the block books, the first il¬ lustrations of Scripture, and they showed more originality and invention than anything that had gone before. Many of the decorative borders of this Bible are in curious contrast to the sacred text.

The tendency of the early printers to trade cuts is made clear by the fact that the Nurem¬ berg Bible, published in 1482, contains woodcuts from the Cologne Bible, published between 1470 and 1475. The Augsburg Bible, published about 1475, is a most elaborately illustrated work; Gunther Zainer is said to have been the publisher. With the exception of two, all the 73 woodcuts are placed in combination with initial letters and absorb a full column of space.

Next to the Bibles in interest in the study of wood engraving are the numerous (Chronicles) and histories. These are records of leg¬ ends and imaginery events and* are illustrated with woodcuts dealing with the lives of the saints and the great happenings in local history. One of the best known of these chronicles is the one published at Nuremberg in 1493. Hart¬ mann Schedel, a Nuremberg physician, com¬ piled the work and it was printed by Anthony Koburger. It has over 2,000 cuts, views of cities, saints, portraits, etc., and is supposed to have been supervised by William Pleydenwurft and Michael Wohlgemuth, the latter a master of the great Differ. The chief distinction of the

Nuremberg Chronicle lies in the fact that in it for the first time woodcuts were printed in simple black and white. They were modern in this respect and in the use of cross-hatching by which grays and blacks of varying intensity were obtained by engraving lines that crossed each other at different intervals.

Another peculiar feature is the fact that the same single cut is used to represent a number of different poets, etc., or one cut suffices to de¬ pict views of several cities, *etc.* This economi¬ cal method of multiplying the usefulness of a woodcut occurs frequently in contemporary

works. .

An old style of book of the 15th century also is the figure alphabet, in which the pages are devoted to forming initial letters from fig-gures of all kinds posed in attitudes conforming to the outlines of the capital letters. All these early *l5th century books were printed by a rubbing process, either some forrrf of burnisher or roller pressed the paper over the block, ihe book printing press was not invented till the lat¬ ter half of the century.

In France wood engraving was early identi¬ fied with printing. Religious books contained

many curious and often beautiful illustrations. Those known as the (Livres d'Heures,* Books of Hours, often contained many fine examples of carefully executed blocks in imitation of-min¬ iatures. Many of these early woodcuts served simply as an outline for the colorist, who often overlaid them with an entirely different design. The first really effective artistic use of the deco¬ rative border may be seen in these (Livres d'Heures,* and some of them are notably quaint

The Ploughman, from the Dance of Death, by Holbein

embodiments of scriptural ideas combined with others that are certainly not to be found in-the sacred Book.

At Lyons several books with woodcuts were published about 1476, but the engraving is of the same coarse German grade, till, in 1493, an edition of Terence was issued with illustrations of a more artistic nature. In Paris we find among the publishers of the above-mentioned

books of devotion ("Hours"), history, romance and poetry, such names as Jehan Du Pre, Guyot Marchand, Pierre Le Rouge ((La Mer des Histoires, > 1488), Pierre Le Caron, Antoine Verard, *etc.* Those engravings done by Jean Foucquet and Jean Perreal showed ambitious art work that needed no pigments for embellishment. The books from these publishers found a wide for¬ eign circulation in their Flemish, English and Italian versions. Guyot Marchand s (Danse Macabre, > Dance of Death (1485), shows most merit in its illustrations. The French brought out a new style, termed by us "crible," in which the delineation is composed of dots; Renouvier says it was the goldsmiths' manner of engrav¬ ing and may have been impressed, in some cases, from metal.

England lagged behind other countries in her art development, and wood engraving was little known there before the publication of Caxton's (Game and Playe of the Chesse) pub¬ lished in 1476 and it is thought that the cuts in this were imported from Germany, and they are too crude for the English to dispute the claim. In Italy the earliest wood engravings were either importations from Germany or were suggested by German originals. The most noted example of early Italian wood engraving is the (Hyp-ncrotomachia Poliphiliˆ or Dream of Poliphilo,

written by a Venetian monk in 1467 and printed by the famous Aldus, in Venice, 1499. It con¬ tains 192 woodcuts on such subjects as my¬ thology, ancient history, processions, *etc.* The Italians developed a method of engraving in chiaroscuro, in imitation of painting, by the use of several blocks, each printed in a different color. The Germans also employed the same methods, but in a much cruder form.

With the advent of Albrecht Differ (1471— 1528), of Nuremberg, wood engraving reached its highest attainment. First of all he was a great designer with a far-reaching and power¬ ful imagination and a mind full of the new learning and spirit of the coming Reformation. He was the first fully to realize the great possi-

The Savages of Calient, from the Triumphal Procession by Burgkmair

bilities of wood engraving, and by his influ¬ ence it was raised to the dignity of a fine art. He is known chiefly by four great works. The first of them the 15 large drawings illustrating the Apocalypse of Saint John (1498). Others are the ‘Larger Passion of Our Lord) (1509— 11), 12 cuts, ‘The Life of the Virgin, } 20 cuts, and the ‘Smaller Passion of Our Lord,* 36 cuts. Among Durer’s other famous works are the ‘Car and Gate of Triumph* made for the Emperor Maximilian. Another great work celebrating the emperor’s fame was by Hans Burgkmair (Augsburg, 1472-1531) the magnifi¬ cent ‘Triumphal Procession, > *etc.* The colossal work entitled ‘The Triumph of Maximilian) was made by command of that emperor and consisted of three sets of designs: “The Tri¬ umphal Procession,* ‘The Triumphal Arch,* and ‘The Triumphal Car.* Its size is enor¬ mous, the “arch,® composed of 92 blocks, when displayed in their correct relative position, is 10*4 feet high by 9*4 feet wide. While the de¬ signs were by Differ and Burgkmair the exe¬ cution of the work was by highly talented and enthusiastic wood engravers with Jerome of Nuremberg and Jost de Negker or Dienecker at the head of the list.

Durer’s masterly activity in wood engraving gave rise to a school (some of the members were pupils) of decorative designers of great

talent who put their conceptions into engrav¬ ings, forming them into sets, books, *etc.* These artists are known as the “Little Masters,® and their fine work created a general renaissance in the arts of decoration; the jeweler, the potter, the cabinetmaker, all artisans incor¬ porated in their work beautiful decoration taken from the popular designs published and widely circulated all over Europe in these engravings. The best known of these ‘little masters* are Beham, Baldung, Aldegrever, Amman, Virgil Solis, *etc.*

Hans Holbein (1497-1543) ranks among the really great artists and wood engraving owes to him a still further advance. Holbein indeed might be well called the father of modern illus¬ tration. Among the first books he illustrated were the ‘Utopia) of Sir Thomas Moore and the biblical translations of Luther. He is best known, however, for his remarkable series of designs known as the ‘Dance of Death* (1538), a

popular subject of mediaeval times. In each of the 41 designs is a scene from common daily life expressed with a grim dramatic power and truth of drawing that are remarkable in a very high degree. Death spares neither the king nor the peasant, the praying nun nor the priest in the pulpit. Much of their success was due to the wonderfully accurate wood engraving of Hans Liitzelburger, for in the hands of a less skilful engraver the originals would have lost much of their power. Holbein's 86 desighs for the Old Testament, generally known as 'Hol¬ bein's Bible Cuts,* were also remarkable in many aspects, but they were more conventional in conception. After Holbein, wood engraving as an art steadily declined.

Early in the 16th century either Tost de Neg¬ ker, German, or Ugo de Carpi, Italian (dis¬ puted claims) invented the so-called "chiaro¬ scuro® process by which color effects are gained by using a series of wood blocks each im¬ pressed over the other, a separate color being produced by each successive addition. Carpi reproduced several of Raphael's designs by this method, and in Germany were reproduced sheets from the designs of J. Wechtlin, Burgk¬ mair, Cranach, Baldung and others.

A revival, in a modern sense, began with the work of Thomas Bewick (1753-1828) in Eng¬ land. To him we owe the great principle of the white line which did away with much of the old drudgery and gave the engravers more freedom in handling. In the old way, where black lines crossed, the little white lozenges between had to be laboriously cut away, Bewick simply gouged out with his graver a line and by varying the width and number obtained his gradation of light and shade. He was the first also to use boxwood and the burin. Bewick is best known by the drawings and engravings in his 'British Quadrtipeds) and 'History of British Birds. * He was the founder of the modern British school which held for many years a distin¬ guished place in modern illustrative art. Be¬ wick's pupils, Charlton Nesbit and Luke Clen-nell; Robert Branston, John Thompson, the Dal-zels, William Harvey and W. J. Linton en¬ graved the work of many distinguished English artists. In France and German}' wood engrav¬ ing has maintained a distinct place in spite of process work and some of it has been and still is of a very high order of merit. In France a pupil of Bewick's, Charles Thomnson, intro-WOOD ENGRAVING

duced and brought together a school of wood-engravers using the refinements of the English master. In Germany, where the art of wood engraving was in an expiring condition from the middle of the 18th century, new life was developed early in the 19th century by the two Ungers and recent methods of treatment aided the reputations of Gubitz in Berlin and Blasius Hofei in Vienna. Adolf Menzel trained for the reproductions of his illustrations the engravers Unzelmann, A. and O. Vogel, H. Muller and Kretzchmar. In France the leading names of wood engravers include Leloir, Regnier, Laccate, Breviere, Porret, Count Laborde, Gerard, Ber¬ nard, Breval, Chauchoin, Lepere, Pannemaker (son), Baude, Thiriat, Huyot, Grenier, *etc.*

It is to America, however, that we must look for the greatest achievement in wood engraving. Our artists have carried it to a degree of per¬ fection unparalleled anywhere else in the world. They have taken it out of the domain of a largely mechanical handicraft and given it al¬ most the individuality that belongs to creative art. The first American wood engraver of dis¬ tinction, Dr. Alexander Anderson, was a fol¬ lower of Bewick. His work appears in many early American books. Joseph Alexander Adams was another early American wood en¬ graver whose work was even more worthy of study. The notable wood engravings made for the Harper Bible published in 1843 were done under his supervision.

To the great English and American maga¬ zines we owe the incentive and the opportunity for the development of the best wood engraving. Even before a way was discovered by which drawings might be photographed on the block, American engravers had begun to show their capacity for interpreting the lines and tones of drawings with exceptional accuracy and original¬ ity. In some instances attempts were made to copy the qualities of brush marks and the textures of different mediums such as pencil and charcoal, etc., but this was only a passing phase of an attempt at superior cleverness. W. J. Linton who spent the later years of his life in America was a leader in the effort to make wood engraving more of an individual art and although he was not always in full sympathy with the tendency toward a greater refinement of line and an effort that seemed to him to be leading away from the legitimate purposes of wood engraving, he was a very great power for good, J. G. Smithwick, long identified with the art de¬ partment of Harpers', and Alexander Wilson Drake, of Scribner's Monthly and the Cen¬ tury, did their full share in the development of the art. Frederick Juengling, J. P. Davis, Frank French, F. S. King, Wm. B. Closson, Henry Wolf, Thomas Cole, Thomas Johnson, Elbridge Kingsley, Gustav Kruell, William Muller and others are names identified with the highest attainment of American wood engraving.

In other countries we find admirable ex¬ position of wood engraving done by such artists as A. Brown and his school at The Hague and Antwerp, with Vermorken, Pannemaker (father) and Bosquet prominent; in Italy Fabris and Ratti must be mentioned.

With the advent of process work (see Photo-kngraving) the demand for wood engraving has greatly diminished and its employment as a reproductive art is constantly decreasing. It is a beautiful art as exemplified by the best

practitioners, remarkable for its brilliancy of effect in pure black and white, requiring the most delicate skill in its manual execution and a feeling and invention with respect to the correct interpretation of values and textures of a very high order.

With the passing of the men of to-day who have given wood engraving a place among the fine arts, it is likely that it may cease to be a field for further endeavor. There are no longer incentives for its study and the time and artistic training necessary for any real accomplishment can be put to much better profit in other direc¬ tions. Prints by famous wood engravers are already much sought by collectors and the future historian of the art will probably end his record with the close of the 19th century and the beginning of the 20th.

More than to any other of the graphic arts are we indebted to wood engraving. It led the way to the invention of printing and has been the means of putting before the world a record of the progress of the greater arts of drawing and painting. See also Engravings.

Bibliography. — Austin, Stanley Elston, (The History of Engraving from its Inception to the Time of Thomas Bewick* (London 1902) ; Baker, William Spohn, (American Engravers and their Works) (Philadelphia 1875) ; Bartsch, Adam, (Le Peintre-Graveur* (Vienna 1803-21) ; . Berjeau, J. Ph., (Biblia Pauperum. Reproduced in facsimile … with historical and biblio¬

graphical introduction) (London 1859) ; id., Speculum Humanae Salvationis … Re—

produit en facsimile) (London 1861) ; Albert-verein, (Bilder-Album zur neueren Geschichte des Holzschnitts in Deutschland> (Leipzig 1877) ; Breviere, A., (De la Xilographie ou Gravure sur Bois) (Rouen 1833) ; Chatto, W. A., (A Treatise on Wood-engraving* (London 1839) ; Cundall, Joseph, (A brief History of Wood-engraving from its

Invention* (London 1895) ; Dibdin, T. F., (Bibliotheca Spenceriana* (London 1814-15, 4 vols.) ; Didot, Ambroise Firmin, (Essai typographique et bibliographique sur l'Histoire de la Gravure sur Bois) (Paris 1863); Duplessis, G. G., (Histoire de la Gravure) (Paris 1880) ; fimeric-David, T. B., (Discours historique sur la Gravure en Taille-Douce et la Gravure en Bois) (Paris 1809) ; Fournier, P. S.,

(Dissertation sur l'Origine et les Progres de l'Art de graver en Bois) (Paris 1758) ; Grolier Club, (Wood-engraving; three Essays by A. V. S. Anthony, Timothy Cole and Eldridge Kingsley > (New York 1916) ; Heinecken, K. H., Baron von, Udee generale d'une Collection com¬ plete d'Estampes) (Leipzig and Vienna 1771) ; Heller, Joseph, (Geschichte der Holzschneide-kunst) (Bamberg 1823); Jansen, H., (Essai sur l'Origine de la Gravure en Bois et en Taille-douce) (Paris 1808) ; Lippmenn, Friedrich, <The Art of Wood-engraving in Italy in the XV Century) (London 1888) ; Linton, W. J., (The History of Wood-Engraving in America) (Boston 1882) ; Osborn, Max, (Der Holzschnitt* (Bielefeld 1905, in Sammlung illustrirter Mon-ographen) ; Renouvier, Jules, (Des Gravures en Bois dans les Livres d' Antoine Verard) (Paris 1859) ; id., (Des Gravures sur Bois dans les Livres de Simon Vostre) (Paris 1862) ; Ruskin, John, (Ariadne Florentina. Six Lectures on Wood and Metal Engraving* (Orpington, Kent, 1876); Sotheby, S. L., (Principia Typographical The Block-books issued in Holland, Flanders,

and Germany during the 15th Century) (Lon¬ don 1858) ; Woodberry, G. E., (A History of Wood-Engraving) (New York 1883).

Clement W. Coumbe.

WOOD-FROG. See Frog.

WOOD-IBIS, a kind of stork (q.v.).

WOOD-LARK, a European lark (Lullula arbor ea) closely allied to the sky-lark (q.v.), but distinguished by its smaller size, shorter tail, a

distinct light streak over the eyes and ears and more distinct markings on the breast. It perches upon trees, and is found chiefly in fields near the borders of woods. Its flight is much less extensive and powerful than that of the sky-lark. The wood-lark often sings during the night, and on this account has been mis¬ taken for the nightingale. <(Its song® is de¬ scribed as (<sweet and flute-like, more melan¬ choly than that of the sky-lark, and is generally uttered from the top of some tree or else when the bird is on the wing. It rises to some height before commencing, then ascends, sing¬ ing, higher and higher, throwing itself from side to side, hovers and floats in the air, and when the song is ended drops with closed wings to the ground again.® It bears confinement well, singing sweetly in the cage, and even breeding easily there or in an aviary; hence it is constantly caught and kept. The nest is gen¬ erally built under bushes. The eggs are five in number, of a dusky color, spotted with deep-brown spots.

WOOD-LOUSE, one of the little isopod crustaceans (see Isopoda) of the family Oni-scidcz, which abound underneath logs and in decaying stumps in the woods, and which, when touched, curl up for protection like armadillos. They are numerous and hardy, the sexes are distinct, and the young are hatched from the eggs in their full form, passing through no metamorphoses. The names pill bug, arma¬ dillo and sow bug are sometimes applied to the wood-louse.

WOOD-MOUSE, the red-backed mouse (q.v.). In England the long-tailed field-mouse {Mils, sylvaticus) is so called.

WOOD NYMPH, a minor pagan divinity supposed to live in trees and woods. This is the common name, also, of the beautiful lepidopterous insects comprising the genus Eudryas which are very common in the United States. It is one of the chief enemies of the grapevine. Its front wings are of a creamy white with a purple-brown border. The eggs are laid on vines in midsummer and the caterpillars de¬ velop black and orange lines and feed on the vines until September, after which they hiber¬ nate as chrysalises. Arsenate of lead sprayed on the vines is a most effective remedy against this pest of the vineyard.

WOOD OIL, the name given in commerce to a resinous juice which exudes from various trees of eastern Asia. It has a fine aromatic odor, and is used for a great variety of pur¬ poses ; in medicine as a substitute for copaiba balsam ; by sailors for paying the seams of a ship instead of tar ; by painters as a varnish ; also in the making of lithographic ink, *etc.* It is an excellent preservative of timber against the attacks of white-ants. It is strictly an oleo-resin, and is also known as gurjun balsam.

WOOD-PEWEE. See Pewee.

WOOD-PULP, wood that is reduced to a mass of pulp and mixed with water — the fundamental process in making paper from wood. There are three kinds of wood pulp — ground wood, soda-process wood and sulphite-process wood ; the latter two are not wood in either physical or chemical properties, but cellu¬ lose, similar to cotton fibre in appearance and nature. (See Paper; Paper Industry in Amer¬ ica). The name of wood-pulp is generally understood as designating mechanically ground pulp as distinguished from chemical pulp, or cellulose. In the manufacture of mechanical wood-pulp a block of wood is held against the surface of a rapidly revolving grindstone by hydraulic or other pressure, a stream of water pouring down upon the stone carrying away the disintegrated fibres into a stuff-chest, where they are mixed with a percentage of sulphite or other cellulose, and are then ready to go on the paper machine to be converted into paper. Spruce principally, but also poplar and other soft woods are used in the manufacture of this pulp.

Ground wood was developed in Germany in 1847 by Keller and perfected and patented by Henry Voelter, who constructed a machine which is in general use to-day. Mr. Albrecht Pagenstecher, of New York, bought and con¬ trolled the Voelter patent and introduced this industry into the United States in 1867-68, im¬ porting two machines, which were set up in Curtisville, Mass.

The introduction of this new process marked a new era in the manufacture of paper. It fur¬ nished a cheap and abundant raw material, sim¬ plified the former complicated methods of pre¬ paring stock for paper machines, and-improved the quality of the paper made, besides cheapen¬ ing the cost of production. Without wood-pulp it would be impossible to supply the demand for paper at the present day.

Wood-pulp was first sold at eight cents per pound, but finally dropped to less than one cent per pound, and brought the price of news¬ paper from 14 cents in 1868 down to less than two cents per pound in 1890 to 1900, making the onecent newspaper possible.

The introduction of ground wood-pulp print¬ ing paper into rolls completely revolutionized modern methods of journalism. The absorbent quality of this wood-pulp paper made the modern rapid printing press practicable, elimi¬ nating the allowance for drying and

limiting the printing speed only by the mechanical pos¬ sibilities of the press, which were in no way dependent, as in the case of rag paper, upon the drying of each sheet. Such an improvement caused immediate changes in the making and printing, of the newspaper, and as soon as the results of this new process became commercially practicable, the entire system of news gather¬ ing changed as well.

The output of wood-pulp, which in 1868 was less than one ton per day from the only mill then in existence, increased by 1900 to over 5,000 tons per day in 188 mills, requiring in its manufacture nearly 2,000,000 cords of wood an¬ nually. About this date the wood-pulp industry of Canada became important, and in 1916 there were used by Canadian mills 1,764,912 cords of

the value of $13,104,458. For other statistics, see Paper.

The introduction of this new process was made under many difficulties, the greatest of which was to overcome the prejudice of paper-makers, who believed that rags were the only fit substance to make paper of, and considered wood-pulp as an adulteration or shoddy. At present every newspaper is composed largely of ground wood-pulp, with a small percentage of chemical fibre. Many book, wrapping and other papers also contain a large percentage of ground wood-pulp.

WOOD-QUAIL, or ROULROUL. See

Quail.

WOOD-RAT, a large rat-like wild mouse of the genus Neotoma, of which two species dwell in the forests of the southern half of the United States. The body is eight or nine inches long, and the tail nearly as long. The form resembles that of the white-footed mouse (Microtus), the animal being more slender and squirrel-like than are the true or house rats, from which this may always be distinguished by his hairy tail, softer fur and much larger ears. The best known

species is the Alleghany wood-rat (N . Pennsylvania), which is lead-colored above, sprinkled with black hairs, which lightens to yellowish on the flanks and becomes pure white on the abdomen and feet. Consult Goldman, E. A., (Revision of the Wood Rats of the Genus Neotoma) (in United States Bureau of Biological Survey, (North American Fauna, No. 31, > Washington, D. C., 1910), and Stone and Cram, (American Animals) (New York 1902).

WOOD-ROBIN, the wood-thrush (q.v.).

WOOD-THRUSH, or WOOD-ROBIN,

the most familiar of North American spotted thrushes (Hylochichla mnstelina), famous for the rich four-parted melody of its spring song. It is numerous in warm weather throughout the Eastern States and Canada, inhabiting the wild spaces as well as confidently approaching the house and roadside. Its nest is often built in a village shade-tree, or even in a garden bush, but more frequently among the forking twigs of an apple tree; and it is to be distinguished from that of the robin by the absence of mud and the presence of many dead leaves, which always form the principal part of its founda¬ tion. The eggs are deep blue, smaller and less greenish than those of the robin. It soon be¬ comes unsuspicious of the persons whom it is accustomed to see about the place and who do not disturb it, but is jealous of the attention of other birds, and defends its home with admir¬ able vigor and success. The song, which is heard most frequently and pleasingly toward sunset, is excelled by that of none of the more familiar Eastern birds either in musical quality or in sentiment. It is low, sweet, evenly modu¬ lated and flute-like, yet has far-carrying power, and when heard at twilight across the fields, or from unseen recesses of the orchard, it brings to the mind a hymn chanted in praise ot the serenity of the summer evening. This thrush is bright cinnamon above, brightest on the head ; below white, with large rounded black spots forming lines down in fiont.

WOOD-WARBLER, a book-name for the small and beautiful American birds of the family Mniotiltidce (see Warbler) ; but the name is without special significance, as these birds are not more characteristic of woodland than of other places; nor than other warblers.

WOODWORKING MACHINERY em¬ braces the various machines employed to re¬ duce the timber as cut in the forests into lum¬ ber, shingles, doors, sashes, moldings, veneers, barrels, buckets and the

endless variety of wooden objects and contrivances used for in¬ dustrial purposes. As the woods upon which they are used vary in many qualities from the docile white pine to the difficult elm and the almost metallic hardness of the ebony and toughness of the lignum vitae, their variety and adjustments must be almost numberless. They may be conveniently divided into four general classes — saws, which operate by rending or scission ; planers, 'by which the work is accom¬ plished by a paring action; lathes, in which the wood is turned or pared while being revolved ; and grinders or abrading machines, which are generally employed as finishers and accom¬ plish the work through the medium of sand or emery. Saws are blades of steel with toothed edges and though also used to divide metal and stone, they are employed principally, to divided wood. (See Saws and Sawing; Sawmill). For saws used in metal-working see Metal Working Machinery. The use of saws is of very ancient origin, and it is prac¬ tically impossible to enumerate in detail their adaptations to various mechanical processes. Among uncivilized peoples, saws were made of flakes of flint imbedded in wooden blades and held in place by means of bitumen. Later, among the ancients, bronze saws were used, but all modern saws are made of steel of the finest quality. Band saws were invented about the beginning of the 19th century, and although their particular merits were known long before the circular saws came into general use, they were not adopted until the latter part of the century, owing to the difficulty of making blades capable of withstanding the severe serv¬ ice., But, with the manufacture of the finer grades of steel of greater tensile strength and * elasticity, since 1885, they have been adopted in addition to the circular saws in many of the larger mills. They are made in sizes ranging from one-half inch in width, used for ordinary shopwork, to from six to eight inches in width, for the use of the larger lumber mills. In mode of operation, which js as that of a belt over two pulleys, they cut' with a continuous down¬ ward motion, with the toothed edge always in the kerf. The pulleys or guide-wheels, one of which is the driver, range from 54 to 72 inches in diameter. The saw blades are in a continu¬ ous band, from 45 to 60 feet in length, and the saw is run at a speed of 4,000 feet per minute. Being made extremely thin, they are used for continuous and rapid cutting in planing mills and other woodworking plants, where some cuts have to be made in scrolls and curves, and require a very flexible blade. The thinness of the blade insures a much smaller kerf-waste than that resulting from the circular saw, and as installed in their larger forms in the lumber

mills are capable of sawing an average of 40,000 feet of lumber per day. The table of band saws used in shopwork is often made to tilt, for beveled work; or the saw blade and its pulleys may be tipped backward, fo-r the

edge of a strong cast-iron centre, which gives the required rigidity. The larger sizes range up to six feet in diameter and possess cutting edges so light that they are capable of cutting veneers almost as thin as a sheet of paper.

Gang Saw.

same purpose. The saws commonly known as scroll saws and jig saws are very narrow straight blades of steel, often as fine as 1/32 of an inch in width, which are operated with a reciprocating movement, and are employed to cut various ornamental designs as for brackets, corner-pieces, clock-cases, etc., and in making furniture.

Another form of veneer-cutting saw is a sin-gle-bladed reciprocating saw doing its work in a horizontal position in a carriage which rises and falls in vertical guides. Another form of veneer cutter is a vertical knife against which the log of wood is revolved so as to take off a continuous shaving. Planers are used to smooth lumber and to reduce it to exact dimen-

Of saws used for special purposes, the seg¬ ment saw used for cutting veneers should re¬ ceive mention. The segment saw is circular in shape and is formed by bolting the blade seg¬ ments, which are extremely thin, upon the outer

sions by removing the rough surfaces of the product of the sawmills. In the surface planer this is accomplished by a rank of overlapping revolving cutters which pare off shavings and leave the surface of the timber quite smooth.

The cutters are very ingeniously arranged, and in many cases all four sides of the board are planed down, and the tongue and groove cut in the edges at one operation. The cutters may he so arranged as to produce curved surfaces by following a pattern or model which controls the depth of the cut, and are extensively used in the manufacture of moldings, panels, *etc.* These machines also cut rebates and grooves and do a limited amount of shaping. They can be run at several different speeds, whichever may be best adapted for the kind of wood being worked. Moldings are, however, usually cut on special machines with upright spindles, the cutter-head only being above the table. Some have two spindles and two cutters, so that both sides of a strip may be modeled at once. They are run at a speed of 5,000 feet per minute.

Mortising machines are of two classes: (1) in which the cutter is chisel-shaped and works with a reciprocating motion; and (2) in which a revolving cutter is used. Large machines of this type, as used in shipbuilding, usually carry a rank of chisels on a single frame, so that several mortises may be cutting at the same time. The blocks to be mortised are adjusted on the feed table so that each chisel cuts its proper chip, and scores for the next chip ; each succeeding chisel cutting deeper into the wood. A machine for the ordinary shop, carrying a single chisel, is actuated by a link motion so that each successive blow is deeper than the previous one. Or the depth may be arbitrarily controlled by the foot of the operator on a treadle. Tilting tables enable the mortise to be cut on the bevel if desired. These machines operate at the speed of about 400 strokes per minute. To this class also belong the dove¬ tailing machines in which the cutters are arranged in gangs, similar to a gang of chisels, or revolve upon a vertical spindle. They cut out the tongues and spaces automatically.

Woodworking lathes are similar in principle

handles, gun stocks and shoe lasts are produced. Other machines involving the lathe principle are the various kinds of borers for drilling holes ; tenoning machines and mortising ma¬ chines for making tenon joints and the mor¬ tises to receive the tenons ; and gaining ma¬

chines for cutting grooves. Abrading machines are of two kinds — those in which an endless belt coated with sand or emery is brought in contact with the work, generally of small di¬ mensions ; and those in which a drum similarly coated is employed to work down large sur¬ faces. Or they may take the form of simple disks of sandpaper or emery paper glued to a face plate.

Planer, with Roller-feed.

to those employed in metal-working. The piece of wood is held between the stocks of the machine and revolved rapidly, while a chisel or other tool is pressed against it and removes a shaving ‘by a combined paring and severing action. By the use of various automatic du¬ plicating attachments in conjunction with pat¬ terns, as in the case of the Blanchard lathe, in which patterns and blanks are revolved together, exact facsimiles are readily obtained, and the output of the machines greatly increased. By these machines such irregular shapes as axe

Practical Suggestions. — The very important place occupied by the circular and band saws among the various classes of woodworking machines demands a few practical suggestions and rules relative to their use, care and man¬ agement. The principal points to be observed in this connection are as follows :

Hanging the Saw. — Circular saws should always be hung upon the mandrel with the side marked <(log side® next to the log on the mill, and should be perfectly plumb when the flanges have been screwed

up. Thin saws and saws

driven at high speed should be put up very open in order to allow the centre to pull through. These saws when hung on the man¬ drel may be concave or convex on the log side when at rest, but when running at the speed for which they are hammered they should straighten up and be flat on the log side. The difficulties resulting from too much crowning or dishing on the log side may be overcome by the use of suitable paper rings placed between the saw and the collars, so that when the saw is clamped between the flanges it will be brought to the proper position.

teeth are in the best of condition ; but, when the teeth have lost their sharp edge, the saw will dodge whenever it runs against the slightest obstacle. Speeds too low are also objectionable, but they do not produce such ruinous effects upon the saw. These difficulties may be par¬ tially remedied by the hammering of the saw, but it is impossible to overcome them completely by such means. The accompanying table gives the proper speed of circular saws of varying diameter. It is calculated on the basis of a periphery speed of 9,000 feet per minute. As a general rule, however, saws for portable mills

Copying Lathe.

Lining the Saw with the Track. — The

track should be solid, level and straight, and should be put down by careful measurement so as to be from one-eighth to one-quarter of an inch farther from the saw at its centre than at a distance of 20 feet from it. Some saws re¬ quire more inclination toward the track than

others in order to hold them to their work on the log, and if the track is properly adjusted any small variations from the required inclination may be effected by means of the set screws on the box.

The lead or the holding of the saw to its work may be adjusted by its position to the track as already described, or by beveling on the back of the teeth. Assuming that the teeth are properly filed perfectly square in front, then bevel filing on the back of the teeth on the board side will lead the saw into the log, and bevel filing on the log side will lead it out of the log. A ((snaky}) or in-and-out lead indi¬ cates that the rim of the saw is too large for the centre and, therefore, requires to be opened out at the centre. This may be effected by running the saw warm at the centre by creating friction, by reducing the set or spread of the teeth, or by hammering between the centre and the rim.

Motion. — The motion of circular saws is one of the conditions which requires the most care¬ ful attention. The saw should always be run at a speed approximating as nearly as practica¬ ble to a periphery speed of 9,000 feet per minute (in soft woods), and it should be run at a uni¬ form speed both in and out of the cut. Excess¬ ively high speeds generate heat in the saw and make it so touchy and limber that it will do good work only on light feed and while the

are usually run at a speed of 450 revolutions per minute, and those for steam feed mills from 600 to 900 revolutions per minute.

Table of Speed of Circular Saws.

D iameter,

Revolutions

Diameter

Revolutions

inches

per minute

inches

per minute

8 .

4.500

42 .

870

10 .

3,600

44 .

840

12 .

3,000

46 .

800

14 .

2.585

48 .

750

16 .

2,222

50 .

725

18 .

2,000

52 .

700

20 .

1,800

54 .

675

22 .

1 .636

56 .

650

24 .

1,500

58 .

625

26 .

1,384

60 .

600

28 .

1,285

62 .

575

30 .

1,200

64 .

550

32 .

1,120

66 .

545

34 .

1,050

68 .

529

36 .

1,000

70 .

514

38 .

950

72 .

500

40 .

900

The three following rules may be readily employed for calculating the speed of saws, pulleys or drums.

1. To find the number of revolutions of the driven when its diameter is known.

Multiply the diameter of the driver by its number of revolutions and divide the product by the diameter of the driven; the quotient will be the number of revolutions of the driven.

2. The diameter and revolution of the driver being given, to find the diameter of the driven, that shall make any given number of revolutions in the same time.

Multiply the diameter of the driver by its number of revolutions and divide the product by the number of revolutions of the driven ; the . quotient will be the diameter of the driven.

3. To find the size of the driver.

Multiply the diameter of the driven by the number of revolutions it is required to make, and divide the product by the number of revolu¬ tions of the driver; the quotient will be the size of the driver.

In the case of band saws the most important point requiring careful attention is the tension or the opening up or expanding of the centre of the blade so as to place the strain on the edges of the band. The tensioning of saws may be accomplished by the use of rolls, or by hammering, the last-named method being pref¬ erable as the saws are liable to hold their shape much longer. The accompanying table shows the circles of tension for band saws of different widths and gauges. These figures give the saw as much tension as it will take and lie flat on the running-board, a condition which accords with the best practice.

Circles of Tension for Band Saws.

Width,

inches

6 .

6 .

6 .

6 .

6 .

7 .

7 .

7 .

7 .

7 .

8 .

8 .

8 .

8 .

8 .

9 .

9 .

9 .

9 .

10 .

Circle,

Width,

Circle,

Gauge

feet

inches

Gauge

feet

16

26

10 .

… 15

35

17

26

10 .

… 16

40

18

26

11 .

.. . 14

40

19

30

11 .

… 15

45

20

30

12 .

… 13

40

15

30

12 .

… 14

40

16

30

12 .

… 15

45

17

30

13 .

… 12

50

18

30

13 .

… 13

50

19

35

13 .

… 14

50

14

30

14 .

… 12

50

15

30

14 .

… 13

50

16

30

14 .

… 14

50

17

35

15 …

… 12

55

18

35

15 .

… 13

55

14

30

15 .

… 14

55

15

30

16 .

… 12

66

16

30

16 .

… 13

66

17

35

16 .

… 14

66

14

30

en desirable

that the

toothed

edge

11 lb U1LC11 UCJliaUlC L11CIL 111’-

should be strained a little tighter than any other portion of the saw. This may be accomplished, and an uniform tension preserved by rolling or hammering the back of the saw to a curve show¬ ing about one-sixty-fourth of an inch rounding in five feet, and then tilting the upper wheel so that the saw has an uniform pressure across the blade. The strains usually put upon saws range from 5,000 to 12,000 pounds, and should be only sufficient to prevent slipping on the wheels. A rubber tire three-fourths of an inch in thickness on the upper pulley adds much to the endurance of the blade. This upper pulley should also be provided with a tension link, ffhe following table gives the strains for band saws of differ¬ ent sizes and gauges.

Table of Strains for Band Saws.

Width,

inches

6 .

6 .

6 .

6 .

6 .

7 .

7 .

7 .

8 .

8 .

8 .

9 .

9 .

9 .

10 .

10 .

Gauge Pounds

Width,

inches

Gauge

16

4,212

10 .

… . 15

17

3,756

11 .

. . 13

18

3,174

11 .

… . 14

19

2,718

11 .

… . 15

20

2,268

12 .

… . 13

15

5,439

12 .

… . 14

16

4,914

12 .

… . 15

17

4,382

13 .

…. 13

14

7,168

13 .

… . 14

15

6.216

14 .

… . 13

16

5,616

14 .

… . 14

14

8,064

15 .

_ 13

15

6,699

15 .

. . 14

16

6,318

16 .

… . 13

13

10,260

16 .

… . 14

14

8,960

Pounds

7,770

11,286

9,856

8,547

12,312

10,752

9,324

13,338

11,648

14,364

12,544

15,390

13,440

10,416

14,336

Gauges. — In selecting a saw, the nature of the work for which it is required, and the power available to drive it, should always be taken

into account. In this connection the first important point is the proper gauge. Generally speaking, a thin-gauge saw blade lasts much longer than a thick one. For mills of ordinary capacity and operating on a general line of work the most suitable saws are those measur¬ ing seven gauge at the centre and eight on the rim. If the timber is valuable, and the sawyer skillful, saws as light as eight or 10 gauge may be used, but saws lighter than that are im¬ practicable for use in ordinary mills. In large mills where the saving of time is more desirable than the saving of lumber, and consequently greater speed and feed are used, the most suit¬ able saws are those of six and seven gauge, which are sufficiently heavy to stand up to the more severe service. In the case of these heavier saws it is imperative that the pulleys be of large diameter.

The second important point in the selection of a saw is the number of teeth. With high speed and the accompanying high feed, more work is required of a saw in a given time, and, therefore, it should have more teeth with which to do that work and to distribute the strain evenly. The speed, however, should not exceed 3,500 feet per minute with 36-inch pulleys. The . number of teeth should depend not only on the thickness of the saw, but also on the character of the timber to be sawed and the speed and feed of the mill. Gullet teeth are preferable for all except very hard woods, and they should not be too close together. Consult Bale, M. P., (Woodworking Machinery) (London 1914) ; Hasluck, P. N., (The Wood-Turner's Handy Book) (London 1910) ; U. S. Vocational Edu¬ cation Board, (Factory Woodworking Trades5 (Washington 1919).

WOODBERRY, wud'ber-i, George Ed¬ ward, American critic and poet: b. Beverly, Mass., 12 May 1855. He was graduated from Harvard in 1877, became professor of English in the University of Nebraska in 1878-79, was on the Nation staff in 1879-80, was again at Nebraska, and subsequently, until 1891, was in active literary work, holding the literary editor¬ ship of the Boston Post , and contributing much to the Atlantic. From 1891 until his resig¬ nation in 1904 he was successively professor of literature and of comparative literature (from 1899) in Columbia University. He became known as an authoritative critic, and a poet of much distinction, and must be ranked among the most scholarly and important of the more recent American litterateurs. The titles of his works include A History of Wood-Engraving5 (1883); a very valuable <Life5 of Poe (1885;

(American Men of Letters5); (The North Shore Watch, and Other Poems) (1890) ;

< Studies in Letters and Life) (1890) ; <The Heart of Man5 (1899) ; (Makers of Literature) (1900); (Nathaniel Hawthorne) (1902; Amer¬ ican Men of Letters5); Collected Poems) (1903); America in Literature) (1903); (North Africa and The Desert) (1914) ; (The Flight, and Other Poems1* (1914). He also edited the poetical works of Shelley (4 vols., 1892); Poe's works (1894; with Stedman) ; Lamb's Assays of Elia5 (1892) ; Aubrey de Vere's (Select Poems5 (1894) ; (National

Studies in American Literature) (4 vols., 1899— 1900) ; Columbia University Studies in Com¬ parative Literature) (9 vols., 1899-1903) ; cBacon's Essays) (1900) ; Sidney's (Defense of Poesie) (1908); (European Years; Letters of an Idle Man) (1911) ; (New Letters of an Idle Man> (1913).

WOODBINE, N. J, borough in Cape May County, 48 miles southeast of Philadelphia, Pa., on the Pennsylvania and the Atlantic City Rail¬ roads. It is the seat of the Baron de Hirsch Agricultural School. There are garment facto¬ ries and an iron foundry. Pop. (1920) 1,406.

WOODBRIDGE, Frederick James Eu¬ gene, American educator and philosophical scholar : b. Windsor, Ontario, Canada, 26 March 1867. He was graduated at Amherst College in 1889, at the Union Theological Seminary, New York, in 1892, and studied at the Univer¬ sity of Berlin in 1892-94. He became a mem¬ ber of the faculty at the University of Minne¬ sota in 1894, and held the chair of philosophy there in 1895-1902. He was appointed profes¬ sor of philosophy at Columbia University in 1902, became Johnsonian professor of philoso¬ phy there in 1904, and since 1912 has also been-dean of the faculties of political science, phi¬ losophy, pure science and fine arts. He was prominently connected with the neo-realism movement in philosophy. He is editor of the Journal of Philosophy, Psychology and Scien¬ tific Methods, and of the Archives of Philoso¬ phy; has

contributed to scientific periodicals, and is author of (The Philosophy of Hobbes) (1903) ; (The Purpose of History) (1916).

WOODBRIDGE, William, American poli¬ tician : b. Norwich, Conn., 20 Aug. 1780; d. 20 Oct. 1861. He removed with his father to Mar¬ ietta, Ohio, in 1791, but studied law at Litch¬ field in his native State, and in 1806 was ad¬ mitted to the Ohio bar, becoming a member of the Ohio assembly the next year. A State senator 1808-14, as well as county attorney, he was appointed secretary of Michigan Territory in 1814, was territorial delegate to Congress 1819-20, and judge of the Supreme Court of the Territory 1828-32. In 1837 he became a State senator, was governor of Michigan 1839-41, and a United States senator 1841-47. Consult Lanman, Charles, (Life of William Woodbridge } (Washington 1867).

WOODBRIDGE, N. J., township, Middle¬ sex County, on Staten Island Sound, and on the Central New Jersey and the Pennsylvania railroads, about 25 miles southwest of New York. It has regular steamer connection with New York. It has valuable deposits of fire¬ clay, and the chief industrial establishments are brick, tile and drain pipe works. The township contains several villages. It has a high school, established in 1876, public and parish graded schools and a public library. Pop. (1920) 13,423.

WOODBURN, James Albert, American educator and historian : b. Bloomington, Ind., 30 Nov. 1856. He was graduated at the Indiana State University in 1876; taught in the prepara¬ tory department of that university from 1878 to 1886; from 1889 to 1890 was Fellow in history at Johns Hopkins University; and since 1890, has been professor of American history in the University of Indiana. He has written <Higher Education in Indiana) (1890) ; (Causes of the

American Revolution in (Johns Hopkins Uni¬ versity Studies) (1891); (The Historical Sig¬ nificance of the Missouri Compromise, in Re¬ ports of the American Historical Association y (1893) ; (The American Republic and Its Gov¬ ernment (1903) ; Political Parties and Party Problems in the United States) (1903; rev. ed., 1914); the article (United States — Political Events of the Civil War,} in the Encyclopedia Americana, *etc.* He has also edited (with Prof. C. W. Hodgin) (Select Orations of Burke and Webster) (1892) ; Lecky's (American Revolu¬ tion > (from Leckey's (England in the Eigh¬ teenth Century*), with bibliography and notes; (American Political History) from Prof. Alex¬ ander Johnston's articles in Lalor's

(Cyclopedia of Political Science and United States History* (4 vols.), *etc.*

WOODBURY, Charles Herbert, Ameri¬ can artist: b. Lynn, Mass., 14 July 1864. He was graduated at the Massachusetts Institute of Technology in 1886, and studied art in Paris at the Julien Academie under Boulanger and Lefebvre. He later established himself in Boston, where he became well known as a painter of marines. He was elected to the National Academy of Design in 1907; was awarded medals at the expositions held at Paris, Buffalo, Saint Louis and Buenos Aires ; re¬ ceived a gold medal at Atlanta in 1905 and a gold medal and medal of honor at San Francisco in 1915. Among his works are (The North Atlantic (Worcester Museum) ; (The Sea* (Indianapolis Art Association); (The Cliff > (Carnegie Institute, Pittsburgh) ; (The Forest* ; (On a Lee Shore, * *etc.*

WOODBURY, wud'bur-n, Daniel Phin-eas, American soldier and military engineer : b. New London, N. H., 16 Dec. 1812; d. Key West, Fla., 15 Aug. 1864. He was graduated from West Point in 1836 and was appointed second lieutenant of artillery. He was not long afterward transferred to the engineers and be¬ came first lieutenant in July 1838. After ser¬ vice to 1840 in constructing the Cumberland Road in Ohio, he took charge until 1847 of repairing works on the Atlantic Coast. He was in charge of construction at Forts Kearny and Laramie till 1850 and on the North Carolina Coast till 1856. He became captain of engineers 1860, major 6 Aug. 1861, lieutenant-colonel Sept., and brigadier general of volunteers 19 March 1862. At the opening of the Civil War he was assigned for engineer duty in the Army of the Potomac and was active in planning the defenses of Washington. He controlled all the engineering operations in the siege of Yorktown and those before Richmond, and his prompt action at the battle of Fredericksburg in bridging the Rappahannock, won for him the brevet of brigadier-general in the regular army. While in command of the Key West District he died of yellow fever. He published Sus¬ taining Walls) (1845) ; <Theory of the Arch*

(1858).

WOODBURY, Levi, American jurist: b. Francestown, N. H., 22 Dec. 1789; d. Ports¬ mouth, N. H., 7 Sept. 1851. He was graduated at Dartmouth in 1809, studied law, was admitted to the bar in 1812, and practised his profession at Francestown till 1816, when he was elected clerk of the State senate. In 1817 he was ap¬ pointed a judge of the

Superior Court, and

in 1823 he was elected governor of New Hamp¬ shire, and in 1825 represented Portsmouth in the State legislature and became speaker of the house. He sat in the United States Sen¬ ate 1825-31, and on the expiration of his term was elected in March 1831 to the State senate, but declined the offer in order to accept that of Secretary of the Navy, to which he had been appointed by President Jackson. In July 1834 he was transferred to the office of Secretary of the Treasury, which he retained during the re¬ mainder of President Jackson's second term of office, and the whole of President Van Buren's administration, retiring on the inaugu¬ ration of President Harrison 4 March 1841. During this period the post of chief justice of the Superior Court of New Hampshire was offered him, but was declined. In 1841 he was again returned to the United States Senate, but resigned in 1845 on account of his appointment as a justice of the United States Supreme Court, an office which he held until his death. He was a highly influential member of the Democratic party and at the time of his death was considered its most likely Presidential candidate. Consult Capen, N. (ed.), 'Political, udicial and Literary Writings of Levi Wood-ury) (Boston 1852).

WOODBURY, N. J., city, county-seat of Gloucester County, on the Delaware River, and on the West Jersey and Sea Shore (Penn¬ sylvania) Railroad, eight miles south of Phila¬ delphia. The chief industrial establishments are a glass factory, chemical works, piano fac¬ tory and machine shops. Woodbury ships large quantities of fruit and vegetables. There are several churches, a high school, public and pri¬ vate schools, and the Deptford Institute Free Library. The local banks have a combined capital of over $300,000. Pop. (1920) 5,801.

WOODBURYTYPE PRINTING, a proc¬ ess for obtaining by means of photography a picture or illustration for press printing. This process was invented by W. B. Woodbury, and is the only photo-mechanical one which, in the printing press, realizes the gradations of tone without grain or texture of any kind. The idea of the process emanated

from the carbon print, in which the picture is formed in all its gradations by various thicknesses of pigmented gelatine, the shadows, representing the great¬ est thickness, being in relatively high relief, and the high lights the lowest. Mr. Woodbury con¬ ceived the idea of making an electrotype mold of a carbon picture and using the mold so ob¬ tained as a printing surface by covering it over with warm pigmented gelatine and by flat pressure attaching a sheet of paper to the pig¬ ment, so that when the gelatine jelly was set he could detach it from its mold and thus by repeating the operation obtain unlimited copies. This was practically the Woodburytype ; but of course there were difficulties and imperfections, which the inventor quickly set to work to over¬ come. He found that a thick film of gelatine and bichromate, when exposed under a nega¬ tive and washed, gave a very high, sharp relief ; and he also found that when this relief was perfectly dry it possessed the property of being absolutely incompressible, in other words, it was as hard as steel and could be used as a die. The relief film of gelatine was placed on a

block of smooth, hardened steel, with raised edges, upon this was laid a sheet of type metal or lead about a quarter of an inch thick and the arrangement was then placed under a hy¬ draulic press capable of exerting a pressure of about 40 hundredweight to the square inch. The pressure forced the lead into the gelatine image with such accuracy that every shade and detail of the relief was impressed. The raised edges round the steel block prevented the metal from squeezing out and on being de¬ tached, a mold in lead was obtained which could be used as a printing surface for thousands of copies. The seemingly delicate relief in gela¬ tine was quite uninjured by this treatment, and would serve for any number of further pressed molds.

The printing press for these pictures is special, resembling the copperplate process in principle. It is formed of a cast-iron base, on which is fitted a movable table to hold the mold, which is bedded down with gutta percha ; over the table is a hinged lid, faced with plate-glass, with a lever attachment for giving the pressure. The printing ink is a solution of gelatine in a hot state to which a pigment is added to give any desired tint. In printing, the lead mold is first oiled to prevent the gelatine sticking, and a pool of the warm ink is poured on to the middle of the mold; over this pool is laid a sheet of paper waterproofed with shellac, and the lid of the press is brought down over the whole, and pressure applied. The pressure squeezes out over the edges of the mold all superfluous ink, and all that is left is that re¬ tained in the graduated hollows and depres¬ sions of the lead

mold; the warm ink sets in a few minutes, and on opening the press the paper support is removed with its gelatine copy of the molded picture firmly attached to it.

WOODCHAT, wiid'chat, a bird which, not¬ withstanding its name, is not a chat, but a shrike, and belongs to the genus Lanius rutilus. Its whole length is about seven and one-half inches. The upper parts are mostly black, under parts white, with some white on head, wings and tail ; crown of the head and nape of the neck rich chestnut-red. The woodchat is abun¬ dant in southern Europe; and it is an African bird, being found from the Mediterranean to the Cape of Good Hope at all seasons of the year.

WOODCHUCK, or GROUND-HOG, an

American marmot (Arctomys or Marmota monax), 18 to 24 inches long, grizzled above and chestnut red below, the feet and tail black¬ ish. It is found from Hudson Bay to South Carolina, and west to the neighborhood of the Rocky Mountains, several distinct subspecies * and varieties appearing in this wide range. It digs deep holes in the fields, on sides of hills, or under rocks in the woods, in a slant¬ ing direction, at first upward to keep out the water, with several compartments, and usually with more than one entrance. It passes the winter in the burrow, in a dormant state. The digging is effected by the powerful fore feet, assisted by the teeth, the dirt being thrown backward under the belly and then kicked out by the widespreading hind feet. The food consists of various plants, fruits and vege¬ tables ; they are especially fond of red clover,

often doing great mischief to this crop and to gardens ; another favorite food is celery.

Woodchucks feed chiefly during the early morning and late afternoon and spend most of the remaining time lying in the sun or sleeping in the nests at the bottom of their burrows. They become extremely fat and re¬ tire to hibernate on the first intimation of ap¬ proaching

winter and only appear after the snow is gone in the spring. A large brood of young is born in the spring or early summer and when a few months old they are forced to leave the burrow and to shift for themselves. The woodchuck is generally a bold and un¬ suspecting creature, but has alert senses and where much persecuted may become vigilant. When driven to bay it may fight with consider¬ able courage and effectiveness. Its chief natural enemies are foxes and skunks, but the animal remains generally abundant in both cultivated regions and woodlands in the New England and Middle States. Consult Ingersoll, Ernest, (Wild Neighbors) (New York 1898) ; Seton, E. T., (Life Histories of Northern Animals* (New York 1909) ; Stone and Cram, Ameri¬ can Animals) (new ed., ib. 1914).

WOODCOCK, any of several birds, par¬ ticularly certain snipe-like birds of the family Scolopacidce. The American woodcock, duck snipe, bog-sucker, big-headed snipe, mud snipe, etc., as this bird is variously named by gunners, is the Philohela minor of ornithologists. The body is full and robust; the wings short and rounded; the head and eyes very large, and the bill straight, tapering from the stout base, grooved for nearly the entire length and ex¬ ceedingly sensitive at the end ; there is prac¬ tically no gape ; the ear is situated beneath the eye ; the legs are very short for a snipe and the tibiae are fully feathered. The woodcock is 10 or 12 inches long and weighs from seven to nine ounces, the females being the larger. The colors are a soft harmonious blending of vari¬ ous shades of brown and gray, with black mottling above, nearly uniform pale brown below. Except that it invades Ontario and other southern provinces of Canada the wood¬ cock seldoms ventures beyond the limits of the eastern half of the United States at any season. In winter it migrates to the South Atlantic and Gulf States, but most of them breed in the central and northern States. Migration north¬ ward begins very early and many of the more hardy individuals reach the Middle and New England States in early March before the frost has left the ground. At such times, and also in the late fall, they secure their food, con¬ sisting of insects and their larvae, snails, etc., •by turning over fallen leaves, but during the summer and whenever the ground is suffi¬ ciently soft they probe it with their long sen¬ sitive bills and with great skill extract the earthworms which constitute their chief food, and of which enormous quantities are con¬ sumed. They frequent bogs and swampy places along alder-grown streams, hillside springs, etc., during the summer ; but in the autumn forsake these coverts for cornfields and the under¬ growth of low woods, the surest indication of their presence being their perforations in the soft earth. Few birds are more uncertain in the choice of their feeding grounds, changing

from high to low as the weather varies from wet to dry. Their solitary habits are no doubt the result of the character of their favorite food, to obtain which they not infrequently search city lawns after nightfall. As the large - size of the eye suggests, the woodcock is cre¬ puscular and nocturnal, the period of its great¬ est activity being in the hours immediately suc¬ ceeding sunset and preceding dawn, though, especially when moonlight, it may be abroad throughout the night. During the day it re¬ mains hidden in deep bogs and thickets, rising only when forced and then springing perpendic¬ ularly above the bushes it flies in an irregular course for a short distance and drops as sud¬ denly to the ground and its concealment.

Mating takes place as soon as the sexes meet in the spring and is followed in April or even earlier by the building of a simple nest of leaves and grass in a dry and well concealed spot in a bog. Four or sometimes five buff or clay-colored eggs variously spotted with dark brown and lilac are laid, and after three weeks of incubation yield the fluffy, brownish-white young, which at once leave the nest led by the old birds to the feeding grounds. The love antics and nuptial flights of the male are cu¬ rious and interesting. In the former he is a diminutive of a turkey cock; in the latter he mounts in the darkness of night on swift wing high in the air above a wet meadow, then falls like a shot with a whistling sound as the air rushes through his tail and wing-quills. He has also a simple whistling vocal note. The female especially is very solicitous in the care of her young and not only feigns injury in order to entice an intruder from their vicinity, but frequently has been observed to bear them one by one between her thighs to a place of safety. Later in the summer the members of a family scatter to feed singly in their home-bog and with the advance of fall seek the uplands as above described. With the coming of hard frosts most of the woodcock leave for the South and become concentrated in favorite bot¬ toms along the lower Mississippi and other sections of the Gulf States. There and at this time the outrageous practice of fire-hunting is indulged in, chiefly by negroes and market hunt¬ ers. One person bears a torch which lights the ground and confuses the birds which are often killed in great numbers by a second per¬ son with gun or club as they crouch confused on the earth. It is to this practice, as well as to the equally to be condemned spring and early summer shooting still permitted in some of the northern States, that the almost threat¬ ened extinction of this fine bird in many parts of the country is to be largely traced. Among natural enemies of the woodcock are minks, hawks, owls, red squirrels, cats and snakes.

Next to the quail the woodcock is probably the most popular game bird of the eastern United States, and deservedly so, but its num¬ bers have greatly decreased since about 1880. To save it all gunners should unite in abolish¬ ing spring and summer shooting and in re¬ stricting the great destruction which takes place in the Gulf States during the winter by the absolute prohibition of fire-hunting and similar barbarous methods. In every respect fall hunting is the most delightful sport and the birds are then in the best condition for

the table. Most gunners prefer a cocker or other spaniel for flushing the birds from thick coverts and much the same style of gun and ammunition as quail shooting requires. The successful woodcock shooter must be a quick and steady shot, for these birds are as change¬ able as the Wilson's snipe in their moods, and their coverts offer greater difficulties. When shooting in cornfields the gunner sometimes stands on an elevated platform so that he can overlook the stalks among which his dogs are quartering.

The European woodcock, which occasion¬ ally occurs in this country, is a much larger bird and belongs to the genus Scolopax, which has long pointed wings, in which the outer primaries are neither much shortened nor at¬ tenuated. Its color is a brown of various shades, of darkest hue on the back, while the tail is black above, tipped with gray. Their habits are very similar to those of the Ameri¬ can kind. Consult Lewis, (American Sportsman) (Philadelphia 1868) ; Fisher, Wear-book, } United States Department of Agricul¬ ture for 1901.

WOODEN WALL, the side of a ship; hence the ship itself. When Athens was in imminent danger from the Persians 483 b.c., during the invasion of Xerxes, the oracle at Delphi was consulted, and, intimating that the city and country were doomed to ruin, added that — when all was lost, a wooden wall should still shelter her citizens. The Athenian young men interpreted ((a wooden wall® to signify ships ; Themistocles, who had probably influ¬ enced the oracle to utter the prediction or counsel it had given, was of the same opinion; faith was put in the navy and the result was the great victory of Salamis. It was

from this incident that the expression, ((The wooden walls of England,® arose.

WOODFALL, Henry Sampson, English printer and journalist: b. London, 21 June 1739; d. there, 12 Dec. 1805. From about 1758 until 1793, when he disposed of his interest and retired, he conducted the Public Adver¬ tiser, among the contributors to which was Sir Philip Francis (q.v.). He printed the (Letters of Junius) (see Junius), which have been conjecturally assigned to Francis. Woodfall, how¬ ever, is on record as stating that he definitely knew Francis ((never wrote a line of Junius.® After the Junius letter to the king had ap¬ peared in the Advertiser, Woodfall was prose¬ cuted for libel by the Crown, but the verdict rendered was practically one of acquittal. In 1797 Woodfall was master of the Stationers' Company. The Advertiser ceased to exist in

1795.

WOODFORD, Steward Lyndon, Ameri¬ can diplomat: b. New York, 3 Sept. 1835; d. 1913. He was graduated at Columbia in 1854 and admitted to the bar three years later, beginning practice in his native city in 1857. He served in the Federal army 1862-65, being at one period military commandant of Charles¬ ton and Savannah, and becoming brevet brigadier-general of volunteers. He was lieu¬ tenant-governor of New York 1866-68, but in 1870 as the Republican candidate for governor was defeated. A member of Congress 1873-75, and attorney for the southern district of New

York 1877-83, he subsequently engaged in private practice, but was appointed Minister to Spain in 1897, returning to the United States the next year on the opening of the Spanish-American War. He was president of the com¬ mission in charge of the Hudson-Fulton Cele¬ bration in New York in 1909.

WOODHULL, Alfred Alexander, Ameri¬ can brigadier-general: b. Princeton, N. J., 13 April 1837. He was graduated at Princeton, from which he received the degree LL.D. also, and from the University of Pennsylvania as M.D. He served through the Civil War in various medical and surgical offices, and in March 1865 he was brevetted captain, major and lieutenant-colonel ((for faithful and meri¬ torious services.® He has since filled many other offices in the surgical

department of the army, and by Act of 23 April 1904 he was ad¬ vanced to the rank of brigadier-general, re¬ tired. He lectured on personal hygiene and general sanitation at Princeton 1902-07, and has been the author of several medical works, especially (Military Hygiene* (1890, 1898, 1904, 1909), and (Personal Hygiene) (1906).

WOODHULL, John Francis, American university professor: b. Westport, N. Y., 2 July 1857. He was graduated at Yale, studied at Johns Hopkins and received Ph.D. from Columbia. He was teacher and principal in secondary schools 1881-85 ; professor of natural sciences at the New York State Normal School 1887 ; professor physical sciences, Teach¬ ers' College, Columbia, 1888- ; member of

the University Council of Columbia 1899-1902. He is a lecturer and author; some of his books being (Physics) (1900); (Simple Experiments in Chemistry *(1905) ; (Physical Nature Study Library* (1906) ; 'Electricity and Its Every¬ day Uses> (1911).

WOODHULL, Maxwell, naval officer: b. New York, 2 April 1813; d. 19 Feb. 1863; only son of the founder of Williamsburgh, Long Is¬ land, Richard Miller Woodhull. He entered the navy 4 June 1832, and after service in the Mediterranean, on the coast of Africa, at Brazil, and in the Gulf of Mexico, he engaged in the survey of New York Harbor, made plans for removal of obstructions from Hell Gate, and executed surveys on the New England Coast. In the Civil War, with rank of commander, 1 July 1861, he organized the supply service for the blockading fleet, commanded a division of the James River flotilla in the Peninsular cam¬ paign, was later attached to Admiral Wilkes' flying squadron in Florida waters, and after being ordered North was accidentally killed.

WOODLAND, Cal., city, county-seat of Yolo County, on the Southern Pacific Railroad, about 85 miles northeast of San Francisco, and 18 miles north of Sacramento. It is in an agri¬ cultural region, in which wheat and grapes are among the chief products. Many sheep are raised in Yolo County. The chief industries are connected with raising and shipping grapes, and shipping wheat, fruit, barley, wool and livestock. The educational institutions are Holy Rosary Academy (Roman Catholic), Hes¬ perian College (Disciples of Christ), opened in 1861, a high school established in 1895, graded elementary public and parish schools and a public library. The city has several

banks with deposits amounting to about $2,000,-’ 000. The commission form of government is in operation. Pop. (1920) 5,751. *

WOODLAND AREA OF THE UNITED STATES. See Lumber Industry of the United States.

WOODMEN OF AMERICA, Modern, a

fraternal beneficiary society instituted at Lyons, Iowa, 5 Jan. 1883, by Joseph Cullen Root, who served as its president until November 1890. It affords life insurance to its members and pays to the designated beneficiary on the death of a member the amount designated in the certifi¬ cate or policy held, the maximum being $3,000. Available statistics indicate a membership of 1,082,255; benefits disbursed since organization, $210,251,048.53; benefits disbursed in a recent fiscal year, $14,750,000. The society maintains a sanatorium for the treatment of tuberculosis. The head consul’s office is at Lincoln, Neb.; the head clerk’s office at Rock Island, Ill. The recognized women’s auxiliary of the Modern Woodmen of America is the Royal Neigh¬

bors of America, which has a membership of about 375,000.

WOODMEN OF THE WORLD, Sov¬ ereign Camp. The Sovereign Camp of the Woodmen of the World was organized in

Omaha, June 1890, by the founder, Joseph Cullen Root, in conjunction with John T. Tates, B. W. Jewell, F. F. Roose, F. A.

Falkenburg and W. O. Rodgers. The Wood¬ men of the World, Sovereign Jurisdiction, in¬ cludes all of the United States except the

eight States on the Pacific Coast. It is a bene¬ ficiary society affording life insurance to mem¬ bers thereof and has a membership approxi¬ mating 1,000,000, carrying $1,263,547,700 insur¬ ance and erects a monument at the grave of every member ; provides 70-year old benefits and has a juvenile class insurance. The Wood¬ men Circle is the recognized women’s auxiliary of this order and has a membership of 225,649. The headquarters of the society are located at Omaha, Neb., where they have erected an 18-story office building, costing $1,500,000, the institution occupying the greater part of the building

for headquarters.

WOODPECKER, a bird of the family Picidce, one of the most sharply defined fami¬ lies of birds which, with the related Picum-nidcE and lyngidce form the natural order Pici. These birds have a unique type of bony palate (saurognathous) especially characterized by the separation of the vomer into a pair of splint-bones; the fourth toe is reversed permanently so that it forms a pair with the hallux, which, however, is occasionally absent. The Picidce are distinguished by the acute, rigid and bristly character of the tips of the five well-developed pairs of tail-quills, the outer or sixth pair be¬ ing rudimentary. In typical woodpeckers the head is large, the neck slender but very powerful, the bill stout, straight, chisel-pointed, and often strengthened by longi¬ tudinal ridges, the nostrils protected by a thick screen of bristly feathers, and the feet very powerful, with short stout tarsi, strongly hooked claws and rough scales. The tongue is slender and flexible, with a barbed, hard tip in most cases, and the posterior hyoid “horns® curving up over the rear of the skull

into sheaths of muscle. This tongue is pro¬ vided with muscles for projecting it far be¬ yond the tip of the bill. This arrangement enables these birds to explore deep recesses for insects, and even to drag larvae from their burrows by means of the barbed tip and the adhesive secretion which the tongue receives from the greatly developed salivary glands.

The woodpeckers are a large group, 45 genera and 350 species having been enumerated in 1890. Except Australian, Madagascar and certain groups of the Polynesian Islands they inhabit the forest-clad regions of the entire globe. Their food, which consists to a . great extent of the long-lived wood-boring larvae, makes them largely independent of seasons, and they are, with some exceptions, little migratory and are equally at home in far northern and tropical forests. A few wood¬ peckers, like Colaptes (see Flicker), robin¬ like, search for worms and insects on the ground, and these have weaker, slightly curved rounded bills and smaller heads. Some, as the sapsuckers (Sphyrapicus) , drill the outer bark of rosaceous trees and lap the flow¬ ing sap with their bristle-brushed tongues or, like the redhead woodpecker, peck the ripest apples, green corn and other sweet and suc¬ culent vegetables. But the great majority are strictly insectivorous and perform an invalu¬ able service to human kind by their enormous destruction of a class of pernicious insects largely beyond artificial attack. In searching for insects woodpeckers usually begin at the very base of a tree trunk,

move spirally up¬ ward supported by their strong feet and bracket-like tail, peering into every crevice, pausing occasionally to tap the bark, then re¬ main in an attitude of apparent intense listen¬ ing and move on. From time to time they peck the bark with hammer-like blows de¬ livered with intense energy, which make the chips fly rapidly and soon expose the larva whose presence within had apparently been detected by the bird's keen sense of hearing. As soon as one tree is sufficiently explored they go to another, but often spend a long time searching and drilling a decayed limb or stump much infested with insects. Wood¬ peckers have a very characteristic undulating or galloping flight which is seldom much pro¬ tracted. Their nests are in holes drilled by themselves first horizontally then vertically downward and chambered in the usually par¬ tially decayed limb or bole of a tree or some suitable substitute. The eggs are always white with a highly polished porcelain-like surface, are usually numerous, and are deposited on a few wood chips at the bottom of the excava¬ tion. Woodpeckers are unmusical, their nup¬ tial song being a loud harsh rattling cry or laugh, combined with a loud drumming on resonant branches. Except during the nesting season they are usually silent and solitary birds.

About one-half of the known woodpeckers are American and eight genera and 30 species and subspecies enter the United States, a number of racial forms being confined to the extreme Southwest. As their habits conform pretty closely to the account just given, only a few representative forms need be mentioned.

The primate is the magnificent ivory-billed woodpecker (Campephilns principalis) , the embodiment of all the attributes of wood¬ pecker life and structure. (See Ivory-bill). A smaller, duller colored, but generally close counterpart of the ivory-bill is the pileated woodpecker (Ceophlocus pileatus) , of similar habits and only less quickly affected by the destructive agencies of man. Its original range, however, was much wider, but it is now a generally very rare and wary inhabitant of the deep woods. It is about 17 inches long, the bill is black and the fourth toe is peculiar in being much shorter than the hallux. Dryo-bates includes numerous species of small and moderate size with the plumage variously striped and spotted with black and white, the males with a red head-patch which the females lack. Very familiar nearly

resident species of the wood lot and orchard are the little downy and the larger hairy woodpeckers (D . pnbes-cens and D. villosus). A more southern and woodland species is D. borealis, the red-cock- aded woodpecker, while the West has D. scalaris, D. nuttallii and D. arizonce. Xeno-picus contains the noteworthy X. albolarvatus, which has a completely white head; while Picoides is still more noteworthy in the entire absence of the hallux. Two or three species of the three-toed woodpeckers (P. arcticus, P. americanus, etc.), inhabit the northern parts and western mountains of North America, and others occur in Eurasia. Besides the much divided black and white the plumage shows some yellow and brown. The remaining North American species are less typical in structure and habits. First of them is the handsome and well-known redheaded woodpecker (Melan - erpes erythrocephalus) , locally a common bird among old timber everywhere east of the Rocky Mountains, except in New England. Southward it is resident, northward migratory and more a vegetarian than most woodpeckers, eating, besides insects, which it sometimes catches flying, nuts, berries, green corn and fruits in search of which it haunts the orchard. The California woodpecker (M. formicivorns) , as its name indicates, finds ants a favorite article of diet, but also eats fruits, nuts and acorns, and has a remarkable habit of storing vast quantities of the latter in chinks and holes, often completely studding the boles of tall trees with acorns wedged in singly and sometimes using the space behind the cornices of houses for storage. Much speculation has been indulged in concerning this habit, but the fact is that these birds are migratory and but few of the acorns or the contained grubs thus stored are ever utilized for food. The eastern redhead stores up acorns less regularly. This genus also in¬ cludes three other western species and the red-bellied woodpecker (M . carolinus) chiefly of the southeastern United States.

The sapsucking habit and the peculiar structure of the tongue of Sphyrapicus have been alluded to above. The eastern species, the yellow-bellied woodpecker (S. varius) , is the well-known sapsucker, whose rows of holes completely encircling the trunks of orchard trees are so familiar. In the West are S. nuchalis, S. ruber and S. tliyroideus. Finally, the genus Colaptes contains the hand-vol. 29 — 32

some ground-woodpeckers or flickers (q.v.), which, while retaining

much that is picine in structure and habit, in other respects depart widely.

The Old World woodpeckers for the most part belong to the typical groups of genera, but three-toed woodpeckers are found in Europe and Asia and in the Malayan Islands, the latter being a peculiar crested genus (Gauropicoides) . A ground woodpecker (Geo colaptes olivaceus) of South Africa is gregarious and remarkable from its habit of nesting, kingfisher-like, in holes in banks. The related wrynecks (lyngi - dee), confined to the Old World, have the general aspects of larks, with soft broadly web¬ bed tail feathers, but their feet and other anatomical parts and their habits, as well, are those of the woodpeckers. However, they nest in natural holes in trees or banks and often seek their food on the ground. The Picu-minidee have short tails with feathers of the ordinary structure. They are mostly diminu¬ tive insectivorous birds, chiefly confined to tropical America.

Consult Malherbe, (Monographic des Picidees) (Metz 1862) ; Evans. (Birds} (Lon¬ don 1900) ; Eckstorm, (The Woodpecker* (Boston 1901) ; Coues, (Key to North Ameri¬ can Birds) (Boston 1903); Beal, (Food of Woodpeckers,* Bulletin 37, United States De¬ partment of Agriculture (Washington 1911).

WOODROW, wud'ro, James, American Presbyterian clergyman and college president; b. Carlisle, England, 30 May 1828; d. Colum¬ bia, S. C., 17 Jan. 1907. He was graduated from Jefferson College, Canonsburg, Pa., in 1849, subsequently studied at the Lawrence Scientific School at Harvard, and at the Uni¬ versity of Heidelberg. He was professor of natural science in Oglethorpe College, Ga., 1853-61, entered the Presbyterian ministry in 1860 and was Perkins professor in the Presby¬ terian Theological Seminary, Columbia, S. C., 1861-84. From 1891 to 1897 he was president of South Carolina College.

WOODRUFF, Charles Edward, American army surgeon and ethnologist : b. Philadelphia, Pa., 2 Oct. 1860; d. 13 June 1915. He was graduated at the General High School of Phil¬ adelphia in 1879, studied at the United States Naval Academy in 1879-83, and was graduate at Jefferson Medical College in 1886. He be¬ came an assistant surgeon in the navy in 1886, but in 1887 was transferred to the army. He was on duty in the Philippine Islands in 1898, 1902-04, and in 1909-10, and attained the rank of lieutenant-colonel. In 1913 he was retired. He was subsequently chief health officer at New Rochelle, N. Y. He was author of about 75 monographs and of (The Effects of Tropi¬ cal Light on the White Man* (1905) ; Ex¬ pansion of Races) (1909) ; (Medical Ethnology*

(1915).

WOODRUFF, Clinton Rogers, American municipal reformer : b. Philadelphia, Pa., 17 Dec. 1868. He was graduated at the University of Pennsylvania in 1889 and received the de¬ gree of LL.D. there in 1892. He was counsel of the Philadelphia Municipal League in 1891—1903, and in 1903-04 he was special Indian com¬ missioner for the investigation of alleged frauds. He served in the Pennsylvania legislature

two terms and fathered the <(personal regis¬ tration55 amendment to the Pennsylvania Constitution. In 1906 he was appointed presi¬ dent of the board of personal registration com¬ missioners for Philadelphia. He later served as secretary of the National Municipal League, and in 1917 he was appointed to the advisory committee of the National Council of Defense. He edited the Proceedings of the National Con¬ ference for Good City Government in 1894-1911, and is editor of the National Municipal Review. He has published (City Government by Commission1* (1911).

WOODRUFF, Wilford, American Mor¬ mon leader: b. Northington (now Avon), Conn., 1 March 1807 ; d. Salt Lake City, Utah, 3 Sept. 1898. He adopted the Mormon faith in 1833 and in subsequent years made missionary tours to England, and in the eastern States. He was one of the Mormon emigrants to Salt Lake City; became one of the 12 apostles in 1839; and in 1887 was elected president of the Mormon Church. For 22 years he held a seat in the Utah legislature.

WOODRUFF, wud'ruf, or WOODROOF,

plant of the genus Asperula and natural order Rubicacece, with whorled leaves, native of northern parts of the old world, and distin¬ guished by a funnel-shaped or bell-shaped corolla, a bifid style, capitate stigma, and dry didymous fruit. The sweet woodruff (A.

odorata) is common in shady woods in all parts of Europe. It has a creeping root, a stem five to 10 inches long, weak and sub-erect, four or five whorls of lanceolate leaves, six to eight in the whorl rough at the edge and keel, and small white flowers. The plant when dried has a very agreeable fragrance, similar to that of Anthoxanthum odoratum under similar circum¬ stances. It forms an agreeable herb-tea, and enters into the composition of the popular May drink of the Germans. Dyer's Woodruff (A. tinctoria) is a native of the continent of Europe and of Siberia, a perennial, with reclin¬ ing stems about 12 inches long, whorls of six oi four linear leaves, upper leaves opposite, flowers whitish. The root is used in Dalmatia and elsewhere instead of madder ; but the crop obtained from a field is inferior in quantity to that of madder. For flavoring, the Germans in this country use the sweet-scented bedstraw (Galium triflorum), of the same family, and with odor much like that of woodruff ; it is procum¬ bent, the fruit bur-like, with hooked bristles, the flowers in threes, greenish ; it is common in woods that have a rich soil.

WOODS, Charles Robert, American sol¬ dier: b. Newark, Ohio, 19 Feb. 1827; d there, 26 Feb. 1885. He was graduated at the United States Military Academy in 1852 and was en¬ gaged in garrison and frontier service until 1861. He commanded the troops on the steamer Star of the West, in the attempt to relieve Fort Sumter in April 1861, and was appointed colonel of the 76th Ohio volun¬ teers 13 Oct. 1861. He saw service at Fort Donaldson, at Shiloh, the siege of Corinth and in the Vicksburg campaign, and was pro¬ moted brigadier-general of volunteers 4 Aug. 1863. He commanded a brigade at Lookout Mountain and Mission Ridge and a division in the Georgia and Carolina campaigns. He was

mustered out of the volunteer service 1 Sept. 1866, with brevet rank of major-general in the regular army and was transferred to the regular army. He was later engaged in the Indian warfare of the western plains. He was appointed colonel of the Second infantry 23 March 1874 and was retired from service in December 1874.

WOODS, Frederick Adams, American

biologist: b. Boston, Mass., 29 Jan. 1873. He studied at the Massachusetts Institute of Tech¬ nology in 1890-94 and took the degree of M.D. at Harvard University in 1898. He was con¬ nected with the faculty of the Harvard Medi¬ cal School in 1898-1903, and since 1903 has been lecturer on biology at the Massachusetts Institute

of Technology. He has published many papers on heredity and the volumes (Mental and Moral Heredity of Royalty 5 (1906) ; (The Influence of Monarchs) (1913), and is joint author of (Is War Diminishing?)

(1915).

WOODS, Katherine Pearson, American

novelist: b. Wheeling, W. Va., 28 Jan. 1853. She was educated in private schools in Balti¬ more. During 1893-94 she held a fellowship under the College Settlement Association and published the report of investigations during that period in the American Journal of Statistics (December 1895.) She engaged in missionary work among the whites of North Carolina from 1903-06. Her published works include (Metz-erott Shoemaker) ; (Mark of the Beast) ; (A Web of Gold) ; (From Dusk to Dawn5 ; (A Tale of King Messiah) ; (The Son of Ingar5 ; (The True Story of Captain John Smith) ; and many magazine articles.

WOODS, Leonard, American Congrega¬ tional clergyman: b. Princeton, Mass., 19 June 1774; d. Andover, Mass., 24 Aug. 1854. Gradu¬ ated at Harvard in 1796, he studied theology at Somers, Conn., as a pupil of Dr. Charles Backus, in 1798 was ordained pastor of the church at Newbury, Mass., and upon the es¬ tablishment of the Andover Theological Semi¬ nary in 1808 was made professor of Christian theology there. In 1846 he retired from the active duties of the chair. He was a strict Calvinist, well-versed in metaphysical studies, a clear and vigorous writer and a champion of the New England theology against Ware, Buck¬ minster, Channing and other Unitarians. <(He is emphatically,55 says H. P. Smith, <(the judi¬ cious 5 divine of the later New England theol¬ ogy.55 He was prominent in the founding of the Temperance Society, the American Tract Society, and the Board of Commissioners of Foreign Missions. Among his works are (Life of Mrs. Harriet NewelP (1814) ; (Letters to Unitarians5 (1820) ; ˆLectures on the Inspira¬ tion of the Scriptures5 (1829) ; (Letters to the Rev. N. W. Taylor5 (1830) ; (Memoirs of American Missionaries5 (1833); Examina¬ tion of the Doctrine of Perfection5 (1841) and (Lectures on Church Government5 (1843) ; (Theology of the Puritans5 (1851). Consult Foster, F. H., (A Genetic History of New England Theology5 (Chicago 1907), and Walker, Williston, (Ten New England Lead¬ ers5 (New York 1901).

WOODS, Leonard, American theologiar and college president, son of

Leonard Woods,

1774-1854 (q.v.) : b. Newbury, Mass., 24 Nov. 1807 ; d. Boston, Mass., 24 Dec. 1878. He was graduated at Union College in 1827 and at the Andover Theological Seminary in 1830. He was professor of sacred literature at Bangor Seminary in 1836-39, and in 1839-66 he was president of Bowdoin College. He edited the Literary and Theological Review, New York, in 1834-37; translated G. C. Knapp's < Christian Theology) (2 vols., 1831-33), and was author of many valuable papers on the early history of Maine, contributed to the Proceedings of the Maine Historical Society.

WOODS, Robert Archey, American uni¬ versity settlement worker: b. Pittsburgh, Pa., 9 Dec. 1865. He was graduated at Amherst in 1886, and from Andover Theological Seminary in 1890, and made a European tour for the pur¬ pose of investigating social problems, spending six months at Toynbee Hall, London, and has been head of the South End House, a university settlement in Boston, since 1891. He lectured on social economics at Andover Theological Seminary (1890-95), and on social ethics at the Episcopal Theological School, Cambridge (1896-1914). In 1911 he became secretary of the National Federation of Settlements, and he was president of the National Conference of Social Work (1917-18). He is the author of (English Social Movements) (1891); edited <The City Wilderness* (1898); (Americans in Process) (1902) ; and was joint editor of (Handbook of Settlements* (1911); (Y,oung Working Girls) (1913).

WOODS, William Burnham, American jurist: b. Newark, Ohio, 3 Aug. 1824; d. Wash¬ ington, D. C., 14 May 1887. He was graduated ai Yale in 1845, was admitted to the Ohio bar in 1847, and was mayor of his native city in 1856— 57. In the last-named year he was elected to the Ohio legislature and chosen speaker, at the outbreak of the Civil War entered the Union army as lieutenant-colonel of the 76th Ohio reg¬ iment, and was promoted brevet major-general, serving under Grant and Sherman. At the close of the war he took up his residence in Alabama, was chosen chancellor of that State in 1868, appointed

circuit judge of the Fifth District in 1870, and in 1880 became an asso¬ ciate justice of the United States Supreme Court.

WOOD'S HOLL, or WOOD'S HOLE,

Mass., in the town of Falmouth (q.v.), in Barnstable County, on Buzzards Bay, and on the New York, New Haven and Hartford Rail¬ road. It has a large, deep harbor, and is widely known as the location of a station with a marine laboratory of the United States Fish Commission.

WOODSFIELD, Ohio, village and county-seat of Monroe County, 100 miles southeast of Columbus, and on the Ohio River and Western Railroad. It is situated in an oil region, has machine shops and several small manufacturing industries. Pop. about 2,502.

WOODSTOCK, Canada, the county-seat of Carleton County, New Brunswick, charmingly situated on the left bank of the Saint John River, and on the Canadian Pacific Railway, 6S miles from Fredericton. The industries in¬ clude sawmills, tanneries, foundries, wood¬ working shops, *etc.* Pop. about 3,856.

WOODSTOCK, Conn., town in Windham County, about 40 miles northeast of Hartford and five miles northwest of Putnam. It con¬ tains six villages. The town is in an agricul¬ tural and stock-raising region. The chief in¬ dustrial establishments are creameries and cot¬ ton twine factories. It has Woodstock Acad¬ emy, graded schools and a public library. Woodstock belonged to Massachusetts when it was incorporated in 1690. In 1749 it was an¬ nexed to Connecticut. Pop. about 1,849.

WOODSTOCK, Ill., city and county-seat of McHenry County, on the Chicago and Northwestern Railroad, about 50 miles north¬ west of Chicago and 30 miles east _ of Rockford. It is in an agricultural and dairy¬ ing section. It has flour and lumber mills, a creamery, typewriter works, planing mills, ma¬ chine shops, pickle and canning works. The principal public buildings are the county court¬ house, city hall and business blocks. It has several churches, the Todd Seminary for boys, the Chicago Industrial Home for Children, the Old Folks Rest Home, an armory, a high school, established in 1867, public elementary schools and a public library. Pop. (1920) 5,523.

WOODSTOCK, Vt., town and county-seat of Windsor County, on the Ottaguechee River, and on the Woodstock Railroad, 38 miles south of

Montpelier and 30 miles east of Rutland.- It is in an agricultural and dairying region, and contains four villages. The chief industrial establishments are butter and cheese factories, sash, door and blind factories, flour and lumber mills. Other manufactures are hay-rakes, sleighs, wagons, carriages, butter tubs and cheese boxes. The town has several churches, graded grammar and elementary schools, and the Norman Williams Public Library, founded in 1885. Pop. about 2,545.

WOODSTOCK, Va., town and county-seat of Shenandoah County, on the north branch of the Shenandoah River, and on the Baltimore and Ohio Railroad, about 95 miles west of Washington, D. C., and 155 miles north¬ west of Richmond. It was founded in 1762. It is in an agricultural and stock-raising region, and its industries are connected chiefly with farm and dairy products and the marketing of livestock. It has several churches and graded schools for both races. Pop. (1920) 1,580.

WOODSTOCK, a novel by Sir Walter Scott, published in 1826. It is an English tale of the time of Cromwell ; the events occurring in the year 1652, immediately after the battle of Worcester. The scene is laid chiefly in the Royal Park and Manor of Woodstock.

WOODWARD, Calvin Milton, American educator: b. Fitchburg, Mass., 25 Aug. 1837 ; d. Saint Louis, Mo., 12 Jan. 1914. He was graduated at Harvard University in 1860 and was principal of Brown High School, Newburyport, Mass. (1860-65). During one year of the Civil War he was captain of Company A, 48th Massachusetts Volunteers, serving in Louisiana. In 1865 he was called to Washing¬ ton University, Saint Louis; elected professor of mathematics and applied sciences (1870) ; dean of the school of engineering (1871-96) and was founder and director of the Saint Louis Manual Training School since its organization in 1879. Dr. Woodward's service to the cause

of education was marked by success along prac¬ tical lines. He served as a member of the Saint Louis School Board (1877-79) and again after 1897 ; regent of the Missouri State Uni¬ versity (1891-97) and in

1906 president of the American Association for the Advancement of Science. In 1909-10 he was also president of the North Central Association of Colleges and Secondary Schools; president of the Society for the Promotion of Engineering Education and was reelected dean of the School of Engineering and Architecture (1901). In 1905 Washington University conferred upon him the degree of LL.D., and in 1908 he received the same honor from the University of Wisconsin. He contributed many valuable articles to edu¬ cational and scientific journals and wrote (History of the St. Louis Bridge) (1881); (The Manual Training SchooP (1887) ; Man¬ ual Training in Education > (1890), *etc.* In the summer of 1910 he retired from the deanship and the last four years of his life were devoted to works of philanthropy and to the authorship and publication of his book upon (Rational and Applied Mechanics.)

WOODWARD, Robert Simpson, Ameri—

ican astronomer, physicist and mathematician : b. Rochester, Mich., 21 July 1849. He was grad¬ uated with the degree of C.E. at the University of Michigan 1872 and was appointed assistant engineer, United States Lake Survey. During 1882-84 he served as assistant astronomer to the United States Transit of Venus Commission; from 1884-90 he was astronomer, geographer and chief geographer to the United States Geological Survey, became assistant in the United States Coast and Geodetic Survey in 1890, and served for three years. From 1893-1905 he was professor of mechanics and mathe¬ matical physics at Columbia University, and from 1895 to 1905 was dean of the faculty of pure science. In 1905 he became president of Carnegie Institution, Washington, D. C. Dr. Woodward was president of the American Mathematical Society 1898-1900, American As¬ sociation for the Advancement of Science 1900-01, New York Academy of Sciences 1900-02. In 1892 he received the degree of doctor of philosophy from the University of Michi¬ gan, and in 1904 the degree of doctor of laws from the University of Wisconsin. He has published many papers and addresses on as¬ tronomy, geodesy, mathematics and other scien¬ tific subjects. (See article Earth in this En¬ cyclopedia). He has written (Smithsonian Geographical Tables1* (1894) ; (Higher Mathe¬ matics — a Text Book for Classical and Engi¬ neering Colleges* (1896 with Mansfield Merri-man), *etc.*

WOODWARD, Okla., city and county-seat of Woodward County, on the North Canadian River, 130 miles northwest of Okla¬ homa City, and on the Atchison, Topeka and Santa Fe and the Wichita and Northwestern railroads. A government agricultural experi¬ ment station is located here. There are a Carnegie library, Federal building,

courthouse and school. The city is a shipping centre for wheat, corn, livestock and poultry. Poo

(1920) 3,849.

WOODWORTH, Robert Sessions, Amer—

can psychologist and physiologist: b. Belcher-town, Mass., 17 Oct. 1869. He was graduated

at Amherst College in 1891, received the de¬ gree of A.M. at Harvard University in 1897, and that of Ph.D. at Columbia University in 1899, and later studied at the universities of Edinburgh, Liverpool and Bonn. He was demonstrator in physiology at the University of Liverpool in 1902-03, and was subsequently con¬ nected with the facultv of Columbia University, where since 1909 he has been professor of psychology. He was president of the Ameri¬ can Psychological Association in 1914. He is joint author of (The Elements of Physiological Psychology) (1911), and author of <The Ac¬ curacy of Voluntary Movement1* (1899) ; (The Care of the Body) (1912) ; (Dynamic Psychol¬ ogy } (1917), *etc.*

WOODWORTH, wud'werth; Samuel, American author and editor: b. Scituate, Mass., 13 Jan. 1785; d .New York, 9 Dec. 1842. He re¬ ceived a limited education in his native town, and was apprenticed in Boston to Benjamin Russell, editor and publisher of the Columbian Sentinel. After the expiration of his inden¬ tures he published for a brief period at New Haven, Conn., the Weekly Belles Lettres Re¬ pository, and engaged in other literary pursuits, in which he continued with more or less success until the close of his life. He was one of the founders in 1823, in conjunction with George P. Morris, of the New York Mirror, from which he withdrew within a year. Among his writings were a number of dramatic pieces, and (Champions of Freedom, * a romance of the War of 1812 (1816), but his reputation rests principally upon his songs and miscellaneous poems, one of which, (The Old Oaken Bucket,) obtained a wide popularity. His collected poems were published by his son, with a memoir by George P. Morris (2 vols., 1861).

WOOF. See Weaving.

WOOL, wul, John Ellis, American gen¬ eral: b. Newburgh, N. Y., 20

Feb. 1789; d. Troy, N. Y., 10 Nov. 1869. He was in early life proprietor of a bookstore in Troy, and his property being consumed by fire, he turned to the law, but his studies were interrupted by the war with Great Britain in 1812, when he became captain in the 13th infantry. He distinguished himself at Queenstown Heights, Plattsburgh, and Beekmantown, and in 1816 was appointed inspector-general of the northern division ; in 1818 lieutenant-colonel; in 1821 inspector-gen¬ eral of the whole army; and in 1826 brevet brigadier-general for 10 years' faithful service. In 1832 the government sent him to Europe to examine the military systems of some of the principal nations. In 1836 he was charged with removing the Cherokee Indians to Arkansas; and in 1838, during the Canadian difficulties, made a reconnoissance through the wilds of northern Maine, with a view to the defense of the frontier. He was appointed brigadier-gen¬ eral, 25 June 1841, and at the beginning of the Mexican War was ordered to the West to organize the volunteers, 30 May 1846, and in less than six weeks dispatched to the seat of war with 12,000 troops fully armed and equipped. He selected the ground on which was fought the battle of Buena Vista 23 Feb. 1847, commanded in the early part of the action, and for his conduct on this occasion was brevetted a major-general in 1848. After his return home in July 1848, he commanded the

eastern military division, with headquarters at Troy, until October 1853, when he was placed at the head of the department of the East, with the headquarters at Baltimore. From 1854 to 1857 he was in command of the department of the Pacific and of the Eastern department again in 1857-60. When civil war was immi¬ nent toward the close of 1860, he offered his services to the government, and after the at¬ tack upon Fort Sumter went to New York to organize, equip and send to Washington the first regiment of volunteers. In August he was sent to Fortress Monroe as commander of the department of Virginia, and from that post led an expedition which occupied Norfolk, 10 May 1862. He was promoted to be full major-general in the regular army, 16 May 1862 and the next year was placed on the

re¬ tired list.

WOOL. Wool is the soft elastic fiber which is grown on the domestic sheep. It so closely resembles the longer hairy fibres growing on the Llama, Alpaca, Angora and Cashmere goats that these fibres are imported under the name wool for commercial reasons.

Wool is shorn from the sheep ordinarily once each year; however, there are some sec¬ tions in which it is thought desirable on account of continued hot weather to shear twice each year. The shearing season varies with climatic conditions but generally speaking it occurs early in the spring. In those sections where shearing is done twice each year, it is done in the spring and fall. Most of the sheep in the large wool-producing sections of the world are shorn by machine clippers. The remainder are shorn by hand shears or “blades.® Skilful shearers can shear very rapidly, sometimes with machine clippers handling more than 200 sheep in a day of 10 hours.

The average shearer will probably shear 150 sheep each day. With the hand shears or “blades® the number would be somewhat smaller. The amount of wool obtained from each sheep varies with the breed and the section from which it is obtained. Ordinarily from 3 to 12 pounds of wool are obtained from each sheep. An average fleece might be said to weigh from five to eight pounds.

According to the Bradford system of manu¬ facture, wools are classed as “combing® or “clothing.® A wool, to be combing, must be at least two and one-half inches in length, while wools shorter than that are used for carding and are termed “clothing.® There is a third class called “carpet wools,® which includes the very coarse wools and inferior wools not well adapted to the finer class of goods for which the first two classes are used. Carpet wools are, however, either carded or combed. The introduction of the French comb has made it possible to comb wools of a shorter length than heretofore and many of the wools formerly used for carding or clothing are now combed with this comb and are known as “baby comb¬ ing.® Another possible system of classifying wools divides them into four groups which take into account the breed of sheep and gives better defined divisions than the system mentioned above. These groups are: (1) Merino wool; (2) British wool; (3) Crossbred wool; (4) Carpet wool. The breed of the sheep has a direct influence on the character of the wool and

this fact makes such a system especially de¬ sirable for classifying fleece wools.

There are more than 200 different breeds of sheep in the world, representing all grades of wool, from the finest to the coarsest. The entire wool production of the world for the year 1917 was 2,790,472,220 pounds. Of this total the distribution is as follows : Eu¬ rope, 793,400,043; Australia, 741,802,000; South America, 470,120,707 ; United States, 285,573,- 000; Asia, 273,146,000: Africa, 207,680,470, and a remaining 18,750,000, of which 11,400,000 is from British provinces of North America, 6,500,000 from Mexico, 750,000 from Central .America and the West Indies, with 100,000 pounds from small oceanic countries not in¬ cluded under any of the above classifications.

Carpet wools as the name implies are gen¬ erally used in making carpets, Oriental rugs and also more or less in the coarser grades of clothing. For the most part they come from Asia and southeastern Europe. The crossbred wools from South America, South Africa, New Zealand and Australia have a considerable variation in grade and a wide range of uses. The British wools are from sheep of English blood and are divided according to the char¬ acter of the wool into long and medium wools. The long wools are noted for their lustre and are classified in the trade as lustrous and semi-or demi-lustrous, being used for fancy-dress goods, linings and braids where the lustre of the material is an important consideration. The medium wools are much finer than the long wools and were until recently used for woolens. Now with the improved combing machinery and the introduction of the French combs they are used for either woolens or worsteds. They come mostly from Great Britain and British provinces and the United States. Merino wools are our finest wools and are used for materials of very fine texture, either woolens or worsteds. These wools are produced in Continental Europe, Australia, South Africa, South America and the United States.

The wools of the United States are divided into two groups, territory and domestic. The territory wools, sometimes called “range® or “western,® are those grown under range con¬ ditions as found in Wyoming, Montana, Idaho, Nevada, Utah, Arizona, New Mexico, Colorado and other States where the same conditions prevail. The domestic wools are those grown under farming conditions and are often spoken of as “farm,® “eastern® or fleece wools.

Sheep in sections producing territory wools are exposed to all kinds of weather on the range and are seldom protected from storms, for which

reason the wool is often harsh and contains more dirt and foreign matter than the domestic wools. Often the fleeces are com¬ posed of very weak fibres or fibres that are weak at some one point in their length. The domestic wools on the other hand are usually strong and are more free from dirt and, therefore, have a smaller shrinkage. They are protected from inclement weather and are given more care and attention than the territory wools.

It has been stated above that there is a large variation in the quality of wools from the different countries. There is a difference in the quality of wools from different breeds of

sheep, and indeed there is a variation in the wool on different parts of the same animal. This variation in wools makes it necessary to classify them according to their qualities. Wools are generally separated out according to the grades of the different fleeces, either at the time of shearing or at the wool warehouses. When this work is done at the shearing shed it is sometimes called classing, while at the warehouse it is called grading. The most progressive wool-growing centres of the world class and bale their wool at the time it is shorn,

used for the manufacture of worsteds, while the .clothing is used in the manufacture of woolens.

Pulled wool or skin wool is wool that is obtained from the pelts of sheep that have been slaughtered or have died from disease or ex¬ posure. It is generally inferior to shorn wool obtained from live sheep. This is due to the methods of obtaining it. The skin is treated chemically or submitted to a special treatment which loosens the roots of the fibres. The wool is then pulled out by hand much as the bristles

Fig. 1. — • Shearing wool in Wyoming.

others ship it to the warehouse wdiere it is graded and baled. Though much advancement has been made in the Western States in the past five years in the manner of handling wool, there is still much room for improvement. There is considerable difference in the terms used in classing and grading wool throughout the world. The terms most widely used are those of the topmakers' system. They classify wools according to fineness or coarseness in terms of spinning counts; a spinning count re¬ ferring to the number of hanks of worsted yarn that a pound of a given grade of wool will spin. For example, a lot of wool classed as 60s would spin 60 times 560 yards, or 33,600 yards of worsted yarn. The terms used in the American system, ((Boston Terms,® were orig¬ inally based on the proportion of Merino blood a sheep producing the given wool possessed. The pure-blood Merinos, having the finest wool, were used as the standard. These terms are still retained but no longer carry their orig¬ inal significance, as any one of a large number of different breeds might easily produce a half-blood wool.

The terms ((staple® or ˆcombing® and <(clothing® are often added to the grade names to dis¬ tinguish them. Both the staple or combing and the clothing of a given grade are the same fineness, but the combing wools are generally

are removed from a hog after scalding. Dur¬ ing the year 1917 there were 40,000,000 pounds of pulled wool produced in the United States. In addition to the pulled wools from the United States there are large wool-pulling establish¬ ments in practically all the large wool-produc¬ ing centres. Mazumet in France is the largest wool-pulling centre in the world.

The following table shows the American grades, together with the corresponding topmakers' terms :

Topmakers'

American terms quality terms

Fine and fine medium . 64s-74s

Half-blood . 58s-60s

Three eights-blood . 50s-56s

Quarter-blood . 46s-50s

Low quarter-blood . 40S-44S

Common or braid . 36s-40s

The Wool Fibre. — The wool fibre as has been stated above is the hair-like covering growing on the skin of the sheep. Each fibre is similar to hair in its method of growth. The appearance presented by a cross-section of a hair follicle under the microscope is shown in Fig. 2.

The skin of the sheep is composed of four layers, an outer or scarf, which is composed mostly of dead cells; the epidermis, or true

skin ; a papillary layer filled with minute blood vessels, and finally the dermis or corium. Pro¬ jecting through this skin are innumerable so-called hair follicles or sack-like bodies. Each wool fibre is formed in one of these follicles and grows from it. As the fibre is pushed out through the skin it is rather plastic, but on coming to the surface it soon hardens. The wool fibre is composed of three parts. In the centre is the medulla composed of soft globu¬ lar cells. This medulla is well defined in the coarser fibres but in the finer grades of wool is seldom visible even under the most powerful microscope. Next surrounding the medulla are spindle-shaped cells which make up the largest part of the fibre known as corticle, while on the outer part are the horny scale-like cells. These cells surround the outer part of the fibre scales, projecting some¬ what from the body of the fibre and overlapping much like the shingles on a roof. These scales are very important for it is the scales upon the wool fibre that produce what are known as serrations and give the wool fibre its property of felting, a property possessed by no other fibre to such a marked degree. The serrations are most numerous, acute and pointed, in fine-wooled sheep such as Merinos. In Saxony Merino for example as many as 2,800 have been counted in one inch. This surface or epidermal layer of scales gives the wool its lustrous quality. The fibre with smooth flatly lying scales is generally very lustrous. This is well shown in some of our hairy, long-

wooled sheep such as the Leicester and Lincoln. These have fewer serrations, there being about 1,800

Fig. 2. — Drawing showing cross-section of a hair follicle.

per inch. Some of the coarse inferior wools do not exceed 500 serrations per inch. There is also much difference in the size of the in¬ dividual fibre. The finest Merino wools will vary from 1/2000 to 1/4000 of an inch, while a maximum diameter of l/2o0 of an inch is ob¬ tained in the coarsest wools.

The crimp or curliness is an important property of wool fibres, since it plays a large part in the spinning of yarn and the felling of cloth The curly fibres will spin finer and make a better thread than the straighter ones. In

spinning, the fibres interlock with their serra¬ tions and the crimp or curliness helps to keep them from untwisting. They also give to cloth made from them a much better felting property, although this property is due only in part to the curliness of the fibres. The serrations or scales, as stated above, play the most important part. There seems to be a definite relation between the curliness and fineness of the wool fibre. The curliness and waviness are noted points in the judging of wool.

Wool, even the finest, has a high tensile strength and the fibre is strong throughout its length. Sometimes tender wool results from

Fig. 3. — A, Merino wool fibres; B, Lincoln wool fibres;

C, Leicester wool fibres.

the lack of proper foods, severe climatic con¬ ditions or sickness. This is wool having a weak spot at some point in its length. Dead fibres are sometimes found on poorly-bred sheep and are known as (<kemps® and referred to as kempy wool. Dead or weak fibres are highly unde¬ sirable as they will not stand the strain which fibres must undergo in spinning, but will break instead of stretching.

The elasticity of wool is one of its most im¬ portant qualities, giving to wool its soft feel and to the finished cloth its characteristic pliabil¬ ity and softness. Many of the finer wools will stretch 35 per cent of their length without breaking. There are many shades of wool found throughout the world, including black, white, brown, fawn, yellow and gray shades. White is by far the prevailing color. The colored wools are made use of in the spinning, knitting and weaving of rough yarns, knitted shawls and tweeds.

From a chemical standpoint wool is a highly complex substance. There are three components which go to make up the raw wool. All wool in its natural state contains a fatty or greasy matter called yolk'. This is secreted from the skin and covers the fibres. It serves to lubri¬ cate the fibres, prevents their matting together and protects them during growth, and pro¬ tects the fleece to a great degree against injury by outside agencies. It is a natural

impurity of the wool. There is also the wool fat which permeates both the yolk and the fibre, and the wool fibre, which is really a more complex chemical compound than either the yolk or the wool fat.

According to Hummel, the composition of the average wool is as follows : Moisture, 4-24 per cent ; yolk, 12-47 per cent ; dirt, 3-24 per cent; wool fibre, 15-72 per cent.

According to Bowman, the composition of the wool fibre is as follows : Carbon, 50.8 ; hydrogen, 7.2; nitrogen, 18.5; oxygen, 21.2; sulphur, 23.0.

It is said to have a probable empirical formula of CwHistNsSCXs. However, this con¬ veys but a small idea of its complexity. The wool fibre belongs to a class of chemical com¬ pounds known as proteins. The complexity of this group of compounds is clearly seen when we consider the fact that on hydrolysis they are usually broken up into 17 distinct units known chemically as amino acids.

Wool as distinguished from cotton burns slowly with an odor characteristic of burning animal matter such as horns and feathers, leav¬ ing at the end of the fibres a small crusty globule. Cotton on the other hand burns without odor to a white ash. Wool is readily dissolved by hot caustic soda solution, while cotton is practically unaffected. This, although a simple test, is an important one for use in determining the presence of cotton, one of the most common adulterants found in woolen goods.

Manufacture of Wool into Cloth. — When wool is received at the millˆit is generally in a graded condition, having either been graded at the shed where shorn or at some one of the numerous wool warehouses. The first step in the preparation of the ,wool at the mill is to remove the string and open up the fleece and tear out all hard paint which will not scour out when the fleece is cleaned. The fleece is then spread on a table, the centre of which is covered with a wire netting. This allows the sand and dirt to pass readily to the floor. The sorters tear the fleece apart, separat¬ ing it into piles according to its different quali¬ ties. As a rule the best wool is obtained from the shoulder and sides. That from the fore¬ part is irregular and sometimes filled with burrs, while the loin wool is shorter and coarser. The wool from the britch and hind quarters is the coarsest, while the wool from the under side of the throat is liable to be short, worn and dirty. The wool on the shoulder is finest and superior in soundness of fibre, softness of curl and evennessˆ of length.

After the wool is sorted it is next passed through a machine called a duster, which not only removes much sand, dirt and dust, but opens up the wool and better prepares it for the next operation, the scouring.

After the wool passes from the duster, the first operation is to scour it to remove the dirt and grease, thereby obtaining the pure wool fibre. This operation consists in passing the wool through three or four vats or bowls which contain a cleaning solution of hot soapy water. Each vat has its own set of rollers which squeeze out the washing solution from the wool before it passes on to the next vat. In this way the wool is gradually cleaned and on pass¬

ing through the rollers of the last vat is pro¬ pelled by means of a chain elevator to the dryer. The dryer is a specially constructed chamber kept very hot by means of steam. Most of the moisture is removed from the wool while in the dryer.

When wool contains burrs, chaff and simi¬ lar vegetable matter it must pass through a special treatment. When the wool is very burry it is passed through what is known as the car¬ bonizing process. This consists of dipping it in a bath of aluminum chloride or sulphuric acid solution, extracting the moisture and heating the wool to 212° F., when the vegetable mat¬ ter is reduced to a powder and may be readily shaken or blown from the wool. Wools hav¬ ing comparatively few burrs are ordinarily only run through the machine known as the burr-picker, which removes the burrs mechani¬ cally by tearing them from the wool. Some¬ times when quite burry it is found more satis¬ factory to run the wool first through the burr-picker to remove larger burrs and then to carbonize it to remove all the fine seeds and such material as is not entirely removed by the burr-picker.

The wool is now ready for the next operation, known as carding. None of the operations up to this point has made an attempt to straighten the fibres, but all have left them in a more or less tangled condition. The purpose of carding is to open the fibres so that they lie loosely separated in a uniform film, and to eliminate remaining impurities and fibres too short to spin. In the manufacture of woolens the rotary cards are used. These cards consist of rollers in the sur¬ face of which there is a large number of wires. These rollers revolving in opposite directions cause the wool as it is passed between them to be opened, separated and straight¬ ened. The fibres are usually carded three times by being passed successively through three cards known as scribbler, interme¬ diate and finishing card. From the first two the fibres come out in the form of a filmy lap. From the third, this product goes to a condensing machine, where it is divided and comes out in light strands about one-eighth of an inch in diameter. These strands, known as rovings, are wound onto spools and are now ready for the spinning room.

The next operation is the. spinning of the yarn. This consists of drawing out the rov¬ ing and twisting it into yarn. Up to this stage the wool has received no twisting, but has held itself together by the binding action of the scales on the wool, and their natural curliness or crimp. The spinning is for the most part done on a machine known as a mule and is in four successive steps which are practically automatic. Mule spun yarns are soft and rather loosely spun. Another kind of spin¬ ning is known as frame spinning. The frame spinning requires less space and labor for its operation. However, frame-spun yarns are not so soft as those produced on the mule. After the yarn is spun, it is used singly or twisted together into two, three or four strands, de¬ pending upon the coarseness or fineness of the fabric into which it is to be made. The yarn is now ready for the weave room, where it will

be woven into cloth.

WOOL INDUSTRY

Copyright, Underwood & Underwood,

WOOL INDUSTRY

Cloth consists essentially of two sets of interlaced threads. One set runs lengthwise and is known as the warp, while the other runs cross-wise and is known as the weft or filling. In a plainly woven cloth, the weaving consists of running each strand of filling alternately above and below each strand of warp. Mount¬ ing the warp beam consists of drawing several thousand threads through wire heddles in a frame called a harness and then through a wire reed. When this is done the warp beam is ready for the loom. These heddles are so arranged that the alternate threads rise and fall in rotation. Through the opening made between these sets of raised and lowered warp threads, a shuttle containing the filling is run and the cloth is woven. This covers in a gen¬ eral way the manufacture of woolen cloth. The manufacture of worsteds is similar in operation to the manufacture of woolens, dif¬ fering for the most part in preparation of the yarn. The main difference between wool¬ ens and worsteds is in the thread. In the preparation of the wool for woolen threads, it is carded. This leaves the fibres of the thread in a mixed and matted condition and results in a rather irregular thread. In the making of worsted thread the wool is not only carded, but is also combed. The combing operation leaves the fibres lying parallel to each other, removes the short ones and, after spin¬ ning, the thread is found to be well formed and regular in shape. Upon examining woolen and worsted fabrics, it will be found

that a woolen is soft and elastic, with a blended pattern and threads, that are not really dis¬ tinguishable. On the other hand, a worsted has a much brighter and more clearly defined pattern and a close, even and well-defined weave.

United States Wool Manufacturing Sta¬ tistics. — The wool manufacturing industry of the United States as recorded by the last Special Census of Manufactures grouped under this title 501 establishments making woolen goods; 298 establishments making worsted goods ; 97 making carpets and rugs ; 53 making wool felts ; and 30 making wool-felt hats — -a total of 979. The entire industry so constituted engaged 203,716 persons, of which number 195,285 were wage earners; 22,160 being spinners, and 46,173 being weavers. Of the whole number, 109,527 were employed in making worsted goods ; 49,165 in making woolen goods; 31,309 in making carpets and rugs; 4,035 manufacturing felt; and 1,249 in making wool-felt hats.

The number of establishments engaged in this industry has steadily declined since 1869, when 3,208 were in operation. This reduction in number has been due in part to the abandon¬ ment of many rural carding mills operated often in connection with the local grist-mill or sawmill, and in larger part to the consolida¬ tion of the smaller concerns into large units. The industry is at present centralized in Penn¬ sylvania and Massachusetts, 266 of the estab¬ lishments reported being in the former State and 183 in the latter. Rhode Island appears as a distant third with 80.

Practically all of the wool used in the manufacture of woolen, worsted and felt goods is of the finer grades — that is of clothing and combing wools. The raw wool used by the

carpet mills is nearly all of foreign origin, and of low grade. Less than of 1 per cent of American grown wool enters into the carpet and rug manufacture.

The capital employed in all branches of wool manufacture in the United States as reported by the last census amounted to $497,699,293, and the total production was valued at $464,- 249,813, divided thus: worsteds, $275,688,474; woolens, $103,815,905; carpets and rugs, $69,- 128,185; felts and felt hats, $15,637,249.

The specific products of the industry were reported as follows :

All-wool woven goods, a total of 323,067,563 square yards,

comprising

Worsted suitings, overcoatings and dress-goods. 222,420, 785

Woolen suitings, overcoatings and dress-goods. 90,980,381

U nderwear flannels . ‘ . 2,176,264

Blankets . 6,489,689

Horse blankets . 102,205

Carriage cloths . 514,226

Carriage robes . 132 , 399

Shawls . 124,486

M iscellaneous . 127,128

Cotton-warp woven goods, a total of 196,-

179,866 square yards, comprising

Worsted-filling suitings, overcoatings, and dress

goods . 56,763,091

Wool-filling suitings, overcoatings, and dress

goods . . 53 , 509 , 462

Domett flannels and shirtings… 16,092,266

Linings, Italian cloths, and Tastings . 36,196,243

Satinets and linseys . 8,415,079

Blankets . 17,973,821

H orse blankets . 5,831, 305

Carriage robes . 1,282,417

Miscellaneous . 116,182

46,244,730 square yards, comprising

Suitings, overcoatings and dress-goods . 31,400,082

Underwear flannels . 4,995,575

Blankets . 3,937,463

Horse blankets . 2, 231 , 162

Carriage robes . 354,049

Miscellaneous . 3,326,399

In addition there were manufactured 1,598,- 444 square yards of upholstery goods ; 132,- 559,701 pounds of yarns for sale; 8,985,170 pounds of tops and slubbing; 23,961,100 pounds of noils ; and 26,433,970 pounds of wool waste.

In the carpet and rug industry a total of 66,3 40,314 square yards was produced, divided as follows :

Axminster and moquette . 15,742,835

Wilton . 5,616,263

Brussels . 2 , 698 , 840

Tapestry velvets … 13,227,859

Tapestry, Brussels . 13,614,354

Ingrain . 5,795,807

Ingrain art squares . 3,177,563

Smyrna rugs . 822,150

All other carpets and rugs . 5 , 644 , 643

In the hosiery industry large quantities of wool were used in making the yarns consumed, and the census reported the finished yarns as follows: merino yarn, 24,180,036 pounds; woolen yarns, 7,714,761 pounds; worsted yarns, 231,752 pounds. These quantities must be accounted a part of the wool consumption of the country, as they were in addition to the 25,000,000 pounds of yarn bought by the hosiery mills from the woolen mills.

The materials used in the wool manufactur¬ ing industry embraced 277,588,101 pounds of domestic wool and 225,269,232 pounds of foreign wool — equivalent to about 307,705,932 pounds of scoured wool. In addition there was used 6,928,622 pounds of domestic mohair ;

2,446,219 pounds of foreign mohair; 6,619,750 pounds of camel, alpaca and vicuna hair; and 28,136,636 pounds of other animal hair. Rags and clippings yielded 62,083,016 pounds, and wool recovered from other materials, 30,158,915 pounds. Yarns purchased in for¬ eign countries totaled 214,455,204 pounds, divided thus : woolen yarn, 23,802,234 pounds ; worsted yarn, 62,895,372 pounds; merino yarn, 706,483 pounds. Silk yarns were used to the extent of 706,483 pounds ; cotton yarns, 56,988,- 329 pounds; linen yarns, 7,611,078 pounds; and yarns of jute, ramie, and other vegetable fibre in the amount of 61,653,015 pounds. The cotton, linen, jute, and other vegetable yarns were used almost exclusively by the carpet and rug industry.

Closely associated with the wool manufac¬ turing industry are the wool shoddy and the wool pulling industries. Shoddy is the trade name given to wool recovered by tearing apart soft woolen rags. It is of the class of short staple, and while it is not as durable as new wool, it provides a very large amount of ma¬ terial suitable for cheap garments, blankets, *etc.* The wool shoddy industry according to the census was carried on by 64 establishments em¬ ploying a capital of

$6,420,985, and 2,145 hands, and producing a yearly output valued at $7,706,- 843. The wool pulling factories reduce waste yarn to fibre which may be recarded, spun and woven. In 1914 there were 34 such establish¬ ments with a combined capital of $3,534,203. They employed 708 hands, and their annual out¬ put was valued at $8,272,721.

Bibliography. — Barker, A. F., and Priestley, E., (Wool Carding and Combing* (London 1912) ; Beaumont, R., (Woolen and Worsted* (ib. 1915) ; Bennett, F. P., & Co., (Woolen and Worsted Fabrics Glossary: Containing Instruc¬ tions for the Manufacture of Every Known Grade) (Boston 1914) ; National Association of Wool Manufacturers, (Annual Wool Review) (Boston); Ormerod, F., (Wool* (London 1918); Radcliffe, J. W., (The Manufacture of Woolen and Worsted Yarns* (Manchester 1913) ; The Textile Mercury's (Wool Yearbook> (Man¬ chester annually) ; Turner, H., (The Worsted Spinners Practical Handbook (London 1915) ; U. S. Agriculture Department Bulletin 206, (The Woolgrower and the Wool Trade) (Washington 1915). J. I. Hardy,

Associate Wool Specialist, The University of Wyoming Agricultural College and Experi¬ ment Station.

WOOL-GRASS, a rush. See Scirpus.

WOOL-SORTERS' DISEASE. See An¬

thrax.

WOOLF, wulf, Albert Edward, American chemist and inventor, son of Edward Woolf b. New York, 26 Sept. 1846. He was educated in the College of the City of New York. Among his discoveries are the antiseptic . and medical properties of seawater combined with the electric current, and the use of elec¬ trically decomposed seawater for sanitary pur¬ poses, used in many large cities in treatment of drinking water, sewage and garbage, and adopted by the United States government to combat the yellow fever epidemic in Cuba; the use of peroxide of hydrogen to bleach black ostrich feathers white, and also its employment

as an antiseptic. He also modeled the bronze medallion of General Grant, now at the former home of the general at Mount McGregor.

WOOLF, Benjamin Edward, American dramatist and musician: b.

London, 16 Feb. 1836; d. Boston, Mass., 7 Feb. 1901. Coming to New York in childhood with his parents, he early displayed a passion for music and was carefully trained by his father, with such re¬ sults that in later days he became leader of orchestras in Boston, Philadelphia and New Orleans. He settled in Boston, where he was dramatic critic for the Saturday Evening Gazette 1871-93, a post which he quitted for a similar one on the Boston Herald. He was an industrious musical composer, writing many overtures, quintets and trios, besides plays and operettas. His most successful comedy was <The Mighty Dollar,* while his operetta, (The Doctor of Alcantara,* was a favorite in its time.

WOOLLETT, wiihet, William, English

engraver: b. Maidstone, Kent, 15 Aug. 1735; d. London, 23 May 1785. His family originally came from Holland, and he was instructed in his art by an engraver named John Tinney. He engraved historical subjects and portraits, but was most successful in landscapes, in which he exhibited such varied excellences, as in the opinion of Longhi, to entitle him to be con¬ sidered (<the marvel and the example for all contemporary engravers and for those of the present time.® His foregrounds are vigorous and solid, and his aerial perspective wonder¬ fully clear and true, while he treats water, the crux of the engraver, with supreme success. His masterpieces are his (Niobe* and other plates after pictures by Richard Wilson, and the (Death of Wolfe) and the (Battle of La Hogue* after West. He was the first who conceived and embodied in practice the idea of uniting in one plate the three methods of en¬ graving, by aqua fortis, the burin, and the dry needle. His genuine plates are estimated at 123, but impressions are exceedingly rare and ‘valuable, as he permitted no imperfect prints to be struck off. Consult Fagan, Louis, Cata¬ logue Raisonne of the Engraved Works of William Woollett* (1885).

WOOLLEY, wui’i, Celia Parker, Ameri¬ can Unitarian minister: b. Toledo, Ohio, 14 I June 1848; d. 9 March 1918. Graduated from Coldwater Female Seminary, in 1868 she was married to J. H. Woolley and in 1876 removed to Chicago. She was pastor of the Unitarian Church, Geneva, Ill., for three years, and of the Independent Liberal Church, Chicago (1896-98), after which she was active as a lecturer and in the work of women’s clubs. She is the author of the novels (Lo*ve and Theology* (1887), republished as (Rachel Armstrong, or, Love and Theology) ; (A Girl Graduate) (1889) ; / Roger Hunt* (1893).

WOOLLEY, John Granville, American prohibitionist: b. Collinsville,

Ohio, 15 Feb. 1850. Graduated from the Ohio Wesleyan Uni¬ versity in 1871, he was admitted to the bar of the Illinois Supreme Court in 1873, became city attorney of Paris, Ill., in 1875, prosecuting attorney in Minneapolis in 1881, and practised at New York, 1886. At one period addicted to intemperance, he began lecturing against it in 1888, and has lectured to many audi-

ences on this theme at home and abroad. He became editor of The New Voice, a prohibi¬ tion organ in 1899, and was the Presidential candidate of the Prohibition party in 1900, re¬ ceiving a vote of 208,914. He has published (Seed* ; (The Sower) ; Civilization by Faith > ; (The Christian Citizen) (1897-98) ; (The Lion Hunter) (1900) ; (Temperance Progress in the 19th Century* (1902) ; (South Sea Letters*

(1905).

WOOLLEY, Mary Emma, American edu¬ cator: b. South Norwalk, Conn., 13 July 1863. She qualified as a teacher and was an instructor in Wheaton Seminary, Norton, Mass. (1886-91) ; in 1894 she was graduated at Brown Uni¬ versity. She was teacher of biblical history at Wellesley College, 1895-1900, the last two years being professor and head of the depart¬ ment of biblical history and literature. In 1900 she became president of Mount Holyoke College and the growth and development of that institution have largely been due to her efforts. She has received honorary degrees from Brown, Amherst, Smith and Yale. Miss Woolley is closely identified with many and varied movements, having served as member of the board of electors of the Hall of Fame, National board of the Y. W. C. A., executive committee of the American School Peace League, council of the National Institute for Moral Instruction, Commission on Peace and Arbitration; senator of United Chapters Phi Beta Kappa; honorary vice-president of the National Consumers' League, *etc.* She has written (Early History of the Colonial Post Office* ; development of the Love of

Ro¬ mantic Scenery in America) ; also many edu¬ cational articles.

WOOLMAN, John, American Quaker preacher: b. Northampton, Burlington County, N. J., August 1720; d. York, England, 7 Oct. 1772. In 1741 he became a speaker in the meet¬ ings of the Society of Friends. He was at this time a bookkeeper in a mercantile house, but subsequently learned the tailor's trade. In 1746, in company with Isaac Andrews, he made his first itinerant tour in some of the back settle¬ ments of Virginia, and from that time con¬ tinued at intervals to visit the societies of Friends in the different portions of the colo¬ nies. In 1763 he visited the Indians on the Sus¬ quehanna. He both spoke and wrote much against slavery. His best-known work , is the posthumons (Journal of John Woolman's Life and Travels in the Service of the Gospel* (1775), which Whittier edited, with an intro¬ duction in 1871. Woolman's simple and candid style has been highly praised by Charles Lamb, Crabb Robinson, and others. Among his other writings are (Some Considerations on the Keeping of Negroes) (1753; Part II, 1762); (Considerations* on various topics (1768), and (Serious Considerations) (1773). In 1774 — 75 a collective edition of his works appeared. Consult Whittier's sketch in the above-men¬ tioned edition of the (JournaP ; also Shore, W. T., (John Woolman : His Life and Our Times* (New York 1914).

WOOLNER, Thomas, English sculptor and poet: b. Hadleigh, Suffolk, 17 Dec. 1825; d. London, 7 Oct. 1892. At 12 he was placed in the studio of William Behnes, in 1842 en¬

tered the schools of the Royal Academy, and in the following year his first work, (Eleanor Sucking the Poison from the Arm of Prince Edward,* was exhibited. His first work to attract attention was (The Death of Boadicea* (1844), and this success was followed by (Alastor* (1846) ; Puck* (1847) ; (Titania and Her Indian Boy* (1848), and (Eros and Euphrosyne* (1848). About 1850 he was asso¬ ciated with Rossetti and the other artists who formed the (<Pre-Raphaelite Brotherhood,** in founding the short-lived but famous periodical called The Germ. His contributions, which were in verse, were collected and pub¬ lished, with additions, under the name (My Beautiful Lady* (1863). Woolner visited Australia in 1852, and one of his first works on his return was a life-size statue of Lord Bacon for the Oxford Museum. Among his more important works are (Elaine with the Shield of Sir Lancelot ; (In Memoriam* (1870) ; Puinevere* (1872) ; Pady Godiva* (1876) ; portrait busts of Carlyle, Tennyson, Darwin, Newman, Glad¬ stone, Kingsley and Dickens, and statues of Lord

Macaulay for Trinity College, Cam¬ bridge (1866), Sir Bartle Frere for Bombay (1872), Dr. Whewell for Trinity College, Cam¬ bridge (1873), Lord Lawrence for Calcutta (1875), J. S. Mill for the Thames Embank¬ ment (1878), Captain Cook for Sydney (1879), Sir Stamford Raffles for Singapore (1887) and Lord Palmerston for Palace Yard, Westminster. He became a Royal Academician in 1874, and for a time was professor of sculpture in the Academy. His fame as a sculptor has over¬ shadowed his reputation as a poet, but Pyg¬ malion* (1881), (Silenus* (1884), (TiresiasJ (1886) and (Poems* (1887) give him honorable rank among the minor poets of his time. Con¬ sult Garnett, in (Dictionary of National Biog¬ raphy.*

WOOLSACK, a sack filled with wool; hence, the seat of the lord chancellor in the House of Lords, a square cushion of wool, covered with red cloth. It is said to have been first placed in the House of Lords in the 14th century to symbolize an act prohibiting the exportation of wool from England.

WOOLSEY, wul'si, Sarah Chauncey

(Pusan Coolidge**) , American author, niece Of T. D. Woolsey (q.v.) : b. Cleveland, Ohio, 1835; d. Newport, R. I., 9 April 1905. As <(Susan Coolidge** she was a popular writer for children, but also wrote for their elders (Verses* (1880) ; (A Short History of Philadelphia* (1887). Among her books for young people were (The New Year's Bargain* (1871) ;

(What Katy Did) (1872); (A Guernsey Lily* (1881); (A Little Country Girl* (1885); Plover* (1888); Purly Locks* (1899); (Short History of the City of Philadelphia* (1887). She also edited <The Diary and Let¬ ters of Mrs. Delaney* (1878) ; (The Diary and Letters of Frances Burney, Madame D'Arblay* (1880).

WOOLSEY, Theodore Dwight, American college president and scholar, nephew of Timothy Dwight (q.v.) : b. New York, 31 Oct. 1801 ; d. New Haven, Conn., 1 July 1889. He was graduated at Yale College in 1820; studied law in Philadelphia, and theology at

Princeton, was tutor at Yale, 1823-25, and was licensed to preach in 1825. After studying abroad (1827-30) he was professor of Greek at Yale 1831-46,. and president of the college 1846-71. In 1871-81 he was chairman of the American company of revisers of the New Testament. Besides editions of Greek plays — the ‘Alcestis5 of Euripides (1833), the ‘Anti¬ gone5 (1835) and <Electra) (1837) of Sophocles, the <Prometheus) of Plato (1837), as well as the (Georgias) of Plato (1842) — his works include an introduction to the Study of International Law5 (1860; 5th ed. 1879) ;

(Essays on Divorce and Divorce Legislation > (1869); (Political Science; or the State

Theoretically and Practically Considered J (1877) ; (Religion of the Past and of the Future5 (1871) ; Communism and Socialism) (1880) ; (Helpful Thoughts for Young Men> (1882). He also edited Lieber’s (Civil Liberty and Self-Government5 (1871), and his (Manual of Political Ethics 5 (1871). He was one of the founders of the New Englander , to which he often contributed, one of the re¬ gents of the Smithsonian Institution, and at one period president of the American Oriental Association. Woolsey Hall of Yale University was named in his memory.

WOOLSEY, Theodore Salisbury, Ameri¬ can professor of international law, son of T. D. Woolsey (q.v.) : b. New Haven, Conn., 22 Oct. 1852. He was graduated from Yale in 1872, became instructor in international law at Yale in 1877, and from 1878 to 1911 was full profes¬ sor there. He has published America’s Foreign Policy,5 and edited Pomeroy’s ‘International Law) (1886) ; and the 6th edition of Woolsey’s (International Law5 (1891). He was also associate editor of Johnson’s ‘Universal Cyclo¬ pedia 5 (1892-95) ; and editor of the American Journal of International Law. He received the degree of LL.D. from Brown University in

1903.

WOOLSON, Constance Fenimore, Ameri¬ can author: b. Claremont, N. H., 5 March 1848; d. Venice, Italy, 24 Jan. 1894. Educated in Cleveland, Ohio, and New York, she re-, sided in Ohio, then in Florida and other South¬ ern States, and finally abroad, chiefly in Italy. Her first story published in a secular magazine — contributions to

Episcopalian periodicals had preceded it — was (The Happy Valley) in Harper's Monthly (1870). In this much of her subsequent work appeared. Many poems were printed from time to time, but these were never collected. Her reputation was based on works of fiction, the volumes being 'The Old Stone House) (1873) ; 'Castle Nowhere: Lake Country Sketches) (1875); 'Rodman the Keeper) (1880); 'Anne5 (1882); 'For the Major) (1883) ; 'East Angels> (1886) ; 'Jupiter Lights) (1889) ; 'Horace Chase) (1894), and 'The Front Yard, and Other Italian Stories) (1895). Their background is generally Ameri¬ can, preferably the Lake region or the South ; and when it shifts to Europe is less skilfully treated. They were highly praised by Stedman and other critics for equal freedom in present¬ ing diverse types and conformity to high literary standards.

WOOLSTON, wul'ston, Thomas, Eng¬ lish deist: b. Northampton, 1669; d. London,

21 Jan. 1731. He was educated at Sidney Sus¬ sex College, Cambridge, became a Fellow, and took orders in the English Church. He made a careful study of Origen, and in 1705 pub¬ lished the 'Old Apology for the Truth of the Christian Religion against the Jews and Gen¬ tiles Revived. > He maintained in this work that Moses was an allegorical personage, and his history typical of that of Christ. In 1721 he published 'The Moderator between an Infi¬ del and an Apostate,5 dialogues tending to show that the Gospel miracles by themselves could not prove Christ to be the Messiah. This work occasioned great scandal, and it was only through the intervention of Whiston that the author escaped a prosecution. In 1721 his college deprived him of his fellowship. The views set forth in his last work Woolston de¬ veloped more fully in 'The Moderator between an Infidel and an Apostate) (1725). His famous series of six 'Discourses on the Miracles of Christ5 appeared 1727-29, with two 'Defences5 in 1729 and 1730. He was in¬ dicted for blasphemy in consequence of the publication of this work and was imprisoned 28 Nov. 1729. His collected works with 'Life' appeared in five volumes (1833). See Deism, and consult Cairns, J., 'Unbelief in the Eighteenth Century5 (1880), and Sayons, 'Les Deistes anglais5 (1882).

WOOLWICH, wiil'ich, England, a munici¬ pal and parliamentary borough of London, in Kent, eight miles below London Bridge. Area, 8,277 acres. It has many ancient, together with a number of handsome modern houses, an old church (restored 1894), other places of worship, a town hall and several charitable en¬ dowments. It owes its

importance to the royal arsenal, which occupies an area of above 350 acres, and is one of the most complete and magnificent establishments of the kind in the world, with extensive forges, foundries and workshops of various kinds in which the new¬ est types of machinery are employed for the manufacture of immense quantities of warlike stores which are kept in suitable magazines and storehouses. Woolwich Dockyard, for cen¬ turies the most important in the kingdom, having become unsuitable for modern require¬ ments, was made over to the War Office in 1872. In the Rotunda there is a fine historical collection of arms and other interesting ob¬ jects. A large garrison is stationed at Wool¬ wich, which is the headquarters of the royal artillery; and there are various barracks, a military and a naval hospital, *etc.* On the edge of Woolwich Common, a fine large open area, are the handsome buildings of the Royal Military Academy (see Military Schools) ; and the Royal Ordnance College is also at Woolwich. At North Woolwich, on the op¬ posite side of the river, to which runs a free steam ferry, many houses and extensive fac¬ tories, especially of telegraph cables, have re¬ cently sprung up. The borough returns one member to Parliament. Pop. 121,376. Consult Larking, 'The Domesday Book of Kent5 (1869) ; Vincent, 'Records of Woolwich5

(1890).

WOOLWORTH, Frank W., American merchant: b. Rodman, N. Y., 13 April 1852; d. Glen Cove, L. I., 9 April 1919. He received

a public and commercial school education, and in 1879 established a %ve cent store® at Utica, N. Y., removing the business to Lancaster, Pa., later in that year. Out of the business grew a great chain of about 1,000 <(five and ten cent stores® in the United States and Canada, and about 75 in England. The business was organized under the firm name of Frank W. Woolworth and Company, of which Woolworth was president. He amassed a great fortune, and was a director in various

banks and trust companies. He also built in New York the famous tower <(skyscraper® known as the Woolworth Building, 57 stories high and of beautiful design.

WOONSOCKET, woon-sok'et, R. I., city in Providence County, on the Blackstone River, and on the New York, New Haven and Hart¬ ford (two branches) Railroad, about 15 miles northwest of Providence and 37 miles south¬ west of Boston. It has electric lines extending to all the near-by towns. The river here is spanned by a bridge which cost originally $300,000. It has three parks and the county fair grounds. It is a well-known manufactur¬ ing city. The chief manufactures are cotton goods, foundry and machine-shop products, worsted goods and hosiery and knit goods, rubber boots and shoes and wringing machines. Other manufactures are carved and turned wood, wagons, carriages, woolen goods, ma¬ chinery and furniture. The educational institutions are a high school, established in 1857 ; Sacred Heart College (Roman Catholic) for young men; Saint Ann's Acad¬ emy (Roman Catholic) for girls and young women, public and parish schools, the Harris Institute Library containing about 16,000 volumes. There are several banks and trust companies. The city owns and operates the waterworks. Woonsocket is a consolidation of several factory villages. The first village called Woonsocket is not included in the limits of the present city. The city was set off in 1867 from the town of Cumberland; in 1871 a part of Smithfield was annexed, and 13 June 1888 the city was incorporated. Pop. 43,496. Consult Richardson, <History of Woonsocket5 (Woonsocket 1876).

WOORARI, or WOORARA. See Curari.

WOOSTER, wus'ter, David, American Revolutionary general : b. Stratford, Conn., 2 March 1710; d. Danbury, Conn., 2 May 1777. He was graduated at Yale College in 1738, and in 1739, when the war broke out between Eng¬ land and Spain, entered the provincial army as lieutenant, and was subsequently made captain of a vessel built and equipped by the colony for defense of its coasts. In 1745 he partic¬ ipated in the expedition against Louisburg, and went in command of a cartel ship to Eng¬ land, where he was made a captain in the regular service under Sir William Peppered. In the French War which ended in 1763 he was commissioned by the governor of Connecti¬ cut as colonel, and subsequently as brigadier-general, and served during the whole war. In April 1775 he was one of the members of the assembly of Connecticut who concerted the plan for the seizure of Ticonderoga; and when the continental army was organized he was ap¬ pointed one of the eight brigadier-generals.

He was engaged in the expedition into Canada, where after the death of General Montgomery he for a time held the chief command. He resigned and returned to Connecticut, and was major-general of the militia when Tryon in¬ vaded that province for the purpose of destroy¬ ing the military stores at Danbury. He at¬ tacked Tryon's rear guard 27 April 1777, and while rallying his men was mortally wounded. On 17 June Congress voted that a monument should be erected to his memory, but no steps were taken to have the resolution carried into effect, and his neglected grave was not identi¬ fied until 1854, on 27 April of which year the cornerstone of a monument to his memory was laid, by act of the legislature of Connecticut. The town of Wooster, Ohio, was named in his honor.

WOOSTER, Ohio, city and county-seat of Wayne County, on the Killbuck Creek, and on the Pennsylvania and the Baltimore and Ohio railroads, about 50 miles southwest of Cleve¬ land. It is in an agricultural and stock-raising region. It has manufactories of flour, furni¬ ture, doors, sash and blinds, boilers, engines, aluminum ware, pumps, brushes, farm imple¬ ments, pianos, glass, mill-gearing, and brick. There are banks having a combined capital of over $200,000. The educational institutions are - Wooster University, the Ohio Agricultural Ex¬ periment Station, a high school, public ele¬ mentary schools, and libraries. Pop. (1920)

8,204.

WOOSTER, College of, located at Woo¬ ster, Ohio, was founded under the auspices of the Presbyterian Church, chartered in 1866 and first opened in 1870. In 1899 the charter was revised and the power of electing the members of the board of trustees delegated to the Presbyterian Synod of Ohio. Previously the board was self-perpetuating. In 1914 the name of the institution was changed from ((The Uni¬ versity of Wooster® to ((The College of Woo¬ ster.® It is a coeducational non-sectarian insti¬ tution.

The organization of the college now con¬ sists of the collegiate department, the Bible and missionary training school and the conservatory of music. The college offers two baccalaureate degrees, bachelor of arts and bachelor of science. It has always stood for a high grade of scholarship, being a member of the North Central Association of Colleges. On a beautiful campus of 100 acres on a hilltop

overlooking the city of Wooster are the 12 modern and fully equipped college buildings. The prevailing style of architecture is the English Collegiate-Gothic. Splendid athletic facilities are furnished by the large gymnasium and a 14-acre stadium given to the college by the late L. H. Severance of New York. A unit of the Students' Army Training Corps was established in 1918. The faculty consists of 41 members. The college has over 2,000 alumni, and represents an investment in buildings and endowment of over $2,000,000. Its aim is to provide a liberal and thorough education em¬ bracing physical, mental and moral development.

WORCESTER, Dean Conant, American educator: b. Thetford, Vt., 1 Oct. 1866. He was graduated at the University of Michigan in 1889, having previously accompanied the

Stecre scientific expedition to the Philippine Islands in 1887-89. He was instructor in ani¬ mal morphology at the University of Michigan 1893-96, becoming assistant professor in the last-named year. In 1890-92 he again traveled in the Philippines, with F. S. Bourns, in a tour known as (The Menage Scientific Expedition,* and in January 1899 was appointed one of the United States commissioners to the islands to investigate and report on conditions there. He was the only member of this commission to be appointed on the second or Taft commission, which returned to the Philippines in 1900, and established civil government there. He was Secretary of the Interior of the Philippines (1901-13). He has published Preliminary Notes on Birds and Mammals collected by the Menage Scientific Expedition to the Philippine Islands) (1894) ; Contributions to Philippine Ornithology (1898) ; <The Philippine Islands and their People) (1898) ; (The Philippines, Past and Present (1914) ; and numerous articles on the (Wild Tribes of the Islands, * which were under his executive control for 12 years.

WORCESTER, Edward Somerset, 2d

Marquis of, English inventor : b. Raglan Castle, Monmouthshire, 1601

; d. 3 April 1667. He engaged in the service of Charles I during the Civil War, and was employed by the king to act for him in Ireland; but when his errand was discovered he was treated with duplicity by Charles, and retired to France in 1648. Re¬ turning to England in 1652 he was imprisoned in the Tower 1652-54, and his estates were seized, but after the Restoration he recovered most of these. He afterward spent his time in retirement, and in the cultivation of natural philosophy and mechanics. In 1663 he pub¬ lished a book entitled Century of the Names and Scantlings of Inventions as I can call to mind to have been Tried and Perfected,* in which he first gave a description of the uses and effects of an engine for adriving up water by fire** ; and afterward published a small pam¬ phlet, called (An Exact and True Definition of the most Stupendous Water-commanding Engine, invented by the Marquess of Worces¬ ter. > In neither of these does he give any statement of the mode of constructing his en¬ gine ; but, from his description and account of its effects, it may be inferred that its action de¬ pended on the condensation as well as the elastic force of the steam. (See Steam-engine). Consult Dircks, Henry, (Life, Times, and Scien¬ tific Labors of the Second Marquis of Wor¬ cester, *London (1865) ; Dircks, (Worcester-iana* (1865).

WORCESTER, Edwin Dean, American railway official: b. Albany, N. Y., 19 Nov. 1828; d. New York, 13 June 1904. He studied law, and followed various pursuits, but entered rail¬ roading in 1853, when he became a member of the accounting department of the New York Central Railway. He laid out, opened and ‘ managed the books of this company when there were no precedents in the United States for the organization of large railways, and the pres¬ ent accounting system of railways in this country is largely the development of his work. Subsequently he became successively treasurer and secretary of the company; in 1873 secre¬ tary and treasurer of the Lake Shore and

Michigan Southern ; in 1883 its vice-president ; and in 1878 secretary of the Michigan Central, in 1883 its vice-president. From 1883 he was also secretary, or treasurer, or both, in 15 other companies.

WORCESTER, Elwood, American Prot¬ estant Episcopal clergyman and author: b. Massillon, Ohio, 16 May 1863. He was gradu¬ ated at Columbia University in 1886 and re¬ ceived the degree of Ph.D. at the University of Leipzig in 1889. He was professor of philos¬ ophy and psychology at Lehigh University in 1890-96, also serving as chaplain; was acting rector at Saint John’s, Dresden, Germany, in lg94_95; rector of Saint Stephen’s, Philadel¬ phia, in 1896-1904, and has since

had charge of Emmanuel Church, Boston. He originated the Emmanuel Movement, which gives moral treatment for nervous and, rarely, for organic disorders, with the aid of medical practitioners in such cases as require medical assistance. His works include < Religious Opinions of John Locke* (1889) ; (The Book of Genesis in the Light of Modern Knowledge) (1901) ; (Reli¬ gion and Medicine* (1907) ; (The Living Word) (1908) ; <The Christian Religion as a Healing Power) (1909); (Religion and Life) (1914) ; (The Issues of Life) (1915), *etc.*

WORCESTER, Joseph Emerson, Ameri¬ can lexicographer and philologist; b. Bedford, N. H., 24 Aug. 1784; d. Cambridge, Mass., 27 Oct. 1865. He was graduated from Yale in 1811, and from 1819 resided in Cambridge, Mass., busily preparing and publishing books. Among his earlier works, compiled with much accuracy and excellent considerations, were <A Geographical Dictionary) (1817), of which an enlarged edition appeared in 1823; a Gaz¬ etteer of the United States* (1818) ; and Gut¬ lines of Scripture Geography) (1828). His first effort in English lexicography was an edition of (Johnson's English Dictionary, as Improved by Todd and Abridged by Chalmers, with Walker's Pronouncing Dictionary Combined) (1828). In 1829 he prepared an abridgment of Webster's (American Dictionary* ; and in 1830 published his (Comprehensive Pronounc¬ ing and Explanatory Dictionary. *After col¬ lecting philological works in Europe in 1830-31, he edited the (American Almanac) in 1831G3, and in 1846 published the (Universal and Critical Dictionary of the English Language.* His chief work, (A Dictionary of the English Lan¬ guage, } appeared in 1860, being the first work of the sort to employ illustrations. For this many collaborators were employed, particularly for the definition of technical terms.

WORCESTER, Noah, American theolo¬ gian: b. Hollis, N. H., 25 Nov. 1758; d. Brighton, Mass., 31 Oct. 1837. He was a fifer in the Continental army in 1775, and entered the service again for a short time as fife-major in 1777. In 1786 he was licensed to preach by a Congregational association, and in 1787 or¬ dained pastor of the church in Thornton, N. H., where he had held local offices and been elected representative to the General Court. In 1802 he was employed as the first missionary of. the New Hampshire Missionary Society, and in that capacity traveled and preached widely in the northern portion of the State. In 1810 he removed to Salisbury and took charge of the

congregation, and in 1813 settled at Brighton, Mass. His work on the doctrine of the Trinity, entitled (Bible News of the Father, Son, and Holy Ghost) (1810), soon became the subject of severe criticism, the Hopkinton asso¬ ciation, of which he was a member, passing a formal sentence of condemnation against the book. From 1813 to 1818 he edited The Chris¬ tian Disciple, a periodical published in Boston, and in 1814 published his tract, (A Solemn Re¬ view of the Custom of War,> once well known, and translated into several languages. Shortly after this the Massachusetts peace society was formed, and in 1819 he began The Friend of Peace, which continued in quarterly num¬ bers for 10 years, nearly the whole of it being written by himself. In 1829 he published (The Atoning Sacrifice, a Display of Love, not of Wrathi; in 1831, (The Causes and Evils of Contention among Christians) ; and in 1833, (Last Thoughts on Important Subjects.* Among his further writings is a (Respectful Address to the Trinitarian Clergy* (1812). Consult Ware, Henry, (Memoirs of Noah Webster, D.D.* (Boston 1844).

WORCESTER, Samuel Austin, American missionary and translator: b. Worcester, Mass., 19 Jan. 1798; d. Park Hill, Indian Territory, 20 April 1868. His father was a Congregational minister and also a printer. His parents moved to Vermont during his childhood. He was edu¬ cated in the University of Vermont (of which his uncle, Rev. Samuel Austin, was president), where he was graduated in 1819. He was graduated from Andover Theological Seminary in 1823 and in 1825 was ordained to the min¬ istry and shortly afterward entered the service of the American Board of Commissioners for Foreign Missions, being assigned to duty at Brainerd Mission in East Tennessee. In 1827 he was transferred to New Echota, Ga., which was the Cherokee capital. He aided in the establishment of the Cherokee Phoenix, which was the first paper to be printed in the Chero¬ kee language and alphabet. In March 1829 he was arrested by the Georgia authorities because of his refusal to take a special oath of allegi¬ ance to that State — an obligation which had been devised and prescribed for the avowed purpose of discouraging missionary work among the Indians. He was released but was re¬ arrested, tried, convicted and sentenced to the State penitentiary for the term of four years Clad in the garb of a felon, he was confined at hard labor until January 1833, though the Supreme Court of the United States had de¬ cided nearly a year before

that his imprison¬ ment was illegal. He then returned to Bram-erd where he was beyond the jurisdiction of Georgia. In 1835 he moved to the Indian Ter¬ ritory, whither the Western Cherokees had re¬ moved from Arkansas in 1829. After visiting the Dwight Mission he tarried for a season at Union Mission, where he set up the first printing establishment in the Indian Territory. In December 1836 he settled at Park Hill, five miles south of the present town of Tahlequah, where his mission was established and where he labored during the remainder of his life. In addition to his work as a preacher and teacher Mr. Worcester devoted himself to the task ot translating various works into the Cherokee language, to be printed and published at his

Park Hill Mission. The mission press also printed many books and pamphlets for the missionaries laboring among the Creek, Semi¬ nole, Choctaw and Chickasaw nations. His own translations included large portions of the Bible, tracts, hymn-books, school books and the Cherokee Almanac, printed in English and Cherokee, with astronomical calculations for the meridian of Fort Gibson. In translating the Bible he rendered the text from the original Hebrew directly into Cherokee without the medium of either the Greek, Latin or English versions. Prior to his removal to the West he had laboriously prepared manuscripts for a grammar and a dictionary of the Cherokee language, both of which were unfortunately lost when the steamboat transporting his personal effects was sunk while ascending the Arkansas River. He was greatly revered among the Cherokees by whom he was known as ((The Messenger.® Consult Mooney, James, (Myths of the Cherokee* (in 19th Annual Report of the Bureau of American Ethnology) ; Lumpkin, Wilson, (Removal of the Cherokee Indians from Georgia) ; Benson, Henry C., (Life Among the Choctaws) ; and Drake, Samuel G., (The Abo¬ riginal Races of North America. *

WORCESTER, England, (1) a city, the capital of Worcestershire, situated in a beauti¬ ful vale on the eastern bank of the Severn, 120 miles west-northwest of London. The cathedral is a noble specimen of Gothic simplicity. It was first erected by Ethelred, king of Mercia, in 680, and a later edifice was burned down and rebuilt in the beginning of the 13th century. It was restored in 1857-74. It is 394 feet long, 78 feet wide and 68 feet high, and the tower, which rises from the intersection of the nave and aisles to the altitude of 170 feet, is ornamented at the corners by lofty pinnacles. It contains many handsome monuments and sculptures, in¬ cluding the tombs of King John, of Bishop Gauden and of Arthur, Prince of Wales and son of

Henry VII. There are about 20 other handsome places of worship, such as Holy Trinity, Saint Nicholas, Saint Andrew's, Saint Helen's *etc.* Among other buildings are the shire-hall, guildhall, Victoria Institute (library, museum, etc.), corn-exchange, the hop and fruit market, museum of natural history, two gram¬ mar-schools, several charitable institutions, *etc.* Worcester is the chief seat of the English leather glove trade, has celebrated porcelain-works, ((Worcester sauce® works, vinegar-works' chemical and manure works, foundries, railway signal works, locomotive works, horse¬ hair weaving, agricultural implements, carriage factories and other works. Its trade in hops is extensive. There are municipal electric light¬ ing works and a service of electric trams. The most remarkable event here was the victory of the English army, under Cromwell, over the Scotch in the cause of Charles II, in 1651. There are traces of Roman occupation, but its history dates from the establishment of the Episcopal see in the 7th century. The first charter was obtained from Philip and Mary in 1554; James I granted another in 1622 and its government was again altered by the Munic¬ ipal Reform Act of 1835. Pop. about 50,000. (2) An inland county bounded on the north by Shrop and Stafford, on the west by Hereford, on the south by Gloucester and on the east by

Warwick; with some separated portions, en¬ closed by the counties of Gloucester and War¬ wick. The area is 751 square miles. The surface, generally level or gently undulating, has some extensive and beautiful vales, the principal of which, that of the Severn, is 30 miles long and one quarter to a mile broad. On the southwest are the fine Malvern Hills, the loftiest of which is 1,444 feet above set-level. The soil, composed chiefly of clay and loam, is of great fertility. The principal crops are wheat, barley, oats, beans, peas, turnips and hops. The orchards are celebrated for their apples and cider. The vales consist of meadows and rich pastures. The sheep are of the Leicester breed. Coal is found in the north and northwest ; the brine springs at Droitwich and Stoke Prior supply immense quantities of salt; iron is found with the coal, and the manu¬ facture of iron and steel, and of hardware, is extensive ; carpets and rugs are made at Kid¬ derminster; and

porcelain, gloves and other articles at Worcester. Pop. 427,064. Consult Brassington, (Historic Worcestershire> (Bir¬ mingham 1894-95).

WORCESTER, Mass., city and county-seat of Worcester County, on the Blackstone River, and on the New York, New Haven and Hart¬ ford, the Boston and Maine and the New York Central railroads, 44 miles west of Boston and 45 miles northwest of Providence. Electric railways extend to all the nearby towns and to Boston. The city was begun in a valley, but it now occupies a number of the surrounding hills; the elevation above sea-level is 481 feet; area, 38.41 square miles.

Industries. — Worcester is noted for the number and variety of its manufacturing es¬ tablishments. According to the State census the city's manufactured products in 1915 were valued at nearly $100,000,000, while the figure for 1917 reached nearly $193,000,000. Among the numerous factories are those producing steel, wire, machine-tools, grinding wheels, car¬ pets, leather goods, steam and electric cars, firearms, textile machinery, automobile parts, musical instruments, chains, *etc.* About 6,500 men are employed in the building trade. There are approximately 3,200 mercantile establish¬ ments employing about 25,000 people. The trading population of the suburbs is estimated at about 450,000. Owing to its large, up-to-date machinery equipment, Worcester became one of the most important war material producing cities in the country.

Buildings and Municipal Improvements. —

The principal public buildings are the Federal building, courthouse, city hall ($650,000), State armory, Mechanics Hall, the Young Men's Christian Association, the Young Women's Christian Association, buildings of the women's clubs and of several fraternal organizations, the State Mutual Assurance Company, Masonic temple, one of the finest in New England, several charitable institutions, the religious and educational institutions and the union station. There are 17 public parks, having a combined area of 1,091.88 acres; Lake Park has 110 acres and Elm Park 86 acres. Playgrounds occupy 74 acres. The system of waterworks cost $7,150,000. The sewer system covers about 240 miles and cost $5,977,499. Together with the sewerage pumping and purification works the

total cost is over $7,000,000. The city is divided into 10 wards, which

diverge from its centre like the spokes of a wheel. The prin¬ cipal business streets run north and south. There are 221 miles of public streets, 12 theatres and 33 hotels.

Churches, Charitable and Educational In¬ stitutions. — There are over 100 church organ¬ izations with property valued at $3,000,000. The denominations rank, according to the number of their buildings, as follows : Congregational¬ ism Baptist, Methodist Episcopal, Roman Catho¬ lic, Protestant Episcopal, Unitarian and others one or two each. The hospitals are the Wash¬ burn Memorial Hospital, for women and chil¬ dren, the City Hospital, Homoeopathic Hospital, and Saint Vincent's Hospital. Other Institutions are the State Insane Asylum, the State Odd Fellows' Home, Saint Ann's Orphan Asylum, Saint Vincent's Home for the Aged, Saint Francis' Home for the Aged, Our Lady of Mercy Orphanage, a home for the friendless, and a number of private hospitals. The educational institutions are Clark University, a post-grad¬ uate school for original research, opened in 1889, Clark College, Worcester Polytechnic In¬ stitute, College of the Holy Cross (Roman Catholic), opened in 1843, the Bancroft School, Kimball's School for Girls, Saint John's School (Roman Catholic), Worcester Academy, As-sumptionist College, Becker's Business College, Hinman's Business College, State Normal School, Boy's Trade School and Girls' Trade School, the evening high school, 74 public school buildings (four public high schools) and 10 portable schoolhouses, the Free Public Li¬ brary, two antiquarian societies, historical and literary societies and several school libraries. There are altogether more than 30 libraries with some 600, 0400 volumes; the Public Library con¬ tains 219,000 volumes. There are also 594 newspaper and magazines. Worcester boasts one of the finest art museums in the United States, with an endowment of $4,000,000.

Banks and Finances. — In 1919 Worcester had five savings banks with deposits of $100,- 000,000; two national banks; two trust com¬ panies and four co-operative banks. At 1 July 1917 the city had a valuation of more than $187,000,000 with $7,000,000 exempt. This valu¬ ation does not include $15,000,000 intangible personalty taxed directly by the commonwealth. The four insurance companies (one life and three fire) have total assets over $56,500,000, with a total surplus of about $5,000,000. The municipal expenditures for maintenance and operation are about $6,500,000. The chief items of expense are as follows: schools, $1,200,000; streets, $600,000; fire department, $320,000; police department, $495,000; charity department, $350,000; public library, $82,000.

Government. — The government is vested in a mayor, whose term of

office is one year. He is the chief executive officer and has ex¬ tensive power of veto over the acts of the board of aldermen and the common council, the former consisting of 11 members, one from each ward and one at large ; and the latter of 30 members, three from each ward. The two boards con¬ stitute the city council, who have power to accept or reject the mayor's appointments. The council elects the heads of the departments.

History. — A settlement was made here in 1673-74, called Quansigamog Plantations. The

Indians were hostile to the settlers from the first ; but at the beginning of King Philip's War, their hostility increased and the whites abandoned the settlement. Another attempt to found a settlement was made in 1684, but after a few years the Indians forced the whites again to leave. The second time the place was named Worcester on account of Worcester in England having been the home of some of the settlers. In 1713 the permanent settlement was made. In 1722 Worcester was incorporated; and char¬ tered as a city in 1848. Isaac Thomas, a pub¬ lisher, moved from Boston to Worcester in 1775, and until about 1800 the town was among the leading publishing places in the country.

Population. — The city ranks second in the State in population which is made up of 50 nationalities. Since 1850 it has grown rapidly. Beginning with 1800 the Federal census returns have given the following: (1800) 2,411; (1820)

2,962; (1850) 17,049; (1870) 41,405; 1880)

58,291; (1890) 84,655; (1900) 118,421; (1910)

145,986; (1915 State census), 162,697; (U. S. official census 1920) 179,754.

Consult Blake, F. E., incidents of the First and Second Settlements of

Worcester (Wor¬ cester 1884) ; Hurd, D. H., (History of Wor¬ cester County) (ib. 1889) ; Lincoln and Hersey, (History of Worcester (1837-62) ; Metcalfe, I. N., illustrated Business Guide to the City of Worcester (ib. 1880) ; O'Flynn, (School His¬ tory of Worcester (1910) ; Nutt, (History of Worcester and Its People) (1919) ; Rice, (Worcester in 1898) (ib. 1899).

John D. Hughes,

Secretary of Mercantile Bureau, Worcester Chamber of Commerce.

WORCESTER, South Africa, a town of Cape Colony, 60 miles northeast of Cape Town, 109 miles by rail through Paarl and Tulbagh. The town is regularly laid out, the streets being planted with trees. It is well supplied with water from the Hex River. The vine is exten¬ sively cultivated in the neighborhood and brandy and wine are made in considerable quantity. Pop. about 6.000.

WORCESTER COLLEGE, Oxford, Eng¬ land, originally called Gloucester Hall, was founded in 1714 by Sir Thomas Cookes of Bent¬ ley, Worcestershire, for a provost, six fellows and six scholars. Under the statutes of 1882 Worcester College consists of a provost, 9 or 10 fellows, and 19 scholars. There are a number of exhibitions, two of which are connected with the Charterhouse School, and three with Bromsgrove School. There are 10 livings within the gift of the college. See Oxford University and consult Daniel and Barker, (Worcester College) (London 1900).

WORCESTER MUSICAL FESTIVAL,

an annual musical event held at Worcester, Mass., consisting of four concerts, including one or more large oratorio or choral work, given under the auspices of the Worcester County Musical Association. The festival is the outgrowth of the joint meetings of the choirs in the vicinity, and the first festival was given in September 1858. The choirs were regularly organized at the Worcester County Musical Convention in 1863, and the present name was adopted in 1871. 4 he first entire

oratorio was given in 1866, with Karl Zerrahn as conductor. Zerrahn continued as conductor vol. 29 — 33

until 1897 ; G. W. Chadwick was conductor in 1898-1901 ; Walter Doodrich occupied the office in 1902-07, and since the 1908 festival Arthur Mees has been conductor. Victor Herbert was associate

conductor in 1889-91, and Franz Kneisel in 1892-1908. The musical festival held at Worcester, England, is known as the Three Choirs Festival.

WORCESTER POLYTECHNIC IN¬ STITUTE, a professional school of engineer¬ ing and chemistry located at Worcester, Mass. It was founded by a gift of $100,000 from John Boynton of Templeton; was chartered in 1865, and opened to students in 1868. Since that time its resources have been largely increased both by private benefactions and State donations. Though one of the earliest schools of the kind in the United States, it has in every way kept pace with the progress in scientific and technical education, and is recognized as one of the lead¬ ing American technical schools. From the time of its organization, laboratory and shop work have been a distinctive feature of its plan ; it was one of the first schools to emphasize the import¬ ance of laboratory methods and the first in the United States to establish a workshop as an essential part of the training in mechanical engineering. The institute offers five courses of four years each leading to the degree of B.S. ; these are mechanical, civil and electrical engi¬ neering, chemistry and general science. English, political science, French or German, and mathe¬ matics are included in all courses; the work of the freshman year is practically the same for each course; with the sophomore year the special work of each course begins. The work of the junior and senior years of the general science course is largely elective ; otherwise the courses are practically all prescribed. Graduate courses are provided leading to the degrees of M.S., D.S., M.E., C.E., E.E., and Ch.E. The students maintain a Christian association, student branches of the national engineering societies, chapters of several Greek fraternities and an athletic association. The institute publishes a bi-monthly Journal, containing original articles on technical and scientific subjects by the alumni and faculty and news of the institute and gen¬ eral scientific progress. The students publish a weekly paper. The institute campus comprises 34 acres on a slight elevation in the northwestern part of the city ; it slopes on the north to In¬ stitute Park and includes a large athletic field with a quarter mile track, gridiron and baseball diamond. The buildings on this campus are Boynton Hall, the Washburn shops (pattern, machine and forge), the Salisbury laboratories (chemistry, physics), the electrical engineering laboratories, the mechanical laboratories, the power laboratory, the foundry, the magnetic laboratory, and the alumni gymnasium and the Alden hydraulics laboratory at Chaffinsville, five miles distant. The laboratories and shops are all excellently equipped ; the library in 1919 contained 17,096 volumes including departmental libraries; the Worcester Free

Public Library, with 230,000 volumes in 1919, is also open to students. Free tuition is given to 40 Massa¬ chusetts students in consideration of which the institute receives an annual State appropriation. The students in 1919 numbered 474, and have averaged over 500 for the past 10 years ; the total number of graduates was 2,075.

WORCESTER PORCELAIN. In 1751, Dr. John Wall, physician, and William Davis, apothecary, established the <(Worcester Ton-quin Manufacture,® to imitate Chinese blue-and-white ware. Many connoisseurs declare some of the porcelain pieces were the best ever made in England. Robert Hancock, the clever engraver at the Battersea Enamel Works, helped by introducing transfer-printing; his fine work made the ware famous with such decorative pictures as Carden Scene,® ((Milkmaid in a Farmyard,® ((The Hunt,® etc., from noted ar¬ tists as Gainsborough, Watteau, *etc.* Hancock left in 1774 and Dr. Wall died in 1776; then Thomas Flight purchased the factory, and, with his sons, John and Thomas, ran the works. Frequent changes of partnership changed the firm name respectively to Flight and Barr; Barr, Flight and Barr; Flight, Barr and Barr, when, in 1840, the competition of Robert Chamberlain forced an amalgamation in the firm name Chamberlain's.® Oriental decoration and Eng¬ lish silverware forms characterize the Dr. Wall period (1751-83). The quality of the potting, as well as decoration, was first class from the start, but the (<inky® quality of the blue (through impurity) was a defect of early pieces. Wor¬ cester soon acquired a deserved reputation for its wonderful gilding. O'Neal and Donaldson painted lovely figure decoration. The <(Japan® pattern gained fame. A number of pieces in Worcester paste are facsimiles of Bow and Chelsea ware (<(quail® pattern, etc.). Wall period blues (all underglaze) as backgrounds were <(scale blue® and (<powdered blue,® of very variable quality. Other early colors were ca¬ nary yellow, turquoise, copper green, apple green and purple. In enameling sprays and stripes, a dead-surface opaque gros bleu is fre¬ quent. Favorite decorative motifs were <(ex-otic birds,® flowers, fruit, figures, landscapes, etc.,

also handpainted camaieu <(sprig pattern® in pink or overglaze blue. The early transfer¬ printing was in dark blue, chocolate brown, red, puce or purple, in overglaze. Decoration in the Flight period changed to <(armorial® services of a gorgeous character; Grecian fret, anthemion and ((Early Empire® conceptions (then in vogue) are favored. The great change in deco¬ rative treatment appears to have been without a transition period. The heavy gilding was still of fine execution but excessive and changed too in style. The final period is noted for grand services made for the emperor of Russia, George III, George IV and William IV. Ar¬ tists were, besides Hancock, such men as Valen¬ tine Green, James Ross, Thomas Baxter, en¬ gravers; Donaldson, Williamson, Dyer, O'Neal, Fogo, etc., painters. The products were large vases after Sevres and Dresden, table services, jugs, beakers, *etc.* Documentary evidence adds figures to Worcester ware, but none are known. Early Worcester paste was a glassy, trans¬ lucent, beautiful frit of greenish tinge when looked through. This gave way to a semi¬ opaque paste of yellowish tone, of which in¬ ferior body some of Worcester's most costly pieces is composed. The Flight period paste was no longer a soft, but hard, opaque, greyish body, often both thick and heavy. From 1783 to 1793 we have a pure, translucent, fine paste of bone-ash, china stone and china clay. Marks: First came a crescent or the Chinese square <(seal® mark, and the letter W, two on the same

piece sometimes. At times a capital E lies within the horns of the crescent. Then we get ((FLIGHTS® or the same in italics, some with a superposed crown. These are followed by the changed firm names. Crossed swords closely resembling the Dresden mark are on some pieces.

Chamberlain Worcester. — On the pur¬ chase of the Worcester factory by Flight, Rob¬ ert Chamberlain (about 1783), whose capacity is a mooted point, left the factory and started on his own account at the Diglis works. His brother Humphrey and Richard Nash were partners. H. Chamberlain, Junior, and Robert Chamberlain, Junior, ran the works from 1798 to 1811, and, from 1804 to 1811, G. Boulton was a partner. Competition between the Wor¬ cester factories was so keen that Barr, Flight and Barr, after heavy losses, combined with Chamberlain (1840) when the work was con¬ tinued in the Chamberlain plant only. The art value of the product soon fell off. Under Kerr and Binns the later factory produced, in the 19th century, very fine work. Chamberlains® started the lovely, translucent <(Regent® body in their finest pieces, but it was very costly and

unprofitable. Chamberlain ware so closely resembles the Flight and Barr product that they are hard to sometimes differentiate. Both did spiral-fluted table services. <(Japan® style was used by Chamberlains for many years. Marks were ((Chamberlain's® or Chamberlain's Worcester,® also ((Chamberlains Wor¬ cester.® The crown appears on ((Regent Paste® pieces and over some Flight firms' names. The factory is still running as the Royal Worcester Works.

Grainger Worcester. — A nephew of Hum¬ phrey Chamberlain, a porcelain painter in the Worcester works, named Thomas Grainger, opened (about 1801) an independent factory with a partner in the firm name of Grainger and Wood. In 1812 the firm became Grainger, Lee and Company, then G. Grainger and Com¬ pany in 1839. Their chief product was services, and excellently painted views in panels with handsome gilding appear on extant pieces. Among other marks are <(Geerge Grainger, Royal China Works,® ((Grainger, Lee and Co.,® the last mark being <(G. & Co.® in a shield with three martlets in a canton.

Bibliography. — Binns, W. M., (The First Century of English Porcelain } (London 1906) ; Burton, W., (A History and Description of English Porcelain) (London 1902) ; Church, A. H., (English Porcelain made during the Eighteenth Century* (London 1904) ; Hobson, R. L., (Worcester Porcelain) (London 1910) ; Jewitt, LI., (The Ceramic Art of Great Britain* (London 1883) ; Nightingale, J. E., Contribu¬ tion towards the History of Early English Porcelain* (Salisbury 1881); Solon, M. L., <Brief History of Old English Porcelain) (Lon¬ don 1903).

Clement W. Coumbe.

WORCESTER VS. GEORGIA. A statute of Georgia which prohibited residence within the territory of the Cherokee nation without the license of the State governor. Worcester was prosecuted in the criminal courts for having violated this statute. He appealed from his conviction to the Supreme Court of the United States claiming that the decision of the lower

court was in derogation of rights and privileges claimed by him under treaties existing between the government of the United States and the Cherokee nation. The latter was held to be a sovereign nation having the inherent power of negotiating treaties with the United States government subject only to the protection of the latter against the aggression of foreign powers. It was held also that the State of Georgia within whose limits lay the territory of the Cherokees had no power to legislate as to the rights of white persons residing in said territory and consequently his conviction of a crime against the laws of the State for residing in such territory with the license of the State governor, was without authority and void. Con¬ sult Canfield, G. F., in American Law Review, Vol. XV (1881) ; Thayer, J. B., in Atlantic Monthly (Vol. LXVIII, 1891); and Wil¬ loughby, W. W., Constitutional Law* (1910).

WORDE, word, Wynkyn de, English printer and stationer: b. Alsace, late 15th cen¬ tury; d. London, about 1534. His name was properly Jan van Wynkyn, de Worde being a place-name referring to Worth in Alsace. He probably went to England with Caxton from Bruges in 1476, and later was an apprentice in Caxton's printing office, in which he established himself in 1491. Fie printed between 700 and 800 works, which are known through fragments or at least one complete copy. This is thought to be not more than half his work. Among the books printed by him were Higden's (Poly-chronicon) (1495), in which occurs the first specimen of music type; Wakefield's <Oratio) (1524), in which italic type was first used in England; and Trevisa's rendering of Bartholo-mseus Anglicus' <De Proprietatibus Rerum *

(1496).

WORDEN, wor'dn, John Lorimer, Ameri¬ can naval officer: b. Ossining, Westchester County, N. Y., 12 March 1818; d. Washingtcpn, D. C., 18 Oct. 1897. He was appointed a mid¬ shipman in the navy in 1834. At the beginning of the Civil War he was captured by the Con¬ federates, but after seven months was ex¬ changed and was subsequently ordered to the command of the Monitor, which left New York 6 March 1862. He arrived at Hampton Roads on the evening of the 8th, after the ironclad Merrimac had destroyed the wooden frigates Cumberland and Congress. On the morning of the 9th a memorable battle was fought by the Merrimac and Monitor, the former of which was partly disabled and abandoned the fight, after several violent collisions with the Monitor. Promoted commander in

1862 and captain in 1863 he commanded the ironclad Montauk in the operations against Fort Sumter in April of that year. In June 1868 he was promoted com¬ modore, and in 1872 rear admiral. He was su¬ perintendent of the Naval Academy at Anna¬ polis in 1870-74; commander-in-chief of the European squadron in 1875-77 ; and was re¬ tired in 1886.

WORDSWORTH, werdz'werth, Charles, Scottish prelate, son of Christopher Words¬ worth (1774— 1846) (q.v.) : b. Lambeth, 22 Aug. 1806; d. Saint Andrews, Scotland, 5 Dec. 1892. He was educated at Harrow and Christ Church Oxford, and, becoming a private tutor, had Gladstone and Manning as pupils. From 1835 to 1846 he was second master at Winchester

School, and from 1846 to 1854 was the first warden of Trinity College, Glenalmond, Perth¬ shire. He was elected bishop of Saint An¬ drews, Dunkeld and Dunblane in 1852, and was a prominent figure in the ecclesiastical life of Scotland, being filled with an earnest desire to heal the dissensions between the different churches and pave the way for their reunion. Besides volumes of sermons, discourses, etc., he published a widely-used (Greek Grammar * (written in Latin) (1839) ; (Shakespeare's

Knowledge and Use of the Bible) (1864 ; 4th ed. 1892) ; (Annals of My Early Life* (1891). Consult (Annals of My Life) (1893), edited by Hodgson; and (The Episcopate of Charles Wordsworth* (1899) by John Wordsworth.

WORDSWORTH, Christopher, English Anglican clergyman, youngest brother of Wil¬ liam Wordsworth (q.v.) : b. Cockermouth, Cumberland, 9 June 1774; d. Buxted, Sussex, 2 Feb. 1846. He was educated at Hawkshead Grammar School and Trinity College, Cam¬ bridge, and was elected a Fellow of his college in 1798. He held various livings in the Church and was master of Trinity College 1820-41. He published (Ecclesiastical Biography) (1810) ; (Sermons on Various Subjects) (1814) ; Chris¬ tian Institutes,* a series of discourses and tracts (1836) ; (Who Wrote Eikon Basilike?) (1824-25), *etc.*

WORDSWORTH, Christopher, English Anglican prelate, son of the preceding: b. Lam¬ beth, 30 Oct. 1807 ; d. Harewood, Yorkshire, 21 March 1885. He was educated at Winchester and at Trinity College, Cambridge, and from 1836 to 1844 was head master of Harrow

School. He then became canon of Westminster, and after being made archdeacon of Westminster in 1865 was appointed bishop of Lincoln in 1868. He was the author of writings connected with classical, theological or ecclesiastical subjects, among which are (Athens and Attica) (1836) ; (Greece: Pictorial, Descriptive, and HistoricaP (1839) ; an edition of cTheocritus* (1844; fuller one, 1877) ; (Memoirs of William Wordsworth* (1851) ; (Saint Hippolytus and the Church of Rome in the 3d Century) (1853) ; (The New Testament in the Original Greeks (1856-60) ; (The Old Testament in the Authorized Ver¬ sion, *with notes and introduction (1864-71); (A Church History to the Council of Chalcedon, 451 a.d.* (1881-83). Consult (Life* by his daughter Elizabeth and J. H. Overton (1888).

WORDSWORTH, Christopher, English Anglican clergyman and scholar, second son of Bishop Christopher Wordsworth (q.v.) : b. Westminster, 26 March 1848. He was educated at Trinity College, Cambridge, in 1876-88 was a Fellow and tutor of Peterhouse College, and in 1877 was appointed rector of Galston, in Rut¬ land. In 1886 he became a prebendary of Lin¬ coln cathedral, and in 1889 rector of Tyneham, Dorset. In 1897-1911 was rector of Saint Peter's, Marlborough; in 1911-17 sub-dean of Cam¬ bridge ; from 1917 chancellor of Salisbury Cathedral. His works comprise (University Society in the 18th Century) (1874); (Scholse Academics* (1877) ; (Breviarium ad Usum Sacrum* (1879-86), edited with F. Proctor: (Pontificale Ecclesise S. Andreae* (edited 1885) : (Lincoln Cathedral Statutes) (1892-97) ; Coro¬ nation of King Charles P (1892-94) ; *etc.*

WORDSWORTH, Dorothy, English writer: b. Cockermouth, 25 Dec. 1771 ; d. Gras¬ mere, 25 Jan. 1855. She was the only sister of the poet and was a woman of remarkable men¬ tal powers, who described country life with keen observation and much literary skill. Be¬ sides her (Recollections of a Tour in Scotland) (1874) other journals and letters of hers have been published, the manuscripts having been finally collected by Knight in 1897. Her mind was latterly clouded. Consult Lee, 'Dorothy Wordsworth > (1886; new ed., 1894s*

WORDSWORTH, John, English Anglican prelate, eldest son of Bishop Christopher Wordsworth (q.v.) : b. Harrow, 21 Sept. 1843; d. 16 Aug. 1911. He was educated at New Col¬ lege, Oxford, was ordained deacon in 1867, and in 1868 became an assistant master in Welling¬ ton College. In 1870 he was made prebendary of Lincoln, and in 1883-85 was Oriel professor of the interpretation of Holy Scripture, Fel¬ low of Oriel and canon of Rochester. He was Bampton lecturer in 1881 and in 1885 became bishop of Salisbury. His chief publications are 'Fragments and Specimens of Early Latin) (1874) ; 'University Sermons of Gospel Subjects) (1878); 'The One Religion* (1881, Bamp¬ ton Lectures) ; (01d Latin Biblical Texts)

(1883-86), with Sanday and White; 'The Holy Communion* (1891) ; (Novum Testamcntum Latine, secundum editionem S. Hieronymi* (1898) ; 'The Episcopate of Charles Wordsworth) (1899) ; 'Teaching of the Church of England for Information of Eastern Chris¬ tians* (1900); 'The Ministry of Grace) (1901); 'Unity and Fellowship* (1910), *etc.* Consult Watson, E. W., 'Life of Bishop John Words¬ worth } (London 1916).

WORDSWORTH, William, English poet: b. Cockermouth, Cumberland, 7 April 1770; d. Rydal Mount, Westmoreland, 23 April 1850. He was the second son of John Wordsworth, attorney-at-law, who was descended from a Yorkshire family dating back to the Norman Conquest. His mother, Anne Cookson, be¬ longed to an ancient family of Crackanthorpes, who had lived in Westmoreland from the times of Edward III. He was educated at Hawkshead Grammar School and at Saint John's Col¬ lege, Cambridge, where he entered in 1787, tak¬ ing his B.A. degree in January 1791. In the summer vacation of 1790 he went to the Con¬ tinent with Robert Jones, a fellow-collegian, starting, as he says, "staff in hand, without knapsacks, each his needments tied up in a pocket-handkerchief, with about 20 pounds apiece in our pockets.® They spent most of the time in walking through Switzerland.

He left Cambridge with no definite plans for the future. He did not feel himself, as he said afterward, "good enough for the church,® and had no inclination to the law. He had studied military history with much interest, and at one time thought of going into the army, but on reflection gave up the plan. He finally went to London, where he lived for a time on a small allowance with no special aim or employment. In November 1791, he went to France, with the idea of spending the winter and learning French, but, becoming interested in the revolutionary politics of the period, re¬ mained in the country until October 1792, when

his friends, fearing for his safety, stopped his funds, and he reluctantly returned to England.

He soon began to turn his attention to lit¬ erary work. He had written verse in his school days, at first as a task imposed by his master, the subject assigned being “The Sum¬ mer Vacation,® to which of his own accord he added a poem on ‘The Return to School.* This was before he was 15, for in 1785 he was called upon to write verses in commemo¬ ration of the second centennial anniversary of the founding of the school. These, he says, “were much admired — far more than they deserved — for they were but a tame imitation of Pope’s versification, and a little in his style.® His first publication was in 1792 (not 1793, as generally stated), a thin quarto entitled ‘A-n Evening Walk — an Epistle in Verse ad¬ dressed to a Young Lady from the Lakes of the North of England. By W. Wordsworth, B.A., of Saint John’s College, Cambridge. J This was followed, the same year, by ‘Descrip¬ tive Sketches’ in Verse, taken from a Pedes¬ trian Tour in the Italian, Grison, Swiss and Savoyard Alps.* The books attracted little attention, and sold very slowly; but they led to the friendship between Wordsworth and Coleridge, which proved to be a lifelong inti¬ macy. Coleridge says in his ‘Biographia Literaria) : “During the last year of my resi¬ dence at Cambridge I became acquainted with Mr. Wordsworth’s ‘Descriptive Sketches,* and seldom, if ever, was the emergence of an original poetic genius above the literary hori¬ zon more evidently announced.® Wordsworth himself did not estimate these early poems very highly. In a letter to a friend at the time he says : “It was with great reluctance that I

sent those two little works into the world in so imperfect a state. But as I had done nothing by which to distinguish myself at the univer¬ sity, I thought these little things might show that I could do something. They have been treated with unmerited contempt by some of the periodicals, and others have spoken of them in higher terms than they deserved.®

In the latter part of 1794 Wordsworth re¬ ceived a legacy of £900 from a young friend, Raisley Calvert, son of the steward of the duke of Norfolk, who owned large estates in Cum¬ berland. They had long been very intimate when Calvert was attacked by consumption, and Wordsworth was his devoted companion and nurse until his death. The poet now felt that he could make a home for himself and his only sister, with whom, the next autumn (1 795) , he settled down in a cottage at Racedown in Dorsetshire. In July 1797, they moved to

Alfoxden, in Somersetshire, in order to be near Coleridge at Netherstowey. Here Words¬ worth added to his income by taking a young son of Basil Montague as pupil ; and here he wrote many of the poems included in the ‘Lyrical Ballads,) published in the autumn of 1798 by Mr. Joseph Cottle of Bristol, who had been rash enough to pay 30 guineas (about $150) for the copyright. The volume con¬ tained Coleridge’s ‘Ancient Mariner,* which he and Wordsworth had planned together, ami to which the latter had contributed a few lines ; together with Wordsworth’s ‘Idiot Boy,* ‘We are Seven,* and 20 other poems. Among these were the famous lines on ‘Tintern Abbey, *

which were written just before the book ap¬ peared. Five hundred copies were issued, but most of them were afterward sold to a Lon¬ don bookseller at a sacrifice. When Cottle gave up business soon afterward, his copy¬ rights were transferred to Mr. Longman of London, and in the estimation of their value the (Lyrical Ballads) were put down as ((worth nothing.® Cottle, therefore, asked that the copyright might be given back to him, and, the request being granted, he made a present of it to the authors, who both lived to see it become a piece of really valuable literary property. It is not easy to imagine a book containing (The Ancient Mariner) and the (Tintern Abbey > reckoned absolutely worthless, from a commer¬ cial point of view, only about a century ago.

Immediately after the publication of the (Lyrical Ballads,* Wordsworth, his sister and Coleridge sailed for Hamburg, with a view of perfecting their acquaintance with the German language by a winter at Goslar. During the four months spent in that dull and dismal town, in a particularly cold and disagreeable season, Wordsworth wrote some of his best and most characteristic poems, full of the loveliness of English rural scenery and life. Coleridge trav¬ eled independently of his friends a part of the time they were abroad, but the three made ex¬ cursions together in the rural districts of Ger¬ many, and had some unpleasant experiences. Sometimes they found it difficult to obtain food and shelter in the wretched inns of the

country. In one instance, as Coleridge records, they were actually driven out of doors and had to spend the night in the fields. But they met with no worse misadventures than these, and the Words¬ worths got safely back to England in the spring of 1799.

The poet was always fond of travel, and in later years frequently indulged in it both in the British Isles and on the Continent. . In August 1802, he went to France again, and in 1803 and 1814 visited Scotland. In 1820 he went with his wife and sister through Switzerland and Italy. In 1823 he traveled in Holland, in 1824 in North Wales, in 1828 in Belgium with Coleridge, and ir. 1829 in Ireland with his friend Marshall. In 1831 he and his daughter visited Scott at Ab¬ botsford. In 1833 he made another tour in Scotland, and in 1837 a long one in Italy with Crabbe Robinson. In all these journeys he found more or less material and inspiration for his poems.

After his return to England in 1799 he and his sister decided to settle down in their ances¬ tral Lake Country, and soon took a small cot¬ tage at Grasmere. Here and in the immediate vicinity the remainder of their lives, except for the occasional journeys abroad, was passed in domestic and poetic seclusion, with few import¬ ant incidents to disturb the calm current of the lapsing years. In 1802 the poet married Mary Hutchinson, whom he had known from child¬ hood and with whom he had attended the same “dame’s school® at Penrith, where his boyhood was partly spent with his mother’s parents. After his marriage he and his wife continued to reside with his sister at Grasmere, and there three of his children were born. From 1808 to 1813 the family lived in the same neighborhood in two other houses, and then removed to Rydal Mount, a few miles distant, which was the poet’s

home for 37 happy years. There, among his native lakes and hills, he died in his 81st year.

In his early manhood the poet’s resources were very slender, but his tastes were simple and he made what he had suffice for his needs. He and his sister managed to live for six or seven years on about $500 a year. Later he came into possession of a little property, and later still was appointed stamp-distributor for Cumberland and Westmoreland, an office worth £500 a year, the duties of which were mostly discharged by a clerk, leaving the poet leisure for his literary pursuits. In 1803 he be¬ came acquainted with Sir George Beaumont, a descendant of the dramatist and a cultivated man, who presented him

with a beautiful piece of land at Applethwaite, near Skiddaw, hoping that he might be induced to settle there, but he could not make up his mind to leave his chosen home at Grasmere. His friendship with Beaumont remained unbroken until the death of the latter in 1827.

Wordsworth retained the stamp-collectorship until 1842, when it was transferred to his second son. A more lucrative office, the collectorship of Whitehaven, was offered him, but he declined it, being unwilling to exchange his secluded life at Rydal “for riches and a load of care.® In 1843, he was made poet-laureate on the death of Southey. He declined the honor at first as imposing duties which at his’ advanced age he hesitated to undertake; but he finally accepted it, at the personal solicita¬ tion of Sir Robert Peel, who assured him that nothing <(should be required of him,® adding that the appointment was ((a tribute of respect justly due to the first of living poets,® that ((the queen entirely approved of the nomina¬ tion,® and that there was “tone unanimous feel¬ ing on the part of all who had heard of the proposal that there could not be a question about the selection.®

In 1800 a second edition of (Lyrical Bal¬ lads, *with other poems, was published, and others appeared in 1802 and 1805. Meanwhile, the poet had made few friends and many and bitter enemies. The issue of two more volumes of (Poems) in 1807 led to a fresh onslaught upon the author, who persisted in writing verse after the autocratic Edinburgh Review had given judgment against him. Jeffrey, in notic¬ ing the new volumes in the Reviezv, remarked : ((Even in the worst of these productions there are, no doubt, occasional little touches of deli¬ cate feeling and original fancy; but these are quite lost and obscured in the mass of child¬ ishness and simplicity with which they are in¬ corporated.® Such was the high critical ver¬ dict upon a collection of poems that included the (Ode to Duty,1* the < Sonnets dedicated to Liberty,* (The Happy Warrior,* the exquisite lines, “She was a Phantom of Delight,® etc., and the sublime (Ode on the Intimations of Immortalit}’.* Eight years elapsed before an¬ other edition of the poems was printed; and the year previous (1814) Wordsworth had published (The Excursion.* Five hundred copies of this sufficed to supply the demand for six years. The new poem was savagely treated by Jeffrey, who boasted that he had “crushed (The Excursion.*® Southey remarked: “He might as well seat himself on Skiddaw, and fancy that he crushed the mountain.® Jeffrey

began his crushing criticism with (<This will never do,® and went on to pronounce the poem <(longer, weaker and tamer than any of Mr. Wordsworth's other productions® ; but though he and his fellow reviewers prevented the sale of the poem, they could not kill it, in spite of its obvious faults.

Other volumes were brought out by the un¬ dismayed poet in 1815 ((The White Doe of RylstoneO, in 1819, 1820 and 1822, and all were condemned by the Edinburgh Review, as they appeared ; but the reaction had now begun among the critical authorities, and henceforth Wordsworth had powerful defenders in literary circles. <(War was no longer waged against his poems, but rather concerning them.® It was, however, a long fight yet before their rightful position was accorded them by the general con¬ sent of the contending parties. De Quincey has well summed up the matter thus: <(From 1800 to 1820 the poetry of Wordsworth was trodden under foot; from 1820 to 1830 it was militant; from 1830 and onward it has been triumphant.® And the triumph was complete. There were still those who could see little to admire in the meditative measures of the Cumberland recluse, but the general verdict was in his favor, and his place among the great poets of our literature was secure beyond dispute. Honors, too, were conferred upon him. In 1839 he received the degree of D.C.L. from Oxford University; and the enthusiasm of the audience on the occasion was such as had never been known except upon the visits of the Duke of Wellington. One who was present says : (<Scarcely had his name been pronounced than from 3,000 voices at once there broke forth a burst of applause, echoed and taken up again when it seemed about to die away, and that thrice repeated.® The poet no doubt went through the ceremony with his wonted calmness and composure; but it was none the less significant as a 'tribute to the man and a testimonial that he had fairly won the laurel crown. A few years later, as we have seen, he received the further honors of a gov¬ ernment pension and the laureateship.

Wordsworth's famous theory of poetic art was first set forth in the preface to the second edition of the (Lyrical Ballads* (1800), and more at length subsequently in prefaces and appendixes. He took the ground that not only might the poet draw his subjects from common life, but he might treat of them in the lan¬ guage of common life. (<I have proposed to myself,® he says, <(to imitate and, as far as is possible, to adopt the very language of men… . I have taken as much pains to

avoid

what is usually called poetic diction as others ordinarily take to produce it.® And again he asserts that <(there neither is, nor can be, any essential difference between the language of prose and metrical composition.® But his theory was the result of his rebellion against the highly artificial style of Pope and his school, and, like many reformers, he was at first in¬ clined to go too far in the opposite direction. He himself admitted this later by giving up the puerile style in which many of his earlier poems were written, and adopting a more ele¬ vated diction, and also by changing some of the most prosaic expressions in those early poems. To take a single brief example of these emendations, in <The Thorn, > one of the

(Lyrical Ballads,* as printed in 1798 and 1815, we have this arithmetical statement :

And to the left, three yards beyond,

You see a little muddy pond Of water never dry.

I've measured it from side to side,

'Tis three feet long and two feet wide.

Crabbe Robinson told Wordsworth that ffhe dared not read these lines aloud in company.® ((They ought to be liked,® was the poet's reply; but he nevertheless modified the last two lines in 1820, so that now they read :

Though but of compass small and bare To thirsty suns and parching air.

Wordsworth was much gratified at the com¬ paratively early appreciation of his works in America. The (Lyrical Ballads) were re¬ printed at Philadelphia in 1802, and an edition of his poems in four volumes appeared in Bos¬ ton in 1824. A complete edition was brought out (Philadelphia 1837) by Prof. Henry Reed, with whom the poet interchanged many letters. In one of. these he says: ((The acknowledg¬ ments which I receive from the vast continent of America are among the most grateful that reach me.® Reed's edition was revised and enlarged in 1851. In 1854, a Boston edition in seven volumes was published, with a biographi¬ cal introduction (though without his name) by James Russell Lowell. Thirty years later (1884)

when Lowell was Minister to England, he was made president of the Wordsworth Society, and in the closing words of an address on that occa¬ sion he thus aptly and admirably expressed what we may call the <(true mission® of the poet :

((As in Catholic countries men go for a time into retreat from the importunate dissonances of life to collect their better selves again by communion with things that are heavenly and therefore eternal, so this Chartreuse of Words¬ worth, dedicated to the Genius of Solitude, will allure to its imperturbable calm the finer na¬ tures and the more highly tempered intellects of every generation, so long as man has any intuition of what is most sacred in his own emotions and sympathies, or of whatever in outward nature is the most capable of awaken¬ ing them and making them operative, whether to console or strengthen. And over the en¬ trance gate to that purifying seclusion shall be inscribed :

Minds innocent and quiet take This for a hermitage.

Bibliography. — Editions : Acland, A. H. D. (ed.) (The Patriotic Poetry of William Wordsworth> (Oxford 1915) ; Cambridge Edition of Wordsworth's (Complete Poetical Works* (Boston 1904); Dowden, Edward (ed.), The Aldine Edition of Wordsworth's (Complete Poetical Works *(7 vols., London 1892-93) ; Globe Edition of Wordsworth's Complete Poetical Works,* edited by John Morley (New York 1909) ; Grosart, A. B. (ed.), (Prose Works of William Wordsworth) (6 vols., Lon¬ don 1876) ; Hutchinson, Thomas, (Complete Poetical Works* (Oxford ed., 1904) ; Knight, W. A. ed.), (Poetical Works) (8 vols., Edin¬ burgh 1882-86) ; id., (Poetical and Prose Works, together with Dorothy Wordsworth's Journal * (16 vols., London 1896; 2d ed. (Journals) only, 2 vols., ib. 1904) ; White, W. Hale,

'A Description of the Wordsworth and Cole¬ ridge Manuscripts in the Possession of T. N. Longman5 (New York 1897) ; Wordsworth, Dorothy, (Recollections of a Tour in Scot¬ landˆ edited by Shairp, J. C. (London 1874). Commentaries, Criticisms: Arnold, Matthew, 'Essays

in Criticism, Second Series,5 (London 1888); Cooper, Lane, ‘Concordance to the Poems of Wordsworth) (New York 1911) ; Gingerich, S. F., ‘Wordsworth, Tennyson and Browning: A Study in Human FreedonP

(Ann Arbor, Mich., 1911) ; Herford, C. H., ‘The Age of Wordsworth5 (London 1901) ; Knight, W. A., ‘Coleridge and Wordsworth in the West Country5 (New York 1914) ; Legonis, Emile, ‘William WordswortfP (in ‘Cambridge History of English Literature,5 Vol. XI, ib. 1914) ; More, P. E., ‘Shelburne Essays, Seventh Series5 (London 1907) ; Robertson, E. S., ‘Wordsworth and the Eng¬ lish Lake Country5 (ib. 1911) ; Scudder, V. D., ‘The Life of the Spirit in the Modern Eng¬ lish Poets5 (Boston 1895) ; Stephen, Leslie, ‘Hours in a Library5 (Vol. II, New York 1894) ; Tutin, J. R., ‘A Wordsworth Diction¬ ary of Persons and Places5 (Hull 1891) ; Winchester, C. T., ‘William Wordsworth: How to Know Him5 (Indianapolis 1916) ; Wylie, L. J., ‘Social Studies in English Litera¬ ture5 (Boston 1916). Biographies Gothein, Marie, ‘Wordsworth: ˆein Leben, seine Werke, seine Zeitgenossen5 (2 vols., Halle 1893) ; Harper, G. McL., ‘William Wordsworth: His Life, Works and Influence5 (2 vols., New York 1916) ; Knight, W. A., ‘Life of William Wordsworth5 (3 vols., London 1889) ; Legonis, Emile, ‘La jeunesse de William Wordsworth: etude sur le “Prelude55 5 (Paris 1896; English translation by J. W. Matthews, London 1897) ; Myers, F. W. H., ‘Wordsworth5 (in ‘English Men of Letters,5 New York 1880; 1904) ; Raleigh, W. A., ‘Wordsworth5 (New York 1915) ; Rannie, D. W., ‘Wordsworth and his Circle5 (ib. 1907), with bibliography; Words¬ worth, Christopher (ed.), ‘The Memoirs of William Wordsworth5 (London 1851) ; Yarnall, Ellis, ‘Wordsworth and the Coleridges5 (Phil¬ adelphia 1899).

WORK, Henry Clay, American song writer and inventor : b. Middletown, Conn., 1 Oct. 1832 ; d. Hartford, Conn., 8 June 1884. He was a printer for a time, but studied harmony and became widely popular during the Civil War period by his songs, such as ‘Kingdom Cornin’5 ; ‘Wake Nicodemus5 ; ‘Babylon is Fallen5; and ‘Marching Through Georgia.5 He wrote also temperance songs, which had a wide circulation, among them, ‘Father, Dear Father, Come Home with Me Now5 ; and sentimental melodies like ‘My Grandfather’s Clock5 and ‘Lily Dale.5 Among inventions by him were a rotary engine, a knitting machine and a walking doll.

WORK, in mechanics. See Energetics; Mechanics.

WORKHOUSE, in the United States, a correctional prison for petty offenders. In England the poorhouse is called a “workhouse.55

Workhouses appear to have been correctional originally in England also and were first erected in the reign of Charles II in order to compel rogues and vagabonds to work for a living. Act 8 Charles I, ch. vii, entitled the churchwardens

or overseers of the poor, with consent of the majority of the inhabitants to establish workhouses for lodging and maintaining the poor, and made various arrangements for union of parishes for this purpose. By 34 and 35 Vic¬ toria, ch. cviii, the guardians of every union are bound to provide casual wards, with such fittings as the poor-law board consider neces¬ sary, for the accommodation of the casual poor. Every workhouse has to keep a register of re¬ ligious creeds and also a register of persons under 16, hired out as servants or apprentices, whom the relieving officer must visit to in¬ quire into their food and treatment. The inmates of workhouses are not allowed to go out and in at pleasure and the able-bodied are compelled to work when required. In suitable situations they are often employed in field labor. Married persons are separated unless both are above 60 years of age. Drunkenness, misconduct or re¬ fusal to work exposes to the penalty of im¬ prisonment with hard labor. The workhouses, after being under the control of the poor-law board, were placed under the local government board in 1891.

In Scotland the legal designation of houses provided for the accommodation of the poor is “poorhouses,55 as in America, the designation “asylum for the poor55 being also used in the United States. See Charities, Public; Pen¬ sions ; Pauperism ; Sociology.

WORKINGMEN’S ASSOCIATION, In¬ ternational. See International Working¬ men’s Association; Socialism.

WORKINGMEN’S CLUBS, organizations for educational and social purposes composed of workingmen, but having none of the benefit or industrial features of the trade-union. In the United States they are not numerous, and where they exist are organized by those interested in philanthropic work for the benefit of working¬ men, and are usually largely educational. In Europe, however,- clubs are often formed by the workingmen themselves, and are sometimes po¬ litical, usually socialistic, and sometimes purely social; there are also numerous philanthropic clubs, especially in England, organized generally under church auspices. These are both social and educational.

WORKINGTON, wer’king-ton, England, a seaport and manufacturing

town in Cumberland, near the mouth of the Derwent, which enters the Solway Firth 33 miles from Carlisle. It has a good harbor furnished with a breakwater, and is provided with docks. The municipal borough, incorporated 1888, does not include the whole of the previously existing urban district. The town is of importance from its industrial establishments, which comprise large iron¬ smelting works and works for steel rails, iron plates, *etc.* ; it has a shipbuilding yard and collieries, and carries on a considerable shipping trade. The salmon fishery is increasing in importance and seaborne commerce has made great advances in recent years. Pop. 25,092.

WORKINGWOMEN'S CLUBS, organiza¬ tions for educational and social purposes for workingwomen. The formation of these clubs was begun in Boston in 1890, and they are now numerous Throughout the United States ; there is a National League of Workingwomen's Clubs; and several State leagues. These clubs have been organized on the initiative of women out-

side the working class, and include in their membership both workingwomen and ((women of leisure** ; one of their great benefits is the promotion of understanding and sympathy be¬ tween these two classes. The clubs are entirely self-governing, all members being on an equal footing and having equal share in the manage¬ ment. They are also self-supporting by means of moderate fees and the proceeds of entertain¬ ments. The club rooms furnish the workingwomen with a place for recreation with pleasant surroundings and the social feature is empha¬ sized, but the educational side is not neglected; public questions are discussed and instruction in domestic science, stenography, etc., is given. In some cases the clubs have been instrumental in obtaining reforms in industrial conditions for women; the Massachusetts State League, for instance, was largely influential in establishing the eight-hour day in Boston department stores. Some clubs maintain vacation homes.

WORKMAN, Fanny Bullock, American traveler and mountain climber, wife of W. H. Workman: b. Worcester, Mass., about 1850. She was a

daughter of Gov. A. H. Bul¬ lock of Massachusetts, and was educated in New York and in France and Germany. She was married in 1881, afterward traveling with her husband in Northern Africa, Asia Minor and the Far East. In 1889 she made several record first ascents for women in the Himalayas, of which the highest was Mount Koser Gunge, 21,000 feet in altitude. She gained the women's world record for mountaineering in 1906 by her ascent of the Nun Kun Peaks, reaching an altitude of 23,300 feet. In 1912 she surveyed the Rose Glacier, and discovered the water¬ shed between the Indus and the Turkestan re¬ gions. She is a Fellow of the Royal Geographi¬ cal Society, and has collaborated with her hus¬ band in writing books of travel.

WORKMAN, George Coulson, Canadian educator and theological writer: b. Grafton, Ontario, 28 Sept. 1848. He was graduated at Victoria University in 1875, and received the degree of Ph.D. at the University of Leipzig in 1889. In 1876-78 he was assistant editor of the Christian Guardian, and he afterward served several years as a pastor in the Metho¬ dist Church. He was professor at Victoria University, Coburg, in 1884-91 ; and in 1904-OS he was professor of Old Testament exegesis and literature at the Wesleyan Theological Seminary, Montreal. He was later engaged in writing and gained a high reputation as a biblical critic. He has written (The Text of Jeremiah* (1889); (The Old Testament Vindi¬ cated* (1897) ; (How to Study the Bible* (1902); (The Servant of Jeremiah* (1907); (At Onement, or Reconciliation with God* (1911), *etc.*

WORKMEN'S COMPENSATION, a

system of indemnifying wageworkers and em¬ ployees generally for economic losses caused by injuries (either through accident or occupational disease) and due to employment. The modern development of industry, especially through ap¬ plication of mechanical energy and complicated machinery and through the growth in the di¬ mensions of industrial operations, has raised industrial accidents and injuries to the dignity of a grave social problem. It is enough to point out that in Germany alone the number

of accidents reported annually exceed 700,000, of which the fatalities approach 10,000; that in the United States the number of industrial accidents is estimated from 2,000,000 to 3,000,000 and the fatalities from 25,000 to 30,000 a year.

The theory of compensation first developed in Europe when the older theory of employers' liability (q.v.) proved inadequate to meet the economic problems created by these fatal or disabling accidents. Employers' liability, or the general legal principle of liability based upon the code civil, gave the injured workman the right to recover damages if he could establish by proper evidence that the accident was due to the negligence of the employer or his agent. In the nature of things this was possible only in a small percentage of cases, perhaps 10 per cent ; in a large number of cases the accidents were found to be due to the negligence of the injured employee, or of one of his fellow employees, or the inherent hazards of the industry. The result was a rapid increase in litigation with comparatively little benefit to the injured. This became a serious problem in the more hazard¬ ous industries and special legislation developed in the railroad and mining fields. Beginning with the early 70's the problem of industrial accidents began to attract the attention of Euro¬ pean legislators. The earlier proposals were directed at a change of the burden of proof, so as to force the employer to show that the acci¬ dent had occurred without any negligence on his part, rather than to require the injured person to establish negligence. The next step was the announcement of the doctrine of «trade risk** (risque professionelle, in French terminology). This established a right of recovery when an accident was admittedly due to no one's negli¬ gence but to the inevitable hazard of the in¬ dustry. Yet even with these modifications the doctrine of employers' liability failed to give general satisfaction. The final step in the evolution of the compensation method was taken in Germany when the question of negligence was entirely left out. Proposals made in 1879 have materialized in Germany in legislation in 1884. This legislation established on right of re¬ covery entirely irrespective of the question of causation of the injury, but simply on the basis of the fact. On the other hand, it announced the principle of a specified (admittedly partial) compensation according to a definite schedule, in which compensation is graded according to the nature of the injury, the degree and duration of disability and generally the wage-earning capacity of the injured person.

The movement for accident compensation once begun in Germany, spread rapidly through¬ out Europe and later through other parts of the world — as the following list indicates (in which the acts are listed according to the year in which they have passed). Europe. — Germany, 1884; Austria, 1887; Norway, 1894; Finlandˆ 1895 ; Great Britain, 1897 ; Denmark, Italy, trance, 1898; Spain, 1900; Greece, Netherlands, Sweden, 1901; Luxemburg, 1902; Russia, Bel¬ gium, 1903; Hungary, 1907; Bulgaria, 1909; Lichtenstein, Serbia, 1910;

Switzerland, 1911; Roumania, 1912; Portugal, 1913. British Col¬ onies. — New Zealand, New South Wales, S. Australia, 1900; British Columbia, 1902; New Brunswick, 1903; Cape of Good Hope, Queens¬ land, 1905; Transvaal, 1907; Alberta, Newfound¬ land, 1908; Quebec, 1909; Manitoba, Nova

Si-Otia, 1910; Tasmania, Saskatchewan, Labra¬ dor, 1911; W. Australia, 1912; Victoria, 1914; Ontario, 1916. Other Foreign Countries. — Leon (Mexico), Venezuela, 1906; Peru, Japan, 1911; Cuba, 1916. United States. — Maryland, 1902; United States (government employees), 1908; Montana, 1909; New York, 1910; Kansas, Washington, New Jersey, California, New Hampshire, Wisconsin, Illinois, Ohio, Massa¬ chusetts, 1911; Michigan, Rhode Island, Ari¬ zona, Canal Zone, 1912; West Virginia, Oregon, Nevada, Texas, Iowa, Nebraska, Minnesota, Connecticut, New York, 1913; Maryland, Louisi¬ ana, Kentucky, 1914; Wyoming, Indiana, Mon¬ tana, Oklahoma, Maine, Vermont, Colorado, Hawaii, Pennsylvania, 1915; Kentucky, Porto Rico, 1916; New Mexico, Idaho, 1917; Dela¬ ware, 1918; Tennessee. Missouri, Alabama, and North Dakota in 1919. This long list in¬ dicates that the basic principle is accepted now throughout the civilized world. It represents a victory of the economic and social considerations of need over the purely legal considerations of personal fault and responsibility.

Though based upon the same general prin¬ ciple, the numerous compensation acts present a very great variety of provisions. The special features of the American compensation legisla¬ tion will be referred to presently, and in view of the very large number of compensation acts, only the most important European acts need to be compared here.

Though the elimination of the principle of fault lies at the very bottom of all compensation legislation, in several acts vestiges of the con¬ cept still remain, as for instance in the excep¬ tion of accidents due to wilful misconduct (Great Britain) or even gross negligence (Den¬ mark, Russia, Sweden, etc.). In some acts (Great Britain)

compensation is limited to acci¬ dents arising <(out of employment,® but the pre¬ vailing tendency is to cover all accidental in¬ juries sustained during employment (Germany, Austria, Hungary, France, Italy), so as to avoid all unnecessary enquiry and controversy.

In comparatively few countries have all em¬ ployees been covered. During the early history, when compensation was still considered an ex¬ periment, it was limited to specified groups of industries and wageworkers; and while in most countries by subsequent amendments the appli¬ cation of acts was rapidly extended, Germany and Great Britain are perhaps the only ones in which the acts are almost universal. Agricul¬ tural laborers are still outside of the compen¬ sation acts in most countries, and office and clerical employees and even all commercial es¬ tablishments are excluded in most European acts.

Within the recent years, with better study of occupational hygiene, the danger of vocational diseases (such as poisons, etc.) has attracted a great deal of attention. The British and the Swiss acts are, however, the only ones which in¬ clude such occupational diseases under compen¬ sation. In the other acts the fact of sudden occurrence of the injury through an accident must be established, and the entire branch of legislation is still known as accident compen¬ sation. .

Next to the elimination of the question of fault, the specific benefit scale is a fundamental feature of the compensation system, a benefit jˆcale which admittedly grants a limited and not

full compensation for losses sustained. One method of limitation is the waiting period which leaves minor accidents entirely without money compensation. This waiting period varies be¬ tween two days (in the Netherlands), or three days (in Austria-Hungary), or none in Italy and Spain, to 13 weeks in Denmark or Germany. In four countries, however, all accidents are treated and compensated out of the com¬ pulsory sickness insurance system (13 weeks in Germany and Russia, 10 weeks in Hungary and four weeks in Austria). The general method of compensation is a weekly benefit in propor¬ tion to the usual earnings of the injured person, the proportion varying between 50 per cent and 66ˆ3 per cent, though scales up to 80 per cent are occasionally met. This method of weekly compensation during the time of disability is considered preferable to a lump sum usually payable as a result of litigation under liability laws, because it is better adapted to the normal conditions of a wageworker’s existence

and pre¬ vents the squandering of the indemnity either in unwise living or unwise investment.

The compensation of partial disability, which often is permanent in character, raises many complicated problems. The economic consequences of such injuries are a decrease in earnings rather than total disability. The German method followed by many acts is to grant a permanent pension commensurate with ‘ the degree of loss of earning capacity. _ This is admitted, however, to develop undesirable consequences ; a very large number of per¬ sons drawing very slight pensions, a desire to retain this small pension by constant ex¬ aggeration of insignificant injuries, and a com¬ mutation of small pensions to lump sums finds many advocates.

Still more complicated is the compensation for fatal accidents. Here many different methods are found, from lump sums to life pensions. The latter method is recognized as preferable, and the pension in proportion to the wages is adjusted to the number of sur¬ viving dependents. The latter includes the widow and orphans under a certain specified age (from 14 to 18 in various acts) and some¬ times other relatives, parents, brothers, grand¬ children. The socially adequate way is to com¬ pensate the widow till death or remarriage; in the latter case a small lump sum is offered as a dowry so as to counteract the unfavorable influence of discontinuance of pension upon the frequency of remarriage. Some laws, how¬ ever (and this includes the British Act and acts of most Britsh colonies) place definite money limits on the total amount of com¬ pensation for fatal accidents. It is evident, therefore, that the entire subject of compen¬ sation for industrial injuries is still in a primi¬ tive stage even in Europe. Up to the begin¬ ning of the European War there was a con¬ stant and growing stream of legislation by means of which compensation systems were being gradually extended and improved.

Workmen’s Compensation in United States. — ‘The movement for compensation legis¬ lation did not reach the United States until some 25 years after it began in Europe. Meanwhile the rapid industrialization of the country made the problem of industrial accidents a very grave one. The conditions of Employers’

Liability based upon the Anglo-Saxon common law are very much less favorable to the in¬ jured workman than the Code Civil of Euro¬ pean countries. The doctrines of Mellow serv¬ ant,® ˆcontributory negligence® and ((assumption of risk® substantially affected the pro¬ portion of cases in which recovery was pos¬ sible. For years legislative efforts were made to strengthen the liability of employers by com¬ plex legislation and the result was very much increased litigation with greater waste for attorney's fees, occasional heavy verdicts, and on the whole, very limited compensation to the injured.

Agitation for a radical change to a system of compensation appeared sporadically even toward the close of the last century, but gained strength only toward 1910, when a veritable flood of legislation appeared. The earlier acts were declared unconstitutional. In fact, the famous Ives decision by which the New York Compensation Act of 1910 was declared un¬ constitutional, influenced the subsequent de¬ velopment of legislation very strongly. A very large number of States adopted the so-called New Jersey or elective system. According to this system employers may elect or reject to come under a compensation system. But the penalty for rejection is a strengthening of the liability provisions by the abolition of some or all of the three doctrines above referred to, of Mellow servant, contributory negligence or assumption of cost,® while the award for election is freedom from the obligations of em¬ ployers' liability. In fact, most of the States are still operating their compensation under this elective system except Arizona, California, New York, Ohio, Washington, Wyoming, Maryland, Oklahoma. Of these seven States three (California, New York and Ohio) took the precaution to amend their State constitu¬ tions before passing compulsory acts, while in the other States the opinion prevailed that compulsory laws were not contrary to the Constitution of either the State or the Union. Opinions differ among authorities on Consti¬ tutional Law as to whether both compulsory or even elective (with their hidden methods of coercion) are in accordance with the Consti¬ tution of the United States.

The necessity of making compensation ac¬ ceptable to employers under an elective system has kept the scale of benefits down so as to make it cheaper. The benefit scale of the numerous acts fluctuates considerably, the New York act of 1913 presenting the highest, and the acts of New Jersey, Colorado, Pennsyl¬ vania the lowest levels of compensation, so that on an average the New York acts offers about

twice as much to the injured workman as the acts of New Jersey or Pennsylvania. Considerable dissatisfaction with the provisions of compensation acts is, therefore, rapidly ac¬ cumulating. Most frequent causes mentioned is the length of the waiting period which re¬ mains two weeks in most acts, the 50 per cent scale of compensation, which is the rule, only five or six acts having raised it to 60 per cent or 66ˆ3 per cent and the strict time limitation for permanent injuries as well as fatal acci¬ dents, varying between 300 and 500 weeks. In some acts, however, the necessity for life pen¬

sion in total or otherwise serious disabilities has been recognized (notably New York and California) as well as life pensions to widows.

An interesting feature of American Com¬ pensation acts is the so called dismember¬ ment schedule, i.e., a schedule of specific bene¬ fits expressed in number of weeks of payments for loss of extremities or parts thereof. This was first introduced in New Jersey, being adopted from the usual commercial accident insurance contracts and was accepted by almost all of the other acts, because of its simplicity and ease of adjustment. It is questioned how just such an appraisal of surgical injuries ir¬ respective of occupational difference can be.

The tentative character of these benefit pro¬ visions is shown by the very large number of amendatory acts notwithstanding the short history of compensation in this country. In Massachusetts the amendments of 1914 in¬ creased the average value of benefits by nearly 50 per cent. In other States elective acts were substituted by compulsory acts (California, Ohio, Maryland), in others the administrative provisions have been thoroughly rewritten. The strongest tendency in administration is the establishment of special commissions or board for adjudication of disputed claims and con¬ trol of all settlements.

Compensation Insurance. — The compensa¬ tion principle establishes new relations between employers and employees. In a certain sense it makes the employer an insurer of the em¬ ployee. Unless, however, the principle of in¬ surance would be further developed, compen¬ sation might prove a very serious hazard to the employer, especially the smaller employer. Most compensation laws contain, therefore, provision for insurance by means of which a collective responsibility takes the place of the individual responsibility of the employer. In some acts such insurance is compulsory and in the other only permissive. As to the or¬ ganization of insurance an active struggle

may be observed between ordinary commercial (stock) insurance companies, mutual insurance companies on general lines, employers' associa¬ tions or State funds. The struggle expresses itself either in legislative elimination of some forms and provision for others, or in open competition between co-existing various forms.

A classification of the various compensation acts according to their insurance system may be presented in tabular form as follows: (1) Compulsory insurance in prescribed carriers.

(a) In a monopolistic State insurance fund (Norway, Switzerland, Ohio, Washington, Wyoming, Nevada, Oregon, West Virginia).

(b) In employers' mutual association con¬

trolled by the State (Luxemburg, Roumania, Servia, Hungary, Austria, Russia, Germany, Greece). (2) Compulsory insurance with choice of insurance form. (a) State fund competing with private or mutual insurance companies (Italy, Netherlands, Maryland, New York, Oklahoma, Michigan, Colorado, Penn¬ sylvania, Montana) ; (b) Private or mutual

insurance companies (Massachusetts, Texas, Connecticut, Illinois, Iowa, Wisconsin, Indi¬ ana, Maine). (3) Voluntary insurance. (a) Slate fund competing with private or mutual insurance carriers (Sweden, France, Portugal,

California) ; (b) Private or mutual insurance carriers only (Belgium, Great Britain, Spain, Lichtenstein, British Colonies, Japan, Nuevo Leon, Peru, Venezuela, Cuba, Alaska, Arizona, Kansas, Louisiana, Minnesota, Nebraska, New Hampshire, New Jersey, Rhode Island).

In the United States the principle of com¬ pulsory insurance has evidently made substan¬ tial gains. In some form this principle is found in 22 States, though in 15 of these, compensation itself is, in form at least, elect¬ ive. Another significant feature brought out by this table is the development of State in¬ surance, not only in Europe but in the United States.

Monopolistic State Compensation Insurance is found in Europe in Norway, Switzerland; in the United States in Nevada, Ohio, Oregon, Washington, West Virginia, Wyoming.

Competitive State Compensation Insurance is found in Europe in Italy, Netherlands, France, Sweden, Portugal ; in the United States in Maryland, New York, California, Michigan, Colorado, Pennsylvania, Montana. Altogether state compensation insurance is found in seven European countries and 13 States of the American Union.

This development indicates a growing tend¬ ency to eliminate both private profits and the high expenses of private competitive business out of this field, so that insurance can be furnished to employers at cost and the burden to industry made as light as possible. See Social Insurance and the authorities there listed.

Bibliography. — Boyd, J. H., (Workmen's Compensation and-Industrial Insurance under Modern Conditions) (Indianapolis 1913) ; Bradbury, H. B„ (Workmen's Compensation and State Insurance Law in the United States1* (New York 1912) ; Clark, L. D., (The Law of the Employment of Labor* (New York 1911); Eastman, C., (Work Accidents and the Law* (New York 1910) ; Schwedtmen, F. C. and Emery, J. E., (Accident Prevention and Relief* (New York 1911) ; (American Labor Legislation Review) (Vols; I-VII) ; (Bulletin of the United States Bureau of Labor Statistics) (No. 126, 155, 185); (National Confer¬ ence on Workingmen's Compensation for Industrial Accidents.* (Reports , 1909-10) ; Publications of Workmen's Compensation Publicity Bureau.*

Isaac M. Rubinow.

WORKS, John Downey, American jurist and senator: b. Ohio County, Ind., 29 March 1847. He served 18 months in the United States Army in the Civil War, later studied law, and in 1868 was admitted to the bar. He practised law at Vevay, Ind., in 1868-83, and served in the legislature in 1879. After 1883 he was en¬ gaged in practice at Los Angeles, Cal., was judge of the Superior Court of San Diego, Cal., in 1886-87, and justice of the Supreme Court of California in 1888-91. He afterward returned to law practice and was active in con¬ nection with anti-race track legislation and municipal and other reforms. He served in the United States Senate as a Republican in 1911— 17. He published (Courts and Their Jurisdic¬ tion (1894) ; Practice, Pleading and Forms) (3 vols., 1882-86; 4th ed., 1906); 'Irrigation* (1900), *etc.*

WORKSHOP COMMITTEES, or the "WHITLEY'S • INDUSTRIAL" COUN¬ CILS, joint committees of employers and em¬ ployed in each British factory, workshop or coal pit, the formation of which was advocated in 1918 in the first report of the Committee on Relations between Employers and Employed of the Ministry of Reconstruction, by the Rt. Hon. John Henry Whitley, chairman of Ways and Means and deputy speaker of the House of Commons. The purpose of work committees is to establish and maintain a system of friendly cooperation and discussion between employers and employed, by regular meetings at fixed times, keeping in the forefront the idea of constructive cooperation in the improvement of the industry to which they belong. Reports of the operations of these works committees are issued by the Ministry of Labor.

WORKSHOP TERMS. The following list of mechanical terms includes a selected number of the most significant terms and phrases com¬ monly used in workshops by mechanics, machin¬ ists and metal-workers, describing briefly the various methods, processes, and special opera¬ tions usually required in the execution of a general line of shopwork, either in wood or metal.

For information relative to similar terms specifically applied to the making and handling of hand and machine tools ; to the construction of engines and machines, etc., consult articles under the titles Boiler Shop Terms; Electrical Terms; Engine; Engineering Terms; Foundry and Forge Shop Terms ; Locomotive, Principal Parts of; Mechanical Terms; Tools; and Valve and Valve Terms; in this Encyclopedia.

About Sledge. — To deliver heavy blows with a sledge ham¬ mer by swinging it through large arcs, as distinguished from “Up Hand,” meaning the delivering of light blows by swinging the hammer through small arcs, or by the use of a lighter hammer.

Abrasion. — The wearing away by grinding instead of cut¬ ting. It is effected by the use of emery wheels and other forms of grindstones, when cutting tools cannot be used on account of the hardness of the material worked upon, or where the action of such tools would be too slow, or tend to produce inaccurate results.

Arboring. — The shouldering back of a flat bearing face to receive the washers and nuts of attachment bolts. Assembling. — The putting together of the parts of a machine preparatory to the final work of fitting and adjusting. It is especially applicable in cases where such parts are made in great numbers by machinery, and are designed to be interchangeable.

Autogenous Soldering. — The joining of pieces of metal by fusing their contact surfaces, and without the use of solder.

Babbitting. — The process of lining bearings with Babbitt metal or with white metal.

Backing-off. — The cutting away of the “ leaving ” portion of a screw tap so as to allow the “ entering ” portion to work more freely. It effects a reduction in the friction between the sides of the tapped hole and the portions of the tap which do not cut.

Backing-out. — The withdrawing of a tap or die after the thread has been cut.

Bare. — Slightly less than; scant; applied to a dimension slightly below a definite size. So slightly, that the differ¬ ence cannot be detected by rule measurement, and may be determined only by calipers, that is, a difference less than 1-64 of an inch.

Barffed. — Iron work which has been coated with a film of magnetic oxide by the “ Barff ” process, to prevent it from rusting.

Beading. — The edge of a sheet of metal thickened or turned over to stiffen and strengthen it. A fillet or strip curved around the edge of a casting to strengthen it, or for orna¬ mental purposes. The semi-circular termination of the spigot end of a pipe.

Beaumontague. — Any compound used for filling up holes for

purposes of concealment. As prepared for filling up blowholes in castings, it consists of beeswax, resin, lamp¬ black and iron borings.

WORKSHOP TERMS

Bench Work. — Work executed at the bench or vise as dis¬ tinguished from lathe work, the work of the fitter, or that of the erector.

Bend.— The curved part of a pipe by which its axial direc¬ tion is changed. A bend ought to be of as large a radius as possible in order to reduce the friction of the liquids conveyed by them. They are known as quarter-bends, eighth-bends and sixteenth-bends, having angles of 90°, 45° and 22£°, respectively.

Black Pipe. — Iron pipe that is not galvanized or polished.

Black Work. — Machine work which has not been machined or polished.

Blank. — A piece of metal cast, stamped or forged to a rough shape, designed to be later machined to some par¬ ticular form. Blank bolts are the rough forgings of the bolts before the screw threads have been cut.

Boring. — The making or finishing of circular holes of com¬ paratively large diameter, in metal or wood, by the use of tools having one cutting edge only, as distinguished from drilling, which signifies the making of small holes with tools having two cutting edges.

Brass Borings. — The borings and turnings of brass castings which are collected in shops. They are separated from the iron borings by the use of magnets and are then re¬ melted.

Brass Finishing. — A special branch of work involving the later stages of the manufacture of brass cocks, lubricators, valves and other similar engine and pump fittings. It combines the operations of turning, milling, grinding and burnishing.

Brazing. — The joining of metallic surfaces by the use of an interposed

film of brazing metal, an alloy of about 98 parts of copper to two parts of tin. The joints to be brazed are first cleaned and bound with wire. Then they are subjected to the action of a clear fire, sprinkled with borax and heated until the alloy is melted. This process is also known as hard soldering. The proportion of copper in the alloy should be as high as possible, so as to prevent the use of a brazing temperature that would melt the sur¬ faces being brazed.

Bright Work. — Those parts of a machine which are pol¬ ished, either to reduce the friction of the bearing parts, or for the purpose of ornamentation.

Broaching. — The enlarging, smoothing and turning out of drilled holes by the use of a broach or reamer. Broaches are sometimes called rose reamers. , They are made of vari¬ ous sectional forms, their cutting angles ranging from 90° to 130°.

Buckle. — A localized inequality in plates of wood or metal caused by unequal strains and stresses. Buckling is pro¬ duced in timber by the .presence of moisture, by dryness, or by unevenness of grain. In metals, it is caused by unequal stresses set up by variations in density, temperature, or in the rate of cooling.

Buffing. — Polishing by means of leather and emery, or other abrasive powder, on a buffing wheel.

Burnishing. — The polishing of one metallic surface by rubbing with another. It is sometimes erroneously applied to the process of buffing.

Burr. — The ragged and undetached edge of metal turned over when a metal plate is subjected to abrasion, or when it is subjected to punching, drilling, or cutting operations in general.

Bush or Bushing. — The internal cylindrical lining of a bearing. Bushes are made of gun metal, or of some kind of anti-friction metal, and are used, either for purposes of economy or for convenience. In the former case, an inferior metal is lined with one more expensive, thus reducing the total cost, and in the latter case in order to permit of their being replaced when worn out, without replacing the main casting. A bush is undivided, thus being distinguished from a brass, which is divided.

Pushing. — The fitting or driving in of bushes into their seatings.

Butt Measurement. — The taking of measurements by means of a rule placed against the part measured, as dis¬ tinguished from

measurements taken by the use of tram¬ mels, calipers, compasses or dividers.

Camber. — The amount of curvature given to an arched bar or structure.

Chamfer. — A bevel imparted to edges otherwise rectan¬ gular, such as the bevels of nuts, and the rounding ends of bolts.

Chatter. — - The noise caused in machine work by a lack of rigidity in the cutting tools.

Chipping. — The removal of minute particles of metal from the faces or from the edges of metal work with a chisel and hammerlwhen the amount of metal required to be removed is too large to be accomplished by the use of the file alone.

Chucking. — The method of attaching lathe work to the various chucks of a lathe.

Clearance. — The amount of space, open or free, between the contiguous parts of a machine or the like. Wheel clearance is the space between contiguous teeth. In the case of brasses, it is the space between their flanges and the collars upon their shafts.

Clearance Angle. — The angle formed between the face of a cutting tool and the face of the material operated

upon. The maintenance of the proper angle is very necessary to prevent the setting-up of undue friction or grinding action between the tool and the work. This angle varies from about 3° in some metal working tools, to about 25° in woodworking planes. Also called the angle of relief.

Clearing Hole. — A hole full to the specified size, so that a turned stud or bolt of the same nominal diameter will pass freely yet closely through it. It is used in opposition to the term tapping hole.

Coning. — The tapering of the running edges of the wheels of railway cars, cranes and turntable rollers. When a train runs around a curve, the wheels are thrown outward by centrifugal force, and the inner and outer whee's de¬ scribe arcs of unequal length. By coning, the outer wheels are enabled to run on their greater, and the inner wheels on their lesser diameters, thus compensating for the differ¬ ence in the

arcs described by the wheels, by the difference in the diameters of the wheels.

Countersinking. — The process of recessing a hole conically with a countersink, or with a rose bit, or with drills, so that the head of a screw or a rivet will lie level with the surface of the material into which it is fitted.

Crow's Feet. — The marks made thus < > on drawings to indicate the points between which a dimension or measurement is given.

Cut. — The removal of a shaving from a piece of work in a lathe, or in a planing, boring or other similar machine.

Dead Size. — The exact size or length without any allow¬ ances whatever for contingencies or for machining.

Draw Filing. — The polishing of a metallic surface with a file moved transversely of the direction of its own longi¬ tudinal axis so that the cutting action of the teeth is very slight. Sometimes called " poker filing."

Drawing-down. — The thinning down of forged work by the use of hammers, fullers and flatters, or drawing dies. The dimensions may be reduced all around equally or reduced in one direction and increased in the other.

Drawing-in or Hitching.— The condition wffien a cutting tool cuts to a greater depth than that intended for it to cut. Usually due to the improper form of the tool; to an unsuitable cutting angle; or to the improper position of the cutting point relatively to the shank.

Drawing-on. — A method by which wheels, pulleys, etc., are attached to their axles or shafts when they are too large to be driven on by a hammer. As commonly applied, long bolts, the heads of which are held in a massive cross attached to one end of the axle, pass on the outside of the wheel, or through it between the arms, and the tightening of their nuts against a washer plate placed across the face of the wheel, pulls the wheel into the proper position on the shaft. Hydraulic presses are also used for this purpose.

Drifting. — The shaping and enlarging of holes by the use of a drift. Also applied to the adjusting of overlapping rivet holes into alignment with each other.

Driving Fit. — The fit of a bush, a spindle, or of a shaft, when it is

driven by the blows of a hammer into the hole bored for its reception.

Driving-home. — - The driving of a wheel, shaft, or any other part of a machine to its final and permanent position.

Ear. — A lug or projection upon a casting designed for the reception of a bolt or other attachment.

Erecting.- — The final building-up of machines in readiness for working. The work is accomplished by the “ erector,” to whom all the work of the turners, planers, slotters, drillers and fitters is brought, ready to be put together with little adjustment being required of them.

Female. — The recessed part of any piece of work designed for the reception of a male piece or stud.

Fin. — Any thin wafer-like expansion of metal that occurs on the side or edge of a larger portion, such as those on the joints of castings, and on the edges of forgings pressed in dies.

Finger. — A narrow projection of metal used as a guide in various kinds of metal work.

Fitter. — A working mechanic whose duty consists of the work of putting together machine or engine parts after they have passed through the hands of the turners, planers, drillers, *etc.*

Fixed Centre. — A centre, the position of which is localized in space, as distinguished from a movable centre.

Flush. — The parts of a machine are said to be flush when their surfaces are on the same level.

Forming. — The shaping of work on special lathes by means of broad cutting tools, the faces of which correspond exactly to the sections of the pieces to be cut. The value of the method lies in its capacity to produce irregular con¬ tours, curved and otherwise, by the use of single tools which ordinarily would require the use of several tools, thereby rendering the attainment of uniformity in many kinds of work practically impossible, or economically difficult. The method is extensively applied to the work of brass finishers and automobile manufacturers.

Fretting. — The abrasions of a cutting tool when it is sharpened on an oil-stone.

Frosting. — A finish put upon the exposed surfaces of machine parts for ornamental purposes only. It is

effected by scraping at different crossing angles from which the light is reflected irregularly, producing a beautiful effect.

Full. — Slightly larger than it ought to be, but so slightly that the excess may be measured only by calipers rather than by rule measurement.

Gear. — A term widely applied to a great variety of arrange¬ ments of toothed wheels, valve motions, pump work, hoisting tackle, ropes, *etc.* Gearing is a synonymous term, but it is specifically applicable to gear wheels, and also to the driving in and the working of the wooden cogs of mortise wheels.

Glazing. — As used in the workshop, the filling up of the interstices of the surface of a grindstone, or of an emery wheel, with the minute particles of metal detached by the process of grinding, giving the surface a smooth and pol¬ ished appearance, and reducing its cutting quality. It is primarily caused either by an insufficient supply of water; by the grinding of material unsuitable to the nature of the stone or wheel; or by the grinding of so broad a surface that the abraded particles of metal are imprisoned by it and are squeezed between the rigid particles composing the grinder.

Grinding-in. — The process of bringing the bearing surfaces of cylindrical cocks and plugs to an exact fit by the use of emery powder.

Gumming. — The tendency of lubricating oils to become thick and sticky.

Hacking. — The dressing-off of the projections on the face of a grindstone which has become so uneven that the effective use of the ordinary pointed grinding tool is rendered very difficult. It is accomplished by means of a chisel-shaped, cross-paned hammer called

a hack-hammer, the chief projections being reduced by a series of cross hatchings, or chequered cuts.

Handing. — Making symmetrical work right and left hand respectively, and the changing of patterns from right to left hand, and from left to right hand.

Jacking-up. — The elevating of machinery or heavy struc¬ tures by means of jacks. Also the planing of the rough outsides of boards with a jack plane.

Jag. — A roughed-up or barbed projection of metal produced by nicking underneath, or in front of it, with a cold chisel, or by castings.

Jointing. — The joining together of iron pipes, sockets, *etc.* The jointing of iron pipes is effected with red lead and boiled oil when the flanges are brought together, while that of sockets is effected with melted lead, with a gasket, or with rubber rings. Hydraulic jointing is accomplished with sal-ammoniac and iron borings.

Jumping-up. — The knocking down of the end of a bar of iron upon the anvil so as to thicken the heated portion.

Kerf.— The width of the cut produced by the teeth of a saw. It depends upon the amount of set given to the teeth.

Kink. — The sharp bend or angle given to a piece of metal by a blow or a strain. It is also applied to the knotting of the links of a chain.

Knocking. — The noise caused in a machine, pump, etc., when some part is loose and makes a regular rapping

Knotting. — A compound, either of shellac and methylated spirit, or of red lead and glue, used for filling-in or covering knots to prevent the absorption of oil paint.

Lap.— A body of lead, tin, brass, or other soft metal employed to hold or support the emery or pumice stone used in the grinding of surfaces of hardened steel, chilled iron and other substances too hard to be attacked with ordinary tools. The character and shape of the lap depends upon the nature of the work performed. Usually the outline of the lap is made similar to that of the work. Lead is used for the commonest grades of work, tin for better grades, and brass for the finest grades. The term is also applied to the extent to which the plates pass over each other in the making of rivet joints, and to a single turn of a rope or chain around the barrel or drum of a hoisting

machine.

Lapping. — The polishing and truing up of spindles and circular bearing parts in general, by the use of laps of lead or other material. ,
. ,

Lathe Work. — Work commonly accomplished m the lathe. It embraces nearly all kinds of mechanical work accom¬ plished by turning operations.

Machining. — A general term applied to the operations of turning, planing, shaping, boring, etc., performed on metal work by machines.
.

Magneting. — The process of separating particles of iron from those of brass and copper turnings by the use of a magnet, prior to remelting.

Male. — A stud, screw or dowell that fits into a recess formed for its reception, in a particular piece of work.

Mandrel or Mandril. — In a general sense, any cylindrical rod of metal. Specifically, the revolving spindle used for chucking lathe work; the spindle of a circular saw; the round rod upon which the nuts made by a smith are finished

Marker Out — The workman who marks out the centres and the working lines of metal work preparatory to the operations of the machinists and the fitters.

Metal-spinning. — The process by which light articles of malleable metal are formed into circular and other shapes

by means of pressure applied to them while they are rapidly rotated in a lathe.

Milling. — The method of forming metal into various shapes by means of tools or cutters rotated in milling machines. A greater variety of surface contours can be produced more rapidly and accurately by milling than by the ordinary planing and shaping operations in which single cutting tools are employed. The great value of the method is its capability to produce an indefinite number of articles or machine parts exactly similar in outline, and of uniform size.

M itre.— Lines or edges which meet at an angle of 45° with each

other, as in the case of any two adjoining corners of a picture frame.

Mortise. — A joint in timber work formed by a recess cut in one piece, and a corresponding tenon in the other. Nicking. — The cutting of a shallow V-shaped groove around a pipe, or across a bar of metal so that it may be broken by a blow at that particular point.

Opening-out. — The enlarging of the diameter of a hole by means of a broach or reamer.

Out and Out, or Overall. — An outside dimension taken to its utmost extent.

Overhauling. — The examination of machines and machine parts, preparatory to the making of repairs.

Pattern Work. — The making of patterns for purposes of casting, turning, milling, *etc.*

Pening. — The beating over or the smoothing over of a metallic surface with the pene or smaller end of a hammer¬ head.

Pipe Connections. — The various parts used in making the joints of pipes, such as bends, tees, unions, elbows, nipples, thimbles, *etc.*

Planing. — The removal of material from plane or flat sur¬ faces by the use of cutting tools. In the case of small wood work, hand planes are employed; but, in the case of wood work in large quantities or sizes, and in metal work, the operations are performed by the use of planing machines.

Planishing. — The smoothing and polishing of metallic sur¬ faces by hammering, or by rolling, instead of by cutting or by abrasion. Shafting is very often planished instead of turned. Planishing hammers used on sheet metal are capable of delivering blows at the rate of 300 per minute. Play. — The freedom of movement, within definite limits, allowed in bearing or working parts, to prevent their jamming by heating, or by oscillation.

Plumb. — In a vertical position, as indicated by the position of a weighted cord hanging at rest.

Ply. — Signifies a fold, a twist, or a single thickness of a material such as wire gauze or cotton belting. In the latter case, the terms two-ply, three-ply and four-ply indicate that the belting is made up of two, three or four single thicknesses of the material.

Press Fit. — The fit of adjoining parts which is a little tighter than a sliding fit. It is provided for the purpose of allowing such parts to be jammed together by hydraulic pressure.

Prising. — The turning of a wheel around its axle with a crowbar; sometimes called “ barring.”

Punching. — The making of holes through metal plates by a punching machine, as distinguished from the making of holes by drilling.

Raised Work. — Metal work whose surface is raised in part by being hammered into the required outline.

Raising.— The production of raised work in curved outlines in sheet metal by hammering.

Reaming. — The enlarging of holes, already punched or drilled, by the use of a reamer. By this method, holes which have been roughly drilled, or those in which ridges have been left by the drill, are smoothed down and made truer; holes which have been punched or drilled in plates, and which do not correspond exactly, are corrected by clamping the plates together and passing the reamer through both of them at once; and punched holes in the immediate vicinity of which local tension has been set up by the punching operations, are relieved of that strain by reaming them slightly larger in diameter.

Red Lead. — The red oxide of lead. Mixed with boiled oil, or with boiled oil and white lead, it is used in making steam joints; mixed t;o the consistency of a thin semi-fluid paste, it is used for checking the accuracy of contact surfaces during the operations of fitting, the color being transferred from the surface that has been finished to the highest por¬ tions of the surface to which the finished surface is being fitted. , . _ . ,

Reddle. — Red lead mixed with oil, used m the fitting of metal surfaces by the processes of scraping and filing. Rivet. — A double-headed, solid, bolt-like fastening, used for securing metal plates together, when they are subjected to shearing and not to tensile strains. They are made of soft iron, superior in quality to that of the plates, and are pressed into form in dies while red hot. They hold partly by the grip due to contraction on cooling, and partly by the frictional resistance of the plates to slipping.

Riveting. — The forming of the rivet heads in place. The rivets are first heated to a red heat, then they are placed in the rivet holes in the plates, and the tail turned over or

clenched by the blows of a hammer. This operation is commonly called closing-up. Large rivets are usually closed-up when red hot, and small rivets when cold; but, if the length between the heads is more than four inches the heads formed on hot rivets are liable to be broken off by the contraction of the metal when it cools. Rivets of that length and over ought to be closed-up cold. Riveting is accomplished either by the use of hand hammers and hand riveting-sets, which close up and form the tails of the rivets, or by hydraulic pressure. In machine riveting, the closing-up and the forming of the tail are performed in one operation.

Roughing-dovvn or Roughing. — The removal of the outer skin or scale, and the larger bulk of the material from a piece of work preparatory to the more accurate shaping with finishing cuts.

Rule Measurements. — The taking of all ordinary dimen¬ sions with a rule where the character of the work does not require the exactness which can be attained only by the use of calipers, trammels, gauges and micrometer gauges.

Running-out. — In boring operations, slipping away of the drill from the centre in which it was started. It is caused in various ways, such as the carelessness in the initial centring; the improper setting of the work; the influence of inequalities on the surface of the work; or the bad form of the drill itself.

Rusting. — The coating of bright iron or steel surfaces, such as those of iron patterns, with rust so that they will take shellac varnish without the risk of peeling off. Rusting is accomplished very quickly by coating the iron with a solution of sal-ammoniac, or with a weak solution of hydrochloric acid, and allowing it to dry.

Scaling. — The taking of measurements or dimensions by means of a scale from drawings made full or actual size, or from those upon which the dimensions are not given in figures.

Scribing. — Marking out with a scribe on rough pieces of wood or metal, the outline of the shape or pattern to which such pieces are to be worked by the subsequent operations. A timber scribe is a steel tool pointed at one end for scratch¬ ing, and knife-shaped at the other end for cutting. A metal fitter's scribe is pointed at both ends, one being straight for top scribing, and the other curved for marking underneath work.

Set Work. — Regular work or that which is repeated many times or perpetually in a workshop. It is also applied to any class of work which is made a specialty by a manufac¬ turing concern.

Shrinking-on. — The fixing or clasping of wheel tires, the securing of the jackets of built-up guns over the central tube, etc., by expanding the wheel or jacket, as the case may be, by means of heat, then placing it in the desired position, and allowing it to grip or tighten on the receiving part by the shrinkage caused by cooling.

Shutting. — The welding together of joints in wrought iron or steel.

Slack Fit. — A bad fit, or the fit of machine parts in contact, which have more play than is sufficient or desirable for their easy movement.

Slide Principle. — A principle of construction upon which the adjacent moving parts of a machine are so fitted to one another with guides or guiding strips, that they can slide or move over each other in one direction only. It is a principle which is applied in one way or another in the construction of many kinds of modern machine tools.

Sliding Fit. — The fit obtained when cylindrical or plane surfaces move over each other freely, but without any per¬ ceptible slackness. The difference of l-10,000th of an inch is equivalent to the difference between a sliding and a slack fit.

Soldering. — The joining of two pieces of metal by means of another metal or an alloy. Soft soldering is accom¬ plished by means of the various alloys of lead and tin; while hard soldering or brazing is effected by the use of the alloys of copper and tin. Clean surfaces are essential to effective soldering. In soft soldering a copper bit is used to fuse the alloy; in hard soldering the metal parts are held together by means of binding wire, and the melted alloy allowed to run in between them.

Spinning. — See Metal spinning in this article.

Swaging. — The drawing down of wrought metal to a definite form

with or without the use of swage tools. It is the reverse of upsetting.

Sweating or Sweating-on. — The soldering of metallic sur¬ faces without the aid of a copper bit. After being thor¬ oughly cleaned the surfaces are heated and covered with a film of solder. Then they are brought together and heated until the solder flows and unites them. The method is often employed to hold together temporarily various kinds of work which has to be turned or shaped, and which could not be conveniently held in any other manner. The sub¬ sequent separation of the parts is easily accomplished by the aid of heat.

Taking-up. — A general term which signifies the making of adjustments for wear. Specifically, it denotes the closing up of strap-ends of connecting rods, the cone bearings of lathes, compensating collars, etc., and the smooth working

of bearing and moving parts, rather than the tightening of parts which are either bolted or wedged together.

Tooling. — The working or cutting of metals with ordinary cutting tools as distinguished from the shaping of surfaces by grinding.

Trial and Error. — A method commonly employed in the workshop to obtain correct work in the construction of mechanisms, or in the making of tools. The most accurate results are obtained as follows: When a piece of work has been produced as accurately as possible by the use of a particular set of tools, or by a particular method of con¬ struction, some other set of tools, or some other method of construction is resorted to for the detection of the errors left uncorrected by the tools or method previously em¬ ployed. The production of surface plates and straight edges, and the centring of work in a lathe with chalk, are cases in point.

Trying-up. — The straight and accurate planing of wooden surfaces, out of winding and at right angles with each other. Turning. — The fashioning of wood and metal work to cir¬ cular forms in a lathe. It is accomplished either by hand tools, or by power-driven machine tools.

Up-hand or Up-hand Sledge. — The delivering of light blows with a smith's sledge-hammer in light work, or the use of a light hammer for that purpose.

WORKSHOP REGULATIONS. See

Factories and Factory Inspection; Child-Labor; Labor Legislation in the United States; Labor Legislation, Foreign, *etc.*

WORKSOP, England, a town of Notting¬ hamshire, on the Ryton and the Chesterfield Canal, 16 miles east-southeast of Sheffield. It lies near the northern extremity of Sherwood Forest, in a district known as the <(Dukery,® from the number of ducal seats. Its parish church, dating from 1103, was an ancient Nor¬ man abbey church. There are manufactures of agricultural implements, mill machinery, Wind¬ sor chairs, chemicals, etc., and there are iron and brass foundries. Pop. 20,387.

WORLD (old English, weoruld, composed of veer, man, and eald, eld, age, the age of man), the globe or planet on which we live. The word is also used to designate any celestial orb considered as the scene of interests analogous to those of mankind; the present state of ex¬ istence; the enjoyments and cares of the pres¬ ent life; the customs and practices of men; peo¬ ple in general ; mankind, or some particular sec¬ tion of mankind; a large and more or less defi¬ nite division of the globe, as the New World; the whole human race; the ungodly as con¬ trasted with the self-styled Children of light®; a great number or quantity, very much or a great deal, as a <(tc >orld of good.® See Earth.

WORLD-ENGLISH, the name given by Prof. A. Melville Bell to a proposed new pho¬ netic system of spelling the English language, so as to render its acquirement by foreigners more easy and to make it available for inter¬ national use.

WORLD AND HIS WIFE, The. See

El Gran Galeoto.

WORLD POLITICS AND THE EX¬ PANSION OF EUROPEAN CIVILIZA¬ TION. I. Introductory. — The modern man who is able, through the aid of the recently provided mechanism for the communication

Editorial Note. — As the article on “World Politics” was prepared after the greater part of the Encyclopedia had appeared in print, it has been possible to introduce with con¬ siderable exactness a number of important cross-references containing material bearing directly upon the various sub¬ jects and areas discussed in the article. The article forms a coherent introduction to the subject and the cross-references put at the disposal of the reader the resources of the entire Encyclopedia and make available a more detailed treatment of this

important subject than has been previously attempted in any single work in the English language.

and dissemination of information, to familiar¬ ize himself with the more important events which have taken place throughout the world in the previous 24 hours, finds it very difficult to comiprehend that during the greater part of recorded history the chief successive centres of civilization have occupied an extremely limited field of activity and have had only the most im¬ perfect and tardy knowledge of what was con¬ temporaneously taking place within even this small area. Oriental history developed and passed chiefly within the confines of what Pro¬ fessor Breasted has called the "fertile cres¬ cent" of the valleys of the Nile and the Tigris and Euphrates. Classical history added to this area of historic activity the coast of the Medi¬ terranean Sea, with a varying depth of hinter¬ land. Mediaeval civilization, driven on primar¬ ily by the expansive power of Christianity work¬ ing on the basis of the ruins of the Roman im¬ perial system, brought within the realm of chronicled human endeavor northern and west¬ ern Europe. While one should not forget the flourishing north European civilization of pre¬ historic or proto-historic times, which has been revealed by Dechelette, Montelius, Peet, Munro and others, or the advanced and extremely old civilizations of India and China, it is fairly ac¬ curate to maintain that up to the opening of the 16th century the great historic civilizations had arisen and had declined, all of them within an area not greater than that of the present United States of America. The subsequent his¬ tory of the world in its larger aspects has been a process, based upon exploration, colonization and mechanical invention, of extending the area of historical interaction between peoples, of breaking down the earlier localism, isolation, provincialism and stability, and of utilizing the reactions of these changes upon the original European centres of worldwide expansion. See History, Its Rise and Development (Vol. XIV, pp. 226-232, 253) ; History, Ancient.

II. The Dynamic Forces Behind the Ex¬ pansion of European

Civilization. — Of all the forces producing the general process of Euro¬ pean expansion in modern times, the oldest and most permanent, if not the most important, has been the missionary impulse of Christianity. This has not only been widening the field of European civilization during the period from the fall of the Roman empire to the height of the Middle Ages, but ever since that time it has maintained its energy and activity. As Pro¬ fessors Robinson and Beard have well expressed the matter: “The way for imperialism has been smoothed by the missionaries. There have always been ardent Christians ready to obey the command, (Go ye into all the world and preach the gospel to every creature. } No sooner was a new country brought to the attention of Eu¬ ropeans than missionaries flocked thither with traders and soldiers.” The Crusades (1095— 1291) constitute the first notable religious move¬ ment which possesses great significance for the subsequent expansion of Europe. While the in¬ tellectual and economic results of the Crusades, centring in the appropriation of Arabian culture and the development of trading relations be¬ tween East and West by the Italian city-states, were much more significant for posterity than the temporary triumph of the Cross over the

Crescent, it is certain that without the initial religious impulse there would have been no pos¬ sibility for the development of the subsequent significant intellectual and economic interaction between Europe and the East which followed the Crusades. In the period of European explora¬ tion which ushered in the Commercial Revolu¬ tion the Catholic missionaries, Franciscans, Do¬ minicans and Jesuits, were in the vanguard of expansion. About the beginning of the 19th century the Protestant missions entered into the campaign of conversion, which has since been in a process of ever greater expansion and more perfect organization. Profoundly impressed with the semi-fanatical conviction as to the uniqueness and the superiority of Christianity over all other forms of world religions, these missionaries have often cut sharply across the theology and the “mores” of the native or Ori¬ ental peoples. This has frequently been fol¬ lowed by the persecution or the extermination of the missionaries, which has in turn opened the way for the military intervention of mod¬ ern governments, driven on by eager capitalists anxiously awaiting the opportunity for invest¬ ment in these undeveloped areas. As Dr. Dennis, Mr. Macdonald and Prof. E. C. Moore have shown, the missionary movement has ever been closely linked up with the expansion of Euro¬ pean civilization and the growth of modern im¬ perialism. See Missions, Protestant Foreign ;

Missions, Roman Catholic.

One of the most persistent and effective of all influences stimulating the process of expan¬ sion has been the desire to develop more ex¬ tensive and profitable trading relations. It was the trade which the Italian merchants carrying the Crusaders to the East built up with the Levant that produced the flourishing Mediter¬ ranean commercial activity that was both a harbinger and a cause of the later overseas ex¬ ploration. The jealousy on the part of the western and northern European powers of the Italian monopoly of the trade with the East led to attempts, first made by the Portuguese, to discover another route to the Indies. This resulted in that great era of exploration which brought about the Commercial Revolution and the beginnings of modern world trade. From 1550 to the present day the development of world trade has been one of the most notable dynamic agencies promoting the movement of expansion, particularly since it has been reinforced by the Industrial Revolution, and at the present time it quite overshadows all other stimuli in this field. See Commerce, History of; Commerce of the World.

A powerful psychological and political mo¬ tive for expansion is to be seen in modern na¬ tionalism, a force which has been developing with ever greater intensity since the first ap¬ pearance of the dynastic national states during the 16th and 17th centuries. It was nationalism which promoted the narrow and exclusive eco¬ nomic and political policy, known as “Mercan¬ tilism,” which dominated European commer¬ cial and colonial methods from the close of the 16th century until its overthrow by the eco¬ nomic liberals following the middle of the 18th century. It was nationalism which combined with trade rivalry to produce the series of Eu¬ ropean wars over colonial interests in the late

17th and 18th centuries. In the period of re¬ cent national imperialism since 1870 the national¬ istic or patriotic impulse has played a most im¬ portant part. Territory overseas has been sought as compensation for European losses, as in the case of France; for the

purpose of stimu¬ lating national pride, as was most evident in the case of Germany; or as a means of providing investment opportunities for national capital, which has been the case with all modern nations, but was most particularly true of Great Britain, the United States and Germany. In the last half century, the period in which the capitalis¬ tic party gradually displaced the landlords and became the dominant group in the control of modern governments, patriotic pride in national expansion overseas has been assiduously fos¬ tered by the governing classes in order to gain a psychological support for their imperialistic policies. See National Ideals and the War; Nationalism.

All of the motives leading to overseas ex¬ pansion have been powerfully advanced and given new energy by the Industrial Revolution of the 18th and 19th centuries, which has fur¬ nished the perfected mechanism of modern ex¬ pansion and has greatly augmented the eco¬ nomic motives for imperialistic activity. The vast increase in the productivity of marketable commodities through the application of the ma¬ chine processes and the factory system has led to the search for more markets. The improved methods of oceanic transportation and of the communication of intelligence have made the search for world markets more feasible and successful. Exploration in the undeveloped re¬ gions has revealed the wealth of raw materials to be obtained from these districts, and the in¬ crease of available capital has led to a desire to develop the economic potentialities of these backward regions. This has been made easy through the fact that the industrial and scientific revolutions affected the military, as well as the economic field, and provided the modern ma¬ chines of war which put the natives completely at the mercy of the European invaders. Mod¬ ern world politics, then, is a great historic com¬ plex of ever greater significance, which draws its motive power from the realms of religious fanaticism, commercial ambitions, national pride and the multifarious impulses from modern capitalism. See Industrial Revolution, The.

III. The Commercial Revolution and the First Period of European Expansion. 1. The Background of the Commercial Revolution. — While the volume of European trade during the so-called <(Dark Ages® was greater than was once supposed, it is true that the earliest notable development of mediaeval trade followed the Crusades. The peoples of western Europe de¬ sired the edible spices from the Malay Archi¬ pelago and the East Indies to make their coarse and ill-preserved food palatable. They further wished to secure the precious stones from Per¬ sia and India ; the drugs, perfumes, gums, dyes and woods from the Indies, China and japan; and the draperies, cloth, rugs and fine steel work from Persia and Asia Minor. The de¬ sire for these

commodities was awakened by the contact with the East during the Crusades and was exploited by the Italian city-states. Their merchants purchased these products which had

been brought from the East through the Red Sea, Asia Minor or Turkestan, took them back to Europe and sold them to distributing mer¬ chants. It was long a venerable tradition in European history that the occupation of the above-mentioned eastern trade-routes by the Turks following 1453 constituted the chief cause of the downfall of the Italian city-states and of the subsequent development of attempts to discover new routes to the East. Prof. A. H. Lybyer has shown, however, that Thorold Rogers' and M. D'Avenel's statistics of prices following 1453 indicate no appreciable effect of Turkish occupation on the volume or prices of commodities coming from the East to Europe, and further calls attention to the fact that the Turks did not occupy the southern routes until nearly a generation after overseas communica¬ tion had been established with the Indies. Rather, it seems that the chief cause of over¬ seas exploration was the jealousy of the west¬ ern and northern European powers and mer¬ chants toward the Italian monopoly of the Eastern trade. The Portuguese under Henry the Navigator and Diaz began, in the middle of the 15th century, the explorations which ended in the successful voyage of Vasco de Gama to India in 1498. Under Spanish aus¬ pices Columbus discovered America in 1492, and Magellan's fleet circumnavigated the globe in 1519-22. These and contemporary and sub¬ sequent explorations opened the way for further expansion and constituted the geographical foundations of the Commercial Revolution and of the dawn of modern history. Along with this major economic impulse to exploration and colonization should be mentioned the religious ambition to convert the heathen, the political de¬ sire to increase the territorial possessions and the national prestige of the states of western Europe, and the hope of satisfying that intel¬ lectual curiosity which had been developing since the cultural revival of the 12th and 13th centuries. See America, Discovery and Colo¬ nization of; Colonies and Colonization.

2. The Rival Commercial Empires. — The period from 1500 to 1763 in world politics may be most intelligently viewed as the era of the rise and struggles of what has been called the ((rival commercial empires.® This period started with the rise of the Portuguese to commercial supremacy following the return of Vasco de Gama from India in 1499, and ended with the conquest of the French in North America by Great Britain in 1763. Taking advantage of her priority in

explorations in this region Portu¬ gal occupied the Spice Islands and several of the East Indies and established a partial mo¬ nopoly over this valuable trade, but her internal strength was not equal to the strain imposed by this over extensive and rapid external ex¬ pansion. She lacked the naval power to defend her trading monopoly; she was unable to organize a systematic and competent distributing service for the Eastern commodities; she had few commodities to be taken East in exchange for materials purchased ; and a corrupt official¬ dom made it impossible for her to control un¬ scrupulous traders. Her decline invited for¬ eign aggression, and in 1580 Portugal was annexed to Spain and held in subjection for 60 years. Spain vied with Portugal as an early

WORLD 1919

jt from Greenwich

Washington

Longitude

LINCOLN . SEA

Longitude West from Greenwich

ij-jC. Bridgman I

•OoWyokoff 1. 1

C. Henry Pariah ”MELLVILLE LAND |

_ /^\C. Klgsdagou

C. Columbia

WORLD

C. Alexandra

C. Sherard -Osborne

Cape Alfred.

Y flaxen

.RUDOLF LAND ‘ .oHvidt Land

“land

Hand McNally ’a New 11 x 14 Map of the World.

McNally & Co.

ISLANDS

SVERDRtfi

Copyright by Rand

LAN)

TRANZ J03l

ALEXANDRA \,’ ‘ C. f

liar mo worth jAy

k \ Ptttrmann

Y) i)’ord

WASH! NOTON LAND

1C MALLIXUCK

Hanoa

%CZAR NICHOLAS II LAND

Amsterdam l-?/*?, , MIIEKT LAND I I \

＞.k. i. ! Ki«u fl.l) i

SPITSBERGEN N

PRINCE (HAULER FORBLANDyˆ.

1 06 Fjord”

Bell Sd.

A’anrl-firUln

rvK

O BA RE NTT. r.

Wor.-K

PARRY 1!

L. Marie Yaldemar ˆ C. ˆiliftmurok

C. Mauritius

1 BARENTS i LAND

C. Cholyuakln V Thaddtux L. Bay

ce Patrick

OXRMAN1A.LA

KONIfl

WILHELM LAN

.AND

> Henrietta I.

<1 Jeannette I,

V.

ˆKoldowoy

\Clarenca’ n-‘ Hoad thCoburg*5* I ‘Hi. C. Y

C. Petermann

, FKNINIULA

.tfidvilll

EW SIBERIA

Lands End <

1SL \NDS

SFadkicf or Thaddsih

EGUNT04LL

Admiralty Pen./ffl»4 >

■ Alt Kotelnyi

DENMARK)

Melville Sound , FRt?

New Siberia I.

rr^u£(Ilamke B» 2 Kaiser > Franz Joeof Fjord

Laneastc

C. Pr. Alfred,

MafoljeAhin Sika*

F\S ANKS

[tSLAND/:

oJUpornivlk

SCORKS8T

LANQ

U*t > *(nal > arkoe,

JLcOCKRURN ft LAND

B A Y

C. Adair

i Liverpool Coast

Pt. Barrow

iyNcorcs&jy Sd. ˆ Jon Ma; t C. Brewster

WranoellI. ˆ

Pmanai Fjord J

Disco I.e (bjdhavn’ Egedoniniiid

Mackenzie

Albrrrpa

ISLAND

.Uaika

Nizhne-*

Kolymsk,

ijˆJacob ihavn fchristjanshaab ittolatoinburg

Troint Lofoten fal ISLANDS;*)?* Bodo jt’

iBulun

Ust-Yansk

,(lalketyi.

g - • I Port M,

• Pt. Yukon Sx

- — i _

Rampart ft-ALl

L-A’-gCKaA

IN u la to ˆtoaaaˆV

’PujKoierak

Langanacs

> vjrkhnokolymsk;

Circle

Angpagsalj

ARCTIC

Mezen

Aroli angel

J ,\ytaur-C.

0 oU m

Reykjavik

SGodthaab J rLlchtenfela) IftPredtrlkspaab “Yplyigtut/

VY«. o.N51 I

Mnadj/r ˆ Lawren u. NavarlnL

, -i <

Si. Matthew I.

Nomˆ \

Trond”bjei

‘loro

.•BergenJL-

Michael

‘enjinsk lllutorak 1

I«kon &. - !°

•L PottSlmpaoi

1

Gizhlgn

| Manaal t-jC.

r d s o x / 1

Srlk i r it

Yakutsk,

Onfpa

Sunrii

Kenoi’

RiaolvJ;1

Olekminak

flhnhnAa

Tauiak

■‘are well

sETROGRAD

Vologdaˆ.

UN HV ISLANDS IRIIRIDEH— SCOTI.ANlj,* V

HEilInbark.h. <JI««eo*V/L’ ,

Ollutorsk NunWitk I.

[Okbotel

.Venisoisk

\5cM)ouglaeA

Vo

Sitka [jˆvA Wrangell

BA r

V Karaglnskii I.

: Oxernyl B fjaltno-Kamchatka Bering 1.

‘ u ˆ Mi,»lol 1.

0*’tA.VD*a is.

javlofik

TdbolsicVˆ

j1 Ekaterinburg

f SKA <)F

OKHOTSK

Eraanovui

Bratskiy

IFOR Til

OENMA Pr,C0«*ENK W .VA’A Hl-Ilaiohj

inahkoj

Kirensl

Hamilton Inlrt

SLroict

Battle Uarboi

- s«f

vl

Kursk] <,K.barkovi iˆ0 Bkate«(Vno»l /

Ddskoi /Tp

iC. Etiaahelh

L. Baikal

Y ‘ Priuˆa Albertˆ . P BattlefoidˆW tCaltarrvNL./iˆ;ˆ [\ico«»et ˆlUglnaf i . ‘New Wc st in . -i >l er _]

Fort Gaorga

Ignashina

Queen

‘rtfthinek)Cbit*ˆ_ UrgaTLerulen

MON iCfoQˆT1

DESERT OF GOBI 1

/ˆ‘irkutak1

ALEU1Y

. >Onk

Turgtl <

Nikolaievslf

BhpnMˆB

Sakhalin

ver

v KtoaH ˆ C. Flattery C&fp

01vinpii5~

lEWFOUf OLANO LSt. Johns *0. Race | _

lalkhatl

Kaaallnsˆ

, Jay” rif Biscay

Qlympii

I»o»h| ,]j

e”

invar \r Omaln ’VChiolgO

Breton 1.

VRSHAMO-

PortlnnT Salem Mendocino \ , Sacramonti u Francisco

C. Finiatenre JS” bportorjU R.lSBONA«j

0. Bl. yinitoutTˆJ I I! ili m 10 tr. of Gibraltar

Azores

(PpRT.)

S.U L.k. Cllyt D”’-

. Cttieou Cy.Leaavlllv’

i«Lu n i Jr e

3. Hattcras

-Tˆ At Peking v

pˆjTlenUiofl / L-rn’«k

;jTarkand

Sink i a n g

Ss oKhotan..

f ntnnrkand

tellAihkˆt.ail

＞Ul.ihomA

FRui

Sianfu ,

!harlcston

SHIKOKU

;i ˆSavannah

‘Wargla‘

Diiabli

> “■ IT- ‘ ” ■

Foochow 1 f ,Li««Vwfu 2Kz

Lhasa;

GULF OF h \ MEXTQfij?-

».nW”HAVANA . \ orJ» Mai iil» J <

.Bahama

Pt. Eugenia’

Midway Ik.

.(u. s.)

.Bonin Is. :(jap.)

Benaw

_Tcnduf |

‘”“Yk ‘

.Vadanˆ 0Timbuktu

of Cancer

Tropic

Haw a 1 1 an Inlands ILULU *■* U . S)

C. Blancoˆ ■*ST. LOU I C. Vcrdci

Wadjr Hulfnfo A Nouiil QuaklnA i ANGLO -(Sˆntaltiv EGYPTIAN /

Ou)dunoan-/KX

KY*r/

_ SUDAN Iv?/ / A

tin EDO Is.

r-ˆˆTakoWljAP.) V >7 K long, how _

’Hainan I. r*)

- Luzon I.£ ˆPhilippine Is. mTnuaTI i » Mlndoio La PannZl.

Refilla Sant* Rosa or Oil

ARABIAN

Cap* V xr|j)E Jh. (port.)

Tehuanut

‘Madras

IPnndleh&T’ [1*.) 1

GAMBIA

BATrtua&rwJ

<b,-jwS

l. of 81. Pajul tA ‘or 3an Pedro

°.Soki.lo

NIGERIA

; <k«.)

’rinidad

(BR.)

ˆCGCCRGfTOWN

wy-Pahamabibo GI)lANi5ˆc*YENN

,Bokotra (B«J

, L_ My*oiv

Rr-) ‘ Taccaoiv* Is. rl (DR.) 7

‘ C. Comorii > Maldiv* Islands J tBR.) %

‘AJUrua’

>Mandatory \ -awost

_cl .© Howland I. “wfrflftT Baker I.

rfluam I. t u. s.)

ˆOMVt

‘■((•.Jr.)

DAPACASˆJˆy* ■ ‘/ENE’ZUELA

Samar

is.”

1 Malay.

NICOBA

Colombo

Christmas Islands

> (»*■)

IOOOTA

Molui

(Mogdiahn)

TP’

Qalapauos Id.

(Eeuadei)

IhLands

(dr!)

L’BSEVIvLl . \t*

ka#ino»V.^

(Port.) Loanda’!

do Norooho I.

Seychelles

(.■>»•) »e

IRANTE Is. (DR-) . *bh idence I. (*** ■•)

.germBˆ I EAST IkAFRIC/

Phoenix Is. (br.)

Benkulon’

Tllerojdr

aC. Sao Roqui Jr Ileoi|fe (Pernumbuco) o Salvador (Bahll)

3OSED

tttAXbflY1

A la. A,

(…) A

Trujillo’

iS-SALAM

, Ellice Is.

Cocos or bATM** Kbeuno Is. [—

ljUNDA Isua*

Benguela.

j.‘oˆUMAn

Nornmnlon SEA

Porto Seguro

St. Helena (sn.)

iotu Archipelago (Fr.)

NewVJIebrides

C. Lever i

_ •- LAHtiADUS »».

dTamatave (br.) (Antananarivo ’ o o Mauritius l. (■*•) Reunion 1.

• “Cook Is.

. _ HRJ.

New,, .nCALEDONlA.

’ (PR.)

Lookhampton,

fwflrtODESi I BF.CHCANA I LAND V’-

lAFEKlAiG^^rfi

Jtj/S OE jANEIf ““N.lotheroy

Tropic of

Tubuai Is.

U(M>.r ■

wfcSTCTN

•TTrinidadTs!

, Santos 3Deeterro >rto Alecro

?M*HQUtS [a sane

ATORY.

“Caruarvt

Sala-y-Oomet 1.

Copiapc La SereDa)

Easter or Walhu I.

Norfolk Is.

Rrishnne

lontel

AUSTRALIA

DongariW

Coquiml

Atr*TJ

’kermadec Lb.

jRaseru

Valparaiso

Santiagc

CbillaV

0n,nde d0 Sul BLiq wtc»\Montevioeq

» As ‘“nit,

iSjCarinen de Patagonee

)fUulf of SanJMatieu

f Fremantle Williamsburg C. Leeuwtn

North Cape

‘jNorˆh Island

East Cape t ˆr.pier

\JfVELlilNGTON

‘h r ifitet. lu rchjt Chatham I< ■

rii w (ˆNewcastle

loRiAjr Bombala ˆaydioiirne I

Klliabeth

ˆEW ˆ

Auckland \ ■ Plymouth]

Nsw Amstfrd (Fk.)

Valdivia

Puerto Montt Chiloe I \ Chonos

St. Paul

(F«.)

.LAND

I Nelsonf

. Jos* Strait Burni# TASMANIA’

llobai

Hokitil

(BfJ.)/

South Island

1 1 PKLAllO

‘Prince Edwi ,rd I.

(…)

Mariuo I.

(.»)

Dunedin

Cape Providence’

o Dcscado

fr? Kerguelen I.

(…)

Wsllinoton I.

Antipodes I.

, Falkland Is (br.)

■” (BR) Antipo > ies of Greenwich I.

Auckland

(».)

e Campbell I.

(na.)

Punts Arp’nl Santa Inez i!

TierraIdel

VFueap

South

ˆ(or.)

McDonald

(FR.)

Georcta

Bouvet Is.

C. Horn

Sandwich a

GROUP

Emerald I. (br.)

Elephant l.a(

Clarence 1, j ** JˆKIng George I :V(ˆˆˆ > Joinville I, TˆRoss I.

RAH A M’S) LAND

KN DERBY lani > 7

Circle

Antarctic

KEMP LAND

KAISER

‘VILHELM if LAND

KATSEK WILHELM II

contender for colonial and commercial su¬ premacy, occupying the greater part of the New World, especially South and Central America, and several groups of Pacific islands. The great wealth thereby controlled by Spain might have made that country the greatest of modern pow'ers, had it been guided by a wise adminis¬ trative and fiscal policy, but such wisdom was lacking and the Spanish decline was only slightly less rapid and complete than that of Portugal. The excessively strict regulation of the colonial trade crippled commerce with the mother coun¬ try and invited smuggling; a cruel and wasteful system of native labor lessened productivity in the colonies; the expulsion of Jews and Moors from Spain lost her the possession of her monied classes, while repudiation of debts forced the withdrawal of German credit; re¬ ligious bigotry and fiscal exaction lost the rich province of the Netherlands; the Inquisition crushed out all individual originality and initi¬ ative ; and the loss of the Armada in 1588 meant the end of .Spanish naval supremacy. At the beginning of the 17th century Spain was becoming that second-rate power which she has since remained. Stirred to action by Spanish oppression, the Netherlands enjoyed the commercial supremacy of Europe for more than a half century following 1590, occupying most of the old Portuguese possessions in the East, as well as valuable areas in North and South America. But the Dutch were not equal to the task of building up a permanent com¬ mercial empire of great extent. Like ancient Athens, the Netherlands were a loosely united group of jealous city-states rather than a com¬ pact national unit ; the ((Spanish Fury® helped to ruin Antwerp and the closing of the Scheldt ended its prosperity; the Dutch devoted their energy chiefly to commercial activity with little attention to permanent colonial policy; and in the contest with England under Cromwell and during the 'early years of the Restoration the Dutch were thoroughly worsted. France was prevented from making an early entry into the commercial and colonial scramble through the religious divisions that led to the civil wars of the latter part of the 16th century. Even when she did make

some systematic attempt to con¬ tend as a first-class commercial and colonizing power, her strength was sapped by the suicidal policy of Louis XIV, who at the critical mo¬ ment wasted the national energy of France in a futile attempt to extend the eastern bound¬ ary of that country. France was immensely more rich and powerful than England in the 17th and 18th centuries, but lost out in the final con¬ flict because ‘of a corrupt administration, the failure to devote her resources to the strength¬ ening of her colonies, and the adoption of a fatally weak colonial policy — ‘that of scattered military occupation. England, which emerged from this first period of European expansion as the leading colonial and commercial state of the modern world, was but a small and weak countrv after its loss of the Continental terri¬ tory until the time of Elizabeth. Her rising sea-power was based upon the naval training afforded her sailors by buccaneering expeditions against the Spaniards and was proved by the destruction of the Spanish Armada in 1588. The Dutch were vanquished in the middle of the 17th century and the duel of a hundred VOL. 29 — 34

years with France for colonial supremacy began. Aside from the fact that England took her colonial enterprise seriously and France looked upon it as a (<side issue® as compared with the dynastic struggle on the continent of Europe, the chief significance of this century-long contest was that it represented a struggle between two different colonial systems — the in¬ tensive occupation and exploitation of a limited area versus the extremely meagre occupation of a vast territory by a few soldiers and traders.

In 1688 there were about 300,000 English col¬ onists in the narrow Piedmont region of the Atlantic Coast, while there were scarcely 20,000 Frenchmen in the vast regions of Canada and the Mississippi Valley. With the French handicapped by futile dissipation of energy elsewhere and infinitely weaker in colonial policy, there could be only one issue to the conflict, and by the Treaty of Paris of 1763 Great Britain took over the possession of the great majority of the French colonies in Amer¬ ica. See Colonial Wars in America; Col¬ ony ; Exploration in America.

But this very triumph of Great Britain over her traditional European enemy only involved her in a more serious struggle with her most important colonial domains, the English col¬ onies of the Atlantic Coast. The occupation of the vast territory conquered from France - west of the Alleghenies forced upon England a reconstruction of her hitherto loosely organ¬ ized and indifferently enforced colonial policy.

This imperial organization necessitated addi¬ tional expenditures, which Great Britain pro¬ posed to raise through direct taxation and through an enforcement of the long-dor¬ mant navigation laws. But this fiscal policy aroused the opposition of the colonial merchants, long accustomed to unhampered smuggling, and they united with the debtor landlords of the southern colonies to give vitality to that as¬ piration for independence which Mr. Sydney George Fisher has analyzed with such acumen. The revolution which ensued was in its essence a civil war within the British empire, in which British and American liberals made common cause against conservatives and imperialists in both countries, and the colonial cause prevailed chiefly on account of that defection of the British Whigs which Trevelyan, Fiske and Lecky have clearly recognized and described. The Joss of the more important British col¬ onies in America produced a marked tendency toward the granting of greater autonomy in the British colonies that remained. This changing attitude was reflected in the Quebec Acts of 1774 and 1791, the Irish Parliament Act of 1782, and the India Act of 1784, but the thor¬ oughgoing revision of British imperial policy in a liberal direction did not take place until a half century later, following Lord Durham's famous Canada report of 1839. In this first phase of European expansion Germany, Aus¬ tria and Russia failed to participate, Germany because of the distracting religious, wars and Austria and Russia on account of isolation, inertia or propinquity to a vast amount of unoccupied districts in Asia. Their remaining without the circle of the new commercial and colonial powers was most influential in de¬ termining the lines of their later political and economic evolution and possessed the greatest

significance for their subsequent history and for that of the rest of the world. It should not be forgotten, however, that Russia was beginning that expansion eastward through Si¬ beria which was to make her an important participant in the second great period of col¬ onial expansion after 1870.

3. The Larger Aspects and Results of the Commercial Revolution. —

The outstanding effect of the Commercial Revolution and the era of colonization in this first phase was the rude shock which it gave to the mediaeval order. It broke down the previous isolation, stability and repetition and gave Europeans a new and ever-varying and extending outlook; in other words, it first introduced the dynamic element and the worldwide viewpoint into western European civilization. It further brought a shifting of the centre of progressive civiliza¬ tion from the Mediterranean Basin to northern and western Europe. The economic effects of the period were varied and profound. Com¬ merce was greatly expanded through its be¬ coming oceanic rather than thalassic and through the entry of many new commodities which had been discovered in the process of exploration. The centres of commerce shifted from Italy to western Europe. With the re¬ sulting ˆintervention of capitalˆ there de¬ veloped the whole mechanism of capitalistic institutions, a greater supply of money, bank¬ ing practices, credit instruments and insurance. New types of commercial organization sprang up, such as chartered companies, joint-stock companies and commercial corporations. A definite type of economic theory emerged in what was variously known as Mercantilism, Cameralism and Colbertism, but which in all cases consisted in a strict state regulation of national industrial and commercial activities. Again, there emerged a new class of ever greater proportions, the new merchant group or bour¬ geoisie , who were to play so important a part in the commerce and politics of the age. Finally, probably the most significant economic result of the Commercial Revolution was its preparation of Europe for the most far-reach¬ ing transformation in human history, the In¬ dustrial Revolution of the 18th and 19th cen¬ turies. Through producing a greater supply of capital, introducing and improving the mech¬ anism of credit and banking, developing more scientific and efficient methods of industrial and commercial organization, extending commercial relations and expanding the volume of com¬ merce, opening up new markets, and increas¬ ing the power of the business classes in the law-making bodies, with the resulting protection of business interests, the Commercial Revolution alone made possible the coming of the great industrial and social revolution associated with the growth of mechanical industry, the de¬ velopment of the factory system and the rise of the urban age. England led in this new industrial era solely because of her more ex¬ tensive and successful participation in the previous colonial and commercial activity. In the field of social results there were intro¬ duced new standards of comfort; new food products ; novel beverages with important social consequences, such as the rise of the coffee¬ houses and the use of narcotics, especially tobacco. The stimulation of travel and emigra¬

tion, and a general increase in the mobility of mankind ensued. In the political realm the Commercial Revolution produced the national dynastic states, which were built on the ruins of feudalism by the monarchs through the increase in the royal income and by the aid of the new merchant classes. The new middle class at first supported the monarchs, but later rose against the old order, terminated despotism and established the beginnings of representative government. The rise of the national states and the usages and necessities of commerce led to the development of international law, which was first systematized in the (De jure belli et pacis) of Hugo Grotius (1625). In the realm of intellectual and cultural influences the effects of the Commercial Revolution were most significant. It gave an irreparable shock to the Patristic and Scholastic outlook and view of man and the world. The discoveries brought to Europe the most prolific and varied types of scientific data, stimulating general sci¬ entific curiosity and giving a great specific im¬ pulse to the natural sciences, such as astronomy, geography, cartography and biology. The social and moral sciences were also ‘deeply affected, in turn. The discovery of the new types of man produced the origins of anthro¬ pology, while the observation of diverse cus¬ toms and institutions gave rise to the study of comparative jurisprudence, philology, religion and ethics and to the growth of descriptive world history. These combined to develop a philosophy of science, which appeared in the writings of Bacon and Descartes ; a secular and human outlook, exemplified in the writings of Montaigne; a eulogy of the state of nature in the early works of Rousseau ; and an applica¬ tion of the new concepts to the problems of intellectual and social progress by the English Deists and the French Philosophes. Further, artistic and decorative standards were pro¬ foundly modified by the introduction of new designs from the Orient. In short, there were few of the novel trends in thought and culture in the late 17th and 18th centuries which were not in one way or another intimately related to the reaction of the European expansion upon Europe itself. See Banks and Banking — Origin and Development; Commerce, History of; Democracy, History of; History, Its Rise and Development; Nationalism.

IV. The Revolt Against Mercantilism and the Old Colonial Order. 1. The Background of the Reaction. — The old colonial system was built up chiefly by the dynastic national states at a time when they were dominated by royal abso¬ lutism, narrow chauvinism, and -an extremely archaic and fallacious viewr of economic and commercial theory. It was constructed as much on the basis of a desire to promote an increase of wealth in royal hands as to make possible the maximum

expansion of national trade. It was a narrow political and class policy rather than a broad democratic or socialized proce¬ dure. Therefore, it naturally aroused the ani¬ mosity of the merchant classes at home and in the colonies who desired a maximum degree of activity and business. Further, the attempt to enforce this unpopular policy proved expen¬ sive, especially in the face of ever-increasing colonial resistance. Finally, the intellectual currents promoted by the Commercial Revolu-WORLD POLITICS AND EUROPEAN CIVILIZATION

tion tended toward an opposition to mercantil¬ ism. The eulogy of the ˆnatural,® and the growing belief that social and economic proc¬ esses functioned most perfectly when in com¬ plete conformity with those natural laws which Newton and others had shown to govern the physical universe, combined to discredit so arti¬ ficial a system as the extensive legislative re¬ strictions on free competition which were em¬ bodied in the mercantilistic order. In this way social, economic and political theory were being reshaped so as to reinforce the practical com¬ mercial and administrative objections to the old colonial regime. See Economics.

2. Economic Liberalism and the Assault on Mercantilism. — At the same time when the American colonists were offering a successful resistance to British mercantilism in practice, economic theorists were submitting a doctrinal attack upon the foundations of this system. The leaders of the movement were the French Physiocrats and their defender, Turgot ; and the English classical economists, with their follow¬ ers on the continent. This group of so-called economic liberals assumed that economic pros¬ perity and social welfare could best be pro¬ moted by securing as far as possible the con¬ formity of economic processes and institutions to that ’supposedly beneficent (<natural order** which was believed to pervade and govern the universe. This conformity would be realized with greatest assurance through ushering in an era of free competition in the economic realm. To do this it would be necessary to repeal the restrictive legislation which had grown up as the basis and essence of mercantilism. There¬ fore, the practical program of the economic lib¬ erals called for a thorough-going abolition of the restrictions on the perfect freedom of the development of industry and trade. Indeed, the Physiocrats held

that the chief function of the state, at least temporarily, was the passing of laws repealing the restrictive legislation for¬ merly enacted. While there were important points of difference in the details of the em¬ phasis of this group of writers, varying all the way from the physiocratic eulogy of agricul¬ ture to the excessive praise of mechanical manu¬ facturing by J. B. Say, all united in opposing the forcible acquisition of colonial territory and in advocating near or complete freedom of trade. The doctrines of the theorists were warmly espoused by the new capitalistic class which was produced by the Industrial Revolu¬ tion, as well as by all others likely to benefit by a greater degree of industrial and commer¬ cial freedom. In England, Huskisson, and later Cobden and Bright led in the attack upon the old navigation and corn laws, and by 1860 this group had succeeded in bringing free trade to England and in discrediting to a very consid¬ erable degree the idea of the advantages of an aggressive imperial policy. The (<cosmopolitan dream® of Cobden embodied the acceptance of complete freedom of trade, anti-imperialism and international arbitration. In France the work of Cobden in applying these new theories in the realm of statesmanship was carried on by Guizot, who opposed French intervention in the Levant, and by Bastiat and Saint-Beuve who strove with some success to secure the radical downward revision of the French tariff svstem, wThich was realized by the Cobden treaty of 1860 and similar subsequent agree¬

ments with other states. In Prussia, Maassen, Biilow, Eichhorn and von Motz carried through the liberal trade policy embodied in the Zollverein of 1818-67. Every important Euro¬ pean state was affected to some extent by this reaction against trade restrictions and colonial expansion. But at the very time when free trade and anti-imperialism were receiving the largest degree of practical application great historic changes were beginning to work out their effects in a manner designed to wreck the program of the economic liberals. Nationalism, intensified by the French Revolution and sub¬ sequent political events, made for the defeat of cosmopolitanism, while the increased produc¬ tivity made possible by the Industrial Revolu¬ tion stimulated that search for additional mar¬ kets in backward districts which doomed the impulses supporting anti-imperialism. With the French intervention in Tunis and other north African territory and the English purchase of the Suez Canal stock, and with the reaction to¬ ward higher tariff schedules which was initi¬ ated by the German act of 1879 the day of eco¬ nomic liberalism was over and there began that commercial warfare and that struggle for colo¬ nial dominion which, with other co-operative forces, led straight to the European

War of 1914. See Free Trade; Great Britain — ‘The Free Trade Movement; Imperialism.

V. The Rise and Development of the New National Imperialism since 1870. 1. The

Historical Background. — One of the most strik¬ ing phases of the modern dynamic age has been the rise of the new national imperialism since 1870. By this is meant the development of European or American control over the ter¬ ritory or the resources of the less highly devel¬ oped or the less powerful peoples outside of Europe and the United States, accomplished usually with the sanction or the armed inter¬ vention of the states of which the traders were citizens. As a movement this has varied greatly, extending all the way from simply a dominating control over the commerce of a given area to complete political absorption. Perhaps the most conspicuous phase of modern imperialism has been the great swiftness of this European expansion and occupation. More ter¬ ritory has been actually procured for European occupation of one sort or another within 40 years than was occupied in the three centuries of the old colonial movement. In 1800 about four-fifths of the land area of the world had not been opened to civilized man through ex¬ ploration, and as late as 1870 more than half of the habitable surface of the earth had not been touched by Europeans. By the’ beginning of the 20th century the whole planet outside of the extreme polar regions had been traversed by the white man and its resources and potentialities for exploitation had been catalogued. Africa had been explored and partitioned. Oceania and Australasia had been occupied, and a com¬ mercial hegemony of Europe and America had been established in Asia and Latin America. See Geographical Conquests.

The forces or causes lying back of this ex¬ pansive movement are conventionally classified as economic, political, social, religious and psychological. The economic causes of expan¬ sion grew directly out of the Industrial Revolu¬ tion. While this movement had affected Eng¬ land and France at a somewhat earlier period,

the great era of industrial development in Germany and the United States was in the years following 1860. This new industry, carried on by mechanical processes under the factory system, gave rise to an unprecedented increase in productivity and to an enormous expansion of capital available for investment. At the same time, the vast improvement in the means of land and water transportation made possible the growth of world trade on a scale which ex¬ ceeded anything before known, because of cheap transportation, the rapidity with which ship¬ ments could be made and the decreased proportion of losses in ocean shipments. All of these developments inevitably led to a scramble for foreign markets and to large scale investment of capital in overseas areas. These markets and areas for investment were sought, when possible, in colonies carved out of backward and unoccupied tracts, and, when these were not available, in seats of older civil¬ izations which had not yet passed into the mod¬ ern industrial age. Political causes cooperated with the economic in producing the new move¬ ment of expansion. The growth of modern nationalism stimulated and intensified the de¬ sire to secure and control colonial areas. Italy and Germany had just achieved national unifica¬ tion in 1870 and had developed an intense patriotic fervor which required an outlet in foreign expansion. France turned to foreign areas to secure compensation for the loss of Alsace-Lorraine. Russia, not satisfied with a vast area still awaiting exploitation and devel¬ opment, turned southward to seize more ter¬ ritory in Asia. England had long staked her future on supremacy as a commercial and col¬ onizing nation. Even the United States, before the close of the 19th century, had occupied all the available free land within its boundaries and turned to the Spanish-American area for a new region of investment and exploitation. This process naturally produced as a sort of psychic compensation the notion of the (<civilizing mis¬ sion® or the ((white man's burden,® and gave rise to sharp national jealousies over the rela¬ tive extent of external possessions. Then, there was a strong sociological motive which com¬ bined with the political impulses to favor expansion. For some set of causes not yet well understood, but which centre about modern in¬ dustrialism and the growth of medical science, the population of Europe increased from about 175,000,000 to over 450,000,000 from 1800 to 1915. This led in many countries to a real pressure of the population on the means of subsistence and emigration was stimulated, if not necessi¬ tated. It was natural that the mother country should desire to retain a political control over its emigrants and this could be achieved only when they migrated to colonies. Again, the religious motives for developing oversea areas had not declined, but had increased' instead. To the Catholic missionaries, who had never ceased activity since the

beginning of expansion, were added an ever-increasing number of Protestants. The appeal of the missionaries was further strengthened when it became possible for them to carry with them not only <(the word which maketh wise unto salvation,® but also modern industrial arts and the blessings of sanitary and medical science. Finally, psychological im¬ pulses have served to extend the interests of Europe overseas. The love of adventure has

operated as ever, and the compelling power of scientific curiosity has not abated. Again, the social prestige usually attached to colonial serv¬ ice has acted as an incentive to the movement. Further, the various psychological aspects of modern aggressive nationalism have been util¬ ized in the propaganda of skilful and unscru¬ pulous imperialists to effect a popular espousal of their program.

The newer movement of expansion has been national rather than one of persons or privi¬ leged companies, and its chief field of operation has been the eastern hemisphere, rather than the western, as was the case with the earlier period of exploration and colonization. Africa, Oceania and Australasia have been forcibly colonized, while economic exploitation has been vigorously cultivated in Asia. This statement does not, however, ignore the extensive com¬ mercial exploitation of Latin America by Euro¬ pean nations and the United States. The significance of this more recent period of ex¬ pansion has been vividly described by Professor Shotwell : (<Conquistadors, clad in khaki or glittering in helmetted display, have proclaimed to most of the savages of the globe that they belong henceforth to European nations. On the wharves of London there are goods from Ger¬ man workshops for the merchant adventurers of today to carry off to Bantus or Negritos. Piles of coal from Cardiff lie inside the coral reefs of Australasian islands, for the ships which come to break the silence of farther Hebrides than Wordsworth dreamed of. But for the historian there is more significance than romance in such events. The men whom Joseph Conrad and Kipling describe are responsible for the trans¬ formation of Africa and Asia. And that trans¬ formation in its turn is mainly responsible for those policies of imperial expansion, of com¬ mercial and colonial rivalries which underlie the causes of the present war.® The effects of the new imperialism upon the political and diplo¬ matic events and tendencies of the last half century in Europe have been most profound. Scarcely a dominating alliance or an armed conflict has existed which has not been more or less directly a result of overseas policies and ambitions, while these policies have very fre¬ quently even determined the characteristics and trends of

domestic politics, as well as the des¬ tinies and careers of statesmen.

While it cannot be doubted that much of the older policy of thorough-going exploitation has been carried over into the new imperialistic movement since 1870, it is certain that a some¬ what higher moral level has prevailed in the activities of the colonizers. There has been at least some rhetorical, though often hypocritical, recognition of a moral obligation in the <(white man's burden® and of the duty of elevating the cultural standards of the natives. There can be no question that even Karl Peters and the agents of Leopold of Belgium treated the natives of Africa with a greater degree of fair¬ ness and honesty than can be discerned in the relations of the Puritans of New England with the Indians of the district. See History, Mod¬ ern ; Industrial Revolution; Nationalism; Population, Growth of ; Missions.

2. The Rediscovery and Partition of Africa. The Explorations. — Africa has during historic times presented great ethnographic contrasts,- her inhabitants varying all the way from what

ethnologists now believe to have been the origi¬ nal North African ancestors of the white race to the pygmy Negrilloes of the equatorial forests The cultural contrasts have not been less marked. At least three times in historic eras, in ancient Egypt, in the Alexandrian Age, and during the Saracen hegemony in the Middle Ages, northern Africa was the seat of the most advanced type of human culture, while the dis¬ tricts south were at all times inhabited by some of the most backward of savages. Down to 1870 Europeans had made little progress in the way of opening up the African continent. The Arabs had pushed southward along the coas* carrying with them the propaganda of Islam and developing the deplorable slave trade. In the middle of the 15th century the Portuguese began their explorations which were to carry them around the Cape of Good Hope to India. In the 1 7th century the Dutch tended to displace the Portuguese, and after 1795 the English began to make inroads upon the Dutch settle¬ ments. Despite some scattered trading posts the French made no permanent conquests of importance until the acquisition of Algeria fol¬ lowing

1830. Spain possessed a few trading posts of little consequence, and Prussia in 1720 abandoned the settlement made on the coast of Guinea iby the Great Elector in 1681. Yet all of these advances, significant as they were, had failed to penetrate more than a narrow and incomplete fringe around the western and south¬ ern portion of the continent. But on the eve of the new imperialistic developments following the “70’s® scientific curiosity, religious propa¬ ganda, and journalistic enterprise were leading men to carry on those epoch-making explora¬ tions which revealed to enthusiastic European and American capitalists the economic and com¬ mercial potentialities of the “Dark Continent.® This process of exploration has been clearly summarized by Professor Harris: “Fortunately, at the time when the European states began to think seriously of colonial expansion, the inter¬ est of Europe in the Dark Continent, as a field for commercial and economic activity, was aroused to a degree never before known. Con¬ siderable information existed concerning certain portions of Africa and its general contour, for, in the 40 years prior to 1870, a large part of the continent had been explored; but few persons, except scholars and geographers, had taken particular notice of it. Before 1880, indeed, Mungo Park, Major Laing and M. Caille had gone from the west coast up the Gambia and Senegal rivers, found the upper waters of the Niger and Timbuctu and crossed the Sahara to Tangier and Tripoli, while Clapperton and Denham were exploring the Central Sudan from Lake Chad to the Niger River, and the brothers Lander down that stream to its mouth. Dr. Henry Barth spent the years 1850 to 1855 in the scientific study of the language, peoples and geography of the region just mentioned (west of Lake Chad) including the kingdom of Sokoto. Farther south, on the east coast, Paul du Chaillu traveled over the Gaboon River district between 1856 and 1868; and, in the interior, David Livingstone explored the Zam¬ besi River, the region about Lakes Nyasa and Tanganyika, and crossed the continent to Ben-guella during the 18 years following 1851. Meanwhile, Burton, Speke and Grant, coming up from the east coast, had discovered Lake

Victoria Nyanza and the headwaters of the Nile; and Sir Samuel Baker, traversing the whole of that river from the north to the south, found its other source in Albert Nyanza. But it was the work of Dr. Nachtigal, who in 1869 to 1871 studied carefully the eastern Sahara and Sudan ; of Cameron, who crossed the whole continent from the Zanzibar Coast to Ben-guella between 1873 and 1875 ; of Savorgnan de Brazza, who explored scientifically the whole region between Libreville on the Gaboon and the north banks of the Kongo and Ubangi rivers from 1874 to 1884; and of Henry M. Stanley, who found

Livingstone in 1873, that drew the attention of the general public to Africa. Books were written, money raised, and colonial so¬ cieties formed with the purpose of inducing people to study African conditions' and to start colonies. By the time Stanley returned from his second journey in 1877, with the news of the discovery of the great Kongo River and its tributaries, the statesmen and the intelligent public of Europe were taking a very considerable interest in African affairs. The general topog¬ raphy of the continent had been mapped, — in outline, at least, — the location <of all the im¬ portant lakes and waterways pointed out, and the possibilities of the different sections as sources of wealth and trade for Europe as¬ certained with a fair degree of accuracy.® See Africa.

About a decade after most of the great African discoveries had been concluded the diplomatic and legal basis for the partition was arranged by the Berlin Conference of December 1884 to February 1885. The slave trade was branded as illegal ; formal notice was ordered given of all protectorates assumed; it was de¬ clared that no ' terrritory should be annexed which was not "effectively occupied®; freedom was prescribed for all nations in the navigation of the Kongo and Niger rivers; and provision was made for general freedom of trade in the Kongo Basin. No systematic provision, how¬ ever, was made for carrying out the "white man's burden® of advancing the cultural and moral status of the natives.

Leopold of Belgium and the Episode of the Kongo Free State. — The first notable apostle of modern capitalistic imperialism to Africa was none other than King Leopold II of Bel¬ gium. His interest was aroused by Stanley's first report of his African explorations in 1876. Under Leopold's leadership an "International Association for the Exploration and Coloniza¬ tion of Africa® was formed in the autumn of 1876. Two years later Stanley returned from a second exploring tour and conveyed to Leo¬ pold's agents an account of the natural re¬ sources of the Kongo district in rubber, palm products, ivory and various tropical woods, gums and fibres. Stimulated by this informa¬ tion Leopold developed through the Belgian branch of the International Association the "Committee for the Study and Investigation of the Upper Kongo® (1878), which employed Stanley for the next few years in making a de¬ tailed geographic and economic survey of the Kongo district. In the meantime, Leopold car¬ ried along his plans to obtain full political and economic control of this region. In 1882 he organized the "International Association of the Kongo,® with himself as president. Between April 1884 and February 1885, in part by

intrigue at the Berlin Conference of 1884—85, he secured from the great powers the recognition of the International Association of the Kongo as an independent sovereign state, and in April 1885 he realized his full ambition by trans¬ forming it into the ((Kongo Free State" with himself as its king. It should be kept in mind that Leopold was not the sovereign of the Kongo Free State in virtue of his position as king of Belgium, but that the African district was his own private possession. While Leopold per¬ sistently maintained that his enterprise was founded primarily upon the desire to bring to the natives of the Kongo district the blessings of Christian civilization, his actual administra¬ tion, especially in its economic phase of forced labor, was one of the most notorious examples of cruel and extortionate exploitation of a backward people of which modern history bears any record. Protests, begun by mis¬ sionaries who were greatly handicapped by the difficulty of spreading the gospel in the face of the concrete demonstration of the methods of the (<most Christian King," were taken up by leading nations who were motivated in part by humanitarian considerations and in part by commercial jealousy of Leopold's financial profits from his African patrimony. Revela¬ tions of extreme cruelty, made by English in¬ vestigators in 1902 and 1904, were confirmed by an international commission in 1905, and the strength of indignant public opinion in Europe and America, including liberal Belgian, opinion, forced Leopold to surrender the Kongo Free State to the Belgian government in 1908, in re¬ turn for an ample indemnity. Since the estab¬ lishment of Belgian control, not only has the political administration been greatly improved and liberalized, but also the commercial import¬ ance of the district has been greatly increased under more generous concessions to merchants and capitalists from Belgium and other states. See African International Association ; Kongo.

German Colonial Enterprise in Africa. — For a number of historical reasons Germany was extremely tardy in her entry into the colo¬ nial movement. Though the Great Elector had begun a policy of colonial expansion and naval development in the latter half of the 17th cen¬

tury, the agrarian fixation of the Prussian Junkerdom had led his successors to abandon these beginnings. The persistence of the mediaeval empire, the lack of national unification until 1870, and the absence of significant in¬ dustrial and commercial expansion down to the <(70's" had served to prevent Germany from being a contender in the old colonial movement. Even as late as 1870 Bismarck had opposed overseas expansion and had declared that he would not accept the entire French colonial em¬ pire as a gift. But forces were at work in Ger¬ many which made Bismarck's opposition inef¬ fective and which produced one of the most en¬ thusiastic and aggressive policies of colonial expansion witnessed in modern times. The un¬ precedented industrial development during the decade following 1870 and the exuberant patriot¬ ism produced by the process of unification cre¬ ated an overwhelming desire for world mar¬ kets and a prominent colonial dominion. This movement was initiated by private merchants and capitalists, but at a slightly later period they won over the government to that coopera¬

tion in building up German commercial expan¬ sion which resulted in the phenomenal success of German officials and merchants in securing a great proportion of the trade of the world and in erecting a very respectable colonial empire. While German missionaries had explored the southwestern coast of Africa in the middle of the 19th century and German steamship com¬ panies had begun a desultory trade along the coast shortly afterward, the real awakening of German interest in imperialism came about in 1878, when the German branch of the Interna¬ tional African Association was established. In 1882 a society for the development of Weltpolitik was founded as the German Colonial Union, and two years later several mercantile marine companies and colonial societies openly sponsored a program of commercial and colonial expansion. Within two years after 1884 Ger¬ many had acquired what was substantially the basis of her African domains. In each case the territory was acquired by government explorers or by representatives of private commercial or colonial societies, and then Bismarck was won over to annexation through the pressure of na¬ tional pride or foreign opposition. Dr. Gustav Nachtigal, the noted explorer, negotiated for the possession of Kamerun and Togoland in 1884 and both were taken over as a German protec¬ torate in 1884. F. A. E. von Liideritz, a Bremen merchant, in the summer -of 1883 pur¬ chased what became German Southwest Africa when it was taken over by the German govern¬ ment in the next year. Karl Peters, one of the most blatant of Pan-Germans and a representa¬ tive of the German Colonial Society,

acquired German East Africa in 1884, and his activity was approved and confirmed by the govern¬ ment in 1885. This German territory in Africa, totaling slightly over 1,000,000 square miles, was later defined in its boundaries and somewhat extended in the Anglo-German agreement of July 1890 and the Franco-German arrangement of November 1911 respectively. In a financial sense the German colonies have not been a profitable investment, though Kamerun and East Africa gave promise of developing into fruitful areas for economic exploitation. The general nature of the German colonial adminis¬ tration in Africa may best be described by di¬ viding it into two periods, that before and that after the reconstruction of the administrative system in 1906-07. In the earlier period the ad¬ ministration was under the control of chartered companies, not unlike the famous British East India Company. A policy of ruthless exploita¬ tion, more perfect in its refinement of cruelty than that of Leopold in the Kongo district, was followed during this period, but in the same way that the Sepoy mutiny of 1857 led Great Brit¬ ain to transfer India to the Crown, so the frightful Herero wars of 1903-06 and the mas¬ sacre of the natives in East Africa in 1905 forced the German government to undertake a sweeping reorganization of their colonial policy and administration. A colonial office was estab¬ lished in 1906 and Dr. Bernhard Dernberg took charge as colonial secretary in the fol¬ lowing year. After 1907 the oppressive meth¬ ods were abandoned and a systematic attempt made to introduce the essentials of Western civilization into these colonies, including trans¬ portation systems, scientific forestry work, san¬ itary science and some degree of elementary

education. It must frankly be admitted that no other country has governed its African colonies of the same level of culture in a more efficient and enlightened manner than Germany since 1907, and the deprivation of Germany of her African possessions by the Peace Conference was one of the least justifiable acts of that body and perhaps the best proof that colonial booty, as well as the safety of the democratic principle in the world, weighed heavily upon the attention of the Allied powers. See Germany — Ger¬ many and the War. _

Great Britain and the Boers in South Africa. — The original white population of South Africa was a colony of Dutch farmers, called Boers (from the Dutch term for peasant), who settled at Cape Colony in the latter part of the 17th century. The region was permanently oc¬

cupied by the British in 1806. On account of re¬ ligious and linguistic differences, the extension of political equality to the native blacks, and, above all, the arming of the natives, the Boers found existence under British domination in¬ tolerable, and in 1836 under the leadership of Peter Retief they began their C(Great Trek" across the Orange and Vaal rivers toward Natal, where they established a Boer republic in 1838. After some vicissitudes respecting political in¬ dependence two Boer republics, the Transvaal and Orange Free State, had emerged by 1854. Nothing of consequence happened in South African politics from 1854 to 1877, when Dis¬ raeli, in the first enthusiasm of the new British imperialism, annexed the Transvaal. This led to the first Boer War of 1881 which ended in the complete defeat of an insignificant British force at Majuba Hill in 1881. This victory, combined with Gladstone's grant of independ¬ ence, produced a great inflation of Boer na¬ tional pride and did much to create that inflex¬ ible Boer stubbornness which furnished the chief pretext for British intervention in 1899. The significant background of the Boer War was provided through the great influx of for¬ eigners following the discovery of the rich gold and diamond mines in the Boer republics in the «S0'sA By 1896 these foreigners or aUitland-ers)} had come to own two-thirds of the land and about 90 per cent of the personal property in this region, and paid about 95 per cent of the taxes. In. spite of this they were excluded from political rights and subjected to extortionate taxes and irritating economic restrictions. De¬ spairing of their efforts to secure enfranchise¬ ment by legal means some of the more daring Uitlanders, encouraged by Cecil Rhodes and led by Dr. Leander S. Jameson, attempted in an ill-starred raid to overthrow the Boer government and supplant it by Uitlander control. While this wild escapade failed miserably, it had con¬ sequences of the utmost importance for South African history. The Boers grew more sus¬ picious and intolerant, and the Uitlanders came to put their trust more and more in the hope of British intervention in their behalf. Matters were; still further complicated by the German kaiser's ill-considered congratulatory telegram to President Kruger following the capture of Jameson, which did much to create greater ten¬ sion between Germany and England. In Mai ch of 1899 the Uitlanders appealed to Great Brit¬ ain for relief, and the British commissioner, Sir Alfred Milner, advised intervention. When it was too late Kruger agreed to the long-EUROPEAN CIVILIZATION

sought reforms, but Great Britain had then re¬ solved upon war. To crush the Boers Great Britain was compelled to put more soldiers in the field than ever before in her history and the war was the most expensive she had ever undertaken, with the sole exception of the se¬

ries of conflicts in the Napoleonic period. Her action was bitterly opposed at home by liberal statesmen like Lloyd George and by progressive publicists like J. A. Hobson. The triumph of the British Liberal party in 1905, however, brought into power the group that had opposed the war, and a liberal policy of conciliation was immediately adopted. A constitutional conven¬ tion for South Africa was held from October 1908 to Tune 1909. It drew up a constitution for the Union of South Africa, which was ap¬ proved by Great Britain on 20 Sept. 1909, and the Union — a new self-governing colony — wa $ thereby created out of Cape Colony, Na¬ tal, Orange Free State and the Transvaal. While the Boers have dominated the govern¬ ment, their interests have been in the hands of moderate and statesmanlike leaders, most no¬ tably Gens. Louis Botha and Johannes Smuts, who have recognized that the future prosperity and peace of the Boer people depend upon an avoidance of the narrow intolerance of the Kruger regime. Their loyalty was vindicated when in the autumn of 1914 they speedily re¬ pressed a nationalist revolt, encouraged by the German emperor and led by Hertzog, Beyers, De Wet, Maritz and other irreconcilables. Botha and Smuts participated with credit in the conquest of the German colonies in Africa and General Smuts was generally recognized as easily the ablest and most far-sighted repre¬ sentative of the Allied powers at the Peace Conference. The economic prosperity of South Africa still rests chiefly upon the gold and dia¬ mond products, though livestock and wˆool have become prominent products in recent years and some considerable development of manufactur¬ ing industry has taken place. Immense coal reserves exist, but iron ore is lacking. The economic expansion of the colony has been handicapped by the lack of an adequate and competent labor supply. Native labor _ has been inefficient; the introduction of Chinese labor proved an unsuccessful experiment in 1904-05; and the importation of labor from In¬ dia Which followed was abandoned in 1911. See Boers; Great Britain — Foreign Policy in Africa and America.

Great Britain in Egypt and the Sudan. the interest of modern Europe in Egypt was first stirred by Niapoleon's romantic campaign there in 1798. French interest survived during the first half of the 19th century, and in 1869 a French engineer, Ferdinand de Lesseps, com¬ pleted the Suez Canal. Great Britain turned her attention to Egypt folffiwing the explora¬ tions of Baker and others in the ˆ60's.® She had particular reasons for desiring a dominat¬ ing control over the Suez Canal. In addition to the general commercial advantages to be de¬ rived from its control, it provided the shortest water-route to India and Australasia, and Great Britain could scarcely regard with

com¬ placency the spectacle of a rival in possession of so vital a point for British imperial communica¬ tion. A fortunate combination of circumstances — the French defeat and indemnity of 1870 and the contemporaneous bankruptcy of the khedive

— made it possible in 1875 for Disraeli to pur¬ chase some 177,000 shares of canal stock from the khedive for £4,000,000 ($20,000,000) after France had refused the offer. The reckless financial operations of the khedive led to the establishment of a dual control over Egyptian finances by Great Britain and France in 1877. Some five years later an Egyptian nationalist revolt broke out, led by native officers who were restive under the domination of foreigners. France was prevented from intervening to sup¬ press the revolt by the opposition of Clemen-ceau and other radical anti-imperialists, and Great Britain had to crush the revolt unaided in the summer of 1882. The result was to exclude France from a parity in the control of Egypt and to make Egypt practically an English pro¬ tectorate, although this relationship was not formally proclaimed until 18 Dec. 1914, and Egypt was controlled during this period by a British ˆfinancial adviser® (Lord Cromer, 1883 — 1907; Eldon Gorst, 1907—1 1 ; Lord Kitchener, 1911-14). The British occupation has brought great material advantages to both Egypt and Great Britain. Archaic and oppressive native customs and institutions have been uprooted ; new industrial methods have been introduced; great public works, especially irrigation projects, have been completed ; and the finances have been put on a stable and scientific basis. Great Britain has been rewarded by the possession of not only the key to the British empire, but also the basis for the development of her interests in the ((Cape-to-Cairo® project and for the ex¬ tension of her dominion in western Asia and Arabia, and by the control of the foreign trade and the valuable cotton crop of Egypt. See Egypt.

South of Egypt is the great district of the Sudan. Nominally under Egyptian control, the inefficiency of that administration enabled a group of Mohammedan fanatics under El Mahdi to secure control of

that region and to massacre the distinguished English soldier, Gen. Charles George Gordon, and his forces at Khartum in January 1885. Gladstone took no active steps to avenge the murder, but by 1896 some action was rendered necessary to protect Egypt from invasion and to safeguard the Egyp¬ tian water-supply. This task of conquering the Sudan was entrusted to Gen. Horatio Herbert Kitchener, who completed the conquest on 2 Sept. 1898 and received as his reward elevation to the peerage. The British conquest of the Sudan was followed by a diplomatic crisis of the first importance for subsequent history. At the same time that Kitchener was subduing the Sudanese a French force under Marchand was moving eastward across Africa to the sources of the Nile, and it arrived at Fashoda in the lower Sudan on 12 July 1898. Pushing south¬ ward after his victories Kitchener reached the same spot about two months later. War was imminent, but the skilful handling of the situa¬ tion by the French foreign minister, Delcasse, not only averted hostilities, but also secured a potential Anglo-French alliance which was still further strengthened in 1903-04, confirmed in 1911 and given practical demonstration in 1914.

I he World War completed the occupation of the Egyptian area by the British. Turkey's ac¬ tion in joining the Central Powers in Novem¬ ber l'H4 furnished the pretext for the British declaration of the Egyptian protectorate on 18

Dec. 1914. The seizure of German East Africa by Great Britain and the approval of this ac¬ tion by the Peace Conference gives Great Brit¬ ain unobstructed control of a broad strip of territory from Cairo to Cape Town and assures the future hegemony of Britain in African im¬ perialism. At the same time, her domination of this district probably will not remain un¬ challenged on account of the persistence of a strong Egyptian nationalist movement which is not likely to subside. See Kitchener, Horatio Herbert; Sudan.

French Imperialism in Africa. — The earliest centre of French interests in Africa was Egypt, but, as has been pointed out above, France was excluded from Egypt by British action in 1882. In the meantime, however, France had been lay¬ ing elsewhere the basis for the great French colonial dominions in Africa. Algeria was con¬ quered in the Orleanist period (1830-48). Set¬ tlements were made at Gabun following 1840 which opened the way for the colonization of French Equatorial Africa. At the same time posts were located on the Ivory and Guinea coasts which prepared the way for the French expansion

in the Senegal and Niger regions. Entry into Somaliland after 1864 put in French hands the key to the lower end of the Red Sea and to the Gulf of Aden. Tunis was made a protectorate in 1881, and Italy was thereby estranged from France and impelled to enter the Triple Alliance with Germany and Austria. By the Anglo-French agreement of 1890 French possession of the Sahara district was confirmed and a protectorate allowed over Madagascar, which was transformed into a French colony in 1896. In the early ((90's)) the French ex¬ tended their possessions in the Senegal, Niger and Kongo districts, and by the Anglo-French agreement of 1899 France acquired the cen¬ tral Sudan and was enabled thereby to connect Algeria and the Sahara with the French Kongo. In 1900 and 1902 Italy agreed to a French pro¬ tectorate over Morocco in lieu of French con¬ sent to Italian occupation of Tripoli, and in 1904 Great Britain gave her assent to the Mo¬ roccan protectorate in return for a French will¬ ingness to see a British protectorate proclaimed in Egypt, but at this juncture Germany took a hand and the dispute over Morocco threatened the peace of_ Europe for some seven years. Early in 1905 the German emperor landed at Tangier and hailed the sultan of Morocco as an independent prince, thereby ignoring or defying French interests in that country. France was not able to accept the challenge on account of Russian weakness at the time and the dispute was temporarily settled by the Algeciras Con¬ ference of 1906. But the French were unwilling to cease their political penetration and the Ger¬ man economic interests pressed their govern¬ ment for more vigorous action. A second seri¬ ous crisis arising over the action of the French and German authorities at Casablanca was set¬ tled without hostilities through referring the dispute to The Hague. A more serious crisis arose three years later when, as a counterpoise to the French occupation of Fez, a German naval force seized the port of Agadir. War was only averted by a definite statement from the Brit¬ ish foreign office that Great Britain would stand with France in the controversy. Germany backed down and agreed to the convention of November 1911, whereby she gave France a

free hand in Morocco in return for a cession of a part of the French Kongo. Accordingly, France transformed Morocco into a French pro¬ tectorate between 30 March and 28 Sept. 1912, and thereby rounded out her possession of the most of northwestern Africa. See France- — ■ French Colonies, Morocco.

Italian Imperialism in Africa. — • The Ital¬ ians, ever mindful of the classical glories of Italy, were unable to forget that northern Af¬ rica had once belonged to the Roman empire. In the very year of the occupation of Rome by Victor Emmanuel's army Italy acquired the foothold on the Red Sea which soon developed into the colony of Eritrea. In 1889 the Ital¬ ians occupied Italian Somaliland and attempted to reduce the neighboring region of Abyssinia to a protectorate. In this they were unsuccess¬ ful and a stinging defeat at the hands of Mene-lek in 1896 caused the resignation of Crispi, the leader of Italian imperialism, and forced Italy to desist from further attempts to control Abyssinia, the independence of which was guaranteed by international agreement 10 years later. Italian attention was next centred upon Tripolitania, the choicest bit of north African territory which remained after Tunis had been lost to France. Agreements of December 1900 and November 1902 secured French consent to aggressive action in this area. An ultimatum sent on 28 Sept. 1911 to the sultan of Turkey concerning reforms in Tripolitania brought on war. Superior Italian forces, together with Turkish embarrassment in the Balkan War, led to the treaty of 18 Oct. 1912, by which Italy ob¬ tained formal control of Tripolitania, or Trip¬ oli, Libya and Cyrenaica — the "gateway to the Sahara.® There is, however, some doubt as to whether the territory was worth the price paid by Italy in the expensive war of 1911-12, and Italy has not yet succeeded in reducing the natives to complete subjection.

Other African Territory. — The African ter¬ ritory which has been described above is all that has borne any great significance for world politics. A mere summary enumeration will serve to account for the remaining districts. In addition to that already enumerated Great Brit¬ ain possesses Gambia, Sierra Leone, the Gold Coast, Nigeria and Walfisch Bay in western Africa ; Bechuanaland and Rhodesia in south central Africa; and British East Africa, Uganda and British Somaliland in eastern Africa. To these areas should now be added the most of the colonial possessions of Germany before the war. Portugal retains out of her former African possessions, Guinea, Angola and Portuguese East Africa. Spain has on the western coast three small areas of domination, northern Mo¬ rocco, Rio de Oro and Rio Muni. Finally, there are the independent states of Liberia, founded in 1817 under American auspices as a colony for emancipated slaves, and Abyssinia,

a native Christian kingdom with its independence guar¬ anteed by an international agreement of 1906. Thus, from an almost untouched continent in 1870 Africa has passed into a well advanced and completely partitioned area for imperialistic ex¬ ploitation' Its great natural resources will in¬ evitably result in its ultimate development as an important economic factor in modern civiliza¬ tion, once these resources are utilized by the methods of Occidental material culture. See Africa.

3. Modern Imperialism in Western Asia. — The Berlin-Bagdad Railroad and the (< Drang nach OstenA — Among the various plans for im¬ perialistic expansion since 1870, none has been more interesting or. significant than the attempt of the German empire to gain control of the re¬ sources and means of communication in Asia Minor and Mesopotamia, generally known as the Berlin-Bagdad Railroad or the "Drang nach Os-ten® plan. There were numerous considera¬ tions which impelled Germany to undertake this program of expansion. It meant that Germany would possess the central and most direct commerical route to the Orient and India and that she would also be enabled to develop the rich natural resources of this region. It would be, further, of great strategic value, as it would give Germany a naval base on the Persian Gulf, would put her in a position to strike quickly at either India or Egypt, and wˆould make her the natural heir of British dominions in this area. The first necessary move in carrying through this project was to displace England as the traditional protector of the sultan and the Turk¬ ish domains. In 1878 Bismarck took a promi¬ nent part in the Congress of Berlin which set back the Eastern Question for 40 years and saved the Turkish empire from partial dismem¬ berment. In 1883 General von der Goltz went to Constantinople and led in the reorganization of the Turkish army according to the German model. In 1897 the emperor took Von Bieberstein out of the German administrative system and sent him as ambassador to Turkey, where, in the ensuing 15 years, he proved himself the most astute German diplomat since Bismarck. A year later the emperor himself made an ostentatious visit to Turkey, honoring the sul¬ tan and proclaiming himself upon the grave of Saladin at Damascus the (<eternal friend of the 300,000,000 Mohammedans in the world.® The friendship of the kaiser, together with the subtle diplomacy of Bieberstein, won for Ger¬ many the Turkish consent to the building of a railroad from Konia in western Asia Minor to Basra on the entry to the Persian Gulf. A very considerable volume of international op¬ position to the project developed. Russia feared German activity in the Balkans and in the Caspian and northern

Persian region; France was fearful lest this might threaten her financial and railroad interests in Syria; Eng¬ land was suspicious lest the scheme would cause the bankruptcy of Turkey and a subse¬ quent German protectorate and wTould threaten both India and Egypt, not only through a pos¬ sible direct German attack, but also through German encouragement of the dangerous na¬ tionalistic sentiment in both of these regions. Only a few Englishmen like Sir Harry H. Johnston favored the project as the least dangerous outlet for German energy. These objections were, however, in the main removed by diplomatic activity. Russia was placated after a meeting of the tsar and the kaiser in November 1910, which arranged an agreement made public on 19 Aug. 1911. French objec¬ tions did not prove serious, and a satisfactory adjustment was made with Great Britain on 29 June 1914, which safeguarded British inter¬ ests in the East and gave Germany the desired transit rights. The actual building of the rail¬ road proceeded slowly and was often inter¬ rupted by financial and diplomatic obstacles. A

German engineering company had constructed for Turkish interests a railroad from Ismidt to Angora following 1888. In 1896 a southern branch was built from Eskishehr to Konia and either a southern or a northern route was thereby made possible from Konia or Angora. Russian opposition to the northern route led to a favoring of the southern line. In 1899 the Turkish government gave Germany the desired railroad concession, which was confirmed by the sultan's Firman of 1903, establishing the Bagdad Railway Company as a Turkish cor¬ poration with a majority of German directors, and extending permission to build the railway to the Persian Gulf. The company had hoped to sell the Turkish government bonds, issued to build the railroad, to French and English, as well as German, investors, but the methods of financing the project and the German domination of the enterprise discouraged French and British investment and the project had to be halted until a sufficient sale could be effected elsewhere. This was accomplished by 1908, but the <(Young Turk Revolution® broke out in that year and caused a

cessation of the work. Arrangements for resuming the con¬ struction were made with the Turkish govern¬ ment in March 1911, and work was begun soon afterward. In the months just previous to the outbreak of the World War construction was greatly hastened and since 1914 the work has progressed very rapidly. Several great engi¬ neering feats have been accomplished, especially tunnels under the Taurus Mountains and a great bridge over the Euphrates. Over 1,100 out of 1,500 miles to Bagdad have been con¬ structed and about 165 of the remainder can be covered by water on the Tigris. The hastening of construction at and before the outbreak of the war proved of great strategic value to the Central Powers. It enabled rapid Turkish mobilization to protect Constantinople and the Caucasus district and to attack Egypt. Danger to India and Egypt compelled the undertaking of the British Mesopotamian and Western Asian expeditions that early met with disaster, but which later gained a sweeping victory under General Allenby in the autumn of 1918 and put Turkey out of the war. Whatever the specific arrangements as to mandates over this area, it seems perfectly evident from the Anglo-French agreement over Syria, announced 16 Sept. 1919, as well as from the Anglo-Persian agreement of 9 Aug. 1919, that France and Great Britain will take over the former German interests in this region. See Bagdad Railway ; Mesopotamia.

Great Britain and Russia in Western Asia. — The history of Persia in modern times has been one of the most revolting on record, the government not being one in which tyranny was tempered by assassination, but one in which tyranny reveled in assassination and massacre. It was inevitable that in such an environment industry and commerce could scarcely thrive under the control of domestic authorities and that such an internal situation would invite foreign aggression. The natural contenders for this district were Russia, working southward from European Russia and Siberia, and England slowly converging from India and Egypt. Rus¬ sian occupation of Persian territory developed after 1722, when the northern provinces were seized, and by the close of the third quarter of

the 19th century Russia had occupied all Per¬ sian territory as far south as the southern end of the Caspian Sea. British invasion began in 1856, and, while no territory was permanently occupied, Great Britain developed a firm hold upon Persian finances and commerce after her entry into these fields in 1873, 1887 and 1889. From the close of the Napoleonic wars both England and Russia were jealous contenders for the control of Persia. This colored the allied activity in the Greek War

of Independ¬ ence (1827) ; brought on a general European conflict in the Crimean War of 1854-56; pro¬ duced Disraeli's sinister interference with the treaty of San Stefano in the short-sighted re¬ adjustment at the Congress of Berlin (1878) ; and constituted the cause for Great Britain's unsavory protection of the ˆintolerable Turk.® After considerable friction, as well as the de¬ velopment of alliances between France and England, and France and Russia, the rivals finally decided to terminate their disputes by a partition of the coveted territory. This was achieved by the Anglo-Russian agreement of 31 Aug. 1907, dividing Persia into two spheres of "influence.® Northern Persia was put under Russian domination and the southern portion in control of Great Britain. An intermediate or neutral zone was created in which both powers might operate. Germany was placated in part by securing the withdrawal of Russian opposi¬ tion to the Berlin-Bagdad project, while France was sufficiently consoled by the compromise and unity thus effected between her two powerful allies. It fell upon Persia to pay the price of the realization of the "Drang-nach-Osten® plan and the consummation of the Triple Entente. While a nationalist revolution of 1908-09 endeavored to free Persia of foreign aggres¬ sion and intrigue, and an American financier, Morgan Schuster, attempted to put the Persian finances on a sound footing in 1911-12, neither was able to shake off the Anglo-Russian incubus and Persia was successfully "strangled® down to the outbreak of the World War. The only apparent result of the war upon the fate of Persia is that Great Britain has taken advantage of Russian weakness and Russian repudiation of her part in the agree¬ ment of 1907 to extend British influence over that part of Persia formerly dominated by Russia. The agreement of 9 Aug. 1919, be¬ tween England and Persia practically estab¬ lished a military and financial protectorate over Persia. See Persia; Russia; Russo-Turkish Wars; Siberia.

Russia and Great Britain came into conflict not only in Persia but in Afghanistan, imme¬ diately to the east. Russia had pushed south¬ ward and occupied western Turkestan by 1895. Nothing stood between Russia and India except the relatively small state of Afghanistan, and Great Britain, failing to capture it for herself, bent all her energies to maintaining its in¬ dependence as a buffer state between India and Russian Turkestan. An agreement of 1880 gave Great Britain control over the foreign affairs of Afghanistan, and the boundarv of this state on the north was adjusted with Russia in 1885. In 1907 a further agreement was made between Great Britain and Russia whereby the com¬ mercial equality of both states in Afghanistan was guaranteed, Great Britain was left in full control of

the foreign affairs of the district, and

the immunity of Afghanistan from annexation or occupation was safeguarded. Russian power in this region has waned since the Revolution of 1917, but the Amir has made little progress in obtaining freedom from British domination. See Afghanistan.

Britain in India. — The place of India in modern imperialism is particularly interesting on account of the complicated situation which arises from the fact that within this vast and densely populated area, imperfectly described as India, there are included not only some of the most primitive peoples now in existence, but also one of the oldest and richest of historic cultures. In the earlier part of the old colonial movement Portugal, Holland, France and Eng¬ land aspired to control parts of India, but the final rivalry for European control lay between Great Britain and France. This was decided by Clive's victory at Plassey in 1757, Coote's triumph at Wandewash in 1760, and the subse¬ quent capture of Pondicherry. By the treaty of 1763 France lost her Indian possessions, along with most of those in America. During the 19th century the British occupation of India pro¬ ceeded. The Mahratta confederacy was over¬ thrown in 1816-18; Nepal was overcome _ in 1814-18; Burma was conquered in successive portions in 1826, 1852 and 1885 ; the Sind and Punjab areas were taken over in 1843-49; Sat-tari, Jhansi, Nagpur and Oudh were annexed in 1852-56; Baluchistan was added in 1887; while Tibet was successfully ˆpenetrated® in 1904—14. The development of the administrative machin¬ ery proceeded parallel with territorial acquisi¬ tion. The corruption that had crept into the management of Indian affairs by the East India Company (founded 1600) was curtailed by the Regulating Act of 1773, which provided for Parliamentary supervision through a super¬ visory council. Eleven years later, by the Indian Act of 1784, this governmental supervision was extended through the nomination of officials for the Indian service by the ministry and by the creation of a board of control in London. This act, with minor amendments, governed Anglo-Indian relations until the Sepoy Mutiny of 1857. In

this year the native troops, alarmed by continued British aggression in India, irri¬ tated by British interference with native cus¬ toms, and enraged by the introduction of new ammunition which offended their religious prej¬ udices, arose in a rebellion which was put down only with the greatest difficulty. The mutiny was a sufficient lesson to British statesmen. They terminated the control of the East India Company in 1858 and transferred the adminis¬ tration to the Crown. A secretary of state for India was created and the local administrative control was given to a viceroy appointed by the home government. There is, of course, no uniformity in the government of India, some districts being under the direct control of British administrators, while others are ruled wholly by native princes under only the most casual British oversight, which is concerned chiefly with the prevention of rebellion. In 1877 Disraeli had Queen Victoria formally de¬ clared the empress of India. The growth of Indian nationalism in the late 19th century led to the Indian Councils Acts of 1892 and 1909, which allowed a greater degree of native representation in both central and local govern¬ ing bodies. In spite of these concessions, how¬

ever, the nationalist movement has continued to thrive, though it had not developed sufficiently to secure Indian independence during Britain's hour of weakness in the World War. The chief obstacle to the nationalist cause is the geat diversity in the population of India in race, religion and degree of civilization, which makes unified native action well-nigh impos¬ sible. While Great Britain was extremely re¬ miss in granting promotion to brave Indian soldiers in the late war, she did indicate some gratitude for Indian loyalty by allowing Indian representation in imperial conferences on some¬ thing approaching a parity with the self-gov¬ erning colonies, and by promising, and to some ex¬ tent executing, administrative reforms in India. The Amritsar massacre in the Punjab region in April 1919, where about 500 natives were killed and a much larger number injured by British troops, not only indicates the persistence of a strong nationalist feeling, but also the willing¬ ness of the British government to turn the methods of 1857 against the natives themselves in order to hold them in line with imperial policy. The chief reason for the British tenacity in maintaining control of India is the great economic advantages from this posses¬ sion. Great Britain has a nearly complete mo¬ nopoly of the vast Indian trade. Fine cloth, metal and ivory work, rice, wheat, cotton and some valuable minerals are exported from India; while Great Britain sells to India annu¬ ally about $400,000,000 worth of commodities, chiefly cotton goods and iron and steel products. The British administration has brought to India the

same material advantages that have accrued to Egypt under British domination in the way of irrigation and other engineering f-eats and the introduction of modern agricultural and in¬ dustrial methods and sanitary science. See Great Britain — Foreign Policy in India; India.

4. Modern Imperialism in the Far East — The Western Intrusion in China. — ‘Of all the devel¬ opments in modern imperialism that which will probably possess the greatest significance for the future of world history is the establishment of contact between western civilization and the Chinese Empire. The authentic history of China goes back to some 2,500 years b.c., but the dynasty which alone has any significance for the modern history of China dates from 1644, when, after a war of some 27 years, the Tatar Manchus from the north overthrew the native Ming dynasty and established the foreign domination which lasted until the resignation of the youthful emperor, Pu-yi, in 1912. In a geographic and administrative sense China is divided into southeastern China, or China proper, and a number of outlying dependencies of great extent and widely varied degree of population. China proper is the only part of China that has any great historic significance and is the centre of the Chinese population and historic culture. It is about 1,500,000 square miles in area, possesses a population of some¬ thing over 300,000,000, and is divided into 18 provinces or administrative districts. Surround¬ ing China proper at the opening of the 19th century were the following more or less loosely attached dependencies, Korea, Manchuria, Mon¬ golia, .Sungaria, Turkestan, Tibet, Burma and Indo-China. Though Marco Polo had visited China in the 13th century and had been followed

in the succeeding centuries by Catholic mis¬ sionaries and by Portuguese, Dutch and British traders, China remained practically sealed against European contact, except for some strictly limited commercial relations with a few ports, especially Canton. The first notable in¬ cursion of Europeans followed the deplorable Opium War of 1840-42, through which Great Britain, in the Treaty of Nanking,

forced China to open four additional important Chinese ports to European trade. The foreign ingression was continued by the War of 1856430, waged by the English and French against the Chinese and which terminated in the Treaty of Tientsin of 1860, opening six more Chinese ports to foreign trade and guaranteeing the position and safety of foreign traders and missionaries in China. Between 1853 and 1864 Great Britain aided the Manchus in putting down a native patriotic insurrection — the TaiPing Rebellion — because she believed the dynastic party likely to be most favorable to the foreign incursion. Further progress was made following the Chino-Japan- ese War of 1894-95, “when the European powers abstracted from Japan most of her territorial gains. Germany followed the lead of Great Britain and France by seizing the port of Kiao-chau in the province of Shantung in 1898 as revenge for the murder of two German Catholic missionaries, whom the kaiser sud¬ denly beheld as his ((dear brothers in Christ,® in spite of his well-known anti-Catholic prej¬ udices at home. Finally, by the joint European and American armed intervention of 1900 to suppress the Boxer revolt all barriers to west¬ ern commerce and economic penetration were removed and China was put under the com¬ mercial, and to a considerable extent the fiscal, tutelage of the western powers, being unable even to determine her own tariff schedules. At the same time that the western powers were forcing a commercial and financial entry into China they were also proceeding to encroach upon the Chinese dependencies and to wrest many of these from the empire. Japan took over the Liukiu Islands in 1874, Formosa in 1895, the Liaotung Peninsula and Port Arthur in 1905, Korea in 1910, and made considerable progress soon afterward in the penetration of Manchuria. Russia, taking a portion of Chinese Turkestan in 1881, pushed southward from Siberia, taking over Amur in 1860, and outer Mongolia in 1913. after having lost her control of Manchuria and the Liaotung Peninsula through the Russo-Japanese War of 1904-05. The British assumed control of Tibet between 1904 and 1914, after having conquered Burma in 1885. France occuoied eastern Indo-China be¬ tween 1862 and 1885. Finally, some of the most valuable Chinese ports, such as Hongkong, Port Arthur, Kiao-chau, Weihaiwei and Kwang-chow Wan were handed over to foreign powers under military pressure.

The combination of foreign commercial penetration and exploitation and the accom¬ panying territorial aggression with the humili¬ ating defeat of China by Europeanized Japan in the war of 1894—95 led the more thoughtful and progressive Chinese leaders to feel that the old order in China must be altered to allow the entry of the more advanced military and tech¬ nological methods of western civilization

if China was to be saved from ultimate partition. In 1898, accordingly, the reform party, led by

the young emperor, Kwang Hsu, introduced a sweeping set of political, economic and educa¬ tional reforms, but their beneficent program was halted for the time being, after only about 100 days of the new regime, through a reac¬ tionary coup d' etat led by the dowager em¬ press, Tzu Hsi. The success of the reaction¬ aries in 1898 led them to undertake a more am¬ bitious program, namely, the ousting of all for¬ eigners from China. This movement was led! by the Boxers, or the <(Society of the Fists of Righteous Harmony.® It was stimulated by the foreign aggression ; the commercial and finan¬ cial exploitation; the territorial seizures; the burden of unjust indemnities; the indiscretion of the missionaries in seeking high Chinese rank, in protecting the lawless elements under the cover of a <(rice conversion,® and in a bigoted interference with Chinese customs; and the loose talk of foreigners about the ultimate partition of China. This anti-foreign movement broke out in 1900, but was speedily put down by Allied military intervention. On the whole, however, it would seem that the Boxer revolt probably helped along the reform tendency by proving once more the utter helplessness of China with her antiquated technique when she was confronted with the material culture of the West. In 1905 the old competitive state exami¬ nations were abolished and the basis laid for a new compulsory public school system. In 1906 legislation was enacted looking forward to the extinction of the opium trade. In 1911 oc¬ curred the great Chinese Revolution. It broke out on 12 October, and received special support from the southern provinces. In about three months the revolution had accomplished its aims, and in February 1912 the Manchu dynasty was ended and a republic proclaimed. To give greater unity and strength to the new republic the revolutionary president, Dr. Sun Yat Sen, with a high degree of patriotic self-re¬ straint, retired from power and surrendered the presidency to the northern and more con¬ servative statesman, Yuan Shih Kai, a disciple of Li Hung Chang and next to his master the most astute of modern Chinese statesmen. The subsequent history of reform in China has cen¬ tred around the struggle between the north and south of China. The northerners, led by Yuan Shih Kai, have desired to set up a constitu¬ tional monarchy, while the more radical south¬ ern party, led by Dr. Sun Yat Sen, have pre¬ ferred a progressive republic. The southern party organized a revolt in 1913 against the con¬ servative policies and the provisional constitu¬ tion of 1913, but this was speedily suppressed and conservatism was only strengthened. En¬ couraged by his successes, Yuan Shih Kai plot¬ ted

a restoration of the empire in 1915. By carefully manipulating the press and telegraph lines Yuan made it appear that there was an overwhelming desire in China for him to re¬ store the empire and assume the imperial title. He announced his intention <(to bow before the mandate of the people® on 11 Dec. 1915, but 12 days later the radical counter-revolution broke out which soon defeated Yuan and supplanted him, after his death in June 1916, by the vice-president, Li Yuan Hung. A final effort to re¬ store the empire came in July 1917 when Gen. Chang Hsun attempted to put the baby em¬ peror, Hsuan Tung, on the throne, but this

reactionary coup was crushed in seven days.

Li Yuan Hung, refusing to resume office as president, was succeeded by Feng Kwo Chang in July . 1917, and in October 191b, Hsii Shih Chang, a northern military leader, was elected president. A civil war between northern and southern China, alleged to have been fomented in part by Japanese intrigue, has been in progress since 1917 with varied in¬ tensity and unsuccessful attempts at final ad¬ justment, but it seems likely that the common indignation of the Chinese at the treatment of China by the Peace Conference will go a long way toward healing the breach between the two districts. It appears absolutely certain that China will be successful in establishing a lib¬ eral form of government and will go through a vast economic transformation within the next half century. The great natural resources of China warrant the prediction that she is bound to become one of the first industrial states of the world as soon as she is en¬ abled to exploit these resources by more ad¬ vanced methods. What she needs above all other things is ample public revenue to finance the reform program. The World War was a severe blow to China in this respect, as it pre¬ vented the final arrangement of a large inter¬ national loan to her which was contemplated on the eve of the war. Steps are already being taken, however, by the Western powers to ar¬ range for a great post-war loan to China. See China — History.

The Awakening of Japan — European con¬ tact with Japan was first

established in the middle of the 16th century and at first the Jap¬ anese welcomed the foreign incursion, but fear¬ ing European domination they ousted the for¬ eign element in the decade following 15S7, and massacred many of the Christianized natives. From 1600 to 1853 European relations with Japan were limited to a very severely restricted trading arrangement with the Dutch. In 1853— 54 Commodore Perry, an American naval of¬ ficer, obtained certain commercial concessions for American ships, and his success prompted other nations to attempt to secure similar privileges. Native opposition soon developed. The Daimios or feudal princes opposed the policy of the Shogun in opening Japan to foi-eign interests and began an active anti-foreign campaign. As a mode of retaliation foi this attitude the American and European fleets bombarded the Japanese ports of Kagoshima and Shimonoseki in 1863 and 1864. This ac¬ tion proved, a very successful and rapid dem¬ onstration of the superiority of Occidental ma¬ terial culture, and the daimios, like the Chinese m 1900, readily perceived the necessity of adopt¬ ing the Western technology as a protective measure if they desired to preserve the inde¬ pendent existence of Japan. From 1867 to 1871 a political revolution occurred which ended the shogunate, revived the imperial power, abolished feudalism, carried through sweeping legal and administrative reforms, and established a new national army drilled and equipped according to Western standards. These reforms were syste¬ matized in a new constitution drawn up and ac¬ cepted in 1889. A patriotic national religion was secured through the revival and stiengthening o Shintoism, and a deliberate and systematic intro¬ duction of the European and American indus¬

trial technology was provided. As a result Japan has advanced in less than a half-cen¬ tury from a feudal regime with an archaic in¬ dustrial and military technique to a modern in¬ dustrial nation and a first-class military state. But, as in the case of modern Germany, the rapid technological evolution of Japan has not allowed the operation of the broader cultural forces which should accompany and moderate so sweeping a technological change, and the Japanese cultural complex has retained a large number of anachronisms which help to make Japan under the present dominating classes a dangerous and aggressive state, dhe growth of capitalism, as elsewhere, has produced a tendency toward imperialism and territorial ex¬ pansion, which in the case of Japan has been greatly hastened and intensified by the dynamic power of a fanatically patriotic religion. In this process of imperialistic expansion it was natural that Japan should turn to the adjoin¬ ing islands and to the neighboring coast of eastern Asia. The

Liukiu Islands were secured from China in 1874; Formosa was retained from the spoil of the Chino-Japanese War of 1894-95; as a result of the Russo-Japanese War of 1904-05 the Liaotung Peninsula and Port Arthur, as well as southern Sakhalin, were ob¬ tained, and Korea and Manchuria were freed from Russian domination; in 1910 Korea was annexed and a political and economic penetra¬ tion of Manchuria begun ; as a result of minor and ineffective participation in the World War, Japan was awarded the German possessions in the Shantung Peninsula, with some political reservations, and the German island possessions in the Pacific ‘ north of the equator, including the Caroline, Pelew, Marianne and Marshall islands. During the war period the notorious «21 (later 24) demands® of Japan upon China were successfully negotiated and forced by japan from 18 Tan. to 9 May 1915, and also the deplorable Lansing-Ishii Agreement of 2 Nov. 1917, by which the United States, while for¬ mally proclaiming that it recognized and con¬ tinued the policy of an wOpen Door® for China, actually gave up that position and conceded to Japan special interests in China and contiguous Asiatic territory, thereby confirming in practice Japan’s claim’ to a Japanese Monroe Doctrine for China if not for the entire Far East. The «21 demands® are worthy of at least a brief summary and classification. They were divided into some five general groups. Group one re¬ quired the cession to Japan of the former German interests in the Shantung Peninsula, with some significant extensions of the German concessions. Group two called for a recognition of the special position of Japan in southern Manchuria and Inner Mongolia, with respect to economic and political influence and activity. Group three aimed to give Japan control over the Chinese Hanyehping Company, in other words, over the key to the iron and steel indus¬ try and the coal mines of China, with power also to exclude other nations from threatening Japanese domination. Group four was designed to give Japan power to dominate future con¬ cessions of Chinese territory by requiring China ((not to cede or lease to any third power any harbor or bay or island along the Chinese coast.® Most significant of all was the fifth group, ac¬ cording to which (< China was to employ Japanese

advisers in political, financial and military affairs; to admit Japanese to joint participation in the policing of ˆimportant places* ; to pur¬ chase from Japan (say fifty per cent, or more) of her munitions of war, or allow the estab¬ lishing of an arsenal in China under Japanese supervision; to grant Japan the right to con¬ struct important designated railway lines in the \angtse Valley; to specify that Japanese might carry on missionary propaganda and own lands for hospitals, churches and schools in the in¬ terior; and to give Japan first option for the furnishing of capital for developments, in¬ cluding dock yards,* in the Fukien Province.® It will readily be seen that these practically abro¬ gated the sovereignty of China in both foreign relations and domestic affairs, and that as long as they are recognized they must inevitably prove a stumbling block to all liberal foreign relations in the Far East. As a result of the war Japan has also advanced to a position of first-rate importance in the world's ship¬ ping. While there is little doubt that Japan is likely to prove the most aggressive and intractable modern state in imperialistic expansion, there can be no question that the western nations must refrain from a ((holier than thou® attitude in the premises, for Japan received her first lessons in Weltpolitik and Machtpolitik from the nations of Europe, from the time of the bombardments of 1863-64 to the despoiling of Japan by the European powers after the Chino-Japanese War of 1894-95. Nor has the conduct of the European powers in world politics generally been of the sort to convince Japan that they were all inspired by the golden rule, any more than' their redistri¬ bution of German colonial possessions and commercial interests in Africa and western Asia would be likely to make Japan hesitant in demanding the German possessions in the Far East. Probably the most promising aspect of the Japanese question in Weltpolitik is the existence of a growing liberal party in Japan which is likely to come into power and to re¬ pudiate the aggressive policy now being pursued. See Japan — History, 1889-1919; Japan — Russo-Japanese War.

The Philippine Islands and American Inter¬ ests in the Far East. — The occupation of the Philippine Islands by the United States was •but an incident in the beginnings of the overseas expansion of this most powerful of American republics. Mr. Bryan and others were greatly stirred in 1898 by what they regarded as a new and doubtful venture in American policy, but in reality the conquest of the Philippines was a new policy only in the matter of geographic location and not from the standpoint of a social or political process. If by imperialism is meant the occupation and exploitation of virgin soil previously possessed by a more primitive people, no nation has been more persistently imperial¬ istic than the United States. Like Russia, the

United States was long able to expand through the seizure of contiguous territory, and the his¬ tory of the United States since 1789 can only be properly comprehended when interpreted as a process of continuous westward expansion. The 19th century witnessed the occupation of the central portion of the American continent from ocean to ocean, but the passing of the frontier in 1890 produced the necessity of dis¬

covering a field for expansion and investment elsewhere than within the boundaries of the United States. The dispute with Spain over Cuba proved but a welcome pretext and a moral issue which allowed the formal and systematic initiation of a process which had been long in preparation. While the West Indies and the region of Central America and Mexico have been far more important in the commercial phases of the imperialism of the United States than the Philippine Islands, the latter constitute the best example of a systematic attempt at colonial administration by the United States.

The original population of the Philippines was probably a primitive pygmy negro stock, to which were added by migration Malayans, Chi¬ nese and Arabs. The Philippines were first discovered by Europeans in 1521 when Ma¬ gellan's fleet reached this region. The actual conquest by the Spanish was carried on from 1565 to 1571 under the leadership of Miguel Lopez de Legazpi. The conquest was most superficial, Luzon being the only island which was subjected to any considerable degree. From this time until 1898 the Philippines were con¬ trolled by Spain, save only for the period of 1762-63, when Manila was occupied by the Brit¬ ish. They were governed as a subdivision of the larger administrative unit of Mexico. The con¬ dition of the Philippines under Spanish rule was one of almost unrelieved stagnation and corruption. The political administration was generally corrupt and extravagant and the occasional honest and competent administrator met a fatal opposition from the <(vested inter¬ ests.® The economic and commercial life of the islands was paralyzed under the restrictions im¬ posed by the severe mercantilistic policy of the mother country. Finally, the Catholic friars secured control of much of the best land, es¬ pecially in Luzon, intimidated the civil govern¬ ment, and secured much immunity from the civil law. So onerous did the clerical domina¬ tion become that several reform movements de¬ veloped, the last of which had proved successful on the eve of the American occupation. The military events connected with the American conquest of the Philippines are well known. Dewey crushed the Spanish opposition on the sea by his brilliant victory of 1 May 1898,

and the land forces of the Spanish were soon over¬ powered by General Merritt. By the treaty of 10 Dec. 1898, Spain agreed to cede the Philippine Islands to the United States in lieu of a pay¬ ment of $20,000,000 and the guaranty of free entry of Spanish ships into Philippine ports for a period of 10 years. In spite of violent oppo¬ sition from the ˆanti-imperialists,® the United States government decided to accept the re¬ sponsibility for (<civilizing® the inhabitants of the new island possessions. A preliminary Philippine Commission, headed by President Schurman of Cornell University, went to the Philippines in 1899 and gathered information essential to the establishment of a civil gov¬ ernment. A more permanent administrative commission with Judge W. H. Taft at its head was sent to the Philippines in 1900. Be¬ fore his retirement three years later Mr. Taft had by his constructive administrative ability won that admiration by President Roosevelt which later secured for him the presidency of the United States. A civil, government was

established in July 1901, with the commissioners at its head. Native Filipino members were later added to the commission. The notable Philip¬ pine Act of 1 July 1902, made the civil govern¬ ment permanent and provided the governmental arrangement which, with some modifications, prevailed down to the Jones Act of 1916. Pur¬ suant to the policy of the act of 1902 a census was completed in 1905, and an election held tor a native assembly in 1907. From 1907 to 1916 the commission acted as the upper house of the legislature, though after 1913 more Filipinos were added to the commission. In August 1916, the Jones Act which provides the present constitutional basis of the Philippine govern¬ ment, ordered the establishment of a native senate as well as a native house of representa¬ tives. The chief executive remains the gov¬ ernor-general appointed by the President of the United States. The judiciary was estab¬ lished in 1901, and has from the beginning been made up of a majority of Filipinos. The Democratic administration has been especi¬ ally favorable to an early acquiescence in grant¬ ing the Filipino request for complete inde¬ pendence, but even a Democratic Congress could not be induced in 1916 to commit itself to any definite date at which independence might be expected. It is extremely doubtful if com¬ plete autonomy will be granted as long as there is urgent need for checkmating Japanese aggression in the Orient, for the United States could not

afford to retire from so advan¬ tageous a position or risk the possibility of being superseded by Japan as the possessor of the Philippines. While there is a warm senti¬ ment for independence in the native popula¬ tion, there can be no doubt that the American administration has in 20 years accomplished great results in the way of improving the ma¬ terial culture of the Filipinos, in fact here rivaling the achievements of the British in Egypt. The oppression and corruption were speedily wiped out ; sanitary conditions have been greatly improved; the currency has been standardized ; great public works have been completed; means of communication and trans¬ portation have been improved and widely ex¬ tended, railroads having been introduced; the educational work with the natives has. been one of the most creditable of the administrative achievements, school facilities having been ex¬ tended to over half of the population; industry and commerce have been fostered and greatly increased; and, finally, the juridical and penal institutions have been revolutionized, the Bill-bid prison at Manila and the Iwahig penal colony on the island of Palawan constituting probably the most advanced and successful penal system now in existence anywhere. The products of the Philippines are principally agricultural, being in order of importance, corn, rice, manila hemp, cocoanuts, sugar and to¬ bacco. The rice and corn are, however, raised almost entirely for home consumption. Little manufacturing industry exists, though there has been a considerable development of saw¬ mills and cocoanut-oil factories. At the pres¬ ent time the commerce of the islands is con¬ trolled by the United States which ships to the Philippines more goods than all other coun¬ tries combined and buys from the Philippines about twice as much as all other coun-

tries. While this domination has been ab¬ normally increased by war conditions, it seems that the United States has arrived at a state of effective preponderance in Philippine com¬ mercial relations and that in this case, at least, ’(<trade has followed the flag.ˆ It is further probable that there is nothing subtle in the assertion that this state of affairs is not at all conducive to the hastening of the relaxation of the political grip of the United States on the Philippines. See Philippine Islands.

Oceania and Australasia. — One of the areas of so-called backward races which has been most thoroughly appropriated by western im¬ perialistic nations is that which includes the islands, greatly varying in size and importance, which are situated south and east of Asia. These are usually divided into two major divisions, Oceania and Australasia. The former is further subdivided into Malaysia, Polynesia, Micronesia and Melanesia, while theˆ latter is composed of Australia, Tasmania,

New Zea¬ land and the lesser adjacent islands. Malaysia, sometimes known as the East Indies or the Malay Archipelago, is made up of the islands lying immediately to the southeast of Asia, the most important of which are Sumatra, Java, Borneo, Celebes, New Guinea, and Luzon and Mindanao of the Philippine group. The great majority of these belong to the Dutch, the - only exceptions being the Philippines; eastern Timor, belonging to Portugal; the British possessions of Singapore and parts of Borneo and New Guinea; and the former German colony in northeastern New Guinea, known as Kaiser Wilhelmsland. Polynesia comprises the great majority of the islands of the western and mid-Pacific area, including the Fanning, Ellice, Tokelau, Tonga, ICermadec and Cook islands, belonging to Great Britain; the Samoan Islands formerly belonging, with the exception of an American naval base, to Ger¬ many; the Austral, Society, Tuamotu and Mar¬ quesas islands possessed by France; and the Hawaiian Islands, a territory of the United States. Micronesia consists of the Marianne, Pelew, Caroline and Marshall islands, formerly owned by Germany; and the Gilbert Islands possessed by Great Britain. Melanesia com¬ prises the Santa Cruz, Banks, Fiji, D'Entre¬ casteaux and Louisiade islands, belonging to Great Britain; the former German colonies of the Admiralty, Bougainville and Bismarck is¬ lands of the Bismarck Archipelago ; the Solo¬ mon Islands, owned formerly by Great Britain and Germany; the French possessions of New Caledonia and the Loyalty Islands; and the New Hebrides owned jointly by France and Great Britain. The economic resources of the region known as Oceania vary greatly. The Dutch possessions in Malaysia have throughout modern times been the chief source of the world's supply of spices, and are also im¬ portant for production of tea, coffee and tropical fruits and woods. The products of the Philippines have already been mentioned. The lesser islands in some cases possess valu¬ able mineral deposits and most of them pro¬ duce the cocoanut and tropical fruits in a varying degree of profusion, but, with few exceptions, the western powers have sought dominion in these oceanic regions on account of the supposed strategic value of harbor

naval bases and coaling stations in the Pacific area. As yet the economic exploitation of much of the district has not been systematically prosecuted. While the international relations in this area have been rich in producing sig¬ nificant developments in diplomatic negotia1 tions, there have been only a few incidents worthy of specific mention. The Philippine situation has already been treated. Next to these islands the most important international controversy in Oceania arose over the Samoan Islands. From 1877 to 1889 Great Britain, Germany and the United States contested in diplomacy for these islands and an inter¬ national war would probably have been pre¬ cipitated over them had it not been for the hurricane of 16 March 1889, which destroyed the fleets of the rivals in these waters. Matters were smoothed over, and by the agreement of 2 Dec. 1899, most of the Samoan Islands were handed over to Germany, with the exception of Tutuila and some lesser islands taken by the United States. In the World War the German Samoan possessions were captured by New Zealand and given to this state by the Peace Treaty of 1919. The Hawaiian Islands, an¬ nexed by the United States in 1898, after a considerable debate, constituted the first im¬ portant Pacific extension of American im¬ perialism. The chief significance of the World War in this area was its relation to the dis¬ position of the German possessions in Oceania. In general, the German islands north of the equator were handed over as mandatories of Japan, while those south of the equator, with the exception of Samoa, were given to Aus¬ tralia. This region can never possess any great importance for the future commerce of the world, except in the case of scattered deposits of rare minerals and through providing coal¬ ing stations and drydocks, but, as the Samoan incident proved, trifling disputes over such in¬ significant islands may jeopardize the peace of the world. The chief cause for apprehension at present is the possibility of an attempt of Japan to assert her right to a hegemony of Oceania, especially if her progress in China and Siberia should be blocked. See Melanesia; Oceanica.

Australia, while discovered by Portuguese and Dutch navigators early in the 17th century, Was not extensively explored or claimed as a European possession until 1770, when Capt. James Cook sailed along a considerable por¬ tion of the coast and established the claim of Great Britain to this great continent. A use for the region was found after the American Revolution had prevented Great Britain from making the American colonies a dumping-ground for the great number of criminals pro¬ duced by her barbarously severe criminal laws. In January of 1788 the settlement of Australia was begun by the landing of nearly 1,000 criminals at Botany Bay. The Australian penal

colony was of great importance in the history of penology, as it was here in 1840 that Alex¬ ander Maconochie began his reforms which developed into the Irish system of penal ad¬ ministration under Walter Crofton and the Elmira Reformatory principle under Z. R. Brockway and others. In 1803 the settlement of Tasmania began and the resources of Aus¬ tralia were discovered by such explorers as Sturt, Hume, Stuart and others. The explora¬

tions revealed the possibility of an economic exploitation of Australia. Sheep were intro¬ duced in the first quarter of the 19th century from South Africa and Spain, and today Aus¬ tralia is much the most important area for the production of export wool in the world. Gold was discovered in 1823 and 1851, and a large immigration of gold-seekers followed. Finally, the adaptability of Australia to wheat raising attracted a large number of farmers. Those who came to Australia for economic reasons naturally opposed the further population of the region by convicts, and their protests, together with the reform of the English criminal juris¬ prudence, led to the discouragement of crimi¬ nal transportation after 1840 and to the com¬ plete termination of the practice after 1857. By 1859 some six colonies had developed in Australia and Tasmania, Niew South Wales, Victoria, Queensland, South Australia, North Australia and Tasmania. In 1852 Great Brit¬ ain permitted the Australian states to hold constitutional conventions and determine their own form of government, but the problem of the method of federal and imperial union was not settled until a half-century later. As early as 1847 it had been proposed by British statesmen that Australia have a general legis¬ lative body, but particularism, especially in re¬ gard to the tariff, prevented such a project from being immediately executed. From this time onward there were sporadic attempts to secure unity. Intercolonial conferences and conventions, at which the importance of unity was stressed, were held in 1867 at Melbourne, in 1880 at Melbourne, in 1883 at Sydney, in 1890 at Melbourne, in 1891 at Sydney, and in 1897-99 at Adelaide, Sydney and Melbourne. The conventions of 1897-99 drafted a constitu¬ tion for Australia and Tasmania which was embodied in the Australian Commonwealth Act of 1900, uniting the six colonies into a self-governing unit within the British Empire to be administered under a form of government supposed to combine the best aspects of the governments of England and the United States. New Zealand, though included in Australasia, is situated no less than 1,200 miles from eastern Australia. It was dis¬ covered by the Dutch in 1642, and the coast was explored by Captain Cook in 1769. From this time until 1839 it was nominally claimed by Great Britain, but

was not settled. In 1839 Great Britain formally assumed possession of the region. In 1853 New Zealand was given self-government, and in 1865 it was separated inˆan administrative sense from Australia. In 1876 the evils of particularism were remedied by an abolition of the local provincial councils and the establishment of a more unified system. In September 1907, it was proclaimed the “Dominion of New Zealand” and transformed into another self-governing colony of the Brit¬ ish Empire. In both divisions of Australasia advanced programs of radical democracy and social legislation have been successfully adopted, and these self-governing units of the British Empire are entitled to rank as the most pro¬ gressive of the world’s democracies. New Zealand has been most conspicuous in this progressive movement. A defeat of the labor unions in a great strike in 1890 led to vigorous political activity on the part of labor, and the radical party controlled New Zealand for

nearly a quarter of a century. It proceeded to enact laws providing for woman suffrage, pro¬ portional representation and the referendum, compulsory arbitration of labor disputes, gov¬ ernment ownership of railroads and other public service utilities, progressive land taxa¬ tion, old age pensions, workingmen’s compen¬ sation and other types of modern advanced social legislation. While Australia has not gone quite as far in this direction as New Zealand, she has adopted most of these ad¬ vanced measures of a progressive democracy, especially since the growth of the strength of the Labor Party in the 20th century. The chief industries of Australasia are the raising of sheep, horses and cattle, hardwood timber extraction, wheat cultivation, and gold mining. Manufacturing industry is now developing and the great supply of raw wool and the exist¬ ence of rich coal and iron deposits make it certain that in the future Australia will assume a leading position among the manufacturing states of the world. The commerce of Aus¬ tralasia, which in 1916 amounted to over a billion dollars, is still over 60 per cent with Great Britain and parts of the British Empire, though in recent years there has developed an ever greater tendency to trade more and more with foreign countries. Following

the lead of Canada, Australia and New Zealand have adopted the principle of imperial preference and have reduced their duties on British products brought into Australasia. Provisions for home and imperial defense have been made, Australia having adopted compulsory military service in 1909 and New Zealand in 1910, while in 1909 Australia began the construction of her very respectable navy which played an important part in the World War by clearing the Pacific of German raiders. The soldiers of Aus¬ tralia and New Zealand participated with dis¬ tinction in the war, both in the disastrous Gallipoli expedition and on the Western Front. They also conquered the German colonies in the southern Pacific. At the Peace Confer¬ ence the Australasian delegates took an aggress¬ ive part, demanding the conquered German colonies south of the equator, opposing Jap¬ anese occupation of those north, constituting the most effective obstacle to Japan's attempt ,;o secure the recognition of racial equality in immigration laws, and indicating a determina¬ tion to establish an Australasian ((Monroe Doctrine® for the southern Pacific. The vast extent and great natural resources of Aus¬ tralasia justify the opinion that it is likely to prove the seat of one of the most important and most advanced civilizations and one of the strongest political organizations of the future. See Australia — Discovery and Early His¬ tory; New Zealand.

Summary Generalization? Concerning Inter¬ national Relations in the Far East. — It may be useful at this point to summarize the present status of international relations in the Far Fast. Great Britain can be relied upon to attempt to maintain control over Tibet in order to protect India, and to stand back of Australasia in most policies _ designed to strengthen the British Empire in the Pacihc. France is likely to evince a lively interest in all negotiations affecting southern China, but if she gains a free hand in Syn-a her im¬ perialistic efforts are likely to be centred in the VOL. 29 — 35

main on Africa and western Asia. The fate of western Siberia apparently hangs on the fu¬ ture of the Russian Empire. If the latter dis¬ integrates into chaos, Japan is likely to domi¬ nate the greater part of eastern Siberia, but if a strong Russia emerges it is probable that she will retain her grip on Siberia. The future disposition of Manchuria and Mongolia is also most uncertain. At present Japan dominates Manchuria and inner Mongolia, while Russia still formally preserves her loose control over outer Mongolia. A strong and unified China may oust both Russia and Japan, but it seems more probable that a weak Russia and China will for a time be dominated by an

aggressive Japan in this region. Korea is completely con¬ trolled by Japan, but the significant develop¬ ment of the patriotic nationalist movement in Korea within recent years makes it certain that Janan will have difficulty in maintaining an iron grip on Korea. How far the <(Open Door,® or international commercial equality policy, established in March 1900 by John Hay, still prevails in China it is difficult to say. The notorious ((21 demands® made upon China by Japan in 1915 certainly compelled special concessions to Japan of a very con¬ crete and considerable nature and they were not vigorously protested by the United States. Indeed, the United States practically acquiesced in this shameful extortion by the Lansing-Ishii Agreement of November 1917, which recognized the <(special interests® of Japan in China. It has become evident that only a strong and united China will _ suffice to enforce inter¬ national equality in the Chinese Republic. What China most needs to secure her future development is adequate funds. These were about to be provided in 1912, though not with¬ out embarrassing concessions, through an inter¬ national consortium of the so-called ((Six Power Loan Group® — England, France, Ger¬ many, Belgium, Japan and the United States. President Wilson's opposition caused the United States to withdraw, and the European War broke up the whole plan. A new loan con¬ sortium is now being arranged. Japan, en¬ riched by the spoil of the German colonies in the Far East and by recent extortion in China, is now at the height of her aggressive im¬ perialism, but is likely to meet strong opposi¬ tion. China is nearly a unit against her since the Peace Conference. The interests of the United States in the Philippines and Hawaii will keep the latter country alert against Jap¬ anese domination. Great Britain, no longer fearful of Germany or Russia, is likely to de¬ sire to break away from the Anglo-Japanese agreement of 1902. A China militarized and dominated by Japan would be a serious menace to India. Great Britain will probably be strengthened in this attitude by the unmistak¬ able anti-Japanese sentiment in Australasia. With the growth of population and wealth in the last-named region a new element is enter¬ ing the politics of the Far East, and the Euro¬ pean and American expansionists seem likely to have to deal with a contender of the same race in the eastern hemisphere. In the main, how¬ ever, it seems highly probable that the core of the international relations of the Far East during the next half century will be the devel¬ opments within China. See China — Diplomatic

Relations with; Japan — Diplomatic Rela¬ tions with ; Russia and the War.

5. Latin America in Modern Imperialism. — On account of its original settlement by Span¬ ish, Portuguese and French, the American con¬ tinent and adjacent islands from the southern boundary of the United States to Cape Horn are conventionally known as (<Latin America.® The matter of the original settlement has been briefly alluded to in an earlier section of this article. It will be sufficient at this place to recall that this region was explored and settled mainly by the Spanish, with the exception of Portuguese Brazil and a few French settlements in the West Indies. Politically Spanish Amer¬ ica was controlled through a highly centralized administrative system culminating in the Royal and Supreme Council of the Indies, estab¬ lished in 1542. In an economic sense the trade of the Spanish colonies was regulated under the provisions of the extremely rigid Spanish mercantilism administered through the so-called (<House of Trade,® which was created in 1503 and extended and systematized during the next half century. Dwelling under a corrupt and inefficient officialdom and a stifled commercial activity the inhabitants of Latin America made little general social and political progress until the era of the revolutions following 1810. The series of revolutions in the Latin-American states were closely related in their origin to contemporary events in European history. In 1808 Napoleon had invaded Spain and aroused the patriots and liberals to resistance. In 1812 they drew up a liberal constitution, modeled after the French constitution of 1791, and the wave of liberalism extended to the Spanish-American colonies in the western hemisphere. After the overthrow of Napoleon in 1814 the reactionary regime under the unspeakable Ferdinand VII was restored in Spain and an attempt was made to revive it in the colonies, but the latter resisted. Spain, unaided, proved unequal to the task, but in the year 1823 the reactionary powers, joined together by the Quadruple Alliance of 20 Nov. 1815 and dominated by the sinister spirit of Metternich, determined to aid Spain in American inter¬ vention against revolution. At this juncture Great Britain took a vigorous stand in oppo¬ sition. She had1 welcomed the overthrow of the old Spanish trading restrictions after 1812 and had built up a lucrative and flour¬ ishing trade with the Spanish colonies. This trade she feared she would lose in the event of the restoration of the Spanish domina¬ tion. Therefore, on 23 Aug. 1823, George Canning, the English foreign secretary, sug¬ gested to Richard Rush, the American ambassador in

London, that the United States join with Great Britain in a note to the group of reactionary powers warning them against inter¬ vention in Latin America. While Rush was communicating with Washington Canning in¬ formed Polignac, the French ambassador at London, that Great Britain would oppose inter¬ vention by any country save Spain alone. Alarmed by the European situation and by Rus¬ sian aggression along the Pacific Coast of North America, President Monroe and his ad¬ visers gladly accepted the suggestion of Canning in protesting against intervention. The Secre¬ tary of State, John Quincy Adams, however, convinced Monroe that the declaration should

be made independent of Great Britain and he formulated what became the famous <(Monroe Doctrine,® when embodied in the Presidential message of 2 Dec. 1823. The chief pronounce¬ ments were the declaration of the separation and distinctness of the two hemispheres ; the doctrine of non-intervention of European powers in American domestic politics ; the proclamation, set forth especially for the at¬ tention of Russia, that the American continent was closed to further European colonization ; and that the extension of absolutism to Amer¬ ica would be unwelcome to the United States. Canning was pleased with the American at¬ titude and gave notice that the British fleet would back up the policy enunciated by the United States. In this way the independence of the Latin-American states was assured and the first systematic formulation of American foreign policy definitely expressed to the world. The Anglo-American opposition to Metternichian intervention clinched the movement toward independence and Latin America soon became a group of independent American states. Haiti declared its independence in 1804, San Domingo in 1821 (1844), Cuba in 1902, Mexico in 1821, Guatemala in 1821 (1847), Salvador in 1821 (1838), Hon ‘uras in 1821 (1839), Nicaragua in 1821 (1839), Costa Rica in 1821 (1838), Panama in 1903, Colombia in 1813, Venezuela in 1811 (1829), Ecuador in 1811 (1830), Peru in 1821, Brazil in 1822, Bolivia in 1825, Paraguay in 1811, Uruguay in 1828, Ar¬ gentine Republic in 1816 and Chile in 1818 (dates in parentheses refer to establishment of present independent states). As these dates will indicate, the two chief periods of national differentiation were from 1810 to 1830 and from 1838 to 1850, with two late additions at the very opening of the 20th century. Although with these independent states in Latin America there are the following foreign possessions: British Guiana, British Honduras, Jamaica, the Bahamas, the Barbados, the Leeward and Wind¬ ward Islands, Trinidad and Tobago controlled by Great Britain; French Guiana, Martinique and Guadeloupe owned by France; Dutch Guiana,

Curasao and some lesser islands be¬ longing to Holland; and Porto Rico and the Virgin Islands possessed by the United States. The development of the Latin-American nations since the establishment of their independence may be divided into three broad periods characterized by certain definite advances. That from independence to about 1852 «the age of dictators® ; that from 1852 to 1876 as the era of the struggle for stability and organ¬ ization ; while that from 1876 to the present was one notable for general social progress and the emergence of certain leading Latin-Amer¬ ican states. It might also be added that the period from 1898 to the present has been con¬ spicuous for the development of international relations in this district, namely, the rise of a distinct Latin-American foreign policy under the direction of the so-called <(A B C Powers® (Argentine, Brazil and Chile) which has chal¬ lenged the Monroe Doctrine over Latin Amer¬ ica generally and south of the equator in particular; the development of an opposing tendency in the aggressive imperialism of the United States in this region with a bold ex¬ tension of the implications of the Monroe Doc¬ trine for Latin America ; and the attempt to

compromise these two conflicting tendencies through the development of the Pan-American movement, which has been in progress since

1889.

The expansion of the Monroe Doctrine has kept pace with Latin-American progress and the development of the foreign relations of the United States. Under Jackson the doctrine was not developed because it was associated in its origins with John Quincy Adams, all of whose works were anathema with Jackson. Polk introduced a novel and aggressive interpretation — a sort of precau¬ tionary or preventive policy — to the effect that the United States should annex all American territory which might eventually fall into Euro¬ pean hands. This view was strengthened by Seward's warning to Napoleon III to leave Mexico in 1865 and by President Grant and Secretary Fish, who

announced that no Euro¬ pean power might annex any American terri¬ tory, irrespective of whether the annexation was voluntary or forced, and proclaimed the United States the leader in American policy. In 1889 Blaine further contended that the United States would not sanction the conquest of American territory either by Latin-American states or by foreign powers. The Clayton-Bulwer Treaty of 1850 originated the half-cen¬ tury discussion as to the bearing of the Mon¬ roe Doctrine on the isthmian canal project. When the French company was formed in 1878-79 to build the Panama Canal Secretary Evarts and President Hayes declared that any isthmian canal must inevitably become a coast line of the United States. In 1881 Blaine warned that a European canal would be equiva¬ lent to the extension of the European political system to the American continent. Finally, in 1903 President Roosevelt allowed the United States to sanction violent changes in Latin-American governments in order to secure our dominance in the canal scheme, and the com¬ pletion of the Panama Canal by the United States and our option on the Nicaragua route has settled that problem. In 1895, as a phase of the Anglo-American dispute over Vene¬ zuela, President Cleveland and Secretary Olney made a startling extension of the Mon¬ roe Doctrine when they declared it to be an accepted and integral part of American public law and that the law of the United States was sovereign on the western hemisphere in such matters as this country saw fit to act upon. President Roosevelt's administration witnessed two notable developments of the doctrine. By allowing the German fleet to bombard ports of Venezuela he refused to accept the ((Drago Doctrine® and gave warning that perversely delinquent Latin-American states could not skulk behind the Monroe Doctrine, while at the same time he stood firmly against territorial aggression by Europeans. His second contri¬ bution, probably the most important positive moral and political extension of the policy, as well as the most dangerous when dishonestly or unscrupulously applied, amounted to a decla¬ ration that when any American state was un¬ able to discharge the duties normally devolving on a civilized state or when it used force on representatives of foreign countries it was the duty of the United States to intervene to maintain order and keep the peace. Following

out this policy President Roosevelt took over the financial administration of San Domingo in 1905, President Taft took similar action with regard to Nicaragua in 1912 and President Wilson did the same with Haiti in 1915. Had a Republican administration been continued after 1912 it is probable that intervention in Mexico would

have come ere this. In his fa¬ mous Mobile speech of 1913 President Wilson declared that the United States would never intervene in any country on this continent for territorial aggrandizement, but only to restore order and promote progress, but this cannot be taken as any guaranty of the future. The question of territorial aggrandizement will be decided by the nature of a future President's advisers and class affiliations. (See Monroe Doctrine, The). The World War has pro¬ duced a fundamental revolution in the Monroe Doctrine. The participation of the United States in the Algeciras Congress of 1906 proved that the initial doctrine of the isolation and distinct separation of the two hemispheres was fast givirfg way before the growth of world commerce and international relations. What remained of this conception after 1906 was completely destroyed by the entry of the United States into the World War. Far more significant than the military intervention in Europe were the repeated public declarations of President Wilson that the chief aim of the United States in entering the war was to trans¬ form and improve the internal political or¬ ganization of the German Empire, a complete reversal of President Monroe's statement that the United States would never concern itself with or intervene in the domestic politics of Europe. The United States having destroyed the isolation policy of the western hemi¬ sphere and intervened in European politics, the vigorous reassertion of the sanctity of the Monroe Doctrine by the jingoistic senators in the United States can rest only upon two foundations, the fact that we are strong enough to maintain it and the oft-asserted contention that our leadership ensures a higher type of international morality on this continent. Of the former there is no doubt; the latter must await the test of future events.

The most important and interesting phases of international relations in Latin America are the problem of the relations of the United States to Mexico and the distinct difference between the position of the United States north of the equator and south of that line. From 1884 to 1911 Mexico was under the dictator¬ ship of Porfirio Diaz, who has been called wone of the most able and talented administra¬ tors of modern times.® His rule brought to Mexico peace and prosperity but little progress toward democracy, and when he was forced to resign in 1911 there was a natural relapse into civil war. After a season of murder and treachery Victoriano Huerta, a military leader of Indian blood, emerged as provisional Presi¬ dent in February 1913. On account of the vio¬ lence attending his rise to power President Wilson refused to recognize Huerta, but also refused to intervene, and pursued his famous policy of <(watchful waiting® until the local fac¬ tions would be united and organized by con¬ stitutional methods under a

Mexican leader. This proved a tedious process. Huerta was

forced to resign in August 1914 and was suc¬ ceeded by Venustiano Carranza, but a number of the military leaders dominated by Francesco Villa, a half-breed bandit, declared their oppo¬ sition to Carranza and the civil war continued, though he succeeded in getting the upper hand in the greater part of his country. The forces of Villa conducted border raids and a considerable number of American citizens on the Texan border were killed or wounded. Early in 1916 a detachment of the regular army was sent into Mexico under General Pershing to capture Villa, but the force dispatched was inadequate and not effectively supported by Washington diplomacy, and intervention ended ingloriously. In the middle of the summer the national guard was called out to police the Mexican border, the only result being a dem¬ onstration of the ineffectiveness of the militia organization, whatever the bravery of individual guardsmen. In January 1917 the Carranza government revised the constitution and put in force the amended document in May of that year. It was a notably liberal.and progressive constitution, providing, among other things, for advanced social legislation, anti-trust legisla¬ tion and the confiscation of churches, schools and hospitals belonging to religious associa¬ tions. A new tax schedule was created for foreign oil and mining interests and Article 27 of the new constitution looked forward to the nationalizing of the natural resources of Mex¬ ico. These liberal measures aroused against Carranza all the vested interests at home and abroad. Capitalists at home were alarmed at the industrial legislation. The reactionary re¬ ligious bodies opposed the liberal religious pol¬ icy of the government. Above all, the foreign mining and oil interests, especially in the United States, were rendered hysterical by the new restrictions placed upon them and the plans for a future confiscation of their hold¬ ings. As soon as it began to appear that the Carranza government would remain in com¬ mand of the Mexican situation and put its pro¬ gram into effect the foreign investors began a systematic propaganda urging every conceiv¬ able cause for the intervention of the United States in Mexico. This

propaganda was con¬ tinued throughout 1920 and the first half of 1921. By that time a stable government under Obregon had come into power in Mexico. The retroactive clauses of article 27 of the Mexican Constitution were eliminated and a working agreement was reached by the principal Ameri¬ can oil interests and the Mexican President which put an end to the existing friction. See Mexico (Vol. XVIII, pp. 757-758; 793-800).

The commercial, and for practical purposes, the political domination of the United States over the Caribbean region and Central Amer¬ ica appears to be assured. This proceeds from the lack of internal stability in this region, re¬ quiring, according to the Roosevelt interpreta¬ tion of the Monroe Doctrine, the intervention of the United States to preserve order ; the great increase of the trade of the United States with this area, now exceeding that of the rest of the world combined ; and the neces¬ sity of naval domination to afford proper pro¬ tection for the Panama Canal. In line with the establishment of this dominating position the United States has retained control of Porto

Rico, exercises a general supervision over Cuba, administers the finances of Haiti, San Domingo and Nicaragua, has purchased the Virgin Islands from Denmark, has intervened in several Central American states and in Venezuela in the interest of promoting political stability and peace, and connived at the disrup¬ tion of Colombia in order to secure the Panama route for the isthmian canal. While the Mon¬ roe Doctrine is formally held to apply to all of Latin America it ends in practice witn the equator. There are two chief reasons for this. The first is that in this region European com¬ mercial and financial interests dominate as completely as do those of the United States north of this line; therefore, the United States has less practical reason for desiring to control the foreign policy of this region. In the sec¬ ond place, the ABC powers have rightfully claimed the authority for determining the gen¬ eral policies of the area south of the equator and resent the intrusion of the United States. In this attitude they have not been without European support and encouragement. These great powers south of the equator, supported b}r the more liberal element in the United States, have favored the supplanting of the Monroe Doctrine by a broader policy of Pan-Ameri¬ canism. General Pan-American congresses have met in 1889, 1901, 1906 and 1910, while special scientific and commercial congresses have assembled from time to time. There is an official organization of the 21 American repub¬ lics in the Pan-American Union, established in 1910 and maintained at Washington with an endowment from Andrew

Carnegie. The two chief obstacles to the development of Pan-Americanism are the commercial value of the Monroe Doctrine to American capitalists and the disproportionate strength of the United States as compared to the most powerful Latin-American states. To these might be added the differences in culture, the peculiar Latin-Amer¬ ican psychology, the domineering attitude of the United States and the inflated pride of the lesser Latin-American states that leads them to demand political equality with Argentina, Brazil and the United States in any binding legal or¬ ganization of American states. The final out¬ come of the conflict between Pan-Americanism and the Monroe Doctrine cannot be foreseen, but it is safe to predict that the ABC powers will check the Monroe Doctrine at the equator. The significance and status of the whole Latin-American problem will probably be greatly al¬ tered by the present introduction of the mod¬ ern industrial technology into South America which will tend to make this region become a very important centre of the world's industry, politics and culture. While the United States dominates Latin America north of the equator in all matters pertaining to capital, industry and commerce, a similar control is exerted south of the equator by Great Britain, Ger¬ many and France in the order given. The World War was a hard blow to German inter¬ ests in South America, but they will probably revive and those of Great Britain and France seem likely to expand. See Latin America — Pan-American Union; Caribbean Sea; Panama.

6. The British Empire in Recent World Pol¬ itics. — The more significant aspects of British

imperial history in the era of the old colonial movement, including the origins of British colonization, the struggle with the French for the colonial and commercial hegemony of North America and India, the transformation of Brit¬ ish imperial policy in 1763 and its subsequent modification after the revolt of the American colonies and the theoretical attack upon Mer¬ cantilism by the Physiocrats, Adam Smith and others, have been briefly sketched in an earlier section of

this article. It remains to trace the chief developments in the 19th and 20th cen¬ turies. From 1820 down to about 1870 the most advanced view taken toward the future of the British Empire was that of the so-called ((Little Englanders,® led by Cobden, Bright, Gladstone and other adherents to the doctrines of the Manchester school. They held that the colonies were both an economic burden and a political danger to the mother-country. They believed that the colonies were destined ultimately to be¬ come independent and maintained that it was much better that this process should be volun¬ tary and unopposed than that it should be ac¬ complished by violence and accompanied by hatred, as in the case of the separation of the American colonies. They further contended that, in keeping with the free-trade tenets and the (<cosmopolitan dream® of the Manchester school, the colonies would be as valuable to the mother-country when independent as they were while an integral part of the empire. Had this group dominated British policy with a free hand it is probable that the disintegration of the imperial domains would have been accom¬ plished before 1870. But there were other forces and other groups of colonial theorists that proved too powerful for the ((Little Eng¬ landers.® There was a tremendous expansion of British trade after the Industrial Revolu¬ tion which brought Great Britain into contact with all parts of the world and produced a new need for the extension of markets. The preva¬ lence of misery in the industrial population at the same time, coupled with the unprecedented increase of the native population, gaye rise to a remarkable movement of emigration from England. Then, there were political impulses which kept alive the expansionist policy by promoting a sort of precautionary or protec¬ tive expansion. An example of this influence may be detected in the occupation of northern India as a method of checkmating Russian ex¬ tension southward. Accompanying these forces making for expansion and partially produced by them were definite theories and plans for colonization and a better organization of the imperial system which either were diametri¬ cally opposed to the doctrines of the Man¬ chester school or profoundly modified these ex¬ treme views. At the opposite pole from the Cobdenites were of course the lineal descend¬ ants of the “King’s Friends® of the days of George III, Tories and firm adherents to mili¬ tarism, naval supremacy and vigorous and forci¬ ble imperial expansion. Between these two groups and probably more powerful than either in their effect upon British foreign pol¬ icy from 1830 to 1870 were a group of con¬ structive Liberals led by Lord John Durham, Charles Buller and Edward Gibbon Wakefield. Theirs was a socio-political theory which has been well summarized by Ramsay Muir : “The

main object of colonization was the systematic draining-off of the surplus population of the older lands. This, it was felt, could not safely be left to the operation of mere chance; and one of the great advantages of colonial posses¬ sions was that they enabled the country which controlled them to deal in a scientific way with its surplus population, and to prevent the re¬ production of unhealthy conditions in the new communities, which was apt to result if emi¬ grants were allowed to drift aimlessly where¬ soever chance took them, and received no guidance as to the proper modes of establishing themselves in their new homes.® These men were also effective in modifying the Cobdenite view of the inevitability of the independ¬ ence of the colonies by holding that self-gov¬ ernment would give the colonists all the advan¬ tages of independence without separating them from the mother-country and destroying all unity of imperial policy. It was their influence which brought practical self-government to Canada in 1847 and formal self-government to Australia in 1852, and to New Zealand in 1853. Finally, there operated the influence of the mis¬ sionary spirit, which was the logical heir of the anti-slavery crusade in the empire led by Bishop Wilberforce and which met with final success in 1833. The missionaries emphasized the moral obligation of protecting and civiliz¬ ing the backward peoples and kept alive the impulse to expansion, not only in the growing English-speaking colonies, but also in the re¬ gions inhabited wholly by blacks. These forces and theories served to carry the British Em¬ pire over intact until Disraeli, who had in his early days declared the empire a mill-stone around England's neck, could purchase the Suez Canal stock in 1875 and initiate the new period of British imperialism. By the <(S0's® the new scramble for the remaining un¬ appropriated parts of the earth was in full swing with Britain managing to get the ((Lion's share® of the spoil, as she had in the old colo¬ nial movement. The influences which stimu¬ lated the neo-expansionist movement in Great Britain after 1870 were a continuation and in¬ tensification of those forces which checked Cobdenism and the (<Little England® tendency in the middle of the century, the contagion of the general wave of colonial expansion which swept over Europe from 1870 to 1895 with the defensive measures which this forced upon England, and, finally, the renaissance of the expansionist group in British politics with the long ascendancy of the Conservative and Unionist parties after 1875. The specific re¬ sults of British imperialistic activity in this period have been summarized in the descrip¬ tion of the progress of imperialism in the vari¬ ous areas which have been brought under re¬ view.

The British Empire, as now constituted, em¬ braces something over 13,000,000 square miles, ‘ about one-fourth of the land surface of the earth, with a population of about 450,000,000. Of this population, those of European descent number only about 60,000,000, of which number 45,000,000 dwell in the United Kingdom of Great Britain and Ireland. Of the remaining 15,000,000 Europeans in the overseas posses¬ sions of the empire not to exceed 13,000,000 are of English descent. The British Empire, then.

is probably the most stupendous example in history of a vast territory and a great popula¬ tion held together and dominated by a small number of persons drawn from a politically and economically more advanced and highly or¬ ganized civilization. From an administrative standpoint the British Empire as now organ¬ ized falls into some six different classes of pos¬ sessions, the self-governing colonies, the crown colonies, the chartered companies, the protec¬ torates, a few residual possessions, of which India is the most important, which are hard to place within any of the preceding categories, and the new mandatories handed over to Great Britain by the Peace Conference. The self-governing colonies are constituted by the Do¬ minion of Canada, Newfoundland, the Aus¬ tralian Commonwealth, the Dominion of New Zealand and the Union of South Africa, the colonies, in other words, which are chiefly in¬ habited hy British emigrants. The administra¬ tive and constitutional history of the self-gov¬ erning colonies, considered in their relation to the British Empire, centres about three progress¬ ive processes, the granting of self-govern¬ ment, the progress of local colonial federation and the trend toward imperial federation and tariff preference. The grants of self-govern¬ ment came in most cases in the middle of the 19th century, as a result of the agitation of Wakefield and his adherents. Canada received self-government in 1847, Newfoundland in 1855, Australia in 1852 and N;ew Zealand in 1853. The principle was delayed in the Union of South Africa until 1909, for the obvious rea¬ son that the constituent parts of that colony, on account of historical and other causes, were not adapted for self-government before this date. The federation of the

various units in each self-governing colony soon followed. Canada was united by the British North American Act of 1867, Australia by the Commonwealth Act of 1900, New Zealand by the Act of 1907 and South Africa by the imperial legislation of 1909. Parallel with this process has gone the effort to bring a closer union between the mother-country and the self-governing colonies, led in most cases by the most ardent imperialists in the colonies and at home. The earliest move in this direction was the series of imperial con¬ ferences which began in 1887 and have met periodically for a discussion of problems and policies which were a matter of common con¬ cern to the empire and its organization and ad¬ ministration. The first conference was held in London in 1887, the second in Ottawa in 1894, and subsequent ones in London in 1897, 1902, 1907 and 1911, culminating in the imperial war conference of March 1917. The conference of 1907 provided for subsequent quadrennial con¬ ferences and for the representation of the United Kingdom and the colonies through their respective premiers. The war conference of 1917 resolved upon the institution of an im¬ perial cabinet to meet annually or more fre¬ quently if necessary; the calling of a special conference for a readjustment of the consti¬ tutional relations of the various parts of the empire; the representation of India at all fu¬ ture conferences ; more systematic and scientifi¬ cally distributed provisions for imperial de¬ fense ; and such encouragement of imperial preference as would tend to stimulate imperial

production and make the empire independent and self-sufficient in an economic and commer¬ cial sense. A war cabinet of imperial dimen¬ sions was, accordingly, created and the other provisions are being worked out. Paralleling the movement for imperial federation was the accompanying economic movement toward greater imperial cohesion, namely, imperial tariff preference, The leader in this move¬ ment was the colonial secretary, Joseph Cham¬ berlain, who was also an ardent federationist. He proposed that Great Britain return to a protective basis by establishing a small protec¬ tive tariff on imports brought from other dis¬ tricts than the British colonies, with the under¬ standing that the colonies would reciprocate by reducing their customs rates on British products. This project was put forward in a systematic way in 1903 and was an important plank in the platform of the Conservative-Unionist party in the Parliamentary elections of 1905. The free-trade tradition in Britain, together with the tendency of British labor to favor the Liberals, proved, however, too strong for Mr. Chamberlain, and his party and program went down to defeat in 1905. The colonies, however, had al¬ ready begun to extend

preferential duties to British products since Canada initiated the prac¬ tice in 1897. The World War finally produced the realization of Mr. Chamberlain's dreams after his death. Great Britain adopted a pro¬ tective tariff during the war and the imperial war conference of 1917 declared strongly for imperial preference. In the third place, imperial defense has occupied the attention of the statesmen of modern British imperialism, espe¬ cially since the beginning of the 20th century. With respect to naval defense, some of the colonies, such as Canada, South Africa and New Zealand, have contributed to the strength¬ ening of the British imperial fleet, while Aus¬ tralia has chosen to build and maintain its own navy. All of the self-governing colonies have made provision for military service and have provided efficient local armies. The Australian fleet and the soldiers of all the self-governing colonies participated in force and with great distinction in the late World War, and the war conference of 1917 came out for the neces¬ sity of a more scientific determination and pro¬ vision of imperial defense. The World War has had most significant but what are as yet in¬ calculable effects upon the United Kingdom and its relations with the self-governing colonies. The immediate and extensive rallying of the colonies to the support of the mother-country indicated the strength of the bond of senti¬ ment uniting the mother-country and the self-governing colonies. At the same time, during the war the exploits of soldiers from the vari¬ ous colonies tended to inflate the pride of the colony from which they came and to react even more in the direction of nationalism than in that of imperial solidarity. In the Peace Con¬ ference, also, it was apparent that the repre¬ sentatives of the colonies would not sanction any diplomatic action by the United Kingdom which impaired or threatened any of their vital local or national interests. Especially was this true of Australia. While it is difficult to fore¬ cast just what the outcome will be in the final adjustment between colonial nationalism and imperial sentiment, it would appear safe to pre-

diet that the self-governing colonies will never again be subordinated to any important con¬ trol through Downing Street. At present, while Great Britain has a formal control over those colonies through the royal governor, the veto over colonial legislation, the control of colonial foreign relations and the right of ap¬ peal over colonial

courts to the Privy Council of the United Kingdom, it is safe to hold that, except in the case of a lesser colony like New¬ foundland, Great Britain will never attempt to dominate colonial policy or coerce a colony, except in those matters of foreign relations which might, through colonial pugnacity, in¬ volve the whole empire in a costly war.

(see extensive articles on each of the

SELF-GOVERNING COLONIES).

Next in order of importance are the crown colonies. These represent the holdover into the present era of what was a typical colonial pol¬ icy in the original period of colonial adminis¬ tration. One important difference, however, ex¬ ists, namely, that the modern crown colonies have tended to lose their elective legislatures. Of the older variety possessing an elective leg¬ islative body only the Bermudas, Bahamas and Barbados remain. Next come the Leeward Islands, British Guiana, Malta, Mauritius and the Fiji Islands, where the elective members of the colonial legislature are less in number than those appointed by the mother-country. The most numerous of all the grades of crown colonies is the third, in which all the members of the legislative body are appointed by the mother-country. Such are most of the British West Indies, Ceylon, the colonies in tropical Africa and the majority of those in Oceania. Finally, there are small and lightly populated military posts and naval bases, such as Gibraltar and Saint Helena, which possess no legislature at all. Like the crown colonies, colonial govern¬ ment through chartered companies is a heritage of the old colonial movement. In the present empire, however, there are only two such col¬ onies, Rhodesia in southern Africa and northern Borneo. The protectorates in the British Em¬ pire exist primarily where a penetration of new territory is in process and is preparatory to a more firm foothold, where the native customs and political organization are of a sort that is best left without interference, or where among a more highly developed people there exists a strong nationalistic sentiment which will not permit a thorough-going form of administrative union with the mother-country. Examples are the Malay Peninsula, Zanzibar, Bechuanaland and Egypt. Persia seems in process of de¬ velopment into a protectorate. The ((Empire of India® is difficult to classify from an ad¬ ministrative standpoint. It began as a govern¬ ment by a chartered company, was transformed into a crown colony following 1857 and now seems well on the road toward a self-governing colony. Again, not only historical, but also ethnographic and cultural factors complicate the situation in India, for certain highly civilized parts are administered practically as a self-

governing colony and more backward portions as differing types of crown colonies. Finally, there are the few mandatories which have been given to Great Britain as a result of the con¬ quest of the German colonial possessions during the World War. They are akin to a protecto¬

rate administered under an alleged international supervision. Some are controlled directly by Great Britain, as in the case of German East Africa, while others, such as German South¬ west Africa or the German islands in the Pacific south of the equator, are directly super¬ vised by a self-governing colony. Perhaps the most novel and interesting thing about this new type of administration is that the Union of South Africa, Australia and New Zealand have themselves begun to enter upon an imperialistic expansion of their own.

Of the future of the British Empire it is difficult to speak with certainty. There is no doubt that Great Britain has reached a more complete relative supremacy as a power in im¬ perial and colonial politics than has been the case since the collapse of France in 1763. Both of her most dangerous rivals, Germany and Russia, are now helpless, one conquered and the other in a state of disintegration. Her naval domination is complete and her merchant marine is still far in the lead among all powers, in spite of losses during the war. All of these circumstances would, seem to make it apparent that Great Britain might not need to retain any dominating political grip upon her imperial possessions in order to enjoy all the commercial benefits which have come to her as a great colonial power. On the other hand, such policies as imperial preference and imperial defense are likely to lead to a greater degree of imperial cohesion. Then there is the opposition to any thought of imperial dissolution which would arise from the vast body of civil servants who are engaged in colonial service at home and abroad and derive their income from this activ¬ ity, and from the still more powerful group of large investors in colonial securities and re¬ sources who would regard their investments as likely to be jeopardized by a loss of imperial control of the territory. Nior are there lacking political reasons why the empire should persist. Japan seems destined to rival Great Britain as a colonial power of the future and this will create the necessity of a strong British policy in the Pacific area and the Far East generally. A still more ambitious plan than a retention and strengthening of the British Empire is the program of a considerable group of Americans and Englishmen, namely, the union or firm political alliance of the ((English-speaking peoples.® This project was foreshadowed as early

as the middle of the 18th century by Thomas Pownall, governor first of Massachu¬ setts and then of South Carolina, was advocated by Joseph Chamberlain, and its historical back¬ ground and practical advantages have been made the subject of recent scholarly treatises by such American writers as George Louis Beer and Sinclair Kennedy. The cooperation of the two countries in the World War has brought a closer feeling of unity, and the promise of a more sympathetic study of the history and in¬ stitutions of each state by the other. See British Empire; Great Britain — Foreign Policies, British Commerce, British Shipping, British Navy.

7. Modern Imperialism and the World War. — It is difficult at present to analyze satis¬ factorily the causes of the late World War. It would seem, however, that the causes may be divided into two main classes, those which

arose out of European conditions and those which developed primarily as a result of ex¬ pansion overseas, however much the latter may in their inception have been produced by Euro¬ pean forces. The former may again be classified as social and economic, and political and diplo¬ matic. Among the European economic and social causes might be listed trade rivalry, and, in the case of Germany in particular, the ((dangerous® development of the Social Democratic party, the progress of which it was hoped the war would check. The most important of the political and diplomatic causes in European con¬ ditions was the hatred between France and Germany which was created in the Napoleonic period, intensified by the Franco-Prussian War of 1870 and kept alive as the dominating thread in European diplomacy by the wiles of Bismarck and Delcasse. All combined to create the war psychological state which was the dominating factor among the immediate causes of the con¬ flict. It has been shown above that the forces leading to expansion overseas were of the most diverse sort, political, social, economic, religious and psychological, and it will not be necessary to analyze them again at this point. The rela¬ tion of the expansionist movement to the state of mind which

brought on the war will be ap¬ parent from a bare summary of the inter¬ national friction which it created. England and Germany clashed in Africa over Walfisch Bay and over the German attitude toward the British policy in dealing with the Boers ; in Oceania concerning the Samoan and other islands ; and in Asia Minor over the attempt of Germany to secure a port and naval base on the Persian Gulf. England and Russia were led by jealousy over territory in the Near East into a bloody war in the middle of the century and nearly to another in 1878; and mutual ag¬ gression in Afghanistan and Persia ended with¬ out war only through a parceling out of the ter¬ ritory between them. England and France, after earlier friction over Northern Egypt, came near to war over the Fashoda incident in 1898, and hostility was here averted solely by a redistribu¬ tion of colonial possessions and ambitions. Germany and France threatened the peace of Europe three times over Morocco before the matter was even temporarily adjusted. The rivalry of Germany and Russia in Asia Minor was not wholly settled by the <(Willy-Nicky® correspondence or the convention of 1911, and the conflict between the Mittel-Europa and Pan-Slavic plans, and the mutual rivalry over Turkey created the diplomatic crisis which pre¬ cipitated the war. Germany and the United States clashed over the Samoan Islands and in regard to the American conquest of the Philip¬ pines. Italy broke her long friendship with France over the latter's annexation of Tunis and made war on Turkey to secure Tripolitania after being sharply held up in Abyssinia. Russia and Japan fought over eastern Siberia and Manchuria. Finally, the <(glory® of the war with Spain served the better to prepare the United States to enter upon the World War.

It might have been supposed that the states of the world would have profited to some degree by the lessons of the past 40 years as to the dangers of aggressive WcltpoUrik, and while in the midst of the great conflict would have hesitated to lay plans for a continuance of

the same policies that had done so much to bring on the tragedy, but there are no indica¬ tions that they had learned anything from the history of the world since 1870. Germany planned, if victorious, to seize most of Africa and western Asia and to extend her possessions in Oceania and the Far East, as well as to ex¬ pand her spheres of interest in South America. If the Allied plans for annexation were some¬ what less extensive it was only because there was less German than Allied territory overseas to be occupied. The Allied powers early en¬ tered into secret and nefarious agreements as to the seizure of the German colonies, the con¬ quest of western Asia, the Japanese

occupation of Shantung and the partition of Turkey. The United States made no claim for territorial an¬ nexation, but proceeded to appropriate nearly a billion dollars' worth of German property in this country, an accession of much greater im¬ mediate value than the whole German colonial empire. The extra-European phases of the war were colored and determined wholly by at¬ tempts to execute these plans for annexation. Germany tried to stir up rebellion in the Brit¬ ish colonies and ordered the Turks to invade Egypt. The Western powers invaded Tur¬ key and sent an expedition into Mesopotamia. Japan seized the German possessions north of the equator in the Far East, while Australia and New Zealand took those below the line. In no case did the Peace Conference seriously interfere with the execution of the secret agree¬ ments made by the Allied powers as to the dis¬ position of the spoil. The one progressive pol¬ icy which has emerged from the war in regard to imperialism is the so-called mandatory prin¬ ciple for an international control of the colonial possessions taken from Germany. This is em¬ bodied in Article XXII of the Covenant of the League of Nations and provides for the admin¬ istration of the former German colonies by the various Allied powers subject to the supervision of the council of the league and a special com¬ mission created to examine the annual reports upon administration which are to be submitted by the states possessing the mandatory power. Theoretically this marks a very important ad¬ vance in the way of international supervision of overseas administration, but it would be easy to be over sanguine as to the probable beneficial results of this departure. The mandates will all be in the hands of the Allied states, and it is not probable that there will be any alertness and enthusiasm in mutual criticism of the adminis¬ tration. States that could acquiesce in the an¬ nexation of the German colonies and the de¬ spoiling of China cannot be relied upon to have extremely tender consciences in the international relations of the future. Finally, the success of the whole scheme rests upon the adoption and successful working of the League of Nations, something which at present is far from as¬ sured. See National Ideals and the War; and War, European articles: Diplomatic Negotiations During the War, The Peace Conference, The Peace Treaties, Neutrals and the War, The War and the Small Nations.

8. The General Significance of Modern Im¬ perialism. — The broader significance of modern imperialism, as Professor Shepherd has sug¬ gested, may best be comprehended by viewing

60’

SO’

40

30”

SO”

c

D

E

0°

G

H

T

. v’j°

Longitude West from Greenwich

*

Longitude Last from Greenwich

on°

M = - »,C»Frt Vattoy“l

M

N

/

—

hik

lc r

S c

° y so”^ oV°

O _x; tV - /V (V , — .

60®

70”

0

I Islands—

■:>

\c

V coˆT‘^*

. V-

/- -c,»cle

•tvaV.

— ■ is*^5’

C-hi

L«*

s»A

■c*

s \ r v V,

[i j§gN

r^evi’SC%,

V1

Irt

V

c

$ >

0

«»,

//£

iAfy

***

°0G* r . .

*”& ‘t-ti-yos

S,/£7-; .

V Strom

7®«9

0»0

•»4

lia

u£es

tyornorj/p’ A V

^ UmMi

nojj^z. ffrrr]\s sm^“:<

7 e/jo’v^s^i -A/f 7 sY

° V^- pp7 alwd

AY

ncOtli’^t?UV iOc’

«C’s’e

.,6V1

60“

ˆiceˆA < 7oˆ u.ˆv.

> <•

VO’ \«»v <

V*°v

mad?

0

« <

c

‘*T

\

\

‘/ K

H ,. A

»KV*

«* _

<

Urebro d Motels -

p-f ˆpisBˆ r1

i/„.

V’-7?

ft*

weai.

/; * <

= c”‘

o

wY

a/iger

£ˆsun < - v—

Chrl‘,hartUt*‘fZ’°h* >Ve<£ˆ >

Ar tt»derJk’£l3|1 ˆ U®0ˆ®“* >orik®pl,,y\Vlsbj

° * r &

‘ . SlVcˆ’A-ˆO ˆeboklnjb **‘iuBS>V — ˆ’°3l,K»lm>r j/7<JLAND \

. ˆ«uy7wˆ4.’>ˆ,o, *

‘Or# iC

•rk’

4-1??

LvM

V* • V’

W ˆ

If’”‘3” .

iTOC KHOLM

o *Z,

“^Kevel ‘ p«‘j»«s ‘

7iovgˆr’

DAoSiˆY ilHaiJL/ psk0’? ■rfptwaJ*-” o\oX«c’

> *w w I* ■ > *l J. ”* I’

b}0tVaJˆWS , ■-,

Aˆvui

\M i tauˆsl f riedricVi{ta*lt

w ° Sow**” T v> >-

sr-‘v«>ˆ5j4.

<f3>

o\» yj

\

■*•“**. vSS*®*- /*» «A on7sˆ\>ˆ

r\o’

jsVo’*’

iskov\ ) va\6»’ 0sias^“‘iih0^y - \ <-^ s»6 .

^ ao^Assys

yva4“‘7> WV(

‘\

•I

,o»°

p\

~toJ-“a-

vAUcIsingliorj 11/ /-

*i^E^A’^$o#4^SSfffu4 . A

D Srti, o^o«“Hoi y V

^ R av

Lib^u * e|

* i ^‘Os

. Metnel DvinsTL’

S. ‘ oRossieny I

- VˆVyLlTH U AULA. \

vˆrwˆ 7 ° “icioi Rasau s A°”" rˆ’ sa1*1’ˆ0 *

w1.»‘uYj f ˆ JˆAj tovo .<?/

a*v

0“*

’vpvre

kntii

;sberg

. Geoi

c Rr>*roi ˆ

‘flC /a*.

r< V.

S/r ‘

‘InstarburgS ˆBrauasWig I— j,

kVS

R.OVUO

Vilna’

Elbing

■ re “Jo*]o’%V”

leni Augu8jpwu ■»ˆ-

.TlTorT

o i r~v 1 5tfˆ<rsi’y’ens‘1 G

•*“VU ■i K.»

**“ r I ,

ˆ“s.”

poiots’K yv «[\J . ˆv»‘- i

-OWniV’O. 7vlW>l»’“ 7ˆ SCU r_Jj oW°S’ft cˆ°ˆVc6Xa“

,s-LttA=i

Al>°

c-” ■

L-”*” ■

AO*

v Brest Litovsk

ni«°v9

oBVeWY

[

L’j.- . _ .

’ J

rcI\,\n o A40tcA

Os”0

»SVct’ , •.

0 pr\aV’

,s\a{

^*WUA

r.lVSˆ’

■ˆoS”Aa’A

JQ*

nsV

.rVO’

la’c4 ,

.s»»V

SVvˆ>. ,. . ‘ v _

“TV* ,.oVv» ^°v

8\slt tS»lV

<1*1

**0.4,

.ni‘0”

AVˆjj

1 Alo”,

,of

7l”e

few.

V

oˆ.

y :>

“‘”Ai

Hi

Ma”uV

*o’P

BctAVˆ

®afiu

n /v

„ˆ/v

‘J’j-＞rt

1 -■«»«

■V～r5a»Cl££ˆ

poivp A,ˆ or e3SS

Jfc-co(?s;cAˆ7L„if

o-

＞

yrtflT/

K C.

7s-

＜7*

ˆA«4,r

4 > tir. -

Rlorenc

Ro\

VmlDi

sM «

tui*BEST_ /ˆoN«6y-Sj* < ®J ”.JL’iassyˆ,)‘qˆi li’VoVvAˆ

■ ‘ Vaspkdj J \ V. ˆpctniao/ , pcr‘5ˆv»»s” SS

0 - < ˆrF4aˆ#ˆ JCT‘V pa,,u7— ˆua > . Ce4»L#RV’u pjjp \ ˆ 4

W/ˆJ. Jc-Ka’ˆD X- ˆ O A

J,l»“‘jC,‘l/„lp =

v»V

O’

>

60”

.A’°

>

ae \

a0/.,1. X Vl/,

■W

.0ˆ

. M

c»j:

s»

»w

p-&c

e*’°®

-Sio°®9

a.4##’ ˆ

in#c,“

to’ ..>!>

„«l’l‘1’

IfSilfltef,

‘Ttcb

‘^||ll’,7?”::;.>

T^’

.“tv -3TJ

40“

Q

%

■ G°t*J

iT’s D

\

K E

fl.°|*^

rr . Cose

taPe SpartiVenfo A < A CaUn A-

PlzzoY

-JAB AN TO I «wt

J Cob

rC. Rhzuto

IONIAN

<

**o If

‘°ccc

ˆ

1

Ar 1

‘I

7

i J

I

Jvˆ7’;iL .

Rfcglo d!

Calabria

, SBA Sf “‘p ˆ

Malta l(Bt.)\ˆ“‘e/

? LamU“f‘

M 1

UOR

>r/ f

ˆV*V Vs.-V,K‘fe

2ˆ Vji Ajˆ Mcixts <

y

.. ““to.. k dalia .

,/r /

U4??*

RAND MCNALLY

POPULAR MAP OF

NEW EUROPE

SCALES

Statute Kite*, 28C — 1 Inrh.

i 0 50 100

V>o

E

?»o°

G

H

<? Q

- . , - Og.yTOM* ^

20” K fj

24

0”

^7777

kilo met ret, 400 =1 Inek.

0 SO 100 ?00 3*>Q *00 500 600 TOO

Ran<l McNally Si Co.’s 11 x 14 Map of New Europe Copyright by Road McNally A Co.

30,

’o

R

40” c

U 327 Ei

it in two different aspects, namely the process of extending European civilization to lands overseas and the reaction of this expansion upon European culture itself. There can be no question that much the most important phase of the extension of European culture since 1870 has been the carrying of the material culture, especially the machine technology of Europe, throughout the world. In some cases it has not been widely adopted by the natiye populations, especially in the case of primitive tribes, but even in such areas it has been transplanted among the white settlers and has been the means of obtaining that supremacy of the white over the native black which has everywhere accom¬ panied the coming of modern imperialism. The more conspicuous effects of the extension of the machine technology have been evident in the case of such older civilizations as those of Japan, China and India, where even a partial introduction of the more advanced industrial methods has wrought a complete transforma¬ tion of the external aspects of their, civilization. Further, if it be true that economic processes tend ultimately to shape the other phases of civilization, then this economic transformation will bring a general cultural revolution. The industrial changes in Asia which are now taking place will afford the most extensive social lab¬ oratory which could be imagined in which to test the validity of the Marxian theory of cul¬ tural development. Certainly the political and educational changes which have already been ob¬ servable in Japan and China would indicate the coming of a general cultural readjustment. Along

with the machine technology has gone the various phases of modern applied science, not only that which is directly related to indus¬ try, but also the sanitary and medical sciences which have done so much to save lives and re¬ duce suffering. One of the earliest and always the most energetic and all-pervading channels for the transmission of certain phases of Euro¬ pean civilization has been the activity of the missionaries. The importance of their work will be differently estimated according to the theological outlook of the historian. If he re¬ tains a belief in orthodoxy he must regard the conversion of millions of Africans and Orien¬ tals and the salvation of their souls from eter¬ nal torment as far and away the outstanding achievement of overseas expansion. If, on the other hand, he rejects the Christian dogmas he must view the missionary enterprise as an au¬ dacious and arrogant meddling with the local beliefs and institutions of other peoples. But the orthodox and the sceptic alike must pay tribute to the non-religious phases of mission¬ ary activity, such as the introduction of 'better medical, sanitary and industrial practices, and the teaching of the elementary facts of West¬ ern knowledge. In the political realm the ex¬ tension of European institutions has been of a mixed character. In the government of back¬ ward peoples there has been little real political education or liberalism, except perhaps in such cases as the government of the Philippine Islands. In most instances it has meant a su¬ perimposition of an autocratic white bureau¬ cracy which has been quite as oppressive, even if more efficient than the native governments. On the other hand, there can be no doubt that the imitation of Western political theories and institutions by such states as China and Japan

will be conducive to a greater degree of liberty and political efficiency than would ever have been possible under the old regime. In the mat¬ ter of the extension of social customs so little has been accomplished that it would be difficult to generalize. In most cases the European gov¬ ernments have found it best to interfere as lit¬ tle as possible with native social customs, ex¬ cept in the case of what is obviously both cruel and useless. The abolition of infanticide, the suttee and some of the more painful and repul¬ sive religious rites of the natives are definite examples of progress due to the contact with European customs. Much has been done by missionaries in the attempt to improve the sex mores of the natives and the Orientals, but as to how much positive progress is involved in the introduction of the Patristic "impurity complex® among overseas populations is a ques¬ tion upon which students of comparative ethics and modern medical psychology have differed with the missionaries. Lest one might be in¬ clined to

regard the European expansion as a wholly beneficent process, it is necessary to call attention to certain detrimental effects of the contact of European peoples with those over¬ seas. In economic matters Western industry and commerce, when introduced, mean the de¬ velopment of modern capitalism with all of the misery which it has entailed in Western states. Further, there has been a general tendency to exploit native labor, not only in factories and mines, but also on rubber plantations and in ag¬ ricultural activity, and to oust the natives from their lands when these possess valuable mineral deposits or other important products of com¬ mercial significance. Then, over against the saving of native lives by the introduction of modern medical and sanitary science, must be set the introduction or development of the use of alcoholic liquors and opium products which has brought about not only a great loss of life among natives, but also unspeakable misery and serious physical deterioration. In the field of religious endeavor one should not forget the frequent persecution of those natives who per¬ severe in their older beliefs, the protection by missionaries of criminals guilty of atrocious crimes, as was the case in China previous to the Boxer rebellion, and the frequent oppressive economic exploitation of natives, as was well exemplified in the conduct of agrarian opera¬ tions by the Spanish friars of the Philippines. The undoubtedly superior efficiency of Euro¬ pean political control over colonies and the greater liberalism brought in through the Orien¬ tal limitation of Western constitutions have been paralleled by extreme autocracy and cruelty, in colonial administration, especially in . dealing with native revolts or crimes. Cases in point are the administration of Leopold in Belgian Kongo, the German suppression of the Hercro revolt in southwest Africa and the general ad¬ ministration of Karl Peters in German East Africa, the attempted extermination of the na¬ tives by the English settlers in Australia and New Zealand and the conduct of the American military forces in coercing some of the more warlike tribes in the Philippines. Nor has the social side of the contact between Europeans and natives been without unfortunate results. European vices have been introduced for na¬ tive imitation, especially the use of alcoholics, and, at the same time that missionaries were

trying to inculcate the sexual mores of West¬ ern monogamy, the white traders and others were systematically debauching the morals of the native women. While one cannot question the fact that the expansion of European civiliza¬ tion has brought a vast amount of material progress to the world at large, it seems equally true that the natives have lost more than they have gained by the process. If this be true, then the progress of modern imperialism can only be justified as Mr. Roosevelt upheld the conquest and expropriation of the American Indian, namely, on the ground that the lower civiliza¬ tion must give way before the advance of the higher.

It has generally ‘been held that all the out¬ standing results of overseas expansion have been limited to the extension of Western cul¬ ture to the peoples overseas, but there have been equally notable reactions produced upon European culture and institutions by this proc¬ ess of expansion. In the matter of the economic reaction of expansion upon Europe one of the most significant results has been the introduc¬ tion of new commodities, extremely important articles of industry like rubber, petroleum and nitrate of soda; food products and beverages, such as tropical fruits, rice, cocoa and tea; and articles of ornament, as in the case of Chinese and Japanese ware and Indian ornamentation. The discovery of these new commodities and the stimulation of diversified industry overseas has promoted the development of a greatly ex¬ tended international division of labor. Com¬ mercial mechanisms and financial institutions have been greatly altered as a result of the dis¬ coveries and the increased trade which accom¬ panied the more recent phases of imperialism. While one should not neglect the significant be¬ ginnings of credit institutions and other de¬ vices to aid commerce in the old colonial move¬ ment, the mechanism of commerce in 1800 was extremely crude as compared with that which has developed in the last 50 years to expedite world trade. Again, the volume of money in circulation has been greatly increased, not only by the growth of business, but also by the dis¬ coveries of the precious metals in Australia, South Africa and other overseas territories. Finally, the growth of the world trade has stimulated the increase of capitalism quite as much as this has been promoted by it. The po¬ litical reaction of imperialism upon Western society has been almost wholly unfortunate. The autocratic government of natives has tended to react to the weakening of democratic institutions at home. Then, the burden of im¬ perial administration has proved to be a severe drain upon national resources and has lessened the funds available for advanced social legisla¬ tion. To this must be added the important part which modern

imperialism has played in the re¬ cent development of armaments on both sea and land and in producing the most expensive and deadly tragedy of history in the late World War. The only valuable contribution of imperialism in its political reaction upon Eu¬ rope has been the training it has afforded in colonial administration. In addition to the earlier policies of subjection and partial auton¬ omy, which were typical of the colonial admin¬ istration in the old colonial movement, 'there have been three other policies contributed in the more recent era, complete autonomy, as in

the case of the British self-governing colonies; assimilation, or adaptation to Western culture, practised, for example, by France in northern Africa ; and association, in which native cus¬ toms are respected and the native culture al¬ lowed to develop along natural lines, though af¬ fected by the introduction of new industrial methods and subject to a general oversight of Europeans, cases in point being India, Egypt and Zanzibar. In the field of natural science overseas expansion has been most potent in leading to revolutionary progress. It is con¬ ventionally supposed that scientific advances have come almost entirely from isolated work in European and American laboratories, but it would be easy to demonstrate that much of modern scientific progress has come from re¬ search in the realm of the greater laboratory of the scientific data of nature which has been opened to many by explorations overseas. In the field of geography there have been contribu¬ ted, not only the great mass of new data and the perfection of cartography, but also the develop¬ ment of physical geography in all its phases since Alexander von Humboldt, and the analy¬ sis of the influence of the various physical en¬ vironments of the earth upon man and social institutions in the writings of Ritter, Peschel, Ratzel and Reclus. Astronomy has been per¬ fected through the possibility of a wider and more accurate observation of the heavens after modern explorations had begun. In biology and zoology, not only has a vast amount of new data been brought together which has over¬ thrown much of the systems of classification of Linnaeus, Buffon and Cuvier, but also the ob¬ servation of the diverse species of plants and animals throughout different parts of the world enabled Darwin, Huxley and Wallace to formu¬ late the greatest discovery of the 19th century in biological science, namely, the law of evolu¬ tion. Both chemistry and the (<materia medica® have been infinitely enriched by discoveries made during overseas expansion. Not less sig¬ nificant has been the reaction of overseas dis¬ coveries on social science. Without the data supplied by the observation of a great number of different cultures

and peoples there could have been no such sciences as anthropology, ethnology, comparative philology, comparative religion, comparative jurisprudence, descriptive sociology, evolutionary politics and historical economics. Nor has the overseas expansion been without its significance in providing the knowledge and motif for important contribu¬ tions to philosophy, literature, the drama and music, as will be evident from noting the in¬ fluence of the <Shakuntala) of Kalidas upon Herder, Goethe and the Romantic movement in European literature, of the <Geeta) upon mod¬ ern European philosophy, and of the teachings of Manu upon the doctrines of Nietzsche. It is these little-recognized but all important cul¬ tural contributions which have accompanied re¬ cent overseas expansion that must be set off against its detrimental effects when one attempts to assess the total significance of modern im¬ perialism for European civilization. While there have been certain sporadic attempts to imitate Oriental social customs, it must be admitted that the social reaction of expansion on Western civilization has been effective chiefly in an indirect manner due to the effects upon social customs of the broader cultural changes which

have been briefly summarized. If, in conclusion, one were to raise the question of the probable future of imperialism little can be said further than that it seems to be a function of capitalism and Machtpolitik and is not likely to decline as long as these forces and principles remain operative, and their abatement does not appear imminent. It would seem, however, that, ex¬ cept in the event of another world war, the im¬ perialism of the future will have to be carried on primarily by economic rather than political means, as most of the formerly unoccupied areas of the earth have now been appropriated by the stronger powers.

Bibliography. — While there are many vo¬ luminous special bibliographies dealing with im¬ perialism and colonization in specific areas, such as the great bibliography of the Philippine Islands prepared by Blair and Robertson, there is no up-to-date and

comprehensive bibliography of the expansion of Europe. The best ele¬ mentary guide is the (Syllabus of Imperialism and World Politics) by Dr. Parker T. Moon (1919), the general order of which has been at least roughly followed in this article. It also contains a brief, but well-chosen and classified introductory bibliography. Probably the most satisfactory bibliography of an introductory sort is that which follows chapters ii, ix and x of Volume I and Part V of Volume II of Hayes, C. J. H., (Political and Social History of Modern Europe.5 A more exhaustive bibli¬ ography may be obtained by consulting the bibli¬ ographies following the special articles on subjects relating to world politics in this Encyclopedia.

There are a number of fairly complete gen¬ eral summaries of the whole movement of col¬ onization and imperialism. While Prof. W. R. Shepherd's comprehensive survey of the expan¬ sion of Europe has been limited thus far to unpublished lectures, he has summarized the significance of this process for world history in a series of articles on ((The Expansion of Europe® in the Political Science Quarterly (1919). The best introductory survey of the expansion of Europe in English is to be found in the above-mentioned work of Professor Hayes, Volume I, chaps, ii, ix and x and Vol¬ ume II,. chaps, xxvii-xxx. Another good intro¬ duction is to be found in Robinson and Beard's development of Modern Europe5 (Vol. I, chaps, vi, vii and Vol. II, chaps, xxvii, xxx). Ramsay Muir's Expansion of Europe/ while promising in title, is so preoccupied with British colonization as to be scarcely more than a good introduction to the growth of the British Em¬ pire. The standard manuals on the subject are Morris, H. C., 'History of Colonization5 ; Keller, A. G., Colonization5 ; Leroy-Beaulieu, P., <La colonisation chez les peuples modernes5 and Zimmermann, A., 'Die europaischen Kolonien.5

The background of the old colonial move¬ ment is best described in Cheyney, E. P., (The European Background of American History.5 Prof. A. H. Lybyer's important investiga¬ tions modifying the older notions of the relation of the coming of the Turks to exploration and colonization are summarized in the deport of the American Historical Association5 (Vol. I, pp. 127-133, 1914). The nature of the ex¬ plorations is described in Jacobs, J., (Story

of Geographical Discovery5 and Beazley, C. R., (The Dawn of Modern Geography.5 The most convenient elementary presentations of the old colonial movement are to be found in Hayes, Volume I, chaps, ii, ix and x; and Muir, chaps, i-iv. More thorough treatments are to be

found in Cunningham, W., (Western Civilization in Its Economic Aspects,5 (Book V, chaps, ii, iii) ; Day, Clive, (History of Com¬ merce,5 Part III; Abbott, W. C., ‘Expansion of Europe5 (Vol. I, chaps, ii, iii, ix, x, xvi, and Vol. II, chap, xxiv) ; Lannoy and Linden’s (Histoire de l’expansion coloniale des peuples europeens5 (Vols. I and II) ; and in the detailed manuals mentioned above. The standard treat¬ ment of mercantilism is to be found in Schmoller, G., ‘The Mercantile System.5 Its relation to the American colonies is summarized by Beer, G. L., in ‘The Commercial Policy of England toward the American Colonies.5 The background of the American Revolution is ad¬ mirably set forth in Schlesinger, A. M., (The Colonial Merchants and the American Revolu¬ tion5 ; and Alvord, C. W., ‘The Mississippi Valley in British Politics.5 The American Revolution is best described in Van Tyne, C. H., (The American Revolution5 ; Fisher, S. G., Struggle for American Independence5 ; and Channing, E., ‘History of the United States5 (Vol. III).

The reaction against the movement of co¬ lonial expansion and the mercantilist system, which followed the American Revolution and the work of the classical economists, is well analyzed in Ogg, F. A., (Economic Develop¬ ment of Modern Europe5 (chaps, xii-xiv) ; Muir, chaps, v-vi; Egerton, H. E., (Short History of British Colonial Policy,5 Book IV ; and Hobson, J. A., (Richard Cobden, the Inter¬ national Man.5 The European and American background of the new national imperialism is discussed in Ogg, chaps, vii, x, xi and xvi; Hayes, Volume II, chaps, xviii and xxvii; Bogart, E. L., ‘Economic History of the United States 5 (chaps, xi, xiii, xxviii and xxxii) ; Farrand, Max, (The Development of the United States5 (chaps, xii, xiii and xvi) ; and Harris, N. D., ‘Intervention and Colonization in Africa5 (chap. i).

For modern colonization in Africa the best introduction is Johnston, H. H., (The Opening Up of Africa.5 The most authoritative survey is his (History of the Colonization of Africa by Alien Races.5 Other standard treatments of this area are Keltie, J. S., (The Parti¬ tion of Africa5 ; Harris, N. D., intervention and Colonization in Africa5 ; and Gibbons, H. A., (The New Map of Africa.5 Harris and Gibbons are particularly valuable for developments since 1870. In addition to these and the general manuals on imperial¬ ism, there might be mentioned Rose, J. H., ‘ Development of the Modern European Na¬ tions5 (Vol. II), for the Kongo Free State and Egypt; Morel, E. D., ‘Morocco in Diplo¬ macy5 ; Lewin, P. E., ‘The Germans in Africa5 ; Piquet, V., (La colonisation frangaise dans l’Afrique du nord5 ; Hobson, J. A., ‘(The War in South Africa5 ; and Macdonald, A., ‘Trade, Politics and Christianity.5

On modern imperialism in the whole con¬ tinent of Asia there is a very recent breezy survey from the libera1 point of view in

Gibbons, H. A., (New Map of Asia.-* The Berlin-Bagdad Railway scheme is analyzed in Schmitt, B., (England and Germany since 1740> (chap, x) ; Jastrow, M., (The War and the Bagdad Railroad* ; and Rohrbach, P., (Die Bagdadbahn.* Anglo-Russian imperialism in western Asia is dealt with in Skrine, F. H., (Expansion of Russia* ; Sykes, P. M., (A History of Persia* ; Browne, E. G., Che Persian Revolution of 1905-1909* ; and Schus¬ ter, W. M., Che Strangling of Persia.* British imperialism in India is well discussed in Holderness, T. W., Che Peoples and Prob¬ lems of India* ; Fuller, J. B., Che Empire of India* ; Ilbert, C., (The Government of India* ; Smith, V. A., Che Oxford History of India* ; and Rai, Lajpat, (Young India.* The his¬ torical background of recent world politics in the Far East is most effectively set forth in Douglas, R. K., (Europe and the Far East, 1506-1912* ; and Reinsch, P. S., (World Poli¬ tics at the End of the Nineteenth Century.* The best general treatments in English of this area in modern imperialism are Latourette, K. S., (The Development of China* and Che Development of Japan* ; Clements, P. H., (The Boxer Rebellion* ; Hornbeck, S. K., Contemporary Politics in the Far East*; and Wheeler, W. R., China and the World War.* Special works of importance are Tyau, M. T. Z., Creaty Obligations be¬ tween China and other States*; Overlach, F. W., ˆForeign Financial Control in China* ; and Blakeslee, G. H., (JaPan and Japanese-Ameri- can Relations* and (Recent Developments in China.* On the Philippine Islands there is the remarkably authoritative and comprehensive work of Worcester, D. C., Che Philippines, Past and Present* ; Miller and Storms, eco¬ nomic Conditions in the Philippine Islands* ; and Kalaw, M., (The Case for the Filipinos.* On Oceania the three most useful books are Colquhoun, A. R., Che Mastery of the Pacific* ; Callahan, J. M., (American Relations in the Pacific and the Far East* ; and Fletcher, C. B., Che Problem of the Pacific.* Other important works are Codrington, R. H., Che Melanesians* ; Alexander, J. M., Che Islands of the Pacific* ; and Bancroft, H. H., Che New Pacific.* For

Australasia the most serviceable books are Jenks, E., (Short History of the Australasian Colonies* ; Scott, E., (Short History of Australia*; Rus-den, G. W., (History of New Zealand* and (History of Australia* ; Wise, B. R., (Making of the Australian Commonwealth* ; Clark, V. S., (Labor Movement in Australasia* ; and Reeves, W. P., (State Experiments in Austra¬ lia and New Zealand.* A very valuable socio¬ logical study has just appeared by Northcott, C. H., Australian Social Development.* There is an important descriptive article on Australia by Gregory, H. E., in the National Geographic Magazine (December 1916).

The historical background of Latin Amer¬ ica in modern imperialism is best presented in Shepherd, W. R., (Latin America,* and Che Hispanic Nations of the New World* ; Bourne, E. G., (Spain in America* ; Paxson, F. L., Che Independence of the Latin American Repub¬ lics* ; Robertson, W. S., Che Rise of the Spanish American Republics* ; and Hart, A. B., Che Monroe Doctrine.* The diplomatic and

economic factors relating to Latin America are well summarized in Moore, J. B., Princi¬ ples of American Diplomacy* ; Fish, C. R., American Diplomacy* ; Latane, J. H., Amer¬ ica as a World Power* ; Jones, C. L., Che Caribbean Interests of the United States* ; and Weyl, W., American World Policies.* The subject is surveyed from the Latin-American point of view in Calderon, F. G., (Latin Amer¬ ica* ; and is presented from both that of Latin America and the United States in Blakeslee, G. H., (Latin America.* There is an import¬ ant article on Che Psychology of the Latin American** in the Journal of Race Develop¬ ment (January 1919), by W. R. Shepherd. An indispensable compendium of facts is provided in the (Encyclopedia of Latin America,* edited by G. E. Rines *et al.*

A concise introduction to the relation of the British Empire to the overseas movement is Muir, Ramsay, Expansion of Europe* ; a more critical introductory treatment is to be found in chaps, ix, x, xxviii and xxix of Hayes. The standard treatments are Woodward, W. H., (Short History of the Expansion of the British Empire* ; and Egerton, H. E., A Short His¬ tory of British Colonial Policy.* The most satisfactory analysis of the government of the empire is to be found in Lowell, A. L., Che Government of England* (Vol. II, chaps, liv-lviii). Jebb, R., Che Imperial Conference* is an important special study. The most detailed description of the British Empire is Herbert-son and Howarth, Che Oxford Survey of the British Empire.* A closer union of the British

Empire and the United States is proposed in Kennedy, Sinclair, Che Pan-Angles* ; and Beer, George Louis, Che English Speaking Peoples.* The Round Table is a scholarly periodical dealing with British imperial rela¬ tions.' It has published some ((Studies,** of which Volume I (1912) is a very important analysis of the empire.

The time has not yet come for the appear¬ ance of complete and authoritative histories of the World War. A clear introduction to the conflict and its progress is provided in Hayes, C. J. H., A Brief History of the Great War* ; and Usher, R. G., Che Story of the Great War.* A large amount of useful information concerning the part of the United States in the World War is to be found in McMaster, J. B., Che United States in the World War.* The narrative is much clearer in Bassett, J. S., (Our War with Germany.* An elaborate economic and social history of the war is being prepared by the Carnegie Endowment under the editor¬ ship of James T. Shotwell.

The authoritative discussion of the relation of the Peace Conference to imperialistic prob¬ lems has not yet been produced, though there are pertinent observations in Gibbons' (New Map of Asia,* and many of the facts as to its work in redistributing territory can be found in the New York Times Current History Maga¬ zine. The remarkable book by Keynes, J. M., Che Economic Consequences of the Peace* scarcely touches the problem of imperialism. The League of Nations and imperialism is best analyzed in Duggan, S. P., Che League of Nations, the Principle and the Practice* (es¬ pecially chaps, iii, viii, xi, xii, xiv and xvi). Works calculated to provoke serious re-

flection on the relation of overseas expansion to modern civilization are Hobson, J. A., Im¬ perialism) ; Angell, N-orman, (The, Great Illu¬ sion ; Reinsch, P. S., (Colonial Government' ; Lippman, W., (Stakes of Diplomacy' ; Mac¬ donald, A., (Trade, Politics and Christianity' ; Johnston, H. H., (Common Sense in Foreign Policy' ; Sumner, W. G., (Earth Hunger and Other Essays,' and (War and Other Essays ; Giddings, F. H., < Democracy and Empire

(particularly chap, xvii) ; Hobhouse, L. f •>

(Democracy and Reaction' ; Dennis, J. c>.,

(Christian Missions and Social Progress' ; and Carpenter, J. E., (Comparative Religion.

There are periodicals dealing especially with imperialistic problems, such as Asia; The Asi¬ atic Review; the Far Eastern Political Science Review; The Near East; The International Re¬ view; Eastern Europe; Millard's Review of the Far East; and, most useful of all, the Journal of International Relations (formerly the Jour¬ nal of Race Development) . Information of great interest and value is often presented in

the National Geographic Magazine.

Harry Elmer Barnes,

Professor of History, Clark University, XV or- ■ c ester, Mass.

WORLD POWER, United States as a.

See United States — Diplomacy; United States — Foreign Policy.

WORLD WAR. See War, European.

WORLD'S COLUMBIAN EXPOSI¬ TION, an international exposition held in Chicago, Ill., in 1893, to celebrate the 400th anniversary of the discovery of America by

Columbus. „ . . ,

History — The fitness of some special cele¬ bration of the discovery of America had been recognized and the question agitated severa years before the bill providing for a Columbian Exposition was introduced in Congress in 1889. Several cities urged their claims for the site of the exposition ; chief among them were New York, Chicago, Washington and Saint Loms,

Chicago was finally chosJ% VVrqo The bill passed and approved 25 April 1890. The

organization of the fair was placed under the charge of an Illinois corporation previously or¬ ganized, and the World's Columbian Commis¬ sion, a national commission consisting of dele¬ gates appointed two from each State and I errl" torv two from the District of Columbia and eight at large. The work of construction was placed

under the charge of a Bureau of Con¬ struction, of which Daniel H. Burnham was chief - work was begun on the first building in July 1891 On 23 Oct. 1892 the buildings were formally dedicated by the Vice-President of the United States; the dedication ceremony which was attended by 130,000 people, was held in the Manufactures and Liberal Arts Building. The exposition was formally opened 1 May-1893 by President Cleveland; at the moment when he declared the fair open the flags of the various nations were unfurled, the ˆectric fountains turned on, and the statue of The Rep lie" unveiled. The attendance at the fair was 27 539 041 of which 21,479,661 were paid ad¬ missions ;' the days showing the largest atten-ance were 9 October, Chicago Day, and 4 July, American Independence Day ; the average daily attendance was 172, 71Z The exposition was formally closed 30 October.

Financial. — The bill providing for the expo¬ sition required the city of Chicago to raise $10,000,000 toward the expenses ; later Congress provided for the gift of a special mintage of $2,500,000 in souvenir half-dollars, the exposi¬ tion authorities also issued $5,000,000 worth of debenture bonds ; about $3,000,000 additional were received from other miscellaneous sources, so that about $20,000,000 was available before the opening; the total expenditures for the fair were over $31,000,000, and the profits about $1850,000. The United States government ap¬ propriated $2,250,000 to its exhibits, the States $6,060,350, the foreign governments $5 830 000, and over $350,000 was invested in the Midway Pl3.lS3.nCC.

Buildings and Principal Exhibits.— The site chosen for the exposition was Jackson Park, a portion of the South Park system of Chicago ; it covered 666 acres and extended about two miles along the shore of Lake Michigan. There were about 150 buildings erected ; the more im¬ portant were built of the material called start, a composition of plaster of Paris and jute fibre, which produced the general effect of white mar¬ ble, hence the exposition grounds became generally known as the White City. The Manu¬ factures and Liberal Arts Building faced the lake near the eastern end of the basin ; this was the largest building ever constructed for an exposition ; it covered nearly 31 acres , the main roof was of iron and glass. . At the head of the basin was the Administration Building, with its gilded dome; near this were the Agri¬ cultural Building, Machinery Hall, and the Elec¬ trical and Mining Building. On the west of the lagoon were the Transportation Building and Horticultural Hall, and on the east the Govern¬ ment Building, with a large dome 150 feet high; at the

northwestern end of the lagoon was the Woman's Building, and at the northeastern end the Fisheries Building. Still further to the north were the State buildings, many of the foreign nations' exhibits, and the Fine Arts Building. The Fine Arts Building was an ex- ˆjyiplg of purely classical architecture , it was entered by four richly ornamented portals. The State and foreign nations buildings were in many cases copies of some characteristic historic building or type; as, for example, Virginia's building was modeled on Washing¬ ton's Mount Vernon home, Massachusetts was a copy of John Hancock s house Eng¬ land's represented a manor house of the time of Henry VIII, and Spain's the Convent of La Rabida. In the southern part of the grounds was the Forestry Building, . built in the rustic style; the columns supporting the roof being made of tree trunks furnished by the different nations and the States and Territories of the United States. Near the Forestry Building were 21 number of the small exhibits, the Lrupp exhibit, dairy, *etc.* The Manufactures and Lib¬ eral Arts Building included in its exhibits everything related to engineering, architecture, publishing, technical and domestic arts, together with education, the professions, music and the drama. The Fine Arts exhibit included many masterpieces of painting and sculpture, the Woman's Building containing a collection repre¬ senting woman's work in all lines of activity , the Transportation Building's collection repre¬ sented all modes of transportation from the most primitive to the most complete modern

inventions of ocean steamers and locomotives; and the exhibits of the other special departments of human industry showed most excellently the progress of the race in each special industry.

Special Features. — Among the special fea¬ tures of the exposition the Midway Plaisance was perhaps most interesting; on this were represented the villages of different nations and peoples, including the Irish village, the Javanese village, the Japanese bazaar, the Samoan and Dahomey villages, *etc.* ; here also were the <(Street of Cairo,® and the various amusement features; and the Ferris wheel, 250 feet in

diam¬ eter, carrying 36 coaches. Other special exhibi¬ tions of interest outside the main buildings were the reproduction of the cliff dwellers' buildings at Battle Rock Mountain, Colo. ; the models of Columbus' three caravels, of the Viking ship, and of a modern United States battleship. An¬ other interesting feature of the exposition was the numerous world's congresses held on the grounds under the auspices of the World's Congress Auxiliary. These congresses . dis¬ cussed the leading phases of professional, scientific, economic, educational and religious thought; the World's Parliament of Religions probably attracted the most general attention. Consult Johnson, Rossiter (ed.), <History of the World's Columbian Exposition Held in Chicago in 1893 > (4 vols., New York 1897-98).

WORLD'S PARLIAMENT OF RE¬ LIGIONS. See Congress of Religions.

WORM, or SCREW GEARING are gears connecting shafts that are not parallel and do not meet, and the elements of whose teeth are helical or screw-like. The worm is a screw, sometimes termed an endless screw, made to mesh with the teeth of a wheel called the worm-wheel. The axis of the worm is usually at right angles to the axis of the worm-wheel. Worms are usually made for single curve gear-teeth, because the sides of involute rack teeth being straight, the tool for cutting worm-teeth is easily made. Special gear-cutting machines are used to cut worm-gears. See Gears.

WORM-EATING WARBLER, a small, ground-keeping warbler (q.v.) of the United States (Helmintheros vermivorus), breeding commonly in the woods of the eastern part, and migrating in winter to Central America. It is five and one-half inches long, olive-green above, yellowish-white below, the distinguishing specific mark being three black stripes on the huffy crown. Its song is a faint trill, heard most often in hilly woodlands, where the bird hunts for caterpillars and similar food among the lower branches of the bushes or upon the ground. Its nest is constructed with great skill in some little natural cavity of a hillside, and is cleverly hidden under an arch of twigs and old leaves, so disposed as to well conceal the white, red-speckled eggs. The mother uses the trick common to so many ground-building birds, of feigning lameness, fluttering ahead of the in¬ truder in a frantic attempt to draw him away from the nesting-place in vain pursuit of herself.

WORM FEVER, popular name for the

disease formerly described as infantile remittent fever, but now known to be typhoid fever in young children.

WORM-SEED, the flower-heads of certain species of Artemisia (q.v.) used as a vermifuge. See also Erysimum ; Goosefoot.

WORM-SHELL, one of the curiously un¬ coiled and distorted gastropod mollusks of the ‘ marine family Vermetidce, whose shells might easily be mistaken for the tubes of annelids, such as Serpula. They are free and spiral in early life, and crawl about like ordinary gas¬ tropods, but they afterward settle down and become attached to stones, etc., for the re¬ mainder of their lives. The animals are worm¬ like, with a short proboscis, horny jaws and ra-dula and two short tentacles. When they be¬ come stationary the foot, being of no further use as a locomotive organ, becomes modified into an organ of attachment, and the shell stretches out irregularly. The species are not numerous and occur mainly within the tropics of Eastern seas.

WORMELEY, werm’li, Katharine Pres¬ cott, American author and translator: b. Ips¬ wich, England, 14 Jan. 1830; d. 4 Aug. 1908. She was the daughter of an English rear-admiral and a niece of Com. Edward Preble of the American navy, and came to the United States in girlhood. She was engaged in the relief of Union soldiers during the Civil War and was connected with the United States Sanitary Com¬ mission. She was widely known as a translator of Honore de Balzac’s novels in 40 volumes (1883-97) ; of Moliere in 6 vols. (1892) ; and of the Duc’de Saint-Simon’s (Memoirs) (20 vols., 1898-1901) ; and wrote (Letters from Head¬ quarters during the Peninsular Campaign) (1862) ; (The Other Side of War* (1888); cLife of Balzac* (1892) ; <The United States Sanitary Commission (1863).

WORMS, vorms, Hesse-Darmstadt, town on the Rhine, nine miles northwest of Mannheim. The town is irregularly built and has remains of its mediaeval walls and ramparts. Its princi¬ pal building is the cathedral, completed and con¬ secrated in 1101, a ndble Romanesque structure with four elegant tow’ers, two domes, a double choir and a flamboyant 15th century Gothic portal. The interior is 357 feet long, 87 feet wide, across the transepts 117 feet and is very imposing from its grand simplicity. On the north side of the cathedral is the site of the Bischofshof or episcopal palace, the seat of the celebrated Diet of Worms in April 1521. It was destroyed by the French in 1689, and again in 1794. On its massive red sandstone sub¬ structure the Heil’sche Haus has been erected in the rich Renaissance style. The

restored church of Saint Martin, and the church of Saint Paul secularized as a museum, are also of notable ecclesiastical architecture. Outside the town stands the Liebfrauenkirche (dating from the 1 5th century), which gives its name to the Liebfrauenmilch, a much-esteemed wine grown in the vicinity. The finest monument in Worms is that to Luther, erected from Rietschel's designs in 1868 at a cost of $85,000. Worms is a considerable river port with a good harbor and an active shipping trade. The prin¬ cipal industries of Worms are the manufacture of patent leather, machinery, worsteds, chicory, slate, tobacco, beer, soap and amber wares. Worms is one of the most historical towns of Germany. It was known to the Romans as Borbetomagus, and later as Augusta V angionum,

the capital of the Vangiones. It was destroyed by Attila and rebuilt by Chlodwig in 486. After the partition of the empire among the sons of Ludwig the Pious, Worms became a German free town under the protection of the Elector of the Palatinate. Already in 1255 it belonged to the Confederation of Rhenish towns, and it contained in the time of Frederick Barbarossa 70,000 inhabitants. It was the seat of many Imperial Diets, most famous that under Karl V, at which Luther made his defense. In 1632 the suburbs of the town were leveled by the Swed¬ ish Colonel Haubold, and in 1689 the town itself was ruthlessly destroyed by Melac and the young Due de Crequi under the orders of Louis XIV. In September 1792 part of it was leveled by the French under Custine; at the peace of Luneville in 1801 it was given to France. The peace of Paris in 1814 gave it back to Germany, and the Vienna Congress in 1815 to Hesse-Darmstadt. Pop. 46,891. Consult Fuchs, (Geschichte der Stadt Worms* (Worms 1868) ; (Beitrage zur Geschichte der Stadt Worms5 (Worms 1896) ; Nover, (Das alte und neue Worms5 (Worms 1895).

WORMS, vorms, island in the Baltic, east of Dago, belonging to Esthonia, about 36 square miles in area. It is flat and generally well wooded in the interior and throws out numerous steep promontories, round which strong currents run, so that, often for months together, it

is cut off from all intercourse with the neighboring islands of Oesel, Dago, Runo, etc., as well as with the mainland, and thus the inhabitants who are 9f Swedish origin have re¬ mained unmixed with foreign elements. A stranger is a surprising rarity on this island, and he, in turn, is not less surprised at the pe¬ culiar old Swedish dialect, the architecture and the manners and customs of this small, poor, but happy insular people.

WORMS, any of many elongated jointed animals ; the term has no more definite significa¬ tion or limits than has Vermes (q.v.). Exam¬ ples of what may most properly be called worms are earthworms, leeches, marine annelids and the parasitic flatworms, roundworms, etc., espe¬ cially such as infest the intestinal tract. These are described elsewhere, under their names. See also Parasites.

WORMWOOD, a perennial herb { Arte¬ misia absinthium) of the composite family. It is a native of Europe and northern Asia, whence it has been introduced into other countries by way of gardens in which it was formerly culti¬ vated for domestic medicine. The plant grows about three feet tall, is spreading, bears silky, pinnatifid leaves and yellow flowers in heads arranged in racemes. All parts of the plant are intensely bitter on which account they, the leaves especially, have been used for flavoring drinks. Wormwood is cultivated to some ex¬ tent for the manufacture of absinthe (q.v.), of which it forms one of the most important in¬ gredients and which is named from it. See Artemisia.

WORSHIP, the act of paying divine honors to the Supreme Being; or the reverence or homage paid to Him in religious exercises, con¬ sisting in adoration, confession, prayer, thanks¬ giving and the like. *1 he Christian Church dis¬ tinguishes between the worship due to God

alone (latria), the respect paid to the saints (dalia) and the worship due to the Virgin Mother of Christ {Hyperdulia) . The homage paid to idols or false gods by pagans is idola¬ try. ((Worship5) is also a title used in Great Britain and some British colonies in addressing certain magistrates. See Liturgy; Prayers; Religion ; Ritual.

WORSHIP, Freedom of. (The word wo rship is derived from A. S. weortliscipe — zveorth, worthy, -|- scipe, ship ; it meant zvorthi - ness in O. E., and is now used to designate reverence for a person or a thing). Reverence is the honor due to another because of some

excellence which he has and we have not. That excellence is either natural or supernatural. If we reverence another because of some natural excellence, which we have not, our worship is natural. By such natural reverence we honor our parents, because of a superior excellence in them. They gave us life itself. For that gift we can never sufficiently pay them back. By the excellence of parenthood they will ever be superior to us, and an object of natural reverence. Of natural worship and reverence this article does not treat.

1. Supernatural and External Worship. — If we reverence another because of some supernatural excellence, which we have not, our worship is supernatural. Now this super¬ natural excellence may be finite or infinite, created or uncreated. Supernatural reverence of another, because of infinite and uncreated excellence, is called adoration. Supernatural reverence of another, because of finite and created excellence, has among Catholics the technical, figurative name of dulia — from douieia t Slavery.® Just as the subscription (<Your obedient servant5) means servitude only in a figurative sense, so the supernatural rev¬ erence of the saints is slavery only by a figure of speech. Moreover, among Catholics the reverence for the Blessed Virgin Mary is called hyperdulia, <(more than dulia? to indi¬ cate that the homage paid to her is in a class by itself. It is not adoration, because the motive, objectively considered, is not infinite and uncreated. It is dulia ; because the motive is finite and created. It is <(more than dulia* ; because divine motherhood, the motive of our reverence for Mary, though a finite and created excellence, is unique and in a class by itself. There is only one mother of the divine Per¬ son, Jesus Christ. Supernatural reverence — be it adoration, hyperdulia, or dulia — is either ma¬ ternal or external worship. Quite naturally one is free from State interference with one's internal worship; the State is not concerned with the acts of reverence, which one in no wise expresses by outward signs. The subject of this article is freedom, not of internal, but of external, supernatural worship.

2. Obligatory Worship. — This freedom of worship does not preclude man's obligation to religion, which flows from natural law. Ex¬ ternal, supernatural worship is not a matter of choice to man. Apart from the duty of reli¬ gion, consequent upon his knowledge of God's supernatural revelation of Himself to the hu¬ man race, man is by the very law of nature obliged to both internal and external super¬ natural worship. For man was created to praise, reverence and serve God. But man is

made up of both body and soul. Hence the faculties of his animated body, as well as the powers of his spiritual soul, should join in this praise, reverence and service of the Crea¬ tor. That is to say, there should be an ex¬ ternal manifestation of the reverence, which the mind conceives and the will elicits. (<Ever since the creation of the world, the unseen truths about God, — that is, His everlasting power and divinity, — are to be seen by being reasoned out by means of His works. So that men have no excuse.® (Romans i, 20). The religious freedom, whereof our article treats, is man's right to follow the dictate of his rea¬ son and the mandate of his will as to the manner of external worship. This right should be respected and protected by the State as it now is constituted. It is fundamental to our government. For the First Amendment to the Constitution ordains that (f|Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof.®

Freedom of external worship, guaranteed to the individual by the Constitution of the. United States, does not preclude the duty of civil so¬ ciety as such to give reverence to God. For God is the author and stay of civil society. Without Him and His gifts there would be no social organism. Hence is society bound to acknowledge His dominion and beneficence. The State recognizes its indebtedness to par¬ ticular persons and to other States. America is not unmindful of the services of Lafayette and Rochambeau, nor of France that sent them to our aid. Much less should our State be oblivious of the infinite Being, on whom we depend for our existence and well-being. Nor are the United States forgetful of God. Wit¬ ness the appeal of the signers of the Declara¬ tion of Independence to ((the laws of nature and of nature's God,® to the rights wherewith men <(are endowed by their Creator,® and ((to the Supreme Judge of the world, for the rectitude of their intentions,® when they pledged them¬ selves to the support of the independence of the United States ((with a firm reliance on the protection of divine Providence.® Witness likewise the annual proclamation of Thanks¬ giving Day by the President of the United States.

The Church, as established by Christ, is a true and perfect society; it has its own in¬ alienable rights, which the State should pro¬ tect.

Such protection is quite feasible, when society is entirely Catholic; but in a State such as ours, would be fraught with many and varied difficulties. Hence Catholics of the United States have always stood for justice to the consciences of each and all. Their prin¬ ciple of action in matters religious has been: Live and let live. Whereas at times Protest¬ ants seem to have called upon civil authority to impose on others their own religious tenets. In colonial days, the only real freedom of worship to be found was that of Maryland during the brief control of the colony by Catho¬ lics, 1634 — 89. As Bancroft says, in his (History of the United States, } the Maryland Act of Toleration, 1649, was <(the first in the annals of mankind to make religious freedom the basis of the State.®

3. Free Worship. — In civil society consti¬ tuted as is ours, the only feasible attitude of

the State toward external worship is that of the First Amendment to the Constitution. Thereby is safeguarded by the United States the inalienable right, which her every citizen has to liberty of conscience. That right should be respected by civil authority. For authority, the unitive principle of the State, is from God. Therefore it may not validly impose an obligation to violate God's law. But to go against one's conscience is to violate God's law. For it is the function of conscience to dictate to us what is God's law in each partic¬ ular case. Were the State so to legislate as to atrophy this function of conscience, it would seriously interfere with the observance of God's law. For it is the certain dictate of conscience that testifies just what particular form of worship is willed by God.

From this inalienable right, which each one has to worship God according to the certain dictate of conscience, we may conclude that, in a State such as ours, it would be ethically wrong to force one to practice even the true revealed religion. And this conclusion we draw, despite the fact that Christianity was estab¬ lished as a world-religion, which Jesus wished all to embrace. Just before the Ascension, He appeared to the eleven apostles in Galilee and said to them : (<A11 power hath been given me in heaven and upon earth. Therefore go ye; make disciples of all nations; baptize them in the name of the Father and of the Son and of the Holy Ghost ; teach them to observe all things whatsoever I have commanded you. And, lo, I am with you all days, even to the end of the world.® (Matthew xxviii, 18-20). And on the very point of ascending into heaven from Mount Olivet, Jesus once again gave this solemn message to the same body of teachers : <(Go

ye to all the world ; preach the Gospel to all creation. He that believeth and is baptized, shall be saved. He that believeth not, shall be damned.® (Mark xvi, 15-16). The will of Jesus Christ, the divine Ambassa¬ dor, is clear. He wishes all to belong to His Church. And yet no one is subject to the au¬ thority of the Church, unless he has entered it. And he enters the Church by faith ; since faith is the root and foundation of justifica¬ tion. But true faith may not be forced. It must flow from the reason at the mandate of the unhampered, unshackled, free will.

Likewise, as our Constitution decrees, the State may not <(prohibit the free exercise® of religion according to one's conscience ; nor im¬ pose any obligation which runs counter to one's religious duty. It goes without saying that the rights of others must be protected. And the State may prevent such religious prac¬ tices as interfere with these rights, and hinder the well-being of the community. This juridi¬ cal status of the modern, constitutional State, as the protector of the religious rights of all, is the logical consequence of two fundamental facts in the science of sociology.

First, the State is not a divinely constituted depository of God's revelation to man. Hence it has neither the duty nor the right to dictate what its members shall believe, nor how they shall externally manifest their belief. Christ established a spiritual, and not a material so¬ ciety. He gave His doctrines to the Church, and not to the State, to hand down to men.

Pilate asked Him, <(Art thou a king?® Jesus made reply : (fMy kingdom is not of this world.® (John xviii, 33-36).

Secondly, the social organism or State is from God. Because man is by nature a social being. It is by the law of nature that men form themselves into an organic social unit. But whatsoever is by the law of nature, is from God the Author of nature. Therefore the social organism is from God. Therefore the unifying and vitalizing principle of that social organism is from God. But authority is the principle

which unifies and vitalizes society. Hence the authority of the State is from God. Therefore civil authority is bound to protect God's rights in society. And one of those divine rights is to the reasonable manifestation, by the members of society, of their relations to the Supreme Author of the social organism.

No State has the right to be so godless and atheistic as utterly to rule God out. To rule God out of society were to do away with the very Author of society; to substitute the au¬ thority of might for the might of authority; to destroy the vitalizing principle of the State, and to devitalize, disintegrate and destroy the social organism.

4. Freedom of Worship, Guaranteed by Treaties. — Since the State, as to-day consti¬ tuted, has the right and the duty to guarantee to its subjects that freedom of worship which is dictated by the certain conscience of each individual and does not clash with the rights of others, this same freedom may be the legiti¬ mate content of international treaties. The exigencies of diplomatic, business or other re¬ lations may render it necessary that the sub¬ jects of one State reside in another. They still have the natural right to worship God according to the dictate of a certain conscience. And their own State may protect that right. The treaty, whereby a State protects the re¬ ligious freedom of its subjects abroad, is an agreement between two sovereign States ; and essentially differs from a concordat. A con¬ cordat is a treaty between the Apostolic See of Rome and a State in diplomatic relations therewith; it has to do with the relations of the Catholic Church to the State. Before the Protestant reformation there was only one ecclesiastical authority in Christendom ; and the religious rights of subjects were amply protected by the canonical relations between that supreme papal power and Christian states. Now such protection can no longer be guaran¬ teed. Hence the necessity of treaties between sovereign states, which have as their object the guarantee of a freedom of divine woiship. We instance some such treaties between the United States and other countries, which were generally made for the protection of Protestant missionaries. By a treaty of 1805, with the sultan of Tripoli, the American consul, his family and household, were guaranteed free¬ dom of worship in the consulate. By the Treaty of Guadalupe, 1848, Mexico permitted Americans to practise and spread their reli¬ gion within that republic. In 1856, Siam signed a treaty with the United States, whereby Ameri¬ cans were allowed to build churches and prac¬ tise their faith in that kingdom. China, by the treaties of 1858 and 1868, yielded to Americans the right to build churches, maintain ceme-VOL. 29 — 36

teries and practise their religion in those parts where foreigners were permitted to reside. In 1858, Japari ceded to Americans freedom of worship and the right to build churches ; and the United States in turn assured Japan against molestation of her subjects in their worship. The year following, 1859, our government secured by treaty the religious freedom of Americans, residing in Paraguay. In Turkey, American missionaries have been active since 1818. At first they shared in the religious freedom, which the Edict of Toleration has al¬ lowed to all Christians in the Ottoman empire since the 15th century. The treaties of 1830 and 1874 guaranteed to Americans the right to build churches, conduct mission schools and spread their religion throughout the Turkish empire.

Bibliography. — Pelisson-Fontanier, (De la tolerance des religions ; Lettres de M. Leibnitz et Reponses de M. Pelisson) (1692) ; Balmes, (E1 protestantismo comparado con el catol-icismo en sus relaciones con la civilizacion europea) (Vol. I, 1842) ; von Ketteler, Prei-heit, Autoritat, und Kirche5 (1862) ; Mon-talembert, P'eglise libre dans l'etat libre> (1863) ; Liberatore, (La chiesa e lo stato5 (1871) ; Hergenrother, (Catholic Church and Christian State) (Eng. tr., 1876) ; Lehmkuhl, (Gewissens-und Kulturfreiheit5 (in Stimmen aus Maria Lack, . 1876); Basˆ (Etudes sur les rapports de l'eglise et de l'etat, et sur leur separation (1882); Reinkens, (Lessing fiber Toleranz5 (1884) ; Schaff, (Church and State in the United States, or the American Idea of Religious Liberty and its Practical Effects5 (1888) ; Dollinger, (Akademische Vortrage5 (III, 1891) ; Nilles, (Tolerari potest' (in Zeitschrift fiir katholische Theologie, 1893) ; Rickaby, Joseph, (Moral Philosophy, or Ethics and Natural Law5 (1893) ; Creighton, Per¬ secution and Tolerance5 (1895) ; Paulus, Pie Strassburger Reformatoren und die Gewissens-freiheit5 (1895) ; id., Protestantismus und Toleranz im 16 Jahrh.5 (1911) ; Lecky, (Democracy and Liberty5 (Vol. I, 1896) ; Havet, P'heresie et le bras seculier au moyen age jusqu'au xiiie siecle5 (1896) ; Ruffini, (La liberta religiosa5 (1901) ; Kohler, (Reforma¬ tion und Ketzerprocess5 (1901); Devas, (Key of the Worid's Progress5 (1906) ; Cathrein, <Gewissen und Gewissensfrejheit5 (1906); Acton, (History of Freedom5 (1907) ; Vacandard, P'inquisition : etude historique et critique sur le pouvoir coercitif de l'eglise5 (1907); von Hertling, Pecht, Staat, und Gesellschaft5 (1907).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College,

M ary land.

WORSTEDS, wust'ed or wur'sted, are varieties of woolen yarn or thread, spun from long staple wool which has been combed, and which in the spinning is twisted harder than ordinary. It is knit or woven into stockings, carpets, *etc.* The name is derived from Wor¬ sted, a village in Norfolk, where it is supposed to have been first manufactured.

WORT, the saccharine liquid obtained by the action of malt on a mixture of water and crushed barley, corn or other grain, the whole being known as <(mash.® The water extracts

the maltose and dextrine from the malt and allows the diastase to act on the starch of the grain, changing it also to maltose and dex¬ trine. The pectase of the malt at the same time changes the grain proteids to soluble pep¬ tones. Care must be taken of the temperature and the dilution of the mash in order to obtain the best results. Worts are of various kinds, depending on the grain used and the tempera¬ ture given it. Some are fermented to beer, ale, porter and like beverages, while other forms are fermented to a mash that is distilled for alcohol or whisky.

WORTH, William Jenkins, American gen¬ eral : b. Hudson, Columbia County, N. Y., 1 March 1794; d. San Antonio, Tex., 7 May 1849. He received an ordinary education, and when the War of 1812 broke out enlisted as a private soldier, rising to the rank of captain in 1815. He was instructor of infantry tactics and commander of cadets at West Point 1820-28 and in 1838 became colonel of the 8th infan¬ try. In 1840 he was sent to serve in the war against the Florida Indians, and in 1841 took the chief command. He was successful in re¬ peated and severe conflicts with the aborigines, whereby the war was brought to a close, and in August 1842 was brevetted a brigadier-gen¬ eral for gallantry and distinguished services. In the war with Mexico, at the-battle of Mon¬ terey, 23 Sept. 1846, he bore a very important part. As it was impossible to communicate with the commander-in-chief, Worth was obliged to act independently throughout the battle. He carried the forts commanding his line of approach, stormed the

bishop's palace, and had fought his way through the streets nearly to the great plaza, when the town capitu¬ lated to Taylor, approaching from the other side. For these achievements Worth was brevetted a major-general, and received a sword from Congress. He was also distinguished at Cerro Gordo, Puebla, Cherubusco, Molino del Rey, and at the storming of the City of Mexico. A monument was erected to his memory by the city of New York, at Broadway and 25th street in 1858.

WORTH, William Scott, American gen¬ eral: b. Albany, N. Y., 6 Jan. 1840; d. Clifton, S. I., 16 Oct. 1904. Entering the Union army as 2d lieutenant in 1861, he became captain in 1866; lieutenant-colonel of the 13th infantry in 1894, and colonel in September 1898. He ac¬ companied the army to Cuba, and during the assault on San Juan Hill, 1 July 1898, was severely wounded. He was promoted brigadier-general, United States army, in the following November, and was retired a week later.

WORTH, vert, Alsace, village at the conflu¬ ence of the Sauerbach and Sulzbach rivers, 10 miles southwest of Weissenburg. It is cele¬ brated as the place where the French under Marshal MacMahon on 6 Aug. 1870 met their first great defeat in the Franco-German War (q.v.).

WORTHEN, wer't'hen, William Ezra,

American civil engineer: b. Amesbury, Mass., 14 March 1819; d. New York, 2 April 1897. After graduation from Harvard in 1838, he be¬ gan the practice of civil engineering, and until 1848 was employed chiefly with surveys con¬ nected with the Boston water supply, and in

other hydraulic works. He designed and con¬ structed several mills in Lowell, in 1849 began architectural work in New York, was made engineer of the New York and New Haven Railway, and in 1854 its vice-president. After 1854 he was busily employed as a practising and consulting engineer, being frequently retained as an expert in matters relating to the planning, construction or improvement of sewage and water systems. He was chief engineer of the first rapid transit commission of New York, and in 1890-91 chief engineer of the Chicago main drainage canal. In 1887 he was president of the American Society of Civil Engineers. Be¬ sides official reports, he published (Cyclopaedia of Drawing1* (1857) ; (First Lessons in Mechanics) (1862) ; and (Rudimentary Drawing for Schools* (1863).

WORTHING, wer'fhmg, England, a water¬ ing place in Sussex, 12 miles west of Brighton, with good streets, handsome terraces, cres¬ cents, and villas, splendid hotels, baths, smooth sands, a beautiful esplanade, libraries, a literary institution, reading-rooms and assembly-rooms. Fruit-growing under glass is an important in¬ dustry of the town. Pop. 30,305.

WORTHINGTON, Henry Rossiter,

American inventor : b. New York, 17 Dec. 1817; d. Tarrytown, N. Y., 17 Dec. 1880. In 1840 he began a series of experiments with steam for the propulsion of canal boats, soon afterward devised a small steam pump to be used in the maintenance of the water supply in the engine boiler, and in 1841 patented an independent feed pump which developed into the direct-act¬ ing steam pump which he patented in 1849. Subsequently he built in Savannah, Ga., the first direct-acting compound-engine ever used in waterworks ; invented the duplex pump, and de¬ vised various improvements in steam and hy¬ draulic machinery.

WORTHINGTON, Minn., village, county-seat of Nobles County, on the Chicago, Rock Island and Pacific, and the Chicago, Milwaukee and Saint Paul railroads nearly 100 miles north¬ east of Sioux City, la. It is in an agricultural section and has flour mills, a grain elevator, stockyards and machine shops. The three banks have a combined capital of over $125,000. The village has a high school established in 1883, and a public library. Pop. (1920) 3,481.

WOTHERSPOON, William Wallace,

American military officer: b. Washington, 16 Nov. 1850; d. there, 21 Oct. 1921. He was appointed an officer in the army in 1873. He first saw service in the Indian wars of that period, and later took an active part in both Mexican and Philippine wars, and dur¬ ing the latter campaign was collector of customs at the port of Iloilo in the Philippines. On his return to the United States in 1903, Woth-erspoon was appointed assistant commandant of the army service schools at Fort Leavenworth, Kansas. Promoted to the general staff of the army (1909-10) he soon rose to the presidency of the Army War College (1910-12) ; and from April to November 1914 was chief of staff of the United States army. He retired with the rank of major-general, 16 Nov. 1914. In the following year he was appointed superin¬ tendent of public works of the State of New York.

WOTTON, wot'on, Sir Henry, English diplomat and poet : b. Boughton Malherbe, Kent, 30 March 1568; d. Eton, December 1639. He was educated at Oxford, and having studied civil law under an eminent Italian professor, became proficient in the Italian language. He visited all the principal countries of the Con¬ tinent 1589-97, and on his return was secretary to the Earl of Essex. On the fall of that nobleman he went to Florence, where he com¬ posed a treatise, printed after his death, en¬ titled (The State of Christendom.5 The Grand Duke of Tuscany having intercepted some let¬ ters disclosing a plot to take away the life of James, king of Scotland, engaged Wotton to carry secret intelligence of it to that prince. This service he ably performed in the character of an Italian, and when James came to the English crown he sent for Wotton, knighted him and in 1604 employed him as an Ambassa¬ dor to the Republic of Venice. As Wotton passed through Augsburg, being desired to write in an album, he wrote in Latin that ((an am¬ bassador is a good man, sent to lie abroad for the good of his country.® This innocent sally was represented as a state maxim sanctioned by the religion of the king of England. James, who thought nothing relative either to king¬ craft or state-craft a subject for wit, was highly displeased; and on his return Wotton had to make humble apology. At length he recovered the royal favor, and was restored to his former post at Venice (1616-19). Other missions fol¬ lowed, and in 1624 he was made provost of Eton College. The first-fruits of his leisure were his 'Elements of Architecture.5 A' col¬ lection of miscellanies was published after his death entitled 'Reliquiae Wottonianae.5 This collection includes several poems by Wotton, of which two, (The Character of a Happy Life* and 'On His Mistress, the Queen of Bohemia,5 are among the finest lyrics in the English lan¬ guage. Consult (Lives) by Izaak Walton (1651) and A. W. Ward (1899) and More, P. E., 'Shelburne Essays) (Fifth Series, New York 1908).

WOTTON, William, English scholar : b. Wrentham, Suffolk, 13 Aug. 1666; d. Buxted, Essex, 13 Feb. 1726. He had acquired a re¬ markable knowledge of Latin, Greek and He¬ brew at the age of 10, was graduated at Saint John's College, Cambridge, in 1679, and was elected a Fellow there. He was later ordained, held various livings, and was a prebend of Salisbury Cathedral from 1705 until his death.

He was prominent in the controversy concern¬ ing the respective merits of ancient and modern languages, taking the side of the moderns. He ably defended his views in ‘Reflections Upon Ancient and Modern Learning 5 (1694, 1697), which was subjected to an attack by Swift in ‘The Battle of the Books.5 He was also -au¬ thor of ‘History of Rome5 (1701) ; ‘Traditions and Usages of the Scribes and Pharisees5 (1718), and he left an unpublished translation from the Celtic of the laws of Hywel Dda

(1730).

WOUND, in surgery, a solution of contin¬ uity of any tissue or soft part of the body. Wounds are divided by writers on surgery into several kinds, the distinctions being founded either upon the sort of weapon with which the

injury has been inflicted; upon the circumstance of a venomous matter having been introduced into the part ; or upon the nature of the wounded parts themselves, and the particular situation of the wound. Hence we have cuts, incisions, or incised wounds, which are pro¬ duced by sharp-edged instruments, and are gen¬ erally free from all contusion and laceration. The fibres and texture of the wounded part have suffered no other injury but their mere division ; and there is, consequently, less tend¬ ency to inflammation, suppuration, gangrene and other bad consequences than in the gener¬ ality of other species of wounds. Another class of wounds are stabs or punctured wounds, made by the thrusts of pointed weapons, as bayonets, lances, swords, daggers, etc., and also by the accidental and forcible introduction of con¬ siderable thorns, nails, etc., into the flesh. These wounds frequently penetrate to a great depth so as to injure large blood-vessels, viscera and other organs of importance ; and as they are generally inflicted with much violence the parts suffer more injury than would result from their simple division. Many instruments by which punctured wounds are made increase in diam¬ eter from the point, and when they penetrate far they force the fibres asunder like a wedge, and cause serious stretching and contusion. Bayonet wounds of the very soft parts are ordinarily followed by violent inflammation, tumefaction, large abscesses, fever, delirium, *etc.* A third description of wounds are the contused and lacerated, which strictly compre¬ hend, together with a variety of cases produced by the violent application of hard, blunt, obtuse bodies to the soft parts, all those

common in¬ juries called gunshot wounds (q.v.). Many bites rank also as contused and lacerated wounds. In short, every solution of continuity which is suddenly produced in the soft parts by a blunt instrument or weapon which had neither a sharp point nor edge must be a contused, lacerated wound.

Poison wounds are those which are compli¬ cated with the introduction of a venomous mat¬ ter or fluid into the part. Such are the stings and bites of a variety of insects, and the sur¬ geon, in the dissection of putrid bodies, or in handling instruments infected with any venom¬ ous matter, is exposed to the danger of poisoned wounds from cuts. The most dangerous, how¬ ever, of this class of wounds occur from the bites of the viper, the rattlesnake, etc., or from those of rabid animals. (See Hydrophobia). Wounds may likewise be universally referred to two other general classes, the simple and com¬ plicated. A wound is called simple when it occurs in a healthy subject, has been produced by a clean, sharp-edged instrument, and is un¬ attended with any serious symptoms. A wound, on the contrary, is said to be complicated when the state of the system, of the wounded part, or the wound itself, indicates the necessity for more complex treatment than the simple reunion of the cut surfaces. The differences of compli¬ cated wounds must, therefore, be very numer¬ ous, as they depend upon many incidental cir¬ cumstances, the principal of which, however, are hemorrhage, nervous symptoms, contusion, the unfavorable shape of the injury, the dis¬ charge or extravasation of certain fluids, indi¬ cating the injury of particular bowels or vessels,

etc. All large or deep wounds are attended with more or less symptomatic fever, which usually comes on at a period varying from 16 to 36 hours after the infliction of the injury, and is generally of the inflammatory, but sometimes of an asthenic character. The liability to gan¬ grene is also a formidable danger to be guarded against in the treatment of complex wounds.

In incised wounds the first thing to be at¬ tended to is to stop the hemorrhage. This is usually accomplished by simply bringing the

edges of the wound together; but if any of the larger blood-vessels have been injured, pressing the trunk by means of a bandage or tourniquet will be necessary; and should this not succeed, the vessels must be secured with ligatures. Next, care should be taken that all extraneous substances are removed from the wound. Then the edges of the wound are to be brought to¬ gether, and retained either by straps of ad¬ hesive plaster, or in some situations by one or two stitches. Generally such wounds heal very quickly, without any suppuration, ((by first in¬ tention.® When, however, this is not the case, and suppuration comes on, all attempts to pro¬ cure union by first intention should be aban¬ doned, the plasters and bandages removed, poul¬ tices and warm dressings used to remove in¬ flammation, and afterward healing ointment applied. Lacerated and contused wounds re¬ quire to be similarly treated ; but they heal less kindly, and suppuration almost always takes place. The swelling and inflammatory symp¬ toms which commonly attend contused wounds are to be diminished by cooling lotions or emol¬ lient poultices. Punctured wounds are danger¬ ous from their depth ; and the internal effusion of serum and blood which usually attends them. They are frequently also followed by severe inflammation and suppuration. The same gen¬ eral principles apply in this case, too. Some¬ times it may be necessary to enlarge the wound a little, so as to remove the stretching of the parts, and to lessen the inflammation ; leeches and fomentations are often required. In poi¬ soned wounds free incisions, and even ampu¬ tation may often be necessary. See Gunshot Wounds and consult Brewer, G. E., (A Text¬ book of Surgery* (New York 1915) ; Groves, E. W. H., (Gunshot Injuries of Bones) (Lon¬ don 1915) ; Penhollow, D. P., (Military Surgery) (ib. 1916) ; Stevenson, W. F., (Wounds in War) (New York 1898).

WOUNDS, War. See War Wounds.

WOUWERMAN, wow ver-man, Philips, a

Dutch painter: b. Haarlem, May 1620; d. there, 19 May 1668. He was instructed by his father, an indifferent artist and by Wynants of Haar¬ lem, in which city his life was passed. Accord¬ ing to the commonly received account, his repu¬ tation as a painter during his life was small. After his death his pictures rose immensely in value, and he is now one of the most esteemed painters of the Dutch school. In consequence, it is said, of the disgust with which this neglect inspired him, he destroyed before his death all the studies he had made during his life, from fear that his son might be induced by the pos¬ session of them to become a painter. His sub¬ jects consist for the most part of roadside scenes and hunting or battle pieces, and it is commonly

believed that he never painted a

picture without a white or gray horse as a conspicuous object. His technical qualities are of a high order and his skies, foregrounds and foliage are executed in the best style of his school. He left upward of 800 carefully fin¬ ished pictures. Those offered for sale always bring high prices, and in 1892 his (Halt of a Sporting Party) was sold for $18,375. The best collection of his works is in the Royal Gallery of Dresden. There are also fine ex¬ amples in the Louvre, and in Munich, Vienna, Petrograd, Amsterdam, The Hague, Rotter¬ dam, *etc.* Consult De Groot, C. Hofstede, Catalogue Raisonne of the Works of the Most Eminent Dutch and Flemish Painters of the 1 7th Century* (new ed., 1909).

WOVEN FURNITURE. See Wicker

Weaving and Products.

WOVOKA (English name, Jack Wil¬ son), Piute Indian prophet: b. Mason Valley, Nev., about 1856. He was left an orphan at the age of 14, and became a member of the family of David Wilson, a white man, from whom he received his English name. In 1888 or 1889, while in delirium from an illness he had what he described as a revelation to the Indians from the Great Spirit. He established himself as a prophet, foretelling the time when the old Indian life would be restored as it had been before the coming of the whites. Among the principles he put forth in his preaching were the equality of women in ceremonial affairs, the abolition of tribal war¬ fare and the war dance, property distribution, and undue grief at funerals. He became most widely known among the various tribes by the institution of the Ghost Dance (q.v.) which the Indians generally adopted. The dance reached its greatest popularity in about a year's time after which, largely because of the Sioux outbreak (1890-91) and the action of the United States government, the excite¬ ment quickly subsided. Wovoka's influence waned to negligibility upon the failure of his prophecies. Consult Mooney, J., (The Ghost Dance Religion) (1900).

WRANGEL, vrang'el, or WRANGELL, Ferdinand Petrovitch, Baron, Russian naval officer and explorer: b. Livonia, 9 Jan. 1795; d. Dorpat, 6 June 1870. He studied at the Naval Academy, Saint Petersburg and in 1820-24 directed a Polar expedition to explore the coast of eastern Siberia and the region north of Asiatic Russia. By sledge-journeys under¬ taken in 1822 and 1823 he reached lat. 72° 2' N., but he found

no trace of the reported land for which he was searching. This was discovered by G. W. De Long in 1867, and is now known as Wrangel Land, though taken possession for the United States as ((New Columbia® by Hooper in 1881. In 1829-34 Wrangel was governor-general of Russian America, and in 1840-49 director of the Russian-American Company. He attained vice-ad¬ miral's rank in the navy. In 1855-58 he was acting Minister of Marine, and subsequently a Councillor of State. He opposed the sale of Russian America to the United States. His ac¬ count of his Polar expedition appeared in Rus¬ sian in 1844. An account in German was pre¬ pared from Wrangel's journals (1839), and of this an English translation was made by Sabine,

(Wrangell's Expedition to the Polar Sea> (1840). Consult Von Engelhardt, (Ferdinand von Wrangel und seine Reise) (1885) and Sa¬ bine (ed.) (Narrative of an Expedition to the Polar Sea in 1820-23> (London 1840).

WRANGEL, Karl Gustaf von, Count, Swed¬ ish general : b. Skokloster, on Lake Maelar, 13 Dec. 1613; d. Isle of Rugen, 24 June 1676. He accompanied Gustavus Adolphus in his expe¬ dition to Germany, and at the battle of Liitzen, in 1632, rendered great services after the fall of the king. In 1641 he was one of the major-generals who commanded the Swedish forces until the arrival of Torstenson, and under him participated in the campaign in Germany, and the famous march of Holstein. After the death of Flemming in 1644 he received the supreme command of the Swedish fleet, and obtained over the Danish fleet a great naval victory on 13 October, between the islands of Femern and Laaland. In 1646 he succeeded Torstenson as commander-in-chief of the Swedish army, ef¬ fected a junction at Geissen with the French forces under Turenne, with whom he crossed the Main and besieged Augsburg, which, how¬ ever, was relieved by the Austrian army. In 1648 the Swedes and French defeated the Aus¬ trians and Bavarians near Zusmarshen, but re¬ tired before the army of Piccolomini. Wrangel commanded under Charles X in the

campaigns in Poland (1655) and Denmark (1657-59), and in 1674 led an army of 16,000 men into the elec¬ torate of Brandenburg. Ill health obliged him to relinquish this command before the conclu¬ sion of the campaign.

WRANGEL (rang'gel) LAND, or NEW COLUMBIA, an island in lat. 71° 32" N., and long. 178° W. ; in the Arctic Ocean, about 100 miles off the coast of Siberia and 300 miles from the coast of Alaska. It is about 75 miles long and 20 miles wide. It consists chiefly of bare rocks which rise to a height of 2.000 feet. At the base and in places near the shore line there is some vegetation. The first mention of an island in this locality was made about 1810, and in 1821 Ferdinand Baron Wrangel, the Rus¬ sian explorer, commanded an expedition in search of this land. Long, the American ex¬ plorer, sighted the island in 1867, and Hooper, also an American, visited it in 1881, and took possession of it for the United States. He named the island New Columbia. Consult Hooper, Rosse, Muir and Nelson, (Cruise of the Corwin* (Washington 1893).

WRANGELL, Alaska, village, on Wrangell Island, near the mouth of the Stikine River, about 170 miles southeast of Juneau, and 120 southeast of Sitka. A settlement was made here by Russians in 1833. It is a trading post for fish and furs. It has a hatchery, salmon can¬ neries and storehouses. It was long important as a distributing centre for mining camps and interior trading posts. There is steamship com¬ munication with Seattle and the town has a government school for natives. It contains also a wireless station. Pop. about 800.

WRANGLER, Senior, a term applied previous to 1909 in the University of Cam¬ bridge, England, to the undergraduate who passed the best public mathematical examina¬ tion for the bachelor's degree. The candidates

for honors were arranged in order of merit in three lists or classes, of which the highest was called that of wranglers, the next that of senior optimes, and the lowest that of junior optimes — the whole constituting what was known as the mathematical tripos. Hence the senior wrangler or the highest in the list of wranglers was the most distinguished mathematician of the year. Since 1909 the results of the examination have been published with the names in alpha¬ betical order.

WRASSE, a fish of the family Labridce (q.v.), of which the best known

representatives in America are cunners, doncellas, ladyfishes, tautogs, *etc.*

WRATTISLAW, rat'is-la, Arthur Henry,

English scholar : b. England, of Bohemian par¬ entage, about 1822; d. 1892. He was gradˆ uated from Cambridge in 1844, was headmaster of Felstead Grammar School 1849-57, and of that at Bury Saint Edmonds 1857-79, and was vicar of Manorbier, Pembrokeshire, Wales, 1879-87. He was the leading Slavonic scholar of his day in England, and among his impor¬ tant publications are (Lyro Czecho-Slavon- ska* (1849) ; (The Queen's Court MSS. with Other Ancient Bohemian Poems* (1852) ; (Life, Legend and Canonization of Saint John Nepo-muk* (1873) ; (Native Literature of Bohemia . in the 14th Century* (1878) ; (Sixty Folk Tales from Exclusively Slavonic Sources * (1889).

WRAXALL, raUsal, Sir Nathaniel Wil¬ liam, English historian : b. Bristol, 8 April 1751; d. Dover, Kent, 7 Nov. 1831. He was in the East Indian Civil Service, 1769-72, and dur¬ ing the course of some seven years of foreign travel was a confidential agent of Queen Caro¬ line Matilda of Denmark to her brother, George III (1774-75). He published (Cursory Re¬ marks Made in a Tour* (1775) ; (Memoirs of the Valois Kings1* (1777) ; (History of France from Henry III to Louis XIV) (1795) ; Me¬ moirs of the Courts of Berlin, Dresden, War¬ saw, and Vienna1* (1799), and the famous (Historical Memoirs of My Own Time, from 1772 to 1784> (1815). For a libel in the last on Count Woronzov, Russian envoy to England, Wraxall was fined $2,500 and sentenced to six months' imprisonment. He is an amusing writer, but his veracity has been many times questioned. He sat in Parliament for 14 years from 1780 and was knighted in 1813. Consult his (Posthumous Memoirs,1* continued from 1784 to 1790 (1836).

WRAY, John. See Ray, John.

WRECK, that which is cast or driven ashore by the waves, the goods, broken timbers, plates, etc., cast ashore from a ship that has been broken up, destroyed or rendered helpless at sea, as by collision, tempest, *etc.* In mari¬ time law the term means the goods cast ashore by the waves after shipwreck, and left there within the jurisdiction of some country, and subject to common law. A ship also is a wreck when she is rendered unable to pursue her voyages without repairs exceeding half her value. A sunken vessel is not a wreck, but a derelict. In the United States laws have been enacted by the several States bordering on the sea and on the Great Lakes for the safe-keep-

ing and proper disposition of wreck. Goods found at low-water mark, or between high-and low-water mark, whether resting or partly rest¬ ing on the ground, are wrecks, and, if not re¬ claimed, belong to the owner of the shore. See Salvage; Marine Insurance.

WRECKAGE, in navigation, is usually understood to mean any ship or goods driven ashore or found floating at sea in a deserted or unmanageable condition. In law, wreckage is defined as such articles of value as are cast upon land by the sea, and includes jetsam, flotsam, ligan and derelict. In most countries any person found stealing or destroying any wreck is chargeable with felony; and a person proved to be in possession of shipwrecked goods, or who offers such goods for sale, may be fined or imprisoned. See Wreck.

WREN, ren, Sir Christopher, English architect: b. East Knoyle, Wiltshire, 20 Oct. 1632; d. Hampton Court, Berkshire, 25 Feb. 1723. He entered as a student at Wadham Col¬ lege, Oxford, in 1646, having previously given proofs of genius by the invention of astro¬ nomical and pneumatic instruments. In 1647 he wrote a treatise on spherical trigonometry upon a new plan, and the following year composed an algebraical tract on the Julian period. He was one of the earliest members of the Philosophi¬ cal Society at Oxford, which was the origin of the Royal Society, after the institution of which, in 1663, he was elected a Fellow and distinguished himself by his activity in pro¬ moting the objects of that institution. In 1657 he was appointed professor of astronomy at Gresham College, but, being nominated to the Savilian professorship of astronomy at Oxford, resigned the former office, and in 1661 returned to the university. He received a commission in 1663 to prepare designs for the restoration of Saint Paul's Cathedral, then the largest Gothic edifice in the kingdom. While his designs were under consideration the cathedral was destroyed by the fire of 1666, and Wren had now an opportunity for signalizing his talents by the erection of an entirely new structure. In 1668 he succeeded to the office of surveyor of works, resigned his Savilian professorship in 1673, in 1674 received the honor of knighthood; and

in the following year the foundation of the new cathedral was laid. In 1680 he was chosen president of the Royal Society. In 1683 he was appointed architect and one of the commission¬ ers of Chelsea College ; and the following year controller of the works at Windsor Castle. He was elected member of Parliament for Plymp-ton in 1685, and to his public trusts were added in 1698 that of commissioner for the repair of Westminster Abbey, and in 1699 that of archi¬ tect of Greenwich Hospital. In 1700 he repre¬ sented in Parliament the boroughs of Weymouth and Melcombe Regis. In 1708 he was made one of the commissioners for the erection of 50 new churches in and near the city of London. After having long been the highest ornament of his profession he was, in 1714, deprived of the sur-veyorship of the royal works from political mo¬ tives. He was then in the 85th year of his life, the remainder of which was devoted to scien¬ tific pursuits and the study of the Scriptures. His remains were interred under the choir of Saint Paul's Cathedral, and over the choir en¬

trance was placed the following inscription (since removed to another part of the church) :

Subtus conditur

Hujus Ecclesiae et Urbis Conditor,

Christ. Wren;

Qui vixit Annos ultra nonaginta.

Non sibi sed Bono publico.

Lector, si Monumentum quaeris,

Circumspice.

(Beneath is laid the builder of the church and city, who lived above ninety years, not for himself but for the public good. Reader, if thou seekest his monument, look around).

The edifices constructed by Wren were prin¬ cipally public, including a royal hunting seat at Winchester and the modern part of the palace at Hampton Court. Some of the most remark¬ able of his buildings, besides Saint Paul's, are the monument on Fish Street Hill, the theatre at Oxford, the library at Trinity College, Cam¬ bridge; the hospitals of Chelsea and Green¬ wich; the church of Saint Stephen's, Walbrook;

those of Saint Mary-le-Bow, Saint Michael, Cornhill and Saint Bridge, Fleet street; and the great campanile of Christ Church, Oxford. The Royal Exchange and Customhouse, since de¬ stroyed by fire and reerected, were among his works. As an architect he possessed an inex¬ haustible fertility of invention combined with good natural taste and profound knowledge of the principles of his art. His talents were par¬ ticularly adapted to ecclesiastical architecture, but in his palaces and private houses he some¬ times achieved monotonous results, as at Hamp¬ ton Court. The interior of the church of Saint Stephen's, Walbrook, which has been considered as his chefd'ceuvre, exhibits a deviation from common forms equally ingenious and beautiful, and Saint Paul's Cathedral may be fairly reck¬ oned among the most magnificent productions of architectural genius. Yet the works of Wren have not passed without censure. Even in Saint Paul's, while the grandeur of the whole work is admitted, many faults, and especially waste of interior space, are charged against him. Consult 'Parentalia, or Memoirs of the Family of the Wrens) (1750) ; Elmes, 'Sir Christopher Wren and His Times) (London 1823) ; Clay¬ ton, (Churches of Sir Christopher Wren* (London 1848) ; Milman, 'Annals of Saint Paul's Cathedral > (1868) ; 'Life,* by Phillimore (1883) ; Loftie, 'Inigo Jones and Wren* (New York 1893) ; Marshall, 'Under the Dome of Saint Paul's* (1899); Dimock, 'Handbook of Saint Paul's CathedraP (1900).

WREN, a family (Troglody tides) of pas¬ serine birds, having a slender, slightly curved and pointed bill, with the exposed nostrils partly concealed by a scale, the wings very short and rounded, with nine well developed and the first short primaries, the tail short and often carried erect ; the legs are robust and rather long. They are abundant in the neotropical re¬ gion, less common in the nearctic, and only a few occur in the Old World in Europe, Asia and Sumatra, those of the latter region being more or less aberrant. The known species ex¬ ceed 100 and are arranged in about 15 genera, several of which are confined to tropical Amer¬ ica. North America has six genera and 14 species. Closely related to the wrens are the mocking thrushes, which some ornithologists place in the same family, and the creepers (Certhiidce). The wrens are plain little birds

WRESTLING

usually clothed in modest browns and seldom exhibiting bright colors of very conspicuous markings. They are insectivorous and mostly migratory, though particular species may in¬ habit either warm or cold regions. Their haunts are mostly brush piles, tangled roots, stone walls and similar places, where they pry into every nook and cranny; they enter holes and reappear in another place in very mouse¬ like fashion ; and are altogether very sprightly little creatures. Their songs are wonderfully loud and vehement for such small birds, but differ characteristically for each species. Al¬ though the nests vary greatly in their location, which is most often a hole of some sort, they are always more or less spherical in construc¬ tion. Few passerine birds are more prolific, the eggs numbering from five to 10, and many of the species producing several -broods.

Few birds are more familiar in the United States than the house-wren (Troglodytes a'edori). It is about five inches long. The color is very uniform, reddish brown above, barred with dusky, and pale fulvous white below. It often builds its nest near houses and in boxes pre¬ pared for it or in any convenient hole. The nests are made to fill the boxes ; and to effect this a large mass of heterogeneous materials is sometimes collected. From six to eight eggs constitute a brood and two or three broods are produced in a summer. The eggs are so thickly spotted with brown that they appear to be al¬ most uniformly colored. The song is extremely rapid and vivacious as though the performer were overflowing with good spirits. The male is a very bold, pugnacious bird, readily attack¬ ing birds far larger than itself, as the bluebird and swallows, and taking possessionˆ of the boxes which they have appropriated for their nests. It even attacks cats when they approach its nests and vigorously scolds all intruders.

The winter wren (T . hiemalis) is our small¬ est species of wren, only about four inches long, and the ridiculous little tail is usually cocked straight up into the air. Above, the color is a rich dark brown ; below it is much lighter, both regions prettily barred. The typical form in¬ habits most of eastern North America, the Canadas, and northernmost United States dur¬ ing the summer and the rest during the winter. Except in the higher mountains, it is known in the New England and Middle States only in the latter season. It is a silent, secretive bird of the winter brush-heap and roadside, but withal bold and saucy and prone to state its opinion of intruders. The summer song is said to be powerful and musical, and the nest to be placed in a hole in a log or root near the ground. The eggs are white, spotted with red¬ dish brown.

Of the genus Cistothorus , or marsh-wrens, we have three species, of which one (C . mari - ones') is a Florida form. See Marsh-wren.

Thryothorus comprises the mocking wrens, of which T. ludovicianus, the great Carolina wren, is the best known Eastern species and the largest of the wrens of this region. It is six inches long, of which the tail is two and one-third inches, about equaling the wings. It is nearly uniform bright reddish brown above with yellowish white under parts, a conspicuous white superciliary streak and the wings and tail cross-barred with black. It lives east of the

plains, but is more abundant South and scarcely gets northward beyond Pennsylvania, in which region, however, it is becoming more plentiful of late years. It inhabits deserted buildings, old mills and shrubbery in secluded spots, and builds its nest in crannies in such places, laying six or more white eggs speckled with various shades of brown. The loud clear whistled song is very characteristic, and as this bird is scarcely migratory is heard in winter as well as summer in the neighborhood of Philadelphia. This bird also mimics the notes of others. Bewick's wren (T. bewickii) is a related species very abundant in the interior southward, while a number of other species and subspecies of the same genus are found in the West and Southwest. In the latter region also, as well as in Mexico and southward, occur several large wrens which have broad spread¬ ing tails composed of somewhat cuneate feath¬ ers. Among these are the cactus wrens (q.v.)', which build purse-shaped nests in bushes in the desert regions of Texas, California, etc., and the rock-wrens and canon-wrens (qq.v.), which live and nest in rocky places. They have loud ringing songs. In Europe are several species of Troglodytes , of which the beloved common or jenny wren (T . parvulus) is found in all parts of Europe, and in Morocco and Algeria, and in Asia Minor and northern Persia. In central Asia it is represented by T. pallidas, in Iceland and the Faroes by T. borealis and in Norway by T. bergensis. In England the vernacular name ˆwren55 is also applied to various species of warblers and elsewhere to other small birds.

Consult Baird, Brewer and Ridgway, (Land Birds of North America) (Boston 1874) ; Sharpe, (Catalogue Birds of the British Mu¬ seum5 (Vol. VI, London 1881); Coues, Elliott, (Birds of the Colorado Valley) (Washington 1878) ; Forbush, E. H„ (Useful Birds and their Protection5 (Boston 1913) ; and (Bulletin 30, United States Biological Survey.5

WRESTLING, the most ancient form of athletic exercise, and at one time the favorite pastime of the Greeks. The Olympic Games (q.v.), the great festival of the Greeks, which were instituted for the exhibition of various trials of strength and skill, included races on foot and with horses and chariots, contests in leaping, throwing, boxing and wrestling. One of the great objects of the old classical wrest¬ lers was to make every attack with elegance and grace under certain laws of a most intricate nature, and the game is described by Plutarch as the hardest working form of athletics. In Devon and Cornwall, England, wrestling on the catch-hold principle still finds favor. In Lan¬ cashire they adopt a catch-as-catch-can style; while in Cumberland and Westmoreland the an¬ cient back-hold system continues to hold its own. In the United States and Australia, in Germany, France and Japan, ground wrestling, which is the most objectionable of all known methods, is the most popular. This system has been dignified by the title of Graeco-Roman wrestling. The Graeco-Roman style is practi¬ cally the same as the French method, and con¬ sists of a struggle on the ground till one or the other of the competitors is compelled through sheer exhaustion to give in ; indeed, such a con¬ test is simply an exhibition of brute strength.

On beginning, the wrestlers take hold from the head and not lower than the waist, when both roll on the ground, and then the actual struggle begins. Tripping, which is the very essence of the game, is not allowed; therefore weight and strength are the only factors in the contest, which terminates when one of the com¬ batants has been placed on both shoulders. Wrestling has recently become popular in Japan and India. The Japanese have adopted the Graeco-Roman style and receive handsome re¬ wards at the conclusion of their contests. The Jap wrestlers, who are a most formidable class of men, before entering the arena adorn them¬ selves with a certain kind of paint, with a huge belt round the waist and their enormous calves encased in stout leggings. The Indians, on the other hand, wrestle in bathing costume, and in a match only contest one bout, and one shoulder on the ground is deemed a fall. Con¬ sult Cann, W. E., ‘Manual of

Wrestling) (Battle Creek, Mich., 1912).

WREXHAM, reks'am, North Wales, a market-town in the county of Denbigh, 12 miles south of Chester, in a district containing coal, lead and iron. It is a station on the Great Western and Great Central railways, 201 miles from London, and has several churches and other places of worship, schools, a guildhall, in¬ firmary, barracks, market-halls, public ibaths, electrical works, a free library, *etc.* The re¬ stored parish church, dedicated to Saint Giles, was erected in the reign of Henry VIII. There are in the town large breweries, tanneries, paper mills, *etc.* It is the seat of a Roman Catholic bishopric. In Saint Giles' churchyard is the tomb of Elihu Yale, founder of Yale College, New Haven, Conn.„ U. S. A. Pop. 18,377.

WRIGHT, Adam Henry, Canadian physi¬ cian: b. Brampton, Ontario, 1846. He was graduated at Toronto University in 1866, took the degree of M.D. there in 1873, and later studied in Europe. He taught in the Toronto School of Medicine in 1879-87 ; was associated with the staffs of the Toronto General Hospital and the Women's Medical College; was pro¬ fessor of obstetrics at Toronto University in 1887-1912, and has since been professor emeri¬ tus. Since 1911 he has been chairman of the provincial 'board of health of Ontario. He wrote (A Text Book of Obstetrics5 (1905).

WRIGHT, Arthur Williams, American physicist: b. Lebanon, Conn., 8 Sept. 1836; d. 19 Dec. 1915. He was graduated from Yale in 1859, studied law and was admitted to the bar, but did not practise, and was a tutor in Latin at Yale 1863-66, and in physics 1866-68. He afterward studied at Heidelberg and Berlin, was professor of physics and chemistry at Williams College 1869-72; of molecular physics and chemistry at Yale 1875-87, and of experimental physics there from 1887-1906. From 1885 he has been in charge of the Sloane physical labora¬ tory at Yale. He has published numerous pro¬ fessional papers, is a Fellow of the Royal Astronomical Society of Great Britain, and a member of various other learned societies. He has also published a (History of the Class of 1859 of Yale College) (1914).

WRIGHT, Carroll Davidson, American statistician and sociologist: b. Dunbarton, N. H., 28 July 1840; d. Worcester, Mass., 20 Feb. 1909.

After studying law, he enlisted in the 14th New Hampshire volunteers at the outbreak of the Civil War, and in 1864 became its colonel. In 1865 he was admitted to the bar at Keene. N. H., in 1867 began

practice at Boston, in 1872-73 was a member of the Massachusetts senate, and in 1873-88 chief of the Massa¬ chusetts Bureau of Labor Statistics. He was appointed national commissioner of labor in 1885, and he continued in this office for some time after his election as president of the col¬ legiate department of Clark University (Wor¬ cester, Mass.) in 1902. In 1895 he became hon¬ orary professor of social economics in the Co¬ lumbian University (now George Washington), and delivered lectures in numerous institutions. He was chosen president of the American Statistical Association, -in 1902 chairman of the section on social and economic science in the American Association for the Advancement of Science and vice-president of the associa¬ tion, and in 1903 president. He was re¬ corder of the commission appointed by the President to arbitrate in connection with the anthracite coal strike in the fall of 1902. In 1906 the order of Saints Maurizio e Laz¬ zaro was conferred upon him by the king of Italy in recognition of his services as political economist. Besides numerous con¬ tributions to periodicals, he has published 'The Industrial Evolution of the United States1* (1895); (Outlines of Practical Sociology5 (1899) ; (Some Ethical Phases of the Labor Question5 (1902) ; 'Battles of Labor5 (1906) ; (The Apprenticeship System in its Relation to Industrial Education5 (1908). Consult Wadlin, H. G., (Carroll Davidson Wright: a Memorial5 (Boston 1911).

WRIGHT, Charles Henry Hamilton, Irish

Anglican clergyman: b. Dublin, 9 March 1836; d. 1909. He was graduated from Trinity Col¬ lege, Dublin, in 1857, was Bampton lecturer at Oxford in 1878, Donnellan lecturer at Dublin 1880, Grinfield lecturer on the Septuagint at Oxford 1893-97, and vicar of Saint John's, Liver¬ pool, 1891-98, examiner in Hebrew at the Uni¬ versity of London 1897-99, at the University of Wales 1897-1901, and clerical superintendent of the Protestant Reform Society in 1898-1907. Among his numerous publications are 'Gram¬ mar of Modern Irish5 (1855; ed. 1860); 'Book of Genesis in Hebrew5 (1859) ; Run¬ yan's Works with Notes5 (1866) ; fragments and Specimens of Early Latin5 (1874) ; (The One Religion5 (1881) ; 'Biblical Essays5 (1885); Roman Catholicism in the Light of Scripture5 (2d ed., 1897) ; 'The Intermediate State and Prayers for the Dead5 (1900) ; 'Genuine Writings of Saint Patrick with Life5 (1902) ; Daniel and his Prophecies5 (1906).

WRIGHT, Elizur, American abolitionist : b. South Canaan, Conn., 12 Feb. 1804; d. Med¬ ford, Mass., 21 Nov. 1885. He was graduated at Yale in 1886, was professor of mathematics in Western Reserve College in 1829-33, and be¬ came identified with the anti-slavery

movement in the last-named year. He then removed to New York, where he edited Human Rights (1834-35), and the Quarterly Anti-Slavery Magazine (1837-38), and was at the same time secretary of the Anti-Slavery Society. Re¬ moving to Boston in 1838 he there edited the

Massachusetts Abolitionist, the Daily Chrono-type (1845), and The Commonwealth, its suc¬ cessor (1850). He published (Savings Banks Life Insurance) (1872) ; (The Politics and Mysteries of Life Insurance) (1873), etc., and was (1858-66) insurance commissioner of Massachusetts. He wrote an introduction to Whittier's poems (1844), and published a trans¬ lation in verse of 'La Fontaine s Fables

(1859).

WRIGHT, Fanny. See D'Arusmont, Frances.

WRIGHT, George Frederick, American educator and geologist: b. Whitehall, N. Y., 22 Jan 1838; d. 20 April 1921. He was educated at Oberlin College and Theological Seminary, and held Congregational pastorates at Bakers¬ field, Vt., 1861-72, and Andover, Mass., 1872-81. He was professor of New Testament literature in Oberlin College 1881-92, and of the harmony of science and religion 1892-1907, when he be¬ came professor emeritus retired on Carnegie pension. He was connected with the United States Geological Survey 1884-92. His works include 'The Logic of Christian Evidence (1880) ; 'Studies in Science and Religion) .(1882); 'The Relation of Death to Probation (1882) ; 'The Glacial Boundary in Ohio, In¬ diana and Kentucky > (1884) ; 'The Divine

Authority of the Bible } (1884) ; 'The Ice Age in North America5 (1889 ; 5th ed., 1911) ; 'Man and the Glacial Period* (1892); <

Aspects of Christian Evidences* (1898); ‘Asiatic Russia* (2 vols., 1902) ; ‘Scientific Confirmations of Old Testament History* (1906) ; ‘Origin and Antiquity of Man* (1912); <See Ohio First> (1915) ; ‘Story of My Life and Work) (1916). He edited the Bibliotheca Sacra from 1884.

WRIGHT, Harold Bell, American novel¬ ist : b. Rome, N. Y., 4 May 1872. He was engaged in the painting and decorating busi¬ ness in 1887-92; was a landscape painter in 1892-97, and in 1897-1908 he was a pastor in the Christian (Disciples) Church. He later de¬ voted himself wholly to the writing of fiction, producing novels of great popular appeal and which reached a unusually wide circulation. These include ‘That Printer of Udells) (1903) ; ‘The Shepherd of the Hills 5 (1907) ; ‘The

Calling of Dan Matthews *(1909) ; ‘The Win¬ ning of Barbara Worth) (1911) ; ‘Their Yester¬ day^ (1912) ; ‘Eyes of the World* (1914) ; ‘When a Man’s a MaiP (1916) ; ‘The ReCreation of Brian Kent) (1919), *etc.*

WRIGHT, Horatio Gouverneur, American military officer : b. Clinton, Conn., 6 March 1820; d. Washington, D. C., 2 July 1899. He was graduated at West Point in 1841, was superintending engineer of the building of Fort Jackson at Tortugas, Fla. (1846-56) ; light¬ house engineer in Florida (1852-53) ; and as¬ sistant to the chief of engineers in Washington (1856-61). He was active throughout the Civil War, became brigadier-general of volunteers in September 1861, and took command of the De¬ partment of Ohio in August 1862. He com¬ manded a division at the battle of the Wilder¬ ness, a corps at Spottsylvania Court House and Cold Harbor, 3 June; served as major-general at the battle of Opequaon Creek, 19 Sept. 1864, and contributed to the decisive victory at Cedar Creek, 19 Oct. 1864. He was brevetted major-

general in the United States army for his serv¬ ices at the capture of Petersburg, 13 March 1865, and was mustered out of the volunteer service 1 Sept. 1866. He then returned to regular army duty as lieutenant-colonel of en¬ gineers, becoming brigadier-general and chief of engineers 30 June 1879, retiring 6 March

1884.

WRIGHT, John Henry, American classical scholar: b. Urumyah, Persia, 4 Feb. 1852; d. 25 Nov. 1908. He was graduated from Dart¬ mouth in 1873, and studied at Leipzig 1876-78. He was associate professor of Greek at Dart¬ mouth 1878-86, professor of classical philology at Johns Hopkins 1886-87, and after 1887 pro¬ fessor of Greek at Harvard and dean of the graduate school from 1895. He was editor-in-chief of the American Journal of Archceology from 1897, and edited several important works, including Collingnon's 'Manual of Greek Ar¬ chaeology } (1886), and 'History of All Nations) (24 vols., 1902).

WRIGHT, Joseph, American artist: b. Bordentown, N. J., 16 July 1756; d. New \ork, 1793. He obtained his art education in England and Paris, in 1783 returned to America, and in that year painted a portrait of Washington. Sub¬ sequently he executed another for the Comte de Solms, and still later a miniature profile. Among his other portraits ' were those of Jay and Madi¬ son. In 1792 he was made first draughtsman and die-sinker in the mint newly established at Philadelphia. He was the designer of the first coins and medals struck by the national govern¬ ment.

WRIGHT, Joseph, English philologist: b. 31 Oct. 1855. From 1891 to 1901 he was deputy-professor of comparative philology in the Uni¬ versity of Oxford, and in 1901 was made pro¬ fessor. Among his publications are a render¬ ing of Brugmann's 'Grundriss der verleichen-den Grammatik der Indogermanischen Spra-cheiP (Vol. I) ; textbooks of Middle Old High German, and a grammar of the dialect of Windhill in the West Riding of Yorkshire. But he is known for his 'English Dialect Dic¬ tionary } (6 vols., 1896-1905). In 1899 he was given a civil-list pension of $1,000 per annum.

WRIGHT, Luke E., statesman, diplomat: b. Tennessee, 1846. He has taken a prominent and active part in the affairs of his State, es¬ pecially in Memphis, where he has practised law. For eight years he was attorney-general of Tennessee, and during the epidemic of yel¬ low fever in 1878 he did much to relieve the suffering. From 1900 to 1904 he served on the United States Philippine Commission, of which he was president in 1903-04. In the latter year he 'became Civil Governor of the Philippine Is¬ lands, and was appointed Governor-General soon after. This position he held until 1906, when he became Ambassador to Japan, but re¬ signed soon after to become Secretary of War

(1908-09).

WRIGHT, Mabel Osgood, American writer on nature, daughter of Samuel Osgood (1812-80) (q.v.) : b. New York, 26 Jan. 1859. She was married in 1884 to J. O. WYight, and has made her home in Fairfield, Conn. She is contributing editor to Bird Lore, and has published 'The Friendship of Nature) (a series of outdoor studies, 1894) ; 'BirdcrafD

(a book on New England birds, 1895) ; (Tommy-Anne: A Natural History Story' (1896) ; (Citizen Bird' (with Dr. Coves, a book for beginners, 1897) ; (The Dream Fox Story Book' (1900); (The Flowers and Ferns in Their Haunts' (1901); (Dogtown' (1902); (The Garden, You and I' (1906) ; (Gray Lady and the Birds) (1907); (Princess Flower Hat' (1910) ; (The Stranger at the Gate) (1913) ; (The Hymn of the Flag' (soldier marching song, 1917) ; (Captain of the Watch' (1918).

WRIGHT, Marcus Joseph, American soldier, brother of J. V. Wright (q.v.) : b. Purdy, Tenn., 5 June 1831. He studied law, was admitted to the bar and practised his pro¬ fession in Memphis till the outbreak of the Civil War, when he entered the Confederate army as lieutenant-colonel of the 154th Tennessee regi¬ ment. He was promoted brigadier-general in 1862, and was wounded at Shiloh. He has writ¬ ten (Life of Gen. Winfield Scott' in (Great Commander' series (1894); (Life of Governor William Blount' ; (History of McNairy County, Tenn.' ; (Sketch of the Life of the Duke of Kent' ; (The Social Evolution of Woman' ; Sketches of Confederate generals in Ap¬ pleton's (Cyclopedia of American Biography.' In addition he was also co-editor of (Memoirs of Robert E. Lee' (with Gen. A. L. Long, 1886) ; (Library of American History' (1900) ; (General Officers of the Confederate Army' ; (Colonel David Crockett of Tennessee' ; (Life of Gen. John Peter Muhlenberg' ; (Tennessee in the War of 1861-65.' In 1878 he was selected by the Department of War as agent for the col¬ lection of Confederate records for the United States government.

WRIGHT, Mary Tappan, American novel¬ ist : b. Steubenville, Ohio, December 1851; d. 1917. She was a daughter of Eli Tappan, a president of Kenyon College, and in 1879 was married to John Henry Wright (q.v.). Her work in fiction which displays much keen

characterization and charm of style, includes (A Truce and Other Stories' (1895) ; Aliens' (1902); (The Test' (1904); <The Tower' (1906) ; (Charioteers' (1912).

WRIGHT, Orville, American aviator and inventor: b. Dayton, Ohio, 19 Aug. 1871. He was educated in public and high schools until 1888. He became interested in kites and gliding machines and did much experimental work, to¬ gether with his brother Wilbur (q.v.). From 1903 he devoted his attention mainly to de¬ veloping a biplane. The first test was made at Kittyhawk, N. C., in 1903, and the first success¬ ful long distance test took place near Dayton, Ohio, in 1905. He afterward made numerous flights in the United States and abroad. He was awarded a gold medal by the French Acad¬ emy of Sciences in 1909. He received the hon¬ orary degree of B.S. from Earlham College in 1909, and LL.D. from Oberlin College in 1910. In 1915 he sold his holdings in the Wright Aeroplane Company of Dayton.

WRIGHT, Robert Ramsay, Canadian bi¬ ologist and educator: b. Alloa, Scotland, 23 Sept. 1852. He was graduated at Edinburgh University in 1873, removed to Canada in 1874, and in that year was appointed professor of natural history at University College, Toronto. He was professor of biology at the University

of Toronto in 1887-1912, and in 1901-12 he was also vice-president of the university and dean of the faculty of arts. Since 1912 he has been professor emeritus of biology. He was as¬ sistant director of the biological station of Canada after 1901. He served at different times as president of the Canadian Institute, the American Association of Anatomists and of the Royal Society of Canada.

WRIGHT, Silas, American statesman : b. Amherst, Mass., 24 May 1795 ; d. Canton, N. Y., 27 Aug. 1847. He was graduated at Middlebury College, Vermont, in 1815, studied law, was admitted to the bar in 1819, and established himself as an attorney at Canton, N, Y. In 1823 he entered the State senate, where he steadily opposed the political advancement, of De Witt Clinton, which he regarded as dan¬ gerous to the Democratic party, of which throughout his life he was a firm adherent. He sat in Congress 1827-29, and there ad¬ vocated and voted for the protective tariff of 1828. He also voted for the appointment of a committee to enquire into the expediency of abolishing slavery and the slave trade in the District of Columbia. He was comptroller of New York 1829-33, and a United States senator 1833 — 44. He supported Clay's compromise bill in 1833; voted

against receiving a petition for abolishing slavery in the District of Columbia, and in favor of excluding from the mails all “printed matter calculated to excite the pre¬ judices of the Southern States in regard to the question of slavery,” voted for the tariff of 1842, though most of his political associates in the Senate voted against it; and voted for the annexation of Texas to the Union. In 1844, against his will, he was nominated by his party to be governor of New York, and was elected. President Polk offered him the office of Secre¬ tary of the Treasury in 1845, but he declined it, as he had previously declined a seat on the Supreme Court bench. As governor he vetoed a bill appropriating money for works on the canals, on the ground that the effect of the bill was to resume the enlargement of the canals, which had been suspended by law in 1842, out of regard for the financial safety of the State; recommended legislation against the anti-renters, and on occasion of disturbances produced by them in Delaware County in 1845 proclaimed the county to be in a state of insurrection and called out a military force. Nominated for re-election in 1846, he was defeated by the Whig candidate. When the application of the Wilmot proviso to the territories obtained from Mexico was under discussion, Wright emphatically de¬ clared that the arms and the money of the Union ought never to be used to acquire terri¬ tory then free for the purpose of planting slavery upon it. On the expiration of his term as governor he returned to his farm at Canton. Consult (Lives’ by Jenkins (Auburn 1847) ; Hammond (Syracuse 1848); Gillet (Albany

1874).

WRIGHT, Thomas, English antiquary: b. Tenbury, Shropshire, 23 April 1810; d. Chelsea, London, 23 Dec. 1877. He was gradu¬ ated at Trinity College, Cambridge, settled in London, and devoted himself to the study of English history, literature and antiquities. He was one of the founders of the Camden Society, and of the British Archaeological Association’

whose journal he edited 1843-50. Of the Percy Society and the Shakespeare Society he was also an active member, and in 1842 he was chosen a corresponding member of the French Academy of Inscriptions. He edited a great number of rare works connected with Early English literature and history which have been published in England by the societies above mentioned, and also published (Queen Elizabeth and Her Times) (1838) ; ‘ Essays on the Litera¬ ture, Popidar Superstitions, and History of England in the Middle Ages* (1846); ‘Narra¬ tive of Sorcery and Magic* (1851) ; ‘The Celt, the Roman, and the Saxon) (1852; 5th ed., 1890) ; ‘Wanderings of an Antiquary* (1854) ; ‘The History of Ireland* (1857) ; ‘Dictionary of Obsolete and Provincial English* (1858) ; ‘History of France* (1858-60) ; ‘Essays on Archaeological Subjects* (1861); ‘Manners and Sentiments in English During the Middle Ages* (1862); ‘History of Caricature and the Gro¬ tesque* (1865); ‘Womankind in Western Eu¬ rope* (1869).

WRIGHT, Thomas, English biographer: b. Olney, Buckinghamshire, 16 May 1859. He was educated at Buxton College, Forest Gate, and for several years has been principal of the Cowper School at Olney. He is the founder of the Cowper Society, and has published ‘The Town of Cowper* (1886) ; the novels ‘The Chalice of Carden* (1889); ‘The Blue Fire-drake* (1892), and ‘The Mystery of St. Dunstan’s* (1892) ; ‘Life of William Cowper* (the standard biography of the poet, 1892) ; ‘Life of Daniel Defoe* (1894); ‘The Correspond¬ ence of William Cowper* (4 vols., 1904) ; ‘The Romance of a Lace Pillow* (1917), and sev¬ eral biographies.

WRIGHT, Wilbur, American aviator and inventor : b. near Millville, Ind., 1867 ; d. Day-ton, Ohio, 29 May 1912. With his brother Orville (q.v.) he experimented with kites and gliding machines, and in 1903 constructed a suc¬ cessful biplane with which they made four flights on 17 December at Kittyhawk, N. C. They constructed a number of biplanes in 1904-OS, and in the latter year went to France, where Wilbur won the Michelin prize for a successful flight. In 1909 during the Hudson-Fulton cele¬ bration in New York he flew from Governor’s Island up the Hudson to Grant’s Tomb and returned. The Wright machine was afterward adopted by the United States army and the French patents were sold for $100,000. Wilbur received a gold medal from the French Acad¬ emy of Sciences in 1909. See Aeronautics.

WRIGHT, William Aldis, English scholar : b. 1836; d. 1914. He was a contributor to Smith’s ‘Dictionary of the Bible* (1860-63), secretary to

the Old Testament Revision Company in 1870-85, and from 1868, the year of its establish¬ ment, editor of the Journal of Philology. In 1888 he became vice-master of Trinity College, Cambridge. With W. G. Clarke he collaborated on the 'Cambridge Shakespeare* (1863-66) and the 'Globe* edition of Shakespeare's complete works (1864). Among his other publications are editions of the 'Letters and Literary Re¬ mains of Edward Fitz-Gerald* (1889); of the 'Facsimile MSS. of Milton's Minor Poems* (1899)' ' Fitz-Gerald' s Miscellanies* (1900);

'More Letters of Edward Fitz-Gerald* (1901) ;

'Literary Remains of Edward Fitz-Gerald* (1902-03), and 'Milton's Poetical Works* (1903) ; 'English Works of Roger Ascham* (1904) ; 'The Hexaplar Psalter* (1911).

WRIGHT, William Burnet, American Presbyterian clergyman: b. Cincinnati, Ohio, 15 April 1838. He was graduated from Dartmouth in 1857 ; was four years pastor of the South Congregational Church, Chicago; 20 years pastor of the Berkeley Street Church, Boston, and three of the First Congregational Church, New Britain, Conn., and subsequently of the Lafayette Avenue Presbyterian Church, Buf¬ falo, prior to 1901. In 1902 he retired from the active pastorate and has been occupied with lecturing and writing on various historical and literary themes. Fie has published 'Ancient Cities from the Dawn to the Daylight* (1887) ; 'The World to Come* (1887) ; 'Master and Men* or 'The Sermon on the Mountain Prac¬ tised on the Plain* (1894); 'The Cities of Paul* (1906) ; 'The Heart of the Master*

(1911).

WRIGHTIA, an apocynaceous genus of small trees and shrubs, with long, loose branches, named after William Wright (1740-1827), a Scotch botanist resident in Jamaica. The flowers are salver-shaped, white, yellow or red, usually in terminal cymes, and have a short corolla-tube, five or more scales at the throat, and an exerted cone of sagittate anthers. IV. tinctoria is a small tree, a native of Burma and Southern India. The wood resembles ivory in its hard, close grain and exquisite whiteness, and like that other species of the genus, is used for small articles of turnery. The tree is also known as ivory-tree, Pala and palay. The seeds are said to be used in dyeing, and the leaves, with the seeds of Cassia tora, yield a blue dye known as pala-indigo,

but inferior to the gen¬ uine indigo. W. tomeniosa, a small, deciduous tree, growing in India and Burma, has a yellow juice, which, mixed with water, produces a per¬ manent yellow dye. It is used by the Nepalese to stop bleeding, and the bark is given as an antidote to snakebite. IV. antidysenterica, a small tree found in India and Burma, is a most valuable remedy for dysentery; the Arabs and Persians consider the seeds as carminative, as¬ tringent, tonic and aphrodisiac. This tree, is now classified under Holarrhena, and is a prin¬ cipal source of conessi-or pala-bark.

WRIGHTSVILLE, York County, Pa., on the Susquehanna River, 31 miles southeast of Flarrisburg and 11 miles northeast of York, was the farthest point east . reached by the Confederates during the Civil War. In the campaign preceding Gettysburg General Early was ordered to seize the bridge across the Sus¬ quehanna at this point, a wooden structure o\er a mile long, resting on stone piers. Included in the structure was a railroad bridge, a pass¬ way for wagons and also a towpath for the canal which here crossed the Susquehanna. On 28 June 1863 the bridge was defended by the 27th Pennsylvania militia, a few companies of the 20th and some other organizations and con¬ valescents hastily collected, in all numbering about 1,200 men, under command of Col. J. G. Frick, 27th militia. Frick held an intrenched line about' a half mile west of Wrightsville. Gen¬ eral Gordon's brigade, with Capt. W. Tanners

battery and White's battalion of cavalry, marching through York, appeared before Frick's position on the evening of 28 June and began skirmishing, under cover of which Gordon en¬ deavored to cut him off from the bridge by a flank movement, but failed, and then opened fire with Tanner's artillery, to which Frick could not reply, being without guns. His rear threatened, Frick retreated across the bridge and fired it, leaving 18 or 20 prisoners in Gor¬ don's hands. Gordon attempted to follow, but was checked by the flames. The bridge was totally destroyed and the flames communicated to the town of Wrightsville, consuming several buildings, but the further progress

was arrested by Gordon's men. The destruction of the bridge was a keen disappointment to Early, who had hoped to cross it and attack Harrisburg from the east side of the river. On the 29th Gordon marched back to York.

WRIT. In general understanding a writ is a mandatory precept issued by the authority of and in the name of the executive branch of the State for the purpose of compelling the defend¬ ant to do some particular thing mentioned in the instrument. Writs are generally classified as mandamus, habeas corpus, summons, error, quo warranto, certiorari or review. Writs are fur¬ ther distinguished as original and judicial. Original issued without any order of the court in the particular case, judicial issued in pur¬ suance of a decree or order or judgment of the court. A writ of mandamus is a command issuing from a court of law of competent juris¬ diction, in the name of the State, directed to some inferior court, officer, corporation or per¬ son, requiring them to do some particular thing therein specified, and which appertains to their office or duty. In order to secure a writ of mandamus it is necessary to show (1) that the petitioner has a legal right to have the thing done which it is sought to be done; (2) that it is the duty of the respondent to perform it; (3) that the writ is the only plain, speedy and adequate remedy. A writ has a purely per¬ sonal effect. An injunction — either mandatory or prohibitory — is a writ framed according to the circumstances of the case commanding an act which the court regards as essential to justice or restraining an act which it esteems contrary to equity and good conscience. Quo warranto is an order to show by what authority a given act is done or office held. A writ of error is a commission to a superior court by which they are authorized to examine the rec¬ ord in a case on which judgment has been given in an inferior court. Habeas corpus is an order issued by a magistrate to an officer in charge of the person of the defendant and designed to give summary relief against illegal restraint of personal liberty. Summons is a demand made to a person to appear at a given time before a court or officer. Certiorari or review is an order to a superior court to review the evidence presented before an inferior court. Consult Blackstone, Commentaries on the Laws of Fngland) ; Hallam, Constitutional History) (New York 1872) ; Hurd, (On the Right of Personal Liberty) and (On the Writ of Habeas Corpus > (2d ed., Albany 1876) ; Pollock and Maitland, (History of the English Law) (2d ed., Boston 1899).

WRITERS' CRAMP, or SCRIVENERS' CRAMP, or PALSY, an occupation-neurosis to which those who do much writing, especially

with the hand too tightly contracted, are very liable. A person with this trouble has no com¬ plete control over the muscles of the thumb and middle and forefingers, brought into use in writ¬ ing, although other manual operations are per¬ formed without difficulty. The affection seldom manifests itself until toward middle age. The various methods of treatment that have been proposed have not been very successful. Small surgical operations have been performed with occasional but far from general good results. The application of electricity to the adductor of the thumb, and the kneading of the muscles of the ball of the thumb and the lower part of the forearm, so as to promote the circulation in those parts, are said to be beneficial, but the only way to obtain perfect relief is for the patient to abstain from writing altogether. If he is obliged to write he will do so with more ease if he uses a pen with a very thick handle. For extreme cases several contrivances have been devised for assisting the patient to write by altering the movements of the fingers in writing, and giving support to the ball of the hand. The typewriter has proved the best re¬ source of those who suffer from the ailment. See Neurosis.

WRITERS TO THE SIGNET, in Scot¬ land, where lawyers generally are called writers, an incorporated legal society dating from an early period of Scottish history. Originally, the name probably applied to clerks in the office of the Secretary of State, where was deposited the seal by which the king's letters and writs for the purposes of justice were authenticated. This duty was monopolized by this close society of practitioners, members being appointed, not by public officials, but by the organization. Thus the Writers to the Signet came to control ad¬ missions to the bar, like the English Inns of Court. They still retain a certain prestige at the bar, but their former monopoly has been taken away by recent statutes.

WRITING, the art of recording ideas bv means of characters or figures of some sort impressed upon some kind of material sub¬ stance. History, though it does not throw com¬ plete light on the origin of writing, suffices to show certain stages in its progress, and upon these a classification has been founded, which is, however, incomplete and unsatisfactory. The simplest classification and perhaps at an initiatory stage the best, is that which divides all writing into ideographic and phonographic, or signs representing the things symbolized by words and signs representing sounds, that is, words themselves. Less satisfactory is the classification of writing into three historical stages, the figurative, the transitional or con¬ ventional, and the alphabetic. In the first of these, to which hieroglyphic writing belongs, writing is supposed to be pictorial or immedi¬ ately representative of objects. After this, in the transitional period comes symbolical writ¬ ing, in

which abbreviated pictures are trans¬ formed into arbitrary symbols, first of things and afterward of sounds and words. Lastly, with the prevalence of phonetic writing sounds are represented first in syllables and afterward in

letters. The course of writing is generally in the direction thus indicated, but it is inaccurate and misleading to represent these stages as epochs in its progress. As the most modern Writing contains traces of the first of these methods, so the earliest contains traces of the last. The majority of the letters in modern alphabets can be traced to symbols or abbrevi¬ ated pictures representative of things, but as the thing originally represented is usually an object whose name begins with the sound repre¬ sented by the letter, there is no evidence that the sign was not originally intended in a double sense and used as a phonograph. In Egyptian hieroglyphics we have ideographs and phono¬ graphs mixed together. This, however, does not prove the absolute precedence of ideographs, but only the imperfection of the phonographic elements in that system. The same thing oc¬ curs in the Mexican picture writing, which was long supposed to be purely ideographic. Its phonetic signs are syllabic, not alphabetic. In our own system we use figures and other sym¬ bols when phonographic signs are too slow for our purpose, and with a less perfect phono¬ graphic system this would naturally occur much more frequently. It does not appear, moreover, that any transition from pictorial to phonetic writing is necessary through arbitrary non-phonetical symbols. Both of these modifications would no doubt proceed simultaneously from in¬ dependent causes. Pictorial signs not phonetized would be abbreviated as well as phonetized signs, and when the phonetized abbreviations came to prevail the non-phonetized abbrevia¬ tions would be phonetized also, thus producing the appearance of a transition from arbitrary symbols to phonetic signs.

The reason why writing has had to pass through various stages of pictorial and more or less arbitrary symbolical representation before reaching the more perfect development of the alphabetic form is not

very difficult to discover, and it has an important bearing on the order of development. It is not because the representa¬ tion of words is in itself more difficult to con¬ ceive than the representation of things, or because when the desire for writing as a me¬ dium of communication is excited the human intellect is inadequate to the task of forming at cnce an entire phonetic system. Had phonetic or even alphabetic representation been the only possible means of constructing a written symbol all difficulties would doubtless have been over¬ come by one sustained effort, as they have actually been by many partial ones ; but as an easier process was to be found and would di¬ rectly suggest itself as a means of meeting the immediate demand, the more elaborate process was excluded and prevented by this process from being performed. Nothing is easier than to make a rude pictorial representation of cer¬ tain objects. To draw something resembling a man would be easier than to agree on a sign to represent the word man, hence ideographs would naturally precede phonetic symbols. But for the same reason the earliest systems of writing would not be purely ideographic but mixed. There are many things which form the subject of the least sophisticated human com¬ munications which cannot be represented pictorially. When writing was first practised these things were already represented by words, and

the idea would naturally occur to form a sign to represent the word, that is, a phonetic sign. These signs could not be directly pictorial, but they might be allegorical or symbolic, and in the absence of analysis of sound they probably would take that form, although the direct in¬ tention was to suggest conventionally a specific word by the symbol. This sort of symbol might be called a mnemonic. From such symbols to merely arbitrary syllabic and alphabetic symbols the transition would be easy.

It is generally agreed that writing was in¬ troduced to the western nations by the Phoeni¬ cians, and it is commonly believed that the Phoenician system was based on the Egyptian but the comparative antiquity of the Egyptian and Assyrian or Akkadian, the hieroglyphic and cuneiform systems, cannot be definitely deter¬ mined. The Egyptians attributed their writing to Thoth, and the first characters are said to have consisted of portraits of the gods. The cuneiform writing, which is cumbrous and ex¬ ceedingly difficult to read, has been adapted to several languages, the Akkadian, the Assyrian, the Persian, etc., in a variety of ways, ideo¬ graphic, syllabic and alphabetic. The Egyptians had three distinct kinds of writing, the hiero¬ glyphic, the hieratic and the enchorial or de¬ motic. The first is

a mixed system, containing large numbers of signs of various characters, ideographic and phonetic. It is used chiefly for inscriptions on monuments and public buildings. The hieratic is a cursive hand abridged from the hieroglyphic for use on papyri. Both these forms were sacred, and the priestly caste only were initiated in them. The demotic was in¬ troduced much later than the other forms. It was used for trading and common purposes, and in civil documents. The hieratic writing was more phonetic than the hieroglyphic, and the alphabetic character prevailed in the demotic. The first was written in any direction according to the form of the surface; the hieratic was at first written in columns, but afterward always in horizontal lines. The hieratic and demotic are read from right to left, but the individual letters are formed from left to righc. The con¬ nection between the Egyptian and the Semitic writings, to which the Phoenician belongs, is by no means unanimously admitted, many scholars holding that the resemblances between them may be explained by the independent adoption of common principles. The leading Semitic forms are the Samaritan or ancient Hebrew, the Chaldee or East Aramaic, the Syriac or West Aramaic, and the Kufic or early Arabic, which continued to be used in manuscript for several centuries after the Mohammedan con¬ quest, after which it was replaced by the Neshki or modern Arabic, which, with some slight modifications, is the same with the modern Persian. The Hebrew alphabet now in use, the Babylonian or East Aramaic, is en¬ tirely consonantal, the vowel points being of modern origin. The Phoenician which forms the basis of the western languages was of a similar character. Phoenician writing was anciently represented to have been brought by a Cadmean colony to Boeotia about the 16th century b.c. (see Cadmus) ; and a certain num¬ ber of the Greek letters are undoubtedly of Phoenician origin. (See the section on lan¬ guage and writing in the article Greece). The

Greeks at first wrote from right to left, and afterward adopted the method called boustro-phedon, from the motion of the ox in plowing, that is, alternately from right to left, and from left to right. Writing from left to right was said to have ‘been introduced in the time of

Homer by Pronapides of Athens. The various modifications which the Phoenician or Pelasgian forms underwent in Italy are to be found by comparison of the Oscan, Etruscan, Umbrian and early Latin inscriptions. In the ancient Greek and Roman writing, and even for a time in the mediaeval writing of Europe, the words were not separated by spaces, and no punctua¬ tion marks were used. The present cursive characters with modifications occur in Greek inscriptions of the age of Augustus. In mediaeval manuscripts a variety of styles were adopted in different epochs and countries and for different uses, to describe which in detail would require a separate treatise. In France the various styles were called after the dynas¬ ties under which they prevailed : Merovingian, Carlovingian, Capetian, Valesian and Bourbon. There were also a variety of styles used for different purposes distinguished by such names as majuscule and minuscule (great and small letters), diplomatic minuscule and many others. Capitals were not then used as now to distin¬ guish prominent words, .but whole manuscripts were written in large or small capitals. There were also a variety of mixed styles. From the 8th to the 11th centuries writing with tr emble¬ ments was affected in France. The diplomatic minuscule was a mixture of minuscule and cursive characters distinguished by an unusual prolongation of the long letters. Uncial letters, which prevailed* from the 7th to the 10th cen¬ turies, were rounded capitals with few hair-strokes. The practice of ornamenting pages be¬ gan in the 8th century, and the earliest manu¬ scripts are also without title pages. The so-called Gothic characters, in reality of scholastic origin, are merely fanciful deviations from the Roman types, such as the rounding of straight limbs, the substitution of angular facets for rounded forms, with hair-lined projections from the extremities contrasting with massi\c body-strokes. They became common in in¬ scriptions from the 13th to the 15th centuries, and were employed in church-books from the time of Saint Louis. The Gothic cursive was introduced about the middle of the 13th cen¬ tury. The modern German alphabet was also introduced in the 13th century. In England a variety of styles called Saxon prevailed in the early Middle Ages.. An elegant mixed style was formed of a combination of Roman Lombardic and Saxon characters. The Norman style of writing came in with William the Conqueror. The old English form of Gothic dates from the middle of the 14th century. The English “court hand,** an adaptation of Saxon, pre¬ vailed from the 16th century to the reign of George II. In regard to the antiquity of writ¬ ing in other parts of Europe, it was known to the Gauls before the time of Caesar; but no traces of the ancient writing remain, and whether it was derived from the Greeks or the Phoenicians is doubtful. There are slight traces of writing in Britain previous to the Roman

period, but if it were employed by the Druids, as Caesar says, it may have existed without leav¬

ing remains. The Germans claim the knowl¬ edge of writing previous to their contact with the Romans; but in their case also we are with¬ out early remains. The Runic alphabet used for many centuries in Denmark, Norway, etc., may have been employed long before the Christian era.

In the East we find one of the most striking contrasts in the history of language. The Chinese, who have an ancient system of writing which they attribute to Fou-hi, have never reached the alphabetic system. Their characters are syllabic, and as Chinese words are mono¬ syllables, they are strictly ideographic. They have been adopted in this way by peoples speak¬ ing not only different dialects, but different lan¬ guages, who apply the signs to words of dif¬ ferent sound but of the same signification as the original. The Chinese system is said to con¬ tain 40,000 characters. They were originally hieroglyphic, but from difficulty of interpreta¬ tion have become conventional. There are, of course, certain general principles of combina¬ tion and construction, but to master the whole system is said to be the work of a lifetime. Only a limited portion of it can, therefore, have any real existence as a medium of com¬ munication. Sanskrit, on the other hand, pos¬ sesses the most perfect known alphabet. The Hindus claim to have derived it from the gods, and call one form of it devandgari (divine city). It is wholly different from the Semitic, and is founded on a much more complete and subtle analysis of sound. . Its consonant signs number 33, its vowel signs 14. They are ap¬ plied with an analytical method which gives a power of distinction vastly superior to that of European alphabets, and which is greatly ad¬ mired by scholars. Sanskrit is written from left to right. By means of its derivatives it is widely diffused in the East. The Pali, which forms the sacred language of the Buddhists, has car¬ ried it far beyond India. The Burmese Pali character is square, the Siamese round. To complete the vagaries which have prevailed in the direction of writing, the Mexican picture writing was written from bottom to top. See Alphabet; Cuneiform Writing; Etymology; Hieroglyphics; Language, Science of; Pale¬ ography ; Speech.

WRONG, George Mackinnon, Canadian

educator: b. Ontario, 25 June 1860. He was educated at University and Wycliffe colleges in Toronto, took orders in the Church of England

1883, but has since devoted his entire time to academical work, and in 1894 succeeded Sir Daniel Wilson as professor of history in the University of Toronto. He has published (The British Nation: a History) (1903); <The Earl of Elgin* (1905); (A Canadian Manor and Its Seigneurs* (1908) ; (The Fall of Canada* (1914). He is co-editor with H. H. Langton of the annual Review of Historical Publications Relating to Canada, founded in 1897.

WRYBILL, an extraordinarv plover (An¬ ar hynchus frontalis) of New Zealand, which is unique in having a bill bent sideways near the tip,—always toward the right. By this pecu¬ liarly adapted instrument it seems to be able to reach and obtain many small crustaceans, etc., which are able to creep under stones out of reach of all the other shore-birds of the region, which have only the ordinary straight kind of

beak. The questions and inferences which arise in the mind of the evolutionist in view of this case will be found treated in Newton's dic¬ tionary of Birds,) with references to other au¬ thorities. See Plover, and consult Buller, (Birds of New Zealand) (London 1888).

WRYNECK, a European bird (lynx or Yunx torquilla), related to the woodpeckers, which has a habit of twisting its head in a curious manner. This bird visits Great Britain in summer, arriving in April, usually with or just before the cuckoo, and hence is named the <(cuckoo's mate.® The food consists of-insects, arid chiefly of ants and their pupae. It is also said to eat elderberries. The tongue is long and extensile, like that of the woodpeckers. The nest is formed in the holes of trees, and the eggs vary from six to 10.

WRYNECK. See Torticollis.

WU-CHANG, woo'chang', or WOOCHANG, China, a city of the province of Hu¬ peh, on the Yangtse-kiang, opposite the citv of Hankow. The latter is in effect but a suburb of Wu-chang, another portion on the north bank of the river being Hanyang. It is the great

em¬ porium' for the tea exported by way of Shang¬ hai. It has a government college and mint, a college, cotton mills and an electric-lighting plant Pop. variously estimated from 500,000 to 700,000.

WU-HU, woo'hoo', China, a treaty-port, opened in 1877, in the province of Ngan-hwci, on the right bank of the Yangtse-kiang River, about 200 miles west ot Shanghai and 60 miles above Nanking. Some manufactures and a con¬ siderable trade are carried on. Canals connect the city with a large productive region. Cutlery and red cord are its principal products. Its an¬ nual commerce now aggregates . about $L2,UUU,- 000. Wu-hu suffered severely in the lai-ping rebellion. Pop. about 92,000.

WU TING-FANG, Chinese statesman and diplomat: b. Singapore, 1842. He was edu¬ cated at Saint Paul's College, Hongkong, and studied law at Lincoln's Inn, London. He was in the service of the colonial government as interpreter in the law courts in 1862-74, and after his return from England in 1877 he en¬ gaged in law practice in Hongkong. In 1882 he was appointed to the official staff of Li Hung Chang, at that time governor-general of Chih-li and Grand Chancellor of China. He was one of the peace commissioners who, un¬ der the leadership of Li Hung Chang negoti¬ ated the Treaty of Shimonoseki, at the con¬ clusion of the Chino-Japanese War, and he later occupied high governmental offices at Pe¬ king He was appointed Minister to the United States in 1896, but in 1902 he was recalled to China to aid in the negotiation of several com¬ mercial treaties. He was appointed to the new board of commerce in 1903; was Minister of the Board of Punishments in 1905-06, and in 1906 he remodeled the Penal Code. He was again Minister to the United States in 1208 09 where his broad statesmanship, deep learn¬ ing and great diplomatic talent gained for him widespread respect and liking. He was made member of the permanent Court of Arbitration at The Hague. He published < America Through Oriental Spectacles* (1914).

WUCHOUSEN, the great wind eagle, a mythological character, universally believed in by the numerous tribes of Algonquin Indians. Of him many fabulous stories are told. Ac¬ cording to the Passamaquoddy legend, in which he is called The-Bird-who-Blows-the-Winds, Wuchousen lives far in the. north, on a huge rock whose top reaches up into the region of the cloudland, at the very end of the sky. When he flaps his wings the winds blow over all the earth and all the cloudland. In the olden days Wuchousen was so fond of blowing, of flapping the wind with his monster wings, that men could not live in

peace, for the fear of the tempest was ever upon them. So terrible were these tempests that even Kuloskap, the Master of Men and Beasts, was often afraid to venture out upon the sea to fish as was his pleasure. At last he made up his mind to bring the wind eagle to time and make the earth safer for all. So he made a long journey into the far northland, on the very outer border of the world. There he found Wuchousen flapping his mighty wings and screeching louder than the howling tem¬ pest he was winging up. Kuloskap protested against this, representing to the wind eagle that he had already made the world uninhabit¬ able and requested him to modify his tempest¬ making. To this Wuchousen replied that since time began he had blown always in this way, that his wings needed exercise and that he proposed to go on flapping them no matter what happened to the rest of creation. In a rage, Kuloskap, changing himself mt<? a monstrous giant, higher than the clouds, seized the wind eagle and, tying his wings together, cast him dow*n from his high cliff into the sea thousands of feet below. Llnable to move, the eagle exercised all his magic power and made the waters so putrid that they poisoned all the streams and the rain that fell from the clouds, so that Kuloskap was forced to release him, for being a spirit, he could not kill him. But that he might not again incommode and en¬ danger the world, he left one of his wings tied when he replaced him on top of his high cliff. Since that time, in the long past, Wuchousen has been able to raise a wind only half so strong as he used to; and though he often raises a tempest, yet, flapping only one wing, he soon grows tired and then the tem¬ pest subsides.

WULFENITE, native lead molybdate. It is generally admitted that the best specimens of this mineral are among the most beautiful minerals known. It crystallizes in hemi-morphic tetragonal crystals. They are usually in square tabular plates, sometimes very thin and transparent, but occasionally in elongated pyramidal forms and nearly opaque. The mineral also occurs in crystalline masses. It is very brittle, has a hardness of about 3 and is very heavy, its specific gravity ranging from 6.7 to 7.0. Its lustre is resinous to adamantine, and colors are various shades of yellow, orange, red, grayish or greenish. It is associated with other lead ores at many localities, as in Austria-Hungary, and New South Wales, but the United States locali¬ ties are far more important. Magnificent speci¬ mens occur in the Red Cloud and Mammoth mines of Arizona, in the Organ Mountains,

New Mexico, at Eureka, Nev., and Tecorra, Utah. It was named in honor of the Austrian mineralogist, Wulfen, and has been used to a limited extent as an ore of molybdenum.

WULFSTAN, wtilf'stan, WULSTAN, or

WOLSTAN, (1) Anglo-Saxon prelate: b. Long Itchington, Warwickshire, about 1007 ; d. Worcester, 18 Jan. 1095. Educated at Eve¬ sham and Peterborough, he became a monk in the monastery of Worcester and in 1062 was consecrated bishop of Worcester. He was one of those who submitted to William the Con¬ queror at Berkhampstead in 1066, and was al¬ lowed to retain his see. The crypt of the present Worcester cathedral represents the church which Wulfstan caused to be erected between 1084 and 1089. He was a man of saintly character and loyal devotion to his work, and he is credited with having induced the merchants of Bristol to stop their traffic in slaves. He assisted in the Domesday survey, and led the defense of Worcester against the rebellious nobles, commanded by Roger de Montgomery. He was buried in Worcester cathedral, and was canonized in 1203, his day being 19 January. Consult (Lif e, J by William of Malmesbury, (De Gestibus PontificumP (2) Wulfstan: b. about 950; d. 1023. He was archbishop of York, and has been regarded as the author of (Wulfstan's Homilies, } first printed in 1701. (3) Wulfstan of Winchester,

a monk of the 9th century, who wrote metrical lives of Saint Swithin and Saint Ethelwold.

WUNDT, Wilhelm (Max), German physi¬ ologist, psychologist and philosopher : b. 16 Aug. 1832, near Mannheim. During the years 1851-56 he studied at Tubingen, Heidelberg and Berlin. In 1857 he became privatdocent, and in 1864 assistant professor of physiology at Heidelberg where he remained until 1874. Here he wrote his first important books (Die Lehre vom der Muskelbewegung) (1858), (Beitrage zur Theorie der Sinneswahrnehmung) (1858-62), (Vorlesungen ueber die Menschen-und Tierseele) (1863; 4th ed., 1906), (Lectures on Human and Animal Psychology,* trans. by J. E. Creighton and E. B. Titchener, 1894), (Lehrbuch der Physiologie des Menschen* (1865; 4th ed., 1878), (Grundziige der physiologischen

Psychology (1874 ; 6th ed., 1908-11). In the (Vorlesungen) and the (Grundziige) Wundt points the way to a new psychology, one defined not by a differentiation of objects, but by point of view, one that is experimental in its method, and one capable of including much of the psychologv of Herbart and Lotze, the psychophysics of Weber and Fechner, and the sense-physiology of J. Muller and Helm¬ holtz. In 1874 Wundt went to Zurich as pro¬ fessor of philosophy, and in the following year was called to a similar chair at Leipzig where he has since remained. In 1879 he established the first psychological laboratory and in 1883 the Philo so phis che Studicn, devoted chieflv to the contributions of the Leipzig school. This ceased publication with the 20th volume in 1903, but a new series, the Psychologische Studien was begun in 1906. In 1896 appeared 'Grundriss der Psychology (Outlines of Psychology, trans. by C. H. Judd, 1897; 3d ed., 1907), and in 1900 the first installment of his <Volkerpsychologie) (Vol. V of the 2d ed.,

completed in 1914), the development of lan¬ guage, custom and religion from the psycho¬ logical point of view.

Meanwhile he found time also for philoso¬ phy. <Logik,) an inquiry into the theory of knowledge and the methods of scientific in¬ vestigation, was published in 1880-83, <Ethik,) an investigation of the facts and laws of the moral life, in 1886 (Eng. trans. by E. B. Titchener, J. H. Gulliver and M. F. Wash¬ burn, 1897), (System der Philosophies in

1889, (Einleitung in die Philosophies in 1901, and (Kleine SchriftenS Vol. 1, philosophical essays, in 1910. Wundt's system of philosophy has been characterized as the science of the sciences. He attempts to ((unite into a consist¬ ent system the general knowledge contained in the various sciences, and to trace back to their principles the general methods and presup¬ positions of science in general.® As regards his success, Kiilpe says, WVundt's ability to familiarize himself thoroughly with all fields of knowledge, and to enrich them all by his ingenious combinations, by his inspiring ideas and researches, and by a rare gift for systematic-architectonic analysis, has made him not only the greatest all round scholar of our time, but also the most successful repre¬ sentative of those who aim at a mediation between philosophy and the special sciences. In this respect he may be called a modern Aristotle or Leibnitz.®

Bibliography. — Eisler, R., <W. Wundt's

Philosophic und Psychology (Leipzig 1902) ; Hall, G. S., (Founders of Modern Psychology> (New York 1912) ; Konig, E., (Wundt, seine Philosophic und Psychology (Stuttgart 1901) ; Hoffding, H., (Modern Philosophers,* trans. by Mason, A. C. (London 1915) ; Kiilpe, O., (The Philosophy of the Present in Germany,* trans. by Patrick, M. L., and Patrick, G. T. W. (New York 1913) ; Titchener, E. B., Geissler, L. R. and Foster, W. S., (A Bibliography of the Scientific Writings of Wilhelm Wundt,* in American Journal of Psychology, XIX, 1908 and sub¬ sequent volumes.

Harry P. Weld,

Assistant Professor of Psychology, Cornell University.

WUOTAN, the High German name of the Teutonic god of the winds and storms. See Odin.

WUPPER, voop'per, Germany, a river in the governments of Cologne and Diisseldorf of the Prussian province of the Rhine. It rises on the Westphalian frontier, and flows first northwest and then southwest, joining the Rhine between Cologne and Diisseldorf after a course of about 60 miles. It is not navigable for vessels of any size, but it provides con¬ siderable power for manufacturing purposes. Its valley is the most populous in Germany, and contains the important industrial towns of Barmen, Elberfeld and Solingen. In its upper course it is called the Wipper. Consult Schmidt, A., (Die Wupper) (Lennep 1902).

WURDHA, wur'da, India. See Wardha.

WURMSER, voorm'zer, Dagobert Sieg-murd, Count von, Austrian general : b. Alsace, 22 Sept. 1724; d. Vienna, 22 Aug. 1797. He served three years in the French army, but

left it for the Austrian service, where he com¬ manded a hussar regiment during the Seven Years' War, attaining the rank of major-

gen¬ eral. During the Bavarian war of succession he commanded a special corps of the army in Bohemia, and after the peace was made com¬ manding general in Galicia, and in 1787 gen¬ eral of caYalry. By the outbreak of the French Revolution his family lost their es-lates in Alsace. In May 1796 the critical con¬ dition of affairs in Italy after the defeat of Beaulieu led to the appointment of Wurmser to the command of the second Aus¬ trian army destined to act against Bona¬ parte. At the head of 60,000 men he obliged the French to raise the siege of Mantua; but the -defeat of his main body at Castiglione, Roveredo and Bassano, rendered his situation extremely critical. He finally forced his way into Mantua, of which the blockade was re¬ sumed. A third Austrian army was sent into Italy, but the defeat of Axcole prevented it from relieving him; and at length, in February 1797, seeing the impossibility of any longer maintaining the defense, Wurmser surrendered Mantua to Napoleon and was himself allowed his freedom.

WURORA, India. See Warora.

WURTS, John, American educator and legal writer: b. Carbondale, Pa., 10 July 1855. He was educated at Yale and after traveling in Polynesia as a newspaper correspondent (1876-77) was graduated from the Yale Law School in 188ˆ and practised his profession in Jackson¬ ville, Fla., 1884-96. From 1897 he was professor of the law of real property and equity at Yale and was lecturer on law of contracts at West Point in 1916. In 1914-15 he was exchange professor at the University of California. He is joint author of (Minor and Wurts on Real Property) (1910) ; (Complete Revision to Date of Florida Index Digest) (1910) ; and author of (The Anti-Slavery Movement with its Rela¬ tion to the Federal Constitution5 (1883) ; < Washburn on Real Property5 (1902) ; (Cases in Federal Practice5 (1905) ; (A Bit of Judicial History5 (1911) ; (Jury System Under Chang¬ ing Conditions5 (1912).

WURTTEMBERG, viirt'tem-bery, or WURTEMBERG, until 1918 a kingdom, now a component state, of Germany, between Bavaria, Baden, Hohenzollern, and the Lake of Constance, which separates it from Switzer¬ land ; area, 7,534 square miles. It was formerly included in the territory of Swabia (q.v.). Except a few tracts in the south, the surface is hilly and even mountainous. In the west the Schwarzwald, or Black Forest, forms part of the boundary, and the Alb or Rauhe Alp, forming part of the Fran¬ conian Jura, covers an extensive tract. The country belongs in large part to the basin of the Rhine, being drained northward into that river by the Neckar, while the Danube flows across the southern districts. A part of the Lake of

Constance is also included in Wiirttemberg. The climate is temperate. In the lower and more favorable districts the fig and melon ripen in the open air, and the vine, cultivated on an extensive scale, produces several first-class wines ; maize, wheat, hops, tobacco and fruit, which is employed in cider making, are vol. 29 — 37

chiefly cultivated. About a third of the coun¬ try is under forests, which consist mainly of oaks, beeches and pines. Of minerals, the most valuable are iron and salt, both of which are worked by the government ; the others are lime¬ stone, gypsum, alabaster, slate, mill-stones and potter's-clay. The manufactures consist chiefly of cotton, woolen and linen goods, paper, wooden clocks, toys, musical instruments and chemical products. The government until November 1918 was a hereditary constitutional monarchy, the executive power being lodged in the sovereign, and the legislative jointly in the sovereign and a parliament, composed of an upper and a lower chamber. The yearly rev¬ enue from all sources is about $32,000,000, and the public debt, the bulk of which was incurred in constructing the state railways, was, previous to the war of 1914-18, about $160,000,000. There was no exclusively established religion under the monarchy, but the king was invested by the constitution wTith the supreme direction and guardianship of the Evangelical Protestant Church. Education is generally diffused and the centre of the educational system is the Uni¬ versity of Tubingen. Besides Stuttgart (the capital), the chief towns are Ulm, Heilbronn and Esslingen. The history of the state is of little general interest. Previous to the Napo¬ leonic era the rulers had the title of duke, but in 1806, by the favor of Napoleon, the then duke gained a great accession of territory, as well as the title of king. In the subsequent ar¬ rangement of the European states by the Con¬ gress of Vienna the territorial accessions were confirmed and the kingly title formally recog¬ nized. In the war of 1866 Wiirttemberg sided with Austria against Prussia. It became a member of the German empire on its founda¬ tion in 1871. After the collapse of the German imperial armies on the western front in Novem¬ ber 1918 and the establishment of a republic in Berlin, the Wiirttemberg monarch abdicated the throne and Wiirttemberg became a constitu¬ ent state of the Republic. Pop. 2,437,574. Con¬ sult Gaupp, (Das Staatsrecht des Konigsreichs Wiirttemberg5 (Freiberg 1895) ; Hirschfeld,

(Wurttembergs Grossindustrie und Handel5 (Leipzig 1889) ; Belschner, <Geschichte von Wiirttemberg5 (Stuttgart 1902) ; Schliz A., (Urgeschichte Wiirttembergs5 (Stuttgart 1909).

WURTZ, viirts, Charles Adolphe, French chemist: b. Strassburg, 26 Nov. 1817; d. Paris, 12 May 1884. He went to Paris in 1845, in 1851 became professor at the Agronomic Insti¬ tute, Versailles, in 1853 was made professor of organic chemistry at the Sorbonne and pro¬ fessor of toxicology' at the Ecole de Medecin. From 1866 to 1876 he was dean of the Sor¬ bonne faculty of medicine. He made important discoveries in connection with compound am¬ monias, glycol and adol ; and rendered a val¬ uable contribution to theoretical chemistry in distinguishing the atomic relations of organic compounds. Among his numerous works on chemistry are (La theorie atomique5 (1878) ; (Legons elementaires de chimie moderne5 (1868) ; (Traite de chimie biologique5 (1885). Consult Friedel, (Notice sur la vie et les travaux de C. A. Wurtz5 (1884).

WURTZ, Henry, American chemist: b. Easton, Pa., 5 June 1828; d. 10 Nov. 1910. He was graduated from Princeton in 1848, studied

further at the Lawrence Scientific School of Harvard, was State chemist of New Jersey 1854-56, chemical examiner in the United States Patent Office 1859-61, and from 1871 to 1875 edited the American Gas Light Journal. He was closely identified with the earlier investi¬ gations of natural and artificial gas and the use of petroleum as fuel. He proved the existence of gold in sea water. In 1888 he entered the employ of T. A. Edison (q.v.), as chemist, and afterwards made several important chemical dis¬ coveries, chief of which is that of the geometri¬ cal laws of the condensation of chemical mod¬ ules. Other 'important investigations are de¬ scribed in his scientific monographs. Author of (Obtaining Potash Compounds from Greensand Marl> (1850) ; (Geometrical Chemistry > (1876) ;

(Discovery of Lake Superior Silver Minerals, Huntilite and Animikite) (1878), *etc.*

WURTZILITE, an asphalt (elaterite) mined extensively in Wasatch County, Utah, and used for roofing material, waterproof felts, building paper, rubber substitutes and paving materials. Color black, but deep

red in thin plates. Practically insoluble in gasoline (76°) and only partly soluble in ether, carbon disul¬ phide, turpentine and carbon tetrachloride.

WURTZITE (named for C. A. Wurtz, q.v.), in mineralogy , a dimorphous form of zinc blende. Crystallization, hexagonal ; hardness 3.5 to 4; specific gravity, 3.98; lustre, resinous; color, brownish black; streak, brown; compo¬ sition, a sulphide of zinc, ZnS ; occurrence, in a silver mine near Oruro, Bolivia, in Portugal, Peru, and near Butte City, Mont. Its arti¬ ficial manufacture is accomplished by fusing equal parts of zinc sulphate with calcium fluor¬ ide and barium sulphide.

WURZBURG, Bavaria, city and capital of Lower Franconia, on the river Main, 62 miles southeast of Frankfort and at the junc¬ tion of the main railway lines to Nuremberg and Bamberg. The river is crossed here by three bridges, of which the first is a stone structure built in 1474-1607 ; while the modern bridges were built in 1887 and in 1894. 1 he

town is built on both sides of the river, but the main portion of it is on the north bank. The older portion of the city is of quaint and irregular pattern, but the modern suburbs are handsomely laid out, with broad promenades. There are many mediaeval buildings in a good state of preservation and several ancient churches. Among the churches are the Ro¬ manesque cathedral dating from 1042-1189, with additions of later date; the Marienkapelle, a Gothic structure built in 1377-1441 ; the Hauger-stiffs Church, in Italian Renaissance style, 1670—91 ; the Neumiinster Church, dating from the 11th century, and the church of Saint Burk-hard, built in 1033-44. A notable structure is the palace, built in 1720-44 as a residence for the bishops and grand dukes of Wurzburg. The bishopric dates from 741, but the town existed earlier. From the 12th century the bishops had ducal authority. The bishopric was secularized by the Peace of Luneville in 1803, and Wurzburg came under Bavarian control. By the Peace of Pressburg in 1805 it became an electorate under Ferdinand III, former grand duke of Tuscany, who took the title of Grand Duke of Wurzburg and joined the confedera¬ tion of the Rhine. It was restored to Bavaria

in 1815. A new bishopric, without ducal au¬ thority, was established in 1817. The city was bombarded and captured by the Prussians in

1866.

The University of Wurzburg (q.v.) adds considerably to the importance of the town, and there are also schools of agriculture and horticulture, a royal music school and other educational institutions. The city is surrounded by vineyards which produce excellent wine. Manufactures include furniture, machinery, scientific instruments, railway carriages, brick, chocolate, beer, malt and vinegar. It is an im¬ portant commercial centre. Pop. about 84,496.

WURZBURG, University of, a German educational institution founded at Wurzburg, Bavaria, by Bishop Julius in 1582. An earlier university of the same name existed at Wurz¬ burg for a short time after 1403, but passed out of existence. The university was founded as a Roman Catholic institution and its chairs of theology and philosophy were held by Jesuits until the suppression of the order in 1774, but theological instruction remains in Roman Catho¬ lic hands. The faculty of medicine early be¬ came famous and has remained the most im¬ portant in the university; taking, with its kin¬ dred departments of dentistry and pharmacy, more than half the students enrolled. The university was reorganized after Wurzburg passed under Bavarian control in 1803. The library contains nearly 400,000 volumes. There are about 1,400 students and 100 instructors. Here W. K. Rontgen conducted the experi¬ ments which led to his discovery of the Rontgen rays in 1896.

WUSHKUM (from the name of their chief village), meaning a species of louse or flea, a tribe of the Chinookan stock of North American Indians. They call themselves Tlaq-luit, and are the Echeloot of Lewis and Clark and the Wisham, Wishram, etc., of other writers. They occupy the north bank of Colum¬ bia River, Washington, from Tenino to the neighborhood of White Salmon River. They subsist largely on salmon, and are not reserva¬ tion Indians, although they took part in the Yakima treaty of 1855. As they are given to wandering up and down the coast and as they have mixed, to some considerable extent, with neighboring tribes, it is very difficult to esti¬ mate their population.

WUTHERING HEIGHTS, Emily

Bronte’s one novel, was published in 1847 under the pseudonym (<Ellis Bell.® Though an al¬ most complete failure with both the public and the critics it was reissued in 1849 with an in¬ troduction by Emily’s more famous sister, Charlotte, the author of (Jane EyreP The work is a belated and unconventional specimen of the so-called

Gothic Romance or novel of terror, inaugurated by Horace Walpole's (Castle of OtrantoP Its scene is a bleak mansion on the Yorkshire moors, the home of the Earnshaw family, into which is introduced the foundling Heathcliff, picked up by Mr. Earnshaw on the high road. The story deals with the fiercely revengeful life of Heathcliff, who develops under ill usage and neglect an appalling cruelty, coupled with an inflexible will and a strange pov/er of fascination. He gains control of the Earnshaw property and brings up Hareton, son

of the besotted Hindly Earnshaw, whom he hates, in brutal ignorance. The one redeeming trait in his distorted and Satanic nature is his wild love for Hindley's sister, Catherine, which outlives both her marriage to Edgar Linton and her death. Thwarted by Catherine's daughter in his endeavor utterly to debase Hareton Earn¬ shaw, Heathcliff starves himself to-death, haunted and exhilarated by the spectral presence of the woman who, despite his cruelty, of which she herself felt the effect during her life, has always belonged to him in spirit.

The story is a wild and passionate one, far remote from real life, which Emily Bronte knew scarcely at all. Scenes of domestic vio¬ lence succeed each other in a way which is almost too much for the reader's nerves. The characters are the creation of a lawless but extraordinarily vivid imagination, and the whole novel is written with an energy which triumphs over the obvious limitations of its author's art. The best edition, with introduction, etc., is that by Clement K. Shorter, 'The Complete Works of Emily Bronte* (Vol. II). Consult also, Shorter, C. K., (Charlotte Bronte and her

Circle* ; and the essay on Emily Bornte in 'Swinburne's Miscellanies.* James H. Hanford.

WYANDOT, or HURON (English adap¬ tation of the French Ouendat, or Houandate, later written Guyandotte, from the native name Gendat, signifying, "They are is¬ landers"). A tribe composed of the rem¬ nants of several politically independent Iroquoian tribes and confederacies whose political integrity was destroyed by the Iro¬

quois during the middle of the 17th century. Among these peoples may be mentioned the an¬ cient Wendat (or Houandate), or Huron con¬ federacy, which was composed of four tribes, namely, the Attigneenongnahac, the Attignawan-tan the Arendahronons and the Tohontaenrat (for Tohontakenrat), and also, later, the affili¬ ated tribes known as the Ataconchronons (Atar-onchronons), the Wenrohronons, and the Aton-thratarhonons (Muskrat people), the last being Algonquian ; and the Tionontateronons, the At-tiouendaronk (Attiouendarankhronon) or Neu¬ ter Nation, and lastly, the Eries. To the At-tiouendaronk may be added the small affiliated tribes known as the Aondironon and the Ongmarahronon (Ongmarahronon) . The first known habitat of these several peoples was south and east of Lakes Huron and Erie, in the present States of Ohio and Pennsylvania and western New York, in Ontario, Canada, and the north¬ ern shore of the Saint Lawrence River as far down as the site of Quebec. To-day the Wyandots so-called live in Oklahoma, where they number about 300; and at Lorette, Quebec, Canada, where some Hurons who are in fact Wyandots, dwell, numbering about 400; the whole aggregating about 700. All these tribes when first encountered by Europeans were or¬ ganized into well-governed communities. The social and political organizations were based strictly on bloodkinship, real or fictitious, hic-titious kinship was obtained through the rites of adoption. These peoples dwelt in lodges con¬ structed of bark, which were long in figure, sometimes having as many as 10 or 12 fires with a family on two sides of each hre. The lodges were usually collocated into villages, many of which were quite strongly palisaded.

For their sustenance they depended chiefly on agriculture, raising corn and beans of several varieties, squashes and sunflowers for oil. Ihey tanned and dressed the hides of the animals which they killed. The prepared skins they neatly and skilfully utilized in the preparation of their raiment and their bedding. Reeds and barks of various kinds were useful in making mattresses and other needed articles. The title to their lands was vested solely in the mothers of the people. The choice of a candidate for chief for either of the two grades of this office was solely a prerogative of the mothers of the clan to which the chiefship belonged. The chief held his office during his good behavior.

WYANDOTTE, Mich., city situated in Wayne County, about 10 miles southwest of Detroit, on the Detroit River and on the Grand Trunk, the Lake Shore and Michigan South¬ ern, the Michigan Central and the Detroit, To¬ ledo and Ironton railroads. Wyandotte is a thriving industrial centre, having chemical and salt works, ironworks,

shipyards, fur-coat and robe factories, sash and door works, and stove factories. Internal combustion engines, automo¬ biles and their accessories are also manufac¬ tured here. The Eilbert Memorial Hospital is at Wyandotte and there are a public library, churches, schools, *etc.* The commission form of government is in operation. , The city's re¬ ceipts from all sources in 1918 amounted to $53,398.81, of which $22,923.17 was an unex¬ pended balance from the year previous. The total disbursements for the same period were $41,682.01. The real property valuation is $12,547,610, and the personal $3,222,070. Pop.

(1920) 13,851.

WYANDOTTE CAVE, in Crawford County, Ind., a natural formation, five miles northeast of Leavenworth, second in size to Mammoth Cave (q.v.), but having a greater number and variety of stalactites and stalag¬ mites than any other cave in the United States. It has been explored for a distance of 23 miles. The chambers and galleries are numerous, some about 350 feet long and 180 feet high. Some of the remarkable features are Monument Mountain, about 175 feet high, and 75 feet above its crests is the grand dome. The Pil¬ lared Place contains several clusters of stalac¬ tites, and the Pillar of the Constitution, a large stalagmite 30 feet high and 75 feet in circumference. There are 144 places of un¬ usual interest named. Consult Hovey, H. C, 'Celebrated American Caverns) (1896) ; and Indiana State Geological Reports.

WYANT, wi'ant, Alexander Helwig,

American artist: b. Port Washington, Ohio, 11 Jan. 1836; d. New York, 29 Nov. 1892. After trying the saddlery business, he turned to art, became a painter of landscapes at Cin¬ cinnati, exhibited in the National Academy of Design in 1865, was elected associate of the academy in 1868, *md academician in 1869. In 1865 he went to Europe, becoming a pupil of Hans Gude at Carlsruhe. He attained high rank in landscape art, painting almost exclu¬ sively American scenes, and being particularly successful in views from the Adirondack wilderness. His chief characteristics are subtle tones, the evanescent moods of nature that he was quick and able to catch, and a delicate

quality of workmanship. His work is well represented in the Metropolitan Museum, New York. He was a founder of the American Water-Color Society. Among his works are (Scene on the Upper Susquehanna) (1869) ; (Pool on the Ausable) (1871) ; (In the Adirondacks) (Metropolitan Museum) ; (A North Woods' Brook } ; (An Old Clearing) ; (Pool in the North Woods } ; (New Jersey Meadows) (1872) ; (Sunset on the Prairie) (1876) ; Rem¬ iniscence of the Connecticut (1878) ; (Even-irig) (1885) ; (Sunset near Killarney) (1886) ; (October Day) (1892).

WYATT, wl'at, James, English architect: b. Burton Constable, Staffordshire, 3 Aug. 1746; d. Marlborough, Wiltshire, 5 Sept. 1813. He was taken to Rome in 1760 by Sir William Bagot, and during the next six years studied architecture in that city and in Venice. Re¬ turning to London, he brought himself into no¬ tice by his designs for the Pantheon, in Oxford street, a building for many years famous as the rendezvous of the fashionable world. He re¬ ceived innumerable commissions for private residences in all parts of the kingdom; but his designs, for the most part in a sort of Grseco-Iralian style, have little at the present day to recommend them. About 1782 he turned his at¬ tention to Gothic architecture, being one of the first to attempt its revival ; and for many years was employed as a restorer of cathedrals and parish churches, in the course of these labors making sad havoc, at Salisbury, Hereford, Dur¬ ham and elsewhere. It must be said, however, that his imperfect conceptions of Gothic art were shared by his contemporaries and approved by the taste of his time, in large measure. His most famous work in this style was Fonthill abbey, erected for Beckford in 1795. He held the position of surveyor-general subsequent to 1796, and in 1802-03 was president of the Royal Academy. George III employed him at Windsor. Wyatt is often referred to as <(The Destroyer.®

WYATT, Sir Matthew Digby, English architect and art writer: b. Rowde, near Devizes, Wiltshire, 1820; d. London, 21 May 1877. He made a diligent study of the architecture of Italy, France and Germany, re¬ turning to England in 1846 to publish his Geo¬ metrical Mosaics of the Middle Ages) (1848). Tn 1856 he was appointed architect to the East India Company, and made many important de¬ signs for public works in Great Britain and India; in 1866 was

awarded the royal gold medal of the Royal Institute of British Archi¬ tects ; and in 1869 was knighted and made Slade professor of fine arts at Cambridge. His chief books are (Metal Work and its Artistic De-sigiP (1852) ; Undustrial Arts of the 19th Cen¬ tury > (1853) ; (Art Treasures of the United KingdorrP (1857); (Fine Arp (1870); Archi¬ tect's Handbook in Spain) (1872).

WYATT, Sir Thomas,* English poet: ,b. Kent, about 1503; d. Sherborne, Dorsetshire, 11 Oct. 1542. He was graduated from Cambridge in 1518, may have studied at Oxford, and sub¬ sequently went on his travels to the Continent. After his return to England he appeared at court, where the reputation he had already ac¬ quired as a wit and a poet introduced him to the notice of Henry VIII, who retained him

about his person and knighted him in 1537. He was employed on several diplomatic missions to different powers, and was a friend of Thomas Cromwell (q.v.), in whose fall he ran some risk of being involved. In 1542 he was re¬ turned to Parliament as knight of the shire for Kent. A close student of foreign literature, Wyatt introduced the sonnet into England from Italy. In this he is commonly associated with Henry Howard, Earl of Surrey, but is more correctly to be regarded as the pioneer. None of Wyatt's verse, sacred or secular, appeared in his lifetime. Some of the secular poems were printed (96 are assigned to Wyatt) in the (Songes and Sonnettes) (1557) of Richard Tottel, commonly known as (Tottel's Miscel¬ lany. } There are among the extant works 31 sonnets, and satires in heroic couplets, imitated from Persius and Horace. Wyatt's poems evince more elegance of thought than imagina¬ tion, while his mode of expression is far more artificial and labored than that of Surrey. Con¬ sult Nott's edition of Wyatt and Surrey with the elaborate memoir prefixed thereto (1816); also the article by Churton Collins in T. H. Ward's ˆEnglish Poets* (1883), and Simond's (Sir Thomas Wyatt and his Poems) (1889). Consult also Foxwell, A. K., (Study of Sir Thomas Wyatt's Poems) (New York 1912) and Padelford, F. M., (Early XVIth Century

Lyrics) (London 1907).

WYCHERLEY, wich'er-li, William, Eng¬ lish wit and dramatist : b. Clive, Shropshire, about 1640; d. London, 1 Jan. 1716. About 1655 he went to France for his education, but he re¬ turned to England a short time before the Res¬ toration, and was entered a gentleman com¬

moner of Queen's College, Oxford, which he left without a degree, and took chambers in the Middle Temple. He paid, however, little atten¬ tion to the law, but became a man of fashion in the town, and made himself known as author of Rove in a Wood, or Saint James's Park.* a comedy, published about the end of 1671. This piece brought him into much notice, and his popularity was increased by comedies that soon afterward followed : <The Gentleman Dancing-master, > published in 1673; (The Coun¬ try Wife,) produced in 1672 or 1673, and (The Plain Dealer,* 1674. He became a favorite of the meretricious Duchess of Cleveland, and was much regarded by Villiers, the witty and profli¬ gate Duke of Buckingham. About 1680 he im¬ proved his circumstances by marrying the Coun¬ tess of Drogheda, a young, rich and beautiful widow. At her death soon afterward she set¬ tled her fortune upon him; but, his title being disputed, the costs of law and other encum¬ brances produced embarrassment, which ended in arrest. He remained in confinement seven years, until released by James II, who, it is said, was so pleased with his comedy of (The Plain Dealer* that he ordered his debts to be paid, and added a pension of £200 per an¬ num, which he lost at the revolution. The succession to his father's estate, which was strictly entailed, does not appear to have re¬ lieved him from the embarrassments into which he had again fallen, and from which he found a deliverance only a few days be¬ fore his death in marrying a young woman with a fortune of £1,500. Besides the plays al¬ ready mentioned he wrote poems of no value or

interest. His plays are excessively licentious. He was a friend of Dryden, and in his later years of Pope, but Pope's statements regarding their connection are not much to be depended on. Among latest editions of his plays is that by W. C. Ward (London 1893); Hazlitt, Wil¬ liam, (Lectures on the English Comic Writers) (ib. 1819; new ed., New York 1910) ; Lans-downe, Lo-rd, (Memoirs of the Life of William Wycherly, Esq.; with a character of His Writings) (London 1718).

WYCKOFF, wi'kof, Walter Augustus,

American sociologist: b. Mainpuri, India, 12 April 1865 ; d. 15 May 1908. He was gradu¬ ated at Princeton in 1888, and after further study in Europe began in July 1891, the life of a day laborer, working his way from Connecti¬ cut to California and spending 18 months in this manner. His aim was to study from the inside the economic conditions surrounding American wage-earners, and the immediate outcome of his experiment was his three sociological works : (The Workers — the East) (1897) ; (The Work¬ ers — the West) (1898) ; (A.Day with a Tramp and Other Days) (1901). In 1893-94 he went around the world twice as a private tutor, in 1895 was made a lecturer on political science at Princeton, and in 1898 became an assistant pro¬ fessor of political economy there. His works were widely read and aroused considerable dis¬ cussion.

WYCLIFF, wik'lif. See Wiclif, John.

WYE, wi, a river partly in Wales, partly in England, with its source in Plynlimmon, Montgomeryshire. After a circuitous and winding course of about 130 miles, having passed through Radnorshire, Herefordshire and separated Monmouth from Gloucestershire, it falls into the Severn below Chepstow. It is dis¬ tinguished for the beauty and variety of its scenery, especially in the neighborhood of Tintern Abbey. The tide at Chepstow sometimes rises 46 feet. Large vessels cannot ascend be¬ yond Chepstow Bridge, but barges of from 18 to 30 tons reach Hereford. A canal from Here¬ ford connects the Wye with the Severn at Gloucester. Other towns on the river are Mon¬ mouth, Ross and Builth. Tintern Abbey, one of the noblest ruins of England, is on the banks of the Wye.

WYETH, John Allan, American physi¬ cian : b. Marshall County, Ala., 26 May 1845. He received his education at the University of Louisville, and at Bellevue Hospital Medical College. During the Civil War he served as a private in Company I of the Fourth Alaba¬ mian Cavalry. After practising as attending surgeon to Mount Sinai and Saint Elizabeth hospitals, he founded the New York Polyclinic Medical School and Hospital, the pioneer organ¬ ization for post-graduate medical study in the United States. For a number of years. he was president of the faculty, and surgeon-in-chief of that institution. He has been president of the American Medical Association, the New York Academy of Medicine, the New York State Medical Association and the New York Pathological Society. In 1878 he was awarded the first and second prizes of the American Medical Association, and the Bellevue Alumni Association. Prize in 1876. He has published (A TextBook on General Surgery* (1888);

(Osteo-Plastic Operation for Correction of Deformities of the Nose and Palate) (1892) ; (Life of Lieutenant-General Nathan Bedford Forrest* (1899) ; (With Sabre and ScalpeP (an autobiography, 1915).

WYKEHAM, wik'am, William of. See

William of Wykeham.

WYLIE, wl'li, Robert, American artist : b. Isle of Man, 1839; d. Pont Aven, Brittany, France, 4 Feb. 1877. He was brought to this country when a child, and after some study in the Pennsylvania Academy was sent by his trustees to study in France in 1863. Settling at the village of Pont Aven he was presently surrounded by a colony of artists. In the Paris Salon of 1872 he obtained a second-class medal, but not till after his death did his paintings attract much attention. His (Death of a Yen-dean Chief * (1876) hangs in the Metropolitan Museum, New York.

WYMAN, wi'man, Jefferies, American anatomist: b. Chelmsford, Mass., 11 Aug. 1814; d. Bethlehem, N. H., 4 Sept. 1874. He was graduated from the Harvard Medical School in 1833, was professor of anatomy anad physiology at Hampden-Sidney Medical College, Richmond, Va., 1843-47, and Hersey professor of anatomy at Harvard from 1847 until his death. He es¬ tablished there the Museum of Comparative Anatomy and for many years was indefatigable in efforts for its increase, was president of the Boston Society of Natural History 1856-70. be¬ came curator of the Peabody Museum, Cam¬ bridge, in 1866, and published over 175 scientific papers, including (On the External Habits, Characters and Osteology of the Gorilla) (1847) ; (On the Nervous System of the Bull-Frog* (1853) ; Observations on the Develop¬ ment of the Skate) (1865) ; Observations and Experiments on Living Organisms in Heated Water* (1867) ; and (Freshwater Shell-Mounds of the Saint Johns River, Florida1* (1875). He was one of the earliest American supporters of the theory of evolution. Consult biographical sketches by Asa Gray, O. W. Holmes, S. Weir Mitchell, F. W. Putnam, and Burt G. Wilder.

WYMAN, Robert Harris, American naval officer: b. Portsmouth, N. H., 12 July 1822; d. Washington, D. C., 2 Dec. 1882. He entered the navy in 1837, and while attached to the Gulf Squadron during the Mexican War, took part in the siege and capture of Vera Cruz and the expeditions that captured Tuspan and Tam¬ pico. He was stationed at the naval observa¬ tory in Washington in 1848-50 and 1853-54, and

in the Civil War commanded the Yankee and Pawnee and the Potomac flotilla in 1861 ; and the Santiago de Cuba on blockading duty in 1862-64. He became commodore in 1872, and rear-admiral in 1878; and was commander-in- chief of the North Atlantic Station in 1879-82.

WYMAN, Walter, American surgeon : b. Saint Louis, Mo., 17 Aug. 1848 ;ˆd. 1911. He was graduated at Amherst in 1870, and at the Saint Louis Medical College in 1873 ; served in city hospitals 1873-75, and ‘after 1876 was in the Marine Hospital service, being made assist¬ ant surgeon in 1876. chief medical purveyor of the quarantine division in 1888, and supervising surgeon-general in 1891. He was an earnest

advocate of the sanitation of ports not only in the United States, but in the West Indies and South America, holding that if this were en¬ forced yellow fever would be entirely eradicated from the Western hemisphere. On his recom¬ mendation the government set apart a large tract of land at Fort Stanton, New Mexico, for a hospital whither all consumptive patients in the United States marine hospitals could be transferred.

WYMORE, Neb., city in Gage County, on the Big Blue River, 45 miles south of Lincoln, and on the Chicago, Burlington and Quincy Railroad. There are railroad machine shops and the city is a shipping centre for grain and livestock. Pop. about 2,613.

WYNANTS, wi’nants, or WIJNANTS, Jan, Dutch painter: b. Haarlem, between 1615 and 1620; d. about 1680. Very little is known of his life except that he was master of Adrian Vandevelde, Wouwerman and other eminent painters, and that he was naturally indolent and given to pleasure. His works are consequently few, but are highly valued for their technical merits. They consist of landscapes of small size, the figures and cattle in which were often exe¬ cuted by other hands. He is represented in the galleries of Amsterdam, The Hague, Munich and in the National Gallery, London.

WYNDHAM, Sir Charles, English actor: b. Liverpool, 23 March 1837 ; d. London, 12 Jan. 1919. He was the son of a physician, studied medicine and surgery in Germany and passed all his examinations brilliantly. During the Civil War he enlisted with the Union forces in the United States and served con¬ tinuously until the close of the war, being pres¬ ent at the battles of Chancellorsville, Fredericks¬ burg and Gettysburg and through the Red River campaign with General Banks. On quit¬ ting the army he made his initial American stage appearance in (Brothers and Sister) and two years later returned to England, where he supported Henry Irving and Ellen Terry in many plays. When he reappeared at the Wal-lack Theatre, New York, in 1869 he made an excellent impression as a light comedian, and organized a touring company of his own, which went to all of the larger cities of the United States. His repertory was extensive. (The School for Scandal,) in which he appeared as Charles Surface, was one of his greatest suc¬ cesses, and (Pink Dominoes) which he pro¬ duced in 1877, ran for 500 nights. For 20 years Sir Charles successfully managed the Criterion, New and Wvndham's theatres in London. He was knighted by King Edward in 1902. Con¬ sult Scott (The Drama of Yesterday and To¬ day > (1899).

WYNDHAM, George, English cabinet of¬ ficer: b. London, 29 Aug. 1863; d. 1913. He was educated at Eton and Sandhurst Royal Military College. He served through the Sua-kim campaign and at Cyprus in 1885, and was private secretary to A. J. Balfour (q.v.) 1887-92. He also sat in Parliament for Dover from 1889, was Parliamentary Under-Secretary of State for War 1898-1900, became chief sec¬ retary for Ireland in 1900 and entered the Cabi¬ net in 1902. In March 1903 he introduced the Irish land purchase bill subsequently passed. His resignation as chief secretary was brought

about by the Orange Unionists. He published an edition of (North's Plutarch) in the (Tudor Classics) (1894) ; (Shakespeare's Poems'

(1898); (Ronsarde and La Pleiade) (1906).

WYNDHAM, Sir William, English states¬ man: b. Orchard-Wyndham, Somerset, 1687; d. Wells, Somerset, 17 June 1740. He was edu¬ cated at Oxford and entering the House of Commons for his native county, identified him¬ self with the tories, became secretary of war in 1711, and in August 1713 was transferred to the office of Chancellor of the Exchequer. He was suspected of treasonable relations with the Pretender, and lost his office on the death of Queen Anne. On the

outbreak of the rebellion in Scotland under the Earl of Mar in 1715, an order for Wyndham's confinement was issued, and he was arrested at his house in Somerset, but escaped. A reward of $5,000 was offered for his apprehension. After lurking for some time in disguise he surrendered himself and was committed to the Tower. Released with¬ out a trial, he remained until his death a leader of the Parliamentary opposition to the ministry of Sir Robert Walpole. He was a very grace¬ ful, clear, forcible and spirited orator. One of his sons, Percy, took the name of O'Brien and in 1756 was made Earl of Thomond.

WYNNE, win, Charles Whitworth. See

Cayzer, Sir Charles William.

WYNNE, Ark., county-seat of Cross County, on the Missouri Pacific Lines, Little Rock, Ark., to Memphis, Tenn., and Saint Louis to New Orleans, 45 miles west of Memphis. It is the trading centre of a rich farming coun¬ try with good department stores, wholesale grocery houses, railway division headquarters, a flour mill, cotton gins, a stave factory, hoop factory, electric lighting and water systems, automobile garage and repair plants. Its edu¬ cational facilities are excellent and it has a good courthouse and high school building. The town is administered by a mayor and council. Pop. (1920) 2,933.

WYNTOUN, win'ton, Andrew of, Scot¬ tish rhyming chronicler: b. about 1350; d. after 1420. He was a canon regular of the priory of Saint Andrews, and was in 1395 prior of Saint Serf's Inch, in Lochleven, probably holding this office until his death. Wyntoun's (Orygynale Cronykil of Scotland* is the first historical record in the Scottish vernacular. It received little attention until 1795, when David McPher¬ son published an annotated edition of a part of it. David Laing edited a complete edition of this work (3 vols., Edinburgh 1872-79) and an edition from the Wemyss Manuscript was prepared for the Scottish Text Society (1906). Wyntoun's Chronicle' bears the usual char¬ acter of the historical writings of the age in the indiscriminate mixture of tradition with history, but he appears to have been faithful to his authorities, whom he sometimes literally tran¬ scribes. Wyntoun's scholarship appears to have been considerable and the candor and generosity with which he speaks of the enemies of his country are commendable.

WYOMING (Indian, Maughwauwama, <(big plains®), a State of the United States, in the Rocky Mountain region, between the paral¬ lels, lat. 41° and 45° N., and between long.

104° 3’ and 111° 3’ W. Portions of the Louisi¬ ana Purchase, the Oregon claim, the Texas an¬ nexation and the Mexican cession are included in the State. It is bounded on the north by Montana, east by South Dakota, south by Colo¬ rado and Utah, and west by Utah, Idaho and Montana. The boundary lines are all straight. The greatest extent is from east to west, 355 miles (north to south, 276 miles). Area (ex¬ cluding Yellowstone National Park) , . 97,575 square miles. Wyoming ranks eighth in size among the States of the Union.

Topography. — The State averages from 5,000 to 7,000 feet above sea-level and is trav¬ ersed by the main chain of the Rocky Moun¬ tains. From the plateau lands rise a number of lofty ranges and peaks, some of them ap¬ proaching 14,000 feet in altitude. The largest mountain masses are in the southern, north¬ western and north central parts of the State. In the extreme northeast, the Black Hills of South Dakota project into Crook and Weston counties. Other conspicuous groups of outlying hills in this region are the pine-clad Hartville Mountains, north of Guernsey, and the Bear Lodge Mountains. The principal mountains in the south are, first, the Laramie Mountains, which rise to an average height of 1,000 feet above the plain, culminating in Laramie Peak (9,020 feet) and the Medicine Bow Mountains, called locally the Snowy Range, a lofty mass on whose western slopes gather the waters of the North Platte. The highest point in this range is Medicine Bow Peak (12,005 feet). The western watershed of the North Platte is formed by the Sierra Madre Mountains, pro¬ jecting north from Colorado. In the extreme southwestern corner of the State are the lofty Uintah Mountains. The general trend of all these is northwest and southeast, save the Uin¬ tah Mountains, which run east and west. The entire northwest portion of the State comprises a lofty mountain mass broken here and there by small’ valleys. The Absaroka Range (partly in the Yellowstone National Park) forms the Continental Divide. To the west lie the Teton and Snake River ranges near the Idaho bound¬ ary. The highest point is the Grand Teton (13,747 feet). To the south and east of these lie the Gros Ventre, Salt River, Wyoming and Wind River ranges, the latter

projecting well into the west central portion of the State and including such lofty peaks as Fremont (13,730 feet), Gannett (13,785 feet), the highest in the State, and Atlantic (12,700 feet). In north central Wyoming are the isolated Big Horn Mountains, culminating in Cloud Peak (13,165 feet). Other minor ranges cross south cen¬ tral Wyoming, prominent among them being the Green, Ferris, Seminole, Shirley and Rat¬ tlesnake mountains. These are small separated groups lying a little east of the Continental Di¬ vide, but indicating the general course of the Rockies. In this region also are the huge bare granite heaps and domes rising from the sandy plains north of the Sweetwater, known collec¬ tively as the Granite Mountains. The Continen¬ tal Divide extends from the middle of the southern boundary in a northwesterly direction through Yellowstone National Park.

Lofty plateaus characterize all portions of the State and include the Cheyenne Plains and Goshen Hole in the southeast and east, the Lara¬ mie Plains (7,000 feet) and Red Desert in the

south, lower Wind River Valley in the west central and Big Horn Basin in the northern part of the State. These are either level or rolling and lie mainly between 4,500 and 7,000 feet elevation. The eastern plains are grassy, the western and higher plateaus are covered with the characteristic sage brush. Within the mountain ranges are many small sheltered val¬ leys or parks, the most noteworthy being Jack¬ son's Hole in the northwest. There are several gaps in the Continental Divide of varying ac¬ cessibility. Bridger's Pass (used by the Union Pacific Railroad) in southern, and South Pass in central Wyoming are the most available for railroad construction. North of these lie Union Pass and Two Ocean Pass, which are suitable only for wagons and pack trains. Hot springs are found in the region included in and adjacent to the Yellowstone National Park, at Thermopolis and elsewhere. The Thermopolis Springs (135° F.) are of medicinal value and annually attract thousands seeking the cure.

Hydrography. — The general drainage in the eastern two-thirds of the State is from south to north ; in the west from north to south. The State is included within four dis¬ tinct drainage areas. The major portion lies within the Missouri Basin, comprising the val¬ leys of the North Platte, Sweetwater, Wind, Big Horn, Powder, Belle Fourche and Cheyenne rivers. The western part of the State is cut by Green River, an affluent of the Colorado, and hence within the Gulf of California drainage system. North and west of Green River rises Snake River, a

tributary of the Columbia and hence within the Pacific drainage area, while through the extreme southwestern part of the State flows Bear River, the principal affluent of the Great Salt Lake, and, accordingly, a water of the Interior Basin. The water surface of the State totals only 320 square miles. The largest lakes are Yellowstone, Jackson and Shoshone, all in the northwest. There are many small lakes amid the mountains, small bodies of clear water surrounded by wooded mountains.

Geology. — Wyoming lies partly in the Great Plains and partly in the Rocky Mountain provinces, thus presenting the three chief divi¬ sions of land forms, namely, plains, plateaus and mountains. The salient structural features of the region are great anticlinal folds separated by deep synclinal basins, some of which are 100 miles long and 20 to 50 miles wide. Forma¬ tions of pre-Cambrian age are exposed along the crests of the major mountain ranges, namely, the Laramie, Medicine Bow, Wind River, Big Horn and Black Hills. The rocks which com¬ pose these formations constitute a complex group of metamorphosed sediments and associ¬ ated igneous intrusives. The Paleozoic is but slightly developed. Formations of Cambrian, Ordovician, Mississippian, Pennsylvanian and Permian age are found over the northern and western portions of the State. The Meso¬ zoic is represented by slight developments of the Triassic, Jurassic and Lower Cretaceous, while the Upper Cretaceous attains a thickness of several thousand feet. The Cenozoic is char¬ acterized by a great thickness of continental Tertiary formations rich in mammalian fossils. Volcanic eruptives of Tertiary age cover large areas in and adjacent to the Yellowstone Na¬ tional Park. Wyoming's chief contributions to

geology are found in the rich reptilian fauna from the Cretaceous and the mammalian fauna from the Tertiary and in the unsurpassed gey¬ sers of the Yellowstone. _ The chief resources thus far developed are oil from the Pennsyl¬ vanian and Cretaceous, and coal from the Cre¬ taceous and Tertiary.

Minerals and Mining. — The mineral re¬ sources of the State are

annually attracting greater notice. Fourteen out of the 22 coun¬ ties are producers of metallic minerals. The relatively small quantities of gold, silver and copper, the metals for which the State has been prospected, have led to an underestimation of the State's resources. Placer gold was found at Atlantic City in west central Wyo¬ ming in 1842 and subsequently in small quanti¬ ties in the Grand Canyon of the Snake. Lode deposits have been worked in the north Lara¬ mie Mountains and elsewhere intermittently since 1871. The veins are not phenomenally rich but are believed to persist in depth. The future of gold mining here depends on increased capital investment, modern methods of ore treatment and improved transportation and power facilities. In 1915 Wyoming ranked 15th among the States in gold production. To 1911 the total placer yield was estimated at $1,725,-000; the lode yield at $4,137,000. The following table shows the production in recent years :

year Fine ounces

1913 847

1914 324

1915 672

1916 4,054

Silver is usually found in conjunction with gold especially in the western part of the State. The following table shows the value of the silver mined in the State in representative years :

year Value

1912 . $200 00

1913 . 2,254 00

1914 ... 100 00

1915 . 1,400 00

1916 . 3,092 00

A considerable portion of Wyoming is under¬ laid with bituminous coal of excellent quality. The best fields are those near New'astle and at Hanna, Rock Springs, Kemmerer and Dietz. Other rich deposits exist in the north and north¬ west but have not been developed to any ex¬ tent. In 1914 the State produced 6,475,293 tons; in 1915, 6,554,028 tons; and in 1918, 9,265,806 tons. In 1915 Wyoming ranked sixth among the States in the production of iron ore, yield¬ ing in that year 998,845 gross tons. Copper is found in central Wyoming and in the Medicine Bow Mountains in the south. The production in recent years has been as follows: 1914, 165,- 023 pounds; 1915, 1,020,926 pounds; 1916, 2,569,- 000 pounds. Petroleum is already one of the most important mineral products and the State gives every promise of becoming a leader both in production and in quality of output, some geologists even having gone so far as to say that Wyoming is literally underlaid with a sea of oil. The existence of petroleum has been known for years, but among the first to call attention to its commercial possibilities was the late Prof. Wilbur C. Knight of the State Uni¬ versity. The cretaceous shales that have been drilled contain oils with both a paraffine and an

asphalt base. Many of the former are of un¬ surpassed quality. The principal fields thus far developed are the Salt Creek, Powder River, Big Muddy, Basin, Lost Soldier, Pilot Butte, Crow Creek, Torchlight, Lovell, Little Buf¬ falo and Rock Creek. The largest producing fields are the Salt Creek and Big Muddy. Early in 1918 the bringing in of a well on Rock Creek, 50 miles north of Laramie, gave great promise of large quantities of rich oil with a paraffine base in a hitherto little exploited field. In nearly all the fields the oil lies at a depth of 1,500 to 4,000 feet. The difficulties now en¬ countered include lack of transportation facili¬ ties and detailed geologic studies of the State and the danger of litigation. The following table shows the production in recent years :

YEAR	Barrels
1913… .	2,406,522
1914… .	3,560.375
1915… .	4,245,525
1916… .	6,672,000
1917… .	8,978,000
1918… .	10,546,000
1920… .	16,500,000

Natural gas has been encountered in many oil fields and is used locally. In the Salt Creek field the conservation of the natural gas has be¬ come a model for the country.

Climate. — The extremes of temperature exist for a short period each year. The records show the maximum to be 116° above zero and the minimum, 45° below zero. The highest is usually about 100° and the lowest — 30°. The mean temperature for January in Cheyenne and

vicinities is 25.1°; in the northern part of the State, 18.1°. The mean temperature for the whole State for July is 67°. The extreme cold is not severe because of the dryness of the at¬ mosphere. The precipitation varies from 8 to 18 inches, the average being 12.5 inches. A heavier rainfall in the Bear Lodge and Black Hill district is not unusual. The lofty and well-timbered mountain ranges receive a great deal of moisture both in the form of winter snows and, during the summer, as frequent heavy dashing rains. High winds prevail in many parts of the State, especially in spring. The climate is uniformly salubrious and various points are becoming prominent as health resorts.

Soil. — The soil of nearly all the river val¬ leys is a dark loam and most fertile. On the higher lands and mountain slopes occurs a sandy loam, most of which is productive under irrigation. In the eastern counties dry farm¬ ing has been practised on the whole success¬ fully. The Red Desert is the only large infer¬ tile area in the State. Extreme aridity is here combined with alkali deposits. . The soil in all the high mountain intervales or parks is very rich and, although at too high an altitude for cereal crops, produces large yields of nutritive native hay.

Flora and Fauna. — In Wyoming are found widely-varying types of animal and plant life. This is due largely to the diversified climatic conditions occasioned by extremes in altitude and a wide range of local physiographic condi¬ tions. The lower portions of the State (nearly one-third the total area) are marked by the broad-leaved cottonwood, juniper, salt-bush and yucca. A little higher, in the so-called Transition Life zone, covering about half the

110 °

WYOMING

lElectric Oai ˆginerp- /fr ARK yr-\ (Rand McNally's New 11 x 14

- XbiTThaT PiaFLˆ\ l OC A .R B 0/ NN Copyright by Rand M

jA I J O s ® F ort V Jlfw stone" I B a r o n e (t - P i lo t' Peak p" 7 □ , \ i - "> d A _ .

~«ˆh2£ T\p»k: < #ˆ%p«k 1§J “■ ?»» > ”

SCALE lO

Statute Miles, 33 = 1 Incli.

Rand McNally’s New 11 x 14 Map of Wyoming, o _ 6~ 10 15 go 26 30 66 40 45 60

McNally & Co. railroads _ ELECTRIC LINES ……

1 1

70S

12

13

105

14

104 °

I

u

V<? /,’^f.-CacheLˆ>rNHunte

N ?,lV? Bannock Peak - ?\|, iiˆP«k -’rˆvP

< 1 I Y E l LOW SLTSO N rˆVˆV’*

(VJt. Holmesˆ Mt. Washburn’^-

i&lJJ >y*- [ˆ.J_ndian Peak m

Hoodoo Peak ˆ

| | I Norris’ Gey «i - I Basin

\ l .p , N A T I O N’A’L

Loir 1 r Geyser Basin

Lonu r Uoyser Basin c: - _ |rte$»fe- … f

I V ju’:’,r’d ‘r -k Wapiti

‘ •’ *£: (fd <\Xt I . Mt-Doane • A-

\sh”hmfi&5f£lfy.’ M«J3X’.IA-V- #MtJfe(.»ngford ‘-MOouble *«.

<$Q[Heartˆ H

Dike ˆ ‘ˆwllstinking Water Mt. n,

‘n’ Peak /» Corbett

Crow Peak

Monument Peak . AnOˆ, . ,

v- -%?..WaDitiO slioˆ‘xˆt.Kly

>r-O5H0SH(jME CAVERN MorrisX nˆtiona. Ranrli/tf

c,. Mt; Sherid.

PARK

danˆs 11 .r j.v

Ishawooa

?%/*?% fk R

p. .MR- ‘ Sherldatiwˆz HizTrf’ 1 v> .,ˆ0: / -

iL’\ˆb x \t5J’ fbnlt Ishawooaˆ,ˆ;

sLs f»*?i?WY„.v

-1 # 0 ;#.■ J

-»-U T > ‘ ‘ *Mncllc (ll*U J.,

pssar

Table Mt.

- ,-g~ _ VHafvoo ckyp ‘

I’f v%l| ˆJHucMeberry MtTTˆTT/7 \a I I 1 ˆ ˆ /> >v_

Surveys Plnyonxw / \ I Thorofare *v’.Needle*Mt.

Peaˆildˆ L ˆPeakr L Buttes GlfCraterQ Franks Pea

u WildcaflPeaˆ #3f ” Mt. V. M1

sˆTico Ocean Lake

I j~ ‘ c-, > —ˆ\L-Em mg Matili/g

•r/it. Morjr /Sr

LcigfeLakeQ , V/*yk a ■”

Cr. = =V w

■t Ef < A-e5;;3

c

Y1ˆ

,-sso y Leidy

l‘flie,1ˆpper 6,0S Ventre Butte ID -‘ j / ”f’. - ‘-NRj.iroVOIlt

L—

ˆm/o7ˆrM 7ˆ?Glide

ygt/S-Zenitli/y. >

P&ˆWM > r°ˆ~°ˆ‘Ve.ntre Butte* ˆ

- 1 - pftSSy:., *«waq

V. .(> J

■• . = -M».

A’-

V

D

Lu JY” I 2Tˆ>“BairdiˆS!

% I . &<W%%

7 ˆ7/ ’

W$G

Bor

I N C O L N d

.C* \ ‘ˆSHoback _ • - —v •<L.

J Cer

iVirginla Burse

E

r’_ˆ|Bedtord3p(Ppak G rover 1

jFairvievvrj Bald Mtn,

G

edicile Buttf “Wr

w

47

c

D

43

E

Longitude\West froiyˆGreenwich M

T T lˆP1 J A C K S 0(N

G

jPinebluff |

R I M A-Vrˆ. R

1 7 7 7 °

770 “

709°

708°

o

10

106

12

13

705°

47’

14

15

16

WYOMING.

Estimated population, 179,559

COUNTIES

Hop. 1915 Pop. 1915

8,194

Albany .

…G 12

5,398 Natrona .

. D10

6,815

Bighorn .

… .B 8

3,488 Niobrara..

. D 15

2,316

Campbell ….

…B 12

5,473 Park _

. B 5

8,412

Carbon .

,..G 10

5,277 Platte …

. F 14

3,626

Converse .

. . D 13

15,429 Sheridan .

. A 9

5,117

Crook .

… A 13

10,642 Sweetwater . G6

9,633

Fremont .

… D 6

6,051 Uinta …

. E 2

5,035

Goshen .

. ,.F 15

1,744 Washakie

. C 8

3,191

Hot Springs. .

,…C6

4,414 Weston . .

. C 13

3,238

Johnson .

… B 10

…. Yellowstone National

14.631

Laramie .

…G 14

Park (No

population

13,581

Lincoln .

. . ,D 2

shown) …

. A 2

Incorporated Cities, Villages, *Etc.*

673

Alton .

… E 2

55 Lost Cabin .

. D 8

157

Baggs .

. .H 8

80 Lost Spring … .

E 14

728

Basin .

…B7

640 Lovell .

. . A 7

141

Big Piney .

…E 3

434 Lusk .

.E 15

1,246

Buffalo .

..B10

182 Lyman .

. . H 3

232

Byron .

. . A 7

133 Manville .

. E 14

1 ,C23

Cambria .

.C 15

67 Marbelton .

. .E 3

2,639

Casper .

..Ell

170 Medicine Bow . .

.G 11

1,320

Cheyenne .

.H 14

226 Meeteetse .

B 5

1,035

Cody .

…B5

131 Moorcroft .

. B 14

305

Cokeville .

. . F 2

651 Newcastle .

.C 15

630

Cowley .

. . A 7

65 Opal .

,.G3

177

Dayton .

650 Pinebluff .

.H 15

1,018

Diamond ville. .

…G3

83 Pinedale .

. . E 4

111

Dixon .

. H 8

406 Powell .

. .A 6

1,845

Douglas .

. . E 12

2,975 Rawlins .

. .G 9

142

Dubois .

…C4

57 Riverside .

. H 10

177

Elk Mountain.

,.G 10

803 Riverton .

. E 7

218

Encampment . .

. .H 10

195 Rock River… .

.G 12

2,756

Evanston .

…H2

5,699 Rock Springs …

. G 5

220

Glenrock .

. .E 12

425 Saratoga .

. H 10

134

Granger .

. .G 4

12,713 Sheridan .

. A 9

505

Gillette .

,.B 13

278 Shoshoni .

. D 7

1,219

Green River…

…H 5

265 South Superior,

421

Grey Bull .

… B 8

Sweetwater…

. . G 6

239

Guernsey .

. .F 14

524 Sublett .

. G 3

227

Gunn .

…G 5

341 Sundance .

.B 15

105

Hartville,

1,382 Superior .

. .G 6

Laramie ….

. G 14

1,191 Thermopolis ….

. .C 7

428

Hudson, Fremont, D 6

443 Torrington .

.F 15

204

Jackson .

,.D2

219 Upton .

.B 15

1,481

Kemmerer ….

…G3

54 Van Tassell …

E 15

1,726

Lander .

…E 6

76 Wamsutter .

. .G 8

8,256

Laramie .

H 12

810 Wheatland .

.G 14

454 Worland .

. .C 8

WYOMING

585

State, one finds the yellow pine, narrow-leaved cottonwood and pure sage brush ; higher still the spruce, fir, lodgepole pine and aspen cover¬ ing the mountain slopes and higher foothills. The very highest portions of the State produce only the white barked pine, the dwarfed spruce and fir, while the mountain peaks are well above timber-line and are characterized by Arc¬ tic flora.

About 13 per cent, or 12,500 square miles of the State is timbered. Of this 3,500 square miles are located within the Yellowstone Na¬ tional Park, and 13,490 square miles within United States forest reserves.

The fauna of the lower altitudes includes the coyote, badger, ground-squirrel, prairie-dog, gopher, cottontail rabbit, among the mammals, and such birds as the mourning dove, warbler and lark. Reptiles are few. The animal life of the Transition zone includes the white-tailed deer, coyote, jack-rabbit, cottontail rabbit, skunk, sage-hen, hawk and various types of liz¬ ards. Still higher one finds the elk, snow-shoe rabbit, mountain lion, black bear and an occa¬ sional grizzly. All life is rare above 12,500 feet and mammalian life practically non-exist¬

ent at this elevation.

Game. — Wyoming is still one of the most favored resorts of sportsmen. The vicinity of Jackson's Hole in the northwestern corner of the State abounds in elk and deer. In many other portions hunting is also excellent. Besides elk and deer, bear, mountain lions, mountain sheep, wolves, grouse, etc., are found in nearly every county. The game laws are liberal. The streams are richly stocked with trout and Wyo¬ ming until 1919 was one of the few States not requiring fishing licenses so abundant is the

supply… A . ,

Agriculture and Stock Raising. 'Agricul¬ ture has made rapid strides during the past few years. In many ways it is still in the experi¬ mental stage and its possibilities limited by a cool climate due to low average base level. There, are, however, certain areas of compara¬ tively low elevation and moderate climate where a variety of crops and some of the hardier fruits have proved decidedly successful. A spe¬ cial value attaches to these lowlying districts inasmuch as they are immediately surrounded or bordered by extensive non-agricultural areas where mining, lumbering and stock raising are the principal industries. The melting snows of the mountains furnish a never-failing supply of water for irrigation purposes and Federal, State and private irrigation projects have al-leadv reclaimed considerable sections. In 1910 out of the total number of farms (10,987) 6,297 were wholly or in part under irrigation, the total irrigated acreage being 1,333,302, an increase of 87 1 per cent over 1900. The largest proportion of irrigated farms is in Park County (96.5 per cent), but in four other counties the propor¬ tion is over 80 per cent. Of the various irriga¬ tion enterprises in the State, 71.8 per cent are operated by individuals or partnerships; 7.8 per cent by commercial concerns ; 10.3 per cent by co-operative enterprises, leaving only 10.1 per cent controlled by the various governmental projects. In 1910 there were 13,231 miles of ir¬ rigation ditches. In that year about one-eighth of the total area of the State was in farms or ranches. The average value of farm land was

$10.41 per acre though in Big Horn County the average rose to nearly $50. An indication of the tendency for agriculture to supplant stock

raising is seen in the fact that in the decade 1900 to 1910, there was an increase of 80.3 per cent in the total number of holdings but a de¬ crease of 41.7 per cent in the average number of acres per holding. In the same period the value of farm lands increased 279.4 per cent, being placed in 1910 at $88,908,276, while the average value of farm land per acre increased 261.5 per cent. Tenant farming is growing though not alarmingly. In 1920 the number of farms was 15,611. The following table shows the acreage, yield and value of the prin¬ cipal crops in 1920:

CROP	Acreage	Production	Value
Hay .	. . 1,100, 000	2,210,000 tons	$27,348,000
Wheat .	254,000	5,080,000 bu.	

6,858,000

Oats .

300,000

11,400,000 “

7,068,000

Potatoes .

27,000

3,375,000 “

4,052,000

Barley .

28,000

1,008,000 “

1 , 109,000

Corn .

65,000

1,560,000 “

874.000

Rye .

30,000

540,000 *

621,000

The raising of orchard and small fruits and of sugar beets though at present slight is annually increasing. There are three sugar factories in the State, at Lovell, Sheridan and Worland.

Both northern and southern Wyoming is still in large measure devoted to stock raising, though beef cattle are shipped from every county in the State. In 1921 there were on the ranches 800,000 head as compared with 750,000 in 1916. Sheep grazing has become a very im¬ portant industry. Only the best breeds of sheep are kept, and the wool is of superior quality and its yield above the average. The following table indicates the extent of sheep grazing:

YEAR

1911… . 1912 .

1913… . 1914… .

1915… .

1916… .

1917… . 1921… .

Sheep of shearing age and number of fleeces

4.000,000 3,900,000 3,600,000 3,560, 000 3,630, 000 3,675,000 4,381,000 3,040,000

The Agricultural College and Experiment Station located at Laramie, the seat of the State University, have done much, through ex¬ perimentation and extension instruction, to en¬ courage types of agriculture and stock raising suited to the conditions of the State. At the present time county agricultural agents are •maintained in almost all of the 22 counties.

Manufacturing. — In 1919 the State had 572 manufacturing establishments (169 in 1904) giving employment to 8,017 persons of whom 6,578 were wage-earners. The principal con¬ cerns are railroad shops, lumber camps and factories, flour and grist mills, printing and publishing establishments, dairies, sugar fac¬ tories and oil refineries. The total value of manufactured goods was estimated at $81,272,-000. Eight per cent of the factories were in Cheyenne. Electric power is only slightlv used. In 1909, 93.3 per cent of the primary power was derived from steam.

Transportation and Roads — The oldest railroad in the State is the Union Pacific, cross¬ ing the southern tier of counties. From Gran¬ ger in Sweetwater County the Oregon Short Line runs northwest through Lincoln County into Idaho. A number of subsidiary lines con¬ nect with the Union Pacific, chief among them being the Colorado, Wyoming and Eastern and the Saratoga and Encampment. From Chey¬ enne the Union Pacific has a line to Denver. The Chicago, Burlington and Quincy enters the southeast corner of the State to Cheyenne. Its main line, however, runs diagonally across the State from Nebraska to Montana through Goshen, Platte, Converse, Natrona, Fremont, Hot Springs, Washakie and Big Horn coun¬ ties. A branch line runs to Cody in Park County. The Burlington also runs across the northeast corner of the State from South Da¬ kota to Montana through Weston, Crook, Campbell and Sheridan counties. A branch runs to Buffalo in Johnson County. The Chi¬ cago and Northwestern, crossing the eastern boundary of the State in Niobrara County, par¬ allels the main line of the Burlington through Converse and Natrona counties and terminates at Lander in Fremont County. The Colorado and Southern, running north from Denver through Cheyenne, connects with the Burlington at Wendover and the Northwestern at Orin Junction. There is a lack of north and south lines. Most of the railroads run in general east and west, tending thereby to divide the economic interests of the State into horizontal belts or zones.

Wyoming is rapidly developing a system of excellent highways. The Lincoln Highway par¬ allels the Union Pacific and the Oregon Trail the Oregon Short Line. In general these roads are kept in good condition. An improved high¬ way runs north from Cheyenne through Lara¬ mie, Platte, Converse, Natrona, Johnson and Sheridan counties into Montana, serving as one of the approaches to the Yellowstone National Park. Other roads leading into the northeast¬ ern counties, and from Rawlins and Green River and Lander into Jackson's Hole and the Yellowstone National Park are available for au¬ tomobile traffic. In 1917 the legislature created a State Highway Commission to co-operate with the Federal government under the act of Con¬ gress of 11 July 1916, entitled (<An Act to pro¬ vide that the United States shall aid the States in the construction of rural post roads, etc.® State funds for the construction of highways are provided for by a tax of one-fourth mill on the dollar of valuation.

Wealth and Taxation. — In 1920 Wyoming's total receipts of income amounted to $11,383,- 652. Of this the greater part was appropriated for strictly governmental costs and the balance for other purposes. The

principal sources of revenue are the general property, business and license taxes and amounts derived from interest, leases and rents, and from grants and earnings of general departments. In 1920 the bonded debt was $1,935,000.

Charitable and Penal Institutions and Public Health. — There is a State Board of Charities and Reform, comprising five ex of¬ ficio members. This board has general over¬ sight over all State supported charitable, re¬

formatory and penal institutions, including the State Hospital at Rock Springs, the branch hos¬ pitals at Sheridan and Casper, the Soldiers' and Sailors' Home at Buffalo, the School for De¬ fectives at Lander, the Wyoming Industrial In¬ stitute at Worland, the Insane Asylum at Evans¬ ton, the State Penitentiary at Rawlins. At Laramie is located the Cathedral Home for Children, maintained by the Protestant Epis¬ copal Church.

The State Board of Health, appointed by the governor with the confirmation of the senate, comprising three persons, one of whom must be a physician, appoints the county health of¬ ficers, inspects public institutions in the inter¬ est of health and sanitation, makes quarantine regulations and advises counties and municipali¬ ties regarding drainage, water supply and gen¬ eral problems of sanitation. The State dairy and food commissioner is charged with the en¬ forcement of all laws touching frauds, adultera¬ tions and impurities in foods. The practice of medicine, dentistry, pharmacy, nursing, em¬ balming and optometry is regulated by laws, the administration of which is in the hands of a series of State appointed boards.

Education. — Provision for public educa¬ tion was made at the first session of the Terri¬ torial assembly in 1869. Owing to the low dens¬ ity of population the problem of elementary education has been largely the problem of rural education. Educational facilities, however, have more than kept pace with the growth in population. The increase in the number of schoolhouses was slow to 1905, but since 1909 the number has doubled, reaching, in 1920, a total of 1,477. The number of teachers has like¬ wise shown a marked increase. In 1894 there were 407; in 1904, 763; in 1920, 1,950. Less than 10 per cent of the teachers are men. The cost of education in 1914 was 37.93 cents per pupil per day. In 1920 there were 43,077 pupils en¬ rolled. Since 1901 free textbooks have been provided.

Certification regulations were first adopted in 1876. Various changes were made in the law till, in 1917, the whole matter was care¬ fully gone over and an entirely new system of certification was adopted. In 1920 there were 88 four-year high schools in the State with a total enrolment of 4,476 pupils. At first public education was surpassed in importance by pri¬ vate education. The situation is now quite the reverse. In 1872 was established the short¬ lived Wyoming Institute, a Baptist school, at Laramie. Two years before, Saint Mary's School, a Roman Catholic institution, had been established at Laramie, but made little head¬ way till after a decade. In 1885 this was supplanted by the much larger and better equip¬ ped school in Cheyenne established by the Soci¬ ety of the Holy Child Jesus. The first kinder¬ garten in Wyoming was privately established in Cheyenne in 1886. In 1894-95 the Wyoming Collegiate Institute was founded at Big Horn but lasted only a short time. In 1905 was opened the Cheyenne Business College, and, in 1909, under the auspices of the Christian Church there was established Jireh College at Jireh, Niobrara County. The State University at Laramie, the creation of which was urged as early as 1878 by the governor of the Territory, was not established till 1887. In 1870 the Prot¬ estant Episcopal Church opened an Indian

school among the Shoshones. In recent years the task of educating the Indians has been un¬ dertaken more seriously both by the churches and the government. The Wyoming School Journal, a periodical devoted to educational matters, issued under the auspices of the State Teachers' Association, was published for a time in the 90's. In 1904 it was re-established. There has been steady improvement in the standards of education and in school administra¬ tion. In 1917 was created the State Board of Education, comprising seven members ap¬ pointed by the governor for six years. The board prescribes educational policies for the State, exercises general supervision over pub¬ lic education, prepares outlines of study, estab¬ lishes standards of work and rules for the certi¬ fication of teachers. The general administration of the rules and regulations of the board is in the hands of the commissioner of education, ap¬ pointed by them. Each county

eiects a super¬ intendent of schools on a non-partisan basis and each school district elects its own trustees. Teachers' institutes are provided by law. At the 1917 session of the legislature the State ac¬ cepted the terms of the act of Congress provid¬ ing for Federal aid in vocational education.

Government. — The Territory of Wyoming was created in 1868 ; the State in 1890. Equal suffrage was adopted by the first session of the Territorial assembly, making Wyoming the first Territory or State to permit full woman's suf¬ frage. This provision was incorporated in the State constitution drawn up in 1889 and after¬ ward ratified. In general, women voters in Wyoming have not aligned themselves with any one party or on any single issue but divide as the male voters divide. The principal executive officers are the governor, secretary of state, treasurer, auditor, commissioner of taxation, superintendent of public instruction, attorney-general and examiner. The governor receives $4,000. The salaries of the remaining range from $2,400 to $3,600. Besides the above there is a State fish commissioner, game warden, food commissioner, highway engineer, commissioner of labor, geologist and adjutant-general. There are three justices in the Supreme Court, each receiving $5,000. There are seven judicial dis¬ tricts, the judges in each receiving a salary of $4,500. The State legislature, which meets bi¬ ennially for not more than 40 days, comprises 27 senators and 57 representatives. The salary of each is $5 a day and mileage. The capitol is at Cheyenne. Wyoming has but one representa¬ tive in Congress. There are 22 counties with the usual county officials. In 1910 there were 48 incorporated cities and towns. Most cities have the mayor-council type of government. In 1911 an act of the legislature made the commission form permissive. Only one city adopted this type of municipal government and afterward abandoned it. A bill to provide for the city-manager type was introduced in the 1917 ses¬ sion of the legislature but was defeated. A list of the Territorial and State governors appears elsewhere .on this page.

Population. — The census of 1910 gave a total population of 145,965. In 1920 the Fed¬ eral census reported 194,402. Of the popu¬ lation in 1910, 29.6 per cent was urban. There was a sex ratio of 168.8 males to 100 females. Among the native whites the ratio was 147.1 to 100, and among the foreign-born whites,

287.2 to 100. Of the total native-born popu¬ lation only 27.2 pei cent were born in Wyoming, the remaining 72.8 per cent being natives of other States in the Union. Of the foreign-born, 14.6 per cent were

Austrians, 11 per cent Eng¬ lish, 9.7 per cent Germans, 9.2 per cent Swedes,

7.2 per cent Italians, 6.7 per cent Scotch. The counties of Albany, Laramie and Sheridan had, in 1910, a density of two to six to the square mile. All the other counties had less than two to the square mile.

Governors of Wyoming.

TERRITORIAL

John A. Campbell .

John M. Thayer .

John W. Hoyt .

William Hale .

Francis E. Warren .

George W. Baxter* .

Thomas Moonlight .

Francis E. Warren .

1869-75

1875-78

1878-82

1882-85

1885-86

1886

1887-89

1889-90

STATE

Francis E. Warren… Amos W. Barber* ….

John E. Osborne .

William A. Richards. . De Forest Richards . . Fenimore Chatterton*
Bryant B. Brooks… . Joseph M. Carey …. John B. Kendrick… .

Frank L . Houx* .

Robert D. Carey .

Republican .

1890

u

1890-92

Democrat-Populist.

1893-95

Republican .

1895-99

U

1899-1903

U

1903-05

u

1905-11

Democrat .

1911-15

U

1915-17

a

1917-19

Republican .

1919-25

* Acting Governor.

History. — Wyoming was the meeting point of a number of Indian tribes. In the south¬ east were the Arapaho and Cheyennes of Algonquin stock; in the north and east, the Crows and Sioux ; and in the west and south¬ west, the Utes of Shoshonean stock. There are ancient traditions of Spanish exploration into southern Wyoming at a very early date but no adequate proof has been offered of their pres¬ ence prior to the 19th century, although some¬ what earlier the Indians seem to have been familiar with the Spaniards and to have had commercial intercourse with Santa Fe. The first white man to enter Wyoming of whom there is definite record was de la Verendrye, who, in 1743, advancing from Lake Nepigon, penetrated the eastern portion of the State to within sight of the Big Horn Mountains. This was an isolated venture, however, and was not followed up by further exploration on the part of the French. The expedition of Lewis and Clark did not touch Wyoming al¬ though a number of the men who accompanied it subsequently joined the various fur-trading expeditions that were quick to take advantage of the information about the west brought out by these earliest American explorers. A num¬ ber of these companies operated in Wyoming, including that of Manuel Lisa, who set out from Saint Louis in 1807 and established a post at the mouth of the Big Horn River in Montana. That fall or early next spring, John Colter set out southward up the Big Horn and entered Wyoming. He advanced perhaps as far south as the site of Lander where he turned north¬ west and, in the course of his wanderings, probably penetrated the wonderland of Yellow¬ stone National Park. Others of Lisa's men or the employees of the Missouri Fur Company (established 1808-09) may also have pene¬ trated Wyoming from the north about this time. In the summer of 1811 the overland company

sent out by John Jacob Astor to engage in the fur trade with headquarters at the mouth of the Columbia, traversed central Wyoming, crossed the Wind River Mountains by the Union Pass, entered the upper drainage of Green River, and thence, by another pass in the divide, followed down the Hoback River to its confluence with the Snake. They crossed the Snake and journeyed over the Teton Pass into Idaho. The following year the returning Astorians crossed the western boundary of the State, traversed once more the upper reaches of Green River and, after circuitous wanderings, crossed the Continental Divide by or near South Pass to the valley of the Sweetwater and the Platte, which they followed eastward into Nebraska. The next white men to enter Wyoming, of whom there is definite information, were a detachment sent out in 1824 from a post estab¬ lished at the mouth of the Big Horn by the firm of Ashley and Henry. In the spring of this year, Thomas Fitzpatrick and probably Andrew Henry, himself, one of the partners, led a division of the company up the Big Horn to Wind River and thence through South Pass to the waters of Green River. Henry probably returned by the same route, while Fitzpatrick, turning back later, descended the Sweetwater and the valley of the Platte. There is an unsubstantiated tradition that Etienne Provot, in the fall of 1823, preceded Fitzpatrick through the South Pass. In the fall of 1824 two other detachments of the Ashley-Henry men were sent through South Pass, one under command of Jedediah Smith to operate north¬ west into Idaho and the other under William Sublette to operate westward into Utah. Ash¬ ley, himself, was the first white man to pene¬ trate southern Wyoming, entering the State some 20 miles south of the city of Lara¬ mie. He moved northward along the eastern slopes of the Medicine Bow Mountains and then northwest across Great Divide Basin to Green River which he descended in boats into Colorado and Utah. After 1825 the fur trad¬ ers criss-crossed the State in every direction. The firms of Smith, Jackson and Sublette, of Fitzpatrick, Sublette and Bridger and the American Fur Company were among the more prominent operating in this State. The sum¬ mer rendezvous of these companies was usually conducted in Green River Valley or in Wind River Valley, near the eastern end of South Pass. In 1827 the Yellowstone National Park was again penetrated. The fur-trading

opera¬ tions of Captain Bonneville took him into this State. The first scientific explorations of the State were made by Fremont in 1842 and 1843, who examined the southern portion, and by Brevet Brig.-Gen. W. F. Raynolds, who, in 1859, examined the northern portion. The first white settlement was at Fort Laramie on the Platte in 1834. This fort was purchased by the American Fur Company in 1835, rebuilt by them and subsequently sold to the United States government. In 1843 James Bridger, the fur trader, scout and guide, established Fort Bridger on Black's Fork in the extreme south¬ western corner of the State. Forts Laramie and Bridger were stations on the famous Ore¬ gon Trail, which crossed the State by way of the North Platte, the Sweetwater, South Pass, the Sandvs, Green River, Black's Fork and Bear River. Over this trail moved Rev. Marcus

Whitman and his wife and Rev. and Mrs. Spalding, the Oregon missionaries, in 1836, and soon after the Oregon pioneers. In 1847 came the first Mormon migration and, following them, thousands of others of their faith. The illfated E)onner party crossed by the same route. With the discovery of gold in Cali¬ fornia other thousands poured over this first great trans-continental highway. About 1850 the Overland Trail through southern Wyoming (the route in general followed by Ashley in 1825) began to supplant in large measure the Oregon Trail. This soon became an excellent highway used by the overland stage and the pony express. In 1861 a telegraph line par¬ alleled it. Six years later the Union Pacific en¬ tered Wyoming near Cheyenne and the follow¬ ing year completed its line across the State.

In 1851 an important treaty had been con¬ cluded at Fort Laramie with the plains Indians by which they were confirmed in their right to roam pretty much at will north of the Ore¬ gon Trail on their promise not to interfere with the government's project of building roads across the plains and establishing military posts at convenient points. This treaty or series of treaties rendered the overland trails safe for a number of years. In 1864 occurred the Sand Creek massacre in Colorado which started an Indian conflagration that spread next year to Wyoming. The mines of Montana and Idaho lay off the beaten line of travel and in 1865 the government undertook to construct a branch road north from the Oregon Trail, in the vicin¬ ity of Fort Laramie, to Bozeman in Montana. This road was to run through the territory re¬ served by the Treaty of Fort Laramie to the Sioux. Under the guidance of "Jim" Bridger a detachment under General Connor tried un-sucessfully to open the road. Despite the fact that the Sioux of this region, under their leader, Red Cloud, had refused to yield the ground

or even to treat concerning it, Col. Henry B. Carrington, in 1866, was ordered to proceed with the task of opening the road and erecting and garrisoning posts along the way. Moving north to Fort Reno (later Fort McKinney) on Powder River and using this as a base, his orders called for the establishment of a garri¬ son here and the erection of forts on Powder, Big Horn and Yellowstone rivers and the pro¬ tection of the road. The last-named site was afterward eliminated but Fort Phil. Kearney and Fort C. F. Smith were located during July and August, the former near the site of Buf¬ falo, Johnson County. The Sioux were con¬ sistently hostile and on 21 December the wood train was attacked a few miles from Fort Phil. Kearney. Brevet Lieutenant-Colonel Fetterman went to their relief, enabled the wood train to reach the fort in safety, but was himself with all his officers and men, 81 all told, mas¬ sacred by the Indians. In the summer of 1867 the Fetterman massacre was avenged by Maj. James Powell. War with the Cheyennes and Sioux, however, dragged on until in the spring of 1868 a treaty was concluded at Fort Laramie by which the government agreed to withdraw its garrisons from the Bozeman road and aban¬ don the country to the Indians. This same year another treaty, concluded at Fort Bridger, created the Wind River Reservation for the Shoshones to whom were later added the Arap- . aho. Peace continued in Wyoming but only

WYOMING

State Capitol at Cheyenne

In the centre of Bighorn Mountains Cloud Peak highest summit in distance. Granite rocks sculptured by glacial action

WYOMING

WYOMING

through the continued relinquishment of the northern part of the territory by the whites. In 1870 a number of citizens of Cheyenne or¬ ganized a mining and prospecting company to explore the Big Horn country. The Sioux were apprehensive, however, and the expedi¬ tion was abandoned. Four years later, this deferred reconnaissance took place but this time as an official expedition under General Custer, again causing great uneasiness among the Sioux. Actual war broke out in 1876 in which Custer lost his life. The Sioux, however, were crushed and Wyoming made safe for the whites.

In 1854 Wyoming had been a part of Utah Territory, Oregon Territory and the newly-created Nebraska Territory. In 1859 Wash¬ ington Territory was set off, including part of western Wyoming. In 1861 a part of the southern portion was included within the newly-formed Idaho Territory. In 1865 a bill was introduced into Congress to create the Terri¬ tory of Wyoming and in 1867 voters of Lara¬ mie County, including the city of Cheyenne, sent a delegate to Congress. He was not per¬ mitted to take a seat but his presence in Wash¬ ington did much to hasten the actual creation of the Territory by act of Congress, under date 25 July 1868. At that time there were four counties, Laramie, Albany, Carbon and Carter (Sweetwater), each running the entire length of the State from north to south. Agi¬ tation for Statehood was begun in the 80's and in September 1889 a constitutional convention met in Cheyenne. Their work was afterward ratified. By act of Congress 10 July 1890 Wyoming was admitted as the 44th State of the Union.

During the 70's the cattle industry began and continued to be one of the most important in the State. Perhaps the most prosperous years were from 1880 to 1882. Since that time the open range has been gradually but very surely restricted, while several seasons of un¬ wonted severity, notably that of 1886-87, re¬ tarded the industry. With the restriction of the range came a growing feeling of hostility be¬ tween the large cattle interests and the small settlers, whose homestead locations covered the watering places to which the range cattle formerly had free access. Many of the settlers owned no cattle but eked out a precarious ex¬ istence by stealing unbranded cattle (maver¬ icks) from the herds of the great stock own¬ ers. In portions of the Territory it became impossible to get a jury of settlers to convict anyone of cattle-stealing (rustling). The cattle¬ men resorted to force and between 1889 and 1892 several supposed "rustlers55 were

lynched. This aroused an intense hatred against the cattlemen, several of whom were forced to leave Johnson County, the seat of most trouble, under cover of darkness and on swift horses. In 1892, however, the stockmen resolved on a coup and brought up from Texas an armed body of 50 men with the intention of invading northern Wyoming and killing the “rustlers.55 This culminated in * the so-called Johnson County raid. Proceeding by rail to Casper the raiders started north toward Buffalo, learn¬ ing on the way that several “rustlers55 were at the K. C. ranch on Powder River. Most of the K. C. outfit were absent on the round-up and only “Nate55 Champion and < <Nick)) Ray aaid

two trappers, who had stayed over night, were in the cabin. The place was surrounded, the two trappers captured and Ray shot down as he started out of the cabin. Champion bore Ray into the cabin under a fusillade and then for hours defended himself and his wounded com¬ panion, taking time to keep a careful record of the details of his siege, hour by hour. Ray died in the course of the afternoon. Toward nightfall the besiegers fired the cabin and Champion, in undertaking to effect his escape, was shot down and killed. The raiders then started north toward Buffalo, but the alarm had been given and they turned in and fortified themselves at the T. A. ranch on Crazy Wo¬ man’s Fork, 12 miles south of Buffalo. Here the besiegers became the besieged, holding out for over two days against an infuriated mob of over 400. The leader of the settlers, “Arapaho Brown, 55 finally contrived what he called a go-devil, consisting of a breastwork of logs on wheels, which he proposed to move up toward the log buildings where the raiders were besieged and then to destroy the cabins with giant powder. Just before this prototype of the modern tank was started, in the early morn¬ ing of the third day, Col. J. J. Van Horn of Fort McKinney, under orders from President Harrison, came to the rescue with three troops of cavalry. The raiders surrendered and were transferred to Cheyenne where they were re¬ leased on bail on -their own recognizance to appear for trial in January. At that time, on Johnson County’s inability to pay the costs, the case was dropped.

Trouble has, from time to time, developed between the cattlemen and the sheepmen, in which some blood has been shed, but with the creation of the national forests and the regu¬ lation of grazing privileges, an amicable agree¬ ment has been arrived at.

In the last two decades the activities of the State have been devoted to developing the abundant natural resources available.

Bibliography. — Bancroft, (History of Ne¬ vada, Colorado and Wyoming5 (San Fran¬ cisco 1890) ; Cary, <Life Zone Investigations m Wyoming5 (United States Department of Agri¬ culture, Bureau of Biological Survey, Bulletin No. 22) ; Carrington, _ (Ab-sa-ra-ka, Land of Massacre5 (Philadelphia 1878) ; Chapman, (Last War for the Cattle Range5 (in Outing, Sep¬ tember 1905) ; Coutant, (History of Wyoming5 (Laramie 1899) ; Dale, (Brief Sketch of the History of Education in Wyoming5 (Depart¬ ment of Public Instruction Bulletin, No. 2, Cheyenne 1916) ; Dale, (The Ashley-Smith Ex¬ plorations and the Discovery of a Central Route to the Pacific5 (Cleveland 1918) ; Hebard,

< Civil Government of Wyoming5 (San Fran¬ cisco 1917) ; Nelson, (Report on the Flora of Wvomine;5 (Wyoming Experiment Station Bul¬ letin No. 28, Laramie 1916) ; Talbot, (My People of the Plains5 (New York 1906).

Harrison C. Dale,

Professor of Political Science in the University

of Wyoming.

WYOMING, Pa., borough in Luzerne County, on the Susquehanna River, five miles north of Wilkes-Barre, and on the Delaware, Lackawanna and Western and the Lehigh Val¬ ley railroads. It is situated in an iron and coal-mining district and there are manufac-

tures of paint, shovels and flour. Pop. (1920)

3,582.

WYOMING, University of, located at Laramie, Wyo. It was chartered

by the legis¬ lature of the Territory of Wyoming in 1886, and opened to students in 1887 ; the first State legislature in 1890 passed an act enlarging the scope of the University and also made the State Agricultural College provided by the national grants a part of the University organ¬ ization. The State has since doubled its regu^ lar appropriation and made several others for special purposes. The University is open to women on equal terms ; tuition is free except in the Department of Music. The edu¬ cational policy of .the University was liberal from the first; the preparatory and collegiate departments were the first established; the or¬ ganization now includes the Preparatory School; the College of Liberal Arts ; the Graduate School; the Normal School; the College of Agriculture and the Agricultural Experiment Station; .the College of Engineering; the School of Mines ; the School of Commerce ; the School of Music ; the department of secondary educa¬ tion, and a summer school. The College of Liberal Arts offers a classical, a literary and a scientific course and confers the degree of B.S. for the scientific course without Latin, and the degree of B.A. for all other courses. In each course the work of the Freshman year is required, the work of the Sophomore year par¬ tially elective, and the work of the Junior and Senior years almost entirely elective. The Graduate School was discontinued in 1914. The regular courses in the Normal School, the Col¬ lege of Agriculture, the College of Mechan¬ ical Engineering and the School of Mines are five years in length, including one preparatory year the degree of B. Ped. is conferred for the completion of the normal course; the degree of B.S. for the agricultural, engineering and mining courses. There are also a one year's course in the Normal School, a course in* do¬ mestic science, a one year's and a two years' agricultural course and a ranchmen's winter course in the College of Agriculture, and a winter course of six weeks in the School of Mines. The School of Commerce offers two two-year courses in bookkeeping and in ste¬ nography; the School of Music a seven-years' course in piano. Instruction in military science and tactics is also given. The University has organized a University Extension Association, which conducts extension lectures in all parts of the State; a Correspondence Teaching De¬ partment is also conducted, by which some of the work toward a degree may be done. The campus now occupies over 40 acres in the east¬ ern part of the city; the buildings are the Hall of Languages, the Mechanical Building, the Hall of Science, and the Gymnasium ; the three first mentioned are built of gray sandstone, which is found near Laramie. The library con¬ tains about 35,000 volumes; the students num¬ ber 603 ; and 80 professors and instructors.

The University of Wyoming, though in num¬ bers one of the smallest

of the State univer¬ sities, is well equipped and maintains a high standard of scholarship, as the real head of the educational system of the State.

WYOMING VALLEY, a crescent-shaped valley in Luzerne County, Pa., traversed by the

northern branch of the Susquehanna River ; length, 21 miles. It is a fertile alluvial plain, with rich deposits of anthracite coal, and is noted for its beautiful scenery. The valley was claimed by the colony of Connecticut as early as 1753 and was first settled by people from Connecticut; the ensuing dispute be¬ tween Pennsylvania and Connecticut over this territory is known as the (<Pennamite and Yankee war,® and was not finally settled till after the Revolutionary War. (See Pennsyl¬ vania; Boundary Controversies) . In 1782 a commission appointed by Congress decided in favor of Pennsylvania; an attempt was made to drive out the Connecticut settlers which led to a renewal of the war; but in 1788 Pennsylvania confirmed the titles of all actual settlers to their land, and all contro¬ versy was ended by 1800. During the Revo¬ lutionary War a large proportion of the men of the Wyoming Valley joined the Continental army; but a number of Tories were living in the valley; and in 1778, when they were joined by British troops and Indian allies, an attack was made upon the settlers who had taken refuge in Forty Fort, near Wilkes-Barre. The settlers did not number over 400, chiefly boys and old men; the British force, including the 700 Indians, was about 1,100. After a desper¬ ate battle fought on the 3d of July 1778 the settlers were completely defeated, about two-thirds being killed. They were forced to capitulate, and after the surrender many of the prisoners were tortured and killed by the Indians. The greater part of the inhabitants of the valley were compelled to flee to other settlements and endured great hardships. Con¬ sult Miner, (History of Wyoming) (1845) ; Stone, (Poetry and History of Wyoming* (1844); Peck, (Wyoming: its History and In¬ cidents-* (1858) ; Smith, (Story of Wyoming Valley* (Kingston, Pa., 1906).

WYOMINGITE, a rock consisting almost entirely of leucite and phlogopite, abundant in the Leucite Hills in Sweetwater County, Wyo¬ ming. Contains so much potash that it may become a source of that material.

WYON, wi'on, William, English engraver and designer of coins and medals : b. Birming¬ ham, 1795; d. Brighton, Sussex, 29 Oct. 1851.

Having won several prizes for medals offered by the Society of Arts, he went in 1816 to Lon¬ don and was appointed second engraver at the mint, a post which he filled until the close of his life. In 1832 he was elected an associate of the Royal Academy, and in 1838 an academician, being the first of his department who had ever obtained these honors. His works, compris¬ ing coins, pattern pieces of coins not used, med¬ als and seals are numerous. His coins cover a period of nearly 30 years, including the latter part of the reign of George IV, the reign of William IV, and the first 13 years of the reign of Victoria. Far more numerous than these are his war, scientific, artistic and testimonial medals, executed from his own or from Flaxman's designs, and in the highest style of art.

WYSS, vis, Johann Rudolf, Swiss author: b. Bern, 13 March 1781 ; d. there, 31 March 1830. He was educated at various German uni¬ versities, became professor of philosophy at Bern in 1806, and later also chief librarian. His

UNIVERSITY OF WYOMING

] Mechanical Building and Science Hall

2 Hall of Languages

WYTHE

591

(Der Schweizerische Robinson) (1812-13), an imitation of Defoe, was translated into various languages, the first series appearing in English ((The Swiss Family Robinson*) in 1820, the second in 1849. Wyss also wrote (Vorlesungen iiber das Hochste Gut* (1811), and (Idyllen und Erzahlungen aus der Schweiz* (1815-22) ; (Reise im Berner Oberland) (1808) ; and edited the collection (Alpenrose) (1811-30). Wyss is the author of the Swiss national anthem, (Rufst du, mein Vaterland?)

WYTHE, with, George, American patriot: b. 1726 in the county of Elizabeth City, Va., a short distance from Yorktown; d. Richmond, Va., 1806. One of his ancestors was George Keith (1639-1716), a Scotch Quaker, distin¬ guished as a mathematician and Oriental scholar, who emigrated to America about 1684. On account of his radical religious views and his opposition to slavery, he was often im¬ prisoned. On 15 Oct. 1693 Keith issued an ((Exhortation and Caution against buying or keeping Negroes,® seemingly the earliest Quaker protest against slavery. These views were in¬ herited by George Wythe. From his mother Wythe received a lifelong bent toward classical scholarship. Even at the age of 80 he began to learn a new language. He was trained in the law by an uncle. Wythe's connection with the House of Burgesses, in Virginia, began on 27 Feb. 1752, on the eve of the French and Indian War. Hence he knew in a practical way the steps leading up to the Revolution, whose course he was destined to influence. He was a member of the Continental Congress and one of the signers of the Declaration of Independence. He sat in the Philadelphia Convention of 1787 and exerted himself to secure the ratification of the Constitution by Virginia the following • year. For 10 years he was a member of Vir¬ ginia's Supreme Court of Appeals, and for above 20 years sole chancellor of the State. However important and varied were such posi¬ tions that he filled, George Wythe is not to be judged chiefly as statesman or jurist. He was greatest as teacher, and his most lasting work was the subtle influence of his singularly pure and lofty character. Either in his law office or as professor in

William and Mary College, he was the teacher of Thomas Jefferson, John Marshall, James Monroe, Henry Clay and scores of other men only less prominent than these. With Jefferson, in particular, Wythe maintained a friendship and interchange of thought which had a bearing upon national concerns. So highly did Jefferson prize the work of Wythe as a teacher, that he exerted himself to establish, in 1779, in the College of William and Mary a chair of law, expressly for the occupancy of his “master and friend,® as he delighted to call Wythe. Wythe was the first professor of law in the United States. William and Mary College was the second in the English-speaking world to have a chair of Municipal Law, George Wythe coming to such a professorship a few years after Sir William Blackstone. Jefferson, in writing from Paris in 1785 to Dr. Richard Price, an English op¬ ponent of slavery, gives striking evidence of his estimate of the services which Wythe was rendering to his country: “The College of William and Mary in Williamsburg, since the

remodelling of its plan, is the place where are collected together all the young men (of Vir¬ ginia) under preparation for public life. They are under the direction (most of them) of a Mr. Wythe, one of the most virtuous of char¬ acters, and whose sentiments on the subject of slavery are unequivocal.® Henry Clay, in a letter of 3 May 1851, to B. B. Minor, says in reference to Wythe : ((To no man was I more indebted, by his instructions, his advice, and his example, for the little intellectual improvement which I made, up to the period when, in my twenty-first year, I finally left the city of Rich¬ mond.® “The most remarkable instance,® says Munford, (<of his genuine patriotism, to which I confess I am rendered most partial perhaps by my own experience of its effects, was his zeal for the education of youth. Harassed as he was with business; enveloped with perplexing papers, and intricate facts in chancery, he yet fcund time for many years to keep a private school for the instruction of a few young men at a. time, always with very little, and often de¬ manding no compensation.® That Wythe con¬ ceived the training of publicists to be his true task appears from this sentence in a letter on 5 Dec. 1785, to John Adams: “A letter will meet me in Williamsburg, where I have again settled, assisting, as professor of law and police in the University there, to form such characters as may be fit to succeed those which have been ornamental and useful in the national councils of America.® In three signal instances Wythe was a forerunner. As early as 1764 he wrote Virginia’s first remonstrance to the House of Commons against the Stamp Act, taking so ad¬ vanced a position in regard to that ominous act as to alarm his fellow-burgesses. He was

per¬ haps the first judge to lay down, in 1782, the cardinal principle that a court can annul a statute deemed repugnant to the Constitution, thus anticipating by a score of years the classic decision of his great pupil, John Marshall, in the case of Marbury v. Madison. He was an ardent advocate for the emancipation of the slaves, not only infusing his students with his abolition sentiment, but actually freeing his own slaves and making provision for them in his will. His death occurred in Richmond, Va., in 1806, from poison administered by his great-nephew, who hoped to come thus into the inher¬ itance of his estate. ((No man,® says Jefferson, ((ever left behind him a character more ven¬ erated than George Wythe. His virtue was of the purest kind ; his integrity inflexible, and his justice exact; of warm patriotism, and devoted as he was to liberty and the natural and equal rights of men, he might truly be called the Cato of his country, without the avarice of the Ro¬ man ; for a more disinterested person never lived. Temperance and regularity in all his habits gave him general good health, and his unaffected modesty and suavity of manners endeared him to every one. He was of easy elocution, his language chaste, methodical in the arrangement of his matter, learned and logical in the use of it, and of great urbanity in debate. Not quick of apprehension, but with a little time profound in penetration, and sound in conclm sion. His stature was of middle size, well formed and proportioned, and the features of his face manly, comely, and engaging. Such was George Wythe, the honor of his own and

the model of future times. Wythe was the author of (Decisions in Virginia by the High Court of Chancery) (1795; 2d ed., with (Memoir) 1852).

Samuel C. Mitchell, President of Delaware College.

WYTHEVILLE, with'vil, Va., town, county-seat of Wythe County, on the Norfolk and Western Railroad, 130 miles west of Lynch¬ burg and 215 miles southwest of Richmond. It is in a stock-raising and mining region and has considerable lumbering interests. It has iron works, woolen and knit goods factories, flour and lumber mills. The town has

a county courthouse, Trinity Hall Female College (Lu¬ theran), Wytheville Seminary (Protestant Episcopal), Academy of the Visitation (Roman Catholic), public elementary schools and two libraries. Pop. (1920) 4,973.

WYTHEVILLE, Military Operations at.

During the Civil War the lead mines and works near Wytheville assumed much importance.. On 13 July 1863 Col. John T. Toland, with the Second West Virginia cavalry and 34th Ohio mounted infantry, about 800 men, started from Fay¬ etteville, W. Va., to damage the lead works and destroy the railroad near Wytheville. On the evening of the 18th Toland arrived within five miles of the town and detaching two companies to destroy a railroad depot and track, 10 miles west, marched his remaining force into the town, which was defended by less than 200 men, under Major Bowyer, most of them distributed in houses and some in the streets supporting two guns. There was an obstinate fight in the streets, lasting an hour, when the town was taken and eight or 10 of the best houses burned. The two guns and many small arms were cap¬ tured and some prisoners taken, but all were abandoned when the return march was taken up next morning. The command reached Fay¬ etteville on the 23d after a march of about 300 miles. The expedition had failed of its object, with the loss of 78 killed, wounded and miss¬ ing, of whom 17 were killed, including Colonel Toland and two other officers. Colonel Powell, commanding the Second West Virginia cavalry, was severely wounded and captured. The Con¬ federates report a loss of six killed and 12 wounded. On 2 May 1864 General Crook started from Charleston on the Kanawha to destroy the Virginia and Tennessee Railroad and join General Sigel in the Shenandoah Val¬ ley. One of his columns of 2,600 cavalry, under General Averell, was directed upon Saltville to destroy the salt works, and then rejoin the main column under Crook at Dublin Station. After a very difficult march through the moun¬ tains and some sharp skirmishing Averell reached Tazewell Court House on the after¬ noon of the 8th, where he learned that Salt¬ ville was defended by earthworks and artillery, and was held in strength by Gen. W. E. Jones, upon which he abandoned the idea of attack and turned toward Wytheville, near which he arrived on the afternoon of the 10th and en¬ countered Col. John H. Morgan, who had fol¬

lowed him from Saltville and by a detour first gained the town with a brigade and two bat¬ talions. A detachment of Morgan's command had been pushed out to a small gap in the mountain, through which

alone Averell could approach the town from the road on which he was marching. The detachment was immedi¬ ately attacked and Morgan marched to its as¬ sistance with all his command, and Averell fell back to a commanding ridge 800 yards from the gap. The contest continued four hours, or until nightfall, in a succession of attacks on the one side and retreats on the other, when Morgan fell back a short distance and Averell withdrew and next morning marched for Dub¬ lin, where he arrived in the evening and, re¬ suming his march, joined Crook at Union on the 15th. Averell had 114 killed and wounded, and lost nearly 100 in prisoners. Morgan had 50 or 60 killed and wounded. When General Stoneman made his raid into southwestern Vir¬ ginia in December 1864 he captured Wytheville on the 16th, partially burned it and next day sent a detachment to destroy the lead mines, which was done without loss. On Stoneman's second raid in southwest Virginia and western North Carolina in March 1865, Col. J. K. Mil¬ ler, with 500 picked men of his cavalry brigade, captured Wytheville 6 April and destroyed the depot of supplies at that point and the bridges over Reedy Creek and at Max Meadows. At Wytheville, Miller was attacked by Confederate infantry and cavalry, but after hard fighting re¬ pulsed them, and withdrew with a loss of 35 killed, wounded and missing, and rejoined the main column on its march for Salisbury, N. C.

WYTTENBACH, vit'ten-baH, Daniel Al¬ bert, Dutch scholar : b. Bern, Switzerland, 7 Aug. 1746; d. Osgeest, Holland, 17 Jan. 1820.. He studied at Marburg, Gottingen and Leyden ; became professor of Greek at the Remonstrant Gymnasium at Amsterdam in 1771, of philoso¬ phy at the Athenaeum in 1779, and succeeded in 1799 to Ruhnken's chair of rhetoric at Leyden.

His greatest work is the edition of Plutarch's (Morals, > iwith copious annotations and an admirable (Greek Index to Plutarch's Works > (1795-1830). Other works are (Epistola Crit¬ ical (1769) ; (Praecepta Philosophise Logicse5 (1782 ; new ed., 1821) ; (Eclogsesen Selecta Principum Historicorum Capita* (1793; 1829); (Vita RuhnkoniP (1800; Plato's fPhsedo) (1810; new ed. 1825). He retired in 1816, and died after some years of blindness. His <Opuscula) appeared in 1820. Consult Mahne, (Vita D. Wyttenbach) (1823) and Sandys, J. E., (History of Classical Scholar¬ ship J (Cambridge 1908).

WYTTENBACH, Johanna Gallien, Dutch

writer: d. Leyden (1830). She was married to D. Wyttenbach (q.v.) when he was 72, and after her husband's death lived at Paris and was given the degree of doctor in philosophy by Marburg, in 1827. Among

her writings were <Theagenes) (1815); <Leontes' Banquet* (1812); and the romance (Alexis> (1823).

X

Xthe twenty-fourth letter and . nine¬ teenth consonant of the English al¬ phabet : it is a superfluous letter since it stands for no sound that cannot be signified by other letters. When it occurs in the beginning of a word it is always pronounced in English as z: Xenophon, zeno-phon, xiphoid, ziphoid; in the middle of a word it is usually equal to ks: axis, aksis, Saxon, sak-son ; but when in a word it ends a syllable, more especially an initial syllable, if the syllable fol¬ lowing it is open or accented, the x has often the value of gz, as in luxury, lugzury, exhaust, egzaust. Final x is always equal to ks.ˆ As an initial letter x does not occur in English sa\e in words mostly technical and derived from Greek, and in a few words, mostly pioper names, of Spanish origin. — The power of x in English, as in Latin, is that of the Greek letter xi (3 £). It has been suggested that its form is that appropriated in the Greek alphabet to the guttural aspirate chi (X, x)- Before the intro¬ duction of *(O the Greeks represented the sound of x by X2, xs and the Latins at first did the like, writing Maxsumus, proxsumus; but as x had in their writing no function but that of representing, with s the sound of Greek xi, the very sight of the x, even before the eye came to the may have raised in the mind the idea of a sibilant, and thus rendered the sibilant letter itself superfluous, so that before long it was omitted and x, standing alone, represented the two characters X and s. However, the evi¬ dence in favor of this view is not conclusive, and there are alternative opinions. In the pop¬ ular pronunciation of Latin in the later period of the empire, ˆ seems to have been sounded like ˆ or ss: some inscriptions of that period have visit for vixit, and mil ex for miles: t his change in the sound-value of x has persisted in the modern language of Italy m which or ˆ is regularly substituted for the Latin x . saxiun becomes sasso, experimentum, espernnento, maximus, massimo and so on. In hrench, in words derived from Latin, the x occumng in the middle of a word is often changed to ss: laxare becomes laisser; or Latin x is changed to the sound of sh: vexare becomes facher; and the word soixante is pronounced soissante. A scarcely occurs in German words of native ori¬ gin ; its sound is usually represented in that language by chs, examples: ochs (ox), wadis (wax), S*achse* (a Saxon). X stands for 10 in the Roman symbolism; .v is often used in mathematics for an unknown quantity or the abscissa of a point. See Alphabet.

X-RAY, The, a ray proceeding from a glass-bulb from which air has been highly exhausted and through which an electric charge is being passed. It was discovered by Rontgen in

Wurtzburg, 1895. Hundreds of others had ex¬ perimented with Crookes tubes, glass bulbs ex¬ hausted to one millionth of an atmosphere and enclosing the terminals of high tension electric wires. These had all produced X-rays now called Rontgen rays, but Rontgen was the first to detect their presence. They are invisi¬ ble and are supposed to be vibrations of a similar character to those of light but much more rapid than even the invisible ultra violet rays in sunlight. The extremely short wave length accounts for the fact that every sub¬ stance regardless of its color is more or less transparent to the X-rays ; and that the X-rays are not ordinarily reflected or refracted. In fact it was about 23 years after their discovery that it was found out that the cleavage surfaces of crystals, smoother than any artifically pol¬ ished surface, woulcf produce these two effects upon the X-ray which are so easily produced upon ordinary visible light. Excellent pictures are often taken through aluminum one-quarter inch thick, while denser substances like lead and gold arrest most of the X-rays even in much thinner layers. The modern X-ray tube contains a cathode or negative terminal from which the cathode stream of negative particles or electrons traveling at an average velocity of 20,000 miles a second starts under the influence of from 50,000 to 100,000 volts; also a target or anticathode upon which these particles im¬ pinge, setting up the extremely rapid vibrations called the X-ray or Rontgen ray. There is a positive terminal, the anode, which may or may not be used as the target. The gas filled X-ray tube contains air or some gas exhausted upon an air pump to a vacuum of about one-millionth of an atmosphere. It is provided with a regu¬ lator by which the degree of vacuum may be raised or lowered.

The electron discharge X-ray tube, such as the Coolidge tube, is exhausted to as complete a degree of vacuum as possible and even the highest voltage fails to send any electricity through it unless a low tension current is first sent through a tungsen filament forming part of the cathode. During the time that this filament is incandescent, it liberates electrons which are ready to form the cathode stream when the high tension current is turned on. Arrange¬ ments are necessary for regulating the strength of the low tension current so as to vary the incandescence of the tungsten filament.

The rays are made perceptible by looking through a fluoroscope or dark box enclosing a screen of some fluorescent substance like barium platino cyanide which becomes brilliantly illumi¬ nated. If the whole room is darkened the fluoroscope may consist simply of the flat screen. Anything held between the X-ray tube

and the screen casts a shadow upon this illumi¬ nated surface and parts of the object which have different densities become distinguishable in the image upon the screen by reason of dif¬ ferences in the darkness of the shadow. Look¬ ing at a person's chest, the ribs -look moder¬ ately dark and the lungs very light, while the heart is seen as a pale shadow expanding and contracting.

X-ray pictures are very often made with¬ out ever looking at the patient with the fluoroscope and not really seeing the part under ex¬ amination, such as the bones of the leg, until the plate or film is developed. The latter is in a cassette or plate-holder made of aluminum which is opaque to ordinary light, but very transparent to the X-ray. Thin wood or thin hard rubber serve equally well. Or the plate may be simply wrapped in black and orange paper to protect it from ordinary light. No camera is required and the plate is not usually uncovered during the X-ray exposure. It is possible, however, to make an X-ray picture upon a completely uncovered plate providing the room is absolutely dark and the X-ray tube is surrounded by a covering opaque to ordinary light but transparent to the X-ray; it being desirable to protect the uncovered plate from Drdinary light rays produced .by the tube in addition to the X-rays.

A special property of the X-ray is one also possessed by the rays from radium. It is that of ionizing the air and so rendering the air a conductor of electricity as may be demon¬ strated by the discharge of an electroscope. This property is made the basis of measuring the radio-active power of radium and has been occasionally used to measure the intensity or the dosage of the X-ray.

The X-ray is ordinarily made up of different rates of vibrations having as different proper¬ ties as the different rates of vibration in ordi¬ nary light. X-rays of very rapid vibration are highly penetrating and are called hard rays ; they are produced when the tube presents a high resistance to the passage of electricity and it takes a high voltage, perhaps 90,000, to send a current through the tube. This high resist¬ ance occurs when the vacuum of a gas-filled X-ray tube is high, that is most of the gas is removed; with an electron discharge X-ray tube like

the Coolidge tube the resistance is high when the filament is at a low degree of incandescence. Rays of a low degree of pene¬ tration or soft rays are produced in greatest abundance by an X-ray tube whose resistance is so low that about 40,000 volts will send elec¬ tricity through the tube. As a rule, the rays are not all of the same wave length, but the radiation is mixed. The average penetration is determined by the regulation of the resistance of the tube. Under special conditions, however, homogeneous X-rays are obtainable. The parallel spark-gap is the distance that the high tension current will pass across in the open air in preference to passing through the X-ray tube. It is frequently employed as a means of measuring the resistance of the X-ray tube. In a rough way, each inch of parallel spark gap corresponds to 10,000 volts of high tension current required to excite the X-ray tube and very roughly to one Benoist unit of penetration. Direct measurement of the average degree of

penetration of the rays generated by an X-ray tube is generally by the Benoist Radiochro¬ mometer. There is a central disc of silver 0.11 millimeter thick, surrounded by sectors of aluminum from 1 to 12 millimeters thick. The number of millimeters of aluminum which cast a shadow of the same density as that of 0.11 millimeters of silver gives the degree of pene¬ tration. Soft rays are number three or four Benoist, and very hard rays number 10 or 12 Benoist. X-rays are partly absorbed by every substance through which they pass. The den¬ ser the substance and the softer the X-rays the greater proportion is absorbed by a layer of a given thickness. Very soft rays are so absorb¬ able that even the petals of flowers cast shadows and produce beautiful pictures, while extremely hard rays are employed to look for flaws in¬ side of steel rails. Medium degrees of pene¬ tration produce X-ray pictures of the human body in which the bones cast a darker shadow than the flesh, air spaces like the pneumatic sinuses of the face and like the lungs cast a lighter shadow and dense foreign substances like a bullet in a wound or an opaque meal in the stomach and intestines or a stone in the kidney cast dense shadows. Except in the case of a broken bone or a bullet, the interpre¬ tation of a radiograph requires a knowledge of the normal X-ray lights and shadows of the part depicted.

The effects of the X-ray upon the human body were first noticed as X-ray burns and loss of hair. Later it was found that these could be prevented and that the X-ray had marvel¬ ously beneficial effects upon cancer and leucae¬ mia and tubercular glands and other diseases. Skin cancers are usually permanently cured without the

necessity for an operation and moderately soft rays are employed which will be absorbed by the skin with very little deep effect. Deep-seated lesions require .rays of great penetration so that a large fraction will reach the deep tissues. This is partly accom¬ plished by regulating the X-ray tube to a high resistance so that it generates chiefly hard rays and also by interposing a filter between the X-ray tube and the patient. An eighth of an inch or more of aluminum will arrest many rays which would be absorbed by the skin with danger of burning, and which would greatly limit the quantity of the accompanying pene¬ trating rays that could be safely applied. The intensity varies inversely as the square of the distance, so even rays of the proper penetra¬ tion are much stronger at the surface toward the X-ray tube than in the deep tissues con¬ siderably further away. And even the pene¬ trating rays are rapidly weakened by passing through the tissues. To secure sufficient effect upon a deep-seated organ without too much effect upon the skin a cross-fire system is neces¬ sary. One exposure is made shielding the skin with heavy lead except for an opening through which the X-ray passes to the deep organs. For another exposure, the person is in a dif¬ ferent position and the X-ray reaches the same deep organ through a different part of the skin. Sometimes as many as eight different ports of entry are employed, the deep-seated organ receiving eight times the quantity of X-rays that could have been safely applied from a single direction. And so though the

X-RAY

T qteral radiograph of the head; showing frontal sinus, ethmoid cells, antrum, sphenoidal sinus and sella Turcica. The earring on the side away from the photograph in plate is magnified and less distinct. It is seen through the cervical

vertebrae

X-RAY

Radiograph of the stomach and intestine in a case of cancer of the stomach

1 Radiograph of the Human Hand (Dead) Made by Radium 2 Radiograph of the Human Hand (Living) Made by X-Rays

X. Y. Z. CORRESPONDENCE-XANTHIAN MARBLES

595

X-ray is weakened by distance and by absorp¬ tion in passing through the overlying tissues, a really beneficial total dosage is applied to the deep organ. All but the successive ports of entry must be shielded by thick lead. It is not sufficient to merely change the position of the X-Ray tube and the patient.

The cumulative effect of the X-ray is re¬ markable. A certain number of minutes ex¬ posure has the same effect whether applied at one time or in divided doses extending over two or three weeks. This is what makes it so dangerous to the operator if he is frequently exposed to the X-ray. Even though each ex¬ posure for a picture or treatment may be bene¬ ficial to the successive patients and although from the operator's being at a greater distance, he is exposed each time to a much smaller dose than any of the patients, the cumulative effect upon him is disastrous. Many X-ray operators have died from cancer originating from this cause. The only safety for the operator lies in being shielded from the rays by a brick wall or very heavy lead. An operator is very foolish to think that he is going to use the X-ray so seldom that he does not need to be shielded from it. If he does good work he will soon find that he has benefited many patients at the expense of irreparable injury to himself. The period of incubation is another interesting feature of the X-ray effect upon the human body. In treating skin cancers, a reaction is produced somewhat similar to a slight sun¬ burn and this does not appear at the time of the exposure but all the way from four to 20 days afterward.

The dosage of the X-ray necessarily implies the appropriate quality as

represented for in¬ stance, on the Benoist scale of penetration and also the appropriate quantity of X-rays meas¬ ured usually as applied at the surface of the body. One unit of quantity is the Holzknecht unit H and about 5H is an erythema dose. Another unit is Tint B, Sabouraud, which is the same erythema dose. Another is Kien-bock's X unit and 10X is an erythema dose. The erythema dose is that amount of X-ray which will produce redness of the skin with¬ out ulceration. It first became a standard of dosage in Sabouraud's treatment of ring worm of the scalp. In that disease the germs are difficult to kill because they are adherent to the roots of the hairs deep down in the hair •follicles. A single erythema dose causes the hairs to fall out carrying the germs with them. Of course an antiseptic lotion must be em¬ ployed to prevent reinfection of other hairs from those which have fallen out. After a single correct dose the disease is permanently cured and the hair all returns. Repeated doses of the X-ray are sometimes employed for the permanent removal of superfluous hair but not all authorities recommend this use of the X-ray.

The X-ray has led to one of the most im¬ portant discoveries in modern medicine. It has shown that many diseases of the type of rheumatism, arthritis, neuritis and myositis, also endocarditis, digestive troubles including ulcer of the stomach and many other symptoms and lesions of a varied character frequently have their origin in tooth infection. A blind ab¬ scess may exist for years at the apex of the root of a tooth and poison the system all that

time. It may give no pain or swelling and its presence may be unknown to the patient or the dentist and still be the cause of painful or even fatal illness. Such infection is readily disclosed by an X-ray examination and easily cured by the dentist. The patient is fortunate if this is done while the systemic infection is slight and of a nature to certainly get well after the discovery and elimination of the den¬ tal infection. Of course after the onset of a fatal illness is not the time to discover that it was caused by an infected tooth. There are almost always mild indications which suggest the desirability of an X-ray examination of the teeth in time to prevent the more serious effects of tooth infection. One of the effects of a great many mild exposures in the case of X-ray operators is sterility. This is an addi¬ tional reason why the operator should be shielded. And one of the diseases in which X-ray exposures are curative is fibroid tumor of the uterus with hemorrhage as a serious symptom. The cases of this disease which are most successfully treated are those in which the X-ray exposures bring on an artificial menopause.

X-ray operators who are not shielded are liable to blood changes resembling anemia or leucaemia, but this effect is not so generally produced as the X-ray keratoses with a tend¬ ency to change into cancer, and the* sterility.

Sinclair Tousey, M.D.

New York City.

X. Y. Z. CORRESPONDENCE, in United States history, the name given to the dispatches of the three commissioners to France in 1797-98, Marshall, Pinckney and Gerry. These commis¬ sioners reached Paris in October 1797, but were refused recognition by the Directory. They were, however, notified by the secretary of the Marquis de Talleyrand, Minister for Foreign Affairs, that agents would be sent to conclude negotiations. The first of these, Hottinguer, stated that a <(loan* of $1,200,000 would be the necessary means of placating the Directory: the other two, Bellamy and Hauteval, urged that in case the American government would buy at par stock amounting to 32,000,000 livres, but whose market-value was really about one-half that amount, the transaction would be viewed as a loan. The intimation was that in default of money war would ensue. These terms were promptly rejected. The dispatches sent by the commissioners were submittted in copy to Con¬ gress, X., Y., and Z., having been substituted for the respective names of the French agents. A great stir was caused at the time. Preparations for hostilities were made, and war on the sea actually broke out. Consult for the text of the correspondence (American State Papers, For¬ eign Relations, > Vol. II (Washington 1832), also Adams, C. F., (Works of John Adams *(10 vols., Boston 1850-56) ; Bassett, J. S., fed¬ eralist System* (Boston 1906), and Morse, J T., (J°hn Adams) (Boston 1908).

XANTHENE DYESTUFFS. See Coal-tar Colors.

XANTHIAN (zan’thi-an) MARBLES, a

large collection of marbles of various ages (from 545 b.c. onward) discovered near Xanthus, in 1838.

XANTHINE, an organic base, C5H4N4O2, occurring in small amounts in many animal se¬ cretions, in the blood, urine, liver, in some uri¬ nary calculi, and in tea extract. It may be read¬ ily made by the action of nitrous acid on gua¬ nine. A white amorphous powder slightly solu¬ ble in water, and forming crystalline compounds with both acids and bases. It is closely related to theobromine and caffeine, the alkaloids found in cocoa and coffee respectively. Caffeine may be considered as xanthine in which three hydro¬ gen atoms have been replaced by three methyl (CH3) groups.

XANTHIPPE, zan-thip'e, the wife of Soc¬ rates, the Greek philosopher. Her shrewish temper has become proverbial, but many of the stories about her are probably false, for in ancient Athens gossip was cultivated to the perfection of a fine art, the point and not the truth of the story being the chief consideration. Xanthippe's natural inequalities of temper were heightened by the peculiarities of her spouse, especially his indifference to the common place duty laid on the head of the house to make both ends meet. The philosopher received her re¬ proaches with such good-humored indifference that it is not surprising she sometimes resorted to other weapons beside her tongue; as on the occasion when she is said to have finished up a tirade by sousing the philosopher, though his remark, as he moved dripping from the scene, that when Xanthippe thundered she watered, must have shown her that here, too, she was powerless. Consult Zeller, E., (Vortrage und Abhandlungen) (Vol. I, 1875).

XANTHOCONITE. A silver ore

3Ag2S.As2S5, containing 61.4 per cent of silver. Formerly mined in Santa Fe County, N. Mex.

XANTHUS, zan'thus, Asia Minor, (1) an ancient city, the capital of Lycia, on the Xanthus River, about eight miles above its mouth. Its ruins near modern Gunik were discovered in 1838, and have yielded a large collection of marbles, now in the British Museum. (2) The river now known as the Kedja Ak rises in Mount Taurus, and falls into the Mediterra¬ nean a little to the west of Patara. Consult Behndorf and Niemann, (Reisen in Lykien und Karien* (Vienna 1884) ; Smith, Catalogue of the Sculptures of the British Museum* (Vol. I, London 1892).

XAVERIAN BROTHERS. See Orders,

Religious.

XAVIER, zav'T-er, Sp. ha-ve-ar'; Saint Francis. See Francis Xavier, Saint.

XEBEC, ze-bek, a small three-masted ves¬ sel, employed in the Mediterranean, distinguished from other European vessels by the great pro¬ jection of the prow and stern beyond the cut¬ water and stern-post. In this respect it resem¬ bles the felucca, from which it differs only in having the fore-mast square-rigged. The xebec is constructed with a narrow floor for the sake of speed, and of a great breadth, so as to be able to carry a considerable force of sail without danger of overturning.

XENIA, Ohio, city, county-seat of Greene County, on the Shawnee Creek, and on the Pennsylvania, the Cincinnati, Hamilton and Dayton, and the Chicago and Saint Louis rail¬ roads, 55 miles southwest of Columbus. It is

in the Little Miami Valley, in the midst of a productive farming region. It is well laid out and has 11 miles of first-class pavement and a complete storm sewer system. The chief manufacturing establishments are shoe factories, powder works, an ice factory, a flour mill, twine factories, cigar factory, machine shops, one au¬ tomobile factory, saw and planing mills, marble and granite works, canneries, candy kitchens. The county courthouse is in a park in the centre of the city. Other prominent buildings are the municipal building, the Ohio Soldiers and Sail¬ ors' Orphans Home and several business blocks. Outside the city limits are the county infirmary and children's home. The educational institu¬ tions are the Xenia Theological Seminary (United Presbyterian), opened in 1794; three high schools, the Central, established in 1850, one for colored pupils, and the Ohio Soldiers and Sailors' Home High School ; public and par¬ ish schools, a public library and school libraries. Wilberforce University, in Wilberforce suburg, is for colored pupils. It has departments of law, theology, science and literature, and a training school for nurses. There are several churches. The banks have a combined capital of over $250,000, and ottal resources about $2,400,000. The government is vested in a com¬ mission of five and a city manager. Xenia was settled in April 1803 by John Marshall. In 1808 it was incorporated. Pop. (1920) 18,879.

XENOCLE.S, zen'6-klez, Greek tragic poet: b. Athens, 4th century b.c.,

in the time of Philip of Macedon. He obtained a prize for four plays, ˆdipusP ˆycaonP the (Bacchantes,J and ˆthainasP

XENOCRATES, ze-nok'ra-tez, Greek phi¬ losopher: b. Chalcedon, 396 b.c.; d. 314 b.c. He was a pupil and friend of Plato, and though of a dull and sluggish disposition, supplied the defects of nature by unwearied attention and industry He succeeded Speusippus in the school of Plato about 339 b.c., presiding over the academy till his own death 25 years later. He was famed for his integrity and it is said that when he appeared in the court as a witness the judges dispensed with his oath. His philosophy followed the teachings of Plato but was modi¬ fied by Pythagorian tendencies. He measured the value of philosophy and ethics according to their effect upon conduct; and while not a great or original thinker, his personal influence, through his purity and integrity, was enormous. He converted Polemon from dissolute habits to a life of high and pure purpose. Among his followers were Phocion, Chaeron, Zeus and Epicurus. He was the author of numerous works, none of which, however, are extant.

XENOLITHS, inclusions of the wall rock caught in an intrusion, as in a dike (q.v.), sill (q.v.) , or batholith (q.v.); and there frozen into the igneous mass as it cools. See Mag¬ matic Stoping.

XENON, a gaseous chemical element dis¬ covered by Ramsey and Travers (1898) in the residue left after the evaporation of a large quantity of liquid air. It is the heaviest of the elementary substances present in the atmos¬ phere in gaseous form. It can be condensed to a liquid boiling at 109° C., and to a solid which volatilizes without melting. Its volume in at¬ mospheric air is about one in 170,000,000. Sym-

bol X or Xe ; atomic weight 130.2. It is an inert chemical element having a spectrum some¬ what resembling argon.

XENOPHANES, ze-nof'a-nez, Greek plii-lcsopher and poet; founder of the Eleatic school of philosophy ; b. Colophon, Asia Minor, about 570

b.c. ; d. about 480 b.c. He was a contem¬ porary of Pythagoras and Anaximander, and having been banished from his native city, went to Sicily, and thence to Magna Graecia. He set¬ tled, about 536 b.c., at Elea (Velia), whence his system, and the school which he founded, derive their name. Of his poems, in which he treated of philosophical and other sub¬ jects, only fragments are preserved in the works of Athenaeus, Plutarch and others. The portions of his didactic poem, (Peri phy-seos) (On Nature) have been collected by Brandis in his (Commentationes Eleaticae) (1813), and by Karsten in his ˆhilosophorum Graecorum veterum reliquiae) (Vol. I, 1830). He was an ardent monotheist and declared that Homer and Hesiod attributed actions to the gods that were (<a shame and a reproach among men.® Consult Ueberweg, (History of Philos¬ ophyˆ English trans. (1872) ; Zeller, Philoso¬ phic der Grieschen,* 4th ed. (1900). See Eleatics.

XENOPHON, zen‘6-fon, ancient Greek his¬ torian and general : b. Athens, about 434 b.c. ; d. Corinth, about 355 b.c. He lived during a period in which the greatest political and intel¬ lectual excitement existed at Athens, and in which the most distinguished men, of whom he was one, appeared on the stage. Xenophon was a disciple of Socrates. He was said to have fought with his teacher in the Peloponnesian war, and to have had his life saved by Socrates in the battle of Delium (424 b.c.), but this is not now accepted. W hen the Persian prince, Cyrus the Younger, contended with his elder brother Artaxerxes Memnon for the throne, the Lacedaemonians sent him auxiliaries, among whom Xenophon served as a volunteer. Cyrus was defeated and lost his life on the field of Cunaxa (401 b.c.). The principal officers of the auxiliary army having been likewise killed in battle, or taken prisoners by artifice, and then put to death, Xenophon was apparently selected to command the Greek forces, . 10,000 men strong. They were in a most critical situation, in the midst of a hostile country, without cav¬ alry, surrounded by enemies and innumerable difficulties; but Xenophon was able to inspire them with confidence, to repress insubordina¬ tion and to lead them in their return march of 1,500 miles to the Black Sea. Xenophon himself has described this retreat, and at the same time the whole expedition of the younger Cyrus) in his Anabasis,* the most famous of military narratives. There is no means of verifying the statements of this work. On their arrival at Chrysopolis (opposite Byzantium) a number of the troops, with Xenophon at their head, en¬ tered the . service of Seuthes, king of Thrace. Later, Xenophon joined the Spartan general Thimbron or Thibron, who was then conduct¬ ing the war against the Persian satraps, Phar-nabazus and Tissaphernes. There is no reason to believe

that Xenophon left Asia Minor before 304 when he returned to Greece with Agesilaus, king of Sparta, after his expedition against the Persians. In that year he fought on the side

of the Spartans against the Athenians at Coro-neia. As a consequence he was found guilty of high treason and exiled. After that he settled at Scillus, a small town in the neighborhood of Olympia, in Elis. In this solitary retreat he dedicated his time to literary pursuits ; and as he had acquired riches in his Asiatic expedi¬ tions, he began to adorn the country which sur¬ rounded Scillus. He built a magnificent temple 1o Artemis in imitation of that of Ephesus, and spent part of his time in rural employments, or in hunting in the woods and mountains. He does not appear ever to have returned to Athens, although the sentence of banishment passed on him was afterward repealed. He remained for about 20 years at Scillus, but was ultimately expelled from it (371 b.c.) by the Eleans. Thereupon he retired to Corinth, where he died. Besides the 'Anabasis, > Xenophon wrote the 'Apomnemoneumata,* more commonly known as the (Memorabilia SocratisP in which there is no doubt that we have a faithful representation of the moral and practical side of the Socratic teaching, although he makes no attempt at inter¬ preting its metaphysical aspects / the 'Cyropae-diaP in which, under the guise of a life of Cyrus the Elder, there is an exhibition of Xenophon's views respecting the best form and methods of government; the Symposium) (Banquet), in which Socrates is brought before us under his social aspect; the (Hellenica) which continues the history of Thucydides, and which, while open to criticism for its political bias, is nevertheless honestly written and is highly valuable as the only contemporary ac¬ count of the period 411-362 b.c.; and of several minor works on hunting, agriculture, politics and the science of war, all of great interest as giving an authentic presentation of the ordinary life of the Greeks of that period. The style of Xenophon is in general a model of simplicity. The Greeks esteemed his merit as a writer so high that they called him the <(Attic bee® and the <(Attic muse.® Later criticism has found that in both vocabulary and syntax he fre¬ quently deviates from the best Attic usage. His works have been often published separately and together. Among the best editions of the com¬ plete works of Xenophon are those by Schneider and others (1791—1849), Sauppe (1865), and Dindorf (1875). There is a complete English translation 'by H. G. Dakyns, with introductions and notes (1890-93). Consult also the studies by Croiset (1873), Roquette (1884), and Lange 0900) ; Bury, J. C., (Ancient Greek Histonans) (1909); Wright, W. C., (A Short History of Greek Literature) (1907).

XENOPHON OF EPHESUS (“Xeno¬ phon the Younger®), Greek writer who flour¬ ished in the 2d century a.d. One work of his has been preserved, a story in five books, called ‘Ephesiaea ; or The Loves of Abrocomas and Anthia. > The story is written in a style simple and elegant. It was translated into English by Rooke,— and into German by Burger.

XENOS, ze’nos, Stefanos Theodoros, Greek author. From 1855 he was a merchant and general broker in London, , and in 1858 was nat¬ uralized as a British citizen. He published ‘The Devil in Turkey* (1850), a three-volume English translation from the author’s unpub¬ lished Greek manuscript; in Greek, (The Hero¬ ine of the Greek Revolution (1861), trans-

lated as <Andronike) (1897); (East and West: A Diplomatic History of the Annexation of the Ionian Islands to the Kingdom of Greece* (1865); and (Depredations : or Overend, Gur¬ ney and CoC. and the Greek and Oriental Steam Navigation Company) (1869).

XENOTIME, a tetragonal mineral occur¬ ring in crystals of the same forms as zircon. It is essentially an yttrium phosphate, YPCX, hut much erbium is frequently present, and also sometimes the cerium metals, and small quantities of thorium and silicon. It is usually found in minute crystals of resinous or vitre¬ ous lustre, yellow or hrown color and having a hardness of 4 to 5 and specific gravity of about 4.5. It occurs as an acces¬ sory constituent in many granites (see Derby in American Journal of Science 41, 308, 1891), in large crystals in the granitic rocks of Nor¬ way, in the auriferous gravels of North Caro¬ lina and Georgia, and in choice crystals in the gneiss of New York City. When obtainable in sufficient quantities it will be an important ore of yttria and erbia.

XERES, ha’ras, or XEREZ, or JERES, Francisco de, Spanish historian: b. Seville, about 1500; date of death unknown. He ac¬ companied Pizarro, as his secretary, to Peru, about 1530, returned to Spain with the first shipment of gold taken from Atahualpa. At the direction of

Pizarro he wrote a detailed history of the expedition and the conquest down to the death of Atahualpa, entitled (A True Account of the Conquest of Peru) (1547). The work was translated into Ital¬ ian by Ramusio, and into French by Ternaux-Compans and is still valued as a source of information.

XERES DE LA FRONTERA. See

Jerez de la Frontera.

XEROPHYTES, zer‘6-fits, plants which have guarded themselves by structural means against excessive transpiration. The term was originally applied to plants living in dry and sandy soil, or on rocks, and to those in¬ habiting deserts ; but it is now extended to plants existing in localities where, for one reason or another, they cannot readily obtain water, as in the case of the vegetation in salt marshes, arid bogs and moors and of cold regions where water is present but not avail¬ able for the use of the plants, which have consequently adapted themselves to prevent the waste of the moisture which they have. This result is obtained in various ways. In some, the transpiring surface is greatly reduced, and the foliage is nearly or wholly dispensed with, the stems themselves taking its place, as in switch plants and cacti; and this habit is fre¬ quently combined with the storage of water in succulent tissues. Other plants, like the eu¬ calyptus trees predominating in the dry forests of Australia, by a vertical arrangement of their foliage, or a similar disposition of the branches themselves, when foliage is wanting, as it is in the casuarinas, avoid presenting broad surfaces to the sun and hot winds. Some erophytic plants close their leaves just before the dry season ; the whole existence of others begins and ends during the continu¬

ance of a rainy season; and in the bulbous and tuberous plants we see still another com¬ mon arrangement for passing the dreaded dry months, the plants growing vigorously and completing their above-ground existence, while the weather is still favorable, and storing up food in their roots or rootstocks, so that they may rest uninjured in the ground during the heated term, and be ready to spring into activ¬ ity as soon as the rains begin. An extensive development of ligneous tissue is characteristic of xerophytes and so also are such modifica¬ tions of tissue as the matted hairs, mineral, waxy and varnish-like encrustations on the epidermis, the closing or concealing of sto¬ mata, *etc.*

XERXES I, zerk'sez, king of Persia: b. about 519 b.c. ; d. 465 b.c. He was a younger son of Darius, the son of Hystaspes, and began to reign in 485. He was preferred to his elder half-brothers, born before his father was raised to the throne; Xerxes was born after that event, and was the son of Atossa, daughter of Cyrus. After having suppressed a revolt in Egypt in a single campaign, he thought himself able to execute the plan of conquer¬ ing Greece, already conceived by his father, and collected for this purpose an immense army, estimated by the historians as contain¬ ing 1,000,000 men. In all probability the Greeks greatly exaggerated the number of their enemies; and the train of women and slaves who followed the army made at least half of its numerical amount; still the num¬ bers of the Persians were beyond all com¬ parison superior to those of the Greeks. By means of a bridge of boats Xerxes crossed the Hellespont (480) while the Greeks awaited him on the frontier of their country, in the pass of Thermopylae. After the heroic Leoni¬ das had fallen with his Spartans (see Leoni¬ das), Xerxes burned Athens, which had been forsaken by its inhabitants. The first naval battle between the two powers at Ar-temisium had been indecisive; but it inspired the Greeks with new confidence ; and the second naval action at Salamis, in which, if we believe the Greek historians, 2,000 Persian vessels were engaged against 380 Greek, termi¬ nated in the defeat of the Persians (28 Sept. 480). Xerxes now quitted Greece, leaving be¬ hind him his best general, Mardonius, who, not long after, was routed at Platsea. Xerxes now gave himself up to debauchery ; his con¬ duct offended his subjects and Artabanus, the captain of his guards, conspired against him, and murdered him in his bed. The personal accomplishments of Xerxes have been com¬ mended by ancient authors; and Herodotus observes that there was not one man among the millions of his army that was equal to the monarch in comeliness or stature, or as worthy to preside over great and extensive empire. He was succeeded by his son Artaxerxes I.

XIMENA, he-ma'na, in Spanish legendarv history, the wife of the Cid (q.v.).

XIMENA, or The Heroic Daughter, an

English adaptation of Corneille's (Cid, 5 by Colley Cibber, first played in London in 1712 and printed in 1718.

XIMENES, zi-me'nez, Sp. he-ma'nas, or JIMENES (or XIMENES) DE CISNEROS, Francisco, Spanish ecclesiastic, prime minister and regent: b. Torrelaguna, Castile, 1436; d. Roa, near Valladolid, 8 Nov. 1517. He was graduated in civil and canon law at Sala¬ manca in 1456, became a priest and going to Rome practised in the courts of the consist¬ ory 1459-65. He obtained a papal bull, which secured to him the first vacant benefice in Spain, but the archbishop of Toledo refused to give him any place, and, Ximenes having taken possession of a vacant benefice, the arch¬ bishop caused him to be imprisoned. Ximenes, nevertheless, recovered his freedom and the Cardinal Gonzalez Mendoza, bishop of Sigu-enca, appointed him his grand-vicar. He en¬ tered the Franciscan order in 1482, and for several years practised the most rigid asceti¬ cism. In 1492 he became confessor to Queen Isabella of Castile, to whose notice he had been recommended by Cardinal Mendoza, and in 1495 was made archbishop of Toledo. He did not accept this dignity till after many refusals, and an express command from the Pope. As an archbishop he was very zealous, behaving as a father toward the poor, abolish¬ ing a multitude of abuses, and adhering stead¬ fastly to his resolution that public offices should be filled with honorable and well-quali¬ fied men. In spite of all opposition he effected a reform in the mendicant Orders of Spain, founded in 1499 a university at Alcala de Henares, and undertook in 1502 the Complu-tensian Polyglot Bible. His activity was also displayed in other ways. Dissensions prer-vailed in the royal family. Philip of Austria, son of the Emperor Maximilian I, had mar¬ ried Joanna, the only daughter of Ferdinand and Isabella, and on the death of the latter Philip received Castile, in right of his wife, the sole heiress of her mother. This gave rise to disputes between him and his father-in-law, which were composed by Ximenez. After Philip's death (1506) Ferdinand became regent of Castile for his grandson, afterward the Em¬ peror Charles V, who was a minor. On this occasion he had been much assisted by Ximenez, who in 1507 was made cardinal and grand-inquisitor of Spain. The con¬ version of the Moors now particularly occupied his attention. With this view he formed the project of passing over to Africa, in order to take the fortress of Oran, and in May 1508, landed on the coast of Africa. A battle soon followed in the neighborhood of Oran, in which the Moors were defeated. The fortress was immediately taken and the garri¬ son put to the sword. Ximenes caused Oran to be fortified anew, changed the mosques into churches, and returned as a conqueror to Spain. When Ferdinand died in 1516, his grandson Charles being still a minor, Ximenes became

regent of Spain and during his re¬ gency of two years brought the finances into order, paid the crown debts and restored the domains which had been alienated, caused the laws to be observed, and placed the Spanish military force upon a respectable footing. Consult Flechier, fHistoire du Cardinal Ximenes) (1693); Hefele, (Der Kardinal Ximens) (1844; English trans. 1860); Bar¬ rett, (Life of Cardinal Ximenes) (1813);

Prescott, (Ferdinand and Isabella) (1838) ; <Life,) by Ulrich (1883).

XIMENEZ DE QUESADA, da ka sa tha, Gonzalo, Spanish explorer and conqueror : b. Granada, about 1498; d. Mariquita, New Gran¬ ada, 16 Feb. 1579. He came to America in

1535 as a judicial functionary in the suite of Pedro Fernandez de Lugo, governor of the province of Santa Marta, who chose him to head an expedition against the Chibchas, supposed to number more than 2,000,000 souls, on the great plains of Tunja and Bogota, and the neighboring regions about the headwaters of the river Magdalena. He set out 6 April

1536 from Santa Marta, but at the end of eight months had made no more than 450 miles. After great hardships the expedition reached the mountains and in the following March progress was resumed.

The first Indians he met were so terrified by the sight of his horses that they instantly submitted. Approaching at Tunja the court of one of the great chiefs of the Chibchas, he was allowed to/ enter the palace, but was treacherously attacked as he was about to em¬ brace the chief. The latter was taken, after much slaughter, and Ximenez became possessed of vast riches. From Tunja he marched upon Iraca, the sacred city of the nation. Here two Spanish soldiers, in pursuit of plunder, accidentally set fire to the great temple of the sun, which had been captured by Ximenez, and it perished with the city after burning sev¬ eral days. Returning toward Tunja, he fought a desperate battle at Borja against 12,000 na¬ tives, whom he defeated, after which he made treaties with several caciques, who voluntarily submitted. A usurping chief was then pro¬ claimed king; but was required to deliver the treasures of his predecessor to the Spaniards. After a short imprisonment he promised within 40 days to fill a room with gold and emeralds, but not keeping his promise, was put to death with cruel tortures. On 6 Aug. 1538 Ximenez founded the city of Santa Fe de Bogota.

He was presently joined by Benalcazar, the lieutenant of Pizarro, and Federmann, who presently conspired against Ximenez but with¬ out much success. The three then returned to Europe to lay their claims before Charles V, but while Benalcazar was made governor of Popayan, Federmann and Ximenez gained nothing. Later, however, Ximenez was made marshal of New Granada and returning to • Bogota in 1551, seems to have protected the people against the rapacity of Spanish officials. About 1561 he was named by the Spanish government adelantado, or governor-in-chief of the king¬ dom of New Granada, and induced to fit out an expedition in search of El Dorado, beyond the territories of Pauto and Papamene. To this enterprise he devoted three years, spend¬ ing immense sums in fitting it out, but return¬ ing with only a handful of followers. In 1572 he founded the city of Santa Agueda, 21 miles from Mariquita. He died of leprosy and by his will declared himself poor and forbade the erection of any but the simplest monument over his grave. His remains were removed to Bogota in 1597. He left a manu¬ script work entitled <Sermones) and a (Compendio historial,* both of which have been

lost. Consult Acosta, J., (Historia del des-cubrimiento y colonizacion de la Nueva Gran¬ ada } (1849) ; de Plaza, Antonio, <Memorias

para la historia de la Nueva Granada* (Bo¬ gota 1850).

XIMENIA, a genus of plants of the family Olacacece, represented by large shrubs or small trees, often spiny. Leaves entire, leath¬ ery; calyx very small, petals four, hairy in¬ side ; stamens eight ; ovary with four one-seeded1 cells. X. americana, the false sandal¬ wood, is a straggling shrub, or low spread¬ ing tree producing dull-white fragrant flow¬ ers, smelling like cloves, succeeded by small, oval, red or yellow pulpy fruits, an inch long, aromatic, but somewhat astringent. They con¬ tain a white globose nut with a kernel which tastes like a filbert. Its wood is very tough and heavy. This shrub is known in Flor¬ ida as the hog-plum or wild lime, and in the West Indies as mountain or seaside plum.

XINGtJ, shen-goo’, a river of Brazil, one of the chief tributaries of the Amazon. It is formed by the junction of several headstreams which rise near Lat. 15° S., Long. 55° W. Chief of these is the Tamitatoaba, which flows from a small lake about 75 miles in circum¬ ference. After flowing north for 1,200 miles through a densely forested and little explored region, the Xingu forms a large lake which is connected with the Amazon estuary by a number of deltaic channels 240 miles west of Para. Steamers ascend the river to the Cat¬ aract and Fall of Itamaraca. The river was unexplored until 1884-87, when it was de¬ scended from Cuyaba by Von den Steinen.

XIPHODONTID2E, zif-6-don’ti-de, a fam¬ ily of primitive forerunners of the ruminants, whose remains occur in the Upper Eocene rocks of western Europe. Some of them are the largest and most slender artiodactyls of their age, and the only feet hitherto discovered are two-toed, with mere rudiments of the lateral digits. See Oreodonts.

XIPHOSURA. See Horse-foot Crab; Me—

ROSTOMATA.

XUARES, hoo-a’ras, Gaspar, Paraguayan botanist, historian and biographer: b. Santiago del Estero, Paraguay, 1731 ; d. Rome, Italy, 1804. Entering the order of Jesuits, he de¬ voted himself to teaching philosophy and the¬ ology; and .after the suppression of his order he removed to Italy, where he occupied him¬ self with botanical researches. He wrote ˆHis¬ tory of Buenos Ayres,* and (Dissertations,* which remain in manuscript; (Life of Saint Francis Xavier,* *etc.*

XULLA, shool’la, or ZORELLA IS¬ LANDS, East Indies, a group in the Molucca Sea, south of the Molucca Passage, and east of Celebes. The largest islands of the group are Taliabo, Mangola, and Xulla Besi. The first is about 60 miles long and 15 miles wide.

XUREL. See Horse-mackerel; Jurel.

XYLANDER, ksl-lan’der, Guilielmus, Ger¬ man scholar: b. Augsburg, 20 Aug. 1532; d. Heidelberg, 10 Feb. 1576. His real name was Wilhelm Holzmann. He was educated at. Tubingen and Basel and in 1558 was appointed professor of Greek at Heidelberg. His numer¬ ous Latin translations from the Greek have been of much service to later students.

XYLENE, or DIMETHYL BENZENE, in chemistry. Three isomeric hydrocarbons are known by this general name, orthoxylene, me¬ taxylene, and paraxylene. They all have the composition CeHˆCHsˆ and are dimethyl de¬ rivatives of benzene. Commercial xylene or xylol, found in coal tar, is a mixture of the above three. It is a colorless, oily liquid, boiling above 140° C., not soluble in water, and used as a solvent in various chemical operations.

XYLOGRAPHY. See Wood Engraving.

XYLOIDIN, or XYLIDINE, in chemistry, an explosive probably of the composition CeHuNOXX, known also as pyroxylam and nitro-starch. Discovered by Braconnet in 1833 and prepared by dissolving one part of potato starch in eight parts of fuming nitric acid and then pouring this solution, well cooled, into 16 parts of concentrated sulphuric acid. It is a white hydroscopic powder, insoluble in water and alcohol, but soluble in ether. It is not used to any considerable extent.

XYLOPHONE, a musical instrument of percussion consisting of bars of wood or glass graduated in length and resting on belts. The notes are produced by striking on the bars with small hammers and have a range of two or three octaves. Called also (<aigelira,® (<sticcada,*> and ˆstraw-fiddle.®

XYLOPIA, a genus of anonaceous trees or shrubs, natives of tropical regions, with coria¬ ceous leaves, commonly two-ranked, and flowers in axillary clusters or solitary. The corollas have six petals, the outer three elon¬ gated, boat-shaped, curving over and partially enclosing the other three. The receptacle is conical, with the stamens outside and the car¬ pels in its excavated interior. The fruits are elongated berries. X. sericea, the pindaiba of Rio Janeiro, bears a highly aromatic fruit, which may be used as pepper, with which it agrees in flavor. Good cordage is made from the fibres of its bark. The wood, bark and berries of X. glabra, the (<bitter wood® of the West Indies, taste like orange seeds, and im¬ part a similar flavor to the wild pigeons which feed on them. It is said to be useful in colic and for creating an appetite. Martius believes the fruit of X. grandiflora to constitute a valu¬ able febrifuge used by the South American Indians. The dry, black and quill-like fruits of X. aromatica form the Piper cethiopicum of commerce, used as pepper by the West African negroes. They are sold in the native market as a stimulant and condiment. X. polycarpa is the yellow dye-tree of tropical Africa, with a bitter bark, that contains berberine and which yields a yellow dye, of extensive use ; it is also employed for the treatment of bad ulcers.

Y

Ythe 25th letter of the English alphabet, derived from the Greek through the Latin, is both vowel and consonant. It came into Latin in Cicero's time in spelling words borrowed from the Greek; for the Latin language has no sound like that of the Greek T (upsilon) ; the y found in some Latin words, as lacryma, satyra, sylva, is due to an er¬ ror of modern editors; those words were in ancient Latin always written lacrima, satira, silva. The modern Italian alphabet has no y, and the y of Greek words adapted into Italian is changed to i: sinfonia, symphony, sindico, syndic. In Dutch, y stands for ij, and rep¬ resents the diphthonal long i of English as in time. In English, y is a superfluous letter, so far as it stands for a vowel sound; as such, it can always be represented by the vowel i. The sound of T, v, in Greek, was that of French u and German ii. This sound does not exist in English : it is heard when, with lips and tongue in the positions for pronouncing the vowel sound oo, one tries to give the English vowel sound of e in he. In early English or Anglo-Saxon, y represented this peculiar vowel sound; but it has so far dropped out of English speech that a person whose only speech is English can¬ not pronounce it untaught. At the time of the Norman Conquest i had taken the place of this y, and soon both the sound and the letter went out of English use. But when Norman words came to be used by the English the French u sound was retained in many words, as muse, lute, duke, and they were pronounced with the French u; this sound gradually developed into in, but the spelling remained unchanged : this in represents the sound of u in muse, duke as now pronounced. In the beginning of syllables and when followed by a vowel, y is a palatal con¬ sonant formed by bringing the middle of the tongue in contact with the palate, nearly in the position for g hard; hence Old-English g hard has often been softened into y, as in day from Old-English dag. Y also often stands for the sound pronounced in the same manner but writ¬ ten j in the other Germanic tongues. Until com¬ paratively recent times it was customary to write the y* and that y1, and those forms were repeated in typography. In those cases the character resembling y or identical with it, stood, not for y but for the Old-English letter p; it is a mere ignorantism to read (<ye year,** ye year as though y here stood for the con¬ sonant y, and not for the digraph th. As an abbreviation Y stands for yttrium. Y is used in mathematics for the second of two unknown quantities or the ordinate of a point in Carte¬ sian co-ordinates. See Alphabet.

YACHTING RECORDS. See Sports.

YACHTS AND YACHTING. A yacht, as distinguished from a boat or ship, is a vessel

designed for pleasure, not commerce, usually built for both comfort and speed, and often luxuriously equipped. It may be either a sail¬ ing vessel of one, two or more masts, or a steam or gasoline-power craft. Small, very swift pleasure craft, with gasoline power, are called motor-boats, and slow-going but more or less well-cabined boats for shore and private use are house-boats (q.v.). Yachts are further distinguished from merchant vessels in that they are free to go between coast ports without registering at a custom house, although in going to a foreign port registration is usually required. Visiting yachts of other countries are commonly extended the privileges granted to local yachts.

English Yachting. — The word yacht is of Dutch origin, being from the Dutch jagt, a swift vessel, from jagen, to chase, to hunt. It seems to have been introduced into England in 1660 when the Dutch presented Charles II with a yacht. The first recorded yacht race was be¬ tween Charles II and his brother, the Duke of York, which took place on the Thames in 1661, but from that date none is on record till 1796, when 10 boats started on a 50-mile race in the Bristol Channel under the auspices of the Bristol Sailing Society. For a long period, ex¬ tending well into the 19th century, yachting was closely connected with naval defense, and pri¬ vate yachts were generally constructed to carry guns and to be used in case of need for naval purposes. Private individuals of means were thus able to contribute to national defense not only directly by forming a kind of minor vol¬ unteer fleet, but also indirectly by leading the way in the development of naval architecture. In 1832 the Emerald, the fastest cutter in the Royal navy, was defeated in a racing and sail¬ ing contest with the Paddy from Cork, a yacht belonging to a member of the famous Water Club of Cork, and in consequence the head of the government school of naval architecture in Portsmouth was deputed to measure several private yachts with a view to improving the construction of vessels for the navy. In the following year the Water Witch, a vessel similar to the 10-inch gun brigs of the navy, built for Lord Belfast, proved herself faster than any vessel in the Royal navy, and better than any of her kind for purposes of warfare. Of the many yacht clubs now in existence only the Royal Cork Yacht Club and the Royal Thames Yacht Club can trace their history back to a period before the last century.

While the modern yacht clubs have promoted a vast num¬ ber of sailing races, wealthy yachtsmen have come to own numerous steam pleasure yachts devoted to summer cruising. The premier yacht club of Great Britain, the Royal Yacht Squadron, with headquarters at Cowes, dates back to 1815 in its formal capacity. In 1820 it

became the Royal Yacht Club, and in 1833 its name was changed by royal order to Royal Yacht Squadron. The Royal Northern Yacht Club, with headquarters at Rothesay, was founded in 1824.

In 1909 Lloyds Registry of yachts showed a total of 2,250 craft, of which 1,443 belonged in the United Kingdom, 137* were colonial, 182 French, 86 German and Austrian, and other countries totaled 332. The United Kingdom tonnage totaled 190,000, the French 6,745, the German and Austrian 6,602, the other countries about 72,000. Perhaps the most elaborate steam yacht was the Hohenzollern, the private yacht of the former kaiser. There was a marked increase in 1915, the last year before the war changed conditions. In that year the English, French, Continental and colonial yachts regis¬ tered in Lloyds showed 10 of from 2,000, to 5,000 tons, 33 from 1,000 to 2,000 tons, 71 from 500 to 1,000 tons, 535 from 100 to 500 tons and 3,125 below 100 tons; total, 3,774 craft. The number of yacht clubs in Great Britain at the same date was nearly 200. With the coming of the Great War and the U-boat campaign, British and Continental yachting were almost forgotten. Races ceased and the larger and finer steam and pleasure yachts were loaned or sold to their respective governments. The typical sailing racers are of little practical use, but the steam pleasure yachts made splendid dispatch boats and were also useful for hos¬ pital purposes.

Among pioneer British sailing yachts of the first half of the 19th century the most not¬ able were the Menai, in which the hollow bow was first introduced; the Mosquito (1848), an iron vessel built on the Thames in accordance with Scott Russell's theories; and the Tiara, built at Renfrew in 1850. The victory of the America from the United States in 1851 marked an epoch in British yachting. It secured the

triumph of the views represented in the Mos¬ quito and the Tiara and revolutionized the practice of British yachtsmen. For about a quarte'r of a century the schooner was the pop¬ ular form of racing yacht, among the most notable being Cambria and Miranda. Gradually the schooners were displaced by cutters and yawls. The more famous of the early racing cutters were Kriemhilda, Oimara, Cytliera, Vol-au-Vent (1875) and Neva (1876) ; and the lead¬ ing yawls of that period were Florinda (1873) and Jullanar (1877). Formosa, a big cutter built in 1878, was supreme in her class till 1880, when G. L. Watson's first large yacht, the Van-duara, came on the scene. Another famous designer, Mr. Fife, scored a great success with the 40-ton yacht Annasona, which began to com¬ pete in 1881. Marjorie, from Watson's lines, a vessel of 68 tons, was the chief new cutter of .1883; and to the following year belong Irex, designed by Mr. Richardson, and Genesta, an America Cup competitor designed by Beaver Webb. The Galatea, another cup challenger, was a complete failure in home waters in 1885; but the challenger of 1887, Thistle, from Wat¬ son's design, met with great success before crossing the Atlantic. Thistle was the first large yacht constructed under the length-and-sail-area rule. Yarana, another Watson boat, was the chief novelty of 1888, and in 1889 the same de¬ signer produced Valkyrie I for Lord Dunraven. The old lrex continued racing with consider¬

able success down to 1889 and was succeeded in 1890 by Iverna, by the same designer. In the latter year Thistle reappeared and thus the leading yachts of that season were the Yarana, Valkyrie I, Thistle and Iverna. These were rated at 60, 77, 121 and 118 respectively. The Valkyrie I was ultimately sold to an Austrian archduke and the Thistle to the German em¬ peror, who renamed it Meteor. The years 1891 and 1892 were chiefly remarkable for smaller vessels, such as Watson's Queen Mab and Vanina and Fife's Thalia and Lais ; but 1893 was rendered memorable in the annals of yacht¬ ing by fine contests between Valkyrie II, de¬ signed by Mr. Watson for Lord Dunraven; Britannia, designed by Watson for the Prince of Wales; Satanita, Calluna and Navahoe, an American yacht, designed by Mr. Herreshoff. Valkyrie II proved to be the best of these cut¬ ters, but Britannia was a good second. In 1894 these yachts competed with Vigilant, a Herreshoff vessel which had defeated Valkyrie II in the contest for the America Cup. Valkyrie II was sunk by Satanita in the Clyde while ma¬ noeuvring for a start, but Britannia repeatedly beat the Vigilant. The Ailsa, from the lines by Mr. Fife, Jr., and the Valkyrie III, designed by Mr. Watson for Lord Dunraven, appeared in 1895. The third Valkyrie went to America to contest the cup and the honors at home fell to

Britannia and Ailsa, especially the former. Mr. Fife, however, scored in the 40-raters with Isolde, which was distinctly better than Mr. Watson's Caress. A new Meteor, designed by Mr. Watson for the German emperor, competed in 1896 against Britannia and Ailsa, the result for the season being: Ailsa (60 starts, 21 firsts), Britannia (58 starts, 14 firsts), Meteor (22 starts, 13 firsts). The principal first-class cut¬ ters since that date are Bona, by Watson (1897), for the Duke d'Abruzzi ; Shamrock /, built for Sir Thomas Lipton to contest the America Cup in 1899; and Shamrock II, built for Sir Thomas Lipton to contest the America Cup in 1901.

American and International Yachting. —

The Jefferson, built in 1801, is regarded as the first yacht built in America; but the first Ameri¬ can yachts of importance were those designed by George Steers, notably the America. In 1857 the America beat all the English yachts in their own waters and established an American interest in yachting that has proved permanent. The America was a schooner of 208 tons and entered along with 14 other vessels for a race round the Isle of Wight. Five of the vessels were schooners, nine were cutters, the remain¬ ing one being a bark (Brilliant), and though they varied in tonnage from 47 (Aurora) to 393 (Brilliant) no time allowance was given. The America won the race and the cup presented by the Royal Yacht Squadron, the Aurora com¬ ing second, 18 minutes behind. In 1857 the cup was set aside by the owners of the America as a perpetual international challenge troph>. This was the origin of the contests for the so-called America Cup. In 1866 three American yachts, Henrietta, Fleetwing and Vesta, raced across the Atlantic, the first-named winning the race with a time of 13 days, 21 hours, 55 min¬ utes. In 1870 the English yacht Cambria, which had challenged for the America Cup, beat the American Dauntless in a transatlantic race,' but she was beaten by the Magic and several

other boats in a race for the cup. In 1873 Mr. Ashbury, who owned the Cambria, again chal¬ lenged for the cup, but his yacht Livonia was

defeated by the New York Club's Vessels Columbia and Sappho. Major Charles Gifford, a Canadian, challenged for the America Cup in 1876 with the Countess of Dufferin, but his yacht was beaten by the defender, Madeline. Another Canadian vessel, the Atlanta, contested the cup in 1881, her opponent being the Mischief, but the result was the same as before. Sir Richard Sutton sent the next challenge in 1885 and his yacht Genesta was pitted against the Puritan, but without success. The Puritan was designed by Edward Burgess, as was also the Mayflower, which successfully defended the cup against the English Galatea in 1886. The Thistle met another Burgess boat, the Volun¬ teer, in the same contest the following year, but like all preceding challengers, she failed to gain the cup. Mr. Herreshoff scored his first great success as a designer with Gloriana in 1891, and soon afterward he produced the Vigilant, which defeated Valkyrie II in the America Cup contest of 1893. The cup contest of 1895 between Lord Dunraven's Valkyrie III and the American Defender had an unsatis¬ factory result. Two races were awarded to the latter on purely technical grounds, and in con¬ sequence Lord Dunraven withdrew from the competition. In the same year a Canadian yacht named Canada defeated the United States 3'acht Vancedor in a competition for an inter¬ national cup. The next challenges for the America Cup came from Sir Thomas Lipton, whose yachts Shamrock I and Shamrock II were beaten by the American Columbia in 1899 and 1901 respectively. Sir Thomas again chal¬ lenged for the cup in 1902 and 1903, and lost to the Americans.

In 1914 Sir Thomas Lipton having chal¬ lenged again . for the America Cup, his yacht Shamrock IV crossed the Atlantic, but because of the war the races were postponed. The American yachts, Resolute and V anitie, one of which would have defended the cup, sailed 15 trial races in 1914. While the V anitie won a few times, the Resolute was declared the better boat. The smaller sailing yachts in the United States kept up some racing, mostly under the management of those under and over draft age, but the most of the racing was suspended until after the war. Lloyds Register of American Yachts includes also those of Canada and the West Indies. There are 383 yacht clubs proper and many motor-boat clubs, some of which are miscalled yacht clubs. In 1917, 3,590 yachts m all were registered, and it is probable that the American total is now the greatest in the world. In 1920 the American yacht Resolute successfully defended the America s Cup against the challenger Shamrock IV , owned by Bir Thomas Lipton. Five races were sailed of which the Resolute won three. In 1920 also there was sailed off Halifax, N. S., a race between fishing schooners for the championship of the North Atlantic Fishing Fleet. I he American

Esperanto captured two straight from the Canadian schooner Delawana ,

Racing Rules — The ordinary rules of the road at sea apply in the main to yacht-racing. Yachts sailing with the wind free must clear those sailing close-hauled. Yachts on the poit

tack must give way to those on the starboard tack, and an overtaking yacht must clear the overtaken vessel. The start in a yacht race is now always a flying one, but prior to about 1860 yachts started from anchor. Frequently much depends upon the start, and accordingly ma¬ noeuvring for initial position is of considerable importance. At the start, as throughout the race, the skipper counts for a good deal. The course to be traversed is marked out by buoys, light-ships or flag-boats. The time allowances corresponding to differences in rating are deter¬ mined in accordance with a scale prepared by the Yacht Racing Association. Vessels always start together, the time allowance being made at the end of the race. Handicapping is also practised to some extent in yacht-racing. Pleas¬ ure yachts are supposed to carry ensigns when in commission, also a burgee (swallow-tailed pennant) and a private signal flag. Sailing yachts fly the ensign at the main peak; power yachts hang it on a staff at the stern. All yachts when at anchor in the daytime are ex¬ pected to fly an ensign from a staff at the stern. Yachts in commission usually hoist their colors at 8 a.m. and lower them at sunset. Amateur yachtsmen sailing on the coasts and Great Lakes may obtain from the Bureau of Lighthouses at Washington a <(List of Lights and Fog Sig¬ nals® and a ((List of Buoys, Beacons and Day Marks,® together with maps, which are very important in navigating.

Racing Yachts. — The designing and con¬ struction of a racing yacht require no small amount of scientific and technical knowledge besides large experience, and consequently the yachts entered for the leading races, at least in the higher classes, are the work of a very few designers and builders. In a yacht intended for racing, speed is the primary essential, and to it accommodation and convenience are in large measure sacrificed. Moreover, a designer has to take into account the circumstances under which his vessel is to be run or the competitors which she has to meet, because a yacht that does well in fine weather and a smooth sea will usually be of little account in boisterous weather and a rough sea. The rating rules of the Yacht Racing Association (formed in 1875) also con¬ dition the designer's work, and it will be neces¬ sary, therefore, to give some account of

them here. The object of rating regulations is to secure that all competitors shall start on prac¬ tically even terms in any given race, and this is achieved by the classification of yachts in well-defined groups according to certain measure¬ ments, and also, especially among large yachts, by means of time allowances corresponding to differences in these measurements. In the early days of racing, yachts were grouped according to tonnage, the tonnage being determined, as for other vessels at that time, by multiplying the length by the breadth and the depth and divid¬ ing by 96 (afterward 94). This was replaced by what is called builder's measurement or old meas¬ urement, which is still in use for some purposes connected with yachts. The formula for tonnage

(L — IB) XBX1B

according to this system is -

94

where L and B denote length and breadth re¬ spectively. The Thames measurement rule,

introduced in 1854, made tonnage equal to (L— B) X B X |B

- ; but in 1881 the Yacht

94

Racing Association introduced the 1730 rule, ac¬ cording to which the

tonnage was equal to

(L X B)a X B

- . These rules were found to

1730

have the effect of encouraging the construction of yachts of very narrow beam, especially after about 1871, when designers learned the use of outside ballast on the keel. A great change was effected in 1886, when the length-and-sail-area rule came into force, and yachts were classified according to rating determined by the formula

Length X Sail Area in sq. ft.

- . The present lin-

6000

ear rating rule was adopted in 1896, but it can¬ not be said that finality has yet been reached. Linear rating is expressed in feet and is deter¬ mined by the formula

Length X -75 Girth X -5 VSail Area

2

In 1903 the rule was altered to Rating —

LX VS

18 - where L = load water line; S —

ifn

sail' area; D = displacement in cubic feet. Limi¬ tations are added to prevent excessive listed length.

For the smaller vessels wood is the cheapest and lightest material, but larger ones are made of steel or of steel frames with a wooden skin, the latter class being called composite. Other metals, notably aluminum, have also been used for the construction of yachts. Practically all large composite vessels and also many small ones have a copper sheathing to protect the submerged parts of the wood from the action of the water. The sails of racing yachts are .gen¬ erally made of cotton, mostly of the finest Egp-tian variety; but ramie fibre is coming into use for this purpose, and a mixed cotton and ramie material is also in use. Up till a comparatively recent date flax was generally used for the sails of racing yachts, though it does not produce a sufficiently smooth and close-textured cloth.

Speed.— The speed of a racing yacht of given size may be regarded as the result of a compromise between stability, which determines sail-carrying power, and resistance. The sta¬ bility depends upon well-known hydrodynamic principles, and may be roughly said to be deter¬ mined by breadth of beam, the lowness of the centre of gravity of the vessel and the quantity and position of the ballast. Resistance at low speeds is due chiefly to surface or skin friction, but at higher speeds it is principally caused by wave-making, a phenomenon too intricate to be discussed here. An increase in beam increases stability, but at the same time increases skin friction. Wave resistance is less in vessels whose displacement is obtained mainly by breadth than in those where displacement is principally determined by depth. Various means of lowering the centre of gravity have been adopted with advantage, such as the use of

hollow masts and booms, the use of aluminum for the upper part of the vessel's sides, *etc.* Stone ballast was used in the early days of yachting, but it was superseded by iron, and that in turn by lead. The lead ballast was after¬ ward carried on the keel, and later the keel consisted of a plate of lead, hung horizontally below the hull. The fin-keel followed, this being a fin or extension of thin metal for carrying a lead keel to a lower position. The America was a keel boat, and beat out the English boats because it had a deeper draft, and because the weight of the keel was so cen¬ tred as to bring the effort of the sails well aft. When other designers had profited by this idea, and further improvements were demanded, the centre-board was introduced. Many claim this to be an English invention, although it was developed

to success by American designers. The centre-board is nothing more than an ad¬ justable keel that may be raised or lowered as conditions make it best. When set low the boat can be steered much closer to the wind. The centre-board boat is very fast in smooth water and down wind. It was used on the Magic in 1870, the Columbia 1871 and on down to the Vigilant in 1893. American yacht builders then returned to keel designs, depending on other proportions. The Defender, Columbia and Re¬ liance were all keel boats. Probably the Madge, of Scotch design, built in 1881, influenced de¬ signs more than any other except the centre¬ board. Her ballast was in one piece of lead, she was full amidships, with heavy displace¬ ment but a very light hull ; though cramped in beam she was practically non-capsizable. In 1885 Sir Richard Sutton, observing the success of the Madge, built the Genesta on these lines and challenged. Burgess designed the Puritan on a somewhat similar model, but wider and shallower than Genesta, and won. In 1891 the agreed waterline length for cup-racers was 46 feet, and Herreshoff designed the Gloriana on new principles, giving her an overhang of some 25 feet, so that she was 71.9 over all. When the Gloriana heeled over she gained in water¬ line, and the more she leaned the more she gained. As a result, in a stiff breeze she had all the best of it and won easily. This boat was also Herreshoff's first cup-racer with a fin keel. This design was later penalized and nothing radically new in type has developed since.

Steam and Gasoline Yachts. — Pleasure

yachts adopted steam power in the early days, and after the motor-boat appeared the gasoline or gas-engine was naturally adapted to nautical purposes and has become highly developed for use on the water. The typical steam yacht is the light, swift, graceful craft, more often under than over 100 feet, and frequently with most luxurious appointment. Coast yachting and world-cruising became fashionable with million¬ aires on both sides of the Atlantic, and very many of them have maintained floating palaces, on which they could come and go among the coast cities without dependence on public ves¬ sels or trains, and free of all hotel annoyances, for they carried kitchens and cuisines of their own. Bathrooms, electric lights, push buttons and all sorts of comforts were provided, and to be wealthy enough to own a half-million dol¬ lar yacht was the ambition of many aiming to

climb into the most exclusive wealthy circles. Gasolene was hrst adapted to yacht engines in 1885. It is singular to record that naphtha was then a by-product, often thrown away, as there was little use for it. The standard gas engine was studied by Carl F. Riotto and others, and developed so as to be suitable for use on yachts. It was essential to get much higher horse power than had been obtained at that time for marine work. Riotto's motor came to be known as the Standard, and in 1903 he produced a six-cylin¬ der of 110 horse power. This was so successful that it was followed with a 300 horsepower en¬ gine next year. Craig, Seabury and other builders took up the construction of large gaso¬ line engines, following the principles of the high-powered automobiles, and soon they were common. The Diesel engine also became avail¬ able for yacht power early in the present cen¬ tury. Yachts built for ocean trips are called cruisers, and if swift, express cruisers. The most expensive and luxurious are usually ex¬ press cruisers, though some owners have pre¬ ferred less speed in order to have large accom¬ modation for parties. A fair idea of the pro¬ portions of such -boats can be gathered from the dimensions of the following: N. G. Herreshoff's Helianthns is 65 feet over all, 61.6 on the waterline, with 17.1 feet beam and four feet draft. She carries two Standard eight-cylinder engines. Murry Guggenheim's Leonie is 106 feet over all, six inches less in waterline, 20.9 feet beam and four feet draft. Her gas en¬ gines are six-cylinder. (See Navigation; Shipbuilding). Consult (Coast Pilots pub¬ lished by the United States Coast and Geo¬ detic Survey; Lloyd's Register, both British and American.

YADKIN RIVER, North Carolina. See Great Pedee.

YADRINTSEF, Nikolai Michailovitch,

Russian author: b. Siberia, 1842; d. Barnaul, Altai Mountains, 29 June 1894. Accused in youth of conspiring for the independence of Siberia, he was exiled to Archangel, but later was permitted to return and was appointed on the staff of Governor-General Kaznakof. Be¬ tween 1865 and 1875 he traveled extensively in Siberia, publishing the results of his explorations and in 1882 founded at Petrograd (later removing to Irkutsk), the Eastern Review, a strong popular weekly devoted to the interests of Asiatic Russia. In 1891-92 he made care¬ ful explorations in Mongolia, discovering the ruins of the ancient capital of the Tartar Khans and forming archaeological collections of great value. In 1893

he visited the United States. He was the founder of the Siberian University and a promoter of universal education. Among his works are (The Russian Commune in Prison and in Exile) ; Liberia as a Co4ony> (1882); <The Culture and Industrial State of Siberiaˆ *etc.*

YAGUARONDI. ya-gwa-run'de. See Jaguarondi.

YAHOO, ya-hoo', a name given by Swift in his (Gulliver's Travels> to a race of brutes, described as having human forms and degraded propensities. They were subject to the Hou-yhnhnms, or horses endowed with human rea¬ son. Hence, the term is applied to a rough, low, boorish, or uneducated person.

YAJUR VEDA, ya'joor va'da. See Vedic Literature.

YAK, the native name for the wild ox (Bos grunniens) of the mountainous regions of Tibet. There are two races: the wild yak, generally black, which is found near the snow line, descending into the valleys in winter, and a domesticated race, usually half-breeds, of various colors, black and white being most com¬ mon. The yak is about the size of the com¬ mon ox, to which it has a general resemblance, but it is covered with a thick coat of long, silky hair, hanging down like the fleece of a sheep, completely investing the tail, and form¬ ing a lengthy fringe along the shoulders, flanks and thighs. This fringe, which exists in both races, was apparently developed as a protection to the animal in its alpine haunts, as the long hair forms a sort of mat which defends the body from the effects of the cold when the ani¬ mal is reposing in the snow.

The domesticated race is of great importance to the natives of Tibet. The yak is employed as a beast of burden, but never for tillage or draught; the milk is very rich and yields ex¬ cellent butter; the flesh is of the finest quality, and that of the calves far superior to ordinary veal. The hair is spun into ropes and made into coverings for tents, and the soft fur of the hump and withers is woven into a fine strong cloth. The tails, often dyed red, are made into the chowries or fly-flappers, used in India. Yaks are often seen in zoological gardens and men¬ ageries and have repeatedly bred! in Europe. It is probable that they might be advan¬ tageously introduced into the northern parts of the continents of America and Europe. They have, however, the disadvantages of not eating corn and not being able to live at a low eleva¬ tion.

YAKIMA, yak'i-ma. See Shah aptian In¬ dians.

YAKIMA, a river of the State of Washing¬ ton, rising in the Cascade Mountains and after a southeastward course of about 175 miles, flowing into the Columbia about six miles north of Paseo and Kennewick, and 10 miles above the confluence of the Snake River. It flows through an important coal-mining region and its valley and those of its numerous short tributaries are among the most fertile in the State. The Northern Pacific Railway traverses the whole length of the valley of the Yakima, almost to its source.

YAKIMA, or STAMPEDE PASS, a defile

over the Cascade Mountains, in the State of Washington, near the source of. the Yakima River (q.v.). Its highest point is 3,600 feet. It is crossed by the Northern Pacific Railway, which at an elevation of 2,800 feet, between Martin and Stampede, passes through the Stam¬ pede Tunnel, 9,850 feet long.

YAKOBA, ya-ko ba, or YAKUBU (native Bauchi), West Africa, a town in northern Nigeria, finely situated on a plateau partly sur¬ rounded by mountains, 140 miles southeast of Kano, and on a caravan route. It is walled and the interior is finely diversified with gardens and ponds. The climate is healthful. Pop.

70,000.

YAKONAN (from yakwina , < <spirit))). A. linguistic stock of North American Indians, consisting of the Alsea, Yakwina, Kuich and Siuslaw divisions. They were physically of the type of the Northwest Coast Indians and were the southernmost tribe practising artificial de¬ formation of the head. Their mythology and traditions were chiefly of the North but were somewhat modified by contact with the Indians of the California coast. Slavery existed among them until they came under the control of the United States. The home of the Yakwina was along Yaquina River, Oregon, from the site of Elk City to the sea; they

were formerly numerous, occupying 56 villages in early days, but the tribal distinction of the Yakwina, as well as of the other Yakonan divisions, was gradually broken down through their prefer¬ ence for marriage outside the tribe ; there are only a few Yakwina left and these reside on Siletz reservation, but their number is un¬ known. The Alsea formerly dwelt in villages along both sides of Alsea River, Oregon, and on the adjacent coast; they are now on Siletz reservation, and perhaps a few are on Grande Ronda reservation. The Siuslaw were also village dwellers, inhabiting Siuslaw River as late as 1857 ; they are probably extinct. The Kuich or Lower Umpqua, villages were on both sides of Umpqua River from its mouth upward for 30 miles; a few survivors still reside on Siletz reservation. The entire population of the Yakonan Indians probably does not exceed

400.

YAKUB BEG, ya-koob' beg, surnamed Attalik Ghazi ((<leader of the champions of the faith®), amir of Kashgar: b. Russian Turk¬ estan early in the 19th century; d. 31 May 1877 ; He distinguished himself in the defense of Khokan against the Russians. But he first rose to great eminence after the recovery of Kashgar from the Chinese in 1864, when he acted as lieutenant to Buzurg Khan, whom he soon sup¬ planted. For 12 years this remarkable man con¬ ferred on a large part of Central Asia the bene¬ fits of a settled though rigorous government. He drilled and disciplined a large civil staff, while his army contained the best native sol¬ diers in Central Asia. In his foreign policy he was strongly anti-Russian, . and ultimately friendly to Great Britain. China, however, set out to recover its lost Mohammedan provinces and had gained some victories when Yakub died — by assassination, some said. His realm at once fell in pieces. The Chinese armies over¬ ran the country (1878), and Kashgar again came under Chinese rule.

YAKUB KHAN, khan, ex-amir of Afghan¬ istan : b. 1849. He was a son of the amir Shere Sli ; was appointed governor of Herat by his father and became extremely popular, but in 1870 broke into open revolt, and in 1874 was imprisoned at Kabul. On the death of Shere Ali he was proclaimed amir (1879) and concluded a treaty of peace with the British at Gandamak. By the terms of this treaty he was to receive a British resident, and on his side to obtain from the British government a sub¬ sidy and aid in case of foreign attack. The murder of Sir Louis Cavagnari, the resident, with staff and suite, occurred in the following September. Yakub was suspected of complicity. Lord Roberts (then Sir

Frederick) defeated

the Afghan force 6 October and seized Kabul on the 12th. Yakub abdicated and fled to the British camp. In December he was sent to India as a deposed ruler.

YAKUTSK, ya kootsk', Asiatic Russia. (1) A town of Eastern Siberia, capital of the gov¬ ernment of the same name, on a plain sur¬ rounded by lofty heights, on the left bank of the Lena. The streets present a singular aspect, being composed of about 400 houses of Euro¬ pean structure, standing apart, while the inter¬ vening spaces are occupied by winter yurts or huts of the northern nomads, with walls of cow-dung, earthen roofs, and doors covered with hairy hides. The principal buildings of the town are a large stone cathedral, other churches, a synagogue, a market-house and sev¬ eral educational institutions. Inundations are frequent and the town is consequently unhealth¬ ful. The trade is important, Yakutsk being the chief commercial emporium for the whole of Eastern Siberia. The principal articles of native produce are furs and fossil ivory, which are exchanged for European produce. Im¬ portant fairs are held. Pop. about 8,209. (2)

The government of Yakutsk has an area of 1,533,39 7 ((Century DictA and (Encyc. BritA give 1,530,253; other authorities, (Standard Diet,* Lippincott, Longman, agree with Inter-nationaP) square miles, or about two-fifths of that of Europe. The surface is generally low in the north, but rises toward the interior, and in the south and east is covered by the Yablonoi or Stanovoi Mountains and their offshoots. A noteworthy feature of the country is the tundras, immense boggy plains, which stretch along the north. Farther south there are good pastures, and wheat and rye are successfully cultivated, even where the ground is frozen to a depth of 600 feet, the summer heat being strong enough to thaw it sufficiently deep for cultivation. There are a number of large rivers teeming with fish, the principal being the Lena. There are valueable forests in the south, frequented by numerous fur-bearing and other animals. Gold and salt are mined but other mineral wealth, including coal, is practically untouched. Cara¬ vans with Chinese and European goods collect the produce of the whole line of coast on the Polar Sea between the parallels of 70° and 74°, from the mouth of the river Lena to the farthest point inhabited by the Tchukchis. The towns are chiefly inhabited by Turks and Cossacks, but the great body of the people are nomads, consisting of Yakuts, Tunguses, *etc.* Frosts of 79.5° F. are recorded and the period free from

frost is only about 37 days. The climate is the coldest in Siberia. Pop. about 325,000.

YALE, Elihu, English philanthropist: b. in or near Boston, Mass., 5 April 1648; d. London, England, 8 July 1721. His father was Thomas Yale, one of the original settlers in New Haven, Conn., in 1638, but who removed to Boston soon afterward and to England in 1651, followed by his family the next year. The son was educated in England, engaged in trade in India in 1672, and in 1687-92 was governor of the East India Company's fort at Madras. He returned to England in 1692 and, although he never revisited New England, he displayed his interests in the Collegiate School founded at Saybrook in 1700 by sending gifts of money and books to the amount of some £600 in 1715, 1718

and 1721. The largest gift, that in 1718, fol¬ lowed a suggestion from the college authori¬ ties that the college building then being erected in New Haven might be named for him. In 1745 the whole institution received the name of Yale College in his honor. Yale's latest years were passed at Wrexham, Denbighshire, North Wales, and his body is buried in the magnifi¬ cent parish church there.

YALE, Linus, American inventor: b. Salis¬ bury, N. Y., 4 April 1821 ; d. New York, 24 Dec. 1868. In 1851 he patented a safety lock, and for the rest of his life was a recognized au¬ thority on all matters pertaining to locks and safes. Becoming convinced of the necessity of abandoning the use of a keyhole as affording an easy means of introduction to the lock mechan¬ ism, he was led to the adoption of the permanent dial and shaft as used in the combination locks, and subsequently to the perfection of what is known as the <(clock® lock. His most notable invention was the double lock, which comprised two locks within a single case, and was operated by the same or different combinations. He re¬ ceived gold, silver and bronze medals as first awards at various expositions.

YALE UNIVERSITY, New Haven, Conn. From the time of the first

settlement of the New Haven Colony in 1638, the establishment of a college there was contemplated. It was not until 1700-01, however, that definite action was taken by 10 ministers of Connecticut, and a charter was obtained in 1701 for the establish¬ ment of the Collegiate School of Connecticut. This school was first located at Saybrook and Abraham Pierson was the first rector. In 1716 the school was removed to New Haven, and in 1718 the name was changed to Yale College, in honor of Elihu Yale (q.v.), who had given largely to the Collegiate School. The first building was also completed in 1718. In 1745 a new charter was granted making the full name of the corporation ((The President and Fellows of Yale College.® Until after the Revolution the college received occasional grants of money from the colonial government; in 1792 the State made a grant of about $30,000, and the governor, lieutenant-governor and six senators were made members ex-officio of the corporation. In 1795 Timothy Dwight (q.v.) became' president, and during his administration the college attained a higher degree of pros¬ perity than ever before; the college grounds were extended; permanent professorships were established and the formation of separate pro¬ fessional schools planned. The Medical School, however, was the only one established (1813) during President Dwight's lifetime. The Di¬ vinity School was organized in 1822 and the Law School in 1824, though instruction in the¬ ology had been given since the beginning of the college and instruction in law for some years prior to 1824. The Sheffield Scientific School was established in 1847 and the School of Fine Arts in 1866. The elective system was adopted during the administration of Noah Porter, and from 1886-99 the college still fur¬ ther extended its course and doubled its numbei of students; the name was changed to Yale University in 1887. In 1872 provision was made by the State legislature for the substitution of graduates in the place of the six State senators

in the corporation, so that the corporation now consists of 10 Congregational ministers, the suc¬ cessors of the founders, six representatives of the alumni, the governor and the lieutenant-governor of Connecticut. In October 1901 the bicentennial anniversary was celebrated with ap¬ propriate ceremonies on the university grounds. There were 4,691 Yale graduates present at the anniversary ceremonies and in addition 311 former students, not graduates; and 147 hold¬ ers of higher degrees from Yale. The Presi¬ dent of the United States, representatives from every leading American university and college and from many foreign universities were also present. The exercises included addresses by alumni and

distinguished guests, a procession in which graduates and undergraduates took part, the ˆDramatics,® scenes in the history of the university given by the students' Dramatic Society, and the dedication of Woodbridge Hall, the administration building.

The university includes in its schools of instruction Yale College or the Academical De¬ partment, the Sheffield Scientific School, the Graduate School, the School of Fine Arts, the School of Music, the Forestry School and the schools of Religion, Medicine and Law. The university library, the Peabody Museum of Nat¬ ural History, the Astronomical Observatory and several other adjuncts to the university are or¬ ganized independently of the separate depart¬ ments. The undergraduate course in the col¬ lege covers four years. During the years 1917— 18 the individual courses stood arranged in 24 numbered groups, in four main divisions, as follows: (1) Language, . Literature and the Arts; comprising (i) Latin; (ii) Greek; (iii) Classical Archaeology; (iv) Biblical Litera¬ ture and Semitic Languages ; (v) French; (vi) Italian; (vii) Spanish; (viii) German; (ix) English (including English Literature and Com¬ position) ; (x) The Fine Arts and (xi) Music.

(2) Mathematics and the Physical and Natural Sciences: comprising (xii) Mathematics; (xiii) Physics; (xiv) Chemistry; (xv) The Geologi¬ cal Sciences and (xvi) The Biological Sciences.

(3) Philosophy, Education, History and the Social Sciences: comprising (xvii) Philosophy; (xviii) Theory and Practice of Education; (xix) History; (xx) Anthropology; (xxi) Economics and (xxii) Law. (4) Military and Naval Sciences: comprising (xxiii) Military Science; (xxiv) Naval Science.

Sanskrit, Norwegian, Danish, Swedish, Rus¬ sian, Elementary Japanese and Chinese, and also general and religious pedagogy are in¬ cluded in the curriculum.

The Sheffield Scientific School was first or¬ ganized in 1847, and received its present name in 1860; from 1863-92 it was the State College of Agriculture and Mechanic Arts, and received the national grants for such institutions. It offered, until the past year, undergraduate courses of three years; French and German, English and general science are included in all courses, and the work of the freshman year is much the same for all.

Lately, the courses most distinctly marked out are in civil, mechanical, electrical, municipal and sanitary engineering; also those in engi¬

neering preparatory to mining, in chemistry preparatory to metallurgy, in natural history, in mineralogy and other studies preparatory to

geology, in biology preparatory to medicine, in studies preparatory to a forestry course, and in select studies preparatory to other higher studies. One of the most elaborate additions to the courses in recent years is provided for by the Hammond Mining and Metallurgical Laboratory, the gift of John Hays Hammond of the Sheffield class of 1875.

The School of Fine Arts offers both techni¬ cal courses and courses in art, history and criticism ; the regular course is three years in length for the completion of which a diploma is conferred. The degree of Bachelor of Fine Arts is conferred on the completion of certain advanced studies and the presentation of a thesis. The School of Music offers both the¬ oretical and practical courses. The degree of Bachelor of Music is conferred for the com¬ pletion of advanced courses. The Yale Forestry School was established in 1900; it offers a two years' course, the work of the second year being largely field work. The degree of Master of Forestry is conferred on those who have received a bachelor's degree or have had the equivalent of college training. A Summer School of Forestry is also maintained at Mil¬ ford, Pa. The Graduate School was organized as a separate school in 1847, the professors of the other sections of the Department of Philos¬ ophy and the Arts constitute the faculty of the Graduate School. Graduate courses are offered in the Academic Department, the Scien¬ tific Department, the School of Fine Arts and the Department of Music. The degrees con¬ ferred are A.M., M.S., Ph.D., C.E. and M.E. In addition to regular class and laboratory work of the school there are numerous volun¬ tary associations of professors and students for the advancement of graduate work in the sev¬ eral departments of study. The Divinity School offers a regular course of three years leading to the degree of B.D. Seniors in the college may elect such courses in the Divinity School as to shorten the course to two years. A fourth year of

graduate work is also provided. The work includes both prescribed and elective courses; elective courses in sociology, and in the study of missions are included in the curriculum. The Medical School offers a four years' course leading to the degree of M.D. Ample pro¬ vision for clinical work is made in the New Haven Hospital, the State Hospital for the Insane at Middletown and the Springside Hospital. The Law School course covers three years. Previous to 1896 it was two years in length. The degrees of Bachelor of Laws and Bachelor of Civil Law are conferred, the same amount of work being required in each course. Students in the college may so arrange their course as to receive the degrees of arts and laws in six years. Graduate courses are provided, leading to the degree of Master of Laws and Doctor of Civil Law. The school was the first in America or England to estab¬ lish a course leading to the latter degree.

Women are admitted to the School of Fine Arts, the Department of Music, and the Ph.D., courses of the Graduate School, and public school teachers are admitted to some of the regular courses. Numerous scholarships and fellowships are provided in the Academic De¬ partment, the Scientific School, the Divinity School and the Graduate School. A ((Bureau

of Self Help® is maintained, through which students are aided in obtaining employment. The university maintains a public lecture course, and provides several series of lectures in the different departments ; prominent among the latter are the Lyman Beecher lectures on preaching, the Dodge lectures on the responsi¬ bility of citizenship, the Bromley lectures on journalism, literature and public affairs and the Silliman Memorial lectures, of which 12 vol¬ umes have been published by the Yale Univer¬ sity Press. In 1918 Silliman lectures commemo¬ rated the 100th anniversary of the founding of the American Journal of Science by Professor Benjamin Silliman in July 1818. They were published as a full volume-number of the Jour¬ nal entitled (A Century of Science in America, } with special reference to the American Journal of Science. The Journal has for the full cen¬ tury of its existence been edited by three Yale men, Silliman and the elder and younger Dana. It is, however, not directly a Yale institution, though in a sense a Yale reflex of the devel¬ opment of scientific research in America. In scope and influence it has continued national throughout the century of its existence. The University Library contains about 1,250,000 volumes, exclusive of pamphlets. It is sup¬ plemented by a series of special libraries. There are the Linonian and Brothers Library, the Dwight Hall Library, the Law Library, the Sci¬

entific School Library, the Trowbridge Refer¬ ence Library of the Divinity School, the Lowell Mason Library of Church Music, the Library of Foreign Missions and several other department and club libraries. The Peabody Museum was established in 1866 by a gift of George Peabody (q.v.) and in it were accumulated excellent col¬ lections in mineralogy, geology and paleontol¬ ogy and zoology. As part of the building plans now under way, however, the old building has been removed, and these collections, in large part unique, are at present inaccessible to the public, awaiting the erection of a new museum, or new geologic and paleontologic laboratories to take its place.

During the war Yale closed the regular courses, turning her dormitories into quarters and developing a Reserve Officers Training Corps and a Naval Training Unit. Her war activities constitute an important chapter in the history of American participation in the great conflict. With the resumption of normal inter¬ ests following the war, a far-reaching reorgani¬ zation has been effected, involving the status of governing boards and more or less all depart¬ ments and all students. New university officers have been created. There is now in addition to the president, a provost. The undergrad¬ uate schools are more closely co-ordinated, en¬ trance requirements changed, and a common undergraduate Freshman year adopted. The important decision has also been reached that the degree of Bachelor of Philosophy shall be awarded to students who enter Yale without Latin, the B.A. degree being reserved for those offering Latin at entrance. All Sheffield under¬ graduates become candidates for the degree of B.S. Inasmuch as these changes are so recent and have not yet had catalogue announcement, they are not further outlined here. They are in a full measure epochal, coming as they do at the time of the great Stirling bequest of some

YALE UNIVERSITY

V t#*;

Mi

IMM

ill | w

fH

liiHii

T*l

■ iliilffliliii

2 Osborn Memorial Laboratories

1 Woolsey Hall „ Green showing, from left to right, Osborn, Welch, Phelps, Lawrence, and

Southeast Comˆof AaUs” w”t?BaUel? Chapel and it First Methodrst Church at extreme right

YALE UNIVERSITY

1 The Mason Laboratory of Mechanical Engineering

2 Woolsey Hall — Interior

YALE UNIVERSITY

$15,000,000, as well as in a period as distinctly formative as that following the Civil War and the passing of the old Campus group of buildings. The buildings of the university known as the Bicentennial buildings include Woodbridge, Woolsey, Memorial and University halls. They were erected by the graduates in 1900, 1901 and 1902 in commemoration of the 200th anniversary of the founding of Yale Col¬ lege. The buildings were designed by Carrere and Hastings of New York and cost about $1,000,000. They are of Indiana limestone with granite foundations. Memorial Hall, in the centre of the group, is becoming the regular place for tablets and other memorials to gradu¬ ates of the university. The following collec¬ tions are on exhibition in Memorial Hall ; Auto¬ graph Letters and Engravings of Eminent Yale Men; the Morris Steinert Collection of Musical Instruments, and the Rebecca Darlington Stod¬ dard Collection of Greek and Etruscan Vases.

The Yale Roll of Honor, containing the names of 192 Yale men who gave their lives in the Great War, is also in this hall.

Woolsey Hall (see illustration of interior, Plate II, photograph 2) is a part of the group of Bicentennial buildings erected by the gradu¬ ates at a cost of over $1,000,000 in com¬ memoration of the 200th anniversary of the founding of Yale. The hall holds 2,700 peo¬ ple and is acknowledged to be one of the best auditoriums in America. The organ, which is unsurpassed in America and is the third largest in the world, was designed by the Hutchins-Voltey Company of Boston, and is the gift of the Newberry family of Detroit. In 1916, through additional gifts of the Newberry family, the organ was entirely rebuilt by the J. W. Steere and Son Organ Company of Springfield, Mass. The organ now contains 22 stops in the great organ, 22 stops in the swell organ, 11 stops in the choir organ, 16 stops in the solo organ, 13 stops in the orchestral organ and 11 stops in the echo organ. There are, in total, 163 draw-stops, 32 couplers and 78 other piston and pedal accessories. There are more than 7,000 pipes.

The Osborn Memorial Laboratories (see illustration, Plate I, photograph 2), accom¬ modating the departments of Zoology, Com¬ parative Anatomy and Botany, were erected by means of funds paid over to the university by the executors of the late Mrs. Miriam A. Osborn, being the portion of her residuary es¬ tate which was bequeathed to the university. The cost of these laboratories amounted to about $500,000. During her lifetime Mrs. Osborn erected Osborn Hall in memory of her husband. The Mason Laboratory of Mechani¬ cal Engineering (see illustration) was built in 1910 by William Smith Mason and George Grant Mason, both of the Class of 1888, Sheffield. Constructed of brick, with a lime¬ stone fagade on Hillhouse avenue, it extends through to Temple street in the rear. There is here installed one of the most complete machine testing plants in the country, with large units affording unusual opportunities for experimental work and practical instruction.

A panorama of Yale is scarcely satisfactory. But the buildings facing the «Green» (see Plate I, photograph 3) are in the near sense Yale's (<front row.® Through the Phelps Gate—

way (at the centre) is entered the old campus, with its <rold fence,® the Nathan Hale statue and the ((01d South Middle® now nearly all

that remains of the old Yale. On the south¬ west corner of the campus are Vanderbilt Hall, the School of Fine Arts (where is housed the famous Jarvas collection of 13th to 17th cen¬ tury Italian paintings, ˆprimitives®) and the libraries. On the northwest are Dwight, Wright and Durfee Halls. Back of the campus group of dormitories on the site of the old Peabody Museum and taking up the entire block between High and York streets, there is now in course of erection a magnificent Memorial Quadrangle, the gift of Mrs. Stephen V. Harkness. Across the way (Elm street) is the gymnasium. The main extension of Yale is, however, to the right and northerly from Battell Chapel. There follow, in the order named: (1) The Berkeley Court — Blount avenue series of -buildings; (2) the Bicentennial group of buildings (Plates I and II) ; (3) the Sheffield Scientific School (on Prospect street and Hillhouse avenue) ; (4) the Sachem's Wood or Pierson-Sage square group, including the Osborn Labora¬ tories (Plate HI), and the Sloan Physical Laboratory (with probably the site of new geologic-paleontologic laboratories) ; (5) con¬ tinuing on Prospect street, the Forestry School and Botanic Garden, and (6) the Astronomi¬ cal Observatory. The latter are about one

mile northerly from the Phelps Gateway. The Medical Hall and the Medical School Labora¬ tory lie to the west of the campus ; the Uni¬ versity Clinic Building is opposite the New Haven Hospital ; the Forestry School oc¬ cupies Marsh Hall, the house of the late Pro¬ fessor Marsh in the Botanical Gardens. The old athletic field of 30 acres is situated about a mile and a half west of the campus, and ad¬ joining is the new field of 100 acres, including the Yale Bowl which covers 25 acres, and seats over 60,000 spectators. In this great amphi¬ theatre are held the football games and various open air spectacles and pageants more or less closely associated with university life and in¬ terests. The gun club range and Armory are near by. The Adee Boat House is on the har¬ bor, and at Gale's Ferry on the Thames River are quarters for university and freshman

squads and equipment for crew training for the final races. The students maintain a Chris¬ tian Association, an Athletic Association ; numerous literary, dramatic and technical so¬ cieties, and social and special literary -and technical clubs. In addition to the university dormitories, a number of student fraternities have fine homes for their membership. There are also the chapter houses or ˆitombs® of

these fraternities, of more or less individualistic architecture, and one of the odd attractions of the university zone westerly and northerly from the ((Green.® Among these are the three senior society tombs, ((Skull and Bones,® ((Scroll and Key® and the a Wolf's Head,® with

the Sheffield ((Book and Snake® and Phi

Gamma Delta. They are full of local interest and color, and unfailingly arrest the visitor's attention. A chapter of Phi Beta Kappa is

also located at Yale. At the time of entry into the World War in 1917, professors and other

officers numbered 609, and the total number of students was 3,306. The 1920 enrolment was

3,896.

Bibliography.— Dexter, F. B., 'Universities and their Sons) (Boston 1900) ; Dwight, T., (Memories of Yale Life and Men) (1845-99); Hadley and Norton, (Four American Uni¬ versity ; Oviatt, E., 'Early History of Yale> /Yale University Press) ; Stokes, A. P., 'Memorials of Eminent Yale Men* ; Welch, L. S., and Camp, W., 'Yale, her Campus, Classroom, and Athletics* ; Yale Alumni Weekly, a record mainly of current events.

YA-LU-KIANG. See Yalu.

YALU, ya'loo, Chosen, a river forming the boundary with Manchuria. In its upper reaches it is "known as the Am-nok or Ap-nok. Its source is in the Paik-tu-san, the highest peak (8,000 feet) of the Shan-a-lin Mountains of Manchuria. It flows into Korea Bay, near Wi-ju, after a southwesterly course of about 300 miles, and has numerous tributaries, chief of which is the Chang-jin River. It is navi¬ gable for sea-going vessels 30 miles from its mouth and by smaller vessels 145 miles to Wi-wen. On 17 Sept. 1894 its mouth was the scene of the battle in which a Chinese fleet of 12 warships, some of them powerful ironclads, and 16 other vessels, was defeated, with the loss of four vessels, by a Japanese force of 11 war vessels and two others. During

the Russo-Japanese War of 1904 its banks wit¬ nessed much skirmishing and fighting. The Japanese have renamed it Oryoku. See Man¬ churia.

YAM, a popular name for various species of the genus Dioscorea of the family Dio-scoreacece, and loosely applied to certain varities of the sweet potato. The true yams be¬ long to a genus consisting of more than 150 species widely distributed throughout the tropics. They have herbaceous, twining or creeping stems ; broad, alternate or opposite, usually simple leaves ; and small dicecious flowers, followed by three-winged capsular fruits containing winged seeds. The fleshy roots of some species are widely eaten in the tropics. One of the best-known species is D. alata, a native of India and the South Sea Islands, but distributed throughout the tropics. Its tubers usually attain a length of three feet and a weight of 30 pounds, but specimens three times as large are not uncommon. They are black or brownish externally and pink within, and are rich in starch. When boiled their acridity is dispelled and they become of pleasant flavor. It is claimed that this species is the parent of most of the edible so-called species such as D. sativa, D. aculeata, D. rubella, D. globosa, *etc.* The air-potato (D . bulbifera) is an Asiatic species cultivated to a small extent in the southern United States, and in conservatories, for its odd, angled tubers, which are borne in the axils of the leaves. They often exceed two pounds in weight and are sometimes eaten like potatoes. The Chinese yam, Chinese potato, or cinnamon vine (D . divaricata) , is a native of the Philip¬ pine Islands, whence it has been introduced into the gardens of temperate as well as tropi¬ cal climates for ornament. It bears cinnamon-scented white blossoms and aerial tubers which

are used for propagation. As far north as New York the plants have proved hardy.

YAM-A-MAI, an Oriental kind of silk¬ worm (Autliercea jama-mai) , which feeds on the oak, and produces a silk, known by the same name, with peculiar, but useful qualities, extensively utilized in Japan and somewhat elsewhere. See Silkworms.

YAM A, ya-ma’, a Hindu god, the judge of the dead, whose good and bad actions are read to him out of a record, and who according to their merits and demerits are sent to the celes¬ tial or to the infernal regions. Hindus offer to him daily oblations of water. See also Lamaism.

YAM AD A. See Uji-yamada.

YAMAGATA, ya-ma-ga'ta, Aritomo, Prince (early name Kyosuke) Japanese soldier and statesman: b: Choshu (or Nagato) province, 22 April 1838. He was educated by the patriot, Shoin Yoshida; was active in the overthrow of the shogunate, and was made second vice-minister of war under the new government. In 1869 he visited Russia and France for study of their military institutions. In 1876-77 he ably directed the Satsuma rebellion campaign, in 1878 was made commander of the imperial guard and chief of the general staff. He was Prime Minister in 1889-91, in which post he greatly strengthened the army and navy; and Minister of Justice in 1891-93. He was ap¬ pointed to command the first army corps in the war with China in 1894, and quickly ex¬ pelled the Chinese from Korea. His policy was throughout one of study of Western methods. He was a skilful strategist, and was made field-marshal in 1898, receiving also the title of marquis. He was again Prime Minister in 1898, and was chief of staff in the Russo-Japanese War. He became president of the Privy Council in 1905, and was raised to the rank of prince in 1907.

YAMAGATA, Japan, a town in the island of Hondo, capital of a prefecture of the same name, 200 miles north of Tokio, Pop. (city) 42,234; (prefecture) 938,014.

YAMAGUCHI, ya-ma-goo'che, Japan, city, capital and chief city of the prefecture of Yamaguchi, in the southwestern part of the island of Hondo, 15 miles back from the coast, and 220 miles west of Osaka. It was formerly the residence of the lords of Choshu, a Mori family, and became the seat of the local government in 1860. In 1550 a church was es¬ tablished here by Francis Xavier, but was finally destroyed. Pop. (city) 21,100; (pre¬ fecture) 1,068,935.

YAMAJI, ya'ma-je, Motoharu, Viscount, Japanese soldier: b. Tosa province, island of Shikoku, about 1840; d. 1903. He won dis¬ tinction in the campaign against the unsuccess¬ ful revolt in Satsuma province (island of Kiu-siu) in 1877 ; and was promoted lieutenant-general In the Chinese-Japanese War of 1894-95 he had the immediate direction of the attack on Port Arthur, which was finally taken on 22 Nov. 1894. This won for him a great reputation in Japan, where, in allusion to his loss of an eye, he is known as the "One-Eyed Dragon.®

YAMAMA MOLTE. See Silkworms.

YAMANOUCHI GUN. See Ordnance.

YAMASKA, ya-mas'ka, Quebec, Canada; (1) a village and railway junction of Yamaska County, on the Yamaska River, 31 miles north of Saint Hyacinthe. The river affords power for several mills. Pop. about 900. (2) A county bordering on Lake Saint Peter; area, 183,705 acres. Capital, Saint Frangois du Lac. It is drained by the Yamaska, Nicolet and Saint Francis rivers. Pop. 16,204. (3) A river flowing from Brome Lake, Brome County, west, then north, and after a course of about 100 miles through a fertile country, draining into the Saint Lawrence River at Lake Saint Peter.

YAMBO, yam'bd, YAMBU, yam'boo, or YEMBO-EL-BAHR, yem'bo-el-bar, Arabia, a seaport town on the Red Sea, in the province of Hedjas, 115 miles west of Medina, of which it is the harbor. Marking the end of the third quarter of the caravan journey from Cairo to Mecca, the town bears the title <(Gate of the Holy City.® The town consists of a long row of white houses built of limestone and coral¬ line, standing on the edge of an arid plain. It has considerable imports and transit trade be¬ tween Suez, Jidda and Medina. Pop. about

6,000.

YAMEO (also LLAMEO, LAMA, LA-MISTA or LHAMEOS), South American Indian tribe of northeastern Peru, living along the Marathon (Upper Amazon), the lower Huallaga and Javery rivers, and formerly be¬ tween the Tigre and Napo rivers. Physically they are smaller than the other tribes of the region. They have a distinct language, and while formerly warlike are now in the main peaceable agriculturists and weavers. The por¬ tion of the tribe living farthest to the east maintains its primitive customs, but the larger part of the tribe has become merged in the general country population. Franciscan mis¬

sionaries brought most of the tribe under the influence of civilization. Consult Brinton, D. G., (The American Race) (New York 1891).

YANA (((people®), a small tribe, forming the Yanan (or Noje, or Nozi) linguistic stock of North American Indians, whose former hab¬ itat was bounded on the east by a mountain range a little west of Lassen Butte, and termi¬ nating near Pit River, in northern California; on the north by a line running northeast to southwest, passing near the northern side of Round Mountain, three miles from Pit River; on the west by a line extending from Redding southward on an average 10 miles to the east¬ ward from Sacramento River; north of Redding it approximates twice that distance. They were massacred by the miners of the neighboring country in August 1864, all but 50 being killed. The tribe and stock were represented in 1884 by 35 individuals divided into two groups — one at Redding, the other in their original country at Round Mountain and in 1902 but six remained. They have a tradition to the effect that they came from the East and it is said that in physical traits they differ markedly from all the northern California Indians.

YANA, ya'na, or JANA, Eastern Siberia, a river which rises in the Verkhoyanskii Moun¬ tains, and after a northerly course of about 750 miles enters the Arctic Ocean through Yana

Bay, near Ustjansk, by seven large and many small mouths.

YANCEY, William Lowndes: American political leader and orator: b. Ogeechee Shoals, Ga., 10 Aug. 1814; d. 27 July 1863. He was the son of Benjamin Cudworth Yancey, a political leader of the South, who died at the age of 36. His stepfather was Rev. Nathan Benden of New York. Yancey studied at Wil¬ liams College, but lack of funds arrested his course there before he was graduated. He en¬ tered the law office of B. F. Perry at Green¬ ville, S. C., was admitted to the bar in 1834, and began to publish the Greenville Moun¬ taineer, which was opposed to nullification, and supported the Union. In 1835 he married Miss Earle of Greenville, who was possessed of a considerable fortune in negro slaves. Yancey resolved then to abandon law and undertake cotton planting at Catawba, Ala. However, a local feud resulted in the poisoning of the Yancey wells and the consequent death of the slaves, and he was forced to abandon the plan¬ tation. He re-entered his profession, resumed his journalistic efforts, and became a commis¬ sioner in bankruptcy. At Wetumpka, near Harrowgate Spring, Yancey owned and edited a weekly newspaper, and established a flourishing

law practice. He sat in the Alabama legislature, and was active in reform measures (1841-44). After a vigorous campaign he was elected to Congress for the term 1844-46. After a duel with Representative Clingman of North Caro¬ lina, Yancey resigned from service in Congress, disappointed in that body. He moved to Mont¬ gomery, Ala., where he entered the firm of Elmore and Yancey, and soon recuperated his lost fortune. He now began a career of un¬ official political leadership, peculiar to himself. At the National Democratic Convention at Balti¬ more Yancey led the movement which resulted in the adoption of the <(Alabama Platform.® This instructed the delegates not to vote for any candidate opposed to government protection of slavery. In spite of this organized effort, Gen¬ eral Cass, the nominee of the Baltimore con¬ vention, received the electoral vote of Alabama.

When the question of secession was under consideration in 1851, Yancey favored with¬ drawal from the Union. When the State re¬ fused to summon the legislature to submit the question of convention to the people, he sum¬ moned a non-partisan mass State convention which sent representatives independently to the Democratic convention at Cincinnati. Yancey now became the controlling force in the radical politics of the State. He also made a canvass of the North, speaking eloquently in favor of secession and slave owners' rights, after the meetings of the Charleston Democratic Conven¬ tion. The election of Lincoln .was partly due to the split in the Democratic party which Yancey led. After the secession he was sent by the Confederacy to secure the recognition of the various European governments. His efforts at London and Paris were unsuccessful and he returned in 1862, when he was elected senator of the legislature of Alabama. He served in the Confederate Senate until his death. Consult Du Bose, J. W., (Life and Times of William Lowndes Yancey > (Birmingham 1892).

YANES, yan'ez, Francisco Javier, Vene¬ zuelan diplomat: b. Caracas, Venezuela, 6 May

1861. From 1892 to 1897 he was vice-consul and acting consul-general of Venezuela at New York and in 1901-03 served as Spanish secre¬ tary and chief of the translations division of the United States Philippine Commission, Manila. From 1905 to 1910 Senor Yanes was secretary of the governing board of the International Bureau of American Republics and since 1910 has been assistant director and secretary of the governing board of the Pan-American Union, Washington, D. C. At the Jamestown Exposi¬ tion of 1907 he represented the International Bureau of American Republics and was a mem¬ ber of the jury of awards. He is a member of the American Academy of Political and Social Science, the American Society of Inter¬ national Law, and of many other learned bodies. Senor Yanes is a writer on literary and political subjects.

YANG-BAN (two divisions, civil and mili¬ tary). The name first given to the privileged classes in Korea, during the Korai dynasty (918-1392), when the inhabitants were classi¬ fied as nobles, commoners and slaves. The nobles, owing allegiance to the king, exercised within their own domains both civil and mili¬ tary authority. In time, these functions and classes were separated, the civil officers being called East Division and the military, West Division, according to their place at court. After 1392, under the new dynasty, when Buddhism fell and Confucian ethics and Chi¬ nese ideas prevailed, many able commoners en¬ tering politics, the ruling classes numbered five, nobles, local yang-ban, middle-class men, common people and slaves. In this new classi¬ fication, the noble yang-bans held the chief gov¬ ernment offices and were immune from taxation. If not earning a living, they lived off the peo¬ ple. The chief families or clans were the Kim, Chwe, Pak, Li, Chong and An (the Six Fami¬ lies), and later the Min and Cho. The stories of their bitter feuds make up the substance of modern Korean history, culminating in the mur¬ der of Kim Ok Kun and Queen Cho. With other clans and their subdivisions, numbering over a score, there were, in 1910, 54,000 yang-ban families, comprising one-fiftieth of the households in Korea; two central provinces having a total of 35,630 families; though the yang-ban are scattered all over the peninsula. Without domains or fixed stipends, the yang-bans, despising labor and looking only to offi¬ cial positions and income — when there are but 17,000 offices of any and all sorts open to Ko¬ reans — the condition of 37,000 families in this proud class is that of poverty. In old davs, a man in high office would have 200 or 300 hang¬ ers-on to look after, the public looking on his supporting so many relatives as a great virtue. When Korea, in' 1912, for the third time in its history, was given the name of Chosen, apart from the creation of a new class of nobility

pensioned by the Japanese government, all the old class distinctions and privileges — of amaz¬ ing and curious variety — were abolished. Yet as social ideas, habits and customs die slowly, the yang-ban, like the old samurai of Japan, still enjoy, locally, much of the old-time pres¬ tige. The history of Korea, especially in its modern phases, cannot be understood without some understanding of the social influence of the yang-ban and their feuds. Consult Hul-gert, (The Passing of Korea) (1906) ; Griffis, (Corea, the Hermit Nation > (1907), the official Annual Reports on Reforms and Progress in Korea (1917-18), and the Eastern Asia Of¬ ficial Guide Book: Vol. I, Manchuria *and Chosen.

YANG-TSE-KIANG, yang'tse-ke-ang, the name generally given to one of the greatest riv¬ ers of China throughout its entire course, al¬ though this name is only applied in China to the lower course of the river, the entire river being called simply Kiang, or Ta Kiang (river or great river), while in the various provinces it traverses it is generally known by special names. It rises in the Tangla Mountains in mid-Tibet, about lat. 35° N. and long. 89° E., at an altitude of from 16,000 to 19,000 feet, and is first known by the name of Muru-Ussu. In its upper course it is sometimes called the Kin-cha-kiang. Its upper course through the moun¬ tainous region of Tibet extends to about 1,100 miles, during which its windings and falls pre¬ sent numerous striking scenes of natural beauty. It crosses the Chinese frontier in the province of Sze-chuan, then flows southward and eastward through Yunnan and northeast back through Sze-chuan Yunnan. Between the town of Li-kiang in this province and Hui-li in Sze-chuen, for a course of about 250 miles, it flows in an easterly direction through a winding channel or mountain gorge of imposing grandeur. Trav¬ ersing the whole province of Sze-chuen in a northeasterly direction and passing in south¬ easterly direction into the province of Hu-peh, it reaches at King-chau the great Chinese plain, and traversing the provinces of Ngan-hui and Kiang-su, and passing the cities of Han-Yang, Han-kau, and Wu-chang, a great seat of the tea exporting trade, Ngan-king, Nanking, and Chin-kiang, it enters the Tung-hai, or Eastern Sea, above Shanghai. Its direct course from its source to its mouth is estimated at 1,800 miles; its course with windings is about or considerably over 3,000. It receives numerous affluents, and is crossed by the Grand Canal, which forms a junction between it and the Hoang-ho. The summer rains combined with the melting snows of the mountains in Tibet cause the river to rise at times as much as 40 or 50 feet at Hankow and Chin-kiang, re¬ sulting in great loss of life and serious dam¬ age to crops and other property. The drain¬ age area is about 650,000 square miles, and it is estimated that the river annually

carries away 6,428,000,000 cubic feet of sediment ; the volume of water is 770,000 cubic feet a second. Steamers of 5,000 to 6,000 tons bur¬ then easily reach Hankow, 680 miles from the sea, except at low water in winter. The river and the ports of Chin-kiang and Han-kau were opened to foreign navigation in 1860, I-chang (1,000 miles up), and others since. A British squadron sailed up the river in 1861 for more than 800 miles. The last 200 miles of its course is through practically level land, and in the first 1,000 miles the rise of the river is only 130 feet. It constitutes a most im¬ portant waterway, carrying about one-half of the seaborne traffic of China; and it is equally valuable commercially as a means of intercommunication throughout the country. The navigation above the confluence of the Tung-ting is interrupted by rapids. The tidal

influence reaches in February to Lake Po-yang, 436 miles from the sea. Consult Gill, W. J., (The River of Golden Sands' (1883) ; Little, (Through the Yangtse Gorges' (1898).

YANG AND YIN, in Chinese philosophy, terms employed to indicate the two phases, light and darkness, under which the supreme prin¬ ciple of the universe, Tai-ki. displays itself in the world of phenomena, Yang and Yin being, in various proportions, blended in all forms of existence.

YANKEE, a cant name for Americans be¬ longing to the New England States. Dur¬ ing the Revolution the name was applied by the British to all the insurgents; and during the Civil War it was the common designation of the Federal soldiers by the Confederates. In Europe the term is sometimes improperly applied generally to natives of the United States. The most common explanation of the term seems also the most plausible, namely, that it is a corrupt pronunciation of English or of French ((Anglais® formerly current among the Massachusetts Indians. See Nicknames.

YANKEE DOODLE. The air of Yankee Doodle is said to have been a British air known in the time of Cromwell by the name of Nankee-

Doodle, and played with derisive reference to the similarity of this name to Yankee by the British troops in evacuating Boston. The Americans took it up and made it a national air. See National Hymns.

YANKEE GANG, a term used in Canadian sawmills for a method adapted for sawing logs 21 inches in diameter and under. It con¬ sists of two sets of gang saws, connected by parallel ways. The slabbing gang reduces the log to a balk and slab boards after which the balk is transferred to the stock gang, which rips it into lumber.

YANKTON, S. Dak., city, county-seat of Yankton County, on the Missouri River and on the Chicago, Milwaukee and Saint Paul, the Great Northern, and the Chicago and Northwestern railroads, 60 miles northwest of Sioux City and 135 miles northwest of Omaha, Neb. The city is the commercial and indus¬ trial* centre of a large agricultural and stock-raising region. The chief industrial establish¬ ments are Portland cement works, flour mills, brick yards, grain elevators and stock yards. The city owns and operates the waterworks. The educational institutions are Yankton Col¬ lege (Congregational), opened in 1882; Saint Joseph's Academy, a public high school, public and parish elementary schools. It has the South Dakota Hospital for the Insane, and a modern fireproof hospital in charge of the Sisters of Saint Benedict. Yankton s water supply is obtained partly from artesian wells. There are two national and two State banks and a loan and trust company; the five have deposits of over $3,000,000. The city has many miles of concrete paving, and has raised $1,300,~ 000 to construct a combination railroad and wagon bridge across the Missouri River. Yank¬ ton was settled by Eastern people in 1862, and in 1883 received a city charter. Until 1888 it was the capital of the Territory of Dakota. It has the commission form of government. Pop. (1920) 5,024.

YANKTON COLLEGE, located at Yank¬ ton, S. Dak. It was established by the Gen¬ eral Association of Congregational Churches of Dakota in 1881, opened to students in 1882, and is the oldest institution of higher learning in the Dakotas. The college is non¬ sectarian and is open to both men and women. The organization includes the following de¬ partments: (1) the College; (2) the Academy; (3) the Normal Department; (4) the Con¬ servatory of Music; (5) the Department of Art; (6) the Department of Expression; (7) the Commercial Department. The college offers a four years' course leading to the de¬ gree of B.A. The work of the freshman year gives an option between Greek or Latin and Mathematics. Bible study is not

required, but there are a number of electives ; courses in education are included in the curricu¬

lum. The Conservatory of Music offers courses of three to eight years in pianoforte, pipe organ, voice and violin. The course in com¬ mercial studies covers two years. Gymna¬ sium work is required of both men and women, and there is an athletic park, and

ample provision for athletic sports. The stu¬ dents maintain Young Men's and Young Women's Christian associations, literary so¬ cieties, a branch of the InterCollegiate Ora¬ torical and Debating Association and athletic associations. The college has an attractive

campus of 25 acres, including the Athletic . Park (five acres) to the north of the main Campus and Observatory Hill to the south.

The buildings are Middle College, Young Women's Dormitory, the Ward Hall of Sci¬ ence, the Clarke Observatory, the gymnasium, the library and a central heating plant. A Sum¬ mer School was established in 1903. The stu¬ dents in 1919 numbered 517, of whom 174 were in the College.

YAO, or YAU, ancient Chinese emperor: reigned about 2357— 2258 b.c. He was the first of the three model emperors extolled in the (Shu-king) or (Canons of History, > the oldest Chinese source of pre-Confucian history, sup¬ posed to have been edited by Confucius him¬ self. In the works of Confucius Yao Uncele¬ brated as the embodiment of all the virtues requisite for his high position. His patronage of astronomical works and of engineering are highly emphasized, and his government is de¬ scribed as a model of good organization. The great Chinese flood occurred in his reign, and when after several years' endeavor the engi¬ neers failed to check it, Yao decided to abdi¬ cate. He chose for his successor not his son, but a young man named Shun, who was famed for his piety and who became the second, of the moral emperors. Consult Hirth, Friedrich,

< Ancient History of China) (New York 1911).

YAP, an island of the Caroline group, about 500 miles southwest of Guam. According to the Treaty of Versailles Yap went to the Allies with the other German islands of the Pacific. On 7 May 1919 the Peace Conference gave the mandate for Yap to Japan. The United States in 1921 protested this award. A cable is laid direct from Shanghai to Yap and there joins the main cable between Celebes and San Francisco. See Caroline Islands.

YAPOCK, or YAPOK (also called Yapach and Oyapock), a small, rat-like marsupial (Cheironectes variegatus) of the opossum fam¬ ily (Didelphyidce) , which is found in Central and South America. It is rather larger than a common rat, with large, naked ears, and a long nearly naked, tail ; fur brown above, with three transverse bright gray bands, in¬ terrupted in the middle, white below. It dif¬ fers from the opossums in having webbed hind feet and being an expert swimmer and diver. Its habits closely resemble those of the otter, and it feeds on fish, crabs and other aquatic animals.

YAPURA, ya-poo-ra', or JAPURA, zha-poo-ra', also known as Caqueta, a river in Columbia and Brazil, South America, a tribu¬ tary of the Amazon. It rises in the Andes near Popayan and flows in a southwesterly direction, is about 1,800 miles long, and for about 620 miles of its course is navigable for steamers. At lat. 1° 10' S. and Long. 72° 20' W. navigation is interrupted by a large cataract.

YAQUI, or YAKI, a North American In¬ dian tribe of Piman stock and of the Cahita division, living in the state of Sonora, Mexico, along the Yaqui River. They are industrious and are generally engaged in agricultural oc¬ cupations and in weaving, although there are miners and pearl divers among them. They have the clan system of government and have always been determined enemies of the Mexi¬ can government, against which they have waged long and bitter warfare. Repeated wars have reduced the tribe from numbers which once reached 40,000 to about 13,000.

YAQUI, a river in Sonora, northwestern Mexico, with two head streams, both bearing the same name, one rising in New Mexico and one in Chihuahua. The confluence of the two streams occurs about 200 miles from the coast and the river then flows in a southwesterly direction and empties into the Gulf of Cali¬ fornia. It is about 500 miles long and is navi¬ gable at but few points, owing to the rugged, mountainous country and many canons through which it flows. There are two rivers of the same name in Santo Domingo.

YARD. (1) As a nautical term, a spar slung from a mast and serving to extend a sail. Yards are either square, lateen, or lug sail ; those for square sails are suspended across the mast at right angles, and are of a cylindrical form, tapering from the middle, which is termed the ((slings,5) toward the ex¬ tremities, which are called the <(yard arms.® (2) A standard measure of length, equal to three feet or 36 inches, the foot in general being made practically the unit. As a cloth measure the yard is divided into four quarters, equal¬ ing 16 nails. A square yard contains nine square feet, and a cubic yard 27 cubic feet. It was legalized in England in 1855, the previous legal measure, established in 1760, having been destroyed in the Houses of Parliament fire, 16 Oct. 1834. A legend, exists to the effect that the original English yard was established by Henry I, and was the length of his arm. See Weights and Measures.

YARKAND, yar-kand', Central Asia. (1) A city of Eastern or Chinese Turkestan, sit¬ uated on the oasis of Yarkand, on the north side of, and at a little distance from, the river Yarkand, about 100 miles southeast of Kash¬ gar, 3,900 feet above sea-level. It is enclosed by a ditch, and a thick mud wall with towers at intervals. The houses in general are built of sun-dried bricks. Those of the rich are in large open squares surrounded by high walls and well stocked with fruit-trees. The streets are in general too narrow to permit carts to pass. They are intersected by numer¬ ous canals, and where three or four streets meet there is always a tank for water. There is a large covered bazaar wide enough to ad¬ mit carts. The inhabitants, like those of Kashgar, are very mixed in regard to race. The prevailing religion is Mohammedanism. There are 120 mosques and some caravan-series. During the period in which Eastern Turkestan was severed from China a commer¬ cial treaty was concluded at Yarkand in 1874 between Sir Douglas Forsyth, representing Great Britain and Yakub Beg, who was then the independent ruler of Eastern Turkestan. Commercial intercourse with India sprung up in consequence. The chief trade at present is carried on with Russia. Pop. 60,000 to 100,- 000. The oasis of Yarkand is one of the rich¬ est in Eastern Turkestan. It yields gold and precious stones and is rich agriculturally. It manufactures leather and saddlery, carpets, silk fabrics, and woolen and cotton goods. (2) A river of Eastern Turkestan, which rises in the Karakoram Mountains, flows generally in a northeast direction and unites with the Kashgar and Kotan-daria rivers to form the Tarim which flows east and enters the Lob Nor Lake, or series of shallow lakes.

YARMOUTH, Canada, a town and port of entry of Yarmouth County,

Nova Scotia, on tfie Bay of Fundy, the Atlantic Ocean and the Do¬ minion Atlantic Railroad, 90 miles south of Saint John, N. B. The town has extensive fish¬ ing, shipping and manufacturing interests, elec¬ tric lighting and street railways. At the head of its educational institutions is Yarmouth Seminary. It is known also as a summer resort. Pop. about 6,600.

YARMOUTH, Me., town in Cumberland County, on Casco Bay, the Royals River and •on the Grand Trunk Railroad; 10 miles north¬ east of Portland. It contains four villages and has a foundry, paper and cotton mills and granite quarries. The town has six churches, North Yarmouth Academy, a high school, graded schools and a public library. Pop. 2,358.

YARMOUTH, Great, England, a seaport town in the county of Norfolk, 22 miles east of Norwich, and 121 miles by rail northeast of London, on a narrow slip of land between the Yare and the sea. It is connected by a bridge over the Yare with Little Yarmouth, or South Town, in Suffolk, and is on the Great Eastern and the Midland and Northern railroads. The older part, near the river, is remarkable for its 145 narrow lanes at right angles to the main streets, known as the ˆrows® in which the houses were once the homes of the the wealthy burgesses. Between the older part of the town and the sea is the modern part, with a marine

parade and other attractions. The parish church, founded in 1101, is the largest parish church in England, being 230 by 112 feet; and the market-place is also of great size. There is an excellent town-hall, a large customhouse, an ample library and museum, a borough jail, a lofty Nelson monument, the royal hospital and royal naval lunatic asylum, the aquarium, two good piers and an ancient jetty. The North and South Quays stretch along the river for nearly two miles. The harbor is in the Yare, and is accessible by vessels drawing 18 or 19 feet. Immediately off Yarmouth, and parallel to the shore, is a great range of sandbanks, between which and the land is the safe anchor¬ age of Yarmouth Roads. Yarmouth is the great seat of the English

herring-fishery, in which about 300 vessels and 3,000 hands be¬ longing to the port are employed; many are likewise engaged in the mackerel fishery, and in that for cod and other whitefish. Most of the fish are cured, the herrings known as ((Yar¬ mouth bloaters-® being highly esteemed. There are malting-houses, boat-building yards, rope-works, silk-crape factories, trawl-net works, *etc.* Yarmouth has risen into considerable im¬ portance as a watering-place. It suffered from both air and sea raids during the European War. Area, 3,568 acres. Pop. about 55,905.

YARN, any textile before woven into cloth. Cotton yarn is numbered according to the num¬ ber of <(hanks® contained in a pound of 7,000 grains. Each hank, or skein, measures 840 yards. Worsted yarn has 560 yards to the skein; woolen yarn has 1,600 yards to the skein or run. Linen yarn is wound upon reels, and made up into leas, hanks and bundles. Flax and jute yarn is numbered according to the number of leas of 300 yards per pound.

YAROSLAV, ya-ro-slav', or JAROSLA,

Russia, (1) a city, capital of the government of Yaroslav, at the confluence of the Kotorost and Volga rivers, 173 miles northeast of Moscow. It is the see of an archbishop. The Uspenskij Cathedral was begun in 1215, and there are numerous other old churches, several monas¬ teries, schools, gymnasia, a theological semi¬ nary, and a lyceum with a law faculty. The left bank of the Volga is the suburban and resi¬ dential portion of the city and contains many beautiful dwellings. The city is chiefly engaged in manufacturing and commerce, the right bank of the Voiga being lined for two miles with quays. There are numerous cotton and linen mills, silk factories and bell foundries. The city was founded in 1226-36 and was the chief town of a municipality in 1218-1471, then com¬ ing under the rule of Moscow. The village of Velikoje Selo, included in the city, was the cen¬ tre of the linen manufacture of Russia, and had an annual output valued at $3,000,000. Pop. about 11,876. (2) The government had an

area of 13,751 square miles, and is bounded by the governments of Novgorod, Vologda, Kos¬ troma, Vladimil and Tver. It was one of the smallest but most thickly populated govern¬ ments in Russia. The surface is level and well watered by the Volga and its tributaries, the Mologa and Sheksma. The western portion has numerous ponds and marshes, the largest being Lake Nero, near Rostov, from which the Weska flows. The Volga is connected with the Neva

by two canals, through which considerable com¬ merce is carried on. Market gardening, timber cutting, mining, flax, livestock and poultry rais¬ ing and manufacturing are the chief occupa¬ tions. There are extensive linen and cotton mills, and factories for the manufacture of chemicals, machinery, metal ware, flour, tobacco and spirits, making Yaroslav one of the princi¬ pal manufacturing governments of Russia. Considerable commerce is carried on by the two railway lines, the Rybinsk-Petrograd and the Yaroslav-Moscow-Vologda. Its principal commercial cities are Rybrush and Yaroslav; while Rostov, Mologa, Romanovo and Poshek-hon are important trade centres. Pop. about

1,239,300.

YARRA-YARRA, ya'ra-ya'ra, or RIVER YARRA, Australia, (1) river of Victoria on which Melbourne (q.v.) stands. It is about 100 miles long, but is not navigable above Mel¬ bourne, owing to its falls. (2) A lake of Western Australia, east of Darling Range and 150 miles north of Perth.

YARRELL, yar'el, William, English natu¬ ralist : b. London, 3 June 1784; d. Yarmouth, Norfolk, 1 Sept. 1856. Led to note carefully the habits of birds and fishes in 1825 he sent his first contribution to the Zoological Journal, a. notice of some rare British birds observed in the years 1823-25. The same year he became a Fellow of the Linnaean Society, to whose Transactions he repeatedly contributed interest¬ ing papers on the subject of birds, and in 1849 became its vice-president. His chief work is his (History of British Birds) (2 vols., 1839-43; 4th revised edition 1881-85). He also published (The History of British Fishes' (2 vols., 1835—

36).

YARROW, Harry Crecy, American physi¬ cian: b. Philadelphia, Pa., 19 Nov. 1840. He was educated in the schools of his native city and at Geneva, Switzerland, and in 1861 was graduated from the Medical Department of the University of Pennsylvania. His first service in connection with the Union Army was as ex¬ amining surgeon for the Pennsylvania reserve corps. On 18 July 1861, he was regularly mus¬ tered in as assistant surgeon of the Fifth Penn¬ sylvania cavalry, known as the (<Cameron Dragoons.® He was in action at Dranesville, Va., in December 1861, and several minor engagements,

and the following month resigned to accept a position of acting assistant surgeon and executive officer in the United States army general hospital at Philadelphia, where he re¬ mained late in the year 1864, when he was de¬ tailed, with other surgeons, for service at Hilton Head, S. C., in anticipation of the fall of Fort Sumter. In July 1872 he resumed service with the Engineer Corps as surgeon and naturalist with the expedition for explorations west of the 100th meridian. In 1876 Dr. Yar¬ row was ordered to the Centennial Army Hos¬ pital at Philadelphia and in 1878 was assigned to duty, in the Army Medical Museum at Wash¬ ington, where he remained until 1887. He was then attached to the Army Dispensary in Wash¬ ington and was connected with that institution until 1898, when he resigned. In the meantime he was for 15 years honorary curator of the Department of Herpetology in the National Museum at Washington. He has been a member

of the medical faculty of the George Wash¬ ington University for over 20 years, and was a trustee of that organization. Dr. Yarrow is a member of various medical and scientific asso¬ ciations. He is the author of (Study of Mortu¬ ary Customs among the North American In¬ dians^ and has written a number of valuable papers on biological, medical and ethnological subjects.

YARROW, or YARROW WATER,

Scotland, a celebrated pastoral stream in Sel¬ kirkshire, which rises at Yarrow Cleugh, and, running east a few miles, forms a beautiful lake, called the Loch of the Lowes, which dis¬ charges its water into Saint Mary's Loch. Issu¬ ing from the latter, the river, after a course of 16 miles through the district of Ettrick For¬ est, flows into the Ettrick, a tributary of the Tweed, near Selkirk, its total length being about 25 miles. It is famous in Scottish song, and has been celebrated in poems by Scott, Words¬ worth and others.

YARROW, an erect, hairy composite herb (Achillea millefolium) , sometimes called mil¬ foil. The terminal corymbs of small white, or

occasionally rose-colored flowers, are large, compound and fastigiate. The leaves are from two to four inches long, and are cut into nu¬ merous fine segments, which are very pubescent. Yarrow is a common plant of roadsides, and has been introduced from Europe. It has been used for a long time as a tonic and astringent, and enters into an ointment for dressing wounds. Several species of Achillea are gar¬ den plants. Sprigs of yarrow plucked from a young man's grave, by lovesick maidens, who repeat meantime a mystic formula, are expected to invoke the images of their lovers, in dreams.

YARUMAL, ya-roo-mal, Colombia, a town in the department of Antioquia, on the Cauta, 50 miles northeast of Medellen. Gold mining and stock-raising are the chief industries. Pop. about 21,250.

YATAGHAN, yat'a-gan, the Turkish name for a sort of dagger-like sabre with double-curved blade, about, two feet long, the handle without a cross-guard, much worn in Moham¬ medan countries.

YATES, David Gilbert, American physi¬ cian: b. New Jersey, 1870. He was graduated M.D. at New York University in 1898 and specialized thereafter in affections of the eye, ear and throat. He was senior assistant sur¬ geon at the New York Eye and Ear Infirmary; was aural surgeon to the New York City Chil¬ dren's Hospital and Schools, and assistant sur¬ geon at the Manhattan Eye, Ear and Throat Hospital. He is a contributing editor of the Medical Critic and author of numerous medical papers.

YATES, Edmund Hodgson, English jour¬ nalist and author: b. Edinburgh, 3 July 1831; d. London, 20 May 1894. After a secondary education he obtained a post in the secretary's department of the general post office in 1847, and in 1862 became head of the missing-letter depart¬ ment. Meanwhile he was also active in various literary works — writing dramatic critiques for the Court Journal and the Daily News, con¬ tributing to numerous periodicals, editing short¬ lived humorous journals, Comic Times and The Train, and doing some successful farces. In

1855 he instituted a gossipy personal news col¬ umn in the Illustrated Tunes, the first of the sort, and elaborated the idea when in 1858 he became editor of Town Talk, in which he soon made an attack on Thackeray which resulted in his expulsion from the Garrick Club; in 1860 he became acting editor of Temple Bar, of which he was editor-in-chief in 1863-67 ; and for a time he was also editor of Tinsley's

Magazine. Among his subsequent ventures were Time: A Monthly Miscellany (1879-84), and The World. He served seven weeks' im¬ prisonment in 1885 for a libel against the Earl of Lonsdale, published in The World in 1883. He lectured in the United States in 1872, and in that year withdrew from the postoffice depart¬ ment. In 1873-74 he was special correspondent for the New York Herald. The best of his works in fiction are probably (Broken to Har¬ ness } (1864), originally published in Temple Bar, and (Black Sheep) (1867). His Ed¬ mund Yates: His Recollections and Experience-' (1884 ; 4th ed. 1885) contains much interesting material.

YATES, Lorenzo Gordin, American natu¬ ralist: b. England, 8 Jan. 1837; d. 1909. He came to the United States in 1853, and after teaching in Wisconsin, he later studied medicine and dentistry. He served in the geological sur¬ vey of California under Prof. J. D. Whitney (q.v.), and had charge of the scientific depart¬ ment of the Froebel Institute, Los Angeles, Cal. He has published California Digest of Masonic Law* (1867) ; Charm Stones) (1886) ; (The Ferns of Ceylon > (1887) ; (Notes on Hawaiian Ferns) (1887) ; (The Channel Islands) (1890) ; (The Mollusca of Santa Barbara County and New Shells from the Santa Barbara ChanneP (1890); (A11 Known Ferns) ; (Aboriginal

Weapons of California) (1900) ; (Prehistoric California) (1903).

YATES, Richard, American politician: b. Warsaw, Ky., 18 Jan. 1818; d. Saint Louis, Mo., 27 Nov. 1873. He was graduated at Illinois College, Jacksonville, in 1838; practised law at Springfield, Ill., sat in the State legislature 1842-49, and was sent to Congress as a Whig in 1850. In 1860 he was elected governor of Illi¬ nois and was reelected in 1862, becoming one of the notable ˆwar-governors.® He was a strong opponent of slavery, and an ardent sup¬ porter of the government during the Civil War, taking an active part in the organization of vol¬ unteer regiments. He was United States Sen¬ ator in 1865-71, and afterward United States railroad commissioner.

YATES, Richard, American politician, son of the preceding: b. Jacksonville, Ill., 12 Dec. 1860. He was graduated from Illinois College in 1880 and from the law department of the University of Michigan in 1884. After being city attorney of his native place, 1885-91, he was judge of Morgan County, Ill., 1894-97, and United States collector of internal revenue at Springfield, Ill. (1897-1900). In 1901 he was elected governor on the Republican ticket of Illinois for the term ending 1905. In 1913 he was appointed by the governor of Illinois a member of the State railroad commission and in 1914 a

member of the new Illinois State pub¬ lic utilities commission, to which position he was reappointed in 1915.

YATES, Robert, American statesman and jurist: b. Schenectady, N. Y., 17 March 1738; d. Albany, 9 Sept. 1801. He was educated and studied law in New York, and after his admis¬ sion to the bar in 1760 settled in Albany, where at the commencement of the Revolutionary troubles he was a member of the committee of public safety in 1775-77, and also a member of the provincial congress of New York. He was a member of the convention that framed the constitution of the State in 1776. In 1777 was appointed judge of the Supreme Court of New York, and in 1787 was a member of the convention that framed the Constitution of the United States. His notes of - the secret pro¬ ceedings and debates of this convention were printed after his death (1839). In 1790 he was appointed chief justice of the State of New York. On his retirement from the bench in 1798 he was appointed a commissioner to settle disputed titles to lands in the (<Military Tract)} with Massachusetts and Connecticut.

YATES, William, English Baptist mission¬ ary: b. Loughborough, Leicestershire, 15 Dec. 1792; d. at sea, 3 July 1845. He studied for the Baptist ministry at Bristol College, was ordained in 1814, and sailed for Calcutta the next year. He settled at Serampore, preaching for a time and subsequently devoted himself entirely to translation. He translated the whole Bible into Bengalee; the New Testament, the Pentateuch, Job, the Psalms, the Proverbs, the Song of Solo¬ mon, Ecclesiastes, Isaiah and Daniel into Sans¬ krit; and the New Testament into Hindee and Hindustanee. He also prepared in Sanskrit a dictionary, grammar, vocabulary, several school books, and an expurgated edition of the (Hito-padesa) and ˆalodayaP numerous school books in Hindee, Hindustanee, Arabic and Bengalee; and translations of Bunyan's (Pilgrim's Progress) and Baxter's <Call to the Unconverted.*

YATES CENTRE, Kan., city, county-seat of Woodson County, on the Missouri Pacific and the Atchison, Topeka and Santa Fe railroads,

about 90 miles east by north of Wichita. . It is in a productive farming region. It has indus¬ tries connected with farm and dairy products, stock-raising and marketing of wheat, corn and fruit. There are six churches, a high school, graded elementary schools and a school library. It has three banks, one national and two State. Pop. (1920) 2,306.

YAWL, a small ship's boat, propelled by four or six oars. Also applied to a jolly boat, a small fishing boat, and to a sailing boat similar to a cutter, but having a small sail at the stern.

YAWNING, or GAPING, an involuntary and wide opening of the mouth and inhalation of breath, generally produced by weariness, in¬ tense absorption causing an involuntary inter¬ ruption of full breathing, or by an inclination to sleep; sometimes by hunger, sympathy, *etc.* It often precedes the fit in some intermittent fevers, hysteria and spasmodic asthma, and in some instances, by the frequency of its recur¬ rence, becomes a real disease. Persons suffer¬ ing from heart disease may be liable to yawning fits. It is supposed by some to be determined by an interruption of the pulmonary circulation. Yawning is performed by expanding the chest, by extending the lungs, by drawing in, gradually and slowly, a large quantity of air, and gradu¬

ally and slowly expiring it after it has been retained for some time, the muscles of the chest being restored to their natural state. Its effect upon the muscles brought into play is sometimes very restful. When yawning is troublesome, long, deep respiration, or drawing in the air at long intervals, relieves it. It also occurs in certain animals. It often seems con¬ tagious or sympathetic, the sight of another person yawning frequently inducing the act.

YAWS, a disease occurring in Africa, Amer¬ ica, Samoa, Java and tropical regions in many parts of the world. It is almost wholly confined to the African races. It is characterized by cutaneous yellowish tumors, numerous and successive, gradually increasing from specks to the size of a raspberry, one at length growing larger than the rest; core a fungous excres¬ cence ; fever slight, and probably irritative merely, and less noticeable in adults than in children. It is contagious, and cannot be com¬ municated except by the actual contact of yaw matter to some abraded surface, or by inocula¬ tion, which is sometimes effected by flies. It is also called framboesia, from the French fram¬ boise, a raspberry. Some authorities regard it as a

form of syphilis.

YAZD. See Yezd.

YAZOO (an Indian word meaning aRiver of Death**), a river in Mississippi, formed by the junction of the Yallobusha, Tallahatchie and Coldwater rivers, and several bayous thrown out by the Mississippi River in the northwestern part of the State. Its general direction is south¬ west; it is a deep, sluggish stream; the total course nearly 300 miles, and very irregular. It enters the Mississippi about 11 miles above Vicksburg. It is navigable all the year. The Tallahatchie River receives part of its waters from the Mississippi; so that small boats from the Mississippi can enter the Yazoo at its source and re-enter the Mississippi not far from Vicks¬ burg.

YAZOO CITY, Miss., city, county-seat of Yazoo County, on the Yazoo River, and on the Yazoo and Mississippi Valley (Illinois Central) Railroad, about 44 miles northwest of Jackson and 60 miles northeast of Vicksburg. It is in a fertile agricultural region in which the chief products are cotton, farm crops and lumber. The chief industrial establishments are a cotton factory, a lumber mill, cottonseed-oil mills, cot¬ ton gins, cotton compresses, machine shops and brick, lumber, ice and coal yards. The principal public buildings are the county courthouse, opera house and library. There are five church build¬ ings valued at $100,000, and eight churches for colored persons, valued at $40,000. The educa¬ tional institutions are Saint Clara's Academy (Roman Catholic), and public schools for both white and black races. The three banks have a combined capital of $450,000; and the annual business amounts to $3,500,000. The government is vested in a mayor and a council of eight mem¬ bers, four of whom are elected each year. Yazoo City was settled about 1820. In 1830 it was incorporated, and in 1840 chartered as a city. In 1904 the city suffered heavily from fire; practically all the business portion was destroyed; the five churches, the city hall and Masonic hall were also burned; the loss was estimated between $1,000,000 and $2,000,000. Pop. (1920) 5,244.

YAZOO CITY, Military Operations at and near. Yazoo City was chosen by the Con¬ federates as a site for a navy yard, at which were constructed some formidable ironclads. Upon General Grant's approach to Vicksburg from the rear, in May 1863, the Confederates abandoned Haynes' Bluff, near the mouth of Yazoo River, upon which Lieut.-Commander John G. Walker, of the United States navy, went up the river with a small gunboat fleet to destroy all the works at Yazoo City. As the expedition approached the city, Lieut. Isaac N. Brown, of the Confederate navy, set fire to and destroyed three powerful rams which he had nearly completed, and upon which the Confederates were placing great dependence. Walker set fire to everything else of a pub¬ lic character, including the navy yard, con¬ taining five sawmills, planing-mills, machine-shops, etc., and the expedition then returned. Early in June, Kimball's Union division was sent up the Yazoo to destroy the railroad bridge over the Big Black near Canton; but upon arriving at Mechanicsburg, Kimball found a large Confederate force in his front at Ya¬ zoo City and Liverpool, and as the river, on which he depended for supplies, was rapidly falling, he returned to Haynes' Bluff. After the surrender of Vicksburg, 4 July 1863, a re¬ port reached General Grant that Gen. J. E. Johnston was fortifying Yazoo City, and that a number of steamers were at the place, em¬ ployed in supplying his troops. A naval and military expedition was organized to capture or destroy the steamers and take the place. Four vessels, under Lieut.-Commander Walker and 5,000 men under Gen. F. J. Herron, in transports, went up the Yazoo from Haynes' Bluff 12 July, and approached Yazoo City at noon next day; the Confederates were re¬ ported in force, and the ironclad gunboat De Kalb was pushed ahead and opened her guns to ascertain the number and position of the enemy's guns. The Confederates had a bat¬ tery of six heavy guns and the town was held by the 29th North Carolina infantry. Finding the defenses formidable, Walker dropped back and notified Herron, who at once landed his troops and a combined attack was made. After a slight skirmish on shore the Confederates fled, previously setting fire to four large steamers. Six heavy guns and one steamer fell into Union hands. Herron captured nearly 300 prisoners. While the De Kalb was mov¬ ing slowly along and firing on the enemy, she ran on a torpedo and sank in 15 minutes. All on board were saved. Herron destroyed all public property, captured about 2,000 bales of cotton and returned to Vicksburg 21 July.

On 3 Feb. 1864, in cooperation with Gen¬ eral Sherman's Meridian expedition (q.v.), a combined expedition of gunboats and trans¬ ports with troops was sent up the Yazoo River from Vicksburg, with

instructions for the gunboats to explore Yazoo and Sunflower rivers and all their tributaries. The gunboats were five in number, under command of Lieut.- Commander Owen, United States navy. Five transports conveyed the 11th Illinois and 8th Louisiana (colored) infantry and 35 colored cavalry, in all 982 men, under command of Col. James H. Coates, who was instructed to reconnoitre above Yazoo City and to obtain

corn and forage on the Sunflower or on the Yazoo, and also to seize at least 1,000 bales of cotton and to destroy all flats or boats used to cross from the east to the west. From its start the expedition was annoyed by Gen. L. S. Ross, who, with a brigade of about 1,20(1 men, was guarding the Yazoo River and the Mississippi Central Railroad, and who, on 3 February, opened fire with artillery upon one of the gunboats when near Liverpool Heights. Coates landed his men, had an indecisive fight with Ross in which he lost six killed, 21 wounded and eight missing, and at night with¬ drew to his transports. Next morning the expedition, under fire of Ross' artillery and musketry, passed up the river, the gunboats clearing the way to within four miles of Ya¬ zoo City, where it remained until 6 February, when two gunboats, having been ordered to reconnoitre, reported that the place was oc¬ cupied in force, with five guns in position and another in course of erection. The guns opened, two shots taking effect on one of the gunboats, and, the gunboats and transports fell down the river below Satartia, where, on the morning of 7 February, Coates disem¬ barked his entire command, drove back some Confederate ' skirmishers and at night with¬ drew to his transports. On 8th February the expedition again pushed up the river, two gunboats passed the city and the transports landed their men within a mile of it. Next day Coates took possession of the city, and on 11 February moved up the river, arriving at Greenwood on 14 February, where he remained until 19 February, gathering cotton, corn and forage. He then received orders to fall back to Yazoo City. On 28 February when within six miles of the place he ordered his small force of cavalry to move in rear of the city and take possession of all roads leading out of it. That afternoon he landed at Yazoo City and took position in some redoubts com¬ manding the roads. Major Cook, with 50 colored cavalry, was sent toward Benton. When nearly six miles out Cook ran into Ross' brigade, (by which he was roughly handled and pursued nearly to the city, losing eight killed, 35 wounded and 10 missing. Coates' pickets were much annoyed and on the morning of 5 March were driven in. Ross had been joined by Gen. R. V. Richardson's Tennessee brigade of about 600 men and at 10 o'clock the two brigades, about 1,600 men,

making a deter¬ mined attack, forced portions of the Union line and gained the streets of the town. At the same time they used artillery upon the redou'bt, on the Benton road beyond the town, which, with the adjacent rifle-pits, was held by a part of Coates' command and repulsed all Confederate effort to carry. At 2 p.m. Coates, with those who were not in the re¬ doubt, made a charge through the streets and the Confederates withdrew and gave up the attempt upon the redoubt. The Union loss in the engagement was 19 killed, 80 wounded and 18 missing, The Confederate loss was six killed and 51 wounded. On the evening of 6 March Coates started on his return to Vicksburg. He took with him over 1,700 bales of cotton, and much corn and forage. The total loss of the expedition was 31 killed, 121 wounded and 31 missing.

On 19 April 1864 a small detachment of a colored brigade, under command of Col. H. Scofield, marched from Vicksburg for Yazoo City and two gunboats went up the river to co-operate in an attack on the city. Scofield skirmished sharply with a part of Gen. Wirt Adams' brigade and on the night of 20 April bivouacked 15 miles below the city. On 22 April the gunboat Petrel in attempting to run past Yazoo City in order to fire upon the works from above, was fired upon by a section of artillery and a detachment of sharpshooters of Adams' brigade. The men were driven from the guns, the crew from the boat, and most of them captured, including Acting Mas¬ ter McElroy. The Confederates seized the boat, removed her eight guns and burned her. Next morning the expedition returned to Vicksburg.

E. A. Carman.

YAZOO FRAUD, The, a name given to the sale of lands in the western part of Georgia by a corrupt legislature, to certain large com¬ panies in 1789. This action caused great ex¬ citement and bitter controversy until settled by the United States Supreme Court in 1810.

YAZOO PASS AND STEELE'S BAYOU EXPEDITIONS. In the Civil War after the battle of Chickasaw Bayou, 29 Dec. 1862, and the capture of

Arkansas Post, 11 Jan. 1863, General Grant ordered the army to Young's Point and Millikin's Bend, where he took com¬ mand in person 30 January. Work on the pro¬ jected canal across the peninsula opposite Vicksburg was pushed, but on 4 February Grant questioned its success, and began to look for other routes by which the army could reach the high ground either north or south of Vicksburg. Two projects were considered. One involved cutting away from the Missis¬ sippi into Lake Providence from a point 70 miles above Vicksburg. This lake, a former bed of the river, was connected by Bayou Baxter with Bayou Macon, a navigable stream, which led to the Tensas, thence into the Wash¬ ita, and finally into the Red River. Thus it was hoped the army could be transported to the lower Mississippi to co-operate with Banks against Port Hudson. It is 470 miles by the main river from Lake Providence to the mouth of Red River, and much farther by the winding bayous. Upon the cutting of the levee at Lake Providence the water from the river flowed in rapidly and the six miles of the lake beyond were soon available. But Bayou Baxter was found choked for miles with fallen trees and a thick growth of tim¬ ber overhanging it. General McPherson's en¬ tire corps was engaged for some time in at¬ tempting to open this channel and those be¬ low it. In March this project was abandoned.

On the east side of the river, a few miles below Helena, was Yazoo Pass. This had formed the old route of river steamers through the Coldwater to the Tallahatchie, and the Yallabusha to Yazoo City, but it had been closed for some years by a strong levee. By reopening this route it was believed to be pos¬ sible to reach the high ground on the Yazoo bluffs north of Vicksburg. This Yazoo Pass plan promised greater success than the Lake Providence scheme. Under Lieut. -Col. Wilson

of the engineers, later Maj.-Gen. James H. Wilson, the levee was cut 2 February, a way was cleared to the Coldwater, and the Pass opened to navigation on 24 February. Brig.- General Ross, with 4,500 men, was ordered into the pass upon light draft transports, and, preceded by gunboats, penetrated by that stream to the Tallahatchie, and thence to the Yallabusha, where the expedition, after an advance of 225 miles, was stopped 11 March by Fort Pemberton, near the juncture of the last-named streams. It was a strong work in a bend which commanded both. The fort was found to be so situated that in this time of high water neither troops nor gunboats could re¬ duce it although the gunboats attacked on 11 and 12 March. As it stood only a few feet above the water, attempts were made to flood it by cutting the levee

at Austin above Helena, and widening the cut into Yazoo Pass. These were unsuccessful. The expedition, after sev¬ eral attempts on the fort, withdrew. On the way back a reinforcement under General Quimby was met, 22 March, and this officer ordered! a return to Fort Pemberton for fur¬ ther efforts. He soon became satisfied that the fort could not be reached, and ordered final . withdrawal. The gunboats could not turn in the narrow channels and were forced to back out over a large part of the route. General McPherson's corps had been ordered into the pass, but was delayed for lack of light draft transports and later the intended movement of the army by that route was abandoned. Meantime the Confederates had gathered a strong land force under W. W. Loring, which became first harassing and soon after most threatening. Sherman, preceded by five gunboats of Admiral Porter's fleet, was dispatched in haste 16 March through Steele's Bayou, by which route it was hoped he could reach the Yazoo, relieve Ross, then supposed to be in danger of capture, and at the same time find a practical way for the army into the Yazoo. Sherman had a winding and diffi¬ cult route of 150 miles before he could reach that stream. From Steele's Bayou, which he entered at Eagle Bend, he passed to Black Bayou and thence to Deer Creek. This opened into Rolling Fork by which he could enter the Big Sunflower, and by this stream reach the Yazoo. Even with the tremendous energy of his advance Sherman was barely in time to save the gunboats which had been at¬ tacked in Deer Creek by land forces, and were so hard pressed that Admiral Porter was con¬ sidering the blowing up of his fleet and re¬ treating with his crews through the swamps. These several attempts through the bayous east and west of the river had been carried on over hundreds of miles and against the most formidable obstacles of flooded country, dense forests and heavily obstructed streams. They were finally abandoned and the army reassembled at Millikin's Bend and Young's Point. From this position the army subse¬ quently moved in the final campaign against Vicksburg.

H. V. Boynton.

YEAR, the period in which the revolution of the earth round the sun, and the accom¬ panying changes in the order of nature, are completed. The accurate determination of the

length of the year, which required great knowl¬ edge of astronomy and exact observations, could only be reached by the successive efforts of many generations. (On this subject see Calendar). There are years of various lengths, according to the principle adopted in measur¬ ing them. The sidereal year is the interval that elapses while the sun moves from a star to the same star again (of course this motion is only apparent), a period the length of which is slightly affected by nutation, but on the average is equal to 365 days, 6 hours, 9 minutes, 9.6 seconds. The tropical or civil year, some¬ times called the solar year, is the time in which the sun moves from the vernal equinox to the vernal equinox again ; its mean length is 365 days, 5 hours, 48 minutes, 49.7 seconds. This is the year as commonly understood. On ac¬ count of the precession of the equinoxes it is rather shorter than the true period of the earth's revolution. A lunar year is the time required for 12 revolutions of the moon, which is 354 days, 8 hours, 48 minutes, 37 seconds. Bisextile, or leap year, is a calendar year to which one day is added, making 366 days in¬ stead of 365. February of a leap year has 29 days. A light year is a linear measure used by astronomers to measure the distances of in-trestellar space. See also Day ; Sidereal Time; Solar Time.

YEARDLEY, yerd'K, or YARDLEY, Sir George, American colonial governor : b. Eng¬ land, about 1578; d. 1627. After seeing service in the Netherlands he came to America in command! of Sir Thomas Gates' expedition. This was wrecked at the Bermuda Islands, but he reached Virginia in 1610 and was acting governor of the Virginia colony 1616-17. Returning to England the next year he was there knighted and chosen deputy governor of the colony, filling the office in 1619-21. By his instructions was summoned the first legis¬ lative assembly ever gathered in America, the House of Burgesses. The company was dis¬ satisfied with his administration and he was succeeded by Wyatt. He remained in the colony where he served on the council and in 1626 Charles I again made him deputy governor.

YEAR'S MIND. See Month's Mind.

YEAST, or BARM, is a micro-organism of the vegetable kingdom and belongs in the order of the Gymnoascece to the family of the Sac char omyc&tes, of which there are three classes, namely, Monospora, Saccharomyces and Schizosaccharomyces. The main charac¬ teristic of the first class, as its name indicates, is that it only develops one

spore in the ascus. Thus far only one type, the Monospora Cuspidata, which is parasitic in daphiniadcz which it destroys, has been determined. There are many representatives of the second class, while only a few of the third have up to the present time been identified. The second class — the Saccharamyces — is generally what is understood under the term yeast, not only in the brewery but also in the distillery and the compressed yeast fabrication. Its structure is very simple; it consists of a single cell, which has few distinguishing char¬ acteristics. Each cell of the saccharomycetes is more or less globular or ovoid in form and,

just as every other vegetable cell, consists of a colorless, viscous substance (protoplasm), a cell-wall (membrane), and also a nucleus. In the protoplasm there are observed, according to the species of the plant cell, different num¬ bers of spaces filled with cell-juice, which are termed vacuoles.

In young yeast cells the cell-wall, or mem¬ brane, is very thin — 0.4 to 0.9 (*■ — and has almost the same refractive power as the proto¬ plasm which it surrounds. The membrane is thickened through external influences, especially when the yeast-cells must develop in or upon a highly nutritious medium. An increase in the thickness of the cell-wall is also accom¬ panied by greater impermeability and a corre¬ sponding decrease in the fermentative capability of the cell. Through the action of acids or alkalies upon the yeast cell the layers of the cell-wall can be shown, which are two, and sometimes three, or even more in number. Chemically the membrane of the yeast cell con¬ sists of cellulose (erythro and achroo-cellulose), pectinic compounds, and plasmatic components, for which reason it is very nitrogenous. The cell contents consists of protoplasm with more or less glycogen. (According to Laurent there is 32.28 per cent glycogen in the dry substance.) In the young yeast cell the whole interior is filled with protoplasm ; in a short while, how¬ ever, apparently hollow spaces appear, which are filled with the reserve nourishment neces¬ sary for the vitality of the cells. The nucleus furnishes the substances necessary for building up the cell, and, according to its chemical com¬ position, belongs to the albuminoids in the class of the proteids, and especially to the nucleins. The form of the nucleus varies considerably; in a young cell it is spheroid, flattens out with increasing age to a disc whose periphery is no longer entire, but is lobed; elliptical shapes were also found.

The nucleus is in some instances of a con¬ siderable size; its diameter

in some cases being one-third of that of the cell. Concerning the inner structure of the nucleus it was observed that the nucleus of the yeast cell has a pellicle as well as a nucleolus, which is spheroid, and is situated in approximately the centre of the nucleus, the space between the pellicle and the nucleolus being filled with nucleus plasma (Karyo plasma) , this having a netlike structure through which the nucleolus is suspended. One or more vacuoles were observed in several types of yeast in the Karyoplasma under certain con¬ ditions, especially when the cells were trans¬ ferred into fresh nutrient solutions. With the beginning of the propagation of the cell a corresponding development of the nucleus takes place, in either one of two ways, that is, the direct division (Amitosis), or the indirect divi¬ sion (Karyokinesis, Mitosis). The manner in which the nucleus divides itself differs in the various types of yeast.- The yeast cell is propa¬ gated in one of two ways, either through oxygen spore formation, budding, or through endogen spore formation, the real sporulation.

In the former case a new cell is detached from the parent cell, while in the latter the new cells (spores) are formed inside the parent cell, which it leaves only upon complete maturity. Several recent investigators are inclined to be¬ lieve in the sexuality of yeast, and close research

with various yeasts, as Sacch. farinosus, Saccli. Bailii , etc., has been made.

Two types of yeasts have in the course of time become culture plants in the real sense of the word, through intentional continuous culti¬ vation for certain definite purposes. These types are (1) that known as the bottom yeast in the manufacture of beer, and (2) that which is the cause of the fermentation of the top-fer¬ mented beers and of the whisky mash. The former is so called because it settles in a thick, creamy layer upon the bottom-of the fermenting vat during the slow fermentation of lager beers in temperatures of 40° to 50° F. (4.5ˆ to 10° C.), while the latter is termed top yeast because in the more rapid fermentation at 54° to 65° F. (12° to 18° C.) (ale, weissbeer, etc.), it is

sep¬ arated as a yellowish brown foam, which is forced to the surface by the escaping carbonic acid gas. It is the last-named species which furnishes almost exclusively the material for the manufacture of that product known as com¬ pressed yeast.

As has been said, there are a number of inde¬ pendent species of yeast, which vary not only according to form and size of the cell, but also according to the composition of the nutrient medium in which they live, hence according to chemical and physical properties. Yeast flour¬ ishes luxuriantly only then when it finds not only qualitatively but also quantitatively, in the nutrient medium all the substances necessary for its nutrition. The brewer, distiller, etc., therefore endeavors to produce as vigorous a yeast as possible, in order to be enabled to con¬ duct the fermentation in the manner best suiting his purposes. For such normal nourishment, . it is essential that diverse substances are at its disposal.

Yeast thrives well when, besides water, car¬ bon in the form of sugar, nitrogen in albumi¬ nous compounds or ammoniacal salts and vari¬ ous mineral components, especially sulphate of magnesia and potassium phosphate, are at its disposal. If the necessary nutriment is lacking the vitality of the yeast cell may rest, but the •cell does not perish.

Various analytical data are at hand in regard to the composition of the yeast. Dumas found that the yeast contains :

	Per cent
Carbon .	50.6
Hydrogen .	7.3
Nitrogen . .	15.0
Oxygen, sulphur and phosphor	

27.1

Mitscherlich found top yeast of the follow¬ ing composition :

Per cent

Carbon. . Hydrogen Nitrogen. Sulphur . . Oxygen . .

47.0

6.6

10.0

0.6

35.8

The differences found between bottom and top yeasts have been very slight. Wagner ex¬ perimented upon top and bottom yeasts and obtained the following averages:

Carbon .

Hydrogen .

Nitrogen .

Sulphur 4* oxygen.

Top yeast Bottom yeast per cent per cent

49.8 48.4

6.8 6.0

9.2 9.2

34.2 35.8

A yeast may have all the necessary organic substances in the proper form and amount, yet it will not flourish if the salts are lacking. The yeast in this case is the same as any other plant organism, which must perish if it is deprived of its mineral nourishment. Hence a knowl¬ edge of the requirements of mineral substances for a yeast is of utmost importance, and many examinations were made to secure data on this point. Mitscherlich found in the ash of

Top yeast Bottom yeast per cent per cent

Phosphoric acid . .

Potash . .

Soda + magnesia Calcium oxide… Silica .

53.9

59.

9

39.8

28

3

6.0

6

.0

1.0

1

.0

traces

0

0

The most essential substances which the yeast requires for its sustenance are, accord¬ ingly, phosphate of potassium and phosphate of magnesia. The above data are from elementary analyses. Naegeli later instituted investigations which should show the amount of the various combinations, which are observed in a yeast. According to his observations the yeast, when treated with water until its soluble components are absorbed, gives up to the water 37 per cent of the total weight of the dried yeast. The bodies thus brought in solution consist of com¬ pounds closely related to vegetable slime. The amount of moisture in a yeast is exceptionally large, for if it is completely ‘dried it loses 83 per cent of its weight, so that in 100 parts of yeast *only 17 parts are solid components. The mucous part of the yeast cell, the protoplasm, contains more water than the membrane which surrounds it, and consists chiefly of albumin¬ oids, and about 2 per cent of peptone. # Accord¬ ingly the composition of the yeast with 8 per cent nitrogen is :

Per cent

Cellulose and vegetable slime … .

Common albumin… … . • •

Easily converted glutine (caseinic protein) Peptones (precipitable by lead acetate) …

Fat .

Ash .

Extractive aubstances .

37

36

9

2

5

7

4

According to E. C. Hansen of Copenhagen, yeast is divided into two groups, the real Saccharomycetes, which are capable of forming endospores, and the non-saccharomycetes, which never form spores. He subdivides the former into such which separate out sucrase and engen¬ der alcoholic fermentation, that is, which vig¬ orously ferment saccharose, dextrose and maltose, as brewer'-s yeast ; and such which fer¬ ment sacchraose, dextrose, levulose but not maltose, as, for example, Saccharomyces Lud-wigii; Sacch. exiguus, and into such which do not separate out sucrose and do not excite alco¬ holic fermentation, as Saccharomyces membra-ncefaciens.

The non-saccharomycetes Hansen divides into three groups; such which ferment solu¬ tions of dextrose and invert sugar, as S. Rouxii, S. apiculatus; such which separate out no su¬ crase but ferment saccharose, maltose and dex¬ trose, as Monilia Candida , and finally such which ferment saccharose, glycose, galactose and lac¬ tose, the lactose yeasts. In practice the division into' culture and wild yeasts would be appro¬ priate. The yeasts can also be safely divided according to their power of attenuation, that is,

the decrease in the density of the nutrient me¬ dium due to fermentation. The attenuation reached by a yeast in a diastase-free beer wort has been agreed upon as the limit, and in ac¬ cordance therewith the brewers' yeasts are graded, and we have the Frohberg type with high attenuation, and the Saaz with low attenu¬ ation. Van Laer has defined a new type, Logos, so that now we have the types Saaz-Frohberg and Frohberg-Logos, with all inter¬ mediate grades. The numerous wine yeasts vary according to their resistibility against heat and acids ; the amounts of sugar produced by them, and the amount of fruitesters, which they impart to the liquid. The distillers' yeasts, mostly top yeasts, are known by their resistance against acids, and foreign ferments, through their fermentative capability and the amount of alcohol developed.

No one can deny that yeast induces alcoholic fermentation, but how this is accomplished is still a matter of controversy. Liebig and other chemists maintain that fermentation is called forth by a ferment contained in the yeast cell, while Pasteur deems it the necessary conse¬ quence of life without oxygen. Naegeli claims it to be a transferring of the motion of mole¬ cules of protoplasm of the yeast to the ferment¬ ing liquid. Eduard Buchner and Rudolf Rapp of Munich discovered in the yeast cell a fermen¬ tation-inciting enzyme — zymase — which, how¬ ever, can only induce fermentation once after the cell is completely destroyed. This discovery, which is of much scientific import, has not yet been made applicable in practical arts.

Besides; the culture yeasts, there are a num¬ ber of wild yeasts, which can produce great disturbances in the liquids infected by them. In order to avoid such infection by wild yeasts and also by bacteria, Hansen experimented and succeeded in preparing a pure yeast culture, that is, a culture originating from a single cell. Such a culture is not only free from all wild yeasts and bacteria, but also can and does re¬ main unchanged as all cells are of the same nature. A reliable fermentation process can only be obtained by the use of. one single type.

Such pure cultures are variously prepared ; the oldest and best known method is that of Hansen, which has recently been modified by Dr. Lindner of Berlin as the droplet-culture. Both investigators employ for the further devel¬ opment of the young vigorous cultures the propagation apparatus, which when once sup¬ plied with an absolutely pure culture can be used for a long time if proper care is observed. Upon this pure-culture method a new brewing process is

based which permits of entirely sterile work from boiling the beer to the putting it on the market. This process, invented by Nathan, has been called by him in honor of Hansen, the senior in the art of pure culture, the Han-sena process. Another method to obtain yeast of a high degree of purity is that in which a mixture of yeast is exposed to definite condi¬ tions of temperature, aeration, kind of nutrition, action of light, pressure and motion that one yeast of definite properties develops more and better than the other yeasts in the mixture. If, further, the corresponding layer is removed from the yeast and propagated under the afore¬ said conditions, a pure yeast of a uniform char¬ acter is finally obtained. This process, founded

by Delbrueck of Berlin upon his scientific obser¬ vations in American breweries, was further elaborated by him. An idea of the importance and value of pure yeast culture can be had from the fact that almost all the larger breweries and distilleries employ apparatus for .propagation and endeavor through observing the utmost care. »to protect their yeast against infection. But yeast is not only of great import to the brewer and distiller, but also to the baker, as the qual¬ ity of his wares depends upon the quality of the yeast used, and in consequence thereof a special industry, that is, the manufacture of compressed yeast, has been introduced. Compressed yeast is chiefly made from distillers' yeasts; but in some instances also, beer yeasts, which must be purified and disembittered, are utilized. The price of compressed yeast in comparison to beer yeast is considerably high, but the baker has the advantage that by. using the former his wares obtain a larger size than when the latter is used. The process of fermentation with compressed yeast develops more slowly than with beer yeast, hence the dough requires more time to ripen. Much progress has been made in the compressed yeast fabrication and diverse methods are employed in its manufacture. Many operations must be carefully and accu¬ rately observed in order to obtain a salable product. In the main these operations are : (1) Preparation of a fluid in which the yeast can properly develop, either under simultaneous for¬ mation of alcohol or without the formation of much alcohol; (2) preparation of a mass, in which there is a corresponding amount of vig¬ orous seed-yeast, which is added to the above-mentioned fluid (preparation of the mother-yeast) ; (3) bringing together of the nutrient medium with the stock yeast or ˆsetting® ; (4) reproduction of the yeast with or without simul¬ taneous fermentation; (5) separation of the newly formed yeast from the fluid by skimming, *etc.* ; (6) washing the yeast, or removing the last traces of the nutrient medium; (7) pressing of the washed and separated

yeast mass ; (8) form¬ ing the compressed yeast into cakes of suitable size ; (9) packing of the cakes for the trade and# for shipping.

For some time yeast, especially beer yeast, has been used in medicine, and has been suc¬ cessfully employed partly fresh and partly dried, in tablet form in cases of furunculosis, flemo-nen, acne, psoriasis, and other skin diseases, dyspepsia and partly in diabetes. See Brewing.

YEATS, William Butler, Irish author: b. Dublin, 13 June 1865. He obtained a second¬ ary schooling in England and Ireland, was for three years a student of art, but turned to literature in 1886. Lie was a leader in the foundation of the Irish Literary Society and the National Literary Society of Dublin, and a prime mover in the Irish Independent Theatre, thus becoming one of the chief representatives of the Irish Literary Revival. Yeats has no superior as a lyric poet in his generation, but he is perhaps best known as a playwright. After a few years spent in the literary circles of Lon¬ don and Paris he returned to Ireland about 1896 and devoted himself assiduously to litera¬ ture, drawing largely on Gaelic myth, legend and folklore. In 1903-04 and again in 1914 and 1920 he lectured in the United States on subjects con¬ nected with this movement. With E. J. Ellis

lie edited (The Works of William Blake) (1893) and (Ideas of Good and Evil5 (1903). Among his various further publications in prose and verse are (The Wanderings of Oisin) (1889) ; (John Sherman 5 (1891); (Countess Kathleen 5 (1892); <The Celtic Twilight> (1893); (A Book of Irish Verse5 (1895) ; <Poems> (1895) ; (The Secret Rose> (1897) ; (The Wind among the Reeds 5 (1899) ; (The Shadowy Waters > (1900) ; (Cathleen ni Hoolihan) (1902) ; Hdeas of Good and Evil5 (1903) ; (In the Seven Woods) (1903) ; (Hour Glass and Other Plays) (1904) ; (The King's Threshold5 (1904) ; <Deir-dre5 (1907) ; (Collected Works5 (8 vols., 1908) ; (Green Helmet and Other Poems5 (1910) ; (J-M. Synge and the Ireland of his Time5 (1911); Rlays for an Irish Theatre5 (1912); Responsibilities5 (1914); Reveries5 (1916). Consult the autobiographical Reveries5 (1916) ; Gregory, (Our Irish Theatre5 (New York 1913) ; Kraus, W. S., (William B. Yeats5 (ib.

1904) ; Moore, George, Rail and Farewell5 (3 vols., ib. 1912-14) ; Reid, Forrest, (W. B. Yeats5 (ib. 1915) ; Weygand, Carl, Hrish Plays and Playwrights5 (ib. 1913).

YEDO, yed'a. See Tokio.

YELIZAVETPOL, Russia. See Eliza—

VETPOL.

YELLOW, one of the prismatic colors; the color of that part of the solar spectrum situated between the orange and the green; a bright golden color, the type of which may be found in the field buttercup, which is a pure yellow. United with blue it yields green; with red it produces orange.

YELLOW-BASS, PERCH, *etc.* See Bass, Perch, *etc.*

YELLOW BAYOU, Engagement at, and Banks' Retreat from Alexandria. General Banks arrived at Alexandria, La., on his retreat from Sabine Cross Roads, 25 April 1864. Three days later General Hunter handed him an order from General Grant to close up the campaign against Shreveport without delay, and return A. J. Smith's troops to General Sherman, for operations east of the Mississippi. Hunter re¬ turned with a letter from Banks to Grant with the information that Porter's fleet was above the Alexandria Rapids in a critical situation should the army abandon it. As to the further prosecu¬ tion of the Shreveport and Texas campaign that was not to be thought of, and Banks turned his attention to getting Porter's fleet below the rapids. These falls were a mile in length, filled with rugged rocks, which at the time were nearly bare. As the vessels needed at least seven feet of water to float them, they seemed to be doomed. The plans for their release were suggested and executed by Lieut. -Col. Joseph Bailey of the Fourth Wisconsin Cavalry. The work began on 30 April, nearly the entire army at different times being detailed for the duty; 2,000 to 3,000 lumbermen from Maine and the Northwest cut down trees; others were set to collecting stones, bricks, etc., including whole houses and sugar-mills with all their machinery and kettles, and in a week a dam of timber and stone, with sunken barges in the centre, had been constructed across the river, 758 feet in width, raising the water from five to seven feet deep on the rapids. The work had been prose¬ cuted day and night, the men working up to their

waists and exposed to a hot sun. The water having risen, three

gunboats and another vessel ran down the rapids on the afternoon of 8 May and lay to just above the dam. Early in the morning of the 9th two of the barges broke loose, making a gap in the dam 66 feet wide, through which the water rushed in a great torrent, and the four vessels went down safely through the opening. Six gunboats and two tugs were still above the rapids, waiting for a higher rise in the water. The damage to the dam was partially repaired and wing-dams were constructed on the upper falls, which shed the water from either side into the channel between them. They were completed by the 11th, when the water had risen to six and a half feet. Meanwhile the heavier vessels had been lightened by stripping from them their armor-plates and landing some of the heavy guns, ammunition, chain cables, anchors and provisions, and on the 12th all the vessels had run down the falls and through the dam into deeper water. Meanwhile the Confederates had gotten in Banks' front, south of Alexandria, and taken position on the river 25 miles below the town, where 1 May they captured and sunk a transport, and on the morn¬ ing of the 3d captured a transport, on her way up the river with 425 men of the 120th Ohio on board. Some of the men were killed and wounded, all the officers and 270 men were captured. On the evening of the 4th another transport carrying 400 men of the 56th Ohio, while going down the river, convoyed by the gunboats Signal and Covington, was attacked by artillery and musketry, and the gunboats went to her assistance. About 125 men on the transport were killed and wounded; she was soon disabled; the Covington, after losing more than half her men, was abandoned and burned; the Signal also was disabled and, with the trans¬ port, surrendered. No further attempt was made to run the blockade, and for two weeks Banks' communication with the Mississippi was closed. The fleet having passed below the falls and the river rising insuring a safe passage of all the bars below, the gunboats and transports started on the morning of the 13th of May, and in the afternoon Banks marched out of Alexandria for Simsport. From the start his front, flanks and rear were harassed by cavalry and artillery, and on the 16th he had a severe engagement near Mansura, in which the Confederates were driven from position they had taken across the road to Simsport, which place his advance reached on the evening of the 17th. Here it was found that the pontoon-bridge was too short to span the Atchafalaya and Colonel Bailey again im¬ provised a crossing. The transports were ranged side by side across the river, with the planking of the pontoons laid across their bows, making a level road of about 700 yards, oyer which the main body of the army with its trains and artillery -began passing on the 19th. While this bridge was under construction A. J. Smith's command was drawn up in line at Yel¬ low Bayou, covering the rear of the army and the

crossing of the Atchafalaya. Here Smith's troops were attacked on the afternoon of the 18th by General Wharton's cavalry and General Polignac's infantry. Smith's skirmishers vvere driven in, and at first the Confederates gained some advantage ; but General Mower, who was in immediate command of the Union line, made

a counter-charge with two brigades of infantry and one of cavalry and the Confederate attack was repulsed. In endeavoring to follow up his success Mower was checked by a heavy artillery fire, and withdrew to a thicket, where he formed a new line and brought up artillery. The Con¬ federates .renewed the attack and were repulsed with some loss. The thicket now took fire and made an impassable barrier between the two sides, and Mower withdrew, leaving his dead and wounded on the field. The Union loss was 38 killed, 226 wounded, and three missing; the Confederate loss, 452 killed, wounded and miss¬ ing, of whom 180 were taken prisoners. The army had all crossed the Atchafalaya on the 20th. Banks yielded the command to General Canby, wrho had been ordered to relieve him ; the navy and transports passed into the Mississippi ; and the Red River campaign, one of the most humil¬ iating of the war, had ended. On the return march from Alexandria the Union loss was about 165 killed, 650 wounded, and 450 captured or missing. General Taylor says the Confed¬ erate loss in the entire campaign, from Sabine Cross Roads to Yellow Bayou, was 3,976. Con¬ sult (Official Records, } Vol. XXXIV ; Taylor, destruction and Reconstruction > ; Mahan, A. T., (The Gulf and Inland Waters> ; The Century Company's (Battles and Leaders of the Civil War,> Vol. IV.

YELLOW BOOK OF FRANCE, a gov¬ ernment publication issued regularly since 1861, designed to furnish historians and others with official information. It is similar to the British Blue Book and the German White Book. Several publications of this type were issued by the belligerents during the Great War of 1914-18; many of these were merely propaganda designed to influence public opinion in neutral states.

YELLOW COPPERAS, a name sometimes used for the mineral

copiatite. Crystalliza¬ tion, monoclinic, usually in translucent pearly yellow plates ; hardness, 2.5 ; composition, a basic sulphate of iron; specific gravity, 2.1. Found near Copiapo as an incrustation on coquimbite ; also in other places in South and North America.

YELLOW-EYED GRASS, the common

name of the genus Xyris, composed of rush¬ like plants, with bright yellow flowers pro¬ duced from the summit of a naked scape, conspicuous in sandy bogs in July and August. They are mostly of tropical distribution about the world. The? common yellow-eyed grass (X . flexuosa) has a bulbous root; equitant, linear, twisted leaves ; an erect, two-edged, twisted scape; roundish, acute heads, support¬ ing a number of small yellow flowers pro¬ jecting from between the scales, with perianth and other parts of the flowers in threes. An¬ other species with pretty, large petals (X. caroliniana) , occurs near the sea from Rhode Island southward. X. fimbriata, a plant two feet high, the divisions of its calyx conspicu¬ ously fringed on the wing-margined keel, and plumose at the summit, is found in the pine barrens of New Jersey and southward. The foliage and roots of X. indica, of X. americana, and of X. vaginata, are used for a remedy for leprosy and the itch, in India, Guiana and Brazil.

YELLOW FEVER is an acute infectious disease which is transmitted from the sick to susceptible individuals through the agency of mosquitoes. The yellow fever mosquito (Stegomyia fasciata) is found in tropical and semi-tiopical regions, and especially in lowlands near the sea or in river valleys. This mosquito serves as (<an intermediate host® for the yellow-fever parasite, which is present in the blood of those sick with the disease during the first three days of the attack. After filling itself with blood from a yellow-fever patient a period of 12 days is required for the development of the parasite in the body of the mosquito before it can transmit the disease, by its sting, to an¬ other individual.

These facts have been established by the experiments of a board appointed upon the recommendation of the writer, in 1900, for the study of yellow fever in the island of Cuba. The late Maj. Walter Reed, surgeon United States of America, was president of this board, and the success attained is largely due to his carefully made plans and their intelligent and conscientious execution by himself and his associates.

In a ˆpreliminary note® read at the meeting of the American Public

Health Association, 22 Oct. 1900, the board gave a report of three cases of yellow fever which they believed to be the direct result of (<mosquito inoculations.® Two of these were members of the board, namely, Dr. Jesse W. Lazear and Dr. James Carroll, who voluntarily submitted themselves to the experiment. Dr. Carroll suffered a se¬ vere attack of the disease and recovered, but Dr. Lazear fell a victim to the disease and to his enthusiasm in the cause of science and hu¬ manity. Fortunately no other deaths occurred during the subsequent experiments which Major Reed found it necessary to make in order to establish the fact that yellow fever is, beyond question, transmitted by mosquitoes of the genus Stegomyia, and in no other way. In a report made in May 1901, Major Reed says: (tWe have thus far succeeded in conveying yellow fever to 12 individuals by means of the bites of contaminated mosquitoes.® These experiments were made upon individuals who volunteered to submit themselves to the mosquito inoculations with a full knowledge of the possibility of seri¬ ous and even fatal results. Some of the vol¬ unteers were United States soldiers, and some were Spanish immigrants who had recently arrived in Cuba. Further experiments showed that blood drawn from *a yellow-fever patient during the first three' days of the disease and injected by means of a hypodermic syringe be¬ neath the skin of a susceptible individual gives rise to a characteristic attack of yellow fever in the inoculated individual. But all attempts to demonstrate the specific infectious agent (yellow-fever parasite) in the blood or in the bodies of infected mosquitoes have been unsuc¬ cessful. This is probably due to the fact that the yellow-fever parasite is so small as to be practically ultra-microscopic. This inference is supported by experiments made in Cuba by Assistant Surgeon James Carroll, United States of America, a member of the board heretofore referred to. Dr. Carroll found that when blood taken from the circulation of a yellow-fever patient was passed through a Berkefeldt filter

a small quantity of the filtrate injected under the skin of a susceptible person gave rise to a typical attack of the disease.

The experimental results obtained by Major Reed and his associates have been fully con¬ firmed by several independent investigators, including a board of experts from the Pasteur Institute of Paris, who were sent co Brazil to make researches with reference to the etiology of this disease.

Having ascertained that yellow fever is transmitted from man to man by an intermediate host — mosquitoes of the genus Stcgomyia, Major Reed and his associates conducted a series of well-planned experiments for the pur¬ pose of ascertaining whether the disease may also be propagated, as has been commonly sup¬ posed, by clothing, bedding and other articles which have been in use by those sick with the disease. The results of these experiments were entirely negative. That is, all efforts to com¬ municate the disease to susceptible individuals through the medium of such articles were with¬ out result.
.

In view of what has thus far been said it is evident that the preventive measures which were formerly relied upon to arrest the epidemic ex¬ tension of this infectious disease were either of no avail or of comparatively little value. Isolation of the sick from contact with non-immune individuals is not necessary, but pro¬ tection of the sick, by mosquito-bars, from the bites of mosquitoes is all-important. Disinfec¬ tion of clothing and bedding is of no avail, but the destruction of infected mosquitoes, by sulphur fumigation or otherwise, is an essential measure of prophylaxis. Street cleaning and municipal sanitation generally have no material effect in preventing the extension of this dis¬ ease, except in so far as they result in destroy¬ ing the larvae and breeding places of mosquitoes. Applying the knowledge gained by Major Reed and his associates in a practical way, as above indicated, the medical officers of the United States army stationed in Cuba have been able to completely eradicate yellow fever from the city of Havana, which had been the principal en¬ demic focus of the disease for many years, and sanitarians feel confident that by the application of the same methods the epidemic extension of the disease within the limits of the United States, or elsewhere, may be entirely prevented Thus has yellow fever, which formerly ranked with cholera and bubonic plague,— although having a more restricted-area of prevalence, as one of the most fatal scourges of the human race, been robbed of its power for mischief by the painstaking researches of scientific investi¬ gators. The limits of the present article only permit a brief reference to the history of the disease under consideration. It has a compar¬ atively restricted geographic range, but there is every reason to believe that this might be greatly extended if cases of the disease should be introduced to all

of the regions where the intermediate host (Stegomyia fasciata) of the ˆyellow-fever germ® is found. That the dis¬ ease has pot been introduced into regions re¬ mote from its principal endemic foci is prob¬ ably due to the comparatively brief duration of the attack, to the fact that the infectious agent is only present in the blood during a brief period (three days) and to the circumstance

that it cannot be transmitted in any other way than by inoculation — either directly, as in the experiments of Reed and his associates, or through the medium of an infected mosquito. Epidemics have occurred in the United States at all of our principal seaports on the Gulf of Mexico and on the Atlantic Coast as far north as Boston. It has also invaded many of the Southern States, prevailing as a widespread epidemic in the interior, and has extended up the valley of the Mississippi as far as Saint Louis. It has been epidemic at all the principal seaport cities of the West Indies, of Mexico, of Central America and of South American countries bordering upon the Gulf of Mexico ; also upon the Pacific Coast of Mexico and South America and in the Atlantic-Coast cities of Brazil and also of Argentina. The cities of Havana, Vera Cruz and Rio de Janeiro were long regarded as its principal endemic foci. The climate of these cities is favorable to the survival of the Stegomyia throughout the year. Consequently, when once introduced, the dis¬ ease continued to be propagated through a series of cases, occurring successively without regard to seasons. Thus it was ascertained by the Yellow Fever Commission, of which the writer was a member (1879), that during the 10 years from 1870-79 there was not a single month without some recorded deaths from yellow fever, and this continued to be the case until the disease was eradicated in 1901 by the well-directed efforts of Colonel Gorgas, of the medi- - cal department, United States Army. In his report as sanitary officer of the city of Ha¬ vana for the month of November 1901, he says: ((Last year (1900) we had, during this month, 214 cases and 54 deaths. This year the last case of yellow fever occurred on 28 September ; that is, we have gone over two months without a single case or death belonging to Havana.”

. . (<This result I consider due to the sys¬

tem, introduced last February, of killing infected mosquitoes in the neighborhood of each point of infection as it developed.” The introduction of yellow fever into the previously healthful city of

Havana is recorded by the historian Pezuela, as follows: ((Although Havana is situated on the northern boundary of the torrid zone, it was very justly considered one of the most healthy localities on the island before its invasion, in a permanent manner, by the vomito negro, im¬ ported from Vera Cruz in the summer of 1761. In May there came from Vera Cruz, with mate¬ rials and some prisoners destined for the works on the exterior fortifications of Havana, the men-of-war Reina and America, which com¬ municated to the neighborhood the epidemic known by the name of vomito negro. At the end of the following June there were stationed in this fort nine men-of-war, despatched from Cadiz, and sent to the chief of squadron, Don Entienne de Hevia; they brought a reinforce¬ ment of 2,000 men. More than 3,000 persons succumbed to the epidemic on this, the first ap¬ pearance of the vomito .”

History also records the first introduction of the disease to the city of Rio de Janeiro. The highest medical-authorities in Brazil agree that yellow fever was not endemic in the prin¬ cipal seaports of the empire prior to the year 1849, when it was introduced to the city of Bahia by the North American brig Brazil,

which sailed from New Orleans, where yellow fever was prevailing, ami touched at Havana. Two of the crew of this brig died of yellow fever during her voyage from the latter port to Bahia. Soon after her arrival the disease made its appearance among those who had com¬ municated with the ship. The first case oc¬ curred a few days after the arrival of this brig (3 November). From Bahia the disease was carried to Rio de Janeiro, where during the epidemic season of 1850 it caused a mortality of 4,160.

In regions where the winter temperature is so low as to kill mosquitoes, or render them in¬ active, epidemics of yellow fever terminate upon the occurrence of frost, or of continued cool weather. Under such circumstances the disease is not apt to recur during the succeed¬ ing warm season, except as a result of a fresh importation of a yellow-fever case, from which mosquitoes of the new brood may

become in¬ fected. Thus in the United States, even as far south as the city of New Orleans, a recurrence of the disease after its epidemic prevalence .is probably rarely, if ever, due to the survival of infected mosquitoes from the year before. It has been shown, however, by Major Reed, and by others that infected mosquitoes may survive in a warm room for more than two months. Prior to the Civil War yellow fever prevailed almost annually in New Orleans and was generally believed by the residents of that city to be ((a disease of the climate® beyond the control of any preventive measures. Later, un¬ der a more stringent administration-of quaran¬ tine restrictions, such success was attained by the health authorities in preventing the intro¬ duction of cases of the disease, and conse¬ quently of epidemics, that a complete change occurred in public sentiment and it is now gen¬ erally recognized that the introduction of one or more cases from some foreign seaport — usually Havana or Vera Cruz — is an essential prerequisite for the development of an epidemic in the city of New Orleans. The years of greatest mortality in this city were: 1847,

2,259; 1853, 7,970; 1854, 2,423; 1855, 2,670; 1858, 3,889 ; 1867, 3,093 ; 1878, 4,600.

In 1793 the city of Philadelphia, then a town of about 40,000 inhabitants, suffered a devas¬ tating epidemic, the mortality being about 4,000, or 10 per cent of the population. This city was again visited by the scourge in 1797, but the disease was less extended and less fatal — total mortality, 1,300. Philadelphia again suf¬ fered in 1798, the mortality ‘being 3,645. The disease also prevailed during this year in more Northern seaport cities, although the mortality was comparatively small except in New York, where the deaths numbered 2,080 — Boston 200, Portsmouth 100, New London 81. The disease again prevailed in Boston, Philadelphia, Balti¬ more, Wilmington and Charleston, in the year 1802. Minor epidemics continued to occur almost annually in one or more of our South¬ ern seaport cities until the year 1853, when a fatal and widespread epidemic occurred, in¬ volving considerable areas in the States of Florida, Alabama, Louisiana, Mississippi, Ar¬ kansas and Texas. The epidemic of 1867 was also notable in the annals of this disease, al¬ though the area of prevalence was not so great as in the epidemic of 1853. The disease

prevailed extensively in the State of Texas, causing a mortality of 1,150 in the city of Gal¬ veston alone. In Louisiana the city of New

Orleans suffered the heaviest loss (3,093). The next great epidemic within the limits of the United States occurred in 1873. The States of Florida, Alabama, Mississippi, Louisiana and Texas were invaded. The mortality in the city of New Orleans (225) was comparatively small, but Shreveport lost 759 of its inhabitants, and the disease extended its ravages to Memphis, Tenn., where there was a mortality of about

2,000.

The last great epidemic of yellow fever in the United States occurred in 1878, when 132 towns were invaded in the States of Louisiana, Tennessee, Alabama, Mississippi and Kentucky. The total reported mortality was 15,934, and the number of cases more than 74,000. Yellow fever has never invaded the populous countries of .Asia, which have their own endemic pesti¬ lential maladies. It has been introduced from the West Indies to Spain and to Portugal, but is unknown as an epidemic in other countries of Europe. In Africa it appears to be ende¬ mic on the west coast and some authors believe that this was the original home of the disease. Others contend that it was originally a disease of the West Indies and that its occurrence on the African Coast resulted from the importa¬ tion of cases from those islands. The early historians, Herrera, Oviedo, Rochefort and others, make reference to epidemics among the natives which occurred prior to the discovery of the Antilles, and to fatal pestilential diseases among the first settlers of these islands; but their accounts are not sufficiently exact to en¬ able us to affirm that the disease referred to by them was yellow fever. The west coast of Africa was discovered and colonized to some extent before the discovery of America, but the first authentic accounts of the prevalence of yellow fever on this coast date back only to the year 1778, over two centuries after the first settlements had been established. On the other hand, this very epidemic of 1778 at Saint Louis (Senegal) was traced to importation from Sierra Leone, a portion of the African Coast, which, according to Hirsch, <(appears to be the headquarters of the disease, and the starting-point of its epidemic inroad into the territories lying to the north and south, as well as into the West African islands.®

Rochefort, whose <Histoire naturelle et mo¬ rale des isles Antilles de l'Amerique) was pub¬ lished in Holland in 1558, says of the West Indies : (<The air of all those islands is very temperate and healthy when one is accustomed to it. The peste was formerly unknown there as well as in-China and other places in the Orient; but some years since the islands were afflicted with malignant fevers, which the phy¬

sicians considered contagious. The bad air was brought there by some ships which came from the coast of Africa, but at present we hear nothing more of these maladies.®

It seems very probable that a pestilential malady which prevailed for a time in these usually healthful islands and then disappeared was in fact yellow fever, and that it was intro¬ duced by ships from the west coast of Africa is not at all incredible. Indeed, it almost seems necessary to look for an original endemic focus

of the disease outside of the West Indies, for the reason that, in the comparatively few places where it is now endemic, there is historical evidence to show that there was a first im¬ portation and a previous period of exemption ; while, on the other hand, the conditions upon which endemicity at the present day seem mainly to depend, were formerly unknown conditions arising from the aggregation of pop- . ulation at seaport cities, as at Havana, Vera Cruz and Rio de Janeiro.

In 1879 the writer went to Havana, as a member of a commission appointed by the Na¬ tional Board of Health, for the investigation of questions relating to the etiology of yellow fever. One of the main objects in the appoint¬ ment of this commission was the discovery, if possible, of the specific cause of the disease. The commission was fully equipped with the best microscopical apparatus, and with what¬ ever else seemed necessary to promote the ac¬ complishment of the object in view.

As a result of investigations made at that time and subsequently at Rio de Janeiro in 1887 and in Havana in 1888 and 1889, the writer formulated the following conclusions in a final

report: , , ,

«The specific cause of yellow fever has not

yet been demonstrated.

«It is demonstrated that micro-organisms capable of development in the culture-media usually employed by bacteriologists, are only found in the blood and tissues of yellow fever cadavers in exceptional cases, when culture are made very soon after deaths

Subsequent researches by other investiga¬ tors have not invalidated these conclusions. For while the researches of Reed and his asso¬ ciates have demonstrated the fact that the speci¬ fic infectious agent (<(germ®) of the disease is present in the blood, they have failed, as here¬ tofore stated, to isolate or to recognize this specific infectious agent, and no one else, up to the present time, has been more fortunate. Numerous claims have, however, been made to the discovery of the yellow fever germ.

A claim to the discovery of _ the yellow fever germ was made by Sanarelli, an Italian bacteriologist, who visited Brazil for the pui-pose of making investigation with refer¬ ence to the etiology of this disease. Sanarelli obtained from the blood of a certain proportion of the cases which came under his observation (post mortem) a bacillus which he believed to be the cause of the disease. His standing as a bacteriologist and his published papers relating the details of his experiments led to a general acceptance of his claims by members of the medical profession in Brazil and to some ex¬ tent in other countries. But the researches of Major Reed and his associates have shown that the Bacillus icteroides of Sanarelli is a com¬ mon and widely distributed species which has nothing to do with the etiology of yellow fever, athough it may occasionally be obtained in cul¬ tures from yellow fever cadavers. It was not present in any instance in the blood obtained from patients in the early stage of the disease, when this blood was proved by experimental in¬ oculations to be capable of reproducing the disease in non-immune individuals, nor could it be obtained from the bodies of infected

mosquitoes which has been proved to be cap¬ able of communicating the disease.

Yellow fever is a disease in which immu¬ nity results from suffering one attack, and this immunity usually lasts for many years, or for life. Second attacks may, however, occur, al¬ though this is rare.

The mortality from the disease differs greatly in different epidemics and among differ¬ ent classes and races. It has been asserted that the negro race has a congenital immunity from yellow fever, but this is a

mistake. The sus¬ ceptibility of the negro is, however, much less than that of the white race, and among those attacked the mortality, as a rule, is small. This is shown by the statistics relating to white and black troops in the British service at West India stations. ((While in Jamaica the annual loss among the former amounts to 102 per 1,000 of the mean strength, the deaths among the blacks did not exceed 8 per 1,000. In the Bahamas the mortality of the whites was 59 in 1,000, that of the blacks 5.6 in 1,000® (La

Roche).

In the report of the board of experts ap¬ pointed by Congress to investigate the epidemic of 1878, we find the following remarks: ((Berwick City, 40 cases among colored, no deaths.® ((Morgan City, 21 deaths among colored per¬ sons.® <(Brownsville (Tenn.), of 162 colored cases, 21 died.® “Chattanooga, of 685 cases, 256 whites, 429 colored; of 164 deaths, 118 whites, 46 colored.® <(Decatur (Ala.), of 64 white cases, 28 died; of 168 colored, 21 died.®

Barton gives the following figures, show¬ ing the mortality per 1,000 among different races, and those of the same race from different latitudes, in the city of New Orleans in the great epidemic of 1853. per 1>000

Native Creoles … •••••;/ 8,58

Strangers from West Indies, Mexico, and South

America . 6.14

Strangers from Southern States of the Union . 13.22

Strangers from Spain and Italy . . 22.06

Strangers from Middle States of the Union … 30.69

Strangers from New York and New England States 32.83

Strangers from Western States of the Union . 44.23

Strangers from France… 13

Strangers from British America . c V i q

Strangers from Great Britain .

Strangers from Germany … t

Strangers from Scandinavia . ‘ ns

Strangers from Austria and Switzerland . 220 . us

Strangers from Netherlands . 328.94

There is probably no difference in the sus¬ ceptibility of the sexes, but males are attacked in greater proportion than females, because they more frequently, and often recklessly, visit infected localities. The mortality is, as a rule, considerably greater among males. Ligon, in giving an account of the pestilence at Barba¬ dos in 1647, of which he was an eyewitness, says: <(The cause was unknown; one could not say if the ships of commerce had imported the scourge, or if it came from bad food, marshy water, the intemperance of the colonists, and, above’ all, the great quantity of eau-de-vie which they drank… . It was the most debauched

who perished first, and not one woman died for ten men.® No doubt Ligon was right in ascribing the difference in the mortality of the sexes largely to the difference in their habits, with reference to the use of eau-de-vie. Those who habitually use spirituous liquors are less

likely to recover from an attack than the temperate, and a recent debauch is a recog¬ nized predisposing cause.

The mortality among children is consider¬ ably less than among adults. This applies es¬ pecially to children from 5 to 15 years of age. The mortality among children under five is somewhat greater.

The idea which formerly prevailed in New Orleans and Havana that native-born citizens — “creoles® — have an inherited immunity from the disease is not well founded. Whatever im¬ munity they may enjoy is no doubt, to a great extent at least, due to an attack of the disease

frequently occurring during childhood and usu¬ ally unrecognized.

Hinemann writes with reference to Vera Cruz : ((Until lately the physicians and people of Vera Cruz supported with fanaticism the dogma that natives were absolutely exempt from yellow fever. But the fearful epidemics of recent years (1875, 1877, 1878) have worked a change ; for so many native children and adults suffered, that the truth could no longer be denied that these do not enjoy an absolute immunity.®

In Cuba the dogma that creoles are exempt from yellow fever did not withstand the search¬ ing investigation made by the Havana Yellow Fever Commission of 1879.

Nevertheless the mortality from this disease among the creole population of cities where it has established itself as an endemic malady is comparatively small, and by far the largest quota of its victims is drawn from among the strangers who visit the infected places, or resi¬ dents who have recently located in them. Con¬ sult Camerer, C. B., (Resume of Etiological Factors Concerned in Yellow FeveU (in United States Naval Medical Bulletin, Washing¬ ton, January 1915) ; and (Yellow Fever* (Docu¬ ment No. 822 of the Sixty-first Congress, 3d Session, ib. 1911) ; Manson, Sir P., ‘Tropical Diseases) (1907); Allbutt and Rolleston, Sys¬ tem of Medicine* ; Boyce, Sir R., Report on Yellow Fever in Honduras* (1906) ; ‘Health and Administration in the West Indies) (1910) ; ‘Bulletins of the United States Fever Institute) ; Annales de l’lnstitut Pasteur (January

1906).

Geo. M. Sternberg,

S ometime Surgeon-General, United States Army.

YELLOW-HAMMER, originally, in Great Britain, the common yellow bunting (Emberiza citrinella), which is yellow above, varied by dark-brown patches, the under parts being pure yellow, and the wing-feathers dusky black, with brown or yellow edges. The flanks are of a brownish hue. The nest is placed on the ground, and is composed of grasses, moss, roots, etc., and lined with hair. When fat, in the autumn, the birds are much in request for their flesh. They are regarded with super¬ stitious dislike in some districts, and their eggs are broken by boys whenever they are dis¬ covered, a foolish saying being current that each egg contains a drop of “devil’s blood.® The

birds are caught and fattened for the table in Italy. In the United States the term is mis¬ applied to the goldenwinged woodpecker or highhole. See Flicker.

YELLOW JACK, a quarantine flag dis¬ played at naval hospitals and from vessels in

times of epidemics (see Quarantine). Also a common name for yellow fever.

YELLOW-JACKET, any species of small American wasp, marked with black and yellow stripes. See Wasp.

YELLOW-RATTLE, a scrophulariaceous

plant Rhianthus crista galli, an annual herb with opposite, lanceolate, sessile leaves and terminal, one-sided, leafy-bracted spikes of yel¬ low flowers. The corolUs are two-lipped, with an arched upper lip, and three-lobed lower one. The capsule is orbicular and flat with several round-winged seeds, which rattle about the pod when shaken, and have given rise to other descriptive names, such as rattle, rattle-box, penny-rattle, *etc.* In European fields it is very abundant and becomes a pest, since it is parasitic and attaches itself by suckers to the roots of living grasses.

YELLOW RIVER. See Hwang or Hoang-ho.

YELLOW-ROOT, either one of two ra-nunculaceous plants, one being known as the shrub yellow-root (Xanthorrhiza apiifolia) . Its long roots and rootstock, leaves, bark and pith are bright yellow, and the root is ex¬ tremely bitter and astringent, and is used as a tonic. This yellow-root grows in the south¬ ern United States and has pinnate leaves clustered at the top of a short stem, giving the plant a fern-like aspect. The foliage turns to gorgeous scarlet and orange in the autumn. The five-parted flowers are wine-colored. The other yellow-root (Hydrastis canadensis) is known also as golden-seal, or yellow puccoon; its root is a tonic drug. The plant has abund¬ ant reniform, palmately-lobed, basal leaves, and two cauline ones, the uppermost of these subtending the solitary, greenish-white flower. The puccoon is found in woods in the eastern United States and furnished the Indians with a favorite yellow dye.

YELLOW SEA, or HWANG-HAI,

hwang-hi', a gulf of the Pacific Ocean, extend¬ ing between the northeast coast of China and the western coast of Chosen or Korea, north¬ ward to Manchuria; length about 620 miles; greatest breadth about 400 miles. North and northwest it terminates in the gulfs of Liao¬ tung and Pe-chi-li, the latter of which receives the waters of numerous large and important rivers. On the east coast are numerous groups of islets, part of them included in the Korean Archipelago. The Yellow Sea is very shallow, having in no part a greater depth than 300 feet, and is so named from the muddy lemon-yel¬ low color of its waters near the land, caused by the large quantity of alluvium continually brought into it by the Hwang-ho or Yellow River, and the Yangtse Kiang, which gradu¬ ally tends to decrease its depth. Sand banks are numerous off the Chinese coast, and there are several islands off the Chosen coast.

YELLOW-WEED. See Dyer's Rocket.

YELLOW-WOOD, a name applied to sev¬ eral timber trees and shrubs, including Cladras-tis lutea. This is an uncommon leguminous tree, known in cultivation as the virgilia, American or Kentucky yellow-wood, and is indigenous to the United States from Ken-

tucky southwards. The yellow-wood attains to a height of 60 feet, with a trunk some two feet in diameter. It usually divides into two or three limbs not far from the ground, which ramify into slender and somewhat drooping branches, forming a broad, graceful head. In winter the smooth, silvery-gray bark of its main trunk and red-brown of its delicate sprays are very interesting. The limbs, how¬ ever, are brittle and ibrealc easily. The foliage of the yellow-wood consists of light-colored, odd-pinnate leaves, turning to clear yellow in autumn ; and fragrant panicles a foot or more long, of flowers, pea-like and milk-white, droop from the ends of the branches. The fruits are linear legumes. A yellow dye was made from the hard golden-tinted wood, which is used for fuel and occasionally for gun-stocks. The yellow-root (q.v.) {Xanthorrhiza) ; the Osage orange (Toxylon pomi-ferum), a favorite hedge plant; fustic, a dye¬ stuff yielded by the wood of

Chlorophora tinctoria, a West Indian tree with oblong, taper-pointed leaves and an edible fruit; and Schaef-feria frutescens, the valuable boxwood of the West Indies, are all known as yellow-woods. Australian yellow-woods are the Acronychia Icevis, Hovea longipes and Xanthostcmon pachysperma; and the white teak, or Queens¬ land yellow-wood (Fl'indersia oxleyana) , also called light yellow-wood, is a tall, slender tree with many branches. Another tree called light yellow-wood is the Rhus rhodanthema, bearing large red flowers, and growing to 80 feet in height. It is native to Queensland, and yields a fine cabinet-woo'd, close-grained, capable of taking a fine polish, sound and durable. Natal yellow-wood is a tree of about the same height (Podocarpus elongata), with a close-grained wood which will not bear exposure out of doors, but is extensively used for furniture and interior house-building. The bastard yellow-wood of the same region is P. pruinosa, with a tough durable wood, also used in house build¬ ing; still another species (P . latifolia), an evergreen about 80 feet high, having an aro¬ matic wood, is the East Indian yellow-wood. This same name is given to the satin-wood (Chloroxylon swietenia) . The prickly yellow-wood is Zanthoxylum caribceum (q.v.).

YELLOWBIRD, any_ of several familiar birds prevailingly yellow in plumage. In the United States the name belongs to two small garden-visitors. One is the goldfinch (q.v.), and the other often distinguished as (isummer) yellow-bird is a warbler (Dendroica cestiva') , common in summer throughout all the eastern United States and Canada. It is greenish yel¬ low, brightest on the breast, where it is diversi¬ fied by salmon-colored streaks. The song is a melodious trill, often heard among the roses and lilacs of the garden, where the bird is likely to fix its deep nest of hempen shreds in an upright fork. The eggs are pink, with reddish and purplish dots. This nest is one of the receptacles most often chosen by the cow-bird for its surreptitious egg; but the yel-lowbird frequently defeats the intruder's ob¬ ject, by building a new nest on top of the first one,' burying the strange egg.

YELLOWHEAD, a yellow-headed black¬ bird. See Blackbird.

YELLOWLEGS, a genus (Totanus) of birds of the family Scolopacidce , large snipe¬ like species with cross-barred tail-feathers, well-marked gape, long, slender non-sensitive bill and greenish yellow legs, from which they take their common names of yellowlegs, greenshanks, etc., while, because of their constant noisy calling, they are known to gunners as tattlers or tell-tale snipe. The greater yellow¬ legs (T . melanoleucus) inhabits during some part of the year nearly the entire

American continent and breeds chiefly north of the United States, in which it is well known as a coast¬ wise migrant. It is 13 to 14 inches long, with a spread of wings of two feet. Above the color is a mixed dark ashy, varying with the age and season, below white streaked and bar¬ red with ashy black. Although chiefly a mari¬ time bird, this species also migrates through the Mississippi Valley and is found about the lakes of the interior; and even along the coast it is fond of frequenting the fresh and brackish pools on the meadows, where it finds an abundance of food in the small fishes, mollusks, shrimps and crabs. It also eats worms, insects and the spawn of fishes, which it catches with great facility. During the migrations, which occur in April and from late August to Octo¬ ber through the greater part of the United States, it is commonly seen in small parties of six or eight, often consorting with other species of tattlers, willets and godwits. The flight is swift and often elevated, and in alight¬ ing in pools in which they wade leg-deep they keep the wings raised until well settled. They are extremely alert and noisy and thus pro¬ voke the indignation of gunners. The nest is a grass-lined depression on the ground and the four, pyriform, greenish yellow, brown and gray blotched eggs measure upward of two inches in length. The lesser yellowlegs (T. flavipes) is in form and colors nearly an ex¬ act miniature of the last, but is only 10 or II inches long, with a spread of 20 inches. Its range and habits are similar to those of the larger species, but it is much commoner in the East, flies in larger flocks and is better known to shooters of shore-birds. The eggs are more variable, the ground-color being clay or buff, and the markings usually very bold and distinct. The European greenshank (q.v.) occasionally straggles to our shores and may be distinguished from T. melanoleucus, which it resembles in size, by the distinctly green color of the lower legs and feet. About a dozen related species are found in other parts of the world and the genus Hclodromas, containing our solitary and green sandpipers, is closely allied. For methods of shooting see Sandpiper.

YELLOWPLUSH PAPERS, The, a

series of satirical papers by William M. Thackeray, which appeared in Fraser's Maga¬ zine in 1837-38, as (The Yellowplush Mem¬ oirs, > and in book form in 1841 in the volume entitled (Comic Tales and Sketches. }

YELLOWS, a disease of the peach (q.v.).

YELLOWSTONE, formerly SUBLETTE, a lake in the Yellowstone National Park (q.v.), at the northeast base of the Rocky Mountain

range. It has an elevation of nearly 7,800 feet above sea-level. It is irregular in form, hav¬ ing extensions called West Arm, South Arm

and SouthEast Arm. The Yellowstone River flows through the lake, or as sometimes given, the lake is an expansion of the river. It is about 20 miles long and 15 miles wide.

YELLOWSTONE, a river which has its rise in the Shoshone Mountains, in the north¬ western part of Wyoming, near lat. 44° N. It flows north, entering the Yellowstone National Park (q.v.) at the southeast corner, and passes through Yellowstone Lake, which is usually called an expansion of the river. From the lake the course is northeast, east, then northeast to the Missouri River, which it enters at Buford, on the boundary between Montana and North Dakota. The total length of the stream is about 1,000 miles. It is navi¬ gable for nearly 800 miles from its junction with the Missouri. The largest tributaries come from the south, and are Big Horn, Powder, Rosebud and Tongue rivers. The Grand Canon of the Yellowstone (see Yel¬ lowstone National Park) is one of the wonderful sights in a region of wonderful scenery.

YELLOWSTONE NATIONAL PARK,

a government reservation in the northwestern part of Wyoming extending into Idaho and Montana, about 11 miles along the western boundary of the park and into Montana, about three miles along the northern boundary. In 1872 Congress set apart 3,575 square miles as ((a public pleasure ground and a game pre¬ serve.® In 1891 a tract of nearly 2,000 square miles was added to the east and south, making the total area 5,575 square miles. The mean altitude of the plateau portion is 7,800 feet. The ˆContinental Divide® passes through from the southeast to the northwest, and the ffRocky Mountain Divide® through the western part. Surrounding the park are numerous snow-clad mountains; on the south are the Shoshone Mountains, the Big Game and Teton ranges, on the east an extension of the Shoshone and on the southwest the Teton Range, the Big Bend Ridge on the west, and the Gallatin Range, part in the park, on the northwest. Some of

the high peaks on the east are Index, 11,740 feet; Saddle Mountain, 10,676; Sunlight, 10,- 678; Fortress Mount, 12,073 and Ishawooa Cone, 11,840. Within the limits of the park is the Absaroka Range on the eastern border, with numerous vast peaks ; as Table, Humph¬ rey, Schurz, Langford, Chittenden, Cathedral and Stevenson. In the northeast and inside the Absaroka Range, are the Specimen Ridge and the Mirror Plateau. In the northern and southern parts of the park are lofty elevations; Mount Holmes of the Gallatin Range and Bunsen Peak are among the highest. In the southern part of the park is Sheridan Moun¬ tain, 10,385 feet high, the highest point of the Red Mountains. This elevation was named in honor of Philip H. Sheridan. A large part of the peak is formed of porphyry of a purple-pink color. Mount Washburne in the north is noted as the peak from which large portions of the park may be seen. It was named in honor of H. D. Washburne, who explored this region in 1870. There are over 20 high peaks within the limits of the park. The central plateau is composed of vast quantities of lava, in some places 2,000 feet deep. The Absaroka Range

are made up of volcanic rocks, and nearly every part of this peculiar range shows the marks of having gone through a period of volcanic action. Sheridan in the south and Washburne in the north have been active volcanoes. Between Yellowstone and Sho¬ shone lakes is a volcanic ridge about 225 feet in height. Six miles from the Grand Canon of the Yellowstone is Sulphur Mountain, an im¬ mense mound of pure sulphur crystal with a number of steaming springs at its base.

Rivers and Lakes. — The ˆContinental Di¬ vide® marks the land-line of separation of the waters of the Atlantic and the Pacific. The headwaters of several large rivers are in the park; Yellowstone, Snake, Lewis, Madison and Shoshone are some of the streams which have headwaters here. The Yellowstone River (q.v.), Missouri River's longest tributary, rises or passes through Yellowstone Lake, for a stream which enters the lake on the opposite side is, also, called Yellowstone. The Grand Canon of the Yellowstone is one of the won¬ ders of this ((Wonderland.® Its walls on one side are 2,000 feet, and on the other side there is a gradual descent half way down of sliding cinnabar and other delicately tinted chalky for¬ mations, broken at intervals by towering pin¬ nacles of mineral rock, which stand out in bold relief against the brilliant background. These pinnacles take on many fanstastic forms, in¬ spiring the delusion that one is looking down upon the decaying splendors of antique archi¬ tecture. From the base of these solemn senti¬ nels, the descent to the water line is as

abrupt as from surface to torrent on the opposite side. Far below winds the foaming current of white-crested wavelets spread1 out like a silvery band. Though the channel is 160 feet wide, it ap¬ pears no larger than a brook. The whole vol¬ ume of water breaks over a ledge, in the centre of which stands a huge black bowlder which divides the waters for a few feet, and again uniting they fall 370 feet. Showers of spray are sent up, which when touched by the sun¬ light look like innumerable and varied colored jewels. Another falls above the main water¬ fall is of considerable height and great beauty, and above are a series of cascades. The Grand Canon is about 10 miles long. Tower Falls are so named on account of a mass of stone, about 100 feet from the verge of the precipice. The water below flows over a ledge about 150 feet high, and falls in solid sheets. Belcher River drains the southwestern part of the park. Madison, another tributary of the Missouri, has its source at the confluence of the Gibbon and Fire Hole rivers in the western part. In the northwest is the Gardiner River, a branch of the Yellowstone. Yellowstone Lake (q.v.), the largest body of water in the park, is said to have 300 miles of shore line, but it never has been fully explored. It certainly is the gem of the lakes, set as it is in a series of mountain peaks, with pine-clad slopes and snow-crowned summits. The monotony of its crested waves is broken by a verdure-clad is¬ land, Frank Island, giving it the appearance in summer of an emerald in a setting ot bril¬ liants. Shoshone Lake, next in size, is west and Heart Lake is south of Yellowstone. North of Yellowstone is a group of small lakes, the largest of which is White Lake.

They are northwest of Pelican Cone. Near Mount Chittenden is Turbid Lake.

Geysers and Hot Springs. — The Yellow¬ stone Park is famous for its numerous geysers ; it is one of the four regions in the world where

there are groups of large geysers. There are three geyser basins located in the valley of the Fire Hole River, at an average altitude of 7,000 feet above the sea-level ; Upper Geyser, Middle Geyser and Lower Geyser. The Upper, or Great Geyser basin, is the most ac¬ tive. Here are located the great spouters, con¬ spicuous among which are the Giant, Giantess, Castle, Saw Mill, Bee Hive, Lion, Grand Cor¬ net and Cub, and last, but by no means least, Old Faithful. They are all appropriately named. The Giant and Giantess are so called on account of the immense size of their craters and the force of their action; the Bee Hive and Castle because of the peculiar formation of their cones; the Saw Mill and Lion from the roaring noise they make when in a state of activity; and Old Faithful on account of the regular discharges of steam and water at in¬ tervals of 64 minutes. One can rely absolutely on Old Faithful giving an exhibition every hour and four minutes. The stated intervals of activity have not varied in the memory of the oldest visitor to the park. Other geysers are variable in the time of their action; all are subject to changes. The Bee Hive is be¬ coming more active every season. It gives an exhibition two or three times every 24 hours. The Giant and Giantess and Castle cannot al¬ ways be relied upon, but they make a magnif¬ icent display when in action. The Giant averages an exhibition about every six days and the Giantess about every 11 days. Near the maine cone of the Giant Geyser is a small fissure, which seems to do for the Giant what an escape pipe does for a large boiler. When the chambers of the main crater become fully charged, short puffs of steam come hiss¬ ing through this fissure. The grandeur of the spectacle which follows passes description. The interior forces seem to combine in mak¬ ing a display of power,. Accompanying a stunning shock, caused by the volume of steam escaping, a column of water about 10 feet in circumference is thrown up to a considerable height, and emits a dense cloud of steam, so that it is difficult to see what appears in the centre to be a massive marble pillar. But the steam soon, floats away and a column of great beauty stands revealed in all its grandeur. In a few seconds conies another change, the col¬ umn is shattered, the law of gravity asserts itself and the great body of water which went up in a grand column falls in showers of spray. The greater part of the water returns to the crater, and the overflow is carried off by Fire Hole River, a stream well named, as it flows rapidly through three basins fed by many boiling springs and numerous gey¬ sers. ,

There are no cone geysers in the Middle Geyser basin. The great wonder of the Mid¬ dle basin is ˆHell's Half-Acre.® This is located on the bank of Fire Hole, and is a steaming abyss, about 30 feet deep, in a lime¬ stone formation. Four or five times each day, at irregular

intervals, it gives most astonish¬ ing exhibitions. A short distance from <(Hell's

Half-Acre® is a boiling lake, the waters of which are a beautiful blue. The blue liquid-overflow winds over formations which for years have been changing in form and color, making a sight the like of which is nowhere else in the world. The reflection of the trees and hills in the colored water adds to the picturesque beauty of the scene. The ((Devil's Paint Pot® is a boiling caldron of many colored clays, which bubble and steam and change their colors in a way most interesting. The Mammoth Hot Springs are in the north¬ ern part of the park, not far from Cinnabar, the railroad station in Montana. They are somewhat similar to the springs in the Fire Hole basin. The deposits left by the water have built up scalloped terraces. Some of the results of their activity exist in a marked degree on the banks of the Gardiner River. There are places where the water from the geysers is no longer changing the terrace for¬ mations, and which seem to be over caverns as indicated by the sound of footsteps. In some parts caverns have been explored, and found to contain many beautiful specimens of stalagmites and stalactites. The springs of this locality are as varied in color and form as in activities. The ((Goddess of Liberty® is a mass of limestone, 40 or 50 feet high, and shaped like the cap of the Goddess of Liberty. The Mud Geysers, north of and near Yellow¬ stone Lake, are what their name indicates. At irregular intervals mud and water are shot up quite a distance. The slimy substance falls on the dead cedars which have been killed by the hot substance ; but that ever¬ green cedars grew here shows that vegetation existed long befbre the present conditions. There are geysers near Heart Lake and in other parts of the park. There are nearly 100 active hot springs and geysers within the park. The geysers change, some becoming extinct and new ones appearing. In 1878 a large gey¬ ser made its appearance in the Norris basin, near the headwaters of the Madison River. Hot springs are found everywhere in the park; on mountains, in valleys, in the beds of lakes and rivers, near canons and near cold water springs. They vary in size, some cover acres, others only inches of surface. There are also a large number of mineral springs and numerous springs of clear cold water. The whole park and much of the adjoining region are volcanic.

Climate. — The climate is not as severely cold as in other parts of the Rocky Mountain region of the same altitude. The winter season practically begins with September or the last of August. The mean temperature in January is about 20° ; occasionally the temperature

falls to 40° below zero. The summers are short; vege¬ tation begins to grow in May and in July has reached its most luxuriant state. In the last of August the change from summer to winter is usually sudden. In July the mean temperature is 62° ; sometimes in summer the temperature rises to 96°. A hot day in summer may be fol¬ lowed by a cold night, even frost appearing. On the plateau the average annual rainfall is 20 inches.

Flora. — Nearly all the park area is covered with forests, chiefly composed of coniferae. The treeless regions are the summits of the high

mountains, the marshy bottoms, and the steep rocky slopes. The black pine is the most com¬ mon ; in some places there are forests composed almost wholly of black pine {Pinus Murrayana) , which here do not attain any great size. The balsam is found on the high plateaus, and varie¬ ties of fir and spruce are abundant. Forests exist at an elevation of 9,700 feet. Grasses are found on the plateaus and the herbaceous vege¬ tation found in the Rocky Mountains. Above the timber line the vegetation is about as in other parts of the summits of the Rocky Moun¬ tains. The gentian is one of the favorite flow¬ ers of this section. Near the hot springs the vegetation is affected by the overflow and other causes; it is stunted and in some places has been killed entirely. Petrified trees are found in the northwest.

Fauna. — The wild animals of the park are protected by government laws and as a conse¬ quence are becoming more numerous than in other parts of the Rocky Mountains. A herd of buffalo is one of the features of the place. Another wild herd numbering about 50 indi¬ viduals is glimpsed occasionally. The animals found here are deer, antelopes, elk, mountain lions (pumas), beaver, black and brown bears and moose. Sheep are found on the high lands. Grouse is found in some parts, but there are not many birds in this region. Fish abound; trout are in many streams.

Government and Improvements. — Since 1872 the government has

had entire control of a portion of what is now the Yellowstone Na¬ tional Park and later took control of additional lands, and now has entire jurisdiction over all the park. The administrative officials are under the Secretary of the Interior. An army officer is the superintendent in direct charge and he has as his aids a detachment of Federal troops. On 1 July 1900 the Secretary of the Interior gave to the public the following instructions :

The following rules and regulations for the government of the Yellowstone National Park are hereby established and made public pursuant to authority conferred by section 2,475, Revised Statutes, United States, and the act of Congress approved 7 May 1894:

(1) It is forbidden to remove or injure the sediments or incrustations around the geysers, hot springs or steam vents ; or to deface the same by written inscription or otherwise ; or to throw any substance into the springs or geyser vents; or to injure or disturb, in any manner, or to carry off any of the mineral deposits, speci¬ mens, natural curiosities or wonders within the park.

(2) It is forbidden to ride or drive on any of the geyser or hot spring formations or to turn loose stock to graze in their vicinity.

(3) It is forbidden to cut or injure any growing timber. Camping parties will be al¬ lowed to use dead or fallen timber for fuel.

(4) Fires shall be lighted only when neces¬ sary and completely extinguished when no longer required. The utmost care should be exercised at all times to avoid setting fire to the timber and grass and any one failing to comply therewith shall be punished as prescribed by law.

(5) Hunting or killing, wounding or captur¬ ing of any bird or wild animal, except danger¬ ous animals, when necessary to prevent them from destroying life or inflicting an injury, is

prohibited. The outfits, including guns, traps, teams, horses or means of transportation used by persons engaged in hunting, killing, trapping, ensnaring or capturing such birds or wild ani¬ mals, or in possession of game killed in the park under other circumstances than prescribed above, will be forfeited to the United States, ex¬ cept in cases where it is shown by satisfactory evidence that the outfit is not the property of the person or persons violating this regulation, and the actual owner thereof was not a party to such violation. Firearms will

only be permitted in the park on written permission from the super¬ intendent thereof. On arrival at the first station of the park guard, parties having firearms will turn them over to the sergeant in charge of the station, taking his receipt for them. They will be returned to the owners on leaving the park.

(6) Fishing with nets, seines, traps or by the use of drugs or explosives, or in any other wray than with hook and line, is prohibited. Fishing for the purposes of merchandise or profit is forbidden by law. Fishing may be pro¬ hibited by order of the superintendent of the park in any of the waters of the park or limited therein to any specified season of the year, till otherwise ordered by the Secretary of the In¬ terior.

(7) No person will be permitted to reside permanently or to engage in any business in the park without permission, in writing, from the Department of the Interior. The superintendent may grant authority to competent persons to act as guides and revoke the same in his discretion and no pack trains shall be allowed in the park unless in charge of a duly registered guide.

(8) The herding or grazing of loose stock or cattle of any kind within the park, as well as the driving of such stock or cattle over the roads of the park, is strictly forbidden, except in such cases where authority therefor is granted by the Secretary of the Interior.

(9) No drinking saloon or bar room will be permitted within the limits of the park.

(10) Private notices or advertisements shall not be posted or displayed within the park, ex¬ cept such as may be necessary for the con¬ venience and guidance of the public, on build¬ ings on leased ground.

(11) Persons who render themselves obnox¬ ious by disorderly conduct or bad behavior, or who violate any of the foregoing rules, may be summarily removed from the park, and will not be allowed to return without permission, in writ¬ ing, from the Secretary of the Interior or the superintendent of the park.

Any person who violates any of the fore¬ going regulations will be deemed guilty of a misdemeanor and be subjected to a fine, as provided by the act of Congress approved 7 May 1894, <(to protect the birds and animals in Yel¬ lowstone National Park and to punish crimes in said park, and for other purposes,® of not more than $1,000, or imprisonment not exceeding two years, or both, and be

adjudged to pay all costs of the proceedings.

Prior to 1870 little was known about the re¬ gion now included in the park. In 1870 H. D. Washburne, surveyor-general of Montana, and G. C. Doane, an army officer, explored this re¬ gion and gave the first report of the wonderful springs and geysers. In 1872 the government sent Ferdinand V. Hayden, United States geolo¬ gist, and a number of assistants, to explore this

Yellowstone Falls

Bridal-veil Fall

region. The place is visited annually by thou¬ sands of tourists and accounts of this wonder¬ ful park have been published in all languages. The park is reached by the Chicago, Burlington and Quincy Railroad, which operates to Cody, Wyo., thence by stage to the eastern part of the park. The Northern Pacific takes the traveler to Gardiner, Mont., to the north of the Park, and the Oregon Short Line Railroad reaches the western border at Yellowstone, Mont. Consult Wonderland , an annual published by the Northern Pacific Railroad; Chittenden, Yel¬ lowstone National Park,* with bibliography (Chicago 1915) ; Hague, (Geological History of Yellowstone National Park) (Department of the Interior, Washington 1912) ; Weed, <Geysers) (ib. 1912) ; Knowlton, (Fossil Forests of the Yellowstone National Park*

(ib. 1912) ; Rich¬ ardson, (Wonders of Yellowstone) ; United States Geological Survey; (General Informa¬ tion regarding Yellowstone National Park > (annually, Department of the Interior, Wash¬ ington).

YELLOWTAIL, or BLANQUILLO, a

trachinoid fish (Canlolatilus princeps) of the coast of Southern California and southward, allied to the Atlantic tilefish (q.v.), which reaches a length of 40 inches. It abounds about rocky parts of the coasts, is good food and in¬ teresting as a gamefish. Several other fishes in various parts of the world are called yellow-tails, in reference to the yellow or orange color of the tail fin.

YELLOWTHROAT. See Maryland Yel—

LOWTHROAT.

YEMASSEE, The, (The Yemassee, a Ro¬ mance of Carolina) (1835), one of the earliest and on the whole perhaps the best of the novels of William Gilmore Simms, deals with the little-remembered Yemassee War of 1715 in a man¬ ner still effective after all the intervening changes of fashion in romance. Much of the material indeed recalls the older romantic com¬ monplaces : the aspen-like heroine Bess Mat¬ thews ; Gabriel Harrison, irresistible in love and war, who turns out to be the Palatine Charles Craven, capriciously masquerading; bloody, swaggering pirates ; Indians as cruel as eloquent; and the accustomed paraphernalia. of raids and sieges and powwows and heroics. But along with these are such solid realities as Hector, the negro slave, obviously studied from life as Simms knew it, and Mrs. Gra}rson, the settler's wife, too hard and strong to be a mere heroine. Above either romantic commonplaces or normal realities stands one episode so powerfully conceived and handled that it ought to have a secure place in the world of the imagina¬ tion — the episode in which Matiwan, devoted Indian mother, kills her son Occonestoga in order that he may not suffer the disgrace which his tribe has already decreed for him. The book is packed with varied adventure, breathlessly recounted in a style often turgid and verbose but capable at times of dramatic economy and intensity. It is accurate as to topography and is steeped in that traditionary lore of . South Carolina upon which Simms drew for his hap¬ piest successes.

Carl Van Doren.

YEMASSEE WAR. See Colonial Wars in America.

YEMBO-EL-BAHR, yem'bO-el-bar, Arabia. See Yambo.

YEMEN, Arabia, a division occupying the southwest angle of the peninsula, and known both to the ancients and moderns as Arabia Felix (Arabia the Happy), from a mistransla¬ tion by Ptolemy of Yemen, which does not signify happy but the land lying to the right of Mecca. Yemen, in the widest sense, is bounded on the west by the Red Sea, on the south by the Gulf of Aden, on the north by Hejaz and Nejd, and on the east by Hadramaut. It comprises two regions physically distinct; the Tehama or Lowland, lying between a chain of mountains which extends throughout the country and the west coast; and an elevated mountainous tract to the eastward of the former. The Tehama varies in breadth from 10 to 30 miles, and is a barren desert wherever it is not irrigated by the mountain streams. The mountains rise abruptly from the desert plain, enclosing valleys of great luxuriance. The tableland in the interior has an estimated elevation of 4,000 feet, and some of its moun¬ tain groups, as Saber, south of Taes, attain a height of 7,000 to 8,000 feet. The loftiest of thgse mountains are covered with forest to the summit, and the tableland abundantly furnishes coffee, dates, senna, tobacco and other produc¬ tions of rather a warm temperate than a torrid region. Its approximate area is 77,200 square miles. Yemen, taken collectively, still bears un¬ mistakable traces of its ancient superiority in wealth and civilization. In its numerous .well-built towns are many rich merchants, while in the well-populated rural districts the peasantry are generally in easy circumstances. There are two great schools or universities, one at Zebid for Sunnites, and another at Damar for the Ze'ide. The principal towns are Sana, the capi¬ tal, Mocha, and Aden, which last is now in the possession of the British. Pop. 750,000. See European War; Turkey; Hejaz.

YEN (Chinese, Yuen, a round thing), a Japanese coin issued in 5, 10, and 20 yen pieces (gold). A gold yen is equal to 49.8 cents in United States gold.

YENIKALE, yen-e-ka'la, Strait of, called also STRAIT OF KAFFA and STRAIT OF KERTCH, Russia, connects the Black Sea with the Sea of Azov ; it is about 25 miles long and from two and one-half to 20 miles broad, but in some places is so shallow as to leave a chan¬ nel of little more than two fathoms deep. The channel has been dredged and has now a depth of 24 feet.

YENISEI, yen-e-sa/e, Siberia, the longest river of the region, formed by numerous streams from the mountain ranges bordering China and Russia. It has at first a circuitous, and then an almost direct northward

course of about 3,260 miles, finally reaching the Arctic Ocean through the long estuary, and gulf of the same name. Its breadth varies from 3,000 feet to 14 miles in its estuary which is 140 miles long, and its depth varies from 11 to 90 feet. The area of its basin is estimated at about 1,000,000 square miles. . A canal connects it with the Ob. The principal towns on its banks are Minusinsk, Krasnoiarsk, Yeniseisk and Turukansk; it is navigable to the last-named town for large vessels. The waters of the

Yenisei are clear and rich in fish. They are navigated by paddle steamers, drawing barges, and by a number of five or six cornered flat-bottomed boxes which convey flour down stream, and are broken up at their destinations. The Yenisei receives from the right the Upper Tunguska or Angara (the outlet of Lake Bai¬ kal), the Irkut, Middle Tunguska and Lower Tunguska. Nordenskj old's voyage in the sum¬ mer of 1875 from Tromso to the mouth of the Yenisei opened up a trade by sea with northern Siberia, in which a number of vessels are now engaged, finding six weeks in summer when the passage to and from the Yenisei can be made with little difficulty. The Yenisei is ex¬ ceeded in length by the Amazon, the Nile and the Mississippi-Missouri. It is obstructed by ice for almost six months at Turukhausk and for about seven months at Krasnoyarsk, at which point the river is crossed by the Trans-Siberian Railway.

YENISEISK, yen-e-sa'ik, Siberia, (1) a town in the government of the same name on the left bank of the Yenisei, 200 miles north of Krasnoyarsk. It has several churches, a mon¬ astery, museum of natural history and archaeol¬ ogy and a public library. It is in the northern gold-mining region, has a customhouse, an ex¬ tensive 'trade, particularly in furs, and an an¬ nual fair. Pop. about 13,000. (2) A province

in the government of Irkutsk, bordering on the Arctic Ocean, bounded east by Yakutsk and Irkutsk, south by Mongolia, and west by Tomsk; area, 987,186 square miles; capital, Krasnoyarsk. The south part of the province is occupied with the Altai Hills and their off¬ sets. In the

Yenisei valley considerable tracts are under tillage, but north of the town of Yeniseisk this is succeeded first by pasturage, then by stretches ever more and more desolate, to the frozen tundras. The chief river is the Yenisei. Smaller streams are the Taimyr, Ka¬ tanga and Anabar, which, like the Yenisei, form great gulfs at their mouths. The gold wash¬ ings of Yeniseisk occupy 12,000 to 15,000 men and several thousand horses. Of the native tribes, who live by hunting, fishing, and trade in fur, the chief are Samoyedes and Tungus. The mean annual temperature ranges from 8° to 31° F. In recent years flax-growing has in¬ creased. There are extensive and valuable for¬ ests, in which much damage is wrought annually by fires. Pop. 970,800. Consult Martianor, N., (Materials for a Flora of the Minusinsk Re-gion5 (in Trudy of the Kazan Society of Natur¬ alists, Vol. XI, 3, 1882 and Radlov, W., (Aus Sibirien* (2 vols., Leipzig 1880).

YEQ, yo>, Sir James Lucas, . English naval officer: b. Southampton, Hampshire, 1782; d. at sea, 1818. Entering the navy at 11 he was pres¬ ent at the siege of Genoa in 1800, and while in command of a force of English and Portuguese captured Cayenne, French Guiana. In 1813 he became commander-in-chief of the English naval force of the Great Lakes and soon came into conflict with the American ships of war there. An engagement occurred at York Bay, 28 May 1813, in which Yeo received a severe drubbing and was blockaded afterward at Kingston by Chauncey. In the following year Yeo was made commander-in-chief of the Eng¬ lish fleet on the west coast of Africa.

YEOMAN, yo'man, a term of early English origin formerly applied to a feudal attendant or servant, but in the 15th century and subse¬ quently denoting a small freeholder below the rank of gentleman. The term yeoman was given also to the 40 shillings freeholder, and commonly to any small farmer or countryman above the grade of laborer. The term is also familiar in the titles of functionaries in royal households, such as yeoman usher of the black rod, yeoman of the robes, etc., and other appen¬ dages to worn-out and useless royalty.

YEOMAN OF THE GUARD, in England,

a corps of veteran soldiers of stately presence, employed on state occasions in conjunction with the gentlemen-at-arms as the bodyguard of the sovereign. The yeomen were constituted a corps in 1485 by King Henry VII, and they still wear the costumes of that period. The officers of the corps are a captain, ordinarily a peer, a lieutenant, and an ensign — all old army offi¬ cers. There are also a (<Clerk of the

Cheque® and four <(Exons,® besides non-commissioned officers (messengers, sergeant-majors, yeoman bedgoers, yeoman bed-hangers), and 100 pri¬ vates. The Beef-Eaters or Warders of the Tower are, contrary to common belief, an en¬ tirely different corps, but since the reign of Edward VI have been privileged to wear the yeoman's uniform, without the shoulder belt. It is to be hoped that the democratization of peoples, proceeding apace in this 20th century, will soon reach and wipe out these and similar satellites as well as those before whom they bend the knee. See Beef-eaters.

YEOMANRY, a force of volunteer cavalry first enrolled in Great Britain during the wars of the French Revolution, and consisting to a great extent of country gentlemen and farmers possessing their own horses and requisite equip¬ ment. They were, liable to be called out in aid of the civil power in case of riot at any time; in case of actual invasion, or the appearance of an enemy on the coast or during a rebellion, they might be assembled for actual service ; they were then subject to the Mutiny Act and Arti¬ cles of War, and might be called upon to serve in any part of Great Britain. During perma¬ nent service they received cavalry pay and an allowance for forage. For their services dur¬ ing the Boer War, 1899-1902, they received the title of Imperial Yeomanry. Colonial Yeo¬ manry have been enlisted for the defense of the British colonies. The Imperial Yeomanry be¬ came part of the territorial forces in 1907. See Great Britain — The British Army.

YERBA MATE. See Mate.

YERKES, yer'kez, Charles Tyson, Ameri¬ can capitalist: b. Philadelphia, Pa., 25 June 1837; d. New York, 29 Dec. 1905. He received a secondary education in Philadelphia at the Central High School, was for a time in the flour and grain business, in 1859 became a stock¬ broker, and in 1861-86 was in banking, first in Philadelphia, and from 1881 in Chicago. In 1871 he was obliged to make an assignment, but by fortunate investments he soon financially re-established himself, and became prominently connected with the Philadelphia street-railway system. At this time he refused to give prefer¬ ence to the city of Philadelphia for bonds sold on its account. He was thereupon indicted for

misappropriating city funds, was convicted, and sentenced to 33 months imprisonment. After serving seven months in prison he was par¬ doned and soon afterward Philadelphia can¬ celed her claim against him. After his re¬ moval to Chicago he acquired a controlling position in its street-railway system. In 1892— 93 he was a prominent mem'ber of the board of directors of the World's Columbian Exposition at Chicago, rendering particular service to the department of fine arts, to whose exhibit he loaned his choice collection of paintings. Among his later enterprises was that connected with the London system of underground railways after 1901. He gave to the University of Chi¬ cago funds for the buildings and instruments of the Yerkes Observatory (q.v.), with its famous telescope. This was described by New¬ comb as (<one of the most munificent gifts ever made for the promotion of any single science."

YERKES, Robert Mearns, American psy¬ chologist : b. Breadysville, Pa., 26 May 1876. In 1897 he was graduated at Ursinus College and at Harvard in 1898, receiving the degree of D.Ph. at the latter in 1901. He -began as teacher and investigator at Harvard in 1901 ; was assistant professor of comparative _ psy¬ chology from 1908 to 1917 and psychologist to the Psychopathic Hospital, Boston, from 1913 to 1917, and since 1917 has been professor of psychology and director of the Psychological Laboratory of the University of Minnesota. In 1917 he was commissioned major in the Sani¬ tary Corps of the National Army and was made head of the section of psychology in the Surgeon-General's office. He is the author of <The Dancing Mouse, a Study in Animal Be¬ havior J (1907); (Introduction to Psychology > (1911) ; (Methods of Studying Vision in Ani¬ mals^ with J. B. Watson (1911); 'Outline of a Study of the Self,* with D. W. 'La Rue (1914) ; (A Point Scale for Measuring Mental Ability, } with R. S. Hardwick and J. W. Bridges (1915); 'Army Mental Tests, > with Clarence S. Yoakum (1919), and papers on spe¬ cial research topics in physiology of the nervous system, animal behavior and comparative psy¬ chology.

YERKES OBSERVATORY, astronomical observatory of the University of Chicago (q.v.), located on Lake Geneva, near Williams Bay, Wis. It was founded in 1892 by Charles Tyson Yerkes (q.v.), who presented to the Uni¬ versity funds sufficient for its building and equipment. It has a refracting telescope with an aperture of 40 inches, one of the largest in the world. The observatory is used chiefly for advanced work in astronomy, for which its equipment offers exceptional facilities. See

Observatory, Telescope.

YERMAK, Timofeyev, Cossack conqueror of western Siberia: d. Irtish River, Sept. 1584. He was chief of a band of Cossacks which, defeated and outlawed by Ivan IV, took refuge in the settlements of the Stroganov family in Perm. They were undesired guests and the Stroganov, it is said, devised as an expedient of being rid of them, the project of Yermak's moving against the marauding forces of the Khan of Sibir, the Stroganov to furnish ade¬ quate supplies for the expedition. Yermak invaded the country in 1580; took Isker, the

residence of the Khan, in 1581 and drove that ruler into the mountains. Yermak turned the conquered territory over to Ivan IV; and for this service received ftfll ipardon for past offenses. After his death by drowning in the Irtish River, his forces abandoned Siberia. He figures in Russian folk songs, and is the sub¬ ject of a drama by Khomyakov, 'Yermak*

(1832).

YEW, evergreen coniferous shrubs or trees of the genus Taxus. The leaves are flat nee¬ dles arranged in two ranks to the right and left of the stem, but in a horizontal plane. The flowers are dioecious, and have no perianth ; the male inflorescences are composed of a few sta¬ mens partly united at the apex of a scaly, axil¬ lary stalk, with shield-shaped bracts forming a spherical head. The female flowers are axil¬ lary, naked ovules seated on a fleshy annular disc, which becomes cup-shaped and scarlet, and nearly encloses the bony seed. The Euro¬ pean yew, a tree famous in the annals of Old World gardens, is Taxus baccata. It is readily recognizable by its lustrous foliage, so dark a green as to appear velvety and almost black in the shadows. When rather young the typical yew has a broadly pyramidal head, but in its old age it becomes ragged and broken, not unlike an aged hemlock. Some .trees have attained a great age, and they reach to a height of 100 feet, and sometimes to a diameter of 10 feet. In culti¬ vation there are several varieties of yew, in¬ cluding the Irish, with fastigiate branches and columnar habit, and the golden yews, with foli¬ age, which, to a certain extent, is yellow. The dark yew was a favorite tree for planting in church yards. It is even now a common plant in European cemeteries, and has been for centu¬ ries a symbol of mourning at funerals, and especially at those of unhappy lovers.

Lay a garland on my hearse

Of the dismal yew

This couplet in the ‘Maid’s Tragedy* is an allusion to this custom. In India the yew is a sacred tree, its wood and gum being burned as an incense, and branches of it carried before ceremonial processions. Although . the sweet and juicy scarlet aril of yew fruit does noi seem to be poisonous, the enclosed seed is re¬ garded with suspicion, especially when eaten by children, in any quantity. Young branches of yew, too, are dangerous to cattle, which are frequently killed by feeding upon them. The trunks of yews are twisted, ridged and gnarled, and the shreddy bark has the rich red-brown tone of an old cedar. The wood is hard, with an orange red or brown heart, which takes a fine polish and is valued for cabinet work and veneers; since it is also fine and close-grained, flexible and elastic, easy to split and durable, yew-wood was the chosen material for the bows of the English archers, and no other wood has ever equaled it for that purpose. The Indian tribes of the northwestern American coast ar¬ rived at the same conclusion in regard to the beautiful Taxus brevifolia, indigenous to that region and similar in appearance and size to the European tree. It was used by them for bows, spear-handles, paddles and fishhooks, and is the most durable timber that the yvhite man can find for his fence-posts. There is an¬ other arborescent American yew, found in

Florida, a bushy tree (T . floridana) with many stout spreading branches and a short trunk. It rarely exceeds 30 feet in height. A Japanese species (T. cuspidata) , with a bright red bark, is now being introduced to cultivation, and is of bushy habit, and more hardy and successful than the European yew. This is a great favo¬ rite with the Japanese, who clip it into fantas¬ tic shapes. The most familiar yew in Canada and the eastern United States is T. canadensis, a very low, shrubby species with decumbent branches radiating in every direction and form¬ ing thickets hard for a man to travel through, but a first-rate cover for grouse. It grows in moist lands under the shade of trees,

and is readily recognized ‘by its dark foliage and the glowing, crimson, oblong, cup-like fruits.

YEZD, yezd, or YAZD, Persia, (1) A town, capital of a province of the same name, in an oasis in a sandy plain, 190 miles southeast of Isaphan. It is about five miles in circuit; con¬ sists of an old town, enclosed by a wall and ditch, defended by a citadel, and entered by four gates ; and of a larger new town or suburb, which has risen up in a straggling population. Within the citadel are a palace, the principal mosque, several other public buildings, and the residences of the chief men of the district. The bazaars are spacious and well supplied, particu¬ larly with the staple manufactures of the town itself, consisting of silk stuffs, velvets, cottons, coarse woolens called numuds, loaf-sugar, and sweetmeats. The position of Yezdz, on the edge of a desert, at the junction of the principal cara¬ van routes, makes it an important commercial entrepot for the surrounding countries. Silk, felt goods, opium and sugar are the chief items of trade. Pop. about 45,000, of which about a tenth are Zoroastrians or fire-worshippers. (2) The province has an area of about 20,000 square miles, and its population is estimated at 100,000.

YEZEEDEES, or YEZIDIS, yeze-dez. See Religious Sects.

YEZO, ya/zo*, EZO, or HOKKAIDO,

hok-kl’do, Japan, the northernmost of the four main islands of the empire, separated from Hondo on the south by Tsugaru Strait, from Sakhalin on the north by La Perouse Strait, while Yezo Strait divides it from Kunashiri, the southernmost of the Kurile Islands; area, in¬ cluding dependent islands, 30,143 square miles. The capital is Sapporo ; Hakodate, Mororan, and Otaru are other large towns and open ports. Yezo is curiously like a skate-fish in shape. The centre of the island is but little known, though it has been crossed twice or thrice by Japanese and European explorers. It is traversed by chains of mountains, the principal summits being Tokachi-dake, 8,200 feet; Shribetsi-yama, 7,874 feet; Ishikari-dake, 7,710 feet; Sapporo-dake, 6,500 feet; and Komaga-dake, 3,830 feet. Much of the island is volcanic, especially in the east. The chief rivers are the Ishikari and Tesshio, flowing into the Sea of Japan; and the Tokachi, flowing into the Pacific Ocean. The chief bays are Volcano Bay, in the south; Ishikari Bay, in the west; Shari and Walfish bays, in the north¬ east. Yezo has a rigorous climate, being for six months of the year under snow and ice, two feet in the south to eight feet in the north. The original inhabitants of Yezo were probably pit dwellers, of whom distinct traces have been found at Sapporo, Nemuro, and elsewhere.

After these came Ainos or Ainus, whose prin¬ cipal settlement is at Piratori, 50 miles east of Mororan. The bear festival in September is the great event of their year. The Ainos num¬ ber 15,000, a population either stationary or de¬ creasing; they are harmless, lazy and drunken, and live mostly near the mouths of the rivers. The southern corner of the island was wrested from them in the 16th century, and Matsumae, now Fukuyama, in the extreme southwest, be¬ came in the next century the headquarters of Japanese rule. From 1600 to 1868 the south¬ western portion of the island was in possession of a Daimio named Matsumai, and the Shogun was in possession of Hakodate. At the restora¬ tion in 1868 the supporters of the Tokugawa government made a last stand here, and were finally defeated at Hakodate. In 1871 the Jap¬ anese began active colonization, fearing aggres¬ sion on the part of Russia, and a new depart¬ ment — the Colonization Department — was es¬ tablished to further these projects and much development work was done under the super¬ vision of foreigners. This department, how¬ ever, was abolished in 1881 and the country divided into prefectures, though its inhabitants do not as yet enjoy any electoral privileges. The fauna and flora of Yezo differ materially from those of the main island, the bear being a differ¬ ent species, resembling the grizzly. There are no monkeys; a species of grouse is found. The deer, once very plentiful, are now comparatively scarce. The Yezo pony, originally from Nambu on the main island, is hardy, and foreign blood has been introduced, promising good results. The forests furnish valuable timber. Coal, petro¬ leum and gold are found and worked to some extent. The official name Hokkaido, <(Circuit of the Northern Sea,» was bestowed in 1870, when it was brought under a special colonization de¬ partment. An agricultural mission from the United States assisted in founding model farms, laying out roads and building bridges. The capital was changed from Matsumai to Sapporo, which was provided with a railroad to Otarunai, its port, and to Poronai, the great coal district inland. An agricultural college, breweries, can¬ ning factories, beet-root sugar factories, etc., were established. The coal mines are worked by convict labor. A system of military settle¬ ments in late years was put into force, partly with the view of furnishing a militia against possible invasion from Russia, which at that time was supposed to covet the fine harbors of Yezo. The sheltered harbor of Mororan, on Volcano Bay, is now a naval harbor, to which a railway from Poronai mines has been built. The principal products of Yezo are coal, sea¬ weed, sulphur, fish, the catches of salmon on the river Ishikari being sometimes enormous. Kerosene, beer, glass, and other articles are manufactured, and internal communication is facilitated

by a system of railways, either con¬ structed or projected, joining alf the important coast and interior towns. Pop. (including the Kurile Islands), 1,459,424. See Japan.

YGGDRASILL, or YGDRASIL, ig'dra-sil,

in Scandinavian mythology, the giant ash tree overspreading the whole world and reaching above the heavens. It binds together earth, heaven and hell, and its roots stretch out to the Asa or Hisir gods in heaven, to the frost giants, and to the under world. A marvelous fountain

springs up under each of these three great roots and in the tree, whose boughs drip continually with honey, dwell an eagle and the squirrel Ratatoskr. At its roots the serpent Nithoggr gnaws, and between the serpent and the eagle runs the squirrel constantly endeavoring to pro¬ voke the two to strife. Certain writers detect in this myth a distortion of the story of the Cross, but the translator of Grimm says, <(it were a far likelier theory, that floating heathen traditions of the world tree, soon after the con¬ version in Germany, France or England, at¬ tached themselves to an object of Christian faith just as heathen temples and holy places were converted into Christian ones.®

YIDDISH LANGUAGE. Yiddish, the Englishized form of German Jiidisch (Jewish), is one of the names applied to the various Ger¬ man dialects spoken by the Jews of German origin in the diaspora, in Russia, Rumania, Poland and Austria-Hungary, and in England, America, and South Africa, whither Russian and Rumanian Jews have been emigrating in the last 30 years. In Russia it is known under the name of Jargon, while philologically it is gen¬ erally spoken of as Judeo-German.

No literary documents of any consequence bear upon the condition of this group of dia¬ lects previous to the 16th century, and even in the printed works up to a hundred years ago the literary norm seems to have attempted an approach to the literary German, though even then

the deviation was considerable and fairly uniform. In the last century the spoken dia¬ lects have been asserting themselves in the lit¬ erary productions, so that the uniformity no longer exists; ea on author writing in the varia¬ tion familiar to him from childhood.

It seems 'that at first, in the Middle Ages, the German Jews employed the language of their Christian neighborhood without any change Whatever; in their intercommunication with their coreligionists they transcribed this Ger¬ man with Hebrew characters and introduced, Germanizing them, such Hebrew words as were necessitated by the observances of the Mosaic faith. When the German Jews, in the 14th and 15th centuries, settled in Poland, they were cut off from the rest of the German nation, and so their native dialects perpetuated themselves in the form in which they were brought from their homes. They were subjected, however, to the double influence of their Slavic neighborhood and the language of the Bible and the Talmud, to which the Jews devoted themselves with un¬ wonted zeal. In vocabulary, the Yiddish is pre¬ dominantly German, less than one-third having been derived from Slavic, Rumanian and He¬ brew sources. In pronunciation, the influence of Russian and Polish is doubtful or less trans¬ parent, while Hebrew, instead of affecting, it, was itself affected by the current, pronunciation of Yiddish. In syntax and idiom, both the Slavic and the Hebrew have considerably modi¬ fied the native German, without, however, oblit¬ erating the original German basis. At present, three chief varieties may be distinguished in the Yiddish of Russia, the Lithuanian, the Polish, and the Southern ; the dialects in Austria and Hungary are more nearly related to the two latter, while the Rumanian is more akin to the Polish variety. In America all three varieties may be heard, but they are strongly

influenced in vocabulary by the English, and in the periodic press the Lithuanian variety, affected by literary German, seems to supersede all other dialects. The three varieties correspond to . their places of origin in Germany, the Lithu¬ anian issuing from a Middle-German home, the other two from various Upper-German localities. The precise provenience has not yet been ascer¬ tained, as the linguistic study of Yiddish has heretofore been greatly neglected.

The chief differences between Yiddish and the modern German are these : Phonetically, Yiddish represents a mediaeval stage of German when, for example, t and ei were still carefully distinguished, while u before a nasal had not yet changed into o ; on the other hand, the con¬ sonantism, especially the treatment of pf, seems to correspond to

a later stage. The vocabulary of Yiddish is rich in words only sporadically found in German dialects and common to the Middle-High-German literary language. The words from the Hebrew are phonetically treated as Yiddish words, while those from Russian and Polish, to some extent, underwent the changes due to the peculiarity of Yiddish, and present some interesting data to the Slavic scholar. In grammar, Yiddish has developed certain peculiarities which are common to va¬ rious German dialects. Most prominent are the disappearance of final unaccented e, of the genitive case in the declension of the noun, of the imperfect tense in the verb. In syntactic structure, Yiddish resembles English, rather than German, and in English-speaking countries naturally adopts some of the English idioms. But, on the whole, Yiddish is an important group of German dialects, well worthy of a thorough study by the Germanic philologist.

Bibliography. — There are no good gram¬ mars of Yiddish ; for dictionaries one may use the Russo-Yiddish ones by Lifschiz and Dreisin, and the Yiddish-English and English-Yiddish ones by A. Harkavy. To the student of phi¬ lology the following works and articles will prove of value: Landau, A., (Bibliographic des Jiidisch-deutschenP in Deutsche Mundarten, Zeitschrift fiir Bearbeitung des mundartlichen Materials (herausgegeben von Dr. Johann Willibald Nagl, Vienna 1896, Heft II, pp. 126-132) ; Landau, A., (Das Deminutivum der gali-zisch-jiidischen Mundart, Ein Kapitel aus der jiidischen Grammatik) (ib., Vol. I, pp. 46-58) ; Gerzon, Jak. (Die jiidisch-deutsche Sprache, Eine grammatisch-lexikalische Untersuchung ihres deutschen Grundbestandes5 (Frankfurt a. M. 1902) ; Loewe, Richard, review of Gerzon's work, in Anzeiger fur indoge nnanische Sprach-und Altertums-Kunde (Vol. XVI, 1904, pp. 43-50) ; Sainean, L., (Essai sur le judeo-allemand et specialement sur le dialecte parle en Valachie) (cExtraits des Memoires de la Societe de Lin-guistique de Paris'*) , (Vol. XII, premiere partie, Paris 1902) ; Landau, A., review of Ger¬ zon's and Sainean's works, in Zeitschrift fiir deutsche Philologie (Vol. XXXVI, 1904) ; and a valuable bibliography of scattered articles by Frankel, L., in Litteraturblatt fiir germanische und romanische Philologie (Vol. XXII, pp. 386-391). Leo Wiener,

Professor of Slavic Languages and Literatures, Harvard University.

YING-TSE, ying'tse', a noted sea port in Manchuria. See Niu-chuang.

YLANG-YLANG, Attar of, a perfume fully as exquisite and as precious as the much-praised attar of roses. The ylang-ylang tree attains a height of 60 feet and has drooping, greenish-yellow flowers three inches long and extraordinarily fragrant. It is common in the Philippines. It is found chiefly in the well-populated provinces and islands, and the na¬ tives say that it thrives best near the habita¬ tions of man. The propagation in plantations, by seed or cuttings, about 20 feet apart, each way (108 trees to the acre), is easy, and the growth rapid in almost any soil. The first flowers appear in the third year, the eighth yielding as high as 100 pounds, the bloom oc¬ curring every month. The greatest yield is from July to December. The process of con¬ verting the long, greenish yellow, fragrant petals of the flower into essence is by the simplest form of distillation, using merely water and the choicest flowers. No chemicals of any kind are required.

YMIR, e'mir, in Scandinavian mythology, the personification of Chaos, or the first created being, produced by the antagonism of heat and cold in Ginnungagap, the primeval abyss. Slain by Odin and thrown into Ginnungagap, his flesh was transformed into land, his bones be¬ coming the mountains, his blood the rivers and lakes, his hair the forests, while his skull con¬ stituted the heavens, and his brains the clouds.

YOAKUM, Tex., town in De Witt and Lavaca counties, 80 miles east of San Antonio, and on the San Antonio and Aransas Pass Railroad. It is situated in an agricultural region, has railroad shops, a canning industry, creamery, a turkey abattoir, bottling works and manufactures of ice, flour and corn meal. Pop. about 4,657.

YOGA, yo'ga (meaning, in Sanskrit, con¬ centration) one of the six schools or sys¬ tems of Brahmanical philosophy, that of Patanjali, the essence of which is meditation. It believes in a primordial soul which has had existence from an earlier period than primeval matter, and holds that from the two arose the spirit of life (Mahanatma). Theoretically at least, its devotees can acquire even in this world entire command over elementary matter by certain ascetic practices, such as long con¬ tinued suppression of the respiration, inhaling and exhaling the breath in a particular man¬ ner, sitting in 84 attitudes,

fixing the eyes on the tip of the nose, and endeavoring, by force of mental abstraction, to unite themselves with the vital spirit which pervades all nature and is identical with Siva. When this mystic union is effected, the Yoga can make himself lighter than the lightest, or heavier than the heaviest substance, or as small or as large as he pleases ; he can traverse all space, can become in¬ visible, can equally know the past, the pres¬ ent and the future, and can animate any dead body by transferring to it his own spirit. It is claimed that the whole doctrine of the Yoga works toward the establishment of the Su¬ preme Being; and that it claims that it pos¬ sesses the means by which the soul may be¬ come finally united with the Creator from whose hand it came. The system is said to have been founded by Patanjali (q.v.), who claimed that eight distinct stages were neces¬

sary in the development of the soul before it reached that condition in which it was ex¬ empt from further transmigrations. These stages are yama (self-control), niyama (re¬ ligious observances), pranayama (breath regu¬ lation), pratyahara (restraint of senses), dharana (making the mind firm), dhyana (meditation), samadhi (deep contemplation). These correspond generally to the general characteristics of the system given above. Each stage must follow in its order and is dependent upon the attainment of all the stages that precede it; and the great object of the whole is to reach the final stage. Owing to the difficulty of the attainment of all these successive stages of perfection the ad¬ herents of the Yoga believe that it is very rarely that any one reaches them all in this life and that consequently most persons must pass through several births and existences in the attainment of the final goal. In the course of this progress, however, one is believed to acquire wonderful powers. He is enabled to make himself light or heavy, at will, to ac¬ quire a knowledge of the past and the future, to understand the language of all animals, to penetrate the thoughts of others; to remember all that has happened to him in supposed former stages of existence ; and even to tran¬ scend all this and to attain to a knowledge of what is going on or has taken place in the stars and in all other worlds. To these powers the believer in the Yoga adds that of the abil¬ ity to make himself infinitely small or large beyond imagination. ‘ These are accompanied by wonderful powers of body and will and the nicest discrimination in all things, together with the ability to transport oneself anywhere suddenly at will. These wonderful powers are gradually acquired and finally result in the complete separation of the soul from the cor¬ poral body in the ultimate triumph of the former.

The Yoga system has always had a strong¬ hold on its followers principally because of the great powers which it claims to bestow upon its devotees, and on account of the fears of those living upon earth who are believed to have attained to these powers.

Bibliography. — Desai, (Studies of Indian Philosophy5 (Bombay 1906) ; Deussen, P., (Outlines of Indian Philosophy5 (Berlin 1907) ; Garbe, R., (Samkhya und Yoga5 (Strassburg 1896) ; Hall, (Bibliography of the Indian Philosophical Systems5 (Calcutta 1859) ; Johnston, C., (The Yoga Sutras of Patanjali5 (New York 1912) ; Macdonell, A. A., (History of Sanscrit Literature5 (Lon¬ don 1913) ; Markus, (Yoga Philosophic5 (Halle 1886) ; Muller, F. Max, (Six Systems of . Indian Philosophy5 (New York 1899) ; Paul, (Yoga — Philosophy5 (Benares 1851); Vivekananda, (Yoga Philosophy5 (New York

1898).

YOKE, a piece of timber, hollowed or made curving near each end, and fitted with bows for receiving the necks of oxen, by which means two are connected for hauling loads, plows, *etc.* A frame of wood fitted to a per¬ son's shoulders for carrying a pail, etc., sus¬ pended on each side. The ancients regarded the yoke as a symbol of slavery, and it was

customary for vanquished armies to pass under a yoke, formed like a gallows, of two upright spears, and a third fixed transversely at top. The word subjugate (sub, under, and jugum, yoke) is a reminder of this custom.

YOKKAICHI, yo-ka-e-che, Japan, a mod¬ ern seaport, with spacious harbor, on the Tokaido and fronting the bay of Ise, 23 miles from Nagoya. It is connected by railway and by steamship service with most of the ports and foreign countries. Its import trade amounts to

over $5,000,000 yearly, with ex¬ ports of tea, textiles and porcelain. Its manu¬ factures are faience, paper, and striped cotton cloth. It has modem edifices, including Chris¬ tian churches, and many tall chimneys, a mod¬ ern feature. The healing hot springs of Yuno-yama, 12 miles distant, are famous. Pop. about 33,812.

YOKOHAMA, yo-ko-ha'ma, Japan, the chief seaport of the empire, on the Bay of Tokio, about 17 miles southwest of Tokio, of which it is the port. Yokohama is of modern growth, its rise being due to the open¬ ing of Japan to foreign commerce and to the establishment here of foreign merchants, con¬ suls, etc., after the adjacent Kanagawa was de¬ clared a treaty-port. The dwelling-houses and warehouses of the foreign residents are of a superior character, and are built on the bluff facing the bay. The commercial buildings occupy the east of the town, the western part being the Japanese town, and the centre being occupied by the prefecture, customhouse, postoffice and other official buildings. The bay is very beautiful, and, though only an open roadstead, affords a good and commodious an¬ chorage, not only to extensive mercantile shipping, but also to the naval squadrons of other powers. Work on a large harbor was carried out in 1889-96, the main object of which was to prevent the gradual silting up of the anchorage; it is enclosed by two break¬ waters one and one-quarter miles long, and an iron pier, 1,900 feet long, connected with the railway to the capital, 17 miles off. Yokohama is a centre for tourists visiting Japan. The imports into Yokohama are valued at ap¬ proximately $120,000,000, mainly sugar, metals and metal manufactures, cotton manufactures, kerosene, raw cotton and woolens ; the exports at $160,000,000, mainly raw and manufactured silk, copper, tea, fish, cotton goods, fish-oil and paper. The number of vessels entered annually is about 3,600 with a tonnage of about 11,500,000, mainly British, Japanese, Russian, American and French. Pop. (1920) 422,942.

YOKOI HEISHIRO, yo-koy' hay'she-rd, Japanese philosopher, educator and statesman, assassinated at Kioto 15 Feb. 1869 for his liberal opinions. Born in Kumamoto in Higo, before 1810, his fame as a scholar in Chinese and as lecturer and expounder of the Oyomei (q.v.) philosophy made the feudal castle lords com¬ pete for the honor of his presence and the use of his talents (1845-65), many of the makers of the New Japan being his pupils and carrying out his ideas. His best work was done in Fukui (q.v.). He opened a new chapter in the relations of the Orient with the Occident, when in 1865 he sent his two nephews to America for education at New Brunswick, N. J.

When in 1867, after the coup d'etat in Kioto, the new government was formed, the aged scholar was called to advise the new men in power, many of them his former pupils. Gain¬ ing their confidence, he proposed, after the example of Abraham Lincoln, that the outcasts, ˆeta® and ˆhinin® (not human) numbering nearly one million, should be raised to citizen¬ ship and that freedom of conscience be per¬ mitted. Attacked on his way home by the ronin ruffians in Kioto, he was shot and be¬ headed <(for holding evil opinions, » *i.e.* Chris¬ tianity. All the assassins, except one, were caught and beheaded. On the proclamation of the Constitution by the Mikado in 1889, Yokoi was awarded posthumous honors. His son Tokiwo Yokoi is a notable writer in English. Consult Griffis, (The Japanese Nation in Evolu¬ tion > (1907) ; and (The Rutgers Graduates in Japan,* (1916) ; and Armstrong, (Light from the East) (1914).

YOKOSUKA, yoko-soo'ka, Japan, town and naval station on the Bay of Tokio, 12 miles south of Yokohama. It is connected with Yokohama by rail and steamer, and with Kamakura and Tokio by rail. It has a spa¬ cious landlocked harbor, large dry docks, a naval arsenal, and shipbuilding yards suit¬ able for the construction of large war vessels. On these works several millions of dollars were spent in the first years of their opera¬ tion, and their efficiency is being increased yearly. About a mile from the town is the grave of Will Adams (q.v.), the first English¬ man to enter Japan. Pop. about 100,000.

YOKUTS (ˆIndians**), a group of about two dozen small tribes, forming the Mariposan linguistic stock of North American Indians, and occupying an irregular area in central south¬ ern California from Fresno River in the north to near the southern extremity of Tulare Lake in the south, and between the Sierra Nevada in the east and the Coast Range in the west; also a strip, 10 to 20 miles wide, extending southeastward from Tulare Lake along the eastern base of the latter range to Mount Pinos, about lat. 34° 45', together with an isolated area, occupied by the Cholovone divi¬ sion, in San Joaquin Valley from the Tuo¬ lumne northward. The tribes in general were segregated by the natural features of their territory, such as river valleys, and each tribe had its hereditary chief. Their village con¬ sisted of a single row of tule-thatched, wedge-shaped houses, with a continous ramada or shelter of brush along the front. In early times, when large game was abundant, hunt¬ ing formed an important pursuit, but with the coming of the whites and the disappear¬ ance of the game they were compelled to re¬ sort almost exclusively to the products of the soil, the streams and lakes, although rabbits and quail were always abundant and were com¬ monly trapped. Seeds of various kinds were gathered for use as food, as also were grass¬

hoppers, caterpillars, worms and the larvae of insects. Dogs were raised for the same pur¬ pose and even skunks were not despised; but the coyote and the rattlesnake were always tabooed. Their basketry, excellent in shape, design and execution, formed their chief handi¬ work. The Yokuts women were chaste before

the settlement of their country by the whites. Marriage was perhaps by purchase, the hus¬ band residing at the house of his wife; infanti¬ cide was practised in cases of deformity and the dead were generally cremated. The Yokuts are now ‘but a remnant of a once com¬ paratively populous group of tribes. Early warfare with the Paiutes, who pressed them closely from the east, and later and more disastrous contact with white ruffians who found the Indians in their way, practically ex¬ terminated many of the tribes. Their pres¬ ent population is about 500 of Indian habits and life. But numerous members of the race have been absorbed into the life of the nation and are no longer numerated as members of the Yokuts tribes.

YOM KIPPUR, a rabbinical term desig¬ nating the Jewish Day of Atonement. See Atonement.

YONEZAWA, yo’na-za-wa, Japan, a city in the northern centre of Hondo, which in Japanese annals had a long and interesting feudal history. Shut in on all sides by the mountains, it was a community apart. On the railroad, which strikes the west coast north¬ ward, it is famous for its silken fabrics which for over 150 years have had a reputation throughout the empire. Its old castle grounds, centre of song and story, is now a park and its temples are renowned. Pop. about 38,265.

YONGAMPO, yon-gam’po, Korea, a sea¬ port on the left bank of the Yalu estuary, near Wiju, with a large and important harbor. It was used as a landing place by the Japanese during the Chino-Japanese War in 1894, and just prior to the Russo-Japanese War of 1904 was an important outpost of the Russian ad¬ vance into Korea and the headquarters of their timber-felling concession. Russia’s strong

protests against opening the port to foreign trade was one of the many events that hastened the war. See Korea; Japan — Russo-Japanese War.

YONGE, Charlotte Mary, English author: b. Otterbourne, Hampshire, 11 Aug. 1823; d. there, 23 March 1901. She received a private education. She made her name widely known by the publication in 1853 of a novel en¬ titled (The Heir of RedclyffeP which exer¬ cised an important influence on some High Church minds of that time. She devoted part of the proceeds to fitting out a missionary ship, The Southern Cross, for Bishop Selwyn. None of her later novels came up to the stand¬ ard of (The Heir of RedclyffeP Among the best of them are (Katharine Ashton) ; (The Daisy Chain) (1856), the proceeds of which she devoted to founding a missionary college at Auckland, in New Zealand; (Hopes and Fears) ; (The Little Duke) ; (The Prince and the Page> ; and (The Dove in the Eagle's NestP Her staunch attachment to the Church of England more or less colors all these works, and was also manifested, not only in the field of practical effort, but in the choice of the subjects of some other of her works, such as (Biographies of Good Women) (1862); (Life of Bishop J. C. Patterson' (1873) ; (John Keble's Parishes> (1898) ; and (The Patriots of Palestine) (1898). Her later novels showed her to be out of touch

with the new generation which had cast off the smug manners and pseudo-culture of the Victorian period. Her remaining works in¬ clude (Christian Names: their History and Derivation > (1863) ; (Cameos from English

History } (1869-99) ; (History of Germany)

(1877); (History of France* (1879); Uni¬ versal History for Young Peopled For 30 years she edited a High Church magazine known as The Monthly Packet. An illus¬ trated edition of her more popular works in fiction appeared in 1888-89. Consult Cole¬ ridge, Christabel, (Life of Charlotte M. Yonge* (New York 1903) and Romanes, Ethel, (Char¬ lotte Mary Yonge, An Appreciation * (Lon¬ don 1908).

YONKERS, yonk'erz, N. Y., city of West¬ chester County, on the Hudson River, and on the New York Central Railroad, north of and adjoining New York City. It has regular steamer connection, for passengers and freight, with New York and Albany, and is connected by electric lines with New York, Mount Ver¬ non, New Rochelle and many of the villages and cities on the Hudson.

Industries. — The good opportunities for shipment of goods by land and water have aided the industrial growth of the city. In 1920 the estimated number of wage-earners in facto¬ ries is 15,000, and the yearly production ap¬ proximates $75,000,000. The carpet and rug mills alone employ over 5,000 people. There are very large foundries and machine shops, electric motor and electrical supplies factories, besides rubber works, large sugar houses, manu¬ factories of patent medicines, fuels, etc., con¬ fectionery, furniture, roofing materials, cloth¬ ing and hats. There are large coal yards, grain elevators, the Otis Elevator Company works, ship and boat building yards, bridge works, lumber mills, flour and grist mills and carriage and wagon factories. There are three daily and four weekly newspapers.

Municipal Improvements and Buildings. — Yonkers is built on a series of terraces which rise from the Hudson to an elevation of 426 feet above tidewater. The view from the ele¬ vated portions includes a long distance up and down the Hudson, the Palisades and the beau¬ tiful valley to the east. In the residential part of the city are the homes of many New York City business men. The city has a frontage of nearly five miles on the Hudson, and ex¬ tends along the Bronx River for about seven miles. The streets, covering 115 miles, are broad, many of them paved, and well-shaded. The city owns and operates the waterworks. There are three small public parks maintained by the city, also two public bath houses, and, on the Hudson, a steel pavilion for recreation. There is an excellent sewer system. The prin¬ cipal public buildings are the government build¬ ing, the library in Washington Park, the churches, schools and charity institutions. The city hall is of considerable historic interest; it was formerly the Philipse Manor and was built in 1752. Since 1868 it has been used as a municipal building. Another noted building is ˆGreystone,** once the residence of Samuel J. Tilden.

Churches, Charitable and Educational In¬ stitutions. — There are 30 churches, some of which are buildings of considerable architecr

tural merit. The city has the Homoeopathic Hospital, Saint John's Riverside Hospital, Saint Joseph's Hospital, Leake and ˆVatts Orphan Home, the Hebrew Home for the Aged and Infirm and private institutions. The educa¬ tional institutions are Lowden and Halsted schools, the Spencerian Business College ; a pub¬ lic high school, established in 1882 ; public and parish elementary schools and kindergartens ; a public library (building presented by Andrew Carnegie) ; the Hollywood Inn for Working¬ men, with a library of 10,000 volumes ; the Woman's Institute Library, and Saint Joseph's Training School for Nurses. Near the city limits are Saint Joseph's Seminary (q.v.), and Mount Saint Vincent Academy (R.C.). The latter is a school for girls.

Banks and Finances. — Yonkers has both na¬ tional and State banks, the combined deposits amounting to approximately $18,000,000. The expenditures for municipal maintenance and operations are annually about $4,000,000.

History. — In 1650 Adrian Van der Donck and several Dutch families settled in what is now called Yonkers. The region around Yonk¬ ers then belonged to the Dutch. It became a part of Philipse Manor in 1672 and the town was called Philipsburg. The town of Yonkers was founded in 1788, and* in 1855 it was incor¬ porated as a village. The town was divided in 1872; the northern part was chartered as the city of Yonkers and the southern part was called Kingsbridge. In 1874 Kingsbridge be¬ came a part of New York City. Pop. (1920)

100,176.

Consult Scharf, (History of Westchester County) ; Allison, <The History of Yonkers5

(1896).

YONNE, yon, France, a northern interior department bounded by Seine-et-Marne, Aube, Cote-d'Or, Nievre and Loiret; area, 2,892 square miles ; capital, Auxerre. The surface is generally intersected by low hills, sometimes barren, but usually covered with fruitful vine¬ yards, which yield the famous Chahlis, Joigny, Auxerre and Tonnerre wines. Between the hills lie beautiful and productive valleys. The most

elevated land is in the southwest, forming the watershed between the basins of the Loire and Seine. The small part belonging to the former is drained by the Veille. All the rest belongs to the latter, which receives it chiefly by the navigable Yonne. The climate is tem¬ perate, and the air pure and healthful, except in some wet, marshy spots. The minerals in¬ clude iron, red and yellow ochre, building-stone, lithographic stones, pavement and potter's clay. The manufactures are of coarse woolens, woolen covers, serge, glue, sugar, glass, *etc.* The trade is in corn, wine, vinegar, wood and charcoal, ship-timber, wool, cattle, iron and ochre. Pop. 303,889.

YOOSUFZYE, yoo-soof'zi, or YUSUFZAI

(ˆchildren of Joseph55), an important Afghan tribe, on the northwest frontier of India. Their territory includes about 2,000 square miles within the British district of Peshawur and also the hills beyond the north boundary, and their total number is estimated at 246,000, including 73,000 soldiers. The crops of the region are wheat, barley, millets, maize, cotton and mus¬ tard seed. Iron, cattle and wool are exported VOL 29— 41

and the transit trade is considerable. See Afghanistan.

YORICK, (1) The king's fool, whose skull is apostrophized by Hamlet in the fifth act of Shakespeare's tragedy of ˆHamlet.5 (2) The pseudonym adopted by Laurence Sterne in (.A Sentimental Journey.5 (3) . The parson in Sterne's (Tristram Shandy,5 intended as a por¬ trait of himself.

YORITOMO MINAMOTO, yo-re-tomo me-na-mo'to, Japanese soldier and statesman: b. 1146; d. 1199. He became about 1159 the leader of the military clan of Minamoto in its feud with that of Taira. In 1180 he assembled an army of considerable strength, and began operations against the Taira, whom in 1185 he completely destroyed in the naval battle off Dan-no-ura, not far from Shimonoseki. He became practically ruler of Japan, though nomi¬ nally subject to the Mikado, was made (1192) Sei-i-tai sho-gun, established his capital at Ka¬ makura and laid the basis of the feudal system of Japan. See Japan, History.

YORK, Cardinal. See Stuart, Henry

Benedict Maria Clement.

YORK, Duke of, a title formerly conferred on the second sons of the kings of England. It was first borne, however, by Edmund de Lang¬ ley, fifth son of Edward III, who was created Duke of York in 1385, and died in 1402. He was the founder of the house of York, in Eng- - lish history that of the <(white rose,55 while his elder brother John, fourth son of Edward III, created Duke of Lancaster in 1362, was the founder of the rival house of Lancaster, or the (<red rose55; and their claims* were contested for nearly half a century in the so-called Wars of the Roses. The first Duke of York was suc¬ ceeded by his son Edward, who fell at Agincourt in 1415, and was succeeded by his nephew Richard, son of Anne Mortimer, who was granddaughter of Lionel, Duke of Clarence, third son of Edward III. It was by virtue of this descent from the Duke of Clarence that the house alleged its superior right over that of Lancaster, which was descended from the fourth son of Edward III. The title was sub¬ sequently borne by Edward Plantagenet, after¬ ward Edward IV ; by Richard. Plantagenet, supposed to have been murdered in 1483 by his uncle, Richard III ; by Henry Tudor, afterward Henry VIII; 'by Charles Stuart, afterward Charles I; by James Stuart, afterward James II; and was conferred by the pretender, James III, on his second son, Henry Benedict, known in history as Cardinal York, the last of the royal family of the Stuarts. After the acces¬ sion of the house of Hanover to the British throne, George I created his brother Ernest Augustus Duke of York and Albany (1716). He died in 1728, and the title was held by Ed¬ ward Augustus, the second son of Frederic, Prince of Wales, and Frederic, second son of George III, who was made commander-in-chief of the British army, but showed little ability. The title was in abeyance until 1892, when it was conferred on Prince George Frederick Er¬ nest Albert, the second son of Edward VII, who in 1910 ascended the throne as George V.

YORK (British, Caer, Ebroc; Latin, Ebora - cum), England, an archiepiscopal city, county, municipal and Parliamentary borough, capital of

Yorkshire, 196 miles north-northwest from Lon¬ don by rail, at the confluence of the Foss with the Ouse. It consists of the city proper, and of suburbs, some portions of which are situated across the Foss, and communicate with the rest by several bridges. . The city, with a circuit of nearly three miles, is enclosed by ancient double walls, originally Roman, but restored by Edward I, and partly repaired at subsequent periods ; the portions which still remain have been converted into promenades, commanding a beautiful pros¬ pect of the surrounding country. York is en¬ tered by four imposing gates ; and is built for the most part in narrow irregular streets, many lined with houses of antique appearance. Im¬ provements have modernized many of the older parts of the city, and many handsome ranges of new buildings have been erected. The minster or cathedral dates from the 7th century, but did not begin to assume its present form till 1171, and was not completed till 1472. A square mas¬ sive tower rises from the intersection to the height of 235 feet, and two other lofty towers of graceful proportion, 196 feet, flank a richly-decorated western front, divided by paneled buttresses into three compartments, of which that in the centre is chiefly occupied by a beau¬ tiful window and a splendid portal. Measured without the walls, the whole length, from east to west, is 524 feet, and the width across the transepts, north to south, 222 feet; length, from west door to choir, 264 feet; length of choir, 162 feet; breadth of body and side aisles, 109 feet. The interior consists chiefly of a lofty nave, separated from its aisles by long ranges of finely clustered columns, a still loftier choir, lighted by a magnificent and beautifully blazoned window, and a lady-chapel continuing the choir, and containing some beautiful monuments. The cathedral has twice sustained serious damage and narrowly escaped total destruction from fire, caused in 1829 by an incendiary lunatic, and in 1840 by the negligence of a workman engaged on its repair. The chapter-house, entered from the north transept of the cathedral, is a richly decorated octagon, and near it is a fine old chapel, originally forming part of the old archiepiscopal palace, and now appropriated to the library. York possesses many other places of worship, including a beautiful Roman Catholic pro-cathedral ; and collegiate, grammar, blue-coat, gray-coat and board schools. Other not¬ able buildings and establishments are an ancient Gothic guildhall (1446), and spacious mansion-house adjoining; the fine old ruins of Saint Mary's Abbey; Clifford's Tower, part of the city castle founded -by the Con¬ queror; the fine < old merchants' hall; county assize courts; city courts of justice in the late Gothic style (1892) ; the museum of the Yorkshire Philosophical Society, assembly-room, Masonic hall, baths, art-gallery, free library, the Yorkshire Club-house, concert rooms, two theatres, cemetery, lunatic and blind asylums, dispensary, county hospital,

cattle mar¬ ket, almshouses and_ numerous other charities. The railway station is one of the finest in Eng¬ land. The manufactures include iron castings, bottles, leather, flour, cocoa, gloves, glass, flax spinning, linen and confectionery. ‘York ranks second among English cities, its archbishop having the title of Primate of England (see Archbishop); its chief . magistrate takes the title of lord-mayor. It is the headquarters of

the NorthEastern Railway Company and con¬ tains their carriage and wagon shops. There is communication by water with Selby, Goole, Hull, *etc.* York was the early British Caer Ebroc of the Brigantes and under the Romans as Eboracum became their principal seat of power in the north, if not in the whole country. Here died the Roman emperors Severus and Constamius Chlorus, and here it is popularly (but incorrectly) supposed Constantine the Great was born. After their departure it so far retained its importance as to become the capital of Northumbria, whose king, Edwin, in 624 made it an archiepiscopal see. In the 8th cen¬ tury its diocesan school attracted students not only from all parts of the kingdom, but from France and Germany, and sent out scholars who afterward acquired European celebrity. Here the first English Parliament was held by Henry II in 1160. In after-times it makes a distin¬ guished figure in almost all the great epochs and events of English history, during the Civil War surrendering to the Parliamentarians after a siege of several weeks, subsequent to their victory at Marston Moor in the vicinity. Among its distinguished natives are Alcuin, the tutor to the family of Charlemagne; Flaxman the sculptor; and William Etty the painter. Pop. 82,282. Consult Drake, F., (Eboracum: or the History and Antiquities of the City of York) (1843); Raine, J„ <York> (1893); Purev-Cust, A. P., (York Minster* (1897) ; Rowntree, B. S., ‘Poverty: A Study of Town Life* (1901).

YORK, Me., town, port of entry, York County, on York River, and on the Boston and Maine Railroad, about 45 miles south by west of Portland and 100 miles southwest of Au¬ gusta. It is in an agricultural region, but is known as a favorite summer resort. It has a number of buildings of historic interest, among which is the jail, which is one of the oldest in the country. It contains several villages in which are many summer cottages. The town was set off, in 1622, from land granted by the Plymouth Council to John “Mason and Ferdinand Gorges. In 1624 the place was called Agamenticus. On 1 March 1640 a territory of 21 square miles was incorpo¬ rated as a borough by Gorges, and chartered as the city of Gorgeana in 1642. This was the

first municipal corporation made by the English in North America. On the death of Charles I, in 1649, Georgeana City, Isle of Shoals, Wells and Kitterytown united and established a con¬ federacy. In 1652 the confederacy and all of Maine came under the control of Massachu¬ setts. The city charter of Georgeana was re¬ voked, and the name changed to York. The limits of the present town are about as in 1652. In the early years the town suffered from In¬ dian depredations; one attack, in 1692, resulted in the massacre or capture of about one-half the inhabitants. The population is about 3,000 Consult Emery, G. A., 'Ancient City of Gor¬ geana and Modern Town of York* (Boston 1873) ; Baxter, J. P., (Sir Ferdinand Gorges and His Province of Maine) (1890) ; id (Agamenticus, Bristol, Gorgeana, York* (Portland 1904) ; Bouve, Pauline €., 'Old York, a Forgotten Seaport) (in New England Magazine, July 1902).

YORK, Neb., city, county-seat of York County, on the Chicago, Burlington and.

Quincy and the Chicago and Northwestern railroads, 50 miles west of Lincoln. It was settled in 1871 and in 1880 was incorporated. It is in agricultural and stock-raising region, and its industries are connected chiefly with farm products. It has a flour mill, machine shop, foundry, large stock yards and grain ele¬ vators and a good Federal post office. The edu¬ cational institutions are York College (U.B.), opened in 1890; a high school, established in 1880; the Holy Family Academy (R.C.) ; a prosperous business college ; four ward schools and parish elementary schools and public school libraries. The State Odd Fellows Home and the Mothers Jewels Home (M.E.) are located here. There are two national banks with a combined capital of $500,000 and two State banks with a combined capital of $100,000; also one daily and three weekly papers. There are 15 miles of paved streets, four parks with shade trees and drives, and a paid fire depart¬ ment with modern fire apparatus. Pop. 5,388.

YORK, Pa., city, county-seat of York County, on the Condorus Creek, and on the Pennsylvania, the York Southern, the Northern Central and

the Western Maryland railroads, about 28 miles southeast of Harrisburg, and 95 miles west of Philadelphia. It is in a produc¬ tive farming section and has considerable man¬ ufacturing interests.

In 1914 (government census) the city had over 500 manufacturing establishments, capital¬ ized for $29,328,000, with an output valued at $21,969,000. The foundry and machine fin¬ ished products are the largest industry, closely followed by the tobacco products. Other man¬ ufactures of which there are large and valuable outputs annually are agricultural implements, cigar boxes, food products, carriages, wagons, carriage and wagon materials, confectionery, flour and grist mill products, furniture, iron and steel products (including nails, spikes, wire nails, etc.), lumber products, paper and wood pulp, shirts and patent medicines. The vast power generated at Yorkhaven, 11 miles north of York, has greatly increased the manufactur¬ ing industries of York. There is an extensive trade in the manufactured products and in gen¬ eral merchandise which is distributed to the villages and towns of a large region. The sur¬ face is slightly rolling and has sufficient slope to make excellent drainage. The streets are broad and well shaded, lhe city is laid out in sections or blocks, 520 feet long and 480 feet wide. There are seven beautiful parks, of which the principal are Highland, Farquhar and Penn. The principal public buildings are the government building, the courthouse, county jail, the Masonic Temple, four market build¬ ings, an opera house, three public halls and the municipal buildings. There is an excellent water-supply and a good sewerage system. There are over 60 churches, representing 16 different denominations. The principal char¬ itable institutions and hospitals are the city hospital, charity hospital, county almshouse, Children's Home, Christian Home and private sanatoriums. The educational institutions are York Collegiate Institute (Presb.); York County Academy, founded in 1787; two busi¬ ness schools, Saint Patrick's Academy (R.C.) ; a public high school, founded in 1870; public and parish schools, a public library, York

County Law Library, and Saint John's Church free library. There are five national, three State and two private banks.

The government is administered on the com¬ mission plan, which provides for a mayor, elected for four years, and four commissioners elected for two years.

A permanent settlement was made in 1735 by a German colony; but in 1741 the town was laid out by John, Thomas and Richard Penn, and

incorporated as a borough in 1787. In 1887 York was chartered as a city. In 1749 the first Court of General Quarter Sessions was held here. In 1 777 the Continental Congress left Philadelphia, fearing capture by Howe's army, and convened in York 30 September. Congress continued to hold sessions in York until 27 June 1778. Pop. 47,512. Consult Gibson,

(History of York County) (Chicago 1886).

YORK, a river in Virginia, formed by the confluence of the Pamunkey and Mattapony rivers. It is the tidal estuary of the rivers, which begins at West Point and flows southeast to the Chesapeake Bay, into which it empties about 18 miles north of the James River. It is 40 miles long and navigable to the head of tide water. At its entrance, on York Spit, is a lighthouse.

YORK, Battle of, in the War of 1812.

Perry's victory at Lake Erie (q.v.) and Harri¬ son's defeat of Proctor at the Thames (q.v.) successfully concluded one part of the cam¬ paign for the invasion of Canada. As the next step Gen. Henry Dearborn (q.v.) planned to capture York (now Toronto), besiege Fort George (q.v.) by land and water, and then move on to Kingston after being joined by the troops at Buffalo, which were to capture Forts Erie and Chippewa. Leaving Sackett's Harbor (q.v.) defenseless, Com. Isaac Chauncey (q.v.), with 14 vessels, carrying 112 guns and 980 men, conveyed Dearborn, Zebulon M. Pike (q.v.) and 1,600 troops to York, which was attacked on the morning of 27 April 1813. The British garrison of 600 regulars and militia under Major-General Sheaffe were driven back toward their main works but when about 60 yards away a powder magazine was exploded by the British causing great "havoc and killing about 40 British and 100 American soldiers, Pike -being among those mortally wounded. Nevertheless the Americans pressed forward and finally drove the regulars toward Kingston and captured the militia, besides large quanti¬ ties of stores and a 10-gun brigade. The public buildings were then set afire. The American loss was about 320 killed and wounded and the British 90 killed, 200 wounded and 300 prison¬ ers. This paved the way for the capture of Fort George (q.v.) and the later battles of Stony Creek, Beaver Dam, Chrystler's Farm, Chateaugay, Lacolle Mill, Fort Erie, Chippewa, Lundy's Lane, Plattsburg and Lake Champlain (qq.v.). Consult Wiley and Rines, (The United States, > Vol. V, pp. 402-405; Roosevelt, (Naval War of 1812, 5 pp. 224-230; Whitney, Henry, (Life of Pike* ; (American State Papers, Military Affairs,* Vol. I, pp. 442-444; Maclay, E. S., (History of the Navy,1* Vol. I; Cooper, J. F., (Naval History, > Vol. II; histo¬

ries of the war by Lossing, Brackenridge and Armstrong.

YORK COLLEGE, located at York, Neb. It was founded under the auspices of the United Brethren in Christ, and was opened to students in 1890. It is under the control of the board of trustees composed of five members at large and representatives of four conferences of the United Brethren. Its organization in¬ cludes the College, the Preparatory Department, the Normal Department, the Conservatory of Music, the College of Commerce, the School of Shorthand, the School of Expression, the School of Art, the School of Telegraphy (or¬ ganized in 1903) and the Summer School. The college offers classical, philosophical, scientific and literary courses, and confers the degrees of A.B. and B.S. The work of each course is in the main prescribed. The normal department offers a course of two years, and a three-years' teachers' course, which is preparatory to it. The degree of bachelor of didactics is conferred on all graduates from the normal course. A model school was established in 1903. The conserv atory of music offers courses in piano, voice and violin, and confers the degree of bachelor of music for graduation. The College of Com¬ merce offers a course of one year, and an ad¬ vanced course of two terms additional; the degree of bachelor of accounts is conferred. The Summer School courses are intended specially for teachers, and a model school is conducted. Instruction in physical train¬ ing is given, and an organization of college cadets is maintained for military drill; there is also a field for athletic sports on the campus. The students maintain Young Men's and Young Women's Christian Associations, and two literary societies. York College is _ con¬ sidered one of the leading institutions of higher learning in Nebraska.

YORK AND LANCASTER, Wars of.

See Roses, Wars of the.

YORK VON WARTENBURG, york fo-n var'ten-boorg, Hans David Ludwig, Count, a Prussian field-marshal : b. Potsdam, 26 Sept. 1759; d. Klein-ols, near Breslau, Silesia, 4 Oct. 1830. He entered the army in

1772, but was cashiered for insubordination in 1779, and then served the Dutch in the East Indies 1783-84. He, however, was reinstated in the Prussian army in 1785, after the death of Frederick the Great, and was conspicuously successful as a rear-guard commander in the Jena campaigns. He became major-general in 1807 and governor of the province of Prussia in 1811. He com¬ manded the auxiliary corps. Prussia was obliged to send to aid the French in the Rus¬ sian War of 1812 ; but finding the Grand Army doomed, he yielded to the overtures made by the Russians and his corps was Neutralized" by the Convention of Tauroggen. His action signalized a turning-point in Prussian history and resulted in the alignment of Prussia with the Allies. He was especially distinguished dur¬ ing the War of Liberation and the invasion of France (1813-14), was ennobled in 1814 and made a field-marshal in 1821.

YORKE, york, Curtis, pseudonym of S. Richmond Lee, English novelist: b. Glasgow. She is the daughter of J. J. Long and was mar¬ ried to T. W. Richmond Lee, a mining en¬ gineer. Among her numerous works may be cited (That Little GirP (1886) ; (A Record of

Discords> (1894) ; (Because of the Child ? (1896); (A Flirtation with Truth; (1897); (A Memory Incarnate) (1902) ; (01ive Kinsella* (1905); (Thdir Marriage) (1908); (The Vision of the Years) (1913) ; (The Alternate Life' (1916), *etc.*

YORKSHIRE, England, the largest county of the kingdom, bounded on the north by the Tees, separating it from Durham, east by the North Sea, south by Lincoln, Nottingham, Derby and Cheshire, and west by Cheshire, Lancaster and Westmoreland; area, 6,06 7 square miles. Yorkshire is divided into trith-ings, or three ridings, respectively, the north, east and west, each having a separate lord-lieu¬ tenant, but a single high sheriff for the county. The main portion of the county forms a large central valley stretching southeast to the Hum¬ ber, flanked on one side by the Pennine range and on the other by the Cleveland Hills, and drained chiefly by the Ouse and its tributaries. Considerably more of the North Riding is pas¬ turage than is under cultivation, but it includes the vale of York, with an area of about 1,000 square miles, in which there is much fertile land growing all kinds of crops. It also includes the Cleveland district, with its great bed of iron ore. In the North Riding is the capital of the whole county, York, Scarborough, a favorite watering place, and Whitby, famous for its jet. In the East Riding the area under cultivation greatly exceeds that laid down in permanent pasture. Its industrial activity is centred

in the great seaport of Hull. In the West Riding the proportion of land laid down in permanent pasture is larger than in any other, being two-thirds of that under cultiva¬ tion. The West Riding has long been famous for its woolen and worsted manufactures, of which it is now the chief seat. Their de¬ velopment has been in modern times aided by the proximity of coal and iron. The great coal field of the West Riding yields not only the Silkstone bituminous coal, most valuable as a house coal, but also the Barnsley thick coal, semi-anthracitic. There are important manufactures of chemicals in both the South and the West Ridings. Leeds produces every variety of woolen goods, as well as manu¬ facturing clothing and paper; Bradford, mixed worsted fabrics and yarns ; Dewsbury, Batley and adjoining districts, shoddy; Huddersfield, plain goods, with fancy trousering and coat¬ ings ; and Halifax, worsted and carpets ; Barns¬ ley is famous for its linen manufactures, of which Leeds also is a seat, as well as of that of leather. Next to the woolen and other tex¬ tile industries comes the manufacture of iron and steel machinery, and implements of every description. Leeds is one of the principal seats of all kinds of mechanical engineering, and Sheffield of iron-wrork and cutlery. The county was a part of the kingdom of Diera from the 6th century until the Danish Con¬ quest in the 9th century; and it suffered severely under the Norman Conquest. It has many ancient castles and fine examples of ecclesiastical architecture. Pop. 3,584,762.

YORKTON, Canada, town and capital of Mackenzie District, Saskatchewan, 100 miles northeast of Regina and on the Canadian Pa¬ cific, the Canadian Northern and the Grand

Trunk railways. There are Dominion land and lands title offices here. Manufacturing is of increasing importance. Pop. about 2,309.

YORKTOWN, Va., town, county-seat of York County, on the York River, seven miles from its mouth and 68 miles southeast of Richmond. It has regular connection with the Chesapeake and Atlantic ports by means of the Old Dominion and other lines of steamers. York is one of the oldest settlements of the United States ; it contains the

oldest custom¬ house in the country. It is famous for having been the place where Lord Cornwallis sur¬ rendered, and a monument has been erected in honor of the event. This was the last import¬ ant battle of the Revolutionary War. (See Yorktown, iSiege of, in the ,War of the American Revolution). Yorktown was the scene of a second siege during the Civil War. (See Yorktown, Siege of, in the Civil War). Pop. (1920) 155.

YORKTOWN, Siege of, in the Civil War.

On 4 April 1862 General McClellan, with 58,000 men and about 100 guns, started from Fort Mon¬ roe up the York Peninsula for his campaign against Richmond. His plan of operation was to move in two columns, one on the right direct to Yorktown and another along the James River westward of and beyond Yorktown to the vicinity of Williamsburg. Should the Confed¬ erate works at Yorktown and Williamsburg offer serious resistance he designed to land Gen¬ eral McDowell's First Corps, reinforced if nec¬ essary, on the left bank of the York or on the Severn, and move it on Gloucester and West Point, in order to take in reverse whatever force the enemy might have on the peninsula and compel him to abandon his positions. At the end of the first day's march General Heintzelman's Third Corps on the right bivouacked at Howard's Bridge and Cockletown beyond, and General Keyes' Fourth Corps on the left, at Young's Mill, near James River. On 5 April Keyes resumed his march for the Halfway House, between Yorktown and Williamsburg, but had hardly got on the road when it was as¬ certained that a large force of the enemy, with a battery, was at Lee's Mills, six miles beyond, barring the way over the Warwick, concerning the. direction of which McClellan was misin¬ formed. Keyes advanced and in the afternoon found the situation as reported ; and after some artillery-firing he encamped for the night. On the right Heintzelman advanced to near York¬ town, came under artillery-fire from the works and encamped fronting them, where he was destined to remain a full month. Yorktown, as well as the line of the Warwick southward to James River, was held by Gen. J. B. Magruder with about 11,000 men. For 10 days McClellan remained in front of Magruder, making some reconnoissances, but no serious demonstrations, although urged by President Lincoln on 6 April to move upon and break the enemy's line. Mc¬ Clellan was instead engaged in bringing up troops and guns preparatory to a regular siege and was asking for heavy reinforcements and more heavy siege-guns. He adopted the slow method of a siege because of his exaggerated idea of the Confederate strength in his front, although he at no time estimated the forces of Magruder at more than 15,000 to 20,000 and his own initial strength of 58,000 men had been in¬

creased to 100,970 men present for duty accord¬ ing to his report of 13 April. He declared him¬ self seriously weakened by the fact that Mc¬ Dowell's Corps of 33,400 men, which he had pro¬ posed using to flank Yorktown, by Gloucester and West Point, had been withheld from him to protect Washington which had been left with a guard of less than 20,000 raw troops. (See Peninsula Campaign of 1862). However, at McClellan's urgent request Franklin's Division was sent him 10 April, but these troops were held aboard their transports until after the evac¬ uation of Yorktown. On 16 April an attempt was made upon Magruder's lines at Lee's Mill (q.v.) by a reconnoitering force of 200 men who were not reinforced, but resulted in fail¬ ure, and McClellan, giving up the idea of carry¬ ing the Confederate position by assault, devoted his attention entirely to siege operations against Yorktown. Under the direction of Gen. Fitz-John Porter, who was made director of the siege, Gen. J. G. Barnard, chief of engineers, and Gen. W. F. Barry, chief of artillery, the operations were conducted elaborately and with great skill. General Barry reports that the siege train consisted of 101 pieces, as follows: <(Two 200-pounder Parrot rifled guns, eleven 100-pounder Parrot rifled guns, thirteen 30-pounder Parrott rifled guns, twenty-two 20-pounder Parrott rifled guns, ten 4ˆ4-inch rifled siege guns, ten 13-inch seacoast mortars, _ ten 10-inch seacoast mortars, fifteen 10-inch siege mortars, five 8-inch siege mortars, and three 8-inch siege howitzers. Three field batteries of 12-pounders were likewise made use of as guns of position.® These guns were mounted on very elaborate works, some 15 in number, established opposite the town, and the works to its right, at ranges varying from 1,500 to 2,200 yards. In number and weight of metal they were far su¬ perior to those of the Confederates. On 17 April Gen. J. E. Johnston had been assigned to the defense of the peninsula and Richmond, and he had on the Yorktown and Warwick line not to exceed 50,000 men. He made no strenuous effort to interfere with McClellan's operations, but determined to hold his position until Mc¬ Clellan was ready to attack and then to fall back without waiting to have his troops driven from their works. By 30 April McClellan had pres¬ ent for duty 112,392 men, including Franklin's division that had been sent to him to turn York¬ town by Gloucester Point or West Point. On 1 May McClellan proposed to open fire on the morning of 6 May with all his guns and to press the siege until final assault should be deemed practicable. But on 27 April Johnston had learned that McClellan's batteries were approach¬ ing completion and would be ready to open fire in five or six days and he made his dispositions for retreat. On the night of 3 May, leaving some serviceable heavy guns

behind, he evacu¬ ated Yorktown and fell back to Williamsburg on the way to Richmond.

Consult (Official Records* (Vol. XI) ; (McClellan's Own Story) ; Webb, (The Peninsula) ; Barnard, (Peninsular Campaign) ; Allan, his¬ tory of the Army of Northern Virginia* ; The Century Company's (Battles and Leaders of the Civil War* (Vol. II) ; Nicolay and Hay, (Abraham Lincoln) (Vol. V, 1890).

E. A. Carman.

YORKTOWN, Siege of, in the War of the American Revolution, Lord Cornwallis

and the British army, a force of 8,000 men, reached Virginia in May 1781 and in the fol¬ lowing August invested Yorktown, on the York River, throwing up earthworks and fortifying the town ; he also erected fortifications at Glou¬ cester Pond, opposite Yorktown, and was sup¬ ported by several British vessels in the York River. Washington feigning activity around Ne\v York, left his headquarters on the Hudson 19 August, traveled by land to Philadelphia, then to Elktown at the head of Chesapeake Bay and arrived at Williamstown 14 September. His force consisted of 7,000 French under Rochambeau and 9,000 Americans. On 29 Sep¬ tember he invested Yorktown, taking over the command from Lafayette. Meantime, on 28 August, the French fleet of Count de Grasse, numbering 28 ships of the line, with nearly 4,000 infantry on board, reached the Chesapeake and came to safe anchor in the mouth of York River. Cornwallis was securely blockaded both by sea and land, the land forces under Lafayette being sufficient to hold him until Washington's arrival with reinforcements. Just after the ar¬ rival of Count de Grasse came also Count de Barras, who commanded the French flotilla at Newport. He brought with him into the Chesa¬ peake eight additional ships of the line and 10 transports; also cannon for the siege of York¬ town. By the beginning of September York River was effectually closed at the mouth and the Americans and the French began to strengthen their

lines by land. On 5 September the English Admiral Graves appeared in the bay with his squadron, and a naval battle ensued, in which the British ships were so roughly handled that they were glad to draw off and return to New York. The allied armies, new greatly su¬ perior in numbers to the enemy, and confident of success, encamped closely around Yorktown and the siege was regularly begun. The first parallel trench was opened 6 October and com¬ pleted 9 October, when the Americans opened fire and the cannonade became constant and ef¬ fective. The second parallel was opened 11 Oc¬ tober and on 13 October, in the night, the Amer¬ icans made an assault and the outer works of the British were carried by storm. At d&y-dawn on 16 October the British made a sortie from their entrenchments with 350 men and suc¬ ceeded only in spiking a few guns which were promptly restored to action before they were driven back. Cornwallis then attempted a night escape by boat forces, leaving his sick, wounded and baggage behind, but a terrific storm frus¬ trated the plan. On 17 October Cornwallis pro¬ posed to surrender, and on the 19th Major-General O'Hara led out the whole British army from the trenches into the open field, where, in the presence of the allied ranks of France and America, 7,247 English and Hessian sol¬ diers laid down their arms, delivered their standards, and became prisoners of war ; the garrison forces becoming prisoners of the United States, while the sea forces were prisoners of the French. The allied American and French losses were about 300 killed, wounded and missing. The British losses were about 550. This was the last important battle of the Revolutionary War.

YORKVILLE, S. C., town, county-seat of York County, on the Carolina and* North¬ western and Southern railroads, about 85 miles

north of Columbia. It is in an agricultural region, in which are valuable deposits of iron. It has iron works, machine shops, a saddle and harness factory, spoke and handle works, and lumber mill. There are seven churches and two graded schools (including high school depart-' ments), one for colored and one for white upils. The savings bank has a capital of 50,000. Pop. (1920) 2,731.

YORUBA, yo'roo-ba, or YARRIBA, ya'- re-ba, Nigeria, West Africa, a former inde¬ pendent state situated north and northeast of the colony of Lagos, extending from Benim on the east to Dahomey on the west and north to Borgu, its area being about 25,000 square miles, most of which is now a part of the British Protectorate of Southern Nigeria. Its history in European knowledge dates to the 17th century, at which

time it was an empire con¬ sisting of six strong confederate states. About 1830 the empire, weakened by Moslem influ¬ ences and Tula invaders, broke into a number of weak, quarreling states. They came under British protection in 1893, and while only semi-independent have not lost their sense of nationality. They contrive, also, to preserve most of their government and customs. Much of the country is fertile and well cultivated, and the inhabitants have made great progress in the industrial arts. They are of negro stock but many have light skins, probably due to an infusion of Arab and Berber blood. There is a tradition among them of Oriental origin. Their country was repeatedly raided by slave hunters, and many American negroes are said to have come from there. Their houses are well built, those of their chiefs containing great numbers of rooms. They are largely pagans, but Mohammedanism and Christianity have made way among them. Protestant and Roman Catholic missions have long been at work. Ibadan, to which there is a railway from Lagos, is the largest town, having about 200,000 in¬ habitants ; Oyo, farther to the north, is the capital. Population estimated at between 1,000,- 000 and 2,000,000.

YOSEMITE, yo-sem'i-te (Indian, full-grown grizzly bear®) VALLEY, in Mariposa County, Cal., on the west slope of the Sierra Nevada, about 150 miles, in direct line, east of San Francisco. This valley is one of the nat¬ ural wonders of America and is unlike any other known valley in the world. It is about six miles long and from half a mile to a mile wide. It is nearly a mile below the general level of the land near it. Entering the valley from the lower end, the two distinct valley types may be seen, the V-shaped and the U-shaped. (See Valleys). It has the char¬ acteristics of a gorge and also of a canon and was eroded from the surrounding granite by glacial action. It is nearly 4,000 feet above sea-level and its walls of granite from 3,000 to nearly 5,000 feet higher. On the north side is a huge block of granite called El Capitan. It projects into the valley so that two of its smooth, almost perpendicular faces are visible; the height is 7,042 feet. Opposite El Capitan are Cathedral Rocks and Bridal Veil Rock. From the summit of El Capitan to the summit of Bridal Veil Rock is one mile; but at the base of the rocks the distance apart is not great.'

The bottom of the valley widens from El Capitan up to the <(meadows.® Other conspicuous blocks of the unbroken wall are called the Three Brothers (4,630, 5,826, 6,740 feet), the Spires (6,114 feet), Cap of Liberty (7,072 feet) and Sentinel Dome (8,117 feet).

About 15 miles above is the source of the Merced River, which flows through the Yosemite Valley. The Illouette River which enters the valley from the south, and the Tenaya Fork, from the northeast, are branches of the Merced. There are two falls and about half a mile of rapids in the Merced River, beginning just be¬ low the point where the stream enters the val¬ ley. Nevada Fall, the upper one, is about 600 feet high, and Vernal Fall is about 400 feet. The Bridal Veil Falls is on the side of Cathe¬ dral Rock which faces the entrance. Bridal Veil Creek here falls over a precipice 630 feet high and flows over an irregular bed which forms a series of cascades that combined make a descent of about 300 feet. The total fall is 900 feet. The name comes from the appear¬ ance of the highest vertical sheet of water at times when the amount of water in the stream is not too great and when the wind sways the (tveil of waters.® Just below El Capitan is a fall called Virgin's Tears, which is over 1,000 feet high. The waters flow over this precipice only for a few months after the summer heat has melted the mountain snows. The Yosemite Falls, nearly opposite Sentinel Rock, is made by the Yosemite Creek. The first vertical fall is 1,500 feet; then the water descends, in a series of cascades, about 625 feet and again flows over a precipice 400 feet high. In the ((meadows® are a variety of flowers and grasses in the early summer months. The principal trees are the pine, fir, cedar and oak.

In the vicinity are many features of interest; great masses of dome-shaped rocks and the famous ((big trees® of California are nearby. Among the prominent elevations are North Dome, Sentinel Dome, Half Dome and Glacier Point. From Sentinel Dome may be obtained a good view of the Yosemite Valley and the sur¬ rounding country. Glacier Point (7,214 feet) also affords a magnificent view. Half Dome is an imposing mass, 8,852 feet high.

The Yosemite Valley was discovered in 1851 by settlers who were located near a mining camp in the vicinity. The Indians had been annoying the white settlers and miners, and while in pursuit of the band of red men, the whites found this valley. It was named after an Indian chief. In 1864 Congress gave the Yosemite Valley to the State of California, to be ((held for public use, resort, and recreation,® and to be ˆinalienable for all time.® Private parties have built wagon-

roads to the valley and trails to various points of interest in the vicin¬ ity. In 1886 a railroad, 22 miles long, was built from Berenda, the Central Pacific Railroad, to Raymond, whence a stage line extends to the valley. This is now reached by branches of the Northern Pacific and the Union Pacific railroads. In the grant to the State, in 1864, besides the valley proper there was included ad¬ jacent territory for two miles around it. Since 1890 it has been a part of Yosemite Na¬ tional Park, then established by act of Con¬ gress; and it was receded by California to the United States 3 March 1905 and is under the supervision of the Department of the Interior.

Consult Bunnell, (Discovery of the Yosemite) (1893) ; (Guide to the Yosemite5 (Cali¬ fornia Geological Survey) ; Muir, J., (Our Na¬ tional Parks) (1901) ; Chase, J. S., (Yosemite Trails) (1911) ; Johnson, D. W., (The Origin of the Yosemite Valley) (1912).

YOSHIHITO, Emperor of Japan: b. 31 Aug. 1879. He acceded to the throne of Japan, as mikado, on the death of his father Mutsu-hito, 30 July 1912, going through the ceremony of <(Receiving the Sacred Treasures.® He has received a thorough education at the Peers' School in all the learning of modern Japan, as well as in the arts and sciences of the Occident, has spent years in travel and study throughout his realm so that he understands thoroughly the needs of his people and is broad, liberal and democratic. He served in the House of Peers from 1897, when he came of age, until his ac¬ cession to the throne. He has three sons, of whom the heir, Crown Prince Hirohito, was born in 1901.

YOSHINOBU, Prince Tokugawa, Japanese nobleman and political leader, known as ((the last of the Tycoons.® See Hitotsubashi.

YOSHITSUNE, yo-she'tsu-na, the mirror of Japanese valor and chivalry: b. 1159, d. 1189; brother of Yoritomo and son of Yoshitomo. He was exiled as a child by the rival Taira (q.v.) in the far north of Hondo. He escaped from the monastery in which he was put, accompanied by Benkei, the famous priest, ((jack of all trades.® In the rising of the Minamoto clan, in 1180, he was field marshal, fought many battles, winning decisive victory and, in the final naval conflict at Dannoura, annihilated the Taira clan. After this, he was cruelly treated by his jealous brother, Yoritomo, after he had exhausted the benefit of his service. He was attacked and slain by official order and his head sent to Kamakura. According to one legend, however, he fled north, to Yezo, where he was deified by the Ainu, crossed over to

Tartary and ap¬ peared in history as the redoubtable conqueror Genghis Khan (Genghiz Khan). In legend, the theatre, fiction, toy and picture shops and the Festival of Flags for boys, Yoshitsune is the chief figure. The story of his beautiful mis¬ tress, a dancing girl, Shidzuka Gozen, is one of the classic instances in Japan's rich thesauras of pathos and womanly devotion. Consult Suyematsu, (The Identity of the Great Con¬ queror Genghis Khan, with the Japanese Hero Yoshitsune5 (1879) ; Griffis' (The Mikado's Empire5 (1912).

YOUATT, William, English veterinary sur¬ geon: b. Exeter, Devonshire, 1776; d. London, 5 Feb. 1847. Having been educated for the ministry, he preached for a few years in Lon¬ don, but about 1813 established there a veteri¬ nary infirmary, lecturing on veterinary prac¬ tice 1828-35. He published (Extent and Obliga¬ tion of Humanity to Brutes5 (1839) ; (Treatise on Cattle5 (1834) ; (Treatise on Sheep5 (1837) ; (Treatise on the Horse5 (1831); (Treatise on the Pig5 (1847) ; and (Treatise on the Dog5 (1842) ; and was the owner and editor of The Veterinarian, established in London in 1828, the first periodical devoted to that class of sub¬ jects.

YOUGHAL, ya'hal or yal, Ireland, a sea¬ port of County Cork, on the estuary of the

Blackwater, 27 miles east of Cork. The parish church is formed of the nave and aisles of the ancient collegiate church, built by the Earl of Desmond in 1464; the ((water gate,55 the <(clock gate55 and Sir Walter Raleigh's house, Myrtle Grove, are other notable features. The export of agricultural produce and the fisheries are the chief industries. According to local tradition the potato was first planted at Youghal by Raleigh, who was mayor in 1588. Pop. 5,393.

YOUMANS, yoo'manz, Edward Living¬ ston, American scientist : b. Coeymans, N. Y., 3 June 1821 ; d. New York, 18 Jan. 1887. Par¬ tially blind at times through many years of his life, he pursued his studies by the aid of his sister, Eliza Ann Youmans, and became widely known as a popularizer of science. He lec¬ tured extensively and in 1872

founded The Popular Science Monthly, which he edited till his death and established the (International Scientific Series,5 in which the works of Her¬ bert Spencer and other prominent scientists were presented to American readers. The vol¬ umes of this series were published simultane¬ ously in different languages in London, Paris, New York, Leipzig, Petrograd and Milan. Author of (Chemical Chart) (1851) ; hand¬ book of Household Science5 (1857) ; (Culture Demanded by Modern Life5 (1867), *etc.*

YOUMANS, William Jay, American chemist, brother of E. L. Youmans (q.v.) : b. Milton, Saratoga County, N. Y., 14 Oct. 1838; d. Mount Vernon, N. Y., 10 April 1901. He studied chemistry at Columbia College and at the Sheffield Scientific School, New Haven, and was graduated from the medical department of the New York University in 1865 and prac¬ tised his profession for a time at Winona, Minn. In 1871 he was called to assist his brother, who had planned to publish The Popu¬ lar Science Monthly, and from that time till 1900 was actively connected with the manage¬ ment and editorship of that periodical. He ed¬ ited (Pioneers of Science in America5 (1895) ; Huxley's (Lessons in Elementary Physiology,5 adding a second part, (Elementary Hygiene5 (1867) and was author of (Pioneers of Science in America5 (1895).

YOUNG, Alexander, American Unitarian clergyman: b. Boston, 22 Sept. 1800; d. there, 15 March 1854. He was graduated at Harvard in 1820, studied theology at Cambridge, and in 1825 became pastor of the New South Congre¬ gational Church in Boston, which office he held till the close of his life. He was famous as a delineator of character and his discourses in memory of prominent men of his acquaint¬ ance, among which were (Nathaniel Bow-ditch5 (1838) ; (President Kirkland of Har¬ vard5 (1840), and (Judge William Prescott, father of the historian5 (1844), were widely read. He published (Chronicles of the Pil¬ grim Fathers of the Colony of Plymouth5 (1841) ; (Chronicles of the First Planters of the Colony of Massachusetts Bay5 (1846) ; (Library of Old English Prose Writers5 (9 vols., 1831-34), *etc.*

YOUNG, Andrew White, American po¬ litical economist: b. Carlisle, N. Y., 2 March 1802; d. Warsaw, N. Y., 17 Feb. 1877. He was for many years a newspaper editor, served in the State legislature and was author of (Intro¬ duction to the Science of Government5 (1835) ;

< First Lessons in Civil Government5 (1843) ; (Citizen's Manual of

Government and Law5 (1851) ; (The American Statesman: A Political History of the United States5 (1855) ; Na¬ tional Economy: A History of the American Protective System5 (1860).

YOUNG, Arthur, English agricultural writer: b. London, 11 Sept. 1741; d. there, 20 April 1820. He was intended for a mercantile career, but early adopted the profession of agri¬ culture, carrying on farms at various places, and especially on his paternal estate, near Bury Saint Edmunds. He soon became famous as a writer on farming and allied topics and espe¬ cially for his agricultural tours. He also car¬ ried on an extensive correspondence with public men both at home and abroad, Washington being one of his correspondents. In 1784 he began the publication of his (Annals of Agricul¬ ture,5 of which 46 volumes were issued. This work had the most important influence upon the art of agriculture in England and a consider¬ able portion of it was translated into French under the auspices of the government. In 1793 he was appointed secretary of the newly erected board of agriculture, with a salary of i400 a year. Young not only visited and examined with great attention many parts of England and Ireland, but also made several tours on the Continent. His work was highly important, not only in its service to agriculture but from the standpoint of social and political observation. He became blind some years before his death. Among his numerous works are (The Farmer's Letters to the People of England5 (1767; en¬ larged edition 1777) ; (Six Weeks' Tour through the Southern Counties5 (1768) ; (Six Months' Tour through the North of England5 (1770) ; (Farmer's Guide5 (1770); (Farmer's Tour through the East of England5 (1771) ; (The Farmer's Calendar 5 (1771) ; (Tour in Ireland5 (1780) ; (Travels in France during the Years 1 787-89 > (1792-94) ; treating of agriculture and national resources, the social and political con¬ dition of the people, the most trustworthy source of information regarding the state of France on the eve of the Revolution; (Essays on Manures5 (1804) ; (The Rise of Prices in Europe5 (1815). By order of the French Di¬ rectory his. agricultural works were published in French in 20 volumes entitled (Le Cultivateur Anglais5 (1800-01). Consult Leslie, Stephen, 'Studies of a Biographer5 (1898); his Auto¬ biography edited by Miss Betham Edwards (1898) ; and bibliography by Anderson in Hutton's edition of (Tour in Ireland5 (1892).

YOUNG, Brigham, president of the Church of Jesus Christ of Latter-day Saints (com¬ monly called the "Mormon55 Church) from 1844 to 1877; b. Whittingham, Vt., 1 June 1801; d. Salt Lake City, 29 Aug. 1877. In early life he moved to Cayuga County, N. Y., where he fol¬ lowed the occupation of carpenter and glazier. In 1829 he moved to Mendon, N. Y., where he obtained from Samuel H. Smith, brother of

Joseph Smith, the prophet, a copy of the Book of Mormon. His investigation resulted in his conversion and he joined the Church, being baptized and confirmed 14 April 1832. He was ordained an elder and immediately began active service in the ministry, preaching and baptizing in the regions about Mendon. When the main body of the Latter-day Saints settled

in Kirtland, Ohio, he also made his residence there, and was actively engaged traveling and laboring in the ministry. He also spent much of his time as a carpenter and builder, assist¬ ing in the erection of the Kirtland Temple in 1833-36, and having the supervision of much of the work on that building. When the Coun¬ cil of the Twelve Apostles was organized in 1835, he was chosen as a member of that body, and, following the death of David W. Patten, became president of that council, which is the second council in the Church. He passed through the persecutions in Missouri in 1838ˆ- 39 and led the members of the Church from that State to their refuge of safety in Illinois, following the exterminating order given by Gov. Lilburn W. Boggs of Missouri. In the fall of 1839 he started on a mission to Great Britain, where, with other members of the Council of Apostles, he labored until 1841, preaching and organizing branches throughout the British Isles, where thousands of converts joined the Church. Following the assassination of -Joseph and Hyrum Smith, in 1844, Brigham Young, by virtue of his position as president of the Twelve Apostles, became the presiding officer of the Church, and when the Council of the First Presidency was again organized, he was unanimously chosen president, with Heber C. Kimball and ‘Willard Richards as his coun¬ selors. On the forcible expulsion of the Church from Illinois in 1846, he led the Latter-day Saints through toils and dangers, which nothing but the most untiring energy could have conquered, over the plains and tablelands to the valley of the Great Salt Lake. Here, in the heart of the Rocky Mountains, he founded Salt Lake City, 24 July 1847, in a land most unin¬ viting. Due to untiring industry and determined perseverance, this exiled people, under his di¬ rection, soon made the deserts blossom and the waste places fruitful and a pleasant

habitation. In 1849 an attempt was made to organize a State, to be called the State of Deseret, that being the name given by the Latter-day Saints to that region. The United States government refused to sanction the new State, but in 1850 the Territory of Utah was organized and Brig¬ ham Young was appointed governor by Presi¬ dent Fillmore. He served in that capacity until 1858, when he was succeeded by Alfred Cum¬ mings of Georgia. A false report having reached Washington that the “Mormons” had burned the court records and were in rebellion, President Buchanan sent out an army to the Territory. President Young declared that the Latter-day Saints had been driven and perse¬ cuted by armed forces so many times that they would not be so driven again. If an army with hostile intent entered the Territory they would find it a barren waste, in the condition in which the pioneers found it in 1847. The body of the people journeyed to the southern portion of the Territory, leaving in Salt Lake City only enough forces to apply the torch to every sub¬ stance, including their homes, that would burn. When it was discovered that the records were intact and that the report of a “Mormon” re¬ bellion was false, the matter was amicably set-During the administration of President Young, the doctrine of marriage for eternity, including plural marriage, was openly taught. This doctrine was based on a revelation given to

Joseph Smith and recorded in July 1843. The practice of plural marriage brought on opposi¬ tion, and laws were later passed by Congress against the doctrine, which finally resulted, dur¬ ing the administration of President Wilford Woodruff, in the abandonment of the practice by the Latter-day Saints.

Brigham Young was the friend of true edu¬ cation and with his associates founded the Uni¬ versity of Deseret, now the University of Utah; the Brigham Young Academy, now the Brig¬ ham Young University in Provo, and the Brig¬ ham Young College in Logan, Utah. He en¬ couraged and assisted in the building up of the Union Pacific and Southern Pacific railroads and the telegraph line across the plains, and in various other ways was the prime mover in the great development of the West. See Mormons.

YOUNG, Charles Augustus, American as¬ tronomer: b. Hanover, N. H., 15 Dec. 1334; d. 4 Jan. 1908. He was graduated at Dartmouth in 1853, was professor of mathematics, physics and astronomy in Western Reserve College (1857— 66) ; and of astronomy and physics in Dart¬ mouth (1866-77). He was professor of astron¬ omy at

Princeton 1877-1906. He accompanied the eclipse parties to Iowa in 1869, and to Spain in 1870; the transit of Venus party to Peking, China, 1874, and organized the Princeton eclipse expedition to Denver in 1878. He was the dis¬ coverer of the green line of the solar corona in 1869, identifying it with the line 1,474 of Kirch-off's scale. At the 1870 eclipse he detected the so-called "reversing layer" surrounding the solar photosphere, and 'in 1872 at Sherman, Wyo., noticed the bright reversal of many lines of the solar spectrum in ordinary sunlight. He was recognized as an authority in spectroscopy and lectured in the courses of the Peabody In¬ stitute at Baltimore, the Lowell Institute at Boston, and at many colleges. He wrote (The Sun> (1882) ; (General Astronomy > (1889) ;

(Elements of Astronomy) (1890) ; (Lessons in Astronomy) (1891) ; (Manual of Astronomy)

(1902).

YOUNG, Charles Mayne, English trage¬ dian: b. London, 10 Jan. 1777; d. Southwick, Sussex, 28 June 1856. In 1798 he made his debut at Liverpool as Young Norval and his first appearance in London, in 1807, was as Hamlet. As Hamlet, Iago and Falstaff he was seen at his best, but his repertoire was very ex¬ tensive. In 1829 he declined an offer of $50,000 for a 10 months' tour in the United States and in 1832 retired with a fortune of $300,000. At his farewell benefit at Covent Garden, 31 May 1852, he appeared as Hamlet, with Mathews as Polonius, and Macready as the Ghost. Consult J. C. Young, (Memoirs of Charles Mayne Young* (1871).

YOUNG, Clark Montgomery, American educator : b. Hiram, Ohio ; d. 1908. He was graduated at Hiram College and after 1833 was employed in educational work in South Dakota. He was secretary of the Territorial board of education of Dakota in 1889 and of the State board of education of South Dakota, and in 1892 became professor of history and sociol¬ ogy in the University of South Dakota, where he was dean of the faculty from 1902. Author of (The State and Nation* (with G. M. Smith) ; history and Government of South Dakota* ; Elements of Pedagogy> ; *etc.*

YOUNG, Edward, English poet: b. Upham, Hampshire, 3 July 1683; d. Welwyn, Hertford¬ shire, 5 April 1765. He was educated at Ox¬ ford and in 1708 was nominated to a law fel¬ lowship in All Souls College. Befriended by the Duke of Wharton, an annuity of £100 was granted him by the duke. In 1719 and 1821, re¬ spectively, appeared his tragedies of <Busiris) and ‘ Revenge,) both produced at Drury Lane. In 1725 he began the publication of a series of satires, ‘The Universal Passion.) He now took holy orders and in 1728 was nominated one of the royal chaplains. In 1730 the College of All Souls presented him with the rectory of Wel¬ wyn, in Hertfordshire, to which the lordship of the manor was attached. In 1731 he married Lady Elizabeth Lee, daughter of the Earl of Lichfield, and after his marriage the poet lived much in retirement at Welwyn, sadly disap¬ pointed that church preferment, which he so eagerly desired and so unscrupulously belauded those in power to obtain, was refused him. The work by which he is best known is (The Com¬ plaint, or Night Thoughts on Life, Death and Immortality) (1742-45), a series of argumenta¬ tive poems in blank verse, intended to prove the immortality of the soul and the truth of the Christian religion — a work displaying great force of pious and somewhat gloomy reflection, and containing many lofty passages, but marred by a straining after antithesis and ornament. The (Night Thoughts) were translated into French and German and were as popular on the Continent as at home. Of Young’s three trage¬ dies, (Busiris) (1719); (The Revenge) (1721) ; and (The Brothers) (1753), only the second has kept a place on the stage. His (Night Thoughts) has never since ceased to be popular and many of its sententious lines have become proverbial. The poem is not destitute of real excellence, but a note of insincerity runs through it and the poet too often substitutes pomposity for dignity. Consult Mitford edition of Young’s ‘Poetical Works) with ‘Life) (1854); Thomas, (Le poete Edward Young) (1901); ‘Worldli¬ ness and Other-Worldliness,) by George Eliot, in Westminster Review for 1857, reprinted in her ‘Essays and Leaves from a Notebook)

(1884).

YOUNG, Ella Flagg, American educator: b. Buffalo, N. Y., 15 Jan. 1845; d. Washington, D. C., 26 Oct. 1918. She was educated at the Chicago Normal School, and took the degree of Ph.D. at the University

of Chicago in 1900. She engaged in teaching in 1862, and was mar¬ ried to William Young in 1868. She was ap¬ pointed superintendent of schools in Chicago in 1887, and in 1899 she became professor of education at the University of Chicago. She served as principal of the Chicago Normal School in 1905-09, and in 1909 she again be¬ came superintendent of Chicago schools, resign¬ ing in 1915. She was actively connected with various educational associations, and was in 1910-11 the first woman president of the National Education Association. In 1906-09 she edited the Educational Bi-Monthly. She published isolation in the SchooP (1901) ; (Ethics in the SchooP (1902) ; (Some Types of Modern Educational Theory) (1902), *etc.* Consult McManis, John T., 'Ella Flagg Young> (Chicago 1916).

YOUNG, Franklin Knowles, American au¬ thor and inventor: b. Boston, Mass., 21 Oct. 1857. He is the inventor of an automatic breech action for small arms and field artillery. Author of (The Minor Tactics of Chess) (1894) ; (The Major Tactics of Chess) (1898) ; 'Grand Tactics of Chess } (1898) ; (Chess Strategics Illustrated) (1900); (Napoleon's Campaigns.)

YOUNG, Sir Frederick, English publicist: b. London, 21 June 1817; d. 9 Nov. 1913. He was formerly a London merchant and traveled extensively in Greece, Turkey, South Africa and Canada. Lie was active in securing Victoria Park, London and Epping Forest to the public, and in establishing the People's Palace. He took great interest in emigration and was one of the earliest advocates of imperial federation. He published 'Long Ago and Now) (1863) ; 'New Zealand: Past, Present, and Future); 'A Winter Tour in South Africa) (1890) ; (A Scheme for Imperial Federation) (1895) ; (Exit Party) (1900) ; 'A Pioneer of Imperial Federa¬ tion in Canada) (1902), etc., and edited 'Imperial Federation) (1876).

YOUNG, Frederick George, American edu¬ cator: b. Burnett, Wis., 3 June 1858. He was graduated at Johns Hopkins University in 1886; was vice-principal of the State Normal School, in Madison, S. Dak., 1887-90; principal of the Portland High School, Ore., 1890—94 ; president of Albany College, Ore., 1894-95; and was appointed professor of economics and his¬ tory in the University of Oregon in the year last named. Since 1908 he has been secretary of the Oregon Conservation Commission. He edited 'Sources of the History of Oregon,) and is editor of the 'Quarterly Journal of the Ore¬ gon Historical Society.) Author of 'Explora¬ tion Northward) (1898); 'The Lewis and Clark Expedition in American History) (1901) ; 'Procedure

for Tax Reform in Oregon) (1909), *etc.*

YOUNG, George Ulysses, American mine owner and public official: b. Hamburg, Ind., 10 Feb. 1867. His parents emigrated to Kansas in 1880, and two years later, he began teaching school. He was admitted to the bar in 1890, and worked for several years in railroad con¬ struction. He was principal of the Williams schools (Arizona) for four years, and while there was owner of the Williams News, with Capt. W. O. O'Neill. Since 1903 he has been in the mining business, becoming vice-president and general manager of the Madizelle Mining Com¬ pany, and president of the Young Mines Com¬ pany. In 1916 he was elected mayor of Phoenix, Ariz., the first to serve under the commission form of government. From 1909-12 he was territorial secretary of Arizona.

YOUNG, James, Scottish chemist: b. Glas¬ gow, 13 July 1811; d. 14 May 1883. He began his career as a cabinetmaker, but in the even¬ ings studied chemistry under Professor Gra¬ ham in Anderson's College, Glasgow, and be¬ came his assistant both there and afterward at University College, London (1832-38). Re¬ ceiving appointments in chemical works at Manchester and elsewhere, he discovered a method of distilling oil from bituminous shale, and thus became the founder of the mineral-oil industry of Scotland, besides leading to the development of the petroleum industry in

America and elsewhere. (See Paraffin). He acquired a large fortune, endowed a chair of chemistry in Anderson's College, and fitted out at his own expense an expedition in search of Livingstone in 1872.

YOUNG, James Thomas, American publi¬ cist: b. Philadelphia, Pa., 23 Sept. 1873. He was graduated at the University of Pennsylvania 1893, and later studied at German, French and Swiss universities, taking the degree of Ph.D. at Halle in 1896. He is at present professor of public administration, University of Pennsyl¬ vania. He is also the author of (The New American Government and Its Works) (1915), and articles on political science and university training for business.

YOUNG, Jesse Bowman, American Metho¬ dist clergyman and author : b. Berwick, Pa., 5 July 1844; d. 1914. He graduated at Dickinson College in 1868, but had previously served three years in the Union army during the Civil War, becoming captain in the 84th Pennsylvania vol¬ unteers. Entering the ministry in 1868, he held pastorates in Pennsylvania and Kansas City, Mo., and was subsequently editor of the Central Christian Advocate (1892-1900). Author of (What a Boy Saw in the Army* ; (Days and Nights on the Sea* ; (Helps for the Quiet Home) (1900) ; (Our Lord and Master* (1903) ; (Wellsprings in the Desert* (1905) ; (Charms of the Bible) (1910); (The Battle of Gettysburg) (1913), *etc.*

YOUNG, Sir John, Baron Lisgar, Eng¬ lish statesman : b. Bombay, India, 31 Aug. 1807 ; d. Ireland, 6 Oct. 1876. He was graduated at Oxford in 1829, called to the bar in 1834, and sat in the House of Commons in 1831-55. He was lord of the treasury 1841-44; secretary of the treasury in 1844-46; chief secretary for Ireland in 1852-55; and lord high commissioner of the Ionian Islands 1855-59. He succeeded to the baronetcy on the death of his father in 1848 and from 1861 to 1867 was governor to New South Wales. Appointed governor-gen¬ eral of Canada in 1868 he filled this post till 1872, when he was succeeded by the Earl of Dufferin. During his Canadian governorship he suppressed the Riel rebellion in 1870 and was rewarded with the title of Baron Lisgar.

YOUNG, John Russell, American journal¬ ist: b. Downingtown, Pa., 20 Nov. 1841; d. Washington, D. C., 17 Jan. 1899. In 1857 he was copyholder on the Philadelphia Press; and later its news editor. At the outbreak of the Civil War he became war correspondent, and was with the Army of the Potomac from the battle of Bull Run to the end of the Chicka-liominy campaign, when he returned to Phila¬ delphia and became managing editor of the Press. In 1865 he joined the editorial staff of the New York Tribune, resigning in 1869; es¬ tablished the Morning Post in Philadelphia; and the Standard in New York (1869); and was European correspondent of the New York Herald (1871-77). As correspondent of that paper he accompanied General^ Grant in his journey round the world in 1877, and was at¬ tached to the editorial staff of the Herald 1879-82. He was Minister to China 1882-85; and was appointed librarian of Congress 30 June 1897. Author of < Around the World with General Grant* (1879); and editor of (Me¬ morial History of Philadelphia) (1895).

YOUNG, Julia Evelyn, American verse writer and novelist: b. Buffalo,

N. Y., 4 Dec. 1857. She has published (Adrift: A Story of Niagara* (1889) ; (Glvnne's Wife: A Story in Verse) (1896) ; (Thistle-Down,) poems; (The Story of Savilla,* verse (1897) ; {Black Evan, A Tale of the Forty-Five) (1901), *etc.*

YOUNG, Lucien, American rear admiral: b. Lexington, Ky., 21 March 1852; d. 2 Oct. 1912. He was graduated at the United States Naval Academy in 1873, was promoted commander in 1902, captain in 1906 and rear-admiral 17 March 1910. He received two gold medals and other signal honors in recognition of his heroism in life saving on several occasions, and was ad¬ vanced-three numbers in rank for his services in the Spanish-American War, in which he com¬ manded the Hist. He was captain of the Port of Havana in 189ˆ-1900, and commander of the United States naval station at Hawaii in 1900-01. He commanded the Bennington when it was wrecked by a boiler explosion and beached off the coast of San Diego, Cal., 21 July 1905, but was exonerated from blame. He was captain of the Mare Island Navy Yard at the time of the San Francisco earthquake and fire, and distinguished himself in relief work. Lie was later transferred to Key West, Fla. He wrote (Simple Elements of Navigation (1890) ; (The Real Hawaii* (1899).

YOUNG, Robert, Scottish Biblical scholar: b. Edinburgh 10 Sept. 1822; d. there, 14 Oct. 1888. He became a printer and superintended the Mission Press at Surat, India (1856-61). He subsequently devoted himself to preparing, printing and publishing at Edinburgh a long series of works of somewhat narrow but re¬ markable Biblical scholarship; among them were an independent translation of the Bible ; (Marginal Readings (10,000) for the English Testament* ; 'Concise Critical Comments on the Holy Bible) ; Grammatical Analysis) of the Hebrew, Chaldee and Greek Scriptures (1885) ; 'Hebrew Vocabulary) ; and a laborious (Analytical Concordance to the Bible,) giving 311,000 references (1879), which has gone through many editions and remains a highly valuable reference work.

YOUNG, Robert Anderson, American Methodist clergyman: b. Knox County, Tenn., 23 Jan. 1824; d. 1902. He was graduated at Washington College, Tenn., in 1844; entered the Methodist ministry, and held pastorates in several cities in Tennessee. He was president of the Wesleyan University, Florence, Ala., 1861-64; financial secretary of .the board of trustees of Vanderbilt University, 1874-82; secretary of the board of missions of the Methodist Episcopal Church, South; and secre¬ tary of the Tennessee Conference for 21 years. He was editor of the Advocate of Missions, and author of (Personages) ; (ArieP ; 'Twenty Thousand Miles* ; ' Celebrities, and Less,> *etc.*

YOUNG, Samuel Baldwin Marks, Ameri¬ can soldier: b. Pittsburgh, Pa., 1840. He rendered important service in the Civil War, entering the Volunteer Army of the Union in 1861 as a private, and rose to a colonelcy at the end of the war. He was brevetted major for services at Sulphur Springs (1863); lieu¬ tenant-colonel at Amelia Springs (1865); colonel at Sailors Creek (1865) and brigadier-general of volunteers for his share in the final

action against General Lee. At the close of the Civil War he entered the regular army as second lieutenant, took part in the Indian Wars, commanded a brigade at Santiago, and won a decisive victory at Las Guasimas 24 June 1898. In 1899 he was in charge of the cavalry advance of Lawton's Division in its march through northern Luzon, and for his services was appointed military governor of northwestern Luzon ; and later commander of the first district of the Department of North¬ ern Luzon. He was then appointed comman¬ der of the Department of California. In 1902 he became first president of the Army War College Board, chief of staff and lieutenant-general of the army. He was retired-9 Jan. 1904. In 1909-10 he was president of the Brownsville Court of Inquiry; and from 19i0 to 1917 was governor of the Soldiers' Home at Washington, D. C.

YOUNG, Samuel Hall, American Presby¬ terian clergyman : b. Butler, Pa., 12 Sept. 1847. He was graduated at the University of Woos¬ ter, Ohio, in 1875, and at the Western Theolog¬ ical Seminary, Allegheny, Pa., in 1878; and ordained in the Presbyterian ministry in 1878. Going to Fort Wrangel, Alaska, as a mission¬ ary and explorer in 1878, he organized the first Protestant church in Alaska in 1879; and afterward held pastorates in California, Illi¬ nois, Iowa and Ohio. Sent to the Klondike in 1897, he established the First Presbyterian Church in Dawson in 1898; and organized mis¬ sions in Eagle, Romfort, Nome and Teller. In 1901 he was appointed superintendent of all the Presbyterian missions in Alaska, which office he filled until 1913, when he became spe¬ cial representative for Alaska of the Presby¬ terian Board of Home Missions with head¬ quarters in New York.

YOUNG, Thomas, English physicist and archaeologist: b. Milverton, Somerset, 13 June 1773; d. London, 10 May 1829. He was of Quaker parentage, and at the age of 14 pos¬ sessed a remarkable knowledge of Latin, Greek, French, Italian, Hebrew, Persian and Arabic. He studied medicine at London and Edinburgh, taking his M.D. at Gottingen in 1796 and later studying at_ Cambridge. As early as 1799 Young wrote his celebrated me¬ moir on the (Outlines and Experiments re¬ specting Sound and Light,1 which speedily conducted him to the discovery and demonstra¬ tion of the interference of light. This discov¬ ery alone, according to Sir J. Herschel, would have sufficed to have placed its author in the highest rank of scientific immortality. He de¬ scribed astigmatism in 1801 ; formulated a cor¬ rect theory of color perception ; and made im¬ portant contributions to haemadynamics. In 1801 he became professor of natural philosophy at the Royal Institution, and in 1802 foreign secretary to the Royal Society — an office which he held for the remainder of his life. The series of lectures delivered in connection with his professorship form the substance of his great work, (Natural Philosophy and the Me¬ chanical Arts1 (1807). In 1811 he was elected physician to Saint George's Hospital. In 1818 he was appointed secretary to the board of longitude, superintending the (Nautical Alma¬ nac.1 He became also a linguist of high abil¬

ity and is known for his successful pioneer work in deciphering Egyptian hieroglyphic in¬ scriptions and working out the hieroglyphic alphabet. He was author of many scientific papers and of (An Account of Some Recent Discoveries in Hieroglyphical Literature and Egyptian Antiquities1 (1823). Consult Pea¬ cock, (Life of Young,1 and Miscellaneous Works,1 edited by Peacock and Leitch (1855).

YOUNG, Sir William, Canadian jurist and statesman: b. Falkirk, Scotland, 8 Sept. 1799; d. Halifax, Nova Scotia, 8 May 1887. He was educated at Glasgow University, and later joined his parents in Nova Scotia, where he was admitted to the bar in 1826. He was elected to the legislature of Nova Scotia in 1832, and in 1839 he was, with Herbert Huntington, delegated to go to England to urge the establishment of a responsible government for Nova Scotia. He was appointed a member of the Executive Council in 1842, and in 1843-54 he was speaker of the legislature. He was Premier and Attorney-General of Nova Scotia in 1854-57, and was again Premier in 1859-60. He then retired from politics, and was ap¬ pointed Chief Justice of the Supreme Court of Nova Scotia in August 1860. He was knighted in 1868; and in 1881 he retired from the bench.

YOUNG, William, American poet and dramatist: b. Illinois, 1847 ; d. 2 Oct. 1920. He published (Wishmakers Town,1 poems (1885-98); and the plays: (JonquiP (1871); (The Rogue's March1 (1872) ; 'Pendragon,1 verse (1881) ; (The Rajah1 (1883) ; ˆanelon,1 verse (1888); (The Home of Mauprat,1 with J. G. Wilson (1882) ; (Joan of Arc,1 adaptation in verse (1890); <If I Were You1 (1892);

(Young America1 (1894) ; (The Princess of Bagdad1 (1896) ; (Ben Hur,1 dramatization (1899) ; (Woman's Wiles1 (1898) ; (The

Sprightly Romance of Mersac1 (1900) ; (Oh, What Riddles these Women Be!1; narrative poem (1900) ; (A Japanese Nightingale1 a dramatization (1903) ; and (The Sea-Green Man1 (1907).

YOUNG ENGLAND, a political party ac¬ tive in London about 1844 and led by Mr. Dis¬ raeli, after he had begun to oppose the general policy of Sir Robert Peel. Besides its founder it contained some young men of ability and position, prominent among them being Lord John Manners, later Duke of Rutland; George Smythe, afterward Viscount Strangford; and Baillie-Cochrane, afterward Lord Lamington. Its program was the reconciliation of the aristocracy and the Church on the one hand, and the people on the other; and its adherents sought to re-establish the political ascendency of the aristocracy by demonstrating its ability to govern. Its principles were attractively ex¬ pounded in Disraeli's two fictions, ˆoningsby1 and (Sybil.1

YOUNG GERMANY, a group of literary

and political innovators in Germany, headed by Heine (q.v.). Its followers were devoted to the promotion of liberal ideals in literature and in politics, among them being Borne, Gutzkow, Laube, Heller and Kuhne. The movement was strongest in the 1830's and collapsed after the failure of the revolution of 1848.

YOUNG IRELAND, the name applied to ar. Irish political group, active between 1840

and 1850. They at first adhered to O'Connell, but soon became very radical in their opinions ; advocated physical force, and separated from the conservative Irish politicians in 1844. The Nation was their political organ and in this journal the Irish people were constantly in¬ cited to revolt. In 1848 John Mitchell (q.v.), one of the leaders of the party, was arrested and sent to Tasmania, and the attempted insur¬ rection which followed soon collapsed, two of the leaders, T. F. Meagher (q.v.), and W. S. O'Brien (q.v.), being sentenced to death, but their sentences were presently commuted to transportation.

YOUNG ITALY («Giovane Italia»), a society of Italian republicans formed by Giuseppe Mazzini (q.v.) in 1831, whose aims were the emancipation of the Italian peninsula from the control of Austria, and the union of the various portions of the country under a republican rule. Its greatest activity was in 1834, when Mazzini led an unsuccessful inva¬ sion of Savoy. The influence of the society soon declined, but it was of service in arousing Italian patriotism and it formed the model for similar organizations elsewhere in Europe, such as Young France, Young Germany, *etc.*

YOUNG MEN'S CHRISTIAN ASSO¬ CIATION. A Young Men's Christian Asso¬ ciation is an organization composed of young men who are united together for the purpose of ministering to the spiritual, intellectual, social and physical needs of young men. Any young man of good moral character, regardless of race or creed, may become a member of this organization and enjoy its privileges; but only active members, who must be in communion with a Protestant evangelical church, can vote or hold office. Local associations are usually under the administration of a board of di¬ rectors, which employs to carry on its work officers known as general secretaries, physical directors, boys' secretaries, *etc.* Local societies are independent and autonomous in their ad¬ ministration. Local societies are affiliated to¬ gether into national and sometimes into interna¬ tional unions. These national unions are under the administration of a national committee. The national organizations are further united into a world's organization, having its head¬ quarters at Geneva, Switzerland. The world's organization is administered by what is known as the Central International Committee of Young Men's Christian Associations, 3 Rue General Dufour. The International Committee of the North American Young Men's Chris¬ tian Associations is located at 347 Madison avenue, New York City. The chairman is Alfred E. Marling. The vice-chairman for home work is William Sloan and the vice-chairman for foreign work is William D. Mur¬ ray. The general secretary is John R. Mott.

History.— The establishment of the Young Men's Christian Association was occasioned by the growth of the modern city. The city move¬ ment which has spread throughout the more industrial parts of the world created an environ¬ ment which made necessary special efforts in behalf of young men. Without the rise of the city the parlors, gymnasiums, reading-rooms, educational classes, Bible studies, religious meet¬ ing, this vast organization of over 1,000,000

young men throughout the world with its sec¬ retaries, directors, committees, costly buildings and mighty influence would never have been born.

The association movement was founded by a young man who came from the country to the city. It was founded primarily for com¬ mercial young men living away from home in cities. Without the spread of the city it would have remained a London institution, and never have become a worldwide organization. The city has become the dominant factor in modern life. Young men form the largest and most important element of the large army which is annually invading the city from the country. The proportion of young men in the city is much larger than in rural districts. In the city, the home and the church have a smaller place in the life of the average young man than in the country. The city is full of opportuni¬ ties to gratify temptation. Contrasted with the country, where life is in the open air and activity is chiefly muscular, life in the city is indoors and far more full of nervous excite¬ ment. It should also be said that the city has brought young men together in large numbers, and so made possible an organization among themselves in their own behalf.

The history of the association falls into four periods: (I) The Founding of the Asso¬ ciation, 1844-55; (II) The Development of the Association Ideal, 1855-78; (III) The Expan¬ sion of the Movement, 1879-1913; (IV) The Work During the World War, 1914-19.

Period I, 1844 to 1855. Founding of the Young Men's Christian Association. — The founder of the Young Men's Christian Associa¬ tion, George Williams, later Sir George Wil¬ liams, who was born at Ashbury Farmhouse, near Dulverton, southern England, in 1821, grew into manhood at the time when the industrial revolution in England was attracting young men fiom the country to the town. He went to London in October 1841, and became a clerk in the dry goods establishment facing Saint Paul's churchyard, of which he was afterward the proprietor. At that time there were some 80 young men

employed in the different depart¬ ments of the business. Through Air. Williams' efforts, a Young Men's Christian Association was organized, for the purpose of establishing religious services and Bible classes among the young men employed in various houses of busi¬ ness in London. This organization took effect on 6 June 1844. The name was suggested by Christopher Smith, George Williams' roommate. The constitution provided that the association should seek to promote the spiritual and men¬ tal improvement of young men engaged in the drapery trade, that its membership should be young men who gave decided evidence of con¬ version to God and that its management should be in the hands of a small board chosen from the membership. This movement rapidly as¬ sumed important proportions. Prayer meetings and Bible classes were soon established in 14 different business houses, and a missionary to young men was employed in January 1845. In 1848 apartments were rented, in which a library, reading-room, restaurant, social parlors and educational classes were provided ; and young men who made no religious profession were in¬ vited, upon the payment of a small fee, to use

the privileges of the institution, though they were given no share in its management and were known not as members but associates. A lecture course was established, which soon be¬ came the most important lecture platform in London. Branches of the parent society sprang up in different parts of the metropolis, and pro¬ vincial branches in different parts of the United Kingdom became affiliated with the parent society.

The association was marked by intense re¬ ligious zeal. Through personal interviews by its members with young men, through Bible classes and evangelistic meetings for men, a persistent campaign was carried on to win young men to lead a religious life. The secular agencies developed considerably during the first seven years. In 1851, in the Central Associa¬ tion, there were 225 members and 425 associ¬ ates. There were estimated to be 750 members and associates in the other branches in the metropolis. At this time there were eight soci¬

eties in London, and 16 in various parts of the United Kingdom. The 24 associations enrolled approximately 2,700 young men.

Knowledge of this work came to America in the fall of 1851 at three different centres — Montreal, Boston and New York. The first movement took place at Montreal, where, through the efforts of two young men who had become acquainted with the London work through published copies of the lectures deliv¬ ered before the London Association, an associa¬ tion was formed on 25 Nov. 1851. In Novem¬ ber 1851 George Petrie, who had become well acquainted with the London work during a visit to that city, called together a group of his per¬ sonal friends in New York. These conferences, however, did not result in organization until en¬ couraged by the success at Boston, where the first association in the United States was estab¬ lished.

A letter published on 30 Oct. 1851, describ¬ ing in detail the work of the London Associa¬ tion, came under the eye of Capt. Thomas V. Sullivan, who was active in Christian work among seamen, and so impressed him that he determined to establish a society in Boston. His purpose was accomplished at a meeting held on 29 Dec. 1851, in the chapel of the old South Meeting House in Spring Lane. The Boston society laid great emphasis upon the association as a social resort. It introduced the committee system, and inaugurated the plan of restricting voting and officeholding to members who were in good standing in an evangelical church. It was the Boston society which gave character and direction to the American movement. It immediately became one of the leading religious agencies of the city. Twelve hundred young men joined its membership; 10,000 copies of its constitution and by-laws were printed and scat¬ tered widely over the eastern part of the United States ; representatives of the society assisted in founding associations at other points, and through its influence, by the year 1854, some 26 associations had been established in different parts of the Union.

Through the efforts of Chauncey M. Lang-don, a government employee in Washington, and later a clergyman in the Episcopal Church, a convention of the American associations was called at Buffalo in June 1854. This convention

established an alliance of the associations of the United States and Canada, under the supervision of an executive committee which was instructed to call annual conventions, and to do everything in their

power to foster and extend the work of the associations. The organization was made international at the suggestion of a delegate from the association at Toronto, Ontario, who had been invited to the convention. This alli¬ ance was known as the American Confederation, and it was largely through its influence that the American movement rapidly took pre-eminence among the associations of the world.

In the meantime, through the efforts of George Williams and others, associations had been established at Paris and other points in France, and at Geneva, in Switzerland. Prior to the founding of the association, a movement known as the <(Junglingsverein):> (Youth's Union) had been started among young work¬ ingmen in Germany in the year 1834. This had already come into friendly correspondence with the associations in England. The German asso¬ ciations, while not on a strictly interdenomina¬ tional basis, were invited into alliance with the Young Men's Christian Association, and have always continued in this fellowship. Since unit¬ ing with the general movement, they have greatly increased.

The culminating event of the early period was the first convention of the associations of all lands, held at Paris in 1855, at which the memorable statement of belief known as (<the Paris basis® was adopted. This has been called the apostles' creed of the association, and did much to unify the movement. It was proposed by Mr. Frederick Monnier, a layman from Strasburg, and was read before the convention, all the delegates standing, ((in wrhich position it was then solemnly passed by the unanimous vote of the whole assembly. The members present then knelt together, gratefully to ac¬ knowledge the mercy of God and to entreat His benediction on the decision at which they had arrived.® The basis was as follows :

The Young Men's Christian Associations seek to unite those young men, who, regarding Jesus Christ as their God and Saviour according to the Holy Scriptures, desire to be His desciples in their doctrine and in their life, and to asso¬ ciate their efforts for the extension of His kingdom among young men.

The reports of this convention showed the estimated strength of the association movement as follows :

Members

Continent of Europe:

Germany .

130

6,000

700

700

400

60

Switzerland .

54

France .

49

Holland .

10

Belgium and Italy .

3

Total .

246

7,860

8,500

14,000

British Isles .

47

United States and Canada .

36

Total .

329

30,360

The period from 1844 to 1855 saw the asso¬ ciation founded in the various Protestant coun¬ tries, an International Alliance established

on

the American continent and a uniform basis adopted by the associations of all lands. The fundamental principles of the association began clearly to emerge. Although the movement was at first primarily religious and spiritual in char¬ acter, the association was led to add secular agencies for ministering to the intellectual and social needs of young men. It recognized the principle that ministering to the needs of a man is one of the surest ways to promote his reli¬ gious life ; and on the other hand, that the Christian religion demands the development of all human powers and their use in the service of God. It is upon these two truths, the power of environment to mold character and the adap¬ tation of the religion of Jesus Christ to redeem man in body, mind and spirit, that the Young Men's Christian Association rests its claim for a place among the agencies of the Church.

Period II, 1855 to 1878. Period of Devel¬ opment of the Association Ideal. — During the years from the Paris convention in 1855 to the Geneva convention in 1878, when a central ex¬ ecutive committee for the associations of the world was established, with headquarters at Geneva, the Young Men's Christian Associations were gradually developing a world conscious¬ ness as an organization, and slowly evolving a method of work for ministering to the needs of young men. During this period, the American associations rose to the place of pre-eminence, and the type of association developed here has in later years spread throughout the world.

The six years preceding the Civil War were remarkable for two results in the American associations, the creation of the International Committee, with its work of supervision, and the great revival which stirred the entire coun¬ try during the years 1857 and 1858. During these years, the central committee of the confederation was located respectively at Washington, Cincinnati, Buffalo and Philadel¬ phia. This migratory plan was soon found to be a source of weakness, but much good was accomplished. Annual conventions were held, and

information regarding the new movement was widely disseminated. Many new associa¬ tions were founded ; and at the outbreak of the war there were 240 associations in North Amer¬ ica, with an estimated enrolment of 30,000 members.

In 1856 several members of the New York association established a union prayer-meeting, chiefly for men, at the Dutch Reformed Church, in Fulton street. This was carried on for nearly a year, and in the'following September it was given over to Mr. J. C. Lamphier, the city missionary of the Dutch Reformed Church, with the understanding that it should be continued on a union basis. The committee of the associa¬

tion arranged to co-operate heartily in this meeting.

In the fall of 1857 came the financial panic which prostrated the business interests of the country. Large numbers of men began imme¬ diately to attend this noon prayer-meeting and, under the auspices of the New York association, many more union meetings were established in different parts of the city. Similar meetings were conducted by all the Young Men's Chris¬ tian Associations throughout the country. It is estimated that over 300,000 persons were added to the evangelical churches of America as a re¬ sult of this revival.

The years from 1861 to 1866 in America were overshadowed by the cloud of the Civil War. The financial depression and the distrac¬ tions attending the outbreak of the war brought the association to the lowest point it ever reached. The Boston membership fell from 2,400 to 700. The New York City association, at the beginning of 1862, had but 151 members; it was burdened with a debt of $2,400, and its work had sadly declined. It is recorded that only 60 organizations survived the war ; and yet, in the midst of this depression and apparent weakness, the association performed one of the most heroic tasks ever undertaken by a religious organization.

Through the influence of the association in New York, heartily seconded by those of Boston, Washington, Philadelphia, Chicago and other places, the United States Christian Com¬ mission was organized. This was the first or¬ ganized attempt, on a large scale, to minister to both the spiritual and material needs of sol¬ diers in time of war. This form of effort be¬ came later a well-organized feature of the associations. In the Spanish-American War and in the Boer War a service program for the welfare of the soldiers was carried on by the

associations. The same effort was made with marked success by the associations of Japan among Japanese troops in the Russo-Japanese War. The association was the only agency with experience and resources prepared to render a similar social service to the Allied armies in the great World War. The plan of work of the United States Christian Commission was to send out delegates with supplies and needed com¬ forts, who should spend some five or six weeks without remuneration, nursing the sick and wounded, distributing literature, conducting evangelistic and religious meetings, bearing mes¬ sages from home, and in various ways encourag¬ ing and helping the soldiers. Over 5,000 of these delegates were sent to the front during the Civil War. The following table shows the vast efforts of this commission in raising money and .supplies for the soldiers:

*Receipts by the United States Christian Commission.

1862	$40,160
1863	$358,200
1864	$1,297,755
1865 (4 mos.)	$828,357
Total	$2,524,472

Supplies .

191,096

558,637

1,584,592

1,432,298

3,766,623

TYit.nls .

$231,256

$916,837

$2,882,347

$2,260,655

$6,291,095

* Moss, ‘United States Christian Commission,’ p. 729.

This was an heroic service, and won for the association the admiration and confidence of the public. In the meantime, the New York City society had secured for its secretary Rob¬ ert R. McBurney, and for its president William E. Dodge, Jr. It had on its board of directors Hon. Cephas Brainerd, who had been identified with its work from the beginning, and who had early perceived the true mission of the

associa¬ tion. Mr. Dodge with his associates set about developing in New York a work specifically adapted to the needs of young men, and intro¬ duced a new era in association history. Mr. Dodge was in sympathy with the idea of a clean, homelike social resort for young men, and with the providing of opportunities for physical train¬ ing. It was at his suggestion that the constitu¬ tion of the New York City association was altered so as to provide for the erection of a gymnasium. Mr. Dodge was also influential in enlisting large gifts for the association. He was himself the largest donor to the first building.

The years from 1866 to 1870 mark the re¬ vival of the American work after the war. In June 1866 an international convention was called at Albany, which outlined a new policy for the associations. The plan of a migratory interna¬ tional committee was abandoned, and the head¬ quarters were permanently established in New York City. Hon. Cephas Brainerd was, a year Ister, chosen chairman of this committee, a posi¬ tion which he held for 25 years. This conven¬ tion announced the platform that the work of the association should be limited to young men, although it was some years before this became the actual practice. The convention established a day of prayer for young men in November, which has become a worldwide observance. It also arranged for the organizing of State com¬ mittees, and the beginning of what is usually spoken of as State work. Tne great contribu¬ tion of this convention, however, was the em¬ phasis which it placed on the true field of the Young Men's Christian Association as distinc¬ tive work for young men. In his opening ad¬ dress, Mr. Brainerd said : <(Our future progress rests upon an unswerving devotion to the pri¬ mary objects and aims of this association — the social, mental, and religious . improvement of young men. As organizations with these avowed objects, we challenge attention. As seeking these ends we are prominently before the world. Because of these things we are what we are. When we deviate from them, we trench upon ground assigned to others.®

As yet there was no uniformity among the associations in America as to the conditions of membership. At the international convention held in Portland, in 1869, it was decided that only members of evangelical churches should vote or hold office in the association, and it was stated that:

We hold those churches to be evangelical which main¬ taining the Holy Scriptures to be the only infallible rule of faith and practice, do believe in the Lord Jesus Christ (the only begotten son of the Father, King of Kings, and Lord of Lords, in whom dwelleth the fulness of the Godhead bodily, and who was. made sin for us though knowing no

sin, bearing our sins in His own body on the tree) as the only name under heaven given among men whereby we must be saved from everlasting punishment.

In the meantime, in New York City a de¬ termined effort was being made to erect a suit¬ able building adapted to the needs of young

men. In addition to the work already under¬ taken for the spiritual, intellectual and social improvement of young men, it was decided to add a gymnasium for physical training. After an earnest canvass for funds, and a most care¬ ful study of plans, the historic building on the corner of 23d street and Fourth ave¬ nue, which provided under one roof for the various phases of association activity, was erected. This building cost $487,000, and was opened to the public in November 1869. Here was developed the modern type of the diversi¬ fied work for the cultivation of Christian man¬ hood, which has become characteristic of the American associations, and which is spreading throughout the world.

A unique feature of this building, which has been copied in most association structures, was the central reception-room, or lobby, in which was the public office of the secretary, and through which every one must pass upon enter¬ ing the building. . From this reception-room opened the reading-room, the parlors, the amusement-room, the gymnasium, the library, the educational classrooms and the secretary's private office. This enabled the secretary in charge to control the various activities which were housed under one roof, and to keep in touch with the multitude of young men who took advantage of the privileges of the associa¬ tion.

The years from 1870 to 1878 in America may be characterized as a period of adaptation of the work of the association to the needs of young men, and the extension of this work to various classes of young men. It is an interest¬ ing fact that, as soon as the organization spe¬ cialized its work and limited it to young men, it immediately found a large field for service. In 1872, at Cleveland, a branch association was founded for work among railroad men. This met with a hearty response from the men them¬ selves. A secretary was employed, rooms were opened at the railway station of the Lake Shore and Michigan Southern road and an effort made to extend the work elsewhere. Similar societies were also organized at a number of the terminal points, and in the fall of 1875 the atten¬ tion of Mr. Cornelius Vanderbilt was called to this work. Through his

endorsement other railroad officials became interested in this move¬ ment. It was soon found that it was worth while for railroad corporations to provide the facilities and attractions of a Young Men's Christian Association for the comfort of their employees.

As early as 1858, 'at the State universities of Michigan and Virginia, student Young Men's Christian Associations had been organized. Early in the 70's, Mr. Robert Weidensall organ¬ ized similar societies in a number of colleges. By 1876 there were 25 college associations, with about 2,500 members. Through the influence of Mr. Luther D. Wishard, a student at Princeton, representatives of all college associations were invited to the international convention held at Louisville, Ky., in 1877. This resulted in the inauguration of the intercollegiate movement as a department of the work of the international committee.. An extended effort was also made during this period among German-speaking young men, and toward its close a work was inaugurated among colored young men.

One of the most important agencies de¬ veloped during this time was the work of super¬ vision. The international committee located in New York steadily grew in resources and influ¬ ence. A number of the most prominent Chris¬ tian business men of New York City and other parts of the country accepted positions of re¬ sponsibility upon this committee. In 1868 Mr. Robert Weidensall became the first traveling secretary, being located in the West with head¬ quarters at Omaha, afterward Chicago. He is still in the service of the committee. Mr. Wei¬ densall has done much pioneer work, organiz¬ ing State committees, and introducing many new phases of work for young men. In recent years he has particularly fostered what is known as county work for young men in rural districts. Mr. Richard C. Morse accepted a position with the International Committee in De¬ cember 1869, first as editor of the Association Monthly , and in 1872 as executive secretary of the committee, in which position he continued until 1913, when he was succeeded by Dr. John R. Mott. Mr. Morse has been appointed con¬ sulting secretary.

At the close of this period, 1878, the Amer¬ ican International Committee had in their em¬ ploy eight traveling secretaries, and in addition to the general work, were supervising work for railroad men, college students, German-speaking young men and colored young men. The budget for 1878 showed an expenditure for supervision on the part of the International Committee of $16,875. The American associations at this time reported 141 employed officers. Of these, 100 were general secretaries, 21 assistants, 12 State and 8 international secretaries.

In other lands, while war, ecclesiastical con¬ ditions and general conservatism retarded the growth of the association, a marked develop¬ ment had taken place. Every three years con¬ ventions of the associations of all lands were held in different European cities. To these the American associations since 1872 have regularly sent representatives. During the early 70's, Mr. Moody made his evangelistic campaigns in the British Isles, and did a great deal to stimulate the work of the Young Men's Christian Associa¬ tion in securing money for buildings, in arous¬ ing spiritual zeal and in calling the attention of the Church to this important work. In 1878 some 40 representatives of the American asso¬ ciations attended the world's convention, which met at Geneva, Switzerland. Up to that time there had been no established headquarters for the world's work. General affairs had been ad¬ ministered from London through Mr. W. E. Shipton, the secretary of the London associa¬ tion. It was chiefly through the influence of the French and American delegates that the Geneva convention voted to organize the work of the associations in all lands under an advisory com¬ mittee, which should have a quorum located at Geneva, Switzerland. Col. Charles Fermaud, an officer in the Swiss army, and a man with bright business prospects in Geneva, consented to give up his calling and accept the position of general secretary of this committee. By the year 1878, with the establishment of the world's committee, the Young Men's Christian Associa¬ tions of the world may be said to have devel¬ oped their ideal of work for young men.

Period III, 1878 to 1913. Period of Ex¬ pansion. — • Expansion has been the striking characteristic of the period from 1878 to 1913. The association ideal of a four-fold work for the whole man had been developed by the American associations under Robert R. McBurney of New York City. This ideal has been promoted throughout America

under the super¬ vision of the International Committee. The American type of work for young men in this period of expansion was now to be promoted throughout the world largely by the efforts of the American International Committee.

In North America the associations between 1878 and 1913 increased in membership six-fold, from 99,000 to nearly 600,000 members; in value of property 38-fold, from $2,300,000 to $88,300,000; the number of buildings 13-fold, from 56 to 770; the cost oi current operation 36-fold, from $376,000 per year to $13,725,000.

The three factors which have most pro¬ foundly influenced the association movement, during this period, have been (1) the securing of property, (2) of trained secretaries and di¬ rectors who give their whole time to this serv¬ ice, and (3) the development of State and Inter¬ national committees of supervision. The carry¬ ing on of an all-round work for young men — physical, social, intellectual and spiritual — de¬ manded not only experienced and able men to conduct the work, but commodious and prop¬ erly adapted structures in which it could be housed.

The ((discoverer and demonstrator® of the secretaryship was Robert R. McBurney, who was secretary of the New York City association from 1862 until his death in 1898. Under his leadership, this office was developed and the number of employed men increased. Of all the agencies the association movement has brought forth, the most vital is the secretariate. To this may be attributed its permanence and con¬ tinued power. There are now nearly 5,000 men devoting themselves to this service as a life work. Over twice this number were enlisted for war work among the Allied troops. The pre-eminence of the American associations is chiefly due to this policy of employing salaried officers. About five-sixths of the secretaries employed by the associations of all lands are in the United States and Canada.

Not only have men been employed for su¬ pervisory work, but since 1870 there has been an increasing demand for Christian young men to devote their lives to service in the associa¬ tion as physical directors. Seven hundred and fifty-eight such men are now employed. To the Christian physical director, the Young Men's Christian Association owes the development of the physical department, which aims not only to give young men physical training and rugged, vigorous bodily development, but also to de¬ velop character. This department has proved a great attraction to young men. In 1896 the Year Book reports 52,672 men as using the physical department of the association. In 1918 there were 242,000 enrolled in gymnasium classes, of whom

118,000 were boys. Much of the progress of this department has been due to the leadership of Dr. Luther Halsey Gulick, who became instructor of physical training at the Association Training School at Springfield

in 1886, in which position he continued until 1900. In 1888 he was also appointed secretary of the International Committee for the physical department, in which office he served until the spring of 1903. He was succeeded at the Springfield school by Dr. James H. McCurdy and on the International Committee by Dr. George J. Fisher. The Young Men's Christian Association is doing the most extensive work in physical training of any agency in the country. It is also interesting that more than 40 per cent of the physical directors in acad¬ emies and colleges have been furnished by the association. The physical department has proved not only a means for physical well-being, which is much needed under modern city conditions, but also a means of leading young men into lives of personal purity.

In 1878 there were 8 international and 12 State secretaries and 94 secretaries in local associations. At the present time (1919) there are 704 county, State and international em¬ ployed officers engaged in supervisory work, 30 instructors in the training colleges, 3,245 men serving city associations, 550 with railroad asso¬ ciations, 139 with student associations, 78 with associations for colored young men, 77 with army and navy associations and 113 in other forms of service. There are a total of 4,936 salaried officers employed by the associations of North America.

In 1885, at Springfield, Mass., a school was established for the training of general secre¬ taries for the Young Men's Christian Associa¬ tion. The year following a physical department was added for the training of physical directors. This school at first offered a two-years' course of study, which was later extended to three years. In 1890 a similar school was established at Chicago. This institution also conducts a summer term at Lake Geneva, Wis. In 1902 a summer school was established at Silver Bay, Lake George, N. Y. These

educational agencies seek to thoroughly train officers for the Young Men's Christian Association as a life work. About one-sixth of the officers of the associa¬ tion have received training at these institutions. The courses of study cover the Bible, Church history, psychology, sociology, religious peda¬ gogy? physiology, anatomy, anthropometry, physical diagnosis, physiology of exercise, gym¬ nastics, athletics, aquatics, history of the Young Men's Christian Association, methods of work among young men, *etc.* There are about 500 students enrolled in these two institutions in addition to those attending the summer insti¬ tutes. The summer schools have attracted so many of the employed officers (over 1,500 in 1919) that six additional summer schools have been established in the South, the West and in Canada. The Southern associations have also established a training college with a two-year course at Nashville, Tenn. The first summer school was held at Lake Geneva, Wis., in 1884.

The building movement in America has de¬ veloped with increasing momentum. In 1890 there were 205 buildings, valued at $8,350,000, m the United States and Canada ; in 1900 there were 359; in 1902 there were 460. The num¬ ber has now passed the 1,000 mark, valued with other real estate at $96,000 000. During the past year 27 association buildings have been erected. There is no greater testimony to the confidence of Christian philanthropists and

business men in the Young Men's Christian Association and its work than the investment of large sums of money in association prop¬ erty. The type of architecture developed by the Young Men's Christian Association is of the club order, its buildings being homelike and social.

One of the striking developments of this period in the city work has been the growth of the educational classes. Immediately upon the erection of the building on the corner of 23d street and Fourth avenue in New York City, evening classes were begun in different subjects for young men. Similar classes were carried on in other cities, and by 1892 20,526 different men were under instruction. In 1892 George B. Hodge was appointed secretary for the educational department of the International Committee, and this work has been systematized and greatly developed. His successor is Mr. William Orr. International examinations are now held annually, in which large numbers of students take part. International certificates are accepted by more than 100 different col¬ leges and institutions. An illustration of the growth of this department is seen in Boston, where the association in 1918

reported 3,843 different students, studying in its educational department. This association has a law school which has been given by the legislature a char¬ ter, granting the right to confer degrees. It has the Huntington Avenue school for boys who are preparing to enter college. It has schools of engineering and of certified account¬ ancy. The Boston association has also re¬ cently incorporated ((Northeastern College,® of which the educational director, Frank P. Speare, is president. This college supervises branch work in the neighboring city associations of Massachusetts and Rhode Island. Nearly every association contains a reading-room, 700 report having libraries and many others are distribut¬ ing stations for public libraries.

In 1918 the Year Book reports 82,000 stu¬ dents in the day and evening association schools. There were 327 secretaries and as¬ sistants supervising this work and 2,203 paid in¬ structors who were giving part-time service.

The religious spirit of the association has been dominant from the beginning. All wel¬ fare work for young men — economic, physical or educational — ‘is conceived of as an expres¬ sion of the religious spirit and as contributing to a many-sided personality and a symmetrical Christian character. This distinguishes the asso¬ ciation from boys’ clubs, social settlements, boy scouts and many other agencies for the social betterment of young men. There has been a large conservative element in the association which has held theologically to traditional orthodox teaching. The association has, how¬ ever, made remarkable progress in its distinctly religious work. This is now organized into a system with five features: (1) Religious meetings , (2) individual interviews; (3) classes in religious education; (4) social service; (5) mis¬ sions. Religious meetings are chiefly held on Sunday atternoon. These were for many years almost exclusively of an evangelistic character, but in recent years have in many cases become forums for the community where the great social,, civic and religious problems of the day are discussed by prominent leaders from an ethical standpoint. At Springfield, Mass., under

the leadership of Kenneth Robbie, such a Sun¬ day afternoon forum has been maintained for seven years with an attendance often reaching

4,000.

Mr. Fred B. Smith during this period was secretary of the religious department of the International Committe. Under his leadership general evangelistic campaigns for young men were promoted culminating in the Men and Religion Forward Movement of 1912 in 60 North American cities. In 1918 there were re¬ ported 1,061,000 auditors at theatre meetings, 2,273,000 auditors at shop meetings. These are held outside association buildings. In the build¬ ings there were reported 2,276,000 auditors at men's meetings and 295,000 at boys' meetings. There were a total of 6,000,000 auditors at these various religious meetings. There were 32,500 decisions for the Christian life reported and 6,434 young men reported as uniting with churches.

In religious education the chief emphasis has been upon Bible classes, but there is an increasing diversity of program which is evolving into a department of religious educa¬ tion. In more progressive associations like the 23d street branch in New York City, there are classes in ((Christianity and Modern Thought,® led by the secretary, Burt B. Farnsworth, courses in Church history, life problems, sex hygiene and social service.

In spite of the depletion of attendance of young men at colleges and universities during the World War, most gratifying reports come from student associations. In 1917 there were 27,000 students in classes in religious education. These were chiefly in Bible classes, but nearly 3,000 were in mission study classes and 4,000 were in classes studying <(North American Problems.®

An important phase of the religious work of the association is the interest in foreign mis¬ sions which it has aroused among young men. The student volunteer movement, which is an outgrowth of the student department, is the chief missionary agency in the colleges of this country. It annually secures a large number of students to volunteer for foreign missionary service. At one time as many as 4,000 students have been enrolled as volunteers in all colleges. In the men's

colleges in 1917 the number was 1,237. More recently the effort has been broadened to include all religious callings, home as well as foreign. In 1917 there were reported 280 undergraduates as preparing for the sec¬ retaryship of the Y. M. C. A. and 3,066 for the ministry.

The latest period of association history has been marked by a great extension in the work for different classes of young men. In August 1895 the World's Student Christian Federation of undergraduates of all lands was established. This is now the largest organization among undergraduates in the world. In the United States and Canada the movement has been extended to professional schools, theological seminaries and other institutions of learning. There a rfe now 791 college associations upon this continent, enrolling 51,117 student members. American student associations own buildings valued at $1,581,000. There are now 137 student g0Qj-g£ˆries devoting their whole time to this

work.

The work for railroad men has become one of the most remarkable features of Christian endeavor. Railroad corporations which control three-fourths of the railroad mileage on this continent contribute from the corporation funds large amounts toward the current expenses, of the railroad associations. There are 122 build¬ ings, valued at $7,422,000, occupied by these .associations, with a membership of 94,000 rail¬ road men. There are 550 secretaries engaged in this department.

Since 1879 the International Committee has employed a secretary to develop the work among colored young men. The work among colored young men was greatly stimulated by the offer of Julius Rosenwald of Chicago, a wealthy business man of Jewish race, to give $25,000 toward the erection of a building for a colored Young Men's Christian Association to any community which would raise $75,000 addi¬ tional. This offer was continued for a period of five years, during which some 12 colored association buildings were erected. There are now 150 associations of colored young men, with 17,600 members, with 77 employed officers, with property valued at $1,716,000. The secre¬ tary of the International Committee for this department is Jesse E. Moorland. There are to-day 86 Indian associations, with 815 mem¬ bers, under the direction of a traveling secre¬ tary, who is a native American Indian.

Largely as an outgrowth of the work for students in other lands, the American Inter¬ national Committee was invited by missionaries in India to inaugurate a work among young men in non-Christian lands. This work has always been carried on in subordination to the church and as a supplementary work where missions have already been developed. There are now 118 secretaries of the American Inter¬ national Committee in India, Ceylon, Japan, China, Brazil, and other foreign lands.

The policy on the foreign field is to develop self-governing and self-supporting local as¬ sociations and national committees. In coun¬ tries outside of the United States, Canada and Europe there are 292 associations with 58,231 members, occupying property valued at $700,000. In these associations there are 462 employed officers, four-fifths of whom are natives. In the promotion of this work in 1910 ex-Presi- dent William Howard Taft invited a ’conference at the White House, attended by about 100 leading Christian laymen, which resulted in securing $2,000,000 for the foreign work.

Even before the Spanish War began steps had been taken to inaugurate a work among the seamen of the navy, and after the war a build¬ ing was equipped for seamen at the Brooklyn navy yard. This department has developed rapidly, and at the present time there is an organized movement among the seamen of the navy which is full of promise. Through the munificence of Mrs. Helen Gould Shepard and Mrs. Russell Sage, an attractively equipped building has been erected for the Naval Asso¬ ciation, near the navy yard in Brooklyn, at a cost of $1,100,000. Work is now being done at seven other home ports and also in the Philippine Islands. There were 77 secretaries in the army and navy associations of the United States at the outbreak of the war.

For many years the work of the associations

was limited to young men between 16 to 17 years of age and upward. It is an interesting sociological development that, in the prosecuting of its work for young men, the association has been led to give its

attention to work among boys. Careful study led to the conviction that effort ought to begin at the age when the boy is becoming a man — at the dawn of adolescence. There are almost as many boys in cities between the ages of 12 and 17 as there are young men. The first boys' department was organized at Salem in 1869, but it is only in recent years that a determined effort has been made to organize

commercial young men. Afterward associations were organized for students and later for rail¬ road men. The city associations in recent years have been attracting large numbers of skilled mechanics to their membership, and to-day in Eastern associations 35 per cent of the mem¬ bers belong to this class. An industrial asso¬ ciation existed in 1897 in connection with the Johnson Steel Plant at Lorain, Ohio, and an association building at a cost of $25,000 was erected for the use of the workingmen. Similar associations were established at Proctor, Vt. ; Wilmerding, Pa. ; Stampo, Ark. ; Douglas,

a work among boys. In 1890 there were four secretaries giving their time to this department. This number had increased in 1903 to 107. It is now 545.

In 1903 there were 46,000 members in boys' departments. This number had increased by 1917 to 152,600. The work is carried on at 985 different points. The most unique feature of this department is what is known as the boys' camp, which was first developed by the Young Men's Christian Association, and is already a large factor in Christian work. In 1903 214 summer camps were conducted by the American associations.

One of the most important developments of recent years has been the extension of the as¬ sociation among men engaged in industrial pur¬ suits. The associations were originally for

Alaska, and Cananea, Mexico. An extensive work was undertaken among the coal miners in Pennsylvania and the lumber men in a num¬ ber of States. The Colorado Fuel and Iron Company and their employees combined to establish a series of associations among the workmen at the different plants of the com¬ pany similar to the railroad Young Men's Chris¬ tian Associations. It was the experience of the railroad and industrial associations which pre¬ pared the way

for the unparalleled service ren¬ dered to the armies during the World War.

The distinctive industrial department is un¬ der the direction of Charles R. Towson of the International Committee, who has 11 associates. There are 117,000 industrial workers who are association members. In 70 cities special in¬ dustrial secretaries are employed. There are

134 association buildings erected especially for men in industry at a cost of $4,717,000. In 1917 the companies contributed $417,000 toward current expenses and the employees paid an equal amount in membership fees.

The industrial revolution which attracted the young men to the city, and so created the basis for the Young Men's Christian Association, has to a large extent depleted the rural districts of young men. At the same time it still remains true that a majority of young men are found in the country. There are 8,000,000 young men in the country districts of the United States and Canada. For many years an effort was made to discover some method of carrying on association work among these men. What is known as county work has proved so suc¬ cessful that in 19 different States there are now county organizations, the most extensive work being carried on in Michigan, where 32 county secretaries are employed in 26 counties. The plan of work is a county committee, which employes a traveling secretary who will super¬ vise and stimulate Christian work among the young men in the county, organizing Bible classes, men's meetings, in many cases estab¬ lishing reading-rooms, social parlors, sometimes educational classes, and in some instances organizing clubs for athletics of various kinds. County conventions are held, deputation Sun¬ days and a carefully systematized effort is made through the entire county. There are now 150 secretaries employed in county work.

Under Mr. Morse's leadership the staff of the International Committee had increased from two executive secretaries in 1869 to 93 on the

home field and 175 on the foreign field in 1915. The budget of the committee had grown from $2,345 in 1869 to $354,000 for supervision of the home field and $433,000 for the foreign field. The North American type of association work for the whole man had largely through the influence of the International Committee spread to Europe and widely through the colleges and cities of Asia, Africa and South America.

Membership fees range from $2 to $25 per year in addition to receipts from dormitories, restaurants, educational classes and many other features. The income of the North American associations for the year ending 30 April 1917, exclusive of receipts from contributions and endowments, was $13,071,609 — this amount was paid by the young men. The receipts from contributions were $2,140,114 and from endow¬ ment $325,561. The accompanying illustration gives an idea of the growth of the organization.

Period IV, 1914 to 1919. The World War Period.— The leading spirit during this period has been Dr. John R. Mott, who was trans¬ ferred in 1915 from the secretaryship of the foreign department to the general secretary¬ ship of the International Committee.

The important features of these five years were (1) the great activity of the home work in the rural field, in industry and among boys; (2) the rapid development in the foreign field; (3) the great work for the pris¬ oners of war, both in allied countries and in the Central empires; and (4) and surpassing all these the transcendent work for the armies of America, France, Italy and Russia carried on by the American associations and for British and Canadian troops carried on by the British

and Canadian associations. The work for war prisoners was peculiarly the task of the American associations prior to the American declaration of war against Germany in April 1917. No other country was free to undertake this service. By May 1916 there were over 4,000,000 men in the prisoner-of-war camps of Europe (Report International Convention, 1916, page 91). These men were in enclosures con¬ taining from a few thousand to 40,000 persons, who were practically without occupation. Through the efforts of Dr. Mott and a num¬ ber of American secretaries detailed from the foreign field, permission was secured from the various belligerent governments and a most beneficent service inaugurated for this vast body of prisoners. The policy was to erect in each camp an

inexpensive hut or service build¬ ing, organize a camp association, establish edu¬ cational classes, athletics and games, furnish a reading room, supply writing material, in¬ augurate shows and entertainments and carry on religious meetings and Bible classes. In cooperation with the Red Cross, food kitchens were established and supplied, the sick men nursed and clothing and other necessaries pro¬ vided. During the first 17 months of the war $300,000 was raised in the United States for this work and the following year $1,167,322 were raised and expended for work in Europe among both prisoners and soldiers. This Christian service to the prisoners saved men from starving, restored morale, awakened new hope and often educated men for a new sphere in civil life.

On the Mexican border in the summer of 1916 there were a total of 150,000 American troops called into service under conditions, not only full of discomforts and hardships, but full of menace to moral character. The Army and Navy Department was quick to respond to this need. Thirty-eight temporary buildings were erected. Tents were used at six additional points and special motor equipments devised with moving picture machines, graphophones and other features. There were 350 secretaries, clergymen and business men employed in this service. Free stationery was provided for the writing of 5,000,000 letters home. Recreational and educational facilities were promoted by trained leaders. For this work during eight months $308,000 was raised. At the entertain¬ ments there were present nearly 3,000,000 audi¬ tors ; a well-planned religious program was carried out and over 13,000 soldiers decided to live the Christian life. The chairman of the Army and Navy Department of the Interna¬ tional Committee was William Sloane of New York and the executive secretary John S. Tichenor. This work on the Mexican border prepared the way for the unsurpassed service among American troops during the World War — the climax of the work of the Young Men's Christian Associations. Upon the dec¬ laration of war in April 1917 the International Committee immediately offered the services of all the Young Men's Christian Associations of America to the government, and this offer was cordially accepted by President Wilson.

On 10 April Dr. Mott called a conference of association leaders to meet at Garden City, L. I. He outlined plans for the establishment of a National War Work Council of 100, which

should be appointed by the International Com¬ mittee, carry on all work for the American soldiers and make reports to the International Committee. Dr. Mott asked that the associa¬ tions raise $3,000,000 to sustain this work until 31 Dec. 1917.

The conference enthusiastically endorsed the plan proposed and devised methods to co¬ operate in securing the fund needed in 30 days. Two days later a meeting was held of the International Committee; the proposition was approved, the National War Work Council ap¬ pointed and the first meeting called for 28 April. William Sloane became chairman, Cleveland H. Dodge, treasurer and Dr. John R. Mott, general secretary. George W. Perkins was made chairman of the finance committee; Lucien T. Warner, chairman of the committee on personnel and John Sherman Hoyt, chair¬ man of the committee on activities.

It is well known how much vaster the Amer¬ ican forces became by land, sea and air than was at first anticipated. The Young Men's Christian Association with heroic effort ex¬ panded its services to meet the crisis.

The advantages of this work to the comfort, the morals and the spirit of the troops was so great that requests came from the French gov¬ ernment for a similar service to the French army. Later an urgent appeal was cheerfully responded to from both Russia and Italy. Under American leadership work for French troops was carried on at 1,350 Foyers du soldat and in Italy at 2,000 case del soldato. The British associations in the same manner did an extended work for the British soldiers in England and France. This effort was carried on under the leadership of the National Secre¬ tary, Sir Arthur Yapp, who was knighted by King George as a recognition of this service.

The Canadian associations under their own National Council ministered in an equally thorough manner to the Canadian army; about 700,000 Canadians were enlisted, of whom about 400,000 were sent overseas. This work over¬ seas was in charge of Lieut.-Col. Gerald W. Birks of Montreal and in France under the direction of Maj. Ernest M. Best. This service began in Canada in August 1914 and was car¬ ried on during the entire war. The Young Men's Christian Association

of Canada was made a part of the military establishment and the secretaries became officers in much the same manner as chaplains. The first secretary to give up his life was Capt. Harry Whiteman of Quebec, who died from overwork in northern France. The first secretary to receive the British Military Cross was Capt. Frank Guy Armitage.

The work for the American army was di¬ vided into two sections, (1) the home camps; and (2) the work overseas. Overseas, E. C. Carter, who had been national secretary of India, was placed in charge at Paris. The first problem of the War Work Council was to secure funds. To these appeals the citizens of America responded with great liberality. The first request for $3,000,000 met with contribu¬ tions amounting to $5,000,000. So vast did the work become that this amount subscribed in May 1917 was exhausted by October and it became necessary to borrow large sums. A second campaign, of which A. H. Whitford general secretary at Buffalo, was director, was

inaugurated in November 1917; an appeal was made for $35,000,000 to carry on the war work at home and abroad for one year. This appeal met with a response of $54,000,000. In the mean¬ time other agencies beside the Young Men's Christian Association had become enlisted in a large way. As the. association had been the pioneer since the Civil War in this form of effort it furnishes the standards and most of the methods undertaken by other agencies. In ac¬ cordance with the desire of the government Commission on Soldier's Activities appointed by the War Department, the various agencies, ex¬ clusive of* the Red Cross, which were engaged in promoting welfare work for the army and navy combined their budgets for a joint campaign for November 1918. The budgets were ap¬ proved by the commission and a total of $170,- 000,000 was asked for. Of this sum the allot¬ ment for the Red Triangle work was 58 per cent. Dr. John R. Mott was made director-general of this campaign and Mr. C. S. Ward, the originator of the short term campaign method for securing funds, was associated with him. In spite of the excitement incident to the signing of the armistice during the campaign the effort was successful, the subscriptions amounting to $203,000,000 — the largest volun¬ tary offering for religious welfare work ever made.

It is impossible to portray here the enormous work done for the troops. Some facts about the activities carried on on the home side of the Atlantic for the year ending 30 April 1919 are as follows (Year Book 1919) : Different men served, 4,000,000; number of employed

officers, 4,600; funds expended, $30,000,000; number of units, 1,171 ; attendance at entertain¬ ments, 27,000,000; participants in athletic sports, 2,500,000; lectures given, 39,044; attendance at educational classes, 5,404,000; at Bible classes, 2,085,000; at religious meetings, 14,181,000; de¬ cisions for the Christian life, 195,414. A most effective service was also rendered by the local associations throughout the country to soldiers on liberty leave, and a carefully organized work for the men in transit on the troop trains. The problem of personnel was most difficult; only men beyond military age could be used and the proportion of those interviewed who were qualified and were physically fit to stand the arduous work required was less than one in 10. Short term intensive courses of training cov¬ ering one month were established at the Springfield and Chicago colleges in June 1917 and later at Silver Bay and Blue Ridge. In several of the large camps similar courses were con¬ ducted, the largest at San Antonio, Tex. Approximately 4,000 students received the train¬ ing of the short-term courses. For the men who were to go overseas, an additional course of one week was conducted by the War Work Council at Columbia University.

The most remarkable work of all was for the Expeditionary Forces in France. Here over 3,000 miles from its base of supplies, the association undertook to serve 2,000,000 men scattered through France and later western Germany. How to interest the soldiers in their leisure time back of the front and how to serve them to the uttermost in the war area was the problem of the staff at headquarters. The association did not shrink from any task to which it was called, even when asked to carry

on the army store (canteen) in order to re¬ lease effective men for fighting. When Mr. Carter reported to General Pershing that there were complaints about the canteen, General Pershing replied, <(The Y. M. C. A. are not in this war to avoid criticism, but to render as much service as possible to the men, under the limitations under which we are all working in this war.®

In the canteen alone the <(Y® in France from June 1918 to April 1919 handled 2,000,000,000 cigarettes, 32,000,000 bars of chocolate, 18,000,- 000 cans of smoking tobacco, 50,000,000 cigars, 60,000,000 cans of jam, 20,000,000 packages of chewing gum and 10,000,000 packages of candy. These were only a few of the items handled. (Report on Activities by George W. Perkins). Because of the difficulty in buying supplies, the <(Y® operated in France 20 biscuit factories, 13 chocolate factories, three candy factories and three jam factories. All of this canteen service was undertaken unexpectedly and carried on in addition to the regular work for the men — physical, social, intellectual and religious.

The ((Y® was operating in March 1919 in France 587 buildings erected by the association, 596 leased buildings and 782 tents and army buildings. <(These buildings were used as cen¬ tres where the men could congregate, write letters, read magazines, books and papers, play games, visit and feel relieved of a certain amount of the restraint necessary to army life.® (Perkins). In them were conducted concerts, moving picture shows, all sorts of en¬ tertainments and religious services. The build¬ ings were open to all welfare organizations. Religious services were conducted by Protest¬ ants, Catholics, Jews and all other religious organizations, regardless of creeds.

A large number of well-trained athletes led in athletic games and in boxing and wrestling. Athletic supplies were given without charge to the soldiers. These included 575,000 base¬ balls, 140,000 bats, 65,000 fielders' gloves, 85,000 indoor baseballs and 75,000 footballs. This work was in charge of Dr. James H. McCurdy of Springfield. The entertainments of various kinds were multitudinous and often of the highest quality. A number of theatres were operated in different parts of France. In March 1919 there were 95 American troupes, playing in different parts of France, which gave 4,350 performances in a single month.

In one year 220 French entertainers and 702 American were employed. From August 1917 to April 1919 in France 90,000 <(movie® shows were given to audiences aggregating 50,000,000 (Perkins).

Writing home was a great opportunity to the men; MOO, 000, 000 sheets of writing paper with the necessary envelopes and 16,000,000 postal cards were distributed to the soldiers.® At 25 leave areas holiday opportunities, in¬ cluding athletics and entertainments, and sight seeing were freely provided; also large hotels and recreation

grounds at various centres in France, England, Italy and later in Germany.

An educational system was developed under the leadership of 600 college professors and school teachers. This was expanded rapidly after the fighting ceased. Up to April 1919, remittances from 323,432 soldiers were sent

home through the association, amounting to

$19,542,000.

Many prominent clergymen in addition to ((Y® secretaries and business men led in the religious work. The religious program was carried on at all the centres. Instruction in sex-hygiene was given by a staff of 40 lec¬ turers under the direction of Dr. Frank N. Seerley of Springfield, Mass. The general re¬ ligious work was under the supervision of President Henry Churchill King of Oberlin.

A devoted body of workers enrolling a total 11,229 was sent overseas for this service. In April 1919 there were 5,693 men and 2,657 women on the association staff in France. A most self-sacrificing service was rendered by these workers, not only in the training areas but on every front in exposed positions in the face of danger and hardships. There were 215 casualties among association workers al¬ though they were non-combatants. Nine work¬ ers were killed by shell-fire while on duty, 29 were seriously gassed or wounded and 31 died in the service from exposure and overwork. (Mott, Association Men, January 1919).

Whether the Young Men's Christian Asso¬ ciation has reached its final form no one would be bold enough to affirm. It is remarkable that it should have grouped together such a variety of agencies upon the simple platform of young men advancing the kingdom of Christ among young men. Through the four periods of its history the association has evolved into an in¬ stitution with an enlarged ideal, closely akin to that of the Christian university. It is still animated by the evangelistic, spiritual purpose of the original band of young men who rallied around George Williams 75 years ago. But, while keeping uppermost this ideal, it has en¬ deavored to do, in a popular way, for the multi¬ tudes of young men of our cities what the Christian university, in a more scholarly way, is doing for the young men who are to enter the professions. There is every evidence that the

association has only begun its career of use¬ fulness, and that in the future it will become a manifold more important factor than in the past.

Bibliography. — Doggett, L. L., (Life of Robert R. McBurney) (1902) ; id., (Julfilee Work for Young Men in North America) (1901); id., (History of the Young Men's Christian Association (New York 1896) J Hod-der-William, Sir Earnest, (Life of Sir George Williams > (1906); Morse, R. C., (My Life with Young Men> (1918) ; id., Fifty Years of FederatiotP (New York 1905) ; Mott, J. R., (Strategic Points in the World's Conquest J (1897) ; Yearbook of the Association (New York).

Laurence L. Doggett,

President International Young Men's Christian

Association College, Springfield, Mass.

YOUNG PEOPLE'S CHRISTIAN EN¬ DEAVOR UNION OF THE UNITED BRETHREN IN CHRIST, founded 5 June 1890. It is a union of all forms of young peo¬ ple's societies within the church, uniting them for the purpose of denominational direction. It was originally named the Young People's Christian Union. Its official organ, The Watchword, was founded in 1893. With its junior societies the organization numbers over

2.000 societies and more than 85,000 members. It contributes about $10,000 annually to mis¬ sions.

YOUNG PEOPLE'S SOCIETY OF CHRISTIAN ENDEAVOR. See Christian Endeavor, Young People's Society of.

YOUNG PRETENDER, The, a title ap¬ plied to Charles Edward Stuart, son of the Pretender. He was defeated by the Duke of Cumberland at Culloden, 16 April 1746.

YOUNG'S TRAVELS. In 1767 Arthur Young began that series of

journeys, or farm¬ ing tours, which were the basis for his graphic sketches of rural England, Ireland and France. His first trip included Southern England and Wales, and an account of his observations appeared in 1768 under the title (A Six Weeks' Tour through the Southern Counties of Eng¬ land and Wales.' Following this first survey, he traveled through Northern and Eastern England from 1768-70; this resulted in (A Six Months' Tour through the North of England' (4 vols., 1770), and (The Farmer's Tour through the East of England' (2 vols., 1771). These books contain a wealth of information relative to the social, economic and political conditions in England during the latter half of the 18th century. Young was a most de¬ termined and indefatigable tourist. He visited practically every county in England, inspected farms, described farm methods and implements used. He imet all classes of people, from peasantry to nobility. His information con¬ cerning rural conditions, such as rentals, produce, livestock, and means of transportation and communication in the kingdom, was founded on actual examination. Two features especially roused Young's indignation. In the first place, he saw on every side vast tracts of land uncultivated and in waste; even all the cultivated land, with rare exceptions, was placed under the same unvarying rotation. Everywhere there seemed to be inability to put the land to its best use. Then, too, Young had no patience with poor roads. In 1770, on the Preston-Wagan turnpike, he measured ruts " four feet deep and floating with mud, only from a wet summer " ; and again he says,

" I know not in the whole range of language terms sufficiently expressive to describe this infernal road. Let me most seriously caution all travelers who may accidentally propose to travel this terrible country, to avoid it as they would the devil ; for a thousand to one, they break their necks or their limbs by overthrows or breakings down." His description of other highways is given in an equally lucid manner. Young's works on England were very favor¬ ably received, being translated into most of the European languages by 1792.

In 1776 he made a tour of Ireland, publish¬ ing his (Tour in Ireland' in 1780. He re¬ mained in Ireland three years and during part of this time was occupied in managing an es¬ tate in County Cork. The result of his stay, nevertheless, was a survey of the country which, for accuracy, fullness of detail, and acuteness of observation, is invaluable to this day. He stated clearly and exposed unspar¬ ingly the causes which retarded the progress of Ireland. He strongly urged the repeal of the penal laws which oppressed the Catholics ; he

condemned the restrictions imposed by Great Britain on the commerce of Ireland, and also the perpetual interference of the Irish Parlia¬ ment with industry. The work abounds in elaborate statistics and tables of prices; as Marie Edgeworth well says, it is “the first faithful portrait of the inhabitants.”

(Travels in France’ (2 vols., 1792) is prob¬ ably the best known of Young’s writings. He made his first visit to France in 1787 largely as the result of an invitation from the French nobleman, the Duke of Laincourt. He trav¬ ersed France in every direction just before and during the first movements of the French Revolution, and he paints not only a picture of French agriculture but describes institu¬ tional conditions in France at that critical period. This work, while of great .intrinsic merit in itself, has been greatly enhanced and widely circulated because of the fact that it is one of the most valuable sources to which his¬ torians have turned for a comprehensive state¬ ment of the actual pre-revolutionary situation in France. He visited one out-of-the-way re¬ gion after another, recording in diary fashion his impressions vividly and candidly. From the first page to the last he sets forth the ab¬ ject wretchedness of the majority of the people and the stagnant c<pnditi<pns of trade and com¬ merce caused by inefficient government. His earliest journey took him in a southwesterly direction through the Orleannais and the Berri, where for the first time he met with the metayage, which he described as “a miserable system that perpetuates poverty and excludes instruction” ; and further, he describes the fields as “scenes of pitiable management ; and the houses of misery.” Throughout the entire work the metayage, or farming on half profits, is condemned in the strongest terms. Poitou is described as “an unimproved, poor and ugly country.” \ oung said it seemed greatly in need of “communication, demand and activity of all kinds.” Journeying on to Languedoc, he found the land in a high state of cultivation and the peasants happy; he concluded his journey by a visit to Landes on his way to Bor¬ deaux. Young’s second journey took him through Brittany and Anjou, which he de¬ scribed as a land “possessing nothing but privi¬ lege and poverty” — while Maine and Anjou — “have the appearances of deserts.” His third tour of France covered a much greater area. He started with Champagne, traveled through Alsace-Lorraine, made his way through to Jura, Burgundy, the Bourbonnais, Auvergne; took a glimpse of the Rhone valley, visited Avignon and Compte de Nice. His impres¬ sions on this journey are not so full, and this fact is probably due to the extent of territory covered and the local disturbances. Young found that half, if not two-thirds, of the land was already in the hands of small pro¬ prietors. Peasants supplied the industry and carried out what

improvements were made, thus illustrating his famous phrase, “The magic of property turns sand to gold.” The great seigneurs did nothing; they received the quit rents and enforced tallies and corvees and all the other oppressive incidents of feudal tenure. He drew a severe indictment against the French nobility, and even approved of the forceful seizure of the waste land by the .

French peasantry. He severely censured the higher classes for their neglect of the soil, —

“ Oh, if I were a Legislator of France for a day,” he exclaimed at the sight of estates left waste and only to be used for game purposes,

“ I would make such great lords skip again.” Young saw the commencement of violence in the rural districts and his sympathies were largely on the side of the classes suffering from excesses of the Revolution, although he was never a thorough political follower of the Revolutionists. Tocqueville recognized his work as a first-hand authority on the rural conditions of the country on the eve of the Revolution.

Young was a highly sensitive, enthusiastic, impulsive, affectionate man and a great lover of nature. His <Travels) are deservedly fa¬ mous and have earned a wide reputation and have been of great influence. No better sum¬ mary of the chief characteristics of Young’s writings can be given than to quote the words of R. E. Prothero in (English Farming, Past and Present. > <(His careless ease of style, his racy, forcible English, his gift of happy phrases, his quick observation, his wealth of miscellaneous material, make him the first of English agricultural writers… . His

tours, with their fresh word-pictures, their gossip, their personal incidents, and even their irrelevancies, have the charm of private dia¬ ries? His varied agricultural writings, thus characterized above, were by far the most im¬ portant agency in disseminating the informa¬ tion concerning those advanced methods intro¬ duced into England by

Jethro Tull, Lord Town-shend and Robert Bakewell and which con¬ stituted the agricultural revolution in 18th century England.

Consult the works mentioned. ‘Travels in France) were translated in 1793-94 by Soules (new version by M. Lesage, with an introduc¬ tion by M. De Lavergne, 1836). An interesting review of the latter publication, under the title of ‘Arthur Young et la France de 1 789, will be found in M. Baudrillarts’ ‘Publicistes modernes) (2d ed., 1873). Consult also Bethan-Edwards, Matilda B., ‘Autobiography of Ar¬ thur Young > (1898) ; Prothero, R. E., ‘Eng¬ lish Farming, Past and Present (1912; pp. 154,

184, 195-206, 286, 313, 470).

Harry James Carman,

Instructor in History, Columbia University. YOUNG WOMEN’S CHRISTIAN AS¬ SOCIATION. The Young Women’s Chris¬ tian associations in the cities, the colleges and the rural communities of the United States are organized into a national association . called the Young Womens Christian Association of the United States of America. The National Board is the executive body of this associa¬ tion, chosen to carry out the policies adopted by the voting delegates at the national con¬ ventions, which are the regular business meet¬ ings of the National Association. The 30 National Board members and the 15 auxiliary members are elected by the conventions; the 11 nonresident members are chosen each by her own field committee to represent that par¬ ticular section of the country. The National Board appoints a committee of 40 or more members in each field to have the responsibil¬ ity for organizing and aiding in the develop¬

ment of the association in that field. Head¬ quarters of these field committees are in Phila¬ delphia, Richmond, Cincinnati, Chicago, Saint Louis, Dallas, Minneapolis, Denver, Seattle, San Francisco and New York City.

The name Young Women’s Christian Asso¬ ciation has been known in the United States since 1866. When the first organization bear¬ ing this title was formed in Boston, it had the same objective, the same evangelical church membership basis, the same combination of volunteers and employed working forces as obtain to-day. The first student association, Normal University, Illinois, dates from 1873.

Without tracing history, in this connection it should be said that each united with other associations subsequently formed. The stu¬ dent and many city associations on the evan¬ gelical basis (according to which only associa¬ tions in which the right to vote was held by members of evangelical churches were received into affiliation), united in electing the Amer¬ ican Committee with headquarters in Chicago ; the Women's and Young Women's Christian Association of many other large cities holding various forms of charter united in the Interna¬ tional Board.

In December 1906, after 18 months of con¬ structive negotiation, the present national movement was formed of all local, city and student associations affiliated with either body - which wished to come in on their then exist¬ ing basis, with the understanding that all associations in the future should have the evangelical church basis. Very few failed to avail themselves of this privilege. One hun¬ dred and thirty-two associations were repre¬ sented by 392 delegates in that first convention, which voted policies for immediate action and elected the National Board. This board at once elected as president, Miss Grace H. Dodge, who had been chairman of the Joint Commission which had effected the union. Six years later, members of this board and a few other friends gave site and funds for the erec¬ tion of the present headquarters building at Lexington avenue and 52d street, New York City.

The scheme of organization is as follows : The resident members of the National Board are assigned to committee work under eight departments — "field work, department of method, foreign, secretarial, conventions and conferences, publication, finance and office. Each department has an employed executive and other staff secretaries. The office depart¬ ment applies scientific management to the work of all the other departments. The publication department edits and publishes The Association Monthly, technical leaflets, Bible study texts; handles printing of the other departments; fills orders for books. The finance department makes the budget and secures the money. In 1915 the conference department conducted 15 conferences with 4,592 delegates, two camp councils for high school girls and six for in¬ dustrial members, attended by 1,358 girls. The secretarial department conducts a graduate training school in New York City; prepar¬ atory training centres in different parts of the country prior to this year's course; and a summer school with graduate courses for phys¬ ical directors, house secretaries and lunch

room directors. The number enrolled in the whole training system for 1915-16 was 141. A bureau for placing association secretaries is also part of the work of this department. The foreign department co-operates with the World's Young Women's Christian Associa¬ tion in sending American secretaries, 38 in number, to India, China, Japan, South Amer¬ ica and Turkey. The field work department correlates the work of the 11 field committees before mentioned with the work at headquar¬ ters.

If the field work department of the National Board can be called colloquially the clearing house, the department of method can be called the laboratory of the National Board. By visiting local associations, sharing in their work, studying other organizations of women and other Christian and social movements, a great body of information is gathered. This study and planning cover the needs and possi¬ bilities of all young women, their conditions and general environment in city, student, coun¬ try and large town communities, with special emphasis at the present time upon the adoles¬ cent girls, the foreign-born young woman, the girls in business and professional life, the girls in industry, the girl at study, the girl in domes¬ tic service, the girl at home.

There are 994 associations with a total mem¬ bership of 360,865, distributed as follows :

(1) There are 255 city associations with a membership of 292,181. City associations are found in every State of the Union except Ver¬ mont, Wyoming and Nevada, and in Washing¬ ton, D. C., and in Honolulu. There are a few unaffiliated city associations. In 1915, 137 associations received regular or transient guests; 90 associations have travelers' aid de¬ partments and are prepared to carry that re¬ sponsibility until a national Travelers' Aid Society is formed. These associations (so far as reporting) have 193 gymnasiums where 65,693 members are enrolled; 18,341 students in domestic art and 8,623 in domestic science classes (1914) ; and 795 certificates of the National Board and American Red Cross were granted for first aid. Of the religious work and missionary department it can be said that it is to-

day the most characteristic feature of the movement.

(2) There are 18 county associations in 13 States with a membership of 7,215. Supple¬ mentary to these organized associations in reaching country girls are the eight week clubs. From 101 different colleges last sum¬ mer, specially prepared student members of the associations returned to their homes in vil¬ lages and open country and organized 244 groups of 3,863 girls.

(3) There are 721 student associations with 61,569 members, of which 1,288 members are in Indian schools and 2,327 members are in col¬ ored schools. The National Board has four commissions at work — The Commission on Character Standards, on Social Morality, on Thrift and* Efficiency and on Household Em¬ ployment.

YOUNGHUSBAND, Sir George John,

English soldier; b. 9 July 1859. He entered the army 1878, and was promoted successively lieutenant 1880, captain in 1889, major in 1896 and lieutenant-colonel in 1900. He served in

the Afghan War in 1878-80, in the Sudan in

1885, on the northwestern Indian frontier in

1886, and in the Burmese expedition of 1886-87. In 1895 he was a member of the Chitral relief force, and in 1898 was detailed to accom¬ pany the American forces in the Spanish-Amer- ican War and the subsequent campaign against the Philippine insurgents. He fought in the second Boer War in South Africa (1899-1902), and was severely wounded. Subsequently he was assigned to the Indian staff corps, and was awarded a medal and clasp for his services with the Mohmand Expedition to the North¬ western frontier of India. He was knighted in 1913, and served in the European War in 1914— 17, attaining rank as major-general. From 1917 he was Keeper of the Jewel House in the Tower of London. Author of (Eighteen Hun¬ dred Miles in a Burmese TaC (1888) ; (The Queen's Commission (1891); (Relief of Chit-raP (1895) ; (The Story of the Guides> (1908); (A Soldier's Memories) (1917); (The Tower from Within (1918), *etc.*

YOUNGSTOWN, Ohio, a modern indus¬ trial city of 132,358 population, centre of the second largest steel district in the United States, sixth city in population and fourth in financial and industrial importance in Ohio, county-seat of Mahoning County, on the direct

line between Pittsburgh and Cleveland, 67 miles from each and five miles from the Pennsylvania line; cov¬ ers a rectangle containing 25.15 square miles, di¬ vided diagonally by Mahoning River which flows southeasterly and joins the Ohio 35 miles away. The river divides the city into north and south sides, the latter first settled. A viaduct built in 1899 has given the (<South Side® such impetus that it is now a thickly populated resi¬ dence district. The main business street, Fed¬ eral, parallels the river for three miles, crossing at the Public Square, Wick avenue which con¬ nects the north and south sides and southward is called Market street. The public square at Youngstown is 285 feet above Lake Erie, and 858 feet above sea-level.

Municipal Service and Improvements. — The city has 320 miles of streets of which 158 miles are paved. There are 180 miles of sewers, discharging into the Mahoning River. A dis¬ posal plant is now projected. In 1917 the city built an impounding reservoir of 1,700 acres on the river at Milton, 17 miles away. The capac¬ ity is 10,000,000,000 gallons; cost $1,250,000. Be¬ side producing an immediate expansion in the industries of the whole valley, the reservoir is becoming one of the most attractive play spots in the State. The domestic water supply is municipally owned and was established in 1872. A new pumping station, 1916, has 31,500,000 gal¬ lons daily capacity, the water from Mahon¬ ing River, passing through mechanical sand filter, with alum and lime, through 206 miles of cast-iron mains. There are 2,091 fire hydrants and three standpipes. The valuation of the water system is $2,477,000 and the annual cost of the pumping plant $56,460. The city as a whole is very healthy. The birth rate is 34.18 and the average death rate 14.51. In addition to the health officer, there is a secretary, chem¬ ist, bacteriologist, six sanitary inspectors, in¬ spectors of plumbing and foods. The police de¬ partment has 154 men, 12 mounted, with the three platoon system established in 1897; 80’

YOUNGSTOWN, OHIO

Part of the Main Plant of the Youngstown Sheet and Tube Company which extends four and one-half miles along the Mahoning River

YOUNGSTOWN, OHIO

1 Butler Art Institute

2 Mill Creek Park

itM-

YOUNGSTOWN

66?

patrol boxes, 8 motor vehicles ; expenditures $158,732. The fire department was completely motorized in 1913 and now has three steam en¬ gines, five triple pumpers, nine hose wagons, 10 substations, 108 men, and expends $151,859 annu¬ ally. The service-at-cost, or ((Tayler,® system of street-car operation became effective by action of the council December 1918, and by this 59 miles of the track and property of the Mahoning and Shenango Railway Company is supervised by the city under a commissioner ($6,000) ap¬ pointed by the mayor for a four-year term. There are 119 miles of suburban street railways centring in Youngstown, besides a 23-mile line of the Youngstown and Southern, to Leetonia. The Mahoning River is spanned by seven bridges, of which the Market Street viaduct is

I, 600 feet long. Division Street bridge is to be replaced by a high level bridge, 3,400 feet, cross¬ ing the river and 44 railroad tracks. There are two telephone companies — the automatic with

II, 000 instruments, the Bell with 15,500 instru¬ ments. Electric lighting is general (14,000 meters) but natural gas from West Virginia is used for domestic fuel.

Parks. — Mill Creek Park, situated in the southwestern section of the city, consisting of 485 acres, is the largest and one of the most beautiful natural parks in the country, largely the result of the 30 years' labor of Volney Rogers, a local attorney. The park is three miles long, winding through a natural gorge. It has 14 miles of drives and seven miles of walks, three bathing beaches, two large artificial lakes, three water falls, an old mill and dancing pavilion. A canoe house at

$15,000 and bathing house at $50,000 will be erected soon. This park is managed by a commission, consisting of three men appointed by the judge of the County Common Pleas Court, with power to levy a maintenance tax on the “township® of Youngs¬ town. Up to the present time it has cost the taxpayers of the city $700,000 and is valued at $1,500,000. Other parks of the city are under the management of a commission appointed by the mayor. They receive their funds from the regular tax levy. Wick Park, northern part of the city, has 34 acres, one and one-half miles of paved1 drives ; Lincoln Park, eastern part of city, 60 acres ; Crandall Park, northern part of city, 50 acres; Souith Side Park, southern part of city, 22 acres; Pine Hollow Park, south¬ eastern section of city, 22 acres. Most of these have playgrounds and (bathing pools.

Chief Buildings. — The most notable build¬ ing in Youngstown and one of the most beauti¬ ful in the country is the gallery of The Butler Art Institute, erected by Jos. G. Butler, Jr., at a cost of $500,000 and opened in 1919. It is of marble, the simple, chaste design having been made by McKim, Mead and White. The Ma¬ honing County Court House built in 1911, cost¬ ing $1,000,000, is a classic building containing excellent mural paintings Iby E. H. Blashfield and C. Y. Turner. In 1915 the city erected a handsome six-story municipal building at a cost of $340,000. The Reuben McMillan Free Li¬ brary - building (named in honor of a former superintendent of schools) is a handsome Indi¬ ana Stone structure, planned with unusual suc¬ cess and built in 1911 at a cost of $155,000, of which $50,000 was contributed by Andrew Carnegie. The Y.M.C.A. building was opened

in 1915, having cost $375,000. It has 137 dor¬ mitory rooms. The Y.W.C.A. building was opened in 1912, and an annex given by Robert Bentley in 1918, the total cost having been $250,000. A postoffice building, erected in 1898 (cost, $75,000) and an addition in 1910 (cost, $100,000) have for several years (been totally inadequate so that temporary additions have been resorted to. Important business buildings include the Dollar Savings, Commercial Na¬ tional and Mahoning bank buildings, the Wick, Stambaugh and Home Savings and Loan build¬ ings and others under construction. Three of the foregoing are 13 stories high. Rayen and South High schools offer interesting contrast, the first of Ionic style opened in 1866 built dur¬ ing the Civil War, but with two recent addi¬ tions ; the latter a buff brick building costing $350,000 opened 1911. Other buildings of note are (the Youngstown and Saint Elizabeth’s hospi¬ tals, Masonic Temple, Saint Columbia’s, Saint Edward’s and Saint John’s churches.

Commerce. — The Pennsylvania and Ohio Canal, built in 1839, stimulated mining of large deposits of Brier Hill block-coal, which long formed a principal part of Youngstown's com¬ merce and warranted building a railroad to Cleveland, opened in 1856. There are now the Erie, Pittsburgh and Lake Erie, Pennsylvania, Baltimore and Ohio, New York Central, and Lake Erie and Eastern roads, four stations, and 57 passenger trains daily. Bonds for $800,000 were issued by the city in 1915 to eliminate the Erie grade crossings and land has been con¬ demned for a union passenger station costing $5,000,000 to be erected by the Erie Railroad. One mile east of the city the railroads converge into what is reputed the heaviest traffic point in the United States. Of this tonnage the larger part is raw and finished products of the steel works which line the Mahoning River for 21 miles. Some relief is promised in the proposed Lake Erie and Ohio River barge canal, surveys for which have been completed.

Steel Industries. — The growth and import¬ ance of the city has been due to the iron and steel industry. As early as 1805 a blast furnace was built with a capacity of two tons of pig iron per day. The second blast furnace in the United States to use raw block coal, and a rolling mill for making bar iron were both built here in 1846. In 1856 shipments of Lake Superior ores brought much new smelting in¬ dustry to Youngstown, and blast furnaces sprang up rapidly during the next generation, using lake ore and Pennsylvania coal and coke as the native supplies became exhausted. Roll¬ ing mills were built between 1880 and 1890 and the first general steel mill in the valley was erected in 1895 by the Ohio Steel Company, now the ((Ohio Works® of the Carnegie Steel Com¬ pany. The close proximity of limestone, one of the raw materials for steel making, has been a great aid in the industry. Four limestone quar¬ ries, nearby, have a combined output of 5,000,- 000 tons a year, employ over 2,000 people, and besides steel material supply the largest paving-brick plant in the world, as well as agricultural lime and other by-products.

During 1917 the American Iron and Steel In¬ stitute recognized the growing importance of Youngstown by creating the Youngstown Dis¬ trict, which includes works in the Mahoning,

Shenango and Beaver valleys and adjacent ter¬ ritory, and produces one-sixth of the pig iron and one-eighth of all steel made in the United States. In 1918 there were in the district 51 blast furnaces producing 6,250,611 tons of pig iron, 47 steel works and' rolling mills producing 2,843,455 tons of Bessemer, 4,462,061 of open hearth and 20,680 of other castings ; wire rods, 225,306; plates and sheets, 1,133,712; merchant bars, 791,691; skelp, 701,376; other rolled prod¬ ucts, 913,913 tons ; a total of rolled products, 3,765,998. In addition there are coke-oven plants at three of the Youngstown works, with a total of 533 Koppers ovens. From the by¬ products large quantities of tar, benzol, ammo¬ nium sulphate, toluol, xylol and solvent naph¬ thas are made locally, while other by-products are shipped for manufacture elsewhere.

Subsidiary and Other Industries. — Sub¬ sidiary to the steel industry are many manu¬ factures which use steel or its by-products. Among these are steel furniture and structural parts ; steel sash and pressed-steel buildings ; waterproofing, asbesteos, cement, shingles, blast furnace equipment, boilers, bridges, cars, cranes, engines, forgings, machine-shop products, stoves and washed metal. Independent of the steel industry are manufactories of automobile trucks, brass, cement, flour, gas mantles, mill work, electric bulbs, leather, powder, wagons and rubber.

Finances and Banking. — The assessed val¬ uation of the city is $215,260,960; tax rate, $15 ; bonded debt, $5,502,356. The State tax law makes bonding practically the only method for public improvements with the result that of a total city revenue of $2,766,666, the annual in¬ terest on bonds and debts is $1,778,882, while $987,784 is spent on operating expenses. The school board levies its own tax, expending $1,180,324 on public schools. The city owns property valued at $17,717,110. Postoffice re¬ ceipts are $457,190. The banking business is conducted by five banks and three building and loan associations, which have a combined capital of $5,400,000 and total deposits of $70,000,000. The savings deposits alone amount to $41,428,036, an unusual average for the population. The First National (the third oldest national bank in the United States) and Dollar Bank has 61,- 000 depositors, and the largest retail foreign ex¬ change department in the country, with 10,000 depositors and $7,000,000 deposits. No bank failures have occurred in Youngstown.

Churches. — Of the 110 churches, chapels and missions 64 are English-speaking congrega¬ tions; 74 are Protestant, with a

membership of about 20,000 and Protestant constituency of approximately 50,000. These represent every major denomination. The Federated churches have a central office and a paid secretary to promote church activities. More than $100,000 a year is contributed by these church members for missionary and benevolent enterprises. The contributions for local work total above $200,- 000. There are five orthodox and one reformed Jewish Synagogues, with flourishing congrega¬ tions. the Jewish population being approximately 10,000, who are active in the business, social and intellectual progress of the city. The Cath¬ olic church plays an important part in the life of the city. The estimated Catholic population is 65,000. There are 22 churches, six English, three Greek Catholic, two Polish, two Italian,

two Slovak, one each of German, Rumanian, Croatian, Magyar, Lithuanian and Syrian.

Benevolent and Social Service. — Youngs¬ town has a complete and carefully developed plan for organized social service, centring in its Community Corporation (not for profit) organized in 1919, which annually raises in one campaign the funds necessary to maintain 28 affiliated organizations. Of the $1,200,000 total budget $400,000 is contributed annually by 15,000 citizens through the Community Cor¬ poration. Nursing service is furnished by City Hospital (250 beds), Saint Elizabeth Hospital (200 beds), Visiting Nurse Association, Anti-Tuberculosis League, Community Social Hy¬ giene Clinic and Florence Crittenton Home Association. Bonds for $500,000 have been is¬ sued by the city to erect a contagious hospital. Relief for needy families is given by the Com¬ munity Service Society, Municipal Lodging House, Salvation Army, Rescue Mission, Saint Vincent de Paul Society and the United Jewish Charities. The welfare of children is promoted by the Baby Welfare Committee, Christ Mission Settlement, Day Nursery, Children's Service Bureau, Free Kindergarten Association, Fresh Air Camp and Joint Committee on Boys' and Girls' Work. Recreation, education, moral and civic training are afforded through activities of the Boy Scout Association (1,000 members), Y. M. C. A. (4,000 members), Y. W. C. A. (3,000 members), Playground Association, Niel¬ son House, Colored Community Centre and the Booker T. Washington Settlement. Other or¬ ganizations are the Youngstown Humane Soci¬ ety, Old Ladies' Home, Children's Home, Wel¬ fare Association for the Blind and Social Serv¬ ice Committee for the Blind, and the Mennonite Mission Settlement. Important industrial housing projects have been carried out, one company having erected 650 homes at an invest¬ ment of $2,750,000.

Fraternal Orders. — The fraternal orders in Youngstown include Masonic (three Blue Lodges), Odd Fellows, Elks, Knights of Colum¬ bus, Moose, *etc.* The Chamber of Commerce has 1,050 members, the Rotary Club 130 mem¬ bers.

Education. — Youngstown's schools stand high among those of the nation, due largely to the devotion and ability which has characterized superintendents and teachers since the begin¬ ning. Among these was Reuben McMillan (1820-98) who with two short intermissions was superintendent from 1853-86. There are now 49 public school buildings in the city, valued at $2,820,000, on land valued at $550,000, which with equipment represent a total value of $3,482,000. There are two high schools, Rayen with a notable history dating back to the will of Judge William Rayen and opened in 1866, now with 38 teachers and 930 pupils ; and South with 45 teachers and 1,208 pupils; 43 elementary schools, with 489 teachers and 18,273 pupils — * a grand total of 565 teachers and 20,411 pupils. There are six kindergartens in addition to five others operated by the Kindergarten Associa¬ tion. The social centres regularly maintained at 12 schoolhouses and 13 public playgrounds on school property are effective and largely patronized. Schools are maintained also by the Catholic, Lutheran and other churches. The Catholic Church maintains 12 schools, with 80 teachers and 3,679 pupils. Yale School, estab-

lished in 1895, is a private school of 150 pupils. Large classes in varied subjects are conducted by the Y. M. C. A., Y. W. C. A., and other organizations. To supplement the schools the Public Library system is supported by taxation ($31,000 — including $6,000 from School Board), and under direction of Reuben McMil¬ lan Free Library Association of open member¬ ship. It has collections totalling 85,000 volumes, a staff of 20 assistants and circulates 310,000 volumes per year from its central building and 45 distributing points, most of which are in schoolhouses.

Newspapers. — The city is fortunate in its high class newspapers — both evening — Tele¬ gram (Rep.) established in 1851, and Vindicator (Dem.) established! in 1862, with Sunday edi¬ tion. Weekly papers in Italian, Hungarian, Rumanian, Greek, Slovak are

widely read among the adult foreigners in the Mahoning and Shenango valleys.

Government. — Every two years the people elect a mayor; president of council; one council¬ man from each of the seven wards and three councilmen-at-large ; solicitor, auditor, treasurer. The city clerk is appointed by the council. A director of public service and director of public safety are appointed by the mayor for a term of two years, and they with the mayor form the Board of Control which awards contracts for public work. Under the department of pub¬ lic service are the city engineer and superintend¬ ent of waterworks. Under the public safety de¬ partment are the chief of police, fire chief, building inspector, electrical inspector and charities agent. The chiefs of police and fire are appointed by the mayor. A judge of the civil and criminal branches of Municipal Court are elected by the voters for two and four years. The Sinking Fund Trustees have charge of and provide for the payment of all bonds issued, for interest maturing thereon and the payment of all judgments final against the cor¬ poration. The Sinking Fund is now $509,-

745.54.

Population. — The population increased from 8,075 in 1870 to 44,885 in 1900, and 79,066 in 1910. The Federal census reported 132,358 in 1920. The people of foreign birth or descent comprise the larger part of this number. Ac¬ cording to the 1910 census there were 6,000 Ger¬ mans, 5,500 Hungarians, 3', 600 Italians and 1,700 Russians. The English, Irish, Welsh and Cana¬ dians totaled 5,600. Approximate estimates of foreign population now in Youngstown show Italians, 12,000; Slovaks, 12,000; Hungarians, 8,000; Croatians-Serbians, 5,000; Polish, 4,500; Rumanians, 4,000; Greeks, 3,000; Russians, 1.500; Spanish, 500; Syrians, Armenians, Turks, 250 each. Beside five newspapers these people have manv social, educational and benefit or¬ ganizations and take an increasingly valuable part in the city's progress. .

History. — The township was named for John Young, one of the first settlers, who bought a tract from the Connecticut Land Company in 1796. David Tod, afterward ((war governor,® operated the first coal mines and led in establishing the canal and first rail¬ road. Sturdy foreign elements attracted later by manual industries have combined with the descendants of early residents, largely from New England, and others, to form an enter¬ prising, industrious, upright and

patriotic com¬

munity, which during 1917-18 sent 7,000 men (Mahoning County) to war, purchased over $50,000,000 government bonds and gave more than $3,000,000 to war work.

Joseph L. Wheeler, Librarian, Youngstown Public Library.

YPRES, e'pr (Flemish, Yperen), Belgium, a town in the province of West Flanders, in a plain, on both sides of the Yperlee, 28 miles south-southwest of Bruges, 53 miles by rail. Ypres formerly was one of the most important manufacturing towns of Flanders, and in the 14th century had 200,000 inhabitants and em¬ ployed 4,000 looms. Its manufacturing prosper¬ ity had long departed prior to the European War, 1914—18, but a striking monument remained in its cloth-hall (Les Halles), an immense build¬ ing of the 13th and 14th centuries, in the form of an irregular trapezium, surmounted by a square tower dr belfry. One of its wings was used as the townhouse, and other parts were occupied by different public establishments and concert-rooms. The Gothic cathedral of Saint Martin, dating from the 13th century, was one of the most remarkable religious edifices in Belgium. The chief manufactures were cotton and lace. The population numbered 19,000. Ypres was made by Louis XIV in 1688 one of the strongest fortresses of the Low Countries, and in the great European wars seldom escaped a siege or bombardment. Jansen (q.v.) was .bishop of Ypres, and was buried in the cathedral of Saint Martin. During the European War the town was reduced to ruins. Its location on the most hotly contested debatable land® on the western front, made it the scene of many a grim strugr gle between the German and British forces, three great pitched battles being fought over the vicinity. Here the British troops barred the way to the Channel ports. The first battle of Ypres began 14 Oct. 1914, the second on 9 Nov. 1915, and the third on 31 July 1916.

In March 1919 the Belgian government inti¬ mated their desire of making Canada a grant of land in the city of Ypres for the erection of a memorial museum and shrine to the brave Canadian soldiers who in the defense of liberty had made the supreme sacrifice on the battle¬ fields of the famous Ypres salient. It was also suggested not to rebuild the city but to leave its rums standing as a lasting monument to un¬ justifiable and ruthless German aggression. For an account of the Ypres battles see War, European — Military Operations on the Western Front.

YPSILANTI, lp-si-lan’tl, a distinguished Fanariot family descended from the Comneni and of prominence as defenders of Greek lib¬ erties. Its most conspicuous members are : Alexander: b. Constantinople 1725; d. 1805; hospodar of Wallachia 1774-82, and again in 1796-98, and of Moldavia 1784-92. He pro¬ pounded a scheme for the fusion of the Greek and Turkish people, but having incurred the suspicion of the Porte, was executed. Constantinos, his son : b. Constantinople 1760; d. Kiev, Russia, 28 July 1816. He early planned the freedom of Greece, but his scheme was pre¬ maturely discovered, and he fled to Vienna. Pardoned by the sultan, he was hospodar of Moldavia 1799-1805. He then went to Russia, but returned to Bucharest with 20,000 men, in the hope of freeing Greece. The peace of Til¬ sit interrupting his plans, he returned to Russia.

Alexander, eldest son of the preceding : b. Constantinople, 12 Dec. 1792; d. Vienna, 31 Jan. 1828. He went with his father to Russia and, joining the Russian army, served with dis¬ tinction in various campaigns. In 1820 he be¬ came head of the secret association known as Hetseria, whose aim was the independence of Greece, and in March 1821 entered Moldavia and raised the standard of revolt among the Rumanians. He was defeated by the Turks at Dragaschen, near Galatz, 19 June 1821, fled to Austria and was imprisoned six years at Mun-kacs, Hungary. Dimitrios, brother of the pre¬ ceding: b. Constantinople, 25 Dec. 1793; d. Nauplia, 16 Aug. 1832. After serving in the Russian army, in 1821 he joined the Greek patriots in the Morea and played a brilliant part in the struggle. But though a brave and successful general, as his victory at Tripolitza and his defense of Argos show, his influence was constantly undermined by the ˆnative® party, who never forgot that he was a Fanariot, and, therefore, a foreigner in part. In 1827, however, he was made commander-in-chief of the Greek army but the ungenerous course adopted toward him by the government of Capo d’Istria compelled him to resign 1 Jan. 1830, and he then withdrew from public affairs. Gregory, brother of the preceding: d. 1835. He was the founder of a princely family now living near Briinn. Nicolas, brother of the preced¬ ing: b. 1796. He

wrote a volume of Me¬ moirs, •'which gives considerable information concerning events leading to the insurrection of 1820.

YPSILANTI, Mich., city in Washtenaw County, on the Huron River and on the Lake Shore and Michigan Southern and the Michigan Central railroads, 30 miles west of Detroit and eight miles southeast of Ann Arbor. It is on both sides of the river, which furnishes a large amount of water power. In 1807 there was an Indian trading post on the site of the present city. In 1824 it was laid out as a town, became a village in 1832 and was chartered as a city in 1858. It has considerable manufacturing in¬ terests. In 1900 (government census) the total capitalization of the manufacturing establish¬ ments in the city was $1,200,000; the value of the annual products was $1,318,793. The chief manufactures are flour, paper, dairy products, underwear, agricultural implements, iron castings, pressed steel, hosiery, automatic parts, sash, door and blinds, tags and labels, pumps, cement and foundry and machine-shop products. The city is the commercial centre of a rich surrounding country. It contains nine churches and the Michigan State Normal Col¬ lege, a high school established in 1849, a -busi¬ ness college, public elementary schools, kinder¬ gartens and public and school libraries. The two banks have a combined capital of $675,000, and, in 1919, had deposits amounting to $2,500,- 000. The city owns and operates the electric-light plant, the waterworks and gas plant. The government is administered under a charter of 1898, and is vested in a mayor, who holds of¬ fice one year, and a common council of 10 members. Pop. 7,500.

YREKA, wi-re'ka, Cal., city, county-seat of Siskiyou County, on the Yreka Creek and on the Yreka Railroad, about 275 miles north of San Francisco. It is in an agricultural and

lumbering region, in which considerable atten¬ tion is given to fruit cultivation and stock-rais¬ ing. There are large stock yards, a lumber mill and fruit-packing houses. The city has three banks with a combined capital of $210,000 and a county high school. Pop, (1920) 2,324.

YRIARTE, e-re-ar'ta, Charles Emile,

French journalist, artist and author: b. Paris, 5 Dec. 1832; d. there, 10 April 1898. He studied architecture as a pupil of Constant Defeux, became inspector of imperial asylums, and after this post was abolished, went on the Spanish expedition to Morocco in 1859 as

correspondent and artist for the Monde Illustre, and in 1860 on Garibaldi's campaign in Sicily in the same capacity. From 1864 to 1870 he was editor-in-chief of the Monde Illustre. In 1881 he was made inspector of fine arts and in 1889 member of the superior council of fine arts. He wrote for the Figaro and for La Vie Parisienne over the pseudonym ((Marquis de VillemerP Among his numerous volumes of various character are Portraits Parisiens' (1865) ; (Gaya, sa vie et son ceuvre) (1867) ; (Les Tableaux de la Guerre* (1870) ; <Le puritain* (1875) ; <Venise) (1877) ; <Autour du Concile* (1887) ; and several works on the Italian Renaissance, such as (Florence) (1880) ;

(Francois de Rimini* (1882) ; (Matteo Civitali, sa Vie et son CEuvre) (1885) ; (Autour des Borgia* (1890) and (Maso di Bartolommeo dit Masaccio* (1894).

YRIARTE, or IRIARTE, Juan de, Span¬ ish linguist: b. Orotava, island of Teneriffe, 15 Dec. 1702; d. Madrid, 23 Aug. 1771. In 1714 he was sent to school at Paris and afterward he studied English in London and jurisprudence in Madrid, where he presently obtained a post in the royal library. In 1732 he became chief li¬ brarian and in 1742 translator for the ministry of foreign affairs. He published an important (Codices grseci manuscriptˆ (1769) and wrote many Latin and Spanish epigrams and proverbs, Latin poems, etc., included in his (Obras Suel-tas) (4 vols., 1774).

YRIARTE, or IRIARTE, Tomas de,

Spanish dramatist: b. Orotava, island of Teneriffe, 18 Sept. 1750; d. Madrid, 17 Sept. 1791. He began to write in -boyhood and in 1770 published his comedy, <Hacer que hacer-mos,' under the pseudonym, ((Tirso Ymareta.** In 1870 he published a didactic poem, (La musica,* and in 1782 (Fabulas literarias,* con¬ sidered the best fables in the Spanish language. He also wrote the first regular comedies in Spanish, the best being <The Spoiled Child> and The Ill-Bred Young Lady> (1788), and pub¬ lished Spanish translations of French plays Horace's (Ars Poetica* (1777), and four books of the ˆEneidP In 1771 he succeeded his uncle, Juan de Yriarte (q.v.), as royal librarian.

YSAYE, e-sl-ye, Eugene, Belgian violin¬ ist: b. Liege, Belgium, 16 July 1858. He studied at the Liege Conservatory and subsequently with Wieniawski and Vieuxtemps at Brussels. He made many successful European concert tours and in 1886-98 he was professor in the Royal Conservatory of Brussels. He originated a new school of violin playing, embracing fea¬ tures of the German, the French and the Bel¬ gian

schools. He is considered one of the leading violinists of the world and is gifted-

with marvelous powers of interpretation. He visited London in 1889 and established there as well as in the principal cities of the Con¬ tinent a high reputation as a conductor and soloist. He first visited the United States in 1894 and toured the country repeatedly there¬ after, becoming in 1918 conductor of the Cin¬ cinnati Orchestra. His compositions include several violin concertos, a piano concerto, a program symphony and a (Suite Wallonne.)

YSLETA, e-sla'ta, Tex., city in El Paso County, on the Rio Grande and on the Texas and Pacific and the Southern Pacific railroads, 12 miles southeast of El Paso. It is in a fertile agricultural region, the productive Rio Grande Valley, in which fruit and grains grow in abundance. It was founded in 1682 after the uprising of 1680, its residents being the Tigeux Pueblo Indians of the village of the same name in New Mexico visited by Coronado in 1540. They were later settled here by Gov¬ ernor Otermin, retaining the name of their village in New Mexico. The city claims to be the oldest in the State. Several of the descend¬ ants of the Pueblos are residents of the city. Population is more than 2,000; about one-third are citizens of the United States and nearly all the others are Mexicans and Indians.

YSSEL, i'sel, or IJSSEL, Netherlands, the name of several rivers, chief of which are: (1) the Nieuw Yssel, one of the principal arms of the - Rhine, which leaves that river below Arnheim, flows northeast for 16 miles to Does-burg, where it receives the Oude Yssel from Westphalia, then northeast, north and north¬ west, through Gelderland and Overyssel, past Zutphen and Deventer, receiving the Borkel and Schip-Beek, emptying at Kampen by many arms into the Zuyder Zee about 40 miles north¬ east of Amsterdam, and forming a constantly widening delta. It is one of the five main arms of the Rhine, is 320 feet broad at Zutphen, 764 at Kampen, and 90 miles in length, all of which is navigable. (2) The Neder Yssel, an arm of the Leek, which leaves that stream at Vianen, flows west through Utrecht, at Oudewater

enters southern Holland and' flows southwest past Gouda to join the Maas above Rotterdam, forming at its mouth the island of Ysselmonde. Length, 30 miles.

YTTERBIUM, a rare chemical element belonging to the Yttrium group. Discovered by Marignac in 1878 in the mineral gadolinite, it was separated into two elements named neo¬ ytterbium and lutecium by G. Urbain in 1907, and the same result was announced in 1908 by E. A. von Welsbach, who named the elements aldebaranium and cassiopeium. There was some discussion in regard to priority of discovery. Also found in other minerals occurring in Siberia, Scandinavia and Greenland. Symbol, Yb. ; atomic weight, 173. Its oxide Yb203 forms colorless salts with sulphuric acid, *etc.*

YTTRIALITE, a native silicate chiefly of thorium and the yttrium metals. It occurs in Llano County, Tex., in grayish-olive-green masses, associated with gadolinite and other minerals which have been mined as a source of the rare earths.

YTTRIUM, a rare chemical element dis¬ covered 1794 by Gadolin in the mineral gadoli¬ nite from Ytterby. It is always found in com¬

bination, some of the minerals containing it being gadolinite, xenotime, euxenite, yttrotanta-lite and polycrase. It is usually separated from the mineral by use of sulphuric acid or aqua regia. The element is obtained by heating the chloride with metallic potassium, by electrolysis of a molten mixture of the chloride and sodium chloride, or by heating the oxide with mag¬ nesium. It is a grayish-black, lustrous, metallic powder that burns in the air to the oxide Y203; soluble in dilute acids ; symbol Y ; atomic weight 89 ; valence 3. It forms a great many compounds closely resembling aluminium, but unlike that element forms no alums.

YUAN SHIH-KAI, Chinese soldier and statesman : b. Hsiang Ching, province of Honan; d. Peking, 6 June 1916. Descended from a family long active in the service of the state, Yuan was destined from the beginning of his career to become a leader in military, foreign and domestic affairs. Yuan Chi-san, his grand¬ father, achieved distinction in suppressing the Taiping rebellion (q.v.) and died (1864) as imperial commissioner and provincial com¬ mander-in-chief. Yuan qualified for a bach¬ elor's degree and immediately attached himself to the (then despised) military profession. At the age of 20 he was appointed aide-de-camp to General Wu Chang-ching, then commanding the

Chinese forces in eastern Santung. When the rebellion broke out in Korea (July 1882) Li . Hung Chang, then the helmsman of China's ship of state, sent an expeditionary force, to which Yuan was attached, to the assistance of the emperor and quelled the uprising. Yuan in 1884 was given command of the Chinese gar¬ rison in Korea and the following year was ap¬ pointed Imperial Resident. For the next nine years he was the de facto ruler, ably assisted by Sir J. McLeavy Brown. Yuan soon demon¬ strated his uncompromising attitude and auto¬ cratic methods, which involved him in many difficulties with the Japanese at Seoul. The Tonghak Rebellion (1893), the well-organized movement of the Nationalist party, followed by the sinking of the Kowshing, first proved China's military weakness. Protected by British blue jackets Yuan escaped to the coast. After tem¬ porary peace Yuan was restored, Li Hung Chang sent 5,000 troops to Yuan and ordered them to be trained in the Western fashion. This marked the 'beginning of China's modern army. Yuan ruled this small force with a rod of iron, but the men were slow to accept sub¬ ordination and Yuan could not instill the neces¬ sary spirit of devotion in his troops. After the coup d'etat of 1898 and the subsequent resump¬ tion of power by the Empress Dowager, the military prowess and reputation of Yuan became an important factor. He always remained a close friend of the empress, who was able to maintain the ruling hand until her death, with the constant assistance of Yuan, by this time well versed in all important affairs of govern¬ ment. When at the death of the Empress Dowager Tzu Hsi (1908), Kuang Hsu came into power, he fulfilled an old grudge and caused Yuan's humiliating retirement, for it had been rumored that this close friend of the empress silently acquiesced in a plot to overthrow the state, in which Yuan's blood-brother, Jung Lu, was the dominating factor. During the Boxer uprising (1900) the military experience of Yuan

became necessary and he was reinstated. As¬ sisting the different viceroys in keeping the trouble confined to the immediate vicinity of Tientsin, at the same time lending valuable aid to the allied forces then in China. As Viceroy of Ghihli, November 1901, he was

welcomed by the natives and foreigners as the best guaran¬ tee of restoration of order, and in this office he at once instituted educational and administra¬ tive reforms. His statesmanship was of a high order; he could always be trusted, and so with his appointment as administrative head of the foreign office at Peking (September 1907) and member of the Grand Council, the foreign diplomats welcomed Yuan as a statesman well liked and respected. At this period China was in the throes of continual unrest, and lacking trained military leaders, was compelled to re¬ call Yuan (October 1911) ; he was appointed president of the Council of Ministers on November 1, and Prime Minister two weeks later, with full power to meet conditions as he found them. His rise was rapid. The subjects in the south clamored for a republican form of government.

While the Manchu Tartar autocracy which had ruled the <cCelestial Empire® since 1643, strove to withstand the inevitable, Yuan, ambi¬ tious to become the supreme ruler, wavered be¬ tween the (01d Buddha) of the Tartars and the reform movement ; fully realizing his ability to continue the actual domination of China whether it were termed republic or monarchy, he con¬ sented to be proclaimed provisional President of the republic of China (15 Feb. 1912). He was finally elected President 6 Oct. 1913, and im¬ mediately announced that China undertook to observe all treaties and obligations incurred by ithe Manchu regimen. He immediately abol¬ ished the Democratic opposition party, deprived members of their seats and suspended Parlia¬ ment, and appointed an Administration Council until it could be reconstituted. The provisional constitution was completed in the spring of 1914, giving Yuan extensive powers, thus smoothing the way for his complete direct con¬ trol of the empire. In November 1915 most of the provinces having voted for a return to monarchy, Yuan refused to ascend the throne as emperor; then changed his views and fixed the coronation for 9 Feb. 1916, and again abandoned the proposed idea of a monarchy. The provinces in the south again revolted, de¬ claring that Yuan had forfeited his right by acceptance of the throne and proclaimed the vice-president, General Li Yuan-hung, as Presi¬ dent of the new republic, but he was not gen¬ erally recognized. Upon the death of Yuan the appointment of General Li Yuan-hung became certain, and he stepped into office 7 June 1916.

YUBA, yoo’ba, a river in California formed by the junction of three rivers, North, Middle and South, which have their sources in the Sierra Nevada. The Yuba enters the Feather River just below Yuba City. In its upper course it has many picturesque gorges and sev¬ eral cascades.

YUBA CITY, Cal., town, county-seat of Sutter County, on the Feather

River, near the mouth of the Yuba River, and on the Southern Pacific Railroad, about 40 miles north of Sac¬ ramento. It is in a fertile agicultural region, in which fruits are among the important pro¬

ductions. The industries are chiefly connected with farm products. The town has one bank, Farmers' Co-operative Union of Sutter County, with a capital of $50,000. Pop. (1920) 2,894.

YUCATAN, yoo'ka-tan, Mexico, the most southeasterly and in respect to its ancient his¬ tory one of the most interesting states of the republic. It is situated between 17° 40' and 21° 35' north latitude, and between 8° 39' and 12° 12' east longitude, meridian of Mexico. Bounded on the north by the Gulf of Mexico ; on the east by Quintana Roo; on the south by Quin¬ tana Roo and Campeche, and on the west by the state of Campeche. . Area, 15,939 square miles. Principal cities and towns: Merida (the capital) (q.v.), Progreso, Peto, Ticul, Uxmal and Izamal. Principal products : aguardiente, henequen, corn, honey, woods not reported; fruits, the principal ones being oranges, agua-cates, watermelons, bananas, limes and lemons. Henequen or sisal hemp has become the prin¬ cipal crop. It finds a ready market in the United States. In 1900 a portion of the state was formed into the territory of Quintana Roo. Pop. 347,781.

YUCATAN, a peninsula in the southeast extremity of Mexico, projecting north by east to within 120 miles of the western end of Cuba. The peninsula comprises the Mexican states of Campeche and Yucatan and the ter¬ ritory of Quintana Roo, British Honduras and a portion of the republic of Guatemala. The sur¬ face is largely a tableland. The climate is hot, with deficient rainfall, but is not unhealthful, except for periodical visits of yellow fever. The soil is calcareous and porous ; and little is seen of the ancient fertility which must have characterized this region when it was the seat of a flourishing civilization, with populous cities of great size and splendor. Only a small portion of the country is under tillage, and the general appearance is that of a wilderness. Vastly dif¬ ferent was the scene at the time of the Spanish conquest 1527-47, <(as revealed by the innumer¬ able remains of towns, cities, temples, palaces and other public buildings dotted over the pla¬ teau, especially round the now desolate north and northeast shore of the peninsula.® The vast ruins are the mysterious monumental re¬ mains of the Maya nation, whom the Spaniards found here, and whose descendants constitute five-sixths of the present population. There is no evidence for the great antiquity formerly as¬ signed to the ruined structures in Yucatan; yet

they are considered to antedate the southward Toltec migration — some of the cities having been forgotten ruins at the time of the Spanish conquest. Pop. about 400,000.

YUCATAN, Antiquities of. See Maya;

Mayapan.

YUCCA, the name of a genus of shrubs with clustered ensiform leaves, belonging to the Liliacece, but also employed as a common name to designate the plants belonging to the entire botanical family of yuccas. This includes not only the genus Yucca but several other genera, as Samuella, Clistoyiicca, Hesperaloe, *etc.* The species are chiefly found in the United States and Mexico, though some of them are dis¬ tributed to many portions of the world. The best known species in the United States is Yucca filamentosa, or Adam's needle, which is

found in cultivations as far north as New Eng¬ land, its clusters of large white, bell-shaped flowers making it a favorite in gardens. Until recently none of the species has been regarded as valuable commercially, although the coarse fibre of Y. filament osa i, called bear-grass, has long been used in a small way as tie material in the south. In Mexico, however, there are several species with larger leaves that have of late years been exploited for their fibre, which is becoming known as a rather coarse substitute for the better cordage fibres. Yucca australis, Hesperaloe funifera and Samuella carnerosana especially are used in northern, eastern and cen¬ tral Mexico for fibre, which is derived from the cogolla or central spike of unopened leaves, the cogolias first being steamed, and the individual leaves scraped with a dull-edged iron tool, upon a block of wood, and the fibre extracted. This coarse fibre is known as palma istle, pita sylvestris, zamandoque, *etc.* Yucca fibre is stiff, harsh and brittle, and as prepared is not always of good color, and therefore can never take rank with the better fibre known as hard cord¬ age fibres. (See Fibre). Yucca baccata yields a fairly good fibre, and the parenchyma or pith, and the root possess detergent qualities, from which the name soap-

plant has been derived. The sun-cured, whitish yellow inner leaves of Yucca glauca are used by the Arizona Indians for ornamental basketry, either entire or sub¬ divided and several other species are also em¬ ployed in the domestic economy of North American Indian tribes for rude cordage, bas¬ kets, sandals, mats, *etc.*

A very remarkable feature in the yucca is its fertilization by the aid of any of several spe¬ cies of small whitish moths of the tineimne genus Pronuba. The yucca flowers are so shaped as to be impossible of fertilization, and no other insects attach themselves to this plant. The yucca moth gathers a quantity of pollen in its jaws, then lays an egg in the pistil, and stuffs the hole in which it is laid with pollen, thus fertilizing the ovary. The caterpillar de¬ velops in the fruit-pod, but does not seriously harm the plant. This extraordinary case of symbiosis was disclosed by C. V. Riley in 1872, and may be found fully related by him in the < Fourth Annual Report* of the State ento¬ mologist of Missouri.

YUCHEE, a linguistic stock of North American Indians who once lived along the banks of the Savannah River. See Uchean.

YUEN, or YUAN, a Mongolian dynasty which ruled in China in 1280-1367. The founder of the dynasty was Kublai Khan (q.v.), who by 1280 had conquered China and established complete jurisdiction. But while he was wise in government, a patron of literature and art, and executed public works of great importance, the Chinese were less sensible of the benefits he conferred than of the fact that he was a barbarian and placed barbarians in office to the exclusion of Chinese. He. was succeeded by his grandson, Timur, who reigned in 1294-1307 as Yiien-cheng. A Mongol prince, Wu-tsung, was the third ot the dynasty ; and in 1312-20, the Chinese became somewhat less re¬ sentful of the alien dynasty through the efforts of Jen-tsung, Who paid honors to Confucius, re¬ placed the Chinese in many offices, and in various ways succeeded in gaining the favor of

his subjects. From his time the power of the dynasty declined rapidly in authority, and during the reign of the ninth ruler, Shun Ti, in whom were said to be all the faults and none of the virtues of his predecessors, revolts broke out all over China; the Chinese found a leader in Chu Yiien-chang, who forced Shun Ti to flee. He found refuge at Ying-chang Fu, and died there, the last of the dynasty.

YUGA, yoo’ga, or YOOGA, Sanskrit, Yoke, a period of time, one of the

periods into which the past history of the globe is divided in the chronology of the Hindus. There are four yugas : The«Satya Yuga, containing 1,728,- 000 years; the Treta Yuga, 1,296,000 years; the Dwapara Yuga, 864,000 years; and the Kali Yuga, now in progress, which began about 3094 b.c., and which will extend to 432,000 years. Horace Hayman Wilson points out that these numbers originate in the descending arithmeti¬ cal progressions of 4, 3, 2, 1, according to the notions of diminishing virtue in several ages applied to a cycle of 12,000 divine years, each equal to 360 years of mortals; and 12,000 X 360 = 4,320,000, the periods of the four yugas added together. See India.

YUIT, the Eskimos of extreme northeast¬ ern Asia, from East Cape to a little beyond Plover Bay. They migrated from America probably in recent times, and in appearance, cus¬ toms and manners differ in no great degree from their Alaskan kinsmen. Their population is unknown.

YUKIAN (adjectival form of the Win-tun yuki, Stranger,® also Htad,** ˆthieving**) , a linguistic stock of North American Indians, con¬ sisting chiefly of the Ashochimi, Chumaya, Napa, Tatu and Yuki tribes, which formerly occupied Round Valley and the area extending therefrom to the California coast. The Round Valley reservation was subsequently established to receive these and other tribes, and most of their representatives now reside thereon. The entire group numbers only a few hundred at most. The original home of the Ashochimi was near the present Healdsburg; the Chumaya oc¬ cupied middle Eel River; the Napa, upper Napa Valley; the Tatu, Potter Valley, and the Yuki, Round Valley.

YUKON, yoo'kon, North America, a large river, mainly in the United States Territory of Alaska, which rises as the Lewes in British Columbia, about lat. 59°, and after a tortuous northwest by south, and northwest course of 2,300 miles, flows into Bering Sea, on the southern shore of Norton Sound, through a many-channeled delta from 80 to 90 miles wide. The northernmost channel of the delta, the Aphoon Mouth, is the only one navigable. It has a drainage area of 330,000 square miles. The main stream of the Yukon is formed at Fort Selkirk in 63°, by the junction of the Lewes and the Pelly, the former being con¬ stituted by the junction of the Big Salmon and Teslin flowing from Teslin Lake and draining a group of small lakes in the region around Mounts Landsdowne and Lome. From Fort Selkirk, the Yukon flows northwest with many windings, passing through the Klondike gold¬ field, receiving from the right the Stewart River, and at Dawson the Klondike, and from the left

the White River, Sixty-Mile Creek and Forty-Mile Creek. It enters Alaska in about 65° N., and continues its northwestern course until the Arctic Circle is reached, when at the abandoned Fort Yukon it is joined on the right by the Porcupine River, bends suddenly, almost at right angles, and thenceforward has a general south¬ western trend to its mouth.

The chief Alaskan tributaries of the Yukon are the Kozukuk on the right bank, and the Birch and Tanana on the left bank. Its whole course of 1,260 miles through Alaska is navi¬ gable by stern-wheel steamers, and beyond to Dawson in Canada ; since the discovery of gold throughout the region in 1897 a regular summer service is maintained; the first impracticable obstruction to navigation is at the Grand Canon, 1,866 miles from the mouth. In its lower course the Yukon is a broad, muddy stream flowing mostly through a marshy plain and for nearly nine months of the year, from October to June, frozen over; its upper course is through the grand scenery of narrow moun¬ tain valleys and rocky gorges. The Yukon is the largest American river flowing into the Pacific; it is the 17th river of the world as to length, the seventh of the Western hemi¬ sphere, the fifth of the North American con¬ tinent and the third in the United States. This last assertion is based on its whole length of 2,300 miles, however, but taking only that por¬ tion which i9 in the United States, or Alaska, 1,260; it is the fifth river of our country, the Mississippi, Missouri, Arkansas and Ohio rivers being longer. There are but four rivers in the world with a greater capacity, the Amazon, the Mississippi, the Missouri and the Saint Law¬ rence.

YUKON. The Yukon territory is the most northwesterly of the political divisions of the Dominion of Canada. It embraces a large, roughly triangular area of country, measuring about 207,000 square miles, bounded on the south by British Columbia, on the west by Alaska, on the north by the Arctic Ocean and on the north¬ east by the series of mountain ranges separating the Yukon and Mackenzie basins. The popula¬ tion in 1911 was about 8,512, of which over 3,000 were

Indians.

Topography. — The territory includes a mountainous belt on the northeast consisting of the Selwyn, Oigilvie and Peel River ranges of mountains, all of which are usually classed in the Rocky Mountain System, and the great Saint Elias range on the southwest. A number of peaks in the latter range, such as Mount Saint Elias and Mounit Logan, exceed 18,000 feet in height. The central part of the territory is a broken upland known as the Yukon plateau, a great tract of rolling country deeply trenched in all directions by the wide valleys of the present and preglacial drainage system. Toward the Arctic Ocean the plateau is replaced by a plain sloping easily down to sea-level.

The greater part of the Yukon territory is drained by the Yukon River, with a total length of 2,300 miles, the fifth largest river on the North American continent and one of the great rivers of the world. The Yukon is formed by the junction of the Lewes and Pelly, the former drawing most of its waters from the Coast Range and the latter from the mountains of the Rocky Mountain System. Other large tribu¬ taries of the upper Yukon are White River, a

swift, turbid stream heading in the glaciers of the Saint Elias Range, and the Stewart and Porcupine rivers, both of which enter it from the east. River steamers navigate the Yukon River throughout its whole length and also ascend the Lewes up to Whitehorse rapids, a total distance from tidewater of about 2,000 miles. The Pelly, Stewart and other tribu¬ taries are also navigable for some hundreds of miles above their junctions with the main stream.

Fauna and Flora. — The valley flats and the lower slopes of the hills and ridges throughout the territory are more or less thickly forested, while the uplands are bare. In the southern part of the territory the forest ceases at an ele¬ vation of 4,000 feet above the sea. Going north¬ ward the tree line descends gradually, and at the Arctic circle has an elevation of less than 2,000 feet above the sea. The principal forest trees are the white and black spruces (Picea alba and P. nigra), the aspen (Popuhis tremuloides) , the balsam poplar (Populus balsamifera) , the bal¬ sam fir (Abies siibalpina) , the black pine (Pinus Murrayana) , and the birch (Betula papyrifera) .

The larger animals of the district include the black and brown bear, the woodland and barren land caribou, the moose, at least two species of mountain sheep, the mountain goat, the timber wolf, the red fox

and the wolverine, lynx and martin.

Climate. — The climate is severe. The win¬ ter season lasts from about the first November until April. The rivers are usually frozen by the first of November and remain frozen until May, while the lakes are seldom free from ice before the first of June. During the winter season thaws are infrequent and the tempera¬ ture usually ranges from zero to 40° F. below. Occasional dips to 60° F. below and one to 68.50° F. below have been recorded. The low temperatures are usually accompanied by a dry atmosphere and do not occasion much hardship. The summer season, lasting from the middle of May ‘to the middle of September, is exceedingly pleasant, as the long clear days are never op¬ pressively hot and the nights are always cool. The rainfall is light, the annual precipitation amounting to about 15 inches.

History. — The history of the Yukon terri¬ tory dates back only to the year 1840. In that year Robert Campbell, a fur trader in the employ of the Hudson Bay Company, crossed from the Liard, a tributary of the Mackenzie, and discovered and named the Pelly, one of the main branches of the Yukon. In 1843 the same explorer descended the Pelly to its junction with the Lewes and was thus the first trader to reach the upper Yukon. In 1846 J. Bell, also in the employ of the Hudson Bay Company, de¬ scended the Porcupine to the Yukon, and in the following year Fort Yukon was built at the con¬ fluence of the two streams. In 1849 Fort Selkirk was established at the junction of the Lewes and the Pelly. It was raided and burnt by the Coast Indians in 1852 and was never rebuilt. Fort Yukon was occupied until 1869, when its site was proved to be in Alaskan territory and it was abandoned, and a new fort was built at the upper ramparts of the Porcupine. In 1850, Campbell descended the Yukon from Fort Sel¬ kirk to Fort Yukon and proved its identity with the Kwikhpak, the name by which the lower portion of the river was known to the Russians.

YUKON

Bathurst

SCALE Statute Miles, 70

051015 21)25 50

Liverpool ‘“a

3liy ˆvMait’and

Y oninl

AXKLlX’ %

$KX t

100 Miles

Rand McNally’s New 11 x 14 Map of Yukon Copyright by Rand McNally k Co.

JPullrn Island Hooper Island <P

l Herschbl Island ˆ

Garry Island V)

31 A CXENZIE J\

u\ » Kay Point py

Ba»\)\ IS A y<ˆA N Lanulev filUNm

|1<Barn¥'S!h. OT L

■on ough

RicHanps

Island,

Kshuhnaux Villas’

VAUCr of /,

w

&Setidoi Lake

UVU-LIAMS IˆL

SiwP*°n

ILLIVRAY

J-Ya point Separation

Greatjish Lake

’ s Font.

McPhersJSˆ,.

Lapierre H>ouse

1 J n?/f

‘Lower Ramparts

luJda’i

iMt. J

ieen Mt,

line 1

%ke Grouartl

Carwt

Lake ‘Liard

CIRCLE

‘ ARCTIC’

—t — 7ia|e

Good Hope

Deception

• Tato <

MCQuesten

>iiciik’c

Mt. Haldan

-5,333 feet .f.S

Moyo LnAre

Stewart

River

? Moose Lake Sliver —

Sort It

wi(kC«“LUN, MTˆC’V/

‘•STjiuprf ILoA* dlyˆLuktso _ y

Lakt

s’ >

ˆ i/rˆˆTustles Lake

iwfrJsT Logan

1ˆ1 j

Simp*®” /Tower

,| I’lLasA&is <rf ?ort Frances

*0

VsU1,,k ˆlta?e

rWmim _£„&!

j-WA7uane ˆ ‘’Sf.ˆoarttsmai

7.300 feet

yA/hyinu V

TwinTeak:

Cu/efXdˆ1

SIFTON 1 Grange y

Bp

POO N ˆ<7 MTS.

About

6,oU0 fectpˆ > nfirfdiei

Canyonj

lit (Thor so <

P»

fP?Mt

.afctrˆariTi

Hau

Kitsawa I

ˆTS.

ifcet

Jˆn,saa\wn’eˆ’

“wi?rA . yV

Cn r 1 1)< i u L-Jjiy/i

isVcltal

“”IS ceol

0‘Acini > /U

I t&KSlin I*«

1 ˆ iDawso n Peak

ˆ%s’Mo;ooo feet

.‘NO/ia\j

*£ GLAC*Efi-

[nfjntu

Mt. Glave

Dalton Cap hi

• H ItROOT PASS f

Dye* a/ z/

Valcutai

‘ 7«»

Skugvray

-Centtˆ evJ

YUKON GOLD FIELDS — YULEE

675

The fur traders were followed, after an interval of some years, by the prospector. The first gold seeker entered the country by the Chilkoot pass, through the Coast Range, in 1873. In 1881, bar-mining began on the Big Salmon River, and discoveries of produc¬ tive bars on the Lewes, Pelly and Stewart soon followed. The first discovery of coarse gold was made in 1886 on Forty-mile River and was followed by important finds on streams flow¬ ing into Sixty-mile River. The Sixty-mile streams were actively worked until the an¬ nouncement, in 1896, of the discovery of aston¬ ishingly rich creeks in the Klondike

district drew most of the miners away. In 1897-98 a stream of 30,000 adventurers, including people of all trades and callings, poured into the coun¬ try, all heading for the Klondike.

The discovery of the Klondike gold fields completely changed conditions in the hitherto unorganized and almost unknown Yukon terri¬ tory. The town of Dawson was built at the confluence of the Yukon and Klondike rivers, and soon superseded Forty-mile as the chief commercial centre. A local administration, with courts of justice and other organizations neces¬ sary to government, was quickly established. The demand for better transportation was met by the construction of a railway from tidewater at the head of Lynn Canal to the foot of the Whitehorse rapids on the Lewes River from which point communication with Dawson is maintained by a large fleet of well-equipped river steamers. Telegraphic communication was also established with the outside world and roads were constructed up the valleys of most of the producing creeks.

Government.— The territory is governed, at present, by a commissioner appointed by the Federal government at Ottawa, assisted by an elective council of three members.

Industries. — Placer Mining. — The devel¬ opment of the territory has depended so far almost entirely on placer mining. The ricn Klondike creeks have been worked continuously since 1897, and have yielded gold to the value of $198,000,000 up to the end of 1918. The yearly production reached its maximum in 1900, when it amounted to $22,275,000. Since that date production has been marked by a generally pro¬ gressive decline; the yield of 1920 was $1,660,- 048. The dwindling production marks the grad¬ ual exhaustion of the phenomenally rich claims on the various creeks, but does not mean a corresponding decline in the mining industry as the amount of gravel handled has if anything increased in recent years. The decreased re¬ turns are due to the lower grade of the gravels mined. In the early days of the camp most of the work was done with pick and shovel. More economic methods, such as dredging and hydraulicing, are now being introduced.

Outside the Klondike district, some placer mining is being done on the upper waters of the Stewart, on the south branch of the Big Salmon and on the headwaters of the Alsek and White rivers. A certain proportion of the territory is still unprospected.

Ore Mining.— Ore mining follows placer mining in most mining camps, and such promises to be the case in the Yukon. Quartz veins

carrying free gold have been found at several points in the Klondike district. . An important copper belt occurs west of Whitehorse. Some

development work has been done on a few of the claims and some rich ore, principally bornite, has been shipped to outside smelters. Native copper, sometimes in large masses, occurs loose in many of the creeks at the head of White River, but has not been traced to its source. Numerous discoveries of quartz veins carrying high grade silver minerals have re¬ cently been made in the vicinity of Windy Arm, Tagish Lake. Work is being actively prosecuted on some of these veins with very satisfactory results. Besides those mentioned, discoveries of ores of various kinds have been reported from nearly every section of the territory.

Coal Mining. — Seams of lignite coal of good quality occur at several points along the Yukon River, and a sufficient quantity is mined to supply the small local demand. Anthracite coal also occurs in the region southwest of Whitehorse but has not so far been worked.

Agriculture. — Experiments made during the past few years have shown that nearly all the common vegetables can be grown successfully in the Yukon valley, and there is every reason to believe that in the near future produce of this kind will be raised in sufficient quantity to supply

the local market. ˆ

R. G. McConnell, Geological Survey of Canada.

YUKON GOLD FIELDS. See Alaska;

Cape Nome; Klondike.

YULAN, a Chinese tree. See Magnolia.

YULE, yool, Sir Henry, British geog¬ rapher and Orientalist: b. Inveresk, Midlothian, Scotland, 1 May 1820; d. London, 30 Dec. 1889. He was educated at Addiscombe and in 1840 was appointed to the Bengal Engineers, serving in both Sikh Wars. He retired from the army with rank of colonel in 1862 and in 1864 took up his residence at Palermo, Sicily, in order to continue and extend the researches which led to the publication of his great work, (The Book of Ser Marco Polo, the Venetian) (1871-75), which erained him the founder’s medal of the Royal Geological Society. In 1875 he returned to England, and

from that year till 1889 was a member of the Indian Council. His other works include a treatise in fortification, > which was used as a textbook; (Narrative of a Mission to the Court of Ava in 1855 > (1858) ; (Cathay and the Way Thither > (1866) ; (Notes on Hwen Thsang's Account of the Principalities of Tok-haristan> (1872); (Hobson-Jobson : a Glossary of Anglo-Indian Colloquial Words and Phrases, and of Kindred Terms, etc.* (1886), with A. C. Burnell; (The Diary of William Hedges* (1887-89), edited for the Hakluyt Society, of which he was for many years president.

YULE, the old English name for Christ¬ mas, still used provincially and in poetry or poetic phrases. See Christmas, and consult Pringle, Mary P., (Yule-T!ide in Many Lands>

(1916).

YULEE, David Levy, American politician; b. West Indies, 1811 ; d. New York, 10 Oct. 1886. In boyhood he came with his father, whose name was Levy, to Richmond, Va., where he was educated. Sent to Florida in 1824, he there studied law, became a planter, and being elected to Congress, served from 1841 to 1845, chang¬ ing his name at this time from David Levy to David Yulee. He was United States senator from Florida 1845-51, taking a prominent part

in senatorial debates, and again 1855-61, when he resigned on account of the Civil War. He was then made a member of the Confederate Congress. After the war he became president of the Atlantic and Gulf Railroad, and was in¬ terested in the commercial development of Fernandina and Cedar Keys, Fla.

YUMA, yoo'ma, Ariz., city, county-seat of Yuma County, on the Colorado River, and on the Southern Pacific Railroad, 150 miles south¬ west of Phoenix. It is in a mining region in which there are considerable productive farm lands on which are raised grains and

fruits. Its climate is remarkable for its dryness, its rain¬ fall of 3.13 inches being the lowest recorded by the United States Weather Bureau Station. There are several churches, a high school, hos¬ pital and excellent county and Federal buildings and banking facilities. Pop. (1920) 4,237.

YUMAN STOCK, an important family or linguistic stock of North American Indians, the tribes composing it being scattered from the Colorado River region of Northern Arizona to the southern extremity of Lower California and even into the Mexican state of Sonora. The most important tribes of the stock are the Cochimi, Cocopa, Comeya, Cuchan, Diegueno, Havesupai, Maricopa, Mohave, Yavapai, Pericu, Seri, Tonto, Waikuru and Walapai. Of these, the Maricopa, or Coco-Maricopa, formerly in¬ habited the region around the confluence of the Gila and Colorado rivers. Their descendants and the Pimas, with whom they subsequently confederated, are now to be found in the Gila River Reservation to the number of about 400. They were an agricultural people and raised large crops by irrigation. . Under missionary influence they have been civilized and are now noted for their industry, their efforts at self-improvement, and their manufactures of cotton cloth, baskets and pottery.

The Seri Indians (Opata, ˆSpry®) speak a distinct language and live on Tiburn Island, in the Gulf of California, and the adjacent main¬ land of Sonora, Mexico. Their houses are flimsy bowers of cactus and shrubbery, some¬ times rudely shingled with turtle shells and sponges. They make graceful balsas of canes lashed together for use in navigating the strait between their island and the mainland. They also manufacture a very light pottery and some basketry. The modern Seris are loosely organ¬ ized into a number of maternal groups or clans in which polygamy prevails. They manifest im¬ placable hatred toward aliens whether Caucasian or Indian and regard the shedding of alien blood as a great virtue. The population of the tribe was formerly several thousands but by constant warfare this number has been greatly reduced.

The name Tonto (Spanish, <(foolish):>) has been inappropriately applied by the Spanish colonists of Arizona in the 19th century to a number of Indian tribes, namely: (1) To the Tulkepaia, a tribe of the Yurnan stock settled in 1875 on San Carlos reservation Arizona. (2) To the Eoyotero Apaches, an Athapascan tribe.

(3) To the Pinal Apaches of the same stock.

(4) To a mixture of Yavakai (Yuman) men and Pinal women who have

intermarried. The name has been especially applied to the last-mentioned body, who formerly occupied Tonto Basin and the Pinal Mountains of central

Arizona, whence some 500 of them were re¬ moved to the Rio Verde reservation and later to the San Carlos reservation. They number about 700, and speak a mixed Yuman-Athapascan language.

The Mohave Indians reside in Arizona and California in the region of the Colorado River. There were in 1896 upward of 2,000 Mohaves remaining, 600 of whom live on the Colorado River Reservation in Arizona. They are an agricultural people, rank high physically and are expert makers of pottery and baskets. They practised tattooing and cremated their dead. The Yuma reside in the valley of the lower Col¬ orado River in Arizona and California. Pop. about 655. The Cochimi were formerly the most populous of the tribes of Lower California but only a few are now extant. They live mainly about Loreto Mission. The Cocopa formerly occupied the valley of the Colorado River up to the Gila junction, but the remaining members now live mostly in Mexican territory. The Havesupai occupy the gorge of Cataract Creek, a branch of the Colorado River, in northwestern Arizona. The Mohave Yavapai left the main tribe in the Colorado valley and migrating to the Rio Santa Maria district, in 1873 were re¬ moved to the Camp Verde agency; but since 1875 they have been under the San Carlos agency. The Walapai originally occupied the territory above the Mohaves on the Colorado River. The total number, 20,000, who origi¬ nally inhabited the United States, has been greatly depleted and at present there are not more than 6,000 living within the limits of the United States on reservations. But many mem¬ bers have become full-fledged citizens and no longer figure as wards of the United States. Of these no record is kept.

YUNG-LO, Chinese emperor, third of the Ming dynasty: b. 1360; d. 1424. He was the eldest son of Emperor Hung-wu, but was ab¬ sent at the time of the emperor's death in 1398 and was superseded on the throne by a nephew, Kien-Wen. In 1403, however, Yung-lo reached Nanking with his forces, entered the city and assumed his place as emperor, compelling the flight of Kien-Wen. He conquered Cochin China and Tongking, and made successful war against Tartary. He was a famous patron of literature, particularly as sponsor of the c Yung-lo Ta Tien5 — (The Standard of Yung-lo,5 a collection of all the literary work known to the Chinese down to that period. It was com¬ pleted under the supervision of three scholars who were assisted by 2,166

literary workers, and when finished there were 22,877 books with a table of contents filling 60 books. The work was never printed, but three complete copies were made. Of these all have perished except about 11,000 books of one set.

YUNG WING, yoong'wing', Chinese diplo¬ matist and scholar: b. Nan Ping, province of Kwang Tung, 17 Nov. 1828; d. 21 April 1912. After graduation from Yale in 1854, he was in the silk and tea trade until 1864, and then en¬ tered the governmental service of China. The China Steam Navigation Company was estab¬ lished on his initiative, as was also the Chinese Educational Mission, for the education of Chi¬ nese in America. Yung Wing was made chief commissioner of this enterprise, for which an appropriation of $1,500,000 was made by the

Chinese government. He was granted the rank of mandarin of the second grade, and appointed intendant of Kiang-Su province ; and was for four years associate resident minister to the United States, where he took up his residence in 1902. Author of (My Life in China and America) (1909).

YUNNAN, yun-nan', China, the most southwesterly and second largest province of the empire, bordering on Tonkin and Burma; area, about 146,680 square miles. It is very mountainous in the north and west, and has a general slope toward the southeast. The cen¬ tral part is a plateau about 6,500 feet above sea-level, dotted with lakes and diversified by hills of red sandstone; but in the south the elevation of the land is much less. The province is trav¬ ersed by several large rivers, principally the upper courses of the Yangtse-kiang (called Kin-cha-kiang) , the Si-kiang, the Song-ka or Red River, the Mekong and the Salwin, but only the Song-ka can be regarded as of use for navigation within the province. The principal crops are rice, maize and wheat, but tea, indigo, sugar-cane, cotton, earth-nuts, and many vege¬ tables also are cultivated. Opium was an im¬ portant crop until 1907, when its cultivation was forbidden. Cattle, sheep, hogs and other ani¬ mals are reared in considerable numbers, and silkworm-rearing is also extensively carried on. The chief wealth of the

province, however, lies in its immense mineral resources, which include iron, coal, copper, gold, silver, lead, tin, zinc, cinnabar and precious stones. The manufactur¬ ing industries include the making of silk goods and other textiles, leather goods, *etc.* The cli¬ mate varies from the rigor of the northern dis¬ tricts, where the mountains are snow-capped for the greater part of the year, to the compar¬ atively tropical condition of the southeast. A large part of the population consists of Miao-tse and other non-Chinese elements, and Moham¬ medanism has many adherents. Yunnan, the capital, in the southeast, is a busy and prosper¬ ous town, with large copper factories, and manufactures of silks and carpets. (Fop. 150,000). Other towns are Chaotung, Tali-fu, Momein, Linganfu, Puerh, Tung-chwan, Mengtse and Ssumao, the last two being open to foreign trade since 1889 and 1897 respec¬ tively. The British have endeavored to estab¬ lish a direct trade route between Yunnan and Burma, but from the physical features of the region this is not easy. The history of Yunnan can be traced back to the 3d century b.c. Owing to its distance from the seat of the cen¬ tral authority and its mountainous character this province long remained practically independent. It was conquered by Kublai Khan but was not incorporated in the empire until the 17th cen¬ tury. The most noteworthy event of its recent history is the great Panthay revolt of 1855, which was not suppressed by the Chinese authorities till 1873; and from the effects of which, owing to the merciless measures taken, the province has not yet wholly recovered. The first Prot¬ estant Christian mission work was begun in 1877. Pop. (estimated) 12,324,574.

YUPANQUI PACHACUTI, yoo-pan'ke pii-cha-koo'te, or PACHECUTEC YUPANQUI Peruvian inca : b. about 1380; d. about 1440. * He was the ninth ruler of the Inca line

of sovereigns, and one of the greatest. He was the second son of the Inca Viracocha and after deposing or superseding his imbecile elder brother, Urco, he defeated the Chancas in a great battle, annexed their territory to his own and continued his successful career till the Inca kingdom included nearly all of what is now the republic of Peru. In order to relieve the con¬ gested condition of Peru he developed a system of colonies called mitimaes. Yupanqui figures largely in Quechuca tradition and various na¬ tional institutions have been traced to him. He was grandfather to Stahualpa, ruler of Peru at the time of its conquest by Pizarro.

YUROK. See Weitspekan Indians.

YURUARY, yoo-roo-a're, a river of Venezuela, rising to the east of the Caroni and flowing eastward to join the Cuyuni in about long. 61° W., near the frontier of British Guiana. It gives its name to the Yuruary ter¬ ritory claimed by both Venezuela and Great Britain until 1899, when the award of an arbi¬ tration court gave most of it to. Venezuela. There are several gold-fields here, including El Callao, *etc.*

YURUCARES, yoo-roo-ka-ras', or YURUCARE, Indians of Bolivia occupying the forest plains on the eastern slope of the Andes between the rivers Mamore and Beni. They in¬ clude several tribes, are tall and shapely, and are almost white. They plant maize and manioc but are hunters and warriors for the most part. They are said to give complete liberty to their children, never punishing them but sometimes killing them in order to be rid of them. They dress in a bark cloth which they print with fig¬ ures by means of engraved blocks; engage in duelling with bows and arrows ; and make an intoxicating liquor from maize which is im¬ bibed freely in their festivities. Their mythol¬ ogy is intricate and confused. Prior to the ex¬ pulsion of the Jesuits, in 1767, numbers of them were attached to the Chiquito missions. They number about 2,000.

YUSUF, yoos'uf, or YUSSUF, Abu Amru,

Arabic historian: b. Cordova, about 976; d. Xativa, 1070. He was profoundly versed in the traditions of the Oriental Mussulman countries and wrote (Behedjet-Almodjalisyn,) a collection of tales relating to Mohammed, etc.; (Tamhyd, a commentary on one of the chief Mussulman works of religious and civil law; (History of the Opinions and Doctrines of the Principal Mussulman Sects; ; 'History of the Wars Against the Christians, > *etc.*

YUSUF, or YUSSUF-BEN-TAXFYN,

Moorish prince: b. Velad, Sahara; d. 1106. He was the second prince of the Almoravide line and in 1086 aided the Emir of Seville, Al-Mo'tamid, to gain the victory over Alfonso VI at Zalaca near Badajoz. In 1090 he again in¬ vaded Spain, at the call of the emir of Seville, and taking advantage of Mohammedan dissen¬ sions, gradually acquired the sovereignty of the kingdoms of Malaga, Grenada, Murcia, Cor¬ dova Seville, Almeria, Badajoz and Valencia, which he united to the kingdom of Morocco. Notwithstanding his power, Yusuf never as¬ sumed a higher title than that of emir, and in 1103 his son Ali was acknowledged heir of both

his Spanish and Moorish possessions. Consult Freeman, (History and Conquests of the Sara¬ cens } (1856) ; Yonge, (Story of the Christians and Moors in Spain' (1878) ; Coppee, (History of the Conquest of Spain by the Arab-Moors)

(1881).

YUTERBOG, yu-ter bog, a town and dis¬ trict capital in Brandenburg, Prussia, about 26 miles south of Potsdam. Commercially and in¬ dustrially it is of some local importance, pos¬ sessing woolen mills, cigar factories and an export business in wines, wool, flax and consti¬ tuting itself an excellent market centre for a considerable extent of country. It possesses a number of interesting old buildings, dating back to the 15th century. Pop. about 8,000.

YVERDON, e-ver'don (German, Ifferten), Switzerland, a town in the canton of Vaud, at the southwestern extremity of Lake Neuchatel and an outlet of the Orbe, 17 miles north of Lausanne. Its castle, built in 1135, was used by Pestalozzi (q.v.) as an educational establish¬ ment in 1805-25, and now contains a library and museum, devoted to Roman and Celtic antiqui¬ ties. The town has also an excellent townhouse, a hospital and a memorial of Pestalozzi. Among the manufactures are railway wagons and materials, beer, *etc.* The town has also an extensive system of wharves. Yverdon was the Eburodunum of the Romans, and there are re¬ mains of the ancient walls. Its residents are mostly French-speaking Protestants. Pop. about

8,600.

YVES D'EVREUX, ev dav-re, Pierre, Franco-Brazilian historian: b. Evreux, Nor¬ mandy, France, about 1577; d. after 1620. He became a member of the Capuchin order in 1595 and was sent in 1612 with four missiona¬ ries as their superior, to Maranhao, Brazil, where a French colony had been established. He returned in 1614 and wrote

(History of the

Most Memorable Things that Happened at Ma¬ ranhao in the Years 1613 and 1614) (Paris, 1615; 2d ed. 1864), a continuation of the his¬ tory of Claude d' Abbeville, a work of great historical value.

YVETOT, ev-td, France, a town in the de¬ partment of Seine-Inferieure, on an elevated plain, 23 miles northwest of Rouen. It has manufactures of calico, hosiery, linen, leather and baskets. Antiquaries have been much puz¬ zled by an ancient chronicle, and still earlier edict, which gave the title of king to the lords of Yvetot. This edict was formally abrogated in 1681. (Le Roi d'Yvetot,' the well-known song by Beranger, translated by Thackeray, was a satire on Napoleon, which has immortalized the ancient dignity. It was the scene of the defeat of the troops of the League by Henry IV in 1592. Pop. about 7,133.

YVON, e-von, Adolphe, French historical painter: b. Eschwiller, Moselle, 1, Feb. 1817; d. Paris, 11 Sept. 1893. He studied under Paul Delaroche, traveled in Russia in 1843, and brought back with him a series of designs ex¬ hibited in Paris in 1847-48. He obtained the medal of honor at the Salon of 1857 ; 10 years later he became an officer of the Legion of Honor. In 1855 he was commissioned by the French government to accompany the army to the Crimea. Among his most important works are (The Remorse of Judas) (1846) ; (The Battle of Kolikova> (1850) ; (The First Consul Descending the Alps' (1853); (Marshal Ney Supporting the Rear Guard in Russia) (1855) ; (The Seven Deadly Sins,' designed after Dante (1855) ; The Capture of the Malakoff' (1859) ; (Battle of Solferino) (1861) ; and an allegorical picture of (The United States of America' (1870), executed for A. T. Stewart. He was an artist of remarkable power and holds a prominent place among the historical and re¬ ligious painters of France.

Zthe twenty-sixth of the letters of the English alphabet, is a vocal or sonant consonant, as distinguished from s, which is the corresponding fricative sibilant. It was adopted into the Latin from the Greek alphabet in the time of Cicero : in the Latin alphabet, as in our own, it holds the last place; but in the Greek its place is sixth, and in the Phoenician, Hebrew and other Semitic alphabets seventh. Its earliest Phoenician and Greek form was I. The name of the Greek letter is Zeta, that of the Phoenician Zayin. The Greek name is either derived

from that of the Phoenician letter Zade, or has been assimilated to Eta and Theta. In German and Italian it represents the sound of ts; in our language and in French it represents one simple sound. In Latin it was used only in words derived from the Greek. The exact value of zeta in Greek is not known with certainty ; but beyond any question it stood for a double sound, not a simple sound like our z; this is conclusively in¬ ferred from Aristotle's remark that xi (£), psi (V>)> and zeta (C) are like in sound; and the inference is strengthened' by the fact that in Greek prosody a vowel short by nature is made long by position when it occurs next before the zeta. The sound of the zeta, however, is in doubt — whether it was dz or zd or 'both. The name of Z in Great Britain is zed, in the United States zee. Z is often related to palatal sounds as zealous, jealous, *etc.* Though z is the alphabetic representative of the sonant sibi¬ lant, the special £-sound is in English and many other languages oftener represented by s than by z. In azure and some other words z is the sonant corresponding to sh. See Alphabet.

Z-BARS. See Rails and Structural Spiapes.

ZABERN, or S A VERNE (anc. Tres Tabernce), Alsace, a town in lower Alsace, on the Rhine-Marne Canal, at the foot of a pass over the Vosges Mountains, 24 miles northwest of Strassburg, and on the railway to Avricourt. There is an episcopal palace, rebuilt in 1779, and under German rule used as a 'barracks ; a church dating from the 15th century, and many ruined castles. The town was of importance in the time of the Romans, was destroyed by the Alemanni in 357, and was rebuilt by the Emperor Julian. It suffered greatly in the Thirty Years' War. It came prominently into public notice in 1913 through the ((Zabern In¬ cident.® The 99th Infantry was garrisoned there and it was said that the soldiers were encouraged by their officers in maltreating the Alsatians. Affairs came to a climax when a young nobleman of the German army. Lieu¬ tenant von Forstner, offered 10 marks to any soldier who would 'bayonet an Alsatian, then

further compromised himself by striking with his sword a lame shoemaker. The incident aroused a furore of indignation, not only in the French press, but in Germany. In the Reichstag it reached such importance that a vote of no confidence was passed against the government, 293 to 54. This, however, had no result except as an expression of disapproval, the chancellor announcing that he held his office through im¬ perial appointment and subject to no other con¬ trol. Von Forstner was upheld by his superior officers, and although

subjected to the form of a court-martial was acquitted. The emperors decision regarding the matter was that, the honor of the army must be upheld with neither compromise nor apology. Pop. 8,643.

ZABIANS, a term not identical with Sa-baeans, but properly meaning certain non-Chris¬ tian Gnostics, predecessors of the peculiar sect - called Mandeeans, still surviving in South Baby¬ lonia. The Cyrian Zabians were the survivors of the ancient Syrian heathen who, being under Mohammedan rule, took the name of Zabians in order to share the toleration which the fol¬ lowers of Mohammed extended to the real Za¬ bians. This sect became extinct about the 12th century. See Mandeeans.

ZACATECAS, tza-ka-ta'kas, a Mexican city and a state of the same name bounded by Coahuila, San Luis Potosi, Aguasca-lientes and Durango. The city of Zaca¬ tecas is 439 miles from Mexico City and 785 miles from El Paso, Tex., and is situ¬ ated at an elevation of 8,044 feet above sea-level. It lies in a narrow and deep ravine, and is surrounded and closely abutted on three sides by mountains or high hills. It possesses a chain of mines many of which are among the oldest in the Republic and have produced enormous quantities of precious metals. Not all these are now worked, a number having seemingly become exhausted in so far as satisfactory re¬ turns are concerned. A public library con¬ taining some 20,000 volumes is maintained by the local government. The most notable, build¬ ings are the historic old Cathedral, with its front wall a mass of artistic carving, and the Theatre, a very imposing structure of modern design. In the heart of the city is the Market House, an iron building admirably adapted to its uses and of pleasing appearance. A few minutes' ride southward toward a broad valley is the little village of Guadalupe, where there was a Chapel of Gold, built by a devout woman and ornamented throughout in solid gold gilt at great cost, estimated at not less than $1,000,000. Here, also, is located the State Industrial School for poor boys, in which shoemaking, tailoring, cabinetmaking, and other trades are taught, to¬ gether with the rudiments of a common school

education. There are The School of Arts, the Benito Juarez School and several other educa¬ tional institutions of merit; the Civil Hospital and two theatres the Gonzalez and the Cal¬ deron. Pop. about 60,000.

ZACCHAEUS, a New Testament character. He was a tax collector living near Jericho. Only one detail of his life is given, — he was short of stature. Jesus was accompanied by a crowd and in order to see the famous Rabbi, Zacchaeus climbed a tree. He was a Jew, but ostracised as an alien and outcast because of his business, so that Jesus by taking up his abode with him gave a blow at Jewish caste and at the same time laid himself liable to the criticism that arose, because he had accepted the hospitality of <(a man that was a sinner.® Ac¬ cording to tradition Zacchaeus became the com¬ panion of Peter and finally Bishop of Caesarea in Palestine.

ZACHARIA, tsa-ha-rea, Heinrich Albert,

German publicist: b. Herbsleben, Saxe-Gotha, 20 Nov. 1806; d. Kannstadt, 29 April 1875. He was graduated from the University of Gottin¬ gen in 1829, was lecturer there in 1835-42, and in 1842 became professor of law. He took ac¬ tive part in the political movement of 1848 as a member of the National Parliament; in 1866 he opposed annexation to Prussia; and in 1867 took a leading part in the convention which framed the constitution of the North German Confederacy. He wrote (German States' Rights and Federal Rights* (1841) ; (Manual of German Criminal Procedure) (1860) ; Ger¬ man Constitutional Laws of the Present Time) (1855) ; (The Question of the Competence of the Empire in View of the Dogma of infalli¬ bility'* (1871).

ZACHARIA, Just Friedrich Wilhelm,

German poet: b. Frankenhausen, 1 May 1726; d. Brunswick, 30 Jan. 1777. After studying at Leipzig and Gottingen be became professor of belles-lettres in the Carolinum, Brunswick. He wrote: <Der Rennomist* (The Brawler) (1744), the first burlesque heroic poem that had appeared in German; (Fables and Tales-* (1771), etc.; and translated into German hexameters Milton's (Paradise Lost* (1760).

ZACHARIA VON LINGENTHAL, ling'- en-tal, Karl Eduard, German writer on Juris¬ prudence, son of Karl Salomo Zacharia von Lingenthal (q.v.) : b. Heidelberg, 21 Dec. 1812; d. Grosskmehlen, near Merseburg, 3 June 1894. He was educated at Leipzig, Berlin and

Heidel¬ berg, and traveled widely in Europe and in the East, making exhaustive researches in Roman and Byzantine law. He is regarded as the founder of the science of Graeco-Roman juris¬ prudence. His works include <Outline of a His¬ tory of Graeco-Roman Jurisprudence* (1839) ;

(History of Graeco-Roman Private Right* (1864); (Graeco-Roman Laws* (1856-84);

<Paralipomena ad Basilica* (1893); and an edition of Justinian's (Novellae* (1881-91).

ZACHARIA VON LINGENTHAL, Karl Salomo, German jurist: b. Meissen, Saxony, 14 Sept. 1769; d. Heidelberg, 27 March 1843. He studied at Leipzig and Wittenberg, was profes¬ sor of law at the latter university, 1797-1807, and filled the same position at Heidelberg, 1807-43. He was active politically in 1820-29. His writings covered practically every branch of

jurisprudence, dealing with Roman, Canon, Ger¬ man, English and French law, and paved the way for modern writing of the sort. He wrote (The Unity of State and Church* (1797); (Forty Books on the State* (2d ed. 7 vols., 1839-43) ; (Hand-Book of French Civil Law* (8th ed. 1894-95), *etc.*

ZACHARIA.S, zak-a-ri'as, father of Saint John the Baptist and husband of Saint Eliza¬ beth. He was a priest of the temple of Jeru¬ salem, and was stricken dumb on refusing-to believe the announcement, made by the angel Gabriel, that a son should be bom unto him; but recovered his speech at the birth of Saint John the Baptist. He is supposed to have been put to death by Herod (Luke i, 5-79).

ZACHARIAS, or ZACHARY, Saint, Pope:

of Greek birth; d. Rome, 14 March 752. He succeeded Saint Gregory III in the papal chair in 741 and at his death was followed by Stephen II. He exercised a powerful influence over several of the Lombard kings, obtaining the restoration of various cities and territories which had formerly been subject to the papacy, and gave his consent to the setting aside of the Merovingian Childeric III and the elevation of Pepin the Short to the French throne (1752). His day is commemorated 15 March.

ZACHARIAS. See Zechariah.

ZACHER, tsaH'er, Ernst Julius August,

German philologist: b. Obernigk, Silesia, 15 Feb. 1816; d. Halle, 23 March 1887. He was edu¬ cated at Berlin and Breslau and was professor of German philology in Halle 1856-59, and 1863-87. His works, which are greatly prized by students, include <German Proverbs* (1852) ; (Ulfilas' Gothic Alphabet and the Runic Alpha¬ bet* (1855); (History of the Palgravine Geno-veva* (1860) ; (Pseudo-Callisthenes* (1867), dealing with the Alexander myth, *etc.*

ZACK. See Keats, Gwendoline.

ZACYNTHUS za-kin'thus. See Zante.

ZADKIEL, zad'ki-el, (1) According to Jew¬ ish legend the angel of the planet Jupiter. (2) A pseudonym adopted by William Lilly (b. 1602; d. 1681), the astrologer. (3) The name as¬ sumed by Richard James Morrison (b. 1794; d.

5 Feb. 1874), compiler of an astrological al¬ manac, begun by him in 1830, and whichTeached an annual sale of from 100,000 to 200,000 copies.

ZADOK, za'dok, (1) A high priest of Israel, contemporary with David. (See Sad-ducees). (2) A personage in Dryden's Ab¬ salom and Achitophel,* intended as a portrayal of Archbishop Sancroft.

ZADOKITE FRAGMENTS. The Zado—

kites are mentioned in the book of Ezekiel as the true upholders of the worship of Jehovah when Israel as a nation had deserted it. By some it is thought that their descendants settled in Damascus some time in the 1st century a.d. Some fragments discovered in the Cairo Geni-zah or Jewish Congregation, now in possession of Cambridge University Library, have been attributed to them with a date between 70 and 80 a.d. Considerable controversy arose con¬ cerning them among scholars in regard to their interpretation and implication. Rabbi Solomon Schechter published them under the Title doc¬ uments of Jewish Sectaries* (2 vols., Cambridge 1910). The best account of the history of the

manuscripts and sect is in an article in The Biblical World , Dec. 1911, by James A. Mont¬ gomery entitled (A Lost Jewish Sect.5

ZAFFARIN ISLANDS, a group of three islands lying off the coast of Morocco, near the Algerian frontier. They are at the mouth of the Muluya River and shelter its harbor. They have belonged to Spain since 1848. The central island is fortified.

ZAFFRE, or ZAFFER, in chemistry, an impure oxide of cobalt containing some arsenic and made by roasting speiss cobalt. The res¬ iduum consists of a grayish oxide of cobalt, usually mingled with sand and other impurities. It is used in the manufacture of smalt and in other ways, but its importance in furnishing ‘(cobalt blue® has been lessened by the discovery of methods of making artificial blue.

ZAGAZIG, za-ga-zeg’, or ZAKAZIK,

Egypt, the chief town of the province of Shar-kieh, in the delta of the Nile, on the Muizz and Ismailia or Freshwater canals, connected by rail with Cairo, Alexandria, and Suez, 40 miles north-northwest of Cairo. The great number of factories, with their tall chimneys, and the structure of the houses, give the place a Euro¬ pean appearance, and testify to the industrial activity which prevails. Nearly all of the cot¬ ton grown in the eastern Delta is sent here to be cleaned, sorted and partly spun before being put on the market. The town is also a centre of the grain trade, and has rapidly increased in prosperity and population since its connection with Suez by the Freshwater Canal. Many European merchants maintain offices here. The excavated ruins of the ancient Bubastis are in the vicinity. Pop. about 34,900.

ZAGOSKIN, za-gos’kin, Mikhail Nikolaie-vitch, Russian author: b. government of Penza, 1789; d. Moscow, 5 July 1852. For some time he held a post in the department of mines at Saint Petersburg. His comedy, (The Scape¬ grace, 5 was praised by Prince Tschaikovski, a dramatist of influence, and he wrote a number of others which had some success but were deficient in originality, although they gained for him the appointment as director of the Court Theatre as Moscow. His efforts in the domain of historical fiction, with Scott as a guide, were more worthy, the chief being (Yuri Miloslavski5 (1829) and he has been called the (<Russian Walter Scott.® . There were half a score of others, their subjects de¬ rived from Russian history or

legend. Their patriotic quality assured them an audience on their first appearance, and that they do not yet lack for readers is shown by the beginning of a complete edition of his works in 1898. There is a Russian biography by Aksakov in an edition of selected works published in 1858.

ZAHM, tsam, John Augustine, American author: b. New Lexington, Perry County, Ohio, 14 June 1851. He received his education at Notre Dame University, where he was grad¬ uated in 1871. He at once entered the order of the Holy Cross; and occupied the chair of physics at Notre Dame for 25 years, for the greater part of Which time he was also head of the scientific department there. He was for many years president of the board of trustees of the university, provincial of his order in the United States and procurator-general of his

community in Rome, where he enjoyed the special favor of Leo XIII, who conferred on him the degree of Ph.D. in 1895. Dr. Zahm has lectured at the summer schools at Plattsburg, N. Y., and at Madison, Wis. ; also at the New Orleans winter school and the Catholic University of America. In scientific circles, his position as an advanced evolutionist has brought him into prominence. He is a member of the Societe Frangaise de Physique; the Societe Scientifique of Brussels; the Arcadia, Rome; and the Dante Society of Florence. His pub¬ lished works include ‘Evolution and Dogma) ; (Bible Science and Faith5 ; ‘Sound and Music5 ;

(Catholic Science and Catholic Scientists5 ; Scientific Theory and Catholic Doctrine5 ; Sci¬ ence and the Church5 ; (Evolution and Tele¬ ology5 ; Souvenirs of Travel5; ‘Alaska: The Country and the People5 ; (Hawaii and the Hawaiians.5 Dr. Zahm has devoted many years to the study of South America and on this subject has written, under the pseudonyms of H. J. Mozans and J. A. Manzo (Following the Conquistadores by the Orinoco and Down the Magdalene5 ; (Following the Conquistadores

Along the Andes and Down the Amazon5 ; (The Quest of El Dorado5 ; ‘Woman in Science5 ; following the Conquistadores Through South America’s Southland, with an Account of the Roosevelt Expedition to South America.5

ZAHN, tsan, Ernst, Swiss novelist and . writer of short stories: b. Zurich, 24 Jan. 1867. In 1873 his father, an innkeeper, bought a hotel at Siders in the canton of Wallis and here Ernst obtained his first

instruction in the Prot¬ estant Elementary School. In 1875 he went to Zurich, where his grandparents took charge of him and sent him to the public schools, later (for three years) to the gymnasium. His father leased, in 1880, the restaurant in the railroad station at Goschenen, at the entrance to the Saint Gotthard Tunnel, and here Zahn worked as a waiter in 1883. For a year and a half he also attended the Breidenstein Interna¬ tional Boys' School at Grenchen. canton of Solothurn. In all these various capacities, and in spite of a much interrupted education, he was energetically pursuing every opportunity that presented itself to him for increasing his knowl¬ edge. In the winter of 1885 he again worked as a waiter at Hotel Beaurivage, Geneva ; in the winter of 1886 he was at Hastings, England, learning the language; in 1887 he was hotel clerk at the Hotel de la Ville, Genoa. He re¬ turned1 to his father's restaurant in 1888. becom¬ ing a partner in 1894 and taking sole charge in 1897. The town of Goschenen made him a town councillor, and one of his first acts in office was to cause the erection of a monument for the constructor of the Mount Saint Gotthard Tun¬ nel and for the many laborers who met their death during its construction. In 1902 he became judge of the Uri Criminal Court, in 1904 a member of the Cantonal Council of Uri, in 1908 its president. He received the honorary de¬ gree of Ph.D. fro mthe University of Geneva in 1909. He has written an unusual quan¬ tity of stories of Swiss local life, which are very attractive in form and correct in tech¬ nique. Some of his short stories seem like faultless works of art, especially 'Stephan der Schmied5 and 'Verena Stadler.5 In his larger works, however, he has not devoted his atten-682

tion chiefly to the difficult task of analyzing serious conflicts of character, but rather to more or less superficial problems, with the result that he is drifting more and more into the position of a writer interested only in success, which will therefore perhaps not be of very durable character. Consult (Gesammelte Werke) (10 vols., Stuttgart 1910) ; <Herzenskampfe) (1893) ; <Die Clari-Marie> (1904); <Die Helden des Alltags' (1905; 20th ed., 1912), <Fimwind> (1906) ; (Der Apotheker von Klein WeltwiP (Stuttgart 1913). A translation of (Stephan der Schmied) is given in (German Classics' (Vol. XIX, New York 1914).

Jacob Wittmer Hartmann.

ZAHN, Johann Karl Wilhelm, German architect, painter and art critic : b. Rodenberg, Schaumburg, 21 Aug. 1800; d. Berlin, 22 Aug. 1871. He became professor in the Academy of Arts, Berlin, 1829. He superintended excava¬ tions at Herculaneum and Pompeii ; cast the fin¬ est bronzes and silver vases for the Museum Borbonico ; and was architect of many fine houses and villas in Pompeiian style in England and America. Author of (The Most Beautiful Ornaments and the Most Notable Pictures from Pompeii, Herculaneum and Stabiae) (1828-30);

(Ornaments of All Classical Periods of Art>

(1832-39).

ZAHN, Theodor, German theologian: b. Mors, Prussia, 10 Oct. 1838. After studying at Basel, Erlangen and Berlin he became pro¬ fessor of theology in the University of Got¬ tingen in 1871. He filled a similar chair at Kiel in 1877, at Erlangen in 1878, at Leipzig in 1888 and in 1892 returned to Erlangen. He became a foremost authority on the New Testament. Among his works may be named (Marcellus of Ancyra) (1867) ; (The Shepherd of Hermas) (1868); Ugnatius of Antioch) (1873) ; (The Acts of Saint John> (1880) ; (Cyprian of An¬ tioch and the German Story of Faust) (1882) ; Researches Into the History of the New Testa¬ ment Canon) (1881-93) ; (The Gospel of Peter) (1893) ; Untroduction to the New Testament > (1897); (Das Evangelium des Lucas) (1913), *etc.*

ZAHRINGEN, tsa'ring-en, the house from which the former grand-ducal family of Ba¬ den (q.v.), Germany, took its origin. The name is derived from the castle of Zahringen, now in ruins, in the village of that name, about two miles north of Freiburg in Baden. The founders of the family were from the 8th to the 10th century Counts of Breisgau, but the history of the house really began with Duke Bertold I, <(the Bearded, w d. 1078, who began to rule in the first third of the 11th century. Bertold II took the title of Duke of Zahringen in 1090. The main line of the family became extinct in 1218 and their territories, which in¬ cluded lands in Burgundy and Switzerland as well as Baden, were divided. A portion passed through a younger branch of the house to the Counts of Kyburg and thence to the Hapsburgs, to whom they are related. The remaining lands descended to the former reigning family of Baden.

ZAIMIS, Alexander, Greek statesman : b. Athens, 1855. He was educated at the uni¬ versities of Athens, Leipzig, Berlin, Heidelberg

and Paris. He was elected to the Chamber of

Deputies in 1885; served as Minister of Jus¬ tice in 1890-92, and was president of the Cham¬ ber of Deputies in 1895-97. He was Premier in 1897-99, under King George, and again in 1901-02. He was High Commissioner of the Powers in Crete in 1906-11 and was successful in securing the annexation of that island to Greece. He was appointed Premier to succeed Venizelos in October 1915, but resigned a month later when his government failed to receive a vote of confidence. He was again appointed Premier in June 1916, but was succeeded by Lambros before the end of the year, only to succeed Lambros in May 1917. Upon the abdication of King Constantine, however, he was asked to resign, and was succeeded by Venizelos 25 June 1917. He was generally supposed to favor neutrality for Greece in the European War, but to be personally in favor of the Allies.

ZAIRE, za-e'ra, Africa (a Portuguese vari¬ ant of the Bantu word, nzari) , the name by which the Kongo River was known before the possession of the banks of its lower course by the Kongo tribe, and still much used until the last quarter of the 19th century.

ZAKAZIK, za-ka-zek', Egypt. See Zagazig.

ZALESKI, za-les'ki, Bohdan, Polish poet: b. Bohaterka, in the Ukraine, 14 Feb. 1802; d. Villepreux, near Paris, 31 March 1886. He studied at Warsaw and being obliged to leave his country after the revolution of 1830, he went to France. Many of his poems depict in the most vivid manner the scenery of Poland, as well as its history and legends, in which he was well-versed. His chief works are (The Spirit of the Steppes* (1842) ; /The Most Holy Family) (1851), and collections of shorter poems.

ZALEUCUS, za-lu'kus, the legendary law¬ giver to the Epizephyrian Locrians, the Greeks who colonized Magna Graecia, the southwest ex¬ tremity of Italy. He is supposed to have flour¬ ished in the middle of the 7th century b.c. and his code is said to have comprised the first written laws of the Greeks. According to tra¬ dition his laws were exceedingly severe.

ZALINSKI, za-lm'ski, Edmund, Ameri¬ can soldier and inventor: b. Kurnich, Prus¬ sian Poland, 13 Dec. 1849; d. 10 March 1909. Coming to the United States in 1853 with his parents, who settled at Seneca Falls, N. Y., he was educated at the Syracuse High School, and entered

the army in 1864 as volunteer aid on the staff of Gen. N. A. Miles. He was ap¬ pointed second lieutenant Fifth United States Artillery in 1866, and captain in 1887. He was professor of military science at the Massachu¬ setts Institute of Technology 1872-76, and was appointed second lieutenant Fifth United States Artillery School at Fort Monroe and the School of Submarine Mining at Willett's Point, N. Y. From 1883 to 1889 he devoted himself to the development and perfecting of a pneumatic dynamite torpedo gun. Among his inventions are an intrenching tool, a ramrod bayonet, a telescopic sight for artillery and a system of range and position finding for seacoast and artillery firing. He retired from active service in 1894 and was promoted major in 1904. See Ordnance.

ZALINSKI GUN. See Ordnance.

ZALOKOSTAS, Georgios, Greek poet: b. Syrrhako, Epirus, 17 April 1805 ; d. Athens, 3 Sept. 1858. An ardent patriot, at 16 he fought in the insurrection at Missolonghi. Greek chil¬ dren are taught his songs, and among his best-known poems are <Missolonghi) ; (Armatoles and Klepts) ; (The Entrance of Prevesa) ; (Hours of Leisure* ; (Marco Bozzaris,* *etc.* Several of his verses have been translated into Italian, Spanish, English, German, French and Russian. His (Poetical Works* were published at Athens in 1860.

ZALUSKI, za-loos'ke, Josef Andrezei, Po¬ lish prelate and scholar: b. Poland, 1/02; d. 9 Jan. 1774. After serving for three years at Rome as ambassador to Pope Clement XII he was made bishop of Kiev, but was banished to Kaluga and imprisoned there in 1766-73 for his opposition to the Dissidents. He is chiefly re¬ membered for the service he did in awakening Polish literature. He spent his fortune in col¬ lecting a great library, which he bequeathed to Poland, but which was taken by Russia after the partition, and formed the nucleus of the Imperial Public Library. He was a great scholar and while in prison wrote from memory a versified account of the Polish histories in his collection. He was not a great writer but his works have a high historical and bibliographical value. Author of (Biblioteka historykow*

(1832) ; (Specimen historiae Polonise criticae

(1733).

ZAMA, zama, North Africa, the name of two ancient cities about 30 miles apart, 100 miles southwest of Carthage, now represented by Djiama and Sidi Amor-Djedidi. Both claim to be the scene of the victory of Scipio Africanus over Hannibal, which decided the fate of Car¬ thage 202 b.c. It led to an ignominious peace which closed the Second Punic War 201 b.c. The Romans lost about 2,000 killed and wounded, while the Carthaginians lost in killed and prisoners over 40,000.

ZAMACOIS, tha-ma-kd'es, Eduardo, Span¬ ish artist: b. Bilbao, Vizcaya, 1842; d. Madrid, 14 Jan. 1871. He was a pupil in Madrid of Balaca, Federico de Madrazo, and the Acad¬ emy; in Paris, of Meissonier and the Beaux-Arts; and has been ranked as second to only Fortuny among Spanish genre-painters of the 19th century. His subjects were drawn largely from the 16th and 17th centuries, and were fre¬ quently treated in a satirical vein. His technical finish has been described as ((almost as perfect as Meissonier's.** Among his paintings are <The Hunchback*; (Spanish Recruits) ; (The Bull Fighters' *; Hndirect Taxes) ; (A Court Jester of the 16th Century) ; <The King's Favo¬ rite* (1867); 'Cervantes as a Recruit*; <The Rival Confessors> (1868) ; 'Return to the Convent* (1869); (The Education of a Prince) (1870); 'The Puzzled Musician/ Many of his works are in private collections in the United States.

ZAMBALES, tham-ba'las, Philippines, a province of Luzon, in the southwestern part of northern Luzon; bounded on the west by the China Sea; on the north by the province of Pangasinan: on the east by the provinces of Pangasinan, Tarlac, and Pampanga; and on the south by Bataan and Subig Bay; length, 80

miles ; width, 28 miles in the southern part, 25 miles in the nortern part, and 12 miles in the central part; area, about 1,650 square miles. The Zambales Mountain range near the eastern boundary parallels the coast, and has several points of high elevation, High Peak being 6,683 feet in height, Mount Pinalobo, 5,524 feet and Mount Guadradro 5.443 feet ; there are also two groups of peaks but a few miles inland

from the coast. There are numerous short rivers, and several thermal springs in the province. The chief industry of the province is agricul¬ ture ; rice and wheat of superior quality are the special products ; sugar, cotton, tobacco and coffee are also extensively cultivated. Next to agriculture in importance is the raising of cat¬ tle, horses, carabaos and hogs. The mechan¬ ical industries are very limited and primitive; copper and coal are mined; and there are indi¬ cations of iron. The forest products are valu¬ able, and amber is collected in considerable quantities on the coast. There are but few roads, and these are mostly impassable in the rainy season ; a road and telegraph line par¬ allel the coast for the greater part of the dis¬ tance. Civil government was established in Au¬ gust 1901, and the provincial governor reported the province in a peaceful and prosperous con¬ dition in January 1902. The chief town and capital is Iba, a seaport (Pop. 4,482/ Until 1904 the province extended north to Lingayen Gulf, but a redivision of territory then gave the territory north from Dasol Bay to the prov¬ ince of Pangasinan. Pop. 101,381.

ZAMBESI, zam-be'ze, or ZAMBEZI, South Africa, a river rising in Portuguese West Africa, in lat. 11° 2F 3" S., and long. 24 . 22 E., and reaching the Indian Ocean at Chinde and Conceifao in Portuguese East Africa, oppo¬ site Madagascar, after a total course of 2,200 miles, of which the middle part belongs wholly to Rhodesia. The Victoria Falls and the Kebrabasa Rapids, the former in the west of Rho¬ desia and the latter in Portuguese East Africa, above Tete, are regarded as dividing the river into three sections, the Upper, Middle and Lower Zambesi. The neighborhood of the source has an altitude of about 5,000 feet, and the river has its origin in a deep depression at the base of steep undulations, where the water oozes from a black marshy bog and quickly collects into a well-defined stream. ˆ Another headstream of the Zambesi is the Kabompo, which rises in the northwest of Rhodesia, about lat. 11° 34' S., and long. 25° 17' E., also at an altitude of 5,000 feet, and in a region of open grassy downs. The former stream, at first known as Yambeshe and then as Liambai (Liambeshe), flows at first west with a south¬ ward trend, and then turns south-southeast. Ten miles of rapids precede the Sapuma cata¬ racts (13° 7' S.), where the river flows <(through a narrow rocky fissure into a pool of considerable extent.** At about 14 S. it is joined by the Kabompo from the northeast, and the remaining course of the Upper Zam¬ besi has a south and southeasterly direction through the lowlying, grassy Marotse country, and is marked by various cataracts and rapids. Sesheki is a place of some importance on the left bank, near where the river begins to be wholly in British territory; and a short distance farther down, opposite Kazungula, it receives

from the west the waters of the large tributary Kuanda. In about 18° S. there are the cele¬ brated Victoria Falls (q.v.), discovered by Liv¬ ingstone in 1855. Here the broad river sud¬ denly plunges into a transverse chasm 400 feet deep amidst a scene of tremendous grandeur. The gorge just below (eight miles long) and in full view of the falls is spanned since 1904 by a lofty bridge on the Cape to Cairo Railway. The Middle Zambesi, whose direction is east, northeast and again east, receives the Guay-Shangani and Sanyati from the south ; the Ka-fukwe and Loangwa from the north, the latter at Zumbo, where the river leaves British terri¬ tory; and is interrupted by various rapids and rocks, especially at low water, the Kebrabasa Rapids being the first impassable obstacle _ to navigation from the mouth. The remaining course of the river (Lower Zambesi) has been described as, except for the Lupata Gorge, <(merely a broad expanse of sand, three to five miles wide, with low, reed-fringed banks, and intersected by numerous shallow streams.® It passes the town of Tete, below which it is joined on the right by the Mazoe, and after passing Sena it receives from the left the Shire from Lake Nyassa, the waterway to British Central Africa. It enters the Indian Ocean' by several mouths, of which the Chinde one is the most practicable. The delta covers an area of about 25,000 square miles, and begins about 90 miles from the coast, a little below the confluence of the main stream with the Shire. The river drains an area estimated at 600,000 square miles. Its basin is separated fiom that of the Orange River on the southwest by a slight watershed, and from that of the Limpopo on the south by a mountain range. The valley of the Zambesi is capable of im¬ mense development in the way of trade. The Portuguese government has long exercised sway for 300 miles from the mouths of the river, and by the international arrangement of June 1891 the river from the coast to the con¬ fluence of the Loangwa is recognized as being in Portuguese territory. The Zambesi and its affluents are now free to the flags of all nations. The Upper Zambesi was first explored by Liv¬ ingstone, who reached the Liambai in 1851. Consult Coillard, <On the Threshold of Central Africa) (1897) ; Gibbons, < Africa from South to North* (1904) ; Livingstone, < Narrative of an Expedition to

the Zambezi and its Tributaries) (1865).

ZAMBESIA, zam-be'zhi-a, one of the three districts of Portuguese East Africa, divided into the sub-districts Quilimane and Tete; also a name popularly applied to the regions in Rho¬ desia divided by the Zambesi, known respec¬ tively as North and South Zambesia, and some¬ times called British Zambesia. See East Af¬ rica, Portuguese; Rhodesia.

ZAMBOANGA, tham-bd-an'ga, Philippines, (1) town, capital of the District of Zamboanga; on the southern coast, 17 miles across the strait from Isabela. It was founded in 1635 as a base of operations against Moro pirates ; shortly before the American occupancy of the islands it was almost entirely destroyed by fire, partly by the Spaniards and partly by the Filipinos ; since then it has been rebuilt. Many of the houses are of stone, and the town contains a fort, the

Castle of San Felipe, a cathedral, a public hos¬ pital, the provincial capitol, completed in 1908, and a customs house. Since the American occu¬ pation the streets have been improved, public parks established and docking facilities have been extended. It is connected with Manila by steamer, and is the chief market in the southern part of the archipelago for hemp, copra and gutta percha. Pop. 30,000. (2) A District of

Moro province, forming the western peninsula of the island of Mindanao, bounded on the north by Dapitan and Misamis, on the south by the Celebes Sea and Basilan Strait, on the east by Lanao and on the west by the Sulu Sea; area, with dependent islands, 6,085 square miles. The district was increased in size by the act of the Philippine Commission 1 June 1903. The main mountain range extends west and then southwest from the northeastern boundary; an¬ other range traverses the Banganinan or Flecha peninsula. The climate is the best in the Phil¬ ippines, the temperature varying but a few de¬ grees. Agriculture and stock raising are the more important industries; rice, hemp, cotton, coffee, sugar, cocoanuts are cultivated; and cloves and nutmegs and vegetables are also among the valuable products of this province. Cattle, horses and hogs are raised. There is an abundance of valuable woods, particularly teak and juniper; deposits of coal at the head of Sibuguey Bay and at other places, and gold also is found in the western portion. Pop. 98,078.

ZAMBONI'S DRY PILE, in electricity, a dry voltaic pile or battery

invented by Zam-boni. Paper silvered on one side is damped and coated on the other with manganese di¬ oxide ; half a dozen of these sheets being superimposed to save time, discs are punched out, and 1,000 to 2,000 single sheets are com¬ pressed in a glass tube with metal caps and knobs at the ends. Such a pile will charge a Leyden jar, though it will not give shocks or sparks.

ZAMIA, a genus of plants of the family Cycadacece. (See Cycapales). In aspect the species partly resemble palms, and partly tree ferns ; in affinity they are nearer the latter than the former, but rise considerably above them in organization. They are natives of tropical America, tropical Asia, the Cape of Good Hope, and Australia. The stems of Z. tennis and Z. furfuracea, and the seeds of Z. pnmila, in the West Indies, yield arrowroot. The Florida Indians call the last <(coontie,® and manufacture flour from the rhizomes. It grows in the ever¬ glades of Florida, and has large tubers of the shape and size of parsnips, which are rough and gray on the outside, but are white internally. The tubers are pounded to a pulp, in a log mortar, and washed in a straining cloth, the abundant starch of the coontie passing through and settling in a deerhide. This process rids the plant of an acrid poisonous principle which is carried away by the water. The Federal armies lost a number of men during the Civil War, who ate the root in its crude poisonous state. The sediment, or starch left in the deer¬ skin after straining, is fermented and dried, and becomes a yellowish-white flour ready for use, which has long been a staple food of the Seminoles. The coontie starch, when extracted in proper mills, is finer and whiter than the

Indian product, and is called Florida arrowroot. It is nutritious, and makes excellent puddings, and the like.

ZAMOJSKI, za-moi'ske, ZAMOYSKI, or ZAMOSC, an ancient family of Poland, whose most distinguished members have been Jan Zamojski, statesman and general: b. Skokow, palatinate of Chelm, 1 April 1541 ; d. near Skokow, 3 July 1605. He was educated at Paris, Strassburg and Padua, and in 1564 was elected rector of the university at Padua.

In 1565 he returned to Poland, and upon the death of King Sigismund Augustus in 1572, succeeded in so organizing the equestrian order, that in the diet of 1573, held at Warsaw, Henry of Anjou (afterward Henry III of France) was chosen king of Poland. Upon the abandonment of Poland by Henry, a party of nobles elected Maximilian II of Austria, and he was pro¬ claimed king by the primate; but the party hostile to the house of Austria, led by Za¬ mojski, chose Stephen Bathory (q.v.), who marched rapidly to Cracow, and was there crowned. Zamojski was made grand chancellor of the kingdom and became a power in Polish affairs. He was afterward married to Gri-selda, a niece of the king. In 1580, during the war with Russia, Bathori appointed him com¬ mander of the principal army, with the title of hetman; and in 1582 he negotiated the peace by which Livonia, Esthonia and Novgorod were ceded to Poland. After the death of Bathori in 1586, he might have secured the crown for himself ; but he used his influence in favor of Sigismund III, son of the king of Sweden, defeated the army of the opposing claimant, the Archduke Maximilian, at Cracow, pursued him into Silesia, and took him and his forces pris¬ oners. From 1590 to 1597 he was engaged in a constant series of wars; and while often at variance with Sigismund, with whom he was no favorite, he remained a dominant figure in the state. fighting successfully against the Turks, Tartars and Cossacks, and oftentimes supporting the army from his private fortune. Zamojski was not only a great statesman and general, but a munificent patron of literature and the sciences. He founded New Zamosc, which came to be regarded as one of the strongest fortresses of Poland, and established there a university and a famous printing press. He wrote (Testamentum Joannis ZamorP (1606), and many letters of his are to be found in Lunig's (Literae Procerum EuropaeP Jan Zamojski, general, grandson of the preceding: b. 1626; d. Warsaw, 2 April 1665. He partici¬ pated in the campaign of 1651 against the Cossacks, was made palatine of Sandomir, and was conspicuous in the wars that followed. In 1659 he was at the head of the army which acted in the Ukraine against the tsar of Rus¬ sia. Andrzej Zamojski, statesman : b. Bie-zun, 1716; d. Zamosc, 10 Feb. 1792. He en¬ tered the military service of Saxony, returned to Poland in 1754 and was made marshal of the palatinate of Smolensk. In 1760 he emanci¬ pated his serfs, and on the accession of Stanis¬ las, Augustus was appointed grand chancellor in 1764, an office he resigned rather than sign the partition treaty. In 1776, at the request of the diet, he drew up a code of laws, which was printed under the title of (Zbior praw sado-wych> (1778). The liberal character of the code, especially its provision for a general

measure of emancipation, aroused against it so great a hostility, that in the diet of 1780 it was not permitted to be read, but it was adopted in 1791. Andrzej Zamojski, statesman, grand¬ son of the preceding: b. 2 April 1800; d. Cra¬ cow, 29 Oct. 1874. He studied at Geneva and Edinburgh, entered the Polish civil service in 1823 and was Minister of the Interior of the i evolutionary government in 1831. He later introduced steam navigation on the Vistula, but as the head of an important agricultural association incurred the suspicion of the Rus¬ sian government. The association was sup¬ pressed in 1862. At the request of the viceroy, Grand Duke Constantine, Zamojski drew up a statement of the claims of Poland, a document which displeased the Russian government and caused Zamoj ski's banishment.

ZAMORA, tha-mo'ra, Antonio de, Spanish dramatist : b. Madrid, about 1660 ; d. there, be¬ fore 1744. He was a court officer during the reign of Philip V and also held a secretaryship in the department of Indian affairs. He wrote many dramas which were highly esteemed by his contemporaries, some 40 of which are extant. He imitated the style of Calderon, but rarely attained the poetic beauty of that author. To modern taste his plays are slow and over-loaded with stage directions which were probably nec¬ essary in their day, and they lack the brilliant invention of the dramas of Calderon and Lope de Vega. Yet they are the best of their age. The best of his dramas, however, show skilful development of character. Among the most noteworthy are (Mazariegos y Monsalves* ; <Cada uno es Linaje Aparte* ; (E1 hechizado por fuerza,* a comedy produced in Spain in modern times; and (E1 Convidado de Piedra,* on which is based the libretto of the opera of (Don Juan.*

ZAMORA, Spain, a city and capital of a province of the same name, 140 miles northwest of Madrid, on a rocky hill on the right bank of the Douro which is here crossed by a fine bridge. It has interesting mediaeval buildings, and is the see of a bishop; the cathedral is a Gothic structure, completed about 1174, but par¬ tially modernized in the Corinthian and Doric styles. Zamora as a fortified town played an important part in early Spanish history, and it is renowned for the successful defense which it made against the Moors in 939 a.d. Pop. 20,000. The province of Zamora is divided into eight departments and has a population of about

280,000.

ZAMORA, Venezuela, an interior north¬ western state bounded by

Lara, Miranda, Boli¬ var and Los Andes. It has not been very much developed and possesses many natural resources. The capital is Barinas. Pop. 36,000. Area of province, 25,212 square miles. Pop. 246,676.

ZAMORA Y CORONADO, e kd-ro-na'fho, Jose Maria, Central American jurist: b. Cartago, Costa Rica, 1785 ; d. Cuba, after 1846. He was educated in Spain and on his return from there held important judicial and civil posts in both Porto Rico and Cuba. He pub¬ lished (Registro de la legislation ultramarina* (6 vols., 1844-48), a work of much historical value on account of its being a collection of laws and regulations pertaining to the Spanish-American colonies. For this reason it has been

largely consulted by students of Latin Ameri¬ can law and institutions.

ZAMOSC, za'mosch (Zamostye, in Rus¬ sian) Poland, a fortified town in the prov¬ ince of Lublin, on the Wieprz, 50 miles southeast of the town of Lublin. It was laid out in 1588 in the Italian style by Jan Zamojski, and all its houses have arcades. Its fine castle, the four churches, the arsenal, and the townhouse are the chief buildings. The manufac¬ ture of furniture is the principal industry. Pop. 16,000.

ZAMOUSE, za-moos', the West African short-horned buffalo (q.v.).

ZAMPA, zan-pa, Ou la Fiancee de Mar-bre, an opera comique by the French composer, Louis Joseph Ferdinand Herold (q.v.), first pro¬ duced in 1831.

ZAMPIERI, dzam-pe-a're, Domenico. See

Domenichino.

ZANARDELLI, dza-nar-del'le, Giuseppe, Italian statesman: b. Brescia, 29 Oct. 1826; d. Modena, 20 Dec. 1903. After study at Pavia, he was a volunteer in the war of 1848, then was for a time in journalism and

gave lectures on law, but was forced by the Austrian officials to discontinue them. Elected deputy in 1859, he held various administrative posts, in 1876 be¬ came Minister of Public Works, and in 1878 ot the Interior. From 1881 to 1883 he was Minis¬ ter of justice, and from 1887 to 1891 again held that portfolio. During the latter period of service he issued the penal code and began a reform in the magistracy. He was presi¬ dent of the Chamber of Deputies in 1894, in 1896 was again chosen, in December 1897 ac¬ cepted the portfolio of justice for a third time, but withdrew in May 1898, once more to become president of the Chamber. This post, too, he relinquished, to identify himself with the oppo¬ sition, and at the fall of the Saracco Cabinet in February 1901 was able to form an administra¬ tion with the aid of the extreme left. He was an orator of high rank, a steadfast Liberal, and the recognized leader of the constitutional left. Failing health prompted his resignation 2 Nov. 1903, shortly before his death.

ZANDEH, zan'da. See Nyam-Nyam.

ZANE, zan, Ebenezer, American pioneer: b. Berkeley County, Va., 7 Oct. 1747; d. Wheel¬ ing, W. Va., 1811. Of Danish descent he made the first permanent settlement on the Ohio River in 1770, on the site of the present city of Wheel¬ ing, building there a block house called Fort Henry, whence he repelled several Indian as¬ saults during the Revolutionary War. He was a disbursing officer under Lord Dunmore ; held several military and civil offices, and attained the rank of colonel. The land where the city of Zanesville, Ohio, now stands, formed a por¬ tion of his property, and he assisted his brother Jonathan and John Mclntire in laying out that town in 1799. The locality was called by them Westbourn, and the present name was not adopted till 1802.

ZANELLA, dza-nel'la, Giacomo, Italian poet: b. Chiampo (Vicenza) 9 Sept. 1820; d. Vicenza, 17 May 1888. After studying for the priesthood-at the Vicenza Seminary, he became professor there of philosophy and Italian liter¬ ature. Having held posts in lyceums at Venice,

Vicenza and Padua, he was made professor of Italian literature in the University of Padua in 1866, and in 1871-72 was rector of the uni¬ versity. His work is noted for beauty of style and mastery of form ; his most popular poem being (La Conchiglia Fossile) (The Fossil Shell). His first volume of poems, (Verses,* appeared in 1868, and was

followed by several others. Among his poetic tales are (The Lit¬ tle Calabrese) (1870), and (Robin Redbreast* (1881). He published also some volumes of prose, including (On Italian Literature in the Last Century* (1885).

ZANESVILLE, Ohio, city and county-seat of Muskingum County, at the confluence of the Muskingum and Licking Rivers, 60 miles east of Columbus, on the Baltimore apd Ohio, the Pennsylvania, the Zanesville and Western, the Wheeling and Lake Erie, the Ohio River and Western, and several electric railroads. The town was founded by Ebenezer and Jonathan Zane and John Mclntire in 1799;' it was capital of the State in 1810-12; was incorporated as a town in 1814; and received its city charter in 1850. There are seven bridges crossing the Muskingum and two across the Licking River, the town being built on the banks of the two rivers. The Muskingum is made navigable for small vessels by means of a series of locks and dams, and the city thus has water communica¬ tion with Columbus; and with Cleveland by means of the Ohio Canal. The city is situated in a fertile agricultural region which has also deposits of coal, clay and limestone. Manufac¬ tures were early attracted by the abundant water power supplied by the two rivers and by cheap fuel; they consist of important tile works, potteries, brickyards, tanneries, machine shops, foundries, bent-wood works, tube works, flour and woolen mills, and glass, coffin and mining-tool factories. The chief •buildings include the Soldiers' and Sailors' Monumental Building, the County Courthouse, the City Market House, and excellent banking and fraternity buildings. There is a well-organized city school system, both Roman Catholic and Lutheran parochial schools, a business college, high school and Roman Catholic Academy. The Mclntire Chil¬ dren's Home was endowed by the estate of John Mclntire, and the John Mclntire Public Library received a $50,000 Carnegie endowment. The city owns its waterworks, and has a municipal hospital. The commission form of government is in force. Pop. (1920) 29,569.

ZANGWILL, Israel, British author: b.

London, 14 Feb. 1864. He was educated at the Jews' Free School, (Spitalfields,* and the Univer¬ sity of London, published in 1888 (The Premier and the Painter, * a fantastic romance, in 1890 established Ariel , or the London Puck, a bril¬ liant but short-lived periodical, and soon made his reputation by his essays, works in fiction, and plays. His department of literary causerie,

< Without Prejudice,* in the Pall Mall Maga¬ zine, became well known in Great Britain for its able critiques. Some of these essays

were gathered into a volume of that title in 1896. Some of Zangwill's best fiction deals with Tew-ish types and subjects, as in (Dreamers of the Ghetto* (1898), with its semi-historical pictures of Heine, Spinoza, Uriel (Gabriel) Acosta and others. He lectured in Great Britain, Ireland,

Palestine, Holland and the United States, and, as a prominent Zionist, gave addresses in con¬ nection with that movement and the applica¬ tion to it of the Baron de Hirsch millions; and is president of the Jewish International Territo¬ rial Association. His literary work is in a style of much distinction, with frequent touches of irony. Besides the works already mentioned he is author of (Children of the Ghetto) (1892) ; (Ghetto Tragedies) (1893) ; (They That Walk in Darkness) (1899) ; (The Mantle of Elijah) (1900); (The Grey Wig> (1903); <The Celi¬ bates' Club* (1904) ; (Blind Children,* verses (1903) ; (Ghetto Comedies *(1907) ; (Italian Fantasies* (1910) ; (The War for the World) (1916) ; (The Principle of Nationalities> (1917) ; (Chosen Peoples> (1918), *etc.* The play which he constructed (under the same title) from his (Merely Mary Ann* (1893), was more successful (1904) than the dramatization (1899) of ˆChildren of the Ghetto) or the one-act (The Moment of Death* (1900). (Six Persons) (1892) was well received in England and later plays include (The War God) (1911); (Plaster Saints) (1914) ; (Too Much Money-* (1918), *etc.*

ZANGWILL, Louis, English author, brother of I. Zangwill (q.v.) : b. Bristol, 25 July 1869. At first a journalist he later took up literature as a profession, using for a while the pseudo¬ nym !<(ZZ.® He has published (A Drama in Dutch> (1894) ; (The World and a Man> (1896) ; (The Beautiful Miss Brooke* (1897) ; (A 19th Century Miracle) (1897) ; (One's Womankind) (1902); (An Engagement of Convenience> (1908), *etc.*

ZANKOFF, zan'kof, Dragan, Bulgarian politician : b. Sistova, 1827 ; d. Sofia, 24 March 1911. He studied at the universities of Odessa, Kiev and Vienna, and entering the service of Turkey, became secretary to the Pasha of Rust-chuk, Bulgaria. In 1880 he was made Premier of

Bulgaria and Minister of Foreign Affairs by Prince Alexander, and again held the post of Premier 1883-84. Later he became the enemy of Alexander and the head of the pro-Russian party. On the night of 20 Aug. 1886 Zankoff with a party of fellow-revolutionists broke in Prince Alexander's palace and forced him to resign. Zankoff then became a member of the provisional government. Upon the restoration of the prince he was banished, but was subse¬ quently permitted to return. He again, became the leader of the Russophile party and in 1902-03 he was president of the Sobranje.

ZANOTTI, dza-not'te, or CAVAZZONI ZANOTTI, Giovanni Pietro, jo-van'ne pe-a'- tro, Italian artist: b. Paris, 1674; d. Cortona, 1765. He was a pupil of Lorenzo Pasinelli at Bologna, and became a good designer and colorist, and) an adept in chiaroscuro. For churches at Bologna he executed several altarpieces, among the chief that of (The Incre¬ dulity of Saint Thomas) in the church of that saint. There i9 also in the Palazzo Pubblico a large picture by him of (The Ambassadors of Rome Swearing Fidelity to the Bolognese. *At Cortona, where he long resided, he distinguished himself by such pictures for churches as (Christ Appearing to Mary Magdalene* and (Christ Carrying His Cross.* He was a careful writer on art, the most important of his works being

the (Storia dell' Accademia Clementina di Bologna> (2 vols., 1739).

ZANTE, zan'te, Greece (anc. Zacynthus), one of the Ionian Islands, in the Mediterranean, between eight and 10 miles south of Cepha-lonia and 15 miles from the nearest point of Greece. It is about 24 miles long, 12 miles broad, and 60 miles in circuit ; area, 277 square miles. It has the form of an irregular oblong, indented with a deep bay at its southeast ex¬ tremity. The western half is hilly, rising to 2,500 feet, and the west coast exhibits limestone cliffs. The east coast has a harbor, within which is situated the town of Zante (pop. about 13,501), a thriving and well-built place, the see of a Greek protopapas, and of a Roman Catholic bishop. Part of the island consists of an extensive fertile plain, having the appear¬ ance of one continuous vineyard, with a few parcels under cereals or pasture. The pre¬ vailing rocks are calcareous; gypsum appears in various parts, and its pitch-wells are famous. Earthquakes frequently occur. The staple ex¬ port of Zante is the dried <(currant® of com¬ merce, the fruit of a dwarf grape. The other chief exports are oil, soap and a little wine; pomegranates, melons, peaches, oranges, cit¬ rons and other fruits are also grown, but the corn raised scarcely supplies three

months' consumption. Goats are the only livestock. The island forms a monarchy of the kingdom of Greece since 1864; it is mentioned by Homer, and was formerly an independent state which successively came under Macedonian, Roman, and finally Greek rule. Pop. 42,502.

ZANTHOXYLUM, a genus of the family Rutacecz, composed of erect or climbing shrubs or trees, often with prickly branches. The leaves are compound, pinnate, sometimes re¬ duced to three, or rarely, to one, leaflet, usually pellucid-dotted. The flowers are small, in axil¬ lary or terminal panicles, and are from three-to five-parted. The fruits split in two, with one or two shining black seeds. Zanthoxylum is a large genus, found in both the Eastern and Western hemispheres, especially in their warmer parts. The species are so aromatic and pun¬ gent that in the countries where they exist they are popularly called peppers, specially Z. pipcri-tum, called Japan pepper, which is regarded as an antidote for poison. Z. rhetsa, an Indian species, has small yellow flowers and small round berries, which, when unripe, . taste like the skin of a fresh orange. Its fruit, and the seeds and bark of Z. alatum, which grows near the base of the Himalayas, and those of Z. budrunga, also Indian, are given as aromatic tonics in fever, diarrhoea, dysentery and cholera. They are used as a condiment in India and as a fish-poison. The small branches are employed to make walking-sticks, and the twigs as toothbrushes. The seeds of the latter are as fragrant as lemon peel. Z. clava-herculis and Z. americanum applied externally to the gums or taken internally, are powerful sudorifics and diaphoretics used in toothache, paralysis of the muscles of the mouth and rheumatism. The root of Z. nitidum is sudorific, emmenagogue, *etc.* The powdered bark of Z. hiemale is given in Brazil in earache; and the capsules and seeds of Z. hastile are employed in northern India to intoxicate fish. The West Indian species of

Zanthoxylum is called yellow-wood, Z. cari-b<eum being differentiated as the prickly yel¬ low-wood. It is a tree, 20 to 50 feet high, whose prickly young stems are made into walk¬ ing-sticks. The wood is used for inlaying and for furniture. Z. cribrosum is the satin-

wood of the West Indies, which when first cut has the odor of the veritable satin-wood. Z. fagara is a small tree common in the same region, and tropical America, producing a hard, heavy, red¬ dish-brown wood known as savin or iron-wood or as the wild-lime. Still another species is Z. emarginatum , a shrub with coriaceous foli¬ age, exported under the name of rose-wood, but called licca-tree or lignumvorum at home. The commonest species of the northern United States and the hardiest is Z. americanum, a shrub or small tree, with odd-pinnate leaves, and twigs which are generally prickly. The cymose flowers are axillary and sessile, without calyx, and they are greenish-white. The cap¬ sules are black and ellipsoidal. It is called prickly-ash or toothache-tree, because both In¬ dians and country people used the hot, acrid bark of both this species and Z. clavalier cutis, which when chewed produces a stinging sensa¬ tion, for aching teeth. The bark of both these species, and the capsules of the latter, are a powerful stimulant and tonic drug. The south¬ ern prickly ash, Z. clava-herculis, the sea-ash, or pepper-wood, has its flowers in large ter¬ minal compound cymes, and its prickles are supported on corky cushions.

ZANZALIANS. See Jacobites.

ZANZIBAR, zan-zi-bar', East Africa, (1) A sultanate comprising the whole coast between Magdishu (Magadoxo), about lat. 2° N., and Cape Delgado, lat. 10° 42' S., with the four islands of Zanzibar, Pemba, Lamu and Mafia. The continental part of the sultanate in 1890 was divided between British East Africa and German East Africa; while the island and town of Zanzibar, and the island of Pemba became a British protectorate; in the course of the European War the German territory was taken by the Allies late in 1917. Joint area, 1,020 square miles; pop. est. 250,000. (2) The

island of Zanzibar, with an area of 640 square miles, is 47 miles long and 20 miles wide. It is partly of coralline formation. Its forests have disappeared but its flora is abundant and of great variety. Its fauna is chiefly con¬ tinental. The island is very fertile and well cultivated, being especially suited for the cul¬ tivation of cloves, sugar, coffee, cocoa and vari¬ ous spices, of which there is a considerable ex¬ port. There are more than 60,000 acres planted to cloves, and there are extensive plantations of rubber and chile. Copra also is an impor¬ tant export. Roads are excellent and an Amer¬ ican railway traverses the island. The aboli¬ tion of slavery was accomplished gradually, be¬ ginning in 1897, when it was decreed that no child could be born a slave, and provision for slaves obtaining freedom was made. The proc¬ ess was completed in 1908 and was notably successful in its

avoidance of upsetting eco¬ nomic conditions or offending the Moslems. The heterogeneous population estimated at 176,- 000 includes Europeans, Arabs, half-caste Por¬ tuguese from the Malabar Coast of India, and the Suahilis from the mainland. (3) Zanzibar, the chief town (pop. 55,750) on the west side

of the island, is the centre of trade for the eastern seaboard of Africa, and of missionary and exploring work for the interior. The city is connected with all parts of the world by cables and is a regular port of call for steam¬ ships plying between India and Europe. Direct steamship communication was established with London in 1910. The commerce of the islands is largely in the hands of East Indians, of whom there are about 10,000; while the Arabs, also numbering about 10,000, are the principal landlords. European residents number less than 300. Both its exports and imports amount to more than £1,000,000 annually. The govern¬ ment is practically British.

ZAPATA, Emiliano, Mexican agitator and revolutionary leader: b. state of Morelos, about 1869. He became known as a political agitator during the Diaz regime and was banished to Quintana Roo, but he later returned to his native state. In 1910, at the time of the Madero in¬ surrection, Zapata fought independently against Diaz, in the hope of personally setting up a government. He formulated a scheme for an agrarian reform known as the Plan of Ayala, and when it was refused by the new leaders in Mexico he fought in turn against Madero, Huerta and Carranza. He was in possession of the capital for short periods in March and April 1915, and subsequently, in command of an army of about 10,000 men, he conducted a harrying warfare in the neighborhood with the purpose of establishing a government of which he would be the head.

ZAPOLYA, za'pol'yo, John, king of Hun¬ gary: b. about 1487; d. 1540. After the death of Louis II at Mohacs (1526) he was elected king of Hungary by the National party, having previously been voivode, or prince, of Transyl¬ vania. The crown was contested by Ferdinand of Austria, who was at first so successful as to compel Zapolya to flee to Poland. But the latter, with Turkish assistance, by 1529 had subdued a great part of Hungary, together with the capital city of Buda, as well as Transyl¬ vania. The kingdom was divided between Za¬ polya and Ferdinand in 1538 by the treaty of Grosswardein.

ZAPPI, Giovanni Bastista Felice, jo-van'ne ba-tes'ta fa-le'cha zap'pe, Italian poet : b. Imola, 18 March 1667 ; d. Rome, 30 Aug. 1719. after

a legal training at Bologna, he went to Rome, where he gained a brilliant reputation as jurisconsult and poet. He assisted in estab¬ lishing the Academy of Arcadians, in which he held the name Tirsi Leucasio. His verse abounds in fantastic adornments. A collection of it appeared in 1776, and it has been other¬ wise published, both separately and in asso¬ ciation with that of his Arcadian colleagues. He received the patronage of Pope Clement XI.

ZARA, za'ra (Ital. dza rd), Dalmatia, a sea¬ port town, capital of the district, oln a promontory, which was converted into an island by cutting through the narrow isthmus which formerly connected it with the mainland, 70 miles north¬ west of Spalatro. It was a fortress till 1873, and still has four gates and mediaeval ramparts, the latter now converted into a public prom¬ enade. It has steep and narrow streets; sev¬ eral squares ; a fine Roman triumphal arch ; an

interesting cathedral, in the Lombard style, dating from the 13th century; several other churches ; a townhouse ; a lyceum, gymnasium, archiepiscopal seminary, normal and other schools ; a civil and a military hospital ; and a capacious but somewhat shallow harbor, ad¬ mitting warships of medium size. It has manufactures of roisogliq, maraschino,, and glass, and a considerable coasting trade. Zara has stood many sieges, particularly one in 1202, when it was taken by the Venetian doge Dandolo, with the assistance of the French crusaders ; and another in 1346, when it was taken by Marino Faliero in the face of a large Hungarian army. It was under Venetian con¬ trol from 1409 and passed into Austrian pos¬ session in 1797. It was under French rule in 1805-13. Pop. 36,600.

ZARATE, thar-a'ta, Antonio Gil y, Span¬ ish dramatic poet: b. San Lorenzo de l'Escu-rial, Spain, 1795; d. 1860. He was educated in Paris ; and on his return to Spain became professor of physics in Granda. He after¬ ward wrote dramas notable for striking situ¬ ations, lively dialogue and elegant versification; among them are (Blanca de Bourbon* (1835) ; (Guzman il Bravo* ; (E1 Czar Demetrius.* He also published a history of Spanish literature and other prose and poetic

work including good literary criticism.

ZARATE, Augustin de, Spanish historian : b. about 1492 ; d. Madrid, about 1560. After holding for 15 years the office of comptrol¬ ler of Castile he accompanied Nunez Vela, viceroy of Peru, to South America in 1543, and while there was not only an eyewitness of many historical events of importance, but made a close study of Peru and its annals. On the fall of Gonzalo Pizarro he returned to Spain and in 1555 published <Historia del descubrimento y conquista de la provincia del Peru* (History of the Discovery and Con¬ quest of the Province of Peru). There have been many later editions of this most valuable work, and it has been translated into French, English, German, Portuguese and Italian.

ZARATHUSHTRA, za-ra-thoosh'tra, the name by which Zoroaster is known in the <Avesta.) See Zoroaster.

ZARATITE, an emerald-green incrustation usually on chromite. It is a hydrous basic carbonate of nickel. Its best known locality is at Texas, Pa. It is often called <(emerald

nickel.®

ZAREEBA, the general name of all the African striped species of the horse family. See Zeriba.

ZARITZIN, Russia. See Tsaritsyn.

ZARLINO, tzar-le'no-, Giuseppe, Italian composer: b. Chioggia, near Venice, 1517, d. Venice 14 Feb. 1590. He became a Francis¬ can in 1537 and in 1541 went to Venice to study music with Willaert. In 1565 he was appointed choir master of Saint Marks Ven¬ ice and continued in that position till his death He was especially famous for the music he composed to be performed on the occasion of the victory of Lepanto. He de¬ termined the relations of the tones and semi¬ tones more precisely than had previously been done, and on this subject wrote Hnstituziom

armoniche) (1562—73). Other works of his are (Dimostrazioni harmoniche (1571) ; ˆop-plementi musicali* (1588). Among his musi¬ cal compositions may be named (Modula-tiones) (1566) ; (Lectiones pro Mortuis*

(1563).

ZARNCKE, tsarn'ke, Friedrich, German scholar : b. Zahrenstorf, near Briiel, Mecklenburg-Schwerin, 7 July 1825 ; d. Leipzig, 15 Oct. 1891. After study at Rostock, Leipzig and Berlin, he founded the Litterarisches Zen-tralblatt fur Deutschland at Leipzig in 1850, and in 1858 became professor at the university there. His work in connection with mediaeval literature was of particular importance, and his chief publications were his edition of Brant's <Narrenschiff * (1854), and joint-edi¬ tion of Benecke's c Middle High German Lexicon) (1863). His valuable library was ac¬ quired by Cornell University. Among his further writings were a study of Christian Reuter (1884) and <Kurzgefasstes Verzeich-niss der Originalaufnahmen von Goethes Bild-niss> (1888).

ZARSKOJE-SELO, zar-skoT-sa'ld, Russia. See Tsarskoye-Selo.

ZASULITCH, Viera Ivanovna, Russian revolutionist: b. 1851. She was arrested for connection with a revolutionary plot in 1869, im¬ prisoned for two years and was later under police surveillance in Eastern Russia, but was freed in 1876. On 5 Feb. 1878 she shot, but did not kill, General Trepov, head of the secret police, because of his ordering the flogging of a student who had failed to salute him. She was ac¬ quitted by the jury at her trial and the verdict was favorably received. General Trepov, in deference to public opinion, was transferred to the cavalry. Later, her acquittal was annulled by the Supreme Court of Appeals, and *Mme.* Zasulitch fled to Switzerland, remaining there until the Tsar's amnesty of 1905 permitted her return to Russia. Her works were published (2 vols., 1906).

ZAUBERFLOTE, tsow'be-fle"te, Die (ftThe Magic Flute®), an opera by Mozart, first produced at Vienna in September 1791, under the direction of the composer. A French version of the opera bears the title <Les Mysteres d'Isis.*

ZAVALA, tha-va'la, Joaquin, Nicaraguan politician: b. Nicaragua, about 1839. He en¬ tered the army, became prominent in political affairs and was president of Nicaragua 1879-83. He was afterward

Minister to the United States and in 1893 headed the insurrection which secured the deposition of President Sacaza in May 1893. On 17 July of that year he was declared provisional president, but only to lose his position through another revolt a fortnight later.

ZBYLITOWSKI, zbi-li-tow'ske, Andre, Polish writer, philosopher and poet: b. Galicia, 1732; d. 1813. He was doctor of philosophy for a time at Cracow and later made extensive travels through South America and Europe. Author of (Rhythms in Polish Verse) (1763) ; <The Marshal* ; <A Beard,* *etc.*

ZBYLITOWSKI, Pierre, Polish writer and poet: b. in the palatine of Lubein 1684; d. Warsaw 1757. He was educated at the Uni-

versity of Warsaw and after leaving there traveled extensively through Europe and North America. He has published ˆorydia1* (1734) ; <Epigrams) (1735) ; (Lucie,> a poem (1739), *etc.*

ZEA, tha'a, Francisco Antonio, Colombian naturalist and statesman: b. Medellin, New Granada (Colombia), 21 Oct. 1772; d. Bath, England, 28 Nov. 1822. After study at the College of Popayan, he was connected with the botanical expeditions of Mutis, in 1795 was sent to Spain under arrest on the charge of circulating republican literature, and though acquitted in 1799 was forbidden to return to New Granada. He carried on botanical re¬ searches in Europe, but in 1815 joined Boli¬ var at Jamaica. In 1819 he was chosen vice-president of Colombia by the congress of Angostura, and in 1820 went to Europe as envoy of the Colombian republic to France and England. He has sometimes been styled the (<Franklin of Colombia.® Among his pub¬ lished works are (Memoria sobre la Quina segun los Principios de Mutis> (1800), and a (Historia de Colombia) (1821).

ZEA, ze'a. See Ceos.

ZEALAND, ze'land, or SJELLAND, Den¬ mark, the largest island of the kingdom, be¬ tween the Cattegat and the Baltic, separated from

Sweden by the Sound and from Funen by the Great Belt; it is 82 miles long by 68 miles wide and very irregular, its area being 2,636 square miles, including the two islands Moen and Samsoe, 2,793 square miles ; it is three miles from Sweden and 11 miles from Funen. It has no mountains; but the surface is finely variegated, having small hills and fields of a fertile soil, intersected by canals. It pro¬ duces large crops of corn, and has excellent pasture. Besides several other towns of con¬ siderable importance, it contains the fortress of Elsinore or Helsingor, and the capital and royal residence, Copenhagen. Pop. about

1,096,897.

ZEALAND, or ZEELAND, Netherlands,

a province bounded south by Belgium, west by the North Sea, east by North Brabant and northeast by South Holland; area, 690 square miles. The capital is Middleburg, in the island of Walcheren; principal seaport town, Flushing. The province consists of a lowlying tract of land on the frontiers of Bel¬ gium and on the southern shore of the estuary of the Schelde, and of the islands of Wal¬ cheren, North and South Beveland, Schouwen, Tholen, etc., separated from each other and from the mainland by arms of the Schelde, from which and from the North Sea it is pro¬ tected by dikes. As a whole the province is flat and fertile, producing excellent crops of the ordinary cereals, a considerable quantity of clover, rape and madder, and a superabun¬ dance of excellent fruit. The grass lands also are rich and extensive. The climate is rather moist, but comparatively healthful. Large tracts partially covered by the sea have in recent times been successfully reclaimed. Pop.

236,149.

ZEALOTS (Greek, zelotes, enthusiasts, followers and strong supporters), a sect of the Jews, composed of the more fanatical elements opposed to Roman rule. They led a revolt

against the Romans in 6 a.d., and after that frequently robbed and murdered those whom they knew to be supporters of or sympathizers with the Romans. Felix tried to suppress them by crucifying all of the sect whom he could cap¬ ture, but this only caused an increase in the

number of their acts of violence. They continu¬ ally stirred up the Jews against the Romans, and were largely influential in bringing on the Jewish War of 66-70, which resulted in the overthrow of Jerusalem.

ZEBALLOS, tha-bal'yos, or CEBALLOS, Pedro (Zeballos Cortes y Calderon), Span¬ ish general: b. Cadiz, 29 June 1715; d. Cordova, 26 Dec. 1778. Entering the army as a cavalry captain in 1738, he became a lieutenant-general in 1755 and was dispatched to Buenos Aires as governor the next year. On the outbreak of the war with Portugal and England in 1762, Zeballos besieged the Portuguese port of Colonia de Sacramento, near the entrance of the Uruguay River, forcing its surrender 2 Nov. 1762, and capturing 26 English ships in its har¬ bor. He returned to Spain in 1767 and in 1777 was made viceroy of the newly established viceroyalty of La Plata. On his way thither he wrested Santa Catharina from the Portu¬ guese and retaking Colonia de Sacramento, which had reverted to Portugal since its former capture, destroyed it. He was relieved of his duties in 1778 and returned to Spain where he died shortly after his arrival.

ZEBID, ze-bed', Arabia, a town in Yemen, on the inland route from Hodeida to Mokha, 60 miles north of the latter. It was formerly the seat of a long line of princes, and was famous for its commerce and learning. In the neigh¬ borhood are ruins of ancient cities. The popu¬ lation has dwindled to 9,000 inhabitants.

ZEBRA, the name of several animals, na¬ tives of Africa, belonging to the family of the horses. The zebra belongs to the same general type as the ass, distinguished from E quits (the horse) proper by smaller size and by having the body more or less banded black upon yellow¬ ish. The forelegs only possess the Hvarts,® seen in both fore-and hind-legs in the horses ; and the tail is < <tufted.)) The typical or moun¬ tain zebra (Equus zebra) inhabits South Africa, but it is now almost extinct. A few specimens, however, are strictly preserved in the mountain¬ ous districts of eastern Cape Colony, where, un¬ til about 1875, they abounded in herds on the plains. The body is cream-colored, its charac¬ teristic bands being deep black. The stripes are drawn at right angles to the axis of the body. The legs are striped right down to the hoof, but the under part of the body has no stripes. The neck bears a faint development of skin or dew-lap, and the mane is very short. The animal was long considered untamable, but experiments made since 1872 have shown that with proper treatment it can be made to work well in harness. Any general utilization and improvement of it, however, seems impracti¬ cable. The dauw, or Burchell's zebra (Equus burchelli), is higher and more graceful than

the true zebra and is the one commonly seen in menageries. Its stripes are narrower and some¬ what differently disposed from those of the true zebra, and extend under the belly, but are absent from the lower part of the legs. It has been

driven northward, and is now rare even in the Transvaal. Chapmann's zebra (E . chapmanni) is another variety, found from Bechuanaland north to the Sudan. Grevy's zebra (E. grevyi) is restricted to Abyssinia and Somaliland. The quagga (q.v.) is a near ally of the zebras. Con¬ sult Lydekker, (Royal Natural History) (Vol. II, London 1895) ; Tegetmeier and Sutherland, (Horses, Zebras, Mules and Mule-breeding > (London 1895).

ZEBRA PARRAKEET, an Australian or East Indian parrot. See Budgerigar.

ZEBRA-SHARK. See Tiger-sharks.

ZEBRA WOLF, an early colonial name for the wolf-like, striped, predatory marsupial of Tasmania. See Dasyure.

ZEBRA WOOD, in botany and commerce : (1) A kind of wood imported from South America, and used by cabinet makers, produced by Connarus guianensis (Omphalobium lam-berti), a large tree belonging to the natural order Connaraccce, and growing in Guiana. Its colors consist of brown on a white ground, clouded with black, and each strongly con¬ trasted, thus somewhat resembling the skin of a zebra. It is also called pigeon wood, and is used for furniture. (2) The wood of Eugenia fra~ grans, variety cuneata. It is a shrub about eight feet high, growing in Jamaica. (3) The wood of Guettarda speciosa, an evergreen tree 25 feet high, with scarlet-colored flowers, growing in the East Indies.

ZEBU, ze-boo' or tha-boo,' Philippines. See Cebu.

ZEBU. See Indian Humped Cattle.

ZEBULUN, zeb'u-lun, or ZEBULON, the 10th of Jacob's 12 sons, and the sixth and last by his wife Leah (Gen. xxx, 19-20). Of his individual history nothing is related in the Scriptures, but his name was given to one of the 12 tribes of Israel, and to a region of Palestine. At the time of the exodus from Egypt the tribe of Zebulon moved in the van, following the tribes of Judah and Issacher. The territory of the tribe lay in the fertile hilly country to the north of the plain of Jezreel, and included Nazareth. The tribe of Zebulon was inferior in importance to several of the other tribes and its tribal existence closed when Tiglath-Pileser carried its principal members, with the northern tribes, into captivity (2 Kings xv, 29).

ZECH, Frederick, American pianist and composer: b. Philadelphia, Pa., 10 May 1858. Taken to San Francisco when very young, he began to study music there and afterward stud¬ ied in Berlin, 1877-82. Since the year last named he has resided in San Francisco, where he has been conductor of the symphony orches¬ tra and has given .many piano recitals. Among his many compositions are four symphonies, four concertos for piano and orchestra, a con¬ certo for violin, one for 'cello ; two string quar¬ tettes ; three sonatas for violin and piano ; two for clarinet and piano, one sonata for 'cello and piano, one for flute and piano; several sympho¬ nic poems: (The Eve of Saint Agnes, * The Raven > ; <Lamia) after Keats, and (The Wreck of the Hesperus) after Longfellow; operas (The

Cruise of the Excelsior) and <Wakinyon,) a North American Indian Opera, sonatas and songs.

ZECHARIAH, zek-a-ri'a, the 11th in order

of the Hebrew writers known as minor prophets. Little is known of his personal his¬ tory, but he first publicly discharged his office as priest in the second year of Darius 519 b.c. He is called in his prophecy the son of Berechiah and the grandson of Iddo, but in the Book of Ezra (v, 1 ; vi, 14) he is termed ((the son of Iddo? He was priest as well as prophet and is associated with the prophet Haggai. Tradition states that Zechariah had much to do in furnish¬ ing the liturgical services of the temple, and in the Septuagint and Vulgate versions several

psalms are attributed to him. He deals in his prophecy with the same objects as occupied the mind of the prophet Haggai. His style is char¬ acterized by symbolic vision and dramatic ac¬ tion. It is distinctly Apocalyptic. This form of prophecy never predominated until after the Exile and seems to have constituted an element in the last and most powerful appeal made by the mouthpieces of Jehovah to the heart and conscience of His people.

Contents of the Prophecy. — The great por¬ tion of the Book consists of a series of. visions intended to represent grounds for national con¬ fidence and to encourage national effort. The prophecy opens with an exhortation to repent¬ ance and a warning against neglect of the prophet's word. The remainder of the book consists of two sections. The first section runs from chapters i to vi.

Ch. i, 15, contains nine symbols, mostly vis¬ ions, accompanied by their interpretations.

Ch. i, 8-17, a vision of the horses of Jeho¬ vah, which, as His messengers, report to Him; along with His reply.

Gh. i, 18-21, four horns, representing the op¬ ponents of Israel, are broken.

Ch. ii, a man with a measuring-line lays out the restored Jerusalem..

Ch. iii, Joshua, the high priest, is accused by Satan, and acquitted, and is honored with com¬ missions and revelations from Jehovah.

Ch. iv, the beautiful symbol of the golden candlestick and two olive trees, with the prac¬ tical application of encouragement to Zerubbabel.

Ch. v, 1-4, a flying roll recording a curse upon immoral actions.

Ch. v, 5-11, an ephah measure containing a woman is seen carried away to Babylon.

Ch. vi, 1-8, four chariots, each having horses of a particular color, are the four heavenly spir¬ its charged to carry out God's purposes in the earth.

Gh. vi, 9-15, the symbolical action of crowns of silver and gold being made and placed upon the head of Joshua the high-priest, who thus represents the Messiah-priest upon His throne.

The second section runs from chapters vii to xiv. In ch. vii the prophet, in answer to a question as to observance of a certain fast, re¬ plies that the true fast is justice, mercy and piety, which had been so much neglected in ear¬ lier generations. This suggests, in ch. viii, the coming Messianic time, when the city shall be populous and happy under the renewed protec¬ tion of Jehovah, and the fasts shall be joyful

feasts, attended by multitude of strangers seek¬ ing His favor.

There is so much that is matter of dispute in ch. ix-xiv, as regards their date and immediate application, that we shall have to content our¬ selves with a summary and a few general re¬ marks. The contents are largely symbolical and figurative. Ch. ix-xi, form a division by them¬ selves, . perhaps written by the Zechariah of Isa. viii, 2. It has an entirely different historical setting from that of ch.i, 8. Here we are trans¬ ported back to the 8th century b.c. Ch. ix, 1-8, refers to conquests made by Tiglath-pileser III (745-727 b.c.) . Northern Israel is still in exist¬ ence, and Assyria is still in its “pride® (x, lOff). These allusions form part of the very texture of the prophecy, and are assumed by some to be old fragments embedded in a post-Exilic work.

Ch. ix, 1-8, Syria, Phoenicia and Philistia are to be brought low. Yet a remnant of the Philistines shall be united with Judah, and both shall be under the protection of Jehovah. Ch. ix, 9-17, the Messiah shall come as the Prince of Peace to restore the dispersed of Israel, and save them from their enemies. Ch. x, the people are entreated to turn to Jehovah in their troubles, and not to diviners and images. Je¬ hovah will be the defender alike of Judah and Israel, restoring and strengthening them and bringing low their oppressors. Ch. xi an¬ nounces the shock of war which appals the rulers of Judah (ver. 1-3). The rest of the chapter is allegorical. It represents Jehovah as. rejected by His people, they being in turn rejected by Him, their true Shepherd. By an expressive figure, the brotherhood of Judah and Israel is declared to be broken. Ch. xii,

1 to xiii, 6, the nations come against Jerusalem; but Jehovah defends and saves it. The conflict is shown to be spiritual, for a spirit of grace and supplication is to be poured upon Judah and Jerusalem. Also a fountain is to be opened for the cleansing of guilt, and the idols and false prophets are to be banished. Ch. xiv — Again Jerusalem is besieged, and this time it is taken, half the people going into exile; but the residue are saved. After various figurative illustra¬ tions of the processes and results of the Mes¬ sianic reign, it is declared that the survivors among the nations shall go up to worship in Jerusalem, which shall be wholly consecrated to Jehovah.

ZECHARIAH, Book of. One of the gen¬ erally accepted results of Biblical criticism is the conclusion that Zechariah i— viii are the work of the prophet whose name they bear, but that the remainder of the book, chapters ix-xiv, was written by another author or authors. The reasons for this conclusion will be given later. The first part, chapters i — viii, will be discussed by themselves, followed by a consideration of the remaining chapters.

Zechariah the prophet is doubtless to be identified with Zechariah the priest of Nehemiah xii, 16, see also xii, 4. He was probably the son rather than the grandson of lddo, see Ezra v, 1, vi, 14, the phrase “the son j .erechiah > in Zechariah i, 1 being a later addition resulting from a confusion with Zechariah the son of Jeberechiah mentioned in Isaiah vm, 2. The evident interest of Zechariah

in the temple is in accord with his priestly descent. But his general outlook is more pro¬ phetic than priestly, as in the case of the other priest-prophets, Jeremiah and Ezekiel. Zech¬ ariah doubtless returned from the exile in the company of Zerubbabel along with his father, lddo, Nehemiah xii, 1-4.

These chapters are given precise dates, in the years 520-518 b.c. The historical circum¬ stances of that time are well known. The return from the Babylonian exile under Zerubbabel had taken place some 16 years be¬ fore. A beginning of the rebuilding of the temple had been made at that time, if the data are historical, but it is evident that little progress had been made. The people became discouraged, they were few in numbers, sur¬ rounded by enemies, with precarious conditions of existence. The attempt to rebuild the tem¬ ple was soon given up, and the people resigned themselves to a discouraged selfish life. Hag-gai began his prophetic ministry in 520, en¬ deavoring to encourage the people to rebuild the temple. His message centred about this

thought, accompanied by denunciation of the people for their sins and indifference. About two months later came the first message of Zechariah. Both prophets speak as if there had been no return from the exile in any true sense. The return announced in prediction, es¬ pecially by Deutero-Isaiah, was to be a glorious return, accompanied by signal manifestations of the power of Yahweh. Such a return had not taken place. Zechariah speaks of the people, therefore, as still in captivity, and the return as yet of the future. Zechariah continues and amplifies the work of Haggai. His specific ob¬ ject is the rebuilding of the temple, but he seeks the attainment of this end by a presenta¬ tion of the glorious future in store for the nation.

There are probably no important later ad¬ ditions in these chapters, iv, 6b-10a is prob¬ ably by Zechariah, but does not belong in its present position where it interrupts the con¬ nection. The meaning in vi, 11—13 has been obscured by textual corruption, which will be considered later.

Chap, i, 1-6 is a hortatory introduction, dated in 520. The main part of the collection consists of i, 7-vi, 15, bearing the date of 519.

I his is made up of eight visions and their in¬ terpretations, with an appendix. The interpre¬ ter is an angel, a feature original with Zecha¬ riah. The first three visions, i, 7— ii, 13, present various features in the coming return from the captivity; iii-iv, except iv, 6b-10a, deal with the two leaders of the people, Joshua the priest and Zerubbabel the Davidic prince, teach¬ ing the removal of the guilt of Joshua and of the nation and the divine favor which will attend both these leaders; v, 1-vi, 8 contain thiee visions, dealing with the purification from sin of the restored people, vi, 9-15 con¬ tains a historical appendix to the visions. This predicts, in accord with Haggai, that Zerub¬ babel is to be manifested as the Messiah, re¬ building the temple and bringing deliverance to the people, while Joshua is to be closely as¬ sociated with him. The principal place, how¬ ever, is occupied by Zerubbabel. Verse 11 doubtless originally mentioned only one crown, for Zerubbabel, this being required by the con-

text. How the verse originally read is a ques¬ tion ; perhaps the latter

part should be omitted. In verse 13 the phrase ((and he shall be a priest upon his throne® should be read ((and there shall be a priest upon his right hand,® with the Septuagint. The changes in the text as it now is were doubtless intentional, intro¬ duced later when it was seen that Zerubbabel was not the Messiah. For the interpretation here given compare verse 13 with iv, 8. Chaps, vii-viii give an account of the visit of men of Bethel to the prophet with inquiries concerning fasting, with special reference to the fast com¬ memorating the destruction of Jerusalem. The prophet answers that the future will be a time of joy and rejoicing rather than of fasting and sadness.

The thought of Zechariah shows much simi¬ larity to that of the earlier prophets, with which he is evidently familiar, and his phraseology also shows the impress of their influence. He demands faithfulness to Yahweh and the ob¬ servance of ethical standards, in accord with the highest teaching of the pre-exilic prophets.

The activity of angels is specially prominent in these messages of Zechariah. The super¬ human adversary, Satan, also appears here for the first time, iii, 1-2.

There are practically no resemblances be¬ tween chapters ix-xiv and i-viii, while there are many differences. The first chapters, those of Zechariah, are precisely dated, the second part has no dates ; the first part has visions, the second not; the first part makes the temple especially prominent, it is hardly alluded to in the second part; the first part reflects the Persian period, the second part has no certain references to it; and the peaceful outlook of the first part has become warlike in the second part, and is characterized, in cer¬ tain portions, by a bitterness of feeling toward other nations hardly paralleled elsewhere, see ix, Iff, 13ff, xii, Iff, *etc.* The nations men¬ tioned are not those of > the Persian period, Hadrach and Damascus, ix, 1, Hamath, ix, 2, Greece, if the text is correct, ix, 13, and Assyria and Egypt, x, 10. The Messianic picture of the second part, ix, 9-10, is the ordinary one of a Messianic king of the future, his reign in this case to be preceded by the destruction of enemy nations, in contrast with Zechariah's concep¬ tion of Zerubbabel, the prince already present, as the Messianic king, himself bringing de¬ liverance.

The question to what period chapters ix-xiv belong has been much disputed, which is also true of the further question whether they are the work of one author, or of more than one.

The following features are claimed to be references to a pre-exilic situation. The north¬ ern kingdom, it is said, is still in existence, ix,

10, 13; xi, 14; Egypt and Assyria are contem¬ porary nations of the writer, x, lOf ; idolatrous conditions, 10, If, are thought to indicate this period ; and the nations mentioned with threats, ix 1-7, are said to be those of this time, see Amos i, 3-10. The pre-exilic date usually as¬ signed is about the time of Amos.

There is a growing tendency, however, to assign these chapters to the time after the exile, and usually to the Greek period. Little dependence can be placed on the mention of the Greeks as a present power, ix, 13, for there

is considerable reason to think that these words may be an addition. The nations which are here denounced were prominent during the time of conflict between the Seleucidae of Syria and the Ptolemies of Egypt. Egypt and Assyria, on this view, designate the Ptolemies and the Seleucidae; such a usage probably has parallels elsewhere, as in Micah v, 5f, which at least uses the term Assyria after Assyria had passed away. These chapters contain evident allusions to the captivity, ix, Ilf, x, 6-9. There is no reference to a Davidic king as reigning in Jerusalem, the Davidic family being like the other noble families, xii, 7, 12ff. The general character of the message is not like that of pre-exilic prophecy, it has characteristics which are usually called apocalyptic, found in Ezekiel xxxviii-xxxix, Joel iii, Isaiah xxiv-xxvii, *etc.* These characteristics are partly vagueness and obscurity; in part the form of presentation of the future, the nations are to attack Israel and Yahweh is to destroy them ; and especially the great extravagance of representation, found particularly in chapter xiv. The priestly tone, manifesting itself in the great emphasis upon the externals of worship and upon holi¬ ness, is also a mark of the later time.

The inconclusiveness of some of the argu¬ ments given above for a pre-exilic date has al¬ ready been noted1. Further, the mention of the northern kingdom is not out of harmony with the pos'texilic period, for a return of Ephraim along with Judah was a part of the prophetic expectation, see Ezekiel xxxvii, 16ff. Idolatry is not unknown after the exile, contrary to the view often maintained, see Malachi iii, 5.

The indications which have been mentioned point to the Greek period for chapters ix-xiv. There are many obscurities in these chapters, so that the interpretation is not always cer¬ tain. But there are variations in the repre¬ sentation which make it probable that these chapters are not entirely the work of one au¬ thor, or of entirely the same period. Especially to be noted is the optimistic tone in ix, ll~xi, 3, in which

the restoration of the people from captivity under favorable national conditions is indicated. In xi, 4-17, xiii, 7-9, however, the tone is one of pessimism. Here severe oppres¬ sion by their captors has aroused intense bitter¬ ness toward them. Such oppression seems to have characterized the reign of Ptolemy Philo-pator, 222-205 b.c., after the battle of Raphia, 217 b.c. These portions, therefore, seem to have been written after 217 b.c., while the more optimistic portions are somewhat earlier under more favorable conditions. It may be that the earlier portion includes all of ix, 1— xi, 3, and the later xi, 4-xiv, 21. But it is also quite pos¬ sible that there are more than two authors. .

In the-whole of chapters ix-xiv the principal thought is the future expectation of the nation. In the first part it is a message of hope and national restoration, accompanied by punish¬ ment of the enemies. In the second part there is a note of discouragement, finding expression in bitterness against the oppressors. The destruction of these oppressors is por¬ trayed with expressions of hate in chapter xiv. The ethical teaching concerning the present-day conditions, so characteristic of the earlier prophets and of Zechariah himself, is not found here. The hope for the future of

the nation is principally in Yahweh’s manifesta¬ tion of his power against the nations, rather than in the cooperation of the nation with God.

Bibliography. — « Barnes, W. E., (Haggai and Zechariah) (Cambridge Bible, > Cambridge 1917) ; Creelman, Harlan, (An Introduction to the Old Testament (pp. 274-279), New York 1917); Driver, S. R., ‘Zechariah* ((Century Bible, > Edinburgh 1906) ; Mitchell, H. G., (Haggai and Zechariah) (international Criti¬ cal Commentary, > New York 1912).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

ZEDEKIAH, zed-e-ki'a, the last king of Judah of the line of David. He was the third son of Josiah and Hamutal and his name was originally Mattaniah. At 21 he was appointed by Nebuchadnezzar to succeed his nephew Je-hoiachim (whom he had carried to Babylon) as king of Judah about 579 B.C., and changed his name to Zedekiah. He reigned in Jerusalem 11 years. He took an oath of allegiance to Neb¬ uchadnezzar, which he afterward broke, and entered into a league with Egypt against him. His action in so doing was denounced by the prophet, Jeremiah, who, as well as Ezekiel, then in Chaldaea, predicted the approaching fall of Jerusalem. Jerusalem was besieged by Nebu¬ chadnezzar and taken in 588 b.c., after a siege of a year and a half, the temple and city de¬ stroyed, and the leaders of the Jews carried captive. Zedekiah, whose sons were killed in his presence, had his eyes put out, and was carried in fetters of brass to Babylon, where he died, but the time of his death is unknown. His his¬ tory is recorded in the books of Kings and Chronicles, and more fully in Jeremiah.

ZEDLITZ, tsed'lits, Josef Christian, Baron von, Austrian poet: b. Johannisberg, Austrian Silesia, 28 Feb. 1790; d. Vienna, 16 March 1862. He served in the Austrian army at the battles of Regensburg, Aspern and Wagram, and after¬ ward entered the service of the Austrian for¬ eign-office. His dramas, (Der Stern von Se-villa* (1830); (Kerker und Krone > (1834), etc., were long popular, but he is best known by his pleasing lyrics and ballads, 'Totenkranz,* a collection of elegies (1827) ; (Gedichte) (1832) ; (Soldatenbuchlein) (1848). He translated into German Byron's (Childe Harold> (1836).

ZEDLITZ, Karl Abraham, Baron von, Prussian statesman: b. Landshut, Silesia, 4 Jan. 1731; d. Kapsdorf, Silesia. 18 March 1793. He was appointed Minister of Justice in 1770, and was placed at the head of the department of ecclesiastical affairs and public instruction in the next year. He did much to uphold the lib¬ erty of the press and was a leader in the matter of prison reform. He resigned office in 1789.

ZEDOARY, certain species of Curcuma, natives of India, China, etc., whose rootstocks are aromatic, bitter, pungent and tonic, and are used for similar purposes with ginger, although less effective. The round zedoary is the product of C. zedoaria, having palmate rootstocks, straw-colored within, which are used like tur¬ meric for dyeing. Long zedoary, produced by the same species, has long palmate rootstocks, yellow within. Zedoary is a powerful sudorific

and is employed in the Orient in alterative medicines and for incense.

ZEEHAN, ze'han, Tasmania, a mining township on the west coast near the base of Mount Zeehan, from which it takes its name, and 29 miles from the port of Strahan on Macquarie Harbor. The township owes its ex¬ istence to the discovery in 1884 of rich silver-lead ore in great abundance, extending over an area of more than 160 square miles. Pop. 5,014.

ZEELAND, za'lant, Netherlands. See Zea¬ land.

ZEEMAN, Pieter, Dutch physicist: b. Zon-nemaire, Zeeland, 1865. He was educated at the University of Leyden, and was later as¬ sistant and lecturer there. From 1900 he was professor of physics at the University of Am¬ sterdam. He discovered in 1896 the phenome¬ non in light now known as the Zeeman Effect, for which achievement he was awarded the Baumgartner prize at Vienna ; the Wilde prize at Paris, and one-half of the Nobel prize in physics in 1902. He wrote (Messungen iieber das kerrsche Magneto-optische Phanomen) (1893) ; 'Experimentaluntersuchungen fiber Teile die kleiner als Atome Sind} (1900) ; Re¬ searches in Magneto Optics) (1913), *etc.*

ZEEMAN, Remigius, Dutch marine painter: b. Amsterdam, about 1609; d. there, after 1673. His real name was Nooms, but he received the name of Zeeman from painting marine subjects. There are a number of his works in the royal palaces at Berlin, where he resided for a num¬ ber of years and was painter to the Elector Frederick William. He also produced several etchings of more than ordinary merit, among them three of naval battles between the English, French and Dutch, which occurred in 1673. Among his paintings are (Sea-fight near Leg¬ horn, 14 March 1653 } (Amsterdam Museum) ; 'Seashore with Boats) (Berlin Museum), the very fine 'View of the Old Louvre from the South Bank of the Seine) (Louvre), *etc.*

ZEEMAN EFFECT, a phenomenon highly important in connection with theoretical physics, discovered in 1897 by Dr. Pieter Zeeman, of the University of Amsterdam. It consists in the doubling (or further multiplication) of the lines of the spectrum of a substance, when the source of the light under examination is placed in a powerful magnetic field. (See Spectroscopy). The results that are obtained under varying conditions are too complicated to admit of full discussion in the present place. In general, however, it may be said that when the ray of light under examination travels in a direction parallel to the lines of force in the magnetic field, each line of its spectrum is separated into two lines, which are collectively known as a "magnetic doublet. The

two components of such a magnetic doublet have (in general) the same intensity, and they are circularly polarized in opposite directions. Previous to Dr. Zee¬ man's discovery, no source of light was known, the rays from which were completely polarized, either circularly or otherwise. In order to ob¬ serve the Zeeman effect properly, it is essential for the magnetic field to be both intense and uniform, and for the spectroscope to have a high resolving power. An idea of the order of magnitude of the phenomenon may be had

from the following fact: In a magnetic field whose intensity is 10,000 C. G. S. units, each of the two well-known D lines of sodium is re¬ solved into a doublet, and the separation of the constituents of either of these doublets is ap¬ proximately equal to one-twelfth of the distance between the original D lines.

When a ray of light originating in a mag¬ netic field leaves that field in a direction per¬ pendicular to the lines of magnetic force, the phenomena that are observed are much more complicated. The lines of the spectrum are often observed to be triple, and not infrequently they are quadrupled, or even more complex. In all cases, however, each constituent of the modi¬ fied line is completely polarized ; but the polari¬ zation, instead of being circular as before, . is new plane. The several constituents into which each primitive line is resolved may, in fact, be divided into two groups, one of which is polar¬ ized in a plane parallel to the lines of magnetic force, while the other is polarized in a plane perpendicular to those lines.

It will be observed that the Zeeman effect is due, apparently, to the influence of the mag¬ netic field upon the ultimate molecular mechan¬ ism which is concerned in the very genesis of the light-ray; and herein lies its great theoretical importance. The ordinary theories of light treat of the propagation of luminous waves through the ether and through matter, after those waves have left their source; and little is known of the way in which a light-wave origi¬ nates, at the atom which presumably gives it birth. The phenomenon discovered by Dr. Zee-man enables us to trace the consequences of modifying, by direct

experimental means, the ultimate conditions that prevail at the very source of the light; and for this reason it is likely to lead to results of the highest import¬ ance with respect to the structure of matter and the nature of the ether and its motions. At the present day, physicists believe that the atoms which constitute matter are themselves com¬ posed of far smaller particles called ˆelectrons** (q.v.), the electron, or ultimate unit in the structure of matter, being of the nature of a tiny disembodied charge of electricity. Light is believed to be due to the motions of these electrons within the atoms; and the Zeeman ef¬ fect is believed to be due to the influence of the magnetic field upon the motion of the electrons. (See Light; Ether; Electron Theory; Spec¬ troscopy). For* a good account of the main facts, consult Cotton, (Le phenomene de Zee-man) (Paris 1900). Consult also Lewis, E. P., < Effect of a Magnetic Field on Radiation > (Scientific Memoir Series, 5 Vol. VIII, New York 1903) ; Zeeman, Pieter, ˆResearches m Magneto optics) (London 1913). Reference should also be made to current scientific period¬ icals, because the subiect is being intently studied, and data in connection with it are being rapidly accumulated.

Allan D. Risteen.

ZEGEDIN, Stephen de, Hungarian Protes¬ tant theologian: b. Zegedin, 1505; d. Revm, Hungary, 2 May 1572. He studied under Luther and Melanchthon at Wittemberg, and taught and preached afterward throughout the cities of Hungary; was taken prisoner by the Turks who treated him with severe cruelty. Among his works were (Speculum Roman

Pontificum HistoricunP (1602) ; (Assertio de Trinitate) (1573) ; (Tabulae Analyticse in Pro-phetas. Psalmos, et Novum TestamentunP

(1592).

ZEGEDIN, SZEGEDIN, or SZEGED,

Hungary, city in Csongrad, near confluence of the rivers Maros and Theiss, 100 miles south¬ east of Budapest and an important railroad junction. It is the second largest town in Hungary and has been practically rebuilt since the inundation caused by the rising of the Theiss nearly destroyed it 11 March 1879. It has fine buildings and handsome squares and boulevards. A dam protects the town from the river. It manufactures paprika, soap, . woolens, leather and toys. Being

located adjacent to two navigable rivers, it controls the commerce of a large surrounding district. It was an imperial city from the 15th century and was held by the Turks in 1541-1686. Pop. 118,328.

ZEGERS, za'gers, or SEGHERS, Her¬ cules, Dutch landscape painter: b. about 1589; d. about 1645. He was an artist and engraver of great merit, but notwithstanding the general excellence of his works he found great difficulty in disposing of them, and, becoming discour¬ aged, fell into habits of intemperance. After his death his works sold for very high prices.

ZEGERS, Tacite Nicolas, Flemish theolo¬ gian: b. Brussels, in the latter part of the 15th century; d. there, 1559. He entered the Fran¬ ciscan order and in 1536—48 he was professor of theology at Louvain. His works are of high value and he was considered one of the greatest critics of his time. He prepared many volumes of criticisms on the New Testament besides a Latin edition <Testamentum justa veterem ecclesiae editionenP (1559).

ZEILA, za la, ZAYLAH, or SELA, North¬ east Africa, a seaport of the British Somali Coast Protectorate, on the Gulf of Aden, 25 miles southeast of Jibutil, the port of French Somaliland. Its former commercial importance as the terminus of caravan routes from Harar and Shoa in Abyssinia has diminished since the construction of a railroad from Jibutil to Harar. Pop. 15,000.

ZEILER, tsl'ler, or ZEILLER, Martin,

German geographer: b. Styria 1589; d. 6 Oct. 1661. He was one of the foremost authorities of his time, and a voluminous writer on various subjects. He wrote the text for many of the long series of works entitled (Topographia) published by Matthew Merian, who himself en¬ graved the copper plates.

ZEISBERGER, tsis'berg-er, David, Ameri¬ can Moravian missionary among the Indians: b. Zanchtenthal, Moravia, 11 April 1721 ; d. Goshen, Ohio, 17 Nov. 1808. Educated in Saxony, he emigrated to Georgia in 1738 and in 1740 went to Pennsylvania, where he was one of the founders of the towns of Bethlehem and Nazareth. In 1743 he became a missionary to the Indians, and labored until the breaking out of the Indian war in 1755 among the Dela¬ wares at Shamokin (Sunbury, Pa.), and the Iroquois at Onondaga. In the time of the Pontiac conspiracy, he assisted in ministering to. the Christian Indians for whom the governor of Pennsylvania had provided a refuge at the barracks at Philadelphia. Peace having been concluded, he led the

remnant of these Indians

to Wyalusing, on the Susquehanna, in Bradford County, Pa. In 1767 he penetrated through the wilderness to Goshgoshunk, on the Allegheny, in Venango County, and established a church among the Monseys. He removed with his flock in 1770 to the Beaver Creek, and began another station, called Friedenstadt, in what is now Lawrence County; two years later he ex¬ plored the Muskingum region, in the present State of Ohio, and laid out an Indian town, Schoenbrunn, on the Tuscarawas. After a time he was joined by all the Moravian Indians of Pennsylvania, whom the march of civilization drove westward. Two more towns were built, a number of other missionaries entered the field, and many new converts were added. In 1782 the Wyandots fell upon the settlement of the Christian Indians at Gnadenhutten and mas¬ sacred many of them. This was a death blow to the Moravian mission among the Indians. With a small remnant Zeisberger built an Indian town, in what is now the State of Michigan, but in 1786, at the head of a small band of followers, he returned to Ohio, and in the following year commenced a new settlement, which he called New Salem, in Huron County. In 1791 the hostility of other Indians obliged them to emi¬ grate to Canada, where they founded Fairfield, on the river Thames. In 1798 the United States Congress having granted to the Moravian In¬ dians the tract of land in Ohio upon which they had formerly been settled, Zeisberger returned to that country with some of his converts, and near the ruins of their once flourishing towns established a new station, to which he gave the name of Goshen. There he preached the re¬ maining 10 years of his life. His published works are a (Delaware and English Spelling Book) (1776) ; (A Collection of Hymns in Delaware> (1803) ; (Sermons to Children, J in Delaware (1803). In recent years have ap¬ peared his (Dictionary in German and Delaware) (1887) ; (Diary of David Zeisberger

1 781— 98 > (1888); and (Essay toward an Onon¬ daga Grammar > (1888). Consult Schweinitz, (Life and Times of David Zeisberger) (1870).

ZEISE, tsi'se, Heinrich, German poet: b. Altona, Schleswig-Holstein, 19 April 1822. He was an apothecary successively in Altona and Copenhagen, and from 1863 to his re¬ tirement in 1875 was proprietor of a chemical manufactory at Altona. He finally settled in Grossflotbek, near Altona. During an extended journey through Norway, Sweden and Den¬ mark, he familiarized himself with Scandinavian literature, and subsequently he translated the writings of Oehlenschlager, Andersen, Holst, Jorgen, Moe and others, and works of natural history by.Schouw and Oersted. Zeise's origi¬ nal verse is often careless in diction, but has generally a pleasing quality, and reaches a stirring note in his patriotic songs, many of which are among the more valuable in his col¬ lection of (Deutsche Kriegs-und Siegeslieder> (1864). Among his volumes are (Reiseblatter aus dem Norden> (1848); <Gedichte> (2d ed. 1852) ; (Neuere Gedichte) (1850) ; (Kampf-und Schwertlieder> (1849); <Kleine ; Lieder> (1871); ˆAus dem Leben und den Erinnerungen eines Nord-Deutschen Poeten) (1888); and <Natur-und Lebensbilder) (1892).

ZEISING, tsl sing, Adolf, German writer on aesthetics : b. Ballenstedt (Anhalt), 24 Sept.

1810; d. Munich, 27 April 1876. He wrote (Neue Lehre von den Proportionen des men-schlichen Korpers) (1854); (yEsthetische For-schungen) (1855) ; (Religion und WissenschafD (1873) ; and several works of fiction. For a time he held a professorship in the Bern-burg (Anhalt) gymnasium, but after 1853 de¬ voted himself to letters, residing generally in Munich.

ZEISLER, Fannie Bloomfield, American

pianist : b. Bielitz, Austria, 1865. When she was two years of age, her family emigrated to the United States and settled at Chicago, where she showed an early aptitude for the piano. Her first teacher was Bernard Ziehn of Chicago, and she studied later under Carl Wolfsohn in this country. In 1878, she went to Vienna where she studied for five years under Leschetizky, and also made her debut in 1883. In 1885 she married Sigmund Zeisler, a Chicago lawyer. Until 1893 she played in concerts in the United States; then toured Germany (1893-95), England in 1898, and re¬ turned to America for an extended tour in

that year. In 1902, she was again in Europe, tour¬ ing Germany, Austria and France. Since 1903 she has been in the United States, with the ex¬ ception of one concert tour in Europe in 1912. She is also a prominent member of literary and musical clubs in Chicago. Mrs. Zeisler's playing has met with the greatest praise. Her technique is brilliant and her interpretation is of much intellectual and emotional depth.

ZEITUN, za-toon', or ZEITAN, Asiatic Turkey, a town in the province of Aleppo, 25 miles northwest of Marash, in an iron-mining district, inhabited chiefly by Armenian Chris¬ tians. The district is fertile but mountainous. The people, distinguished by their martial spirit and their immunity from crimes of violence, are. descendants of the Armenian kingdom which existed in Cilicia from the 11th to the 14th century. A sanguinary conflict with Turk¬ ish troops soon after the Crimean War drew European attention to the community, and it was stopped by the intervention of the British and French consuls. In 1878, 1890 and 1895 they defended themselves successfully from Turkish oppression, securing favorable con¬ ditions of peace. The population suffered greatly from massacres during the European War. Pop. about 20,000.

. ZEITZ, tslts, Germany, a town in the prov¬ ince of Saxony, Prussia, on the Weisse Elster, 23 miles by rail southwest of Leipzig. A gym¬ nasium, and a library in a former Franciscan monastery are among its educational institu¬ tions. It is a busy industrial centre with man¬ ufactures of woolens, cottons, calicoes, leather, hoisery, mineral oil, sugar, pianofortes, cycles! *etc.* Pop. 37,000.

ZELA, ze'la, an ancient town of Asia Minor, in the Pontus, where Julius Caesar defeated Pharnaces, king of Pontus and son of Mithridates, and announced his victory to the Roman Senate, in the famous brief dispatch, Veni, vidi, vici — «I came, I saw, I conquered.® This battle ended the war; Pharnaces escaped into Bosporus, where he was slain by his lieutenant, Asander ; Pontus was made a Romon province, and Bosporus was given to Mithridates of Per-gamus, 47 b.c.

ZELAYA, za-la'ya, Jose Santos, Nica¬ raguan statesman: b. Managua, Nicaragua, about 1853. Educated in England, he entered the Nicaraguan army and was made a general in 1885. He became the leader of the Liberal party and united with Joaquin Zavala in the re¬ volt of April-June 1893, which resulted in the overthrow of President Sacaza. When Zavala was made provisional President Zelaya rebelled and Zavala was obliged to resign. A new con¬ stitution was then proclaimed, under which Ze¬ laya was elected President 17 Sept. 1893 and re¬ tained the office until 1911. In 1894 he in¬ vaded the Mosquito territory and in May 1895 an English force held the port of Corinto for a short time until Nicaragua agreed to pay in¬ demnity for the murder of an English subject.

ZELAYA, Mexico, a town of Guanajuato, on the Rio Grande de Santiago, 120 miles north¬ west of Mexico City. It is a cotton, soap and other manufacturing centre. The chief build¬ ings are a large and elegant cathedral and sev¬ eral convents. Pop. 32,000.

ZELENY, John, American physicist : b. Racine, Wis., 26 March 1872. He was gradu¬ ated at the University of Minnesota in 1892 and took his Ph.D. there in 1906, meantime having studied at the University of Berlin and at Cambridge University. He was pro¬ fessor of physics at the University of Minne¬ sota in 1892-1915, and has held that position al the Sheffield Scientific School, Yale University, since 1915. He is author of various papers on physics, particularly on the conduction of elec¬ tricity through gases and on kindred subjects.

ZELKONA TREE, a large elm-like tree (Zelkova crenata), native to the Orient. The timber is much prized, the heartwood when dry being exceedingly hard, capable of a fine polish and an excellent furniture wood.

ZELL, tsel, Karl, German philologist and archaeologist : b. Mannheim, Baden, 8 April 1793; d. Freiburg-im-Breisgau, Baden, 24 Jan. 1873. He studied in Heidelberg, Gottingen and Breslau, was made professor of philology at Freiburg in 1821, and, as representative of the university in the first Baden chamber in 1831-3a, secured a reorganization of the system of higher education in the grand duchy. He was made a member of the council for higher studies, with the title of ministerial councillor. From 1846 until his retirement in 1855, he was professor of archaeology at Heidelberg. His scholarship is amply shown by his studies of Aristotle and the Aristotelian philosophy. He served in the Lower Chamber of the Diet of Baden in 1848-55, and was noted for his defense of the Roman Catholic 'Church against its enemies in that body. He was president of the assemblies of the

Catholic Union in 1852 and 1853. . Among his writings are ‘Observations Criticae de Aristotele) (1817); ‘Ethica Nicomachea) (1820) ; a translation (1834) of the <Organon> ; <Bilder aus der Gegenwart> (1855); and some opuscula academica.

ZELLER, tsel’ler, Eduard, German theo¬ logian and historian of Greek philosophy: b. Kleinbottwar, Wiirtemberg, 22 Jan. 1814; d. Stuttgart, 19 March 1908. He studied at Tubingen and Berlin, and was made privatdocent at Tubingen in 1840. Though bitterly opposed by the more orthodox, he became pro¬

fessor of theology at Bern in 1847, and at Mar¬ burg in 1849. Appointed to the chair of philos¬ ophy at Heidelberg in 1862, he went to Berlin in 1872 and retired in 1895. He early forsook theology and his Hegelianism for historical work which reveals the most impartial and eclectic spirit. Among his writings the follow¬ ing are the most important: ‘Platonische

Studied (1839) ; (Die Philosophic der Griechen,* his greatest work (1844-52; last per¬ sonally revised ed. 1904) ; ‘Das Theologische System Zwinglis) (1853) ; (Die Apostelge-schichte kritisch UntersuchD (1854; English trans. 1875-76) ; ‘Vortrage und Abhandlungen) (1865; 2d ed. 1875-77-84) ; ‘Staat und Kirche> (1873) ; (David Friedrich Strauss > (1874) ;

‘Geschichte der deutschen Philosophic seit Leibnitz) (1872) ; (Friedrich der Grosse als Philosoph> (1886). His work on Greek philos¬ ophy has been translated into English under the titles (Socrates and the Socratic Schools* (1868) ; ‘Stoics, Epicureans, and Sceptics) (1870); (Plato and the Older Academy* (1876) ; ‘The Pre-Socratic Philosophy* (1881) ; <The Eclectics* (1883); ‘Aristotle* (1897).

ZELLER, zel-lar, Jules Sylvain, French historian: b. Paris, 23 April 1820; d. there, 25 July 1900. He studied in Paris and in Ger¬ many and afterward held the chair of history successively in the lycees of Rennes, Bordeaux and Strassburg, in the faculty of Aix and in the Paris Normal School. In 1863 he was made professor of history in the Ecole Poly technique, in 1874 member of the Academy of Moral and Political Sciences and in 1876-88 was inspector-general of higher education. His works in¬ clude ‘Les Empereurs Romains) (1863) ; (En-tretiens sur l’Histoire) (1865) ; ‘Pie IX et Vic¬ tor Emanuel* (1879) ; (Histoire de l’Allemagne) (1872-91) ; and ‘Histoire Resumee de

rAllemagne) (1888).

ZEMSTVO, or ZEMSKIYA UCHREJ-DERIYA (district institutions), a Russian po¬ litical body, originally designating the country people, but later used for the governments and their representative bodies, comparing with our State legislatures. The Zemstvo was first men¬ tioned by Alexander II in the imperial edict of 1859, and after years of labor in perfecting it, in January 1864, was officially recognized by him as an institution. Its original intent was the greatest possible development of local home rule, the members of the district assemblies or zemstvos being elected by three different elec¬ toral classes — the landowners, the city people and the country inhabitants — thereby introduc¬ ing for trial a sort of constitutional representa¬ tion. Before long, however, dissensions arose, the central government accusing the zemstvos of assuming too much authority, of becoming too liberal and by several edicts the orderly de¬ velopment of these districts was checked. Fi¬ nally by the edict of June 1890 the zemstvo rep¬ resentation was limited to two classes of citi¬ zens — the hereditary and personal nobility and the burghers of the cities — thus depriving the peasants entirely of their elective franchise, their representatives afterward being selected by the governors and by members of the volost assemblies. See Russia — History.

ZENANA MISSION, a mission rounded in 1852 under the auspices of the Protestant missionary societies in India, with the object

(1) of sending the Gospel to the women of In¬ dia in their own homes by means of female missionaries; (2) of alleviating their sufferings in sickness and ministering to their spiritual need; and (3) of promoting education, based on Holy Scripture, especially among women of the higher classes. See India.

ZEND, more correctly AVESTAN, an ancient Iranian language, in which the Zend-Avesta is composed. This language was first introduced to notice by Anquetil Duperron, and the accurate knowledge of it has been developed among others by Rask, Burnouf,

Bopp and Haug. It is now recognized to be a coaeval and cognate dialect with the Vedic Sanskrit. It embraces two dialects called Bactrian, in con¬ tradistinction to the ancient languages of Media and Persia, which are called the Western Ira¬ nian, while the Zend or Bactrian dialects are called the Eastern Iranian dialects. The two Zend dialects consist of an earlier and a later, analogous to the Vedic and classic Sanskrit or to the Homeric and classic Greek. The period of transition between them is perhaps from 100 toˆ 200 years. The earlier dialect is called the Gatha, from the Gathas or sacred songs which form the only remains of it ; the later is that in which the greater part of the Zend-Avesta or Zoroastrian sacred writings are found. They differ both in grammar and pronunciation, they are both highly cultivated languages and rich in inflections, but the earlier is richer in inflections and the later in compounds. The earlier is dis¬ tinguished by long vowel terminations, probably produced by transcribing the singing pronunci¬ ation of the gathas. The present alphabet is comparatively modern and is probably derived from the Syriac. There are 12 simple vowels, 14 diphthongs and 29 consonants, represented by separate characters. The roots are mostly monosyllabic, some consisting only of a single vowel, others of a vowel and consonant or a vowel between two consonants. These primitive roots are modified by articulate additions, which extend or limit their meaning after the manner of prefixes and suffixes, thus da, to make, with the addition of th, becomes dath, to place. Verbal roots undergo modifications producing three distinct forms, the causal, the desiderative and the intensive. Verbs have three voices, ac¬ tive, middle (reflective) and passive; and four moods, indicative, subjunctive, potential and imperative. _ Some of these moods are double. The tenses include one for the present, four for the past and two for the future. Nouns are formed from roots by means of suffixes. There are three genders, masculine, feminine and neuter. There are also three numbers, singular, dual and plural, with eight inflections in the first and last and five in the middle number. The forms of the declensions closely resemble those of Sanskrit; and there are many other analogies between the Gatha dialect and the Vedic Sanskrit. See Avesta; Sanskrit; Sanskrit Literature.

ZENGER, John Peter, American pub¬ lisher: b. Germany, about 1680; d. New York, 1746. He came to America about 1700 and be¬ came a printer s apprentice. He began the publication of the New York Weekly Journal,

5 Nov. 1733, an organ opposed to the governor and supported by Chief Justice Lewis Morris and other leading men. The paper was cred¬

ited with greatly influencing public opinion against the government, and Zenger was ar¬ rested 17 Nov. 1734 on a charge of publishing seditious libels. He was imprisoned for some time before his trial, at which he was defended by Andrew Hamilton, and his acquittal by the jury was regarded as the first important vic¬ tory for the freedom of the press. The ver¬ dict has been called <(the morning star of that liberty which subsequently revolutionized America.® Consult Rutherford, (John Peter Zenger* (New York 1904).

ZENITH, the vertical point of the heavens at any place, that is, the point right above a spectator's head and from which a line drawn perpendicular to the plane of the horizon would, if produced, pass through the earth's centre, supposing the earth a perfect sphere. Each point on the surface of the earth has, therefore, its corresponding zenith. The zenith distance of a heavenly body is the arc intercepted be¬ tween the body and the zenith, being the same as the coaltitude of the body.

ZENITH SECTOR, an astronomical in¬ strument consisting of a telescope swinging upon pivots and having attached to it an arc graduated into degrees and minutes. It is used for the same purpose as the mural circle, namely, to ascertain the zenith distance of the several stars.

ZENITH TELESCOPE, an instrument

used in field astronomy for the determination of latitudes, by the measurement of the dif¬ ference of meridian-zenith distance of two

A Zenith Telescope.

stars, one culminating north of the zenith, and the other at so nearly the same distance south that that difference can be measured by a filar micrometer in the field of the telescope when

the latter is revolved 180° round a vertical axis between the two culminations.

I he determination of latitude with this in¬ strument is frequently referred to as the <(American method,® because first practically employed by Captain Talcott of the United States Engineers in 1845. It is also sometimes called the ((Talcott method.® Prior to this time accurate latitudes were usually deter¬ mined by the employment of the transit in¬ strument mounted in the Prime Vertical, but this mode has been practically superseded by the present method, which is one of extreme accuracy and simplicity. It is employed for the determination of latitudes in the United States Coast and Geodetic Survey, in the larger fixed observatories, and, in fact, wher¬ ever accurate latitudes are desired. Its only drawback consists in the fact that it requires a special instrument, designed for the deter¬ mination of latitudes alone, and not available for other kinds of astronomical observation.

ZENITH TUBE, an instrument designed for very accurate determinations of latitude by observing stars which transit the meridian close to the observer's zenith, or (when the latitude is known), for determining the dec¬ linations of such stars. It consists of a rigid, immovable telescope tube so mounted as to point always to the zenith ; the plane of the telescope lens is thus horizontal. Within the tube, at a distance below the lens of slightly less than one-half of the focal length, there is a basin of mercury; the rays from a zenith star after passing through the objective are re¬ flected from the mercury surface and finally come to a focus and form the image a short distance above the lens, a hole being drilled through the centre of this to allow of their passage. The micrometer wires are adjusted a'bove the lens in this focal plane, both they and the image being reflected horizontally from a prism placed at this point into the eye¬ pieces, of which there are two on the sides of the main tube, one to the eas-t and one to the west of it.

The great advantage possessed by the in¬ strument consists in the fact that the observer's horizon (and, therefore, his zenith) is deter¬ mined wholly by the surface of the mercury; the more usual level tubes, which always pre¬ sent irregular and annoying anomalies when employed for work of "the highest accuracy, are wholly dispensed with. Only stars which enter the fixed field of the telescope, and hence pass within a few minutes of the zenith, can, however, be observed with it.

A very large zenith tube (aperture eight inches), was installed in the Flower Observa¬ tory of the University of Pennsylvania at Phila¬ delphia in the year 1904, for the purpose of find¬ ing whether certain sudden changes of the local latitude, amounting in some cases to several feet, had a real existence, or whether they arose from undetected changes in the zenith telescope (q.v.), with which the latitudes had previously been determined. The new instru¬ ment agreed with the other in indicating oc¬ casional sudden changes in latitude, hut their cause has not yet been discovered.

ZENJUN, zen-jun', or ZINJAN, Persia, town and capital of the province of Khamseh, 190 miles northwest of Teheran, on the high¬

way to Tabriz. It has postal and telegraph service and is important commercially to the surrounding district. Its elevation is 5,180 feet. It has manufactures of carpets, woolen cloths and arms. Pop 24,000.

ZENKER, Friedrich Albert von, German physician: b. Dresden, 13 March 1825; d. Rep-pentin, Mecklenburg, 13 June 1898. He was educated at the universities of Leipzig and Heidelberg. From 1851 he was connected with the city hospital of Dresden and in 1855-62 he was also professor of pathological anatomy and general pathology at the Surgico-Medical Acad¬ emy at Dresden. He was appointed professor of pathological anatomy and pharmacology at Er¬ langen in 1862, and in 1865 he became joint editor of the Deutschen Archiv fur klinische Mcdizin. He is famous for his discovery of trichinae in 1860, concerning which he published (Ueber die Trichenenkrankheit des Menschen) (in Virchows' <Archiv,> Vol. XVIII, 1860).

ZENKOJI, zen-ko'je, Japan. See Nagano.

ZENO, ze'no>, Emperor of the East (Byzan¬ tine empire) from 474 to 491 a.d. An Isaurian by birth and named Trascalisseus he changed his name to Zeno upon his marriage to the daughter of Leo I. He commanded the im¬ perial guards and armies, and was elevated to the consulship in 469 ; procured the assassi¬ nation of Aspar, the minister of Leo, in 471, and usurped the crown on the death of Leo in 474. He was driven out of his capital by Basilicus, who was proclaimed emperor in 475, ■but regained Constantinople in 477 by buying over Harmatius, the nephew and general of Basilicus, who was deposed and died shortly afterward. In 478 a Gothic invasion was bought off ; in 479 a revolt in Constantinople was put down by corrupting the troops engaged; a sec¬ ond Gothic invasion was bought

off, and a third was repelled by purchasing the aid of an opposing party among the Goths, one of whose chieftains, afterward Theodoric the Great, was made consul in 484. Having quarreled with Theodoric, Zeno in 487, anxious to save him¬ self and his capital, proposed to him to in¬ vade Italy, and expel Odoacer and the Heruli. Among the more important events of his reign was the publication of the so-called (Heno-ticon) (482), or (Decree of Union, > intended to adjust the controversy between the Mono-physites (q.v.) and the Orthodox Church.

ZENO, dza'no, Apostolo, Italian dramatist and literary historian: b. Venice, 11 Dec. 1668; d. there, 11 Nov. 1750. He was a founder (1710) of the critical periodical Giornale de * Letterati d'ltalia, in 1718-29 was at Vienna as court-poet, and made his reputation in Italian literature by libretti for the musical drama, which in his work attained real literary rank. For many years he was the chief dramatic poet of Italy. He was also a scholar, antiquary and well-known numismatist. His collected dramas appeared in 1744. Among his further writings is the (Dissertazioni Istorico-Critiche e Lettera-rie) (1752-53). Consult the <Life) by Negri (1816) ; Fehr, M., (Apostolo Zeno und seine Reform des Operntextes) (1912).

ZENO, Nicolo and Antonio, Venetian nav¬ igators of the late 14th and early 1 5th centuries. Antonio about 1390 fitted a ship with which he sailed northward on the Atlantic. He was

wrecked on one of the Faroe islands. Here he would have been killed by the Scandinavian natives had he not been opportunely rescued by Earl Sinclair, whom Haakon VI of Norway had invested with the Orkneys and Caithness. He was made commander of the earl's small fleet, and in 1393 or 1394 sailed with three ships to Greenland, where he spent some time. He died in the Faroes about 1395. Antonio went out to the Faroes in 1391, and was in Sinclair's service for 14 years, dying at Venice in 1406. After Nicolo's death he was commander of the fleet ; and on one occasion, to verify fisher¬ men's reports of land some 1,000 miles west¬ ward, he undertook a voyage of discovery in

the Atlantic. He described his adventures in a letter, and on this letter and some others and a sailing-chart, probably made by Antonio, is based a work containing matter of some in¬ terest in connection with pre-Columbian dis¬ covery in the New World. The letters were worked into a narrative, and, with a copy of the map, appeared in book-form in 1558. The narrative says that a fisherman, returning to the Faroes after a 26 years' absence, told of a land called Estotiland, where there was much gold and forest. The people built small boats and traded with Greenland. The description of Estotiland is vague, and contains little to suggest North America. But a voyage was undertaken from Estotiland to a region south¬ ward, called Drogio. There, said the fisher¬ men, the people were cannibals. <(They have no kind of metal. They live by hunting, and carry lances of wood, sharpened at the point." Farther south, <(they have cities and temples," as well as ((some knowledge and use of gold and silver." The honesty of the Zeno narra¬ tive has been sufficiently well established; but whether or not the fisherman had the experi¬ ences he narrated in Drogio, and whether that may be identified with North America, are questions that have been much debated. The map, drawn from hearsay, and necessarily of the vaguest character, was accepted as au¬ thentic and caused trouble for mariners and geographers for more than a century. Con¬ sult Major, <The Voyages of Nicolo and An¬ tonio Zeno) (Hakluyt Society, 1873), with a translation of the narrative and a copy of the map; and Fiske, (The Discovery of America) (Vol. I, 1892).

ZENO (ze'no) (Gk.Zˆv) OF CITIUM, ancient Greek philosopher: b. Citium, island of Cyprus. He flourished in the late 4th and early 3d century b.c., and was the founder of the Stoic school of philosophy (see Stoicism). The circumstances of his life are not well known. Tradition says that after suffering shipwreck near the Peiraeus, and according to one account losing his all, while by another his wealth amounted to 1,000 talents, he settled at Athens. There he early made himself remarked for the virtues of moderation and contentment, and during his long life he so acquired the es¬ teem of the citizens that they voted him a crown of gold and a public burial in the Cera-micus. He is said to have declined the citizen¬ ship of Athens from fidelity to his native coun¬ try. He first resorted to the teaching of the Cynic Crater, and by this school his own views, especially in the earlier period of his career, were much influenced. It may seem surprising

that Zeno, who rejected both the contempt for established usages and for general knowledge which distinguished the Cynics, should have at¬ tached himself to that school, but the central point of every true

system of philosophy is its' ethics, and he was attracted to the Cynics by their doctrines of moral obligation, which he made the foundation of his own system. Con¬ trary to the advice of Crater he afterward studied under Stilpo the Megarian. Among his subsequent advisers or teachers are enumer¬ ated the Megarians, Cronus and Philon, and the Academics, Xenocrates and Polemon. Of the last two he is said to have been a pupil. He maintained a friendship with Antogonus Gona-tas, king of Macedon, of whom his disciples Persaeus and Philonides were companions. About 310 b.c. he opened his school in the TLomlri 2roa (Stoa), or <(Painted Porch." This place, which was adorned with paintings by Polygnotus, had formerly been the resort of a school of poets, who were from this circum¬ stance called Stoics, and the name was now transferred from them to the disciples of Zeno, who at first had been called Zenonians. All the works of Zeno are lost. They were nu¬ merous, and include treatises (On the State' (early and of cynical tendencies) ; (On the Ethics of Crater' ; (On Life According to Nature' ; (On Impulse' ; (On the Nature of Man' ; (On the Affections' ; (On the Becom¬ ing' (or Fitting) ; (On Law,' and (On Grecian Education' ; various treaties on physics, logic and poetry, and a work on the Pythagorean doctrine. Concerning the doctrines of Zeno, which employed very largely the ethics of the Cynic school, as well as the physics of Heracli¬ tus and Pythagoras, see Stoicism ; and consult also Zeller, Stoics, Epicureans, and Skeptics' (1870); Ueberweg, (History of Philosophy' (Eng. trans., 1887) ; and Ritter and Preller, (Historia Philosophise Grsecse' (8th ed., 1898).

ZENO OF ELEA, ancient Greek philoso¬ pher: b. Ele (Velia), Lucania, southern Italy, about 488 b.c. He was the favorite disciple of Parmendies, whose opinions he defended, and whose ethico-political schemes he shared. He appears to have lived for a considerable time in Athens, where he taught for re¬ munerations, and had distinguished pupils, as Pericles and Callias. He is said, on un¬ satisfactory evidence, to have engaged in an enterprise on behalf of his native land against the tyrant Nearchus. Whether he perished in this attempt or survived is not known. None of his writings are extant, but his opinions are referred to by Aristotle, who attempted to confute some of them, and who had distin¬ guished him as the inventor of dialectic. As a defender of the Eleatic doctrine of the unity of the existent, he was the first to lay down the problems of skepticism in regard to the real existence of the phenomenal world, and has thus exercised an important influence on philosophy. He is said to have directed four arguments against the reality of motion. These all are very similar to one another; the two most famous are those of the flying arrow and of Achilles and the tortoise. The first finds a

contradiction in the properties of the arrow, which cannot be where it is not, but is at rest if it remain where it is. That is, al-ZENO OF SIDON — ZENOS

though a body in motion is in motion through¬ out its course, if any instant of the existence of the body be considered in itself, there is no distinguishable property of the body which can be called motion. Bergson considers that the paradox, which was stated by Zeno in order to prove the specious character of motion and change, is insoluble on any view which analyzes motion into a series of states. An answer to the paradox which is more in favor among scientists follows outlines that had already been indicated by Aristotle, and depends upon the fact that the velocity or measure of motion of a body is a limit — the limit of the ratio of the distance traversed by a body, divided by the time which it takes the body to traverse the distance, as this time grows smaller and smaller. The distinction between a property of a body at an instant, and the limit of a pi operty of a body in the neighborhood of that instant, is all-essential for the explanation of the paradox. This distinction was only ren¬ dered clear in the last century by the develop¬ ment of the theories of assemblages and of the functions of a real variable, which made clear the nature of continua and of continuous functions. It will be seen, then, how incorrect is the often-repeated statement that, the para¬ doxes of Zeno were dialectical puerilities which were completely refuted by Aristotle.

The other famous paradox of Zeno is that of Achilles and the tortoise. Achilles, the swiftest of mortals, can never catch up with the tortoise, because when he reaches the tor¬ toise's former position, the animal is no longer there, so that he has to traverse an infinite number of distances to overtake it. This argument is completely dependent on a clear distinction between the measure of an interval and the number of points it contains — a dis¬ tinction whose true import has only been under¬ stood within the past 50 years. Zeno, in his arguments against motion, exhibits a truer ap¬ preciation of the nature of this process than is evinced by many moderns in their support of it.

In another argument, designed to. establish the fallacious nature of sense-perception, Zeno shows his knowledge of the existence of sen¬ sory limina (see Weber's Law). He points out the difficulty of

understanding how, if the fall of one grain of wheat makes no audible noise, the fall of a bushel can be heard. See Time; Space; Assemblages, General Theory of; Real Variable, Theory of Functions of the.

Bibliography. — Bergson, H., (Time and Free WilP (tr., London 1910) ; Burnet, J., Creek Philosophy (part i, London 1914) ; Diels, H. (Die Fragmente der VorsokratikeD (Berlin 1906-07) ; Russell, B. A. W., Princi¬ ples of Mathematics) (Cambridge 1903).

ZENO OF SIDON, Epicurean philoso¬ pher: b. about 1 50 b.c. ; d. about 80 b.c.. He was a contemporary and instructor of Cicero, who refers to him in {De Natura Deorum (i, 34), as an accurate and highly cultivated thinker, but one who was scornful of other philosophers. His works are not in existence, but a treatise by Posidonius gives a summary of his beliefs and teachings.

ZENOBIA, ze-no'bi-a, queen of Palmyra (q.v.). Her native name was Septimia Bath-zabbai', and she was instructed in the sciences

by the celebrated Longinus, and made such progress that besides her native tongue she spoke the Latin, Greek, Coptic and Syrian lan¬ guages. She also patronized learned men, and herself formed an epitome of Egyptian his¬ tory. She was married to Odenathus, king of Palmyra, accompanied him both in the war and the chase, and the success of his military ex¬ pedition against the Persians is, in a great de¬ gree, attributed to her prudence and courage. Gallienus, in return for services which tended to preserve the East to the Romans after the capture of Valerian by Sapor, king of Persia, acknowledged Odenathus as emperor, and on his death, 267 a.d., Zenobia assumed the sov¬ ereignty, under the title of Queen of the East. She preserved the provinces which had been ruled by Odenathus, and was preparing to make other conquests, when the succession of Aurelian to the purple led to a remarkable change of fortune. That martial prince/disgusted at the usurpation of the richest provinces of the East by a female, determined to make war tipon her : and having gained two battles, Antioch and Emesa, beseiged her in Palmyra, where she defended herself with great bravery. At length, finding that the city would be obliged to sur¬ render, she quitted it privately; but the emperor, having notice of her escape, caused her to be pursued with such diligence that she was over¬ taken just as she got into, a boat to cross the Euphrates, in 272. Aurelian spared her life, but made her serve to grace his triumph. The Roman soldiers demanded her life, and accord¬ ing to Zosimus she purchased her safety by sacrificing her

ministers, among whom was the distinguished scholar, Longinus. She was allowed to pass the remainder of her life as a Roman matron, and her daughters were mar¬ ried by Aurelian into families of distinction. Her only surviving son retired into Armenia, where the emperor bestowed on him a small principality. Consult Gibbon, (Decline and FalP (ed. Bury, 1896-1900) ; (Life of Aurelian > by Vopiscus in (Augustse Historise Scriptores) (Eng. trans., Bernard 1740) ; Ware, (Zenobia, or The Fall of Palmyra) (1837).

ZENOBIA, or THE FALL OF PAL¬ MYRA, a noted historical novel, by William Ware, first issued in 1837 in the Knickerbocker Magazine,' and] then entitled) (Letters from Palmyra. > It was shortly afterward published in book form, and later editions were issued from time to time for more than 50 years.

ZENOS, ze'nos, Andrew Constantinides,

American educator : b. of Greek parentage, Con¬ stantinople, Turkey, 13 Aug. 1855. He was graduated at Robert College, Constantinople, in 1872, studied theology at Princeton Seminary and was pastor of a Presbyterian church in Brandt, Pa., 1881-83. From 1883 to 1888 he was professor of Greek in Lake Forest University and of New Testament exegesis at Hartford Theological Seminary 1888-91. In 1891 he was made professor of church history in McCor¬ mick Theological Seminary in Chicago, and in 1894 was transferred to the chair of biblical theology in that institution, a position he still holds. He wrote (Elements of Higher Criti¬ cism > ; - Compendium of Church History) (1896) ; (The Teachings of Jesus Concerning Christian Conduct* (1905) ; (The Son of Man*

(1914), etc.; edited Xenophon's <Anabasis) (with F. W. Kelsey (1888), and was co-editor of (The Standard Bible Dictionary } (1909).

ZENTA, zen'to, Jugo-Slavia, a town in the county of Bacs-Bodrog, on the Theiss, 120 miles southeast of Budapest. Here, 11 Sept. 1697, the Germans under Prince Eugene of Savoy, defeated the Turks, a victory

which led to the Peace of Carlowitz, ratified January 1699. Pop. about 30,000.

ZEOLITE, a name given to a group of hydrated silicate minerals commonly found in cavities in igneous rocks, from which they are derived through secondary alteration. They in¬ clude thompsonite, natrolite, scolecite, analcite, chabazite, gmelinite, phillipsite, harmotome, stillite and heulandite. The name i,s derived from the boiling reaction before the blowpipe.

ZEPHANIAH, zef-a-ni'a, the ninth in order of the Scriptural writers known as the minor prophets. His pedigree is traced back for four generations. He is the son of Cushi, the son of Gedaliah, the son of Amariah, the son of Hezekiah and he is supposed to have been of noble, if not of royal, ancestry. His brief but pregnant prophecy was delivered just after the time of the first appearance of Jere¬ miah (626 b.c.) — that is, in the first half of the reign of Josiah. The next preceding prophet was Micah, who died in the early part of the reign of Manasseh. But the condition of the whole of western Asia, including Palestine, por¬ tended a speedy upheaval. Above all, Nineveh was beginning its memorable decline after the death of its king. . Assur-banipal (668-626 b.c.). Morally and religiously the Jewish nation had improved but little since the degeneracy that had followed the death of Hezekiah, and Josiah's reform (621 b.c.) had not yet begun, if we may judge the invectives of the prophet against idolatrous practices. Zephaniah was ap¬ parently a descendant of King Hezekiah.

The Prophet's Message.— Zephaniah spoke and wrote primarily for the correction and warning of Judah and Jerusalem, though he draws illustrations from the sins and fates of other peoples. . The culmination of these is found in the iniquities, the pride and the speedy fall of Nineveh. His prophecy extends to three chapters in the Bible. A division into four parts is as follows :

The threatening:. ch. i (1), the whole world

— that is, the Semitic world — is to undergo exemplary punishment, particularly Jerusalem and its apostates from Jehovah (ver. 1-6). (2) The classes of people who are to be thus visited

— the royal house, the nobles, the wealthy traders, the careless and defiant generally — are characterized, and their chastisement set forth in language largely figurative (ver. 7-18).

The lessons from the nations: ch. ii. God's own people are warned to

repent in time (ver. 1-3), and so avoid the doom that is about to fall upon the Philistines (ver. 4-7), Moab (ver. 8-11), Egypt, under the name of Ethiopia (ver. 12), and finally Assyria and Nineveh (ver. 131 5) .

The remonstrance: ch. iii, 1-7. Rebellious and obstinate Jerusalem is urged to repent by the righteous and reasonable God, in view of coming woes; for the lesson of the fate of other nations has so far been unheeded.

The promised redemption: ch. iii, 8-20. (1)

The faithful remnant is bidden to wait and trust. It shall survive the ruin of the nations, be joined by exiled brethren from far and near, and rest in quiet content (ver. 8-13). (2) Joy¬

ous thanksgiving is now in place, for Jehovah is in the midst of Jerusalem, to comfort and bless his people. Their reproach is taken away ; dispersion and captivity are at an end.

ZEPHANIAH, Book of. The title of the book of Zephaniah says that the prophetic message was given in the days of Josiah, king of Judah, 639-608 b.c. Since that time is appropriate for the book, the title is usually con¬ sidered to rest upon an historical basis, al¬ though other suitable times for these utter¬ ances might be found. In the title Zephaniah is said to have been the great-great-grandson of Hezekiah, by whom the king of that name is doubtless meant. This also is generally ac¬ cepted, since the book contains nothing out of harmony with the royal descent.

It is evident that the message of Zephaniah must have preceded the introduction of the Deuteronomic law in 621. This is because the conditions here reflected are such as doubtless belonged to the early part of the reign of Jo¬ siah, but were somewhat changed, perhaps only temporarily, by the Deuteronomic reform. The characteristic, features are religious syncretism, astral worship, imitation of foreign customs, and scepticism, i, 4-6, 8, 9, 12. Since the book shows no clear influence of Jeremiah it is prob¬ ably to be dated not later than the beginning of his work. That indicates a date of about 627 b.c.

The background of the book is some great invasion affecting many lands. At the time mentioned that must have been the Scythian

invasion, alluded to in Jeremiah i, as a danger from the north. The invasion cannot have come from Egypt or Assyria, since both are mentioned as affected by it, ii, 12. This Scythian invasion, it is known, affected Assyria arid ex¬ tended to the borders of Egypt, overrunning also several of the intermediate countries. It lasted for a considerable number of years, and, while its limits cannot be determined with entire certainty, the year mentioned, 627, was quite evidently near the beginning of its course.

The theme of the book is the coming of the day of Yahweh. This is probably not to be regarded as identified with the Scythian inva¬ sion, but the latter is an introductory move¬ ment indicating that it is at hand. The day of Yahweh is first mentioned by Amos, and then as a familiar idea. As here presented the de¬ struction of that day is to engulf Judah, Philistia, Moab, Ammon, Ethiopia (Egypt) and As¬ syria; but the mention of Moab and Ammon is often considered a later addition. That day, while regularly a day of world-judgment in some real sense, is here presented in unusually vivid terms as a day of universal judgment and destruction.. The judgment upon Judah has an ethical basis, a point which does not appear in the condemnation of the other nations.

Zephaniah, like Amos whom he resembles is distinctly a prophet of judgment. Most of the book gives little suggestion of mercy. At the end, however, are several verses of a dif¬ ferent tenor which, as in the parallel case in Amos, are to be regarded as a later addition.

This applies most clearly to iii, 14-20. Here is a message of restoration of the people now scattered among the nations. This belongs to the exile or, more probably, after the exile, iii, 9-10 is probably also a later addition be¬ cause its attitude toward the nations is out of harmony with most of the book. Other passages sometimes considered to be later are less cer¬ tainly so ; most prominent among these is ii, Br¬ il, which has suggestions of the exile.

While Zephaniah adds nothing of funda¬ mental importance to the

messages of the line of prophets who have preceded him, yet his utterance is characterized by a zeal for right¬ eousness and a vigor of presentation not un¬ worthy of that goodly fellowship. Historically, his testimony to the conditions in the time shortly before the reform of Josiah is of much value.

Bibliography. — Davidson, A. B., (Nahum, Habakkuk and ZephanialP (Cambridge Bible,) Cambridge 1896) ; Driver, S. R., <Zephaniah> ((Century Bible,* Edinburgh 1906); Smith, J. M. P., (The Book of Zephaniah* (interna¬ tional Critical Commentary,* New York 1911).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

ZEPHYR, a soft, cool, agreeable wind; in Greece the west, or rather west-southwest wind, typified in Greek mythology by the god of the west wind Zephyrus (q.vl). The Greek name, according to the etymology, signifies life-bring¬ ing, because at the time when this wind begins to blow, the plants are restored to life by the balmy spring air.

ZEPHYRANTHES, a genus of Liliacece, indigenous to the warmer regions of America, and most commonly represented by the atamasco lily. The species are bulbous, and are not hardy in the Northern States, but make charm¬ ing summer-blooming window and green¬ house plants, resting in the winter. The foliage is linear, springing from the bulb, and a scape, appearing at the same time, is crowned by a regular, three-parted corolla which is nearly, or quite, erect, from one to three inches across, and red,' yellow or white. Z. Candida is one of the white-flowered species, and is also one of the hardiest and thriftiest. It is a lovely, crocus-like plant, with pure-white blossoms, opening out flat in the sunshine, and evergreen foliage.

ZEPHYRUS, zef'i-rus, in Greek mythology, the god of the west-wind, a son of TEolus,. or of Astrseus and of Aurora. He was married to Chloris, goddess of fruits and flowers, their son being Carpus, god of fruit. By the harpy Podarge he was the sire of the swift horses of Achilles, Xanthos and Balios. His love being rejected by Hyacinthus, he was the cause of his death by blowing Apollo's quoit against his head. Some make him the husband of one of the Hours. Flowers and fruits are under his protection. He is represented as a gentle beauti¬ ful youth, naked, with a wreath on his head or flowers in the fold of his mantle. According to Homer he was brother to Boreas, with whom

he lived in a palace in Thrace . The Romans identified him as Favomus, and his wife, Chins, as Flora.

ZEPPELIN, tsep'pe-lln, Ferdinand, Count von, German airship builder : b. Constance, Baden, 8 July 1838; d. Charlottenburg, Prussia,

8 March 1917. His father was Count Friedrich von Zeppelin, a Wiirttemberg court official. After studies at the Stuttgart Polytechnicum, the Ludwigsburg Military Academy and the University of Tubingen, he entered on a military career and as a lieutenant was one of the Ger¬ man military observers in 1863 attached to the Army of the Potomac during the Civil War in the United States. His first ascent in a balloon made at Saint Paul, Minn., during this visit, is said to have been the incentive of his later experiments in aeronautics. He took part in the Seven Weeks' War of 1866, fighting for Wiirttemberg against Prussia, and was an offi¬ cer of cavalry in the Franco-German War 1871— 72. He rose to the rank of lieutenant-general in the German army and in 1891 at the age of 53 retired and devoted his time and wealth to experiments in connection with dirigible bal¬ loons. While increasing proofs of success en¬ couraged him to continue his efforts, a record of failures which reduced him to poverty marked his experiments for several years. Im¬ perial patronage and public subscriptions, how¬ ever, enabled him at last to conquer all diffi¬ culties, and in 1908-09 dirigibles of the type constructed with his name were making success¬ ful journeys ranging from 350 to 1,000 miles. Thirteen Zeppelins, however, had been de¬ stroyed and numerous lives sacrificed during the experiments up to 1914. During the Euro¬ pean War, Zeppelins were used mostly for raids over Belgium and England, and over 40 were reported as destroyed. Their failure as warships is said to have been a great disap¬ pointment to Count Zeppelin. ('See Aeronau¬ tics ; Dirigible). Consult Hearne, R. P., Zep¬ pelins and Suner-Zeppelins) (New York 1916).

ZERAFSHAN, zer-af-shan', Asiatic Rus¬ sia, a river rising in a valley at the junction of the Hissar and Turkestan Mountain chains, and after a westerly by north course of about 400 miles, passing the towns of Penjakent, Sa¬ markand, Katakurgan, Kerminch and Bokhara, dispersing itself in the desert sands, between Karakul and the Oxus River. A railway line traverses the valley from Karakul to near Pen-j akent.

ZERAH, (Heb. Zarach), king of Ethio¬ pia, known to the Egyptians as Azech Amen, who flourished in southern Egypt about 900 b.c. He

conquered Egypt and invaded Palestine, where he was defeated by Asa, king of Judah. Zerah then abandoned not only Palestine, but also Egypt (2 Chron. xiv).

ZERBI, or DE Z ARB IS, Gabriel, Italian physician and anatomist: b. Verona in the 1 5th century; d. there, 1505. He lectured for some time at Rome, and became professor of medi¬ cine at Padua in 1495. His chief work is Anat¬ omy of the Human Body* ((Liber Anatomise Corporis humani*), published about 1490, a work remarkable for its keen insight and deductions confirmed by later discoveries in anatomy.

ZERBONI DI SPOSETTI, Joseph, Ger¬ man philosopher: b. Breslau, 1760; d.1831. In 1796 he wrote to the governor of Silesia a letter in which he set forth the absurdity of grant¬ ing to the nobility exalted privileges through

right of birth. Knowledge of the letter reach¬ ing Frederick William III, he was imprisoned for three years on a charge of high treason. When his case was brought to trial he was freed, with no political disability, and later re¬ ceived various official appointments.

ZERBST, tserpst, Germany, a town in the State of Anhalt, on the Nuthe. a small tribu¬ tary of the Elbe, 70 miles southwest of Berlin, and 27 miles southeast of Magdeburg, on the Dessau-Leipzig Railway. The chief buildings are the great Schloss in a fine park; the 1 5th century Nikolaikirche, and the stately 15th cen¬ tury Rathhaus on the market place where are the Roland column (1445) and the Butterjungter, a slender column bearing a female figure. The chief educational institution is the Francisceum, a gymnasium of high repute. The town has manufactures of noted bitter beer, of silks, plush, cloth, leather, machinery, musical instru¬ ments, *etc.* Zerbst was founded in 1007. From 1603 to 1793 it was the capital of a principality of the same name, which in 1797 was absorbed in Anhalt-Dessau. Pop. of commune about

19,210.

ZERFFI, George Gustavus, English author : b. Hungary, 1821 ; d. Chiswick, England, 28 Jan. 1892. He edited a newspaper at Budapest, and in 1848 served as a captain in the revolu¬ tionary army. He also acted for a time as Kossuth's private secretary. On the failure of the revolution in 1849 he went to England and was naturalized, and some years later was engaged as a lecturer in the department of art at South Kensington. Throughout his career Zerffi gave much attention to the subjects of decoration and history, and wrote many works treating these themes in a comprehensive man¬ ner. He asserted that history should be studied as a whole on philosophical principles. He planned a general work on these lines entitled (Studies in the Science of General History? of which two volumes were issued, dealing with ancient and mediaeval history respectively. Among his other publications are (A Manual of the Historical Development of Art, with Special Reference to Architecture, Sculpture, Painting and Ornament* (1876); an English version of Goethe's (Faust) with critical and explanatory notes (1859) ; he also published a number of his lectures.

ZERIBA, or ZAREEBA, a temporary mili¬ tary enclosure, the sides of which are formed of prickly brush wood, sheltered by which a force may camp comparatively safe from sudden surprise. The term came into prominent use during the Anglo-Egyptian campaign of 1884. The protection is also used against wild ani¬ mals.

ZERMATT, tser-mat', or zer-mat' (for¬ merly called PRABORGNE), Switzerland, a mountain village and tourist-resort in the can¬ ton of Valais, at the foot of the Matterhorn and near the head of the Visp Valley, 22ˆ4 miles by rail southwest of Visp. It stands 5,315 feet above sea-level, having to the south the great Theodule glacier, above which tower the Breithorn on the east, and beyond the Monte Rosa group, and on the west the rocky cone of the Matterhorn. An electric mountain rail¬ way connects with the Riffelberg and the sum¬

mit of the Gornergrat (10,290 feet). The Theo¬ dule Pass or Matterjoch (10,899 feet) leads to Aosta in Italy. Its scenery compares in grand¬ eur with that of Grundewald and Chamonix. In the village churchyard are the graves of many victims of mountaineering. Pop. about

ZERO, in mathematics, the absence of magnitude; the remainder that is obtained when any quantity is subtracted from itself ; nothing, considered as a quantity; that which separates real positive quantities from real negative quan¬ tities. Zero is denoted by the symbol 0 (“cipher®), and this symbol itself is often called “zero? In the theory of functions, any value of a variable which reduces a given function of that variable to zero is called a “zero® of the given function. In infinitesimal analysis, infinitesimal quantities are sometimes called zeros. This usage is incorrect, and it leads to confusion of thought. An “infinitesimal® has an actual magnitude, and although that magni¬ tude is smaller than any quantity that can be definitely stated or assigned, the fact that it exists distinguishes the infinitesimal from zero, properly so-called.

In physical measurement, the “zero® of any scale is the starting point from which measure¬ ments on that scale are reckoned. In ther¬ mometry (q.v.) it is customary to distinguish three different kinds of zeros. These are, re¬ spectively, (1) the arbitrary zero, (2) the “natu¬ ral® zero and (3) the “absolute® zero. The arbitrary zero on such a scale is a zero that is selected arbitrarily, as a convenient point of reference ; the selection being governed by prac¬ tical considerations of convenience, or by the facility with which the point can be experimen¬ tally determined. (See Thermometer). The “natural® zero is employed chiefly in connection with the gas thermometer. In a gas thermom¬ eter in which the temperature is indicated by the expansion of a given volume of gas at con¬ stant pressure, the “natural® zero is the tem¬ perature at which the volume of the gas would just vanish, if the contraction of the gas were to follow, at very low temperatures, the law of variation with temperature that prevails be¬ tween the freezing and boiling points of water. Similarly, in a gas thermometer in which tem¬ perature is measured by the change in pressure of a mass of gas that is confined at constant volume, the “natural® zero is the temperature at which the pressure of the gas would just vanish,* if the law of variation of pressure were the same, at very low temperatures, as it is between the freezing and boiling points of water. The “natural® zeros of the various gas ther¬ mometers that are in actual use are not iden¬ tical, but their positions differ only by a few degrees, at the most.

The “absolute® zero of temperature is the temperature that a body would have, if it were absolutely deprived of heat ; and this

“absolute® zero is identically the same for all substances. It happens that the “absolute® zero has nearly the same position on the thermometer scale as the “natural® zeros of the various gas ther¬ mometers that are in use, and this fact has led to a great deal of confusion in popular and semi-scientific writings upon the subject of tempera¬ ture, the “natural® and “absolute® zeros being

very commonly confounded with one another. The “absolute® zero is slightly lower than the “natural” zero of any gas thermometer that we know of, with the possible exception of the “natural® zero of the hydrogen thermometer. There is some reason for believing that the “natural® zero of the normal hydrogen ther¬ mometer (whether at constant volume or at constant pressure) is a few hundredths of a centigrade degree lower than the true “abso¬ lute® zero. If further research bears out this opinion, then it is plain that the “natural® zero of the hydrogen thermometer can never be at¬ tained; for the “absolute® zero, being the tem¬ perature corresponding to absolute cold, is the lowest temperature that can possibly have a real existence. On the absolute centigrade scale, the temperature of the “absolute® zero is ap¬ proximately 273.10° below the freezing point of water. This estimate i,s probably in error by a few hundredths of a degree. There is no theo¬ retical reason why the position of the “abso¬ lute® zero cannot be determined to the thou¬ sandth of a degree ; but the experimental data required for such a determination are not yet available. See Thermodynamics.

ZERRAHN, Carl, American musical con¬ ductor: b. Malchow, Mecklenburg, 28 July 1826; d. Milton, Mass., 29 Dec. 1909. In 1848 he came to America as flute-player with the Ger-manica Orchestra, and six years later became director of the Handel and Haydn Society of Boston, a position he held for 42 years. He was conductor of the Harvard Symphony con¬ certs 1861-82, and for several years was a suc¬ cessful director of famous musical festivals throughout New England, among them being those at Worcester, Mass., which he conducted in 1866-97. He retired in 1898.

ZERUBBABEL, ze-rub'a-bel, leader of the first band of Israelitish exiles returning from Babylon. His name in the Captivity was Sheshbazzar. He was the recognized prince of Judah, son of Shealtiel, governor of Judah (Hag. i, 12, 14), and on arrival at Jerusalem, with Jcshua, the high-priest, directed the re¬ newal of public daily worship and of festival days, and in the second month of the second year of the return, the reconstruction of the Temple. This last work was stopped by their foes and revived only after 16 years, when it was again undertaken and finally completed by Zerubbabel and Jeshua.

ZETA, ze'ta, (1) the Greek equivalent of the English letter Z, and sixth in the Greek alphabet. (2) a small closet or chamber ; ap¬ plied by some authorities to the room over the porch of a Christian church, where were kept the documents of the church and also contain¬ ing quarters of the sexton.

ZETLAND ISLANDS. See Shetland.

ZEUGLODON, zu'glo-don, a gigantic fos¬ sil cetacean mammal, found in the Eocene and Miocene strata of the southern United States and Europe, so named by Owen from the yoke¬ like character displayed by a section of the molar teeth. Its remains were first discovered in 1834 in the Tertiary of Louisiana, and were supposed to belong to some reptile, to which Dr. Harlan gave the name of Basilosaurus ; but Owen showed that it was a mammal, and be¬ longed among cetaceans. A few years later a vol. 29 — 45

German collector named Koch collected great quantities of the bones and stringing them to¬ gether in some semblance of a natural skeleton, constructed a "sea-serpent,® mostly neck and tail, no less than 114 feet long, which was ex¬ hibited widely in America and Europe, and required the exertions of eminent men (for ex¬ ample, Wyman, <Proc. Boston Soc. Nat. Hist.,* November 1845) to expose as a humbug. The form was probably cetacean, though slender, elongated and more snake-like, with small an¬ terior limbs in the shape of paddles, and no hind limbs; the length about 70 feet; the skin was supplied with an armor consisting of small irregular bony plates more or less fused to¬ gether. The skull in some specimens was nearly a yard in length. It is well constructed, the blowhole in the middle of the face, and the brain-cavity. The teeth are limited in num¬ ber and disposed in three series as incisors, canines and molars ; the molars are double-rooted, and have serrated crowns. Much dis¬ cussion has occurred as to the affinities of this great sea-beast, whose characters

are so gen¬ eralized, and period of existence so early that it is now agreed to be a representative of the most primitive Cetacea, and is set apart as a family, Zeuglodontidce constituting a primitive order Archoeocceti. Consult Woodward, (Vertebrate Palaeontology* (New York 1898) ; Zittel-Eastman, (TextBook of Palseonotology) (Part HI) ; Lucas, F. A., (Animals in the Past) (1901), and (The Pelvic Girdle of the Zeuglodon> (1901).

ZEUGMA, zug'ma, the connection of one word with two words or with two clauses, to both of which it does not equally apply; so that, for one of them, another word (to be gathered from the sense of the passage) must be mentally supplied. Zeugma is, therefore, a species of ellipsis ; both abbreviate discourse. Where the word to be supplied is a form of another in the sentence, as "I love you, and you [love] mej the construction is elliptical; where the sense requires a different word, as "The sun shall not smite thee by day, nor the moon [injure thee] by night® (Ps. cxxi, 6) (Prayer Book), it is zeugma.

ZEUNERITE, a hydrous copper-uranium arsenate, Cu (U02)a As208.H20. Minute yel¬ lowish-green crystals with barite in ores of the Tintic district, Utah. A possible source of uranium.

ZEUS, zus (Greek in Greek mythol¬

ogy, the chief of the gods. He was the son of Cronus and Rhaea. According to the myth Cronus was in the habit of swallowing his children immediately after their birth. When Zeus was about to be born Rhaea consulted Uranus and Gaea as to how he might be saved, and they sent her to Crete (the Trojan Ida and other places are mentioned in other accounts) to be delivered. She concealed Zeus in a cave in Mount Ida, and gave Cronus a stone wrapped up in a cloth to swallow. The infant Zeus was tended by the nymphs Ida and Adrastea. He was supplied with milk by the goat Amalthea, and the bees gathered honey for him. When he had reached manhood, by the aid of Gaea or Metis he persuaded his father to restore to the light the children he had swallowed. Zeus now united with his brothers to dethrone his father. This led to a war with the Titans, a struggle

not terminated until Zeus delivered the Cyclopes, sons of Uranus and Gaea, who had been bound ‘by Cronus, and who in return pro¬ vided him with thunder and lightning, and also liberated the hundred-handed beings Briareus, Cottus and Gyes, who likewise lent him their aid. Having vanquished the Titans, the other children of Uranus and Gaea, he shut them up in Tartarus. Tartarus and Gaea now begot an¬ other monster, Typhceus, who engaged in a fearful struggle with Zeus, but was finally van¬ quished by a thunderbolt. Zeus now obtained the dominion of the world, which he divided by lot with his brothers Poseidon (Neptune), who obtained the sea, and Hades (Pluto), who re¬ ceived the lower world. Zeus retained for him¬ self the heavens and the upper regions, while the earth was held as common property. An¬ other dreadful war was now waged against the Olympian gods by the giants sprung from the blood of Uranus. In this struggle the gods were assisted by Athene, Apollo, Heracles and other children of Zeus, and the giants were completely vanquished. Zeus had three sisters and three brothers, Hestia (Vesta), Demeter (Ceres) and Hera (Juno). He first married Metis, a daughter of Oceanus and Tethys; but as Fate had prophesied that she should bear a son who should rule the world, Zeus swallowed her when she was with child, and Athene sub¬ sequently sprang from his head. As his second wife he took, for a time, Themis, daughter of Uranus and Gaea, but his final and best-beioved consort was his sister Hera, by whom he had Hebe, Ares and Hephaestus. Zeus was re¬ garded at the height of the organization of the Roman pantheon, as the founder of law, order and authority, the avenger of wrongs, the punisher of crime, the rewarder of good ac¬ tions, the source of prophetic power, the au¬ thor of all good things and the omnipotent, all-wise and benevolent ruler of the universe. He was especially looked upon as the con¬ troller of all the phenomena of the heavens, and was constantly spoken of as the ((Cloud-gatherer® or the ˆThunderer.® Notwithstand¬ ing his general character of wisdom and benev¬ olence, his conduct was anything but im¬ maculate. The incongruity struck some of the ancients themselves, and led to protest against such stories being believed. There appear to have been various local gods of the same name, with various attributes and legendary histories, who were finally merged in the national Hel¬ lenic Zeus. Traces of the original traditions, however, remained in the local rites of particu¬ lar places. An Arcadian and a Cretan Zeus are particularly distinguished. The former had a temple at Mount Lycaeus, so sacred that if any one entered it he died within 12 months, while intentional trespassers were stoned to death. In Crete there were many places sacred to Zeus, who had passed his early life there, particularly Mount

Ida and the district around it. Zeus, according to tradition, also landed on the island at Gortyn in the shape of a bull, when he carried off Euro-pa, and was worship¬ ped there by the surname of Hecatombieus. The national god was worshipped by sacrifices of bulls, cows and goats. Two of the principal localities where his worship was carried on in Greece were Athens and Olympia. At the lat¬ ter place the Olympic games, the most splendid

festival in Greece, were held in his honor. (See Olympic Games). Here there was a magnificent temple andi a gold and ivory statue of the god, the work of Phidias, and reckoned one of the seven wonders of the world. In representations of Zeus his attributes are the eagle, the sceptre and the thunderbolt. See Roman Religion. Consult Preller-Robert, (Griechische Mythologie) (1887).

ZEUSS, tsois, Johann Kaspar, German phi¬ lologist and historical scholar: b. Vogtendorf, near Kronach, in Upper Franconia, 22 July 1806; d. there, 10 Nov. 1856. He was educated in Munich, and became professor of history in the lycee at Bamberg, Upper Frpnconia. He wrote several valuable books — (Die Deutschen und die Nachbarstamme) (1837) ; (Die Her-kunft der Bayern von den Markomannen) (1839) ; (Traditiones Possessionesque Witzen-burgenses) (1842) ; (Die Freie Reichstadt Speier vor ihrer Zerstorung) (1843). But his greatest work was (Grammatica Celtica) (1853; 2d ed., by Ebel, 1868-71), a pattern of scholar¬ ship and thorough method, in which he really founded the science of Celtic philology. Con¬ sult Kuhn, E., (Johann Kaspar Zeuss) (1906).

ZEUXIPPUS, zuk-sip'us, one of the eight successors of ˆEnesidemus (q.v.) in the last school of Greek skeptics. Of him, as of all the others with the exception of Sextus Em¬ piricus (q.v.), nothing further is known. Con¬ sult Zeller, E., (Outlines of the History of Greek Philosophy) (trans. Alleyne and Abbott,

1886).

ZEUXIS, zuk'sis (Greek Zevtig), ancient Greek painter. He was a native of Heracleia, but which town of that name was his birth¬ place is not certain. He was born about the middle of the 5th century before Christ, and flourished about the end of the 4th century b.c. He is said by some authorities to have studied under Demophilus of Himera, by

others under Neseas of Thasos. He also studied at Ephesus, where he eventually settled, although he worked at times at Athens and other cities. Aristotle says that an elevated conception of character was wanting in his work, while Cicero praises him along with Polygnotus and Timanthes for forme? et lineamenta. He learned from Apollodorus the treatment of light and shade, which he greatly developed, and from Phidias to take Homer's descriptions of his heroes as ideal models and to paint them with limbs larger than the ordinary human proportion. One of his most famous works was a picture of Helen for the temple of Hera at Croton. The rivalry of Zeuxis and Parrhasius is represented in a well-known story about a contest in which Zeuxis painted grapes at which the birds pecked, and Parrhasius a curtain which Zeuxis wished to have raised in order to see the picture. Some of his later works he gave away as being val¬ uable beyond any fixed price. As far as may be judged from extant accounts, he painted small works on panels in contrast to the large mural paintings of Polygnotus. It is, of course, now impossible to form a correct idea of his art, though more ancedotes are told of him than of any other painter of antiquity. These are to be found in Lucian, Cicero, and especially the (Historia Naturalis^ of Pliny. Among his other works were (Zeus on His Throne Sur-ZEVECOT — ZIEGLER

rounded by Deities) ; (Eros Crowned with Roses } ; (Centaur Family } ; (The Infant Her¬ cules Strangling the Serpent* ; <Penelope) ; (Menelaus Weeping*; (Boy with Grapes.*

ZEVECOT, zav-ko, Jacques (Zevecotius), Dutch poet: b. Ghent, 14 Jan. 1596; d. Harderwijk, 17 March 1642. For a time he was a barrister, but subsequently he became a friar of the order of Saint Augustine, and wrote Latin verse which made him widely and favorably known. He visited Rome in 1624 and declined flattering offers of preferment from Pope Ur¬ ban VIII. In 1625 he made open profession of Protestantism, and later was appointed pro¬ fessor of history and eloquence in the Univer¬ sity of Harderwijk (Gelderland). Certainly in the Netherlands, if not beyond, he was es¬ teemed the best Latin poet of his time. The best edition of his verse is (Jacobi Zevecotii Poematum Editio Ultima) (1740).

ZEYER, tsl'er, Jules, Czech author: b. Prague, 26 April 1841; d. 29

Jan. 1901. After travel in France, Germany, Italy, Greece and Russia, he became an instructor in the last, and published a number of volumes highly rated in literature. In prose these include (Count Xavier) and (Andrew Cernysev,* the period of which is that of Catharine II; in verse, (Vysehrad,* a series of epic poems, the subject of which are derived from the early history of Bohemia.

ZEZSCHWITZ, tsetsh'vish, Gerhard von,

German Lutheran theologian : b. Bautzen, Saxony, 2 July 1825; d. Erlangen, 20 July 1886. Educated in the University of Leipzig, he be¬ came pastor at Grosszschocher, near Leipzig, but subsequently passed from a lectureship in the university to an extraordinary professor¬ ship there. Still later he held chairs in Giessen, from 1865, and in Erlangen from 1866. He was an authority in the department of practical theology. A full list of his volumes cannot be given here ; but they number such solid compendiums as (System der Christlich-Kirchlichen Katechetik* (1863-72; 2d ed. of Vol. II, 1872-74) ; (System der Praktischen Theologie) (1876-78), and (Die Christenlehre im Zusammenhang) (2d ed., 1883-86). Con¬ sult (Zur Erinnerung an Gerhard von Zezsch-witz> (1886).

ZHITLOVOSKY, Chaim, Jewish writer and communist : b. Vitebsk, Russia, 1865. He was well known as a writer in Yiddish before he came to New York in 1907, and in 1909 he established there the Das Neue Leben. He was one of the early advocates of Jewish national¬ ism and was one of the founders of the Jewish Socialist Labor Party. His books include (Thoughts on the Historical Fate of Judaism* (1887); Socialism and Nationalism* (1907); (Philosophy: What It Is and How It Developed) (1910), *etc.* A collected edition of his works was published (4 vols., 1912).

ZHOB, zhob, Northwest India, a river of Lewistan, British Baluchistan, which joins the Gomul northwest of the Suliman Mountains, and with it flows into the Indus near Dera Is¬ mael Khan. The Gomul and the Zhob valleys — the latter of which was first known to Euro¬ peans about 1884, and with Gomul Pass was an¬ nexed by Great Britain in 1889 — are passes into Afghanistan of strategical value, as they

form the most direct route between the north¬ west frontier province and Quetta, and cut off the Pathan tribes of Baluchistan from Afghanis¬ tan.

ZHUKOVSKli, zhoo-kof'ski-i, Vasilff An¬ dreevich, Russian poet : b. near Byelev, govern¬ ment of Tula, Russia, 29 Jan. 1783; d. 12 April 1852. He served in the campaign of 1812 against Napoleon, later settled in Dorpat, in 1816 obtained an imperial pension and in 1826 became tutor to the tsarevitch, later Alexander II. His most important service to Russian lit¬ erature is to be found in his translations of the poems of Byron, Gray, Moore, Scott, Goethe, Schiller, Rucker and others'; (Don Quixote*; the (Odyssey* and various further foreign class¬ ics. Among his original verses, <Liudmilla,> an imitation of Burger's <Lenore,) and (The Minstrel in the Russian Camp* were the most successful. Examples of them were turned into English verse in Bowring's Specimens of the Russian Poets) (1821-23).

ZICHY, Geza, Count von Vasonykeo,

Hungarian pianist and composer: b. Sztara, 23 July 1849. He lost his right arm at the age of 16, but under the tutelage of Liszt gained a mastery of the piano which created a sen¬ sation when he made his debut in 1878, his work comparing favorably with that of other artists despite his single hand. His public appearances have been made solely for charity, for which he has raised huge sums. Since the European War he has added to his activities by giving recitals for the maimed in order to prove what can be accomplished by them. He is president of the Hungarian National Con¬ servatory and since 1891 has been intendant of the Royal Opera House and the National The¬ atre of Budapest. He has written several choral works, piano pieces for the left hand, songs and the operas <Alar) (1896) ; (Meister Roland* (1897).

ZIEGENBALG, tse'genbalg, Bartholo-maus, German missionary: b. Pulsnitz (Sax¬ ony), 24 June 1683; d. Tranquebar (Coroman¬ del Coast), 6 March 1719. He obtained a uni¬ versity training at Halle and in 1705 sailed from Copenhagen for Tranquebar in response to the call of Frederick IV of Denmark for mission¬ aries to the Danish possessions in India. He compiled a grammar of Tamil and two lexi¬ cons and translated the New Testament and the Pentateuch. His labors were effective despite much opposition. He was the first Protestant missionary to India. Consult Germann, (Zie-genbalg und Plutzschau* (1868) ; and Plitt, (Kurze Geschichte der Lutherischen Mission*

(1871).

ZIEGLER, tseg'ler, Friedrich Wilhelm,

German actor and dramatist: b. Brunswick, 1750; d. Pressburg, 21 or 24 Sept. 1827. He first appeared in 1784 at Vienna, and from that time until his retirement in 1822 he was con¬ nected with the Court Theatre there, becoming one of the foremost actors of his day. Of his many dramatic works, the comedy (Die Tem-peramente) and the drama (Parteiwuth) were among those of less ephemeral value.

ZIEGLER, Karl, Austrian poet: b. Saint Martin, Upper Austria, 12 April 1812; d. Vi¬ enna, 20 May 1877. He studied at the Univer¬ sity of Vienna, was in the government service

from 1835 until his retirement in 1857 and sub¬ sequently devoted himself to literature. He contributed largely to the literary periodicals and “annuals® of the time, and under his pseu¬ donym of “Carlopago® published a collection of ˆedichte5 in 1843. His other volumes were (Himmel und Erde) (1856); <0den> (1866) and (Vom Kothurn der Lyrik) (1869). His verse is simple and original in quality and was once extremely popular, especially in literary circles.

ZIEGLER, Theobald, German philoso¬ pher: b. Goppingen, Wiirtemberg, 9 Feb. 1846. He studied at Tubingen, from 1871 was an in¬ structor in various gymnasia, in 1884 was ap¬ pointed lecturer on philosophy and pedagogy in the University of Strassburg and in 1886 pro¬ fessor there. He retired in 1911. His (Sittliches Sein und Sittliches Werden) (2d ed., 1890; English, 1892) was a substantial enrich¬ ment of the literature of moral philosophy, and the (Geschichte der Ethik) (2d ed., 1892) is also a work of importance. His further vol¬ umes include (Religion und Religionen) (1893) ; and (Fr. Th. VischeU (1893) ; (David Friedrich Strauss* (2 vols., 1908) ; <Menschen und Prob-leme) (1914) ; (Der Krieg als Erzieher) (1914) ; (Das offentliche Leben) (1914), *etc.*

ZIEGLER, William, American capitalist: b. Beaver County, Pa., 1 Sept. 1843 ; d. Stam¬ ford, Conn., 24 May 1905. He at first entered the printers’ trade and in 1868 the bakers’ and confectioners’ supplies business. In 1870 he or¬ ganized the Royal Chemical Company, which

he developed into the Royal Baking Powder Com¬ pany, retiring from active business in 1886. He also operated largely in real estate. He fitted out the Ziegler expedition to explore the Arc¬ tic by way of Franz Josef Land, and, if possible, reach the North Pole. The expedition, Com¬ mander Fiala, left Vardo, Norway, 10 July 1903, and was not heard from thereafter.

ZIEGLER UND KLIPPHAUSEN, oont klip'howzen, Heinrich Anselm von, German poet: b. Radmeritz, Upper Lusatia, 6 Jan. 1663; d. Liebertwolkwitz, near Leipzig, 8 Sept. 1696. He was educated at Frankfort-on-theOder and lived as a landed proprietor. His chief work is (Asiatische Banise, oder Blutiges doch Mu-tiges Pegu) (1688), which continued to appear in successive editions as late as 1764. It was reprinted, under Felix Bober-tag's supervision, from the third edition (1707), in Vol. XXXVII of Kiirschner's (Deutsche NationallitteraturP The work is done in a turgid style, but met in its day a great success and had in Germany considerable lit¬ erary influence. Its author's further writings are of less significance.

ZIEM, zem, Felix, French artist: b. Beaune (Cote d'Or), 25 Feb. 1821; d. Paris, 10 Nov. 1911. He studied in the art school of Dijon, traveled in southern France, Italy and the Orient, obtained a third-class medal at the Salon of 1851, a first-class in 1852 and became well known for his landscapes, particularly for scenes of Venice. Among his many canvases are (View of Venice) (1852; Luxembourg); (The Bank of the AmsteP (Bordeaux Mu¬ seum) ; (Quai Saint-Jean at Marseilles® (Mar¬ seilles Museum) ; <The Doge's Palace* (Ra-vene Gallery, Berlin) and several in private col¬ lections in the United States.

ZIERIKSEE, ze'rik-za, Netherlands, a town in the province of Zeeland, on the south side and the chief town of the island of Schou-vven, three miles from the Ooster Schelde, with which it is connected by two canal harbors, and 38 miles northwest of Antwerp. It has six churches, a fine townhouse dating from the 15th century and a gymnasium ; manufactures mad¬ der, carries on brewing and oyster fishing and has considerable trade and shipping. It is the oldest town of Zeeland and was formerly an important Hanse town. Its demolished walls are now replaced by promenades. Pop. 6,813.

ZIETHEN, tse'ten, or ZIETEN, Hans Joachim von, German general : b. Wustrau, near Neu-Ruppin, Brandenburg, 14 May 1699; d. Berlin, 26 Jan. 1786. He entered the Prus¬ sian army in 1714, distinguished himself as a colonel in the Silesian campaign of 1742, as a major-

general in that of 1745, and in May 1745 made his celebrated march through the enemy's country in Upper Silesia, in order to communicate with the Margrave Karl at Jag-erndorf. In 1756 he was made lieutenant-gen¬ eral. He obtained his chief renown in the Seven Years' War, winning the victories of Reichenberg, Prague and Leuthen, and deciding the day at Torgau by storming the heights of Siiptitz. He was promoted general of cavalry and was the most famous of the commanders of Frederick the Great. To the development of the light cavalry service he made important con¬ tributions. Consult the biographies by Count zur Lippe-Weissenfeld (2d ed., 1885) and by Winter (1886).

ZIF, ZIV, ZIPH, IYAR, or IYYAR, in

the Hebrew calendar, the second month of the year, always of 29 days. It falls between 10 April and 8 June.

ZIHLMAN, Frederick Nicholas, Ameri¬ can legislator, son of Nicholas Zihlman, a Swiss glassworker who came to the United States in 1870: b. Carnegie, Pa., 2 Oct. 1879. The family removed to Cumberland, Md., three years later. Mr. Zihlman was educated in the public schools. At the age of 11 years he began working in a glass factory and sub¬ sequently became a journeyman; he was presi¬ dent of local Flint Glass Workers 1904-09; national delegate 1904—08; member of the Na¬ tional Executive Board 1905-06; and president of the Allegany Trades Council 1904-09; and president of the Maryland State Federation of Labor 1906-07. He continued working at the glass trade until 1912, when he entered the real estate firm of Cowden and Zihlman, in which business he is still engaged. He was elected State senator for Allegany County, Md., in 1909, and was reelected in 1913, serving until 1917, when he resigned to take his seat in the Sixty-fifth Congress. He was minority leader in the Maryland State senate in 1914-16. He was reelected member of the Sixty-sixth Congress. Mr. Zihlman is the author of the first compulsory Workman's Compensation Law in operation in the United States. In 1907 he mar¬ ried Margaret Clara, daughter of Charles T. Dahl of Cumberland, Md.

ZILLEH, zel-lU, or ZILE (anc. Zela), Asiatic Turkey, a town in the vilayet of Sivas, 25 miles south of Amasia. It is built on a hill, the mound of Semiramis mentioned by Strabo ; a modern castle occupies the site of an old

Byzantine fortress. Ancient Zela was a theoc¬ racy ruled by the priests of the temple of An-aitis. Here Mithridates won a victory over the Romans 67 b.c., and it was also the scene of Caesar's victory over Pharnaces, 47 b.c., con¬ cerning which Caesar wrote aVeni. vidi, vici? Pop. 20,000.

ZILLER, tsil'ler, Tuisken, German edu¬ cator : b. Wasungen, Saxe-Meiningen, 22 Dec. 1817 ; d. Leipzig, 20 April 1882. He was edu¬ cated at Leipzig, where he was at first a lec¬ turer in jurisprudence, but in 1854 became pro¬ fessor of philosophy and pedagogy. At his initiative the Verein fiir Wissenschaftliche Padagogik was founded. Among his books are (Einleitung in die Allgemeine Padagogik) (1856; 2d ed., 1901) and (Allgemeine Philosophische Ethik) (1880 ; 2d ed., 1886).

ZILLERTHAL, tsil'ler-tal, Austria, a val¬ ley of the Tyrol in the eastern Alps, about 25 miles below Innsbruck, famous for its scenic beauties. It is traversed by the Ziller, which joins the Inn River at the mouth of the valley. It is much frequented by tourists, a railway line connecting with Mairhofen in the valley.

ZIMBABWE, zem-bab'wa, or ZIMBABYE

(Bantu for <(here is a great kraal®), a name ap¬ plied to numerous interesting South African ruins in Rhodesia and the Transvaal. They were discovered by Adam Benders in 1868. The best known and most important is the Great Zimbabwe, near the Sabi River, about 17 miles from Victoria in southern Rhodesia. There are two principal structures at Great Zimbabwe, one on the crest of a granite hill breaking down pre¬ cipitously to the south, and the other on the level ground about a third of a mile to the south. The lower one is roughly circular or elliptical, enclosed by a wall of 30 or 40 feet high, 14 feet thick at the base, and from six to nine feet thick at the summit. The wall is com¬ posed of well-trimmed blocks of granite fitted together without mortar in regular courses and occasionally set angularly for ornamental pur¬ poses. An inner wall runs close to the outer for a considerable distance, forming a passage which leads to a sacred enclosure containing two conical solid towers, the larger of which is some 40 feet high. The rest of the enclo¬ sure is divided into irregular unroofed

chambers. The building on the hill is very strongly built for defense and also contains a sacred enclosure. Emblems, believed by some to be phallic, many curious objects in soapstone, and undoubted re¬ mains of gold-working utensils have been found in the Zimbabwes. The nearest gold deposits and ancient gold workings are, however, some miles distant. Some theorists would locate here the Ophir of Solomon. It is also suggested that the lower building was a kind of town occupied by pre-Mohammedan Arabs who came here in search of gold, and that the ruin on the hill was a stronghold for defense. The signs of orientation reported by earlier visitors were disproved by scientific investigators who explored the ruins in 1905. The theories of Bent are now definitely discarded. Consult Randall-Maclver, D., ‘Mediaeval Rhodesia) (1906); for illustrations Bent, J. T., ‘The Ruined Cities of Mashonaland) (1892); and Hall and Neal, ‘The Ancient Ruins of Rhodesia) (1902).

ZIMMERMAN, Eugene (“Zim®), Ameri¬ can caricaturist and illustrator: b. Basel, Switzerland, 25 May 1862. After a public school education in Paterson, N. J., and some time in various employments, he turned his at¬ tention to comic art, was on the staff of Puck illustrators in 1882-85, and in 1885 became con¬ nected with Judge. He also did illustrations for some of the works of J. W. Riley “Bill Nye®) and others. He conducted Zirn’s Correspondence School of Cartooning, Comic Art and Caricature. Author of ‘This and That About Caricature> (1892-93).

ZIMMERMAN, Jeremiah, American cler¬ gyman, author, educator and numismatist: b. Snydersburg, Md., 26 April 1848. Graduated from Pennsylvania College, Gettysburg, in 1873, and the theological seminary there in 1876, he was pastor of the Lutheran Church at Valatie, N. Y., in 1877-78, and in 1879 organized at Syracuse, N. Y., the First English Lutheran Church, of which he was pastor until 1904. He then resigned to engage in foreign travel and literature, specializing on the Far East, archae¬ ology and history. He is also regarded as an authority on the historical branch of numis¬ matics, and has been professor of numismatics at Syracuse University since 1912. Author of ‘Spain and her People> (1902) ; ‘The Religious Character of Ancient Coins) ; ‘The God Jugger¬ naut and Hinduism in India) (1914), *etc.*

ZIMMERMANN, tsim’mer-man, Albert, German painter: b. Zittau, Saxony, 20 Sept. 1809; d. Munich, 18 Oct. 1888. He studied in Dresden and Munich and was made pro¬ fessor in the Milan Academy

in 1857 and at the Vienna Academy in 1859 His works display admirable characterizations of mountainous scenery and excellent light-effects, and are rep¬ resented in the museums at Leipzig, Munich, Stuttgart, Hanover, Dresden, Frankfort and in the R. L. Stuart Collection (New York Pub¬ lic Library). Among them are ‘Rocky Land¬ scape with Centaurs and Leopards > ; ‘Chiem Lake in Storm) ; ‘The High GolP ; ‘Sunset on Hintersee-* ; and ‘Lake Como.*

ZIMMERMANN, Johann Georg, Ritter von, Swiss philosopher and writer: b. at Brugg, canton of Aagau (then in Bern), 8 Dec. 1728; d. Hanover, 7 Oct. 1795. He studied medicine under Haller at Gottingen, and in 1754 was appointed public physician to his native town. He employed his leisure in the publication of pieces in prose and verse, including the first sketch of his popular work ‘Ueber die F.insam-keit) (On Solitude, 1756; completely rewritten 1784-85). This was followed by his essay ‘Vom Nationalstolz) (On National Pride 1758). In 1763 he composed his work ‘Von der Erfahrung in der Arzneikunst* (1764), which he followed up by several other professional treatises; in consequence of which he received an offer of the post of physician to the king of England for Hanover, which he accepted, and removed in 1768 to that capital. In 1786 he attended Fred¬ erick the Great in his last illness, which afforded little room for medical skill, but enabled him to publish an account of his conversations with that celebrated sovereign, ‘Ueber Friedrich den Grossen und meine Unterredung mit ihm) (1788), and ‘Fragmente fiber Friedrich den Grossen * (1789), works of little value. His ‘Solitude> was at one time very popular, and

was translated into almost every language of Europe. Consult the studies by Bodemann (1878) and Ischer (1893).

ZIMMERMANN, Wilhelm, German poet and historian: b. Stuttgart, 2 Jan. 1807; d. Mer-gentheim, Wurtemberg, 22 Sept. 1878. After study at Tubingen, he was connected with cari¬ ous journals at Stuttgart, from 1847 to 1850 was professor of history and of German lan¬ guage and literature in the Polytechnic Insti¬ tute there, but lost the post

through his liberal attitude as a member of the German National Assembly (1848) and the Wurtemberg Parlia¬ ment. Subsequently he was pastor of Evangeli¬ cal churches at Leonbronn, Schnaitheim and Owen. He is best known for his (Gedichte) (1832; 2d ed., 1839; 3d ed., 1854), which reveal the influence of Schiller and Uhland, but are never merely imitative. Others of his publi¬ cations are (Befreiungskamfke der Deutschen gegen Napoleon) (1836; 3d ed., 1859); (Geschichte des Grossen Bauernkriegs) (3 vols., 1841-43 ; 3d ed., 1891), *etc.*

ZIMMERN, Helen, English author : b. Hamburg, Germany, 25 March 1846. She was taken to England when an infant and was naturalized as a British subject upon coming of age. After a secondary education at Bays-water, she became a contributor to Once a Week j Old Merry's Monthly, the Press, the Examiner and other periodicals, and in 1876 achieved a success with Schopenhauer, his Life and Philosophy.) From 1887 she has re¬ sided at Florence, Italy, where she corresponds for Italian, English and American periodicals. She has also lectured in Italy, England and Germany on Italian art. Among her further publications are (Gotthold Ephraim Lessing, his Life and his Works) (1878) ; (The Epic of Kings) (1882), a paraphrase from Firdusi; a (Life of Maria Edgeworth) (1883) ; (The Hansa Towns) (1889) ; (Italy of the Italians) (1906); cTripoli and Young Italy) (1912); Htalian Leaders of Today) (1915) ; (New Italy y (1918), *etc.* She also translated from Nietzsche, and Lessing's prose; edited the com¬ edies of Goldoni (1892) ; was joint translator of Ferrero's essays as (Europe's Fateful Hour) (1918), and translated Enrico Catsellani's (Italy and Austria at War* (1918).

ZIMRI, zim'ri, in the satire (Absalom and AchitopheP (pt. i, 1681; pt. ii, 1682) by John Dryden (q.v.), a character representing Villiers, Duke of Buckingham :

Some of the chiefs were princes in the land:

In the front rank of these did Imri stand, *etc.*

(Pt. i, 545 et seq.)

Buckingham was depicted as a factional leader, like Zimri who conspired against Asa, king of Judah (1 Kings xvi, 9).

ZINC. Zinc cast into slabs as it comes from the furnace is commercially known .as spelter, but zinc recast into forms such as are used in galvanic batteries is known as battery zinc, and zinc rolled into sheets

is known as sheet zinc. There is a growing movement, fostered by the American Zinc Institute, to avoid confusion by abandoning the use of the word spelter.

Properties. — • Zinc is a bluish-white metal with a bright metallic lustre, an atomic weight of 65.37, a density of about seven, and a hard¬

ness, when cast, of 38 in the Brinell scale, as compared to a hardness of 40 for copper and 28 for silver. Both density and hardness are slightly increased by rolling. It is so hard that it can be filed with difficulty, and in a large mass it can be broken only with considerable' force. Its texture as shown on a broken sur¬ face is prismatic crystalline, the crystals being six-sided and belonging to the hexagonal sys¬ tem. At different temperatures zinc has dif¬ ferent properties. At ordinary temperatures it is fairly brittle, but at 100°-150°C. it can be rolled out into sheets or drawn into wire, though above 200° C. it becomes brittle again. It melts at 419.4° C. and boils at 920° C., the vapor burning in air with a characteristic bril¬ liant bluish-green flame to zinc oxide, formerly known as (<philosopher's wool® or "flowers of zinc.® Zinc is not affected by dry air or by oxygen at ordinary temperatures, but under moist atmospheric conditions the surface be¬ comes covered with a coating of grayish-white basic carbonate of zinc, which protects the metal from further corrosion. The industrial value of zinc for use as a protective coating for iron and steel and for use in exposed positions is due largely to this property.

Uses. — Zinc is used in metallic form in gal¬ vanizing iron and steel, in making sheet zinc, and in making brass and some other alloys. Iron and steel may be galvanized in several ways — by dipping the articles in a bath of molten zinc; by heating them to 425°-450° C. in a drum filled with zinc dust, a process known as "sherardizing,® in which they are coated with zinc by the zinc vapor given off from the zinc dust; and by electroplating them with zinc. As only the last method employs the galvanic current, the others are miscalled "galvanizing,® and an article protected by a coat of zinc would better be called "zinc-coated.® In normal times about 60 per cent of the zinc out¬ put of the country is used in zinc-coating iron and steel. Metallic zinc may be rolled in plates an inch or so thick — "boiler plates,® which, suspended in boilers, preserve them from the corrosion of sea water — or in thinner sheets for roofing, shingles, gutters, spouts, house¬ hold utensils, zincographer's plates, dry bat¬ teries, buttons, shoe-lace tips, *etc.* Much sheet zinc was used during the European War to line

packing cases filled with munitions and machined parts which needed protection from the sea air. Metallic zinc is alloyed with cop¬ per to form brass, some “bronzes® and other alloys. In normal times only about 20 per cent of the total consumption is used in making brass, but during the European War the greater part of the metallic zinc produced in the country was used for that purpose. A considerable quantity of metallic zinc is used annually in desilverizing lead by the Parkes process.

Zinc oxide is made under the French process by burning metallic zinc in an oxidizing atmosphere, and under the American process by burning oxidized or desulphurized zinc ores mixed with ground coal in an oxidizing atmos¬ phere. The purity of the product depends on the purity of the metal and the ore. Chemi¬ cally pure zinc oxide is used in pharmaceutical preparations. Zinc oxide of good grades free from lead is also used largely in making rub¬ ber, to increase its tensile strength, toughen it

and increase its wear-resisting properties. Zinc oxide of both good and common grades is used as a pigment . in making paints. American process oxide, in which there is a considerable percentage of lead, i.e., leaded zinc oxide, is also used for pigment, as a combination of lead and zinc is held to be desirable in a paint.

Zinc dtist, which consists of minute droplets of metallic zinc coated with a film of zinc oxide, is formed in the distillation of zinc, or is specially prepared. It is a very active chemical agent and is used to discharge the color of the pat¬ tern in calico printing. It is also used to precipitate gold in the cyanide process of gold recovery and to precipitate other metals and purify the solution in making lithopone and in the electrolytic deposition of zinc. Another use is in sherardizing as mentioned above. Litho¬ pone, a chemical combination of zinc sulphide and barium sulphate, is a white pigment used for interior paints and forms the base of most white enamels. Several salts of zinc are em¬ ployed in medicine and the arts. Zinc acetate and zinc sulphate are used in medicine as an emetic,

astringent and antiseptic. They are used as a mordant in dyeing, and are also use¬ ful in wood preservation, but the chloride is generally employed for that purpose, as in the Burnett process. Zinc chloride is used as a caustic agent in the treatment of certain dis¬ eases, as a general disinfectant and preserva¬ tive, and as a flux in soldering. Zinc sulphate is used in bleaching paper and as a dryer in varnishes and in fireproofing paints.

Sources. — The chief zinc minerals are zinc sulphide, sphalerite (zinc blende or ((black jack®) ; zinc carbonates, smithsonite (calamine in Europe) and hydrozincite ; zinc silicates, calamine (smithsonite in Europe) and willemite; zinc oxide, zincite ((<red zinc ore®); and zinc-iron-manganese oxide, franklinite. The three minerals last named form the ore at Franklin Furnace mines, in New Jersey, where they occur more plentifully than anywhere else in the world. Zinc blende is the most common ore of zinc. It usually occurs as a complex ore in association with galena and with pyrite and other metallic sulphides, but in the Mascot mines of eastern Tennessee it is unassociated with either lead or iron. The upper parts of sulphide deposits containing zinc have usually been altered by oxidation, and the zinc minerals changed to the silicate and carbonate. The principal zinc-producing region in the United States is the Joplin district, comprising south¬ western Missouri, southeastern Kansas and northeastern Oklahoma, which in 1917 pro¬ duced ores containing 238', 676 short tons of recoverable zinc, about 34 per cent of the total production of the country. The Franklin Furnace mines produced 119,736 tons of re¬ coverable zinc, or 17 per cent of the total, the Butte district of Montana produced 90,145 tons, or 13 per cent, and the upper Mississippi Val¬ ley district of Wisconsin, Illinois and Iowa pro¬ duced 64,027 tons, or 9 per cent. Other im¬ portant zinc districts are the Coeur d'Alene district of Idaho, the Leadville district of Colorado, the east Tennessee district and the Yellow Pine district of Nevada. The total recoverable zinc content of zinc ores mined in the country in 1917 was 710,972 short tons, a large increase in response to the demands of the

war, from an average of 400,000 tons in the years immediately before the war.

Canada and Mexico are well supplied with reserves of zinc ores and have exported large quantities into the United States in past years. During the early years of the European War large imports of zinc concentrates were brought to the United States from Australia, where

the extensive deposits of lead-zinc ores of the Broken Hill lode of New South Wales have been for years the main foreign dependence of the zinc smelters of Belgium, Germany and France. The zinc deposits of Rhodesia Broken Hill in Africa are extensive, and there are many deposits in Algeria and Tunis. The Bawdwin deposits of India are reckoned among the largest in the world, as are also those of the Ridder and adjoining concessions in the Irtysh region of southwestern Siberia. The chief zinc-producing regions of Europe are the Upper Silesia district, formerly a part of Prussia; the Rhine district of Germany; the island of Sardinia in Italy, and the Santander and Cartagena districts of Spain.

Before the complex ores, sulphides of zinc, lead, copper and other metals — the refractory ores of the metallurgist — are treated in the usual practice by smelting in the blast furnace, the zinc minerals must be separated from the others because zinc interferes so greatly with the reduction of the other minerals that a <(fine® or “penalty® is placed by the smelter on ores containing zinc above a fixed limit, de¬ pending on circumstances. Moreover, the zinc is lost. Hence practically all zinc-bearing ores are subjected to milling, in which the zinc minerals are separated from the others and all are concentrated to workable richness. In the Joplin region ore of lower metallic content than anywhere else in the world is profitably mined. In one type of deposits, the “sheet ground,® the ore mined in 1916-17 averaged 1.3 per cent of zinc and 0.3 per cent of lead, as shown by the metal content of the con¬ centrates. The zinc concentrates average from 58 to 59 per cent of zinc. In the Broken Hill district of New South Wales in early years the zinc was separated as middlings and accumu¬ lated in huge stacks. By the flotation process, perfected in that region since 1903, the sulphide minerals are floated off in a froth while the gangue minerals sink to the bottom. The stocks of zincky middlings thus became avail¬ able and have furnished the bulk of Broken Hill’s large annual output of zinc concentrates in recent years. The flotation process has likewise made available large reserves of lead-zinc ores previously unworkable in various parts of the world.

Zinc Smelting. — The origin of the art of smelting is lost in the mists of antiquity. Brass was an article of commerce with the Orient from the earliest days of which there is record, but brass can be made by the <(cementation® process in which granulated copper is melted with granulated “calamine® (oxidized zinc ore), and hence the existence of brass is not proof of the production of metallic zinc. How¬ ever, metallic zinc was certainly known in India in the 14th century. Zinc ore may be reduced by burning off the zinc as oxide, and the oxide may be utilized as such or may be dissolved and the zinc

content deposited

electrolytically ; or the desulphurized ore may be leached with sulphuric or other acid and the zinc obtained by electrolysis. Both these methods are in commercial use, and other electrochemical processes are in a fair way to be established. Electrothermic reduction of zinc ores is practised in Sweden, but has not yet proved commercially feasible in the United States. The low volatilization point of zinc led to distillation as the first method for the reduction of zinc ores, and it is yet the chief

In 1913 the United States ranked first in production, with 31.7 per cent, and first in corn-sumption, with 27.7 per cent. The other large consumers were Germany, 22.9 per cent ; Great Britain, 19.2 per cent; France, 8.1 per cent, and Belgium, 7.5 per cent.

The production and consumption of metallic zinc in the United States during the European War as compared to the average of the four years immediately preceding the war is here shown, in short tons.

1910-1913

(average)

1914

1915

1916

1917

1918 2

Production of primary zinc:*

From domestic ore .

296,315

13,983

343,418

9,631

458,135

31,384

563,451

104,005

584,597

84,976

492,405

25,522

From foreign ore .

Production of secondary zinc:*

Redistilled .

310,298

353,049

489,519

667,456

669,573

517,927

19,721

26,302

20,545

22,424

29,764

23,136

29,663

21,037

16,835

14,565

9,918

17,190

Remelted .

Apparent consumption of primary zinc

356,321

396,018

542,419

718,156

700,973

545,035

290,413

299,125

364,632

458,428

413,643

423,356

*“ Primary zinc,” which is produced from ore, is distinguished from “ secondary zinc,” which is obtained by refining zinc ashes, shimmings, drosses, and old metals and which has already been statistically counted as metal.

method. The native Chinese method of making zinc, though primitive, nevertheless, involves all the essential principles of modern zinc dis¬ tillation. Clay pots or crucibles are set in the flat top of the furnace so that the lower half is exposed to the heat of the furnace. The zinc ore and carbon are put into the pot, a sloping partition with a perforation at the upper edge is luted (sealed with clay) into position at the middle of the pot, and the cover is luted on. The zinc vapor comes up through the perforation, condenses in the cooler upper chamber and collects as liquid zinc on the lower portion of the sloping partition, whence it may be dipped and cast into cakes. In the modern retort furnace there may be 300 to 450 clay retorts set in three to five horizontal rows, each retort about 10 inches in diameter and about five feet long. Two such furnaces are joined back to back in a block. Only the mouth of the retort projects from the furnace, and to this is luted the condenser, a conical clay cylinder closed at the slightly lower front end, except for a small aperture, by a clay plug. The zinc vapor distils over and is liquefied in the condenser, from which it is “drawn55 and cast into slabs four times during the “campaign,55 which lasts 24 hours, the re¬ torts being cleaned out and the charges re¬ newed each morning.

Production. — World’s production of metal¬ lic zinc in 1913, in short tons was a follows :

Australia .	4,105
Austria .	23,928
Belgium .	217,928
France .	71,672
Germany:	124,552
Silesia .	187,522
Rhine district	65,197
Great Britain .	26,811
Holland .	
Norway .	
Russia .	
Spain .	
United States… .	

10,237

8,389

6,617

346,676

Total

1,093,634

The first zinc was made in the United States in 1835 by Dr. F. R. Hassler, superintendent of the United States Coast Survey. Finding it impossible to obtain abroad brass or zinc of the requisite purity for the standard sets of weights and measures he set up a small zinc-distillation plant in the arsenal at Washington. The ore used was a mixture of blende from Perkiomen, Pa., and red zinc ore from Franklin Furnace, New Jersey. The first zinc smelting on a commercial scale was at the Lehigh works at South Bethlehem, Pa., in 1860. In the same year the Matthiessen and Hegeler works were opened at La Salle, Ill. These were the main eastern and western centres of zinc smelting until 1892, when smelters in the coal fields of Kansas assumed equal importance with Illinois plants. This importance was increased about 1896, when natural gas began to be used for smelting, and by 1899 Kansas had become the largest producer among the States. The waning of the gas fields caused Kansas to fall behind Illinois in 1913, but for the last two years the natural-gas smelters of Oklahoma, which first smelted zinc in 1907, have held that State in the front rank. (See Electrochemical In¬ dustries; Metallurgy; Metals). Consult Hol¬ ley, C. D., (Lead and Zinc Pigments 5 (New York 1909) ; Ingalls, W. R., ‘Production and Properties of Zinc) (ib. 1902) ; id., ‘Metallurgy of Zinc and Cadmium5 (2d ed., ib. 1906) ; id., ‘Lead and Zinc in the United States5 (ib. 1908) ; ‘Mineral Industry5 (annual vol., Newr York) ; ‘Mineral Resources of the United States5 (annual vol., United States Geological Survey, Washington, D. C.).

C. E. Siebenthal,

Geologist, United States Geological Survey.

ZINC, Refining of. See Electrochemical Industries.

ZINC WHITE. See White Colors.

ZINCITE, or KINKITE, a deep blood-red to orange-red mineral found quite abundantly in Sussex County, N. J. It is

usually in granular or foliated masses, associ¬ ated with franklinite, willemite, tephroite and calcite. It rarely occurs in hexagonal, hemimor-phic crystals, with perfect basal cleavage. Its hardness is 4 to 4.5 and specific gravity about 5.7. It is an oxide of zinc, ZnO, and is valuable as an ore of that metal. It is often called ((red oxide of zinc® and <(red zinc ore.®

ZINCOGRAPHY. See Lithography.

ZINGARELLI, dzen-ga-rel'le, Nicolo An¬ tonio, Italian composer: b. Naples, 4 April 1752; d. Forre del Greco, 5 May 1837. He studied at the Gonservatorio di-Loreto and also under the Abbate Speranza, and on leaving the conservatory received the place of master of the chapel at Torre dell' Annunziata. In 1781 he composed for the Theatre San Carlos, in Naples, his opera 'Montezuma,* and in 1785 brought forward his 'Alzinda* in La Scala, Milan, with great success. In this work he adopted a more simple and easy style. His best operas are <Pirro,> <Artaserse> and Bo¬ rneo e Giulietta.* In 1789 he brought out his 'Antigone,* from Marmontel in Paris; but the public events then occurring absorbed the attention of the public, and he soon returned to Italy, where he became director of the Vati¬ can chapel in 1804. He refused to conduct the musical services rejoicing over the birth of Napoleon's son as the ((King of Rome,® and by the order of Napoleon was arrested and taken to Paris. Napoleon, however, pardoned him be-cuse of his fondness for the composer's music. In 1813 he was appointed director of the musi¬ cal academy of San Sebastiano, and in 1816 chapel-master in Saint Peter's, Naples, holding both positions while he lived. Zingarelli com¬ posed much church music, including more than 30 masses, and numerous cantatas

and oratorios. His works are highly esteemed for their ex¬ pression. From 1781 he wrote about 40ˆ operas, many melodies from which have continued to be interpolated in modern Italian productions.

ZINGERLE (VON SOMMER.SBERG)

tsing'er-le, Ignaz Vincenz, Austrian Teutonic scholar: b. Meran, 6 June 1825; d. Innsbruck, 17 Sept. 1892. He was a nephew of Pius Zing-erle (q.v.). He studied at Innsbruck, Trent and Brixen, and was for a time an inmate of a Benedictine monastery at Marienberg, but later abandoned theology. From 1859 until his retirement in 1890 was the professor of Ger¬ man language and literature at Innsbruck. Among his works are 'Sagen aus TiroP (1850; 2d ed., 1891 f; (Sitten, Brauche, und Meinungen des Tiroler Volkes* (2d ed., 1871); (Schildereien aus TiroP (1877-88) ; his tales include (Von den Alpen) (1850) ; 'Der Bauer von LongvalP (1874), *etc.*

ZINGERLE, Pius, Austrian Orientalist and Catholic theologian : b. Meran, 17 March 1801 ; d. Marienberg cloister, 10 Jan. 1881. He studied at Innsbruck, became in 1862 professor of Oriental languages in the Sapienza at Rome, and in 1867-71 was director of the gymnasium at Meran. Among his works are ˆAusgewahlte Schriften des Heiligen Kirchenvaters Ephram* (1830-37; 2d ed., 1845-46); 'Akten der Heiligen Martyrer des Morgenlandes* (1836) ; 'Chresto-mathia Syriaca) (1871), and 'Lexicon Syria-cum.*

ZINJAN, zm-jan', Persia. See Zenjun.

ZINNIA, a genus of annual and perennial herbs and sub-shrubby plants of the family Asteracece. The species, of which about 20 are known, are indigenous from southern Colorado to Chile, but are chiefly distributed in Mexico and Central America. They have opposite, gen¬ erally entire leaves and terminal heads of very variously tinted flowers, for which some of the species have become popular in gardens. The best-known species is the garden zinnia or youth-and-old-age (Z. elegans), an erect an¬ nual usually about 18 inches tall and originally bearing yellow or orange flowers, but now ex¬ hibiting nearly every tint except blue and green in both single and double forms, which often exceed three inches in diameter. Z. haageana was introduced into cultivation in 1861, but being less showy and smaller than the former is of secondary importance. A hybrid race developed from these two species, and known as Z. darwini, has been evolved, but has not become widely popular in America. The plants are rather

stiff, formal and coarse in habit, and their colors, although brilliant and metallic, lack the delicacy of the dahlia and the china aster, to which they are not distantly related. They are, however, among the most useful garden annuals, because they will thrive upon almost any kind of soil and yield a profusion of bloom from midsummer until frost.

ZINZENDORF, tsin'tsen-dorf, Nicholas Ludwig, Count von, German religious leader, founder of the Society of United Brethren: b. Dresden, Saxony, 26 May 1700; d. Herrnhut, Upper Lusatia, 9 May 1760. From 1716 to 1719 he studied at the orthodox University of Wit¬ tenberg, and subsequently traveled in Holland and France, describing his journey in (The Pilgrimage of Atticus through the World.* In 1721 he received an appointment to the council of state from the Saxon government, which he held till 1727. He then completely withdrew from public affairs. He received at his estate in Upper Lusatia in 1722 the persecuted Mora¬ vian Brethren. This settlement received in 1724 the name of Herrnhut. With a view to founding the body called the United Brethren (q.v.), he published various projects, not in harmony with each other, which excited opposi¬ tion, but he persevered in his plan and finally succeeded in establishing a religious order based on family instead of monastic conditions. In 1734 he passed a theological examination under an assumed name, and was ordained a clergy¬ man of the Lutheran Church. After two years spent in traveling on behalf of his society, he was banished in 1736 from Saxony. The order of his banishment was repealed in 1747. In the meantime he had been consecrated bishop of the Moravian Church in Berlin, founded Moravian colonies in Holland, Esthonia and Livonia, and visited England. In 1739 he wrote a catechism which he styled the 'Good Word of the Lord,* and the same year visited the mis¬ sions of the Brethren in the West Indies. In 1741 he visited the United States and founded the well-known Moravian colony at Bethlehem, Pa., and before returning to Germany in 1743 assisted in establishing missions among the Indian tribes. After returning to Europe he made a journey to Livonia, whence the Russian

government sent him back under a military escort to the frontier. He afterward visited Holland, spent several years in England, and obtained an act of Parliament for the protec¬ tion of his followers in the British dominions. He wrote more than 100 works in prose and verse. A collection of his hymns, edited by Knapp, appeared in 1845. His (Diary > was published (1907). Consult the <Lives) by Spangenberg, A. G. (1772-75) ; Eng. trans., abridged, London 1838) and Romer, H. (Gnadau 1900) ; also, Plitt, H., (Zinzendorf's Theologie) (3 vols., Gotha, 1869-74), and Becker, B., (Zinzendorf und sein Christentum im Verhaltnis zum kirchlichen und religiosen Leben seiner Zeit) (1886 ; 2d ed., Leipzig 19001 *Williston, W., (Great Men of the Christian Church* (Chicago 1908).

ZION, or SION, the loftiest mount of Jerusalem, and often used in biblical and other literature to designate the whole city, and metaphorically the kingdom of God on earth and in heaven. Zion rises about 2,500 feet above the Mediterranean, and from 200 to 300 feet above the valleys at its base. It was sepa¬ rated from Akra on the north and Moriah on the northwest by the Valley Tyropoeon, and had the valley of Gibbon on the west, that of Hinnom on the south and that of the Kidron on the southeast. It was a fortified town of the Jebusites till subdued by David, and thence¬ forward was called the <(City of David® (2 Sam. 6-7). A mosque near its southern brow now covers the l((tomb of David® so-called. This mount, together with Moriah and Ophel, was enclosed by the first wall, and fortified by citadels. On it were erected the palaces of Solomon, and long afterward those of Herod. At the present day a considerable portion of it lies outside of the modern wall on the south.

ZION CITY, Ill., city in Lake County, 40 miles north of Chicago, on the Chicago and Northwestern Railroad. Manufactures include lace, bricks and candy, and office, milling, bak¬ ing and electrical supplies. Pop. (1920) 5,580.

ZION NATIONAL MONUMENT. A

government reservation in the southwestern part of Utah. Its area is 76,800 acres. It com¬ prises the upper part of the valley of the Virgin River which here flows for eight miles in a narrow canyon with walls in places 2,500 feet high, of brilliant colors and with great variety of gorgeous cliffs, towers and pinnacles. Notable among these are two great pinnacles known as the Temples of the Virgin and also as the Gates of Zion ; they rise 4,000 feet above the valley and consist of sandstone, red in large part, capped by gleaming white. They were discovered by J. W. Powell in 1864. While the reservation is a long

distance from the rail¬ road, being 90 miles from Lund, the nearest point on the Salt Lake Line, it is accessible by good auto roads and a camp for tourists is maintained by the Wylie Company.

ZIONISM. See Jews and Judaism — Zionism.

ZIPAQUIRA, se-pa-ke-ra', Colombia, town, department of Cundinamarca, 25 miles north of Bogota. It is built on the site of an old Chibcha Indian town, which was the resi¬ dence of the chiefs of Zipas. It is especially noted for its valuable salt bed which is owned

and operated by the government, and supplies the greater part of the salt used in the re¬ public. Coal, lead, copper and iron are also found in the vicinity, and the town carries on an active trade with the surrounding district. Pop. (district) 12,000.

ZIPH. See Zif.

ZIRCON, the native zirconium silicate, ZrSi04. Its crystals are tetragonal and isomor-phous with thorite, xenotime, cassiterite and rutile. Though its crystal forms are very varied, they are usually prisms terminated by pyramids, the base being rare. Small crystals frequently show a wealth of faces, among which the <(zirconoids; or ditetragonal pyramids are prominent. It is a heavy mineral, its specific gravity averaging about 4.7, and it has a char¬ acteristic greasy-adamantine lustre. Though often nearly or quite opaque, transparent crys¬ tals are not uncommon, and owing to its hard¬ ness, 7.5, strong double refraction and the variety of rich colors in which it is found, zircon has long been prized as a gem. Its dispersive i|>ower is excelled only by the diamond. (<Hyacinth® or <(jacinth® includes reddish, orange or brownish gem stones, while <(j argon® embraces the colorless, yellowish, grayish or smoky varie¬ ties. It is often an important accessory con¬ stituent of gneiss, syenite and many crystalline rocks. Because of its resistance to weathering and abrasion it frequently occurs in fine little crystals in alluvial sands as in Ceylon, Brazil and the monazite region of North Carolina. The finest zircon gems come from Ceylon and New South Wales, while France yields very small stones of remarkably fine red color. Ex¬ cellent translucent to opaque crystals occur in Norway, the Ural Mountains, Canada (up to 15 pounds), in New York, New Jersey, Colo¬ rado and North Carolina. By far the most important locality is in Henderson County, N. C., where many tons of crystals occur loose in the soil. Zirconia, derived from this source, was used in the <(Welsbach® or <(Auer®

mantles, but its incandescence had not sufficient permanency and its use has been superseded by thoria. Zirconia is still useful as a refractory material in furnace and crucible linings, and because of its incandescence in the <(zircon light,® which is an improvement on the ordinary lime light.

ZIRCONIUM, a chemical element named after the mineral zircon in which Klaproth dis¬ covered the oxide zirconia (1789), and obtained by Berzelius in 1824 as an iron-gfey powder. Afterward found in many other minerals, some of the most important' being eudialyte, hyacinth, polymignite, *etc.* It has many physical and chemical properties resembling the element sili¬ con. Like silicon and carbon it exists free in three allotropic forms; the amorphous, obtained as a black powder by heating sodium zirconium chloride with metallic sodium or potassium ; the crystalline, as foliated leaves from heating so¬ dium zirconium fluoride with metallic alumir-num; and the graphitoidal, obtained in scales of a steel gray color by action of iron on sodium zirconium. Symbol Zr; atomic weight 90.7-specific gravity 4.15. The element is only slightly soluble in hydrochloric or sulphuric acids, but is readily so in aqua regia or hydrofluoric acid. When heated highly in the air it burns to the

oxide Zr02. This oxide, commonly known as zirconia, is prepared by fusing the mineral zircon (ZrSiC)4) with a mixture of sodium hydrate and sodium carbonate, treating with hydrochlo¬ ric acid and heating to separate the silica, pre¬ cipitating the solution so obtained with ammo¬ nia, and heating this white precipitate. An¬ other method is now used by which the chloride is made by treating crushed zircon with chlo¬ rine, separating the silicon chloride by heat, pre¬ cipitating the solution of zirconium chloride with ammonia, and heating the precipitate. Zir¬ conia forms a white powder or amorphous lumps. It has both basic and acid properties. It dissolves slowly in hydrofluoric or sulphuric acids, the fluoride (ZrF4) uniting with fluorides of other metals forming complex salts called zircofluorides, example K2ZrF6, potassium zircofluoride. With strong

alkalies zirconia forms zirconates, example, K4Zr04, potassium zirconate. Zirconium forms a long series of salts, in most of which it acts as a basic element.

Uses. — Zirconia possesses the power of be¬ ing extremely refractory toward heat, not being changed even by that of the oxy-hydrogen blow¬ pipe flame. It also has great radiating power. Because of this it is used in the “zirconia light,® a light used considerably in lighthouses. A cone of zirconia is played upon by the very hot flame of the oxy-hydrogen blowpipe so that it glows with a very intense white light. While this is the principal use of compounds of zir¬ conium, certain minerals containing it are found as clear beautiful stones and are used as gems.

ZIRKNITZ, tsirk’mts, or ZIRKNITZER ZEE, or CZIRKNITZE’R SEE, Juglo-Slavia, a phenomenal periodical lake in Carniola. 30 miles east-northeast of Trieste, in a deep valley sur¬ rounded iby mountains, the principal of which are Javornik, Succhi, Slivinza and Sternitz. The lake takes its name from Zirknitz, situ¬ ated at an elevation of 3,500 feet, and one of many villages in the neighborhood. Receiving the waters of six streams, and surrounded by mountains with no outlet, the characteristic fea¬ ture of the lake is its internal drainage. The bottom of the lake partakes of the limestone formation of the district, which fissures readily, and has numerous subter¬ ranean caves and channels. Some of these caverns are of great depth, and in the dry season absorb the waters of the lake, leav¬ ing it sometimes completely dry, with only a few pools, in which the fish take refuge. A luxuriant natural vegetation covers the surface of the deserted lake, and when the drought is protracted grass, millet, or buck¬ wheat is sown on it and the harvest reaped be¬ fore the return of the water. In June the lake is frequented -by wild ducks, which afford abundant sport, and when _ the water is de¬ creasing fish are caught in great numbers. The lake is from six to seven miles long, nearly three broad and of an average depth of 11 feet, but there is no stated limit to its basin. It receives the drainage of a consider¬ able country, and even when no rain falls in the immediate neighborhood its reservoirs are filled from the rainfall of more distant hills. In dry seasons the lake takes about 30 days to empty. When rain has been abundant and all its subterranean sources are in simultaneous ac¬ tivity, it reaches the average height in 72

hours, and when the rain has extended to all the tributary region it reaches its extreme level, which is albout two feet above the average,

in 196 hours. The natural outlets then no longer suffice to carry away the water, and it overflows the country, damaging or destroying the surrounding villages. The emptying and flooding of the lake depends upon the drought or moisture of the season, and is not strictly periodic. It has been known to empty and fill three times in one year. From 1707-14 it was only once dry, and from January 1834 to February 1835, it remained entirely without water, the longest drought on record. This lake was known to the ancients for the same phenomena, the Romans calling it Lacus Lugens or Lugea Palus; and it has been picturesquely described by Tasso in his (Sette Giornate del MondoF

ZISKA, zis'ka (properly ZIZKA, zhizh'ka), John, Bohemian Hussite leader: b. Trocznov, near Budweis, about 1360 (by some authori¬ ties a9 late as 1380) ; d. Pfbyslav 11 Oct. 1424. He was educated at the court of King Wenceslas at Prague, entered the profession of arms, joined the contingent that went from Bohemia and Hungary in 1410 to the assistance of the Teutonic Kinghts against the Poles and Lithuanians, and fought with great prowess in the fiercely contested battle of Tannenberg, 15 July 1410. Then he served in Hungary against the Turks, and with the English at Agincourt, 25 Oct. 14-15. Soon after the execution of Huss (q.v.), he returned to Bohemia and be¬ came a leader of the Hussites. In 1419, when the Hussites broke into rebellion against the Emperor Sigismund, Ziska organized their military forces into a well-disciplined army of infantry, supplying the want of cavalry by means of the Waggenburgen, or "car-forts,® constructed of the baggage-wagons. He took up his headquarters at a stronghold on the heights of Austie, in southern Bohemia, the fortress being known as Tabor (with ref¬ erence, perhaps, both to tabor , Bohemian for "encampment,® and to Mount Tabor in Pal¬ estine), and the extreme Hussites as "Tabor-ites.® Sigismund sent an army of 30,000 into the country, but Ziska, with a hasty levy of about 4,000, took up his position on Mount Vitkov, near Prague, and on 14 July 1420 de¬ feated the enemy with great slaughter. The eminence has since been known as the Hill of Ziska. On 1 Nov. 1420, at Pankratz, he was again victorious over Sigismund, andˆ on 2 November captured the fortress of Vysehrad, near Prague. He won a second great battle against Sigismund 8 Jan. 1422 at Deutschbrod, and penetrated into Moravia and Austria. He had long had but one eye, and lost the other by an arrow-wound at the siege of Raby castle in 1421. Notwithstanding his blindness he continued to direct his troops with great effi¬ ciency and almost unvarying success. Prague refused to recognize his authority, and he thoroughly subdued it in 1424. In that year, it is said, Sigismund, realizing the impossibility of conquering

Bohemia, began negotiations toward a treaty, by the terms of which the Hussites were to have full religious liberty and Ziska was to be governor of Bohemia. Such negotiations, if undertaken, were interrupted by Zi ska's death at the siege of Pfbyslav.

Ziska became the hero of the Bohemian revolu¬ tionary party, and for this character he was well fitted by his zeal and military ability. He was frequently cruel in his method of war¬ fare and conquest. Much fiction has been mingled with the facts of his career. Alfred Meissner's epic <Ziska,) based on the leader's history, reached a 12th edition in 1884. Con¬ sult the German translation (1882) of Tomek's <Life.>

ZITHER, or CITHERN, a modern devel¬ opment of the musical instrument known to the Greeks as cithara. In the early part of the 19th century it became a favorite with the peasantry of the Styrian and Bavarian Alps, and was introduced into England about 1850. The zither consists of a resonance box, with a large circular sound hole near the middle ; the strings, 32 in number, in some cases in¬ creased to 40 and even 46, being made of steel, brass, catgut and silk covered with fine silver or copper wire, and tuned by pegs at one end. Five of the strings are stretched over a fretted keyboard, and are used to play the melody, the fingers of the left hand stop¬ ping the strings on the frets, the right-hand thumb, armed with a metal ring, striking the strings, which are tuned in fifths, and have a chromatic range from C in the second space of the bas's staff to D in the sixth ledger line above the treble. The remainder, called the accompaniment strings, are struck by the first three fingers of the right hand. The viola zither, in which the resonance box is heart-shaped, is tuned like the violin, and is played with a bow.

ZITTAU, tsit'tow, Germany, a town of Saxony, on the Mandau, near the Austrian frontier, 49 miles by rail east-southeast of Dresden. The town was practically » destroyed in the Seven Years' War, since which time most of its buildings have been erected. The chief public buildings are a splendid townhouse, the churches of Saint Peter, Saint Paul, Saint John and Mary, hospitals, custom¬ house, gymnasium, a

municipal museum, and a valuable library. Its principal manufactures are cotton-spinning, dress goods, iron-found¬ ing machinery, stained glass, cycles, ropes, paper, brewing and brick-making; and there is a trade in cotton and linen goods, chemicals, *etc.* There are a number of lignite mines in the neighborhood. Pop. 34,719.

ZITTEL, tsit'tel, Karl Alfred von, Ger¬ man palaeontologist and geologist : b. Bahlin-gen, Baden, 25 Sept. 1839; d. Munich, Bavaria, 6 Jan. 1904. After study at Heidelberg and Paris, he entered the geological survey at Vienna, in 1863 became a lecturer in the uni¬ versity there, and later in the same year was appointed professor of mineralogy at Karls¬ ruhe. In 1866 he was made professor of palae¬ ontology and geology at Munich; and from 1899 he was president of the Bavarian Acad¬ emy of Sciences and curator-general of the scientific collections of Bavaria. The Rohlfs expedition, which he accompanied to Egypt and the Libyan desert in 1873-74, derived much of its value from his important labors. Among his publications are the (PalaontoIo-gische Studien fiber die Grenzschichten der Jura- und Kreideformation) (1868-83) ; (Aus

der UrzeiC (1872; 2d ed., 1875); <Handbuch der Palaontologie) (5 vols ; 5th vol. with Schimper and Schenk, 1876-93), the most com¬ plete and authoritative work in that field ; and (Geschichte der Geologie und Palaontologie bis Ende des Neunzehnten Jahrhunderts* (1899). He edited the periodical Palceonto-graphica from 1869.

ZIWET, Alexander, American mathemati¬ cian : b. Breslau, Germany, 8 Feb. 1853. Grad¬ uated from the Polytechnical School of Karls¬ ruhe in 1880, he came in that year to the United States, and for some time was con¬ nected with the United States lake survey (De¬ troit) and! the coast and geodetic survey (Washington). Subsequently he became suc¬ cessively instructor in, and junior professor of, mathematics in the University of Michigan, where he has been professor since 1905. In 1892 he was made co-editor of the Bulletin of the American Mathematical Society. He pub¬ lished an (Elementary Treatise on Theoret¬ ical Mechanics) in three parts, as follows: Pt. I, <Kinematics) (1893) ; Pt. II, introduc¬ tion to Dynamics, Statics* (1893) ; Pt. Ill, <Kinetics) (1894; revised ed., 1904).

ZIZANIA, a genus of grasses (q.v.) includ¬ ing the wild rice.

ZIZYPHUS, a genus of the family Rham-nacece, shrubs or small trees, with spiny stip¬ ules, alternate three-nerved leaves, a spreading five-

cleft calyx, five hood-like petals, five sta¬ mens, a five-angled disc, adhering to the tube of the calyx, and having enclosed within it the two-or three-celled ovary. Fruit a drupe, which is sometimes edible and has a large stone or kernel containing from one to sev¬ eral flattened seeds. Zizyphus is widely dis¬ tributed, but is chiefly indigenous to tropical Asia and America. The fruits of the culti¬ vated Z. jujube ˆ and of Z. sativa, are of the size and shape of a small, oval plum. They ripen in September when they are gathered and stored in a dry place, the pulp becoming sweeter by the process. They have a dark-red skin, but are yellow within. If carefully dried, these fruits, called jujubes, will keep for a long time, and retain their acid flavor, which has made them a refreshing dessert fruit, in the Mediterranean countries and ‘in China. They are nutritive and demulcent, a cough medicine having been prepared from them, and formerly the sweetmeat known as jujube paste was made from the evaporated juice of jujube, and of gum-arabic; but now the jujube is displaced by the gum and by gelatine. Z. sativa is a handsome arborescent shrub, with small, varnished, oval leaves and greenish in¬ conspicuous flowers, succeeded by the bright drupes. It is sometimes cultivated in the United States, being hardy as far north as Washington. The bark, in its native countries, was used medicinally, for fever and for sores; and it is also employed for tanning and for a dye-stuff like that of Z. xylopyra which yields a black dye. Various parts of other species yield medicines, and the edible fruits of Z. baclei of Africa are used for a pleasant drink and are also made into bread. Z. lotus is by some believed to be the lotus-trees the fruit of which produced such indolence in fhose who ate them. It grows in Barbary,

where it is called sadr. Z. spinachristi is a small, prickly tree, which is reputed to have composed! Christ’s crown of thorns. Like other spiny species of Zizyphns, this is a good hedge plant. Z. nummularia of Persia and India is one of the camel’s thorns, whose foliage forms a fodder, and which has edible fruits. The cog-wood of Jamaica, an im¬ portant timber tree, is Z. cliloroxylon.

ZLATOUST, zla-to-oost', Russia, a town in the province of Ufa, on the Ai, an affluent of the Ufa, near the Ural Mountains, 150 miles direct and 199 miles by railway northeast of Ufa. It has a cathedral and a meteorological and magnetical observatory. In the vicinity are rich iron and gold mines, and in the town are government works, manufacturing sword-blades, steel instruments and ammunition. Pop. about 34,245.

ZNAIM, tsnirn (formerly ZNOIMO or ZNOJMO), Czecho-Slovakia, a town of Mora¬ via, on the Thaya, 50 miles northwest of Vienna. The chief buildings are a Rathhaus (1446), a circular church, said to have been a heathen temple, and the Gothic church of Saint Nich¬ olas, dating from 1348. The old ducal castle crowns a neighboring height. The trade is largely agricultural. Mustard, wine and cu¬ cumbers are exported. Fine majolica, leather and chocolate are manufactured. New water¬ works were opened in 1877. As Znoimo, it was the capital of Moravia, destroyed in 1145 by the Bohemian Prince Vladislav, and re¬ built in 1226. On 11 July 1809, the French under Massena andl Marmont defeated the Austrians here, resulting in the armistice be¬ tween Napoleon and) Archduke Charles; it was captured by the Prussians 13 July 1866 and was occupied by them until 3 Sept. 1866. Pop. about 18,828.

ZOANTHARIA, an order of Actinozoa (q.v.) characterized by the fact that the ten¬ tacles are simple and unbranched, that there are usually incomplete as well as complete mesenteries, and that the tentacles usually alternate in several circles. The mesenteries and tentacles are often arranged in multiples of the number six, but this is variable, and in some forms the number of mesenteries in¬ creases during the growth of the animal. The animal develops as a gastrula, the blastapore of which remains as the mouth. The larva is usually ciliated and free-swimming. The Zoantharia include the sea-anemones and corals (qq.v.) ; these do not represent natural divi¬ sions of the class, but merely modes of life of its members. A colonial Zoantharian with a calcareous exoskeleton is a coral ; an iso¬ lated Zoantharian without an exoskeleton is a sea-anemone.

ZOAR, Palestine, an ancient city men¬ tioned in the Bible, but whose exact location is unknown, although it probably stood at the southern end of the Dead Sea. It is spoken of as visible from Pisgah (Deut. xxxiv, 3). The Arabic historian Abulfeda speaks of a Zoara near the Dead Sea, and the Roman garri¬ son, Zoara, mentioned by Jerome and Eusebius, is probably the same place. Mention of it oc¬ curs in Genesis xiv and xix; in Isaiah, xv, and in Jeremiah xlviii. Consult Smith, G. A., his¬

torical Geography of the Holy Land) (16th ed., London 1910).

ZOAR, zo'ar, Separatists Society of. The

Separatists Society of Zoar was a communistic religious organization located at Zoar, on the Tuscarawas River, Tuscarawas County, Ohio. They were German Protestant peasants, 225 in number, who emigrated from Wurttemberg in April 1817. Their chosen leader was Joseph Baumler, whose name was later changed, for the sake of euphony, to Bimeler. Bimeler was of humble origin, but a man of unusual ability and independence, well educated, a natural leader, and a fluent speaker; he purchased in his own name, in the locality named above, 5,000 acres of farm land, at an average value of $3 per acre, giving a mortgage at long time for the entire amount. This Separatist emigration had been primarily for the pur¬ pose of securing religious liberty; and for better opportunities in obtaining a livelihood. It was expected that each family would, by its industrious labor, secure separate ownership in a portion of the land held by Bimeler, but the colonists being diverse in age, strength, experience, education and enterprize, they soon realized that their personal inequality stood in the way of the collective success of the colony, and early in 1819 they decided to organize into a community of property and effort. Articles of agreement were signed by 159 adults — 53 males and 104 females. The articles created a community of interest, present and prospective, whereby all the property, movable and im¬ movable, of the individual members, and their future earnings should become the common stock of the association, to be held and man¬ aged by chosen directors. Death of a mem¬ ber passed no property interest to his heirs, and withdrawal from the society, voluntary or compulsory, carried with it no claim upon a divided or undivided right in the association. Bimeler was to retain the realty in trust until the societey by its earnings could pay the mort¬ gage and assume title.

In 1832 the society reached its highest membership of 500, and was incorporated un¬ der the then existing laws of Ohio by the name of <(The Society of Separatists of Zoar.® This conferred upon the society the ordinary powers of a corporation, with perpetual suc¬ cession, power to hold property, purchase and sell, pass by-laws, *etc.* Under this reorganiza¬ tion the members were divided into two classes, known as the novitiates and the full associates ; the novitiates were obliged to serve at least one year before admission to the second class, and this applied to the children of the mem¬ bers if, on becoming of age, they wished to join the society; the full associates

must be of legal age — the males 21 and the females 18 ; all officers were elected by the whole so¬ ciety, the women voting as well as the men, all elections being by ballot and a majority vote; the government of the community vested solely in a board of three trustees (or direc¬ tors) to serve three years each, one to be elected annually; these trustees had unlimited power over the custody and management of the property and all the temporalities of the society, but were bound to provide clothing, board and dwelling for each member <(without respect to person,® and use all means

confided to their charge for the best interests of the society; they directed the industries and detail of affairs of the society; assigned each member his especial work, and the portion of necessaries each should receive. Beside the board of trustees there was a standing com¬ mittee, or council, of five, one member being elected each year. This council was the su¬ preme judiciary, or board of arbitration, of the society, in cases of disagreement, dissen¬ sion or complaint ; it had power to excom¬ municate members or deprive them of partic¬ ipation in the affairs of the society. They also elected once in four years a cashier or treasurer who had custody of all moneys, kept the books, and had immediate oversight over the finances of the society. In addition there was an official known as the <(agent general,® who acted as the trader to buy and sell for the society in its dealings with the outside world, make and enforce contracts, *etc.* The office of agent general was regarded as the position of honor and influence, and to it Joseph Bimeler was elected for life; after his death the office remained vacant, its duties being performed by the cashier or the trustees.

The society, from, its organization as a commune, steadily prospered, and in time built up a large number of enterprising and success¬ ful industries, having in the period of its height two large flour mills, saw mill, planing mill, machine shop, tannery, dyehouse, stove foun¬ dry, cooper shop, woolen mill, brewery, slaugh¬ terhouse, blacksmith shop, tile works, pottery, *etc.* In all these concerns a high grade of goods was produced which found a ready mar¬ ket with foreign

customers. The value of the Zoar property increased until about 1875, when their land, industrial plants and money ac¬ cumulation were estimated at $1,500,000. From that time the enterprise began to decline. Bimeler died in 1853, and there was no leader or director his equal in sagacity or personality. The environment of the -society slowly changed from that of a western pioneer frontier to a prosperous, cultivated section of country, and rival neighboring industries made inroads into the export business of Zoar; the Zoarites were not progressive and did not keep pace in their manufactures with modern methods and im¬ provements, and in time found that they could purchase products for use and wear cheaper than they could make them ; there were few accessions to the society; the original mem¬ bers became too old and feeble to conduct its affairs; outside laborers had to be employed; the younger members were inclined to leave and seek their fortunes where they could ac¬ quire independent property and freedom of ac¬ tion. This decline continued until in 1897, when, by a common consent, the organization decided to disband and place the property in the hands of a commission for equal division. The appraisement and distribution was com¬ pleted in the fall of 1898. There were at this time 222 people, adults and children, in the society, of whom 136 were entitled to one equal share. They each received a few hundred dol¬ lars in cash and a portion of the farm land or village property.

The religious tenets of the Zoarites were few and simple. They confessed the doctrine of the Trinity; the fall of man, the return

through Christ, the Holy Scriptures as the guide of their lives, all ceremonies were de¬ clared useless and injurious, marriages were contracted by mutual consent and before wit¬ nesses, they recognized no ordained minister, and engaged in no public prayer. Bimeler was their only preacher and teacher, he spoke each Sunday to the society, and after his death his published discourses were read in the pub¬ lic meetings by various members. The society did not seek additions and made no attempt to propagate its principles, either economic or religious. The life of the Zoarites was one of utmost simplicity, serenity and morality. There never was a divorce in the community and no member was ever charged with a crime or felony. Consult Nordhoff (Communistic So¬ cieties in United States > (1875) ; and Randall, < History Zoar Society J (1904).

ZOBEIR, or ZUBAIR, ibn al Awam, a

relative of Mohammed, and one of the earliest converts to Islam: d. 656. He was one of the 10 predicted by Mohammed as certain to enter the Garden of Allah. Before his death, Omar, successor of Mohammed, appointed Zobeir one of a council of six who were to choose from their own number a new caliph. Zobeir op¬ posed the election of Othman and was there¬ after his enemy; he also opposed his successor, Ali, with whom he had been friendly before Ali's accession. Later Zobeir succeeded in raising a rebellion against Ali, and he was slain at the battle of the Camel, at Basra. For his son see Abd Allah ibn Zubair. Consult Huart, C. I., (Histoire des Arabes> (Paris 1912).

ZOBEIR, Rahama, Egyptian pasha and Sudanese governor : b. 1830. He came of a family claiming descent from an uncle of Mo¬ hammed. By 1860 he had established his leader¬ ship among the Arab ivory and slave traders on the White Nile and in the Bahr-el-Ghazal, and although nominally an Egyptian subject he maintained a great army of blacks and was the real ruler of the surrounding country. He de¬ feated an expedition sent from Khartum to Bahr-el-Ghazal in 1869, but pleaded innocence in the matter, was pardoned and appointed governor of the district. In 1874 he conquered Darfur, and was made governor-general of the new province, but wfien he went to Cairo in 1876 the authorities prevented his return. His son assumed his place in Bahr-el-Ghazal, and under the instruction of Zobeir defied the forces of General Gordon, and in 1878 was subdued. In 1884, however, General Gordon, apprehensive of the Mahdist movement, vainly asked that Zobeir be permitted to return in order to check it. Zobeir was interned at Gibraltar in 1885-87, returned to Cairo in 1887, and after 1899 lived on his estates in his native country.

ZOCKLER, tsek'ler, Otto, German Lu¬ theran theologian : b. Griinberg, Hesse, 27 May 1833; d. Greifswald, 9 Feb. 1906. He was edu¬ cated in the universities of Giessen, Erlangen, Halle, Gottingen and Berlin, became a lecturer at the first-named in 1857, and in 1863 professor of theology. In 1866 he was appointed profes¬ sor at Greifswald, and in 1885 consistorial coun¬ cillor. He was one of the leaders of the move¬ ment toward the establishment of a state church in Prussia. In 1882 he became editor of the

Evangelische Kirchenzeitung. For the (Kurzgefasstes Kommentar zum Alten und Neuen Testament und zu den Apokryphen) (1886 et seq.), which he edited with Strack, he prepared the commentaries on the Old Testament apocry¬ phal books, the Acts, and the epistles to the Thessalonians and Galatians. Among his works are ˆHieronymus, _ sein Leben und WirkeiP (1865) ; commentaries to Chronicles, Job, Prov¬ erbs, Ecclesiastes, Canticles and Daniel, in Lange's (Bibelwerk > (1866-72; Eng. trans. 1870 et seq.); (Das Kreuz ChristP (1875; Eng. trans. 1877) ; Lottes Zeugen im Reich der Natur) (1881; 4th ed., 1906; Eng. trans. 1886) ; (Biblische und Kirchen-historische Studien) (1893) ; (Die Tugendlehre des Christentums) (1904) ; (Geschichte der Apologie des Christentums) (edited by H. J. and E. Schlapp, 1907), *etc.*

ZODIAC. The zodiac is a belt of the celes¬ tial sphere, extending 8° on each side of the ecliptic, or the path of the sun among the stars. (<The name is derived from (,uov a liv¬ ing creature, because the constellations in it (except Libra) are all figures of animals. It wTas taken of that particular width by the an¬ cients simply because the moon and the then known planets never go farther than 8° from the ecliptic® (Young's (Astronomy >). The belt is divided into 12 parts, of 30° each, to which are given the following names: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces. This division into 12 parts was suggested by the 12 reappearances of the moon in a year. The idea seems to have originated with the Chaldsean astronomers, about 2100 B.c.

Owing to the fact that the earth is not a perfect sphere, the pole of the earth's equator describes a circle around the pole of the eclip¬ tic, which causes a constant retrograde motion in equator with the point of intersection of the plane of the zodiac. The rate of this motion is 1° in 70 years, and has amounted to 30°, or one entire sign, up to the present time. <(The sign of Aries, therefore, is now in the position of the constellation Pisces; each sign having backed so to speak into the constellation west of it.° The constellations themselves bear no resemblance to the signs designated by them.

During the Middle Ages the signs of the zodiac were supposed to influence human life, and hence were distributed to different parts of the human body. Disease was supposed to be cured by the aid of the zodiacal power pre¬ siding over that part of the body. The rem¬ nant of this superstition is still seen in some almanacs.

The Egyptians are supposed to have adopted the 12-fold division of the Zodiac from the Greeks, but they changed the symbols of living creatures to others of their own. The Chinese divided the course of the sun into 12 parts, which they designated as the rat, the ox, the tiger, hare, dragon, serpent, horse, sheep, mon¬ key, hen, dog and pig. This division is still found in some parts of Central Asia and Japan. It has also been found, among the remains of the Aztec race in America. The original zodi¬ acal constellations occupied unequal spaces in the heavens. Hipparchus was the first to divide the zodiac into equal spaces of 30° each, and

give to them the names of the older constella¬ tions. His method of reckoning positions in the ecliptic was used until this century. Astrono¬ mers have now abandoned it for the more accu¬ rate measurement of degrees, beginning at the vernal equinox.

The origin of the names of the animals as¬ signed to the zodiac by the ancients is unknown. Some have supposed that the spring signs : Aries, the Ram, Taurus, the Bull, and Gemini, the Twins, mark the time of the bringing forth of young by flocks and herds. Cancer, the Crab, marks the time when the sun appears to move backward. Leo, the Lion, symbolizes the fierce heat of summer, and Virgo, the Virgin, glean¬ ing corn, symbolizes the harvest. In Libra, the Balance, the day and night balance each other. Scorpio is supposed to have marked the pres¬ ence of venomous reptiles in October; while Sagittarius symbolizes the season of hunting. Capricornus marks the beginning of the return of the sun to the north, Aquarius symbolizes the winter rains, and Pisces the season of fishes. These are but fanciful representations, and have no foundation in fact.

ZODIACAL LIGHT. «The zodiacal light is a faint column of light rising from the west¬ ern horizon after twilight in winter or spring evenings; and before daybreak in summer or autumn. It extends out on each side of the sun, and lies nearly in the plane of the ecliptic. Near the equator it can be seen all the year, and has ‘been traced all the way across the heavens from east to west, forming a complete ring.® In our latitudes it can seldom be traced more than 90° from the sun. Parts of the column near the sun are somewhat bright, but distant portions are extremely faint, and can only be seen on the very clearest nights; though the cause of the zodiacal light cannot be said to have been definitely proved, it is very probable that it is sunlight reflected by myriads of small meteoric bodies revolving around the sun, nearly in the plane of the ecliptic. This theory re¬ quires a thin flat ring of

these meteors to ex¬ tending beyond the orbit of the earth. The name zodiacal light was given to this phenome¬ non by Cassini in 1653, who described it as a flat luminous ring encircling the sun nearly in the plane of the ecliptic. Kepler supposed it to be the atmosphere of the sun ; but Laplace showed that the atmosphere of the sun could not extend to anything like the distance from the sun which is reached by the zodiacal light. In 1853 an extended series of observations was made by Jones from different parts of the Pacific Ocean. From these observations he deduced the theory that the zodiacal light was caused by a ring of matter surrounding the earth, and not the sun.

Professor Wright, of Yale University, has determined that the spectrum of the light is continuous, and therefore is essentially reflected sunlight. He has also determined that the light is partially polarized in a plane passing through the sun, and that the amount of the polarization is between 15 and 20 per cent. The origin of the minute particles which reflect the light has been accounted for in many ways. By some they are believed to have been thrown out from the corona of the sun ; by others to be com¬ posed of dust thrown out from the ‘equatorial

regions of the sun; but by most they are be¬ lieved to be an immense cloud of meteoroids filling the space between the earth and the sun. The meteoric theory of the sun’s heat presup¬ poses a multitude ot these meteoric bodies con¬ stantly falling into the sun to supply the loss by radiation, as well as multitudes of others which never reach the surface. It is not propable, however, that these meteors if they exist play any part in the phenomena of the zodiacal light.

A most valuable and important contribution to our knowledge of the zodiacal light is due to a recent research of Seeliger. It has long been known that the slow, secular changes of some of the elements of the orbits of the plan¬ ets of the solar system, when these are derived from observation, are not in exact agreement when these same changes are determined from a computation based upon the law of universal gravitation. In particular, it is found that the computed

motions of the perihelia of the orbits of Mercury and Mars and of the node of Venus differ from the motions derived from observa¬ tion by amounts far in excess of the uncertain¬ ties inherent in the observations themselves. Many attempts to account for the first discrep¬ ancy have been made. Thus, Leverrier assumed that it arose from the disturbing pull of a small planet near the sun, which for many years found its place in our astronomical books under the name of Vulcan. Other astronomers have supposed that the disturbance might be due to the pull of a ring of particles about the sun, to an unequal distribution of the material within the body of the sun itself, or even to an inex¬ actness in the accepted statement of the law of gravity. Analysis shows, however, that none of these explanations are admissible, for all of them lead to disturbances in other directions, either of the planets or of the moon, which are in discordance with observation. But Seeliger has shown that if there be ascribed to the zo¬ diacal light an even almost inconceivable tenuity, its gravitational pull will exactly account for the discrepancies observed, without at the same time introducing any new discrepancies. The densi¬ ties to be assumed for the inner and outer por¬ tions of the zodiacal light in order that its at¬ traction may be sufficient to balance the former discrepancies are as follows :

Average density of the inner portion, extend¬ ing from the sun to 0.24X, the distance of the earth = 2.52 X Kb11 X, the sun's density;

Average density of the outer portion, extend¬ ing from the sun to 1.20 X» the distance of the earth = 2.52 X 10"11 X, the sun's density. Aver¬ age density of the outer portion, extending from the sun to 1.20 X, the distance of the earth = 0.0026 X 10'n X, the sun's density.

ZOE, zo'e (Gr. Zuy), empress of the East: b. about 978; d. 1050. She was the daughter of Constantine VIII, and became the wife of Romanus III in 1028. In 1034 Romanus was put to death by Zoe and Michael the Paphlagonian, whom she married and raised to the throne as Michael IV. The latter dying, was succeeded by his nephew, Michael V, who was deposed by the people in 1042. Zoe and her sister Theodora were then proclaimed joint sovereigns. She dis¬ played great ability and firmness in the govern¬ ment, and in 1042 married Constantine IX,

Monomachus, who supplanted Theodora. She reigned till her death.

ZOETROPE, an optical instrument used as a mechanical top,

depending, for its interest, on the constancy of visual impressions. It con¬ sists of a rotating drum, open at the top, in which around its inner periphery are placed strips of paper, having figures of men, animals, etc., in varying positions. By turning the cylin¬ der the images are seen through slots in its upper side, giving the effect of action to the figures.

ZOFFANY, tsof'fa-m (properly ZAU-FELBY), Johann, British painter : b. Ratisbon, 1733; d. London, 11 Nov. 1810. He was a pupil of Speer at Ratisbon, but at 13 ran away to Italy, where he studied for 12 years. In 1758 he went to England, where he first attracted attention by a portrait of Garrick, and soon won considerable reputation, becoming one of the original members of the Royal Academy on its foundation in 1769. He was sent by George III to Italy, where he remained in 1772-79, and among other paintings executed (The Tribune of Florence,* one of his most celebrated works. In 1783-90 he engaged in painting in India; and the last 20 years of his life he spent in Eng¬ land. Among his further paintings are (Earl of Barrymore* ; (Foote* ; (Weston* ; (Members of the Royal Academy) ; (Tiger Hunt* ; and (Embassy of Hyder Beg.*

ZOGBAUM, Rufus Fairchild, American

artist: b. Charleston, S. C., 28 Aug. 1849. He studied at the Art Students' League 1878-79 and in Paris with Leon Bonnat in 1880-82, made ex¬ tensive study of European armies in field and garrison, and later became known as a leading delineator of military and naval subjects, which he renders with scrupulous fidelity to the vari¬ ous points of detail. His publications, written and illustrated by himself, are (Horse, Foot and Dragoons) (1887); (A11 Hands) (1897);

(Ships and Sailors) and (The Junior Officer of the Watch* (1908).

ZOHAR, zo'har, the Bible of the Kabbalists, long reverenced by Jewish mystics and re¬ garded by some as higher than the Bible and the Talmud, but proved a clever forgery. The secret science of the Kabbala received a marked development at the beginning of the 13th century, when a mystic, Ezra or Azriel (b. 1160; d. 1238), compiled a work called brilliancy* (cBahir'>). In an atmosphere of reputed mira¬ cles and a new Messiah, there appeared some years later the most famous Kabbalistic book of the time — the bohar,* or (Splendor.* It was offered as the work of Simon ben Jochai, a sage of the 2d century, of whom many legends are told. He is said to have spent years in soli¬ tude, a hermit receiving special revelations. It was claimed that for over a thousand years the (Zohar* had been concealed in a cave in

Galilee and had been at last brought to light. The lit¬ erary forger who ˆdiscovered® the (Zohar* was Moses of Leon (b. Leon, about 1250; d. Arevalo, 1305), who employed an Aramaic idiom to give the book an air of antiquity, and with such skill that Jew and Christian alike were deceived and some even to-day attribute to it hoary age. Yet his widow declared that it was a forgery.

The character of the <Zohar) can hardly

be dismissed as unique in literature, with its fantastic, imaginative and emotional elements. It is a medley of spirituality and coarseness, a strange combination of intellectuality and gross¬ ness, whose influence has been far-reaching and whose adherents have numbered hundreds of thousands. It is a work without method, a kind of impressionist commentary on the Pen¬ tateuch, half homily, half meditation, dwelling largely on the -((higher® sense of Scripture and allowing every opportunity for vague and mys¬ tic interpretation. Hence the moral perver¬ sions that abound, the blasphemy and absurd¬ ity. The pre-existence of the soul is assumed

— paradise and hell are alike depicted, the. varieties of sin described with painful minute¬ ness, Messianic speculations indulged in, and views favorable to the dogma of the Trinity uttered, while communion with departed spir¬ its, celestial hosts and angels completes the farrago of nonsensical speculation. Such an aberration is rare in the history of Judaism and has been productive of much harm. Its soil has nourished gross superstitions and strengthened the belief in ghosts and evil spir¬ its ; its mode of interpretation has degraded the study of the Bible and spread the wildest fancies. At one time it was high in favor with the papacy when the Talmud was condemned to the flames, but it was later included in the Index Expurgatorius. Its occasional Christian tone was not overlooked by Christian scholars

— Pico di Mirandola (1463-94) and Reuchlin (1455-1522) both made the <Zohar> the basis of their vindication of Jewish literature. Its literary influence, however, was not long re¬ tained. It developed a

few <(saints® and <(miracle workers,® spurious Messiahs and the like, but it has had no successor. In absorbing the miasma of the earlier Kabbalistic literature, it left no germs for further development. (See Jews and Judaism). Consult Graetz's (History of the Jews* (Vols. Ill and IV) ; Abrahams' (Jewish Literature) (pp. 172-175).

ZOILUS, zo'i-lus (Gr. Z ullog): b. about 400 b.c. ; d. about 320 b.c. Thracian rhetorician, chiefly remembered for the asperity of his criticisms on the poems of Homer. An account of his career is given by Vitruvius, which is not self-consistent, and states that he lived 385-247 b.c. He is said to have been a pupil of Polycrates, to have been eminent before the rise of Socrates, and to have continued to write until the reign of Alexander. Vitruvius repre¬ sents him as seeking the patronage of Ptolemy Philadelphus. Heracleides says he was orig¬ inally a Thracian slave. He is reported by Vitruvius to have died a violent death. The virulence of his attacks on Homer procured him the title of Homer omastix ((<The Scourge of Homer®). He also attacked Plato and Isocrates. It is said he censored Homer principally for introducing fabulous and incredible stories into his poems. He has the reputation of a captious and unjust critic, so that his name became a synonym for such, but Dionysius of Halicarnas¬ sus places him in the highest rank. Consult Spindler, (De Zoilo* (1888-89).

ZOISITE, a mineral closely related to epidote named by Werner in 1805 in honor of Baron von Zois who discovered it. It is a basic orthosilicate of calcium and aluminum, vol. 29 — 46

HCa2Al3Si30i3. The aluminum is sometimes partly replaced by iron, the mineral thus ap¬ proaching epidote in composition. Though its crystals are orthorhombic, their form is very similar to the monoclinic epidote. Its hardness is 6 to 6.5 and specific gravity about 3.3. Its color is usually dull gray or brown, but in the \ariety <(thulite,® found in Norway, it is a beautiful rose pink. It is found in many European localities, also abundantly in the New England States, Pennsylvania, and North Caro¬ lina, and in exceptionally good crystals at Duck-town, Tenn.

ZOLA, zo'la (Fr. zo-la), Emile Edouard Charles Antoine, French novelist: b. Paris, 2 April 1840; d. there, 29 Sept. 1902. He was educated at the College of Aix, from which he went to the Lycee Saint Louis at Paris with a scholarship in 1858. His career there was un¬ distinguished, and he left in 1860 after failing to take his degree owing to insufficiency in literature. After a brief experience as a clerk

in a business house he was for more than a year compelled to sound the lowest depths of pov¬ erty in Paris, but in 1861 he obtained employ¬ ment as a shopman with MM. Hachette, the publishers, at a salary of about five dollars a week. He devoted his spare time to literary work, contributing short stories to the Petit Journal and La Vie Parisienne and critical articles to the Salut Public of Lyons and after¬ ward to Villemessant's journals, L.Evenement and the Figaro. Several of his stories were published separately in the volumes (Contes a Ninon) (1864), which contain some of his best and purest work, and which were followed in 1874 by (Nouveaux Contes a Ninon.* Some of his critical articles were collected under the title (Mes Haines) (1866). In (La Confession de Claude) (1865), a novel in which he utilized his early struggles, we find him already in full progress toward the characteristic work of his maturity, and this tendency became still more marked in the immediately succeeding novels ; (Le Vceu d'une Morte) (1866) ; (Les Mysteres de Marseille) (1867) ; (Therese Raquin) (1867), a powerful study of the effects of remorse fol¬ lowing on adultery and murder; and Made¬ leine Ferat* (1868). Having by this time gained a secure footing in the world of letters, he conceived the plan of the series of novels known as (Les Rougon-Macquart* (1871-93), which includes his best-known work and occu¬ pied him for nearly a quarter of a century. It is described as an (histoire naturelle et sociale d'une famille sous le second empire, *and con¬ sists of 20 works dealing with different phases of modern life, not always strictly that of the Second Empire, but rather that of the Third Republic. The particular departments of life treated in the volumes were studied by Zola in the spirit of a scientific observer, but of one with a decided bias toward the portrayal of moral filth and disease; and the bond of con¬ nection which constitutes them a series is the persistence under various forms in all the members of the Rougon family of a moral taint which is transmitted in accordance with Zola's views of heredity. The series consists of the following works: (La Fortune des Rou-gon* (1871); <La Curee* (1874); (La Con-quete de Plassans* (1874) ; (Le Ventre de Paris) (1874), treating of the Paris markets;

(La Faute de l'Abbe Mouret) (1875), whose subject is clerical celibacy; (Son Excellence Eugene Rougon) (1876); <L,Assommoir) (1877), a powerful but revolting study of the effects of drunkenness and idleness, the first great success of the series; (Une page d'amour> (1878); <Nana> (1880), a coarse picture of courtesan life; <Pot-Bouille) (1882) ; (Au Bonheur des Dames) (1883), dealing with the great shops of Paris; (La joie de Vivre) (1883) ; (Germinal > (1885), treating of the life of French miners; (L'CEuvre> (1886), in which he dissects literary and artistic decadents; (La Terre > (1888), a study of the French peasantry in which prurient naturalism reaches the zenith of repulsiveness; (Le Reve) (1888); <La Bete Humaine) (1890), treating of railways; (L'Argent) (1891), dealing with stockbrokers and company promoters; <La Debacle* (1892), a powerfully realistic picture of military life in connection with the Franco-German war and the break-up of the Second Empire ; and (Le Docteur Pascal* (1893), in which the whole is brought to a conclusion. Immediately after completing this huge undertaking he started the (Trois Villes) series, consisting of (Lourdes* (1894), <Rome) (1896), and (Paris* (1898), in which he portrays the spiritual development of a priest, Pierre Froment, out of miraculous Christianity through a sort of social Cathol¬ icism into a creed of justice and labor. In the incomplete tetralogy entitled (Les Quatres Evangiles) ((The Four Gospels*) he proposed to formulate his social gospel. The first vol¬ ume is (Fecondite (1900), whose hero, Mathieu, is the son of the hero of the preced¬ ing series. The second volume, (TravaiP ((Labor,* 1901), has a hero named Luc; and of the remaining two, (Verite (Truth) and ˆJustice,* whose heroes were to be named after the other two evangelists, the former was ap¬ pearing at the time of his death. In the eyes of English readers Zola appears best in his short stories, of which, in addition to those already mentioned, collections entitled (Le Capitaine Burle* (1882), and (Na'is Micoulin* (1883) have been published. His famous story of (L'Attaque du Moulin *forms part of the vol¬ ume of (Soirees de Medan* (1880), to which Maupassant and other friends also contributed. He defended his view of the nature and func¬ tion of literary art and collected many critical articles in several works. Several of his novels were dramatized by himself and others, and he also wrote for the stage (Les Heritiers Ra-bourdin) (1874), and (Le Bouton de Rose> (1878), but none of them, except (L'Assommoir) (1881), known in Charles Reade's Eng¬ lish version as < Drink? (1879), were at all suc¬ cessful. On 13 Jan. 1898, Zola, convinced of the innocence of Captain Dreyfus, (q.v.) went chivalrously to the defense of that officer in a letter <J'Accuse* published in L'Aurore. In it he arraigned the government for the irregu¬ larities of Dreyfus's trial, making charges that practically forced the government to

prosecute him, an expedient that achieved its purpose in reopening the Dreyfus case and led to the com¬ plete vindication of that officer. Zola was tried in February 1898 and a verdict imposing im¬ prisonment and fine was brought against him. He appealed the case and the verdict was quashed by the Cour de Cassation, 2 April 1898. A second trial was called and Zola, his purpose

accomplished, decided not to appear, but went to England where he remained until the amnesty for offenders connected with the Dreyfus case, 24 Dec. 1900, permitted his return to France. His account of his connection with the case is given in (L'affaire Dreyfus. La veritie en marche* (1901). He was created a knight of the Legion of Honor in 1888 and an officer in 1893, but after his condemnation in 1898 his name was removed from the roll. He was president of the Societe des Gens de Lettres in 1891—94, but he was repeatedly refused ad¬ mission to the Academy. Zola was the recog¬ nized head of the naturalistic school in fiction, but his followers were latterly few in number. His novels belong rather to the domain of science than to that of art. They are studies, in the main faithful enough though not free from distortion and exaggeration, in moral and social pathology; but they are not true to life and nature in the fullest sense, in the only sense which would entitle them to rank as artistic creations. Translations of the most important have appeared, chiefly by Vizetelly. Consult Brunetiere, ,(Le Roman Naturaliste) (1883) ; R. H. Sherard's highly eulogistic biographical and critical study (1893) ; (La Proces Zola) (2 vols., 1898; Eng. trans. 1898) ; Vizetelly, E. A., (Emile Zola, Novelist and Reformed (1904) ; and his <Letters) (1908).

ZOLLARS, Ely Vaughan, American edu¬ cator: b. near Lower Salem, Washington County, Ohio, 19 Sept. 1847; d. Warren, Ohio, 10 Feb. 1916 Graduated from Bethany College, West Virginia, in 1875, he was pastor of the church of the Disciples of Christ at Springfield, Ill., in 1885-88, and in 1888-1902 was president of Hiram College (Ohio). He was president of the Texas Christian Union in 1902-06; and from 1906 was president of Phillips University. His writings include (Holy Book and Sacred Day* (1893); (Bible Geography) (1894) ; cGreat Salvation* (1895) ; He¬ brew Prophecy) ; (The King of Kings) ; (Word of Truth* ; <The Commission Executed> ; Ser¬ mons, } *etc.*

ZOLLICOFFER, zol'T-kSf-er, Felix Kirk,

American soldier: b. Maury County, Tenn., 19 May 1812; d. near Mill Springs, Ky., 19 Jan. 1862. He entered the printer's trade, published a

weekly newspaper at Paris, Tenn., for about a year, and afterward was editor of the Observer at Columbia, Tenn., his duties being temporarily interrupted by his service in the Seminole war, in which he rose to be a commissioned officer. At Columbia he also published and edited an agricultural weekly. He became editor of the Nashville Banner, the leading Whig organ of Tennessee, in 1841 ; in 1844-49 was State comp¬ troller; and in 1853-59 was a representative in Congress. In 1861 he entered the Confederate army with brigadier's rank. He was in im¬ mediate command at the battle of Mill Springs, on the Cumberland, when Thomas drove the Confederates from the field, and achieved the first real victory for the National cause. Zollicoffer was killed within the Union lines, whither he had passed by mistake while on a tour of reconnaissance.

ZOLLNER, tsel'ner, Johann Karl Fried¬ rich, German physicist and astronomer: b. Berlin, 8 Nov. 1834; d. Leipzig, 25 April 1882. Educated at Berlin and Basel, he became a

lecturer in the University of Leipzig in 1865, in 1866 professor extraordinary of physical astronomy, and in 1872 professor ordinary. He made numerous contributions to astronomical science. These included the determination of the reflective capacity (albedo) of many planets and a study of their thermal conditions; photo¬ metric investigations of the Mercurian phases; and a study, through observation, of the in¬ tensity of solar radiations at their source, of the solar temperature. His (Grundzuge einer allegemeinen Photometrie des Himmels) (1861) contained the description of a new instrument, the astrophotometer, for the measurement of the light and color of stars. To the publications of the Royal Saxon Scientific Society he fur¬ nished many papers on the physical constitu¬ tion of the sun and stars; and he constructed spectroscopic instruments. (Ueber die Natur der Kometen) (1872; 3d ed. 1883) expounded the theory that the brightness of comets is due not to the fact that they are incandescent through heat but that they are glowing with electricity. Zollner was -latterly interested in spiritualism. Among his further

volumes are (Photometrische Untersuchungen) (1865), and (Ueber die universelle Bedeutung der mechan-ischen Principien) (1867). (Wissenschaftliche Abhandlungen) (4 vols., 1878-82). Consult the study by F. Korber (Berlin 1899), and Clerke, A. M., ‘History of Astronomy in the 19th Cen¬ tury0 (London 1908).

ZOLLVEREIN, tsol’fer-In ˆ (“customs—

union®). The feeble German Confederation formed in 1815 failed in many respects to meet the desire for union among the German people, or even to satisfy their practical re¬ quirements. The trade of Germany in particular suffered much from the obstructions caused by the different customs systems of so many petty states. In 1818 Prussia took the initiative of abolishing internal customs, but this policy ex¬ cited much opposition among the other German states, and even on the part of the Bund itself, which was indeed to some extent justified by the coercive measures used by Prussia to en¬ force the adoption of its policy on the smaller German states within its bounds. Prussia offered to admit the other German states within its union, but many of them preferred to set up rival and antagonistic associations. Thus Bavaria and Wiirtemberg formed a customs league in 1827, and Hohenzollern joined these states in 1828. In the same year was formed the Middle German Union, including Saxony, Han¬ over, Hesse, Brunswick, Nassau, Oldenburg, Bremen, Frankfort-on-the-Main, etc., and in 1834 another union (Steuerverein) . between Hanover, Brunswick, Schaumburg-Lippe, and which was joined by Oldenburg in 1836. But these hostile unions were not sufficiently ex¬ tensive to have any great vitality, and they were gradually distintegrated by the desertion of their individual members to join the Prussian union. Electoral Hesse joined in 1831 ; Bavaria, Wiirttemberg, Saxony, and other states in 1833; Hesse-Homburg, Baden, and Nassau in 1835; Frankfort in 1836; Luxemburg in 1842; Han¬ over, Oldenburg, etc., in 1851. During the treaty period of 1854-65 nearly all Germany, with the exception of Austria, the two Mecklenburgs and the Hansetowns, was included in the union. A difference of views between the various parties to the union began at this time

to develop, which caused much tedious nego¬ tiation. In general the north of Germany was in favor of imposing import duties on foreign trade for purposes of revenue only, while the south favored protective duties. As each mem¬ ber of the Zollverein had an equal voice in the direction of a common policy it was impossible to adjust these differences so as to satisfy the more powerful states, particularly

Prussia. Aus¬ tria also wished either to be included in the union or to break it up. Matters continued substantially in the same state after the re¬ newal of the treaty from 1 Jan. 1866 to 31 Dec. 1867 ; but the war of 1866 put an end to this agreement and new arrangements were entered into according to the political combinations then formed, Prussia obtaining a preponder¬ ating influence in the union of 1867, which in¬ cluded the North German Bund, Bavaria, Wurtemberg, Baden, Hesse (south of the Main) and Luxemburg. It was directed by a Zollbundesrath and a Zoll Parliament. The total number of votes in the Zollbundesrath was 58, of which Prussia had 17. This arrangement, formed for 12 years, was also brought to an end prematurely by the formation of the Ger¬ man Empire. By article 33 of the constitution of the empire the territory included in the Zoll¬ verein is to coincide with the territories of the empire, with a few exceptions noticed below. The powers of the Zollbundesrath and Zoll Parliament are transferred to the legislative bodies of the empire, and the affairs of the cen¬ tral bureau of the Zollverein are transferred to committees formed by the Federal Council of the empire. The territories of the free ports of Hamburg and Bremen were for some time excluded from the Zollverein and some com¬ munes of the grand duchy of Baden and a frag¬ ment of Hamburg were still excluded from it; while Luxemburg and the Austrian commune of Jungholz were included in it up to the fall of the empire in November 1918. Consult Ash¬ ley, W. L., (Modern Tariff History: Germany, United States, France) (2d ed., London 1910) ; Cambridge Modern History) (Vols. X, XI, New York 1909) ; Dittmar, (Der deutsche Zollverein) (Leipzig 1867) ; Worms, (L'Allemagne economique au histoire du Zollverein allemand) (Paris 1874). See Germany; War, European.

ZOLNAY, George Julian, American sculp¬ tor : b. Pecs, Hungary, 4 July 1863. Although educated for the diplomatic service, he eventu¬ ally entered the Royal Art Academy of Bu¬ charest and later the Imperial Academy of Fine Arts of Vienna, graduating with highest honors from both institutions. In 1894, after his work at the Columbian Exposition of Chicago, he settled in New York City where he won national reputation through his Tympanum and Poe bust for the University of Virginia; the Winnie Davis Memorial (Richmond, Va.) ; decorative figures for the Nashville Centennial; the monu¬ ments to General Bartow and McLaws (Savan¬ nah, Ga.) ; the Soldier Monument for Owens¬ boro, Ky. ; the Duncan Jacob Memorial for Louisville, Ky., and a large number of portrait busts.

In 1903 he was appointed director of the sculpture exhibit at the World's Fair in Saint Louis and professor of sculpture and perspective at Washington University. He resigned in 1909 to become director of

Art Academy. There he produced the heroic size granite group for the United States Custom House in San Francisco; the Sam Davis and Soldier Monument for Nashville, Tenn. ; the Hayes Memorial for Richmond, Va. ; two colos¬ sal lions for University City; the Laclede Monu¬ ment for Saint Louis; portrait busts of Em¬ peror Francis Joseph, Victor Hugo, Gen. Stone¬ wall Jackson, Major Rollins, Clara Hoffman, Walter Sheldon and others. In 1913 he trans¬ ferred his studio to Washington, D. €., where he has since produced the Saint Louis Confed¬ erate Monument; the great Industrial Monu¬ ment for New Bedford, Mass.; a large educa¬ tional frieze for the National Capitol s new high school; the Hoxie Memorial for Arling¬ ton cemetery; a number of portrait busts, and the Dr. Still Monument for Kirksville, Mo. He was president of the Saint Louis Artist's Guild, Vice-president Society of Washington Artists, Union Internationale des Arts et Sciences of Paris. He has won four bronze, one silver and three gold medals and was decorated by the king of Rumania with the Order Pour le Merit of the first class.

ZOMBOR, zom'bor, or SOMBOR, Jugo¬ slavia, a town of the comitat of Bacs-Bodrog, on the Baczer or Franzens Canal, which unites the Theiss with the Danube, 65 miles southwest of Szegedin. It has two Greek churches, a mag¬ nificent townhouse, and a public library, and carries on manufactures of silk. There is a large trade in cattle and corn. Pop. 30,552.

ZONA LIBRE, sd'na le'bra, formerly the designation of a strip of country extending along the whole northern frontier of Mexico, 20 kilometres wide, where imported goods were admitted at 10 per cent of the ordinary duties for use within the zone. This zone was first established on the frontier of the state of Ta-maulipas alone, in 1858, and was not extended across the whole frontier until 1885. At one time after the Civil War, the United States authorities claimed that the privileges permittted within the zone encouraged smuggling; the Mexican government claimed that the condi¬ tions of retail trade

made the zone a necessity; opposition to the zone, however, continued among competing manufacturers in the interior of Mexico and the zone privileges were at length eliminated.

ZONARA.S, Joannes, Byzantine historian of the first half of the 12th century a.d. He filled some distinguished offices about the impe¬ rial court, but gave himself up to a religious life as a monk of Saint Basil, employing his leisure hours in the compilation of a (History of the World from the Earliest Periods to the Year 1118P In this work (of which an edition appeared at Paris in 1686) he follows princi¬ pally the narrative of Dio Cassius, of whose first 20 books nothing is extant save Zonaras' abstract; but as he approaches his own times he becomes more entitled to attention, as his mistakes arise evidently more from ignorance than design. There is also extant a commen¬ tary on the apostolic canons by him. There is an edition of the <History) by Pinder (1841-44), with a third volume by Buttner-Wobst (1897). His <Chronicon) was edited by Dindorf (Leip¬ zig 1868-75). Consult Krumbacher, Karl,

(Geschichte der byzantinischen Litterature* (2d ed., Munich 1897).

ZONE, the term applied to any portion of the earth's surface bounded by two parallels of latitude, but more particularly applied to five such zones, the position of which is marked by natural boundaries. These five zones are called the torrid, northern and southern temperate, and northern and southern frigid zones. The torrid zone extends 23ˆ2° north and south of the equator; and twice a year the sun shines vertically on its inhabitants. This zone is bounded, on both sides of the equator, by the two tropics; that is, the circles in which the sun reaches its greatest distance from the equator. As the rays of the sun here are nearly vertical a perpetual summer reigns, and day and night under the equator are always equal ; and even at the tropics the difference is scarcely an hour Owing to the nature and situation, however, of the countries in this zone the heat is not every¬ where the same. The warmest portions are the sandy deserts of Africa; in the regions nearer the equator wherеˆ vegetation prevails the heat is less excessive; in the islands of the South Seas a milder climate prevails, and the highest mountains of Peru and equatorial Af¬ rica are covered with perpetual snow. The two temperate zones extend from the tropics to the polar circles. They contain the most popu¬ lous countries, and the climate is various. As the distance from the tropics increases the heat under similar conditions diminishes, the differ¬ ence of the seasons becomes greater, the days and nights become more unequal

until we ar¬ rive at a point where once a year the sun does not appear above the horizon during the 24 hours, and once a year does not set for the same time. The circles passing through these points, parallel to the equator and the tropics, form the limits of the temperate zones, and are called the arctic and antarctic circles. The distance from the tropics to the polar cir¬ cles, or the breadth of the temperate zones, both in the northern and southern hemispheres, is 43°. All beyond the polar circles to the poles is called the frigid zones. The distance from the polar circles to the poles is 23ˆ2°. The characteristic of the frigid zones is, that day and night are more and more unequal the nearer you approach the poles, and for days, weeks and even months the sun is either con¬ stantly above or constantly below the horizon. At the poles the year consists of one day and

one night

each six months long.

ZONE

OF

FLOWAGE.

See

Rock—

FLOWAGE.

ZONE

OF

FRACTURE.

See

Rock—

FLOWAGE.

ZOOGEOGRAPHY, the science of map¬ ping out the surface of the

earth with reference to its faunae; the study of the distribution of animal life. It has always been obvious to trav¬ elers, and even the most superficial students of nature, that the various regions of the earth's surface were characterized, among other differ¬ ences, by local peculiarities in animals and plants. It is a commonplace of knowledge that the animal life of the tropics is different from that of the arctic regions ; that the birds and mammals and small creatures of Africa differ

almost altogether from those of South Amer¬ ica or Australia. Closer examination shows that such differences exist in a greater or less degree between lesser regions, as the east and west sides of a continentˆ groups of islands separated by a sea-space, and so forth. On the other hand, there may be found striking re¬ semblances in the faunae of certain separate regions, or a sameness over an extensive area, as Europe and Asia.

The importance and significance of these facts impressed themselves upon scientific men only within recent times. As long as it was held that each species must have been created, as a general rule within the geographical area which it now occupies, the most curious facts of distribution could be regarded only with (<sterile wonder.® But when the idea came to be entertained that allied species have had a common origin, it was obviously implied that they or their ancestors must have had a com¬ mon birthplace, and consequently, when we find members of a group severed from their nearest kindred, we feel bound to inquire how this came about. Thus, we have to explain how the tapirs are confined to the Malayan region and South America; the camels to the deserts of Asia and the Andes; marsupials to the Australian region and ˆAmerica; how the birds, mammals and reptiles of North America resemble those of Europe-more than those of South America and so on.

Means of Dispersal. — Accepting as a start¬ ing point the proposition that the various forms of life originated in some iparent-stock or stocks at a particular place or places, the pres¬ ent distribution of

their descendants as we know them, must depend mainly upon the pow¬ ers of dispersion which each possessed, and the character of the physical influences and ob¬ structions which acted as controlling factors or barriers in guiding their dispersal along cer¬ tain lines and altogether prevented it elsewhere. Theoretically a new stock would spread equally in all directions from its point of origin; actu¬ ally a very irregular and complicated kind of distribution has ensued in most or all cases. Hence an inquiry as to the means and limita¬ tions of dispersion possessed by animals and plants is of first importance.

It is scarcely necessary to draw attention to the facilities for diffusion possessed by ani¬ mals endowed with great locomotive powers, and especially among land animals, by those having the power of flight (q.v.) ; but it is im¬ portant to note that some animals, which in the adult state have only feeble powers of locomo¬ tion, are better endowed in this respect when young. Such, for example, is the case with echinoderms, marine mollusks and similar lowly aquatic forms, all of which develop from free-swimming and often far-drifting larvae. (See Deep-Sea Life). But accidental modes of dis¬ persal must also be taken into account. The carrying power of winds is known to be suffi¬ cient to bear along in the air fine dust across seas many hundreds of miles in width, and we have in that agency alone an adequate means of accounting for the dispersion of all plants propagated by minute spores. For that reason the distribution of most cryptogamic plants hardly enters into the problem, since these mosses, fungi, seaweeds and the like are almost

universal. What part winds may have played in carrying the seeds of flowering plants is more doubtful ; but observations show that even for such seeds, especially when provided with some kind of feathery appendage, winds may occasionally serve as a means of transport for very long distances. See Plant Geog¬ raphy ; Plants, Migration of.

But in the case of animals also, winds are a more important means of transport than one might at first, suppose. Birds and insects are often blown immense distances out of their course; and to this cause, for instance, is due the arrival every year of American birds on the coasts of Great Britain and France, while European birds almost never reach America — a. fact plainly due to the prevalent easterly direction of the winds, and especially the gales in spring and autumn, when birds are migrat¬ ing. Insects have been caught on ships more than 300 miles from land. Further, there are well-authenticated cases of even crabs, frogs and fishes being carried long distances by storms, and in

this way it is possible to ac¬ count for the transference of fish, etc., from one river system to another. Still more fre¬ quently, in all probability, are the eggs of such creatures ‘transported, by this means.

Next, marine currents also form, beyond doubt, a highly important means of dispersal both for plants and animals, and that in vari- - ous ways. First, seeds may float on the sur¬ face of the ocean, and be carried by currents hundreds of miles, and become stranded on a distant shore still in a condition fit for germination. The experiments of Darwin to determine the vitality of seeds in seawater first enabled us to appreciate the importance of this factor. Further, marine currents often carry on their surface various kinds of natural rafts, which may transport both plants and animals. In the polar regions icebergs and icefloes may serve this purpose ; and elsewhere trunks of trees, and even fragments torn from the land. Such fragments, forming small islands with erect trees upon them, have been seen at a distance of 100 miles from the mouth of the Ganges and other rivers. Wal¬ lace points out that ocean waifs of one kind or another are almost the only means we can imagine by which land-shells can have ac¬ quired the wide distribution for which they are remarkable. Again, locomotive animals are very frequently the means of dispersing both plants and other animals. Seeds may be at¬ tached to the fleece or fur of mammals or the plumage of birds, or may be enclosed in clumps of earth clingting to the feet or some other part of bird or beast, even of ‘insects.

It seems probable that aquatic birds and water-beetles have been the means of distributing aquatic plants and freshwater mollusks, which are remarkable for their wide diffusion ; and the spawn of amphibians and freshwater fishes may be conveyed from one body of fresh water to another by the same means.

Lastly, man is often unintentionally the means of conveying both plants and animals from one region to another. The foreign plants found growing on ballast heaps near every civilized port are instances of this, and so, also, are the plants which have sprung from seeds introduced with imported grain and

merchandise. The whole costal region of North America is overrun with European weeds. Whereever European ships have gone the rats and other vermin of the Old World have ac¬ companied them, and hundreds of species of ex¬ otic injurious insects are known in all agricul¬ tural districts.

Obstacles to Diffusion of Animals. — For

all land plants and land animals the most ob¬ vious and effective barrier is a wide ex¬ panse of ocean ; and where the expanse is very wide it is seldom passable except with the aid of man. For land mammals the ocean is an absolutely impassable barrier, and hence native mammals are always absent from oceanic is¬ lands (that is, islands that have never been connected with the mainland) ; and this bar¬ rier is almost equally effective for serpents and amphibians, which also are nearly always want¬ ing where there are no native mammals. Liz¬ ards are more frequently found indigenous on oceanic islands, though their means of transit from the mainland is unknown. Arms of the sea and broad rivers are likewise generally im¬ passable for the creatures mentioned, though some of them have greater powers of swim¬ ming than is generally supposed. The tiger, the jaguar, the bear and the bison are capable of swimming the widest rivers; pigs have been known to swim ashore when carried out to sea to a distance of several miles ; and even a boa constrictor, it is said, has swum to the island of Saint Vincent from the South American coast — a distance of 200 miles.

Mountains, and especially high mountains, are also frequently effective barriers to the migration of land plants and animals; but in some cases they enable plants and animals of a cold climate -to spread along ‘their summits into latitudes where, in the plains, the climate is too hot for them. Again, deserts act as a barrier to the majority of plants and animals; forests are a barrier to the camel, hare, zebra, giraffe, etc.; treeless regions to apes, lemurs and many monkeys; plains to wild goats and sheep. Broad rivers also act occasionally as barriers to distribution, and that,, strange to say, even in the case of some species of bird’s.

Another important barrier is that of climate ; but climate merely limits the range of a species or group within-a continuous area, for exam¬ ple, through limiting the food supply by re¬ stricting vegetation. The range of insects is peculiarly liable to be limited in this way, cer¬ tain insects being attached* to particular species of plants, or at least to

genera or families ; and for this reason insects, in spite of the excep¬ tional facilities for dispersal which many of them enjoy, are remarkable, as a rule, rather for the restriction of their areas of distribution than for their wide diffusion. Various other minor factors might be mentioned.

But a more generally operative organic bar¬ rier consists in the fact of a region being al¬ ready fully occupied by a native flora and fauna, so that there is no room for new¬ comers. Hence it happens that seeds may be wafted in plenty from one country to another without a single plant growing from these seeds being able to establish itself ; and there may even be, as in South America, a free com¬ munication with another region while the fauna remains strikingly distinct, simply because that

portion of the American continent is already completely stocked with a fauna perfectly adapted to the physical conditions there pre¬ vailing.

The barriers to the spread of marine crea¬ tures are not so numerous as in the case of terrestrial forms. The freedom of communi¬ cation between one part of the ocean and an¬ other makes it impossible to mark out any marine zoogeographical regions, though many seas and coasts are distinguished by char¬ acteristic fishes and other marine creatures. There is also in the ocean a vertical distribu¬ tion, the limits of which are determined by depth and its conditions. The principal bar¬ riers for fish are temperature and the inter¬ vention of land. Thus, the Isthmus of Panama is at present a complete barrier for fishes re¬ quiring warm seas.

Geological Evidence. — If all the barriers to migration had existed in all past time as they are now, it would be quite impossible to ex¬ plain the present distribution of plants and ani¬ mals on the supposition that kindred groups have had a common birthplace. But the solu¬ tion of the problems of distribution is to be found in the fact that all the -barriers are liable to change. Of changes of sea and land geology supplies us with abundant evidence. Portions of the mainland now continuous were at one time severed by arms of the sea; and islands have been formed iby the severance of portions of land that once belonged to the mainland. Such islands are known as continental islands, and the study of their faunae and floras is one of peculiar interest in connection with geo¬ graphical distribution. These faunae and floras show, as might be expected, a greater or less degree of

correspondence with those of the mainland from which the islands have been cut off ; and the resemblance is the closer the more recently the land connection has been destroyed. The relative date of the disunion is usually approximately indicated by the depth of the sea which now separates island and mainland, shallow seas dividing portions of land that have only recently been disconnected, and deeper seas separating those which have been longer apart.

The most remarkable case of isolation is presented by the Australian region, the fauna and flora of which are the most peculiar in the would. In the widest sense, this region in¬ cludes not only the vast island of Australia itself, but also New Guinea and all the Mala¬ yan and Pacific islands to the east of a deep channel between the islands of Bali and Lom¬ bok — a channel the significance of which, as a boundary line for plants and animals, was first pointed out by A. R. Wallace, the great authority on animal distribution, and hence known as Wallace's Line. The great feature of this region (so far as animal distribution is concerned) is (The almost total absence of all the forms of mammalia which abound in the rest of the world, their place being taken by a great variety of marsupials.® This presents one of the best examples of what are known as discontinuous areas of distribution, and offers an illustration of the mode in which such discontinuity is usually brought about. The early severance of the Australian region from the Asiatic continent (in the Mesozoic

Age) saved the Australian marsupials from the competition which almost extinguished the group elsewhere.

Changes in the climatic barrier have also had an important influence on geographical distri¬ bution ; and it is by such changes, combined with changes in the continuity of Land in the north polar regions, that the affinities between the floras of Japan and eastern North Amer¬ ica must be explained. (See Land-Bridges). When these affinities were first pointed out by Asa Gray, that distinguished botanist divined the true explanation — namely, that in for¬ mer geological epochs, a genial climate must

various barriers to migration, and of the changes in these barriers, we have the present distribu¬ tion of plants and animals, which is such as to enable us_ to divide the terrestrial surface of the globe into more or less well-marked regions. For mammals, the regions adopted by Wallace are nearly the same as those first suggested by Sclalter as applicable to the distribution of birds; for, in spite of the exceptional facility which birds have for crossing barriers im¬ passable by mammals, Wallace finds that the distribution of mammals (which afford the best means of marking off zoogeographical regions) corresponds with that of birds to an extent that

The Zoogeographical Regions according to Sclater and Wallace:

Sub-regions of Palaearctic Region —

1. European.

2. Mediterranean.

3. Siberian.

4. Manchurian.

Sub-regions of Ethiopian Region —

1. East African.

2. West African.

3. South African.

4. Malagasy.

Sub-regions of Oriental Region —

1. Indian.

2. Ceylonese.

3. Indo-Chinese.

4. Indo-Malayan.

Sub-regions of Australian Region —

1. Austro-Malayan.

2. Australian.

3. Polynesian.

4. New Zealand.

Sub-regions of Neotropical Region —

1. Chilian.

2. Brazilian.

3. Mexican.

4. Antillean.

Sub-regions of Nearctic Region —

1. Californian.

2. Rocky Mountain.

3. Alleghanian.

4. Canadian.

have prevailed even within the polar circle, so as to allow of the existence of a remarkably uniform flora, suitable to such a climate, all round the pole in very high latitudes ; and that as the climate became colder in the North this flora was driven southward, and became dif¬ ferentiated according to the differences of cli¬ mate in the more southerly latitudes to which it advanced. Hence the eastern parts of America and Asia, as they correspond pretty much in climate, came to correspond also more closely than other tracts in the same latitude in the character of their floras. The soundness of this surmise was

afterward confirmed by the discovery of abundant plant remains of the Miocene Age, indicating a warm climate in Greenland, Spitzbergen, and elsewhere. The effects on distribution of the changes of cli¬ mate belonging to the Glacial Period or Ice Age may only be alluded to here.

Zoogeographical Regions. — As the result of all the processes of dispersal across the

one would not perhaps have previously antic¬ ipated. But with regard to these regions it must be remembered (1) that it is impossible in most cases to draw any very clearly marked boundary line between one region and another; (2) that the degree of divergence between dif¬ ferent regions is different in different cases; and (3) that, when any two regions are com¬ pared, we have not the same degree of diverg¬ ence between different groups of the animal kingdom, or between animals and plants be¬ longing to the two regions. Obviously, the degree of correspondence depends largely on the facilities for dispersal, and largely also on the geological age of different groups ; and both of these are varying factors. These con¬ siderations being premised, we may now state briefly the limits of the six zoological regions adopted by Wallace, as given in his (Island Life.* In the space to which the present arti¬ cle is necessarily restricted it is impossible to give even the most fragmentary sketch of the

characteristic life of the different regions, for which the reader must be referred to the works cited at the end of the article.

(1) Palaearctic Region, including Europe and north temperate Asia and Africa to the northern borders of the Sahara.

(2) Ethiopian or Palaeotropical Region, con¬ sisting of all tropical .and South Africa, to¬ gether with Madagascar and the Mascarene

Islands.

(3) Oriental Region, comprising all Asia south of the Palaearctic limits, and the Malay Islands as far as the Philippines, Borneo and Java.

(4) Australian Region, the Papuan Islands, Australia, New Zealand, and the islands of Oceanica. Celebes might be referred almost with equal right to this or the previous region. New Zealand is treated by Wallace as a highly peculiar sub-region of this great region.

(5) Nearctic Region, comprising all tem¬ perate and arctic North America, including Greenland, and extending on the south to an irregular line running from the Rio Grande del Norte on the east to a point nearly opposite Cape Saint Lucas on the west.

(6) Neotropical Region, the American con¬ tinent south of this line, together with the West Indian Islands, sometimes called Neogaea.

Heilprin and others advocate the union of the Nearctic and Palaeartic regions under the name of Holarctic, and introduce three transi¬ tional tracts (the Mediterranean, embracing southern Europe, northern Africa and western Asia, south of the Caspian and west of India, but exclusive of the southern half of Arabia; the Sonoran tract, embracing the northwest of Mexico ; and the Austro-Malaysian tract, em¬ bracing Celebes and the smaller islands lying between it and New Guinea and Australia). Otherwise his major faunal divisions of the globe are similar to those of Wallace.

On plant distribution the most important recent works are those of Engler and Drude. Engler attempts to trace the history of the vegetable kingdom since the Tertiary period, and comes to the conclusion that already in the Tertiary period four <(floral elements" (Florenelemente) could be distinguished, namely :

(1) The Arcto-tertiary element, character¬ ized by an abundance of conifers and numer¬ ous genera of trees and shrubs now prevalent in North America, or in extratropical eastern Asia and in Europe.

(2) The Palaeotropical element, character¬ ized by the presence of the families and sub¬ families dominant in the tropics of the Old World ; and still more by the absence of cer¬ tain families, groups and genera found in the territory of the Arcto-tertiary element.

(3) The Neotropical or South American element, which, according to Engler, must have had in Tertiary times much the same character as that now possessed by tropical Brazil and the West Indies.

(4) The old Oceanic element, consisting of forms which possessed the power of traversing considerable stretches of ocean and developing further on islands.

The modern provinces of the vegetable king¬ dom are subordinated by Engler to these great divisions. Drude, in the first place, distin¬

guishes the oceanic (marine) flora from the terrestrial forms, and the latter he divides into three great groups, and these again into 14 floral domains. See Plant Geography.

Bibliography. — Sclater, Geographical Dis¬ tribution of Birds,) in (Journ. Linn. SocP (Zool.), Vol. II (1875); Wallace, Geographi¬ cal Distribution of Animals } (New York 1876) ; Wallace, Hsland Life) (New York 1885) ; Heilprin, Geographical and Geological Dis¬ tribution of Animals) (New York 1887) , Beddard, (Textbook of Zoogeography* (London 1895) ; Engler, (Entwicklungsgeschichte der Pflanzenwelt* (Leipzig 1879-82) ; Drude, (Die Florenreiche der Erde) in (Petermann's Mitteil-ungen> (1884).

Ernest Ingersoll.

ZOOLATRY, the worship of animals. This seems to have passed through three stages: (1) The animal was reverenceed and propitiated as possessing a power greater than that of man. (2) It was regarded as an incarnation of some deity or spirit. (3) It was raised to the posi¬ tion of a tribal ancestor. Zoolatry had its origin in the belief of primitive man that all nature was endowed with life and that many beings were possessed of great and magical powers. Animals were believed to be especially endowed with such powers. They were also thought to have their chiefs and tribal organiza¬ tions just as man had, and their great magicians who were powerful enough to bring confusion upon their enemies. Hence primitive man at¬ tempted to conciliate all the mysterious forces and powers of nature, among them, those of the animal kingdom. Out of this, through suc¬ cessive stages, grew animal worship, with all its attendant ceremonies, forms and incanta¬ tions. In the early history of the human race zoolatry of some kind was very prevalent. Traces of it appear in the Bible, as in the story of the -Golden Calf made by the Israelites (Ex. xxxii). Zoolatry took deep root in the re¬ ligious life of the aftcient Egyptians, and all three forms flourished among that people. Juvenal opens his 1 5th satire with a scathing invective of Eˆ>rptian zoolatry, and detailed ac¬ counts of it occur in Herodotus, Plutarch, Strabo and

Cicero. In the present day zoolatry survives chiefly in India and among the snake-worshippers of the west coast of Africa. See Nature Worship.

ZOOLOGICAL GARDENS, or PARKS,

places for the keeping and attractive display of living animals, where they may live, as far as possible, in the open air and under natural conditions; a zoological garden thus differs from a menagerie, as that term is now under¬ stood, in that in the latter the animals are con¬ fined in narrow prison-cages, under cover, and are usually borne from place to place to be dis¬ played for a fee. Collections of captive ani¬ mals have always been kept by royal and eminent persons, and formed a large element in the sights and amusements of the populace in ancient and mediaeval cities. The present conception of zoological collection, as a place where animals shall be maintained in the great¬ est practicable freedom for the sake of exhibit¬ ing their traits to the student, and shall be re¬ garded only secondarily as objects of curiosity, is a modern idea, and one that has been

A ,

Copyright 1904 N. Y. Zoological Society

2 White-tailed Gnu, in the New York Zoological Park

1 Rhinoceros Iguana, in the New York Zoological Park

Copyright 1904 N. Y. Zoological Society

2 Gila Monster, in the New York Zoological Park

ZOOLOGY

developed to its highest degree in the United States. Many large cities of the Old World have ((zoos,55 as they are popularly called, not¬ ably London, Dublin, Berlin, Paris, Vienna, Amsterdam, Rotterdam, Antwerp, Hamburg, Copenhagen, Hanover, Cologne, Bombay, Cal¬ cutta, Tokio, Melbourne and several South American cities, especially Rio de Janeiro and Buenos Aires. All of these are the property of a society or private ownership of some sort except the garden in Berlin, and that attached to the Museum of Natural History at the Jardin des Plantes, in Paris and that in Vienna. They are sustained, therefore, partly by membership subscriptions and partly by gate-receipts, but most or all of them give free days. The sale of animals born and reared within their pre¬ cincts is a source of revenue with some, as, for instance, the Dublin garden which has supplied a large proportion of all the lions now held in captivity by circus and traveling menageries. The Berlin <(zoo55 stands third in the number of its animals and general excellence of ar¬ rangements ; that of London, founded in 1828, is second only to the New York Zoological Park, and the splendid series of volumes constituting the Proceedings5 and transactions5 of the Zoological Society of London attest the ad¬ mirable use which has been made of the col¬ lection by naturalists.

Zoological gardens have long existed in the United States, among the oldest being those at Cincinnati and Philadelphia, both privately sus¬ tained, and each highly credita'ble. To these were added collections of living animals in the parks of various cities, maintained by municipal appropriation, among which those in Bronx Park, New York; Highland Park, Pittsburgh; Lincoln Park, Chicago; Belle Isle, Detroit, and Golden Gate Park, San Francisco, are im¬ portant.

The National Zoological Park at Washing¬ ton was established in 1889, in a large tract of hilly and forested land along Rock Creek in the outskirts of Washington. Its prime purpose was to gather a representative collection of American animals and possibly preserve from extinction species threatened with racial de¬ struction. It has extensive and highly pic¬ turesque grounds, and its collection of animals has remarkably favorable surroundings and is kept in admirable condition. The support of this free park, one-half of which comes from Congress and one-half from the District of Columbia, has not been sufficiently liberal to make its development as rapid as its friends desire.

The latest and foremost American zoolog¬ ical park is that in the northern part of the city of New York, which -is under the control of the New York Zoological Society, to which the city granted 264 acres of land in Bronx Park, police protection and various aids and immuni¬ ties. It is largely financed out of municipal funds and is free to the public five days a weeks. A large herd of American bison is a notable feature of this park. This is the largest and most suitable space devoted to the care and exhibition of animals anywhere in the world, and since its opening in 1897 it has developed into a most prominent and useful position among the world's 'institutions of this kind. The society has about 2,000 members, and is¬

sues a series of important periodical publica¬ tions. This park has been developed and re¬ mains under the care of William T. Hornaday. Consult (Annual Reports5 of the Smithsonian Institution (Washington, D. C.) ; (Bulletins ot the Zoological Society of New York5 (contain¬ ing many photographs and plans of buildings and enclosures) ; Flower, S. S., (Notes on Zoological Collections visited in Europe in 1907 5 (Public Works Department, Cairo, Egypt) ;

(Reference List of the Zoological Gardens of the World5 (1910) ; Loisel, G., <Rapiport sur une mission scientifique dans les jardins et etablissements zoologiques publics et prives du Royaume-Uni, de la Belgique et des Pays-Bas, et des Ltats-Unis et du Canada, et conclusions generates5 (Paris 1908) ; Peel, C. V. A., (The Zoological Gardens of Europe5 (London 1903).

ZOOLOGY, that branch of biology, or the science of living things, which treats of animals. The scope of the science may be gathered from the following enumeration of its main branches: (1) Morphology, which treats of the outer form and internal structure of animals, their anatomy, histology, physiology, etc.; (2) Embryology, or ontogeny, treating of the development of individual animals from their earliest discernible stage; (3) Threm¬ matology, treating of <(breeding or propagating animals and plants under dome*stication, of their congenital variations under these circumstances, and of the perpetuation of such variations55 ; (4) Palceozoology, or animal palaeontology, treating of fossil animals. (5) Phylogeny, which seeks to investigate the evolution of the various groups or types of animals; (6) Taxon¬ omy, or Systematic Zoology, treating of the classification of animals, — their arrangement in groups determined by genetic relationships; (7) Bionomics, or Ecology, which investigates the conditions of life as a whole, habits, instincts, etc.; (8) Zoogeography,

dealing with the dis¬ tribution of animals on the surface of the earth. So comprehensive a view of zoology is a mod¬ ern conception and has resulted from the con¬ viction of the unity of organic nature and the kinship of descent which pervades the whole realm of beings, past and present. In the ear¬ lier days of the study of nature each group of animals was considered by itself, and to each such study was naturally given a name, many of which survive as convenient terms in de¬ scriptive zoology. Such are Conchology, the study of shells (of mollusks), and hence the study of the Mollusca; Entomology, the study of insects ; Herpetology, the study of reptiles (popularly including amphibians) ; Ornithology, the study of birds, and so on. For detailed in¬ formation upon animals and the various aspects of their instigation consult articles under their names, as birds, horse, pompano, *etc.* ; under the technical names of groups, as Carnivora, Camelidae, and under such terms as Ichthyology, Herpetology and the like. See also Anatomy ; Animal Heat; Biology; Bionomics; Breed¬ ing; Cell; Coloration, Protective; Darwinian Theory; Embryology; Evolution; Growth; Heredity; Hybridity ; Instinct; Lamarck¬ ism; Life; Migration; Natural Selection; Organ; Paleontology; Weismannism; Zoo¬ geography and related topics.

ZOOLOGY, History of, the record of dis¬ covery in the science of zoology. We have no

evidence that the study of zoology was prose¬ cuted to any considerable extent before the time of Aristotle. In his hands it became at once a science, and the foundations of a system of classification were laid. No artificial system of classification has ever been proposed in zoology, like the sexual system of Linnaeus in botany; but from the very first to the present day, a natural grouping of animals has always been attempted. To this the widely-marked distinctions between the principal groups almost unavoidably led. Aristotle brought to bear on the subject the highest powers both of obser¬ vation and of generalization, and some of the groups established by him retain their place in the most modern systems.

t Aelian and Pliny show no capacity for the scientific treatment of the subject, and in their writings facts are largely mingled with fables. During the Middle Ages the greatest name in connection with the history of the science is that of Albertus Magnus ; much of whose knowledge, however, was derived from Aristotle and other ancient authors. From his time, in the first half -of the 13th century, to the beginning of the 16th, zoology made little ad¬ vances; but the new activity of mind which then displayed itself soon sought this as well as other directions, and an especial impulse was given to zoology by the progress of geo¬ graphical discovery. The names of Belon and Rondelet are the two greatest in this depart¬ ment at this period, and by them zoology was enriched with many new facts, while attempts were made at a more perfect classification. Aldrovandi and Gesner soon followed, besides others who began to direct their attention more specially to particular branches of zoology; but it was not till after the middle of the 17th cen¬ tury that any real progress was made in classi¬ fication founded on a philosophical study and comparison of animals. The works of Ray are described by Cuvier as (<the foundation of modern zoology.® -The materials, however, were in great part prepared, and the first outline of a system sketched by Willughby. From the days of Aristotle, zoology had never been prose¬ cuted with such acuteness ‘of observation, ac¬ curacy of description and breadth of philosophi¬ cal generalization as it was by Willughby and Ray. The progress of the science now became very rapid. Buffon won for it, by his interest¬ ing descriptions and brilliant style, the general attention of the educated portion of society in his own and in other countries. He was almost immediately followed by Linneseus, who, ex¬ tending his studies from botany to zoology, not only enlarged the science by his own ob¬ servations and discoveries, but rendered it far greater service by gathering together the facts ascertained by others, and by the improvement which he effected in classification. Some of the larger groups established by Linnaeus have been retained by all subsequent naturalists with¬ out essential modification of their characters, and even his smallest groups — genera — have been very generally retained, though now re¬ garded as constituting tribes or families. Ac¬ cording to the Linnaean system, the animal kingdom is divided into six great classes, fur¬ ther brought together in groups of two each. His classes are: I. Mammalia , with the orders Primates, Bruta, Ferae, Glires, Pecora, Belluae

and Lete; II. Aves, with the orders Accipitres, Picae, Anseres, Grallae, Gallinae and Passeres; III. Amphibia , with the orders Reptilia, Serpentes and Nantes; IV. Pisces, with the orders Apodes, Jugulares,

Thoracici and Abdominales ; V. Insecta, with the orders Coleoptera, Hemip-tera, Lepidoptera, Neuroptera, Hymenoptera, Diptera and Aptera; VI. Vermes, with the or¬ ders Intestina, Mollusca, Testacea, Lithphyta and Zoophyta. It was, however, in constituting and defining the genera that Linnaeus showed in the highest degree his powers both of obser¬ vation and of arrangement. The names of Pal¬ las, Hunter and Blumenbach particularly are worthy of notice, but more than any other the name of Cuvier, who, like Linnaeus, took a com¬ prehensive view of the whole subject of zoology and carried forward the work of minute obser¬ vation as well as of generalization. His system of classification is so vast an improvement on that of Linnaeus as to be almost fundamentally new, and has formed a new starting point for all further progress.

He rejected the view, held by Lamarck, that a linear classification of the animal kingdom is possible, and in his great work, (Le Regne AnimaP (1817), he grouped his classes in four embranchements, representing-four funda¬ mentally distinct types of structure. These branches, with their contained classes, are as follows: Vertebrata, including Mammalia,

Birds, Reptiles, Fishes ; Mollusca, including Cephalopoda, Pteropoda, Gasteropoda, Acephala, Brachiopoda, Cirrhopoda; Articulala, including Annelides, Crustacea, Arachnides, Insects; and Radiata, including Echinoderms, Intestinal Worms, Acalephae, Polypi, Infusoria. He raised comparative anatomy to the dignity of a true science, and he carried out researches of the utmost value in palaeontology. In the restora¬ tion of extinct animals from remains of parts he used his law of the correlation of parts ac¬ cording to which animals are so constituted that single organs or parts can serve as an index to all other parts and to the general structure. The system of Cuvier has been extensively modified by many subsequent anatomists; nota¬ bly Lamarck, De Blainville, Ehrenberg, Owen, Milne-Edwards, Von Siebold, Stannius, Leack-art, Agassiz, Huxley, Haeckel and others. The present state of classification must not be re¬ garded as authoritative or final, since the rapid progress of knowledge is introducing incessant change in our conceptions of the relations of the greater groups. The reverse error must, however, be guarded against — that of suppos¬ ing one classification as good as another, for each really marks a stage of progress.

Darwin and After.— - The theory of the fixity of species was challenged at various times by different zoologists, notably by Lamarck, but it was not till the publication of (The Origin of Species) (1859) by Charles Robert Darwin (1809-82) that the old view became

generally abandoned and the evolution or development theory took its place. This has completely transformed the whole outlook of the zoologist and has brought new branches of the science into being, notably thremmatology. It makes the tree-like classification to which systematists have, steadily advanced a truly genealogical tree, and it has contributed enormously to the prog¬ ress of what may be called philosophical zool-

ogy. The natural-selection principle was inde¬ pendently discovered at practically the same time by Alfred R. Wallace (-1823-1913), the eminent naturalist-traveler. Herbert Spencer had also formulated an evolution theory, ex¬ tending to the whole of nature and life. Thomas Henry Huxley (1825-95), master of an ad¬ mirably lucid and attractive method of exposi¬ tion, and Ernst Hseckel (1834-), have done admirable work in embryology and other branches of zoology, and have contributed much to developing and popularizing the Darwinian views. August Weismann (1834-1914) is best known by his valuable contributions to the doc¬ trine of heredity. The number of other zool¬ ogists who have done good work during the Darwinian period and under the influence of the Darwinian conceptions is so great that no attempt will be made to enumerate them.

Bibliography. — Lamarck, (Philosophic Zoologique) (Paris 1809) ; Carus, (Geschichte der Zoologie) (Leipzig 1872) ; Spencer, Principles of Biology) (London and New York 1898) ; Osborn, Prom the Greeks to Darwin > (New York 1894) ; Miall, (Early Naturalists> (Lon¬ don 1912) ; (Cambridge Natural History) (10 vols., New York 1895-1909) ; Lankester, E. R., (Zoology) (ib. 1906) ; Parker and Haswell, <Zoology) (2 vols., ib. 1910) ; Zoological Rec¬ ord (London, annually).

ZOOMORPHIC, a word meaning, pertain¬ ing to or exhibiting animal forms. In anthropol¬ ogy, representing a god or other supernatural being under the form of one of the lower ani¬ mals. The zoomorphic element in classic my¬ thology appears in such cases as that of the Sminthean Apollo, and the metamorphoses of Jupiter; it is very

strongly marked in the re¬ ligion of ancient Egypt, and traces of it may be found among the Jews and in the Apocalypse.

ZOOPHYTE, a term meaning literally ani¬ mal plants, borrowed from Aristotle by Cuvier, and used by him as a synonym of Radiata. The term has no longer any specific value, but is often loosely applied as a designation for many plant-like animals, as sponges, corals, etc., more or less resembling plants in appearance.

ZOPFL, tsepfl, Heinrich Matthias, German legal scholar: b. Bamberg, Upper Franconia, Bavaria, 6 April 1807; d. Heidelberg, 4 July 1877. Educated at Wurzburg, he became a lec¬ turer at Heidelberg in 1828, in 1839 professor extraordinary of constitutional law, and in 1842 professor ordinary. He was elected university representative in the first chamber of Baden in 1850, and sat in the Unionsparliament at Elfurt. Among his works are (Grundsatze des Gemeinen Deutschen Staatsrechts) (1841; 5th ed., 1863), and (Deutsche Staats-und Rechtsge-schichte) (1834-36 ; 4th ed. as (Deutsche Rechts-geschichteˆ 1871-72).

ZORELLA ISLANDS, East Indies. See

Xulla Islands.

ZORGITE, a mineral from Zorge and Tilkerode in the Harz. Massive; brittle; hard¬ ness, 2.5 ; specific gravity, 7 to 7.5 ; lustre, metal¬ lic ; color, lead or sometimes yellowish gray. A selenide of lead and copper in varying amounts.

ZORILLA, or ZORRILLA, thoˆ-rel'ya, Manuel Ruiz, Spanish statesman : b. Burgo de Osma, province of Soria, 1834; d. Burgos, 13

June 1895. He studied law at Valladolid and became an advocate at Madrid, where in 1856 he was chosen to the Cortes, in which he identi¬ fied himself with the Progressive party, and displayed a vigorous hostility against the Neo-Catholics. Banished in consequence of the in¬ surrection of June 1866, he remained in France until the revolution of 1868, when Serrano ap¬ pointed him Minister of Commerce, Education and Public Works. In 1869-70 he was Min¬ ister of Justice, and later president of the Cortes. He was a supporter of Duke Amadeus of Aosta for the Spanish throne, and when the latter became Amadeus I, was made Minister of Pub¬ lic Works. In 1872 he assumed the head of a radical ministry, but after Amadeus' abdica¬ tion retired. Upon the accession of Alphonso XII in 1875 he went to

France and for 18 years was the leader of the Spanish Republicans. He was continually under the observation of both the French and Spanish secret service ofifi-. cers and for his participation in the military revolt of March 1884, he was sentenced to death, although still on French soil. Broken in health and spirits, he at length abandoned his leadership and was permitted to return to Spain. Consult Villareal, (Ruiz Zorilla desde la Expulsion de Espana hasta su Muerte 1875—

95 (1903).

ZORN, tsorn, Anders Leonard, Swedish painter: b. Utmedal, 18 Feb. 1860; d. 22 Aug. 1920. He studied sculpture and painting at the Stolkholm Academy. In 1882 he settled in Lon¬ don, where he attained special success as a por¬ trait painter, and in 1889 went to Paris. He traveled widely in Sweden, Italy, Spain, England, the United States and elsewhere ; while in the United States he painted several portraits. He ranks among the leading contemporary Swedish artists, and his work includes landscape, genre, portrait painting and sculpture, as well as etch¬ ings of great merit, which are chiefly copies of his own paintings. Among his paintings are (Irish Maidens> ; (The ToasD ; Htalian Street Scene) ; (Summer in Sweden) (National Gal¬ leries, Berlin) ; (Midsummer Night Dance at Dalecarlia) (National Museum, Stockholm) ; (Nude} (Metropolitan Museum, New York), and portraits of Renan, King Oscar, King Charles of Sweden, of himself (Uffizi Gal¬ leries), Harald Wieselgren, *etc.*

ZORN, Philipp, German jurist: b. Bay¬ reuth, 13 Jan. 1850. After study at Munich and Leipzig, he became a lecturer at Munich in 1875, and in that year went as professor to Bern. From 1877 he was at Konigsberg, and in 1900 took a chair in the legal faculty at Bonn. In 1899 he participated as an expert in the Peace Conference at The Hague. Among his works are (Staat und Kirche in Norwegen bis zun Ende des 13ten Jahrhunderts* (1875) ; (Staat und Kirche in der Schweiz) (with Gareis 1877-78) ; (Staatsrecht des Deutschen Reichs) (2d ed., 1894-97) ; (Deutsche Kolonialgesetzge-bung> (1901), and (Die Deutsche Staatssprache* (1903) ; (Die Deutsche Reichverfassung> (1907); (Staats-und VerwaltungsrechD (1914), *etc.*

ZORNDORF, tsorn'dorf, Germany, a vil¬ lage of Brandenburg, Prussia, 53 miles north¬ east of Berlin. It is celebrated for the Prussian victory won by Frederick the Great over the

Russians under General Fermor, 25 Aug. 1758, the Russians losing 21,529 men and the Prus¬ sians about 11,000. See Seven Years' War. Pop. 988.

ZOROASTER, religious reformer of an¬ cient Persia. Termed Zarathustra in the Avesta or primitive Iranian code, and in later Persian Zardusht, its meaning has been vari¬ ously interpreted — one of its roots is un¬ doubtedly "camel.® Its modern form Zoroaster was adopted from the Greek and Latin. The story of his birth and activities has little au¬ thentic basis, although his historic personality is admitted. All details are scanty, and it is impossible to distinguish 'between legend and fact, as is true in general of old time founders of religions, whose personality and exploits later ages have magnified out of all proportion to their real stature and deeds.

Greek and Roman writers make frequent mention of him as founder of the wisdom of the Magi and tell of his childhood and solitary life. Plato in his <Alcibiades) (I, p. 122) makes one of the earliest references.' Pliny, Plutarch, Dio Chrysostom are explicit in their accounts, which border on the miraculous. No mention is made, as might be expected, in the cunei¬ form inscriptions of the Achaemenidse, the an¬ cestral royal line of Persia, although 'Darius and his successors were loyal followers of the prophet. Darmesteter terms Zoroaster a myth, the incarnation of the storm-god. As Dr. Geldner states, however, the French scholar does not distinguish between the Zoroaster of the younger Avesta and of the Gathas, or "songs,® in which the very words of the sage are expressed, his authentic say¬ ings, the last survivals of the sermons which he spoke at the court of King Vishtospa. In these psalms, hymns, or songs, he appears as a man on solid ground, like some later world-prophet, with his alternation of confidence and despair, but with his hold on God firmly re¬ tained in all changes of fortune. The Gathas, on the other hand, furnish no precise his¬ torical data, merely a number of verses that allude to personal events interwoven with sage reflections and counsel — a kind of modern pastoral admonition. A comparison to the Psalms of David will illustrate this point of literary content to a certain degree.

Admitting, then, his historical personality, what do the Persian traditions tell of his origin? His father bore the title Spitama, indicating a noble line ; his mother's name, too, is mentioned. His birthplace was on the hill of the river Darga (Darya). Another legend traces his birth to Ragha in Media, the seat of the imperial hereditary church in Sassanian times. Like others of his type — Mohammed, for example — he had heavenly visions in early years and conversed with archangels and the Highest. At the age of 30 he had a celestial vision on the banks of the river. An angel in¬ vited him to a conference with Mazda, or the Highest, a symbol of the new era and religion which he was to found, abolishing the crude notions of his age and environment and de¬ veloping a loftier ideal of the Supreme and humanity. Sent by Mazda to the court of King Vishtaspa, king of Bactria in epic legend, he suffered indignities at first and was thrown into prison — how familiar these points in the

narrative ! Then on gaining his liberty, he converted to the new faith the king himself, wife, brother and the two viziers, all of whom became ardent devotees and gave strength to the cause, despite the many severe trials it had to endure. Finally, on an invasion of the kingdom, Zoroaster was slain in 'his 77th year by a Turanian. His sons and daughters are frequently mentioned. As to the date of Zoroaster, the chronology is obscure. The time of his birth varies from the extravagance of Greek writers who place him 5,000 years before the Trojan War to the Parsee tradition, which puts his birth at 660 b.c. and his death at 583 b.c. Edward Meyer and Duncker give 1000 b.c. as date of his birth, after careful study of available sources.

While the doctrines in general of Zoroas¬ trianism are discussed elsewhere, the personal declarations of its founder as expressed, as before stated, in the Gathas, are eminently quotable. His conviction of his mission and its sacred message is breathed in the words : "I am thy chosen one from the beginning; all others I consider my opponents.® "To thee I cry: Behold, O Lord, and grant me assistance, as a friend grants it to a dear friend,® so sounds his appeal. "Tell me right, O Lord — will the good deeds of men be rewarded al¬ ready before the best life comes?® is his in¬ spiring question. "Who sustains the earth here below, and the space above, that they do not fall? Who made the waters and the plants? Who has yoked to the winds the storm clouds, the two swiftest of things?® is in the spirit of Job's glorification of the Creator. Consult Jackson, A. V. W., ˆZoroaster, the Prophet of Ancient Iran> ˆNew York 1899) ; Ragozin, Z. A., (The Story of Media, Babylon and Persia) (New York 1888).

ZOROASTRIANISM, the religious system of ancient Persia as founded by Zoroaster, whose religious teachings are preserved in the Avesta, one of the world's oldest sacred books. The character of the Persian religion in pre-zoroastrian times has been a frequent subject of inquiry, but while nothing authentic is known, there is every reason to infer a certain similarity with the ancient faith of the Hindus. Iran and India were not so distant from each other as to make impossible communication one with the other. If we turn to Herodotus as informant (Hist, i, 31ff.) the Persians are said to have worshipped from antiquity the sun, moon and stars, the earth, the waters and the wind, the crassest polytheism. He inti¬ mates also that they borrowed some religious notions from Assyria and practised certain rites against which the prophet protested. His account too of the Magian ceremonies indi¬ cates that they were not inconsonant with Zoroastrianism. Ed Meyer in the Reports of the Prussian Academy (1908) shows how re¬ cently discovered Hittite inscriptions have a distinct bearing on the old creed of Iran, upon which the religion of the prophet was based, that Aryan folk-religion, polytheistic in its nature, many of whose divinities, Mitra and the rest, are not strangers in the Indian pantheon, while diversities as well as similari¬ ties abound in the theologies of both.

Dualism. — The first characteristic element of Zoroastrianism is its doctrine of dualism,

which personifies the opposing principles of good and evil, and recognizes the universal sway of these hostile forces. Briefly to de¬ scribe this vital feature, the powers of good are led by Sharamazda or Ormuzd (((the Wise Lord/0) ; those of evil by Ahriman (((the Spiritual Foe"). These opposing hosts, as if trained to combat and command by Oriental despots, have in their return an array of war¬ riors, with the skill and persistency of actual armies. On one side are bands of angels and archangels ; on the other companies of demons and archfiends. Under the general name of Amesha Spentas (((Immortal Holy Ones") are grouped the six archangels, who personify fundamental virtues

and abstract ideas, and whose Persian names represent (<Good Mind," t(P erfeot Righteousness," ˆWished of a King¬ dom," (<Earthly Harmony," ((Salvation," <(Immortality." In addition, are a number of angels and lesser divinities, called <(Worshipful Ones" who are more eminent than the rest, and in¬ clude divine personifications of the planets, fire, air, water, the spirits of the righteous ((fravashis "), and some abstract notions like religion, glory, victory, Mithra, a divinity who incarnates light and truth. The opposing army, commanded by Ahriman, is less disciplined. Its chief archfiend is the demon HLshma {Daeva). A crowd of lesser fiends and de¬ mons (adaeva» K(dnty})) accompany the six archfiends.

The Millennium. — The world's history is nothing but the story of the contest between good and evil, light and darkness, which shall endure for 12,000 years, divided into four periods of 3,000 years each. The first period is one of spiritual existence. Conscious that Ahri¬ man lives, Ormuzd makes the world a spiritual creation before it assumes the material form. When Ahriman discovers his enemy at work, he arouses to life his army of demons and fiends. In the second Epoch Ormuzd creates the material world, which is invaded by Ahri¬ man and his cohorts. The third period marks the contest for mastery between the rivals and the battle for the human soul until Zoroaster is born. A new Epoch is now com¬ menced, as the fourth and last 3,000 years be¬ gins. The propheit and his three sons, to be born in ages to come, the last being the Mes¬ siah, liberally <(he who will benefit and save the world," preside over the final eon. This dualism is an approach to monotheism, as it teaches the ultimate sway of Ormuzd — its hopeful philosophy of the world's regeneration is not to be overlooked. Throughout the con¬ flict, man is the chief factor, for all depends upon his choice as free agent, of the good. The final aim of Zoroaster's system is to as¬ sure world perfection by ithe individual's adoption of the right path. This will come to pass, with the setting up of the <(Good King¬ dom," the (<Wished for Kingdom,1" or the ((Kingdom of Desire," as the Avesta expresses it. As the world enters the stage of regenera¬ tion, Ahriman forms his hosts for a final battle. They are defeated, and good is to reign forever. Accompanying the advent of the Messiah (Saoshayant) occur the resurrec¬ tion of the dead and the judgment of the world, to be.

Code of Ethics. — One sometimes over¬

values old-time ethical codes, because we are apt to emphasize their good features. A study of the ethics of Zoroastrianism cannot but

arouse admiration for their lofty qualities. They bear the stamp naturally of their environ¬ ment, but in moral elevation do not yield to standards that we term modern and of which we are justly proud. A fair idea of their character can be gathered from the profession of faith required from converts and preserved in its entirety in the Avesta. These few para¬ graphs are condensed from Professor Jackson's translation in Ragozin's (Media0 (p. Ill) : ((I

forswear henceforth all robbing and stealing of cattle and the plundering and destruction of villages belonging to worshippers of Mazda. I promise householders that they may roam at will and abide unmolested, wherever dwelling with their herds; I swear this with uplifted hands. Nor will I bring plunder or destruction, not even or avenge life and limb. I confess myself a worshipper of Mazda, a follower of Zarathustra. I profess good thoughts, good words, good deeds" — which last phrase is the motto of the religion of Zoroaster and is found throughout his sayings and injunctions. Each day man must preserve the purity of body and soul. Earth, air and water are to be kept free from defilement. To speak the truth and act honestly are fundamental ; to be kind and gen¬ erous the highest duty. To till the field and raise cattle, are part of one's religious require¬ ments. Marriage is insisted upon, even among kindred. The deed, the action, is the only source of salvation. God is manifested in virtuous thoughts, words, deeds.

Ritual. — In the Gathas, which, as before stated, is the scanty source of Zoroastrian per¬ sonal teaching, there is little, if any, mention of ritual or ceremonials. He is less the law¬ giver there than the prophet, it has been aptly stated. Yet a full ceremonial worship de¬ veloped, the priesthood was at the head and its office was hereditary, with the Mobeds and Herveds, the Levites and Kohanim of Zoroastrianism. The Magi were of Median origin. Annual sacrifices were originally offered but were less and less insisted upon as praise and thanskgivings took their place with oblations of consecrated milk, water and bread. Lengthy litanies accompanied these rites, which were of special significance in connection with the preparation of (<haoma," the sacred drink, like the Indian ((Soma." A curious practice arose in the disposal of the dead. No bodies could be burnt, buried, or thrown into the water, as thereby defilement to the elements would be caused, they were consigned to high places, to. be devoured by dogs and birds, a custom still in vogue among the Parsees and Gabars in their so-called <(Towers of Silence." Practices of abstinence and asceticism, what is termed ((mortification of the flesh" are not en¬ couraged but are condemned as foolish and wicked and as strengthening the arch enemy's hands. The excessive reverence paid to

Fire, which won for the Zoroastrians the name of ((Fire-worshippers," was a later development as were numerous forms of incantation and purification.

Resemblances to Judaism and Christian¬ ity.— These are many and striking. Ahura-mazda, supreme Ruler, with the attributes of

omniscience, omnipresence and eternity, with creative power which he employs through his Spenta Mainya, or ((Holy Spirit, 55 with the best of angels and archangels in his train, suggests unmistakably the Old Testament Yahveh, es¬ pecially in certain books, written under later influences, and which appeared more magnified in the Gospels. So Ahriman, Ormuzd's ad¬ versary, reminds one of Satan in later epochs, and whose future end is similar; these, too, are almost parallel ideas as to the world's re¬ generation the Messiah, the resurrection of the dead and everlasting life. Zoroaster receives his law from Aheramazda on the ˆMountain of the Two Holy Communing Ones,® as does Moses on Sinai. There are six periods of creation in the Avesta like the six days in Genesis, and a single pair, Moshya and Moshyana, like Adam and Eve. The deluge of the Bible is paralleled by the devastating winter. Shetm, Ham and Japhet are recalled by the three sons in the Avesta. Similarities in ritual details are many and have been studied at length. Here as is usual the critics disagree. The larger number trace these anal¬ ogies to the influence exerted on Judiaism by Zoroastrianism during their period of the Exile, if not earlier. On the other hand, the contrary view, advocated by James Darmesteter, is held by some — that early Persian thought was influenced by Judaism, and that Neoplatonism, through Philo, left also its mark on the Avesta. It is impossible at pres¬ ent to decide definitely the point at issue; one must await fresh discoveries and identifications in the East, to give us more exact knowledge. Perhaps a common influence was at the root of both Jewish and Persian ideas.

Historical Growth. — While Zoroastrianism was the national religion of Persia, it was accepted by Turamans as well as Iromons, and spread to Armenia, Cappodocia and the entire near East. With the Sassanides,

the national church was restored, and the priesthood became strongly organized with unlimited power and an authoritative religious lawbook. The head of the hierarchy, with his seat at Rai in Media, was next in power to the king. New sects now began to arise, but the Mohammedan onset in 636 with the persecutions that followed, spelled overthrow to the religion of Zoroaster. To¬ day only a few followers of the prophet are found even in Persia. In and around Bom¬ bay the Parsees, limited in number, profess allegiance to him and his religion, but the creed has developed into a pure monotheism.

Bibliography. — In addition to Jackson and Ragozin as given above, consult Jackson, (Grandriss der iranischen Philologie> (11.612ff. Strassburg 1896-1904) ; Karaka, (History of the Parsis) (London 1884) ; Lehmann, (Zara thustra) (Copenhagen 1899-1900) ; Moffat, Zo¬ roastrianism and Primitive Christianity5 (in Hibbert Journal, 1903, 1768-1780). As to anal¬ ogies with Judaism, consult treatises (by Kohut, Schoer, Stabe, while for the general student are the works of Schrader, Spiegel and West, E. W.

ZORILLA Y MORAL, Jose, ho-sa' thor-rel'ya e md'-ral', Spanish poet: b. Valladolid, 21 Feb. 1817; d. Madrid, 23 Jan. 1893. He studied for the law at Toledo and Valladolid, but turned to literature. His attempts in poli¬

tics showed him to be unfitted for such a career. From 1855 to 1866 he was in Mexico, latterly at the court of Maximilian. His plays, of which (Don Juan Tenorio) is now the best known and is still a great favorite in Spain. Others are (E1 zapatera y el rey) ; (Traidor, inconfeso y martir5 ; (E1 Alcalde Rouquillo5 and (E1 Rey loco.5 The plays were hastily written and are without finish, but have continued effective through their strong appeal to national patriot¬ ism, and their adaptability to theatrical re¬ quisites. His (Leyenda de Alhamar,5 (Granada> and <Leyenda del Cid5 were picturesque presen¬ tations of national legends in the general man¬ ner of Scott, and very popular. Zorrilla was not a careful artist, but an improvisator of great readiness and skill, both lyrical and dramatic. He suffered bitter poverty in 1871-83, for, al¬ though his plays were still highly successful, they were not protected by copyright. He later received a government pension of 30,000 reales ; was awarded the gold medal of the Spanish Academy in 1885, and in 1889 was crowned national laureate at Granada. A bronze me¬ morial was erected to him in Madrid in 1900. An account of him may be found in the auto¬ biographic (Recuerdos del Tiempo Viejo5 (Old-Time Memories,

1880-83), which work, how¬ ever, is not wholly dependable. His collected works were published (Madrid, 4 vols., 1895;

1905).

ZO.SIMUS, zos'i-mus (Gr. Z6a/>of), Greek historian of the 5th century a.d. He lived at Constantinople and wrote a history of the em¬ pire in six books, the (N'ew History,5 which is frequently referred to by Gibbon. He begins with the change of constitution introduced by Augustus, and his first book brings him to the reign of Diocletian, 305 a.d. ; in the second, third ,and fourth books the history of the 4th century is given with more detail ; the fifth and sixth books are occupied with the period from 395 to 410. From internal evidence the work must have been written about 450-502. Zosimus was a pagan, and severely criticized the Chris¬ tian emperors, making the change of religion largely responsible for the decline of the em¬ pire. His work is on the whole trustworthy, but his pagan bias in some instances leads him to various misinterpretations of the acts of the Christians. The best editions are those of Bekker (1837) and Mendelssohn (1887).

ZOSTERA, a genus of marine plants. See

Eel-grass.

ZOTAL. See Mescal.

ZOUAVE, zoo-av, a soldier in the French army. Zouaves were organized in 1831 and were originally mercenaries belonging to a Kabyle tribe. The Zouaves in the pay of the dey of Algiers were, when Algeria became a French possession, incorporated with the French army there, preserving their Arab dress. Ulti¬ mately the native element was eliminated, and the Zouaves became French soldiers in the picturesque Arab costume. As such they dis¬ tinguished themselves in the Crimea, which was their first European service, and the Franco-Italian War of 1859. There were several regi¬ ments of Zouaves among the volunteer Fed¬ eral troops in the American Civil War, so-called because of their wearing an adaptation of the costume of the French Zouaves. The

1 apal or Pontifical Zouaves were recruited from French soldiers at Rome in 1860 and under General Lamoriciere, a former commander in Algeria, defended the temporal sovereignty ol the Pope. They were unsuccessful against the Italian troops at Rome in 1870, and after serving in France against the Germans and the Commune they were disbanded in 1871.

ZOUCHE Richard, English legal scholar: b Anstey, Wiltshire, 1590; d. London, 1 March 1661. He was educated at New College, Ox¬ ford, in 1617 was admitted an advocate of Doctors Commons, and in 1620 became regius professor of civil law at Oxford. In addition to his university duties he had a large practice T ˆP.nd°n-1641 he was made judge of the High Court of Admiralty. He was a Royal¬ ist, though not a pronounced one, at the civil and, although replaced in the judgeship in 1649, was nevertheless appointed by Cromwell to a special commission of oyer and terminer, and retained his academic appointments. He was regarded with some suspicion by both po¬ litical parties ; but after the Restoration he was appointed to the commission which reinstated the professors and Fellows of Oxford who had been removed under the Protectorate of Crom¬ well. On 4 Feb. 1661 he was restored to the bench. His writings include a descriptive poem, (The Dove, or Passages of Cosmography* (1613); a comedy, <The Sophister* (1639), and many works of a professional ‘sort, most important of which are ‘Elementa Jurispru¬ dentˆ (1629),ˆ a general system of legal science, and ‘Juris et Judicii Fecialis Explicate (1650) , regarded by critics as the first treatise containing a systematized arrangement of what is now known as international law.

ZRINYI, zrenye, Niklas (Miklos), Count, Hungarian soldier: b. 1508; d. Szigetvar, 7 Sept. 1566. He distinguished himself in the siege of Vienna by Charles ,V, and in campaigns against John Zapolya and Sultan Suleiman. As ban of Croatia from 1542, he defended that territory against the Turks, and became famous for his defense of Szigetvar (or Sziget) in 1566. His garrison of scarcely 3,000 was re¬ duced to 600, and on 5 September the enemy succeeded in firing the outer fortifications. Zrinyi retreated to the inner fortress, but this also was soon on fire. He thereupon ordered the gates to be opened, and after firing a mortar filled with broken iron into the midst of the Turks, who were surging along a narrow ap¬ proach to the castle, led a sally of the garrison. He fell, mortally wounded, and the defenders were forced back, but a slow match ignited 3,000 pounds of

gunpowder stored within, and great carnage among the Turks ensued. The catastrophe has been made by Theodor Korner the subject of his ‘Zrinyi: Ein TrauerspielP

ZSCHOKKE, chok’ke, Johann Heinrich Daniel, Swiss author: b. Magdeburg, Germany, 22 March 1771 ; d. Blumenhalde, near Aarau, 27 June 1848. He left his native place in 1788, and for some time wandered about the country as play-writer to a strolling company of actors, but afterward studied at the Uni¬ versity of Frankfort-on-theOder. In 1792 he began life there as a private teacher, and produced several pieces for the stage. He sub¬ sequently settled down in the canton of the

Grisons and became director of an academy at Reichenau, where he wrote a history of the Grisons (1798). He then became head of the department of public instruction at Aarau, and was soon afterward sent by the Helvetic exec¬ utive directory to Unterwalden as government commissioner, for the purpose of restoring tran¬ quillity. He acquitted himself so satisfactorily that his powers as commissioner were extended to the cantons of Uri, Schwyz and Zug. In 1800 he was appointed commissioner for the organization of the Italian territories of Switz¬ erland. In 1804 he became a member of the board of mines and forests, and in the same year began the issue of his highly popular Schweizerbote (Swiss Messenger) . Through the greater part of his life Zschokke appeared as one of the most distinguished and energetic public men in Switzerland, but he found time to cultivate his favorite literary pursuits, and it is chiefly by his numerous writings, histori¬ cal and fictitious, that he is known to the world at large. Among his works may be mentioned ‘Ueberlieferungen zur Geschichte unserer Zeit) (1811-27) (Contributions to the History of Our Time) ; (Des Schweizerlandes Geschichte fur das Schweizervolk) 1822) (History of Switzerland for the Swiss People), one of the best of his works, and ‘Bilder aus der Schweiz* (1824-26) (Pictures from Switzerland). As a writer of tales he possesses a European repu¬ tation, and among them we may refer more especially to ‘The Creole,* (Alamontade,* ‘Jonathan Frock, > ‘Clementine,* (Oswald or the Goldmakers’ Village) and ‘Master Jordan.* The work, however, which has had the most extended circulation is his ‘Stunden der Andacht* (Hours of Devotion) (1809-16; 27 editions in his lifetime), which, though rational¬ istic, has yet, from the pious feeling pervading it, found admirers among all classes of readers. Editions of his works were published (40 vols. 1824-28; 35 vols., 1851-54), and an edition of his ‘Novellen* (12 vols., 1904). Consult the studies by Munch (1831);

Keller, ‘Beitrage zur Politische, Thatigkeit Zschokkes* (1887). and Wernly (1894).

ZUAZO, thoo-a’tho, Alonso, Spanish ju¬ rist in the New World: b. Olmedo, 1466; d. Santo Domingo, West Indies, 1527. A learned can’on of Valladolid, he was appointed jurist of the commission wdiich, at the request of Las Casas, was sent to the New World. He was given authority to organize justice in the West Indies, and to appoint judges. For his opposi¬ tion to the complete abolition of enforced labor, he was denounced by Las Casas, although in Santo Domingo he emancipated the Indians who had been held in slavery by the officials. In 1518 he was dispatched to Cuba to systematize the administration of justice in the island, and from 1525 until his death was auditor of the audiencia of Sant’o Domingo. Icazibalceta, in the (Collecion de Documentos para la Historia de Mexico* (1858-66), gives an interest¬ ing narrative, written by Zuazo from Cuba in 1521, regarding the condition of the natives there and in Santo Domingo.

ZUBLY, John Joachim, American Inde¬ pendent Presbyterian clergyman: b. Saint Gall, Switzerland, 1725; d. Savannah, Ga., 23 July 1781. The date of his arrival in America is

unknown, but in 1760 he became the first regu¬ lar pastor of the Independent Presbyterian Church in Savannah, coming thither, accord¬ ing to the church record, from Wando Neck, S. C., where he was located prior to 1758. In 1775, at the provincial congress of 4 July, he was one of five delegates elected to represent Georgia in the Continental Congress, and was selected to draft a petition to the king regard¬ ing the (<unhappy situation of affairs.® In a letter of 3 Sept. 1775 to the Earl of Dartmouth, he denounced the suggestions made in England of arming the slaves to bring the Southern provinces to obedience. He took part in the adjourned session of the Continental Congress assembled 13 Sept. 1775. When he discovered the intention of the Congress to declare the independence of the United States, he revealed to Sir James Wright, royal governor of Georgia, the plans being made. One of the letters was seized, and Samuel Chase, of

Maryland, re¬ ferred to the fact on the floor of Congress. Zubly hastily withdrew, and in Georgia openly made common cause with the Tories. In 1777 he was banished, and half of his estate seized. He remained in South Carolina until the royal government was re-established in 1779. He then resumed his work as a pastor and con¬ tinued it until his death, which occurred before the end of the war. He was an eloquent and learned preacher. Consult Jones, C. C., his¬ tory of Georgia. } Vol. II (1883).

ZUCCARELLI, dzoo-ka-rel'le, or ZUC-CHERELLI, Francesco, Italian painter: b. Pitigliano, Tuscany, 1702; d. Florence, 30 Dec. 1788. He studied painting at Florence and Rome, and after gaining some success in decora tive landscape, worked for five years in London decorating the Opera-House and executing views of the Thames. He returned to England in 1752 and became well known in London, where he was patronized by the royal family, especially the Prince of Wales, and the aristoc¬ racy. He was one of the original members of the Royal Academy in 1768. After 1773 he lived in his native country. He painted land¬ scapes principally, his work inclining to the classic, the best examples of it ranking with that of his leading contemporaries ; but he also exe¬ cuted much of an inferior quality. He fre¬ quently painted a tiny pumpkin as a signature, his name meaning <(little pumpkin.® Numerous examples of his art are in Venice, the Palazzo Reale containing 21. A large number, too, are in Windsor Castle, and he is also represented in Glasgow, Edinburgh, Paris (Louvre), Petrograd (Hermitage), Milan (Brera), and other cities.

ZUCCARO, dzook-ka'ro, or ZUCCHERO, Federigo, Italian painter: b. Sant' Agnolo in Vado (Urbino) 1543; d. Ancona, 1609. He studied under his brother Taddeo in Rome, and was employed by Gregory XIII to paint the vault of the Cappella Paolina in the Vatican, but having quarreled with some papal officials and painted a scurrilous picture he fled to France and ultimately reached England in 1574. There he painted portraits of Queen Elizabeth, the Earl of Leicester and other dis¬ tinguished persons (21 were exhibited in 1866), and afterward worked in Venice until he re¬ turned to Rome to complete his work in the

Cappella Paolina. On the invitation of Philip II he went to Madrid in 1586 to paint for the Escorial, and on his return to Rome he founded the Accademia San Luca, of which he became the first president. Many portraits of English personages in the Elizabethan era are wrongly ascribed to him, but some genuine works from his brush are extant.

He was also something of an architect and sculptor. His frescoes, painted on an enormous scale and crowded with figures, gave him a great reputation during his lifetime ; but modern criticism places his easel paintings far above them. Among his easel-works are deposition from the Cross) (Pa¬ lazzo Borghese, Rome) ; descent of Christ into Limbo > (Brera, Milan)) ; (Sir Walter Raleigh > (Kensington Gallery) ; (The Resurrection (Borghese).

ZUCCHI, dzook'ke, Antonio Pietro, Ital¬ ian painter: b. Venice, 1726; d. Rome, 25 Dec. 1795. In 1754 he accompanied the English ar¬ chitect Robert Adam on his journeys in Italy and Dalmatia, and on Adam's invitation he went to England in 1766. He decorated the interiors of several of the mansions built or altered by Adam, such as Caen Wood (Hampstead), Luton House (Bedfordshire), Osterley House (near Brentford), and Sion House (Middlesex). In 1770 he was elected an associate of the recently established Royal Academy. He marr ed M. A. C. Kauffman (q.v.), better known as (<Angelica Kauffman,® in 1781 and afterward lived in Rome.

ZUCHETTO, tsuk-ket'to, or ZUCHETTA,

the skull cap of a Roman Catholic ecclesiastic covering the tonsure. That of a priest is black, of a bishop or monsignor purple, of a cardinal red, and of the pope white.

ZUEBLIN, Charles, American sociologist: b. Pendleton, Ind., 4 May 1866. He studied at the University of Pennsylvania, was graduated at Northwestern University in 1887 and at Yale in 1889, later studying at Leipzig. He became an instructor in sociology at the University of Chicago in 1892; was assistant professor in 1895; associate professor from 1895 to J902; and was professor of sociology there in 1902-08. He edited the Twentieth Century Magazine in 191 1— 12. He is well known as a lecturer and maga¬ zine contributor. Author of (American Munic¬ ipal Progress) (1902) ; (A Decade of Civic Development } (1905) ; (Religion and a Demo¬ crat (1905) ; democracy and the Overman) (1911), *etc.*

ZUG, tsoog or zoog, Switzerland; (1) The capital of the canton of the same name, on the northeast shore of Lake Zug, 12 miles by rail northeast of Lucerne. It is popular as a pleas¬ ure resort and has fine scenery although it is located in the hilly rather than the mountainous part of Switzerland. The earliest mention of the town is in 1240. It has splendid old man¬ sions and strong watch-towers; several interest¬ ing churches ; a Capuchin monastery .and a con¬ vent ; a cantonal government building jn Renais¬ sance style ; a fine townhouse in late

Gothic style, with a museum of antiquities; an ar¬ senal; manufactures of cottons, enamel-ware, metal goods, tobacco, cigars, soap, *etc.* In 1435, 1594 and 1887 portions of the town sank into the lake. Pop. about 8,038. (2) A

central and the smallest undivided canton

of Switzerland, bounded by Zurich, Schwyz, Lucerne and Aargau, and connected by rail with Zurich and Lucerne. The surface, which is generally mountainous in the southeast and south, where the Rossberg occupies the frontier, slopes more or less gradually north and west till it becomes comparatively flat. The portion of Lake Zug within its borders occupies 10 square miles; while Lake ZEgeri, wholly within its borders, occupies two and three-fourths square miles. Of its total area of 92 square miles about 75 square miles are under cultiva¬ tion. The battle of Morgarten, won by the Swiss 5 Nov. 1315, was fought within its bound¬ aries. The climate, rigorous in the mountain¬ ous districts, is mild on the lower southern slopes. The chief exports are cattle, fruits, cider and ˆkirschwasser.® Pop. about 20,013. (3) A lake chiefly in the canton of Zug, but partly also in Lucerne and Schwyz. It is 1,368 feet above sea-level; 12 miles long north to south, and varies in breadth from three miles to one mile at the centre. The shores are low in all directions except the south and southeast. In the former direction the Righi, with Mount Pilatus towering behind it, and in the latter the Rufiberg or Rossberg (5,195 feet), rise in abrupt and lofty precipices, pre¬ senting scenery of the grandest description. At the foot of the Rossberg the depth of the lake is not less than 650 feet. Steamers ply upon it, and the fishing, principally of pike and carp, is very productive.

ZUIDER-ZEE, zi’der ze (Dutch, zoi’der-zd), or ZUYDER ZEE, or SOUTH SEA (as op¬ posed to the North Sea), Netherlands, a large gulf pentrating deeply between the provinces of Friesland, Overyssel, Gelderland, Utrecht and North Holland; about 80 miles long, 45 miles greatest breadth, but ‘only 10 miles broad be¬ tween Enkhuizen and Stavoren. The islands Texel, Vlieland, Terschelling, Ameland, and

several smaller islands separate it from the North Sea, with which it communicates by va¬ rious channels, the principal being Marsdiep, between the Helder and Texel, and the Vlie Strom between Vlieland and Terchelling. It contains the islands of Wieringen, Marken, Urk, and Schokland, and numerous sandbanks, espe¬ cially in its northern portion ; has on its shores numerous towns, and receives the waters of the Yssel, Vecht, Eem Kuinder, and other streams; but is generally shallow, and only navigable by vessels of small draft, much of its area being only three feet in depth, while its maximum depth, in the southern portion of the former lake, is only 19 feet. Oysters and plaice are plentiful. The Zuider-Zee is of modern origin, having been formed chiefly since the 12th cen¬ tury by successive irruptions of the sea. In ear¬ lier times there were here only a lake and marshes, the lake being called Flevo by Pliny and Tacitus. The reclamation of the greater portion of the Zuider-Zee has long been a pet project with the Dutch and plans for the work were formulated as early as 1886. But while the area thus available was much to be desired, financial considerations barred the way for many years. However, a bill authorizing the work which is to create a new province became a law 14 June 1918. The area to be reclaimed 3 is 523,000 acres, of which it is estimated about

475,000 will be fertile. The completion of the work will require 15 years and the cost is fig¬ ured at 66,250,000 florins. A dike is to be built from the island of Weiringen to the coast of Friesland, a distance of 15 miles; and the land then drained and prepared for cultivation.

ZULIA, thoo'le-a, Venezuela, the most northwestern state of the republic, surrounding Lake Maracaibo (q.v.), bounded on the west by Colombia and on the east by Falcon. It was formerly united with Falcon, but is now politi¬ cally independent. Lake Maracaibo is sur¬ rounded by low lands, but a great part of the rest of the province is mountainous. Agricul¬ ture is the chief industry; coffee, sugar and cacao are raised. Area, 24,969 square miles; pop. 100,000. Zulia is also the name of a fa¬ mous trade route connecting northeastern Co¬ lombia with the Venezuelan port of Maracaibo. The Zulia River forms a part of this route. The navigation of the latter river has often been the subject of international controversy between Colombia and Venezuela.

ZULOAGA, thoo-lo*-a'ga, Felix, Mexican politician, president of the republic : b. Alamos, Chihuahua, 1814; d. Mexico, 1876. Having en¬ tered the national guard as a lieutenant, he fought against the Yucatan

secessionists in 1842-43, on the conclusion of which he was pro¬ moted to the rank of lieutenant-colonel. In preparation for the war with the United States he directed the fortification of Monterey, Saltillo and the southerly approaches of the cap¬ ital. From 1848 to 1853 he was not in active service. In the latter year he was promoted colonel, and subsequently variously employed. On 17 Dec. 1857 he conspired against the Liberal government, and finally on 11 Jan. 1858 the brigade of which he was the commander de¬ clared Comonf'ort (see Comonfort, Ygnacio) deposed and Zuloaga president. Zuloaga en¬ tered on the office 23 January, and the (<War of Reform® began, the Liberals being under the leadership of Benito Juarez. In December the garrison deposed Zuloaga, who finally resigned, and appointed as a substitute General Miramon (q.v.), who assumed office 2 February. In 1860 Zuloaga published a manifesto proclaiming him¬ self constitutional president, but subsequently he came to an agreement with Miramon. When the French invaded Mexico in 1862, he with¬ drew, but in 1864 he returned and submitted to the empire and promised fealty to Maximilian. This promise he broke and attempted, in 1865, to overthrow Maximilian; but he was unsuc¬ cessful.

ZULOAGA, Ignacio, Spanish painter: b. Eibar, a town in the Basque provinces, 1870. He is descended from a family of artistic craftsmen, his father having been a noted damascener (Placida Zuloaga), and his great¬ grandfather the organizer and director of the royal armory at Madrid. He was at first sent to Rome to study architecture, but sub¬ sequently turned to painting and spent five years in Paris. Here he devoted himself to the private study of the old Spanish masters, and produced his first work which was exhibited at the Paris Salon (1890). Zuloaga then re¬ turned to his native country, and after a long struggle for recognition, rose to the foremost rank as a truly representative Spanish artist.

He modeled his work on the style of the old Spanish masters, painting directly without preliminary drawings, with strong sure lines and splendid imagination. His works are to be found in the leading cities

of Europe and also in the United States. The American Hispanic Society, which presented an exhibit in the United States in 1908, possesses a half¬ portrait of Zuloaga, (The Gypsy Bull Fight¬ er's Family > and (Mlle. Lucianne Breval as Carmen. > Canvases that are well known abroad are his (Avant la Corrida) (Brussels Museum) ; (Don Miguel > (Vienna Gallery) ; (Portrait of a Lady) (Pan Museum) ; <Amies) (Barcelona) ; (Madame Louise) (Venice) ; (The Topers) (Berlin). Zuloaga has also painted a number of pictures in propaganda for the arousing of his country to a national consciousness of the evils which beset it, prin¬ cipally from the excessive power of the church and the degrading indulgence in bull-fighting. The most striking of these are his (Cardinal } ; (The Victim of the Feast) ; (The Idols of the People) ; (The Brotherhood of Christ Cruci¬ fied^ In 1917, exhibits were held in several cities in the United States, which won enthu¬ siastic praise. Among those which were partic¬ ularly noticed were (Portrait of Maurice Bar-res* ; (My Uncle Daniel and His Family) ; (Anita Ramirez) ; (Basque Peasant,* and sev¬ eral fine portraits of ladies. The colors used are generally sombre, occasionally heightened by bright contrasting hues. The treatment of the subject is intensely realistic, often brutal in its impassioned sincerity. Yet his work al¬ ways makes, through its imaginative quality, a certain spiritual, almost mystic, aesthetic appeal. The choice of detail is deliberate and careful; and the subject matter well con¬ ceived and arranged. Consult Brinton, Chris¬ tian, (Modern Artists* (New* York 1909) ; Utrillo and Others, (Five Essays on the Art of Ignacia Zuloaga *(New York 1909) ; Cat¬ alogue of Paintings by Ignacia Zuloaga, Ex¬ hibited at the Hispanic Society of America> (ib.) ; Sargent, J. S., Ugnacio Zuloaga,* and Wyer, R., (Ignacio Zuloaga's Exhibition * (in International Studio , December 1916).

ZULULAND, zoo'loo-land, South Africa, a country lying on the southeast coast of Africa, now a province of Natal, and since 31 May 1910 a part of the South African Union; it is bounded on the north by Portuguese East Africa and the Transvaal and on the west by the Orange Free State. Area, 10,424 square miles. The principal rivers are the Tugela, on the Natal boundary; the Buffalo, which joins the Tugela on the left, about midway up the Natal frontier, and forms the remaining por¬ tion of the boundary between Natal and Zululand; and the Umvolosi, which flows into Saint Lucia Bay. From the coast at Saint Lucia a range of mountains called the Libombo range runs northward nearly parallel to the coast, separating the country into two regions. The coast region is malarial, but fertile, and is cultivated chiefly by the whites. The in¬ land region is comparatively healthful and is fertile. Rich gold reefs have been found, and excellent coal

exists. The coal is being worked and a railway has been constructed for 98 miles along the coast, extending north from

Durbar. There are great plantations of sugar, tea, cereals, fruits and vegetables. The coun¬ try, which was on 30 Dec. 1897 annexed to the colony of Natal, is mainly inhabited by the Zulus, who have long been distinguished as the most warlike of the Kaffir tribes. The country inhabited by the Zulus was formerly much more extensive. In the beginning of 1879 the Zulu king, Cetewayo or Ketchwayo, with a large army of fairly disciplined troops armed with rifles, came into collision with the British in South Africa. This was partly due to a long¬ standing dispute as to the claims of the Zulus to the Utrecht district in the southeastern angle of the Transvaal, partly to other causes, which at last induced Sir Bartle Frere, the governor-general of the British provinces in South Africa, to send an ultimatum to Cete¬ wayo. To this no reply was sent, and war ensued. On 22 January a portion of a British column was attacked at a place called Isan-dula or Isandhlwana, about 10 miles from Rorke's Drift on the Buffalo, by 20,000 Zulus, and completely destroyed. As soon as possible after the news of the disaster reached Eng¬ land, strong reinforcements were sent out, and on 4 July following the Zulu army was totally defeated at Ulundi. On 28 August Cetewayo was captured. Meanwhile Sir Garnet (later Lord) Wolseley had arrived with supreme military and civil authority in this part of Africa, and the Zulu territory was parceled out by him among several chieftains who were placed under the paramount supremacy of the British government, and were not to be al¬ lowed to keep up standing armies or to import firearms or ammunition. British residents were appointed, one in North and one in South Zululand. In 1883 Cetewayo was restored to a portion of his dominions, but was opposed by some of the chiefs. After severe fighting he placed himself in the hands of the British at Ekowe or Eshowe, where he died in 1884. Subsequently the Boers of the Transvaal made themselves masters of a considerable portion of the territory and incorporated it with their own republic. In 1885 the British as¬ sumed a protectorate over the coast of the country and in 1887 annexed all the rest. Ton-galand was later incorporated with Zululand and was annexed with it to Natal. An up¬ rising among the Zulus occurred in 1906 and its leader Dinizulu was captured and later tried for high treason. He was imprisoned but afterward was pardoned and pensioned. Pop. about 219,606, of whom the whites number about 1 per cent. Consult Ingram, J F., (Natalia: History of Natal and Zulu¬ land* (1897) ; Stuart, J., (A History of the Zulu Rebellion (1906; new ed., 1913).

ZUMALACARREGUI, thoo-ma”la-ka’ra-ge, Tomas, Spanish soldier and Carlist leader: b. Ormastegui, province of Guipuzcoa, 1788; d. Segama, Navarre, 23 June 1835. He distin¬ guished himself in the war of independence, subsequently entered the regular army, became a lieutenant-colonel in 1825, and later colonel. Ferdinand VII made him governor of Ferrol, but Cea Bermudez, the prime-minister, removed him. Soon after the death of Ferdinand, he became the head of the Carlist bands in the Basque provinces and Navarre. With great

ability he organized these troops into a really formidable force, and wielded them with re¬ markable success against such generals as Val¬ des, Quesada and Rodil. Finally, when the con¬ stitutional army had been signally outfought Don Carlos, against Zumalacarregui’s advice, determined to attack Bilboa. Zumalacarregui’s plan was to march upon Madrid by way of Vi¬ toria and Burgos, and he regarded the siege of Bilbao as a waste of time. It was during the operations there that he received the wound from which he eventually died. He was the most able figure of the first Carlist War. Con¬ sult Henningsen, (Twelve Months of Campaign with Zumala-Carreguy) (London 1836).

ZUMARRAGA, Juan de, thoo-mar’ra-ga, Spanish prelate in America: b. Durango (Bis¬ cay), 1468; d. Mexico, 3 June 1548. He was for many years guardian of the convent of Abrojo in Spain, and in December 1527 was appointed bishop of the newly established see of Mexico. He greatly developed the Mexican missions, but directed considerable misguided zeal against Aztec manuscripts, which he gath¬ ered together all over Mexico and publicly burned. Only comparatively few escaped this destruction. His see was elevated to an arch¬ bishopric in 1548. He left many letters and other literary remains, a considerable number of which appeared in the c Carlas de Indias) (Madrid 1877).

ZUMBO, South Africa, a town of Portu¬ guese East Africa, near the confluence of the Loangwa with the Zambesi, and on the frontier line of North Rhodesia, 450 miles from the mouth of the Zambesi. It marks the western point of the Portuguese territories on the Zam¬ besi, and was formerly the seat of an important trade, but its trade declined. In

recent years the development of the territory adjacent and the general improvement of Portuguese East Africa has given a new impetus to Zumbo which has, in some measure, restore J its com¬ mercial activity.

ZUMPT, tsoompt, August Wilhelm, Ger¬ man classical philologist : b. Konigsberg, 4 Dec. 1815 ; d. Berlin, 23 April 1877. He was nephew of Karl Gottlob Zumpt (q.v.). He was a pro¬ fessor in the Friedrich-Wilhelms gymnasium of Berlin from 1851 to his death. Among his pub¬ licans are editions of (Rutilius Namatianus) (1840) and the (Monumentum AncyranunP (1845) ; (Commentationes Epigraphicse ad Antiquitates Romanas Pertinentes) (1850-54) ; and 'Studia Romana) (1859) ; (Das kriminal-recht der Romischen Republik (1865-69); (De Monumento Ancyrano Supplendo) (1869) ; and (Der kriminalprozess der romischen Repub¬ lic (1871). The larger part of the last two volumes of the German edition of Ihne's '■His¬ tory of Rome) is the work of Zumpt.

ZUMPT, Karl Gottlob, German philolo¬ gist: b. Berlin, 20 March 1792; d. Karlsbad, 25 June 1849. Educated at Heidelberg and Berlin, he was, in 1827, appointed professor at the lat¬ ter, where he did much effective work toward the improvement of instruction in the Latin language. Among his writings were a Latin grammar (1818; 13th ed. 1874); editions of Quintilian (1831); Curtius (1826; 1846), Cic¬ ero's orations against Verres (1831) and the (De Officiis) (1838); (Ueber den Stand der Bevol-

kerung und die Volksvermehrung im Altertum2 (1841); (Ueber die bauliche Einrichtung des romischen Wohnhauses) (1842); (Ueber den Bestand der philosophischen Schulen in Athen und die Succession der ScholiarcheiP (1843); and several treatises, such as (Die Religion der Romer) (1845). An abbreviation of the gram¬ mar (1824) reached a 9th edition in 1866.

ZUNI, zoo'ne, N. Mex., Pueblo village about 40 miles southeast of Fort Wingate, near the western boundary of the state. The residents constitute a distinct linguistic stock and call themselves Ashivi. They are the descendants of the people of Cibola, recorded by the Span¬ iards. The Spaniards first visited them in 1539 and were driven away, but Spanish mis¬ sionaries later gained considerable influence among them. In 1680 the Pueblos revolted against the Spaniards, and for 12 years they remained free from their authority. The vil¬ lagers retain their ancient beliefs and cere¬ monials and are peaceful

agriculturalists, weavers and pottery makers. With the Hopi they are regarded as the most truly typical of the Pueblo tribes.

ZUNI MOUNTAINS, a detached range in Valencia County, N. Mex. The general trend is from southeast to northwest; length, 45 miles. The mountains do not rise more than 10,000 feet above sea-level, and this is only from 3,000 to 4,000 feet above the sur¬ rounding plateau. The range is heavily tim¬ bered. It is of geological interest on account of its isolation and the simplicity of the strati¬ fication.

ZUNI SALT LAKE. This lake is in a large crater-like cavity in the plain 40 miles south of the Zuni Indian pueblo in western New Mexico. The lake is encrusted with salt which is an important source of local supply. The Indians have used the salt for many centuries and regard the lake as sacred. Its diameter is less than a half-mile and on its shores rise two recent volcanit cones, one with a deep crater. The hole in which these features occur is a mile in diameter, 200 feet deep and rimmed by a low encircling ridge of scoria and rock fragments ejected from the hole, doubtless by a volcanic explosion.

ZUNIAN, or ZUNYAN, a Pueblo Indian stock of the New Mexico-Arizona region. Their tribal emblem is (Cthe sacred water-spi¬ der,® from the Indian name of which they are often called Shi-wi-nas. They are of the great¬ est interest to the ethnographer and student be¬ cause they still retain to a great extent their primitive condition and culture. They are skilled in pottery-burning. They cultivate the arid regions and plant wheat, barley and corn in fields. Cattle, horses, sheep and pigs are kept. The language has a superior gram¬ matical structure and traces of an earlier lan¬ guage, now dead, are to be found. The dances, festivals and other tribal customs differ little from other Indians of the pueblos. They have always practised monogamy. The ravages of smallpox and other diseases have reduced their

numbers to below 2,000. See Pueblo Indians. * ^

ZUNIGA, thoon-ye'ga, Alvaro Manrique

de, Spanish viceroy of Mexico : b. Seville, about 1530; d. Madrid, about 1600. He entered Mex¬ ico in October 1585 as viceroy, and his adrr.inis-

tration was, according to the historian, Juan de Torquemada, one of prudence and wisdom. A dispute with the audiencia of Guadalajara, how¬ ever, on a point of jurisdiction, nearly precipi¬ tated civil war upon the colony. Philip II, on the basis of reports circulated by his foes, finally removed him in 1589, and directed Pedro Ro¬ mano, the bishop of Tlaxcala, to investigate Zuniga's government. Romano persecuted Zu¬ niga with great cruelty until 1596, when the lat¬ ter, sailed for Spain, where he was successful in getting revoked the sentence of confiscation

pronounced against him.

• •

ZUNIGA, Dionisio de, Central American missionary: b. Guatemala, about 1550; d. Chiapa (now in southern Mexico), about 1620. He be¬ came a Dominican in Chiapa province, and for the greater part of his life was a missionary among the Quiche Indians. He wrote a gram¬ mar of the Quiche language and prepared also in Quiche a volume of sermons and several religious treatises, besides translating Francisco Viana's works, originally written in the dialect of Vera Paz.

ZUNIGA Y AZEVEDO, e a-tha-va fho, Gaspar de, Count of Monterey, Spanish vice¬ roy in America: b. Andalusia, about 1540; d. Lima, Peru, 10 Feb. 1066. He took viceroyal charge of Mexico, 5 Nov. 1595, and in 1596 sent an expedition in command of Sebastian Vizcaino for the exploration and occupa¬ tion of Lower California. Vizcaino was ham¬ pered by lack of provisions, and returned after accomplishing little. By royal order, he was again sent out by Zuniga in 1602, when he ex¬ plored the coast of Upper California. In 1597 Zuniga drove out William Park, an English pirate who had taken possession of Campeche. Among other expeditions organized by him was one commanded by De Onate (see Onate, Juan de) and Zaldivar to take New Mexico. During his administration in Mexico he was a benefac¬ tor of the natives. In 1603" he became viceroy of Peru, though he did not enter Lima until

1604.

ZUNZ, tsunts, Leopold, German Jewish scholar: b. Detmold, Germany,

10 Aug. 1794; d. Berlin, 17 March 1886. He studied at the university, to 1839 he was in Prague as preacher at the synagogue of Berlin ; and in 1824-32 was editor of the Spenersche Zeitung. From 1835 to 1839 he was in Prague as preacher at the synagogue there, but in 1839 returned to Berlin to become director of the normal seminary, a position he held until 1850. In 1845 he was made a member of the board of commissioners for the promotion of the educational interests of the Jews. His writings are remarkable, in their age, for their broad view, their grasp of the subject, their clearness of presentation and their charm of language. He was the first to take up the scientific study of the Jews' rabbin¬ ical literature in his (Etwas fiber die rabbinische Litteratur,* published in 1818; and his (Die gottesdienstlichen Vortrage der Juden* (1832) is considered the authoritative work on the biblical exegesis and the homiletics of the rabbinical writings. Among his other works are (Die Namen der Juden) (1836) ; (Die synagogale Poesie des Mittellaters> ; and (Littera-turgeschichte der synagogalen Poesie1* (1865).

ZURBARAN, thoor-ba-ran', Francisco de,

Spanish painter: b. Fuente de Cantos, Estremadura, 7 Nov. 1598; d. Seville, 1662. He was educated in the school of Juan de Roelas in Seville, and early formed his style on that of Caravaggio. He is thence frequently known as the Spanish Caravaggio. He first brought him¬ self Tnto notice by a series of pictures for the chapel of Saint Peter in the cathedral of Seville, illustrating the life of the titular apostle; and about 1625 he executed his cele¬ brated picture of (The Glory of Saint Thomas Aquinas* (Seville Museum), which is esteemed his masterpiece, and one of the finest works in Spain. Another famous series is his 11 pictures illustrative of the life of Saint Jerome painted for the monastery of Guadalupe. No less fa¬ mous is his series of three pictures in the monas¬ tery of Santa Maria de los Cuevas, in Seville, which were produced on his return from Guada¬ lupe. These pictures, which are now in the Seville Museum, represent the ((Virgin Extend¬ ing her Mantel over a Group of Carthusian Monks* ; °Saint Hugo Surprising the Monks at a Secret Feast in the Refectory* ; and (Saint Bruno in Conversation with Pope Urban II. *His (Crucifixion* (1527) in the church of San Pablo is a notable picture. As early as 1633 he signed himself painter to the king. In 1650 he executed for the palace of Buen Retiro the (Labors of Hercules* in 10 pictures, now in the Madrid Museum. From this time on he seems to have been a great favorite at the court, though he continued to paint monks and church dignitaries with great spirit and faithfulness to truth, which have

gained for him the position of one of the three greatest of Spanish painters. Though he painted several large compositions, he preferred small and simple ones, generally religious in subject. He especially made studies of the Spanish friar. His works are to be seen in some private collections, and in the galleries of Saint Petersburg, Pesth, Munich, Paris and London. Consult Bermudez, (Diccionario de los mas ilustres profesores* (1800) ; and Lefort, (La peinture espagnole* (1894).

j

ZURICH, zoo'rik, Switzerland; (1) a city, capital of the canton of the same name, situated at the northeast extremity of the lake of the same name. It is divided by the Limmat into unequal parts, forming an upper and lower town, connected with their suburbs by several bridges. The streets in the oldest quarters are narrow, crooked and dark, but have undergone considerable improvement. The principal build¬ ings are the cathedral or Grosse Munster, on a hill near the right bank of the Limmat, a heavy massive structure in the Byzantine style; the Fraumunster, on the left bank of the river; Saint Peter's Church, with a fine tower and clock; the townhouse; the town library, con¬ taining 130,000 volumes; the museum, with a collection of home and foreign periodicals, and a rich library; the university; the new Swiss Polytechnic School ; the arsenal ; the music buildings ; the railway station ; the theatre and the post office. Two public promenades add to the attractions of the city, besides a botani¬ cal garden and many smaller parks and walks connected with a variety of institutions, pub¬ lic and private. Manufactures of silk and cot¬ ton, including dyeing and calico-printing, are

extensive ; those of candles, soap, tobacco, paper, leather and machinery are also consider¬ able. Besides the university, founded in

1832 and having a professional staff of 150, and over 1,300 students in theology, law, medicine and philosophy, there are the Polytechnic School which is maintained by the government and in 1917 had a teaching staff of 262, Schools of medicine and of arts, secondary and ele¬ mentary schools of all kinds, deaf and dumb and blind asylums, orphan and several other hospitals. Learned and other societies of various descriptions abound. Zurich is of great antiquity and early became a Roman station. In 1219 it was declared a free imperial city. The preaching of Zwingli in the cathedral made it the centre of the Swiss Reformation. Here, in 1443, the Swiss defeated the Austrians, and here also, in 1799, the Russians were defeated by the French. The Treaty of Zurich, signed here 10 Nov. 1859 by the plenipotentiaries of France and Austria, closed the Franco-Italian war by Austria's abandonment of her right to Lombardy. Pop. (1918), estimated 213,900. (2) A northern canton bounded north by Schaffhausen and the grand duchy of Baden, west by Aargau, south by Zug and Schwyz, and east by Saint Gall and Thurgau ; area, 666 square miles. Though not properly mountain¬ ous, it has on its south and southeast frontiers several lofty ridges, remarkable for their paral¬ lelism. Except the Lagern and adjoining heights, they have their longer axis from south¬ east to northwest and form a succession of terraces lowering gradually toward the north. The general slope is toward the left bank of the Hornli and the Schauenberg, both in the east. The general slope is toward the left bank of the Rhine, which drains part of it directly and part indirectly, by the Thur, Toss, Glatt and Lim-mat. Of the lakes, about 40 in all, the most important are those of Zurich, Greiffen, Pfeffi-kon, Ttirler and Katzen. The climate is on the whole temperate, but mists are prevalent, particularly on the lower grounds. In some parts the prevailing rock is the Jura limestone, but a more recent formation, consisting chiefly of marl and sandstone in almost horizontal strata, is still more largely developed. One re¬ markable feature is the immense number and magnitude of the granite boulders which cover the surface. The minerals are few and of lit¬ tle value. The soil, with the exception of a few favored spots, is far from fertile and hence, though the arable land is comparatively large and carefully cultivated, the corn produced falls short of the consumption. In some districts a wine of tolerable quality is produced. Wood seldom forms forests, but occupies many scat¬ tered patches and hedgerows. Game is scarce , fish almost superabundant. In no canton have manufactures made more progress. The great staples are silk and cotton goods. The inhab¬ itants are almost all Protestants, and educa¬ tion is very generally diffused. Zurich was admitted into the Swiss Confederation in 1351 and readmitted in 1450, after a 10 years' al¬ liance with Austria. The government, formerly somewhat aristocratic, became

decidedly demo¬ cratic in 1831. A new democratic constitution was adopted in 1869. Zurich holds the first place in the Swiss Confederation. Pop. about 550,000. (3) One of the principal

lakes of Switzerland, chiefly in the canton of Zurich, but partly also in Schwyz. It forms a long irregular curve, bending round from southeast to northwest, convex on the south and concave on the north side; greatest length, about 27 miles ; greatest breadth, two and one* half miles; greatest depth, 469 leet. Its scenery is distinguished not so much for grandeur as for beauty. The mountains around, nowhere exceeding 1,700 feet above the lake, which is itself 1,342 feet above sea-level, com¬ mence in wooded heights and descend to the water's edge in gentle slopes, covered with vineyards, orchards, gardens, cultivated fields and verdant meadows, and studded over with country-seats and smiling villages. A consid¬ erable traffic is carried on upon the lake by means of sailing vessels and numbers of steam¬ ers. It is well supplied with fish. Its chief feeder is the Linth Canal (completed in 1816), communicating with the Wallenstatter-see. It discharges itself at the town of Zurich by the Limmat.

ZURITA Y CASTRO, thoo-re'ta e kas-tro, Geronimo, Spanish historian : b. Saragossa, 4 Dec. 1512; d. 3 Nov. 1580. He was educated at Alcala, and in 1543, he was sent to Germany on a diplomatic mission to Charles V by the inquisitor-general of Aragon. Subsequently he was made councillor of state and secretary to Philip II. Appointed chronicler of Aragon, he traveled in quest of data through Spain, Sicily and Italy, and finally in 1562-80 pub¬ lished in six volumes his (Anales de la Corona de Aragon } (continued by Argensola and Blas-co-Lanuza 1622). He also made important cor-reactions, in, and additions to, Lopez de Ayala's (see Ayala, Lopez de) (Cronicas de los Reyes de CastillasP For a biographical sketch and some correspondence, consult Dormer, (Prog¬ resses de la Historia en Aragon } (1860). The (Anales) was looked upon as a work of very great importance during more than a century after its publication, and several editions of it have been issued, notably in 1558, 1610 and 1669, and annotated editions of it have been pub¬ lished within the past 25 years.

ZUTPHEN, ziit'fen, Netherlands, a for¬ mer fortified town in the province of Gelderland, 27 miles northeast of Arnhem on the right bank of the river Yssel, where it is joined by the Berkel. Its chief edifice is the 12th cen¬ tury church of Saint Walpurgis. The town was at one time a member of the Hanseatic League, and had a considerable

foreign trade. It still has an active home trade, more especially in sending grain and timber, both rough and pre¬ pared, down the Yssel. Pop. about 24,000.

ZUYDER ZEE. See Zuider-Zee.

ZWEIBRUCKEN, tsvi'bruk-en (Latin, Bipontium; French, Deux-Ponts, ((Two Bridges®), Germany, a town in the Rhine-Palatinate, on the Schwarzbach River, 54 miles southwest of Mannheim. It was the capital of the mediaeval Duchy of Zweibriichen, until the end of the 18th century. It is well built and has Protestant and Roman Catholic churches and a synagogue ; gymnasium, a realschule and several other schools ; courts and public offices occupying the former ducal palace ; an orphan¬ age and hospitals ; manufactories of silk plush, machinery, chicory, tacks, chains, leather, etc.,

and a trade in corn and cattle. The edition of the classics known by the name of 'BiponD was published here in 1779 and subsequent years. Pop. about 15,250.

ZWEMER, Samuel Marinus, American missionary: b. 12 Aug. 1867 at Vriesland, Mich. He graduated at Hope College, Holland, Mich., A.B. 1887; B.D., New Brunswick Theological Seminary 1890. He was ordained a minister of the Reformed Church in America 1890, and became a missionary at Busrah, Bahrein and other stations in Arabia 1891-1905, afterward re¬ siding in Cairo, Egypt. He was the organizer and chairman of the Mohammedan Missionary Conference, Cairo, 1906, and has traveled exten¬ sively in Moslem lands. He is the author of 'Arabia the Cradle of IslanP (1892) ; 'Topsy Turvy Land* (1902) ; 'Raymond LulP (1904) ; 'Moslem Doctrine of God) (1906) ; 'Islam, a Challenge to Faiths (1907); 'The Moslem WorkP (1907); (The Moslem Christ* (1911); 'The Unoccupied Mission Fields* (1910) ; 'Zig¬ zag Journeys in the Camel Country* (1912) ; 'Childhood in the Moslem World> (1915) ; 'Mo¬ hammed or Christ* (1915) ; 'Life of William Borden) (1916) ; 'The Disintegration of Islam) (1917). He is editor of The Moslem World, a quarterly review, New York.

ZWICKAU, tsvik'ow, Germany, a town of Saxony, on the west bank of the Mulde, 60 miles west-southwest of Dresden. It has sev¬ eral interesting churches, among them two an¬ cient Gothic types recently restored, that of Saint Mary, dating from the 15th century; a gymnasium with a library; a town hall built in 1581, which has archives dating from the 13th century, and an old castle converted into a penitentiary. The chief source of its wealth is the rich coal beds in the vicinity, employing 8,000 miners, and yielding annually 2,500,000 tons of coal. The mines were known as early as 1348 but have been worked only since 1826. There are also manufactures of linen and cot¬ ton goods, dyes and chemical products, numer¬ ous tanneries, dyeworks, bleach-fields, oil, saw and other mills, and a considerable transit and general trade. It was the birthplace of Robert Schumann, the composer. See Anabaptists for the "Prophets of Zwickau.® Pop. about

73,538.

ZWINGER, tsving'er, Theodor, Swiss scholar: b. Basel, 2 Aug. 1533; d. there, 10 March 1588. He studied at Basel and at Paris, and after a course in medicine at Padua, became a member of the Basel medical faculty. He lectured there on Greek in 1565-71 and sub¬ sequently on ethics, and from 1580 .was pro¬ fessor of the theory of medicine. Zwinger was a type of the universal scholarship of that time, and wrote a 'Theatrum Vitae Humanae* (1565), a kind of general encyclopaedia, then regarded as a marvel, but now having only a bibliographi¬ cal interest. His 'Methodus Apodemica* (1578), contains material valuable for local his¬ tory. Consult 'Athenae Rauricae) (1778), which contains a list of his writings.

ZWINGER, The, a public building in Dresden, containing a valuable collection of works of art and scientific treasures. The word Zwinger is a general name for a prison or any confined place.

ZWINGLI, zwmg'le, Ger. tsving'le, or ZUINGLIUS ULRICH, a celebrated Swiss re¬ former, was a contemporary of Luther (q.v.), and was born at Wildhaus, canton of Saint Gall, on 1 Jan. 1484; d. Kappel, 11 Oct. 1531. Ulrich was the third of eight sons of the bailiff of that place. He studied at an early age in Basel and Bern, and continued his studies in Vienna, where he occupied himself with philosophy, and again in Basel, where he devoted his attention to theology, under the

direction of Wyttenbach. In 1506 Zwingli became parish priest at Glarus, and here employed his time, as Luther had done in the Augustine monastery at Erfurt, in the diligent reading of the Holy Scriptures. He copied the epistles of Saint Paul in the original Greek, and even learned them by heart — an acquisition which afterward proved of great service to him in his public discussions. He accompanied the forces of Glarus during the campaigns of 1512, 1513 and 1515, in Lom¬ bardy, in the cause of the Pope against the French, in the capacity of chaplain, and was rewarded for this service by the grant of a pension from the Pope. In 1516 he became preacher in the convent of Einsiedeln, then a celebrated place of pilgrimage. Here he began to make known publicly his ideas of reform, preaching against the pilgrimage of Einsiedeln, which he termed an abuse and a corruption of the doctrine of the Christian Church, and calling upon the bishops of Sion and Constance to pro¬ mote a reformation of religious doctrines, upon those points in which Zwingli considered that the Church had departed from the primitive teaching. Up to this time, however, his ideas of innovation excited no rebuke upon the part of the authorities, and he wras, not long after, in¬ vited to Zurich, and entered on his office of preacher in the cathedral 1 Jan. 1519, with a discourse in which he declared himself for the use of the simple Scriptures without regard to the prescribed texts and lessons. At Zurich Zwingli delivered a series of sermons on the Holy Scriptures ; and these discourses in which he inveighed against what he declared to be the errors and superstition of the times, laid the foundation for his future work of reformation. The occasion which launched him on his career was similar to that which had aroused Luther. In 1518 Bernadin Samson, a Franciscan monk of Milan, appeared in Switzerland to preach the indulgence proclaimed by Leo X to all who should subscribe, alms to the building of Saint Peter's Church at Rome. Zwingli, who was then preaching at Einsiedeln, opposed him there, and afterward in Zurich, with all the power of his eloquence, and brought the indulgences into so much odium that Samson was not even per¬ mitted to enter Zurich ; and the Council of Zurich finally obtained from the Papal Nuncio the recall of Samson to render an account of his mission at Rome. From this time Zwingli gradually went further in his plans, supported by the Ziirichers. In Zurich his innovations were so far promoted by the government that in 1520 a decree was issued ordering that the Holy Scriptures should be taught "without human additions.® In 1522 the reformation was extended to external ceremonies. In this year Zwingli was forbidden to preach by the bishop of Constance. In it also he wrote his first work against the fasts of the Church and began the

study of Hebrew. In 1523 the government in Zurich invited all theologians to a public con¬ ference in Zurich, to convict, if possible, Zwingli of an error in doctrine. About 600 persons, clergy and laymen, were present at this disputa¬ tion. Zwingli exhibited his opinions in the form of 67 propositions, which were to form the subject of discussion. The celebrated John Faber, the vicar-general of the bishop of Constance, refused to discuss any of Zwingli's propositions save the last one, which denied the supreme authority of the Church, whereupon the Council of Zurich decreed that Zwingli had not been convicted of error or heresy, and ((might continue to freely announce the holy gospel and the Word of God according to the new order.® In a second dispute Zwingli urged his objections to images and the mass and the former were soon afterward removed from the churches by order of the council and the lat¬ ter abolished. In 1524 Zwingli married Anna Reinhard, a widow, and the next year pub¬ lished his commentary on «True and False Re¬ ligion.® The Reformation in Switzerland was now fixed upon a firm base; and Zwingli con¬ tinued the work with undiminished zeal, warmly supported by the cantons which es¬ poused the Protestant cause. The religious or¬ ders were suppressed and all questions of mar¬ riage were placed under the jurisdiction of the civil tribunals, as well as the administration of the Church revenues. In general, Zwingli agreed in his opinions with the German re¬ formers ; like them he assumed the Bible as the only rule of faith, rejected the Papacy, attacked the authority of the priesthood and declared that his object was to restore the Church to the simplicity of primitive times. His views dif¬ fered on some points from those of Luther, particularly in regard to the real presence, and on some less important matters relative to the liturgy. In order to remove this wall of par¬ tition from between the two parties which adopted the new doctrines, a meeting between the Saxon and Swiss reformers was held at Marburg (1-3 Oct. 1529) at the suggestion of Philip, the Landgrave of Hesse. The former were represented by Luther and Melanchthon, the latter by Zwingli and CEcolampadius. Although a complete union was not effected, yet a convention was agreed upon, the first 13 arti¬ cles of which, containing the most important matters

of religious faith, were recognized by both parties ; and the 14th declared that, though they could not agree as to the real presence of Christ in the eucharist, they would behave reciprocally in the spirit of Christian charity. In 1531 an open war broke out be¬ tween Zurich on the one side and the Catholic cantons of Lucerne, Schwyz, Uri, Unterwalden and Zug on the other; and Zwingli was commanded to take the field, bearing the ban¬ ner of the canton, which it had been usual for an ecclesiastic to support. A battle ensued at Kappel, on 11th October. But the enemy were more than twice as strong as the Ziirichers and under better officers; the latter were, therefore, defeated and Zwingli was among the slain. The spot where he fell is marked by a monu¬ ment. The Reformed Church in Switzerland afterward received from the hands of Calvin (q.v.) its present organization. The collected

works of Zwingli were published at Zurich in 1545. A complete collection of Zwingli's writ¬ ings was also published at Zurich in eight vol¬ umes in 1828. E. Zeller has attempted to de¬ duce Zwingli's doctrines from his writings, (Das theologische System Zwinglis dargestellC (Tubingen 1853). There are numerous biog¬ raphies of this reformer, for example, (Huld-reich Zwingli, sein Leben und Wirken) (1895— 97) by Stahelin. Consult also Jannsen, his¬ tory of the German People* (1903).

George E. Rines.

ZWOLLE, zwol'le, Netherlands, capital of the province of Overyssel on the Zwarte Water, 60 miles northeast of Amsterdam. Formerly it was a member of the Hanseatic League and was a strong fortress with 11 bastions and three forts. It is a well-built city, with hand¬ some boulevards on the site of its ancient ramparts, and three fine suburbs. Its corn market is one of the best in Holland. Its chief buildings are Saint Michael's Church, dating from the 15th century, a large and splendid building with a famous organ; the government buildings with the provincial archives; the town-hall, dating from 1448, but since remod¬ eled; and the courts of justice. The town has a Latin school, a school of navigation, an in¬ dustrial school, a public library with rare works on geography and local history, a mu¬ seum of natural history, a theatre, *etc.* Zwolle has communication with the sea by means of the Willemsvaart Canal and is the centre of the northern and eastern canal systems of the Netherlands. It manufactures oil, spirits, iron goods and linens, carries on shipbuilding and a trade in corn and cattle. In a monastery in the neighborhood Thomas a Kempis lived and died. Pop.

34,224.

XYLONITE, XYLONITE, same as cellu¬ loid. See Celluloid.

ZYLONITE, a material made by treating cellulose or vegetable fibre with nitric and sul¬ phuric acids, dissolving the resulting pulp in camphor and then drying it. In its liquid state, collodion, it was used in surgical operations as early as 1848; in 1855 zylonite was manufac¬ tured by Alexander Parkes of Birmingham, England, and put on the market as parkesine. About the same time several factories for the manufacture of zylonite were established in France and Germany, England and the United States. In 1869 celluloid (q.v.), a kind of zylo¬ nite, was first manufactured and has entirely superseded all other forms of zylonite.

ZYMOTIC DISEASE, any disease caused and continued by a living germ introduced from without into the body and there multi¬ plied. The term was formerly applied to epi¬ demic and endemic contagious diseases because they were supposed to be produced by some morbific principle acting on the system like a ferment (Greek Cf'^). The chief of such dis¬ eases include measles, scarlet fever, smallpox, typhus, diphtheria, whooping-cough, croup and erysipelas (qq.v.). With the development of present theories and scientific knowledge of in¬ fectious disease, the term zymotic has been al¬ most abandoned. See Bacteriology; Dis¬ ease, Germ Theory of; Malaria; Nosology.

/

■ ‘

-

-

* •: , . J Hu

,

.

* . .

/ H \

mj

i®g

jh

t/

/

*»’